

THE NAUTICAL ALMANAC

2026

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Original concept from: Enno RODEGERDTS

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Disclaimer: These are computer generated tables - use them at your own risk. The accuracy has been randomly checked with JPL HORIZONS System, but cannot be guaranteed. The author claims no liability for any consequences arising from use of these tables. Besides, this publication only contains the 'daily pages' of the Nautical Almanac: an official version of the Nautical Almanac is indispensable.

Information in the data page footers

Information pertaining to the IERS EOP data has been added to the odd data page footers if using MiKTeX or TeX Live (2020 or later). The International Earth Rotation Service (IERS) provides accurate data (updated weekly) on the Earth Orientation Parameters (EOP).

Earth's speed of rotation is not constant, i.e. the day length fluctuates.¹ This is due to *internal torques* caused by relative movements and mass redistribution of Earth's core, mantle, oceans, atmosphere, and cryosphere. This has an immediate impact on the GHA values of all celestial objects.

The IERS monitors and measures several parameters taking the actual speed of Earth's rotation into account. Their measured data begins on 2nd January 1973. Predictive data begins following the last day of (obtained) data and extends about 360 days into the future. (The IERS results are published with a delay of about 18-hours between the date of publication and the last available date with measured EOP.²) These Nautical Almanac daily pages take the (measured or predicted) UT1-UTC values into account providing highly accurate navigational data especially if the predictions are fairly recent.

As long as either measured or predicted data is available the footer will show:

[IERS Earth Orientation data as of dd-mmm-yyyy](#)

This indicates that IERS EOP data is in use - older dates are measured; newer dates are predictions.

If the final date of IERS prediction data is on the current data page, the footer shows:

[IERS Earth Orientation predictions end dd-mmm-yyyy](#)

Pages with dates beyond the final date of IERS prediction data have the following footer:

[No IERS EOP prediction data available](#)

Skyfield then defaults to using the ΔT and leap second files that ship with Skyfield internally.

The footers mentioned are only displayed as long as `'useIERS = True'` is set in `config.py` to enable use of IERS EOP data.

Brief historical overview

The story begins with the XEphem astronomical library, which is declared 'end of life' by its author, Elwood Charles Downey, as no further updates are planned. He generously gave permission for use of XEphem code in Ephem (also known as Pyephem), an astronomical library authored by Brandon Rhodes. Enno Rodergerdts (<https://sv-inua.net/>) created the original Nautical Almanac 'daily pages' in Pyalmanac using Python 2 and LaTeX. After contacting him I obtained permission for its future enhancement and maintenance. Pyalmanac uses Ephem.

Meanwhile Brandon Rhodes was working on a far more sophisticated astronomical library, Skyfield. This was 'state of the art' and clearly surpassed the 'Jean Meeus'-based Pyephem/Ephem. Skyfield uses NASA's NAIF (Navigation and Ancillary Information Facility) SPICE algorithms. The results agree with those from the HORIZONS System (*operated by NASA JPL (Jet Propulsion Laboratory) SSD (Solar System Dynamics) group, not by NAIF*). This in turn implies that celestial positions calculated by Skyfield agree with those generated by the United States Naval Observatory and their *Astronomical Almanac* to within 0.0005 arcseconds (half a milliarcsecond).

Pyephem was then in 'maintenance mode'. Clearly Pyalmanac needed adaptation to use Skyfield, and thus SFalmanac was born. However its performance was poor regarding the calculation of 'events' such as: sunrise, sunset, moonrise, moonset, civil twilight start/end and nautical twilight start/end. An interim (faster) solution was required.

A hybrid application, originally named Skyalmanac, was developed using Ephem to calculate 'events' and Skyfield for the rest. This was indeed much faster at the cost of poorer 'event time' data. It took a while to find a better solution: multiprocessing, which was built into SFalmanac. This now could compare to the execution times in Pyalmanac but with improved data.

New functionality was added to SFalmanac, e.g. lunar phase as a graphic; Lunar Distance tables and charts. The original Skyalmanac is deprecated and has now been replaced with the latest SFalmanac code, so Skyalmanac and SFalmanac are now identical apart from the name. Since April 2019 <http://thenauticalalmanac.com> has been publishing Celestial Navigation related material with software provided here.

¹https://en.wikipedia.org/wiki/Day_length_fluctuations

²<https://hpiers.obspm.fr/eoppc/bul/bulb/explanatory.html>

January 01, 02, 03 UT (Thu., Fri., Sat.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|--|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|
| Thu | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 100°39.7 | | 180°36.3 | S23°37.3 | 176°47.0 | S23°43.2 | 347°32.3 | N21°58.7 | 103°16.9 | S03°35.8 |
| 1 | 115°42.2 | | 195°35.4 | 37.2 | 191°47.3 | 43.0 | 2°35.1 | 58.8 | 118°19.2 | 35.7 |
| 2 | 130°44.7 | | 210°34.4 | 37.1 | 206°47.7 | 42.9 | 17°37.9 | 58.9 | 133°21.5 | 35.7 |
| 3 | 145°47.1 | | 225°33.4 | · · 37.0 | 221°48.1 | · · 42.7 | 32°40.7 | · · 58.9 | 148°23.9 | · · 35.6 |
| 4 | 160°49.6 | | 240°32.5 | 36.8 | 236°48.5 | 42.5 | 47°43.5 | 59.0 | 163°26.2 | 35.5 |
| 5 | 175°52.1 | | 255°31.5 | 36.7 | 251°48.9 | 42.4 | 62°46.3 | 59.0 | 178°28.5 | 35.5 |
| 6 | 190°54.5 | | 270°30.5 | S23°36.6 | 266°49.2 | S23°42.2 | 77°49.1 | N21°59.1 | 193°30.9 | S03°35.4 |
| 7 | 205°57.0 | | 285°29.6 | 36.4 | 281°49.6 | 42.0 | 92°52.0 | 59.1 | 208°33.2 | 35.3 |
| 8 | 220°59.4 | | 300°28.6 | 36.3 | 296°50.0 | 41.8 | 107°54.8 | 59.2 | 223°35.5 | 35.3 |
| 9 | 236°01.9 | | 315°27.6 | · · 36.2 | 311°50.4 | · · 41.7 | 122°57.6 | · · 59.3 | 238°37.9 | · · 35.2 |
| 10 | 251°04.4 | | 330°26.7 | 36.0 | 326°50.8 | 41.5 | 138°00.4 | 59.3 | 253°40.2 | 35.1 |
| 11 | 266°06.8 | | 345°25.7 | 35.9 | 341°51.1 | 41.3 | 153°03.2 | 59.4 | 268°42.5 | 35.1 |
| 12 | 281°09.3 | | 0°24.7 | S23°35.7 | 356°51.5 | S23°41.2 | 168°06.0 | N21°59.4 | 283°44.9 | S03°35.0 |
| 13 | 296°11.8 | | 15°23.8 | 35.6 | 11°51.9 | 41.0 | 183°08.8 | 59.5 | 298°47.2 | 34.9 |
| 14 | 311°14.2 | | 30°22.8 | 35.5 | 26°52.3 | 40.8 | 198°11.6 | 59.5 | 313°49.5 | 34.9 |
| 15 | 326°16.7 | | 45°21.8 | · · 35.3 | 41°52.7 | · · 40.6 | 213°14.4 | · · 59.6 | 328°51.9 | · · 34.8 |
| 16 | 341°19.2 | | 60°20.9 | 35.2 | 56°53.0 | 40.5 | 228°17.3 | 59.7 | 343°54.2 | 34.7 |
| 17 | 356°21.6 | | 75°19.9 | 35.0 | 71°53.4 | 40.3 | 243°20.1 | 59.7 | 358°56.5 | 34.7 |
| 18 | 11°24.1 | | 90°18.9 | S23°34.9 | 86°53.8 | S23°40.1 | 258°22.9 | N21°59.8 | 13°58.9 | S03°34.6 |
| 19 | 26°26.6 | | 105°18.0 | 34.7 | 101°54.2 | 39.9 | 273°25.7 | 59.8 | 29°01.2 | 34.5 |
| 20 | 41°29.0 | | 120°17.0 | 34.6 | 116°54.6 | 39.8 | 288°28.5 | 59.9 | 44°03.5 | 34.5 |
| 21 | 56°31.5 | | 135°16.0 | · · 34.4 | 131°54.9 | · · 39.6 | 303°31.3 | 21°59.9 | 59°05.8 | · · 34.4 |
| 22 | 71°33.9 | | 150°15.1 | 34.3 | 146°55.3 | 39.4 | 318°34.1 | 22°00.0 | 74°08.2 | 34.3 |
| 23 | 86°36.4 | | 165°14.1 | 34.1 | 161°55.7 | 39.2 | 333°37.0 | 00.1 | 89°10.5 | 34.3 |
| Mer.pass. 17:15 | | | ν-1.0' d-0.1' m-3.90 | | ν0.4' d-0.2' m1.12 | | ν2.8' d0.1' m-2.67 | | ν2.3' d-0.1' m1.01 | |
| Fri | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 101°38.9 | | 180°13.2 | S23°34.0 | 176°56.1 | S23°39.1 | 348°39.8 | N22°00.1 | 104°12.8 | S03°34.2 |
| 1 | 116°41.3 | | 195°12.2 | 33.8 | 191°56.5 | 38.9 | 3°42.6 | 00.2 | 119°15.2 | 34.1 |
| 2 | 131°43.8 | | 210°11.2 | 33.7 | 206°56.8 | 38.7 | 18°45.4 | 00.2 | 134°17.5 | 34.1 |
| 3 | 146°46.3 | | 225°10.3 | · · 33.5 | 221°57.2 | · · 38.5 | 33°48.2 | · · 00.3 | 149°19.8 | · · 34.0 |
| 4 | 161°48.7 | | 240°09.3 | 33.3 | 236°57.6 | 38.3 | 48°51.0 | 00.3 | 164°22.2 | 33.9 |
| 5 | 176°51.2 | | 255°08.3 | 33.2 | 251°58.0 | 38.2 | 63°53.8 | 00.4 | 179°24.5 | 33.9 |
| 6 | 191°53.7 | | 270°07.4 | S23°33.0 | 266°58.4 | S23°38.0 | 78°56.6 | N22°00.5 | 194°26.8 | S03°33.8 |
| 7 | 206°56.1 | | 285°06.4 | 32.8 | 281°58.7 | 37.8 | 93°59.5 | 00.5 | 209°29.1 | 33.7 |
| 8 | 221°58.6 | | 300°05.4 | 32.7 | 296°59.1 | 37.6 | 109°02.3 | 00.6 | 224°31.5 | 33.7 |
| 9 | 237°01.1 | | 315°04.5 | · · 32.5 | 311°59.5 | · · 37.4 | 124°05.1 | · · 00.6 | 239°33.8 | · · 33.6 |
| 10 | 252°03.5 | | 330°03.5 | 32.3 | 326°59.9 | 37.2 | 139°07.9 | 00.7 | 254°36.1 | 33.5 |
| 11 | 267°06.0 | | 345°02.5 | 32.2 | 342°00.3 | 37.1 | 154°10.7 | 00.7 | 269°38.5 | 33.5 |
| 12 | 282°08.4 | | 0°01.6 | S23°32.0 | 357°00.6 | S23°36.9 | 169°13.5 | N22°00.8 | 284°40.8 | S03°33.4 |
| 13 | 297°10.9 | | 15°00.6 | 31.8 | 12°01.0 | 36.7 | 184°16.3 | 00.9 | 299°43.1 | 33.3 |
| 14 | 312°13.4 | | 29°59.7 | 31.7 | 27°01.4 | 36.5 | 199°19.2 | 00.9 | 314°45.4 | 33.3 |
| 15 | 327°15.8 | | 44°58.7 | · · 31.5 | 42°01.8 | · · 36.3 | 214°22.0 | · · 01.0 | 329°47.8 | · · 33.2 |
| 16 | 342°18.3 | | 59°57.7 | 31.3 | 57°02.2 | 36.1 | 229°24.8 | 01.0 | 344°50.1 | 33.1 |
| 17 | 357°20.8 | | 74°56.8 | 31.1 | 72°02.5 | 36.0 | 244°27.6 | 01.1 | 359°52.4 | 33.0 |
| 18 | 12°23.2 | | 89°55.8 | S23°31.0 | 87°02.9 | S23°35.8 | 259°30.4 | N22°01.1 | 14°54.8 | S03°33.0 |
| 19 | 27°25.7 | | 104°54.8 | 30.8 | 102°03.3 | 35.6 | 274°33.2 | 01.2 | 29°57.1 | 32.9 |
| 20 | 42°28.2 | | 119°53.9 | 30.6 | 117°03.7 | 35.4 | 289°36.0 | 01.3 | 44°59.4 | 32.8 |
| 21 | 57°30.6 | | 134°52.9 | · · 30.4 | 132°04.1 | · · 35.2 | 304°38.9 | · · 01.3 | 60°01.7 | · · 32.8 |
| 22 | 72°33.1 | | 149°52.0 | 30.2 | 147°04.4 | 35.0 | 319°41.7 | 01.4 | 75°04.1 | 32.7 |
| 23 | 87°35.6 | | 164°51.0 | 30.1 | 162°04.8 | 34.8 | 334°44.5 | 01.4 | 90°06.4 | 32.6 |
| Mer.pass. 17:11 | | | ν-1.0' d-0.2' m-3.90 | | ν0.4' d-0.2' m1.12 | | ν2.8' d0.1' m-2.67 | | ν2.3' d-0.1' m1.01 | |
| Sat | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 102°38.0 | | 179°50.0 | S23°29.9 | 177°05.2 | S23°34.6 | 349°47.3 | N22°01.5 | 105°08.7 | S03°32.6 |
| 1 | 117°40.5 | | 194°49.1 | 29.7 | 192°05.6 | 34.4 | 4°50.1 | 01.5 | 120°11.0 | 32.5 |
| 2 | 132°42.9 | | 209°48.1 | 29.5 | 207°06.0 | 34.3 | 19°52.9 | 01.6 | 135°13.4 | 32.4 |
| 3 | 147°45.4 | | 224°47.2 | · · 29.3 | 222°06.3 | · · 34.1 | 34°55.8 | · · 01.7 | 150°15.7 | · · 32.4 |
| 4 | 162°47.9 | | 239°46.2 | 29.1 | 237°06.7 | 33.9 | 49°58.6 | 01.7 | 165°18.0 | 32.3 |
| 5 | 177°50.3 | | 254°45.2 | 28.9 | 252°07.1 | 33.7 | 65°01.4 | 01.8 | 180°20.3 | 32.2 |
| 6 | 192°52.8 | | 269°44.3 | S23°28.7 | 267°07.5 | S23°33.5 | 80°04.2 | N22°01.8 | 195°22.7 | S03°32.2 |
| 7 | 207°55.3 | | 284°43.3 | 28.5 | 282°07.9 | 33.3 | 95°07.0 | 01.9 | 210°25.0 | 32.1 |
| 8 | 222°57.7 | | 299°42.4 | 28.3 | 297°08.2 | 33.1 | 110°09.8 | 01.9 | 225°27.3 | 32.0 |
| 9 | 238°00.2 | | 314°41.4 | · · 28.1 | 312°08.6 | · · 32.9 | 125°12.7 | · · 02.0 | 240°29.6 | · · 32.0 |
| 10 | 253°02.7 | | 329°40.4 | 27.9 | 327°09.0 | 32.7 | 140°15.5 | 02.1 | 255°32.0 | 31.9 |
| 11 | 268°05.1 | | 344°39.5 | 27.7 | 342°09.4 | 32.5 | 155°18.3 | 02.1 | 270°34.3 | 31.8 |
| 12 | 283°07.6 | | 359°38.5 | S23°27.5 | 357°09.8 | S23°32.3 | 170°21.1 | N22°02.2 | 285°36.6 | S03°31.7 |
| 13 | 298°10.1 | | 14°37.6 | 27.3 | 12°10.2 | 32.1 | 185°23.9 | 02.2 | 300°38.9 | 31.7 |
| 14 | 313°12.5 | | 29°36.6 | 27.1 | 27°10.5 | 31.9 | 200°26.7 | 02.3 | 315°41.3 | 31.6 |
| 15 | 328°15.0 | | 44°35.6 | · · 26.9 | 42°10.9 | · · 31.7 | 215°29.6 | · · 02.3 | 330°43.6 | · · 31.5 |
| 16 | 343°17.4 | | 59°34.7 | 26.7 | 57°11.3 | 31.5 | 230°32.4 | 02.4 | 345°45.9 | 31.5 |
| 17 | 358°19.9 | | 74°33.7 | 26.5 | 72°11.7 | 31.4 | 245°35.2 | 02.5 | 0°48.2 | 31.4 |
| 18 | 13°22.4 | | 89°32.8 | S23°26.3 | 87°12.1 | S23°31.2 | 260°38.0 | N22°02.5 | 15°50.6 | S03°31.3 |
| 19 | 28°24.8 | | 104°31.8 | 26.1 | 102°12.4 | 31.0 | 275°40.8 | 02.6 | 30°52.9 | 31.3 |
| 20 | 43°27.3 | | 119°30.9 | 25.9 | 117°12.8 | 30.8 | 290°43.6 | 02.6 | 45°55.2 | 31.2 |
| 21 | 58°29.8 | | 134°29.9 | · · 25.7 | 132°13.2 | · · 30.6 | 305°46.5 | · · 02.7 | 60°57.5 | · · 31.1 |
| 22 | 73°32.2 | | 149°28.9 | 25.5 | 147°13.6 | 30.4 | 320°49.3 | 02.7 | 75°59.9 | 31.1 |
| 23 | 88°34.7 | | 164°28.0 | 25.3 | 162°14.0 | 30.2 | 335°52.1 | 02.8 | 91°02.2 | 31.0 |
| Mer.pass. 17:07 | | | ν-1.0' d-0.2' m-3.90 | | ν0.4' d-0.2' m1.11 | | ν2.8' d0.1' m-2.67 | | ν2.3' d-0.1' m1.01 | |

| Stars | | |
|-------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°34.0 | 29°14.2 |
| Ankaa | 353°06.4 | -42°10.1 |
| Schedar | 349°30.1 | 56°41.1 |
| Diphda | 348°46.5 | -17°50.7 |
| Achernar | 335°19.4 | -57°06.5 |
| Hamal | 327°50.1 | 23°35.3 |
| Polaris | 313°17.9 | 89°22.7 |
| Acamar | 315°10.9 | -40°12.2 |
| Menkar | 314°05.1 | 4°11.5 |
| Mirfak | 308°26.7 | 49°57.4 |
| Aldebaran | 290°38.4 | 16°33.7 |
| Rigel | 281°02.8 | -8°10.3 |
| Capella | 280°20.2 | 46°01.5 |
| Bellatrix | 278°21.7 | 6°22.4 |
| Elnath | 278°00.5 | 28°37.8 |
| Alnilam | 275°36.6 | -1°11.1 |
| Betelgeuse | 270°50.9 | 7°24.7 |
| Canopus | 263°51.5 | -52°42.6 |
| Sirius | 258°25.2 | -16°45.1 |
| Adhara | 255°04.8 | -29°00.4 |
| Procyon | 244°49.6 | 5°09.5 |
| Pollux | 243°15.9 | 27°57.7 |
| Avior | 234°13.8 | -59°35.4 |
| Suhail | 222°45.3 | -43°32.1 |
| Miaplacidus | 221°37.3 | -69°49.2 |
| Alphard | 217°46.7 | -8°46.3 |
| Regulus | 207°33.4 | 11°50.3 |
| Dubhe | 193°39.7 | 61°36.3 |
| Denebola | 182°24.0 | 14°25.5 |
| Gienah | 175°42.7 | -17°41.1 |
| Acrux | 172°59.1 | -63°14.3 |
| Gacrux | 171°50.7 | -57°15.3 |
| Alioth | 166°12.3 | 55°48.8 |
| Spica | 158°21.5 | -11°17.8 |
| Alkaid | 152°51.5 | 49°10.7 |
| Hadar | 148°35.1 | -60°29.7 |
| Menkent | 147°56.8 | -36°29.7 |
| Arcturus | 145°47.3 | 19°02.6 |
| Rigel Kent. | 139°39.5 | -60°56.3 |
| Kochab | 137°20.5 | 74°02.5 |
| Zuben'ubi | 136°55.3 | -16°09.0 |
| Alphecca | 126°03.3 | 26°37.4 |
| Antares | 112°15.2 | -26°29.3 |
| Atria | 107°09.2 | -69°04.3 |
| Sabik | 102°02.2 | -15°45.4 |
| Shaula | 96°09.7 | -37°07.3 |
| Rasalhague | 95°58.1 | 12°32.4 |
| Eltanin | 90°42.3 | 51°29.0 |
| Kaus Aust. | 83°31.8 | -34°22.3 |
| Vega | 80°33.1 | 38°48.4 |
| Nunki | 75°47.1 | -26°15.9 |
| Altair | 61°59.5 | 8°56.2 |
| Peacock | 53°05.0 | -56°39.2 |
| Deneb | 49°25.7 | 45°22.5 |
| Enif | 33°38.2 | 9°59.7 |
| Al Na'ir | 27°32.2 | -46°50.3 |
| Fomalhaut | 15°13.8 | -29°29.2 |
| Scheat | 13°44.6 | 28°13.6 |
| Markab | 13°29.2 | 15°20.8 |

| Jan 01 Thu | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 79°56.6 | 11:58 |
| Mars | 76°07.2 | 12:13 |
| Jupiter | 246°52.5 | 00:50 |
| Saturn | 2°37.1 | 17:04 |

| Jan 02 Fri | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 78°34.3 | 12:00 |
| Mars | 75°17.2 | 12:12 |
| Jupiter | 247°00.9 | 00:45 |
| Saturn | 2°34.0 | 17:01 |

| Jan 03 Sat | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 77°12.0 | 12:01 |
| Mars | 74°27.2 | 12:11 |
| Jupiter | 247°09.3 | 00:41 |
| Saturn | 2°30.7 | 16:57 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.1 |
| Mars: | 0.1 |

| h | | Sun | | Moon | | | |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 179°10.1 | S23°01.0 | 36°44.5 | 2.4' | N26°24.2 | 6.7' | 60.7' |
| 1 | 194°09.8 | 00.8 | 51°06.0 | 2.3' | 26°30.9 | 6.5' | 60.7' |
| 2 | 209°09.5 | 00.6 | 65°27.3 | 2.3' | 26°37.4 | 6.3' | 60.7' |
| 3 | 224°09.2 | 00.4 | 79°48.6 | 2.2' | 26°43.7 | 6.1' | 60.7' |
| 4 | 239°08.9 | 00.2 | 94°09.7 | 2.1' | 26°49.8 | 5.9' | 60.7' |
| 5 | 254°08.6 | 23°00.0 | 108°30.8 | 2.0' | 26°55.7 | 5.7' | 60.7' |
| 6 | 269°08.3 | S22°59.8 | 122°51.8 | 1.9' | N27°01.5 | 5.5' | 60.7' |
| 7 | 284°08.0 | 59.6 | 137°12.7 | 1.8' | 27°07.0 | 5.3' | 60.7' |
| 8 | 299°07.7 | 59.4 | 151°33.5 | 1.8' | 27°12.3 | 5.1' | 60.7' |
| 9 | 314°07.4 | 59.2 | 165°54.3 | 1.7' | 27°17.4 | 4.9' | 60.7' |
| 10 | 329°07.1 | 59.0 | 180°14.9 | 1.6' | 27°22.3 | 4.7' | 60.7' |
| 11 | 344°06.8 | 58.8 | 194°35.6 | 1.5' | 27°27.0 | 4.5' | 60.7' |
| 12 | 359°06.5 | S22°58.6 | 208°56.1 | 1.5' | N27°31.4 | 4.3' | 60.7' |
| 13 | 14°06.2 | 58.3 | 223°16.6 | 1.4' | 27°35.7 | 4.1' | 60.8' |
| 14 | 29°05.9 | 58.1 | 237°37.0 | 1.4' | 27°39.8 | 3.9' | 60.8' |
| 15 | 44°05.6 | 57.9 | 251°57.3 | 1.3' | 27°43.6 | 3.6' | 60.8' |
| 16 | 59°05.4 | 57.7 | 266°17.6 | 1.2' | 27°47.3 | 3.4' | 60.8' |
| 17 | 74°05.1 | 57.5 | 280°37.9 | 1.2' | 27°50.7 | 3.2' | 60.8' |
| 18 | 89°04.8 | S22°57.3 | 294°58.1 | 1.2' | N27°53.9 | 3.0' | 60.8' |
| 19 | 104°04.5 | 57.1 | 309°18.2 | 1.1' | 27°56.9 | 2.8' | 60.8' |
| 20 | 119°04.2 | 56.8 | 323°38.3 | 1.1' | 27°59.7 | 2.6' | 60.8' |
| 21 | 134°03.9 | 56.6 | 337°58.4 | 1.0' | 28°02.2 | 2.3' | 60.8' |
| 22 | 149°03.6 | 56.4 | 352°18.5 | 1.0' | 28°04.6 | 2.1' | 60.8' |
| 23 | 164°03.3 | 56.2 | 6°38.5 | 1.0' | 28°06.7 | 1.9' | 60.8' |
| SD = 16.3' $d = -0.2'$ | | | SD = 16.5' | | | | |
| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 179°03.0 | S22°56.0 | 20°58.4 | 1.0' | N28°08.6 | 1.7' | 60.8' |
| 1 | 194°02.7 | 55.7 | 35°18.4 | 0.9' | 28°10.3 | 1.5' | 60.8' |
| 2 | 209°02.4 | 55.5 | 49°38.3 | 0.9' | 28°11.8 | 1.3' | 60.8' |
| 3 | 224°02.2 | 55.3 | 63°58.2 | 0.9' | 28°13.0 | 1.0' | 60.8' |
| 4 | 239°01.9 | 55.1 | 78°18.2 | 0.9' | 28°14.1 | 0.8' | 60.8' |
| 5 | 254°01.6 | 54.8 | 92°38.0 | 0.9' | 28°14.9 | 0.6' | 60.8' |
| 6 | 269°01.3 | S22°54.6 | 106°57.9 | 0.9' | N28°15.5 | 0.4' | 60.8' |
| 7 | 284°01.0 | 54.4 | 121°17.8 | 0.9' | 28°15.8 | 0.1' | 60.8' |
| 8 | 299°00.7 | 54.2 | 135°37.7 | 0.9' | 28°16.0 | -0.1' | 60.7' |
| 9 | 314°00.4 | 53.9 | 149°57.6 | 0.9' | 28°15.9 | -0.3' | 60.7' |
| 10 | 329°00.1 | 53.7 | 164°17.5 | 0.9' | 28°15.6 | -0.5' | 60.7' |
| 11 | 343°59.8 | 53.5 | 178°37.4 | 0.9' | 28°15.1 | -0.7' | 60.7' |
| 12 | 358°59.5 | S22°53.3 | 192°57.3 | 0.9' | N28°14.4 | -0.9' | 60.7' |
| 13 | 13°59.3 | 53.0 | 207°17.3 | 1.0' | 28°13.4 | -1.2' | 60.7' |
| 14 | 28°59.0 | 52.8 | 221°37.3 | 1.0' | 28°12.3 | -1.4' | 60.7' |
| 15 | 43°58.7 | 52.6 | 235°57.3 | 1.0' | 28°10.9 | -1.6' | 60.7' |
| 16 | 58°58.4 | 52.3 | 250°17.3 | 1.1' | 28°09.3 | -1.8' | 60.7' |
| 17 | 73°58.1 | 52.1 | 264°37.4 | 1.1' | 28°07.4 | -2.0' | 60.7' |
| 18 | 88°57.8 | S22°51.9 | 278°57.5 | 1.1' | N28°05.4 | -2.3' | 60.7' |
| 19 | 103°57.5 | 51.6 | 293°17.6 | 1.2' | 28°03.1 | -2.5' | 60.7' |
| 20 | 118°57.2 | 51.4 | 307°37.8 | 1.2' | 28°00.7 | -2.7' | 60.6' |
| 21 | 133°56.9 | 51.1 | 321°58.0 | 1.3' | 27°58.0 | -2.9' | 60.6' |
| 22 | 148°56.7 | 50.9 | 336°18.3 | 1.3' | 27°55.1 | -3.1' | 60.6' |
| 23 | 163°56.4 | 50.7 | 350°38.7 | 1.4' | 27°52.0 | -3.3' | 60.6' |
| SD = 16.3' $d = -0.2'$ | | | SD = 16.6' | | | | |
| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°56.1 | S22°50.4 | 4°59.1 | 1.5' | N27°48.6 | -3.5' | 60.6' |
| 1 | 193°55.8 | 50.2 | 19°19.5 | 1.5' | 27°45.1 | -3.7' | 60.6' |
| 2 | 208°55.5 | 49.9 | 33°40.1 | 1.6' | 27°41.4 | -4.0' | 60.6' |
| 3 | 223°55.2 | 49.7 | 48°00.7 | 1.7' | 27°37.4 | -4.2' | 60.6' |
| 4 | 238°54.9 | 49.5 | 62°21.3 | 1.7' | 27°33.2 | -4.4' | 60.5' |
| 5 | 253°54.6 | 49.2 | 76°42.1 | 1.8' | 27°28.9 | -4.6' | 60.5' |
| 6 | 268°54.4 | S22°49.0 | 91°02.9 | 1.9' | N27°24.3 | -4.8' | 60.5' |
| 7 | 283°54.1 | 48.7 | 105°23.8 | 2.0' | 27°19.5 | -5.0' | 60.5' |
| 8 | 298°53.8 | 48.5 | 119°44.8 | 2.1' | 27°14.5 | -5.2' | 60.5' |
| 9 | 313°53.5 | 48.2 | 134°05.9 | 2.2' | 27°09.3 | -5.4' | 60.5' |
| 10 | 328°53.2 | 48.0 | 148°27.0 | 2.3' | 27°04.0 | -5.6' | 60.4' |
| 11 | 343°52.9 | 47.7 | 162°48.3 | 2.3' | 26°58.4 | -5.8' | 60.4' |
| 12 | 358°52.6 | S22°47.5 | 177°09.6 | 2.4' | N26°52.6 | -6.0' | 60.4' |
| 13 | 13°52.4 | 47.2 | 191°31.1 | 2.5' | 26°46.6 | -6.2' | 60.4' |
| 14 | 28°52.1 | 47.0 | 205°52.6 | 2.6' | 26°40.5 | -6.4' | 60.4' |
| 15 | 43°51.8 | 46.7 | 220°14.3 | 2.8' | 26°34.1 | -6.5' | 60.3' |
| 16 | 58°51.5 | 46.5 | 234°36.0 | 2.9' | 26°27.6 | -6.7' | 60.3' |
| 17 | 73°51.2 | 46.2 | 248°57.9 | 3.0' | 26°20.8 | -6.9' | 60.3' |
| 18 | 88°50.9 | S22°46.0 | 263°19.8 | 3.1' | N26°13.9 | -7.1' | 60.3' |
| 19 | 103°50.7 | 45.7 | 277°41.9 | 3.2' | 26°06.8 | -7.3' | 60.3' |
| 20 | 118°50.4 | 45.5 | 292°04.1 | 3.3' | 25°59.5 | -7.5' | 60.2' |
| 21 | 133°50.1 | 45.2 | 306°26.4 | 3.4' | 25°52.1 | -7.6' | 60.2' |
| 22 | 148°49.8 | 45.0 | 320°48.8 | 3.5' | 25°44.4 | -7.8' | 60.2' |
| 23 | 163°49.5 | 44.7 | 335°11.4 | 3.7' | 25°36.6 | -8.0' | 60.2' |
| SD = 16.3' $d = -0.2'$ | | | SD = 16.5' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 08:23 | 10:39 | ■ | ■ | 13:29 | 15:46 |
| N 70° | 08:04 | 09:48 | ■ | ■ | 14:21 | 16:04 |
| 68° | 07:49 | 09:16 | ■ | ■ | 14:53 | 16:19 |
| 66° | 07:37 | 08:52 | 10:26 | 13:42 | 15:16 | 16:32 |
| 64° | 07:26 | 08:34 | 09:48 | 14:20 | 15:35 | 16:42 |
| 62° | 07:17 | 08:18 | 09:22 | 14:46 | 15:50 | 16:51 |
| 60° | 07:09 | 08:05 | 09:02 | 15:07 | 16:03 | 16:59 |
| N 58° | 07:02 | 07:54 | 08:45 | 15:23 | 16:14 | 17:06 |
| 56° | 06:55 | 07:44 | 08:31 | 15:37 | 16:24 | 17:13 |
| 54° | 06:50 | 07:35 | 08:19 | 15:50 | 16:33 | 17:19 |
| 52° | 06:44 | 07:27 | 08:08 | 16:00 | 16:41 | 17:24 |
| 50° | 06:39 | 07:20 | 07:58 | 16:10 | 16:48 | 17:29 |
| 45° | 06:28 | 07:05 | 07:38 | 16:30 | 17:04 | 17:41 |
| N 40° | 06:18 | 06:52 | 07:22 | 16:46 | 17:17 | 17:51 |
| 35° | 06:09 | 06:40 | 07:08 | 17:00 | 17:28 | 18:00 |
| 30° | 06:00 | 06:30 | 06:56 | 17:12 | 17:38 | 18:08 |
| 20° | 05:44 | 06:12 | 06:35 | 17:33 | 17:57 | 18:24 |
| N 10° | 05:28 | 05:55 | 06:17 | 17:51 | 18:14 | 18:40 |
| 0° | 05:12 | 05:38 | 06:00 | 18:08 | 18:30 | 18:56 |
| S 10° | 04:53 | 05:20 | 05:43 | 18:25 | 18:48 | 19:15 |
| 20° | 04:31 | 05:00 | 05:25 | 18:43 | 19:08 | 19:37 |
| 30° | 04:03 | 04:36 | 05:03 | 19:05 | 19:32 | 20:05 |
| 35° | 03:44 | 04:21 | 04:50 | 19:17 | 19:47 | 20:23 |
| 40° | 03:22 | 04:03 | 04:36 | 19:32 | 20:05 | 20:46 |
| 45° | 02:52 | 03:41 | 04:18 | 19:50 | 20:27 | 21:15 |
| S 50° | 02:09 | 03:12 | 03:56 | 20:11 | 20:55 | 21:58 |
| 52° | 01:43 | 02:58 | 03:46 | 20:22 | 21:10 | 22:24 |
| 54° | 01:04 | 02:41 | 03:34 | 20:34 | 21:27 | 23:02 |
| 56° | //// | 02:20 | 03:20 | 20:47 | 21:48 | //// |
| 58° | //// | 01:52 | 03:04 | 21:03 | 22:15 | //// |
| S 60° | //// | 01:09 | 02:45 | 21:23 | 22:56 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | □ | □ | □ | □ | □ | □ |
| 66° | □ | □ | □ | □ | □ | □ |
| 64° | □ | □ | □ | □ | □ | □ |
| 62° | 10:58 | □ | 13:35 | 08:53 | □ | 10:56 |
| 60° | 11:50 | 12:40 | 14:19 | 08:02 | 09:32 | 10:12 |
| N 58° | 12:21 | 13:18 | 14:48 | 07:31 | 08:55 | 09:43 |
| 56° | 12:45 | 13:44 | 15:10 | 07:07 | 08:28 | 09:20 |
| 54° | 13:05 | 14:05 | 15:28 | 06:48 | 08:07 | 09:02 |
| 52° | 13:21 | 14:23 | 15:44 | 06:32 | 07:49 | 08:46 |
| 50° | 13:36 | 14:38 | 15:57 | 06:18 | 07:34 | 08:32 |
| 45° | 14:05 | 15:08 | 16:25 | 05:49 | 07:04 | 08:04 |
| N 40° | 14:27 | 15:32 | 16:46 | 05:27 | 06:40 | 07:42 |
| 35° | 14:46 | 15:51 | 17:04 | 05:09 | 06:20 | 07:23 |
| 30° | 15:03 | 16:08 | 17:19 | 04:53 | 06:04 | 07:07 |
| 20° | 15:30 | 16:36 | 17:45 | 04:26 | 05:35 | 06:40 |
| N 10° | 15:54 | 17:01 | 18:08 | 04:03 | 05:11 | 06:17 |
| 0° | 16:16 | 17:23 | 18:29 | 03:42 | 04:48 | 05:55 |
| S 10° | 16:39 | 17:46 | 18:49 | 03:20 | 04:25 | 05:33 |
| 20° | 17:03 | 18:10 | 19:12 | 02:58 | 04:01 | 05:09 |
| 30° | 17:31 | 18:39 | 19:37 | 02:31 | 03:32 | 04:41 |
| 35° | 17:48 | 18:55 | 19:52 | 02:16 | 03:15 | 04:25 |
| 40° | 18:07 | 19:15 | 20:10 | 01:58 | 02:56 | 04:06 |
| 45° | 18:31 | 19:38 | 20:31 | 01:36 | 02:32 | 03:43 |
| S 50° | 19:01 | 20:09 | 20:57 | 01:08 | 02:01 | 03:13 |
| 52° | 19:16 | 20:24 | 21:09 | 00:55 | 01:46 | 02:58 |
| 54° | 19:34 | 20:41 | 21:24 | 00:40 | 01:28 | 02:41 |
| 56° | 19:55 | 21:02 | 21:41 | 00:22 | 01:07 | 02:20 |
| 58° | 20:23 | 21:28 | 22:01 | 00:00 | 00:39 | 01:54 |
| S 60° | 21:01 | 22:05 | 22:26 | □ | □ | 01:17 |

| Day | Sun | | Mer. Pass | Moon | | Age |
|-----|-------------------------|----------------------|-----------|-----------------|-------|-----|
| | Eqn. of 00 ^h | Time 12 ^h | | Mer. Pass Upper | Lower | |
| 01 | 03:20 | 03:34 | 12:04 | 22:32 | 09:59 | |
| 02 | 03:48 | 04:02 | 12:04 | 23:39 | 11:06 | |
| 03 | 04:16 | 04:29 | 12:04 | —:— | 12:12 | |

January 04, 05, 06 UT (Sun., Mon., Tue.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------------------|----------|----------|--------------------|----------|----------|--------------------|----------|---------|--------------------|-----|--------|--|--|
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 103°37.2 | 179°27.0 | S23°25.0 | 177°14.3 | S23°30.0 | 350°54.9 | N22°02.9 | 106°04.5 | S03°30.9 | | | | | | |
| 1 | 118°39.6 | 194°26.1 | 24.8 | 192°14.7 | 29.8 | 5°57.7 | 02.9 | 121°06.8 | 30.8 | | | | | | |
| 2 | 133°42.1 | 209°25.1 | 24.6 | 207°15.1 | 29.6 | 21°00.5 | 03.0 | 136°09.2 | 30.8 | | | | | | |
| 3 | 148°44.6 | 224°24.2 | · · 24.4 | 222°15.5 | · · 29.4 | 36°03.4 | · · 03.0 | 151°11.5 | · · 30.7 | | | | | | |
| 4 | 163°47.0 | 239°23.2 | 24.2 | 237°15.9 | 29.2 | 51°06.2 | 03.1 | 166°13.8 | 30.6 | | | | | | |
| 5 | 178°49.5 | 254°22.3 | 23.9 | 252°16.3 | 29.0 | 66°09.0 | 03.1 | 181°16.1 | 30.6 | | | | | | |
| 6 | 193°51.9 | 269°21.3 | S23°23.7 | 267°16.6 | S23°28.7 | 81°11.8 | N22°03.2 | 196°18.4 | S03°30.5 | | | | | | |
| 7 | 208°54.4 | 284°20.3 | 23.5 | 282°17.0 | 28.5 | 96°14.6 | 03.3 | 211°20.8 | 30.4 | | | | | | |
| 8 | 223°56.9 | 299°19.4 | 23.3 | 297°17.4 | 28.3 | 111°17.4 | 03.3 | 226°23.1 | 30.4 | | | | | | |
| 9 | 238°59.3 | 314°18.4 | · · 23.0 | 312°17.8 | · · 28.1 | 126°20.3 | · · 03.4 | 241°25.4 | · · 30.3 | | | | | | |
| 10 | 254°01.8 | 329°17.5 | 22.8 | 327°18.2 | 27.9 | 141°23.1 | 03.4 | 256°27.7 | 30.2 | | | | | | |
| 11 | 269°04.3 | 344°16.5 | 22.6 | 342°18.5 | 27.7 | 156°25.9 | 03.5 | 271°30.1 | 30.1 | | | | | | |
| 12 | 284°06.7 | 359°15.6 | S23°22.3 | 357°18.9 | S23°27.5 | 171°28.7 | N22°03.5 | 286°32.4 | S03°30.1 | | | | | | |
| 13 | 299°09.2 | 14°14.6 | 22.1 | 12°19.3 | 27.3 | 186°31.5 | 03.6 | 301°34.7 | 30.0 | | | | | | |
| 14 | 314°11.7 | 29°13.7 | 21.9 | 27°19.7 | 27.1 | 201°34.4 | 03.6 | 316°37.0 | 29.9 | | | | | | |
| 15 | 329°14.1 | 44°12.7 | · · 21.6 | 42°20.1 | · · 26.9 | 216°37.2 | · · 03.7 | 331°39.3 | · · 29.9 | | | | | | |
| 16 | 344°16.6 | 59°11.8 | 21.4 | 57°20.5 | 26.7 | 231°40.0 | 03.8 | 346°41.7 | 29.8 | | | | | | |
| 17 | 359°19.1 | 74°10.8 | 21.2 | 72°20.8 | 26.5 | 246°42.8 | 03.8 | 1°44.0 | 29.7 | | | | | | |
| 18 | 14°21.5 | 89°09.8 | S23°20.9 | 87°21.2 | S23°26.3 | 261°45.6 | N22°03.9 | 16°46.3 | S03°29.6 | | | | | | |
| 19 | 29°24.0 | 104°08.9 | 20.7 | 102°21.6 | 26.1 | 276°48.4 | 03.9 | 31°48.6 | 29.6 | | | | | | |
| 20 | 44°26.4 | 119°07.9 | 20.5 | 117°22.0 | 25.9 | 291°51.3 | 04.0 | 46°50.9 | 29.5 | | | | | | |
| 21 | 59°28.9 | 134°07.0 | · · 20.2 | 132°22.4 | · · 25.6 | 306°54.1 | · · 04.0 | 61°53.3 | · · 29.4 | | | | | | |
| 22 | 74°31.4 | 149°06.0 | 20.0 | 147°22.7 | 25.4 | 321°56.9 | 04.1 | 76°55.6 | 29.4 | | | | | | |
| 23 | 89°33.8 | 164°05.1 | 19.7 | 162°23.1 | 25.2 | 336°59.7 | 04.2 | 91°57.9 | 29.3 | | | | | | |
| Mer.pass. 17:03 | | ν-1.0' d-0.2' m-3.90 | | | ν0.4' d-0.2' m1.11 | | | ν2.8' d0.1' m-2.68 | | | ν2.3' d-0.1' m1.01 | | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 104°36.3 | 179°04.1 | S23°19.5 | 177°23.5 | S23°25.0 | 352°02.5 | N22°04.2 | 107°00.2 | S03°29.2 | | | | | | |
| 1 | 119°38.8 | 194°03.2 | 19.2 | 192°23.9 | 24.8 | 7°05.4 | 04.3 | 122°02.5 | 29.2 | | | | | | |
| 2 | 134°41.2 | 209°02.2 | 19.0 | 207°24.3 | 24.6 | 22°08.2 | 04.3 | 137°04.9 | 29.1 | | | | | | |
| 3 | 149°43.7 | 224°01.3 | · · 18.7 | 222°24.7 | · · 24.4 | 37°11.0 | · · 04.4 | 152°07.2 | · · 29.0 | | | | | | |
| 4 | 164°46.2 | 239°00.3 | 18.5 | 237°25.0 | 24.2 | 52°13.8 | 04.4 | 167°09.5 | 28.9 | | | | | | |
| 5 | 179°48.6 | 253°59.4 | 18.2 | 252°25.4 | 24.0 | 67°16.6 | 04.5 | 182°11.8 | 28.9 | | | | | | |
| 6 | 194°51.1 | 268°58.4 | S23°18.0 | 267°25.8 | S23°23.7 | 82°19.5 | N22°04.6 | 197°14.1 | S03°28.8 | | | | | | |
| 7 | 209°53.6 | 283°57.5 | 17.7 | 282°26.2 | 23.5 | 97°22.3 | 04.6 | 212°16.5 | 28.7 | | | | | | |
| 8 | 224°56.0 | 298°56.5 | 17.5 | 297°26.6 | 23.3 | 112°25.1 | 04.7 | 227°18.8 | 28.6 | | | | | | |
| 9 | 239°58.5 | 313°55.6 | · · 17.2 | 312°26.9 | · · 23.1 | 127°27.9 | · · 04.7 | 242°21.1 | · · 28.6 | | | | | | |
| 10 | 255°00.9 | 328°54.6 | 17.0 | 327°27.3 | 22.9 | 142°30.7 | 04.8 | 257°23.4 | 28.5 | | | | | | |
| 11 | 270°03.4 | 343°53.7 | 16.7 | 342°27.7 | 22.7 | 157°33.6 | 04.8 | 272°25.7 | 28.4 | | | | | | |
| 12 | 285°05.9 | 358°52.7 | S23°16.4 | 357°28.1 | S23°22.4 | 172°36.4 | N22°04.9 | 287°28.0 | S03°28.4 | | | | | | |
| 13 | 300°08.3 | 13°51.8 | 16.2 | 12°28.5 | 22.2 | 187°39.2 | 05.0 | 302°30.4 | 28.3 | | | | | | |
| 14 | 315°10.8 | 28°50.8 | 15.9 | 27°28.9 | 22.0 | 202°42.0 | 05.0 | 317°32.7 | 28.2 | | | | | | |
| 15 | 330°13.3 | 43°49.9 | · · 15.6 | 42°29.2 | · · 21.8 | 217°44.8 | · · 05.1 | 332°35.0 | · · 28.1 | | | | | | |
| 16 | 345°15.7 | 58°48.9 | 15.4 | 57°29.6 | 21.6 | 232°47.7 | 05.1 | 347°37.3 | 28.1 | | | | | | |
| 17 | 0°18.2 | 73°48.0 | 15.1 | 72°30.0 | 21.4 | 247°50.5 | 05.2 | 2°39.6 | 28.0 | | | | | | |
| 18 | 15°20.7 | 88°47.0 | S23°14.8 | 87°30.4 | S23°21.1 | 262°53.3 | N22°05.2 | 17°41.9 | S03°27.9 | | | | | | |
| 19 | 30°23.1 | 103°46.1 | 14.6 | 102°30.8 | 20.9 | 277°56.1 | 05.3 | 32°44.3 | 27.9 | | | | | | |
| 20 | 45°25.6 | 118°45.1 | 14.3 | 117°31.2 | 20.7 | 292°58.9 | 05.4 | 47°46.6 | 27.8 | | | | | | |
| 21 | 60°28.0 | 133°44.2 | · · 14.0 | 132°31.5 | · · 20.5 | 308°01.8 | · · 05.4 | 62°48.9 | · · 27.7 | | | | | | |
| 22 | 75°30.5 | 148°43.3 | 13.8 | 147°31.9 | 20.3 | 323°04.6 | 05.5 | 77°51.2 | 27.6 | | | | | | |
| 23 | 90°33.0 | 163°42.3 | 13.5 | 162°32.3 | 20.0 | 338°07.4 | 05.5 | 92°53.5 | 27.6 | | | | | | |
| Mer.pass. 16:59 | | ν-1.0' d-0.2' m-3.90 | | | ν0.4' d-0.2' m1.10 | | | ν2.8' d0.1' m-2.68 | | | ν2.3' d-0.1' m1.01 | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 105°35.4 | 178°41.4 | S23°13.2 | 177°32.7 | S23°19.8 | 353°10.2 | N22°05.6 | 107°55.8 | S03°27.5 | | | | | | |
| 1 | 120°37.9 | 193°40.4 | 12.9 | 192°33.1 | 19.6 | 8°13.0 | 05.6 | 122°58.2 | 27.4 | | | | | | |
| 2 | 135°40.4 | 208°39.5 | 12.7 | 207°33.5 | 19.4 | 23°15.9 | 05.7 | 138°00.5 | 27.4 | | | | | | |
| 3 | 150°42.8 | 223°38.5 | · · 12.4 | 222°33.8 | · · 19.1 | 38°18.7 | · · 05.8 | 153°02.8 | · · 27.3 | | | | | | |
| 4 | 165°45.3 | 238°37.6 | 12.1 | 237°34.2 | 18.9 | 53°21.5 | 05.8 | 168°05.1 | 27.2 | | | | | | |
| 5 | 180°47.8 | 253°36.6 | 11.8 | 252°34.6 | 18.7 | 68°24.3 | 05.9 | 183°07.4 | 27.1 | | | | | | |
| 6 | 195°50.2 | 268°35.7 | S23°11.5 | 267°35.0 | S23°18.5 | 83°27.1 | N22°05.9 | 198°09.7 | S03°27.1 | | | | | | |
| 7 | 210°52.7 | 283°34.7 | 11.2 | 282°35.4 | 18.2 | 98°30.0 | 06.0 | 213°12.1 | 27.0 | | | | | | |
| 8 | 225°55.2 | 298°33.8 | 11.0 | 297°35.8 | 18.0 | 113°32.8 | 06.0 | 228°14.4 | 26.9 | | | | | | |
| 9 | 240°57.6 | 313°32.9 | · · 10.7 | 312°36.1 | · · 17.8 | 128°35.6 | · · 06.1 | 243°16.7 | · · 26.8 | | | | | | |
| 10 | 256°00.1 | 328°31.9 | 10.4 | 327°36.5 | 17.6 | 143°38.4 | 06.1 | 258°19.0 | 26.8 | | | | | | |
| 11 | 271°02.5 | 343°31.0 | 10.1 | 342°36.9 | 17.3 | 158°41.2 | 06.2 | 273°21.3 | 26.7 | | | | | | |
| 12 | 286°05.0 | 358°30.0 | S23°09.8 | 357°37.3 | S23°17.1 | 173°44.1 | N22°06.3 | 288°23.6 | S03°26.6 | | | | | | |
| 13 | 301°07.5 | 13°29.1 | 09.5 | 12°37.7 | 16.9 | 188°46.9 | 06.3 | 303°25.9 | 26.5 | | | | | | |
| 14 | 316°09.9 | 28°28.1 | 09.2 | 27°38.1 | 16.7 | 203°49.7 | 06.4 | 318°28.3 | 26.5 | | | | | | |
| 15 | 331°12.4 | 43°27.2 | · · 08.9 | 42°38.4 | · · 16.4 | 218°52.5 | · · 06.4 | 333°30.6 | · · 26.4 | | | | | | |
| 16 | 346°14.9 | 58°26.3 | 08.6 | 57°38.8 | 16.2 | 233°55.4 | 06.5 | 348°32.9 | 26.3 | | | | | | |
| 17 | 1°17.3 | 73°25.3 | 08.3 | 72°39.2 | 16.0 | 248°58.2 | 06.5 | 3°35.2 | 26.3 | | | | | | |
| 18 | 16°19.8 | 88°24.4 | S23°08.0 | 87°39.6 | S23°15.7 | 264°01.0 | N22°06.6 | 18°37.5 | S03°26.2 | | | | | | |
| 19 | 31°22.3 | 103°23.4 | 07.7 | 102°40.0 | 15.5 | 279°03.8 | 06.7 | 33°39.8 | 26.1 | | | | | | |
| 20 | 46°24.7 | 118°22.5 | 07.4 | 117°40.4 | 15.3 | 294°06.6 | 06.7 | 48°42.1 | 26.0 | | | | | | |
| 21 | 61°27.2 | 133°21.5 | · · 07.1 | 132°40.7 | · · 15.0 | 309°09.5 | · · 06.8 | 63°44.5 | · · 26.0 | | | | | | |
| 22 | 76°29.7 | 148°20.6 | 06.8 | 147°41.1 | 14.8 | 324°12.3 | 06.8 | 78°46.8 | 25.9 | | | | | | |
| 23 | 91°32.1 | 163°19.7 | 06.5 | 162°41.5 | 14.6 | 339°15.1 | 06.9 | 93°49.1 | 25.8 | | | | | | |
| Mer.pass. 16:55 | | ν-0.9' d-0.3' m-3.90 | | | ν0.4' d-0.2' m1.10 | | | ν2.8' d0.1' m-2.68 | | | ν2.3' d-0.1' m1.01 | | | | |

| Stars | | |
|---------------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°34.0 | 29°14.2 |
| Ankaa | 353°06.4 | -42°10.1 |
| Schedar | 349°30.1 | 56°41.1 |
| Diphda | 348°46.5 | -17°50.7 |
| Achernar | 335°19.4 | -57°06.5 |
| Hamal | 327°50.1 | 23°35.3 |
| Polaris | 313°18.8 | 89°22.7 |
| Acamar | 315°10.9 | -40°12.2 |
| Menkar | 314°05.1 | 4°11.5 |
| Mirfak | 308°26.7 | 49°57.4 |
| Aldebaran | 290°38.4 | 16°33.7 |
| Rigel | 281°02.8 | -8°10.3 |
| Capella | 280°20.2 | 46°01.5 |
| Bellatrix | 278°21.7 | 6°22.4 |
| Elnath | 278°00.4 | 28°37.8 |
| Alnilam | 275°36.6 | -1°11.1 |
| Betelgeuse | 270°50.8 | 7°24.7 |
| Canopus | 263°51.5 | -52°42.6 |
| Sirius | 258°25.1 | -16°45.1 |
| Adhara | 255°04.8 | -29°00.4 |
| Procyon | 244°49.6 | 5°09.4 |
| Pollux | 243°15.9 | 27°57.7 |
| Avior | 234°13.8 | -59°35.4 |
| Suhail | 222°45.3 | -43°32.1 |
| Miaplacidus | 221°37.3 | -69°49.2 |
| Alphard | 217°46.7 | -18°46.3 |
| Regulus | 207°33.3 | 11°50.3 |
| Dubhe | 193°39.7 | 61°36.3 |
| Denebola | 182°24.0 | 14°25.4 |
| Gienah | 175°42.7 | -17°41.2 |
| Acrux | 172°59.1 | -63°14.3 |
| Gacrux | 171°50.7 | -57°15.3 |
| Alioth | 166°12.2 | 55°48.8 |
| Spica | 158°21.5 | -11°17.8 |
| Alkaid | 152°51.5 | 49°10.7 |
| Hadar | 148°35.0 | -60°29.7 |
| Menkent | 147°56.8 | -36°29.7 |
| Arcturus | 145°47.3 | 19°02.6 |
| Rigil Kent. | 139°39.4 | -60°56.3 |
| Kochab | 137°20.4 | 74°02.5 |
| Zuben'ubi | 136°55.3 | -16°09.0 |
| Alphecca | 126°03.3 | 26°37.4 |
| Antares | 112°15.1 | -26°29.3 |
| Atria | 107°09.1 | -69°04.3 |
| Sabik | 102°02.1 | -15°45.4 |
| Shaula | 96°09.6 | -37°07.3 |
| Rasalhague | 95°58.1 | 12°32.4 |
| Eltanin | 90°42.3 | 51°29.0 |
| Kaus Aust. | 83°31.8 | -34°22.3 |
| Vega | 80°33.1 | 38°48.4 |
| Nunki | 75°47.1 | -26°15.9 |
| Altair | 61°59.5 | 8°56.2 |
| Peacock | 53°05.0 | -56°39.2 |
| Deneb | 49°25.7 | 45°22.5 |
| Enif | 33°38.2 | 9°59.7 |
| Al Na'ir | 27°32.2 | -46°50.3 |
| Fomalhaut | 15°13.8 | -29°29.2 |
| Scheat | 13°44.6 | 28°13.6 |
| Markab | 13°29.2 | 15°20.8 |
| | | |
| Jan 04 Sun | SHA | Mer.pass |
| Venus | 75°49.9 | 12:03 |
| Mars | 73°37.2 | 12:11 |
| Jupiter | 247°17.7 | 00:36 |
| Saturn | 2°27.3 | 16:53 |
| | | |
| Jan 05 Mon | SHA | Mer.pass |
| Venus | 74°27.8 | 12:04 |
| Mars | 72°47.2 | 12:10 |
| Jupiter | 247°26.2 | 00:32 |
| Saturn | 2°23.9 | 16:49 |
| | | |
| Jan 06 Tue | SHA | Mer.pass |
| Venus | 73°05.9 | 12:06 |
| Mars | 71°57.2 | 12:10 |
| Jupiter | 247°34.8 | 00:27 |
| Saturn | 2°20.4 | 16:46 |
| | | |
| Horizontal parallax | | |
| Venus: | | 0.1 |
| Mars: | | 0.1 |

| Sun | | | | Moon | | | |
|------------------------|----------|----------|--|------------|-------|----------|--------------|
| h | GHA | Dec | | GHA | ν | Dec | HP |
| Sun | | | | | | | |
| 0 | 178°49.2 | S22°44.4 | | 349°34.0 | 3.8' | N25°28.6 | -8.2' 60.2' |
| 1 | 193°49.0 | 44.2 | | 3°56.8 | 3.9' | 25°20.5 | -8.3' 60.1' |
| 2 | 208°48.7 | 43.9 | | 18°19.7 | 4.0' | 25°12.1 | -8.5' 60.1' |
| 3 | 223°48.4 | 43.7 | | 32°42.7 | 4.2' | 25°03.6 | -8.7' 60.1' |
| 4 | 238°48.1 | 43.4 | | 47°05.9 | 4.3' | 24°55.0 | -8.8' 60.1' |
| 5 | 253°47.8 | 43.1 | | 61°29.2 | 4.4' | 24°46.1 | -9.0' 60.0' |
| 6 | 268°47.5 | S22°42.9 | | 75°52.6 | 4.5' | N24°37.1 | -9.2' 60.0' |
| 7 | 283°47.3 | 42.6 | | 90°16.1 | 4.7' | 24°28.0 | -9.3' 60.0' |
| 8 | 298°47.0 | 42.4 | | 104°39.8 | 4.8' | 24°18.7 | -9.5' 59.9' |
| 9 | 313°46.7 | 42.1 | | 119°03.6 | 4.9' | 24°09.2 | -9.6' 59.9' |
| 10 | 328°46.4 | 41.8 | | 133°27.5 | 5.1' | 23°59.6 | -9.8' 59.9' |
| 11 | 343°46.1 | 41.6 | | 147°51.6 | 5.2' | 23°49.8 | -9.9' 59.9' |
| 12 | 358°45.8 | S22°41.3 | | 162°15.8 | 5.3' | N23°39.9 | -10.1' 59.8' |
| 13 | 13°45.6 | 41.0 | | 176°40.2 | 5.5' | 23°29.8 | -10.2' 59.8' |
| 14 | 28°45.3 | 40.7 | | 191°04.6 | 5.6' | 23°19.6 | -10.4' 59.8' |
| 15 | 43°45.0 | 40.5 | | 205°29.2 | 5.8' | 23°09.3 | -10.5' 59.7' |
| 16 | 58°44.7 | 40.2 | | 219°54.0 | 5.9' | 22°58.8 | -10.6' 59.7' |
| 17 | 73°44.4 | 39.9 | | 234°18.9 | 6.0' | 22°48.2 | -10.8' 59.7' |
| 18 | 88°44.2 | S22°39.7 | | 248°43.9 | 6.2' | N22°37.4 | -10.9' 59.7' |
| 19 | 103°43.9 | 39.4 | | 263°09.1 | 6.3' | 22°26.5 | -11.0' 59.6' |
| 20 | 118°43.6 | 39.1 | | 277°34.4 | 6.4' | 22°15.5 | -11.2' 59.6' |
| 21 | 133°43.3 | 38.8 | | 291°59.8 | 6.6' | 22°04.3 | -11.3' 59.6' |
| 22 | 148°43.0 | 38.6 | | 306°25.4 | 6.7' | 21°53.0 | -11.4' 59.5' |
| 23 | 163°42.8 | 38.3 | | 320°51.1 | 6.9' | 21°41.6 | -11.5' 59.5' |
| SD = 16.3' $d = -0.3'$ | | | | SD = 16.4' | | | |

| Mon | GHA | Dec | | GHA | ν | Dec | HP |
|------------------------|----------|----------|--|------------|-------|----------|--------------|
| 0 | 178°42.5 | S22°38.0 | | 335°17.0 | 7.0' | N21°30.1 | -11.6' 59.5' |
| 1 | 193°42.2 | 37.7 | | 349°43.0 | 7.1' | 21°18.5 | -11.8' 59.4' |
| 2 | 208°41.9 | 37.5 | | 4°09.1 | 7.3' | 21°06.7 | -11.9' 59.4' |
| 3 | 223°41.6 | 37.2 | | 18°35.4 | 7.4' | 20°54.8 | -12.0' 59.4' |
| 4 | 238°41.4 | 36.9 | | 33°01.8 | 7.6' | 20°42.8 | -12.1' 59.3' |
| 5 | 253°41.1 | 36.6 | | 47°28.3 | 7.7' | 20°30.7 | -12.2' 59.3' |
| 6 | 268°40.8 | S22°36.3 | | 61°55.0 | 7.8' | N20°18.5 | -12.3' 59.3' |
| 7 | 283°40.5 | 36.1 | | 76°21.9 | 8.0' | 20°06.2 | -12.4' 59.2' |
| 8 | 298°40.3 | 35.8 | | 90°48.8 | 8.1' | 19°53.8 | -12.5' 59.2' |
| 9 | 313°40.0 | 35.5 | | 105°15.9 | 8.2' | 19°41.2 | -12.6' 59.2' |
| 10 | 328°39.7 | 35.2 | | 119°43.2 | 8.4' | 19°28.6 | -12.7' 59.1' |
| 11 | 343°39.4 | 34.9 | | 134°10.5 | 8.5' | 19°15.9 | -12.8' 59.1' |
| 12 | 358°39.2 | S22°34.6 | | 148°38.0 | 8.6' | N19°03.1 | -12.9' 59.1' |
| 13 | 13°38.9 | 34.3 | | 163°05.7 | 8.8' | 18°50.2 | -13.0' 59.0' |
| 14 | 28°38.6 | 34.1 | | 177°33.5 | 8.9' | 18°37.2 | -13.1' 59.0' |
| 15 | 43°38.3 | 33.8 | | 192°01.4 | 9.0' | 18°24.1 | -13.2' 59.0' |
| 16 | 58°38.0 | 33.5 | | 206°29.4 | 9.2' | 18°10.9 | -13.3' 58.9' |
| 17 | 73°37.8 | 33.2 | | 220°57.6 | 9.3' | 17°57.6 | -13.3' 58.9' |
| 18 | 88°37.5 | S22°32.9 | | 235°25.9 | 9.4' | N17°44.3 | -13.4' 58.8' |
| 19 | 103°37.2 | 32.6 | | 249°54.3 | 9.6' | 17°30.9 | -13.5' 58.8' |
| 20 | 118°36.9 | 32.3 | | 264°22.9 | 9.7' | 17°17.4 | -13.6' 58.8' |
| 21 | 133°36.7 | 32.0 | | 278°51.6 | 9.8' | 17°03.8 | -13.7' 58.7' |
| 22 | 148°36.4 | 31.7 | | 293°20.4 | 9.9' | 16°50.1 | -13.7' 58.7' |
| 23 | 163°36.1 | 31.4 | | 307°49.3 | 10.1' | 16°36.4 | -13.8' 58.7' |
| SD = 16.3' $d = -0.3'$ | | | | SD = 16.2' | | | |

| Tue | GHA | Dec | | GHA | ν | Dec | HP |
|------------------------|----------|----------|--|------------|-------|----------|--------------|
| 0 | 178°35.8 | S22°31.1 | | 322°18.4 | 10.2' | N16°22.6 | -13.9' 58.6' |
| 1 | 193°35.6 | 30.8 | | 336°47.6 | 10.3' | 16°08.7 | -13.9' 58.6' |
| 2 | 208°35.3 | 30.5 | | 351°16.9 | 10.4' | 15°54.8 | -14.0' 58.6' |
| 3 | 223°35.0 | 30.2 | | 5°46.3 | 10.6' | 15°40.8 | -14.1' 58.5' |
| 4 | 238°34.7 | 29.9 | | 20°15.9 | 10.7' | 15°26.7 | -14.1' 58.5' |
| 5 | 253°34.5 | 29.6 | | 34°45.5 | 10.8' | 15°12.6 | -14.2' 58.4' |
| 6 | 268°34.2 | S22°29.3 | | 49°15.3 | 10.9' | N14°58.4 | -14.2' 58.4' |
| 7 | 283°33.9 | 29.0 | | 63°45.2 | 11.0' | 14°44.1 | -14.3' 58.4' |
| 8 | 298°33.7 | 28.7 | | 78°15.3 | 11.1' | 14°29.8 | -14.4' 58.3' |
| 9 | 313°33.4 | 28.4 | | 92°45.4 | 11.3' | 14°15.5 | -14.4' 58.3' |
| 10 | 328°33.1 | 28.1 | | 107°15.7 | 11.4' | 14°01.1 | -14.5' 58.2' |
| 11 | 343°32.8 | 27.8 | | 121°46.0 | 11.5' | 13°46.6 | -14.5' 58.2' |
| 12 | 358°32.6 | S22°27.5 | | 136°16.5 | 11.6' | N13°32.1 | -14.6' 58.2' |
| 13 | 13°32.3 | 27.2 | | 150°47.1 | 11.7' | 13°17.5 | -14.6' 58.1' |
| 14 | 28°32.0 | 26.9 | | 165°17.8 | 11.8' | 13°02.9 | -14.6' 58.1' |
| 15 | 43°31.7 | 26.6 | | 179°48.6 | 11.9' | 12°48.3 | -14.7' 58.1' |
| 16 | 58°31.5 | 26.3 | | 194°19.5 | 12.0' | 12°33.6 | -14.7' 58.0' |
| 17 | 73°31.2 | 26.0 | | 208°50.5 | 12.1' | 12°18.9 | -14.8' 58.0' |
| 18 | 88°30.9 | S22°25.7 | | 223°21.6 | 12.2' | N12°04.1 | -14.8' 57.9' |
| 19 | 103°30.7 | 25.4 | | 237°52.9 | 12.3' | 11°49.3 | -14.8' 57.9' |
| 20 | 118°30.4 | 25.1 | | 252°24.2 | 12.4' | 11°34.5 | -14.9' 57.9' |
| 21 | 133°30.1 | 24.7 | | 266°55.6 | 12.5' | 11°19.6 | -14.9' 57.8' |
| 22 | 148°29.9 | 24.4 | | 281°27.1 | 12.6' | 11°04.7 | -14.9' 57.8' |
| 23 | 163°29.6 | 24.1 | | 295°58.7 | 12.7' | 10°49.7 | -15.0' 57.7' |
| SD = 16.3' $d = -0.3'$ | | | | SD = 16.0' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 08:19 | 10:30 | ■ | ■ | 13:42 | 15:52 |
| N 70° | 08:01 | 09:43 | ■ | ■ | 14:29 | 16:10 |
| 68° | 07:47 | 09:12 | 11:29 | 12:42 | 14:59 | 16:24 |
| 66° | 07:35 | 08:49 | 10:20 | 13:51 | 15:22 | 16:36 |
| 64° | 07:25 | 08:31 | 09:45 | 14:27 | 15:40 | 16:46 |
| 62° | 07:16 | 08:16 | 09:19 | 14:52 | 15:55 | 16:55 |
| 60° | 07:08 | 08:04 | 09:00 | 15:11 | 16:07 | 17:03 |
| N 58° | 07:01 | 07:53 | 08:43 | 15:28 | 16:18 | 17:10 |
| 56° | 06:55 | 07:43 | 08:30 | 15:41 | 16:28 | 17:16 |
| 54° | 06:49 | 07:35 | 08:18 | 15:53 | 16:36 | 17:22 |
| 52° | 06:44 | 07:27 | 08:07 | 16:04 | 16:44 | 17:27 |
| 50° | 06:39 | 07:20 | 07:58 | 16:13 | 16:51 | 17:32 |
| 45° | 06:28 | 07:05 | 07:38 | 16:33 | 17:06 | 17:43 |
| N 40° | 06:18 | 06:52 | 07:22 | 16:49 | 17:19 | 17:53 |
| 35° | 06:09 | 06:41 | 07:09 | 17:02 | 17:30 | 18:02 |
| 30° | 06:01 | 06:30 | 06:57 | 17:14 | 17:40 | 18:10 |
| 20° | 05:45 | 06:12 | 06:36 | 17:35 | 17:58 | 18:26 |
| N 10° | 05:30 | 05:56 | 06:18 | 17:52 | 18:15 | 18:41 |
| 0° | 05:13 | 05:39 | 06:02 | 18:09 | 18:31 | 18:58 |
| S 10° | 04:55 | 05:22 | 05:45 | 18:26 | 18:49 | 19:16 |
| 20° | 04:33 | 05:02 | 05:27 | 18:44 | 19:09 | 19:37 |
| 30° | 04:05 | 04:38 | 05:05 | 19:05 | 19:32 | 20:05 |
| 35° | 03:47 | 04:23 | 04:53 | 19:18 | 19:47 | 20:23 |
| 40° | 03:25 | 04:06 | 04:38 | 19:32 | 20:04 | 20:45 |
| 45° | 02:56 | 03:44 | 04:21 | 19:49 | 20:26 | 21:14 |
| S 50° | 02:14 | 03:16 | 04:00 | 20:11 | 20:54 | 21:56 |
| 52° | 01:49 | 03:02 | 03:49 | 20:21 | 21:08 | 22:20 |
| 54° | 01:13 | 02:45 | 03:38 | 20:32 | 21:25 | 22:56 |
| 56° | //// | 02:25 | 03:24 | 20:46 | 21:45 | //// |
| 58° | //// | 01:58 | 03:09 | 21:01 | 22:11 | //// |
| S 60° | //// | 01:19 | 02:50 | 21:20 | 22:49 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | □ | □ | 18:27 | □ | □ | 12:03 |
| N 70° | □ | 16:00 | 18:49 | □ | 12:42 | 11:39 |
| 68° | □ | 16:44 | 19:06 | □ | 11:57 | 11:20 |
| 66° | 14:23 | 17:13 | 19:19 | 12:20 | 11:27 | 11:05 |
| 64° | 15:18 | 17:34 | 19:30 | 11:24 | 11:04 | 10:52 |
| 62° | 15:50 | 17:51 | 19:40 | 10:51 | 10:46 | 10:41 |
| 60° | 16:14 | 18:06 | 19:48 | 10:26 | 10:31 | 10:32 |
| N 58° | 16:33 | 18:18 | 19:55 | 10:06 | 10:18 | 10:24 |
| 56° | 16:49 | 18:28 | 20:01 | 09:50 | 10:06 | 10:17 |
| 54° | 17:03 | 18:37 | 20:06 | 09:35 | 09:56 | 10:10 |
| 52° | 17:15 | 18:45 | 20:11 | 09:23 | 09:47 | 10:05 |
| 50° | 17:25 | 18:53 | 20:16 | 09:12 | 09:39 | 09:59 |
| 45° | 17:47 | 19:08 | 20:25 | 08:49 | 09:22 | 09:48 |
| N 40° | 18:04 | 19:21 | 20:33 | 08:30 | 09:08 | 09:38 |
| 35° | 18:19 | 19:32 | 20:40 | 08:15 | 08:56 | 09:30 |
| 30° | 18:32 | 19:41 | 20:46 | 08:01 | 08:45 | 09:23 |
| 20° | 18:53 | 19:57 | 20:56 | 07:38 | 08:27 | 09:10 |
| N 10° | 19:12 | 20:11 | 21:05 | 07:17 | 08:11 | 08:59 |
| 0° | 19:29 | 20:24 | 21:13 | 06:58 | 07:56 | 08:48 |
| S 10° | 19:46 | 20:37 | 21:22 | 06:39 | 07:41 | 08:37 |
| 20° | 20:05 | 20:51 | 21:30 | 06:18 | 07:24 | 08:26 |
| 30° | 20:26 | 21:06 | 21:40 | 05:54 | 07:05 | 08:12 |
| 35° | 20:38 | 21:15 | 21:46 | 05:40 | 06:54 | 08:05 |
| 40° | 20:52 | 21:26 | 21:53 | 05:23 | 06:41 | 07:56 |
| 45° | 21:09 | 21:38 | 22:00 | 05:03 | 06:26 | 07:45 |
| S 50° | 21:29 | 21:52 | 22:09 | 04:38 | 06:07 | 07:33 |
| 52° | 21:39 | 21:59 | 22:13 | 04:26 | 05:58 | 07:27 |
| 54° | 21:50 | 22:06 | 22:18 | 04:12 | 05:48 | 07:20 |
| 56° | 22:02 | 22:15 | 22:23 | 03:55 | 05:36 | 07:13 |
| 58° | 22:16 | 22:24 | 22:28 | 03:36 | 05:23 | 07:04 |
| S 60° | 22:33 | 22:34 | 22:35 | 03:11 | 05:07 | 06:55 |

| Day | Sun | | | Moon | | |
|-----|---|----------------------------------|-----------------------|-----------------------------|----------------|------------------------|
| | Eqn.of Time 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 15-17 99-91% |
| 04 | 04:43 | 04:57 | 12:05 | 00:44 | 13:14 | |
| 05 | 05:10 | 05:23 | 12:05 | 01:43 | 14:10 | |
| 06 | 05:37 | 05:50 | 12:06 | 02:36 | 15:01 | |

January 07, 08, 09 UT (Wed., Thu., Fri.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|----------|
| Wed | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 106°34.6 | | 178°18.7 | S23°06.2 | 177°41.9 | S23°14.3 | 354°17.9 | N22°06.9 | 108°51.4 | S03°25.7 |
| 1 | 121°37.0 | | 193°17.8 | 05.9 | 192°42.3 | 14.1 | 9°20.7 | 07.0 | 123°53.7 | 25.7 |
| 2 | 136°39.5 | | 208°16.8 | 05.6 | 207°42.7 | 13.9 | 24°23.6 | 07.1 | 138°56.0 | 25.6 |
| 3 | 151°42.0 | | 223°15.9 | · · 05.3 | 222°43.0 | · · 13.6 | 39°26.4 | · · 07.1 | 153°58.3 | · · 25.5 |
| 4 | 166°44.4 | | 238°15.0 | 05.0 | 237°43.4 | 13.4 | 54°29.2 | 07.2 | 169°00.6 | 25.4 |
| 5 | 181°46.9 | | 253°14.0 | 04.7 | 252°43.8 | 13.2 | 69°32.0 | 07.2 | 184°03.0 | 25.4 |
| 6 | 196°49.4 | | 268°13.1 | S23°04.4 | 267°44.2 | S23°12.9 | 84°34.9 | N22°07.3 | 199°05.3 | S03°25.3 |
| 7 | 211°51.8 | | 283°12.2 | 04.0 | 282°44.6 | 12.7 | 99°37.7 | 07.3 | 214°07.6 | 25.2 |
| 8 | 226°54.3 | | 298°11.2 | 03.7 | 297°45.0 | 12.5 | 114°40.5 | 07.4 | 229°09.9 | 25.1 |
| 9 | 241°56.8 | | 313°10.3 | · · 03.4 | 312°45.4 | · · 12.2 | 129°43.3 | · · 07.4 | 244°12.2 | · · 25.1 |
| 10 | 256°59.2 | | 328°09.3 | 03.1 | 327°45.7 | 12.0 | 144°46.1 | 07.5 | 259°14.5 | 25.0 |
| 11 | 272°01.7 | | 343°08.4 | 02.8 | 342°46.1 | 11.7 | 159°49.0 | 07.6 | 274°16.8 | 24.9 |
| 12 | 287°04.1 | | 358°07.5 | S23°02.5 | 357°46.5 | S23°11.5 | 174°51.8 | N22°07.6 | 289°19.1 | S03°24.8 |
| 13 | 302°06.6 | | 13°06.5 | 02.1 | 12°46.9 | 11.3 | 189°54.6 | 07.7 | 304°21.4 | 24.8 |
| 14 | 317°09.1 | | 28°05.6 | 01.8 | 27°47.3 | 11.0 | 204°57.4 | 07.7 | 319°23.8 | 24.7 |
| 15 | 332°11.5 | | 43°04.7 | · · 01.5 | 42°47.7 | · · 10.8 | 220°00.3 | · · 07.8 | 334°26.1 | · · 24.6 |
| 16 | 347°14.0 | | 58°03.7 | 01.2 | 57°48.0 | 10.5 | 235°03.1 | 07.8 | 349°28.4 | 24.5 |
| 17 | 2°16.5 | | 73°02.8 | 00.8 | 72°48.4 | 10.3 | 250°05.9 | 07.9 | 4°30.7 | 24.5 |
| 18 | 17°18.9 | | 88°01.9 | S23°00.5 | 87°48.8 | S23°10.1 | 265°08.7 | N22°08.0 | 19°33.0 | S03°24.4 |
| 19 | 32°21.4 | | 103°00.9 | 23°00.2 | 102°49.2 | 09.8 | 280°11.5 | 08.0 | 34°35.3 | 24.3 |
| 20 | 47°23.9 | | 118°00.0 | 22°59.8 | 117°49.6 | 09.6 | 295°14.4 | 08.1 | 49°37.6 | 24.2 |
| 21 | 62°26.3 | | 132°59.0 | · · 59.5 | 132°50.0 | · · 09.3 | 310°17.2 | · · 08.1 | 64°39.9 | · · 24.2 |
| 22 | 77°28.8 | | 147°58.1 | 59.2 | 147°50.4 | 09.1 | 325°20.0 | 08.2 | 79°42.2 | 24.1 |
| 23 | 92°31.3 | | 162°57.2 | 58.8 | 162°50.7 | 08.8 | 340°22.8 | 08.2 | 94°44.5 | 24.0 |
| Mer.pass. 16:51 | | ν-0.9' d-0.3' m-3.90 | | ν0.4' d-0.2' m1.09 | | ν2.8' d0.1' m-2.68 | | ν2.3' d-0.1' m1.01 | | |

| Thu | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|----------|
| 0 | 107°33.7 | | 177°56.2 | S22°58.5 | 177°51.1 | S23°08.6 | 355°25.7 | N22°08.3 | 109°46.9 | S03°23.9 |
| 1 | 122°36.2 | | 192°55.3 | 58.2 | 192°51.5 | 08.4 | 10°28.5 | 08.3 | 124°49.2 | 23.9 |
| 2 | 137°38.6 | | 207°54.4 | 57.8 | 207°51.9 | 08.1 | 25°31.3 | 08.4 | 139°51.5 | 23.8 |
| 3 | 152°41.1 | | 222°53.4 | · · 57.5 | 222°52.3 | · · 07.9 | 40°34.1 | · · 08.5 | 154°53.8 | · · 23.7 |
| 4 | 167°43.6 | | 237°52.5 | 57.2 | 237°52.7 | 07.6 | 55°36.9 | 08.5 | 169°56.1 | 23.6 |
| 5 | 182°46.0 | | 252°51.6 | 56.8 | 252°53.1 | 07.4 | 70°39.8 | 08.6 | 184°58.4 | 23.6 |
| 6 | 197°48.5 | | 267°50.7 | S22°56.5 | 267°53.4 | S23°07.1 | 85°42.6 | N22°08.6 | 200°00.7 | S03°23.5 |
| 7 | 212°51.0 | | 282°49.7 | 56.1 | 282°53.8 | 06.9 | 100°45.4 | 08.7 | 215°03.0 | 23.4 |
| 8 | 227°53.4 | | 297°48.8 | 55.8 | 297°54.2 | 06.6 | 115°48.2 | 08.7 | 230°05.3 | 23.3 |
| 9 | 242°55.9 | | 312°47.9 | · · 55.4 | 312°54.6 | · · 06.4 | 130°51.1 | · · 08.8 | 245°07.6 | · · 23.3 |
| 10 | 257°58.4 | | 327°46.9 | 55.1 | 327°55.0 | 06.1 | 145°53.9 | 08.9 | 260°09.9 | 23.2 |
| 11 | 273°00.8 | | 342°46.0 | 54.7 | 342°55.4 | 05.9 | 160°56.7 | 08.9 | 275°12.3 | 23.1 |
| 12 | 288°03.3 | | 357°45.1 | S22°54.4 | 357°55.8 | S23°05.6 | 175°59.5 | N22°09.0 | 290°14.6 | S03°23.0 |
| 13 | 303°05.8 | | 12°44.1 | 54.0 | 12°56.1 | 05.4 | 191°02.4 | 09.0 | 305°16.9 | 23.0 |
| 14 | 318°08.2 | | 27°43.2 | 53.7 | 27°56.5 | 05.1 | 206°05.2 | 09.1 | 320°19.2 | 22.9 |
| 15 | 333°10.7 | | 42°42.3 | · · 53.3 | 42°56.9 | · · 04.9 | 221°08.0 | · · 09.1 | 335°21.5 | · · 22.8 |
| 16 | 348°13.1 | | 57°41.4 | 53.0 | 57°57.3 | 04.6 | 236°10.8 | 09.2 | 350°23.8 | 22.7 |
| 17 | 3°15.6 | | 72°40.4 | 52.6 | 72°57.7 | 04.4 | 251°13.6 | 09.2 | 5°26.1 | 22.7 |
| 18 | 18°18.1 | | 87°39.5 | S22°52.3 | 87°58.1 | S23°04.1 | 266°16.5 | N22°09.3 | 20°28.4 | S03°22.6 |
| 19 | 33°20.5 | | 102°38.6 | 51.9 | 102°58.5 | 03.9 | 281°19.3 | 09.4 | 35°30.7 | 22.5 |
| 20 | 48°23.0 | | 117°37.6 | 51.5 | 117°58.8 | 03.6 | 296°22.1 | 09.4 | 50°33.0 | 22.4 |
| 21 | 63°25.5 | | 132°36.7 | · · 51.2 | 132°59.2 | · · 03.4 | 311°24.9 | · · 09.5 | 65°35.3 | · · 22.4 |
| 22 | 78°27.9 | | 147°35.8 | 50.8 | 147°59.6 | 03.1 | 326°27.8 | 09.5 | 80°37.6 | 22.3 |
| 23 | 93°30.4 | | 162°34.9 | 50.5 | 163°00.0 | 02.9 | 341°30.6 | 09.6 | 95°39.9 | 22.2 |
| Mer.pass. 16:47 | | ν-0.9' d-0.3' m-3.90 | | ν0.4' d-0.2' m1.09 | | ν2.8' d0.1' m-2.68 | | ν2.3' d-0.1' m1.02 | | |

| Fri | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|----------|
| 0 | 108°32.9 | | 177°33.9 | S22°50.1 | 178°00.4 | S23°02.6 | 356°33.4 | N22°09.6 | 110°42.2 | S03°22.1 |
| 1 | 123°35.3 | | 192°33.0 | 49.7 | 193°00.8 | 02.4 | 11°36.2 | 09.7 | 125°44.5 | 22.0 |
| 2 | 138°37.8 | | 207°32.1 | 49.4 | 208°01.2 | 02.1 | 26°39.1 | 09.7 | 140°46.9 | 22.0 |
| 3 | 153°40.2 | | 222°31.2 | · · 49.0 | 223°01.6 | · · 01.8 | 41°41.9 | · · 09.8 | 155°49.2 | · · 21.9 |
| 4 | 168°42.7 | | 237°30.2 | 48.6 | 238°01.9 | 01.6 | 56°44.7 | 09.9 | 170°51.5 | 21.8 |
| 5 | 183°45.2 | | 252°29.3 | 48.3 | 253°02.3 | 01.3 | 71°47.5 | 09.9 | 185°53.8 | 21.7 |
| 6 | 198°47.6 | | 267°28.4 | S22°47.9 | 268°02.7 | S23°01.1 | 86°50.3 | N22°10.0 | 200°56.1 | S03°21.7 |
| 7 | 213°50.1 | | 282°27.5 | 47.5 | 283°03.1 | 00.8 | 101°53.2 | 10.0 | 215°58.4 | 21.6 |
| 8 | 228°52.6 | | 297°26.5 | 47.1 | 298°03.5 | 00.6 | 116°56.0 | 10.1 | 231°00.7 | 21.5 |
| 9 | 243°55.0 | | 312°25.6 | · · 46.8 | 313°03.9 | · · 00.3 | 131°58.8 | · · 10.1 | 246°03.0 | · · 21.4 |
| 10 | 258°57.5 | | 327°24.7 | 46.4 | 328°04.3 | 23°00.0 | 147°01.6 | 10.2 | 261°05.3 | 21.4 |
| 11 | 274°00.0 | | 342°23.8 | 46.0 | 343°04.7 | 22°59.8 | 162°04.5 | 10.3 | 276°07.6 | 21.3 |
| 12 | 289°02.4 | | 357°22.8 | S22°45.6 | 358°05.0 | S22°59.5 | 177°07.3 | N22°10.3 | 291°09.9 | S03°21.2 |
| 13 | 304°04.9 | | 12°21.9 | 45.2 | 13°05.4 | 59.3 | 192°10.1 | 10.4 | 306°12.2 | 21.1 |
| 14 | 319°07.4 | | 27°21.0 | 44.9 | 28°05.8 | 59.0 | 207°12.9 | 10.4 | 321°14.5 | 21.0 |
| 15 | 334°09.8 | | 42°20.1 | · · 44.5 | 43°06.2 | · · 58.7 | 222°15.8 | · · 10.5 | 336°16.8 | · · 21.0 |
| 16 | 349°12.3 | | 57°19.2 | 44.1 | 58°06.6 | 58.5 | 237°18.6 | 10.5 | 351°19.1 | 20.9 |
| 17 | 4°14.7 | | 72°18.2 | 43.7 | 73°07.0 | 58.2 | 252°21.4 | 10.6 | 6°21.4 | 20.8 |
| 18 | 19°17.2 | | 87°17.3 | S22°43.3 | 88°07.4 | S22°57.9 | 267°24.2 | N22°10.6 | 21°23.7 | S03°20.7 |
| 19 | 34°19.7 | | 102°16.4 | 42.9 | 103°07.8 | 57.7 | 282°27.1 | 10.7 | 36°26.0 | 20.7 |
| 20 | 49°22.1 | | 117°15.5 | 42.6 | 118°08.1 | 57.4 | 297°29.9 | 10.8 | 51°28.3 | 20.6 |
| 21 | 64°24.6 | | 132°14.6 | · · 42.2 | 133°08.5 | · · 57.1 | 312°32.7 | · · 10.8 | 66°30.6 | · · 20.5 |
| 22 | 79°27.1 | | 147°13.6 | 41.8 | 148°08.9 | 56.9 | 327°35.5 | 10.9 | 81°32.9 | 20.4 |
| 23 | 94°29.5 | | 162°12.7 | 41.4 | 163°09.3 | 56.6 | 342°38.3 | 10.9 | 96°35.2 | 20.3 |
| Mer.pass. 16:43 | | ν-0.9' d-0.4' m-3.90 | | ν0.4' d-0.3' m1.09 | | ν2.8' d0.1' m-2.68 | | ν2.3' d-0.1' m1.02 | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°34.0 | 29°14.2 |
| Ankaa | 353°06.4 | -42°10.1 |
| Schedar | 349°30.2 | 56°41.1 |
| Diphda | 348°46.5 | -17°50.7 |
| Achernar | 335°19.5 | -57°06.5 |
| Hamal | 327°50.1 | 23°35.3 |
| Polaris | 313°20.1 | 89°22.7 |
| Acamar | 315°10.9 | -40°12.2 |
| Menkar | 314°05.1 | 4°11.5 |
| Mirfak | 308°26.7 | 49°57.4 |
| Aldebaran | 290°38.4 | 16°33.7 |
| Rigel | 281°02.8 | -8°10.3 |
| Capella | 280°20.2 | 46°01.5 |
| Bellatrix | 278°21.7 | 6°22.4 |
| Elnath | 278°00.4 | 28°37.8 |
| Alnilam | 275°36.6 | -1°11.1 |
| Betelgeuse | 270°50.8 | 7°24.7 |
| Canopus | 263°51.5 | -52°42.6 |
| Sirius | 258°25.1 | -16°45.1 |
| Adhara | 255°04.8 | -29°00.5 |
| Procyon | 244°49.6 | 5°09.4 |
| Pollux | 243°15.9 | 27°57.7 |
| Avior | 234°13.8 | -59°35.5 |
| Suhail | 222°45.3 | -43°32.2 |
| Miaplacidus | 221°37.3 | -69°49.3 |
| Alphard | 217°46.7 | -8°46.3 |
| Regulus | 207°33.3 | 11°50.3 |
| Dubhe | 193°39.6 | 61°36.3 |
| Denebola | 182°24.0 | 14°25.4 |
| Gienah | 175°42.7 | -17°41.2 |
| Acrux | 172°59.1 | -63°14.4 |
| Gacrux | 171°50.6 | -57°15.3 |
| Alioth | 166°12.2 | 55°48.8 |
| Spica | 158°21.4 | -11°17.8 |
| Alkaid | 152°51.4 | 49°10.7 |
| Hadar | 148°35.0 | -60°29.7 |
| Menkent | 147°56.7 | -36°29.7 |
| Arcturus | 145°47.3 | 19°02.6 |
| Rigel Kent. | 139°39.4 | -60°56.3 |
| Kochab | 137°20.4 | 74°02.5 |
| Zuben'ubi | 136°55.2 | -16°09.0 |
| Alphecca | 126°03.3 | 26°37.4 |
| Antares | 112°15.1 | -26°29.3 |
| Atria | 107°09.1 | -69°04.3 |
| Sabik | 102°02.1 | -15°45.4 |
| Shaula | 96°09.6 | -37°07.3 |
| Rasalhague | 95°58.1 | 12°32.4 |
| Eltanin | 90°42.3 | 51°29.0 |
| Kaus Aust. | 83°31.8 | -34°22.3 |
| Vega | 80°33.1 | 38°48.4 |
| Nunki | 75°47.1 | -26°15.9 |
| Altair | 61°59.5 | 8°56.2 |
| Peacock | 53°05.0 | -56°39.2 |
| Deneb | 49°25.7 | 45°22.5 |
| Enif | 33°38.2 | 9°59.7 |
| Al Na'ir | 27°32.2 | -46°50.3 |
| Fomalhaut | 15°13.8 | -29°29.2 |
| Scheat | 13°44.6 | 28°13.6 |
| Markab | 13°29.2 | 15°20.8 |

| Jan 07 Wed | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 71°44.1 | 12:08 |
| Mars | 71°07.3 | 12:09 |
| Jupiter | 247°43.3 | 00:23 |
| Saturn | 2°16.8 | 16:42 |

| Jan 08 Thu | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 70°22.5 | 12:09 |
| Mars | 70°17.4 | 12:08 |
| Jupiter | 247°51.9 | 00:18 |
| Saturn | 2°13.1 | 16:38 |

| Jan 09 Fri | SHA |
|------------|-----|
|------------|-----|


| h | | | Sun | | Moon | | | |
|------------|----------|----------|-------------|-------|----------|------------|-------|--|
| Wed | GHA | Dec | GHA | ν | Dec | d | HP | |
| 0 | 178°29.3 | S22°23.8 | 310°30.4 | 12.8' | N10°34.8 | -15.0' | 57.7' | |
| 1 | 193°29.0 | 23.5 | 325°02.2 | 12.9' | 10°19.8 | -15.0' | 57.7' | |
| 2 | 208°28.8 | 23.2 | 339°34.1 | 13.0' | 10°04.7 | -15.1' | 57.6' | |
| 3 | 223°28.5 | •• 22.9 | 354°06.1 | 13.1' | 09°49.7 | -15.1' | 57.6' | |
| 4 | 238°28.2 | 22.5 | 8°38.2 | 13.2' | 09°34.6 | -15.1' | 57.6' | |
| 5 | 253°28.0 | 22.2 | 23°10.4 | 13.3' | 09°19.5 | -15.1' | 57.5' | |
| 6 | 268°27.7 | S22°21.9 | 37°42.6 | 13.3' | N09°04.4 | -15.1' | 57.5' | |
| 7 | 283°27.4 | 21.6 | 52°15.0 | 13.4' | 08°49.3 | -15.2' | 57.4' | |
| 8 | 298°27.2 | 21.3 | 66°47.4 | 13.5' | 08°34.1 | -15.2' | 57.4' | |
| 9 | 313°26.9 | •• 20.9 | 81°19.9 | 13.6' | 08°18.9 | -15.2' | 57.4' | |
| 10 | 328°26.6 | 20.6 | 95°52.5 | 13.7' | 08°03.7 | -15.2' | 57.3' | |
| 11 | 343°26.4 | 20.3 | 110°25.1 | 13.7' | 07°48.5 | -15.2' | 57.3' | |
| 12 | 358°26.1 | S22°20.0 | 124°57.9 | 13.8' | N07°33.3 | -15.2' | 57.2' | |
| 13 | 13°25.8 | 19.7 | 139°30.7 | 13.9' | 07°18.1 | -15.2' | 57.2' | |
| 14 | 28°25.6 | 19.3 | 154°03.6 | 14.0' | 07°02.8 | -15.3' | 57.2' | |
| 15 | 43°25.3 | •• 19.0 | 168°36.6 | 14.0' | 06°47.6 | -15.3' | 57.1' | |
| 16 | 58°25.0 | 18.7 | 183°09.6 | 14.1' | 06°32.3 | -15.3' | 57.1' | |
| 17 | 73°24.8 | 18.4 | 197°42.7 | 14.2' | 06°17.1 | -15.3' | 57.1' | |
| 18 | 88°24.5 | S22°18.0 | 212°15.9 | 14.3' | N06°01.8 | -15.3' | 57.0' | |
| 19 | 103°24.2 | 17.7 | 226°49.2 | 14.3' | 05°46.5 | -15.3' | 57.0' | |
| 20 | 118°24.0 | 17.4 | 241°22.5 | 14.4' | 05°31.2 | -15.3' | 56.9' | |
| 21 | 133°23.7 | •• 17.0 | 255°55.9 | 14.4' | 05°15.9 | -15.3' | 56.9' | |
| 22 | 148°23.4 | 16.7 | 270°29.3 | 14.5' | 05°00.7 | -15.3' | 56.9' | |
| 23 | 163°23.2 | 16.4 | 285°02.8 | 14.6' | 04°45.4 | -15.3' | 56.8' | |
| SD = 16.3' | | | $d = -0.3'$ | | | SD = 15.7' | | |

| Thu | GHA | Dec | GHA | ν | Dec | d | HP | |
|------------|----------|----------|-------------|-------|----------|------------|-------|--|
| 0 | 178°22.9 | S22°16.0 | 299°36.4 | 14.6' | N04°30.1 | -15.3' | 56.8' | |
| 1 | 193°22.6 | 15.7 | 314°10.0 | 14.7' | 04°14.8 | -15.3' | 56.8' | |
| 2 | 208°22.4 | 15.4 | 328°43.7 | 14.7' | 03°59.5 | -15.3' | 56.7' | |
| 3 | 223°22.1 | •• 15.0 | 343°17.5 | 14.8' | 03°44.2 | -15.3' | 56.7' | |
| 4 | 238°21.8 | 14.7 | 357°51.3 | 14.9' | 03°29.0 | -15.3' | 56.6' | |
| 5 | 253°21.6 | 14.4 | 12°25.1 | 14.9' | 03°13.7 | -15.3' | 56.6' | |
| 6 | 268°21.3 | S22°14.0 | 26°59.0 | 15.0' | N02°58.4 | -15.3' | 56.6' | |
| 7 | 283°21.0 | 13.7 | 41°33.0 | 15.0' | 02°43.2 | -15.2' | 56.5' | |
| 8 | 298°20.8 | 13.4 | 56°07.0 | 15.1' | 02°27.9 | -15.2' | 56.5' | |
| 9 | 313°20.5 | •• 13.0 | 70°41.1 | 15.1' | 02°12.7 | -15.2' | 56.5' | |
| 10 | 328°20.3 | 12.7 | 85°15.2 | 15.2' | 01°57.5 | -15.2' | 56.4' | |
| 11 | 343°20.0 | 12.3 | 99°49.3 | 15.2' | 01°42.3 | -15.2' | 56.4' | |
| 12 | 358°19.7 | S22°12.0 | 114°23.5 | 15.2' | N01°27.1 | -15.2' | 56.4' | |
| 13 | 13°19.5 | 11.7 | 128°57.8 | 15.3' | 01°11.9 | -15.2' | 56.3' | |
| 14 | 28°19.2 | 11.3 | 143°32.0 | 15.3' | 00°56.7 | -15.2' | 56.3' | |
| 15 | 43°18.9 | •• 11.0 | 158°06.4 | 15.4' | 00°41.6 | -15.1' | 56.3' | |
| 16 | 58°18.7 | 10.6 | 172°40.7 | 15.4' | 00°26.5 | -15.1' | 56.2' | |
| 17 | 73°18.4 | 10.3 | 187°15.1 | 15.4' | N00°11.3 | -15.1' | 56.2' | |
| 18 | 88°18.2 | S22°09.9 | 201°49.6 | 15.5' | S00°03.8 | 15.1' | 56.2' | |
| 19 | 103°17.9 | 09.6 | 216°24.0 | 15.5' | 00°18.8 | 15.1' | 56.1' | |
| 20 | 118°17.6 | 09.2 | 230°58.6 | 15.5' | 00°33.9 | 15.0' | 56.1' | |
| 21 | 133°17.4 | •• 08.9 | 245°33.1 | 15.6' | 00°48.9 | 15.0' | 56.1' | |
| 22 | 148°17.1 | 08.5 | 260°07.7 | 15.6' | 01°04.0 | 15.0' | 56.0' | |
| 23 | 163°16.9 | 08.2 | 274°42.3 | 15.6' | 01°19.0 | 15.0' | 56.0' | |
| SD = 16.3' | | | $d = -0.3'$ | | | SD = 15.5' | | |

| Fri | GHA | Dec | GHA | ν | Dec | d | HP | |
|------------|----------|----------|-------------|-------|----------|------------|-------|--|
| 0 | 178°16.6 | S22°07.8 | 289°16.9 | 15.7' | S01°33.9 | 14.9' | 56.0' | |
| 1 | 193°16.3 | 07.5 | 303°51.6 | 15.7' | 01°48.9 | 14.9' | 55.9' | |
| 2 | 208°16.1 | 07.1 | 318°26.2 | 15.7' | 02°03.8 | 14.9' | 55.9' | |
| 3 | 223°15.8 | •• 06.8 | 333°00.9 | 15.7' | 02°18.7 | 14.9' | 55.9' | |
| 4 | 238°15.6 | 06.4 | 347°35.7 | 15.8' | 02°33.6 | 14.8' | 55.8' | |
| 5 | 253°15.3 | 06.1 | 2°10.4 | 15.8' | 02°48.4 | 14.8' | 55.8' | |
| 6 | 268°15.0 | S22°05.7 | 16°45.2 | 15.8' | S03°03.2 | 14.8' | 55.8' | |
| 7 | 283°14.8 | 05.4 | 31°20.0 | 15.8' | 03°18.0 | 14.8' | 55.7' | |
| 8 | 298°14.5 | 05.0 | 45°54.8 | 15.8' | 03°32.8 | 14.7' | 55.7' | |
| 9 | 313°14.3 | •• 04.6 | 60°29.6 | 15.8' | 03°47.5 | 14.7' | 55.7' | |
| 10 | 328°14.0 | 04.3 | 75°04.5 | 15.9' | 04°02.2 | 14.7' | 55.6' | |
| 11 | 343°13.8 | 03.9 | 89°39.3 | 15.9' | 04°16.8 | 14.6' | 55.6' | |
| 12 | 358°13.5 | S22°03.6 | 104°14.2 | 15.9' | S04°31.5 | 14.6' | 55.6' | |
| 13 | 13°13.2 | 03.2 | 118°49.1 | 15.9' | 04°46.1 | 14.6' | 55.6' | |
| 14 | 28°13.0 | 02.9 | 133°24.0 | 15.9' | 05°00.6 | 14.5' | 55.5' | |
| 15 | 43°12.7 | •• 02.5 | 147°58.9 | 15.9' | 05°15.2 | 14.5' | 55.5' | |
| 16 | 58°12.5 | 02.1 | 162°33.8 | 15.9' | 05°29.6 | 14.5' | 55.5' | |
| 17 | 73°12.2 | 01.8 | 177°08.7 | 15.9' | 05°44.1 | 14.4' | 55.4' | |
| 18 | 88°12.0 | S22°01.4 | 191°43.7 | 15.9' | S05°58.5 | 14.4' | 55.4' | |
| 19 | 103°11.7 | 01.0 | 206°18.6 | 15.9' | 06°12.9 | 14.3' | 55.4' | |
| 20 | 118°11.5 | 00.7 | 220°53.5 | 15.9' | 06°27.2 | 14.3' | 55.4' | |
| 21 | 133°11.2 | 22°00.3 | 235°28.5 | 15.9' | 06°41.5 | 14.3' | 55.3' | |
| 22 | 148°10.9 | 21°59.9 | 250°03.4 | 15.9' | 06°55.8 | 14.2' | 55.3' | |
| 23 | 163°10.7 | 59.6 | 264°38.4 | 15.9' | 07°10.0 | 14.2' | 55.3' | |
| SD = 16.3' | | | $d = -0.4'$ | | | SD = 15.3' | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 08:15 | 10:19 | ██ | ██ | 13:55 | 15:59 |
| N 70° | 07:58 | 09:36 | ██ | ██ | 14:38 | 16:16 |
| 68° | 07:44 | 09:07 | 11:09 | 13:05 | 15:06 | 16:30 |
| 66° | 07:32 | 08:46 | 10:13 | 14:01 | 15:28 | 16:42 |
| 64° | 07:23 | 08:28 | 09:40 | 14:34 | 15:45 | 16:51 |
| 62° | 07:14 | 08:14 | 09:16 | 14:58 | 16:00 | 17:00 |
| 60° | 07:07 | 08:02 | 08:57 | 15:17 | 16:12 | 17:07 |
| N 58° | 07:00 | 07:51 | 08:41 | 15:33 | 16:23 | 17:14 |
| 56° | 06:54 | 07:42 | 08:28 | 15:46 | 16:32 | 17:20 |
| 54° | 06:48 | 07:34 | 08:16 | 15:58 | 16:40 | 17:26 |
| 52° | 06:43 | 07:26 | 08:06 | 16:08 | 16:48 | 17:31 |
| 50° | 06:38 | 07:19 | 07:57 | 16:17 | 16:55 | 17:35 |
| 45° | 06:28 | 07:04 | 07:38 | 16:36 | 17:09 | 17:46 |
| N 40° | 06:18 | 06:52 | 07:22 | 16:52 | 17:22 | 17:56 |
| 35° | 06:09 | 06:41 | 07:09 | 17:05 | 17:33 | 18:04 |
| 30° | 06:01 | 06:31 | 06:57 | 17:17 | 17:43 | 18:12 |
| 20° | 05:46 | 06:13 | 06:37 | 17:37 | 18:00 | 18:28 |
| N 10° | 05:31 | 05:57 | 06:19 | 17:54 | 18:17 | 18:43 |
| 0° | 05:15 | 05:41 | 06:03 | 18:10 | 18:33 | 18:59 |
| S 10° | 04:57 | 05:24 | 05:46 | 18:27 | 18:50 | 19:17 |
| 20° | 04:35 | 05:04 | 05:28 | 18:45 | 19:09 | 19:38 |
| 30° | 04:08 | 04:41 | 05:08 | 19:05 | 19:33 | 20:05 |
| 35° | 03:50 | 04:26 | 04:55 | 19:18 | 19:47 | 20:23 |
| 40° | 03:28 | 04:09 | 04:41 | 19:32 | 20:04 | 20:44 |
| 45° | 03:00 | 03:48 | 04:24 | 19:49 | 20:25 | 21:13 |
| S 50° | 02:19 | 03:20 | 04:03 | 20:09 | 20:52 | 21:53 |
| 52° | 01:56 | 03:07 | 03:53 | 20:19 | 21:06 | 22:16 |
| 54° | 01:23 | 02:50 | 03:42 | 20:31 | 21:22 | 22:48 |
| 56° | //// | 02:31 | 03:29 | 20:43 | 21:41 | //// |
| 58° | //// | 02:06 | 03:14 | 20:59 | 22:06 | //// |
| S 60° | //// | 01:30 | 02:56 | 21:17 | 22:41 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | 20:51 | 22:59 | •• •• | 11:16 | 10:41 | 10:08 |
| N 70° | 20:59 | 22:57 | •• •• | 11:05 | 10:39 | 10:13 |
| 68° | 21:05 | 22:55 | •• •• | 10:56 | 10:37 | 10:18 |
| 66° | 21:10 | 22:54 | •• •• | 10:49 | 10:35 | 10:22 |
| 64° | 21:15 | 22:53 | •• •• | 10:43 | 10:34 | 10:25 |
| 62° | 21:19 | 22:52 | •• •• | 10:37 | 10:33 | 10:28 |
| 60° | 21:22 | 22:51 | •• •• | 10:32 | 10:32 | 10:31 |
| N 58° | 21:25 | 22:50 | •• •• | 10:28 | 10:31 | 10:33 |
| 56° | 21:27 | 22:49 | •• •• | 10:24 | 10:30 | 10:35 |
| 54° | 21:30 | 22:49 | •• •• | 10:21 | 10:29 | 10:37 |
| 52° | 21:32 | 22:48 | •• •• | 10:18 | 10:28 | 10:39 |
| 50° | 21:33 | 22:48 | 23:59 | 10:15 | 10:28 | 10:40 |
| 45° | 21:38 | 22:46 | 23:53 | 10:08 | 10:26 | 10:43 |
| N 40° | 21:41 | 22:46 | 23:48 | 10:03 | 10:25 | 10:46 |
| 35° | 21:44 | 22:45 | 23:44 | 09:59 | 10:24 | 10:49 |
| 30° | 21:46 | 22:44 | 23:40 | 09:55 | 10:23 | 10:51 |
| 20° | 21:51 | 22:43 | 23:34 | 09:47 | 10:22 | 10:55 |
| N 10° | 21:55 | 22:42 | 23:28 | 09:41 | 10:20 | 10:58 |
| 0° | 21:58 | 22:41 | 23:22 | 09:35 | 10:19 | 11:01 |
| S 10° | 22:02 | 22:40 | 23:17 | 09:29 | 10:18 | 11:04 |
| 20° | 22:06 | 22:39 | 23:12 | 09:23 | 10:16 | 11:07 |
| 30° | 22:10 | 22:38 | 23:05 | 09:15 | 10:14 | 11:11 |
| 35° | 22:13 | 22:38 | 23:02 | 09:11 | 10:13 | 11:13 |
| 40° | 22:16 | 22:37 | 22:58 | 09:06 | 10:12 | 11:16 |
| 45° | 22:19 | 22:36 | 22:53 | 09:00 | 10:11 | 11:19 |
| S 50° | 22:23 | 22:35 | 22:48 | 08:53 | 10:09 | 11:22 |
| 52° | 22:25 | 22:35 | 22:45 | 08:50 | 10:09 | 11:24 |
| 54° | 22:27 | 22:35 | 22:42 | 08:47 | 10:08 | 11:26 |
| 56° | 22:29 | 22:34 | 22:39 | 08:43 | 10:07 | 11:28 |
| 58° | 22:31 | 22:34 | 22:36 | 08:38 | 10:06 | 11:30 |
| S 60° | 22:34 | 22:33 | 22:32 | 08:33 | 10:05 | 11:32 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-------|-----------|-------|---|
| | Eqn.of Time | | Mer. | Mer.Pass. | | Age |
| | 00 ^h | 12 ^h | Pass | Upper | Lower | 18-20 |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 84-66% |
| 07 | 06:03 | 06:16 | 12:06 | 03:24 | 15:47 |  |
| 08 | 06:28 | 06:41 | 12:07 | 04:09 | 16:30 | |
| 09 | 06:54 | 07:06 | 12:07 | 04:51 | 17:12 | |

January 10, 11, 12 UT (Sat., Sun., Mon.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------|----------------------|----------|----------|--------------------|----------|----------|--------------------|---------|-----|--------------------|--------|--|--|
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 109°32.0 | 177°11.8 | S22°41.0 | 178°09.7 | S22°56.4 | 357°41.2 | N22°11.0 | 111°37.5 | S03°20.3 | | | | | | |
| 1 | 124°34.5 | 192°10.9 | 40.6 | 193°10.1 | 56.1 | 12°44.0 | 11.0 | 126°39.8 | 20.2 | | | | | | |
| 2 | 139°36.9 | 207°10.0 | 40.2 | 208°10.5 | 55.8 | 27°46.8 | 11.1 | 141°42.2 | 20.1 | | | | | | |
| 3 | 154°39.4 | 222°09.1 | · · 39.8 | 223°10.9 | · · 55.6 | 42°49.6 | · · 11.1 | 156°44.5 | · · 20.0 | | | | | | |
| 4 | 169°41.9 | 237°08.1 | 39.4 | 238°11.2 | 55.3 | 57°52.5 | 11.2 | 171°46.8 | 20.0 | | | | | | |
| 5 | 184°44.3 | 252°07.2 | 39.0 | 253°11.6 | 55.0 | 72°55.3 | 11.3 | 186°49.1 | 19.9 | | | | | | |
| 6 | 199°46.8 | 267°06.3 | S22°38.6 | 268°12.0 | S22°54.7 | 87°58.1 | N22°11.3 | 201°51.4 | S03°19.8 | | | | | | |
| 7 | 214°49.2 | 282°05.4 | 38.2 | 283°12.4 | 54.5 | 103°00.9 | 11.4 | 216°53.7 | 19.7 | | | | | | |
| 8 | 229°51.7 | 297°04.5 | 37.8 | 298°12.8 | 54.2 | 118°03.8 | 11.4 | 231°56.0 | 19.6 | | | | | | |
| 9 | 244°54.2 | 312°03.6 | · · 37.4 | 313°13.2 | · · 53.9 | 133°06.6 | · · 11.5 | 246°58.3 | · · 19.6 | | | | | | |
| 10 | 259°56.6 | 327°02.6 | 37.0 | 328°13.6 | 53.7 | 148°09.4 | 11.5 | 262°00.6 | 19.5 | | | | | | |
| 11 | 274°59.1 | 342°01.7 | 36.6 | 343°14.0 | 53.4 | 163°12.2 | 11.6 | 277°02.9 | 19.4 | | | | | | |
| 12 | 290°01.6 | 357°00.8 | S22°36.2 | 358°14.4 | S22°53.1 | 178°15.1 | N22°11.6 | 292°05.2 | S03°19.3 | | | | | | |
| 13 | 305°04.0 | 11°59.9 | 35.8 | 13°14.7 | 52.9 | 193°17.9 | 11.7 | 307°07.5 | 19.2 | | | | | | |
| 14 | 320°06.5 | 26°59.0 | 35.3 | 28°15.1 | 52.6 | 208°20.7 | 11.8 | 322°09.8 | 19.2 | | | | | | |
| 15 | 335°09.0 | 41°58.1 | · · 34.9 | 43°15.5 | · · 52.3 | 223°23.5 | · · 11.8 | 337°12.1 | · · 19.1 | | | | | | |
| 16 | 350°11.4 | 56°57.2 | 34.5 | 58°15.9 | 52.0 | 238°26.3 | 11.9 | 352°14.4 | 19.0 | | | | | | |
| 17 | 5°13.9 | 71°56.2 | 34.1 | 73°16.3 | 51.8 | 253°29.2 | 11.9 | 7°16.7 | 18.9 | | | | | | |
| 18 | 20°16.3 | 86°55.3 | S22°33.7 | 88°16.7 | S22°51.5 | 268°32.0 | N22°12.0 | 22°19.0 | S03°18.9 | | | | | | |
| 19 | 35°18.8 | 101°54.4 | 33.3 | 103°17.1 | 51.2 | 283°34.8 | 12.0 | 37°21.3 | 18.8 | | | | | | |
| 20 | 50°21.3 | 116°53.5 | 32.9 | 118°17.5 | 50.9 | 298°37.6 | 12.1 | 52°23.6 | 18.7 | | | | | | |
| 21 | 65°23.7 | 131°52.6 | · · 32.4 | 133°17.9 | · · 50.7 | 313°40.5 | · · 12.1 | 67°25.9 | · · 18.6 | | | | | | |
| 22 | 80°26.2 | 146°51.7 | 32.0 | 148°18.3 | 50.4 | 328°43.3 | 12.2 | 82°28.2 | 18.5 | | | | | | |
| 23 | 95°28.7 | 161°50.8 | 31.6 | 163°18.6 | 50.1 | 343°46.1 | 12.2 | 97°30.5 | 18.5 | | | | | | |
| Mer.pass. 16:39 | | | ν-0.9' d-0.4' m-3.90 | | | ν0.4' d-0.3' m1.09 | | | ν2.8' d0.1' m-2.68 | | | ν2.3' d-0.1' m1.02 | | | |

| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
|-----------------|----------|----------|----------------------|----------|----------|--------------------|----------|----------|--------------------|--|--|--------------------|--|--|
| 0 | 110°31.1 | 176°49.9 | S22°31.2 | 178°19.0 | S22°49.8 | 358°48.9 | N22°12.3 | 112°32.8 | S03°18.4 | | | | | |
| 1 | 125°33.6 | 191°49.0 | 30.8 | 193°19.4 | 49.6 | 13°51.8 | 12.4 | 127°35.1 | 18.3 | | | | | |
| 2 | 140°36.1 | 206°48.0 | 30.3 | 208°19.8 | 49.3 | 28°54.6 | 12.4 | 142°37.4 | 18.2 | | | | | |
| 3 | 155°38.5 | 221°47.1 | · · 29.9 | 223°20.2 | · · 49.0 | 43°57.4 | · · 12.5 | 157°39.7 | · · 18.1 | | | | | |
| 4 | 170°41.0 | 236°46.2 | 29.5 | 238°20.6 | 48.7 | 59°00.2 | 12.5 | 172°42.0 | 18.1 | | | | | |
| 5 | 185°43.5 | 251°45.3 | 29.0 | 253°21.0 | 48.4 | 74°03.1 | 12.6 | 187°44.3 | 18.0 | | | | | |
| 6 | 200°45.9 | 266°44.4 | S22°28.6 | 268°21.4 | S22°48.2 | 89°05.9 | N22°12.6 | 202°46.6 | S03°17.9 | | | | | |
| 7 | 215°48.4 | 281°43.5 | 28.2 | 283°21.8 | 47.9 | 104°08.7 | 12.7 | 217°48.9 | 17.8 | | | | | |
| 8 | 230°50.8 | 296°42.6 | 27.8 | 298°22.2 | 47.6 | 119°11.5 | 12.7 | 232°51.2 | 17.7 | | | | | |
| 9 | 245°53.3 | 311°41.7 | · · 27.3 | 313°22.5 | · · 47.3 | 134°14.4 | · · 12.8 | 247°53.5 | · · 17.7 | | | | | |
| 10 | 260°55.8 | 326°40.8 | 26.9 | 328°22.9 | 47.0 | 149°17.2 | 12.9 | 262°55.8 | 17.6 | | | | | |
| 11 | 275°58.2 | 341°39.9 | 26.5 | 343°23.3 | 46.8 | 164°20.0 | 12.9 | 277°58.1 | 17.5 | | | | | |
| 12 | 291°00.7 | 356°39.0 | S22°26.0 | 358°23.7 | S22°46.5 | 179°22.8 | N22°13.0 | 293°00.4 | S03°17.4 | | | | | |
| 13 | 306°03.2 | 11°38.1 | 25.6 | 13°24.1 | 46.2 | 194°25.6 | 13.0 | 308°02.7 | 17.3 | | | | | |
| 14 | 321°05.6 | 26°37.2 | 25.1 | 28°24.5 | 45.9 | 209°28.5 | 13.1 | 323°05.0 | 17.3 | | | | | |
| 15 | 336°08.1 | 41°36.3 | · · 24.7 | 43°24.9 | · · 45.6 | 224°31.3 | · · 13.1 | 338°07.2 | · · 17.2 | | | | | |
| 16 | 351°10.6 | 56°35.4 | 24.3 | 58°25.3 | 45.3 | 239°34.1 | 13.2 | 353°09.5 | 17.1 | | | | | |
| 17 | 6°13.0 | 71°34.5 | 23.8 | 73°25.7 | 45.1 | 254°36.9 | 13.2 | 8°11.8 | 17.0 | | | | | |
| 18 | 21°15.5 | 86°33.5 | S22°23.4 | 88°26.1 | S22°44.8 | 269°39.8 | N22°13.3 | 23°14.1 | S03°16.9 | | | | | |
| 19 | 36°18.0 | 101°32.6 | 22.9 | 103°26.4 | 44.5 | 284°42.6 | 13.4 | 38°16.4 | 16.9 | | | | | |
| 20 | 51°20.4 | 116°31.7 | 22.5 | 118°26.8 | 44.2 | 299°45.4 | 13.4 | 53°18.7 | 16.8 | | | | | |
| 21 | 66°22.9 | 131°30.8 | · · 22.0 | 133°27.2 | · · 43.9 | 314°48.2 | · · 13.5 | 68°21.0 | · · 16.7 | | | | | |
| 22 | 81°25.3 | 146°29.9 | 21.6 | 148°27.6 | 43.6 | 329°51.1 | 13.5 | 83°23.3 | 16.6 | | | | | |
| 23 | 96°27.8 | 161°29.0 | 21.1 | 163°28.0 | 43.3 | 344°53.9 | 13.6 | 98°25.6 | 16.5 | | | | | |
| Mer.pass. 16:35 | | | ν-0.9' d-0.4' m-3.90 | | | ν0.4' d-0.3' m1.09 | | | ν2.8' d0.1' m-2.68 | | | ν2.3' d-0.1' m1.02 | | |

| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
|-----------------|----------|----------|----------------------|----------|----------|--------------------|----------|----------|--------------------|--|--|--------------------|--|--|
| 0 | 111°30.3 | 176°28.1 | S22°20.7 | 178°28.4 | S22°43.1 | 359°56.7 | N22°13.6 | 113°27.9 | S03°16.5 | | | | | |
| 1 | 126°32.7 | 191°27.2 | 20.2 | 193°28.8 | 42.8 | 14°59.5 | 13.7 | 128°30.2 | 16.4 | | | | | |
| 2 | 141°35.2 | 206°26.3 | 19.8 | 208°29.2 | 42.5 | 30°02.4 | 13.7 | 143°32.5 | 16.3 | | | | | |
| 3 | 156°37.7 | 221°25.4 | · · 19.3 | 223°29.6 | · · 42.2 | 45°05.2 | · · 13.8 | 158°34.8 | · · 16.2 | | | | | |
| 4 | 171°40.1 | 236°24.5 | 18.9 | 238°30.0 | 41.9 | 60°08.0 | 13.8 | 173°37.1 | 16.1 | | | | | |
| 5 | 186°42.6 | 251°23.6 | 18.4 | 253°30.4 | 41.6 | 75°10.8 | 13.9 | 188°39.4 | 16.1 | | | | | |
| 6 | 201°45.1 | 266°22.7 | S22°18.0 | 268°30.8 | S22°41.3 | 90°13.6 | N22°14.0 | 203°41.7 | S03°16.0 | | | | | |
| 7 | 216°47.5 | 281°21.8 | 17.5 | 283°31.1 | 41.0 | 105°16.5 | 14.0 | 218°44.0 | 15.9 | | | | | |
| 8 | 231°50.0 | 296°20.9 | 17.0 | 298°31.5 | 40.7 | 120°19.3 | 14.1 | 233°46.3 | 15.8 | | | | | |
| 9 | 246°52.4 | 311°20.0 | · · 16.6 | 313°31.9 | · · 40.4 | 135°22.1 | · · 14.1 | 248°48.6 | · · 15.7 | | | | | |
| 10 | 261°54.9 | 326°19.1 | 16.1 | 328°32.3 | 40.2 | 150°24.9 | 14.2 | 263°50.9 | 15.6 | | | | | |
| 11 | 276°57.4 | 341°18.2 | 15.6 | 343°32.7 | 39.9 | 165°27.8 | 14.2 | 278°53.2 | 15.6 | | | | | |
| 12 | 291°59.8 | 356°17.3 | S22°15.2 | 358°33.1 | S22°39.6 | 180°30.6 | N22°14.3 | 293°55.5 | S03°15.5 | | | | | |
| 13 | 307°02.3 | 11°16.5 | 14.7 | 13°33.5 | 39.3 | 195°33.4 | 14.3 | 308°57.8 | 15.4 | | | | | |
| 14 | 322°04.8 | 26°15.6 | 14.2 | 28°33.9 | 39.0 | 210°36.2 | 14.4 | 324°00.1 | 15.3 | | | | | |
| 15 | 337°07.2 | 41°14.7 | · · 13.8 | 43°34.3 | · · 38.7 | 225°39.1 | · · 14.4 | 339°02.3 | · · 15.2 | | | | | |
| 16 | 352°09.7 | 56°13.8 | 13.3 | 58°34.7 | 38.4 | 240°41.9 | 14.5 | 354°04.6 | 15.2 | | | | | |
| 17 | 7°12.2 | 71°12.9 | 12.8 | 73°35.1 | 38.1 | 255°44.7 | 14.6 | 9°06.9 | 15.1 | | | | | |
| 18 | 22°14.6 | 86°12.0 | S22°12.4 | 88°35.5 | S22°37.8 | 270°47.5 | N22°14.6 | 24°09.2 | S03°15.0 | | | | | |
| 19 | 37°17.1 | 101°11.1 | 11.9 | 103°35.9 | 37.5 | 285°50.3 | 14.7 | 39°11.5 | 14.9 | | | | | |
| 20 | 52°19.6 | 116°10.2 | 11.4 | 118°36.3 | 37.2 | 300°53.2 | 14.7 | 54°13.8 | 14.8 | | | | | |
| 21 | 67°22.0 | 131°09.3 | · · 10.9 | 133°36.6 | · · 36.9 | 315°56.0 | · · 14.8 | 69°16.1 | · · 14.7 | | | | | |
| 22 | 82°24.5 | 146°08.4 | 10.5 | 148°37.0 | 36.6 | 330°58.8 | 14.8 | 84°18.4 | 14.7 | | | | | |
| 23 | 97°26.9 | 161°07.5 | 10.0 | 163°37.4 | 36.3 | 346°01.6 | 14.9 | 99°20.7 | 14.6 | | | | | |
| Mer.pass. 16:31 | | | ν-0.9' d-0.5' m-3.90 | | | ν0.4' d-0.3' m1.09 | | | ν2.8' d0.1' m-2.68 | | | ν2.3' d-0.1' m1.02 | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°34.0 | 29°14.2 |
| Ankaa | 353°06.4 | -42°10.1 |
| Schedar | 349°30.2 | 56°41.1 |
| Diphda | 348°46.5 | -17°50.7 |
| Achernar | 335°19.5 | -57°06.5 |
| Hamal | 327°50.2 | 23°35.3 |
| Polaris | 313°21.4 | 89°22.7 |
| Acamar | 315°10.9 | -40°12.2 |
| Menkar | 314°05.1 | 4°11.5 |
| Mirfak | 308°26.8 | 49°57.4 |
| Aldebaran | 290°38.4 | 16°33.7 |
| Rigel | 281°02.8 | -8°10.3 |
| Capella | 280°20.2 | 46°01.5 |
| Bellatrix | 278°21.7 | 6°22.4 |
| Elnath | 278°00.5 | 28°37.8 |
| Alnilam | 275°36.6 | -1°11.2 |
| Betelgeuse | 270°50.8 | 7°24.7 |
| Canopus | 263°51.5 | -52°42.6 |
| Sirius | 258°25.1 | -16°45.2 |
| Adhara | 255°04.8 | -29°00.5 |
| Procyon | 244°49.6 | 5°09.4 |
| Pollux | 243°15.9 | 27°57.7 |
| Avior | 234°13.8 | -59°35.5 |
| Suhail | 222°45.3 | -43°32.2 |
| Miaplacidus | 221°37.3 | -69°49.3 |
| Alphard | 217°46.6 | -8°46.3 |
| Regulus | 207°33.3 | 11°50.3 |
| Dubhe | 193°39.6 | 61°36.3 |
| Denebola | 182°24.0 | 14°25.4 |
| Gienah | 175°42.6 | -17°41.2 |
| Acrux | 172°59.0 | -63°14.4 |
| Gacrux | 171°50.6 | -57°15.3 |
| Alioth | 166°12.2 | 55°48.8 |
| Spica | 158°21.4 | -11°17.9 |
| Alkaid | 152°51.4 | 49°10.7 |
| Hadar | 148°35.0 | -60°29.7 |
| Menkent | 147°56.7 | -36°29.8 |
| Arcturus | 145°47.2 | 19°02.6 |
| Rigel Kent. | 139°39.4 | -60°56.3 |
| Kochab | 137°20.3 | 74°02.5 |
| Zuben'ubi | 136°55.2 | -16°09.0 |
| Alphecca | 126°03.2 | 26°37.4 |
| Antares | 112°15.1 | -26°29.3 |
| Atria | 107°09.0 | -69°04.3 |
| Sabik | 102°02.1 | -15°45.4 |
| Shaula | 96°09.6 | -37°07.3 |
| Rasalhague | 95°58.1 | 12°32.4 |
| Eltanin | 90°42.3 | 51°28.9 |
| Kaus Aust. | 83°31.8 | -34°22.3 |
| Vega | 80°33.1 | 38°48.4 |
| Nunki | 75°47.1 | -26°15.9 |
| Altair | 61°59.5 | 8°56.2 |
| Peacock | 53°05.0 | -56°39.2 |
| Deneb | 49°25.7 | 45°22.4 |
| Enif | 33°38.2 | 9°59.7 |
| Al Na'ir | 27°32.2 | -46°50.3 |
| Fomalhaut | 15°13.8 | -29°29.2 |
| Scheat | 13°44.6 | 28°13.6 |
| Markab | 13°29.2 | 15°20.8 |

| Jan 10 Sat | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 67°39.8 | 12:12 |
| Mars | 68°37.7 | 12:07 |
| Jupiter | 248°09.2 | 00:09 |
| Saturn | 2°05.6 | 16:31 |

| Jan 11 Sun | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 66°18.7 | 12:13 |
| Mars | 67°47.9 | 12:06 |
| Jupiter | 248°17.8 | 00:05 |
| Saturn | 2°01.6 | 16:27 |

| Jan 12 Mon | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 64°57.9 | 12:15 |
| Mars | 66°58.1 | 12:06 |
| Jupiter | 248°26.4 | 00:00 |
| Saturn | 1°57.7 | 16:24 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.1 |
| Mars: | 0.1 |

| h | Sun | | | Moon | | | |
|------------------------|----------|----------|------------|----------|-------|----------|-------------|
| Sat | GHA | Dec | | GHA | ν | Dec | d HP |
| 0 | 178°10.4 | S21°59.2 | | 279°13.3 | 15.9' | S07°24.2 | 14.1' 55.2' |
| 1 | 193°10.2 | 58.8 | | 293°48.2 | 15.9' | 07°38.3 | 14.1' 55.2' |
| 2 | 208°09.9 | 58.5 | | 308°23.2 | 15.9' | 07°52.4 | 14.0' 55.2' |
| 3 | 223°09.7 | 58.1 | · · | 322°58.1 | 15.9' | 08°06.5 | 14.0' 55.2' |
| 4 | 238°09.4 | 57.7 | | 337°33.0 | 15.9' | 08°20.5 | 14.0' 55.1' |
| 5 | 253°09.2 | 57.3 | | 352°07.9 | 15.9' | 08°34.4 | 13.9' 55.1' |
| 6 | 268°08.9 | S21°57.0 | | 6°42.8 | 15.9' | S08°48.3 | 13.9' 55.1' |
| 7 | 283°08.7 | 56.6 | | 21°17.7 | 15.9' | 09°02.2 | 13.8' 55.1' |
| 8 | 298°08.4 | 56.2 | | 35°52.6 | 15.9' | 09°16.0 | 13.8' 55.0' |
| 9 | 313°08.2 | 55.8 | · · | 50°27.5 | 15.9' | 09°29.8 | 13.7' 55.0' |
| 10 | 328°07.9 | 55.5 | | 65°02.4 | 15.9' | 09°43.5 | 13.7' 55.0' |
| 11 | 343°07.7 | 55.1 | | 79°37.2 | 15.8' | 09°57.2 | 13.6' 55.0' |
| 12 | 358°07.4 | S21°54.7 | | 94°12.1 | 15.8' | S10°10.8 | 13.6' 54.9' |
| 13 | 13°07.2 | 54.3 | | 108°46.9 | 15.8' | 10°24.4 | 13.5' 54.9' |
| 14 | 28°06.9 | 54.0 | | 123°21.7 | 15.8' | 10°37.9 | 13.5' 54.9' |
| 15 | 43°06.7 | 53.6 | · · | 137°56.5 | 15.8' | 10°51.4 | 13.4' 54.9' |
| 16 | 58°06.4 | 53.2 | | 152°31.2 | 15.7' | 11°04.8 | 13.4' 54.9' |
| 17 | 73°06.2 | 52.8 | | 167°06.0 | 15.7' | 11°18.2 | 13.3' 54.8' |
| 18 | 88°05.9 | S21°52.4 | | 181°40.7 | 15.7' | S11°31.5 | 13.3' 54.8' |
| 19 | 103°05.7 | 52.1 | | 196°15.4 | 15.7' | 11°44.8 | 13.2' 54.8' |
| 20 | 118°05.4 | 51.7 | | 210°50.1 | 15.7' | 11°58.0 | 13.2' 54.8' |
| 21 | 133°05.2 | 51.3 | · · | 225°24.8 | 15.6' | 12°11.1 | 13.1' 54.7' |
| 22 | 148°04.9 | 50.9 | | 239°59.4 | 15.6' | 12°24.2 | 13.0' 54.7' |
| 23 | 163°04.7 | 50.5 | | 254°34.0 | 15.6' | 12°37.3 | 13.0' 54.7' |
| SD = 16.3' $d = -0.4'$ | | | SD = 15.1' | | | | |

| Sun | GHA | Dec | | GHA | ν | Dec | d HP |
|------------------------|----------|----------|------------|----------|-------|----------|-------------|
| 0 | 178°04.4 | S21°50.1 | | 269°08.6 | 15.6' | S12°50.3 | 12.9' 54.7' |
| 1 | 193°04.2 | 49.7 | | 283°43.1 | 15.5' | 13°03.2 | 12.9' 54.7' |
| 2 | 208°03.9 | 49.4 | | 298°17.7 | 15.5' | 13°16.0 | 12.8' 54.6' |
| 3 | 223°03.7 | 49.0 | · · | 312°52.2 | 15.5' | 13°28.9 | 12.7' 54.6' |
| 4 | 238°03.4 | 48.6 | | 327°26.6 | 15.4' | 13°41.6 | 12.7' 54.6' |
| 5 | 253°03.2 | 48.2 | | 342°01.1 | 15.4' | 13°54.3 | 12.6' 54.6' |
| 6 | 268°02.9 | S21°47.8 | | 356°35.5 | 15.4' | S14°06.9 | 12.6' 54.6' |
| 7 | 283°02.7 | 47.4 | | 11°09.8 | 15.3' | 14°19.5 | 12.5' 54.6' |
| 8 | 298°02.4 | 47.0 | | 25°44.1 | 15.3' | 14°32.0 | 12.4' 54.5' |
| 9 | 313°02.2 | 46.6 | · · | 40°18.4 | 15.3' | 14°44.4 | 12.4' 54.5' |
| 10 | 328°01.9 | 46.2 | | 54°52.7 | 15.2' | 14°56.8 | 12.3' 54.5' |
| 11 | 343°01.7 | 45.8 | | 69°26.9 | 15.2' | 15°09.1 | 12.2' 54.5' |
| 12 | 358°01.4 | S21°45.4 | | 84°01.1 | 15.1' | S15°21.3 | 12.2' 54.5' |
| 13 | 13°01.2 | 45.0 | | 98°35.2 | 15.1' | 15°33.5 | 12.1' 54.5' |
| 14 | 28°01.0 | 44.6 | | 113°09.3 | 15.1' | 15°45.6 | 12.0' 54.4' |
| 15 | 43°00.7 | 44.2 | · · | 127°43.4 | 15.0' | 15°57.6 | 12.0' 54.4' |
| 16 | 58°00.5 | 43.8 | | 142°17.4 | 15.0' | 16°09.6 | 11.9' 54.4' |
| 17 | 73°00.2 | 43.4 | | 156°51.4 | 14.9' | 16°21.5 | 11.8' 54.4' |
| 18 | 88°00.0 | S21°43.0 | | 171°25.3 | 14.9' | S16°33.3 | 11.8' 54.4' |
| 19 | 102°59.7 | 42.6 | | 185°59.2 | 14.8' | 16°45.0 | 11.7' 54.4' |
| 20 | 117°59.5 | 42.2 | | 200°33.1 | 14.8' | 16°56.7 | 11.6' 54.4' |
| 21 | 132°59.3 | 41.8 | · · | 215°06.9 | 14.8' | 17°08.3 | 11.5' 54.3' |
| 22 | 147°59.0 | 41.4 | | 229°40.6 | 14.7' | 17°19.9 | 11.5' 54.3' |
| 23 | 162°58.8 | 41.0 | | 244°14.3 | 14.7' | 17°31.3 | 11.4' 54.3' |
| SD = 16.3' $d = -0.4'$ | | | SD = 14.9' | | | | |

| Mon | GHA | Dec | | GHA | ν | Dec | d HP |
|------------------------|----------|----------|------------|----------|-------|----------|-------------|
| 0 | 177°58.5 | S21°40.6 | | 258°48.0 | 14.6' | S17°42.7 | 11.3' 54.3' |
| 1 | 192°58.3 | 40.2 | | 273°21.6 | 14.6' | 17°54.1 | 11.2' 54.3' |
| 2 | 207°58.0 | 39.8 | | 287°55.2 | 14.5' | 18°05.3 | 11.2' 54.3' |
| 3 | 222°57.8 | 39.4 | · · | 302°28.7 | 14.5' | 18°16.5 | 11.1' 54.3' |
| 4 | 237°57.6 | 39.0 | | 317°02.1 | 14.4' | 18°27.6 | 11.0' 54.2' |
| 5 | 252°57.3 | 38.6 | | 331°35.5 | 14.4' | 18°38.6 | 10.9' 54.2' |
| 6 | 267°57.1 | S21°38.2 | | 346°08.9 | 14.3' | S18°49.5 | 10.9' 54.2' |
| 7 | 282°56.8 | 37.8 | | 0°42.2 | 14.2' | 19°00.3 | 10.8' 54.2' |
| 8 | 297°56.6 | 37.4 | | 15°15.4 | 14.2' | 19°11.1 | 10.7' 54.2' |
| 9 | 312°56.4 | 37.0 | · · | 29°48.6 | 14.1' | 19°21.8 | 10.6' 54.2' |
| 10 | 327°56.1 | 36.6 | | 44°21.8 | 14.1' | 19°32.4 | 10.5' 54.2' |
| 11 | 342°55.9 | 36.1 | | 58°54.8 | 14.0' | 19°42.9 | 10.4' 54.2' |
| 12 | 357°55.6 | S21°35.7 | | 73°27.9 | 14.0' | S19°53.4 | 10.4' 54.2' |
| 13 | 12°55.4 | 35.3 | | 88°00.8 | 13.9' | 20°03.8 | 10.3' 54.2' |
| 14 | 27°55.2 | 34.9 | | 102°33.8 | 13.9' | 20°14.0 | 10.2' 54.1' |
| 15 | 42°54.9 | 34.5 | · · | 117°06.6 | 13.8' | 20°24.2 | 10.1' 54.1' |
| 16 | 57°54.7 | 34.1 | | 131°39.4 | 13.7' | 20°34.3 | 10.0' 54.1' |
| 17 | 72°54.4 | 33.7 | | 146°12.2 | 13.7' | 20°44.3 | 9.9' 54.1' |
| 18 | 87°54.2 | S21°33.2 | | 160°44.8 | 13.6' | S20°54.3 | 9.8' 54.1' |
| 19 | 102°54.0 | 32.8 | | 175°17.5 | 13.6' | 21°04.1 | 9.8' 54.1' |
| 20 | 117°53.7 | 32.4 | | 189°50.0 | 13.5' | 21°13.9 | 9.7' 54.1' |
| 21 | 132°53.5 | 32.0 | · · | 204°22.5 | 13.4' | 21°23.5 | 9.6' 54.1' |
| 22 | 147°53.3 | 31.6 | | 218°55.0 | 13.4' | 21°33.1 | 9.5' 54.1' |
| 23 | 162°53.0 | 31.1 | | 233°27.3 | 13.3' | 21°42.6 | 9.4' 54.1' |
| SD = 16.3' $d = -0.4'$ | | | SD = 14.8' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 08:09 | 10:07 | ■ | ■ | 14:09 | 16:07 |
| N 70° | 07:53 | 09:29 | ■ | ■ | 14:48 | 16:23 |
| 68° | 07:40 | 09:02 | 10:53 | 13:24 | 15:15 | 16:36 |
| 66° | 07:29 | 08:41 | 10:05 | 14:12 | 15:35 | 16:47 |
| 64° | 07:20 | 08:25 | 09:34 | 14:42 | 15:52 | 16:57 |
| 62° | 07:12 | 08:11 | 09:11 | 15:05 | 16:05 | 17:05 |
| 60° | 07:04 | 07:59 | 08:53 | 15:23 | 16:17 | 17:12 |
| N 58° | 06:58 | 07:49 | 08:38 | 15:38 | 16:27 | 17:18 |
| 56° | 06:52 | 07:40 | 08:25 | 15:51 | 16:36 | 17:24 |
| 54° | 06:47 | 07:32 | 08:14 | 16:02 | 16:44 | 17:29 |
| 52° | 06:42 | 07:25 | 08:04 | 16:12 | 16:52 | 17:34 |
| 50° | 06:37 | 07:18 | 07:55 | 16:21 | 16:58 | 17:39 |
| 45° | 06:27 | 07:04 | 07:37 | 16:40 | 17:13 | 17:49 |
| N 40° | 06:18 | 06:51 | 07:21 | 16:55 | 17:25 | 17:58 |
| 35° | 06:09 | 06:41 | 07:08 | 17:08 | 17:35 | 18:07 |
| 30° | 06:01 | 06:31 | 06:57 | 17:19 | 17:45 | 18:15 |
| 20° | 05:47 | 06:14 | 06:37 | 17:38 | 18:02 | 18:29 |
| N 10° | 05:32 | 05:58 | 06:20 | 17:56 | 18:18 | 18:44 |
| 0° | 05:16 | 05:42 | 06:04 | 18:12 | 18:34 | 19:00 |
| S 10° | 04:58 | 05:25 | 05:48 | 18:28 | 18:51 | 19:17 |
| 20° | 04:37 | 05:06 | 05:30 | 18:45 | 19:09 | 19:38 |
| 30° | 04:11 | 04:43 | 05:10 | 19:05 | 19:32 | 20:05 |
| 35° | 03:53 | 04:29 | 04:58 | 19:17 | 19:46 | 20:22 |
| 40° | 03:32 | 04:12 | 04:44 | 19:31 | 20:03 | 20:43 |
| 45° | 03:05 | 03:52 | 04:28 | 19:47 | 20:23 | 21:10 |
| S 50° | 02:25 | 03:25 | 04:07 | 20:08 | 20:50 | 21:49 |
| 52° | 02:03 | 03:12 | 03:58 | 20:17 | 21:03 | 22:11 |
| 54° | 01:33 | 02:56 | 03:47 | 20:28 | 21:19 | 22:41 |
| 56° | 00:32 | 02:37 | 03:34 | 20:41 | 21:37 | 23:35 |
| 58° | //// | 02:14 | 03:19 | 20:55 | 22:00 | //// |
| S 60° | //// | 01:41 | 03:02 | 21:12 | 22:32 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | 01:04 | 03:23 | ■ | 09:32 | 08:41 | ■ |
| N 70° | 00:52 | 02:54 | 05:33 | 09:46 | 09:12 | 08:03 |
| 68° | 00:42 | 02:33 | 04:40 | 09:58 | 09:34 | 08:57 |
| 66° | 00:34 | 02:17 | 04:08 | 10:08 | 09:52 | 09:30 |
| 64° | 00:28 | 02:04 | 03:45 | 10:16 | 10:07 | 09:55 |
| 62° | 00:22 | 01:53 | 03:26 | 10:24 | 10:19 | 10:14 |
| 60° | 00:17 | 01:43 | 03:11 | 10:30 | 10:29 | 10:30 |
| N 58° | 00:13 | 01:35 | 02:58 | 10:35 | 10:39 | 10:43 |
| 56° | 00:09 | 01:28 | 02:47 | 10:40 | 10:47 | 10:55 |
| 54° | 00:05 | 01:21 | 02:38 | 10:45 | 10:54 | 11:05 |
| 52° | 00:02 | 01:16 | 02:29 | 10:49 | 11:00 | 11:15 |
| 50° | · · | 01:10 | 02:22 | 10:53 | 11:06 | 11:23 |
| 45° | · · | 00:59 | 02:05 | 11:01 | 11:19 | 11:40 |
| N 40° | · · | 00:50 | 01:52 | 11:07 | 11:30 | 11:55 |
| 35° | · · | 00:42 | 01:41 | 11:13 | 11:39 | 12:07 |
| 30° | · · | 00:35 | 01:31 | 11:18 | 11:47 | 12:18 |
| 20° | · · | 00:24 | 01:14 | 11:27 | 12:01 | 12:36 |
| N 10° | · · | 00:13 | 01:00 | 11:35 | 12:13 | 12:53 |
| 0° | · · | 00:04 | 00:47 | 11:42 | 12:24 | 13:08 |
| S 10° | 23:54 | · · | 00:33 | 11:50 | 12:36 | 13:23 |
| 20° | 23:44 | · · | 00:19 | 11:58 | 12:48 | 13:39 |
| 30° | 23:33 | · · | 00:03 | 12:07 | 13:02 | 13:58 |
| 35° | 23:27 | 23:53 | · · | 12:12 | 13:11 | 14:09 |
| 40° | 23:19 | 23:43 | · · | 12:18 | 13:20 | 14:22 |
| 45° | 23:11 | 23:30 | 23:54 | 12:25 | 13:31 | 14:37 |
| S 50° | 23:00 | 23:15 | 23:34 | 12:34 | 13:45 | 14:56 |
| 52° | 22:56 | 23:08 | 23:25 | 12:38 | 13:51 | 15:05 |
| 54° | 22:51 | 23:01 | 23:14 | 12:42 | 13:58 | 15:15 |
| 56° | 22:45 | 22:52 | 23:02 | 12:47 | 14:06 | 15:26 |
| 58° | 22:38 | 22:42 | 22:49 | 12:52 | 14:15 | 15:39 |
| S 60° | 22:31 | 22:31 | 22:33 | 12:58 | 14:25 | 15:54 |

| Day | Sun | | Mer. Pass | Moon | | Age 21-23 57-37% |
|-----|------------------------------|----------------------------|-----------|-----------------------|-------------|------------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 10 | 07:18 | 07:30 | 12:08 | 05:32 | 17:53 | |
| 11 | 07:42 | 07:54 | 12:08 | 06:14 | 18:35 | |
| 12 | 08:06 | 08:17 | 12:08 | 06:57 | 19:19 | |

January 13, 14, 15 UT (Tue., Wed., Thu.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|----------------------|----------|----------|--------------------|----------|----------|--------------------|----------|----------|--------------------|--------|-----|--|-------------|-------------------|--|
| Tue | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | | SHA | Dec | |
| 0 | 112°29.4 | 176°06.6 | S22°09.5 | 178°37.8 | S22°36.0 | | 1°04.5 | N22°14.9 | | 114°23.0 | S03°14.5 | | | | | Alpheratz | 357°34.0 29°14.2 | |
| 1 | 127°31.9 | 191°05.7 | 09.0 | 193°38.2 | 35.7 | | 16°07.3 | 15.0 | | 129°25.3 | 14.4 | | | | | Ankaa | 353°06.4 -42°10.1 | |
| 2 | 142°34.3 | 206°04.8 | 08.5 | 208°38.6 | 35.4 | | 31°10.1 | 15.0 | | 144°27.6 | 14.3 | | | | | Schedar | 349°30.2 56°41.1 | |
| 3 | 157°36.8 | 221°03.9 | · · 08.1 | 223°39.0 | · · 35.1 | | 46°12.9 | · · 15.1 | | 159°29.9 | · · 14.3 | | | | | Diphda | 348°46.5 -17°50.7 | |
| 4 | 172°39.3 | 236°03.1 | 07.6 | 238°39.4 | 34.8 | | 61°15.8 | 15.2 | | 174°32.2 | 14.2 | | | | | Achernar | 335°19.5 -57°06.5 | |
| 5 | 187°41.7 | 251°02.2 | 07.1 | 253°39.8 | 34.5 | | 76°18.6 | 15.2 | | 189°34.5 | 14.1 | | | | | Hamal | 327°50.2 23°35.2 | |
| 6 | 202°44.2 | 266°01.3 | S22°06.6 | 268°40.2 | S22°34.2 | | 91°21.4 | N22°15.3 | | 204°36.7 | S03°14.0 | | | | | Polaris | 313°22.5 89°22.7 | |
| 7 | 217°46.7 | 281°00.4 | 06.1 | 283°40.6 | 33.9 | | 106°24.2 | 15.3 | | 219°39.0 | 13.9 | | | | | Acamar | 315°10.9 -40°12.2 | |
| 8 | 232°49.1 | 295°59.5 | 05.6 | 298°41.0 | 33.6 | | 121°27.0 | 15.4 | | 234°41.3 | 13.8 | | | | | Menkar | 314°05.1 4°11.5 | |
| 9 | 247°51.6 | 310°58.6 | · · 05.1 | 313°41.4 | · · 33.3 | | 136°29.9 | · · 15.4 | | 249°43.6 | · · 13.8 | | | | | Mirfak | 308°26.8 49°57.4 | |
| 10 | 262°54.1 | 325°57.7 | 04.7 | 328°41.8 | 33.0 | | 151°32.7 | 15.5 | | 264°45.9 | 13.7 | | | | | Aldebaran | 290°38.4 16°33.7 | |
| 11 | 277°56.5 | 340°56.8 | 04.2 | 343°42.2 | 32.7 | | 166°35.5 | 15.5 | | 279°48.2 | 13.6 | | | | | Rigel | 281°02.8 -8°10.3 | |
| 12 | 292°59.0 | 355°55.9 | S22°03.7 | 358°42.6 | S22°32.4 | | 181°38.3 | N22°15.6 | | 294°50.5 | S03°13.5 | | | | | Capella | 280°20.2 46°01.5 | |
| 13 | 308°01.4 | 10°55.1 | 03.2 | 13°42.9 | 32.1 | | 196°41.2 | 15.6 | | 309°52.8 | 13.4 | | | | | Bellatrix | 278°21.7 6°22.4 | |
| 14 | 323°03.9 | 25°54.2 | 02.7 | 28°43.3 | 31.8 | | 211°44.0 | 15.7 | | 324°55.1 | 13.3 | | | | | Elnath | 278°00.5 28°37.8 | |
| 15 | 338°06.4 | 40°53.3 | · · 02.2 | 43°43.7 | · · 31.5 | | 226°46.8 | · · 15.7 | | 339°57.4 | · · 13.3 | | | | | Alnilam | 275°36.6 -1°11.2 | |
| 16 | 353°08.8 | 55°52.4 | 01.7 | 58°44.1 | 31.2 | | 241°49.6 | 15.8 | | 354°59.7 | 13.2 | | | | | Betelgeuse | 270°50.8 7°24.7 | |
| 17 | 8°11.3 | 70°51.5 | 01.2 | 73°44.5 | 30.9 | | 256°52.5 | 15.9 | | 10°02.0 | 13.1 | | | | | Canopus | 263°51.5 -52°42.6 | |
| 18 | 23°13.8 | 85°50.6 | S22°00.7 | 88°44.9 | S22°30.6 | | 271°55.3 | N22°15.9 | | 25°04.2 | S03°13.0 | | | | | Sirius | 258°25.1 -16°45.2 | |
| 19 | 38°16.2 | 100°49.7 | 22°00.2 | 103°45.3 | 30.3 | | 286°58.1 | 16.0 | | 40°06.5 | 12.9 | | | | | Adhara | 255°04.8 -29°00.5 | |
| 20 | 53°18.7 | 115°48.9 | 21°59.7 | 118°45.7 | 30.0 | | 302°00.9 | 16.0 | | 55°08.8 | 12.9 | | | | | Procyon | 244°49.6 5°09.4 | |
| 21 | 68°21.2 | 130°48.0 | · · 59.2 | 133°46.1 | · · 29.7 | | 317°03.7 | · · 16.1 | | 70°11.1 | · · 12.8 | | | | | Pollux | 243°15.9 27°57.7 | |
| 22 | 83°23.6 | 145°47.1 | 58.7 | 148°46.5 | 29.3 | | 332°06.6 | 16.1 | | 85°13.4 | 12.7 | | | | | Avior | 234°13.8 -59°35.5 | |
| 23 | 98°26.1 | 160°46.2 | 58.2 | 163°46.9 | 29.0 | | 347°09.4 | 16.2 | | 100°15.7 | 12.6 | | | | | Suhail | 222°45.3 -43°32.2 | |
| Mer.pass. 16:27 | | | ν-0.9' d-0.5' m-3.90 | | | ν0.4' d-0.3' m1.09 | | | ν2.8' d0.1' m-2.68 | | | ν2.3' d-0.1' m1.02 | | | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | | | | |
| 0 | 113°28.5 | 175°45.3 | S21°57.7 | 178°47.3 | S22°28.7 | | 2°12.2 | N22°16.2 | | 115°18.0 | S03°12.5 | | | | | Regulus | 207°33.3 11°50.3 | |
| 1 | 128°31.0 | 190°44.4 | 57.2 | 193°47.7 | 28.4 | | 17°15.0 | 16.3 | | 130°20.3 | 12.4 | | | | | Dubhe | 193°39.5 61°36.3 | |
| 2 | 143°33.5 | 205°43.6 | 56.6 | 208°48.1 | 28.1 | | 32°17.9 | 16.3 | | 145°22.6 | 12.4 | | | | | Denebola | 182°23.9 14°25.4 | |
| 3 | 158°35.9 | 220°42.7 | · · 56.1 | 223°48.5 | · · 27.8 | | 47°20.7 | · · 16.4 | | 160°24.9 | · · 12.3 | | | | | Giennah | 175°42.6 -17°41.2 | |
| 4 | 173°38.4 | 235°41.8 | 55.6 | 238°48.9 | 27.5 | | 62°23.5 | 16.4 | | 175°27.1 | 12.2 | | | | | Acrux | 172°59.0 -63°14.4 | |
| 5 | 188°40.9 | 250°40.9 | 55.1 | 253°49.3 | 27.2 | | 77°26.3 | 16.5 | | 190°29.4 | 12.1 | | | | | Gacrux | 171°50.6 -57°15.3 | |
| 6 | 203°43.3 | 265°40.0 | S21°54.6 | 268°49.7 | S22°26.9 | | 92°29.1 | N22°16.6 | | 205°31.7 | S03°12.0 | | | | | Alioth | 166°12.1 55°48.8 | |
| 7 | 218°45.8 | 280°39.2 | 54.1 | 283°50.1 | 26.6 | | 107°32.0 | 16.6 | | 220°34.0 | 11.9 | | | | | Spica | 158°21.4 -11°17.9 | |
| 8 | 233°48.3 | 295°38.3 | 53.6 | 298°50.5 | 26.2 | | 122°34.8 | 16.7 | | 235°36.3 | 11.9 | | | | | Alkaid | 152°51.4 49°10.6 | |
| 9 | 248°50.7 | 310°37.4 | · · 53.0 | 313°50.9 | · · 25.9 | | 137°37.6 | · · 16.7 | | 250°38.6 | · · 11.8 | | | | | Hadar | 148°34.9 -60°29.7 | |
| 10 | 263°53.2 | 325°36.5 | 52.5 | 328°51.3 | 25.6 | | 152°40.4 | 16.8 | | 265°40.9 | 11.7 | | | | | Menkent | 147°56.7 -36°29.8 | |
| 11 | 278°55.7 | 340°35.6 | 52.0 | 343°51.6 | 25.3 | | 167°43.2 | 16.8 | | 280°43.2 | 11.6 | | | | | Arcturus | 145°47.2 19°02.6 | |
| 12 | 293°58.1 | 355°34.8 | S21°51.5 | 358°52.0 | S22°25.0 | | 182°46.1 | N22°16.9 | | 295°45.5 | S03°11.5 | | | | | Rigel Kent. | 139°39.3 -60°56.3 | |
| 13 | 309°00.6 | 10°33.9 | 51.0 | 13°52.4 | 24.7 | | 197°48.9 | 16.9 | | 310°47.7 | 11.4 | | | | | Kochab | 137°20.2 74°02.5 | |
| 14 | 324°03.0 | 25°33.0 | 50.4 | 28°52.8 | 24.4 | | 212°51.7 | 17.0 | | 325°50.0 | 11.3 | | | | | Zuben'ubi | 136°55.2 -16°09.0 | |
| 15 | 339°05.5 | 40°32.1 | · · 49.9 | 43°53.2 | · · 24.0 | | 227°54.5 | · · 17.0 | | 340°52.3 | · · 11.3 | | | | | Alphecca | 126°03.2 26°37.4 | |
| 16 | 354°08.0 | 55°31.3 | 49.4 | 58°53.6 | 23.7 | | 242°57.4 | 17.1 | | 355°54.6 | 11.2 | | | | | Antares | 112°15.1 -26°29.3 | |
| 17 | 9°10.4 | 70°30.4 | 48.9 | 73°54.0 | 23.4 | | 258°00.2 | 17.1 | | 10°56.9 | 11.1 | | | | | Atria | 107°09.0 -69°04.3 | |
| 18 | 24°12.9 | 85°29.5 | S21°48.3 | 88°54.4 | S22°23.1 | | 273°03.0 | N22°17.2 | | 25°59.2 | S03°11.0 | | | | | Sabik | 102°02.1 -15°45.4 | |
| 19 | 39°15.4 | 100°28.6 | 47.8 | 103°54.8 | 22.8 | | 288°05.8 | 17.3 | | 41°01.5 | 10.9 | | | | | Shaula | 96°09.6 -37°07.3 | |
| 20 | 54°17.8 | 115°27.8 | 47.3 | 118°55.2 | 22.5 | | 303°08.6 | 17.3 | | 56°03.8 | 10.8 | | | | | Rasalhague | 95°58.1 12°32.3 | |
| 21 | 69°20.3 | 130°26.9 | · · 46.8 | 133°55.6 | · · 22.1 | | 318°11.5 | · · 17.4 | | 71°06.0 | · · 10.8 | | | | | Eltanin | 90°42.3 51°28.9 | |
| 22 | 84°22.8 | 145°26.0 | 46.2 | 148°56.0 | 21.8 | | 333°14.3 | 17.4 | | 86°08.3 | 10.7 | | | | | Kaus Aust. | 83°31.8 -34°22.3 | |
| 23 | 99°25.2 | 160°25.1 | 45.7 | 163°56.4 | 21.5 | | 348°17.1 | 17.5 | | 101°10.6 | 10.6 | | | | | Vega | 80°33.1 38°48.3 | |
| Mer.pass. 16:23 | | | ν-0.9' d-0.5' m-3.90 | | | ν0.4' d-0.3' m1.09 | | | ν2.8' d0.1' m-2.68 | | | ν2.3' d-0.1' m1.02 | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | | | | |
| 0 | 114°27.7 | 175°24.3 | S21°45.2 | 178°56.8 | S22°21.2 | | 3°19.9 | N22°17.5 | | 116°12.9 | S03°10.5 | | | | | Nunki | 75°47.1 -26°15.9 | |
| 1 | 129°30.2 | 190°23.4 | 44.6 | 193°57.2 | 20.9 | | 18°22.8 | 17.6 | | 131°15.2 | 10.4 | | | | | Altair | 61°59.5 8°56.2 | |
| 2 | 144°32.6 | 205°22.5 | 44.1 | 208°57.6 | 20.5 | | 33°25.6 | 17.6 | | 146°17.5 | 10.3 | | | | | Peacock | 53°05.0 -56°39.1 | |
| 3 | 159°35.1 | 220°21.7 | · · 43.5 | 223°58.0 | · · 20.2 | | 48°28.4 | · · 17.7 | | 161°19.8 | · · 10.3 | | | | | Deneb | 49°25.7 45°22.4 | |
| 4 | 174°37.5 | 235°20.8 | 43.0 | 238°58.4 | 19.9 | | 63°31.2 | 17.7 | | 176°22.1 | 10.2 | | | | | Enif | 33°38.2 9°59.7 | |
| 5 | 189°40.0 | 250°19.9 | 42.5 | 253°58.8 | 19.6 | | 78°34.0 | 17.8 | | 191°24.3 | 10.1 | | | | | Al Na'ir | 27°32.2 -46°50.3 | |
| 6 | 204°42.5 | 265°19.0 | S21°41.9 | 268°59.2 | S22°19.3 | | 93°36.9 | N22°17.8 | | 206°26.6 | S03°10.0 | | | | | Fomalhaut | 15°13.8 -29°29.2 | |
| 7 | 219°44.9 | 280°18.2 | 41.4 | 283°59.6 | 18.9 | | 108°39.7 | 17.9 | | 221°28.9 | 09.9 | | | | | Scheat | 13°44.6 28°13.6 | |
| 8 | 234°47.4 | 295°17.3 | 40.8 | 299°00.0 | 18.6 | | 123°42.5 | 17.9 | | 236°31.2 | 09.8 | | | | | Markab | 13°29.3 15°20.8 | |

| h | Sun | | | Moon | | | | |
|------------------------|----------|----------|------------|----------|-------|----------|------|-------|
| Tue | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 177°52.8 | S21°30.7 | | 247°59.7 | 13.3' | S21°52.0 | 9.3' | 54.1' |
| 1 | 192°52.5 | 30.3 | | 262°31.9 | 13.2' | 22°01.3 | 9.2' | 54.1' |
| 2 | 207°52.3 | 29.9 | | 277°04.1 | 13.1' | 22°10.5 | 9.1' | 54.1' |
| 3 | 222°52.1 | · · 29.4 | | 291°36.2 | 13.1' | 22°19.6 | 9.0' | 54.1' |
| 4 | 237°51.8 | 29.0 | | 306°08.3 | 13.0' | 22°28.6 | 8.9' | 54.1' |
| 5 | 252°51.6 | 28.6 | | 320°40.3 | 12.9' | 22°37.5 | 8.8' | 54.1' |
| 6 | 267°51.4 | S21°28.2 | | 335°12.3 | 12.9' | S22°46.3 | 8.7' | 54.0' |
| 7 | 282°51.1 | 27.7 | | 349°44.1 | 12.8' | 22°55.1 | 8.6' | 54.0' |
| 8 | 297°50.9 | 27.3 | | 4°16.0 | 12.8' | 23°03.7 | 8.5' | 54.0' |
| 9 | 312°50.7 | · · 26.9 | | 18°47.7 | 12.7' | 23°12.2 | 8.4' | 54.0' |
| 10 | 327°50.4 | 26.5 | | 33°19.4 | 12.6' | 23°20.6 | 8.3' | 54.0' |
| 11 | 342°50.2 | 26.0 | | 47°51.0 | 12.6' | 23°29.0 | 8.2' | 54.0' |
| 12 | 357°50.0 | S21°25.6 | | 62°22.6 | 12.5' | S23°37.2 | 8.1' | 54.0' |
| 13 | 12°49.7 | 25.2 | | 76°54.1 | 12.4' | 23°45.3 | 8.0' | 54.0' |
| 14 | 27°49.5 | 24.7 | | 91°25.5 | 12.4' | 23°53.3 | 7.9' | 54.0' |
| 15 | 42°49.3 | · · 24.3 | | 105°56.9 | 12.3' | 24°01.2 | 7.8' | 54.0' |
| 16 | 57°49.0 | 23.9 | | 120°28.2 | 12.2' | 24°09.0 | 7.7' | 54.0' |
| 17 | 72°48.8 | 23.4 | | 134°59.4 | 12.2' | 24°16.7 | 7.6' | 54.0' |
| 18 | 87°48.6 | S21°23.0 | | 149°30.6 | 12.1' | S24°24.3 | 7.5' | 54.0' |
| 19 | 102°48.3 | 22.6 | | 164°01.7 | 12.0' | 24°31.8 | 7.4' | 54.0' |
| 20 | 117°48.1 | 22.1 | | 178°32.8 | 12.0' | 24°39.2 | 7.3' | 54.0' |
| 21 | 132°47.9 | · · 21.7 | | 193°03.7 | 11.9' | 24°46.5 | 7.2' | 54.0' |
| 22 | 147°47.7 | 21.3 | | 207°34.7 | 11.9' | 24°53.6 | 7.1' | 54.0' |
| 23 | 162°47.4 | 20.8 | | 222°05.5 | 11.8' | 25°00.7 | 6.9' | 54.0' |
| SD = 16.3' $d = -0.4'$ | | | SD = 14.7' | | | | | |
| Wed | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 177°47.2 | S21°20.4 | | 236°36.3 | 11.7' | S25°07.6 | 6.8' | 54.0' |
| 1 | 192°47.0 | 19.9 | | 251°07.0 | 11.7' | 25°14.5 | 6.7' | 54.0' |
| 2 | 207°46.7 | 19.5 | | 265°37.7 | 11.6' | 25°21.2 | 6.6' | 54.0' |
| 3 | 222°46.5 | · · 19.1 | | 280°08.3 | 11.5' | 25°27.8 | 6.5' | 54.0' |
| 4 | 237°46.3 | 18.6 | | 294°38.8 | 11.5' | 25°34.3 | 6.4' | 54.0' |
| 5 | 252°46.1 | 18.2 | | 309°09.3 | 11.4' | 25°40.6 | 6.3' | 54.0' |
| 6 | 267°45.8 | S21°17.7 | | 323°39.7 | 11.4' | S25°46.9 | 6.1' | 54.0' |
| 7 | 282°45.6 | 17.3 | | 338°10.1 | 11.3' | 25°53.0 | 6.0' | 54.0' |
| 8 | 297°45.4 | 16.8 | | 352°40.4 | 11.2' | 25°59.1 | 5.9' | 54.0' |
| 9 | 312°45.1 | · · 16.4 | | 7°10.6 | 11.2' | 26°05.0 | 5.8' | 54.0' |
| 10 | 327°44.9 | 16.0 | | 21°40.8 | 11.1' | 26°10.8 | 5.7' | 54.0' |
| 11 | 342°44.7 | 15.5 | | 36°10.9 | 11.1' | 26°16.4 | 5.5' | 54.0' |
| 12 | 357°44.5 | S21°15.1 | | 50°40.9 | 11.0' | S26°22.0 | 5.4' | 54.0' |
| 13 | 12°44.2 | 14.6 | | 65°10.9 | 10.9' | 26°27.4 | 5.3' | 54.1' |
| 14 | 27°44.0 | 14.2 | | 79°40.9 | 10.9' | 26°32.7 | 5.2' | 54.1' |
| 15 | 42°43.8 | · · 13.7 | | 94°10.7 | 10.8' | 26°37.9 | 5.1' | 54.1' |
| 16 | 57°43.6 | 13.3 | | 108°40.5 | 10.8' | 26°43.0 | 4.9' | 54.1' |
| 17 | 72°43.3 | 12.8 | | 123°10.3 | 10.7' | 26°47.9 | 4.8' | 54.1' |
| 18 | 87°43.1 | S21°12.4 | | 137°40.0 | 10.6' | S26°52.7 | 4.7' | 54.1' |
| 19 | 102°42.9 | 11.9 | | 152°09.7 | 10.6' | 26°57.4 | 4.6' | 54.1' |
| 20 | 117°42.7 | 11.5 | | 166°39.3 | 10.5' | 27°02.0 | 4.4' | 54.1' |
| 21 | 132°42.4 | · · 11.0 | | 181°08.8 | 10.5' | 27°06.4 | 4.3' | 54.1' |
| 22 | 147°42.2 | 10.5 | | 195°38.3 | 10.4' | 27°10.7 | 4.2' | 54.1' |
| 23 | 162°42.0 | 10.1 | | 210°07.7 | 10.4' | 27°14.9 | 4.1' | 54.1' |
| SD = 16.3' $d = -0.4'$ | | | SD = 14.7' | | | | | |
| Thu | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 177°41.8 | S21°09.6 | | 224°37.1 | 10.3' | S27°19.0 | 3.9' | 54.1' |
| 1 | 192°41.5 | 09.2 | | 239°06.4 | 10.3' | 27°22.9 | 3.8' | 54.1' |
| 2 | 207°41.3 | 08.7 | | 253°35.7 | 10.2' | 27°26.7 | 3.7' | 54.1' |
| 3 | 222°41.1 | · · 08.3 | | 268°05.0 | 10.2' | 27°30.3 | 3.5' | 54.1' |
| 4 | 237°40.9 | 07.8 | | 282°34.1 | 10.1' | 27°33.9 | 3.4' | 54.1' |
| 5 | 252°40.7 | 07.3 | | 297°03.3 | 10.1' | 27°37.3 | 3.3' | 54.1' |
| 6 | 267°40.4 | S21°06.9 | | 311°32.4 | 10.0' | S27°40.5 | 3.1' | 54.2' |
| 7 | 282°40.2 | 06.4 | | 326°01.4 | 10.0' | 27°43.7 | 3.0' | 54.2' |
| 8 | 297°40.0 | 06.0 | | 340°30.4 | 10.0' | 27°46.7 | 2.9' | 54.2' |
| 9 | 312°39.8 | · · 05.5 | | 354°59.4 | 9.9' | 27°49.6 | 2.7' | 54.2' |
| 10 | 327°39.6 | 05.0 | | 9°28.3 | 9.9' | 27°52.3 | 2.6' | 54.2' |
| 11 | 342°39.3 | 04.6 | | 23°57.2 | 9.8' | 27°54.9 | 2.5' | 54.2' |
| 12 | 357°39.1 | S21°04.1 | | 38°26.0 | 9.8' | S27°57.4 | 2.3' | 54.2' |
| 13 | 12°38.9 | 03.6 | | 52°54.8 | 9.8' | 27°59.7 | 2.2' | 54.2' |
| 14 | 27°38.7 | 03.2 | | 67°23.6 | 9.7' | 28°01.9 | 2.1' | 54.2' |
| 15 | 42°38.5 | · · 02.7 | | 81°52.3 | 9.7' | 28°04.0 | 1.9' | 54.2' |
| 16 | 57°38.2 | 02.2 | | 96°21.0 | 9.7' | 28°05.9 | 1.8' | 54.2' |
| 17 | 72°38.0 | 01.8 | | 110°49.6 | 9.6' | 28°07.7 | 1.6' | 54.3' |
| 18 | 87°37.8 | S21°01.3 | | 125°18.2 | 9.6' | S28°09.3 | 1.5' | 54.3' |
| 19 | 102°37.6 | 00.8 | | 139°46.8 | 9.6' | 28°10.8 | 1.4' | 54.3' |
| 20 | 117°37.4 | 21°00.4 | | 154°15.4 | 9.5' | 28°12.2 | 1.2' | 54.3' |
| 21 | 132°37.1 | 20°59.9 | | 168°43.9 | 9.5' | 28°13.4 | 1.1' | 54.3' |
| 22 | 147°36.9 | 59.4 | | 183°12.4 | 9.5' | 28°14.5 | 1.0' | 54.3' |
| 23 | 162°36.7 | 59.0 | | 197°40.9 | 9.4' | 28°15.5 | 0.8' | 54.3' |
| SD = 16.3' $d = -0.5'$ | | | SD = 14.8' | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 08:03 | 09:55 | ■ | ■ | 14:23 | 16:16 |
| N 70° | 07:48 | 09:21 | ■ | ■ | 14:58 | 16:31 |
| 68° | 07:36 | 08:56 | 10:38 | 13:41 | 15:23 | 16:43 |
| 66° | 07:25 | 08:36 | 09:56 | 14:23 | 15:43 | 16:54 |
| 64° | 07:16 | 08:20 | 09:28 | 14:51 | 15:58 | 17:02 |
| 62° | 07:09 | 08:07 | 09:06 | 15:12 | 16:11 | 17:10 |
| 60° | 07:02 | 07:56 | 08:49 | 15:29 | 16:23 | 17:17 |
| N 58° | 06:56 | 07:46 | 08:35 | 15:44 | 16:32 | 17:23 |
| 56° | 06:50 | 07:38 | 08:22 | 15:56 | 16:41 | 17:28 |
| 54° | 06:45 | 07:30 | 08:12 | 16:07 | 16:49 | 17:34 |
| 52° | 06:40 | 07:23 | 08:02 | 16:17 | 16:56 | 17:38 |
| 50° | 06:36 | 07:16 | 07:53 | 16:25 | 17:02 | 17:43 |
| 45° | 06:26 | 07:02 | 07:35 | 16:43 | 17:16 | 17:52 |
| N 40° | 06:17 | 06:51 | 07:20 | 16:58 | 17:28 | 18:01 |
| 35° | 06:09 | 06:40 | 07:08 | 17:11 | 17:38 | 18:09 |
| 30° | 06:01 | 06:31 | 06:57 | 17:22 | 17:47 | 18:17 |
| 20° | 05:47 | 06:14 | 06:38 | 17:40 | 18:04 | 18:31 |
| N 10° | 05:33 | 05:59 | 06:21 | 17:57 | 18:20 | 18:46 |
| 0° | 05:17 | 05:43 | 06:05 | 18:13 | 18:35 | 19:01 |
| S 10° | 05:00 | 05:27 | 05:50 | 18:28 | 18:51 | 19:18 |
| 20° | 04:40 | 05:08 | 05:32 | 18:45 | 19:10 | 19:38 |
| 30° | 04:13 | 04:46 | 05:13 | 19:05 | 19:32 | 20:04 |
| 35° | 03:57 | 04:32 | 05:01 | 19:17 | 19:46 | 20:21 |
| 40° | 03:36 | 04:16 | 04:48 | 19:30 | 20:02 | 20:41 |
| 45° | 03:09 | 03:56 | 04:32 | 19:46 | 20:22 | 21:08 |
| S 50° | 02:32 | 03:30 | 04:12 | 20:06 | 20:47 | 21:45 |
| 52° | 02:11 | 03:17 | 04:02 | 20:15 | 21:00 | 22:06 |
| 54° | 01:43 | 03:02 | 03:52 | 20:25 | 21:15 | 22:33 |
| 56° | 00:57 | 02:44 | 03:40 | 20:37 | 21:32 | 23:15 |
| 58° | /// | 02:22 | 03:26 | 20:51 | 21:54 | /// |
| S 60° | /// | 01:52 | 03:09 | 21:08 | 22:23 | /// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | ■ | ■ | ■ | ■ | ■ | ■ |
| 68° | ■ | ■ | ■ | ■ | ■ | ■ |
| 66° | 06:27 | ■ | ■ | 08:45 | ■ | ■ |
| 64° | 05:37 | ■ | ■ | 09:36 | ■ | ■ |
| 62° | 05:05 | 06:52 | 09:01 | 10:08 | 10:01 | 09:37 |
| 60° | 04:42 | 06:15 | 07:42 | 10:32 | 10:39 | 10:56 |
| N 58° | 04:24 | 05:48 | 07:07 | 10:51 | 11:05 | 11:32 |
| 56° | 04:08 | 05:28 | 06:41 | 11:07 | 11:27 | 11:57 |
| 54° | 03:55 | 05:10 | 06:21 | 11:21 | 11:44 | 12:18 |
| 52° | 03:43 | 04:56 | 06:04 | 11:33 | 11:59 | 12:35 |
| 50° | 03:33 | 04:43 | 05:49 | 11:44 | 12:12 | 12:50 |
| 45° | 03:12 | 04:17 | 05:19 | 12:06 | 12:39 | 13:20 |
| N 40° | 02:55 | 03:57 | 04:56 | 12:24 | 13:00 | 13:43 |
| 35° | 02:40 | 03:39 | 04:37 | 12:40 | 13:18 | 14:02 |
| 30° | 02:28 | 03:25 | 04:21 | 12:53 | 13:33 | 14:19 |
| 20° | 02:06 | 03:00 | 03:54 | 13:16 | 13:59 | 14:47 |
| N 10° | 01:48 | 02:38 | 03:30 | 13:35 | 14:21 | 15:11 |
| 0° | 01:31 | 02:18 | 03:08 | 13:54 | 14:42 | 15:33 |
| S 10° | 01:14 | 01:59 | 02:47 | 14:12 | 15:03 | 15:56 |
| 20° | 00:56 | 01:38 | 02:23 | 14:32 | 15:26 | 16:20 |
| 30° | 00:36 | 01:13 | 01:56 | 14:55 | 15:52 | 16:48 |
| 35° | 00:24 | 00:59 | 01:40 | 15:09 | 16:08 | 17:04 |
| 40° | 00:10 | 00:42 | 01:22 | 15:25 | 16:26 | 17:24 |
| 45° | · · | 00:23 | 00:59 | 15:43 | 16:47 | 17:47 |
| S 50° | 23:58 | · · | 00:31 | 16:07 | 17:15 | 18:17 |
| 52° | 23:47 | · · | 00:17 | 16:18 | 17:29 | 18:32 |
| 54° | 23:33 | · · | 00:01 | 16:31 | 17:45 | 18:49 |
| 56° | 23:18 | 23:42 | · · | 16:46 | 18:03 | 19:10 |
| 58° | 23:00 | 23:19 | 23:55 | 17:04 | 18:26 | 19:37 |
| S 60° | 22:37 | 22:49 | 23:18 | 17:26 | 18:56 | 20:14 |

| Day | Sun | | Mer. Pass | Moon | | Age 24-26 29-13% |
|-----|-----------------------------------|----------------------------|-----------|-----------------------|-------------|------------------|
| | Eqn.of Time 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 13 | 08:29 | 08:40 | 12:09 | 07:42 | 20:06 | |
| 14 | 08:51 | 09:02 | 12:09 | 08:30 | 20:55 | |
| 15 | 09:13 | 09:24 | 12:09 | 09:21 | 21:47 | |

January 16, 17, 18 UT (Fri., Sat., Sun.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|---------|-----|-----|--------|-----|-----|
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 115°26.8 | 175°03.5 | S21°32.0 | 179°06.4 | S22°13.4 | 4°27.6 | N22°18.8 | 117°07.8 | S03°08.5 | | | | | | |
| 1 | 130°29.3 | 190°02.6 | 31.4 | 194°06.8 | 13.1 | 19°30.4 | 18.8 | 132°10.0 | 08.4 | | | | | | |
| 2 | 145°31.8 | 205°01.7 | 30.9 | 209°07.2 | 12.7 | 34°33.3 | 18.9 | 147°12.3 | 08.3 | | | | | | |
| 3 | 160°34.2 | 220°00.9 | •• 30.3 | 224°07.6 | •• 12.4 | 49°36.1 | •• 19.0 | 162°14.6 | •• 08.2 | | | | | | |
| 4 | 175°36.7 | 235°00.0 | 29.7 | 239°08.0 | 12.1 | 64°38.9 | 19.0 | 177°16.9 | 08.1 | | | | | | |
| 5 | 190°39.2 | 249°59.2 | 29.2 | 254°08.4 | 11.7 | 79°41.7 | 19.1 | 192°19.2 | 08.0 | | | | | | |
| 6 | 205°41.6 | 264°58.3 | S21°28.6 | 269°08.8 | S22°11.4 | 94°44.5 | N22°19.1 | 207°21.5 | S03°07.9 | | | | | | |
| 7 | 220°44.1 | 279°57.4 | 28.0 | 284°09.2 | 11.1 | 109°47.4 | 19.2 | 222°23.7 | 07.9 | | | | | | |
| 8 | 235°46.5 | 294°56.6 | 27.5 | 299°09.6 | 10.7 | 124°50.2 | 19.2 | 237°26.0 | 07.8 | | | | | | |
| 9 | 250°49.0 | 309°55.7 | •• 26.9 | 314°10.0 | •• 10.4 | 139°53.0 | •• 19.3 | 252°28.3 | •• 07.7 | | | | | | |
| 10 | 265°51.5 | 324°54.9 | 26.3 | 329°10.4 | 10.1 | 154°55.8 | 19.3 | 267°30.6 | 07.6 | | | | | | |
| 11 | 280°53.9 | 339°54.0 | 25.7 | 344°10.8 | 09.7 | 169°58.6 | 19.4 | 282°32.9 | 07.5 | | | | | | |
| 12 | 295°56.4 | 354°53.2 | S21°25.2 | 359°11.2 | S22°09.4 | 185°01.5 | N22°19.4 | 297°35.1 | S03°07.4 | | | | | | |
| 13 | 310°58.9 | 9°52.3 | 24.6 | 14°11.6 | 09.1 | 200°04.3 | 19.5 | 312°37.4 | 07.3 | | | | | | |
| 14 | 326°01.3 | 24°51.5 | 24.0 | 29°12.0 | 08.7 | 215°07.1 | 19.5 | 327°39.7 | 07.3 | | | | | | |
| 15 | 341°03.8 | 39°50.6 | •• 23.4 | 44°12.4 | •• 08.4 | 230°09.9 | •• 19.6 | 342°42.0 | •• 07.2 | | | | | | |
| 16 | 356°06.3 | 54°49.7 | 22.8 | 59°12.8 | 08.1 | 245°12.7 | 19.6 | 357°44.3 | 07.1 | | | | | | |
| 17 | 11°08.7 | 69°48.9 | 22.3 | 74°13.2 | 07.7 | 260°15.6 | 19.7 | 12°46.6 | 07.0 | | | | | | |
| 18 | 26°11.2 | 84°48.0 | S21°21.7 | 89°13.6 | S22°07.4 | 275°18.4 | N22°19.7 | 27°48.8 | S03°06.9 | | | | | | |
| 19 | 41°13.7 | 99°47.2 | 21.1 | 104°14.0 | 07.0 | 290°21.2 | 19.8 | 42°51.1 | 06.8 | | | | | | |
| 20 | 56°16.1 | 114°46.3 | 20.5 | 119°14.4 | 06.7 | 305°24.0 | 19.8 | 57°53.4 | 06.7 | | | | | | |
| 21 | 71°18.6 | 129°45.5 | •• 19.9 | 134°14.8 | •• 06.4 | 320°26.8 | •• 19.9 | 72°55.7 | •• 06.6 | | | | | | |
| 22 | 86°21.0 | 144°44.6 | 19.3 | 149°15.2 | 06.0 | 335°29.6 | 20.0 | 87°58.0 | 06.6 | | | | | | |
| 23 | 101°23.5 | 159°43.8 | 18.8 | 164°15.6 | 05.7 | 350°32.5 | 20.0 | 103°00.2 | 06.5 | | | | | | |
| Mer.pass. | 16:16 | ν-0.9' d-0.6' m-3.90 | | ν0.4' d-0.3' m1.09 | | ν2.8' d0.1' m-2.67 | | ν2.3' d-0.1' m1.02 | | | | | | | |

| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|-----|-----|
| 0 | 116°26.0 | 174°42.9 | S21°18.2 | 179°16.0 | S22°05.3 | 5°35.3 | N22°20.1 | 118°02.5 | S03°06.4 | | |
| 1 | 131°28.4 | 189°42.1 | 17.6 | 194°16.4 | 05.0 | 20°38.1 | 20.1 | 133°04.8 | 06.3 | | |
| 2 | 146°30.9 | 204°41.2 | 17.0 | 209°16.8 | 04.7 | 35°40.9 | 20.2 | 148°07.1 | 06.2 | | |
| 3 | 161°33.4 | 219°40.4 | •• 16.4 | 224°17.2 | •• 04.3 | 50°43.7 | •• 20.2 | 163°09.4 | •• 06.1 | | |
| 4 | 176°35.8 | 234°39.5 | 15.8 | 239°17.6 | 04.0 | 65°46.6 | 20.3 | 178°11.6 | 06.0 | | |
| 5 | 191°38.3 | 249°38.7 | 15.2 | 254°18.0 | 03.6 | 80°49.4 | 20.3 | 193°13.9 | 06.0 | | |
| 6 | 206°40.8 | 264°37.8 | S21°14.6 | 269°18.4 | S22°03.3 | 95°52.2 | N22°20.4 | 208°16.2 | S03°05.9 | | |
| 7 | 221°43.2 | 279°37.0 | 14.0 | 284°18.8 | 02.9 | 110°55.0 | 20.4 | 223°18.5 | 05.8 | | |
| 8 | 236°45.7 | 294°36.1 | 13.4 | 299°19.2 | 02.6 | 125°57.8 | 20.5 | 238°20.8 | 05.7 | | |
| 9 | 251°48.1 | 309°35.3 | •• 12.8 | 314°19.6 | •• 02.3 | 141°00.6 | •• 20.5 | 253°23.0 | •• 05.6 | | |
| 10 | 266°50.6 | 324°34.4 | 12.2 | 329°20.0 | 01.9 | 156°03.5 | 20.6 | 268°25.3 | 05.5 | | |
| 11 | 281°53.1 | 339°33.6 | 11.6 | 344°20.4 | 01.6 | 171°06.3 | 20.6 | 283°27.6 | 05.4 | | |
| 12 | 296°55.5 | 354°32.7 | S21°11.0 | 359°20.8 | S22°01.2 | 186°09.1 | N22°20.7 | 298°29.9 | S03°05.3 | | |
| 13 | 311°58.0 | 9°31.9 | 10.4 | 14°21.2 | 00.9 | 201°11.9 | 20.7 | 313°32.2 | 05.3 | | |
| 14 | 327°00.5 | 24°31.1 | 09.8 | 29°21.7 | 00.5 | 216°14.7 | 20.8 | 328°34.4 | 05.2 | | |
| 15 | 342°02.9 | 39°30.2 | •• 09.2 | 44°22.1 | 22°00.2 | 231°17.5 | •• 20.8 | 343°36.7 | •• 05.1 | | |
| 16 | 357°05.4 | 54°29.4 | 08.6 | 59°22.5 | 21°59.8 | 246°20.4 | 20.9 | 358°39.0 | 05.0 | | |
| 17 | 12°07.9 | 69°28.5 | 08.0 | 74°22.9 | 59.5 | 261°23.2 | 20.9 | 13°41.3 | 04.9 | | |
| 18 | 27°10.3 | 84°27.7 | S21°07.4 | 89°23.3 | S21°59.1 | 276°26.0 | N22°21.0 | 28°43.6 | S03°04.8 | | |
| 19 | 42°12.8 | 99°26.8 | 06.8 | 104°23.7 | 58.8 | 291°28.8 | 21.0 | 43°45.8 | 04.7 | | |
| 20 | 57°15.3 | 114°26.0 | 06.2 | 119°24.1 | 58.4 | 306°31.6 | 21.1 | 58°48.1 | 04.6 | | |
| 21 | 72°17.7 | 129°25.2 | •• 05.6 | 134°24.5 | •• 58.1 | 321°34.5 | •• 21.1 | 73°50.4 | •• 04.5 | | |
| 22 | 87°20.2 | 144°24.3 | 05.0 | 149°24.9 | 57.7 | 336°37.3 | 21.2 | 88°52.7 | 04.5 | | |
| 23 | 102°22.6 | 159°23.5 | 04.3 | 164°25.3 | 57.4 | 351°40.1 | 21.3 | 103°54.9 | 04.4 | | |
| Mer.pass. | 16:12 | ν-0.9' d-0.6' m-3.90 | | ν0.4' d-0.3' m1.09 | | ν2.8' d0.1' m-2.67 | | ν2.3' d-0.1' m1.03 | | | |

| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|-----|-----|
| 0 | 117°25.1 | 174°22.6 | S21°03.7 | 179°25.7 | S21°57.0 | 6°42.9 | N22°21.3 | 118°57.2 | S03°04.3 | | |
| 1 | 132°27.6 | 189°21.8 | 03.1 | 194°26.1 | 56.7 | 21°45.7 | 21.4 | 133°59.5 | 04.2 | | |
| 2 | 147°30.0 | 204°21.0 | 02.5 | 209°26.5 | 56.3 | 36°48.5 | 21.4 | 149°01.8 | 04.1 | | |
| 3 | 162°32.5 | 219°20.1 | •• 01.9 | 224°26.9 | •• 56.0 | 51°51.3 | •• 21.5 | 164°04.1 | •• 04.0 | | |
| 4 | 177°35.0 | 234°19.3 | 01.3 | 239°27.3 | 55.6 | 66°54.2 | 21.5 | 179°06.3 | 03.9 | | |
| 5 | 192°37.4 | 249°18.4 | 00.6 | 254°27.7 | 55.3 | 81°57.0 | 21.6 | 194°08.6 | 03.8 | | |
| 6 | 207°39.9 | 264°17.6 | S21°00.0 | 269°28.1 | S21°54.9 | 96°59.8 | N22°21.6 | 209°10.9 | S03°03.8 | | |
| 7 | 222°42.4 | 279°16.8 | 20°59.4 | 284°28.5 | 54.6 | 112°02.6 | 21.7 | 224°13.2 | 03.7 | | |
| 8 | 237°44.8 | 294°15.9 | 58.8 | 299°28.9 | 54.2 | 127°05.4 | 21.7 | 239°15.4 | 03.6 | | |
| 9 | 252°47.3 | 309°15.1 | •• 58.1 | 314°29.3 | •• 53.9 | 142°08.2 | •• 21.8 | 254°17.7 | •• 03.5 | | |
| 10 | 267°49.8 | 324°14.3 | 57.5 | 329°29.8 | 53.5 | 157°11.1 | 21.8 | 269°20.0 | 03.4 | | |
| 11 | 282°52.2 | 339°13.4 | 56.9 | 344°30.2 | 53.2 | 172°13.9 | 21.9 | 284°22.3 | 03.3 | | |
| 12 | 297°54.7 | 354°12.6 | S20°56.3 | 359°30.6 | S21°52.8 | 187°16.7 | N22°21.9 | 299°24.5 | S03°03.2 | | |
| 13 | 312°57.1 | 9°11.8 | 55.6 | 14°31.0 | 52.4 | 202°19.5 | 22.0 | 314°26.8 | 03.1 | | |
| 14 | 327°59.6 | 24°10.9 | 55.0 | 29°31.4 | 52.1 | 217°22.3 | 22.0 | 329°29.1 | 03.0 | | |
| 15 | 343°02.1 | 39°10.1 | •• 54.4 | 44°31.8 | •• 51.7 | 232°25.1 | •• 22.1 | 344°31.4 | •• 03.0 | | |
| 16 | 358°04.5 | 54°09.3 | 53.7 | 59°32.2 | 51.4 | 247°28.0 | 22.1 | 359°33.7 | 02.9 | | |
| 17 | 13°07.0 | 69°08.4 | 53.1 | 74°32.6 | 51.0 | 262°30.8 | 22.2 | 14°35.9 | 02.8 | | |
| 18 | 28°09.5 | 84°07.6 | S20°52.5 | 89°33.0 | S21°50.7 | 277°33.6 | N22°22.2 | 29°38.2 | S03°02.7 | | |
| 19 | 43°11.9 | 99°06.8 | 51.8 | 104°33.4 | 50.3 | 292°36.4 | 22.3 | 44°40.5 | 02.6 | | |
| 20 | 58°14.4 | 114°05.9 | 51.2 | 119°33.8 | 49.9 | 307°39.2 | 22.3 | 59°42.8 | 02.5 | | |
| 21 | 73°16.9 | 129°05.1 | •• 50.6 | 134°34.2 | •• 49.6 | 322°42.0 | •• 22.4 | 74°45.0 | •• 02.4 | | |
| 22 | 88°19.3 | 144°04.3 | 49.9 | 149°34.6 | 49.2 | 337°44.8 | 22.4 | 89°47.3 | 02.3 | | |
| 23 | 103°21.8 | 159°03.5 | 49.3 | 164°35.0 | 48.9 | 352°47.7 | 22.5 | 104°49.6 | 02.2 | | |
| Mer.pass. | 16:08 | ν-0.8' d-0.6' m-3.90 | | ν0.4' d-0.4' m1.09 | | ν2.8' d0.1' m-2.67 | | ν2.3' d-0.1' m1.03 | | | |

| Stars | | |
|-------------|-----------|-----------|
| | SHA | Dec |
| Alpheratz | 357° 34.0 | 29° 14.2 |
| Ankaa | 353° 06.4 | -42° 10.1 |
| Schedar | 349° 30.2 | 56° 41.1 |
| Diphda | 348° 46.5 | -17° 50.7 |
| Achernar | 335° 19.5 | -57° 06.5 |
| Hamal | 327° 50.2 | 23° 35.2 |
| Polaris | 313° 23.6 | 89° 22.7 |
| Acamar | 315° 11.0 | -40° 12.2 |
| Menkar | 314° 05.1 | 4° 11.5 |
| Mirfak | 308° 26.8 | 49° 57.4 |
| Aldebaran | 290° 38.4 | 16° 33.7 |
| Rigel | 281° 02.8 | -8° 10.4 |
| Capella | 280° 20.2 | 46° 01.5 |
| Bellatrix | 278° 21.7 | 6° 22.4 |
| Elnath | 278° 00.5 | 28° 37.8 |
| Alnilam | 275° 36.6 | -1° 11.2 |
| Betelgeuse | 270° 50.8 | 7° 24.7 |
| Canopus | 263° 51.5 | -52° 42.6 |
| Sirius | 258° 25.1 | -16° 45.2 |
| Adhara | 255° 04.8 | -29° 00.5 |
| Procyon | 244° 49.6 | 5° 09.4 |
| Pollux | 243° 15.9 | 27° 57.7 |
| Avior | 234° 13.7 | -59° 35.5 |
| Suhail | 222° 45.3 | -43° 32.2 |
| Miaplacidus | 221° 37.2 | -69° 49.3 |
| Alphard | 217° 46.6 | -8° 46.3 |
| Regulus | 207° 33.3 | 11° 50.3 |
| Dubhe | 193° 39.5 | 61° 36.3 |
| Denebola | 182° 23.9 | 14° 25.4 |
| Gienah | 175° 42.6 | -17° 41.2 |
| Acrux | 172° 58.9 | -63° 14.4 |
| Gacrux | 171° 50.5 | -57° 15.3 |
| Alioth | 166° 12.1 | 55° 48.7 |
| Spica | 158° 21.4 | -11° 17.9 |
| Alkaid | 152° 51.3 | 49° 10.6 |
| Hadar | 148° 34.9 | -60° 29.7 |
| Menkent | 147° 56.7 | -36° 29.8 |
| Arcturus | 145° 47.2 | 19° 02.6 |
| Rigel Kent. | 139° 39.3 | -60° 56.3 |
| Kochab | 137° 20.2 | 74° 02.5 |
| Zuben'ubi | 136° 55.2 | -16° 09.0 |
| Alphecca | 126° 03.2 | 26° 37.4 |
| Antares | 112° 15.0 | -26° 29.3 |
| Atria | 107° 08.9 | -69° 04.2 |
| Sabik | 102° 02.1 | -15° 45.4 |
| Shaula | 96° 09.6 | -37° 07.3 |
| Rasalhague | 95° 58.0 | 12° 32.3 |
| Eltanin | 90° 42.3 | 51° 28.9 |
| Kaus Aust. | 83° 31.8 | -34° 22.3 |
| Vega | 80° 33.1 | 38° 48.3 |
| Nunki | 75° 47.1 | -26° 15.9 |
| Altair | 61° 59.5 | 8° 56.2 |
| Peacock | 53° 05.0 | -56° 39.1 |
| Deneb | 49° 25.7 | 45° 22.4 |
| Enif | 33° 38.2 | 9° 59.7 |
| Al Na'ir | 27° 32.2 | -46° 50.2 |
| Fomalhaut | 15° 13.8 | -29° 29.2 |
| Scheat | 13° 44.6 | 28° 13.6 |
| Markab | 13° 29.3 | 15° 20.8 |

| Jan 16 Fri | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 59° 36.6 | 12:20 |
| Mars | 63° 39.5 | 12:03 |
| Jupiter | 249° 00.8 | 23:38 |
| Saturn | 1° 40.9 | 16:09 |

| Jan 17 Sat | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 58° 16.9 | 12:22 |
| Mars | 62° 50.0 | 12:03 |
| Jupiter | 249° 09.3 | 23:33 |
| Saturn | 1° 36.6 | 16:05 |

| Jan 18 Sun | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 56° 57.5 | 12:23 |
| Mars | 62° 00.6 | 12:02 |
| Jupiter | 249° 17.8 | 23:29 |
| Saturn | 1° 32.1 | 16:02 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.1 |
| Mars: | 0.1 |

| h | Sun | | | Moon | | | |
|------------|----------|----------|-----------|----------|-------|----------|------------|
| | GHA | Dec | | GHA | ν | Dec | d |
| Fri | | | | | | | |
| 0 | 177°36.5 | S20°58.5 | | 212°09.3 | 9.4' | S28°16.3 | 0.7' |
| 1 | 192°36.3 | 58.0 | | 226°37.7 | 9.4' | 28°17.0 | 0.5' |
| 2 | 207°36.1 | 57.5 | | 241°06.1 | 9.4' | 28°17.5 | 0.4' |
| 3 | 222°35.9 | 57.1 | | 255°34.5 | 9.4' | 28°17.9 | 0.2' |
| 4 | 237°35.6 | 56.6 | | 270°02.8 | 9.3' | 28°18.1 | 0.1' |
| 5 | 252°35.4 | 56.1 | | 284°31.2 | 9.3' | 28°18.2 | -0.0' |
| 6 | 267°35.2 | S20°55.6 | | 298°59.5 | 9.3' | S28°18.2 | -0.2' |
| 7 | 282°35.0 | 55.2 | | 313°27.8 | 9.3' | 28°18.0 | -0.3' |
| 8 | 297°34.8 | 54.7 | | 327°56.1 | 9.3' | 28°17.7 | -0.5' |
| 9 | 312°34.6 | 54.2 | | 342°24.3 | 9.3' | 28°17.3 | -0.6' |
| 10 | 327°34.4 | 53.7 | | 356°52.6 | 9.2' | 28°16.6 | -0.7' |
| 11 | 342°34.1 | 53.2 | | 11°20.8 | 9.2' | 28°15.9 | -0.9' |
| 12 | 357°33.9 | S20°52.8 | | 25°49.1 | 9.2' | S28°15.0 | -1.0' |
| 13 | 12°33.7 | 52.3 | | 40°17.3 | 9.2' | 28°14.0 | -1.2' |
| 14 | 27°33.5 | 51.8 | | 54°45.5 | 9.2' | 28°12.8 | -1.3' |
| 15 | 42°33.3 | 51.3 | | 69°13.7 | 9.2' | 28°11.5 | -1.5' |
| 16 | 57°33.1 | 50.8 | | 83°41.9 | 9.2' | 28°10.0 | -1.6' |
| 17 | 72°32.9 | 50.3 | | 98°10.1 | 9.2' | 28°08.4 | -1.7' |
| 18 | 87°32.7 | S20°49.9 | | 112°38.3 | 9.2' | S28°06.7 | -1.9' |
| 19 | 102°32.4 | 49.4 | | 127°06.5 | 9.2' | 28°04.8 | -2.0' |
| 20 | 117°32.2 | 48.9 | | 141°34.7 | 9.2' | 28°02.7 | -2.2' |
| 21 | 132°32.0 | 48.4 | | 156°02.9 | 9.2' | 28°00.6 | -2.3' |
| 22 | 147°31.8 | 47.9 | | 170°31.1 | 9.2' | 27°58.2 | -2.5' |
| 23 | 162°31.6 | 47.4 | | 184°59.3 | 9.2' | 27°55.8 | -2.6' |
| SD = 16.3' | | | d = -0.5' | | | | SD = 14.8' |
| Sat | | | | | | | |
| 0 | 177°31.4 | S20°46.9 | | 199°27.6 | 9.2' | S27°53.2 | -2.8' |
| 1 | 192°31.2 | 46.4 | | 213°55.8 | 9.2' | 27°50.4 | -2.9' |
| 2 | 207°31.0 | 45.9 | | 228°24.0 | 9.2' | 27°47.5 | -3.0' |
| 3 | 222°30.8 | 45.5 | | 242°52.3 | 9.3' | 27°44.5 | -3.2' |
| 4 | 237°30.6 | 45.0 | | 257°20.5 | 9.3' | 27°41.3 | -3.3' |
| 5 | 252°30.4 | 44.5 | | 271°48.8 | 9.3' | 27°38.0 | -3.5' |
| 6 | 267°30.2 | S20°44.0 | | 286°17.1 | 9.3' | S27°34.5 | -3.6' |
| 7 | 282°29.9 | 43.5 | | 300°45.4 | 9.3' | 27°30.9 | -3.7' |
| 8 | 297°29.7 | 43.0 | | 315°13.7 | 9.3' | 27°27.2 | -3.9' |
| 9 | 312°29.5 | 42.5 | | 329°42.0 | 9.4' | 27°23.3 | -4.0' |
| 10 | 327°29.3 | 42.0 | | 344°10.4 | 9.4' | 27°19.2 | -4.2' |
| 11 | 342°29.1 | 41.5 | | 358°38.7 | 9.4' | 27°15.1 | -4.3' |
| 12 | 357°28.9 | S20°41.0 | | 13°07.1 | 9.4' | S27°10.8 | -4.5' |
| 13 | 12°28.7 | 40.5 | | 27°35.6 | 9.4' | 27°06.3 | -4.6' |
| 14 | 27°28.5 | 40.0 | | 42°04.0 | 9.5' | 27°01.7 | -4.7' |
| 15 | 42°28.3 | 39.5 | | 56°32.5 | 9.5' | 26°57.0 | -4.9' |
| 16 | 57°28.1 | 39.0 | | 71°01.0 | 9.5' | 26°52.1 | -5.0' |
| 17 | 72°27.9 | 38.5 | | 85°29.5 | 9.5' | 26°47.1 | -5.1' |
| 18 | 87°27.7 | S20°38.0 | | 99°58.0 | 9.6' | S26°42.0 | -5.3' |
| 19 | 102°27.5 | 37.5 | | 114°26.6 | 9.6' | 26°36.7 | -5.4' |
| 20 | 117°27.3 | 37.0 | | 128°55.2 | 9.6' | 26°31.3 | -5.6' |
| 21 | 132°27.1 | 36.5 | | 143°23.9 | 9.7' | 26°25.7 | -5.7' |
| 22 | 147°26.9 | 36.0 | | 157°52.5 | 9.7' | 26°20.0 | -5.8' |
| 23 | 162°26.7 | 35.5 | | 172°21.2 | 9.7' | 26°14.2 | -6.0' |
| SD = 16.3' | | | d = -0.5' | | | | SD = 14.9' |
| Sun | | | | | | | |
| 0 | 177°26.5 | S20°35.0 | | 186°50.0 | 9.8' | S26°08.2 | -6.1' |
| 1 | 192°26.3 | 34.5 | | 201°18.8 | 9.8' | 26°02.1 | -6.2' |
| 2 | 207°26.1 | 34.0 | | 215°47.6 | 9.9' | 25°55.9 | -6.4' |
| 3 | 222°25.9 | 33.5 | | 230°16.4 | 9.9' | 25°49.5 | -6.5' |
| 4 | 237°25.7 | 32.9 | | 244°45.3 | 9.9' | 25°43.0 | -6.6' |
| 5 | 252°25.5 | 32.4 | | 259°14.3 | 10.0' | 25°36.4 | -6.8' |
| 6 | 267°25.3 | S20°31.9 | | 273°43.2 | 10.0' | S25°29.6 | -6.9' |
| 7 | 282°25.1 | 31.4 | | 288°12.2 | 10.1' | 25°22.7 | -7.0' |
| 8 | 297°24.9 | 30.9 | | 302°41.3 | 10.1' | 25°15.7 | -7.2' |
| 9 | 312°24.7 | 30.4 | | 317°10.4 | 10.1' | 25°08.5 | -7.3' |
| 10 | 327°24.5 | 29.9 | | 331°39.5 | 10.2' | 25°01.2 | -7.4' |
| 11 | 342°24.3 | 29.4 | | 346°08.7 | 10.2' | 24°53.8 | -7.5' |
| 12 | 357°24.1 | S20°28.9 | | 0°38.0 | 10.3' | S24°46.2 | -7.7' |
| 13 | 12°23.9 | 28.3 | | 15°07.2 | 10.3' | 24°38.6 | -7.8' |
| 14 | 27°23.7 | 27.8 | | 29°36.6 | 10.4' | 24°30.8 | -7.9' |
| 15 | 42°23.5 | 27.3 | | 44°05.9 | 10.4' | 24°22.8 | -8.1' |
| 16 | 57°23.3 | 26.8 | | 58°35.3 | 10.5' | 24°14.8 | -8.2' |
| 17 | 72°23.1 | 26.3 | | 73°04.8 | 10.5' | 24°06.6 | -8.3' |
| 18 | 87°22.9 | S20°25.8 | | 87°34.3 | 10.6' | S23°58.3 | -8.4' |
| 19 | 102°22.7 | 25.2 | | 102°03.9 | 10.6' | 23°49.9 | -8.5' |
| 20 | 117°22.5 | 24.7 | | 116°33.5 | 10.7' | 23°41.3 | -8.7' |
| 21 | 132°22.3 | 24.2 | | 131°03.1 | 10.7' | 23°32.7 | -8.8' |
| 22 | 147°22.1 | 23.7 | | 145°32.9 | 10.8' | 23°23.9 | -8.9' |
| 23 | 162°21.9 | 23.2 | | 160°02.6 | 10.8' | 23°15.0 | -9.0' |
| SD = 16.2' | | | d = -0.5' | | | | SD = 15.0' |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|--------------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 07:56 | 09:43 | ■ | ■ | 14:38 | 16:26 |
| N 70° | 07:42 | 09:12 | 11:41 | 12:40 | 15:09 | 16:39 |
| 68° | 07:30 | 08:48 | 10:23 | 13:57 | 15:32 | 16:51 |
| 66° | 07:21 | 08:30 | 09:47 | 14:34 | 15:51 | 17:00 |
| 64° | 07:12 | 08:15 | 09:21 | 15:00 | 16:05 | 17:09 |
| 62° | 07:05 | 08:03 | 09:01 | 15:20 | 16:18 | 17:16 |
| 60° | 06:59 | 07:52 | 08:44 | 15:36 | 16:28 | 17:22 |
| N 58° | 06:53 | 07:43 | 08:31 | 15:50 | 16:38 | 17:28 |
| 56° | 06:48 | 07:35 | 08:19 | 16:02 | 16:46 | 17:33 |
| 54° | 06:43 | 07:27 | 08:08 | 16:12 | 16:53 | 17:38 |
| 52° | 06:38 | 07:21 | 07:59 | 16:21 | 17:00 | 17:42 |
| 50° | 06:34 | 07:14 | 07:51 | 16:30 | 17:06 | 17:46 |
| 45° | 06:25 | 07:01 | 07:34 | 16:47 | 17:20 | 17:56 |
| N 40° | 06:16 | 06:50 | 07:19 | 17:01 | 17:31 | 18:04 |
| 35° | 06:09 | 06:40 | 07:07 | 17:13 | 17:41 | 18:12 |
| 30° | 06:01 | 06:31 | 06:56 | 17:24 | 17:50 | 18:19 |
| 20° | 05:47 | 06:14 | 06:38 | 17:42 | 18:06 | 18:33 |
| N 10° | 05:33 | 05:59 | 06:22 | 17:59 | 18:21 | 18:47 |
| 0° | 05:19 | 05:44 | 06:06 | 18:14 | 18:36 | 19:01 |
| S 10° | 05:02 | 05:28 | 05:51 | 18:29 | 18:52 | 19:18 |
| 20° | 04:42 | 05:10 | 05:34 | 18:45 | 19:09 | 19:38 |
| 30° | 04:16 | 04:49 | 05:15 | 19:05 | 19:31 | 20:03 |
| 35° | 04:00 | 04:35 | 05:04 | 19:16 | 19:44 | 20:19 |
| 40° | 03:40 | 04:19 | 04:51 | 19:29 | 20:00 | 20:39 |
| 45° | 03:14 | 04:00 | 04:35 | 19:44 | 20:19 | 21:05 |
| S 50° | 02:38 | 03:35 | 04:16 | 20:03 | 20:44 | 21:40 |
| 52° | 02:19 | 03:23 | 04:07 | 20:12 | 20:56 | 22:00 |
| 54° | 01:53 | 03:08 | 03:57 | 20:22 | 21:10 | 22:24 |
| 56° | 01:15 | 02:51 | 03:45 | 20:33 | 21:27 | 23:01 |
| 58° | /// | 02:31 | 03:32 | 20:47 | 21:47 | /// |
| S 60° | /// | 02:03 | 03:16 | 21:02 | 22:14 | /// |

| Lat. | Moonrise | | | Moonset | | |
|--------------|----------|-------|-------|---------|-------|-------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | ■ | ■ | ■ | ■ | ■ | ■ |
| 68° | ■ | ■ | ■ | ■ | ■ | ■ |
| 66° | ■ | ■ | ■ | ■ | ■ | ■ |
| 64° | ■ | ■ | 10:48 | ■ | ■ | 13:18 |
| 62° | ■ | 10:12 | 10:01 | ■ | 12:04 | 14:04 |
| 60° | 08:47 | 09:19 | 09:31 | 11:39 | 12:58 | 14:34 |
| N 58° | 08:08 | 08:46 | 09:07 | 12:19 | 13:30 | 14:56 |
| 56° | 07:41 | 08:22 | 08:49 | 12:46 | 13:54 | 15:14 |
| 54° | 07:19 | 08:03 | 08:33 | 13:07 | 14:13 | 15:30 |
| 52° | 07:01 | 07:46 | 08:19 | 13:25 | 14:29 | 15:43 |
| 50° | 06:46 | 07:32 | 08:07 | 13:40 | 14:43 | 15:55 |
| 45° | 06:16 | 07:03 | 07:42 | 14:11 | 15:11 | 16:19 |
| N 40° | 05:52 | 06:41 | 07:22 | 14:35 | 15:34 | 16:38 |
| 35° | 05:32 | 06:22 | 07:06 | 14:54 | 15:52 | 16:54 |
| 30° | 05:15 | 06:06 | 06:51 | 15:11 | 16:08 | 17:08 |
| 20° | 04:47 | 05:38 | 06:26 | 15:39 | 16:34 | 17:31 |
| N 10° | 04:23 | 05:15 | 06:05 | 16:03 | 16:57 | 17:51 |
| 0° | 04:00 | 04:53 | 05:45 | 16:26 | 17:18 | 18:10 |
| S 10° | 03:38 | 04:31 | 05:25 | 16:48 | 17:39 | 18:28 |
| 20° | 03:13 | 04:07 | 05:03 | 17:12 | 18:02 | 18:48 |
| 30° | 02:45 | 03:40 | 04:38 | 17:40 | 18:28 | 19:11 |
| 35° | 02:29 | 03:24 | 04:24 | 17:57 | 18:43 | 19:24 |
| 40° | 02:09 | 03:05 | 04:07 | 18:16 | 19:01 | 19:39 |
| 45° | 01:46 | 02:42 | 03:46 | 18:39 | 19:22 | 19:57 |
| S 50° | 01:15 | 02:12 | 03:20 | 19:09 | 19:49 | 20:19 |
| 52° | 01:00 | 01:58 | 03:07 | 19:24 | 20:02 | 20:30 |
| 54° | 00:43 | 01:41 | 02:52 | 19:41 | 20:17 | 20:42 |
| 56° | 00:22 | 01:20 | 02:35 | 20:01 | 20:35 | 20:56 |
| 58° | | 00:55 | 02:15 | 20:27 | 20:56 | 21:12 |
| S 60° | | 00:20 | 01:48 | 21:02 | 21:23 | 21:31 |

| Day | Sun | | Mer. Pass | Moon | | Age |
|-----|---|----------------------------------|-----------|----------------|----------------|-----|
| | Eqn.of Time 00 ^h mm:ss | Time 12 ^h mm:ss | | Upper hh:mm | Lower hh:mm | |
| 16 | 09:34 | 09:44 | 12:10 | 10:13 | 22:39 | |
| 17 | 09:54 | 10:04 | 12:10 | 11:06 | 23:32 | |
| 18 | 10:14 | 10:24 | 12:10 | 11:57 | --- | |

January 19, 20, 21 UT (Mon., Tue., Wed.)

| h | Aries | | | Venus | | Mars | | Jupiter | | Saturn | | | |
|-----------------|----------|----------|----------------------|----------|----------|--------------------|----------|----------|--------------------|--------|-----|--------------------|--|
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 118°24.3 | 174°02.6 | S20°48.6 | 179°35.4 | S21°48.5 | 7°50.5 | N22°22.5 | 119°51.9 | S03°02.2 | | | | |
| 1 | 133°26.7 | 189°01.8 | 48.0 | 194°35.9 | 48.1 | 22°53.3 | 22.6 | 134°54.1 | 02.1 | | | | |
| 2 | 148°29.2 | 204°01.0 | 47.4 | 209°36.3 | 47.8 | 37°56.1 | 22.6 | 149°56.4 | 02.0 | | | | |
| 3 | 163°31.6 | 219°00.2 | · · 46.7 | 224°36.7 | · · 47.4 | 52°58.9 | · · 22.7 | 164°58.7 | · · 01.9 | | | | |
| 4 | 178°34.1 | 233°59.3 | 46.1 | 239°37.1 | 47.1 | 68°01.7 | 22.7 | 180°00.9 | 01.8 | | | | |
| 5 | 193°36.6 | 248°58.5 | 45.4 | 254°37.5 | 46.7 | 83°04.5 | 22.8 | 195°03.2 | 01.7 | | | | |
| 6 | 208°39.0 | 263°57.7 | S20°44.8 | 269°37.9 | S21°46.3 | 98°07.4 | N22°22.8 | 210°05.5 | S03°01.6 | | | | |
| 7 | 223°41.5 | 278°56.8 | 44.1 | 284°38.3 | 46.0 | 113°10.2 | 22.9 | 225°07.8 | 01.5 | | | | |
| 8 | 238°44.0 | 293°56.0 | 43.5 | 299°38.7 | 45.6 | 128°13.0 | 22.9 | 240°10.0 | 01.4 | | | | |
| 9 | 253°46.4 | 308°55.2 | · · 42.8 | 314°39.1 | · · 45.2 | 143°15.8 | · · 23.0 | 255°12.3 | · · 01.3 | | | | |
| 10 | 268°48.9 | 323°54.4 | 42.2 | 329°39.5 | 44.9 | 158°18.6 | 23.0 | 270°14.6 | 01.3 | | | | |
| 11 | 283°51.4 | 338°53.6 | 41.5 | 344°39.9 | 44.5 | 173°21.4 | 23.1 | 285°16.9 | 01.2 | | | | |
| 12 | 298°53.8 | 353°52.7 | S20°40.9 | 359°40.3 | S21°44.1 | 188°24.2 | N22°23.1 | 300°19.1 | S03°01.1 | | | | |
| 13 | 313°56.3 | 8°51.9 | 40.2 | 14°40.8 | 43.8 | 203°27.0 | 23.2 | 315°21.4 | 01.0 | | | | |
| 14 | 328°58.8 | 23°51.1 | 39.6 | 29°41.2 | 43.4 | 218°29.9 | 23.2 | 330°23.7 | 00.9 | | | | |
| 15 | 344°01.2 | 38°50.3 | · · 38.9 | 44°41.6 | · · 43.0 | 233°32.7 | · · 23.3 | 345°26.0 | · · 00.8 | | | | |
| 16 | 359°03.7 | 53°49.5 | 38.3 | 59°42.0 | 42.7 | 248°35.5 | 23.3 | 0°28.2 | 00.7 | | | | |
| 17 | 14°06.1 | 68°48.6 | 37.6 | 74°42.4 | 42.3 | 263°38.3 | 23.4 | 15°30.5 | 00.6 | | | | |
| 18 | 29°08.6 | 83°47.8 | S20°36.9 | 89°42.8 | S21°41.9 | 278°41.1 | N22°23.4 | 30°32.8 | S03°00.5 | | | | |
| 19 | 44°11.1 | 98°47.0 | 36.3 | 104°43.2 | 41.6 | 293°43.9 | 23.5 | 45°35.0 | 00.4 | | | | |
| 20 | 59°13.5 | 113°46.2 | 35.6 | 119°43.6 | 41.2 | 308°46.7 | 23.5 | 60°37.3 | 00.4 | | | | |
| 21 | 74°16.0 | 128°45.4 | · · 34.9 | 134°44.0 | · · 40.8 | 323°49.5 | · · 23.6 | 75°39.6 | · · 00.3 | | | | |
| 22 | 89°18.5 | 143°44.5 | 34.3 | 149°44.4 | 40.5 | 338°52.4 | 23.6 | 90°41.9 | 00.2 | | | | |
| 23 | 104°20.9 | 158°43.7 | 33.6 | 164°44.9 | 40.1 | 353°55.2 | 23.7 | 105°44.1 | 00.1 | | | | |
| Mer.pass. 16:04 | | | ν-0.8' d-0.6' m-3.90 | | | ν0.4' d-0.4' m1.09 | | | ν2.8' d0.1' m-2.67 | | | ν2.3' d-0.1' m1.03 | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 119°23.4 | 173°42.9 | S20°33.0 | 179°45.3 | S21°39.7 | 8°58.0 | N22°23.8 | 120°46.4 | S03°00.0 | | | | |
| 1 | 134°25.9 | 188°42.1 | 32.3 | 194°45.7 | 39.3 | 24°00.8 | 23.8 | 135°48.7 | 02°59.9 | | | | |
| 2 | 149°28.3 | 203°41.3 | 31.6 | 209°46.1 | 39.0 | 39°03.6 | 23.9 | 150°51.0 | 59.8 | | | | |
| 3 | 164°30.8 | 218°40.5 | · · 30.9 | 224°46.5 | · · 38.6 | 54°06.4 | · · 23.9 | 165°53.2 | · · 59.7 | | | | |
| 4 | 179°33.2 | 233°39.6 | 30.3 | 239°46.9 | 38.2 | 69°09.2 | 24.0 | 180°55.5 | 59.6 | | | | |
| 5 | 194°35.7 | 248°38.8 | 29.6 | 254°47.3 | 37.9 | 84°12.0 | 24.0 | 195°57.8 | 59.5 | | | | |
| 6 | 209°38.2 | 263°38.0 | S20°28.9 | 269°47.7 | S21°37.5 | 99°14.9 | N22°24.1 | 211°00.0 | S02°59.4 | | | | |
| 7 | 224°40.6 | 278°37.2 | 28.3 | 284°48.1 | 37.1 | 114°17.7 | 24.1 | 226°02.3 | 59.4 | | | | |
| 8 | 239°43.1 | 293°36.4 | 27.6 | 299°48.6 | 36.7 | 129°20.5 | 24.2 | 241°04.6 | 59.3 | | | | |
| 9 | 254°45.6 | 308°35.6 | · · 26.9 | 314°49.0 | · · 36.4 | 144°23.3 | · · 24.2 | 256°06.9 | · · 59.2 | | | | |
| 10 | 269°48.0 | 323°34.8 | 26.2 | 329°49.4 | 36.0 | 159°26.1 | 24.3 | 271°09.1 | 59.1 | | | | |
| 11 | 284°50.5 | 338°34.0 | 25.6 | 344°49.8 | 35.6 | 174°28.9 | 24.3 | 286°11.4 | 59.0 | | | | |
| 12 | 299°53.0 | 353°33.2 | S20°24.9 | 359°50.2 | S21°35.2 | 189°31.7 | N22°24.4 | 301°13.7 | S02°58.9 | | | | |
| 13 | 314°55.4 | 8°32.3 | 24.2 | 14°50.6 | 34.9 | 204°34.5 | 24.4 | 316°15.9 | 58.8 | | | | |
| 14 | 329°57.9 | 23°31.5 | 23.5 | 29°51.0 | 34.5 | 219°37.3 | 24.5 | 331°18.2 | 58.7 | | | | |
| 15 | 345°00.4 | 38°30.7 | · · 22.8 | 44°51.4 | · · 34.1 | 234°40.1 | · · 24.5 | 346°20.5 | · · 58.6 | | | | |
| 16 | 0°02.8 | 53°29.9 | 22.2 | 59°51.8 | 33.7 | 249°43.0 | 24.6 | 1°22.7 | 58.5 | | | | |
| 17 | 15°05.3 | 68°29.1 | 21.5 | 74°52.3 | 33.3 | 264°45.8 | 24.6 | 16°25.0 | 58.4 | | | | |
| 18 | 30°07.7 | 83°28.3 | S20°20.8 | 89°52.7 | S21°33.0 | 279°48.6 | N22°24.7 | 31°27.3 | S02°58.4 | | | | |
| 19 | 45°10.2 | 98°27.5 | 20.1 | 104°53.1 | 32.6 | 294°51.4 | 24.7 | 46°29.6 | 58.3 | | | | |
| 20 | 60°12.7 | 113°26.7 | 19.4 | 119°53.5 | 32.2 | 309°54.2 | 24.8 | 61°31.8 | 58.2 | | | | |
| 21 | 75°15.1 | 128°25.9 | · · 18.7 | 134°53.9 | · · 31.8 | 324°57.0 | · · 24.8 | 76°34.1 | · · 58.1 | | | | |
| 22 | 90°17.6 | 143°25.1 | 18.0 | 149°54.3 | 31.4 | 339°59.8 | 24.9 | 91°36.4 | 58.0 | | | | |
| 23 | 105°20.1 | 158°24.3 | 17.3 | 164°54.7 | 31.1 | 355°02.6 | 24.9 | 106°38.6 | 57.9 | | | | |
| Mer.pass. 16:00 | | | ν-0.8' d-0.7' m-3.90 | | | ν0.4' d-0.4' m1.09 | | | ν2.8' d0.1' m-2.67 | | | ν2.3' d-0.1' m1.03 | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 120°22.5 | 173°23.5 | S20°16.7 | 179°55.2 | S21°30.7 | 10°05.4 | N22°24.9 | 121°40.9 | S02°57.8 | | | | |
| 1 | 135°25.0 | 188°22.7 | 16.0 | 194°55.6 | 30.3 | 25°08.2 | 25.0 | 136°43.2 | 57.7 | | | | |
| 2 | 150°27.5 | 203°21.9 | 15.3 | 209°56.0 | 29.9 | 40°11.1 | 25.0 | 151°45.4 | 57.6 | | | | |
| 3 | 165°29.9 | 218°21.1 | · · 14.6 | 224°56.4 | · · 29.5 | 55°13.9 | · · 25.1 | 166°47.7 | · · 57.5 | | | | |
| 4 | 180°32.4 | 233°20.3 | 13.9 | 239°56.8 | 29.2 | 70°16.7 | 25.1 | 181°50.0 | 57.4 | | | | |
| 5 | 195°34.9 | 248°19.5 | 13.2 | 254°57.2 | 28.8 | 85°19.5 | 25.2 | 196°52.2 | 57.3 | | | | |
| 6 | 210°37.3 | 263°18.7 | S20°12.5 | 269°57.6 | S21°28.4 | 100°22.3 | N22°25.2 | 211°54.5 | S02°57.3 | | | | |
| 7 | 225°39.8 | 278°17.9 | 11.8 | 284°58.1 | 28.0 | 115°25.1 | 25.3 | 226°56.8 | 57.2 | | | | |
| 8 | 240°42.2 | 293°17.1 | 11.1 | 299°58.5 | 27.6 | 130°27.9 | 25.3 | 241°59.0 | 57.1 | | | | |
| 9 | 255°44.7 | 308°16.3 | · · 10.4 | 314°58.9 | · · 27.2 | 145°30.7 | · · 25.4 | 257°01.3 | · · 57.0 | | | | |
| 10 | 270°47.2 | 323°15.5 | 09.7 | 329°59.3 | 26.9 | 160°33.5 | 25.4 | 272°03.6 | 56.9 | | | | |
| 11 | 285°49.6 | 338°14.7 | 09.0 | 344°59.7 | 26.5 | 175°36.3 | 25.5 | 287°05.8 | 56.8 | | | | |
| 12 | 300°52.1 | 353°13.9 | S20°08.3 | 0°00.1 | S21°26.1 | 190°39.1 | N22°25.5 | 302°08.1 | S02°56.7 | | | | |
| 13 | 315°54.6 | 8°13.1 | 07.6 | 15°00.5 | 25.7 | 205°41.9 | 25.6 | 317°10.4 | 56.6 | | | | |
| 14 | 330°57.0 | 23°12.3 | 06.9 | 30°01.0 | 25.3 | 220°44.8 | 25.6 | 332°12.7 | 56.5 | | | | |
| 15 | 345°59.5 | 38°11.5 | · · 06.2 | 45°01.4 | · · 24.9 | 235°47.6 | · · 25.7 | 347°14.9 | · · 56.4 | | | | |
| 16 | 1°02.0 | 53°10.7 | 05.5 | 60°01.8 | 24.5 | 250°50.4 | 25.7 | 2°17.2 | 56.3 | | | | |
| 17 | 16°04.4 | 68°09.9 | 04.7 | 75°02.2 | 24.1 | 265°53.2 | 25.8 | 17°19.5 | 56.2 | | | | |
| 18 | 31°06.9 | 83°09.1 | S20°04.0 | 90°02.6 | S21°23.8 | 280°56.0 | N22°25.8 | 32°21.7 | S02°56.1 | | | | |
| 19 | 46°09.3 | 98°08.3 | 03.3 | 105°03.0 | 23.4 | 295°58.8 | 25.9 | 47°24.0 | 56.1 | | | | |
| 20 | 61°11.8 | 113°07.5 | 02.6 | 120°03.4 | 23.0 | 311°01.6 | 25.9 | 62°26.3 | 56.0 | | | | |
| 21 | 76°14.3 | 128°06.7 | · · 01.9 | 135°03.9 | · · 22.6 | 326°04.4 | · · 26.0 | 77°28.5 | · · 55.9 | | | | |
| 22 | 91°16.7 | 143°05.9 | 01.2 | 150°04.3 | 22.2 | 341°07.2 | 26.0 | 92°30.8 | 55.8 | | | | |
| 23 | 106°19.2 | 158°05.1 | 00.5 | 165°04.7 | 21.8 | 356°10.0 | 26.1 | 107°33.1 | 55.7 | | | | |
| Mer.pass. 15:56 | | | ν-0.8' d-0.7' m-3.90 | | | ν0.4' d-0.4' m1.09 | | | ν2.8' d0.0' m-2.66 | | | ν2.3' d-0.1' m1.03 | |

| | SHA | Dec |
|---------------------|----------|----------|
| Alpheratz | 357°34.0 | 29°14.2 |
| Ankaa | 353°06.4 | -42°10.1 |
| Schedar | 349°30.2 | 56°41.1 |
| Diphda | 348°46.5 | -17°50.7 |
| Achernar | 335°19.6 | -57°06.5 |
| Hamal | 327°50.2 | 23°35.2 |
| Polaris | 313°25.0 | 89°22.8 |
| Acamar | 315°11.0 | -40°12.2 |
| Menkar | 314°05.1 | 4°11.5 |
| Mirfak | 308°26.8 | 49°57.4 |
| Aldebaran | 290°38.4 | 16°33.7 |
| Rigel | 281°02.8 | -8°10.4 |
| Capella | 280°20.2 | 46°01.5 |
| Bellatrix | 278°21.7 | 6°22.4 |
| Elnath | 278°00.5 | 28°37.8 |
| Alnilam | 275°36.6 | -1°11.2 |
| Betelgeuse | 270°50.8 | 7°24.7 |
| Canopus | 263°51.5 | -52°42.7 |
| Sirius | 258°25.1 | -16°45.2 |
| Adhara | 255°04.8 | -29°00.5 |
| Procyon | 244°49.6 | 5°09.4 |
| Pollux | 243°15.9 | 27°57.7 |
| Avior | 234°13.7 | -59°35.5 |
| Suhail | 222°45.2 | -43°32.2 |
| Miaplacidus | 221°37.2 | -69°49.3 |
| Alphard | 217°46.6 | -8°46.4 |
| Regulus | 207°33.2 | 11°50.3 |
| Dubhe | 193°39.5 | 61°36.3 |
| Denebola | 182°23.9 | 14°25.4 |
| Gienah | 175°42.6 | -17°41.2 |
| Acrux | 172°58.9 | -63°14.4 |
| Gacrux | 171°50.5 | -57°15.4 |
| Alioth | 166°12.0 | 55°48.7 |
| Spica | 158°21.3 | -11°17.9 |
| Alkaid | 152°51.3 | 49°10.6 |
| Hadar | 148°34.8 | -60°29.7 |
| Menkent | 147°56.6 | -36°29.8 |
| Arcturus | 145°47.1 | 19°02.6 |
| Rigel Kent. | 139°39.2 | -60°56.4 |
| Kochab | 137°20.1 | 74°02.5 |
| Zuben'ubi | 136°55.1 | -16°09.0 |
| Alphecca | 126°03.2 | 26°37.4 |
| Antares | 112°15.0 | -26°29.3 |
| Atria | 107°08.9 | -69°04.2 |
| Sabik | 102°02.0 | -15°45.4 |
| Shaula | 96°09.5 | -37°07.3 |
| Rasalhague | 95°58.0 | 12°32.3 |
| Eltanin | 90°42.3 | 51°28.9 |
| Kaus Aust. | 83°31.7 | -34°22.3 |
| Vega | 80°33.0 | 38°48.3 |
| Nunki | 75°47.0 | -26°15.9 |
| Altair | 61°59.4 | 8°56.2 |
| Peacock | 53°05.0 | -56°39.1 |
| Deneb | 49°25.7 | 45°22.4 |
| Enif | 33°38.2 | 9°59.7 |
| Al Na'ir | 27°32.2 | -46°50.2 |
| Fomalhaut | 15°13.8 | -29°29.2 |
| Scheat | 13°44.6 | 28°13.5 |
| Markab | 13°29.3 | 15°20.8 |
| Jan 19 Mon | SHA | Mer.pass |
| Venus | 55°38.4 | 12:25 |
| Mars | 61°11.2 | 12:01 |
| Jupiter | 249°26.2 | 23:24 |
| Saturn | 1°27.6 | 15:58 |
| Jan 20 Tue | SHA | Mer.pass |
| Venus | 54°19.5 | 12:26 |
| Mars | 60°21.9 | 12:01 |
| Jupiter | 249°34.6 | 23:20 |
| Saturn | 1°23.0 | 15:54 |
| Jan 21 Wed | SHA | Mer.pass |
| Venus | 53°00.9 | 12:27 |
| Mars | 59°32.6 | 12:00 |
| Jupiter | 249°42.9 | 23:15 |
| Saturn | 1°18.4 | 15:51 |
| Horizontal parallax | | |
| Venus: | | 0.1 |
| Mars: | | 0.1 |

| h | Sun | | | Moon | | | |
|------------|----------|----------|-------------|----------|-------|------------|--------|
| | GHA | Dec | | GHA | ν | Dec | d |
| Mon | | | | | | | HP |
| 0 | 177°21.7 | S20°22.6 | | 174°32.4 | 10.9' | S23°05.9 | -9.1' |
| 1 | 192°21.5 | 22.1 | | 189°02.3 | 10.9' | 22°56.8 | -9.3' |
| 2 | 207°21.3 | 21.6 | | 203°32.2 | 11.0' | 22°47.5 | -9.4' |
| 3 | 222°21.1 | 21.1 | | 218°02.2 | 11.0' | 22°38.1 | -9.5' |
| 4 | 237°21.0 | 20.5 | | 232°32.2 | 11.1' | 22°28.6 | -9.6' |
| 5 | 252°20.8 | 20.0 | | 247°02.3 | 11.1' | 22°19.0 | -9.7' |
| 6 | 267°20.6 | S20°19.5 | | 261°32.4 | 11.2' | S22°09.3 | -9.8' |
| 7 | 282°20.4 | 19.0 | | 276°02.6 | 11.2' | 21°59.5 | -10.0' |
| 8 | 297°20.2 | 18.4 | | 290°32.8 | 11.3' | 21°49.5 | -10.1' |
| 9 | 312°20.0 | 17.9 | | 305°03.1 | 11.3' | 21°39.4 | -10.2' |
| 10 | 327°19.8 | 17.4 | | 319°33.4 | 11.4' | 21°29.3 | -10.3' |
| 11 | 342°19.6 | 16.9 | | 334°03.8 | 11.4' | 21°19.0 | -10.4' |
| 12 | 357°19.4 | S20°16.3 | | 348°34.3 | 11.5' | S21°08.6 | -10.5' |
| 13 | 12°19.2 | 15.8 | | 3°04.8 | 11.6' | 20°58.1 | -10.6' |
| 14 | 27°19.0 | 15.3 | | 17°35.3 | 11.6' | 20°47.5 | -10.7' |
| 15 | 42°18.9 | 14.7 | | 32°05.9 | 11.7' | 20°36.8 | -10.8' |
| 16 | 57°18.7 | 14.2 | | 46°36.6 | 11.7' | 20°26.0 | -10.9' |
| 17 | 72°18.5 | 13.7 | | 61°07.3 | 11.8' | 20°15.1 | -11.0' |
| 18 | 87°18.3 | S20°13.1 | | 75°38.1 | 11.8' | S20°04.0 | -11.1' |
| 19 | 102°18.1 | 12.6 | | 90°08.9 | 11.9' | 19°52.9 | -11.2' |
| 20 | 117°17.9 | 12.1 | | 104°39.8 | 11.9' | 19°41.7 | -11.3' |
| 21 | 132°17.7 | 11.5 | | 119°10.7 | 12.0' | 19°30.4 | -11.4' |
| 22 | 147°17.5 | 11.0 | | 133°41.7 | 12.0' | 19°18.9 | -11.5' |
| 23 | 162°17.4 | 10.5 | | 148°12.7 | 12.1' | 19°07.4 | -11.6' |
| SD = 16.2' | | | $d = -0.5'$ | | | SD = 15.1' | |

| Tue | Sun | | | Moon | | | |
|------------|----------|----------|-------------|----------|-------|------------|--------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 177°17.2 | S20°09.9 | | 162°43.8 | 12.1' | S18°55.8 | -11.7' |
| 1 | 192°17.0 | 09.4 | | 177°14.9 | 12.2' | 18°44.1 | -11.8' |
| 2 | 207°16.8 | 08.8 | | 191°46.1 | 12.2' | 18°32.3 | -11.9' |
| 3 | 222°16.6 | 08.3 | | 206°17.4 | 12.3' | 18°20.4 | -12.0' |
| 4 | 237°16.4 | 07.8 | | 220°48.6 | 12.3' | 18°08.4 | -12.1' |
| 5 | 252°16.2 | 07.2 | | 235°20.0 | 12.4' | 17°56.3 | -12.2' |
| 6 | 267°16.1 | S20°06.7 | | 249°51.4 | 12.4' | S17°44.1 | -12.3' |
| 7 | 282°15.9 | 06.1 | | 264°22.8 | 12.5' | 17°31.9 | -12.4' |
| 8 | 297°15.7 | 05.6 | | 278°54.3 | 12.5' | 17°19.5 | -12.4' |
| 9 | 312°15.5 | 05.0 | | 293°25.8 | 12.6' | 17°07.1 | -12.5' |
| 10 | 327°15.3 | 04.5 | | 307°57.4 | 12.6' | 16°54.5 | -12.6' |
| 11 | 342°15.1 | 04.0 | | 322°29.1 | 12.7' | 16°41.9 | -12.7' |
| 12 | 357°15.0 | S20°03.4 | | 337°00.8 | 12.7' | S16°29.2 | -12.8' |
| 13 | 12°14.8 | 02.9 | | 351°32.5 | 12.8' | 16°16.4 | -12.9' |
| 14 | 27°14.6 | 02.3 | | 6°04.3 | 12.8' | 16°03.6 | -12.9' |
| 15 | 42°14.4 | 01.8 | | 20°36.1 | 12.9' | 15°50.6 | -13.0' |
| 16 | 57°14.2 | 01.2 | | 35°08.0 | 12.9' | 15°37.6 | -13.1' |
| 17 | 72°14.0 | 00.7 | | 49°39.9 | 13.0' | 15°24.5 | -13.2' |
| 18 | 87°13.9 | S20°00.1 | | 64°11.8 | 13.0' | S15°11.3 | -13.3' |
| 19 | 102°13.7 | 19°59.6 | | 78°43.8 | 13.0' | 14°58.0 | -13.3' |
| 20 | 117°13.5 | 59.0 | | 93°15.9 | 13.1' | 14°44.7 | -13.4' |
| 21 | 132°13.3 | 58.5 | | 107°48.0 | 13.1' | 14°31.3 | -13.5' |
| 22 | 147°13.1 | 57.9 | | 122°20.1 | 13.2' | 14°17.8 | -13.6' |
| 23 | 162°13.0 | 57.4 | | 136°52.3 | 13.2' | 14°04.2 | -13.6' |
| SD = 16.2' | | | $d = -0.5'$ | | | SD = 15.3' | |

| Wed | Sun | | | Moon | | | |
|------------|----------|----------|-------------|----------|-------|------------|--------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 177°12.8 | S19°56.8 | | 151°24.5 | 13.3' | S13°50.6 | -13.7' |
| 1 | 192°12.6 | 56.3 | | 165°56.7 | 13.3' | 13°36.9 | -13.8' |
| 2 | 207°12.4 | 55.7 | | 180°29.0 | 13.3' | 13°23.1 | -13.8' |
| 3 | 222°12.3 | 55.1 | | 195°01.4 | 13.4' | 13°09.3 | -13.9' |
| 4 | 237°12.1 | 54.6 | | 209°33.7 | 13.4' | 12°55.4 | -14.0' |
| 5 | 252°11.9 | 54.0 | | 224°06.1 | 13.4' | 12°41.4 | -14.0' |
| 6 | 267°11.7 | S19°53.5 | | 238°38.6 | 13.5' | S12°27.3 | -14.1' |
| 7 | 282°11.5 | 52.9 | | 253°11.1 | 13.5' | 12°13.2 | -14.2' |
| 8 | 297°11.4 | 52.4 | | 267°43.6 | 13.5' | 11°59.0 | -14.2' |
| 9 | 312°11.2 | 51.8 | | 282°16.1 | 13.6' | 11°44.8 | -14.3' |
| 10 | 327°11.0 | 51.2 | | 296°48.7 | 13.6' | 11°30.5 | -14.4' |
| 11 | 342°10.8 | 50.7 | | 311°21.3 | 13.6' | 11°16.2 | -14.4' |
| 12 | 357°10.7 | S19°50.1 | | 325°53.9 | 13.7' | S11°01.7 | -14.5' |
| 13 | 12°10.5 | 49.6 | | 340°26.6 | 13.7' | 10°47.3 | -14.5' |
| 14 | 27°10.3 | 49.0 | | 354°59.3 | 13.7' | 10°32.7 | -14.6' |
| 15 | 42°10.1 | 48.4 | | 9°32.0 | 13.8' | 10°18.2 | -14.6' |
| 16 | 57°10.0 | 47.9 | | 24°04.8 | 13.8' | 10°03.5 | -14.7' |
| 17 | 72°09.8 | 47.3 | | 38°37.5 | 13.8' | 09°48.8 | -14.7' |
| 18 | 87°09.6 | S19°46.7 | | 53°10.3 | 13.8' | S09°34.1 | -14.8' |
| 19 | 102°09.5 | 46.2 | | 67°43.2 | 13.8' | 09°19.3 | -14.8' |
| 20 | 117°09.3 | 45.6 | | 82°16.0 | 13.9' | 09°04.4 | -14.9' |
| 21 | 132°09.1 | 45.0 | | 96°48.9 | 13.9' | 08°49.5 | -14.9' |
| 22 | 147°08.9 | 44.5 | | 111°21.8 | 13.9' | 08°34.6 | -15.0' |
| 23 | 162°08.8 | 43.9 | | 125°54.7 | 13.9' | 08°19.6 | -15.0' |
| SD = 16.2' | | | $d = -0.6'$ | | | SD = 15.4' | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 07:48 | 09:31 | ■ | ■ | 14:52 | 16:35 |
| N 70° | 07:35 | 09:02 | 11:05 | 13:18 | 15:21 | 16:48 |
| 68° | 07:24 | 08:41 | 10:10 | 14:13 | 15:42 | 16:59 |
| 66° | 07:15 | 08:24 | 09:37 | 14:46 | 15:59 | 17:07 |
| 64° | 07:08 | 08:10 | 09:13 | 15:09 | 16:13 | 17:15 |
| 62° | 07:01 | 07:58 | 08:55 | 15:28 | 16:25 | 17:22 |
| 60° | 06:55 | 07:48 | 08:39 | 15:43 | 16:35 | 17:28 |
| N 58° | 06:50 | 07:39 | 08:26 | 15:56 | 16:43 | 17:33 |
| 56° | 06:45 | 07:31 | 08:15 | 16:08 | 16:51 | 17:38 |
| 54° | 06:40 | 07:24 | 08:05 | 16:18 | 16:58 | 17:42 |
| 52° | 06:36 | 07:18 | 07:56 | 16:26 | 17:05 | 17:47 |
| 50° | 06:32 | 07:12 | 07:48 | 16:34 | 17:11 | 17:50 |
| 45° | 06:23 | 06:59 | 07:31 | 16:51 | 17:23 | 17:59 |
| N 40° | 06:15 | 06:48 | 07:18 | 17:05 | 17:34 | 18:07 |
| 35° | 06:08 | 06:39 | 07:06 | 17:16 | 17:44 | 18:15 |
| 30° | 06:01 | 06:30 | 06:56 | 17:27 | 17:52 | 18:21 |
| 20° | 05:47 | 06:14 | 06:38 | 17:44 | 18:08 | 18:35 |
| N 10° | 05:34 | 06:00 | 06:22 | 18:00 | 18:22 | 18:48 |
| 0° | 05:20 | 05:45 | 06:07 | 18:15 | 18:37 | 19:02 |
| S 10° | 05:04 | 05:30 | 05:53 | 18:29 | 18:52 | 19:18 |
| 20° | 04:44 | 05:13 | 05:36 | 18:45 | 19:09 | 19:37 |
| 30° | 04:19 | 04:51 | 05:18 | 19:04 | 19:30 | 20:02 |
| 35° | 04:04 | 04:38 | 05:07 | 19:15 | 19:43 | 20:18 |
| 40° | 03:44 | 04:23 | 04:54 | 19:27 | 19:58 | 20:37 |
| 45° | 03:20 | 04:05 | 04:40 | 19:42 | 20:17 | 21:01 |
| S 50° | 02:45 | 03:41 | 04:21 | 20:00 | 20:40 | 21:35 |
| 52° | 02:27 | 03:29 | 04:12 | 20:09 | 20:52 | 21:53 |
| 54° | 02:04 | 03:15 | 04:03 | 20:18 | 21:05 | 22:16 |
| 56° | 01:31 | 02:59 | 03:52 | 20:29 | 21:21 | 22:47 |
| 58° | /// | 02:40 | 03:39 | 20:42 | 21:40 | 23:57 |
| S 60° | /// | 02:15 | 03:24 | 20:56 | 22:05 | /// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | ■ | 11:58 | 10:48 | ■ | 15:36 | 18:23 |
| N 70° | ■ | 11:14 | 10:30 | ■ | 16:18 | 18:39 |
| 68° | 11:44 | 10:44 | 10:15 | 14:07 | 16:46 | 18:51 |
| 66° | 10:51 | 10:22 | 10:03 | 14:59 | 17:07 | 19:01 |
| 64° | 10:19 | 10:04 | 09:53 | 15:30 | 17:24 | 19:10 |
| 62° | 09:54 | 09:49 | 09:44 | 15:54 | 17:38 | 19:17 |
| 60° | 09:35 | 09:36 | 09:36 | 16:12 | 17:49 | 19:23 |
| N 58° | 09:19 | 09:26 | 09:30 | 16:28 | 17:59 | 19:29 |
| 56° | 09:05 | 09:16 | 09:24 | 16:41 | 18:08 | 19:34 |
| 54° | 08:53 | 09:08 | 09:18 | 16:52 | 18:15 | 19:38 |
| 52° | 08:43 | 09:00 | 09:14 | 17:02 | 18:22 | 19:42 |
| 50° | 08:33 | 08:53 | 09:09 | 17:11 | 18:28 | 19:46 |
| 45° | 08:13 | 08:38 | 09:00 | 17:30 | 18:41 | 19:53 |
| N 40° | 07:57 | 08:26 | 08:52 | 17:45 | 18:52 | 19:59 |
| 35° | 07:43 | 08:16 | 08:45 | 17:57 | 19:01 | 20:05 |
| 30° | 07:31 | 08:07 | 08:39 | 18:09 | 19:09 | 20:10 |
| 20° | 07:10 | 07:51 | 08:28 | 18:27 | 19:23 | 20:18 |
| N 10° | 06:52 | 07:37 | 08:19 | 18:44 | 19:35 | 20:25 |
| 0° | 06:35 | 07:24 | 08:10 | 18:59 | 19:46 | 20:31 |
| S 10° | 06:18 | 07:11 | 08:01 | 19:14 | 19:57 | 20:38 |
| 20° | 06:00 | 06:56 | 07:52 | 19:30 | 20:09 | 20:45 |
| 30° | 05:39 | 06:40 | 07:41 | 19:48 | 20:22 | 20:53 |
| 35° | 05:27 | 06:31 | 07:34 | 19:59 | 20:29 | 20:57 |
| 40° | 05:12 | 06:20 | 07:27 | 20:11 | 20:38 | 21:02 |
| 45° | 04:55 | 06:07 | 07:19 | 20:25 | 20:48 | 21:08 |
| S 50° | 04:34 | 05:51 | 07:09 | 20:42 | 21:00 | 21:15 |
| 52° | 04:24 | 05:44 | 07:04 | 20:50 | 21:05 | 21:18 |
| 54° | 04:13 | 05:36 | 06:59 | 20:59 | 21:12 | 21:21 |
| 56° | 04:00 | 05:26 | 06:53 | 21:09 | 21:18 | 21:25 |
| 58° | 03:44 | 05:16 | 06:46 | 21:20 | 21:26 | 21:29 |
| S 60° | 03:26 | 05:04 | 06:39 | 21:34 | 21:34 | 21:34 |

| Day | Sun | | Mer. Pass | Moon | | Age |
|-----|--|----------------------------------|-----------|------------------------------|----------------|-----|
| | Eqn. of Time 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer. Pass. Upper hh:mm | Lower hh:mm | |
| 19 | 10:33 | 10:42 | 12:11 | 12:47 | 00:23 | |
| 20 | 10:51 | 11:00 | 12:11 | 13:35 | 01:11 | |
| 21 | 11:09 | 11:17 | 12:11 | 14:21 | 01:58 | |

January 22, 23, 24 UT (Thu., Fri., Sat.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|----------|
| Thu | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 121°21.7 | | 173°04.3 | S19°59.8 | 180°05.1 | S21°21.4 | 11°12.8 | N22°26.1 | 122°35.3 | S02°55.6 |
| 1 | 136°24.1 | | 188°03.5 | 59.0 | 195°05.5 | 21.0 | 26°15.6 | 26.2 | 137°37.6 | 55.5 |
| 2 | 151°26.6 | | 203°02.7 | 58.3 | 210°05.9 | 20.6 | 41°18.4 | 26.2 | 152°39.8 | 55.4 |
| 3 | 166°29.1 | | 218°02.0 | · · 57.6 | 225°06.4 | · · 20.2 | 56°21.2 | · · 26.3 | 167°42.1 | · · 55.3 |
| 4 | 181°31.5 | | 233°01.2 | 56.9 | 240°06.8 | 19.8 | 71°24.0 | 26.3 | 182°44.4 | 55.2 |
| 5 | 196°34.0 | | 248°00.4 | 56.2 | 255°07.2 | 19.5 | 86°26.8 | 26.4 | 197°46.6 | 55.1 |
| 6 | 211°36.5 | | 262°59.6 | S19°55.4 | 270°07.6 | S21°19.1 | 101°29.7 | N22°26.4 | 212°48.9 | S02°55.0 |
| 7 | 226°38.9 | | 277°58.8 | 54.7 | 285°08.0 | 18.7 | 116°32.5 | 26.5 | 227°51.2 | 54.9 |
| 8 | 241°41.4 | | 292°58.0 | 54.0 | 300°08.5 | 18.3 | 131°35.3 | 26.5 | 242°53.4 | 54.8 |
| 9 | 256°43.8 | | 307°57.2 | · · 53.3 | 315°08.9 | · · 17.9 | 146°38.1 | · · 26.6 | 257°55.7 | · · 54.8 |
| 10 | 271°46.3 | | 322°56.4 | 52.5 | 330°09.3 | 17.5 | 161°40.9 | 26.6 | 272°58.0 | 54.7 |
| 11 | 286°48.8 | | 337°55.7 | 51.8 | 345°09.7 | 17.1 | 176°43.7 | 26.7 | 288°00.2 | 54.6 |
| 12 | 301°51.2 | | 352°54.9 | S19°51.1 | 0°10.1 | S21°16.7 | 191°46.5 | N22°26.7 | 303°02.5 | S02°54.5 |
| 13 | 316°53.7 | | 7°54.1 | 50.4 | 15°10.5 | 16.3 | 206°49.3 | 26.8 | 318°04.8 | 54.4 |
| 14 | 331°56.2 | | 22°53.3 | 49.6 | 30°11.0 | 15.9 | 221°52.1 | 26.8 | 333°07.0 | 54.3 |
| 15 | 346°58.6 | | 37°52.5 | · · 48.9 | 45°11.4 | · · 15.5 | 236°54.9 | · · 26.9 | 348°09.3 | · · 54.2 |
| 16 | 2°01.1 | | 52°51.7 | 48.2 | 60°11.8 | 15.1 | 251°57.7 | 26.9 | 3°11.6 | 54.1 |
| 17 | 17°03.6 | | 67°51.0 | 47.4 | 75°12.2 | 14.7 | 267°00.5 | 27.0 | 18°13.8 | 54.0 |
| 18 | 32°06.0 | | 82°50.2 | S19°46.7 | 90°12.6 | S21°14.3 | 282°03.3 | N22°27.0 | 33°16.1 | S02°53.9 |
| 19 | 47°08.5 | | 97°49.4 | 46.0 | 105°13.1 | 13.9 | 297°06.1 | 27.1 | 48°18.4 | 53.8 |
| 20 | 62°11.0 | | 112°48.6 | 45.2 | 120°13.5 | 13.5 | 312°08.9 | 27.1 | 63°20.6 | 53.7 |
| 21 | 77°13.4 | | 127°47.8 | · · 44.5 | 135°13.9 | · · 13.1 | 327°11.7 | · · 27.2 | 78°22.9 | · · 53.6 |
| 22 | 92°15.9 | | 142°47.0 | 43.8 | 150°14.3 | 12.7 | 342°14.5 | 27.2 | 93°25.1 | 53.5 |
| 23 | 107°18.3 | | 157°46.3 | 43.0 | 165°14.7 | 12.3 | 357°17.3 | 27.2 | 108°27.4 | 53.4 |
| Mer.pass. 15:52 | | ν-0.8' d-0.7' m-3.90 | | ν0.4' d-0.4' m1.10 | | ν2.8' d0.0' m-2.66 | | ν2.3' d-0.1' m1.03 | | |
| Fri | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 122°20.8 | | 172°45.5 | S19°42.3 | 180°15.1 | S21°11.9 | 12°20.1 | N22°27.3 | 123°29.7 | S02°53.4 |
| 1 | 137°23.3 | | 187°44.7 | 41.5 | 195°15.6 | 11.5 | 27°22.9 | 27.3 | 138°31.9 | 53.3 |
| 2 | 152°25.7 | | 202°43.9 | 40.8 | 210°16.0 | 11.1 | 42°25.7 | 27.4 | 153°34.2 | 53.2 |
| 3 | 167°28.2 | | 217°43.2 | · · 40.1 | 225°16.4 | · · 10.7 | 57°28.5 | · · 27.4 | 168°36.5 | · · 53.1 |
| 4 | 182°30.7 | | 232°42.4 | 39.3 | 240°16.8 | 10.3 | 72°31.3 | 27.5 | 183°38.7 | 53.0 |
| 5 | 197°33.1 | | 247°41.6 | 38.6 | 255°17.3 | 09.9 | 87°34.1 | 27.5 | 198°41.0 | 52.9 |
| 6 | 212°35.6 | | 262°40.8 | S19°37.8 | 270°17.7 | S21°09.5 | 102°36.9 | N22°27.6 | 213°43.2 | S02°52.8 |
| 7 | 227°38.1 | | 277°40.0 | 37.1 | 285°18.1 | 09.1 | 117°39.7 | 27.6 | 228°45.5 | 52.7 |
| 8 | 242°40.5 | | 292°39.3 | 36.3 | 300°18.5 | 08.7 | 132°42.5 | 27.7 | 243°47.8 | 52.6 |
| 9 | 257°43.0 | | 307°38.5 | · · 35.6 | 315°18.9 | · · 08.3 | 147°45.3 | · · 27.7 | 258°50.0 | · · 52.5 |
| 10 | 272°45.4 | | 322°37.7 | 34.8 | 330°19.4 | 07.9 | 162°48.1 | 27.8 | 273°52.3 | 52.4 |
| 11 | 287°47.9 | | 337°37.0 | 34.1 | 345°19.8 | 07.5 | 177°51.0 | 27.8 | 288°54.6 | 52.3 |
| 12 | 302°50.4 | | 352°36.2 | S19°33.3 | 0°20.2 | S21°07.1 | 192°53.8 | N22°27.9 | 303°56.8 | S02°52.2 |
| 13 | 317°52.8 | | 7°35.4 | 32.6 | 15°20.6 | 06.7 | 207°56.6 | 27.9 | 318°59.1 | 52.1 |
| 14 | 332°55.3 | | 22°34.6 | 31.8 | 30°21.0 | 06.2 | 222°59.4 | 28.0 | 334°01.3 | 52.0 |
| 15 | 347°57.8 | | 37°33.9 | · · 31.1 | 45°21.5 | · · 05.8 | 238°02.2 | · · 28.0 | 349°03.6 | · · 51.9 |
| 16 | 3°00.2 | | 52°33.1 | 30.3 | 60°21.9 | 05.4 | 253°05.0 | 28.1 | 4°05.9 | 51.8 |
| 17 | 18°02.7 | | 67°32.3 | 29.5 | 75°22.3 | 05.0 | 268°07.8 | 28.1 | 19°08.1 | 51.7 |
| 18 | 33°05.2 | | 82°31.6 | S19°28.8 | 90°22.7 | S21°04.6 | 283°10.6 | N22°28.2 | 34°10.4 | S02°51.7 |
| 19 | 48°07.6 | | 97°30.8 | 28.0 | 105°23.2 | 04.2 | 298°13.4 | 28.2 | 49°12.7 | 51.6 |
| 20 | 63°10.1 | | 112°30.0 | 27.3 | 120°23.6 | 03.8 | 313°16.2 | 28.3 | 64°14.9 | 51.5 |
| 21 | 78°12.6 | | 127°29.3 | · · 26.5 | 135°24.0 | · · 03.4 | 328°19.0 | · · 28.3 | 79°17.2 | · · 51.4 |
| 22 | 93°15.0 | | 142°28.5 | 25.8 | 150°24.4 | 03.0 | 343°21.8 | 28.3 | 94°19.4 | 51.3 |
| 23 | 108°17.5 | | 157°27.7 | 25.0 | 165°24.8 | 02.6 | 358°24.6 | 28.4 | 109°21.7 | 51.2 |
| Mer.pass. 15:48 | | ν-0.8' d-0.7' m-3.90 | | ν0.4' d-0.4' m1.10 | | ν2.8' d0.0' m-2.66 | | ν2.3' d-0.1' m1.03 | | |
| Sat | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 123°19.9 | | 172°27.0 | S19°24.2 | 180°25.3 | S21°02.2 | 13°27.4 | N22°28.4 | 124°24.0 | S02°51.1 |
| 1 | 138°22.4 | | 187°26.2 | 23.5 | 195°25.7 | 01.7 | 28°30.2 | 28.5 | 139°26.2 | 51.0 |
| 2 | 153°24.9 | | 202°25.4 | 22.7 | 210°26.1 | 01.3 | 43°33.0 | 28.5 | 154°28.5 | 50.9 |
| 3 | 168°27.3 | | 217°24.7 | · · 21.9 | 225°26.5 | · · 00.9 | 58°35.8 | · · 28.6 | 169°30.7 | · · 50.8 |
| 4 | 183°29.8 | | 232°23.9 | 21.2 | 240°27.0 | 00.5 | 73°38.6 | 28.6 | 184°33.0 | 50.7 |
| 5 | 198°32.3 | | 247°23.1 | 20.4 | 255°27.4 | 21°00.1 | 88°41.4 | 28.7 | 199°35.3 | 50.6 |
| 6 | 213°34.7 | | 262°22.4 | S19°19.6 | 270°27.8 | S20°59.7 | 103°44.1 | N22°28.7 | 214°37.5 | S02°50.5 |
| 7 | 228°37.2 | | 277°21.6 | 18.9 | 285°28.2 | 59.3 | 118°46.9 | 28.8 | 229°39.8 | 50.4 |
| 8 | 243°39.7 | | 292°20.8 | 18.1 | 300°28.7 | 58.9 | 133°49.7 | 28.8 | 244°42.0 | 50.3 |
| 9 | 258°42.1 | | 307°20.1 | · · 17.3 | 315°29.1 | · · 58.4 | 148°52.5 | · · 28.9 | 259°44.3 | · · 50.2 |
| 10 | 273°44.6 | | 322°19.3 | 16.5 | 330°29.5 | 58.0 | 163°55.3 | 28.9 | 274°46.6 | 50.1 |
| 11 | 288°47.1 | | 337°18.6 | 15.8 | 345°29.9 | 57.6 | 178°58.1 | 29.0 | 289°48.8 | 50.0 |
| 12 | 303°49.5 | | 352°17.8 | S19°15.0 | 0°30.4 | S20°57.2 | 194°00.9 | N22°29.0 | 304°51.1 | S02°49.9 |
| 13 | 318°52.0 | | 7°17.0 | 14.2 | 15°30.8 | 56.8 | 209°03.7 | 29.1 | 319°53.3 | 49.8 |
| 14 | 333°54.4 | | 22°16.3 | 13.4 | 30°31.2 | 56.4 | 224°06.5 | 29.1 | 334°55.6 | 49.8 |
| 15 | 348°56.9 | | 37°15.5 | · · 12.7 | 45°31.6 | · · 55.9 | 239°09.3 | · · 29.1 | 349°57.9 | · · 49.7 |
| 16 | 3°59.4 | | 52°14.8 | 11.9 | 60°32.1 | 55.5 | 254°12.1 | 29.2 | 5°00.1 | 49.6 |
| 17 | 19°01.8 | | 67°14.0 | 11.1 | 75°32.5 | 55.1 | 269°14.9 | 29.2 | 20°02.4 | 49.5 |
| 18 | 34°04.3 | | 82°13.3 | S19°10.3 | 90°32.9 | S20°54.7 | 284°17.7 | N22°29.3 | 35°04.6 | S02°49.4 |
| 19 | 49°06.8 | | 97°12.5 | 09.5 | 105°33.3 | 54.3 | 299°20.5 | 29.3 | 50°06.9 | 49.3 |
| 20 | 64°09.2 | | 112°11.7 | 08.8 | 120°33.8 | 53.9 | 314°23.3 | 29.4 | 65°09.1 | 49.2 |
| 21 | 79°11.7 | | 127°11.0 | · · 08.0 | 135°34.2 | · · 53.4 | 329°26.1 | · · 29.4 | 80°11.4 | · · 49.1 |
| 22 | 94°14.2 | | 142°10.2 | 07.2 | 150°34.6 | 53.0 | 344°28.9 | 29.5 | 95°13.7 | 49.0 |
| 23 | 109°16.6 | | 157°09.5 | 06.4 | 165°35.0 | 52.6 | 359°31.7 | 29.5 | 110°15.9 | 48.9 |
| Mer.pass. 15:44 | | ν-0.8' d-0.8' m-3.90 | | ν0.4' d-0.4' m1.10 | | ν2.8' d0.0' m-2.65 | | ν2.3' d-0.1' m1.03 | | |

| | SHA | Dec |
|---------------------|----------|----------|
| Alpheratz | 357°34.1 | 29°14.2 |
| Ankaa | 353°06.5 | -42°10.1 |
| Schedar | 349°30.3 | 56°41.1 |
| Diphda | 348°46.5 | -17°50.7 |
| Achernar | 335°19.6 | -57°06.5 |
| Hamal | 327°50.2 | 23°35.2 |
| Polaris | 313°26.6 | 89°22.8 |
| Acamar | 315°11.0 | -40°12.2 |
| Menkar | 314°05.1 | 4°11.5 |
| Mirfak | 308°26.8 | 49°57.4 |
| Aldebaran | 290°38.4 | 16°33.7 |
| Rigel | 281°02.8 | -8°10.4 |
| Capella | 280°20.2 | 46°01.5 |
| Bellatrix | 278°21.7 | 6°22.4 |
| Elnath | 278°00.5 | 28°37.8 |
| Alnilam | 275°36.6 | -1°11.2 |
| Betelgeuse | 270°50.8 | 7°24.7 |
| Canopus | 263°51.5 | -52°42.7 |
| Sirius | 258°25.1 | -16°45.2 |
| Adhara | 255°04.8 | -29°00.5 |
| Procyon | 244°49.6 | 5°09.4 |
| Pollux | 243°15.9 | 27°57.7 |
| Avior | 234°13.7 | -59°35.6 |
| Suhail | 222°45.2 | -43°32.3 |
| Miaplacidus | 221°37.2 | -69°49.4 |
| Alphard | 217°46.6 | -8°46.4 |
| Regulus | 207°33.2 | 11°50.2 |
| Dubhe | 193°39.4 | 61°36.3 |
| Denebola | 182°23.9 | 14°25.4 |
| Gienah | 175°42.5 | -17°41.2 |
| Acrux | 172°58.8 | -63°14.4 |
| Gacrux | 171°50.4 | -57°15.4 |
| Alioth | 166°12.0 | 55°48.7 |
| Spica | 158°21.3 | -11°17.9 |
| Alkaid | 152°51.3 | 49°10.6 |
| Hadar | 148°34.8 | -60°29.7 |
| Menkent | 147°56.6 | -36°29.8 |
| Arcturus | 145°47.1 | 19°02.6 |
| Rigel Kent. | 139°39.2 | -60°56.4 |
| Kochab | 137°20.0 | 74°02.5 |
| Zuben'ubi | 136°55.1 | -16°09.0 |
| Alphecca | 126°03.1 | 26°37.4 |
| Antares | 112°15.0 | -26°29.3 |
| Atria | 107°08.8 | -69°04.2 |
| Sabik | 102°02.0 | -15°45.5 |
| Shaula | 96°09.5 | -37°07.3 |
| Rasalhague | 95°58.0 | 12°32.3 |
| Eltanin | 90°42.2 | 51°28.9 |
| Kaus Aust. | 83°31.7 | -34°22.3 |
| Vega | 80°33.0 | 38°48.3 |
| Nunki | 75°47.0 | -26°15.9 |
| Altair | 61°59.4 | 8°56.2 |
| Peacock | 53°04.9 | -56°39.1 |
| Deneb | 49°25.7 | 45°22.4 |
| Enif | 33°38.2 | 9°59.6 |
| Al Na'ir | 27°32.2 | -46°50.2 |
| Fomalhaut | 15°13.8 | -29°29.2 |
| Scheat | 13°44.6 | 28°13.5 |
| Markab | 13°29.3 | 15°20.8 |
| Jan 22 Thu | SHA | Mer.pass |
| Venus | 51°42.7 | 12:28 |
| Mars | 58°43.4 | 11:59 |
| Jupiter | 249°51.1 | 23:11 |
| Saturn | 1°13.6 | 15:47 |
| Jan 23 Fri | SHA | Mer.pass |
| Venus | 50°24.7 | 12:30 |
| Mars | 57°54.3 | 11:59 |
| Jupiter | 249°59.3 | 23:06 |
| Saturn | 1°08.9 | 15:44 |
| Jan 24 Sat | SHA | Mer.pass |
| Venus | 49°07.0 | 12:31 |
| Mars | 57°05.3 | 11:58 |
| Jupiter | 250°07.4 | 23:02 |
| Saturn | 1°04.0 | 15:40 |
| Horizontal parallax | | |
| Venus: | | 0.1 |

| h | | Sun | | Moon | | | |
|------------------------|----------|----------|------------|-------|----------|--------|-------|
| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 177°08.6 | S19°43.3 | 140°27.6 | 13.9' | S08°04.6 | -15.1' | 56.9' |
| 1 | 192°08.4 | 42.8 | 155°00.6 | 14.0' | 07°49.5 | -15.1' | 56.9' |
| 2 | 207°08.3 | 42.2 | 169°33.5 | 14.0' | 07°34.3 | -15.2' | 56.9' |
| 3 | 222°08.1 | · · 41.6 | 184°06.5 | 14.0' | 07°19.2 | -15.2' | 57.0' |
| 4 | 237°07.9 | 41.1 | 198°39.5 | 14.0' | 07°04.0 | -15.3' | 57.0' |
| 5 | 252°07.8 | 40.5 | 213°12.5 | 14.0' | 06°48.7 | -15.3' | 57.0' |
| 6 | 267°07.6 | S19°39.9 | 227°45.6 | 14.0' | S06°33.4 | -15.3' | 57.0' |
| 7 | 282°07.4 | 39.3 | 242°18.6 | 14.0' | 06°18.1 | -15.4' | 57.0' |
| 8 | 297°07.3 | 38.8 | 256°51.6 | 14.1' | 06°02.7 | -15.4' | 57.1' |
| 9 | 312°07.1 | · · 38.2 | 271°24.7 | 14.1' | 05°47.3 | -15.4' | 57.1' |
| 10 | 327°06.9 | 37.6 | 285°57.8 | 14.1' | 05°31.9 | -15.5' | 57.1' |
| 11 | 342°06.8 | 37.0 | 300°30.8 | 14.1' | 05°16.4 | -15.5' | 57.1' |
| 12 | 357°06.6 | S19°36.5 | 315°03.9 | 14.1' | S05°00.9 | -15.5' | 57.1' |
| 13 | 12°06.4 | 35.9 | 329°37.0 | 14.1' | 04°45.3 | -15.6' | 57.2' |
| 14 | 27°06.3 | 35.3 | 344°10.1 | 14.1' | 04°29.8 | -15.6' | 57.2' |
| 15 | 42°06.1 | · · 34.7 | 358°43.2 | 14.1' | 04°14.2 | -15.6' | 57.2' |
| 16 | 57°05.9 | 34.1 | 13°16.3 | 14.1' | 03°58.5 | -15.7' | 57.2' |
| 17 | 72°05.8 | 33.6 | 27°49.3 | 14.1' | 03°42.9 | -15.7' | 57.2' |
| 18 | 87°05.6 | S19°33.0 | 42°22.4 | 14.1' | S03°27.2 | -15.7' | 57.3' |
| 19 | 102°05.4 | 32.4 | 56°55.5 | 14.1' | 03°11.5 | -15.7' | 57.3' |
| 20 | 117°05.3 | 31.8 | 71°28.6 | 14.1' | 02°55.8 | -15.8' | 57.3' |
| 21 | 132°05.1 | · · 31.2 | 86°01.7 | 14.1' | 02°40.0 | -15.8' | 57.3' |
| 22 | 147°04.9 | 30.7 | 100°34.8 | 14.1' | 02°24.2 | -15.8' | 57.3' |
| 23 | 162°04.8 | 30.1 | 115°07.8 | 14.1' | 02°08.4 | -15.8' | 57.4' |
| SD = 16.2' $d = -0.6'$ | | | SD = 15.5' | | | | |
| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 177°04.6 | S19°29.5 | 129°40.9 | 14.1' | S01°52.6 | -15.8' | 57.4' |
| 1 | 192°04.5 | 28.9 | 144°13.9 | 14.0' | 01°36.8 | -15.9' | 57.4' |
| 2 | 207°04.3 | 28.3 | 158°47.0 | 14.0' | 01°20.9 | -15.9' | 57.4' |
| 3 | 222°04.1 | · · 27.7 | 173°20.0 | 14.0' | 01°05.1 | -15.9' | 57.4' |
| 4 | 237°04.0 | 27.1 | 187°53.0 | 14.0' | 00°49.2 | -15.9' | 57.5' |
| 5 | 252°03.8 | 26.6 | 202°26.0 | 14.0' | 00°33.3 | -15.9' | 57.5' |
| 6 | 267°03.6 | S19°26.0 | 216°59.0 | 14.0' | S00°17.4 | -15.9' | 57.5' |
| 7 | 282°03.5 | 25.4 | 231°32.0 | 13.9' | S00°01.5 | -15.9' | 57.5' |
| 8 | 297°03.3 | 24.8 | 246°04.9 | 13.9' | N00°14.5 | 15.9' | 57.5' |
| 9 | 312°03.2 | · · 24.2 | 260°37.9 | 13.9' | 00°30.4 | 15.9' | 57.6' |
| 10 | 327°03.0 | 23.6 | 275°10.8 | 13.9' | 00°46.3 | 16.0' | 57.6' |
| 11 | 342°02.9 | 23.0 | 289°43.7 | 13.9' | 01°02.3 | 16.0' | 57.6' |
| 12 | 357°02.7 | S19°22.4 | 304°16.5 | 13.8' | N01°18.3 | 16.0' | 57.6' |
| 13 | 12°02.5 | 21.8 | 318°49.4 | 13.8' | 01°34.2 | 16.0' | 57.6' |
| 14 | 27°02.4 | 21.2 | 333°22.2 | 13.8' | 01°50.2 | 16.0' | 57.7' |
| 15 | 42°02.2 | · · 20.7 | 347°55.0 | 13.8' | 02°06.1 | 16.0' | 57.7' |
| 16 | 57°02.1 | 20.1 | 2°27.7 | 13.7' | 02°22.1 | 16.0' | 57.7' |
| 17 | 72°01.9 | 19.5 | 17°00.4 | 13.7' | 02°38.1 | 16.0' | 57.7' |
| 18 | 87°01.8 | S19°18.9 | 31°33.1 | 13.7' | N02°54.1 | 16.0' | 57.7' |
| 19 | 102°01.6 | 18.3 | 46°05.8 | 13.6' | 03°10.0 | 16.0' | 57.8' |
| 20 | 117°01.4 | 17.7 | 60°38.4 | 13.6' | 03°26.0 | 16.0' | 57.8' |
| 21 | 132°01.3 | · · 17.1 | 75°11.0 | 13.6' | 03°41.9 | 15.9' | 57.8' |
| 22 | 147°01.1 | 16.5 | 89°43.6 | 13.5' | 03°57.9 | 15.9' | 57.8' |
| 23 | 162°01.0 | 15.9 | 104°16.1 | 13.5' | 04°13.8 | 15.9' | 57.8' |
| SD = 16.2' $d = -0.6'$ | | | SD = 15.6' | | | | |
| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 177°00.8 | S19°15.3 | 118°48.6 | 13.4' | N04°29.7 | 15.9' | 57.9' |
| 1 | 192°00.7 | 14.7 | 133°21.0 | 13.4' | 04°45.7 | 15.9' | 57.9' |
| 2 | 207°00.5 | 14.1 | 147°53.4 | 13.4' | 05°01.6 | 15.9' | 57.9' |
| 3 | 222°00.4 | · · 13.5 | 162°25.8 | 13.3' | 05°17.5 | 15.9' | 57.9' |
| 4 | 237°00.2 | 12.9 | 176°58.1 | 13.3' | 05°33.3 | 15.9' | 57.9' |
| 5 | 252°00.1 | 12.3 | 191°30.4 | 13.2' | 05°49.2 | 15.8' | 58.0' |
| 6 | 266°59.9 | S19°11.7 | 206°02.6 | 13.2' | N06°05.1 | 15.8' | 58.0' |
| 7 | 281°59.8 | 11.1 | 220°34.7 | 13.1' | 06°20.9 | 15.8' | 58.0' |
| 8 | 296°59.6 | 10.5 | 235°06.9 | 13.1' | 06°36.7 | 15.8' | 58.0' |
| 9 | 311°59.5 | · · 09.9 | 249°38.9 | 13.0' | 06°52.5 | 15.8' | 58.0' |
| 10 | 326°59.3 | 09.3 | 264°10.9 | 13.0' | 07°08.3 | 15.7' | 58.1' |
| 11 | 341°59.2 | 08.7 | 278°42.9 | 12.9' | 07°24.0 | 15.7' | 58.1' |
| 12 | 356°59.0 | S19°08.1 | 293°14.8 | 12.8' | N07°39.7 | 15.7' | 58.1' |
| 13 | 11°58.9 | 07.4 | 307°46.7 | 12.8' | 07°55.4 | 15.7' | 58.1' |
| 14 | 26°58.7 | 06.8 | 322°18.4 | 12.7' | 08°11.1 | 15.6' | 58.1' |
| 15 | 41°58.6 | · · 06.2 | 336°50.2 | 12.7' | 08°26.7 | 15.6' | 58.2' |
| 16 | 56°58.4 | 05.6 | 351°21.8 | 12.6' | 08°42.3 | 15.6' | 58.2' |
| 17 | 71°58.3 | 05.0 | 5°53.5 | 12.5' | 08°57.9 | 15.5' | 58.2' |
| 18 | 86°58.1 | S19°04.4 | 20°25.0 | 12.5' | N09°13.5 | 15.5' | 58.2' |
| 19 | 101°58.0 | 03.8 | 34°56.5 | 12.4' | 09°29.0 | 15.5' | 58.2' |
| 20 | 116°57.8 | 03.2 | 49°27.9 | 12.3' | 09°44.4 | 15.4' | 58.3' |
| 21 | 131°57.7 | · · 02.6 | 63°59.2 | 12.3' | 09°59.9 | 15.4' | 58.3' |
| 22 | 146°57.5 | 02.0 | 78°30.5 | 12.2' | 10°15.3 | 15.4' | 58.3' |
| 23 | 161°57.4 | 01.3 | 93°01.7 | 12.1' | 10°30.6 | 15.3' | 58.3' |
| SD = 16.2' $d = -0.6'$ | | | SD = 15.8' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 07:39 | 09:18 | ■ | ■ | 15:07 | 16:46 |
| N 70° | 07:27 | 08:52 | 10:41 | 13:44 | 15:33 | 16:57 |
| 68° | 07:18 | 08:33 | 09:56 | 14:28 | 15:52 | 17:07 |
| 66° | 07:10 | 08:17 | 09:27 | 14:57 | 16:08 | 17:15 |
| 64° | 07:03 | 08:04 | 09:05 | 15:19 | 16:21 | 17:22 |
| 62° | 06:56 | 07:53 | 08:48 | 15:36 | 16:32 | 17:28 |
| 60° | 06:51 | 07:43 | 08:33 | 15:51 | 16:41 | 17:34 |
| N 58° | 06:46 | 07:35 | 08:21 | 16:03 | 16:49 | 17:38 |
| 56° | 06:41 | 07:28 | 08:10 | 16:14 | 16:57 | 17:43 |
| 54° | 06:37 | 07:21 | 08:01 | 16:23 | 17:03 | 17:47 |
| 52° | 06:33 | 07:15 | 07:53 | 16:32 | 17:09 | 17:51 |
| 50° | 06:30 | 07:09 | 07:45 | 16:39 | 17:15 | 17:55 |
| 45° | 06:21 | 06:57 | 07:29 | 16:55 | 17:27 | 18:03 |
| N 40° | 06:14 | 06:47 | 07:16 | 17:08 | 17:37 | 18:10 |
| 35° | 06:07 | 06:37 | 07:05 | 17:19 | 17:47 | 18:17 |
| 30° | 06:00 | 06:29 | 06:55 | 17:29 | 17:55 | 18:24 |
| 20° | 05:47 | 06:14 | 06:37 | 17:46 | 18:10 | 18:36 |
| N 10° | 05:35 | 06:00 | 06:22 | 18:01 | 18:23 | 18:49 |
| 0° | 05:21 | 05:46 | 06:08 | 18:15 | 18:37 | 19:03 |
| S 10° | 05:05 | 05:31 | 05:54 | 18:30 | 18:52 | 19:18 |
| 20° | 04:47 | 05:15 | 05:38 | 18:45 | 19:09 | 19:37 |
| 30° | 04:23 | 04:54 | 05:21 | 19:03 | 19:29 | 20:01 |
| 35° | 04:07 | 04:42 | 05:10 | 19:13 | 19:41 | 20:16 |
| 40° | 03:49 | 04:27 | 04:58 | 19:25 | 19:56 | 20:34 |
| 45° | 03:25 | 04:09 | 04:44 | 19:39 | 20:14 | 20:58 |
| S 50° | 02:52 | 03:46 | 04:26 | 19:57 | 20:36 | 21:30 |
| 52° | 02:35 | 03:35 | 04:18 | 20:05 | 20:47 | 21:46 |
| 54° | 02:14 | 03:22 | 04:08 | 20:14 | 21:00 | 22:07 |
| 56° | 01:45 | 03:07 | 03:58 | 20:24 | 21:15 | 22:35 |
| 58° | 00:55 | 02:49 | 03:46 | 20:36 | 21:33 | 23:20 |
| S 60° | //// | 02:26 | 03:32 | 20:50 | 21:55 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | 10:07 | 09:32 | 08:56 | 20:40 | 22:53 | · · · |
| N 70° | 09:59 | 09:33 | 09:06 | 20:44 | 22:47 | · · · |
| 68° | 09:53 | 09:33 | 09:13 | 20:47 | 22:42 | · · · |
| 66° | 09:48 | 09:34 | 09:20 | 20:50 | 22:38 | · · · |
| 64° | 09:43 | 09:34 | 09:25 | 20:52 | 22:35 | · · · |
| 62° | 09:39 | 09:35 | 09:30 | 20:54 | 22:32 | · · · |
| 60° | 09:36 | 09:35 | 09:34 | 20:56 | 22:29 | · · · |
| N 58° | 09:33 | 09:35 | 09:38 | 20:58 | 22:27 | · · · |
| 56° | 09:30 | 09:36 | 09:41 | 20:59 | 22:25 | 23:54 |
| 54° | 09:27 | 09:36 | 09:44 | 21:00 | 22:23 | 23:49 |
| 52° | 09:25 | 09:36 | 09:47 | 21:01 | 22:22 | 23:44 |
| 50° | 09:23 | 09:36 | 09:50 | 21:02 | 22:20 | 23:40 |
| 45° | 09:19 | 09:37 | 09:55 | 21:05 | 22:17 | 23:31 |
| N 40° | 09:15 | 09:37 | 10:00 | 21:07 | 22:14 | 23:24 |
| 35° | 09:11 | 09:37 | 10:04 | 21:08 | 22:12 | 23:18 |
| 30° | 09:09 | 09:38 | 10:07 | 21:10 | 22:10 | 23:12 |
| 20° | 09:03 | 09:38 | 10:14 | 21:12 | 22:07 | 23:03 |
| N 10° | 08:59 | 09:39 | 10:19 | 21:14 | 22:03 | 22:55 |
| 0° | 08:55 | 09:39 | 10:25 | 21:16 | 22:01 | 22:47 |
| S 10° | 08:50 | 09:40 | 10:30 | 21:18 | 21:58 | 22:39 |
| 20° | 08:46 | 09:40 | 10:36 | 21:20 | 21:55 | 22:31 |
| 30° | 08:41 | 09:41 | 10:42 | 21:22 | 21:51 | 22:22 |
| 35° | 08:38 | 09:41 | 10:46 | 21:23 | 21:49 | 22:16 |
| 40° | 08:34 | 09:42 | 10:50 | 21:25 | 21:47 | 22:10 |
| 45° | 08:30 | 09:42 | 10:56 | 21:26 | 21:44 | 22:04 |
| S 50° | 08:26 | 09:43 | 11:02 | 21:28 | 21:41 | 21:55 |
| 52° | 08:23 | 09:43 | 11:05 | 21:29 | 21:40 | 21:51 |
| 54° | 08:21 | 09:44 | 11:08 | 21:30 | 21:38 | 21:47 |
| 56° | 08:18 | 09:44 | 11:11 | 21:31 | 21:36 | 21:43 |
| 58° | 08:15 | 09:44 | 11:15 | 21:32 | 21:35 | 21:37 |
| S 60° | 08:12 | 09:45 | 11:19 | 21:33 | 21:32 | 21:32 |

| Day | Sun | | | Moon | | |
|-----|-------------------------------|----------------------------|-----------------|------------------------|-------------|----------------|
| | Eqn. of 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer. Pass. Upper hh:mm | Lower hh:mm | Age 4-6 10-27% |
| 22 | 11:26 | 11:34 | 12:12 | 15:05 | 02:43 | |
| 23 | 11:42 | 11:49 | 12:12 | 15:50 | 03:27 | |
| 24 | 11:57 | 12:04 | 12:12 | 16:36 | 04:13 | |

January 25, 26, 27 UT (Sun., Mon., Tue.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|----------|
| Sun | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 124°19.1 | | 172°08.7 | S19°05.6 | 180°35.5 | S20°52.2 | 14°34.5 | N22°29.6 | 125°18.2 | S02°48.8 |
| 1 | 139°21.5 | | 187°08.0 | 04.8 | 195°35.9 | 51.8 | 29°37.3 | 29.6 | 140°20.4 | 48.7 |
| 2 | 154°24.0 | | 202°07.2 | 04.0 | 210°36.3 | 51.3 | 44°40.1 | 29.7 | 155°22.7 | 48.6 |
| 3 | 169°26.5 | | 217°06.5 | · · 03.2 | 225°36.7 | · · 50.9 | 59°42.9 | · · 29.7 | 170°25.0 | · · 48.5 |
| 4 | 184°28.9 | | 232°05.7 | 02.5 | 240°37.2 | 50.5 | 74°45.7 | 29.7 | 185°27.2 | 48.4 |
| 5 | 199°31.4 | | 247°05.0 | 01.7 | 255°37.6 | 50.1 | 89°48.5 | 29.8 | 200°29.5 | 48.3 |
| 6 | 214°33.9 | | 262°04.2 | S19°00.9 | 270°38.0 | S20°49.6 | 104°51.3 | N22°29.8 | 215°31.7 | S02°48.2 |
| 7 | 229°36.3 | | 277°03.5 | 19°00.1 | 285°38.4 | 49.2 | 119°54.1 | 29.9 | 230°34.0 | 48.1 |
| 8 | 244°38.8 | | 292°02.7 | 18°59.3 | 300°38.9 | 48.8 | 134°56.9 | 29.9 | 245°36.2 | 48.0 |
| 9 | 259°41.3 | | 307°02.0 | · · 58.5 | 315°39.3 | · · 48.4 | 149°59.7 | · · 30.0 | 260°38.5 | · · 47.9 |
| 10 | 274°43.7 | | 322°01.2 | 57.7 | 330°39.7 | 47.9 | 165°02.4 | 30.0 | 275°40.8 | 47.8 |
| 11 | 289°46.2 | | 337°00.5 | 56.9 | 345°40.2 | 47.5 | 180°05.2 | 30.1 | 290°43.0 | 47.7 |
| 12 | 304°48.7 | | 351°59.7 | S18°56.1 | 0°40.6 | S20°47.1 | 195°08.0 | N22°30.1 | 305°45.3 | S02°47.6 |
| 13 | 319°51.1 | | 6°59.0 | 55.3 | 15°41.0 | 46.7 | 210°10.8 | 30.2 | 320°47.5 | 47.5 |
| 14 | 334°53.6 | | 21°58.2 | 54.5 | 30°41.4 | 46.2 | 225°13.6 | 30.2 | 335°49.8 | 47.4 |
| 15 | 349°56.0 | | 36°57.5 | · · 53.7 | 45°41.9 | · · 45.8 | 240°16.4 | · · 30.3 | 350°52.0 | · · 47.3 |
| 16 | 4°58.5 | | 51°56.7 | 52.9 | 60°42.3 | 45.4 | 255°19.2 | 30.3 | 5°54.3 | 47.2 |
| 17 | 20°01.0 | | 66°56.0 | 52.1 | 75°42.7 | 45.0 | 270°22.0 | 30.3 | 20°56.5 | 47.2 |
| 18 | 35°03.4 | | 81°55.3 | S18°51.3 | 90°43.2 | S20°44.5 | 285°24.8 | N22°30.4 | 35°58.8 | S02°47.1 |
| 19 | 50°05.9 | | 96°54.5 | 50.5 | 105°43.6 | 44.1 | 300°27.6 | 30.4 | 51°01.1 | 47.0 |
| 20 | 65°08.4 | | 111°53.8 | 49.7 | 120°44.0 | 43.7 | 315°30.4 | 30.5 | 66°03.3 | 46.9 |
| 21 | 80°10.8 | | 126°53.0 | · · 48.9 | 135°44.4 | · · 43.3 | 330°33.2 | · · 30.5 | 81°05.6 | · · 46.8 |
| 22 | 95°13.3 | | 141°52.3 | 48.1 | 150°44.9 | 42.8 | 345°36.0 | 30.6 | 96°07.8 | 46.7 |
| 23 | 110°15.8 | | 156°51.5 | 47.3 | 165°45.3 | 42.4 | 0°38.8 | 30.6 | 111°10.1 | 46.6 |
| Mer.pass. 15:40 | | ν-0.8' d-0.8' m-3.90 | | ν0.4' d-0.4' m1.10 | | ν2.8' d0.0' m-2.65 | | ν2.3' d-0.1' m1.03 | | |

| Mon | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|----------|
| 0 | 125°18.2 | | 171°50.8 | S18°46.4 | 180°45.7 | S20°42.0 | 15°41.5 | N22°30.7 | 126°12.3 | S02°46.5 |
| 1 | 140°20.7 | | 186°50.1 | 45.6 | 195°46.2 | 41.5 | 30°44.3 | 30.7 | 141°14.6 | 46.4 |
| 2 | 155°23.1 | | 201°49.3 | 44.8 | 210°46.6 | 41.1 | 45°47.1 | 30.8 | 156°16.8 | 46.3 |
| 3 | 170°25.6 | | 216°48.6 | · · 44.0 | 225°47.0 | · · 40.7 | 60°49.9 | · · 30.8 | 171°19.1 | · · 46.2 |
| 4 | 185°28.1 | | 231°47.9 | 43.2 | 240°47.5 | 40.2 | 75°52.7 | 30.8 | 186°21.4 | 46.1 |
| 5 | 200°30.5 | | 246°47.1 | 42.4 | 255°47.9 | 39.8 | 90°55.5 | 30.9 | 201°23.6 | 46.0 |
| 6 | 215°33.0 | | 261°46.4 | S18°41.6 | 270°48.3 | S20°39.4 | 105°58.3 | N22°30.9 | 216°25.9 | S02°45.9 |
| 7 | 230°35.5 | | 276°45.6 | 40.8 | 285°48.8 | 38.9 | 121°01.1 | 31.0 | 231°28.1 | 45.8 |
| 8 | 245°37.9 | | 291°44.9 | 39.9 | 300°49.2 | 38.5 | 136°03.9 | 31.0 | 246°30.4 | 45.7 |
| 9 | 260°40.4 | | 306°44.2 | · · 39.1 | 315°49.6 | · · 38.1 | 151°06.7 | · · 31.1 | 261°32.6 | · · 45.6 |
| 10 | 275°42.9 | | 321°43.4 | 38.3 | 330°50.0 | 37.6 | 166°09.5 | 31.1 | 276°34.9 | 45.5 |
| 11 | 290°45.3 | | 336°42.7 | 37.5 | 345°50.5 | 37.2 | 181°12.2 | 31.2 | 291°37.1 | 45.4 |
| 12 | 305°47.8 | | 351°42.0 | S18°36.7 | 0°50.9 | S20°36.8 | 196°15.0 | N22°31.2 | 306°39.4 | S02°45.3 |
| 13 | 320°50.3 | | 6°41.2 | 35.8 | 15°51.3 | 36.3 | 211°17.8 | 31.3 | 321°41.6 | 45.2 |
| 14 | 335°52.7 | | 21°40.5 | 35.0 | 30°51.8 | 35.9 | 226°20.6 | 31.3 | 336°43.9 | 45.1 |
| 15 | 350°55.2 | | 36°39.8 | · · 34.2 | 45°52.2 | · · 35.5 | 241°23.4 | · · 31.3 | 351°46.2 | · · 45.0 |
| 16 | 5°57.6 | | 51°39.0 | 33.4 | 60°52.6 | 35.0 | 256°26.2 | 31.4 | 6°48.4 | 44.9 |
| 17 | 21°00.1 | | 66°38.3 | 32.5 | 75°53.1 | 34.6 | 271°29.0 | 31.4 | 21°50.7 | 44.8 |
| 18 | 36°02.6 | | 81°37.6 | S18°31.7 | 90°53.5 | S20°34.2 | 286°31.8 | N22°31.5 | 36°52.9 | S02°44.7 |
| 19 | 51°05.0 | | 96°36.8 | 30.9 | 105°53.9 | 33.7 | 301°34.6 | 31.5 | 51°55.2 | 44.6 |
| 20 | 66°07.5 | | 111°36.1 | 30.1 | 120°54.4 | 33.3 | 316°37.3 | 31.6 | 66°57.4 | 44.5 |
| 21 | 81°10.0 | | 126°35.4 | · · 29.2 | 135°54.8 | · · 32.8 | 331°40.1 | · · 31.6 | 81°59.7 | · · 44.4 |
| 22 | 96°12.4 | | 141°34.7 | 28.4 | 150°55.2 | 32.4 | 346°42.9 | 31.7 | 97°01.9 | 44.3 |
| 23 | 111°14.9 | | 156°33.9 | 27.6 | 165°55.7 | 32.0 | 1°45.7 | 31.7 | 112°04.2 | 44.2 |
| Mer.pass. 15:36 | | ν-0.7' d-0.8' m-3.90 | | ν0.4' d-0.4' m1.10 | | ν2.8' d0.0' m-2.65 | | ν2.3' d-0.1' m1.03 | | |

| Tue | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|----------|
| 0 | 126°17.4 | | 171°33.2 | S18°26.7 | 180°56.1 | S20°31.5 | 16°48.5 | N22°31.8 | 127°06.4 | S02°44.1 |
| 1 | 141°19.8 | | 186°32.5 | 25.9 | 195°56.5 | 31.1 | 31°51.3 | 31.8 | 142°08.7 | 44.0 |
| 2 | 156°22.3 | | 201°31.8 | 25.1 | 210°57.0 | 30.6 | 46°54.1 | 31.8 | 157°10.9 | 43.9 |
| 3 | 171°24.8 | | 216°31.0 | · · 24.2 | 225°57.4 | · · 30.2 | 61°56.9 | · · 31.9 | 172°13.2 | · · 43.8 |
| 4 | 186°27.2 | | 231°30.3 | 23.4 | 240°57.8 | 29.8 | 76°59.6 | 31.9 | 187°15.4 | 43.7 |
| 5 | 201°29.7 | | 246°29.6 | 22.6 | 255°58.3 | 29.3 | 92°02.4 | 32.0 | 202°17.7 | 43.6 |
| 6 | 216°32.1 | | 261°28.9 | S18°21.7 | 270°58.7 | S20°28.9 | 107°05.2 | N22°32.0 | 217°19.9 | S02°43.5 |
| 7 | 231°34.6 | | 276°28.1 | 20.9 | 285°59.1 | 28.4 | 122°08.0 | 32.1 | 232°22.2 | 43.4 |
| 8 | 246°37.1 | | 291°27.4 | 20.1 | 300°59.6 | 28.0 | 137°10.8 | 32.1 | 247°24.4 | 43.3 |
| 9 | 261°39.5 | | 306°26.7 | · · 19.2 | 316°00.0 | · · 27.5 | 152°13.6 | · · 32.2 | 262°26.7 | · · 43.2 |
| 10 | 276°42.0 | | 321°26.0 | 18.4 | 331°00.4 | 27.1 | 167°16.4 | 32.2 | 277°29.0 | 43.1 |
| 11 | 291°44.5 | | 336°25.2 | 17.5 | 346°00.9 | 26.7 | 182°19.1 | 32.2 | 292°31.2 | 43.1 |
| 12 | 306°46.9 | | 351°24.5 | S18°16.7 | 1°01.3 | S20°26.2 | 197°21.9 | N22°32.3 | 307°33.5 | S02°43.0 |
| 13 | 321°49.4 | | 6°23.8 | 15.8 | 16°01.8 | 25.8 | 212°24.7 | 32.3 | 322°35.7 | 42.9 |
| 14 | 336°51.9 | | 21°23.1 | 15.0 | 31°02.2 | 25.3 | 227°27.5 | 32.4 | 337°38.0 | 42.8 |
| 15 | 351°54.3 | | 36°22.4 | · · 14.2 | 46°02.6 | · · 24.9 | 242°30.3 | · · 32.4 | 352°40.2 | · · 42.7 |
| 16 | 6°56.8 | | 51°21.7 | 13.3 | 61°03.1 | 24.4 | 257°33.1 | 32.5 | 7°42.5 | 42.6 |
| 17 | 21°59.3 | | 66°20.9 | 12.5 | 76°03.5 | 24.0 | 272°35.9 | 32.5 | 22°44.7 | 42.5 |
| 18 | 37°01.7 | | 81°20.2 | S18°11.6 | 91°03.9 | S20°23.5 | 287°38.6 | N22°32.5 | 37°47.0 | S02°42.4 |
| 19 | 52°04.2 | | 96°19.5 | 10.8 | 106°04.4 | 23.1 | 302°41.4 | 32.6 | 52°49.2 | 42.3 |
| 20 | 67°06.6 | | 111°18.8 | 09.9 | 121°04.8 | 22.6 | 317°44.2 | 32.6 | 67°51.5 | 42.2 |
| 21 | 82°09.1 | | 126°18.1 | · · 09.1 | 136°05.2 | · · 22.2 | 332°47.0 | · · 32.7 | 82°53.7 | · · 42.1 |
| 22 | 97°11.6 | | 141°17.4 | 08.2 | 151°05.7 | 21.8 | 347°49.8 | 32.7 | 97°56.0 | 42.0 |
| 23 | 112°14.0 | | 156°16.6 | 07.4 | 166°06.1 | 21.3 | 2°52.6 | 32.8 | 112°58.2 | 41.9 |
| Mer.pass. 15:32 | | ν-0.7' d-0.8' m-3.90 | | ν0.4' d-0.4' m1.10 | | ν2.8' d0.0' m-2.64 | | ν2.3' d-0.1' m1.03 | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°34.1 | 29°14.2 |
| Ankaa | 353°06.5 | -42°10.1 |
| Schedar | 349°30.3 | 56°41.1 |
| Diphda | 348°46.5 | -17°50.7 |
| Achernar | 335°19.6 | -57°06.5 |
| Hamal | 327°50.2 | 23°35.2 |
| Polaris | 313°28.0 | 89°22.8 |
| Acamar | 315°11.0 | -40°12.2 |
| Menkar | 314°05.2 | 4°11.5 |
| Mirfak | 308°26.8 | 49°57.4 |
| Aldebaran | 290°38.4 | 16°33.7 |
| Rigel | 281°02.8 | -8°10.4 |
| Capella | 280°20.2 | 46°01.6 |
| Bellatrix | 278°21.7 | 6°22.4 |
| Elnath | 278°00.5 | 28°37.8 |
| Alnilam | 275°36.6 | -1°11.2 |
| Betelgeuse | 270°50.9 | 7°24.7 |
| Canopus | 263°51.5 | -52°42.7 |
| Sirius | 258°25.1 | -16°45.2 |
| Adhara | 255°04.8 | -29°00.5 |
| Procyon | 244°49.6 | 5°09.4 |
| Pollux | 243°15.9 | 27°57.7 |
| Avior | 234°13.7 | -59°35.6 |
| Suhail | 222°45.2 | -43°32.3 |
| Miaplacidus | 221°37.2 | -69°49.4 |
| Alphard | 217°46.6 | -8°46.4 |
| Regulus | 207°33.2 | 11°50.2 |
| Dubhe | 193°39.4 | 61°36.3 |
| Denebola | 182°23.8 | 14°25.4 |
| Gienah | 175°42.5 | -17°41.2 |
| Acrux | 172°58.8 | -63°14.4 |
| Gacrux | 171°50.4 | -57°15.4 |
| Alioth | 166°12.0 | 55°48.7 |
| Spica | 158°21.3 | -11°17.9 |
| Alkaid | 152°51.2 | 49°10.6 |
| Hadar | 148°34.7 | -60°29.7 |
| Menkent | 147°56.6 | -36°29.8 |
| Arcturus | 145°47.1 | 19°02.6 |
| Rigel Kent. | 139°39.1 | -60°56.4 |
| Kochab | 137°20.0 | 74°02.5 |
| Zuben'ubi | 136°55.1 | -16°09.0 |
| Alphecca | 126°03.1 | 26°37.3 |
| Antares | 112°15.0 | -26°29.3 |
| Atria | 107°08.8 | -69°04.2 |
| Sabik | 102°02.0 | -15°45.5 |
| Shaula | 96°09.5 | -37°07.3 |
| Rasalhague | 95°58.0 | 12°32.3 |
| Eltanin | 90°42.2 | 51°28.9 |
| Kaus Aust. | 83°31.7 | -34°22.3 |
| Vega | 80°33.0 | 38°48.3 |
| Nunki | 75°47.0 | -26°15.9 |
| Altair | 61°59.4 | 8°56.1 |
| Peacock | 53°04.9 | -56°39.1 |
| Deneb | 49°25.7 | 45°22.4 |
| Enif | 33°38.2 | 9°59.6 |
| Al Na'ir | 27°32.2 | -46°50.2 |
| Fomalhaut | 15°13.8 | -29°29.2 |
| Scheat | 13°44.6 | 28°13.5 |
| Markab | 13°29.3 | 15°20.8 |

| Jan 25 Sun | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 47°49.6 | 12:32 |
| Mars | 56°16.4 | 11:57 |
| Jupiter | 250°15.4 | 22:57 |
| Saturn | 0°59.1 | 15:36 |

| Jan 26 Mon | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 46°32.6 | 12:33 |
| Mars | 55°27.5 | 11:57 |
| Jupiter | 250°23.3 | 22:53 |
| Saturn | 0°54.1 | 15:33 |

| Jan 27 Tue | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 45°15.8 | 12:34 |
| Mars | 54°38.7 | 11:56 |
| Jupiter | 250°31.1 | 22:49 |
| Saturn | 0°49.1 | 15:29 |

| h | Sun | | | Moon | | | |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 176°57.2 | S19°00.7 | 107°32.9 | 12.1' | N10°46.0 | 15.3' | 58.3' |
| 1 | 191°57.1 | 19°00.1 | 122°03.9 | 12.0' | 11°01.2 | 15.2' | 58.4' |
| 2 | 206°56.9 | 18°59.5 | 136°34.9 | 11.9' | 11°16.5 | 15.2' | 58.4' |
| 3 | 221°56.8 | · · 58.9 | 151°05.8 | 11.8' | 11°31.6 | 15.1' | 58.4' |
| 4 | 236°56.7 | 58.3 | 165°36.7 | 11.8' | 11°46.8 | 15.1' | 58.4' |
| 5 | 251°56.5 | 57.7 | 180°07.4 | 11.7' | 12°01.9 | 15.0' | 58.4' |
| 6 | 266°56.4 | S18°57.0 | 194°38.1 | 11.6' | N12°16.9 | 15.0' | 58.5' |
| 7 | 281°56.2 | 56.4 | 209°08.7 | 11.5' | 12°31.9 | 14.9' | 58.5' |
| 8 | 296°56.1 | 55.8 | 223°39.2 | 11.4' | 12°46.8 | 14.9' | 58.5' |
| 9 | 311°55.9 | · · 55.2 | 238°09.6 | 11.4' | 13°01.7 | 14.8' | 58.5' |
| 10 | 326°55.8 | 54.6 | 252°40.0 | 11.3' | 13°16.5 | 14.8' | 58.5' |
| 11 | 341°55.7 | 53.9 | 267°10.3 | 11.2' | 13°31.3 | 14.7' | 58.6' |
| 12 | 356°55.5 | S18°53.3 | 281°40.4 | 11.1' | N13°46.0 | 14.6' | 58.6' |
| 13 | 11°55.4 | 52.7 | 296°10.5 | 11.0' | 14°00.6 | 14.6' | 58.6' |
| 14 | 26°55.2 | 52.1 | 310°40.5 | 10.9' | 14°15.2 | 14.5' | 58.6' |
| 15 | 41°55.1 | · · 51.5 | 325°10.4 | 10.8' | 14°29.7 | 14.5' | 58.6' |
| 16 | 56°55.0 | 50.8 | 339°40.3 | 10.7' | 14°44.2 | 14.4' | 58.6' |
| 17 | 71°54.8 | 50.2 | 354°10.0 | 10.6' | 14°58.6 | 14.3' | 58.7' |
| 18 | 86°54.7 | S18°49.6 | 8°39.6 | 10.5' | N15°12.9 | 14.2' | 58.7' |
| 19 | 101°54.5 | 49.0 | 23°09.2 | 10.4' | 15°27.1 | 14.2' | 58.7' |
| 20 | 116°54.4 | 48.3 | 37°38.6 | 10.3' | 15°41.3 | 14.1' | 58.7' |
| 21 | 131°54.3 | · · 47.7 | 52°08.0 | 10.2' | 15°55.4 | 14.0' | 58.7' |
| 22 | 146°54.1 | 47.1 | 66°37.2 | 10.2' | 16°09.4 | 13.9' | 58.8' |
| 23 | 161°54.0 | 46.5 | 81°06.4 | 10.1' | 16°23.4 | 13.9' | 58.8' |
| SD = 16.2' $d = -0.6'$ | | | SD = 15.9' | | | | |

| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 176°53.8 | S18°45.8 | 95°35.4 | 9.9' | N16°37.2 | 13.8' | 58.8' |
| 1 | 191°53.7 | 45.2 | 110°04.4 | 9.8' | 16°51.0 | 13.7' | 58.8' |
| 2 | 206°53.6 | 44.6 | 124°33.2 | 9.7' | 17°04.7 | 13.6' | 58.8' |
| 3 | 221°53.4 | · · 43.9 | 139°02.0 | 9.6' | 17°18.3 | 13.5' | 58.9' |
| 4 | 236°53.3 | 43.3 | 153°30.6 | 9.5' | 17°31.9 | 13.4' | 58.9' |
| 5 | 251°53.2 | 42.7 | 167°59.1 | 9.4' | 17°45.3 | 13.4' | 58.9' |
| 6 | 266°53.0 | S18°42.0 | 182°27.6 | 9.3' | N17°58.7 | 13.3' | 58.9' |
| 7 | 281°52.9 | 41.4 | 196°55.9 | 9.2' | 18°11.9 | 13.2' | 58.9' |
| 8 | 296°52.8 | 40.8 | 211°24.1 | 9.1' | 18°25.1 | 13.1' | 58.9' |
| 9 | 311°52.6 | · · 40.2 | 225°52.2 | 9.0' | 18°38.2 | 13.0' | 59.0' |
| 10 | 326°52.5 | 39.5 | 240°20.2 | 8.9' | 18°51.1 | 12.9' | 59.0' |
| 11 | 341°52.4 | 38.9 | 254°48.1 | 8.8' | 19°04.0 | 12.8' | 59.0' |
| 12 | 356°52.2 | S18°38.2 | 269°15.9 | 8.7' | N19°16.8 | 12.7' | 59.0' |
| 13 | 11°52.1 | 37.6 | 283°43.6 | 8.6' | 19°29.5 | 12.6' | 59.0' |
| 14 | 26°52.0 | 37.0 | 298°11.1 | 8.4' | 19°42.1 | 12.5' | 59.0' |
| 15 | 41°51.8 | · · 36.3 | 312°38.6 | 8.3' | 19°54.5 | 12.4' | 59.1' |
| 16 | 56°51.7 | 35.7 | 327°05.9 | 8.2' | 20°06.9 | 12.3' | 59.1' |
| 17 | 71°51.6 | 35.1 | 341°33.1 | 8.1' | 20°19.1 | 12.1' | 59.1' |
| 18 | 86°51.4 | S18°34.4 | 356°00.2 | 8.0' | N20°31.3 | 12.0' | 59.1' |
| 19 | 101°51.3 | 33.8 | 10°27.2 | 7.9' | 20°43.3 | 11.9' | 59.1' |
| 20 | 116°51.2 | 33.1 | 24°54.1 | 7.8' | 20°55.2 | 11.8' | 59.1' |
| 21 | 131°51.0 | · · 32.5 | 39°20.9 | 7.7' | 21°07.0 | 11.7' | 59.2' |
| 22 | 146°50.9 | 31.9 | 53°47.5 | 7.5' | 21°18.7 | 11.6' | 59.2' |
| 23 | 161°50.8 | 31.2 | 68°14.0 | 7.4' | 21°30.3 | 11.4' | 59.2' |
| SD = 16.2' $d = -0.6'$ | | | SD = 16.0' | | | | |

| Tue | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 176°50.7 | S18°30.6 | 82°40.5 | 7.3' | N21°41.7 | 11.3' | 59.2' |
| 1 | 191°50.5 | 29.9 | 97°06.8 | 7.2' | 21°53.0 | 11.2' | 59.2' |
| 2 | 206°50.4 | 29.3 | 111°33.0 | 7.1' | 22°04.2 | 11.1' | 59.2' |
| 3 | 221°50.3 | · · 28.7 | 125°59.0 | 7.0' | 22°15.3 | 10.9' | 59.3' |
| 4 | 236°50.2 | 28.0 | 140°25.0 | 6.8' | 22°26.2 | 10.8' | 59.3' |
| 5 | 251°50.0 | 27.4 | 154°50.8 | 6.7' | 22°37.0 | 10.7' | 59.3' |
| 6 | 266°49.9 | S18°26.7 | 169°16.6 | 6.6' | N22°47.7 | 10.5' | 59.3' |
| 7 | 281°49.8 | 26.1 | 183°42.2 | 6.5' | 22°58.2 | 10.4' | 59.3' |
| 8 | 296°49.6 | 25.4 | 198°07.7 | 6.4' | 23°08.6 | 10.3' | 59.3' |
| 9 | 311°49.5 | · · 24.8 | 212°33.0 | 6.3' | 23°18.9 | 10.1' | 59.3' |
| 10 | 326°49.4 | 24.1 | 226°58.3 | 6.2' | 23°29.0 | 10.0' | 59.4' |
| 11 | 341°49.3 | 23.5 | 241°23.5 | 6.0' | 23°39.0 | 9.8' | 59.4' |
| 12 | 356°49.1 | S18°22.8 | 255°48.5 | 5.9' | N23°48.8 | 9.7' | 59.4' |
| 13 | 11°49.0 | 22.2 | 270°13.4 | 5.8' | 23°58.5 | 9.5' | 59.4' |
| 14 | 26°48.9 | 21.5 | 284°38.2 | 5.7' | 24°08.0 | 9.4' | 59.4' |
| 15 | 41°48.8 | · · 20.9 | 299°02.9 | 5.6' | 24°17.4 | 9.2' | 59.4' |
| 16 | 56°48.7 | 20.2 | 313°27.5 | 5.5' | 24°26.6 | 9.1' | 59.4' |
| 17 | 71°48.5 | 19.6 | 327°52.0 | 5.4' | 24°35.7 | 8.9' | 59.5' |
| 18 | 86°48.4 | S18°18.9 | 342°16.3 | 5.3' | N24°44.6 | 8.8' | 59.5' |
| 19 | 101°48.3 | 18.3 | 356°40.6 | 5.1' | 24°53.4 | 8.6' | 59.5' |
| 20 | 116°48.2 | 17.6 | 11°04.7 | 5.0' | 25°02.0 | 8.5' | 59.5' |
| 21 | 131°48.0 | · · 17.0 | 25°28.8 | 4.9' | 25°10.5 | 8.3' | 59.5' |
| 22 | 146°47.9 | 16.3 | 39°52.7 | 4.8' | 25°18.8 | 8.1' | 59.5' |
| 23 | 161°47.8 | 15.7 | 54°16.5 | 4.7' | 25°26.9 | 8.0' | 59.5' |
| SD = 16.2' $d = -0.6'$ | | | SD = 16.1' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 07:30 | 09:05 | 11:38 | 12:48 | 15:21 | 16:57 |
| N 70° | 07:19 | 08:42 | 10:20 | 14:06 | 15:44 | 17:07 |
| 68° | 07:11 | 08:24 | 09:43 | 14:43 | 16:02 | 17:15 |
| 66° | 07:03 | 08:09 | 09:17 | 15:09 | 16:17 | 17:23 |
| 64° | 06:57 | 07:57 | 08:57 | 15:29 | 16:29 | 17:29 |
| 62° | 06:51 | 07:47 | 08:41 | 15:45 | 16:39 | 17:35 |
| 60° | 06:46 | 07:38 | 08:27 | 15:58 | 16:48 | 17:40 |
| N 58° | 06:42 | 07:30 | 08:16 | 16:10 | 16:55 | 17:44 |
| 56° | 06:38 | 07:23 | 08:06 | 16:20 | 17:02 | 17:48 |
| 54° | 06:34 | 07:17 | 07:57 | 16:29 | 17:09 | 17:52 |
| 52° | 06:30 | 07:11 | 07:49 | 16:37 | 17:14 | 17:56 |
| 50° | 06:27 | 07:06 | 07:42 | 16:44 | 17:20 | 17:59 |
| 45° | 06:19 | 06:54 | 07:26 | 16:59 | 17:31 | 18:07 |
| N 40° | 06:12 | 06:45 | 07:14 | 17:12 | 17:41 | 18:14 |
| 35° | 06:05 | 06:36 | 07:03 | 17:23 | 17:49 | 18:20 |
| 30° | 05:59 | 06:28 | 06:53 | 17:32 | 17:57 | 18:26 |
| 20° | 05:47 | 06:14 | 06:37 | 17:48 | 18:11 | 18:38 |
| N 10° | 05:35 | 06:00 | 06:23 | 18:03 | 18:25 | 18:50 |
| 0° | 05:22 | 05:47 | 06:09 | 18:16 | 18:38 | 19:03 |
| S 10° | 05:07 | 05:33 | 05:55 | 18:30 | 18:52 | 19:18 |
| 20° | 04:49 | 05:17 | 05:40 | 18:44 | 19:08 | 19:36 |
| 30° | 04:26 | 04:57 | 05:23 | 19:01 | 19:28 | 19:59 |
| 35° | 04:11 | 04:45 | 05:13 | 19:11 | 19:39 | 20:13 |
| 40° | 03:53 | 04:31 | 05:02 | 19:23 | 19:53 | 20:31 |
| 45° | 03:30 | 04:14 | 04:48 | 19:36 | 20:10 | 20:53 |
| S 50° | 03:00 | 03:52 | 04:31 | 19:53 | 20:32 | 21:24 |
| 52° | 02:43 | 03:41 | 04:23 | 20:01 | 20:42 | 21:40 |
| 54° | 02:24 | 03:29 | 04:14 | 20:09 | 20:55 | 21:59 |
| 56° | 01:58 | 03:15 | 04:04 | 20:19 | 21:08 | 22:24 |
| 58° | 01:19 | 02:58 | 03:53 | 20:30 | 21:25 | 23:00 |
| S 60° | //// | 02:37 | 03:40 | 20:43 | 21:46 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | 08:10 | 06:17 | ☐ | 01:19 | 04:58 | ☐ |
| N 70° | 08:32 | 07:36 | ☐ | 00:59 | 03:41 | ☐ |
| 68° | 08:50 | 08:15 | ☐ | 00:44 | 03:04 | ☐ |
| 66° | 09:04 | 08:42 | 07:58 | 00:32 | 02:38 | 05:15 |
| 64° | 09:15 | 09:03 | 08:45 | 00:22 | 02:18 | 04:30 |
| 62° | 09:25 | 09:21 | 09:16 | 00:13 | 02:02 | 04:00 |
| 60° | 09:34 | 09:35 | 09:39 | 00:06 | 01:48 | 03:37 |
| N 58° | 09:42 | 09:47 | 09:58 | 00:00 | 01:37 | 03:19 |
| 56° | 09:48 | 09:58 | 10:13 | · · · | 01:27 | 03:04 |
| 54° | 09:55 | 10:08 | 10:27 | · · · | 01:18 | 02:51 |
| 52° | 10:00 | 10:16 | 10:39 | · · · | 01:10 | 02:40 |
| 50° | 10:05 | 10:24 | 10:50 | · · · | 01:04 | 02:30 |
| 45° | 10:16 | 10:40 | 11:12 | · · · | 00:49 | 02:09 |
| N 40° | 10:25 | 10:54 | 11:30 | · · · | 00:37 | 01:52 |
| 35° | 10:33 | 11:06 | 11:45 | · · · | 00:26 | 01:38 |
| 30° | 10:40 | 11:16 | 11:58 | · · · | 00:17 | 01:26 |
| 20° | 10:52 | 11:34 | 12:21 | · · · | 00:02 | 01:05 |
| N 10° | 11:02 | 11:49 | 12:41 | 23:49 | · · · | 00:47 |
| 0° | 11:12 | 12:04 | 13:00 | 23:36 | · · · | 00:30 |
| S 10° | 11:22 | 12:18 | 13:19 | 23:24 | · · · | 00:13 |
| 20° | 11:33 | 12:34 | 13:39 | 23:11 | 23:55 | · · · |
| 30° | 11:46 | 12:53 | 14:02 | 22:56 | 23:35 | · · · |
| 35° | 11:53 | 13:03 | 14:16 | 22:47 | 23:23 | · · · |
| 40° | 12:02 | 13:16 | 14:32 | 22:37 | 23:09 | 23:49 |
| 45° | 12:11 | 13:31 | 14:52 | 22:26 | 22:53 | 23:29 |
| S 50° | 12:23 | 13:49 | 15:16 | 22:12 | 22:33 | 23:03 |
| 52° | 12:29 | 13:57 | 15:28 | 22:05 | 22:24 | 22:51 |
| 54° | 12:35 | 14:07 | 15:41 | 21:58 | 22:14 | 22:37 |
| 56° | 12:42 | 14:18 | 15:57 | 21:51 | 22:02 | 22:21 |
| 58° | 12:50 | 14:31 | 16:16 | 21:42 | 21:49 | 22:02 |
| S 60° | 12:59 | 14:45 | 16:39 | 21:32 | 21:33 | 21:38 |

| Day | Sun | | Mer. Pass | Moon | | Age 7-9 37-59% |
|-----|-------------------------------|----------------------------|-----------|------------------------|-------------|----------------|
| | Eqn. of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer. Pass. Upper hh:mm | Lower hh:mm | |
| 25 | 12:11 | 12:18 | 12:12 | 17:24 | 04:59 | |
| 26 | 12:25 | 12:31 | 12:13 | 18:17 | 05:50 | |
| 27 | 12:37 | 12:43 | 12:13 | 19:14 | 06:45 | |


January 28, 29, 30 UT (Wed., Thu., Fri.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | | | | |
|-----------------|----------|----------|----------|----------------------|----------|----------|----------|--------------------|----------|---------|-----|--------------------|--------|--|--|--------------------|--|--|--|
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | | |
| 0 | 127°16.5 | 171°15.9 | S18°06.5 | 181°06.6 | S20°20.9 | 17°55.3 | N22°32.8 | 128°00.5 | S02°41.8 | | | | | | | | | | |
| 1 | 142°19.0 | 186°15.2 | 05.7 | 196°07.0 | 20.4 | 32°58.1 | 32.9 | 143°02.7 | 41.7 | | | | | | | | | | |
| 2 | 157°21.4 | 201°14.5 | 04.8 | 211°07.4 | 20.0 | 48°00.9 | 32.9 | 158°05.0 | 41.6 | | | | | | | | | | |
| 3 | 172°23.9 | 216°13.8 | · · 03.9 | 226°07.9 | · · 19.5 | 63°03.7 | · · 32.9 | 173°07.2 | · · 41.5 | | | | | | | | | | |
| 4 | 187°26.4 | 231°13.1 | 03.1 | 241°08.3 | 19.1 | 78°06.5 | 33.0 | 188°09.5 | 41.4 | | | | | | | | | | |
| 5 | 202°28.8 | 246°12.4 | 02.2 | 256°08.7 | 18.6 | 93°09.2 | 33.0 | 203°11.7 | 41.3 | | | | | | | | | | |
| 6 | 217°31.3 | 261°11.7 | S18°01.4 | 271°09.2 | S20°18.2 | 108°12.0 | N22°33.1 | 218°14.0 | S02°41.2 | | | | | | | | | | |
| 7 | 232°33.8 | 276°10.9 | 18°00.5 | 286°09.6 | 17.7 | 123°14.8 | 33.1 | 233°16.2 | 41.1 | | | | | | | | | | |
| 8 | 247°36.2 | 291°10.2 | 17°59.6 | 301°10.1 | 17.2 | 138°17.6 | 33.2 | 248°18.5 | 41.0 | | | | | | | | | | |
| 9 | 262°38.7 | 306°09.5 | · · 58.8 | 316°10.5 | · · 16.8 | 153°20.4 | · · 33.2 | 263°20.7 | · · 40.9 | | | | | | | | | | |
| 10 | 277°41.1 | 321°08.8 | 57.9 | 331°10.9 | 16.3 | 168°23.2 | 33.2 | 278°23.0 | 40.8 | | | | | | | | | | |
| 11 | 292°43.6 | 336°08.1 | 57.1 | 346°11.4 | 15.9 | 183°25.9 | 33.3 | 293°25.2 | 40.7 | | | | | | | | | | |
| 12 | 307°46.1 | 351°07.4 | S17°56.2 | 1°11.8 | S20°15.4 | 198°28.7 | N22°33.3 | 308°27.5 | S02°40.6 | | | | | | | | | | |
| 13 | 322°48.5 | 6°06.7 | 55.3 | 16°12.3 | 15.0 | 213°31.5 | 33.4 | 323°29.7 | 40.5 | | | | | | | | | | |
| 14 | 337°51.0 | 21°06.0 | 54.5 | 31°12.7 | 14.5 | 228°34.3 | 33.4 | 338°32.0 | 40.4 | | | | | | | | | | |
| 15 | 352°53.5 | 36°05.3 | · · 53.6 | 46°13.1 | · · 14.1 | 243°37.1 | · · 33.5 | 353°34.2 | · · 40.3 | | | | | | | | | | |
| 16 | 7°55.9 | 51°04.6 | 52.7 | 61°13.6 | 13.6 | 258°39.8 | 33.5 | 8°36.5 | 40.2 | | | | | | | | | | |
| 17 | 22°58.4 | 66°03.9 | 51.9 | 76°14.0 | 13.2 | 273°42.6 | 33.6 | 23°38.7 | 40.1 | | | | | | | | | | |
| 18 | 38°00.9 | 81°03.2 | S17°51.0 | 91°14.4 | S20°12.7 | 288°45.4 | N22°33.6 | 38°40.9 | S02°40.0 | | | | | | | | | | |
| 19 | 53°03.3 | 96°02.5 | 50.1 | 106°14.9 | 12.2 | 303°48.2 | 33.6 | 53°43.2 | 39.9 | | | | | | | | | | |
| 20 | 68°05.8 | 111°01.8 | 49.3 | 121°15.3 | 11.8 | 318°51.0 | 33.7 | 68°45.4 | 39.8 | | | | | | | | | | |
| 21 | 83°08.2 | 126°01.1 | · · 48.4 | 136°15.8 | · · 11.3 | 333°53.7 | · · 33.7 | 83°47.7 | · · 39.7 | | | | | | | | | | |
| 22 | 98°10.7 | 141°00.4 | 47.5 | 151°16.2 | 10.9 | 348°56.5 | 33.8 | 98°49.9 | 39.6 | | | | | | | | | | |
| 23 | 113°13.2 | 155°59.7 | 46.6 | 166°16.7 | 10.4 | 3°59.3 | 33.8 | 113°52.2 | 39.5 | | | | | | | | | | |
| Mer.pass. 15:28 | | | | ν-0.7' d-0.9' m-3.90 | | | | ν0.4' d-0.4' m1.10 | | | | ν2.8' d0.0' m-2.64 | | | | ν2.3' d-0.1' m1.03 | | | |
| | | | | | | | | | | | | | | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | | |
| 0 | 128°15.6 | 170°59.0 | S17°45.8 | 181°17.1 | S20°10.0 | 19°02.1 | N22°33.9 | 128°54.4 | S02°39.4 | | | | | | | | | | |
| 1 | 143°18.1 | 185°58.3 | 44.9 | 196°17.5 | 09.5 | 34°04.8 | 33.9 | 143°56.7 | 39.3 | | | | | | | | | | |
| 2 | 158°20.6 | 200°57.6 | 44.0 | 211°18.0 | 09.0 | 49°07.6 | 33.9 | 158°58.9 | 39.2 | | | | | | | | | | |
| 3 | 173°23.0 | 215°56.9 | · · 43.1 | 226°18.4 | · · 08.6 | 64°10.4 | · · 34.0 | 174°01.2 | · · 39.1 | | | | | | | | | | |
| 4 | 188°25.5 | 230°56.2 | 42.3 | 241°18.9 | 08.1 | 79°13.2 | 34.0 | 189°03.4 | 39.0 | | | | | | | | | | |
| 5 | 203°28.0 | 245°55.5 | 41.4 | 256°19.3 | 07.7 | 94°16.0 | 34.1 | 204°05.7 | 38.9 | | | | | | | | | | |
| 6 | 218°30.4 | 260°54.8 | S17°40.5 | 271°19.7 | S20°07.2 | 109°18.7 | N22°34.1 | 219°07.9 | S02°38.8 | | | | | | | | | | |
| 7 | 233°32.9 | 275°54.1 | 39.6 | 286°20.2 | 06.7 | 124°21.5 | 34.2 | 234°10.2 | 38.7 | | | | | | | | | | |
| 8 | 248°35.4 | 290°53.4 | 38.7 | 301°20.6 | 06.3 | 139°24.3 | 34.2 | 249°12.4 | 38.6 | | | | | | | | | | |
| 9 | 263°37.8 | 305°52.7 | · · 37.9 | 316°21.1 | · · 05.8 | 154°27.1 | · · 34.2 | 264°14.7 | · · 38.5 | | | | | | | | | | |
| 10 | 278°40.3 | 320°52.0 | 37.0 | 331°21.5 | 05.4 | 169°29.8 | 34.3 | 279°16.9 | 38.4 | | | | | | | | | | |
| 11 | 293°42.7 | 335°51.3 | 36.1 | 346°22.0 | 04.9 | 184°32.6 | 34.3 | 294°19.2 | 38.3 | | | | | | | | | | |
| 12 | 308°45.2 | 350°50.6 | S17°35.2 | 1°22.4 | S20°04.4 | 199°35.4 | N22°34.4 | 309°21.4 | S02°38.2 | | | | | | | | | | |
| 13 | 323°47.7 | 5°49.9 | 34.3 | 16°22.8 | 04.0 | 214°38.2 | 34.4 | 324°23.6 | 38.1 | | | | | | | | | | |
| 14 | 338°50.1 | 20°49.2 | 33.4 | 31°23.3 | 03.5 | 229°40.9 | 34.5 | 339°25.9 | 38.0 | | | | | | | | | | |
| 15 | 353°52.6 | 35°48.5 | · · 32.5 | 46°23.7 | · · 03.0 | 244°43.7 | · · 34.5 | 354°28.1 | · · 37.9 | | | | | | | | | | |
| 16 | 8°55.1 | 50°47.8 | 31.7 | 61°24.2 | 02.6 | 259°46.5 | 34.5 | 9°30.4 | 37.8 | | | | | | | | | | |
| 17 | 23°57.5 | 65°47.1 | 30.8 | 76°24.6 | 02.1 | 274°49.3 | 34.6 | 24°32.6 | 37.7 | | | | | | | | | | |
| 18 | 39°00.0 | 80°46.4 | S17°29.9 | 91°25.1 | S20°01.6 | 289°52.0 | N22°34.6 | 39°34.9 | S02°37.6 | | | | | | | | | | |
| 19 | 54°02.5 | 95°45.8 | 29.0 | 106°25.5 | 01.2 | 304°54.8 | 34.7 | 54°37.1 | 37.5 | | | | | | | | | | |
| 20 | 69°04.9 | 110°45.1 | 28.1 | 121°25.9 | 00.7 | 319°57.6 | 34.7 | 69°39.4 | 37.4 | | | | | | | | | | |
| 21 | 84°07.4 | 125°44.4 | · · 27.2 | 136°26.4 | 20°00.2 | 335°00.4 | · · 34.7 | 84°41.6 | · · 37.3 | | | | | | | | | | |
| 22 | 99°09.9 | 140°43.7 | 26.3 | 151°26.8 | 19°59.8 | 350°03.1 | 34.8 | 99°43.9 | 37.2 | | | | | | | | | | |
| 23 | 114°12.3 | 155°43.0 | 25.4 | 166°27.3 | 59.3 | 5°05.9 | 34.8 | 114°46.1 | 37.1 | | | | | | | | | | |
| Mer.pass. 15:24 | | | | ν-0.7' d-0.9' m-3.90 | | | | ν0.4' d-0.5' m1.10 | | | | ν2.8' d0.0' m-2.64 | | | | ν2.2' d-0.1' m1.03 | | | |
| | | | | | | | | | | | | | | | | | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | | |
| 0 | 129°14.8 | 170°42.3 | S17°24.5 | 181°27.7 | S19°58.8 | 20°08.7 | N22°34.9 | 129°48.4 | S02°37.0 | | | | | | | | | | |
| 1 | 144°17.2 | 185°41.6 | 23.6 | 196°28.2 | 58.4 | 35°11.5 | 34.9 | 144°50.6 | 36.9 | | | | | | | | | | |
| 2 | 159°19.7 | 200°40.9 | 22.7 | 211°28.6 | 57.9 | 50°14.2 | 35.0 | 159°52.8 | 36.8 | | | | | | | | | | |
| 3 | 174°22.2 | 215°40.3 | · · 21.8 | 226°29.1 | · · 57.4 | 65°17.0 | · · 35.0 | 174°55.1 | · · 36.7 | | | | | | | | | | |
| 4 | 189°24.6 | 230°39.6 | 20.9 | 241°29.5 | 57.0 | 80°19.8 | 35.0 | 189°57.3 | 36.6 | | | | | | | | | | |
| 5 | 204°27.1 | 245°38.9 | 20.0 | 256°29.9 | 56.5 | 95°22.6 | 35.1 | 204°59.6 | 36.5 | | | | | | | | | | |
| 6 | 219°29.6 | 260°38.2 | S17°19.1 | 271°30.4 | S19°56.0 | 110°25.3 | N22°35.1 | 220°01.8 | S02°36.4 | | | | | | | | | | |
| 7 | 234°32.0 | 275°37.5 | 18.2 | 286°30.8 | 55.6 | 125°28.1 | 35.2 | 235°04.1 | 36.3 | | | | | | | | | | |
| 8 | 249°34.5 | 290°36.8 | 17.3 | 301°31.3 | 55.1 | 140°30.9 | 35.2 | 250°06.3 | 36.2 | | | | | | | | | | |
| 9 | 264°37.0 | 305°36.2 | · · 16.4 | 316°31.7 | · · 54.6 | 155°33.6 | · · 35.2 | 265°08.6 | · · 36.0 | | | | | | | | | | |
| 10 | 279°39.4 | 320°35.5 | 15.5 | 331°32.2 | 54.2 | 170°36.4 | 35.3 | 280°10.8 | 35.9 | | | | | | | | | | |
| 11 | 294°41.9 | 335°34.8 | 14.6 | 346°32.6 | 53.7 | 185°39.2 | 35.3 | 295°13.0 | 35.8 | | | | | | | | | | |
| 12 | 309°44.4 | 350°34.1 | S17°13.7 | 1°33.1 | S19°53.2 | 200°42.0 | N22°35.4 | 310°15.3 | S02°35.7 | | | | | | | | | | |
| 13 | 324°46.8 | 5°33.4 | 12.8 | 16°33.5 | 52.7 | 215°44.7 | 35.4 | 325°17.5 | 35.6 | | | | | | | | | | |
| 14 | 339°49.3 | 20°32.7 | 11.9 | 31°34.0 | 52.3 | 230°47.5 | 35.5 | 340°19.8 | 35.5 | | | | | | | | | | |
| 15 | 354°51.7 | 35°32.1 | · · 11.0 | 46°34.4 | · · 51.8 | 245°50.3 | · · 35.5 | 355°22.0 | · · 35.4 | | | | | | | | | | |
| 16 | 9°54.2 | 50°31.4 | 10.1 | 61°34.9 | 51.3 | 260°53.0 | 35.5 | 10°24.3 | 35.3 | | | | | | | | | | |
| 17 | 24°56.7 | 65°30.7 | 09.2 | 76°35.3 | 50.8 | 275°55.8 | 35.6 | 25°26.5 | 35.2 | | | | | | | | | | |
| 18 | 39°59.1 | 80°30.0 | S17°08.3 | 91°35.8 | S19°50.4 | 290°58.6 | N22°35.6 | 40°28.7 | S02°35.1 | | | | | | | | | | |
| 19 | 55°01.6 | 95°29.4 | 07.3 | 106°36.2 | 49.9 | 306°01.3 | 35.7 | 55°31.0 | 35.0 | | | | | | | | | | |
| 20 | 70°04.1 | 110°28.7 | 06.4 | 121°36.6 | 49.4 | 321°04.1 | 35.7 | 70°33.2 | 34.9 | | | | | | | | | | |
| 21 | 85°06.5 | 125°28.0 | · · 05.5 | 136°37.1 | · · 48.9 | 336°06.9 | · · 35.7 | 85°35.5 | · · 34.8 | | | | | | | | | | |
| 22 | 100°09.0 | 140°27.3 | 04.6 | 151°37.5 | 48.5 | 351°09.7 | 35.8 | 100°37.7 | 34.7 | | | | | | | | | | |
| 23 | 115°11.5 | 155°26.7 | 03.7 | 166°38.0 | 48.0 | 6°12.4 | 35.8 | 115°40.0 | 34.6 | | | | | | | | | | |
| Mer.pass. 15:20 | | | | ν-0.7' d-0.9' m-3.90 | | | | ν0.4' d-0.5' m1.11 | | | | ν2.8' d0.0' m-2.63 | | | | ν2.2' d-0.1' m1.03 | | | |

| h | Sun | | | Moon | | | |
|------------|----------|----------|-------------|----------|-------|------------|-------|
| | GHA | Dec | | GHA | ν | Dec | d |
| Wed | | | | | | | HP |
| 0 | 176°47.7 | S18°15.0 | | 68°40.3 | 4.6' | N25°34.9 | 7.8' |
| 1 | 191°47.6 | 14.4 | | 83°03.9 | 4.5' | 25°42.7 | 7.6' |
| 2 | 206°47.4 | 13.7 | | 97°27.4 | 4.4' | 25°50.3 | 7.5' |
| 3 | 221°47.3 | 13.0 | | 111°50.8 | 4.3' | 25°57.7 | 7.3' |
| 4 | 236°47.2 | 12.4 | | 126°14.1 | 4.2' | 26°05.0 | 7.1' |
| 5 | 251°47.1 | 11.7 | | 140°37.4 | 4.1' | 26°12.1 | 6.9' |
| 6 | 266°47.0 | S18°11.1 | | 155°00.5 | 4.0' | N26°19.1 | 6.8' |
| 7 | 281°46.9 | 10.4 | | 169°23.5 | 3.9' | 26°25.8 | 6.6' |
| 8 | 296°46.7 | 09.7 | | 183°46.4 | 3.8' | 26°32.4 | 6.4' |
| 9 | 311°46.6 | 09.1 | | 198°09.3 | 3.8' | 26°38.8 | 6.2' |
| 10 | 326°46.5 | 08.4 | | 212°32.0 | 3.7' | 26°45.0 | 6.0' |
| 11 | 341°46.4 | 07.8 | | 226°54.7 | 3.6' | 26°51.1 | 5.9' |
| 12 | 356°46.3 | S18°07.1 | | 241°17.3 | 3.5' | N26°56.9 | 5.7' |
| 13 | 11°46.2 | 06.4 | | 255°39.8 | 3.4' | 27°02.6 | 5.5' |
| 14 | 26°46.0 | 05.8 | | 270°02.2 | 3.3' | 27°08.1 | 5.3' |
| 15 | 41°45.9 | 05.1 | | 284°24.6 | 3.3' | 27°13.4 | 5.1' |
| 16 | 56°45.8 | 04.4 | | 298°46.8 | 3.2' | 27°18.5 | 4.9' |
| 17 | 71°45.7 | 03.8 | | 313°09.0 | 3.1' | 27°23.4 | 4.7' |
| 18 | 86°45.6 | S18°03.1 | | 327°31.1 | 3.0' | N27°28.1 | 4.5' |
| 19 | 101°45.5 | 02.4 | | 341°53.2 | 3.0' | 27°32.7 | 4.3' |
| 20 | 116°45.4 | 01.8 | | 356°15.2 | 2.9' | 27°37.0 | 4.1' |
| 21 | 131°45.3 | 01.1 | | 10°37.1 | 2.8' | 27°41.1 | 3.9' |
| 22 | 146°45.1 | 18°00.4 | | 24°58.9 | 2.8' | 27°45.1 | 3.7' |
| 23 | 161°45.0 | 17°59.8 | | 39°20.7 | 2.7' | 27°48.8 | 3.6' |
| SD = 16.2' | | | $d = -0.7'$ | | | SD = 16.2' | |
| Thu | | | | | | | HP |
| 0 | 176°44.9 | S17°59.1 | | 53°42.4 | 2.7' | N27°52.4 | 3.4' |
| 1 | 191°44.8 | 58.4 | | 68°04.1 | 2.6' | 27°55.7 | 3.2' |
| 2 | 206°44.7 | 57.8 | | 82°25.7 | 2.6' | 27°58.9 | 3.0' |
| 3 | 221°44.6 | 57.1 | | 96°47.3 | 2.5' | 28°01.8 | 2.8' |
| 4 | 236°44.5 | 56.4 | | 111°08.8 | 2.5' | 28°04.6 | 2.5' |
| 5 | 251°44.4 | 55.7 | | 125°30.3 | 2.4' | 28°07.1 | 2.3' |
| 6 | 266°44.3 | S17°55.1 | | 139°51.8 | 2.4' | N28°09.5 | 2.1' |
| 7 | 281°44.2 | 54.4 | | 154°13.2 | 2.4' | 28°11.6 | 1.9' |
| 8 | 296°44.0 | 53.7 | | 168°34.5 | 2.3' | 28°13.6 | 1.7' |
| 9 | 311°43.9 | 53.1 | | 182°55.9 | 2.3' | 28°15.3 | 1.5' |
| 10 | 326°43.8 | 52.4 | | 197°17.2 | 2.3' | 28°16.8 | 1.3' |
| 11 | 341°43.7 | 51.7 | | 211°38.4 | 2.3' | 28°18.2 | 1.1' |
| 12 | 356°43.6 | S17°51.0 | | 225°59.7 | 2.2' | N28°19.3 | 0.9' |
| 13 | 11°43.5 | 50.4 | | 240°20.9 | 2.2' | 28°20.2 | 0.7' |
| 14 | 26°43.4 | 49.7 | | 254°42.1 | 2.2' | 28°20.9 | 0.5' |
| 15 | 41°43.3 | 49.0 | | 269°03.3 | 2.2' | 28°21.4 | 0.3' |
| 16 | 56°43.2 | 48.3 | | 283°24.5 | 2.2' | 28°21.7 | 0.1' |
| 17 | 71°43.1 | 47.6 | | 297°45.7 | 2.2' | 28°21.8 | -0.1' |
| 18 | 86°43.0 | S17°47.0 | | 312°06.9 | 2.2' | N28°21.6 | -0.3' |
| 19 | 101°42.9 | 46.3 | | 326°28.1 | 2.2' | 28°21.3 | -0.5' |
| 20 | 116°42.8 | 45.6 | | 340°49.3 | 2.2' | 28°20.8 | -0.7' |
| 21 | 131°42.7 | 44.9 | | 355°10.4 | 2.2' | 28°20.0 | -1.0' |
| 22 | 146°42.6 | 44.2 | | 9°31.6 | 2.2' | 28°19.1 | -1.2' |
| 23 | 161°42.5 | 43.6 | | 23°52.8 | 2.2' | 28°17.9 | -1.4' |
| SD = 16.2' | | | $d = -0.7'$ | | | SD = 16.3' | |
| Fri | | | | | | | HP |
| 0 | 176°42.4 | S17°42.9 | | 38°14.0 | 2.2' | N28°16.5 | -1.6' |
| 1 | 191°42.3 | 42.2 | | 52°35.3 | 2.3' | 28°14.9 | -1.8' |
| 2 | 206°42.2 | 41.5 | | 66°56.5 | 2.3' | 28°13.2 | -2.0' |
| 3 | 221°42.1 | 40.8 | | 81°17.8 | 2.3' | 28°11.2 | -2.2' |
| 4 | 236°42.0 | 40.1 | | 95°39.1 | 2.3' | 28°09.0 | -2.4' |
| 5 | 251°41.9 | 39.5 | | 110°00.4 | 2.4' | 28°06.6 | -2.6' |
| 6 | 266°41.8 | S17°38.8 | | 124°21.8 | 2.4' | N28°04.0 | -2.8' |
| 7 | 281°41.7 | 38.1 | | 138°43.2 | 2.4' | 28°01.2 | -3.0' |
| 8 | 296°41.6 | 37.4 | | 153°04.6 | 2.5' | 27°58.2 | -3.2' |
| 9 | 311°41.5 | 36.7 | | 167°26.1 | 2.5' | 27°55.0 | -3.4' |
| 10 | 326°41.4 | 36.0 | | 181°47.6 | 2.6' | 27°51.5 | -3.6' |
| 11 | 341°41.3 | 35.3 | | 196°09.2 | 2.6' | 27°47.9 | -3.8' |
| 12 | 356°41.2 | S17°34.6 | | 210°30.8 | 2.7' | N27°44.1 | -4.0' |
| 13 | 11°41.1 | 34.0 | | 224°52.5 | 2.7' | 27°40.1 | -4.2' |
| 14 | 26°41.0 | 33.3 | | 239°14.2 | 2.8' | 27°35.9 | -4.4' |
| 15 | 41°40.9 | 32.6 | | 253°36.0 | 2.8' | 27°31.5 | -4.6' |
| 16 | 56°40.8 | 31.9 | | 267°57.8 | 2.9' | 27°26.9 | -4.8' |
| 17 | 71°40.7 | 31.2 | | 282°19.8 | 3.0' | 27°22.1 | -5.0' |
| 18 | 86°40.6 | S17°30.5 | | 296°41.7 | 3.0' | N27°17.1 | -5.2' |
| 19 | 101°40.5 | 29.8 | | 311°03.8 | 3.1' | 27°11.9 | -5.4' |
| 20 | 116°40.4 | 29.1 | | 325°25.9 | 3.2' | 27°06.5 | -5.6' |
| 21 | 131°40.3 | 28.4 | | 339°48.1 | 3.3' | 27°00.9 | -5.8' |
| 22 | 146°40.2 | 27.7 | | 354°10.3 | 3.3' | 26°55.1 | -6.0' |
| 23 | 161°40.1 | 27.0 | | 8°32.7 | 3.4' | 26°49.2 | -6.1' |
| SD = 16.2' | | | $d = -0.7'$ | | | SD = 16.3' | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 07:20 | 08:52 | 10:55 | 13:32 | 15:36 | 17:08 |
| N 70° | 07:11 | 08:31 | 10:02 | 14:25 | 15:56 | 17:17 |
| 68° | 07:03 | 08:15 | 09:30 | 14:57 | 16:13 | 17:24 |
| 66° | 06:57 | 08:01 | 09:07 | 15:20 | 16:26 | 17:31 |
| 64° | 06:51 | 07:50 | 08:48 | 15:39 | 16:37 | 17:36 |
| 62° | 06:46 | 07:41 | 08:33 | 15:54 | 16:46 | 17:41 |
| 60° | 06:41 | 07:33 | 08:21 | 16:06 | 16:54 | 17:46 |
| N 58° | 06:37 | 07:25 | 08:10 | 16:17 | 17:02 | 17:50 |
| 56° | 06:33 | 07:19 | 08:00 | 16:26 | 17:08 | 17:54 |
| 54° | 06:30 | 07:13 | 07:52 | 16:35 | 17:14 | 17:57 |
| 52° | 06:27 | 07:07 | 07:45 | 16:42 | 17:19 | 18:00 |
| 50° | 06:23 | 07:03 | 07:38 | 16:49 | 17:24 | 18:03 |
| 45° | 06:16 | 06:52 | 07:23 | 17:03 | 17:35 | 18:10 |
| N 40° | 06:10 | 06:42 | 07:11 | 17:15 | 17:44 | 18:17 |
| 35° | 06:04 | 06:34 | 07:01 | 17:26 | 17:52 | 18:23 |
| 30° | 05:58 | 06:27 | 06:52 | 17:35 | 18:00 | 18:28 |
| 20° | 05:47 | 06:13 | 06:36 | 17:50 | 18:13 | 18:40 |
| N 10° | 05:35 | 06:01 | 06:23 | 18:04 | 18:26 | 18:51 |
| 0° | 05:23 | 05:48 | 06:10 | 18:17 | 18:38 | 19:04 |
| S 10° | 05:08 | 05:34 | 05:56 | 18:30 | 18:52 | 19:18 |
| 20° | 04:51 | 05:19 | 05:42 | 18:44 | 19:07 | 19:35 |
| 30° | 04:29 | 05:00 | 05:26 | 19:00 | 19:26 | 19:57 |
| 35° | 04:15 | 04:48 | 05:16 | 19:09 | 19:37 | 20:11 |
| 40° | 03:58 | 04:35 | 05:05 | 19:20 | 19:50 | 20:28 |
| 45° | 03:36 | 04:19 | 04:52 | 19:33 | 20:07 | 20:49 |
| S 50° | 03:07 | 03:58 | 04:36 | 19:49 | 20:27 | 21:18 |
| 52° | 02:52 | 03:48 | 04:29 | 19:56 | 20:37 | 21:32 |
| 54° | 02:34 | 03:36 | 04:21 | 20:04 | 20:49 | 21:50 |
| 56° | 02:11 | 03:23 | 04:11 | 20:14 | 21:02 | 22:12 |
| 58° | 01:38 | 03:07 | 04:00 | 20:24 | 21:17 | 22:43 |
| S 60° | 00:22 | 02:48 | 03:48 | 20:36 | 21:36 | 00:05 |

| Lat. | Moonrise | | | Moonset | | |
|-------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| N 70° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 62° | 09:09 | <input type="checkbox"/> | 10:32 | 06:11 | <input type="checkbox"/> | 09:17 |
| 60° | 09:49 | 10:21 | 11:37 | 05:31 | 07:13 | 08:12 |
| N 58° | 10:17 | 10:58 | 12:12 | 05:03 | 06:36 | 07:37 |
| 56° | 10:39 | 11:25 | 12:37 | 04:42 | 06:09 | 07:12 |
| 54° | 10:57 | 11:46 | 12:57 | 04:24 | 05:48 | 06:51 |
| 52° | 11:13 | 12:03 | 13:14 | 04:09 | 05:31 | 06:34 |
| 50° | 11:26 | 12:18 | 13:29 | 03:56 | 05:16 | 06:20 |
| 45° | 11:54 | 12:49 | 13:58 | 03:30 | 04:45 | 05:50 |
| N 40° | 12:15 | 13:13 | 14:21 | 03:09 | 04:22 | 05:26 |
| 35° | 12:34 | 13:32 | 14:40 | 02:51 | 04:02 | 05:07 |
| 30° | 12:49 | 13:49 | 14:56 | 02:36 | 03:46 | 04:51 |
| 20° | 13:16 | 14:17 | 15:24 | 02:10 | 03:18 | 04:22 |
| N 10° | 13:39 | 14:42 | 15:47 | 01:49 | 02:53 | 03:58 |
| 0° | 14:01 | 15:05 | 16:09 | 01:28 | 02:31 | 03:36 |
| S 10° | 14:22 | 15:28 | 16:31 | 01:08 | 02:08 | 03:13 |
| 20° | 14:46 | 15:52 | 16:55 | 00:46 | 01:44 | 02:49 |
| 30° | 15:13 | 16:21 | 17:22 | 00:21 | 01:16 | 02:20 |
| 35° | 15:29 | 16:38 | 17:38 | 00:06 | 01:00 | 02:03 |
| 40° | 15:48 | 16:58 | 17:57 | ... | 00:40 | 01:43 |
| 45° | 16:11 | 17:22 | 18:19 | ... | 00:17 | 01:19 |
| S 50° | 16:40 | 17:53 | 18:48 | 23:47 | ... | 00:48 |
| 52° | 16:55 | 18:08 | 19:02 | 23:32 | ... | 00:33 |
| 54° | 17:12 | 18:26 | 19:18 | 23:15 | ... | 00:15 |
| 56° | 17:32 | 18:48 | 19:37 | 22:55 | 23:53 | ... |
| 58° | 17:57 | 19:16 | 20:01 | 22:29 | 23:25 | ... |
| S 60° | 18:32 | 19:57 | 20:32 | 21:54 | 22:44 | ... |

| Day | Sun | | Mer. Pass | Moon | | Age 10-12 70-89% |
|-----|---|----------------------------------|-----------|----------------|----------------|---|
| | Eqn.of Time 00 ^h mm:ss | Time 12 ^h mm:ss | | Upper hh:mm | Lower hh:mm | |
| 28 | 12:49 | 12:55 | 12:13 | 20:16 | 07:44 |  |
| 29 | 13:00 | 13:06 | 12:13 | 21:20 | 08:48 | |
| 30 | 13:11 | 13:15 | 12:13 | 22:24 | 09:53 | |

January 31, 01, 02 UT (Sat., Sun., Mon.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------|----------------------|----------|----------|--------------------|----------|----------|--------------------|---------|-----|--------------------|--------|-----|-----|
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 130°13.9 | 170°26.0 | S17°02.8 | 181°38.4 | S19°47.5 | 21°15.2 | N22°35.9 | 130°42.2 | S02°34.5 | | | | | | |
| 1 | 145°16.4 | 185°25.3 | 01.9 | 196°38.9 | 47.0 | 36°18.0 | 35.9 | 145°44.4 | 34.4 | | | | | | |
| 2 | 160°18.9 | 200°24.6 | 00.9 | 211°39.3 | 46.6 | 51°20.7 | 36.0 | 160°46.7 | 34.3 | | | | | | |
| 3 | 175°21.3 | 215°24.0 | 17°00.0 | 226°39.8 | · · 46.1 | 66°23.5 | · · 36.0 | 175°48.9 | · · 34.2 | | | | | | |
| 4 | 190°23.8 | 230°23.3 | 16°59.1 | 241°40.2 | 45.6 | 81°26.3 | 36.0 | 190°51.2 | 34.1 | | | | | | |
| 5 | 205°26.2 | 245°22.6 | 58.2 | 256°40.7 | 45.1 | 96°29.0 | 36.1 | 205°53.4 | 34.0 | | | | | | |
| 6 | 220°28.7 | 260°21.9 | S16°57.3 | 271°41.1 | S19°44.6 | 111°31.8 | N22°36.1 | 220°55.7 | S02°33.9 | | | | | | |
| 7 | 235°31.2 | 275°21.3 | 56.4 | 286°41.6 | 44.2 | 126°34.6 | 36.2 | 235°57.9 | 33.8 | | | | | | |
| 8 | 250°33.6 | 290°20.6 | 55.4 | 301°42.0 | 43.7 | 141°37.3 | 36.2 | 251°00.1 | 33.7 | | | | | | |
| 9 | 265°36.1 | 305°19.9 | · · 54.5 | 316°42.5 | · · 43.2 | 156°40.1 | · · 36.2 | 266°02.4 | · · 33.6 | | | | | | |
| 10 | 280°38.6 | 320°19.3 | 53.6 | 331°42.9 | 42.7 | 171°42.9 | 36.3 | 281°04.6 | 33.5 | | | | | | |
| 11 | 295°41.0 | 335°18.6 | 52.7 | 346°43.4 | 42.2 | 186°45.6 | 36.3 | 296°06.9 | 33.4 | | | | | | |
| 12 | 310°43.5 | 350°17.9 | S16°51.7 | 1°43.8 | S19°41.8 | 201°48.4 | N22°36.4 | 311°09.1 | S02°33.3 | | | | | | |
| 13 | 325°46.0 | 5°17.3 | 50.8 | 16°44.3 | 41.3 | 216°51.2 | 36.4 | 326°11.4 | 33.2 | | | | | | |
| 14 | 340°48.4 | 20°16.6 | 49.9 | 31°44.7 | 40.8 | 231°53.9 | 36.4 | 341°13.6 | 33.1 | | | | | | |
| 15 | 355°50.9 | 35°15.9 | · · 49.0 | 46°45.2 | · · 40.3 | 246°56.7 | · · 36.5 | 356°15.8 | · · 33.0 | | | | | | |
| 16 | 10°53.4 | 50°15.3 | 48.0 | 61°45.6 | 39.8 | 261°59.5 | 36.5 | 11°18.1 | 32.9 | | | | | | |
| 17 | 25°55.8 | 65°14.6 | 47.1 | 76°46.1 | 39.4 | 277°02.2 | 36.6 | 26°20.3 | 32.8 | | | | | | |
| 18 | 40°58.3 | 80°13.9 | S16°46.2 | 91°46.5 | S19°38.9 | 292°05.0 | N22°36.6 | 41°22.6 | S02°32.7 | | | | | | |
| 19 | 56°00.7 | 95°13.3 | 45.2 | 106°47.0 | 38.4 | 307°07.7 | 36.6 | 56°24.8 | 32.6 | | | | | | |
| 20 | 71°03.2 | 110°12.6 | 44.3 | 121°47.4 | 37.9 | 322°10.5 | 36.7 | 71°27.0 | 32.5 | | | | | | |
| 21 | 86°05.7 | 125°11.9 | · · 43.4 | 136°47.9 | · · 37.4 | 337°13.3 | · · 36.7 | 86°29.3 | · · 32.4 | | | | | | |
| 22 | 101°08.1 | 140°11.3 | 42.4 | 151°48.4 | 36.9 | 352°16.0 | 36.8 | 101°31.5 | 32.3 | | | | | | |
| 23 | 116°10.6 | 155°10.6 | 41.5 | 166°48.8 | 36.4 | 7°18.8 | 36.8 | 116°33.8 | 32.2 | | | | | | |
| Mer.pass. 15:17 | | | ν-0.7' d-0.9' m-3.90 | | | ν0.4' d-0.5' m1.11 | | | ν2.8' d0.0' m-2.63 | | | ν2.2' d-0.1' m1.03 | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 131°13.1 | 170°10.0 | S16°40.6 | 181°49.3 | S19°36.0 | 22°21.6 | N22°36.8 | 131°36.0 | S02°32.1 | | | | | | |
| 1 | 146°15.5 | 185°09.3 | 39.6 | 196°49.7 | 35.5 | 37°24.3 | 36.9 | 146°38.2 | 32.0 | | | | | | |
| 2 | 161°18.0 | 200°08.6 | 38.7 | 211°50.2 | 35.0 | 52°27.1 | 36.9 | 161°40.5 | 31.9 | | | | | | |
| 3 | 176°20.5 | 215°08.0 | · · 37.8 | 226°50.6 | · · 34.5 | 67°29.9 | · · 37.0 | 176°42.7 | · · 31.8 | | | | | | |
| 4 | 191°22.9 | 230°07.3 | 36.8 | 241°51.1 | 34.0 | 82°32.6 | 37.0 | 191°45.0 | 31.7 | | | | | | |
| 5 | 206°25.4 | 245°06.7 | 35.9 | 256°51.5 | 33.5 | 97°35.4 | 37.0 | 206°47.2 | 31.6 | | | | | | |
| 6 | 221°27.9 | 260°06.0 | S16°34.9 | 271°52.0 | S19°33.0 | 112°38.1 | N22°37.1 | 221°49.4 | S02°31.4 | | | | | | |
| 7 | 236°30.3 | 275°05.4 | 34.0 | 286°52.4 | 32.6 | 127°40.9 | 37.1 | 236°51.7 | 31.3 | | | | | | |
| 8 | 251°32.8 | 290°04.7 | 33.1 | 301°52.9 | 32.1 | 142°43.7 | 37.2 | 251°53.9 | 31.2 | | | | | | |
| 9 | 266°35.2 | 305°04.0 | · · 32.1 | 316°53.3 | · · 31.6 | 157°46.4 | · · 37.2 | 266°56.2 | · · 31.1 | | | | | | |
| 10 | 281°37.7 | 320°03.4 | 31.2 | 331°53.8 | 31.1 | 172°49.2 | 37.2 | 281°58.4 | 31.0 | | | | | | |
| 11 | 296°40.2 | 335°02.7 | 30.2 | 346°54.2 | 30.6 | 187°51.9 | 37.3 | 297°00.6 | 30.9 | | | | | | |
| 12 | 311°42.6 | 350°02.1 | S16°29.3 | 1°54.7 | S19°30.1 | 202°54.7 | N22°37.3 | 312°02.9 | S02°30.8 | | | | | | |
| 13 | 326°45.1 | 5°01.4 | 28.3 | 16°55.2 | 29.6 | 217°57.5 | 37.4 | 327°05.1 | 30.7 | | | | | | |
| 14 | 341°47.6 | 20°00.8 | 27.4 | 31°55.6 | 29.1 | 233°00.2 | 37.4 | 342°07.4 | 30.6 | | | | | | |
| 15 | 356°50.0 | 35°00.1 | · · 26.4 | 46°56.1 | · · 28.6 | 248°03.0 | · · 37.4 | 357°09.6 | · · 30.5 | | | | | | |
| 16 | 11°52.5 | 49°59.5 | 25.5 | 61°56.5 | 28.1 | 263°05.7 | 37.5 | 12°11.8 | 30.4 | | | | | | |
| 17 | 26°55.0 | 64°58.8 | 24.6 | 76°57.0 | 27.7 | 278°08.5 | 37.5 | 27°14.1 | 30.3 | | | | | | |
| 18 | 41°57.4 | 79°58.2 | S16°23.6 | 91°57.4 | S19°27.2 | 293°11.3 | N22°37.6 | 42°16.3 | S02°30.2 | | | | | | |
| 19 | 56°59.9 | 94°57.5 | 22.7 | 106°57.9 | 26.7 | 308°14.0 | 37.6 | 57°18.6 | 30.1 | | | | | | |
| 20 | 72°02.3 | 109°56.9 | 21.7 | 121°58.3 | 26.2 | 323°16.8 | 37.6 | 72°20.8 | 30.0 | | | | | | |
| 21 | 87°04.8 | 124°56.2 | · · 20.8 | 136°58.8 | · · 25.7 | 338°19.5 | · · 37.7 | 87°23.0 | · · 29.9 | | | | | | |
| 22 | 102°07.3 | 139°55.6 | 19.8 | 151°59.2 | 25.2 | 353°22.3 | 37.7 | 102°25.3 | 29.8 | | | | | | |
| 23 | 117°09.7 | 154°54.9 | 18.8 | 166°59.7 | 24.7 | 8°25.0 | 37.8 | 117°27.5 | 29.7 | | | | | | |
| Mer.pass. 15:13 | | | ν-0.7' d-0.9' m-3.91 | | | ν0.5' d-0.5' m1.11 | | | ν2.8' d0.0' m-2.62 | | | ν2.2' d-0.1' m1.03 | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 132°12.2 | 169°54.3 | S16°17.9 | 182°00.2 | S19°24.2 | 23°27.8 | N22°37.8 | 132°29.7 | S02°29.6 | | | | | | |
| 1 | 147°14.7 | 184°53.6 | 16.9 | 197°00.6 | 23.7 | 38°30.6 | 37.8 | 147°32.0 | 29.5 | | | | | | |
| 2 | 162°17.1 | 199°53.0 | 16.0 | 212°01.1 | 23.2 | 53°33.3 | 37.9 | 162°34.2 | 29.4 | | | | | | |
| 3 | 177°19.6 | 214°52.3 | · · 15.0 | 227°01.5 | · · 22.7 | 68°36.1 | · · 37.9 | 177°36.5 | · · 29.3 | | | | | | |
| 4 | 192°22.1 | 229°51.7 | 14.1 | 242°02.0 | 22.2 | 83°38.8 | 38.0 | 192°38.7 | 29.2 | | | | | | |
| 5 | 207°24.5 | 244°51.0 | 13.1 | 257°02.4 | 21.7 | 98°41.6 | 38.0 | 207°40.9 | 29.1 | | | | | | |
| 6 | 222°27.0 | 259°50.4 | S16°12.1 | 272°02.9 | S19°21.2 | 113°44.3 | N22°38.0 | 222°43.2 | S02°29.0 | | | | | | |
| 7 | 237°29.5 | 274°49.7 | 11.2 | 287°03.4 | 20.7 | 128°47.1 | 38.1 | 237°45.4 | 28.9 | | | | | | |
| 8 | 252°31.9 | 289°49.1 | 10.2 | 302°03.8 | 20.2 | 143°49.9 | 38.1 | 252°47.6 | 28.8 | | | | | | |
| 9 | 267°34.4 | 304°48.5 | · · 09.3 | 317°04.3 | · · 19.7 | 158°52.6 | · · 38.2 | 267°49.9 | · · 28.7 | | | | | | |
| 10 | 282°36.8 | 319°47.8 | 08.3 | 332°04.7 | 19.2 | 173°55.4 | 38.2 | 282°52.1 | 28.5 | | | | | | |
| 11 | 297°39.3 | 334°47.2 | 07.3 | 347°05.2 | 18.7 | 188°58.1 | 38.2 | 297°54.4 | 28.4 | | | | | | |
| 12 | 312°41.8 | 349°46.5 | S16°06.4 | 2°05.6 | S19°18.2 | 204°00.9 | N22°38.3 | 312°56.6 | S02°28.3 | | | | | | |
| 13 | 327°44.2 | 4°45.9 | 05.4 | 17°06.1 | 17.7 | 219°03.6 | 38.3 | 327°58.8 | 28.2 | | | | | | |
| 14 | 342°46.7 | 19°45.2 | 04.5 | 32°06.6 | 17.2 | 234°06.4 | 38.3 | 343°01.1 | 28.1 | | | | | | |
| 15 | 357°49.2 | 34°44.6 | · · 03.5 | 47°07.0 | · · 16.7 | 249°09.1 | · · 38.4 | 358°03.3 | · · 28.0 | | | | | | |
| 16 | 12°51.6 | 49°44.0 | 02.5 | 62°07.5 | 16.2 | 264°11.9 | 38.4 | 13°05.5 | 27.9 | | | | | | |
| 17 | 27°54.1 | 64°43.3 | 01.6 | 77°07.9 | 15.7 | 279°14.6 | 38.5 | 28°07.8 | 27.8 | | | | | | |
| 18 | 42°56.6 | 79°42.7 | S16°00.6 | 92°08.4 | S19°15.2 | 294°17.4 | N22°38.5 | 43°10.0 | S02°27.7 | | | | | | |
| 19 | 57°59.0 | 94°42.1 | 15°59.6 | 107°08.9 | 14.7 | 309°20.2 | 38.5 | 58°12.3 | 27.6 | | | | | | |
| 20 | 73°01.5 | 109°41.4 | 58.6 | 122°09.3 | 14.2 | 324°22.9 | 38.6 | 73°14.5 | 27.5 | | | | | | |
| 21 | 88°04.0 | 124°40.8 | · · 57.7 | 137°09.8 | · · 13.7 | 339°25.7 | · · 38.6 | 88°16.7 | · · 27.4 | | | | | | |
| 22 | 103°06.4 | 139°40.1 | 56.7 | 152°10.2 | 13.2 | 354°28.4 | 38.7 | 103°19.0 | 27.3 | | | | | | |
| 23 | 118°08.9 | 154°39.5 | 55.7 | 167°10.7 | 12.7 | 9°31.2 | 38.7 | 118°21.2 | 27.2 | | | | | | |
| Mer.pass. 15:09 | | | ν-0.6' d-1.0' m-3.91 | | | ν0.5' d-0.5' m1.11 | | | ν2.8' d0.0' m-2.62 | | | ν2.2' d-0.1' m1.03 | | | |

| Stars | | |
|---------------------|-----------|-----------|
| | SHA | Dec |
| Alpheratz | 357° 34.1 | 29° 14.2 |
| Ankaa | 353° 06.5 | -42° 10.1 |
| Schedar | 349° 30.3 | 56° 41.1 |
| Diphda | 348° 46.6 | -17° 50.7 |
| Achernar | 335° 19.7 | -57° 06.5 |
| Hamal | 327° 50.2 | 23° 35.2 |
| Polaris | 313° 30.4 | 89° 22.8 |
| Acamar | 315° 11.0 | -40° 12.2 |
| Menkar | 314° 05.2 | 4° 11.5 |
| Mirfak | 308° 26.8 | 49° 57.4 |
| Aldebaran | 290° 38.4 | 16° 33.7 |
| Rigel | 281° 02.8 | -8° 10.4 |
| Capella | 280° 20.2 | 46° 01.6 |
| Bellatrix | 278° 21.7 | 6° 22.4 |
| Elnath | 278° 00.5 | 28° 37.8 |
| Alnilam | 275° 36.6 | -1° 11.2 |
| Betelgeuse | 270° 50.9 | 7° 24.7 |
| Canopus | 263° 51.5 | -52° 42.7 |
| Sirius | 258° 25.1 | -16° 45.2 |
| Adhara | 255° 04.8 | -29° 00.6 |
| Procyon | 244° 49.6 | 5° 09.4 |
| Pollux | 243° 15.8 | 27° 57.7 |
| Avior | 234° 13.7 | -59° 35.6 |
| Suhail | 222° 45.2 | -43° 32.3 |
| Miaplacidus | 221° 37.2 | -69° 49.4 |
| Alphard | 217° 46.5 | -8° 46.4 |
| Regulus | 207° 33.2 | 11° 50.2 |
| Dubhe | 193° 39.3 | 61° 36.4 |
| Denebola | 182° 23.8 | 14° 25.4 |
| Gienah | 175° 42.5 | -17° 41.3 |
| Acrux | 172° 58.7 | -63° 14.5 |
| Gacrux | 171° 50.3 | -57° 15.4 |
| Alioth | 166° 11.9 | 55° 48.7 |
| Spica | 158° 21.2 | -11° 17.9 |
| Alkaid | 152° 51.2 | 49° 10.6 |
| Hadar | 148° 34.6 | -60° 29.7 |
| Menkent | 147° 56.5 | -36° 29.8 |
| Arcturus | 145° 47.0 | 19° 02.5 |
| Rigel Kent. | 139° 39.0 | -60° 56.4 |
| Kochab | 137° 19.9 | 74° 02.5 |
| Zuben'ubi | 136° 55.0 | -16° 09.0 |
| Alphecca | 126° 03.1 | 26° 37.3 |
| Antares | 112° 14.9 | -26° 29.4 |
| Atria | 107° 08.6 | -69° 04.2 |
| Sabik | 102° 02.0 | -15° 45.5 |
| Shaula | 96° 09.4 | -37° 07.3 |
| Rasalhague | 95° 57.9 | 12° 32.3 |
| Eltanin | 90° 42.2 | 51° 28.8 |
| Kaus Aust. | 83° 31.6 | -34° 22.3 |
| Vega | 80° 33.0 | 38° 48.3 |
| Nunki | 75° 47.0 | -26° 15.9 |
| Altair | 61° 59.4 | 8° 56.1 |
| Peacock | 53° 04.9 | -56° 39.1 |
| Deneb | 49° 25.7 | 45° 22.3 |
| Enif | 33° 38.2 | 9° 59.6 |
| Al Na'ir | 27° 32.2 | -46° 50.2 |
| Fomalhaut | 15° 13.8 | -29° 29.2 |
| Scheat | 13° 44.6 | 28° 13.5 |
| Markab | 13° 29.3 | 15° 20.7 |
| | | |
| Jan 31 Sat | SHA | Mer.pass |
| Venus | 40° 12.1 | 12:39 |
| Mars | 51° 24.5 | 11:53 |
| Jupiter | 251° 01.3 | 22:31 |
| Saturn | 0° 28.3 | 15:15 |
| | | |
| Feb 01 Sun | SHA | Mer.pass |
| Venus | 38° 56.9 | 12:40 |
| Mars | 50° 36.2 | 11:52 |
| Jupiter | 251° 08.5 | 22:26 |
| Saturn | 0° 22.9 | 15:11 |
| | | |
| Feb 02 Mon | SHA | Mer.pass |
| Venus | 37° 42.1 | 12:41 |
| Mars | 49° 48.0 | 11:52 |
| Jupiter | 251° 15.6 | 22:22 |
| Saturn | 0° 17.5 | 15:08 |
| | | |
| Horizontal parallax | | |
| Venus: | 0.1 | |
| Mars: | 0.1 | |

| h | Sun | | | Moon | | | | |
|------------------------|----------|----------|--|------------|-------|----------|--------|-------|
| Sat | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 176°40.0 | S17°26.3 | | 22°55.1 | 3.5' | N26°43.0 | -6.3' | 59.7' |
| 1 | 191°39.9 | 25.6 | | 37°17.6 | 3.6' | 26°36.7 | -6.5' | 59.7' |
| 2 | 206°39.8 | 24.9 | | 51°40.2 | 3.7' | 26°30.2 | -6.7' | 59.7' |
| 3 | 221°39.7 | · · 24.3 | | 66°02.9 | 3.8' | 26°23.5 | -6.9' | 59.7' |
| 4 | 236°39.6 | 23.6 | | 80°25.6 | 3.9' | 26°16.6 | -7.1' | 59.7' |
| 5 | 251°39.5 | 22.9 | | 94°48.5 | 3.9' | 26°09.6 | -7.2' | 59.7' |
| 6 | 266°39.4 | S17°22.2 | | 109°11.4 | 4.0' | N26°02.4 | -7.4' | 59.7' |
| 7 | 281°39.4 | 21.5 | | 123°34.5 | 4.1' | 25°54.9 | -7.6' | 59.7' |
| 8 | 296°39.3 | 20.8 | | 137°57.6 | 4.2' | 25°47.4 | -7.8' | 59.7' |
| 9 | 311°39.2 | · · 20.1 | | 152°20.9 | 4.3' | 25°39.6 | -7.9' | 59.6' |
| 10 | 326°39.1 | 19.4 | | 166°44.2 | 4.4' | 25°31.7 | -8.1' | 59.6' |
| 11 | 341°39.0 | 18.7 | | 181°07.6 | 4.5' | 25°23.6 | -8.3' | 59.6' |
| 12 | 356°38.9 | S17°18.0 | | 195°31.2 | 4.6' | N25°15.3 | -8.4' | 59.6' |
| 13 | 11°38.8 | 17.3 | | 209°54.8 | 4.8' | 25°06.9 | -8.6' | 59.6' |
| 14 | 26°38.7 | 16.6 | | 224°18.6 | 4.9' | 24°58.3 | -8.8' | 59.6' |
| 15 | 41°38.6 | · · 15.8 | | 238°42.4 | 5.0' | 24°49.5 | -8.9' | 59.6' |
| 16 | 56°38.5 | 15.1 | | 253°06.4 | 5.1' | 24°40.6 | -9.1' | 59.6' |
| 17 | 71°38.5 | 14.4 | | 267°30.5 | 5.2' | 24°31.5 | -9.2' | 59.5' |
| 18 | 86°38.4 | S17°13.7 | | 281°54.7 | 5.3' | N24°22.3 | -9.4' | 59.5' |
| 19 | 101°38.3 | 13.0 | | 296°19.0 | 5.4' | 24°12.9 | -9.5' | 59.5' |
| 20 | 116°38.2 | 12.3 | | 310°43.4 | 5.5' | 24°03.3 | -9.7' | 59.5' |
| 21 | 131°38.1 | · · 11.6 | | 325°07.9 | 5.6' | 23°53.6 | -9.8' | 59.5' |
| 22 | 146°38.0 | 10.9 | | 339°32.6 | 5.8' | 23°43.8 | -10.0' | 59.5' |
| 23 | 161°37.9 | 10.2 | | 353°57.3 | 5.9' | 23°33.8 | -10.1' | 59.4' |
| SD = 16.2' $d = -0.7'$ | | | | SD = 16.3' | | | | |

| Sun | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| 0 | 176°37.9 | S17°09.5 | | 8°22.2 | 6.0' | N23°23.6 | -10.3' | 59.4' |
| 1 | 191°37.8 | 08.8 | | 22°47.2 | 6.1' | 23°13.3 | -10.4' | 59.4' |
| 2 | 206°37.7 | 08.1 | | 37°12.3 | 6.2' | 23°02.9 | -10.6' | 59.4' |
| 3 | 221°37.6 | · · 07.4 | | 51°37.5 | 6.3' | 22°52.4 | -10.7' | 59.4' |
| 4 | 236°37.5 | 06.7 | | 66°02.9 | 6.5' | 22°41.6 | -10.8' | 59.4' |
| 5 | 251°37.4 | 05.9 | | 80°28.3 | 6.6' | 22°30.8 | -11.0' | 59.3' |
| 6 | 266°37.4 | S17°05.2 | | 94°53.9 | 6.7' | N22°19.8 | -11.1' | 59.3' |
| 7 | 281°37.3 | 04.5 | | 109°19.6 | 6.8' | 22°08.7 | -11.2' | 59.3' |
| 8 | 296°37.2 | 03.8 | | 123°45.4 | 6.9' | 21°57.5 | -11.4' | 59.3' |
| 9 | 311°37.1 | · · 03.1 | | 138°11.4 | 7.1' | 21°46.1 | -11.5' | 59.3' |
| 10 | 326°37.0 | 02.4 | | 152°37.5 | 7.2' | 21°34.6 | -11.6' | 59.2' |
| 11 | 341°36.9 | 01.7 | | 167°03.6 | 7.3' | 21°23.0 | -11.7' | 59.2' |
| 12 | 356°36.9 | S17°01.0 | | 181°30.0 | 7.4' | N21°11.3 | -11.9' | 59.2' |
| 13 | 11°36.8 | 17°00.2 | | 195°56.4 | 7.6' | 20°59.4 | -12.0' | 59.2' |
| 14 | 26°36.7 | 16°59.5 | | 210°22.9 | 7.7' | 20°47.4 | -12.1' | 59.2' |
| 15 | 41°36.6 | · · 58.8 | | 224°49.6 | 7.8' | 20°35.3 | -12.2' | 59.1' |
| 16 | 56°36.5 | 58.1 | | 239°16.4 | 7.9' | 20°23.1 | -12.3' | 59.1' |
| 17 | 71°36.5 | 57.4 | | 253°43.3 | 8.0' | 20°10.8 | -12.4' | 59.1' |
| 18 | 86°36.4 | S16°56.7 | | 268°10.4 | 8.2' | N19°58.4 | -12.5' | 59.1' |
| 19 | 101°36.3 | 55.9 | | 282°37.5 | 8.3' | 19°45.9 | -12.6' | 59.0' |
| 20 | 116°36.2 | 55.2 | | 297°04.8 | 8.4' | 19°33.2 | -12.7' | 59.0' |
| 21 | 131°36.1 | · · 54.5 | | 311°32.2 | 8.5' | 19°20.5 | -12.8' | 59.0' |
| 22 | 146°36.1 | 53.8 | | 325°59.7 | 8.6' | 19°07.6 | -12.9' | 59.0' |
| 23 | 161°36.0 | 53.1 | | 340°27.3 | 8.8' | 18°54.7 | -13.0' | 58.9' |
| SD = 16.2' $d = -0.7'$ | | | SD = 16.2' | | | | | |

| Mon | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| 0 | 176°35.9 | S16°52.3 | | 354°55.1 | 8.9' | N18°41.6 | -13.1' | 58.9' |
| 1 | 191°35.8 | 51.6 | | 9°23.0 | 9.0' | 18°28.5 | -13.2' | 58.9' |
| 2 | 206°35.8 | 50.9 | | 23°51.0 | 9.1' | 18°15.3 | -13.3' | 58.9' |
| 3 | 221°35.7 | · · 50.2 | | 38°19.1 | 9.2' | 18°02.0 | -13.4' | 58.8' |
| 4 | 236°35.6 | 49.5 | | 52°47.3 | 9.3' | 17°48.5 | -13.5' | 58.8' |
| 5 | 251°35.5 | 48.7 | | 67°15.6 | 9.5' | 17°35.1 | -13.6' | 58.8' |
| 6 | 266°35.5 | S16°48.0 | | 81°44.1 | 9.6' | N17°21.5 | -13.7' | 58.8' |
| 7 | 281°35.4 | 47.3 | | 96°12.6 | 9.7' | 17°07.8 | -13.7' | 58.7' |
| 8 | 296°35.3 | 46.6 | | 110°41.3 | 9.8' | 16°54.1 | -13.8' | 58.7' |
| 9 | 311°35.2 | · · 45.8 | | 125°10.1 | 9.9' | 16°40.2 | -13.9' | 58.7' |
| 10 | 326°35.2 | 45.1 | | 139°39.0 | 10.0' | 16°26.3 | -14.0' | 58.7' |
| 11 | 341°35.1 | 44.4 | | 154°08.1 | 10.1' | 16°12.3 | -14.1' | 58.6' |
| 12 | 356°35.0 | S16°43.7 | | 168°37.2 | 10.2' | N15°58.3 | -14.1' | 58.6' |
| 13 | 11°34.9 | 42.9 | | 183°06.4 | 10.4' | 15°44.2 | -14.2' | 58.6' |
| 14 | 26°34.9 | 42.2 | | 197°35.8 | 10.5' | 15°30.0 | -14.3' | 58.6' |
| 15 | 41°34.8 | · · 41.5 | | 212°05.2 | 10.6' | 15°15.7 | -14.3' | 58.5' |
| 16 | 56°34.7 | 40.8 | | 226°34.8 | 10.7' | 15°01.4 | -14.4' | 58.5' |
| 17 | 71°34.7 | 40.0 | | 241°04.5 | 10.8' | 14°47.0 | -14.5' | 58.5' |
| 18 | 86°34.6 | S16°39.3 | | 255°34.3 | 10.9' | N14°32.5 | -14.5' | 58.4' |
| 19 | 101°34.5 | 38.6 | | 270°04.1 | 11.0' | 14°18.0 | -14.6' | 58.4' |
| 20 | 116°34.4 | 37.8 | | 284°34.1 | 11.1' | 14°03.4 | -14.6' | 58.4' |
| 21 | 131°34.4 | · · 37.1 | | 299°04.2 | 11.2' | 13°48.8 | -14.7' | 58.4' |
| 22 | 146°34.3 | 36.4 | | 313°34.4 | 11.3' | 13°34.1 | -14.7' | 58.3' |
| 23 | 161°34.2 | 35.6 | | 328°04.7 | 11.4' | 13°19.3 | -14.8' | 58.3' |
| SD = 16.2' $d = -0.7'$ | | | SD = 16.1' | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 07:09 | 08:38 | 10:27 | 14:01 | 15:50 | 17:19 |
| N 70° | 07:02 | 08:20 | 09:45 | 14:43 | 16:09 | 17:27 |
| 68° | 06:55 | 08:05 | 09:17 | 15:11 | 16:23 | 17:33 |
| 66° | 06:49 | 07:53 | 08:56 | 15:32 | 16:35 | 17:39 |
| 64° | 06:44 | 07:43 | 08:39 | 15:49 | 16:45 | 17:44 |
| 62° | 06:40 | 07:34 | 08:26 | 16:02 | 16:54 | 17:48 |
| 60° | 06:36 | 07:27 | 08:14 | 16:14 | 17:01 | 17:52 |
| N 58° | 06:32 | 07:20 | 08:04 | 16:24 | 17:08 | 17:56 |
| 56° | 06:29 | 07:14 | 07:55 | 16:33 | 17:14 | 17:59 |
| 54° | 06:26 | 07:08 | 07:47 | 16:41 | 17:20 | 18:02 |
| 52° | 06:23 | 07:03 | 07:40 | 16:48 | 17:24 | 18:05 |
| 50° | 06:20 | 06:59 | 07:34 | 16:54 | 17:29 | 18:08 |
| 48° | 06:13 | 06:49 | 07:20 | 17:08 | 17:39 | 18:14 |
| N 40° | 06:08 | 06:40 | 07:09 | 17:19 | 17:48 | 18:20 |
| 38° | 06:02 | 06:32 | 06:59 | 17:29 | 17:55 | 18:26 |
| 36° | 05:57 | 06:25 | 06:50 | 17:37 | 18:02 | 18:31 |
| 34° | 05:46 | 06:12 | 06:35 | 17:52 | 18:15 | 18:41 |
| N 10° | 05:35 | 06:00 | 06:22 | 18:05 | 18:27 | 18:52 |
| 0° | 05:23 | 05:48 | 06:10 | 18:17 | 18:39 | 19:04 |
| S 10° | 05:10 | 05:35 | 05:58 | 18:29 | 18:51 | 19:17 |
| 20° | 04:53 | 05:21 | 05:44 | 18:43 | 19:06 | 19:34 |
| 30° | 04:32 | 05:03 | 05:29 | 18:58 | 19:24 | 19:55 |
| 35° | 04:18 | 04:52 | 05:19 | 19:07 | 19:35 | 20:08 |
| 40° | 04:02 | 04:39 | 05:09 | 19:17 | 19:47 | 20:24 |
| 45° | 03:42 | 04:23 | 04:57 | 19:30 | 20:03 | 20:44 |
| S 50° | 03:14 | 04:04 | 04:42 | 19:44 | 20:22 | 21:11 |
| 52° | 03:00 | 03:54 | 04:35 | 19:51 | 20:32 | 21:25 |
| 54° | 02:43 | 03:43 | 04:27 | 19:59 | 20:42 | 21:42 |
| 56° | 02:22 | 03:31 | 04:18 | 20:08 | 20:55 | 22:02 |
| 58° | 01:55 | 03:16 | 04:08 | 20:18 | 21:09 | 22:28 |
| S 60° | 01:10 | 02:58 | 03:56 | 20:29 | 21:26 | 23:09 |

| Lat. | Moonrise | | | Moonset | | |
|-------|--------------------------|--------------------------|-------|--------------------------|--------------------------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | <input type="checkbox"/> | <input type="checkbox"/> | 15:08 | <input type="checkbox"/> | <input type="checkbox"/> | 10:54 |
| N 70° | <input type="checkbox"/> | <input type="checkbox"/> | 15:45 | <input type="checkbox"/> | <input type="checkbox"/> | 10:14 |
| 68° | <input type="checkbox"/> | 13:17 | 16:10 | <input type="checkbox"/> | 10:49 | 09:47 |
| 66° | <input type="checkbox"/> | 14:08 | 16:30 | <input type="checkbox"/> | 09:57 | 09:26 |
| 64° | 12:03 | 14:40 | 16:45 | 09:59 | 09:24 | 09:09 |
| 62° | 12:56 | 15:03 | 16:58 | 09:06 | 09:00 | 08:55 |
| 60° | 13:28 | 15:22 | 17:09 | 08:33 | 08:40 | 08:43 |
| N 58° | 13:51 | 15:37 | 17:18 | 08:09 | 08:24 | 08:32 |
| 56° | 14:10 | 15:50 | 17:26 | 07:49 | 08:10 | 08:23 |
| 54° | 14:26 | 16:01 | 17:34 | 07:33 | 07:58 | 08:15 |
| 52° | 14:40 | 16:11 | 17:40 | 07:19 | 07:48 | 08:08 |
| 50° | 14:52 | 16:20 | 17:46 | 07:06 | 07:38 | 08:01 |
| 45° | 15:17 | 16:39 | 17:58 | 06:40 | 07:18 | 07:47 |
| N 40° | 15:37 | 16:54 | 18:09 | 06:20 | 07:02 | 07:35 |
| 35° | 15:53 | 17:07 | 18:17 | 06:02 | 06:48 | 07:25 |
| 30° | 16:07 | 17:18 | 18:25 | 05:47 | 06:36 | 07:16 |
| 20° | 16:31 | 17:37 | 18:38 | 05:22 | 06:15 | 07:00 |
| N 10° | 16:52 | 17:53 | 18:50 | 05:00 | 05:56 | 06:47 |
| 0° | 17:11 | 18:08 | 19:00 | 04:39 | 05:39 | 06:34 |
| S 10° | 17:30 | 18:23 | 19:11 | 04:18 | 05:22 | 06:21 |
| 20° | 17:51 | 18:40 | 19:22 | 03:56 | 05:03 | 06:07 |
| 30° | 18:14 | 18:58 | 19:35 | 03:30 | 04:41 | 05:50 |
| 35° | 18:28 | 19:09 | 19:42 | 03:14 | 04:28 | 05:41 |
| 40° | 18:44 | 19:21 | 19:51 | 02:56 | 04:13 | 05:30 |
| 45° | 19:03 | 19:35 | 20:01 | 02:34 | 03:56 | 05:17 |
| S 50° | 19:26 | 19:53 | 20:12 | 02:06 | 03:34 | 05:01 |
| 52° | 19:37 | 20:01 | 20:18 | 01:53 | 03:23 | 04:54 |
| 54° | 19:50 | 20:10 | 20:24 | 01:37 | 03:11 | 04:45 |
| 56° | 20:05 | 20:20 | 20:30 | 01:18 | 02:57 | 04:36 |
| 58° | 20:21 | 20:32 | 20:38 | 00:55 | 02:41 | 04:25 |
| S 60° | 20:42 | 20:45 | 20:46 | 00:25 | 02:21 | 04:13 |

| Day | Sun | | Mer. Pass | Moon | | Age |
|-----|-------------------------|----------------------|-----------|------------------|-------|---------------|
| | Eqn. of 00 ^h | Time 12 ^h | | Mer. Pass. Upper | Lower | |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 13-15 95-100% |
| 31 | 13:20 | 13:24 | 12:13 | 23:25 | 10:55 | |
| 01 | 13:29 | 13:33 | 12:14 | — | 11:54 | |
| 02 | 13:36 | 13:40 | 12:14 | 00:21 | 12:47 | |

February 03, 04, 05 UT (Tue., Wed., Thu.)


| h | Aries | | | Venus | | Mars | | Jupiter | | Saturn | |
|----------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------|-----|
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 133°11.3 | 169°38.9 | S15°54.8 | 182°11.2 | S19°12.2 | 24°33.9 | N22°38.7 | 133°23.4 | S02°27.1 | | |
| 1 | 148°13.8 | 184°38.2 | 53.8 | 197°11.6 | 11.7 | 39°36.7 | 38.8 | 148°25.7 | 27.0 | | |
| 2 | 163°16.3 | 199°37.6 | 52.8 | 212°12.1 | 11.2 | 54°39.4 | 38.8 | 163°27.9 | 26.9 | | |
| 3 | 178°18.7 | 214°37.0 | • • 51.8 | 227°12.5 | • • 10.7 | 69°42.2 | • • 38.8 | 178°30.1 | • • 26.8 | | |
| 4 | 193°21.2 | 229°36.3 | 50.9 | 242°13.0 | 10.2 | 84°44.9 | 38.9 | 193°32.4 | 26.7 | | |
| 5 | 208°23.7 | 244°35.7 | 49.9 | 257°13.5 | 09.7 | 99°47.7 | 38.9 | 208°34.6 | 26.6 | | |
| 6 | 223°26.1 | 259°35.1 | S15°48.9 | 272°13.9 | S19°09.2 | 114°50.4 | N22°39.0 | 223°36.8 | S02°26.5 | | |
| 7 | 238°28.6 | 274°34.4 | 47.9 | 287°14.4 | 08.7 | 129°53.2 | 39.0 | 238°39.1 | 26.4 | | |
| 8 | 253°31.1 | 289°33.8 | 47.0 | 302°14.8 | 08.2 | 144°55.9 | 39.0 | 253°41.3 | 26.2 | | |
| 9 | 268°33.5 | 304°33.2 | • • 46.0 | 317°15.3 | • • 07.7 | 159°58.7 | • • 39.1 | 268°43.6 | • • 26.1 | | |
| 10 | 283°36.0 | 319°32.5 | 45.0 | 332°15.8 | 07.2 | 175°01.4 | 39.1 | 283°45.8 | 26.0 | | |
| 11 | 298°38.4 | 334°31.9 | 44.0 | 347°16.2 | 06.7 | 190°04.2 | 39.2 | 298°48.0 | 25.9 | | |
| 12 | 313°40.9 | 349°31.3 | S15°43.0 | 2°16.7 | S19°06.2 | 205°06.9 | N22°39.2 | 313°50.3 | S02°25.8 | | |
| 13 | 328°43.4 | 4°30.7 | 42.0 | 17°17.2 | 05.7 | 220°09.7 | 39.2 | 328°52.5 | 25.7 | | |
| 14 | 343°45.8 | 19°30.0 | 41.1 | 32°17.6 | 05.1 | 235°12.4 | 39.3 | 343°54.7 | 25.6 | | |
| 15 | 358°48.3 | 34°29.4 | • • 40.1 | 47°18.1 | • • 04.6 | 250°15.2 | • • 39.3 | 358°57.0 | • • 25.5 | | |
| 16 | 13°50.8 | 49°28.8 | 39.1 | 62°18.5 | 04.1 | 265°17.9 | 39.3 | 13°59.2 | 25.4 | | |
| 17 | 28°53.2 | 64°28.2 | 38.1 | 77°19.0 | 03.6 | 280°20.7 | 39.4 | 29°01.4 | 25.3 | | |
| 18 | 43°55.7 | 79°27.5 | S15°37.1 | 92°19.5 | S19°03.1 | 295°23.4 | N22°39.4 | 44°03.7 | S02°25.2 | | |
| 19 | 58°58.2 | 94°26.9 | 36.1 | 107°19.9 | 02.6 | 310°26.2 | 39.5 | 59°05.9 | 25.1 | | |
| 20 | 74°00.6 | 109°26.3 | 35.2 | 122°20.4 | 02.1 | 325°28.9 | 39.5 | 74°08.1 | 25.0 | | |
| 21 | 89°03.1 | 124°25.7 | • • 34.2 | 137°20.9 | • • 01.6 | 340°31.7 | • • 39.5 | 89°10.4 | • • 24.9 | | |
| 22 | 104°05.6 | 139°25.0 | 33.2 | 152°21.3 | 01.1 | 355°34.4 | 39.6 | 104°12.6 | 24.8 | | |
| 23 | 119°08.0 | 154°24.4 | 32.2 | 167°21.8 | 00.6 | 10°37.1 | 39.6 | 119°14.8 | 24.7 | | |
| Mer.pass. 15:05 | | | | | | | | | | | |
| ν-0.6' d-1.0' m-3.91 | | | | | | | | | | | |
| ν0.5' d-0.5' m1.11 | | | | | | | | | | | |
| ν2.8' d0.0' m-2.61 | | | | | | | | | | | |
| ν2.2' d-0.1' m1.03 | | | | | | | | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 134°10.5 | 169°23.8 | S15°31.2 | 182°22.3 | S19°00.0 | 25°39.9 | N22°39.6 | 134°17.1 | S02°24.6 | | |
| 1 | 149°12.9 | 184°23.2 | 30.2 | 197°22.7 | 18°59.5 | 40°42.6 | 39.7 | 149°19.3 | 24.5 | | |
| 2 | 164°15.4 | 199°22.5 | 29.2 | 212°23.2 | 59.0 | 55°45.4 | 39.7 | 164°21.5 | 24.4 | | |
| 3 | 179°17.9 | 214°21.9 | • • 28.2 | 227°23.7 | • • 58.5 | 70°48.1 | • • 39.8 | 179°23.8 | • • 24.3 | | |
| 4 | 194°20.3 | 229°21.3 | 27.2 | 242°24.1 | 58.0 | 85°50.9 | 39.8 | 194°26.0 | 24.1 | | |
| 5 | 209°22.8 | 244°20.7 | 26.2 | 257°24.6 | 57.5 | 100°53.6 | 39.8 | 209°28.2 | 24.0 | | |
| 6 | 224°25.3 | 259°20.1 | S15°25.2 | 272°25.0 | S18°57.0 | 115°56.4 | N22°39.9 | 224°30.5 | S02°23.9 | | |
| 7 | 239°27.7 | 274°19.4 | 24.2 | 287°25.5 | 56.4 | 130°59.1 | 39.9 | 239°32.7 | 23.8 | | |
| 8 | 254°30.2 | 289°18.8 | 23.2 | 302°26.0 | 55.9 | 146°01.8 | 39.9 | 254°34.9 | 23.7 | | |
| 9 | 269°32.7 | 304°18.2 | • • 22.2 | 317°26.4 | • • 55.4 | 161°04.6 | • • 40.0 | 269°37.2 | • • 23.6 | | |
| 10 | 284°35.1 | 319°17.6 | 21.2 | 332°26.9 | 54.9 | 176°07.3 | 40.0 | 284°39.4 | 23.5 | | |
| 11 | 299°37.6 | 334°17.0 | 20.2 | 347°27.4 | 54.4 | 191°10.1 | 40.0 | 299°41.6 | 23.4 | | |
| 12 | 314°40.1 | 349°16.4 | S15°19.2 | 2°27.8 | S18°53.9 | 206°12.8 | N22°40.1 | 314°43.9 | S02°23.3 | | |
| 13 | 329°42.5 | 4°15.7 | 18.2 | 17°28.3 | 53.4 | 221°15.6 | 40.1 | 329°46.1 | 23.2 | | |
| 14 | 344°45.0 | 19°15.1 | 17.2 | 32°28.8 | 52.8 | 236°18.3 | 40.2 | 344°48.3 | 23.1 | | |
| 15 | 359°47.4 | 34°14.5 | • • 16.2 | 47°29.2 | • • 52.3 | 251°21.1 | • • 40.2 | 359°50.6 | • • 23.0 | | |
| 16 | 14°49.9 | 49°13.9 | 15.2 | 62°29.7 | 51.8 | 266°23.8 | 40.2 | 14°52.8 | 22.9 | | |
| 17 | 29°52.4 | 64°13.3 | 14.2 | 77°30.2 | 51.3 | 281°26.5 | 40.3 | 29°55.0 | 22.8 | | |
| 18 | 44°54.8 | 79°12.7 | S15°13.2 | 92°30.6 | S18°50.8 | 296°29.3 | N22°40.3 | 44°57.3 | S02°22.7 | | |
| 19 | 59°57.3 | 94°12.1 | 12.2 | 107°31.1 | 50.2 | 311°32.0 | 40.3 | 59°59.5 | 22.6 | | |
| 20 | 74°59.8 | 109°11.5 | 11.2 | 122°31.6 | 49.7 | 326°34.8 | 40.4 | 75°01.7 | 22.5 | | |
| 21 | 90°02.2 | 124°10.8 | • • 10.2 | 137°32.0 | • • 49.2 | 341°37.5 | • • 40.4 | 90°03.9 | • • 22.3 | | |
| 22 | 105°04.7 | 139°10.2 | 09.2 | 152°32.5 | 48.7 | 356°40.2 | 40.5 | 105°06.2 | 22.2 | | |
| 23 | 120°07.2 | 154°09.6 | 08.2 | 167°33.0 | 48.2 | 11°43.0 | 40.5 | 120°08.4 | 22.1 | | |
| Mer.pass. 15:01 | | | | | | | | | | | |
| ν-0.6' d-1.0' m-3.91 | | | | | | | | | | | |
| ν0.5' d-0.5' m1.11 | | | | | | | | | | | |
| ν2.7' d0.0' m-2.61 | | | | | | | | | | | |
| ν2.2' d-0.1' m1.03 | | | | | | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 135°09.6 | 169°09.0 | S15°07.2 | 182°33.4 | S18°47.7 | 26°45.7 | N22°40.5 | 135°10.6 | S02°22.0 | | |
| 1 | 150°12.1 | 184°08.4 | 06.2 | 197°33.9 | 47.1 | 41°48.5 | 40.6 | 150°12.9 | 21.9 | | |
| 2 | 165°14.5 | 199°07.8 | 05.2 | 212°34.4 | 46.6 | 56°51.2 | 40.6 | 165°15.1 | 21.8 | | |
| 3 | 180°17.0 | 214°07.2 | • • 04.2 | 227°34.9 | • • 46.1 | 71°53.9 | • • 40.6 | 180°17.3 | • • 21.7 | | |
| 4 | 195°19.5 | 229°06.6 | 03.2 | 242°35.3 | 45.6 | 86°56.7 | 40.7 | 195°19.6 | 21.6 | | |
| 5 | 210°21.9 | 244°06.0 | 02.1 | 257°35.8 | 45.0 | 101°59.4 | 40.7 | 210°21.8 | 21.5 | | |
| 6 | 225°24.4 | 259°05.4 | S15°01.1 | 272°36.3 | S18°44.5 | 117°02.2 | N22°40.7 | 225°24.0 | S02°21.4 | | |
| 7 | 240°26.9 | 274°04.8 | 15°00.1 | 287°36.7 | 44.0 | 132°04.9 | 40.8 | 240°26.3 | 21.3 | | |
| 8 | 255°29.3 | 289°04.2 | 14°59.1 | 302°37.2 | 43.5 | 147°07.6 | 40.8 | 255°28.5 | 21.2 | | |
| 9 | 270°31.8 | 304°03.5 | • • 58.1 | 317°37.7 | • • 43.0 | 162°10.4 | • • 40.8 | 270°30.7 | • • 21.1 | | |
| 10 | 285°34.3 | 319°02.9 | 57.1 | 332°38.1 | 42.4 | 177°13.1 | 40.9 | 285°33.0 | 21.0 | | |
| 11 | 300°36.7 | 334°02.3 | 56.1 | 347°38.6 | 41.9 | 192°15.8 | 40.9 | 300°35.2 | 20.9 | | |
| 12 | 315°39.2 | 349°01.7 | S14°55.0 | 2°39.1 | S18°41.4 | 207°18.6 | N22°41.0 | 315°37.4 | S02°20.7 | | |
| 13 | 330°41.7 | 4°01.1 | 54.0 | 17°39.6 | 40.9 | 222°21.3 | 41.0 | 330°39.6 | 20.6 | | |
| 14 | 345°44.1 | 19°00.5 | 53.0 | 32°40.0 | 40.3 | 237°24.1 | 41.0 | 345°41.9 | 20.5 | | |
| 15 | 0°46.6 | 33°59.9 | • • 52.0 | 47°40.5 | • • 39.8 | 252°26.8 | • • 41.1 | 0°44.1 | • • 20.4 | | |
| 16 | 15°49.0 | 48°59.3 | 51.0 | 62°41.0 | 39.3 | 267°29.5 | 41.1 | 15°46.3 | 20.3 | | |
| 17 | 30°51.5 | 63°58.7 | 49.9 | 77°41.4 | 38.8 | 282°32.3 | 41.1 | 30°48.6 | 20.2 | | |
| 18 | 45°54.0 | 78°58.1 | S14°48.9 | 92°41.9 | S18°38.2 | 297°35.0 | N22°41.2 | 45°50.8 | S02°20.1 | | |
| 19 | 60°56.4 | 93°57.5 | 47.9 | 107°42.4 | 37.7 | 312°37.7 | 41.2 | 60°53.0 | 20.0 | | |
| 20 | 75°58.9 | 108°56.9 | 46.9 | 122°42.8 | 37.2 | 327°40.5 | 41.2 | 75°55.3 | 19.9 | | |
| 21 | 91°01.4 | 123°56.3 | • • 45.9 | 137°43.3 | • • 36.6 | 342°43.2 | • • 41.3 | 90°57.5 | • • 19.8 | | |
| 22 | 106°03.8 | 138°55.7 | 44.8 | 152°43.8 | 36.1 | 357°45.9 | 41.3 | 105°59.7 | 19.7 | | |
| 23 | 121°06.3 | 153°55.1 | 43.8 | 167°44.3 | 35.6 | 12°48.7 | 41.3 | 121°01.9 | 19.6 | | |
| Mer.pass. 14:57 | | | | | | | | | | | |
| ν-0.6' d-1.0' m-3.91 | | | | | | | | | | | |
| ν0.5' d-0.5' m1.11 | | | | | | | | | | | |
| ν2.7' d0.0' m-2.60 | | | | | | | | | | | |
| ν2.2' d-0.1' m1.03 | | | | | | | | | | | |

| Stars | | |
|---------------------|-----------|-----------|
| | SHA | Dec |
| Alpheratz | 357° 34.1 | 29° 14.2 |
| Ankaa | 353° 06.5 | -42° 10.0 |
| Schedar | 349° 30.3 | 56° 41.1 |
| Diphda | 348° 46.6 | -17° 50.7 |
| Achernar | 335° 19.7 | -57° 06.5 |
| Hamal | 327° 50.2 | 23° 35.2 |
| Polaris | 313° 32.1 | 89° 22.8 |
| Acamar | 315° 11.1 | -40° 12.2 |
| Menkar | 314° 05.2 | 4° 11.5 |
| Mirfak | 308° 26.9 | 49° 57.4 |
| Aldebaran | 290° 38.4 | 16° 33.7 |
| Rigel | 281° 02.8 | -8° 10.4 |
| Capella | 280° 20.3 | 46° 01.6 |
| Bellatrix | 278° 21.7 | 6° 22.4 |
| Elnath | 278° 00.5 | 28° 37.8 |
| Alnilam | 275° 36.6 | -1° 11.2 |
| Betelgeuse | 270° 50.9 | 7° 24.7 |
| Canopus | 263° 51.6 | -52° 42.7 |
| Sirius | 258° 25.1 | -16° 45.2 |
| Adhara | 255° 04.8 | -29° 00.6 |
| Procyon | 244° 49.6 | 5° 09.4 |
| Pollux | 243° 15.8 | 27° 57.7 |
| Avior | 234° 13.7 | -59° 35.6 |
| Suhail | 222° 45.2 | -43° 32.3 |
| Miaplacidus | 221° 37.2 | -69° 49.4 |
| Alphard | 217° 46.5 | -8° 46.4 |
| Regulus | 207° 33.2 | 11° 50.2 |
| Dubhe | 193° 39.3 | 61° 36.4 |
| Denebola | 182° 23.8 | 14° 25.4 |
| Gienah | 175° 42.4 | -17° 41.3 |
| Acrux | 172° 58.7 | -63° 14.5 |
| Gacrux | 171° 50.3 | -57° 15.4 |
| Alioth | 166° 11.9 | 55° 48.7 |
| Spica | 158° 21.2 | -11° 17.9 |
| Alkaid | 152° 51.1 | 49° 10.6 |
| Hadar | 148° 34.6 | -60° 29.7 |
| Menkent | 147° 56.5 | -36° 29.8 |
| Arcturus | 145° 47.0 | 19° 02.5 |
| Rigel Kent. | 139° 39.0 | -60° 56.4 |
| Kochab | 137° 19.8 | 74° 02.4 |
| Zuben'ubi | 136° 55.0 | -16° 09.1 |
| Alphecca | 126° 03.0 | 26° 37.3 |
| Antares | 112° 14.9 | -26° 29.4 |
| Atria | 107° 08.6 | -69° 04.2 |
| Sabik | 102° 01.9 | -15° 45.5 |
| Shaula | 96° 09.4 | -37° 07.3 |
| Rasalhague | 95° 57.9 | 12° 32.3 |
| Eltanin | 90° 42.1 | 51° 28.8 |
| Kaus Aust. | 83° 31.6 | -34° 22.3 |
| Vega | 80° 33.0 | 38° 48.2 |
| Nunki | 75° 47.0 | -26° 15.9 |
| Altair | 61° 59.4 | 8° 56.1 |
| Peacock | 53° 04.9 | -56° 39.9 |
| Deneb | 49° 25.7 | 45° 22.3 |
| Enif | 33° 38.2 | 9° 59.6 |
| Al Na'ir | 27° 32.2 | -46° 50.2 |
| Fomalhaut | 15° 13.8 | -29° 29.2 |
| Scheat | 13° 44.6 | 28° 13.5 |
| Markab | 13° 29.3 | 15° 20.7 |
| | | |
| Feb 03 Tue | SHA | Mer.pass |
| Venus | 36° 27.5 | 12:42 |
| Mars | 48° 59.8 | 11:51 |
| Jupiter | 251° 22.6 | 22:18 |
| Saturn | 0° 12.1 | 15:04 |
| | | |
| Feb 04 Wed | SHA | Mer.pass |
| Venus | 35° 13.3 | 12:43 |
| Mars | 48° 11.8 | 11:50 |
| Jupiter | 251° 29.4 | 22:13 |
| Saturn | 0° 06.6 | 15:01 |
| | | |
| Feb 05 Thu | SHA | Mer.pass |
| Venus | 33° 59.4 | 12:44 |
| Mars | 47° 23.8 | 11:49 |
| Jupiter | 251° 36.1 | 22:09 |
| Saturn | 0° 01.0 | 14:57 |
| | | |
| Horizontal parallax | | |
| Venus: | | 0.1 |
| Mars: | | 0.1 |

| h | Sun | | | Moon | | | | |
|------------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| Tue | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 176°34.2 | S16°34.9 | | 342°35.1 | 11.5' | N13°04.5 | -14.8' | 58.3' |
| 1 | 191°34.1 | 34.2 | | 357°05.6 | 11.6' | 12°49.7 | -14.9' | 58.2' |
| 2 | 206°34.0 | 33.4 | | 11°36.1 | 11.7' | 12°34.8 | -14.9' | 58.2' |
| 3 | 221°34.0 | · · 32.7 | | 26°06.8 | 11.8' | 12°19.9 | -15.0' | 58.2' |
| 4 | 236°33.9 | 32.0 | | 40°37.6 | 11.9' | 12°04.9 | -15.0' | 58.1' |
| 5 | 251°33.8 | 31.2 | | 55°08.5 | 12.0' | 11°49.8 | -15.1' | 58.1' |
| 6 | 266°33.8 | S16°30.5 | | 69°39.4 | 12.1' | N11°34.8 | -15.1' | 58.1' |
| 7 | 281°33.7 | 29.8 | | 84°10.5 | 12.1' | 11°19.7 | -15.2' | 58.1' |
| 8 | 296°33.6 | 29.0 | | 98°41.6 | 12.2' | 11°04.5 | -15.2' | 58.0' |
| 9 | 311°33.6 | · · 28.3 | | 113°12.9 | 12.3' | 10°49.3 | -15.2' | 58.0' |
| 10 | 326°33.5 | 27.6 | | 127°44.2 | 12.4' | 10°34.1 | -15.3' | 58.0' |
| 11 | 341°33.4 | 26.8 | | 142°15.6 | 12.5' | 10°18.8 | -15.3' | 57.9' |
| 12 | 356°33.4 | S16°26.1 | | 156°47.1 | 12.6' | N10°03.5 | -15.3' | 57.9' |
| 13 | 11°33.3 | 25.3 | | 171°18.6 | 12.7' | 09°48.2 | -15.3' | 57.9' |
| 14 | 26°33.3 | 24.6 | | 185°50.3 | 12.7' | 09°32.9 | -15.4' | 57.8' |
| 15 | 41°33.2 | · · 23.9 | | 200°22.0 | 12.8' | 09°17.5 | -15.4' | 57.8' |
| 16 | 56°33.1 | 23.1 | | 214°53.9 | 12.9' | 09°02.1 | -15.4' | 57.8' |
| 17 | 71°33.1 | 22.4 | | 229°25.8 | 13.0' | 08°46.7 | -15.5' | 57.7' |
| 18 | 86°33.0 | S16°21.6 | | 243°57.7 | 13.1' | N08°31.2 | -15.5' | 57.7' |
| 19 | 101°32.9 | 20.9 | | 258°29.8 | 13.1' | 08°15.7 | -15.5' | 57.7' |
| 20 | 116°32.9 | 20.1 | | 273°01.9 | 13.2' | 08°00.3 | -15.5' | 57.6' |
| 21 | 131°32.8 | · · 19.4 | | 287°34.1 | 13.3' | 07°44.7 | -15.5' | 57.6' |
| 22 | 146°32.8 | 18.7 | | 302°06.4 | 13.3' | 07°29.2 | -15.5' | 57.6' |
| 23 | 161°32.7 | 17.9 | | 316°38.7 | 13.4' | 07°13.7 | -15.6' | 57.6' |
| SD = 16.2' $d = -0.7'$ | | | SD = 15.9' | | | | | |
| Wed | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 176°32.6 | S16°17.2 | | 331°11.2 | 13.5' | N06°58.1 | -15.6' | 57.5' |
| 1 | 191°32.6 | 16.4 | | 345°43.6 | 13.6' | 06°42.5 | -15.6' | 57.5' |
| 2 | 206°32.5 | 15.7 | | 0°16.2 | 13.6' | 06°27.0 | -15.6' | 57.5' |
| 3 | 221°32.5 | · · 14.9 | | 14°48.8 | 13.7' | 06°11.4 | -15.6' | 57.4' |
| 4 | 236°32.4 | 14.2 | | 29°21.5 | 13.8' | 05°55.8 | -15.6' | 57.4' |
| 5 | 251°32.3 | 13.4 | | 43°54.3 | 13.8' | 05°40.1 | -15.6' | 57.4' |
| 6 | 266°32.3 | S16°12.7 | | 58°27.1 | 13.9' | N05°24.5 | -15.6' | 57.3' |
| 7 | 281°32.2 | 12.0 | | 72°59.9 | 13.9' | 05°08.9 | -15.6' | 57.3' |
| 8 | 296°32.2 | 11.2 | | 87°32.9 | 14.0' | 04°53.3 | -15.6' | 57.3' |
| 9 | 311°32.1 | · · 10.5 | | 102°05.9 | 14.1' | 04°37.6 | -15.6' | 57.2' |
| 10 | 326°32.1 | 09.7 | | 116°38.9 | 14.1' | 04°22.0 | -15.6' | 57.2' |
| 11 | 341°32.0 | 09.0 | | 131°12.0 | 14.2' | 04°06.4 | -15.6' | 57.2' |
| 12 | 356°31.9 | S16°08.2 | | 145°45.2 | 14.2' | N03°50.8 | -15.6' | 57.1' |
| 13 | 11°31.9 | 07.5 | | 160°18.4 | 14.3' | 03°35.1 | -15.6' | 57.1' |
| 14 | 26°31.8 | 06.7 | | 174°51.7 | 14.3' | 03°19.5 | -15.6' | 57.1' |
| 15 | 41°31.8 | · · 05.9 | | 189°25.0 | 14.4' | 03°03.9 | -15.6' | 57.0' |
| 16 | 56°31.7 | 05.2 | | 203°58.4 | 14.4' | 02°48.3 | -15.6' | 57.0' |
| 17 | 71°31.7 | 04.4 | | 218°31.8 | 14.5' | 02°32.7 | -15.6' | 57.0' |
| 18 | 86°31.6 | S16°03.7 | | 233°05.3 | 14.5' | N02°17.1 | -15.6' | 56.9' |
| 19 | 101°31.6 | 02.9 | | 247°38.8 | 14.6' | 02°01.5 | -15.6' | 56.9' |
| 20 | 116°31.5 | 02.2 | | 262°12.3 | 14.6' | 01°45.9 | -15.6' | 56.9' |
| 21 | 131°31.5 | · · 01.4 | | 276°45.9 | 14.6' | 01°30.3 | -15.6' | 56.8' |
| 22 | 146°31.4 | 16°00.7 | | 291°19.6 | 14.7' | 01°14.8 | -15.5' | 56.8' |
| 23 | 161°31.4 | 15°59.9 | | 305°53.3 | 14.7' | 00°59.2 | -15.5' | 56.8' |
| SD = 16.2' $d = -0.7'$ | | | SD = 15.7' | | | | | |
| Thu | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 176°31.3 | S15°59.2 | | 320°27.0 | 14.8' | N00°43.7 | -15.5' | 56.7' |
| 1 | 191°31.2 | 58.4 | | 335°00.7 | 14.8' | 00°28.2 | -15.5' | 56.7' |
| 2 | 206°31.2 | 57.6 | | 349°34.6 | 14.8' | N00°12.7 | -15.5' | 56.7' |
| 3 | 221°31.1 | · · 56.9 | | 4°08.4 | 14.9' | S00°02.8 | 15.5' | 56.6' |
| 4 | 236°31.1 | 56.1 | | 18°42.3 | 14.9' | 00°18.2 | 15.4' | 56.6' |
| 5 | 251°31.0 | 55.4 | | 33°16.2 | 14.9' | 00°33.7 | 15.4' | 56.6' |
| 6 | 266°31.0 | S15°54.6 | | 47°50.1 | 15.0' | S00°49.1 | 15.4' | 56.5' |
| 7 | 281°30.9 | 53.9 | | 62°24.1 | 15.0' | 01°04.5 | 15.4' | 56.5' |
| 8 | 296°30.9 | 53.1 | | 76°58.1 | 15.0' | 01°19.8 | 15.3' | 56.5' |
| 9 | 311°30.8 | · · 52.3 | | 91°32.1 | 15.1' | 01°35.2 | 15.3' | 56.4' |
| 10 | 326°30.8 | 51.6 | | 106°06.1 | 15.1' | 01°50.5 | 15.3' | 56.4' |
| 11 | 341°30.8 | 50.8 | | 120°40.2 | 15.1' | 02°05.8 | 15.3' | 56.4' |
| 12 | 356°30.7 | S15°50.1 | | 135°14.3 | 15.1' | S02°21.1 | 15.2' | 56.4' |
| 13 | 11°30.7 | 49.3 | | 149°48.5 | 15.2' | 02°36.3 | 15.2' | 56.3' |
| 14 | 26°30.6 | 48.5 | | 164°22.6 | 15.2' | 02°51.5 | 15.2' | 56.3' |
| 15 | 41°30.6 | · · 47.8 | | 178°56.8 | 15.2' | 03°06.7 | 15.2' | 56.3' |
| 16 | 56°30.5 | 47.0 | | 193°31.0 | 15.2' | 03°21.9 | 15.1' | 56.2' |
| 17 | 71°30.5 | 46.2 | | 208°05.2 | 15.2' | 03°37.0 | 15.1' | 56.2' |
| 18 | 86°30.4 | S15°45.5 | | 222°39.4 | 15.2' | S03°52.1 | 15.1' | 56.2' |
| 19 | 101°30.4 | 44.7 | | 237°13.7 | 15.3' | 04°07.1 | 15.0' | 56.1' |
| 20 | 116°30.3 | 43.9 | | 251°47.9 | 15.3' | 04°22.1 | 15.0' | 56.1' |
| 21 | 131°30.3 | · · 43.2 | | 266°22.2 | 15.3' | 04°37.1 | 14.9' | 56.1' |
| 22 | 146°30.2 | 42.4 | | 280°56.5 | 15.3' | 04°52.1 | 14.9' | 56.0' |
| 23 | 161°30.2 | 41.6 | | 295°30.8 | 15.3' | 05°07.0 | 14.9' | 56.0' |
| SD = 16.2' $d = -0.8'$ | | | SD = 15.5' | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 06:59 | 08:25 | 10:04 | 14:25 | 16:04 | 17:31 |
| N 70° | 06:52 | 08:08 | 09:29 | 15:00 | 16:21 | 17:37 |
| 68° | 06:46 | 07:55 | 09:04 | 15:24 | 16:34 | 17:43 |
| 66° | 06:42 | 07:44 | 08:46 | 15:43 | 16:45 | 17:47 |
| 64° | 06:37 | 07:35 | 08:30 | 15:59 | 16:54 | 17:52 |
| 62° | 06:33 | 07:27 | 08:17 | 16:11 | 17:02 | 17:55 |
| 60° | 06:30 | 07:20 | 08:07 | 16:22 | 17:08 | 17:59 |
| N 58° | 06:27 | 07:14 | 07:57 | 16:31 | 17:15 | 18:02 |
| 56° | 06:24 | 07:08 | 07:49 | 16:39 | 17:20 | 18:05 |
| 54° | 06:21 | 07:03 | 07:42 | 16:47 | 17:25 | 18:07 |
| 52° | 06:19 | 06:59 | 07:35 | 16:53 | 17:30 | 18:10 |
| 50° | 06:16 | 06:55 | 07:29 | 16:59 | 17:34 | 18:12 |
| 45° | 06:10 | 06:45 | 07:16 | 17:12 | 17:43 | 18:18 |
| N 40° | 06:05 | 06:37 | 07:06 | 17:23 | 17:51 | 18:23 |
| 35° | 06:00 | 06:30 | 06:56 | 17:32 | 17:58 | 18:28 |
| 30° | 05:55 | 06:24 | 06:48 | 17:40 | 18:05 | 18:33 |
| 20° | 05:45 | 06:12 | 06:34 | 17:54 | 18:16 | 18:43 |
| N 10° | 05:35 | 06:00 | 06:22 | 18:06 | 18:28 | 18:53 |
| 0° | 05:24 | 05:49 | 06:10 | 18:17 | 18:39 | 19:04 |
| S 10° | 05:11 | 05:37 | 05:59 | 18:29 | 18:51 | 19:17 |
| 20° | 04:55 | 05:23 | 05:46 | 18:42 | 19:05 | 19:32 |
| 30° | 04:35 | 05:06 | 05:31 | 18:56 | 19:22 | 19:52 |
| 35° | 04:22 | 04:55 | 05:23 | 19:05 | 19:32 | 20:05 |
| 40° | 04:07 | 04:43 | 05:13 | 19:14 | 19:44 | 20:20 |
| 45° | 03:47 | 04:28 | 05:01 | 19:26 | 19:59 | 20:39 |
| S 50° | 03:21 | 04:09 | 04:47 | 19:40 | 20:17 | 21:05 |
| 52° | 03:08 | 04:01 | 04:40 | 19:46 | 20:26 | 21:18 |
| 54° | 02:53 | 03:50 | 04:33 | 19:54 | 20:36 | 21:33 |
| 56° | 02:34 | 03:39 | 04:25 | 20:02 | 20:47 | 21:51 |
| 58° | 02:09 | 03:25 | 04:15 | 20:11 | 21:01 | 22:14 |
| S 60° | 01:35 | 03:09 | 04:05 | 20:21 | 21:16 | 22:47 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | 17:56 | 20:12 | 22:20 | 09:47 | 09:07 | 08:33 |
| N 70° | 18:09 | 20:14 | 22:13 | 09:31 | 09:01 | 08:35 |
| 68° | 18:20 | 20:16 | 22:07 | 09:18 | 08:57 | 08:37 |
| 66° | 18:29 | 20:18 | 22:02 | 09:07 | 08:52 | 08:39 |
| 64° | 18:36 | 20:19 | 21:57 | 08:58 | 08:49 | 08:40 |
| 62° | 18:43 | 20:20 | 21:54 | 08:50 | 08:46 | 08:41 |
| 60° | 18:48 | 20:21 | 21:51 | 08:43 | 08:43 | 08:42 |
| N 58° | 18:53 | 20:22 | 21:48 | 08:37 | 08:40 | 08:43 |
| 56° | 18:57 | 20:23 | 21:45 | 08:32 | 08:38 | 08:44 |
| 54° | 19:01 | 20:24 | 21:43 | 08:27 | 08:36 | 08:44 |
| 52° | 19:04 | 20:24 | 21:41 | 08:23 | 08:34 | 08:45 |
| 50° | 19:07 | 20:25 | 21:39 | 08:18 | 08:33 | 08:45 |
| 45° | 19:14 | 20:26 | 21:35 | 08:10 | 08:29 | 08:47 |
| N 40° | 19:20 | 20:27 | 21:32 | 08:02 | 08:26 | 08:48 |
| 35° | 19:24 | 20:28 | 21:29 | 07:56 | 08:23 | 08:49 |
| 30° | 19:29 | 20:29 | 21:27 | 07:50 | 08:21 | 08:49 |
| 20° | 19:36 | 20:30 | 21:23 | 07:40 | 08:17 | 08:51 |
| N 10° | 19:42 | 20:31 | 21:19 | 07:32 | 08:13 | 08:52 |
| 0° | 19:48 | 20:33 | 21:15 | 07:23 | 08:10 | 08:53 |
| S 10° | 19:54 | 20:34 | 21:12 | 07:15 | 08:06 | 08:54 |
| 20° | 20:00 | 20:35 | 21:08 | 07:06 | 08:02 | 08:56 |
| 30° | 20:07 | 20:37 | 21:04 | 06:56 | 07:58 | 08:57 |
| 35° | 20:11 | 20:37 | 21:02 | 06:50 | 07:55 | 08:58 |
| 40° | 20:16 | 20:38 | 21:00 | 06:43 | 07:52 | 08:59 |
| 45° | 20:21 | 20:39 | 20:57 | 06:35 | 07:49 | 09:00 |
| S 50° | 20:28 | 20:41 | 20:53 | 06:25 | 07:45 | 09:01 |
| 52° | 20:30 | 20:41 | 20:51 | 06:21 | 07:43 | 09:01 |
| 54° | 20:34 | 20:42 | 20:50 | 06:16 | 07:41 | 09:02 |
| 56° | 20:37 | 20:43 | 20:48 | 06:10 | 07:39 | 09:03 |
| 58° | 20:41 | 20:43 | 20:46 | 06:04 | 07:36 | 09:03 |
| S 60° | 20:45 | 20:44 | 20:43 | 05:57 | 07:33 | 09:04 |

| Day | Sun | | Mer. Pass hh:mm | Moon | | Age 16-18 99-89% |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|---|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 03 | 13:43 | 13:46 | 12:14 | 01:12 | 13:36 |  |
| 04 | 13:49 | 13:52 | 12:14 | 01:59 | 14:21 | |
| 05 | 13:55 | 13:57 | 12:14 | 02:43 | 15:04 | |

February 06, 07, 08 UT (Fri., Sat., Sun.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|---------|-----|-----|--------|-----|-----|
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 136°08.8 | 168°54.5 | S14°42.8 | 182°44.7 | S18°35.1 | 27°51.4 | N22°41.4 | 136°04.2 | S02°19.5 | | | | | | |
| 1 | 151°11.2 | 183°53.9 | 41.8 | 197°45.2 | 34.5 | 42°54.1 | 41.4 | 151°06.4 | 19.4 | | | | | | |
| 2 | 166°13.7 | 198°53.3 | 40.7 | 212°45.7 | 34.0 | 57°56.9 | 41.5 | 166°08.6 | 19.3 | | | | | | |
| 3 | 181°16.1 | 213°52.7 | · · 39.7 | 227°46.2 | · · 33.5 | 72°59.6 | · · 41.5 | 181°10.9 | · · 19.1 | | | | | | |
| 4 | 196°18.6 | 228°52.1 | 38.7 | 242°46.6 | 32.9 | 88°02.3 | 41.5 | 196°13.1 | 19.0 | | | | | | |
| 5 | 211°21.1 | 243°51.6 | 37.6 | 257°47.1 | 32.4 | 103°05.1 | 41.6 | 211°15.3 | 18.9 | | | | | | |
| 6 | 226°23.5 | 258°51.0 | S14°36.6 | 272°47.6 | S18°31.9 | 118°07.8 | N22°41.6 | 226°17.5 | S02°18.8 | | | | | | |
| 7 | 241°26.0 | 273°50.4 | 35.6 | 287°48.0 | 31.3 | 133°10.5 | 41.6 | 241°19.8 | 18.7 | | | | | | |
| 8 | 256°28.5 | 288°49.8 | 34.6 | 302°48.5 | 30.8 | 148°13.3 | 41.7 | 256°22.0 | 18.6 | | | | | | |
| 9 | 271°30.9 | 303°49.2 | · · 33.5 | 317°49.0 | · · 30.3 | 163°16.0 | · · 41.7 | 271°24.2 | · · 18.5 | | | | | | |
| 10 | 286°33.4 | 318°48.6 | 32.5 | 332°49.5 | 29.7 | 178°18.7 | 41.7 | 286°26.5 | 18.4 | | | | | | |
| 11 | 301°35.9 | 333°48.0 | 31.5 | 347°49.9 | 29.2 | 193°21.5 | 41.8 | 301°28.7 | 18.3 | | | | | | |
| 12 | 316°38.3 | 348°47.4 | S14°30.4 | 2°50.4 | S18°28.7 | 208°24.2 | N22°41.8 | 316°30.9 | S02°18.2 | | | | | | |
| 13 | 331°40.8 | 3°46.8 | 29.4 | 17°50.9 | 28.2 | 223°26.9 | 41.8 | 331°33.1 | 18.1 | | | | | | |
| 14 | 346°43.3 | 18°46.2 | 28.4 | 32°51.4 | 27.6 | 238°29.6 | 41.9 | 346°35.4 | 18.0 | | | | | | |
| 15 | 1°45.7 | 33°45.6 | · · 27.3 | 47°51.8 | · · 27.1 | 253°32.4 | · · 41.9 | 1°37.6 | · · 17.9 | | | | | | |
| 16 | 16°48.2 | 48°45.0 | 26.3 | 62°52.3 | 26.5 | 268°35.1 | 41.9 | 16°39.8 | 17.7 | | | | | | |
| 17 | 31°50.6 | 63°44.5 | 25.2 | 77°52.8 | 26.0 | 283°37.8 | 42.0 | 31°42.1 | 17.6 | | | | | | |
| 18 | 46°53.1 | 78°43.9 | S14°24.2 | 92°53.3 | S18°25.5 | 298°40.6 | N22°42.0 | 46°44.3 | S02°17.5 | | | | | | |
| 19 | 61°55.6 | 93°43.3 | 23.2 | 107°53.7 | 24.9 | 313°43.3 | 42.0 | 61°46.5 | 17.4 | | | | | | |
| 20 | 76°58.0 | 108°42.7 | 22.1 | 122°54.2 | 24.4 | 328°46.0 | 42.1 | 76°48.7 | 17.3 | | | | | | |
| 21 | 92°00.5 | 123°42.1 | · · 21.1 | 137°54.7 | · · 23.9 | 343°48.7 | · · 42.1 | 91°51.0 | · · 17.2 | | | | | | |
| 22 | 107°03.0 | 138°41.5 | 20.1 | 152°55.2 | 23.3 | 358°51.5 | 42.2 | 106°53.2 | 17.1 | | | | | | |
| 23 | 122°05.4 | 153°40.9 | 19.0 | 167°55.6 | 22.8 | 13°54.2 | 42.2 | 121°55.4 | 17.0 | | | | | | |
| Mer.pass. | 14:53 | ν-0.6' d-1.0' m-3.91 | | ν0.5' d-0.5' m1.11 | | ν2.7' d0.0' m-2.60 | | ν2.2' d-0.1' m1.02 | | | | | | | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 137°07.9 | 168°40.4 | S14°18.0 | 182°56.1 | S18°22.3 | 28°56.9 | N22°42.2 | 136°57.6 | S02°16.9 | | | | | | |
| 1 | 152°10.4 | 183°39.8 | 16.9 | 197°56.6 | 21.7 | 43°59.7 | 42.3 | 151°59.9 | 16.8 | | | | | | |
| 2 | 167°12.8 | 198°39.2 | 15.9 | 212°57.1 | 21.2 | 59°02.4 | 42.3 | 167°02.1 | 16.7 | | | | | | |
| 3 | 182°15.3 | 213°38.6 | · · 14.8 | 227°57.6 | · · 20.6 | 74°05.1 | · · 42.3 | 182°04.3 | · · 16.6 | | | | | | |
| 4 | 197°17.8 | 228°38.0 | 13.8 | 242°58.0 | 20.1 | 89°07.8 | 42.4 | 197°06.6 | 16.5 | | | | | | |
| 5 | 212°20.2 | 243°37.4 | 12.7 | 257°58.5 | 19.6 | 104°10.6 | 42.4 | 212°08.8 | 16.3 | | | | | | |
| 6 | 227°22.7 | 258°36.9 | S14°11.7 | 272°59.0 | S18°19.0 | 119°13.3 | N22°42.4 | 227°11.0 | S02°16.2 | | | | | | |
| 7 | 242°25.1 | 273°36.3 | 10.7 | 287°59.5 | 18.5 | 134°16.0 | 42.5 | 242°13.2 | 16.1 | | | | | | |
| 8 | 257°27.6 | 288°35.7 | 09.6 | 302°59.9 | 18.0 | 149°18.7 | 42.5 | 257°15.5 | 16.0 | | | | | | |
| 9 | 272°30.1 | 303°35.1 | · · 08.6 | 318°00.4 | · · 17.4 | 164°21.5 | · · 42.5 | 272°17.7 | · · 15.9 | | | | | | |
| 10 | 287°32.5 | 318°34.5 | 07.5 | 333°00.9 | 16.9 | 179°24.2 | 42.6 | 287°19.9 | 15.8 | | | | | | |
| 11 | 302°35.0 | 333°33.9 | 06.5 | 348°01.4 | 16.3 | 194°26.9 | 42.6 | 302°22.1 | 15.7 | | | | | | |
| 12 | 317°37.5 | 348°33.4 | S14°05.4 | 3°01.9 | S18°15.8 | 209°29.6 | N22°42.6 | 317°24.4 | S02°15.6 | | | | | | |
| 13 | 332°39.9 | 3°32.8 | 04.4 | 18°02.3 | 15.2 | 224°32.4 | 42.7 | 332°26.6 | 15.5 | | | | | | |
| 14 | 347°42.4 | 18°32.2 | 03.3 | 33°02.8 | 14.7 | 239°35.1 | 42.7 | 347°28.8 | 15.4 | | | | | | |
| 15 | 2°44.9 | 33°31.6 | · · 02.3 | 48°03.3 | · · 14.2 | 254°37.8 | · · 42.7 | 2°31.0 | · · 15.3 | | | | | | |
| 16 | 17°47.3 | 48°31.1 | 01.2 | 63°03.8 | 13.6 | 269°40.5 | 42.8 | 17°33.3 | 15.2 | | | | | | |
| 17 | 32°49.8 | 63°30.5 | 14°00.2 | 78°04.2 | 13.1 | 284°43.3 | 42.8 | 32°35.5 | 15.0 | | | | | | |
| 18 | 47°52.2 | 78°29.9 | S13°59.1 | 93°04.7 | S18°12.5 | 299°46.0 | N22°42.8 | 47°37.7 | S02°14.9 | | | | | | |
| 19 | 62°54.7 | 93°29.3 | 58.0 | 108°05.2 | 12.0 | 314°48.7 | 42.9 | 62°39.9 | 14.8 | | | | | | |
| 20 | 77°57.2 | 108°28.8 | 57.0 | 123°05.7 | 11.4 | 329°51.4 | 42.9 | 77°42.2 | 14.7 | | | | | | |
| 21 | 92°59.6 | 123°28.2 | · · 55.9 | 138°06.2 | · · 10.9 | 344°54.1 | · · 42.9 | 92°44.4 | · · 14.6 | | | | | | |
| 22 | 108°02.1 | 138°27.6 | 54.9 | 153°06.6 | 10.4 | 359°56.9 | 43.0 | 107°46.6 | 14.5 | | | | | | |
| 23 | 123°04.6 | 153°27.0 | 53.8 | 168°07.1 | 09.8 | 14°59.6 | 43.0 | 122°48.8 | 14.4 | | | | | | |
| Mer.pass. | 14:49 | ν-0.6' d-1.0' m-3.91 | | ν0.5' d-0.5' m1.12 | | ν2.7' d0.0' m-2.59 | | ν2.2' d-0.1' m1.02 | | | | | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 138°07.0 | 168°26.5 | S13°52.8 | 183°07.6 | S18°09.3 | 30°02.3 | N22°43.0 | 137°51.1 | S02°14.3 | | | | | | |
| 1 | 153°09.5 | 183°25.9 | 51.7 | 198°08.1 | 08.7 | 45°05.0 | 43.1 | 152°53.3 | 14.2 | | | | | | |
| 2 | 168°12.0 | 198°25.3 | 50.6 | 213°08.6 | 08.2 | 60°07.7 | 43.1 | 167°55.5 | 14.1 | | | | | | |
| 3 | 183°14.4 | 213°24.7 | · · 49.6 | 228°09.0 | · · 07.6 | 75°10.5 | · · 43.1 | 182°57.7 | · · 14.0 | | | | | | |
| 4 | 198°16.9 | 228°24.2 | 48.5 | 243°09.5 | 07.1 | 90°13.2 | 43.2 | 198°00.0 | 13.9 | | | | | | |
| 5 | 213°19.4 | 243°23.6 | 47.5 | 258°10.0 | 06.5 | 105°15.9 | 43.2 | 213°02.2 | 13.7 | | | | | | |
| 6 | 228°21.8 | 258°23.0 | S13°46.4 | 273°10.5 | S18°06.0 | 120°18.6 | N22°43.2 | 228°04.4 | S02°13.6 | | | | | | |
| 7 | 243°24.3 | 273°22.5 | 45.3 | 288°11.0 | 05.4 | 135°21.3 | 43.3 | 243°06.6 | 13.5 | | | | | | |
| 8 | 258°26.7 | 288°21.9 | 44.3 | 303°11.5 | 04.9 | 150°24.1 | 43.3 | 258°08.9 | 13.4 | | | | | | |
| 9 | 273°29.2 | 303°21.3 | · · 43.2 | 318°11.9 | · · 04.3 | 165°26.8 | · · 43.3 | 273°11.1 | · · 13.3 | | | | | | |
| 10 | 288°31.7 | 318°20.8 | 42.2 | 333°12.4 | 03.8 | 180°29.5 | 43.4 | 288°13.3 | 13.2 | | | | | | |
| 11 | 303°34.1 | 333°20.2 | 41.1 | 348°12.9 | 03.2 | 195°32.2 | 43.4 | 303°15.5 | 13.1 | | | | | | |
| 12 | 318°36.6 | 348°19.6 | S13°40.0 | 3°13.4 | S18°02.7 | 210°34.9 | N22°43.4 | 318°17.8 | S02°13.0 | | | | | | |
| 13 | 333°39.1 | 3°19.1 | 39.0 | 18°13.9 | 02.1 | 225°37.7 | 43.5 | 333°20.0 | 12.9 | | | | | | |
| 14 | 348°41.5 | 18°18.5 | 37.9 | 33°14.3 | 01.6 | 240°40.4 | 43.5 | 348°22.2 | 12.8 | | | | | | |
| 15 | 3°44.0 | 33°17.9 | · · 36.8 | 48°14.8 | · · 01.0 | 255°43.1 | · · 43.5 | 3°24.4 | · · 12.7 | | | | | | |
| 16 | 18°46.5 | 48°17.4 | 35.8 | 63°15.3 | 18°00.5 | 270°45.8 | 43.6 | 18°26.7 | 12.5 | | | | | | |
| 17 | 33°48.9 | 63°16.8 | 34.7 | 78°15.8 | 17°59.9 | 285°48.5 | 43.6 | 33°28.9 | 12.4 | | | | | | |
| 18 | 48°51.4 | 78°16.2 | S13°33.6 | 93°16.3 | S17°59.4 | 300°51.2 | N22°43.6 | 48°31.1 | S02°12.3 | | | | | | |
| 19 | 63°53.9 | 93°15.7 | 32.5 | 108°16.8 | 58.8 | 315°53.9 | 43.7 | 63°33.3 | 12.2 | | | | | | |
| 20 | 78°56.3 | 108°15.1 | 31.5 | 123°17.3 | 58.3 | 330°56.7 | 43.7 | 78°35.6 | 12.1 | | | | | | |
| 21 | 93°58.8 | 123°14.5 | · · 30.4 | 138°17.7 | · · 57.7 | 345°59.4 | · · 43.7 | 93°37.8 | · · 12.0 | | | | | | |
| 22 | 109°01.2 | 138°14.0 | 29.3 | 153°18.2 | 57.2 | 1°02.1 | 43.8 | 108°40.0 | 11.9 | | | | | | |
| 23 | 124°03.7 | 153°13.4 | 28.3 | 168°18.7 | 56.6 | 16°04.8 | 43.8 | 123°42.2 | 11.8 | | | | | | |
| Mer.pass. | 14:45 | ν-0.6' d-1.1' m-3.91 | | ν0.5' d-0.5' m1.12 | | ν2.7' d0.0' m-2.59 | | ν2.2' d-0.1' m1.02 | | | | | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°34.1 | 29°14.1 |
| Ankaa | 353°06.5 | -42°10.0 |
| Schedar | 349°30.4 | 56°41.0 |
| Diphda | 348°46.6 | -17°50.7 |
| Achernar | 335°19.7 | -57°06.5 |
| Hamal | 327°50.3 | 23°35.2 |
| Polaris | 313°33.7 | 89°22.8 |
| Acamar | 315°11.1 | -40°12.2 |
| Menkar | 314°05.2 | 4°11.5 |
| Mirfak | 308°26.9 | 49°57.4 |
| Aldebaran | 290°38.4 | 16°33.7 |
| Rigel | 281°02.8 | -8°10.4 |
| Capella | 280°20.3 | 46°01.6 |
| Bellatrix | 278°21.7 | 6°22.4 |
| Elnath | 278°00.5 | 28°37.8 |
| Alnilam | 275°36.6 | -1°11.2 |
| Betelgeuse | 270°50.9 | 7°24.7 |
| Canopus | 263°51.6 | -52°42.7 |
| Sirius | 258°25.2 | -16°45.2 |
| Adhara | 255°04.8 | -29°00.6 |
| Procyon | 244°49.6 | 5°09.4 |
| Pollux | 243°15.8 | 27°57.7 |
| Avior | 234°13.7 | -59°35.7 |
| Suhail | 222°45.2 | -43°32.3 |
| Miaplacidus | 221°37.2 | -69°49.5 |
| Alphard | 217°46.5 | -8°46.4 |
| Regulus | 207°33.2 | 11°50.2 |
| Dubhe | 193°39.3 | 61°36.4 |
| Denebola | 182°23.8 | 14°25.4 |
| Gienah | 175°42.4 | -17°41.3 |
| Acrux | 172°58.7 | -63°14.5 |
| Gacrux | 171°50.3 | -57°15.4 |
| Alioth | 166°11.8 | 55°48.7 |
| Spica | 158°21.2 | -11°17.9 |
| Alkaid | 152°51.1 | 49°10.6 |


| h | Sun | | | Moon | | | | |
|------------------------|----------|----------|------------|----------|-------|----------|-------|-------|
| Fri | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 176°30.2 | S15°40.9 | | 310°05.1 | 15.3' | S05°21.9 | 14.8' | 56.0' |
| 1 | 191°30.1 | 40.1 | | 324°39.4 | 15.3' | 05°36.7 | 14.8' | 56.0' |
| 2 | 206°30.1 | 39.3 | | 339°13.8 | 15.3' | 05°51.5 | 14.8' | 55.9' |
| 3 | 221°30.0 | · · 38.6 | | 353°48.1 | 15.3' | 06°06.3 | 14.7' | 55.9' |
| 4 | 236°30.0 | 37.8 | | 8°22.5 | 15.4' | 06°21.0 | 14.7' | 55.9' |
| 5 | 251°29.9 | 37.0 | | 22°56.8 | 15.4' | 06°35.7 | 14.6' | 55.8' |
| 6 | 266°29.9 | S15°36.3 | | 37°31.2 | 15.4' | S06°50.3 | 14.6' | 55.8' |
| 7 | 281°29.9 | 35.5 | | 52°05.5 | 15.4' | 07°04.9 | 14.5' | 55.8' |
| 8 | 296°29.8 | 34.7 | | 66°39.9 | 15.4' | 07°19.4 | 14.5' | 55.7' |
| 9 | 311°29.8 | · · 33.9 | | 81°14.3 | 15.4' | 07°33.9 | 14.5' | 55.7' |
| 10 | 326°29.7 | 33.2 | | 95°48.6 | 15.4' | 07°48.4 | 14.4' | 55.7' |
| 11 | 341°29.7 | 32.4 | | 110°23.0 | 15.4' | 08°02.8 | 14.4' | 55.7' |
| 12 | 356°29.7 | S15°31.6 | | 124°57.3 | 15.4' | S08°17.1 | 14.3' | 55.6' |
| 13 | 11°29.6 | 30.9 | | 139°31.7 | 15.3' | 08°31.4 | 14.3' | 55.6' |
| 14 | 26°29.6 | 30.1 | | 154°06.0 | 15.3' | 08°45.7 | 14.2' | 55.6' |
| 15 | 41°29.6 | · · 29.3 | | 168°40.4 | 15.3' | 08°59.9 | 14.2' | 55.6' |
| 16 | 56°29.5 | 28.5 | | 183°14.7 | 15.3' | 09°14.1 | 14.1' | 55.5' |
| 17 | 71°29.5 | 27.8 | | 197°49.0 | 15.3' | 09°28.2 | 14.1' | 55.5' |
| 18 | 86°29.4 | S15°27.0 | | 212°23.4 | 15.3' | S09°42.2 | 14.0' | 55.5' |
| 19 | 101°29.4 | 26.2 | | 226°57.7 | 15.3' | 09°56.3 | 14.0' | 55.4' |
| 20 | 116°29.4 | 25.4 | | 241°32.0 | 15.3' | 10°10.2 | 13.9' | 55.4' |
| 21 | 131°29.3 | · · 24.6 | | 256°06.2 | 15.3' | 10°24.1 | 13.8' | 55.4' |
| 22 | 146°29.3 | 23.9 | | 270°40.5 | 15.3' | 10°37.9 | 13.8' | 55.4' |
| 23 | 161°29.3 | 23.1 | | 285°14.8 | 15.2' | 10°51.7 | 13.7' | 55.3' |
| SD = 16.2' $d = -0.8'$ | | | SD = 15.3' | | | | | |

| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 176°29.2 | S15°22.3 | 299°49.0 | 15.2' | S11°05.5 | 13.7' | 55.3' |
| 1 | 191°29.2 | 21.5 | 314°23.2 | 15.2' | 11°19.1 | 13.6' | 55.3' |
| 2 | 206°29.2 | 20.8 | 328°57.5 | 15.2' | 11°32.7 | 13.6' | 55.3' |
| 3 | 221°29.1 | · · 20.0 | 343°31.6 | 15.2' | 11°46.3 | 13.5' | 55.2' |
| 4 | 236°29.1 | 19.2 | 358°05.8 | 15.2' | 11°59.8 | 13.4' | 55.2' |
| 5 | 251°29.0 | 18.4 | 12°40.0 | 15.1' | 12°13.2 | 13.4' | 55.2' |
| 6 | 266°29.0 | S15°17.6 | 27°14.1 | 15.1' | S12°26.6 | 13.3' | 55.2' |
| 7 | 281°29.0 | 16.8 | 41°48.2 | 15.1' | 12°39.9 | 13.3' | 55.1' |
| 8 | 296°29.0 | 16.1 | 56°22.3 | 15.1' | 12°53.2 | 13.2' | 55.1' |
| 9 | 311°28.9 | · · 15.3 | 70°56.4 | 15.0' | 13°06.4 | 13.1' | 55.1' |
| 10 | 326°28.9 | 14.5 | 85°30.4 | 15.0' | 13°19.5 | 13.1' | 55.1' |
| 11 | 341°28.9 | 13.7 | 100°04.4 | 15.0' | 13°32.5 | 13.0' | 55.1' |
| 12 | 356°28.8 | S15°12.9 | 114°38.4 | 15.0' | S13°45.5 | 12.9' | 55.0' |
| 13 | 11°28.8 | 12.1 | 129°12.4 | 14.9' | 13°58.5 | 12.9' | 55.0' |
| 14 | 26°28.8 | 11.4 | 143°46.3 | 14.9' | 14°11.3 | 12.8' | 55.0' |
| 15 | 41°28.7 | · · 10.6 | 158°20.2 | 14.9' | 14°24.1 | 12.7' | 55.0' |
| 16 | 56°28.7 | 09.8 | 172°54.1 | 14.8' | 14°36.8 | 12.7' | 54.9' |
| 17 | 71°28.7 | 09.0 | 187°27.9 | 14.8' | 14°49.5 | 12.6' | 54.9' |
| 18 | 86°28.6 | S15°08.2 | 202°01.7 | 14.8' | S15°02.1 | 12.5' | 54.9' |
| 19 | 101°28.6 | 07.4 | 216°35.5 | 14.7' | 15°14.6 | 12.4' | 54.9' |
| 20 | 116°28.6 | 06.6 | 231°09.3 | 14.7' | 15°27.1 | 12.4' | 54.9' |
| 21 | 131°28.6 | · · 05.9 | 245°43.0 | 14.7' | 15°39.4 | 12.3' | 54.8' |
| 22 | 146°28.5 | 05.1 | 260°16.6 | 14.6' | 15°51.7 | 12.2' | 54.8' |
| 23 | 161°28.5 | 04.3 | 274°50.3 | 14.6' | 16°04.0 | 12.2' | 54.8' |
| SD = 16.2' $d = -0.8'$ | | | SD = 15.1' | | | | |

| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 176°28.5 | S15°03.5 | 289°23.9 | 14.6' | S16°16.1 | 12.1' | 54.8' |
| 1 | 191°28.4 | 02.7 | 303°57.5 | 14.5' | 16°28.2 | 12.0' | 54.8' |
| 2 | 206°28.4 | 01.9 | 318°31.0 | 14.5' | 16°40.2 | 11.9' | 54.7' |
| 3 | 221°28.4 | · · 01.1 | 333°04.5 | 14.4' | 16°52.1 | 11.9' | 54.7' |
| 4 | 236°28.4 | 15°00.3 | 347°37.9 | 14.4' | 17°04.0 | 11.8' | 54.7' |
| 5 | 251°28.3 | 14°59.5 | 2°11.3 | 14.4' | 17°15.8 | 11.7' | 54.7' |
| 6 | 266°28.3 | S14°58.7 | 16°44.7 | 14.3' | S17°27.5 | 11.6' | 54.7' |
| 7 | 281°28.3 | 58.0 | 31°18.0 | 14.3' | 17°39.1 | 11.5' | 54.6' |
| 8 | 296°28.3 | 57.2 | 45°51.3 | 14.2' | 17°50.6 | 11.5' | 54.6' |
| 9 | 311°28.2 | · · 56.4 | 60°24.5 | 14.2' | 18°02.1 | 11.4' | 54.6' |
| 10 | 326°28.2 | 55.6 | 74°57.7 | 14.1' | 18°13.5 | 11.3' | 54.6' |
| 11 | 341°28.2 | 54.8 | 89°30.9 | 14.1' | 18°24.8 | 11.2' | 54.6' |
| 12 | 356°28.2 | S14°54.0 | 104°04.0 | 14.1' | S18°36.0 | 11.1' | 54.6' |
| 13 | 11°28.2 | 53.2 | 118°37.0 | 14.0' | 18°47.1 | 11.1' | 54.5' |
| 14 | 26°28.1 | 52.4 | 133°10.1 | 14.0' | 18°58.2 | 11.0' | 54.5' |
| 15 | 41°28.1 | · · 51.6 | 147°43.0 | 13.9' | 19°09.1 | 10.9' | 54.5' |
| 16 | 56°28.1 | 50.8 | 162°15.9 | 13.9' | 19°20.0 | 10.8' | 54.5' |
| 17 | 71°28.1 | 50.0 | 176°48.8 | 13.8' | 19°30.8 | 10.7' | 54.5' |
| 18 | 86°28.0 | S14°49.2 | 191°21.6 | 13.8' | S19°41.5 | 10.6' | 54.5' |
| 19 | 101°28.0 | 48.4 | 205°54.4 | 13.7' | 19°52.1 | 10.5' | 54.5' |
| 20 | 116°28.0 | 47.6 | 220°27.1 | 13.7' | 20°02.7 | 10.4' | 54.4' |
| 21 | 131°28.0 | · · 46.8 | 234°59.8 | 13.6' | 20°13.1 | 10.4' | 54.4' |
| 22 | 146°28.0 | 46.0 | 249°32.4 | 13.6' | 20°23.5 | 10.3' | 54.4' |
| 23 | 161°27.9 | 45.2 | 264°05.0 | 13.5' | 20°33.8 | 10.2' | 54.4' |
| SD = 16.2' $d = -0.8'$ | | | SD = 14.9' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|--------------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 06:47 | 08:11 | 09:43 | 14:47 | 16:18 | 17:43 |
| N 70° | 06:42 | 07:57 | 09:13 | 15:16 | 16:33 | 17:48 |
| 68° | 06:37 | 07:45 | 08:52 | 15:38 | 16:44 | 17:52 |
| 66° | 06:33 | 07:35 | 08:35 | 15:55 | 16:54 | 17:56 |
| 64° | 06:30 | 07:27 | 08:21 | 16:08 | 17:02 | 18:00 |
| 62° | 06:27 | 07:20 | 08:09 | 16:20 | 17:09 | 18:03 |
| 60° | 06:24 | 07:14 | 07:59 | 16:30 | 17:16 | 18:05 |
| N 58° | 06:21 | 07:08 | 07:51 | 16:38 | 17:21 | 18:08 |
| 56° | 06:19 | 07:03 | 07:43 | 16:46 | 17:26 | 18:10 |
| 54° | 06:16 | 06:58 | 07:36 | 16:53 | 17:31 | 18:13 |
| 52° | 06:14 | 06:54 | 07:30 | 16:59 | 17:35 | 18:15 |
| 50° | 06:12 | 06:50 | 07:24 | 17:04 | 17:39 | 18:17 |
| 45° | 06:07 | 06:42 | 07:12 | 17:16 | 17:47 | 18:22 |
| N 40° | 06:02 | 06:34 | 07:02 | 17:26 | 17:54 | 18:27 |
| 35° | 05:58 | 06:28 | 06:54 | 17:35 | 18:01 | 18:31 |
| 30° | 05:53 | 06:22 | 06:46 | 17:42 | 18:07 | 18:35 |
| 20° | 05:44 | 06:10 | 06:33 | 17:55 | 18:18 | 18:44 |
| N 10° | 05:35 | 06:00 | 06:22 | 18:07 | 18:28 | 18:53 |
| 0° | 05:24 | 05:49 | 06:11 | 18:18 | 18:39 | 19:04 |
| S 10° | 05:12 | 05:38 | 06:00 | 18:29 | 18:50 | 19:16 |
| 20° | 04:57 | 05:24 | 05:48 | 18:40 | 19:03 | 19:31 |
| 30° | 04:38 | 05:08 | 05:34 | 18:54 | 19:19 | 19:50 |
| 35° | 04:26 | 04:58 | 05:26 | 19:02 | 19:29 | 20:02 |
| 40° | 04:11 | 04:47 | 05:16 | 19:11 | 19:40 | 20:16 |
| 45° | 03:53 | 04:33 | 05:05 | 19:22 | 19:54 | 20:34 |
| S 50° | 03:28 | 04:15 | 04:52 | 19:35 | 20:11 | 20:58 |
| 52° | 03:16 | 04:07 | 04:46 | 19:41 | 20:20 | 21:10 |
| 54° | 03:02 | 03:57 | 04:39 | 19:48 | 20:29 | 21:24 |
| 56° | 02:45 | 03:47 | 04:31 | 19:55 | 20:40 | 21:41 |
| 58° | 02:23 | 03:34 | 04:23 | 20:04 | 20:52 | 22:02 |
| S 60° | 01:54 | 03:19 | 04:13 | 20:13 | 21:07 | 22:29 |

| Lat. | Moonrise | | | Moonset | | |
|--------------|----------|-------|-------|---------|-------|-------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | · · · | 00:34 | 03:32 | 07:59 | 07:15 | 05:48 |
| N 70° | · · · | 00:14 | 02:33 | 08:09 | 07:38 | 06:49 |
| 68° | 23:58 | · · · | 01:59 | 08:18 | 07:55 | 07:25 |
| 66° | 23:45 | · · · | 01:34 | 08:25 | 08:10 | 07:50 |
| 64° | 23:35 | · · · | 01:16 | 08:31 | 08:21 | 08:10 |
| 62° | 23:26 | · · · | 01:00 | 08:36 | 08:31 | 08:26 |
| 60° | 23:19 | · · · | 00:48 | 08:41 | 08:40 | 08:40 |
| N 58° | 23:12 | · · · | 00:37 | 08:45 | 08:48 | 08:52 |
| 56° | 23:06 | · · · | 00:27 | 08:49 | 08:55 | 09:02 |
| 54° | 23:01 | · · · | 00:19 | 08:52 | 09:01 | 09:11 |
| 52° | 22:56 | · · · | 00:11 | 08:55 | 09:06 | 09:19 |
| 50° | 22:52 | · · · | 00:05 | 08:58 | 09:11 | 09:27 |
| 45° | 22:43 | 23:50 | · · · | 09:04 | 09:22 | 09:42 |
| N 40° | 22:36 | 23:39 | · · · | 09:09 | 09:31 | 09:55 |
| 35° | 22:29 | 23:29 | · · · | 09:13 | 09:39 | 10:06 |
| 30° | 22:24 | 23:20 | · · · | 09:17 | 09:46 | 10:16 |
| 20° | 22:14 | 23:05 | 23:58 | 09:24 | 09:58 | 10:33 |
| N 10° | 22:05 | 22:52 | 23:41 | 09:30 | 10:08 | 10:48 |
| 0° | 21:58 | 22:40 | 23:25 | 09:36 | 10:18 | 11:02 |
| S 10° | 21:50 | 22:29 | 23:09 | 09:41 | 10:28 | 11:15 |
| 20° | 21:42 | 22:16 | 22:53 | 09:47 | 10:39 | 11:30 |
| 30° | 21:32 | 22:02 | 22:33 | 09:54 | 10:51 | 11:48 |
| 35° | 21:27 | 21:53 | 22:22 | 09:58 | 10:58 | 11:58 |
| 40° | 21:21 | 21:44 | 22:10 | 10:03 | 11:06 | 12:09 |
| 45° | 21:14 | 21:33 | 21:55 | 10:08 | 11:16 | 12:23 |
| S 50° | 21:06 | 21:20 | 21:37 | 10:14 | 11:27 | 12:40 |
| 52° | 21:02 | 21:14 | 21:29 | 10:17 | 11:32 | 12:47 |
| 54° | 20:58 | 21:07 | 21:19 | 10:21 | 11:38 | 12:56 |
| 56° | 20:53 | 21:00 | 21:09 | 10:24 | 11:45 | 13:06 |
| 58° | 20:48 | 20:51 | 20:56 | 10:28 | 11:52 | 13:18 |
| S 60° | 20:42 | 20:42 | 20:42 | 10:33 | 12:01 | 13:31 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-----------------------|-----------|-------|---|
| | Eqn.of Time | | Mer. Pass hh:mm | Mer.Pass. | | Age 19-21 82-65% |
| | 00 ^h | 12 ^h | | Upper | Lower | |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | |
| 06 | 13:59 | 14:01 | 12:14 | 03:26 | 15:47 |  |
| 07 | 14:03 | 14:05 | 12:14 | 04:08 | 16:29 | |
| 08 | 14:06 | 14:07 | 12:14 | 04:51 | 17:13 | |

February 09, 10, 11 UT (Mon., Tue., Wed.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------------------|----------|----------|--------------------|----------|----------|--------------------|----------|---------|--------------------|-----|--------|-----|-----|
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 139°06.2 | 168°12.9 | S13°27.2 | 183°19.2 | S17°56.1 | 31°07.5 | N22°43.8 | 138°44.4 | S02°11.7 | | | | | | |
| 1 | 154°08.6 | 183°12.3 | 26.1 | 198°19.7 | 55.5 | 46°10.2 | 43.9 | 153°46.7 | 11.6 | | | | | | |
| 2 | 169°11.1 | 198°11.7 | 25.0 | 213°20.2 | 55.0 | 61°12.9 | 43.9 | 168°48.9 | 11.5 | | | | | | |
| 3 | 184°13.6 | 213°11.2 | · · 24.0 | 228°20.6 | · · 54.4 | 76°15.7 | · · 43.9 | 183°51.1 | · · 11.3 | | | | | | |
| 4 | 199°16.0 | 228°10.6 | 22.9 | 243°21.1 | 53.9 | 91°18.4 | 44.0 | 198°53.3 | 11.2 | | | | | | |
| 5 | 214°18.5 | 243°10.1 | 21.8 | 258°21.6 | 53.3 | 106°21.1 | 44.0 | 213°55.6 | 11.1 | | | | | | |
| 6 | 229°21.0 | 258°09.5 | S13°20.7 | 273°22.1 | S17°52.7 | 121°23.8 | N22°44.0 | 228°57.8 | S02°11.0 | | | | | | |
| 7 | 244°23.4 | 273°08.9 | 19.7 | 288°22.6 | 52.2 | 136°26.5 | 44.0 | 244°00.0 | 10.9 | | | | | | |
| 8 | 259°25.9 | 288°08.4 | 18.6 | 303°23.1 | 51.6 | 151°29.2 | 44.1 | 259°02.2 | 10.8 | | | | | | |
| 9 | 274°28.3 | 303°07.8 | · · 17.5 | 318°23.6 | · · 51.1 | 166°31.9 | · · 44.1 | 274°04.4 | · · 10.7 | | | | | | |
| 10 | 289°30.8 | 318°07.3 | 16.4 | 333°24.0 | 50.5 | 181°34.6 | 44.1 | 289°06.7 | 10.6 | | | | | | |
| 11 | 304°33.3 | 333°06.7 | 15.3 | 348°24.5 | 50.0 | 196°37.4 | 44.2 | 304°08.9 | 10.5 | | | | | | |
| 12 | 319°35.7 | 348°06.2 | S13°14.3 | 3°25.0 | S17°49.4 | 211°40.1 | N22°44.2 | 319°11.1 | S02°10.4 | | | | | | |
| 13 | 334°38.2 | 3°05.6 | 13.2 | 18°25.5 | 48.9 | 226°42.8 | 44.2 | 334°13.3 | 10.2 | | | | | | |
| 14 | 349°40.7 | 18°05.1 | 12.1 | 33°26.0 | 48.3 | 241°45.5 | 44.3 | 349°15.6 | 10.1 | | | | | | |
| 15 | 4°43.1 | 33°04.5 | · · 11.0 | 48°26.5 | · · 47.7 | 256°48.2 | · · 44.3 | 4°17.8 | · · 10.0 | | | | | | |
| 16 | 19°45.6 | 48°03.9 | 09.9 | 63°27.0 | 47.2 | 271°50.9 | 44.3 | 19°20.0 | 09.9 | | | | | | |
| 17 | 34°48.1 | 63°03.4 | 08.8 | 78°27.5 | 46.6 | 286°53.6 | 44.4 | 34°22.2 | 09.8 | | | | | | |
| 18 | 49°50.5 | 78°02.8 | S13°07.8 | 93°27.9 | S17°46.1 | 301°56.3 | N22°44.4 | 49°24.4 | S02°09.7 | | | | | | |
| 19 | 64°53.0 | 93°02.3 | 06.7 | 108°28.4 | 45.5 | 316°59.0 | 44.4 | 64°26.7 | 09.6 | | | | | | |
| 20 | 79°55.5 | 108°01.7 | 05.6 | 123°28.9 | 44.9 | 332°01.7 | 44.5 | 79°28.9 | 09.5 | | | | | | |
| 21 | 94°57.9 | 123°01.2 | · · 04.5 | 138°29.4 | · · 44.4 | 347°04.4 | · · 44.5 | 94°31.1 | · · 09.4 | | | | | | |
| 22 | 110°00.4 | 138°00.6 | 03.4 | 153°29.9 | 43.8 | 2°07.2 | 44.5 | 109°33.3 | 09.3 | | | | | | |
| 23 | 125°02.8 | 153°00.1 | 02.3 | 168°30.4 | 43.3 | 17°09.9 | 44.6 | 124°35.6 | 09.1 | | | | | | |
| Mer.pass. 14:41 | | ν-0.6' d-1.1' m-3.91 | | | ν0.5' d-0.6' m1.12 | | | ν2.7' d0.0' m-2.58 | | | ν2.2' d-0.1' m1.02 | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 140°05.3 | 167°59.5 | S13°01.2 | 183°30.9 | S17°42.7 | 32°12.6 | N22°44.6 | 139°37.8 | S02°09.0 | | | | | | |
| 1 | 155°07.8 | 182°59.0 | 13°00.1 | 198°31.4 | 42.1 | 47°15.3 | 44.6 | 154°40.0 | 08.9 | | | | | | |
| 2 | 170°10.2 | 197°58.4 | 12°59.1 | 213°31.8 | 41.6 | 62°18.0 | 44.6 | 169°42.2 | 08.8 | | | | | | |
| 3 | 185°12.7 | 212°57.9 | · · 58.0 | 228°32.3 | · · 41.0 | 77°20.7 | · · 44.7 | 184°44.4 | · · 08.7 | | | | | | |
| 4 | 200°15.2 | 227°57.3 | 56.9 | 243°32.8 | 40.4 | 92°23.4 | 44.7 | 199°46.7 | 08.6 | | | | | | |
| 5 | 215°17.6 | 242°56.8 | 55.8 | 258°33.3 | 39.9 | 107°26.1 | 44.7 | 214°48.9 | 08.5 | | | | | | |
| 6 | 230°20.1 | 257°56.2 | S12°54.7 | 273°33.8 | S17°39.3 | 122°28.8 | N22°44.8 | 229°51.1 | S02°08.4 | | | | | | |
| 7 | 245°22.6 | 272°55.7 | 53.6 | 288°34.3 | 38.8 | 137°31.5 | 44.8 | 244°53.3 | 08.3 | | | | | | |
| 8 | 260°25.0 | 287°55.2 | 52.5 | 303°34.8 | 38.2 | 152°34.2 | 44.8 | 259°55.5 | 08.2 | | | | | | |
| 9 | 275°27.5 | 302°54.6 | · · 51.4 | 318°35.3 | · · 37.6 | 167°36.9 | · · 44.9 | 274°57.8 | · · 08.0 | | | | | | |
| 10 | 290°30.0 | 317°54.1 | 50.3 | 333°35.8 | 37.1 | 182°39.6 | 44.9 | 290°00.0 | 07.9 | | | | | | |
| 11 | 305°32.4 | 332°53.5 | 49.2 | 348°36.3 | 36.5 | 197°42.3 | 44.9 | 305°02.2 | 07.8 | | | | | | |
| 12 | 320°34.9 | 347°53.0 | S12°48.1 | 3°36.7 | S17°35.9 | 212°45.0 | N22°45.0 | 320°04.4 | S02°07.7 | | | | | | |
| 13 | 335°37.3 | 2°52.4 | 47.0 | 18°37.2 | 35.4 | 227°47.7 | 45.0 | 335°06.6 | 07.6 | | | | | | |
| 14 | 350°39.8 | 17°51.9 | 45.9 | 33°37.7 | 34.8 | 242°50.4 | 45.0 | 350°08.9 | 07.5 | | | | | | |
| 15 | 5°42.3 | 32°51.3 | · · 44.8 | 48°38.2 | · · 34.2 | 257°53.1 | · · 45.1 | 5°11.1 | · · 07.4 | | | | | | |
| 16 | 20°44.7 | 47°50.8 | 43.7 | 63°38.7 | 33.7 | 272°55.8 | 45.1 | 20°13.3 | 07.3 | | | | | | |
| 17 | 35°47.2 | 62°50.3 | 42.6 | 78°39.2 | 33.1 | 287°58.5 | 45.1 | 35°15.5 | 07.2 | | | | | | |
| 18 | 50°49.7 | 77°49.7 | S12°41.5 | 93°39.7 | S17°32.5 | 303°01.2 | N22°45.1 | 50°17.7 | S02°07.0 | | | | | | |
| 19 | 65°52.1 | 92°49.2 | 40.4 | 108°40.2 | 32.0 | 318°04.0 | 45.2 | 65°20.0 | 06.9 | | | | | | |
| 20 | 80°54.6 | 107°48.6 | 39.3 | 123°40.7 | 31.4 | 333°06.7 | 45.2 | 80°22.2 | 06.8 | | | | | | |
| 21 | 95°57.1 | 122°48.1 | · · 38.2 | 138°41.2 | · · 30.8 | 348°09.4 | · · 45.2 | 95°24.4 | · · 06.7 | | | | | | |
| 22 | 110°59.5 | 137°47.6 | 37.1 | 153°41.7 | 30.3 | 3°12.1 | 45.3 | 110°26.6 | 06.6 | | | | | | |
| 23 | 126°02.0 | 152°47.0 | 36.0 | 168°42.2 | 29.7 | 18°14.8 | 45.3 | 125°28.8 | 06.5 | | | | | | |
| Mer.pass. 14:37 | | ν-0.5' d-1.1' m-3.91 | | | ν0.5' d-0.6' m1.12 | | | ν2.7' d0.0' m-2.57 | | | ν2.2' d-0.1' m1.02 | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 141°04.4 | 167°46.5 | S12°34.9 | 183°42.7 | S17°29.1 | 33°17.5 | N22°45.3 | 140°31.1 | S02°06.4 | | | | | | |
| 1 | 156°06.9 | 182°45.9 | 33.8 | 198°43.1 | 28.6 | 48°20.2 | 45.4 | 155°33.3 | 06.3 | | | | | | |
| 2 | 171°09.4 | 197°45.4 | 32.7 | 213°43.6 | 28.0 | 63°22.9 | 45.4 | 170°35.5 | 06.2 | | | | | | |
| 3 | 186°11.8 | 212°44.9 | · · 31.6 | 228°44.1 | · · 27.4 | 78°25.6 | · · 45.4 | 185°37.7 | · · 06.0 | | | | | | |
| 4 | 201°14.3 | 227°44.3 | 30.5 | 243°44.6 | 26.8 | 93°28.3 | 45.4 | 200°39.9 | 05.9 | | | | | | |
| 5 | 216°16.8 | 242°43.8 | 29.4 | 258°45.1 | 26.3 | 108°30.9 | 45.5 | 215°42.1 | 05.8 | | | | | | |
| 6 | 231°19.2 | 257°43.3 | S12°28.3 | 273°45.6 | S17°25.7 | 123°33.6 | N22°45.5 | 230°44.4 | S02°05.7 | | | | | | |
| 7 | 246°21.7 | 272°42.7 | 27.2 | 288°46.1 | 25.1 | 138°36.3 | 45.5 | 245°46.6 | 05.6 | | | | | | |
| 8 | 261°24.2 | 287°42.2 | 26.1 | 303°46.6 | 24.6 | 153°39.0 | 45.6 | 260°48.8 | 05.5 | | | | | | |
| 9 | 276°26.6 | 302°41.7 | · · 25.0 | 318°47.1 | · · 24.0 | 168°41.7 | · · 45.6 | 275°51.0 | · · 05.4 | | | | | | |
| 10 | 291°29.1 | 317°41.1 | 23.9 | 333°47.6 | 23.4 | 183°44.4 | 45.6 | 290°53.2 | 05.3 | | | | | | |
| 11 | 306°31.6 | 332°40.6 | 22.8 | 348°48.1 | 22.8 | 198°47.1 | 45.7 | 305°55.5 | 05.2 | | | | | | |
| 12 | 321°34.0 | 347°40.1 | S12°21.7 | 3°48.6 | S17°22.3 | 213°49.8 | N22°45.7 | 320°57.7 | S02°05.0 | | | | | | |
| 13 | 336°36.5 | 2°39.5 | 20.6 | 18°49.1 | 21.7 | 228°52.5 | 45.7 | 335°59.9 | 04.9 | | | | | | |
| 14 | 351°38.9 | 17°39.0 | 19.4 | 33°49.6 | 21.1 | 243°55.2 | 45.7 | 351°02.1 | 04.8 | | | | | | |
| 15 | 6°41.4 | 32°38.5 | · · 18.3 | 48°50.1 | · · 20.5 | 258°57.9 | · · 45.8 | 6°04.3 | · · 04.7 | | | | | | |
| 16 | 21°43.9 | 47°37.9 | 17.2 | 63°50.6 | 20.0 | 274°00.6 | 45.8 | 21°06.5 | 04.6 | | | | | | |
| 17 | 36°46.3 | 62°37.4 | 16.1 | 78°51.1 | 19.4 | 289°03.3 | 45.8 | 36°08.8 | 04.5 | | | | | | |
| 18 | 51°48.8 | 77°36.9 | S12°15.0 | 93°51.6 | S17°18.8 | 304°06.0 | N22°45.9 | 51°11.0 | S02°04.4 | | | | | | |
| 19 | 66°51.3 | 92°36.3 | 13.9 | 108°52.0 | 18.2 | 319°08.7 | 45.9 | 66°13.2 | 04.3 | | | | | | |
| 20 | 81°53.7 | 107°35.8 | 12.8 | 123°52.5 | 17.7 | 334°11.4 | 45.9 | 81°15.4 | 04.2 | | | | | | |
| 21 | 96°56.2 | 122°35.3 | · · 11.7 | 138°53.0 | · · 17.1 | 349°14.1 | · · 46.0 | 96°17.6 | · · 04.0 | | | | | | |
| 22 | 111°58.7 | 137°34.8 | 10.5 | 153°53.5 | 16.5 | 4°16.8 | 46.0 | 111°19.8 | 03.9 | | | | | | |
| 23 | 127°01.1 | 152°34.2 | 09.4 | 168°54.0 | 15.9 | 19°19.5 | 46.0 | 126°22.1 | 03.8 | | | | | | |
| Mer.pass. 14:33 | | ν-0.5' d-1.1' m-3.91 | | | ν0.5' d-0.6' m1.12 | | | ν2.7' d0.0' m-2.57 | | | ν2.2' d-0.1' m1.02 | | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°34.1 | 29°14.1 |
| Ankaa | 353°06.5 | -42°10.0 |
| Schedar | 349°30.4 | 56°41.0 |
| Diphda | 348°46.6 | -17°50.7 |
| Achernar | 335°19.7 | -57°06.5 |
| Hamal | 327°50.3 | 23°35.2 |
| Polaris | 313°35.0 | 89°22.8 |
| Acamar | 315°11.1 | -40°12.2 |
| Menkar | 314°05.2 | 4°11.5 |
| Mirfak | 308°26.9 | 49°57.4 |
| Aldebaran | 290°38.4 | 16°33.7 |
| Rigel | 281°02.8 | -8°10.4 |
| Capella | 280°20.3 | 46°01.6 |
| Bellatrix | 278°21.7 | 6°22.3 |
| Elnath | 278°00.5 | 28°37.8 |
| Alnilam | 275°36.6 | -1°11.2 |
| Betelgeuse | 270°50.9 | 7°24.7 |
| Canopus | 263°51.6 | -52°42.8 |
| Sirius | 258°25.2 | -16°45.3 |
| Adhara | 255°04.8 | -29°00.6 |
| Procyon | 244°49.6 | 5°09.4 |
| Pollux | 243°15.8 | 27°57.7 |
| Avior | 234°13.8 | -59°35.7 |
| Suhail | 222°45.2 | -43°32.4 |
| Miaplacidus | 221°37.2 | -69°49.5 |
| Alphard | 217°46.5 | -8°46.4 |
| Regulus | 207°33.1 | 11°50.2 |

| h | | Sun | | | Moon | | | |
|-----|--|------------------------|----------|--|------------|-------|----------|-------------|
| Mon | | GHA | Dec | | GHA | ν | Dec | d HP |
| 0 | | 176°27.9 | S14°44.4 | | 278°37.5 | 13.5' | S20°43.9 | 10.1' 54.4' |
| 1 | | 191°27.9 | 43.6 | | 293°09.9 | 13.4' | 20°54.0 | 10.0' 54.4' |
| 2 | | 206°27.9 | 42.8 | | 307°42.4 | 13.4' | 21°04.0 | 9.9' 54.4' |
| 3 | | 221°27.9 | · · 42.0 | | 322°14.7 | 13.3' | 21°13.9 | 9.8' 54.4' |
| 4 | | 236°27.8 | 41.2 | | 336°47.0 | 13.2' | 21°23.7 | 9.7' 54.3' |
| 5 | | 251°27.8 | 40.4 | | 351°19.3 | 13.2' | 21°33.4 | 9.6' 54.3' |
| 6 | | 266°27.8 | S14°39.6 | | 5°51.5 | 13.1' | S21°43.0 | 9.5' 54.3' |
| 7 | | 281°27.8 | 38.8 | | 20°23.6 | 13.1' | 21°52.6 | 9.4' 54.3' |
| 8 | | 296°27.8 | 38.0 | | 34°55.7 | 13.0' | 22°02.0 | 9.3' 54.3' |
| 9 | | 311°27.8 | · · 37.2 | | 49°27.7 | 13.0' | 22°11.3 | 9.2' 54.3' |
| 10 | | 326°27.7 | 36.4 | | 63°59.7 | 12.9' | 22°20.5 | 9.1' 54.3' |
| 11 | | 341°27.7 | 35.6 | | 78°31.6 | 12.9' | 22°29.7 | 9.0' 54.3' |
| 12 | | 356°27.7 | S14°34.8 | | 93°03.4 | 12.8' | S22°38.7 | 8.9' 54.3' |
| 13 | | 11°27.7 | 34.0 | | 107°35.2 | 12.7' | 22°47.6 | 8.8' 54.3' |
| 14 | | 26°27.7 | 33.2 | | 122°07.0 | 12.7' | 22°56.5 | 8.7' 54.2' |
| 15 | | 41°27.7 | · · 32.4 | | 136°38.7 | 12.6' | 23°05.2 | 8.6' 54.2' |
| 16 | | 56°27.7 | 31.6 | | 151°10.3 | 12.6' | 23°13.8 | 8.5' 54.2' |
| 17 | | 71°27.6 | 30.7 | | 165°41.9 | 12.5' | 23°22.4 | 8.4' 54.2' |
| 18 | | 86°27.6 | S14°29.9 | | 180°13.4 | 12.5' | S23°30.8 | 8.3' 54.2' |
| 19 | | 101°27.6 | 29.1 | | 194°44.9 | 12.4' | 23°39.1 | 8.2' 54.2' |
| 20 | | 116°27.6 | 28.3 | | 209°16.3 | 12.3' | 23°47.3 | 8.1' 54.2' |
| 21 | | 131°27.6 | · · 27.5 | | 223°47.6 | 12.3' | 23°55.4 | 8.0' 54.2' |
| 22 | | 146°27.6 | 26.7 | | 238°18.9 | 12.2' | 24°03.4 | 7.9' 54.2' |
| 23 | | 161°27.6 | 25.9 | | 252°50.1 | 12.2' | 24°11.3 | 7.8' 54.2' |
| | | SD = 16.2' $d = -0.8'$ | | | SD = 14.8' | | | |

| Tue | | GHA | Dec | | GHA | ν | Dec | d HP |
|-----|--|------------------------|----------|--|------------|-------|----------|------------|
| 0 | | 176°27.6 | S14°25.1 | | 267°21.3 | 12.1' | S24°19.1 | 7.7' 54.2' |
| 1 | | 191°27.6 | 24.3 | | 281°52.4 | 12.1' | 24°26.8 | 7.6' 54.2' |
| 2 | | 206°27.5 | 23.5 | | 296°23.4 | 12.0' | 24°34.3 | 7.5' 54.2' |
| 3 | | 221°27.5 | · · 22.6 | | 310°54.4 | 11.9' | 24°41.8 | 7.3' 54.2' |
| 4 | | 236°27.5 | 21.8 | | 325°25.4 | 11.9' | 24°49.2 | 7.2' 54.2' |
| 5 | | 251°27.5 | 21.0 | | 339°56.2 | 11.8' | 24°56.4 | 7.1' 54.2' |
| 6 | | 266°27.5 | S14°20.2 | | 354°27.0 | 11.8' | S25°03.5 | 7.0' 54.2' |
| 7 | | 281°27.5 | 19.4 | | 8°57.8 | 11.7' | 25°10.5 | 6.9' 54.2' |
| 8 | | 296°27.5 | 18.6 | | 23°28.5 | 11.6' | 25°17.4 | 6.8' 54.1' |
| 9 | | 311°27.5 | · · 17.8 | | 37°59.2 | 11.6' | 25°24.2 | 6.7' 54.1' |
| 10 | | 326°27.5 | 17.0 | | 52°29.7 | 11.5' | 25°30.9 | 6.6' 54.1' |
| 11 | | 341°27.5 | 16.1 | | 67°00.3 | 11.5' | 25°37.4 | 6.4' 54.1' |
| 12 | | 356°27.5 | S14°15.3 | | 81°30.7 | 11.4' | S25°43.9 | 6.3' 54.1' |
| 13 | | 11°27.4 | 14.5 | | 96°01.2 | 11.4' | 25°50.2 | 6.2' 54.1' |
| 14 | | 26°27.4 | 13.7 | | 110°31.5 | 11.3' | 25°56.4 | 6.1' 54.1' |
| 15 | | 41°27.4 | · · 12.9 | | 125°01.8 | 11.2' | 26°02.5 | 6.0' 54.1' |
| 16 | | 56°27.4 | 12.1 | | 139°32.1 | 11.2' | 26°08.5 | 5.8' 54.1' |
| 17 | | 71°27.4 | 11.2 | | 154°02.3 | 11.1' | 26°14.3 | 5.7' 54.1' |
| 18 | | 86°27.4 | S14°10.4 | | 168°32.4 | 11.1' | S26°20.0 | 5.6' 54.1' |
| 19 | | 101°27.4 | 9.6 | | 183°02.5 | 11.0' | 26°25.6 | 5.5' 54.1' |
| 20 | | 116°27.4 | 8.8 | | 197°32.5 | 11.0' | 26°31.1 | 5.4' 54.1' |
| 21 | | 131°27.4 | · · 8.0 | | 212°02.5 | 10.9' | 26°36.5 | 5.2' 54.1' |
| 22 | | 146°27.4 | 7.2 | | 226°32.4 | 10.9' | 26°41.7 | 5.1' 54.1' |
| 23 | | 161°27.4 | 6.3 | | 241°02.3 | 10.8' | 26°46.8 | 5.0' 54.1' |
| | | SD = 16.2' $d = -0.8'$ | | | SD = 14.8' | | | |

| Wed | | GHA | Dec | | GHA | ν | Dec | d HP |
|-----|--|------------------------|----------|--|------------|-------|----------|------------|
| 0 | | 176°27.4 | S14°05.5 | | 255°32.1 | 10.8' | S26°51.8 | 4.9' 54.1' |
| 1 | | 191°27.4 | 04.7 | | 270°01.9 | 10.7' | 26°56.7 | 4.7' 54.1' |
| 2 | | 206°27.4 | 03.9 | | 284°31.6 | 10.7' | 27°01.4 | 4.6' 54.1' |
| 3 | | 221°27.4 | · · 03.0 | | 299°01.3 | 10.6' | 27°06.1 | 4.5' 54.2' |
| 4 | | 236°27.4 | 02.2 | | 313°30.9 | 10.6' | 27°10.6 | 4.4' 54.2' |
| 5 | | 251°27.4 | 01.4 | | 328°00.4 | 10.5' | 27°14.9 | 4.2' 54.2' |
| 6 | | 266°27.4 | S14°00.6 | | 342°30.0 | 10.5' | S27°19.2 | 4.1' 54.2' |
| 7 | | 281°27.4 | 13°59.8 | | 356°59.4 | 10.4' | 27°23.3 | 4.0' 54.2' |
| 8 | | 296°27.4 | 58.9 | | 11°28.8 | 10.4' | 27°27.2 | 3.9' 54.2' |
| 9 | | 311°27.4 | · · 58.1 | | 25°58.2 | 10.3' | 27°31.1 | 3.7' 54.2' |
| 10 | | 326°27.4 | 57.3 | | 40°27.5 | 10.3' | 27°34.8 | 3.6' 54.2' |
| 11 | | 341°27.4 | 56.5 | | 54°56.8 | 10.2' | 27°38.4 | 3.5' 54.2' |
| 12 | | 356°27.4 | S13°55.6 | | 69°26.1 | 10.2' | S27°41.9 | 3.3' 54.2' |
| 13 | | 11°27.4 | 54.8 | | 83°55.3 | 10.2' | 27°45.2 | 3.2' 54.2' |
| 14 | | 26°27.4 | 54.0 | | 98°24.4 | 10.1' | 27°48.4 | 3.1' 54.2' |
| 15 | | 41°27.4 | · · 53.2 | | 112°53.5 | 10.1' | 27°51.4 | 2.9' 54.2' |
| 16 | | 56°27.4 | 52.3 | | 127°22.6 | 10.0' | 27°54.4 | 2.8' 54.2' |
| 17 | | 71°27.4 | 51.5 | | 141°51.6 | 10.0' | 27°57.2 | 2.7' 54.2' |
| 18 | | 86°27.4 | S13°50.7 | | 156°20.6 | 10.0' | S27°59.8 | 2.5' 54.2' |
| 19 | | 101°27.4 | 49.9 | | 170°49.6 | 9.9' | 28°02.4 | 2.4' 54.2' |
| 20 | | 116°27.4 | 49.0 | | 185°18.5 | 9.9' | 28°04.8 | 2.3' 54.2' |
| 21 | | 131°27.4 | · · 48.2 | | 199°47.4 | 9.8' | 28°07.0 | 2.1' 54.3' |
| 22 | | 146°27.4 | 47.4 | | 214°16.2 | 9.8' | 28°09.1 | 2.0' 54.3' |
| 23 | | 161°27.4 | 46.5 | | 228°45.0 | 9.8' | 28°11.1 | 1.8' 54.3' |
| | | SD = 16.2' $d = -0.8'$ | | | SD = 14.8' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 06:35 | 07:58 | 09:24 | 15:06 | 16:32 | 17:55 |
| N 70° | 06:31 | 07:45 | 08:58 | 15:31 | 16:45 | 17:59 |
| 68° | 06:28 | 07:35 | 08:39 | 15:51 | 16:55 | 18:02 |
| 66° | 06:25 | 07:26 | 08:24 | 16:06 | 17:04 | 18:05 |
| 64° | 06:22 | 07:19 | 08:11 | 16:18 | 17:11 | 18:08 |
| 62° | 06:20 | 07:12 | 08:01 | 16:29 | 17:17 | 18:10 |
| 60° | 06:17 | 07:07 | 07:51 | 16:38 | 17:23 | 18:12 |
| N 58° | 06:15 | 07:02 | 07:44 | 16:46 | 17:28 | 18:14 |
| 56° | 06:13 | 06:57 | 07:36 | 16:53 | 17:32 | 18:16 |
| 54° | 06:11 | 06:53 | 07:30 | 16:59 | 17:36 | 18:18 |
| 52° | 06:09 | 06:49 | 07:25 | 17:05 | 17:40 | 18:20 |
| 50° | 06:07 | 06:46 | 07:19 | 17:10 | 17:44 | 18:22 |
| 45° | 06:03 | 06:38 | 07:08 | 17:21 | 17:51 | 18:26 |
| N 40° | 05:59 | 06:31 | 06:59 | 17:30 | 17:58 | 18:30 |
| 35° | 05:55 | 06:25 | 06:51 | 17:38 | 18:04 | 18:34 |
| 30° | 05:51 | 06:19 | 06:44 | 17:45 | 18:09 | 18:38 |
| 20° | 05:43 | 06:09 | 06:32 | 17:57 | 18:19 | 18:46 |
| N 10° | 05:34 | 05:59 | 06:21 | 18:07 | 18:29 | 18:54 |
| 0° | 05:25 | 05:49 | 06:11 | 18:18 | 18:39 | 19:04 |
| S 10° | 05:13 | 05:39 | 06:00 | 18:28 | 18:50 | 19:15 |
| 20° | 04:59 | 05:26 | 05:49 | 18:39 | 19:02 | 19:29 |
| 30° | 04:41 | 05:11 | 05:36 | 18:52 | 19:17 | 19:47 |
| 35° | 04:29 | 05:02 | 05:29 | 18:59 | 19:26 | 19:58 |
| 40° | 04:16 | 04:51 | 05:20 | 19:08 | 19:37 | 20:12 |
| 45° | 03:58 | 04:38 | 05:10 | 19:18 | 19:50 | 20:29 |
| S 50° | 03:35 | 04:21 | 04:58 | 19:30 | 20:06 | 20:51 |
| 52° | 03:24 | 04:13 | 04:52 | 19:35 | 20:14 | 21:03 |
| 54° | 03:11 | 04:05 | 04:45 | 19:42 | 20:22 | 21:15 |
| 56° | 02:55 | 03:54 | 04:38 | 19:49 | 20:32 | 21:31 |
| 58° | 02:36 | 03:43 | 04:30 | 19:56 | 20:43 | 21:49 |
| S 60° | 02:11 | 03:29 | 04:21 | 20:05 | 20:57 | 22:13 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | ■ | ■ | ■ | ■ | ■ | ■ |
| 68° | 04:50 | ■ | ■ | 06:07 | ■ | ■ |
| 66° | 03:40 | ■ | ■ | 07:18 | ■ | ■ |
| 64° | 03:04 | 05:15 | ■ | 07:54 | 07:22 | ■ |
| 62° | 02:39 | 04:23 | 06:21 | 08:21 | 08:13 | 07:59 |
| 60° | 02:19 | 03:52 | 05:24 | 08:41 | 08:45 | 08:56 |
| N 58° | 02:02 | 03:29 | 04:51 | 08:58 | 09:09 | 09:29 |
| 56° | 01:49 | 03:10 | 04:27 | 09:13 | 09:28 | 09:54 |
| 54° | 01:37 | 02:54 | 04:07 | 09:25 | 09:45 | 10:14 |
| 52° | 01:26 | 02:40 | 03:51 | 09:36 | 09:59 | 10:30 |
| 50° | 01:17 | 02:29 | 03:37 | 09:46 | 10:11 | 10:45 |
| 45° | 00:58 | 02:04 | 03:08 | 10:06 | 10:36 | 11:14 |
| N 40° | 00:42 | 01:45 | 02:46 | 10:23 | 10:56 | 11:36 |
| 35° | 00:29 | 01:28 | 02:27 | 10:37 | 11:13 | 11:55 |
| 30° | 00:17 | 01:14 | 02:11 | 10:50 | 11:28 | 12:12 |
| 20° | · · · | 00:51 | 01:45 | 11:11 | 11:53 | 12:39 |
| N 10° | · · · | 00:30 | 01:22 | 11:30 | 12:14 | 13:03 |
| 0° | · · · | 00:11 | 01:00 | 11:47 | 12:35 | 13:25 |
| S 10° | 23:52 | · · · | 00:39 | 12:04 | 12:55 | 13:47 |
| 20° | 23:32 | · · · | 00:16 | 12:23 | 13:17 | 14:11 |
| 30° | 23:09 | 23:50 | · · · | 12:45 | 13:42 | 14:38 |
| 35° | 22:56 | 23:35 | · · · | 12:57 | 13:57 | 14:55 |
| 40° | 22:40 | 23:17 | · · · | 13:12 | 14:14 | 15:14 |
| 45° | 22:22 | 22:55 | 23:37 | 13:30 | 14:35 | 15:37 |
| S 50° | 21:59 | 22:28 | 23:07 | 13:52 | 15:02 | 16:06 |
| 52° | 21:48 | 22:15 | 22:52 | 14:02 | 15:15 | 16:21 |
| 54° | 21:36 | 22:00 | 22:35 | 14:14 | 15:29 | 16:38 |
| 56° | 21:21 | 21:42 | 22:15 | 14:28 | 15:47 | 16:59 |
| 58° | 21:05 | 21:20 | 21:48 | 14:44 | 16:08 | 17:25 |
| S 60° | 20:45 | 20:53 | 21:12 | 15:03 | 16:35 | 18:01 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|--------------|-----------|-------|------------------------|
| | Eqn.of Time | | Mer. Pass | Mer.Pass. | | Age 22-24 55-36% |
| | 00 ^h | 12 ^h | | Upper | Lower | |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | |
| 09 | 14:08 | 14:09 | 12:14 | 05:36 | 17:59 | |
| 10 | 14:10 | 14:10 | 12:14 | 06:23 | 18:47 | |
| 11 | 14:10 | 14:10 | 12:14 | 07:12 | 19:38 | |

February 12, 13, 14 UT (Thu., Fri., Sat.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|--|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|
| Thu | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 142°03.6 | | 167°33.7 | S12°08.3 | 183°54.5 | S17°15.4 | 34°22.2 | N22°46.0 | 141°24.3 | S02°03.7 |
| 1 | 157°06.1 | | 182°33.2 | 07.2 | 198°55.0 | 14.8 | 49°24.9 | 46.1 | 156°26.5 | 03.6 |
| 2 | 172°08.5 | | 197°32.7 | 06.1 | 213°55.5 | 14.2 | 64°27.5 | 46.1 | 171°28.7 | 03.5 |
| 3 | 187°11.0 | | 212°32.1 | · · 05.0 | 228°56.0 | · · 13.6 | 79°30.2 | · · 46.1 | 186°30.9 | · · 03.4 |
| 4 | 202°13.4 | | 227°31.6 | 03.8 | 243°56.5 | 13.1 | 94°32.9 | 46.2 | 201°33.2 | 03.3 |
| 5 | 217°15.9 | | 242°31.1 | 02.7 | 258°57.0 | 12.5 | 109°35.6 | 46.2 | 216°35.4 | 03.1 |
| 6 | 232°18.4 | | 257°30.6 | S12°01.6 | 273°57.5 | S17°11.9 | 124°38.3 | N22°46.2 | 231°37.6 | S02°03.0 |
| 7 | 247°20.8 | | 272°30.0 | 12°00.5 | 288°58.0 | 11.3 | 139°41.0 | 46.2 | 246°39.8 | 02.9 |
| 8 | 262°23.3 | | 287°29.5 | 11°59.4 | 303°58.5 | 10.7 | 154°43.7 | 46.3 | 261°42.0 | 02.8 |
| 9 | 277°25.8 | | 302°29.0 | · · 58.2 | 318°59.0 | · · 10.2 | 169°46.4 | · · 46.3 | 276°44.2 | · · 02.7 |
| 10 | 292°28.2 | | 317°28.5 | 57.1 | 333°59.5 | 09.6 | 184°49.1 | 46.3 | 291°46.5 | 02.6 |
| 11 | 307°30.7 | | 332°27.9 | 56.0 | 349°00.0 | 09.0 | 199°51.8 | 46.4 | 306°48.7 | 02.5 |
| 12 | 322°33.2 | | 347°27.4 | S11°54.9 | 4°00.5 | S17°08.4 | 214°54.5 | N22°46.4 | 321°50.9 | S02°02.4 |
| 13 | 337°35.6 | | 2°26.9 | 53.7 | 19°01.0 | 07.8 | 229°57.1 | 46.4 | 336°53.1 | 02.3 |
| 14 | 352°38.1 | | 17°26.4 | 52.6 | 34°01.5 | 07.3 | 244°59.8 | 46.5 | 351°55.3 | 02.1 |
| 15 | 7°40.6 | | 32°25.9 | · · 51.5 | 49°02.0 | · · 06.7 | 260°02.5 | · · 46.5 | 6°57.5 | · · 02.0 |
| 16 | 22°43.0 | | 47°25.3 | 50.4 | 64°02.5 | 06.1 | 275°05.2 | 46.5 | 21°59.7 | 01.9 |
| 17 | 37°45.5 | | 62°24.8 | 49.2 | 79°03.0 | 05.5 | 290°07.9 | 46.5 | 37°02.0 | 01.8 |
| 18 | 52°47.9 | | 77°24.3 | S11°48.1 | 94°03.5 | S17°04.9 | 305°10.6 | N22°46.6 | 52°04.2 | S02°01.7 |
| 19 | 67°50.4 | | 92°23.8 | 47.0 | 109°04.0 | 04.3 | 320°13.3 | 46.6 | 67°06.4 | 01.6 |
| 20 | 82°52.9 | | 107°23.3 | 45.9 | 124°04.5 | 03.8 | 335°16.0 | 46.6 | 82°08.6 | 01.5 |
| 21 | 97°55.3 | | 122°22.7 | · · 44.7 | 139°05.0 | · · 03.2 | 350°18.6 | · · 46.7 | 97°10.8 | · · 01.4 |
| 22 | 112°57.8 | | 137°22.2 | 43.6 | 154°05.5 | 02.6 | 5°21.3 | 46.7 | 112°13.0 | 01.2 |
| 23 | 128°00.3 | | 152°21.7 | 42.5 | 169°06.0 | 02.0 | 20°24.0 | 46.7 | 127°15.3 | 01.1 |
| Mer.pass. 14:29 | | | ν-0.5' d-1.1' m-3.91 | | ν0.5' d-0.6' m1.12 | | ν2.7' d0.0' m-2.56 | | ν2.2' d-0.1' m1.02 | |
| Fri | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 143°02.7 | | 167°21.2 | S11°41.4 | 184°06.5 | S17°01.4 | 35°26.7 | N22°46.7 | 142°17.5 | S02°01.0 |
| 1 | 158°05.2 | | 182°20.7 | 40.2 | 199°07.0 | 00.8 | 50°29.4 | 46.8 | 157°19.7 | 00.9 |
| 2 | 173°07.7 | | 197°20.2 | 39.1 | 214°07.5 | 17°00.3 | 65°32.1 | 46.8 | 172°21.9 | 00.8 |
| 3 | 188°10.1 | | 212°19.6 | · · 38.0 | 229°08.0 | 16°59.7 | 80°34.8 | · · 46.8 | 187°24.1 | · · 00.7 |
| 4 | 203°12.6 | | 227°19.1 | 36.8 | 244°08.5 | 59.1 | 95°37.4 | 46.9 | 202°26.3 | 00.6 |
| 5 | 218°15.1 | | 242°18.6 | 35.7 | 259°09.0 | 58.5 | 110°40.1 | 46.9 | 217°28.5 | 00.5 |
| 6 | 233°17.5 | | 257°18.1 | S11°34.6 | 274°09.5 | S16°57.9 | 125°42.8 | N22°46.9 | 232°30.8 | S02°00.3 |
| 7 | 248°20.0 | | 272°17.6 | 33.4 | 289°10.0 | 57.3 | 140°45.5 | 46.9 | 247°33.0 | 00.2 |
| 8 | 263°22.4 | | 287°17.1 | 32.3 | 304°10.5 | 56.7 | 155°48.2 | 47.0 | 262°35.2 | 00.1 |
| 9 | 278°24.9 | | 302°16.6 | · · 31.2 | 319°11.0 | · · 56.1 | 170°50.9 | · · 47.0 | 277°37.4 | 02°00.0 |
| 10 | 293°27.4 | | 317°16.1 | 30.0 | 334°11.5 | 55.6 | 185°53.5 | 47.0 | 292°39.6 | 01°59.9 |
| 11 | 308°29.8 | | 332°15.5 | 28.9 | 349°12.0 | 55.0 | 200°56.2 | 47.0 | 307°41.8 | 59.8 |
| 12 | 323°32.3 | | 347°15.0 | S11°27.8 | 4°12.5 | S16°54.4 | 215°58.9 | N22°47.1 | 322°44.0 | S01°59.7 |
| 13 | 338°34.8 | | 2°14.5 | 26.6 | 19°13.0 | 53.8 | 231°01.6 | 47.1 | 337°46.3 | 59.6 |
| 14 | 353°37.2 | | 17°14.0 | 25.5 | 34°13.6 | 53.2 | 246°04.3 | 47.1 | 352°48.5 | 59.4 |
| 15 | 8°39.7 | | 32°13.5 | · · 24.3 | 49°14.1 | · · 52.6 | 261°06.9 | · · 47.2 | 7°50.7 | · · 59.3 |
| 16 | 23°42.2 | | 47°13.0 | 23.2 | 64°14.6 | 52.0 | 276°09.6 | 47.2 | 22°52.9 | 59.2 |
| 17 | 38°44.6 | | 62°12.5 | 22.1 | 79°15.1 | 51.4 | 291°12.3 | 47.2 | 37°55.1 | 59.1 |
| 18 | 53°47.1 | | 77°12.0 | S11°20.9 | 94°15.6 | S16°50.8 | 306°15.0 | N22°47.2 | 52°57.3 | S01°59.0 |
| 19 | 68°49.5 | | 92°11.5 | 19.8 | 109°16.1 | 50.3 | 321°17.7 | 47.3 | 67°59.5 | 58.9 |
| 20 | 83°52.0 | | 107°11.0 | 18.6 | 124°16.6 | 49.7 | 336°20.3 | 47.3 | 83°01.8 | 58.8 |
| 21 | 98°54.5 | | 122°10.5 | · · 17.5 | 139°17.1 | · · 49.1 | 351°23.0 | · · 47.3 | 98°04.0 | · · 58.7 |
| 22 | 113°56.9 | | 137°09.9 | 16.4 | 154°17.6 | 48.5 | 6°25.7 | 47.4 | 113°06.2 | 58.5 |
| 23 | 128°59.4 | | 152°09.4 | 15.2 | 169°18.1 | 47.9 | 21°28.4 | 47.4 | 128°08.4 | 58.4 |
| Mer.pass. 14:25 | | | ν-0.5' d-1.1' m-3.91 | | ν0.5' d-0.6' m1.12 | | ν2.7' d0.0' m-2.56 | | ν2.2' d-0.1' m1.02 | |
| Sat | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 144°01.9 | | 167°08.9 | S11°14.1 | 184°18.6 | S16°47.3 | 36°31.1 | N22°47.4 | 143°10.6 | S01°58.3 |
| 1 | 159°04.3 | | 182°08.4 | 12.9 | 199°19.1 | 46.7 | 51°33.7 | 47.4 | 158°12.8 | 58.2 |
| 2 | 174°06.8 | | 197°07.9 | 11.8 | 214°19.6 | 46.1 | 66°36.4 | 47.5 | 173°15.0 | 58.1 |
| 3 | 189°09.3 | | 212°07.4 | · · 10.7 | 229°20.1 | · · 45.5 | 81°39.1 | · · 47.5 | 188°17.3 | · · 58.0 |
| 4 | 204°11.7 | | 227°06.9 | 09.5 | 244°20.6 | 44.9 | 96°41.8 | 47.5 | 203°19.5 | 57.9 |
| 5 | 219°14.2 | | 242°06.4 | 08.4 | 259°21.1 | 44.3 | 111°44.4 | 47.5 | 218°21.7 | 57.7 |
| 6 | 234°16.7 | | 257°05.9 | S11°07.2 | 274°21.6 | S16°43.7 | 126°47.1 | N22°47.6 | 233°23.9 | S01°57.6 |
| 7 | 249°19.1 | | 272°05.4 | 06.1 | 289°22.1 | 43.1 | 141°49.8 | 47.6 | 248°26.1 | 57.5 |
| 8 | 264°21.6 | | 287°04.9 | 04.9 | 304°22.7 | 42.6 | 156°52.5 | 47.6 | 263°28.3 | 57.4 |
| 9 | 279°24.0 | | 302°04.4 | · · 03.8 | 319°23.2 | · · 42.0 | 171°55.1 | · · 47.7 | 278°30.5 | · · 57.3 |
| 10 | 294°26.5 | | 317°03.9 | 02.6 | 334°23.7 | 41.4 | 186°57.8 | 47.7 | 293°32.7 | 57.2 |
| 11 | 309°29.0 | | 332°03.4 | 01.5 | 349°24.2 | 40.8 | 202°00.5 | 47.7 | 308°35.0 | 57.1 |
| 12 | 324°31.4 | | 347°02.9 | S11°00.3 | 4°24.7 | S16°40.2 | 217°03.2 | N22°47.7 | 323°37.2 | S01°57.0 |
| 13 | 339°33.9 | | 2°02.4 | 10°59.2 | 19°25.2 | 39.6 | 232°05.8 | 47.8 | 338°39.4 | 56.8 |
| 14 | 354°36.4 | | 17°01.9 | 58.0 | 34°25.7 | 39.0 | 247°08.5 | 47.8 | 353°41.6 | 56.7 |
| 15 | 9°38.8 | | 32°01.4 | · · 56.9 | 49°26.2 | · · 38.4 | 262°11.2 | · · 47.8 | 8°43.8 | · · 56.6 |
| 16 | 24°41.3 | | 47°00.9 | 55.7 | 64°26.7 | 37.8 | 277°13.9 | 47.8 | 23°46.0 | 56.5 |
| 17 | 39°43.8 | | 62°00.4 | 54.6 | 79°27.2 | 37.2 | 292°16.5 | 47.9 | 38°48.2 | 56.4 |
| 18 | 54°46.2 | | 76°59.9 | S10°53.4 | 94°27.7 | S16°36.6 | 307°19.2 | N22°47.9 | 53°50.4 | S01°56.3 |
| 19 | 69°48.7 | | 91°59.4 | 52.3 | 109°28.2 | 36.0 | 322°21.9 | 47.9 | 68°52.7 | 56.2 |
| 20 | 84°51.2 | | 106°58.9 | 51.1 | 124°28.7 | 35.4 | 337°24.5 | 47.9 | 83°54.9 | 56.0 |
| 21 | 99°53.6 | | 121°58.4 | · · 50.0 | 139°29.3 | · · 34.8 | 352°27.2 | · · 48.0 | 98°57.1 | · · 55.9 |
| 22 | 114°56.1 | | 136°57.9 | 48.8 | 154°29.8 | 34.2 | 7°29.9 | 48.0 | 113°59.3 | 55.8 |
| 23 | 129°58.5 | | 151°57.4 | 47.7 | 169°30.3 | 33.6 | 22°32.6 | 48.0 | 129°01.5 | 55.7 |
| Mer.pass. 14:22 | | | ν-0.5' d-1.1' m-3.91 | | ν0.5' d-0.6' m1.12 | | ν2.7' d0.0' m-2.55 | | ν2.2' d-0.1' m1.02 | |

| Stars | | |
|-------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°34.1 | 29°14.1 |
| Ankaa | 353°06.5 | -42°10.0 |
| Schedar | 349°30.4 | 56°41.0 |
| Diphda | 348°46.6 | -17°50.7 |
| Achernar | 335°19.7 | -57°06.5 |
| Hamal | 327°50.3 | 23°35.2 |
| Polaris | 313°36.3 | 89°22.8 |
| Acamar | 315°11.1 | -40°12.2 |
| Menkar | 314°05.2 | 4°11.5 |
| Mirfak | 308°26.9 | 49°57.4 |
| Aldebaran | 290°38.5 | 16°33.7 |
| Rigel | 281°02.8 | -8°10.4 |
| Capella | 280°20.3 | 46°01.6 |
| Bellatrix | 278°21.7 | 6°22.3 |
| Elnath | 278°00.5 | 28°37.8 |
| Alnilam | 275°36.6 | -1°11.2 |
| Betelgeuse | 270°50.9 | 7°24.7 |
| Canopus | 263°51.6 | -52°42.8 |
| Sirius | 258°25.2 | -16°45.3 |
| Adhara | 255°04.8 | -29°00.6 |
| Procyon | 244°49.6 | 5°09.4 |
| Pollux | 243°15.8 | 27°57.7 |
| Avior | 234°13.8 | -59°35.7 |
| Suhail | 222°45.2 | -43°32.4 |
| Miaplacidus | 221°37.2 | -69°49.5 |
| Alphard | 217°46.5 | -8°46.4 |
| Regulus | 207°33.1 | 11°50.2 |
| Dubhe | 193°39.2 | 61°36.4 |
| Denebola | 182°23.7 | 14°25.4 |
| Gienah | 175°42.4 | -17°41.3 |
| Acrux | 172°58.6 | -63°14.5 |
| Gacrux | 171°50.2 | -57°15.5 |
| Alioth | 166°11.8 | 55°48.8 |
| Spica | 158°21.2 | -11°18.0 |
| Alkaid | 152°51.1 | 49°10.6 |
| Hadar | 148°34.5 | -60°29.8 |
| Menkent | 147°56.4 | -36°29.9 |
| Arcturus | 145°47.0 | 19°02.5 |
| Rigel Kent. | 139°38.9 | -60°56.4 |
| Kochab | 137°19.6 | 74°02.4 |
| Zuben'ubi | 136°54.9 | -16°09.1 |
| Alphecca | 126°03.0 | 26°37.3 |
| Antares | 112°14.8 | -26°29.4 |
| Atria | 107°08.4 | -69°04.2 |
| Sabik | 102°01.9 | -15°45.5 |
| Shaula | 96°09.3 | -37°07.3 |
| Rasalhague | 95°57.9 | 12°32.3 |
| Eltanin | 90°42.1 | 51°28.8 |
| Kaus Aust. | 83°31.6 | -34°22.3 |
| Vega | 80°32.9 | 38°48.2 |
| Nunki | 75°46.9 | -26°15.9 |
| Altair | 61°59.4 | -8°56.1 |
| Peacock | 53°04.8 | -56°39.0 |
| Deneb | 49°25.6 | 45°22.3 |
| Enif | 33°38.2 | 9°59.6 |
| Al Na'ir | 27°32.2 | -46°50.1 |
| Fomalhaut | 15°13.8 | -29°29.1 |
| Scheat | 13°44.6 | 28°13.5 |
| Markab | 13°29.3 | 15°20.7 |

| Feb 12 Thu | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 25°30.1 | 12:50 |
| Mars | 41°50.9 | 11:44 |
| Jupiter | 252°18.6 | 21:39 |
| Saturn | 359°20.7 | 14:32 |

| Feb 13 Fri | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 24°18.5 | 12:51 |
| Mars | 41°03.8 | 11:43 |
| Jupiter | 252°24.0 | 21:34 |
| Saturn | 359°14.7 | 14:29 |

| Feb 14 Sat | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 23°07.1 | 12:52 |
| Mars | 40°16.7 | 11:42 |
| Jupiter | 252°29.2 | 21:30 |
| Saturn | 359°08.7 | 14:25 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.1 |
| Mars: | 0.1 |

| h | | Sun | | Moon | | | |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 176°27.4 | S13°45.7 | 243°13.8 | 9.7' | S28°13.0 | 1.7' | 54.3' |
| 1 | 191°27.4 | 44.9 | 257°42.6 | 9.7' | 28°14.7 | 1.6' | 54.3' |
| 2 | 206°27.4 | 44.0 | 272°11.3 | 9.7' | 28°16.3 | 1.4' | 54.3' |
| 3 | 221°27.4 | · · 43.2 | 286°40.0 | 9.7' | 28°17.7 | 1.3' | 54.3' |
| 4 | 236°27.4 | 42.4 | 301°08.6 | 9.6' | 28°19.0 | 1.2' | 54.3' |
| 5 | 251°27.4 | 41.5 | 315°37.2 | 9.6' | 28°20.2 | 1.0' | 54.3' |
| 6 | 266°27.4 | S13°40.7 | 330°05.8 | 9.6' | S28°21.2 | 0.9' | 54.3' |
| 7 | 281°27.4 | 39.9 | 344°34.4 | 9.5' | 28°22.1 | 0.7' | 54.3' |
| 8 | 296°27.5 | 39.1 | 359°03.0 | 9.5' | 28°22.8 | 0.6' | 54.4' |
| 9 | 311°27.5 | · · 38.2 | 13°31.5 | 9.5' | 28°23.4 | 0.5' | 54.4' |
| 10 | 326°27.5 | 37.4 | 28°00.0 | 9.5' | 28°23.9 | 0.3' | 54.4' |
| 11 | 341°27.5 | 36.6 | 42°28.5 | 9.5' | 28°24.2 | 0.2' | 54.4' |
| 12 | 356°27.5 | S13°35.7 | 56°56.9 | 9.4' | S28°24.4 | 0.0' | 54.4' |
| 13 | 11°27.5 | 34.9 | 71°25.4 | 9.4' | 28°24.4 | -0.1' | 54.4' |
| 14 | 26°27.5 | 34.0 | 85°53.8 | 9.4' | 28°24.3 | -0.2' | 54.4' |
| 15 | 41°27.5 | · · 33.2 | 100°22.2 | 9.4' | 28°24.1 | -0.4' | 54.4' |
| 16 | 56°27.5 | 32.4 | 114°50.6 | 9.4' | 28°23.7 | -0.5' | 54.5' |
| 17 | 71°27.5 | 31.5 | 129°18.9 | 9.4' | 28°23.2 | -0.7' | 54.5' |
| 18 | 86°27.5 | S13°30.7 | 143°47.3 | 9.4' | S28°22.5 | -0.8' | 54.5' |
| 19 | 101°27.6 | 29.9 | 158°15.7 | 9.3' | 28°21.7 | -0.9' | 54.5' |
| 20 | 116°27.6 | 29.0 | 172°44.0 | 9.3' | 28°20.8 | -1.1' | 54.5' |
| 21 | 131°27.6 | · · 28.2 | 187°12.3 | 9.3' | 28°19.7 | -1.2' | 54.5' |
| 22 | 146°27.6 | 27.3 | 201°40.7 | 9.3' | 28°18.4 | -1.4' | 54.5' |
| 23 | 161°27.6 | 26.5 | 216°09.0 | 9.3' | 28°17.1 | -1.5' | 54.6' |
| SD = 16.2' $d = -0.8'$ | | | SD = 14.8' | | | | |
| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 176°27.6 | S13°25.7 | 230°37.3 | 9.3' | S28°15.5 | -1.7' | 54.6' |
| 1 | 191°27.6 | 24.8 | 245°05.6 | 9.3' | 28°13.9 | -1.8' | 54.6' |
| 2 | 206°27.6 | 24.0 | 259°33.9 | 9.3' | 28°12.1 | -1.9' | 54.6' |
| 3 | 221°27.7 | · · 23.2 | 274°02.2 | 9.3' | 28°10.1 | -2.1' | 54.6' |
| 4 | 236°27.7 | 22.3 | 288°30.5 | 9.3' | 28°08.0 | -2.2' | 54.6' |
| 5 | 251°27.7 | 21.5 | 302°58.8 | 9.3' | 28°05.8 | -2.4' | 54.6' |
| 6 | 266°27.7 | S13°20.6 | 317°27.1 | 9.3' | S28°03.4 | -2.5' | 54.7' |
| 7 | 281°27.7 | 19.8 | 331°55.4 | 9.3' | 28°00.9 | -2.7' | 54.7' |
| 8 | 296°27.7 | 18.9 | 346°23.7 | 9.3' | 27°58.3 | -2.8' | 54.7' |
| 9 | 311°27.7 | · · 18.1 | 0°52.0 | 9.3' | 27°55.4 | -2.9' | 54.7' |
| 10 | 326°27.8 | 17.3 | 15°20.3 | 9.3' | 27°52.5 | -3.1' | 54.7' |
| 11 | 341°27.8 | 16.4 | 29°48.6 | 9.3' | 27°49.4 | -3.2' | 54.7' |
| 12 | 356°27.8 | S13°15.6 | 44°17.0 | 9.3' | S27°46.2 | -3.4' | 54.8' |
| 13 | 11°27.8 | 14.7 | 58°45.3 | 9.4' | 27°42.8 | -3.5' | 54.8' |
| 14 | 26°27.8 | 13.9 | 73°13.7 | 9.4' | 27°39.3 | -3.7' | 54.8' |
| 15 | 41°27.8 | · · 13.0 | 87°42.0 | 9.4' | 27°35.6 | -3.8' | 54.8' |
| 16 | 56°27.9 | 12.2 | 102°10.4 | 9.4' | 27°31.8 | -3.9' | 54.8' |
| 17 | 71°27.9 | 11.3 | 116°38.8 | 9.4' | 27°27.9 | -4.1' | 54.9' |
| 18 | 86°27.9 | S13°10.5 | 131°07.2 | 9.4' | S27°23.8 | -4.2' | 54.9' |
| 19 | 101°27.9 | 09.7 | 145°35.6 | 9.4' | 27°19.6 | -4.4' | 54.9' |
| 20 | 116°27.9 | 08.8 | 160°04.1 | 9.5' | 27°15.2 | -4.5' | 54.9' |
| 21 | 131°27.9 | · · 08.0 | 174°32.5 | 9.5' | 27°10.7 | -4.6' | 54.9' |
| 22 | 146°28.0 | 07.1 | 189°01.0 | 9.5' | 27°06.1 | -4.8' | 54.9' |
| 23 | 161°28.0 | 06.3 | 203°29.5 | 9.5' | 27°01.3 | -4.9' | 55.0' |
| SD = 16.2' $d = -0.8'$ | | | SD = 14.9' | | | | |
| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 176°28.0 | S13°05.4 | 217°58.0 | 9.5' | S26°56.4 | -5.1' | 55.0' |
| 1 | 191°28.0 | 04.6 | 232°26.6 | 9.6' | 26°51.3 | -5.2' | 55.0' |
| 2 | 206°28.0 | 03.7 | 246°55.1 | 9.6' | 26°46.1 | -5.3' | 55.0' |
| 3 | 221°28.1 | · · 02.9 | 261°23.7 | 9.6' | 26°40.8 | -5.5' | 55.0' |
| 4 | 236°28.1 | 02.0 | 275°52.3 | 9.6' | 26°35.3 | -5.6' | 55.1' |
| 5 | 251°28.1 | 01.2 | 290°21.0 | 9.7' | 26°29.7 | -5.8' | 55.1' |
| 6 | 266°28.1 | S13°00.3 | 304°49.7 | 9.7' | S26°23.9 | -5.9' | 55.1' |
| 7 | 281°28.1 | 12°59.5 | 319°18.4 | 9.7' | 26°18.0 | -6.0' | 55.1' |
| 8 | 296°28.2 | 58.6 | 333°47.1 | 9.8' | 26°12.0 | -6.2' | 55.1' |
| 9 | 311°28.2 | · · 57.8 | 348°15.8 | 9.8' | 26°05.8 | -6.3' | 55.2' |
| 10 | 326°28.2 | 56.9 | 2°44.6 | 9.8' | 25°59.5 | -6.4' | 55.2' |
| 11 | 341°28.2 | 56.1 | 17°13.5 | 9.9' | 25°53.1 | -6.6' | 55.2' |
| 12 | 356°28.3 | S12°55.2 | 31°42.3 | 9.9' | S25°46.5 | -6.7' | 55.2' |
| 13 | 11°28.3 | 54.4 | 46°11.2 | 9.9' | 25°39.8 | -6.8' | 55.3' |
| 14 | 26°28.3 | 53.5 | 60°40.1 | 10.0' | 25°33.0 | -7.0' | 55.3' |
| 15 | 41°28.3 | · · 52.6 | 75°09.1 | 10.0' | 25°26.0 | -7.1' | 55.3' |
| 16 | 56°28.4 | 51.8 | 89°38.1 | 10.0' | 25°18.9 | -7.2' | 55.3' |
| 17 | 71°28.4 | 50.9 | 104°07.1 | 10.1' | 25°11.7 | -7.4' | 55.3' |
| 18 | 86°28.4 | S12°50.1 | 118°36.2 | 10.1' | S25°04.3 | -7.5' | 55.4' |
| 19 | 101°28.4 | 49.2 | 133°05.3 | 10.1' | 24°56.8 | -7.6' | 55.4' |
| 20 | 116°28.5 | 48.4 | 147°34.4 | 10.2' | 24°49.2 | -7.8' | 55.4' |
| 21 | 131°28.5 | · · 47.5 | 162°03.6 | 10.2' | 24°41.4 | -7.9' | 55.4' |
| 22 | 146°28.5 | 46.7 | 176°32.8 | 10.3' | 24°33.5 | -8.0' | 55.5' |
| 23 | 161°28.5 | 45.8 | 191°02.1 | 10.3' | 24°25.5 | -8.1' | 55.5' |
| SD = 16.2' $d = -0.8'$ | | | SD = 15.0' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 06:23 | 07:44 | 09:05 | 15:25 | 16:46 | 18:07 |
| N 70° | 06:20 | 07:33 | 08:43 | 15:46 | 16:57 | 18:10 |
| 68° | 06:18 | 07:24 | 08:26 | 16:03 | 17:06 | 18:12 |
| 66° | 06:16 | 07:16 | 08:13 | 16:17 | 17:13 | 18:14 |
| 64° | 06:14 | 07:10 | 08:01 | 16:28 | 17:20 | 18:16 |
| 62° | 06:12 | 07:04 | 07:52 | 16:38 | 17:25 | 18:17 |
| 60° | 06:10 | 06:59 | 07:44 | 16:46 | 17:30 | 18:19 |
| N 58° | 06:09 | 06:55 | 07:36 | 16:53 | 17:34 | 18:21 |
| 56° | 06:07 | 06:51 | 07:30 | 16:59 | 17:38 | 18:22 |
| 54° | 06:06 | 06:47 | 07:24 | 17:05 | 17:42 | 18:24 |
| 52° | 06:04 | 06:44 | 07:19 | 17:10 | 17:45 | 18:25 |
| 50° | 06:03 | 06:41 | 07:14 | 17:15 | 17:48 | 18:26 |
| 45° | 05:59 | 06:34 | 07:04 | 17:25 | 17:55 | 18:30 |
| N 40° | 05:56 | 06:28 | 06:55 | 17:33 | 18:01 | 18:33 |
| 35° | 05:52 | 06:22 | 06:48 | 17:41 | 18:07 | 18:36 |
| 30° | 05:49 | 06:17 | 06:42 | 17:47 | 18:12 | 18:40 |
| 20° | 05:42 | 06:08 | 06:30 | 17:58 | 18:21 | 18:47 |
| N 10° | 05:34 | 05:59 | 06:20 | 18:08 | 18:30 | 18:55 |
| 0° | 05:25 | 05:49 | 06:11 | 18:18 | 18:39 | 19:03 |
| S 10° | 05:14 | 05:39 | 06:01 | 18:27 | 18:49 | 19:14 |
| 20° | 05:01 | 05:28 | 05:51 | 18:37 | 19:00 | 19:27 |
| 30° | 04:44 | 05:14 | 05:39 | 18:49 | 19:14 | 19:44 |
| 35° | 04:33 | 05:05 | 05:32 | 18:56 | 19:23 | 19:55 |
| 40° | 04:20 | 04:55 | 05:24 | 19:04 | 19:33 | 20:07 |
| 45° | 04:03 | 04:42 | 05:14 | 19:13 | 19:45 | 20:24 |
| S 50° | 03:42 | 04:27 | 05:03 | 19:24 | 20:00 | 20:45 |
| 52° | 03:32 | 04:20 | 04:58 | 19:30 | 20:07 | 20:55 |
| 54° | 03:19 | 04:12 | 04:52 | 19:35 | 20:15 | 21:07 |
| 56° | 03:05 | 04:02 | 04:45 | 19:42 | 20:24 | 21:21 |
| 58° | 02:48 | 03:51 | 04:38 | 19:49 | 20:35 | 21:38 |
| S 60° | 02:26 | 03:39 | 04:29 | 19:57 | 20:47 | 21:59 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | ██ | ██ | ██ | ██ | ██ | ██ |
| N 70° | ██ | ██ | ██ | ██ | ██ | ██ |
| 68° | ██ | ██ | ██ | ██ | ██ | ██ |
| 66° | ██ | ██ | ██ | ██ | ██ | ██ |
| 64° | ██ | ██ | ██ | ██ | ██ | ██ |
| 62° | ██ | ██ | 08:18 | ██ | ██ | 11:27 |
| 60° | 06:40 | 07:24 | 07:40 | 09:27 | 10:33 | 12:05 |
| N 58° | 06:00 | 06:47 | 07:13 | 10:07 | 11:09 | 12:31 |
| 56° | 05:32 | 06:21 | 06:52 | 10:35 | 11:35 | 12:52 |
| 54° | 05:11 | 06:00 | 06:35 | 10:57 | 11:56 | 13:09 |
| 52° | 04:53 | 05:43 | 06:20 | 11:14 | 12:13 | 13:24 |
| 50° | 04:37 | 05:28 | 06:07 | 11:30 | 12:28 | 13:36 |
| 45° | 04:07 | 04:58 | 05:40 | 12:01 | 12:57 | 14:02 |
| N 40° | 03:43 | 04:34 | 05:19 | 12:24 | 13:21 | 14:23 |
| 35° | 03:23 | 04:15 | 05:01 | 12:44 | 13:40 | 14:40 |
| 30° | 03:07 | 03:58 | 04:46 | 13:01 | 13:56 | 14:55 |
| 20° | 02:38 | 03:30 | 04:20 | 13:29 | 14:23 | 15:20 |
| N 10° | 02:14 | 03:06 | 03:57 | 13:54 | 14:47 | 15:41 |
| 0° | 01:51 | 02:44 | 03:36 | 14:17 | 15:09 | 16:01 |
| S 10° | 01:29 | 02:21 | 03:15 | 14:39 | 15:31 | 16:21 |
| 20° | 01:05 | 01:57 | 02:52 | 15:04 | 15:54 | 16:42 |
| 30° | 00:37 | 01:29 | 02:26 | 15:32 | 16:22 | 17:06 |
| 35° | 00:20 | 01:12 | 02:11 | 15:49 | 16:38 | 17:20 |
| 40° | 00:01 | 00:53 | 01:52 | 16:08 | 16:56 | 17:37 |
| 45° | · · · | 00:29 | 01:31 | 16:32 | 17:18 | 17:56 |
| S 50° | 23:59 | · · · | 01:03 | 17:02 | 17:47 | 18:21 |
| 52° | 23:44 | · · · | 00:49 | 17:17 | 18:01 | 18:32 |
| 54° | 23:26 | · · · | 00:33 | 17:35 | 18:17 | 18:46 |
| 56° | 23:05 | · · · | 00:14 | 17:56 | 18:36 | 19:01 |
| 58° | 22:38 | 23:51 | · · · | 18:23 | 18:59 | 19:19 |
| S 60° | 22:00 | 23:21 | · · · | 19:02 | 19:30 | 19:41 |

| Day | Sun | | Mer. Pass | Moon | | Age |
|-----|--|--------------------------|-----------|----------------|----------------|-----|
| | Eqn. of Time 00 ^h mm:ss | 12 ^h mm:ss | | Upper hh:mm | Lower hh:mm | |
| 12 | 14:10 | 14:10 | 12:14 | 08:04 | 20:30 | |
| 13 | 14:10 | 14:09 | 12:14 | 08:56 | 21:23 | |
| 14 | 14:08 | 14:07 | 12:14 | 09:49 | 22:14 | |

February 15, 16, 17 UT (Sun., Mon., Tue.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------------------|----------|----------|--------------------|----------|----------|--------------------|----------|---------|--------------------|-----|--------|-----|-----|
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 145°01.0 | 166°56.9 | S10°46.5 | 184°30.8 | S16°33.0 | 37°35.2 | N22°48.1 | 144°03.7 | S01°55.6 | | | | | | |
| 1 | 160°03.5 | 181°56.4 | 45.4 | 199°31.3 | 32.4 | 52°37.9 | 48.1 | 159°05.9 | 55.5 | | | | | | |
| 2 | 175°05.9 | 196°55.9 | 44.2 | 214°31.8 | 31.8 | 67°40.6 | 48.1 | 174°08.1 | 55.4 | | | | | | |
| 3 | 190°08.4 | 211°55.4 | · · 43.0 | 229°32.3 | · · 31.2 | 82°43.2 | · · 48.1 | 189°10.3 | · · 55.3 | | | | | | |
| 4 | 205°10.9 | 226°54.9 | 41.9 | 244°32.8 | 30.6 | 97°45.9 | 48.2 | 204°12.6 | 55.1 | | | | | | |
| 5 | 220°13.3 | 241°54.4 | 40.7 | 259°33.3 | 30.0 | 112°48.6 | 48.2 | 219°14.8 | 55.0 | | | | | | |
| 6 | 235°15.8 | 256°54.0 | S10°39.6 | 274°33.9 | S16°29.4 | 127°51.2 | N22°48.2 | 234°17.0 | S01°54.9 | | | | | | |
| 7 | 250°18.3 | 271°53.5 | 38.4 | 289°34.4 | 28.8 | 142°53.9 | 48.2 | 249°19.2 | 54.8 | | | | | | |
| 8 | 265°20.7 | 286°53.0 | 37.3 | 304°34.9 | 28.2 | 157°56.6 | 48.3 | 264°21.4 | 54.7 | | | | | | |
| 9 | 280°23.2 | 301°52.5 | · · 36.1 | 319°35.4 | · · 27.6 | 172°59.2 | · · 48.3 | 279°23.6 | · · 54.6 | | | | | | |
| 10 | 295°25.7 | 316°52.0 | 34.9 | 334°35.9 | 27.0 | 188°01.9 | 48.3 | 294°25.8 | 54.5 | | | | | | |
| 11 | 310°28.1 | 331°51.5 | 33.8 | 349°36.4 | 26.4 | 203°04.6 | 48.3 | 309°28.0 | 54.3 | | | | | | |
| 12 | 325°30.6 | 346°51.0 | S10°32.6 | 4°36.9 | S16°25.8 | 218°07.2 | N22°48.4 | 324°30.2 | S01°54.2 | | | | | | |
| 13 | 340°33.0 | 1°50.5 | 31.5 | 19°37.4 | 25.2 | 233°09.9 | 48.4 | 339°32.5 | 54.1 | | | | | | |
| 14 | 355°35.5 | 16°50.0 | 30.3 | 34°37.9 | 24.6 | 248°12.6 | 48.4 | 354°34.7 | 54.0 | | | | | | |
| 15 | 10°38.0 | 31°49.5 | · · 29.1 | 49°38.5 | · · 24.0 | 263°15.2 | · · 48.4 | 9°36.9 | · · 53.9 | | | | | | |
| 16 | 25°40.4 | 46°49.0 | 28.0 | 64°39.0 | 23.4 | 278°17.9 | 48.5 | 24°39.1 | 53.8 | | | | | | |
| 17 | 40°42.9 | 61°48.6 | 26.8 | 79°39.5 | 22.8 | 293°20.6 | 48.5 | 39°41.3 | 53.7 | | | | | | |
| 18 | 55°45.4 | 76°48.1 | S10°25.6 | 94°40.0 | S16°22.2 | 308°23.2 | N22°48.5 | 54°43.5 | S01°53.5 | | | | | | |
| 19 | 70°47.8 | 91°47.6 | 24.5 | 109°40.5 | 21.6 | 323°25.9 | 48.5 | 69°45.7 | 53.4 | | | | | | |
| 20 | 85°50.3 | 106°47.1 | 23.3 | 124°41.0 | 21.0 | 338°28.6 | 48.6 | 84°47.9 | 53.3 | | | | | | |
| 21 | 100°52.8 | 121°46.6 | · · 22.2 | 139°41.5 | · · 20.4 | 353°31.2 | · · 48.6 | 99°50.1 | · · 53.2 | | | | | | |
| 22 | 115°55.2 | 136°46.1 | 21.0 | 154°42.1 | 19.7 | 8°33.9 | 48.6 | 114°52.4 | 53.1 | | | | | | |
| 23 | 130°57.7 | 151°45.6 | 19.8 | 169°42.6 | 19.1 | 23°36.6 | 48.6 | 129°54.6 | 53.0 | | | | | | |
| Mer.pass. 14:18 | | ν-0.5' d-1.2' m-3.91 | | | ν0.5' d-0.6' m1.13 | | | ν2.7' d0.0' m-2.54 | | | ν2.2' d-0.1' m1.02 | | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 146°00.1 | 166°45.2 | S10°18.7 | 184°43.1 | S16°18.5 | 38°39.2 | N22°48.7 | 144°56.8 | S01°52.9 | | | | | | |
| 1 | 161°02.6 | 181°44.7 | 17.5 | 199°43.6 | 17.9 | 53°41.9 | 48.7 | 159°59.0 | 52.7 | | | | | | |
| 2 | 176°05.1 | 196°44.2 | 16.3 | 214°44.1 | 17.3 | 68°44.5 | 48.7 | 175°01.2 | 52.6 | | | | | | |
| 3 | 191°07.5 | 211°43.7 | · · 15.2 | 229°44.6 | · · 16.7 | 83°47.2 | · · 48.7 | 190°03.4 | · · 52.5 | | | | | | |
| 4 | 206°10.0 | 226°43.2 | 14.0 | 244°45.1 | 16.1 | 98°49.9 | 48.8 | 205°05.6 | 52.4 | | | | | | |
| 5 | 221°12.5 | 241°42.7 | 12.8 | 259°45.7 | 15.5 | 113°52.5 | 48.8 | 220°07.8 | 52.3 | | | | | | |
| 6 | 236°14.9 | 256°42.2 | S10°11.7 | 274°46.2 | S16°14.9 | 128°55.2 | N22°48.8 | 235°10.0 | S01°52.2 | | | | | | |
| 7 | 251°17.4 | 271°41.8 | 10.5 | 289°46.7 | 14.3 | 143°57.8 | 48.8 | 250°12.2 | 52.1 | | | | | | |
| 8 | 266°19.9 | 286°41.3 | 09.3 | 304°47.2 | 13.7 | 159°00.5 | 48.9 | 265°14.4 | 51.9 | | | | | | |
| 9 | 281°22.3 | 301°40.8 | · · 08.1 | 319°47.7 | · · 13.1 | 174°03.2 | · · 48.9 | 280°16.7 | · · 51.8 | | | | | | |
| 10 | 296°24.8 | 316°40.3 | 07.0 | 334°48.2 | 12.5 | 189°05.8 | 48.9 | 295°18.9 | 51.7 | | | | | | |
| 11 | 311°27.3 | 331°39.8 | 05.8 | 349°48.7 | 11.8 | 204°08.5 | 48.9 | 310°21.1 | 51.6 | | | | | | |
| 12 | 326°29.7 | 346°39.4 | S10°04.6 | 4°49.3 | S16°11.2 | 219°11.1 | N22°49.0 | 325°23.3 | S01°51.5 | | | | | | |
| 13 | 341°32.2 | 1°38.9 | 03.5 | 19°49.8 | 10.6 | 234°13.8 | 49.0 | 340°25.5 | 51.4 | | | | | | |
| 14 | 356°34.6 | 16°38.4 | 02.3 | 34°50.3 | 10.0 | 249°16.5 | 49.0 | 355°27.7 | 51.3 | | | | | | |
| 15 | 11°37.1 | 31°37.9 | 10°01.1 | 49°50.8 | · · 09.4 | 264°19.1 | · · 49.0 | 10°29.9 | · · 51.1 | | | | | | |
| 16 | 26°39.6 | 46°37.4 | 09°59.9 | 64°51.3 | 08.8 | 279°21.8 | 49.1 | 25°32.1 | 51.0 | | | | | | |
| 17 | 41°42.0 | 61°37.0 | 58.8 | 79°51.8 | 08.2 | 294°24.4 | 49.1 | 40°34.3 | 50.9 | | | | | | |
| 18 | 56°44.5 | 76°36.5 | S09°57.6 | 94°52.4 | S16°07.6 | 309°27.1 | N22°49.1 | 55°36.5 | S01°50.8 | | | | | | |
| 19 | 71°47.0 | 91°36.0 | 56.4 | 109°52.9 | 07.0 | 324°29.7 | 49.1 | 70°38.7 | 50.7 | | | | | | |
| 20 | 86°49.4 | 106°35.5 | 55.2 | 124°53.4 | 06.3 | 339°32.4 | 49.2 | 85°41.0 | 50.6 | | | | | | |
| 21 | 101°51.9 | 121°35.0 | · · 54.1 | 139°53.9 | · · 05.7 | 354°35.1 | · · 49.2 | 100°43.2 | · · 50.5 | | | | | | |
| 22 | 116°54.4 | 136°34.6 | 52.9 | 154°54.4 | 05.1 | 9°37.7 | 49.2 | 115°45.4 | 50.3 | | | | | | |
| 23 | 131°56.8 | 151°34.1 | 51.7 | 169°55.0 | 04.5 | 24°40.4 | 49.2 | 130°47.6 | 50.2 | | | | | | |
| Mer.pass. 14:14 | | ν-0.5' d-1.2' m-3.91 | | | ν0.5' d-0.6' m1.13 | | | ν2.7' d0.0' m-2.54 | | | ν2.2' d-0.1' m1.01 | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 146°59.3 | 166°33.6 | S09°50.5 | 184°55.5 | S16°03.9 | 39°43.0 | N22°49.3 | 145°49.8 | S01°50.1 | | | | | | |
| 1 | 162°01.8 | 181°33.1 | 49.4 | 199°56.0 | 03.3 | 54°45.7 | 49.3 | 160°52.0 | 50.0 | | | | | | |
| 2 | 177°04.2 | 196°32.7 | 48.2 | 214°56.5 | 02.7 | 69°48.3 | 49.3 | 175°54.2 | 49.9 | | | | | | |
| 3 | 192°06.7 | 211°32.2 | · · 47.0 | 229°57.0 | · · 02.1 | 84°51.0 | · · 49.3 | 190°56.4 | · · 49.8 | | | | | | |
| 4 | 207°09.1 | 226°31.7 | 45.8 | 244°57.5 | 01.4 | 99°53.6 | 49.4 | 205°58.6 | 49.6 | | | | | | |
| 5 | 222°11.6 | 241°31.2 | 44.6 | 259°58.1 | 00.8 | 114°56.3 | 49.4 | 221°00.8 | 49.5 | | | | | | |
| 6 | 237°14.1 | 256°30.8 | S09°43.5 | 274°58.6 | S16°00.2 | 129°58.9 | N22°49.4 | 236°03.0 | S01°49.4 | | | | | | |
| 7 | 252°16.5 | 271°30.3 | 42.3 | 289°59.1 | 15°59.6 | 145°01.6 | 49.4 | 251°05.2 | 49.3 | | | | | | |
| 8 | 267°19.0 | 286°29.8 | 41.1 | 304°59.6 | 59.0 | 160°04.2 | 49.5 | 266°07.5 | 49.2 | | | | | | |
| 9 | 282°21.5 | 301°29.3 | · · 39.9 | 320°00.1 | · · 58.4 | 175°06.9 | · · 49.5 | 281°09.7 | · · 49.1 | | | | | | |
| 10 | 297°23.9 | 316°28.9 | 38.7 | 335°00.7 | 57.7 | 190°09.5 | 49.5 | 296°11.9 | 49.0 | | | | | | |
| 11 | 312°26.4 | 331°28.4 | 37.6 | 350°01.2 | 57.1 | 205°12.2 | 49.5 | 311°14.1 | 48.8 | | | | | | |
| 12 | 327°28.9 | 346°27.9 | S09°36.4 | 5°01.7 | S15°56.5 | 220°14.8 | N22°49.6 | 326°16.3 | S01°48.7 | | | | | | |
| 13 | 342°31.3 | 1°27.5 | 35.2 | 20°02.2 | 55.9 | 235°17.5 | 49.6 | 341°18.5 | 48.6 | | | | | | |
| 14 | 357°33.8 | 16°27.0 | 34.0 | 35°02.8 | 55.3 | 250°20.1 | 49.6 | 356°20.7 | 48.5 | | | | | | |
| 15 | 12°36.2 | 31°26.5 | · · 32.8 | 50°03.3 | · · 54.7 | 265°22.8 | · · 49.6 | 11°22.9 | · · 48.4 | | | | | | |
| 16 | 27°38.7 | 46°26.1 | 31.6 | 65°03.8 | 54.0 | 280°25.4 | 49.7 | 26°25.1 | 48.3 | | | | | | |
| 17 | 42°41.2 | 61°25.6 | 30.5 | 80°04.3 | 53.4 | 295°28.1 | 49.7 | 41°27.3 | 48.2 | | | | | | |
| 18 | 57°43.6 | 76°25.1 | S09°29.3 | 95°04.8 | S15°52.8 | 310°30.7 | N22°49.7 | 56°29.5 | S01°48.0 | | | | | | |
| 19 | 72°46.1 | 91°24.6 | 28.1 | 110°05.4 | 52.2 | 325°33.4 | 49.7 | 71°31.7 | 47.9 | | | | | | |
| 20 | 87°48.6 | 106°24.2 | 26.9 | 125°05.9 | 51.6 | 340°36.0 | 49.7 | 86°33.9 | 47.8 | | | | | | |
| 21 | 102°51.0 | 121°23.7 | · · 25.7 | 140°06.4 | · · 50.9 | 355°38.7 | · · 49.8 | 101°36.1 | · · 47.7 | | | | | | |
| 22 | 117°53.5 | 136°23.2 | 24.5 | 155°06.9 | 50.3 | 10°41.3 | 49.8 | 116°38.4 | 47.6 | | | | | | |
| 23 | 132°56.0 | 151°22.8 | 23.3 | 170°07.4 | 49.7 | 25°44.0 | 49.8 | 131°40.6 | 47.5 | | | | | | |
| Mer.pass. 14:10 | | ν-0.5' d-1.2' m-3.91 | | | ν0.5' d-0.6' m1.13 | | | ν2.7' d0.0' m-2.53 | | | ν2.2' d-0.1' m1.01 | | | | |

| Stars | | |
|----------------------------|------------|-----------------|
| | SHA | Dec |
| Alpheratz | 357° 34.1 | 29° 14.1 |
| Ankaa | 353° 06.5 | -42° 10.0 |
| Schedar | 349° 30.4 | 56° 41.0 |
| Diphda | 348° 46.6 | -17° 50.7 |
| Achernar | 335° 19.8 | -57° 06.5 |
| Hamal | 327° 50.3 | 23° 35.2 |
| Polaris | 313° 37.8 | 89° 22.8 |
| Acamar | 315° 11.1 | -40° 12.2 |
| Menkar | 314° 05.2 | 4° 11.5 |
| Mirfak | 308° 26.9 | 49° 57.4 |
| Aldebaran | 290° 38.5 | 16° 33.7 |
| Rigel | 281° 02.8 | -8° 10.4 |
| Capella | 280° 20.3 | 46° 01.6 |
| Bellatrix | 278° 21.7 | 6° 22.3 |
| Elnath | 278° 00.5 | 28° 37.8 |
| Alnilam | 275° 36.6 | -1° 11.2 |
| Betelgeuse | 270° 50.9 | 7° 24.7 |
| Canopus | 263° 51.6 | -52° 42.8 |
| Sirius | 258° 25.2 | -16° 45.3 |
| Adhara | 255° 04.8 | -29° 00.6 |
| Procyon | 244° 49.6 | 5° 09.4 |
| Pollux | 243° 15.8 | 27° 57.7 |
| Avior | 234° 13.8 | -59° 35.7 |
| Suhail | 222° 45.2 | -43° 32.4 |
| Miaplacidus | 221° 37.2 | -69° 49.5 |
| Alphard | 217° 46.5 | -8° 46.4 |
| Regulus | 207° 33.1 | 11° 50.2 |
| Dubhe | 193° 39.2 | 61° 36.4 |
| Denebola | 182° 23.7 | 14° 25.4 |
| Gienah | 175° 42.4 | -17° 41.3 |
| Acrux | 172° 58.6 | -63° 14.5 |
| Gacrux | 171° 50.2 | -57° 15.5 |
| Alioth | 166° 11.7 | 55° 48.8 |
| Spica | 158° 21.1 | -11° 18.0 |
| Alkaid | 152° 51.0 | 49° 10.6 |
| Hadar | 148° 34.4 | -60° 29.8 |
| Menkent | 147° 56.4 | -36° 29.9 |
| Arcturus | 145° 46.9 | 19° 02.5 |
| Rigel Kent. | 139° 38.8 | -60° 56.4 |
| Kochab | 137° 19.5 | 74° 02.4 |
| Zuben'ubi | 136° 54.9 | -16° 09.1 |
| Alphecca | 126° 02.9 | 26° 37.3 |
| Antares | 112° 14.8 | -26° 29.4 |
| Atria | 107° 08.3 | -69° 04.2 |
| Sabik | 102° 01.8 | -15° 45.5 |
| Shaula | 96° 09.3 | -37° 07.3 |
| Rasalhague | 95° 57.8 | 12° 32.3 |
| Eltanin | 90° 42.0 | 51° 28.8 |
| Kaus Aust. | 83° 31.5 | -34° 22.3 |
| Vega | 80° 32.9 | 38° 48.2 |
| Nunki | 75° 46.9 | -26° 15.9 |
| Altair | 61° 59.3 | 8° 56.1 |
| Peacock | 53° 04.8 | -56° 39.0 |
| Deneb | 49° 25.6 | 45° 22.3 |
| Enif | 33° 38.2 | 9° 59.6 |
| Al Na'ir | 27° 32.2 | -46° 50.1 |
| Fomalhaut | 15° 13.8 | -29° 29.1 |
| Scheat | 13° 44.6 | 28° 13.5 |
| Markab | 13° 29.3 | 15° 20.7 |
| <hr/> | | |
| Feb 15 Sun | SHA | Mer.pass |
| Venus | 21° 55.9 | 12:53 |
| Mars | 39° 29.8 | 11:42 |
| Jupiter | 252° 34.2 | 21:26 |
| Saturn | 359° 02.7 | 14:22 |
| <hr/> | | |
| Feb 16 Mon | SHA | Mer.pass |
| Venus | 20° 45.0 | 12:53 |
| Mars | 38° 42.9 | 11:41 |
| Jupiter | 252° 39.1 | 21:22 |
| Saturn | 358° 56.6 | 14:18 |
| <hr/> | | |
| Feb 17 Tue | SHA | Mer.pass |
| Venus | 19° 34.3 | 12:54 |
| Mars | 37° 56.2 | 11:40 |
| Jupiter | 252° 43.7 | 21:17 |
| Saturn | 358° 50.5 | 14:15 |
| <hr/> | | |
| Horizontal parallax | | |
| | Venus: | 0.1 |
| | Mars: | 0.1 |

| h | Sun | | | Moon | | | |
|------------------------|----------|----------|----------|------------|----------|----------|--------------|
| | Sun | GHA | Dec | GHA | ν | Dec | HP |
| 0 | | 176°28.6 | S12°44.9 | 205°31.4 | 10.3' | S24°17.4 | -8.3' 55.5' |
| 1 | | 191°28.6 | 44.1 | 220°00.8 | 10.4' | 24°09.1 | -8.4' 55.5' |
| 2 | | 206°28.6 | 43.2 | 234°30.2 | 10.4' | 24°00.7 | -8.5' 55.5' |
| 3 | | 221°28.7 | · · 42.4 | 248°59.6 | 10.5' | 23°52.2 | -8.7' 55.6' |
| 4 | | 236°28.7 | 41.5 | 263°29.1 | 10.5' | 23°43.5 | -8.8' 55.6' |
| 5 | | 251°28.7 | 40.7 | 277°58.6 | 10.6' | 23°34.7 | -8.9' 55.6' |
| 6 | | 266°28.7 | S12°39.8 | 292°28.1 | 10.6' | S23°25.8 | -9.0' 55.6' |
| 7 | | 281°28.8 | 38.9 | 306°57.8 | 10.7' | 23°16.8 | -9.1' 55.7' |
| 8 | | 296°28.8 | 38.1 | 321°27.4 | 10.7' | 23°07.7 | -9.3' 55.7' |
| 9 | | 311°28.8 | · · 37.2 | 335°57.1 | 10.7' | 22°58.4 | -9.4' 55.7' |
| 10 | | 326°28.9 | 36.4 | 350°26.8 | 10.8' | 22°49.0 | -9.5' 55.7' |
| 11 | | 341°28.9 | 35.5 | 4°56.6 | 10.8' | 22°39.5 | -9.6' 55.8' |
| 12 | | 356°28.9 | S12°34.6 | 19°26.5 | 10.9' | S22°29.9 | -9.7' 55.8' |
| 13 | | 11°29.0 | 33.8 | 33°56.3 | 10.9' | 22°20.1 | -9.9' 55.8' |
| 14 | | 26°29.0 | 32.9 | 48°26.3 | 11.0' | 22°10.3 | -10.0' 55.8' |
| 15 | | 41°29.0 | · · 32.0 | 62°56.2 | 11.0' | 22°00.3 | -10.1' 55.9' |
| 16 | | 56°29.0 | 31.2 | 77°26.2 | 11.1' | 21°50.2 | -10.2' 55.9' |
| 17 | | 71°29.1 | 30.3 | 91°56.3 | 11.1' | 21°40.0 | -10.3' 55.9' |
| 18 | | 86°29.1 | S12°29.5 | 106°26.4 | 11.2' | S21°29.7 | -10.4' 55.9' |
| 19 | | 101°29.1 | 28.6 | 120°56.6 | 11.2' | 21°19.2 | -10.6' 56.0' |
| 20 | | 116°29.2 | 27.7 | 135°26.8 | 11.3' | 21°08.7 | -10.7' 56.0' |
| 21 | | 131°29.2 | · · 26.9 | 149°57.0 | 11.3' | 20°58.0 | -10.8' 56.0' |
| 22 | | 146°29.2 | 26.0 | 164°27.3 | 11.3' | 20°47.2 | -10.9' 56.0' |
| 23 | | 161°29.3 | 25.1 | 178°57.7 | 11.4' | 20°36.4 | -11.0' 56.0' |
| SD = 16.2' $d = -0.9'$ | | | | SD = 15.1' | | | |
| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 176°29.3 | S12°24.3 | 193°28.1 | 11.4' | S20°25.4 | -11.1' | 56.1' |
| 1 | 191°29.4 | 23.4 | 207°58.5 | 11.5' | 20°14.3 | -11.2' | 56.1' |
| 2 | 206°29.4 | 22.5 | 222°29.0 | 11.5' | 20°03.1 | -11.3' | 56.1' |
| 3 | 221°29.4 | · · 21.7 | 236°59.5 | 11.6' | 19°51.8 | -11.4' | 56.1' |
| 4 | 236°29.5 | 20.8 | 251°30.1 | 11.6' | 19°40.3 | -11.5' | 56.2' |
| 5 | 251°29.5 | 19.9 | 266°00.7 | 11.7' | 19°28.8 | -11.6' | 56.2' |
| 6 | 266°29.5 | S12°19.1 | 280°31.4 | 11.7' | S19°17.2 | -11.7' | 56.2' |
| 7 | 281°29.6 | 18.2 | 295°02.1 | 11.8' | 19°05.5 | -11.8' | 56.2' |
| 8 | 296°29.6 | 17.3 | 309°32.9 | 11.8' | 18°53.6 | -11.9' | 56.3' |
| 9 | 311°29.6 | · · 16.5 | 324°03.7 | 11.9' | 18°41.7 | -12.0' | 56.3' |
| 10 | 326°29.7 | 15.6 | 338°34.5 | 11.9' | 18°29.7 | -12.1' | 56.3' |
| 11 | 341°29.7 | 14.7 | 353°05.4 | 11.9' | 18°17.5 | -12.2' | 56.3' |
| 12 | 356°29.8 | S12°13.9 | 7°36.4 | 12.0' | S18°05.3 | -12.3' | 56.4' |
| 13 | 11°29.8 | 13.0 | 22°07.4 | 12.0' | 17°53.0 | -12.4' | 56.4' |
| 14 | 26°29.8 | 12.1 | 36°38.4 | 12.1' | 17°40.6 | -12.5' | 56.4' |
| 15 | 41°29.9 | · · 11.2 | 51°09.5 | 12.1' | 17°28.1 | -12.6' | 56.4' |
| 16 | 56°29.9 | 10.4 | 65°40.6 | 12.2' | 17°15.5 | -12.7' | 56.5' |
| 17 | 71°30.0 | 09.5 | 80°11.8 | 12.2' | 17°02.8 | -12.8' | 56.5' |
| 18 | 86°30.0 | S12°08.6 | 94°43.0 | 12.2' | S16°50.0 | -12.9' | 56.5' |
| 19 | 101°30.0 | 07.8 | 109°14.2 | 12.3' | 16°37.1 | -13.0' | 56.5' |
| 20 | 116°30.1 | 06.9 | 123°45.5 | 12.3' | 16°24.1 | -13.1' | 56.6' |
| 21 | 131°30.1 | · · 06.0 | 138°16.8 | 12.4' | 16°11.1 | -13.1' | 56.6' |
| 22 | 146°30.2 | 05.1 | 152°48.2 | 12.4' | 15°57.9 | -13.2' | 56.6' |
| 23 | 161°30.2 | 04.3 | 167°19.6 | 12.5' | 15°44.7 | -13.3' | 56.6' |
| SD = 16.2' $d = -0.9'$ | | | | SD = 15.3' | | | |
| Tue | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 176°30.2 | S12°03.4 | 181°51.1 | 12.5' | S15°31.4 | -13.4' | 56.7' |
| 1 | 191°30.3 | 02.5 | 196°22.6 | 12.5' | 15°18.0 | -13.5' | 56.7' |
| 2 | 206°30.3 | 01.6 | 210°54.1 | 12.6' | 15°04.5 | -13.6' | 56.7' |
| 3 | 221°30.4 | 12°00.8 | 225°25.7 | 12.6' | 14°50.9 | -13.6' | 56.7' |
| 4 | 236°30.4 | 11°59.9 | 239°57.3 | 12.6' | 14°37.3 | -13.7' | 56.8' |
| 5 | 251°30.5 | 59.0 | 254°28.9 | 12.7' | 14°23.5 | -13.8' | 56.8' |
| 6 | 266°30.5 | S11°58.1 | 269°00.6 | 12.7' | S14°09.7 | -13.9' | 56.8' |
| 7 | 281°30.5 | 57.3 | 283°32.3 | 12.8' | 13°55.9 | -14.0' | 56.8' |
| 8 | 296°30.6 | 56.4 | 298°04.1 | 12.8' | 13°41.9 | -14.0' | 56.9' |
| 9 | 311°30.6 | · · 55.5 | 312°35.9 | 12.8' | 13°27.9 | -14.1' | 56.9' |
| 10 | 326°30.7 | 54.6 | 327°07.7 | 12.9' | 13°13.8 | -14.2' | 56.9' |
| 11 | 341°30.7 | 53.8 | 341°39.6 | 12.9' | 12°59.6 | -14.3' | 56.9' |
| 12 | 356°30.8 | S11°52.9 | 356°11.5 | 12.9' | S12°45.3 | -14.3' | 57.0' |
| 13 | 11°30.8 | 52.0 | 10°43.4 | 13.0' | 12°31.0 | -14.4' | 57.0' |
| 14 | 26°30.9 | 51.1 | 25°15.3 | 13.0' | 12°16.6 | -14.5' | 57.0' |
| 15 | 41°30.9 | · · 50.2 | 39°47.3 | 13.0' | 12°02.2 | -14.5' | 57.0' |
| 16 | 56°31.0 | 49.4 | 54°19.3 | 13.0' | 11°47.6 | -14.6' | 57.1' |
| 17 | 71°31.0 | 48.5 | 68°51.4 | 13.1' | 11°33.0 | -14.7' | 57.1' |
| 18 | 86°31.0 | S11°47.6 | 83°23.4 | 13.1' | S11°18.4 | -14.7' | 57.1' |
| 19 | 101°31.1 | 46.7 | 97°55.5 | 13.1' | 11°03.7 | -14.8' | 57.1' |
| 20 | 116°31.1 | 45.8 | 112°27.6 | 13.1' | 10°48.9 | -14.8' | 57.1' |
| 21 | 131°31.2 | · · 45.0 | 126°59.8 | 13.2' | 10°34.0 | -14.9' | 57.2' |
| 22 | 146°31.2 | 44.1 | 141°32.0 | 13.2' | 10°19.1 | -15.0' | 57.2' |
| 23 | 161°31.3 | 43.2 | 156°04.1 | 13.2' | 10°04.2 | -15.0' | 57.2' |
| SD = 16.2' $d = -0.9'$ | | | | SD = 15.5' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 06:10 | 07:30 | 08:48 | 15:42 | 17:00 | 18:20 |
| N 70° | 06:09 | 07:21 | 08:29 | 16:01 | 17:09 | 18:21 |
| 68° | 06:08 | 07:13 | 08:14 | 16:16 | 17:17 | 18:22 |
| 66° | 06:07 | 07:06 | 08:02 | 16:28 | 17:23 | 18:23 |
| 64° | 06:05 | 07:01 | 07:52 | 16:38 | 17:28 | 18:24 |
| 62° | 06:04 | 06:56 | 07:43 | 16:46 | 17:33 | 18:25 |
| 60° | 06:03 | 06:52 | 07:35 | 16:54 | 17:37 | 18:26 |
| N 58° | 06:02 | 06:48 | 07:29 | 17:00 | 17:41 | 18:27 |
| 56° | 06:01 | 06:44 | 07:23 | 17:06 | 17:45 | 18:28 |
| 54° | 06:00 | 06:41 | 07:18 | 17:11 | 17:48 | 18:29 |
| 52° | 05:59 | 06:38 | 07:13 | 17:16 | 17:51 | 18:30 |
| 50° | 05:58 | 06:36 | 07:09 | 17:20 | 17:53 | 18:31 |
| 45° | 05:55 | 06:29 | 07:00 | 17:29 | 17:59 | 18:34 |
| N 40° | 05:52 | 06:24 | 06:52 | 17:37 | 18:05 | 18:36 |
| 35° | 05:50 | 06:19 | 06:45 | 17:44 | 18:09 | 18:39 |
| 30° | 05:47 | 06:15 | 06:39 | 17:49 | 18:14 | 18:42 |
| 20° | 05:40 | 06:06 | 06:29 | 18:00 | 18:22 | 18:48 |
| N 10° | 05:33 | 05:58 | 06:19 | 18:09 | 18:30 | 18:55 |
| 0° | 05:25 | 05:49 | 06:11 | 18:17 | 18:39 | 19:03 |
| S 10° | 05:15 | 05:40 | 06:02 | 18:26 | 18:48 | 19:13 |
| 20° | 05:03 | 05:29 | 05:52 | 18:36 | 18:58 | 19:25 |
| 30° | 04:47 | 05:16 | 05:41 | 18:46 | 19:11 | 19:41 |
| 35° | 04:36 | 05:08 | 05:35 | 18:53 | 19:19 | 19:51 |
| 40° | 04:24 | 04:59 | 05:27 | 19:00 | 19:29 | 20:03 |
| 45° | 04:09 | 04:47 | 05:19 | 19:09 | 19:40 | 20:18 |
| S 50° | 03:49 | 04:33 | 05:08 | 19:19 | 19:54 | 20:38 |
| 52° | 03:39 | 04:26 | 05:03 | 19:24 | 20:01 | 20:47 |
| 54° | 03:28 | 04:18 | 04:58 | 19:29 | 20:08 | 20:58 |
| 56° | 03:15 | 04:10 | 04:52 | 19:35 | 20:16 | 21:11 |
| 58° | 02:59 | 04:00 | 04:45 | 19:41 | 20:26 | 21:26 |
| S 60° | 02:39 | 03:49 | 04:38 | 19:49 | 20:37 | 21:45 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | ■ | ■ | 09:21 | ■ | ■ | 15:38 |
| N 70° | ■ | 09:57 | 08:56 | ■ | 13:21 | 16:01 |
| 68° | ■ | 09:13 | 08:37 | ■ | 14:03 | 16:18 |
| 66° | 09:27 | 08:44 | 08:22 | 12:06 | 14:31 | 16:32 |
| 64° | 08:40 | 08:21 | 08:09 | 12:52 | 14:53 | 16:43 |
| 62° | 08:10 | 08:03 | 07:58 | 13:22 | 15:10 | 16:52 |
| 60° | 07:46 | 07:48 | 07:49 | 13:44 | 15:24 | 17:01 |
| N 58° | 07:28 | 07:36 | 07:41 | 14:02 | 15:35 | 17:08 |
| 56° | 07:12 | 07:25 | 07:33 | 14:18 | 15:46 | 17:14 |
| 54° | 06:58 | 07:15 | 07:27 | 14:30 | 15:55 | 17:19 |
| 52° | 06:47 | 07:06 | 07:21 | 14:42 | 16:03 | 17:24 |
| 50° | 06:36 | 06:58 | 07:16 | 14:52 | 16:10 | 17:29 |
| 45° | 06:14 | 06:41 | 07:04 | 15:13 | 16:25 | 17:39 |
| N 40° | 05:56 | 06:27 | 06:54 | 15:30 | 16:38 | 17:47 |
| 35° | 05:41 | 06:16 | 06:46 | 15:44 | 16:49 | 17:53 |
| 30° | 05:28 | 06:05 | 06:39 | 15:56 | 16:58 | 17:59 |
| 20° | 05:05 | 05:47 | 06:26 | 16:17 | 17:14 | 18:10 |
| N 10° | 04:46 | 05:32 | 06:15 | 16:35 | 17:27 | 18:18 |
| 0° | 04:27 | 05:17 | 06:05 | 16:51 | 17:40 | 18:27 |
| S 10° | 04:09 | 05:02 | 05:54 | 17:08 | 17:53 | 18:35 |
| 20° | 03:49 | 04:46 | 05:43 | 17:26 | 18:06 | 18:44 |
| 30° | 03:26 | 04:28 | 05:30 | 17:46 | 18:21 | 18:53 |
| 35° | 03:13 | 04:17 | 05:22 | 17:58 | 18:30 | 18:59 |
| 40° | 02:57 | 04:05 | 05:14 | 18:11 | 18:40 | 19:05 |
| 45° | 02:39 | 03:50 | 05:03 | 18:27 | 18:52 | 19:13 |
| S 50° | 02:15 | 03:33 | 04:51 | 18:46 | 19:06 | 19:22 |
| 52° | 02:04 | 03:24 | 04:45 | 18:55 | 19:12 | 19:26 |
| 54° | 01:51 | 03:15 | 04:39 | 19:05 | 19:19 | 19:30 |
| 56° | 01:36 | 03:04 | 04:32 | 19:17 | 19:27 | 19:35 |
| 58° | 01:19 | 02:51 | 04:24 | 19:30 | 19:36 | 19:40 |
| S 60° | 00:57 | 02:37 | 04:15 | 19:45 | 19:46 | 19:46 |

| Day | Sun | | | Moon | | |
|-----|---|----------------------------------|-----------------------|-----------------------------|----------------|---------------------|
| | Eqn.of Time 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 28-0 7-0% |
| 15 | 14:06 | 14:04 | 12:14 | 10:40 | 23:04 | |
| 16 | 14:03 | 14:01 | 12:14 | 11:29 | 23:52 | |
| 17 | 13:59 | 13:57 | 12:14 | 12:16 | --- | |

February 18, 19, 20 UT (Wed., Thu., Fri.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------------------|----------|----------|--------------------|----------|----------|--------------------|----------|---------|--------------------|-----|--------|-----|-----|
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 147°58.4 | 166°22.3 | S09°22.1 | 185°08.0 | S15°49.1 | 40°46.6 | N22°49.8 | 146°42.8 | S01°47.3 | | | | | | |
| 1 | 163°00.9 | 181°21.8 | 21.0 | 200°08.5 | 48.5 | 55°49.3 | 49.9 | 161°45.0 | 47.2 | | | | | | |
| 2 | 178°03.4 | 196°21.4 | 19.8 | 215°09.0 | 47.8 | 70°51.9 | 49.9 | 176°47.2 | 47.1 | | | | | | |
| 3 | 193°05.8 | 211°20.9 | •• 18.6 | 230°09.5 | •• 47.2 | 85°54.6 | •• 49.9 | 191°49.4 | •• 47.0 | | | | | | |
| 4 | 208°08.3 | 226°20.4 | 17.4 | 245°10.1 | 46.6 | 100°57.2 | 49.9 | 206°51.6 | 46.9 | | | | | | |
| 5 | 223°10.7 | 241°20.0 | 16.2 | 260°10.6 | 46.0 | 115°59.9 | 50.0 | 221°53.8 | 46.8 | | | | | | |
| 6 | 238°13.2 | 256°19.5 | S09°15.0 | 275°11.1 | S15°45.4 | 131°02.5 | N22°50.0 | 236°56.0 | S01°46.7 | | | | | | |
| 7 | 253°15.7 | 271°19.1 | 13.8 | 290°11.6 | 44.7 | 146°05.1 | 50.0 | 251°58.2 | 46.5 | | | | | | |
| 8 | 268°18.1 | 286°18.6 | 12.6 | 305°12.2 | 44.1 | 161°07.8 | 50.0 | 267°00.4 | 46.4 | | | | | | |
| 9 | 283°20.6 | 301°18.1 | •• 11.4 | 320°12.7 | •• 43.5 | 176°10.4 | •• 50.0 | 282°02.6 | •• 46.3 | | | | | | |
| 10 | 298°23.1 | 316°17.7 | 10.2 | 335°13.2 | 42.9 | 191°13.1 | 50.1 | 297°04.8 | 46.2 | | | | | | |
| 11 | 313°25.5 | 331°17.2 | 09.1 | 350°13.7 | 42.2 | 206°15.7 | 50.1 | 312°07.0 | 46.1 | | | | | | |
| 12 | 328°28.0 | 346°16.7 | S09°07.9 | 5°14.3 | S15°41.6 | 221°18.4 | N22°50.1 | 327°09.2 | S01°46.0 | | | | | | |
| 13 | 343°30.5 | 1°16.3 | 06.7 | 20°14.8 | 41.0 | 236°21.0 | 50.1 | 342°11.4 | 45.8 | | | | | | |
| 14 | 358°32.9 | 16°15.8 | 05.5 | 35°15.3 | 40.4 | 251°23.6 | 50.2 | 357°13.6 | 45.7 | | | | | | |
| 15 | 13°35.4 | 31°15.4 | •• 04.3 | 50°15.8 | •• 39.8 | 266°26.3 | •• 50.2 | 12°15.9 | •• 45.6 | | | | | | |
| 16 | 28°37.9 | 46°14.9 | 03.1 | 65°16.4 | 39.1 | 281°28.9 | 50.2 | 27°18.1 | 45.5 | | | | | | |
| 17 | 43°40.3 | 61°14.4 | 01.9 | 80°16.9 | 38.5 | 296°31.6 | 50.2 | 42°20.3 | 45.4 | | | | | | |
| 18 | 58°42.8 | 76°14.0 | S09°00.7 | 95°17.4 | S15°37.9 | 311°34.2 | N22°50.3 | 57°22.5 | S01°45.3 | | | | | | |
| 19 | 73°45.2 | 91°13.5 | 08°59.5 | 110°17.9 | 37.3 | 326°36.8 | 50.3 | 72°24.7 | 45.1 | | | | | | |
| 20 | 88°47.7 | 106°13.1 | 58.3 | 125°18.5 | 36.6 | 341°39.5 | 50.3 | 87°26.9 | 45.0 | | | | | | |
| 21 | 103°50.2 | 121°12.6 | •• 57.1 | 140°19.0 | •• 36.0 | 356°42.1 | •• 50.3 | 102°29.1 | •• 44.9 | | | | | | |
| 22 | 118°52.6 | 136°12.1 | 55.9 | 155°19.5 | 35.4 | 11°44.8 | 50.3 | 117°31.3 | 44.8 | | | | | | |
| 23 | 133°55.1 | 151°11.7 | 54.7 | 170°20.0 | 34.7 | 26°47.4 | 50.4 | 132°33.5 | 44.7 | | | | | | |
| Mer.pass. 14:06 | | ν-0.5' d-1.2' m-3.91 | | | ν0.5' d-0.6' m1.13 | | | ν2.6' d0.0' m-2.52 | | | ν2.2' d-0.1' m1.01 | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 148°57.6 | 166°11.2 | S08°53.5 | 185°20.6 | S15°34.1 | 41°50.0 | N22°50.4 | 147°35.7 | S01°44.6 | | | | | | |
| 1 | 164°00.0 | 181°10.8 | 52.3 | 200°21.1 | 33.5 | 56°52.7 | 50.4 | 162°37.9 | 44.5 | | | | | | |
| 2 | 179°02.5 | 196°10.3 | 51.1 | 215°21.6 | 32.9 | 71°55.3 | 50.4 | 177°40.1 | 44.3 | | | | | | |
| 3 | 194°05.0 | 211°09.8 | •• 49.9 | 230°22.2 | •• 32.2 | 86°58.0 | •• 50.5 | 192°42.3 | •• 44.2 | | | | | | |
| 4 | 209°07.4 | 226°09.4 | 48.7 | 245°22.7 | 31.6 | 102°00.6 | 50.5 | 207°44.5 | 44.1 | | | | | | |
| 5 | 224°09.9 | 241°08.9 | 47.5 | 260°23.2 | 31.0 | 117°03.2 | 50.5 | 222°46.7 | 44.0 | | | | | | |
| 6 | 239°12.3 | 256°08.5 | S08°46.3 | 275°23.7 | S15°30.4 | 132°05.9 | N22°50.5 | 237°48.9 | S01°43.9 | | | | | | |
| 7 | 254°14.8 | 271°08.0 | 45.1 | 290°24.3 | 29.7 | 147°08.5 | 50.5 | 252°51.1 | 43.8 | | | | | | |
| 8 | 269°17.3 | 286°07.6 | 43.9 | 305°24.8 | 29.1 | 162°11.1 | 50.6 | 267°53.3 | 43.6 | | | | | | |
| 9 | 284°19.7 | 301°07.1 | •• 42.7 | 320°25.3 | •• 28.5 | 177°13.8 | •• 50.6 | 282°55.5 | •• 43.5 | | | | | | |
| 10 | 299°22.2 | 316°06.7 | 41.5 | 335°25.9 | 27.8 | 192°16.4 | 50.6 | 297°57.7 | 43.4 | | | | | | |
| 11 | 314°24.7 | 331°06.2 | 40.3 | 350°26.4 | 27.2 | 207°19.0 | 50.6 | 313°00.0 | 43.3 | | | | | | |
| 12 | 329°27.1 | 346°05.8 | S08°39.1 | 5°26.9 | S15°26.6 | 222°21.7 | N22°50.6 | 328°02.2 | S01°43.2 | | | | | | |
| 13 | 344°29.6 | 1°05.3 | 37.9 | 20°27.4 | 25.9 | 237°24.3 | 50.7 | 343°04.4 | 43.1 | | | | | | |
| 14 | 359°32.1 | 16°04.8 | 36.7 | 35°28.0 | 25.3 | 252°26.9 | 50.7 | 358°06.6 | 42.9 | | | | | | |
| 15 | 14°34.5 | 31°04.4 | •• 35.5 | 50°28.5 | •• 24.7 | 267°29.6 | •• 50.7 | 13°08.8 | •• 42.8 | | | | | | |
| 16 | 29°37.0 | 46°03.9 | 34.3 | 65°29.0 | 24.0 | 282°32.2 | 50.7 | 28°11.0 | 42.7 | | | | | | |
| 17 | 44°39.5 | 61°03.5 | 33.1 | 80°29.6 | 23.4 | 297°34.8 | 50.8 | 43°13.2 | 42.6 | | | | | | |
| 18 | 59°41.9 | 76°03.0 | S08°31.9 | 95°30.1 | S15°22.8 | 312°37.5 | N22°50.8 | 58°15.4 | S01°42.5 | | | | | | |
| 19 | 74°44.4 | 91°02.6 | 30.7 | 110°30.6 | 22.2 | 327°40.1 | 50.8 | 73°17.6 | 42.4 | | | | | | |
| 20 | 89°46.8 | 106°02.1 | 29.5 | 125°31.2 | 21.5 | 342°42.7 | 50.8 | 88°19.8 | 42.2 | | | | | | |
| 21 | 104°49.3 | 121°01.7 | •• 28.3 | 140°31.7 | •• 20.9 | 357°45.4 | •• 50.8 | 103°22.0 | •• 42.1 | | | | | | |
| 22 | 119°51.8 | 136°01.2 | 27.1 | 155°32.2 | 20.3 | 12°48.0 | 50.9 | 118°24.2 | 42.0 | | | | | | |
| 23 | 134°54.2 | 151°00.8 | 25.9 | 170°32.7 | 19.6 | 27°50.6 | 50.9 | 133°26.4 | 41.9 | | | | | | |
| Mer.pass. 14:02 | | ν-0.5' d-1.2' m-3.91 | | | ν0.5' d-0.6' m1.13 | | | ν2.6' d0.0' m-2.51 | | | ν2.2' d-0.1' m1.01 | | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 149°56.7 | 166°00.3 | S08°24.6 | 185°33.3 | S15°19.0 | 42°53.3 | N22°50.9 | 148°28.6 | S01°41.8 | | | | | | |
| 1 | 164°59.2 | 180°59.9 | 23.4 | 200°33.8 | 18.4 | 57°55.9 | 50.9 | 163°30.8 | 41.7 | | | | | | |
| 2 | 180°01.6 | 195°59.4 | 22.2 | 215°34.3 | 17.7 | 72°58.5 | 50.9 | 178°33.0 | 41.5 | | | | | | |
| 3 | 195°04.1 | 210°59.0 | •• 21.0 | 230°34.9 | •• 17.1 | 88°01.2 | •• 51.0 | 193°35.2 | •• 41.4 | | | | | | |
| 4 | 210°06.6 | 225°58.5 | 19.8 | 245°35.4 | 16.5 | 103°03.8 | 51.0 | 208°37.4 | 41.3 | | | | | | |
| 5 | 225°09.0 | 240°58.1 | 18.6 | 260°35.9 | 15.8 | 118°06.4 | 51.0 | 223°39.6 | 41.2 | | | | | | |
| 6 | 240°11.5 | 255°57.7 | S08°17.4 | 275°36.5 | S15°15.2 | 133°09.0 | N22°51.0 | 238°41.8 | S01°41.1 | | | | | | |
| 7 | 255°13.9 | 270°57.2 | 16.2 | 290°37.0 | 14.5 | 148°11.7 | 51.1 | 253°44.0 | 41.0 | | | | | | |
| 8 | 270°16.4 | 285°56.8 | 15.0 | 305°37.5 | 13.9 | 163°14.3 | 51.1 | 268°46.2 | 40.8 | | | | | | |
| 9 | 285°18.9 | 300°56.3 | •• 13.8 | 320°38.1 | •• 13.3 | 178°16.9 | •• 51.1 | 283°48.4 | •• 40.7 | | | | | | |
| 10 | 300°21.3 | 315°55.9 | 12.6 | 335°38.6 | 12.6 | 193°19.5 | 51.1 | 298°50.6 | 40.6 | | | | | | |
| 11 | 315°23.8 | 330°55.4 | 11.3 | 350°39.1 | 12.0 | 208°22.2 | 51.1 | 313°52.8 | 40.5 | | | | | | |
| 12 | 330°26.3 | 345°55.0 | S08°10.1 | 5°39.7 | S15°11.4 | 223°24.8 | N22°51.2 | 328°55.0 | S01°40.4 | | | | | | |
| 13 | 345°28.7 | 0°54.5 | 08.9 | 20°40.2 | 10.7 | 238°27.4 | 51.2 | 343°57.2 | 40.3 | | | | | | |
| 14 | 0°31.2 | 15°54.1 | 07.7 | 35°40.7 | 10.1 | 253°30.0 | 51.2 | 358°59.4 | 40.1 | | | | | | |
| 15 | 15°33.7 | 30°53.6 | •• 06.5 | 50°41.3 | •• 09.5 | 268°32.7 | •• 51.2 | 14°01.6 | •• 40.0 | | | | | | |
| 16 | 30°36.1 | 45°53.2 | 05.3 | 65°41.8 | 08.8 | 283°35.3 | 51.2 | 29°03.8 | 39.9 | | | | | | |
| 17 | 45°38.6 | 60°52.8 | 04.1 | 80°42.3 | 08.2 | 298°37.9 | 51.3 | 44°06.0 | 39.8 | | | | | | |
| 18 | 60°41.1 | 75°52.3 | S08°02.9 | 95°42.9 | S15°07.5 | 313°40.5 | N22°51.3 | 59°08.3 | S01°39.7 | | | | | | |
| 19 | 75°43.5 | 90°51.9 | 01.6 | 110°43.4 | 06.9 | 328°43.2 | 51.3 | 74°10.5 | 39.6 | | | | | | |
| 20 | 90°46.0 | 105°51.4 | 08°00.4 | 125°43.9 | 06.3 | 343°45.8 | 51.3 | 89°12.7 | 39.4 | | | | | | |
| 21 | 105°48.4 | 120°51.0 | 07°59.2 | 140°44.5 | •• 05.6 | 358°48.4 | •• 51.3 | 104°14.9 | •• 39.3 | | | | | | |
| 22 | 120°50.9 | 135°50.5 | 58.0 | 155°45.0 | 05.0 | 13°51.0 | 51.4 | 119°17.1 | 39.2 | | | | | | |
| 23 | 135°53.4 | 150°50.1 | 56.8 | 170°45.6 | 04.3 | 28°53.7 | 51.4 | 134°19.3 | 39.1 | | | | | | |
| Mer.pass. 13:58 | | ν-0.4' d-1.2' m-3.91 | | | ν0.5' d-0.6' m1.13 | | | ν2.6' d0.0' m-2.51 | | | ν2.2' d-0.1' m1.01 | | | | |

| Stars | | |
|----------------------------|------------|-----------------|
| | SHA | Dec |
| Alpheratz | 357° 34.1 | 29° 14.1 |
| Ankaa | 353° 06.5 | -42° 10.0 |
| Schedar | 349° 30.4 | 56° 41.0 |
| Diphda | 348° 46.6 | -17° 50.7 |
| Achernar | 335° 19.8 | -57° 06.5 |
| Hamal | 327° 50.3 | 23° 35.2 |
| Polaris | 313° 39.5 | 89° 22.8 |
| Acamar | 315° 11.1 | -40° 12.2 |
| Menkar | 314° 05.2 | 4° 11.5 |
| Mirfak | 308° 27.0 | 49° 57.4 |
| Aldebaran | 290° 38.5 | 16° 33.7 |
| Rigel | 281° 02.8 | -8° 10.4 |
| Capella | 280° 20.3 | 46° 01.6 |
| Bellatrix | 278° 21.7 | 6° 22.3 |
| Elnath | 278° 00.5 | 28° 37.8 |
| Alnilam | 275° 36.6 | -1° 11.2 |
| Betelgeuse | 270° 50.9 | 7° 24.7 |
| Canopus | 263° 51.7 | -52° 42.8 |
| Sirius | 258° 25.2 | -16° 45.3 |
| Adhara | 255° 04.9 | -29° 00.6 |
| Procyon | 244° 49.6 | 5° 09.4 |
| Pollux | 243° 15.8 | 27° 57.7 |
| Avior | 234° 13.8 | -59° 35.7 |
| Suhail | 222° 45.2 | -43° 32.4 |
| Miaplacidus | 221° 37.2 | -69° 49.5 |
| Alphard | 217° 46.5 | -8° 46.5 |
| Regulus | 207° 33.1 | 11° 50.2 |
| Dubhe | 193° 39.2 | 61° 36.4 |
| Denebola | 182° 23.7 | 14° 25.4 |
| Gienah | 175° 42.4 | -17° 41.3 |
| Acrux | 172° 58.5 | -63° 14.6 |
| Gacrux | 171° 50.2 | -57° 15.5 |
| Alioth | 166° 11.7 | 55° 48.8 |
| Spica | 158° 21.1 | -11° 18.0 |
| Alkaid | 152° 51.0 | 49° 10.6 |
| Hadar | 148° 34.4 | -60° 29.8 |
| Menkent | 147° 56.3 | -36° 29.9 |
| Arcturus | 145° 46.9 | 19° 02.5 |
| Rigel Kent. | 139° 38.8 | -60° 56.4 |
| Kochab | 137° 19.5 | 74° 02.4 |
| Zuben'ubi | 136° 54.9 | -16° 09.1 |
| Alphecca | 126° 02.9 | 26° 37.3 |
| Antares | 112° 14.7 | -26° 29.4 |
| Atria | 107° 08.3 | -69° 04.2 |
| Sabik | 102° 01.8 | -15° 45.5 |
| Shaula | 96° 09.3 | -37° 07.3 |
| Rasalhague | 95° 57.8 | 12° 32.2 |
| Eltanin | 90° 42.0 | 51° 28.8 |
| Kaus Aust. | 83° 31.5 | -34° 22.3 |
| Vega | 80° 32.9 | 38° 48.2 |
| Nunki | 75° 46.9 | -26° 15.9 |
| Altair | 61° 59.3 | 8° 56.1 |
| Peacock | 53° 04.8 | -56° 39.0 |
| Deneb | 49° 25.6 | 45° 22.3 |
| Enif | 33° 38.2 | 9° 59.6 |
| Al Na'ir | 27° 32.2 | -46° 50.1 |
| Fomalhaut | 15° 13.8 | -29° 29.1 |
| Scheat | 13° 44.6 | 28° 13.5 |
| Markab | 13° 29.3 | 15° 20.7 |
| Feb 18 Wed | SHA | Mer.pass |
| Venus | 18° 23.9 | 12:55 |
| Mars | 37° 09.5 | 11:39 |
| Jupiter | 252° 48.2 | 21:13 |
| Saturn | 358° 44.3 | 14:11 |
| Feb 19 Thu | SHA | Mer.pass |
| Venus | 17° 13.7 | 12:56 |
| Mars | 36° 23.0 | 11:38 |
| Jupiter | 252° 52.5 | 21:09 |
| Saturn | 358° 38.1 | 14:08 |
| Feb 20 Fri | SHA | Mer.pass |
| Venus | 16° 03.6 | 12:56 |
| Mars | 35° 36.6 | 11:37 |
| Jupiter | 252° 56.6 | 21:05 |
| Saturn | 358° 31.9 | 14:04 |
| Horizontal parallax | | |
| | Venus: | 0.1 |
| | Mars: | 0.1 |

| h | Sun | | | Moon | | | | |
|------------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| Wed | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 176°31.3 | S11°42.3 | | 170°36.4 | 13.2' | S09°49.1 | -15.1' | 57.2' |
| 1 | 191°31.4 | 41.4 | | 185°08.6 | 13.3' | 09°34.1 | -15.1' | 57.3' |
| 2 | 206°31.4 | 40.6 | | 199°40.9 | 13.3' | 09°18.9 | -15.2' | 57.3' |
| 3 | 221°31.5 | 39.7 | | 214°13.1 | 13.3' | 09°03.7 | -15.2' | 57.3' |
| 4 | 236°31.5 | 38.8 | | 228°45.4 | 13.3' | 08°48.5 | -15.3' | 57.3' |
| 5 | 251°31.6 | 37.9 | | 243°17.8 | 13.3' | 08°33.2 | -15.3' | 57.4' |
| 6 | 266°31.6 | S11°37.0 | | 257°50.1 | 13.4' | S08°17.9 | -15.4' | 57.4' |
| 7 | 281°31.7 | 36.1 | | 272°22.5 | 13.4' | 08°02.5 | -15.4' | 57.4' |
| 8 | 296°31.7 | 35.3 | | 286°54.8 | 13.4' | 07°47.0 | -15.5' | 57.4' |
| 9 | 311°31.8 | 34.4 | | 301°27.2 | 13.4' | 07°31.5 | -15.5' | 57.4' |
| 10 | 326°31.9 | 33.5 | | 315°59.6 | 13.4' | 07°16.0 | -15.6' | 57.5' |
| 11 | 341°31.9 | 32.6 | | 330°32.0 | 13.4' | 07°00.4 | -15.6' | 57.5' |
| 12 | 356°32.0 | S11°31.7 | | 345°04.4 | 13.4' | S06°44.8 | -15.7' | 57.5' |
| 13 | 11°32.0 | 30.8 | | 359°36.9 | 13.4' | 06°29.1 | -15.7' | 57.5' |
| 14 | 26°32.1 | 29.9 | | 14°09.3 | 13.4' | 06°13.4 | -15.7' | 57.6' |
| 15 | 41°32.1 | 29.1 | | 28°41.8 | 13.5' | 05°57.7 | -15.8' | 57.6' |
| 16 | 56°32.2 | 28.2 | | 43°14.2 | 13.5' | 05°41.9 | -15.8' | 57.6' |
| 17 | 71°32.2 | 27.3 | | 57°46.7 | 13.5' | 05°26.1 | -15.9' | 57.6' |
| 18 | 86°32.3 | S11°26.4 | | 72°19.1 | 13.5' | S05°10.2 | -15.9' | 57.6' |
| 19 | 101°32.3 | 25.5 | | 86°51.6 | 13.5' | 04°54.4 | -15.9' | 57.7' |
| 20 | 116°32.4 | 24.6 | | 101°24.1 | 13.5' | 04°38.4 | -16.0' | 57.7' |
| 21 | 131°32.4 | 23.7 | | 115°56.6 | 13.5' | 04°22.5 | -16.0' | 57.7' |
| 22 | 146°32.5 | 22.8 | | 130°29.1 | 13.5' | 04°06.5 | -16.0' | 57.7' |
| 23 | 161°32.6 | 22.0 | | 145°01.5 | 13.5' | 03°50.5 | -16.0' | 57.7' |
| SD = 16.2' $d = -0.9'$ | | | SD = 15.6' | | | | | |

| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|--------|-------|
| 0 | 176°32.6 | S11°21.1 | 159°34.0 | 13.5' | S03°34.4 | -16.1' | 57.8' |
| 1 | 191°32.7 | 20.2 | 174°06.5 | 13.5' | 03°18.4 | -16.1' | 57.8' |
| 2 | 206°32.7 | 19.3 | 188°39.0 | 13.5' | 03°02.3 | -16.1' | 57.8' |
| 3 | 221°32.8 | 18.4 | 203°11.4 | 13.5' | 02°46.1 | -16.1' | 57.8' |
| 4 | 236°32.8 | 17.5 | 217°43.9 | 13.5' | 02°30.0 | -16.2' | 57.8' |
| 5 | 251°32.9 | 16.6 | 232°16.4 | 13.5' | 02°13.8 | -16.2' | 57.9' |
| 6 | 266°33.0 | S11°15.7 | 246°48.8 | 13.4' | S01°57.7 | -16.2' | 57.9' |
| 7 | 281°33.0 | 14.8 | 261°21.3 | 13.4' | 01°41.5 | -16.2' | 57.9' |
| 8 | 296°33.1 | 13.9 | 275°53.7 | 13.4' | 01°25.2 | -16.2' | 57.9' |
| 9 | 311°33.1 | 13.1 | 290°26.1 | 13.4' | 01°09.0 | -16.3' | 57.9' |
| 10 | 326°33.2 | 12.2 | 304°58.5 | 13.4' | 00°52.7 | -16.3' | 58.0' |
| 11 | 341°33.3 | 11.3 | 319°30.9 | 13.4' | 00°36.5 | -16.3' | 58.0' |
| 12 | 356°33.3 | S11°10.4 | 334°03.3 | 13.4' | S00°20.2 | -16.3' | 58.0' |
| 13 | 11°33.4 | 09.5 | 348°35.7 | 13.3' | S00°03.9 | -16.3' | 58.0' |
| 14 | 26°33.4 | 08.6 | 3°08.0 | 13.3' | N00°12.4 | 16.3' | 58.0' |
| 15 | 41°33.5 | 07.7 | 17°40.3 | 13.3' | 00°28.7 | 16.3' | 58.0' |
| 16 | 56°33.6 | 06.8 | 32°12.6 | 13.3' | 00°45.0 | 16.3' | 58.1' |
| 17 | 71°33.6 | 05.9 | 46°44.9 | 13.3' | 01°01.3 | 16.3' | 58.1' |
| 18 | 86°33.7 | S11°05.0 | 61°17.2 | 13.2' | N01°17.7 | 16.3' | 58.1' |
| 19 | 101°33.7 | 04.1 | 75°49.4 | 13.2' | 01°34.0 | 16.3' | 58.1' |
| 20 | 116°33.8 | 03.2 | 90°21.7 | 13.2' | 01°50.3 | 16.3' | 58.1' |
| 21 | 131°33.9 | 02.3 | 104°53.9 | 13.2' | 02°06.7 | 16.3' | 58.2' |
| 22 | 146°33.9 | 01.4 | 119°26.0 | 13.1' | 02°23.0 | 16.3' | 58.2' |
| 23 | 161°34.0 | 00.5 | 133°58.2 | 13.1' | 02°39.3 | 16.3' | 58.2' |
| SD = 16.2' $d = -0.9'$ | | | SD = 15.8' | | | | |

| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 176°34.1 | S10°59.6 | 148°30.3 | 13.1' | N02°55.6 | 16.3' | 58.2' |
| 1 | 191°34.1 | 58.7 | 163°02.4 | 13.1' | 03°11.9 | 16.3' | 58.2' |
| 2 | 206°34.2 | 57.8 | 177°34.4 | 13.0' | 03°28.3 | 16.3' | 58.2' |
| 3 | 221°34.2 | 56.9 | 192°06.4 | 13.0' | 03°44.6 | 16.3' | 58.3' |
| 4 | 236°34.3 | 56.0 | 206°38.4 | 12.9' | 04°00.8 | 16.3' | 58.3' |
| 5 | 251°34.4 | 55.1 | 221°10.4 | 12.9' | 04°17.1 | 16.3' | 58.3' |
| 6 | 266°34.4 | S10°54.3 | 235°42.3 | 12.9' | N04°33.4 | 16.3' | 58.3' |
| 7 | 281°34.5 | 53.4 | 250°14.2 | 12.8' | 04°49.7 | 16.2' | 58.3' |
| 8 | 296°34.6 | 52.5 | 264°46.0 | 12.8' | 05°05.9 | 16.2' | 58.3' |
| 9 | 311°34.6 | 51.6 | 279°17.8 | 12.8' | 05°22.1 | 16.2' | 58.3' |
| 10 | 326°34.7 | 50.7 | 293°49.6 | 12.7' | 05°38.3 | 16.2' | 58.4' |
| 11 | 341°34.8 | 49.8 | 308°21.3 | 12.7' | 05°54.5 | 16.2' | 58.4' |
| 12 | 356°34.8 | S10°48.9 | 322°52.9 | 12.6' | N06°10.7 | 16.1' | 58.4' |
| 13 | 11°34.9 | 48.0 | 337°24.6 | 12.6' | 06°26.8 | 16.1' | 58.4' |
| 14 | 26°35.0 | 47.1 | 351°56.1 | 12.5' | 06°42.9 | 16.1' | 58.4' |
| 15 | 41°35.0 | 46.2 | 6°27.7 | 12.5' | 06°59.0 | 16.1' | 58.4' |
| 16 | 56°35.1 | 45.3 | 20°59.2 | 12.4' | 07°15.1 | 16.0' | 58.5' |
| 17 | 71°35.2 | 44.4 | 35°30.6 | 12.4' | 07°31.1 | 16.0' | 58.5' |
| 18 | 86°35.2 | S10°43.4 | 50°02.0 | 12.3' | N07°47.1 | 16.0' | 58.5' |
| 19 | 101°35.3 | 42.5 | 64°33.3 | 12.3' | 08°03.1 | 15.9' | 58.5' |
| 20 | 116°35.4 | 41.6 | 79°04.6 | 12.2' | 08°19.1 | 15.9' | 58.5' |
| 21 | 131°35.5 | 40.7 | 93°35.8 | 12.2' | 08°35.0 | 15.9' | 58.5' |
| 22 | 146°35.5 | 39.8 | 108°07.0 | 12.1' | 08°50.8 | 15.8' | 58.5' |
| 23 | 161°35.6 | 38.9 | 122°38.1 | 12.1' | 09°06.7 | 15.8' | 58.5' |
| SD = 16.2' $d = -0.9'$ | | | SD = 15.9' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 05:57 | 07:16 | 08:31 | 15:58 | 17:14 | 18:33 |
| N 70° | 05:57 | 07:08 | 08:14 | 16:15 | 17:21 | 18:32 |
| 68° | 05:57 | 07:02 | 08:01 | 16:28 | 17:27 | 18:32 |
| 66° | 05:57 | 06:56 | 07:51 | 16:38 | 17:33 | 18:32 |
| 64° | 05:57 | 06:52 | 07:42 | 16:47 | 17:37 | 18:33 |
| 62° | 05:56 | 06:48 | 07:34 | 16:55 | 17:41 | 18:33 |
| 60° | 05:56 | 06:44 | 07:27 | 17:01 | 17:45 | 18:33 |
| N 58° | 05:55 | 06:41 | 07:21 | 17:07 | 17:48 | 18:34 |
| 56° | 05:55 | 06:38 | 07:16 | 17:12 | 17:51 | 18:34 |
| 54° | 05:54 | 06:35 | 07:11 | 17:17 | 17:53 | 18:35 |
| 52° | 05:53 | 06:33 | 07:07 | 17:21 | 17:56 | 18:35 |
| 50° | 05:53 | 06:30 | 07:03 | 17:25 | 17:58 | 18:36 |
| 45° | 05:51 | 06:25 | 06:55 | 17:33 | 18:03 | 18:38 |
| N 40° | 05:49 | 06:20 | 06:48 | 17:40 | 18:08 | 18:40 |
| 35° | 05:46 | 06:16 | 06:42 | 17:46 | 18:12 | 18:42 |
| 30° | 05:44 | 06:12 | 06:36 | 17:52 | 18:16 | 18:44 |
| 20° | 05:39 | 06:04 | 06:27 | 18:01 | 18:23 | 18:49 |
| N 10° | 05:32 | 05:57 | 06:18 | 18:09 | 18:31 | 18:55 |
| 0° | 05:25 | 05:49 | 06:10 | 18:17 | 18:38 | 19:03 |
| S 10° | 05:16 | 05:41 | 06:02 | 18:25 | 18:47 | 19:12 |
| 20° | 05:04 | 05:31 | 05:54 | 18:34 | 18:56 | 19:23 |
| 30° | 04:49 | 05:19 | 05:43 | 18:44 | 19:08 | 19:38 |
| 35° | 04:40 | 05:11 | 05:38 | 18:49 | 19:16 | 19:47 |
| 40° | 04:28 | 05:02 | 05:31 | 18:56 | 19:24 | 19:58 |
| 45° | 04:14 | 04:52 | 05:23 | 19:04 | 19:35 | 20:12 |
| S 50° | 03:55 | 04:39 | 05:13 | 19:13 | 19:48 | 20:31 |
| 52° | 03:46 | 04:32 | 05:09 | 19:17 | 19:54 | 20:39 |
| 54° | 03:36 | 04:25 | 05:04 | 19:22 | 20:01 | 20:50 |
| 56° | 03:24 | 04:17 | 04:59 | 19:27 | 20:08 | 21:01 |
| 58° | 03:10 | 04:08 | 04:53 | 19:33 | 20:17 | 21:15 |
| S 60° | 02:52 | 03:58 | 04:46 | 19:40 | 20:28 | 21:32 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | 08:33 | 07:56 | 07:20 | 18:05 | 20:21 | 22:44 |
| N 70° | 08:22 | 07:54 | 07:27 | 18:13 | 20:19 | 22:30 |
| 68° | 08:13 | 07:52 | 07:32 | 18:19 | 20:17 | 22:18 |
| 66° | 08:05 | 07:51 | 07:36 | 18:24 | 20:15 | 22:09 |
| 64° | 07:59 | 07:49 | 07:40 | 18:29 | 20:13 | 22:01 |
| 62° | 07:53 | 07:48 | 07:44 | 18:32 | 20:12 | 21:54 |
| 60° | 07:48 | 07:47 | 07:47 | 18:36 | 20:11 | 21:48 |
| N 58° | 07:44 | 07:47 | 07:49 | 18:39 | 20:10 | 21:43 |
| 56° | 07:40 | 07:46 | 07:52 | 18:41 | 20:09 | 21:39 |
| 54° | 07:36 | 07:45 | 07:54 | 18:44 | 20:08 | 21:35 |
| 52° | 07:33 | 07:44 | 07:56 | 18:46 | 20:07 | 21:31 |
| 50° | 07:30 | 07:44 | 07:57 | 18:48 | 20:07 | 21:28 |
| 45° | 07:24 | 07:43 | 08:01 | 18:52 | 20:05 | 21:21 |
| N 40° | 07:19 | 07:42 | 08:05 | 18:55 | 20:04 | 21:15 |
| 35° | 07:14 | 07:41 | 08:07 | 18:58 | 20:03 | 21:10 |
| 30° | 07:10 | 07:40 | 08:10 | 19:01 | 20:02 | 21:05 |
| 20° | 07:03 | 07:39 | 08:14 | 19:05 | 20:01 | 20:57 |
| N 10° | 06:57 | 07:37 | 08:18 | 19:09 | 19:59 | 20:51 |
| 0° | 06:51 | 07:36 | 08:22 | 19:12 | 19:58 | 20:45 |
| S 10° | 06:45 | 07:35 | 08:26 | 19:16 | 19:57 | 20:38 |
| 20° | 06:38 | 07:34 | 08:30 | 19:20 | 19:55 | 20:32 |
| 30° | 06:31 | 07:33 | 08:35 | 19:24 | 19:54 | 20:24 |
| 35° | 06:27 | 07:32 | 08:38 | 19:26 | 19:53 | 20:20 |
| 40° | 06:22 | 07:31 | 08:41 | 19:29 | 19:52 | 20:15 |
| 45° | 06:17 | 07:30 | 08:44 | 19:32 | 19:50 | 20:09 |
| S 50° | 06:10 | 07:29 | 08:49 | 19:36 | 19:49 | 20:03 |
| 52° | 06:07 | 07:28 | 08:51 | 19:37 | 19:48 | 20:00 |
| 54° | 06:03 | 07:28 | 08:53 | 19:39 | 19:47 | 19:56 |
| 56° | 06:00 | 07:27 | 08:56 | 19:41 | 19:47 | 19:53 |
| 58° | 05:55 | 07:26 | 08:58 | 19:43 | 19:46 | 19:48 |
| S 60° | 05:51 | 07:26 | 09:02 | 19:46 | 19:45 | 19:44 |

| Day | Sun | | Mer. Pass | Moon | | Age 1-3 0-7% |
|-----|------------------------------|----------------------------|-----------|-----------------------|-------------|--------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 18 | 13:55 | 13:52 | 12:14 | 13:02 | 00:39 | |
| 19 | 13:50 | 13:47 | 12:14 | 13:47 | 01:24 | |
| 20 | 13:44 | 13:41 | 12:14 | 14:33 | 02:10 | |

February 21, 22, 23 UT (Sat., Sun., Mon.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------|---------------------------|----------|----------|-------------------------|----------|----------|-------------------------|----------|----------|-------------------------|--------|-----|--|
| Sat | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | |
| 0 | 150°55.8 | 165°49.7 | S07°55.6 | 185°46.1 | S15°03.7 | | 43°56.3 | N22°51.4 | | 149°21.5 | S01°39.0 | | | | |
| 1 | 165°58.3 | 180°49.2 | 54.3 | 200°46.6 | 03.1 | | 58°58.9 | 51.4 | | 164°23.7 | 38.9 | | | | |
| 2 | 181°00.8 | 195°48.8 | 53.1 | 215°47.2 | 02.4 | | 74°01.5 | 51.4 | | 179°25.9 | 38.7 | | | | |
| 3 | 196°03.2 | 210°48.3 | · · 51.9 | 230°47.7 | · · 01.8 | | 89°04.1 | · · 51.5 | | 194°28.1 | · · 38.6 | | | | |
| 4 | 211°05.7 | 225°47.9 | 50.7 | 245°48.2 | 01.1 | | 104°06.8 | 51.5 | | 209°30.3 | 38.5 | | | | |
| 5 | 226°08.2 | 240°47.5 | 49.5 | 260°48.8 | 15°00.5 | | 119°09.4 | 51.5 | | 224°32.5 | 38.4 | | | | |
| 6 | 241°10.6 | 255°47.0 | S07°48.3 | 275°49.3 | S14°59.9 | | 134°12.0 | N22°51.5 | | 239°34.7 | S01°38.3 | | | | |
| 7 | 256°13.1 | 270°46.6 | 47.0 | 290°49.8 | 59.2 | | 149°14.6 | 51.5 | | 254°36.9 | 38.2 | | | | |
| 8 | 271°15.5 | 285°46.1 | 45.8 | 305°50.4 | 58.6 | | 164°17.2 | 51.6 | | 269°39.1 | 38.0 | | | | |
| 9 | 286°18.0 | 300°45.7 | · · 44.6 | 320°50.9 | · · 57.9 | | 179°19.9 | · · 51.6 | | 284°41.3 | · · 37.9 | | | | |
| 10 | 301°20.5 | 315°45.3 | 43.4 | 335°51.5 | 57.3 | | 194°22.5 | 51.6 | | 299°43.5 | 37.8 | | | | |
| 11 | 316°22.9 | 330°44.8 | 42.2 | 350°52.0 | 56.6 | | 209°25.1 | 51.6 | | 314°45.7 | 37.7 | | | | |
| 12 | 331°25.4 | 345°44.4 | S07°40.9 | 5°52.5 | S14°56.0 | | 224°27.7 | N22°51.6 | | 329°47.9 | S01°37.6 | | | | |
| 13 | 346°27.9 | 0°44.0 | 39.7 | 20°53.1 | 55.4 | | 239°30.3 | 51.7 | | 344°50.1 | 37.5 | | | | |
| 14 | 1°30.3 | 15°43.5 | 38.5 | 35°53.6 | 54.7 | | 254°33.0 | 51.7 | | 359°52.3 | 37.3 | | | | |
| 15 | 16°32.8 | 30°43.1 | · · 37.3 | 50°54.1 | · · 54.1 | | 269°35.6 | · · 51.7 | | 14°54.5 | · · 37.2 | | | | |
| 16 | 31°35.3 | 45°42.7 | 36.1 | 65°54.7 | 53.4 | | 284°38.2 | 51.7 | | 29°56.7 | 37.1 | | | | |
| 17 | 46°37.7 | 60°42.2 | 34.8 | 80°55.2 | 52.8 | | 299°40.8 | 51.7 | | 44°58.9 | 37.0 | | | | |
| 18 | 61°40.2 | 75°41.8 | S07°33.6 | 95°55.8 | S14°52.1 | | 314°43.4 | N22°51.8 | | 60°01.1 | S01°36.9 | | | | |
| 19 | 76°42.7 | 90°41.4 | 32.4 | 110°56.3 | 51.5 | | 329°46.0 | 51.8 | | 75°03.3 | 36.7 | | | | |
| 20 | 91°45.1 | 105°40.9 | 31.2 | 125°56.8 | 50.8 | | 344°48.6 | 51.8 | | 90°05.5 | 36.6 | | | | |
| 21 | 106°47.6 | 120°40.5 | · · 29.9 | 140°57.4 | · · 50.2 | | 359°51.3 | · · 51.8 | | 105°07.7 | · · 36.5 | | | | |
| 22 | 121°50.0 | 135°40.0 | 28.7 | 155°57.9 | 49.6 | | 14°53.9 | 51.8 | | 120°09.9 | 36.4 | | | | |
| 23 | 136°52.5 | 150°39.6 | 27.5 | 170°58.5 | 48.9 | | 29°56.5 | 51.9 | | 135°12.1 | 36.3 | | | | |
| Mer.pass. 13:54 | | | ν -0.4' d-1.2' m-3.91 | | | ν 0.5' d-0.6' m1.13 | | | ν 2.6' d0.0' m-2.50 | | | ν 2.2' d-0.1' m1.01 | | | |

| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | |
|-----------------|----------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|--|
| 0 | 151°55.0 | 165°39.2 | S07°26.3 | 185°59.0 | S14°48.3 | 44°59.1 | N22°51.9 | 150°14.3 | S01°36.2 | |
| 1 | 166°57.4 | 180°38.7 | 25.0 | 200°59.5 | 47.6 | 60°01.7 | 51.9 | 165°16.5 | 36.0 | |
| 2 | 181°59.9 | 195°38.3 | 23.8 | 216°00.1 | 47.0 | 75°04.3 | 51.9 | 180°18.7 | 35.9 | |
| 3 | 197°02.4 | 210°37.9 | · · 22.6 | 231°00.6 | · · 46.3 | 90°06.9 | · · 51.9 | 195°20.9 | · · 35.8 | |
| 4 | 212°04.8 | 225°37.5 | 21.4 | 246°01.2 | 45.7 | 105°09.6 | 51.9 | 210°23.1 | 35.7 | |
| 5 | 227°07.3 | 240°37.0 | 20.1 | 261°01.7 | 45.0 | 120°12.2 | 52.0 | 225°25.3 | 35.6 | |
| 6 | 242°09.8 | 255°36.6 | S07°18.9 | 276°02.2 | S14°44.4 | 135°14.8 | N22°52.0 | 240°27.5 | S01°35.5 | |
| 7 | 257°12.2 | 270°36.2 | 17.7 | 291°02.8 | 43.7 | 150°17.4 | 52.0 | 255°29.7 | 35.3 | |
| 8 | 272°14.7 | 285°35.7 | 16.5 | 306°03.3 | 43.1 | 165°20.0 | 52.0 | 270°31.9 | 35.2 | |
| 9 | 287°17.2 | 300°35.3 | · · 15.2 | 321°03.9 | · · 42.4 | 180°22.6 | · · 52.0 | 285°34.1 | · · 35.1 | |
| 10 | 302°19.6 | 315°34.9 | 14.0 | 336°04.4 | 41.8 | 195°25.2 | 52.1 | 300°36.3 | 35.0 | |
| 11 | 317°22.1 | 330°34.4 | 12.8 | 351°05.0 | 41.1 | 210°27.8 | 52.1 | 315°38.5 | 34.9 | |
| 12 | 332°24.5 | 345°34.0 | S07°11.5 | 6°05.5 | S14°40.5 | 225°30.4 | N22°52.1 | 330°40.7 | S01°34.8 | |
| 13 | 347°27.0 | 0°33.6 | 10.3 | 21°06.0 | 39.8 | 240°33.0 | 52.1 | 345°42.9 | 34.6 | |
| 14 | 2°29.5 | 15°33.2 | 09.1 | 36°06.6 | 39.2 | 255°35.7 | 52.1 | 0°45.1 | 34.5 | |
| 15 | 17°31.9 | 30°32.7 | · · 07.9 | 51°07.1 | · · 38.5 | 270°38.3 | · · 52.2 | 15°47.3 | · · 34.4 | |
| 16 | 32°34.4 | 45°32.3 | 06.6 | 66°07.7 | 37.9 | 285°40.9 | 52.2 | 30°49.5 | 34.3 | |
| 17 | 47°36.9 | 60°31.9 | 05.4 | 81°08.2 | 37.2 | 300°43.5 | 52.2 | 45°51.7 | 34.2 | |
| 18 | 62°39.3 | 75°31.4 | S07°04.2 | 96°08.8 | S14°36.6 | 315°46.1 | N22°52.2 | 60°53.9 | S01°34.0 | |
| 19 | 77°41.8 | 90°31.0 | 02.9 | 111°09.3 | 35.9 | 330°48.7 | 52.2 | 75°56.1 | 33.9 | |
| 20 | 92°44.3 | 105°30.6 | 01.7 | 126°09.8 | 35.3 | 345°51.3 | 52.2 | 90°58.3 | 33.8 | |
| 21 | 107°46.7 | 120°30.2 | 07°00.5 | 141°10.4 | · · 34.6 | 0°53.9 | · · 52.3 | 106°00.5 | · · 33.7 | |
| 22 | 122°49.2 | 135°29.7 | 06°59.2 | 156°10.9 | 34.0 | 15°56.5 | 52.3 | 121°02.7 | 33.6 | |
| 23 | 137°51.6 | 150°29.3 | 58.0 | 171°11.5 | 33.3 | 30°59.1 | 52.3 | 136°04.9 | 33.5 | |
| Mer.pass. 13:50 | | | ν-0.4' d-1.2' m-3.91 | | ν0.5' d-0.6' m1.13 | | ν2.6' d0.0' m-2.49 | | ν2.2' d-0.1' m1.00 | |

| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | |
|-----------------|----------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|--|
| 0 | 152°54.1 | 165°28.9 | S06°56.8 | 186°12.0 | S14°32.7 | 46°01.7 | N22°52.3 | 151°07.1 | S01°33.3 | |
| 1 | 167°56.6 | 180°28.5 | 55.6 | 201°12.6 | 32.0 | 61°04.3 | 52.3 | 166°09.3 | 33.2 | |
| 2 | 182°59.0 | 195°28.0 | 54.3 | 216°13.1 | 31.4 | 76°06.9 | 52.4 | 181°11.5 | 33.1 | |
| 3 | 198°01.5 | 210°27.6 | · · 53.1 | 231°13.7 | · · 30.7 | 91°09.5 | · · 52.4 | 196°13.7 | · · 33.0 | |
| 4 | 213°04.0 | 225°27.2 | 51.9 | 246°14.2 | 30.1 | 106°12.1 | 52.4 | 211°15.9 | 32.9 | |
| 5 | 228°06.4 | 240°26.8 | 50.6 | 261°14.7 | 29.4 | 121°14.7 | 52.4 | 226°18.1 | 32.7 | |
| 6 | 243°08.9 | 255°26.3 | S06°49.4 | 276°15.3 | S14°28.8 | 136°17.3 | N22°52.4 | 241°20.3 | S01°32.6 | |
| 7 | 258°11.4 | 270°25.9 | 48.1 | 291°15.8 | 28.1 | 151°19.9 | 52.4 | 256°22.5 | 32.5 | |
| 8 | 273°13.8 | 285°25.5 | 46.9 | 306°16.4 | 27.4 | 166°22.5 | 52.5 | 271°24.7 | 32.4 | |
| 9 | 288°16.3 | 300°25.1 | · · 45.7 | 321°16.9 | · · 26.8 | 181°25.1 | · · 52.5 | 286°26.9 | · · 32.3 | |
| 10 | 303°18.8 | 315°24.6 | 44.4 | 336°17.5 | 26.1 | 196°27.8 | 52.5 | 301°29.1 | 32.2 | |
| 11 | 318°21.2 | 330°24.2 | 43.2 | 351°18.0 | 25.5 | 211°30.4 | 52.5 | 316°31.3 | 32.0 | |
| 12 | 333°23.7 | 345°23.8 | S06°42.0 | 6°18.6 | S14°24.8 | 226°33.0 | N22°52.5 | 331°33.5 | S01°31.9 | |
| 13 | 348°26.1 | 0°23.4 | 40.7 | 21°19.1 | 24.2 | 241°35.6 | 52.6 | 346°35.7 | 31.8 | |
| 14 | 3°28.6 | 15°23.0 | 39.5 | 36°19.7 | 23.5 | 256°38.2 | 52.6 | 1°37.9 | 31.7 | |
| 15 | 18°31.1 | 30°22.5 | · · 38.3 | 51°20.2 | · · 22.9 | 271°40.8 | · · 52.6 | 16°40.1 | · · 31.6 | |
| 16 | 33°33.5 | 45°22.1 | 37.0 | 66°20.8 | 22.2 | 286°43.4 | 52.6 | 31°42.3 | 31.4 | |
| 17 | 48°36.0 | 60°21.7 | 35.8 | 81°21.3 | 21.5 | 301°46.0 | 52.6 | 46°44.5 | 31.3 | |
| 18 | 63°38.5 | 75°21.3 | S06°34.5 | 96°21.9 | S14°20.9 | 316°48.5 | N22°52.6 | 61°46.7 | S01°31.2 | |
| 19 | 78°40.9 | 90°20.9 | 33.3 | 111°22.4 | 20.2 | 331°51.1 | 52.7 | 76°48.9 | 31.1 | |
| 20 | 93°43.4 | 105°20.4 | 32.1 | 126°23.0 | 19.6 | 346°53.7 | 52.7 | 91°51.1 | 31.0 | |
| 21 | 108°45.9 | 120°20.0 | · · 30.8 | 141°23.5 | · · 18.9 | 1°56.3 | · · 52.7 | 106°53.3 | · · 30.9 | |
| 22 | 123°48.3 | 135°19.6 | 29.6 | 156°24.1 | 18.3 | 16°58.9 | 52.7 | 121°55.5 | 30.7 | |
| 23 | 138°50.8 | 150°19.2 | 28.4 | 171°24.6 | 17.6 | 32°01.5 | 52.7 | 136°57.7 | 30.6 | |
| Mer.pass. 13:46 | | | ν-0.4' d-1.2' m-3.91 | | ν0.5' d-0.7' m1.14 | | ν2.6' d0.0' m-2.49 | | ν2.2' d-0.1' m1.00 | |

| Stars | | |
|----------------------------|------------|-----------------|
| | SHA | Dec |
| Alpheratz | 357° 34.1 | 29° 14.1 |
| Ankaa | 353° 06.6 | -42° 10.0 |
| Schedar | 349° 30.4 | 56° 41.0 |
| Diphda | 348° 46.6 | -17° 50.7 |
| Achernar | 335° 19.8 | -57° 06.5 |
| Hamal | 327° 50.3 | 23° 35.2 |
| Polaris | 313° 41.0 | 89° 22.8 |
| Acamar | 315° 11.2 | -40° 12.2 |
| Menkar | 314° 05.2 | 4° 11.5 |
| Mirfak | 308° 27.0 | 49° 57.4 |
| Aldebaran | 290° 38.5 | 16° 33.7 |
| Rigel | 281° 02.9 | -8° 10.4 |
| Capella | 280° 20.4 | 46° 01.6 |
| Bellatrix | 278° 21.8 | 6° 22.3 |
| Elnath | 278° 00.5 | 28° 37.8 |
| Alnilam | 275° 36.6 | -1° 11.2 |
| Betelgeuse | 270° 50.9 | 7° 24.7 |
| Canopus | 263° 51.7 | -52° 42.8 |
| Sirius | 258° 25.2 | -16° 45.3 |
| Adhara | 255° 04.9 | -29° 00.6 |
| Procyon | 244° 49.6 | 5° 09.4 |
| Pollux | 243° 15.9 | 27° 57.7 |
| Avior | 234° 13.8 | -59° 35.7 |
| Suhail | 222° 45.2 | -43° 32.4 |
| Miaplacidus | 221° 37.2 | -69° 49.5 |
| Alphard | 217° 46.5 | -8° 46.5 |
| Regulus | 207° 33.1 | 11° 50.2 |
| Dubhe | 193° 39.2 | 61° 36.4 |
| Denebola | 182° 23.7 | 14° 25.4 |
| Gienah | 175° 42.3 | -17° 41.3 |
| Acrux | 172° 58.5 | -63° 14.6 |
| Gacrux | 171° 50.2 | -57° 15.5 |
| Alioth | 166° 11.7 | 55° 48.8 |
| Spica | 158° 21.1 | -11° 18.0 |
| Alkaid | 152° 51.0 | 49° 10.6 |
| Hadar | 148° 34.4 | -60° 29.8 |
| Menkent | 147° 56.3 | -36° 29.9 |
| Arcturus | 145° 46.9 | 19° 02.5 |
| Rigel Kent. | 139° 38.8 | -60° 56.4 |
| Kochab | 137° 19.4 | 74° 02.5 |
| Zuben'ubi | 136° 54.9 | -16° 09.1 |
| Alphecca | 126° 02.9 | -26° 37.3 |
| Antares | 112° 14.7 | -26° 29.4 |
| Atria | 107° 08.2 | -69° 04.2 |
| Sabik | 102° 01.8 | -15° 45.5 |
| Shaula | 96° 09.2 | -37° 07.3 |
| Rasalhague | 95° 57.8 | 12° 32.2 |
| Eltanin | 90° 42.0 | 51° 28.8 |
| Kaus Aust. | 83° 31.5 | -34° 22.3 |
| Vega | 80° 32.8 | 38° 48.2 |
| Nunki | 75° 46.8 | -26° 15.9 |
| Altair | 61° 59.3 | 8° 56.1 |
| Peacock | 53° 04.8 | -56° 39.0 |
| Deneb | 49° 25.6 | 45° 22.2 |
| Enif | 33° 38.2 | 9° 59.6 |
| Al Na'ir | 27° 32.2 | -46° 50.1 |
| Fomalhaut | 15° 13.8 | -29° 29.1 |
| Scheat | 13° 44.7 | 28° 13.4 |
| Markab | 13° 29.3 | 15° 20.7 |
| | | |
| Feb 21 Sat | SHA | Mer.pass |
| Venus | 14° 53.8 | 12:57 |
| Mars | 34° 50.3 | 11:37 |
| Jupiter | 253° 00.4 | 21:01 |
| Saturn | 358° 25.6 | 14:01 |
| | | |
| Feb 22 Sun | SHA | Mer.pass |
| Venus | 13° 44.2 | 12:58 |
| Mars | 34° 04.0 | 11:36 |
| Jupiter | 253° 04.1 | 20:56 |
| Saturn | 358° 19.3 | 13:57 |
| | | |
| Feb 23 Mon | SHA | Mer.pass |
| Venus | 12° 34.8 | 12:58 |
| Mars | 33° 17.9 | 11:35 |
| Jupiter | 253° 07.6 | 20:52 |
| Saturn | 358° 13.0 | 13:53 |
| | | |
| Horizontal parallax | | |
| Venus: | 0.1 | |
| Mars: | 0.1 | |

| h | Sun | | | Moon | | | |
|------------------------|-----|----------|----------|------------|-------|----------|-------------|
| | Sat | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 176°35.7 | S10°38.0 | 137°09.2 | 12.0' | N09°22.5 | 15.8' 58.6' |
| 1 | | 191°35.7 | 37.1 | 151°40.1 | 11.9' | 09°38.2 | 15.7' 58.6' |
| 2 | | 206°35.8 | 36.2 | 166°11.1 | 11.9' | 09°53.9 | 15.7' 58.6' |
| 3 | | 221°35.9 | · · 35.3 | 180°42.0 | 11.8' | 10°09.6 | 15.6' 58.6' |
| 4 | | 236°36.0 | 34.4 | 195°12.8 | 11.7' | 10°25.2 | 15.6' 58.6' |
| 5 | | 251°36.0 | 33.5 | 209°43.5 | 11.7' | 10°40.8 | 15.5' 58.6' |
| 6 | | 266°36.1 | S10°32.6 | 224°14.2 | 11.6' | N10°56.3 | 15.5' 58.6' |
| 7 | | 281°36.2 | 31.7 | 238°44.8 | 11.5' | 11°11.8 | 15.4' 58.7' |
| 8 | | 296°36.2 | 30.8 | 253°15.4 | 11.5' | 11°27.3 | 15.4' 58.7' |
| 9 | | 311°36.3 | · · 29.9 | 267°45.8 | 11.4' | 11°42.6 | 15.3' 58.7' |
| 10 | | 326°36.4 | 29.0 | 282°16.2 | 11.3' | 11°58.0 | 15.3' 58.7' |
| 11 | | 341°36.5 | 28.1 | 296°46.6 | 11.3' | 12°13.2 | 15.2' 58.7' |
| 12 | | 356°36.5 | S10°27.2 | 311°16.9 | 11.2' | N12°28.4 | 15.2' 58.7' |
| 13 | | 11°36.6 | 26.3 | 325°47.0 | 11.1' | 12°43.6 | 15.1' 58.7' |
| 14 | | 26°36.7 | 25.4 | 340°17.2 | 11.0' | 12°58.7 | 15.0' 58.7' |
| 15 | | 41°36.8 | · · 24.4 | 354°47.2 | 11.0' | 13°13.7 | 15.0' 58.7' |
| 16 | | 56°36.8 | 23.5 | 9°17.2 | 10.9' | 13°28.7 | 14.9' 58.8' |
| 17 | | 71°36.9 | 22.6 | 23°47.1 | 10.8' | 13°43.6 | 14.8' 58.8' |
| 18 | | 86°37.0 | S10°21.7 | 38°16.9 | 10.7' | N13°58.4 | 14.8' 58.8' |
| 19 | | 101°37.1 | 20.8 | 52°46.6 | 10.7' | 14°13.2 | 14.7' 58.8' |
| 20 | | 116°37.1 | 19.9 | 67°16.3 | 10.6' | 14°27.9 | 14.6' 58.8' |
| 21 | | 131°37.2 | · · 19.0 | 81°45.9 | 10.5' | 14°42.5 | 14.5' 58.8' |
| 22 | | 146°37.3 | 18.1 | 96°15.3 | 10.4' | 14°57.0 | 14.5' 58.8' |
| 23 | | 161°37.4 | 17.2 | 110°44.8 | 10.3' | 15°11.5 | 14.4' 58.8' |
| SD = 16.2' $d = -0.9'$ | | | | SD = 16.0' | | | |

| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|----------|------------|----------|-------|-------|
| 0 | 176°37.4 | S10°16.3 | 125°14.1 | 10.2' | N15°25.9 | 14.3' | 58.8' |
| 1 | 191°37.5 | 15.4 | 139°43.3 | 10.2' | 15°40.2 | 14.2' | 58.8' |
| 2 | 206°37.6 | 14.4 | 154°12.5 | 10.1' | 15°54.5 | 14.2' | 58.9' |
| 3 | 221°37.7 | · · 13.5 | 168°41.6 | 10.0' | 16°08.6 | 14.1' | 58.9' |
| 4 | 236°37.8 | 12.6 | 183°10.5 | 9.9' | 16°22.7 | 14.0' | 58.9' |
| 5 | 251°37.8 | 11.7 | 197°39.4 | 9.8' | 16°36.7 | 13.9' | 58.9' |
| 6 | 266°37.9 | S10°10.8 | 212°08.2 | 9.7' | N16°50.6 | 13.8' | 58.9' |
| 7 | 281°38.0 | 09.9 | 226°36.9 | 9.6' | 17°04.4 | 13.7' | 58.9' |
| 8 | 296°38.1 | 09.0 | 241°05.6 | 9.5' | 17°18.1 | 13.6' | 58.9' |
| 9 | 311°38.1 | · · 08.1 | 255°34.1 | 9.4' | 17°31.7 | 13.5' | 58.9' |
| 10 | 326°38.2 | 07.2 | 270°02.5 | 9.3' | 17°45.3 | 13.4' | 58.9' |
| 11 | 341°38.3 | 06.2 | 284°30.9 | 9.3' | 17°58.7 | 13.3' | 58.9' |
| 12 | 356°38.4 | S10°05.3 | 298°59.1 | 9.2' | N18°12.0 | 13.2' | 58.9' |
| 13 | 11°38.5 | 04.4 | 313°27.3 | 9.1' | 18°25.3 | 13.1' | 58.9' |
| 14 | 26°38.6 | 03.5 | 327°55.4 | 9.0' | 18°38.4 | 13.0' | 59.0' |
| 15 | 41°38.6 | · · 02.6 | 342°23.3 | 8.9' | 18°51.5 | 12.9' | 59.0' |
| 16 | 56°38.7 | 01.7 | 356°51.2 | 8.8' | 19°04.4 | 12.8' | 59.0' |
| 17 | 71°38.8 | 10°00.8 | 11°19.0 | 8.7' | 19°17.2 | 12.7' | 59.0' |
| 18 | 86°38.9 | S09°59.8 | 25°46.7 | 8.6' | N19°30.0 | 12.6' | 59.0' |
| 19 | 101°39.0 | 58.9 | 40°14.3 | 8.5' | 19°42.6 | 12.5' | 59.0' |
| 20 | 116°39.0 | 58.0 | 54°41.7 | 8.4' | 19°55.1 | 12.4' | 59.0' |
| 21 | 131°39.1 | · · 57.1 | 69°09.1 | 8.3' | 20°07.5 | 12.3' | 59.0' |
| 22 | 146°39.2 | 56.2 | 83°36.4 | 8.2' | 20°19.8 | 12.2' | 59.0' |
| 23 | 161°39.3 | 55.3 | 98°03.6 | 8.1' | 20°31.9 | 12.0' | 59.0' |
| SD = 16.2' $d = -0.9'$ | | | | SD = 16.0' | | | |

| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|----------|------------|----------|-------|-------|
| 0 | 176°39.4 | S09°54.3 | 112°30.7 | 8.0' | N20°44.0 | 11.9' | 59.0' |
| 1 | 191°39.5 | 53.4 | 126°57.7 | 7.9' | 20°55.9 | 11.8' | 59.0' |
| 2 | 206°39.5 | 52.5 | 141°24.6 | 7.8' | 21°07.7 | 11.7' | 59.0' |
| 3 | 221°39.6 | · · 51.6 | 155°51.4 | 7.7' | 21°19.4 | 11.6' | 59.0' |
| 4 | 236°39.7 | 50.7 | 170°18.1 | 7.6' | 21°31.0 | 11.4' | 59.0' |
| 5 | 251°39.8 | 49.8 | 184°44.7 | 7.5' | 21°42.4 | 11.3' | 59.0' |
| 6 | 266°39.9 | S09°48.8 | 199°11.2 | 7.4' | N21°53.7 | 11.2' | 59.1' |
| 7 | 281°40.0 | 47.9 | 213°37.6 | 7.3' | 22°04.9 | 11.0' | 59.1' |
| 8 | 296°40.1 | 47.0 | 228°03.9 | 7.2' | 22°16.0 | 10.9' | 59.1' |
| 9 | 311°40.1 | · · 46.1 | 242°30.1 | 7.1' | 22°26.9 | 10.8' | 59.1' |
| 10 | 326°40.2 | 45.2 | 256°56.2 | 7.0' | 22°37.7 | 10.6' | 59.1' |
| 11 | 341°40.3 | 44.2 | 271°22.2 | 6.9' | 22°48.3 | 10.5' | 59.1' |
| 12 | 356°40.4 | S09°43.3 | 285°48.1 | 6.8' | N22°58.8 | 10.4' | 59.1' |
| 13 | 11°40.5 | 42.4 | 300°13.9 | 6.7' | 23°09.2 | 10.2' | 59.1' |
| 14 | 26°40.6 | 41.5 | 314°39.6 | 6.6' | 23°19.4 | 10.1' | 59.1' |
| 15 | 41°40.7 | · · 40.6 | 329°05.2 | 6.5' | 23°29.5 | 9.9' | 59.1' |
| 16 | 56°40.8 | 39.6 | 343°30.7 | 6.4' | 23°39.4 | 9.8' | 59.1' |
| 17 | 71°40.8 | 38.7 | 357°56.1 | 6.3' | 23°49.2 | 9.7' | 59.1' |
| 18 | 86°40.9 | S09°37.8 | 12°21.4 | 6.2' | N23°58.9 | 9.5' | 59.1' |
| 19 | 101°41.0 | 36.9 | 26°46.7 | 6.1' | 24°08.4 | 9.4' | 59.1' |
| 20 | 116°41.1 | 36.0 | 41°11.8 | 6.0' | 24°17.8 | 9.2' | 59.1' |
| 21 | 131°41.2 | · · 35.0 | 55°36.8 | 5.9' | 24°27.0 | 9.0' | 59.1' |
| 22 | 146°41.3 | 34.1 | 70°01.7 | 5.8' | 24°36.0 | 8.9' | 59.1' |
| 23 | 161°41.4 | 33.2 | 84°26.6 | 5.7' | 24°44.9 | 8.7' | 59.1' |
| SD = 16.2' $d = -0.9'$ | | | | SD = 16.1' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 05:43 | 07:02 | 08:14 | 16:14 | 17:27 | 18:46 |
| N 70° | 05:45 | 06:55 | 08:00 | 16:28 | 17:33 | 18:44 |
| 68° | 05:46 | 06:50 | 07:49 | 16:40 | 17:38 | 18:43 |
| 66° | 05:47 | 06:46 | 07:39 | 16:49 | 17:42 | 18:42 |
| 64° | 05:47 | 06:42 | 07:31 | 16:57 | 17:46 | 18:41 |
| 62° | 05:48 | 06:39 | 07:25 | 17:03 | 17:49 | 18:41 |
| 60° | 05:48 | 06:36 | 07:19 | 17:09 | 17:52 | 18:40 |
| N 58° | 05:48 | 06:33 | 07:14 | 17:14 | 17:55 | 18:40 |
| 56° | 05:48 | 06:31 | 07:09 | 17:19 | 17:57 | 18:40 |
| 54° | 05:48 | 06:29 | 07:05 | 17:23 | 17:59 | 18:40 |
| 52° | 05:47 | 06:27 | 07:01 | 17:27 | 18:01 | 18:40 |
| 50° | 05:47 | 06:25 | 06:57 | 17:30 | 18:03 | 18:41 |
| 45° | 05:46 | 06:20 | 06:50 | 17:38 | 18:07 | 18:42 |
| N 40° | 05:45 | 06:16 | 06:44 | 17:44 | 18:11 | 18:43 |
| 35° | 05:43 | 06:13 | 06:38 | 17:49 | 18:15 | 18:44 |
| 30° | 05:41 | 06:09 | 06:33 | 17:54 | 18:18 | 18:46 |
| 20° | 05:37 | 06:03 | 06:25 | 18:02 | 18:25 | 18:50 |
| N 10° | 05:31 | 05:56 | 06:17 | 18:10 | 18:31 | 18:56 |
| 0° | 05:25 | 05:49 | 06:10 | 18:17 | 18:38 | 19:02 |
| S 10° | 05:16 | 05:41 | 06:03 | 18:24 | 18:45 | 19:10 |
| 20° | 05:06 | 05:32 | 05:55 | 18:32 | 18:54 | 19:21 |
| 30° | 04:52 | 05:21 | 05:46 | 18:41 | 19:05 | 19:34 |
| 35° | 04:43 | 05:14 | 05:40 | 18:46 | 19:12 | 19:43 |
| 40° | 04:32 | 05:06 | 05:34 | 18:52 | 19:20 | 19:53 |
| 45° | 04:19 | 04:56 | 05:27 | 18:59 | 19:29 | 20:07 |
| S 50° | 04:02 | 04:44 | 05:19 | 19:07 | 19:41 | 20:23 |
| 52° | 03:53 | 04:38 | 05:15 | 19:11 | 19:47 | 20:32 |
| 54° | 03:44 | 04:32 | 05:10 | 19:15 | 19:53 | 20:41 |
| 56° | 03:33 | 04:25 | 05:05 | 19:20 | 20:00 | 20:52 |
| 58° | 03:20 | 04:17 | 05:00 | 19:25 | 20:08 | 21:04 |
| S 60° | 03:04 | 04:07 | 04:54 | 19:31 | 20:18 | 21:20 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | 06:38 | 05:25 | ☐ | · · | 01:42 | ☐ |
| N 70° | 06:55 | 06:09 | ☐ | · · | 01:00 | ☐ |
| 68° | 07:09 | 06:39 | 05:26 | · · | 00:32 | 03:37 |
| 66° | 07:21 | 07:01 | 06:28 | · · | 00:11 | 02:36 |
| 64° | 07:30 | 07:19 | 07:03 | 23:55 | · · | 02:02 |
| 62° | 07:39 | 07:34 | 07:29 | 23:41 | · · | 01:37 |
| 60° | 07:46 | 07:46 | 07:49 | 23:30 | · · | 01:18 |
| N 58° | 07:52 | 07:57 | 08:06 | 23:20 | · · | 01:02 |
| 56° | 07:58 | 08:07 | 08:20 | 23:12 | · · | 00:48 |
| 54° | 08:03 | 08:15 | 08:32 | 23:04 | · · | 00:37 |
| 52° | 08:08 | 08:23 | 08:43 | 22:57 | · · | 00:26 |
| 50° | 08:12 | 08:30 | 08:53 | 22:51 | · · | 00:17 |
| 45° | 08:21 | 08:45 | 09:14 | 22:38 | 23:58 | · · |
| N 40° | 08:29 | 08:57 | 09:31 | 22:27 | 23:42 | · · |
| 35° | 08:36 | 09:08 | 09:45 | 22:18 | 23:29 | · · |
| 30° | 08:42 | 09:17 | 09:57 | 22:10 | 23:18 | · · |
| 20° | 08:52 | 09:33 | 10:19 | 21:56 | 22:58 | · · |
| N 10° | 09:01 | 09:47 | 10:37 | 21:45 | 22:42 | 23:42 |
| 0° | 09:10 | 10:00 | 10:55 | 21:33 | 22:26 | 23:22 |
| S 10° | 09:19 | 10:14 | 11:13 | 21:22 | 22:10 | 23:03 |
| 20° | 09:28 | 10:28 | 11:32 | 21:11 | 21:54 | 22:42 |
| 30° | 09:39 | 10:45 | 11:54 | 20:57 | 21:35 | 22:18 |
| 35° | 09:45 | 10:55 | 12:07 | 20:50 | 21:24 | 22:04 |
| 40° | 09:52 | 11:06 | 12:22 | 20:41 | 21:11 | 21:48 |
| 45° | 10:01 | 11:20 | 12:40 | 20:31 | 20:56 | 21:29 |
| S 50° | 10:11 | 11:36 | 13:03 | 20:19 | 20:38 | 21:05 |
| 52° | 10:16 | 11:44 | 13:14 | 20:13 | 20:30 | 20:54 |
| 54° | 10:21 | 11:52 | 13:26 | 20:07 | 20:21 | 20:41 |
| 56° | 10:27 | 12:02 | 13:41 | 20:00 | 20:10 | 20:26 |
| 58° | 10:34 | 12:13 | 13:57 | 19:52 | 19:58 | 20:08 |
| S 60° | 10:41 | 12:26 | 14:18 | 19:43 | 19:44 | 19:47 |

| Day | Sun | | | Moon | | |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|----------------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 4-6 14-33% |
| 21 | 13:37 | 13:34 | 12:14 | 15:22 | 02:57 | |
| 22 | 13:30 | 13:26 | 12:13 | 16:13 | 03:47 | |
| 23 | 13:22 | 13:18 | 12:13 | 17:09 | 04:40 | |

February 24, 25, 26 UT (Tue., Wed., Thu.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------|----------------------|----------|----------|--------------------|----------|----------|--------------------|---------|-----|--------------------|--------|--|--|
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 153°53.3 | 165°18.8 | S06°27.1 | 186°25.1 | S14°16.9 | 47°04.1 | N22°52.7 | 151°59.8 | S01°30.5 | | | | | | |
| 1 | 168°55.7 | 180°18.3 | 25.9 | 201°25.7 | 16.3 | 62°06.7 | 52.8 | 167°02.0 | 30.4 | | | | | | |
| 2 | 183°58.2 | 195°17.9 | 24.6 | 216°26.2 | 15.6 | 77°09.3 | 52.8 | 182°04.2 | 30.3 | | | | | | |
| 3 | 199°00.6 | 210°17.5 | · · 23.4 | 231°26.8 | · · 15.0 | 92°11.9 | · · 52.8 | 197°06.4 | · · 30.1 | | | | | | |
| 4 | 214°03.1 | 225°17.1 | 22.2 | 246°27.3 | 14.3 | 107°14.5 | 52.8 | 212°08.6 | 30.0 | | | | | | |
| 5 | 229°05.6 | 240°16.7 | 20.9 | 261°27.9 | 13.6 | 122°17.1 | 52.8 | 227°10.8 | 29.9 | | | | | | |
| 6 | 244°08.0 | 255°16.3 | S06°19.7 | 276°28.4 | S14°13.0 | 137°19.7 | N22°52.8 | 242°13.0 | S01°29.8 | | | | | | |
| 7 | 259°10.5 | 270°15.8 | 18.4 | 291°29.0 | 12.3 | 152°22.3 | 52.9 | 257°15.2 | 29.7 | | | | | | |
| 8 | 274°13.0 | 285°15.4 | 17.2 | 306°29.5 | 11.7 | 167°24.9 | 52.9 | 272°17.4 | 29.6 | | | | | | |
| 9 | 289°15.4 | 300°15.0 | · · 15.9 | 321°30.1 | · · 11.0 | 182°27.5 | · · 52.9 | 287°19.6 | · · 29.4 | | | | | | |
| 10 | 304°17.9 | 315°14.6 | 14.7 | 336°30.6 | 10.3 | 197°30.1 | 52.9 | 302°21.8 | 29.3 | | | | | | |
| 11 | 319°20.4 | 330°14.2 | 13.5 | 351°31.2 | 09.7 | 212°32.7 | 52.9 | 317°24.0 | 29.2 | | | | | | |
| 12 | 334°22.8 | 345°13.8 | S06°12.2 | 6°31.7 | S14°09.0 | 227°35.3 | N22°52.9 | 332°26.2 | S01°29.1 | | | | | | |
| 13 | 349°25.3 | 0°13.4 | 11.0 | 21°32.3 | 08.4 | 242°37.9 | 53.0 | 347°28.4 | 29.0 | | | | | | |
| 14 | 4°27.8 | 15°12.9 | 09.7 | 36°32.9 | 07.7 | 257°40.4 | 53.0 | 2°30.6 | 28.8 | | | | | | |
| 15 | 19°30.2 | 30°12.5 | · · 08.5 | 51°33.4 | · · 07.0 | 272°43.0 | · · 53.0 | 17°32.8 | · · 28.7 | | | | | | |
| 16 | 34°32.7 | 45°12.1 | 07.2 | 66°34.0 | 06.4 | 287°45.6 | 53.0 | 32°35.0 | 28.6 | | | | | | |
| 17 | 49°35.1 | 60°11.7 | 06.0 | 81°34.5 | 05.7 | 302°48.2 | 53.0 | 47°37.2 | 28.5 | | | | | | |
| 18 | 64°37.6 | 75°11.3 | S06°04.8 | 96°35.1 | S14°05.0 | 317°50.8 | N22°53.0 | 62°39.4 | S01°28.4 | | | | | | |
| 19 | 79°40.1 | 90°10.9 | 03.5 | 111°35.6 | 04.4 | 332°53.4 | 53.1 | 77°41.6 | 28.2 | | | | | | |
| 20 | 94°42.5 | 105°10.5 | 02.3 | 126°36.2 | 03.7 | 347°56.0 | 53.1 | 92°43.8 | 28.1 | | | | | | |
| 21 | 109°45.0 | 120°10.0 | 06°01.0 | 141°36.7 | · · 03.1 | 2°58.6 | · · 53.1 | 107°46.0 | · · 28.0 | | | | | | |
| 22 | 124°47.5 | 135°09.6 | 05°59.8 | 156°37.3 | 02.4 | 18°01.2 | 53.1 | 122°48.2 | 27.9 | | | | | | |
| 23 | 139°49.9 | 150°09.2 | 58.5 | 171°37.8 | 01.7 | 33°03.8 | 53.1 | 137°50.4 | 27.8 | | | | | | |
| Mer.pass. 13:42 | | | ν-0.4' d-1.2' m-3.91 | | | ν0.5' d-0.7' m1.14 | | | ν2.6' d0.0' m-2.48 | | | ν2.2' d-0.1' m1.00 | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | | |
| 0 | 154°52.4 | 165°08.8 | S05°57.3 | 186°38.4 | S14°01.1 | 48°06.3 | N22°53.1 | 152°52.6 | S01°27.7 | | | | | | |
| 1 | 169°54.9 | 180°08.4 | 56.0 | 201°38.9 | 14°00.4 | 63°08.9 | 53.2 | 167°54.8 | 27.5 | | | | | | |
| 2 | 184°57.3 | 195°08.0 | 54.8 | 216°39.5 | 13°59.7 | 78°11.5 | 53.2 | 182°57.0 | 27.4 | | | | | | |
| 3 | 199°59.8 | 210°07.6 | · · 53.5 | 231°40.0 | · · 59.1 | 93°14.1 | · · 53.2 | 197°59.2 | · · 27.3 | | | | | | |
| 4 | 215°02.2 | 225°07.2 | 52.3 | 246°40.6 | 58.4 | 108°16.7 | 53.2 | 213°01.4 | 27.2 | | | | | | |
| 5 | 230°04.7 | 240°06.8 | 51.0 | 261°41.1 | 57.7 | 123°19.3 | 53.2 | 228°03.6 | 27.1 | | | | | | |
| 6 | 245°07.2 | 255°06.3 | S05°49.8 | 276°41.7 | S13°57.1 | 138°21.9 | N22°53.2 | 243°05.8 | S01°26.9 | | | | | | |
| 7 | 260°09.6 | 270°05.9 | 48.5 | 291°42.3 | 56.4 | 153°24.4 | 53.3 | 258°08.0 | 26.8 | | | | | | |
| 8 | 275°12.1 | 285°05.5 | 47.3 | 306°42.8 | 55.7 | 168°27.0 | 53.3 | 273°10.1 | 26.7 | | | | | | |
| 9 | 290°14.6 | 300°05.1 | · · 46.0 | 321°43.4 | · · 55.1 | 183°29.6 | · · 53.3 | 288°12.3 | · · 26.6 | | | | | | |
| 10 | 305°17.0 | 315°04.7 | 44.8 | 336°43.9 | 54.4 | 198°32.2 | 53.3 | 303°14.5 | 26.5 | | | | | | |
| 11 | 320°19.5 | 330°04.3 | 43.5 | 351°44.5 | 53.7 | 213°34.8 | 53.3 | 318°16.7 | 26.3 | | | | | | |
| 12 | 335°22.0 | 345°03.9 | S05°42.3 | 6°45.0 | S13°53.1 | 228°37.4 | N22°53.3 | 333°18.9 | S01°26.2 | | | | | | |
| 13 | 350°24.4 | 0°03.5 | 41.0 | 21°45.6 | 52.4 | 243°39.9 | 53.3 | 348°21.1 | 26.1 | | | | | | |
| 14 | 5°26.9 | 15°03.1 | 39.8 | 36°46.1 | 51.7 | 258°42.5 | 53.4 | 3°23.3 | 26.0 | | | | | | |
| 15 | 20°29.4 | 30°02.7 | · · 38.5 | 51°46.7 | · · 51.1 | 273°45.1 | · · 53.4 | 18°25.5 | · · 25.9 | | | | | | |
| 16 | 35°31.8 | 45°02.3 | 37.3 | 66°47.3 | 50.4 | 288°47.7 | 53.4 | 33°27.7 | 25.7 | | | | | | |
| 17 | 50°34.3 | 60°01.9 | 36.0 | 81°47.8 | 49.7 | 303°50.3 | 53.4 | 48°29.9 | 25.6 | | | | | | |
| 18 | 65°36.7 | 75°01.4 | S05°34.8 | 96°48.4 | S13°49.1 | 318°52.9 | N22°53.4 | 63°32.1 | S01°25.5 | | | | | | |
| 19 | 80°39.2 | 90°01.0 | 33.5 | 111°48.9 | 48.4 | 333°55.4 | 53.4 | 78°34.3 | 25.4 | | | | | | |
| 20 | 95°41.7 | 105°00.6 | 32.3 | 126°49.5 | 47.7 | 348°58.0 | 53.5 | 93°36.5 | 25.3 | | | | | | |
| 21 | 110°44.1 | 120°00.2 | · · 31.0 | 141°50.0 | · · 47.1 | 4°00.6 | · · 53.5 | 108°38.7 | · · 25.2 | | | | | | |
| 22 | 125°46.6 | 134°59.8 | 29.8 | 156°50.6 | 46.4 | 19°03.2 | 53.5 | 123°40.9 | 25.0 | | | | | | |
| 23 | 140°49.1 | 149°59.4 | 28.5 | 171°51.1 | 45.7 | 34°05.8 | 53.5 | 138°43.1 | 24.9 | | | | | | |
| Mer.pass. 13:38 | | | ν-0.4' d-1.2' m-3.91 | | | ν0.6' d-0.7' m1.14 | | | ν2.6' d0.0' m-2.47 | | | ν2.2' d-0.1' m1.00 | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | | |
| 0 | 155°51.5 | 164°59.0 | S05°27.3 | 186°51.7 | S13°45.0 | 49°08.3 | N22°53.5 | 153°45.3 | S01°24.8 | | | | | | |
| 1 | 170°54.0 | 179°58.6 | 26.0 | 201°52.3 | 44.4 | 64°10.9 | 53.5 | 168°47.5 | 24.7 | | | | | | |
| 2 | 185°56.5 | 194°58.2 | 24.8 | 216°52.8 | 43.7 | 79°13.5 | 53.5 | 183°49.7 | 24.6 | | | | | | |
| 3 | 200°58.9 | 209°57.8 | · · 23.5 | 231°53.4 | · · 43.0 | 94°16.1 | · · 53.6 | 198°51.9 | · · 24.4 | | | | | | |
| 4 | 216°01.4 | 224°57.4 | 22.3 | 246°53.9 | 42.4 | 109°18.7 | 53.6 | 213°54.1 | 24.3 | | | | | | |
| 5 | 231°03.9 | 239°57.0 | 21.0 | 261°54.5 | 41.7 | 124°21.2 | 53.6 | 228°56.3 | 24.2 | | | | | | |
| 6 | 246°06.3 | 254°56.6 | S05°19.8 | 276°55.1 | S13°41.0 | 139°23.8 | N22°53.6 | 243°58.4 | S01°24.1 | | | | | | |
| 7 | 261°08.8 | 269°56.2 | 18.5 | 291°55.6 | 40.3 | 154°26.4 | 53.6 | 259°00.6 | 24.0 | | | | | | |
| 8 | 276°11.2 | 284°55.8 | 17.3 | 306°56.2 | 39.7 | 169°29.0 | 53.6 | 274°02.8 | 23.8 | | | | | | |
| 9 | 291°13.7 | 299°55.4 | · · 16.0 | 321°56.7 | · · 39.0 | 184°31.5 | · · 53.6 | 289°05.0 | · · 23.7 | | | | | | |
| 10 | 306°16.2 | 314°55.0 | 14.7 | 336°57.3 | 38.3 | 199°34.1 | 53.7 | 304°07.2 | 23.6 | | | | | | |
| 11 | 321°18.6 | 329°54.6 | 13.5 | 351°57.8 | 37.7 | 214°36.7 | 53.7 | 319°09.4 | 23.5 | | | | | | |
| 12 | 336°21.1 | 344°54.2 | S05°12.2 | 6°58.4 | S13°37.0 | 229°39.3 | N22°53.7 | 334°11.6 | S01°23.4 | | | | | | |
| 13 | 351°23.6 | 359°53.8 | 11.0 | 21°59.0 | 36.3 | 244°41.8 | 53.7 | 349°13.8 | 23.2 | | | | | | |
| 14 | 6°26.0 | 14°53.4 | 09.7 | 36°59.5 | 35.6 | 259°44.4 | 53.7 | 4°16.0 | 23.1 | | | | | | |
| 15 | 21°28.5 | 29°53.0 | · · 08.5 | 52°00.1 | · · 35.0 | 274°47.0 | · · 53.7 | 19°18.2 | · · 23.0 | | | | | | |
| 16 | 36°31.0 | 44°52.6 | 07.2 | 67°00.6 | 34.3 | 289°49.6 | 53.7 | 34°20.4 | 22.9 | | | | | | |
| 17 | 51°33.4 | 59°52.2 | 05.9 | 82°01.2 | 33.6 | 304°52.1 | 53.8 | 49°22.6 | 22.8 | | | | | | |
| 18 | 66°35.9 | 74°51.8 | S05°04.7 | 97°01.8 | S13°32.9 | 319°54.7 | N22°53.8 | 64°24.8 | S01°22.6 | | | | | | |
| 19 | 81°38.4 | 89°51.4 | 03.4 | 112°02.3 | 32.3 | 334°57.3 | 53.8 | 79°27.0 | 22.5 | | | | | | |
| 20 | 96°40.8 | 104°51.0 | 02.2 | 127°02.9 | 31.6 | 349°59.8 | 53.8 | 94°29.2 | 22.4 | | | | | | |
| 21 | 111°43.3 | 119°50.6 | 05°00.9 | 142°03.5 | · · 30.9 | 5°02.4 | · · 53.8 | 109°31.4 | · · 22.3 | | | | | | |
| 22 | 126°45.7 | 134°50.2 | 04°59.7 | 157°04.0 | 30.2 | 20°05.0 | 53.8 | 124°33.6 | 22.2 | | | | | | |
| 23 | 141°48.2 | 149°49.8 | 58.4 | 172°04.6 | 29.6 | 35°07.6 | 53.8 | 139°35.8 | 22.0 | | | | | | |
| Mer.pass. 13:34 | | | ν-0.4' d-1.3' m-3.91 | | | ν0.6' d-0.7' m1.14 | | | ν2.6' d0.0' m-2.46 | | | ν2.2' d-0.1' m1.00 | | | |

| Stars | | |
|----------------------------|------------|-----------------|
| | SHA | Dec |
| Alpheratz | 357°34.1 | 29°14.1 |
| Ankaa | 353°06.6 | -42°10.0 |
| Schedar | 349°30.4 | 56°41.0 |
| Diphda | 348°46.6 | -17°50.7 |
| Achernar | 335°19.8 | -57°06.5 |
| Hamal | 327°50.3 | 23°35.2 |
| Polaris | 313°42.2 | 89°22.8 |
| Acamar | 315°11.2 | -40°12.2 |
| Menkar | 314°05.3 | 4°11.5 |
| Mirfak | 308°27.0 | 49°57.4 |
| Aldebaran | 290°38.5 | 16°33.7 |
| Rigel | 281°02.9 | -8°10.4 |
| Capella | 280°20.4 | 46°01.6 |
| Bellatrix | 278°21.8 | 6°22.3 |
| Elnath | 278°00.6 | 28°37.8 |
| Alnilam | 275°36.7 | -1°11.2 |
| Betelgeuse | 270°50.9 | 7°24.6 |
| Canopus | 263°51.7 | -52°42.8 |
| Sirius | 258°25.2 | -16°45.3 |
| Adhara | 255°04.9 | -29°00.6 |
| Procyon | 244°49.6 | 5°09.4 |
| Pollux | 243°15.9 | 27°57.7 |
| Avior | 234°13.8 | -59°35.8 |
| Suhail | 222°45.2 | -43°32.4 |
| Miaplacidus | 221°37.2 | -69°49.6 |
| Alphard | 217°46.5 | -8°46.5 |
| Regulus | 207°33.1 | 11°50.2 |
| Dubhe | 193°39.2 | 61°36.4 |
| Denebola | 182°23.7 | 14°25.4 |
| Gienah | 175°42.3 | -17°41.3 |
| Acrux | 172°58.5 | -63°14.6 |
| Gacrux | 171°50.1 | -57°15.5 |
| Alioth | 166°11.7 | 55°48.8 |
| Spica | 158°21.1 | -11°18.0 |
| Alkaid | 152°50.9 | 49°10.6 |
| Hadar | 148°34.3 | -60°29.8 |
| Menkent | 147°56.3 | -36°29.9 |
| Arcturus | 145°46.9 | 19°02.5 |
| Rigel Kent. | 139°38.7 | -60°56.4 |
| Kochab | 137°19.4 | 74°02.5 |
| Zuben'ubi | 136°54.8 | -16°09.1 |
| Alphecca | 126°02.9 | 26°37.3 |
| Antares | 112°14.7 | -26°29.4 |
| Atria | 107°08.2 | -69°04.2 |
| Sabik | 102°01.8 | -15°45.5 |
| Shaula | 96°09.2 | -37°07.3 |
| Rasalhague | 95°57.8 | 12°32.2 |
| Eltanin | 90°42.0 | 51°28.8 |
| Kaus Aust. | 83°31.5 | -34°22.3 |
| Vega | 80°32.8 | 38°48.2 |
| Nunki | 75°46.8 | -26°15.8 |
| Altair | 61°59.3 | 8°56.1 |
| Peacock | 53°04.7 | -56°39.0 |
| Deneb | 49°25.6 | 45°22.2 |
| Enif | 33°38.2 | 9°59.6 |
| Al Na'ir | 27°32.2 | -46°50.1 |
| Fomalhaut | 15°13.8 | -29°29.1 |
| Scheat | 13°44.6 | 28°13.4 |
| Markab | 13°29.3 | 15°20.7 |
| <hr/> | | |
| Feb 24 Tue | SHA | Mer.pass |
| Venus | 11°25.5 | 12:59 |
| Mars | 32°31.9 | 11:34 |
| Jupiter | 253°10.9 | 20:48 |
| Saturn | 358°06.6 | 13:50 |
| <hr/> | | |
| Feb 25 Wed | SHA | Mer.pass |
| Venus | 10°16.4 | 13:00 |
| Mars | 31°46.0 | 11:33 |
| Jupiter | 253°13.9 | 20:44 |
| Saturn | 358°00.2 | 13:46 |
| <hr/> | | |
| Feb 26 Thu | SHA | Mer.pass |
| Venus | 9°07.5 | 13:00 |
| Mars | 31°00.2 | 11:32 |
| Jupiter | 253°16.8 | 20:40 |
| Saturn | 357°53.7 | 13:43 |
| <hr/> | | |
| Horizontal parallax | | |
| | Venus: | 0.1 |
| | Mars: | 0.1 |

| h | Sun | | | Moon | | | |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| Tue | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 176°41.5 | S09°32.3 | 98°51.3 | 5.7' | N24°53.6 | 8.6' | 59.1' |
| 1 | 191°41.6 | 31.4 | 113°16.0 | 5.6' | 25°02.2 | 8.4' | 59.1' |
| 2 | 206°41.7 | 30.4 | 127°40.6 | 5.5' | 25°10.6 | 8.3' | 59.1' |
| 3 | 221°41.7 | · · 29.5 | 142°05.0 | 5.4' | 25°18.9 | 8.1' | 59.1' |
| 4 | 236°41.8 | 28.6 | 156°29.4 | 5.3' | 25°27.0 | 7.9' | 59.1' |
| 5 | 251°41.9 | 27.7 | 170°53.7 | 5.2' | 25°34.9 | 7.8' | 59.1' |
| 6 | 266°42.0 | S09°26.7 | 185°18.0 | 5.1' | N25°42.7 | 7.6' | 59.1' |
| 7 | 281°42.1 | 25.8 | 199°42.1 | 5.0' | 25°50.3 | 7.4' | 59.1' |
| 8 | 296°42.2 | 24.9 | 214°06.1 | 5.0' | 25°57.8 | 7.3' | 59.1' |
| 9 | 311°42.3 | · · 24.0 | 228°30.1 | 4.9' | 26°05.0 | 7.1' | 59.1' |
| 10 | 326°42.4 | 23.0 | 242°54.0 | 4.8' | 26°12.1 | 6.9' | 59.1' |
| 11 | 341°42.5 | 22.1 | 257°17.8 | 4.7' | 26°19.1 | 6.8' | 59.2' |
| 12 | 356°42.6 | S09°21.2 | 271°41.5 | 4.6' | N26°25.8 | 6.6' | 59.2' |
| 13 | 11°42.7 | 20.3 | 286°05.2 | 4.6' | 26°32.4 | 6.4' | 59.2' |
| 14 | 26°42.8 | 19.3 | 300°28.7 | 4.5' | 26°38.8 | 6.2' | 59.2' |
| 15 | 41°42.9 | · · 18.4 | 314°52.2 | 4.4' | 26°45.0 | 6.1' | 59.2' |
| 16 | 56°43.0 | 17.5 | 329°15.7 | 4.4' | 26°51.1 | 5.9' | 59.2' |
| 17 | 71°43.0 | 16.6 | 343°39.0 | 4.3' | 26°56.9 | 5.7' | 59.2' |
| 18 | 86°43.1 | S09°15.6 | 358°02.3 | 4.2' | N27°02.6 | 5.5' | 59.2' |
| 19 | 101°43.2 | 14.7 | 12°25.5 | 4.2' | 27°08.1 | 5.3' | 59.2' |
| 20 | 116°43.3 | 13.8 | 26°48.7 | 4.1' | 27°13.5 | 5.1' | 59.2' |
| 21 | 131°43.4 | · · 12.8 | 41°11.8 | 4.0' | 27°18.6 | 5.0' | 59.2' |
| 22 | 146°43.5 | 11.9 | 55°34.8 | 4.0' | 27°23.6 | 4.8' | 59.2' |
| 23 | 161°43.6 | 11.0 | 69°57.8 | 3.9' | 27°28.4 | 4.6' | 59.2' |
| SD = 16.2' $d = -0.9'$ | | | SD = 16.1' | | | | |
| Wed | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 176°43.7 | S09°10.1 | 84°20.7 | 3.9' | N27°33.0 | 4.4' | 59.2' |
| 1 | 191°43.8 | 09.1 | 98°43.6 | 3.8' | 27°37.4 | 4.2' | 59.2' |
| 2 | 206°43.9 | 08.2 | 113°06.4 | 3.8' | 27°41.6 | 4.0' | 59.2' |
| 3 | 221°44.0 | · · 07.3 | 127°29.2 | 3.7' | 27°45.6 | 3.8' | 59.2' |
| 4 | 236°44.1 | 06.3 | 141°51.9 | 3.7' | 27°49.4 | 3.7' | 59.2' |
| 5 | 251°44.2 | 05.4 | 156°14.6 | 3.6' | 27°53.1 | 3.5' | 59.2' |
| 6 | 266°44.3 | S09°04.5 | 170°37.2 | 3.6' | N27°56.6 | 3.3' | 59.2' |
| 7 | 281°44.4 | 03.6 | 184°59.8 | 3.5' | 27°59.8 | 3.1' | 59.2' |
| 8 | 296°44.5 | 02.6 | 199°22.3 | 3.5' | 28°02.9 | 2.9' | 59.2' |
| 9 | 311°44.6 | · · 01.7 | 213°44.8 | 3.5' | 28°05.8 | 2.7' | 59.2' |
| 10 | 326°44.7 | 09°00.8 | 228°07.3 | 3.4' | 28°08.5 | 2.5' | 59.2' |
| 11 | 341°44.8 | 08°59.8 | 242°29.8 | 3.4' | 28°11.0 | 2.3' | 59.2' |
| 12 | 356°44.9 | S08°58.9 | 256°52.2 | 3.4' | N28°13.3 | 2.1' | 59.2' |
| 13 | 11°45.0 | 58.0 | 271°14.6 | 3.4' | 28°15.4 | 1.9' | 59.1' |
| 14 | 26°45.1 | 57.0 | 285°36.9 | 3.3' | 28°17.3 | 1.7' | 59.1' |
| 15 | 41°45.2 | · · 56.1 | 299°59.3 | 3.3' | 28°19.0 | 1.5' | 59.1' |
| 16 | 56°45.3 | 55.2 | 314°21.6 | 3.3' | 28°20.5 | 1.3' | 59.1' |
| 17 | 71°45.4 | 54.2 | 328°43.9 | 3.3' | 28°21.9 | 1.1' | 59.1' |
| 18 | 86°45.5 | S08°53.3 | 343°06.2 | 3.3' | N28°23.0 | 0.9' | 59.1' |
| 19 | 101°45.6 | 52.4 | 357°28.5 | 3.3' | 28°23.9 | 0.7' | 59.1' |
| 20 | 116°45.7 | 51.4 | 11°50.8 | 3.3' | 28°24.7 | 0.5' | 59.1' |
| 21 | 131°45.8 | · · 50.5 | 26°13.0 | 3.3' | 28°25.2 | 0.3' | 59.1' |
| 22 | 146°45.9 | 49.6 | 40°35.3 | 3.3' | 28°25.5 | 0.1' | 59.1' |
| 23 | 161°46.0 | 48.6 | 54°57.6 | 3.3' | 28°25.7 | -0.1' | 59.1' |
| SD = 16.2' $d = -0.9'$ | | | SD = 16.1' | | | | |
| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 176°46.1 | S08°47.7 | 69°19.8 | 3.3' | N28°25.6 | -0.2' | 59.1' |
| 1 | 191°46.2 | 46.8 | 83°42.1 | 3.3' | 28°25.4 | -0.4' | 59.1' |
| 2 | 206°46.3 | 45.8 | 98°04.4 | 3.3' | 28°24.9 | -0.6' | 59.1' |
| 3 | 221°46.4 | · · 44.9 | 112°26.7 | 3.3' | 28°24.3 | -0.8' | 59.1' |
| 4 | 236°46.5 | 44.0 | 126°49.0 | 3.3' | 28°23.5 | -1.0' | 59.1' |
| 5 | 251°46.6 | 43.0 | 141°11.3 | 3.3' | 28°22.4 | -1.2' | 59.1' |
| 6 | 266°46.7 | S08°42.1 | 155°33.6 | 3.4' | N28°21.2 | -1.4' | 59.1' |
| 7 | 281°46.8 | 41.2 | 169°56.0 | 3.4' | 28°19.8 | -1.6' | 59.1' |
| 8 | 296°46.9 | 40.2 | 184°18.3 | 3.4' | 28°18.2 | -1.8' | 59.1' |
| 9 | 311°47.1 | · · 39.3 | 198°40.7 | 3.4' | 28°16.4 | -2.0' | 59.1' |
| 10 | 326°47.2 | 38.4 | 213°03.2 | 3.5' | 28°14.3 | -2.2' | 59.1' |
| 11 | 341°47.3 | 37.4 | 227°25.6 | 3.5' | 28°12.1 | -2.4' | 59.1' |
| 12 | 356°47.4 | S08°36.5 | 241°48.1 | 3.5' | N28°09.7 | -2.6' | 59.1' |
| 13 | 11°47.5 | 35.6 | 256°10.7 | 3.6' | 28°07.2 | -2.8' | 59.1' |
| 14 | 26°47.6 | 34.6 | 270°33.2 | 3.6' | 28°04.4 | -3.0' | 59.1' |
| 15 | 41°47.7 | · · 33.7 | 284°55.8 | 3.7' | 28°01.4 | -3.2' | 59.1' |
| 16 | 56°47.8 | 32.7 | 299°18.5 | 3.7' | 27°58.2 | -3.4' | 59.0' |
| 17 | 71°47.9 | 31.8 | 313°41.2 | 3.7' | 27°54.9 | -3.5' | 59.0' |
| 18 | 86°48.0 | S08°30.9 | 328°03.9 | 3.8' | N27°51.3 | -3.7' | 59.0' |
| 19 | 101°48.1 | 29.9 | 342°26.7 | 3.8' | 27°47.6 | -3.9' | 59.0' |
| 20 | 116°48.2 | 29.0 | 356°49.6 | 3.9' | 27°43.7 | -4.1' | 59.0' |
| 21 | 131°48.3 | · · 28.1 | 11°12.5 | 4.0' | 27°39.6 | -4.3' | 59.0' |
| 22 | 146°48.4 | 27.1 | 25°35.4 | 4.0' | 27°35.3 | -4.5' | 59.0' |
| 23 | 161°48.6 | 26.2 | 39°58.4 | 4.1' | 27°30.8 | -4.7' | 59.0' |
| SD = 16.1' $d = -0.9'$ | | | SD = 16.1' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 05:29 | 06:47 | 07:58 | 16:30 | 17:41 | 18:59 |
| N 70° | 05:32 | 06:43 | 07:46 | 16:42 | 17:45 | 18:56 |
| 68° | 05:35 | 06:39 | 07:36 | 16:51 | 17:49 | 18:53 |
| 66° | 05:37 | 06:36 | 07:28 | 16:59 | 17:52 | 18:51 |
| 64° | 05:38 | 06:33 | 07:21 | 17:06 | 17:55 | 18:50 |
| 62° | 05:39 | 06:30 | 07:15 | 17:12 | 17:57 | 18:48 |
| 60° | 05:40 | 06:28 | 07:10 | 17:17 | 17:59 | 18:48 |
| N 58° | 05:41 | 06:26 | 07:06 | 17:21 | 18:01 | 18:47 |
| 56° | 05:41 | 06:24 | 07:02 | 17:25 | 18:03 | 18:46 |
| 54° | 05:41 | 06:22 | 06:58 | 17:29 | 18:05 | 18:46 |
| 52° | 05:41 | 06:20 | 06:55 | 17:32 | 18:06 | 18:46 |
| 50° | 05:42 | 06:19 | 06:52 | 17:35 | 18:08 | 18:45 |
| 45° | 05:41 | 06:15 | 06:45 | 17:42 | 18:11 | 18:45 |
| N 40° | 05:41 | 06:12 | 06:39 | 17:47 | 18:15 | 18:46 |
| 35° | 05:40 | 06:09 | 06:35 | 17:52 | 18:17 | 18:47 |
| 30° | 05:38 | 06:06 | 06:30 | 17:56 | 18:20 | 18:48 |
| 20° | 05:35 | 06:01 | 06:23 | 18:03 | 18:26 | 18:51 |
| N 10° | 05:30 | 05:55 | 06:16 | 18:10 | 18:31 | 18:56 |
| 0° | 05:24 | 05:49 | 06:10 | 18:16 | 18:37 | 19:02 |
| S 10° | 05:17 | 05:42 | 06:03 | 18:23 | 18:44 | 19:09 |
| 20° | 05:07 | 05:34 | 05:56 | 18:30 | 18:52 | 19:18 |
| 30° | 04:55 | 05:24 | 05:48 | 18:38 | 19:02 | 19:31 |
| 35° | 04:46 | 05:17 | 05:43 | 18:42 | 19:08 | 19:39 |
| 40° | 04:36 | 05:10 | 05:38 | 18:48 | 19:15 | 19:49 |
| 45° | 04:24 | 05:01 | 05:31 | 18:54 | 19:24 | 20:01 |
| S 50° | 04:08 | 04:50 | 05:24 | 19:01 | 19:35 | 20:16 |
| 52° | 04:00 | 04:45 | 05:20 | 19:05 | 19:40 | 20:24 |
| 54° | 03:52 | 04:39 | 05:16 | 19:08 | 19:46 | 20:33 |
| 56° | 03:41 | 04:32 | 05:12 | 19:13 | 19:52 | 20:42 |
| 58° | 03:30 | 04:25 | 05:07 | 19:17 | 20:00 | 20:54 |
| S 60° | 03:16 | 04:16 | 05:02 | 19:23 | 20:08 | 21:08 |

| Lat. | Moonrise | | | Moonset | | |
|-------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| N 70° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64° | 06:22 | <input type="checkbox"/> | <input type="checkbox"/> | 04:43 | <input type="checkbox"/> | <input type="checkbox"/> |
| 62° | 07:22 | 07:06 | <input type="checkbox"/> | 03:44 | 06:08 | <input type="checkbox"/> |
| 60° | 07:56 | 08:17 | 09:15 | 03:10 | 04:57 | 06:11 |
| N 58° | 08:21 | 08:52 | 09:53 | 02:46 | 04:22 | 05:33 |
| 56° | 08:41 | 09:18 | 10:20 | 02:26 | 03:56 | 05:06 |
| 54° | 08:58 | 09:39 | 10:41 | 02:10 | 03:36 | 04:45 |
| 52° | 09:12 | 09:56 | 10:58 | 01:56 | 03:19 | 04:27 |
| 50° | 09:25 | 10:11 | 11:13 | 01:43 | 03:04 | 04:12 |
| 45° | 09:51 | 10:41 | 11:44 | 01:18 | 02:35 | 03:42 |
| N 40° | 10:12 | 11:04 | 12:07 | 00:58 | 02:12 | 03:18 |
| 35° | 10:30 | 11:24 | 12:27 | 00:42 | 01:53 | 02:58 |
| 30° | 10:45 | 11:40 | 12:44 | 00:27 | 01:36 | 02:41 |
| 20° | 11:10 | 12:09 | 13:12 | 00:03 | 01:09 | 02:13 |
| N 10° | 11:33 | 12:33 | 13:36 | · · · | 00:45 | 01:48 |
| 0° | 11:54 | 12:56 | 13:58 | · · · | 00:23 | 01:26 |
| S 10° | 12:15 | 13:18 | 14:21 | · · · | 00:01 | 01:03 |
| 20° | 12:37 | 13:43 | 14:45 | 23:37 | · · · | 00:38 |
| 30° | 13:04 | 14:11 | 15:13 | 23:10 | · · · | 00:09 |
| 35° | 13:19 | 14:28 | 15:30 | 22:54 | 23:52 | · · · |
| 40° | 13:38 | 14:48 | 15:49 | 22:35 | 23:32 | · · · |
| 45° | 14:00 | 15:12 | 16:13 | 22:12 | 23:08 | · · · |
| S 50° | 14:28 | 15:43 | 16:43 | 21:43 | 22:37 | 23:48 |
| 52° | 14:42 | 15:59 | 16:57 | 21:29 | 22:22 | 23:33 |
| 54° | 14:58 | 16:17 | 17:15 | 21:13 | 22:03 | 23:16 |
| 56° | 15:17 | 16:39 | 17:35 | 20:53 | 21:41 | 22:56 |
| 58° | 15:40 | 17:07 | 18:01 | 20:29 | 21:13 | 22:30 |
| S 60° | 16:12 | 17:48 | 18:37 | 19:58 | 20:32 | 21:55 |

| Day | Sun | | Mer. Pass | Moon | | Age 7-9 44-67% |
|-----|-----------------------------------|----------------------------|-----------|-----------------------|-------------|----------------|
| | Eqn.of Time 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 24 | 13:14 | 13:10 | 12:13 | 18:08 | 05:38 | |
| 25 | 13:05 | 13:00 | 12:13 | 19:11 | 06:39 | |
| 26 | 12:56 | 12:51 | 12:13 | 20:13 | 07:42 | |

February 27, 28, 01 UT (Fri., Sat., Sun.)


| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|--|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|
| Fri | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 156°50.7 | | 164°49.4 | S04°57.1 | 187°05.1 | S13°28.9 | 50°10.1 | N22°53.9 | 154°37.9 | S01°21.9 |
| 1 | 171°53.1 | | 179°49.0 | 55.9 | 202°05.7 | 28.2 | 65°12.7 | 53.9 | 169°40.1 | 21.8 |
| 2 | 186°55.6 | | 194°48.6 | 54.6 | 217°06.3 | 27.5 | 80°15.3 | 53.9 | 184°42.3 | 21.7 |
| 3 | 201°58.1 | | 209°48.2 | · · 53.4 | 232°06.8 | · · 26.9 | 95°17.8 | · · 53.9 | 199°44.5 | · · 21.6 |
| 4 | 217°00.5 | | 224°47.8 | 52.1 | 247°07.4 | 26.2 | 110°20.4 | 53.9 | 214°46.7 | 21.4 |
| 5 | 232°03.0 | | 239°47.4 | 50.9 | 262°07.9 | 25.5 | 125°23.0 | 53.9 | 229°48.9 | 21.3 |
| 6 | 247°05.5 | | 254°47.0 | S04°49.6 | 277°08.5 | S13°24.8 | 140°25.5 | N22°53.9 | 244°51.1 | S01°21.2 |
| 7 | 262°07.9 | | 269°46.6 | 48.3 | 292°09.1 | 24.2 | 155°28.1 | 54.0 | 259°53.3 | 21.1 |
| 8 | 277°10.4 | | 284°46.2 | 47.1 | 307°09.6 | 23.5 | 170°30.7 | 54.0 | 274°55.5 | 21.0 |
| 9 | 292°12.9 | | 299°45.8 | · · 45.8 | 322°10.2 | · · 22.8 | 185°33.3 | · · 54.0 | 289°57.7 | · · 20.8 |
| 10 | 307°15.3 | | 314°45.4 | 44.5 | 337°10.8 | 22.1 | 200°35.8 | 54.0 | 304°59.9 | 20.7 |
| 11 | 322°17.8 | | 329°45.0 | 43.3 | 352°11.3 | 21.4 | 215°38.4 | 54.0 | 320°02.1 | 20.6 |
| 12 | 337°20.2 | | 344°44.6 | S04°42.0 | 7°11.9 | S13°20.8 | 230°41.0 | N22°54.0 | 335°04.3 | S01°20.5 |
| 13 | 352°22.7 | | 359°44.2 | 40.8 | 22°12.5 | 20.1 | 245°43.5 | 54.0 | 350°06.5 | 20.4 |
| 14 | 7°25.2 | | 14°43.8 | 39.5 | 37°13.0 | 19.4 | 260°46.1 | 54.1 | 5°08.7 | 20.2 |
| 15 | 22°27.6 | | 29°43.4 | · · 38.2 | 52°13.6 | · · 18.7 | 275°48.6 | · · 54.1 | 20°10.9 | · · 20.1 |
| 16 | 37°30.1 | | 44°43.0 | 37.0 | 67°14.1 | 18.1 | 290°51.2 | 54.1 | 35°13.0 | 20.0 |
| 17 | 52°32.6 | | 59°42.6 | 35.7 | 82°14.7 | 17.4 | 305°53.8 | 54.1 | 50°15.2 | 19.9 |
| 18 | 67°35.0 | | 74°42.2 | S04°34.5 | 97°15.3 | S13°16.7 | 320°56.3 | N22°54.1 | 65°17.4 | S01°19.8 |
| 19 | 82°37.5 | | 89°41.8 | 33.2 | 112°15.8 | 16.0 | 335°58.9 | 54.1 | 80°19.6 | 19.6 |
| 20 | 97°40.0 | | 104°41.4 | 31.9 | 127°16.4 | 15.3 | 351°01.5 | 54.1 | 95°21.8 | 19.5 |
| 21 | 112°42.4 | | 119°41.0 | · · 30.7 | 142°17.0 | · · 14.7 | 6°04.0 | · · 54.2 | 110°24.0 | · · 19.4 |
| 22 | 127°44.9 | | 134°40.6 | 29.4 | 157°17.5 | 14.0 | 21°06.6 | 54.2 | 125°26.2 | 19.3 |
| 23 | 142°47.4 | | 149°40.2 | 28.1 | 172°18.1 | 13.3 | 36°09.2 | 54.2 | 140°28.4 | 19.2 |
| Mer.pass. 13:30 | | | ν-0.4' d-1.3' m-3.91 | | ν0.6' d-0.7' m1.14 | | ν2.6' d0.0' m-2.46 | | ν2.2' d-0.1' m0.99 | |
| Sat | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 157°49.8 | | 164°39.8 | S04°26.9 | 187°18.7 | S13°12.6 | 51°11.7 | N22°54.2 | 155°30.6 | S01°19.0 |
| 1 | 172°52.3 | | 179°39.5 | 25.6 | 202°19.2 | 11.9 | 66°14.3 | 54.2 | 170°32.8 | 18.9 |
| 2 | 187°54.7 | | 194°39.1 | 24.4 | 217°19.8 | 11.2 | 81°16.8 | 54.2 | 185°35.0 | 18.8 |
| 3 | 202°57.2 | | 209°38.7 | · · 23.1 | 232°20.4 | · · 10.6 | 96°19.4 | · · 54.2 | 200°37.2 | · · 18.7 |
| 4 | 217°59.7 | | 224°38.3 | 21.8 | 247°20.9 | 09.9 | 111°22.0 | 54.2 | 215°39.4 | 18.6 |
| 5 | 233°02.1 | | 239°37.9 | 20.6 | 262°21.5 | 09.2 | 126°24.5 | 54.3 | 230°41.6 | 18.4 |
| 6 | 248°04.6 | | 254°37.5 | S04°19.3 | 277°22.1 | S13°08.5 | 141°27.1 | N22°54.3 | 245°43.7 | S01°18.3 |
| 7 | 263°07.1 | | 269°37.1 | 18.0 | 292°22.6 | 07.8 | 156°29.6 | 54.3 | 260°45.9 | 18.2 |
| 8 | 278°09.5 | | 284°36.7 | 16.8 | 307°23.2 | 07.2 | 171°32.2 | 54.3 | 275°48.1 | 18.1 |
| 9 | 293°12.0 | | 299°36.3 | · · 15.5 | 322°23.8 | · · 06.5 | 186°34.8 | · · 54.3 | 290°50.3 | · · 18.0 |
| 10 | 308°14.5 | | 314°35.9 | 14.2 | 337°24.3 | 05.8 | 201°37.3 | 54.3 | 305°52.5 | 17.8 |
| 11 | 323°16.9 | | 329°35.5 | 13.0 | 352°24.9 | 05.1 | 216°39.9 | 54.3 | 320°54.7 | 17.7 |
| 12 | 338°19.4 | | 344°35.1 | S04°11.7 | 7°25.5 | S13°04.4 | 231°42.4 | N22°54.3 | 335°56.9 | S01°17.6 |
| 13 | 353°21.8 | | 359°34.7 | 10.4 | 22°26.0 | 03.7 | 246°45.0 | 54.4 | 350°59.1 | 17.5 |
| 14 | 8°24.3 | | 14°34.4 | 09.2 | 37°26.6 | 03.1 | 261°47.5 | 54.4 | 6°01.3 | 17.4 |
| 15 | 23°26.8 | | 29°34.0 | · · 07.9 | 52°27.2 | · · 02.4 | 276°50.1 | · · 54.4 | 21°03.5 | · · 17.2 |
| 16 | 38°29.2 | | 44°33.6 | 06.6 | 67°27.7 | 01.7 | 291°52.7 | 54.4 | 36°05.7 | 17.1 |
| 17 | 53°31.7 | | 59°33.2 | 05.4 | 82°28.3 | 01.0 | 306°55.2 | 54.4 | 51°07.9 | 17.0 |
| 18 | 68°34.2 | | 74°32.8 | S04°04.1 | 97°28.9 | S13°00.3 | 321°57.8 | N22°54.4 | 66°10.1 | S01°16.9 |
| 19 | 83°36.6 | | 89°32.4 | 02.8 | 112°29.5 | 12°59.6 | 337°00.3 | 54.4 | 81°12.2 | 16.8 |
| 20 | 98°39.1 | | 104°32.0 | 01.6 | 127°30.0 | 58.9 | 352°02.9 | 54.4 | 96°14.4 | 16.6 |
| 21 | 113°41.6 | | 119°31.6 | 04°00.3 | 142°30.6 | · · 58.3 | 7°05.4 | · · 54.5 | 111°16.6 | · · 16.5 |
| 22 | 128°44.0 | | 134°31.2 | 03°59.0 | 157°31.2 | 57.6 | 22°08.0 | 54.5 | 126°18.8 | 16.4 |
| 23 | 143°46.5 | | 149°30.9 | 57.8 | 172°31.7 | 56.9 | 37°10.5 | 54.5 | 141°21.0 | 16.3 |
| Mer.pass. 13:26 | | | ν-0.4' d-1.3' m-3.91 | | ν0.6' d-0.7' m1.14 | | ν2.6' d0.0' m-2.45 | | ν2.2' d-0.1' m0.99 | |
| Sun | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 158°49.0 | | 164°30.5 | S03°56.5 | 187°32.3 | S12°56.2 | 52°13.1 | N22°54.5 | 156°23.2 | S01°16.2 |
| 1 | 173°51.4 | | 179°30.1 | 55.2 | 202°32.9 | 55.5 | 67°15.6 | 54.5 | 171°25.4 | 16.0 |
| 2 | 188°53.9 | | 194°29.7 | 54.0 | 217°33.4 | 54.8 | 82°18.2 | 54.5 | 186°27.6 | 15.9 |
| 3 | 203°56.3 | | 209°29.3 | · · 52.7 | 232°34.0 | · · 54.1 | 97°20.8 | · · 54.5 | 201°29.8 | · · 15.8 |
| 4 | 218°58.8 | | 224°28.9 | 51.4 | 247°34.6 | 53.4 | 112°23.3 | 54.5 | 216°32.0 | 15.7 |
| 5 | 234°01.3 | | 239°28.5 | 50.1 | 262°35.2 | 52.8 | 127°25.9 | 54.6 | 231°34.2 | 15.6 |
| 6 | 249°03.7 | | 254°28.1 | S03°48.9 | 277°35.7 | S12°52.1 | 142°28.4 | N22°54.6 | 246°36.4 | S01°15.4 |
| 7 | 264°06.2 | | 269°27.7 | 47.6 | 292°36.3 | 51.4 | 157°31.0 | 54.6 | 261°38.5 | 15.3 |
| 8 | 279°08.7 | | 284°27.4 | 46.3 | 307°36.9 | 50.7 | 172°33.5 | 54.6 | 276°40.7 | 15.2 |
| 9 | 294°11.1 | | 299°27.0 | · · 45.1 | 322°37.4 | · · 50.0 | 187°36.1 | · · 54.6 | 291°42.9 | · · 15.1 |
| 10 | 309°13.6 | | 314°26.6 | 43.8 | 337°38.0 | 49.3 | 202°38.6 | 54.6 | 306°45.1 | 15.0 |
| 11 | 324°16.1 | | 329°26.2 | 42.5 | 352°38.6 | 48.6 | 217°41.2 | 54.6 | 321°47.3 | 14.8 |
| 12 | 339°18.5 | | 344°25.8 | S03°41.3 | 7°39.2 | S12°47.9 | 232°43.7 | N22°54.6 | 336°49.5 | S01°14.7 |
| 13 | 354°21.0 | | 359°25.4 | 40.0 | 22°39.7 | 47.3 | 247°46.3 | 54.6 | 351°51.7 | 14.6 |
| 14 | 9°23.5 | | 14°25.0 | 38.7 | 37°40.3 | 46.6 | 262°48.8 | 54.7 | 6°53.9 | 14.5 |
| 15 | 24°25.9 | | 29°24.7 | · · 37.4 | 52°40.9 | · · 45.9 | 277°51.3 | · · 54.7 | 21°56.1 | · · 14.4 |
| 16 | 39°28.4 | | 44°24.3 | 36.2 | 67°41.4 | 45.2 | 292°53.9 | 54.7 | 36°58.3 | 14.2 |
| 17 | 54°30.8 | | 59°23.9 | 34.9 | 82°42.0 | 44.5 | 307°56.4 | 54.7 | 52°00.5 | 14.1 |
| 18 | 69°33.3 | | 74°23.5 | S03°33.6 | 97°42.6 | S12°43.8 | 322°59.0 | N22°54.7 | 67°02.6 | S01°14.0 |
| 19 | 84°35.8 | | 89°23.1 | 32.4 | 112°43.2 | 43.1 | 338°01.5 | 54.7 | 82°04.8 | 13.9 |
| 20 | 99°38.2 | | 104°22.7 | 31.1 | 127°43.7 | 42.4 | 353°04.1 | 54.7 | 97°07.0 | 13.8 |
| 21 | 114°40.7 | | 119°22.3 | · · 29.8 | 142°44.3 | · · 41.7 | 8°06.6 | · · 54.7 | 112°09.2 | · · 13.6 |
| 22 | 129°43.2 | | 134°22.0 | 28.5 | 157°44.9 | 41.0 | 23°09.2 | 54.8 | 127°11.4 | 13.5 |
| 23 | 144°45.6 | | 149°21.6 | 27.3 | 172°45.5 | 40.4 | 38°11.7 | 54.8 | 142°13.6 | 13.4 |
| Mer.pass. 13:23 | | | ν-0.4' d-1.3' m-3.91 | | ν0.6' d-0.7' m1.14 | | ν2.6' d0.0' m-2.44 | | ν2.2' d-0.1' m0.99 | |

| | SHA | Dec |
|---------------------|----------|----------|
| Alpheratz | 357°34.1 | 29°14.1 |
| Ankaa | 353°06.6 | -42°10.0 |
| Schedar | 349°30.4 | 56°41.0 |
| Diphda | 348°46.6 | -17°50.7 |
| Achernar | 335°19.8 | -57°06.4 |
| Hamal | 327°50.3 | 23°35.2 |
| Polaris | 313°43.4 | 89°22.8 |
| Acamar | 315°11.2 | -40°12.2 |
| Menkar | 314°05.3 | 4°11.5 |
| Mirfak | 308°27.0 | 49°57.4 |
| Aldebaran | 290°38.5 | 16°33.7 |
| Rigel | 281°02.9 | -8°10.4 |
| Capella | 280°20.4 | 46°01.6 |
| Bellatrix | 278°21.8 | 6°22.3 |
| Elnath | 278°00.6 | 28°37.8 |
| Alnilam | 275°36.7 | -1°11.2 |
| Betelgeuse | 270°50.9 | 7°24.6 |
| Canopus | 263°51.7 | -52°42.8 |
| Sirius | 258°25.2 | -16°45.3 |
| Adhara | 255°04.9 | -29°00.7 |
| Procyon | 244°49.6 | 5°09.4 |
| Pollux | 243°15.9 | 27°57.7 |
| Avior | 234°13.8 | -59°35.8 |
| Suhail | 222°45.2 | -43°32.5 |
| Miaplacidus | 221°37.3 | -69°49.6 |
| Alphard | 217°46.5 | -8°46.5 |
| Regulus | 207°33.1 | 11°50.2 |
| Dubhe | 193°39.1 | 61°36.4 |
| Denebola | 182°23.7 | 14°25.4 |
| Gienah | 175°42.3 | -17°41.4 |
| Acrux | 172°58.4 | -63°14.6 |
| Gacrux | 171°50.1 | -57°15.6 |
| Alioth | 166°11.6 | 55°48.8 |
| Spica | 158°21.1 | -11°18.0 |
| Alkaid | 152°50.9 | 49°10.6 |
| Hadar | 148°34.3 | -60°29.8 |
| Menkent | 147°56.3 | -36°29.9 |
| Arcturus | 145°46.8 | 19°02.5 |
| Rigel Kent. | 139°38.7 | -60°56.5 |
| Kochab | 137°19.3 | 74°02.5 |
| Zuben'ubi | 136°54.8 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.3 |
| Antares | 112°14.7 | -26°29.4 |
| Atria | 107°08.1 | -69°04.2 |
| Sabik | 102°01.7 | -15°45.5 |
| Shaula | 96°09.2 | -37°07.3 |
| Rasalhague | 95°57.7 | 12°32.2 |
| Eltanin | 90°41.9 | 51°28.7 |
| Kaus Aust. | 83°31.4 | -34°22.3 |
| Vega | 80°32.8 | 38°48.2 |
| Nunki | 75°46.8 | -26°15.8 |
| Altair | 61°59.3 | 8°56.1 |
| Peacock | 53°04.7 | -56°39.0 |
| Deneb | 49°25.6 | 45°22.2 |
| Enif | 33°38.2 | 9°59.6 |
| Al Na'ir | 27°32.2 | -46°50.1 |
| Fomalhaut | 15°13.8 | -29°29.1 |
| Scheat | 13°44.6 | 28°13.4 |
| Markab | 13°29.3 | 15°20.7 |
| Feb 27 Fri | SHA | Mer.pass |
| Venus | 7°58.7 | 13:01 |
| Mars | 30°14.5 | 11:31 |
| Jupiter | 253°19.5 | 20:36 |
| Saturn | 357°47.3 | 13:39 |
| Feb 28 Sat | SHA | Mer.pass |
| Venus | 6°50.0 | 13:02 |
| Mars | 29°28.9 | 11:30 |
| Jupiter | 253°21.9 | 20:32 |
| Saturn | 357°40.8 | 13:36 |
| Mar 01 Sun | SHA | Mer.pass |
| Venus | 5°41.5 | 13:02 |
| Mars | 28°43.3 | 11:29 |
| Jupiter | 253°24.1 | 20:28 |
| Saturn | 357°34.2 | 13:32 |
| Horizontal parallax | | |
| Venus: | | 0 |

| h | | Sun | | Moon | | | |
|------------|----------|-------------|------------|-------|----------|--------|-------|
| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 176°48.7 | S08°25.2 | 54°21.5 | 4.1' | N27°26.1 | -4.8' | 59.0' |
| 1 | 191°48.8 | 24.3 | 68°44.7 | 4.2' | 27°21.3 | -5.0' | 59.0' |
| 2 | 206°48.9 | 23.4 | 83°07.9 | 4.3' | 27°16.3 | -5.2' | 59.0' |
| 3 | 221°49.0 | · · 22.4 | 97°31.1 | 4.3' | 27°11.1 | -5.4' | 59.0' |
| 4 | 236°49.1 | 21.5 | 111°54.5 | 4.4' | 27°05.7 | -5.6' | 59.0' |
| 5 | 251°49.2 | 20.5 | 126°17.9 | 4.5' | 27°00.1 | -5.7' | 59.0' |
| 6 | 266°49.3 | S08°19.6 | 140°41.4 | 4.6' | N26°54.3 | -5.9' | 58.9' |
| 7 | 281°49.4 | 18.7 | 155°05.0 | 4.6' | 26°48.4 | -6.1' | 58.9' |
| 8 | 296°49.5 | 17.7 | 169°28.6 | 4.7' | 26°42.3 | -6.3' | 58.9' |
| 9 | 311°49.6 | · · 16.8 | 183°52.3 | 4.8' | 26°36.0 | -6.4' | 58.9' |
| 10 | 326°49.8 | 15.8 | 198°16.1 | 4.9' | 26°29.6 | -6.6' | 58.9' |
| 11 | 341°49.9 | 14.9 | 212°40.0 | 5.0' | 26°23.0 | -6.8' | 58.9' |
| 12 | 356°50.0 | S08°14.0 | 227°04.0 | 5.0' | N26°16.2 | -7.0' | 58.9' |
| 13 | 11°50.1 | 13.0 | 241°28.0 | 5.1' | 26°09.2 | -7.1' | 58.9' |
| 14 | 26°50.2 | 12.1 | 255°52.1 | 5.2' | 26°02.1 | -7.3' | 58.9' |
| 15 | 41°50.3 | · · 11.1 | 270°16.4 | 5.3' | 25°54.8 | -7.5' | 58.9' |
| 16 | 56°50.4 | 10.2 | 284°40.7 | 5.4' | 25°47.3 | -7.6' | 58.9' |
| 17 | 71°50.5 | 09.2 | 299°05.1 | 5.5' | 25°39.7 | -7.8' | 58.8' |
| 18 | 86°50.7 | S08°08.3 | 313°29.6 | 5.6' | N25°31.9 | -7.9' | 58.8' |
| 19 | 101°50.8 | 07.4 | 327°54.2 | 5.7' | 25°24.0 | -8.1' | 58.8' |
| 20 | 116°50.9 | 06.4 | 342°18.8 | 5.8' | 25°15.9 | -8.3' | 58.8' |
| 21 | 131°51.0 | · · 05.5 | 356°43.6 | 5.9' | 25°07.6 | -8.4' | 58.8' |
| 22 | 146°51.1 | 04.5 | 11°08.5 | 6.0' | 24°59.2 | -8.6' | 58.8' |
| 23 | 161°51.2 | 03.6 | 25°33.5 | 6.1' | 24°50.6 | -8.7' | 58.8' |
| SD = 16.1' | | $d = -0.9'$ | SD = 16.1' | | | | |
| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 176°51.3 | S08°02.6 | 39°58.5 | 6.2' | N24°41.9 | -8.9' | 58.8' |
| 1 | 191°51.5 | 01.7 | 54°23.7 | 6.3' | 24°33.0 | -9.0' | 58.8' |
| 2 | 206°51.6 | 08°00.8 | 68°49.0 | 6.4' | 24°24.0 | -9.2' | 58.8' |
| 3 | 221°51.7 | 07°59.8 | 83°14.4 | 6.5' | 24°14.8 | -9.3' | 58.7' |
| 4 | 236°51.8 | 58.9 | 97°39.8 | 6.6' | 24°05.5 | -9.5' | 58.7' |
| 5 | 251°51.9 | 57.9 | 112°05.4 | 6.7' | 23°56.1 | -9.6' | 58.7' |
| 6 | 266°52.0 | S07°57.0 | 126°31.1 | 6.8' | N23°46.4 | -9.7' | 58.7' |
| 7 | 281°52.2 | 56.0 | 140°56.9 | 6.9' | 23°36.7 | -9.9' | 58.7' |
| 8 | 296°52.3 | 55.1 | 155°22.7 | 7.0' | 23°26.8 | -10.0' | 58.7' |
| 9 | 311°52.4 | · · 54.1 | 169°48.7 | 7.1' | 23°16.8 | -10.2' | 58.7' |
| 10 | 326°52.5 | 53.2 | 184°14.8 | 7.2' | 23°06.6 | -10.3' | 58.7' |
| 11 | 341°52.6 | 52.2 | 198°41.0 | 7.3' | 22°56.3 | -10.4' | 58.6' |
| 12 | 356°52.7 | S07°51.3 | 213°07.3 | 7.4' | N22°45.9 | -10.6' | 58.6' |
| 13 | 11°52.9 | 50.4 | 227°33.8 | 7.5' | 22°35.3 | -10.7' | 58.6' |
| 14 | 26°53.0 | 49.4 | 242°00.3 | 7.6' | 22°24.6 | -10.8' | 58.6' |
| 15 | 41°53.1 | · · 48.5 | 256°26.9 | 7.7' | 22°13.8 | -10.9' | 58.6' |
| 16 | 56°53.2 | 47.5 | 270°53.6 | 7.8' | 22°02.9 | -11.1' | 58.6' |
| 17 | 71°53.3 | 46.6 | 285°20.5 | 7.9' | 21°51.8 | -11.2' | 58.6' |
| 18 | 86°53.4 | S07°45.6 | 299°47.4 | 8.1' | N21°40.6 | -11.3' | 58.5' |
| 19 | 101°53.6 | 44.7 | 314°14.5 | 8.2' | 21°29.3 | -11.4' | 58.5' |
| 20 | 116°53.7 | 43.7 | 328°41.7 | 8.3' | 21°17.8 | -11.6' | 58.5' |
| 21 | 131°53.8 | · · 42.8 | 343°08.9 | 8.4' | 21°06.3 | -11.7' | 58.5' |
| 22 | 146°53.9 | 41.8 | 357°36.3 | 8.5' | 20°54.6 | -11.8' | 58.5' |
| 23 | 161°54.0 | 40.9 | 12°03.8 | 8.6' | 20°42.9 | -11.9' | 58.5' |
| SD = 16.1' | | $d = -0.9'$ | SD = 16.0' | | | | |
| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 176°54.2 | S07°39.9 | 26°31.4 | 8.7' | N20°31.0 | -12.0' | 58.5' |
| 1 | 191°54.3 | 39.0 | 40°59.1 | 8.8' | 20°19.0 | -12.1' | 58.4' |
| 2 | 206°54.4 | 38.0 | 55°26.9 | 8.9' | 20°06.9 | -12.2' | 58.4' |
| 3 | 221°54.5 | · · 37.1 | 69°54.8 | 9.0' | 19°54.6 | -12.3' | 58.4' |
| 4 | 236°54.6 | 36.1 | 84°22.8 | 9.1' | 19°42.3 | -12.4' | 58.4' |
| 5 | 251°54.8 | 35.2 | 98°51.0 | 9.2' | 19°29.9 | -12.5' | 58.4' |
| 6 | 266°54.9 | S07°34.2 | 113°19.2 | 9.3' | N19°17.4 | -12.6' | 58.4' |
| 7 | 281°55.0 | 33.3 | 127°47.5 | 9.4' | 19°04.7 | -12.7' | 58.3' |
| 8 | 296°55.1 | 32.3 | 142°16.0 | 9.5' | 18°52.0 | -12.8' | 58.3' |
| 9 | 311°55.3 | · · 31.4 | 156°44.5 | 9.6' | 18°39.2 | -12.9' | 58.3' |
| 10 | 326°55.4 | 30.4 | 171°13.1 | 9.7' | 18°26.3 | -13.0' | 58.3' |
| 11 | 341°55.5 | 29.5 | 185°41.9 | 9.9' | 18°13.3 | -13.1' | 58.3' |
| 12 | 356°55.6 | S07°28.5 | 200°10.7 | 10.0' | N18°00.2 | -13.2' | 58.3' |
| 13 | 11°55.7 | 27.6 | 214°39.7 | 10.1' | 17°47.0 | -13.3' | 58.2' |
| 14 | 26°55.9 | 26.6 | 229°08.8 | 10.2' | 17°33.7 | -13.4' | 58.2' |
| 15 | 41°56.0 | · · 25.7 | 243°37.9 | 10.3' | 17°20.4 | -13.4' | 58.2' |
| 16 | 56°56.1 | 24.7 | 258°07.2 | 10.4' | 17°06.9 | -13.5' | 58.2' |
| 17 | 71°56.2 | 23.8 | 272°36.5 | 10.5' | 16°53.4 | -13.6' | 58.2' |
| 18 | 86°56.4 | S07°22.8 | 287°06.0 | 10.6' | N16°39.8 | -13.7' | 58.1' |
| 19 | 101°56.5 | 21.9 | 301°35.5 | 10.6' | 16°26.1 | -13.8' | 58.1' |
| 20 | 116°56.6 | 20.9 | 316°05.2 | 10.7' | 16°12.3 | -13.8' | 58.1' |
| 21 | 131°56.7 | · · 20.0 | 330°34.9 | 10.8' | 15°58.5 | -13.9' | 58.1' |
| 22 | 146°56.9 | 19.0 | 345°04.7 | 10.9' | 15°44.6 | -14.0' | 58.1' |
| 23 | 161°57.0 | 18.1 | 359°34.7 | 11.0' | 15°30.6 | -14.1' | 58.0' |
| SD = 16.1' | | $d = -0.9'$ | SD = 15.9' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 05:15 | 06:33 | 07:42 | 16:45 | 17:54 | 19:13 |
| N 70° | 05:19 | 06:30 | 07:32 | 16:55 | 17:57 | 19:08 |
| 68° | 05:23 | 06:27 | 07:24 | 17:03 | 18:00 | 19:04 |
| 66° | 05:26 | 06:25 | 07:17 | 17:10 | 18:02 | 19:01 |
| 64° | 05:28 | 06:23 | 07:11 | 17:15 | 18:04 | 18:59 |
| 62° | 05:30 | 06:21 | 07:06 | 17:20 | 18:05 | 18:56 |
| 60° | 05:32 | 06:20 | 07:02 | 17:25 | 18:07 | 18:55 |
| N 58° | 05:33 | 06:18 | 06:58 | 17:28 | 18:08 | 18:53 |
| 56° | 05:34 | 06:17 | 06:54 | 17:32 | 18:09 | 18:52 |
| 54° | 05:35 | 06:15 | 06:51 | 17:35 | 18:11 | 18:52 |
| 52° | 05:35 | 06:14 | 06:48 | 17:38 | 18:12 | 18:51 |
| 50° | 05:36 | 06:13 | 06:46 | 17:40 | 18:13 | 18:50 |
| 48° | 05:36 | 06:10 | 06:40 | 17:46 | 18:15 | 18:49 |
| N 40° | 05:36 | 06:08 | 06:35 | 17:51 | 18:18 | 18:49 |
| 38° | 05:36 | 06:05 | 06:31 | 17:55 | 18:20 | 18:49 |
| 36° | 05:35 | 06:03 | 06:27 | 17:58 | 18:22 | 18:50 |
| 34° | 05:33 | 05:58 | 06:21 | 18:05 | 18:27 | 18:52 |
| N 10° | 05:29 | 05:54 | 06:15 | 18:10 | 18:31 | 18:56 |
| 0° | 05:24 | 05:48 | 06:09 | 18:16 | 18:37 | 19:01 |
| S 10° | 05:18 | 05:42 | 06:03 | 18:21 | 18:43 | 19:07 |
| 20° | 05:09 | 05:35 | 05:57 | 18:27 | 18:50 | 19:16 |
| 30° | 04:57 | 05:26 | 05:50 | 18:34 | 18:59 | 19:27 |
| 35° | 04:50 | 05:20 | 05:46 | 18:38 | 19:04 | 19:35 |
| 40° | 04:40 | 05:13 | 05:41 | 18:43 | 19:11 | 19:44 |
| 45° | 04:29 | 05:05 | 05:36 | 18:49 | 19:19 | 19:55 |
| S 50° | 04:14 | 04:55 | 05:29 | 18:55 | 19:29 | 20:09 |
| 52° | 04:07 | 04:50 | 05:26 | 18:58 | 19:33 | 20:16 |
| 54° | 03:59 | 04:45 | 05:22 | 19:01 | 19:38 | 20:24 |
| 56° | 03:50 | 04:39 | 05:19 | 19:05 | 19:44 | 20:33 |
| 58° | 03:39 | 04:32 | 05:14 | 19:09 | 19:51 | 20:44 |
| S 60° | 03:26 | 04:25 | 05:10 | 19:14 | 19:58 | 20:56 |

| Lat. | Moonrise | | | Moonset | | |
|-------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| N 70° | <input type="checkbox"/> | <input type="checkbox"/> | 12:34 | <input type="checkbox"/> | <input type="checkbox"/> | 09:01 |
| 68° | <input type="checkbox"/> | <input type="checkbox"/> | 13:15 | <input type="checkbox"/> | <input type="checkbox"/> | 08:18 |
| 66° | <input type="checkbox"/> | 11:03 | 13:43 | <input type="checkbox"/> | 08:37 | 07:49 |
| 64° | <input type="checkbox"/> | 11:52 | 14:04 | <input type="checkbox"/> | 07:47 | 07:27 |
| 62° | 10:14 | 12:23 | 14:20 | 07:23 | 07:15 | 07:09 |
| 60° | 10:55 | 12:46 | 14:34 | 06:41 | 06:51 | 06:55 |
| N 58° | 11:23 | 13:05 | 14:46 | 06:13 | 06:32 | 06:42 |
| 56° | 11:44 | 13:20 | 14:56 | 05:50 | 06:16 | 06:31 |
| 54° | 12:02 | 13:33 | 15:05 | 05:32 | 06:02 | 06:21 |
| 52° | 12:17 | 13:45 | 15:13 | 05:17 | 05:50 | 06:12 |
| 50° | 12:31 | 13:55 | 15:20 | 05:03 | 05:39 | 06:04 |
| 48° | 12:57 | 14:16 | 15:35 | 04:35 | 05:16 | 05:48 |
| N 40° | 13:19 | 14:34 | 15:48 | 04:14 | 04:58 | 05:34 |
| 38° | 13:36 | 14:48 | 15:58 | 03:55 | 04:43 | 05:22 |
| 36° | 13:51 | 15:00 | 16:08 | 03:40 | 04:29 | 05:11 |
| 34° | 14:17 | 15:22 | 16:23 | 03:13 | 04:06 | 04:53 |
| N 10° | 14:39 | 15:40 | 16:37 | 02:50 | 03:46 | 04:38 |
| 0° | 15:00 | 15:57 | 16:50 | 02:28 | 03:27 | 04:23 |
| S 10° | 15:20 | 16:14 | 17:03 | 02:06 | 03:09 | 04:08 |
| 20° | 15:42 | 16:32 | 17:16 | 01:43 | 02:48 | 03:52 |
| 30° | 16:07 | 16:53 | 17:31 | 01:15 | 02:24 | 03:33 |
| 35° | 16:22 | 17:05 | 17:40 | 00:59 | 02:10 | 03:22 |
| 40° | 16:39 | 17:19 | 17:50 | 00:40 | 01:54 | 03:09 |
| 45° | 17:00 | 17:35 | 18:02 | 00:17 | 01:34 | 02:54 |
| S 50° | 17:25 | 17:55 | 18:16 | · · · | 01:10 | 02:36 |
| 52° | 17:38 | 18:04 | 18:23 | · · · | 00:58 | 02:27 |
| 54° | 17:52 | 18:15 | 18:30 | · · · | 00:44 | 02:17 |
| 56° | 18:08 | 18:27 | 18:38 | · · · | 00:28 | 02:06 |
| 58° | 18:28 | 18:41 | 18:47 | · · · | 00:09 | 01:53 |
| S 60° | 18:52 | 18:57 | 18:58 | 23:46 | · · · | 01:38 |

| Day | Sun | | Mer. Pass | Moon | | Age 10-12 77-93% |
|-----|-------------------------------|----------------------------|-----------|------------------------|-------------|---|
| | Eqn. of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer. Pass. Upper hh:mm | Lower hh:mm | |
| 27 | 12:45 | 12:40 | 12:13 | 21:14 | 08:44 |  |
| 28 | 12:35 | 12:29 | 12:12 | 22:10 | 09:42 | |
| 01 | 12:23 | 12:18 | 12:12 | 23:02 | 10:36 | |

March 02, 03, 04 UT (Mon., Tue., Wed.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------------------|----------|----------|--------------------|----------|----------|--------------------|----------|---------|--------------------|-----|--------|-----|-----|
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 159°48.1 | 164°21.2 | S03°26.0 | 187°46.0 | S12°39.7 | 53°14.3 | N22°54.8 | 157°15.8 | S01°13.3 | | | | | | |
| 1 | 174°50.6 | 179°20.8 | 24.7 | 202°46.6 | 39.0 | 68°16.8 | 54.8 | 172°18.0 | 13.2 | | | | | | |
| 2 | 189°53.0 | 194°20.4 | 23.5 | 217°47.2 | 38.3 | 83°19.3 | 54.8 | 187°20.2 | 13.0 | | | | | | |
| 3 | 204°55.5 | 209°20.0 | · · 22.2 | 232°47.8 | · · 37.6 | 98°21.9 | · · 54.8 | 202°22.4 | · · 12.9 | | | | | | |
| 4 | 219°57.9 | 224°19.7 | 20.9 | 247°48.3 | 36.9 | 113°24.4 | 54.8 | 217°24.6 | 12.8 | | | | | | |
| 5 | 235°00.4 | 239°19.3 | 19.6 | 262°48.9 | 36.2 | 128°27.0 | 54.8 | 232°26.7 | 12.7 | | | | | | |
| 6 | 250°02.9 | 254°18.9 | S03°18.4 | 277°49.5 | S12°35.5 | 143°29.5 | N22°54.8 | 247°28.9 | S01°12.5 | | | | | | |
| 7 | 265°05.3 | 269°18.5 | 17.1 | 292°50.1 | 34.8 | 158°32.1 | 54.8 | 262°31.1 | 12.4 | | | | | | |
| 8 | 280°07.8 | 284°18.1 | 15.8 | 307°50.6 | 34.1 | 173°34.6 | 54.9 | 277°33.3 | 12.3 | | | | | | |
| 9 | 295°10.3 | 299°17.7 | · · 14.5 | 322°51.2 | · · 33.4 | 188°37.1 | · · 54.9 | 292°35.5 | · · 12.2 | | | | | | |
| 10 | 310°12.7 | 314°17.4 | 13.3 | 337°51.8 | 32.7 | 203°39.7 | 54.9 | 307°37.7 | 12.1 | | | | | | |
| 11 | 325°15.2 | 329°17.0 | 12.0 | 352°52.4 | 32.0 | 218°42.2 | 54.9 | 322°39.9 | 11.9 | | | | | | |
| 12 | 340°17.7 | 344°16.6 | S03°10.7 | 7°52.9 | S12°31.3 | 233°44.8 | N22°54.9 | 337°42.1 | S01°11.8 | | | | | | |
| 13 | 355°20.1 | 359°16.2 | 09.4 | 22°53.5 | 30.6 | 248°47.3 | 54.9 | 352°44.3 | 11.7 | | | | | | |
| 14 | 10°22.6 | 14°15.8 | 08.2 | 37°54.1 | 30.0 | 263°49.8 | 54.9 | 7°46.5 | 11.6 | | | | | | |
| 15 | 25°25.1 | 29°15.5 | · · 06.9 | 52°54.7 | · · 29.3 | 278°52.4 | · · 54.9 | 22°48.6 | · · 11.5 | | | | | | |
| 16 | 40°27.5 | 44°15.1 | 05.6 | 67°55.2 | 28.6 | 293°54.9 | 54.9 | 37°50.8 | 11.3 | | | | | | |
| 17 | 55°30.0 | 59°14.7 | 04.3 | 82°55.8 | 27.9 | 308°57.5 | 55.0 | 52°53.0 | 11.2 | | | | | | |
| 18 | 70°32.4 | 74°14.3 | S03°03.1 | 97°56.4 | S12°27.2 | 324°00.0 | N22°55.0 | 67°55.2 | S01°11.1 | | | | | | |
| 19 | 85°34.9 | 89°13.9 | 01.8 | 112°57.0 | 26.5 | 339°02.5 | 55.0 | 82°57.4 | 11.0 | | | | | | |
| 20 | 100°37.4 | 104°13.5 | 03°00.5 | 127°57.5 | 25.8 | 354°05.1 | 55.0 | 97°59.6 | 10.9 | | | | | | |
| 21 | 115°39.8 | 119°13.2 | 02°59.2 | 142°58.1 | · · 25.1 | 9°07.6 | · · 55.0 | 113°01.8 | · · 10.7 | | | | | | |
| 22 | 130°42.3 | 134°12.8 | 58.0 | 157°58.7 | 24.4 | 24°10.1 | 55.0 | 128°04.0 | 10.6 | | | | | | |
| 23 | 145°44.8 | 149°12.4 | 56.7 | 172°59.3 | 23.7 | 39°12.7 | 55.0 | 143°06.2 | 10.5 | | | | | | |
| Mer.pass. 13:19 | | ν-0.4' d-1.3' m-3.92 | | | ν0.6' d-0.7' m1.14 | | | ν2.5' d0.0' m-2.43 | | | ν2.2' d-0.1' m0.99 | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 160°47.2 | 164°12.0 | S02°55.4 | 187°59.9 | S12°23.0 | 54°15.2 | N22°55.0 | 158°08.4 | S01°10.4 | | | | | | |
| 1 | 175°49.7 | 179°11.6 | 54.1 | 203°00.4 | 22.3 | 69°17.8 | 55.0 | 173°10.5 | 10.3 | | | | | | |
| 2 | 190°52.2 | 194°11.3 | 52.9 | 218°01.0 | 21.6 | 84°20.3 | 55.0 | 188°12.7 | 10.1 | | | | | | |
| 3 | 205°54.6 | 209°10.9 | · · 51.6 | 233°01.6 | · · 20.9 | 99°22.8 | · · 55.1 | 203°14.9 | · · 10.0 | | | | | | |
| 4 | 220°57.1 | 224°10.5 | 50.3 | 248°02.2 | 20.2 | 114°25.4 | 55.1 | 218°17.1 | 09.9 | | | | | | |
| 5 | 235°59.6 | 239°10.1 | 49.0 | 263°02.7 | 19.5 | 129°27.9 | 55.1 | 233°19.3 | 09.8 | | | | | | |
| 6 | 251°02.0 | 254°09.7 | S02°47.8 | 278°03.3 | S12°18.8 | 144°30.4 | N22°55.1 | 248°21.5 | S01°09.6 | | | | | | |
| 7 | 266°04.5 | 269°09.4 | 46.5 | 293°03.9 | 18.1 | 159°33.0 | 55.1 | 263°23.7 | 09.5 | | | | | | |
| 8 | 281°06.9 | 284°09.0 | 45.2 | 308°04.5 | 17.4 | 174°35.5 | 55.1 | 278°25.9 | 09.4 | | | | | | |
| 9 | 296°09.4 | 299°08.6 | · · 43.9 | 323°05.1 | · · 16.7 | 189°38.0 | · · 55.1 | 293°28.1 | · · 09.3 | | | | | | |
| 10 | 311°11.9 | 314°08.2 | 42.6 | 338°05.6 | 16.0 | 204°40.6 | 55.1 | 308°30.2 | 09.2 | | | | | | |
| 11 | 326°14.3 | 329°07.9 | 41.4 | 353°06.2 | 15.3 | 219°43.1 | 55.1 | 323°32.4 | 09.0 | | | | | | |
| 12 | 341°16.8 | 344°07.5 | S02°40.1 | 8°06.8 | S12°14.6 | 234°45.6 | N22°55.1 | 338°34.6 | S01°08.9 | | | | | | |
| 13 | 356°19.3 | 359°07.1 | 38.8 | 23°07.4 | 13.9 | 249°48.1 | 55.2 | 353°36.8 | 08.8 | | | | | | |
| 14 | 11°21.7 | 14°06.7 | 37.5 | 38°08.0 | 13.2 | 264°50.7 | 55.2 | 8°39.0 | 08.7 | | | | | | |
| 15 | 26°24.2 | 29°06.3 | · · 36.3 | 53°08.5 | · · 12.5 | 279°53.2 | · · 55.2 | 23°41.2 | · · 08.6 | | | | | | |
| 16 | 41°26.7 | 44°06.0 | 35.0 | 68°09.1 | 11.8 | 294°55.7 | 55.2 | 38°43.4 | 08.4 | | | | | | |
| 17 | 56°29.1 | 59°05.6 | 33.7 | 83°09.7 | 11.1 | 309°58.3 | 55.2 | 53°45.6 | 08.3 | | | | | | |
| 18 | 71°31.6 | 74°05.2 | S02°32.4 | 98°10.3 | S12°10.4 | 325°00.8 | N22°55.2 | 68°47.8 | S01°08.2 | | | | | | |
| 19 | 86°34.0 | 89°04.8 | 31.1 | 113°10.9 | 09.7 | 340°03.3 | 55.2 | 83°49.9 | 08.1 | | | | | | |
| 20 | 101°36.5 | 104°04.5 | 29.9 | 128°11.5 | 09.0 | 355°05.9 | 55.2 | 98°52.1 | 08.0 | | | | | | |
| 21 | 116°39.0 | 119°04.1 | · · 28.6 | 143°12.0 | · · 08.3 | 10°08.4 | · · 55.2 | 113°54.3 | · · 07.8 | | | | | | |
| 22 | 131°41.4 | 134°03.7 | 27.3 | 158°12.6 | 07.6 | 25°10.9 | 55.2 | 128°56.5 | 07.7 | | | | | | |
| 23 | 146°43.9 | 149°03.3 | 26.0 | 173°13.2 | 06.9 | 40°13.4 | 55.3 | 143°58.7 | 07.6 | | | | | | |
| Mer.pass. 13:15 | | ν-0.4' d-1.3' m-3.92 | | | ν0.6' d-0.7' m1.14 | | | ν2.5' d0.0' m-2.43 | | | ν2.2' d-0.1' m0.99 | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 161°46.4 | 164°03.0 | S02°24.7 | 188°13.8 | S12°06.2 | 55°16.0 | N22°55.3 | 159°00.9 | S01°07.5 | | | | | | |
| 1 | 176°48.8 | 179°02.6 | 23.5 | 203°14.4 | 05.5 | 70°18.5 | 55.3 | 174°03.1 | 07.3 | | | | | | |
| 2 | 191°51.3 | 194°02.2 | 22.2 | 218°14.9 | 04.8 | 85°21.0 | 55.3 | 189°05.3 | 07.2 | | | | | | |
| 3 | 206°53.8 | 209°01.8 | · · 20.9 | 233°15.5 | · · 04.1 | 100°23.5 | · · 55.3 | 204°07.5 | · · 07.1 | | | | | | |
| 4 | 221°56.2 | 224°01.5 | 19.6 | 248°16.1 | 03.4 | 115°26.1 | 55.3 | 219°09.6 | 07.0 | | | | | | |
| 5 | 236°58.7 | 239°01.1 | 18.3 | 263°16.7 | 02.7 | 130°28.6 | 55.3 | 234°11.8 | 06.9 | | | | | | |
| 6 | 252°01.2 | 254°00.7 | S02°17.1 | 278°17.3 | S12°02.0 | 145°31.1 | N22°55.3 | 249°14.0 | S01°06.7 | | | | | | |
| 7 | 267°03.6 | 269°00.3 | 15.8 | 293°17.9 | 01.3 | 160°33.6 | 55.3 | 264°16.2 | 06.6 | | | | | | |
| 8 | 282°06.1 | 283°59.9 | 14.5 | 308°18.4 | 12°00.6 | 175°36.2 | 55.3 | 279°18.4 | 06.5 | | | | | | |
| 9 | 297°08.5 | 298°59.6 | · · 13.2 | 323°19.0 | 11°59.9 | 190°38.7 | · · 55.3 | 294°20.6 | · · 06.4 | | | | | | |
| 10 | 312°11.0 | 313°59.2 | 11.9 | 338°19.6 | 59.2 | 205°41.2 | 55.3 | 309°22.8 | 06.3 | | | | | | |
| 11 | 327°13.5 | 328°58.8 | 10.7 | 353°20.2 | 58.5 | 220°43.7 | 55.4 | 324°25.0 | 06.1 | | | | | | |
| 12 | 342°15.9 | 343°58.5 | S02°09.4 | 8°20.8 | S11°57.8 | 235°46.3 | N22°55.4 | 339°27.2 | S01°06.0 | | | | | | |
| 13 | 357°18.4 | 358°58.1 | 08.1 | 23°21.4 | 57.1 | 250°48.8 | 55.4 | 354°29.3 | 05.9 | | | | | | |
| 14 | 12°20.9 | 13°57.7 | 06.8 | 38°21.9 | 56.4 | 265°51.3 | 55.4 | 9°31.5 | 05.8 | | | | | | |
| 15 | 27°23.3 | 28°57.3 | · · 05.5 | 53°22.5 | · · 55.7 | 280°53.8 | · · 55.4 | 24°33.7 | · · 05.6 | | | | | | |
| 16 | 42°25.8 | 43°57.0 | 04.3 | 68°23.1 | 55.0 | 295°56.3 | 55.4 | 39°35.9 | 05.5 | | | | | | |
| 17 | 57°28.3 | 58°56.6 | 03.0 | 83°23.7 | 54.3 | 310°58.9 | 55.4 | 54°38.1 | 05.4 | | | | | | |
| 18 | 72°30.7 | 73°56.2 | S02°01.7 | 98°24.3 | S11°53.6 | 326°01.4 | N22°55.4 | 69°40.3 | S01°05.3 | | | | | | |
| 19 | 87°33.2 | 88°55.8 | 02°00.4 | 113°24.9 | 52.8 | 341°03.9 | 55.4 | 84°42.5 | 05.2 | | | | | | |
| 20 | 102°35.6 | 103°55.5 | 01°59.1 | 128°25.5 | 52.1 | 356°06.4 | 55.4 | 99°44.7 | 05.0 | | | | | | |
| 21 | 117°38.1 | 118°55.1 | · · 57.9 | 143°26.0 | · · 51.4 | 11°08.9 | · · 55.4 | 114°46.8 | · · 04.9 | | | | | | |
| 22 | 132°40.6 | 133°54.7 | 56.6 | 158°26.6 | 50.7 | 26°11.5 | 55.5 | 129°49.0 | 04.8 | | | | | | |
| 23 | 147°43.0 | 148°54.3 | 55.3 | 173°27.2 | 50.0 | 41°14.0 | 55.5 | 144°51.2 | 04.7 | | | | | | |
| Mer.pass. 13:11 | | ν-0.4' d-1.3' m-3.92 | | | ν0.6' d-0.7' m1.15 | | | ν2.5' d0.0' m-2.42 | | | ν2.2' d-0.1' m0.98 | | | | |

| Stars | | |
|---------------------|-----------|-----------|
| | SHA | Dec |
| Alpheratz | 357° 34.1 | 29° 14.1 |
| Ankaa | 353° 06.6 | -42° 10.0 |
| Schedar | 349° 30.5 | 56° 41.0 |
| Diphda | 348° 46.6 | -17° 50.7 |
| Achernar | 335° 19.9 | -57° 06.4 |
| Hamal | 327° 50.3 | 23° 35.2 |
| Polaris | 313° 44.9 | 89° 22.8 |
| Acamar | 315° 11.2 | -40° 12.2 |
| Menkar | 314° 05.3 | 4° 11.5 |
| Mirfak | 308° 27.0 | 49° 57.4 |
| Aldebaran | 290° 38.5 | 16° 33.7 |
| Rigel | 281° 02.9 | -8° 10.4 |
| Capella | 280° 20.4 | 46° 01.6 |
| Bellatrix | 278° 21.8 | 6° 22.3 |
| Elnath | 278° 00.6 | 28° 37.8 |
| Alnilam | 275° 36.7 | -1° 11.2 |
| Betelgeuse | 270° 50.9 | 7° 24.6 |
| Canopus | 263° 51.7 | -52° 42.8 |
| Sirius | 258° 25.2 | -16° 45.3 |
| Adhara | 255° 04.9 | -29° 00.7 |
| Procyon | 244° 49.6 | 5° 09.4 |
| Pollux | 243° 15.9 | 27° 57.8 |
| Avior | 234° 13.9 | -59° 35.8 |
| Suhail | 222° 45.2 | -43° 32.5 |
| Miaplacidus | 221° 37.3 | -69° 49.6 |
| Alphard | 217° 46.5 | -8° 46.5 |
| Regulus | 207° 33.1 | 11° 50.2 |
| Dubhe | 193° 39.1 | 61° 36.5 |
| Denebola | 182° 23.6 | 14° 25.4 |
| Gienah | 175° 42.3 | -17° 41.4 |
| Acrux | 172° 58.4 | -63° 14.6 |
| Gacrux | 171° 50.1 | -57° 15.6 |
| Alioth | 166° 11.6 | 55° 48.8 |
| Spica | 158° 21.0 | -11° 18.0 |
| Alkaid | 152° 50.9 | 49° 10.6 |
| Hadar | 148° 34.3 | -60° 29.8 |
| Menkent | 147° 56.2 | -36° 29.9 |
| Arcturus | 145° 46.8 | 19° 02.5 |
| Rigel Kent. | 139° 38.6 | -60° 56.5 |
| Kochab | 137° 19.2 | 74° 02.5 |
| Zuben'ubi | 136° 54.8 | -16° 09.1 |
| Alphecca | 126° 02.8 | 26° 37.3 |
| Antares | 112° 14.6 | -26° 29.4 |
| Atria | 107° 08.0 | -69° 04.2 |
| Sabik | 102° 01.7 | -15° 45.5 |
| Shaula | 96° 09.1 | -37° 07.3 |
| Rasalhague | 95° 57.7 | 12° 32.2 |
| Eltanin | 90° 41.9 | 51° 28.7 |
| Kaus Aust. | 83° 31.4 | -34° 22.3 |
| Vega | 80° 32.8 | 38° 48.1 |
| Nunki | 75° 46.8 | -26° 15.8 |
| Altair | 61° 59.3 | 8° 56.1 |
| Peacock | 53° 04.7 | -56° 38.9 |
| Deneb | 49° 25.6 | 45° 22.2 |
| Enif | 33° 38.2 | 9° 59.6 |
| Al Na'ir | 27° 32.1 | -46° 50.1 |
| Fomalhaut | 15° 13.8 | -29° 29.1 |
| Scheat | 13° 44.6 | 28° 13.4 |
| Markab | 13° 29.3 | 15° 20.7 |
| Mar 02 Mon | SHA | Mer.pass |
| Venus | 4° 33.1 | 13:03 |
| Mars | 27° 57.9 | 11:28 |
| Jupiter | 253° 26.2 | 20:24 |
| Saturn | 357° 27.7 | 13:29 |
| Mar 03 Tue | SHA | Mer.pass |
| Venus | 3° 24.8 | 13:04 |
| Mars | 27° 12.6 | 11:28 |
| Jupiter | 253° 28.0 | 20:20 |
| Saturn | 357° 21.1 | 13:25 |
| Mar 04 Wed | SHA | Mer.pass |
| Venus | 2° 16.6 | 13:04 |
| Mars | 26° 27.4 | 11:27 |
| Jupiter | 253° 29.6 | 20:16 |
| Saturn | 357° 14.5 | 13:22 |
| Horizontal parallax | | |
| | Venus: | 0.1 |
| | Mars: | 0.1 |


| h | Sun | | | Moon | | | | |
|------------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| Mon | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 176°57.1 | S07°17.1 | | 14°04.7 | 11.1' | N15°16.6 | -14.1' | 58.0' |
| 1 | 191°57.2 | 16.2 | | 28°34.8 | 11.2' | 15°02.4 | -14.2' | 58.0' |
| 2 | 206°57.4 | 15.2 | | 43°05.0 | 11.3' | 14°48.2 | -14.3' | 58.0 |
| 3 | 221°57.5 | 14.2 | · · | 57°35.4 | 11.4' | 14°34.0 | -14.3' | 58.0' |
| 4 | 236°57.6 | 13.3 | | 72°05.7 | 11.5' | 14°19.7 | -14.4' | 57.9' |
| 5 | 251°57.7 | 12.3 | | 86°36.2 | 11.6' | 14°05.3 | -14.4' | 57.9' |
| 6 | 266°57.9 | S07°11.4 | | 101°06.8 | 11.7' | N13°50.9 | -14.5' | 57.9' |
| 7 | 281°58.0 | 10.4 | | 115°37.5 | 11.7' | 13°36.4 | -14.6' | 57.9' |
| 8 | 296°58.1 | 09.5 | | 130°08.2 | 11.8' | 13°21.8 | -14.6' | 57.9' |
| 9 | 311°58.2 | 08.5 | · · | 144°39.0 | 11.9' | 13°07.2 | -14.7' | 57.8' |
| 10 | 326°58.4 | 07.6 | | 159°10.0 | 12.0' | 12°52.5 | -14.7' | 57.8' |
| 11 | 341°58.5 | 06.6 | | 173°41.0 | 12.1' | 12°37.8 | -14.8' | 57.8' |
| 12 | 356°58.6 | S07°05.7 | | 188°12.0 | 12.2' | N12°23.0 | -14.8' | 57.8' |
| 13 | 11°58.8 | 04.7 | | 202°43.2 | 12.2' | 12°08.2 | -14.9' | 57.8' |
| 14 | 26°58.9 | 03.7 | | 217°14.5 | 12.3' | 11°53.4 | -14.9' | 57.7' |
| 15 | 41°59.0 | 02.8 | · · | 231°45.8 | 12.4' | 11°38.5 | -15.0' | 57.7' |
| 16 | 56°59.1 | 01.8 | | 246°17.2 | 12.5' | 11°23.5 | -15.0' | 57.7' |
| 17 | 71°59.3 | 07°00.9 | | 260°48.7 | 12.6' | 11°08.5 | -15.0' | 57.7' |
| 18 | 86°59.4 | S06°59.9 | | 275°20.2 | 12.6' | N10°53.5 | -15.1' | 57.6' |
| 19 | 101°59.5 | 59.0 | | 289°51.9 | 12.7' | 10°38.4 | -15.1' | 57.6' |
| 20 | 116°59.7 | 58.0 | | 304°23.6 | 12.8' | 10°23.3 | -15.2' | 57.6' |
| 21 | 131°59.8 | 57.1 | · · | 318°55.3 | 12.9' | 10°08.1 | -15.2' | 57.6' |
| 22 | 146°59.9 | 56.1 | | 333°27.2 | 12.9' | 09°52.9 | -15.2' | 57.6' |
| 23 | 162°00.1 | 55.1 | | 347°59.1 | 13.0' | 09°37.7 | -15.3' | 57.5' |
| SD = 16.1' $d = -1.0'$ | | | SD = 15.8' | | | | | |

| Tue | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|--------|-------|
| 0 | 177°00.2 | S06°54.2 | 2°31.1 | 13.1' | N09°22.4 | -15.3' | 57.5' |
| 1 | 192°00.3 | 53.2 | 17°03.2 | 13.1' | 09°07.1 | -15.3' | 57.5' |
| 2 | 207°00.4 | 52.3 | 31°35.3 | 13.2' | 08°51.8 | -15.3' | 57.5' |
| 3 | 222°00.6 | · · 51.3 | 46°07.5 | 13.3' | 08°36.5 | -15.4' | 57.4' |
| 4 | 237°00.7 | 50.4 | 60°39.7 | 13.3' | 08°21.1 | -15.4' | 57.4' |
| 5 | 252°00.8 | 49.4 | 75°12.1 | 13.4' | 08°05.7 | -15.4' | 57.4' |
| 6 | 267°01.0 | S06°48.4 | 89°44.5 | 13.4' | N07°50.3 | -15.4' | 57.4' |
| 7 | 282°01.1 | 47.5 | 104°16.9 | 13.5' | 07°34.8 | -15.5' | 57.3' |
| 8 | 297°01.2 | 46.5 | 118°49.4 | 13.6' | 07°19.3 | -15.5' | 57.3' |
| 9 | 312°01.4 | · · 45.6 | 133°22.0 | 13.6' | 07°03.9 | -15.5' | 57.3' |
| 10 | 327°01.5 | 44.6 | 147°54.6 | 13.7' | 06°48.3 | -15.5' | 57.3' |
| 11 | 342°01.6 | 43.6 | 162°27.3 | 13.7' | 06°32.8 | -15.5' | 57.3' |
| 12 | 357°01.8 | S06°42.7 | 177°00.0 | 13.8' | N06°17.3 | -15.6' | 57.2' |
| 13 | 12°01.9 | 41.7 | 191°32.8 | 13.8' | 06°01.7 | -15.6' | 57.2' |
| 14 | 27°02.0 | 40.8 | 206°05.7 | 13.9' | 05°46.2 | -15.6' | 57.2' |
| 15 | 42°02.2 | · · 39.8 | 220°38.6 | 14.0' | 05°30.6 | -15.6' | 57.2' |
| 16 | 57°02.3 | 38.8 | 235°11.5 | 14.0' | 05°15.0 | -15.6' | 57.1' |
| 17 | 72°02.4 | 37.9 | 249°44.5 | 14.1' | 04°59.4 | -15.6' | 57.1' |
| 18 | 87°02.6 | S06°36.9 | 264°17.6 | 14.1' | N04°43.8 | -15.6' | 57.1' |
| 19 | 102°02.7 | 36.0 | 278°50.7 | 14.1' | 04°28.2 | -15.6' | 57.1' |
| 20 | 117°02.8 | 35.0 | 293°23.8 | 14.2' | 04°12.5 | -15.6' | 57.0' |
| 21 | 132°03.0 | · · 34.0 | 307°57.0 | 14.2' | 03°56.9 | -15.6' | 57.0' |
| 22 | 147°03.1 | 33.1 | 322°30.3 | 14.3' | 03°41.3 | -15.6' | 57.0' |
| 23 | 162°03.2 | 32.1 | 337°03.5 | 14.3' | 03°25.6 | -15.6' | 57.0' |
| SD = 16.1' $d = -1.0'$ | | | SD = 15.7' | | | | |

| Wed | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|--------|-------|
| 0 | 177°03.4 | S06°31.2 | 351°36.9 | 14.4' | N03°10.0 | -15.6' | 56.9' |
| 1 | 192°03.5 | 30.2 | 6°10.2 | 14.4' | 02°54.4 | -15.6' | 56.9' |
| 2 | 207°03.6 | 29.2 | 20°43.6 | 14.4' | 02°38.8 | -15.6' | 56.9' |
| 3 | 222°03.8 | 28.3 | 35°17.1 | 14.5' | 02°23.1 | -15.6' | 56.9' |
| 4 | 237°03.9 | 27.3 | 49°50.6 | 14.5' | 02°07.5 | -15.6' | 56.8' |
| 5 | 252°04.1 | 26.4 | 64°24.1 | 14.6' | 01°51.9 | -15.6' | 56.8' |
| 6 | 267°04.2 | S06°25.4 | 78°57.6 | 14.6' | N01°36.3 | -15.6' | 56.8' |
| 7 | 282°04.3 | 24.4 | 93°31.2 | 14.6' | 01°20.7 | -15.6' | 56.8' |
| 8 | 297°04.5 | 23.5 | 108°04.8 | 14.7' | 01°05.1 | -15.6' | 56.7' |
| 9 | 312°04.6 | 22.5 | 122°38.5 | 14.7' | 00°49.5 | -15.6' | 56.7' |
| 10 | 327°04.7 | 21.5 | 137°12.2 | 14.7' | 00°33.9 | -15.6' | 56.7' |
| 11 | 342°04.9 | 20.6 | 151°45.9 | 14.7' | 00°18.4 | -15.5' | 56.7' |
| 12 | 357°05.0 | S06°19.6 | 166°19.6 | 14.8' | N00°02.8 | -15.5' | 56.6' |
| 13 | 12°05.2 | 18.7 | 180°53.4 | 14.8' | S00°12.7 | 15.5' | 56.6' |
| 14 | 27°05.3 | 17.7 | 195°27.2 | 14.8' | 00°28.2 | 15.5' | 56.6' |
| 15 | 42°05.4 | 16.7 | 210°01.0 | 14.8' | 00°43.7 | 15.5' | 56.5' |
| 16 | 57°05.6 | 15.8 | 224°34.8 | 14.9' | 00°59.2 | 15.5' | 56.5' |
| 17 | 72°05.7 | 14.8 | 239°08.7 | 14.9' | 01°14.7 | 15.4' | 56.5' |
| 18 | 87°05.8 | S06°13.8 | 253°42.6 | 14.9' | S01°30.1 | 15.4' | 56.5' |
| 19 | 102°06.0 | 12.9 | 268°16.5 | 14.9' | 01°45.5 | 15.4' | 56.4' |
| 20 | 117°06.1 | 11.9 | 282°50.4 | 14.9' | 02°00.9 | 15.4' | 56.4' |
| 21 | 132°06.3 | 10.9 | 297°24.4 | 15.0' | 02°16.3 | 15.4' | 56.4' |
| 22 | 147°06.4 | 10.0 | 311°58.3 | 15.0' | 02°31.7 | 15.3' | 56.4' |
| 23 | 162°06.5 | 09.0 | 326°32.3 | 15.0' | 02°47.0 | 15.3' | 56.3' |
| SD = 16.1' $d = -1.0'$ | | | SD = 15.5' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 05:00 | 06:18 | 07:26 | 16:59 | 18:08 | 19:27 |
| N 70° | 05:06 | 06:17 | 07:18 | 17:08 | 18:09 | 19:20 |
| 68° | 05:11 | 06:15 | 07:11 | 17:14 | 18:10 | 19:15 |
| 66° | 05:15 | 06:14 | 07:05 | 17:20 | 18:11 | 19:11 |
| 64° | 05:18 | 06:13 | 07:01 | 17:25 | 18:12 | 19:07 |
| 62° | 05:21 | 06:12 | 06:56 | 17:29 | 18:13 | 19:05 |
| 60° | 05:23 | 06:11 | 06:53 | 17:32 | 18:14 | 19:02 |
| N 58° | 05:25 | 06:10 | 06:49 | 17:35 | 18:15 | 19:00 |
| 56° | 05:26 | 06:09 | 06:47 | 17:38 | 18:16 | 18:59 |
| 54° | 05:28 | 06:09 | 06:44 | 17:41 | 18:16 | 18:57 |
| 52° | 05:29 | 06:08 | 06:42 | 17:43 | 18:17 | 18:56 |
| 50° | 05:30 | 06:07 | 06:39 | 17:45 | 18:18 | 18:55 |
| 48° | 05:31 | 06:05 | 06:35 | 17:50 | 18:19 | 18:53 |
| N 40° | 05:32 | 06:03 | 06:31 | 17:54 | 18:21 | 18:52 |
| 38° | 05:32 | 06:02 | 06:27 | 17:57 | 18:23 | 18:52 |
| 36° | 05:32 | 06:00 | 06:24 | 18:00 | 18:24 | 18:52 |
| 34° | 05:31 | 05:56 | 06:18 | 18:06 | 18:28 | 18:53 |
| N 10° | 05:28 | 05:52 | 06:13 | 18:11 | 18:32 | 18:56 |
| 0° | 05:24 | 05:48 | 06:09 | 18:15 | 18:36 | 19:00 |
| S 10° | 05:18 | 05:43 | 06:04 | 18:20 | 18:41 | 19:06 |
| 20° | 05:10 | 05:36 | 05:58 | 18:25 | 18:47 | 19:13 |
| 30° | 05:00 | 05:28 | 05:52 | 18:31 | 18:55 | 19:24 |
| 35° | 04:53 | 05:23 | 05:49 | 18:35 | 19:00 | 19:30 |
| 40° | 04:44 | 05:17 | 05:45 | 18:39 | 19:06 | 19:39 |
| 45° | 04:34 | 05:10 | 05:40 | 18:43 | 19:13 | 19:49 |
| S 50° | 04:20 | 05:01 | 05:34 | 18:49 | 19:22 | 20:02 |
| 52° | 04:14 | 04:56 | 05:31 | 18:51 | 19:26 | 20:09 |
| 54° | 04:06 | 04:52 | 05:28 | 18:54 | 19:31 | 20:16 |
| 56° | 03:58 | 04:46 | 05:25 | 18:57 | 19:36 | 20:24 |
| 58° | 03:48 | 04:40 | 05:21 | 19:01 | 19:42 | 20:33 |
| S 60° | 03:37 | 04:33 | 05:17 | 19:05 | 19:49 | 20:44 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | 14:58 | 17:22 | 19:33 | 08:24 | 07:37 | 07:01 |
| N 70° | 15:19 | 17:29 | 19:30 | 08:00 | 07:26 | 06:59 |
| 68° | 15:35 | 17:35 | 19:28 | 07:42 | 07:18 | 06:58 |
| 66° | 15:48 | 17:40 | 19:26 | 07:27 | 07:11 | 06:57 |
| 64° | 15:58 | 17:44 | 19:24 | 07:15 | 07:05 | 06:56 |
| 62° | 16:08 | 17:47 | 19:23 | 07:04 | 07:00 | 06:55 |
| 60° | 16:15 | 17:50 | 19:21 | 06:55 | 06:55 | 06:54 |
| N 58° | 16:22 | 17:53 | 19:20 | 06:47 | 06:51 | 06:54 |
| 56° | 16:28 | 17:55 | 19:19 | 06:40 | 06:47 | 06:53 |
| 54° | 16:33 | 17:57 | 19:18 | 06:34 | 06:44 | 06:52 |
| 52° | 16:38 | 17:59 | 19:18 | 06:28 | 06:41 | 06:52 |
| 50° | 16:42 | 18:01 | 19:17 | 06:23 | 06:38 | 06:52 |
| 45° | 16:52 | 18:05 | 19:15 | 06:12 | 06:32 | 06:50 |
| N 40° | 16:59 | 18:08 | 19:14 | 06:03 | 06:27 | 06:50 |
| 35° | 17:06 | 18:11 | 19:13 | 05:54 | 06:23 | 06:49 |
| 30° | 17:12 | 18:13 | 19:12 | 05:47 | 06:19 | 06:48 |
| 20° | 17:22 | 18:17 | 19:10 | 05:35 | 06:12 | 06:47 |
| N 10° | 17:30 | 18:21 | 19:09 | 05:24 | 06:06 | 06:46 |
| 0° | 17:39 | 18:24 | 19:08 | 05:13 | 06:01 | 06:45 |
| S 10° | 17:47 | 18:27 | 19:06 | 05:03 | 05:55 | 06:44 |
| 20° | 17:55 | 18:31 | 19:05 | 04:52 | 05:49 | 06:43 |
| 30° | 18:05 | 18:35 | 19:03 | 04:39 | 05:41 | 06:42 |
| 35° | 18:10 | 18:37 | 19:03 | 04:31 | 05:37 | 06:41 |
| 40° | 18:17 | 18:40 | 19:02 | 04:22 | 05:33 | 06:40 |
| 45° | 18:24 | 18:43 | 19:01 | 04:12 | 05:27 | 06:39 |
| S 50° | 18:33 | 18:47 | 18:59 | 04:00 | 05:20 | 06:38 |
| 52° | 18:37 | 18:48 | 18:59 | 03:54 | 05:17 | 06:37 |
| 54° | 18:41 | 18:50 | 18:58 | 03:48 | 05:14 | 06:36 |
| 56° | 18:46 | 18:52 | 18:57 | 03:40 | 05:10 | 06:36 |
| 58° | 18:52 | 18:54 | 18:57 | 03:32 | 05:06 | 06:35 |
| S 60° | 18:58 | 18:57 | 18:56 | 03:23 | 05:01 | 06:34 |

| Day | Sun | | | Moon | | |
|-----|-------------------------------------|----------------------------------|-----------------------|------------------------------|----------------|---|
| | Eqn. of 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer. Pass. Upper hh:mm | Lower hh:mm | Age 13-15 97-100% |
| 02 | 12:12 | 12:05 | 12:12 | 23:50 | 11:26 |  |
| 03 | 11:59 | 11:53 | 12:12 | — | 12:12 | |
| 04 | 11:46 | 11:40 | 12:12 | 00:35 | 12:56 | |

March 05, 06, 07 UT (Thu., Fri., Sat.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|----------|
| Thu | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 162°45.5 | | 163°54.0 | S01°54.0 | 188°27.8 | S11°49.3 | 56°16.5 | N22°55.5 | 159°53.4 | S01°04.6 |
| 1 | 177°48.0 | | 178°53.6 | 52.7 | 203°28.4 | 48.6 | 71°19.0 | 55.5 | 174°55.6 | 04.4 |
| 2 | 192°50.4 | | 193°53.2 | 51.4 | 218°29.0 | 47.9 | 86°21.5 | 55.5 | 189°57.8 | 04.3 |
| 3 | 207°52.9 | | 208°52.8 | · · 50.2 | 233°29.6 | · · 47.2 | 101°24.1 | · · 55.5 | 205°00.0 | · · 04.2 |
| 4 | 222°55.4 | | 223°52.5 | 48.9 | 248°30.1 | 46.5 | 116°26.6 | 55.5 | 220°02.2 | 04.1 |
| 5 | 237°57.8 | | 238°52.1 | 47.6 | 263°30.7 | 45.8 | 131°29.1 | 55.5 | 235°04.3 | 03.9 |
| 6 | 253°00.3 | | 253°51.7 | S01°46.3 | 278°31.3 | S11°45.1 | 146°31.6 | N22°55.5 | 250°06.5 | S01°03.8 |
| 7 | 268°02.8 | | 268°51.4 | 45.0 | 293°31.9 | 44.4 | 161°34.1 | 55.5 | 265°08.7 | 03.7 |
| 8 | 283°05.2 | | 283°51.0 | 43.8 | 308°32.5 | 43.7 | 176°36.6 | 55.5 | 280°10.9 | 03.6 |
| 9 | 298°07.7 | | 298°50.6 | · · 42.5 | 323°33.1 | · · 43.0 | 191°39.1 | · · 55.5 | 295°13.1 | · · 03.5 |
| 10 | 313°10.1 | | 313°50.2 | 41.2 | 338°33.7 | 42.2 | 206°41.7 | 55.5 | 310°15.3 | 03.3 |
| 11 | 328°12.6 | | 328°49.9 | 39.9 | 353°34.2 | 41.5 | 221°44.2 | 55.6 | 325°17.5 | 03.2 |
| 12 | 343°15.1 | | 343°49.5 | S01°38.6 | 8°34.8 | S11°40.8 | 236°46.7 | N22°55.6 | 340°19.7 | S01°03.1 |
| 13 | 358°17.5 | | 358°49.1 | 37.3 | 23°35.4 | 40.1 | 251°49.2 | 55.6 | 355°21.8 | 03.0 |
| 14 | 13°20.0 | | 13°48.8 | 36.1 | 38°36.0 | 39.4 | 266°51.7 | 55.6 | 10°24.0 | 02.9 |
| 15 | 28°22.5 | | 28°48.4 | · · 34.8 | 53°36.6 | · · 38.7 | 281°54.2 | · · 55.6 | 25°26.2 | · · 02.7 |
| 16 | 43°24.9 | | 43°48.0 | 33.5 | 68°37.2 | 38.0 | 296°56.7 | 55.6 | 40°28.4 | 02.6 |
| 17 | 58°27.4 | | 58°47.6 | 32.2 | 83°37.8 | 37.3 | 311°59.3 | 55.6 | 55°30.6 | 02.5 |
| 18 | 73°29.9 | | 73°47.3 | S01°30.9 | 98°38.4 | S11°36.6 | 327°01.8 | N22°55.6 | 70°32.8 | S01°02.4 |
| 19 | 88°32.3 | | 88°46.9 | 29.6 | 113°39.0 | 35.9 | 342°04.3 | 55.6 | 85°35.0 | 02.2 |
| 20 | 103°34.8 | | 103°46.5 | 28.4 | 128°39.5 | 35.1 | 357°06.8 | 55.6 | 100°37.1 | 02.1 |
| 21 | 118°37.2 | | 118°46.2 | · · 27.1 | 143°40.1 | · · 34.4 | 12°09.3 | · · 55.6 | 115°39.3 | · · 02.0 |
| 22 | 133°39.7 | | 133°45.8 | 25.8 | 158°40.7 | 33.7 | 27°11.8 | 55.6 | 130°41.5 | 01.9 |
| 23 | 148°42.2 | | 148°45.4 | 24.5 | 173°41.3 | 33.0 | 42°14.3 | 55.6 | 145°43.7 | 01.8 |
| Mer.pass. 13:07 | | ν-0.4' d-1.3' m-3.92 | | ν0.6' d-0.7' m1.15 | | ν2.5' d0.0' m-2.41 | | ν2.2' d-0.1' m0.98 | | |

| Fri | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|----------|
| 0 | 163°44.6 | | 163°45.1 | S01°23.2 | 188°41.9 | S11°32.3 | 57°16.8 | N22°55.7 | 160°45.9 | S01°01.6 |
| 1 | 178°47.1 | | 178°44.7 | 21.9 | 203°42.5 | 31.6 | 72°19.3 | 55.7 | 175°48.1 | 01.5 |
| 2 | 193°49.6 | | 193°44.3 | 20.6 | 218°43.1 | 30.9 | 87°21.8 | 55.7 | 190°50.3 | 01.4 |
| 3 | 208°52.0 | | 208°43.9 | · · 19.4 | 233°43.7 | · · 30.2 | 102°24.4 | · · 55.7 | 205°52.5 | · · 01.3 |
| 4 | 223°54.5 | | 223°43.6 | 18.1 | 248°44.3 | 29.5 | 117°26.9 | 55.7 | 220°54.6 | 01.1 |
| 5 | 238°57.0 | | 238°43.2 | 16.8 | 263°44.9 | 28.7 | 132°29.4 | 55.7 | 235°56.8 | 01.0 |
| 6 | 253°59.4 | | 253°42.8 | S01°15.5 | 278°45.4 | S11°28.0 | 147°31.9 | N22°55.7 | 250°59.0 | S01°00.9 |
| 7 | 269°01.9 | | 268°42.5 | 14.2 | 293°46.0 | 27.3 | 162°34.4 | 55.7 | 266°01.2 | 00.8 |
| 8 | 284°04.4 | | 283°42.1 | 12.9 | 308°46.6 | 26.6 | 177°36.9 | 55.7 | 281°03.4 | 00.7 |
| 9 | 299°06.8 | | 298°41.7 | · · 11.7 | 323°47.2 | · · 25.9 | 192°39.4 | · · 55.7 | 296°05.6 | · · 00.5 |
| 10 | 314°09.3 | | 313°41.4 | 10.4 | 338°47.8 | 25.2 | 207°41.9 | 55.7 | 311°07.8 | 00.4 |
| 11 | 329°11.7 | | 328°41.0 | 09.1 | 353°48.4 | 24.5 | 222°44.4 | 55.7 | 326°09.9 | 00.3 |
| 12 | 344°14.2 | | 343°40.6 | S01°07.8 | 8°49.0 | S11°23.8 | 237°46.9 | N22°55.7 | 341°12.1 | S01°00.2 |
| 13 | 359°16.7 | | 358°40.2 | 06.5 | 23°49.6 | 23.0 | 252°49.4 | 55.7 | 356°14.3 | 01°00.1 |
| 14 | 14°19.1 | | 13°39.9 | 05.2 | 38°50.2 | 22.3 | 267°51.9 | 55.7 | 11°16.5 | 00°59.9 |
| 15 | 29°21.6 | | 28°39.5 | · · 03.9 | 53°50.8 | · · 21.6 | 282°54.4 | · · 55.8 | 26°18.7 | · · 59.8 |
| 16 | 44°24.1 | | 43°39.1 | 02.7 | 68°51.4 | 20.9 | 297°56.9 | 55.8 | 41°20.9 | 59.7 |
| 17 | 59°26.5 | | 58°38.8 | 01.4 | 83°52.0 | 20.2 | 312°59.4 | 55.8 | 56°23.1 | 59.6 |
| 18 | 74°29.0 | | 73°38.4 | S01°00.1 | 98°52.5 | S11°19.5 | 328°01.9 | N22°55.8 | 71°25.3 | S00°59.4 |
| 19 | 89°31.5 | | 88°38.0 | 00°58.8 | 113°53.1 | 18.8 | 343°04.4 | 55.8 | 86°27.4 | 59.3 |
| 20 | 104°33.9 | | 103°37.7 | 57.5 | 128°53.7 | 18.0 | 358°06.9 | 55.8 | 101°29.6 | 59.2 |
| 21 | 119°36.4 | | 118°37.3 | · · 56.2 | 143°54.3 | · · 17.3 | 13°09.4 | · · 55.8 | 116°31.8 | · · 59.1 |
| 22 | 134°38.8 | | 133°36.9 | 54.9 | 158°54.9 | 16.6 | 28°11.9 | 55.8 | 131°34.0 | 59.0 |
| 23 | 149°41.3 | | 148°36.6 | 53.7 | 173°55.5 | 15.9 | 43°14.4 | 55.8 | 146°36.2 | 58.8 |
| Mer.pass. 13:03 | | ν-0.4' d-1.3' m-3.92 | | ν0.6' d-0.7' m1.15 | | ν2.5' d0.0' m-2.40 | | ν2.2' d-0.1' m0.98 | | |

| Sat | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|----------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|----------|
| 0 | 164°43.8 | | 163°36.2 | S00°52.4 | 188°56.1 | S11°15.2 | 58°16.9 | N22°55.8 | 161°38.4 | S00°58.7 |
| 1 | 179°46.2 | | 178°35.8 | 51.1 | 203°56.7 | 14.5 | 73°19.4 | 55.8 | 176°40.6 | 58.6 |
| 2 | 194°48.7 | | 193°35.5 | 49.8 | 218°57.3 | 13.8 | 88°21.9 | 55.8 | 191°42.7 | 58.5 |
| 3 | 209°51.2 | | 208°35.1 | · · 48.5 | 233°57.9 | · · 13.0 | 103°24.4 | · · 55.8 | 206°44.9 | · · 58.3 |
| 4 | 224°53.6 | | 223°34.7 | 47.2 | 248°58.5 | 12.3 | 118°26.9 | 55.8 | 221°47.1 | 58.2 |
| 5 | 239°56.1 | | 238°34.4 | 45.9 | 263°59.1 | 11.6 | 133°29.4 | 55.8 | 236°49.3 | 58.1 |
| 6 | 254°58.6 | | 253°34.0 | S00°44.7 | 278°59.7 | S11°10.9 | 148°31.9 | N22°55.9 | 251°51.5 | S00°58.0 |
| 7 | 270°01.0 | | 268°33.6 | 43.4 | 294°00.3 | 10.2 | 163°34.4 | 55.9 | 266°53.7 | 57.9 |
| 8 | 285°03.5 | | 283°33.3 | 42.1 | 309°00.9 | 09.5 | 178°36.9 | 55.9 | 281°55.9 | 57.7 |
| 9 | 300°06.0 | | 298°32.9 | · · 40.8 | 324°01.5 | · · 08.7 | 193°39.4 | · · 55.9 | 296°58.0 | · · 57.6 |
| 10 | 315°08.4 | | 313°32.5 | 39.5 | 339°02.0 | 08.0 | 208°41.9 | 55.9 | 312°00.2 | 57.5 |
| 11 | 330°10.9 | | 328°32.2 | 38.2 | 354°02.6 | 07.3 | 223°44.4 | 55.9 | 327°02.4 | 57.4 |
| 12 | 345°13.3 | | 343°31.8 | S00°36.9 | 9°03.2 | S11°06.6 | 238°46.9 | N22°55.9 | 342°04.6 | S00°57.2 |
| 13 | 0°15.8 | | 358°31.4 | 35.7 | 24°03.8 | 05.9 | 253°49.4 | 55.9 | 357°06.8 | 57.1 |
| 14 | 15°18.3 | | 13°31.1 | 34.4 | 39°04.4 | 05.1 | 268°51.9 | 55.9 | 12°09.0 | 57.0 |
| 15 | 30°20.7 | | 28°30.7 | · · 33.1 | 54°05.0 | · · 04.4 | 283°54.4 | · · 55.9 | 27°11.1 | · · 56.9 |
| 16 | 45°23.2 | | 43°30.3 | 31.8 | 69°05.6 | 03.7 | 298°56.9 | 55.9 | 42°13.3 | 56.8 |
| 17 | 60°25.7 | | 58°30.0 | 30.5 | 84°06.2 | 03.0 | 313°59.4 | 55.9 | 57°15.5 | 56.6 |
| 18 | 75°28.1 | | 73°29.6 | S00°29.2 | 99°06.8 | S11°02.3 | 329°01.9 | N22°55.9 | 72°17.7 | S00°56.5 |
| 19 | 90°30.6 | | 88°29.2 | 27.9 | 114°07.4 | 01.6 | 344°04.4 | 55.9 | 87°19.9 | 56.4 |
| 20 | 105°33.1 | | 103°28.9 | 26.6 | 129°08.0 | 00.8 | 359°06.9 | 55.9 | 102°22.1 | 56.3 |
| 21 | 120°35.5 | | 118°28.5 | · · 25.4 | 144°08.6 | 11°00.1 | 14°09.4 | · · 55.9 | 117°24.3 | · · 56.1 |
| 22 | 135°38.0 | | 133°28.1 | 24.1 | 159°09.2 | 10°59.4 | 29°11.9 | 55.9 | 132°26.4 | 56.0 |
| 23 | 150°40.5 | | 148°27.8 | 22.8 | 174°09.8 | 58.7 | 44°14.4 | 55.9 | 147°28.6 | 55.9 |
| Mer.pass. 12:59 | | ν-0.4' d-1.3' m-3.92 | | ν0.6' d-0.7' m1.15 | | ν2.5' d0.0' m-2.39 | | ν2.2' d-0.1' m0.98 | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°34.1 | 29°14.1 |
| Ankaa | 353°06.6 | -42°10.0 |
| Schedar | 349°30.5 | 56°40.9 |
| Diphda | 348°46.6 | -17°50.7 |
| Achernar | 335°19.9 | -57°06.4 |
| Hamal | 327°50.3 | 23°35.2 |
| Polaris | 313°46.3 | 89°22.8 |
| Acamar | 315°11.2 | -40°12.2 |
| Menkar | 314°05.3 | 4°11.5 |
| Mirfak | 308°27.1 | 49°57.4 |
| Aldebaran | 290°38.5 | 16°33.7 |
| Rigel | 281°02.9 | -8°10.4 |
| Capella | 280°20.4 | 46°01.6 |
| Bellatrix | 278°21.8 | 6°22.3 |
| Elnath | 278°00.6 | 28°37.8 |
| Alnilam | 275°36.7 | -1°11.2 |
| Betelgeuse | 270°51.0 | 7°24.6 |
| Canopus | 263°51.8 | -52°42.8 |
| Sirius | 258°25.2 | -16°45.3 |
| Adhara | 255°04.9 | -29°00.7 |
| Procyon | 244°49.6 | 5°09.4 |
| Pollux | 243°15.9 | 27°57.8 |
| Avior | 234°13.9 | -59°35.8 |
| Suhail | 222°45.2 | -43°32.5 |
| Miaplacidus | 221°37.3 | -69°49.6 |
| Alphard | 217°46.5 | -8°46.5 |
| Regulus | 207°33.1 | 11°50.2 |
| Dubhe | 193°39.1 | 61°36.5 |
| Denebola | 182°23.6 | 14°25.4 |
| Gienah | 175°42.3 | -17°41.4 |
| Acrux | 172°58.4 | -63°14.6 |
| Gacrux | 171°50.1 | -57°15.6 |
| Alioth | 166°11.6 | 55°48.8 |
| Spica | 158°21.0 | -11°18.0 |
| Alkaid | 152°50.9 | 49°10.6 |
| Hadar | 148°34.2 | -60°29.8 |
| Menkent | 147°56.2 | -36°29.9 |
| Arcturus | 145°46.8 | 19°02.5 |
| Rigel Kent. | 139°38.6 | -60°56.5 |
| Kochab | 137°19.2 | 74°02.5 |
| Zuben'ubi | 136°54.8 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.3 |
| Antares | 112°14.6 | -26°29.4 |
| Atria | 107°08.0 | -69°04.2 |
| Sabik | 102°01.7 | -15°45.5 |
| Shaula | 96°09.1 | -37°07.3 |
| Rasalhague | 95°57.7 | 12°32.2 |
| Eltanin | 90°41.9 | 51°28.7 |
| Kaus Aust. | 83°31.4 | -34°22.3 |
| Vega | 80°32.7 | 38°48.1 |
| Nunki | 75°46.7 | -26°15.8 |
| Altair | 61°59.2 | 8°56.1 |
| Peacock | 53°04.7 | -56°38.9 |
| Deneb | 49°25.5 | 45°22.2 |
| Enif | 33°38.2 | 9°59.6 |
| Al Na'ir | 27°32.1 | -46°50.1 |
| Fomalhaut | 15°13.8 | -29°29.1 |
| Scheat | 13°44.6 | 28°13.4 |
| Markab | 13°29.3 | 15°20.7 |

| Mar 05 Thu | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 1°08.5 | 13:05 |
| Mars | 25°42.3 | 11:26 |
| Jupiter | 253°31.0 | 20:12 |
| Saturn | 357°07.9 | 13:18 |


| Mar 06 Fri | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 0°00.4 | 13:05 |
| Mars | 24°57.3 | 11:25 |
| Jupiter | 253°32.2 | 20:08 |
| Saturn | 357°01.3 | 13:15 |

|--|

| h | Sun | | | Moon | | | |
|------------|----------|----------|------------|----------|-------|----------|-------|
| | GHA | Dec | | GHA | ν | Dec | d |
| Thu | | | | | | | HP |
| 0 | 177°06.7 | S06°08.1 | | 341°06.3 | 15.0' | S03°02.3 | 15.3' |
| 1 | 192°06.8 | 07.1 | | 355°40.3 | 15.0' | 03°17.6 | 15.2' |
| 2 | 207°07.0 | 06.1 | | 10°14.3 | 15.0' | 03°32.8 | 15.2' |
| 3 | 222°07.1 | · · 05.2 | | 24°48.3 | 15.0' | 03°48.0 | 15.2' |
| 4 | 237°07.2 | 04.2 | | 39°22.4 | 15.1' | 04°03.2 | 15.2' |
| 5 | 252°07.4 | 03.2 | | 53°56.4 | 15.1' | 04°18.4 | 15.1' |
| 6 | 267°07.5 | S06°02.3 | | 68°30.5 | 15.1' | S04°33.5 | 15.1' |
| 7 | 282°07.7 | 01.3 | | 83°04.6 | 15.1' | 04°48.6 | 15.1' |
| 8 | 297°07.8 | 06°00.3 | | 97°38.6 | 15.1' | 05°03.7 | 15.0' |
| 9 | 312°08.0 | 05°59.4 | | 112°12.7 | 15.1' | 05°18.7 | 15.0' |
| 10 | 327°08.1 | 58.4 | | 126°46.8 | 15.1' | 05°33.7 | 14.9' |
| 11 | 342°08.2 | 57.4 | | 141°20.9 | 15.1' | 05°48.6 | 14.9' |
| 12 | 357°08.4 | S05°56.5 | | 155°55.0 | 15.1' | S06°03.5 | 14.9' |
| 13 | 12°08.5 | 55.5 | | 170°29.1 | 15.1' | 06°18.4 | 14.8' |
| 14 | 27°08.7 | 54.5 | | 185°03.2 | 15.1' | 06°33.2 | 14.8' |
| 15 | 42°08.8 | · · 53.6 | | 199°37.2 | 15.1' | 06°48.0 | 14.7' |
| 16 | 57°08.9 | 52.6 | | 214°11.3 | 15.1' | 07°02.8 | 14.7' |
| 17 | 72°09.1 | 51.6 | | 228°45.4 | 15.1' | 07°17.5 | 14.7' |
| 18 | 87°09.2 | S05°50.7 | | 243°19.5 | 15.1' | S07°32.1 | 14.6' |
| 19 | 102°09.4 | 49.7 | | 257°53.6 | 15.1' | 07°46.7 | 14.6' |
| 20 | 117°09.5 | 48.7 | | 272°27.7 | 15.1' | 08°01.3 | 14.5' |
| 21 | 132°09.7 | · · 47.8 | | 287°01.7 | 15.1' | 08°15.8 | 14.5' |
| 22 | 147°09.8 | 46.8 | | 301°35.8 | 15.0' | 08°30.3 | 14.4' |
| 23 | 162°10.0 | 45.8 | | 316°09.8 | 15.0' | 08°44.7 | 14.4' |
| SD = 16.1' | | | SD = 15.4' | | | | |
| Fri | | | | | | | |
| 0 | 177°10.1 | S05°44.9 | | 330°43.9 | 15.0' | S08°59.1 | 14.3' |
| 1 | 192°10.2 | 43.9 | | 345°17.9 | 15.0' | 09°13.5 | 14.3' |
| 2 | 207°10.4 | 42.9 | | 359°51.9 | 15.0' | 09°27.7 | 14.2' |
| 3 | 222°10.5 | · · 41.9 | | 14°25.9 | 15.0' | 09°42.0 | 14.2' |
| 4 | 237°10.7 | 41.0 | | 28°59.9 | 15.0' | 09°56.1 | 14.1' |
| 5 | 252°10.8 | 40.0 | | 43°33.9 | 15.0' | 10°10.3 | 14.1' |
| 6 | 267°11.0 | S05°39.0 | | 58°07.8 | 14.9' | S10°24.3 | 14.0' |
| 7 | 282°11.1 | 38.1 | | 72°41.8 | 14.9' | 10°38.3 | 14.0' |
| 8 | 297°11.3 | 37.1 | | 87°15.7 | 14.9' | 10°52.3 | 13.9' |
| 9 | 312°11.4 | · · 36.1 | | 101°49.6 | 14.9' | 11°06.2 | 13.8' |
| 10 | 327°11.5 | 35.2 | | 116°23.5 | 14.9' | 11°20.0 | 13.8' |
| 11 | 342°11.7 | 34.2 | | 130°57.4 | 14.9' | 11°33.8 | 13.7' |
| 12 | 357°11.8 | S05°33.2 | | 145°31.3 | 14.8' | S11°47.5 | 13.7' |
| 13 | 12°12.0 | 32.3 | | 160°05.1 | 14.8' | 12°01.2 | 13.6' |
| 14 | 27°12.1 | 31.3 | | 174°38.9 | 14.8' | 12°14.8 | 13.5' |
| 15 | 42°12.3 | · · 30.3 | | 189°12.7 | 14.8' | 12°28.4 | 13.5' |
| 16 | 57°12.4 | 29.3 | | 203°46.4 | 14.7' | 12°41.8 | 13.4' |
| 17 | 72°12.6 | 28.4 | | 218°20.2 | 14.7' | 12°55.2 | 13.3' |
| 18 | 87°12.7 | S05°27.4 | | 232°53.9 | 14.7' | S13°08.6 | 13.3' |
| 19 | 102°12.9 | 26.4 | | 247°27.6 | 14.7' | 13°21.9 | 13.2' |
| 20 | 117°13.0 | 25.5 | | 262°01.2 | 14.6' | 13°35.1 | 13.2' |
| 21 | 132°13.2 | · · 24.5 | | 276°34.9 | 14.6' | 13°48.2 | 13.1' |
| 22 | 147°13.3 | 23.5 | | 291°08.5 | 14.6' | 14°01.3 | 13.0' |
| 23 | 162°13.5 | 22.5 | | 305°42.0 | 14.5' | 14°14.3 | 12.9' |
| SD = 16.1' | | | SD = 15.2' | | | | |
| Sat | | | | | | | |
| 0 | 177°13.6 | S05°21.6 | | 320°15.6 | 14.5' | S14°27.3 | 12.9' |
| 1 | 192°13.8 | 20.6 | | 334°49.1 | 14.5' | 14°40.2 | 12.8' |
| 2 | 207°13.9 | 19.6 | | 349°22.6 | 14.4' | 14°53.0 | 12.7' |
| 3 | 222°14.1 | · · 18.7 | | 3°56.0 | 14.4' | 15°05.7 | 12.7' |
| 4 | 237°14.2 | 17.7 | | 18°29.4 | 14.4' | 15°18.4 | 12.6' |
| 5 | 252°14.4 | 16.7 | | 33°02.8 | 14.3' | 15°31.0 | 12.5' |
| 6 | 267°14.5 | S05°15.7 | | 47°36.1 | 14.3' | S15°43.5 | 12.4' |
| 7 | 282°14.7 | 14.8 | | 62°09.4 | 14.3' | 15°55.9 | 12.4' |
| 8 | 297°14.8 | 13.8 | | 76°42.7 | 14.2' | 16°08.3 | 12.3' |
| 9 | 312°15.0 | · · 12.8 | | 91°15.9 | 14.2' | 16°20.6 | 12.2' |
| 10 | 327°15.1 | 11.9 | | 105°49.1 | 14.2' | 16°32.8 | 12.1' |
| 11 | 342°15.3 | 10.9 | | 120°22.3 | 14.1' | 16°44.9 | 12.1' |
| 12 | 357°15.4 | S05°09.9 | | 134°55.4 | 14.1' | S16°57.0 | 12.0' |
| 13 | 12°15.6 | 08.9 | | 149°28.5 | 14.0' | 17°08.9 | 11.9' |
| 14 | 27°15.7 | 08.0 | | 164°01.5 | 14.0' | 17°20.8 | 11.8' |
| 15 | 42°15.9 | · · 07.0 | | 178°34.5 | 14.0' | 17°32.6 | 11.7' |
| 16 | 57°16.0 | 06.0 | | 193°07.5 | 13.9' | 17°44.4 | 11.6' |
| 17 | 72°16.2 | 05.0 | | 207°40.4 | 13.9' | 17°56.0 | 11.6' |
| 18 | 87°16.3 | S05°04.1 | | 222°13.3 | 13.8' | S18°07.6 | 11.5' |
| 19 | 102°16.5 | 03.1 | | 236°46.1 | 13.8' | 18°19.1 | 11.4' |
| 20 | 117°16.6 | 02.1 | | 251°18.9 | 13.7' | 18°30.5 | 11.3' |
| 21 | 132°16.8 | · · 01.1 | | 265°51.6 | 13.7' | 18°41.8 | 11.2' |
| 22 | 147°16.9 | 05°00.2 | | 280°24.3 | 13.7' | 18°53.0 | 11.1' |
| 23 | 162°17.1 | 04°59.2 | | 294°57.0 | 13.6' | 19°04.1 | 11.0' |
| SD = 16.1' | | | SD = 15.0' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 04:44 | 06:03 | 07:11 | 17:14 | 18:22 | 19:41 |
| N 70° | 04:52 | 06:03 | 07:04 | 17:20 | 18:21 | 19:33 |
| 68° | 04:59 | 06:03 | 06:59 | 17:25 | 18:21 | 19:26 |
| 66° | 05:04 | 06:03 | 06:54 | 17:30 | 18:21 | 19:21 |
| 64° | 05:08 | 06:03 | 06:50 | 17:34 | 18:21 | 19:16 |
| 62° | 05:11 | 06:03 | 06:47 | 17:37 | 18:21 | 19:13 |
| 60° | 05:14 | 06:02 | 06:44 | 17:40 | 18:21 | 19:10 |
| N 58° | 05:17 | 06:02 | 06:41 | 17:42 | 18:22 | 19:07 |
| 56° | 05:19 | 06:02 | 06:39 | 17:45 | 18:22 | 19:05 |
| 54° | 05:21 | 06:02 | 06:37 | 17:47 | 18:22 | 19:03 |
| 52° | 05:22 | 06:01 | 06:35 | 17:49 | 18:22 | 19:01 |
| 50° | 05:24 | 06:01 | 06:33 | 17:50 | 18:23 | 19:00 |
| 45° | 05:26 | 06:00 | 06:29 | 17:54 | 18:23 | 18:57 |
| N 40° | 05:28 | 05:59 | 06:26 | 17:57 | 18:24 | 18:56 |
| 35° | 05:28 | 05:58 | 06:23 | 18:00 | 18:25 | 18:55 |
| 30° | 05:29 | 05:57 | 06:20 | 18:02 | 18:26 | 18:54 |
| 20° | 05:28 | 05:54 | 06:16 | 18:07 | 18:29 | 18:54 |
| N 10° | 05:26 | 05:51 | 06:12 | 18:11 | 18:32 | 18:56 |
| 0° | 05:23 | 05:47 | 06:08 | 18:14 | 18:35 | 18:59 |
| S 10° | 05:18 | 05:43 | 06:04 | 18:18 | 18:39 | 19:04 |
| 20° | 05:11 | 05:37 | 05:59 | 18:23 | 18:45 | 19:11 |
| 30° | 05:02 | 05:30 | 05:54 | 18:28 | 18:52 | 19:20 |
| 35° | 04:56 | 05:26 | 05:51 | 18:31 | 18:56 | 19:26 |
| 40° | 04:48 | 05:20 | 05:48 | 18:34 | 19:01 | 19:34 |
| 45° | 04:38 | 05:14 | 05:44 | 18:38 | 19:08 | 19:43 |
| S 50° | 04:26 | 05:06 | 05:39 | 18:42 | 19:15 | 19:55 |
| 52° | 04:20 | 05:02 | 05:37 | 18:45 | 19:19 | 20:01 |
| 54° | 04:13 | 04:58 | 05:34 | 18:47 | 19:23 | 20:07 |
| 56° | 04:06 | 04:53 | 05:31 | 18:50 | 19:28 | 20:15 |
| 58° | 03:57 | 04:48 | 05:28 | 18:53 | 19:33 | 20:23 |
| S 60° | 03:47 | 04:41 | 05:25 | 18:56 | 19:39 | 20:33 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | 21:43 | · · · | 00:13 | 06:27 | 05:48 | 04:51 |
| N 70° | 21:30 | 23:39 | · · · | 06:33 | 06:05 | 05:26 |
| 68° | 21:19 | 23:15 | · · · | 06:39 | 06:18 | 05:52 |
| 66° | 21:10 | 22:57 | · · · | 06:43 | 06:29 | 06:11 |
| 64° | 21:02 | 22:43 | · · · | 06:47 | 06:38 | 06:27 |
| 62° | 20:56 | 22:30 | · · · | 06:50 | 06:46 | 06:41 |
| 60° | 20:51 | 22:20 | 23:51 | 06:53 | 06:52 | 06:52 |
| N 58° | 20:46 | 22:11 | 23:38 | 06:56 | 06:58 | 07:02 |
| 56° | 20:41 | 22:03 | 23:26 | 06:58 | 07:04 | 07:10 |
| 54° | 20:38 | 21:56 | 23:15 | 07:00 | 07:09 | 07:18 |
| 52° | 20:34 | 21:50 | 23:06 | 07:02 | 07:13 | 07:25 |
| 50° | 20:31 | 21:45 | 22:58 | 07:04 | 07:17 | 07:31 |
| 45° | 20:24 | 21:33 | 22:41 | 07:08 | 07:26 | 07:45 |
| N 40° | 20:19 | 21:23 | 22:27 | 07:11 | 07:33 | 07:56 |
| 35° | 20:14 | 21:14 | 22:15 | 07:14 | 07:39 | 08:06 |
| 30° | 20:10 | 21:07 | 22:05 | 07:16 | 07:45 | 08:15 |
| 20° | 20:02 | 20:54 | 21:47 | 07:21 | 07:54 | 08:29 |
| N 10° | 19:56 | 20:44 | 21:32 | 07:24 | 08:03 | 08:42 |
| 0° | 19:50 | 20:33 | 21:17 | 07:28 | 08:11 | 08:54 |
| S 10° | 19:45 | 20:23 | 21:03 | 07:32 | 08:19 | 09:07 |
| 20° | 19:38 | 20:12 | 20:48 | 07:35 | 08:27 | 09:20 |
| 30° | 19:31 | 20:00 | 20:31 | 07:40 | 08:37 | 09:35 |
| 35° | 19:27 | 19:53 | 20:21 | 07:42 | 08:43 | 09:44 |
| 40° | 19:23 | 19:45 | 20:10 | 07:45 | 08:50 | 09:54 |
| 45° | 19:18 | 19:36 | 19:57 | 07:49 | 08:57 | 10:05 |
| S 50° | 19:12 | 19:25 | 19:41 | 07:53 | 09:06 | 10:20 |
| 52° | 19:09 | 19:20 | 19:34 | 07:54 | 09:11 | 10:27 |
| 54° | 19:06 | 19:15 | 19:25 | 07:56 | 09:15 | 10:34 |
| 56° | 19:02 | 19:09 | 19:16 | 07:59 | 09:21 | 10:43 |
| 58° | 18:59 | 19:02 | 19:06 | 08:01 | 09:27 | 10:52 |
| S 60° | 18:55 | 18:54 | 18:54 | 08:04 | 09:33 | 11:03 |

| Day | Sun | | Mer. Pass | Moon | | Age |
|-----|--|--------------------------|-----------|----------------|----------------|---|
| | Eqn. of Time 00 ^h mm:ss | 12 ^h mm:ss | | Upper hh:mm | Lower hh:mm | |
| 05 | 11:33 | 11:26 | 12:11 | 01:18 | 13:39 |  |
| 06 | 11:20 | 11:13 | 12:11 | 02:01 | 14:22 | |
| 07 | 11:06 | 10:58 | 12:11 | 02:44 | 15:06 | |

March 08, 09, 10 UT (Sun., Mon., Tue.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------|----------------------|----------|----------|--------------------|----------|----------|--------------------|---------|-----|--------------------|--------|-----|-----|
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 165°42.9 | 163°27.4 | S00°21.5 | 189°10.4 | S10°58.0 | 59°16.8 | N22°56.0 | 162°30.8 | S00°55.8 | | | | | | |
| 1 | 180°45.4 | 178°27.0 | 20.2 | 204°11.0 | 57.2 | 74°19.3 | 56.0 | 177°33.0 | 55.7 | | | | | | |
| 2 | 195°47.8 | 193°26.7 | 18.9 | 219°11.6 | 56.5 | 89°21.8 | 56.0 | 192°35.2 | 55.5 | | | | | | |
| 3 | 210°50.3 | 208°26.3 | •• 17.6 | 234°12.2 | •• 55.8 | 104°24.3 | •• 56.0 | 207°37.4 | •• 55.4 | | | | | | |
| 4 | 225°52.8 | 223°25.9 | 16.4 | 249°12.8 | 55.1 | 119°26.8 | 56.0 | 222°39.6 | 55.3 | | | | | | |
| 5 | 240°55.2 | 238°25.6 | 15.1 | 264°13.4 | 54.4 | 134°29.3 | 56.0 | 237°41.7 | 55.2 | | | | | | |
| 6 | 255°57.7 | 253°25.2 | S00°13.8 | 279°14.0 | S10°53.6 | 149°31.8 | N22°56.0 | 252°43.9 | S00°55.0 | | | | | | |
| 7 | 271°00.2 | 268°24.8 | 12.5 | 294°14.6 | 52.9 | 164°34.3 | 56.0 | 267°46.1 | 54.9 | | | | | | |
| 8 | 286°02.6 | 283°24.5 | 11.2 | 309°15.2 | 52.2 | 179°36.8 | 56.0 | 282°48.3 | 54.8 | | | | | | |
| 9 | 301°05.1 | 298°24.1 | •• 09.9 | 324°15.8 | •• 51.5 | 194°39.3 | •• 56.0 | 297°50.5 | •• 54.7 | | | | | | |
| 10 | 316°07.6 | 313°23.7 | 08.6 | 339°16.4 | 50.7 | 209°41.7 | 56.0 | 312°52.7 | 54.6 | | | | | | |
| 11 | 331°10.0 | 328°23.4 | 07.3 | 354°17.0 | 50.0 | 224°44.2 | 56.0 | 327°54.8 | 54.4 | | | | | | |
| 12 | 346°12.5 | 343°23.0 | S00°06.1 | 9°17.6 | S10°49.3 | 239°46.7 | N22°56.0 | 342°57.0 | S00°54.3 | | | | | | |
| 13 | 1°14.9 | 358°22.6 | 04.8 | 24°18.2 | 48.6 | 254°49.2 | 56.0 | 357°59.2 | 54.2 | | | | | | |
| 14 | 16°17.4 | 13°22.3 | 03.5 | 39°18.8 | 47.9 | 269°51.7 | 56.0 | 13°01.4 | 54.1 | | | | | | |
| 15 | 31°19.9 | 28°21.9 | •• 02.2 | 54°19.4 | •• 47.1 | 284°54.2 | •• 56.0 | 28°03.6 | •• 53.9 | | | | | | |
| 16 | 46°22.3 | 43°21.5 | S00°00.9 | 69°20.0 | 46.4 | 299°56.7 | 56.0 | 43°05.8 | 53.8 | | | | | | |
| 17 | 61°24.8 | 58°21.2 | N00°00.4 | 84°20.6 | 45.7 | 314°59.1 | 56.0 | 58°08.0 | 53.7 | | | | | | |
| 18 | 76°27.3 | 73°20.8 | N00°01.7 | 99°21.2 | S10°45.0 | 330°01.6 | N22°56.0 | 73°10.1 | S00°53.6 | | | | | | |
| 19 | 91°29.7 | 88°20.4 | 03.0 | 114°21.8 | 44.2 | 345°04.1 | 56.0 | 88°12.3 | 53.5 | | | | | | |
| 20 | 106°32.2 | 103°20.1 | 04.2 | 129°22.4 | 43.5 | 0°06.6 | 56.0 | 103°14.5 | 53.3 | | | | | | |
| 21 | 121°34.7 | 118°19.7 | •• 05.5 | 144°23.0 | •• 42.8 | 15°09.1 | •• 56.1 | 118°16.7 | •• 53.2 | | | | | | |
| 22 | 136°37.1 | 133°19.4 | 06.8 | 159°23.6 | 42.1 | 30°11.6 | 56.1 | 133°18.9 | 53.1 | | | | | | |
| 23 | 151°39.6 | 148°19.0 | 08.1 | 174°24.2 | 41.3 | 45°14.1 | 56.1 | 148°21.1 | 53.0 | | | | | | |
| Mer.pass. 12:55 | | | ν-0.4' d-1.3' m-3.92 | | | ν0.6' d-0.7' m1.15 | | | ν2.5' d0.0' m-2.39 | | | ν2.2' d-0.1' m0.97 | | | |

| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|----------|---------------------|----------|----------|--------------------|----------|----------|--------------------|-----|-----|--------------------|-----|-----|-----|
| 0 | 166°42.1 | 163°18.6 | N00°09.4 | 189°24.8 | S10°40.6 | 60°16.5 | N22°56.1 | 163°23.2 | S00°52.8 | | | | | | |
| 1 | 181°44.5 | 178°18.3 | 10.7 | 204°25.4 | 39.9 | 75°19.0 | 56.1 | 178°25.4 | 52.7 | | | | | | |
| 2 | 196°47.0 | 193°17.9 | 12.0 | 219°26.0 | 39.2 | 90°21.5 | 56.1 | 193°27.6 | 52.6 | | | | | | |
| 3 | 211°49.4 | 208°17.5 | •• 13.3 | 234°26.6 | •• 38.4 | 105°24.0 | •• 56.1 | 208°29.8 | •• 52.5 | | | | | | |
| 4 | 226°51.9 | 223°17.2 | 14.5 | 249°27.2 | 37.7 | 120°26.5 | 56.1 | 223°32.0 | 52.4 | | | | | | |
| 5 | 241°54.4 | 238°16.8 | 15.8 | 264°27.8 | 37.0 | 135°28.9 | 56.1 | 238°34.2 | 52.2 | | | | | | |
| 6 | 256°56.8 | 253°16.4 | N00°17.1 | 279°28.4 | S10°36.3 | 150°31.4 | N22°56.1 | 253°36.3 | S00°52.1 | | | | | | |
| 7 | 271°59.3 | 268°16.1 | 18.4 | 294°29.0 | 35.5 | 165°33.9 | 56.1 | 268°38.5 | 52.0 | | | | | | |
| 8 | 287°01.8 | 283°15.7 | 19.7 | 309°29.6 | 34.8 | 180°36.4 | 56.1 | 283°40.7 | 51.9 | | | | | | |
| 9 | 302°04.2 | 298°15.3 | •• 21.0 | 324°30.2 | •• 34.1 | 195°38.9 | •• 56.1 | 298°42.9 | •• 51.7 | | | | | | |
| 10 | 317°06.7 | 313°15.0 | 22.3 | 339°30.8 | 33.4 | 210°41.3 | 56.1 | 313°45.1 | 51.6 | | | | | | |
| 11 | 332°09.2 | 328°14.6 | 23.6 | 354°31.4 | 32.6 | 225°43.8 | 56.1 | 328°47.3 | 51.5 | | | | | | |
| 12 | 347°11.6 | 343°14.3 | N00°24.9 | 9°32.0 | S10°31.9 | 240°46.3 | N22°56.1 | 343°49.5 | S00°51.4 | | | | | | |
| 13 | 2°14.1 | 358°13.9 | 26.1 | 24°32.6 | 31.2 | 255°48.8 | 56.1 | 358°51.6 | 51.3 | | | | | | |
| 14 | 17°16.6 | 13°13.5 | 27.4 | 39°33.2 | 30.5 | 270°51.3 | 56.1 | 13°53.8 | 51.1 | | | | | | |
| 15 | 32°19.0 | 28°13.2 | •• 28.7 | 54°33.8 | •• 29.7 | 285°53.7 | •• 56.1 | 28°56.0 | •• 51.0 | | | | | | |
| 16 | 47°21.5 | 43°12.8 | 30.0 | 69°34.4 | 29.0 | 300°56.2 | 56.1 | 43°58.2 | 50.9 | | | | | | |
| 17 | 62°23.9 | 58°12.4 | 31.3 | 84°35.0 | 28.3 | 315°58.7 | 56.1 | 59°00.4 | 50.8 | | | | | | |
| 18 | 77°26.4 | 73°12.1 | N00°32.6 | 99°35.6 | S10°27.6 | 331°01.2 | N22°56.1 | 74°02.6 | S00°50.6 | | | | | | |
| 19 | 92°28.9 | 88°11.7 | 33.9 | 114°36.2 | 26.8 | 346°03.6 | 56.1 | 89°04.7 | 50.5 | | | | | | |
| 20 | 107°31.3 | 103°11.3 | 35.2 | 129°36.8 | 26.1 | 1°06.1 | 56.1 | 104°06.9 | 50.4 | | | | | | |
| 21 | 122°33.8 | 118°11.0 | •• 36.4 | 144°37.4 | •• 25.4 | 16°08.6 | •• 56.1 | 119°09.1 | •• 50.3 | | | | | | |
| 22 | 137°36.3 | 133°10.6 | 37.7 | 159°38.0 | 24.6 | 31°11.1 | 56.2 | 134°11.3 | 50.1 | | | | | | |
| 23 | 152°38.7 | 148°10.3 | 39.0 | 174°38.6 | 23.9 | 46°13.5 | 56.2 | 149°13.5 | 50.0 | | | | | | |
| Mer.pass. 12:51 | | | ν-0.4' d1.3' m-3.92 | | | ν0.6' d-0.7' m1.15 | | | ν2.5' d0.0' m-2.38 | | | ν2.2' d-0.1' m0.97 | | | |

| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|----------|---------------------|----------|----------|--------------------|----------|----------|--------------------|-----|-----|--------------------|-----|-----|-----|
| 0 | 167°41.2 | 163°09.9 | N00°40.3 | 189°39.2 | S10°23.2 | 61°16.0 | N22°56.2 | 164°15.7 | S00°49.9 | | | | | | |
| 1 | 182°43.7 | 178°09.5 | 41.6 | 204°39.8 | 22.5 | 76°18.5 | 56.2 | 179°17.8 | 49.8 | | | | | | |
| 2 | 197°46.1 | 193°09.2 | 42.9 | 219°40.4 | 21.7 | 91°21.0 | 56.2 | 194°20.0 | 49.7 | | | | | | |
| 3 | 212°48.6 | 208°08.8 | •• 44.2 | 234°41.0 | •• 21.0 | 106°23.4 | •• 56.2 | 209°22.2 | •• 49.5 | | | | | | |
| 4 | 227°51.0 | 223°08.4 | 45.5 | 249°41.7 | 20.3 | 121°25.9 | 56.2 | 224°24.4 | 49.4 | | | | | | |
| 5 | 242°53.5 | 238°08.1 | 46.7 | 264°42.3 | 19.5 | 136°28.4 | 56.2 | 239°26.6 | 49.3 | | | | | | |
| 6 | 257°56.0 | 253°07.7 | N00°48.0 | 279°42.9 | S10°18.8 | 151°30.9 | N22°56.2 | 254°28.8 | S00°49.2 | | | | | | |
| 7 | 272°58.4 | 268°07.3 | 49.3 | 294°43.5 | 18.1 | 166°33.3 | 56.2 | 269°30.9 | 49.0 | | | | | | |
| 8 | 288°00.9 | 283°07.0 | 50.6 | 309°44.1 | 17.4 | 181°35.8 | 56.2 | 284°33.1 | 48.9 | | | | | | |
| 9 | 303°03.4 | 298°06.6 | •• 51.9 | 324°44.7 | •• 16.6 | 196°38.3 | •• 56.2 | 299°35.3 | •• 48.8 | | | | | | |
| 10 | 318°05.8 | 313°06.3 | 53.2 | 339°45.3 | 15.9 | 211°40.7 | 56.2 | 314°37.5 | 48.7 | | | | | | |
| 11 | 333°08.3 | 328°05.9 | 54.5 | 354°45.9 | 15.2 | 226°43.2 | 56.2 | 329°39.7 | 48.6 | | | | | | |
| 12 | 348°10.8 | 343°05.5 | N00°55.8 | 9°46.5 | S10°14.4 | 241°45.7 | N22°56.2 | 344°41.9 | S00°48.4 | | | | | | |
| 13 | 3°13.2 | 358°05.2 | 57.0 | 24°47.1 | 13.7 | 256°48.1 | 56.2 | 359°44.0 | 48.3 | | | | | | |
| 14 | 18°15.7 | 13°04.8 | 58.3 | 39°47.7 | 13.0 | 271°50.6 | 56.2 | 14°46.2 | 48.2 | | | | | | |
| 15 | 33°18.2 | 28°04.4 | 00°59.6 | 54°48.3 | •• 12.2 | 286°53.1 | •• 56.2 | 29°48.4 | •• 48.1 | | | | | | |
| 16 | 48°20.6 | 43°04.1 | 01°00.9 | 69°48.9 | 11.5 | 301°55.6 | 56.2 | 44°50.6 | 47.9 | | | | | | |
| 17 | 63°23.1 | 58°03.7 | 02.2 | 84°49.5 | 10.8 | 316°58.0 | 56.2 | 59°52.8 | 47.8 | | | | | | |
| 18 | 78°25.5 | 73°03.3 | N01°03.5 | 99°50.1 | S10°10.1 | 332°00.5 | N22°56.2 | 74°55.0 | S00°47.7 | | | | | | |
| 19 | 93°28.0 | 88°03.0 | 04.8 | 114°50.7 | 09.3 | 347°03.0 | 56.2 | 89°57.1 | 47.6 | | | | | | |
| 20 | 108°30.5 | 103°02.6 | 06.1 | 129°51.3 | 08.6 | 2°05.4 | 56.2 | 104°59.3 | 47.4 | | | | | | |
| 21 | 123°32.9 | 118°02.3 | •• 07.3 | 144°52.0 | •• 07.9 | 17°07.9 | •• 56.2 | 120°01.5 | •• 47.3 | | | | | | |
| 22 | 138°35.4 | 133°01.9 | 08.6 | 159°52.6 | 07.1 | 32°10.4 | 56.2 | 135°03.7 | 47.2 | | | | | | |
| 23 | 153°37.9 | 148°01.5 | 09.9 | 174°53.2 | 06.4 | 47°12.8 | 56.2 | 150°05.9 | 47.1 | | | | | | |
| Mer.pass. 12:47 | | | ν-0.4' d1.3' m-3.92 | | | ν0.6' d-0.7' m1.15 | | | ν2.5' d0.0' m-2.37 | | | ν2.2' d-0.1' m0.97 | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°34.1 | 29°14.1 |
| Ankaa | 353°06.6 | -42°09.9 |
| Schedar | 349°30.5 | 56°40.9 |
| Diphda | 348°46.6 | -17°50.7 |
| Achernar | 335°19.9 | -57°06.4 |
| Hamal | 327°50.3 | 23°35.2 |
| Polaris | 313°47.5 | 89°22.7 |
| Acamar | 315°11.2 | -40°12.2 |
| Menkar | 314°05.3 | 4°11.5 |
| Mirfak | 308°27.1 | 49°57.4 |
| Aldebaran | 290°38.6 | 16°33.7 |
| Rigel | 281°02.9 | -8°10.4 |
| Capella | 280°20.4 | 46°01.6 |
| Bellatrix | 278°21.8 | 6°22.3 |
| Elnath | 278°00.6 | 28°37.8 |
| Alnilam | 275°36.7 | -1°11.2 |
| Betelgeuse | 270°51.0 | 7°24.6 |
| Canopus | 263°51.8 | -52°42.8 |
| Sirius | 258°25.3 | -16°45.3 |
| Adhara | 255°04.9 | -29°00.7 |
| Procyon | 244°49.6 | 5°09.4 |
| Pollux | 243°15.9 | 27°57.8 |
| Avior | 234°13.9 | -59°35.8 |
| Suhail | 222°45.2 | -43°32.5 |
| Miaplacidus | 221°37.3 | -69°49.6 |
| Alphard | 217°46.5 | -8°46.5 |
| Regulus | 207°33.1 | 11°50.2 |


| h | Sun | | | Moon | | | |
|------------|----------|----------|------------|-------|----------|-------|-------|
| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 177°17.2 | S04°58.2 | 309°29.6 | 13.6' | S19°15.2 | 11.0' | 54.7' |
| 1 | 192°17.4 | 57.3 | 324°02.2 | 13.5' | 19°26.1 | 10.9' | 54.7' |
| 2 | 207°17.5 | 56.3 | 338°34.7 | 13.5' | 19°37.0 | 10.8' | 54.7' |
| 3 | 222°17.7 | 55.3 | 353°07.2 | 13.4' | 19°47.8 | 10.7' | 54.7' |
| 4 | 237°17.8 | 54.3 | 7°39.6 | 13.4' | 19°58.5 | 10.6' | 54.6' |
| 5 | 252°18.0 | 53.4 | 22°12.0 | 13.3' | 20°09.1 | 10.5' | 54.6' |
| 6 | 267°18.1 | S04°52.4 | 36°44.3 | 13.3' | S20°19.6 | 10.4' | 54.6' |
| 7 | 282°18.3 | 51.4 | 51°16.6 | 13.2' | 20°30.0 | 10.3' | 54.6' |
| 8 | 297°18.4 | 50.4 | 65°48.8 | 13.2' | 20°40.3 | 10.2' | 54.6' |
| 9 | 312°18.6 | 49.5 | 80°21.0 | 13.1' | 20°50.6 | 10.1' | 54.6' |
| 10 | 327°18.8 | 48.5 | 94°53.1 | 13.1' | 21°00.7 | 10.0' | 54.5' |
| 11 | 342°18.9 | 47.5 | 109°25.2 | 13.0' | 21°10.7 | 9.9' | 54.5' |
| 12 | 357°19.1 | S04°46.5 | 123°57.2 | 13.0' | S21°20.7 | 9.8' | 54.5' |
| 13 | 12°19.2 | 45.5 | 138°29.2 | 12.9' | 21°30.5 | 9.7' | 54.5' |
| 14 | 27°19.4 | 44.6 | 153°01.1 | 12.9' | 21°40.3 | 9.6' | 54.5' |
| 15 | 42°19.5 | 43.6 | 167°33.0 | 12.8' | 21°49.9 | 9.5' | 54.5' |
| 16 | 57°19.7 | 42.6 | 182°04.8 | 12.8' | 21°59.4 | 9.4' | 54.5' |
| 17 | 72°19.8 | 41.6 | 196°36.6 | 12.7' | 22°08.9 | 9.3' | 54.5' |
| 18 | 87°20.0 | S04°40.7 | 211°08.3 | 12.7' | S22°18.2 | 9.2' | 54.4' |
| 19 | 102°20.1 | 39.7 | 225°40.0 | 12.6' | 22°27.5 | 9.1' | 54.4' |
| 20 | 117°20.3 | 38.7 | 240°11.6 | 12.6' | 22°36.6 | 9.0' | 54.4' |
| 21 | 132°20.5 | 37.7 | 254°43.2 | 12.5' | 22°45.6 | 8.9' | 54.4' |
| 22 | 147°20.6 | 36.8 | 269°14.7 | 12.5' | 22°54.6 | 8.8' | 54.4' |
| 23 | 162°20.8 | 35.8 | 283°46.1 | 12.4' | 23°03.4 | 8.7' | 54.4' |
| SD = 16.1' | | | SD = 14.9' | | | | |

| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|-------|----------|------|-------|
| 0 | 177°20.9 | S04°34.8 | 298°17.5 | 12.4' | S23°12.1 | 8.6' | 54.4' |
| 1 | 192°21.1 | 33.8 | 312°48.9 | 12.3' | 23°20.7 | 8.5' | 54.4' |
| 2 | 207°21.2 | 32.9 | 327°20.2 | 12.3' | 23°29.3 | 8.4' | 54.3' |
| 3 | 222°21.4 | 31.9 | 341°51.5 | 12.2' | 23°37.7 | 8.3' | 54.3' |
| 4 | 237°21.6 | 30.9 | 356°22.7 | 12.1' | 23°46.0 | 8.2' | 54.3' |
| 5 | 252°21.7 | 29.9 | 10°53.8 | 12.1' | 23°54.1 | 8.1' | 54.3' |
| 6 | 267°21.9 | S04°28.9 | 25°24.9 | 12.0' | S24°02.2 | 8.0' | 54.3' |
| 7 | 282°22.0 | 28.0 | 39°55.9 | 12.0' | 24°10.2 | 7.9' | 54.3' |
| 8 | 297°22.2 | 27.0 | 54°26.9 | 11.9' | 24°18.0 | 7.7' | 54.3' |
| 9 | 312°22.3 | 26.0 | 68°57.9 | 11.9' | 24°25.8 | 7.6' | 54.3' |
| 10 | 327°22.5 | 25.0 | 83°28.7 | 11.8' | 24°33.4 | 7.5' | 54.3' |
| 11 | 342°22.7 | 24.1 | 97°59.6 | 11.8' | 24°40.9 | 7.4' | 54.3' |
| 12 | 357°22.8 | S04°23.1 | 112°30.4 | 11.7' | S24°48.3 | 7.3' | 54.3' |
| 13 | 12°23.0 | 22.1 | 127°01.1 | 11.7' | 24°55.6 | 7.2' | 54.3' |
| 14 | 27°23.1 | 21.1 | 141°31.8 | 11.6' | 25°02.8 | 7.1' | 54.2' |
| 15 | 42°23.3 | 20.1 | 156°02.4 | 11.6' | 25°09.9 | 6.9' | 54.2' |
| 16 | 57°23.4 | 19.2 | 170°33.0 | 11.5' | 25°16.8 | 6.8' | 54.2' |
| 17 | 72°23.6 | 18.2 | 185°03.5 | 11.5' | 25°23.7 | 6.7' | 54.2' |
| 18 | 87°23.8 | S04°17.2 | 199°33.9 | 11.4' | S25°30.4 | 6.6' | 54.2' |
| 19 | 102°23.9 | 16.2 | 214°04.4 | 11.4' | 25°37.0 | 6.5' | 54.2' |
| 20 | 117°24.1 | 15.2 | 228°34.7 | 11.3' | 25°43.5 | 6.4' | 54.2' |
| 21 | 132°24.2 | 14.3 | 243°05.1 | 11.3' | 25°49.8 | 6.2' | 54.2' |
| 22 | 147°24.4 | 13.3 | 257°35.3 | 11.2' | 25°56.1 | 6.1' | 54.2' |
| 23 | 162°24.6 | 12.3 | 272°05.5 | 11.2' | 26°02.2 | 6.0' | 54.2' |
| SD = 16.1' | | | SD = 14.8' | | | | |

| Tue | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|-------|----------|------|-------|
| 0 | 177°24.7 | S04°11.3 | 286°35.7 | 11.1' | S26°08.2 | 5.9' | 54.2' |
| 1 | 192°24.9 | 10.3 | 301°05.8 | 11.1' | 26°14.0 | 5.8' | 54.2' |
| 2 | 207°25.0 | 09.4 | 315°35.9 | 11.0' | 26°19.8 | 5.6' | 54.2' |
| 3 | 222°25.2 | 08.4 | 330°05.9 | 11.0' | 26°25.4 | 5.5' | 54.2' |
| 4 | 237°25.4 | 07.4 | 344°35.9 | 10.9' | 26°30.9 | 5.4' | 54.2' |
| 5 | 252°25.5 | 06.4 | 359°05.9 | 10.9' | 26°36.3 | 5.3' | 54.2' |
| 6 | 267°25.7 | S04°05.4 | 13°35.8 | 10.8' | S26°41.6 | 5.1' | 54.2' |
| 7 | 282°25.8 | 04.5 | 28°05.6 | 10.8' | 26°46.7 | 5.0' | 54.2' |
| 8 | 297°26.0 | 03.5 | 42°35.4 | 10.8' | 26°51.7 | 4.9' | 54.2' |
| 9 | 312°26.2 | 02.5 | 57°05.1 | 10.7' | 26°56.6 | 4.8' | 54.2' |
| 10 | 327°26.3 | 01.5 | 71°34.9 | 10.7' | 27°01.4 | 4.6' | 54.2' |
| 11 | 342°26.5 | 04°00.5 | 86°04.5 | 10.6' | 27°06.0 | 4.5' | 54.2' |
| 12 | 357°26.6 | S03°59.6 | 100°34.1 | 10.6' | S27°10.5 | 4.4' | 54.2' |
| 13 | 12°26.8 | 58.6 | 115°03.7 | 10.5' | 27°14.9 | 4.2' | 54.2' |
| 14 | 27°27.0 | 57.6 | 129°33.3 | 10.5' | 27°19.2 | 4.1' | 54.2' |
| 15 | 42°27.1 | 56.6 | 144°02.8 | 10.5' | 27°23.3 | 4.0' | 54.2' |
| 16 | 57°27.3 | 55.6 | 158°32.2 | 10.4' | 27°27.3 | 3.9' | 54.2' |
| 17 | 72°27.5 | 54.7 | 173°01.7 | 10.4' | 27°31.1 | 3.7' | 54.2' |
| 18 | 87°27.6 | S03°53.7 | 187°31.0 | 10.3' | S27°34.9 | 3.6' | 54.2' |
| 19 | 102°27.8 | 52.7 | 202°00.4 | 10.3' | 27°38.5 | 3.5' | 54.2' |
| 20 | 117°27.9 | 51.7 | 216°29.7 | 10.3' | 27°41.9 | 3.3' | 54.2' |
| 21 | 132°28.1 | 50.7 | 230°59.0 | 10.2' | 27°45.3 | 3.2' | 54.2' |
| 22 | 147°28.3 | 49.8 | 245°28.2 | 10.2' | 27°48.5 | 3.1' | 54.2' |
| 23 | 162°28.4 | 48.8 | 259°57.4 | 10.2' | 27°51.6 | 2.9' | 54.2' |
| SD = 16.1' | | | SD = 14.8' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 04:28 | 05:48 | 06:55 | 17:28 | 18:35 | 19:56 |
| N 70° | 04:38 | 05:50 | 06:50 | 17:33 | 18:34 | 19:46 |
| 68° | 04:46 | 05:51 | 06:46 | 17:37 | 18:32 | 19:38 |
| 66° | 04:52 | 05:52 | 06:43 | 17:40 | 18:31 | 19:31 |
| 64° | 04:57 | 05:53 | 06:40 | 17:43 | 18:30 | 19:26 |
| 62° | 05:02 | 05:53 | 06:37 | 17:45 | 18:29 | 19:21 |
| 60° | 05:05 | 05:54 | 06:35 | 17:47 | 18:29 | 19:17 |
| N 58° | 05:08 | 05:54 | 06:33 | 17:49 | 18:28 | 19:14 |
| 56° | 05:11 | 05:54 | 06:31 | 17:51 | 18:28 | 19:11 |
| 54° | 05:13 | 05:54 | 06:30 | 17:52 | 18:28 | 19:09 |
| 52° | 05:15 | 05:55 | 06:28 | 17:54 | 18:27 | 19:07 |
| 50° | 05:17 | 05:55 | 06:27 | 17:55 | 18:27 | 19:05 |
| 45° | 05:21 | 05:55 | 06:24 | 17:58 | 18:27 | 19:01 |
| N 40° | 05:23 | 05:54 | 06:21 | 18:00 | 18:27 | 18:59 |
| 35° | 05:25 | 05:54 | 06:19 | 18:02 | 18:28 | 18:57 |
| 30° | 05:25 | 05:53 | 06:17 | 18:04 | 18:28 | 18:56 |
| 20° | 05:26 | 05:52 | 06:14 | 18:08 | 18:30 | 18:55 |
| N 10° | 05:25 | 05:49 | 06:10 | 18:11 | 18:32 | 18:56 |
| 0° | 05:22 | 05:46 | 06:07 | 18:14 | 18:34 | 18:59 |
| S 10° | 05:18 | 05:43 | 06:04 | 18:17 | 18:38 | 19:02 |
| 20° | 05:13 | 05:38 | 06:00 | 18:20 | 18:42 | 19:08 |
| 30° | 05:04 | 05:32 | 05:56 | 18:24 | 18:48 | 19:16 |
| 35° | 04:58 | 05:28 | 05:54 | 18:27 | 18:52 | 19:22 |
| 40° | 04:51 | 05:24 | 05:51 | 18:29 | 18:56 | 19:29 |
| 45° | 04:43 | 05:18 | 05:48 | 18:32 | 19:02 | 19:37 |
| S 50° | 04:32 | 05:11 | 05:44 | 18:36 | 19:09 | 19:48 |
| 52° | 04:26 | 05:08 | 05:42 | 18:38 | 19:12 | 19:53 |
| 54° | 04:20 | 05:04 | 05:40 | 18:40 | 19:16 | 19:59 |
| 56° | 04:13 | 05:00 | 05:38 | 18:42 | 19:20 | 20:06 |
| 58° | 04:05 | 04:55 | 05:35 | 18:44 | 19:24 | 20:14 |
| S 60° | 03:56 | 04:50 | 05:33 | 18:47 | 19:30 | 20:23 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | 03:04 | ■ | ■ | 03:34 | ■ | ■ |
| 68° | 01:33 | ■ | ■ | 05:07 | ■ | ■ |
| 66° | 00:55 | 03:44 | ■ | 05:46 | 04:34 | ■ |
| 64° | 00:28 | 02:27 | ■ | 06:14 | 05:52 | ■ |
| 62° | 00:08 | 01:51 | 03:42 | 06:35 | 06:29 | 06:19 |
| 60° | ■ | 01:25 | 02:59 | 06:52 | 06:55 | 07:02 |
| N 58° | ■ | 01:05 | 02:30 | 07:07 | 07:16 | 07:31 |
| 56° | ■ | 00:48 | 02:08 | 07:20 | 07:33 | 07:54 |
| 54° | ■ | 00:34 | 01:50 | 07:31 | 07:47 | 08:12 |
| 52° | ■ | 00:22 | 01:34 | 07:40 | 08:00 | 08:28 |
| 50° | ■ | 00:11 | 01:21 | 07:49 | 08:11 | 08:41 |
| 45° | 23:48 | ■ | 00:54 | 08:08 | 08:35 | 09:09 |
| N 40° | 23:30 | ■ | 00:33 | 08:23 | 08:54 | 09:31 |
| 35° | 23:15 | ■ | 00:15 | 08:36 | 09:10 | 09:49 |
| 30° | 23:02 | ■ | 00:00 | 08:47 | 09:23 | 10:05 |
| 20° | 22:40 | 23:34 | ■ | 09:06 | 09:47 | 10:31 |
| N 10° | 22:21 | 23:12 | ■ | 09:23 | 10:07 | 10:54 |
| 0° | 22:04 | 22:52 | 23:42 | 09:39 | 10:27 | 11:16 |
| S 10° | 21:46 | 22:31 | 23:20 | 09:55 | 10:46 | 11:37 |
| 20° | 21:27 | 22:10 | 22:56 | 10:13 | 11:06 | 12:00 |
| 30° | 21:06 | 21:44 | 22:29 | 10:32 | 11:30 | 12:27 |
| 35° | 20:53 | 21:30 | 22:12 | 10:44 | 11:44 | 12:43 |
| 40° | 20:39 | 21:13 | 21:53 | 10:58 | 12:01 | 13:02 |
| 45° | 20:22 | 20:52 | 21:31 | 11:13 | 12:20 | 13:24 |
| S 50° | 20:01 | 20:27 | 21:02 | 11:33 | 12:45 | 13:53 |
| 52° | 19:51 | 20:14 | 20:47 | 11:43 | 12:57 | 14:07 |
| 54° | 19:40 | 20:00 | 20:31 | 11:53 | 13:11 | 14:23 |
| 56° | 19:27 | 19:44 | 20:11 | 12:05 | 13:27 | 14:43 |
| 58° | 19:13 | 19:25 | 19:47 | 12:19 | 13:46 | 15:07 |
| S 60° | 18:56 | 19:01 | 19:14 | 12:36 | 14:09 | 15:39 |

| Day | Sun | | | Moon | | |
|-----|---|--------------------------|-----------------------|-----------------------------|----------------|---|
| | Eqn.of Time 00 ^h mm:ss | 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 19-21 80-63% |
| 08 | 10:51 | 10:44 | 12:11 | 03:28 | 15:51 |  |
| 09 | 10:36 | 10:29 | 12:10 | 04:15 | 16:39 | |
| 10 | 10:21 | 10:13 | 12:10 | 05:04 | 17:29 | |

March 11, 12, 13 UT (Wed., Thu., Fri.)

| Aries | | Venus | | Mars | | Jupiter | | Saturn | | Stars | | |
|-----------------|----------|---------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|-------------|---------------------|----------|
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | |
| 0 | 168°40.3 | 163°01.2 | N01°11.2 | 189°53.8 | S10°05.7 | 62°15.3 | N22°56.2 | 165°08.0 | S00°47.0 | Alpheratz | 357°34.1 | 29°14.1 |
| 1 | 183°42.8 | 178°00.8 | 12.5 | 204°54.4 | 04.9 | 77°17.8 | 56.2 | 180°10.2 | 46.8 | Ankaa | 353°06.6 | -42°09.9 |
| 2 | 198°45.3 | 193°00.4 | 13.8 | 219°55.0 | 04.2 | 92°20.2 | 56.2 | 195°12.4 | 46.7 | Schedar | 349°30.5 | 56°40.9 |
| 3 | 213°47.7 | 208°00.1 | •• 15.1 | 234°55.6 | •• 03.5 | 107°22.7 | •• 56.2 | 210°14.6 | •• 46.6 | Diphda | 348°46.6 | -17°50.7 |
| 4 | 228°50.2 | 222°59.7 | 16.4 | 249°56.2 | 02.7 | 122°25.1 | 56.2 | 225°16.8 | 46.5 | Achernar | 335°19.9 | -57°06.4 |
| 5 | 243°52.7 | 237°59.4 | 17.6 | 264°56.8 | 02.0 | 137°27.6 | 56.2 | 240°19.0 | 46.3 | Hamal | 327°50.4 | 23°35.2 |
| 6 | 258°55.1 | 252°59.0 | N01°18.9 | 279°57.4 | S10°01.3 | 152°30.1 | N22°56.2 | 255°21.1 | S00°46.2 | Polaris | 313°48.6 | 89°22.7 |
| 7 | 273°57.6 | 267°58.6 | 20.2 | 294°58.0 | 10°00.5 | 167°32.5 | 56.2 | 270°23.3 | 46.1 | Acamar | 315°11.3 | -40°12.2 |
| 8 | 289°00.0 | 282°58.3 | 21.5 | 309°58.6 | 09°59.8 | 182°35.0 | 56.2 | 285°25.5 | 46.0 | Menkar | 314°05.3 | 4°11.5 |
| 9 | 304°02.5 | 297°57.9 | •• 22.8 | 324°59.3 | •• 59.1 | 197°37.5 | •• 56.2 | 300°27.7 | •• 45.9 | Mirfak | 308°27.1 | 49°57.4 |
| 10 | 319°05.0 | 312°57.5 | 24.1 | 339°59.9 | 58.3 | 212°39.9 | 56.2 | 315°29.9 | 45.7 | Aldebaran | 290°38.6 | 16°33.7 |
| 11 | 334°07.4 | 327°57.2 | 25.4 | 355°00.5 | 57.6 | 227°42.4 | 56.3 | 330°32.1 | 45.6 | Rigel | 281°02.9 | -8°10.4 |
| 12 | 349°09.9 | 342°56.8 | N01°26.7 | 10°01.1 | S09°56.9 | 242°44.8 | N22°56.3 | 345°34.2 | S00°45.5 | Capella | 280°20.5 | 46°01.6 |
| 13 | 4°12.4 | 357°56.4 | 27.9 | 25°01.7 | 56.1 | 257°47.3 | 56.3 | 0°36.4 | 45.4 | Bellatrix | 278°21.8 | 6°22.3 |
| 14 | 19°14.8 | 12°56.1 | 29.2 | 40°02.3 | 55.4 | 272°49.8 | 56.3 | 15°38.6 | 45.2 | Elnath | 278°00.6 | 28°37.8 |
| 15 | 34°17.3 | 27°55.7 | •• 30.5 | 55°02.9 | •• 54.7 | 287°52.2 | •• 56.3 | 30°40.8 | •• 45.1 | Anilam | 275°36.7 | -1°11.2 |
| 16 | 49°19.8 | 42°55.4 | 31.8 | 70°03.5 | 53.9 | 302°54.7 | 56.3 | 45°43.0 | 45.0 | Betelgeuse | 270°51.0 | 7°24.6 |
| 17 | 64°22.2 | 57°55.0 | 33.1 | 85°04.1 | 53.2 | 317°57.1 | 56.3 | 60°45.2 | 44.9 | Canopus | 263°51.8 | -52°42.8 |
| 18 | 79°24.7 | 72°54.6 | N01°34.4 | 100°04.7 | S09°52.5 | 332°59.6 | N22°56.3 | 75°47.3 | S00°44.7 | Sirius | 258°25.3 | -16°45.3 |
| 19 | 94°27.2 | 87°54.3 | 35.7 | 115°05.4 | 51.7 | 348°02.1 | 56.3 | 90°49.5 | 44.6 | Adhara | 255°05.0 | -29°00.7 |
| 20 | 109°29.6 | 102°53.9 | 37.0 | 130°06.0 | 51.0 | 3°04.5 | 56.3 | 105°51.7 | 44.5 | Procyon | 244°49.6 | 5°09.4 |
| 21 | 124°32.1 | 117°53.5 | •• 38.2 | 145°06.6 | •• 50.2 | 18°07.0 | •• 56.3 | 120°53.9 | •• 44.4 | Pollux | 243°15.9 | 27°57.8 |
| 22 | 139°34.5 | 132°53.2 | 39.5 | 160°07.2 | 49.5 | 33°09.4 | 56.3 | 135°56.1 | 44.3 | Avior | 234°13.9 | -59°35.8 |
| 23 | 154°37.0 | 147°52.8 | 40.8 | 175°07.8 | 48.8 | 48°11.9 | 56.3 | 150°58.2 | 44.1 | Suhail | 222°45.2 | -43°32.5 |
| Mer.pass. 12:43 | | ν-0.4' d1.3' m-3.92 | | ν0.6' d-0.7' m1.15 | | ν2.5' d0.0' m-2.36 | | ν2.2' d-0.1' m0.96 | | | | |
| | | | | | | | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | |
| 0 | 169°39.5 | 162°52.5 | N01°42.1 | 190°08.4 | S09°48.0 | 63°14.3 | N22°56.3 | 166°00.4 | S00°44.0 | | | |
| 1 | 184°41.9 | 177°52.1 | 43.4 | 205°09.0 | 47.3 | 78°16.8 | 56.3 | 181°02.6 | 43.9 | Denebola | 182°23.6 | 14°25.4 |
| 2 | 199°44.4 | 192°51.7 | 44.7 | 220°09.6 | 46.6 | 93°19.3 | 56.3 | 196°04.8 | 43.8 | Gienah | 175°42.3 | -17°41.4 |
| 3 | 214°46.9 | 207°51.4 | •• 46.0 | 235°10.2 | •• 45.8 | 108°21.7 | •• 56.3 | 211°07.0 | •• 43.6 | Acrux | 172°58.4 | -63°14.7 |
| 4 | 229°49.3 | 222°51.0 | 47.2 | 250°10.9 | 45.1 | 123°24.2 | 56.3 | 226°09.2 | 43.5 | Gacrux | 171°50.0 | -57°15.6 |
| 5 | 244°51.8 | 237°50.6 | 48.5 | 265°11.5 | 44.4 | 138°26.6 | 56.3 | 241°11.3 | 43.4 | Alioth | 166°11.6 | 55°48.8 |
| 6 | 259°54.3 | 252°50.3 | N01°49.8 | 280°12.1 | S09°43.6 | 153°29.1 | N22°56.3 | 256°13.5 | S00°43.3 | Spica | 158°21.0 | -11°18.0 |
| 7 | 274°56.7 | 267°49.9 | 51.1 | 295°12.7 | 42.9 | 168°31.5 | 56.3 | 271°15.7 | 43.1 | Alkaid | 152°50.8 | 49°10.7 |
| 8 | 289°59.2 | 282°49.5 | 52.4 | 310°13.3 | 42.1 | 183°34.0 | 56.3 | 286°17.9 | 43.0 | Hadar | 148°34.2 | -60°29.9 |
| 9 | 305°01.6 | 297°49.2 | •• 53.7 | 325°13.9 | •• 41.4 | 198°36.4 | •• 56.3 | 301°20.1 | •• 42.9 | Menkent | 147°56.2 | -36°30.0 |
| 10 | 320°04.1 | 312°48.8 | 55.0 | 340°14.5 | 40.7 | 213°38.9 | 56.3 | 316°22.2 | 42.8 | Arcturus | 145°46.8 | 19°02.5 |
| 11 | 335°06.6 | 327°48.5 | 56.2 | 355°15.1 | 39.9 | 228°41.3 | 56.3 | 331°24.4 | 42.7 | Rigel Kent. | 139°38.5 | -60°36.5 |
| 12 | 350°09.0 | 342°48.1 | N01°57.5 | 10°15.8 | S09°39.2 | 243°43.8 | N22°56.3 | 346°26.6 | S00°42.5 | Kochab | 137°19.1 | 74°02.5 |
| 13 | 5°11.5 | 357°47.7 | 01°58.8 | 25°16.4 | 38.5 | 258°46.2 | 56.3 | 1°28.8 | 42.4 | Zuben'ubi | 136°54.7 | -16°09.1 |
| 14 | 20°14.0 | 12°47.4 | 02°00.1 | 40°17.0 | 37.7 | 273°48.7 | 56.3 | 16°31.0 | 42.3 | Alphecca | 126°02.8 | 26°37.3 |
| 15 | 35°16.4 | 27°47.0 | •• 01.4 | 55°17.6 | •• 37.0 | 288°51.2 | •• 56.3 | 31°33.2 | •• 42.2 | Antares | 112°14.6 | -26°29.4 |
| 16 | 50°18.9 | 42°46.6 | 02.7 | 70°18.2 | 36.2 | 303°53.6 | 56.3 | 46°35.3 | 42.0 | Atria | 107°07.9 | -69°04.2 |
| 17 | 65°21.4 | 57°46.3 | 04.0 | 85°18.8 | 35.5 | 318°56.1 | 56.3 | 61°37.5 | 41.9 | Sabik | 102°01.6 | -15°45.5 |
| 18 | 80°23.8 | 72°45.9 | N02°05.2 | 100°19.4 | S09°34.8 | 333°58.5 | N22°56.3 | 76°39.7 | S00°41.8 | Shaula | 96°09.1 | -37°07.3 |
| 19 | 95°26.3 | 87°45.6 | 06.5 | 115°20.1 | 34.0 | 349°01.0 | 56.3 | 91°41.9 | 41.7 | Rasalhague | 95°57.7 | 12°32.2 |
| 20 | 110°28.8 | 102°45.2 | 07.8 | 130°20.7 | 33.3 | 4°03.4 | 56.3 | 106°44.1 | 41.5 | Eltanin | 90°41.8 | 51°28.7 |
| 21 | 125°31.2 | 117°44.8 | •• 09.1 | 145°21.3 | •• 32.5 | 19°05.8 | •• 56.3 | 121°46.2 | •• 41.4 | Kaus Aust. | 83°31.3 | -34°22.3 |
| 22 | 140°33.7 | 132°44.5 | 10.4 | 160°21.9 | 31.8 | 34°08.3 | 56.3 | 136°48.4 | 41.3 | Vega | 80°32.7 | 38°48.1 |
| 23 | 155°36.1 | 147°44.1 | 11.7 | 175°22.5 | 31.1 | 49°10.7 | 56.3 | 151°50.6 | 41.2 | Nunki | 75°46.7 | -26°15.8 |
| Mer.pass. 12:39 | | ν-0.4' d1.3' m-3.92 | | ν0.6' d-0.7' m1.16 | | ν2.5' d0.0' m-2.36 | | ν2.2' d-0.1' m0.96 | | | | |
| | | | | | | | | | | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | |
| 0 | 170°38.6 | 162°43.7 | N02°13.0 | 190°23.1 | S09°30.3 | 64°13.2 | N22°56.3 | 166°52.8 | S00°41.1 | | | |
| 1 | 185°41.1 | 177°43.4 | 14.2 | 205°23.7 | 29.6 | 79°15.6 | 56.3 | 181°55.0 | 40.9 | Al Na'ir | 27°32.1 | -46°50.0 |
| 2 | 200°43.5 | 192°43.0 | 15.5 | 220°24.4 | 28.8 | 94°18.1 | 56.3 | 196°57.1 | 40.8 | Fomalhaut | 15°13.8 | -29°29.1 |
| 3 | 215°46.0 | 207°42.6 | •• 16.8 | 235°25.0 | •• 28.1 | 109°20.5 | •• 56.3 | 211°59.3 | •• 40.7 | Scheat | 13°44.6 | 28°13.4 |
| 4 | 230°48.5 | 222°42.3 | 18.1 | 250°25.6 | 27.4 | 124°23.0 | 56.3 | 227°01.5 | 40.6 | Markab | 13°29.3 | 15°20.7 |
| 5 | 245°50.9 | 237°41.9 | 19.4 | 265°26.2 | 26.6 | 139°25.4 | 56.3 | 242°03.7 | 40.4 | | | |
| 6 | 260°53.4 | 252°41.6 | N02°20.7 | 280°26.8 | S09°25.9 | 154°27.9 | N22°56.3 | 257°05.9 | S00°40.3 | | | |
| 7 | 275°55.9 | 267°41.2 | 22.0 | 295°27.4 | 25.1 | 169°30.3 | 56.3 | 272°08.1 | 40.2 | Mar 11 Wed | SHA | Mer.pass |
| 8 | 290°58.3 | 282°40.8 | 23.2 | 310°28.1 | 24.4 | 184°32.8 | 56.3 | 287°10.2 | 40.1 | Venus | 354°20.8 | 13:08 |
| 9 | 306°00.8 | 297°40.5 | •• 24.5 | 325°28.7 | •• 23.7 | 199°35.2 | •• 56.3 | 302°12.4 | •• 39.9 | Mars | 21°13.4 | 11:20 |
| 10 | 321°03.3 | 312°40.1 | 25.8 | 340°29.3 | 22.9 | 214°37.7 | 56.3 | 317°14.6 | 39.8 | Jupiter | 253°35.0 | 19:48 |
| 11 | 336°05.7 | 327°39.7 | 27.1 | 355°29.9 | 22.2 | 229°40.1 | 56.3 | 332°16.8 | 39.7 | Saturn | 356°27.7 | 12:58 |
| 12 | 351°08.2 | 342°39.4 | N02°28.4 | 10°30.5 | S09°21.4 | 244°42.5 | N22°56.3 | 347°19.0 | S00°39.6 | | | |
| 13 | 6°10.6 | 357°39.0 | 29.7 | 25°31.1 | 20.7 | 259°45.0 | 56.3 | 2°21.1 | 39.5 | Mar 12 Thu | SHA | Mer.pass |
| 14 | 21°13.1 | 12°38.6 | 30.9 | 40°31.7 | 20.0 | 274°47.4 | 56.3 | 17°23.3 | 39.3 | Venus | 353°13.0 | 13:09 |
| 15 | 36°15.6 | 27°38.3 | •• 32.2 | 55°32.4 | •• 19.2 | 289°49.9 | •• 56.3 | 32°25.5 | •• 39.2 | Mars | 20°28.9 | 11:19 |
| 16 | 51°18.0 | 42°37.9 | 33.5 | 70°33.0 | 18.5 | 304°52.3 | 56.3 | 47°27.7 | 39.1 | Jupiter | 253°34.9 | 19:44 |
| 17 | 66°20.5 | 57°37.5 | 34.8 | 85°33.6 | 17.7 | 319°54.7 | 56.3 | 62°29.9 | 39.0 | Saturn | 356°21.0 | 12:54 |
| 18 | 81°23.0 | 72°37.2 | N02°36.1 | 100°34.2 | S09°17.0 | 334°57.2 | N22°56.3 | 77°32.0 | S00°38.8 | | | |
| 19 | 96°25.4 | 87°36.8 | 37.4 | 115°34.8 | 16.2 | 349°59.6 | 56.3 | 92°34.2 | 38.7 | Mar 13 Fri | SHA | Mer.pass |
| 20 | 111°27.9 | 102°36.5 | 38.7 | 130°35.5 | 15.5 | 5°02.1 | 56.3 | 107°36.4 | 38.6 | Venus | 352°05.1 | 13:09 |
| 21 | 126°30.4 | 117°36.1 | •• 39.9 | 145°36.1 | •• 14.8 | 20°04.5 | •• 56.3 | 122°38.6 | •• 38.5 | Mars | 19°44.5 | 11:18 |
| 22 | 141°32.8 | 132°35.7 | 41.2 | 160°36.7 | 14.0 | 35°07.0 | 56.3 | 137°40.8 | 38.3 | Jupiter | 253°34.6 | 19:40 |
| 23 | 156°35.3 | 147°35.4 | 42.5 | 175°37.3 | 13.3 | 50°09.4 | 56.3 | 152°43.0 | 38.2 | Saturn | 356°14.2 | 12:51 |
| Mer.pass. 12:35 | | ν-0.4' d1.3' m-3.92 | | ν0.6' d-0.7' m1.16 | | ν2.4' d0.0' m-2.35 | | ν2.2' d-0.1' m0.96 | | | | |
| | | | | | | | | | | | Horizontal parallax | |
| | | | | | | | | | | | Venus: | 0.1 |
| | | | | | | | | | | | Mars: | 0.1 |


| h | Sun | | | Moon | | | | |
|------------------------|----------|----------|------------|----------|-------|----------|-------|-------|
| Wed | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 177°28.6 | S03°47.8 | | 274°26.6 | 10.1' | S27°54.5 | 2.8' | 54.2' |
| 1 | 192°28.8 | 46.8 | | 288°55.7 | 10.1' | 27°57.3 | 2.7' | 54.2' |
| 2 | 207°28.9 | 45.8 | | 303°24.8 | 10.1' | 28°00.0 | 2.5' | 54.2' |
| 3 | 222°29.1 | · · 44.8 | | 317°53.9 | 10.0' | 28°02.5 | 2.4' | 54.2' |
| 4 | 237°29.2 | 43.9 | | 332°22.9 | 10.0' | 28°04.9 | 2.3' | 54.2' |
| 5 | 252°29.4 | 42.9 | | 346°51.9 | 10.0' | 28°07.2 | 2.1' | 54.2' |
| 6 | 267°29.6 | S03°41.9 | | 1°20.9 | 10.0' | S28°09.3 | 2.0' | 54.2' |
| 7 | 282°29.7 | 40.9 | | 15°49.9 | 9.9' | 28°11.3 | 1.9' | 54.2' |
| 8 | 297°29.9 | 39.9 | | 30°18.8 | 9.9' | 28°13.2 | 1.7' | 54.2' |
| 9 | 312°30.1 | · · 39.0 | | 44°47.7 | 9.9' | 28°14.9 | 1.6' | 54.2' |
| 10 | 327°30.2 | 38.0 | | 59°16.6 | 9.9' | 28°16.5 | 1.5' | 54.2' |
| 11 | 342°30.4 | 37.0 | | 73°45.4 | 9.8' | 28°18.0 | 1.3' | 54.2' |
| 12 | 357°30.6 | S03°36.0 | | 88°14.3 | 9.8' | S28°19.3 | 1.2' | 54.2' |
| 13 | 12°30.7 | 35.0 | | 102°43.1 | 9.8' | 28°20.5 | 1.0' | 54.2' |
| 14 | 27°30.9 | 34.0 | | 117°11.9 | 9.8' | 28°21.5 | 0.9' | 54.3' |
| 15 | 42°31.0 | · · 33.1 | | 131°40.6 | 9.8' | 28°22.4 | 0.8' | 54.3' |
| 16 | 57°31.2 | 32.1 | | 146°09.4 | 9.7' | 28°23.2 | 0.6' | 54.3' |
| 17 | 72°31.4 | 31.1 | | 160°38.1 | 9.7' | 28°23.8 | 0.5' | 54.3' |
| 18 | 87°31.5 | S03°30.1 | | 175°06.9 | 9.7' | S28°24.3 | 0.4' | 54.3' |
| 19 | 102°31.7 | 29.1 | | 189°35.6 | 9.7' | 28°24.7 | 0.2' | 54.3' |
| 20 | 117°31.9 | 28.1 | | 204°04.2 | 9.7' | 28°24.9 | 0.1' | 54.3' |
| 21 | 132°32.0 | · · 27.2 | | 218°32.9 | 9.7' | 28°25.0 | -0.1' | 54.3' |
| 22 | 147°32.2 | 26.2 | | 233°01.6 | 9.7' | 28°24.9 | -0.2' | 54.3' |
| 23 | 162°32.4 | 25.2 | | 247°30.2 | 9.6' | 28°24.7 | -0.3' | 54.3' |
| SD = 16.1' $d = -1.0'$ | | | SD = 14.8' | | | | | |

| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 177°32.5 | S03°24.2 | 261°58.9 | 9.6' | S28°24.4 | -0.5' | 54.3' |
| 1 | 192°32.7 | 23.2 | 276°27.5 | 9.6' | 28°23.9 | -0.6' | 54.4' |
| 2 | 207°32.9 | 22.2 | 290°56.1 | 9.6' | 28°23.3 | -0.8' | 54.4' |
| 3 | 222°33.0 | · · 21.3 | 305°24.7 | 9.6' | 28°22.5 | -0.9' | 54.4' |
| 4 | 237°33.2 | 20.3 | 319°53.3 | 9.6' | 28°21.6 | -1.0' | 54.4' |
| 5 | 252°33.4 | 19.3 | 334°22.0 | 9.6' | 28°20.6 | -1.2' | 54.4' |
| 6 | 267°33.5 | S03°18.3 | 348°50.6 | 9.6' | S28°19.4 | -1.3' | 54.4' |
| 7 | 282°33.7 | 17.3 | 3°19.2 | 9.6' | 28°18.1 | -1.5' | 54.4' |
| 8 | 297°33.9 | 16.3 | 17°47.7 | 9.6' | 28°16.6 | -1.6' | 54.4' |
| 9 | 312°34.0 | · · 15.4 | 32°16.3 | 9.6' | 28°15.0 | -1.7' | 54.4' |
| 10 | 327°34.2 | 14.4 | 46°44.9 | 9.6' | 28°13.3 | -1.9' | 54.5' |
| 11 | 342°34.4 | 13.4 | 61°13.5 | 9.6' | 28°11.4 | -2.0' | 54.5' |
| 12 | 357°34.5 | S03°12.4 | 75°42.1 | 9.6' | S28°09.4 | -2.2' | 54.5' |
| 13 | 12°34.7 | 11.4 | 90°10.7 | 9.6' | 28°07.2 | -2.3' | 54.5' |
| 14 | 27°34.9 | 10.4 | 104°39.3 | 9.6' | 28°04.9 | -2.4' | 54.5' |
| 15 | 42°35.0 | · · 09.5 | 119°08.0 | 9.6' | 28°02.5 | -2.6' | 54.5' |
| 16 | 57°35.2 | 08.5 | 133°36.6 | 9.6' | 27°59.9 | -2.7' | 54.5' |
| 17 | 72°35.4 | 07.5 | 148°05.2 | 9.6' | 27°57.2 | -2.9' | 54.6' |
| 18 | 87°35.5 | S03°06.5 | 162°33.8 | 9.6' | S27°54.3 | -3.0' | 54.6' |
| 19 | 102°35.7 | 05.5 | 177°02.5 | 9.7' | 27°51.3 | -3.1' | 54.6' |
| 20 | 117°35.9 | 04.5 | 191°31.1 | 9.7' | 27°48.2 | -3.3' | 54.6' |
| 21 | 132°36.0 | · · 03.5 | 205°59.8 | 9.7' | 27°44.9 | -3.4' | 54.6' |
| 22 | 147°36.2 | 02.6 | 220°28.5 | 9.7' | 27°41.5 | -3.6' | 54.6' |
| 23 | 162°36.4 | 01.6 | 234°57.2 | 9.7' | 27°37.9 | -3.7' | 54.7' |
| SD = 16.1' $d = -1.0'$ | | | SD = 14.8' | | | | |

| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 177°36.6 | S03°00.6 | 249°25.9 | 9.7' | S27°34.2 | -3.8' | 54.7' |
| 1 | 192°36.7 | 02°59.6 | 263°54.6 | 9.7' | 27°30.4 | -4.0' | 54.7' |
| 2 | 207°36.9 | 58.6 | 278°23.3 | 9.8' | 27°26.4 | -4.1' | 54.7' |
| 3 | 222°37.1 | · · 57.6 | 292°52.1 | 9.8' | 27°22.3 | -4.2' | 54.7' |
| 4 | 237°37.2 | 56.6 | 307°20.9 | 9.8' | 27°18.1 | -4.4' | 54.7' |
| 5 | 252°37.4 | 55.7 | 321°49.7 | 9.8' | 27°13.7 | -4.5' | 54.8' |
| 6 | 267°37.6 | S02°54.7 | 336°18.5 | 9.8' | S27°09.2 | -4.7' | 54.8' |
| 7 | 282°37.7 | 53.7 | 350°47.3 | 9.9' | 27°04.5 | -4.8' | 54.8' |
| 8 | 297°37.9 | 52.7 | 5°16.2 | 9.9' | 26°59.7 | -4.9' | 54.8' |
| 9 | 312°38.1 | · · 51.7 | 19°45.0 | 9.9' | 26°54.8 | -5.1' | 54.8' |
| 10 | 327°38.2 | 50.7 | 34°13.9 | 9.9' | 26°49.7 | -5.2' | 54.9' |
| 11 | 342°38.4 | 49.7 | 48°42.9 | 10.0' | 26°44.5 | -5.3' | 54.9' |
| 12 | 357°38.6 | S02°48.8 | 63°11.8 | 10.0' | S26°39.2 | -5.5' | 54.9' |
| 13 | 12°38.8 | 47.8 | 77°40.8 | 10.0' | 26°33.7 | -5.6' | 54.9' |
| 14 | 27°38.9 | 46.8 | 92°09.8 | 10.0' | 26°28.1 | -5.7' | 54.9' |
| 15 | 42°39.1 | · · 45.8 | 106°38.8 | 10.1' | 26°22.4 | -5.9' | 55.0' |
| 16 | 57°39.3 | 44.8 | 121°07.9 | 10.1' | 26°16.5 | -6.0' | 55.0' |
| 17 | 72°39.4 | 43.8 | 135°37.0 | 10.1' | 26°10.5 | -6.1' | 55.0' |
| 18 | 87°39.6 | S02°42.8 | 150°06.1 | 10.1' | S26°04.3 | -6.3' | 55.0' |
| 19 | 102°39.8 | 41.9 | 164°35.2 | 10.2' | 25°58.1 | -6.4' | 55.1' |
| 20 | 117°39.9 | 40.9 | 179°04.4 | 10.2' | 25°51.7 | -6.5' | 55.1' |
| 21 | 132°40.1 | · · 39.9 | 193°33.6 | 10.2' | 25°45.1 | -6.7' | 55.1' |
| 22 | 147°40.3 | 38.9 | 208°02.9 | 10.3' | 25°38.4 | -6.8' | 55.1' |
| 23 | 162°40.5 | 37.9 | 222°32.1 | 10.3' | 25°31.6 | -6.9' | 55.1' |
| SD = 16.1' $d = -1.0'$ | | | SD = 14.9' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 04:11 | 05:33 | 06:40 | 17:42 | 18:49 | 20:12 |
| N 70° | 04:23 | 05:36 | 06:36 | 17:45 | 18:46 | 19:59 |
| 68° | 04:32 | 05:38 | 06:34 | 17:48 | 18:43 | 19:50 |
| 66° | 04:40 | 05:40 | 06:31 | 17:50 | 18:41 | 19:42 |
| 64° | 04:46 | 05:42 | 06:29 | 17:52 | 18:39 | 19:35 |
| 62° | 04:52 | 05:44 | 06:28 | 17:53 | 18:37 | 19:30 |
| 60° | 04:56 | 05:45 | 06:26 | 17:55 | 18:36 | 19:25 |
| N 58° | 05:00 | 05:46 | 06:25 | 17:56 | 18:35 | 19:21 |
| 56° | 05:03 | 05:46 | 06:23 | 17:57 | 18:34 | 19:18 |
| 54° | 05:06 | 05:47 | 06:22 | 17:58 | 18:33 | 19:15 |
| 52° | 05:09 | 05:48 | 06:21 | 17:59 | 18:33 | 19:12 |
| 50° | 05:11 | 05:48 | 06:20 | 18:00 | 18:32 | 19:10 |
| 45° | 05:15 | 05:49 | 06:18 | 18:02 | 18:31 | 19:05 |
| N 40° | 05:18 | 05:50 | 06:17 | 18:04 | 18:31 | 19:02 |
| 35° | 05:20 | 05:50 | 06:15 | 18:05 | 18:30 | 19:00 |
| 30° | 05:22 | 05:50 | 06:14 | 18:06 | 18:30 | 18:58 |
| 20° | 05:24 | 05:49 | 06:11 | 18:09 | 18:31 | 18:56 |
| N 10° | 05:23 | 05:48 | 06:09 | 18:11 | 18:32 | 18:56 |
| 0° | 05:22 | 05:46 | 06:06 | 18:13 | 18:34 | 18:58 |
| S 10° | 05:19 | 05:43 | 06:04 | 18:15 | 18:36 | 19:01 |
| 20° | 05:14 | 05:39 | 06:01 | 18:18 | 18:40 | 19:05 |
| 30° | 05:06 | 05:34 | 05:58 | 18:21 | 18:45 | 19:13 |
| 35° | 05:01 | 05:31 | 05:56 | 18:22 | 18:48 | 19:18 |
| 40° | 04:55 | 05:27 | 05:54 | 18:24 | 18:52 | 19:24 |
| 45° | 04:47 | 05:22 | 05:52 | 18:27 | 18:56 | 19:31 |
| S 50° | 04:37 | 05:16 | 05:49 | 18:30 | 19:02 | 19:41 |
| 52° | 04:32 | 05:13 | 05:47 | 18:31 | 19:05 | 19:46 |
| 54° | 04:27 | 05:10 | 05:46 | 18:32 | 19:08 | 19:51 |
| 56° | 04:21 | 05:06 | 05:44 | 18:34 | 19:12 | 19:57 |
| 58° | 04:13 | 05:02 | 05:42 | 18:36 | 19:16 | 20:04 |
| S 60° | 04:05 | 04:58 | 05:40 | 18:38 | 19:20 | 20:12 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | ██ | ██ | ██ | ██ | ██ | ██ |
| N 70° | ██ | ██ | ██ | ██ | ██ | ██ |
| 68° | ██ | ██ | ██ | ██ | ██ | ██ |
| 66° | ██ | ██ | ██ | ██ | ██ | ██ |
| 64° | ██ | ██ | ██ | ██ | ██ | ██ |
| 62° | ██ | ██ | 06:37 | ██ | ██ | 08:46 |
| 60° | 04:24 | 05:22 | 05:47 | 07:22 | 08:12 | 09:35 |
| N 58° | 03:46 | 04:42 | 05:16 | 08:01 | 08:52 | 10:06 |
| 56° | 03:19 | 04:15 | 04:53 | 08:27 | 09:19 | 10:29 |
| 54° | 02:58 | 03:53 | 04:33 | 08:49 | 09:41 | 10:48 |
| 52° | 02:40 | 03:35 | 04:17 | 09:06 | 09:58 | 11:04 |
| 50° | 02:25 | 03:20 | 04:03 | 09:21 | 10:14 | 11:17 |
| 45° | 01:55 | 02:49 | 03:35 | 09:52 | 10:44 | 11:45 |
| N 40° | 01:32 | 02:26 | 03:13 | 10:15 | 11:08 | 12:07 |
| 35° | 01:13 | 02:06 | 02:54 | 10:35 | 11:27 | 12:25 |
| 30° | 00:56 | 01:49 | 02:38 | 10:52 | 11:44 | 12:41 |
| 20° | 00:28 | 01:21 | 02:11 | 11:20 | 12:12 | 13:07 |
| N 10° | 00:04 | 00:56 | 01:47 | 11:44 | 12:36 | 13:30 |
| 0° | · · · | 00:34 | 01:26 | 12:07 | 12:59 | 13:51 |
| S 10° | · · · | 00:11 | 01:04 | 12:29 | 13:21 | 14:11 |
| 20° | 23:47 | · · · | 00:40 | 12:54 | 13:45 | 14:34 |
| 30° | 23:18 | · · · | 00:13 | 13:22 | 14:13 | 14:59 |
| 35° | 23:02 | 23:57 | · · · | 13:39 | 14:30 | 15:15 |
| 40° | 22:42 | 23:38 | · · · | 13:58 | 14:49 | 15:32 |
| 45° | 22:18 | 23:15 | · · · | 14:22 | 15:12 | 15:53 |
| S 50° | 21:48 | 22:46 | 23:55 | 14:52 | 15:41 | 16:19 |
| 52° | 21:33 | 22:32 | 23:42 | 15:08 | 15:56 | 16:32 |
| 54° | 21:15 | 22:15 | 23:28 | 15:25 | 16:13 | 16:47 |
| 56° | 20:53 | 21:55 | 23:11 | 15:47 | 16:33 | 17:04 |
| 58° | 20:26 | 21:30 | 22:51 | 16:14 | 16:59 | 17:24 |
| S 60° | 19:47 | 20:55 | 22:26 | 16:53 | 17:33 | 17:50 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-------|-----------|-------|---|
| | Eqn.of Time | | Mer. | Mer.Pass. | | Age |
| | 00 ^h | 12 ^h | Pass | Upper | Lower | 22-24 |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 54-35% |
| 11 | 10:06 | 09:58 | 12:10 | 05:54 | 18:20 |  |
| 12 | 09:50 | 09:42 | 12:10 | 06:46 | 19:12 | |
| 13 | 09:34 | 09:26 | 12:09 | 07:38 | 20:04 | |

March 14, 15, 16 UT (Sat., Sun., Mon.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|---------------------|----------|----------|--------------------|----------|----------|---------------------|----------|---------|--------------------|-----|--------|--|--|
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 171°37.8 | 162°35.0 | N02°43.8 | 190°37.9 | S09°12.5 | 65°11.8 | N22°56.3 | 167°45.1 | S00°38.1 | | | | | | |
| 1 | 186°40.2 | 177°34.6 | 45.1 | 205°38.5 | 11.8 | 80°14.3 | 56.3 | 182°47.3 | 38.0 | | | | | | |
| 2 | 201°42.7 | 192°34.3 | 46.4 | 220°39.2 | 11.0 | 95°16.7 | 56.3 | 197°49.5 | 37.9 | | | | | | |
| 3 | 216°45.1 | 207°33.9 | · · 47.6 | 235°39.8 | · · 10.3 | 110°19.1 | · · 56.3 | 212°51.7 | · · 37.7 | | | | | | |
| 4 | 231°47.6 | 222°33.5 | 48.9 | 250°40.4 | 09.6 | 125°21.6 | 56.3 | 227°53.9 | 37.6 | | | | | | |
| 5 | 246°50.1 | 237°33.2 | 50.2 | 265°41.0 | 08.8 | 140°24.0 | 56.3 | 242°56.0 | 37.5 | | | | | | |
| 6 | 261°52.5 | 252°32.8 | N02°51.5 | 280°41.6 | S09°08.1 | 155°26.5 | N22°56.3 | 257°58.2 | S00°37.4 | | | | | | |
| 7 | 276°55.0 | 267°32.4 | 52.8 | 295°42.3 | 07.3 | 170°28.9 | 56.3 | 273°00.4 | 37.2 | | | | | | |
| 8 | 291°57.5 | 282°32.1 | 54.1 | 310°42.9 | 06.6 | 185°31.3 | 56.3 | 288°02.6 | 37.1 | | | | | | |
| 9 | 306°59.9 | 297°31.7 | · · 55.3 | 325°43.5 | · · 05.8 | 200°33.8 | · · 56.3 | 303°04.8 | · · 37.0 | | | | | | |
| 10 | 322°02.4 | 312°31.4 | 56.6 | 340°44.1 | 05.1 | 215°36.2 | 56.3 | 318°06.9 | 36.9 | | | | | | |
| 11 | 337°04.9 | 327°31.0 | 57.9 | 355°44.7 | 04.3 | 230°38.6 | 56.3 | 333°09.1 | 36.7 | | | | | | |
| 12 | 352°07.3 | 342°30.6 | N02°59.2 | 10°45.4 | S09°03.6 | 245°41.1 | N22°56.3 | 348°11.3 | S00°36.6 | | | | | | |
| 13 | 7°09.8 | 357°30.3 | 03°00.5 | 25°46.0 | 02.9 | 260°43.5 | 56.3 | 3°13.5 | 36.5 | | | | | | |
| 14 | 22°12.2 | 12°29.9 | 01.7 | 40°46.6 | 02.1 | 275°45.9 | 56.3 | 18°15.7 | 36.4 | | | | | | |
| 15 | 37°14.7 | 27°29.5 | · · 03.0 | 55°47.2 | · · 01.4 | 290°48.4 | · · 56.3 | 33°17.8 | · · 36.3 | | | | | | |
| 16 | 52°17.2 | 42°29.2 | 04.3 | 70°47.8 | 09°00.6 | 305°50.8 | 56.3 | 48°20.0 | 36.1 | | | | | | |
| 17 | 67°19.6 | 57°28.8 | 05.6 | 85°48.5 | 08°59.9 | 320°53.2 | 56.3 | 63°22.2 | 36.0 | | | | | | |
| 18 | 82°22.1 | 72°28.4 | N03°06.9 | 100°49.1 | S08°59.1 | 335°55.7 | N22°56.3 | 78°24.4 | S00°35.9 | | | | | | |
| 19 | 97°24.6 | 87°28.1 | 08.2 | 115°49.7 | 58.4 | 350°58.1 | 56.3 | 93°26.6 | 35.8 | | | | | | |
| 20 | 112°27.0 | 102°27.7 | 09.4 | 130°50.3 | 57.6 | 6°00.5 | 56.3 | 108°28.7 | 35.6 | | | | | | |
| 21 | 127°29.5 | 117°27.3 | · · 10.7 | 145°50.9 | · · 56.9 | 21°03.0 | · · 56.3 | 123°30.9 | · · 35.5 | | | | | | |
| 22 | 142°32.0 | 132°27.0 | 12.0 | 160°51.6 | 56.1 | 36°05.4 | 56.3 | 138°33.1 | 35.4 | | | | | | |
| 23 | 157°34.4 | 147°26.6 | 13.3 | 175°52.2 | 55.4 | 51°07.8 | 56.3 | 153°35.3 | 35.3 | | | | | | |
| Mer.pass. 12:31 | | ν-0.4' d1.3' m-3.92 | | | ν0.6' d-0.7' m1.16 | | | ν2.4' d-0.0' m-2.34 | | | ν2.2' d-0.1' m0.95 | | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | | |
| 0 | 172°36.9 | 162°26.2 | N03°14.6 | 190°52.8 | S08°54.6 | 66°10.3 | N22°56.3 | 168°37.5 | S00°35.1 | | | | | | |
| 1 | 187°39.4 | 177°25.9 | 15.8 | 205°53.4 | 53.9 | 81°12.7 | 56.3 | 183°39.6 | 35.0 | | | | | | |
| 2 | 202°41.8 | 192°25.5 | 17.1 | 220°54.0 | 53.2 | 96°15.1 | 56.3 | 198°41.8 | 34.9 | | | | | | |
| 3 | 217°44.3 | 207°25.1 | · · 18.4 | 235°54.7 | · · 52.4 | 111°17.5 | · · 56.3 | 213°44.0 | · · 34.8 | | | | | | |
| 4 | 232°46.7 | 222°24.8 | 19.7 | 250°55.3 | 51.7 | 126°20.0 | 56.3 | 228°46.2 | 34.7 | | | | | | |
| 5 | 247°49.2 | 237°24.4 | 21.0 | 265°55.9 | 50.9 | 141°22.4 | 56.3 | 243°48.4 | 34.5 | | | | | | |
| 6 | 262°51.7 | 252°24.0 | N03°22.2 | 280°56.5 | S08°50.2 | 156°24.8 | N22°56.3 | 258°50.5 | S00°34.4 | | | | | | |
| 7 | 277°54.1 | 267°23.7 | 23.5 | 295°57.2 | 49.4 | 171°27.3 | 56.3 | 273°52.7 | 34.3 | | | | | | |
| 8 | 292°56.6 | 282°23.3 | 24.8 | 310°57.8 | 48.7 | 186°29.7 | 56.3 | 288°54.9 | 34.2 | | | | | | |
| 9 | 307°59.1 | 297°22.9 | · · 26.1 | 325°58.4 | · · 47.9 | 201°32.1 | · · 56.3 | 303°57.1 | · · 34.0 | | | | | | |
| 10 | 323°01.5 | 312°22.6 | 27.4 | 340°59.0 | 47.2 | 216°34.5 | 56.3 | 318°59.3 | 33.9 | | | | | | |
| 11 | 338°04.0 | 327°22.2 | 28.6 | 355°59.6 | 46.4 | 231°37.0 | 56.3 | 334°01.4 | 33.8 | | | | | | |
| 12 | 353°06.5 | 342°21.8 | N03°29.9 | 11°00.3 | S08°45.7 | 246°39.4 | N22°56.3 | 349°03.6 | S00°33.7 | | | | | | |
| 13 | 8°08.9 | 357°21.5 | 31.2 | 26°00.9 | 44.9 | 261°41.8 | 56.3 | 4°05.8 | 33.5 | | | | | | |
| 14 | 23°11.4 | 12°21.1 | 32.5 | 41°01.5 | 44.2 | 276°44.2 | 56.3 | 19°08.0 | 33.4 | | | | | | |
| 15 | 38°13.9 | 27°20.7 | · · 33.8 | 56°02.1 | · · 43.4 | 291°46.7 | · · 56.3 | 34°10.2 | · · 33.3 | | | | | | |
| 16 | 53°16.3 | 42°20.4 | 35.0 | 71°02.8 | 42.7 | 306°49.1 | 56.3 | 49°12.3 | 33.2 | | | | | | |
| 17 | 68°18.8 | 57°20.0 | 36.3 | 86°03.4 | 41.9 | 321°51.5 | 56.3 | 64°14.5 | 33.1 | | | | | | |
| 18 | 83°21.2 | 72°19.6 | N03°37.6 | 101°04.0 | S08°41.2 | 336°53.9 | N22°56.2 | 79°16.7 | S00°32.9 | | | | | | |
| 19 | 98°23.7 | 87°19.3 | 38.9 | 116°04.6 | 40.4 | 351°56.4 | 56.2 | 94°18.9 | 32.8 | | | | | | |
| 20 | 113°26.2 | 102°18.9 | 40.2 | 131°05.3 | 39.7 | 6°58.8 | 56.2 | 109°21.1 | 32.7 | | | | | | |
| 21 | 128°28.6 | 117°18.5 | · · 41.4 | 146°05.9 | · · 38.9 | 22°01.2 | · · 56.2 | 124°23.2 | · · 32.6 | | | | | | |
| 22 | 143°31.1 | 132°18.2 | 42.7 | 161°06.5 | 38.2 | 37°03.6 | 56.2 | 139°25.4 | 32.4 | | | | | | |
| 23 | 158°33.6 | 147°17.8 | 44.0 | 176°07.1 | 37.4 | 52°06.1 | 56.2 | 154°27.6 | 32.3 | | | | | | |
| Mer.pass. 12:27 | | ν-0.4' d1.3' m-3.92 | | | ν0.6' d-0.7' m1.16 | | | ν2.4' d-0.0' m-2.33 | | | ν2.2' d-0.1' m0.95 | | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | | |
| 0 | 173°36.0 | 162°17.4 | N03°45.3 | 191°07.8 | S08°36.7 | 67°08.5 | N22°56.2 | 169°29.8 | S00°32.2 | | | | | | |
| 1 | 188°38.5 | 177°17.1 | 46.5 | 206°08.4 | 35.9 | 82°10.9 | 56.2 | 184°32.0 | 32.1 | | | | | | |
| 2 | 203°41.0 | 192°16.7 | 47.8 | 221°09.0 | 35.2 | 97°13.3 | 56.2 | 199°34.1 | 31.9 | | | | | | |
| 3 | 218°43.4 | 207°16.3 | · · 49.1 | 236°09.6 | · · 34.4 | 112°15.7 | · · 56.2 | 214°36.3 | · · 31.8 | | | | | | |
| 4 | 233°45.9 | 222°16.0 | 50.4 | 251°10.3 | 33.7 | 127°18.2 | 56.2 | 229°38.5 | 31.7 | | | | | | |
| 5 | 248°48.3 | 237°15.6 | 51.7 | 266°10.9 | 32.9 | 142°20.6 | 56.2 | 244°40.7 | 31.6 | | | | | | |
| 6 | 263°50.8 | 252°15.2 | N03°52.9 | 281°11.5 | S08°32.2 | 157°23.0 | N22°56.2 | 259°42.9 | S00°31.4 | | | | | | |
| 7 | 278°53.3 | 267°14.9 | 54.2 | 296°12.1 | 31.4 | 172°25.4 | 56.2 | 274°45.0 | 31.3 | | | | | | |
| 8 | 293°55.7 | 282°14.5 | 55.5 | 311°12.8 | 30.7 | 187°27.8 | 56.2 | 289°47.2 | 31.2 | | | | | | |
| 9 | 308°58.2 | 297°14.1 | · · 56.8 | 326°13.4 | · · 29.9 | 202°30.3 | · · 56.2 | 304°49.4 | · · 31.1 | | | | | | |
| 10 | 324°00.7 | 312°13.8 | 58.0 | 341°14.0 | 29.2 | 217°32.7 | 56.2 | 319°51.6 | 31.0 | | | | | | |
| 11 | 339°03.1 | 327°13.4 | 03°59.3 | 356°14.6 | 28.4 | 232°35.1 | 56.2 | 334°53.8 | 30.8 | | | | | | |
| 12 | 354°05.6 | 342°13.0 | N04°00.6 | 11°15.3 | S08°27.7 | 247°37.5 | N22°56.2 | 349°55.9 | S00°30.7 | | | | | | |
| 13 | 9°08.1 | 357°12.7 | 01.9 | 26°15.9 | 26.9 | 262°39.9 | 56.2 | 4°58.1 | 30.6 | | | | | | |
| 14 | 24°10.5 | 12°12.3 | 03.1 | 41°16.5 | 26.2 | 277°42.3 | 56.2 | 20°00.3 | 30.5 | | | | | | |
| 15 | 39°13.0 | 27°11.9 | · · 04.4 | 56°17.1 | · · 25.4 | 292°44.8 | · · 56.2 | 35°02.5 | · · 30.3 | | | | | | |
| 16 | 54°15.5 | 42°11.6 | 05.7 | 71°17.8 | 24.7 | 307°47.2 | 56.2 | 50°04.7 | 30.2 | | | | | | |
| 17 | 69°17.9 | 57°11.2 | 07.0 | 86°18.4 | 23.9 | 322°49.6 | 56.2 | 65°06.8 | 30.1 | | | | | | |
| 18 | 84°20.4 | 72°10.8 | N04°08.2 | 101°19.0 | S08°23.2 | 337°52.0 | N22°56.2 | 80°09.0 | S00°30.0 | | | | | | |
| 19 | 99°22.8 | 87°10.5 | 09.5 | 116°19.6 | 22.4 | 352°54.4 | 56.2 | 95°11.2 | 29.8 | | | | | | |
| 20 | 114°25.3 | 102°10.1 | 10.8 | 131°20.3 | 21.7 | 7°56.8 | 56.2 | 110°13.4 | 29.7 | | | | | | |
| 21 | 129°27.8 | 117°09.7 | · · 12.1 | 146°20.9 | · · 20.9 | 22°59.2 | · · 56.2 | 125°15.6 | · · 29.6 | | | | | | |
| 22 | 144°30.2 | 132°09.3 | 13.3 | 161°21.5 | 20.2 | 38°01.7 | 56.2 | 140°17.7 | 29.5 | | | | | | |
| 23 | 159°32.7 | 147°09.0 | 14.6 | 176°22.2 | 19.4 | 53°04.1 | 56.2 | 155°19.9 | 29.4 | | | | | | |
| Mer.pass. 12:24 | | ν-0.4' d1.3' m-3.92 | | | ν0.6' d-0.8' m1.16 | | | ν2.4' d-0.0' m-2.32 | | | ν2.2' d-0.1' m0.95 | | | | |

| | SHA | Dec |
|---------------------|----------|----------|
| Alpheratz | 357°34.1 | 29°14.1 |
| Ankaa | 353°06.6 | -42°09.9 |
| Schedar | 349°30.5 | 56°40.9 |
| Diphda | 348°46.6 | -17°50.7 |
| Achernar | 335°19.9 | -57°06.4 |
| Hamal | 327°50.4 | 23°35.2 |
| Polaris | 313°49.7 | 89°22.7 |
| Acamar | 315°11.3 | -40°12.2 |
| Menkar | 314°05.3 | 4°11.5 |
| Mirfak | 308°27.1 | 49°57.4 |
| Aldebaran | 290°38.6 | 16°33.7 |
| Rigel | 281°02.9 | -8°10.4 |
| Capella | 280°20.5 | 46°01.6 |
| Bellatrix | 278°21.8 | 6°22.3 |
| Elnath | 278°00.6 | 28°37.8 |
| Alnilam | 275°36.7 | -1°11.2 |
| Betelgeuse | 270°51.0 | 7°24.6 |
| Canopus | 263°51.8 | -52°42.8 |
| Sirius | 258°25.3 | -16°45.3 |
| Adhara | 255°05.0 | -29°00.7 |
| Procyon | 244°49.6 | 5°09.4 |
| Pollux | 243°15.9 | 27°57.8 |
| Avior | 234°13.9 | -59°35.8 |
| Suhail | 222°45.3 | -43°32.5 |
| Miaplacidus | 221°37.4 | -69°49.7 |
| Alphard | 217°46.5 | -8°46.5 |
| Regulus | 207°33.1 | 11°50.2 |
| Dubhe | 193°39.1 | 61°36.5 |
| Denebola | 182°23.6 | 14°25.4 |
| Gienah | 175°42.3 | -17°41.4 |
| Acrux | 172°58.4 | -63°14.7 |
| Gacrux | 171°50.0 | -57°15.6 |
| Alioth | 166°11.6 | 55°48.8 |
| Spica | 158°21.0 | -11°18.0 |
| Alkaid | 152°50.8 | 49°10.7 |
| Hadar | 148°34.1 | -60°29.9 |
| Menkent | 147°56.2 | -36°30.0 |
| Arcturus | 145°46.8 | 19°02.5 |
| Rigel Kent. | 139°38.5 | -60°56.5 |
| Kochab | 137°19.0 | 74°02.5 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.7 | 26°37.3 |
| Antares | 112°14.5 | -26°29.4 |
| Atria | 107°07.8 | -69°04.2 |
| Sabik | 102°01.6 | -15°45.5 |
| Shaula | 96°09.0 | -37°07.3 |
| Rasalhague | 95°57.6 | 12°32.2 |
| Eltanin | 90°41.8 | 51°28.7 |
| Kaus Aust. | 83°31.3 | -34°22.3 |
| Vega | 80°32.7 | 38°48.1 |
| Nunki | 75°46.7 | -26°15.8 |
| Altair | 61°59.2 | 8°56.1 |
| Peacock | 53°04.6 | -56°38.9 |
| Deneb | 49°25.5 | 45°22.2 |
| Enif | 33°38.1 | 9°59.6 |
| Al Na'ir | 27°32.1 | -46°50.0 |
| Fomalhaut | 15°13.8 | -29°29.1 |
| Scheat | 13°44.6 | 28°13.4 |
| Markab | 13°29.2 | 15°20.7 |
| Mar 14 Sat | SHA | Mer.pass |
| Venus | 350°57.2 | 13:10 |
| Mars | 19°00.2 | 11:17 |
| Jupiter | 253°34.1 | 19:36 |
| Saturn | 356°07.4 | 12:47 |
| Mar 15 Sun | SHA | Mer.pass |
| Venus | 349°49.4 | 13:11 |
| Mars | 18°15.9 | 11:16 |
| Jupiter | 253°33.4 | 19:32 |
| Saturn | 356°00.6 | 12:44 |
| Mar 16 Mon | SHA | Mer.pass |
| Venus | 348°41.4 | 13:11 |
| Mars | 17°31.7 | 11:15 |
| Jupiter | 253°32.4 | 19:28 |
| Saturn | 355°53.8 | 12:40 |
| Horizontal parallax | | |
| Venus: | | 0.1 |
| Mars: | | 0.1 |

| h | Sun | | | Moon | | | |
|------------|----------|----------|-------------|------------|-------|----------|-------------|
| Sat | GHA | Dec | | GHA | ν | Dec | HP |
| 0 | 177°40.6 | S02°36.9 | | 237°01.4 | 10.3' | S25°24.7 | -7.1' 55.2' |
| 1 | 192°40.8 | 35.9 | | 251°30.8 | 10.4' | 25°17.6 | -7.2' 55.2' |
| 2 | 207°41.0 | 35.0 | | 266°00.1 | 10.4' | 25°10.4 | -7.3' 55.2' |
| 3 | 222°41.1 | · · 34.0 | | 280°29.5 | 10.4' | 25°03.1 | -7.5' 55.2' |
| 4 | 237°41.3 | 33.0 | | 294°59.0 | 10.5' | 24°55.7 | -7.6' 55.3' |
| 5 | 252°41.5 | 32.0 | | 309°28.5 | 10.5' | 24°48.1 | -7.7' 55.3' |
| 6 | 267°41.7 | S02°31.0 | | 323°58.0 | 10.5' | S24°40.4 | -7.8' 55.3' |
| 7 | 282°41.8 | 30.0 | | 338°27.5 | 10.6' | 24°32.5 | -8.0' 55.3' |
| 8 | 297°42.0 | 29.0 | | 352°57.1 | 10.6' | 24°24.6 | -8.1' 55.4' |
| 9 | 312°42.2 | · · 28.1 | | 7°26.7 | 10.7' | 24°16.5 | -8.2' 55.4' |
| 10 | 327°42.4 | 27.1 | | 21°56.4 | 10.7' | 24°08.3 | -8.3' 55.4' |
| 11 | 342°42.5 | 26.1 | | 36°26.1 | 10.7' | 23°59.9 | -8.5' 55.4' |
| 12 | 357°42.7 | S02°25.1 | | 50°55.8 | 10.8' | S23°51.5 | -8.6' 55.5' |
| 13 | 12°42.9 | 24.1 | | 65°25.6 | 10.8' | 23°42.9 | -8.7' 55.5' |
| 14 | 27°43.0 | 23.1 | | 79°55.4 | 10.9' | 23°34.2 | -8.8' 55.5' |
| 15 | 42°43.2 | · · 22.1 | | 94°25.3 | 10.9' | 23°25.3 | -9.0' 55.5' |
| 16 | 57°43.4 | 21.1 | | 108°55.2 | 10.9' | 23°16.4 | -9.1' 55.6' |
| 17 | 72°43.6 | 20.2 | | 123°25.1 | 11.0' | 23°07.3 | -9.2' 55.6' |
| 18 | 87°43.7 | S02°19.2 | | 137°55.1 | 11.0' | S22°58.1 | -9.3' 55.6' |
| 19 | 102°43.9 | 18.2 | | 152°25.1 | 11.1' | 22°48.8 | -9.4' 55.6' |
| 20 | 117°44.1 | 17.2 | | 166°55.1 | 11.1' | 22°39.4 | -9.6' 55.7' |
| 21 | 132°44.3 | · · 16.2 | | 181°25.2 | 11.1' | 22°29.8 | -9.7' 55.7' |
| 22 | 147°44.4 | 15.2 | | 195°55.4 | 11.2' | 22°20.1 | -9.8' 55.7' |
| 23 | 162°44.6 | 14.2 | | 210°25.5 | 11.2' | 22°10.4 | -9.9' 55.8' |
| SD = 16.1' | | | $d = -1.0'$ | SD = 15.0' | | | |

| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|----------|-------------|------------|----------|--------|-------|
| 0 | 177°44.8 | S02°13.2 | 224°55.7 | 11.3' | S22°00.5 | -10.0' | 55.8' |
| 1 | 192°45.0 | 12.3 | 239°26.0 | 11.3' | 21°50.4 | -10.1' | 55.8' |
| 2 | 207°45.1 | 11.3 | 253°56.3 | 11.3' | 21°40.3 | -10.3' | 55.8' |
| 3 | 222°45.3 | · · 10.3 | 268°26.6 | 11.4' | 21°30.0 | -10.4' | 55.9' |
| 4 | 237°45.5 | 09.3 | 282°57.0 | 11.4' | 21°19.7 | -10.5' | 55.9' |
| 5 | 252°45.6 | 08.3 | 297°27.4 | 11.5' | 21°09.2 | -10.6' | 55.9' |
| 6 | 267°45.8 | S02°07.3 | 311°57.9 | 11.5' | S20°58.6 | -10.7' | 56.0' |
| 7 | 282°46.0 | 06.3 | 326°28.4 | 11.5' | 20°47.9 | -10.8' | 56.0' |
| 8 | 297°46.2 | 05.3 | 340°58.9 | 11.6' | 20°37.1 | -10.9' | 56.0' |
| 9 | 312°46.3 | · · 04.4 | 355°29.5 | 11.6' | 20°26.2 | -11.0' | 56.0' |
| 10 | 327°46.5 | 03.4 | 10°00.1 | 11.7' | 20°15.2 | -11.1' | 56.1' |
| 11 | 342°46.7 | 02.4 | 24°30.7 | 11.7' | 20°04.0 | -11.2' | 56.1' |
| 12 | 357°46.9 | S02°01.4 | 39°01.4 | 11.7' | S19°52.8 | -11.4' | 56.1' |
| 13 | 12°47.0 | 02°00.4 | 53°32.2 | 11.8' | 19°41.4 | -11.5' | 56.2' |
| 14 | 27°47.2 | 01°59.4 | 68°02.9 | 11.8' | 19°30.0 | -11.6' | 56.2' |
| 15 | 42°47.4 | · · 58.4 | 82°33.7 | 11.8' | 19°18.4 | -11.7' | 56.2' |
| 16 | 57°47.6 | 57.4 | 97°04.6 | 11.9' | 19°06.7 | -11.8' | 56.3' |
| 17 | 72°47.7 | 56.4 | 111°35.5 | 11.9' | 18°55.0 | -11.9' | 56.3' |
| 18 | 87°47.9 | S01°55.5 | 126°06.4 | 12.0' | S18°43.1 | -12.0' | 56.3' |
| 19 | 102°48.1 | 54.5 | 140°37.4 | 12.0' | 18°31.1 | -12.1' | 56.3' |
| 20 | 117°48.3 | 53.5 | 155°08.4 | 12.0' | 18°19.0 | -12.2' | 56.4' |
| 21 | 132°48.5 | · · 52.5 | 169°39.4 | 12.1' | 18°06.9 | -12.3' | 56.4' |
| 22 | 147°48.6 | 51.5 | 184°10.5 | 12.1' | 17°54.6 | -12.4' | 56.4' |
| 23 | 162°48.8 | 50.5 | 198°41.6 | 12.1' | 17°42.2 | -12.5' | 56.5' |
| SD = 16.1' | | | $d = -1.0'$ | SD = 15.2' | | | |

| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|----------|-------------|------------|----------|--------|-------|
| 0 | 177°49.0 | S01°49.5 | 213°12.7 | 12.2' | S17°29.7 | -12.6' | 56.5' |
| 1 | 192°49.2 | 48.5 | 227°43.9 | 12.2' | 17°17.2 | -12.7' | 56.5' |
| 2 | 207°49.3 | 47.6 | 242°15.1 | 12.2' | 17°04.5 | -12.8' | 56.6' |
| 3 | 222°49.5 | · · 46.6 | 256°46.3 | 12.3' | 16°51.8 | -12.8' | 56.6' |
| 4 | 237°49.7 | 45.6 | 271°17.6 | 12.3' | 16°38.9 | -12.9' | 56.6' |
| 5 | 252°49.9 | 44.6 | 285°48.9 | 12.3' | 16°26.0 | -13.0' | 56.7' |
| 6 | 267°50.0 | S01°43.6 | 300°20.3 | 12.4' | S16°12.9 | -13.1' | 56.7' |
| 7 | 282°50.2 | 42.6 | 314°51.7 | 12.4' | 15°59.8 | -13.2' | 56.7' |
| 8 | 297°50.4 | 41.6 | 329°23.1 | 12.4' | 15°46.6 | -13.3' | 56.7' |
| 9 | 312°50.6 | · · 40.6 | 343°54.5 | 12.5' | 15°33.3 | -13.4' | 56.8' |
| 10 | 327°50.7 | 39.6 | 358°26.0 | 12.5' | 15°19.9 | -13.5' | 56.8' |
| 11 | 342°50.9 | 38.7 | 12°57.5 | 12.5' | 15°06.4 | -13.6' | 56.8' |
| 12 | 357°51.1 | S01°37.7 | 27°29.0 | 12.6' | S14°52.9 | -13.6' | 56.9' |
| 13 | 12°51.3 | 36.7 | 42°00.6 | 12.6' | 14°39.2 | -13.7' | 56.9' |
| 14 | 27°51.5 | 35.7 | 56°32.2 | 12.6' | 14°25.5 | -13.8' | 56.9' |
| 15 | 42°51.6 | · · 34.7 | 71°03.8 | 12.6' | 14°11.7 | -13.9' | 57.0' |
| 16 | 57°51.8 | 33.7 | 85°35.4 | 12.7' | 13°57.8 | -14.0' | 57.0' |
| 17 | 72°52.0 | 32.7 | 100°07.1 | 12.7' | 13°43.8 | -14.1' | 57.0' |
| 18 | 87°52.2 | S01°31.7 | 114°38.8 | 12.7' | S13°29.7 | -14.1' | 57.1' |
| 19 | 102°52.3 | 30.7 | 129°10.5 | 12.7' | 13°15.6 | -14.2' | 57.1' |
| 20 | 117°52.5 | 29.8 | 143°42.2 | 12.8' | 13°01.4 | -14.3' | 57.1' |
| 21 | 132°52.7 | · · 28.8 | 158°14.0 | 12.8' | 12°47.1 | -14.4' | 57.2' |
| 22 | 147°52.9 | 27.8 | 172°45.8 | 12.8' | 12°32.7 | -14.4' | 57.2' |
| 23 | 162°53.1 | 26.8 | 187°17.6 | 12.8' | 12°18.3 | -14.5' | 57.2' |
| SD = 16.1' | | | $d = -1.0'$ | SD = 15.4' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 03:54 | 05:17 | 06:24 | 17:56 | 19:03 | 20:28 |
| N 70° | 04:08 | 05:22 | 06:22 | 17:57 | 18:58 | 20:13 |
| 68° | 04:19 | 05:26 | 06:21 | 17:59 | 18:54 | 20:02 |
| 66° | 04:28 | 05:29 | 06:20 | 18:00 | 18:51 | 19:52 |
| 64° | 04:35 | 05:32 | 06:19 | 18:01 | 18:48 | 19:45 |
| 62° | 04:41 | 05:34 | 06:18 | 18:01 | 18:46 | 19:38 |
| 60° | 04:47 | 05:36 | 06:17 | 18:02 | 18:44 | 19:33 |
| N 58° | 04:51 | 05:37 | 06:16 | 18:03 | 18:42 | 19:28 |
| 56° | 04:55 | 05:39 | 06:16 | 18:03 | 18:40 | 19:24 |
| 54° | 04:59 | 05:40 | 06:15 | 18:04 | 18:39 | 19:21 |
| 52° | 05:02 | 05:41 | 06:14 | 18:04 | 18:38 | 19:17 |
| 50° | 05:04 | 05:42 | 06:14 | 18:05 | 18:37 | 19:15 |
| 45° | 05:09 | 05:44 | 06:13 | 18:06 | 18:35 | 19:09 |
| N 40° | 05:13 | 05:45 | 06:12 | 18:07 | 18:34 | 19:05 |
| 35° | 05:16 | 05:46 | 06:11 | 18:07 | 18:33 | 19:02 |
| 30° | 05:18 | 05:46 | 06:10 | 18:08 | 18:32 | 19:00 |
| 20° | 05:21 | 05:47 | 06:08 | 18:10 | 18:32 | 18:57 |
| N 10° | 05:22 | 05:46 | 06:07 | 18:11 | 18:32 | 18:56 |
| 0° | 05:21 | 05:45 | 06:06 | 18:12 | 18:33 | 18:57 |
| S 10° | 05:19 | 05:43 | 06:04 | 18:14 | 18:35 | 18:59 |
| 20° | 05:15 | 05:40 | 06:02 | 18:15 | 18:37 | 19:03 |
| 30° | 05:08 | 05:36 | 06:00 | 18:17 | 18:41 | 19:09 |
| 35° | 05:04 | 05:34 | 05:59 | 18:18 | 18:44 | 19:13 |
| 40° | 04:58 | 05:30 | 05:57 | 18:20 | 18:47 | 19:18 |
| 45° | 04:52 | 05:26 | 05:56 | 18:21 | 18:51 | 19:25 |
| S 50° | 04:43 | 05:21 | 05:54 | 18:23 | 18:55 | 19:34 |
| 52° | 04:38 | 05:19 | 05:53 | 18:24 | 18:58 | 19:38 |
| 54° | 04:33 | 05:16 | 05:52 | 18:25 | 19:01 | 19:43 |
| 56° | 04:28 | 05:13 | 05:50 | 18:26 | 19:03 | 19:48 |
| 58° | 04:21 | 05:09 | 05:49 | 18:27 | 19:07 | 19:55 |
| S 60° | 04:14 | 05:05 | 05:48 | 18:29 | 19:11 | 20:02 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | ■ | ■ | 08:07 | ■ | ■ | 12:32 |
| N 70° | ■ | ■ | 07:30 | ■ | ■ | 13:07 |
| 68° | ■ | 07:54 | 07:03 | ■ | 11:00 | 13:32 |
| 66° | ■ | 07:10 | 06:43 | ■ | 11:43 | 13:50 |
| 64° | 07:07 | 06:41 | 06:26 | 10:03 | 12:12 | 14:06 |
| 62° | 06:25 | 06:18 | 06:12 | 10:44 | 12:33 | 14:18 |
| 60° | 05:56 | 06:00 | 06:01 | 11:12 | 12:51 | 14:29 |
| N 58° | 05:34 | 05:45 | 05:51 | 11:33 | 13:05 | 14:38 |
| 56° | 05:16 | 05:31 | 05:42 | 11:51 | 13:18 | 14:46 |
| 54° | 05:01 | 05:20 | 05:34 | 12:06 | 13:28 | 14:53 |
| 52° | 04:48 | 05:10 | 05:27 | 12:18 | 13:38 | 14:59 |
| 50° | 04:36 | 05:01 | 05:20 | 12:30 | 13:46 | 15:05 |
| 45° | 04:12 | 04:42 | 05:06 | 12:53 | 14:04 | 15:17 |
| N 40° | 03:52 | 04:26 | 04:55 | 13:12 | 14:19 | 15:27 |
| 35° | 03:36 | 04:13 | 04:45 | 13:27 | 14:31 | 15:36 |
| 30° | 03:22 | 04:01 | 04:36 | 13:41 | 14:42 | 15:43 |
| 20° | 02:58 | 03:41 | 04:21 | 14:03 | 15:00 | 15:56 |
| N 10° | 02:37 | 03:23 | 04:08 | 14:23 | 15:16 | 16:07 |
| 0° | 02:17 | 03:07 | 03:55 | 14:41 | 15:30 | 16:18 |
| S 10° | 01:57 | 02:50 | 03:43 | 14:59 | 15:45 | 16:28 |
| 20° | 01:36 | 02:33 | 03:29 | 15:19 | 16:00 | 16:39 |
| 30° | 01:12 | 02:12 | 03:14 | 15:41 | 16:18 | 16:51 |
| 35° | 00:57 | 02:00 | 03:05 | 15:54 | 16:28 | 16:58 |
| 40° | 00:40 | 01:46 | 02:54 | 16:08 | 16:39 | 17:06 |
| 45° | 00:20 | 01:30 | 02:42 | 16:26 | 16:53 | 17:16 |
| S 50° | · · · | 01:09 | 02:27 | 16:48 | 17:09 | 17:27 |
| 52° | · · · | 01:00 | 02:20 | 16:58 | 17:17 | 17:32 |
| 54° | · · · | 00:49 | 02:13 | 17:09 | 17:26 | 17:37 |
| 56° | · · · | 00:36 | 02:04 | 17:23 | 17:35 | 17:44 |
| 58° | · · · | 00:22 | 01:54 | 17:38 | 17:46 | 17:51 |
| S 60° | · · · | 00:04 | 01:42 | 17:56 | 17:58 | 17:59 |

| Day | Sun | | | Moon | | |
|-----|---|----------------------------------|-----------------------|-----------------------------|----------------|------------------------|
| | Eqn.of Time 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 25-27 26-11% |
| 14 | 09:17 | 09:09 | 12:09 | 08:29 | 20:54 | |
| 15 | 09:01 | 08:53 | 12:09 | 09:19 | 21:43 | |
| 16 | 08:44 | 08:36 | 12:09 | 10:06 | 22:30 | |

March 17, 18, 19 UT (Tue., Wed., Thu.)

| h | Aries | | | Venus | | Mars | | Jupiter | | Saturn | |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------|-----|
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 174°35.2 | 162°08.6 | N04°15.9 | 191°22.8 | S08°18.7 | 68°06.5 | N22°56.2 | 170°22.1 | S00°29.2 | | |
| 1 | 189°37.6 | 177°08.2 | 17.2 | 206°23.4 | 17.9 | 83°08.9 | 56.2 | 185°24.3 | 29.1 | | |
| 2 | 204°40.1 | 192°07.9 | 18.4 | 221°24.0 | 17.1 | 98°11.3 | 56.2 | 200°26.5 | 29.0 | | |
| 3 | 219°42.6 | 207°07.5 | •• 19.7 | 236°24.7 | •• 16.4 | 113°13.7 | •• 56.2 | 215°28.6 | •• 28.9 | | |
| 4 | 234°45.0 | 222°07.1 | 21.0 | 251°25.3 | 15.6 | 128°16.1 | 56.2 | 230°30.8 | 28.7 | | |
| 5 | 249°47.5 | 237°06.8 | 22.3 | 266°25.9 | 14.9 | 143°18.5 | 56.2 | 245°33.0 | 28.6 | | |
| 6 | 264°50.0 | 252°06.4 | N04°23.5 | 281°26.6 | S08°14.1 | 158°20.9 | N22°56.1 | 260°35.2 | S00°28.5 | | |
| 7 | 279°52.4 | 267°06.0 | 24.8 | 296°27.2 | 13.4 | 173°23.4 | 56.1 | 275°37.3 | 28.4 | | |
| 8 | 294°54.9 | 282°05.6 | 26.1 | 311°27.8 | 12.6 | 188°25.8 | 56.1 | 290°39.5 | 28.2 | | |
| 9 | 309°57.3 | 297°05.3 | •• 27.4 | 326°28.4 | •• 11.9 | 203°28.2 | •• 56.1 | 305°41.7 | •• 28.1 | | |
| 10 | 324°59.8 | 312°04.9 | 28.6 | 341°29.1 | 11.1 | 218°30.6 | 56.1 | 320°43.9 | 28.0 | | |
| 11 | 340°02.3 | 327°04.5 | 29.9 | 356°29.7 | 10.4 | 233°33.0 | 56.1 | 335°46.1 | 27.9 | | |
| 12 | 355°04.7 | 342°04.2 | N04°31.2 | 11°30.3 | S08°09.6 | 248°35.4 | N22°56.1 | 350°48.2 | S00°27.7 | | |
| 13 | 10°07.2 | 357°03.8 | 32.5 | 26°31.0 | 08.9 | 263°37.8 | 56.1 | 5°50.4 | 27.6 | | |
| 14 | 25°09.7 | 12°03.4 | 33.7 | 41°31.6 | 08.1 | 278°40.2 | 56.1 | 20°52.6 | 27.5 | | |
| 15 | 40°12.1 | 27°03.0 | •• 35.0 | 56°32.2 | •• 07.3 | 293°42.6 | •• 56.1 | 35°54.8 | •• 27.4 | | |
| 16 | 55°14.6 | 42°02.7 | 36.3 | 71°32.9 | 06.6 | 308°45.0 | 56.1 | 50°57.0 | 27.3 | | |
| 17 | 70°17.1 | 57°02.3 | 37.5 | 86°33.5 | 05.8 | 323°47.4 | 56.1 | 65°59.1 | 27.1 | | |
| 18 | 85°19.5 | 72°01.9 | N04°38.8 | 101°34.1 | S08°05.1 | 338°49.8 | N22°56.1 | 81°01.3 | S00°27.0 | | |
| 19 | 100°22.0 | 87°01.6 | 40.1 | 116°34.7 | 04.3 | 353°52.3 | 56.1 | 96°03.5 | 26.9 | | |
| 20 | 115°24.4 | 102°01.2 | 41.4 | 131°35.4 | 03.6 | 8°54.7 | 56.1 | 111°05.7 | 26.8 | | |
| 21 | 130°26.9 | 117°00.8 | •• 42.6 | 146°36.0 | •• 02.8 | 23°57.1 | •• 56.1 | 126°07.9 | •• 26.6 | | |
| 22 | 145°29.4 | 132°00.4 | 43.9 | 161°36.6 | 02.1 | 38°59.5 | 56.1 | 141°10.0 | 26.5 | | |
| 23 | 160°31.8 | 147°00.1 | 45.2 | 176°37.3 | 01.3 | 54°01.9 | 56.1 | 156°12.2 | 26.4 | | |
| Mer.pass. 12:20 ν -0.4' d1.3' m-3.92 ν 0.6' d-0.8' m1.16 ν 2.4' d-0.0' m-2.32 ν 2.2' d-0.1' m0.94 | | | | | | | | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 175°34.3 | 161°59.7 | N04°46.4 | 191°37.9 | S08°00.5 | 69°04.3 | N22°56.1 | 171°14.4 | S00°26.3 | | |
| 1 | 190°36.8 | 176°59.3 | 47.7 | 206°38.5 | 07°59.8 | 84°06.7 | 56.1 | 186°16.6 | 26.1 | | |
| 2 | 205°39.2 | 191°59.0 | 49.0 | 221°39.2 | 59.0 | 99°09.1 | 56.1 | 201°18.8 | 26.0 | | |
| 3 | 220°41.7 | 206°58.6 | •• 50.3 | 236°39.8 | •• 58.3 | 114°11.5 | •• 56.1 | 216°20.9 | •• 25.9 | | |
| 4 | 235°44.2 | 221°58.2 | 51.5 | 251°40.4 | 57.5 | 129°13.9 | 56.1 | 231°23.1 | 25.8 | | |
| 5 | 250°46.6 | 236°57.8 | 52.8 | 266°41.1 | 56.8 | 144°16.3 | 56.1 | 246°25.3 | 25.7 | | |
| 6 | 265°49.1 | 251°57.5 | N04°54.1 | 281°41.7 | S07°56.0 | 159°18.7 | N22°56.1 | 261°27.5 | S00°25.5 | | |
| 7 | 280°51.6 | 266°57.1 | 55.3 | 296°42.3 | 55.2 | 174°21.1 | 56.1 | 276°29.6 | 25.4 | | |
| 8 | 295°54.0 | 281°56.7 | 56.6 | 311°42.9 | 54.5 | 189°23.5 | 56.0 | 291°31.8 | 25.3 | | |
| 9 | 310°56.5 | 296°56.4 | •• 57.9 | 326°43.6 | •• 53.7 | 204°25.9 | •• 56.0 | 306°34.0 | •• 25.2 | | |
| 10 | 325°58.9 | 311°56.0 | 04°59.1 | 341°44.2 | 53.0 | 219°28.3 | 56.0 | 321°36.2 | 25.0 | | |
| 11 | 341°01.4 | 326°55.6 | 05°00.4 | 356°44.8 | 52.2 | 234°30.7 | 56.0 | 336°38.4 | 24.9 | | |
| 12 | 356°03.9 | 341°55.2 | N05°01.7 | 11°45.5 | S07°51.5 | 249°33.1 | N22°56.0 | 351°40.5 | S00°24.8 | | |
| 13 | 11°06.3 | 356°54.9 | 02.9 | 26°46.1 | 50.7 | 264°35.5 | 56.0 | 6°42.7 | 24.7 | | |
| 14 | 26°08.8 | 11°54.5 | 04.2 | 41°46.7 | 49.9 | 279°37.9 | 56.0 | 21°44.9 | 24.5 | | |
| 15 | 41°11.3 | 26°54.1 | •• 05.5 | 56°47.4 | •• 49.2 | 294°40.3 | •• 56.0 | 36°47.1 | •• 24.4 | | |
| 16 | 56°13.7 | 41°53.7 | 06.7 | 71°48.0 | 48.4 | 309°42.7 | 56.0 | 51°49.3 | 24.3 | | |
| 17 | 71°16.2 | 56°53.4 | 08.0 | 86°48.6 | 47.7 | 324°45.1 | 56.0 | 66°51.4 | 24.2 | | |
| 18 | 86°18.7 | 71°53.0 | N05°09.3 | 101°49.3 | S07°46.9 | 339°47.5 | N22°56.0 | 81°53.6 | S00°24.1 | | |
| 19 | 101°21.1 | 86°52.6 | 10.5 | 116°49.9 | 46.2 | 354°49.9 | 56.0 | 96°55.8 | 23.9 | | |
| 20 | 116°23.6 | 101°52.2 | 11.8 | 131°50.5 | 45.4 | 9°52.3 | 56.0 | 111°58.0 | 23.8 | | |
| 21 | 131°26.0 | 116°51.9 | •• 13.1 | 146°51.2 | •• 44.6 | 24°54.7 | •• 56.0 | 127°00.1 | •• 23.7 | | |
| 22 | 146°28.5 | 131°51.5 | 14.3 | 161°51.8 | 43.9 | 39°57.1 | 56.0 | 142°02.3 | 23.6 | | |
| 23 | 161°31.0 | 146°51.1 | 15.6 | 176°52.4 | 43.1 | 54°59.5 | 56.0 | 157°04.5 | 23.4 | | |
| Mer.pass. 12:16 ν -0.4' d1.3' m-3.92 ν 0.6' d-0.8' m1.16 ν 2.4' d-0.0' m-2.31 ν 2.2' d-0.1' m0.94 | | | | | | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 176°33.4 | 161°50.7 | N05°16.9 | 191°53.1 | S07°42.4 | 70°01.9 | N22°56.0 | 172°06.7 | S00°23.3 | | |
| 1 | 191°35.9 | 176°50.4 | 18.1 | 206°53.7 | 41.6 | 85°04.3 | 56.0 | 187°08.9 | 23.2 | | |
| 2 | 206°38.4 | 191°50.0 | 19.4 | 221°54.3 | 40.8 | 100°06.7 | 56.0 | 202°11.0 | 23.1 | | |
| 3 | 221°40.8 | 206°49.6 | •• 20.7 | 236°55.0 | •• 40.1 | 115°09.1 | •• 56.0 | 217°13.2 | •• 22.9 | | |
| 4 | 236°43.3 | 221°49.2 | 21.9 | 251°55.6 | 39.3 | 130°11.4 | 55.9 | 232°15.4 | 22.8 | | |
| 5 | 251°45.8 | 236°48.9 | 23.2 | 266°56.2 | 38.6 | 145°13.8 | 55.9 | 247°17.6 | 22.7 | | |
| 6 | 266°48.2 | 251°48.5 | N05°24.5 | 281°56.9 | S07°37.8 | 160°16.2 | N22°55.9 | 262°19.8 | S00°22.6 | | |
| 7 | 281°50.7 | 266°48.1 | 25.7 | 296°57.5 | 37.1 | 175°18.6 | 55.9 | 277°21.9 | 22.4 | | |
| 8 | 296°53.2 | 281°47.7 | 27.0 | 311°58.2 | 36.3 | 190°21.0 | 55.9 | 292°24.1 | 22.3 | | |
| 9 | 311°55.6 | 296°47.4 | •• 28.3 | 326°58.8 | •• 35.5 | 205°23.4 | •• 55.9 | 307°26.3 | •• 22.2 | | |
| 10 | 326°58.1 | 311°47.0 | 29.5 | 341°59.4 | 34.8 | 220°25.8 | 55.9 | 322°28.5 | 22.1 | | |
| 11 | 342°00.5 | 326°46.6 | 30.8 | 357°00.1 | 34.0 | 235°28.2 | 55.9 | 337°30.6 | 22.0 | | |
| 12 | 357°03.0 | 341°46.2 | N05°32.1 | 12°00.7 | S07°33.3 | 250°30.6 | N22°55.9 | 352°32.8 | S00°21.8 | | |
| 13 | 12°05.5 | 356°45.9 | 33.3 | 27°01.3 | 32.5 | 265°33.0 | 55.9 | 7°35.0 | 21.7 | | |
| 14 | 27°07.9 | 11°45.5 | 34.6 | 42°02.0 | 31.7 | 280°35.4 | 55.9 | 22°37.2 | 21.6 | | |
| 15 | 42°10.4 | 26°45.1 | •• 35.9 | 57°02.6 | •• 31.0 | 295°37.8 | •• 55.9 | 37°39.4 | •• 21.5 | | |
| 16 | 57°12.9 | 41°44.7 | 37.1 | 72°03.2 | 30.2 | 310°40.1 | 55.9 | 52°41.5 | 21.3 | | |
| 17 | 72°15.3 | 56°44.3 | 38.4 | 87°03.9 | 29.5 | 325°42.5 | 55.9 | 67°43.7 | 21.2 | | |
| 18 | 87°17.8 | 71°44.0 | N05°39.6 | 102°04.5 | S07°28.7 | 340°44.9 | N22°55.9 | 82°45.9 | S00°21.1 | | |
| 19 | 102°20.3 | 86°43.6 | 40.9 | 117°05.1 | 27.9 | 355°47.3 | 55.9 | 97°48.1 | 21.0 | | |
| 20 | 117°22.7 | 101°43.2 | 42.2 | 132°05.8 | 27.2 | 10°49.7 | 55.9 | 112°50.2 | 20.8 | | |
| 21 | 132°25.2 | 116°42.8 | •• 43.4 | 147°06.4 | •• 26.4 | 25°52.1 | •• 55.9 | 127°52.4 | •• 20.7 | | |
| 22 | 147°27.6 | 131°42.5 | 44.7 | 162°07.1 | 25.6 | 40°54.5 | 55.8 | 142°54.6 | 20.6 | | |
| 23 | 162°30.1 | 146°42.1 | 45.9 | 177°07.7 | 24.9 | 55°56.9 | 55.8 | 157°56.8 | 20.5 | | |
| Mer.pass. 12:12 ν -0.4' d1.3' m-3.92 ν 0.6' d-0.8' m1.17 ν 2.4' d-0.0' m-2.30 ν 2.2' d-0.1' m0.93 | | | | | | | | | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°34.1 | 29°14.0 |
| Ankaa | 353°06.6 | -42°09.9 |
| Schedar | 349°30.5 | 56°40.9 |
| Diphda | 348°46.6 | -17°50.7 |
| Achernar | 335°19.9 | -57°06.4 |
| Hamal | 327°50.4 | 23°35.2 |
| Polaris | 313°51.1 | 89°22.7 |
| Acamar | 315°11.3 | -40°12.2 |
| Menkar | 314°05.3 | 4°11.5 |
| Mirfak | 308°27.1 | 49°57.4 |
| Aldebaran | 290°38.6 | 16°33.7 |
| Rigel | 281°03.0 | -8°10.4 |
| Capella | 280°20.5 | 46°01.6 |
| Bellatrix | 278°21.8 | 6°22.3 |
| Elnath | 278°00.6 | 28°37.8 |
| Alnilam | 275°36.7 | -1°11.2 |
| Betelgeuse | 270°51.0 | 7°24.6 |
| Canopus | 263°51.9 | -52°42.8 |
| Sirius | 258°25.3 | -16°45.3 |
| Adhara | 255°05.0 | -29°00.7 |
| Procyon | 244°49.7 | 5°09.4 |
| Pollux | 243°15.9 | 27°57.8 |
| Avior | 234°14.0 | -59°35.8 |
| Suhail | 222°45.3 | -43°32.5 |
| Miaplacidus | 221°37.4 | -69°49.7 |
| Alphard | 217°46.5 | -8°46.5 |
| Regulus | 207°33.1 | 11°50.2 |
| Dubhe | 193°39.1 | 61°36.5 |
| Denebola | 182°23.6 | 14°25.4 |
| Gienah | 175°42.3 | -17°41.4 |
| Acrux | 172°58.4 | -63°14.7 |
| Gacrux | 171°50.0 | -57°15.7 |
| Alioth | 166°11.5 | 55°48.8 |
| Spica | 158°21.0 | -11°18.0 |
| Alkaid | 152°50.8 | 49°10.7 |
| Hadar | 148°34.1 | -60°29.9 |
| Menkent | 147°56.1 | -36°30.0 |
| Arcturus | 145°46.7 | 19°02.5 |
| Rigil Kent. | 139°38.5 | -60°56.5 |
| Kochab | 137°19.0 | 74°02.5 |
| Zuben'ubi | 136°54.7 | -16°09.2 |
| Alphecca | 126°02.7 | 26°37.3 |
| Antares | 112°14.5 | -26°29.4 |
| Atria | 107°07.8 | -69°04.2 |
| Sabik | 102°01.6 | -15°45.5 |
| Shaula | 96°09.0 | -37°07.3 |
| Rasalhague | 95°57.6 | 12°32.2 |
| Eltanin | 90°41.7 | 51°28.7 |
| Kaus Aust. | 83°31.3 | -34°22.3 |
| Vega | 80°32.6 | 38°48.1 |
| Nunki | 75°46.6 | -26°15.8 |
| Altair | 61°59.2 | 8°56.1 |
| Peacock | 53°04.5 | -56°38.9 |
| Deneb | 49°25.5 | 45°22.2 |
| Enif | 33°38.1 | 9°59.6 |
| Al Na'ir | 27°32.1 | -46°50.0 |
| Fomalhaut | 15°13.8 | -29°29.1 |
| Scheat | 13°44.6 | 28°13.4 |
| Markab | 13°29.2 | 15°20.7 |
| Mar 17 Tue | SHA | Mer.pass |
| Venus | 347°33.4 | 13:12 |
| Mars | 16°47.6 | 11:14 |
| Jupiter | 253°31.3 | 19:24 |
| Saturn | 355°46.9 | 1 |


| h | Sun | | | Moon | | | |
|------------|----------|----------|-------------|------------|-------|----------|--------|
| | GHA | Dec | | GHA | ν | Dec | d |
| Tue | | | | | | | HP |
| 0 | 177°53.2 | S01°25.8 | | 201°49.4 | 12.8' | S12°03.8 | -14.6' |
| 1 | 192°53.4 | 24.8 | | 216°21.3 | 12.9' | 11°49.2 | -14.7' |
| 2 | 207°53.6 | 23.8 | | 230°53.1 | 12.9' | 11°34.5 | -14.7' |
| 3 | 222°53.8 | · · 22.8 | | 245°25.0 | 12.9' | 11°19.8 | -14.8' |
| 4 | 237°53.9 | 21.8 | | 259°56.9 | 12.9' | 11°05.0 | -14.9' |
| 5 | 252°54.1 | 20.9 | | 274°28.8 | 12.9' | 10°50.1 | -14.9' |
| 6 | 267°54.3 | S01°19.9 | | 289°00.8 | 12.9' | S10°35.2 | -15.0' |
| 7 | 282°54.5 | 18.9 | | 303°32.7 | 13.0' | 10°20.2 | -15.1' |
| 8 | 297°54.7 | 17.9 | | 318°04.7 | 13.0' | 10°05.1 | -15.1' |
| 9 | 312°54.8 | · · 16.9 | | 332°36.6 | 13.0' | 09°50.0 | -15.2' |
| 10 | 327°55.0 | 15.9 | | 347°08.6 | 13.0' | 09°34.8 | -15.3' |
| 11 | 342°55.2 | 14.9 | | 1°40.6 | 13.0' | 09°19.6 | -15.3' |
| 12 | 357°55.4 | S01°13.9 | | 16°12.6 | 13.0' | S09°04.3 | -15.4' |
| 13 | 12°55.6 | 12.9 | | 30°44.7 | 13.0' | 08°48.9 | -15.4' |
| 14 | 27°55.7 | 12.0 | | 45°16.7 | 13.0' | 08°33.5 | -15.5' |
| 15 | 42°55.9 | · · 11.0 | | 59°48.7 | 13.0' | 08°18.0 | -15.5' |
| 16 | 57°56.1 | 10.0 | | 74°20.8 | 13.0' | 08°02.4 | -15.6' |
| 17 | 72°56.3 | 09.0 | | 88°52.8 | 13.1' | 07°46.8 | -15.6' |
| 18 | 87°56.4 | S01°08.0 | | 103°24.9 | 13.1' | S07°31.2 | -15.7' |
| 19 | 102°56.6 | 07.0 | | 117°56.9 | 13.1' | 07°15.5 | -15.7' |
| 20 | 117°56.8 | 06.0 | | 132°29.0 | 13.1' | 06°59.7 | -15.8' |
| 21 | 132°57.0 | · · 05.0 | | 147°01.0 | 13.1' | 06°43.9 | -15.8' |
| 22 | 147°57.2 | 04.0 | | 161°33.1 | 13.1' | 06°28.1 | -15.9' |
| 23 | 162°57.3 | 03.1 | | 176°05.2 | 13.1' | 06°12.2 | -15.9' |
| SD = 16.1' | | | $d = -1.0'$ | SD = 15.6' | | | |

| Wed | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------|----------|----------|-------------|------------|-------|----------|--------|-------|
| 0 | 177°57.5 | S01°02.1 | | 190°37.2 | 13.1' | S05°56.3 | -16.0' | 58.0' |
| 1 | 192°57.7 | 01.1 | | 205°09.3 | 13.1' | 05°40.3 | -16.0' | 58.0' |
| 2 | 207°57.9 | 01°00.1 | | 219°41.3 | 13.0' | 05°24.3 | -16.1' | 58.0' |
| 3 | 222°58.1 | 00°59.1 | | 234°13.4 | 13.0' | 05°08.2 | -16.1' | 58.1' |
| 4 | 237°58.2 | 58.1 | | 248°45.4 | 13.0' | 04°52.1 | -16.1' | 58.1' |
| 5 | 252°58.4 | 57.1 | | 263°17.5 | 13.0' | 04°35.9 | -16.2' | 58.1' |
| 6 | 267°58.6 | S00°56.1 | | 277°49.5 | 13.0' | S04°19.7 | -16.2' | 58.1' |
| 7 | 282°58.8 | 55.1 | | 292°21.5 | 13.0' | 04°03.5 | -16.3' | 58.2' |
| 8 | 297°59.0 | 54.2 | | 306°53.5 | 13.0' | 03°47.3 | -16.3' | 58.2' |
| 9 | 312°59.2 | · · 53.2 | | 321°25.5 | 13.0' | 03°31.0 | -16.3' | 58.2' |
| 10 | 327°59.3 | 52.2 | | 335°57.5 | 13.0' | 03°14.7 | -16.4' | 58.3' |
| 11 | 342°59.5 | 51.2 | | 350°29.5 | 13.0' | 02°58.3 | -16.4' | 58.3' |
| 12 | 357°59.7 | S00°50.2 | | 5°01.4 | 12.9' | S02°41.9 | -16.4' | 58.3' |
| 13 | 12°59.9 | 49.2 | | 19°33.4 | 12.9' | 02°25.5 | -16.4' | 58.3' |
| 14 | 28°00.1 | 48.2 | | 34°05.3 | 12.9' | 02°09.1 | -16.5' | 58.4' |
| 15 | 43°00.2 | · · 47.2 | | 48°37.2 | 12.9' | 01°52.6 | -16.5' | 58.4' |
| 16 | 58°00.4 | 46.2 | | 63°09.1 | 12.9' | 01°36.1 | -16.5' | 58.4' |
| 17 | 73°00.6 | 45.3 | | 77°41.0 | 12.8' | 01°19.6 | -16.5' | 58.4' |
| 18 | 88°00.8 | S00°44.3 | | 92°12.8 | 12.8' | S01°03.1 | -16.6' | 58.5' |
| 19 | 103°01.0 | 43.3 | | 106°44.7 | 12.8' | 00°46.5 | -16.6' | 58.5' |
| 20 | 118°01.1 | 42.3 | | 121°16.5 | 12.8' | 00°30.0 | -16.6' | 58.5' |
| 21 | 133°01.3 | · · 41.3 | | 135°48.2 | 12.8' | S00°13.4 | -16.6' | 58.6' |
| 22 | 148°01.5 | 40.3 | | 150°20.0 | 12.7' | N00°03.2 | 16.6' | 58.6' |
| 23 | 163°01.7 | 39.3 | | 164°51.7 | 12.7' | 00°19.9 | 16.6' | 58.6' |
| SD = 16.1' | | | $d = -1.0'$ | SD = 15.8' | | | | |

| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 178°01.9 | S00°38.3 | 179°23.4 | 12.7' | N00°36.5 | 16.6' | 58.6' |
| 1 | 193°02.1 | 37.3 | 193°55.1 | 12.6' | 00°53.1 | 16.6' | 58.7' |
| 2 | 208°02.2 | 36.4 | 208°26.7 | 12.6' | 01°09.8 | 16.7' | 58.7' |
| 3 | 223°02.4 | · · 35.4 | 222°58.3 | 12.6' | 01°26.4 | 16.7' | 58.7' |
| 4 | 238°02.6 | 34.4 | 237°29.9 | 12.5' | 01°43.1 | 16.7' | 58.7' |
| 5 | 253°02.8 | 33.4 | 252°01.4 | 12.5' | 01°59.8 | 16.7' | 58.7' |
| 6 | 268°03.0 | S00°32.4 | 266°32.9 | 12.5' | N02°16.4 | 16.7' | 58.8' |
| 7 | 283°03.1 | 31.4 | 281°04.4 | 12.4' | 02°33.1 | 16.7' | 58.8' |
| 8 | 298°03.3 | 30.4 | 295°35.8 | 12.4' | 02°49.8 | 16.7' | 58.8' |
| 9 | 313°03.5 | · · 29.4 | 310°07.2 | 12.4' | 03°06.5 | 16.7' | 58.8' |
| 10 | 328°03.7 | 28.4 | 324°38.6 | 12.3' | 03°23.1 | 16.7' | 58.9' |
| 11 | 343°03.9 | 27.4 | 339°09.9 | 12.3' | 03°39.8 | 16.7' | 58.9' |
| 12 | 358°04.1 | S00°26.5 | 353°41.2 | 12.2' | N03°56.4 | 16.7' | 58.9' |
| 13 | 13°04.2 | 25.5 | 8°12.4 | 12.2' | 04°13.1 | 16.6' | 58.9' |
| 14 | 28°04.4 | 24.5 | 22°43.6 | 12.1' | 04°29.7 | 16.6' | 58.9' |
| 15 | 43°04.6 | · · 23.5 | 37°14.7 | 12.1' | 04°46.4 | 16.6' | 59.0' |
| 16 | 58°04.8 | 22.5 | 51°45.8 | 12.0' | 05°03.0 | 16.6' | 59.0' |
| 17 | 73°05.0 | 21.5 | 66°16.8 | 12.0' | 05°19.6 | 16.6' | 59.0' |
| 18 | 88°05.2 | S00°20.5 | 80°47.8 | 11.9' | N05°36.2 | 16.6' | 59.0' |
| 19 | 103°05.3 | 19.5 | 95°18.7 | 11.9' | 05°52.8 | 16.6' | 59.1' |
| 20 | 118°05.5 | 18.5 | 109°49.6 | 11.8' | 06°09.3 | 16.5' | 59.1' |
| 21 | 133°05.7 | · · 17.6 | 124°20.5 | 11.8' | 06°25.9 | 16.5' | 59.1' |
| 22 | 148°05.9 | 16.6 | 138°51.2 | 11.7' | 06°42.4 | 16.5' | 59.1' |
| 23 | 163°06.1 | 15.6 | 153°22.0 | 11.7' | 06°58.9 | 16.5' | 59.1' |
| SD = 16.1' $d = -1.0'$ | | | SD = 16.0' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 03:35 | 05:01 | 06:09 | 18:10 | 19:18 | 20:46 |
| N 70° | 03:52 | 05:08 | 06:09 | 18:10 | 19:11 | 20:28 |
| 68° | 04:05 | 05:13 | 06:08 | 18:10 | 19:05 | 20:15 |
| 66° | 04:15 | 05:17 | 06:08 | 18:10 | 19:01 | 20:04 |
| 64° | 04:24 | 05:21 | 06:08 | 18:09 | 18:57 | 19:55 |
| 62° | 04:31 | 05:24 | 06:08 | 18:09 | 18:54 | 19:47 |
| 60° | 04:37 | 05:27 | 06:08 | 18:09 | 18:51 | 19:41 |
| N 58° | 04:42 | 05:29 | 06:08 | 18:10 | 18:49 | 19:35 |
| 56° | 04:47 | 05:31 | 06:08 | 18:10 | 18:47 | 19:31 |
| 54° | 04:51 | 05:32 | 06:08 | 18:10 | 18:45 | 19:27 |
| 52° | 04:54 | 05:34 | 06:07 | 18:10 | 18:43 | 19:23 |
| 50° | 04:57 | 05:35 | 06:07 | 18:10 | 18:42 | 19:20 |
| 45° | 05:04 | 05:38 | 06:07 | 18:10 | 18:39 | 19:13 |
| N 40° | 05:08 | 05:40 | 06:07 | 18:10 | 18:37 | 19:08 |
| 35° | 05:12 | 05:41 | 06:07 | 18:10 | 18:35 | 19:05 |
| 30° | 05:15 | 05:43 | 06:06 | 18:10 | 18:34 | 19:02 |
| 20° | 05:18 | 05:44 | 06:06 | 18:10 | 18:32 | 18:58 |
| N 10° | 05:20 | 05:44 | 06:05 | 18:11 | 18:32 | 18:56 |
| 0° | 05:20 | 05:44 | 06:05 | 18:11 | 18:32 | 18:56 |
| S 10° | 05:19 | 05:43 | 06:04 | 18:12 | 18:33 | 18:57 |
| 20° | 05:16 | 05:41 | 06:03 | 18:13 | 18:35 | 19:00 |
| 30° | 05:10 | 05:38 | 06:02 | 18:13 | 18:37 | 19:05 |
| 35° | 05:07 | 05:36 | 06:01 | 18:14 | 18:39 | 19:09 |
| 40° | 05:02 | 05:34 | 06:01 | 18:15 | 18:42 | 19:13 |
| 45° | 04:56 | 05:30 | 06:00 | 18:16 | 18:45 | 19:19 |
| S 50° | 04:48 | 05:26 | 05:58 | 18:17 | 18:49 | 19:27 |
| 52° | 04:44 | 05:24 | 05:58 | 18:17 | 18:51 | 19:31 |
| 54° | 04:40 | 05:22 | 05:57 | 18:18 | 18:53 | 19:35 |
| 56° | 04:35 | 05:19 | 05:57 | 18:18 | 18:55 | 19:40 |
| 58° | 04:29 | 05:16 | 05:56 | 18:19 | 18:58 | 19:45 |
| S 60° | 04:22 | 05:13 | 05:55 | 18:20 | 19:01 | 19:52 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | 07:04 | 06:24 | 05:48 | 15:13 | 17:34 | 19:56 |
| N 70° | 06:48 | 06:18 | 05:51 | 15:27 | 17:36 | 19:47 |
| 68° | 06:35 | 06:13 | 05:53 | 15:37 | 17:37 | 19:39 |
| 66° | 06:24 | 06:09 | 05:55 | 15:46 | 17:39 | 19:33 |
| 64° | 06:15 | 06:06 | 05:56 | 15:54 | 17:40 | 19:28 |
| 62° | 06:07 | 06:03 | 05:58 | 16:00 | 17:41 | 19:24 |
| 60° | 06:01 | 06:00 | 05:59 | 16:05 | 17:42 | 19:20 |
| N 58° | 05:55 | 05:58 | 06:00 | 16:10 | 17:42 | 19:17 |
| 56° | 05:49 | 05:55 | 06:01 | 16:14 | 17:43 | 19:14 |
| 54° | 05:44 | 05:54 | 06:02 | 16:18 | 17:43 | 19:11 |
| 52° | 05:40 | 05:52 | 06:03 | 16:21 | 17:44 | 19:09 |
| 50° | 05:36 | 05:50 | 06:04 | 16:24 | 17:44 | 19:06 |
| 45° | 05:27 | 05:47 | 06:06 | 16:31 | 17:45 | 19:02 |
| N 40° | 05:20 | 05:44 | 06:07 | 16:36 | 17:46 | 18:58 |
| 35° | 05:14 | 05:41 | 06:08 | 16:41 | 17:47 | 18:54 |
| 30° | 05:08 | 05:39 | 06:09 | 16:45 | 17:48 | 18:51 |
| 20° | 04:59 | 05:35 | 06:11 | 16:52 | 17:49 | 18:46 |
| N 10° | 04:50 | 05:32 | 06:13 | 16:58 | 17:49 | 18:42 |
| 0° | 04:42 | 05:28 | 06:15 | 17:04 | 17:50 | 18:37 |
| S 10° | 04:34 | 05:25 | 06:17 | 17:10 | 17:51 | 18:33 |
| 20° | 04:25 | 05:22 | 06:18 | 17:16 | 17:52 | 18:29 |
| 30° | 04:15 | 05:18 | 06:21 | 17:22 | 17:53 | 18:24 |
| 35° | 04:10 | 05:15 | 06:22 | 17:26 | 17:53 | 18:21 |
| 40° | 04:03 | 05:13 | 06:23 | 17:31 | 17:54 | 18:17 |
| 45° | 03:56 | 05:10 | 06:25 | 17:36 | 17:54 | 18:14 |
| S 50° | 03:46 | 05:06 | 06:27 | 17:42 | 17:55 | 18:09 |
| 52° | 03:42 | 05:04 | 06:28 | 17:44 | 17:56 | 18:07 |
| 54° | 03:37 | 05:02 | 06:29 | 17:47 | 17:56 | 18:05 |
| 56° | 03:32 | 05:00 | 06:30 | 17:50 | 17:56 | 18:02 |
| 58° | 03:26 | 04:58 | 06:31 | 17:54 | 17:57 | 18:00 |
| S 60° | 03:19 | 04:56 | 06:33 | 17:58 | 17:57 | 17:56 |

| Day | Sun | | Mer. Pass hh:mm | Moon | | Age 28-0 5-0% |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|---|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 17 | 08:27 | 08:19 | 12:08 | 10:53 | 23:16 |  |
| 18 | 08:10 | 08:01 | 12:08 | 11:39 | -- | |
| 19 | 07:53 | 07:44 | 12:08 | 12:26 | 00:03 | |

March 20, 21, 22 UT (Fri., Sat., Sun.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------|---------------------|----------|----------|--------------------|----------|----------|---------------------|---------|-----|--------------------|--------|-----|-----|
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 177°32.6 | 161°41.7 | N05°47.2 | 192°08.3 | S07°24.1 | 70°59.3 | N22°55.8 | 172°59.0 | S00°20.4 | | | | | | |
| 1 | 192°35.0 | 176°41.3 | 48.5 | 207°09.0 | 23.4 | 86°01.6 | 55.8 | 188°01.1 | 20.2 | | | | | | |
| 2 | 207°37.5 | 191°40.9 | 49.7 | 222°09.6 | 22.6 | 101°04.0 | 55.8 | 203°03.3 | 20.1 | | | | | | |
| 3 | 222°40.0 | 206°40.6 | · · 51.0 | 237°10.2 | · · 21.8 | 116°06.4 | · · 55.8 | 218°05.5 | · · 20.0 | | | | | | |
| 4 | 237°42.4 | 221°40.2 | 52.3 | 252°10.9 | 21.1 | 131°08.8 | 55.8 | 233°07.7 | 19.9 | | | | | | |
| 5 | 252°44.9 | 236°39.8 | 53.5 | 267°11.5 | 20.3 | 146°11.2 | 55.8 | 248°09.9 | 19.7 | | | | | | |
| 6 | 267°47.4 | 251°39.4 | N05°54.8 | 282°12.2 | S07°19.6 | 161°13.6 | N22°55.8 | 263°12.0 | S00°19.6 | | | | | | |
| 7 | 282°49.8 | 266°39.0 | 56.0 | 297°12.8 | 18.8 | 176°16.0 | 55.8 | 278°14.2 | 19.5 | | | | | | |
| 8 | 297°52.3 | 281°38.7 | 57.3 | 312°13.4 | 18.0 | 191°18.3 | 55.8 | 293°16.4 | 19.4 | | | | | | |
| 9 | 312°54.8 | 296°38.3 | · · 58.5 | 327°14.1 | · · 17.3 | 206°20.7 | · · 55.8 | 308°18.6 | · · 19.2 | | | | | | |
| 10 | 327°57.2 | 311°37.9 | 05°59.8 | 342°14.7 | 16.5 | 221°23.1 | 55.8 | 323°20.7 | 19.1 | | | | | | |
| 11 | 342°59.7 | 326°37.5 | 06°01.1 | 357°15.3 | 15.7 | 236°25.5 | 55.8 | 338°22.9 | 19.0 | | | | | | |
| 12 | 358°02.1 | 341°37.1 | N06°02.3 | 12°16.0 | S07°15.0 | 251°27.9 | N22°55.8 | 353°25.1 | S00°18.9 | | | | | | |
| 13 | 13°04.6 | 356°36.8 | 03.6 | 27°16.6 | 14.2 | 266°30.3 | 55.8 | 8°27.3 | 18.7 | | | | | | |
| 14 | 28°07.1 | 11°36.4 | 04.8 | 42°17.3 | 13.5 | 281°32.6 | 55.7 | 23°29.5 | 18.6 | | | | | | |
| 15 | 43°09.5 | 26°36.0 | · · 06.1 | 57°17.9 | · · 12.7 | 296°35.0 | · · 55.7 | 38°31.6 | · · 18.5 | | | | | | |
| 16 | 58°12.0 | 41°35.6 | 07.4 | 72°18.5 | 11.9 | 311°37.4 | 55.7 | 53°33.8 | 18.4 | | | | | | |
| 17 | 73°14.5 | 56°35.2 | 08.6 | 87°19.2 | 11.2 | 326°39.8 | 55.7 | 68°36.0 | 18.3 | | | | | | |
| 18 | 88°16.9 | 71°34.9 | N06°09.9 | 102°19.8 | S07°10.4 | 341°42.2 | N22°55.7 | 83°38.2 | S00°18.1 | | | | | | |
| 19 | 103°19.4 | 86°34.5 | 11.1 | 117°20.5 | 09.6 | 356°44.5 | 55.7 | 98°40.3 | 18.0 | | | | | | |
| 20 | 118°21.9 | 101°34.1 | 12.4 | 132°21.1 | 08.9 | 11°46.9 | 55.7 | 113°42.5 | 17.9 | | | | | | |
| 21 | 133°24.3 | 116°33.7 | · · 13.6 | 147°21.7 | · · 08.1 | 26°49.3 | · · 55.7 | 128°44.7 | · · 17.8 | | | | | | |
| 22 | 148°26.8 | 131°33.3 | 14.9 | 162°22.4 | 07.4 | 41°51.7 | 55.7 | 143°46.9 | 17.6 | | | | | | |
| 23 | 163°29.2 | 146°33.0 | 16.2 | 177°23.0 | 06.6 | 56°54.1 | 55.7 | 158°49.1 | 17.5 | | | | | | |
| Mer.pass. 12:08 | | | ν-0.4' d1.3' m-3.92 | | | ν0.6' d-0.8' m1.17 | | | ν2.4' d-0.0' m-2.29 | | | ν2.2' d-0.1' m0.93 | | | |

| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|----------|---------------------|----------|----------|--------------------|----------|----------|---------------------|-----|-----|--------------------|-----|-----|-----|
| 0 | 178°31.7 | 161°32.6 | N06°17.4 | 192°23.7 | S07°05.8 | 71°56.4 | N22°55.7 | 173°51.2 | S00°17.4 | | | | | | |
| 1 | 193°34.2 | 176°32.2 | 18.7 | 207°24.3 | 05.1 | 86°58.8 | 55.7 | 188°53.4 | 17.3 | | | | | | |
| 2 | 208°36.6 | 191°31.8 | 19.9 | 222°24.9 | 04.3 | 102°01.2 | 55.7 | 203°55.6 | 17.1 | | | | | | |
| 3 | 223°39.1 | 206°31.4 | · · 21.2 | 237°25.6 | · · 03.5 | 117°03.6 | · · 55.7 | 218°57.8 | · · 17.0 | | | | | | |
| 4 | 238°41.6 | 221°31.0 | 22.4 | 252°26.2 | 02.8 | 132°05.9 | 55.6 | 233°59.9 | 16.9 | | | | | | |
| 5 | 253°44.0 | 236°30.7 | 23.7 | 267°26.9 | 02.0 | 147°08.3 | 55.6 | 249°02.1 | 16.8 | | | | | | |
| 6 | 268°46.5 | 251°30.3 | N06°24.9 | 282°27.5 | S07°01.2 | 162°10.7 | N22°55.6 | 264°04.3 | S00°16.7 | | | | | | |
| 7 | 283°49.0 | 266°29.9 | 26.2 | 297°28.1 | 07°00.5 | 177°13.1 | 55.6 | 279°06.5 | 16.5 | | | | | | |
| 8 | 298°51.4 | 281°29.5 | 27.4 | 312°28.8 | 06°59.7 | 192°15.4 | 55.6 | 294°08.7 | 16.4 | | | | | | |
| 9 | 313°53.9 | 296°29.1 | · · 28.7 | 327°29.4 | · · 58.9 | 207°17.8 | · · 55.6 | 309°10.8 | · · 16.3 | | | | | | |
| 10 | 328°56.4 | 311°28.7 | 30.0 | 342°30.1 | 58.2 | 222°20.2 | 55.6 | 324°13.0 | 16.2 | | | | | | |
| 11 | 343°58.8 | 326°28.4 | 31.2 | 357°30.7 | 57.4 | 237°22.6 | 55.6 | 339°15.2 | 16.0 | | | | | | |
| 12 | 359°01.3 | 341°28.0 | N06°32.5 | 12°31.4 | S06°56.7 | 252°24.9 | N22°55.6 | 354°17.4 | S00°15.9 | | | | | | |
| 13 | 14°03.7 | 356°27.6 | 33.7 | 27°32.0 | 55.9 | 267°27.3 | 55.6 | 9°19.5 | 15.8 | | | | | | |
| 14 | 29°06.2 | 11°27.2 | 35.0 | 42°32.6 | 55.1 | 282°29.7 | 55.6 | 24°21.7 | 15.7 | | | | | | |
| 15 | 44°08.7 | 26°26.8 | · · 36.2 | 57°33.3 | · · 54.4 | 297°32.1 | · · 55.6 | 39°23.9 | · · 15.5 | | | | | | |
| 16 | 59°11.1 | 41°26.4 | 37.5 | 72°33.9 | 53.6 | 312°34.4 | 55.6 | 54°26.1 | 15.4 | | | | | | |
| 17 | 74°13.6 | 56°26.1 | 38.7 | 87°34.6 | 52.8 | 327°36.8 | 55.5 | 69°28.3 | 15.3 | | | | | | |
| 18 | 89°16.1 | 71°25.7 | N06°40.0 | 102°35.2 | S06°52.1 | 342°39.2 | N22°55.5 | 84°30.4 | S00°15.2 | | | | | | |
| 19 | 104°18.5 | 86°25.3 | 41.2 | 117°35.8 | 51.3 | 357°41.6 | 55.5 | 99°32.6 | 15.1 | | | | | | |
| 20 | 119°21.0 | 101°24.9 | 42.5 | 132°36.5 | 50.5 | 12°43.9 | 55.5 | 114°34.8 | 14.9 | | | | | | |
| 21 | 134°23.5 | 116°24.5 | · · 43.7 | 147°37.1 | · · 49.8 | 27°46.3 | · · 55.5 | 129°37.0 | · · 14.8 | | | | | | |
| 22 | 149°25.9 | 131°24.1 | 45.0 | 162°37.8 | 49.0 | 42°48.7 | 55.5 | 144°39.1 | 14.7 | | | | | | |
| 23 | 164°28.4 | 146°23.7 | 46.2 | 177°38.4 | 48.2 | 57°51.0 | 55.5 | 159°41.3 | 14.6 | | | | | | |
| Mer.pass. 12:04 | | | ν-0.4' d1.3' m-3.92 | | | ν0.6' d-0.8' m1.17 | | | ν2.4' d-0.0' m-2.28 | | | ν2.2' d-0.1' m0.92 | | | |

| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|----------|---------------------|----------|----------|--------------------|----------|----------|---------------------|-----|-----|--------------------|-----|-----|-----|
| 0 | 179°30.9 | 161°23.3 | N06°47.5 | 192°39.1 | S06°47.5 | 72°53.4 | N22°55.5 | 174°43.5 | S00°14.4 | | | | | | |
| 1 | 194°33.3 | 176°23.0 | 48.7 | 207°39.7 | 46.7 | 87°55.8 | 55.5 | 189°45.7 | 14.3 | | | | | | |
| 2 | 209°35.8 | 191°22.6 | 50.0 | 222°40.3 | 45.9 | 102°58.1 | 55.5 | 204°47.9 | 14.2 | | | | | | |
| 3 | 224°38.2 | 206°22.2 | · · 51.2 | 237°41.0 | · · 45.2 | 118°00.5 | · · 55.5 | 219°50.0 | · · 14.1 | | | | | | |
| 4 | 239°40.7 | 221°21.8 | 52.5 | 252°41.6 | 44.4 | 133°02.9 | 55.5 | 234°52.2 | 13.9 | | | | | | |
| 5 | 254°43.2 | 236°21.4 | 53.7 | 267°42.3 | 43.6 | 148°05.2 | 55.5 | 249°54.4 | 13.8 | | | | | | |
| 6 | 269°45.6 | 251°21.0 | N06°55.0 | 282°42.9 | S06°42.9 | 163°07.6 | N22°55.4 | 264°56.6 | S00°13.7 | | | | | | |
| 7 | 284°48.1 | 266°20.6 | 56.2 | 297°43.6 | 42.1 | 178°10.0 | 55.4 | 279°58.7 | 13.6 | | | | | | |
| 8 | 299°50.6 | 281°20.3 | 57.5 | 312°44.2 | 41.3 | 193°12.4 | 55.4 | 295°00.9 | 13.5 | | | | | | |
| 9 | 314°53.0 | 296°19.9 | 06°58.7 | 327°44.9 | · · 40.6 | 208°14.7 | · · 55.4 | 310°03.1 | · · 13.3 | | | | | | |
| 10 | 329°55.5 | 311°19.5 | 07°00.0 | 342°45.5 | 39.8 | 223°17.1 | 55.4 | 325°05.3 | 13.2 | | | | | | |
| 11 | 344°58.0 | 326°19.1 | 01.2 | 357°46.1 | 39.0 | 238°19.4 | 55.4 | 340°07.5 | 13.1 | | | | | | |
| 12 | 0°00.4 | 341°18.7 | N07°02.4 | 12°46.8 | S06°38.3 | 253°21.8 | N22°55.4 | 355°09.6 | S00°13.0 | | | | | | |
| 13 | 15°02.9 | 356°18.3 | 03.7 | 27°47.4 | 37.5 | 268°24.2 | 55.4 | 10°11.8 | 12.8 | | | | | | |
| 14 | 30°05.3 | 11°17.9 | 04.9 | 42°48.1 | 36.7 | 283°26.5 | 55.4 | 25°14.0 | 12.7 | | | | | | |
| 15 | 45°07.8 | 26°17.5 | · · 06.2 | 57°48.7 | · · 36.0 | 298°28.9 | · · 55.4 | 40°16.2 | · · 12.6 | | | | | | |
| 16 | 60°10.3 | 41°17.1 | 07.4 | 72°49.4 | 35.2 | 313°31.3 | 55.4 | 55°18.3 | 12.5 | | | | | | |
| 17 | 75°12.7 | 56°16.8 | 08.7 | 87°50.0 | 34.4 | 328°33.6 | 55.4 | 70°20.5 | 12.3 | | | | | | |
| 18 | 90°15.2 | 71°16.4 | N07°09.9 | 102°50.7 | S06°33.7 | 343°36.0 | N22°55.3 | 85°22.7 | S00°12.2 | | | | | | |
| 19 | 105°17.7 | 86°16.0 | 11.2 | 117°51.3 | 32.9 | 358°38.4 | 55.3 | 100°24.9 | 12.1 | | | | | | |
| 20 | 120°20.1 | 101°15.6 | 12.4 | 132°51.9 | 32.1 | 13°40.7 | 55.3 | 115°27.1 | 12.0 | | | | | | |
| 21 | 135°22.6 | 116°15.2 | · · 13.7 | 147°52.6 | · · 31.4 | 28°43.1 | · · 55.3 | 130°29.2 | · · 11.9 | | | | | | |
| 22 | 150°25.1 | 131°14.8 | 14.9 | 162°53.2 | 30.6 | 43°45.5 | 55.3 | 145°31.4 | 11.7 | | | | | | |
| 23 | 165°27.5 | 146°14.4 | 16.1 | 177°53.9 | 29.8 | 58°47.8 | 55.3 | 160°33.6 | 11.6 | | | | | | |
| Mer.pass. 12:00 | | | ν-0.4' d1.2' m-3.92 | | | ν0.6' d-0.8' m1.17 | | | ν2.4' d-0.0' m-2.28 | | | ν2.2' d-0.1' m0.92 | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°34.1 | 29°14.0 |
| Ankaa | 353°06.6 | -42°09.9 |
| Schedar | 349°30.5 | 56°40.9 |
| Diphda | 348°46.6 | -17°50.7 |
| Achernar | 335°19.9 | -57°06.3 |
| Hamal | 327°50.4 | 23°35.2 |
| Polaris | 313°52.2 | 89°22.7 |
| Acamar | 315°11.3 | -40°12.2 |
| Menkar | 314°05.3 | 4°11.5 |
| Mirfak | 308°27.1 | 49°57.4 |
| Aldebaran | 290°38.6 | 16°33.7 |
| Rigel | 281°03.0 | -8°10.4 |
| Capella | 280°20.5 | 46°01.6 |
| Bellatrix | 278°21.9 | 6°22.3 |
| Elnath | 278°00.7 | 28°37.8 |
| Alnilam | 275°36.8 | -1°11.2 |
| Betelgeuse | 270°51.0 | 7°24.6 |
| Canopus | 263°51.9 | -52°42.8 |
| Sirius | 258°25.3 | -16°45.3 |
| Adhara | 255°05.0 | -29°00.7 |
| Procyon | 244°49.7 | 5°09.4 |
| Pollux | 243°15.9 | 27°57.8 |
| Avior | 234°14.0 | -59°35.9 |
| Suhail | 222°45.3 | -43°32.5 |
| Miaplacidus | 221°37.4 | -69°49 |

| h | Sun | | Moon | | | | |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°06.3 | S00°14.6 | 167°52.6 | 11.6' | N07°15.3 | 16.4' | 59.1' |
| 1 | 193°06.4 | 13.6 | 182°23.2 | 11.6' | 07°31.8 | 16.4' | 59.2' |
| 2 | 208°06.6 | 12.6 | 196°53.8 | 11.5' | 07°48.2 | 16.4' | 59.2' |
| 3 | 223°06.8 | 11.6 | 211°24.3 | 11.4' | 08°04.5 | 16.3' | 59.2' |
| 4 | 238°07.0 | 10.6 | 225°54.7 | 11.4' | 08°20.9 | 16.3' | 59.2' |
| 5 | 253°07.2 | 09.6 | 240°25.1 | 11.3' | 08°37.2 | 16.3' | 59.2' |
| 6 | 268°07.4 | S00°08.7 | 254°55.4 | 11.2' | N08°53.5 | 16.2' | 59.3' |
| 7 | 283°07.5 | 07.7 | 269°25.6 | 11.2' | 09°09.7 | 16.2' | 59.3' |
| 8 | 298°07.7 | 06.7 | 283°55.8 | 11.1' | 09°25.9 | 16.2' | 59.3' |
| 9 | 313°07.9 | 05.7 | 298°25.9 | 11.0' | 09°42.0 | 16.1' | 59.3' |
| 10 | 328°08.1 | 04.7 | 312°56.0 | 11.0' | 09°58.2 | 16.1' | 59.3' |
| 11 | 343°08.3 | 03.7 | 327°25.9 | 10.9' | 10°14.2 | 16.0' | 59.3' |
| 12 | 358°08.5 | S00°02.7 | 341°55.8 | 10.8' | N10°30.2 | 16.0' | 59.3' |
| 13 | 13°08.6 | 01.7 | 356°25.7 | 10.8' | 10°46.2 | 15.9' | 59.4' |
| 14 | 28°08.8 | S00°00.8 | 10°55.4 | 10.7' | 11°02.1 | 15.9' | 59.4' |
| 15 | 43°09.0 | N00°00.2 | 25°25.1 | 10.6' | 11°18.0 | 15.8' | 59.4' |
| 16 | 58°09.2 | 01.2 | 39°54.7 | 10.5' | 11°33.8 | 15.8' | 59.4' |
| 17 | 73°09.4 | 02.2 | 54°24.2 | 10.5' | 11°49.6 | 15.7' | 59.4' |
| 18 | 88°09.6 | N00°03.2 | 68°53.7 | 10.4' | N12°05.3 | 15.6' | 59.4' |
| 19 | 103°09.7 | 04.2 | 83°23.1 | 10.3' | 12°20.9 | 15.6' | 59.4' |
| 20 | 118°09.9 | 05.2 | 97°52.4 | 10.2' | 12°36.5 | 15.5' | 59.5' |
| 21 | 133°10.1 | 06.2 | 112°21.6 | 10.1' | 12°52.0 | 15.5' | 59.5' |
| 22 | 148°10.3 | 07.2 | 126°50.8 | 10.1' | 13°07.5 | 15.4' | 59.5' |
| 23 | 163°10.5 | 08.1 | 141°19.8 | 10.0' | 13°22.9 | 15.3' | 59.5' |
| SD = 16.1' $d = -1.0'$ | | | SD = 16.1' | | | | |

| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|------------|------------|-------|----------|-------|-------|
| 0 | 178°10.7 | N00°09.1 | 155°48.8 | 9.9' | N13°38.2 | 15.2' | 59.5' |
| 1 | 193°10.8 | 10.1 | 170°17.7 | 9.8' | 13°53.4 | 15.2' | 59.5' |
| 2 | 208°11.0 | 11.1 | 184°46.5 | 9.7' | 14°08.6 | 15.1' | 59.5' |
| 3 | 223°11.2 | 12.1 | 199°15.2 | 9.6' | 14°23.7 | 15.0' | 59.5' |
| 4 | 238°11.4 | 13.1 | 213°43.9 | 9.6' | 14°38.7 | 14.9' | 59.5' |
| 5 | 253°11.6 | 14.1 | 228°12.4 | 9.5' | 14°53.7 | 14.9' | 59.6' |
| 6 | 268°11.8 | N00°15.1 | 242°40.9 | 9.4' | N15°08.6 | 14.8' | 59.6' |
| 7 | 283°12.0 | 16.0 | 257°09.3 | 9.3' | 15°23.3 | 14.7' | 59.6' |
| 8 | 298°12.1 | 17.0 | 271°37.6 | 9.2' | 15°38.0 | 14.6' | 59.6' |
| 9 | 313°12.3 | 18.0 | 286°05.8 | 9.1' | 15°52.7 | 14.5' | 59.6' |
| 10 | 328°12.5 | 19.0 | 300°33.9 | 9.0' | 16°07.2 | 14.4' | 59.6' |
| 11 | 343°12.7 | 20.0 | 315°02.0 | 8.9' | 16°21.6 | 14.4' | 59.6' |
| 12 | 358°12.9 | N00°21.0 | 329°29.9 | 8.8' | N16°36.0 | 14.3' | 59.6' |
| 13 | 13°13.1 | 22.0 | 343°57.7 | 8.8' | 16°50.3 | 14.2' | 59.6' |
| 14 | 28°13.3 | 23.0 | 358°25.5 | 8.7' | 17°04.4 | 14.1' | 59.6' |
| 15 | 43°13.4 | 24.0 | 12°53.1 | 8.6' | 17°18.5 | 14.0' | 59.6' |
| 16 | 58°13.6 | 24.9 | 27°20.7 | 8.5' | 17°32.5 | 13.9' | 59.6' |
| 17 | 73°13.8 | 25.9 | 41°48.2 | 8.4' | 17°46.3 | 13.8' | 59.6' |
| 18 | 88°14.0 | N00°26.9 | 56°15.5 | 8.3' | N18°00.1 | 13.7' | 59.6' |
| 19 | 103°14.2 | 27.9 | 70°42.8 | 8.2' | 18°13.8 | 13.6' | 59.7' |
| 20 | 118°14.4 | 28.9 | 85°10.0 | 8.1' | 18°27.3 | 13.4' | 59.7' |
| 21 | 133°14.6 | 29.9 | 99°37.1 | 8.0' | 18°40.8 | 13.3' | 59.7' |
| 22 | 148°14.7 | 30.9 | 114°04.1 | 7.9' | 18°54.1 | 13.2' | 59.7' |
| 23 | 163°14.9 | 31.9 | 128°31.0 | 7.8' | 19°07.3 | 13.1' | 59.7' |
| SD = 16.1' | | $d = 1.0'$ | SD = 16.2' | | | | |

| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|------------|----------|------------|----------|-------|-------|
| 0 | 178°15.1 | N00°32.8 | 142°57.8 | 7.7' | N19°20.4 | 13.0' | 59.7' |
| 1 | 193°15.3 | 33.8 | 157°24.5 | 7.6' | 19°33.4 | 12.9' | 59.7' |
| 2 | 208°15.5 | 34.8 | 171°51.1 | 7.5' | 19°46.3 | 12.8' | 59.7' |
| 3 | 223°15.7 | 35.8 | 186°17.6 | 7.4' | 19°59.1 | 12.6' | 59.7' |
| 4 | 238°15.9 | 36.8 | 200°44.0 | 7.3' | 20°11.7 | 12.5' | 59.7' |
| 5 | 253°16.0 | 37.8 | 215°10.4 | 7.2' | 20°24.2 | 12.4' | 59.7' |
| 6 | 268°16.2 | N00°38.8 | 229°36.6 | 7.1' | N20°36.6 | 12.3' | 59.7' |
| 7 | 283°16.4 | 39.8 | 244°02.7 | 7.0' | 20°48.9 | 12.1' | 59.7' |
| 8 | 298°16.6 | 40.7 | 258°28.7 | 6.9' | 21°01.0 | 12.0' | 59.7' |
| 9 | 313°16.8 | 41.7 | 272°54.6 | 6.8' | 21°13.0 | 11.9' | 59.7' |
| 10 | 328°17.0 | 42.7 | 287°20.5 | 6.7' | 21°24.9 | 11.7' | 59.7' |
| 11 | 343°17.2 | 43.7 | 301°46.2 | 6.6' | 21°36.6 | 11.6' | 59.7' |
| 12 | 358°17.3 | N00°44.7 | 316°11.8 | 6.5' | N21°48.3 | 11.5' | 59.7' |
| 13 | 13°17.5 | 45.7 | 330°37.4 | 6.4' | 21°59.7 | 11.3' | 59.7' |
| 14 | 28°17.7 | 46.7 | 345°02.8 | 6.3' | 22°11.0 | 11.2' | 59.7' |
| 15 | 43°17.9 | 47.6 | 359°28.2 | 6.3' | 22°22.2 | 11.0' | 59.7' |
| 16 | 58°18.1 | 48.6 | 13°53.4 | 6.2' | 22°33.3 | 10.9' | 59.7' |
| 17 | 73°18.3 | 49.6 | 28°18.6 | 6.1' | 22°44.2 | 10.8' | 59.7' |
| 18 | 88°18.5 | N00°50.6 | 42°43.7 | 6.0' | N22°54.9 | 10.6' | 59.7' |
| 19 | 103°18.6 | 51.6 | 57°08.6 | 5.9' | 23°05.5 | 10.5' | 59.7' |
| 20 | 118°18.8 | 52.6 | 71°33.5 | 5.8' | 23°16.0 | 10.3' | 59.7' |
| 21 | 133°19.0 | 53.6 | 85°58.3 | 5.7' | 23°26.3 | 10.2' | 59.7' |
| 22 | 148°19.2 | 54.6 | 100°23.0 | 5.6' | 23°36.5 | 10.0' | 59.7' |
| 23 | 163°19.4 | 55.5 | 114°47.6 | 5.5' | 23°46.5 | 9.8' | 59.7' |
| SD = 16.0' | | $d = 1.0'$ | | SD = 16.3' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 03:15 | 04:45 | 05:53 | 18:23 | 19:32 | 21:05 |
| N 70° | 03:35 | 04:53 | 05:55 | 18:22 | 19:24 | 20:44 |
| 68° | 03:50 | 05:00 | 05:56 | 18:20 | 19:17 | 20:28 |
| 66° | 04:02 | 05:05 | 05:57 | 18:19 | 19:11 | 20:15 |
| 64° | 04:12 | 05:10 | 05:58 | 18:18 | 19:06 | 20:05 |
| 62° | 04:20 | 05:14 | 05:58 | 18:18 | 19:02 | 19:56 |
| 60° | 04:27 | 05:17 | 05:59 | 18:17 | 18:59 | 19:49 |
| N 58° | 04:33 | 05:20 | 05:59 | 18:16 | 18:56 | 19:43 |
| 56° | 04:38 | 05:23 | 06:00 | 18:16 | 18:53 | 19:37 |
| 54° | 04:43 | 05:25 | 06:00 | 18:15 | 18:51 | 19:33 |
| 52° | 04:47 | 05:27 | 06:01 | 18:15 | 18:49 | 19:29 |
| 50° | 04:51 | 05:29 | 06:01 | 18:14 | 18:47 | 19:25 |
| 45° | 04:58 | 05:32 | 06:02 | 18:14 | 18:43 | 19:17 |
| N 40° | 05:03 | 05:35 | 06:02 | 18:13 | 18:40 | 19:12 |
| 35° | 05:08 | 05:37 | 06:02 | 18:12 | 18:38 | 19:07 |
| 30° | 05:11 | 05:39 | 06:03 | 18:12 | 18:36 | 19:04 |
| 20° | 05:16 | 05:41 | 06:03 | 18:11 | 18:33 | 18:59 |
| N 10° | 05:18 | 05:43 | 06:04 | 18:11 | 18:32 | 18:56 |
| 0° | 05:19 | 05:43 | 06:04 | 18:10 | 18:31 | 18:55 |
| S 10° | 05:19 | 05:43 | 06:04 | 18:10 | 18:31 | 18:55 |
| 20° | 05:16 | 05:42 | 06:04 | 18:10 | 18:32 | 18:57 |
| 30° | 05:12 | 05:40 | 06:04 | 18:10 | 18:34 | 19:02 |
| 35° | 05:09 | 05:39 | 06:04 | 18:10 | 18:35 | 19:05 |
| 40° | 05:05 | 05:37 | 06:04 | 18:10 | 18:37 | 19:08 |
| 45° | 05:00 | 05:34 | 06:04 | 18:10 | 18:39 | 19:13 |
| S 50° | 04:53 | 05:31 | 06:03 | 18:10 | 18:42 | 19:20 |
| 52° | 04:50 | 05:29 | 06:03 | 18:10 | 18:44 | 19:23 |
| 54° | 04:46 | 05:28 | 06:03 | 18:10 | 18:45 | 19:27 |
| 56° | 04:41 | 05:26 | 06:03 | 18:10 | 18:47 | 19:31 |
| 58° | 04:36 | 05:23 | 06:03 | 18:10 | 18:50 | 19:36 |
| S 60° | 04:31 | 05:21 | 06:02 | 18:11 | 18:52 | 19:42 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | 05:09 | 04:14 | | 22:37 | | |
| N 70° | 05:21 | 04:43 | 03:05 | 22:11 | 01:41 | 01:41 |
| 68° | 05:31 | 05:05 | 04:18 | 21:51 | 00:29 | 00:29 |
| 66° | 05:40 | 05:22 | 04:56 | 21:35 | 23:53 | |
| 64° | 05:47 | 05:36 | 05:23 | 21:22 | 23:27 | 00:00 |
| 62° | 05:53 | 05:49 | 05:44 | 21:12 | 23:07 | 00:00 |
| 60° | 05:59 | 05:59 | 06:01 | 21:03 | 22:51 | 00:00 |
| N 58° | 06:04 | 06:08 | 06:15 | 20:55 | 22:38 | 00:00 |
| 56° | 06:08 | 06:16 | 06:28 | 20:48 | 22:26 | 00:00 |
| 54° | 06:12 | 06:23 | 06:39 | 20:42 | 22:16 | 23:52 |
| 52° | 06:15 | 06:30 | 06:48 | 20:36 | 22:07 | 23:39 |
| 50° | 06:18 | 06:36 | 06:57 | 20:31 | 21:59 | 23:28 |
| 45° | 06:26 | 06:48 | 07:16 | 20:20 | 21:42 | 23:05 |
| N 40° | 06:31 | 06:59 | 07:31 | 20:12 | 21:28 | 22:46 |
| 35° | 06:37 | 07:08 | 07:44 | 20:04 | 21:16 | 22:30 |
| 30° | 06:41 | 07:16 | 07:55 | 19:57 | 21:06 | 22:17 |
| 20° | 06:49 | 07:30 | 08:15 | 19:46 | 20:49 | 21:54 |
| N 10° | 06:56 | 07:42 | 08:32 | 19:36 | 20:33 | 21:34 |
| 0° | 07:03 | 07:54 | 08:49 | 19:27 | 20:19 | 21:16 |
| S 10° | 07:10 | 08:06 | 09:05 | 19:18 | 20:05 | 20:58 |
| 20° | 07:17 | 08:18 | 09:23 | 19:08 | 19:50 | 20:38 |
| 30° | 07:25 | 08:33 | 09:43 | 18:57 | 19:33 | 20:16 |
| 35° | 07:30 | 08:41 | 09:55 | 18:50 | 19:24 | 20:03 |
| 40° | 07:36 | 08:51 | 10:09 | 18:43 | 19:12 | 19:48 |
| 45° | 07:42 | 09:03 | 10:25 | 18:35 | 18:59 | 19:30 |
| S 50° | 07:50 | 09:17 | 10:46 | 18:25 | 18:43 | 19:08 |
| 52° | 07:54 | 09:24 | 10:56 | 18:20 | 18:36 | 18:58 |
| 54° | 07:58 | 09:31 | 11:07 | 18:15 | 18:28 | 18:46 |
| 56° | 08:03 | 09:39 | 11:20 | 18:09 | 18:19 | 18:33 |
| 58° | 08:08 | 09:49 | 11:34 | 18:03 | 18:08 | 18:17 |
| S 60° | 08:13 | 09:59 | 11:52 | 17:56 | 17:56 | 17:59 |

| Day | Sun | | | Moon | | |
|-----|---|--------------------------|--------------------|-----------------------------|----------------|---------------------|
| | Eqn.of Time 00 ^h mm:ss | 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 1-3 1-11% |
| 20 | 07:35 | 07:26 | 12:07 | 13:15 | 00:50 | |
| 21 | 07:17 | 07:08 | 12:07 | 14:07 | 01:40 | |
| 22 | 07:00 | 06:51 | 12:07 | 15:02 | 02:34 | |

March 23, 24, 25 UT (Mon., Tue., Wed.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|----------|
| Mon | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 180°30.0 | | 161°14.0 | N07°17.4 | 192°54.5 | S06°29.0 | 73°50.2 | N22°55.3 | 175°35.8 | S00°11.5 |
| 1 | 195°32.5 | | 176°13.6 | 18.6 | 207°55.2 | 28.3 | 88°52.5 | 55.3 | 190°37.9 | 11.4 |
| 2 | 210°34.9 | | 191°13.2 | 19.9 | 222°55.8 | 27.5 | 103°54.9 | 55.3 | 205°40.1 | 11.2 |
| 3 | 225°37.4 | | 206°12.9 | · · 21.1 | 237°56.5 | · · 26.7 | 118°57.3 | · · 55.3 | 220°42.3 | · · 11.1 |
| 4 | 240°39.8 | | 221°12.5 | 22.4 | 252°57.1 | 26.0 | 133°59.6 | 55.3 | 235°44.5 | 11.0 |
| 5 | 255°42.3 | | 236°12.1 | 23.6 | 267°57.8 | 25.2 | 149°02.0 | 55.2 | 250°46.7 | 10.9 |
| 6 | 270°44.8 | | 251°11.7 | N07°24.8 | 282°58.4 | S06°24.4 | 164°04.3 | N22°55.2 | 265°48.8 | S00°10.7 |
| 7 | 285°47.2 | | 266°11.3 | 26.1 | 297°59.1 | 23.7 | 179°06.7 | 55.2 | 280°51.0 | 10.6 |
| 8 | 300°49.7 | | 281°10.9 | 27.3 | 312°59.7 | 22.9 | 194°09.1 | 55.2 | 295°53.2 | 10.5 |
| 9 | 315°52.2 | | 296°10.5 | · · 28.6 | 328°00.3 | · · 22.1 | 209°11.4 | · · 55.2 | 310°55.4 | · · 10.4 |
| 10 | 330°54.6 | | 311°10.1 | 29.8 | 343°01.0 | 21.4 | 224°13.8 | 55.2 | 325°57.5 | 10.3 |
| 11 | 345°57.1 | | 326°09.7 | 31.0 | 358°01.6 | 20.6 | 239°16.1 | 55.2 | 340°59.7 | 10.1 |
| 12 | 0°59.6 | | 341°09.3 | N07°32.3 | 13°02.3 | S06°19.8 | 254°18.5 | N22°55.2 | 356°01.9 | S00°10.0 |
| 13 | 16°02.0 | | 356°08.9 | 33.5 | 28°02.9 | 19.1 | 269°20.8 | 55.2 | 11°04.1 | 09.9 |
| 14 | 31°04.5 | | 11°08.5 | 34.8 | 43°03.6 | 18.3 | 284°23.2 | 55.2 | 26°06.3 | 09.8 |
| 15 | 46°07.0 | | 26°08.1 | · · 36.0 | 58°04.2 | · · 17.5 | 299°25.6 | · · 55.2 | 41°08.4 | · · 09.6 |
| 16 | 61°09.4 | | 41°07.7 | 37.2 | 73°04.9 | 16.7 | 314°27.9 | 55.1 | 56°10.6 | 09.5 |
| 17 | 76°11.9 | | 56°07.3 | 38.5 | 88°05.5 | 16.0 | 329°30.3 | 55.1 | 71°12.8 | 09.4 |
| 18 | 91°14.3 | | 71°07.0 | N07°39.7 | 103°06.2 | S06°15.2 | 344°32.6 | N22°55.1 | 86°15.0 | S00°09.3 |
| 19 | 106°16.8 | | 86°06.6 | 40.9 | 118°06.8 | 14.4 | 359°35.0 | 55.1 | 101°17.1 | 09.1 |
| 20 | 121°19.3 | | 101°06.2 | 42.2 | 133°07.5 | 13.7 | 14°37.3 | 55.1 | 116°19.3 | 09.0 |
| 21 | 136°21.7 | | 116°05.8 | · · 43.4 | 148°08.1 | · · 12.9 | 29°39.7 | · · 55.1 | 131°21.5 | · · 08.9 |
| 22 | 151°24.2 | | 131°05.4 | 44.7 | 163°08.8 | 12.1 | 44°42.0 | 55.1 | 146°23.7 | 08.8 |
| 23 | 166°26.7 | | 146°05.0 | 45.9 | 178°09.4 | 11.4 | 59°44.4 | 55.1 | 161°25.8 | 08.7 |
| Mer.pass. 11:56 | | ν-0.4' d1.2' m-3.92 | | ν0.6' d-0.8' m1.17 | | ν2.4' d-0.0' m-2.27 | | ν2.2' d-0.1' m0.91 | | |
| Tue | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 181°29.1 | | 161°04.6 | N07°47.1 | 193°10.1 | S06°10.6 | 74°46.7 | N22°55.1 | 176°28.0 | S00°08.5 |
| 1 | 196°31.6 | | 176°04.2 | 48.4 | 208°10.7 | 09.8 | 89°49.1 | 55.1 | 191°30.2 | 08.4 |
| 2 | 211°34.1 | | 191°03.8 | 49.6 | 223°11.4 | 09.0 | 104°51.4 | 55.0 | 206°32.4 | 08.3 |
| 3 | 226°36.5 | | 206°03.4 | · · 50.8 | 238°12.0 | · · 08.3 | 119°53.8 | · · 55.0 | 221°34.6 | · · 08.2 |
| 4 | 241°39.0 | | 221°03.0 | 52.1 | 253°12.7 | 07.5 | 134°56.1 | 55.0 | 236°36.7 | 08.0 |
| 5 | 256°41.5 | | 236°02.6 | 53.3 | 268°13.3 | 06.7 | 149°58.5 | 55.0 | 251°38.9 | 07.9 |
| 6 | 271°43.9 | | 251°02.2 | N07°54.5 | 283°14.0 | S06°06.0 | 165°00.9 | N22°55.0 | 266°41.1 | S00°07.8 |
| 7 | 286°46.4 | | 266°01.8 | 55.8 | 298°14.6 | 05.2 | 180°03.2 | 55.0 | 281°43.3 | 07.7 |
| 8 | 301°48.8 | | 281°01.4 | 57.0 | 313°15.3 | 04.4 | 195°05.6 | 55.0 | 296°45.4 | 07.5 |
| 9 | 316°51.3 | | 296°01.0 | · · 58.2 | 328°15.9 | · · 03.6 | 210°07.9 | · · 55.0 | 311°47.6 | · · 07.4 |
| 10 | 331°53.8 | | 311°00.6 | 07°59.5 | 343°16.6 | 02.9 | 225°10.3 | 55.0 | 326°49.8 | 07.3 |
| 11 | 346°56.2 | | 326°00.2 | 08°00.7 | 358°17.2 | 02.1 | 240°12.6 | 55.0 | 341°52.0 | 07.2 |
| 12 | 1°58.7 | | 340°59.8 | N08°01.9 | 13°17.9 | S06°01.3 | 255°14.9 | N22°54.9 | 356°54.2 | S00°07.1 |
| 13 | 17°01.2 | | 355°59.4 | 03.2 | 28°18.5 | 06°00.6 | 270°17.3 | 54.9 | 11°56.3 | 06.9 |
| 14 | 32°03.6 | | 10°59.0 | 04.4 | 43°19.2 | 05°59.8 | 285°19.6 | 54.9 | 26°58.5 | 06.8 |
| 15 | 47°06.1 | | 25°58.6 | · · 05.6 | 58°19.8 | · · 59.0 | 300°22.0 | · · 54.9 | 42°00.7 | · · 06.7 |
| 16 | 62°08.6 | | 40°58.2 | 06.9 | 73°20.5 | 58.2 | 315°24.3 | 54.9 | 57°02.9 | 06.6 |
| 17 | 77°11.0 | | 55°57.8 | 08.1 | 88°21.1 | 57.5 | 330°26.7 | 54.9 | 72°05.0 | 06.4 |
| 18 | 92°13.5 | | 70°57.4 | N08°09.3 | 103°21.8 | S05°56.7 | 345°29.0 | N22°54.9 | 87°07.2 | S00°06.3 |
| 19 | 107°15.9 | | 85°57.0 | 10.6 | 118°22.4 | 55.9 | 0°31.4 | 54.9 | 102°09.4 | 06.2 |
| 20 | 122°18.4 | | 100°56.6 | 11.8 | 133°23.1 | 55.2 | 15°33.7 | 54.9 | 117°11.6 | 06.1 |
| 21 | 137°20.9 | | 115°56.2 | · · 13.0 | 148°23.7 | · · 54.4 | 30°36.1 | · · 54.8 | 132°13.8 | · · 05.9 |
| 22 | 152°23.3 | | 130°55.8 | 14.2 | 163°24.4 | 53.6 | 45°38.4 | 54.8 | 147°15.9 | 05.8 |
| 23 | 167°25.8 | | 145°55.4 | 15.5 | 178°25.0 | 52.8 | 60°40.8 | 54.8 | 162°18.1 | 05.7 |
| Mer.pass. 11:52 | | ν-0.4' d1.2' m-3.92 | | ν0.6' d-0.8' m1.17 | | ν2.4' d-0.0' m-2.26 | | ν2.2' d-0.1' m0.91 | | |
| Wed | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 182°28.3 | | 160°55.0 | N08°16.7 | 193°25.7 | S05°52.1 | 75°43.1 | N22°54.8 | 177°20.3 | S00°05.6 |
| 1 | 197°30.7 | | 175°54.6 | 17.9 | 208°26.3 | 51.3 | 90°45.5 | 54.8 | 192°22.5 | 05.5 |
| 2 | 212°33.2 | | 190°54.2 | 19.2 | 223°27.0 | 50.5 | 105°47.8 | 54.8 | 207°24.6 | 05.3 |
| 3 | 227°35.7 | | 205°53.8 | · · 20.4 | 238°27.6 | · · 49.8 | 120°50.1 | · · 54.8 | 222°26.8 | · · 05.2 |
| 4 | 242°38.1 | | 220°53.4 | 21.6 | 253°28.3 | 49.0 | 135°52.5 | 54.8 | 237°29.0 | 05.1 |
| 5 | 257°40.6 | | 235°53.0 | 22.8 | 268°28.9 | 48.2 | 150°54.8 | 54.8 | 252°31.2 | 05.0 |
| 6 | 272°43.1 | | 250°52.6 | N08°24.1 | 283°29.6 | S05°47.4 | 165°57.2 | N22°54.7 | 267°33.3 | S00°04.8 |
| 7 | 287°45.5 | | 265°52.2 | 25.3 | 298°30.2 | 46.7 | 180°59.5 | 54.7 | 282°35.5 | 04.7 |
| 8 | 302°48.0 | | 280°51.8 | 26.5 | 313°30.9 | 45.9 | 196°01.9 | 54.7 | 297°37.7 | 04.6 |
| 9 | 317°50.4 | | 295°51.4 | · · 27.7 | 328°31.5 | · · 45.1 | 211°04.2 | · · 54.7 | 312°39.9 | · · 04.5 |
| 10 | 332°52.9 | | 310°51.0 | 29.0 | 343°32.2 | 44.3 | 226°06.5 | 54.7 | 327°42.1 | 04.3 |
| 11 | 347°55.4 | | 325°50.6 | 30.2 | 358°32.8 | 43.6 | 241°08.9 | 54.7 | 342°44.2 | 04.2 |
| 12 | 2°57.8 | | 340°50.2 | N08°31.4 | 13°33.5 | S05°42.8 | 256°11.2 | N22°54.7 | 357°46.4 | S00°04.1 |
| 13 | 18°00.3 | | 355°49.8 | 32.6 | 28°34.1 | 42.0 | 271°13.6 | 54.7 | 12°48.6 | 04.0 |
| 14 | 33°02.8 | | 10°49.4 | 33.9 | 43°34.8 | 41.3 | 286°15.9 | 54.7 | 27°50.8 | 03.9 |
| 15 | 48°05.2 | | 25°49.0 | · · 35.1 | 58°35.5 | · · 40.5 | 301°18.2 | · · 54.6 | 42°52.9 | · · 03.7 |
| 16 | 63°07.7 | | 40°48.6 | 36.3 | 73°36.1 | 39.7 | 316°20.6 | 54.6 | 57°55.1 | 03.6 |
| 17 | 78°10.2 | | 55°48.2 | 37.5 | 88°36.8 | 38.9 | 331°22.9 | 54.6 | 72°57.3 | 03.5 |
| 18 | 93°12.6 | | 70°47.8 | N08°38.8 | 103°37.4 | S05°38.2 | 346°25.3 | N22°54.6 | 87°59.5 | S00°03.4 |
| 19 | 108°15.1 | | 85°47.4 | 40.0 | 118°38.1 | 37.4 | 1°27.6 | 54.6 | 103°01.7 | 03.2 |
| 20 | 123°17.6 | | 100°47.0 | 41.2 | 133°38.7 | 36.6 | 16°29.9 | 54.6 | 118°03.8 | 03.1 |
| 21 | 138°20.0 | | 115°46.5 | · · 42.4 | 148°39.4 | · · 35.8 | 31°32.3 | · · 54.6 | 133°06.0 | · · 03.0 |
| 22 | 153°22.5 | | 130°46.1 | 43.6 | 163°40.0 | 35.1 | 46°34.6 | 54.6 | 148°08.2 | 02.9 |
| 23 | 168°24.9 | | 145°45.7 | 44.9 | 178°40.7 | 34.3 | 61°36.9 | 54.6 | 163°10.4 | 02.8 |
| Mer.pass. 11:48 | | ν-0.4' d1.2' m-3.92 | | ν0.7' d-0.8' m1.17 | | ν2.3' d-0.0' m-2.25 | | ν2.2' d-0.1' m0.91 | | |

| Stars | | |
|-------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°34.1 | 29°14.0 |
| Ankaa | 353°06.6 | -42°09.9 |
| Schedar | 349°30.5 | 56°40.9 |
| Diphda | 348°46.6 | -17°50.7 |
| Achernar | 335°20.0 | -57°06.3 |
| Hamal | 327°50.4 | 23°35.2 |
| Polaris | 313°53.0 | 89°22.7 |
| Acamar | 315°11.3 | -40°12.1 |
| Menkar | 314°05.3 | 4°11.5 |
| Mirfak | 308°27.2 | 49°57.4 |
| Aldebaran | 290°38.6 | 16°33.7 |
| Rigel | 281°03.0 | -8°10.4 |
| Capella | 280°20.5 | 46°01.6 |
| Bellatrix | 278°21.9 | 6°22.3 |
| Elnath | 278°00.7 | 28°37.8 |
| Alnilam | 275°36.8 | -1°11.2 |
| Betelgeuse | 270°51.0 | 7°24.6 |
| Canopus | 263°51.9 | -52°42.8 |
| Sirius | 258°25.3 | -16°45.3 |
| Adhara | 255°05.0 | -29°00.7 |
| Procyon | 244°49.7 | 5°09.4 |
| Pollux | 243°16.0 | 27°57.8 |
| Avior | 234°14.0 | -59°35.9 |
| Suhail | 222°45.3 | -43°32.5 |
| Miaplacidus | 221°37.5 | -69°49.7 |
| Alphard | 217°46.5 | -8°46.5 |
| Regulus | 207°33.1 | 11°50.2 |
| Dubhe | 193°39.1 | 61°36.6 |
| Denebola | 182°23.6 | 14°25.4 |
| Gienah | 175°42.2 | -17°41.4 |
| Acrux | 172°58.3 | -63°14.7 |
| Gacrux | 171°50.0 | -57°15.7 |
| Alioth | 166°11.5 | 55°48.9 |
| Spica | 158°21.0 | -11°18.1 |
| Alkaid | 152°50.8 | 49°10.7 |
| Hadar | 148°34.1 | -60°29.9 |
| Menkent | 147°56.1 | -36°30.0 |
| Arcturus | 145°46.7 | 19°02.5 |
| Rigel Kent. | 139°38.4 | -60°56.6 |
| Kochab | 137°18.9 | 74°02.5 |
| Zuben'ubi | 136°54.7 | -16°09.2 |
| Alphecca | 126°02.7 | 26°37.3 |
| Antares | 112°14.5 | -26°29.4 |
| Atria | 107°07.6 | -69°04.2 |
| Sabik | 102°01.6 | -15°45.5 |
| Shaula | 96°09.0 | -37°07.3 |
| Rasalhague | 95°57.6 | 12°32.2 |
| Eltanin | 90°41.7 | 51°28.7 |
| Kaus Aust. | 83°31.2 | -34°22.3 |
| Vega | 80°32.6 | 38°48.1 |
| Nunki | 75°46.6 | -26°15.8 |
| Altair | 61°59.1 | 8°56.1 |
| Peacock | 53°04.5 | -56°38.9 |
| Deneb | 49°25.4 | 45°22.1 |
| Enif | 33°38.1 | 9°59.6 |
| Al Na'ir | 27°32.0 | -46°50.0 |
| Fomalhaut | 15°13.8 | -29°29.0 |
| Scheat | 13°44.6 | 28°13.4 |
| Markab | 13°29.2 | 15°20.7 |

| Mar 23 Mon | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 340°44.0 | 13:15 |
| Mars | 12°24.5 | 11:08 |
| Jupiter | 253°20.2 | 19:02 |
| Saturn | 355°05.8 | 12:16 |

| Mar 24 Tue | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 339°35.5 | 13:16 |
| Mars | 11°40.9 | 11:07 |
| Jupiter | 253°17.6 | 18:58 |
| Saturn | 354°58.9 | 12:12 |

| Mar 25 Wed | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 338°26.8 | 13:17 |
| Mars | 10°57.4 | 11:06 |
| Jupiter | 253°14.8 | 18:54 |
| Saturn | 354°52.0 | 12:09 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.1 |
| Mars: | 0.1 |


| h | Sun | | Moon | | | | |
|-----------------------|----------|----------|------------|-------|----------|------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°19.6 | N00°56.5 | 129°12.1 | 5.4' | N23°56.3 | 9.7' | 59.7' |
| 1 | 193°19.8 | 57.5 | 143°36.5 | 5.3' | 24°06.0 | 9.5' | 59.7' |
| 2 | 208°20.0 | 58.5 | 158°00.9 | 5.3' | 24°15.5 | 9.4' | 59.7' |
| 3 | 223°20.1 | 00°59.5 | 172°25.1 | 5.2' | 24°24.9 | 9.2' | 59.7' |
| 4 | 238°20.3 | 01°00.5 | 186°49.3 | 5.1' | 24°34.1 | 9.0' | 59.7' |
| 5 | 253°20.5 | 01.5 | 201°13.4 | 5.0' | 24°43.1 | 8.9' | 59.6' |
| 6 | 268°20.7 | N01°02.4 | 215°37.4 | 4.9' | N24°52.0 | 8.7' | 59.6' |
| 7 | 283°20.9 | 03.4 | 230°01.3 | 4.8' | 25°00.7 | 8.5' | 59.6' |
| 8 | 298°21.1 | 04.4 | 244°25.1 | 4.8' | 25°09.2 | 8.4' | 59.6' |
| 9 | 313°21.3 | · · 05.4 | 258°48.9 | 4.7' | 25°17.6 | 8.2' | 59.6' |
| 10 | 328°21.5 | 06.4 | 273°12.6 | 4.6' | 25°25.8 | 8.0' | 59.6' |
| 11 | 343°21.6 | 07.4 | 287°36.2 | 4.5' | 25°33.8 | 7.9' | 59.6' |
| 12 | 358°21.8 | N01°08.4 | 301°59.7 | 4.4' | N25°41.7 | 7.7' | 59.6' |
| 13 | 13°22.0 | 09.3 | 316°23.1 | 4.4' | 25°49.4 | 7.5' | 59.6' |
| 14 | 28°22.2 | 10.3 | 330°46.5 | 4.3' | 25°56.9 | 7.3' | 59.6' |
| 15 | 43°22.4 | · · 11.3 | 345°09.8 | 4.2' | 26°04.2 | 7.1' | 59.6' |
| 16 | 58°22.6 | 12.3 | 359°33.1 | 4.2' | 26°11.3 | 7.0' | 59.6' |
| 17 | 73°22.8 | 13.3 | 13°56.2 | 4.1' | 26°18.3 | 6.8' | 59.6' |
| 18 | 88°23.0 | N01°14.3 | 28°19.3 | 4.0' | N26°25.1 | 6.6' | 59.6' |
| 19 | 103°23.1 | 15.3 | 42°42.4 | 4.0' | 26°31.7 | 6.4' | 59.6' |
| 20 | 118°23.3 | 16.2 | 57°05.3 | 3.9' | 26°38.1 | 6.2' | 59.6' |
| 21 | 133°23.5 | · · 17.2 | 71°28.3 | 3.9' | 26°44.3 | 6.1' | 59.5' |
| 22 | 148°23.7 | 18.2 | 85°51.1 | 3.8' | 26°50.4 | 5.9' | 59.5' |
| 23 | 163°23.9 | 19.2 | 100°13.9 | 3.8' | 26°56.3 | 5.7' | 59.5' |
| SD = 16.0' $d = 1.0'$ | | | SD = 16.3' | | | | |

| Tue | Sun | | Moon | | | | |
|-----------------------|----------|----------|------------|-------|----------|------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°24.1 | N01°20.2 | 114°36.7 | 3.7' | N27°01.9 | 5.5' | 59.5' |
| 1 | 193°24.3 | 21.2 | 128°59.4 | 3.6' | 27°07.4 | 5.3' | 59.5' |
| 2 | 208°24.5 | 22.2 | 143°22.0 | 3.6' | 27°12.7 | 5.1' | 59.5' |
| 3 | 223°24.6 | · · 23.1 | 157°44.6 | 3.6' | 27°17.8 | 4.9' | 59.5' |
| 4 | 238°24.8 | 24.1 | 172°07.2 | 3.5' | 27°22.7 | 4.7' | 59.5' |
| 5 | 253°25.0 | 25.1 | 186°29.7 | 3.5' | 27°27.5 | 4.5' | 59.5' |
| 6 | 268°25.2 | N01°26.1 | 200°52.2 | 3.4' | N27°32.0 | 4.3' | 59.5' |
| 7 | 283°25.4 | 27.1 | 215°14.6 | 3.4' | 27°36.4 | 4.2' | 59.5' |
| 8 | 298°25.6 | 28.1 | 229°37.0 | 3.4' | 27°40.5 | 4.0' | 59.4' |
| 9 | 313°25.8 | · · 29.0 | 243°59.4 | 3.3' | 27°44.5 | 3.8' | 59.4' |
| 10 | 328°26.0 | 30.0 | 258°21.7 | 3.3' | 27°48.2 | 3.6' | 59.4' |
| 11 | 343°26.1 | 31.0 | 272°44.0 | 3.3' | 27°51.8 | 3.4' | 59.4' |
| 12 | 358°26.3 | N01°32.0 | 287°06.3 | 3.3' | N27°55.2 | 3.2' | 59.4' |
| 13 | 13°26.5 | 33.0 | 301°28.5 | 3.2' | 27°58.3 | 3.0' | 59.4' |
| 14 | 28°26.7 | 34.0 | 315°50.8 | 3.2' | 28°01.3 | 2.8' | 59.4' |
| 15 | 43°26.9 | · · 34.9 | 330°13.0 | 3.2' | 28°04.1 | 2.6' | 59.4' |
| 16 | 58°27.1 | 35.9 | 344°35.2 | 3.2' | 28°06.7 | 2.4' | 59.4' |
| 17 | 73°27.3 | 36.9 | 358°57.4 | 3.2' | 28°09.1 | 2.2' | 59.3' |
| 18 | 88°27.5 | N01°37.9 | 13°19.5 | 3.2' | N28°11.3 | 2.0' | 59.3' |
| 19 | 103°27.6 | 38.9 | 27°41.7 | 3.2' | 28°13.3 | 1.8' | 59.3' |
| 20 | 118°27.8 | 39.9 | 42°03.9 | 3.2' | 28°15.1 | 1.6' | 59.3' |
| 21 | 133°28.0 | · · 40.9 | 56°26.0 | 3.2' | 28°16.7 | 1.4' | 59.3' |
| 22 | 148°28.2 | 41.8 | 70°48.2 | 3.2' | 28°18.1 | 1.2' | 59.3' |
| 23 | 163°28.4 | 42.8 | 85°10.3 | 3.2' | 28°19.3 | 1.0' | 59.3' |
| SD = 16.0' $d = 1.0'$ | | | SD = 16.2' | | | | |

| Wed | Sun | | Moon | | | | |
|-----------------------|----------|----------|------------|-------|----------|-------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°28.6 | N01°43.8 | 99°32.5 | 3.2' | N28°20.3 | 0.8' | 59.3' |
| 1 | 193°28.8 | 44.8 | 113°54.7 | 3.2' | 28°21.1 | 0.6' | 59.2' |
| 2 | 208°29.0 | 45.8 | 128°16.8 | 3.2' | 28°21.7 | 0.4' | 59.2' |
| 3 | 223°29.2 | · · 46.8 | 142°39.0 | 3.2' | 28°22.1 | 0.2' | 59.2' |
| 4 | 238°29.3 | 47.7 | 157°01.2 | 3.2' | 28°22.3 | 0.0' | 59.2' |
| 5 | 253°29.5 | 48.7 | 171°23.4 | 3.2' | 28°22.3 | -0.2' | 59.2' |
| 6 | 268°29.7 | N01°49.7 | 185°45.7 | 3.3' | N28°22.1 | -0.4' | 59.2' |
| 7 | 283°29.9 | 50.7 | 200°08.0 | 3.3' | 28°21.8 | -0.6' | 59.2' |
| 8 | 298°30.1 | 51.7 | 214°30.2 | 3.3' | 28°21.2 | -0.8' | 59.1' |
| 9 | 313°30.3 | · · 52.7 | 228°52.6 | 3.4' | 28°20.4 | -1.0' | 59.1' |
| 10 | 328°30.5 | 53.6 | 243°14.9 | 3.4' | 28°19.5 | -1.2' | 59.1' |
| 11 | 343°30.7 | 54.6 | 257°37.3 | 3.4' | 28°18.3 | -1.4' | 59.1' |
| 12 | 358°30.9 | N01°55.6 | 271°59.7 | 3.5' | N28°16.9 | -1.5' | 59.1' |
| 13 | 13°31.0 | 56.6 | 286°22.2 | 3.5' | 28°15.4 | -1.7' | 59.1' |
| 14 | 28°31.2 | 57.6 | 300°44.7 | 3.5' | 28°13.7 | -1.9' | 59.1' |
| 15 | 43°31.4 | · · 58.5 | 315°07.2 | 3.6' | 28°11.7 | -2.1' | 59.0' |
| 16 | 58°31.6 | 01°59.5 | 329°29.8 | 3.6' | 28°09.6 | -2.3' | 59.0' |
| 17 | 73°31.8 | 02°00.5 | 343°52.4 | 3.7' | 28°07.3 | -2.5' | 59.0' |
| 18 | 88°32.0 | N02°01.5 | 358°15.1 | 3.7' | N28°04.8 | -2.7' | 59.0' |
| 19 | 103°32.2 | 02.5 | 12°37.9 | 3.8' | 28°02.1 | -2.9' | 59.0' |
| 20 | 118°32.4 | 03.5 | 27°00.6 | 3.8' | 27°59.2 | -3.1' | 59.0' |
| 21 | 133°32.5 | · · 04.4 | 41°23.5 | 3.9' | 27°56.1 | -3.3' | 59.0' |
| 22 | 148°32.7 | 05.4 | 55°46.4 | 4.0' | 27°52.9 | -3.4' | 58.9' |
| 23 | 163°32.9 | 06.4 | 70°09.4 | 4.0' | 27°49.4 | -3.6' | 58.9' |
| SD = 16.0' $d = 1.0'$ | | | SD = 16.2' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 02:53 | 04:29 | 05:38 | 18:37 | 19:47 | 21:25 |
| N 70° | 03:17 | 04:39 | 05:41 | 18:34 | 19:37 | 21:00 |
| 68° | 03:34 | 04:47 | 05:43 | 18:31 | 19:28 | 20:42 |
| 66° | 03:48 | 04:53 | 05:45 | 18:29 | 19:21 | 20:27 |
| 64° | 04:00 | 04:59 | 05:47 | 18:27 | 19:15 | 20:15 |
| 62° | 04:09 | 05:04 | 05:48 | 18:26 | 19:10 | 20:06 |
| 60° | 04:17 | 05:08 | 05:50 | 18:24 | 19:06 | 19:57 |
| N 58° | 04:24 | 05:12 | 05:51 | 18:23 | 19:02 | 19:50 |
| 56° | 04:30 | 05:15 | 05:52 | 18:22 | 18:59 | 19:44 |
| 54° | 04:35 | 05:17 | 05:53 | 18:21 | 18:56 | 19:39 |
| 52° | 04:40 | 05:20 | 05:54 | 18:20 | 18:54 | 19:34 |
| 50° | 04:44 | 05:22 | 05:54 | 18:19 | 18:52 | 19:30 |
| 45° | 04:52 | 05:27 | 05:56 | 18:17 | 18:47 | 19:22 |
| N 40° | 04:58 | 05:30 | 05:57 | 18:16 | 18:43 | 19:15 |
| 35° | 05:03 | 05:33 | 05:58 | 18:15 | 18:40 | 19:10 |
| 30° | 05:07 | 05:35 | 05:59 | 18:14 | 18:38 | 19:06 |
| 20° | 05:13 | 05:39 | 06:01 | 18:12 | 18:34 | 19:00 |
| N 10° | 05:17 | 05:41 | 06:02 | 18:11 | 18:32 | 18:56 |
| 0° | 05:18 | 05:42 | 06:03 | 18:09 | 18:30 | 18:54 |
| S 10° | 05:19 | 05:43 | 06:04 | 18:08 | 18:29 | 18:54 |
| 20° | 05:17 | 05:43 | 06:05 | 18:07 | 18:29 | 18:55 |
| 30° | 05:14 | 05:42 | 06:06 | 18:06 | 18:30 | 18:58 |
| 35° | 05:12 | 05:41 | 06:06 | 18:06 | 18:31 | 19:00 |
| 40° | 05:08 | 05:40 | 06:07 | 18:05 | 18:32 | 19:03 |
| 45° | 05:04 | 05:38 | 06:07 | 18:04 | 18:34 | 19:08 |
| S 50° | 04:58 | 05:36 | 06:08 | 18:04 | 18:36 | 19:13 |
| 52° | 04:55 | 05:35 | 06:08 | 18:03 | 18:37 | 19:16 |
| 54° | 04:52 | 05:33 | 06:09 | 18:03 | 18:38 | 19:19 |
| 56° | 04:48 | 05:32 | 06:09 | 18:02 | 18:39 | 19:23 |
| 58° | 04:44 | 05:30 | 06:09 | 18:02 | 18:41 | 19:27 |
| S 60° | 04:39 | 05:28 | 06:10 | 18:02 | 18:43 | 19:32 |

| Lat. | Moonrise | | | Moonset | | |
|-------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| N 70° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64° | 04:57 | <input type="checkbox"/> | <input type="checkbox"/> | 01:53 | <input type="checkbox"/> | <input type="checkbox"/> |
| 62° | 05:38 | 05:29 | <input type="checkbox"/> | 01:13 | 03:30 | <input type="checkbox"/> |
| 60° | 06:06 | 06:22 | 07:07 | 00:45 | 02:38 | 04:06 |
| N 58° | 06:28 | 06:54 | 07:45 | 00:24 | 02:06 | 03:27 |
| 56° | 06:46 | 07:18 | 08:12 | 00:07 | 01:42 | 03:00 |
| 54° | 07:02 | 07:38 | 08:33 | · · · | 01:23 | 02:39 |
| 52° | 07:15 | 07:54 | 08:51 | · · · | 01:07 | 02:21 |
| 50° | 07:27 | 08:08 | 09:06 | · · · | 00:53 | 02:06 |
| 45° | 07:51 | 08:37 | 09:37 | · · · | 00:24 | 01:35 |
| N 40° | 08:11 | 09:00 | 10:00 | · · · | 00:02 | 01:12 |
| 35° | 08:27 | 09:19 | 10:20 | 23:44 | · · · | 00:52 |
| 30° | 08:42 | 09:36 | 10:37 | 23:28 | · · · | 00:35 |
| 20° | 09:06 | 10:03 | 11:05 | 23:01 | · · · | 00:07 |
| N 10° | 09:27 | 10:27 | 11:30 | 22:38 | 23:42 | · · · |
| 0° | 09:47 | 10:49 | 11:52 | 22:17 | 23:19 | · · · |
| S 10° | 10:07 | 11:12 | 12:15 | 21:55 | 22:57 | · · · |
| 20° | 10:29 | 11:36 | 12:40 | 21:32 | 22:32 | 23:36 |
| 30° | 10:54 | 12:04 | 13:08 | 21:06 | 22:04 | 23:08 |
| 35° | 11:09 | 12:21 | 13:25 | 20:50 | 21:47 | 22:51 |
| 40° | 11:27 | 12:40 | 13:44 | 20:32 | 21:27 | 22:32 |
| 45° | 11:48 | 13:04 | 14:08 | 20:10 | 21:03 | 22:08 |
| S 50° | 12:14 | 13:34 | 14:39 | 19:43 | 20:32 | 21:38 |
| 52° | 12:27 | 13:49 | 14:54 | 19:30 | 20:17 | 21:23 |
| 54° | 12:42 | 14:07 | 15:12 | 19:14 | 19:59 | 21:06 |
| 56° | 13:00 | 14:28 | 15:33 | 18:56 | 19:38 | 20:44 |
| 58° | 13:21 | 14:56 | 16:00 | 18:34 | 19:10 | 20:17 |
| S 60° | 13:48 | 15:35 | 16:39 | 18:07 | 18:31 | 19:39 |

| Day | Sun | | | Moon | |  | |
|-----|-----------------|-----------------|-------|-----------|-------|---|--------|
| | Eqn.of Time | | Mer. | Mer.Pass. | | | Age |
| | 00 ^h | 12 ^h | Pass | Upper | Lower | | 4-6 |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | | 20-41% |
| 23 | 06:42 | 06:33 | 12:07 | 16:02 | 03:32 | | |
| 24 | 06:24 | 06:15 | 12:06 | 17:04 | 04:33 | | |
| 25 | 06:06 | 05:57 | 12:06 | 18:07 | 05:36 | | |

March 26, 27, 28 UT (Thu., Fri., Sat.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|----------|
| Thu | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 183°27.4 | | 160°45.3 | N08°46.1 | 193°41.3 | S05°33.5 | 76°39.3 | N22°54.5 | 178°12.5 | S00°02.6 |
| 1 | 198°29.9 | | 175°44.9 | 47.3 | 208°42.0 | 32.7 | 91°41.6 | 54.5 | 193°14.7 | 02.5 |
| 2 | 213°32.3 | | 190°44.5 | 48.5 | 223°42.6 | 32.0 | 106°43.9 | 54.5 | 208°16.9 | 02.4 |
| 3 | 228°34.8 | | 205°44.1 | · · 49.7 | 238°43.3 | · · 31.2 | 121°46.3 | · · 54.5 | 223°19.1 | · · 02.3 |
| 4 | 243°37.3 | | 220°43.7 | 51.0 | 253°44.0 | 30.4 | 136°48.6 | 54.5 | 238°21.3 | 02.1 |
| 5 | 258°39.7 | | 235°43.3 | 52.2 | 268°44.6 | 29.6 | 151°51.0 | 54.5 | 253°23.4 | 02.0 |
| 6 | 273°42.2 | | 250°42.9 | N08°53.4 | 283°45.3 | S05°28.9 | 166°53.3 | N22°54.5 | 268°25.6 | S00°01.9 |
| 7 | 288°44.7 | | 265°42.5 | 54.6 | 298°45.9 | 28.1 | 181°55.6 | 54.5 | 283°27.8 | 01.8 |
| 8 | 303°47.1 | | 280°42.1 | 55.8 | 313°46.6 | 27.3 | 196°58.0 | 54.4 | 298°30.0 | 01.6 |
| 9 | 318°49.6 | | 295°41.7 | · · 57.0 | 328°47.2 | · · 26.5 | 212°00.3 | · · 54.4 | 313°32.1 | · · 01.5 |
| 10 | 333°52.1 | | 310°41.3 | 58.3 | 343°47.9 | 25.8 | 227°02.6 | 54.4 | 328°34.3 | 01.4 |
| 11 | 348°54.5 | | 325°40.8 | 08°59.5 | 358°48.5 | 25.0 | 242°05.0 | 54.4 | 343°36.5 | 01.3 |
| 12 | 3°57.0 | | 340°40.4 | N09°00.7 | 13°49.2 | S05°24.2 | 257°07.3 | N22°54.4 | 358°38.7 | S00°01.2 |
| 13 | 18°59.4 | | 355°40.0 | 01.9 | 28°49.8 | 23.4 | 272°09.6 | 54.4 | 13°40.8 | 01.0 |
| 14 | 34°01.9 | | 10°39.6 | 03.1 | 43°50.5 | 22.7 | 287°11.9 | 54.4 | 28°43.0 | 00.9 |
| 15 | 49°04.4 | | 25°39.2 | · · 04.3 | 58°51.2 | · · 21.9 | 302°14.3 | · · 54.4 | 43°45.2 | · · 00.8 |
| 16 | 64°06.8 | | 40°38.8 | 05.6 | 73°51.8 | 21.1 | 317°16.6 | 54.3 | 58°47.4 | 00.7 |
| 17 | 79°09.3 | | 55°38.4 | 06.8 | 88°52.5 | 20.3 | 332°18.9 | 54.3 | 73°49.6 | 00.5 |
| 18 | 94°11.8 | | 70°38.0 | N09°08.0 | 103°53.1 | S05°19.6 | 347°21.3 | N22°54.3 | 88°51.7 | S00°00.4 |
| 19 | 109°14.2 | | 85°37.6 | 09.2 | 118°53.8 | 18.8 | 2°23.6 | 54.3 | 103°53.9 | 00.3 |
| 20 | 124°16.7 | | 100°37.1 | 10.4 | 133°54.4 | 18.0 | 17°25.9 | 54.3 | 118°56.1 | 00.2 |
| 21 | 139°19.2 | | 115°36.7 | · · 11.6 | 148°55.1 | · · 17.2 | 32°28.3 | · · 54.3 | 133°58.3 | S00°00.1 |
| 22 | 154°21.6 | | 130°36.3 | 12.8 | 163°55.8 | 16.5 | 47°30.6 | 54.3 | 149°00.4 | N00°00.1 |
| 23 | 169°24.1 | | 145°35.9 | 14.1 | 178°56.4 | 15.7 | 62°32.9 | 54.3 | 164°02.6 | 00.2 |
| Mer.pass. 11:44 | | ν-0.4' d1.2' m-3.92 | | ν0.7' d-0.8' m1.17 | | ν2.3' d-0.0' m-2.25 | | ν2.2' d-0.1' m0.91 | | |
| Fri | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 184°26.6 | | 160°35.5 | N09°15.3 | 193°57.1 | S05°14.9 | 77°35.2 | N22°54.2 | 179°04.8 | N00°00.3 |
| 1 | 199°29.0 | | 175°35.1 | 16.5 | 208°57.7 | 14.1 | 92°37.6 | 54.2 | 194°07.0 | 00.4 |
| 2 | 214°31.5 | | 190°34.7 | 17.7 | 223°58.4 | 13.4 | 107°39.9 | 54.2 | 209°09.2 | 00.6 |
| 3 | 229°33.9 | | 205°34.3 | · · 18.9 | 238°59.0 | · · 12.6 | 122°42.2 | · · 54.2 | 224°11.3 | · · 00.7 |
| 4 | 244°36.4 | | 220°33.8 | 20.1 | 253°59.7 | 11.8 | 137°44.6 | 54.2 | 239°13.5 | 00.8 |
| 5 | 259°38.9 | | 235°33.4 | 21.3 | 269°00.4 | 11.0 | 152°46.9 | 54.2 | 254°15.7 | 00.9 |
| 6 | 274°41.3 | | 250°33.0 | N09°22.5 | 284°01.0 | S05°10.3 | 167°49.2 | N22°54.2 | 269°17.9 | N00°01.0 |
| 7 | 289°43.8 | | 265°32.6 | 23.7 | 299°01.7 | 09.5 | 182°51.5 | 54.2 | 284°20.0 | 01.2 |
| 8 | 304°46.3 | | 280°32.2 | 24.9 | 314°02.3 | 08.7 | 197°53.9 | 54.1 | 299°22.2 | 01.3 |
| 9 | 319°48.7 | | 295°31.8 | · · 26.1 | 329°03.0 | · · 07.9 | 212°56.2 | · · 54.1 | 314°24.4 | · · 01.4 |
| 10 | 334°51.2 | | 310°31.4 | 27.4 | 344°03.6 | 07.2 | 227°58.5 | 54.1 | 329°26.6 | 01.5 |
| 11 | 349°53.7 | | 325°30.9 | 28.6 | 359°04.3 | 06.4 | 243°00.8 | 54.1 | 344°28.7 | 01.7 |
| 12 | 4°56.1 | | 340°30.5 | N09°29.8 | 14°05.0 | S05°05.6 | 258°03.2 | N22°54.1 | 359°30.9 | N00°01.8 |
| 13 | 19°58.6 | | 355°30.1 | 31.0 | 29°05.6 | 04.8 | 273°05.5 | 54.1 | 14°33.1 | 01.9 |
| 14 | 35°01.0 | | 10°29.7 | 32.2 | 44°06.3 | 04.1 | 288°07.8 | 54.1 | 29°35.3 | 02.0 |
| 15 | 50°03.5 | | 25°29.3 | · · 33.4 | 59°06.9 | · · 03.3 | 303°10.1 | · · 54.1 | 44°37.5 | · · 02.2 |
| 16 | 65°06.0 | | 40°28.9 | 34.6 | 74°07.6 | 02.5 | 318°12.4 | 54.0 | 59°39.6 | 02.3 |
| 17 | 80°08.4 | | 55°28.4 | 35.8 | 89°08.2 | 01.7 | 333°14.8 | 54.0 | 74°41.8 | 02.4 |
| 18 | 95°10.9 | | 70°28.0 | N09°37.0 | 104°08.9 | S05°00.9 | 348°17.1 | N22°54.0 | 89°44.0 | N00°02.5 |
| 19 | 110°13.4 | | 85°27.6 | 38.2 | 119°09.6 | 05°00.2 | 3°19.4 | 54.0 | 104°46.2 | 02.6 |
| 20 | 125°15.8 | | 100°27.2 | 39.4 | 134°10.2 | 04°59.4 | 18°21.7 | 54.0 | 119°48.3 | 02.8 |
| 21 | 140°18.3 | | 115°26.8 | · · 40.6 | 149°10.9 | · · 58.6 | 33°24.1 | · · 54.0 | 134°50.5 | · · 02.9 |
| 22 | 155°20.8 | | 130°26.4 | 41.8 | 164°11.5 | 57.8 | 48°26.4 | 54.0 | 149°52.7 | 03.0 |
| 23 | 170°23.2 | | 145°25.9 | 43.0 | 179°12.2 | 57.1 | 63°28.7 | 53.9 | 164°54.9 | 03.1 |
| Mer.pass. 11:40 | | ν-0.4' d1.2' m-3.92 | | ν0.7' d-0.8' m1.18 | | ν2.3' d-0.0' m-2.24 | | ν2.2' d0.1' m0.91 | | |
| Sat | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 185°25.7 | | 160°25.5 | N09°44.2 | 194°12.9 | S04°56.3 | 78°31.0 | N22°53.9 | 179°57.1 | N00°03.3 |
| 1 | 200°28.2 | | 175°25.1 | 45.4 | 209°13.5 | 55.5 | 93°33.3 | 53.9 | 194°59.2 | 03.4 |
| 2 | 215°30.6 | | 190°24.7 | 46.6 | 224°14.2 | 54.7 | 108°35.7 | 53.9 | 210°01.4 | 03.5 |
| 3 | 230°33.1 | | 205°24.3 | · · 47.8 | 239°14.8 | · · 54.0 | 123°38.0 | · · 53.9 | 225°03.6 | · · 03.6 |
| 4 | 245°35.5 | | 220°23.8 | 49.0 | 254°15.5 | 53.2 | 138°40.3 | 53.9 | 240°05.8 | 03.7 |
| 5 | 260°38.0 | | 235°23.4 | 50.2 | 269°16.2 | 52.4 | 153°42.6 | 53.9 | 255°07.9 | 03.9 |
| 6 | 275°40.5 | | 250°23.0 | N09°51.4 | 284°16.8 | S04°51.6 | 168°44.9 | N22°53.8 | 270°10.1 | N00°04.0 |
| 7 | 290°42.9 | | 265°22.6 | 52.6 | 299°17.5 | 50.8 | 183°47.2 | 53.8 | 285°12.3 | 04.1 |
| 8 | 305°45.4 | | 280°22.2 | 53.8 | 314°18.1 | 50.1 | 198°49.6 | 53.8 | 300°14.5 | 04.2 |
| 9 | 320°47.9 | | 295°21.7 | · · 55.0 | 329°18.8 | · · 49.3 | 213°51.9 | · · 53.8 | 315°16.7 | · · 04.4 |
| 10 | 335°50.3 | | 310°21.3 | 56.2 | 344°19.5 | 48.5 | 228°54.2 | 53.8 | 330°18.8 | 04.5 |
| 11 | 350°52.8 | | 325°20.9 | 57.4 | 359°20.1 | 47.7 | 243°56.5 | 53.8 | 345°21.0 | 04.6 |
| 12 | 5°55.3 | | 340°20.5 | N09°58.6 | 14°20.8 | S04°47.0 | 258°58.8 | N22°53.8 | 0°23.2 | N00°04.7 |
| 13 | 20°57.7 | | 355°20.0 | 09°59.8 | 29°21.4 | 46.2 | 274°01.1 | 53.8 | 15°25.4 | 04.8 |
| 14 | 36°00.2 | | 10°19.6 | 10°01.0 | 44°22.1 | 45.4 | 289°03.5 | 53.7 | 30°27.5 | 05.0 |
| 15 | 51°02.7 | | 25°19.2 | · · 02.2 | 59°22.8 | · · 44.6 | 304°05.8 | · · 53.7 | 45°29.7 | · · 05.1 |
| 16 | 66°05.1 | | 40°18.8 | 03.4 | 74°23.4 | 43.8 | 319°08.1 | 53.7 | 60°31.9 | 05.2 |
| 17 | 81°07.6 | | 55°18.3 | 04.6 | 89°24.1 | 43.1 | 334°10.4 | 53.7 | 75°34.1 | 05.3 |
| 18 | 96°10.0 | | 70°17.9 | N10°05.8 | 104°24.7 | S04°42.3 | 349°12.7 | N22°53.7 | 90°36.2 | N00°05.5 |
| 19 | 111°12.5 | | 85°17.5 | 07.0 | 119°25.4 | 41.5 | 4°15.0 | 53.7 | 105°38.4 | 05.6 |
| 20 | 126°15.0 | | 100°17.1 | 08.2 | 134°26.1 | 40.7 | 19°17.4 | 53.7 | 120°40.6 | 05.7 |
| 21 | 141°17.4 | | 115°16.7 | · · 09.4 | 149°26.7 | · · 40.0 | 34°19.7 | · · 53.6 | 135°42.8 | · · 05.8 |
| 22 | 156°19.9 | | 130°16.2 | 10.6 | 164°27.4 | 39.2 | 49°22.0 | 53.6 | 150°45.0 | 05.9 |
| 23 | 171°22.4 | | 145°15.8 | 11.8 | 179°28.0 | 38.4 | 64°24.3 | 53.6 | 165°47.1 | 06.1 |
| Mer.pass. 11:36 | | ν-0.4' d1.2' m-3.92 | | ν0.7' d-0.8' m1.18 | | ν2.3' d-0.0' m-2.23 | | ν2.2' d0.1' m0.91 | | |

| Stars | | |
|---------------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°34.1 | 29°14.0 |
| Ankaa | 353°06.6 | -42°09.9 |
| Schedar | 349°30.5 | 56°40.9 |
| Diphda | 348°46.6 | -17°50.6 |
| Achernar | 335°20.0 | -57°06.3 |
| Hamal | 327°50.4 | 23°35.2 |
| Polaris | 313°53.7 | 89°22.7 |
| Acamar | 315°11.3 | -40°12.1 |
| Menkar | 314°05.3 | 4°11.5 |
| Mirfak | 308°27.2 | 49°57.4 |
| Aldebaran | 290°38.6 | 16°33.7 |
| Rigel | 281°03.0 | -8°10.4 |
| Capella | 280°20.5 | 46°01.6 |
| Bellatrix | 278°21.9 | 6°22.3 |
| Elnath | 278°00.7 | 28°37.8 |
| Alnilam | 275°36.8 | -1°11.2 |
| Betelgeuse | 270°51.0 | 7°24.6 |
| Canopus | 263°52.0 | -52°42.8 |
| Sirius | 258°25.3 | -16°45.3 |
| Adhara | 255°05.0 | -29°00.7 |
| Procyon | 244°49.7 | 5°09.4 |
| Pollux | 243°16.0 | 27°57.8 |
| Avior | 234°14.1 | -59°35.9 |
| Suhail | 222°45.3 | -43°32.6 |
| Miaplacidus | 221°37.5 | -69°49.7 |
| Alphard | 217°46.5 | -8°46.5 |
| Regulus | 207°33.1 | 11°50.2 |
| Dubhe | 193°39.1 | 61°36.6 |
| Denebola | 182°23.6 | 14°25.4 |
| Gienah | 175°42.2 | -17°41.4 |
| Acrux | 172°58.3 | -63°14.8 |
| Gacrux | 171°50.0 | -57°15.7 |
| Alioth | 166°11.5 | 55°48.9 |
| Spica | 158°20.9 | -11°18.1 |
| Alkaid | 152°50.7 | 49°10.7 |
| Hadar | 148°34.0 | -60°30.0 |
| Menkent | 147°56.1 | -36°30.0 |
| Arcturus | 145°46.7 | 19°02.5 |
| Rigel Kent. | 139°38.4 | -60°56.6 |
| Kochab | 137°18.9 | 74°02.5 |
| Zuben'ubi | 136°54.6 | -16°09.2 |
| Alphecca | 126°02.6 | 26°37.3 |
| Antares | 112°14.4 | -26°29.4 |
| Atria | 107°07.6 | -69°04.2 |
| Sabik | 102°01.5 | -15°45.5 |
| Shaula | 96°08.9 | -37°07.3 |
| Rasalhague | 95°57.5 | 12°32.2 |
| Eltanin | 90°41.6 | 51°28.7 |
| Kaus Aust. | 83°31.2 | -34°22.3 |
| Vega | 80°32.6 | 38°48.1 |
| Nunki | 75°46.6 | -26°15.8 |
| Altair | 61°59.1 | 8°56.1 |
| Peacock | 53°04.4 | -56°38.9 |
| Deneb | 49°25.4 | 45°22.1 |
| Enif | 33°38.1 | 9°59.6 |
| Al Na'ir | 27°32.0 | -46°50.0 |
| Fomalhaut | 15°13.7 | -29°29.0 |
| Scheat | 13°44.6 | 28°13.4 |
| Markab | 13°29.2 | 15°20.7 |
| | | |
| Mar 26 Thu | SHA | Mer.pass |
| Venus | 337°17.9 | 13:17 |
| Mars | 10°13.9 | 11:05 |
| Jupiter | 253°11.9 | 18:50 |
| Saturn | 354°45.1 | 12:05 |
| | | |
| Mar 27 Fri | SHA | Mer.pass |
| Venus | 336°08.9 | 13:18 |
| Mars | 9°30.5 | 11:04 |
| Jupiter | 253°08.7 | 18:47 |
| Saturn | 354°38.2 | 12:02 |
| | | |
| Mar 28 Sat | SHA | Mer.pass |
| Venus | 334°59.8 | 13:19 |
| Mars | 8°47.2 | 11:03 |
| Jupiter | 253°05.3 | 18:43 |
| Saturn | 354°31.4 | 11:58 |
| | | |
| Horizontal parallax | | |
| Venus: | 0.1 | |
| Mars: | 0.1 | |


| h | | Sun | | Moon | | | |
|------------|----------|------------|------------|-------|----------|-------|-------|
| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°33.1 | N02°07.4 | 84°32.4 | 4.1' | N27°45.8 | -3.8' | 58.9' |
| 1 | 193°33.3 | 08.4 | 98°55.5 | 4.2' | 27°42.0 | -4.0' | 58.9' |
| 2 | 208°33.5 | 09.3 | 113°18.7 | 4.2' | 27°38.0 | -4.2' | 58.9' |
| 3 | 223°33.7 | 10.3 | 127°41.9 | 4.3' | 27°33.8 | -4.4' | 58.9' |
| 4 | 238°33.9 | 11.3 | 142°05.2 | 4.4' | 27°29.4 | -4.5' | 58.8' |
| 5 | 253°34.1 | 12.3 | 156°28.6 | 4.5' | 27°24.9 | -4.7' | 58.8' |
| 6 | 268°34.2 | N02°13.3 | 170°52.0 | 4.5' | N27°20.2 | -4.9' | 58.8' |
| 7 | 283°34.4 | 14.2 | 185°15.6 | 4.6' | 27°15.3 | -5.1' | 58.8' |
| 8 | 298°34.6 | 15.2 | 199°39.2 | 4.7' | 27°10.2 | -5.2' | 58.8' |
| 9 | 313°34.8 | 16.2 | 214°02.9 | 4.8' | 27°05.0 | -5.4' | 58.8' |
| 10 | 328°35.0 | 17.2 | 228°26.7 | 4.9' | 26°59.5 | -5.6' | 58.7' |
| 11 | 343°35.2 | 18.2 | 242°50.5 | 4.9' | 26°53.9 | -5.8' | 58.7' |
| 12 | 358°35.4 | N02°19.2 | 257°14.5 | 5.0' | N26°48.2 | -5.9' | 58.7' |
| 13 | 13°35.6 | 20.1 | 271°38.5 | 5.1' | 26°42.2 | -6.1' | 58.7' |
| 14 | 28°35.8 | 21.1 | 286°02.6 | 5.2' | 26°36.1 | -6.3' | 58.7' |
| 15 | 43°35.9 | 22.1 | 300°26.8 | 5.3' | 26°29.9 | -6.4' | 58.7' |
| 16 | 58°36.1 | 23.1 | 314°51.1 | 5.4' | 26°23.4 | -6.6' | 58.6' |
| 17 | 73°36.3 | 24.1 | 329°15.5 | 5.5' | 26°16.8 | -6.8' | 58.6' |
| 18 | 88°36.5 | N02°25.0 | 343°40.0 | 5.6' | N26°10.0 | -6.9' | 58.6' |
| 19 | 103°36.7 | 26.0 | 358°04.6 | 5.7' | 26°03.1 | -7.1' | 58.6' |
| 20 | 118°36.9 | 27.0 | 12°29.3 | 5.8' | 25°56.0 | -7.2' | 58.6' |
| 21 | 133°37.1 | 28.0 | 26°54.0 | 5.9' | 25°48.8 | -7.4' | 58.6' |
| 22 | 148°37.3 | 29.0 | 41°18.9 | 6.0' | 25°41.4 | -7.6' | 58.5' |
| 23 | 163°37.5 | 29.9 | 55°43.9 | 6.1' | 25°33.8 | -7.7' | 58.5' |
| SD = 16.0' | | $d = 1.0'$ | SD = 16.1' | | | | |

| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|------------|------------|-------|----------|--------|-------|
| 0 | 178°37.6 | N02°30.9 | 70°09.0 | 6.2' | N25°26.1 | -7.9' | 58.5' |
| 1 | 193°37.8 | 31.9 | 84°34.1 | 6.3' | 25°18.2 | -8.0' | 58.5' |
| 2 | 208°38.0 | 32.9 | 98°59.4 | 6.4' | 25°10.2 | -8.2' | 58.5' |
| 3 | 223°38.2 | 33.8 | 113°24.8 | 6.5' | 25°02.0 | -8.3' | 58.5' |
| 4 | 238°38.4 | 34.8 | 127°50.3 | 6.6' | 24°53.7 | -8.5' | 58.4' |
| 5 | 253°38.6 | 35.8 | 142°15.9 | 6.7' | 24°45.3 | -8.6' | 58.4' |
| 6 | 268°38.8 | N02°36.8 | 156°41.5 | 6.8' | N24°36.6 | -8.8' | 58.4' |
| 7 | 283°39.0 | 37.8 | 171°07.3 | 6.9' | 24°27.9 | -8.9' | 58.4' |
| 8 | 298°39.2 | 38.7 | 185°33.2 | 7.0' | 24°19.0 | -9.0' | 58.4' |
| 9 | 313°39.3 | 39.7 | 199°59.3 | 7.1' | 24°10.0 | -9.2' | 58.4' |
| 10 | 328°39.5 | 40.7 | 214°25.4 | 7.2' | 24°00.8 | -9.3' | 58.3' |
| 11 | 343°39.7 | 41.7 | 228°51.6 | 7.3' | 23°51.5 | -9.4' | 58.3' |
| 12 | 358°39.9 | N02°42.7 | 243°17.9 | 7.4' | N23°42.0 | -9.6' | 58.3' |
| 13 | 13°40.1 | 43.6 | 257°44.4 | 7.5' | 23°32.4 | -9.7' | 58.3' |
| 14 | 28°40.3 | 44.6 | 272°10.9 | 7.7' | 23°22.7 | -9.8' | 58.3' |
| 15 | 43°40.5 | 45.6 | 286°37.6 | 7.8' | 23°12.9 | -10.0' | 58.2' |
| 16 | 58°40.7 | 46.6 | 301°04.4 | 7.9' | 23°02.9 | -10.1' | 58.2' |
| 17 | 73°40.9 | 47.5 | 315°31.2 | 8.0' | 22°52.8 | -10.2' | 58.2' |
| 18 | 88°41.0 | N02°48.5 | 329°58.2 | 8.1' | N22°42.6 | -10.4' | 58.2' |
| 19 | 103°41.2 | 49.5 | 344°25.3 | 8.2' | 22°32.2 | -10.5' | 58.2' |
| 20 | 118°41.4 | 50.5 | 358°52.5 | 8.3' | 22°21.8 | -10.6' | 58.2' |
| 21 | 133°41.6 | 51.5 | 13°19.8 | 8.4' | 22°11.2 | -10.7' | 58.1' |
| 22 | 148°41.8 | 52.4 | 27°47.2 | 8.5' | 22°00.4 | -10.8' | 58.1' |
| 23 | 163°42.0 | 53.4 | 42°14.8 | 8.6' | 21°49.6 | -10.9' | 58.1' |
| SD = 16.0' | | $d = 1.0'$ | SD = 16.0' | | | | |

| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|------------|------------|-------|----------|--------|-------|
| 0 | 178°42.2 | N02°54.4 | 56°42.4 | 8.7' | N21°38.7 | -11.1' | 58.1' |
| 1 | 193°42.4 | 55.4 | 71°10.1 | 8.9' | 21°27.6 | -11.2' | 58.1' |
| 2 | 208°42.6 | 56.3 | 85°38.0 | 9.0' | 21°16.4 | -11.3' | 58.0' |
| 3 | 223°42.8 | 57.3 | 100°06.0 | 9.1' | 21°05.2 | -11.4' | 58.0' |
| 4 | 238°42.9 | 58.3 | 114°34.0 | 9.2' | 20°53.8 | -11.5' | 58.0' |
| 5 | 253°43.1 | 02°59.3 | 129°02.2 | 9.3' | 20°42.3 | -11.6' | 58.0' |
| 6 | 268°43.3 | N03°00.2 | 143°30.5 | 9.4' | N20°30.7 | -11.7' | 58.0' |
| 7 | 283°43.5 | 01.2 | 157°58.9 | 9.5' | 20°18.9 | -11.8' | 57.9' |
| 8 | 298°43.7 | 02.2 | 172°27.4 | 9.6' | 20°07.1 | -11.9' | 57.9' |
| 9 | 313°43.9 | 03.2 | 186°56.0 | 9.7' | 19°55.2 | -12.0' | 57.9' |
| 10 | 328°44.1 | 04.2 | 201°24.7 | 9.8' | 19°43.2 | -12.1' | 57.9' |
| 11 | 343°44.3 | 05.1 | 215°53.5 | 9.9' | 19°31.1 | -12.2' | 57.9' |
| 12 | 358°44.5 | N03°06.1 | 230°22.4 | 10.0' | N19°18.9 | -12.3' | 57.9' |
| 13 | 13°44.6 | 07.1 | 244°51.4 | 10.1' | 19°06.6 | -12.4' | 57.8' |
| 14 | 28°44.8 | 08.1 | 259°20.5 | 10.2' | 18°54.2 | -12.5' | 57.8' |
| 15 | 43°45.0 | 09.0 | 273°49.7 | 10.3' | 18°41.7 | -12.6' | 57.8' |
| 16 | 58°45.2 | 10.0 | 288°19.1 | 10.4' | 18°29.1 | -12.7' | 57.8' |
| 17 | 73°45.4 | 11.0 | 302°48.5 | 10.5' | 18°16.5 | -12.8' | 57.8' |
| 18 | 88°45.6 | N03°12.0 | 317°18.0 | 10.6' | N18°03.7 | -12.8' | 57.7' |
| 19 | 103°45.8 | 12.9 | 331°47.6 | 10.7' | 17°50.9 | -12.9' | 57.7' |
| 20 | 118°46.0 | 13.9 | 346°17.4 | 10.8' | 17°37.9 | -13.0' | 57.7' |
| 21 | 133°46.2 | 14.9 | 0°47.2 | 10.9' | 17°24.9 | -13.1' | 57.7' |
| 22 | 148°46.3 | 15.9 | 15°17.1 | 11.0' | 17°11.9 | -13.2' | 57.7' |
| 23 | 163°46.5 | 16.8 | 29°47.1 | 11.1' | 16°58.7 | -13.2' | 57.6' |
| SD = 16.0' | | $d = 1.0'$ | SD = 15.8' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 02:29 | 04:11 | 05:22 | 18:51 | 20:03 | 21:49 |
| N 70° | 02:57 | 04:24 | 05:27 | 18:46 | 19:50 | 21:18 |
| 68° | 03:18 | 04:33 | 05:31 | 18:42 | 19:40 | 20:56 |
| 66° | 03:34 | 04:41 | 05:34 | 18:39 | 19:32 | 20:40 |
| 64° | 03:47 | 04:48 | 05:36 | 18:36 | 19:25 | 20:26 |
| 62° | 03:58 | 04:54 | 05:39 | 18:34 | 19:19 | 20:15 |
| 60° | 04:07 | 04:59 | 05:41 | 18:32 | 19:14 | 20:06 |
| N 58° | 04:15 | 05:03 | 05:42 | 18:30 | 19:09 | 19:58 |
| 56° | 04:21 | 05:06 | 05:44 | 18:28 | 19:06 | 19:51 |
| 54° | 04:27 | 05:10 | 05:45 | 18:26 | 19:02 | 19:45 |
| 52° | 04:32 | 05:13 | 05:47 | 18:25 | 18:59 | 19:40 |
| 50° | 04:37 | 05:15 | 05:48 | 18:24 | 18:56 | 19:35 |
| 45° | 04:46 | 05:21 | 05:50 | 18:21 | 18:51 | 19:26 |
| N 40° | 04:53 | 05:25 | 05:52 | 18:19 | 18:46 | 19:18 |
| 35° | 04:59 | 05:29 | 05:54 | 18:17 | 18:43 | 19:12 |
| 30° | 05:04 | 05:32 | 05:56 | 18:16 | 18:40 | 19:08 |
| 20° | 05:10 | 05:36 | 05:58 | 18:13 | 18:35 | 19:01 |
| N 10° | 05:15 | 05:39 | 06:00 | 18:11 | 18:32 | 18:56 |
| 0° | 05:17 | 05:41 | 06:02 | 18:09 | 18:29 | 18:53 |
| S 10° | 05:19 | 05:43 | 06:04 | 18:07 | 18:28 | 18:52 |
| 20° | 05:18 | 05:44 | 06:06 | 18:05 | 18:27 | 18:52 |
| 30° | 05:16 | 05:44 | 06:08 | 18:03 | 18:26 | 18:54 |
| 35° | 05:14 | 05:43 | 06:09 | 18:01 | 18:27 | 18:56 |
| 40° | 05:11 | 05:43 | 06:10 | 18:00 | 18:27 | 18:59 |
| 45° | 05:08 | 05:42 | 06:11 | 17:59 | 18:28 | 19:02 |
| S 50° | 05:03 | 05:41 | 06:13 | 17:57 | 18:29 | 19:07 |
| 52° | 05:00 | 05:40 | 06:13 | 17:56 | 18:30 | 19:09 |
| 54° | 04:58 | 05:39 | 06:14 | 17:55 | 18:31 | 19:12 |
| 56° | 04:54 | 05:38 | 06:15 | 17:55 | 18:31 | 19:15 |
| 58° | 04:51 | 05:37 | 06:16 | 17:54 | 18:33 | 19:18 |
| S 60° | 04:46 | 05:35 | 06:17 | 17:52 | 18:34 | 19:22 |

| Lat. | Moonrise | | | Moonset | | |
|-------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| N 70° | <input type="checkbox"/> | <input type="checkbox"/> | 09:10 | <input type="checkbox"/> | <input type="checkbox"/> | 08:13 |
| 68° | <input type="checkbox"/> | <input type="checkbox"/> | 10:31 | <input type="checkbox"/> | <input type="checkbox"/> | 06:50 |
| 66° | <input type="checkbox"/> | <input type="checkbox"/> | 11:08 | <input type="checkbox"/> | <input type="checkbox"/> | 06:12 |
| 64° | <input type="checkbox"/> | 09:18 | 11:35 | <input type="checkbox"/> | 06:09 | 05:44 |
| 62° | 07:46 | 09:57 | 11:55 | 05:37 | 05:29 | 05:23 |
| 60° | 08:36 | 10:24 | 12:11 | 04:47 | 05:01 | 05:06 |
| N 58° | 09:07 | 10:45 | 12:25 | 04:15 | 04:39 | 04:51 |
| 56° | 09:30 | 11:02 | 12:37 | 03:52 | 04:21 | 04:39 |
| 54° | 09:49 | 11:17 | 12:47 | 03:32 | 04:06 | 04:28 |
| 52° | 10:05 | 11:30 | 12:56 | 03:16 | 03:53 | 04:18 |
| 50° | 10:19 | 11:41 | 13:04 | 03:02 | 03:41 | 04:09 |
| 45° | 10:47 | 12:04 | 13:21 | 02:33 | 03:17 | 03:50 |
| N 40° | 11:09 | 12:22 | 13:35 | 02:10 | 02:58 | 03:35 |
| 35° | 11:28 | 12:38 | 13:47 | 01:52 | 02:41 | 03:22 |
| 30° | 11:43 | 12:51 | 13:58 | 01:35 | 02:27 | 03:11 |
| 20° | 12:10 | 13:14 | 14:15 | 01:08 | 02:03 | 02:51 |
| N 10° | 12:33 | 13:33 | 14:30 | 00:44 | 01:42 | 02:34 |
| 0° | 12:54 | 13:52 | 14:45 | 00:22 | 01:22 | 02:17 |
| S 10° | 13:15 | 14:10 | 14:59 | 00:00 | 01:02 | 02:01 |
| 20° | 13:38 | 14:29 | 15:14 | | 00:41 | 01:44 |
| 30° | 14:04 | 14:51 | 15:31 | | 00:16 | 01:23 |
| 35° | 14:19 | 15:04 | 15:41 | | 00:01 | 01:11 |
| 40° | 14:37 | 15:19 | 15:53 | 23:44 | | 00:57 |
| 45° | 14:59 | 15:37 | 16:06 | 23:23 | | 00:41 |
| S 50° | 15:26 | 15:59 | 16:22 | 22:57 | | 00:20 |
| 52° | 15:39 | 16:09 | 16:29 | 22:44 | | 00:11 |
| 54° | 15:54 | 16:21 | 16:38 | 22:29 | | 00:00 |
| 56° | 16:12 | 16:34 | 16:47 | 22:12 | 23:47 | |
| 58° | 16:33 | 16:49 | 16:58 | 21:51 | 23:32 | |
| S 60° | 17:01 | 17:08 | 17:10 | 21:24 | 23:15 | |

| Day | Sun | | Mer. Pass | Moon | | Age 7-9 52-74% |
|-----|-------------------------------|----------------------------|-----------|------------------------|-------------|---|
| | Eqn. of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer. Pass. Upper hh:mm | Lower hh:mm | |
| 26 | 05:48 | 05:38 | 12:06 | 19:08 | 06:38 |  |
| 27 | 05:29 | 05:20 | 12:05 | 20:05 | 07:37 | |
| 28 | 05:11 | 05:02 | 12:05 | 20:57 | 08:31 | |

March 29, 30, 31 UT (Sun., Mon., Tue.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|---------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---------|-----|-----|--------|--|--|
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 186°24.8 | 160°15.4 | N10°13.0 | 194°28.7 | S04°37.6 | 79°26.6 | N22°53.6 | 180°49.3 | N00°06.2 | | | | | | |
| 1 | 201°27.3 | 175°14.9 | 14.2 | 209°29.4 | 36.8 | 94°28.9 | 53.6 | 195°51.5 | 06.3 | | | | | | |
| 2 | 216°29.8 | 190°14.5 | 15.4 | 224°30.0 | 36.1 | 109°31.2 | 53.6 | 210°53.7 | 06.4 | | | | | | |
| 3 | 231°32.2 | 205°14.1 | •• 16.5 | 239°30.7 | •• 35.3 | 124°33.5 | •• 53.5 | 225°55.8 | •• 06.6 | | | | | | |
| 4 | 246°34.7 | 220°13.7 | 17.7 | 254°31.4 | 34.5 | 139°35.8 | 53.5 | 240°58.0 | 06.7 | | | | | | |
| 5 | 261°37.2 | 235°13.2 | 18.9 | 269°32.0 | 33.7 | 154°38.2 | 53.5 | 256°00.2 | 06.8 | | | | | | |
| 6 | 276°39.6 | 250°12.8 | N10°20.1 | 284°32.7 | S04°32.9 | 169°40.5 | N22°53.5 | 271°02.4 | N00°06.9 | | | | | | |
| 7 | 291°42.1 | 265°12.4 | 21.3 | 299°33.3 | 32.2 | 184°42.8 | 53.5 | 286°04.6 | 07.0 | | | | | | |
| 8 | 306°44.5 | 280°12.0 | 22.5 | 314°34.0 | 31.4 | 199°45.1 | 53.5 | 301°06.7 | 07.2 | | | | | | |
| 9 | 321°47.0 | 295°11.5 | •• 23.7 | 329°34.7 | •• 30.6 | 214°47.4 | •• 53.5 | 316°08.9 | •• 07.3 | | | | | | |
| 10 | 336°49.5 | 310°11.1 | 24.9 | 344°35.3 | 29.8 | 229°49.7 | 53.4 | 331°11.1 | 07.4 | | | | | | |
| 11 | 351°51.9 | 325°10.7 | 26.1 | 359°36.0 | 29.1 | 244°52.0 | 53.4 | 346°13.3 | 07.5 | | | | | | |
| 12 | 6°54.4 | 340°10.2 | N10°27.2 | 14°36.6 | S04°28.3 | 259°54.3 | N22°53.4 | 1°15.4 | N00°07.7 | | | | | | |
| 13 | 21°56.9 | 355°09.8 | 28.4 | 29°37.3 | 27.5 | 274°56.6 | 53.4 | 16°17.6 | 07.8 | | | | | | |
| 14 | 36°59.3 | 10°09.4 | 29.6 | 44°38.0 | 26.7 | 289°58.9 | 53.4 | 31°19.8 | 07.9 | | | | | | |
| 15 | 52°01.8 | 25°09.0 | •• 30.8 | 59°38.6 | •• 25.9 | 305°01.2 | •• 53.4 | 46°22.0 | •• 08.0 | | | | | | |
| 16 | 67°04.3 | 40°08.5 | 32.0 | 74°39.3 | 25.2 | 320°03.5 | 53.4 | 61°24.2 | 08.1 | | | | | | |
| 17 | 82°06.7 | 55°08.1 | 33.2 | 89°40.0 | 24.4 | 335°05.9 | 53.3 | 76°26.3 | 08.3 | | | | | | |
| 18 | 97°09.2 | 70°07.7 | N10°34.4 | 104°40.6 | S04°23.6 | 350°08.2 | N22°53.3 | 91°28.5 | N00°08.4 | | | | | | |
| 19 | 112°11.6 | 85°07.2 | 35.6 | 119°41.3 | 22.8 | 5°10.5 | 53.3 | 106°30.7 | 08.5 | | | | | | |
| 20 | 127°14.1 | 100°06.8 | 36.7 | 134°42.0 | 22.0 | 20°12.8 | 53.3 | 121°32.9 | 08.6 | | | | | | |
| 21 | 142°16.6 | 115°06.4 | •• 37.9 | 149°42.6 | •• 21.3 | 35°15.1 | •• 53.3 | 136°35.0 | •• 08.8 | | | | | | |
| 22 | 157°19.0 | 130°05.9 | 39.1 | 164°43.3 | 20.5 | 50°17.4 | 53.3 | 151°37.2 | 08.9 | | | | | | |
| 23 | 172°21.5 | 145°05.5 | 40.3 | 179°43.9 | 19.7 | 65°19.7 | 53.2 | 166°39.4 | 09.0 | | | | | | |
| Mer.pass. 11:32 | | | | | | | | | | | | | | | |
| ν-0.4' d1.2' m-3.92 | | | | | | | | | | | | | | | |
| ν0.7' d-0.8' m1.18 | | | | | | | | | | | | | | | |
| ν2.3' d-0.0' m-2.22 | | | | | | | | | | | | | | | |
| ν2.2' d0.1' m0.91 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 187°24.0 | 160°05.1 | N10°41.5 | 194°44.6 | S04°18.9 | 80°22.0 | N22°53.2 | 181°41.6 | N00°09.1 | | | | | | |
| 1 | 202°26.4 | 175°04.6 | 42.6 | 209°45.3 | 18.1 | 95°24.3 | 53.2 | 196°43.8 | 09.2 | | | | | | |
| 2 | 217°28.9 | 190°04.2 | 43.8 | 224°45.9 | 17.4 | 110°26.6 | 53.2 | 211°45.9 | 09.4 | | | | | | |
| 3 | 232°31.4 | 205°03.8 | •• 45.0 | 239°46.6 | •• 16.6 | 125°28.9 | •• 53.2 | 226°48.1 | •• 09.5 | | | | | | |
| 4 | 247°33.8 | 220°03.3 | 46.2 | 254°47.3 | 15.8 | 140°31.2 | 53.2 | 241°50.3 | 09.6 | | | | | | |
| 5 | 262°36.3 | 235°02.9 | 47.4 | 269°47.9 | 15.0 | 155°33.5 | 53.2 | 256°52.5 | 09.7 | | | | | | |
| 6 | 277°38.8 | 250°02.5 | N10°48.6 | 284°48.6 | S04°14.2 | 170°35.8 | N22°53.1 | 271°54.6 | N00°09.8 | | | | | | |
| 7 | 292°41.2 | 265°02.0 | 49.7 | 299°49.3 | 13.5 | 185°38.1 | 53.1 | 286°56.8 | 10.0 | | | | | | |
| 8 | 307°43.7 | 280°01.6 | 50.9 | 314°49.9 | 12.7 | 200°40.4 | 53.1 | 301°59.0 | 10.1 | | | | | | |
| 9 | 322°46.1 | 295°01.2 | •• 52.1 | 329°50.6 | •• 11.9 | 215°42.7 | •• 53.1 | 317°01.2 | •• 10.2 | | | | | | |
| 10 | 337°48.6 | 310°00.7 | 53.3 | 344°51.3 | 11.1 | 230°45.0 | 53.1 | 332°03.4 | 10.3 | | | | | | |
| 11 | 352°51.1 | 325°00.3 | 54.4 | 359°51.9 | 10.3 | 245°47.3 | 53.1 | 347°05.5 | 10.5 | | | | | | |
| 12 | 7°53.5 | 339°59.9 | N10°55.6 | 14°52.6 | S04°09.6 | 260°49.6 | N22°53.0 | 2°07.7 | N00°10.6 | | | | | | |
| 13 | 22°56.0 | 354°59.4 | 56.8 | 29°53.2 | 08.8 | 275°51.9 | 53.0 | 17°09.9 | 10.7 | | | | | | |
| 14 | 37°58.5 | 9°59.0 | 58.0 | 44°53.9 | 08.0 | 290°54.2 | 53.0 | 32°12.1 | 10.8 | | | | | | |
| 15 | 53°00.9 | 24°58.5 | 10°59.2 | 59°54.6 | •• 07.2 | 305°56.5 | •• 53.0 | 47°14.2 | •• 10.9 | | | | | | |
| 16 | 68°03.4 | 39°58.1 | 11°00.3 | 74°55.2 | 06.4 | 320°58.8 | 53.0 | 62°16.4 | 11.1 | | | | | | |
| 17 | 83°05.9 | 54°57.7 | 01.5 | 89°55.9 | 05.7 | 336°01.1 | 53.0 | 77°18.6 | 11.2 | | | | | | |
| 18 | 98°08.3 | 69°57.2 | N11°02.7 | 104°56.6 | S04°04.9 | 351°03.4 | N22°52.9 | 92°20.8 | N00°11.3 | | | | | | |
| 19 | 113°10.8 | 84°56.8 | 03.9 | 119°57.2 | 04.1 | 6°05.7 | 52.9 | 107°22.9 | 11.4 | | | | | | |
| 20 | 128°13.2 | 99°56.3 | 05.0 | 134°57.9 | 03.3 | 21°08.0 | 52.9 | 122°25.1 | 11.6 | | | | | | |
| 21 | 143°15.7 | 114°55.9 | •• 06.2 | 149°58.6 | •• 02.5 | 36°10.3 | •• 52.9 | 137°27.3 | •• 11.7 | | | | | | |
| 22 | 158°18.2 | 129°55.5 | 07.4 | 164°59.2 | 01.8 | 51°12.6 | 52.9 | 152°29.5 | 11.8 | | | | | | |
| 23 | 173°20.6 | 144°55.0 | 08.5 | 179°59.9 | 01.0 | 66°14.9 | 52.9 | 167°31.7 | 11.9 | | | | | | |
| Mer.pass. 11:29 | | | | | | | | | | | | | | | |
| ν-0.4' d1.2' m-3.92 | | | | | | | | | | | | | | | |
| ν0.7' d-0.8' m1.18 | | | | | | | | | | | | | | | |
| ν2.3' d-0.0' m-2.22 | | | | | | | | | | | | | | | |
| ν2.2' d0.1' m0.92 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 188°23.1 | 159°54.6 | N11°09.7 | 195°00.6 | S04°00.2 | 81°17.2 | N22°52.8 | 182°33.8 | N00°12.0 | | | | | | |
| 1 | 203°25.6 | 174°54.1 | 10.9 | 210°01.2 | 03°59.4 | 96°19.5 | 52.8 | 197°36.0 | 12.2 | | | | | | |
| 2 | 218°28.0 | 189°53.7 | 12.1 | 225°01.9 | 58.6 | 111°21.8 | 52.8 | 212°38.2 | 12.3 | | | | | | |
| 3 | 233°30.5 | 204°53.3 | •• 13.2 | 240°02.6 | •• 57.9 | 126°24.1 | •• 52.8 | 227°40.4 | •• 12.4 | | | | | | |
| 4 | 248°33.0 | 219°52.8 | 14.4 | 255°03.2 | 57.1 | 141°26.4 | 52.8 | 242°42.5 | 12.5 | | | | | | |
| 5 | 263°35.4 | 234°52.4 | 15.6 | 270°03.9 | 56.3 | 156°28.7 | 52.8 | 257°44.7 | 12.6 | | | | | | |
| 6 | 278°37.9 | 249°51.9 | N11°16.7 | 285°04.6 | S03°55.5 | 171°31.0 | N22°52.7 | 272°46.9 | N00°12.8 | | | | | | |
| 7 | 293°40.4 | 264°51.5 | 17.9 | 300°05.2 | 54.7 | 186°33.3 | 52.7 | 287°49.1 | 12.9 | | | | | | |
| 8 | 308°42.8 | 279°51.1 | 19.1 | 315°05.9 | 53.9 | 201°35.5 | 52.7 | 302°51.3 | 13.0 | | | | | | |
| 9 | 323°45.3 | 294°50.6 | •• 20.2 | 330°06.6 | •• 53.2 | 216°37.8 | •• 52.7 | 317°53.4 | •• 13.1 | | | | | | |
| 10 | 338°47.7 | 309°50.2 | 21.4 | 345°07.2 | 52.4 | 231°40.1 | 52.7 | 332°55.6 | 13.3 | | | | | | |
| 11 | 353°50.2 | 324°49.7 | 22.6 | 0°07.9 | 51.6 | 246°42.4 | 52.7 | 347°57.8 | 13.4 | | | | | | |
| 12 | 8°52.7 | 339°49.3 | N11°23.7 | 15°08.6 | S03°50.8 | 261°44.7 | N22°52.6 | 3°00.0 | N00°13.5 | | | | | | |
| 13 | 23°55.1 | 354°48.8 | 24.9 | 30°09.2 | 50.0 | 276°47.0 | 52.6 | 18°02.1 | 13.6 | | | | | | |
| 14 | 38°57.6 | 9°48.4 | 26.1 | 45°09.9 | 49.3 | 291°49.3 | 52.6 | 33°04.3 | 13.7 | | | | | | |
| 15 | 54°00.1 | 24°47.9 | •• 27.2 | 60°10.6 | •• 48.5 | 306°51.6 | •• 52.6 | 48°06.5 | •• 13.9 | | | | | | |
| 16 | 69°02.5 | 39°47.5 | 28.4 | 75°11.2 | 47.7 | 321°53.9 | 52.6 | 63°08.7 | 14.0 | | | | | | |
| 17 | 84°05.0 | 54°47.1 | 29.6 | 90°11.9 | 46.9 | 336°56.2 | 52.6 | 78°10.9 | 14.1 | | | | | | |
| 18 | 99°07.5 | 69°46.6 | N11°30.7 | 105°12.6 | S03°46.1 | 351°58.5 | N22°52.5 | 93°13.0 | N00°14.2 | | | | | | |
| 19 | 114°09.9 | 84°46.2 | 31.9 | 120°13.2 | 45.4 | 7°00.8 | 52.5 | 108°15.2 | 14.4 | | | | | | |
| 20 | 129°12.4 | 99°45.7 | 33.1 | 135°13.9 | 44.6 | 22°03.0 | 52.5 | 123°17.4 | 14.5 | | | | | | |
| 21 | 144°14.8 | 114°45.3 | •• 34.2 | 150°14.6 | •• 43.8 | 37°05.3 | •• 52.5 | 138°19.6 | •• 14.6 | | | | | | |
| 22 | 159°17.3 | 129°44.8 | 35.4 | 165°15.2 | 43.0 | 52°07.6 | 52.5 | 153°21.8 | 14.7 | | | | | | |
| 23 | 174°19.8 | 144°44.4 | 36.5 | 180°15.9 | 42.2 | 67°09.9 | 52.5 | 168°23.9 | 14.8 | | | | | | |
| Mer.pass. 11:25 | | | | | | | | | | | | | | | |
| ν-0.4' d1.2' m-3.92 | | | | | | | | | | | | | | | |
| ν0.7' d-0.8' m1.18 | | | | | | | | | | | | | | | |
| ν2.3' d-0.0' m-2.21 | | | | | | | | | | | | | | | |
| ν2.2' d0.1' m0.92 | | | | | | | | | | | | | | | |


| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|------------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 178°46.7 | N03°17.8 | | 44°17.2 | 11.2' | N16°45.5 | -13.3' | 57.6' |
| 1 | 193°46.9 | 18.8 | | 58°47.4 | 11.3' | 16°32.1 | -13.4' | 57.6' |
| 2 | 208°47.1 | 19.8 | | 73°17.7 | 11.4' | 16°18.8 | -13.5' | 57.6' |
| 3 | 223°47.3 | · · 20.7 | | 87°48.1 | 11.5' | 16°05.3 | -13.5' | 57.6' |
| 4 | 238°47.5 | 21.7 | | 102°18.6 | 11.6' | 15°51.8 | -13.6' | 57.5' |
| 5 | 253°47.7 | 22.7 | | 116°49.1 | 11.7' | 15°38.2 | -13.7' | 57.5' |
| 6 | 268°47.8 | N03°23.6 | | 131°19.8 | 11.7' | N15°24.5 | -13.7' | 57.5' |
| 7 | 283°48.0 | 24.6 | | 145°50.5 | 11.8' | 15°10.8 | -13.8' | 57.5' |
| 8 | 298°48.2 | 25.6 | | 160°21.4 | 11.9' | 14°56.9 | -13.9' | 57.5' |
| 9 | 313°48.4 | · · 26.6 | | 174°52.3 | 12.0' | 14°43.1 | -13.9' | 57.4' |
| 10 | 328°48.6 | 27.5 | | 189°23.3 | 12.1' | 14°29.2 | -14.0' | 57.4' |
| 11 | 343°48.8 | 28.5 | | 203°54.4 | 12.2' | 14°15.2 | -14.0' | 57.4' |
| 12 | 358°49.0 | N03°29.5 | | 218°25.6 | 12.3' | N14°01.1 | -14.1' | 57.4' |
| 13 | 13°49.2 | 30.5 | | 232°56.8 | 12.3' | 13°47.0 | -14.2' | 57.4' |
| 14 | 28°49.4 | 31.4 | | 247°28.2 | 12.4' | 13°32.8 | -14.2' | 57.4' |
| 15 | 43°49.5 | · · 32.4 | | 261°59.6 | 12.5' | 13°18.6 | -14.3' | 57.3' |
| 16 | 58°49.7 | 33.4 | | 276°31.1 | 12.6' | 13°04.4 | -14.3' | 57.3' |
| 17 | 73°49.9 | 34.4 | | 291°02.7 | 12.7' | 12°50.0 | -14.4' | 57.3' |
| 18 | 88°50.1 | N03°35.3 | | 305°34.3 | 12.7' | N12°35.7 | -14.4' | 57.3' |
| 19 | 103°50.3 | 36.3 | | 320°06.1 | 12.8' | 12°21.2 | -14.5' | 57.3' |
| 20 | 118°50.5 | 37.3 | | 334°37.9 | 12.9' | 12°06.8 | -14.5' | 57.2' |
| 21 | 133°50.7 | · · 38.2 | | 349°09.8 | 13.0' | 11°52.2 | -14.6' | 57.2' |
| 22 | 148°50.9 | 39.2 | | 3°41.7 | 13.0' | 11°37.7 | -14.6' | 57.2' |
| 23 | 163°51.1 | 40.2 | | 18°13.8 | 13.1' | 11°23.1 | -14.7' | 57.2' |
| SD = 16.0' $d = 1.0'$ | | | | SD = 15.7' | | | | |

| Mon | GHA | Dec | | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|--|------------|-------|----------|--------|-------|
| 0 | 178°51.2 | N03°41.2 | | 32°45.9 | 13.2' | N11°08.4 | -14.7' | 57.2' |
| 1 | 193°51.4 | 42.1 | | 47°18.0 | 13.2' | 10°53.7 | -14.7' | 57.1' |
| 2 | 208°51.6 | 43.1 | | 61°50.3 | 13.3' | 10°39.0 | -14.8' | 57.1' |
| 3 | 223°51.8 | · · 44.1 | | 76°22.6 | 13.4' | 10°24.2 | -14.8' | 57.1' |
| 4 | 238°52.0 | 45.0 | | 90°55.0 | 13.4' | 10°09.4 | -14.8' | 57.1' |
| 5 | 253°52.2 | 46.0 | | 105°27.4 | 13.5' | 09°54.5 | -14.9' | 57.1' |
| 6 | 268°52.4 | N03°47.0 | | 119°59.9 | 13.6' | N09°39.7 | -14.9' | 57.0' |
| 7 | 283°52.6 | 48.0 | | 134°32.5 | 13.6' | 09°24.8 | -14.9' | 57.0' |
| 8 | 298°52.7 | 48.9 | | 149°05.1 | 13.7' | 09°09.8 | -15.0' | 57.0' |
| 9 | 313°52.9 | · · 49.9 | | 163°37.8 | 13.7' | 08°54.8 | -15.0' | 57.0' |
| 10 | 328°53.1 | 50.9 | | 178°10.5 | 13.8' | 08°39.8 | -15.0' | 56.9' |
| 11 | 343°53.3 | 51.8 | | 192°43.3 | 13.9' | 08°24.8 | -15.1' | 56.9' |
| 12 | 358°53.5 | N03°52.8 | | 207°16.2 | 13.9' | N08°09.7 | -15.1' | 56.9' |
| 13 | 13°53.7 | 53.8 | | 221°49.1 | 14.0' | 07°54.6 | -15.1' | 56.9' |
| 14 | 28°53.9 | 54.7 | | 236°22.1 | 14.0' | 07°39.5 | -15.1' | 56.9' |
| 15 | 43°54.1 | · · 55.7 | | 250°55.1 | 14.1' | 07°24.4 | -15.2' | 56.8' |
| 16 | 58°54.3 | 56.7 | | 265°28.2 | 14.1' | 07°09.2 | -15.2' | 56.8' |
| 17 | 73°54.4 | 57.7 | | 280°01.3 | 14.2' | 06°54.0 | -15.2' | 56.8' |
| 18 | 88°54.6 | N03°58.6 | | 294°34.5 | 14.2' | N06°38.8 | -15.2' | 56.8' |
| 19 | 103°54.8 | 03°59.6 | | 309°07.8 | 14.3' | 06°23.6 | -15.2' | 56.8' |
| 20 | 118°55.0 | 04°00.6 | | 323°41.0 | 14.3' | 06°08.4 | -15.3' | 56.7' |
| 21 | 133°55.2 | · · 01.5 | | 338°14.4 | 14.4' | 05°53.1 | -15.3' | 56.7' |
| 22 | 148°55.4 | 02.5 | | 352°47.7 | 14.4' | 05°37.9 | -15.3' | 56.7' |
| 23 | 163°55.6 | 03.5 | | 7°21.2 | 14.5' | 05°22.6 | -15.3' | 56.7' |
| SD = 16.0' $d = 1.0'$ | | | | SD = 15.6' | | | | |

| Tue | GHA | Dec | | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|--|------------|-------|----------|--------|-------|
| 0 | 178°55.8 | N04°04.4 | | 21°54.6 | 14.5' | N05°07.3 | -15.3' | 56.7' |
| 1 | 193°55.9 | 05.4 | | 36°28.1 | 14.5' | 04°52.0 | -15.3' | 56.6' |
| 2 | 208°56.1 | 06.4 | | 51°01.7 | 14.6' | 04°36.7 | -15.3' | 56.6' |
| 3 | 223°56.3 | · · 07.3 | | 65°35.3 | 14.6' | 04°21.4 | -15.3' | 56.6' |
| 4 | 238°56.5 | 08.3 | | 80°08.9 | 14.7' | 04°06.0 | -15.3' | 56.6' |
| 5 | 253°56.7 | 09.3 | | 94°42.5 | 14.7' | 03°50.7 | -15.3' | 56.6' |
| 6 | 268°56.9 | N04°10.2 | | 109°16.2 | 14.7' | N03°35.4 | -15.3' | 56.5' |
| 7 | 283°57.1 | 11.2 | | 123°50.0 | 14.8' | 03°20.0 | -15.4' | 56.5' |
| 8 | 298°57.3 | 12.2 | | 138°23.7 | 14.8' | 03°04.7 | -15.4' | 56.5' |
| 9 | 313°57.4 | · · 13.1 | | 152°57.5 | 14.8' | 02°49.3 | -15.4' | 56.5' |
| 10 | 328°57.6 | 14.1 | | 167°31.4 | 14.9' | 02°33.9 | -15.4' | 56.5' |
| 11 | 343°57.8 | 15.1 | | 182°05.2 | 14.9' | 02°18.6 | -15.4' | 56.4' |
| 12 | 358°58.0 | N04°16.0 | | 196°39.1 | 14.9' | N02°03.2 | -15.4' | 56.4' |
| 13 | 13°58.2 | 17.0 | | 211°13.1 | 14.9' | 01°47.9 | -15.3' | 56.4' |
| 14 | 28°58.4 | 18.0 | | 225°47.0 | 15.0' | 01°32.5 | -15.3' | 56.4' |
| 15 | 43°58.6 | · · 18.9 | | 240°21.0 | 15.0' | 01°17.2 | -15.3' | 56.4' |
| 16 | 58°58.8 | 19.9 | | 254°55.0 | 15.0' | 01°01.9 | -15.3' | 56.3' |
| 17 | 73°58.9 | 20.9 | | 269°29.0 | 15.0' | 00°46.5 | -15.3' | 56.3' |
| 18 | 88°59.1 | N04°21.8 | | 284°03.1 | 15.1' | N00°31.2 | -15.3' | 56.3' |
| 19 | 103°59.3 | 22.8 | | 298°37.1 | 15.1' | 00°15.9 | -15.3' | 56.3' |
| 20 | 118°59.5 | 23.8 | | 313°11.2 | 15.1' | N00°00.6 | -15.3' | 56.3' |
| 21 | 133°59.7 | · · 24.7 | | 327°45.3 | 15.1' | S00°14.7 | 15.3' | 56.2' |
| 22 | 148°59.9 | 25.7 | | 342°19.4 | 15.1' | 00°30.0 | 15.3' | 56.2' |
| 23 | 164°00.1 | 26.7 | | 356°53.6 | 15.2' | 00°45.3 | 15.3' | 56.2' |
| SD = 16.0' $d = 1.0'$ | | | | SD = 15.5' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 02:01 | 03:54 | 05:07 | 19:05 | 20:19 | 22:17 |
| N 70° | 02:37 | 04:08 | 05:13 | 18:59 | 20:04 | 21:38 |
| 68° | 03:01 | 04:20 | 05:18 | 18:53 | 19:52 | 21:12 |
| 66° | 03:20 | 04:29 | 05:22 | 18:49 | 19:42 | 20:53 |
| 64° | 03:34 | 04:37 | 05:26 | 18:45 | 19:34 | 20:37 |
| 62° | 03:46 | 04:43 | 05:29 | 18:42 | 19:27 | 20:25 |
| 60° | 03:56 | 04:49 | 05:32 | 18:39 | 19:22 | 20:15 |
| N 58° | 04:05 | 04:54 | 05:34 | 18:36 | 19:16 | 20:06 |
| 56° | 04:12 | 04:58 | 05:36 | 18:34 | 19:12 | 19:58 |
| 54° | 04:19 | 05:02 | 05:38 | 18:32 | 19:08 | 19:52 |
| 52° | 04:25 | 05:06 | 05:40 | 18:30 | 19:05 | 19:46 |
| 50° | 04:30 | 05:09 | 05:41 | 18:29 | 19:01 | 19:41 |
| 45° | 04:40 | 05:15 | 05:45 | 18:25 | 18:55 | 19:30 |
| N 40° | 04:48 | 05:20 | 05:47 | 18:22 | 18:49 | 19:22 |
| 35° | 04:55 | 05:24 | 05:50 | 18:20 | 18:45 | 19:15 |
| 30° | 05:00 | 05:28 | 05:52 | 18:17 | 18:41 | 19:10 |
| 20° | 05:08 | 05:33 | 05:55 | 18:14 | 18:36 | 19:02 |
| N 10° | 05:13 | 05:37 | 05:58 | 18:11 | 18:32 | 18:56 |
| 0° | 05:16 | 05:40 | 06:01 | 18:08 | 18:28 | 18:52 |
| S 10° | 05:18 | 05:43 | 06:04 | 18:05 | 18:26 | 18:50 |
| 20° | 05:19 | 05:44 | 06:06 | 18:02 | 18:24 | 18:50 |
| 30° | 05:18 | 05:46 | 06:09 | 17:59 | 18:23 | 18:51 |
| 35° | 05:16 | 05:46 | 06:11 | 17:57 | 18:23 | 18:52 |
| 40° | 05:14 | 05:46 | 06:13 | 17:55 | 18:22 | 18:54 |
| 45° | 05:12 | 05:46 | 06:15 | 17:53 | 18:22 | 18:56 |
| S 50° | 05:08 | 05:45 | 06:17 | 17:51 | 18:23 | 19:00 |
| 52° | 05:06 | 05:45 | 06:19 | 17:49 | 18:23 | 19:02 |
| 54° | 05:03 | 05:44 | 06:20 | 17:48 | 18:23 | 19:04 |
| 56° | 05:01 | 05:44 | 06:21 | 17:47 | 18:24 | 19:07 |
| 58° | 04:58 | 05:43 | 06:23 | 17:45 | 18:24 | 19:10 |
| S 60° | 04:54 | 05:43 | 06:24 | 17:43 | 18:25 | 19:13 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | 12:09 | 14:42 | 16:53 | 07:00 | 06:04 | 05:27 |
| N 70° | 12:39 | 14:54 | 16:54 | 06:28 | 05:50 | 05:22 |
| 68° | 13:00 | 15:03 | 16:55 | 06:05 | 05:39 | 05:18 |
| 66° | 13:17 | 15:10 | 16:56 | 05:46 | 05:29 | 05:15 |
| 64° | 13:31 | 15:17 | 16:57 | 05:31 | 05:21 | 05:12 |
| 62° | 13:42 | 15:22 | 16:57 | 05:18 | 05:14 | 05:09 |
| 60° | 13:52 | 15:27 | 16:57 | 05:07 | 05:08 | 05:07 |
| N 58° | 14:00 | 15:31 | 16:58 | 04:58 | 05:02 | 05:05 |
| 56° | 14:08 | 15:35 | 16:58 | 04:50 | 04:57 | 05:03 |
| 54° | 14:14 | 15:38 | 16:58 | 04:42 | 04:53 | 05:02 |
| 52° | 14:20 | 15:41 | 16:59 | 04:35 | 04:49 | 05:00 |
| 50° | 14:26 | 15:44 | 16:59 | 04:29 | 04:45 | 04:59 |
| 45° | 14:37 | 15:49 | 17:00 | 04:16 | 04:37 | 04:56 |
| N 40° | 14:46 | 15:54 | 17:00 | 04:05 | 04:31 | 04:53 |
| 35° | 14:54 | 15:58 | 17:00 | 03:56 | 04:25 | 04:51 |
| 30° | 15:01 | 16:02 | 17:01 | 03:48 | 04:20 | 04:49 |
| 20° | 15:13 | 16:08 | 17:01 | 03:33 | 04:11 | 04:46 |
| N 10° | 15:24 | 16:14 | 17:02 | 03:21 | 04:03 | 04:43 |
| 0° | 15:34 | 16:19 | 17:03 | 03:09 | 03:56 | 04:40 |
| S 10° | 15:43 | 16:24 | 17:03 | 02:56 | 03:48 | 04:37 |
| 20° | 15:54 | 16:30 | 17:04 | 02:43 | 03:40 | 04:34 |
| 30° | 16:05 | 16:36 | 17:04 | 02:28 | 03:31 | 04:31 |
| 35° | 16:12 | 16:40 | 17:05 | 02:20 | 03:25 | 04:28 |
| 40° | 16:20 | 16:44 | 17:05 | 02:10 | 03:19 | 04:26 |
| 45° | 16:29 | 16:48 | 17:06 | 01:58 | 03:12 | 04:23 |
| S 50° | 16:39 | 16:54 | 17:07 | 01:43 | 03:03 | 04:20 |
| 52° | 16:44 | 16:56 | 17:07 | 01:37 | 02:59 | 04:19 |
| 54° | 16:50 | 16:59 | 17:07 | 01:29 | 02:55 | 04:17 |
| 56° | 16:56 | 17:02 | 17:08 | 01:21 | 02:50 | 04:15 |
| 58° | 17:02 | 17:06 | 17:08 | 01:11 | 02:44 | 04:13 |
| S 60° | 17:10 | 17:09 | 17:08 | 01:00 | 02:38 | 04:11 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-----------------------|-----------|-------|---|
| | Eqn.of Time | | Mer. Pass hh:mm | Mer.Pass. | | Age 10-12 83-95% |
| | 00 ^h | 12 ^h | | Upper | Lower | |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | |
| 29 | 04:53 | 04:44 | 12:05 | 21:45 | 09:21 |  |
| 30 | 04:35 | 04:26 | 12:04 | 22:30 | 10:08 | |
| 31 | 04:17 | 04:08 | 12:04 | 23:13 | 10:51 | |

April 01, 02, 03 UT (Wed., Thu., Fri.)

| | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|---------------------|----------|----------|--------------------|----------|----------|---------------------|--|-----|-------------------|--------|-----|-----|-------|--|--|
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | |
| 0 | 189°22.2 | 159°43.9 | N11°37.7 | 195°16.6 | S03°41.4 | 82°12.2 | N22°52.4 | 183°26.1 | N00°15.0 | <div>Alpheratz 357°34.1 29°14.0</div> <div>Ankaa 353°06.6 -42°09.8</div> <div>Schedar 349°30.5 56°40.8</div> <div>Diphda 348°46.6 -17°50.6</div> <div>Achernar 335°20.0 -57°06.3</div> <div>Hamal 327°50.4 23°35.2</div> <div>Polaris 313°55.6 89°22.7</div> <div>Acamar 315°11.3 -40°12.1</div> <div>Menkar 314°05.4 4°11.5</div> <div>Mirfak 308°27.2 49°57.3</div> <div>Aldebaran 290°38.6 16°33.7</div> <div>Rigel 281°03.0 -8°10.4</div> <div>Capella 280°20.6 46°01.6</div> <div>Bellatrix 278°21.9 6°22.3</div> <div>Elnath 278°00.7 28°37.8</div> <div>Alnilam 275°36.8 -1°11.2</div> <div>Betelgeuse 270°51.1 7°24.6</div> <div>Canopus 263°52.0 -52°42.8</div> <div>Sirius 258°25.4 -16°45.3</div> <div>Adhara 255°05.1 -29°00.7</div> <div>Procyon 244°49.7 5°09.4</div> <div>Pollux 243°16.0 27°57.8</div> <div>Avior 234°14.1 -59°35.9</div> <div>Suhail 222°45.3 -43°32.6</div> <div>Miaplacidus 221°37.6 -69°49.7</div> <div>Alphard 217°46.6 -8°46.5</div> <div>Regulus 207°33.1 11°50.2</div> <div>Dubhe 193°39.2 61°36.6</div> <div>Denebola 182°23.6 14°25.4</div> <div>Gienah 175°42.2 -17°41.4</div> <div>Acrux 172°58.3 -63°14.8</div> <div>Gacrux 171°50.0 -57°15.7</div> <div>Alioth 166°11.5 55°48.9</div> <div>Spica 158°20.9 -11°18.1</div> <div>Alkaid 152°50.7 49°10.7</div> <div>Hadar 148°34.0 -60°30.0</div> <div>Menkent 147°56.1 -36°30.0</div> <div>Arcturus 145°46.7 19°02.5</div> <div>Rigel Kent. 139°38.3 -60°56.6</div> <div>Kochab 137°18.8 74°02.6</div> <div>Zuben'ubi 136°54.6 -16°09.2</div> <div>Alphecca 126°02.6 26°37.3</div> <div>Antares 112°14.4 -26°29.4</div> <div>Atria 107°07.5 -69°04.3</div> <div>Sabik 102°01.5 -15°45.5</div> <div>Shaula 96°08.9 -37°07.3</div> <div>Rasalhague 95°57.5 12°32.2</div> <div>Eltanin 90°41.6 51°28.7</div> <div>Kaus Aust. 83°31.1 -34°22.3</div> <div>Vega 80°32.5 38°48.1</div> <div>Nunki 75°46.5 -26°15.8</div> <div>Altair 61°59.1 8°56.1</div> <div>Peacock 53°04.4 -56°38.8</div> <div>Deneb 49°25.3 45°22.1</div> <div>Enif 33°38.0 9°59.6</div> <div>Al Na'ir 27°32.0 -46°49.9</div> <div>Fomalhaut 15°13.7 -29°29.0</div> <div>Scheat 13°44.6 28°13.4</div> <div>Markab 13°29.2 15°20.7</div> | | | | | | | | |
| 1 | 204°24.7 | 174°43.5 | 38.9 | 210°17.2 | 40.7 | 97°14.5 | 52.4 | 198°28.3 | 15.1 | | | | | | | | | |
| 2 | 219°27.2 | 189°43.0 | 40.0 | 225°17.9 | 39.9 | 112°16.8 | 52.4 | 213°30.5 | 15.2 | | | | | | | | | |
| 3 | 234°29.6 | 204°42.6 | · · 41.2 | 240°18.6 | · · 39.1 | 127°19.1 | · · 52.4 | 228°32.6 | · · 15.3 | | | | | | | | | |
| 4 | 249°32.1 | 219°42.1 | 42.3 | 255°19.2 | 38.3 | 142°21.4 | 52.4 | 243°34.8 | 15.4 | | | | | | | | | |
| 5 | 264°34.6 | 234°41.7 | 43.5 | 270°19.9 | 37.5 | 157°23.6 | 52.4 | 258°37.0 | 15.6 | | | | | | | | | |
| 6 | 279°37.0 | 249°41.2 | N11°44.7 | 285°20.6 | S03°36.8 | 172°25.9 | N22°52.3 | 273°39.2 | N00°15.7 | | | | | | | | | |
| 7 | 294°39.5 | 264°40.8 | 45.8 | 300°21.3 | 36.0 | 187°28.2 | 52.3 | 288°41.4 | 15.8 | | | | | | | | | |
| 8 | 309°42.0 | 279°40.3 | 47.0 | 315°21.9 | 35.2 | 202°30.5 | 52.3 | 303°43.5 | 15.9 | | | | | | | | | |
| 9 | 324°44.4 | 294°39.9 | · · 48.1 | 330°22.6 | · · 34.4 | 217°32.8 | · · 52.3 | 318°45.7 | · · 16.1 | | | | | | | | | |
| 10 | 339°46.9 | 309°39.4 | 49.3 | 345°23.3 | 33.6 | 232°35.1 | 52.3 | 333°47.9 | 16.2 | | | | | | | | | |
| 11 | 354°49.3 | 324°39.0 | 50.4 | 0°23.9 | 32.8 | 247°37.4 | 52.2 | 348°50.1 | 16.3 | | | | | | | | | |
| 12 | 9°51.8 | 339°38.5 | N11°51.6 | 15°24.6 | S03°32.1 | 262°39.6 | N22°52.2 | 3°52.2 | N00°16.4 | | | | | | | | | |
| 13 | 24°54.3 | 354°38.1 | 52.7 | 30°25.3 | 31.3 | 277°41.9 | 52.2 | 18°54.4 | 16.5 | | | | | | | | | |
| 14 | 39°56.7 | 9°37.6 | 53.9 | 45°25.9 | 30.5 | 292°44.2 | 52.2 | 33°56.6 | 16.7 | | | | | | | | | |
| 15 | 54°59.2 | 24°37.2 | · · 55.1 | 60°26.6 | · · 29.7 | 307°46.5 | · · 52.2 | 48°58.8 | · · 16.8 | | | | | | | | | |
| 16 | 70°01.7 | 39°36.7 | 56.2 | 75°27.3 | 28.9 | 322°48.8 | 52.2 | 64°01.0 | 16.9 | | | | | | | | | |
| 17 | 85°04.1 | 54°36.3 | 57.4 | 90°27.9 | 28.1 | 337°51.1 | 52.1 | 79°03.1 | 17.0 | | | | | | | | | |
| 18 | 100°06.6 | 69°35.8 | N11°58.5 | 105°28.6 | S03°27.4 | 352°53.3 | N22°52.1 | 94°05.3 | N00°17.1 | | | | | | | | | |
| 19 | 115°09.1 | 84°35.3 | 11°59.7 | 120°29.3 | 26.6 | 7°55.6 | 52.1 | 109°07.5 | 17.3 | | | | | | | | | |
| 20 | 130°11.5 | 99°34.9 | 12°00.8 | 135°30.0 | 25.8 | 22°57.9 | 52.1 | 124°09.7 | 17.4 | | | | | | | | | |
| 21 | 145°14.0 | 114°34.4 | · · 02.0 | 150°30.6 | · · 25.0 | 38°00.2 | · · 52.1 | 139°11.8 | · · 17.5 | | | | | | | | | |
| 22 | 160°16.4 | 129°34.0 | 03.1 | 165°31.3 | 24.2 | 53°02.5 | 52.0 | 154°14.0 | 17.6 | | | | | | | | | |
| 23 | 175°18.9 | 144°33.5 | 04.3 | 180°32.0 | 23.5 | 68°04.8 | 52.0 | 169°16.2 | 17.7 | | | | | | | | | |
| Mer.pass. 11:21 | | | ν-0.4' d1.2' m-3.92 | | | ν0.7' d-0.8' m1.18 | | | ν2.3' d-0.0' m-2.20 | | | ν2.2' d0.1' m0.92 | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | | | | | |
| 0 | 190°21.4 | 159°33.1 | N12°05.4 | 195°32.6 | S03°22.7 | 83°07.0 | N22°52.0 | 184°18.4 | N00°17.9 | | | | | | | | | |
| 1 | 205°23.8 | 174°32.6 | 06.6 | 210°33.3 | 21.9 | 98°09.3 | 52.0 | 199°20.6 | 18.0 | | | | | | | | | |
| 2 | 220°26.3 | 189°32.2 | 07.7 | 225°34.0 | 21.1 | 113°11.6 | 52.0 | 214°22.7 | 18.1 | | | | | | | | | |
| 3 | 235°28.8 | 204°31.7 | · · 08.9 | 240°34.6 | · · 20.3 | 128°13.9 | · · 52.0 | 229°24.9 | · · 18.2 | | | | | | | | | |
| 4 | 250°31.2 | 219°31.2 | 10.0 | 255°35.3 | 19.5 | 143°16.2 | 51.9 | 244°27.1 | 18.4 | | | | | | | | | |
| 5 | 265°33.7 | 234°30.8 | 11.2 | 270°36.0 | 18.8 | 158°18.4 | 51.9 | 259°29.3 | 18.5 | | | | | | | | | |
| 6 | 280°36.2 | 249°30.3 | N12°12.3 | 285°36.7 | S03°18.0 | 173°20.7 | N22°51.9 | 274°31.4 | N00°18.6 | | | | | | | | | |
| 7 | 295°38.6 | 264°29.9 | 13.4 | 300°37.3 | 17.2 | 188°23.0 | 51.9 | 289°33.6 | 18.7 | | | | | | | | | |
| 8 | 310°41.1 | 279°29.4 | 14.6 | 315°38.0 | 16.4 | 203°25.3 | 51.9 | 304°35.8 | 18.8 | | | | | | | | | |
| 9 | 325°43.6 | 294°28.9 | · · 15.7 | 330°38.7 | · · 15.6 | 218°27.5 | · · 51.8 | 319°38.0 | · · 19.0 | | | | | | | | | |
| 10 | 340°46.0 | 309°28.5 | 16.9 | 345°39.3 | 14.8 | 233°29.8 | 51.8 | 334°40.2 | 19.1 | | | | | | | | | |
| 11 | 355°48.5 | 324°28.0 | 18.0 | 0°40.0 | 14.1 | 248°32.1 | 51.8 | 349°42.3 | 19.2 | | | | | | | | | |
| 12 | 10°50.9 | 339°27.6 | N12°19.2 | 15°40.7 | S03°13.3 | 263°34.4 | N22°51.8 | 4°44.5 | N00°19.3 | | | | | | | | | |
| 13 | 25°53.4 | 354°27.1 | 20.3 | 30°41.3 | 12.5 | 278°36.7 | 51.8 | 19°46.7 | 19.4 | | | | | | | | | |
| 14 | 40°55.9 | 9°26.6 | 21.4 | 45°42.0 | 11.7 | 293°38.9 | 51.8 | 34°48.9 | 19.6 | | | | | | | | | |
| 15 | 55°58.3 | 24°26.2 | · · 22.6 | 60°42.7 | · · 10.9 | 308°41.2 | · · 51.7 | 49°51.1 | · · 19.7 | | | | | | | | | |
| 16 | 71°00.8 | 39°25.7 | 23.7 | 75°43.4 | 10.1 | 323°43.5 | 51.7 | 64°53.2 | 19.8 | | | | | | | | | |
| 17 | 86°03.3 | 54°25.3 | 24.9 | 90°44.0 | 09.4 | 338°45.8 | 51.7 | 79°55.4 | 19.9 | | | | | | | | | |
| 18 | 101°05.7 | 69°24.8 | N12°26.0 | 105°44.7 | S03°08.6 | 353°48.0 | N22°51.7 | 94°57.6 | N00°20.0 | | | | | | | | | |
| 19 | 116°08.2 | 84°24.3 | 27.1 | 120°45.4 | 07.8 | 8°50.3 | 51.7 | 109°59.8 | 20.2 | | | | | | | | | |
| 20 | 131°10.7 | 99°23.9 | 28.3 | 135°46.0 | 07.0 | 23°52.6 | 51.6 | 125°01.9 | 20.3 | | | | | | | | | |
| 21 | 146°13.1 | 114°23.4 | · · 29.4 | 150°46.7 | · · 06.2 | 38°54.9 | · · 51.6 | 140°04.1 | · · 20.4 | | | | | | | | | |
| 22 | 161°15.6 | 129°22.9 | 30.6 | 165°47.4 | 05.4 | 53°57.1 | 51.6 | 155°06.3 | 20.5 | | | | | | | | | |
| 23 | 176°18.1 | 144°22.5 | 31.7 | 180°48.1 | 04.7 | 68°59.4 | 51.6 | 170°08.5 | 20.7 | | | | | | | | | |
| Mer.pass. 11:17 | | | ν-0.5' d1.1' m-3.92 | | | ν0.7' d-0.8' m1.18 | | | ν2.3' d-0.0' m-2.20 | | | ν2.2' d0.1' m0.92 | | | | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | | | | | |
| 0 | 191°20.5 | 159°22.0 | N12°32.8 | 195°48.7 | S03°03.9 | 84°01.7 | N22°51.6 | 185°10.7 | N00°20.8 | | | | | | | | | |
| 1 | 206°23.0 | 174°21.6 | 34.0 | 210°49.4 | 03.1 | 99°03.9 | 51.5 | 200°12.8 | 20.9 | | | | | | | | | |
| 2 | 221°25.4 | 189°21.1 | 35.1 | 225°50.1 | 02.3 | 114°06.2 | 51.5 | 215°15.0 | 21.0 | | | | | | | | | |
| 3 | 236°27.9 | 204°20.6 | · · 36.2 | 240°50.8 | · · 01.5 | 129°08.5 | · · 51.5 | 230°17.2 | · · 21.1 | | | | | | | | | |
| 4 | 251°30.4 | 219°20.2 | 37.4 | 255°51.4 | 00.7 | 144°10.8 | 51.5 | 245°19.4 | 21.3 | | | | | | | | | |
| 5 | 266°32.8 | 234°19.7 | 38.5 | 270°52.1 | 03°00.0 | 159°13.0 | 51.5 | 260°21.6 | 21.4 | | | | | | | | | |
| 6 | 281°35.3 | 249°19.2 | N12°39.6 | 285°52.8 | S02°59.2 | 174°15.3 | N22°51.4 | 275°23.7 | N00°21.5 | | | | | | | | | |
| 7 | 296°37.8 | 264°18.8 | 40.8 | 300°53.4 | 58.4 | 189°17.6 | 51.4 | 290°25.9 | 21.6 | | | | | | | | | |
| 8 | 311°40.2 | 279°18.3 | 41.9 | 315°54.1 | 57.6 | 204°19.8 | 51.4 | 305°28.1 | 21.7 | | | | | | | | | |
| 9 | 326°42.7 | 294°17.8 | · · 43.0 | 330°54.8 | · · 56.8 | 219°22.1 | · · 51.4 | 320°30.3 | · · 21.9 | | | | | | | | | |
| 10 | 341°45.2 | 309°17.4 | 44.2 | 345°55.5 | 56.0 | 234°24.4 | 51.4 | 335°32.4 | 22.0 | | | | | | | | | |
| 11 | 356°47.6 | 324°16.9 | 45.3 | 0°56.1 | 55.3 | 249°26.7 | 51.3 | 350°34.6 | 22.1 | | | | | | | | | |
| 12 | 11°50.1 | 339°16.4 | N12°46.4 | 15°56.8 | S02°54.5 | 264°28.9 | N22°51.3 | 5°36.8 | N00°22.2 | | | | | | | | | |
| 13 | 26°52.5 | 354°15.9 | 47.6 | 30°57.5 | 53.7 | 279°31.2 | 51.3 | 20°39.0 | 22.3 | | | | | | | | | |
| 14 | 41°55.0 | 9°15.5 | 48.7 | 45°58.2 | 52.9 | 294°33.5 | 51.3 | 35°41.2 | 22.5 | | | | | | | | | |
| 15 | 56°57.5 | 24°15.0 | · · 49.8 | 60°58.8 | · · 52.1 | 309°35.7 | · · 51.3 | 50°43.3 | · · 22.6 | | | | | | | | | |
| 16 | 71°59.9 | 39°14.5 | 51.0 | 75°59.5 | 51.3 | 324°38.0 | 51.2 | 65°45.5 | 22.7 | | | | | | | | | |
| 17 | 87°02.4 | 54°14.1 | 52.1 | 91°00.2 | 50.6 | 339°40.3 | 51.2 | 80°47.7 | 22.8 | | | | | | | | | |
| 18 | 102°04.9 | 69°13.6 | N12°53.2 | 106°00.8 | S02°49.8 | 354°42.5 | N22°51.2 | 95°49.9 | N00°22.9 | | | | | | | | | |
| 19 | 117°07.3 | 84°13.1 | 54.3 | 121°01.5 | 49.0 | 9°44.8 | 51.2 | 110°52.1 | 23.1 | | | | | | | | | |
| 20 | 132°09.8 | 99°12.6 | 55.5 | 136°02.2 | 48.2 | 24°47.1 | 51.2 | 125°54.2 | 23.2 | | | | | | | | | |
| 21 | 147°12.3 | 114°12.2 | · · 56.6 | 151°02.9 | · · 47.4 | 39°49.3 | · · 51.1 | 140°56.4 | · · 23.3 | | | | | | | | | |
| 22 | 162°14.7 | 129°11.7 | 57.7 | 166°03.5 | 46.6 | 54°51.6 | 51.1 | 155°58.6 | 23.4 | | | | | | | | | |
| 23 | 177°17.2 | 144°11.2 | 58.8 | 181°04.2 | 45.9 | 69°53.9 | 51.1 | 171°00.8 | 23.6 | | | | | | | | | |
| Mer.pass. 11:13 | | | ν-0.5' d1.1' m-3.92 | | | ν0.7' d-0.8' m1.19 | | | ν2.3' d-0.0' m-2.19 | | | ν2.2' d0.1' m0.92 | | | | | | |

| Apr 01 Wed | | | SHA | Mer.pass |
|------------|--|--|----------|----------|
| Venus | | | 330°21.7 | 13:21 |
| Mars | | | 5°54.3 | 10:58 |
| Jupiter | | | 252°50.0 | 18:28 |
| Saturn | | | 354°03.9 | 11:45 |

| Apr 02 Thu | | | SHA | Mer.pass |
|------------|--|--|----------|----------|
| Venus | | | 329°11.7 | 13:22 |
| Mars | | | 5°11.3 | 10:57 |
| Jupiter | | | 252°45.7 | 18:25 |
| Saturn | | | 353°57.0 | 11:41 |

| Apr 03 Fri | | | SHA | Mer.pass |
|------------|--|--|----------|----------|
| Venus | | | 328°01.5 | 13:23 |
| Mars | | | 4°28.2 | 10:56 |
| Jupiter | | | 252°41.2 | 18:21 |
| Saturn | | | 353°50.1 | 11:38 |

| Horizontal parallax | | |
|---------------------|--|-----|
| Venus: | | 0.1 |
| Mars: | | 0.1 |


| h | Sun | | | Moon | | | |
|------------|----------|----------|------------|------------|-------|----------|-------|
| | GHA | Dec | | GHA | ν | Dec | d |
| Wed | | | | | | | HP |
| 0 | 179°00.2 | N04°27.6 | | 11°27.8 | 15.2' | S01°00.5 | 15.2' |
| 1 | 194°00.4 | 28.6 | | 26°01.9 | 15.2' | 01°15.8 | 15.2' |
| 2 | 209°00.6 | 29.6 | | 40°36.1 | 15.2' | 01°31.0 | 15.2' |
| 3 | 224°00.8 | · · 30.5 | | 55°10.3 | 15.2' | 01°46.2 | 15.2' |
| 4 | 239°01.0 | 31.5 | | 69°44.5 | 15.2' | 02°01.4 | 15.2' |
| 5 | 254°01.2 | 32.5 | | 84°18.8 | 15.2' | 02°16.6 | 15.2' |
| 6 | 269°01.4 | N04°33.4 | | 98°53.0 | 15.2' | S02°31.7 | 15.1' |
| 7 | 284°01.6 | 34.4 | | 113°27.2 | 15.3' | 02°46.8 | 15.1' |
| 8 | 299°01.7 | 35.4 | | 128°01.5 | 15.3' | 03°01.9 | 15.1' |
| 9 | 314°01.9 | · · 36.3 | | 142°35.8 | 15.3' | 03°17.0 | 15.1' |
| 10 | 329°02.1 | 37.3 | | 157°10.0 | 15.3' | 03°32.1 | 15.0' |
| 11 | 344°02.3 | 38.2 | | 171°44.3 | 15.3' | 03°47.1 | 15.0' |
| 12 | 359°02.5 | N04°39.2 | | 186°18.6 | 15.3' | S04°02.1 | 15.0' |
| 13 | 14°02.7 | 40.2 | | 200°52.8 | 15.3' | 04°17.1 | 15.0' |
| 14 | 29°02.9 | 41.1 | | 215°27.1 | 15.3' | 04°32.1 | 14.9' |
| 15 | 44°03.0 | · · 42.1 | | 230°01.4 | 15.3' | 04°47.0 | 14.9' |
| 16 | 59°03.2 | 43.1 | | 244°35.7 | 15.3' | 05°01.9 | 14.9' |
| 17 | 74°03.4 | 44.0 | | 259°09.9 | 15.3' | 05°16.8 | 14.8' |
| 18 | 89°03.6 | N04°45.0 | | 273°44.2 | 15.3' | S05°31.6 | 14.8' |
| 19 | 104°03.8 | 46.0 | | 288°18.5 | 15.3' | 05°46.4 | 14.8' |
| 20 | 119°04.0 | 46.9 | | 302°52.7 | 15.3' | 06°01.2 | 14.7' |
| 21 | 134°04.2 | · · 47.9 | | 317°27.0 | 15.3' | 06°15.9 | 14.7' |
| 22 | 149°04.3 | 48.8 | | 332°01.3 | 15.2' | 06°30.6 | 14.7' |
| 23 | 164°04.5 | 49.8 | | 346°35.5 | 15.2' | 06°45.2 | 14.6' |
| SD = 16.0' | | | $d = 1.0'$ | SD = 15.3' | | | |

| Thu | GHA | Dec | | GHA | ν | Dec | d |
|------------|----------|----------|------------|------------|-------|----------|-------|
| 0 | 179°04.7 | N04°50.8 | | 1°09.7 | 15.2' | S06°59.9 | 14.6' |
| 1 | 194°04.9 | 51.7 | | 15°44.0 | 15.2' | 07°14.4 | 14.5' |
| 2 | 209°05.1 | 52.7 | | 30°18.2 | 15.2' | 07°29.0 | 14.5' |
| 3 | 224°05.3 | · · 53.6 | | 44°52.4 | 15.2' | 07°43.5 | 14.5' |
| 4 | 239°05.5 | 54.6 | | 59°26.6 | 15.2' | 07°57.9 | 14.4' |
| 5 | 254°05.6 | 55.6 | | 74°00.8 | 15.2' | 08°12.4 | 14.4' |
| 6 | 269°05.8 | N04°56.5 | | 88°34.9 | 15.2' | S08°26.7 | 14.3' |
| 7 | 284°06.0 | 57.5 | | 103°09.1 | 15.1' | 08°41.1 | 14.3' |
| 8 | 299°06.2 | 58.5 | | 117°43.2 | 15.1' | 08°55.3 | 14.2' |
| 9 | 314°06.4 | 04°59.4 | | 132°17.3 | 15.1' | 09°09.6 | 14.2' |
| 10 | 329°06.6 | 05°00.4 | | 146°51.4 | 15.1' | 09°23.8 | 14.1' |
| 11 | 344°06.7 | 01.3 | | 161°25.5 | 15.1' | 09°37.9 | 14.1' |
| 12 | 359°06.9 | N05°02.3 | | 175°59.6 | 15.0' | S09°52.0 | 14.0' |
| 13 | 14°07.1 | 03.3 | | 190°33.6 | 15.0' | 10°06.0 | 14.0' |
| 14 | 29°07.3 | 04.2 | | 205°07.7 | 15.0' | 10°20.0 | 13.9' |
| 15 | 44°07.5 | · · 05.2 | | 219°41.7 | 15.0' | 10°34.0 | 13.9' |
| 16 | 59°07.7 | 06.1 | | 234°15.6 | 15.0' | 10°47.9 | 13.8' |
| 17 | 74°07.9 | 07.1 | | 248°49.6 | 14.9' | 11°01.7 | 13.8' |
| 18 | 89°08.0 | N05°08.1 | | 263°23.5 | 14.9' | S11°15.5 | 13.7' |
| 19 | 104°08.2 | 09.0 | | 277°57.4 | 14.9' | 11°29.2 | 13.7' |
| 20 | 119°08.4 | 10.0 | | 292°31.3 | 14.9' | 11°42.9 | 13.6' |
| 21 | 134°08.6 | · · 10.9 | | 307°05.1 | 14.8' | 11°56.5 | 13.6' |
| 22 | 149°08.8 | 11.9 | | 321°39.0 | 14.8' | 12°10.0 | 13.5' |
| 23 | 164°09.0 | 12.8 | | 336°12.8 | 14.8' | 12°23.5 | 13.4' |
| SD = 16.0' | | | $d = 1.0'$ | SD = 15.2' | | | |

| Fri | GHA | Dec | | GHA | ν | Dec | d |
|------------|----------|----------|------------|------------|-------|----------|-------|
| 0 | 179°09.1 | N05°13.8 | | 350°46.5 | 14.7' | S12°37.0 | 13.4' |
| 1 | 194°09.3 | 14.8 | | 5°20.3 | 14.7' | 12°50.3 | 13.3' |
| 2 | 209°09.5 | 15.7 | | 19°54.0 | 14.7' | 13°03.7 | 13.2' |
| 3 | 224°09.7 | · · 16.7 | | 34°27.6 | 14.6' | 13°16.9 | 13.2' |
| 4 | 239°09.9 | 17.6 | | 49°01.3 | 14.6' | 13°30.1 | 13.1' |
| 5 | 254°10.1 | 18.6 | | 63°34.9 | 14.6' | 13°43.2 | 13.1' |
| 6 | 269°10.3 | N05°19.5 | | 78°08.5 | 14.5' | S13°56.3 | 13.0' |
| 7 | 284°10.4 | 20.5 | | 92°42.0 | 14.5' | 14°09.3 | 12.9' |
| 8 | 299°10.6 | 21.5 | | 107°15.5 | 14.5' | 14°22.2 | 12.9' |
| 9 | 314°10.8 | · · 22.4 | | 121°49.0 | 14.4' | 14°35.0 | 12.8' |
| 10 | 329°11.0 | 23.4 | | 136°22.4 | 14.4' | 14°47.8 | 12.7' |
| 11 | 344°11.2 | 24.3 | | 150°55.8 | 14.4' | 15°00.5 | 12.6' |
| 12 | 359°11.4 | N05°25.3 | | 165°29.2 | 14.3' | S15°13.2 | 12.6' |
| 13 | 14°11.5 | 26.2 | | 180°02.5 | 14.3' | 15°25.8 | 12.5' |
| 14 | 29°11.7 | 27.2 | | 194°35.8 | 14.2' | 15°38.3 | 12.4' |
| 15 | 44°11.9 | · · 28.2 | | 209°09.0 | 14.2' | 15°50.7 | 12.4' |
| 16 | 59°12.1 | 29.1 | | 223°42.2 | 14.2' | 16°03.1 | 12.3' |
| 17 | 74°12.3 | 30.1 | | 238°15.4 | 14.1' | 16°15.3 | 12.2' |
| 18 | 89°12.5 | N05°31.0 | | 252°48.5 | 14.1' | S16°27.5 | 12.1' |
| 19 | 104°12.6 | 32.0 | | 267°21.5 | 14.0' | 16°39.7 | 12.1' |
| 20 | 119°12.8 | 32.9 | | 281°54.6 | 14.0' | 16°51.7 | 12.0' |
| 21 | 134°13.0 | · · 33.9 | | 296°27.6 | 13.9' | 17°03.7 | 11.9' |
| 22 | 149°13.2 | 34.8 | | 311°00.5 | 13.9' | 17°15.6 | 11.8' |
| 23 | 164°13.4 | 35.8 | | 325°33.4 | 13.9' | 17°27.4 | 11.7' |
| SD = 16.0' | | | $d = 1.0'$ | SD = 15.1' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 01:25 | 03:35 | 04:51 | 19:19 | 20:36 | 22:55 |
| N 70° | 02:13 | 03:52 | 04:59 | 19:11 | 20:18 | 22:01 |
| 68° | 02:43 | 04:06 | 05:05 | 19:04 | 20:04 | 21:29 |
| 66° | 03:04 | 04:16 | 05:11 | 18:59 | 19:53 | 21:07 |
| 64° | 03:21 | 04:25 | 05:15 | 18:54 | 19:44 | 20:49 |
| 62° | 03:35 | 04:33 | 05:19 | 18:50 | 19:36 | 20:35 |
| 60° | 03:46 | 04:40 | 05:22 | 18:46 | 19:29 | 20:24 |
| N 58° | 03:55 | 04:45 | 05:25 | 18:43 | 19:24 | 20:14 |
| 56° | 04:04 | 04:50 | 05:28 | 18:40 | 19:18 | 20:05 |
| 54° | 04:11 | 04:55 | 05:31 | 18:38 | 19:14 | 19:58 |
| 52° | 04:17 | 04:58 | 05:33 | 18:35 | 19:10 | 19:52 |
| 50° | 04:22 | 05:02 | 05:35 | 18:33 | 19:06 | 19:46 |
| 45° | 04:34 | 05:09 | 05:39 | 18:29 | 18:59 | 19:34 |
| N 40° | 04:43 | 05:15 | 05:43 | 18:25 | 18:53 | 19:25 |
| 35° | 04:50 | 05:20 | 05:46 | 18:22 | 18:48 | 19:18 |
| 30° | 04:56 | 05:24 | 05:48 | 18:19 | 18:43 | 19:12 |
| 20° | 05:05 | 05:31 | 05:53 | 18:15 | 18:37 | 19:03 |
| N 10° | 05:11 | 05:36 | 05:57 | 18:10 | 18:32 | 18:56 |
| 0° | 05:15 | 05:40 | 06:00 | 18:07 | 18:28 | 18:52 |
| S 10° | 05:18 | 05:43 | 06:04 | 18:03 | 18:24 | 18:49 |
| 20° | 05:20 | 05:45 | 06:07 | 18:00 | 18:22 | 18:47 |
| 30° | 05:20 | 05:47 | 06:11 | 17:55 | 18:19 | 18:47 |
| 35° | 05:19 | 05:48 | 06:13 | 17:53 | 18:18 | 18:48 |
| 40° | 05:17 | 05:49 | 06:16 | 17:51 | 18:18 | 18:49 |
| 45° | 05:15 | 05:49 | 06:19 | 17:48 | 18:17 | 18:51 |
| S 50° | 05:12 | 05:50 | 06:22 | 17:44 | 18:16 | 18:54 |
| 52° | 05:11 | 05:50 | 06:24 | 17:43 | 18:16 | 18:55 |
| 54° | 05:09 | 05:50 | 06:25 | 17:41 | 18:16 | 18:57 |
| 56° | 05:07 | 05:50 | 06:27 | 17:39 | 18:16 | 18:59 |
| 58° | 05:04 | 05:50 | 06:29 | 17:37 | 18:16 | 19:01 |
| S 60° | 05:01 | 05:50 | 06:31 | 17:34 | 18:16 | 19:04 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | 19:01 | 21:17 | · · · | 04:53 | 04:18 | 03:32 |
| N 70° | 18:52 | 20:55 | 23:22 | 04:56 | 04:30 | 03:57 |
| 68° | 18:45 | 20:38 | 22:42 | 04:59 | 04:39 | 04:16 |
| 66° | 18:39 | 20:24 | 22:16 | 05:01 | 04:47 | 04:32 |
| 64° | 18:34 | 20:12 | 21:55 | 05:03 | 04:54 | 04:45 |
| 62° | 18:30 | 20:03 | 21:39 | 05:05 | 05:00 | 04:55 |
| 60° | 18:26 | 19:55 | 21:25 | 05:06 | 05:05 | 05:05 |
| N 58° | 18:23 | 19:48 | 21:13 | 05:07 | 05:10 | 05:13 |
| 56° | 18:20 | 19:41 | 21:03 | 05:08 | 05:14 | 05:20 |
| 54° | 18:17 | 19:36 | 20:55 | 05:09 | 05:18 | 05:27 |
| 52° | 18:15 | 19:31 | 20:47 | 05:10 | 05:21 | 05:32 |
| 50° | 18:13 | 19:26 | 20:40 | 05:11 | 05:24 | 05:38 |
| 45° | 18:08 | 19:16 | 20:25 | 05:13 | 05:31 | 05:49 |
| N 40° | 18:04 | 19:08 | 20:12 | 05:15 | 05:36 | 05:59 |
| 35° | 18:01 | 19:01 | 20:02 | 05:16 | 05:41 | 06:07 |
| 30° | 17:58 | 18:55 | 19:53 | 05:17 | 05:45 | 06:14 |
| 20° | 17:53 | 18:45 | 19:37 | 05:19 | 05:53 | 06:27 |
| N 10° | 17:49 | 18:36 | 19:24 | 05:21 | 05:59 | 06:38 |
| 0° | 17:45 | 18:28 | 19:11 | 05:23 | 06:05 | 06:48 |
| S 10° | 17:41 | 18:19 | 18:59 | 05:25 | 06:12 | 06:59 |
| 20° | 17:37 | 18:11 | 18:46 | 05:26 | 06:18 | 07:10 |
| 30° | 17:32 | 18:01 | 18:31 | 05:29 | 06:26 | 07:23 |
| 35° | 17:30 | 17:55 | 18:22 | 05:30 | 06:30 | 07:31 |
| 40° | 17:27 | 17:48 | 18:12 | 05:31 | 06:35 | 07:39 |
| 45° | 17:23 | 17:41 | 18:01 | 05:33 | 06:41 | 07:49 |
| S 50° | 17:19 | 17:32 | 17:47 | 05:35 | 06:48 | 08:01 |
| 52° | 17:17 | 17:28 | 17:40 | 05:35 | 06:51 | 08:07 |
| 54° | 17:15 | 17:23 | 17:33 | 05:36 | 06:55 | 08:14 |
| 56° | 17:13 | 17:18 | 17:25 | 05:37 | 06:59 | 08:21 |
| 58° | 17:10 | 17:13 | 17:17 | 05:39 | 07:03 | 08:29 |
| S 60° | 17:07 | 17:07 | 17:07 | 05:40 | 07:08 | 08:38 |

| Day | Sun | | Mer. Pass hh:mm | Moon | | Age 13-15 99-99% |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|---|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 01 | 03:59 | 03:50 | 12:04 | 23:55 | 11:34 |  |
| 02 | 03:41 | 03:32 | 12:04 | --:-- | 12:17 | |
| 03 | 03:23 | 03:15 | 12:03 | 00:38 | 13:00 | |

April 04, 05, 06 UT (Sat., Sun., Mon.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|-------------------|----------|----------|
| Sat | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 192°19.7 | | 159°10.8 | N13°00.0 | 196°04.9 | S02°45.1 | 84°56.1 | N22°51.1 | 186°02.9 | N00°23.7 |
| 1 | 207°22.1 | | 174°10.3 | 01.1 | 211°05.6 | 44.3 | 99°58.4 | 51.1 | 201°05.1 | 23.8 |
| 2 | 222°24.6 | | 189°09.8 | 02.2 | 226°06.2 | 43.5 | 115°00.7 | 51.0 | 216°07.3 | 23.9 |
| 3 | 237°27.0 | | 204°09.3 | •• 03.3 | 241°06.9 | •• 42.7 | 130°02.9 | •• 51.0 | 231°09.5 | •• 24.0 |
| 4 | 252°29.5 | | 219°08.9 | 04.5 | 256°07.6 | 41.9 | 145°05.2 | 51.0 | 246°11.7 | 24.2 |
| 5 | 267°32.0 | | 234°08.4 | 05.6 | 271°08.3 | 41.1 | 160°07.5 | 51.0 | 261°13.8 | 24.3 |
| 6 | 282°34.4 | | 249°07.9 | N13°06.7 | 286°08.9 | S02°40.4 | 175°09.7 | N22°51.0 | 276°16.0 | N00°24.4 |
| 7 | 297°36.9 | | 264°07.4 | 07.8 | 301°09.6 | 39.6 | 190°12.0 | 50.9 | 291°18.2 | 24.5 |
| 8 | 312°39.4 | | 279°07.0 | 08.9 | 316°10.3 | 38.8 | 205°14.2 | 50.9 | 306°20.4 | 24.6 |
| 9 | 327°41.8 | | 294°06.5 | •• 10.1 | 331°11.0 | •• 38.0 | 220°16.5 | •• 50.9 | 321°22.6 | •• 24.8 |
| 10 | 342°44.3 | | 309°06.0 | 11.2 | 346°11.6 | 37.2 | 235°18.8 | 50.9 | 336°24.7 | 24.9 |
| 11 | 357°46.8 | | 324°05.5 | 12.3 | 1°12.3 | 36.4 | 250°21.0 | 50.9 | 351°26.9 | 25.0 |
| 12 | 12°49.2 | | 339°05.0 | N13°13.4 | 16°13.0 | S02°35.7 | 265°23.3 | N22°50.8 | 6°29.1 | N00°25.1 |
| 13 | 27°51.7 | | 354°04.6 | 14.5 | 31°13.6 | 34.9 | 280°25.6 | 50.8 | 21°31.3 | 25.2 |
| 14 | 42°54.1 | | 9°04.1 | 15.6 | 46°14.3 | 34.1 | 295°27.8 | 50.8 | 36°33.4 | 25.4 |
| 15 | 57°56.6 | | 24°03.6 | •• 16.8 | 61°15.0 | •• 33.3 | 310°30.1 | •• 50.8 | 51°35.6 | •• 25.5 |
| 16 | 72°59.1 | | 39°03.1 | 17.9 | 76°15.7 | 32.5 | 325°32.3 | 50.8 | 66°37.8 | 25.6 |
| 17 | 88°01.5 | | 54°02.6 | 19.0 | 91°16.3 | 31.7 | 340°34.6 | 50.7 | 81°40.0 | 25.7 |
| 18 | 103°04.0 | | 69°02.2 | N13°20.1 | 106°17.0 | S02°31.0 | 355°36.9 | N22°50.7 | 96°42.2 | N00°25.8 |
| 19 | 118°06.5 | | 84°01.7 | 21.2 | 121°17.7 | 30.2 | 10°39.1 | 50.7 | 111°44.3 | 26.0 |
| 20 | 133°08.9 | | 99°01.2 | 22.3 | 136°18.4 | 29.4 | 25°41.4 | 50.7 | 126°46.5 | 26.1 |
| 21 | 148°11.4 | | 114°00.7 | •• 23.4 | 151°19.0 | •• 28.6 | 40°43.6 | •• 50.7 | 141°48.7 | •• 26.2 |
| 22 | 163°13.9 | | 129°00.2 | 24.6 | 166°19.7 | 27.8 | 55°45.9 | 50.6 | 156°50.9 | 26.3 |
| 23 | 178°16.3 | | 143°59.8 | 25.7 | 181°20.4 | 27.0 | 70°48.2 | 50.6 | 171°53.1 | 26.4 |
| Mer.pass. 11:09 | | ν-0.5' d1.1' m-3.92 | | ν0.7' d-0.8' m1.19 | | ν2.3' d-0.0' m-2.18 | | ν2.2' d0.1' m0.93 | | |
| Sun | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 193°18.8 | | 158°59.3 | N13°26.8 | 196°21.1 | S02°26.2 | 85°50.4 | N22°50.6 | 186°55.2 | N00°26.6 |
| 1 | 208°21.3 | | 173°58.8 | 27.9 | 211°21.8 | 25.5 | 100°52.7 | 50.6 | 201°57.4 | 26.7 |
| 2 | 223°23.7 | | 188°58.3 | 29.0 | 226°22.4 | 24.7 | 115°54.9 | 50.5 | 216°59.6 | 26.8 |
| 3 | 238°26.2 | | 203°57.8 | •• 30.1 | 241°23.1 | •• 23.9 | 130°57.2 | •• 50.5 | 232°01.8 | •• 26.9 |
| 4 | 253°28.6 | | 218°57.3 | 31.2 | 256°23.8 | 23.1 | 145°59.4 | 50.5 | 247°04.0 | 27.0 |
| 5 | 268°31.1 | | 233°56.9 | 32.3 | 271°24.5 | 22.3 | 161°01.7 | 50.5 | 262°06.1 | 27.2 |
| 6 | 283°33.6 | | 248°56.4 | N13°33.4 | 286°25.1 | S02°21.5 | 176°04.0 | N22°50.5 | 277°08.3 | N00°27.3 |
| 7 | 298°36.0 | | 263°55.9 | 34.5 | 301°25.8 | 20.8 | 191°06.2 | 50.4 | 292°10.5 | 27.4 |
| 8 | 313°38.5 | | 278°55.4 | 35.6 | 316°26.5 | 20.0 | 206°08.5 | 50.4 | 307°12.7 | 27.5 |
| 9 | 328°41.0 | | 293°54.9 | •• 36.7 | 331°27.2 | •• 19.2 | 221°10.7 | •• 50.4 | 322°14.9 | •• 27.6 |
| 10 | 343°43.4 | | 308°54.4 | 37.8 | 346°27.8 | 18.4 | 236°13.0 | 50.4 | 337°17.0 | 27.8 |
| 11 | 358°45.9 | | 323°53.9 | 39.0 | 1°28.5 | 17.6 | 251°15.2 | 50.4 | 352°19.2 | 27.9 |
| 12 | 13°48.4 | | 338°53.5 | N13°40.1 | 16°29.2 | S02°16.8 | 266°17.5 | N22°50.3 | 7°21.4 | N00°28.0 |
| 13 | 28°50.8 | | 353°53.0 | 41.2 | 31°29.9 | 16.0 | 281°19.7 | 50.3 | 22°23.6 | 28.1 |
| 14 | 43°53.3 | | 8°52.5 | 42.3 | 46°30.5 | 15.3 | 296°22.0 | 50.3 | 37°25.7 | 28.2 |
| 15 | 58°55.8 | | 23°52.0 | •• 43.4 | 61°31.2 | •• 14.5 | 311°24.2 | •• 50.3 | 52°27.9 | •• 28.4 |
| 16 | 73°58.2 | | 38°51.5 | 44.5 | 76°31.9 | 13.7 | 326°26.5 | 50.2 | 67°30.1 | 28.5 |
| 17 | 89°00.7 | | 53°51.0 | 45.6 | 91°32.6 | 12.9 | 341°28.8 | 50.2 | 82°32.3 | 28.6 |
| 18 | 104°03.1 | | 68°50.5 | N13°46.7 | 106°33.2 | S02°12.1 | 356°31.0 | N22°50.2 | 97°34.5 | N00°28.7 |
| 19 | 119°05.6 | | 83°50.0 | 47.8 | 121°33.9 | 11.3 | 11°33.3 | 50.2 | 112°36.6 | 28.8 |
| 20 | 134°08.1 | | 98°49.5 | 48.9 | 136°34.6 | 10.6 | 26°35.5 | 50.2 | 127°38.8 | 29.0 |
| 21 | 149°10.5 | | 113°49.1 | •• 50.0 | 151°35.3 | •• 09.8 | 41°37.8 | •• 50.1 | 142°41.0 | •• 29.1 |
| 22 | 164°13.0 | | 128°48.6 | 51.1 | 166°36.0 | 09.0 | 56°40.0 | 50.1 | 157°43.2 | 29.2 |
| 23 | 179°15.5 | | 143°48.1 | 52.2 | 181°36.6 | 08.2 | 71°42.3 | 50.1 | 172°45.4 | 29.3 |
| Mer.pass. 11:05 | | ν-0.5' d1.1' m-3.92 | | ν0.7' d-0.8' m1.19 | | ν2.3' d-0.0' m-2.17 | | ν2.2' d0.1' m0.93 | | |
| Mon | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 194°17.9 | | 158°47.6 | N13°53.3 | 196°37.3 | S02°07.4 | 86°44.5 | N22°50.1 | 187°47.5 | N00°29.4 |
| 1 | 209°20.4 | | 173°47.1 | 54.4 | 211°38.0 | 06.6 | 101°46.8 | 50.0 | 202°49.7 | 29.6 |
| 2 | 224°22.9 | | 188°46.6 | 55.5 | 226°38.7 | 05.8 | 116°49.0 | 50.0 | 217°51.9 | 29.7 |
| 3 | 239°25.3 | | 203°46.1 | •• 56.5 | 241°39.3 | •• 05.1 | 131°51.3 | •• 50.0 | 232°54.1 | •• 29.8 |
| 4 | 254°27.8 | | 218°45.6 | 57.6 | 256°40.0 | 04.3 | 146°53.5 | 50.0 | 247°56.3 | 29.9 |
| 5 | 269°30.2 | | 233°45.1 | 58.7 | 271°40.7 | 03.5 | 161°55.8 | 50.0 | 262°58.4 | 30.0 |
| 6 | 284°32.7 | | 248°44.6 | N13°59.8 | 286°41.4 | S02°02.7 | 176°58.0 | N22°49.9 | 278°00.6 | N00°30.2 |
| 7 | 299°35.2 | | 263°44.1 | 14°00.9 | 301°42.0 | 01.9 | 192°00.3 | 49.9 | 293°02.8 | 30.3 |
| 8 | 314°37.6 | | 278°43.6 | 02.0 | 316°42.7 | 01.1 | 207°02.5 | 49.9 | 308°05.0 | 30.4 |
| 9 | 329°40.1 | | 293°43.1 | •• 03.1 | 331°43.4 | 02°00.4 | 222°04.8 | •• 49.9 | 323°07.2 | •• 30.5 |
| 10 | 344°42.6 | | 308°42.6 | 04.2 | 346°44.1 | 01°59.6 | 237°07.0 | 49.8 | 338°09.3 | 30.6 |
| 11 | 359°45.0 | | 323°42.1 | 05.3 | 1°44.8 | 58.8 | 252°09.2 | 49.8 | 353°11.5 | 30.8 |
| 12 | 14°47.5 | | 338°41.6 | N14°06.4 | 16°45.4 | S01°58.0 | 267°11.5 | N22°49.8 | 8°13.7 | N00°30.9 |
| 13 | 29°50.0 | | 353°41.2 | 07.5 | 31°46.1 | 57.2 | 282°13.7 | 49.8 | 23°15.9 | 31.0 |
| 14 | 44°52.4 | | 8°40.7 | 08.6 | 46°46.8 | 56.4 | 297°16.0 | 49.8 | 38°18.1 | 31.1 |
| 15 | 59°54.9 | | 23°40.2 | •• 09.6 | 61°47.5 | •• 55.6 | 312°18.2 | •• 49.7 | 53°20.2 | •• 31.2 |
| 16 | 74°57.4 | | 38°39.7 | 10.7 | 76°48.1 | 54.9 | 327°20.5 | 49.7 | 68°22.4 | 31.4 |
| 17 | 89°59.8 | | 53°39.2 | 11.8 | 91°48.8 | 54.1 | 342°22.7 | 49.7 | 83°24.6 | 31.5 |
| 18 | 105°02.3 | | 68°38.7 | N14°12.9 | 106°49.5 | S01°53.3 | 357°25.0 | N22°49.7 | 98°26.8 | N00°31.6 |
| 19 | 120°04.7 | | 83°38.2 | 14.0 | 121°50.2 | 52.5 | 12°27.2 | 49.6 | 113°29.0 | 31.7 |
| 20 | 135°07.2 | | 98°37.7 | 15.1 | 136°50.9 | 51.7 | 27°29.5 | 49.6 | 128°31.1 | 31.8 |
| 21 | 150°09.7 | | 113°37.2 | •• 16.2 | 151°51.5 | •• 50.9 | 42°31.7 | •• 49.6 | 143°33.3 | •• 32.0 |
| 22 | 165°12.1 | | 128°36.7 | 17.2 | 166°52.2 | 50.1 | 57°33.9 | 49.6 | 158°35.5 | 32.1 |
| 23 | 180°14.6 | | 143°36.2 | 18.3 | 181°52.9 | 49.4 | 72°36.2 | 49.5 | 173°37.7 | 32.2 |
| Mer.pass. 11:01 | | ν-0.5' d1.1' m-3.92 | | ν0.7' d-0.8' m1.19 | | ν2.3' d-0.0' m-2.17 | | ν2.2' d0.1' m0.93 | | |

| Stars | | |
|-------------|-----------|-----------|
| | SHA | Dec |
| Alpheratz | 357° 34.1 | 29° 14.0 |
| Ankaa | 353° 06.5 | -42° 09.8 |
| Schedar | 349° 30.5 | 56° 40.8 |
| Diphda | 348° 46.6 | -17° 50.6 |
| Achernar | 335° 20.0 | -57° 06.3 |
| Hamal | 327° 50.4 | 23° 35.1 |
| Polaris | 313° 56.3 | 89° 22.6 |
| Acamar | 315° 11.4 | -40° 12.1 |
| Menkar | 314° 05.4 | 4° 11.5 |
| Mirfak | 308° 27.2 | 49° 57.3 |
| Aldebaran | 290° 38.7 | 16° 33.7 |
| Rigel | 281° 03.0 | -8° 10.4 |
| Capella | 280° 20.6 | 46° 01.6 |
| Bellatrix | 278° 21.9 | 6° 22.3 |
| Elnath | 278° 00.7 | 28° 37.8 |
| Alnilam | 275° 36.8 | -1° 11.2 |
| Betelgeuse | 270° 51.1 | 7° 24.6 |
| Canopus | 263° 52.0 | -52° 42.8 |
| Sirius | 258° 25.4 | -16° 45.3 |
| Adhara | 255° 05.1 | -29° 00.7 |
| Procyon | 244° 49.7 | 5° 09.4 |
| Pollux | 243° 16.0 | 27° 57.8 |
| Avior | 234° 14.1 | -59° 35.9 |
| Suhail | 222° 45.4 | -43° 32.6 |
| Miaplacidus | 221° 37.6 | -69° 49.8 |
| Alphard | 217° 46.6 | -8° 46.5 |
| Regulus | 207° 33.1 | 11° 50.2 |
| Dubhe | 193° 39.2 | 61° 36.6 |
| Denebola | 182° 23.6 | 14° 25.4 |
| Gienah | 175° 42.2 | -17° 41.4 |
| Acrux | 172° 58.3 | -63° 14.8 |
| Gacrux | 171° 50.0 | -57° 15.8 |
| Alioth | 166° 11.5 | 55° 48.9 |
| Spica | 158° 20.9 | -11° 18.1 |
| Alkaid | 152° 50.7 | 49° 10.7 |
| Hadar | 148° 34.0 | -60° 30.0 |
| Menkent | 147° 56.1 | -36° 30.0 |
| Arcturus | 145° 46.7 | 19° 02.5 |
| Rigel Kent. | 139° 38.3 | -60° 56.6 |
| Kochab | 137° 18.8 | 74° 02.6 |
| Zuben'ubi | 136° 54.6 | -16° 09.2 |
| Alphecca | 126° 02.6 | 26° 37.3 |
| Antares | 112° 14.4 | -26° 29.4 |
| Atria | 107° 07.4 | -69° 04.3 |
| Sabik | 102° 01.5 | -15° 45.5 |
| Shaula | 96° 08.8 | -37° 07.3 |
| Rasalhague | 95° 57.5 | 12° 32.2 |
| Eltanin | 90° 41.6 | 51° 28.7 |
| Kaus Aust. | 83° 31.1 | -34° 22.3 |
| Vega | 80° 32.5 | 38° 48.1 |
| Nunki | 75° 46.5 | -26° 15.8 |
| Altair | 61° 59.0 | 8° 56.1 |
| Peacock | 53° 04.3 | -56° 38.8 |
| Deneb | 49° 25.3 | 45° 22.1 |
| Enif | 33° 38.0 | 9° 59.6 |
| Al Na'ir | 27° 32.0 | -46° 49.9 |
| Fomalhaut | 15° 13.7 | -29° 29.0 |
| Scheat | 13° 44.5 | 28° 13.4 |
| Markab | 13° 29.2 | 15° 20.7 |

| Apr 04 Sat | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 326° 51.1 | 13:24 |
| Mars | 3° 45.2 | 10:55 |
| Jupiter | 252° 36.5 | 18:17 |
| Saturn | 353° 43.3 | 11:34 |

| Apr 05 Sun | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 325° 40.5 | 13:24 |
| Mars | 3° 02.3 | 10:54 |
| Jupiter | 252° 31.6 | 18:14 |
| Saturn | 353° 36.4 | 11:31 |

| Apr 06 Mon | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 324° 29.7 | 13:25 |
| Mars | 2° 19.4 | 10:53 |
| Jupiter | 252° 26.6 | 18:10 |
| Saturn | 353° 29.6 | 11:27 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.1 |
| Mars: | 0.1 |


| h | Sun | | | Moon | | | | |
|------------|----------|----------|------------|------------|-------|----------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 179°13.5 | N05°36.7 | | 340°06.3 | 13.8' | S17°39.1 | 11.7' | 54.8' |
| 1 | 194°13.7 | 37.7 | | 354°39.1 | 13.8' | 17°50.8 | 11.6' | 54.8' |
| 2 | 209°13.9 | 38.7 | | 9°11.9 | 13.7' | 18°02.4 | 11.5' | 54.8' |
| 3 | 224°14.1 | · · 39.6 | | 23°44.6 | 13.7' | 18°13.8 | 11.4' | 54.8' |
| 4 | 239°14.3 | 40.6 | | 38°17.3 | 13.6' | 18°25.2 | 11.3' | 54.7' |
| 5 | 254°14.5 | 41.5 | | 52°49.9 | 13.6' | 18°36.6 | 11.2' | 54.7' |
| 6 | 269°14.6 | N05°42.5 | | 67°22.5 | 13.5' | S18°47.8 | 11.1' | 54.7' |
| 7 | 284°14.8 | 43.4 | | 81°55.0 | 13.5' | 18°58.9 | 11.1' | 54.7' |
| 8 | 299°15.0 | 44.4 | | 96°27.5 | 13.4' | 19°10.0 | 11.0' | 54.7' |
| 9 | 314°15.2 | · · 45.3 | | 110°59.9 | 13.4' | 19°21.0 | 10.9' | 54.7' |
| 10 | 329°15.4 | 46.3 | | 125°32.3 | 13.3' | 19°31.8 | 10.8' | 54.7' |
| 11 | 344°15.6 | 47.2 | | 140°04.6 | 13.3' | 19°42.6 | 10.7' | 54.6' |
| 12 | 359°15.7 | N05°48.2 | | 154°36.9 | 13.2' | S19°53.3 | 10.6' | 54.6' |
| 13 | 14°15.9 | 49.1 | | 169°09.2 | 13.2' | 20°03.9 | 10.5' | 54.6' |
| 14 | 29°16.1 | 50.1 | | 183°41.4 | 13.1' | 20°14.5 | 10.4' | 54.6' |
| 15 | 44°16.3 | · · 51.0 | | 198°13.5 | 13.1' | 20°24.9 | 10.3' | 54.6' |
| 16 | 59°16.5 | 52.0 | | 212°45.6 | 13.0' | 20°35.2 | 10.2' | 54.6' |
| 17 | 74°16.6 | 52.9 | | 227°17.6 | 13.0' | 20°45.4 | 10.1' | 54.6' |
| 18 | 89°16.8 | N05°53.9 | | 241°49.6 | 12.9' | S20°55.6 | 10.0' | 54.5' |
| 19 | 104°17.0 | 54.8 | | 256°21.5 | 12.9' | 21°05.6 | 9.9' | 54.5' |
| 20 | 119°17.2 | 55.8 | | 270°53.4 | 12.8' | 21°15.6 | 9.8' | 54.5' |
| 21 | 134°17.4 | · · 56.7 | | 285°25.3 | 12.8' | 21°25.4 | 9.7' | 54.5' |
| 22 | 149°17.5 | 57.7 | | 299°57.0 | 12.7' | 21°35.2 | 9.6' | 54.5' |
| 23 | 164°17.7 | 58.6 | | 314°28.8 | 12.7' | 21°44.8 | 9.5' | 54.5' |
| SD = 16.0' | | | $d = 1.0'$ | SD = 14.9' | | | | |

| Sun | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|------------|-------|----------|------|-------|
| 0 | 179°17.9 | N05°59.6 | | 329°00.5 | 12.6' | S21°54.4 | 9.4' | 54.5' |
| 1 | 194°18.1 | 06°00.5 | | 343°32.1 | 12.6' | 22°03.8 | 9.3' | 54.4' |
| 2 | 209°18.3 | 01.5 | | 358°03.7 | 12.5' | 22°13.2 | 9.2' | 54.4' |
| 3 | 224°18.4 | · · 02.4 | | 12°35.2 | 12.5' | 22°22.4 | 9.1' | 54.4' |
| 4 | 239°18.6 | 03.4 | | 27°06.7 | 12.4' | 22°31.5 | 9.0' | 54.4' |
| 5 | 254°18.8 | 04.3 | | 41°38.1 | 12.4' | 22°40.6 | 8.9' | 54.4' |
| 6 | 269°19.0 | N06°05.3 | | 56°09.4 | 12.3' | S22°49.5 | 8.8' | 54.4' |
| 7 | 284°19.2 | 06.2 | | 70°40.8 | 12.3' | 22°58.3 | 8.7' | 54.4' |
| 8 | 299°19.3 | 07.2 | | 85°12.0 | 12.2' | 23°07.1 | 8.6' | 54.4' |
| 9 | 314°19.5 | · · 08.1 | | 99°43.2 | 12.2' | 23°15.7 | 8.5' | 54.4' |
| 10 | 329°19.7 | 09.1 | | 114°14.4 | 12.1' | 23°24.2 | 8.4' | 54.3' |
| 11 | 344°19.9 | 10.0 | | 128°45.5 | 12.1' | 23°32.6 | 8.3' | 54.3' |
| 12 | 359°20.1 | N06°11.0 | | 143°16.5 | 12.0' | S23°40.9 | 8.2' | 54.3' |
| 13 | 14°20.2 | 11.9 | | 157°47.5 | 12.0' | 23°49.0 | 8.1' | 54.3' |
| 14 | 29°20.4 | 12.9 | | 172°18.5 | 11.9' | 23°57.1 | 8.0' | 54.3' |
| 15 | 44°20.6 | · · 13.8 | | 186°49.4 | 11.9' | 24°05.1 | 7.8' | 54.3' |
| 16 | 59°20.8 | 14.8 | | 201°20.2 | 11.8' | 24°12.9 | 7.7' | 54.3' |
| 17 | 74°21.0 | 15.7 | | 215°51.0 | 11.7' | 24°20.7 | 7.6' | 54.3' |
| 18 | 89°21.1 | N06°16.7 | | 230°21.8 | 11.7' | S24°28.3 | 7.5' | 54.3' |
| 19 | 104°21.3 | 17.6 | | 244°52.5 | 11.6' | 24°35.8 | 7.4' | 54.3' |
| 20 | 119°21.5 | 18.6 | | 259°23.1 | 11.6' | 24°43.2 | 7.3' | 54.2' |
| 21 | 134°21.7 | · · 19.5 | | 273°53.7 | 11.6' | 24°50.4 | 7.2' | 54.2' |
| 22 | 149°21.9 | 20.5 | | 288°24.3 | 11.5' | 24°57.6 | 7.0' | 54.2' |
| 23 | 164°22.0 | 21.4 | | 302°54.8 | 11.5' | 25°04.6 | 6.9' | 54.2' |
| SD = 16.0' | | | $d = 0.9'$ | SD = 14.9' | | | | |

| Mon | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|------------|-------|----------|------|-------|
| 0 | 179°22.2 | N06°22.3 | | 317°25.2 | 11.4' | S25°11.6 | 6.8' | 54.2' |
| 1 | 194°22.4 | 23.3 | | 331°55.7 | 11.4' | 25°18.4 | 6.7' | 54.2' |
| 2 | 209°22.6 | 24.2 | | 346°26.0 | 11.3' | 25°25.1 | 6.6' | 54.2' |
| 3 | 224°22.8 | · · 25.2 | | 0°56.3 | 11.3' | 25°31.6 | 6.5' | 54.2' |
| 4 | 239°22.9 | 26.1 | | 15°26.6 | 11.2' | 25°38.1 | 6.3' | 54.2' |
| 5 | 254°23.1 | 27.1 | | 29°56.8 | 11.2' | 25°44.4 | 6.2' | 54.2' |
| 6 | 269°23.3 | N06°28.0 | | 44°27.0 | 11.1' | S25°50.6 | 6.1' | 54.2' |
| 7 | 284°23.5 | 29.0 | | 58°57.1 | 11.1' | 25°56.7 | 6.0' | 54.2' |
| 8 | 299°23.6 | 29.9 | | 73°27.2 | 11.0' | 26°02.7 | 5.8' | 54.2' |
| 9 | 314°23.8 | · · 30.8 | | 87°57.2 | 11.0' | 26°08.5 | 5.7' | 54.2' |
| 10 | 329°24.0 | 31.8 | | 102°27.2 | 10.9' | 26°14.3 | 5.6' | 54.1' |
| 11 | 344°24.2 | 32.7 | | 116°57.1 | 10.9' | 26°19.9 | 5.5' | 54.1' |
| 12 | 359°24.4 | N06°33.7 | | 131°27.1 | 10.9' | S26°25.3 | 5.3' | 54.1' |
| 13 | 14°24.5 | 34.6 | | 145°56.9 | 10.8' | 26°30.7 | 5.2' | 54.1' |
| 14 | 29°24.7 | 35.6 | | 160°26.7 | 10.8' | 26°35.9 | 5.1' | 54.1' |
| 15 | 44°24.9 | · · 36.5 | | 174°56.5 | 10.7' | 26°41.0 | 5.0' | 54.1' |
| 16 | 59°25.1 | 37.5 | | 189°26.3 | 10.7' | 26°46.0 | 4.8' | 54.1' |
| 17 | 74°25.2 | 38.4 | | 203°56.0 | 10.7' | 26°50.8 | 4.7' | 54.1' |
| 18 | 89°25.4 | N06°39.3 | | 218°25.6 | 10.6' | S26°55.5 | 4.6' | 54.1' |
| 19 | 104°25.6 | 40.3 | | 232°55.3 | 10.6' | 27°00.1 | 4.5' | 54.1' |
| 20 | 119°25.8 | 41.2 | | 247°24.8 | 10.6' | 27°04.6 | 4.3' | 54.1' |
| 21 | 134°25.9 | · · 42.2 | | 261°54.4 | 10.5' | 27°08.9 | 4.2' | 54.1' |
| 22 | 149°26.1 | 43.1 | | 276°23.9 | 10.5' | 27°13.1 | 4.1' | 54.1' |
| 23 | 164°26.3 | 44.0 | | 290°53.4 | 10.4' | 27°17.2 | 3.9' | 54.1' |
| SD = 16.0' | | | $d = 0.9'$ | SD = 14.8' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 00:09 | 03:16 | 04:35 | 19:34 | 20:54 | //// |
| N 70° | 01:46 | 03:36 | 04:45 | 19:24 | 20:33 | 22:29 |
| 68° | 02:23 | 03:51 | 04:52 | 19:15 | 20:17 | 21:48 |
| 66° | 02:48 | 04:04 | 04:59 | 19:08 | 20:04 | 21:22 |
| 64° | 03:07 | 04:14 | 05:04 | 19:03 | 19:54 | 21:02 |
| 62° | 03:22 | 04:23 | 05:09 | 18:58 | 19:45 | 20:46 |
| 60° | 03:35 | 04:30 | 05:13 | 18:53 | 19:37 | 20:33 |
| N 58° | 03:45 | 04:36 | 05:17 | 18:50 | 19:31 | 20:22 |
| 56° | 03:54 | 04:42 | 05:20 | 18:46 | 19:25 | 20:13 |
| 54° | 04:02 | 04:47 | 05:23 | 18:43 | 19:20 | 20:05 |
| 52° | 04:09 | 04:51 | 05:26 | 18:41 | 19:15 | 19:58 |
| 50° | 04:15 | 04:55 | 05:28 | 18:38 | 19:11 | 19:51 |
| 45° | 04:28 | 05:04 | 05:34 | 18:33 | 19:03 | 19:38 |
| N 40° | 04:38 | 05:10 | 05:38 | 18:28 | 18:56 | 19:28 |
| 35° | 04:46 | 05:16 | 05:42 | 18:24 | 18:50 | 19:20 |
| 30° | 04:52 | 05:21 | 05:45 | 18:21 | 18:45 | 19:14 |
| 20° | 05:02 | 05:28 | 05:50 | 18:15 | 18:38 | 19:03 |
| N 10° | 05:09 | 05:34 | 05:55 | 18:10 | 18:32 | 18:56 |
| 0° | 05:14 | 05:39 | 05:59 | 18:06 | 18:27 | 18:51 |
| S 10° | 05:18 | 05:43 | 06:04 | 18:02 | 18:23 | 18:47 |
| 20° | 05:20 | 05:46 | 06:08 | 17:57 | 18:19 | 18:45 |
| 30° | 05:21 | 05:49 | 06:13 | 17:52 | 18:16 | 18:44 |
| 35° | 05:21 | 05:50 | 06:16 | 17:49 | 18:14 | 18:44 |
| 40° | 05:20 | 05:52 | 06:19 | 17:46 | 18:13 | 18:44 |
| 45° | 05:19 | 05:53 | 06:22 | 17:42 | 18:11 | 18:45 |
| S 50° | 05:17 | 05:54 | 06:27 | 17:38 | 18:10 | 18:47 |
| 52° | 05:16 | 05:55 | 06:29 | 17:36 | 18:09 | 18:48 |
| 54° | 05:14 | 05:55 | 06:31 | 17:34 | 18:09 | 18:50 |
| 56° | 05:13 | 05:56 | 06:33 | 17:31 | 18:08 | 18:51 |
| 58° | 05:11 | 05:56 | 06:36 | 17:28 | 18:08 | 18:53 |
| S 60° | 05:09 | 05:57 | 06:39 | 17:26 | 18:07 | 18:55 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | 01:07 | ■ | ■ | 01:16 | ■ | ■ |
| N 70° | ■ | ■ | ■ | 03:03 | ■ | ■ |
| 68° | ■ | ■ | ■ | 03:43 | ■ | ■ |
| 66° | · · | 00:27 | ■ | 04:11 | 03:35 | ■ |
| 64° | 23:47 | · · | 02:07 | 04:33 | 04:17 | 03:36 |
| 62° | 23:19 | · · | 01:06 | 04:50 | 04:45 | 04:38 |
| 60° | 22:58 | · · | 00:32 | 05:05 | 05:07 | 05:12 |
| N 58° | 22:41 | · · | 00:07 | 05:17 | 05:25 | 05:37 |
| 56° | 22:26 | 23:48 | · · | 05:28 | 05:40 | 05:58 |
| 54° | 22:14 | 23:31 | · · | 05:38 | 05:53 | 06:14 |
| 52° | 22:03 | 23:17 | · · | 05:46 | 06:04 | 06:29 |
| 50° | 21:53 | 23:05 | · · | 05:54 | 06:14 | 06:41 |
| 45° | 21:33 | 22:40 | 23:43 | 06:10 | 06:36 | 07:07 |
| N 40° | 21:16 | 22:20 | 23:20 | 06:24 | 06:53 | 07:28 |
| 35° | 21:03 | 22:03 | 23:02 | 06:36 | 07:08 | 07:45 |
| 30° | 20:51 | 21:49 | 22:46 | 06:46 | 07:21 | 08:00 |
| 20° | 20:31 | 21:25 | 22:19 | 07:03 | 07:43 | 08:26 |
| N 10° | 20:13 | 21:04 | 21:55 | 07:19 | 08:02 | 08:48 |
| 0° | 19:57 | 20:44 | 21:34 | 07:33 | 08:19 | 09:08 |
| S 10° | 19:41 | 20:25 | 21:12 | 07:47 | 08:37 | 09:29 |
| 20° | 19:23 | 20:04 | 20:49 | 08:03 | 08:57 | 09:51 |
| 30° | 19:04 | 19:41 | 20:23 | 08:21 | 09:19 | 10:16 |
| 35° | 18:52 | 19:27 | 20:07 | 08:31 | 09:32 | 10:32 |
| 40° | 18:39 | 19:11 | 19:49 | 08:43 | 09:47 | 10:49 |
| 45° | 18:24 | 18:52 | 19:27 | 08:58 | 10:05 | 11:11 |
| S 50° | 18:05 | 18:28 | 19:00 | 09:15 | 10:28 | 11:38 |
| 52° | 17:56 | 18:17 | 18:46 | 09:23 | 10:39 | 11:51 |
| 54° | 17:46 | 18:04 | 18:30 | 09:33 | 10:51 | 12:06 |
| 56° | 17:35 | 17:50 | 18:12 | 09:43 | 11:05 | 12:24 |
| 58° | 17:23 | 17:32 | 17:50 | 09:55 | 11:22 | 12:46 |
| S 60° | 17:08 | 17:12 | 17:21 | 10:09 | 11:42 | 13:15 |

| Day | Sun | | | Moon | | |
|-----|--------------------------|--------------------------|-----------------------|----------------|----------------|---|
| | Eqn.of Time | | Mer. Pass hh:mm | Mer.Pass. | | Age 16-18 96-86% |
| | 00 ^h mm:ss | 12 ^h mm:ss | | Upper hh:mm | Lower hh:mm | |
| | 04 | 03:06 | 02:57 | 12:03 | 01:22 | 13:45 |
| 05 | 02:48 | 02:40 | 12:03 | 02:08 | 14:32 |  |
| 06 | 02:31 | 02:23 | 12:02 | 02:56 | 15:21 | |

April 07, 08, 09 UT (Tue., Wed., Thu.)

| h | Aries | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|-----------|---------------------|-----------|--------------------|-----------|---------------------|-----------|-------------------|-----------|
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 195° 17.1 | 158° 35.7 | N14° 19.4 | 196° 53.6 | S01° 48.6 | 87° 38.4 | N22° 49.5 | 188° 39.9 | N00° 32.3 |
| 1 | 210° 19.5 | 173° 35.2 | 20.5 | 211° 54.3 | 47.8 | 102° 40.7 | 49.5 | 203° 42.0 | 32.4 |
| 2 | 225° 22.0 | 188° 34.7 | 21.6 | 226° 54.9 | 47.0 | 117° 42.9 | 49.5 | 218° 44.2 | 32.6 |
| 3 | 240° 24.5 | 203° 34.2 | •• 22.7 | 241° 55.6 | •• 46.2 | 132° 45.2 | •• 49.5 | 233° 46.4 | •• 32.7 |
| 4 | 255° 26.9 | 218° 33.6 | 23.7 | 256° 56.3 | 45.4 | 147° 47.4 | 49.4 | 248° 48.6 | 32.8 |
| 5 | 270° 29.4 | 233° 33.1 | 24.8 | 271° 57.0 | 44.7 | 162° 49.6 | 49.4 | 263° 50.8 | 32.9 |
| 6 | 285° 31.9 | 248° 32.6 | N14° 25.9 | 286° 57.6 | S01° 43.9 | 177° 51.9 | N22° 49.4 | 278° 52.9 | N00° 33.0 |
| 7 | 300° 34.3 | 263° 32.1 | 27.0 | 301° 58.3 | 43.1 | 192° 54.1 | 49.4 | 293° 55.1 | 33.2 |
| 8 | 315° 36.8 | 278° 31.6 | 28.1 | 316° 59.0 | 42.3 | 207° 56.4 | 49.3 | 308° 57.3 | 33.3 |
| 9 | 330° 39.2 | 293° 31.1 | •• 29.1 | 331° 59.7 | •• 41.5 | 222° 58.6 | •• 49.3 | 323° 59.5 | •• 33.4 |
| 10 | 345° 41.7 | 308° 30.6 | 30.2 | 347° 00.4 | 40.7 | 238° 00.8 | 49.3 | 339° 01.7 | 33.5 |
| 11 | 0° 44.2 | 323° 30.1 | 31.3 | 2° 01.0 | 39.9 | 253° 03.1 | 49.3 | 354° 03.8 | 33.6 |
| 12 | 15° 46.6 | 338° 29.6 | N14° 32.4 | 17° 01.7 | S01° 39.2 | 268° 05.3 | N22° 49.2 | 9° 06.0 | N00° 33.8 |
| 13 | 30° 49.1 | 353° 29.1 | 33.4 | 32° 02.4 | 38.4 | 283° 07.6 | 49.2 | 24° 08.2 | 33.9 |
| 14 | 45° 51.6 | 8° 28.6 | 34.5 | 47° 03.1 | 37.6 | 298° 09.8 | 49.2 | 39° 10.4 | 34.0 |
| 15 | 60° 54.0 | 23° 28.1 | •• 35.6 | 62° 03.8 | •• 36.8 | 313° 12.0 | •• 49.2 | 54° 12.6 | •• 34.1 |
| 16 | 75° 56.5 | 38° 27.6 | 36.7 | 77° 04.4 | 36.0 | 328° 14.3 | 49.1 | 69° 14.7 | 34.2 |
| 17 | 90° 59.0 | 53° 27.1 | 37.7 | 92° 05.1 | 35.2 | 343° 16.5 | 49.1 | 84° 16.9 | 34.4 |
| 18 | 106° 01.4 | 68° 26.6 | N14° 38.8 | 107° 05.8 | S01° 34.4 | 358° 18.8 | N22° 49.1 | 99° 19.1 | N00° 34.5 |
| 19 | 121° 03.9 | 83° 26.1 | 39.9 | 122° 06.5 | 33.7 | 13° 21.0 | 49.1 | 114° 21.3 | 34.6 |
| 20 | 136° 06.4 | 98° 25.5 | 40.9 | 137° 07.2 | 32.9 | 28° 23.2 | 49.1 | 129° 23.5 | 34.7 |
| 21 | 151° 08.8 | 113° 25.0 | •• 42.0 | 152° 07.8 | •• 32.1 | 43° 25.5 | •• 49.0 | 144° 25.6 | •• 34.8 |
| 22 | 166° 11.3 | 128° 24.5 | 43.1 | 167° 08.5 | 31.3 | 58° 27.7 | 49.0 | 159° 27.8 | 34.9 |
| 23 | 181° 13.7 | 143° 24.0 | 44.1 | 182° 09.2 | 30.5 | 73° 29.9 | 49.0 | 174° 30.0 | 35.1 |
| Mer.pass. 10:57 | | ν-0.5' d1.1' m-3.92 | | ν0.7' d-0.8' m1.19 | | ν2.2' d-0.0' m-2.16 | | ν2.2' d0.1' m0.93 | |

| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|-------------------|----------|
| 0 | 196°16.2 | 158°23.5 | N14°45.2 | 197°09.9 | S01°29.7 | 88°32.2 | N22°49.0 | 189°32.2 | N00°35.2 |
| 1 | 211°18.7 | 173°23.0 | 46.3 | 212°10.6 | 29.0 | 103°34.4 | 48.9 | 204°34.4 | 35.3 |
| 2 | 226°21.1 | 188°22.5 | 47.4 | 227°11.2 | 28.2 | 118°36.6 | 48.9 | 219°36.5 | 35.4 |
| 3 | 241°23.6 | 203°22.0 | · · 48.4 | 242°11.9 | · · 27.4 | 133°38.9 | · · 48.9 | 234°38.7 | · · 35.5 |
| 4 | 256°26.1 | 218°21.4 | 49.5 | 257°12.6 | 26.6 | 148°41.1 | 48.9 | 249°40.9 | 35.7 |
| 5 | 271°28.5 | 233°20.9 | 50.5 | 272°13.3 | 25.8 | 163°43.4 | 48.8 | 264°43.1 | 35.8 |
| 6 | 286°31.0 | 248°20.4 | N14°51.6 | 287°14.0 | S01°25.0 | 178°45.6 | N22°48.8 | 279°45.3 | N00°35.9 |
| 7 | 301°33.5 | 263°19.9 | 52.7 | 302°14.6 | 24.2 | 193°47.8 | 48.8 | 294°47.4 | 36.0 |
| 8 | 316°35.9 | 278°19.4 | 53.7 | 317°15.3 | 23.5 | 208°50.1 | 48.8 | 309°49.6 | 36.1 |
| 9 | 331°38.4 | 293°18.9 | · · 54.8 | 332°16.0 | · · 22.7 | 223°52.3 | · · 48.7 | 324°51.8 | · · 36.3 |
| 10 | 346°40.8 | 308°18.4 | 55.9 | 347°16.7 | 21.9 | 238°54.5 | 48.7 | 339°54.0 | 36.4 |
| 11 | 1°43.3 | 323°17.8 | 56.9 | 2°17.4 | 21.1 | 253°56.8 | 48.7 | 354°56.2 | 36.5 |
| 12 | 16°45.8 | 338°17.3 | N14°58.0 | 17°18.0 | S01°20.3 | 268°59.0 | N22°48.7 | 9°58.3 | N00°36.6 |
| 13 | 31°48.2 | 353°16.8 | 14°59.0 | 32°18.7 | 19.5 | 284°01.2 | 48.6 | 25°00.5 | 36.7 |
| 14 | 46°50.7 | 8°16.3 | 15°00.1 | 47°19.4 | 18.7 | 299°03.4 | 48.6 | 40°02.7 | 36.9 |
| 15 | 61°53.2 | 23°15.8 | · · 01.2 | 62°20.1 | · · 18.0 | 314°05.7 | · · 48.6 | 55°04.9 | · · 37.0 |
| 16 | 76°55.6 | 38°15.3 | 02.2 | 77°20.8 | 17.2 | 329°07.9 | 48.6 | 70°07.1 | 37.1 |
| 17 | 91°58.1 | 53°14.7 | 03.3 | 92°21.4 | 16.4 | 344°10.1 | 48.5 | 85°09.3 | 37.2 |
| 18 | 107°00.6 | 68°14.2 | N15°04.3 | 107°22.1 | S01°15.6 | 359°12.4 | N22°48.5 | 100°11.4 | N00°37.3 |
| 19 | 122°03.0 | 83°13.7 | 05.4 | 122°22.8 | 14.8 | 14°14.6 | 48.5 | 115°13.6 | 37.4 |
| 20 | 137°05.5 | 98°13.2 | 06.4 | 137°23.5 | 14.0 | 29°16.8 | 48.5 | 130°15.8 | 37.6 |
| 21 | 152°08.0 | 113°12.7 | · · 07.5 | 152°24.2 | · · 13.3 | 44°19.1 | · · 48.4 | 145°18.0 | · · 37.7 |
| 22 | 167°10.4 | 128°12.1 | 08.6 | 167°24.9 | 12.5 | 59°21.3 | 48.4 | 160°20.2 | 37.8 |
| 23 | 182°12.9 | 143°11.6 | 09.6 | 182°25.5 | 11.7 | 74°23.5 | 48.4 | 175°22.3 | 37.9 |
| Mer.pass. 10:53 | | ν-0.5' d1.1' m-3.92 | | ν0.7' d-0.8' m1.19 | | ν2.2' d-0.0' m-2.15 | | ν2.2' d0.1' m0.93 | |

| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|-----------|---------------------|-----------|--------------------|-----------|---------------------|-----------|-------------------|-----------|
| 0 | 197° 15.3 | 158° 11.1 | N15° 10.7 | 197° 26.2 | S01° 10.9 | 89° 25.7 | N22° 48.4 | 190° 24.5 | N00° 38.0 |
| 1 | 212° 17.8 | 173° 10.6 | 11.7 | 212° 26.9 | 10.1 | 104° 28.0 | 48.3 | 205° 26.7 | 38.2 |
| 2 | 227° 20.3 | 188° 10.1 | 12.8 | 227° 27.6 | 09.3 | 119° 30.2 | 48.3 | 220° 28.9 | 38.3 |
| 3 | 242° 22.7 | 203° 09.5 | · · 13.8 | 242° 28.3 | · · 08.5 | 134° 32.4 | · · 48.3 | 235° 31.1 | · · 38.4 |
| 4 | 257° 25.2 | 218° 09.0 | 14.9 | 257° 28.9 | 07.8 | 149° 34.7 | 48.3 | 250° 33.2 | 38.5 |
| 5 | 272° 27.7 | 233° 08.5 | 15.9 | 272° 29.6 | 07.0 | 164° 36.9 | 48.2 | 265° 35.4 | 38.6 |
| 6 | 287° 30.1 | 248° 08.0 | N15° 17.0 | 287° 30.3 | S01° 06.2 | 179° 39.1 | N22° 48.2 | 280° 37.6 | N00° 38.8 |
| 7 | 302° 32.6 | 263° 07.4 | 18.0 | 302° 31.0 | 05.4 | 194° 41.3 | 48.2 | 295° 39.8 | 38.9 |
| 8 | 317° 35.1 | 278° 06.9 | 19.1 | 317° 31.7 | 04.6 | 209° 43.6 | 48.2 | 310° 42.0 | 39.0 |
| 9 | 332° 37.5 | 293° 06.4 | · · 20.1 | 332° 32.4 | · · 03.8 | 224° 45.8 | · · 48.1 | 325° 44.1 | · · 39.1 |
| 10 | 347° 40.0 | 308° 05.9 | 21.2 | 347° 33.0 | 03.0 | 239° 48.0 | 48.1 | 340° 46.3 | 39.2 |
| 11 | 2° 42.5 | 323° 05.3 | 22.2 | 2° 33.7 | 02.3 | 254° 50.2 | 48.1 | 355° 48.5 | 39.4 |
| 12 | 17° 44.9 | 338° 04.8 | N15° 23.2 | 17° 34.4 | S01° 01.5 | 269° 52.5 | N22° 48.1 | 10° 50.7 | N00° 39.5 |
| 13 | 32° 47.4 | 353° 04.3 | 24.3 | 32° 35.1 | 01° 00.7 | 284° 54.7 | 48.0 | 25° 52.9 | 39.6 |
| 14 | 47° 49.8 | 8° 03.8 | 25.3 | 47° 35.8 | 00° 59.9 | 299° 56.9 | 48.0 | 40° 55.1 | 39.7 |
| 15 | 62° 52.3 | 23° 03.2 | · · 26.4 | 62° 36.4 | · · 59.1 | 314° 59.1 | · · 48.0 | 55° 57.2 | · · 39.8 |
| 16 | 77° 54.8 | 38° 02.7 | 27.4 | 77° 37.1 | 58.3 | 330° 01.4 | 48.0 | 70° 59.4 | 39.9 |
| 17 | 92° 57.2 | 53° 02.2 | 28.5 | 92° 37.8 | 57.6 | 345° 03.6 | 47.9 | 86° 01.6 | 40.1 |
| 18 | 107° 59.7 | 68° 01.6 | N15° 29.5 | 107° 38.5 | S00° 56.8 | 0° 05.8 | N22° 47.9 | 101° 03.8 | N00° 40.2 |
| 19 | 123° 02.2 | 83° 01.1 | 30.5 | 122° 39.2 | 56.0 | 15° 08.0 | 47.9 | 116° 06.0 | 40.3 |
| 20 | 138° 04.6 | 98° 00.6 | 31.6 | 137° 39.9 | 55.2 | 30° 10.3 | 47.9 | 131° 08.1 | 40.4 |
| 21 | 153° 07.1 | 113° 00.1 | · · 32.6 | 152° 40.5 | · · 54.4 | 45° 12.5 | · · 47.8 | 146° 10.3 | · · 40.5 |
| 22 | 168° 09.6 | 127° 59.5 | 33.7 | 167° 41.2 | 53.6 | 60° 14.7 | 47.8 | 161° 12.5 | 40.7 |
| 23 | 183° 12.0 | 142° 59.0 | 34.7 | 182° 41.9 | 52.8 | 75° 16.9 | 47.8 | 176° 14.7 | 40.8 |
| Mer.pass. 10:49 | | μ-0.5' d1.1' m-3.92 | | μ0.7' d-0.8' m1.19 | | μ2.2' d-0.0' m-2.15 | | μ2.2' d0.1' m0.93 | |

| Stars | | |
|-------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°34.1 | 29°14.0 |
| Ankaa | 353°06.5 | -42°09.8 |
| Schedar | 349°30.5 | 56°40.8 |
| Diphda | 348°46.6 | -17°50.6 |
| Achernar | 335°20.0 | -57°06.2 |
| Hamal | 327°50.4 | 23°35.1 |
| Polaris | 313°56.7 | 89°22.6 |
| Acamar | 315°11.4 | -40°12.1 |
| Menkar | 314°05.4 | 4°11.5 |
| Mirfak | 308°27.2 | 49°57.3 |
| Aldebaran | 290°38.7 | 16°33.7 |
| Rigel | 281°03.0 | -8°10.4 |
| Capella | 280°20.6 | 46°01.6 |
| Bellatrix | 278°21.9 | 6°22.3 |
| Elnath | 278°00.7 | 28°37.8 |
| Alnilam | 275°36.8 | -1°11.2 |
| Betelgeuse | 270°51.1 | 7°24.6 |
| Canopus | 263°52.1 | -52°42.8 |
| Sirius | 258°25.4 | -16°45.3 |
| Adhara | 255°05.1 | -29°00.7 |
| Procyon | 244°49.7 | 5°09.4 |
| Pollux | 243°16.0 | 27°57.8 |
| Avior | 234°14.2 | -59°35.9 |
| Suhail | 222°45.4 | -43°32.6 |
| Miaplacidus | 221°37.7 | -69°49.8 |
| Alphard | 217°46.6 | -8°46.5 |
| Regulus | 207°33.1 | 11°50.2 |
| Dubhe | 193°39.2 | 61°36.6 |
| Denebola | 182°23.6 | 14°25.4 |
| Gienah | 175°42.2 | -17°41.5 |
| Acrux | 172°58.3 | -63°14.8 |
| Gacrux | 171°50.0 | -57°15.8 |
| Alioth | 166°11.5 | 55°48.9 |
| Spica | 158°20.9 | -11°18.1 |
| Alkaid | 152°50.7 | 49°10.8 |
| Hadar | 148°33.9 | -60°30.0 |
| Menkent | 147°56.0 | -36°30.0 |
| Arcturus | 145°46.7 | 19°02.5 |
| Rigil Kent. | 139°38.3 | -60°56.6 |
| Kochab | 137°18.7 | 74°02.6 |
| Zuben'ubi | 136°54.6 | -16°09.2 |
| Alphecca | 126°02.6 | 26°37.3 |
| Antares | 112°14.4 | -26°29.4 |
| Atria | 107°07.4 | -69°04.3 |
| Sabik | 102°01.4 | -15°45.5 |
| Shaula | 96°08.8 | -37°07.3 |
| Rasalhague | 95°57.5 | 12°32.2 |
| Eltanin | 90°41.5 | 51°28.7 |
| Kaus Aust. | 83°31.1 | -34°22.2 |
| Vega | 80°32.5 | 38°48.1 |
| Nunki | 75°46.5 | -26°15.8 |
| Altair | 61°59.0 | 8°56.1 |
| Peacock | 53°04.3 | -56°38.8 |
| Deneb | 49°25.3 | 45°22.1 |
| Enif | 33°38.0 | 9°59.6 |
| Al Na'ir | 27°31.9 | -46°49.9 |
| Fomalhaut | 15°13.7 | -29°29.0 |
| Scheat | 13°44.5 | -28°13.4 |
| Markab | 13°29.2 | 15°20.7 |

| Apr 07 Tue | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 323° 18.6 | 13:26 |
| Mars | 1° 36.5 | 10:52 |
| Jupiter | 252° 21.4 | 18:07 |
| Saturn | 353° 22.8 | 11:24 |

| Apr 08 Wed | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 322° 07.3 | 13:27 |
| Mars | 0° 53.7 | 10:51 |
| Jupiter | 252° 16.0 | 18:03 |
| Saturn | 353° 16.0 | 11:20 |

| Apr 09 Thu | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 320° 55.8 | 13:28 |
| Mars | 0° 10.9 | 10:50 |
| Jupiter | 252° 10.4 | 18:00 |
| Saturn | 353° 09.2 | 11:17 |

| | |
|----------------------------|-----|
| Horizontal parallax | |
| Venus: | 0.1 |
| Mars: | 0.1 |

| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|------------|----------|-------|----------|-------|-------|
| Tue | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 179°26.5 | N06°45.0 | | 305°22.9 | 10.4' | S27°21.1 | 3.8' | 54.1' |
| 1 | 194°26.7 | 45.9 | | 319°52.3 | 10.4' | 27°25.0 | 3.7' | 54.1' |
| 2 | 209°26.8 | 46.9 | | 334°21.6 | 10.4' | 27°28.6 | 3.6' | 54.1' |
| 3 | 224°27.0 | · · 47.8 | | 348°51.0 | 10.3' | 27°32.2 | 3.4' | 54.1' |
| 4 | 239°27.2 | 48.7 | | 3°20.3 | 10.3' | 27°35.6 | 3.3' | 54.1' |
| 5 | 254°27.4 | 49.7 | | 17°49.6 | 10.3' | 27°38.9 | 3.2' | 54.1' |
| 6 | 269°27.5 | N06°50.6 | | 32°18.9 | 10.2' | S27°42.1 | 3.0' | 54.1' |
| 7 | 284°27.7 | 51.6 | | 46°48.1 | 10.2' | 27°45.1 | 2.9' | 54.1' |
| 8 | 299°27.9 | 52.5 | | 61°17.3 | 10.2' | 27°48.0 | 2.8' | 54.1' |
| 9 | 314°28.1 | · · 53.4 | | 75°46.5 | 10.2' | 27°50.7 | 2.6' | 54.1' |
| 10 | 329°28.2 | 54.4 | | 90°15.7 | 10.1' | 27°53.4 | 2.5' | 54.1' |
| 11 | 344°28.4 | 55.3 | | 104°44.8 | 10.1' | 27°55.8 | 2.4' | 54.1' |
| 12 | 359°28.6 | N06°56.3 | | 119°13.9 | 10.1' | S27°58.2 | 2.2' | 54.1' |
| 13 | 14°28.8 | 57.2 | | 133°43.0 | 10.1' | 28°00.4 | 2.1' | 54.1' |
| 14 | 29°28.9 | 58.1 | | 148°12.1 | 10.0' | 28°02.5 | 2.0' | 54.1' |
| 15 | 44°29.1 | 06°59.1 | | 162°41.1 | 10.0' | 28°04.5 | 1.8' | 54.1' |
| 16 | 59°29.3 | 07°00.0 | | 177°10.1 | 10.0' | 28°06.3 | 1.7' | 54.1' |
| 17 | 74°29.5 | 01.0 | | 191°39.1 | 10.0' | 28°08.0 | 1.5' | 54.1' |
| 18 | 89°29.6 | N07°01.9 | | 206°08.1 | 10.0' | S28°09.5 | 1.4' | 54.1' |
| 19 | 104°29.8 | 02.8 | | 220°37.1 | 10.0' | 28°10.9 | 1.3' | 54.1' |
| 20 | 119°30.0 | 03.8 | | 235°06.1 | 9.9' | 28°12.2 | 1.1' | 54.1' |
| 21 | 134°30.2 | · · 04.7 | | 249°35.0 | 9.9' | 28°13.3 | 1.0' | 54.1' |
| 22 | 149°30.3 | 05.6 | | 264°03.9 | 9.9' | 28°14.3 | 0.9' | 54.1' |
| 23 | 164°30.5 | 06.6 | | 278°32.9 | 9.9' | 28°15.2 | 0.7' | 54.1' |
| SD = 16.0' $d = 0.9'$ | | | SD = 14.8' | | | | | |
| Wed | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 179°30.7 | N07°07.5 | | 293°01.8 | 9.9' | S28°15.9 | 0.6' | 54.1' |
| 1 | 194°30.9 | 08.4 | | 307°30.7 | 9.9' | 28°16.5 | 0.5' | 54.1' |
| 2 | 209°31.0 | 09.4 | | 321°59.6 | 9.9' | 28°17.0 | 0.3' | 54.1' |
| 3 | 224°31.2 | · · 10.3 | | 336°28.4 | 9.9' | 28°17.3 | 0.2' | 54.1' |
| 4 | 239°31.4 | 11.3 | | 350°57.3 | 9.9' | 28°17.5 | 0.0' | 54.1' |
| 5 | 254°31.5 | 12.2 | | 5°26.2 | 9.9' | 28°17.5 | -0.1' | 54.1' |
| 6 | 269°31.7 | N07°13.1 | | 19°55.0 | 9.9' | S28°17.4 | -0.2' | 54.1' |
| 7 | 284°31.9 | 14.1 | | 34°23.9 | 9.9' | 28°17.2 | -0.4' | 54.2' |
| 8 | 299°32.1 | 15.0 | | 48°52.8 | 9.9' | 28°16.8 | -0.5' | 54.2' |
| 9 | 314°32.2 | · · 15.9 | | 63°21.6 | 9.9' | 28°16.3 | -0.6' | 54.2' |
| 10 | 329°32.4 | 16.9 | | 77°50.5 | 9.9' | 28°15.7 | -0.8' | 54.2' |
| 11 | 344°32.6 | 17.8 | | 92°19.3 | 9.9' | 28°14.9 | -0.9' | 54.2' |
| 12 | 359°32.8 | N07°18.7 | | 106°48.2 | 9.9' | S28°14.0 | -1.1' | 54.2' |
| 13 | 14°32.9 | 19.7 | | 121°17.1 | 9.9' | 28°12.9 | -1.2' | 54.2' |
| 14 | 29°33.1 | 20.6 | | 135°45.9 | 9.9' | 28°11.8 | -1.3' | 54.2' |
| 15 | 44°33.3 | · · 21.5 | | 150°14.8 | 9.9' | 28°10.4 | -1.5' | 54.2' |
| 16 | 59°33.4 | 22.5 | | 164°43.7 | 9.9' | 28°09.0 | -1.6' | 54.2' |
| 17 | 74°33.6 | 23.4 | | 179°12.6 | 9.9' | 28°07.4 | -1.7' | 54.2' |
| 18 | 89°33.8 | N07°24.3 | | 193°41.5 | 9.9' | S28°05.6 | -1.9' | 54.2' |
| 19 | 104°34.0 | 25.3 | | 208°10.4 | 9.9' | 28°03.8 | -2.0' | 54.2' |
| 20 | 119°34.1 | 26.2 | | 222°39.3 | 9.9' | 28°01.7 | -2.1' | 54.3' |
| 21 | 134°34.3 | · · 27.1 | | 237°08.2 | 9.9' | 27°59.6 | -2.3' | 54.3' |
| 22 | 149°34.5 | 28.1 | | 251°37.1 | 9.9' | 27°57.3 | -2.4' | 54.3' |
| 23 | 164°34.6 | 29.0 | | 266°06.1 | 10.0' | 27°54.9 | -2.6' | 54.3' |
| SD = 16.0' $d = 0.9'$ | | | SD = 14.8' | | | | | |
| Thu | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 179°34.8 | N07°29.9 | | 280°35.0 | 10.0' | S27°52.3 | -2.7' | 54.3' |
| 1 | 194°35.0 | 30.8 | | 295°04.0 | 10.0' | 27°49.6 | -2.8' | 54.3' |
| 2 | 209°35.2 | 31.8 | | 309°33.0 | 10.0' | 27°46.8 | -3.0' | 54.3' |
| 3 | 224°35.3 | · · 32.7 | | 324°02.0 | 10.0' | 27°43.8 | -3.1' | 54.3' |
| 4 | 239°35.5 | 33.6 | | 338°31.0 | 10.0' | 27°40.7 | -3.2' | 54.3' |
| 5 | 254°35.7 | 34.6 | | 353°00.0 | 10.1' | 27°37.5 | -3.4' | 54.4' |
| 6 | 269°35.8 | N07°35.5 | | 7°29.1 | 10.1' | S27°34.1 | -3.5' | 54.4' |
| 7 | 284°36.0 | 36.4 | | 21°58.2 | 10.1' | 27°30.6 | -3.6' | 54.4' |
| 8 | 299°36.2 | 37.4 | | 36°27.3 | 10.1' | 27°27.0 | -3.8' | 54.4' |
| 9 | 314°36.4 | · · 38.3 | | 50°56.4 | 10.1' | 27°23.2 | -3.9' | 54.4' |
| 10 | 329°36.5 | 39.2 | | 65°25.6 | 10.2' | 27°19.3 | -4.0' | 54.4' |
| 11 | 344°36.7 | 40.1 | | 79°54.7 | 10.2' | 27°15.3 | -4.2' | 54.4' |
| 12 | 359°36.9 | N07°41.1 | | 94°23.9 | 10.2' | S27°11.1 | -4.3' | 54.5' |
| 13 | 14°37.0 | 42.0 | | 108°53.1 | 10.2' | 27°06.8 | -4.4' | 54.5' |
| 14 | 29°37.2 | 42.9 | | 123°22.4 | 10.3' | 27°02.4 | -4.6' | 54.5' |
| 15 | 44°37.4 | · · 43.9 | | 137°51.7 | 10.3' | 26°57.8 | -4.7' | 54.5' |
| 16 | 59°37.5 | 44.8 | | 152°20.9 | 10.3' | 26°53.1 | -4.8' | 54.5' |
| 17 | 74°37.7 | 45.7 | | 166°50.3 | 10.4' | 26°48.2 | -5.0' | 54.5' |
| 18 | 89°37.9 | N07°46.6 | | 181°19.6 | 10.4' | S26°43.3 | -5.1' | 54.5' |
| 19 | 104°38.0 | 47.6 | | 195°49.0 | 10.4' | 26°38.2 | -5.2' | 54.6' |
| 20 | 119°38.2 | 48.5 | | 210°18.4 | 10.4' | 26°32.9 | -5.4' | 54.6' |
| 21 | 134°38.4 | · · 49.4 | | 224°47.9 | 10.5' | 26°27.6 | -5.5' | 54.6' |
| 22 | 149°38.6 | 50.3 | | 239°17.3 | 10.5' | 26°22.1 | -5.6' | 54.6' |
| 23 | 164°38.7 | 51.3 | | 253°46.9 | 10.5' | 26°16.5 | -5.7' | 54.6' |
| SD = 16.0' $d = 0.9'$ | | | SD = 14.8' | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|--------------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | 02:55 | 04:19 | 19:48 | 21:14 | //// |
| N 70° | 01:10 | 03:19 | 04:30 | 19:36 | 20:49 | 23:09 |
| 68° | 02:00 | 03:36 | 04:40 | 19:27 | 20:31 | 22:10 |
| 66° | 02:30 | 03:51 | 04:47 | 19:18 | 20:16 | 21:38 |
| 64° | 02:52 | 04:02 | 04:54 | 19:12 | 20:04 | 21:15 |
| 62° | 03:10 | 04:12 | 05:00 | 19:06 | 19:54 | 20:57 |
| 60° | 03:24 | 04:20 | 05:04 | 19:01 | 19:45 | 20:43 |
| N 58° | 03:35 | 04:27 | 05:09 | 18:56 | 19:38 | 20:31 |
| 56° | 03:45 | 04:34 | 05:13 | 18:52 | 19:31 | 20:20 |
| 54° | 03:54 | 04:39 | 05:16 | 18:49 | 19:26 | 20:11 |
| 52° | 04:01 | 04:44 | 05:19 | 18:46 | 19:21 | 20:04 |
| 50° | 04:08 | 04:49 | 05:22 | 18:43 | 19:16 | 19:57 |
| 45° | 04:22 | 04:58 | 05:28 | 18:36 | 19:07 | 19:43 |
| N 40° | 04:33 | 05:06 | 05:33 | 18:31 | 18:59 | 19:32 |
| 35° | 04:41 | 05:12 | 05:37 | 18:27 | 18:53 | 19:23 |
| 30° | 04:48 | 05:17 | 05:41 | 18:23 | 18:47 | 19:16 |
| 20° | 04:59 | 05:26 | 05:48 | 18:16 | 18:38 | 19:05 |
| N 10° | 05:08 | 05:32 | 05:53 | 18:10 | 18:32 | 18:56 |
| 0° | 05:14 | 05:38 | 05:59 | 18:05 | 18:26 | 18:50 |
| S 10° | 05:18 | 05:42 | 06:04 | 18:00 | 18:21 | 18:46 |
| 20° | 05:21 | 05:47 | 06:09 | 17:54 | 18:17 | 18:42 |
| 30° | 05:23 | 05:51 | 06:15 | 17:48 | 18:12 | 18:40 |
| 35° | 05:23 | 05:53 | 06:18 | 17:45 | 18:10 | 18:40 |
| 40° | 05:23 | 05:55 | 06:22 | 17:41 | 18:08 | 18:40 |
| 45° | 05:23 | 05:57 | 06:26 | 17:37 | 18:06 | 18:40 |
| S 50° | 05:22 | 05:59 | 06:31 | 17:31 | 18:04 | 18:41 |
| 52° | 05:21 | 06:00 | 06:34 | 17:29 | 18:03 | 18:42 |
| 54° | 05:20 | 06:01 | 06:36 | 17:26 | 18:02 | 18:43 |
| 56° | 05:19 | 06:02 | 06:39 | 17:23 | 18:01 | 18:44 |
| 58° | 05:17 | 06:03 | 06:42 | 17:20 | 18:00 | 18:45 |
| S 60° | 05:16 | 06:04 | 06:46 | 17:17 | 17:58 | 18:46 |

| Lat. | Moonrise | | | Moonset | | |
|--------------|----------|-------|-------|---------|-------|-------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | ██ | ██ | ██ | ██ | ██ | ██ |
| N 70° | ██ | ██ | ██ | ██ | ██ | ██ |
| 68° | ██ | ██ | ██ | ██ | ██ | ██ |
| 66° | ██ | ██ | ██ | ██ | ██ | ██ |
| 64° | ██ | ██ | ██ | ██ | ██ | ██ |
| 62° | 03:04 | ██ | 04:53 | 04:24 | ██ | 06:10 |
| 60° | 02:02 | 03:12 | 03:49 | 05:27 | 06:03 | 07:13 |
| N 58° | 01:28 | 02:32 | 03:15 | 06:01 | 06:42 | 07:47 |
| 56° | 01:03 | 02:05 | 02:50 | 06:26 | 07:10 | 08:12 |
| 54° | 00:43 | 01:44 | 02:29 | 06:46 | 07:31 | 08:32 |
| 52° | 00:26 | 01:26 | 02:13 | 07:03 | 07:49 | 08:49 |
| 50° | 00:12 | 01:11 | 01:58 | 07:17 | 08:04 | 09:03 |
| 45° | · · · | 00:40 | 01:29 | 07:47 | 08:35 | 09:32 |
| N 40° | · · · | 00:16 | 01:06 | 08:10 | 08:59 | 09:55 |
| 35° | 23:57 | · · · | 00:47 | 08:29 | 09:18 | 10:13 |
| 30° | 23:40 | · · · | 00:30 | 08:45 | 09:35 | 10:29 |
| 20° | 23:12 | · · · | 00:03 | 09:13 | 10:03 | 10:57 |
| N 10° | 22:48 | 23:39 | · · · | 09:36 | 10:27 | 11:20 |
| 0° | 22:25 | 23:17 | · · · | 09:58 | 10:50 | 11:41 |
| S 10° | 22:03 | 22:54 | 23:47 | 10:21 | 11:12 | 12:03 |
| 20° | 21:38 | 22:31 | 23:25 | 10:45 | 11:37 | 12:26 |
| 30° | 21:10 | 22:03 | 22:59 | 11:12 | 12:05 | 12:52 |
| 35° | 20:54 | 21:46 | 22:44 | 11:29 | 12:21 | 13:08 |
| 40° | 20:34 | 21:27 | 22:26 | 11:48 | 12:41 | 13:26 |
| 45° | 20:11 | 21:04 | 22:05 | 12:11 | 13:04 | 13:48 |
| S 50° | 19:41 | 20:34 | 21:38 | 12:41 | 13:34 | 14:16 |
| 52° | 19:26 | 20:19 | 21:25 | 12:56 | 13:49 | 14:29 |
| 54° | 19:09 | 20:02 | 21:09 | 13:13 | 14:06 | 14:45 |
| 56° | 18:48 | 19:41 | 20:51 | 13:34 | 14:27 | 15:03 |
| 58° | 18:22 | 19:15 | 20:29 | 14:00 | 14:53 | 15:26 |
| S 60° | 17:45 | 18:39 | 20:01 | 14:36 | 15:30 | 15:54 |

| Day | Sun | | Mer. Pass | Moon | | Age 19-21 79-62% |
|-----|------------------------------|----------------------------|-----------|-----------------------|-------------|------------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 07 | 02:14 | 02:06 | 12:02 | 03:46 | 16:12 | |
| 08 | 01:57 | 01:49 | 12:02 | 04:37 | 17:03 | |
| 09 | 01:41 | 01:33 | 12:02 | 05:29 | 17:55 | |

April 10, 11, 12 UT (Fri., Sat., Sun.)

| | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|---------------------|----------|----------|--------------------|----------|----------|---------------------|----------|---------|-------------------|-----|--------|---------------------|----------|----------|--|--|
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | |
| 0 | 198°14.5 | 157°58.5 | N15°35.7 | 197°42.6 | S00°52.1 | 90°19.1 | N22°47.8 | 191°16.9 | N00°40.9 | | | | | Alpheratz | 357°34.1 | 29°14.0 | | |
| 1 | 213°17.0 | 172°57.9 | 36.8 | 212°43.3 | 51.3 | 105°21.4 | 47.7 | 206°19.0 | 41.0 | | | | | Ankaa | 353°06.5 | -42°09.8 | | |
| 2 | 228°19.4 | 187°57.4 | 37.8 | 227°44.0 | 50.5 | 120°23.6 | 47.7 | 221°21.2 | 41.1 | | | | | Schedar | 349°30.4 | 56°40.8 | | |
| 3 | 243°21.9 | 202°56.9 | · · 38.8 | 242°44.6 | · · 49.7 | 135°25.8 | · · 47.7 | 236°23.4 | · · 41.2 | | | | | Diphda | 348°46.6 | -17°50.6 | | |
| 4 | 258°24.3 | 217°56.3 | 39.9 | 257°45.3 | 48.9 | 150°28.0 | 47.7 | 251°25.6 | 41.4 | | | | | Achernar | 335°20.0 | -57°06.2 | | |
| 5 | 273°26.8 | 232°55.8 | 40.9 | 272°46.0 | 48.1 | 165°30.3 | 47.6 | 266°27.8 | 41.5 | | | | | Hamal | 327°50.4 | 23°35.1 | | |
| 6 | 288°29.3 | 247°55.3 | N15°41.9 | 287°46.7 | S00°47.3 | 180°32.5 | N22°47.6 | 281°30.0 | N00°41.6 | | | | | Polaris | 313°57.3 | 89°22.6 | | |
| 7 | 303°31.7 | 262°54.7 | 43.0 | 302°47.4 | 46.6 | 195°34.7 | 47.6 | 296°32.1 | 41.7 | | | | | Acamar | 315°11.4 | -40°12.1 | | |
| 8 | 318°34.2 | 277°54.2 | 44.0 | 317°48.0 | 45.8 | 210°36.9 | 47.5 | 311°34.3 | 41.8 | | | | | Menkar | 314°05.4 | 4°11.5 | | |
| 9 | 333°36.7 | 292°53.7 | · · 45.0 | 332°48.7 | · · 45.0 | 225°39.1 | · · 47.5 | 326°36.5 | · · 42.0 | | | | | Mirfak | 308°27.2 | 49°57.3 | | |
| 10 | 348°39.1 | 307°53.1 | 46.1 | 347°49.4 | 44.2 | 240°41.3 | 47.5 | 341°38.7 | 42.1 | | | | | Aldebaran | 290°38.7 | 16°33.7 | | |
| 11 | 3°41.6 | 322°52.6 | 47.1 | 2°50.1 | 43.4 | 255°43.6 | 47.5 | 356°40.9 | 42.2 | | | | | Rigel | 281°03.1 | -8°10.4 | | |
| 12 | 18°44.1 | 337°52.0 | N15°48.1 | 17°50.8 | S00°42.6 | 270°45.8 | N22°47.4 | 11°43.0 | N00°42.3 | | | | | Capella | 280°20.6 | 46°01.6 | | |
| 13 | 33°46.5 | 352°51.5 | 49.1 | 32°51.5 | 41.9 | 285°48.0 | 47.4 | 26°45.2 | 42.4 | | | | | Bellatrix | 278°21.9 | 6°22.3 | | |
| 14 | 48°49.0 | 7°51.0 | 50.2 | 47°52.1 | 41.1 | 300°50.2 | 47.4 | 41°47.4 | 42.5 | | | | | Elnath | 278°00.7 | 28°37.8 | | |
| 15 | 63°51.4 | 22°50.4 | · · 51.2 | 62°52.8 | · · 40.3 | 315°52.4 | · · 47.4 | 56°49.6 | · · 42.7 | | | | | Alnilam | 275°36.8 | -1°11.2 | | |
| 16 | 78°53.9 | 37°49.9 | 52.2 | 77°53.5 | 39.5 | 330°54.7 | 47.3 | 71°51.8 | 42.8 | | | | | Betelgeuse | 270°51.1 | 7°24.6 | | |
| 17 | 93°56.4 | 52°49.4 | 53.3 | 92°54.2 | 38.7 | 345°56.9 | 47.3 | 86°54.0 | 42.9 | | | | | Canopus | 263°52.1 | -52°42.8 | | |
| 18 | 108°58.8 | 67°48.8 | N15°54.3 | 107°54.9 | S00°37.9 | 0°59.1 | N22°47.3 | 101°56.1 | N00°43.0 | | | | | Sirius | 258°25.4 | -16°45.3 | | |
| 19 | 124°01.3 | 82°48.3 | 55.3 | 122°55.6 | 37.1 | 16°01.3 | 47.3 | 116°58.3 | 43.1 | | | | | Adhara | 255°05.1 | -29°00.7 | | |
| 20 | 139°03.8 | 97°47.7 | 56.3 | 137°56.3 | 36.4 | 31°03.5 | 47.2 | 132°00.5 | 43.3 | | | | | Procyon | 244°49.8 | 5°09.4 | | |
| 21 | 154°06.2 | 112°47.2 | · · 57.3 | 152°56.9 | · · 35.6 | 46°05.7 | · · 47.2 | 147°02.7 | · · 43.4 | | | | | Pollux | 243°16.0 | 27°57.8 | | |
| 22 | 169°08.7 | 127°46.6 | 58.4 | 167°57.6 | 34.8 | 61°07.9 | 47.2 | 162°04.9 | 43.5 | | | | | Avior | 234°14.2 | -59°35.9 | | |
| 23 | 184°11.2 | 142°46.1 | 59.4 | 182°58.3 | 34.0 | 76°10.2 | 47.2 | 177°07.0 | 43.6 | | | | | Suhail | 222°45.4 | -43°32.6 | | |
| Mer.pass. 10:45 | | ν-0.5' d1.0' m-3.92 | | | ν0.7' d-0.8' m1.20 | | | ν2.2' d-0.0' m-2.14 | | | ν2.2' d0.1' m0.93 | | | | | | | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 199°13.6 | 157°45.6 | N16°00.4 | 197°59.0 | S00°33.2 | 91°12.4 | N22°47.1 | 192°09.2 | N00°43.7 | | | | | Dubhe | 193°39.2 | 61°36.6 | | |
| 1 | 214°16.1 | 172°45.0 | 01.4 | 212°59.7 | 32.4 | 106°14.6 | 47.1 | 207°11.4 | 43.8 | | | | | Denebola | 182°23.6 | 14°25.4 | | |
| 2 | 229°18.6 | 187°44.5 | 02.5 | 228°00.4 | 31.7 | 121°16.8 | 47.1 | 222°13.6 | 44.0 | | | | | Gienah | 175°42.2 | -17°41.5 | | |
| 3 | 244°21.0 | 202°43.9 | · · 03.5 | 243°01.0 | · · 30.9 | 136°19.0 | · · 47.0 | 237°15.8 | · · 44.1 | | | | | Acrux | 172°58.3 | -63°14.9 | | |
| 4 | 259°23.5 | 217°43.4 | 04.5 | 258°01.7 | 30.1 | 151°21.2 | 47.0 | 252°18.0 | 44.2 | | | | | Gacrux | 171°50.0 | -57°15.8 | | |
| 5 | 274°25.9 | 232°42.8 | 05.5 | 273°02.4 | 29.3 | 166°23.4 | 47.0 | 267°20.1 | 44.3 | | | | | Alioth | 166°11.5 | 55°48.9 | | |
| 6 | 289°28.4 | 247°42.3 | N16°06.5 | 288°03.1 | S00°28.5 | 181°25.7 | N22°47.0 | 282°22.3 | N00°44.4 | | | | | Spica | 158°20.9 | -11°18.1 | | |
| 7 | 304°30.9 | 262°41.8 | 07.5 | 303°03.8 | 27.7 | 196°27.9 | 46.9 | 297°24.5 | 44.6 | | | | | Alkaid | 152°50.7 | 49°10.8 | | |
| 8 | 319°33.3 | 277°41.2 | 08.6 | 318°04.5 | 26.9 | 211°30.1 | 46.9 | 312°26.7 | 44.7 | | | | | Hadar | 148°33.9 | -60°30.0 | | |
| 9 | 334°35.8 | 292°40.7 | · · 09.6 | 333°05.1 | · · 26.2 | 226°32.3 | · · 46.9 | 327°28.9 | · · 44.8 | | | | | Menkent | 147°56.0 | -36°30.1 | | |
| 10 | 349°38.3 | 307°40.1 | 10.6 | 348°05.8 | 25.4 | 241°34.5 | 46.9 | 342°31.0 | 44.9 | | | | | Arcturus | 145°46.6 | 19°02.5 | | |
| 11 | 4°40.7 | 322°39.6 | 11.6 | 3°06.5 | 24.6 | 256°36.7 | 46.8 | 357°33.2 | 45.0 | | | | | Rigel Kent. | 139°38.3 | -60°56.6 | | |
| 12 | 19°43.2 | 337°39.0 | N16°12.6 | 18°07.2 | S00°23.8 | 271°38.9 | N22°46.8 | 12°35.4 | N00°45.1 | | | | | Kochab | 137°18.7 | 74°02.6 | | |
| 13 | 34°45.7 | 352°38.5 | 13.6 | 33°07.9 | 23.0 | 286°41.1 | 46.8 | 27°37.6 | 45.3 | | | | | Zuben'ubi | 136°54.6 | -16°09.2 | | |
| 14 | 49°48.1 | 7°37.9 | 14.6 | 48°08.6 | 22.2 | 301°43.3 | 46.7 | 42°39.8 | 45.4 | | | | | Alphecca | 126°02.6 | 26°37.3 | | |
| 15 | 64°50.6 | 22°37.4 | · · 15.6 | 63°09.2 | · · 21.5 | 316°45.6 | · · 46.7 | 57°42.0 | · · 45.5 | | | | | Antares | 112°14.3 | -26°29.4 | | |
| 16 | 79°53.1 | 37°36.8 | 16.6 | 78°09.9 | 20.7 | 331°47.8 | 46.7 | 72°44.1 | 45.6 | | | | | Atria | 107°07.3 | -69°04.3 | | |
| 17 | 94°55.5 | 52°36.3 | 17.7 | 93°10.6 | 19.9 | 346°50.0 | 46.7 | 87°46.3 | 45.7 | | | | | Sabik | 102°01.4 | -15°45.5 | | |
| 18 | 109°58.0 | 67°35.7 | N16°18.7 | 108°11.3 | S00°19.1 | 1°52.2 | N22°46.6 | 102°48.5 | N00°45.9 | | | | | Shaula | 96°08.8 | -37°07.3 | | |
| 19 | 125°00.4 | 82°35.2 | 19.7 | 123°12.0 | 18.3 | 16°54.4 | 46.6 | 117°50.7 | 46.0 | | | | | Rasalhague | 95°57.4 | 12°32.2 | | |
| 20 | 140°02.9 | 97°34.6 | 20.7 | 138°12.7 | 17.5 | 31°56.6 | 46.6 | 132°52.9 | 46.1 | | | | | Eltanin | 90°41.5 | 51°28.8 | | |
| 21 | 155°05.4 | 112°34.1 | · · 21.7 | 153°13.4 | · · 16.8 | 46°58.8 | · · 46.6 | 147°55.1 | · · 46.2 | | | | | Kaus Aust. | 83°31.0 | -34°22.2 | | |
| 22 | 170°07.8 | 127°33.5 | 22.7 | 168°14.0 | 16.0 | 62°01.0 | 46.5 | 162°57.2 | 46.3 | | | | | Vega | 80°32.4 | 38°48.1 | | |
| 23 | 185°10.3 | 142°33.0 | 23.7 | 183°14.7 | 15.2 | 77°03.2 | 46.5 | 177°59.4 | 46.4 | | | | | Nunki | 75°46.4 | -26°15.8 | | |
| Mer.pass. 10:41 | | ν-0.5' d1.0' m-3.92 | | | ν0.7' d-0.8' m1.20 | | | ν2.2' d-0.0' m-2.13 | | | ν2.2' d0.1' m0.93 | | | | | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 200°12.8 | 157°32.4 | N16°24.7 | 198°15.4 | S00°14.4 | 92°05.4 | N22°46.5 | 193°01.6 | N00°46.6 | | | | | Apr 10 Fri | SHA | Mer.pass | | |
| 1 | 215°15.2 | 172°31.9 | 25.7 | 213°16.1 | 13.6 | 107°07.6 | 46.4 | 208°03.8 | 46.7 | | | | | Venus | 319°44.0 | 13:29 | | |
| 2 | 230°17.7 | 187°31.3 | 26.7 | 228°16.8 | 12.8 | 122°09.9 | 46.4 | 223°06.0 | 46.8 | | | | | Mars | 359°28.1 | 10:49 | | |
| 3 | 245°20.2 | 202°30.8 | · · 27.7 | 243°17.5 | · · 12.0 | 137°12.1 | · · 46.4 | 238°08.2 | · · 46.9 | | | | | Jupiter | 252°04.7 | 17:56 | | |
| 4 | 260°22.6 | 217°30.2 | 28.7 | 258°18.2 | 11.3 | 152°14.3 | 46.4 | 253°10.3 | 47.0 | | | | | Saturn | 353°02.4 | 11:13 | | |
| 5 | 275°25.1 | 232°29.6 | 29.7 | 273°18.8 | 10.5 | 167°16.5 | 46.3 | 268°12.5 | 47.1 | | | | | | | | | |
| 6 | 290°27.6 | 247°29.1 | N16°30.7 | 288°19.5 | S00°09.7 | 182°18.7 | N22°46.3 | 283°14.7 | N00°47.3 | | | | | | | | | |
| 7 | 305°30.0 | 262°28.5 | 31.7 | 303°20.2 | 08.9 | 197°20.9 | 46.3 | 298°16.9 | 47.4 | | | | | | | | | |
| 8 | 320°32.5 | 277°28.0 | 32.7 | 318°20.9 | 08.1 | 212°23.1 | 46.2 | 313°19.1 | 47.5 | | | | | | | | | |
| 9 | 335°34.9 | 292°27.4 | · · 33.7 | 333°21.6 | · · 07.3 | 227°25.3 | · · 46.2 | 328°21.2 | · · 47.6 | | | | | | | | | |
| 10 | 350°37.4 | 307°26.9 | 34.7 | 348°22.3 | 06.6 | 242°27.5 | 46.2 | 343°23.4 | 47.7 | | | | | | | | | |
| 11 | 5°39.9 | 322°26.3 | 35.7 | 3°23.0 | 05.8 | 257°29.7 | 46.2 | 358°25.6 | 47.9 | | | | | | | | | |
| 12 | 20°42.3 | 337°25.7 | N16°36.7 | 18°23.6 | S00°05.0 | 272°31.9 | N22°46.1 | 13°27.8 | N00°48.0 | | | | | | | | | |
| 13 | 35°44.8 | 352°25.2 | 37.7 | 33°24.3 | 04.2 | 287°34.1 | 46.1 | 28°30.0 | 48.1 | | | | | | | | | |
| 14 | 50°47.3 | 7°24.6 | 38.7 | 48°25.0 | 03.4 | 302°36.3 | 46.1 | 43°32.2 | 48.2 | | | | | | | | | |
| 15 | 65°49.7 | 22°24.1 | · · 39.7 | 63°25.7 | · · 02.6 | 317°38.5 | · · 46.0 | 58°34.3 | · · 48.3 | | | | | | | | | |
| 16 | 80°52.2 | 37°23.5 | 40.7 | 78°26.4 | 01.9 | 332°40.7 | 46.0 | 73°36.5 | 48.4 | | | | | | | | | |
| 17 | 95°54.7 | 52°23.0 | 41.7 | 93°27.1 | 01.1 | 347°42.9 | 46.0 | 88°38.7 | 48.6 | | | | | | | | | |
| 18 | 110°57.1 | 67°22.4 | N16°42.6 | 108°27.8 | S00°00.3 | 2°45.1 | N22°46.0 | 103°40.9 | N00°48.7 | | | | | | | | | |
| 19 | 125°59.6 | 82°21.8 | 43.6 | 123°28.4 | N00°00.5 | 17°47.3 | 45.9 | 118°43.1 | 48.8 | | | | | | | | | |
| 20 | 141°02.0 | 97°21.3 | 44.6 | 138°29.1 | 01.3 | 32°49.5 | 45.9 | 133°45.3 | 48.9 | | | | | | | | | |
| 21 | 156°04.5 | 112°20.7 | · · 45.6 | 153°29.8 | · · 02.1 | 47°51.7 | · · 45.9 | 148°47.4 | · · 49.0 | | | | | | | | | |
| 22 | 171°07.0 | 127°20.1 | 46.6 | 168°30.5 | 02.8 | 62°53.9 | 45.8 | 163°49.6 | 49.1 | | | | | | | | | |
| 23 | 186°09.4 | 142°19.6 | 47.6 | 183°31.2 | 03.6 | 77°56.1 | 45.8 | 178°51.8 | 49.3 | | | | | | | | | |
| Mer.pass. 10:37 | | ν-0.6' d1.0' m-3.92 | | | ν0.7' d-0.8' m1.20 | | | ν2.2' d-0.0' m-2.13 | | | ν2.2' d0.1' m0.93 | | | | | | | |
| | | | | | | | | | | | | | | Horizontal parallax | | | | |
| | | | | | | | | | | | | | | Venus: | 0.1 | | | |
| | | | | | | | | | | | | | | Mars: | 0.1 | | | |

| h | Sun | | Moon | | | | |
|------------|----------|----------|------------|-------|----------|-------|-------|
| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 179°38.9 | N07°52.2 | 268°16.4 | 10.6' | S26°10.7 | -5.9' | 54.7' |
| 1 | 194°39.1 | 53.1 | 282°46.0 | 10.6' | 26°04.9 | -6.0' | 54.7' |
| 2 | 209°39.2 | 54.1 | 297°15.6 | 10.6' | 25°58.9 | -6.1' | 54.7' |
| 3 | 224°39.4 | 55.0 | 311°45.2 | 10.7' | 25°52.7 | -6.3' | 54.7' |
| 4 | 239°39.6 | 55.9 | 326°14.9 | 10.7' | 25°46.5 | -6.4' | 54.7' |
| 5 | 254°39.7 | 56.8 | 340°44.6 | 10.7' | 25°40.1 | -6.5' | 54.7' |
| 6 | 269°39.9 | N07°57.8 | 355°14.3 | 10.8' | S25°33.6 | -6.6' | 54.8' |
| 7 | 284°40.1 | 58.7 | 9°44.1 | 10.8' | 25°26.9 | -6.8' | 54.8' |
| 8 | 299°40.2 | 07°59.6 | 24°13.9 | 10.9' | 25°20.2 | -6.9' | 54.8' |
| 9 | 314°40.4 | 08°00.5 | 38°43.8 | 10.9' | 25°13.3 | -7.0' | 54.8' |
| 10 | 329°40.6 | 01.4 | 53°13.7 | 10.9' | 25°06.3 | -7.1' | 54.8' |
| 11 | 344°40.7 | 02.4 | 67°43.6 | 11.0' | 24°59.1 | -7.3' | 54.9' |
| 12 | 359°40.9 | N08°03.3 | 82°13.6 | 11.0' | S24°51.9 | -7.4' | 54.9' |
| 13 | 14°41.1 | 04.2 | 96°43.6 | 11.0' | 24°44.5 | -7.5' | 54.9' |
| 14 | 29°41.2 | 05.1 | 111°13.6 | 11.1' | 24°37.0 | -7.6' | 54.9' |
| 15 | 44°41.4 | 06.1 | 125°43.7 | 11.1' | 24°29.4 | -7.7' | 55.0' |
| 16 | 59°41.6 | 07.0 | 140°13.8 | 11.2' | 24°21.6 | -7.9' | 55.0' |
| 17 | 74°41.7 | 07.9 | 154°44.0 | 11.2' | 24°13.7 | -8.0' | 55.0' |
| 18 | 89°41.9 | N08°08.8 | 169°14.2 | 11.2' | S24°05.8 | -8.1' | 55.0' |
| 19 | 104°42.1 | 09.7 | 183°44.4 | 11.3' | 23°57.7 | -8.2' | 55.0' |
| 20 | 119°42.2 | 10.7 | 198°14.7 | 11.3' | 23°49.4 | -8.3' | 55.1' |
| 21 | 134°42.4 | 11.6 | 212°45.0 | 11.4' | 23°41.1 | -8.5' | 55.1' |
| 22 | 149°42.6 | 12.5 | 227°15.4 | 11.4' | 23°32.6 | -8.6' | 55.1' |
| 23 | 164°42.7 | 13.4 | 241°45.8 | 11.4' | 23°24.0 | -8.7' | 55.1' |
| SD = 16.0' | | | SD = 14.9' | | | | |
| $d = 0.9'$ | | | | | | | |

| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|----------|----------|------------|----------|--------|-------|
| 0 | 179°42.9 | N08°14.4 | 256°16.2 | 11.5' | S23°15.3 | -8.8' | 55.2' |
| 1 | 194°43.1 | 15.3 | 270°46.7 | 11.5' | 23°06.5 | -8.9' | 55.2' |
| 2 | 209°43.2 | 16.2 | 285°17.2 | 11.6' | 22°57.6 | -9.0' | 55.2' |
| 3 | 224°43.4 | 17.1 | 299°47.8 | 11.6' | 22°48.5 | -9.2' | 55.2' |
| 4 | 239°43.6 | 18.0 | 314°18.4 | 11.6' | 22°39.4 | -9.3' | 55.3' |
| 5 | 254°43.7 | 19.0 | 328°49.0 | 11.7' | 22°30.1 | -9.4' | 55.3' |
| 6 | 269°43.9 | N08°19.9 | 343°19.7 | 11.7' | S22°20.7 | -9.5' | 55.3' |
| 7 | 284°44.0 | 20.8 | 357°50.4 | 11.8' | 22°11.2 | -9.6' | 55.4' |
| 8 | 299°44.2 | 21.7 | 12°21.2 | 11.8' | 22°01.6 | -9.7' | 55.4' |
| 9 | 314°44.4 | 22.6 | 26°52.0 | 11.8' | 21°51.9 | -9.8' | 55.4' |
| 10 | 329°44.5 | 23.5 | 41°22.8 | 11.9' | 21°42.1 | -9.9' | 55.4' |
| 11 | 344°44.7 | 24.5 | 55°53.7 | 11.9' | 21°32.1 | -10.1' | 55.5' |
| 12 | 359°44.9 | N08°25.4 | 70°24.6 | 12.0' | S21°22.1 | -10.2' | 55.5' |
| 13 | 14°45.0 | 26.3 | 84°55.6 | 12.0' | 21°11.9 | -10.3' | 55.5' |
| 14 | 29°45.2 | 27.2 | 99°26.6 | 12.0' | 21°01.6 | -10.4' | 55.5' |
| 15 | 44°45.4 | 28.1 | 113°57.6 | 12.1' | 20°51.3 | -10.5' | 55.6' |
| 16 | 59°45.5 | 29.0 | 128°28.7 | 12.1' | 20°40.8 | -10.6' | 55.6' |
| 17 | 74°45.7 | 30.0 | 142°59.8 | 12.2' | 20°30.2 | -10.7' | 55.6' |
| 18 | 89°45.8 | N08°30.9 | 157°31.0 | 12.2' | S20°19.5 | -10.8' | 55.7' |
| 19 | 104°46.0 | 31.8 | 172°02.2 | 12.2' | 20°08.7 | -10.9' | 55.7' |
| 20 | 119°46.2 | 32.7 | 186°33.4 | 12.3' | 19°57.8 | -11.0' | 55.7' |
| 21 | 134°46.3 | 33.6 | 201°04.7 | 12.3' | 19°46.8 | -11.1' | 55.8' |
| 22 | 149°46.5 | 34.5 | 215°36.0 | 12.3' | 19°35.7 | -11.2' | 55.8' |
| 23 | 164°46.7 | 35.5 | 230°07.3 | 12.4' | 19°24.5 | -11.3' | 55.8' |
| SD = 16.0' | | | | SD = 15.0' | | | |

| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|----------|----------|------------|----------|--------|-------|
| 0 | 179°46.8 | N08°36.4 | 244°38.7 | 12.4' | S19°13.2 | -11.4' | 55.8' |
| 1 | 194°47.0 | 37.3 | 259°10.1 | 12.4' | 19°01.8 | -11.5' | 55.9' |
| 2 | 209°47.1 | 38.2 | 273°41.6 | 12.5' | 18°50.3 | -11.6' | 55.9' |
| 3 | 224°47.3 | 39.1 | 288°13.0 | 12.5' | 18°38.6 | -11.7' | 55.9' |
| 4 | 239°47.5 | 40.0 | 302°44.6 | 12.5' | 18°26.9 | -11.8' | 56.0' |
| 5 | 254°47.6 | 40.9 | 317°16.1 | 12.6' | 18°15.1 | -11.9' | 56.0' |
| 6 | 269°47.8 | N08°41.9 | 331°47.7 | 12.6' | S18°03.2 | -12.0' | 56.0' |
| 7 | 284°47.9 | 42.8 | 346°19.3 | 12.6' | 17°51.2 | -12.1' | 56.1' |
| 8 | 299°48.1 | 43.7 | 0°50.9 | 12.7' | 17°39.1 | -12.2' | 56.1' |
| 9 | 314°48.3 | 44.6 | 15°22.6 | 12.7' | 17°27.0 | -12.3' | 56.1' |
| 10 | 329°48.4 | 45.5 | 29°54.3 | 12.7' | 17°14.7 | -12.4' | 56.2' |
| 11 | 344°48.6 | 46.4 | 44°26.1 | 12.8' | 17°02.3 | -12.5' | 56.2' |
| 12 | 359°48.8 | N08°47.3 | 58°57.8 | 12.8' | S16°49.8 | -12.6' | 56.2' |
| 13 | 14°48.9 | 48.2 | 73°29.6 | 12.8' | 16°37.3 | -12.6' | 56.3' |
| 14 | 29°49.1 | 49.1 | 88°01.5 | 12.9' | 16°24.6 | -12.7' | 56.3' |
| 15 | 44°49.2 | 50.1 | 102°33.3 | 12.9' | 16°11.9 | -12.8' | 56.3' |
| 16 | 59°49.4 | 51.0 | 117°05.2 | 12.9' | 15°59.1 | -12.9' | 56.4' |
| 17 | 74°49.6 | 51.9 | 131°37.1 | 12.9' | 15°46.2 | -13.0' | 56.4' |
| 18 | 89°49.7 | N08°52.8 | 146°09.1 | 13.0' | S15°33.2 | -13.1' | 56.4' |
| 19 | 104°49.9 | 53.7 | 160°41.0 | 13.0' | 15°20.1 | -13.2' | 56.5' |
| 20 | 119°50.0 | 54.6 | 175°13.0 | 13.0' | 15°06.9 | -13.3' | 56.5' |
| 21 | 134°50.2 | 55.5 | 189°45.0 | 13.0' | 14°53.7 | -13.3' | 56.5' |
| 22 | 149°50.3 | 56.4 | 204°17.1 | 13.1' | 14°40.3 | -13.4' | 56.6' |
| 23 | 164°50.5 | 57.3 | 218°49.1 | 13.1' | 14°26.9 | -13.5' | 56.6' |
| SD = 16.0' | | | | SD = 15.2' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | 02:33 | 04:02 | 20:04 | 21:36 | //// |
| N 70° | //// | 03:01 | 04:16 | 19:49 | 21:06 | //// |
| 68° | 01:33 | 03:21 | 04:27 | 19:38 | 20:44 | 22:38 |
| 66° | 02:11 | 03:37 | 04:36 | 19:29 | 20:28 | 21:56 |
| 64° | 02:37 | 03:50 | 04:43 | 19:21 | 20:14 | 21:29 |
| 62° | 02:56 | 04:01 | 04:50 | 19:14 | 20:03 | 21:09 |
| 60° | 03:12 | 04:11 | 04:55 | 19:08 | 19:53 | 20:53 |
| N 58° | 03:25 | 04:18 | 05:00 | 19:03 | 19:45 | 20:39 |
| 56° | 03:36 | 04:25 | 05:05 | 18:59 | 19:38 | 20:28 |
| 54° | 03:45 | 04:32 | 05:09 | 18:54 | 19:32 | 20:18 |
| 52° | 03:54 | 04:37 | 05:12 | 18:51 | 19:26 | 20:10 |
| 50° | 04:01 | 04:42 | 05:16 | 18:47 | 19:21 | 20:03 |
| 45° | 04:16 | 04:52 | 05:23 | 18:40 | 19:11 | 19:47 |
| N 40° | 04:28 | 05:01 | 05:28 | 18:34 | 19:02 | 19:35 |
| 35° | 04:37 | 05:08 | 05:33 | 18:29 | 18:55 | 19:26 |
| 30° | 04:45 | 05:13 | 05:38 | 18:25 | 18:49 | 19:18 |
| 20° | 04:57 | 05:23 | 05:45 | 18:17 | 18:39 | 19:06 |
| N 10° | 05:06 | 05:31 | 05:52 | 18:10 | 18:32 | 18:56 |
| 0° | 05:13 | 05:37 | 05:58 | 18:04 | 18:25 | 18:49 |
| S 10° | 05:18 | 05:42 | 06:04 | 17:58 | 18:19 | 18:44 |
| 20° | 05:22 | 05:48 | 06:10 | 17:52 | 18:14 | 18:40 |
| 30° | 05:25 | 05:53 | 06:17 | 17:45 | 18:09 | 18:37 |
| 35° | 05:26 | 05:55 | 06:21 | 17:41 | 18:06 | 18:36 |
| 40° | 05:26 | 05:58 | 06:25 | 17:37 | 18:04 | 18:35 |
| 45° | 05:26 | 06:00 | 06:30 | 17:31 | 18:01 | 18:35 |
| S 50° | 05:26 | 06:03 | 06:36 | 17:25 | 17:58 | 18:35 |
| 52° | 05:26 | 06:05 | 06:39 | 17:22 | 17:56 | 18:35 |
| 54° | 05:25 | 06:06 | 06:42 | 17:19 | 17:55 | 18:36 |
| 56° | 05:25 | 06:08 | 06:45 | 17:16 | 17:53 | 18:36 |
| 58° | 05:24 | 06:09 | 06:49 | 17:12 | 17:52 | 18:37 |
| S 60° | 05:23 | 06:11 | 06:53 | 17:08 | 17:50 | 18:38 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | ██ | ██ | 07:27 | ██ | ██ | 08:48 |
| N 70° | ██ | ██ | 06:10 | ██ | ██ | 10:04 |
| 68° | ██ | ██ | 05:31 | ██ | ██ | 10:41 |
| 66° | ██ | 05:40 | 05:04 | ██ | ██ | 11:07 |
| 64° | 05:40 | 04:59 | 04:43 | 07:08 | 09:32 | 11:27 |
| 62° | 04:38 | 04:31 | 04:26 | 08:10 | 09:59 | 11:43 |
| 60° | 04:04 | 04:09 | 04:11 | 08:44 | 10:20 | 11:56 |
| N 58° | 03:38 | 03:51 | 03:59 | 09:09 | 10:37 | 12:08 |
| 56° | 03:18 | 03:36 | 03:48 | 09:28 | 10:52 | 12:18 |
| 54° | 03:02 | 03:23 | 03:39 | 09:45 | 11:04 | 12:26 |
| 52° | 02:47 | 03:12 | 03:31 | 09:59 | 11:15 | 12:34 |
| 50° | 02:35 | 03:02 | 03:23 | 10:11 | 11:25 | 12:41 |
| 45° | 02:09 | 02:41 | 03:07 | 10:36 | 11:45 | 12:56 |
| N 40° | 01:48 | 02:23 | 02:53 | 10:56 | 12:01 | 13:08 |
| 35° | 01:31 | 02:09 | 02:42 | 11:13 | 12:15 | 13:18 |
| 30° | 01:16 | 01:56 | 02:32 | 11:27 | 12:27 | 13:27 |
| 20° | 00:50 | 01:34 | 02:15 | 11:51 | 12:47 | 13:42 |
| N 10° | 00:28 | 01:15 | 01:59 | 12:12 | 13:04 | 13:55 |
| 0° | 00:08 | 00:57 | 01:45 | 12:32 | 13:20 | 14:08 |
| S 10° | 00:00 | 00:39 | 01:31 | 12:51 | 13:37 | 14:20 |
| 20° | 00:00 | 00:20 | 01:16 | 13:12 | 13:54 | 14:33 |
| 30° | 23:58 | 00:00 | 00:58 | 13:35 | 14:13 | 14:48 |
| 35° | 23:45 | 00:00 | 00:47 | 13:49 | 14:25 | 14:56 |
| 40° | 23:30 | 00:00 | 00:36 | 14:05 | 14:38 | 15:06 |
| 45° | 23:12 | 00:00 | 00:22 | 14:24 | 14:53 | 15:17 |
| S 50° | 22:49 | 00:00 | 00:04 | 14:48 | 15:12 | 15:30 |
| 52° | 22:38 | 23:56 | 00:00 | 14:59 | 15:20 | 15:37 |
| 54° | 22:26 | 23:47 | 00:00 | 15:12 | 15:30 | 15:44 |
| 56° | 22:12 | 23:37 | 00:00 | 15:26 | 15:41 | 15:51 |
| 58° | 21:55 | 23:25 | 00:00 | 15:43 | 15:54 | 16:00 |
| S 60° | 21:35 | 23:11 | 00:00 | 16:04 | 16:08 | 16:10 |

| Day | Sun | | Mer. Pass | Moon | | Age 22-24 52-33% |
|-----|------------------------------------|-----------------------|-----------|------------------------|-------------|------------------|
| | Eqn. of Time 00 ^h mm:ss | 12 ^h mm:ss | | Mer. Pass. Upper hh:mm | Lower hh:mm | |
| 10 | 01:24 | 01:16 | 12:01 | 06:20 | 18:45 | |
| 11 | 01:08 | 01:01 | 12:01 | 07:09 | 19:33 | |
| 12 | 00:53 | 00:45 | 12:01 | 07:56 | 20:20 | |

April 13, 14, 15 UT (Mon., Tue., Wed.)

| Aries | | | | Venus | | | | Mars | | | | Jupiter | | | | Saturn | | | | Stars | | | |
|-----------------|----------|----------|----------|---------------------|----------|----------|----------|-------------------|----------|-------------|----------|---------------------|-----|-----|-----|-------------------|-----|--|--|-------|--|--|--|
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | | | | |
| 0 | 201°11.9 | 157°19.0 | N16°48.6 | 198°31.9 | N00°04.4 | 92°58.3 | N22°45.8 | 193°54.0 | N00°49.4 | Alpheratz | 357°34.0 | 29°14.0 | | | | | | | | | | | |
| 1 | 216°14.4 | 172°18.4 | 49.6 | 213°32.6 | 05.2 | 108°00.5 | 45.8 | 208°56.2 | 49.5 | Ankaa | 353°06.5 | -42°09.8 | | | | | | | | | | | |
| 2 | 231°16.8 | 187°17.9 | 50.5 | 228°33.2 | 06.0 | 123°02.7 | 45.7 | 223°58.4 | 49.6 | Schedar | 349°30.4 | 56°40.8 | | | | | | | | | | | |
| 3 | 246°19.3 | 202°17.3 | •• 51.5 | 243°33.9 | •• 06.8 | 138°04.9 | •• 45.7 | 239°00.5 | •• 49.7 | Diphda | 348°46.6 | -17°50.6 | | | | | | | | | | | |
| 4 | 261°21.8 | 217°16.8 | 52.5 | 258°34.6 | 07.5 | 153°07.1 | 45.7 | 254°02.7 | 49.8 | Achernar | 335°20.0 | -57°06.2 | | | | | | | | | | | |
| 5 | 276°24.2 | 232°16.2 | 53.5 | 273°35.3 | 08.3 | 168°09.3 | 45.6 | 269°04.9 | 50.0 | Hamal | 327°50.4 | 23°35.1 | | | | | | | | | | | |
| 6 | 291°26.7 | 247°15.6 | N16°54.5 | 288°36.0 | N00°09.1 | 183°11.5 | N22°45.6 | 284°07.1 | N00°50.1 | Polaris | 313°57.9 | 89°22.6 | | | | | | | | | | | |
| 7 | 306°29.2 | 262°15.1 | 55.5 | 303°36.7 | 09.9 | 198°13.7 | 45.6 | 299°09.3 | 50.2 | Acamar | 315°11.4 | -40°12.1 | | | | | | | | | | | |
| 8 | 321°31.6 | 277°14.5 | 56.4 | 318°37.4 | 10.7 | 213°15.9 | 45.6 | 314°11.5 | 50.3 | Menkar | 314°05.4 | 4°11.5 | | | | | | | | | | | |
| 9 | 336°34.1 | 292°13.9 | •• 57.4 | 333°38.0 | •• 11.5 | 228°18.1 | •• 45.5 | 329°13.6 | •• 50.4 | Mirfak | 308°27.2 | 49°57.3 | | | | | | | | | | | |
| 10 | 351°36.5 | 307°13.4 | 58.4 | 348°38.7 | 12.2 | 243°20.3 | 45.5 | 344°15.8 | 50.5 | Aldebaran | 290°38.7 | 16°33.7 | | | | | | | | | | | |
| 11 | 6°39.0 | 322°12.8 | 16°59.4 | 3°39.4 | 13.0 | 258°22.5 | 45.5 | 359°18.0 | 50.7 | Rigel | 281°03.1 | -8°10.4 | | | | | | | | | | | |
| 12 | 21°41.5 | 337°12.2 | N17°00.4 | 18°40.1 | N00°13.8 | 273°24.7 | N22°45.4 | 14°20.2 | N00°50.8 | Capella | 280°20.6 | 46°01.6 | | | | | | | | | | | |
| 13 | 36°43.9 | 352°11.6 | 01.3 | 33°40.8 | 14.6 | 288°26.9 | 45.4 | 29°22.4 | 50.9 | Bellatrix | 278°21.9 | 6°22.3 | | | | | | | | | | | |
| 14 | 51°46.4 | 7°11.1 | 02.3 | 48°41.5 | 15.4 | 303°29.1 | 45.4 | 44°24.6 | 51.0 | Elnath | 278°00.8 | 28°37.8 | | | | | | | | | | | |
| 15 | 66°48.9 | 22°10.5 | •• 03.3 | 63°42.2 | •• 16.2 | 318°31.3 | •• 45.3 | 59°26.7 | •• 51.1 | Alnilam | 275°36.8 | -1°11.2 | | | | | | | | | | | |
| 16 | 81°51.3 | 37°09.9 | 04.3 | 78°42.8 | 16.9 | 333°33.5 | 45.3 | 74°28.9 | 51.2 | Betelgeuse | 270°51.1 | 7°24.6 | | | | | | | | | | | |
| 17 | 96°53.8 | 52°09.4 | 05.2 | 93°43.5 | 17.7 | 348°35.7 | 45.3 | 89°31.1 | 51.4 | Canopus | 263°52.1 | -52°42.8 | | | | | | | | | | | |
| 18 | 111°56.3 | 67°08.8 | N17°06.2 | 108°44.2 | N00°18.5 | 3°37.9 | N22°45.3 | 104°33.3 | N00°51.5 | Sirius | 258°25.4 | -16°45.3 | | | | | | | | | | | |
| 19 | 126°58.7 | 82°08.2 | 07.2 | 123°44.9 | 19.3 | 18°40.1 | 45.2 | 119°35.5 | 51.6 | Adhara | 255°05.1 | -29°00.7 | | | | | | | | | | | |
| 20 | 142°01.2 | 97°07.6 | 08.1 | 138°45.6 | 20.1 | 33°42.3 | 45.2 | 134°37.7 | 51.7 | Procyon | 244°49.8 | 5°09.4 | | | | | | | | | | | |
| 21 | 157°03.6 | 112°07.1 | •• 09.1 | 153°46.3 | •• 20.9 | 48°44.5 | •• 45.2 | 149°39.9 | •• 51.8 | Pollux | 243°16.0 | 27°57.8 | | | | | | | | | | | |
| 22 | 172°06.1 | 127°06.5 | 10.1 | 168°47.0 | 21.6 | 63°46.7 | 45.1 | 164°42.0 | 51.9 | Avior | 234°14.2 | -59°35.9 | | | | | | | | | | | |
| 23 | 187°08.6 | 142°05.9 | 11.1 | 183°47.7 | 22.4 | 78°48.9 | 45.1 | 179°44.2 | 52.1 | Suhail | 222°45.4 | -43°32.6 | | | | | | | | | | | |
| Mer.pass. 10:33 | | | | ν-0.6' d1.0' m-3.92 | | | | ν0.7' d0.8' m1.20 | | | | ν2.2' d-0.0' m-2.12 | | | | ν2.2' d0.1' m0.93 | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | | | | |
| 0 | 202°11.0 | 157°05.3 | N17°12.0 | 198°48.3 | N00°23.2 | 93°51.1 | N22°45.1 | 194°46.4 | N00°52.2 | Regulus | 207°33.1 | 11°50.2 | | | | | | | | | | | |
| 1 | 217°13.5 | 172°04.8 | 13.0 | 213°49.0 | 24.0 | 108°53.2 | 45.1 | 209°48.6 | 52.3 | Dubhe | 193°39.2 | 61°36.6 | | | | | | | | | | | |
| 2 | 232°16.0 | 187°04.2 | 14.0 | 228°49.7 | 24.8 | 123°55.4 | 45.0 | 224°50.8 | 52.4 | Denebola | 182°23.6 | 14°25.4 | | | | | | | | | | | |
| 3 | 247°18.4 | 202°03.6 | •• 14.9 | 243°50.4 | •• 25.5 | 138°57.6 | •• 45.0 | 239°53.0 | •• 52.5 | Gienah | 175°42.2 | -17°41.5 | | | | | | | | | | | |
| 4 | 262°20.9 | 217°03.0 | 15.9 | 258°51.1 | 26.3 | 153°59.8 | 45.0 | 254°55.1 | 52.6 | Acrux | 172°58.3 | -63°14.9 | | | | | | | | | | | |
| 5 | 277°23.4 | 232°02.5 | 16.9 | 273°51.8 | 27.1 | 169°02.0 | 44.9 | 269°57.3 | 52.8 | Gacrux | 171°50.0 | -57°15.8 | | | | | | | | | | | |
| 6 | 292°25.8 | 247°01.9 | N17°17.8 | 288°52.5 | N00°27.9 | 184°04.2 | N22°44.9 | 284°59.5 | N00°52.9 | Alioth | 166°11.5 | 55°49.0 | | | | | | | | | | | |
| 7 | 307°28.3 | 262°01.3 | 18.8 | 303°53.2 | 28.7 | 199°06.4 | 44.9 | 300°01.7 | 53.0 | Spica | 158°20.9 | -11°18.1 | | | | | | | | | | | |
| 8 | 322°30.8 | 277°00.7 | 19.7 | 318°53.8 | 29.5 | 214°08.6 | 44.8 | 315°03.9 | 53.1 | Alkaid | 152°50.7 | 49°10.8 | | | | | | | | | | | |
| 9 | 337°33.2 | 292°00.2 | •• 20.7 | 333°54.5 | •• 30.2 | 229°10.8 | •• 44.8 | 330°06.1 | •• 53.2 | Hadar | 148°33.9 | -60°30.0 | | | | | | | | | | | |
| 10 | 352°35.7 | 306°59.6 | 21.7 | 348°55.2 | 31.0 | 244°13.0 | 44.8 | 345°08.2 | 53.3 | Menkent | 147°56.0 | -36°30.1 | | | | | | | | | | | |
| 11 | 7°38.1 | 321°59.0 | 22.6 | 3°55.9 | 31.8 | 259°15.2 | 44.8 | 0°10.4 | 53.5 | Arcturus | 145°46.6 | 19°02.5 | | | | | | | | | | | |
| 12 | 22°40.6 | 336°58.4 | N17°23.6 | 18°56.6 | N00°32.6 | 274°17.4 | N22°44.7 | 15°12.6 | N00°53.6 | Rigel Kent. | 139°38.3 | -60°56.7 | | | | | | | | | | | |
| 13 | 37°43.1 | 351°57.8 | 24.5 | 33°57.3 | 33.4 | 289°19.5 | 44.7 | 30°14.8 | 53.7 | Kochab | 137°18.7 | 74°02.6 | | | | | | | | | | | |
| 14 | 52°45.5 | 6°57.3 | 25.5 | 48°58.0 | 34.2 | 304°21.7 | 44.7 | 45°17.0 | 53.8 | Zuben'ubi | 136°54.6 | -16°09.2 | | | | | | | | | | | |
| 15 | 67°48.0 | 21°56.7 | •• 26.5 | 63°58.7 | •• 34.9 | 319°23.9 | •• 44.6 | 60°19.2 | •• 53.9 | Alphecca | 126°02.5 | 26°37.3 | | | | | | | | | | | |
| 16 | 82°50.5 | 36°56.1 | 27.4 | 78°59.3 | 35.7 | 334°26.1 | 44.6 | 75°21.4 | 54.0 | Antares | 112°14.3 | -26°29.4 | | | | | | | | | | | |
| 17 | 97°52.9 | 51°55.5 | 28.4 | 94°00.0 | 36.5 | 349°28.3 | 44.6 | 90°23.5 | 54.2 | Atria | 107°07.3 | -69°04.3 | | | | | | | | | | | |
| 18 | 112°55.4 | 66°54.9 | N17°29.3 | 109°00.7 | N00°37.3 | 4°30.5 | N22°44.5 | 105°25.7 | N00°54.3 | Sabik | 102°01.4 | -15°45.5 | | | | | | | | | | | |
| 19 | 127°57.9 | 81°54.3 | 30.3 | 124°01.4 | 38.1 | 19°32.7 | 44.5 | 120°27.9 | 54.4 | Shaula | 96°08.8 | -37°07.3 | | | | | | | | | | | |
| 20 | 143°00.3 | 96°53.8 | 31.2 | 139°02.1 | 38.8 | 34°34.9 | 44.5 | 135°30.1 | 54.5 | Rasalhague | 95°57.4 | 12°32.2 | | | | | | | | | | | |
| 21 | 158°02.8 | 111°53.2 | •• 32.2 | 154°02.8 | •• 39.6 | 49°37.1 | •• 44.4 | 150°32.3 | •• 54.6 | Eltanin | 90°41.5 | 51°28.8 | | | | | | | | | | | |
| 22 | 173°05.3 | 126°52.6 | 33.1 | 169°03.5 | 40.4 | 64°39.2 | 44.4 | 165°34.5 | 54.7 | Kaus Aust. | 83°31.0 | -34°22.2 | | | | | | | | | | | |
| 23 | 188°07.7 | 141°52.0 | 34.1 | 184°04.2 | 41.2 | 79°41.4 | 44.4 | 180°36.6 | 54.9 | Vega | 80°32.4 | 38°48.1 | | | | | | | | | | | |
| Mer.pass. 10:30 | | | | ν-0.6' d1.0' m-3.92 | | | | ν0.7' d0.8' m1.20 | | | | ν2.2' d-0.0' m-2.11 | | | | ν2.2' d0.1' m0.93 | | | | | | | |
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| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | | | | |
| 0 | 203°10.2 | 156°51.4 | N17°35.0 | 199°04.8 | N00°42.0 | 94°43.6 | N22°44.4 | 195°38.8 | N00°55.0 | Nunki | 75°46.4 | -26°15.8 | | | | | | | | | | | |
| 1 | 218°12.6 | 171°50.8 | 36.0 | 214°05.5 | 42.8 | 109°45.8 | 44.3 | 210°41.0 | 55.1 | Altair | 61°59.0 | 8°56.1 | | | | | | | | | | | |
| 2 | 233°15.1 | 186°50.2 | 36.9 | 229°06.2 | 43.5 | 124°48.0 | 44.3 | 225°43.2 | 55.2 | Peacock | 53°04.2 | -56°38.8 | | | | | | | | | | | |
| 3 | 248°17.6 | 201°49.7 | •• 37.9 | 244°06.9 | •• 44.3 | 139°50.2 | •• 44.3 | 240°45.4 | •• 55.3 | Deneb | 49°25.2 | 45°22.1 | | | | | | | | | | | |
| 4 | 263°20.0 | 216°49.1 | 38.8 | 259°07.6 | 45.1 | 154°52.4 | 44.2 | 255°47.6 | 55.4 | Enif | 33°38.0 | 9°59.6 | | | | | | | | | | | |
| 5 | 278°22.5 | 231°48.5 | 39.8 | 274°08.3 | 45.9 | 169°54.6 | 44.2 | 270°49.8 | 55.6 | Al Na'ir | 27°31.9 | -46°49.9 | | | | | | | | | | | |
| 6 | 293°25.0 | 246°47.9 | N17°40.7 | 289°09.0 | N00°46.7 | 184°56.7 | N22°44.2 | 285°51.9 | N00°55.7 | Fomalhaut | 15°13.6 | -29°29.0 | | | | | | | | | | | |
| 7 | 308°27.4 | 261°47.3 | 41.7 | 304°09.7 | 47.4 | 199°58.9 | 44.1 | 300°54.1 | 55.8 | Scheat | 13°44.5 | 28°13.3 | | | | | | | | | | | |
| 8 | 323°29.9 | 276°46.7 | 42.6 | 319°10.3 | 48.2 | 215°01.1 | 44.1 | 315°56.3 | 55.9 | Markab | 13°29.1 | 15°20.7 | | | | | | | | | | | |
| 9 | 338°32.4 | 291°46.1 | •• 43.6 | 334°11.0 | •• 49.0 | 230°03.3 | •• 44.1 | 330°58.5 | •• 56.0 | | | | | | | | | | | | | | |
| 10 | 353°34.8 | 306°45.5 | 44.5 | 349°11.7 | 49.8 | 245°05.5 | 44.0 | 346°00.7 | 56.1 | | | | | | | | | | | | | | |
| 11 | 8°37.3 | 321°44.9 | 45.4 | 4°12.4 | 50.6 | 260°07.7 | 44.0 | 1°02.9 | 56.2 | | | | | | | | | | | | | | |
| 12 | 23°39.7 | 336°44.4 | N17°46.4 | 19°13.1 | N00°51.4 | 275°09.8 | N22°44.0 | 16°05.1 | N00°56.4 | | | | | | | | | | | | | | |
| 13 | 38°42.2 | 351°43.8 | 47.3 | 34°13.8 | 52.1 | 290°12.0 | 44.0 | 31°07.2 | 56.5 | | | | | | | | | | | | | | |
| 14 | 53°44.7 | 6°43.2 | 48.3 | 49°14.5 | 52.9 | 305°14.2 | 43.9 | 46°09.4 | 56.6 | | | | | | | | | | | | | | |
| 15 | 68°47.1 | 21°42.6 | •• 49.2 | 64°15.2 | •• 53.7 | 320°16.4 | •• 43.9 | 61°11.6 | •• 56.7 | | | | | | | | | | | | | | |
| 16 | 83°49.6 | 36°42.0 | 50.1 | 79°15.9 | 54.5 | 335°18.6 | 43.9 | 76°13.8 | 56.8 | | | | | | | | | | | | | | |
| 17 | 98°52.1 | 51°41.4 | 51.1 | 94°16.5 | 55.3 | 350°20.8 | 43.8 | 91°16.0 | 56.9 | | | | | | | | | | | | | | |
| 18 | 113°54.5 | 66°40.8 | N17°52.0 | 109°17.2 | N00°56.0 | 5°22.9 | N22°43.8 | 106°18.2 | N00°57.1 | | | | | | | | | | | | | | |
| 19 | 128°57.0 | 81°40.2 | 52.9 | 124°17.9 | 56.8 | 20°25.1 | 43.8 | 121°20.3 | 57.2 | | | | | | | | | | | | | | |
| 20 | 143°59.5 | 96°39.6 | 53.9 | 139°18.6 | 57.6 | 35°27.3 | 43.7 | 136°22.5 | 57.3 | | | | | | | | | | | | | | |
| 21 | 159°01.9 | 111°39.0 | •• 54.8 | 154°19.3 | •• 58.4 | 50°29.5 | •• 43.7 | 151°24.7 | •• 57.4 | | | | | | | | | | | | | | |
| 22 | 174°04.4 | 126°38.4 | 55.7 | 169°20.0 | 59.2 | 65°31.7 | 43.7 | 166°26.9 | 57.5 | | | | | | | | | | | | | | |
| 23 | 189°06.9 | 141°37.8 | 56.7 | 184°20.7 | 59.9 | 80°33.8 | 43.6 | 181°29.1 | 57.6 | | | | | | | | | | | | | | |
| Mer.pass. 10:26 | | | | ν-0.6' d0.9' m-3.92 | | | | ν0.7' d0.8' m1.20 | | | | ν2.2' d-0.0' m-2.11 | | | | ν2.2' d0.1' m0.93 | | | | | | | |
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| h | Sun | | Moon | | | | |
|-----------------------|----------|----------|------------|-------|----------|--------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 179°50.7 | N08°58.2 | 233°21.2 | 13.1' | S14°13.4 | -13.6' | 56.6' |
| 1 | 194°50.8 | 08°59.2 | 247°53.3 | 13.1' | 13°59.8 | -13.7' | 56.7' |
| 2 | 209°51.0 | 09°00.1 | 262°25.4 | 13.1' | 13°46.1 | -13.7' | 56.7' |
| 3 | 224°51.1 | · · 01.0 | 276°57.5 | 13.2' | 13°32.4 | -13.8' | 56.7' |
| 4 | 239°51.3 | 01.9 | 291°29.7 | 13.2' | 13°18.5 | -13.9' | 56.8' |
| 5 | 254°51.5 | 02.8 | 306°01.9 | 13.2' | 13°04.6 | -14.0' | 56.8' |
| 6 | 269°51.6 | N09°03.7 | 320°34.1 | 13.2' | S12°50.7 | -14.1' | 56.8' |
| 7 | 284°51.8 | 04.6 | 335°06.3 | 13.2' | 12°36.6 | -14.1' | 56.9' |
| 8 | 299°51.9 | 05.5 | 349°38.5 | 13.2' | 12°22.5 | -14.2' | 56.9' |
| 9 | 314°52.1 | · · 06.4 | 4°10.7 | 13.2' | 12°08.2 | -14.3' | 57.0' |
| 10 | 329°52.2 | 07.3 | 18°43.0 | 13.3' | 11°54.0 | -14.4' | 57.0' |
| 11 | 344°52.4 | 08.2 | 33°15.2 | 13.3' | 11°39.6 | -14.4' | 57.0' |
| 12 | 359°52.6 | N09°09.1 | 47°47.5 | 13.3' | S11°25.2 | -14.5' | 57.1' |
| 13 | 14°52.7 | 10.0 | 62°19.8 | 13.3' | 11°10.7 | -14.6' | 57.1' |
| 14 | 29°52.9 | 10.9 | 76°52.1 | 13.3' | 10°56.1 | -14.6' | 57.1' |
| 15 | 44°53.0 | · · 11.8 | 91°24.4 | 13.3' | 10°41.5 | -14.7' | 57.2' |
| 16 | 59°53.2 | 12.7 | 105°56.7 | 13.3' | 10°26.8 | -14.8' | 57.2' |
| 17 | 74°53.3 | 13.6 | 120°29.0 | 13.3' | 10°12.0 | -14.8' | 57.2' |
| 18 | 89°53.5 | N09°14.6 | 135°01.3 | 13.3' | S09°57.2 | -14.9' | 57.3' |
| 19 | 104°53.7 | 15.5 | 149°33.7 | 13.3' | 09°42.3 | -15.0' | 57.3' |
| 20 | 119°53.8 | 16.4 | 164°06.0 | 13.3' | 09°27.3 | -15.0' | 57.4' |
| 21 | 134°54.0 | · · 17.3 | 178°38.3 | 13.3' | 09°12.3 | -15.1' | 57.4' |
| 22 | 149°54.1 | 18.2 | 193°10.7 | 13.3' | 08°57.2 | -15.2' | 57.4' |
| 23 | 164°54.3 | 19.1 | 207°43.0 | 13.3' | 08°42.0 | -15.2' | 57.5' |
| SD = 15.9' $d = 0.9'$ | | | SD = 15.4' | | | | |

| Tue | Sun | | Moon | | | | |
|-----------------------|----------|----------|------------|-------|----------|--------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 179°54.4 | N09°20.0 | 222°15.3 | 13.3' | S08°26.8 | -15.3' | 57.5' |
| 1 | 194°54.6 | 20.9 | 236°47.7 | 13.3' | 08°11.5 | -15.3' | 57.5' |
| 2 | 209°54.7 | 21.8 | 251°20.0 | 13.3' | 07°56.2 | -15.4' | 57.6' |
| 3 | 224°54.9 | · · 22.7 | 265°52.3 | 13.3' | 07°40.8 | -15.4' | 57.6' |
| 4 | 239°55.0 | 23.6 | 280°24.6 | 13.3' | 07°25.4 | -15.5' | 57.7' |
| 5 | 254°55.2 | 24.5 | 294°56.9 | 13.3' | 07°09.9 | -15.6' | 57.7' |
| 6 | 269°55.4 | N09°25.4 | 309°29.3 | 13.3' | S06°54.3 | -15.6' | 57.7' |
| 7 | 284°55.5 | 26.3 | 324°01.6 | 13.3' | 06°38.7 | -15.7' | 57.8' |
| 8 | 299°55.7 | 27.2 | 338°33.8 | 13.3' | 06°23.1 | -15.7' | 57.8' |
| 9 | 314°55.8 | · · 28.1 | 353°06.1 | 13.3' | 06°07.4 | -15.8' | 57.8' |
| 10 | 329°56.0 | 29.0 | 7°38.4 | 13.3' | 05°51.6 | -15.8' | 57.9' |
| 11 | 344°56.1 | 29.9 | 22°10.7 | 13.2' | 05°35.8 | -15.8' | 57.9' |
| 12 | 359°56.3 | N09°30.8 | 36°42.9 | 13.2' | S05°20.0 | -15.9' | 57.9' |
| 13 | 14°56.4 | 31.7 | 51°15.1 | 13.2' | 05°04.1 | -15.9' | 58.0' |
| 14 | 29°56.6 | 32.6 | 65°47.3 | 13.2' | 04°48.1 | -16.0' | 58.0' |
| 15 | 44°56.7 | · · 33.5 | 80°19.5 | 13.2' | 04°32.1 | -16.0' | 58.1' |
| 16 | 59°56.9 | 34.4 | 94°51.7 | 13.2' | 04°16.1 | -16.1' | 58.1' |
| 17 | 74°57.0 | 35.3 | 109°23.9 | 13.1' | 04°00.0 | -16.1' | 58.1' |
| 18 | 89°57.2 | N09°36.2 | 123°56.0 | 13.1' | S03°43.9 | -16.1' | 58.2' |
| 19 | 104°57.3 | 37.1 | 138°28.1 | 13.1' | 03°27.8 | -16.2' | 58.2' |
| 20 | 119°57.5 | 38.0 | 153°00.2 | 13.1' | 03°11.6 | -16.2' | 58.2' |
| 21 | 134°57.7 | · · 38.9 | 167°32.3 | 13.0' | 02°55.4 | -16.3' | 58.3' |
| 22 | 149°57.8 | 39.7 | 182°04.3 | 13.0' | 02°39.1 | -16.3' | 58.3' |
| 23 | 164°58.0 | 40.6 | 196°36.3 | 13.0' | 02°22.9 | -16.3' | 58.3' |
| SD = 15.9' $d = 0.9'$ | | | SD = 15.7' | | | | |

| Wed | Sun | | Moon | | | | |
|-----------------------|----------|----------|------------|-------|----------|--------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 179°58.1 | N09°41.5 | 211°08.3 | 13.0' | S02°06.5 | -16.3' | 58.4' |
| 1 | 194°58.3 | 42.4 | 225°40.3 | 12.9' | 01°50.2 | -16.4' | 58.4' |
| 2 | 209°58.4 | 43.3 | 240°12.2 | 12.9' | 01°33.8 | -16.4' | 58.5' |
| 3 | 224°58.6 | · · 44.2 | 254°44.1 | 12.9' | 01°17.4 | -16.4' | 58.5' |
| 4 | 239°58.7 | 45.1 | 269°16.0 | 12.8' | 01°01.0 | -16.5' | 58.5' |
| 5 | 254°58.9 | 46.0 | 283°47.8 | 12.8' | 00°44.5 | -16.5' | 58.6' |
| 6 | 269°59.0 | N09°46.9 | 298°19.6 | 12.8' | S00°28.0 | -16.5' | 58.6' |
| 7 | 284°59.2 | 47.8 | 312°51.3 | 12.7' | S00°11.5 | -16.5' | 58.6' |
| 8 | 299°59.3 | 48.7 | 327°23.1 | 12.7' | N00°05.0 | 16.5' | 58.7' |
| 9 | 314°59.5 | · · 49.6 | 341°54.7 | 12.6' | 00°21.6 | 16.6' | 58.7' |
| 10 | 329°59.6 | 50.5 | 356°26.4 | 12.6' | 00°38.1 | 16.6' | 58.7' |
| 11 | 344°59.8 | 51.4 | 10°58.0 | 12.6' | 00°54.7 | 16.6' | 58.8' |
| 12 | 359°59.9 | N09°52.3 | 25°29.5 | 12.5' | N01°11.3 | 16.6' | 58.8' |
| 13 | 15°00.1 | 53.2 | 40°01.1 | 12.5' | 01°27.9 | 16.6' | 58.8' |
| 14 | 30°00.2 | 54.1 | 54°32.5 | 12.4' | 01°44.6 | 16.6' | 58.9' |
| 15 | 45°00.4 | · · 54.9 | 69°03.9 | 12.4' | 02°01.2 | 16.6' | 58.9' |
| 16 | 60°00.5 | 55.8 | 83°35.3 | 12.3' | 02°17.8 | 16.7' | 58.9' |
| 17 | 75°00.7 | 56.7 | 98°06.6 | 12.3' | 02°34.5 | 16.7' | 59.0' |
| 18 | 90°00.8 | N09°57.6 | 112°37.9 | 12.2' | N02°51.2 | 16.7' | 59.0' |
| 19 | 105°01.0 | 58.5 | 127°09.1 | 12.2' | 03°07.8 | 16.7' | 59.0' |
| 20 | 120°01.1 | 09°59.4 | 141°40.3 | 12.1' | 03°24.5 | 16.7' | 59.1' |
| 21 | 135°01.3 | 10°00.3 | 156°11.4 | 12.1' | 03°41.2 | 16.7' | 59.1' |
| 22 | 150°01.4 | 01.2 | 170°42.4 | 12.0' | 03°57.9 | 16.7' | 59.1' |
| 23 | 165°01.5 | 02.1 | 185°13.4 | 11.9' | 04°14.5 | 16.7' | 59.2' |
| SD = 15.9' $d = 0.9'$ | | | SD = 15.9' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | 02:07 | 03:45 | 20:19 | 22:01 | //// |
| N 70° | //// | 02:41 | 04:01 | 20:03 | 21:24 | //// |
| 68° | 00:57 | 03:05 | 04:14 | 19:50 | 20:59 | 23:21 |
| 66° | 01:50 | 03:24 | 04:24 | 19:39 | 20:40 | 22:17 |
| 64° | 02:20 | 03:38 | 04:33 | 19:30 | 20:25 | 21:45 |
| 62° | 02:43 | 03:51 | 04:40 | 19:22 | 20:12 | 21:21 |
| 60° | 03:00 | 04:01 | 04:47 | 19:16 | 20:02 | 21:03 |
| N 58° | 03:15 | 04:10 | 04:52 | 19:10 | 19:53 | 20:48 |
| 56° | 03:27 | 04:17 | 04:57 | 19:05 | 19:45 | 20:36 |
| 54° | 03:37 | 04:24 | 05:02 | 19:00 | 19:38 | 20:25 |
| 52° | 03:46 | 04:30 | 05:06 | 18:56 | 19:32 | 20:16 |
| 50° | 03:54 | 04:35 | 05:09 | 18:52 | 19:26 | 20:08 |
| 45° | 04:10 | 04:47 | 05:17 | 18:44 | 19:15 | 19:52 |
| N 40° | 04:23 | 04:56 | 05:24 | 18:37 | 19:05 | 19:39 |
| 35° | 04:33 | 05:04 | 05:29 | 18:32 | 18:58 | 19:29 |
| 30° | 04:41 | 05:10 | 05:34 | 18:27 | 18:51 | 19:20 |
| 20° | 04:54 | 05:20 | 05:43 | 18:18 | 18:40 | 19:07 |
| N 10° | 05:04 | 05:29 | 05:50 | 18:10 | 18:32 | 18:57 |
| 0° | 05:12 | 05:36 | 05:57 | 18:04 | 18:25 | 18:49 |
| S 10° | 05:18 | 05:42 | 06:04 | 17:57 | 18:18 | 18:43 |
| 20° | 05:23 | 05:48 | 06:11 | 17:50 | 18:12 | 18:38 |
| 30° | 05:26 | 05:54 | 06:18 | 17:42 | 18:06 | 18:34 |
| 35° | 05:28 | 05:57 | 06:23 | 17:37 | 18:03 | 18:32 |
| 40° | 05:29 | 06:01 | 06:28 | 17:32 | 17:59 | 18:31 |
| 45° | 05:30 | 06:04 | 06:34 | 17:26 | 17:56 | 18:30 |
| S 50° | 05:30 | 06:08 | 06:41 | 17:19 | 17:52 | 18:29 |
| 52° | 05:30 | 06:10 | 06:44 | 17:16 | 17:50 | 18:29 |
| 54° | 05:30 | 06:11 | 06:47 | 17:12 | 17:48 | 18:29 |
| 56° | 05:30 | 06:13 | 06:51 | 17:08 | 17:46 | 18:29 |
| 58° | 05:30 | 06:15 | 06:55 | 17:04 | 17:44 | 18:29 |
| S 60° | 05:29 | 06:18 | 07:00 | 16:59 | 17:42 | 18:30 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | 05:39 | 04:53 | 04:17 | 12:14 | 14:38 | 16:57 |
| N 70° | 05:16 | 04:43 | 04:15 | 12:35 | 14:46 | 16:54 |
| 68° | 04:58 | 04:35 | 04:14 | 12:51 | 14:51 | 16:51 |
| 66° | 04:43 | 04:27 | 04:13 | 13:04 | 14:56 | 16:48 |
| 64° | 04:31 | 04:21 | 04:12 | 13:15 | 15:00 | 16:46 |
| 62° | 04:21 | 04:16 | 04:12 | 13:24 | 15:03 | 16:45 |
| 60° | 04:12 | 04:12 | 04:11 | 13:31 | 15:06 | 16:43 |
| N 58° | 04:04 | 04:08 | 04:11 | 13:38 | 15:09 | 16:42 |
| 56° | 03:57 | 04:04 | 04:10 | 13:44 | 15:11 | 16:41 |
| 54° | 03:51 | 04:01 | 04:10 | 13:49 | 15:13 | 16:40 |
| 52° | 03:45 | 03:58 | 04:09 | 13:54 | 15:15 | 16:39 |
| 50° | 03:40 | 03:55 | 04:09 | 13:58 | 15:17 | 16:38 |
| 45° | 03:29 | 03:49 | 04:08 | 14:08 | 15:21 | 16:36 |
| N 40° | 03:20 | 03:44 | 04:07 | 14:15 | 15:24 | 16:34 |
| 35° | 03:12 | 03:40 | 04:07 | 14:22 | 15:26 | 16:33 |
| 30° | 03:05 | 03:36 | 04:06 | 14:27 | 15:29 | 16:32 |
| 20° | 02:53 | 03:29 | 04:05 | 14:37 | 15:33 | 16:29 |
| N 10° | 02:42 | 03:23 | 04:04 | 14:46 | 15:36 | 16:28 |
| 0° | 02:32 | 03:18 | 04:04 | 14:54 | 15:39 | 16:26 |
| S 10° | 02:22 | 03:12 | 04:03 | 15:02 | 15:43 | 16:24 |
| 20° | 02:11 | 03:06 | 04:02 | 15:10 | 15:46 | 16:22 |
| 30° | 01:58 | 02:59 | 04:01 | 15:19 | 15:50 | 16:20 |
| 35° | 01:51 | 02:55 | 04:01 | 15:25 | 15:52 | 16:19 |
| 40° | 01:43 | 02:51 | 04:00 | 15:31 | 15:54 | 16:17 |
| 45° | 01:33 | 02:46 | 04:00 | 15:38 | 15:57 | 16:16 |
| S 50° | 01:21 | 02:39 | 03:59 | 15:46 | 16:00 | 16:14 |
| 52° | 01:16 | 02:36 | 03:59 | 15:50 | 16:02 | 16:13 |
| 54° | 01:10 | 02:33 | 03:58 | 15:54 | 16:03 | 16:12 |
| 56° | 01:03 | 02:30 | 03:58 | 15:59 | 16:05 | 16:11 |
| 58° | 00:55 | 02:26 | 03:57 | 16:04 | 16:07 | 16:10 |
| S 60° | 00:46 | 02:21 | 03:57 | 16:10 | 16:09 | 16:09 |




| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-------|-----------|-------|---|
| | Eqn.of Time | | Mer. | Mer.Pass. | | Age |
| | 00 ^h | 12 ^h | Pass | Upper | Lower | 25-27 |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 24-8% |
| 13 | 00:37 | 00:30 | 12:00 | 08:43 | 21:06 |  |
| 14 | 00:22 | 00:15 | 12:00 | 09:28 | 21:51 | |
| 15 | 00:08 | 00:00 | 12:00 | 10:15 | 22:38 | |


April 16, 17, 18 UT (Thu., Fri., Sat.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|---------------------|----------|----------|-------------------|----------|----------|---------------------|---------|-----|-------------------|--------|-------------|----------|----------|----------|--|
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | |
| 0 | 204°09.3 | 156°37.2 | N17°57.6 | 199°21.4 | N01°00.7 | 95°36.0 | N22°43.6 | 196°31.3 | N00°57.8 | | | | | Alpheratz | 357°34.0 | 29°14.0 | | |
| 1 | 219°11.8 | 171°36.6 | 58.5 | 214°22.1 | 01.5 | 110°38.2 | 43.6 | 211°33.5 | 57.9 | | | | | Ankaa | 353°06.5 | -42°09.8 | | |
| 2 | 234°14.2 | 186°36.0 | 17°59.5 | 229°22.7 | 02.3 | 125°40.4 | 43.5 | 226°35.6 | 58.0 | | | | | Schedar | 349°30.4 | 56°40.8 | | |
| 3 | 249°16.7 | 201°35.4 | 18°00.4 | 244°23.4 | 03.1 | 140°42.6 | 43.5 | 241°37.8 | 58.1 | | | | | Diphda | 348°46.6 | -17°50.6 | | |
| 4 | 264°19.2 | 216°34.8 | 01.3 | 259°24.1 | 03.9 | 155°44.7 | 43.5 | 256°40.0 | 58.2 | | | | | Achernar | 335°20.0 | -57°06.2 | | |
| 5 | 279°21.6 | 231°34.2 | 02.3 | 274°24.8 | 04.6 | 170°46.9 | 43.4 | 271°42.2 | 58.3 | | | | | Hamal | 327°50.4 | 23°35.1 | | |
| 6 | 294°24.1 | 246°33.6 | N18°03.2 | 289°25.5 | N01°05.4 | 185°49.1 | N22°43.4 | 286°44.4 | N00°58.4 | | | | | Polaris | 313°58.4 | 89°22.6 | | |
| 7 | 309°26.6 | 261°33.0 | 04.1 | 304°26.2 | 06.2 | 200°51.3 | 43.4 | 301°46.6 | 58.6 | | | | | Acamar | 315°11.4 | -40°12.0 | | |
| 8 | 324°29.0 | 276°32.4 | 05.0 | 319°26.9 | 07.0 | 215°53.5 | 43.3 | 316°48.8 | 58.7 | | | | | Menkar | 314°05.4 | 4°11.5 | | |
| 9 | 339°31.5 | 291°31.8 | 06.0 | 334°27.6 | 07.8 | 230°55.6 | 43.3 | 331°50.9 | 58.8 | | | | | Mirfak | 308°27.2 | 49°57.3 | | |
| 10 | 354°34.0 | 306°31.2 | 06.9 | 349°28.3 | 08.5 | 245°57.8 | 43.3 | 346°53.1 | 58.9 | | | | | Aldebaran | 290°38.7 | 16°33.7 | | |
| 11 | 9°36.4 | 321°30.6 | 07.8 | 4°28.9 | 09.3 | 261°00.0 | 43.3 | 1°55.3 | 59.0 | | | | | Rigel | 281°03.1 | -8°10.4 | | |
| 12 | 24°38.9 | 336°30.0 | N18°08.7 | 19°29.6 | N01°10.1 | 276°02.2 | N22°43.2 | 16°57.5 | N00°59.1 | | | | | Capella | 280°20.7 | 46°01.6 | | |
| 13 | 39°41.3 | 351°29.4 | 09.6 | 34°30.3 | 10.9 | 291°04.3 | 43.2 | 31°59.7 | 59.3 | | | | | Bellatrix | 278°22.0 | 6°22.3 | | |
| 14 | 54°43.8 | 6°28.8 | 10.6 | 49°31.0 | 11.7 | 306°06.5 | 43.2 | 47°01.9 | 59.4 | | | | | Elnath | 278°00.8 | 28°37.8 | | |
| 15 | 69°46.3 | 21°28.2 | 11.5 | 64°31.7 | 12.4 | 321°08.7 | 43.1 | 62°04.1 | 59.5 | | | | | Alnilam | 275°36.9 | -1°11.2 | | |
| 16 | 84°48.7 | 36°27.6 | 12.4 | 79°32.4 | 13.2 | 336°10.9 | 43.1 | 77°06.3 | 59.6 | | | | | Betelgeuse | 270°51.1 | 7°24.6 | | |
| 17 | 99°51.2 | 51°27.0 | 13.3 | 94°33.1 | 14.0 | 351°13.0 | 43.1 | 92°08.4 | 59.7 | | | | | Canopus | 263°52.1 | -52°42.8 | | |
| 18 | 114°53.7 | 66°26.4 | N18°14.2 | 109°33.8 | N01°14.8 | 6°15.2 | N22°43.0 | 107°10.6 | N00°59.8 | | | | | Sirius | 258°25.4 | -16°45.3 | | |
| 19 | 129°56.1 | 81°25.8 | 15.2 | 124°34.5 | 15.6 | 21°17.4 | 43.0 | 122°12.8 | 00°59.9 | | | | | Adhara | 255°05.1 | -29°00.7 | | |
| 20 | 144°58.6 | 96°25.2 | 16.1 | 139°35.1 | 16.3 | 36°19.6 | 43.0 | 137°15.0 | 01°00.1 | | | | | Procyon | 244°49.8 | 5°09.4 | | |
| 21 | 160°01.1 | 111°24.6 | 17.0 | 154°35.8 | 17.1 | 51°21.7 | 42.9 | 152°17.2 | 00.2 | | | | | Pollux | 243°16.1 | 27°57.8 | | |
| 22 | 175°03.5 | 126°24.0 | 17.9 | 169°36.5 | 17.9 | 66°23.9 | 42.9 | 167°19.4 | 00.3 | | | | | Avior | 234°14.3 | -59°35.9 | | |
| 23 | 190°06.0 | 141°23.4 | 18.8 | 184°37.2 | 18.7 | 81°26.1 | 42.9 | 182°21.6 | 00.4 | | | | | Suhail | 222°45.4 | -43°32.6 | | |
| Mer.pass. 10:22 | | | ν-0.6' d0.9' m-3.92 | | | ν0.7' d0.8' m1.20 | | | ν2.2' d-0.0' m-2.10 | | | ν2.2' d0.1' m0.93 | | | | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 205°08.5 | 156°22.8 | N18°19.7 | 199°37.9 | N01°19.5 | 96°28.3 | N22°42.8 | 197°23.7 | N01°00.5 | | | | | Dubhe | 193°39.2 | 61°36.6 | | |
| 1 | 220°10.9 | 171°22.2 | 20.6 | 214°38.6 | 20.2 | 111°30.4 | 42.8 | 212°25.9 | 00.6 | | | | | Denebola | 182°23.6 | 14°25.4 | | |
| 2 | 235°13.4 | 186°21.5 | 21.5 | 229°39.3 | 21.0 | 126°32.6 | 42.8 | 227°28.1 | 00.7 | | | | | Gienah | 175°42.2 | -17°41.5 | | |
| 3 | 250°15.8 | 201°20.9 | 22.4 | 244°40.0 | 21.8 | 141°34.8 | 42.7 | 242°30.3 | 00.9 | | | | | Acrux | 172°58.3 | -63°14.9 | | |
| 4 | 265°18.3 | 216°20.3 | 23.4 | 259°40.7 | 22.6 | 156°37.0 | 42.7 | 257°32.5 | 01.0 | | | | | Gacrux | 171°50.0 | -57°15.8 | | |
| 5 | 280°20.8 | 231°19.7 | 24.3 | 274°41.4 | 23.4 | 171°39.1 | 42.7 | 272°34.7 | 01.1 | | | | | Alioth | 166°11.5 | 55°49.0 | | |
| 6 | 295°23.2 | 246°19.1 | N18°25.2 | 289°42.0 | N01°24.1 | 186°41.3 | N22°42.6 | 287°36.9 | N01°01.2 | | | | | Spica | 158°20.9 | -11°18.1 | | |
| 7 | 310°25.7 | 261°18.5 | 26.1 | 304°42.7 | 24.9 | 201°43.5 | 42.6 | 302°39.0 | 01.3 | | | | | Alkaid | 152°50.7 | 49°10.8 | | |
| 8 | 325°28.2 | 276°17.9 | 27.0 | 319°43.4 | 25.7 | 216°45.6 | 42.6 | 317°41.2 | 01.4 | | | | | Hadar | 148°33.9 | -60°30.1 | | |
| 9 | 340°30.6 | 291°17.3 | 27.9 | 334°44.1 | 26.5 | 231°47.8 | 42.5 | 332°43.4 | 01.6 | | | | | Menkent | 147°56.0 | -36°30.1 | | |
| 10 | 355°33.1 | 306°16.7 | 28.8 | 349°44.8 | 27.2 | 246°50.0 | 42.5 | 347°45.6 | 01.7 | | | | | Arcturus | 145°46.6 | 19°02.6 | | |
| 11 | 10°35.6 | 321°16.0 | 29.7 | 4°45.5 | 28.0 | 261°52.2 | 42.5 | 2°47.8 | 01.8 | | | | | Rigel Kent. | 139°38.2 | -60°56.7 | | |
| 12 | 25°38.0 | 336°15.4 | N18°30.6 | 19°46.2 | N01°28.8 | 276°54.3 | N22°42.4 | 17°50.0 | N01°01.9 | | | | | Kochab | 137°18.7 | 74°02.6 | | |
| 13 | 40°40.5 | 351°14.8 | 31.5 | 34°46.9 | 29.6 | 291°56.5 | 42.4 | 32°52.2 | 02.0 | | | | | Zuben'ubi | 136°54.6 | -16°09.2 | | |
| 14 | 55°42.9 | 6°14.2 | 32.4 | 49°47.6 | 30.4 | 306°58.7 | 42.4 | 47°54.4 | 02.1 | | | | | Alphecca | 126°02.5 | 26°37.3 | | |
| 15 | 70°45.4 | 21°13.6 | 33.3 | 64°48.3 | 31.1 | 322°00.8 | 42.3 | 62°56.5 | 02.2 | | | | | Antares | 112°14.3 | -26°29.5 | | |
| 16 | 85°47.9 | 36°13.0 | 34.2 | 79°48.9 | 31.9 | 337°03.0 | 42.3 | 77°58.7 | 02.4 | | | | | Atria | 107°07.2 | -69°04.3 | | |
| 17 | 100°50.3 | 51°12.4 | 35.1 | 94°49.6 | 32.7 | 352°05.2 | 42.3 | 93°00.9 | 02.5 | | | | | Sabik | 102°01.4 | -15°45.5 | | |
| 18 | 115°52.8 | 66°11.7 | N18°36.0 | 109°50.3 | N01°33.5 | 7°07.3 | N22°42.2 | 108°03.1 | N01°02.6 | | | | | Shaula | 96°08.7 | -37°07.3 | | |
| 19 | 130°55.3 | 81°11.1 | 36.9 | 124°51.0 | 34.3 | 22°09.5 | 42.2 | 123°05.3 | 02.7 | | | | | Rasalhague | 95°57.4 | 12°32.2 | | |
| 20 | 145°57.7 | 96°10.5 | 37.8 | 139°51.7 | 35.0 | 37°11.7 | 42.2 | 138°07.5 | 02.8 | | | | | Eltanin | 90°41.4 | 51°28.8 | | |
| 21 | 161°00.2 | 111°09.9 | 38.7 | 154°52.4 | 35.8 | 52°13.8 | 42.1 | 153°09.7 | 02.9 | | | | | Kaus Aust. | 83°31.0 | -34°22.2 | | |
| 22 | 176°02.7 | 126°09.3 | 39.6 | 169°53.1 | 36.6 | 67°16.0 | 42.1 | 168°11.9 | 03.0 | | | | | Vega | 80°32.4 | 38°48.2 | | |
| 23 | 191°05.1 | 141°08.7 | 40.5 | 184°53.8 | 37.4 | 82°18.2 | 42.1 | 183°14.0 | 03.2 | | | | | Nunki | 75°46.4 | -26°15.8 | | |
| Mer.pass. 10:18 | | | ν-0.6' d0.9' m-3.92 | | | ν0.7' d0.8' m1.21 | | | ν2.2' d-0.0' m-2.09 | | | ν2.2' d0.1' m0.93 | | | | | | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 206°07.6 | 156°08.0 | N18°41.4 | 199°54.5 | N01°38.2 | 97°20.3 | N22°42.0 | 198°16.2 | N01°03.3 | | | | | Al Na'ir | 27°31.9 | -46°49.9 | | |
| 1 | 221°10.1 | 171°07.4 | 42.2 | 214°55.2 | 38.9 | 112°22.5 | 42.0 | 213°18.4 | 03.4 | | | | | Fomalhaut | 15°13.6 | -29°28.9 | | |
| 2 | 236°12.5 | 186°06.8 | 43.1 | 229°55.8 | 39.7 | 127°24.7 | 42.0 | 228°20.6 | 03.5 | | | | | Scheat | 13°44.5 | 28°13.3 | | |
| 3 | 251°15.0 | 201°06.2 | 44.0 | 244°56.5 | 40.5 | 142°26.8 | 41.9 | 243°22.8 | 03.6 | | | | | Markab | 13°29.1 | 15°20.7 | | |
| 4 | 266°17.4 | 216°05.6 | 44.9 | 259°57.2 | 41.3 | 157°29.0 | 41.9 | 258°25.0 | 03.7 | | | | | Apr 16 Thu | | SHA | Mer.pass | |
| 5 | 281°19.9 | 231°04.9 | 45.8 | 274°57.9 | 42.0 | 172°31.2 | 41.9 | 273°27.2 | 03.8 | | | | | Venus | 312°27.9 | 13:34 | | |
| 6 | 296°22.4 | 246°04.3 | N18°46.7 | 289°58.6 | N01°42.8 | 187°33.3 | N22°41.8 | 288°29.4 | N01°04.0 | | | | | Mars | 355°12.0 | 10:42 | | |
| 7 | 311°24.8 | 261°03.7 | 47.6 | 304°59.3 | 43.6 | 202°35.5 | 41.8 | 303°31.5 | 04.1 | | | | | Jupiter | 251°26.7 | 17:35 | | |
| 8 | 326°27.3 | 276°03.1 | 48.5 | 320°00.0 | 44.4 | 217°37.7 | 41.8 | 318°33.7 | 04.2 | | | | | Saturn | 352°22.0 | 10:52 | | |
| 9 | 341°29.8 | 291°02.4 | 49.3 | 335°00.7 | 45.2 | 232°39.8 | 41.7 | 333°35.9 | 04.3 | | | | | Apr 17 Fri | | SHA | Mer.pass | |
| | | | | | | | | | | | | | | | | | | |

| h | | Sun | | Moon | | | |
|-----|--|-----------------------|----------|------------|-------|----------|-------------|
| Thu | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 180°01.7 | N10°03.0 | 199°44.4 | 11.9' | N04°31.2 | 16.7' 59.2' |
| 1 | | 195°01.8 | 03.8 | 214°15.3 | 11.8' | 04°47.9 | 16.7' 59.2' |
| 2 | | 210°02.0 | 04.7 | 228°46.1 | 11.8' | 05°04.5 | 16.7' 59.3' |
| 3 | | 225°02.1 | · · 05.6 | 243°16.8 | 11.7' | 05°21.2 | 16.6' 59.3' |
| 4 | | 240°02.3 | 06.5 | 257°47.5 | 11.6' | 05°37.8 | 16.6' 59.3' |
| 5 | | 255°02.4 | 07.4 | 272°18.2 | 11.6' | 05°54.5 | 16.6' 59.4' |
| 6 | | 270°02.6 | N10°08.3 | 286°48.7 | 11.5' | N06°11.1 | 16.6' 59.4' |
| 7 | | 285°02.7 | 09.2 | 301°19.2 | 11.4' | 06°27.7 | 16.6' 59.4' |
| 8 | | 300°02.9 | 10.1 | 315°49.7 | 11.4' | 06°44.3 | 16.6' 59.4' |
| 9 | | 315°03.0 | · · 10.9 | 330°20.0 | 11.3' | 07°00.8 | 16.6' 59.5' |
| 10 | | 330°03.2 | 11.8 | 344°50.3 | 11.2' | 07°17.4 | 16.5' 59.5' |
| 11 | | 345°03.3 | 12.7 | 359°20.5 | 11.1' | 07°33.9 | 16.5' 59.5' |
| 12 | | 0°03.5 | N10°13.6 | 13°50.7 | 11.1' | N07°50.4 | 16.5' 59.6' |
| 13 | | 15°03.6 | 14.5 | 28°20.7 | 11.0' | 08°06.9 | 16.5' 59.6' |
| 14 | | 30°03.7 | 15.4 | 42°50.7 | 10.9' | 08°23.4 | 16.4' 59.6' |
| 15 | | 45°03.9 | · · 16.3 | 57°20.6 | 10.8' | 08°39.8 | 16.4' 59.6' |
| 16 | | 60°04.0 | 17.1 | 71°50.5 | 10.8' | 08°56.2 | 16.4' 59.7' |
| 17 | | 75°04.2 | 18.0 | 86°20.2 | 10.7' | 09°12.5 | 16.3' 59.7' |
| 18 | | 90°04.3 | N10°18.9 | 100°49.9 | 10.6' | N09°28.9 | 16.3' 59.7' |
| 19 | | 105°04.5 | 19.8 | 115°19.5 | 10.5' | 09°45.2 | 16.3' 59.7' |
| 20 | | 120°04.6 | 20.7 | 129°49.0 | 10.4' | 10°01.4 | 16.2' 59.8' |
| 21 | | 135°04.8 | · · 21.6 | 144°18.4 | 10.3' | 10°17.6 | 16.2' 59.8' |
| 22 | | 150°04.9 | 22.4 | 158°47.8 | 10.3' | 10°33.8 | 16.1' 59.8' |
| 23 | | 165°05.0 | 23.3 | 173°17.0 | 10.2' | 10°49.9 | 16.1' 59.8' |
| | | SD = 15.9' $d = 0.9'$ | | SD = 16.1' | | | |
| Fri | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 180°05.2 | N10°24.2 | 187°46.2 | 10.1' | N11°06.0 | 16.0' 59.9' |
| 1 | | 195°05.3 | 25.1 | 202°15.3 | 10.0' | 11°22.0 | 16.0' 59.9' |
| 2 | | 210°05.5 | 26.0 | 216°44.2 | 9.9' | 11°38.0 | 15.9' 59.9' |
| 3 | | 225°05.6 | · · 26.8 | 231°13.1 | 9.8' | 11°53.9 | 15.9' 59.9' |
| 4 | | 240°05.8 | 27.7 | 245°42.0 | 9.7' | 12°09.8 | 15.8' 60.0' |
| 5 | | 255°05.9 | 28.6 | 260°10.7 | 9.6' | 12°25.6 | 15.8' 60.0' |
| 6 | | 270°06.0 | N10°29.5 | 274°39.3 | 9.5' | N12°41.4 | 15.7' 60.0' |
| 7 | | 285°06.2 | 30.4 | 289°07.8 | 9.4' | 12°57.1 | 15.6' 60.0' |
| 8 | | 300°06.3 | 31.2 | 303°36.2 | 9.3' | 13°12.7 | 15.6' 60.1' |
| 9 | | 315°06.5 | · · 32.1 | 318°04.6 | 9.2' | 13°28.3 | 15.5' 60.1' |
| 10 | | 330°06.6 | 33.0 | 332°32.8 | 9.1' | 13°43.8 | 15.4' 60.1' |
| 11 | | 345°06.8 | 33.9 | 347°00.9 | 9.0' | 13°59.2 | 15.4' 60.1' |
| 12 | | 0°06.9 | N10°34.8 | 1°29.0 | 8.9' | N14°14.6 | 15.3' 60.1' |
| 13 | | 15°07.0 | 35.6 | 15°56.9 | 8.8' | 14°29.9 | 15.2' 60.2' |
| 14 | | 30°07.2 | 36.5 | 30°24.7 | 8.7' | 14°45.1 | 15.1' 60.2' |
| 15 | | 45°07.3 | · · 37.4 | 44°52.5 | 8.6' | 15°00.2 | 15.1' 60.2' |
| 16 | | 60°07.5 | 38.3 | 59°20.1 | 8.5' | 15°15.3 | 15.0' 60.2' |
| 17 | | 75°07.6 | 39.1 | 73°47.6 | 8.4' | 15°30.3 | 14.9' 60.2' |
| 18 | | 90°07.7 | N10°40.0 | 88°15.0 | 8.3' | N15°45.2 | 14.8' 60.2' |
| 19 | | 105°07.9 | 40.9 | 102°42.3 | 8.2' | 16°00.0 | 14.7' 60.3' |
| 20 | | 120°08.0 | 41.8 | 117°09.6 | 8.1' | 16°14.7 | 14.6' 60.3' |
| 21 | | 135°08.2 | · · 42.6 | 131°36.7 | 8.0' | 16°29.3 | 14.5' 60.3' |
| 22 | | 150°08.3 | 43.5 | 146°03.7 | 7.9' | 16°43.9 | 14.4' 60.3' |
| 23 | | 165°08.4 | 44.4 | 160°30.5 | 7.8' | 16°58.3 | 14.3' 60.3' |
| | | SD = 15.9' $d = 0.9'$ | | SD = 16.3' | | | |
| Sat | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 180°08.6 | N10°45.3 | 174°57.3 | 7.7' | N17°12.7 | 14.2' 60.3' |
| 1 | | 195°08.7 | 46.1 | 189°24.0 | 7.6' | 17°26.9 | 14.1' 60.4' |
| 2 | | 210°08.9 | 47.0 | 203°50.6 | 7.5' | 17°41.1 | 14.0' 60.4' |
| 3 | | 225°09.0 | · · 47.9 | 218°17.0 | 7.3' | 17°55.1 | 13.9' 60.4' |
| 4 | | 240°09.1 | 48.8 | 232°43.4 | 7.2' | 18°09.1 | 13.8' 60.4' |
| 5 | | 255°09.3 | 49.6 | 247°09.6 | 7.1' | 18°22.9 | 13.7' 60.4' |
| 6 | | 270°09.4 | N10°50.5 | 261°35.7 | 7.0' | N18°36.6 | 13.6' 60.4' |
| 7 | | 285°09.6 | 51.4 | 276°01.7 | 6.9' | 18°50.2 | 13.5' 60.4' |
| 8 | | 300°09.7 | 52.3 | 290°27.6 | 6.8' | 19°03.7 | 13.4' 60.4' |
| 9 | | 315°09.8 | · · 53.1 | 304°53.4 | 6.7' | 19°17.1 | 13.3' 60.4' |
| 10 | | 330°10.0 | 54.0 | 319°19.1 | 6.6' | 19°30.4 | 13.1' 60.5' |
| 11 | | 345°10.1 | 54.9 | 333°44.7 | 6.5' | 19°43.5 | 13.0' 60.5' |
| 12 | | 0°10.2 | N10°55.7 | 348°10.1 | 6.3' | N19°56.5 | 12.9' 60.5' |
| 13 | | 15°10.4 | 56.6 | 2°35.5 | 6.2' | 20°09.4 | 12.8' 60.5' |
| 14 | | 30°10.5 | 57.5 | 17°00.7 | 6.1' | 20°22.2 | 12.6' 60.5' |
| 15 | | 45°10.7 | · · 58.4 | 31°25.8 | 6.0' | 20°34.8 | 12.5' 60.5' |
| 16 | | 60°10.8 | 10°59.2 | 45°50.9 | 5.9' | 20°47.3 | 12.4' 60.5' |
| 17 | | 75°10.9 | 11°00.1 | 60°15.8 | 5.8' | 20°59.7 | 12.2' 60.5' |
| 18 | | 90°11.1 | N11°01.0 | 74°40.6 | 5.7' | N21°11.9 | 12.1' 60.5' |
| 19 | | 105°11.2 | 01.8 | 89°05.2 | 5.6' | 21°24.0 | 12.0' 60.5' |
| 20 | | 120°11.3 | 02.7 | 103°29.8 | 5.5' | 21°36.0 | 11.8' 60.5' |
| 21 | | 135°11.5 | · · 03.6 | 117°54.3 | 5.4' | 21°47.8 | 11.7' 60.5' |
| 22 | | 150°11.6 | 04.4 | 132°18.6 | 5.3' | 21°59.5 | 11.5' 60.5' |
| 23 | | 165°11.7 | 05.3 | 146°42.9 | 5.1' | 22°11.0 | 11.4' 60.5' |
| | | SD = 15.9' $d = 0.9'$ | | SD = 16.5' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | 01:38 | 03:28 | 20:36 | 22:32 | //// |
| N 70° | //// | 02:21 | 03:46 | 20:16 | 21:44 | //// |
| 68° | //// | 02:49 | 04:01 | 20:01 | 21:15 | //// |
| 66° | 01:24 | 03:10 | 04:12 | 19:49 | 20:53 | 22:44 |
| 64° | 02:03 | 03:26 | 04:22 | 19:39 | 20:36 | 22:02 |
| 62° | 02:28 | 03:40 | 04:31 | 19:30 | 20:22 | 21:35 |
| 60° | 02:48 | 03:51 | 04:38 | 19:23 | 20:10 | 21:14 |
| N 58° | 03:04 | 04:01 | 04:44 | 19:17 | 20:00 | 20:58 |
| 56° | 03:17 | 04:09 | 04:50 | 19:11 | 19:52 | 20:44 |
| 54° | 03:28 | 04:16 | 04:55 | 19:06 | 19:44 | 20:33 |
| 52° | 03:38 | 04:23 | 04:59 | 19:01 | 19:37 | 20:23 |
| 50° | 03:46 | 04:29 | 05:03 | 18:57 | 19:31 | 20:14 |
| 45° | 04:04 | 04:41 | 05:12 | 18:48 | 19:19 | 19:56 |
| N 40° | 04:18 | 04:51 | 05:19 | 18:40 | 19:09 | 19:43 |
| 35° | 04:28 | 05:00 | 05:26 | 18:34 | 19:00 | 19:31 |
| 30° | 04:37 | 05:07 | 05:31 | 18:28 | 18:53 | 19:22 |
| 20° | 04:52 | 05:18 | 05:41 | 18:19 | 18:41 | 19:08 |
| N 10° | 05:02 | 05:27 | 05:49 | 18:11 | 18:32 | 18:57 |
| 0° | 05:11 | 05:35 | 05:56 | 18:03 | 18:24 | 18:48 |
| S 10° | 05:18 | 05:42 | 06:04 | 17:55 | 18:17 | 18:41 |
| 20° | 05:23 | 05:49 | 06:11 | 17:47 | 18:10 | 18:35 |
| 30° | 05:28 | 05:56 | 06:20 | 17:38 | 18:03 | 18:31 |
| 35° | 05:30 | 06:00 | 06:25 | 17:33 | 17:59 | 18:28 |
| 40° | 05:32 | 06:03 | 06:31 | 17:28 | 17:55 | 18:27 |
| 45° | 05:33 | 06:08 | 06:37 | 17:21 | 17:51 | 18:25 |
| S 50° | 05:35 | 06:12 | 06:45 | 17:13 | 17:46 | 18:23 |
| 52° | 05:35 | 06:14 | 06:49 | 17:09 | 17:44 | 18:23 |
| 54° | 05:36 | 06:17 | 06:53 | 17:05 | 17:42 | 18:23 |
| 56° | 05:36 | 06:19 | 06:57 | 17:01 | 17:39 | 18:22 |
| 58° | 05:36 | 06:22 | 07:02 | 16:56 | 17:36 | 18:22 |
| S 60° | 05:36 | 06:24 | 07:07 | 16:51 | 17:33 | 18:22 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|---|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | 03:41 | 02:56 | 01:25 | 19:27 | 22:50 |  |
| N 70° | 03:48 | 03:16 | 02:23 | 19:10 | 21:54 |  |
| 68° | 03:54 | 03:31 | 02:57 | 18:57 | 21:21 |  |
| 66° | 03:59 | 03:43 | 03:23 | 18:47 | 20:58 | 23:39 |
| 64° | 04:04 | 03:54 | 03:42 | 18:38 | 20:39 | 22:57 |
| 62° | 04:07 | 04:03 | 03:59 | 18:31 | 20:24 | 22:28 |
| 60° | 04:11 | 04:11 | 04:12 | 18:24 | 20:12 | 22:07 |
| N 58° | 04:14 | 04:18 | 04:24 | 18:19 | 20:01 | 21:49 |
| 56° | 04:16 | 04:24 | 04:34 | 18:14 | 19:52 | 21:35 |
| 54° | 04:19 | 04:30 | 04:44 | 18:09 | 19:44 | 21:22 |
| 52° | 04:21 | 04:35 | 04:52 | 18:05 | 19:36 | 21:11 |
| 50° | 04:23 | 04:39 | 04:59 | 18:02 | 19:30 | 21:01 |
| 45° | 04:27 | 04:49 | 05:15 | 17:54 | 19:16 | 20:40 |
| N 40° | 04:31 | 04:57 | 05:28 | 17:47 | 19:04 | 20:24 |
| 35° | 04:34 | 05:05 | 05:39 | 17:42 | 18:54 | 20:10 |
| 30° | 04:37 | 05:11 | 05:49 | 17:37 | 18:46 | 19:58 |
| 20° | 04:42 | 05:22 | 06:06 | 17:29 | 18:31 | 19:37 |
| N 10° | 04:47 | 05:32 | 06:21 | 17:21 | 18:18 | 19:20 |
| 0° | 04:51 | 05:41 | 06:36 | 17:14 | 18:07 | 19:03 |
| S 10° | 04:55 | 05:51 | 06:50 | 17:08 | 17:55 | 18:47 |
| 20° | 05:00 | 06:01 | 07:05 | 17:00 | 17:42 | 18:29 |
| 30° | 05:05 | 06:13 | 07:23 | 16:52 | 17:28 | 18:09 |
| 35° | 05:09 | 06:19 | 07:34 | 16:48 | 17:20 | 17:57 |
| 40° | 05:12 | 06:27 | 07:46 | 16:42 | 17:10 | 17:44 |
| 45° | 05:16 | 06:36 | 08:00 | 16:36 | 16:59 | 17:28 |
| S 50° | 05:21 | 06:47 | 08:18 | 16:29 | 16:46 | 17:09 |
| 52° | 05:24 | 06:53 | 08:26 | 16:25 | 16:40 | 17:00 |
| 54° | 05:26 | 06:58 | 08:35 | 16:22 | 16:34 | 16:50 |
| 56° | 05:29 | 07:05 | 08:46 | 16:18 | 16:26 | 16:38 |
| 58° | 05:32 | 07:12 | 08:58 | 16:13 | 16:18 | 16:25 |
| S 60° | 05:36 | 07:20 | 09:12 | 16:08 | 16:08 | 16:10 |

| Day | Sun | | | Moon | | |
|-----|--------------------------|--------------------------|--------------|----------------|----------------|---|
| | Eqn.of Time | | Mer. Pass | Mer.Pass. | | Age 28-1 3-1% |
| | 00 ^h mm:ss | 12 ^h mm:ss | | Upper hh:mm | Lower hh:mm | |
| | | | hh:mm | hh:mm | hh:mm | |
| 16 | 00:07 | 00:14 | 12:00 | 11:03 | 23:28 |  |
| 17 | 00:21 | 00:28 | 12:00 | 11:54 | —:— | |
| 18 | 00:34 | 00:41 | 11:59 | 12:49 | 00:21 | |

April 19, 20, 21 UT (Sun., Mon., Tue.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|---------------------|----------|----------|-------------------|----------|----------|---------------------|---------------------|----------|-------------------|--------|----------|-------|-------|--|--|
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | |
| 0 | 207°06.7 | 155°53.0 | N19°02.5 | 200°11.0 | N01°56.8 | 98°12.3 | N22°41.2 | 199°08.7 | N01°06.0 | Alpheratz | 357°34.0 | 29°14.0 | | | | | | |
| 1 | 222°09.2 | 170°52.4 | 03.4 | 215°11.7 | 57.6 | 113°14.4 | 41.2 | 214°10.9 | 06.1 | Ankaa | 353°06.5 | -42°09.7 | | | | | | |
| 2 | 237°11.7 | 185°51.8 | 04.2 | 230°12.4 | 58.4 | 128°16.6 | 41.1 | 229°13.1 | 06.2 | Schedar | 349°30.4 | 56°40.8 | | | | | | |
| 3 | 252°14.1 | 200°51.1 | •• 05.1 | 245°13.1 | •• 59.1 | 143°18.8 | •• 41.1 | 244°15.3 | •• 06.4 | Diphda | 348°46.6 | -17°50.6 | | | | | | |
| 4 | 267°16.6 | 215°50.5 | 06.0 | 260°13.8 | 01°59.9 | 158°20.9 | 41.1 | 259°17.5 | 06.5 | Achernar | 335°20.0 | -57°06.2 | | | | | | |
| 5 | 282°19.0 | 230°49.9 | 06.9 | 275°14.5 | 02°00.7 | 173°23.1 | 41.0 | 274°19.7 | 06.6 | Hamal | 327°50.4 | 23°35.1 | | | | | | |
| 6 | 297°21.5 | 245°49.2 | N19°07.7 | 290°15.2 | N02°01.5 | 188°25.2 | N22°41.0 | 289°21.9 | N01°06.7 | Polaris | 313°58.5 | 89°22.6 | | | | | | |
| 7 | 312°24.0 | 260°48.6 | 08.6 | 305°15.9 | 02.3 | 203°27.4 | 41.0 | 304°24.1 | 06.8 | Acamar | 315°11.4 | -40°12.0 | | | | | | |
| 8 | 327°26.4 | 275°48.0 | 09.5 | 320°16.6 | 03.0 | 218°29.6 | 40.9 | 319°26.2 | 06.9 | Menkar | 314°05.4 | 4°11.5 | | | | | | |
| 9 | 342°28.9 | 290°47.3 | •• 10.3 | 335°17.3 | •• 03.8 | 233°31.7 | •• 40.9 | 334°28.4 | •• 07.0 | Mirfak | 308°27.2 | 49°57.3 | | | | | | |
| 10 | 357°31.4 | 305°46.7 | 11.2 | 350°18.0 | 04.6 | 248°33.9 | 40.9 | 349°30.6 | 07.2 | Aldebaran | 290°38.7 | 16°33.7 | | | | | | |
| 11 | 12°33.8 | 320°46.1 | 12.0 | 5°18.6 | 05.4 | 263°36.0 | 40.8 | 4°32.8 | 07.3 | Rigel | 281°03.1 | -8°10.4 | | | | | | |
| 12 | 27°36.3 | 335°45.4 | N19°12.9 | 20°19.3 | N02°06.1 | 278°38.2 | N22°40.8 | 19°35.0 | N01°07.4 | Capella | 280°20.7 | 46°01.5 | | | | | | |
| 13 | 42°38.8 | 350°44.8 | 13.8 | 35°20.0 | 06.9 | 293°40.3 | 40.7 | 34°37.2 | 07.5 | Bellatrix | 278°22.0 | 6°22.3 | | | | | | |
| 14 | 57°41.2 | 5°44.2 | 14.6 | 50°20.7 | 07.7 | 308°42.5 | 40.7 | 49°39.4 | 07.6 | Elnath | 278°00.8 | 28°37.8 | | | | | | |
| 15 | 72°43.7 | 20°43.5 | •• 15.5 | 65°21.4 | •• 08.5 | 323°44.7 | •• 40.7 | 64°41.6 | •• 07.7 | Alnilam | 275°36.9 | -1°11.2 | | | | | | |
| 16 | 87°46.2 | 35°42.9 | 16.3 | 80°22.1 | 09.2 | 338°46.8 | 40.6 | 79°43.8 | 07.8 | Betelgeuse | 270°51.1 | 7°24.6 | | | | | | |
| 17 | 102°48.6 | 50°42.3 | 17.2 | 95°22.8 | 10.0 | 353°49.0 | 40.6 | 94°45.9 | 07.9 | Canopus | 263°52.2 | -52°42.8 | | | | | | |
| 18 | 117°51.1 | 65°41.6 | N19°18.0 | 110°23.5 | N02°10.8 | 8°51.1 | N22°40.6 | 109°48.1 | N01°08.1 | Sirius | 258°25.4 | -16°45.3 | | | | | | |
| 19 | 132°53.5 | 80°41.0 | 18.9 | 125°24.2 | 11.6 | 23°53.3 | 40.5 | 124°50.3 | 08.2 | Adhara | 255°05.2 | -29°00.7 | | | | | | |
| 20 | 147°56.0 | 95°40.3 | 19.8 | 140°24.9 | 12.3 | 38°55.4 | 40.5 | 139°52.5 | 08.3 | Procyon | 244°49.8 | 5°09.4 | | | | | | |
| 21 | 162°58.5 | 110°39.7 | •• 20.6 | 155°25.6 | •• 13.1 | 53°57.6 | •• 40.5 | 154°54.7 | •• 08.4 | Pollux | 243°16.1 | 27°57.8 | | | | | | |
| 22 | 178°00.9 | 125°39.1 | 21.5 | 170°26.3 | 13.9 | 68°59.7 | 40.4 | 169°56.9 | 08.5 | Avior | 234°14.3 | -59°35.9 | | | | | | |
| 23 | 193°03.4 | 140°38.4 | 22.3 | 185°26.9 | 14.7 | 84°01.9 | 40.4 | 184°59.1 | 08.6 | Suhail | 222°45.4 | -43°32.6 | | | | | | |
| Mer.pass. 10:10 | | | ν-0.6' d0.9' m-3.92 | | | ν0.7' d0.8' m1.21 | | | ν2.2' d-0.0' m-2.08 | | | ν2.2' d0.1' m0.93 | | | | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | Regulus | 207°33.2 | 11°50.2 | | | | | | |
| 0 | 208°05.9 | 155°37.8 | N19°23.2 | 200°27.6 | N02°15.4 | 99°04.1 | N22°40.4 | 200°01.3 | N01°08.7 | Dubhe | 193°39.3 | 61°36.7 | | | | | | |
| 1 | 223°08.3 | 170°37.1 | 24.0 | 215°28.3 | 16.2 | 114°06.2 | 40.3 | 215°03.5 | 08.9 | Denebola | 182°23.6 | 14°25.4 | | | | | | |
| 2 | 238°10.8 | 185°36.5 | 24.9 | 230°29.0 | 17.0 | 129°08.4 | 40.3 | 230°05.6 | 09.0 | Gienah | 175°42.2 | -17°41.5 | | | | | | |
| 3 | 253°13.3 | 200°35.9 | •• 25.7 | 245°29.7 | •• 17.8 | 144°10.5 | •• 40.2 | 245°07.8 | •• 09.1 | Acrux | 172°58.3 | -63°14.9 | | | | | | |
| 4 | 268°15.7 | 215°35.2 | 26.6 | 260°30.4 | 18.5 | 159°12.7 | 40.2 | 260°10.0 | 09.2 | Gacrux | 171°50.0 | -57°15.8 | | | | | | |
| 5 | 283°18.2 | 230°34.6 | 27.4 | 275°31.1 | 19.3 | 174°14.8 | 40.2 | 275°12.2 | 09.3 | Alioth | 166°11.5 | 55°49.0 | | | | | | |
| 6 | 298°20.7 | 245°33.9 | N19°28.3 | 290°31.8 | N02°20.1 | 189°17.0 | N22°40.1 | 290°14.4 | N01°09.4 | Spica | 158°20.9 | -11°18.1 | | | | | | |
| 7 | 313°23.1 | 260°33.3 | 29.1 | 305°32.5 | 20.9 | 204°19.1 | 40.1 | 305°16.6 | 09.5 | Alkaid | 152°50.7 | 49°10.8 | | | | | | |
| 8 | 328°25.6 | 275°32.6 | 29.9 | 320°33.2 | 21.6 | 219°21.3 | 40.1 | 320°18.8 | 09.6 | Hadar | 148°33.9 | -60°30.1 | | | | | | |
| 9 | 343°28.0 | 290°32.0 | •• 30.8 | 335°33.9 | •• 22.4 | 234°23.4 | •• 40.0 | 335°21.0 | •• 09.8 | Menkent | 147°56.0 | -36°30.1 | | | | | | |
| 10 | 358°30.5 | 305°31.3 | 31.6 | 350°34.6 | 23.2 | 249°25.6 | 40.0 | 350°23.2 | 09.9 | Arcturus | 145°46.6 | 19°02.6 | | | | | | |
| 11 | 13°33.0 | 320°30.7 | 32.5 | 5°35.2 | 24.0 | 264°27.7 | 40.0 | 5°25.4 | 10.0 | Rigel Kent. | 139°38.2 | -60°56.7 | | | | | | |
| 12 | 28°35.4 | 335°30.0 | N19°33.3 | 20°35.9 | N02°24.7 | 279°29.9 | N22°39.9 | 20°27.5 | N01°10.1 | Kochab | 137°18.7 | 74°02.7 | | | | | | |
| 13 | 43°37.9 | 350°29.4 | 34.1 | 35°36.6 | 25.5 | 294°32.0 | 39.9 | 35°29.7 | 10.2 | Zuben'ubi | 136°54.5 | -16°09.2 | | | | | | |
| 14 | 58°40.4 | 5°28.8 | 35.0 | 50°37.3 | 26.3 | 309°34.2 | 39.8 | 50°31.9 | 10.3 | Alphecca | 126°02.5 | 26°37.4 | | | | | | |
| 15 | 73°42.8 | 20°28.1 | •• 35.8 | 65°38.0 | •• 27.1 | 324°36.3 | •• 39.8 | 65°34.1 | •• 10.4 | Antares | 112°14.3 | -26°29.5 | | | | | | |
| 16 | 88°45.3 | 35°27.5 | 36.7 | 80°38.7 | 27.8 | 339°38.5 | 39.8 | 80°36.3 | 10.6 | Atria | 107°07.2 | -69°04.3 | | | | | | |
| 17 | 103°47.8 | 50°26.8 | 37.5 | 95°39.4 | 28.6 | 354°40.6 | 39.7 | 95°38.5 | 10.7 | Sabik | 102°01.4 | -15°45.5 | | | | | | |
| 18 | 118°50.2 | 65°26.2 | N19°38.3 | 110°40.1 | N02°29.4 | 9°42.8 | N22°39.7 | 110°40.7 | N01°10.8 | Shaula | 96°08.7 | -37°07.3 | | | | | | |
| 19 | 133°52.7 | 80°25.5 | 39.2 | 125°40.8 | 30.2 | 24°44.9 | 39.7 | 125°42.9 | 10.9 | Rasalhague | 95°57.4 | 12°32.3 | | | | | | |
| 20 | 148°55.2 | 95°24.9 | 40.0 | 140°41.5 | 30.9 | 39°47.1 | 39.6 | 140°45.1 | 11.0 | Eltanin | 90°41.4 | 51°28.8 | | | | | | |
| 21 | 163°57.6 | 110°24.2 | •• 40.8 | 155°42.2 | •• 31.7 | 54°49.2 | •• 39.6 | 155°47.3 | •• 11.1 | Kaus Aust. | 83°31.0 | -34°22.2 | | | | | | |
| 22 | 179°00.1 | 125°23.6 | 41.7 | 170°42.9 | 32.5 | 69°51.4 | 39.6 | 170°49.4 | 11.2 | Vega | 80°32.4 | 38°48.2 | | | | | | |
| 23 | 194°02.5 | 140°22.9 | 42.5 | 185°43.5 | 33.3 | 84°53.5 | 39.5 | 185°51.6 | 11.3 | Nunki | 75°46.4 | -26°15.8 | | | | | | |
| Mer.pass. 10:06 | | | ν-0.6' d0.8' m-3.92 | | | ν0.7' d0.8' m1.21 | | | ν2.2' d-0.0' m-2.08 | | | ν2.2' d0.1' m0.93 | | | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | Altair | 61°58.9 | 8°56.1 | | | | | | |
| 0 | 209°05.0 | 155°22.3 | N19°43.3 | 200°44.2 | N02°34.0 | 99°55.7 | N22°39.5 | 200°53.8 | N01°11.5 | Peacock | 53°04.1 | -56°38.8 | | | | | | |
| 1 | 224°07.5 | 170°21.6 | 44.1 | 215°44.9 | 34.8 | 114°57.8 | 39.4 | 215°56.0 | 11.6 | Deneb | 49°25.2 | 45°22.1 | | | | | | |
| 2 | 239°09.9 | 185°20.9 | 45.0 | 230°45.6 | 35.6 | 130°00.0 | 39.4 | 230°58.2 | 11.7 | Enif | 33°37.9 | 9°59.6 | | | | | | |
| 3 | 254°12.4 | 200°20.3 | •• 45.8 | 245°46.3 | •• 36.4 | 145°02.1 | •• 39.4 | 246°00.4 | •• 11.8 | Al Na'ir | 27°31.8 | -46°49.9 | | | | | | |
| 4 | 269°14.9 | 215°19.6 | 46.6 | 260°47.0 | 37.1 | 160°04.3 | 39.3 | 261°02.6 | 11.9 | Fomalhaut | 15°13.6 | -29°28.9 | | | | | | |
| 5 | 284°17.3 | 230°19.0 | 47.4 | 275°47.7 | 37.9 | 175°06.4 | 39.3 | 276°04.8 | 12.0 | Scheat | 13°44.5 | 28°13.3 | | | | | | |
| 6 | 299°19.8 | 245°18.3 | N19°48.3 | 290°48.4 | N02°38.7 | 190°08.6 | N22°39.3 | 291°07.0 | N01°12.1 | Markab | 13°29.1 | 15°20.7 | | | | | | |
| 7 | 314°22.3 | 260°17.7 | 49.1 | 305°49.1 | 39.5 | 205°10.7 | 39.2 | 306°09.2 | 12.2 | Apr 19 Sun | | | SHA | Mer.pass | | | | |
| 8 | 329°24.7 | 275°17.0 | 49.9 | 320°49.8 | 40.2 | 220°12.9 | 39.2 | 321°11.4 | 12.4 | Venus | 308°46.3 | 13:37 | | | | | | |
| 9 | 344°27.2 | 290°16.4 | •• 50.7 | 335°50.5 | •• 41.0 | 235°15.0 | •• 39.1 | 336°13.5 | •• 12.5 | Mars | 353°04.3 | 10:39 | | | | | | |
| 10 | 359°29.7 | 305°15.7 | 51.6 | 350°51.2 | 41.8 | 250°17.1 | 39.1 | 351°15.7 | 12.6 | Jupiter | 251°05.5 | 17:25 | | | | | | |
| 11 | 14°32.1 | 320°15.0 | 52.4 | 5°51.9 | 42.5 | 265°19.3 | 39.1 | 6°17.9 | 12.7 | Saturn | 352°02.0 | 10:42 | | | | | | |
| 12 | 29°34.6 | 335°14.4 | N19°53.2 | 20°52.5 | N02°43.3 | 280°21.4 | N22°39.0 | 21°20.1 | N01°12.8 | Apr 20 Mon | | | SHA | Mer.pass | | | | |
| 13 | 44°37.0 | 350°13.7 | 54.0 | 35°53.2 | 44.1 | 295°23.6 | 39.0 | 36°22.3 | 12.9 | Venus | 307°31.9 | 13:38 | | | | | | |
| 14 | 59°39.5 | 5°13.1 | 54.8 | 50°53.9 | 44.9 | 310°25.7 | 39.0 | 51°24.5 | 13.0 | Mars | 352°21.8 | 10:38 | | | | | | |
| 15 | 74°42.0 | 20°12.4 | •• 55.6 | 65°54.6 | •• 45.6 | 325°27.9 | •• 38.9 | 66°26.7 | •• 13.1 | Jupiter | 250°58.2 | 17:21 | | | | | | |
| 16 | 89°44.4 | 35°11.8 | 56.5 | 80°55.3 | 46.4 | 340°30.0 | 38.9 | 81°28.9 | 13.3 | Saturn | 351°55.4 | 10:38 | | | | | | |
| 17 | 104°46.9 | 50°11.1 | 57.3 | 95°56.0 | 47.2 | 355°32.2 | 38.8 | 96°31.1 | 13.4 | Apr 21 Tue | | | SHA | Mer.pass | | | | |
| 18 | 119°49.4 | 65°10.4 | N19°58.1 | 110°56.7 | N02°48.0 | 10°34.3 | N22°38.8 | 111°33.3 | N01°13.5 | Venus | 306°17.2 | 13:39 | | | | | | |
| 19 | 134°51.8 | 80°09.8 | 58.9 | 125°57.4 | 48.7 | 25°36.4 | 38.8 | 126°35.5 | 13.6 | Mars | 351°39.2 | 10:37 | | | | | | |
| 20 | 149°54.3 | 95°09.1 | 19°59.7 | 140°58.1 | 49.5 | 40°38.6 | 38.7 | 141°37.6 | 13.7 | Jupiter | 250°50.7 | 17:18 | | | | | | |
| 21 | 164°56.8 | 110°08.5 | 20°00.5 | 155°58.8 | •• 50.3 | 55°40.7 | •• 38.7 | 156°39.8 | •• 13.8 | Saturn | 351°48.8 | 10:35 | | | | | | |
| 22 | 179°59.2 | 125°07.8 | 01.3 | 170°59.5 | 51.0 | 70°42.9 | 38.7 | 171°42.0 | 13.9 | Horizontal parallax | | | | | | | | |
| 23 | 195°01.7 | 140°07.1 | 02.1 | 186°00.2 | 51.8 | 85°45.0 | 38.6 | 186°44.2 | 14.0 | Venus: | | 0.1 | | | | | | |
| Mer.pass. 10:02 | | | ν-0.7' d0.8' m-3.92 | | | ν0.7' d0.8' m1.21 | | | ν2.1' d-0.0' m-2.07 | | | ν2.2' d0.1' m0.93 | | | Mars: | 0.1 | | |

| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|------------|-------|----------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°11.9 | N11°06.2 | | 161°07.0 | 5.0' | N22°22.4 | 11.2' | 60.5' |
| 1 | 195°12.0 | 07.0 | | 175°31.1 | 4.9' | 22°33.6 | 11.1' | 60.5' |
| 2 | 210°12.2 | 07.9 | | 189°55.0 | 4.8' | 22°44.7 | 10.9' | 60.6' |
| 3 | 225°12.3 | · · 08.8 | | 204°18.8 | 4.7' | 22°55.6 | 10.8' | 60.6' |
| 4 | 240°12.4 | 09.6 | | 218°42.6 | 4.6' | 23°06.3 | 10.6' | 60.6' |
| 5 | 255°12.6 | 10.5 | | 233°06.2 | 4.5' | 23°16.9 | 10.4' | 60.6' |
| 6 | 270°12.7 | N11°11.4 | | 247°29.7 | 4.4' | N23°27.4 | 10.3' | 60.6' |
| 7 | 285°12.8 | 12.2 | | 261°53.1 | 4.3' | 23°37.7 | 10.1' | 60.6' |
| 8 | 300°13.0 | 13.1 | | 276°16.5 | 4.2' | 23°47.8 | 10.0' | 60.6' |
| 9 | 315°13.1 | · · 14.0 | | 290°39.7 | 4.1' | 23°57.7 | 9.8' | 60.6' |
| 10 | 330°13.2 | 14.8 | | 305°02.8 | 4.0' | 24°07.5 | 9.6' | 60.6' |
| 11 | 345°13.4 | 15.7 | | 319°25.8 | 3.9' | 24°17.1 | 9.4' | 60.6' |
| 12 | 0°13.5 | N11°16.5 | | 333°48.8 | 3.8' | N24°26.6 | 9.3' | 60.5' |
| 13 | 15°13.6 | 17.4 | | 348°11.6 | 3.8' | 24°35.8 | 9.1' | 60.5' |
| 14 | 30°13.8 | 18.3 | | 2°34.4 | 3.7' | 24°44.9 | 8.9' | 60.5' |
| 15 | 45°13.9 | · · 19.1 | | 16°57.0 | 3.6' | 24°53.8 | 8.7' | 60.5' |
| 16 | 60°14.0 | 20.0 | | 31°19.6 | 3.5' | 25°02.6 | 8.6' | 60.5' |
| 17 | 75°14.2 | 20.9 | | 45°42.1 | 3.4' | 25°11.1 | 8.4' | 60.5' |
| 18 | 90°14.3 | N11°21.7 | | 60°04.5 | 3.3' | N25°19.5 | 8.2' | 60.5' |
| 19 | 105°14.4 | 22.6 | | 74°26.8 | 3.2' | 25°27.7 | 8.0' | 60.5' |
| 20 | 120°14.6 | 23.4 | | 88°49.1 | 3.2' | 25°35.7 | 7.8' | 60.5' |
| 21 | 135°14.7 | · · 24.3 | | 103°11.2 | 3.1' | 25°43.6 | 7.6' | 60.5' |
| 22 | 150°14.8 | 25.2 | | 117°33.3 | 3.0' | 25°51.2 | 7.4' | 60.5' |
| 23 | 165°15.0 | 26.0 | | 131°55.3 | 2.9' | 25°58.6 | 7.3' | 60.5' |
| SD = 15.9' $d = 0.9'$ | | | | SD = 16.5' | | | | |

| Mon | GHA | Dec | | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|--|------------|-------|----------|------|-------|
| 0 | 180°15.1 | N11°26.9 | | 146°17.3 | 2.9' | N26°05.9 | 7.1' | 60.5' |
| 1 | 195°15.2 | 27.7 | | 160°39.1 | 2.8' | 26°13.0 | 6.9' | 60.5' |
| 2 | 210°15.3 | 28.6 | | 175°00.9 | 2.7' | 26°19.8 | 6.7' | 60.5' |
| 3 | 225°15.5 | · · 29.5 | | 189°22.7 | 2.7' | 26°26.5 | 6.5' | 60.5' |
| 4 | 240°15.6 | 30.3 | | 203°44.3 | 2.6' | 26°33.0 | 6.3' | 60.5' |
| 5 | 255°15.7 | 31.2 | | 218°06.0 | 2.6' | 26°39.3 | 6.1' | 60.4' |
| 6 | 270°15.9 | N11°32.0 | | 232°27.5 | 2.5' | N26°45.4 | 5.9' | 60.4' |
| 7 | 285°16.0 | 32.9 | | 246°49.0 | 2.4' | 26°51.3 | 5.7' | 60.4' |
| 8 | 300°16.1 | 33.7 | | 261°10.5 | 2.4' | 26°57.0 | 5.5' | 60.4' |
| 9 | 315°16.3 | · · 34.6 | | 275°31.8 | 2.3' | 27°02.4 | 5.3' | 60.4' |
| 10 | 330°16.4 | 35.5 | | 289°53.2 | 2.3' | 27°07.7 | 5.1' | 60.4' |
| 11 | 345°16.5 | 36.3 | | 304°14.5 | 2.3' | 27°12.8 | 4.9' | 60.4' |
| 12 | 0°16.6 | N11°37.2 | | 318°35.8 | 2.2' | N27°17.7 | 4.7' | 60.4' |
| 13 | 15°16.8 | 38.0 | | 332°57.0 | 2.2' | 27°22.4 | 4.5' | 60.4' |
| 14 | 30°16.9 | 38.9 | | 347°18.2 | 2.1' | 27°26.9 | 4.3' | 60.3' |
| 15 | 45°17.0 | · · 39.7 | | 1°39.3 | 2.1' | 27°31.1 | 4.1' | 60.3' |
| 16 | 60°17.2 | 40.6 | | 16°00.4 | 2.1' | 27°35.2 | 3.9' | 60.3' |
| 17 | 75°17.3 | 41.4 | | 30°21.5 | 2.1' | 27°39.1 | 3.6' | 60.3' |
| 18 | 90°17.4 | N11°42.3 | | 44°42.6 | 2.0' | N27°42.7 | 3.4' | 60.3' |
| 19 | 105°17.5 | 43.1 | | 59°03.6 | 2.0' | 27°46.1 | 3.2' | 60.3' |
| 20 | 120°17.7 | 44.0 | | 73°24.6 | 2.0' | 27°49.4 | 3.0' | 60.3' |
| 21 | 135°17.8 | · · 44.8 | | 87°45.6 | 2.0' | 27°52.4 | 2.8' | 60.2' |
| 22 | 150°17.9 | 45.7 | | 102°06.6 | 2.0' | 27°55.2 | 2.6' | 60.2' |
| 23 | 165°18.1 | 46.5 | | 116°27.6 | 2.0' | 27°57.8 | 2.4' | 60.2' |
| SD = 15.9' $d = 0.9'$ | | | | SD = 16.5' | | | | |

| Tue | GHA | Dec | | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|--|------------|-------|----------|-------|-------|
| 0 | 180°18.2 | N11°47.4 | | 130°48.6 | 2.0' | N28°00.2 | 2.2' | 60.2' |
| 1 | 195°18.3 | 48.3 | | 145°09.6 | 2.0' | 28°02.4 | 2.0' | 60.2' |
| 2 | 210°18.4 | 49.1 | | 159°30.5 | 2.0' | 28°04.4 | 1.8' | 60.2' |
| 3 | 225°18.6 | · · 50.0 | | 173°51.5 | 2.0' | 28°06.2 | 1.6' | 60.1' |
| 4 | 240°18.7 | 50.8 | | 188°12.5 | 2.0' | 28°07.7 | 1.4' | 60.1' |
| 5 | 255°18.8 | 51.7 | | 202°33.5 | 2.0' | 28°09.1 | 1.1' | 60.1' |
| 6 | 270°18.9 | N11°52.5 | | 216°54.5 | 2.0' | N28°10.2 | 0.9' | 60.1' |
| 7 | 285°19.1 | 53.3 | | 231°15.5 | 2.0' | 28°11.2 | 0.7' | 60.1' |
| 8 | 300°19.2 | 54.2 | | 245°36.5 | 2.1' | 28°11.9 | 0.5' | 60.1' |
| 9 | 315°19.3 | · · 55.0 | | 259°57.6 | 2.1' | 28°12.4 | 0.3' | 60.0' |
| 10 | 330°19.4 | 55.9 | | 274°18.6 | 2.1' | 28°12.7 | 0.1' | 60.0' |
| 11 | 345°19.6 | 56.7 | | 288°39.7 | 2.1' | 28°12.8 | -0.1' | 60.0' |
| 12 | 0°19.7 | N11°57.6 | | 303°00.9 | 2.2' | N28°12.7 | -0.3' | 60.0' |
| 13 | 15°19.8 | 58.4 | | 317°22.0 | 2.2' | 28°12.4 | -0.5' | 60.0' |
| 14 | 30°19.9 | 11°59.3 | | 331°43.2 | 2.2' | 28°11.9 | -0.7' | 59.9' |
| 15 | 45°20.1 | 12°00.1 | | 346°04.5 | 2.3' | 28°11.1 | -0.9' | 59.9' |
| 16 | 60°20.2 | 01.0 | | 0°25.8 | 2.3' | 28°10.2 | -1.1' | 59.9' |
| 17 | 75°20.3 | 01.8 | | 14°47.1 | 2.4' | 28°09.1 | -1.3' | 59.9' |
| 18 | 90°20.4 | N12°02.7 | | 29°08.5 | 2.4' | N28°07.7 | -1.5' | 59.9' |
| 19 | 105°20.6 | 03.5 | | 43°29.9 | 2.5' | 28°06.2 | -1.7' | 59.8' |
| 20 | 120°20.7 | 04.4 | | 57°51.4 | 2.5' | 28°04.5 | -1.9' | 59.8' |
| 21 | 135°20.8 | · · 05.2 | | 72°12.9 | 2.6' | 28°02.5 | -2.1' | 59.8' |
| 22 | 150°20.9 | 06.0 | | 86°34.5 | 2.7' | 28°00.4 | -2.3' | 59.8' |
| 23 | 165°21.0 | 06.9 | | 100°56.1 | 2.7' | 27°58.0 | -2.5' | 59.7' |
| SD = 15.9' $d = 0.9'$ | | | | SD = 16.4' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | 00:56 | 03:10 | 20:53 | 23:22 | //// |
| N 70° | //// | 01:57 | 03:31 | 20:30 | 22:07 | //// |
| 68° | //// | 02:31 | 03:47 | 20:13 | 21:31 | //// |
| 66° | 00:48 | 02:55 | 04:01 | 20:00 | 21:06 | 23:27 |
| 64° | 01:42 | 03:14 | 04:12 | 19:48 | 20:47 | 22:22 |
| 62° | 02:13 | 03:29 | 04:21 | 19:39 | 20:32 | 21:49 |
| 60° | 02:35 | 03:41 | 04:29 | 19:30 | 20:19 | 21:26 |
| N 58° | 02:53 | 03:52 | 04:36 | 19:23 | 20:08 | 21:08 |
| 56° | 03:07 | 04:01 | 04:42 | 19:17 | 19:58 | 20:53 |
| 54° | 03:20 | 04:09 | 04:48 | 19:11 | 19:50 | 20:40 |
| 52° | 03:30 | 04:16 | 04:53 | 19:06 | 19:43 | 20:29 |
| 50° | 03:39 | 04:22 | 04:57 | 19:02 | 19:37 | 20:20 |
| 45° | 03:58 | 04:36 | 05:07 | 18:52 | 19:23 | 20:01 |
| N 40° | 04:13 | 04:47 | 05:15 | 18:43 | 19:12 | 19:46 |
| 35° | 04:24 | 04:56 | 05:22 | 18:36 | 19:03 | 19:34 |
| 30° | 04:34 | 05:03 | 05:28 | 18:30 | 18:55 | 19:24 |
| 20° | 04:49 | 05:16 | 05:38 | 18:20 | 18:42 | 19:09 |
| N 10° | 05:01 | 05:26 | 05:47 | 18:11 | 18:32 | 18:57 |
| 0° | 05:10 | 05:34 | 05:56 | 18:02 | 18:23 | 18:48 |
| S 10° | 05:18 | 05:42 | 06:04 | 17:54 | 18:15 | 18:40 |
| 20° | 05:24 | 05:50 | 06:12 | 17:45 | 18:08 | 18:33 |
| 30° | 05:30 | 05:58 | 06:22 | 17:35 | 18:00 | 18:28 |
| 35° | 05:32 | 06:02 | 06:28 | 17:30 | 17:55 | 18:25 |
| 40° | 05:35 | 06:06 | 06:34 | 17:23 | 17:51 | 18:23 |
| 45° | 05:37 | 06:11 | 06:41 | 17:16 | 17:46 | 18:20 |
| S 50° | 05:39 | 06:17 | 06:50 | 17:07 | 17:40 | 18:18 |
| 52° | 05:40 | 06:19 | 06:54 | 17:03 | 17:38 | 18:17 |
| 54° | 05:41 | 06:22 | 06:58 | 16:59 | 17:35 | 18:16 |
| 56° | 05:41 | 06:25 | 07:03 | 16:54 | 17:32 | 18:15 |
| 58° | 05:42 | 06:28 | 07:09 | 16:48 | 17:29 | 18:15 |
| S 60° | 05:43 | 06:31 | 07:15 | 16:42 | 17:25 | 18:14 |

| Lat. | Moonrise | | | Moonset | | |
|-------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| N 70° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66° | 02:42 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64° | 03:25 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 62° | 03:54 | 03:50 | 03:40 | · · · | 00:43 | 03:09 |
| 60° | 04:17 | 04:29 | 05:02 | · · · | 00:05 | 01:47 |
| N 58° | 04:35 | 04:56 | 05:38 | 23:38 | · · · | 01:11 |
| 56° | 04:51 | 05:18 | 06:04 | 23:16 | · · · | 00:45 |
| 54° | 05:04 | 05:35 | 06:25 | 22:59 | · · · | 00:24 |
| 52° | 05:16 | 05:51 | 06:43 | 22:44 | · · · | 00:07 |
| 50° | 05:26 | 06:04 | 06:58 | 22:31 | 23:52 | · · · |
| 45° | 05:48 | 06:31 | 07:28 | 22:05 | 23:22 | · · · |
| N 40° | 06:06 | 06:53 | 07:51 | 21:44 | 22:59 | · · · |
| 35° | 06:21 | 07:11 | 08:11 | 21:26 | 22:40 | 23:44 |
| 30° | 06:34 | 07:27 | 08:28 | 21:12 | 22:23 | 23:28 |
| 20° | 06:56 | 07:53 | 08:56 | 20:46 | 21:55 | 23:00 |
| N 10° | 07:16 | 08:16 | 09:20 | 20:24 | 21:31 | 22:36 |
| 0° | 07:35 | 08:38 | 09:43 | 20:04 | 21:09 | 22:14 |
| S 10° | 07:53 | 08:59 | 10:05 | 19:44 | 20:46 | 21:51 |
| 20° | 08:13 | 09:23 | 10:30 | 19:22 | 20:22 | 21:27 |
| 30° | 08:37 | 09:50 | 10:58 | 18:57 | 19:54 | 20:59 |
| 35° | 08:50 | 10:06 | 11:15 | 18:43 | 19:38 | 20:42 |
| 40° | 09:06 | 10:25 | 11:35 | 18:26 | 19:19 | 20:22 |
| 45° | 09:25 | 10:47 | 11:59 | 18:06 | 18:55 | 19:58 |
| S 50° | 09:50 | 11:17 | 12:30 | 17:40 | 18:26 | 19:28 |
| 52° | 10:01 | 11:31 | 12:45 | 17:28 | 18:11 | 19:13 |
| 54° | 10:15 | 11:48 | 13:03 | 17:15 | 17:54 | 18:55 |
| 56° | 10:30 | 12:08 | 13:24 | 16:59 | 17:34 | 18:33 |
| 58° | 10:48 | 12:33 | 13:52 | 16:40 | 17:08 | 18:06 |
| S 60° | 11:11 | 13:07 | 14:31 | 16:16 | 16:34 | 17:27 |

| Day | Sun | | | Moon | | Age 2-4 3-17% |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|---------------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 19 | 00:48 | 00:54 | 11:59 | 13:49 | 01:19 | |
| 20 | 01:00 | 01:07 | 11:59 | 14:53 | 02:21 | |
| 21 | 01:13 | 01:19 | 11:59 | 15:58 | 03:26 | |

April 22, 23, 24 UT (Wed., Thu., Fri.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------|----------|---------------------|----------|-------------------|----------|---------------------|----------|-------------------|----------|---------|-----|-----|--------|-----|-----|
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 210°04.2 | 155°06.5 | N20°02.9 | 201°00.9 | N02°52.6 | 100°47.2 | N22°38.6 | 201°46.4 | N01°14.2 | | | | | | |
| 1 | 225°06.6 | 170°05.8 | 03.8 | 216°01.6 | 53.4 | 115°49.3 | 38.5 | 216°48.6 | 14.3 | | | | | | |
| 2 | 240°09.1 | 185°05.1 | 04.6 | 231°02.2 | 54.1 | 130°51.4 | 38.5 | 231°50.8 | 14.4 | | | | | | |
| 3 | 255°11.5 | 200°04.5 | •• 05.4 | 246°02.9 | •• 54.9 | 145°53.6 | •• 38.5 | 246°53.0 | •• 14.5 | | | | | | |
| 4 | 270°14.0 | 215°03.8 | 06.2 | 261°03.6 | 55.7 | 160°55.7 | 38.4 | 261°55.2 | 14.6 | | | | | | |
| 5 | 285°16.5 | 230°03.1 | 07.0 | 276°04.3 | 56.4 | 175°57.9 | 38.4 | 276°57.4 | 14.7 | | | | | | |
| 6 | 300°18.9 | 245°02.5 | N20°07.8 | 291°05.0 | N02°57.2 | 191°00.0 | N22°38.4 | 291°59.6 | N01°14.8 | | | | | | |
| 7 | 315°21.4 | 260°01.8 | 08.6 | 306°05.7 | 58.0 | 206°02.1 | 38.3 | 307°01.7 | 14.9 | | | | | | |
| 8 | 330°23.9 | 275°01.1 | 09.4 | 321°06.4 | 58.8 | 221°04.3 | 38.3 | 322°03.9 | 15.1 | | | | | | |
| 9 | 345°26.3 | 290°00.5 | •• 10.2 | 336°07.1 | 02°59.5 | 236°06.4 | •• 38.2 | 337°06.1 | •• 15.2 | | | | | | |
| 10 | 0°28.8 | 304°59.8 | 11.0 | 351°07.8 | 03°00.3 | 251°08.6 | 38.2 | 352°08.3 | 15.3 | | | | | | |
| 11 | 15°31.3 | 319°59.1 | 11.8 | 6°08.5 | 01.1 | 266°10.7 | 38.2 | 7°10.5 | 15.4 | | | | | | |
| 12 | 30°33.7 | 334°58.5 | N20°12.6 | 21°09.2 | N03°01.8 | 281°12.8 | N22°38.1 | 22°12.7 | N01°15.5 | | | | | | |
| 13 | 45°36.2 | 349°57.8 | 13.4 | 36°09.9 | 02.6 | 296°15.0 | 38.1 | 37°14.9 | 15.6 | | | | | | |
| 14 | 60°38.7 | 4°57.1 | 14.2 | 51°10.6 | 03.4 | 311°17.1 | 38.0 | 52°17.1 | 15.7 | | | | | | |
| 15 | 75°41.1 | 19°56.5 | •• 14.9 | 66°11.3 | •• 04.2 | 326°19.2 | •• 38.0 | 67°19.3 | •• 15.8 | | | | | | |
| 16 | 90°43.6 | 34°55.8 | 15.7 | 81°11.9 | 04.9 | 341°21.4 | 38.0 | 82°21.5 | 15.9 | | | | | | |
| 17 | 105°46.0 | 49°55.1 | 16.5 | 96°12.6 | 05.7 | 356°23.5 | 37.9 | 97°23.7 | 16.1 | | | | | | |
| 18 | 120°48.5 | 64°54.5 | N20°17.3 | 111°13.3 | N03°06.5 | 11°25.7 | N22°37.9 | 112°25.9 | N01°16.2 | | | | | | |
| 19 | 135°51.0 | 79°53.8 | 18.1 | 126°14.0 | 07.2 | 26°27.8 | 37.9 | 127°28.1 | 16.3 | | | | | | |
| 20 | 150°53.4 | 94°53.1 | 18.9 | 141°14.7 | 08.0 | 41°29.9 | 37.8 | 142°30.2 | 16.4 | | | | | | |
| 21 | 165°55.9 | 109°52.4 | •• 19.7 | 156°15.4 | •• 08.8 | 56°32.1 | •• 37.8 | 157°32.4 | •• 16.5 | | | | | | |
| 22 | 180°58.4 | 124°51.8 | 20.5 | 171°16.1 | 09.5 | 71°34.2 | 37.7 | 172°34.6 | 16.6 | | | | | | |
| 23 | 196°00.8 | 139°51.1 | 21.3 | 186°16.8 | 10.3 | 86°36.3 | 37.7 | 187°36.8 | 16.7 | | | | | | |
| Mer.pass. | 09:58 | ν-0.7' d0.8' m-3.92 | | ν0.7' d0.8' m1.21 | | ν2.1' d-0.0' m-2.06 | | ν2.2' d0.1' m0.93 | | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 211°03.3 | 154°50.4 | N20°22.0 | 201°17.5 | N03°11.1 | 101°38.5 | N22°37.7 | 202°39.0 | N01°16.8 | | | | | | |
| 1 | 226°05.8 | 169°49.7 | 22.8 | 216°18.2 | 11.9 | 116°40.6 | 37.6 | 217°41.2 | 16.9 | | | | | | |
| 2 | 241°08.2 | 184°49.1 | 23.6 | 231°18.9 | 12.6 | 131°42.8 | 37.6 | 232°43.4 | 17.1 | | | | | | |
| 3 | 256°10.7 | 199°48.4 | •• 24.4 | 246°19.6 | •• 13.4 | 146°44.9 | •• 37.5 | 247°45.6 | •• 17.2 | | | | | | |
| 4 | 271°13.1 | 214°47.7 | 25.2 | 261°20.3 | 14.2 | 161°47.0 | 37.5 | 262°47.8 | 17.3 | | | | | | |
| 5 | 286°15.6 | 229°47.0 | 26.0 | 276°21.0 | 14.9 | 176°49.2 | 37.5 | 277°50.0 | 17.4 | | | | | | |
| 6 | 301°18.1 | 244°46.4 | N20°26.7 | 291°21.6 | N03°15.7 | 191°51.3 | N22°37.4 | 292°52.2 | N01°17.5 | | | | | | |
| 7 | 316°20.5 | 259°45.7 | 27.5 | 306°22.3 | 16.5 | 206°53.4 | 37.4 | 307°54.4 | 17.6 | | | | | | |
| 8 | 331°23.0 | 274°45.0 | 28.3 | 321°23.0 | 17.2 | 221°55.6 | 37.3 | 322°56.6 | 17.7 | | | | | | |
| 9 | 346°25.5 | 289°44.3 | •• 29.1 | 336°23.7 | •• 18.0 | 236°57.7 | •• 37.3 | 337°58.8 | •• 17.8 | | | | | | |
| 10 | 1°27.9 | 304°43.7 | 29.8 | 351°24.4 | 18.8 | 251°59.8 | 37.3 | 353°00.9 | 18.0 | | | | | | |
| 11 | 16°30.4 | 319°43.0 | 30.6 | 6°25.1 | 19.6 | 267°02.0 | 37.2 | 8°03.1 | 18.1 | | | | | | |
| 12 | 31°32.9 | 334°42.3 | N20°31.4 | 21°25.8 | N03°20.3 | 282°04.1 | N22°37.2 | 23°05.3 | N01°18.2 | | | | | | |
| 13 | 46°35.3 | 349°41.6 | 32.2 | 36°26.5 | 21.1 | 297°06.2 | 37.2 | 38°07.5 | 18.3 | | | | | | |
| 14 | 61°37.8 | 4°40.9 | 32.9 | 51°27.2 | 21.9 | 312°08.4 | 37.1 | 53°09.7 | 18.4 | | | | | | |
| 15 | 76°40.3 | 19°40.3 | •• 33.7 | 66°27.9 | •• 22.6 | 327°10.5 | •• 37.1 | 68°11.9 | •• 18.5 | | | | | | |
| 16 | 91°42.7 | 34°39.6 | 34.5 | 81°28.6 | 23.4 | 342°12.6 | 37.0 | 83°14.1 | 18.6 | | | | | | |
| 17 | 106°45.2 | 49°38.9 | 35.3 | 96°29.3 | 24.2 | 357°14.8 | 37.0 | 98°16.3 | 18.7 | | | | | | |
| 18 | 121°47.6 | 64°38.2 | N20°36.0 | 111°30.0 | N03°24.9 | 12°16.9 | N22°37.0 | 113°18.5 | N01°18.8 | | | | | | |
| 19 | 136°50.1 | 79°37.5 | 36.8 | 126°30.7 | 25.7 | 27°19.0 | 36.9 | 128°20.7 | 19.0 | | | | | | |
| 20 | 151°52.6 | 94°36.9 | 37.6 | 141°31.4 | 26.5 | 42°21.1 | 36.9 | 143°22.9 | 19.1 | | | | | | |
| 21 | 166°55.0 | 109°36.2 | •• 38.3 | 156°32.0 | •• 27.2 | 57°23.3 | •• 36.8 | 158°25.1 | •• 19.2 | | | | | | |
| 22 | 181°57.5 | 124°35.5 | 39.1 | 171°32.7 | 28.0 | 72°25.4 | 36.8 | 173°27.3 | 19.3 | | | | | | |
| 23 | 197°00.0 | 139°34.8 | 39.8 | 186°33.4 | 28.8 | 87°27.5 | 36.8 | 188°29.5 | 19.4 | | | | | | |
| Mer.pass. | 09:54 | ν-0.7' d0.8' m-3.92 | | ν0.7' d0.8' m1.21 | | ν2.1' d-0.0' m-2.06 | | ν2.2' d0.1' m0.93 | | | | | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 212°02.4 | 154°34.1 | N20°40.6 | 201°34.1 | N03°29.5 | 102°29.7 | N22°36.7 | 203°31.7 | N01°19.5 | | | | | | |
| 1 | 227°04.9 | 169°33.4 | 41.4 | 216°34.8 | 30.3 | 117°31.8 | 36.7 | 218°33.8 | 19.6 | | | | | | |
| 2 | 242°07.4 | 184°32.8 | 42.1 | 231°35.5 | 31.1 | 132°33.9 | 36.6 | 233°36.0 | 19.7 | | | | | | |
| 3 | 257°09.8 | 199°32.1 | •• 42.9 | 246°36.2 | •• 31.8 | 147°36.1 | •• 36.6 | 248°38.2 | •• 19.8 | | | | | | |
| 4 | 272°12.3 | 214°31.4 | 43.6 | 261°36.9 | 32.6 | 162°38.2 | 36.6 | 263°40.4 | 19.9 | | | | | | |
| 5 | 287°14.8 | 229°30.7 | 44.4 | 276°37.6 | 33.4 | 177°40.3 | 36.5 | 278°42.6 | 20.1 | | | | | | |
| 6 | 302°17.2 | 244°30.0 | N20°45.2 | 291°38.3 | N03°34.2 | 192°42.4 | N22°36.5 | 293°44.8 | N01°20.2 | | | | | | |
| 7 | 317°19.7 | 259°29.3 | 45.9 | 306°39.0 | 34.9 | 207°44.6 | 36.4 | 308°47.0 | 20.3 | | | | | | |
| 8 | 332°22.1 | 274°28.6 | 46.7 | 321°39.7 | 35.7 | 222°46.7 | 36.4 | 323°49.2 | 20.4 | | | | | | |
| 9 | 347°24.6 | 289°27.9 | •• 47.4 | 336°40.4 | •• 36.5 | 237°48.8 | •• 36.4 | 338°51.4 | •• 20.5 | | | | | | |
| 10 | 2°27.1 | 304°27.3 | 48.2 | 351°41.1 | 37.2 | 252°50.9 | 36.3 | 353°53.6 | 20.6 | | | | | | |
| 11 | 17°29.5 | 319°26.6 | 48.9 | 6°41.8 | 38.0 | 267°53.1 | 36.3 | 8°55.8 | 20.7 | | | | | | |
| 12 | 32°32.0 | 334°25.9 | N20°49.7 | 21°42.4 | N03°38.8 | 282°55.2 | N22°36.2 | 23°58.0 | N01°20.8 | | | | | | |
| 13 | 47°34.5 | 349°25.2 | 50.4 | 36°43.1 | 39.5 | 297°57.3 | 36.2 | 39°00.2 | 20.9 | | | | | | |
| 14 | 62°36.9 | 4°24.5 | 51.2 | 51°43.8 | 40.3 | 312°59.5 | 36.2 | 54°02.4 | 21.1 | | | | | | |
| 15 | 77°39.4 | 19°23.8 | •• 51.9 | 66°44.5 | •• 41.1 | 328°01.6 | •• 36.1 | 69°04.6 | •• 21.2 | | | | | | |
| 16 | 92°41.9 | 34°23.1 | 52.7 | 81°45.2 | 41.8 | 343°03.7 | 36.1 | 84°06.8 | 21.3 | | | | | | |
| 17 | 107°44.3 | 49°22.4 | 53.4 | 96°45.9 | 42.6 | 358°05.8 | 36.0 | 99°09.0 | 21.4 | | | | | | |
| 18 | 122°46.8 | 64°21.7 | N20°54.2 | 111°46.6 | N03°43.4 | 13°08.0 | N22°36.0 | 114°11.1 | N01°21.5 | | | | | | |
| 19 | 137°49.3 | 79°21.0 | 54.9 | 126°47.3 | 44.1 | 28°10.1 | 36.0 | 129°13.3 | 21.6 | | | | | | |
| 20 | 152°51.7 | 94°20.3 | 55.7 | 141°48.0 | 44.9 | 43°12.2 | 35.9 | 144°15.5 | 21.7 | | | | | | |
| 21 | 167°54.2 | 109°19.7 | •• 56.4 | 156°48.7 | •• 45.7 | 58°14.3 | •• 35.9 | 159°17.7 | •• 21.8 | | | | | | |
| 22 | 182°56.6 | 124°19.0 | 57.1 | 171°49.4 | 46.4 | 73°16.5 | 35.8 | 174°19.9 | 21.9 | | | | | | |
| 23 | 197°59.1 | 139°18.3 | 57.9 | 186°50.1 | 47.2 | 88°18.6 | 35.8 | 189°22.1 | 22.0 | | | | | | |
| Mer.pass. | 09:50 | ν-0.7' d0.8' m-3.92 | | ν0.7' d0.8' m1.22 | | ν2.1' d-0.0' m-2.05 | | ν2.2' d0.1' m0.93 | | | | | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°34.0 | 29°14.0 |
| Ankaa | 353°06.5 | -42°09.7 |
| Schedar | 349°30.4 | 56°40.8 |
| Diphda | 348°46.5 | -17°50.6 |
| Achernar | 335°20.0 | -57°06.2 |
| Hamal | 327°50.4 | 23°35.1 |
| Polaris | 313°58.5 | 89°22.6 |
| Acamar | 315°11.4 | -40°12.0 |
| Menkar | 314°05.4 | 4°11.5 |
| Mirfak | 308°27.2 | 49°57.3 |
| Aldebaran | 290°38.7 | 16°33.7 |
| Rigel | 281°03.1 | -8°10.4 |
| Capella | 280°20.7 | 46°01.5 |
| Bellatrix | 278°22.0 | 6°22.3 |
| Elnath | 278°00.8 | 28°37.8 |
| Alnilam | 275°36.9 | -1°11.2 |
| Betelgeuse | 270°51.1 | 7°24.6 |
| Canopus | 263°52.2 | -52°42.8 |
| Sirius | 258°25.5 | -16°45.3 |
| Adhara | 255°05.2 | -29°00.7 |
| Procyon | 244°49.8 | 5°09.4 |
| Pollux | 243°16.1 | 27°57.8 |
| Avior | 234°14.3 | -59°35.9 |
| Suhail | 222°45.5 | -43°32.6 |
| Miaplacidus | 221°37.9 | -69°49.8 |
| Alphard | 217°46.6 | -8°46.5 |
| Regulus | 207°33.2 | 11°50.2 |
| Dubhe | 193°39.3 | 61°36.7 |
| Denebola | 182°23.6 | 14°25.4 |
| Gienah | 175°42.2 | -17°41.5 |
| Acrux | 172°58.3 | -63°14.9 |
| Gacrux | 171°50.0 | -57°15.9 |
| Alioth | 166°11.5 | 55°49.0 |
| Spica | 158°20.9 | -11°18.1 |
| Alkaid | 152°50.7 | 49°10.8 |

| h | | Sun | | Moon | | | |
|------------|----------|------------|------------|-------|----------|-------|-------|
| Wed | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 180°21.2 | N12°07.7 | 115°17.8 | 2.8' | N27°55.5 | -2.7' | 59.7' |
| 1 | 195°21.3 | 08.6 | 129°39.6 | 2.9' | 27°52.7 | -2.9' | 59.7' |
| 2 | 210°21.4 | 09.4 | 144°01.5 | 2.9' | 27°49.8 | -3.1' | 59.7' |
| 3 | 225°21.5 | · · 10.3 | 158°23.4 | 3.0' | 27°46.7 | -3.3' | 59.7' |
| 4 | 240°21.7 | 11.1 | 172°45.4 | 3.1' | 27°43.3 | -3.5' | 59.6' |
| 5 | 255°21.8 | 11.9 | 187°07.5 | 3.2' | 27°39.8 | -3.7' | 59.6' |
| 6 | 270°21.9 | N12°12.8 | 201°29.6 | 3.2' | N27°36.1 | -3.9' | 59.6' |
| 7 | 285°22.0 | 13.6 | 215°51.9 | 3.3' | 27°32.2 | -4.1' | 59.6' |
| 8 | 300°22.1 | 14.5 | 230°14.2 | 3.4' | 27°28.1 | -4.3' | 59.5' |
| 9 | 315°22.3 | · · 15.3 | 244°36.6 | 3.5' | 27°23.8 | -4.5' | 59.5' |
| 10 | 330°22.4 | 16.1 | 258°59.1 | 3.6' | 27°19.4 | -4.7' | 59.5' |
| 11 | 345°22.5 | 17.0 | 273°21.7 | 3.7' | 27°14.7 | -4.8' | 59.5' |
| 12 | 0°22.6 | N12°17.8 | 287°44.4 | 3.8' | N27°09.9 | -5.0' | 59.4' |
| 13 | 15°22.7 | 18.7 | 302°07.1 | 3.9' | 27°04.8 | -5.2' | 59.4' |
| 14 | 30°22.9 | 19.5 | 316°30.0 | 4.0' | 26°59.7 | -5.4' | 59.4' |
| 15 | 45°23.0 | · · 20.3 | 330°52.9 | 4.1' | 26°54.3 | -5.6' | 59.4' |
| 16 | 60°23.1 | 21.2 | 345°16.0 | 4.2' | 26°48.0 | -5.7' | 59.3' |
| 17 | 75°23.2 | 22.0 | 359°39.2 | 4.3' | 26°43.0 | -5.9' | 59.3' |
| 18 | 90°23.3 | N12°22.8 | 14°02.4 | 4.4' | N26°37.1 | -6.1' | 59.3' |
| 19 | 105°23.5 | 23.7 | 28°25.8 | 4.5' | 26°31.0 | -6.3' | 59.3' |
| 20 | 120°23.6 | 24.5 | 42°49.3 | 4.6' | 26°24.7 | -6.4' | 59.2' |
| 21 | 135°23.7 | · · 25.3 | 57°12.9 | 4.7' | 26°18.3 | -6.6' | 59.2' |
| 22 | 150°23.8 | 26.2 | 71°36.6 | 4.8' | 26°11.7 | -6.8' | 59.2' |
| 23 | 165°23.9 | 27.0 | 86°00.4 | 4.9' | 26°05.0 | -6.9' | 59.2' |
| SD = 15.9' | | $d = 0.8'$ | SD = 16.3' | | | | |

| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|------------|------------|-------|----------|--------|-------|
| 0 | 180°24.1 | N12°27.8 | 100°24.3 | 5.0' | N25°58.0 | -7.1' | 59.1' |
| 1 | 195°24.2 | 28.7 | 114°48.3 | 5.1' | 25°51.0 | -7.2' | 59.1' |
| 2 | 210°24.3 | 29.5 | 129°12.4 | 5.3' | 25°43.7 | -7.4' | 59.1' |
| 3 | 225°24.4 | · · 30.4 | 143°36.7 | 5.4' | 25°36.3 | -7.6' | 59.0' |
| 4 | 240°24.5 | 31.2 | 158°01.0 | 5.5' | 25°28.7 | -7.7' | 59.0' |
| 5 | 255°24.6 | 32.0 | 172°25.5 | 5.6' | 25°21.0 | -7.9' | 59.0' |
| 6 | 270°24.8 | N12°32.8 | 186°50.1 | 5.7' | N25°13.1 | -8.0' | 59.0' |
| 7 | 285°24.9 | 33.7 | 201°14.8 | 5.8' | 25°05.1 | -8.2' | 58.9' |
| 8 | 300°25.0 | 34.5 | 215°39.7 | 6.0' | 24°56.9 | -8.3' | 58.9' |
| 9 | 315°25.1 | · · 35.3 | 230°04.6 | 6.1' | 24°48.6 | -8.5' | 58.9' |
| 10 | 330°25.2 | 36.2 | 244°29.7 | 6.2' | 24°40.1 | -8.6' | 58.9' |
| 11 | 345°25.3 | 37.0 | 258°54.9 | 6.3' | 24°31.5 | -8.8' | 58.8' |
| 12 | 0°25.5 | N12°37.8 | 273°20.2 | 6.4' | N24°22.7 | -8.9' | 58.8' |
| 13 | 15°25.6 | 38.7 | 287°45.7 | 6.6' | 24°13.8 | -9.0' | 58.8' |
| 14 | 30°25.7 | 39.5 | 302°11.2 | 6.7' | 24°04.8 | -9.2' | 58.7' |
| 15 | 45°25.8 | · · 40.3 | 316°36.9 | 6.8' | 23°55.6 | -9.3' | 58.7' |
| 16 | 60°25.9 | 41.2 | 331°02.7 | 6.9' | 23°46.3 | -9.5' | 58.7' |
| 17 | 75°26.0 | 42.0 | 345°28.7 | 7.1' | 23°36.8 | -9.6' | 58.7' |
| 18 | 90°26.1 | N12°42.8 | 359°54.7 | 7.2' | N23°27.2 | -9.7' | 58.6' |
| 19 | 105°26.3 | 43.6 | 14°20.9 | 7.3' | 23°17.5 | -9.9' | 58.6' |
| 20 | 120°26.4 | 44.5 | 28°47.2 | 7.4' | 23°07.7 | -10.0' | 58.6' |
| 21 | 135°26.5 | · · 45.3 | 43°13.6 | 7.6' | 22°57.7 | -10.1' | 58.6' |
| 22 | 150°26.6 | 46.1 | 57°40.2 | 7.7' | 22°47.6 | -10.2' | 58.5' |
| 23 | 165°26.7 | 46.9 | 72°06.9 | 7.8' | 22°37.3 | -10.3' | 58.5' |
| SD = 15.9' | | $d = 0.8'$ | SD = 16.1' | | | | |

| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|------------|------------|-------|----------|--------|-------|
| 0 | 180°26.8 | N12°47.8 | 86°33.7 | 7.9' | N22°27.0 | -10.5' | 58.5' |
| 1 | 195°26.9 | 48.6 | 101°00.6 | 8.0' | 22°16.5 | -10.6' | 58.4' |
| 2 | 210°27.1 | 49.4 | 115°27.6 | 8.2' | 22°05.9 | -10.7' | 58.4' |
| 3 | 225°27.2 | · · 50.2 | 129°54.8 | 8.3' | 21°55.2 | -10.8' | 58.4' |
| 4 | 240°27.3 | 51.1 | 144°22.1 | 8.4' | 21°44.4 | -10.9' | 58.4' |
| 5 | 255°27.4 | 51.9 | 158°49.5 | 8.5' | 21°33.5 | -11.0' | 58.3' |
| 6 | 270°27.5 | N12°52.7 | 173°17.0 | 8.7' | N21°22.4 | -11.2' | 58.3' |
| 7 | 285°27.6 | 53.5 | 187°44.7 | 8.8' | 21°11.3 | -11.3' | 58.3' |
| 8 | 300°27.7 | 54.4 | 202°12.5 | 8.9' | 21°00.0 | -11.4' | 58.2' |
| 9 | 315°27.8 | · · 55.2 | 216°40.4 | 9.0' | 20°48.7 | -11.5' | 58.2' |
| 10 | 330°28.0 | 56.0 | 231°08.4 | 9.1' | 20°37.2 | -11.6' | 58.2' |
| 11 | 345°28.1 | 56.8 | 245°36.5 | 9.3' | 20°25.6 | -11.7' | 58.2' |
| 12 | 0°28.2 | N12°57.6 | 260°04.8 | 9.4' | N20°13.9 | -11.8' | 58.1' |
| 13 | 15°28.3 | 58.5 | 274°33.1 | 9.5' | 20°02.2 | -11.9' | 58.1' |
| 14 | 30°28.4 | 12°59.3 | 289°01.6 | 9.6' | 19°50.3 | -12.0' | 58.1' |
| 15 | 45°28.5 | 13°00.1 | 303°30.2 | 9.7' | 19°38.3 | -12.1' | 58.0' |
| 16 | 60°28.6 | 00.9 | 317°59.0 | 9.8' | 19°26.3 | -12.2' | 58.0' |
| 17 | 75°28.7 | 01.7 | 332°27.8 | 10.0' | 19°14.1 | -12.2' | 58.0' |
| 18 | 90°28.8 | N13°02.6 | 346°56.8 | 10.1' | N19°01.9 | -12.3' | 58.0' |
| 19 | 105°28.9 | 03.4 | 1°25.8 | 10.2' | 18°49.6 | -12.4' | 57.9' |
| 20 | 120°29.1 | 04.2 | 15°55.0 | 10.3' | 18°37.1 | -12.5' | 57.9' |
| 21 | 135°29.2 | · · 05.0 | 30°24.3 | 10.4' | 18°24.6 | -12.6' | 57.9' |
| 22 | 150°29.3 | 05.8 | 44°53.7 | 10.5' | 18°12.0 | -12.7' | 57.9' |
| 23 | 165°29.4 | 06.7 | 59°23.2 | 10.6' | 17°59.4 | -12.7' | 57.8' |
| SD = 15.9' | | $d = 0.8'$ | SD = 15.9' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | //// | 02:51 | 21:11 | //// | //// |
| N 70° | //// | 01:30 | 03:15 | 20:45 | 22:36 | //// |
| 68° | //// | 02:12 | 03:34 | 20:26 | 21:50 | //// |
| 66° | //// | 02:40 | 03:49 | 20:10 | 21:20 | //// |
| 64° | 01:18 | 03:01 | 04:01 | 19:58 | 20:59 | 22:46 |
| 62° | 01:56 | 03:18 | 04:12 | 19:47 | 20:42 | 22:05 |
| 60° | 02:22 | 03:31 | 04:20 | 19:38 | 20:27 | 21:38 |
| N 58° | 02:42 | 03:43 | 04:28 | 19:30 | 20:16 | 21:18 |
| 56° | 02:58 | 03:53 | 04:35 | 19:23 | 20:05 | 21:01 |
| 54° | 03:11 | 04:02 | 04:41 | 19:17 | 19:57 | 20:48 |
| 52° | 03:22 | 04:09 | 04:46 | 19:11 | 19:49 | 20:36 |
| 50° | 03:32 | 04:16 | 04:51 | 19:06 | 19:42 | 20:26 |
| 45° | 03:52 | 04:31 | 05:02 | 18:55 | 19:27 | 20:06 |
| N 40° | 04:08 | 04:42 | 05:11 | 18:46 | 19:15 | 19:50 |
| 35° | 04:20 | 04:52 | 05:18 | 18:39 | 19:05 | 19:37 |
| 30° | 04:30 | 05:00 | 05:25 | 18:32 | 18:57 | 19:27 |
| 20° | 04:47 | 05:13 | 05:36 | 18:21 | 18:44 | 19:10 |
| N 10° | 04:59 | 05:24 | 05:46 | 18:11 | 18:32 | 18:58 |
| 0° | 05:09 | 05:34 | 05:55 | 18:02 | 18:23 | 18:47 |
| S 10° | 05:18 | 05:42 | 06:04 | 17:53 | 18:14 | 18:39 |
| 20° | 05:25 | 05:51 | 06:13 | 17:43 | 18:06 | 18:32 |
| 30° | 05:31 | 05:59 | 06:24 | 17:32 | 17:57 | 18:25 |
| 35° | 05:34 | 06:04 | 06:30 | 17:26 | 17:52 | 18:22 |
| 40° | 05:37 | 06:09 | 06:37 | 17:19 | 17:47 | 18:19 |
| 45° | 05:40 | 06:15 | 06:45 | 17:11 | 17:41 | 18:16 |
| S 50° | 05:43 | 06:21 | 06:54 | 17:01 | 17:35 | 18:13 |
| 52° | 05:44 | 06:24 | 06:59 | 16:57 | 17:32 | 18:11 |
| 54° | 05:45 | 06:27 | 07:04 | 16:52 | 17:29 | 18:10 |
| 56° | 05:47 | 06:30 | 07:09 | 16:47 | 17:25 | 18:09 |
| 58° | 05:48 | 06:34 | 07:15 | 16:41 | 17:22 | 18:08 |
| S 60° | 05:49 | 06:38 | 07:22 | 16:34 | 17:18 | 18:06 |

| Lat. | Moonrise | | | Moonset | | |
|-------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| N 70° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68° | <input type="checkbox"/> | <input type="checkbox"/> | 07:47 | <input type="checkbox"/> | <input type="checkbox"/> | 05:26 |
| 66° | <input type="checkbox"/> | <input type="checkbox"/> | 08:40 | <input type="checkbox"/> | <input type="checkbox"/> | 04:33 |
| 64° | <input type="checkbox"/> | 06:43 | 09:12 | <input type="checkbox"/> | 04:31 | 04:00 |
| 62° | 05:20 | 07:34 | 09:35 | 03:45 | 03:40 | 03:35 |
| 60° | 06:19 | 08:05 | 09:54 | 02:46 | 03:08 | 03:15 |
| N 58° | 06:52 | 08:29 | 10:09 | 02:12 | 02:44 | 02:59 |
| 56° | 07:17 | 08:47 | 10:22 | 01:47 | 02:24 | 02:45 |
| 54° | 07:37 | 09:03 | 10:34 | 01:27 | 02:08 | 02:33 |
| 52° | 07:53 | 09:17 | 10:44 | 01:11 | 01:54 | 02:23 |
| 50° | 08:08 | 09:29 | 10:53 | 00:56 | 01:42 | 02:13 |
| 45° | 08:37 | 09:53 | 11:12 | 00:27 | 01:16 | 01:53 |
| N 40° | 08:59 | 10:13 | 11:27 | 00:04 | 00:56 | 01:36 |
| 35° | 09:18 | 10:29 | 11:40 | · · · | 00:39 | 01:22 |
| 30° | 09:34 | 10:43 | 11:51 | · · · | 00:24 | 01:10 |
| 20° | 10:02 | 11:07 | 12:10 | 23:58 | · · · | 00:49 |
| N 10° | 10:25 | 11:28 | 12:26 | 23:37 | · · · | 00:31 |
| 0° | 10:47 | 11:47 | 12:42 | 23:16 | · · · | 00:14 |
| S 10° | 11:08 | 12:06 | 12:57 | 22:55 | 23:56 | · · · |
| 20° | 11:32 | 12:26 | 13:13 | 22:33 | 23:38 | · · · |
| 30° | 11:59 | 12:50 | 13:32 | 22:07 | 23:16 | · · · |
| 35° | 12:15 | 13:03 | 13:43 | 21:52 | 23:03 | · · · |
| 40° | 12:33 | 13:19 | 13:55 | 21:34 | 22:48 | · · · |
| 45° | 12:56 | 13:38 | 14:10 | 21:12 | 22:31 | 23:48 |
| S 50° | 13:24 | 14:01 | 14:27 | 20:45 | 22:08 | 23:32 |
| 52° | 13:38 | 14:12 | 14:35 | 20:31 | 21:58 | 23:25 |
| 54° | 13:54 | 14:25 | 14:45 | 20:16 | 21:46 | 23:16 |
| 56° | 14:12 | 14:39 | 14:55 | 19:57 | 21:32 | 23:07 |
| 58° | 14:35 | 14:56 | 15:07 | 19:34 | 21:16 | 22:56 |
| S 60° | 15:05 | 15:16 | 15:20 | 19:05 | 20:56 | 22:43 |

| Day | Sun | | | Moon | | |
|-----|---|--------------------------|-----------------------|-----------------------------|----------------|----------------------|
| | Eqn.of Time 00 ^h mm:ss | 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 5-7 27-49% |
| 22 | 01:25 | 01:31 | 11:58 | 17:01 | 04:30 | |
| 23 | 01:36 | 01:42 | 11:58 | 18:00 | 05:32 | |
| 24 | 01:47 | 01:53 | 11:58 | 18:54 | 06:28 | |

April 25, 26, 27 UT (Sat., Sun., Mon.)

| | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|---------------------|----------|----------|-------------------|----------|----------|---------------------|---------|-----|-------------------|--------|---------------------|-------------------|-------|--|--|
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | |
| 0 | 213°01.6 | 154°17.6 | N20°58.6 | 201°50.8 | N03°48.0 | 103°20.7 | N22°35.7 | 204°24.3 | N01°22.2 | | | | | Alpheratz | 357°34.0 29°14.0 | | | |
| 1 | 228°04.0 | 169°16.9 | 20°59.4 | 216°51.5 | 48.7 | 118°22.8 | 35.7 | 219°26.5 | 22.3 | | | | | Ankaa | 353°06.5 -42°09.7 | | | |
| 2 | 243°06.5 | 184°16.2 | 21°00.1 | 231°52.2 | 49.5 | 133°25.0 | 35.7 | 234°28.7 | 22.4 | | | | | Schedar | 349°30.4 56°40.8 | | | |
| 3 | 258°09.0 | 199°15.5 | •• 00.8 | 246°52.9 | •• 50.2 | 148°27.1 | •• 35.6 | 249°30.9 | •• 22.5 | | | | | Diphda | 348°46.5 -17°50.6 | | | |
| 4 | 273°11.4 | 214°14.8 | 01.6 | 261°53.5 | 51.0 | 163°29.2 | 35.6 | 264°33.1 | 22.6 | | | | | Achernar | 335°20.0 -57°06.1 | | | |
| 5 | 288°13.9 | 229°14.1 | 02.3 | 276°54.2 | 51.8 | 178°31.3 | 35.5 | 279°35.3 | 22.7 | | | | | Hamal | 327°50.4 23°35.1 | | | |
| 6 | 303°16.4 | 244°13.4 | N21°03.0 | 291°54.9 | N03°52.5 | 193°33.4 | N22°35.5 | 294°37.5 | N01°22.8 | | | | | Polaris | 313°58.7 89°22.5 | | | |
| 7 | 318°18.8 | 259°12.7 | 03.8 | 306°55.6 | 53.3 | 208°35.6 | 35.5 | 309°39.7 | 22.9 | | | | | Acamar | 315°11.4 -40°12.0 | | | |
| 8 | 333°21.3 | 274°12.0 | 04.5 | 321°56.3 | 54.1 | 223°37.7 | 35.4 | 324°41.9 | 23.0 | | | | | Menkar | 314°05.4 4°11.5 | | | |
| 9 | 348°23.7 | 289°11.3 | •• 05.2 | 336°57.0 | •• 54.8 | 238°39.8 | •• 35.4 | 339°44.1 | •• 23.1 | | | | | Mirfak | 308°27.2 49°57.3 | | | |
| 10 | 3°26.2 | 304°10.6 | 06.0 | 351°57.7 | 55.6 | 253°41.9 | 35.3 | 354°46.3 | 23.3 | | | | | Aldebaran | 290°38.7 16°33.7 | | | |
| 11 | 18°28.7 | 319°09.9 | 06.7 | 6°58.4 | 56.4 | 268°44.1 | 35.3 | 9°48.5 | 23.4 | | | | | Rigel | 281°03.1 -8°10.4 | | | |
| 12 | 33°31.1 | 334°09.2 | N21°07.4 | 21°59.1 | N03°57.1 | 283°46.2 | N22°35.3 | 24°50.7 | N01°23.5 | | | | | Capella | 280°20.7 46°01.5 | | | |
| 13 | 48°33.6 | 349°08.5 | 08.1 | 36°59.8 | 57.9 | 298°48.3 | 35.2 | 39°52.9 | 23.6 | | | | | Bellatrix | 278°22.0 6°22.3 | | | |
| 14 | 63°36.1 | 4°07.8 | 08.9 | 52°00.5 | 58.7 | 313°50.4 | 35.2 | 54°55.0 | 23.7 | | | | | Elnath | 278°00.8 28°37.8 | | | |
| 15 | 78°38.5 | 19°07.1 | •• 09.6 | 67°01.2 | 03°59.4 | 328°52.5 | •• 35.1 | 69°57.2 | •• 23.8 | | | | | Alnilam | 275°36.9 -1°11.2 | | | |
| 16 | 93°41.0 | 34°06.4 | 10.3 | 82°01.9 | 04°00.2 | 343°54.7 | 35.1 | 84°59.4 | 23.9 | | | | | Betelgeuse | 270°51.1 7°24.7 | | | |
| 17 | 108°43.5 | 49°05.7 | 11.0 | 97°02.6 | 01.0 | 358°56.8 | 35.0 | 100°01.6 | 24.0 | | | | | Canopus | 263°52.2 -52°42.8 | | | |
| 18 | 123°45.9 | 64°05.0 | N21°11.8 | 112°03.3 | N04°01.7 | 13°58.9 | N22°35.0 | 115°03.8 | N01°24.1 | | | | | Sirius | 258°25.5 -16°45.3 | | | |
| 19 | 138°48.4 | 79°04.3 | 12.5 | 127°04.0 | 02.5 | 29°01.0 | 35.0 | 130°06.0 | 24.2 | | | | | Adhara | 255°05.2 -29°00.7 | | | |
| 20 | 153°50.9 | 94°03.6 | 13.2 | 142°04.6 | 03.2 | 44°03.1 | 34.9 | 145°08.2 | 24.4 | | | | | Procyon | 244°49.8 5°09.4 | | | |
| 21 | 168°53.3 | 109°02.9 | •• 13.9 | 157°05.3 | •• 04.0 | 59°05.3 | •• 34.9 | 160°10.4 | •• 24.5 | | | | | Pollux | 243°16.1 27°57.8 | | | |
| 22 | 183°55.8 | 124°02.2 | 14.6 | 172°06.0 | 04.8 | 74°07.4 | 34.8 | 175°12.6 | 24.6 | | | | | Avior | 234°14.3 -59°35.9 | | | |
| 23 | 198°58.2 | 139°01.5 | 15.3 | 187°06.7 | 05.5 | 89°09.5 | 34.8 | 190°14.8 | 24.7 | | | | | Suhail | 222°45.5 -43°32.6 | | | |
| Mer.pass. 09:46 | | | ν-0.7' d0.7' m-3.92 | | | ν0.7' d0.8' m1.22 | | | ν2.1' d-0.0' m-2.05 | | | ν2.2' d0.1' m0.93 | | | | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 214°00.7 | 154°00.8 | N21°16.1 | 202°07.4 | N04°06.3 | 104°11.6 | N22°34.8 | 205°17.0 | N01°24.8 | | | | | Regulus | 207°33.2 11°50.2 | | | |
| 1 | 229°03.2 | 169°00.1 | 16.8 | 217°08.1 | 07.1 | 119°13.7 | 34.7 | 220°19.2 | 24.9 | | | | | Dubhe | 193°39.3 61°36.7 | | | |
| 2 | 244°05.6 | 183°59.4 | 17.5 | 232°08.8 | 07.8 | 134°15.8 | 34.7 | 235°21.4 | 25.0 | | | | | Denebola | 182°23.6 14°25.4 | | | |
| 3 | 259°08.1 | 198°58.7 | •• 18.2 | 247°09.5 | •• 08.6 | 149°18.0 | •• 34.6 | 250°23.6 | •• 25.1 | | | | | Gienah | 175°42.2 -17°41.5 | | | |
| 4 | 274°10.6 | 213°57.9 | 18.9 | 262°10.2 | 09.4 | 164°20.1 | 34.6 | 265°25.8 | 25.2 | | | | | Acrux | 172°58.3 -63°14.9 | | | |
| 5 | 289°13.0 | 228°57.2 | 19.6 | 277°10.9 | 10.1 | 179°22.2 | 34.5 | 280°28.0 | 25.3 | | | | | Gacrux | 171°50.0 -57°15.9 | | | |
| 6 | 304°15.5 | 243°56.5 | N21°20.3 | 292°11.6 | N04°10.9 | 194°24.3 | N22°34.5 | 295°30.2 | N01°25.4 | | | | | Alioth | 166°11.5 55°49.0 | | | |
| 7 | 319°18.0 | 258°55.8 | 21.0 | 307°12.3 | 11.6 | 209°26.4 | 34.5 | 310°32.4 | 25.6 | | | | | Spica | 158°20.9 -11°18.1 | | | |
| 8 | 334°20.4 | 273°55.1 | 21.7 | 322°13.0 | 12.4 | 224°28.5 | 34.4 | 325°34.6 | 25.7 | | | | | Alkaid | 152°50.7 49°10.8 | | | |
| 9 | 349°22.9 | 288°54.4 | •• 22.5 | 337°13.7 | •• 13.2 | 239°30.7 | •• 34.4 | 340°36.8 | •• 25.8 | | | | | Hadar | 148°33.9 -60°30.1 | | | |
| 10 | 4°25.4 | 303°53.7 | 23.2 | 352°14.4 | 13.9 | 254°32.8 | 34.3 | 355°39.0 | 25.9 | | | | | Menkent | 147°56.0 -36°30.1 | | | |
| 11 | 19°27.8 | 318°53.0 | 23.9 | 7°15.1 | 14.7 | 269°34.9 | 34.3 | 10°41.2 | 26.0 | | | | | Arcturus | 145°46.6 19°02.6 | | | |
| 12 | 34°30.3 | 333°52.3 | N21°24.6 | 22°15.8 | N04°15.5 | 284°37.0 | N22°34.2 | 25°43.4 | N01°26.1 | | | | | Rigel Kent. | 139°38.2 -60°56.7 | | | |
| 13 | 49°32.7 | 348°51.6 | 25.3 | 37°16.4 | 16.2 | 299°39.1 | 34.2 | 40°45.6 | 26.2 | | | | | Kochab | 137°18.6 74°02.7 | | | |
| 14 | 64°35.2 | 3°50.9 | 26.0 | 52°17.1 | 17.0 | 314°41.2 | 34.2 | 55°47.8 | 26.3 | | | | | Zuben'ubi | 136°54.5 -16°09.2 | | | |
| 15 | 79°37.7 | 18°50.2 | •• 26.7 | 67°17.8 | •• 17.7 | 329°43.4 | •• 34.1 | 70°50.0 | •• 26.4 | | | | | Alphecca | 126°02.5 26°37.4 | | | |
| 16 | 94°40.1 | 33°49.4 | 27.4 | 82°18.5 | 18.5 | 344°45.5 | 34.1 | 85°52.2 | 26.5 | | | | | Antares | 112°14.2 -26°29.5 | | | |
| 17 | 109°42.6 | 48°48.7 | 28.1 | 97°19.2 | 19.3 | 359°47.6 | 34.0 | 100°54.3 | 26.6 | | | | | Atria | 107°07.1 -69°04.3 | | | |
| 18 | 124°45.1 | 63°48.0 | N21°28.8 | 112°19.9 | N04°20.0 | 14°49.7 | N22°34.0 | 115°56.5 | N01°26.8 | | | | | Sabik | 102°01.3 -15°45.5 | | | |
| 19 | 139°47.5 | 78°47.3 | 29.5 | 127°20.6 | 20.8 | 29°51.8 | 34.0 | 130°58.7 | 26.9 | | | | | Shaula | 96°08.6 -37°07.3 | | | |
| 20 | 154°50.0 | 93°46.6 | 30.2 | 142°21.3 | 21.6 | 44°53.9 | 33.9 | 146°00.9 | 27.0 | | | | | Rasalhague | 95°57.3 12°32.3 | | | |
| 21 | 169°52.5 | 108°45.9 | •• 30.9 | 157°22.0 | •• 22.3 | 59°56.0 | •• 33.9 | 161°03.1 | •• 27.1 | | | | | Eltanin | 90°41.4 51°28.8 | | | |
| 22 | 184°54.9 | 123°45.2 | 31.5 | 172°22.7 | 23.1 | 74°58.1 | 33.8 | 176°05.3 | 27.2 | | | | | Kaus Aust. | 83°30.9 -34°22.2 | | | |
| 23 | 199°57.4 | 138°44.4 | 32.2 | 187°23.4 | 23.8 | 90°00.3 | 33.8 | 191°07.5 | 27.3 | | | | | Vega | 80°32.3 38°48.2 | | | |
| Mer.pass. 09:42 | | | ν-0.7' d0.7' m-3.92 | | | ν0.7' d0.8' m1.22 | | | ν2.1' d-0.0' m-2.04 | | | ν2.2' d0.1' m0.93 | | | | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 214°59.8 | 153°43.7 | N21°32.9 | 202°24.1 | N04°24.6 | 105°02.4 | N22°33.7 | 206°09.7 | N01°27.4 | | | | | Nunki | 75°46.3 -26°15.8 | | | |
| 1 | 230°02.3 | 168°43.0 | 33.6 | 217°24.8 | 25.4 | 120°04.5 | 33.7 | 221°11.9 | 27.5 | | | | | Altair | 61°58.9 8°56.1 | | | |
| 2 | 245°04.8 | 183°42.3 | 34.3 | 232°25.5 | 26.1 | 135°06.6 | 33.7 | 236°14.1 | 27.6 | | | | | Peacock | 53°04.0 -56°38.8 | | | |
| 3 | 260°07.2 | 198°41.6 | •• 35.0 | 247°26.2 | •• 26.9 | 150°08.7 | •• 33.6 | 251°16.3 | •• 27.7 | | | | | Deneb | 49°25.1 45°22.1 | | | |
| 4 | 275°09.7 | 213°40.9 | 35.7 | 262°26.9 | 27.6 | 165°10.8 | 33.6 | 266°18.5 | 27.8 | | | | | Enif | 33°37.9 9°59.6 | | | |
| 5 | 290°12.2 | 228°40.2 | 36.4 | 277°27.5 | 28.4 | 180°12.9 | 33.5 | 281°20.7 | 27.9 | | | | | Al Na'ir | 27°31.8 -46°49.8 | | | |
| 6 | 305°14.6 | 243°39.4 | N21°37.1 | 292°28.2 | N04°29.2 | 195°15.0 | N22°33.5 | 296°22.9 | N01°28.1 | | | | | Fomalhaut | 15°13.6 -29°28.9 | | | |
| 7 | 320°17.1 | 258°38.7 | 37.7 | 307°28.9 | 29.9 | 210°17.2 | 33.4 | 311°25.1 | 28.2 | | | | | Scheat | 13°44.4 28°13.3 | | | |
| 8 | 335°19.6 | 273°38.0 | 38.4 | 322°29.6 | 30.7 | 225°19.3 | 33.4 | 326°27.3 | 28.3 | | | | | Markab | 13°29.1 15°20.7 | | | |
| 9 | 350°22.0 | 288°37.3 | •• 39.1 | 337°30.3 | •• 31.4 | 240°21.4 | •• 33.3 | 341°29.5 | •• 28.4 | | | | | | | | | |
| 10 | 5°24.5 | 303°36.6 | 39.8 | 352°31.0 | 32.2 | 255°23.5 | 33.3 | 356°31.7 | 28.5 | | | | | | | | | |
| 11 | 20°27.0 | 318°35.8 | 40.5 | 7°31.7 | 33.0 | 270°25.6 | 33.3 | 11°33.9 | 28.6 | | | | | | | | | |
| 12 | 35°29.4 | 333°35.1 | N21°41.1 | 22°32.4 | N04°33.7 | 285°27.7 | N22°33.2 | 26°36.1 | N01°28.7 | | | | | | | | | |
| 13 | 50°31.9 | 348°34.4 | 41.8 | 37°33.1 | 34.5 | 300°29.8 | 33.2 | 41°38.3 | 28.8 | | | | | | | | | |
| 14 | 65°34.3 | 3°33.7 | 42.5 | 52°33.8 | 35.2 | 315°31.9 | 33.1 | 56°40.5 | 28.9 | | | | | | | | | |
| 15 | 80°36.8 | 18°33.0 | •• 43.2 | 67°34.5 | •• 36.0 | 330°34.0 | •• 33.1 | 71°42.7 | •• 29.0 | | | | | | | | | |
| 16 | 95°39.3 | 33°32.2 | 43.9 | 82°35.2 | 36.8 | 345°36.1 | 33.0 | 86°44.9 | 29.1 | | | | | | | | | |
| 17 | 110°41.7 | 48°31.5 | 44.5 | 97°35.9 | 37.5 | 0°38.3 | 33.0 | 101°47.1 | 29.2 | | | | | | | | | |
| 18 | 125°44.2 | 63°30.8 | N21°45.2 | 112°36.6 | N04°38.3 | 15°40.4 | N22°33.0 | 116°49.3 | N01°29.4 | | | | | | | | | |
| 19 | 140°46.7 | 78°30.1 | 45.9 | 127°37.3 | 39.0 | 30°42.5 | 32.9 | 131°51.5 | 29.5 | | | | | | | | | |
| 20 | 155°49.1 | 93°29.4 | 46.5 | 142°38.0 | 39.8 | 45°44.6 | 32.9 | 146°53.7 | 29.6 | | | | | | | | | |
| 21 | 170°51.6 | 108°28.6 | •• 47.2 | 157°38.6 | •• 40.6 | 60°46.7 | •• 32.8 | 161°55.9 | •• 29.7 | | | | | | | | | |
| 22 | 185°54.1 | 123°27.9 | 47.9 | 172°39.3 | 41.3 | 75°48.8 | 32.8 | 176°58.1 | 29.8 | | | | | | | | | |
| 23 | 200°56.5 | 138°27.2 | 48.5 | 187°40.0 | 42.1 | 90°50.9 | 32.7 | 192°00.3 | 29.9 | | | | | | | | | |
| Mer.pass. 09:38 | | | ν-0.7' d0.7' m-3.92 | | | ν0.7' d0.8' m1.22 | | | ν2.1' d-0.0' m-2.03 | | | ν2.2' d0.1' m0.93 | | | | | | |
| | | | | | | | | | | | | | | Horizontal parallax | | | | |
| | | | | | | | | | | | | | | Venus: | 0.1 | | | |
| | | | | | | | | | | | | | | Mars: | 0.1 | | | |

| h | Sun | | | Moon | | | | |
|------------|-----|----------|------------|------------|-------|----------|--------|-------|
| | Sat | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | | 180°29.5 | N13°07.5 | 73°52.8 | 10.7' | N17°46.6 | -12.8' | 57.8' |
| 1 | | 195°29.6 | 08.3 | 88°22.6 | 10.8' | 17°33.8 | -12.9' | 57.8' |
| 2 | | 210°29.7 | 09.1 | 102°52.4 | 10.9' | 17°20.9 | -13.0' | 57.7' |
| 3 | | 225°29.8 | · · 09.9 | 117°22.4 | 11.1' | 17°07.9 | -13.1' | 57.7' |
| 4 | | 240°29.9 | 10.7 | 131°52.4 | 11.2' | 16°54.9 | -13.1' | 57.7' |
| 5 | | 255°30.0 | 11.5 | 146°22.6 | 11.3' | 16°41.7 | -13.2' | 57.7' |
| 6 | | 270°30.1 | N13°12.4 | 160°52.8 | 11.4' | N16°28.5 | -13.3' | 57.6' |
| 7 | | 285°30.2 | 13.2 | 175°23.2 | 11.5' | 16°15.3 | -13.3' | 57.6' |
| 8 | | 300°30.4 | 14.0 | 189°53.6 | 11.6' | 16°01.9 | -13.4' | 57.6' |
| 9 | | 315°30.5 | · · 14.8 | 204°24.2 | 11.7' | 15°48.5 | -13.5' | 57.6' |
| 10 | | 330°30.6 | 15.6 | 218°54.9 | 11.8' | 15°35.0 | -13.5' | 57.5' |
| 11 | | 345°30.7 | 16.4 | 233°25.6 | 11.9' | 15°21.5 | -13.6' | 57.5' |
| 12 | | 0°30.8 | N13°17.2 | 247°56.5 | 12.0' | N15°07.9 | -13.7' | 57.5' |
| 13 | | 15°30.9 | 18.1 | 262°27.4 | 12.0' | 14°54.3 | -13.7' | 57.4' |
| 14 | | 30°31.0 | 18.9 | 276°58.5 | 12.1' | 14°40.5 | -13.8' | 57.4' |
| 15 | | 45°31.1 | · · 19.7 | 291°29.6 | 12.2' | 14°26.8 | -13.8' | 57.4' |
| 16 | | 60°31.2 | 20.5 | 306°00.9 | 12.3' | 14°12.9 | -13.9' | 57.4' |
| 17 | | 75°31.3 | 21.3 | 320°32.2 | 12.4' | 13°59.0 | -13.9' | 57.3' |
| 18 | | 90°31.4 | N13°22.1 | 335°03.6 | 12.5' | N13°45.1 | -14.0' | 57.3' |
| 19 | | 105°31.5 | 22.9 | 349°35.1 | 12.6' | 13°31.1 | -14.0' | 57.3' |
| 20 | | 120°31.6 | 23.7 | 4°06.7 | 12.7' | 13°17.1 | -14.1' | 57.3' |
| 21 | | 135°31.7 | · · 24.5 | 18°38.4 | 12.8' | 13°03.0 | -14.1' | 57.2' |
| 22 | | 150°31.8 | 25.3 | 33°10.1 | 12.8' | 12°48.8 | -14.2' | 57.2' |
| 23 | | 165°31.9 | 26.1 | 47°42.0 | 12.9' | 12°34.7 | -14.2' | 57.2' |
| SD = 15.9' | | | $d = 0.8'$ | SD = 15.8' | | | | |

| Sun | Sun | | | Moon | | | | |
|------------|-----|----------|------------|------------|-------|----------|--------|-------|
| | Sat | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | | 180°32.0 | N13°27.0 | 62°13.9 | 13.0' | N12°20.4 | -14.3' | 57.2' |
| 1 | | 195°32.1 | 27.8 | 76°45.9 | 13.1' | 12°06.2 | -14.3' | 57.1' |
| 2 | | 210°32.2 | 28.6 | 91°18.0 | 13.2' | 11°51.8 | -14.4' | 57.1' |
| 3 | | 225°32.3 | · · 29.4 | 105°50.2 | 13.2' | 11°37.5 | -14.4' | 57.1' |
| 4 | | 240°32.4 | 30.2 | 120°22.4 | 13.3' | 11°23.1 | -14.4' | 57.0' |
| 5 | | 255°32.6 | 31.0 | 134°54.8 | 13.4' | 11°08.6 | -14.5' | 57.0' |
| 6 | | 270°32.7 | N13°31.8 | 149°27.2 | 13.5' | N10°54.2 | -14.5' | 57.0' |
| 7 | | 285°32.8 | 32.6 | 163°59.6 | 13.5' | 10°39.6 | -14.5' | 57.0' |
| 8 | | 300°32.9 | 33.4 | 178°32.2 | 13.6' | 10°25.1 | -14.6' | 56.9' |
| 9 | | 315°33.0 | · · 34.2 | 193°04.8 | 13.7' | 10°10.5 | -14.6' | 56.9' |
| 10 | | 330°33.1 | 35.0 | 207°37.5 | 13.8' | 09°55.9 | -14.6' | 56.9' |
| 11 | | 345°33.2 | 35.8 | 222°10.2 | 13.8' | 09°41.3 | -14.7' | 56.9' |
| 12 | | 0°33.3 | N13°36.6 | 236°43.1 | 13.9' | N09°26.6 | -14.7' | 56.8' |
| 13 | | 15°33.4 | 37.4 | 251°15.9 | 14.0' | 09°11.9 | -14.7' | 56.8' |
| 14 | | 30°33.5 | 38.2 | 265°48.9 | 14.0' | 08°57.1 | -14.8' | 56.8' |
| 15 | | 45°33.6 | · · 39.0 | 280°21.9 | 14.1' | 08°42.4 | -14.8' | 56.8' |
| 16 | | 60°33.7 | 39.8 | 294°55.0 | 14.1' | 08°27.6 | -14.8' | 56.7' |
| 17 | | 75°33.8 | 40.6 | 309°28.1 | 14.2' | 08°12.8 | -14.8' | 56.7' |
| 18 | | 90°33.9 | N13°41.4 | 324°01.3 | 14.3' | N07°57.9 | -14.9' | 56.7' |
| 19 | | 105°34.0 | 42.2 | 338°34.6 | 14.3' | 07°43.1 | -14.9' | 56.7' |
| 20 | | 120°34.1 | 43.0 | 353°07.9 | 14.4' | 07°28.2 | -14.9' | 56.6' |
| 21 | | 135°34.2 | · · 43.8 | 7°41.3 | 14.4' | 07°13.3 | -14.9' | 56.6' |
| 22 | | 150°34.3 | 44.6 | 22°14.7 | 14.5' | 06°58.4 | -14.9' | 56.6' |
| 23 | | 165°34.4 | 45.4 | 36°48.2 | 14.5' | 06°43.5 | -15.0' | 56.6' |
| SD = 15.9' | | | $d = 0.8'$ | SD = 15.6' | | | | |

| Mon | Sun | | | Moon | | | | |
|------------|-----|----------|------------|------------|-------|----------|--------|-------|
| | Sat | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | | 180°34.5 | N13°46.2 | 51°21.7 | 14.6' | N06°28.5 | -15.0' | 56.6' |
| 1 | | 195°34.6 | 47.0 | 65°55.3 | 14.6' | 06°13.5 | -15.0' | 56.5' |
| 2 | | 210°34.7 | 47.8 | 80°28.9 | 14.7' | 05°58.6 | -15.0' | 56.5' |
| 3 | | 225°34.8 | · · 48.6 | 95°02.6 | 14.7' | 05°43.6 | -15.0' | 56.5' |
| 4 | | 240°34.9 | 49.4 | 109°36.3 | 14.8' | 05°28.6 | -15.0' | 56.5' |
| 5 | | 255°35.0 | 50.2 | 124°10.1 | 14.8' | 05°13.5 | -15.0' | 56.4' |
| 6 | | 270°35.1 | N13°51.0 | 138°43.9 | 14.9' | N04°58.5 | -15.0' | 56.4' |
| 7 | | 285°35.1 | 51.8 | 153°17.8 | 14.9' | 04°43.5 | -15.0' | 56.4' |
| 8 | | 300°35.2 | 52.6 | 167°51.7 | 14.9' | 04°28.4 | -15.1' | 56.4' |
| 9 | | 315°35.3 | · · 53.4 | 182°25.6 | 15.0' | 04°13.4 | -15.1' | 56.3' |
| 10 | | 330°35.4 | 54.2 | 196°59.6 | 15.0' | 03°58.3 | -15.1' | 56.3' |
| 11 | | 345°35.5 | 55.0 | 211°33.6 | 15.1' | 03°43.3 | -15.1' | 56.3' |
| 12 | | 0°35.6 | N13°55.8 | 226°07.7 | 15.1' | N03°28.2 | -15.1' | 56.3' |
| 13 | | 15°35.7 | 56.6 | 240°41.8 | 15.1' | 03°13.1 | -15.1' | 56.2' |
| 14 | | 30°35.8 | 57.4 | 255°15.9 | 15.2' | 02°58.1 | -15.1' | 56.2' |
| 15 | | 45°35.9 | · · 58.1 | 269°50.1 | 15.2' | 02°43.0 | -15.1' | 56.2' |
| 16 | | 60°36.0 | 58.9 | 284°24.3 | 15.2' | 02°27.9 | -15.1' | 56.2' |
| 17 | | 75°36.1 | 13°59.7 | 298°58.5 | 15.3' | 02°12.9 | -15.1' | 56.2' |
| 18 | | 90°36.2 | N14°00.5 | 313°32.7 | 15.3' | N01°57.8 | -15.1' | 56.1' |
| 19 | | 105°36.3 | 01.3 | 328°07.0 | 15.3' | 01°42.7 | -15.1' | 56.1' |
| 20 | | 120°36.4 | 02.1 | 342°41.3 | 15.3' | 01°27.7 | -15.1' | 56.1' |
| 21 | | 135°36.5 | · · 02.9 | 357°15.7 | 15.4' | 01°12.6 | -15.1' | 56.1' |
| 22 | | 150°36.6 | 03.7 | 11°50.0 | 15.4' | 00°57.6 | -15.0' | 56.0' |
| 23 | | 165°36.7 | 04.5 | 26°24.4 | 15.4' | 00°42.5 | -15.0' | 56.0' |
| SD = 15.9' | | | $d = 0.8'$ | SD = 15.4' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | //// | 02:31 | 21:30 | //// | //// |
| N 70° | //// | 00:52 | 02:59 | 21:00 | 23:21 | //// |
| 68° | //// | 01:51 | 03:21 | 20:38 | 22:11 | //// |
| 66° | //// | 02:24 | 03:37 | 20:21 | 21:36 | //// |
| 64° | 00:46 | 02:48 | 03:51 | 20:07 | 21:11 | 23:26 |
| 62° | 01:38 | 03:06 | 04:02 | 19:55 | 20:52 | 22:23 |
| 60° | 02:08 | 03:21 | 04:12 | 19:45 | 20:36 | 21:51 |
| N 58° | 02:30 | 03:34 | 04:20 | 19:37 | 20:23 | 21:28 |
| 56° | 02:48 | 03:45 | 04:28 | 19:29 | 20:12 | 21:10 |
| 54° | 03:02 | 03:54 | 04:34 | 19:22 | 20:03 | 20:56 |
| 52° | 03:14 | 04:03 | 04:40 | 19:16 | 19:54 | 20:43 |
| 50° | 03:25 | 04:10 | 04:46 | 19:11 | 19:47 | 20:32 |
| 45° | 03:46 | 04:25 | 04:57 | 18:59 | 19:31 | 20:10 |
| N 40° | 04:03 | 04:38 | 05:07 | 18:50 | 19:18 | 19:54 |
| 35° | 04:16 | 04:48 | 05:15 | 18:41 | 19:08 | 19:40 |
| 30° | 04:27 | 04:57 | 05:22 | 18:34 | 18:59 | 19:29 |
| 20° | 04:44 | 05:11 | 05:34 | 18:22 | 18:45 | 19:12 |
| N 10° | 04:58 | 05:23 | 05:45 | 18:11 | 18:33 | 18:58 |
| 0° | 05:08 | 05:33 | 05:54 | 18:01 | 18:22 | 18:47 |
| S 10° | 05:18 | 05:43 | 06:04 | 17:51 | 18:13 | 18:38 |
| 20° | 05:26 | 05:52 | 06:14 | 17:41 | 18:04 | 18:30 |
| 30° | 05:33 | 06:01 | 06:26 | 17:29 | 17:54 | 18:22 |
| 35° | 05:37 | 06:06 | 06:32 | 17:23 | 17:49 | 18:19 |
| 40° | 05:40 | 06:12 | 06:40 | 17:15 | 17:43 | 18:15 |
| 45° | 05:44 | 06:18 | 06:49 | 17:06 | 17:37 | 18:11 |
| S 50° | 05:47 | 06:25 | 06:59 | 16:56 | 17:30 | 18:07 |
| 52° | 05:49 | 06:29 | 07:04 | 16:51 | 17:26 | 18:06 |
| 54° | 05:50 | 06:32 | 07:09 | 16:46 | 17:23 | 18:04 |
| 56° | 05:52 | 06:36 | 07:15 | 16:40 | 17:19 | 18:03 |
| 58° | 05:54 | 06:40 | 07:22 | 16:33 | 17:15 | 18:01 |
| S 60° | 05:55 | 06:44 | 07:29 | 16:26 | 17:10 | 17:59 |

| Lat. | Moonrise | | | Moonset | | |
|--------------|----------|-------|-------|---------|-------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | 09:27 | 12:13 | 14:26 | 05:36 | 04:29 | 03:49 |
| N 70° | 10:07 | 12:28 | 14:30 | 04:54 | 04:11 | 03:42 |
| 68° | 10:35 | 12:40 | 14:33 | 04:25 | 03:57 | 03:36 |
| 66° | 10:55 | 12:50 | 14:36 | 04:03 | 03:45 | 03:30 |
| 64° | 11:12 | 12:58 | 14:38 | 03:45 | 03:35 | 03:26 |
| 62° | 11:25 | 13:05 | 14:40 | 03:31 | 03:26 | 03:22 |
| 60° | 11:36 | 13:11 | 14:42 | 03:18 | 03:19 | 03:19 |
| N 58° | 11:46 | 13:17 | 14:43 | 03:08 | 03:13 | 03:16 |
| 56° | 11:54 | 13:21 | 14:45 | 02:58 | 03:07 | 03:13 |
| 54° | 12:02 | 13:26 | 14:46 | 02:50 | 03:02 | 03:11 |
| 52° | 12:09 | 13:29 | 14:47 | 02:42 | 02:57 | 03:09 |
| 50° | 12:15 | 13:33 | 14:48 | 02:35 | 02:53 | 03:07 |
| 45° | 12:28 | 13:40 | 14:50 | 02:21 | 02:43 | 03:02 |
| N 40° | 12:38 | 13:46 | 14:52 | 02:09 | 02:35 | 02:58 |
| 35° | 12:47 | 13:52 | 14:53 | 01:58 | 02:29 | 02:55 |
| 30° | 12:55 | 13:56 | 14:55 | 01:49 | 02:23 | 02:52 |
| 20° | 13:09 | 14:04 | 14:57 | 01:33 | 02:12 | 02:47 |
| N 10° | 13:21 | 14:11 | 14:59 | 01:19 | 02:03 | 02:43 |
| 0° | 13:32 | 14:18 | 15:01 | 01:06 | 01:54 | 02:39 |
| S 10° | 13:43 | 14:24 | 15:03 | 00:53 | 01:45 | 02:34 |
| 20° | 13:54 | 14:31 | 15:05 | 00:39 | 01:36 | 02:30 |
| 30° | 14:08 | 14:39 | 15:08 | 00:22 | 01:25 | 02:25 |
| 35° | 14:15 | 14:43 | 15:09 | 00:12 | 01:19 | 02:22 |
| 40° | 14:24 | 14:49 | 15:11 | 00:01 | 01:11 | 02:18 |
| 45° | 14:34 | 14:54 | 15:12 | · · | 01:03 | 02:14 |
| S 50° | 14:46 | 15:01 | 15:14 | · · | 00:52 | 02:09 |
| 52° | 14:52 | 15:05 | 15:15 | · · | 00:48 | 02:07 |
| 54° | 14:58 | 15:08 | 15:17 | · · | 00:42 | 02:04 |
| 56° | 15:05 | 15:12 | 15:18 | · · | 00:36 | 02:02 |
| 58° | 15:13 | 15:16 | 15:19 | · · | 00:30 | 01:59 |
| S 60° | 15:21 | 15:21 | 15:20 | · · | 00:22 | 01:55 |

April 28, 29, 30 UT (Tue., Wed., Thu.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|---------------------|----------|----------|-------------------|----------|----------|---------------------|----------|---------|-------------------|-----|--------|-----|-----|
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 215°59.0 | 153°26.5 | N21°49.2 | 202°40.7 | N04°42.8 | 105°53.0 | N22°32.7 | 207°02.5 | N01°30.0 | | | | | | |
| 1 | 231°01.4 | 168°25.7 | 49.9 | 217°41.4 | 43.6 | 120°55.1 | 32.6 | 222°04.7 | 30.1 | | | | | | |
| 2 | 246°03.9 | 183°25.0 | 50.5 | 232°42.1 | 44.3 | 135°57.2 | 32.6 | 237°06.9 | 30.2 | | | | | | |
| 3 | 261°06.4 | 198°24.3 | •• 51.2 | 247°42.8 | •• 45.1 | 150°59.3 | •• 32.6 | 252°09.1 | •• 30.3 | | | | | | |
| 4 | 276°08.8 | 213°23.6 | 51.9 | 262°43.5 | 45.9 | 166°01.4 | 32.5 | 267°11.3 | 30.4 | | | | | | |
| 5 | 291°11.3 | 228°22.8 | 52.5 | 277°44.2 | 46.6 | 181°03.5 | 32.5 | 282°13.5 | 30.5 | | | | | | |
| 6 | 306°13.8 | 243°22.1 | N21°53.2 | 292°44.9 | N04°47.4 | 196°05.6 | N22°32.4 | 297°15.7 | N01°30.6 | | | | | | |
| 7 | 321°16.2 | 258°21.4 | 53.9 | 307°45.6 | 48.1 | 211°07.7 | 32.4 | 312°17.9 | 30.8 | | | | | | |
| 8 | 336°18.7 | 273°20.6 | 54.5 | 322°46.3 | 48.9 | 226°09.9 | 32.3 | 327°20.1 | 30.9 | | | | | | |
| 9 | 351°21.2 | 288°19.9 | •• 55.2 | 337°47.0 | •• 49.7 | 241°12.0 | •• 32.3 | 342°22.3 | •• 31.0 | | | | | | |
| 10 | 6°23.6 | 303°19.2 | 55.8 | 352°47.7 | 50.4 | 256°14.1 | 32.3 | 357°24.5 | 31.1 | | | | | | |
| 11 | 21°26.1 | 318°18.5 | 56.5 | 7°48.4 | 51.2 | 271°16.2 | 32.2 | 12°26.7 | 31.2 | | | | | | |
| 12 | 36°28.6 | 333°17.7 | N21°57.1 | 22°49.1 | N04°51.9 | 286°18.3 | N22°32.2 | 27°28.9 | N01°31.3 | | | | | | |
| 13 | 51°31.0 | 348°17.0 | 57.8 | 37°49.8 | 52.7 | 301°20.4 | 32.1 | 42°31.1 | 31.4 | | | | | | |
| 14 | 66°33.5 | 3°16.3 | 58.4 | 52°50.4 | 53.4 | 316°22.5 | 32.1 | 57°33.3 | 31.5 | | | | | | |
| 15 | 81°35.9 | 18°15.5 | •• 59.1 | 67°51.1 | •• 54.2 | 331°24.6 | •• 32.0 | 72°35.5 | •• 31.6 | | | | | | |
| 16 | 96°38.4 | 33°14.8 | 21°59.7 | 82°51.8 | 55.0 | 346°26.7 | 32.0 | 87°37.7 | 31.7 | | | | | | |
| 17 | 111°40.9 | 48°14.1 | 22°00.4 | 97°52.5 | 55.7 | 1°28.8 | 31.9 | 102°39.9 | 31.8 | | | | | | |
| 18 | 126°43.3 | 63°13.3 | N22°01.0 | 112°53.2 | N04°56.5 | 16°30.9 | N22°31.9 | 117°42.1 | N01°31.9 | | | | | | |
| 19 | 141°45.8 | 78°12.6 | 01.7 | 127°53.9 | 57.2 | 31°33.0 | 31.9 | 132°44.3 | 32.0 | | | | | | |
| 20 | 156°48.3 | 93°11.9 | 02.3 | 142°54.6 | 58.0 | 46°35.1 | 31.8 | 147°46.5 | 32.2 | | | | | | |
| 21 | 171°50.7 | 108°11.1 | •• 03.0 | 157°55.3 | •• 58.7 | 61°37.2 | •• 31.8 | 162°48.7 | •• 32.3 | | | | | | |
| 22 | 186°53.2 | 123°10.4 | 03.6 | 172°56.0 | 04°59.5 | 76°39.3 | 31.7 | 177°50.9 | 32.4 | | | | | | |
| 23 | 201°55.7 | 138°09.7 | 04.3 | 187°56.7 | 05°00.2 | 91°41.4 | 31.7 | 192°53.1 | 32.5 | | | | | | |
| Mer.pass. 09:34 | | ν-0.7' d0.7' m-3.92 | | | ν0.7' d0.8' m1.22 | | | ν2.1' d-0.0' m-2.03 | | | ν2.2' d0.1' m0.93 | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 216°58.1 | 153°08.9 | N22°04.9 | 202°57.4 | N05°01.0 | 106°43.5 | N22°31.6 | 207°55.3 | N01°32.6 | | | | | | |
| 1 | 232°00.6 | 168°08.2 | 05.6 | 217°58.1 | 01.8 | 121°45.6 | 31.6 | 222°57.5 | 32.7 | | | | | | |
| 2 | 247°03.0 | 183°07.5 | 06.2 | 232°58.8 | 02.5 | 136°47.7 | 31.5 | 237°59.7 | 32.8 | | | | | | |
| 3 | 262°05.5 | 198°06.7 | •• 06.8 | 247°59.5 | •• 03.3 | 151°49.8 | •• 31.5 | 253°01.9 | •• 32.9 | | | | | | |
| 4 | 277°08.0 | 213°06.0 | 07.5 | 263°00.2 | 04.0 | 166°51.9 | 31.4 | 268°04.1 | 33.0 | | | | | | |
| 5 | 292°10.4 | 228°05.3 | 08.1 | 278°00.9 | 04.8 | 181°54.0 | 31.4 | 283°06.3 | 33.1 | | | | | | |
| 6 | 307°12.9 | 243°04.5 | N22°08.7 | 293°01.5 | N05°05.5 | 196°56.1 | N22°31.4 | 298°08.5 | N01°33.2 | | | | | | |
| 7 | 322°15.4 | 258°03.8 | 09.4 | 308°02.2 | 06.3 | 211°58.2 | 31.3 | 313°10.7 | 33.3 | | | | | | |
| 8 | 337°17.8 | 273°03.1 | 10.0 | 323°02.9 | 07.0 | 227°00.3 | 31.3 | 328°12.9 | 33.4 | | | | | | |
| 9 | 352°20.3 | 288°02.3 | •• 10.6 | 338°03.6 | •• 07.8 | 242°02.4 | •• 31.2 | 343°15.1 | •• 33.5 | | | | | | |
| 10 | 7°22.8 | 303°01.6 | 11.3 | 353°04.3 | 08.6 | 257°04.5 | 31.2 | 358°17.3 | 33.7 | | | | | | |
| 11 | 22°25.2 | 318°00.8 | 11.9 | 8°05.0 | 09.3 | 272°06.6 | 31.1 | 13°19.5 | 33.8 | | | | | | |
| 12 | 37°27.7 | 333°00.1 | N22°12.5 | 23°05.7 | N05°10.1 | 287°08.7 | N22°31.1 | 28°21.7 | N01°33.9 | | | | | | |
| 13 | 52°30.2 | 347°59.4 | 13.2 | 38°06.4 | 10.8 | 302°10.8 | 31.0 | 43°23.9 | 34.0 | | | | | | |
| 14 | 67°32.6 | 2°58.6 | 13.8 | 53°07.1 | 11.6 | 317°12.9 | 31.0 | 58°26.1 | 34.1 | | | | | | |
| 15 | 82°35.1 | 17°57.9 | •• 14.4 | 68°07.8 | •• 12.3 | 332°15.0 | •• 30.9 | 73°28.3 | •• 34.2 | | | | | | |
| 16 | 97°37.5 | 32°57.2 | 15.0 | 83°08.5 | 13.1 | 347°17.1 | 30.9 | 88°30.5 | 34.3 | | | | | | |
| 17 | 112°40.0 | 47°56.4 | 15.7 | 98°09.2 | 13.8 | 2°19.2 | 30.9 | 103°32.7 | 34.4 | | | | | | |
| 18 | 127°42.5 | 62°55.7 | N22°16.3 | 113°09.9 | N05°14.6 | 17°21.3 | N22°30.8 | 118°34.9 | N01°34.5 | | | | | | |
| 19 | 142°44.9 | 77°54.9 | 16.9 | 128°10.6 | 15.3 | 32°23.4 | 30.8 | 133°37.1 | 34.6 | | | | | | |
| 20 | 157°47.4 | 92°54.2 | 17.5 | 143°11.3 | 16.1 | 47°25.5 | 30.7 | 148°39.3 | 34.7 | | | | | | |
| 21 | 172°49.9 | 107°53.4 | •• 18.1 | 158°12.0 | •• 16.9 | 62°27.6 | •• 30.7 | 163°41.5 | •• 34.8 | | | | | | |
| 22 | 187°52.3 | 122°52.7 | 18.8 | 173°12.6 | 17.6 | 77°29.7 | 30.6 | 178°43.7 | 34.9 | | | | | | |
| 23 | 202°54.8 | 137°52.0 | 19.4 | 188°13.3 | 18.4 | 92°31.8 | 30.6 | 193°45.9 | 35.0 | | | | | | |
| Mer.pass. 09:31 | | ν-0.7' d0.6' m-3.92 | | | ν0.7' d0.8' m1.22 | | | ν2.1' d-0.0' m-2.02 | | | ν2.2' d0.1' m0.93 | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 217°57.3 | 152°51.2 | N22°20.0 | 203°14.0 | N05°19.1 | 107°33.9 | N22°30.5 | 208°48.1 | N01°35.1 | | | | | | |
| 1 | 232°59.7 | 167°50.5 | 20.6 | 218°14.7 | 19.9 | 122°36.0 | 30.5 | 223°50.3 | 35.3 | | | | | | |
| 2 | 248°02.2 | 182°49.7 | 21.2 | 233°15.4 | 20.6 | 137°38.1 | 30.4 | 238°52.5 | 35.4 | | | | | | |
| 3 | 263°04.7 | 197°49.0 | •• 21.8 | 248°16.1 | •• 21.4 | 152°40.2 | •• 30.4 | 253°54.7 | •• 35.5 | | | | | | |
| 4 | 278°07.1 | 212°48.2 | 22.5 | 263°16.8 | 22.1 | 167°42.3 | 30.3 | 268°56.9 | 35.6 | | | | | | |
| 5 | 293°09.6 | 227°47.5 | 23.1 | 278°17.5 | 22.9 | 182°44.3 | 30.3 | 283°59.1 | 35.7 | | | | | | |
| 6 | 308°12.0 | 242°46.7 | N22°23.7 | 293°18.2 | N05°23.6 | 197°46.4 | N22°30.3 | 299°01.3 | N01°35.8 | | | | | | |
| 7 | 323°14.5 | 257°46.0 | 24.3 | 308°18.9 | 24.4 | 212°48.5 | 30.2 | 314°03.5 | 35.9 | | | | | | |
| 8 | 338°17.0 | 272°45.3 | 24.9 | 323°19.6 | 25.1 | 227°50.6 | 30.2 | 329°05.7 | 36.0 | | | | | | |
| 9 | 353°19.4 | 287°44.5 | •• 25.5 | 338°20.3 | •• 25.9 | 242°52.7 | •• 30.1 | 344°07.9 | •• 36.1 | | | | | | |
| 10 | 8°21.9 | 302°43.8 | 26.1 | 353°21.0 | 26.6 | 257°54.8 | 30.1 | 359°10.1 | 36.2 | | | | | | |
| 11 | 23°24.4 | 317°43.0 | 26.7 | 8°21.7 | 27.4 | 272°56.9 | 30.0 | 14°12.3 | 36.3 | | | | | | |
| 12 | 38°26.8 | 332°42.3 | N22°27.3 | 23°22.4 | N05°28.1 | 287°59.0 | N22°30.0 | 29°14.5 | N01°36.4 | | | | | | |
| 13 | 53°29.3 | 347°41.5 | 27.9 | 38°23.0 | 28.9 | 303°01.1 | 29.9 | 44°16.7 | 36.5 | | | | | | |
| 14 | 68°31.8 | 2°40.8 | 28.5 | 53°23.7 | 29.6 | 318°03.2 | 29.9 | 59°18.9 | 36.6 | | | | | | |
| 15 | 83°34.2 | 17°40.0 | •• 29.1 | 68°24.4 | •• 30.4 | 333°05.3 | •• 29.8 | 74°21.1 | •• 36.7 | | | | | | |
| 16 | 98°36.7 | 32°39.3 | 29.7 | 83°25.1 | 31.2 | 348°07.4 | 29.8 | 89°23.3 | 36.8 | | | | | | |
| 17 | 113°39.1 | 47°38.5 | 30.3 | 98°25.8 | 31.9 | 3°09.5 | 29.7 | 104°25.5 | 37.0 | | | | | | |
| 18 | 128°41.6 | 62°37.8 | N22°30.9 | 113°26.5 | N05°32.7 | 18°11.6 | N22°29.7 | 119°27.7 | N01°37.1 | | | | | | |
| 19 | 143°44.1 | 77°37.0 | 31.5 | 128°27.2 | 33.4 | 33°13.7 | 29.7 | 134°29.9 | 37.2 | | | | | | |
| 20 | 158°46.5 | 92°36.3 | 32.1 | 143°27.9 | 34.2 | 48°15.7 | 29.6 | 149°32.1 | 37.3 | | | | | | |
| 21 | 173°49.0 | 107°35.5 | •• 32.7 | 158°28.6 | •• 34.9 | 63°17.8 | •• 29.6 | 164°34.3 | •• 37.4 | | | | | | |
| 22 | 188°51.5 | 122°34.8 | 33.3 | 173°29.3 | 35.7 | 78°19.9 | 29.5 | 179°36.5 | 37.5 | | | | | | |
| 23 | 203°53.9 | 137°34.0 | 33.9 | 188°30.0 | 36.4 | 93°22.0 | 29.5 | 194°38.7 | 37.6 | | | | | | |
| Mer.pass. 09:27 | | ν-0.7' d0.6' m-3.92 | | | ν0.7' d0.8' m1.22 | | | ν2.1' d-0.0' m-2.02 | | | ν2.2' d0.1' m0.93 | | | | |

| Stars | | |
|---------------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°34.0 | 29°14.0 |
| Ankaa | 353°06.4 | -42°09.7 |
| Schedar | 349°30.3 | 56°40.7 |
| Diphda | 348°46.5 | -17°50.5 |
| Achernar | 335°20.0 | -57°06.1 |
| Hamal | 327°50.3 | 23°35.1 |
| Polaris | 313°59.0 | 89°22.5 |
| Acamar | 315°11.4 | -40°12.0 |
| Menkar | 314°05.4 | 4°11.5 |
| Mirfak | 308°27.2 | 49°57.3 |
| Aldebaran | 290°38.7 | 16°33.7 |
| Rigel | 281°03.1 | -8°10.4 |
| Capella | 280°20.7 | 46°01.5 |
| Bellatrix | 278°22.0 | 6°22.3 |
| Elnath | 278°00.8 | 28°37.8 |
| Alnilam | 275°36.9 | -1°11.2 |
| Betelgeuse | 270°51.2 | 7°24.7 |
| Canopus | 263°52.2 | -52°42.8 |
| Sirius | 258°25.5 | -16°45.3 |
| Adhara | 255°05.2 | -29°00.7 |
| Procyon | 244°49.8 | 5°09.4 |
| Pollux | 243°16.1 | 27°57.8 |
| Avior | 234°14.4 | -59°35.9 |
| Suhail | 222°45.5 | -43°32.6 |
| Miaplacidus | 221°38.0 | -69°49.8 |
| Alphard | 217°46.7 | -8°46.5 |
| Regulus | 207°33.2 | 11°50.2 |
| Dubhe | 193°39.3 | 61°36.7 |
| Denebola | 182°23.6 | 14°25.4 |
| Gienah | 175°42.2 | -17°41.5 |
| Acrux | 172°58.3 | -63°14.9 |
| Gacrux | 171°50.0 | -57°15.9 |
| Alioth | 166°11.5 | 55°49.0 |
| Spica | 158°20.9 | -11°18.1 |
| Alkaid | 152°50.7 | 49°10.8 |
| Hadar | 148°33.9 | -60°30.1 |
| Menkent | 147°56.0 | -36°30.1 |
| Arcturus | 145°46.6 | 19°02.6 |
| Rigel Kent. | 139°38.2 | -60°56.7 |
| Kochab | 137°18.6 | 74°02.7 |
| Zuben'ubi | 136°54.5 | -16°09.2 |
| Alphecca | 126°02.5 | 26°37.4 |
| Antares | 112°14.2 | -26°29.5 |
| Atria | 107°07.0 | -69°04.3 |
| Sabik | 102°01.3 | -15°45.5 |
| Shaula | 96°08.6 | -37°07.3 |
| Rasalhague | 95°57.3 | 12°32.3 |
| Eltanin | 90°41.3 | 51°28.8 |
| Kaus Aust. | 83°30.9 | -34°22.2 |
| Vega | 80°32.3 | 38°48.2 |
| Nunki | 75°46.3 | -26°15.8 |
| Altair | 61°58.8 | 8°56.1 |
| Peacock | 53°04.0 | -56°38.8 |
| Deneb | 49°25.1 | 45°22.1 |
| Enif | 33°37.8 | 9°59.6 |
| Al Na'ir | 27°31.7 | -46°49.8 |
| Fomalhaut | 15°13.5 | -29°28.9 |
| Scheat | 13°44.4 | 28°13.3 |
| Markab | 13°29.0 | 15°20.7 |
| | | |
| Apr 28 Tue | SHA | Mer.pass |
| Venus | 297°27.5 | 13:47 |
| Mars | 346°41.7 | 10:29 |
| Jupiter | 249°54.0 | 16:54 |
| Saturn | 351°03.5 | 10:10 |
| | | |
| Apr 29 Wed | SHA | Mer.pass |
| Venus | 296°10.8 | 13:48 |
| Mars | 345°59.3 | 10:28 |
| Jupiter | 249°45.4 | 16:51 |
| Saturn | 350°57.1 | 10:07 |
| | | |
| Apr 30 Thu | SHA | Mer.pass |
| Venus | 294°54.0 | 13:49 |
| Mars | 345°16.8 | 10:27 |
| Jupiter | 249°36.6 | 16:47 |
| Saturn | 350°50.8 | 10:03 |
| | | |
| Horizontal parallax | | |
| | Venus: | 0.1 |
| | Mars: | 0.1 |

| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|----------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| Tue | | | | | | | | |
| 0 | 180°36.8 | N14°05.3 | | 40°58.8 | 15.4' | N00°27.5 | -15.0' | 56.0' |
| 1 | 195°36.9 | 06.0 | | 55°33.2 | 15.4' | N00°12.4 | -15.0' | 56.0' |
| 2 | 210°37.0 | 06.8 | | 70°07.7 | 15.5' | S00°02.6 | 15.0' | 56.0' |
| 3 | 225°37.0 | · · 07.6 | | 84°42.2 | 15.5' | 00°17.6 | 15.0' | 55.9' |
| 4 | 240°37.1 | 08.4 | | 99°16.6 | 15.5' | 00°32.6 | 15.0' | 55.9' |
| 5 | 255°37.2 | 09.2 | | 113°51.1 | 15.5' | 00°47.6 | 15.0' | 55.9' |
| 6 | 270°37.3 | N14°10.0 | | 128°25.7 | 15.5' | S01°02.5 | 15.0' | 55.9' |
| 7 | 285°37.4 | 10.8 | | 143°00.2 | 15.5' | 01°17.5 | 14.9' | 55.9' |
| 8 | 300°37.5 | 11.5 | | 157°34.7 | 15.6' | 01°32.4 | 14.9' | 55.8' |
| 9 | 315°37.6 | · · 12.3 | | 172°09.3 | 15.6' | 01°47.3 | 14.9' | 55.8' |
| 10 | 330°37.7 | 13.1 | | 186°43.9 | 15.6' | 02°02.2 | 14.9' | 55.8' |
| 11 | 345°37.8 | 13.9 | | 201°18.4 | 15.6' | 02°17.1 | 14.9' | 55.8' |
| 12 | 0°37.9 | N14°14.7 | | 215°53.0 | 15.6' | S02°32.0 | 14.8' | 55.8' |
| 13 | 15°38.0 | 15.5 | | 230°27.6 | 15.6' | 02°46.8 | 14.8' | 55.7' |
| 14 | 30°38.1 | 16.2 | | 245°02.2 | 15.6' | 03°01.7 | 14.8' | 55.7' |
| 15 | 45°38.1 | · · 17.0 | | 259°36.8 | 15.6' | 03°16.5 | 14.8' | 55.7' |
| 16 | 60°38.2 | 17.8 | | 274°11.4 | 15.6' | 03°31.3 | 14.8' | 55.7' |
| 17 | 75°38.3 | 18.6 | | 288°46.0 | 15.6' | 03°46.0 | 14.7' | 55.7' |
| 18 | 90°38.4 | N14°19.4 | | 303°20.6 | 15.6' | S04°00.7 | 14.7' | 55.6' |
| 19 | 105°38.5 | 20.2 | | 317°55.3 | 15.6' | 04°15.5 | 14.7' | 55.6' |
| 20 | 120°38.6 | 20.9 | | 332°29.9 | 15.6' | 04°30.1 | 14.7' | 55.6' |
| 21 | 135°38.7 | · · 21.7 | | 347°04.5 | 15.6' | 04°44.8 | 14.6' | 55.6' |
| 22 | 150°38.8 | 22.5 | | 1°39.1 | 15.6' | 04°59.4 | 14.6' | 55.6' |
| 23 | 165°38.9 | 23.3 | | 16°13.7 | 15.6' | 05°14.0 | 14.6' | 55.5' |
| SD = 15.9' $d = 0.8'$ | | | | | | | | |
| SD = 15.3' | | | | | | | | |

| Wed | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|----------|-------|----------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°39.0 | N14°24.1 | | 30°48.3 | 15.6' | S05°28.6 | 14.5' | 55.5' |
| 1 | 195°39.0 | 24.8 | | 45°22.9 | 15.6' | 05°43.1 | 14.5' | 55.5' |
| 2 | 210°39.1 | 25.6 | | 59°57.5 | 15.6' | 05°57.6 | 14.5' | 55.5' |
| 3 | 225°39.2 | · · 26.4 | | 74°32.1 | 15.6' | 06°12.1 | 14.4' | 55.5' |
| 4 | 240°39.3 | 27.2 | | 89°06.6 | 15.6' | 06°26.5 | 14.4' | 55.4' |
| 5 | 255°39.4 | 27.9 | | 103°41.2 | 15.6' | 06°40.9 | 14.4' | 55.4' |
| 6 | 270°39.5 | N14°28.7 | | 118°15.8 | 15.5' | S06°55.3 | 14.3' | 55.4' |
| 7 | 285°39.6 | 29.5 | | 132°50.3 | 15.5' | 07°09.6 | 14.3' | 55.4' |
| 8 | 300°39.7 | 30.3 | | 147°24.8 | 15.5' | 07°23.9 | 14.3' | 55.4' |
| 9 | 315°39.7 | · · 31.0 | | 161°59.4 | 15.5' | 07°38.2 | 14.2' | 55.3' |
| 10 | 330°39.8 | 31.8 | | 176°33.9 | 15.5' | 07°52.4 | 14.2' | 55.3' |
| 11 | 345°39.9 | 32.6 | | 191°08.3 | 15.5' | 08°06.6 | 14.1' | 55.3' |
| 12 | 0°40.0 | N14°33.4 | | 205°42.8 | 15.5' | S08°20.7 | 14.1' | 55.3' |
| 13 | 15°40.1 | 34.1 | | 220°17.3 | 15.4' | 08°34.8 | 14.1' | 55.3' |
| 14 | 30°40.2 | 34.9 | | 234°51.7 | 15.4' | 08°48.9 | 14.0' | 55.3' |
| 15 | 45°40.2 | · · 35.7 | | 249°26.1 | 15.4' | 09°02.9 | 14.0' | 55.2' |
| 16 | 60°40.3 | 36.5 | | 264°00.5 | 15.4' | 09°16.9 | 13.9' | 55.2' |
| 17 | 75°40.4 | 37.2 | | 278°34.9 | 15.4' | 09°30.8 | 13.9' | 55.2' |
| 18 | 90°40.5 | N14°38.0 | | 293°09.2 | 15.3' | S09°44.7 | 13.8' | 55.2' |
| 19 | 105°40.6 | 38.8 | | 307°43.6 | 15.3' | 09°58.5 | 13.8' | 55.2' |
| 20 | 120°40.7 | 39.5 | | 322°17.9 | 15.3' | 10°12.3 | 13.7' | 55.1' |
| 21 | 135°40.8 | · · 40.3 | | 336°52.2 | 15.3' | 10°26.0 | 13.7' | 55.1' |
| 22 | 150°40.8 | 41.1 | | 351°26.4 | 15.2' | 10°39.7 | 13.6' | 55.1' |
| 23 | 165°40.9 | 41.8 | | 6°00.6 | 15.2' | 10°53.3 | 13.6' | 55.1' |
| SD = 15.9' $d = 0.8'$ | | | | | | | | |
| SD = 15.1' | | | | | | | | |

| Thu | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|----------|-------|----------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°41.0 | N14°42.6 | | 20°34.8 | 15.2' | S11°06.9 | 13.5' | 55.1' |
| 1 | 195°41.1 | 43.4 | | 35°09.0 | 15.1' | 11°20.5 | 13.5' | 55.1' |
| 2 | 210°41.2 | 44.2 | | 49°43.2 | 15.1' | 11°33.9 | 13.4' | 55.0' |
| 3 | 225°41.3 | · · 44.9 | | 64°17.3 | 15.1' | 11°47.4 | 13.4' | 55.0' |
| 4 | 240°41.3 | 45.7 | | 78°51.4 | 15.1' | 12°00.7 | 13.3' | 55.0' |
| 5 | 255°41.4 | 46.5 | | 93°25.4 | 15.0' | 12°14.1 | 13.3' | 55.0' |
| 6 | 270°41.5 | N14°47.2 | | 107°59.4 | 15.0' | S12°27.3 | 13.2' | 55.0' |
| 7 | 285°41.6 | 48.0 | | 122°33.4 | 15.0' | 12°40.5 | 13.1' | 55.0' |
| 8 | 300°41.7 | 48.8 | | 137°07.4 | 14.9' | 12°53.7 | 13.1' | 54.9' |
| 9 | 315°41.7 | · · 49.5 | | 151°41.3 | 14.9' | 13°06.7 | 13.0' | 54.9' |
| 10 | 330°41.8 | 50.3 | | 166°15.2 | 14.8' | 13°19.8 | 13.0' | 54.9' |
| 11 | 345°41.9 | 51.0 | | 180°49.0 | 14.8' | 13°32.7 | 12.9' | 54.9' |
| 12 | 0°42.0 | N14°51.8 | | 195°22.8 | 14.8' | S13°45.6 | 12.8' | 54.9' |
| 13 | 15°42.1 | 52.6 | | 209°56.6 | 14.7' | 13°58.5 | 12.8' | 54.9' |
| 14 | 30°42.1 | 53.3 | | 224°30.3 | 14.7' | 14°11.3 | 12.7' | 54.9' |
| 15 | 45°42.2 | · · 54.1 | | 239°04.0 | 14.7' | 14°24.0 | 12.6' | 54.8' |
| 16 | 60°42.3 | 54.9 | | 253°37.7 | 14.6' | 14°36.6 | 12.6' | 54.8' |
| 17 | 75°42.4 | 55.6 | | 268°11.3 | 14.6' | 14°49.2 | 12.5' | 54.8' |
| 18 | 90°42.5 | N14°56.4 | | 282°44.9 | 14.5' | S15°01.7 | 12.4' | 54.8' |
| 19 | 105°42.5 | 57.1 | | 297°18.4 | 14.5' | 15°14.2 | 12.4' | 54.8' |
| 20 | 120°42.6 | 57.9 | | 311°51.9 | 14.4' | 15°26.5 | 12.3' | 54.8' |
| 21 | 135°42.7 | · · 58.7 | | 326°25.3 | 14.4' | 15°38.9 | 12.2' | 54.8' |
| 22 | 150°42.8 | 14°59.4 | | 340°58.7 | 14.4' | 15°51.1 | 12.2' | 54.7' |
| 23 | 165°42.9 | 15°00.2 | | 355°32.1 | 14.3' | 16°03.3 | 12.1' | 54.7' |
| SD = 15.9' $d = 0.8'$ | | | | | | | | |
| SD = 15.0' | | | | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | //// | 02:09 | 21:52 | //// | //// |
| N 70° | //// | //// | 02:43 | 21:16 | //// | //// |
| 68° | //// | 01:27 | 03:07 | 20:51 | 22:36 | //// |
| 66° | //// | 02:08 | 03:25 | 20:32 | 21:52 | //// |
| 64° | //// | 02:35 | 03:40 | 20:16 | 21:24 | //// |
| 62° | 01:17 | 02:55 | 03:53 | 20:04 | 21:02 | 22:45 |
| 60° | 01:53 | 03:12 | 04:04 | 19:53 | 20:45 | 22:06 |
| N 58° | 02:18 | 03:25 | 04:13 | 19:43 | 20:31 | 21:40 |
| 56° | 02:38 | 03:37 | 04:21 | 19:35 | 20:19 | 21:20 |
| 54° | 02:53 | 03:47 | 04:28 | 19:28 | 20:09 | 21:03 |
| 52° | 03:07 | 03:56 | 04:34 | 19:21 | 20:00 | 20:50 |
| 50° | 03:18 | 04:04 | 04:40 | 19:16 | 19:52 | 20:38 |
| 45° | 03:41 | 04:20 | 04:53 | 19:03 | 19:35 | 20:15 |
| N 40° | 03:58 | 04:34 | 05:03 | 18:53 | 19:22 | 19:57 |
| 35° | 04:12 | 04:45 | 05:11 | 18:44 | 19:11 | 19:43 |
| 30° | 04:24 | 04:54 | 05:19 | 18:36 | 19:01 | 19:31 |
| 20° | 04:42 | 05:09 | 05:32 | 18:23 | 18:46 | 19:13 |
| N 10° | 04:56 | 05:22 | 05:43 | 18:11 | 18:33 | 18:59 |
| 0° | 05:08 | 05:33 | 05:54 | 18:01 | 18:22 | 18:47 |
| S 10° | 05:18 | 05:43 | 06:04 | 17:50 | 18:12 | 18:37 |
| 20° | 05:26 | 05:53 | 06:15 | 17:39 | 18:02 | 18:28 |
| 30° | 05:35 | 06:03 | 06:28 | 17:27 | 17:51 | 18:20 |
| 35° | 05:39 | 06:09 | 06:35 | 17:19 | 17:46 | 18:16 |
| 40° | 05:43 | 06:15 | 06:43 | 17:11 | 17:39 | 18:11 |
| 45° | 05:47 | 06:22 | 06:52 | 17:02 | 17:32 | 18:07 |
| S 50° | 05:51 | 06:30 | 07:04 | 16:50 | 17:24 | 18:03 |
| 52° | 05:53 | 06:33 | 07:09 | 16:45 | 17:21 | 18:01 |
| 54° | 05:55 | 06:37 | 07:15 | 16:39 | 17:17 | 17:59 |
| 56° | 05:57 | 06:41 | 07:21 | 16:33 | 17:13 | 17:57 |
| 58° | 05:59 | 06:46 | 07:28 | 16:26 | 17:08 | 17:54 |
| S 60° | 06:01 | 06:51 | 07:36 | 16:18 | 17:03 | 17:52 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | 16:31 | 18:40 | 21:17 | 03:16 | 02:43 | 02:03 |
| N 70° | 16:25 | 18:23 | 20:35 | 03:16 | 02:51 | 02:22 |
| 68° | 16:21 | 18:10 | 20:07 | 03:17 | 02:58 | 02:38 |
| 66° | 16:17 | 17:59 | 19:46 | 03:17 | 03:04 | 02:50 |
| 64° | 16:14 | 17:50 | 19:30 | 03:18 | 03:09 | 03:00 |
| 62° | 16:11 | 17:43 | 19:16 | 03:18 | 03:14 | 03:09 |
| 60° | 16:09 | 17:36 | 19:05 | 03:18 | 03:18 | 03:17 |
| N 58° | 16:07 | 17:30 | 18:55 | 03:19 | 03:21 | 03:24 |
| 56° | 16:05 | 17:25 | 18:46 | 03:19 | 03:24 | 03:30 |
| 54° | 16:04 | 17:21 | 18:38 | 03:19 | 03:27 | 03:36 |
| 52° | 16:02 | 17:17 | 18:32 | 03:19 | 03:29 | 03:41 |
| 50° | 16:01 | 17:13 | 18:26 | 03:19 | 03:32 | 03:45 |
| 45° | 15:58 | 17:05 | 18:12 | 03:20 | 03:37 | 03:55 |
| N 40° | 15:55 | 16:58 | 18:02 | 03:20 | 03:41 | 04:03 |
| 35° | 15:53 | 16:53 | 17:53 | 03:20 | 03:45 | 04:10 |
| 30° | 15:52 | 16:48 | 17:45 | 03:20 | 03:48 | 04:16 |
| 20° | 15:48 | 16:39 | 17:31 | 03:21 | 03:54 | 04:27 |
| N 10° | 15:46 | 16:32 | 17:19 | 03:21 | 03:59 | 04:37 |
| 0° | 15:43 | 16:25 | 17:08 | 03:21 | 04:03 | 04:45 |
| S 10° | 15:41 | 16:18 | 16:57 | 03:22 | 04:08 | 04:54 |
| 20° | 15:38 | 16:11 | 16:45 | 03:22 | 04:13 | 05:04 |
| 30° | 15:35 | 16:03 | 16:32 | 03:22 | 04:19 | 05:15 |
| 35° | 15:33 | 15:58 | 16:24 | 03:22 | 04:22 | 05:22 |
| 40° | 15:32 | 15:53 | 16:16 | 03:23 | 04:26 | 05:29 |
| 45° | 15:29 | 15:47 | 16:06 | 03:23 | 04:30 | 05:37 |
| S 50° | 15:27 | 15:40 | 15:54 | 03:23 | 04:36 | 05:48 |
| 52° | 15:26 | 15:36 | 15:48 | 03:23 | 04:38 | 05:53 |
| 54° | 15:24 | 15:33 | 15:42 | 03:23 | 04:41 | 05:58 |
| 56° | 15:23 | 15:29 | 15:35 | 03:23 | 04:44 | 06:04 |
| 58° | 15:21 | 15:24 | 15:28 | 03:24 | 04:47 | 06:11 |
| S 60° | 15:20 | 15:19 | 15:19 | 03:24 | 04:51 | 06:18 |

| Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|---------------------|----------|-------------------|----------|---------------------|----------|-------------------|----------|
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 218°56.4 | 152°33.3 | N22°34.5 | 203°30.7 | N05°37.2 | 108°24.1 | N22°29.4 | 209°40.9 | N01°37.7 |
| 1 | 233°58.9 | 167°32.5 | 35.1 | 218°31.4 | 37.9 | 123°26.2 | 29.4 | 224°43.1 | 37.8 |
| 2 | 249°01.3 | 182°31.8 | 35.7 | 233°32.1 | 38.7 | 138°28.3 | 29.3 | 239°45.3 | 37.9 |
| 3 | 264°03.8 | 197°31.0 | •• 36.2 | 248°32.8 | •• 39.4 | 153°30.4 | •• 29.3 | 254°47.5 | •• 38.0 |
| 4 | 279°06.3 | 212°30.3 | 36.8 | 263°33.5 | 40.2 | 168°32.5 | 29.2 | 269°49.8 | 38.1 |
| 5 | 294°08.7 | 227°29.5 | 37.4 | 278°34.1 | 40.9 | 183°34.6 | 29.2 | 284°52.0 | 38.2 |
| 6 | 309°11.2 | 242°28.7 | N22°38.0 | 293°34.8 | N05°41.7 | 198°36.6 | N22°29.1 | 299°54.2 | N01°38.3 |
| 7 | 324°13.6 | 257°28.0 | 38.6 | 308°35.5 | 42.4 | 213°38.7 | 29.1 | 314°56.4 | 38.4 |
| 8 | 339°16.1 | 272°27.2 | 39.2 | 323°36.2 | 43.2 | 228°40.8 | 29.0 | 329°58.6 | 38.5 |
| 9 | 354°18.6 | 287°26.5 | •• 39.7 | 338°36.9 | •• 43.9 | 243°42.9 | •• 29.0 | 345°00.8 | •• 38.6 |
| 10 | 9°21.0 | 302°25.7 | 40.3 | 353°37.6 | 44.7 | 258°45.0 | 28.9 | 0°03.0 | 38.7 |
| 11 | 24°23.5 | 317°25.0 | 40.9 | 8°38.3 | 45.4 | 273°47.1 | 28.9 | 15°05.2 | 38.8 |
| 12 | 39°26.0 | 332°24.2 | N22°41.5 | 23°39.0 | N05°46.2 | 288°49.2 | N22°28.8 | 30°07.4 | N01°39.9 |
| 13 | 54°28.4 | 347°23.5 | 42.1 | 38°39.7 | 46.9 | 303°51.3 | 28.8 | 45°09.6 | 39.1 |
| 14 | 69°30.9 | 2°22.7 | 42.6 | 53°40.4 | 47.7 | 318°53.4 | 28.8 | 60°11.8 | 39.2 |
| 15 | 84°33.4 | 17°21.9 | •• 43.2 | 68°41.1 | •• 48.4 | 333°55.4 | •• 28.7 | 75°14.0 | •• 39.3 |
| 16 | 99°35.8 | 32°21.2 | 43.8 | 83°41.8 | 49.1 | 348°57.5 | 28.7 | 90°16.2 | 39.4 |
| 17 | 114°38.3 | 47°20.4 | 44.4 | 98°42.5 | 49.9 | 3°59.6 | 28.6 | 105°18.4 | 39.5 |
| 18 | 129°40.8 | 62°19.7 | N22°44.9 | 113°43.2 | N05°50.6 | 19°01.7 | N22°28.6 | 120°20.6 | N01°39.6 |
| 19 | 144°43.2 | 77°18.9 | 45.5 | 128°43.8 | 51.4 | 34°03.8 | 28.5 | 135°22.8 | 39.7 |
| 20 | 159°45.7 | 92°18.1 | 46.1 | 143°44.5 | 52.1 | 49°05.9 | 28.5 | 150°25.0 | 39.8 |
| 21 | 174°48.1 | 107°17.4 | •• 46.6 | 158°45.2 | •• 52.9 | 64°08.0 | •• 28.4 | 165°27.2 | •• 39.9 |
| 22 | 189°50.6 | 122°16.6 | 47.2 | 173°45.9 | 53.6 | 79°10.0 | 28.4 | 180°29.4 | 40.0 |
| 23 | 204°53.1 | 137°15.9 | 47.8 | 188°46.6 | 54.4 | 94°12.1 | 28.3 | 195°31.6 | 40.1 |
| Mer.pass. 09:23 | | ν-0.8' d0.6' m-3.92 | | ν0.7' d0.8' m1.23 | | ν2.1' d-0.0' m-2.01 | | ν2.2' d0.1' m0.93 | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 219°55.5 | 152°15.1 | N22°48.3 | 203°47.3 | N05°55.1 | 109°14.2 | N22°28.3 | 210°33.8 | N01°40.2 |
| 1 | 234°58.0 | 167°14.3 | 48.9 | 218°48.0 | 55.9 | 124°16.3 | 28.2 | 225°36.0 | 40.3 |
| 2 | 250°00.5 | 182°13.6 | 49.5 | 233°48.7 | 56.6 | 139°18.4 | 28.2 | 240°38.2 | 40.4 |
| 3 | 265°02.9 | 197°12.8 | •• 50.0 | 248°49.4 | •• 57.4 | 154°20.5 | •• 28.1 | 255°40.4 | •• 40.5 |
| 4 | 280°05.4 | 212°12.1 | 50.6 | 263°50.1 | 58.1 | 169°22.6 | 28.1 | 270°42.6 | 40.6 |
| 5 | 295°07.9 | 227°11.3 | 51.1 | 278°50.8 | 58.9 | 184°24.6 | 28.0 | 285°44.8 | 40.7 |
| 6 | 310°10.3 | 242°10.5 | N22°51.7 | 293°51.5 | N05°59.6 | 199°26.7 | N22°28.0 | 300°47.1 | N01°40.8 |
| 7 | 325°12.8 | 257°09.8 | 52.3 | 308°52.2 | 06°00.4 | 214°28.8 | 27.9 | 315°49.3 | 40.9 |
| 8 | 340°15.2 | 272°09.0 | 52.8 | 323°52.9 | 01.1 | 229°30.9 | 27.9 | 330°51.5 | 41.1 |
| 9 | 355°17.7 | | | | | | | | |

<https://pypi.org/project/skyalmanac/>

| h | Sun | | Moon | | | | |
|------------|----------|----------|------------|-------|----------|-------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| Fri | | | | | | | |
| 0 | 180°42.9 | N15°00.9 | 10°05.4 | 14.3' | S16°15.4 | 12.0' | 54.7' |
| 1 | 195°43.0 | 01.7 | 24°38.7 | 14.2' | 16°27.4 | 12.0' | 54.7' |
| 2 | 210°43.1 | 02.5 | 39°11.9 | 14.2' | 16°39.3 | 11.9' | 54.7' |
| 3 | 225°43.2 | 03.2 | 53°45.1 | 14.1' | 16°51.2 | 11.8' | 54.7' |
| 4 | 240°43.2 | 04.0 | 68°18.2 | 14.1' | 17°03.0 | 11.7' | 54.7' |
| 5 | 255°43.3 | 04.7 | 82°51.3 | 14.0' | 17°14.7 | 11.6' | 54.6' |
| 6 | 270°43.4 | N15°05.5 | 97°24.3 | 14.0' | S17°26.4 | 11.6' | 54.6' |
| 7 | 285°43.5 | 06.2 | 111°57.3 | 13.9' | 17°37.9 | 11.5' | 54.6' |
| 8 | 300°43.5 | 07.0 | 126°30.3 | 13.9' | 17°49.4 | 11.4' | 54.6' |
| 9 | 315°43.6 | 07.7 | 141°03.2 | 13.8' | 18°00.8 | 11.3' | 54.6' |
| 10 | 330°43.7 | 08.5 | 155°36.0 | 13.8' | 18°12.2 | 11.2' | 54.6' |
| 11 | 345°43.8 | 09.3 | 170°08.8 | 13.7' | 18°23.4 | 11.2' | 54.6' |
| 12 | 0°43.8 | N15°10.0 | 184°41.5 | 13.7' | S18°34.6 | 11.1' | 54.5' |
| 13 | 15°43.9 | 10.8 | 199°14.2 | 13.6' | 18°45.7 | 11.0' | 54.5' |
| 14 | 30°44.0 | 11.5 | 213°46.8 | 13.6' | 18°56.7 | 10.9' | 54.5' |
| 15 | 45°44.1 | 12.3 | 228°19.4 | 13.5' | 19°07.6 | 10.8' | 54.5' |
| 16 | 60°44.1 | 13.0 | 242°52.0 | 13.5' | 19°18.4 | 10.7' | 54.5' |
| 17 | 75°44.2 | 13.8 | 257°24.4 | 13.4' | 19°29.1 | 10.7' | 54.5' |
| 18 | 90°44.3 | N15°14.5 | 271°56.9 | 13.4' | S19°39.8 | 10.6' | 54.5' |
| 19 | 105°44.4 | 15.3 | 286°29.2 | 13.3' | 19°50.4 | 10.5' | 54.5' |
| 20 | 120°44.4 | 16.0 | 301°01.6 | 13.3' | 20°00.8 | 10.4' | 54.4' |
| 21 | 135°44.5 | 16.8 | 315°33.8 | 13.2' | 20°11.2 | 10.3' | 54.4' |
| 22 | 150°44.6 | 17.5 | 330°06.0 | 13.2' | 20°21.5 | 10.2' | 54.4' |
| 23 | 165°44.6 | 18.3 | 344°38.2 | 13.1' | 20°31.7 | 10.1' | 54.4' |
| SD = 15.9' | | | SD = 14.9' | | | | |

| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 180°44.7 | N15°19.0 | 359°10.3 | 13.1' | S20°41.8 | 10.0' | 54.4' |
| 1 | 195°44.8 | 19.8 | 13°42.4 | 13.0' | 20°51.8 | 9.9' | 54.4' |
| 2 | 210°44.9 | 20.5 | 28°14.4 | 12.9' | 21°01.8 | 9.8' | 54.4' |
| 3 | 225°44.9 | 21.3 | 42°46.3 | 12.9' | 21°11.6 | 9.7' | 54.4' |
| 4 | 240°45.0 | 22.0 | 57°18.2 | 12.8' | 21°21.3 | 9.6' | 54.4' |
| 5 | 255°45.1 | 22.7 | 71°50.0 | 12.8' | 21°30.9 | 9.5' | 54.3' |
| 6 | 270°45.1 | N15°23.5 | 86°21.8 | 12.7' | S21°40.5 | 9.4' | 54.3' |
| 7 | 285°45.2 | 24.2 | 100°53.5 | 12.7' | 21°49.9 | 9.3' | 54.3' |
| 8 | 300°45.3 | 25.0 | 115°25.2 | 12.6' | 21°59.2 | 9.2' | 54.3' |
| 9 | 315°45.4 | 25.7 | 129°56.8 | 12.6' | 22°08.5 | 9.1' | 54.3' |
| 10 | 330°45.4 | 26.5 | 144°28.4 | 12.5' | 22°17.6 | 9.0' | 54.3' |
| 11 | 345°45.5 | 27.2 | 158°59.9 | 12.4' | 22°26.7 | 8.9' | 54.3' |
| 12 | 0°45.6 | N15°28.0 | 173°31.3 | 12.4' | S22°35.6 | 8.8' | 54.3' |
| 13 | 15°45.6 | 28.7 | 188°02.7 | 12.3' | 22°44.4 | 8.7' | 54.3' |
| 14 | 30°45.7 | 29.4 | 202°34.0 | 12.3' | 22°53.1 | 8.6' | 54.3' |
| 15 | 45°45.8 | 30.2 | 217°05.3 | 12.2' | 23°01.8 | 8.5' | 54.2' |
| 16 | 60°45.8 | 30.9 | 231°36.6 | 12.2' | 23°10.3 | 8.4' | 54.2' |
| 17 | 75°45.9 | 31.7 | 246°07.7 | 12.1' | 23°18.7 | 8.3' | 54.2' |
| 18 | 90°46.0 | N15°32.4 | 260°38.9 | 12.1' | S23°27.0 | 8.2' | 54.2' |
| 19 | 105°46.0 | 33.1 | 275°09.9 | 12.0' | 23°35.2 | 8.1' | 54.2' |
| 20 | 120°46.1 | 33.9 | 289°40.9 | 12.0' | 23°43.3 | 8.0' | 54.2' |
| 21 | 135°46.2 | 34.6 | 304°11.9 | 11.9' | 23°51.2 | 7.9' | 54.2' |
| 22 | 150°46.2 | 35.4 | 318°42.8 | 11.9' | 23°59.1 | 7.8' | 54.2' |
| 23 | 165°46.3 | 36.1 | 333°13.7 | 11.8' | 24°06.8 | 7.6' | 54.2' |
| SD = 15.9' | | | SD = 14.8' | | | | |

| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|-------|----------|------|-------|
| 0 | 180°46.4 | N15°36.8 | 347°44.5 | 11.8' | S24°14.5 | 7.5' | 54.2' |
| 1 | 195°46.4 | 37.6 | 2°15.2 | 11.7' | 24°22.0 | 7.4' | 54.2' |
| 2 | 210°46.5 | 38.3 | 16°45.9 | 11.6' | 24°29.4 | 7.3' | 54.1' |
| 3 | 225°46.6 | 39.0 | 31°16.6 | 11.6' | 24°36.7 | 7.2' | 54.1' |
| 4 | 240°46.6 | 39.8 | 45°47.2 | 11.5' | 24°43.9 | 7.1' | 54.1' |
| 5 | 255°46.7 | 40.5 | 60°17.7 | 11.5' | 24°51.0 | 7.0' | 54.1' |
| 6 | 270°46.8 | N15°41.2 | 74°48.2 | 11.4' | S24°58.0 | 6.8' | 54.1' |
| 7 | 285°46.8 | 42.0 | 89°18.7 | 11.4' | 25°04.8 | 6.7' | 54.1' |
| 8 | 300°46.9 | 42.7 | 103°49.0 | 11.3' | 25°11.5 | 6.6' | 54.1' |
| 9 | 315°47.0 | 43.4 | 118°19.4 | 11.3' | 25°18.1 | 6.5' | 54.1' |
| 10 | 330°47.0 | 44.2 | 132°49.7 | 11.3' | 25°24.6 | 6.4' | 54.1' |
| 11 | 345°47.1 | 44.9 | 147°19.9 | 11.2' | 25°31.0 | 6.2' | 54.1' |
| 12 | 0°47.2 | N15°45.6 | 161°50.2 | 11.2' | S25°37.2 | 6.1' | 54.1' |
| 13 | 15°47.2 | 46.4 | 176°20.3 | 11.1' | 25°43.4 | 6.0' | 54.1' |
| 14 | 30°47.3 | 47.1 | 190°50.4 | 11.1' | 25°49.4 | 5.9' | 54.1' |
| 15 | 45°47.3 | 47.8 | 205°20.5 | 11.0' | 25°55.3 | 5.8' | 54.1' |
| 16 | 60°47.4 | 48.6 | 219°50.5 | 11.0' | 26°01.0 | 5.6' | 54.1' |
| 17 | 75°47.5 | 49.3 | 234°20.5 | 10.9' | 26°06.7 | 5.5' | 54.0' |
| 18 | 90°47.5 | N15°50.0 | 248°50.4 | 10.9' | S26°12.2 | 5.4' | 54.0' |
| 19 | 105°47.6 | 50.8 | 263°20.3 | 10.9' | 26°17.6 | 5.3' | 54.0' |
| 20 | 120°47.6 | 51.5 | 277°50.2 | 10.8' | 26°22.8 | 5.1' | 54.0' |
| 21 | 135°47.7 | 52.2 | 292°20.0 | 10.8' | 26°28.0 | 5.0' | 54.0' |
| 22 | 150°47.8 | 52.9 | 306°49.7 | 10.7' | 26°33.0 | 4.9' | 54.0' |
| 23 | 165°47.8 | 53.7 | 321°19.5 | 10.7' | 26°37.9 | 4.8' | 54.0' |
| SD = 15.9' | | | SD = 14.8' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | //// | 01:44 | 22:18 | //// | //// |
| N 70° | //// | //// | 02:25 | 21:33 | //// | //// |
| 68° | //// | 00:55 | 02:53 | 21:05 | 23:12 | //// |
| 66° | //// | 01:49 | 03:14 | 20:43 | 22:10 | //// |
| 64° | //// | 02:21 | 03:30 | 20:26 | 21:37 | //// |
| 62° | 00:49 | 02:44 | 03:44 | 20:12 | 21:13 | 23:17 |
| 60° | 01:37 | 03:02 | 03:55 | 20:00 | 20:55 | 22:22 |
| N 58° | 02:06 | 03:17 | 04:05 | 19:50 | 20:39 | 21:51 |
| 56° | 02:27 | 03:29 | 04:14 | 19:41 | 20:26 | 21:29 |
| 54° | 02:45 | 03:40 | 04:22 | 19:33 | 20:15 | 21:12 |
| 52° | 02:59 | 03:50 | 04:29 | 19:26 | 20:06 | 20:57 |
| 50° | 03:11 | 03:58 | 04:35 | 19:20 | 19:57 | 20:45 |
| 45° | 03:35 | 04:16 | 04:48 | 19:07 | 19:39 | 20:20 |
| N 40° | 03:54 | 04:30 | 04:59 | 18:56 | 19:25 | 20:01 |
| 35° | 04:09 | 04:41 | 05:08 | 18:46 | 19:13 | 19:46 |
| 30° | 04:21 | 04:51 | 05:16 | 18:38 | 19:03 | 19:34 |
| 20° | 04:40 | 05:07 | 05:30 | 18:24 | 18:47 | 19:14 |
| N 10° | 04:55 | 05:21 | 05:42 | 18:12 | 18:34 | 18:59 |
| 0° | 05:07 | 05:32 | 05:54 | 18:00 | 18:22 | 18:47 |
| S 10° | 05:18 | 05:43 | 06:05 | 17:49 | 18:11 | 18:36 |
| 20° | 05:27 | 05:54 | 06:16 | 17:37 | 18:00 | 18:26 |
| 30° | 05:36 | 06:05 | 06:30 | 17:24 | 17:49 | 18:17 |
| 35° | 05:41 | 06:11 | 06:37 | 17:16 | 17:43 | 18:13 |
| 40° | 05:45 | 06:18 | 06:46 | 17:08 | 17:36 | 18:08 |
| 45° | 05:50 | 06:25 | 06:56 | 16:57 | 17:28 | 18:03 |
| S 50° | 05:55 | 06:34 | 07:08 | 16:45 | 17:20 | 17:58 |
| 52° | 05:57 | 06:38 | 07:14 | 16:40 | 17:16 | 17:56 |
| 54° | 06:00 | 06:42 | 07:20 | 16:33 | 17:11 | 17:53 |
| 56° | 06:02 | 06:47 | 07:27 | 16:26 | 17:07 | 17:51 |
| 58° | 06:05 | 06:52 | 07:34 | 16:19 | 17:01 | 17:48 |
| S 60° | 06:07 | 06:57 | 07:43 | 16:10 | 16:56 | 17:45 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | ██ | ██ | ██ | 00:57 | ██ | ██ |
| N 70° | ██ | ██ | ██ | 01:41 | ██ | ██ |
| 68° | 22:33 | ██ | ██ | 02:10 | 01:18 | ██ |
| 66° | 21:46 | ██ | ██ | 02:33 | 02:06 | ██ |
| 64° | 21:16 | 23:17 | ██ | 02:50 | 02:37 | 02:14 |
| 62° | 20:53 | 22:36 | | 03:05 | 03:00 | 02:55 |
| 60° | 20:36 | 22:09 | 23:40 | 03:17 | 03:19 | 03:24 |
| N 58° | 20:21 | 21:47 | 23:10 | 03:28 | 03:35 | 03:46 |
| 56° | 20:08 | 21:30 | 22:47 | 03:38 | 03:48 | 04:04 |
| 54° | 19:57 | 21:15 | 22:29 | 03:46 | 04:00 | 04:19 |
| 52° | 19:47 | 21:02 | 22:13 | 03:54 | 04:10 | 04:32 |
| 50° | 19:38 | 20:51 | 22:00 | 04:00 | 04:19 | 04:44 |
| 45° | 19:20 | 20:27 | 21:32 | 04:15 | 04:39 | 05:08 |
| N 40° | 19:05 | 20:09 | 21:10 | 04:27 | 04:55 | 05:27 |
| 35° | 18:53 | 19:53 | 20:52 | 04:37 | 05:08 | 05:44 |
| 30° | 18:42 | 19:40 | 20:37 | 04:47 | 05:20 | 05:58 |
| 20° | 18:23 | 19:17 | 20:11 | 05:02 | 05:40 | 06:22 |
| N 10° | 18:07 | 18:57 | 19:49 | 05:16 | 05:58 | 06:43 |
| 0° | 17:52 | 18:39 | 19:28 | 05:29 | 06:15 | 07:02 |
| S 10° | 17:38 | 18:21 | 19:07 | 05:42 | 06:31 | 07:22 |
| 20° | 17:22 | 18:02 | 18:45 | 05:56 | 06:49 | 07:43 |
| 30° | 17:04 | 17:39 | 18:20 | 06:12 | 07:10 | 08:08 |
| 35° | 16:53 | 17:26 | 18:05 | 06:22 | 07:22 | 08:22 |
| 40° | 16:41 | 17:12 | 17:47 | 06:32 | 07:36 | 08:39 |
| 45° | 16:28 | 16:54 | 17:27 | 06:45 | 07:53 | 08:59 |
| S 50° | 16:11 | 16:32 | 17:00 | 07:01 | 08:13 | 09:24 |
| 52° | 16:03 | 16:22 | 16:48 | 07:08 | 08:23 | 09:37 |
| 54° | 15:54 | 16:10 | 16:33 | 07:16 | 08:34 | 09:51 |
| 56° | 15:44 | 15:57 | 16:16 | 07:25 | 08:47 | 10:07 |
| 58° | 15:33 | 15:41 | 15:56 | 07:36 | 09:02 | 10:27 |
| S 60° | 15:20 | 15:23 | 15:31 | 07:48 | 09:20 | 10:52 |

| Day | Sun | | | Moon | | |
|-----|---|--------------------------|-----------------------|-----------------------------|----------------|------------------------|
| | Eqn.of Time 00 ^h mm:ss | 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 14-16 99-98% |
| 01 | 02:52 | 02:55 | 11:57 | —:— | 11:41 | |
| 02 | 02:59 | 03:02 | 11:57 | 00:03 | 12:27 | |
| 03 | 03:05 | 03:09 | 11:57 | 00:51 | 13:15 | |

May 04, 05, 06 UT (Mon., Tue., Wed.)


| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|---------------------|----------|----------|-------------------|----------|----------|---------------------|----------|---------|-------------------|-----|--------|-----|-----|
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 221°53.8 | 151°38.2 | N23°14.2 | 204°20.6 | N06°30.9 | 110°54.1 | N22°25.9 | 212°19.7 | N01°45.2 | | | | | | |
| 1 | 236°56.3 | 166°37.4 | 14.7 | 219°21.2 | 31.6 | 125°56.1 | 25.9 | 227°21.9 | 45.3 | | | | | | |
| 2 | 251°58.7 | 181°36.6 | 15.2 | 234°21.9 | 32.3 | 140°58.2 | 25.8 | 242°24.1 | 45.4 | | | | | | |
| 3 | 267°01.2 | 196°35.9 | •• 15.7 | 249°22.6 | •• 33.1 | 156°00.3 | •• 25.8 | 257°26.3 | •• 45.5 | | | | | | |
| 4 | 282°03.7 | 211°35.1 | 16.2 | 264°23.3 | 33.8 | 171°02.4 | 25.7 | 272°28.5 | 45.6 | | | | | | |
| 5 | 297°06.1 | 226°34.3 | 16.7 | 279°24.0 | 34.6 | 186°04.4 | 25.7 | 287°30.7 | 45.7 | | | | | | |
| 6 | 312°08.6 | 241°33.5 | N23°17.2 | 294°24.7 | N06°35.3 | 201°06.5 | N22°25.6 | 302°32.9 | N01°45.8 | | | | | | |
| 7 | 327°11.1 | 256°32.7 | 17.7 | 309°25.4 | 36.0 | 216°08.6 | 25.6 | 317°35.2 | 45.9 | | | | | | |
| 8 | 342°13.5 | 271°32.0 | 18.2 | 324°26.1 | 36.8 | 231°10.7 | 25.5 | 332°37.4 | 46.0 | | | | | | |
| 9 | 357°16.0 | 286°31.2 | •• 18.7 | 339°26.8 | •• 37.5 | 246°12.7 | •• 25.5 | 347°39.6 | •• 46.1 | | | | | | |
| 10 | 12°18.5 | 301°30.4 | 19.2 | 354°27.5 | 38.3 | 261°14.8 | 25.4 | 2°41.8 | 46.2 | | | | | | |
| 11 | 27°20.9 | 316°29.6 | 19.7 | 9°28.2 | 39.0 | 276°16.9 | 25.4 | 17°44.0 | 46.3 | | | | | | |
| 12 | 42°23.4 | 331°28.8 | N23°20.2 | 24°28.9 | N06°39.7 | 291°18.9 | N22°25.3 | 32°46.2 | N01°46.4 | | | | | | |
| 13 | 57°25.8 | 346°28.1 | 20.7 | 39°29.6 | 40.5 | 306°21.0 | 25.3 | 47°48.4 | 46.6 | | | | | | |
| 14 | 72°28.3 | 1°27.3 | 21.2 | 54°30.2 | 41.2 | 321°23.1 | 25.2 | 62°50.6 | 46.7 | | | | | | |
| 15 | 87°30.8 | 16°26.5 | •• 21.7 | 69°30.9 | •• 42.0 | 336°25.2 | •• 25.2 | 77°52.8 | •• 46.8 | | | | | | |
| 16 | 102°33.2 | 31°25.7 | 22.2 | 84°31.6 | 42.7 | 351°27.2 | 25.1 | 92°55.0 | 46.9 | | | | | | |
| 17 | 117°35.7 | 46°24.9 | 22.7 | 99°32.3 | 43.4 | 6°29.3 | 25.1 | 107°57.2 | 47.0 | | | | | | |
| 18 | 132°38.2 | 61°24.2 | N23°23.2 | 114°33.0 | N06°44.2 | 21°31.4 | N22°25.0 | 122°59.4 | N01°47.1 | | | | | | |
| 19 | 147°40.6 | 76°23.4 | 23.7 | 129°33.7 | 44.9 | 36°33.4 | 25.0 | 138°01.7 | 47.2 | | | | | | |
| 20 | 162°43.1 | 91°22.6 | 24.2 | 144°34.4 | 45.7 | 51°35.5 | 24.9 | 153°03.9 | 47.3 | | | | | | |
| 21 | 177°45.6 | 106°21.8 | •• 24.6 | 159°35.1 | •• 46.4 | 66°37.6 | •• 24.8 | 168°06.1 | •• 47.4 | | | | | | |
| 22 | 192°48.0 | 121°21.0 | 25.1 | 174°35.8 | 47.1 | 81°39.7 | 24.8 | 183°08.3 | 47.5 | | | | | | |
| 23 | 207°50.5 | 136°20.2 | 25.6 | 189°36.5 | 47.9 | 96°41.7 | 24.7 | 198°10.5 | 47.6 | | | | | | |
| Mer.pass. 09:11 | | ν-0.8' d0.5' m-3.92 | | | ν0.7' d0.7' m1.23 | | | ν2.1' d-0.1' m-2.00 | | | ν2.2' d0.1' m0.93 | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 222°53.0 | 151°19.5 | N23°26.1 | 204°37.2 | N06°48.6 | 111°43.8 | N22°24.7 | 213°12.7 | N01°47.7 | | | | | | |
| 1 | 237°55.4 | 166°18.7 | 26.6 | 219°37.9 | 49.3 | 126°45.9 | 24.6 | 228°14.9 | 47.8 | | | | | | |
| 2 | 252°57.9 | 181°17.9 | 27.1 | 234°38.5 | 50.1 | 141°47.9 | 24.6 | 243°17.1 | 47.9 | | | | | | |
| 3 | 268°00.3 | 196°17.1 | •• 27.6 | 249°39.2 | •• 50.8 | 156°50.0 | •• 24.5 | 258°19.3 | •• 48.0 | | | | | | |
| 4 | 283°02.8 | 211°16.3 | 28.0 | 264°39.9 | 51.6 | 171°52.1 | 24.5 | 273°21.5 | 48.1 | | | | | | |
| 5 | 298°05.3 | 226°15.5 | 28.5 | 279°40.6 | 52.3 | 186°54.1 | 24.4 | 288°23.7 | 48.2 | | | | | | |
| 6 | 313°07.7 | 241°14.7 | N23°29.0 | 294°41.3 | N06°53.0 | 201°56.2 | N22°24.4 | 303°26.0 | N01°48.3 | | | | | | |
| 7 | 328°10.2 | 256°14.0 | 29.5 | 309°42.0 | 53.8 | 216°58.3 | 24.3 | 318°28.2 | 48.4 | | | | | | |
| 8 | 343°12.7 | 271°13.2 | 29.9 | 324°42.7 | 54.5 | 232°00.4 | 24.3 | 333°30.4 | 48.5 | | | | | | |
| 9 | 358°15.1 | 286°12.4 | •• 30.4 | 339°43.4 | •• 55.2 | 247°02.4 | •• 24.2 | 348°32.6 | •• 48.6 | | | | | | |
| 10 | 13°17.6 | 301°11.6 | 30.9 | 354°44.1 | 56.0 | 262°04.5 | 24.2 | 3°34.8 | 48.7 | | | | | | |
| 11 | 28°20.1 | 316°10.8 | 31.4 | 9°44.8 | 56.7 | 277°06.6 | 24.1 | 18°37.0 | 48.8 | | | | | | |
| 12 | 43°22.5 | 331°10.0 | N23°31.8 | 24°45.5 | N06°57.5 | 292°08.6 | N22°24.1 | 33°39.2 | N01°48.9 | | | | | | |
| 13 | 58°25.0 | 346°09.2 | 32.3 | 39°46.1 | 58.2 | 307°10.7 | 24.0 | 48°41.4 | 49.0 | | | | | | |
| 14 | 73°27.5 | 1°08.4 | 32.8 | 54°46.8 | 58.9 | 322°12.8 | 24.0 | 63°43.6 | 49.1 | | | | | | |
| 15 | 88°29.9 | 16°07.7 | •• 33.2 | 69°47.5 | 06°59.7 | 337°14.8 | •• 23.9 | 78°45.8 | •• 49.2 | | | | | | |
| 16 | 103°32.4 | 31°06.9 | 33.7 | 84°48.2 | 07°00.4 | 352°16.9 | 23.9 | 93°48.0 | 49.3 | | | | | | |
| 17 | 118°34.8 | 46°06.1 | 34.2 | 99°48.9 | 01.1 | 7°19.0 | 23.8 | 108°50.3 | 49.4 | | | | | | |
| 18 | 133°37.3 | 61°05.3 | N23°34.6 | 114°49.6 | N07°01.9 | 22°21.0 | N22°23.8 | 123°52.5 | N01°49.5 | | | | | | |
| 19 | 148°39.8 | 76°04.5 | 35.1 | 129°50.3 | 02.6 | 37°23.1 | 23.7 | 138°54.7 | 49.6 | | | | | | |
| 20 | 163°42.2 | 91°03.7 | 35.6 | 144°51.0 | 03.3 | 52°25.2 | 23.7 | 153°56.9 | 49.7 | | | | | | |
| 21 | 178°44.7 | 106°02.9 | •• 36.0 | 159°51.7 | •• 04.1 | 67°27.2 | •• 23.6 | 168°59.1 | •• 49.8 | | | | | | |
| 22 | 193°47.2 | 121°02.1 | 36.5 | 174°52.4 | 04.8 | 82°29.3 | 23.6 | 184°01.3 | 49.9 | | | | | | |
| 23 | 208°49.6 | 136°01.3 | 36.9 | 189°53.1 | 05.5 | 97°31.4 | 23.5 | 199°03.5 | 50.0 | | | | | | |
| Mer.pass. 09:07 | | ν-0.8' d0.5' m-3.92 | | | ν0.7' d0.7' m1.23 | | | ν2.1' d-0.1' m-1.99 | | | ν2.2' d0.1' m0.92 | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 223°52.1 | 151°00.5 | N23°37.4 | 204°53.7 | N07°06.3 | 112°33.4 | N22°23.5 | 214°05.7 | N01°50.1 | | | | | | |
| 1 | 238°54.6 | 165°59.7 | 37.9 | 219°54.4 | 07.0 | 127°35.5 | 23.4 | 229°07.9 | 50.2 | | | | | | |
| 2 | 253°57.0 | 180°59.0 | 38.3 | 234°55.1 | 07.7 | 142°37.6 | 23.3 | 244°10.1 | 50.3 | | | | | | |
| 3 | 268°59.5 | 195°58.2 | •• 38.8 | 249°55.8 | •• 08.5 | 157°39.6 | •• 23.3 | 259°12.4 | •• 50.4 | | | | | | |
| 4 | 284°02.0 | 210°57.4 | 39.2 | 264°56.5 | 09.2 | 172°41.7 | 23.2 | 274°14.6 | 50.5 | | | | | | |
| 5 | 299°04.4 | 225°56.6 | 39.7 | 279°57.2 | 09.9 | 187°43.7 | 23.2 | 289°16.8 | 50.6 | | | | | | |
| 6 | 314°06.9 | 240°55.8 | N23°40.1 | 294°57.9 | N07°10.7 | 202°45.8 | N22°23.1 | 304°19.0 | N01°50.7 | | | | | | |
| 7 | 329°09.3 | 255°55.0 | 40.6 | 309°58.6 | 11.4 | 217°47.9 | 23.1 | 319°21.2 | 50.8 | | | | | | |
| 8 | 344°11.8 | 270°54.2 | 41.0 | 324°59.3 | 12.1 | 232°49.9 | 23.0 | 334°23.4 | 50.9 | | | | | | |
| 9 | 359°14.3 | 285°53.4 | •• 41.5 | 340°00.0 | •• 12.9 | 247°52.0 | •• 23.0 | 349°25.6 | •• 51.0 | | | | | | |
| 10 | 14°16.7 | 300°52.6 | 41.9 | 355°00.7 | 13.6 | 262°54.1 | 22.9 | 4°27.8 | 51.1 | | | | | | |
| 11 | 29°19.2 | 315°51.8 | 42.4 | 10°01.3 | 14.3 | 277°56.1 | 22.9 | 19°30.0 | 51.2 | | | | | | |
| 12 | 44°21.7 | 330°51.0 | N23°42.8 | 25°02.0 | N07°15.1 | 292°58.2 | N22°22.8 | 34°32.3 | N01°51.3 | | | | | | |
| 13 | 59°24.1 | 345°50.2 | 43.2 | 40°02.7 | 15.8 | 308°00.3 | 22.8 | 49°34.5 | 51.4 | | | | | | |
| 14 | 74°26.6 | 0°49.4 | 43.7 | 55°03.4 | 16.5 | 323°02.3 | 22.7 | 64°36.7 | 51.5 | | | | | | |
| 15 | 89°29.1 | 15°48.6 | •• 44.1 | 70°04.1 | •• 17.3 | 338°04.4 | •• 22.7 | 79°38.9 | •• 51.6 | | | | | | |
| 16 | 104°31.5 | 30°47.8 | 44.6 | 85°04.8 | 18.0 | 353°06.4 | 22.6 | 94°41.1 | 51.8 | | | | | | |
| 17 | 119°34.0 | 45°47.0 | 45.0 | 100°05.5 | 18.7 | 8°08.5 | 22.6 | 109°43.3 | 51.9 | | | | | | |
| 18 | 134°36.4 | 60°46.2 | N23°45.4 | 115°06.2 | N07°19.5 | 23°10.6 | N22°22.5 | 124°45.5 | N01°52.0 | | | | | | |
| 19 | 149°38.9 | 75°45.5 | 45.9 | 130°06.9 | 20.2 | 38°12.6 | 22.5 | 139°47.7 | 52.1 | | | | | | |
| 20 | 164°41.4 | 90°44.7 | 46.3 | 145°07.6 | 20.9 | 53°14.7 | 22.4 | 154°50.0 | 52.2 | | | | | | |
| 21 | 179°43.8 | 105°43.9 | •• 46.7 | 160°08.2 | •• 21.7 | 68°16.7 | •• 22.3 | 169°52.2 | •• 52.3 | | | | | | |
| 22 | 194°46.3 | 120°43.1 | 47.2 | 175°08.9 | 22.4 | 83°18.8 | 22.3 | 184°54.4 | 52.4 | | | | | | |
| 23 | 209°48.8 | 135°42.3 | 47.6 | 190°09.6 | 23.1 | 98°20.9 | 22.2 | 199°56.6 | 52.5 | | | | | | |
| Mer.pass. 09:03 | | ν-0.8' d0.5' m-3.92 | | | ν0.7' d0.7' m1.23 | | | ν2.1' d-0.1' m-1.99 | | | ν2.2' d0.1' m0.92 | | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.9 | 29°14.0 |
| Ankaa | 353°06.4 | -42°09.7 |
| Schedar | 349°30.3 | 56°40.7 |
| Diphda | 348°46.5 | -17°50.5 |
| Achernar | 335°19.9 | -57°06.1 |
| Hamal | 327°50.3 | 23°35.1 |
| Polaris | 313°58.6 | 89°22.5 |
| Acamar | 315°11.4 | -40°12.0 |
| Menkar | 314°05.4 | 4°11.5 |
| Mirfak | 308°27.2 | 49°57.2 |
| Aldebaran | 290°38.7 | 16°33.7 |
| Rigel | 281°03.1 | -8°10.4 |
| Capella | 280°20.7 | 46°01.5 |
| Bellatrix | 278°22.0 | 6°22.3 |
| Elnath | 278°00.8 | 28°37.8 |
| Alnilam | 275°36.9 | -1°11.2 |
| Betelgeuse | 270°51.2 | 7°24.7 |
| Canopus | 263°52.3 | -52°42.8 |
| Sirius | 258°25.5 | -16°45.3 |
| Adhara | 255°05.2 | -29°00.7 |
| Procyon | 244°49.8 | 5°09.4 |
| Pollux | 243°16.1 | 27°57.8 |
| Avior | 234°14.4 | -59°35.9 |
| Suhail | 222°45.5 | -43°32.6 |
| Miaplacidus | 221°38.1 | -69°49.8 |
| Alphard | 217°46.7 | -8°46.5 |
| Regulus | 207°33.2 | 11°50.2 |

| h | | Sun | | Moon | | | |
|-----------------------|----------|----------|------------|-------|----------|-------|-------|
| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 180°47.9 | N15°54.4 | 335°49.2 | 10.7' | S26°42.7 | 4.6' | 54.0' |
| 1 | 195°48.0 | 55.1 | 350°18.8 | 10.6' | 26°47.3 | 4.5' | 54.0' |
| 2 | 210°48.0 | 55.8 | 4°48.4 | 10.6' | 26°51.8 | 4.4' | 54.0' |
| 3 | 225°48.1 | 56.6 | 19°18.0 | 10.5' | 26°56.2 | 4.3' | 54.0' |
| 4 | 240°48.1 | 57.3 | 33°47.6 | 10.5' | 27°00.4 | 4.1' | 54.0' |
| 5 | 255°48.2 | 58.0 | 48°17.1 | 10.5' | 27°04.6 | 4.0' | 54.0' |
| 6 | 270°48.2 | N15°58.7 | 62°46.5 | 10.4' | S27°08.6 | 3.9' | 54.0' |
| 7 | 285°48.3 | 15°59.5 | 77°16.0 | 10.4' | 27°12.4 | 3.7' | 54.0' |
| 8 | 300°48.4 | 16°00.2 | 91°45.4 | 10.4' | 27°16.2 | 3.6' | 54.0' |
| 9 | 315°48.4 | 00.9 | 106°14.8 | 10.4' | 27°19.8 | 3.5' | 54.0' |
| 10 | 330°48.5 | 01.6 | 120°44.1 | 10.3' | 27°23.3 | 3.3' | 54.0' |
| 11 | 345°48.5 | 02.4 | 135°13.5 | 10.3' | 27°26.6 | 3.2' | 54.0' |
| 12 | 0°48.6 | N16°03.1 | 149°42.8 | 10.3' | S27°29.8 | 3.1' | 54.0' |
| 13 | 15°48.7 | 03.8 | 164°12.0 | 10.2' | 27°32.9 | 2.9' | 54.0' |
| 14 | 30°48.7 | 04.5 | 178°41.3 | 10.2' | 27°35.8 | 2.8' | 54.0' |
| 15 | 45°48.8 | 05.2 | 193°10.5 | 10.2' | 27°38.7 | 2.7' | 54.0' |
| 16 | 60°48.8 | 06.0 | 207°39.7 | 10.2' | 27°41.3 | 2.5' | 54.0' |
| 17 | 75°48.9 | 06.7 | 222°08.9 | 10.2' | 27°43.9 | 2.4' | 54.0' |
| 18 | 90°48.9 | N16°07.4 | 236°38.0 | 10.1' | S27°46.3 | 2.3' | 54.0' |
| 19 | 105°49.0 | 08.1 | 251°07.2 | 10.1' | 27°48.6 | 2.1' | 54.0' |
| 20 | 120°49.0 | 08.8 | 265°36.3 | 10.1' | 27°50.7 | 2.0' | 54.0' |
| 21 | 135°49.1 | 09.5 | 280°05.4 | 10.1' | 27°52.7 | 1.9' | 54.0' |
| 22 | 150°49.2 | 10.3 | 294°34.4 | 10.1' | 27°54.6 | 1.7' | 54.0' |
| 23 | 165°49.2 | 11.0 | 309°03.5 | 10.0' | 27°56.4 | 1.6' | 54.0' |
| SD = 15.9' $d = 0.7'$ | | | SD = 14.7' | | | | |
| Tue | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 180°49.3 | N16°11.7 | 323°32.5 | 10.0' | S27°58.0 | 1.5' | 54.0' |
| 1 | 195°49.3 | 12.4 | 338°01.6 | 10.0' | 27°59.5 | 1.3' | 54.0' |
| 2 | 210°49.4 | 13.1 | 352°30.6 | 10.0' | 28°00.8 | 1.2' | 54.0' |
| 3 | 225°49.4 | 13.8 | 6°59.6 | 10.0' | 28°02.0 | 1.1' | 54.0' |
| 4 | 240°49.5 | 14.5 | 21°28.6 | 10.0' | 28°03.1 | 0.9' | 54.0' |
| 5 | 255°49.5 | 15.3 | 35°57.6 | 10.0' | 28°04.0 | 0.8' | 54.0' |
| 6 | 270°49.6 | N16°16.0 | 50°26.6 | 10.0' | S28°04.8 | 0.7' | 54.0' |
| 7 | 285°49.6 | 16.7 | 64°55.6 | 10.0' | 28°05.5 | 0.5' | 54.0' |
| 8 | 300°49.7 | 17.4 | 79°24.5 | 10.0' | 28°06.0 | 0.4' | 54.0' |
| 9 | 315°49.7 | 18.1 | 93°53.5 | 10.0' | 28°06.4 | 0.3' | 54.0' |
| 10 | 330°49.8 | 18.8 | 108°22.5 | 10.0' | 28°06.6 | 0.1' | 54.0' |
| 11 | 345°49.9 | 19.5 | 122°51.4 | 10.0' | 28°06.8 | -0.0' | 54.0' |
| 12 | 0°49.9 | N16°20.2 | 137°20.4 | 10.0' | S28°06.7 | -0.2' | 54.0' |
| 13 | 15°50.0 | 21.0 | 151°49.4 | 10.0' | 28°06.6 | -0.3' | 54.0' |
| 14 | 30°50.0 | 21.7 | 166°18.3 | 10.0' | 28°06.3 | -0.4' | 54.0' |
| 15 | 45°50.1 | 22.4 | 180°47.3 | 10.0' | 28°05.9 | -0.6' | 54.0' |
| 16 | 60°50.1 | 23.1 | 195°16.2 | 10.0' | 28°05.3 | -0.7' | 54.0' |
| 17 | 75°50.2 | 23.8 | 209°45.2 | 10.0' | 28°04.6 | -0.8' | 54.0' |
| 18 | 90°50.2 | N16°24.5 | 224°14.2 | 10.0' | S28°03.8 | -1.0' | 54.0' |
| 19 | 105°50.3 | 25.2 | 238°43.2 | 10.0' | 28°02.8 | -1.1' | 54.0' |
| 20 | 120°50.3 | 25.9 | 253°12.2 | 10.0' | 28°01.7 | -1.2' | 54.0' |
| 21 | 135°50.4 | 26.6 | 267°41.2 | 10.0' | 28°00.5 | -1.4' | 54.0' |
| 22 | 150°50.4 | 27.3 | 282°10.2 | 10.0' | 27°59.1 | -1.5' | 54.0' |
| 23 | 165°50.5 | 28.0 | 296°39.2 | 10.0' | 27°57.6 | -1.6' | 54.0' |
| SD = 15.9' $d = 0.7'$ | | | SD = 14.7' | | | | |
| Wed | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 180°50.5 | N16°28.7 | 311°08.3 | 10.1' | S27°55.9 | -1.8' | 54.0' |
| 1 | 195°50.6 | 29.4 | 325°37.3 | 10.1' | 27°54.1 | -1.9' | 54.0' |
| 2 | 210°50.6 | 30.1 | 340°06.4 | 10.1' | 27°52.2 | -2.1' | 54.0' |
| 3 | 225°50.6 | 30.8 | 354°35.5 | 10.1' | 27°50.2 | -2.2' | 54.1' |
| 4 | 240°50.7 | 31.5 | 9°04.6 | 10.1' | 27°48.0 | -2.3' | 54.1' |
| 5 | 255°50.7 | 32.2 | 23°33.7 | 10.1' | 27°45.7 | -2.5' | 54.1' |
| 6 | 270°50.8 | N16°32.9 | 38°02.8 | 10.2' | S27°43.2 | -2.6' | 54.1' |
| 7 | 285°50.8 | 33.6 | 52°32.0 | 10.2' | 27°40.6 | -2.7' | 54.1' |
| 8 | 300°50.9 | 34.3 | 67°01.1 | 10.2' | 27°37.9 | -2.9' | 54.1' |
| 9 | 315°50.9 | 35.0 | 81°30.3 | 10.2' | 27°35.1 | -3.0' | 54.1' |
| 10 | 330°51.0 | 35.7 | 95°59.6 | 10.2' | 27°32.1 | -3.1' | 54.1' |
| 11 | 345°51.0 | 36.4 | 110°28.8 | 10.3' | 27°28.9 | -3.3' | 54.1' |
| 12 | 0°51.1 | N16°37.1 | 124°58.1 | 10.3' | S27°25.7 | -3.4' | 54.1' |
| 13 | 15°51.1 | 37.8 | 139°27.4 | 10.3' | 27°22.3 | -3.5' | 54.1' |
| 14 | 30°51.2 | 38.5 | 153°56.7 | 10.3' | 27°18.8 | -3.6' | 54.1' |
| 15 | 45°51.2 | 39.2 | 168°26.0 | 10.4' | 27°15.2 | -3.8' | 54.1' |
| 16 | 60°51.2 | 39.9 | 182°55.4 | 10.4' | 27°11.4 | -3.9' | 54.2' |
| 17 | 75°51.3 | 40.6 | 197°24.8 | 10.4' | 27°07.5 | -4.0' | 54.2' |
| 18 | 90°51.3 | N16°41.3 | 211°54.3 | 10.5' | S27°03.4 | -4.2' | 54.2' |
| 19 | 105°51.4 | 42.0 | 226°23.7 | 10.5' | 26°59.3 | -4.3' | 54.2' |
| 20 | 120°51.4 | 42.7 | 240°53.2 | 10.5' | 26°55.0 | -4.4' | 54.2' |
| 21 | 135°51.5 | 43.4 | 255°22.8 | 10.6' | 26°50.5 | -4.6' | 54.2' |
| 22 | 150°51.5 | 44.1 | 269°52.3 | 10.6' | 26°46.0 | -4.7' | 54.2' |
| 23 | 165°51.6 | 44.8 | 284°21.9 | 10.6' | 26°41.3 | -4.8' | 54.2' |
| SD = 15.9' $d = 0.7'$ | | | SD = 14.7' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | //// | 01:14 | 22:50 | //// | //// |
| N 70° | //// | //// | 02:07 | 21:52 | //// | //// |
| 68° | //// | //// | 02:39 | 21:18 | //// | //// |
| 66° | //// | 01:29 | 03:02 | 20:54 | 22:31 | //// |
| 64° | //// | 02:06 | 03:20 | 20:36 | 21:51 | //// |
| 62° | //// | 02:32 | 03:35 | 20:20 | 21:24 | //// |
| 60° | 01:19 | 02:52 | 03:47 | 20:08 | 21:04 | 22:41 |
| N 58° | 01:53 | 03:08 | 03:58 | 19:57 | 20:47 | 22:04 |
| 56° | 02:17 | 03:22 | 04:07 | 19:47 | 20:34 | 21:39 |
| 54° | 02:36 | 03:33 | 04:16 | 19:39 | 20:22 | 21:20 |
| 52° | 02:51 | 03:43 | 04:23 | 19:31 | 20:11 | 21:04 |
| 50° | 03:04 | 03:52 | 04:30 | 19:25 | 20:02 | 20:51 |
| 45° | 03:30 | 04:11 | 04:44 | 19:10 | 19:43 | 20:25 |
| N 40° | 03:49 | 04:26 | 04:55 | 18:59 | 19:28 | 20:05 |
| 35° | 04:05 | 04:38 | 05:05 | 18:49 | 19:16 | 19:49 |
| 30° | 04:18 | 04:48 | 05:14 | 18:40 | 19:06 | 19:36 |
| 20° | 04:38 | 05:05 | 05:29 | 18:25 | 18:48 | 19:16 |
| N 10° | 04:54 | 05:19 | 05:41 | 18:12 | 18:34 | 19:00 |
| 0° | 05:07 | 05:32 | 05:53 | 18:00 | 18:22 | 18:47 |
| S 10° | 05:18 | 05:43 | 06:05 | 17:48 | 18:10 | 18:35 |
| 20° | 05:28 | 05:54 | 06:17 | 17:36 | 17:59 | 18:25 |
| 30° | 05:38 | 06:07 | 06:31 | 17:22 | 17:47 | 18:15 |
| 35° | 05:43 | 06:13 | 06:40 | 17:13 | 17:40 | 18:10 |
| 40° | 05:48 | 06:20 | 06:49 | 17:04 | 17:33 | 18:05 |
| 45° | 05:53 | 06:28 | 06:59 | 16:53 | 17:24 | 17:59 |
| S 50° | 05:59 | 06:38 | 07:12 | 16:40 | 17:15 | 17:53 |
| 52° | 06:02 | 06:42 | 07:18 | 16:34 | 17:11 | 17:51 |
| 54° | 06:04 | 06:47 | 07:25 | 16:28 | 17:06 | 17:48 |
| 56° | 06:07 | 06:52 | 07:33 | 16:20 | 17:01 | 17:45 |
| 58° | 06:10 | 06:57 | 07:41 | 16:12 | 16:55 | 17:42 |
| S 60° | 06:13 | 07:04 | 07:50 | 16:02 | 16:49 | 17:39 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | ██ | ██ | ██ | ██ | ██ | ██ |
| N 70° | ██ | ██ | ██ | ██ | ██ | ██ |
| 68° | ██ | ██ | ██ | ██ | ██ | ██ |
| 66° | ██ | ██ | ██ | ██ | ██ | ██ |
| 64° | ██ | ██ | ██ | ██ | ██ | ██ |
| 62° | 00:26 | ██ | 03:03 | 02:49 | ██ | 03:45 |
| 60° | | 00:58 | 01:47 | 03:35 | 04:03 | 05:01 |
| N 58° | | 00:21 | 01:11 | 04:05 | 04:40 | 05:36 |
| 56° | 23:54 | | 00:45 | 04:28 | 05:06 | 06:02 |
| 54° | 23:34 | | 00:25 | 04:47 | 05:27 | 06:22 |
| 52° | 23:16 | | 00:07 | 05:03 | 05:45 | 06:39 |
| 50° | 23:01 | 23:53 | | 05:16 | 05:59 | 06:54 |
| 45° | 22:31 | 23:23 | | 05:44 | 06:30 | 07:24 |
| N 40° | 22:08 | 23:00 | 23:44 | 06:07 | 06:53 | 07:47 |
| 35° | 21:49 | 22:41 | 23:26 | 06:25 | 07:12 | 08:06 |
| 30° | 21:32 | 22:24 | 23:11 | 06:41 | 07:29 | 08:22 |
| 20° | 21:05 | 21:56 | 22:45 | 07:08 | 07:57 | 08:49 |
| N 10° | 20:41 | 21:32 | 22:22 | 07:31 | 08:21 | 09:13 |
| 0° | 20:19 | 21:10 | 22:01 | 07:52 | 08:43 | 09:35 |
| S 10° | 19:56 | 20:48 | 21:40 | 08:14 | 09:06 | 09:57 |
| 20° | 19:33 | 20:24 | 21:17 | 08:37 | 09:30 | 10:20 |
| 30° | 19:05 | 19:56 | 20:51 | 09:04 | 09:58 | 10:47 |
| 35° | 18:49 | 19:39 | 20:35 | 09:20 | 10:14 | 11:03 |
| 40° | 18:30 | 19:20 | 20:17 | 09:39 | 10:34 | 11:22 |
| 45° | 18:07 | 18:57 | 19:55 | 10:01 | 10:57 | 11:44 |
| S 50° | 17:38 | 18:27 | 19:27 | 10:30 | 11:27 | 12:13 |
| 52° | 17:24 | 18:12 | 19:13 | 10:44 | 11:42 | 12:26 |
| 54° | 17:07 | 17:55 | 18:57 | 11:01 | 11:59 | 12:43 |
| 56° | 16:47 | 17:34 | 18:38 | 11:20 | 12:20 | 13:02 |
| 58° | 16:23 | 17:08 | 18:15 | 11:45 | 12:46 | 13:25 |
| S 60° | 15:50 | 16:32 | 17:44 | 12:18 | 13:22 | 13:56 |

| Day | Sun | | Mer. Pass | Moon | | Age 17-19 95-84% |
|-----|-------------------------------|----------------------------|-----------|------------------------|-------------|---|
| | Eqn. of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer. Pass. Upper hh:mm | Lower hh:mm | |
| 04 | 03:12 | 03:14 | 11:57 | 01:40 | 14:05 |  |
| 05 | 03:17 | 03:20 | 11:57 | 02:31 | 14:57 | |
| 06 | 03:22 | 03:24 | 11:57 | 03:22 | 15:48 | |

May 07, 08, 09 UT (Thu., Fri., Sat.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|---------------------|----------|-------------------|----------|---------------------|----------|-------------------|----------|----------|
| Thu | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 224°51.2 | | 150°41.5 | N23°48.0 | 205°10.3 | N07°23.9 | 113°22.9 | N22°22.2 | 214°58.8 | N01°52.6 |
| 1 | 239°53.7 | | 165°40.7 | 48.5 | 220°11.0 | 24.6 | 128°25.0 | 22.1 | 230°01.0 | 52.7 |
| 2 | 254°56.2 | | 180°39.9 | 48.9 | 235°11.7 | 25.3 | 143°27.0 | 22.1 | 245°03.2 | 52.8 |
| 3 | 269°58.6 | | 195°39.1 | · · 49.3 | 250°12.4 | · · 26.1 | 158°29.1 | · · 22.0 | 260°05.4 | · · 52.9 |
| 4 | 285°01.1 | | 210°38.3 | 49.7 | 265°13.1 | 26.8 | 173°31.2 | 22.0 | 275°07.6 | 53.0 |
| 5 | 300°03.6 | | 225°37.5 | 50.2 | 280°13.8 | 27.5 | 188°33.2 | 21.9 | 290°09.9 | 53.1 |
| 6 | 315°06.0 | | 240°36.7 | N23°50.6 | 295°14.5 | N07°28.2 | 203°35.3 | N22°21.9 | 305°12.1 | N01°53.2 |
| 7 | 330°08.5 | | 255°35.9 | 51.0 | 310°15.1 | 29.0 | 218°37.3 | 21.8 | 320°14.3 | 53.3 |
| 8 | 345°10.9 | | 270°35.1 | 51.4 | 325°15.8 | 29.7 | 233°39.4 | 21.8 | 335°16.5 | 53.4 |
| 9 | 0°13.4 | | 285°34.3 | · · 51.9 | 340°16.5 | · · 30.4 | 248°41.5 | · · 21.7 | 350°18.7 | · · 53.5 |
| 10 | 15°15.9 | | 300°33.5 | 52.3 | 355°17.2 | 31.2 | 263°43.5 | 21.7 | 5°20.9 | 53.6 |
| 11 | 30°18.3 | | 315°32.7 | 52.7 | 10°17.9 | 31.9 | 278°45.6 | 21.6 | 20°23.1 | 53.7 |
| 12 | 45°20.8 | | 330°31.9 | N23°53.1 | 25°18.6 | N07°32.6 | 293°47.6 | N22°21.5 | 35°25.3 | N01°53.8 |
| 13 | 60°23.3 | | 345°31.1 | 53.5 | 40°19.3 | 33.4 | 308°49.7 | 21.5 | 50°27.6 | 53.9 |
| 14 | 75°25.7 | | 0°30.3 | 53.9 | 55°20.0 | 34.1 | 323°51.7 | 21.4 | 65°29.8 | 54.0 |
| 15 | 90°28.2 | | 15°29.5 | · · 54.3 | 70°20.7 | · · 34.8 | 338°53.8 | · · 21.4 | 80°32.0 | · · 54.1 |
| 16 | 105°30.7 | | 30°28.7 | 54.8 | 85°21.4 | 35.5 | 353°55.9 | 21.3 | 95°34.2 | 54.2 |
| 17 | 120°33.1 | | 45°27.9 | 55.2 | 100°22.0 | 36.3 | 8°57.9 | 21.3 | 110°36.4 | 54.3 |
| 18 | 135°35.6 | | 60°27.1 | N23°55.6 | 115°22.7 | N07°37.0 | 24°00.0 | N22°21.2 | 125°38.6 | N01°54.4 |
| 19 | 150°38.1 | | 75°26.3 | 56.0 | 130°23.4 | 37.7 | 39°02.0 | 21.2 | 140°40.8 | 54.5 |
| 20 | 165°40.5 | | 90°25.5 | 56.4 | 145°24.1 | 38.5 | 54°04.1 | 21.1 | 155°43.1 | 54.6 |
| 21 | 180°43.0 | | 105°24.7 | · · 56.8 | 160°24.8 | · · 39.2 | 69°06.1 | · · 21.1 | 170°45.3 | · · 54.7 |
| 22 | 195°45.4 | | 120°23.8 | 57.2 | 175°25.5 | 39.9 | 84°08.2 | 21.0 | 185°47.5 | 54.8 |
| 23 | 210°47.9 | | 135°23.0 | 57.6 | 190°26.2 | 40.6 | 99°10.3 | 20.9 | 200°49.7 | 54.9 |
| Mer.pass. 08:59 | | ν-0.8' d0.4' m-3.92 | | ν0.7' d0.7' m1.23 | | ν2.1' d-0.1' m-1.98 | | ν2.2' d0.1' m0.92 | | |
| Fri | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 225°50.4 | | 150°22.2 | N23°58.0 | 205°26.9 | N07°41.4 | 114°12.3 | N22°20.9 | 215°51.9 | N01°55.0 |
| 1 | 240°52.8 | | 165°21.4 | 58.4 | 220°27.6 | 42.1 | 129°14.4 | 20.8 | 230°54.1 | 55.1 |
| 2 | 255°55.3 | | 180°20.6 | 58.8 | 235°28.3 | 42.8 | 144°16.4 | 20.8 | 245°56.3 | 55.2 |
| 3 | 270°57.8 | | 195°19.8 | · · 59.2 | 250°28.9 | · · 43.5 | 159°18.5 | · · 20.7 | 260°58.6 | · · 55.3 |
| 4 | 286°00.2 | | 210°19.0 | 23°59.6 | 265°29.6 | 44.3 | 174°20.5 | 20.7 | 276°00.8 | 55.4 |
| 5 | 301°02.7 | | 225°18.2 | 24°00.0 | 280°30.3 | 45.0 | 189°22.6 | 20.6 | 291°03.0 | 55.5 |
| 6 | 316°05.2 | | 240°17.4 | N24°00.4 | 295°31.0 | N07°45.7 | 204°24.6 | N22°20.6 | 306°05.2 | N01°55.6 |
| 7 | 331°07.6 | | 255°16.6 | 00.8 | 310°31.7 | 46.5 | 219°26.7 | 20.5 | 321°07.4 | 55.7 |
| 8 | 346°10.1 | | 270°15.8 | 01.2 | 325°32.4 | 47.2 | 234°28.7 | 20.5 | 336°09.6 | 55.8 |
| 9 | 1°12.6 | | 285°15.0 | · · 01.6 | 340°33.1 | · · 47.9 | 249°30.8 | · · 20.4 | 351°11.8 | · · 55.9 |
| 10 | 16°15.0 | | 300°14.2 | 02.0 | 355°33.8 | 48.6 | 264°32.9 | 20.3 | 6°14.1 | 56.0 |
| 11 | 31°17.5 | | 315°13.4 | 02.3 | 10°34.5 | 49.4 | 279°34.9 | 20.3 | 21°16.3 | 56.1 |
| 12 | 46°19.9 | | 330°12.6 | N24°02.7 | 25°35.1 | N07°50.1 | 294°37.0 | N22°20.2 | 36°18.5 | N01°56.2 |
| 13 | 61°22.4 | | 345°11.8 | 03.1 | 40°35.8 | 50.8 | 309°39.0 | 20.2 | 51°20.7 | 56.3 |
| 14 | 76°24.9 | | 0°11.0 | 03.5 | 55°36.5 | 51.5 | 324°41.1 | 20.1 | 66°22.9 | 56.4 |
| 15 | 91°27.3 | | 15°10.2 | · · 03.9 | 70°37.2 | · · 52.3 | 339°43.1 | · · 20.1 | 81°25.1 | · · 56.5 |
| 16 | 106°29.8 | | 30°09.3 | 04.3 | 85°37.9 | 53.0 | 354°45.2 | 20.0 | 96°27.3 | 56.6 |
| 17 | 121°32.3 | | 45°08.5 | 04.7 | 100°38.6 | 53.7 | 9°47.2 | 20.0 | 111°29.6 | 56.7 |
| 18 | 136°34.7 | | 60°07.7 | N24°05.0 | 115°39.3 | N07°54.4 | 24°49.3 | N22°19.9 | 126°31.8 | N01°56.8 |
| 19 | 151°37.2 | | 75°06.9 | 05.4 | 130°40.0 | 55.2 | 39°51.3 | 19.9 | 141°34.0 | 56.9 |
| 20 | 166°39.7 | | 90°06.1 | 05.8 | 145°40.7 | 55.9 | 54°53.4 | 19.8 | 156°36.2 | 57.0 |
| 21 | 181°42.1 | | 105°05.3 | · · 06.2 | 160°41.3 | · · 56.6 | 69°55.4 | · · 19.7 | 171°38.4 | · · 57.1 |
| 22 | 196°44.6 | | 120°04.5 | 06.5 | 175°42.0 | 57.3 | 84°57.5 | 19.7 | 186°40.6 | 57.2 |
| 23 | 211°47.1 | | 135°03.7 | 06.9 | 190°42.7 | 58.1 | 99°59.5 | 19.6 | 201°42.8 | 57.3 |
| Mer.pass. 08:55 | | ν-0.8' d0.4' m-3.92 | | ν0.7' d0.7' m1.24 | | ν2.1' d-0.1' m-1.98 | | ν2.2' d0.1' m0.92 | | |
| Sat | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 226°49.5 | | 150°02.9 | N24°07.3 | 205°43.4 | N07°58.8 | 115°01.6 | N22°19.6 | 216°45.1 | N01°57.4 |
| 1 | 241°52.0 | | 165°02.1 | 07.7 | 220°44.1 | 07°59.5 | 130°03.6 | 19.5 | 231°47.3 | 57.4 |
| 2 | 256°54.4 | | 180°01.3 | 08.0 | 235°44.8 | 08°00.2 | 145°05.7 | 19.5 | 246°49.5 | 57.5 |
| 3 | 271°56.9 | | 195°00.4 | · · 08.4 | 250°45.5 | · · 00.9 | 160°07.7 | · · 19.4 | 261°51.7 | · · 57.6 |
| 4 | 286°59.4 | | 209°59.6 | 08.8 | 265°46.2 | 01.7 | 175°09.8 | 19.4 | 276°53.9 | 57.7 |
| 5 | 302°01.8 | | 224°58.8 | 09.1 | 280°46.8 | 02.4 | 190°11.8 | 19.3 | 291°56.1 | 57.8 |
| 6 | 317°04.3 | | 239°58.0 | N24°09.5 | 295°47.5 | N08°03.1 | 205°13.9 | N22°19.2 | 306°58.4 | N01°57.9 |
| 7 | 332°06.8 | | 254°57.2 | 09.9 | 310°48.2 | 03.8 | 220°15.9 | 19.2 | 322°00.6 | 58.0 |
| 8 | 347°09.2 | | 269°56.4 | 10.2 | 325°48.9 | 04.6 | 235°18.0 | 19.1 | 337°02.8 | 58.1 |
| 9 | 2°11.7 | | 284°55.6 | · · 10.6 | 340°49.6 | · · 05.3 | 250°20.0 | · · 19.1 | 352°05.0 | · · 58.2 |
| 10 | 17°14.2 | | 299°54.8 | 11.0 | 355°50.3 | 06.0 | 265°22.1 | 19.0 | 7°07.2 | 58.3 |
| 11 | 32°16.6 | | 314°54.0 | 11.3 | 10°51.0 | 06.7 | 280°24.1 | 19.0 | 22°09.4 | 58.4 |
| 12 | 47°19.1 | | 329°53.1 | N24°11.7 | 25°51.7 | N08°07.5 | 295°26.2 | N22°18.9 | 37°11.7 | N01°58.5 |
| 13 | 62°21.5 | | 344°52.3 | 12.0 | 40°52.4 | 08.2 | 310°28.2 | 18.9 | 52°13.9 | 58.6 |
| 14 | 77°24.0 | | 359°51.5 | 12.4 | 55°53.0 | 08.9 | 325°30.3 | 18.8 | 67°16.1 | 58.7 |
| 15 | 92°26.5 | | 14°50.7 | · · 12.8 | 70°53.7 | · · 09.6 | 340°32.3 | · · 18.7 | 82°18.3 | · · 58.8 |
| 16 | 107°28.9 | | 29°49.9 | 13.1 | 85°54.4 | 10.3 | 355°34.4 | 18.7 | 97°20.5 | 58.9 |
| 17 | 122°31.4 | | 44°49.1 | 13.5 | 100°55.1 | 11.1 | 10°36.4 | 18.6 | 112°22.7 | 59.0 |
| 18 | 137°33.9 | | 59°48.3 | N24°13.8 | 115°55.8 | N08°11.8 | 25°38.5 | N22°18.6 | 127°25.0 | N01°59.1 |
| 19 | 152°36.3 | | 74°47.5 | 14.2 | 130°56.5 | 12.5 | 40°40.5 | 18.5 | 142°27.2 | 59.2 |
| 20 | 167°38.8 | | 89°46.6 | 14.5 | 145°57.2 | 13.2 | 55°42.6 | 18.5 | 157°29.4 | 59.3 |
| 21 | 182°41.3 | | 104°45.8 | · · 14.9 | 160°57.9 | · · 13.9 | 70°44.6 | · · 18.4 | 172°31.6 | · · 59.4 |
| 22 | 197°43.7 | | 119°45.0 | 15.2 | 175°58.5 | 14.7 | 85°46.7 | 18.3 | 187°33.8 | 59.5 |
| 23 | 212°46.2 | | 134°44.2 | 15.6 | 190°59.2 | 15.4 | 100°48.7 | 18.3 | 202°36.0 | 59.6 |
| Mer.pass. 08:51 | | ν-0.8' d0.4' m-3.92 | | ν0.7' d0.7' m1.24 | | ν2.1' d-0.1' m-1.97 | | ν2.2' d0.1' m0.92 | | |

| Stars | | |
|---------------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°33.9 | 29°14.0 |
| Ankaa | 353°06.4 | -42°09.6 |
| Schedar | 349°30.3 | 56°40.7 |
| Diphda | 348°46.5 | -17°50.5 |
| Achernar | 335°19.9 | -57°06.1 |
| Hamal | 327°50.3 | 23°35.1 |
| Polaris | 313°58.4 | 89°22.5 |
| Acamar | 315°11.4 | -40°11.9 |
| Menkar | 314°05.3 | 4°11.5 |
| Mirfak | 308°27.2 | 49°57.2 |
| Aldebaran | 290°38.7 | 16°33.7 |
| Rigel | 281°03.1 | -8°10.4 |
| Capella | 280°20.7 | 46°01.5 |
| Bellatrix | 278°22.0 | 6°22.4 |
| Elnath | 278°00.8 | 28°37.8 |
| Alnilam | 275°36.9 | -1°11.2 |
| Betelgeuse | 270°51.2 | 7°24.7 |
| Canopus | 263°52.3 | -52°42.8 |
| Sirius | 258°25.5 | -16°45.3 |
| Adhara | 255°05.2 | -29°00.7 |
| Procyon | 244°49.8 | 5°09.4 |
| Pollux | 243°16.1 | 27°57.8 |
| Avior | 234°14.5 | -59°35.9 |
| Suhail | 222°45.5 | -43°32.6 |
| Miaplacidus | 221°38.1 | -69°49.8 |
| Alphard | 217°46.7 | -8°46.5 |
| Regulus | 207°33.2 | 11°50.2 |
| Dubhe | 193°39.4 | 61°36.7 |
| Denebola | 182°23.6 | 14°25.4 |
| Gienah | 175°42.2 | -17°41.5 |
| Acrux | 172°58.4 | -63°15.0 |
| Gacrux | 171°50.0 | -57°15.9 |
| Alioth | 166°11.5 | 55°49.1 |
| Spica | 158°20.9 | -11°18.1 |
| Alkaid | 152°50.7 | 49°10.9 |
| Hadar | 148°33.8 | -60°30.2 |
| Menkent | 147°56.0 | -36°30.1 |
| Arcturus | 145°46.6 | 19°02.6 |
| Rigel Kent. | 139°38.1 | -60°56.8 |
| Kochab | 137°18.6 | 74°02.8 |
| Zuben'ubi | 136°54.5 | -16°09.2 |
| Alphecca | 126°02.5 | 26°37.4 |
| Antares | 112°14.2 | -26°29.5 |
| Atria | 107°06.9 | -69°04.4 |
| Sabik | 102°01.2 | -15°45.5 |
| Shaula | 96°08.6 | -37°07.3 |
| Rasalhague | 95°57.3 | 12°32.3 |
| Eltanin | 90°41.3 | 51°28.8 |
| Kaus Aust. | 83°30.8 | -34°22.2 |
| Vega | 80°32.2 | 38°48.2 |
| Nunki | 75°46.2 | -26°15.8 |
| Altair | 61°58.8 | 8°56.1 |
| Peacock | 53°03.9 | -56°38.8 |
| Deneb | 49°25.0 | 45°22.2 |
| Enif | 33°37.8 | 9°59.6 |
| Al Na'ir | 27°31.7 | -46°49.8 |
| Fomalhaut | 15°13.5 | -29°28.9 |
| Scheat | 13°44.3 | 28°13.4 |
| Markab | 13°29.0 | 15°20.7 |
| | | |
| May 07 Thu | SHA | Mer.pass |
| Venus | 285°50.2 | 13:58 |
| Mars | 340°19.1 | 10:19 |
| Jupiter | 248°31.7 | 16:24 |
| Saturn | 350°07.6 | 09:39 |
| | | |
| May 08 Fri | SHA | Mer.pass |
| Venus | 284°31.9 | 13:59 |
| Mars | 339°36.5 | 10:18 |
| Jupiter | 248°21.9 | 16:21 |
| Saturn | 350°01.5 | 09:35 |
| | | |
| May 09 Sat | SHA | Mer.pass |
| Venus | 283°13.4 | 14:01 |
| Mars | 338°53.9 | 10:17 |
| Jupiter | 248°12.1 | 16:18 |
| Saturn | 349°55.5 | 09:32 |
| | | |
| Horizontal parallax | | |
| Venus: | | 0.1 |
| Mars: | | 0.1 |

| h | Sun | | | Moon | | | |
|------------|----------|----------|------------|-------|----------|-------|-------|
| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 180°51.6 | N16°45.5 | 298°51.6 | 10.7' | S26°36.5 | -4.9' | 54.2' |
| 1 | 195°51.6 | 46.2 | 313°21.2 | 10.7' | 26°31.6 | -5.1' | 54.3' |
| 2 | 210°51.7 | 46.9 | 327°50.9 | 10.7' | 26°26.5 | -5.2' | 54.3' |
| 3 | 225°51.7 | 47.6 | 342°20.7 | 10.8' | 26°21.3 | -5.3' | 54.3' |
| 4 | 240°51.8 | 48.2 | 356°50.4 | 10.8' | 26°16.0 | -5.4' | 54.3' |
| 5 | 255°51.8 | 48.9 | 11°20.3 | 10.9' | 26°10.5 | -5.6' | 54.3' |
| 6 | 270°51.8 | N16°49.6 | 25°50.1 | 10.9' | S26°05.0 | -5.7' | 54.3' |
| 7 | 285°51.9 | 50.3 | 40°20.0 | 10.9' | 25°59.3 | -5.8' | 54.3' |
| 8 | 300°51.9 | 51.0 | 54°49.9 | 11.0' | 25°53.5 | -5.9' | 54.3' |
| 9 | 315°52.0 | 51.7 | 69°19.9 | 11.0' | 25°47.5 | -6.1' | 54.4' |
| 10 | 330°52.0 | 52.4 | 83°49.9 | 11.1' | 25°41.5 | -6.2' | 54.4' |
| 11 | 345°52.0 | 53.1 | 98°20.0 | 11.1' | 25°35.3 | -6.3' | 54.4' |
| 12 | 0°52.1 | N16°53.8 | 112°50.1 | 11.1' | S25°29.0 | -6.4' | 54.4' |
| 13 | 15°52.1 | 54.4 | 127°20.2 | 11.2' | 25°22.5 | -6.5' | 54.4' |
| 14 | 30°52.2 | 55.1 | 141°50.4 | 11.2' | 25°16.0 | -6.7' | 54.4' |
| 15 | 45°52.2 | 55.8 | 156°20.6 | 11.3' | 25°09.3 | -6.8' | 54.4' |
| 16 | 60°52.2 | 56.5 | 170°50.9 | 11.3' | 25°02.5 | -6.9' | 54.5' |
| 17 | 75°52.3 | 57.2 | 185°21.2 | 11.4' | 24°55.6 | -7.0' | 54.5' |
| 18 | 90°52.3 | N16°57.9 | 199°51.5 | 11.4' | S24°48.6 | -7.1' | 54.5' |
| 19 | 105°52.4 | 58.6 | 214°21.9 | 11.4' | 24°41.4 | -7.3' | 54.5' |
| 20 | 120°52.4 | 59.2 | 228°52.4 | 11.5' | 24°34.2 | -7.4' | 54.5' |
| 21 | 135°52.4 | 16°59.9 | 243°22.9 | 11.5' | 24°26.8 | -7.5' | 54.5' |
| 22 | 150°52.5 | 17°00.6 | 257°53.4 | 11.6' | 24°19.3 | -7.6' | 54.6' |
| 23 | 165°52.5 | 01.3 | 272°24.0 | 11.6' | 24°11.7 | -7.7' | 54.6' |
| SD = 15.8' | | | SD = 14.8' | | | | |

| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|-------|----------|--------|-------|
| 0 | 180°52.5 | N17°02.0 | 286°54.6 | 11.7' | S24°04.0 | -7.8' | 54.6' |
| 1 | 195°52.6 | 02.6 | 301°25.2 | 11.7' | 23°56.1 | -8.0' | 54.6' |
| 2 | 210°52.6 | 03.3 | 315°56.0 | 11.8' | 23°48.2 | -8.1' | 54.6' |
| 3 | 225°52.6 | 04.0 | 330°26.7 | 11.8' | 23°40.1 | -8.2' | 54.6' |
| 4 | 240°52.7 | 04.7 | 344°57.5 | 11.8' | 23°31.9 | -8.3' | 54.7' |
| 5 | 255°52.7 | 05.4 | 359°28.4 | 11.9' | 23°23.6 | -8.4' | 54.7' |
| 6 | 270°52.8 | N17°06.0 | 13°59.3 | 11.9' | S23°15.2 | -8.5' | 54.7' |
| 7 | 285°52.8 | 06.7 | 28°30.2 | 12.0' | 23°06.7 | -8.6' | 54.7' |
| 8 | 300°52.8 | 07.4 | 43°01.2 | 12.0' | 22°58.1 | -8.7' | 54.7' |
| 9 | 315°52.9 | 08.1 | 57°32.2 | 12.1' | 22°49.3 | -8.8' | 54.8' |
| 10 | 330°52.9 | 08.7 | 72°03.3 | 12.1' | 22°40.5 | -9.0' | 54.8' |
| 11 | 345°52.9 | 09.4 | 86°34.4 | 12.2' | 22°31.5 | -9.1' | 54.8' |
| 12 | 0°53.0 | N17°10.1 | 101°05.6 | 12.2' | S22°22.5 | -9.2' | 54.8' |
| 13 | 15°53.0 | 10.8 | 115°36.8 | 12.3' | 22°13.3 | -9.3' | 54.8' |
| 14 | 30°53.0 | 11.4 | 130°08.1 | 12.3' | 22°04.0 | -9.4' | 54.9' |
| 15 | 45°53.1 | 12.1 | 144°39.4 | 12.4' | 21°54.7 | -9.5' | 54.9' |
| 16 | 60°53.1 | 12.8 | 159°10.7 | 12.4' | 21°45.2 | -9.6' | 54.9' |
| 17 | 75°53.1 | 13.5 | 173°42.1 | 12.4' | 21°35.6 | -9.7' | 54.9' |
| 18 | 90°53.2 | N17°14.1 | 188°13.6 | 12.5' | S21°25.9 | -9.8' | 55.0' |
| 19 | 105°53.2 | 14.8 | 202°45.0 | 12.5' | 21°16.1 | -9.9' | 55.0' |
| 20 | 120°53.2 | 15.5 | 217°16.6 | 12.6' | 21°06.2 | -10.0' | 55.0' |
| 21 | 135°53.2 | 16.2 | 231°48.1 | 12.6' | 20°56.2 | -10.1' | 55.0' |
| 22 | 150°53.3 | 16.8 | 246°19.8 | 12.7' | 20°46.1 | -10.2' | 55.1' |
| 23 | 165°53.3 | 17.5 | 260°51.4 | 12.7' | 20°35.9 | -10.3' | 55.1' |
| SD = 15.8' | | | SD = 14.9' | | | | |

| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|-------|----------|--------|-------|
| 0 | 180°53.3 | N17°18.2 | 275°23.1 | 12.7' | S20°25.6 | -10.4' | 55.1' |
| 1 | 195°53.4 | 18.8 | 289°54.9 | 12.8' | 20°15.2 | -10.5' | 55.1' |
| 2 | 210°53.4 | 19.5 | 304°26.7 | 12.8' | 20°04.7 | -10.6' | 55.2' |
| 3 | 225°53.4 | 20.2 | 318°58.5 | 12.9' | 19°54.1 | -10.7' | 55.2' |
| 4 | 240°53.5 | 20.8 | 333°30.4 | 12.9' | 19°43.4 | -10.8' | 55.2' |
| 5 | 255°53.5 | 21.5 | 348°02.3 | 13.0' | 19°32.7 | -10.9' | 55.2' |
| 6 | 270°53.5 | N17°22.2 | 2°34.2 | 13.0' | S19°21.8 | -11.0' | 55.3' |
| 7 | 285°53.5 | 22.8 | 17°06.2 | 13.0' | 19°10.8 | -11.1' | 55.3' |
| 8 | 300°53.6 | 23.5 | 31°38.2 | 13.1' | 18°59.7 | -11.2' | 55.3' |
| 9 | 315°53.6 | 24.2 | 46°10.3 | 13.1' | 18°48.6 | -11.3' | 55.3' |
| 10 | 330°53.6 | 24.8 | 60°42.4 | 13.1' | 18°37.3 | -11.3' | 55.4' |
| 11 | 345°53.7 | 25.5 | 75°14.6 | 13.2' | 18°26.0 | -11.4' | 55.4' |
| 12 | 0°53.7 | N17°26.2 | 89°46.8 | 13.2' | S18°14.5 | -11.5' | 55.4' |
| 13 | 15°53.7 | 26.8 | 104°19.0 | 13.3' | 18°03.0 | -11.6' | 55.4' |
| 14 | 30°53.7 | 27.5 | 118°51.2 | 13.3' | 17°51.4 | -11.7' | 55.5' |
| 15 | 45°53.8 | 28.1 | 133°23.5 | 13.3' | 17°39.7 | -11.8' | 55.5' |
| 16 | 60°53.8 | 28.8 | 147°55.9 | 13.4' | 17°27.9 | -11.9' | 55.5' |
| 17 | 75°53.8 | 29.5 | 162°28.2 | 13.4' | 17°16.0 | -12.0' | 55.6' |
| 18 | 90°53.8 | N17°30.1 | 177°00.6 | 13.4' | S17°04.0 | -12.1' | 55.6' |
| 19 | 105°53.9 | 30.8 | 191°33.1 | 13.5' | 16°52.0 | -12.1' | 55.6' |
| 20 | 120°53.9 | 31.4 | 206°05.5 | 13.5' | 16°39.8 | -12.2' | 55.6' |
| 21 | 135°53.9 | 32.1 | 220°38.0 | 13.5' | 16°27.6 | -12.3' | 55.7' |
| 22 | 150°53.9 | 32.8 | 235°10.5 | 13.6' | 16°15.3 | -12.4' | 55.7' |
| 23 | 165°54.0 | 33.4 | 249°43.1 | 13.6' | 16°02.9 | -12.5' | 55.7' |
| SD = 15.8' | | | SD = 15.0' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | //// | 00:25 | //// | //// | //// |
| N 70° | //// | //// | 01:46 | 22:13 | //// | //// |
| 68° | //// | //// | 02:24 | 21:33 | //// | //// |
| 66° | //// | 01:04 | 02:50 | 21:06 | 22:59 | //// |
| 64° | //// | 01:51 | 03:10 | 20:45 | 22:07 | //// |
| 62° | //// | 02:20 | 03:26 | 20:29 | 21:36 | //// |
| 60° | 00:57 | 02:42 | 03:40 | 20:15 | 21:13 | 23:05 |
| N 58° | 01:39 | 03:00 | 03:51 | 20:03 | 20:55 | 22:18 |
| 56° | 02:06 | 03:14 | 04:01 | 19:53 | 20:41 | 21:49 |
| 54° | 02:27 | 03:27 | 04:10 | 19:44 | 20:28 | 21:28 |
| 52° | 02:43 | 03:37 | 04:18 | 19:36 | 20:17 | 21:11 |
| 50° | 02:57 | 03:47 | 04:25 | 19:29 | 20:07 | 20:57 |
| 45° | 03:25 | 04:06 | 04:40 | 19:14 | 19:47 | 20:29 |
| N 40° | 03:45 | 04:22 | 04:52 | 19:02 | 19:32 | 20:09 |
| 35° | 04:02 | 04:35 | 05:02 | 18:51 | 19:19 | 19:52 |
| 30° | 04:15 | 04:46 | 05:11 | 18:42 | 19:08 | 19:38 |
| 20° | 04:36 | 05:04 | 05:27 | 18:26 | 18:50 | 19:17 |
| N 10° | 04:53 | 05:18 | 05:41 | 18:13 | 18:35 | 19:00 |
| 0° | 05:06 | 05:31 | 05:53 | 18:00 | 18:22 | 18:47 |
| S 10° | 05:18 | 05:43 | 06:05 | 17:47 | 18:09 | 18:35 |
| 20° | 05:29 | 05:55 | 06:18 | 17:34 | 17:57 | 18:24 |
| 30° | 05:40 | 06:08 | 06:33 | 17:19 | 17:44 | 18:13 |
| 35° | 05:45 | 06:15 | 06:42 | 17:11 | 17:37 | 18:08 |
| 40° | 05:51 | 06:23 | 06:52 | 17:01 | 17:29 | 18:02 |
| 45° | 05:56 | 06:32 | 07:03 | 16:49 | 17:21 | 17:56 |
| S 50° | 06:03 | 06:42 | 07:17 | 16:36 | 17:10 | 17:49 |
| 52° | 06:06 | 06:46 | 07:23 | 16:29 | 17:06 | 17:46 |
| 54° | 06:09 | 06:51 | 07:30 | 16:22 | 17:01 | 17:43 |
| 56° | 06:12 | 06:57 | 07:38 | 16:14 | 16:55 | 17:40 |
| 58° | 06:15 | 07:03 | 07:47 | 16:05 | 16:49 | 17:37 |
| S 60° | 06:19 | 07:10 | 07:57 | 15:55 | 16:42 | 17:33 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | ██ | ██ | ██ | ██ | ██ | ██ |
| N 70° | ██ | ██ | 05:02 | ██ | ██ | 06:55 |
| 68° | ██ | ██ | 03:59 | ██ | ██ | 07:57 |
| 66° | ██ | 04:16 | 03:23 | ██ | 06:01 | 08:32 |
| 64° | ██ | 03:16 | 02:57 | ██ | 07:00 | 08:57 |
| 62° | 02:48 | 02:42 | 02:37 | 05:45 | 07:33 | 09:16 |
| 60° | 02:08 | 02:17 | 02:20 | 06:25 | 07:58 | 09:32 |
| N 58° | 01:41 | 01:57 | 02:06 | 06:52 | 08:17 | 09:45 |
| 56° | 01:19 | 01:40 | 01:54 | 07:13 | 08:33 | 09:56 |
| 54° | 01:01 | 01:26 | 01:44 | 07:31 | 08:47 | 10:06 |
| 52° | 00:46 | 01:14 | 01:34 | 07:46 | 08:59 | 10:15 |
| 50° | 00:33 | 01:03 | 01:26 | 07:58 | 09:09 | 10:23 |
| 45° | 00:06 | 00:40 | 01:08 | 08:25 | 09:31 | 10:40 |
| N 40° | | 00:21 | 00:53 | 08:46 | 09:49 | 10:53 |
| 35° | | 00:06 | 00:40 | 09:03 | 10:03 | 11:05 |
| 30° | 23:52 | | 00:29 | 09:18 | 10:16 | 11:15 |
| 20° | 23:29 | | 00:10 | 09:43 | 10:38 | 11:32 |
| N 10° | 23:09 | 23:54 | | 10:05 | 10:56 | 11:47 |
| 0° | 22:51 | 23:38 | | 10:25 | 11:14 | 12:00 |
| S 10° | 22:32 | 23:23 | | 10:45 | 11:31 | 12:14 |
| 20° | 22:11 | 23:06 | | 11:07 | 11:49 | 12:29 |
| 30° | 21:48 | 22:46 | 23:45 | 11:31 | 12:10 | 12:45 |
| 35° | 21:34 | 22:35 | 23:37 | 11:46 | 12:23 | 12:55 |
| 40° | 21:18 | 22:22 | 23:27 | 12:02 | 12:37 | 13:06 |
| 45° | 20:59 | 22:06 | 23:16 | 12:22 | 12:53 | 13:18 |
| S 50° | 20:35 | 21:47 | 23:02 | 12:47 | 13:14 | 13:34 |
| 52° | 20:23 | 21:38 | 22:55 | 12:59 | 13:23 | 13:41 |
| 54° | 20:10 | 21:28 | 22:48 | 13:13 | 13:34 | 13:49 |
| 56° | 19:55 | 21:16 | 22:40 | 13:29 | 13:46 | 13:58 |
| 58° | 19:36 | 21:03 | 22:31 | 13:48 | 14:00 | 14:08 |
| S 60° | 19:14 | 20:47 | 22:20 | 14:11 | 14:17 | 14:19 |

| Day | Sun | | Mer. Pass | Moon | | Age 20-22 77-59% |
|-----|------------------------------|----------------------------|-----------|-----------------------|-------------|------------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 07 | 03:26 | 03:28 | 11:57 | 04:13 | 16:38 | |
| 08 | 03:30 | 03:32 | 11:56 | 05:02 | 17:26 | |
| 09 | 03:33 | 03:35 | 11:56 | 05:49 | 18:12 | |

May 10, 11, 12 UT (Sun., Mon., Tue.)

| h | Aries | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|--------------------------|----------|------------------------|----------|--------------------------|----------|------------------------|----------|
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 227°48.7 | 149°43.4 | N24°15.9 | 205°59.9 | N08°16.1 | 115°50.7 | N22°18.2 | 217°38.3 | N01°59.7 |
| 1 | 242°51.1 | 164°42.6 | 16.3 | 221°00.6 | 16.8 | 130°52.8 | 18.2 | 232°40.5 | 59.8 |
| 2 | 257°53.6 | 179°41.8 | 16.6 | 236°01.3 | 17.5 | 145°54.8 | 18.1 | 247°42.7 | 01°59.9 |
| 3 | 272°56.0 | 194°40.9 | · · 16.9 | 251°02.0 | · · 18.3 | 160°56.9 | · · 18.1 | 262°44.9 | 02°00.0 |
| 4 | 287°58.5 | 209°40.1 | 17.3 | 266°02.7 | 19.0 | 175°58.9 | 18.0 | 277°47.1 | 00.1 |
| 5 | 303°01.0 | 224°39.3 | 17.6 | 281°03.4 | 19.7 | 191°01.0 | 17.9 | 292°49.3 | 00.2 |
| 6 | 318°03.4 | 239°38.5 | N24°18.0 | 296°04.0 | N08°20.4 | 206°03.0 | N22°17.9 | 307°51.6 | N02°00.3 |
| 7 | 333°05.9 | 254°37.7 | 18.3 | 311°04.7 | 21.1 | 221°05.1 | 17.8 | 322°53.8 | 00.4 |
| 8 | 348°08.4 | 269°36.9 | 18.6 | 326°05.4 | 21.9 | 236°07.1 | 17.8 | 337°56.0 | 00.5 |
| 9 | 3°10.8 | 284°36.0 | · · 19.0 | 341°06.1 | · · 22.6 | 251°09.2 | · · 17.7 | 352°58.2 | · · 00.6 |
| 10 | 18°13.3 | 299°35.2 | 19.3 | 356°06.8 | 23.3 | 266°11.2 | 17.7 | 8°00.4 | 00.7 |
| 11 | 33°15.8 | 314°34.4 | 19.6 | 11°07.5 | 24.0 | 281°13.2 | 17.6 | 23°02.6 | 00.8 |
| 12 | 48°18.2 | 329°33.6 | N24°20.0 | 26°08.2 | N08°24.7 | 296°15.3 | N22°17.6 | 38°04.9 | N02°00.9 |
| 13 | 63°20.7 | 344°32.8 | 20.3 | 41°08.9 | 25.4 | 311°17.3 | 17.5 | 53°07.1 | 01.0 |
| 14 | 78°23.2 | 359°32.0 | 20.6 | 56°09.5 | 26.2 | 326°19.4 | 17.4 | 68°09.3 | 01.1 |
| 15 | 93°25.6 | 14°31.1 | · · 21.0 | 71°10.2 | · · 26.9 | 341°21.4 | · · 17.4 | 83°11.5 | · · 01.2 |
| 16 | 108°28.1 | 29°30.3 | 21.3 | 86°10.9 | 27.6 | 356°23.5 | 17.3 | 98°13.7 | 01.3 |
| 17 | 123°30.5 | 44°29.5 | 21.6 | 101°11.6 | 28.3 | 11°25.5 | 17.3 | 113°16.0 | 01.4 |
| 18 | 138°33.0 | 59°28.7 | N24°21.9 | 116°12.3 | N08°29.0 | 26°27.5 | N22°17.2 | 128°18.2 | N02°01.5 |
| 19 | 153°35.5 | 74°27.9 | 22.2 | 131°13.0 | 29.7 | 41°29.6 | 17.2 | 143°20.4 | 01.6 |
| 20 | 168°37.9 | 89°27.0 | 22.6 | 146°13.7 | 30.5 | 56°31.6 | 17.1 | 158°22.6 | 01.7 |
| 21 | 183°40.4 | 104°26.2 | · · 22.9 | 161°14.3 | · · 31.2 | 71°33.7 | · · 17.0 | 173°24.8 | · · 01.8 |
| 22 | 198°42.9 | 119°25.4 | 23.2 | 176°15.0 | 31.9 | 86°35.7 | 17.0 | 188°27.1 | 01.9 |
| 23 | 213°45.3 | 134°24.6 | 23.5 | 191°15.7 | 32.6 | 101°37.8 | 16.9 | 203°29.3 | 02.0 |
| | | | | | | | | | |
| Mer.pass. 08:47 | | ν -0.8' d0.3' m-3.92 | | ν 0.7' d0.7' m1.24 | | ν 2.0' d-0.1' m-1.97 | | ν 2.2' d0.1' m0.92 | |

| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|---------------------|----------|-------------------|----------|---------------------|----------|-------------------|----------|
| 0 | 228°47.8 | 149°23.8 | N24°23.8 | 206°16.4 | N08°33.3 | 116°39.8 | N22°16.9 | 218°31.5 | N02°02.1 |
| 1 | 243°50.3 | 164°23.0 | 24.2 | 221°17.1 | 34.0 | 131°41.8 | 16.8 | 233°33.7 | 02.2 |
| 2 | 258°52.7 | 179°22.1 | 24.5 | 236°17.8 | 34.8 | 146°43.9 | 16.7 | 248°35.9 | 02.2 |
| 3 | 273°55.2 | 194°21.3 | · · 24.8 | 251°18.5 | · · 35.5 | 161°45.9 | · · 16.7 | 263°38.1 | · · 02.3 |
| 4 | 288°57.6 | 209°20.5 | 25.1 | 266°19.2 | 36.2 | 176°48.0 | 16.6 | 278°40.4 | 02.4 |
| 5 | 304°00.1 | 224°19.7 | 25.4 | 281°19.8 | 36.9 | 191°50.0 | 16.6 | 293°42.6 | 02.5 |
| 6 | 319°02.6 | 239°18.9 | N24°25.7 | 296°20.5 | N08°37.6 | 206°52.0 | N22°16.5 | 308°44.8 | N02°02.6 |
| 7 | 334°05.0 | 254°18.0 | 26.0 | 311°21.2 | 38.3 | 221°54.1 | 16.5 | 323°47.0 | 02.7 |
| 8 | 349°07.5 | 269°17.2 | 26.3 | 326°21.9 | 39.0 | 236°56.1 | 16.4 | 338°49.2 | 02.8 |
| 9 | 4°10.0 | 284°16.4 | · · 26.6 | 341°22.6 | · · 39.8 | 251°58.2 | · · 16.3 | 353°51.5 | · · 02.9 |
| 10 | 19°12.4 | 299°15.6 | 26.9 | 356°23.3 | 40.5 | 267°00.2 | 16.3 | 8°53.7 | 03.0 |
| 11 | 34°14.9 | 314°14.8 | 27.3 | 11°24.0 | 41.2 | 282°02.2 | 16.2 | 23°55.9 | 03.1 |
| 12 | 49°17.4 | 329°13.9 | N24°27.6 | 26°24.6 | N08°41.9 | 297°04.3 | N22°16.2 | 38°58.1 | N02°03.2 |
| 13 | 64°19.8 | 344°13.1 | 27.9 | 41°25.3 | 42.6 | 312°06.3 | 16.1 | 54°00.3 | 03.3 |
| 14 | 79°22.3 | 359°12.3 | 28.2 | 56°26.0 | 43.3 | 327°08.4 | 16.1 | 69°02.6 | 03.4 |
| 15 | 94°24.8 | 14°11.5 | · · 28.5 | 71°26.7 | · · 44.0 | 342°10.4 | · · 16.0 | 84°04.8 | · · 03.5 |
| 16 | 109°27.2 | 29°10.6 | 28.7 | 86°27.4 | 44.8 | 357°12.4 | 15.9 | 99°07.0 | 03.6 |
| 17 | 124°29.7 | 44°09.8 | 29.0 | 101°28.1 | 45.5 | 12°14.5 | 15.9 | 114°09.2 | 03.7 |
| 18 | 139°32.1 | 59°09.0 | N24°29.3 | 116°28.8 | N08°46.2 | 27°16.5 | N22°15.8 | 129°11.4 | N02°03.8 |
| 19 | 154°34.6 | 74°08.2 | 29.6 | 131°29.4 | 46.9 | 42°18.6 | 15.8 | 144°13.7 | 03.9 |
| 20 | 169°37.1 | 89°07.4 | 29.9 | 146°30.1 | 47.6 | 57°20.6 | 15.7 | 159°15.9 | 04.0 |
| 21 | 184°39.5 | 104°06.5 | · · 30.2 | 161°30.8 | · · 48.3 | 72°22.6 | · · 15.6 | 174°18.1 | · · 04.1 |
| 22 | 199°42.0 | 119°05.7 | 30.5 | 176°31.5 | 49.0 | 87°24.7 | 15.6 | 189°20.3 | 04.2 |
| 23 | 214°44.5 | 134°04.9 | 30.8 | 191°32.2 | 49.7 | 102°26.7 | 15.5 | 204°22.5 | 04.3 |
| Mer.pass. 08:43 | | ν-0.8' d0.3' m-3.92 | | ν0.7' d0.7' m1.24 | | ν2.0' d-0.1' m-1.96 | | ν2.2' d0.1' m0.92 | |

| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|---------------------|----------|-------------------|----------|---------------------|----------|-------------------|----------|
| 0 | 229°46.9 | 149°04.1 | N24°31.1 | 206°32.9 | N08°50.5 | 117°28.7 | N22°15.5 | 219°24.8 | N02°04.4 |
| 1 | 244°49.4 | 164°03.2 | 31.4 | 221°33.6 | 51.2 | 132°30.8 | 15.4 | 234°27.0 | 04.5 |
| 2 | 259°51.9 | 179°02.4 | 31.7 | 236°34.2 | 51.9 | 147°32.8 | 15.4 | 249°29.2 | 04.6 |
| 3 | 274°54.3 | 194°01.6 | · · 31.9 | 251°34.9 | · · 52.6 | 162°34.8 | · · 15.3 | 264°31.4 | · · 04.7 |
| 4 | 289°56.8 | 209°00.8 | 32.2 | 266°35.6 | 53.3 | 177°36.9 | 15.2 | 279°33.7 | 04.8 |
| 5 | 304°59.2 | 223°59.9 | 32.5 | 281°36.3 | 54.0 | 192°38.9 | 15.2 | 294°35.9 | 04.9 |
| 6 | 320°01.7 | 238°59.1 | N24°32.8 | 296°37.0 | N08°54.7 | 207°41.0 | N22°15.1 | 309°38.1 | N02°04.9 |
| 7 | 335°04.2 | 253°58.3 | 33.1 | 311°37.7 | 55.4 | 222°43.0 | 15.1 | 324°40.3 | 05.0 |
| 8 | 350°06.6 | 268°57.5 | 33.3 | 326°38.4 | 56.1 | 237°45.0 | 15.0 | 339°42.5 | 05.1 |
| 9 | 5°09.1 | 283°56.6 | · · 33.6 | 341°39.0 | · · 56.9 | 252°47.1 | · · 14.9 | 354°44.8 | · · 05.2 |
| 10 | 20°11.6 | 298°55.8 | 33.9 | 356°39.7 | 57.6 | 267°49.1 | 14.9 | 9°47.0 | 05.3 |
| 11 | 35°14.0 | 313°55.0 | 34.2 | 11°40.4 | 58.3 | 282°51.1 | 14.8 | 24°49.2 | 05.4 |
| 12 | 50°16.5 | 328°54.2 | N24°34.4 | 26°41.1 | N08°59.0 | 297°53.2 | N22°14.8 | 39°51.4 | N02°05.5 |
| 13 | 65°19.0 | 343°53.4 | 34.7 | 41°41.8 | 08°59.7 | 312°55.2 | 14.7 | 54°53.6 | 05.6 |
| 14 | 80°21.4 | 358°52.5 | 35.0 | 56°42.5 | 09°00.4 | 327°57.2 | 14.6 | 69°55.9 | 05.7 |
| 15 | 95°23.9 | 13°51.7 | · · 35.3 | 71°43.2 | · · 01.1 | 342°59.3 | · · 14.6 | 84°58.1 | · · 05.8 |
| 16 | 110°26.4 | 28°50.9 | 35.5 | 86°43.8 | 01.8 | 358°01.3 | 14.5 | 100°00.3 | 05.9 |
| 17 | 125°28.8 | 43°50.0 | 35.8 | 101°44.5 | 02.5 | 13°03.3 | 14.5 | 115°02.5 | 06.0 |
| 18 | 140°31.3 | 58°49.2 | N24°36.1 | 116°45.2 | N09°03.2 | 28°05.4 | N22°14.4 | 130°04.8 | N02°06.1 |
| 19 | 155°33.7 | 73°48.4 | 36.3 | 131°45.9 | 03.9 | 43°07.4 | 14.3 | 145°07.0 | 06.2 |
| 20 | 170°36.2 | 88°47.6 | 36.6 | 146°46.6 | 04.7 | 58°09.4 | 14.3 | 160°09.2 | 06.3 |
| 21 | 185°38.7 | 103°46.7 | · · 36.9 | 161°47.3 | · · 05.4 | 73°11.5 | · · 14.2 | 175°11.4 | · · 06.4 |
| 22 | 200°41.1 | 118°45.9 | 37.1 | 176°47.9 | 06.1 | 88°13.5 | 14.2 | 190°13.6 | 06.5 |
| 23 | 215°43.6 | 133°45.1 | 37.4 | 191°48.6 | 06.8 | 103°15.5 | 14.1 | 205°15.9 | 06.6 |
| Mer.pass. 08:39 | | ν-0.8' d0.3' m-3.92 | | ν0.7' d0.7' m1.24 | | ν2.0' d-0.1' m-1.96 | | ν2.2' d0.1' m0.92 | |

| Stars | | |
|-------------|-----------|-----------|
| | SHA | Dec |
| Alpheratz | 357° 33.9 | 29° 14.0 |
| Ankaa | 353° 06.4 | -42° 09.6 |
| Schedar | 349° 30.2 | 56° 40.7 |
| Diphda | 348° 46.5 | -17° 50.5 |
| Achernar | 335° 19.9 | -57° 06.0 |
| Hamal | 332° 50.3 | 23° 35.1 |
| Polaris | 313° 58.2 | 89° 22.5 |
| Acamar | 315° 11.4 | -40° 11.9 |
| Menkar | 314° 05.3 | 4° 11.5 |
| Mirfak | 308° 27.2 | 49° 57.2 |
| Aldebaran | 290° 38.7 | 16° 33.7 |
| Rigel | 281° 03.1 | -8° 10.4 |
| Capella | 280° 20.7 | 46° 01.5 |
| Bellatrix | 278° 22.0 | 6° 22.4 |
| Elnath | 278° 00.8 | 28° 37.8 |
| Alnilam | 275° 36.9 | -1° 11.2 |
| Betelgeuse | 270° 51.2 | 7° 24.7 |
| Canopus | 263° 52.3 | -52° 42.8 |
| Sirius | 258° 25.5 | -16° 45.3 |
| Adhara | 255° 05.2 | -29° 00.7 |
| Procyon | 244° 49.9 | 5° 09.4 |
| Pollux | 243° 16.1 | 27° 57.8 |
| Avior | 234° 14.5 | -59° 35.9 |
| Suhail | 222° 45.6 | -43° 32.6 |
| Miaplacidus | 221° 38.1 | -69° 49.8 |
| Alphard | 217° 46.7 | -8° 46.5 |
| Regulus | 207° 33.2 | 11° 50.3 |
| Dubhe | 193° 39.4 | 61° 36.7 |
| Denebola | 182° 23.6 | 14° 25.4 |
| Gienah | 175° 42.2 | -17° 41.5 |
| Acrux | 172° 58.4 | -63° 15.0 |
| Gacrux | 171° 50.0 | -57° 15.9 |
| Alioth | 166° 11.5 | 55° 49.1 |
| Spica | 158° 20.9 | -11° 18.1 |
| Alkaid | 152° 50.7 | 49° 10.9 |
| Hadar | 148° 33.8 | -60° 30.2 |
| Menkent | 147° 56.0 | -36° 30.1 |
| Arcturus | 145° 46.6 | 19° 02.6 |
| Rigil Kent. | 139° 38.1 | -60° 56.8 |
| Kochab | 137° 18.6 | 74° 02.8 |
| Zuben'ubi | 136° 54.5 | -16° 09.2 |
| Alphecca | 126° 02.4 | 26° 37.4 |
| Antares | 112° 14.1 | -26° 29.5 |
| Atria | 107° 06.9 | -69° 04.4 |
| Sabik | 102° 01.2 | -15° 45.5 |
| Shaula | 96° 08.5 | -37° 07.3 |
| Rasalhague | 95° 57.2 | 12° 32.3 |
| Eltanin | 90° 41.3 | 51° 28.9 |
| Kaus Aust. | 83° 30.8 | -34° 22.2 |
| Vega | 80° 32.2 | 38° 48.2 |
| Nunki | 75° 46.2 | -26° 15.8 |
| Altair | 61° 58.8 | 8° 56.1 |
| Peacock | 53° 03.9 | -56° 38.8 |
| Deneb | 49° 25.0 | 45° 22.2 |
| Enif | 33° 37.8 | 9° 59.6 |
| Al Na'ir | 27° 31.6 | -46° 49.8 |
| Fomalhaut | 15° 13.5 | -29° 28.8 |
| Scheat | 13° 44.3 | -28° 13.4 |
| Markab | 13° 29.0 | 15° 20.7 |

| May 10 Sun | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 281° 54.7 | 14:02 |
| Mars | 338° 11.3 | 10:16 |
| Jupiter | 248° 02.1 | 16:14 |
| Saturn | 349° 49.6 | 09:28 |

| May 11 Mon | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 280° 36.0 | 14:03 |
| Mars | 337° 28.6 | 10:14 |
| Jupiter | 247° 52.0 | 16:11 |
| Saturn | 349° 43.7 | 09:25 |

| May 12 Tue | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 279° 17.1 | 14:05 |
| Mars | 336° 45.9 | 10:13 |
| Jupiter | 247° 41.8 | 16:08 |
| Saturn | 349° 37.8 | 09:21 |

| | |
|----------------------------|-----|
| Horizontal parallax | |
| Venus: | 0.1 |
| Mars: | 0.1 |

| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°54.0 | N17°34.1 | | 264°15.7 | 13.6' | S15°50.4 | -12.6' | 55.8' |
| 1 | 195°54.0 | 34.7 | | 278°48.3 | 13.6' | 15°37.9 | -12.6' | 55.8' |
| 2 | 210°54.0 | 35.4 | | 293°21.0 | 13.7' | 15°25.2 | -12.7' | 55.8' |
| 3 | 225°54.1 | · · 36.0 | | 307°53.6 | 13.7' | 15°12.5 | -12.8' | 55.9' |
| 4 | 240°54.1 | 36.7 | | 322°26.3 | 13.7' | 14°59.7 | -12.9' | 55.9' |
| 5 | 255°54.1 | 37.4 | | 336°59.0 | 13.7' | 14°46.8 | -13.0' | 55.9' |
| 6 | 270°54.1 | N17°38.0 | | 351°31.8 | 13.8' | S14°33.9 | -13.0' | 55.9' |
| 7 | 285°54.2 | 38.7 | | 6°04.6 | 13.8' | 14°20.8 | -13.1' | 56.0' |
| 8 | 300°54.2 | 39.3 | | 20°37.4 | 13.8' | 14°07.7 | -13.2' | 56.0' |
| 9 | 315°54.2 | · · 40.0 | | 35°10.2 | 13.8' | 13°54.5 | -13.3' | 56.0' |
| 10 | 330°54.2 | 40.6 | | 49°43.0 | 13.9' | 13°41.3 | -13.3' | 56.1' |
| 11 | 345°54.2 | 41.3 | | 64°15.9 | 13.9' | 13°27.9 | -13.4' | 56.1' |
| 12 | 0°54.3 | N17°41.9 | | 78°48.8 | 13.9' | S13°14.5 | -13.5' | 56.1' |
| 13 | 15°54.3 | 42.6 | | 93°21.7 | 13.9' | 13°01.0 | -13.6' | 56.2' |
| 14 | 30°54.3 | 43.2 | | 107°54.6 | 13.9' | 12°47.5 | -13.6' | 56.2' |
| 15 | 45°54.3 | · · 43.9 | | 122°27.5 | 14.0' | 12°33.9 | -13.7' | 56.2' |
| 16 | 60°54.3 | 44.5 | | 137°00.5 | 14.0' | 12°20.2 | -13.8' | 56.3' |
| 17 | 75°54.4 | 45.2 | | 151°33.4 | 14.0' | 12°06.4 | -13.8' | 56.3' |
| 18 | 90°54.4 | N17°45.8 | | 166°06.4 | 14.0' | S11°52.6 | -13.9' | 56.3' |
| 19 | 105°54.4 | 46.5 | | 180°39.4 | 14.0' | 11°38.7 | -14.0' | 56.4' |
| 20 | 120°54.4 | 47.1 | | 195°12.4 | 14.0' | 11°24.7 | -14.0' | 56.4' |
| 21 | 135°54.4 | · · 47.8 | | 209°45.4 | 14.0' | 11°10.6 | -14.1' | 56.5' |
| 22 | 150°54.5 | 48.4 | | 224°18.4 | 14.0' | 10°56.5 | -14.2' | 56.5' |
| 23 | 165°54.5 | 49.0 | | 238°51.5 | 14.0' | 10°42.4 | -14.2' | 56.5' |
| SD = 15.8' $d = 0.7'$ | | | SD = 15.2' | | | | | |

| Mon | Sun | | | Moon | | | | |
|-----------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°54.5 | N17°49.7 | | 253°24.5 | 14.0' | S10°28.1 | -14.3' | 56.6' |
| 1 | 195°54.5 | 50.3 | | 267°57.6 | 14.1' | 10°13.8 | -14.4' | 56.6' |
| 2 | 210°54.5 | 51.0 | | 282°30.6 | 14.1' | 09°59.5 | -14.4' | 56.6' |
| 3 | 225°54.6 | · · 51.6 | | 297°03.7 | 14.1' | 09°45.1 | -14.5' | 56.7' |
| 4 | 240°54.6 | 52.3 | | 311°36.8 | 14.1' | 09°30.6 | -14.5' | 56.7' |
| 5 | 255°54.6 | 52.9 | | 326°09.8 | 14.1' | 09°16.0 | -14.6' | 56.7' |
| 6 | 270°54.6 | N17°53.6 | | 340°42.9 | 14.1' | S09°01.4 | -14.7' | 56.8' |
| 7 | 285°54.6 | 54.2 | | 355°16.0 | 14.1' | 08°46.8 | -14.7' | 56.8' |
| 8 | 300°54.6 | 54.8 | | 9°49.0 | 14.1' | 08°32.1 | -14.8' | 56.8' |
| 9 | 315°54.7 | · · 55.5 | | 24°22.1 | 14.1' | 08°17.3 | -14.8' | 56.9' |
| 10 | 330°54.7 | 56.1 | | 38°55.2 | 14.1' | 08°02.5 | -14.9' | 56.9' |
| 11 | 345°54.7 | 56.8 | | 53°28.2 | 14.1' | 07°47.6 | -14.9' | 57.0' |
| 12 | 0°54.7 | N17°57.4 | | 68°01.3 | 14.0' | S07°32.6 | -15.0' | 57.0' |
| 13 | 15°54.7 | 58.0 | | 82°34.3 | 14.0' | 07°17.6 | -15.0' | 57.0' |
| 14 | 30°54.7 | 58.7 | | 97°07.4 | 14.0' | 07°02.6 | -15.1' | 57.1' |
| 15 | 45°54.7 | · · 59.3 | | 111°40.4 | 14.0' | 06°47.5 | -15.1' | 57.1' |
| 16 | 60°54.8 | 17°59.9 | | 126°13.4 | 14.0' | 06°32.4 | -15.2' | 57.1' |
| 17 | 75°54.8 | 18°00.6 | | 140°46.4 | 14.0' | 06°17.2 | -15.2' | 57.2' |
| 18 | 90°54.8 | N18°01.2 | | 155°19.4 | 14.0' | S06°01.9 | -15.3' | 57.2' |
| 19 | 105°54.8 | 01.8 | | 169°52.4 | 14.0' | 05°46.6 | -15.3' | 57.3' |
| 20 | 120°54.8 | 02.5 | | 184°25.4 | 14.0' | 05°31.3 | -15.4' | 57.3' |
| 21 | 135°54.8 | · · 03.1 | | 198°58.3 | 13.9' | 05°15.9 | -15.4' | 57.3' |
| 22 | 150°54.8 | 03.7 | | 213°31.3 | 13.9' | 05°00.5 | -15.5' | 57.4' |
| 23 | 165°54.8 | 04.4 | | 228°04.2 | 13.9' | 04°45.0 | -15.5' | 57.4' |
| SD = 15.8' $d = 0.6'$ | | | SD = 15.4' | | | | | |

| Tue | Sun | | | Moon | | | | |
|-----------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°54.9 | N18°05.0 | | 242°37.1 | 13.9' | S04°29.5 | -15.6' | 57.5' |
| 1 | 195°54.9 | 05.6 | | 257°10.0 | 13.9' | 04°13.9 | -15.6' | 57.5' |
| 2 | 210°54.9 | 06.3 | | 271°42.8 | 13.8' | 03°58.3 | -15.6' | 57.5' |
| 3 | 225°54.9 | · · 06.9 | | 286°15.6 | 13.8' | 03°42.7 | -15.7' | 57.6' |
| 4 | 240°54.9 | 07.5 | | 300°48.4 | 13.8' | 03°27.0 | -15.7' | 57.6' |
| 5 | 255°54.9 | 08.2 | | 315°21.2 | 13.8' | 03°11.3 | -15.7' | 57.7' |
| 6 | 270°54.9 | N18°08.8 | | 329°54.0 | 13.7' | S02°55.6 | -15.8' | 57.7' |
| 7 | 285°54.9 | 09.4 | | 344°26.7 | 13.7' | 02°39.8 | -15.8' | 57.7' |
| 8 | 300°54.9 | 10.1 | | 358°59.4 | 13.7' | 02°24.0 | -15.9' | 57.8' |
| 9 | 315°55.0 | · · 10.7 | | 13°32.1 | 13.6' | 02°08.1 | -15.9' | 57.8' |
| 10 | 330°55.0 | 11.3 | | 28°04.7 | 13.6' | 01°52.2 | -15.9' | 57.9' |
| 11 | 345°55.0 | 11.9 | | 42°37.3 | 13.6' | 01°36.3 | -15.9' | 57.9' |
| 12 | 0°55.0 | N18°12.6 | | 57°09.8 | 13.5' | S01°20.4 | -16.0' | 57.9' |
| 13 | 15°55.0 | 13.2 | | 71°42.4 | 13.5' | 01°04.4 | -16.0' | 58.0' |
| 14 | 30°55.0 | 13.8 | | 86°14.9 | 13.4' | 00°48.4 | -16.0' | 58.0' |
| 15 | 45°55.0 | · · 14.4 | | 100°47.3 | 13.4' | 00°32.4 | -16.1' | 58.1' |
| 16 | 60°55.0 | 15.1 | | 115°19.7 | 13.4' | 00°16.3 | -16.1' | 58.1' |
| 17 | 75°55.0 | 15.7 | | 129°52.1 | 13.3' | S00°00.2 | -16.1' | 58.1' |
| 18 | 90°55.0 | N18°16.3 | | 144°24.4 | 13.3' | N00°15.9 | 16.1' | 58.2' |
| 19 | 105°55.0 | 16.9 | | 158°56.7 | 13.2' | 00°32.0 | 16.1' | 58.2' |
| 20 | 120°55.0 | 17.5 | | 173°28.9 | 13.2' | 00°48.1 | 16.2' | 58.2' |
| 21 | 135°55.0 | · · 18.2 | | 188°01.1 | 13.1' | 01°04.3 | 16.2' | 58.3' |
| 22 | 150°55.1 | 18.8 | | 202°33.2 | 13.1' | 01°20.5 | 16.2' | 58.3' |
| 23 | 165°55.1 | 19.4 | | 217°05.3 | 13.0' | 01°36.7 | 16.2' | 58.4' |
| SD = 15.8' $d = 0.6'$ | | | SD = 15.7' | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | | | | | | |
| N 70° | //// | //// | 01:23 | 22:37 | //// | //// |
| 68° | //// | //// | 02:09 | 21:48 | //// | //// |
| 66° | //// | 00:25 | 02:38 | 21:18 | //// | //// |
| 64° | //// | 01:34 | 03:00 | 20:55 | 22:24 | //// |
| 62° | //// | 02:08 | 03:18 | 20:37 | 21:48 | //// |
| 60° | 00:22 | 02:32 | 03:32 | 20:22 | 21:23 | //// |
| N 58° | 01:24 | 02:51 | 03:44 | 20:10 | 21:04 | 22:33 |
| 56° | 01:55 | 03:07 | 03:55 | 19:59 | 20:48 | 22:00 |
| 54° | 02:18 | 03:20 | 04:04 | 19:50 | 20:34 | 21:37 |
| 52° | 02:36 | 03:31 | 04:13 | 19:41 | 20:23 | 21:19 |
| 50° | 02:51 | 03:42 | 04:20 | 19:34 | 20:12 | 21:03 |
| 45° | 03:20 | 04:02 | 04:36 | 19:18 | 19:51 | 20:34 |
| N 40° | 03:41 | 04:19 | 04:49 | 19:05 | 19:35 | 20:12 |
| 35° | 03:58 | 04:32 | 05:00 | 18:53 | 19:21 | 19:55 |
| 30° | 04:12 | 04:43 | 05:09 | 18:44 | 19:10 | 19:41 |
| 20° | 04:34 | 05:02 | 05:26 | 18:27 | 18:51 | 19:19 |
| N 10° | 04:52 | 05:18 | 05:40 | 18:13 | 18:35 | 19:01 |
| 0° | 05:06 | 05:31 | 05:53 | 18:00 | 18:22 | 18:47 |
| S 10° | 05:18 | 05:44 | 06:06 | 17:47 | 18:09 | 18:34 |
| 20° | 05:30 | 05:57 | 06:20 | 17:33 | 17:56 | 18:23 |
| 30° | 05:41 | 06:10 | 06:35 | 17:17 | 17:42 | 18:11 |
| 35° | 05:47 | 06:17 | 06:44 | 17:08 | 17:35 | 18:05 |
| 40° | 05:53 | 06:26 | 06:55 | 16:58 | 17:27 | 17:59 |
| 45° | 06:00 | 06:35 | 07:07 | 16:46 | 17:17 | 17:53 |
| S 50° | 06:07 | 06:46 | 07:21 | 16:31 | 17:06 | 17:45 |
| 52° | 06:10 | 06:51 | 07:28 | 16:24 | 17:01 | 17:42 |
| 54° | 06:13 | 06:56 | 07:35 | 16:17 | 16:56 | 17:39 |
| 56° | 06:17 | 07:02 | 07:44 | 16:08 | 16:50 | 17:35 |
| 58° | 06:20 | 07:09 | 07:53 | 15:59 | 16:43 | 17:32 |
| S 60° | 06:24 | 07:16 | 08:04 | 15:48 | 16:36 | 17:27 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | 04:14 | 03:21 | 02:43 | 09:21 | 11:49 | 14:04 |
| N 70° | 03:42 | 03:06 | 02:38 | 09:50 | 12:01 | 14:05 |
| 68° | 03:19 | 02:54 | 02:34 | 10:12 | 12:11 | 14:06 |
| 66° | 03:00 | 02:44 | 02:30 | 10:29 | 12:19 | 14:07 |
| 64° | 02:45 | 02:36 | 02:27 | 10:43 | 12:25 | 14:08 |
| 62° | 02:33 | 02:28 | 02:24 | 10:54 | 12:31 | 14:08 |
| 60° | 02:22 | 02:22 | 02:22 | 11:04 | 12:36 | 14:09 |
| N 58° | 02:12 | 02:16 | 02:20 | 11:13 | 12:40 | 14:09 |
| 56° | 02:04 | 02:11 | 02:18 | 11:20 | 12:44 | 14:10 |
| 54° | 01:57 | 02:07 | 02:16 | 11:27 | 12:48 | 14:10 |
| 52° | 01:50 | 02:03 | 02:14 | 11:32 | 12:51 | 14:11 |
| 50° | 01:44 | 01:59 | 02:13 | 11:38 | 12:54 | 14:11 |
| 45° | 01:31 | 01:51 | 02:10 | 11:49 | 13:00 | 14:12 |
| N 40° | 01:20 | 01:44 | 02:07 | 11:59 | 13:05 | 14:12 |
| 35° | 01:11 | 01:38 | 02:05 | 12:07 | 13:09 | 14:13 |
| 30° | 01:03 | 01:33 | 02:03 | 12:13 | 13:13 | 14:13 |
| 20° | 00:48 | 01:24 | 01:59 | 12:26 | 13:19 | 14:14 |
| N 10° | 00:36 | 01:16 | 01:56 | 12:36 | 13:25 | 14:14 |
| 0° | 00:24 | 01:09 | 01:53 | 12:46 | 13:30 | 14:15 |
| S 10° | 00:12 | 01:01 | 01:51 | 12:55 | 13:35 | 14:15 |
| 20° | 00:00 | 00:53 | 01:47 | 13:05 | 13:41 | 14:16 |
| 30° | | 00:44 | 01:44 | 13:17 | 13:47 | 14:17 |
| 35° | | 00:39 | 01:42 | 13:24 | 13:51 | 14:17 |
| 40° | | 00:33 | 01:40 | 13:31 | 13:55 | 14:17 |
| 45° | | 00:26 | 01:37 | 13:40 | 13:59 | 14:18 |
| S 50° | | 00:17 | 01:34 | 13:50 | 14:05 | 14:18 |
| 52° | | 00:13 | 01:32 | 13:55 | 14:07 | 14:18 |
| 54° | | 00:09 | 01:30 | 14:00 | 14:10 | 14:19 |
| 56° | | 00:04 | 01:29 | 14:06 | 14:13 | 14:19 |
| 58° | 23:58 | | 01:27 | 14:13 | 14:16 | 14:19 |
| S 60° | 23:52 | | 01:24 | 14:20 | 14:20 | 14:20 |

May 13, 14, 15 UT (Wed., Thu., Fri.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------|---------------------|----------|----------|-------------------|----------|----------|---------------------|---------|-----|-------------------|--------|--|--|
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 230°46.1 | 148°44.3 | N24°37.6 | 206°49.3 | N09°07.5 | 118°17.6 | N22°14.0 | 220°18.1 | N02°06.7 | | | | | | |
| 1 | 245°48.5 | 163°43.4 | 37.9 | 221°50.0 | 08.2 | 133°19.6 | 14.0 | 235°20.3 | 06.8 | | | | | | |
| 2 | 260°51.0 | 178°42.6 | 38.1 | 236°50.7 | 08.9 | 148°21.6 | 13.9 | 250°22.5 | 06.9 | | | | | | |
| 3 | 275°53.5 | 193°41.8 | •• 38.4 | 251°51.4 | •• 09.6 | 163°23.7 | •• 13.9 | 265°24.8 | •• 07.0 | | | | | | |
| 4 | 290°55.9 | 208°41.0 | 38.7 | 266°52.1 | 10.3 | 178°25.7 | 13.8 | 280°27.0 | 07.0 | | | | | | |
| 5 | 305°58.4 | 223°40.1 | 38.9 | 281°52.7 | 11.0 | 193°27.7 | 13.7 | 295°29.2 | 07.1 | | | | | | |
| 6 | 321°00.9 | 238°39.3 | N24°39.2 | 296°53.4 | N09°11.7 | 208°29.8 | N22°13.7 | 310°31.4 | N02°07.2 | | | | | | |
| 7 | 336°03.3 | 253°38.5 | 39.4 | 311°54.1 | 12.4 | 223°31.8 | 13.6 | 325°33.7 | 07.3 | | | | | | |
| 8 | 351°05.8 | 268°37.7 | 39.7 | 326°54.8 | 13.1 | 238°33.8 | 13.6 | 340°35.9 | 07.4 | | | | | | |
| 9 | 6°08.2 | 283°36.8 | •• 39.9 | 341°55.5 | •• 13.8 | 253°35.9 | •• 13.5 | 355°38.1 | •• 07.5 | | | | | | |
| 10 | 21°10.7 | 298°36.0 | 40.2 | 356°56.2 | 14.6 | 268°37.9 | 13.4 | 10°40.3 | 07.6 | | | | | | |
| 11 | 36°13.2 | 313°35.2 | 40.4 | 11°56.8 | 15.3 | 283°39.9 | 13.4 | 25°42.5 | 07.7 | | | | | | |
| 12 | 51°15.6 | 328°34.3 | N24°40.6 | 26°57.5 | N09°16.0 | 298°41.9 | N22°13.3 | 40°44.8 | N02°07.8 | | | | | | |
| 13 | 66°18.1 | 343°33.5 | 40.9 | 41°58.2 | 16.7 | 313°44.0 | 13.3 | 55°47.0 | 07.9 | | | | | | |
| 14 | 81°20.6 | 358°32.7 | 41.1 | 56°58.9 | 17.4 | 328°46.0 | 13.2 | 70°49.2 | 08.0 | | | | | | |
| 15 | 96°23.0 | 13°31.9 | •• 41.4 | 71°59.6 | •• 18.1 | 343°48.0 | •• 13.1 | 85°51.4 | •• 08.1 | | | | | | |
| 16 | 111°25.5 | 28°31.0 | 41.6 | 87°00.3 | 18.8 | 358°50.1 | 13.1 | 100°53.7 | 08.2 | | | | | | |
| 17 | 126°28.0 | 43°30.2 | 41.8 | 102°01.0 | 19.5 | 13°52.1 | 13.0 | 115°55.9 | 08.3 | | | | | | |
| 18 | 141°30.4 | 58°29.4 | N24°42.1 | 117°01.6 | N09°20.2 | 28°54.1 | N22°13.0 | 130°58.1 | N02°08.4 | | | | | | |
| 19 | 156°32.9 | 73°28.5 | 42.3 | 132°02.3 | 20.9 | 43°56.2 | 12.9 | 146°00.3 | 08.5 | | | | | | |
| 20 | 171°35.3 | 88°27.7 | 42.6 | 147°03.0 | 21.6 | 58°58.2 | 12.8 | 161°02.6 | 08.6 | | | | | | |
| 21 | 186°37.8 | 103°26.9 | •• 42.8 | 162°03.7 | •• 22.3 | 74°00.2 | •• 12.8 | 176°04.8 | •• 08.7 | | | | | | |
| 22 | 201°40.3 | 118°26.1 | 43.0 | 177°04.4 | 23.0 | 89°02.2 | 12.7 | 191°07.0 | 08.8 | | | | | | |
| 23 | 216°42.7 | 133°25.2 | 43.3 | 192°05.1 | 23.7 | 104°04.3 | 12.7 | 206°09.2 | 08.8 | | | | | | |
| Mer.pass. 08:36 | | | ν-0.8' d0.3' m-3.92 | | | ν0.7' d0.7' m1.24 | | | ν2.0' d-0.1' m-1.95 | | | ν2.2' d0.1' m0.91 | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 231°45.2 | 148°24.4 | N24°43.5 | 207°05.7 | N09°24.4 | 119°06.3 | N22°12.6 | 221°11.5 | N02°08.9 | | | | | | |
| 1 | 246°47.7 | 163°23.6 | 43.7 | 222°06.4 | 25.1 | 134°08.3 | 12.5 | 236°13.7 | 09.0 | | | | | | |
| 2 | 261°50.1 | 178°22.7 | 43.9 | 237°07.1 | 25.8 | 149°10.4 | 12.5 | 251°15.9 | 09.1 | | | | | | |
| 3 | 276°52.6 | 193°21.9 | •• 44.2 | 252°07.8 | •• 26.5 | 164°12.4 | •• 12.4 | 266°18.1 | •• 09.2 | | | | | | |
| 4 | 291°55.1 | 208°21.1 | 44.4 | 267°08.5 | 27.2 | 179°14.4 | 12.4 | 281°20.4 | 09.3 | | | | | | |
| 5 | 306°57.5 | 223°20.2 | 44.6 | 282°09.2 | 27.9 | 194°16.4 | 12.3 | 296°22.6 | 09.4 | | | | | | |
| 6 | 322°00.0 | 238°19.4 | N24°44.8 | 297°09.8 | N09°28.6 | 209°18.5 | N22°12.2 | 311°24.8 | N02°09.5 | | | | | | |
| 7 | 337°02.5 | 253°18.6 | 45.1 | 312°10.5 | 29.3 | 224°20.5 | 12.2 | 326°27.0 | 09.6 | | | | | | |
| 8 | 352°04.9 | 268°17.8 | 45.3 | 327°11.2 | 30.0 | 239°22.5 | 12.1 | 341°29.3 | 09.7 | | | | | | |
| 9 | 7°07.4 | 283°16.9 | •• 45.5 | 342°11.9 | •• 30.7 | 254°24.5 | •• 12.1 | 356°31.5 | •• 09.8 | | | | | | |
| 10 | 22°09.8 | 298°16.1 | 45.7 | 357°12.6 | 31.4 | 269°26.6 | 12.0 | 11°33.7 | 09.9 | | | | | | |
| 11 | 37°12.3 | 313°15.3 | 45.9 | 12°13.3 | 32.1 | 284°28.6 | 11.9 | 26°35.9 | 10.0 | | | | | | |
| 12 | 52°14.8 | 328°14.4 | N24°46.1 | 27°13.9 | N09°32.8 | 299°30.6 | N22°11.9 | 41°38.2 | N02°10.1 | | | | | | |
| 13 | 67°17.2 | 343°13.6 | 46.4 | 42°14.6 | 33.5 | 314°32.7 | 11.8 | 56°40.4 | 10.2 | | | | | | |
| 14 | 82°19.7 | 358°12.8 | 46.6 | 57°15.3 | 34.2 | 329°34.7 | 11.7 | 71°42.6 | 10.3 | | | | | | |
| 15 | 97°22.2 | 13°11.9 | •• 46.8 | 72°16.0 | •• 34.9 | 344°36.7 | •• 11.7 | 86°44.8 | •• 10.3 | | | | | | |
| 16 | 112°24.6 | 28°11.1 | 47.0 | 87°16.7 | 35.6 | 359°38.7 | 11.6 | 101°47.1 | 10.4 | | | | | | |
| 17 | 127°27.1 | 43°10.3 | 47.2 | 102°17.3 | 36.3 | 14°40.8 | 11.6 | 116°49.3 | 10.5 | | | | | | |
| 18 | 142°29.6 | 58°09.5 | N24°47.4 | 117°18.0 | N09°37.0 | 29°42.8 | N22°11.5 | 131°51.5 | N02°10.6 | | | | | | |
| 19 | 157°32.0 | 73°08.6 | 47.6 | 132°18.7 | 37.7 | 44°44.8 | 11.4 | 146°53.7 | 10.7 | | | | | | |
| 20 | 172°34.5 | 88°07.8 | 47.8 | 147°19.4 | 38.4 | 59°46.8 | 11.4 | 161°56.0 | 10.8 | | | | | | |
| 21 | 187°36.9 | 103°07.0 | •• 48.0 | 162°20.1 | •• 39.1 | 74°48.9 | •• 11.3 | 176°58.2 | •• 10.9 | | | | | | |
| 22 | 202°39.4 | 118°06.1 | 48.2 | 177°20.8 | 39.8 | 89°50.9 | 11.3 | 192°00.4 | 11.0 | | | | | | |
| 23 | 217°41.9 | 133°05.3 | 48.4 | 192°21.4 | 40.5 | 104°52.9 | 11.2 | 207°02.7 | 11.1 | | | | | | |
| Mer.pass. 08:32 | | | ν-0.8' d0.2' m-3.93 | | | ν0.7' d0.7' m1.25 | | | ν2.0' d-0.1' m-1.95 | | | ν2.2' d0.1' m0.91 | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 232°44.3 | 148°04.5 | N24°48.6 | 207°22.1 | N09°41.2 | 119°54.9 | N22°11.1 | 222°04.9 | N02°11.2 | | | | | | |
| 1 | 247°46.8 | 163°03.6 | 48.8 | 222°22.8 | 41.9 | 134°57.0 | 11.1 | 237°07.1 | 11.3 | | | | | | |
| 2 | 262°49.3 | 178°02.8 | 49.0 | 237°23.5 | 42.6 | 149°59.0 | 11.0 | 252°09.3 | 11.4 | | | | | | |
| 3 | 277°51.7 | 193°02.0 | •• 49.2 | 252°24.2 | •• 43.3 | 165°01.0 | •• 10.9 | 267°11.6 | •• 11.5 | | | | | | |
| 4 | 292°54.2 | 208°01.1 | 49.4 | 267°24.9 | 44.0 | 180°03.0 | 10.9 | 282°13.8 | 11.6 | | | | | | |
| 5 | 307°56.7 | 223°00.3 | 49.6 | 282°25.5 | 44.7 | 195°05.0 | 10.8 | 297°16.0 | 11.7 | | | | | | |
| 6 | 322°59.1 | 237°59.5 | N24°49.8 | 297°26.2 | N09°45.4 | 210°07.1 | N22°10.8 | 312°18.2 | N02°11.7 | | | | | | |
| 7 | 338°01.6 | 252°58.6 | 50.0 | 312°26.9 | 46.1 | 225°09.1 | 10.7 | 327°20.5 | 11.8 | | | | | | |
| 8 | 353°04.1 | 267°57.8 | 50.2 | 327°27.6 | 46.8 | 240°11.1 | 10.6 | 342°22.7 | 11.9 | | | | | | |
| 9 | 8°06.5 | 282°57.0 | •• 50.4 | 342°28.3 | •• 47.5 | 255°13.1 | •• 10.6 | 357°24.9 | •• 12.0 | | | | | | |
| 10 | 23°09.0 | 297°56.2 | 50.6 | 357°28.9 | 48.2 | 270°15.2 | 10.5 | 12°27.2 | 12.1 | | | | | | |
| 11 | 38°11.4 | 312°55.3 | 50.7 | 12°29.6 | 48.9 | 285°17.2 | 10.4 | 27°29.4 | 12.2 | | | | | | |
| 12 | 53°13.9 | 327°54.5 | N24°50.9 | 27°30.3 | N09°49.6 | 300°19.2 | N22°10.4 | 42°31.6 | N02°12.3 | | | | | | |
| 13 | 68°16.4 | 342°53.7 | 51.1 | 42°31.0 | 50.3 | 315°21.2 | 10.3 | 57°33.8 | 12.4 | | | | | | |
| 14 | 83°18.8 | 357°52.8 | 51.3 | 57°31.7 | 51.0 | 330°23.2 | 10.3 | 72°36.1 | 12.5 | | | | | | |
| 15 | 98°21.3 | 12°52.0 | •• 51.5 | 72°32.4 | •• 51.7 | 345°25.3 | •• 10.2 | 87°38.3 | •• 12.6 | | | | | | |
| 16 | 113°23.8 | 27°51.2 | 51.7 | 87°33.0 | 52.4 | 0°27.3 | 10.1 | 102°40.5 | 12.7 | | | | | | |
| 17 | 128°26.2 | 42°50.3 | 51.8 | 102°33.7 | 53.1 | 15°29.3 | 10.1 | 117°42.7 | 12.8 | | | | | | |
| 18 | 143°28.7 | 57°49.5 | N24°52.0 | 117°34.4 | N09°53.8 | 30°31.3 | N22°10.0 | 132°45.0 | N02°12.9 | | | | | | |
| 19 | 158°31.2 | 72°48.7 | 52.2 | 132°35.1 | 54.5 | 45°33.3 | 09.9 | 147°47.2 | 13.0 | | | | | | |
| 20 | 173°33.6 | 87°47.8 | 52.4 | 147°35.8 | 55.2 | 60°35.4 | 09.9 | 162°49.4 | 13.0 | | | | | | |
| 21 | 188°36.1 | 102°47.0 | •• 52.5 | 162°36.4 | •• 55.9 | 75°37.4 | •• 09.8 | 177°51.7 | •• 13.1 | | | | | | |
| 22 | 203°38.6 | 117°46.2 | 52.7 | 177°37.1 | 56.6 | 90°39.4 | 09.8 | 192°53.9 | 13.2 | | | | | | |
| 23 | 218°41.0 | 132°45.3 | 52.9 | 192°37.8 | 57.3 | 105°41.4 | 09.7 | 207°56.1 | 13.3 | | | | | | |
| Mer.pass. 08:28 | | | ν-0.8' d0.2' m-3.93 | | | ν0.7' d0.7' m1.25 | | | ν2.0' d-0.1' m-1.95 | | | ν2.2' d0.1' m0.91 | | | |

| | SHA | Dec |
|------------|----------|----------|
| Alpheratz | 357°33.9 | 29°14.0 |
| Ankaa | 353°06.4 | -42°09.6 |
| Schedar | 349°30.2 | 56°40.7 |
| Diphda | 348°46.4 | -17°50.5 |
| Achernar | 335°19.9 | -57°06.0 |
| Hamal | 327°50.3 | 23°35.1 |
| Polaris | 313°58.0 | 89°22.4 |
| Acamar | 315°11.4 | -40°11.9 |
| Menkar | 314°05.3 | 4°11.5 |
| Mirfak | 308°27.2 | 49°57.2 |
| Aldebaran | 290°38.7 | 16°33.7 |
| Rigel | 281°03.1 | -8°10.3 |
| Capella | 280°20.7 | 46°01.5 |
| Bellatrix | 278°22.0 | 6°22.4 |
| Elnath | 278°00.8 | 28°37.8 |
| Alnilam | 275°36.9 | -1°11.2 |
| Betelgeuse | 270°51.2 | 7°24.7 |
| Canopus | 263°52.3 | -52°42.7 |
| Sirius | 258°25.5 | -16°45.3 |
| Adhara | 255°05.3 | -29°00.6 |

| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|------------|----------|-------|----------|-------|-------|
| Wed | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°55.1 | N18°20.0 | | 231°37.3 | 13.0' | N01°52.9 | 16.2' | 58.4' |
| 1 | 195°55.1 | 20.6 | | 246°09.3 | 12.9' | 02°09.1 | 16.2' | 58.4' |
| 2 | 210°55.1 | 21.3 | | 260°41.2 | 12.9' | 02°25.3 | 16.3' | 58.5' |
| 3 | 225°55.1 | · · 21.9 | | 275°13.1 | 12.8' | 02°41.6 | 16.3' | 58.5' |
| 4 | 240°55.1 | 22.5 | | 289°44.9 | 12.7' | 02°57.9 | 16.3' | 58.6' |
| 5 | 255°55.1 | 23.1 | | 304°16.6 | 12.7' | 03°14.1 | 16.3' | 58.6' |
| 6 | 270°55.1 | N18°23.7 | | 318°48.3 | 12.6' | N03°30.4 | 16.3' | 58.6' |
| 7 | 285°55.1 | 24.4 | | 333°20.0 | 12.6' | 03°46.7 | 16.3' | 58.7' |
| 8 | 300°55.1 | 25.0 | | 347°51.5 | 12.5' | 04°03.0 | 16.3' | 58.7' |
| 9 | 315°55.1 | · · 25.6 | | 2°23.0 | 12.4' | 04°19.3 | 16.3' | 58.8' |
| 10 | 330°55.1 | 26.2 | | 16°54.5 | 12.4' | 04°35.6 | 16.3' | 58.8' |
| 11 | 345°55.1 | 26.8 | | 31°25.8 | 12.3' | 04°51.9 | 16.3' | 58.8' |
| 12 | 0°55.1 | N18°27.4 | | 45°57.1 | 12.2' | N05°08.2 | 16.3' | 58.9' |
| 13 | 15°55.1 | 28.0 | | 60°28.4 | 12.2' | 05°24.4 | 16.3' | 58.9' |
| 14 | 30°55.1 | 28.6 | | 74°59.5 | 12.1' | 05°40.7 | 16.3' | 59.0' |
| 15 | 45°55.1 | · · 29.3 | | 89°30.6 | 12.0' | 05°57.0 | 16.3' | 59.0' |
| 16 | 60°55.1 | 29.9 | | 104°01.6 | 11.9' | 06°13.3 | 16.3' | 59.0' |
| 17 | 75°55.1 | 30.5 | | 118°32.5 | 11.9' | 06°29.5 | 16.3' | 59.1' |
| 18 | 90°55.1 | N18°31.1 | | 133°03.4 | 11.8' | N06°45.8 | 16.2' | 59.1' |
| 19 | 105°55.1 | 31.7 | | 147°34.2 | 11.7' | 07°02.0 | 16.2' | 59.1' |
| 20 | 120°55.1 | 32.3 | | 162°04.9 | 11.6' | 07°18.3 | 16.2' | 59.2' |
| 21 | 135°55.1 | · · 32.9 | | 176°35.5 | 11.5' | 07°34.5 | 16.2' | 59.2' |
| 22 | 150°55.1 | 33.5 | | 191°06.0 | 11.4' | 07°50.7 | 16.2' | 59.3' |
| 23 | 165°55.1 | 34.1 | | 205°36.5 | 11.4' | 08°06.8 | 16.2' | 59.3' |
| SD = 15.8' $d = 0.6'$ | | | SD = 15.9' | | | | | |

| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 180°55.1 | N18°34.7 | 220°06.8 | 11.3' | N08°23.0 | 16.1' | 59.3' |
| 1 | 195°55.1 | 35.3 | 234°37.1 | 11.2' | 08°39.1 | 16.1' | 59.4' |
| 2 | 210°55.1 | 35.9 | 249°07.3 | 11.1' | 08°55.2 | 16.1' | 59.4' |
| 3 | 225°55.1 | · · 36.6 | 263°37.4 | 11.0' | 09°11.3 | 16.1' | 59.4' |
| 4 | 240°55.1 | 37.2 | 278°07.4 | 10.9' | 09°27.4 | 16.0' | 59.5' |
| 5 | 255°55.1 | 37.8 | 292°37.3 | 10.8' | 09°43.4 | 16.0' | 59.5' |
| 6 | 270°55.1 | N18°38.4 | 307°07.1 | 10.7' | N09°59.4 | 16.0' | 59.6' |
| 7 | 285°55.1 | 39.0 | 321°36.9 | 10.6' | 10°15.3 | 15.9' | 59.6' |
| 8 | 300°55.1 | 39.6 | 336°06.5 | 10.5' | 10°31.3 | 15.9' | 59.6' |
| 9 | 315°55.1 | · · 40.2 | 350°36.0 | 10.4' | 10°47.1 | 15.8' | 59.7' |
| 10 | 330°55.1 | 40.8 | 5°05.5 | 10.3' | 11°03.0 | 15.8' | 59.7' |
| 11 | 345°55.1 | 41.4 | 19°34.8 | 10.2' | 11°18.8 | 15.8' | 59.7' |
| 12 | 0°55.1 | N18°42.0 | 34°04.0 | 10.1' | N11°34.6 | 15.7' | 59.8' |
| 13 | 15°55.1 | 42.6 | 48°33.1 | 10.0' | 11°50.3 | 15.7' | 59.8' |
| 14 | 30°55.1 | 43.2 | 63°02.2 | 9.9' | 12°06.0 | 15.6' | 59.8' |
| 15 | 45°55.1 | · · 43.8 | 77°31.1 | 9.8' | 12°21.6 | 15.6' | 59.9' |
| 16 | 60°55.1 | 44.4 | 91°59.9 | 9.7' | 12°37.2 | 15.5' | 59.9' |
| 17 | 75°55.1 | 45.0 | 106°28.6 | 9.6' | 12°52.7 | 15.5' | 59.9' |
| 18 | 90°55.1 | N18°45.6 | 120°57.2 | 9.5' | N13°08.1 | 15.4' | 60.0' |
| 19 | 105°55.1 | 46.2 | 135°25.7 | 9.4' | 13°23.5 | 15.4' | 60.0' |
| 20 | 120°55.1 | 46.8 | 149°54.1 | 9.3' | 13°38.9 | 15.3' | 60.0' |
| 21 | 135°55.1 | · · 47.3 | 164°22.3 | 9.1' | 13°54.2 | 15.2' | 60.1' |
| 22 | 150°55.1 | 47.9 | 178°50.5 | 9.0' | 14°09.4 | 15.2' | 60.1' |
| 23 | 165°55.0 | 48.5 | 193°18.5 | 8.9' | 14°24.6 | 15.1' | 60.1' |
| SD = 15.8' $d = 0.6'$ | | | SD = 16.2' | | | | |

| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|-------|------------|-------|-------|
| 0 | 180°55.0 | N18°49.1 | 207°46.4 | 8.8' | N14°39.7 | 15.0' | 60.2' |
| 1 | 195°55.0 | 49.7 | 222°14.2 | 8.7' | 14°54.7 | 15.0' | 60.2' |
| 2 | 210°55.0 | 50.3 | 236°41.9 | 8.6' | 15°09.7 | 14.9' | 60.2' |
| 3 | 225°55.0 | · · 50.9 | 251°09.5 | 8.4' | 15°24.5 | 14.8' | 60.2' |
| 4 | 240°55.0 | 51.5 | 265°36.9 | 8.3' | 15°39.3 | 14.7' | 60.3' |
| 5 | 255°55.0 | 52.1 | 280°04.2 | 8.2' | 15°54.1 | 14.6' | 60.3' |
| 6 | 270°55.0 | N18°52.7 | 294°31.4 | 8.1' | N16°08.7 | 14.6' | 60.3' |
| 7 | 285°55.0 | 53.3 | 308°58.5 | 8.0' | 16°23.3 | 14.5' | 60.4' |
| 8 | 300°55.0 | 53.9 | 323°25.5 | 7.8' | 16°37.7 | 14.4' | 60.4' |
| 9 | 315°55.0 | · · 54.4 | 337°52.3 | 7.7' | 16°52.1 | 14.3' | 60.4' |
| 10 | 330°55.0 | 55.0 | 352°19.0 | 7.6' | 17°06.4 | 14.2' | 60.4' |
| 11 | 345°55.0 | 55.6 | 6°45.6 | 7.5' | 17°20.6 | 14.1' | 60.5' |
| 12 | 0°54.9 | N18°56.2 | 21°12.1 | 7.3' | N17°34.7 | 14.0' | 60.5' |
| 13 | 15°54.9 | 56.8 | 35°38.4 | 7.2' | 17°48.8 | 13.9' | 60.5' |
| 14 | 30°54.9 | 57.4 | 50°04.6 | 7.1' | 18°02.7 | 13.8' | 60.5' |
| 15 | 45°54.9 | · · 58.0 | 64°30.7 | 7.0' | 18°16.5 | 13.7' | 60.6' |
| 16 | 60°54.9 | 58.6 | 78°56.7 | 6.8' | 18°30.2 | 13.6' | 60.6' |
| 17 | 75°54.9 | 59.1 | 93°22.5 | 6.7' | 18°43.8 | 13.5' | 60.6' |
| 18 | 90°54.9 | N18°59.7 | 107°48.2 | 6.6' | N18°57.3 | 13.4' | 60.6' |
| 19 | 105°54.9 | 19°00.3 | 122°13.8 | 6.4' | 19°10.7 | 13.3' | 60.7' |
| 20 | 120°54.9 | 00.9 | 136°39.2 | 6.3' | 19°24.0 | 13.2' | 60.7' |
| 21 | 135°54.9 | · · 01.5 | 151°04.5 | 6.2' | 19°37.1 | 13.0' | 60.7' |
| 22 | 150°54.8 | 02.0 | 165°29.7 | 6.1' | 19°50.2 | 12.9' | 60.7' |
| 23 | 165°54.8 | 02.6 | 179°54.8 | 5.9' | 20°03.1 | 12.8' | 60.7' |
| SD = 15.8' | | | $d = 0.6'$ | | SD = 16.4' | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | | | | | | |
| N 70° | //// | //// | 00:54 | 23:11 | //// | //// |
| 68° | //// | //// | 01:53 | 22:05 | //// | //// |
| 66° | //// | //// | 02:26 | 21:30 | //// | //// |
| 64° | //// | 01:15 | 02:50 | 21:05 | 22:44 | //// |
| 62° | //// | 01:56 | 03:09 | 20:45 | 22:01 | //// |
| 60° | //// | 02:22 | 03:25 | 20:30 | 21:33 | //// |
| N 58° | 01:08 | 02:43 | 03:38 | 20:16 | 21:12 | 22:51 |
| 56° | 01:44 | 03:00 | 03:49 | 20:05 | 20:55 | 22:12 |
| 54° | 02:09 | 03:14 | 03:59 | 19:55 | 20:40 | 21:46 |
| 52° | 02:29 | 03:26 | 04:08 | 19:46 | 20:28 | 21:26 |
| 50° | 02:45 | 03:36 | 04:16 | 19:38 | 20:17 | 21:10 |
| 45° | 03:15 | 03:58 | 04:32 | 19:21 | 19:55 | 20:39 |
| N 40° | 03:38 | 04:15 | 04:46 | 19:07 | 19:38 | 20:16 |
| 35° | 03:55 | 04:29 | 04:57 | 18:56 | 19:24 | 19:58 |
| 30° | 04:10 | 04:41 | 05:07 | 18:46 | 19:12 | 19:43 |
| 20° | 04:33 | 05:01 | 05:24 | 18:29 | 18:52 | 19:20 |
| N 10° | 04:51 | 05:17 | 05:39 | 18:14 | 18:36 | 19:02 |
| 0° | 05:06 | 05:31 | 05:53 | 18:00 | 18:22 | 18:47 |
| S 10° | 05:19 | 05:44 | 06:06 | 17:46 | 18:08 | 18:34 |
| 20° | 05:31 | 05:58 | 06:21 | 17:32 | 17:55 | 18:22 |
| 30° | 05:43 | 06:12 | 06:37 | 17:15 | 17:41 | 18:09 |
| 35° | 05:49 | 06:20 | 06:47 | 17:06 | 17:33 | 18:03 |
| 40° | 05:56 | 06:28 | 06:57 | 16:55 | 17:24 | 17:57 |
| 45° | 06:03 | 06:38 | 07:10 | 16:42 | 17:14 | 17:50 |
| S 50° | 06:10 | 06:50 | 07:25 | 16:27 | 17:02 | 17:42 |
| 52° | 06:14 | 06:55 | 07:32 | 16:20 | 16:57 | 17:38 |
| 54° | 06:17 | 07:01 | 07:40 | 16:12 | 16:51 | 17:35 |
| 56° | 06:21 | 07:07 | 07:49 | 16:03 | 16:45 | 17:31 |
| 58° | 06:25 | 07:14 | 07:59 | 15:53 | 16:38 | 17:27 |
| S 60° | 06:30 | 07:22 | 08:11 | 15:41 | 16:30 | 17:22 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|----------------|---------|-------|-------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | 02:09 | 01:31 | 00:36 | 16:22 | 19:04 | |
| N 70° | 02:12 | 01:44 | 01:06 23:18 | 16:13 | 18:37 | 22:20 |
| 68° | 02:15 | 01:54 | 01:28 | 16:05 | 18:17 | 20:59 |
| 66° | 02:17 | 02:03 | 01:46 | 15:59 | 18:01 | 20:22 |
| 64° | 02:19 | 02:10 | 02:00 | 15:54 | 17:48 | 19:56 |
| 62° | 02:20 | 02:16 | 02:12 | 15:49 | 17:37 | 19:35 |
| 60° | 02:22 | 02:22 | 02:23 | 15:45 | 17:28 | 19:19 |
| N 58° | 02:23 | 02:27 | 02:32 | 15:42 | 17:20 | 19:05 |
| 56° | 02:24 | 02:31 | 02:40 | 15:39 | 17:13 | 18:53 |
| 54° | 02:25 | 02:35 | 02:47 | 15:36 | 17:07 | 18:43 |
| 52° | 02:26 | 02:39 | 02:54 | 15:34 | 17:01 | 18:34 |
| 50° | 02:27 | 02:42 | 03:00 | 15:31 | 16:56 | 18:26 |
| 45° | 02:29 | 02:49 | 03:13 | 15:26 | 16:45 | 18:09 |
| N 40° | 02:30 | 02:55 | 03:23 | 15:22 | 16:36 | 17:55 |
| 35° | 02:32 | 03:00 | 03:32 | 15:19 | 16:29 | 17:43 |
| 30° | 02:33 | 03:05 | 03:41 | 15:16 | 16:22 | 17:32 |
| 20° | 02:35 | 03:13 | 03:55 | 15:10 | 16:10 | 17:15 |
| N 10° | 02:37 | 03:20 | 04:07 | 15:06 | 16:00 | 16:59 |
| 0° | 02:39 | 03:27 | 04:19 | 15:01 | 15:51 | 16:45 |
| S 10° | 02:41 | 03:34 | 04:31 | 14:57 | 15:42 | 16:31 |
| 20° | 02:43 | 03:41 | 04:44 | 14:52 | 15:32 | 16:16 |
| 30° | 02:45 | 03:50 | 04:58 | 14:47 | 15:21 | 15:59 |
| 35° | 02:47 | 03:55 | 05:07 | 14:44 | 15:14 | 15:49 |
| 40° | 02:48 | 04:00 | 05:17 | 14:41 | 15:07 | 15:38 |
| 45° | 02:50 | 04:07 | 05:28 | 14:37 | 14:58 | 15:24 |
| S 50° | 02:52 | 04:15 | 05:43 | 14:32 | 14:48 | 15:08 |
| 52° | 02:53 | 04:19 | 05:49 | 14:30 | 14:44 | 15:01 |
| 54° | 02:55 | 04:23 | 05:57 | 14:28 | 14:38 | 14:52 |
| 56° | 02:56 | 04:28 | 06:05 | 14:25 | 14:33 | 14:43 |
| 58° | 02:57 | 04:33 | 06:15 | 14:22 | 14:26 | 14:33 |
| S 60° | 02:59 | 04:38 | 06:26 | 14:19 | 14:19 | 14:21 |

| Day | Sun | | Moon | | |
|-----|---|--------------------------|-----------------------|-----------------------------|-----------------------|
| | Eqn.of Time 00 ^h mm:ss | 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Age 26-28 20-5% |
| 13 | 03:40 | 03:40 | 11:56 | 08:50 | 21:14 |
| 14 | 03:41 | 03:40 | 11:56 | 09:39 | 22:05 |
| 15 | 03:40 | 03:40 | 11:56 | 10:32 | 23:00 |

May 16, 17, 18 UT (Sat., Sun., Mon.)

| | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------|----------|---------------------|----------|----------|-------------------|----------|----------|---------------------|-----|-----|-------------------|--|--|
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 233°43.5 | 147°44.5 | N24°53.1 | 207°38.5 | N09°57.9 | 120°43.5 | N22°09.6 | 222°58.3 | N02°13.4 | | | | | | |
| 1 | 248°45.9 | 162°43.7 | 53.2 | 222°39.2 | 58.6 | 135°45.5 | 09.6 | 238°00.6 | 13.5 | | | | | | |
| 2 | 263°48.4 | 177°42.8 | 53.4 | 237°39.9 | 09°59.3 | 150°47.5 | 09.5 | 253°02.8 | 13.6 | | | | | | |
| 3 | 278°50.9 | 192°42.0 | •• 53.6 | 252°40.5 | 10°00.0 | 165°49.5 | •• 09.4 | 268°05.0 | •• 13.7 | | | | | | |
| 4 | 293°53.3 | 207°41.2 | 53.7 | 267°41.2 | 00.7 | 180°51.5 | 09.4 | 283°07.3 | 13.8 | | | | | | |
| 5 | 308°55.8 | 222°40.3 | 53.9 | 282°41.9 | 01.4 | 195°53.5 | 09.3 | 298°09.5 | 13.9 | | | | | | |
| 6 | 323°58.3 | 237°39.5 | N24°54.1 | 297°42.6 | N10°02.1 | 210°55.6 | N22°09.2 | 313°11.7 | N02°14.0 | | | | | | |
| 7 | 339°00.7 | 252°38.7 | 54.2 | 312°43.3 | 02.8 | 225°57.6 | 09.2 | 328°13.9 | 14.1 | | | | | | |
| 8 | 354°03.2 | 267°37.8 | 54.4 | 327°43.9 | 03.5 | 240°59.6 | 09.1 | 343°16.2 | 14.1 | | | | | | |
| 9 | 9°05.7 | 282°37.0 | •• 54.5 | 342°44.6 | •• 04.2 | 256°01.6 | •• 09.1 | 358°18.4 | •• 14.2 | | | | | | |
| 10 | 24°08.1 | 297°36.2 | 54.7 | 357°45.3 | 04.9 | 271°03.6 | 09.0 | 13°20.6 | 14.3 | | | | | | |
| 11 | 39°10.6 | 312°35.3 | 54.9 | 12°46.0 | 05.6 | 286°05.7 | 08.9 | 28°22.9 | 14.4 | | | | | | |
| 12 | 54°13.1 | 327°34.5 | N24°55.0 | 27°46.7 | N10°06.3 | 301°07.7 | N22°08.9 | 43°25.1 | N02°14.5 | | | | | | |
| 13 | 69°15.5 | 342°33.7 | 55.2 | 42°47.3 | 07.0 | 316°09.7 | 08.8 | 58°27.3 | 14.6 | | | | | | |
| 14 | 84°18.0 | 357°32.8 | 55.3 | 57°48.0 | 07.6 | 331°11.7 | 08.7 | 73°29.6 | 14.7 | | | | | | |
| 15 | 99°20.4 | 12°32.0 | •• 55.5 | 72°48.7 | •• 08.3 | 346°13.7 | •• 08.7 | 88°31.8 | •• 14.8 | | | | | | |
| 16 | 114°22.9 | 27°31.2 | 55.6 | 87°49.4 | 09.0 | 1°15.7 | 08.6 | 103°34.0 | 14.9 | | | | | | |
| 17 | 129°25.4 | 42°30.3 | 55.8 | 102°50.1 | 09.7 | 16°17.8 | 08.5 | 118°36.2 | 15.0 | | | | | | |
| 18 | 144°27.8 | 57°29.5 | N24°55.9 | 117°50.7 | N10°10.4 | 31°19.8 | N22°08.5 | 133°38.5 | N02°15.1 | | | | | | |
| 19 | 159°30.3 | 72°28.7 | 56.1 | 132°51.4 | 11.1 | 46°21.8 | 08.4 | 148°40.7 | 15.2 | | | | | | |
| 20 | 174°32.8 | 87°27.8 | 56.2 | 147°52.1 | 11.8 | 61°23.8 | 08.4 | 163°42.9 | 15.2 | | | | | | |
| 21 | 189°35.2 | 102°27.0 | •• 56.4 | 162°52.8 | •• 12.5 | 76°25.8 | •• 08.3 | 178°45.2 | •• 15.3 | | | | | | |
| 22 | 204°37.7 | 117°26.2 | 56.5 | 177°53.5 | 13.2 | 91°27.8 | 08.2 | 193°47.4 | 15.4 | | | | | | |
| 23 | 219°40.2 | 132°25.3 | 56.7 | 192°54.1 | 13.9 | 106°29.9 | 08.2 | 208°49.6 | 15.5 | | | | | | |
| Mer.pass. 08:24 | | | | ν-0.8' d0.2' m-3.93 | | | ν0.7' d0.7' m1.25 | | | ν2.0' d-0.1' m-1.94 | | | ν2.2' d0.1' m0.91 | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 234°42.6 | 147°24.5 | N24°56.8 | 207°54.8 | N10°14.6 | 121°31.9 | N22°08.1 | 223°51.9 | N02°15.6 | | | | | | |
| 1 | 249°45.1 | 162°23.7 | 56.9 | 222°55.5 | 15.2 | 136°33.9 | 08.0 | 238°54.1 | 15.7 | | | | | | |
| 2 | 264°47.5 | 177°22.8 | 57.1 | 237°56.2 | 15.9 | 151°35.9 | 08.0 | 253°56.3 | 15.8 | | | | | | |
| 3 | 279°50.0 | 192°22.0 | •• 57.2 | 252°56.9 | •• 16.6 | 166°37.9 | •• 07.9 | 268°58.6 | •• 15.9 | | | | | | |
| 4 | 294°52.5 | 207°21.2 | 57.3 | 267°57.5 | 17.3 | 181°39.9 | 07.8 | 284°00.8 | 16.0 | | | | | | |
| 5 | 309°54.9 | 222°20.3 | 57.5 | 282°58.2 | 18.0 | 196°42.0 | 07.8 | 299°03.0 | 16.1 | | | | | | |
| 6 | 324°57.4 | 237°19.5 | N24°57.6 | 297°58.9 | N10°18.7 | 211°44.0 | N22°07.7 | 314°05.2 | N02°16.2 | | | | | | |
| 7 | 339°59.9 | 252°18.7 | 57.7 | 312°59.6 | 19.4 | 226°46.0 | 07.6 | 329°07.5 | 16.3 | | | | | | |
| 8 | 355°02.3 | 267°17.8 | 57.9 | 328°00.3 | 20.1 | 241°48.0 | 07.6 | 344°09.7 | 16.3 | | | | | | |
| 9 | 10°04.8 | 282°17.0 | •• 58.0 | 343°00.9 | •• 20.8 | 256°50.0 | •• 07.5 | 359°11.9 | •• 16.4 | | | | | | |
| 10 | 25°07.3 | 297°16.2 | 58.1 | 358°01.6 | 21.4 | 271°52.0 | 07.5 | 14°14.2 | 16.5 | | | | | | |
| 11 | 40°09.7 | 312°15.3 | 58.3 | 13°02.3 | 22.1 | 286°54.0 | 07.4 | 29°16.4 | 16.6 | | | | | | |
| 12 | 55°12.2 | 327°14.5 | N24°58.4 | 28°03.0 | N10°22.8 | 301°56.0 | N22°07.3 | 44°18.6 | N02°16.7 | | | | | | |
| 13 | 70°14.7 | 342°13.7 | 58.5 | 43°03.7 | 23.5 | 316°58.1 | 07.3 | 59°20.9 | 16.8 | | | | | | |
| 14 | 85°17.1 | 357°12.8 | 58.6 | 58°04.3 | 24.2 | 332°00.1 | 07.2 | 74°23.1 | 16.9 | | | | | | |
| 15 | 100°19.6 | 12°12.0 | •• 58.8 | 73°05.0 | •• 24.9 | 347°02.1 | •• 07.1 | 89°25.3 | •• 17.0 | | | | | | |
| 16 | 115°22.0 | 27°11.2 | 58.9 | 88°05.7 | 25.6 | 2°04.1 | 07.1 | 104°27.6 | 17.1 | | | | | | |
| 17 | 130°24.5 | 42°10.3 | 59.0 | 103°06.4 | 26.2 | 17°06.1 | 07.0 | 119°29.8 | 17.2 | | | | | | |
| 18 | 145°27.0 | 57°09.5 | N24°59.1 | 118°07.1 | N10°26.9 | 32°08.1 | N22°06.9 | 134°32.0 | N02°17.2 | | | | | | |
| 19 | 160°29.4 | 72°08.7 | 59.2 | 133°07.7 | 27.6 | 47°10.1 | 06.9 | 149°34.3 | 17.3 | | | | | | |
| 20 | 175°31.9 | 87°07.8 | 59.4 | 148°08.4 | 28.3 | 62°12.2 | 06.8 | 164°36.5 | 17.4 | | | | | | |
| 21 | 190°34.4 | 102°07.0 | •• 59.5 | 163°09.1 | •• 29.0 | 77°14.2 | •• 06.7 | 179°38.7 | •• 17.5 | | | | | | |
| 22 | 205°36.8 | 117°06.2 | 59.6 | 178°09.8 | 29.7 | 92°16.2 | 06.7 | 194°41.0 | 17.6 | | | | | | |
| 23 | 220°39.3 | 132°05.3 | 59.7 | 193°10.5 | 30.4 | 107°18.2 | 06.6 | 209°43.2 | 17.7 | | | | | | |
| Mer.pass. 08:20 | | | | ν-0.8' d0.1' m-3.93 | | | ν0.7' d0.7' m1.25 | | | ν2.0' d-0.1' m-1.94 | | | ν2.2' d0.1' m0.91 | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 235°41.8 | 147°04.5 | N24°59.8 | 208°11.1 | N10°31.0 | 122°20.2 | N22°06.5 | 224°45.4 | N02°17.8 | | | | | | |
| 1 | 250°44.2 | 162°03.7 | 24°59.9 | 223°11.8 | 31.7 | 137°22.2 | 06.5 | 239°47.7 | 17.9 | | | | | | |
| 2 | 265°46.7 | 177°02.8 | 25°00.0 | 238°12.5 | 32.4 | 152°24.2 | 06.4 | 254°49.9 | 18.0 | | | | | | |
| 3 | 280°49.2 | 192°02.0 | •• 00.1 | 253°13.2 | •• 33.1 | 167°26.2 | •• 06.3 | 269°52.1 | •• 18.1 | | | | | | |
| 4 | 295°51.6 | 207°01.2 | 00.2 | 268°13.9 | 33.8 | 182°28.2 | 06.3 | 284°54.4 | 18.1 | | | | | | |
| 5 | 310°54.1 | 222°00.3 | 00.4 | 283°14.5 | 34.5 | 197°30.3 | 06.2 | 299°56.6 | 18.2 | | | | | | |
| 6 | 325°56.5 | 236°59.5 | N25°00.5 | 298°15.2 | N10°35.1 | 212°32.3 | N22°06.2 | 314°58.8 | N02°18.3 | | | | | | |
| 7 | 340°59.0 | 251°58.7 | 00.6 | 313°15.9 | 35.8 | 227°34.3 | 06.1 | 330°01.1 | 18.4 | | | | | | |
| 8 | 356°01.5 | 266°57.8 | 00.7 | 328°16.6 | 36.5 | 242°36.3 | 06.0 | 345°03.3 | 18.5 | | | | | | |
| 9 | 11°03.9 | 281°57.0 | •• 00.8 | 343°17.2 | •• 37.2 | 257°38.3 | •• 06.0 | 0°05.5 | •• 18.6 | | | | | | |
| 10 | 26°06.4 | 296°56.2 | 00.9 | 358°17.9 | 37.9 | 272°40.3 | 05.9 | 15°07.8 | 18.7 | | | | | | |
| 11 | 41°08.9 | 311°55.3 | 01.0 | 13°18.6 | 38.6 | 287°42.3 | 05.8 | 30°10.0 | 18.8 | | | | | | |
| 12 | 56°11.3 | 326°54.5 | N25°01.1 | 28°19.3 | N10°39.2 | 302°44.3 | N22°05.8 | 45°12.2 | N02°18.9 | | | | | | |
| 13 | 71°13.8 | 341°53.7 | 01.2 | 43°20.0 | 39.9 | 317°46.3 | 05.7 | 60°14.5 | 19.0 | | | | | | |
| 14 | 86°16.3 | 356°52.8 | 01.2 | 58°20.6 | 40.6 | 332°48.3 | 05.6 | 75°16.7 | 19.0 | | | | | | |
| 15 | 101°18.7 | 11°52.0 | •• 01.3 | 73°21.3 | •• 41.3 | 347°50.4 | •• 05.6 | 90°18.9 | •• 19.1 | | | | | | |
| 16 | 116°21.2 | 26°51.2 | 01.4 | 88°22.0 | 42.0 | 2°52.4 | 05.5 | 105°21.2 | 19.2 | | | | | | |
| 17 | 131°23.7 | 41°50.3 | 01.5 | 103°22.7 | 42.7 | 17°54.4 | 05.4 | 120°23.4 | 19.3 | | | | | | |
| 18 | 146°26.1 | 56°49.5 | N25°01.6 | 118°23.4 | N10°43.3 | 32°56.4 | N22°05.4 | 135°25.6 | N02°19.4 | | | | | | |
| 19 | 161°28.6 | 71°48.7 | 01.7 | 133°24.0 | 44.0 | 47°58.4 | 05.3 | 150°27.9 | 19.5 | | | | | | |
| 20 | 176°31.0 | 86°47.8 | 01.8 | 148°24.7 | 44.7 | 63°00.4 | 05.2 | 165°30.1 | 19.6 | | | | | | |
| 21 | 191°33.5 | 101°47.0 | •• 01.9 | 163°25.4 | •• 45.4 | 78°02.4 | •• 05.2 | 180°32.3 | •• 19.7 | | | | | | |
| 22 | 206°36.0 | 116°46.2 | 02.0 | 178°26.1 | 46.1 | 93°04.4 | 05.1 | 195°34.6 | 19.8 | | | | | | |
| 23 | 221°38.4 | 131°45.3 | 02.0 | 193°26.7 | 46.7 | 108°06.4 | 05.0 | 210°36.8 | 19.9 | | | | | | |
| Mer.pass. 08:16 | | | | ν-0.8' d0.1' m-3.93 | | | ν0.7' d0.7' m1.25 | | | ν2.0' d-0.1' m-1.93 | | | ν2.2' d0.1' m0.91 | | |

| | SHA | Dec |
|---------------------|----------|----------|
| Alpheratz | 357°33.8 | 29°14.0 |
| Ankaa | 353°06.3 | -42°09.6 |
| Schedar | 349°30.2 | 56°40.7 |
| Diphda | 348°46.4 | -17°50.5 |
| Achernar | 335°19.9 | -57°06.0 |
| Hamal | 327°50.3 | 23°35.1 |
| Polaris | 313°57.4 | 89°22.4 |
| Acamar | 315°11.4 | -40°11.9 |
| Menkar | 314°05.3 | 4°11.5 |
| Mirfak | 308°27.2 | 49°57.2 |
| Aldebaran | 290°38.7 | 16°33.7 |
| Rigel | 281°03.1 | -8°10.3 |
| Capella | 280°20.7 | 46°01.5 |
| Bellatrix | 278°22.0 | 6°22.4 |
| Elnath | 278°00.8 | 28°37.8 |
| Alnilam | 275°36.9 | -1°11.2 |
| Betelgeuse | 270°51.2 | 7°24.7 |
| Canopus | 263°52.3 | -52°42.7 |
| Sirius | 258°25.5 | -16°45.3 |
| Adhara | 255°05.3 | -29°00.6 |
| Procyon | 244°49.9 | 5°09.4 |
| Pollux | 243°16.2 | 27°57.8 |
| Avior | 234°14.5 | -59°35.9 |
| Suhail | 222°45.6 | -43°32.6 |
| Miaplacidus | 221°38.2 | -69°49.8 |
| Alphard | 217°46.7 | -8°46.5 |
| Regulus | 207°33.3 | 11°50.3 |
| Dubhe | 193°39.5 | 61°36.7 |
| Denebola | 182°23.7 | 14°25.4 |
| Gienah | 175°42.3 | -17°41.5 |
| Acrux | 172°58.4 | -63°15.0 |
| Gacrux | 171°50.0 | -57°15.9 |
| Alioth | 166°11.6 | 55°49.1 |
| Spica | 158°20.9 | -11°18.1 |
| Alkaid | 152°50.7 | 49°10.9 |
| Hadar | 148°33.8 | -60°30.2 |
| Menkent | 147°56.0 | -36°30.2 |
| Arcturus | 145°46.6 | 19°02.6 |
| Rigil Kent. | 139°38.1 | -60°56.8 |
| Kochab | 137°18.7 | 74°02.8 |
| Zuben'ubi | 136°54.5 | -16°09.2 |
| Alphecca | 126°02.4 | 26°37.5 |
| Antares | 112°14.1 | -26°29.5 |
| Atria | 107°06.8 | -69°04.4 |
| Sabik | 102°01.2 | -15°45.5 |
| Shaula | 96°08.5 | -37°07.3 |
| Rasalhague | 95°57.2 | 12°32.3 |
| Eltanin | 90°41.2 | 51°28.9 |
| Kaus Aust. | 83°30.7 | -34°22.2 |
| Vega | 80°32.2 | 38°48.3 |
| Nunki | 75°46.1 | -26°15.8 |
| Altair | 61°58.7 | 8°56.2 |
| Peacock | 53°03.8 | -56°38.8 |
| Deneb | 49°24.9 | 45°22.2 |
| Enif | 33°37.7 | 9°59.6 |
| Al Na'ir | 27°31.6 | -46°49.8 |
| Fomalhaut | 15°13.4 | -29°28.8 |
| Scheat | 13°44.3 | 28°13.4 |
| Markab | 13°28.9 | 15°20.7 |
| May 16 Sat | SHA | Mer.pass |
| Venus | 274°01.0 | 14:10 |
| Mars | 333°55.0 | 10:09 |
| Jupiter | 247°00.0 | 15:55 |
| Saturn | 349°14.9 | 09:07 |
| May 17 Sun | SHA | Mer.pass |
| Venus | 272°41.9 | 14:11 |
| Mars | 333°12.2 | 10:08 |
| Jupiter | 246°49.3 | 15:52 |
| Saturn | 349°09.2 | 09:03 |
| May 18 Mon | SHA | Mer.pass |
| Venus | 271°22.7 | 14:12 |
| Mars | 332°29.4 | 10:07 |
| Jupiter | 246°38.4 | 15:49 |
| Saturn | 349°03.7 | 09:00 |
| Horizontal parallax | | |
| Venus: | 0.1 | |
| Mars: | 0.1 | |

| h | Sun | | Moon | | | | |
|-----------------------|----------|----------|------------|-------|----------|-------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 180°54.8 | N19°03.2 | 194°19.7 | 5.8' | N20°15.9 | 12.7' | 60.8' |
| 1 | 195°54.8 | 03.8 | 208°44.5 | 5.7' | 20°28.5 | 12.5' | 60.8' |
| 2 | 210°54.8 | 04.4 | 223°09.2 | 5.5' | 20°41.1 | 12.4' | 60.8' |
| 3 | 225°54.8 | · · 04.9 | 237°33.7 | 5.4' | 20°53.5 | 12.3' | 60.8' |
| 4 | 240°54.8 | 05.5 | 251°58.1 | 5.3' | 21°05.8 | 12.1' | 60.8' |
| 5 | 255°54.7 | 06.1 | 266°22.4 | 5.2' | 21°17.9 | 12.0' | 60.9' |
| 6 | 270°54.7 | N19°06.7 | 280°46.6 | 5.0' | N21°29.9 | 11.9' | 60.9' |
| 7 | 285°54.7 | 07.3 | 295°10.6 | 4.9' | 21°41.8 | 11.7' | 60.9' |
| 8 | 300°54.7 | 07.8 | 309°34.5 | 4.8' | 21°53.5 | 11.6' | 60.9' |
| 9 | 315°54.7 | · · 08.4 | 323°58.3 | 4.6' | 22°05.1 | 11.4' | 60.9' |
| 10 | 330°54.7 | 09.0 | 338°21.9 | 4.5' | 22°16.5 | 11.3' | 60.9' |
| 11 | 345°54.7 | 09.6 | 352°45.4 | 4.4' | 22°27.8 | 11.1' | 61.0' |
| 12 | 0°54.6 | N19°10.1 | 7°08.8 | 4.3' | N22°39.0 | 11.0' | 61.0' |
| 13 | 15°54.6 | 10.7 | 21°32.1 | 4.1' | 22°50.0 | 10.8' | 61.0' |
| 14 | 30°54.6 | 11.3 | 35°55.3 | 4.0' | 23°00.8 | 10.7' | 61.0' |
| 15 | 45°54.6 | · · 11.8 | 50°18.3 | 3.9' | 23°11.5 | 10.5' | 61.0' |
| 16 | 60°54.6 | 12.4 | 64°41.2 | 3.8' | 23°22.0 | 10.3' | 61.0' |
| 17 | 75°54.6 | 13.0 | 79°04.0 | 3.7' | 23°32.3 | 10.2' | 61.0' |
| 18 | 90°54.5 | N19°13.6 | 93°26.7 | 3.6' | N23°42.5 | 10.0' | 61.1' |
| 19 | 105°54.5 | 14.1 | 107°49.2 | 3.4' | 23°52.5 | 9.8' | 61.1' |
| 20 | 120°54.5 | 14.7 | 122°11.6 | 3.3' | 24°02.4 | 9.7' | 61.1' |
| 21 | 135°54.5 | · · 15.3 | 136°34.0 | 3.2' | 24°12.0 | 9.5' | 61.1' |
| 22 | 150°54.5 | 15.8 | 150°56.2 | 3.1' | 24°21.5 | 9.3' | 61.1' |
| 23 | 165°54.5 | 16.4 | 165°18.3 | 3.0' | 24°30.9 | 9.1' | 61.1' |
| SD = 15.8' $d = 0.6'$ | | | SD = 16.6' | | | | |

| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|------------|-------|----------|------|-------|
| 0 | 180°54.4 | N19°17.0 | 179°40.2 | 2.9' | N24°40.0 | 9.0' | 61.1' |
| 1 | 195°54.4 | 17.5 | 194°02.1 | 2.8' | 24°49.0 | 8.8' | 61.1' |
| 2 | 210°54.4 | 18.1 | 208°23.9 | 2.7' | 24°57.8 | 8.6' | 61.1' |
| 3 | 225°54.4 | · · 18.7 | 222°45.6 | 2.6' | 25°06.4 | 8.4' | 61.1' |
| 4 | 240°54.4 | 19.2 | 237°07.1 | 2.5' | 25°14.8 | 8.2' | 61.1' |
| 5 | 255°54.3 | 19.8 | 251°28.6 | 2.4' | 25°23.0 | 8.0' | 61.1' |
| 6 | 270°54.3 | N19°20.3 | 265°49.9 | 2.3' | N25°31.1 | 7.9' | 61.1' |
| 7 | 285°54.3 | 20.9 | 280°11.2 | 2.2' | 25°38.9 | 7.7' | 61.1' |
| 8 | 300°54.3 | 21.5 | 294°32.4 | 2.1' | 25°46.6 | 7.5' | 61.1' |
| 9 | 315°54.3 | · · 22.0 | 308°53.5 | 2.0' | 25°54.0 | 7.3' | 61.2' |
| 10 | 330°54.2 | 22.6 | 323°14.5 | 1.9' | 26°01.3 | 7.1' | 61.2' |
| 11 | 345°54.2 | 23.2 | 337°35.4 | 1.8' | 26°08.4 | 6.9' | 61.2' |
| 12 | 0°54.2 | N19°23.7 | 351°56.2 | 1.7' | N26°15.3 | 6.7' | 61.2' |
| 13 | 15°54.2 | 24.3 | 6°16.9 | 1.7' | 26°21.9 | 6.5' | 61.2' |
| 14 | 30°54.2 | 24.8 | 20°37.6 | 1.6' | 26°28.4 | 6.3' | 61.2' |
| 15 | 45°54.1 | · · 25.4 | 34°58.2 | 1.5' | 26°34.7 | 6.1' | 61.2' |
| 16 | 60°54.1 | 25.9 | 49°18.7 | 1.4' | 26°40.7 | 5.9' | 61.2' |
| 17 | 75°54.1 | 26.5 | 63°39.1 | 1.4' | 26°46.6 | 5.6' | 61.2' |
| 18 | 90°54.1 | N19°27.1 | 77°59.5 | 1.3' | N26°52.2 | 5.4' | 61.2' |
| 19 | 105°54.0 | 27.6 | 92°19.8 | 1.3' | 26°57.7 | 5.2' | 61.1' |
| 20 | 120°54.0 | 28.2 | 106°40.1 | 1.2' | 27°02.9 | 5.0' | 61.1' |
| 21 | 135°54.0 | · · 28.7 | 121°00.3 | 1.1' | 27°07.9 | 4.8' | 61.1' |
| 22 | 150°54.0 | 29.3 | 135°20.4 | 1.1' | 27°12.7 | 4.6' | 61.1' |
| 23 | 165°54.0 | 29.8 | 149°40.5 | 1.0' | 27°17.3 | 4.4' | 61.1' |
| SD = 15.8' $d = 0.6'$ | | | SD = 16.7' | | | | |

| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 180°53.9 | N19°30.4 | 164°00.5 | 1.0' | N27°21.7 | 4.2' | 61.1' |
| 1 | 195°53.9 | 30.9 | 178°20.5 | 1.0' | 27°25.8 | 3.9' | 61.1' |
| 2 | 210°53.9 | 31.5 | 192°40.5 | 0.9' | 27°29.8 | 3.7' | 61.1' |
| 3 | 225°53.9 | · · 32.0 | 207°00.4 | 0.9' | 27°33.5 | 3.5' | 61.1' |
| 4 | 240°53.8 | 32.6 | 221°20.3 | 0.8' | 27°37.0 | 3.3' | 61.1' |
| 5 | 255°53.8 | 33.1 | 235°40.1 | 0.8' | 27°40.3 | 3.1' | 61.1' |
| 6 | 270°53.8 | N19°33.7 | 249°59.9 | 0.8' | N27°43.4 | 2.9' | 61.1' |
| 7 | 285°53.8 | 34.2 | 264°19.7 | 0.8' | 27°46.2 | 2.6' | 61.1' |
| 8 | 300°53.7 | 34.8 | 278°39.5 | 0.8' | 27°48.9 | 2.4' | 61.1' |
| 9 | 315°53.7 | · · 35.3 | 292°59.3 | 0.7' | 27°51.3 | 2.2' | 61.1' |
| 10 | 330°53.7 | 35.9 | 307°19.0 | 0.7' | 27°53.5 | 2.0' | 61.0' |
| 11 | 345°53.6 | 36.4 | 321°38.7 | 0.7' | 27°55.4 | 1.7' | 61.0' |
| 12 | 0°53.6 | N19°37.0 | 335°58.5 | 0.7' | N27°57.2 | 1.5' | 61.0' |
| 13 | 15°53.6 | 37.5 | 350°18.2 | 0.7' | 27°58.7 | 1.3' | 61.0' |
| 14 | 30°53.6 | 38.1 | 4°37.9 | 0.7' | 28°00.0 | 1.1' | 61.0' |
| 15 | 45°53.5 | · · 38.6 | 18°57.6 | 0.7' | 28°01.1 | 0.9' | 61.0' |
| 16 | 60°53.5 | 39.2 | 33°17.4 | 0.7' | 28°02.0 | 0.6' | 61.0' |
| 17 | 75°53.5 | 39.7 | 47°37.1 | 0.8' | 28°02.6 | 0.4' | 61.0' |
| 18 | 90°53.5 | N19°40.2 | 61°56.9 | 0.8' | N28°03.0 | 0.2' | 60.9' |
| 19 | 105°53.4 | 40.8 | 76°16.7 | 0.8' | 28°03.2 | -0.0' | 60.9' |
| 20 | 120°53.4 | 41.3 | 90°36.5 | 0.8' | 28°03.2 | -0.2' | 60.9' |
| 21 | 135°53.4 | · · 41.9 | 104°56.3 | 0.9' | 28°03.0 | -0.5' | 60.9' |
| 22 | 150°53.3 | 42.4 | 119°16.2 | 0.9' | 28°02.5 | -0.7' | 60.9' |
| 23 | 165°53.3 | 42.9 | 133°36.1 | 0.9' | 28°01.8 | -0.9' | 60.9' |
| SD = 15.8' $d = 0.6'$ | | | SD = 16.7' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | | | | | | |
| N 70° | | | | | | |
| 68° | //// | //// | 01:36 | 22:22 | //// | //// |
| 66° | //// | //// | 02:14 | 21:42 | //// | //// |
| 64° | //// | 00:52 | 02:41 | 21:14 | 23:09 | //// |
| 62° | //// | 01:43 | 03:01 | 20:53 | 22:14 | //// |
| 60° | //// | 02:13 | 03:18 | 20:37 | 21:43 | //// |
| N 58° | 00:47 | 02:35 | 03:32 | 20:22 | 21:20 | 23:14 |
| 56° | 01:33 | 02:53 | 03:44 | 20:10 | 21:01 | 22:24 |
| 54° | 02:01 | 03:08 | 03:54 | 20:00 | 20:46 | 21:55 |
| 52° | 02:22 | 03:21 | 04:03 | 19:50 | 20:33 | 21:33 |
| 50° | 02:38 | 03:32 | 04:12 | 19:42 | 20:22 | 21:16 |
| 45° | 03:11 | 03:54 | 04:29 | 19:25 | 19:59 | 20:43 |
| N 40° | 03:34 | 04:12 | 04:43 | 19:10 | 19:41 | 20:19 |
| 35° | 03:53 | 04:27 | 04:55 | 18:58 | 19:26 | 20:01 |
| 30° | 04:08 | 04:39 | 05:05 | 18:48 | 19:14 | 19:46 |
| 20° | 04:31 | 05:00 | 05:23 | 18:30 | 18:53 | 19:22 |
| N 10° | 04:50 | 05:16 | 05:39 | 18:14 | 18:37 | 19:03 |
| 0° | 05:05 | 05:31 | 05:53 | 18:00 | 18:22 | 18:47 |
| S 10° | 05:19 | 05:45 | 06:07 | 17:46 | 18:08 | 18:34 |
| 20° | 05:32 | 05:59 | 06:22 | 17:31 | 17:54 | 18:21 |
| 30° | 05:45 | 06:14 | 06:39 | 17:14 | 17:39 | 18:08 |
| 35° | 05:51 | 06:22 | 06:49 | 17:04 | 17:31 | 18:01 |
| 40° | 05:58 | 06:31 | 07:00 | 16:52 | 17:22 | 17:54 |
| 45° | 06:05 | 06:41 | 07:13 | 16:39 | 17:11 | 17:47 |
| S 50° | 06:14 | 06:53 | 07:29 | 16:23 | 16:59 | 17:39 |
| 52° | 06:17 | 06:59 | 07:37 | 16:15 | 16:53 | 17:35 |
| 54° | 06:21 | 07:05 | 07:45 | 16:07 | 16:47 | 17:31 |
| 56° | 06:25 | 07:12 | 07:55 | 15:58 | 16:41 | 17:27 |
| 58° | 06:30 | 07:19 | 08:05 | 15:47 | 16:33 | 17:22 |
| S 60° | 06:35 | 07:27 | 08:18 | 15:35 | 16:25 | 17:17 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | | | | | | |
| N 70° | | | | | | |
| 68° | 00:41 | | | | | |
| 66° | 01:20 | | | | | |
| 64° | 01:47 | 01:23 | | 22:27 | | |
| 62° | 02:09 | 02:05 | 02:04 | 21:45 | · · · | 00:04 |
| 60° | 02:26 | 02:34 | 02:57 | 21:17 | 23:12 | · · · |
| N 58° | 02:41 | 02:57 | 03:29 | 20:55 | 22:40 | 23:59 |
| 56° | 02:53 | 03:15 | 03:53 | 20:38 | 22:16 | 23:33 |
| 54° | 03:04 | 03:31 | 04:13 | 20:23 | 21:57 | 23:13 |
| 52° | 03:14 | 03:44 | 04:29 | 20:10 | 21:41 | 22:56 |
| 50° | 03:23 | 03:56 | 04:44 | 19:58 | 21:26 | 22:41 |
| 45° | 03:42 | 04:21 | 05:13 | 19:35 | 20:58 | 22:11 |
| N 40° | 03:58 | 04:41 | 05:35 | 19:16 | 20:35 | 21:47 |
| 35° | 04:11 | 04:57 | 05:54 | 19:00 | 20:17 | 21:28 |
| 30° | 04:22 | 05:12 | 06:11 | 18:46 | 20:01 | 21:11 |
| 20° | 04:42 | 05:37 | 06:38 | 18:23 | 19:34 | 20:43 |
| N 10° | 04:59 | 05:58 | 07:02 | 18:03 | 19:11 | 20:19 |
| 0° | 05:16 | 06:18 | 07:25 | 17:45 | 18:49 | 19:57 |
| S 10° | 05:32 | 06:39 | 07:47 | 17:26 | 18:28 | 19:34 |
| 20° | 05:50 | 07:00 | 08:11 | 17:07 | 18:05 | 19:10 |
| 30° | 06:11 | 07:26 | 08:39 | 16:44 | 17:38 | 18:41 |
| 35° | 06:23 | 07:41 | 08:56 | 16:31 | 17:22 | 18:25 |
| 40° | 06:37 | 07:58 | 09:15 | 16:16 | 17:04 | 18:05 |
| 45° | 06:54 | 08:20 | 09:39 | 15:58 | 16:42 | 17:41 |
| S 50° | 07:15 | 08:47 | 10:09 | 15:35 | 16:15 | 17:11 |
| 52° | 07:25 | 09:00 | 10:24 | 15:25 | 16:01 | 16:56 |
| 54° | 07:36 | 09:15 | 10:42 | 15:13 | 15:45 | 16:38 |
| 56° | 07:49 | 09:33 | 11:03 | 14:59 | 15:27 | 16:17 |
| 58° | 08:04 | 09:55 | 11:30 | 14:44 | 15:05 | 15:50 |
| S 60° | 08:22 | 10:23 | 12:08 | 14:25 | 14:36 | 15:12 |

| Day | Sun | | Mer. Pass | Moon | | Age 0-2 1-2% |
|-----|------------------------------|----------------------------|-----------|-----------------------|-------------|--------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 16 | 03:39 | 03:39 | 11:56 | 11:30 | —:— | |
| 17 | 03:38 | 03:37 | 11:56 | 12:34 | 00:01 | |
| 18 | 03:36 | 03:34 | 11:56 | 13:41 | 01:07 | |

May 19, 20, 21 UT (Tue., Wed., Thu.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|---------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---------|-----|-----|--------|--|--|
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 236°40.9 | 146°44.5 | N25°02.1 | 208°27.4 | N10°47.4 | 123°08.4 | N22°05.0 | 225°39.0 | N02°19.9 | | | | | | |
| 1 | 251°43.4 | 161°43.7 | 02.2 | 223°28.1 | 48.1 | 138°10.4 | 04.9 | 240°41.3 | 20.0 | | | | | | |
| 2 | 266°45.8 | 176°42.8 | 02.3 | 238°28.8 | 48.8 | 153°12.4 | 04.8 | 255°43.5 | 20.1 | | | | | | |
| 3 | 281°48.3 | 191°42.0 | •• 02.4 | 253°29.5 | •• 49.5 | 168°14.5 | •• 04.8 | 270°45.7 | •• 20.2 | | | | | | |
| 4 | 296°50.8 | 206°41.2 | 02.4 | 268°30.1 | 50.1 | 183°16.5 | 04.7 | 285°48.0 | 20.3 | | | | | | |
| 5 | 311°53.2 | 221°40.3 | 02.5 | 283°30.8 | 50.8 | 198°18.5 | 04.6 | 300°50.2 | 20.4 | | | | | | |
| 6 | 326°55.7 | 236°39.5 | N25°02.6 | 298°31.5 | N10°51.5 | 213°20.5 | N22°04.6 | 315°52.4 | N02°20.5 | | | | | | |
| 7 | 341°58.2 | 251°38.7 | 02.7 | 313°32.2 | 52.2 | 228°22.5 | 04.5 | 330°54.7 | 20.6 | | | | | | |
| 8 | 357°00.6 | 266°37.8 | 02.7 | 328°32.8 | 52.9 | 243°24.5 | 04.4 | 345°56.9 | 20.7 | | | | | | |
| 9 | 12°03.1 | 281°37.0 | •• 02.8 | 343°33.5 | •• 53.5 | 258°26.5 | •• 04.4 | 0°59.2 | •• 20.7 | | | | | | |
| 10 | 27°05.5 | 296°36.2 | 02.9 | 358°34.2 | 54.2 | 273°28.5 | 04.3 | 16°01.4 | 20.8 | | | | | | |
| 11 | 42°08.0 | 311°35.3 | 02.9 | 13°34.9 | 54.9 | 288°30.5 | 04.2 | 31°03.6 | 20.9 | | | | | | |
| 12 | 57°10.5 | 326°34.5 | N25°03.0 | 28°35.5 | N10°55.6 | 303°32.5 | N22°04.2 | 46°05.9 | N02°21.0 | | | | | | |
| 13 | 72°12.9 | 341°33.7 | 03.1 | 43°36.2 | 56.2 | 318°34.5 | 04.1 | 61°08.1 | 21.1 | | | | | | |
| 14 | 87°15.4 | 356°32.8 | 03.1 | 58°36.9 | 56.9 | 333°36.5 | 04.0 | 76°10.3 | 21.2 | | | | | | |
| 15 | 102°17.9 | 11°32.0 | •• 03.2 | 73°37.6 | •• 57.6 | 348°38.5 | •• 04.0 | 91°12.6 | •• 21.3 | | | | | | |
| 16 | 117°20.3 | 26°31.2 | 03.3 | 88°38.3 | 58.3 | 3°40.5 | 03.9 | 106°14.8 | 21.4 | | | | | | |
| 17 | 132°22.8 | 41°30.3 | 03.3 | 103°38.9 | 58.9 | 18°42.5 | 03.8 | 121°17.0 | 21.4 | | | | | | |
| 18 | 147°25.3 | 56°29.5 | N25°03.4 | 118°39.6 | N10°59.6 | 33°44.5 | N22°03.8 | 136°19.3 | N02°21.5 | | | | | | |
| 19 | 162°27.7 | 71°28.7 | 03.4 | 133°40.3 | 11°00.3 | 48°46.5 | 03.7 | 151°21.5 | 21.6 | | | | | | |
| 20 | 177°30.2 | 86°27.8 | 03.5 | 148°41.0 | 01.0 | 63°48.6 | 03.6 | 166°23.8 | 21.7 | | | | | | |
| 21 | 192°32.7 | 101°27.0 | •• 03.6 | 163°41.6 | •• 01.6 | 78°50.6 | •• 03.6 | 181°26.0 | •• 21.8 | | | | | | |
| 22 | 207°35.1 | 116°26.2 | 03.6 | 178°42.3 | 02.3 | 93°52.6 | 03.5 | 196°28.2 | 21.9 | | | | | | |
| 23 | 222°37.6 | 131°25.3 | 03.7 | 193°43.0 | 03.0 | 108°54.6 | 03.4 | 211°30.5 | 22.0 | | | | | | |
| Mer.pass. 08:12 | | | | | | | | | | | | | | | |
| ν-0.8' d0.1' m-3.93 | | | | | | | | | | | | | | | |
| ν0.7' d0.7' m1.25 | | | | | | | | | | | | | | | |
| ν2.0' d-0.1' m-1.93 | | | | | | | | | | | | | | | |
| ν2.2' d0.1' m0.90 | | | | | | | | | | | | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 237°40.0 | 146°24.5 | N25°03.7 | 208°43.7 | N11°03.7 | 123°56.6 | N22°03.4 | 226°32.7 | N02°22.1 | | | | | | |
| 1 | 252°42.5 | 161°23.7 | 03.8 | 223°44.3 | 04.3 | 138°58.6 | 03.3 | 241°34.9 | 22.2 | | | | | | |
| 2 | 267°45.0 | 176°22.9 | 03.8 | 238°45.0 | 05.0 | 154°00.6 | 03.2 | 256°37.2 | 22.2 | | | | | | |
| 3 | 282°47.4 | 191°22.0 | •• 03.9 | 253°45.7 | •• 05.7 | 169°02.6 | •• 03.2 | 271°39.4 | •• 22.3 | | | | | | |
| 4 | 297°49.9 | 206°21.2 | 03.9 | 268°46.4 | 06.4 | 184°04.6 | 03.1 | 286°41.7 | 22.4 | | | | | | |
| 5 | 312°52.4 | 221°20.4 | 04.0 | 283°47.1 | 07.0 | 199°06.6 | 03.0 | 301°43.9 | 22.5 | | | | | | |
| 6 | 327°54.8 | 236°19.5 | N25°04.0 | 298°47.7 | N11°07.7 | 214°08.6 | N22°03.0 | 316°46.1 | N02°22.6 | | | | | | |
| 7 | 342°57.3 | 251°18.7 | 04.0 | 313°48.4 | 08.4 | 229°10.6 | 02.9 | 331°48.4 | 22.7 | | | | | | |
| 8 | 357°59.8 | 266°17.9 | 04.1 | 328°49.1 | 09.1 | 244°12.6 | 02.8 | 346°50.6 | 22.8 | | | | | | |
| 9 | 13°02.2 | 281°17.0 | •• 04.1 | 343°49.8 | •• 09.7 | 259°14.6 | •• 02.8 | 1°52.8 | •• 22.9 | | | | | | |
| 10 | 28°04.7 | 296°16.2 | 04.2 | 358°50.4 | 10.4 | 274°16.6 | 02.7 | 16°55.1 | 22.9 | | | | | | |
| 11 | 43°07.2 | 311°15.4 | 04.2 | 13°51.1 | 11.1 | 289°18.6 | 02.6 | 31°57.3 | 23.0 | | | | | | |
| 12 | 58°09.6 | 326°14.5 | N25°04.2 | 28°51.8 | N11°11.8 | 304°20.6 | N22°02.5 | 46°59.6 | N02°23.1 | | | | | | |
| 13 | 73°12.1 | 341°13.7 | 04.3 | 43°52.5 | 12.4 | 319°22.6 | 02.5 | 62°01.8 | 23.2 | | | | | | |
| 14 | 88°14.5 | 356°12.9 | 04.3 | 58°53.1 | 13.1 | 334°24.6 | 02.4 | 77°04.0 | 23.3 | | | | | | |
| 15 | 103°17.0 | 11°12.1 | •• 04.4 | 73°53.8 | •• 13.8 | 349°26.6 | •• 02.3 | 92°06.3 | •• 23.4 | | | | | | |
| 16 | 118°19.5 | 26°11.2 | 04.4 | 88°54.5 | 14.4 | 4°28.6 | 02.3 | 107°08.5 | 23.5 | | | | | | |
| 17 | 133°21.9 | 41°10.4 | 04.4 | 103°55.2 | 15.1 | 19°30.6 | 02.2 | 122°10.7 | 23.6 | | | | | | |
| 18 | 148°24.4 | 56°09.6 | N25°04.4 | 118°55.8 | N11°15.8 | 34°32.6 | N22°02.1 | 137°13.0 | N02°23.6 | | | | | | |
| 19 | 163°26.9 | 71°08.7 | 04.5 | 133°56.5 | 16.5 | 49°34.6 | 02.1 | 152°15.2 | 23.7 | | | | | | |
| 20 | 178°29.3 | 86°07.9 | 04.5 | 148°57.2 | 17.1 | 64°36.6 | 02.0 | 167°17.5 | 23.8 | | | | | | |
| 21 | 193°31.8 | 101°07.1 | •• 04.5 | 163°57.9 | •• 17.8 | 79°38.6 | •• 01.9 | 182°19.7 | •• 23.9 | | | | | | |
| 22 | 208°34.3 | 116°06.2 | 04.6 | 178°58.5 | 18.5 | 94°40.6 | 01.9 | 197°21.9 | 24.0 | | | | | | |
| 23 | 223°36.7 | 131°05.4 | 04.6 | 193°59.2 | 19.1 | 109°42.6 | 01.8 | 212°24.2 | 24.1 | | | | | | |
| Mer.pass. 08:08 | | | | | | | | | | | | | | | |
| ν-0.8' d0.1' m-3.93 | | | | | | | | | | | | | | | |
| ν0.7' d0.7' m1.25 | | | | | | | | | | | | | | | |
| ν2.0' d-0.1' m-1.92 | | | | | | | | | | | | | | | |
| ν2.2' d0.1' m0.90 | | | | | | | | | | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 238°39.2 | 146°04.6 | N25°04.6 | 208°59.9 | N11°19.8 | 124°44.6 | N22°01.7 | 227°26.4 | N02°24.2 | | | | | | |
| 1 | 253°41.7 | 161°03.8 | 04.6 | 224°00.6 | 20.5 | 139°46.6 | 01.7 | 242°28.7 | 24.2 | | | | | | |
| 2 | 268°44.1 | 176°02.9 | 04.6 | 239°01.2 | 21.1 | 154°48.6 | 01.6 | 257°30.9 | 24.3 | | | | | | |
| 3 | 283°46.6 | 191°02.1 | •• 04.7 | 254°01.9 | •• 21.8 | 169°50.6 | •• 01.5 | 272°33.1 | •• 24.4 | | | | | | |
| 4 | 298°49.0 | 206°01.3 | 04.7 | 269°02.6 | 22.5 | 184°52.6 | 01.5 | 287°35.4 | 24.5 | | | | | | |
| 5 | 313°51.5 | 221°00.4 | 04.7 | 284°03.3 | 23.2 | 199°54.6 | 01.4 | 302°37.6 | 24.6 | | | | | | |
| 6 | 328°54.0 | 235°59.6 | N25°04.7 | 299°03.9 | N11°23.8 | 214°56.6 | N22°01.3 | 317°39.9 | N02°24.7 | | | | | | |
| 7 | 343°56.4 | 250°58.8 | 04.7 | 314°04.6 | 24.5 | 229°58.6 | 01.3 | 332°42.1 | 24.8 | | | | | | |
| 8 | 358°58.9 | 265°58.0 | 04.7 | 329°05.3 | 25.2 | 245°00.6 | 01.2 | 347°44.3 | 24.9 | | | | | | |
| 9 | 14°01.4 | 280°57.1 | •• 04.7 | 344°06.0 | •• 25.8 | 260°02.6 | •• 01.1 | 2°46.6 | •• 24.9 | | | | | | |
| 10 | 29°03.8 | 295°56.3 | 04.8 | 359°06.6 | 26.5 | 275°04.6 | 01.0 | 17°48.8 | 25.0 | | | | | | |
| 11 | 44°06.3 | 310°55.5 | 04.8 | 14°07.3 | 27.2 | 290°06.6 | 01.0 | 32°51.1 | 25.1 | | | | | | |
| 12 | 59°08.8 | 325°54.6 | N25°04.8 | 29°08.0 | N11°27.8 | 305°08.6 | N22°00.9 | 47°53.3 | N02°25.2 | | | | | | |
| 13 | 74°11.2 | 340°53.8 | 04.8 | 44°08.7 | 28.5 | 320°10.6 | 00.8 | 62°55.5 | 25.3 | | | | | | |
| 14 | 89°13.7 | 355°53.0 | 04.8 | 59°09.3 | 29.2 | 335°12.6 | 00.8 | 77°57.8 | 25.4 | | | | | | |
| 15 | 104°16.2 | 10°52.2 | •• 04.8 | 74°10.0 | •• 29.8 | 350°14.6 | •• 00.7 | 93°00.0 | •• 25.5 | | | | | | |
| 16 | 119°18.6 | 25°51.3 | 04.8 | 89°10.7 | 30.5 | 5°16.6 | 00.6 | 108°02.3 | 25.5 | | | | | | |
| 17 | 134°21.1 | 40°50.5 | 04.8 | 104°11.4 | 31.2 | 20°18.6 | 00.6 | 123°04.5 | 25.6 | | | | | | |
| 18 | 149°23.5 | 55°49.7 | N25°04.8 | 119°12.0 | N11°31.8 | 35°20.6 | N22°00.5 | 138°06.7 | N02°25.7 | | | | | | |
| 19 | 164°26.0 | 70°48.8 | 04.8 | 134°12.7 | 32.5 | 50°22.6 | 00.4 | 153°09.0 | 25.8 | | | | | | |
| 20 | 179°28.5 | 85°48.0 | 04.8 | 149°13.4 | 33.2 | 65°24.6 | 00.4 | 168°11.2 | 25.9 | | | | | | |
| 21 | 194°30.9 | 100°47.2 | •• 04.8 | 164°14.1 | •• 33.8 | 80°26.6 | •• 00.3 | 183°13.5 | •• 26.0 | | | | | | |
| 22 | 209°33.4 | 115°46.4 | 04.8 | 179°14.7 | 34.5 | 95°28.6 | 00.2 | 198°15.7 | 26.1 | | | | | | |
| 23 | 224°35.9 | 130°45.5 | 04.8 | 194°15.4 | 35.2 | 110°30.6 | 00.1 | 213°18.0 | 26.1 | | | | | | |
| Mer.pass. 08:04 | | | | | | | | | | | | | | | |
| ν-0.8' d0.0' m-3.93 | | | | | | | | | | | | | | | |
| ν0.7' d0.7' m1.26 | | | | | | | | | | | | | | | |
| ν2.0' d-0.1' m-1.92 | | | | | | | | | | | | | | | |
| ν2.2' d0.1' m0.90 | | | | | | | | | | | | | | | |

| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|------------|----------|-------|----------|-------|-------|
| Tue | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°53.3 | N19°43.5 | | 147°56.0 | 1.0' | N28°00.9 | -1.1' | 60.8' |
| 1 | 195°53.3 | 44.0 | | 162°16.0 | 1.0' | 27°59.8 | -1.3' | 60.8' |
| 2 | 210°53.2 | 44.6 | | 176°36.0 | 1.1' | 27°58.5 | -1.5' | 60.8' |
| 3 | 225°53.2 | · · 45.1 | | 190°56.1 | 1.1' | 27°57.0 | -1.8' | 60.8' |
| 4 | 240°53.2 | 45.6 | | 205°16.2 | 1.2' | 27°55.2 | -2.0' | 60.8' |
| 5 | 255°53.1 | 46.2 | | 219°36.3 | 1.2' | 27°53.2 | -2.2' | 60.7' |
| 6 | 270°53.1 | N19°46.7 | | 233°56.6 | 1.3' | N27°51.0 | -2.4' | 60.7' |
| 7 | 285°53.1 | 47.2 | | 248°16.9 | 1.4' | 27°48.6 | -2.6' | 60.7' |
| 8 | 300°53.0 | 47.8 | | 262°37.2 | 1.4' | 27°46.0 | -2.8' | 60.7' |
| 9 | 315°53.0 | · · 48.3 | | 276°57.6 | 1.5' | 27°43.2 | -3.0' | 60.7' |
| 10 | 330°53.0 | 48.8 | | 291°18.1 | 1.6' | 27°40.2 | -3.2' | 60.6' |
| 11 | 345°52.9 | 49.4 | | 305°38.7 | 1.6' | 27°36.9 | -3.4' | 60.6' |
| 12 | 0°52.9 | N19°49.9 | | 319°59.3 | 1.7' | N27°33.5 | -3.7' | 60.6' |
| 13 | 15°52.9 | 50.4 | | 334°20.1 | 1.8' | 27°29.8 | -3.9' | 60.6' |
| 14 | 30°52.8 | 51.0 | | 348°40.9 | 1.9' | 27°26.0 | -4.1' | 60.5' |
| 15 | 45°52.8 | · · 51.5 | | 3°01.8 | 2.0' | 27°21.9 | -4.3' | 60.5' |
| 16 | 60°52.8 | 52.0 | | 17°22.7 | 2.1' | 27°17.6 | -4.5' | 60.5' |
| 17 | 75°52.7 | 52.6 | | 31°43.8 | 2.2' | 27°13.2 | -4.7' | 60.5' |
| 18 | 90°52.7 | N19°53.1 | | 46°05.0 | 2.3' | N27°08.5 | -4.9' | 60.4' |
| 19 | 105°52.7 | 53.6 | | 60°26.2 | 2.4' | 27°03.6 | -5.1' | 60.4' |
| 20 | 120°52.6 | 54.1 | | 74°47.6 | 2.5' | 26°58.6 | -5.2' | 60.4' |
| 21 | 135°52.6 | · · 54.7 | | 89°09.0 | 2.6' | 26°53.3 | -5.4' | 60.4' |
| 22 | 150°52.6 | 55.2 | | 103°30.6 | 2.7' | 26°47.9 | -5.6' | 60.3' |
| 23 | 165°52.5 | 55.7 | | 117°52.3 | 2.8' | 26°42.3 | -5.8' | 60.3' |
| SD = 15.8' $d = 0.5'$ | | | SD = 16.6' | | | | | |

| Wed | GHA | Dec | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 180°52.5 | N19°56.2 | 132°14.0 | 2.9' | N26°36.5 | -6.0' | 60.3' |
| 1 | 195°52.5 | 56.8 | 146°35.9 | 3.0' | 26°30.5 | -6.2' | 60.3' |
| 2 | 210°52.4 | 57.3 | 160°57.9 | 3.1' | 26°24.3 | -6.4' | 60.2' |
| 3 | 225°52.4 | · · 57.8 | 175°20.0 | 3.2' | 26°17.9 | -6.6' | 60.2' |
| 4 | 240°52.4 | 58.3 | 189°42.3 | 3.3' | 26°11.3 | -6.7' | 60.2' |
| 5 | 255°52.3 | 58.9 | 204°04.6 | 3.5' | 26°04.6 | -6.9' | 60.1' |
| 6 | 270°52.3 | N19°59.4 | 218°27.1 | 3.6' | N25°57.7 | -7.1' | 60.1' |
| 7 | 285°52.2 | 19°59.9 | 232°49.6 | 3.7' | 25°50.6 | -7.3' | 60.1' |
| 8 | 300°52.2 | 20°00.4 | 247°12.3 | 3.8' | 25°43.3 | -7.4' | 60.1' |
| 9 | 315°52.2 | · · 00.9 | 261°35.2 | 4.0' | 25°35.9 | -7.6' | 60.0' |
| 10 | 330°52.1 | 01.5 | 275°58.1 | 4.1' | 25°28.3 | -7.8' | 60.0' |
| 11 | 345°52.1 | 02.0 | 290°21.2 | 4.2' | 25°20.5 | -7.9' | 60.0' |
| 12 | 0°52.1 | N20°02.5 | 304°44.4 | 4.3' | N25°12.6 | -8.1' | 59.9' |
| 13 | 15°52.0 | 03.0 | 319°07.7 | 4.5' | 25°04.5 | -8.3' | 59.9' |
| 14 | 30°52.0 | 03.5 | 333°31.2 | 4.6' | 24°56.2 | -8.4' | 59.9' |
| 15 | 45°51.9 | · · 04.0 | 347°54.8 | 4.7' | 24°47.8 | -8.6' | 59.8' |
| 16 | 60°51.9 | 04.6 | 2°18.5 | 4.9' | 24°39.2 | -8.7' | 59.8' |
| 17 | 75°51.9 | 05.1 | 16°42.4 | 5.0' | 24°30.5 | -8.9' | 59.8' |
| 18 | 90°51.8 | N20°05.6 | 31°06.4 | 5.1' | N24°21.6 | -9.0' | 59.8' |
| 19 | 105°51.8 | 06.1 | 45°30.5 | 5.3' | 24°12.6 | -9.2' | 59.7' |
| 20 | 120°51.7 | 06.6 | 59°54.8 | 5.4' | 24°03.4 | -9.3' | 59.7' |
| 21 | 135°51.7 | · · 07.1 | 74°19.2 | 5.5' | 23°54.0 | -9.5' | 59.7' |
| 22 | 150°51.7 | 07.6 | 88°43.7 | 5.7' | 23°44.5 | -9.6' | 59.6' |
| 23 | 165°51.6 | 08.1 | 103°08.4 | 5.8' | 23°34.9 | -9.8' | 59.6' |
| SD = 15.8' $d = 0.5'$ | | | SD = 16.4' | | | | |

| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|------------|-------|----------|--------|-------|
| 0 | 180°51.6 | N20°08.7 | 117°33.2 | 5.9' | N23°25.2 | -9.9' | 59.6' |
| 1 | 195°51.5 | 09.2 | 131°58.2 | 6.1' | 23°15.3 | -10.0' | 59.5' |
| 2 | 210°51.5 | 09.7 | 146°23.3 | 6.2' | 23°05.2 | -10.2' | 59.5' |
| 3 | 225°51.5 | · · 10.2 | 160°48.5 | 6.4' | 22°55.0 | -10.3' | 59.5' |
| 4 | 240°51.4 | 10.7 | 175°13.8 | 6.5' | 22°44.7 | -10.4' | 59.4' |
| 5 | 255°51.4 | 11.2 | 189°39.4 | 6.6' | 22°34.3 | -10.6' | 59.4' |
| 6 | 270°51.3 | N20°11.7 | 204°05.0 | 6.8' | N22°23.7 | -10.7' | 59.4' |
| 7 | 285°51.3 | 12.2 | 218°30.8 | 6.9' | 22°13.1 | -10.8' | 59.3' |
| 8 | 300°51.2 | 12.7 | 232°56.7 | 7.1' | 22°02.2 | -10.9' | 59.3' |
| 9 | 315°51.2 | · · 13.2 | 247°22.7 | 7.2' | 21°51.3 | -11.1' | 59.3' |
| 10 | 330°51.2 | 13.7 | 261°48.9 | 7.3' | 21°40.3 | -11.2' | 59.2' |
| 11 | 345°51.1 | 14.2 | 276°15.3 | 7.5' | 21°29.1 | -11.3' | 59.2' |
| 12 | 0°51.1 | N20°14.7 | 290°41.7 | 7.6' | N21°17.8 | -11.4' | 59.1' |
| 13 | 15°51.0 | 15.2 | 305°08.3 | 7.7' | 21°06.4 | -11.5' | 59.1' |
| 14 | 30°51.0 | 15.7 | 319°35.1 | 7.9' | 20°54.9 | -11.6' | 59.1' |
| 15 | 45°50.9 | · · 16.2 | 334°02.0 | 8.0' | 20°43.3 | -11.7' | 59.0' |
| 16 | 60°50.9 | 16.7 | 348°29.0 | 8.1' | 20°31.5 | -11.8' | 59.0' |
| 17 | 75°50.9 | 17.2 | 2°56.1 | 8.3' | 20°19.7 | -11.9' | 59.0' |
| 18 | 90°50.8 | N20°17.7 | 17°23.4 | 8.4' | N20°07.8 | -12.0' | 58.9' |
| 19 | 105°50.8 | 18.2 | 31°50.8 | 8.5' | 19°55.7 | -12.1' | 58.9' |
| 20 | 120°50.7 | 18.7 | 46°18.4 | 8.7' | 19°43.6 | -12.2' | 58.9' |
| 21 | 135°50.7 | · · 19.2 | 60°46.0 | 8.8' | 19°31.4 | -12.3' | 58.8' |
| 22 | 150°50.6 | 19.7 | 75°13.8 | 8.9' | 19°19.0 | -12.4' | 58.8' |
| 23 | 165°50.6 | 20.2 | 89°41.8 | 9.1' | 19°06.6 | -12.5' | 58.8' |
| SD = 15.8' $d = 0.5'$ | | | SD = 16.2' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | //// | //// | 01:17 | 22:43 | //// | //// |
| 66° | //// | //// | 02:02 | 21:54 | //// | //// |
| 64° | //// | 00:13 | 02:32 | 21:24 | //// | //// |
| 62° | //// | 01:29 | 02:54 | 21:01 | 22:28 | //// |
| 60° | //// | 02:03 | 03:11 | 20:43 | 21:53 | //// |
| N 58° | 00:12 | 02:27 | 03:26 | 20:28 | 21:28 | //// |
| 56° | 01:21 | 02:47 | 03:39 | 20:16 | 21:08 | 22:36 |
| 54° | 01:52 | 03:02 | 03:49 | 20:05 | 20:52 | 22:04 |
| 52° | 02:15 | 03:16 | 03:59 | 19:55 | 20:39 | 21:40 |
| 50° | 02:33 | 03:27 | 04:08 | 19:46 | 20:27 | 21:22 |
| 45° | 03:06 | 03:51 | 04:26 | 19:28 | 20:03 | 20:48 |
| N 40° | 03:31 | 04:10 | 04:41 | 19:13 | 19:44 | 20:23 |
| 35° | 03:50 | 04:25 | 04:53 | 19:00 | 19:29 | 20:04 |
| 30° | 04:06 | 04:37 | 05:04 | 18:50 | 19:16 | 19:48 |
| 20° | 04:30 | 04:58 | 05:22 | 18:31 | 18:55 | 19:23 |
| N 10° | 04:49 | 05:16 | 05:38 | 18:15 | 18:37 | 19:04 |
| 0° | 05:05 | 05:31 | 05:53 | 18:00 | 18:22 | 18:48 |
| S 10° | 05:20 | 05:45 | 06:08 | 17:45 | 18:08 | 18:33 |
| 20° | 05:33 | 06:00 | 06:23 | 17:30 | 17:53 | 18:20 |
| 30° | 05:46 | 06:15 | 06:41 | 17:12 | 17:38 | 18:07 |
| 35° | 05:53 | 06:24 | 06:51 | 17:02 | 17:29 | 18:00 |
| 40° | 06:00 | 06:33 | 07:03 | 16:50 | 17:19 | 17:52 |
| 45° | 06:08 | 06:44 | 07:17 | 16:36 | 17:08 | 17:44 |
| S 50° | 06:17 | 06:57 | 07:33 | 16:19 | 16:56 | 17:36 |
| 52° | 06:21 | 07:03 | 07:41 | 16:11 | 16:50 | 17:32 |
| 54° | 06:25 | 07:09 | 07:50 | 16:03 | 16:43 | 17:27 |
| 56° | 06:30 | 07:16 | 08:00 | 15:53 | 16:36 | 17:23 |
| 58° | 06:34 | 07:24 | 08:11 | 15:42 | 16:28 | 17:18 |
| S 60° | 06:40 | 07:33 | 08:24 | 15:28 | 16:20 | 17:13 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | □ | □ | □ | □ | □ | □ |
| 66° | □ | □ | 05:56 | □ | □ | 02:59 |
| 64° | □ | □ | 06:39 | □ | □ | 02:15 |
| 62° | 02:46 | 05:00 | 07:08 | 01:44 | 01:48 | 01:45 |
| 60° | 03:56 | 05:37 | 07:30 | 00:34 | 01:10 | 01:23 |
| N 58° | 04:31 | 06:04 | 07:47 | · · · | 00:43 | 01:04 |
| 56° | 04:57 | 06:25 | 08:02 | · · · | 00:21 | 00:49 |
| 54° | 05:17 | 06:42 | 08:15 | · · · | 00:04 | 00:35 |
| 52° | 05:34 | 06:57 | 08:26 | 23:49 | · · · | 00:24 |
| 50° | 05:49 | 07:10 | 08:36 | 23:36 | · · · | 00:13 |
| 45° | 06:19 | 07:36 | 08:57 | 23:08 | 23:51 | · · · |
| N 40° | 06:42 | 07:57 | 09:13 | 22:47 | 23:33 | · · · |
| 35° | 07:01 | 08:14 | 09:27 | 22:29 | 23:18 | 23:58 |
| 30° | 07:18 | 08:29 | 09:40 | 22:13 | 23:05 | 23:48 |
| 20° | 07:46 | 08:54 | 10:00 | 21:47 | 22:43 | 23:30 |
| N 10° | 08:09 | 09:16 | 10:18 | 21:24 | 22:23 | 23:15 |
| 0° | 08:32 | 09:36 | 10:35 | 21:03 | 22:05 | 23:01 |
| S 10° | 08:54 | 09:56 | 10:51 | 20:41 | 21:46 | 22:46 |
| 20° | 09:18 | 10:17 | 11:09 | 20:18 | 21:26 | 22:30 |
| 30° | 09:46 | 10:42 | 11:29 | 19:51 | 21:03 | 22:12 |
| 35° | 10:02 | 10:57 | 11:41 | 19:35 | 20:49 | 22:02 |
| 40° | 10:21 | 11:14 | 11:54 | 19:16 | 20:33 | 21:49 |
| 45° | 10:44 | 11:34 | 12:10 | 18:54 | 20:14 | 21:35 |
| S 50° | 11:14 | 11:59 | 12:30 | 18:25 | 19:50 | 21:17 |
| 52° | 11:28 | 12:11 | 12:39 | 18:11 | 19:38 | 21:08 |
| 54° | 11:45 | 12:25 | 12:49 | 17:54 | 19:25 | 20:59 |
| 56° | 12:05 | 12:41 | 13:00 | 17:34 | 19:10 | 20:48 |
| 58° | 12:30 | 12:59 | 13:14 | 17:10 | 18:51 | 20:36 |
| S 60° | 13:04 | 13:23 | 13:29 | 16:36 | 18:29 | 20:21 |

| Day | Sun | | | Moon | | |
|-----|--------------------------|--------------------------|--------------|----------------|----------------|---------------------|
| | Eqn.of Time | | Mer. Pass | Mer.Pass. | | Age 3-5 7-24% |
| | 00 ^h mm:ss | 12 ^h mm:ss | | Upper hh:mm | Lower hh:mm | |
| | | | hh:mm | | | |
| 19 | 03:33 | 03:32 | 11:56 | 14:47 | 02:14 | |
| 20 | 03:30 | 03:28 | 11:57 | 15:50 | 03:19 | |
| 21 | 03:26 | 03:24 | 11:57 | 16:48 | 04:20 | |

May 22, 23, 24 UT (Fri., Sat., Sun.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------------------|----------|----------|-------------------|----------|----------|---------------------|----------|---------|-------------------|-----|--------|-----|-----|
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 239°38.3 | 145°44.7 | N25°04.8 | 209°16.1 | N11°35.8 | 125°32.6 | N22°00.1 | 228°20.2 | N02°26.2 | | | | | | |
| 1 | 254°40.8 | 160°43.9 | 04.8 | 224°16.8 | 36.5 | 140°34.6 | 22°00.0 | 243°22.4 | 26.3 | | | | | | |
| 2 | 269°43.3 | 175°43.1 | 04.8 | 239°17.4 | 37.1 | 155°36.6 | 21°59.9 | 258°24.7 | 26.4 | | | | | | |
| 3 | 284°45.7 | 190°42.2 | · · 04.7 | 254°18.1 | · · 37.8 | 170°38.6 | · · 59.9 | 273°26.9 | · · 26.5 | | | | | | |
| 4 | 299°48.2 | 205°41.4 | 04.7 | 269°18.8 | 38.5 | 185°40.6 | 59.8 | 288°29.2 | 26.6 | | | | | | |
| 5 | 314°50.6 | 220°40.6 | 04.7 | 284°19.5 | 39.1 | 200°42.5 | 59.7 | 303°31.4 | 26.7 | | | | | | |
| 6 | 329°53.1 | 235°39.8 | N25°04.7 | 299°20.1 | N11°39.8 | 215°44.5 | N21°59.7 | 318°33.6 | N02°26.7 | | | | | | |
| 7 | 344°55.6 | 250°38.9 | 04.7 | 314°20.8 | 40.5 | 230°46.5 | 59.6 | 333°35.9 | 26.8 | | | | | | |
| 8 | 359°58.0 | 265°38.1 | 04.7 | 329°21.5 | 41.1 | 245°48.5 | 59.5 | 348°38.1 | 26.9 | | | | | | |
| 9 | 15°00.5 | 280°37.3 | · · 04.7 | 344°22.2 | · · 41.8 | 260°50.5 | · · 59.4 | 3°40.4 | · · 27.0 | | | | | | |
| 10 | 30°03.0 | 295°36.5 | 04.6 | 359°22.8 | 42.5 | 275°52.5 | 59.4 | 18°42.6 | 27.1 | | | | | | |
| 11 | 45°05.4 | 310°35.6 | 04.6 | 14°23.5 | 43.1 | 290°54.5 | 59.3 | 33°44.9 | 27.2 | | | | | | |
| 12 | 60°07.9 | 325°34.8 | N25°04.6 | 29°24.2 | N11°43.8 | 305°56.5 | N21°59.2 | 48°47.1 | N02°27.3 | | | | | | |
| 13 | 75°10.4 | 340°34.0 | 04.6 | 44°24.8 | 44.4 | 320°58.5 | 59.2 | 63°49.3 | 27.3 | | | | | | |
| 14 | 90°12.8 | 355°33.2 | 04.5 | 59°25.5 | 45.1 | 336°00.5 | 59.1 | 78°51.6 | 27.4 | | | | | | |
| 15 | 105°15.3 | 10°32.3 | · · 04.5 | 74°26.2 | · · 45.8 | 351°02.5 | · · 59.0 | 93°53.8 | · · 27.5 | | | | | | |
| 16 | 120°17.8 | 25°31.5 | 04.5 | 89°26.9 | 46.4 | 6°04.5 | 59.0 | 108°56.1 | 27.6 | | | | | | |
| 17 | 135°20.2 | 40°30.7 | 04.5 | 104°27.5 | 47.1 | 21°06.5 | 58.9 | 123°58.3 | 27.7 | | | | | | |
| 18 | 150°22.7 | 55°29.9 | N25°04.4 | 119°28.2 | N11°47.7 | 36°08.5 | N21°58.8 | 139°00.6 | N02°27.8 | | | | | | |
| 19 | 165°25.1 | 70°29.0 | 04.4 | 134°28.9 | 48.4 | 51°10.5 | 58.7 | 154°02.8 | 27.9 | | | | | | |
| 20 | 180°27.6 | 85°28.2 | 04.4 | 149°29.6 | 49.1 | 66°12.5 | 58.7 | 169°05.0 | 27.9 | | | | | | |
| 21 | 195°30.1 | 100°27.4 | · · 04.3 | 164°30.2 | · · 49.7 | 81°14.5 | · · 58.6 | 184°07.3 | · · 28.0 | | | | | | |
| 22 | 210°32.5 | 115°26.6 | 04.3 | 179°30.9 | 50.4 | 96°16.5 | 58.5 | 199°09.5 | 28.1 | | | | | | |
| 23 | 225°35.0 | 130°25.7 | 04.3 | 194°31.6 | 51.0 | 111°18.4 | 58.5 | 214°11.8 | 28.2 | | | | | | |
| Mer.pass. 08:00 | | ν-0.8' d-0.0' m-3.93 | | | ν0.7' d0.7' m1.26 | | | ν2.0' d-0.1' m-1.92 | | | ν2.2' d0.1' m0.90 | | | | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 240°37.5 | 145°24.9 | N25°04.2 | 209°32.2 | N11°51.7 | 126°20.4 | N21°58.4 | 229°14.0 | N02°28.3 | | | | | | |
| 1 | 255°39.9 | 160°24.1 | 04.2 | 224°32.9 | 52.4 | 141°22.4 | 58.3 | 244°16.3 | 28.4 | | | | | | |
| 2 | 270°42.4 | 175°23.3 | 04.2 | 239°33.6 | 53.0 | 156°24.4 | 58.3 | 259°18.5 | 28.4 | | | | | | |
| 3 | 285°44.9 | 190°22.4 | · · 04.1 | 254°34.3 | · · 53.7 | 171°26.4 | · · 58.2 | 274°20.8 | · · 28.5 | | | | | | |
| 4 | 300°47.3 | 205°21.6 | 04.1 | 269°34.9 | 54.3 | 186°28.4 | 58.1 | 289°23.0 | 28.6 | | | | | | |
| 5 | 315°49.8 | 220°20.8 | 04.0 | 284°35.6 | 55.0 | 201°30.4 | 58.0 | 304°25.2 | 28.7 | | | | | | |
| 6 | 330°52.3 | 235°20.0 | N25°04.0 | 299°36.3 | N11°55.7 | 216°32.4 | N21°58.0 | 319°27.5 | N02°28.8 | | | | | | |
| 7 | 345°54.7 | 250°19.2 | 03.9 | 314°37.0 | 56.3 | 231°34.4 | 57.9 | 334°29.7 | 28.9 | | | | | | |
| 8 | 0°57.2 | 265°18.3 | 03.9 | 329°37.6 | 57.0 | 246°36.4 | 57.8 | 349°32.0 | 29.0 | | | | | | |
| 9 | 15°59.6 | 280°17.5 | · · 03.8 | 344°38.3 | · · 57.6 | 261°38.4 | · · 57.8 | 4°34.2 | · · 29.0 | | | | | | |
| 10 | 31°02.1 | 295°16.7 | 03.8 | 359°39.0 | 58.3 | 276°40.4 | 57.7 | 19°36.5 | 29.1 | | | | | | |
| 11 | 46°04.6 | 310°15.9 | 03.7 | 14°39.6 | 58.9 | 291°42.4 | 57.6 | 34°38.7 | 29.2 | | | | | | |
| 12 | 61°07.0 | 325°15.0 | N25°03.7 | 29°40.3 | N11°59.6 | 306°44.3 | N21°57.5 | 49°41.0 | N02°29.3 | | | | | | |
| 13 | 76°09.5 | 340°14.2 | 03.6 | 44°41.0 | 12°00.3 | 321°46.3 | 57.5 | 64°43.2 | 29.4 | | | | | | |
| 14 | 91°12.0 | 355°13.4 | 03.6 | 59°41.7 | 00.9 | 336°48.3 | 57.4 | 79°45.5 | 29.5 | | | | | | |
| 15 | 106°14.4 | 10°12.6 | · · 03.5 | 74°42.3 | · · 01.6 | 351°50.3 | · · 57.3 | 94°47.7 | · · 29.5 | | | | | | |
| 16 | 121°16.9 | 25°11.8 | 03.5 | 89°43.0 | 02.2 | 6°52.3 | 57.3 | 109°49.9 | 29.6 | | | | | | |
| 17 | 136°19.4 | 40°10.9 | 03.4 | 104°43.7 | 02.9 | 21°54.3 | 57.2 | 124°52.2 | 29.7 | | | | | | |
| 18 | 151°21.8 | 55°10.1 | N25°03.4 | 119°44.3 | N12°03.5 | 36°56.3 | N21°57.1 | 139°54.4 | N02°29.8 | | | | | | |
| 19 | 166°24.3 | 70°09.3 | 03.3 | 134°45.0 | 04.2 | 51°58.3 | 57.0 | 154°56.7 | 29.9 | | | | | | |
| 20 | 181°26.7 | 85°08.5 | 03.2 | 149°45.7 | 04.8 | 67°00.3 | 57.0 | 169°58.9 | 30.0 | | | | | | |
| 21 | 196°29.2 | 100°07.7 | · · 03.2 | 164°46.4 | · · 05.5 | 82°02.3 | · · 56.9 | 185°01.2 | · · 30.0 | | | | | | |
| 22 | 211°31.7 | 115°06.8 | 03.1 | 179°47.0 | 06.2 | 97°04.2 | 56.8 | 200°03.4 | 30.1 | | | | | | |
| 23 | 226°34.1 | 130°06.0 | 03.0 | 194°47.7 | 06.8 | 112°06.2 | 56.8 | 215°05.7 | 30.2 | | | | | | |
| Mer.pass. 07:56 | | ν-0.8' d-0.0' m-3.93 | | | ν0.7' d0.7' m1.26 | | | ν2.0' d-0.1' m-1.91 | | | ν2.2' d0.1' m0.90 | | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 241°36.6 | 145°05.2 | N25°03.0 | 209°48.4 | N12°07.5 | 127°08.2 | N21°56.7 | 230°07.9 | N02°30.3 | | | | | | |
| 1 | 256°39.1 | 160°04.4 | 02.9 | 224°49.0 | 08.1 | 142°10.2 | 56.6 | 245°10.2 | 30.4 | | | | | | |
| 2 | 271°41.5 | 175°03.6 | 02.8 | 239°49.7 | 08.8 | 157°12.2 | 56.5 | 260°12.4 | 30.5 | | | | | | |
| 3 | 286°44.0 | 190°02.8 | · · 02.8 | 254°50.4 | · · 09.4 | 172°14.2 | · · 56.5 | 275°14.6 | · · 30.5 | | | | | | |
| 4 | 301°46.5 | 205°01.9 | 02.7 | 269°51.1 | 10.1 | 187°16.2 | 56.4 | 290°16.9 | 30.6 | | | | | | |
| 5 | 316°48.9 | 220°01.1 | 02.6 | 284°51.7 | 10.7 | 202°18.2 | 56.3 | 305°19.1 | 30.7 | | | | | | |
| 6 | 331°51.4 | 235°00.3 | N25°02.6 | 299°52.4 | N12°11.4 | 217°20.2 | N21°56.3 | 320°21.4 | N02°30.8 | | | | | | |
| 7 | 346°53.9 | 249°59.5 | 02.5 | 314°53.1 | 12.0 | 232°22.1 | 56.2 | 335°23.6 | 30.9 | | | | | | |
| 8 | 1°56.3 | 264°58.7 | 02.4 | 329°53.7 | 12.7 | 247°24.1 | 56.1 | 350°25.9 | 31.0 | | | | | | |
| 9 | 16°58.8 | 279°57.8 | · · 02.3 | 344°54.4 | · · 13.3 | 262°26.1 | · · 56.0 | 5°28.1 | · · 31.0 | | | | | | |
| 10 | 32°01.2 | 294°57.0 | 02.2 | 359°55.1 | 14.0 | 277°28.1 | 56.0 | 20°30.4 | 31.1 | | | | | | |
| 11 | 47°03.7 | 309°56.2 | 02.2 | 14°55.8 | 14.6 | 292°30.1 | 55.9 | 35°32.6 | 31.2 | | | | | | |
| 12 | 62°06.2 | 324°55.4 | N25°02.1 | 29°56.4 | N12°15.3 | 307°32.1 | N21°55.8 | 50°34.9 | N02°31.3 | | | | | | |
| 13 | 77°08.6 | 339°54.6 | 02.0 | 44°57.1 | 15.9 | 322°34.1 | 55.7 | 65°37.1 | 31.4 | | | | | | |
| 14 | 92°11.1 | 354°53.8 | 01.9 | 59°57.8 | 16.6 | 337°36.1 | 55.7 | 80°39.4 | 31.5 | | | | | | |
| 15 | 107°13.6 | 9°52.9 | · · 01.8 | 74°58.4 | · · 17.2 | 352°38.0 | · · 55.6 | 95°41.6 | · · 31.5 | | | | | | |
| 16 | 122°16.0 | 24°52.1 | 01.7 | 89°59.1 | 17.9 | 7°40.0 | 55.5 | 110°43.9 | 31.6 | | | | | | |
| 17 | 137°18.5 | 39°51.3 | 01.7 | 104°59.8 | 18.5 | 22°42.0 | 55.5 | 125°46.1 | 31.7 | | | | | | |
| 18 | 152°21.0 | 54°50.5 | N25°01.6 | 120°00.5 | N12°19.2 | 37°44.0 | N21°55.4 | 140°48.4 | N02°31.8 | | | | | | |
| 19 | 167°23.4 | 69°49.7 | 01.5 | 135°01.1 | 19.8 | 52°46.0 | 55.3 | 155°50.6 | 31.9 | | | | | | |
| 20 | 182°25.9 | 84°48.9 | 01.4 | 150°01.8 | 20.5 | 67°48.0 | 55.2 | 170°52.9 | 32.0 | | | | | | |
| 21 | 197°28.4 | 99°48.1 | · · 01.3 | 165°02.5 | · · 21.1 | 82°50.0 | · · 55.2 | 185°55.1 | · · 32.0 | | | | | | |
| 22 | 212°30.8 | 114°47.2 | 01.2 | 180°03.1 | 21.8 | 97°52.0 | 55.1 | 200°57.4 | 32.1 | | | | | | |
| 23 | 227°33.3 | 129°46.4 | 01.1 | 195°03.8 | 22.4 | 112°53.9 | 55.0 | 215°59.6 | 32.2 | | | | | | |
| Mer.pass. 07:52 | | ν-0.8' d-0.1' m-3.94 | | | ν0.7' d0.7' m1.26 | | | ν2.0' d-0.1' m-1.91 | | | ν2.2' d0.1' m0.90 | | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.8 | 29°14.0 |
| Ankaa | 353°06.3 | -42°09.6 |
| Schedar | 349°30.1 | 56°40.7 |
| Diphda | 348°46.4 | -17°50.4 |
| Achernar | 335°19.8 | -57°06.0 |
| Hamal | 327°50.2 | 23°35.1 |
| Polaris | 313°56.1 | 89°22.4 |
| Acamar | 315°11.3 | -40°11.9 |
| Menkar | 314°05.3 | 4°11.6 |
| Mirfak | 308°27.1 | 49°57.2 |
| Aldebaran | 290°38.7 | 16°33.7 |
| Rigel | 281°03.1 | -8°10.3 |
| Capella | 280°20.7 | 46°01.5 |
| Bellatrix | 278°22.0 | 6°22.4 |
| Elnath | 278°00.8 | 28°37.8 |
| Alnilam | 275°36.9 | -1°11.2 |
| Betelgeuse | 270°51.2 | 7°24.7 |
| Canopus | 263°52.4 | -52°42.7 |
| Sirius | 258°25.5 | -16°45.2 |
| Adhara | 255°05.3 | -29°00.6 |
| Procyon | 244°49.9 | 5°09.4 |
| Pollux | 243°16.2 | 27°57.8 |
| Avior | 234°14.6 | -59°35.9 |
| Suhail | 222°45.6 | -43°32.6 |
| Miaplacidus | 221°38.3 | -69°49.8 |
| Alphard | 217°46.7 | -8°46.5 |
| Regulus | 207°33.3 | |

| h | Sun | | | | Moon | | | | |
|------------|----------|----------|--|------------|------------|-------|----------|--------|-------|
| Fri | GHA | Dec | | | GHA | ν | Dec | d | HP |
| 0 | 180°50.5 | N20°20.7 | | | 104°09.9 | 9.2' | N18°54.1 | -12.6' | 58.7' |
| 1 | 195°50.5 | 21.2 | | | 118°38.1 | 9.3' | 18°41.5 | -12.7' | 58.7' |
| 2 | 210°50.4 | 21.7 | | | 133°06.4 | 9.5' | 18°28.8 | -12.8' | 58.6' |
| 3 | 225°50.4 | · · 22.2 | | | 147°34.9 | 9.6' | 18°16.0 | -12.9' | 58.6' |
| 4 | 240°50.4 | 22.7 | | | 162°03.4 | 9.7' | 18°03.2 | -12.9' | 58.6' |
| 5 | 255°50.3 | 23.2 | | | 176°32.1 | 9.8' | 17°50.3 | -13.0' | 58.5' |
| 6 | 270°50.3 | N20°23.7 | | | 191°01.0 | 10.0' | N17°37.2 | -13.1' | 58.5' |
| 7 | 285°50.2 | 24.2 | | | 205°29.9 | 10.1' | 17°24.1 | -13.2' | 58.5' |
| 8 | 300°50.2 | 24.7 | | | 219°59.0 | 10.2' | 17°11.0 | -13.2' | 58.4' |
| 9 | 315°50.1 | · · 25.2 | | | 234°28.2 | 10.3' | 16°57.7 | -13.3' | 58.4' |
| 10 | 330°50.1 | 25.6 | | | 248°57.5 | 10.4' | 16°44.4 | -13.4' | 58.4' |
| 11 | 345°50.0 | 26.1 | | | 263°27.0 | 10.6' | 16°31.0 | -13.5' | 58.3' |
| 12 | 0°50.0 | N20°26.6 | | | 277°56.5 | 10.7' | N16°17.5 | -13.5' | 58.3' |
| 13 | 15°49.9 | 27.1 | | | 292°26.2 | 10.8' | 16°04.0 | -13.6' | 58.3' |
| 14 | 30°49.9 | 27.6 | | | 306°56.0 | 10.9' | 15°50.4 | -13.7' | 58.2' |
| 15 | 45°49.8 | · · 28.1 | | | 321°25.9 | 11.0' | 15°36.8 | -13.7' | 58.2' |
| 16 | 60°49.8 | 28.6 | | | 335°55.9 | 11.1' | 15°23.0 | -13.8' | 58.1' |
| 17 | 75°49.7 | 29.1 | | | 350°26.1 | 11.2' | 15°09.2 | -13.8' | 58.1' |
| 18 | 90°49.7 | N20°29.5 | | | 4°56.3 | 11.4' | N14°55.4 | -13.9' | 58.1' |
| 19 | 105°49.6 | 30.0 | | | 19°26.7 | 11.5' | 14°41.5 | -14.0' | 58.0' |
| 20 | 120°49.6 | 30.5 | | | 33°57.1 | 11.6' | 14°27.5 | -14.0' | 58.0' |
| 21 | 135°49.5 | · · 31.0 | | | 48°27.7 | 11.7' | 14°13.5 | -14.1' | 58.0' |
| 22 | 150°49.5 | 31.5 | | | 62°58.4 | 11.8' | 13°59.5 | -14.1' | 57.9' |
| 23 | 165°49.4 | 32.0 | | | 77°29.1 | 11.9' | 13°45.4 | -14.2' | 57.9' |
| SD = 15.8' | | | | $d = 0.5'$ | SD = 16.0' | | | | |

| Sat | GHA | Dec | | | GHA | ν | Dec | d | HP |
|------------|----------|----------|--|------------|----------|-------|----------|--------|-------|
| 0 | 180°49.4 | N20°32.4 | | | 92°00.0 | 12.0' | N13°31.2 | -14.2' | 57.9' |
| 1 | 195°49.3 | 32.9 | | | 106°31.0 | 12.1' | 13°17.0 | -14.3' | 57.8' |
| 2 | 210°49.3 | 33.4 | | | 121°02.1 | 12.2' | 13°02.7 | -14.3' | 57.8' |
| 3 | 225°49.2 | · · 33.9 | | | 135°33.2 | 12.3' | 12°48.4 | -14.3' | 57.8' |
| 4 | 240°49.2 | 34.4 | | | 150°04.5 | 12.4' | 12°34.1 | -14.4' | 57.7' |
| 5 | 255°49.1 | 34.8 | | | 164°35.9 | 12.5' | 12°19.7 | -14.4' | 57.7' |
| 6 | 270°49.1 | N20°35.3 | | | 179°07.4 | 12.6' | N12°05.2 | -14.5' | 57.7' |
| 7 | 285°49.0 | 35.8 | | | 193°38.9 | 12.7' | 11°50.8 | -14.5' | 57.6' |
| 8 | 300°49.0 | 36.3 | | | 208°10.6 | 12.7' | 11°36.3 | -14.5' | 57.6' |
| 9 | 315°48.9 | · · 36.7 | | | 222°42.3 | 12.8' | 11°21.7 | -14.6' | 57.5' |
| 10 | 330°48.8 | 37.2 | | | 237°14.2 | 12.9' | 11°07.1 | -14.6' | 57.5' |
| 11 | 345°48.8 | 37.7 | | | 251°46.1 | 13.0' | 10°52.5 | -14.6' | 57.5' |
| 12 | 0°48.7 | N20°38.2 | | | 266°18.1 | 13.1' | N10°37.9 | -14.7' | 57.4' |
| 13 | 15°48.7 | 38.6 | | | 280°50.2 | 13.2' | 10°23.2 | -14.7' | 57.4' |
| 14 | 30°48.6 | 39.1 | | | 295°22.4 | 13.3' | 10°08.5 | -14.7' | 57.4' |
| 15 | 45°48.6 | · · 39.6 | | | 309°54.6 | 13.3' | 09°53.8 | -14.8' | 57.3' |
| 16 | 60°48.5 | 40.1 | | | 324°27.0 | 13.4' | 09°39.0 | -14.8' | 57.3' |
| 17 | 75°48.5 | 40.5 | | | 338°59.4 | 13.5' | 09°24.2 | -14.8' | 57.3' |
| 18 | 90°48.4 | N20°41.0 | | | 353°31.9 | 13.6' | N09°09.4 | -14.8' | 57.2' |
| 19 | 105°48.4 | 41.5 | | | 8°04.4 | 13.6' | 08°54.5 | -14.9' | 57.2' |
| 20 | 120°48.3 | 41.9 | | | 22°37.1 | 13.7' | 08°39.7 | -14.9' | 57.2' |
| 21 | 135°48.2 | · · 42.4 | | | 37°09.8 | 13.8' | 08°24.8 | -14.9' | 57.1' |
| 22 | 150°48.2 | 42.9 | | | 51°42.6 | 13.9' | 08°09.9 | -14.9' | 57.1' |
| 23 | 165°48.1 | 43.3 | | | 66°15.5 | 13.9' | 07°55.0 | -14.9' | 57.1' |
| SD = 15.8' | | | | SD = 15.8' | | | | | |

| Sun | GHA | Dec | | | GHA | ν | Dec | d | HP |
|------------|----------|----------|--|------------|----------|-------|----------|--------|-------|
| 0 | 180°48.1 | N20°43.8 | | | 80°48.4 | 14.0' | N07°40.0 | -15.0' | 57.0' |
| 1 | 195°48.0 | 44.3 | | | 95°21.4 | 14.1' | 07°25.1 | -15.0' | 57.0' |
| 2 | 210°48.0 | 44.7 | | | 109°54.5 | 14.1' | 07°10.1 | -15.0' | 57.0' |
| 3 | 225°47.9 | · · 45.2 | | | 124°27.6 | 14.2' | 06°55.1 | -15.0' | 56.9' |
| 4 | 240°47.8 | 45.7 | | | 139°00.8 | 14.3' | 06°40.1 | -15.0' | 56.9' |
| 5 | 255°47.8 | 46.1 | | | 153°34.1 | 14.3' | 06°25.1 | -15.0' | 56.9' |
| 6 | 270°47.7 | N20°46.6 | | | 168°07.4 | 14.4' | N06°10.1 | -15.0' | 56.8' |
| 7 | 285°47.7 | 47.1 | | | 182°40.8 | 14.4' | 05°55.1 | -15.0' | 56.8' |
| 8 | 300°47.6 | 47.5 | | | 197°14.2 | 14.5' | 05°40.0 | -15.0' | 56.8' |
| 9 | 315°47.6 | · · 48.0 | | | 211°47.7 | 14.5' | 05°25.0 | -15.1' | 56.8' |
| 10 | 330°47.5 | 48.4 | | | 226°21.2 | 14.6' | 05°09.9 | -15.1' | 56.7' |
| 11 | 345°47.4 | 48.9 | | | 240°54.8 | 14.7' | 04°54.9 | -15.1' | 56.7' |
| 12 | 0°47.4 | N20°49.4 | | | 255°28.5 | 14.7' | N04°39.8 | -15.1' | 56.7' |
| 13 | 15°47.3 | 49.8 | | | 270°02.2 | 14.8' | 04°24.7 | -15.1' | 56.6' |
| 14 | 30°47.3 | 50.3 | | | 284°36.0 | 14.8' | 04°09.7 | -15.1' | 56.6' |
| 15 | 45°47.2 | · · 50.7 | | | 299°09.8 | 14.9' | 03°54.6 | -15.1' | 56.6' |
| 16 | 60°47.1 | 51.2 | | | 313°43.6 | 14.9' | 03°39.5 | -15.1' | 56.5' |
| 17 | 75°47.1 | 51.6 | | | 328°17.5 | 14.9' | 03°24.4 | -15.1' | 56.5' |
| 18 | 90°47.0 | N20°52.1 | | | 342°51.5 | 15.0' | N03°09.4 | -15.1' | 56.5' |
| 19 | 105°47.0 | 52.5 | | | 357°25.5 | 15.0' | 02°54.3 | -15.1' | 56.4' |
| 20 | 120°46.9 | 53.0 | | | 11°59.5 | 15.1' | 02°39.2 | -15.1' | 56.4' |
| 21 | 135°46.8 | · · 53.5 | | | 26°33.5 | 15.1' | 02°24.2 | -15.1' | 56.4' |
| 22 | 150°46.8 | 53.9 | | | 41°07.7 | 15.1' | 02°09.1 | -15.0' | 56.4' |
| 23 | 165°46.7 | 54.4 | | | 55°41.8 | 15.2' | 01°54.1 | -15.0' | 56.3' |
| SD = 15.8' | | | | SD = 15.6' | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | | | | | | |
| N 70° | | | | | | |
| 68° | //// | //// | 00:54 | 23:08 | //// | //// |
| 66° | //// | //// | 01:50 | 22:07 | //// | //// |
| 64° | //// | //// | 02:23 | 21:33 | //// | //// |
| 62° | //// | 01:15 | 02:46 | 21:09 | 22:44 | //// |
| 60° | //// | 01:54 | 03:05 | 20:50 | 22:03 | //// |
| N 58° | //// | 02:20 | 03:21 | 20:34 | 21:35 | //// |
| 56° | 01:07 | 02:40 | 03:34 | 20:21 | 21:15 | 22:50 |
| 54° | 01:43 | 02:57 | 03:45 | 20:09 | 20:58 | 22:13 |
| 52° | 02:08 | 03:11 | 03:55 | 19:59 | 20:44 | 21:47 |
| 50° | 02:27 | 03:23 | 04:04 | 19:50 | 20:31 | 21:28 |
| 45° | 03:02 | 03:48 | 04:23 | 19:31 | 20:06 | 20:52 |
| N 40° | 03:28 | 04:07 | 04:38 | 19:16 | 19:47 | 20:26 |
| 35° | 03:48 | 04:23 | 04:51 | 19:03 | 19:31 | 20:06 |
| 30° | 04:04 | 04:36 | 05:02 | 18:51 | 19:18 | 19:50 |
| 20° | 04:29 | 04:58 | 05:21 | 18:32 | 18:56 | 19:25 |
| N 10° | 04:49 | 05:15 | 05:38 | 18:16 | 18:38 | 19:05 |
| 0° | 05:05 | 05:31 | 05:53 | 18:00 | 18:22 | 18:48 |
| S 10° | 05:20 | 05:46 | 06:08 | 17:45 | 18:08 | 18:33 |
| 20° | 05:34 | 06:01 | 06:24 | 17:29 | 17:53 | 18:20 |
| 30° | 05:48 | 06:17 | 06:43 | 17:11 | 17:36 | 18:06 |
| 35° | 05:55 | 06:26 | 06:53 | 17:00 | 17:27 | 17:58 |
| 40° | 06:03 | 06:36 | 07:05 | 16:48 | 17:17 | 17:51 |
| 45° | 06:11 | 06:47 | 07:20 | 16:33 | 17:06 | 17:42 |
| S 50° | 06:20 | 07:00 | 07:37 | 16:16 | 16:53 | 17:33 |
| 52° | 06:24 | 07:06 | 07:45 | 16:08 | 16:47 | 17:29 |
| 54° | 06:29 | 07:13 | 07:54 | 15:59 | 16:40 | 17:24 |
| 56° | 06:34 | 07:21 | 08:05 | 15:48 | 16:32 | 17:19 |
| 58° | 06:39 | 07:29 | 08:16 | 15:37 | 16:24 | 17:14 |
| S 60° | 06:44 | 07:38 | 08:30 | 15:23 | 16:15 | 17:08 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | 06:17 | 09:43 | 12:02 | 04:36 | 02:53 | 02:09 |
| N 70° | 07:27 | 10:02 | 12:08 | 03:24 | 02:31 | 02:00 |
| 68° | 08:03 | 10:18 | 12:14 | 02:46 | 02:14 | 01:52 |
| 66° | 08:29 | 10:30 | 12:18 | 02:20 | 02:00 | 01:45 |
| 64° | 08:48 | 10:40 | 12:22 | 01:59 | 01:48 | 01:39 |
| 62° | 09:04 | 10:49 | 12:25 | 01:42 | 01:38 | 01:34 |
| 60° | 09:17 | 10:56 | 12:28 | 01:28 | 01:29 | 01:30 |
| N 58° | 09:28 | 11:02 | 12:31 | 01:15 | 01:22 | 01:26 |
| 56° | 09:38 | 11:08 | 12:33 | 01:05 | 01:15 | 01:22 |
| 54° | 09:47 | 11:13 | 12:35 | 00:55 | 01:09 | 01:19 |
| 52° | 09:54 | 11:18 | 12:37 | 00:47 | 01:03 | 01:16 |
| 50° | 10:01 | 11:22 | 12:38 | 00:39 | 00:58 | 01:14 |
| 45° | 10:16 | 11:31 | 12:42 | 00:23 | 00:48 | 01:08 |
| N 40° | 10:28 | 11:38 | 12:45 | 00:09 | 00:39 | 01:03 |
| 35° | 10:38 | 11:45 | 12:48 | | 00:31 | 00:59 |
| 30° | 10:47 | 11:50 | 12:50 | | 00:24 | 00:55 |
| 20° | 11:02 | 12:00 | 12:54 | | 00:12 | 00:49 |
| N 10° | 11:15 | 12:08 | 12:57 | | 00:01 | 00:43 |
| 0° | 11:28 | 12:16 | 13:00 | 23:51 | | 00:37 |
| S 10° | 11:40 | 12:24 | 13:04 | 23:41 | | 00:32 |
| 20° | 11:53 | 12:32 | 13:07 | 23:30 | | 00:26 |
| 30° | 12:08 | 12:41 | 13:11 | 23:18 | | 00:19 |
| 35° | 12:17 | 12:47 | 13:13 | 23:10 | | 00:15 |
| 40° | 12:26 | 12:53 | 13:16 | 23:02 | | 00:11 |
| 45° | 12:38 | 13:00 | 13:18 | 22:52 | | 00:05 |
| S 50° | 12:51 | 13:08 | 13:22 | 22:40 | 23:59 | |
| 52° | 12:58 | 13:12 | 13:23 | 22:35 | 23:56 | |
| 54° | 13:05 | 13:16 | 13:25 | 22:29 | 23:53 | |
| 56° | 13:13 | 13:21 | 13:27 | 22:22 | 23:49 | |
| 58° | 13:21 | 13:26 | 13:29 | 22:14 | 23:45 | |
| S 60° | 13:31 | 13:32 | 13:32 | 22:05 | 23:41 | |

May 25, 26, 27 UT (Mon., Tue., Wed.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------------------|----------|----------|-------------------|----------|----------|---------------------|----------|---------|-------------------|-----|--------|-----|-----|
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 242°35.7 | 144°45.6 | N25°01.0 | 210°04.5 | N12°23.1 | 127°55.9 | N21°54.9 | 231°01.8 | N02°32.3 | | | | | | |
| 1 | 257°38.2 | 159°44.8 | 00.9 | 225°05.1 | 23.7 | 142°57.9 | 54.9 | 246°04.1 | 32.4 | | | | | | |
| 2 | 272°40.7 | 174°44.0 | 00.8 | 240°05.8 | 24.4 | 157°59.9 | 54.8 | 261°06.3 | 32.4 | | | | | | |
| 3 | 287°43.1 | 189°43.2 | · · 00.7 | 255°06.5 | · · 25.0 | 173°01.9 | · · 54.7 | 276°08.6 | · · 32.5 | | | | | | |
| 4 | 302°45.6 | 204°42.4 | 00.6 | 270°07.2 | 25.7 | 188°03.9 | 54.7 | 291°10.8 | 32.6 | | | | | | |
| 5 | 317°48.1 | 219°41.5 | 00.5 | 285°07.8 | 26.3 | 203°05.9 | 54.6 | 306°13.1 | 32.7 | | | | | | |
| 6 | 332°50.5 | 234°40.7 | N25°00.4 | 300°08.5 | N12°27.0 | 218°07.8 | N21°54.5 | 321°15.3 | N02°32.8 | | | | | | |
| 7 | 347°53.0 | 249°39.9 | 00.3 | 315°09.2 | 27.6 | 233°09.8 | 54.4 | 336°17.6 | 32.9 | | | | | | |
| 8 | 2°55.5 | 264°39.1 | 00.2 | 330°09.8 | 28.3 | 248°11.8 | 54.4 | 351°19.8 | 32.9 | | | | | | |
| 9 | 17°57.9 | 279°38.3 | · · 00.1 | 345°10.5 | · · 28.9 | 263°13.8 | · · 54.3 | 6°22.1 | · · 33.0 | | | | | | |
| 10 | 33°00.4 | 294°37.5 | 25°00.0 | 0°11.2 | 29.6 | 278°15.8 | 54.2 | 21°24.3 | 33.1 | | | | | | |
| 11 | 48°02.8 | 309°36.7 | 24°59.9 | 15°11.8 | 30.2 | 293°17.8 | 54.1 | 36°26.6 | 33.2 | | | | | | |
| 12 | 63°05.3 | 324°35.9 | N24°59.8 | 30°12.5 | N12°30.8 | 308°19.7 | N21°54.1 | 51°28.8 | N02°33.3 | | | | | | |
| 13 | 78°07.8 | 339°35.1 | 59.7 | 45°13.2 | 31.5 | 323°21.7 | 54.0 | 66°31.1 | 33.3 | | | | | | |
| 14 | 93°10.2 | 354°34.2 | 59.5 | 60°13.8 | 32.1 | 338°23.7 | 53.9 | 81°33.3 | 33.4 | | | | | | |
| 15 | 108°12.7 | 9°33.4 | · · 59.4 | 75°14.5 | · · 32.8 | 353°25.7 | · · 53.8 | 96°35.6 | · · 33.5 | | | | | | |
| 16 | 123°15.2 | 24°32.6 | 59.3 | 90°15.2 | 33.4 | 8°27.7 | 53.8 | 111°37.8 | 33.6 | | | | | | |
| 17 | 138°17.6 | 39°31.8 | 59.2 | 105°15.9 | 34.1 | 23°29.7 | 53.7 | 126°40.1 | 33.7 | | | | | | |
| 18 | 153°20.1 | 54°31.0 | N24°59.1 | 120°16.5 | N12°34.7 | 38°31.6 | N21°53.6 | 141°42.3 | N02°33.8 | | | | | | |
| 19 | 168°22.6 | 69°30.2 | 59.0 | 135°17.2 | 35.4 | 53°33.6 | 53.6 | 156°44.6 | 33.8 | | | | | | |
| 20 | 183°25.0 | 84°29.4 | 58.8 | 150°17.9 | 36.0 | 68°35.6 | 53.5 | 171°46.8 | 33.9 | | | | | | |
| 21 | 198°27.5 | 99°28.6 | · · 58.7 | 165°18.5 | · · 36.6 | 83°37.6 | · · 53.4 | 186°49.1 | · · 34.0 | | | | | | |
| 22 | 213°30.0 | 114°27.8 | 58.6 | 180°19.2 | 37.3 | 98°39.6 | 53.3 | 201°51.3 | 34.1 | | | | | | |
| 23 | 228°32.4 | 129°27.0 | 58.5 | 195°19.9 | 37.9 | 113°41.6 | 53.3 | 216°53.6 | 34.2 | | | | | | |
| Mer.pass. 07:48 | | ν-0.8' d-0.1' m-3.94 | | | ν0.7' d0.6' m1.26 | | | ν2.0' d-0.1' m-1.91 | | | ν2.2' d0.1' m0.89 | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 243°34.9 | 144°26.1 | N24°58.3 | 210°20.5 | N12°38.6 | 128°43.5 | N21°53.2 | 231°55.8 | N02°34.2 | | | | | | |
| 1 | 258°37.3 | 159°25.3 | 58.2 | 225°21.2 | 39.2 | 143°45.5 | 53.1 | 246°58.1 | 34.3 | | | | | | |
| 2 | 273°39.8 | 174°24.5 | 58.1 | 240°21.9 | 39.9 | 158°47.5 | 53.0 | 262°00.3 | 34.4 | | | | | | |
| 3 | 288°42.3 | 189°23.7 | · · 58.0 | 255°22.5 | · · 40.5 | 173°49.5 | · · 53.0 | 277°02.6 | · · 34.5 | | | | | | |
| 4 | 303°44.7 | 204°22.9 | 57.8 | 270°23.2 | 41.1 | 188°51.5 | 52.9 | 292°04.9 | 34.6 | | | | | | |
| 5 | 318°47.2 | 219°22.1 | 57.7 | 285°23.9 | 41.8 | 203°53.5 | 52.8 | 307°07.1 | 34.6 | | | | | | |
| 6 | 333°49.7 | 234°21.3 | N24°57.6 | 300°24.5 | N12°42.4 | 218°55.4 | N21°52.7 | 322°09.4 | N02°34.7 | | | | | | |
| 7 | 348°52.1 | 249°20.5 | 57.4 | 315°25.2 | 43.1 | 233°57.4 | 52.7 | 337°11.6 | 34.8 | | | | | | |
| 8 | 3°54.6 | 264°19.7 | 57.3 | 330°25.9 | 43.7 | 248°59.4 | 52.6 | 352°13.9 | 34.9 | | | | | | |
| 9 | 18°57.1 | 279°18.9 | · · 57.2 | 345°26.5 | · · 44.3 | 264°01.4 | · · 52.5 | 7°16.1 | · · 35.0 | | | | | | |
| 10 | 33°59.5 | 294°18.1 | 57.0 | 0°27.2 | 45.0 | 279°03.4 | 52.4 | 22°18.4 | 35.1 | | | | | | |
| 11 | 49°02.0 | 309°17.3 | 56.9 | 15°27.9 | 45.6 | 294°05.3 | 52.4 | 37°20.6 | 35.1 | | | | | | |
| 12 | 64°04.4 | 324°16.5 | N24°56.8 | 30°28.6 | N12°46.3 | 309°07.3 | N21°52.3 | 52°22.9 | N02°35.2 | | | | | | |
| 13 | 79°06.9 | 339°15.7 | 56.6 | 45°29.2 | 46.9 | 324°09.3 | 52.2 | 67°25.1 | 35.3 | | | | | | |
| 14 | 94°09.4 | 354°14.9 | 56.5 | 60°29.9 | 47.5 | 339°11.3 | 52.1 | 82°27.4 | 35.4 | | | | | | |
| 15 | 109°11.8 | 9°14.1 | · · 56.3 | 75°30.6 | · · 48.2 | 354°13.3 | · · 52.1 | 97°29.6 | · · 35.5 | | | | | | |
| 16 | 124°14.3 | 24°13.3 | 56.2 | 90°31.2 | 48.8 | 9°15.2 | 52.0 | 112°31.9 | 35.5 | | | | | | |
| 17 | 139°16.8 | 39°12.4 | 56.0 | 105°31.9 | 49.5 | 24°17.2 | 51.9 | 127°34.1 | 35.6 | | | | | | |
| 18 | 154°19.2 | 54°11.6 | N24°55.9 | 120°32.6 | N12°50.1 | 39°19.2 | N21°51.8 | 142°36.4 | N02°35.7 | | | | | | |
| 19 | 169°21.7 | 69°10.8 | 55.7 | 135°33.2 | 50.7 | 54°21.2 | 51.8 | 157°38.6 | 35.8 | | | | | | |
| 20 | 184°24.2 | 84°10.0 | 55.6 | 150°33.9 | 51.4 | 69°23.2 | 51.7 | 172°40.9 | 35.9 | | | | | | |
| 21 | 199°26.6 | 99°09.2 | · · 55.4 | 165°34.6 | · · 52.0 | 84°25.1 | · · 51.6 | 187°43.1 | · · 35.9 | | | | | | |
| 22 | 214°29.1 | 114°08.4 | 55.3 | 180°35.2 | 52.7 | 99°27.1 | 51.5 | 202°45.4 | 36.0 | | | | | | |
| 23 | 229°31.6 | 129°07.6 | 55.1 | 195°35.9 | 53.3 | 114°29.1 | 51.5 | 217°47.6 | 36.1 | | | | | | |
| Mer.pass. 07:44 | | ν-0.8' d-0.1' m-3.94 | | | ν0.7' d0.6' m1.26 | | | ν2.0' d-0.1' m-1.90 | | | ν2.3' d0.1' m0.89 | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 244°34.0 | 144°06.8 | N24°55.0 | 210°36.6 | N12°53.9 | 129°31.1 | N21°51.4 | 232°49.9 | N02°36.2 | | | | | | |
| 1 | 259°36.5 | 159°06.0 | 54.8 | 225°37.2 | 54.6 | 144°33.1 | 51.3 | 247°52.2 | 36.3 | | | | | | |
| 2 | 274°38.9 | 174°05.2 | 54.7 | 240°37.9 | 55.2 | 159°35.0 | 51.2 | 262°54.4 | 36.3 | | | | | | |
| 3 | 289°41.4 | 189°04.4 | · · 54.5 | 255°38.6 | · · 55.8 | 174°37.0 | · · 51.2 | 277°56.7 | · · 36.4 | | | | | | |
| 4 | 304°43.9 | 204°03.6 | 54.3 | 270°39.2 | 56.5 | 189°39.0 | 51.1 | 292°58.9 | 36.5 | | | | | | |
| 5 | 319°46.3 | 219°02.8 | 54.2 | 285°39.9 | 57.1 | 204°41.0 | 51.0 | 308°01.2 | 36.6 | | | | | | |
| 6 | 334°48.8 | 234°02.0 | N24°54.0 | 300°40.6 | N12°57.7 | 219°43.0 | N21°50.9 | 323°03.4 | N02°36.7 | | | | | | |
| 7 | 349°51.3 | 249°01.2 | 53.9 | 315°41.2 | 58.4 | 234°44.9 | 50.9 | 338°05.7 | 36.7 | | | | | | |
| 8 | 4°53.7 | 264°00.4 | 53.7 | 330°41.9 | 59.0 | 249°46.9 | 50.8 | 353°07.9 | 36.8 | | | | | | |
| 9 | 19°56.2 | 278°59.6 | · · 53.5 | 345°42.6 | 12°59.7 | 264°48.9 | · · 50.7 | 8°10.2 | · · 36.9 | | | | | | |
| 10 | 34°58.7 | 293°58.8 | 53.4 | 0°43.2 | 13°00.3 | 279°50.9 | 50.6 | 23°12.4 | 37.0 | | | | | | |
| 11 | 50°01.1 | 308°58.0 | 53.2 | 15°43.9 | 00.9 | 294°52.8 | 50.6 | 38°14.7 | 37.1 | | | | | | |
| 12 | 65°03.6 | 323°57.2 | N24°53.0 | 30°44.6 | N13°01.6 | 309°54.8 | N21°50.5 | 53°17.0 | N02°37.1 | | | | | | |
| 13 | 80°06.1 | 338°56.4 | 52.9 | 45°45.2 | 02.2 | 324°56.8 | 50.4 | 68°19.2 | 37.2 | | | | | | |
| 14 | 95°08.5 | 353°55.6 | 52.7 | 60°45.9 | 02.8 | 339°58.8 | 50.3 | 83°21.5 | 37.3 | | | | | | |
| 15 | 110°11.0 | 8°54.8 | · · 52.5 | 75°46.6 | · · 03.5 | 355°00.8 | · · 50.3 | 98°23.7 | · · 37.4 | | | | | | |
| 16 | 125°13.4 | 23°54.0 | 52.3 | 90°47.2 | 04.1 | 10°02.7 | 50.2 | 113°26.0 | 37.4 | | | | | | |
| 17 | 140°15.9 | 38°53.2 | 52.2 | 105°47.9 | 04.7 | 25°04.7 | 50.1 | 128°28.2 | 37.5 | | | | | | |
| 18 | 155°18.4 | 53°52.4 | N24°52.0 | 120°48.6 | N13°05.4 | 40°06.7 | N21°50.0 | 143°30.5 | N02°37.6 | | | | | | |
| 19 | 170°20.8 | 68°51.6 | 51.8 | 135°49.2 | 06.0 | 55°08.7 | 50.0 | 158°32.7 | 37.7 | | | | | | |
| 20 | 185°23.3 | 83°50.8 | 51.6 | 150°49.9 | 06.6 | 70°10.6 | 49.9 | 173°35.0 | 37.8 | | | | | | |
| 21 | 200°25.8 | 98°50.0 | · · 51.5 | 165°50.6 | · · 07.3 | 85°12.6 | · · 49.8 | 188°37.2 | · · 37.8 | | | | | | |
| 22 | 215°28.2 | 113°49.3 | 51.3 | 180°51.2 | 07.9 | 100°14.6 | 49.7 | 203°39.5 | 37.9 | | | | | | |
| 23 | 230°30.7 | 128°48.5 | 51.1 | 195°51.9 | 08.5 | 115°16.6 | 49.7 | 218°41.8 | 38.0 | | | | | | |
| Mer.pass. 07:40 | | ν-0.8' d-0.2' m-3.94 | | | ν0.7' d0.6' m1.26 | | | ν2.0' d-0.1' m-1.90 | | | ν2.3' d0.1' m0.89 | | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.8 | 29°14.0 |
| Ankaa | 353°06.3 | -42°09.6 |
| Schedar | 349°30.1 | 56°40.7 |
| Diphda | 348°46.4 | -17°50.4 |
| Achernar | 335°19.8 | -57°06.0 |
| Hamal | 327°50.2 | 23°35.1 |
| Polaris | 313°55.6 | 89°22.4 |
| Acamar | 315°11.3 | -40°11.8 |
| Menkar | 314°05.3 | 4°11.6 |
| Mirfak | 308°27.1 | 49°57.2 |
| Aldebaran | 290°38.7 | 16°33.7 |
| Rigel | 281°03.1 | -8°10.3 |
| Capella | 280°20.7 | 46°01.5 |
| Bellatrix | 278°22.0 | 6°22.4 |
| Elnath | 278°00.8 | 28°37.8 |
| Alnilam | 275°36.9 | -1°11.2 |
| Betelgeuse | 270°51.2 | 7°24.7 |
| Canopus | 263°52.4 | -52°42.7 |
| Sirius | 258°25.5 | -16°45.2 |
| Adhara | 255°05.3 | -29°00.6 |
| Procyon | 244°49.9 | 5°09.4 |
| Pollux | 243°16.2 | 27°57.8 |
| Avior | 234°14.6 | -59°35.9 |
| Suhail | 222°45.6 | -43°32.6 |
| Miaplacidus | 221°38.4 | -69°49.8 |
| Alphard | 217°46.7 | -8°46.5 |
| Regulus | 207°33.3 | 11°50. |

| h | | Sun | | Moon | | | |
|------------|----------|------------|------------|-------|----------|--------|-------|
| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 180°46.7 | N20°54.8 | 70°16.0 | 15.2' | N01°39.0 | -15.0' | 56.3' |
| 1 | 195°46.6 | 55.3 | 84°50.2 | 15.2' | 01°04.0 | -15.0' | 56.3' |
| 2 | 210°46.5 | 55.7 | 99°24.4 | 15.3' | 01°09.0 | -15.0' | 56.2' |
| 3 | 225°46.5 | 56.2 | 113°58.7 | 15.3' | 00°54.0 | -15.0' | 56.2' |
| 4 | 240°46.4 | 56.6 | 128°33.0 | 15.3' | 00°39.0 | -15.0' | 56.2' |
| 5 | 255°46.4 | 57.1 | 143°07.4 | 15.4' | 00°24.0 | -15.0' | 56.2' |
| 6 | 270°46.3 | N20°57.5 | 157°41.8 | 15.4' | N00°09.0 | -15.0' | 56.1' |
| 7 | 285°46.2 | 58.0 | 172°16.1 | 15.4' | S00°05.9 | 14.9' | 56.1' |
| 8 | 300°46.2 | 58.4 | 186°50.6 | 15.4' | 00°20.9 | 14.9' | 56.1' |
| 9 | 315°46.1 | 58.8 | 201°25.0 | 15.5' | 00°35.8 | 14.9' | 56.0' |
| 10 | 330°46.0 | 59.3 | 215°59.5 | 15.5' | 00°50.7 | 14.9' | 56.0' |
| 11 | 345°46.0 | 20°59.7 | 230°34.0 | 15.5' | 01°05.6 | 14.9' | 56.0' |
| 12 | 0°45.9 | N21°00.2 | 245°08.5 | 15.5' | S01°20.5 | 14.9' | 56.0' |
| 13 | 15°45.8 | 00.6 | 259°43.0 | 15.6' | 01°35.4 | 14.8' | 55.9' |
| 14 | 30°45.8 | 01.1 | 274°17.6 | 15.6' | 01°50.2 | 14.8' | 55.9' |
| 15 | 45°45.7 | 01.5 | 288°52.2 | 15.6' | 02°05.0 | 14.8' | 55.9' |
| 16 | 60°45.7 | 01.9 | 303°26.7 | 15.6' | 02°19.8 | 14.8' | 55.9' |
| 17 | 75°45.6 | 02.4 | 318°01.3 | 15.6' | 02°34.6 | 14.8' | 55.8' |
| 18 | 90°45.5 | N21°02.8 | 332°36.0 | 15.6' | S02°49.4 | 14.7' | 55.8' |
| 19 | 105°45.5 | 03.3 | 347°10.6 | 15.6' | 03°04.1 | 14.7' | 55.8' |
| 20 | 120°45.4 | 03.7 | 1°45.2 | 15.6' | 03°18.8 | 14.7' | 55.8' |
| 21 | 135°45.3 | 04.1 | 16°19.9 | 15.7' | 03°33.5 | 14.7' | 55.7' |
| 22 | 150°45.3 | 04.6 | 30°54.5 | 15.7' | 03°48.1 | 14.6' | 55.7' |
| 23 | 165°45.2 | 05.0 | 45°29.2 | 15.7' | 04°02.8 | 14.6' | 55.7' |
| SD = 15.8' | | $d = 0.5'$ | SD = 15.4' | | | | |

| Tue | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|------------|------------|-------|----------|-------|-------|
| 0 | 180°45.1 | N21°05.5 | 60°03.8 | 15.7' | S04°17.4 | 14.6' | 55.7' |
| 1 | 195°45.1 | 05.9 | 74°38.5 | 15.7' | 04°31.9 | 14.5' | 55.6' |
| 2 | 210°45.0 | 06.3 | 89°13.2 | 15.7' | 04°46.5 | 14.5' | 55.6' |
| 3 | 225°44.9 | 06.8 | 103°47.9 | 15.7' | 05°01.0 | 14.5' | 55.6' |
| 4 | 240°44.9 | 07.2 | 118°22.5 | 15.7' | 05°15.5 | 14.4' | 55.6' |
| 5 | 255°44.8 | 07.6 | 132°57.2 | 15.7' | 05°29.9 | 14.4' | 55.5' |
| 6 | 270°44.7 | N21°08.1 | 147°31.9 | 15.7' | S05°44.3 | 14.4' | 55.5' |
| 7 | 285°44.7 | 08.5 | 162°06.6 | 15.7' | 05°58.7 | 14.3' | 55.5' |
| 8 | 300°44.6 | 08.9 | 176°41.3 | 15.7' | 06°13.0 | 14.3' | 55.5' |
| 9 | 315°44.5 | 09.4 | 191°15.9 | 15.7' | 06°27.4 | 14.3' | 55.4' |
| 10 | 330°44.5 | 09.8 | 205°50.6 | 15.7' | 06°41.6 | 14.2' | 55.4' |
| 11 | 345°44.4 | 10.2 | 220°25.3 | 15.7' | 06°55.9 | 14.2' | 55.4' |
| 12 | 0°44.3 | N21°10.6 | 234°59.9 | 15.6' | S07°10.1 | 14.2' | 55.4' |
| 13 | 15°44.2 | 11.1 | 249°34.6 | 15.6' | 07°24.2 | 14.1' | 55.3' |
| 14 | 30°44.2 | 11.5 | 264°09.2 | 15.6' | 07°38.3 | 14.1' | 55.3' |
| 15 | 45°44.1 | 11.9 | 278°43.8 | 15.6' | 07°52.4 | 14.0' | 55.3' |
| 16 | 60°44.0 | 12.4 | 293°18.4 | 15.6' | 08°06.5 | 14.0' | 55.3' |
| 17 | 75°44.0 | 12.8 | 307°53.0 | 15.6' | 08°20.5 | 14.0' | 55.3' |
| 18 | 90°43.9 | N21°13.2 | 322°27.6 | 15.6' | S08°34.4 | 13.9' | 55.2' |
| 19 | 105°43.8 | 13.6 | 337°02.2 | 15.6' | 08°48.3 | 13.9' | 55.2' |
| 20 | 120°43.8 | 14.0 | 351°36.7 | 15.5' | 09°02.2 | 13.8' | 55.2' |
| 21 | 135°43.7 | 14.5 | 6°11.3 | 15.5' | 09°16.0 | 13.8' | 55.2' |
| 22 | 150°43.6 | 14.9 | 20°45.8 | 15.5' | 09°29.8 | 13.7' | 55.2' |
| 23 | 165°43.5 | 15.3 | 35°20.3 | 15.5' | 09°43.5 | 13.7' | 55.1' |
| SD = 15.8' | | $d = 0.4'$ | SD = 15.2' | | | | |

| Wed | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|------------|------------|-------|----------|-------|-------|
| 0 | 180°43.5 | N21°15.7 | 49°54.8 | 15.5' | S09°57.2 | 13.6' | 55.1' |
| 1 | 195°43.4 | 16.2 | 64°29.2 | 15.4' | 10°10.8 | 13.6' | 55.1' |
| 2 | 210°43.3 | 16.6 | 79°03.7 | 15.4' | 10°24.4 | 13.5' | 55.1' |
| 3 | 225°43.3 | 17.0 | 93°38.1 | 15.4' | 10°38.0 | 13.5' | 55.1' |
| 4 | 240°43.2 | 17.4 | 108°12.5 | 15.4' | 10°51.4 | 13.4' | 55.0' |
| 5 | 255°43.1 | 17.8 | 122°46.9 | 15.3' | 11°04.9 | 13.4' | 55.0' |
| 6 | 270°43.0 | N21°18.2 | 137°21.2 | 15.3' | S11°18.3 | 13.3' | 55.0' |
| 7 | 285°43.0 | 18.7 | 151°55.5 | 15.3' | 11°31.6 | 13.3' | 55.0' |
| 8 | 300°42.9 | 19.1 | 166°29.8 | 15.3' | 11°44.9 | 13.2' | 55.0' |
| 9 | 315°42.8 | 19.5 | 181°04.1 | 15.2' | 11°58.1 | 13.2' | 54.9' |
| 10 | 330°42.8 | 19.9 | 195°38.3 | 15.2' | 12°11.3 | 13.1' | 54.9' |
| 11 | 345°42.7 | 20.3 | 210°12.5 | 15.2' | 12°24.4 | 13.1' | 54.9' |
| 12 | 0°42.6 | N21°20.7 | 224°46.7 | 15.1' | S12°37.4 | 13.0' | 54.9' |
| 13 | 15°42.5 | 21.2 | 239°20.8 | 15.1' | 12°50.4 | 12.9' | 54.9' |
| 14 | 30°42.5 | 21.6 | 253°54.9 | 15.1' | 13°03.4 | 12.9' | 54.8' |
| 15 | 45°42.4 | 22.0 | 268°29.0 | 15.0' | 13°16.2 | 12.8' | 54.8' |
| 16 | 60°42.3 | 22.4 | 283°03.0 | 15.0' | 13°29.1 | 12.8' | 54.8' |
| 17 | 75°42.2 | 22.8 | 297°37.0 | 15.0' | 13°41.8 | 12.7' | 54.8' |
| 18 | 90°42.2 | N21°23.2 | 312°11.0 | 14.9' | S13°54.5 | 12.6' | 54.8' |
| 19 | 105°42.1 | 23.6 | 326°44.9 | 14.9' | 14°07.2 | 12.6' | 54.8' |
| 20 | 120°42.0 | 24.0 | 341°18.8 | 14.9' | 14°19.7 | 12.5' | 54.7' |
| 21 | 135°41.9 | 24.4 | 355°52.7 | 14.8' | 14°32.2 | 12.4' | 54.7' |
| 22 | 150°41.9 | 24.8 | 10°26.5 | 14.8' | 14°44.7 | 12.4' | 54.7' |
| 23 | 165°41.8 | 25.2 | 25°00.2 | 14.7' | 14°57.1 | 12.3' | 54.7' |
| SD = 15.8' | | $d = 0.4'$ | SD = 15.0' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | //// | //// | 00:17 | //// | //// | //// |
| 66° | //// | //// | 01:38 | 22:20 | //// | //// |
| 64° | //// | //// | 02:14 | 21:43 | //// | //// |
| 62° | //// | 00:59 | 02:39 | 21:16 | 23:01 | //// |
| 60° | //// | 01:44 | 02:59 | 20:56 | 22:13 | //// |
| N 58° | //// | 02:13 | 03:16 | 20:40 | 21:43 | //// |
| 56° | 00:53 | 02:35 | 03:29 | 20:26 | 21:21 | 23:06 |
| 54° | 01:35 | 02:52 | 03:41 | 20:14 | 21:03 | 22:22 |
| 52° | 02:02 | 03:07 | 03:52 | 20:03 | 20:48 | 21:54 |
| 50° | 02:22 | 03:19 | 04:01 | 19:54 | 20:36 | 21:34 |
| 45° | 02:59 | 03:45 | 04:21 | 19:34 | 20:10 | 20:56 |
| N 40° | 03:25 | 04:05 | 04:36 | 19:18 | 19:50 | 20:30 |
| 35° | 03:46 | 04:21 | 04:50 | 19:05 | 19:34 | 20:09 |
| 30° | 04:02 | 04:34 | 05:01 | 18:53 | 19:20 | 19:52 |
| 20° | 04:28 | 04:57 | 05:21 | 18:33 | 18:58 | 19:26 |
| N 10° | 04:49 | 05:15 | 05:38 | 18:16 | 18:39 | 19:06 |
| 0° | 05:06 | 05:31 | 05:53 | 18:01 | 18:23 | 18:49 |
| S 10° | 05:21 | 05:47 | 06:09 | 17:45 | 18:07 | 18:33 |
| 20° | 05:35 | 06:02 | 06:26 | 17:28 | 17:52 | 18:19 |
| 30° | 05:49 | 06:19 | 06:44 | 17:09 | 17:35 | 18:05 |
| 35° | 05:57 | 06:28 | 06:55 | 16:58 | 17:26 | 17:57 |
| 40° | 06:05 | 06:38 | 07:08 | 16:46 | 17:16 | 17:49 |
| 45° | 06:13 | 06:50 | 07:23 | 16:31 | 17:04 | 17:40 |
| S 50° | 06:23 | 07:04 | 07:41 | 16:13 | 16:50 | 17:30 |
| 52° | 06:28 | 07:10 | 07:49 | 16:05 | 16:44 | 17:26 |
| 54° | 06:32 | 07:17 | 07:59 | 15:55 | 16:37 | 17:21 |
| 56° | 06:37 | 07:25 | 08:09 | 15:44 | 16:29 | 17:16 |
| 58° | 06:43 | 07:33 | 08:22 | 15:32 | 16:20 | 17:11 |
| S 60° | 06:49 | 07:43 | 08:36 | 15:18 | 16:11 | 17:05 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|----------------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | 14:08 | 16:13 | 18:35 | 01:36 | 01:03 | 00:27 23:35 |
| N 70° | 14:05 | 16:00 | 18:05 | 01:34 | 01:10 | 00:43 |
| 68° | 14:02 | 15:50 | 17:42 | 01:33 | 01:15 | 00:55 |
| 66° | 14:00 | 15:41 | 17:25 | 01:32 | 01:19 | 01:06 |
| 64° | 13:59 | 15:34 | 17:11 | 01:31 | 01:23 | 01:15 |
| 62° | 13:57 | 15:28 | 17:00 | 01:30 | 01:26 | 01:22 |
| 60° | 13:56 | 15:23 | 16:50 | 01:29 | 01:29 | 01:29 |
| N 58° | 13:55 | 15:18 | 16:41 | 01:29 | 01:32 | 01:35 |
| 56° | 13:54 | 15:14 | 16:34 | 01:28 | 01:34 | 01:40 |
| 54° | 13:53 | 15:10 | 16:27 | 01:28 | 01:36 | 01:44 |
| 52° | 13:53 | 15:07 | 16:21 | 01:27 | 01:38 | 01:49 |
| 50° | 13:52 | 15:04 | 16:16 | 01:27 | 01:39 | 01:52 |
| 45° | 13:50 | 14:57 | 16:04 | 01:26 | 01:43 | 02:01 |
| N 40° | 13:49 | 14:52 | 15:55 | 01:25 | 01:46 | 02:08 |
| 35° | 13:48 | 14:47 | 15:46 | 01:24 | 01:49 | 02:14 |
| 30° | 13:47 | 14:43 | 15:39 | 01:24 | 01:51 | 02:19 |
| 20° | 13:45 | 14:36 | 15:27 | 01:23 | 01:56 | 02:29 |
| N 10° | 13:44 | 14:30 | 15:17 | 01:22 | 01:59 | 02:37 |
| 0° | 13:43 | 14:25 | 15:07 | 01:21 | 02:03 | 02:45 |
| S 10° | 13:42 | 14:19 | 14:57 | 01:20 | 02:06 | 02:52 |
| 20° | 13:40 | 14:13 | 14:46 | 01:19 | 02:10 | 03:01 |
| 30° | 13:39 | 14:06 | 14:35 | 01:18 | 02:14 | 03:10 |
| 35° | 13:38 | 14:02 | 14:28 | 01:17 | 02:17 | 03:16 |
| 40° | 13:37 | 13:58 | 14:20 | 01:16 | 02:19 | 03:22 |
| 45° | 13:36 | 13:53 | 14:11 | 01:15 | 02:23 | 03:29 |
| S 50° | 13:35 | 13:47 | 14:01 | 01:14 | 02:27 | 03:38 |
| 52° | 13:34 | 13:44 | 13:56 | 01:13 | 02:28 | 03:42 |
| 54° | 13:33 | 13:41 | 13:51 | 01:13 | 02:30 | 03:47 |
| 56° | 13:33 | 13:38 | 13:45 | 01:12 | 02:33 | 03:52 |
| 58° | 13:32 | 13:35 | 13:38 | 01:11 | 02:35 | 03:58 |
| S 60° | 13:31 | 13:31 | 13:30 | 01:11 | 02:38 | 04:04 |

| Day | Sun | | Mer. Pass hh:mm | Moon | | Age 9-11 66-83% |
|-----|--|--------------------------|--------------------|------------------------------|----------------|-----------------------|
| | Eqn. of Time 00 ^h mm:ss | 12 ^h mm:ss | | Mer. Pass. Upper hh:mm | Lower hh:mm | |
| 25 | 03:07 | 03:04 | 11:57 | 19:53 | 07:32 | |
| 26 | 03:01 | 02:57 | 11:57 | 20:35 | 08:14 | |
| 27 | 02:54 | 02:50 | 11:57 | 21:17 | 08:56 | |


May 28, 29, 30 UT (Thu., Fri., Sat.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | | Stars | | |
|-----------------|----------|----------------------|----------|-------------------|----------|---------------------|----------|-------------------|----------|-------------------------------|-------|------------|-------------------|
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec |
| 0 | 245°33.2 | 143°47.7 | N24°50.9 | 210°52.5 | N13°09.2 | 130°18.5 | N21°49.6 | 233°44.0 | N02°38.1 | | | Alpheratz | 357°33.8 29°14.0 |
| 1 | 260°35.6 | 158°46.9 | 50.7 | 225°53.2 | 09.8 | 145°20.5 | 49.5 | 248°46.3 | 38.2 | | | Ankaa | 353°06.2 -42°09.5 |
| 2 | 275°38.1 | 173°46.1 | 50.5 | 240°53.9 | 10.4 | 160°22.5 | 49.4 | 263°48.5 | 38.2 | | | Schedar | 349°30.1 56°40.7 |
| 3 | 290°40.5 | 188°45.3 | •• 50.3 | 255°54.5 | •• 11.0 | 175°24.5 | •• 49.4 | 278°50.8 | •• 38.3 | | | Diphda | 348°46.3 -17°50.4 |
| 4 | 305°43.0 | 203°44.5 | 50.2 | 270°55.2 | 11.7 | 190°26.4 | 49.3 | 293°53.0 | 38.4 | | | Achernar | 335°19.8 -57°05.9 |
| 5 | 320°45.5 | 218°43.7 | 50.0 | 285°55.9 | 12.3 | 205°28.4 | 49.2 | 308°55.3 | 38.5 | | | Hamal | 327°50.2 23°35.1 |
| 6 | 335°47.9 | 233°42.9 | N24°49.8 | 300°56.5 | N13°12.9 | 220°30.4 | N21°49.1 | 323°57.6 | N02°38.6 | | | Polaris | 313°54.9 89°22.4 |
| 7 | 350°50.4 | 248°42.1 | 49.6 | 315°57.2 | 13.6 | 235°32.4 | 49.1 | 338°59.8 | 38.6 | | | Acamar | 315°11.3 -40°11.8 |
| 8 | 5°52.9 | 263°41.3 | 49.4 | 330°57.9 | 14.2 | 250°34.4 | 49.0 | 354°02.1 | 38.7 | | | Menkar | 314°05.3 4°11.6 |
| 9 | 20°55.3 | 278°40.5 | •• 49.2 | 345°58.5 | •• 14.8 | 265°36.3 | •• 48.9 | 9°04.3 | •• 38.8 | | | Mirfak | 308°27.1 49°57.2 |
| 10 | 35°57.8 | 293°39.7 | 49.0 | 0°59.2 | 15.5 | 280°38.3 | 48.8 | 24°06.6 | 38.9 | | | Aldebaran | 290°38.7 16°33.7 |
| 11 | 51°00.3 | 308°38.9 | 48.8 | 15°59.9 | 16.1 | 295°40.3 | 48.7 | 39°08.8 | 38.9 | | | Rigel | 281°03.1 -8°10.3 |
| 12 | 66°02.7 | 323°38.1 | N24°48.6 | 31°00.5 | N13°16.7 | 310°42.2 | N21°48.7 | 54°11.1 | N02°39.0 | | | Capella | 280°20.7 46°01.5 |
| 13 | 81°05.2 | 338°37.4 | 48.4 | 46°01.2 | 17.3 | 325°44.2 | 48.6 | 69°13.4 | 39.1 | | | Bellatrix | 278°22.0 6°22.4 |
| 14 | 96°07.7 | 353°36.6 | 48.2 | 61°01.9 | 18.0 | 340°46.2 | 48.5 | 84°15.6 | 39.2 | | | Elnath | 278°00.8 28°37.8 |
| 15 | 111°10.1 | 8°35.8 | •• 48.0 | 76°02.5 | •• 18.6 | 355°48.2 | •• 48.4 | 99°17.9 | •• 39.3 | | | Alnilam | 275°36.9 -1°11.1 |
| 16 | 126°12.6 | 23°35.0 | 47.8 | 91°03.2 | 19.2 | 10°50.1 | 48.4 | 114°20.1 | 39.3 | | | Betelgeuse | 270°51.2 7°24.7 |
| 17 | 141°15.0 | 38°34.2 | 47.6 | 106°03.9 | 19.8 | 25°52.1 | 48.3 | 129°22.4 | 39.4 | | | Canopus | 263°52.4 -52°42.7 |
| 18 | 156°17.5 | 53°33.4 | N24°47.4 | 121°04.5 | N13°20.5 | 40°54.1 | N21°48.2 | 144°24.6 | N02°39.5 | | | Sirius | 258°25.5 -16°45.2 |
| 19 | 171°20.0 | 68°32.6 | 47.2 | 136°05.2 | 21.1 | 55°56.1 | 48.1 | 159°26.9 | 39.6 | | | Adhara | 255°05.3 -29°00.6 |
| 20 | 186°22.4 | 83°31.8 | 47.0 | 151°05.8 | 21.7 | 70°58.0 | 48.1 | 174°29.2 | 39.6 | | | Procyon | 244°49.9 5°09.4 |
| 21 | 201°24.9 | 98°31.0 | •• 46.8 | 166°06.5 | •• 22.4 | 86°00.0 | •• 48.0 | 189°31.4 | •• 39.7 | | | Pollux | 243°16.2 27°57.8 |
| 22 | 216°27.4 | 113°30.2 | 46.6 | 181°07.2 | 23.0 | 101°02.0 | 47.9 | 204°33.7 | 39.8 | | | Avior | 234°14.6 -59°35.9 |
| 23 | 231°29.8 | 128°29.5 | 46.3 | 196°07.8 | 23.6 | 116°04.0 | 47.8 | 219°35.9 | 39.9 | | | Suhail | 222°45.7 -43°32.6 |
| Mer.pass. 07:37 | | ν-0.8' d-0.2' m-3.94 | | ν0.7' d0.6' m1.26 | | ν2.0' d-0.1' m-1.89 | | ν2.3' d0.1' m0.89 | | Miaplacidus 221°38.4 -69°49.8 | | | |
| | | | | | | | | | | Alphard 217°46.7 -8°46.5 | | | |
| | | | | | | | | | | Regulus 207°33.3 11°50.3 | | | |
| | | | | | | | | | | Dubhe 193°39.5 61°36.7 | | | |
| | | | | | | | | | | Denebola 182°23.7 14°25.5 | | | |
| | | | | | | | | | | Gienah 175°42.3 -17°41.5 | | | |
| | | | | | | | | | | Acrux 172°58.5 -63°15.1 | | | |
| | | | | | | | | | | Gacrux 171°50.1 -57°16.0 | | | |
| | | | | | | | | | | Alioth 166°11.6 55°49.1 | | | |
| | | | | | | | | | | Spica 158°20.9 -11°18.1 | | | |
| | | | | | | | | | | Alkaid 152°50.7 49°11.0 | | | |
| | | | | | | | | | | Hadar 148°33.9 -60°30.2 | | | |
| | | | | | | | | | | Menkent 147°55.9 -36°30.2 | | | |
| | | | | | | | | | | Arcturus 145°46.6 19°02.7 | | | |
| | | | | | | | | | | Rigel Kent. 139°38.1 -60°56.9 | | | |
| | | | | | | | | | | Kochab 137°18.7 74°02.9 | | | |
| | | | | | | | | | | Zuben'ubi 136°54.4 -16°09.2 | | | |
| | | | | | | | | | | Alphecca 126°02.4 26°37.5 | | | |
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| | | | | | | | | | | Rasalhague 95°57.2 12°32.4 | | | |
| | | | | | | | | | | Eltanin 90°41.1 51°29.0 | | | |
| | | | | | | | | | | Kaus Aust. 83°30.7 -34°22.3 | | | |
| | | | | | | | | | | Vega 80°32.1 38°48.3 | | | |
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| | | | | | | | | | | Altair 61°58.6 8°56.2 | | | |
| | | | | | | | | | | Peacock 53°03.6 -56°38.7 | | | |
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| | | | | | | | | | | Enif 33°37.6 9°59.7 | | | |
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| h | | Sun | | Moon | | | |
|-----|--|------------|----------|------------|-------|----------|-------------|
| Thu | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 180°41.7 | N21°25.6 | 39°34.0 | 14.7' | S15°09.4 | 12.2' 54.7' |
| 1 | | 195°41.6 | 26.1 | 54°07.7 | 14.7' | 15°21.6 | 12.2' 54.7' |
| 2 | | 210°41.6 | 26.5 | 68°41.3 | 14.6' | 15°33.8 | 12.1' 54.6' |
| 3 | | 225°41.5 | 26.9 | 83°14.9 | 14.6' | 15°45.9 | 12.0' 54.6' |
| 4 | | 240°41.4 | 27.3 | 97°48.5 | 14.5' | 15°57.9 | 12.0' 54.6' |
| 5 | | 255°41.3 | 27.7 | 112°22.0 | 14.5' | 16°09.9 | 11.9' 54.6' |
| 6 | | 270°41.2 | N21°28.1 | 126°55.5 | 14.4' | S16°21.8 | 11.8' 54.6' |
| 7 | | 285°41.2 | 28.5 | 141°28.9 | 14.4' | 16°33.6 | 11.8' 54.6' |
| 8 | | 300°41.1 | 28.9 | 156°02.3 | 14.3' | 16°45.4 | 11.7' 54.6' |
| 9 | | 315°41.0 | 29.3 | 170°35.6 | 14.3' | 16°57.1 | 11.6' 54.5' |
| 10 | | 330°40.9 | 29.7 | 185°08.9 | 14.2' | 17°08.7 | 11.5' 54.5' |
| 11 | | 345°40.9 | 30.1 | 199°42.2 | 14.2' | 17°20.2 | 11.5' 54.5' |
| 12 | | 0°40.8 | N21°30.5 | 214°15.4 | 14.1' | S17°31.6 | 11.4' 54.5' |
| 13 | | 15°40.7 | 30.9 | 228°48.5 | 14.1' | 17°43.0 | 11.3' 54.5' |
| 14 | | 30°40.6 | 31.3 | 243°21.6 | 14.0' | 17°54.3 | 11.2' 54.5' |
| 15 | | 45°40.5 | 31.7 | 257°54.7 | 14.0' | 18°05.5 | 11.1' 54.5' |
| 16 | | 60°40.5 | 32.1 | 272°27.7 | 13.9' | 18°16.7 | 11.1' 54.4' |
| 17 | | 75°40.4 | 32.4 | 287°00.6 | 13.9' | 18°27.7 | 11.0' 54.4' |
| 18 | | 90°40.3 | N21°32.8 | 301°33.5 | 13.8' | S18°38.7 | 10.9' 54.4' |
| 19 | | 105°40.2 | 33.2 | 316°06.3 | 13.8' | 18°49.6 | 10.8' 54.4' |
| 20 | | 120°40.1 | 33.6 | 330°39.1 | 13.7' | 19°00.4 | 10.7' 54.4' |
| 21 | | 135°40.1 | 34.0 | 345°11.9 | 13.7' | 19°11.1 | 10.6' 54.4' |
| 22 | | 150°40.0 | 34.4 | 359°44.6 | 13.6' | 19°21.8 | 10.6' 54.4' |
| 23 | | 165°39.9 | 34.8 | 14°17.2 | 13.6' | 19°32.3 | 10.5' 54.4' |
| | | SD = 15.8' | | SD = 14.9' | | | |
| Fri | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 180°39.8 | N21°35.2 | 28°49.8 | 13.5' | S19°42.8 | 10.4' 54.3' |
| 1 | | 195°39.7 | 35.6 | 43°22.3 | 13.5' | 19°53.2 | 10.3' 54.3' |
| 2 | | 210°39.7 | 36.0 | 57°54.8 | 13.4' | 20°03.5 | 10.2' 54.3' |
| 3 | | 225°39.6 | 36.4 | 72°27.2 | 13.4' | 20°13.7 | 10.1' 54.3' |
| 4 | | 240°39.5 | 36.7 | 86°59.5 | 13.3' | 20°23.8 | 10.0' 54.3' |
| 5 | | 255°39.4 | 37.1 | 101°31.8 | 13.2' | 20°33.8 | 9.9' 54.3' |
| 6 | | 270°39.3 | N21°37.5 | 116°04.1 | 13.2' | S20°43.8 | 9.8' 54.3' |
| 7 | | 285°39.3 | 37.9 | 130°36.3 | 13.1' | 20°53.6 | 9.8' 54.3' |
| 8 | | 300°39.2 | 38.3 | 145°08.4 | 13.1' | 21°03.4 | 9.7' 54.3' |
| 9 | | 315°39.1 | 38.7 | 159°40.5 | 13.0' | 21°13.0 | 9.6' 54.2' |
| 10 | | 330°39.0 | 39.1 | 174°12.5 | 13.0' | 21°22.6 | 9.5' 54.2' |
| 11 | | 345°38.9 | 39.4 | 188°44.5 | 12.9' | 21°32.1 | 9.4' 54.2' |
| 12 | | 0°38.8 | N21°39.8 | 203°16.4 | 12.9' | S21°41.5 | 9.3' 54.2' |
| 13 | | 15°38.8 | 40.2 | 217°48.3 | 12.8' | 21°50.7 | 9.2' 54.2' |
| 14 | | 30°38.7 | 40.6 | 232°20.1 | 12.7' | 21°59.9 | 9.1' 54.2' |
| 15 | | 45°38.6 | 41.0 | 246°51.8 | 12.7' | 22°09.0 | 9.0' 54.2' |
| 16 | | 60°38.5 | 41.3 | 261°23.5 | 12.6' | 22°18.0 | 8.9' 54.2' |
| 17 | | 75°38.4 | 41.7 | 275°55.1 | 12.6' | 22°26.9 | 8.8' 54.2' |
| 18 | | 90°38.3 | N21°42.1 | 290°26.7 | 12.5' | S22°35.7 | 8.7' 54.2' |
| 19 | | 105°38.3 | 42.5 | 304°58.2 | 12.5' | 22°44.3 | 8.6' 54.1' |
| 20 | | 120°38.2 | 42.9 | 319°29.7 | 12.4' | 22°52.9 | 8.5' 54.1' |
| 21 | | 135°38.1 | 43.2 | 334°01.1 | 12.3' | 23°01.4 | 8.4' 54.1' |
| 22 | | 150°38.0 | 43.6 | 348°32.4 | 12.3' | 23°09.8 | 8.3' 54.1' |
| 23 | | 165°37.9 | 44.0 | 3°03.7 | 12.2' | 23°18.0 | 8.2' 54.1' |
| | | SD = 15.8' | | SD = 14.8' | | | |
| Sat | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 180°37.8 | N21°44.4 | 17°35.0 | 12.2' | S23°26.2 | 8.1' 54.1' |
| 1 | | 195°37.8 | 44.7 | 32°06.1 | 12.1' | 23°34.3 | 7.9' 54.1' |
| 2 | | 210°37.7 | 45.1 | 46°37.3 | 12.1' | 23°42.2 | 7.8' 54.1' |
| 3 | | 225°37.6 | 45.5 | 61°08.3 | 12.0' | 23°50.0 | 7.7' 54.1' |
| 4 | | 240°37.5 | 45.9 | 75°39.3 | 12.0' | 23°57.8 | 7.6' 54.1' |
| 5 | | 255°37.4 | 46.2 | 90°10.3 | 11.9' | 24°05.4 | 7.5' 54.1' |
| 6 | | 270°37.3 | N21°46.6 | 104°41.2 | 11.8' | S24°12.9 | 7.4' 54.1' |
| 7 | | 285°37.2 | 47.0 | 119°12.0 | 11.8' | 24°20.3 | 7.3' 54.1' |
| 8 | | 300°37.2 | 47.3 | 133°42.8 | 11.7' | 24°27.6 | 7.2' 54.0' |
| 9 | | 315°37.1 | 47.7 | 148°13.6 | 11.7' | 24°34.8 | 7.1' 54.0' |
| 10 | | 330°37.0 | 48.1 | 162°44.3 | 11.6' | 24°41.9 | 7.0' 54.0' |
| 11 | | 345°36.9 | 48.4 | 177°14.9 | 11.6' | 24°48.8 | 6.8' 54.0' |
| 12 | | 0°36.8 | N21°48.8 | 191°45.5 | 11.5' | S24°55.6 | 6.7' 54.0' |
| 13 | | 15°36.7 | 49.2 | 206°16.0 | 11.5' | 25°02.4 | 6.6' 54.0' |
| 14 | | 30°36.6 | 49.5 | 220°46.5 | 11.4' | 25°09.0 | 6.5' 54.0' |
| 15 | | 45°36.5 | 49.9 | 235°16.9 | 11.4' | 25°15.5 | 6.4' 54.0' |
| 16 | | 60°36.5 | 50.3 | 249°47.3 | 11.3' | 25°21.8 | 6.3' 54.0' |
| 17 | | 75°36.4 | 50.6 | 264°17.6 | 11.3' | 25°28.1 | 6.1' 54.0' |
| 18 | | 90°36.3 | N21°51.0 | 278°47.9 | 11.2' | S25°34.2 | 6.0' 54.0' |
| 19 | | 105°36.2 | 51.4 | 293°18.1 | 11.2' | 25°40.3 | 5.9' 54.0' |
| 20 | | 120°36.1 | 51.7 | 307°48.3 | 11.1' | 25°46.2 | 5.8' 54.0' |
| 21 | | 135°36.0 | 52.1 | 322°18.4 | 11.1' | 25°51.9 | 5.7' 54.0' |
| 22 | | 150°35.9 | 52.4 | 336°48.5 | 11.0' | 25°57.6 | 5.5' 54.0' |
| 23 | | 165°35.8 | 52.8 | 351°18.5 | 11.0' | 26°03.1 | 5.4' 54.0' |
| | | SD = 15.8' | | SD = 14.8' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | □ | □ | □ | □ | □ | □ |
| 66° | //// | //// | 01:25 | 22:33 | //// | //// |
| 64° | //// | //// | 02:06 | 21:51 | //// | //// |
| 62° | //// | 00:39 | 02:33 | 21:23 | 23:24 | //// |
| 60° | //// | 01:35 | 02:54 | 21:02 | 22:22 | //// |
| N 58° | //// | 02:06 | 03:11 | 20:45 | 21:50 | //// |
| 56° | 00:35 | 02:29 | 03:26 | 20:30 | 21:27 | 23:27 |
| 54° | 01:27 | 02:48 | 03:38 | 20:18 | 21:08 | 22:31 |
| 52° | 01:56 | 03:03 | 03:49 | 20:07 | 20:53 | 22:01 |
| 50° | 02:17 | 03:16 | 03:58 | 19:57 | 20:40 | 21:39 |
| 45° | 02:56 | 03:42 | 04:18 | 19:37 | 20:13 | 21:00 |
| N 40° | 03:23 | 04:03 | 04:35 | 19:20 | 19:52 | 20:33 |
| 35° | 03:44 | 04:19 | 04:48 | 19:07 | 19:36 | 20:11 |
| 30° | 04:01 | 04:33 | 05:00 | 18:55 | 19:22 | 19:54 |
| 20° | 04:27 | 04:56 | 05:20 | 18:35 | 18:59 | 19:28 |
| N 10° | 04:48 | 05:15 | 05:38 | 18:17 | 18:40 | 19:07 |
| 0° | 05:06 | 05:32 | 05:54 | 18:01 | 18:23 | 18:49 |
| S 10° | 05:21 | 05:47 | 06:10 | 17:45 | 18:08 | 18:34 |
| 20° | 05:36 | 06:03 | 06:27 | 17:28 | 17:52 | 18:19 |
| 30° | 05:51 | 06:20 | 06:46 | 17:09 | 17:35 | 18:04 |
| 35° | 05:58 | 06:30 | 06:57 | 16:57 | 17:25 | 17:56 |
| 40° | 06:07 | 06:40 | 07:10 | 16:44 | 17:14 | 17:48 |
| 45° | 06:16 | 06:52 | 07:25 | 16:29 | 17:02 | 17:39 |
| S 50° | 06:26 | 07:07 | 07:44 | 16:11 | 16:48 | 17:28 |
| 52° | 06:31 | 07:13 | 07:53 | 16:02 | 16:41 | 17:24 |
| 54° | 06:35 | 07:20 | 08:03 | 15:52 | 16:34 | 17:19 |
| 56° | 06:41 | 07:28 | 08:14 | 15:41 | 16:26 | 17:14 |
| 58° | 06:46 | 07:37 | 08:26 | 15:28 | 16:17 | 17:08 |
| S 60° | 06:53 | 07:48 | 08:41 | 15:13 | 16:07 | 17:01 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|----------------|-------|-------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | 20:54 | ■ | ■ | 00:07 22:50 | ■ | ■ |
| 68° | 19:53 | ■ | ■ | 00:31 23:53 | ■ | ■ |
| 66° | 19:18 | 21:43 | ■ | 00:50 23:40 | ■ | ■ |
| 64° | 18:54 | 20:47 | ■ | 01:05 | 00:54 | 00:36 |
| 62° | 18:35 | 20:14 | 22:00 | 01:18 | 01:14 | 01:10 |
| 60° | 18:19 | 19:50 | 21:22 | 01:29 | 01:30 | 01:34 |
| N 58° | 18:06 | 19:31 | 20:55 | 01:38 | 01:44 | 01:54 |
| 56° | 17:54 | 19:15 | 20:34 | 01:47 | 01:56 | 02:10 |
| 54° | 17:44 | 19:02 | 20:17 | 01:54 | 02:07 | 02:24 |
| 52° | 17:36 | 18:50 | 20:02 | 02:01 | 02:16 | 02:37 |
| 50° | 17:28 | 18:40 | 19:50 | 02:07 | 02:25 | 02:47 |
| 45° | 17:11 | 18:18 | 19:23 | 02:20 | 02:43 | 03:10 |
| N 40° | 16:57 | 18:01 | 19:03 | 02:31 | 02:58 | 03:29 |
| 35° | 16:46 | 17:46 | 18:45 | 02:41 | 03:10 | 03:44 |
| 30° | 16:36 | 17:33 | 18:31 | 02:49 | 03:21 | 03:57 |
| 20° | 16:19 | 17:12 | 18:06 | 03:03 | 03:40 | 04:20 |
| N 10° | 16:04 | 16:53 | 17:44 | 03:16 | 03:56 | 04:40 |
| 0° | 15:50 | 16:36 | 17:24 | 03:27 | 04:12 | 04:59 |
| S 10° | 15:37 | 16:19 | 17:04 | 03:39 | 04:28 | 05:18 |
| 20° | 15:22 | 16:01 | 16:43 | 03:52 | 04:44 | 05:38 |
| 30° | 15:05 | 15:40 | 16:18 | 04:07 | 05:04 | 06:01 |
| 35° | 14:56 | 15:27 | 16:04 | 04:15 | 05:15 | 06:15 |
| 40° | 14:45 | 15:13 | 15:47 | 04:25 | 05:28 | 06:31 |
| 45° | 14:32 | 14:57 | 15:28 | 04:36 | 05:43 | 06:50 |
| S 50° | 14:17 | 14:37 | 15:03 | 04:50 | 06:02 | 07:14 |
| 52° | 14:10 | 14:27 | 14:51 | 04:57 | 06:11 | 07:25 |
| 54° | 14:02 | 14:17 | 14:37 | 05:04 | 06:22 | 07:38 |
| 56° | 13:53 | 14:04 | 14:22 | 05:12 | 06:33 | 07:54 |
| 58° | 13:43 | 13:50 | 14:03 | 05:21 | 06:47 | 08:12 |
| S 60° | 13:31 | 13:34 | 13:40 | 05:32 | 07:02 | 08:34 |

| Day | Sun | | Mer. Pass | Moon | | Age 12-14 90-98% |
|-----|------------------------------------|-----------------------|-----------|------------------------|-------------|---|
| | Eqn. of Time 00 ^h mm:ss | 12 ^h mm:ss | | Mer. Pass. Upper hh:mm | Lower hh:mm | |
| 28 | 02:47 | 02:43 | 11:57 | 22:01 | 09:39 |  |
| 29 | 02:39 | 02:35 | 11:57 | 22:47 | 10:24 | |
| 30 | 02:31 | 02:27 | 11:58 | 23:36 | 11:11 | |

May 31, 01, 02 UT (Sun., Mon., Tue.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|----------------------|----------|-------------------|----------|---------------------|----------|-------------------|----------|----------|
| Sun | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 248°30.6 | | 142°51.3 | N24°34.5 | 211°40.3 | N13°54.0 | 132°40.5 | N21°44.0 | 236°26.7 | N02°43.6 |
| 1 | 263°33.0 | | 157°50.5 | 34.3 | 226°41.0 | 54.6 | 147°42.4 | 43.9 | 251°29.0 | 43.7 |
| 2 | 278°35.5 | | 172°49.7 | 34.0 | 241°41.6 | 55.2 | 162°44.4 | 43.8 | 266°31.2 | 43.8 |
| 3 | 293°38.0 | | 187°49.0 | · · 33.7 | 256°42.3 | · · 55.8 | 177°46.4 | · · 43.7 | 281°33.5 | · · 43.8 |
| 4 | 308°40.4 | | 202°48.2 | 33.4 | 271°42.9 | 56.4 | 192°48.3 | 43.7 | 296°35.8 | 43.9 |
| 5 | 323°42.9 | | 217°47.4 | 33.2 | 286°43.6 | 57.0 | 207°50.3 | 43.6 | 311°38.0 | 44.0 |
| 6 | 338°45.4 | | 232°46.6 | N24°32.9 | 301°44.3 | N13°57.6 | 222°52.3 | N21°43.5 | 326°40.3 | N02°44.1 |
| 7 | 353°47.8 | | 247°45.9 | 32.6 | 316°44.9 | 58.3 | 237°54.2 | 43.4 | 341°42.6 | 44.1 |
| 8 | 8°50.3 | | 262°45.1 | 32.3 | 331°45.6 | 58.9 | 252°56.2 | 43.3 | 356°44.8 | 44.2 |
| 9 | 23°52.8 | | 277°44.3 | · · 32.0 | 346°46.2 | 13°59.5 | 267°58.2 | · · 43.3 | 11°47.1 | · · 44.3 |
| 10 | 38°55.2 | | 292°43.6 | 31.8 | 1°46.9 | 14°00.1 | 283°00.1 | 43.2 | 26°49.4 | 44.4 |
| 11 | 53°57.7 | | 307°42.8 | 31.5 | 16°47.6 | 00.7 | 298°02.1 | 43.1 | 41°51.6 | 44.4 |
| 12 | 69°00.1 | | 322°42.0 | N24°31.2 | 31°48.2 | N14°01.3 | 313°04.1 | N21°43.0 | 56°53.9 | N02°44.5 |
| 13 | 84°02.6 | | 337°41.3 | 30.9 | 46°48.9 | 01.9 | 328°06.0 | 42.9 | 71°56.2 | 44.6 |
| 14 | 99°05.1 | | 352°40.5 | 30.6 | 61°49.5 | 02.5 | 343°08.0 | 42.9 | 86°58.4 | 44.7 |
| 15 | 114°07.5 | | 7°39.7 | · · 30.3 | 76°50.2 | · · 03.1 | 358°10.0 | · · 42.8 | 102°00.7 | · · 44.7 |
| 16 | 129°10.0 | | 22°39.0 | 30.1 | 91°50.9 | 03.7 | 13°11.9 | 42.7 | 117°03.0 | 44.8 |
| 17 | 144°12.5 | | 37°38.2 | 29.8 | 106°51.5 | 04.4 | 28°13.9 | 42.6 | 132°05.2 | 44.9 |
| 18 | 159°14.9 | | 52°37.5 | N24°29.5 | 121°52.2 | N14°05.0 | 43°15.9 | N21°42.5 | 147°07.5 | N02°45.0 |
| 19 | 174°17.4 | | 67°36.7 | 29.2 | 136°52.8 | 05.6 | 58°17.8 | 42.5 | 162°09.7 | 45.0 |
| 20 | 189°19.9 | | 82°35.9 | 28.9 | 151°53.5 | 06.2 | 73°19.8 | 42.4 | 177°12.0 | 45.1 |
| 21 | 204°22.3 | | 97°35.2 | · · 28.6 | 166°54.1 | · · 06.8 | 88°21.8 | · · 42.3 | 192°14.3 | · · 45.2 |
| 22 | 219°24.8 | | 112°34.4 | 28.3 | 181°54.8 | 07.4 | 103°23.7 | 42.2 | 207°16.5 | 45.3 |
| 23 | 234°27.3 | | 127°33.6 | 28.0 | 196°55.5 | 08.0 | 118°25.7 | 42.1 | 222°18.8 | 45.3 |
| Mer.pass. 07:25 | | ν-0.8' d-0.3' m-3.95 | | ν0.7' d0.6' m1.27 | | ν2.0' d-0.1' m-1.88 | | ν2.3' d0.1' m0.88 | | |
| Mon | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 249°29.7 | | 142°32.9 | N24°27.7 | 211°56.1 | N14°08.6 | 133°27.6 | N21°42.1 | 237°21.1 | N02°45.4 |
| 1 | 264°32.2 | | 157°32.1 | 27.4 | 226°56.8 | 09.2 | 148°29.6 | 42.0 | 252°23.3 | 45.5 |
| 2 | 279°34.6 | | 172°31.4 | 27.1 | 241°57.4 | 09.8 | 163°31.6 | 41.9 | 267°25.6 | 45.6 |
| 3 | 294°37.1 | | 187°30.6 | · · 26.8 | 256°58.1 | · · 10.4 | 178°33.5 | · · 41.8 | 282°27.9 | · · 45.6 |
| 4 | 309°39.6 | | 202°29.8 | 26.5 | 271°58.8 | 11.0 | 193°35.5 | 41.7 | 297°30.1 | 45.7 |
| 5 | 324°42.0 | | 217°29.1 | 26.2 | 286°59.4 | 11.7 | 208°37.5 | 41.7 | 312°32.4 | 45.8 |
| 6 | 339°44.5 | | 232°28.3 | N24°25.9 | 302°00.1 | N14°12.3 | 223°39.4 | N21°41.6 | 327°34.7 | N02°45.9 |
| 7 | 354°47.0 | | 247°27.6 | 25.6 | 317°00.7 | 12.9 | 238°41.4 | 41.5 | 342°36.9 | 45.9 |
| 8 | 9°49.4 | | 262°26.8 | 25.3 | 332°01.4 | 13.5 | 253°43.4 | 41.4 | 357°39.2 | 46.0 |
| 9 | 24°51.9 | | 277°26.0 | · · 25.0 | 347°02.1 | · · 14.1 | 268°45.3 | · · 41.3 | 12°41.5 | · · 46.1 |
| 10 | 39°54.4 | | 292°25.3 | 24.7 | 2°02.7 | 14.7 | 283°47.3 | 41.3 | 27°43.7 | 46.1 |
| 11 | 54°56.8 | | 307°24.5 | 24.3 | 17°03.4 | 15.3 | 298°49.2 | 41.2 | 42°46.0 | 46.2 |
| 12 | 69°59.3 | | 322°23.8 | N24°24.0 | 32°04.0 | N14°15.9 | 313°51.2 | N21°41.1 | 57°48.3 | N02°46.3 |
| 13 | 85°01.7 | | 337°23.0 | 23.7 | 47°04.7 | 16.5 | 328°53.2 | 41.0 | 72°50.5 | 46.4 |
| 14 | 100°04.2 | | 352°22.3 | 23.4 | 62°05.3 | 17.1 | 343°55.1 | 40.9 | 87°52.8 | 46.4 |
| 15 | 115°06.7 | | 7°21.5 | · · 23.1 | 77°06.0 | · · 17.7 | 358°57.1 | · · 40.9 | 102°55.1 | · · 46.5 |
| 16 | 130°09.1 | | 22°20.8 | 22.8 | 92°06.7 | 18.3 | 13°59.1 | 40.8 | 117°57.3 | 46.6 |
| 17 | 145°11.6 | | 37°20.0 | 22.5 | 107°07.3 | 18.9 | 29°01.0 | 40.7 | 132°59.6 | 46.7 |
| 18 | 160°14.1 | | 52°19.2 | N24°22.1 | 122°08.0 | N14°19.5 | 44°03.0 | N21°40.6 | 148°01.9 | N02°46.7 |
| 19 | 175°16.5 | | 67°18.5 | 21.8 | 137°08.6 | 20.1 | 59°04.9 | 40.5 | 163°04.2 | 46.8 |
| 20 | 190°19.0 | | 82°17.7 | 21.5 | 152°09.3 | 20.7 | 74°06.9 | 40.4 | 178°06.4 | 46.9 |
| 21 | 205°21.5 | | 97°17.0 | · · 21.2 | 167°09.9 | · · 21.3 | 89°08.9 | · · 40.4 | 193°08.7 | · · 47.0 |
| 22 | 220°23.9 | | 112°16.2 | 20.8 | 182°10.6 | 21.9 | 104°10.8 | 40.3 | 208°11.0 | 47.0 |
| 23 | 235°26.4 | | 127°15.5 | 20.5 | 197°11.3 | 22.5 | 119°12.8 | 40.2 | 223°13.2 | 47.1 |
| Mer.pass. 07:21 | | ν-0.8' d-0.3' m-3.95 | | ν0.7' d0.6' m1.27 | | ν2.0' d-0.1' m-1.88 | | ν2.3' d0.1' m0.88 | | |
| Tue | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 250°28.9 | | 142°14.7 | N24°20.2 | 212°11.9 | N14°23.1 | 134°14.7 | N21°40.1 | 238°15.5 | N02°47.2 |
| 1 | 265°31.3 | | 157°14.0 | 19.9 | 227°12.6 | 23.7 | 149°16.7 | 40.0 | 253°17.8 | 47.2 |
| 2 | 280°33.8 | | 172°13.2 | 19.5 | 242°13.2 | 24.3 | 164°18.7 | 40.0 | 268°20.0 | 47.3 |
| 3 | 295°36.2 | | 187°12.5 | · · 19.2 | 257°13.9 | · · 24.9 | 179°20.6 | · · 39.9 | 283°22.3 | · · 47.4 |
| 4 | 310°38.7 | | 202°11.7 | 18.9 | 272°14.6 | 25.5 | 194°22.6 | 39.8 | 298°24.6 | 47.5 |
| 5 | 325°41.2 | | 217°11.0 | 18.5 | 287°15.2 | 26.1 | 209°24.5 | 39.7 | 313°26.8 | 47.5 |
| 6 | 340°43.6 | | 232°10.2 | N24°18.2 | 302°15.9 | N14°26.7 | 224°26.5 | N21°39.6 | 328°29.1 | N02°47.6 |
| 7 | 355°46.1 | | 247°09.5 | 17.9 | 317°16.5 | 27.3 | 239°28.5 | 39.5 | 343°31.4 | 47.7 |
| 8 | 10°48.6 | | 262°08.7 | 17.5 | 332°17.2 | 27.9 | 254°30.4 | 39.5 | 358°33.7 | 47.8 |
| 9 | 25°51.0 | | 277°08.0 | · · 17.2 | 347°17.8 | · · 28.5 | 269°32.4 | · · 39.4 | 13°35.9 | · · 47.8 |
| 10 | 40°53.5 | | 292°07.2 | 16.9 | 2°18.5 | 29.1 | 284°34.4 | 39.3 | 28°38.2 | 47.9 |
| 11 | 55°56.0 | | 307°06.5 | 16.5 | 17°19.1 | 29.7 | 299°36.3 | 39.2 | 43°40.5 | 48.0 |
| 12 | 70°58.4 | | 322°05.7 | N24°16.2 | 32°19.8 | N14°30.3 | 314°38.3 | N21°39.1 | 58°42.7 | N02°48.0 |
| 13 | 86°00.9 | | 337°05.0 | 15.8 | 47°20.5 | 30.9 | 329°40.2 | 39.1 | 73°45.0 | 48.1 |
| 14 | 101°03.4 | | 352°04.3 | 15.5 | 62°21.1 | 31.5 | 344°42.2 | 39.0 | 88°47.3 | 48.2 |
| 15 | 116°05.8 | | 7°03.5 | · · 15.2 | 77°21.8 | · · 32.1 | 359°44.1 | · · 38.9 | 103°49.5 | · · 48.3 |
| 16 | 131°08.3 | | 22°02.8 | 14.8 | 92°22.4 | 32.7 | 14°46.1 | 38.8 | 118°51.8 | 48.3 |
| 17 | 146°10.7 | | 37°02.0 | 14.5 | 107°23.1 | 33.3 | 29°48.1 | 38.7 | 133°54.1 | 48.4 |
| 18 | 161°13.2 | | 52°01.3 | N24°14.1 | 122°23.7 | N14°33.9 | 44°50.0 | N21°38.6 | 148°56.4 | N02°48.5 |
| 19 | 176°15.7 | | 67°00.5 | 13.8 | 137°24.4 | 34.5 | 59°52.0 | 38.6 | 163°58.6 | 48.5 |
| 20 | 191°18.1 | | 81°59.8 | 13.4 | 152°25.1 | 35.1 | 74°53.9 | 38.5 | 179°00.9 | 48.6 |
| 21 | 206°20.6 | | 96°59.0 | · · 13.1 | 167°25.7 | · · 35.7 | 89°55.9 | · · 38.4 | 194°03.2 | · · 48.7 |
| 22 | 221°23.1 | | 111°58.3 | 12.7 | 182°26.4 | 36.3 | 104°57.9 | 38.3 | 209°05.4 | 48.8 |
| 23 | 236°25.5 | | 126°57.6 | 12.4 | 197°27.0 | 36.9 | 119°59.8 | 38.2 | 224°07.7 | 48.8 |
| Mer.pass. 07:17 | | ν-0.8' d-0.3' m-3.95 | | ν0.7' d0.6' m1.27 | | ν2.0' d-0.1' m-1.88 | | ν2.3' d0.1' m0.87 | | |

| Stars | | |
|---------------------|-----------|-----------|
| | SHA | Dec |
| Alpheratz | 357° 33.7 | 29° 14.0 |
| Ankaa | 353° 06.2 | -42° 09.5 |
| Schedar | 349° 30.0 | 56° 40.7 |
| Diphda | 348° 46.3 | -17° 50.4 |
| Achernar | 335° 19.8 | -57° 05.9 |
| Hamal | 327° 50.2 | 23° 35.1 |
| Polaris | 313° 53.9 | 89° 22.4 |
| Acamar | 315° 11.3 | -40° 11.8 |
| Menkar | 314° 05.3 | 4° 11.6 |
| Mirfak | 308° 27.1 | 49° 57.2 |
| Aldebaran | 290° 38.7 | 16° 33.7 |
| Rigel | 281° 03.1 | -8° 10.3 |
| Capella | 280° 20.7 | 46° 01.4 |
| Bellatrix | 278° 22.0 | 6° 22.4 |
| Elnath | 278° 00.8 | 28° 37.8 |
| Alnilam | 275° 36.9 | -1° 11.1 |
| Betelgeuse | 270° 51.2 | 7° 24.7 |
| Canopus | 263° 52.4 | -52° 42.7 |
| Sirius | 258° 25.5 | -16° 45.2 |
| Adhara | 255° 05.3 | -29° 00.6 |
| Procyon | 244° 49.9 | 5° 09.4 |
| Pollux | 243° 16.2 | 27° 57.8 |
| Avior | 234° 14.7 | -59° 35.9 |
| Suhail | 222° 45.7 | -43° 32.6 |
| Miaplacidus | 221° 38.4 | -69° 49.8 |
| Alphard | 217° 46.8 | -8° 46.5 |
| Regulus | 207° 33.3 | 11° 50.3 |
| Dubhe | 193° 39.6 | 61° 36.7 |
| Denebola | 182° 23.7 | 14° 25.5 |
| Gienah | 175° 42.3 | -17° 41.5 |
| Acrux | 172° 58.5 | -63° 15.1 |
| Gacrux | 171° 50.1 | -57° 16.0 |
| Alioth | 166° 11.7 | 55° 49.1 |
| Spica | 158° 20.9 | -11° 18.1 |
| Alkaid | 152° 50.7 | 49° 11.0 |
| Hadar | 148° 33.9 | -60° 30.3 |
| Menkent | 147° 55.9 | -36° 30.2 |
| Arcturus | 145° 46.6 | 19° 02.7 |
| Rigel Kent. | 139° 38.1 | -60° 56.9 |
| Kochab | 137° 18.8 | 74° 02.9 |
| Zuben'ubi | 136° 54.4 | -16° 09.2 |
| Alphecca | 126° 02.4 | 26° 37.5 |
| Antares | 112° 14.1 | -26° 29.5 |
| Atria | 107° 06.7 | -69° 04.5 |
| Sabik | 102° 01.1 | -15° 45.5 |
| Shaula | 96° 08.4 | -37° 07.3 |
| Rasalhague | 95° 57.2 | 12° 32.4 |
| Eltanin | 90° 41.1 | 51° 29.0 |
| Kaus Aust. | 83° 30.6 | -34° 22.3 |
| Vega | 80° 32.1 | 38° 48.3 |
| Nunki | 75° 46.0 | -26° 15.8 |
| Altair | 61° 58.6 | 8° 56.2 |
| Peacock | 53° 03.6 | -56° 38.7 |
| Deneb | 49° 24.8 | 45° 22.2 |
| Enif | 33° 37.6 | 9° 59.7 |
| Al Na'ir | 27° 31.4 | -46° 49.7 |
| Fomalhaut | 15° 13.3 | -29° 28.8 |
| Scheat | 13° 44.1 | 28° 13.4 |
| Markab | 13° 28.8 | 15° 20.8 |
| | | |
| May 31 Sun | SHA | Mer.pass |
| Venus | 254° 20.7 | 14:29 |
| Mars | 323° 09.7 | 09:53 |
| Jupiter | 244° 09.9 | 15:07 |
| Saturn | 347° 56.1 | 08:13 |
| | | |
| Jun 01 Mon | SHA | Mer.pass |
| Venus | 253° 03.2 | 14:31 |
| Mars | 322° 26.4 | 09:52 |
| Jupiter | 243° 57.9 | 15:04 |
| Saturn | 347° 51.4 | 08:09 |
| | | |
| Jun 02 Tue | SHA | Mer.pass |
| Venus | 251° 45.9 | 14:32 |
| Mars | 321° 43.1 | 09:51 |
| Jupiter | 243° 45.9 | 15:01 |
| Saturn | 347° 46.6 | 08:06 |
| | | |
| Horizontal parallax | | |
| Venus: | | 0.1 |
| Mars: | | 0.1 |

| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|----------|----------|----------|----------|-------|-------|
| | Sun | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | | 180°35.7 | N21°53.2 | 5°48.5 | 10.9' | S26°08.5 | 5.3' | 54.0' |
| 1 | | 195°35.7 | 53.5 | 20°18.5 | 10.9' | 26°13.8 | 5.2' | 54.0' |
| 2 | | 210°35.6 | 53.9 | 34°48.4 | 10.9' | 26°19.0 | 5.0' | 53.9' |
| 3 | | 225°35.5 | 54.2 | 49°18.2 | 10.8' | 26°24.0 | 4.9' | 53.9' |
| 4 | | 240°35.4 | 54.6 | 63°48.0 | 10.8' | 26°29.0 | 4.8' | 53.9' |
| 5 | | 255°35.3 | 54.9 | 78°17.8 | 10.7' | 26°33.8 | 4.7' | 53.9' |
| 6 | | 270°35.2 | N21°55.3 | 92°47.5 | 10.7' | S26°38.4 | 4.5' | 53.9' |
| 7 | | 285°35.1 | 55.6 | 107°17.2 | 10.7' | 26°43.0 | 4.4' | 53.9' |
| 8 | | 300°35.0 | 56.0 | 121°46.9 | 10.6' | 26°47.4 | 4.3' | 53.9' |
| 9 | | 315°34.9 | 56.3 | 136°16.5 | 10.6' | 26°51.7 | 4.2' | 53.9' |
| 10 | | 330°34.8 | 56.7 | 150°46.1 | 10.5' | 26°55.8 | 4.0' | 53.9' |
| 11 | | 345°34.8 | 57.1 | 165°15.6 | 10.5' | 26°59.9 | 3.9' | 53.9' |
| 12 | | 0°34.7 | N21°57.4 | 179°45.1 | 10.5' | S27°03.8 | 3.8' | 53.9' |
| 13 | | 15°34.6 | 57.8 | 194°14.6 | 10.4' | 27°07.6 | 3.6' | 53.9' |
| 14 | | 30°34.5 | 58.1 | 208°44.1 | 10.4' | 27°11.2 | 3.5' | 53.9' |
| 15 | | 45°34.4 | 58.5 | 223°13.5 | 10.4' | 27°14.7 | 3.4' | 53.9' |
| 16 | | 60°34.3 | 58.8 | 237°42.8 | 10.3' | 27°18.1 | 3.3' | 53.9' |
| 17 | | 75°34.2 | 59.1 | 252°12.2 | 10.3' | 27°21.4 | 3.1' | 53.9' |
| 18 | | 90°34.1 | N21°59.5 | 266°41.5 | 10.3' | S27°24.5 | 3.0' | 53.9' |
| 19 | | 105°34.0 | 21°59.8 | 281°10.8 | 10.3' | 27°27.5 | 2.9' | 53.9' |
| 20 | | 120°33.9 | 22°00.2 | 295°40.0 | 10.2' | 27°30.4 | 2.7' | 53.9' |
| 21 | | 135°33.8 | 00.5 | 310°09.3 | 10.2' | 27°33.1 | 2.6' | 53.9' |
| 22 | | 150°33.7 | 00.9 | 324°38.5 | 10.2' | 27°35.7 | 2.5' | 53.9' |
| 23 | | 165°33.6 | 01.2 | 339°07.7 | 10.2' | 27°38.1 | 2.3' | 53.9' |
| SD = 15.8' $d = 0.4'$ | | | | | | | | |
| SD = 14.7' | | | | | | | | |
| Mon | GHA | Dec | GHA | ν | Dec | d | HP | |
| 0 | 180°33.5 | N22°01.6 | 353°36.8 | 10.1' | S27°40.5 | 2.2' | 53.9' | |
| 1 | 195°33.5 | 01.9 | 8°06.0 | 10.1' | 27°42.7 | 2.1' | 53.9' | |
| 2 | 210°33.4 | 02.2 | 22°35.1 | 10.1' | 27°44.7 | 1.9' | 53.9' | |
| 3 | 225°33.3 | 02.6 | 37°04.2 | 10.1' | 27°46.7 | 1.8' | 53.9' | |
| 4 | 240°33.2 | 02.9 | 51°33.3 | 10.1' | 27°48.5 | 1.7' | 53.9' | |
| 5 | 255°33.1 | 03.3 | 66°02.4 | 10.1' | 27°50.1 | 1.5' | 53.9' | |
| 6 | 270°33.0 | N22°03.6 | 80°31.4 | 10.0' | S27°51.7 | 1.4' | 53.9' | |
| 7 | 285°32.9 | 03.9 | 95°00.4 | 10.0' | 27°53.1 | 1.3' | 53.9' | |
| 8 | 300°32.8 | 04.3 | 109°29.5 | 10.0' | 27°54.3 | 1.1' | 53.9' | |
| 9 | 315°32.7 | 04.6 | 123°58.5 | 10.0' | 27°55.4 | 1.0' | 53.9' | |
| 10 | 330°32.6 | 05.0 | 138°27.5 | 10.0' | 27°56.4 | 0.9' | 53.9' | |
| 11 | 345°32.5 | 05.3 | 152°56.5 | 10.0' | 27°57.3 | 0.7' | 53.9' | |
| 12 | 0°32.4 | N22°05.6 | 167°25.5 | 10.0' | S27°58.0 | 0.6' | 53.9' | |
| 13 | 15°32.3 | 06.0 | 181°54.4 | 10.0' | 27°58.6 | 0.4' | 53.9' | |
| 14 | 30°32.2 | 06.3 | 196°23.4 | 10.0' | 27°59.0 | 0.3' | 53.9' | |
| 15 | 45°32.1 | 06.6 | 210°52.4 | 10.0' | 27°59.3 | 0.2' | 53.9' | |
| 16 | 60°32.0 | 07.0 | 225°21.3 | 10.0' | 27°59.5 | 0.0' | 53.9' | |
| 17 | 75°31.9 | 07.3 | 239°50.3 | 10.0' | 27°59.6 | -0.1' | 53.9' | |
| 18 | 90°31.8 | N22°07.6 | 254°19.3 | 10.0' | S27°59.5 | -0.2' | 53.9' | |
| 19 | 105°31.7 | 07.9 | 268°48.2 | 10.0' | 27°59.2 | -0.4' | 53.9' | |
| 20 | 120°31.6 | 08.3 | 283°17.2 | 10.0' | 27°58.9 | -0.5' | 53.9' | |
| 21 | 135°31.5 | 08.6 | 297°46.2 | 10.0' | 27°58.4 | -0.6' | 53.9' | |
| 22 | 150°31.4 | 08.9 | 312°15.1 | 10.0' | 27°57.7 | -0.8' | 53.9' | |
| 23 | 165°31.3 | 09.3 | 326°44.1 | 10.0' | 27°57.0 | -0.9' | 53.9' | |
| SD = 15.8' $d = 0.3'$ | | | | | | | | |
| SD = 14.7' | | | | | | | | |
| Tue | GHA | Dec | GHA | ν | Dec | d | HP | |
| 0 | 180°31.2 | N22°09.6 | 341°13.1 | 10.0' | S27°56.0 | -1.0' | 53.9' | |
| 1 | 195°31.2 | 09.9 | 355°42.1 | 10.0' | 27°55.0 | -1.2' | 53.9' | |
| 2 | 210°31.1 | 10.2 | 10°11.1 | 10.0' | 27°53.8 | -1.3' | 53.9' | |
| 3 | 225°31.0 | 10.6 | 24°40.1 | 10.0' | 27°52.5 | -1.5' | 53.9' | |
| 4 | 240°30.9 | 10.9 | 39°09.1 | 10.0' | 27°51.1 | -1.6' | 53.9' | |
| 5 | 255°30.8 | 11.2 | 53°38.1 | 10.0' | 27°49.5 | -1.7' | 53.9' | |
| 6 | 270°30.7 | N22°11.5 | 68°07.2 | 10.1' | S27°47.8 | -1.9' | 53.9' | |
| 7 | 285°30.6 | 11.9 | 82°36.2 | 10.1' | 27°45.9 | -2.0' | 54.0' | |
| 8 | 300°30.5 | 12.2 | 97°05.3 | 10.1' | 27°43.9 | -2.1' | 54.0' | |
| 9 | 315°30.4 | 12.5 | 111°34.4 | 10.1' | 27°41.8 | -2.3' | 54.0' | |
| 10 | 330°30.3 | 12.8 | 126°03.5 | 10.1' | 27°39.5 | -2.4' | 54.0' | |
| 11 | 345°30.2 | 13.1 | 140°32.7 | 10.2' | 27°37.1 | -2.5' | 54.0' | |
| 12 | 0°30.1 | N22°13.5 | 155°01.8 | 10.2' | S27°34.6 | -2.7' | 54.0' | |
| 13 | 15°30.0 | 13.8 | 169°31.0 | 10.2' | 27°32.0 | -2.8' | 54.0' | |
| 14 | 30°29.9 | 14.1 | 184°00.2 | 10.2' | 27°29.2 | -2.9' | 54.0' | |
| 15 | 45°29.8 | 14.4 | 198°29.4 | 10.2' | 27°26.2 | -3.1' | 54.0' | |
| 16 | 60°29.7 | 14.7 | 212°58.7 | 10.3' | 27°23.2 | -3.2' | 54.0' | |
| 17 | 75°29.6 | 15.0 | 227°27.9 | 10.3' | 27°20.0 | -3.3' | 54.0' | |
| 18 | 90°29.5 | N22°15.4 | 241°57.2 | 10.3' | S27°16.7 | -3.4' | 54.0' | |
| 19 | 105°29.4 | 15.7 | 256°26.6 | 10.4' | 27°13.2 | -3.6' | 54.0' | |
| 20 | 120°29.3 | 16.0 | 270°55.9 | 10.4' | 27°09.7 | -3.7' | 54.0' | |
| 21 | 135°29.2 | 16.3 | 285°25.3 | 10.4' | 27°06.0 | -3.8' | 54.0' | |
| 22 | 150°29.1 | 16.6 | 299°54.7 | 10.5' | 27°02.1 | -4.0' | 54.0' | |
| 23 | 165°29.0 | 16.9 | 314°24.2 | 10.5' | 26°58.1 | -4.1' | 54.0' | |
| SD = 15.8' $d = 0.3'$ | | | | | | | | |
| SD = 14.7' | | | | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| N 70° | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 68° | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 66° | //// | //// | 01:12 | 22:47 | //// | //// |
| 64° | //// | //// | 01:58 | 22:00 | //// | //// |
| 62° | //// | //// | 02:27 | 21:30 | //// | //// |
| 60° | //// | 01:26 | 02:49 | 21:08 | 22:32 | //// |
| N 58° | //// | 02:00 | 03:07 | 20:50 | 21:57 | //// |
| 56° | //// | 02:25 | 03:22 | 20:34 | 21:32 | //// |
| 54° | 01:19 | 02:44 | 03:35 | 20:22 | 21:13 | 22:40 |
| 52° | 01:50 | 03:00 | 03:46 | 20:10 | 20:57 | 22:07 |
| 50° | 02:13 | 03:13 | 03:56 | 20:00 | 20:43 | 21:44 |
| 45° | 02:53 | 03:40 | 04:17 | 19:39 | 20:16 | 21:04 |
| N 40° | 03:21 | 04:01 | 04:33 | 19:23 | 19:55 | 20:35 |
| 35° | 03:42 | 04:18 | 04:47 | 19:09 | 19:38 | 20:14 |
| 30° | 04:00 | 04:32 | 04:59 | 18:56 | 19:24 | 19:56 |
| 20° | 04:27 | 04:56 | 05:20 | 18:36 | 19:00 | 19:29 |
| N 10° | 04:48 | 05:15 | 05:38 | 18:18 | 18:41 | 19:08 |
| 0° | 05:06 | 05:32 | 05:54 | 18:01 | 18:24 | 18:50 |
| S 10° | 05:22 | 05:48 | 06:11 | 17:45 | 18:08 | 18:34 |
| 20° | 05:37 | 06:04 | 06:28 | 17:28 | 17:51 | 18:19 |
| 30° | 05:52 | 06:22 | 06:48 | 17:08 | 17:34 | 18:03 |
| 35° | 06:00 | 06:31 | 06:59 | 16:56 | 17:24 | 17:55 |
| 40° | 06:09 | 06:42 | 07:12 | 16:43 | 17:13 | 17:47 |
| 45° | 06:18 | 06:55 | 07:28 | 16:27 | 17:01 | 17:37 |
| S 50° | 06:29 | 07:09 | 07:47 | 16:08 | 16:46 | 17:27 |
| 52° | 06:33 | 07:16 | 07:56 | 15:59 | 16:39 | 17:22 |
| 54° | 06:38 | 07:24 | 08:06 | 15:49 | 16:32 | 17:17 |
| 56° | 06:44 | 07:32 | 08:18 | 15:38 | 16:23 | 17:11 |
| 58° | 06:50 | 07:41 | 08:31 | 15:24 | 16:14 | 17:05 |
| S 60° | 06:57 | 07:52 | 08:46 | 15:09 | 16:04 | 16:59 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | ■ | ■ | ■ | ■ | ■ | ■ |
| 68° | ■ | ■ | ■ | ■ | ■ | ■ |
| 66° | ■ | ■ | ■ | ■ | ■ | ■ |
| 64° | ■ | ■ | ■ | ■ | ■ | ■ |
| 62° | 23:52 | | 01:14 | 01:05 | 00:58 | 01:23 |
| 60° | 22:45 | 23:43 | | 01:43 | 02:05 | 02:54 |
| N 58° | 22:10 | 23:07 | 23:43 | 02:10 | 02:40 | 03:30 |
| 56° | 21:45 | 22:41 | 23:20 | 02:32 | 03:05 | 03:56 |
| 54° | 21:25 | 22:20 | 23:01 | 02:49 | 03:26 | 04:16 |
| 52° | 21:08 | 22:03 | 22:45 | 03:04 | 03:43 | 04:34 |
| 50° | 20:54 | 21:48 | 22:32 | 03:17 | 03:57 | 04:48 |
| 45° | 20:24 | 21:19 | 22:04 | 03:44 | 04:27 | 05:18 |
| N 40° | 20:02 | 20:55 | 21:42 | 04:06 | 04:50 | 05:41 |
| 35° | 19:43 | 20:36 | 21:24 | 04:23 | 05:09 | 06:00 |
| 30° | 19:27 | 20:19 | 21:08 | 04:39 | 05:25 | 06:17 |
| 20° | 18:59 | 19:52 | 20:41 | 05:05 | 05:53 | 06:44 |
| N 10° | 18:36 | 19:28 | 20:18 | 05:27 | 06:17 | 07:08 |
| 0° | 18:14 | 19:05 | 19:57 | 05:48 | 06:39 | 07:30 |
| S 10° | 17:52 | 18:43 | 19:35 | 06:09 | 07:01 | 07:52 |
| 20° | 17:29 | 18:19 | 19:12 | 06:32 | 07:25 | 08:16 |
| 30° | 17:02 | 17:51 | 18:45 | 06:58 | 07:53 | 08:43 |
| 35° | 16:46 | 17:35 | 18:29 | 07:13 | 08:09 | 08:59 |
| 40° | 16:28 | 17:16 | 18:11 | 07:31 | 08:28 | 09:18 |
| 45° | 16:06 | 16:53 | 17:48 | 07:53 | 08:51 | 09:41 |
| S 50° | 15:37 | 16:23 | 17:20 | 08:21 | 09:21 | 10:10 |
| 52° | 15:24 | 16:08 | 17:06 | 08:35 | 09:35 | 10:24 |
| 54° | 15:08 | 15:51 | 16:49 | 08:50 | 09:52 | 10:41 |
| 56° | 14:49 | 15:31 | 16:30 | 09:09 | 10:13 | 11:00 |
| 58° | 14:26 | 15:05 | 16:06 | 09:32 | 10:39 | 11:25 |
| S 60° | 13:55 | 14:29 | 15:33 | 10:02 | 11:14 | 11:57 |

| Day | Sun | | | Moon | | |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|-------------------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 15-17 100-97% |
| 31 | 02:23 | 02:19 | 11:58 | —:— | 12:01 | |

June 03, 04, 05 UT (Wed., Thu., Fri.)

| | Aries | | Venus | | Mars | | Jupiter | | Saturn | | Stars | | |
|-----------------|----------|----------------------|----------|-------------------|----------|---------------------|----------|-------------------|----------|-----|-------|-------------|-------------------|
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec |
| 0 | 251°28.0 | 141°56.8 | N24°12.0 | 212°27.7 | N14°37.5 | 135°01.8 | N21°38.2 | 239°10.0 | N02°48.9 | | | Alpheratz | 357°33.7 29°14.0 |
| 1 | 266°30.5 | 156°56.1 | 11.7 | 227°28.3 | 38.1 | 150°03.7 | 38.1 | 254°12.3 | 49.0 | | | Ankaa | 353°06.2 -42°09.5 |
| 2 | 281°32.9 | 171°55.3 | 11.3 | 242°29.0 | 38.7 | 165°05.7 | 38.0 | 269°14.5 | 49.0 | | | Schedar | 349°30.0 56°40.7 |
| 3 | 296°35.4 | 186°54.6 | · · 11.0 | 257°29.6 | · · 39.3 | 180°07.6 | · · 37.9 | 284°16.8 | · · 49.1 | | | Diphda | 348°46.3 -17°50.4 |
| 4 | 311°37.9 | 201°53.9 | 10.6 | 272°30.3 | 39.9 | 195°09.6 | 37.8 | 299°19.1 | 49.2 | | | Achernar | 335°19.7 -57°05.9 |
| 5 | 326°40.3 | 216°53.1 | 10.2 | 287°31.0 | 40.4 | 210°11.6 | 37.7 | 314°21.3 | 49.3 | | | Hamal | 327°50.2 23°35.1 |
| 6 | 341°42.8 | 231°52.4 | N24°09.9 | 302°31.6 | N14°41.0 | 225°13.5 | N21°37.7 | 329°23.6 | N02°49.3 | | | Polaris | 313°52.9 89°22.4 |
| 7 | 356°45.2 | 246°51.6 | 09.5 | 317°32.3 | 41.6 | 240°15.5 | 37.6 | 344°25.9 | 49.4 | | | Acamar | 315°11.3 -40°11.8 |
| 8 | 11°47.7 | 261°50.9 | 09.1 | 332°32.9 | 42.2 | 255°17.4 | 37.5 | 359°28.2 | 49.5 | | | Menkar | 314°05.2 4°11.6 |
| 9 | 26°50.2 | 276°50.2 | · · 08.8 | 347°33.6 | · · 42.8 | 270°19.4 | · · 37.4 | 14°30.4 | · · 49.5 | | | Mirfak | 308°27.1 49°57.2 |
| 10 | 41°52.6 | 291°49.4 | 08.4 | 2°34.2 | 43.4 | 285°21.4 | 37.3 | 29°32.7 | 49.6 | | | Aldebaran | 290°38.6 16°33.7 |
| 11 | 56°55.1 | 306°48.7 | 08.1 | 17°34.9 | 44.0 | 300°23.3 | 37.2 | 44°35.0 | 49.7 | | | Rigel | 281°03.1 -8°10.3 |
| 12 | 71°57.6 | 321°48.0 | N24°07.7 | 32°35.5 | N14°44.6 | 315°25.3 | N21°37.2 | 59°37.2 | N02°49.8 | | | Capella | 280°20.7 46°01.4 |
| 13 | 87°00.0 | 336°47.2 | 07.3 | 47°36.2 | 45.2 | 330°27.2 | 37.1 | 74°39.5 | 49.8 | | | Bellatrix | 278°22.0 6°22.4 |
| 14 | 102°02.5 | 351°46.5 | 06.9 | 62°36.8 | 45.8 | 345°29.2 | 37.0 | 89°41.8 | 49.9 | | | Elnath | 278°00.8 28°37.8 |
| 15 | 117°05.0 | 6°45.8 | · · 06.6 | 77°37.5 | · · 46.4 | 0°31.1 | · · 36.9 | 104°44.1 | · · 50.0 | | | Alnilam | 275°36.9 -1°11.1 |
| 16 | 132°07.4 | 21°45.0 | 06.2 | 92°38.2 | 47.0 | 15°33.1 | 36.8 | 119°46.3 | 50.0 | | | Betelgeuse | 270°51.2 7°24.7 |
| 17 | 147°09.9 | 36°44.3 | 05.8 | 107°38.8 | 47.6 | 30°35.0 | 36.7 | 134°48.6 | 50.1 | | | Canopus | 263°52.4 -52°42.7 |
| 18 | 162°12.4 | 51°43.6 | N24°05.5 | 122°39.5 | N14°48.1 | 45°37.0 | N21°36.7 | 149°50.9 | N02°50.2 | | | Sirius | 258°25.5 -16°45.2 |
| 19 | 177°14.8 | 66°42.8 | 05.1 | 137°40.1 | 48.7 | 60°39.0 | 36.6 | 164°53.2 | 50.2 | | | Adhara | 255°05.3 -29°00.6 |
| 20 | 192°17.3 | 81°42.1 | 04.7 | 152°40.8 | 49.3 | 75°40.9 | 36.5 | 179°55.4 | 50.3 | | | Procyon | 244°49.9 5°09.4 |
| 21 | 207°19.7 | 96°41.4 | · · 04.3 | 167°41.4 | · · 49.9 | 90°42.9 | · · 36.4 | 194°57.7 | · · 50.4 | | | Pollux | 243°16.2 27°57.8 |
| 22 | 222°22.2 | 111°40.6 | 03.9 | 182°42.1 | 50.5 | 105°44.8 | 36.3 | 210°00.0 | 50.5 | | | Avior | 234°14.7 -59°35.9 |
| 23 | 237°24.7 | 126°39.9 | 03.6 | 197°42.7 | 51.1 | 120°46.8 | 36.2 | 225°02.3 | 50.5 | | | Suhail | 222°45.7 -43°32.6 |
| Mer.pass. 07:13 | | ν-0.7' d-0.4' m-3.95 | | ν0.7' d0.6' m1.27 | | ν2.0' d-0.1' m-1.88 | | ν2.3' d0.1' m0.87 | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | |
| 0 | 252°27.1 | 141°39.2 | N24°03.2 | 212°43.4 | N14°51.7 | 135°48.7 | N21°36.2 | 240°04.5 | N02°50.6 | | | Miaplacidus | 221°38.5 -69°49.8 |
| 1 | 267°29.6 | 156°38.4 | 02.8 | 227°44.0 | 52.3 | 150°50.7 | 36.1 | 255°06.8 | 50.7 | | | Alphard | 217°46.8 -8°46.5 |
| 2 | 282°32.1 | 171°37.7 | 02.4 | 242°44.7 | 52.9 | 165°52.6 | 36.0 | 270°09.1 | 50.7 | | | Regulus | 207°33.3 11°50.3 |
| 3 | 297°34.5 | 186°37.0 | · · 02.0 | 257°45.4 | · · 53.4 | 180°54.6 | · · 35.9 | 285°11.4 | · · 50.8 | | | Dubhe | 193°39.6 61°36.7 |
| 4 | 312°37.0 | 201°36.3 | 01.6 | 272°46.0 | 54.0 | 195°56.6 | 35.8 | 300°13.6 | 50.9 | | | Denebola | 182°23.7 14°25.5 |
| 5 | 327°39.5 | 216°35.5 | 01.3 | 287°46.7 | 54.6 | 210°58.5 | 35.7 | 315°15.9 | 51.0 | | | Gienah | 175°42.3 -17°41.5 |
| 6 | 342°41.9 | 231°34.8 | N24°00.9 | 302°47.3 | N14°55.2 | 226°00.5 | N21°35.7 | 330°18.2 | N02°51.0 | | | Acrux | 172°58.5 -63°15.1 |
| 7 | 357°44.4 | 246°34.1 | 00.5 | 317°48.0 | 55.8 | 241°02.4 | 35.6 | 345°20.5 | 51.1 | | | Gacrux | 171°50.1 -57°16.0 |
| 8 | 12°46.9 | 261°33.3 | 24°00.1 | 332°48.6 | 56.4 | 256°04.4 | 35.5 | 0°22.7 | 51.2 | | | Alioth | 166°11.7 55°49.2 |
| 9 | 27°49.3 | 276°32.6 | 23°59.7 | 347°49.3 | · · 57.0 | 271°06.3 | · · 35.4 | 15°25.0 | · · 51.2 | | | Spica | 158°20.9 -11°18.1 |
| 10 | 42°51.8 | 291°31.9 | 59.3 | 2°49.9 | 57.6 | 286°08.3 | 35.3 | 30°27.3 | 51.3 | | | Alkaid | 152°50.8 49°11.0 |
| 11 | 57°54.2 | 306°31.2 | 58.9 | 17°50.6 | 58.1 | 301°10.2 | 35.2 | 45°29.6 | 51.4 | | | Hadar | 148°33.9 -60°30.3 |
| 12 | 72°56.7 | 321°30.4 | N23°58.5 | 32°51.2 | N14°58.7 | 316°12.2 | N21°35.1 | 60°31.8 | N02°51.4 | | | Menkent | 147°55.9 -36°30.2 |
| 13 | 87°59.2 | 336°29.7 | 58.1 | 47°51.9 | 59.3 | 331°14.1 | 35.1 | 75°34.1 | 51.5 | | | Arcturus | 145°46.6 19°02.7 |
| 14 | 103°01.6 | 351°29.0 | 57.7 | 62°52.5 | 14°59.9 | 346°16.1 | 35.0 | 90°36.4 | 51.6 | | | Rigil Kent. | 139°38.1 -60°56.9 |
| 15 | 118°04.1 | 6°28.3 | · · 57.3 | 77°53.2 | 15°00.5 | 1°18.1 | · · 34.9 | 105°38.7 | · · 51.6 | | | Kochab | 137°18.8 74°02.9 |
| 16 | 133°06.6 | 21°27.5 | 56.9 | 92°53.8 | 01.1 | 16°20.0 | 34.8 | 120°40.9 | 51.7 | | | Zuben'ubi | 136°54.4 -16°09.2 |
| 17 | 148°09.0 | 36°26.8 | 56.5 | 107°54.5 | 01.6 | 31°22.0 | 34.7 | 135°43.2 | 51.8 | | | Alphecca | 126°02.4 26°37.5 |
| 18 | 163°11.5 | 51°26.1 | N23°56.1 | 122°55.1 | N15°02.2 | 46°23.9 | N21°34.6 | 150°45.5 | N02°51.9 | | | Antares | 112°14.0 -26°29.5 |
| 19 | 178°14.0 | 66°25.4 | 55.7 | 137°55.8 | 02.8 | 61°25.9 | 34.6 | 165°47.8 | 51.9 | | | Atria | 107°06.7 -69°04.5 |
| 20 | 193°16.4 | 81°24.7 | 55.3 | 152°56.5 | 03.4 | 76°27.8 | 34.5 | 180°50.0 | 52.0 | | | Sabik | 102°01.1 -15°45.5 |
| 21 | 208°18.9 | 96°23.9 | · · 54.9 | 167°57.1 | · · 04.0 | 91°29.8 | · · 34.4 | 195°52.3 | · · 52.1 | | | Shaula | 96°08.4 -37°07.4 |
| 22 | 223°21.3 | 111°23.2 | 54.5 | 182°57.8 | 04.6 | 106°31.7 | 34.3 | 210°54.6 | 52.1 | | | Rasalhague | 95°57.1 12°32.4 |
| 23 | 238°23.8 | 126°22.5 | 54.1 | 197°58.4 | 05.1 | 121°33.7 | 34.2 | 225°56.9 | 52.2 | | | Eltanin | 90°41.1 51°29.0 |
| Mer.pass. 07:09 | | ν-0.7' d-0.4' m-3.95 | | ν0.7' d0.6' m1.27 | | ν2.0' d-0.1' m-1.87 | | ν2.3' d0.1' m0.87 | | | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | |
| 0 | 253°26.3 | 141°21.8 | N23°53.7 | 212°59.1 | N15°05.7 | 136°35.6 | N21°34.1 | 240°59.1 | N02°52.3 | | | Kaus Aust. | 83°30.6 -34°22.3 |
| 1 | 268°28.7 | 156°21.1 | 53.3 | 227°59.7 | 06.3 | 151°37.6 | 34.0 | 256°01.4 | 52.3 | | | Vega | 80°32.0 38°48.3 |
| 2 | 283°31.2 | 171°20.4 | 52.9 | 243°00.4 | 06.9 | 166°39.5 | 34.0 | 271°03.7 | 52.4 | | | Nunki | 75°46.0 -26°15.8 |
| 3 | 298°33.7 | 186°19.6 | · · 52.5 | 258°01.0 | · · 07.5 | 181°41.5 | · · 33.9 | 286°06.0 | · · 52.5 | | | Altair | 61°58.6 8°56.2 |
| 4 | 313°36.1 | 201°18.9 | 52.0 | 273°01.7 | 08.1 | 196°43.4 | 33.8 | 301°08.3 | 52.5 | | | Peacock | 53°03.5 -56°38.7 |
| 5 | 328°38.6 | 216°18.2 | 51.6 | 288°02.3 | 08.6 | 211°45.4 | 33.7 | 316°10.5 | 52.6 | | | Deneb | 49°24.7 45°22.3 |
| 6 | 343°41.1 | 231°17.5 | N23°51.2 | 303°03.0 | N15°09.2 | 226°47.3 | N21°33.6 | 331°12.8 | N02°52.7 | | | Enif | 33°37.6 9°59.7 |
| 7 | 358°43.5 | 246°16.8 | 50.8 | 318°03.6 | 09.8 | 241°49.3 | 33.5 | 346°15.1 | 52.7 | | | Al Na'ir | 27°31.4 -46°49.7 |
| 8 | 13°46.0 | 261°16.1 | 50.4 | 333°04.3 | 10.4 | 256°51.3 | 33.5 | 1°17.4 | 52.8 | | | Fomalhaut | 15°13.2 -29°28.8 |
| 9 | 28°48.5 | 276°15.3 | · · 50.0 | 348°04.9 | · · 11.0 | 271°53.2 | · · 33.4 | 16°19.6 | · · 52.9 | | | Scheat | 13°44.1 28°13.4 |
| 10 | 43°50.9 | 291°14.6 | 49.5 | 3°05.6 | 11.5 | 286°55.2 | 33.3 | 31°21.9 | 53.0 | | | Markab | 13°28.8 15°20.8 |
| 11 | 58°53.4 | 306°13.9 | 49.1 | 18°06.2 | 12.1 | 301°57.1 | 33.2 | 46°24.2 | 53.0 | | | Jun 03 Wed | |
| 12 | 73°55.8 | 321°13.2 | N23°48.7 | 33°06.9 | N15°12.7 | 316°59.1 | N21°33.1 | 61°26.5 | N02°53.1 | | | Venus | 250°28.8 14:33 |
| 13 | 88°58.3 | 336°12.5 | 48.3 | 48°07.5 | 13.3 | 332°01.0 | 33.0 | 76°28.8 | 53.2 | | | Mars | 320°59.7 09:50 |
| 14 | 104°00.8 | 351°11.8 | 47.8 | 63°08.2 | 13.8 | 347°03.0 | 32.9 | 91°31.0 | 53.2 | | | Jupiter | 243°33.8 14:58 |
| 15 | 119°03.2 | 6°11.1 | · · 47.4 | 78°08.8 | · · 14.4 | 2°04.9 | · · 32.9 | 106°33.3 | · · 53.3 | | | Saturn | 347°42.0 08:02 |
| 16 | 134°05.7 | 21°10.4 | 47.0 | 93°09.5 | 15.0 | 17°06.9 | 32.8 | 121°35.6 | 53.4 | | | Jun 04 Thu | |
| 17 | 149°08.2 | 36°09.6 | 46.6 | 108°10.1 | 15.6 | 32°08.8 | 32.7 | 136°37.9 | 53.4 | | | Venus | 249°12.0 14:34 |
| 18 | 164°10.6 | 51°08.9 | N23°46.1 | 123°10.8 | N15°16.2 | 47°10.8 | N21°32.6 | 151°40.1 | N02°53.5 | | | Mars | 320°16.3 09:49 |
| 19 | 179°13.1 | 66°08.2 | 45.7 | 138°11.4 | 16.7 | 62°12.7 | 32.5 | 166°42.4 | 53.6 | | | Jupiter | 243°21.6 14:55 |
| 20 | 194°15.6 | 81°07.5 | | | | | | | | | | | |

| h | | Sun | | Moon | | | |
|-----|--|-----------------------|----------|------------|-------|----------|-------------|
| Wed | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 180°28.9 | N22°17.2 | 328°53.7 | 10.5' | S26°54.0 | -4.2' 54.1' |
| 1 | | 195°28.8 | 17.5 | 343°23.2 | 10.6' | 26°49.8 | -4.4' 54.1' |
| 2 | | 210°28.6 | 17.9 | 357°52.7 | 10.6' | 26°45.5 | -4.5' 54.1' |
| 3 | | 225°28.5 | · · 18.2 | 12°22.3 | 10.6' | 26°41.0 | -4.6' 54.1' |
| 4 | | 240°28.4 | 18.5 | 26°51.9 | 10.7' | 26°36.4 | -4.7' 54.1' |
| 5 | | 255°28.3 | 18.8 | 41°21.6 | 10.7' | 26°31.6 | -4.9' 54.1' |
| 6 | | 270°28.2 | N22°19.1 | 55°51.3 | 10.7' | S26°26.8 | -5.0' 54.1' |
| 7 | | 285°28.1 | 19.4 | 70°21.0 | 10.8' | 26°21.8 | -5.1' 54.1' |
| 8 | | 300°28.0 | 19.7 | 84°50.8 | 10.8' | 26°16.7 | -5.2' 54.1' |
| 9 | | 315°27.9 | · · 20.0 | 99°20.6 | 10.9' | 26°11.4 | -5.4' 54.1' |
| 10 | | 330°27.8 | 20.3 | 113°50.5 | 10.9' | 26°06.0 | -5.5' 54.1' |
| 11 | | 345°27.7 | 20.6 | 128°20.4 | 10.9' | 26°00.6 | -5.6' 54.1' |
| 12 | | 0°27.6 | N22°20.9 | 142°50.3 | 11.0' | S25°54.9 | -5.7' 54.2' |
| 13 | | 15°27.5 | 21.2 | 157°20.3 | 11.0' | 25°49.2 | -5.9' 54.2' |
| 14 | | 30°27.4 | 21.5 | 171°50.4 | 11.1' | 25°43.4 | -6.0' 54.2' |
| 15 | | 45°27.3 | · · 21.8 | 186°20.4 | 11.1' | 25°37.4 | -6.1' 54.2' |
| 16 | | 60°27.2 | 22.1 | 200°50.6 | 11.2' | 25°31.3 | -6.2' 54.2' |
| 17 | | 75°27.1 | 22.4 | 215°20.7 | 11.2' | 25°25.1 | -6.3' 54.2' |
| 18 | | 90°27.0 | N22°22.7 | 229°50.9 | 11.3' | S25°18.7 | -6.5' 54.2' |
| 19 | | 105°26.9 | 23.0 | 244°21.2 | 11.3' | 25°12.3 | -6.6' 54.2' |
| 20 | | 120°26.8 | 23.3 | 258°51.5 | 11.4' | 25°05.7 | -6.7' 54.2' |
| 21 | | 135°26.7 | · · 23.6 | 273°21.9 | 11.4' | 24°59.0 | -6.8' 54.3' |
| 22 | | 150°26.6 | 23.9 | 287°52.3 | 11.4' | 24°52.2 | -6.9' 54.3' |
| 23 | | 165°26.5 | 24.2 | 302°22.7 | 11.5' | 24°45.2 | -7.0' 54.3' |
| | | SD = 15.8' $d = 0.3'$ | | SD = 14.7' | | | |

| Thu | | GHA | Dec | GHA | ν | Dec | d HP |
|-----|--|-----------------------|----------|------------|-------|----------|-------------|
| 0 | | 180°26.4 | N22°24.5 | 316°53.2 | 11.5' | S24°38.2 | -7.2' 54.3' |
| 1 | | 195°26.3 | 24.8 | 331°23.7 | 11.6' | 24°31.0 | -7.3' 54.3' |
| 2 | | 210°26.2 | 25.1 | 345°54.3 | 11.6' | 24°23.8 | -7.4' 54.3' |
| 3 | | 225°26.0 | · · 25.4 | 0°25.0 | 11.7' | 24°16.4 | -7.5' 54.3' |
| 4 | | 240°25.9 | 25.7 | 14°55.7 | 11.7' | 24°08.9 | -7.6' 54.3' |
| 5 | | 255°25.8 | 25.9 | 29°26.4 | 11.8' | 24°01.3 | -7.7' 54.3' |
| 6 | | 270°25.7 | N22°26.2 | 43°57.2 | 11.8' | S23°53.5 | -7.8' 54.4' |
| 7 | | 285°25.6 | 26.5 | 58°28.1 | 11.9' | 23°45.7 | -7.9' 54.4' |
| 8 | | 300°25.5 | 26.8 | 72°59.0 | 11.9' | 23°37.7 | -8.1' 54.4' |
| 9 | | 315°25.4 | · · 27.1 | 87°29.9 | 12.0' | 23°29.7 | -8.2' 54.4' |
| 10 | | 330°25.3 | 27.4 | 102°00.9 | 12.1' | 23°21.5 | -8.3' 54.4' |
| 11 | | 345°25.2 | 27.7 | 116°32.0 | 12.1' | 23°13.2 | -8.4' 54.4' |
| 12 | | 0°25.1 | N22°28.0 | 131°03.1 | 12.2' | S23°04.8 | -8.5' 54.4' |
| 13 | | 15°25.0 | 28.3 | 145°34.2 | 12.2' | 22°56.4 | -8.6' 54.5' |
| 14 | | 30°24.9 | 28.5 | 160°05.4 | 12.3' | 22°47.8 | -8.7' 54.5' |
| 15 | | 45°24.8 | · · 28.8 | 174°36.7 | 12.3' | 22°39.1 | -8.8' 54.5' |
| 16 | | 60°24.7 | 29.1 | 189°08.0 | 12.4' | 22°30.2 | -8.9' 54.5' |
| 17 | | 75°24.5 | 29.4 | 203°39.4 | 12.4' | 22°21.3 | -9.0' 54.5' |
| 18 | | 90°24.4 | N22°29.7 | 218°10.8 | 12.5' | S22°12.3 | -9.1' 54.5' |
| 19 | | 105°24.3 | 30.0 | 232°42.2 | 12.5' | 22°03.2 | -9.2' 54.6' |
| 20 | | 120°24.2 | 30.2 | 247°13.8 | 12.6' | 21°54.0 | -9.3' 54.6' |
| 21 | | 135°24.1 | · · 30.5 | 261°45.3 | 12.6' | 21°44.6 | -9.4' 54.6' |
| 22 | | 150°24.0 | 30.8 | 276°16.9 | 12.7' | 21°35.2 | -9.5' 54.6' |
| 23 | | 165°23.9 | 31.1 | 290°48.6 | 12.7' | 21°25.7 | -9.6' 54.6' |
| | | SD = 15.8' $d = 0.3'$ | | SD = 14.8' | | | |

| Fri | | GHA | Dec | GHA | ν | Dec | d HP |
|-----|--|-----------------------|----------|------------|-------|----------|--------------|
| 0 | | 180°23.8 | N22°31.3 | 305°20.3 | 12.8' | S21°16.1 | -9.7' 54.6' |
| 1 | | 195°23.7 | 31.6 | 319°52.1 | 12.8' | 21°06.4 | -9.8' 54.7' |
| 2 | | 210°23.6 | 31.9 | 334°23.9 | 12.9' | 20°56.5 | -9.9' 54.7' |
| 3 | | 225°23.5 | · · 32.2 | 348°55.8 | 12.9' | 20°46.6 | -10.0' 54.7' |
| 4 | | 240°23.3 | 32.5 | 3°27.7 | 13.0' | 20°36.6 | -10.1' 54.7' |
| 5 | | 255°23.2 | 32.7 | 17°59.7 | 13.0' | 20°26.5 | -10.2' 54.7' |
| 6 | | 270°23.1 | N22°33.0 | 32°31.7 | 13.1' | S20°16.3 | -10.3' 54.7' |
| 7 | | 285°23.0 | 33.3 | 47°03.8 | 13.1' | 20°06.0 | -10.4' 54.8' |
| 8 | | 300°22.9 | 33.5 | 61°35.9 | 13.2' | 19°55.6 | -10.5' 54.8' |
| 9 | | 315°22.8 | · · 33.8 | 76°08.0 | 13.2' | 19°45.1 | -10.6' 54.8' |
| 10 | | 330°22.7 | 34.1 | 90°40.3 | 13.3' | 19°34.6 | -10.7' 54.8' |
| 11 | | 345°22.6 | 34.4 | 105°12.5 | 13.3' | 19°23.9 | -10.8' 54.8' |
| 12 | | 0°22.5 | N22°34.6 | 119°44.8 | 13.4' | S19°13.2 | -10.8' 54.9' |
| 13 | | 15°22.4 | 34.9 | 134°17.2 | 13.4' | 19°02.3 | -10.9' 54.9' |
| 14 | | 30°22.2 | 35.2 | 148°49.6 | 13.4' | 18°51.4 | -11.0' 54.9' |
| 15 | | 45°22.1 | · · 35.4 | 163°22.0 | 13.5' | 18°40.4 | -11.1' 54.9' |
| 16 | | 60°22.0 | 35.7 | 177°54.5 | 13.5' | 18°29.3 | -11.2' 54.9' |
| 17 | | 75°21.9 | 36.0 | 192°27.0 | 13.6' | 18°18.1 | -11.3' 55.0' |
| 18 | | 90°21.8 | N22°36.2 | 206°59.6 | 13.6' | S18°06.8 | -11.4' 55.0' |
| 19 | | 105°21.7 | 36.5 | 221°32.3 | 13.7' | 17°55.4 | -11.4' 55.0' |
| 20 | | 120°21.6 | 36.8 | 236°04.9 | 13.7' | 17°44.0 | -11.5' 55.0' |
| 21 | | 135°21.5 | · · 37.0 | 250°37.6 | 13.7' | 17°32.4 | -11.6' 55.0' |
| 22 | | 150°21.3 | 37.3 | 265°10.4 | 13.8' | 17°20.8 | -11.7' 55.1' |
| 23 | | 165°21.2 | 37.6 | 279°43.2 | 13.8' | 17°09.1 | -11.8' 55.1' |
| | | SD = 15.8' $d = 0.3'$ | | SD = 14.9' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| N 70° | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 68° | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 66° | //// | //// | 00:59 | 23:02 | //// | //// |
| 64° | //// | //// | 01:51 | 22:08 | //// | //// |
| 62° | //// | //// | 02:22 | 21:36 | //// | //// |
| 60° | //// | 01:18 | 02:45 | 21:12 | 22:42 | //// |
| N 58° | //// | 01:55 | 03:04 | 20:54 | 22:03 | //// |
| 56° | //// | 02:20 | 03:19 | 20:38 | 21:37 | //// |
| 54° | 01:11 | 02:40 | 03:32 | 20:25 | 21:17 | 22:48 |
| 52° | 01:45 | 02:57 | 03:44 | 20:13 | 21:01 | 22:13 |
| 50° | 02:09 | 03:11 | 03:54 | 20:03 | 20:47 | 21:49 |
| 45° | 02:51 | 03:39 | 04:15 | 19:42 | 20:19 | 21:07 |
| N 40° | 03:19 | 04:00 | 04:32 | 19:25 | 19:57 | 20:38 |
| 35° | 03:41 | 04:17 | 04:46 | 19:10 | 19:40 | 20:16 |
| 30° | 03:59 | 04:32 | 04:59 | 18:58 | 19:25 | 19:58 |
| 20° | 04:27 | 04:55 | 05:20 | 18:37 | 19:01 | 19:30 |
| N 10° | 04:48 | 05:15 | 05:38 | 18:19 | 18:42 | 19:09 |
| 0° | 05:06 | 05:32 | 05:55 | 18:02 | 18:24 | 18:50 |
| S 10° | 05:22 | 05:49 | 06:11 | 17:45 | 18:08 | 18:34 |
| 20° | 05:38 | 06:05 | 06:29 | 17:28 | 17:51 | 18:19 |
| 30° | 05:53 | 06:23 | 06:49 | 17:07 | 17:33 | 18:03 |
| 35° | 06:02 | 06:33 | 07:01 | 16:56 | 17:23 | 17:55 |
| 40° | 06:10 | 06:44 | 07:14 | 16:42 | 17:12 | 17:46 |
| 45° | 06:20 | 06:57 | 07:30 | 16:26 | 16:59 | 17:36 |
| S 50° | 06:31 | 07:12 | 07:50 | 16:07 | 16:44 | 17:25 |
| 52° | 06:36 | 07:19 | 07:59 | 15:57 | 16:37 | 17:20 |
| 54° | 06:41 | 07:27 | 08:10 | 15:47 | 16:30 | 17:15 |
| 56° | 06:47 | 07:35 | 08:21 | 15:35 | 16:21 | 17:10 |
| 58° | 06:53 | 07:45 | 08:35 | 15:21 | 16:12 | 17:03 |
| S 60° | 07:00 | 07:56 | 08:51 | 15:05 | 16:01 | 16:56 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | ■ | ■ | ■ | ■ | ■ | ■ |
| 68° | ■ | ■ | 02:29 | ■ | ■ | 05:18 |
| 66° | ■ | ■ | 01:42 | ■ | ■ | 06:04 |
| 64° | ■ | 01:33 | 01:11 | ■ | 04:34 | 06:34 |
| 62° | 00:57 | 00:52 | 00:48 | 03:26 | 05:14 | 06:56 |
| 60° | 00:12 | 00:24 | 00:29 | 04:11 | 05:41 | 07:14 |
| N 58° | · · | 00:02 | 00:14 | 04:40 | 06:03 | 07:29 |
| 56° | 23:45 | · · | 00:01 | 05:03 | 06:20 | 07:42 |
| 54° | 23:29 | 23:49 | · · | 05:21 | 06:35 | 07:53 |
| 52° | 23:16 | 23:39 | 23:56 | 05:37 | 06:48 | 08:02 |
| 50° | 23:05 | 23:29 | 23:49 | 05:50 | 06:59 | 08:11 |
| 45° | 22:41 | 23:10 | 23:34 | 06:17 | 07:22 | 08:29 |
| N 40° | 22:21 | 22:54 | 23:22 | 06:39 | 07:41 | 08:44 |
| 35° | 22:05 | 22:41 | 23:12 | 06:57 | 07:56 | 08:57 |
| 30° | 21:51 | 22:29 | 23:03 | 07:12 | 08:09 | 09:07 |
| 20° | 21:27 | 22:09 | 22:47 | 07:38 | 08:32 | 09:26 |
| N 10° | 21:06 | 21:51 | 22:33 | 08:00 | 08:52 | 09:42 |
| 0° | 20:47 | 21:34 | 22:20 | 08:21 | 09:10 | 09:57 |
| S 10° | 20:27 | 21:18 | 22:07 | 08:42 | 09:28 | 10:12 |
| 20° | 20:06 | 21:00 | 21:53 | 09:04 | 09:47 | 10:27 |
| 30° | 19:42 | 20:39 | 21:37 | 09:29 | 10:09 | 10:45 |
| 35° | 19:27 | 20:27 | 21:28 | 09:44 | 10:22 | 10:56 |
| 40° | 19:11 | 20:13 | 21:17 | 10:01 | 10:37 | 11:07 |
| 45° | 18:51 | 19:57 | 21:05 | 10:22 | 10:55 | 11:21 |
| S 50° | 18:25 | 19:36 | 20:49 | 10:48 | 11:16 | 11:38 |
| 52° | 18:13 | 19:26 | 20:42 | 11:00 | 11:27 | 11:46 |
| 54° | 17:59 | 19:15 | 20:34 | 11:15 | 11:38 | 11:55 |
| 56° | 17:43 | 19:03 | 20:25 | 11:31 | 11:52 | 12:05 |
| 58° | 17:23 | 18:48 | 20:14 | 11:52 | 12:07 | 12:16 |
| S 60° | 16:58 | 18:30 | 20:02 | 12:17 | 12:25 | 12:29 |

| Day | Sun | | | Moon | | |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|------------------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 18-20 94-82% |
| 03 | 01:55 | 01:50 | 11:58 | 02:09 | 14:34 | |
| 04 | 01:45 | 01:40 | 11:58 | 02:58 | 15:22 | |
| 05 | 01:35 | 01:30 | 11:59 | 03:46 | 16:09 | |

June 06, 07, 08 UT (Sat., Sun., Mon.)

| | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|----------------------|----------|----------|-------------------|----------|----------|---------------------|---------|-----|-------------------|--------|-------------|---------------------|-------|--|--|
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | |
| 0 | 254°25.4 | 141°04.7 | N23°43.5 | 213°14.7 | N15°19.6 | 137°22.5 | N21°32.1 | 241°53.8 | N02°53.9 | | | | | Alpheratz | 357°33.7 29°14.0 | | | |
| 1 | 269°27.9 | 156°04.0 | 43.1 | 228°15.3 | 20.2 | 152°24.4 | 32.0 | 256°56.1 | 54.0 | | | | | Ankaa | 353°06.2 -42°09.5 | | | |
| 2 | 284°30.3 | 171°03.3 | 42.7 | 243°16.0 | 20.8 | 167°26.4 | 31.9 | 271°58.4 | 54.0 | | | | | Schedar | 349°29.9 56°40.7 | | | |
| 3 | 299°32.8 | 186°02.6 | •• 42.2 | 258°16.6 | •• 21.3 | 182°28.3 | •• 31.8 | 287°00.7 | •• 54.1 | | | | | Diphda | 348°46.3 -17°50.4 | | | |
| 4 | 314°35.3 | 201°01.9 | 41.8 | 273°17.3 | 21.9 | 197°30.3 | 31.7 | 302°02.9 | 54.2 | | | | | Achernar | 335°19.7 -57°05.9 | | | |
| 5 | 329°37.7 | 216°01.2 | 41.3 | 288°17.9 | 22.5 | 212°32.2 | 31.7 | 317°05.2 | 54.2 | | | | | Hamal | 327°50.1 23°35.2 | | | |
| 6 | 344°40.2 | 231°00.5 | N23°40.9 | 303°18.6 | N15°23.1 | 227°34.2 | N21°31.6 | 332°07.5 | N02°54.3 | | | | | Polaris | 313°52.1 89°22.3 | | | |
| 7 | 359°42.7 | 245°59.8 | 40.5 | 318°19.2 | 23.6 | 242°36.1 | 31.5 | 347°09.8 | 54.4 | | | | | Acamar | 315°11.3 -40°11.8 | | | |
| 8 | 14°45.1 | 260°59.0 | 40.0 | 333°19.9 | 24.2 | 257°38.1 | 31.4 | 2°12.1 | 54.4 | | | | | Menkar | 314°05.2 4°11.6 | | | |
| 9 | 29°47.6 | 275°58.3 | •• 39.6 | 348°20.5 | •• 24.8 | 272°40.0 | •• 31.3 | 17°14.3 | •• 54.5 | | | | | Mirfak | 308°27.1 49°57.2 | | | |
| 10 | 44°50.1 | 290°57.6 | 39.1 | 3°21.2 | 25.4 | 287°42.0 | 31.2 | 32°16.6 | 54.6 | | | | | Aldebaran | 290°38.6 16°33.7 | | | |
| 11 | 59°52.5 | 305°56.9 | 38.7 | 18°21.8 | 25.9 | 302°43.9 | 31.1 | 47°18.9 | 54.6 | | | | | Rigel | 281°03.1 -8°10.3 | | | |
| 12 | 74°55.0 | 320°56.2 | N23°38.2 | 33°22.5 | N15°26.5 | 317°45.9 | N21°31.1 | 62°21.2 | N02°54.7 | | | | | Capella | 280°20.7 46°01.4 | | | |
| 13 | 89°57.5 | 335°55.5 | 37.8 | 48°23.1 | 27.1 | 332°47.8 | 31.0 | 77°23.5 | 54.8 | | | | | Bellatrix | 278°22.0 6°22.4 | | | |
| 14 | 104°59.9 | 350°54.8 | 37.3 | 63°23.8 | 27.7 | 347°49.8 | 30.9 | 92°25.8 | 54.8 | | | | | Elnath | 278°00.8 28°37.8 | | | |
| 15 | 120°02.4 | 5°54.1 | •• 36.9 | 78°24.4 | •• 28.2 | 2°51.7 | •• 30.8 | 107°28.0 | •• 54.9 | | | | | Alnilam | 275°36.9 -1°11.1 | | | |
| 16 | 135°04.8 | 20°53.4 | 36.4 | 93°25.1 | 28.8 | 17°53.7 | 30.7 | 122°30.3 | 55.0 | | | | | Betelgeuse | 270°51.2 7°24.7 | | | |
| 17 | 150°07.3 | 35°52.7 | 36.0 | 108°25.7 | 29.4 | 32°55.6 | 30.6 | 137°32.6 | 55.0 | | | | | Canopus | 263°52.4 -52°42.6 | | | |
| 18 | 165°09.8 | 50°52.0 | N23°35.5 | 123°26.4 | N15°29.9 | 47°57.6 | N21°30.5 | 152°34.9 | N02°55.1 | | | | | Sirius | 258°25.5 -16°45.2 | | | |
| 19 | 180°12.2 | 65°51.4 | 35.1 | 138°27.0 | 30.5 | 62°59.5 | 30.4 | 167°37.2 | 55.2 | | | | | Adhara | 255°05.3 -29°00.6 | | | |
| 20 | 195°14.7 | 80°50.7 | 34.6 | 153°27.7 | 31.1 | 78°01.4 | 30.4 | 182°39.4 | 55.2 | | | | | Procyon | 244°49.9 5°09.4 | | | |
| 21 | 210°17.2 | 95°50.0 | •• 34.1 | 168°28.3 | •• 31.6 | 93°03.4 | •• 30.3 | 197°41.7 | •• 55.3 | | | | | Pollux | 243°16.2 27°57.8 | | | |
| 22 | 225°19.6 | 110°49.3 | 33.7 | 183°29.0 | 32.2 | 108°05.3 | 30.2 | 212°44.0 | 55.4 | | | | | Avior | 234°14.7 -59°35.9 | | | |
| 23 | 240°22.1 | 125°48.6 | 33.2 | 198°29.6 | 32.8 | 123°07.3 | 30.1 | 227°46.3 | 55.4 | | | | | Suhail | 222°45.7 -43°32.6 | | | |
| Mer.pass. 07:01 | | | ν-0.7' d-0.4' m-3.96 | | | ν0.7' d0.6' m1.28 | | | ν1.9' d-0.1' m-1.87 | | | ν2.3' d0.1' m0.86 | | | | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 255°24.6 | 140°47.9 | N23°32.8 | 213°30.3 | N15°33.4 | 138°09.2 | N21°30.0 | 242°48.6 | N02°55.5 | | | | | Denebola | 182°23.7 14°25.5 | | | |
| 1 | 270°27.0 | 155°47.2 | 32.3 | 228°30.9 | 33.9 | 153°11.2 | 29.9 | 257°50.9 | 55.6 | | | | | Gienah | 175°42.3 -17°41.5 | | | |
| 2 | 285°29.5 | 170°46.5 | 31.8 | 243°31.6 | 34.5 | 168°13.1 | 29.8 | 272°53.1 | 55.6 | | | | | Acrux | 172°58.5 -63°15.1 | | | |
| 3 | 300°31.9 | 185°45.8 | •• 31.4 | 258°32.2 | •• 35.1 | 183°15.1 | •• 29.8 | 287°55.4 | •• 55.7 | | | | | Gacrux | 171°50.1 -57°16.0 | | | |
| 4 | 315°34.4 | 200°45.1 | 30.9 | 273°32.9 | 35.6 | 198°17.0 | 29.7 | 302°57.7 | 55.8 | | | | | Alioth | 166°11.7 55°49.2 | | | |
| 5 | 330°36.9 | 215°44.4 | 30.4 | 288°33.5 | 36.2 | 213°19.0 | 29.6 | 318°00.0 | 55.8 | | | | | Spica | 158°20.9 -11°18.1 | | | |
| 6 | 345°39.3 | 230°43.7 | N23°30.0 | 303°34.2 | N15°36.8 | 228°20.9 | N21°29.5 | 333°02.3 | N02°55.9 | | | | | Alkaid | 152°50.8 49°11.0 | | | |
| 7 | 0°41.8 | 245°43.0 | 29.5 | 318°34.8 | 37.3 | 243°22.9 | 29.4 | 348°04.6 | 56.0 | | | | | Hadar | 148°33.9 -60°30.3 | | | |
| 8 | 15°44.3 | 260°42.3 | 29.0 | 333°35.5 | 37.9 | 258°24.8 | 29.3 | 3°06.8 | 56.0 | | | | | Menkent | 147°55.9 -36°30.2 | | | |
| 9 | 30°46.7 | 275°41.6 | •• 28.5 | 348°36.1 | •• 38.5 | 273°26.8 | •• 29.2 | 18°09.1 | •• 56.1 | | | | | Arcturus | 145°46.6 19°02.7 | | | |
| 10 | 45°49.2 | 290°41.0 | 28.1 | 3°36.8 | 39.0 | 288°28.7 | 29.1 | 33°11.4 | 56.2 | | | | | Rigel Kent. | 139°38.1 -60°56.9 | | | |
| 11 | 60°51.7 | 305°40.3 | 27.6 | 18°37.4 | 39.6 | 303°30.7 | 29.1 | 48°13.7 | 56.2 | | | | | Kochab | 137°18.8 74°02.9 | | | |
| 12 | 75°54.1 | 320°39.6 | N23°27.1 | 33°38.1 | N15°40.2 | 318°32.6 | N21°29.0 | 63°16.0 | N02°56.3 | | | | | Zuben'ubi | 136°54.4 -16°09.2 | | | |
| 13 | 90°56.6 | 335°38.9 | 26.6 | 48°38.7 | 40.7 | 333°34.5 | 28.9 | 78°18.3 | 56.4 | | | | | Alphecca | 126°02.4 26°37.5 | | | |
| 14 | 105°59.1 | 350°38.2 | 26.2 | 63°39.3 | 41.3 | 348°36.5 | 28.8 | 93°20.5 | 56.4 | | | | | Antares | 112°14.0 -26°29.5 | | | |
| 15 | 121°01.5 | 5°37.5 | •• 25.7 | 78°40.0 | •• 41.9 | 3°38.4 | •• 28.7 | 108°22.8 | •• 56.5 | | | | | Atria | 107°06.6 -69°04.5 | | | |
| 16 | 136°04.0 | 20°36.8 | 25.2 | 93°40.6 | 42.4 | 18°40.4 | 28.6 | 123°25.1 | 56.6 | | | | | Sabik | 102°01.1 -15°45.5 | | | |
| 17 | 151°06.4 | 35°36.2 | 24.7 | 108°41.3 | 43.0 | 33°42.3 | 28.5 | 138°27.4 | 56.6 | | | | | Shaula | 96°08.4 -37°07.4 | | | |
| 18 | 166°08.9 | 50°35.5 | N23°24.3 | 123°41.9 | N15°43.6 | 48°44.3 | N21°28.4 | 153°29.7 | N02°56.7 | | | | | Rasalhague | 95°57.1 12°32.4 | | | |
| 19 | 181°11.4 | 65°34.8 | 23.8 | 138°42.6 | 44.1 | 63°46.2 | 28.4 | 168°32.0 | 56.8 | | | | | Eltanin | 90°41.1 51°29.0 | | | |
| 20 | 196°13.8 | 80°34.1 | 23.3 | 153°43.2 | 44.7 | 78°48.2 | 28.3 | 183°34.2 | 56.8 | | | | | Kaus Aust. | 83°30.6 -34°22.3 | | | |
| 21 | 211°16.3 | 95°33.4 | •• 22.8 | 168°43.9 | •• 45.2 | 93°50.1 | •• 28.2 | 198°36.5 | •• 56.9 | | | | | Vega | 80°32.0 38°48.4 | | | |
| 22 | 226°18.8 | 110°32.7 | 22.3 | 183°44.5 | 45.8 | 108°52.1 | 28.1 | 213°38.8 | 57.0 | | | | | Nunki | 75°46.0 -26°15.8 | | | |
| 23 | 241°21.2 | 125°32.0 | 21.8 | 198°45.2 | 46.4 | 123°54.0 | 28.0 | 228°41.1 | 57.0 | | | | | Altair | 61°58.6 8°56.2 | | | |
| Mer.pass. 06:57 | | | ν-0.7' d-0.5' m-3.96 | | | ν0.6' d0.6' m1.28 | | | ν1.9' d-0.1' m-1.86 | | | ν2.3' d0.1' m0.86 | | | | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 256°23.7 | 140°31.4 | N23°21.3 | 213°45.8 | N15°46.9 | 138°55.9 | N21°27.9 | 243°43.4 | N02°57.1 | | | | | Jun 06 Sat | SHA Mer.pass | | | |
| 1 | 271°26.2 | 155°30.7 | 20.8 | 228°46.5 | 47.5 | 153°57.9 | 27.8 | 258°45.7 | 57.1 | | | | | Venus | 246°39.3 14:36 | | | |
| 2 | 286°28.6 | 170°30.0 | 20.4 | 243°47.1 | 48.1 | 168°59.8 | 27.7 | 273°48.0 | 57.2 | | | | | Mars | 318°49.3 09:47 | | | |
| 3 | 301°31.1 | 185°29.3 | •• 19.9 | 258°47.8 | •• 48.6 | 184°01.8 | •• 27.7 | 288°50.2 | •• 57.3 | | | | | Jupiter | 242°57.0 14:49 | | | |
| 4 | 316°33.6 | 200°28.6 | 19.4 | 273°48.4 | 49.2 | 199°03.7 | 27.6 | 303°52.5 | 57.3 | | | | | Saturn | 347°28.4 07:51 | | | |
| 5 | 331°36.0 | 215°28.0 | 18.9 | 288°49.1 | 49.7 | 214°05.7 | 27.5 | 318°54.8 | 57.4 | | | | | | | | | |
| 6 | 346°38.5 | 230°27.3 | N23°18.4 | 303°49.7 | N15°50.3 | 229°07.6 | N21°27.4 | 333°57.1 | N02°57.5 | | | | | | | | | |
| 7 | 1°40.9 | 245°26.6 | 17.9 | 318°50.3 | 50.9 | 244°09.6 | 27.3 | 348°59.4 | 57.5 | | | | | | | | | |
| 8 | 16°43.4 | 260°25.9 | 17.4 | 333°51.0 | 51.4 | 259°11.5 | 27.2 | 4°01.7 | 57.6 | | | | | | | | | |
| 9 | 31°45.9 | 275°25.3 | •• 16.9 | 348°51.6 | •• 52.0 | 274°13.4 | •• 27.1 | 19°04.0 | •• 57.7 | | | | | | | | | |
| 10 | 46°48.3 | 290°24.6 | 16.4 | 3°52.3 | 52.5 | 289°15.4 | 27.0 | 34°06.2 | 57.7 | | | | | | | | | |
| 11 | 61°50.8 | 305°23.9 | 15.9 | 18°52.9 | 53.1 | 304°17.3 | 26.9 | 49°08.5 | 57.8 | | | | | | | | | |
| 12 | 76°53.3 | 320°23.2 | N23°15.4 | 33°53.6 | N15°53.7 | 319°19.3 | N21°26.9 | 64°10.8 | N02°57.9 | | | | | | | | | |
| 13 | 91°55.7 | 335°22.6 | 14.9 | 48°54.2 | 54.2 | 334°21.2 | 26.8 | 79°13.1 | 57.9 | | | | | | | | | |
| 14 | 106°58.2 | 350°21.9 | 14.4 | 63°54.9 | 54.8 | 349°23.2 | 26.7 | 94°15.4 | 58.0 | | | | | | | | | |
| 15 | 122°00.7 | 5°21.2 | •• 13.9 | 78°55.5 | •• 55.3 | 4°25.1 | •• 26.6 | 109°17.7 | •• 58.1 | | | | | | | | | |
| 16 | 137°03.1 | 20°20.5 | 13.4 | 93°56.2 | 55.9 | 19°27.1 | 26.5 | 124°20.0 | 58.1 | | | | | | | | | |
| 17 | 152°05.6 | 35°19.9 | 12.9 | 108°56.8 | 56.4 | 34°29.0 | 26.4 | 139°22.3 | 58.2 | | | | | | | | | |
| 18 | 167°08.0 | 50°19.2 | N23°12.4 | 123°57.5 | N15°57.0 | 49°30.9 | N21°26.3 | 154°24.5 | N02°58.2 | | | | | | | | | |
| 19 | 182°10.5 | 65°18.5 | 11.9 | 138°58.1 | 57.6 | 64°32.9 | 26.2 | 169°26.8 | 58.3 | | | | | | | | | |
| 20 | 197°13.0 | 80°17.9 | 11.3 | 153°58.7 | 58.1 | 79°34.8 | 26.1 | 184°29.1 | 58.4 | | | | | | | | | |
| 21 | 212°15.4 | 95°17.2 | •• 10.8 | 168°59.4 | •• 58.7 | 94°36.8 | •• 26.1 | 199°31.4 | •• 58.4 | | | | | | | | | |
| 22 | 227°17.9 | 110°16.5 | 10.3 | 184°00.0 | 59.2 | 109°38.7 | 26.0 | 214°33.7 | 58.5 | | | | | | | | | |
| 23 | 242°20.4 | 125°15.8 | 09.8 | 199°00.7 | 59.8 | 124°40.7 | 25.9 | 229°36.0 | 58.6 | | | | | | | | | |
| Mer.pass. 06:53 | | | ν-0.7' d-0.5' m-3.96 | | | ν0.6' d0.6' m1.28 | | | ν1.9' d-0.1' m-1.86 | | | ν2.3' d0.1' m0.86 | | | | | | |
| | | | | | | | | | | | | | | | Horizontal parallax | | | |
| | | | | | | | | | | | | | | | Venus: | 0.1 | | |
| | | | | | | | | | | | | | | | Mars: | 0.1 | | |


| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| Sat | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°21.1 | N22°37.8 | | 294°16.0 | 13.9' | S16°57.4 | -11.9' | 55.1' |
| 1 | 195°21.0 | 38.1 | | 308°48.9 | 13.9' | 16°45.5 | -11.9' | 55.1' |
| 2 | 210°20.9 | 38.3 | | 323°21.8 | 13.9' | 16°33.6 | -12.0' | 55.2' |
| 3 | 225°20.8 | · · 38.6 | | 337°54.7 | 14.0' | 16°21.6 | -12.1' | 55.2' |
| 4 | 240°20.7 | 38.9 | | 352°27.7 | 14.0' | 16°09.5 | -12.2' | 55.2' |
| 5 | 255°20.6 | 39.1 | | 7°00.7 | 14.1' | 15°57.3 | -12.2' | 55.2' |
| 6 | 270°20.4 | N22°39.4 | | 21°33.8 | 14.1' | S15°45.1 | -12.3' | 55.3' |
| 7 | 285°20.3 | 39.6 | | 36°06.9 | 14.1' | 15°32.7 | -12.4' | 55.3' |
| 8 | 300°20.2 | 39.9 | | 50°40.0 | 14.2' | 15°20.3 | -12.5' | 55.3' |
| 9 | 315°20.1 | · · 40.1 | | 65°13.2 | 14.2' | 15°07.9 | -12.5' | 55.3' |
| 10 | 330°20.0 | 40.4 | | 79°46.4 | 14.2' | 14°55.3 | -12.6' | 55.4' |
| 11 | 345°19.9 | 40.7 | | 94°19.6 | 14.3' | 14°42.7 | -12.7' | 55.4' |
| 12 | 0°19.8 | N22°40.9 | | 108°52.9 | 14.3' | S14°30.0 | -12.8' | 55.4' |
| 13 | 15°19.6 | 41.2 | | 123°26.2 | 14.3' | 14°17.3 | -12.8' | 55.4' |
| 14 | 30°19.5 | 41.4 | | 137°59.5 | 14.4' | 14°04.4 | -12.9' | 55.5' |
| 15 | 45°19.4 | · · 41.7 | | 152°32.9 | 14.4' | 13°51.5 | -13.0' | 55.5' |
| 16 | 60°19.3 | 41.9 | | 167°06.2 | 14.4' | 13°38.6 | -13.0' | 55.5' |
| 17 | 75°19.2 | 42.2 | | 181°39.7 | 14.4' | 13°25.5 | -13.1' | 55.5' |
| 18 | 90°19.1 | N22°42.4 | | 196°13.1 | 14.5' | S13°12.4 | -13.2' | 55.6' |
| 19 | 105°19.0 | 42.7 | | 210°46.6 | 14.5' | 12°59.3 | -13.2' | 55.6' |
| 20 | 120°18.8 | 42.9 | | 225°20.0 | 14.5' | 12°46.0 | -13.3' | 55.6' |
| 21 | 135°18.7 | · · 43.2 | | 239°53.6 | 14.5' | 12°32.7 | -13.4' | 55.6' |
| 22 | 150°18.6 | 43.4 | | 254°27.1 | 14.6' | 12°19.4 | -13.4' | 55.7' |
| 23 | 165°18.5 | 43.6 | | 269°00.6 | 14.6' | 12°05.9 | -13.5' | 55.7' |
| SD = 15.8' $d = 0.3'$ | | | SD = 15.0' | | | | | |

| Sun | GHA | Dec | | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| 0 | 180°18.4 | N22°43.9 | | 283°34.2 | 14.6' | S11°52.5 | -13.6' | 55.7' |
| 1 | 195°18.3 | 44.1 | | 298°07.8 | 14.6' | 11°38.9 | -13.6' | 55.7' |
| 2 | 210°18.1 | 44.4 | | 312°41.4 | 14.6' | 11°25.3 | -13.7' | 55.8' |
| 3 | 225°18.0 | · · 44.6 | | 327°15.1 | 14.7' | 11°11.6 | -13.7' | 55.8' |
| 4 | 240°17.9 | 44.9 | | 341°48.7 | 14.7' | 10°57.9 | -13.8' | 55.8' |
| 5 | 255°17.8 | 45.1 | | 356°22.4 | 14.7' | 10°44.1 | -13.9' | 55.9' |
| 6 | 270°17.7 | N22°45.3 | | 10°56.1 | 14.7' | S10°30.2 | -13.9' | 55.9' |
| 7 | 285°17.6 | 45.6 | | 25°29.8 | 14.7' | 10°16.3 | -14.0' | 55.9' |
| 8 | 300°17.4 | 45.8 | | 40°03.5 | 14.7' | 10°02.4 | -14.0' | 56.0' |
| 9 | 315°17.3 | · · 46.1 | | 54°37.2 | 14.7' | 9°48.3 | -14.1' | 56.0' |
| 10 | 330°17.2 | 46.3 | | 69°10.9 | 14.7' | 9°34.3 | -14.1' | 56.0' |
| 11 | 345°17.1 | 46.5 | | 83°44.7 | 14.8' | 9°20.1 | -14.2' | 56.0' |
| 12 | 0°17.0 | N22°46.8 | | 98°18.4 | 14.8' | S09°06.0 | -14.2' | 56.1' |
| 13 | 15°16.9 | 47.0 | | 112°52.2 | 14.8' | 08°51.7 | -14.3' | 56.1' |
| 14 | 30°16.7 | 47.2 | | 127°26.0 | 14.8' | 08°37.4 | -14.3' | 56.1' |
| 15 | 45°16.6 | · · 47.5 | | 141°59.7 | 14.8' | 08°23.1 | -14.4' | 56.2' |
| 16 | 60°16.5 | 47.7 | | 156°33.5 | 14.8' | 08°08.7 | -14.4' | 56.2' |
| 17 | 75°16.4 | 48.0 | | 171°07.3 | 14.8' | 07°54.3 | -14.5' | 56.2' |
| 18 | 90°16.3 | N22°48.2 | | 185°41.1 | 14.8' | S07°39.8 | -14.5' | 56.3' |
| 19 | 105°16.1 | 48.4 | | 200°14.8 | 14.8' | 07°25.3 | -14.6' | 56.3' |
| 20 | 120°16.0 | 48.6 | | 214°48.6 | 14.8' | 07°10.7 | -14.6' | 56.3' |
| 21 | 135°15.9 | · · 48.9 | | 229°22.4 | 14.8' | 06°56.0 | -14.7' | 56.4' |
| 22 | 150°15.8 | 49.1 | | 243°56.2 | 14.8' | 06°41.4 | -14.7' | 56.4' |
| 23 | 165°15.7 | 49.3 | | 258°29.9 | 14.8' | 06°26.7 | -14.8' | 56.4' |
| SD = 15.8' $d = 0.2'$ | | | SD = 15.2' | | | | | |

| Mon | GHA | Dec | | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| 0 | 180°15.5 | N22°49.6 | | 273°03.7 | 14.8' | S06°11.9 | -14.8' | 56.5' |
| 1 | 195°15.4 | 49.8 | | 287°37.5 | 14.8' | 05°57.1 | -14.8' | 56.5' |
| 2 | 210°15.3 | 50.0 | | 302°11.2 | 14.7' | 05°42.3 | -14.9' | 56.5' |
| 3 | 225°15.2 | · · 50.2 | | 316°45.0 | 14.7' | 05°27.4 | -14.9' | 56.6' |
| 4 | 240°15.1 | 50.5 | | 331°18.7 | 14.7' | 05°12.4 | -15.0' | 56.6' |
| 5 | 255°14.9 | 50.7 | | 345°52.4 | 14.7' | 04°57.5 | -15.0' | 56.6' |
| 6 | 270°14.8 | N22°50.9 | | 0°26.1 | 14.7' | S04°42.5 | -15.0' | 56.7' |
| 7 | 285°14.7 | 51.1 | | 14°59.8 | 14.7' | 04°27.4 | -15.1' | 56.7' |
| 8 | 300°14.6 | 51.4 | | 29°33.5 | 14.7' | 04°12.4 | -15.1' | 56.7' |
| 9 | 315°14.5 | · · 51.6 | | 44°07.2 | 14.6' | 03°57.2 | -15.1' | 56.8' |
| 10 | 330°14.3 | 51.8 | | 58°40.8 | 14.6' | 03°42.1 | -15.2' | 56.8' |
| 11 | 345°14.2 | 52.0 | | 73°14.5 | 14.6' | 03°26.9 | -15.2' | 56.8' |
| 12 | 0°14.1 | N22°52.3 | | 87°48.1 | 14.6' | S03°11.7 | -15.2' | 56.9' |
| 13 | 15°14.0 | 52.5 | | 102°21.7 | 14.6' | 02°56.4 | -15.3' | 56.9' |
| 14 | 30°13.9 | 52.7 | | 116°55.2 | 14.5' | 02°41.2 | -15.3' | 56.9' |
| 15 | 45°13.7 | · · 52.9 | | 131°28.8 | 14.5' | 02°25.9 | -15.3' | 57.0' |
| 16 | 60°13.6 | 53.1 | | 146°02.3 | 14.5' | 02°10.5 | -15.4' | 57.0' |
| 17 | 75°13.5 | 53.3 | | 160°35.8 | 14.5' | 01°55.1 | -15.4' | 57.0' |
| 18 | 90°13.4 | N22°53.6 | | 175°09.3 | 14.4' | S01°39.7 | -15.4' | 57.1' |
| 19 | 105°13.3 | 53.8 | | 189°42.7 | 14.4' | 01°24.3 | -15.4' | 57.1' |
| 20 | 120°13.1 | 54.0 | | 204°16.1 | 14.4' | 01°08.9 | -15.5' | 57.1' |
| 21 | 135°13.0 | · · 54.2 | | 218°49.5 | 14.3' | 00°53.4 | -15.5' | 57.2' |
| 22 | 150°12.9 | 54.4 | | 233°22.8 | 14.3' | 00°37.9 | -15.5' | 57.2' |
| 23 | 165°12.8 | 54.6 | | 247°56.1 | 14.3' | 00°22.4 | -15.5' | 57.3' |
| SD = 15.8' $d = 0.2'$ | | | SD = 15.4' | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| N 70° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66° | //// | //// | 00:45 | 23:18 | //// | //// |
| 64° | //// | //// | 01:45 | 22:15 | //// | //// |
| 62° | //// | //// | 02:18 | 21:41 | //// | //// |
| 60° | //// | 01:10 | 02:42 | 21:17 | 22:50 | //// |
| N 58° | //// | 01:50 | 03:01 | 20:58 | 22:09 | //// |
| 56° | //// | 02:17 | 03:17 | 20:42 | 21:42 | //// |
| 54° | 01:04 | 02:37 | 03:30 | 20:28 | 21:21 | 22:56 |
| 52° | 01:41 | 02:54 | 03:42 | 20:16 | 21:04 | 22:18 |
| 50° | 02:06 | 03:09 | 03:52 | 20:06 | 20:50 | 21:53 |
| 45° | 02:49 | 03:37 | 04:14 | 19:44 | 20:21 | 21:10 |
| N 40° | 03:18 | 03:59 | 04:31 | 19:27 | 19:59 | 20:40 |
| 35° | 03:40 | 04:16 | 04:46 | 19:12 | 19:42 | 20:18 |
| 30° | 03:58 | 04:31 | 04:58 | 18:59 | 19:27 | 20:00 |
| 20° | 04:26 | 04:55 | 05:20 | 18:38 | 19:02 | 19:32 |
| N 10° | 04:48 | 05:15 | 05:38 | 18:20 | 18:43 | 19:10 |
| 0° | 05:07 | 05:33 | 05:55 | 18:03 | 18:25 | 18:51 |
| S 10° | 05:23 | 05:49 | 06:12 | 17:46 | 18:08 | 18:35 |
| 20° | 05:39 | 06:06 | 06:30 | 17:28 | 17:51 | 18:19 |
| 30° | 05:55 | 06:24 | 06:51 | 17:07 | 17:33 | 18:03 |
| 35° | 06:03 | 06:35 | 07:03 | 16:55 | 17:23 | 17:55 |
| 40° | 06:12 | 06:46 | 07:16 | 16:41 | 17:12 | 17:46 |
| 45° | 06:22 | 06:59 | 07:32 | 16:25 | 16:59 | 17:36 |
| S 50° | 06:33 | 07:14 | 07:52 | 16:05 | 16:43 | 17:24 |
| 52° | 06:38 | 07:22 | 08:02 | 15:56 | 16:36 | 17:19 |
| 54° | 06:44 | 07:29 | 08:13 | 15:45 | 16:28 | 17:14 |
| 56° | 06:49 | 07:38 | 08:25 | 15:33 | 16:19 | 17:08 |
| 58° | 06:56 | 07:48 | 08:39 | 15:19 | 16:10 | 17:02 |
| S 60° | 07:03 | 07:59 | 08:55 | 15:02 | 15:59 | 16:55 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | 02:51 | 01:45 | 01:06 | 06:34 | 09:12 | 11:25 |
| N 70° | 02:07 | 01:26 | 00:58 | 07:16 | 09:29 | 11:30 |
| 68° | 01:38 | 01:11 | 00:51 | 07:43 | 09:42 | 11:34 |
| 66° | 01:16 | 00:59 | 00:45 | 08:04 | 09:53 | 11:37 |
| 64° | 00:58 | 00:49 | 00:40 | 08:21 | 10:01 | 11:40 |
| 62° | 00:44 | 00:40 | 00:36 | 08:34 | 10:09 | 11:43 |
| 60° | 00:31 | 00:32 | 00:32 | 08:46 | 10:15 | 11:45 |
| N 58° | 00:21 | 00:25 | 00:29 | 08:55 | 10:21 | 11:47 |
| 56° | 00:11 | 00:19 | 00:26 | 09:04 | 10:26 | 11:48 |
| 54° | 00:03 | 00:14 | 00:23 | 09:12 | 10:30 | 11:50 |
| 52° | · · · | 00:09 | 00:21 | 09:18 | 10:34 | 11:51 |
| 50° | · · · | 00:05 | 00:18 | 09:24 | 10:38 | 11:52 |
| 45° | 23:55 | · · · | 00:14 | 09:37 | 10:46 | 11:55 |
| N 40° | 23:47 | · · · | 00:09 | 09:48 | 10:52 | 11:57 |
| 35° | 23:40 | · · · | 00:06 | 09:57 | 10:58 | 11:59 |
| 30° | 23:34 | · · · | 00:03 | 10:05 | 11:03 | 12:01 |
| 20° | 23:23 | 23:57 | · · · | 10:19 | 11:11 | 12:04 |
| N 10° | 23:13 | 23:52 | · · · | 10:31 | 11:19 | 12:06 |
| 0° | 23:05 | 23:48 | · · · | 10:42 | 11:25 | 12:09 |
| S 10° | 22:56 | 23:43 | · · · | 10:53 | 11:32 | 12:11 |
| 20° | 22:46 | 23:38 | · · · | 11:04 | 11:39 | 12:13 |
| 30° | 22:35 | 23:33 | · · · | 11:17 | 11:47 | 12:16 |
| 35° | 22:29 | 23:30 | · · · | 11:25 | 11:52 | 12:17 |
| 40° | 22:21 | 23:26 | · · · | 11:34 | 11:57 | 12:19 |
| 45° | 22:13 | 23:22 | · · · | 11:44 | 12:03 | 12:21 |
| S 50° | 22:03 | 23:17 | · · · | 11:56 | 12:10 | 12:24 |
| 52° | 21:58 | 23:14 | · · · | 12:01 | 12:13 | 12:25 |
| 54° | 21:53 | 23:12 | · · · | 12:07 | 12:17 | 12:26 |
| 56° | 21:47 | 23:09 | · · · | 12:14 | 12:21 | 12:27 |
| 58° | 21:40 | 23:06 | · · · | 12:21 | 12:25 | 12:28 |
| S 60° | 21:33 | 23:02 | · · · | 12:30 | 12:30 | 12:30 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|--------------|-----------|-------|---|
| | Eqn.of Time | | Mer. Pass | Mer.Pass. | | Age 21-23 74-54% |
| | 00 ^h | 12 ^h | | Upper | Lower | |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | |
| 06 | 01:24 | 01:19 | 11:59 | 04:31 | 16:53 |  |
| 07 | 01:13 | 01:08 | 11:59 | 05:15 | 17:37 | |
| 08 | 01:02 | 00:56 | 11:59 | 05:58 | 18:20 | |

June 09, 10, 11 UT (Tue., Wed., Thu.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|----------------------|----------|----------|-------------------|----------|----------|---------------------|----------|----------|-------------------|--------|-----|--|-------------|----------|----------|
| Tue | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | | SHA | Dec | |
| 0 | 257°22.8 | 140°15.2 | N23°09.3 | 214°01.3 | N16°00.3 | | 139°42.6 | N21°25.8 | | 244°38.3 | N02°58.6 | | | | | Alpheratz | 357°33.6 | 29°14.0 |
| 1 | 272°25.3 | 155°14.5 | 08.8 | 229°02.0 | 00.9 | | 154°44.5 | 25.7 | | 259°40.6 | 58.7 | | | | | Ankaa | 353°06.1 | -42°09.5 |
| 2 | 287°27.8 | 170°13.8 | 08.3 | 244°02.6 | 01.5 | | 169°46.5 | 25.6 | | 274°42.8 | 58.8 | | | | | Schedar | 349°29.9 | 56°40.7 |
| 3 | 302°30.2 | 185°13.2 | · · 07.7 | 259°03.3 | · · 02.0 | | 184°48.4 | · · 25.5 | | 289°45.1 | · · 58.8 | | | | | Diphda | 348°46.3 | -17°50.4 |
| 4 | 317°32.7 | 200°12.5 | 07.2 | 274°03.9 | 02.6 | | 199°50.4 | 25.4 | | 304°47.4 | 58.9 | | | | | Achernar | 335°19.7 | -57°05.9 |
| 5 | 332°35.2 | 215°11.8 | 06.7 | 289°04.5 | 03.1 | | 214°52.3 | 25.3 | | 319°49.7 | 58.9 | | | | | Hamal | 327°50.1 | 23°35.2 |
| 6 | 347°37.6 | 230°11.2 | N23°06.2 | 304°05.2 | N16°03.7 | | 229°54.2 | N21°25.3 | | 334°52.0 | N02°59.0 | | | | | Polaris | 313°51.3 | 89°22.3 |
| 7 | 2°40.1 | 245°10.5 | 05.7 | 319°05.8 | 04.2 | | 244°56.2 | 25.2 | | 349°54.3 | 59.1 | | | | | Acamar | 315°11.3 | -40°11.8 |
| 8 | 17°42.5 | 260°09.8 | 05.1 | 334°06.5 | 04.8 | | 259°58.1 | 25.1 | | 4°56.6 | 59.1 | | | | | Menkar | 314°05.2 | 4°11.6 |
| 9 | 32°45.0 | 275°09.2 | · · 04.6 | 349°07.1 | · · 05.3 | | 275°00.1 | · · 25.0 | | 19°58.9 | · · 59.2 | | | | | Mirfak | 308°27.0 | 49°57.2 |
| 10 | 47°47.5 | 290°08.5 | 04.1 | 4°07.8 | 05.9 | | 290°02.0 | 24.9 | | 35°01.2 | 59.3 | | | | | Aldebaran | 290°38.6 | 16°33.7 |
| 11 | 62°49.9 | 305°07.9 | 03.6 | 19°08.4 | 06.4 | | 305°04.0 | 24.8 | | 50°03.5 | 59.3 | | | | | Rigel | 281°03.1 | -8°10.3 |
| 12 | 77°52.4 | 320°07.2 | N23°03.0 | 34°09.1 | N16°07.0 | | 320°05.9 | N21°24.7 | | 65°05.7 | N02°59.4 | | | | | Capella | 280°20.7 | 46°01.4 |
| 13 | 92°54.9 | 335°06.5 | 02.5 | 49°09.7 | 07.5 | | 335°07.8 | 24.6 | | 80°08.0 | 59.4 | | | | | Bellatrix | 278°22.0 | 6°22.4 |
| 14 | 107°57.3 | 350°05.9 | 02.0 | 64°10.3 | 08.1 | | 350°09.8 | 24.5 | | 95°10.3 | 59.5 | | | | | Elnath | 278°00.8 | 28°37.8 |
| 15 | 122°59.8 | 5°05.2 | · · 01.4 | 79°11.0 | · · 08.6 | | 5°11.7 | · · 24.4 | | 110°12.6 | · · 59.6 | | | | | Alnilam | 275°36.9 | -1°11.1 |
| 16 | 138°02.3 | 20°04.6 | 00.9 | 94°11.6 | 09.2 | | 20°13.7 | 24.4 | | 125°14.9 | 59.6 | | | | | Betelgeuse | 270°51.2 | 7°24.7 |
| 17 | 153°04.7 | 35°03.9 | 23°00.4 | 109°12.3 | 09.7 | | 35°15.6 | 24.3 | | 140°17.2 | 59.7 | | | | | Canopus | 263°52.4 | -52°42.6 |
| 18 | 168°07.2 | 50°03.2 | N22°59.9 | 124°12.9 | N16°10.3 | | 50°17.5 | N21°24.2 | | 155°19.5 | N02°59.8 | | | | | Sirius | 258°25.5 | -16°45.2 |
| 19 | 183°09.6 | 65°02.6 | 59.3 | 139°13.6 | 10.8 | | 65°19.5 | 24.1 | | 170°21.8 | 59.8 | | | | | Adhara | 255°05.3 | -29°00.6 |
| 20 | 198°12.1 | 80°01.9 | 58.8 | 154°14.2 | 11.4 | | 80°21.4 | 24.0 | | 185°24.1 | 59.9 | | | | | Procyon | 244°49.9 | 5°09.4 |
| 21 | 213°14.6 | 95°01.3 | · · 58.2 | 169°14.9 | · · 11.9 | | 95°23.4 | · · 23.9 | | 200°26.4 | 02°59.9 | | | | | Pollux | 243°16.2 | 27°57.8 |
| 22 | 228°17.0 | 110°00.6 | 57.7 | 184°15.5 | 12.5 | | 110°25.3 | 23.8 | | 215°28.6 | 03°00.0 | | | | | Avior | 234°14.7 | -59°35.9 |
| 23 | 243°19.5 | 125°00.0 | 57.2 | 199°16.1 | 13.0 | | 125°27.2 | 23.7 | | 230°30.9 | 00.1 | | | | | Suhail | 222°45.7 | -43°32.6 |
| Mer.pass. 06:49 | | | ν-0.7' d-0.5' m-3.97 | | | ν0.6' d0.6' m1.28 | | | ν1.9' d-0.1' m-1.86 | | | ν2.3' d0.1' m0.85 | | | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | | | | |
| 0 | 258°22.0 | 139°59.3 | N22°56.6 | 214°16.8 | N16°13.6 | | 140°29.2 | N21°23.6 | | 245°33.2 | N03°00.1 | | | | | Miaplacidus | 221°38.6 | -69°49.8 |
| 1 | 273°24.4 | 154°58.6 | 56.1 | 229°17.4 | 14.1 | | 155°31.1 | 23.5 | | 260°35.5 | 00.2 | | | | | Alphard | 217°46.8 | -8°46.5 |
| 2 | 288°26.9 | 169°58.0 | 55.5 | 244°18.1 | 14.7 | | 170°33.1 | 23.5 | | 275°37.8 | 00.3 | | | | | Regulus | 207°33.3 | 11°50.3 |
| 3 | 303°29.4 | 184°57.3 | · · 55.0 | 259°18.7 | · · 15.2 | | 185°35.0 | · · 23.4 | | 290°40.1 | · · 00.3 | | | | | Dubhe | 193°39.6 | 61°36.7 |
| 4 | 318°31.8 | 199°56.7 | 54.5 | 274°19.4 | 15.8 | | 200°36.9 | 23.3 | | 305°42.4 | 00.4 | | | | | Denebola | 182°23.7 | 14°25.5 |
| 5 | 333°34.3 | 214°56.0 | 53.9 | 289°20.0 | 16.3 | | 215°38.9 | 23.2 | | 320°44.7 | 00.4 | | | | | Gienah | 175°42.3 | -17°41.5 |
| 6 | 348°36.8 | 229°55.4 | N22°53.4 | 304°20.6 | N16°16.9 | | 230°40.8 | N21°23.1 | | 335°47.0 | N03°00.5 | | | | | Acrux | 172°58.6 | -63°15.1 |
| 7 | 3°39.2 | 244°54.7 | 52.8 | 319°21.3 | 17.4 | | 245°42.8 | 23.0 | | 350°49.3 | 00.6 | | | | | Gacrux | 171°50.2 | -57°16.0 |
| 8 | 18°41.7 | 259°54.1 | 52.3 | 334°21.9 | 18.0 | | 260°44.7 | 22.9 | | 5°51.6 | 00.6 | | | | | Alioth | 166°11.7 | 55°49.2 |
| 9 | 33°44.1 | 274°53.4 | · · 51.7 | 349°22.6 | · · 18.5 | | 275°46.6 | · · 22.8 | | 20°53.9 | · · 00.7 | | | | | Spica | 158°20.9 | -11°18.1 |
| 10 | 48°46.6 | 289°52.8 | 51.2 | 4°23.2 | 19.1 | | 290°48.6 | 22.7 | | 35°56.1 | 00.8 | | | | | Alkaid | 152°50.8 | 49°11.0 |
| 11 | 63°49.1 | 304°52.1 | 50.6 | 19°23.9 | 19.6 | | 305°50.5 | 22.6 | | 50°58.4 | 00.8 | | | | | Hadar | 148°33.9 | -60°30.3 |
| 12 | 78°51.5 | 319°51.5 | N22°50.1 | 34°24.5 | N16°20.2 | | 320°52.5 | N21°22.6 | | 66°00.7 | N03°00.9 | | | | | Menkent | 147°56.0 | -36°30.2 |
| 13 | 93°54.0 | 334°50.8 | 49.5 | 49°25.1 | 20.7 | | 335°54.4 | 22.5 | | 81°03.0 | 00.9 | | | | | Arcturus | 145°46.6 | 19°02.7 |
| 14 | 108°56.5 | 349°50.2 | 49.0 | 64°25.8 | 21.2 | | 350°56.3 | 22.4 | | 96°05.3 | 01.0 | | | | | Rigil Kent. | 139°38.2 | -60°56.9 |
| 15 | 123°58.9 | 4°49.5 | · · 48.4 | 79°26.4 | · · 21.8 | | 5°58.3 | · · 22.3 | | 111°07.6 | · · 01.1 | | | | | Kochab | 137°18.9 | 74°02.9 |
| 16 | 139°01.4 | 19°48.9 | 47.8 | 94°27.1 | 22.3 | | 21°00.2 | 22.2 | | 126°09.9 | 01.1 | | | | | Zuben'ubi | 136°54.4 | -16°09.2 |
| 17 | 154°03.9 | 34°48.3 | 47.3 | 109°27.7 | 22.9 | | 36°02.2 | 22.1 | | 141°12.2 | 01.2 | | | | | Alphecca | 126°02.4 | 26°37.5 |
| 18 | 169°06.3 | 49°47.6 | N22°46.7 | 124°28.4 | N16°23.4 | | 51°04.1 | N21°22.0 | | 156°14.5 | N03°01.2 | | | | | Antares | 112°14.0 | -26°29.5 |
| 19 | 184°08.8 | 64°47.0 | 46.2 | 139°29.0 | 24.0 | | 66°06.0 | 21.9 | | 171°16.8 | 01.3 | | | | | Atria | 107°06.6 | -69°04.5 |
| 20 | 199°11.3 | 79°46.3 | 45.6 | 154°29.6 | 24.5 | | 81°08.0 | 21.8 | | 186°19.1 | 01.4 | | | | | Sabik | 102°01.1 | -15°45.5 |
| 21 | 214°13.7 | 94°45.7 | · · 45.0 | 169°30.3 | · · 25.0 | | 96°09.9 | · · 21.7 | | 201°21.4 | · · 01.4 | | | | | Shaula | 96°08.4 | -37°07.4 |
| 22 | 229°16.2 | 109°45.0 | 44.5 | 184°30.9 | 25.6 | | 111°11.8 | 21.6 | | 216°23.7 | 01.5 | | | | | Rasalhague | 95°57.1 | 12°32.4 |
| 23 | 244°18.6 | 124°44.4 | 43.9 | 199°31.6 | 26.1 | | 126°13.8 | 21.5 | | 231°26.0 | 01.5 | | | | | Eltanin | 90°41.1 | 51°29.0 |
| Mer.pass. 06:45 | | | ν-0.7' d-0.5' m-3.97 | | | ν0.6' d0.5' m1.28 | | | ν1.9' d-0.1' m-1.85 | | | ν2.3' d0.1' m0.85 | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | | | | |
| 0 | 259°21.1 | 139°43.8 | N22°43.4 | 214°32.2 | N16°26.7 | | 141°15.7 | N21°21.5 | | 246°28.3 | N03°01.6 | | | | | Jun 09 Tue | SHA | Mer.pass |
| 1 | 274°23.6 | 154°43.1 | 42.8 | 229°32.8 | 27.2 | | 156°17.7 | 21.4 | | 261°30.5 | 01.7 | | | | | Venus | 242°52.3 | 14:40 |
| 2 | 289°26.0 | 169°42.5 | 42.2 | 244°33.5 | 27.8 | | 171°19.6 | 21.3 | | 276°32.8 | 01.7 | | | | | Mars | 316°38.5 | 09:43 |
| 3 | 304°28.5 | 184°41.8 | · · 41.7 | 259°34.1 | · · 28.3 | | 186°21.5 | · · 21.2 | | 291°35.1 | · · 01.8 | | | | | Jupiter | 242°19.8 | 14:39 |
| 4 | 319°31.0 | 199°41.2 | 41.1 | 274°34.8 | 28.8 | | 201°23.5 | 21.1 | | 306°37.4 | 01.9 | | | | | Saturn | 347°15.4 | 07:40 |
| 5 | 334°33.4 | 214°40.6 | 40.5 | 289°35.4 | 29.4 | | 216°25.4 | 21.0 | | 321°39.7 | 01.9 | | | | | | | |
| 6 | 349°35.9 | 229°39.9 | N22°39.9 | 304°36.1 | N16°29.9 | | 231°27.3 | N21°20.9 | | 336°42.0 | N03°02.0 | | | | | Jun 10 Wed | SHA | Mer.pass |
| 7 | 4°38.4 | 244°39.3 | 39.4 | 319°36.7 | 30.5 | | 246°29.3 | 20.8 | | 351°44.3 | 02.0 | | | | | Venus | 241°37.3 | 14:41 |
| 8 | 19°40.8 | 259°38.7 | 38.8 | 334°37.3 | 31.0 | | 261°31.2 | 20.7 | | 6°46.6 | 02.1 | | | | | Mars | 315°54.8 | 09:42 |
| 9 | 34°43.3 | 274°38.0 | · · 38.2 | 349°38.0 | · · 31.5 | | 276°33.2 | · · 20.6 | | 21°48.9 | · · 02.2 | | | | | Jupiter | 242°07.2 | 14:36 |
| 10 | 49°45.7 | 289°37.4 | 37.6 | 4°38.6 | 32.1 | | 291°35.1 | 20.5 | | 36°51.2 | 02.2 | | | | | Saturn | 347°11.3 | 07:37 |
| 11 | 64°48.2 | 304°36.8 | 37.1 | 19°39.3 | 32.6 | | 306°37.0 | 20.5 | | 51°53.5 | 02.3 | | | | | | | |
| 12 | 79°50.7 | 319°36.1 | N22°36.5 | 34°39.9 | N16°33.1 | | 321°39.0 | N21°20.4 | | 66°55.8 | N03°02.3 | | | | | Jun 11 Thu | SHA | Mer.pass |
| 13 | 94°53.1 | 334°35.5 | 35.9 | 49°40.5 | 33.7 | | 336°40.9 | 20.3 | | 81°58.1 | 02.4 | | | | | Venus | 240°22.7 | 14:42 |
| 14 | 109°55.6 | 349°34.9 | 35.3 | 64°41.2 | 34.2 | | 351°42.8 | 20.2 | | 97°00.4 | 02.5 | | | | | Mars | 315°11.1 | 09:41 |
| 15 | 124°58.1 | 4°34.2 | · · 34.8 | 79°41.8 | · · 34.8 | | 6°44.8 | · · 20.1 | | 112°02.7 | · · 02.5 | | | | | Jupiter | 241°54.6 | 14:33 |
| 16 | 140°00.5 | 19°33.6 | 34.2 | 94°42.5 | 35.3 | | 21°46.7 | 20.0 | | 127°05.0 | 02.6 | | | | | Saturn | 347°07.1 | 07:33 |
| 17 | 155°03.0 | 34°33.0 | 33.6 | 109°43.1 | 35.8 | | 36°48.7 | 19.9 | | 142°07.3 | 02.6 | | | | | | | |

| h | Sun | | | Moon | | | | |
|-----------------------|-----------|-----------|------------|-----------|-------|-----------|--------|-------|
| Tue | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180° 12.7 | N22° 54.8 | | 262° 29.4 | 14.2' | S00° 06.8 | -15.6' | 57.3' |
| 1 | 195° 12.5 | 55.0 | | 277° 02.6 | 14.2' | N00° 08.7 | 15.6' | 57.3' |
| 2 | 210° 12.4 | 55.3 | | 291° 35.8 | 14.1' | 00° 24.3 | 15.6' | 57.4 |
| 3 | 225° 12.3 | · · 55.5 | | 306° 08.9 | 14.1' | 00° 39.9 | 15.6' | 57.4' |
| 4 | 240° 12.2 | 55.7 | | 320° 42.0 | 14.1' | 00° 55.5 | 15.6' | 57.4' |
| 5 | 255° 12.0 | 55.9 | | 335° 15.1 | 14.0' | 01° 11.1 | 15.6' | 57.5' |
| 6 | 270° 11.9 | N22° 56.1 | | 349° 48.1 | 14.0' | N01° 26.8 | 15.7' | 57.5' |
| 7 | 285° 11.8 | 56.3 | | 4° 21.1 | 13.9' | 01° 42.5 | 15.7' | 57.6' |
| 8 | 300° 11.7 | 56.5 | | 18° 54.0 | 13.9' | 01° 58.1 | 15.7' | 57.6' |
| 9 | 315° 11.5 | · · 56.7 | | 33° 26.9 | 13.8' | 02° 13.8 | 15.7' | 57.6' |
| 10 | 330° 11.4 | 56.9 | | 47° 59.7 | 13.8' | 02° 29.5 | 15.7' | 57.7' |
| 11 | 345° 11.3 | 57.1 | | 62° 32.5 | 13.7' | 02° 45.2 | 15.7' | 57.7' |
| 12 | 0° 11.2 | N22° 57.3 | | 77° 05.2 | 13.7' | N03° 01.0 | 15.7' | 57.7' |
| 13 | 15° 11.1 | 57.5 | | 91° 37.9 | 13.6' | 03° 16.7 | 15.7' | 57.8' |
| 14 | 30° 10.9 | 57.7 | | 106° 10.5 | 13.6' | 03° 32.4 | 15.7' | 57.8' |
| 15 | 45° 10.8 | · · 57.9 | | 120° 43.1 | 13.5' | 03° 48.2 | 15.7' | 57.9' |
| 16 | 60° 10.7 | 58.1 | | 135° 15.6 | 13.4' | 04° 03.9 | 15.7' | 57.9' |
| 17 | 75° 10.6 | 58.3 | | 149° 48.0 | 13.4' | 04° 19.6 | 15.7' | 57.9' |
| 18 | 90° 10.4 | N22° 58.5 | | 164° 20.4 | 13.3' | N04° 35.4 | 15.7' | 58.0' |
| 19 | 105° 10.3 | 58.7 | | 178° 52.7 | 13.2' | 04° 51.1 | 15.7' | 58.0' |
| 20 | 120° 10.2 | 58.9 | | 193° 24.9 | 13.2' | 05° 06.9 | 15.7' | 58.0' |
| 21 | 135° 10.1 | · · 59.1 | | 207° 57.1 | 13.1' | 05° 22.6 | 15.7' | 58.1' |
| 22 | 150° 09.9 | 59.3 | | 222° 29.2 | 13.0' | 05° 38.4 | 15.7' | 58.1' |
| 23 | 165° 09.8 | 59.5 | | 237° 01.3 | 13.0' | 05° 54.1 | 15.7' | 58.2' |
| SD = 15.8' $d = 0.2'$ | | | SD = 15.6' | | | | | |

| Wed | GHA | Dec | GHA | ν | Dec | d | HP |
|-----------------------|-----------|-----------|------------|-------|-----------|-------|-------|
| 0 | 180° 09.7 | N22° 59.7 | 251° 33.2 | 12.9' | N06° 09.8 | 15.7' | 58.2' |
| 1 | 195° 09.6 | 22° 59.9 | 266° 05.1 | 12.8' | 06° 25.6 | 15.7' | 58.2' |
| 2 | 210° 09.4 | 23° 00.1 | 280° 37.0 | 12.7' | 06° 41.3 | 15.7' | 58.3' |
| 3 | 225° 09.3 | · · 00.3 | 295° 08.7 | 12.7' | 06° 57.0 | 15.7' | 58.3' |
| 4 | 240° 09.2 | 00.5 | 309° 40.4 | 12.6' | 07° 12.7 | 15.7' | 58.4' |
| 5 | 255° 09.1 | 00.7 | 324° 12.0 | 12.5' | 07° 28.4 | 15.7' | 58.4' |
| 6 | 270° 08.9 | N23° 00.9 | 338° 43.5 | 12.4' | N07° 44.0 | 15.6' | 58.4' |
| 7 | 285° 08.8 | 01.1 | 353° 14.9 | 12.4' | 07° 59.7 | 15.6' | 58.5' |
| 8 | 300° 08.7 | 01.2 | 7° 46.3 | 12.3' | 08° 15.3 | 15.6' | 58.5' |
| 9 | 315° 08.6 | · · 01.4 | 22° 17.5 | 12.2' | 08° 30.9 | 15.6' | 58.6' |
| 10 | 330° 08.4 | 01.6 | 36° 48.7 | 12.1' | 08° 46.5 | 15.6' | 58.6' |
| 11 | 345° 08.3 | 01.8 | 51° 19.8 | 12.0' | 09° 02.1 | 15.5' | 58.6' |
| 12 | 0° 08.2 | N23° 02.0 | 65° 50.8 | 11.9' | N09° 17.6 | 15.5' | 58.7' |
| 13 | 15° 08.1 | 02.2 | 80° 21.7 | 11.8' | 09° 33.1 | 15.5' | 58.7' |
| 14 | 30° 07.9 | 02.4 | 94° 52.6 | 11.7' | 09° 48.6 | 15.5' | 58.7' |
| 15 | 45° 07.8 | · · 02.5 | 109° 23.3 | 11.6' | 10° 04.1 | 15.4' | 58.8' |
| 16 | 60° 07.7 | 02.7 | 123° 53.9 | 11.5' | 10° 19.5 | 15.4' | 58.8' |
| 17 | 75° 07.5 | 02.9 | 138° 24.5 | 11.4' | 10° 35.0 | 15.4' | 58.9' |
| 18 | 90° 07.4 | N23° 03.1 | 152° 54.9 | 11.3' | N10° 50.3 | 15.3' | 58.9' |
| 19 | 105° 07.3 | 03.3 | 167° 25.3 | 11.2' | 11° 05.7 | 15.3' | 58.9' |
| 20 | 120° 07.2 | 03.5 | 181° 55.5 | 11.1' | 11° 21.0 | 15.3' | 59.0' |
| 21 | 135° 07.0 | · · 03.6 | 196° 25.7 | 11.0' | 11° 36.2 | 15.2' | 59.0' |
| 22 | 150° 06.9 | 03.8 | 210° 55.7 | 10.9' | 11° 51.5 | 15.2' | 59.0' |
| 23 | 165° 06.8 | 04.0 | 225° 25.6 | 10.8' | 12° 06.7 | 15.1' | 59.1' |
| SD = 15.7' $d = 0.2'$ | | | SD = 15.9' | | | | |

| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 180°06.7 | N23°04.2 | 239°55.5 | 10.7' | N12°21.8 | 15.1' | 59.1' |
| 1 | 195°06.5 | 04.3 | 254°25.2 | 10.6' | 12°36.9 | 15.1' | 59.2' |
| 2 | 210°06.4 | 04.5 | 268°54.8 | 10.5' | 12°51.9 | 15.0' | 59.2' |
| 3 | 225°06.3 | · · 04.7 | 283°24.3 | 10.4' | 13°06.9 | 15.0' | 59.2' |
| 4 | 240°06.1 | 04.9 | 297°53.7 | 10.3' | 13°21.9 | 14.9' | 59.3' |
| 5 | 255°06.0 | 05.0 | 312°23.0 | 10.2' | 13°36.8 | 14.8' | 59.3' |
| 6 | 270°05.9 | N23°05.2 | 326°52.2 | 10.1' | N13°51.6 | 14.8' | 59.3' |
| 7 | 285°05.8 | 05.4 | 341°21.2 | 9.9' | 14°06.4 | 14.7' | 59.4' |
| 8 | 300°05.6 | 05.6 | 355°50.2 | 9.8' | 14°21.2 | 14.7' | 59.4' |
| 9 | 315°05.5 | · · 05.7 | 10°19.0 | 9.7' | 14°35.8 | 14.6' | 59.5' |
| 10 | 330°05.4 | 05.9 | 24°47.7 | 9.6' | 14°50.4 | 14.5' | 59.5' |
| 11 | 345°05.3 | 06.1 | 39°16.3 | 9.5' | 15°05.0 | 14.5' | 59.5' |
| 12 | 0°05.1 | N23°06.3 | 53°44.7 | 9.3' | N15°19.5 | 14.4' | 59.6' |
| 13 | 15°05.0 | 06.4 | 68°13.1 | 9.2' | 15°33.9 | 14.3' | 59.6' |
| 14 | 30°04.9 | 06.6 | 82°41.3 | 9.1' | 15°48.2 | 14.3' | 59.6' |
| 15 | 45°04.7 | · · 06.8 | 97°09.4 | 9.0' | 16°02.5 | 14.2' | 59.7' |
| 16 | 60°04.6 | 06.9 | 111°37.4 | 8.8' | 16°16.7 | 14.1' | 59.7' |
| 17 | 75°04.5 | 07.1 | 126°05.2 | 8.7' | 16°30.8 | 14.0' | 59.7' |
| 18 | 90°04.3 | N23°07.3 | 140°32.9 | 8.6' | N16°44.9 | 14.0' | 59.8' |
| 19 | 105°04.2 | 07.4 | 155°00.5 | 8.5' | 16°58.8 | 13.9' | 59.8' |
| 20 | 120°04.1 | 07.6 | 169°27.9 | 8.3' | 17°12.7 | 13.8' | 59.8' |
| 21 | 135°04.0 | · · 07.7 | 183°55.3 | 8.2' | 17°26.5 | 13.7' | 59.9' |
| 22 | 150°03.8 | 07.9 | 198°22.5 | 8.1' | 17°40.2 | 13.6' | 59.9' |
| 23 | 165°03.7 | 08.1 | 212°49.5 | 7.9' | 17°53.8 | 13.5' | 60.0' |
| SD = 15.7' $d = 0.2'$ | | | SD = 16.1' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | □ | □ | □ | □ | □ | □ |
| 66° | //// | //// | 00:28 | 23:37 | //// | //// |
| 64° | //// | //// | 01:39 | 22:21 | //// | //// |
| 62° | //// | //// | 02:14 | 21:46 | //// | //// |
| 60° | //// | 01:03 | 02:39 | 21:21 | 22:58 | //// |
| N 58° | //// | 01:46 | 02:59 | 21:01 | 22:14 | //// |
| 56° | //// | 02:14 | 03:15 | 20:45 | 21:46 | //// |
| 54° | 00:57 | 02:35 | 03:29 | 20:31 | 21:24 | 23:04 |
| 52° | 01:37 | 02:53 | 03:41 | 20:19 | 21:07 | 22:23 |
| 50° | 02:03 | 03:07 | 03:51 | 20:08 | 20:52 | 21:56 |
| 45° | 02:47 | 03:36 | 04:13 | 19:46 | 20:23 | 21:12 |
| N 40° | 03:17 | 03:58 | 04:31 | 19:28 | 20:01 | 20:42 |
| 35° | 03:40 | 04:16 | 04:46 | 19:14 | 19:43 | 20:20 |
| 30° | 03:58 | 04:31 | 04:58 | 19:01 | 19:28 | 20:01 |
| 20° | 04:26 | 04:55 | 05:20 | 18:39 | 19:04 | 19:33 |
| N 10° | 04:49 | 05:16 | 05:39 | 18:20 | 18:43 | 19:10 |
| 0° | 05:07 | 05:33 | 05:56 | 18:03 | 18:26 | 18:52 |
| S 10° | 05:24 | 05:50 | 06:13 | 17:46 | 18:09 | 18:35 |
| 20° | 05:40 | 06:07 | 06:31 | 17:28 | 17:52 | 18:19 |
| 30° | 05:56 | 06:26 | 06:52 | 17:07 | 17:33 | 18:03 |
| 35° | 06:04 | 06:36 | 07:04 | 16:55 | 17:23 | 17:54 |
| 40° | 06:14 | 06:47 | 07:18 | 16:41 | 17:11 | 17:45 |
| 45° | 06:24 | 07:01 | 07:34 | 16:24 | 16:58 | 17:35 |
| S 50° | 06:35 | 07:16 | 07:55 | 16:04 | 16:42 | 17:24 |
| 52° | 06:40 | 07:24 | 08:04 | 15:54 | 16:35 | 17:19 |
| 54° | 06:46 | 07:32 | 08:15 | 15:44 | 16:27 | 17:13 |
| 56° | 06:52 | 07:40 | 08:27 | 15:31 | 16:18 | 17:07 |
| 58° | 06:58 | 07:50 | 08:42 | 15:17 | 16:08 | 17:00 |
| S 60° | 07:05 | 08:02 | 08:59 | 15:00 | 15:57 | 16:53 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------------|----------------------------------|----------------|---------|-------|-------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | 00:32 23:58 | 23:15 | 21:45 | 13:35 | 15:58 | 19:17 |
| N 70° | 00:32 | 00:06 23:35 00:13 23:51 | 22:44 | 13:31 | 15:41 | 18:20 |
| 68° | 00:32 | 00:19 23:44 | 23:19 | 13:27 | 15:27 | 17:46 |
| 66° | 00:32 | 00:19 | 00:04 23:44 | 13:23 | 15:16 | 17:22 |
| 64° | 00:32 | 00:24 | 00:15 | 13:21 | 15:07 | 17:04 |
| 62° | 00:32 | 00:28 | 00:24 | 13:18 | 14:59 | 16:49 |
| 60° | 00:32 | 00:32 | 00:32 | 13:16 | 14:52 | 16:36 |
| N 58° | 00:32 | 00:35 | 00:40 | 13:14 | 14:46 | 16:25 |
| 56° | 00:32 | 00:38 | 00:46 | 13:13 | 14:41 | 16:16 |
| 54° | 00:32 | 00:41 | 00:52 | 13:11 | 14:37 | 16:08 |
| 52° | 00:32 | 00:43 | 00:57 | 13:10 | 14:32 | 16:00 |
| 50° | 00:32 | 00:46 | 01:01 | 13:09 | 14:29 | 15:54 |
| 45° | 00:32 | 00:50 | 01:12 | 13:06 | 14:21 | 15:39 |
| N 40° | 00:32 | 00:55 | 01:20 | 13:04 | 14:14 | 15:28 |
| 35° | 00:32 | 00:58 | 01:28 | 13:02 | 14:08 | 15:18 |
| 30° | 00:32 | 01:01 | 01:34 | 13:00 | 14:03 | 15:09 |
| 20° | 00:31 | 01:07 | 01:46 | 12:58 | 13:54 | 14:54 |
| N 10° | 00:31 | 01:12 | 01:56 | 12:55 | 13:46 | 14:42 |
| 0° | 00:31 | 01:17 | 02:05 | 12:53 | 13:39 | 14:30 |
| S 10° | 00:32 | 01:22 | 02:15 | 12:50 | 13:32 | 14:18 |
| 20° | 00:32 | 01:27 | 02:25 | 12:48 | 13:25 | 14:05 |
| 30° | 00:32 | 01:33 | 02:37 | 12:45 | 13:16 | 13:51 |
| 35° | 00:32 | 01:36 | 02:44 | 12:43 | 13:11 | 13:42 |
| 40° | 00:32 | 01:40 | 02:52 | 12:41 | 13:05 | 13:33 |
| 45° | 00:32 | 01:44 | 03:01 | 12:39 | 12:59 | 13:22 |
| S 50° | 00:32 | 01:50 | 03:13 | 12:37 | 12:51 | 13:09 |
| 52° | 00:32 | 01:53 | 03:18 | 12:36 | 12:48 | 13:02 |
| 54° | 00:32 | 01:55 | 03:24 | 12:34 | 12:44 | 12:56 |
| 56° | 00:32 | 01:58 | 03:30 | 12:33 | 12:40 | 12:48 |
| 58° | 00:32 | 02:02 | 03:38 | 12:31 | 12:35 | 12:40 |
| S 60° | 00:32 | 02:06 | 03:46 | 12:30 | 12:30 | 12:30 |

| Day | Sun | | Mer. Pass hh:mm | Moon | | Age 24-26 44-23% |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|------------------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 09 | 00:51 | 00:45 | 11:59 | 06:42 | 19:05 | |
| 10 | 00:39 | 00:33 | 11:59 | 07:28 | 19:52 | |
| 11 | 00:27 | 00:20 | 12:00 | 08:17 | 20:44 | |

June 12, 13, 14 UT (Fri., Sat., Sun.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------|----------|----------------------|----------|-------------------|----------|---------------------|----------|-------------------|----------|-----------|----------|----------------------|----------|-------------------|----------|
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 260°20.2 | 139°28.6 | N22°29.5 | 214°47.6 | N16°39.6 | 142°02.2 | N21°19.3 | 247°23.3 | N03°03.1 | 260°20.2 | 139°28.6 | N22°29.5 | 214°47.6 | N16°39.6 | 142°02.2 |
| 1 | 275°22.7 | 154°27.9 | 28.9 | 229°48.2 | 40.1 | 157°04.1 | 19.2 | 262°25.6 | 03.1 | 275°22.7 | 154°27.9 | 28.9 | 229°48.2 | 40.1 | 157°04.1 |
| 2 | 290°25.2 | 169°27.3 | 28.3 | 244°48.9 | 40.7 | 172°06.1 | 19.1 | 277°27.9 | 03.2 | 290°25.2 | 169°27.3 | 28.3 | 244°48.9 | 40.7 | 172°06.1 |
| 3 | 305°27.6 | 184°26.7 | · · 27.7 | 259°49.5 | · · 41.2 | 187°08.0 | · · 19.0 | 292°30.2 | · · 03.2 | 305°27.6 | 184°26.7 | · · 27.7 | 259°49.5 | · · 41.2 | 187°08.0 |
| 4 | 320°30.1 | 199°26.1 | 27.1 | 274°50.1 | 41.7 | 202°09.9 | 18.9 | 307°32.5 | 03.3 | 320°30.1 | 199°26.1 | 27.1 | 274°50.1 | 41.7 | 202°09.9 |
| 5 | 335°32.6 | 214°25.4 | 26.5 | 289°50.8 | 42.3 | 217°11.9 | 18.8 | 322°34.8 | 03.3 | 335°32.6 | 214°25.4 | 26.5 | 289°50.8 | 42.3 | 217°11.9 |
| 6 | 350°35.0 | 229°24.8 | N22°25.9 | 304°51.4 | N16°42.8 | 232°13.8 | N21°18.7 | 337°37.1 | N03°03.4 | 350°35.0 | 229°24.8 | N22°25.9 | 304°51.4 | N16°42.8 | 232°13.8 |
| 7 | 5°37.5 | 244°24.2 | 25.3 | 319°52.1 | 43.3 | 247°15.7 | 18.6 | 352°39.4 | 03.5 | 5°37.5 | 244°24.2 | 25.3 | 319°52.1 | 43.3 | 247°15.7 |
| 8 | 20°40.0 | 259°23.6 | 24.7 | 334°52.7 | 43.9 | 262°17.7 | 18.5 | 7°41.7 | 03.5 | 20°40.0 | 259°23.6 | 24.7 | 334°52.7 | 43.9 | 262°17.7 |
| 9 | 35°42.4 | 274°22.9 | · · 24.1 | 349°53.3 | · · 44.4 | 277°19.6 | · · 18.4 | 22°44.0 | · · 03.6 | 35°42.4 | 274°22.9 | · · 24.1 | 349°53.3 | · · 44.4 | 277°19.6 |
| 10 | 50°44.9 | 289°22.3 | 23.5 | 4°54.0 | 44.9 | 292°21.6 | 18.3 | 37°46.3 | 03.6 | 50°44.9 | 289°22.3 | 23.5 | 4°54.0 | 44.9 | 292°21.6 |
| 11 | 65°47.4 | 304°21.7 | 22.9 | 19°54.6 | 45.4 | 307°23.5 | 18.2 | 52°48.6 | 03.7 | 65°47.4 | 304°21.7 | 22.9 | 19°54.6 | 45.4 | 307°23.5 |
| 12 | 80°49.8 | 319°21.1 | N22°22.3 | 34°55.3 | N16°46.0 | 322°25.4 | N21°18.1 | 67°50.9 | N03°03.8 | 80°49.8 | 319°21.1 | N22°22.3 | 34°55.3 | N16°46.0 | 322°25.4 |
| 13 | 95°52.3 | 334°20.5 | 21.7 | 49°55.9 | 46.5 | 337°27.4 | 18.0 | 82°53.2 | 03.8 | 95°52.3 | 334°20.5 | 21.7 | 49°55.9 | 46.5 | 337°27.4 |
| 14 | 110°54.7 | 349°19.9 | 21.1 | 64°56.5 | 47.0 | 352°29.3 | 18.0 | 97°55.5 | 03.9 | 110°54.7 | 349°19.9 | 21.1 | 64°56.5 | 47.0 | 352°29.3 |
| 15 | 125°57.2 | 4°19.2 | · · 20.5 | 79°57.2 | · · 47.6 | 7°31.2 | · · 17.9 | 112°57.8 | · · 03.9 | 125°57.2 | 4°19.2 | · · 20.5 | 79°57.2 | · · 47.6 | 7°31.2 |
| 16 | 140°59.7 | 19°18.6 | 19.9 | 94°57.8 | 48.1 | 22°33.2 | 17.8 | 128°00.1 | 04.0 | 140°59.7 | 19°18.6 | 19.9 | 94°57.8 | 48.1 | 22°33.2 |
| 17 | 156°02.1 | 34°18.0 | 19.3 | 109°58.5 | 48.6 | 37°35.1 | 17.7 | 143°02.4 | 04.1 | 156°02.1 | 34°18.0 | 19.3 | 109°58.5 | 48.6 | 37°35.1 |
| 18 | 171°04.6 | 49°17.4 | N22°18.7 | 124°59.1 | N16°49.2 | 52°37.0 | N21°17.6 | 158°04.7 | N03°04.1 | 171°04.6 | 49°17.4 | N22°18.7 | 124°59.1 | N16°49.2 | 52°37.0 |
| 19 | 186°07.1 | 64°16.8 | 18.1 | 139°59.7 | 49.7 | 67°39.0 | 17.5 | 173°07.0 | 04.2 | 186°07.1 | 64°16.8 | 18.1 | 139°59.7 | 49.7 | 67°39.0 |
| 20 | 201°09.5 | 79°16.2 | 17.5 | 155°00.4 | 50.2 | 82°40.9 | 17.4 | 188°09.3 | 04.2 | 201°09.5 | 79°16.2 | 17.5 | 155°00.4 | 50.2 | 82°40.9 |
| 21 | 216°12.0 | 94°15.5 | · · 16.9 | 170°01.0 | · · 50.7 | 97°42.8 | · · 17.3 | 203°11.6 | · · 04.3 | 216°12.0 | 94°15.5 | · · 16.9 | 170°01.0 | · · 50.7 | 97°42.8 |
| 22 | 231°14.5 | 109°14.9 | 16.2 | 185°01.6 | 51.3 | 112°44.8 | 17.2 | 218°13.9 | 04.3 | 231°14.5 | 109°14.9 | 16.2 | 185°01.6 | 51.3 | 112°44.8 |
| 23 | 246°16.9 | 124°14.3 | 15.6 | 200°02.3 | 51.8 | 127°46.7 | 17.1 | 233°16.2 | 04.4 | 246°16.9 | 124°14.3 | 15.6 | 200°02.3 | 51.8 | 127°46.7 |
| Mer.pass. | 06:38 | ν-0.6' d-0.6' m-3.98 | | ν0.6' d0.5' m1.28 | | ν1.9' d-0.1' m-1.85 | | ν2.3' d0.1' m0.84 | | Mer.pass. | 06:38 | ν-0.6' d-0.6' m-3.98 | | ν0.6' d0.5' m1.28 | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 261°19.4 | 139°13.7 | N22°15.0 | 215°02.9 | N16°52.3 | 142°48.6 | N21°17.0 | 248°18.5 | N03°04.5 | 261°19.4 | 139°13.7 | N22°15.0 | 215°02.9 | N16°52.3 | 142°48.6 |
| 1 | 276°21.9 | 154°13.1 | 14.4 | 230°03.6 | 52.9 | 157°50.6 | 16.9 | 263°20.8 | 04.5 | 276°21.9 | 154°13.1 | 14.4 | 230°03.6 | 52.9 | 157°50.6 |
| 2 | 291°24.3 | 169°12.5 | 13.8 | 245°04.2 | 53.4 | 172°52.5 | 16.8 | 278°23.1 | 04.6 | 291°24.3 | 169°12.5 | 13.8 | 245°04.2 | 53.4 | 172°52.5 |
| 3 | 306°26.8 | 184°11.9 | · · 13.2 | 260°04.8 | · · 53.9 | 187°54.4 | · · 16.7 | 293°25.4 | · · 04.6 | 306°26.8 | 184°11.9 | · · 13.2 | 260°04.8 | · · 53.9 | 187°54.4 |
| 4 | 321°29.2 | 199°11.3 | 12.6 | 275°05.5 | 54.4 | 202°56.4 | 16.6 | 308°27.7 | 04.7 | 321°29.2 | 199°11.3 | 12.6 | 275°05.5 | 54.4 | 202°56.4 |
| 5 | 336°31.7 | 214°10.7 | 11.9 | 290°06.1 | 55.0 | 217°58.3 | 16.6 | 323°30.0 | 04.8 | 336°31.7 | 214°10.7 | 11.9 | 290°06.1 | 55.0 | 217°58.3 |
| 6 | 351°34.2 | 229°10.0 | N22°11.3 | 305°06.8 | N16°55.5 | 233°00.2 | N21°16.5 | 338°32.3 | N03°04.8 | 351°34.2 | 229°10.0 | N22°11.3 | 305°06.8 | N16°55.5 | 233°00.2 |
| 7 | 6°36.6 | 244°09.4 | 10.7 | 320°07.4 | 56.0 | 248°02.2 | 16.4 | 353°34.6 | 04.9 | 6°36.6 | 244°09.4 | 10.7 | 320°07.4 | 56.0 | 248°02.2 |
| 8 | 21°39.1 | 259°08.8 | 10.1 | 335°08.0 | 56.5 | 263°04.1 | 16.3 | 8°36.9 | 04.9 | 21°39.1 | 259°08.8 | 10.1 | 335°08.0 | 56.5 | 263°04.1 |
| 9 | 36°41.6 | 274°08.2 | · · 09.4 | 350°08.7 | · · 57.1 | 278°06.0 | · · 16.2 | 23°39.2 | · · 05.0 | 36°41.6 | 274°08.2 | · · 09.4 | 350°08.7 | · · 57.1 | 278°06.0 |
| 10 | 51°44.0 | 289°07.6 | 08.8 | 5°09.3 | 57.6 | 293°08.0 | 16.1 | 38°41.5 | 05.0 | 51°44.0 | 289°07.6 | 08.8 | 5°09.3 | 57.6 | 293°08.0 |
| 11 | 66°46.5 | 304°07.0 | 08.2 | 20°09.9 | 58.1 | 308°09.9 | 16.0 | 53°43.8 | 05.1 | 66°46.5 | 304°07.0 | 08.2 | 20°09.9 | 58.1 | 308°09.9 |
| 12 | 81°49.0 | 319°06.4 | N22°07.6 | 35°10.6 | N16°58.6 | 323°11.8 | N21°15.9 | 68°46.1 | N03°05.2 | 81°49.0 | 319°06.4 | N22°07.6 | 35°10.6 | N16°58.6 | 323°11.8 |
| 13 | 96°51.4 | 334°05.8 | 06.9 | 50°11.2 | 59.2 | 338°13.8 | 15.8 | 83°48.4 | 05.2 | 96°51.4 | 334°05.8 | 06.9 | 50°11.2 | 59.2 | 338°13.8 |
| 14 | 111°53.9 | 349°05.2 | 06.3 | 65°11.9 | 16°59.7 | 353°15.7 | 15.7 | 98°50.7 | 05.3 | 111°53.9 | 349°05.2 | 06.3 | 65°11.9 | 16°59.7 | 353°15.7 |
| 15 | 126°56.4 | 4°04.6 | · · 05.7 | 80°12.5 | 17°00.2 | 8°17.6 | · · 15.6 | 113°53.0 | · · 05.3 | 126°56.4 | 4°04.6 | · · 05.7 | 80°12.5 | 17°00.2 | 8°17.6 |
| 16 | 141°58.8 | 19°04.0 | 05.1 | 95°13.1 | 00.7 | 23°19.6 | 15.5 | 128°55.3 | 05.4 | 141°58.8 | 19°04.0 | 05.1 | 95°13.1 | 00.7 | 23°19.6 |
| 17 | 157°01.3 | 34°03.4 | 04.4 | 110°13.8 | 01.2 | 38°21.5 | 15.4 | 143°57.6 | 05.4 | 157°01.3 | 34°03.4 | 04.4 | 110°13.8 | 01.2 | 38°21.5 |
| 18 | 172°03.7 | 49°02.8 | N22°03.8 | 125°14.4 | N17°01.8 | 53°23.4 | N21°15.3 | 158°59.9 | N03°05.5 | 172°03.7 | 49°02.8 | N22°03.8 | 125°14.4 | N17°01.8 | 53°23.4 |
| 19 | 187°06.2 | 64°02.2 | 03.2 | 140°15.0 | 02.3 | 68°25.3 | 15.2 | 174°02.2 | 05.6 | 187°06.2 | 64°02.2 | 03.2 | 140°15.0 | 02.3 | 68°25.3 |
| 20 | 202°08.7 | 79°01.6 | 02.5 | 155°15.7 | 02.8 | 83°27.3 | 15.1 | 189°04.6 | 05.6 | 202°08.7 | 79°01.6 | 02.5 | 155°15.7 | 02.8 | 83°27.3 |
| 21 | 217°11.1 | 94°01.0 | · · 01.9 | 170°16.3 | · · 03.3 | 98°29.2 | · · 15.0 | 204°06.9 | · · 05.7 | 217°11.1 | 94°01.0 | · · 01.9 | 170°16.3 | · · 03.3 | 98°29.2 |
| 22 | 232°13.6 | 109°00.4 | 01.3 | 185°16.9 | 03.9 | 113°31.1 | 15.0 | 219°09.2 | 05.7 | 232°13.6 | 109°00.4 | 01.3 | 185°16.9 | 03.9 | 113°31.1 |
| 23 | 247°16.1 | 123°59.8 | 00.6 | 200°17.6 | 04.4 | 128°33.1 | 14.9 | 234°11.5 | 05.8 | 247°16.1 | 123°59.8 | 00.6 | 200°17.6 | 04.4 | 128°33.1 |
| Mer.pass. | 06:34 | ν-0.6' d-0.6' m-3.98 | | ν0.6' d0.5' m1.28 | | ν1.9' d-0.1' m-1.85 | | ν2.3' d0.1' m0.84 | | Mer.pass. | 06:34 | ν-0.6' d-0.6' m-3.98 | | ν0.6' d0.5' m1.28 | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 262°18.5 | 138°59.2 | N22°00.0 | 215°18.2 | N17°04.9 | 143°35.0 | N21°14.8 | 249°13.8 | N03°05.8 | 262°18.5 | 138°59.2 | N22°00.0 | 215°18.2 | N17°04.9 | 143°35.0 |
| 1 | 277°21.0 | 153°58.6 | 21°59.3 | 230°18.9 | 05.4 | 158°36.9 | 14.7 | 264°16.1 | 05.9 | 277°21.0 | 153°58.6 | 21°59.3 | 230°18.9 | 05.4 | 158°36.9 |
| 2 | 292°23.5 | 168°58.0 | 58.7 | 245°19.5 | 05.9 | 173°38.9 | 14.6 | 279°18.4 | 06.0 | 292°23.5 | 168°58.0 | 58.7 | 245°19.5 | 05.9 | 173°38.9 |
| 3 | 307°25.9 | 183°57.4 | · · 58.1 | 260°20.1 | · · 06.5 | 188°40.8 | · · 14.5 | 294°20.7 | · · 06.0 | 307°25.9 | 183°57.4 | · · 58.1 | 260°20.1 | · · 06.5 | 188°40.8 |
| 4 | 322°28.4 | 198°56.8 | 57.4 | 275°20.8 | 07.0 | 203°42.7 | 14.4 | 309°23.0 | 06.1 | 322°28.4 | 198°56.8 | 57.4 | 275°20.8 | 07.0 | 203°42.7 |
| 5 | 337°30.8 | 213°56.2 | 56.8 | 290°21.4 | 07.5 | 218°44.7 | 14.3 | 324°25.3 | 06.1 | 337°30.8 | 213°56.2 | 56.8 | 290°21.4 | 07.5 | 218°44.7 |
| 6 | 352°33.3 | 228°55.6 | N21°56.1 | 305°22.0 | N17°08.0 | 233°46.6 | N21°14.2 | 339°27.6 | N03°06.2 | 352°33.3 | 228°55.6 | N21°56.1 | 305°22.0 | N17°08.0 | 233°46.6 |
| 7 | 7°35.8 | 243°55.0 | 55.5 | 320°22.7 | 08.5 | 248°48.5 | 14.1 | 354°29.9 | 06.2 | 7°35.8 | 243°55.0 | 55.5 | 320°22.7 | 08.5 | 248°48.5 |
| 8 | 22°38.2 | 258°54.5 | 54.8 | 335°23.3 | 09.0 | 263°50.4 | 14.0 | 9°32.2 | 06.3 | 22°38.2 | 258°54.5 | 54.8 | 335°23.3 | 09.0 | 263°50.4 |
| 9 | 37°40.7 | 273°53.9 | · · 54.2 | 350°23.9 | · · 09.6 | 278°52.4 | · · 13.9 | 24°34.5 | · · 06.3 | 37°40.7 | 273°53.9 | · · 54.2 | 350°23.9 | · · 09.6 | 278°52.4 |
| 10 | 52°43.2 | 288°53.3 | 53.5 | 5°24.6 | 10.1 | 293°54.3 | 13.8 | 39°36.8 | 06.4 | 52°43.2 | 288°53.3 | 53.5 | 5°24.6 | 10.1 | 293°54.3 |
| 11 | 67°45.6 | 303°52.7 | 52.9 | 20°25.2 | 10.6 | 308°56.2 | 13.7 | 54°39.1 | 06.5 | 67°45.6 | 303°52.7 | 52.9 | 20°25.2 | 10.6 | 308°56.2 |
| 12 | 82°48.1 | 318°52.1 | N21°52.2 | 35°25.9 | N17°11.1 | 323°58.2 | N21°13.6 | 69°41.4 | N03°06.5 | 82°48.1 | 318°52.1 | N21°52.2 | 35°25.9 | N17°11.1 | 323°58.2 |
| 13 | 97°50.6 | 333°51.5 | 51.6 | 50°26.5 | 11.6 | 339°00.1 | | | | | | | | | |


| h | Sun | | | Moon | | | | |
|------------|----------|----------|------------|----------|-------|------------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| Fri | | | | | | | | |
| 0 | 180°03.6 | N23°08.2 | | 227°16.5 | 7.8' | N18°07.3 | 13.4' | 60.0' |
| 1 | 195°03.4 | 08.4 | | 241°43.3 | 7.7' | 18°20.8 | 13.3' | 60.0' |
| 2 | 210°03.3 | 08.5 | | 256°09.9 | 7.5' | 18°34.1 | 13.2' | 60.1' |
| 3 | 225°03.2 | · · 08.7 | | 270°36.4 | 7.4' | 18°47.4 | 13.1' | 60.1' |
| 4 | 240°03.1 | 08.9 | | 285°02.8 | 7.3' | 19°00.5 | 13.0' | 60.1' |
| 5 | 255°02.9 | 09.0 | | 299°29.1 | 7.1' | 19°13.5 | 12.9' | 60.1' |
| 6 | 270°02.8 | N23°09.2 | | 313°55.2 | 7.0' | N19°26.5 | 12.8' | 60.2' |
| 7 | 285°02.7 | 09.3 | | 328°21.2 | 6.8' | 19°39.3 | 12.7' | 60.2' |
| 8 | 300°02.5 | 09.5 | | 342°47.0 | 6.7' | 19°52.0 | 12.6' | 60.2' |
| 9 | 315°02.4 | · · 09.6 | | 357°12.7 | 6.6' | 20°04.6 | 12.5' | 60.3' |
| 10 | 330°02.3 | 09.8 | | 11°38.3 | 6.4' | 20°17.1 | 12.4' | 60.3' |
| 11 | 345°02.1 | 10.0 | | 26°03.7 | 6.3' | 20°29.5 | 12.3' | 60.3' |
| 12 | 0°02.0 | N23°10.1 | | 40°29.0 | 6.2' | N20°41.8 | 12.1' | 60.4' |
| 13 | 15°01.9 | 10.3 | | 54°54.2 | 6.0' | 20°53.9 | 12.0' | 60.4' |
| 14 | 30°01.8 | 10.4 | | 69°19.2 | 5.9' | 21°05.9 | 11.9' | 60.4' |
| 15 | 45°01.6 | · · 10.6 | | 83°44.1 | 5.7' | 21°17.8 | 11.8' | 60.4' |
| 16 | 60°01.5 | 10.7 | | 98°08.8 | 5.6' | 21°29.6 | 11.6' | 60.5' |
| 17 | 75°01.4 | 10.9 | | 112°33.4 | 5.5' | 21°41.2 | 11.5' | 60.5' |
| 18 | 90°01.2 | N23°11.0 | | 126°57.9 | 5.3' | N21°52.7 | 11.4' | 60.5' |
| 19 | 105°01.1 | 11.2 | | 141°22.2 | 5.2' | 22°04.0 | 11.2' | 60.6' |
| 20 | 120°01.0 | 11.3 | | 155°46.3 | 5.0' | 22°15.3 | 11.1' | 60.6' |
| 21 | 135°00.8 | · · 11.4 | | 170°10.4 | 4.9' | 22°26.3 | 10.9' | 60.6' |
| 22 | 150°00.7 | 11.6 | | 184°34.3 | 4.8' | 22°37.3 | 10.8' | 60.6' |
| 23 | 165°00.6 | 11.7 | | 198°58.1 | 4.6' | 22°48.1 | 10.7' | 60.7' |
| SD = 15.7' | | | $d = 0.2'$ | | | SD = 16.4' | | |

| Sat | Sun | | | Moon | | | | |
|------------|----------|----------|------------|----------|-------|------------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°00.4 | N23°11.9 | | 213°21.7 | 4.5' | N22°58.7 | 10.5' | 60.7' |
| 1 | 195°00.3 | 12.0 | | 227°45.2 | 4.4' | 23°09.2 | 10.3' | 60.7' |
| 2 | 210°00.2 | 12.2 | | 242°08.5 | 4.2' | 23°19.6 | 10.2' | 60.7' |
| 3 | 225°00.0 | · · 12.3 | | 256°31.8 | 4.1' | 23°29.8 | 10.0' | 60.8' |
| 4 | 239°59.9 | 12.4 | | 270°54.9 | 4.0' | 23°39.8 | 9.9' | 60.8' |
| 5 | 254°59.8 | 12.6 | | 285°17.8 | 3.8' | 23°49.7 | 9.7' | 60.8' |
| 6 | 269°59.6 | N23°12.7 | | 299°40.6 | 3.7' | N23°59.4 | 9.6' | 60.8' |
| 7 | 284°59.5 | 12.9 | | 314°03.3 | 3.6' | 24°09.0 | 9.4' | 60.9' |
| 8 | 299°59.4 | 13.0 | | 328°25.9 | 3.4' | 24°18.4 | 9.2' | 60.9' |
| 9 | 314°59.3 | · · 13.1 | | 342°48.3 | 3.3' | 24°27.6 | 9.1' | 60.9' |
| 10 | 329°59.1 | 13.3 | | 357°10.7 | 3.2' | 24°36.7 | 8.9' | 60.9' |
| 11 | 344°59.0 | 13.4 | | 11°32.8 | 3.1' | 24°45.5 | 8.7' | 60.9' |
| 12 | 359°58.9 | N23°13.5 | | 25°54.9 | 2.9' | N24°54.2 | 8.5' | 61.0' |
| 13 | 14°58.7 | 13.7 | | 40°16.8 | 2.8' | 25°02.8 | 8.4' | 61.0' |
| 14 | 29°58.6 | 13.8 | | 54°38.7 | 2.7' | 25°11.1 | 8.2' | 61.0' |
| 15 | 44°58.5 | · · 13.9 | | 69°00.4 | 2.6' | 25°19.3 | 8.0' | 61.0' |
| 16 | 59°58.3 | 14.1 | | 83°22.0 | 2.5' | 25°27.3 | 7.8' | 61.0' |
| 17 | 74°58.2 | 14.2 | | 97°43.4 | 2.4' | 25°35.1 | 7.6' | 61.0' |
| 18 | 89°58.1 | N23°14.3 | | 112°04.8 | 2.2' | N25°42.7 | 7.4' | 61.1' |
| 19 | 104°57.9 | 14.5 | | 126°26.0 | 2.1' | 25°50.1 | 7.2' | 61.1' |
| 20 | 119°57.8 | 14.6 | | 140°47.2 | 2.0' | 25°57.4 | 7.0' | 61.1' |
| 21 | 134°57.7 | · · 14.7 | | 155°08.2 | 1.9' | 26°04.4 | 6.9' | 61.1' |
| 22 | 149°57.5 | 14.9 | | 169°29.1 | 1.8' | 26°11.3 | 6.7' | 61.1' |
| 23 | 164°57.4 | 15.0 | | 183°50.0 | 1.7' | 26°17.9 | 6.5' | 61.1' |
| SD = 15.7' | | | $d = 0.1'$ | | | SD = 16.6' | | |

| Sun | Sun | | | Moon | | | | |
|------------|----------|----------|------------|----------|-------|------------|------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 179°57.3 | N23°15.1 | | 198°10.7 | 1.6' | N26°24.4 | 6.3' | 61.2' |
| 1 | 194°57.1 | 15.2 | | 212°31.3 | 1.5' | 26°30.7 | 6.1' | 61.2' |
| 2 | 209°57.0 | 15.4 | | 226°51.8 | 1.4' | 26°36.7 | 5.9' | 61.2' |
| 3 | 224°56.9 | · · 15.5 | | 241°12.3 | 1.4' | 26°42.6 | 5.6' | 61.2' |
| 4 | 239°56.7 | 15.6 | | 255°32.7 | 1.3' | 26°48.2 | 5.4' | 61.2' |
| 5 | 254°56.6 | 15.7 | | 269°52.9 | 1.2' | 26°53.7 | 5.2' | 61.2' |
| 6 | 269°56.5 | N23°15.9 | | 284°13.1 | 1.1' | N26°58.9 | 5.0' | 61.2' |
| 7 | 284°56.3 | 16.0 | | 298°33.2 | 1.0' | 27°03.9 | 4.8' | 61.2' |
| 8 | 299°56.2 | 16.1 | | 312°53.3 | 1.0' | 27°08.7 | 4.6' | 61.2' |
| 9 | 314°56.1 | · · 16.2 | | 327°13.2 | 0.9' | 27°13.4 | 4.4' | 61.3' |
| 10 | 329°55.9 | 16.3 | | 341°33.1 | 0.8' | 27°17.7 | 4.2' | 61.3' |
| 11 | 344°55.8 | 16.5 | | 355°52.9 | 0.8' | 27°21.9 | 4.0' | 61.3' |
| 12 | 359°55.7 | N23°16.6 | | 10°12.7 | 0.7' | N27°25.9 | 3.7' | 61.3' |
| 13 | 14°55.5 | 16.7 | | 24°32.4 | 0.6' | 27°29.6 | 3.5' | 61.3' |
| 14 | 29°55.4 | 16.8 | | 38°52.0 | 0.6' | 27°33.2 | 3.3' | 61.3' |
| 15 | 44°55.3 | · · 16.9 | | 53°11.6 | 0.5' | 27°36.5 | 3.1' | 61.3' |
| 16 | 59°55.1 | 17.0 | | 67°31.2 | 0.5' | 27°39.5 | 2.9' | 61.3' |
| 17 | 74°55.0 | 17.2 | | 81°50.7 | 0.5' | 27°42.4 | 2.6' | 61.3' |
| 18 | 89°54.8 | N23°17.3 | | 96°10.1 | 0.4' | N27°45.1 | 2.4' | 61.3' |
| 19 | 104°54.7 | 17.4 | | 110°29.5 | 0.4' | 27°47.5 | 2.2' | 61.3' |
| 20 | 119°54.6 | 17.5 | | 124°48.9 | 0.4' | 27°49.7 | 2.0' | 61.3' |
| 21 | 134°54.4 | · · 17.6 | | 139°08.3 | 0.3' | 27°51.7 | 1.8' | 61.3' |
| 22 | 149°54.3 | 17.7 | | 153°27.6 | 0.3' | 27°53.4 | 1.5' | 61.3' |
| 23 | 164°54.2 | 17.8 | | 167°46.9 | 0.3' | 27°55.0 | 1.3' | 61.3' |
| SD = 15.7' | | | $d = 0.1'$ | | | SD = 16.7' | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | □ | □ | □ | □ | □ | □ |
| 66° | □ | □ | □ | □ | □ | □ |
| 64° | //// | //// | 01:35 | 22:26 | //// | //// |
| 62° | //// | //// | 02:12 | 21:49 | //// | //// |
| 60° | //// | 00:57 | 02:37 | 21:24 | 23:05 | //// |
| N 58° | //// | 01:43 | 02:57 | 21:03 | 22:18 | //// |
| 56° | //// | 02:12 | 03:14 | 20:47 | 21:49 | //// |
| 54° | 00:52 | 02:34 | 03:28 | 20:33 | 21:27 | 23:10 |
| 52° | 01:35 | 02:51 | 03:40 | 20:21 | 21:09 | 22:26 |
| 50° | 02:02 | 03:06 | 03:50 | 20:10 | 20:54 | 21:59 |
| 45° | 02:46 | 03:36 | 04:13 | 19:48 | 20:25 | 21:14 |
| N 40° | 03:16 | 03:58 | 04:31 | 19:30 | 20:02 | 20:44 |
| 35° | 03:39 | 04:16 | 04:45 | 19:15 | 19:44 | 20:21 |
| 30° | 03:58 | 04:31 | 04:58 | 19:02 | 19:29 | 20:03 |
| 20° | 04:27 | 04:56 | 05:20 | 18:40 | 19:05 | 19:34 |
| N 10° | 04:49 | 05:16 | 05:39 | 18:21 | 18:44 | 19:11 |
| 0° | 05:08 | 05:34 | 05:56 | 18:04 | 18:26 | 18:52 |
| S 10° | 05:25 | 05:51 | 06:14 | 17:46 | 18:09 | 18:36 |
| 20° | 05:41 | 06:08 | 06:32 | 17:28 | 17:52 | 18:20 |
| 30° | 05:57 | 06:27 | 06:53 | 17:07 | 17:33 | 18:03 |
| 35° | 06:06 | 06:37 | 07:05 | 16:55 | 17:23 | 17:55 |
| 40° | 06:15 | 06:49 | 07:19 | 16:41 | 17:11 | 17:45 |
| 45° | 06:25 | 07:02 | 07:36 | 16:24 | 16:58 | 17:35 |
| S 50° | 06:37 | 07:18 | 07:57 | 16:04 | 16:42 | 17:23 |
| 52° | 06:42 | 07:25 | 08:06 | 15:54 | 16:35 | 17:18 |
| 54° | 06:47 | 07:34 | 08:17 | 15:43 | 16:26 | 17:13 |
| 56° | 06:54 | 07:43 | 08:30 | 15:30 | 16:17 | 17:06 |
| 58° | 07:00 | 07:53 | 08:44 | 15:16 | 16:07 | 17:00 |
| S 60° | 07:08 | 08:04 | 09:01 | 14:59 | 15:56 | 16:52 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | □ | □ | □ | □ | □ | □ |
| 66° | 23:06 | □ | □ | 20:00 | □ | □ |
| 64° | 00:04 | □ | □ | 19:18 | □ | □ |
| 62° | 00:21 | 00:17 | 00:16 | 18:50 | 21:04 | 23:16 |
| 60° | 00:34 | 00:40 | 00:54 | 18:29 | 20:26 | 22:09 |
| N 58° | 00:46 | 00:58 | 01:21 | 18:11 | 19:59 | 21:34 |
| 56° | 00:57 | 01:13 | 01:42 | 17:56 | 19:38 | 21:08 |
| 54° | 01:06 | 01:27 | 02:00 | 17:44 | 19:21 | 20:48 |
| 52° | 01:14 | 01:38 | 02:15 | 17:33 | 19:06 | 20:31 |
| 50° | 01:21 | 01:49 | 02:28 | 17:23 | 18:53 | 20:16 |
| 45° | 01:37 | 02:11 | 02:55 | 17:03 | 18:27 | 19:46 |
| N 40° | 01:51 | 02:28 | 03:17 | 16:46 | 18:06 | 19:23 |
| 35° | 02:02 | 02:43 | 03:35 | 16:32 | 17:49 | 19:04 |
| 30° | 02:12 | 02:57 | 03:51 | 16:20 | 17:34 | 18:47 |
| 20° | 02:29 | 03:19 | 04:17 | 16:00 | 17:09 | 18:20 |
| N 10° | 02:44 | 03:39 | 04:40 | 15:42 | 16:47 | 17:56 |
| 0° | 02:58 | 03:57 | 05:01 | 15:25 | 16:27 | 17:33 |
| S 10° | 03:13 | 04:16 | 05:23 | 15:09 | 16:07 | 17:11 |
| 20° | 03:28 | 04:35 | 05:46 | 14:51 | 15:45 | 16:47 |
| 30° | 03:46 | 04:59 | 06:13 | 14:31 | 15:20 | 16:19 |
| 35° | 03:56 | 05:12 | 06:29 | 14:20 | 15:06 | 16:03 |
| 40° | 04:08 | 05:28 | 06:48 | 14:06 | 14:49 | 15:44 |
| 45° | 04:23 | 05:47 | 07:11 | 13:51 | 14:29 | 15:21 |
| S 50° | 04:40 | 06:11 | 07:40 | 13:31 | 14:04 | 14:51 |
| 52° | 04:49 | 06:23 | 07:54 | 13:22 | 13:52 | 14:37 |
| 54° | 04:58 | 06:36 | 08:10 | 13:12 | 13:38 | 14:20 |
| 56° | 05:09 | 06:52 | 08:30 | 13:01 | 13:22 | 14:00 |
| 58° | 05:21 | 07:10 | 08:55 | 12:48 | 13:03 | 13:35 |
| S 60° | 05:35 | 07:32 | 09:29 | 12:33 | 12:40 | 13:01 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-------|-----------|-------|---|
| | Eqn.of Time | | Mer. | Mer.Pass. | | Age |
| | 00 ^h | 12 ^h | Pass | Upper | Lower | 27-29 |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 14-2% |
| 12 | 00:14 | 00:08 | 12:00 | 09:12 | 21:41 |  |
| 13 | 00:02 | 00:05 | 12:00 | 10:12 | 22:44 | |
| 14 | 00:11 | 00:17 | 12:00 | 11:17 | 23:51 | |

June 15, 16, 17 UT (Mon., Tue., Wed.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|----------------------|----------|----------|-------------------|----------|----------|---------------------|----------|----------|-------------------|--------|-----|--|-------------|----------|----------|
| Mon | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | | SHA | Dec | |
| 0 | 263°17.7 | 138°45.1 | N21°44.4 | 215°33.5 | N17°17.3 | | 144°21.3 | N21°12.5 | | 250°09.1 | N03°07.2 | | | | | Alpheratz | 357°33.6 | 29°14.1 |
| 1 | 278°20.1 | 153°44.5 | 43.7 | 230°34.1 | 17.8 | | 159°23.3 | 12.4 | | 265°11.4 | 07.2 | | | | | Ankaa | 353°06.1 | -42°09.5 |
| 2 | 293°22.6 | 168°43.9 | 43.0 | 245°34.8 | 18.3 | | 174°25.2 | 12.3 | | 280°13.7 | 07.3 | | | | | Schedar | 349°29.8 | 56°40.7 |
| 3 | 308°25.1 | 183°43.3 | · · 42.4 | 260°35.4 | · · 18.8 | | 189°27.1 | · · 12.2 | | 295°16.0 | · · 07.3 | | | | | Diphda | 348°46.2 | -17°50.4 |
| 4 | 323°27.5 | 198°42.8 | 41.7 | 275°36.0 | 19.3 | | 204°29.0 | 12.1 | | 310°18.3 | 07.4 | | | | | Achernar | 335°19.6 | -57°05.9 |
| 5 | 338°30.0 | 213°42.2 | 41.0 | 290°36.7 | 19.9 | | 219°31.0 | 12.0 | | 325°20.6 | 07.5 | | | | | Hamal | 327°50.1 | 23°35.2 |
| 6 | 353°32.5 | 228°41.6 | N21°40.4 | 305°37.3 | N17°20.4 | | 234°32.9 | N21°11.9 | | 340°22.9 | N03°07.5 | | | | | Polaris | 313°48.7 | 89°22.3 |
| 7 | 8°34.9 | 243°41.0 | 39.7 | 320°37.9 | 20.9 | | 249°34.8 | 11.8 | | 355°25.2 | 07.6 | | | | | Acamar | 315°11.2 | -40°11.7 |
| 8 | 23°37.4 | 258°40.4 | 39.0 | 335°38.6 | 21.4 | | 264°36.8 | 11.7 | | 10°27.5 | 07.6 | | | | | Menkar | 314°05.2 | 4°11.6 |
| 9 | 38°39.8 | 273°39.9 | · · 38.4 | 350°39.2 | · · 21.9 | | 279°38.7 | · · 11.6 | | 25°29.8 | · · 07.7 | | | | | Mirfak | 308°27.0 | 49°57.2 |
| 10 | 53°42.3 | 288°39.3 | 37.7 | 5°39.8 | 22.4 | | 294°40.6 | 11.5 | | 40°32.2 | 07.7 | | | | | Aldebaran | 290°38.6 | 16°33.7 |
| 11 | 68°44.8 | 303°38.7 | 37.0 | 20°40.5 | 22.9 | | 309°42.5 | 11.4 | | 55°34.5 | 07.8 | | | | | Rigel | 281°03.1 | -8°10.3 |
| 12 | 83°47.2 | 318°38.1 | N21°36.4 | 35°41.1 | N17°23.4 | | 324°44.5 | N21°11.3 | | 70°36.8 | N03°07.8 | | | | | Capella | 280°20.6 | 46°01.4 |
| 13 | 98°49.7 | 333°37.6 | 35.7 | 50°41.7 | 23.9 | | 339°46.4 | 11.2 | | 85°39.1 | 07.9 | | | | | Bellatrix | 278°21.9 | 6°22.4 |
| 14 | 113°52.2 | 348°37.0 | 35.0 | 65°42.4 | 24.4 | | 354°48.3 | 11.1 | | 100°41.4 | 08.0 | | | | | Elnath | 278°00.8 | 28°37.7 |
| 15 | 128°54.6 | 3°36.4 | · · 34.3 | 80°43.0 | · · 25.0 | | 9°50.3 | · · 11.0 | | 115°43.7 | · · 08.0 | | | | | Alnilam | 275°36.9 | -1°11.1 |
| 16 | 143°57.1 | 18°35.9 | 33.6 | 95°43.6 | 25.5 | | 24°52.2 | 10.9 | | 130°46.0 | 08.1 | | | | | Betelgeuse | 270°51.1 | 7°24.7 |
| 17 | 158°59.6 | 33°35.3 | 33.0 | 110°44.3 | 26.0 | | 39°54.1 | 10.9 | | 145°48.3 | 08.1 | | | | | Canopus | 263°52.4 | -52°42.6 |
| 18 | 174°02.0 | 48°34.7 | N21°32.3 | 125°44.9 | N17°26.5 | | 54°56.0 | N21°10.8 | | 160°50.6 | N03°08.2 | | | | | Sirius | 258°25.5 | -16°45.2 |
| 19 | 189°04.5 | 63°34.2 | 31.6 | 140°45.5 | 27.0 | | 69°58.0 | 10.7 | | 175°52.9 | 08.2 | | | | | Adhara | 255°05.3 | -29°00.5 |
| 20 | 204°07.0 | 78°33.6 | 30.9 | 155°46.2 | 27.5 | | 84°59.9 | 10.6 | | 190°55.2 | 08.3 | | | | | Procyon | 244°49.9 | 5°09.4 |
| 21 | 219°09.4 | 93°33.0 | · · 30.2 | 170°46.8 | · · 28.0 | | 100°01.8 | · · 10.5 | | 205°57.5 | · · 08.3 | | | | | Pollux | 243°16.2 | 27°57.8 |
| 22 | 234°11.9 | 108°32.4 | 29.6 | 185°47.4 | 28.5 | | 115°03.7 | 10.4 | | 220°59.9 | 08.4 | | | | | Avior | 234°14.8 | -59°35.8 |
| 23 | 249°14.3 | 123°31.9 | 28.9 | 200°48.1 | 29.0 | | 130°05.7 | 10.3 | | 236°02.2 | 08.4 | | | | | Suhail | 222°45.7 | -43°32.6 |
| Mer.pass. 06:26 | | | ν-0.6' d-0.7' m-3.98 | | | ν0.6' d0.5' m1.29 | | | ν1.9' d-0.1' m-1.84 | | | ν2.3' d0.1' m0.83 | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | | | | |
| 0 | 264°16.8 | 138°31.3 | N21°28.2 | 215°48.7 | N17°29.5 | | 145°07.6 | N21°10.2 | | 251°04.5 | N03°08.5 | | | | | Miaplacidus | 221°38.6 | -69°49.8 |
| 1 | 279°19.3 | 153°30.8 | 27.5 | 230°49.3 | 30.0 | | 160°09.5 | 10.1 | | 266°06.8 | 08.5 | | | | | Alphard | 217°46.8 | -8°46.5 |
| 2 | 294°21.7 | 168°30.2 | 26.8 | 245°50.0 | 30.5 | | 175°11.5 | 10.0 | | 281°09.1 | 08.6 | | | | | Regulus | 207°33.3 | 11°50.3 |
| 3 | 309°24.2 | 183°29.6 | · · 26.1 | 260°50.6 | · · 31.0 | | 190°13.4 | · · 09.9 | | 296°11.4 | · · 08.7 | | | | | Dubhe | 193°39.7 | 61°36.7 |
| 4 | 324°26.7 | 198°29.1 | 25.4 | 275°51.2 | 31.5 | | 205°15.3 | 09.8 | | 311°13.7 | 08.7 | | | | | Denebola | 182°23.7 | 14°25.5 |
| 5 | 339°29.1 | 213°28.5 | 24.8 | 290°51.9 | 32.0 | | 220°17.2 | 09.7 | | 326°16.0 | 08.8 | | | | | Gienah | 175°42.3 | -17°41.5 |
| 6 | 354°31.6 | 228°27.9 | N21°24.1 | 305°52.5 | N17°32.5 | | 235°19.2 | N21°09.6 | | 341°18.3 | N03°08.8 | | | | | Acrux | 172°58.6 | -63°15.1 |
| 7 | 9°34.1 | 243°27.4 | 23.4 | 320°53.1 | 33.0 | | 250°21.1 | 09.5 | | 356°20.6 | 08.9 | | | | | Gacrux | 171°50.2 | -57°16.0 |
| 8 | 24°36.5 | 258°26.8 | 22.7 | 335°53.8 | 33.6 | | 265°23.0 | 09.4 | | 11°23.0 | 08.9 | | | | | Alioth | 166°11.7 | 55°49.2 |
| 9 | 39°39.0 | 273°26.3 | · · 22.0 | 350°54.4 | · · 34.1 | | 280°24.9 | · · 09.3 | | 26°25.3 | · · 09.0 | | | | | Spica | 158°20.9 | -11°18.1 |
| 10 | 54°41.5 | 288°25.7 | 21.3 | 5°55.0 | 34.6 | | 295°26.9 | 09.2 | | 41°27.6 | 09.0 | | | | | Alkaid | 152°50.8 | 49°11.0 |
| 11 | 69°43.9 | 303°25.1 | 20.6 | 20°55.7 | 35.1 | | 310°28.8 | 09.1 | | 56°29.9 | 09.1 | | | | | Hadar | 148°33.9 | -60°30.3 |
| 12 | 84°46.4 | 318°24.6 | N21°19.9 | 35°56.3 | N17°35.6 | | 325°30.7 | N21°09.0 | | 71°32.2 | N03°09.1 | | | | | Menkent | 147°56.0 | -36°30.2 |
| 13 | 99°48.8 | 333°24.0 | 19.2 | 50°56.9 | 36.1 | | 340°32.6 | 08.9 | | 86°34.5 | 09.2 | | | | | Arcturus | 145°46.6 | 19°02.7 |
| 14 | 114°51.3 | 348°23.5 | 18.5 | 65°57.6 | 36.6 | | 355°34.6 | 08.8 | | 101°36.8 | 09.2 | | | | | Rigel Kent. | 139°38.2 | -60°56.9 |
| 15 | 129°53.8 | 3°22.9 | · · 17.8 | 80°58.2 | · · 37.1 | | 10°36.5 | · · 08.7 | | 116°39.1 | · · 09.3 | | | | | Kochab | 137°18.9 | 74°02.9 |
| 16 | 144°56.2 | 18°22.4 | 17.1 | 95°58.8 | 37.6 | | 25°38.4 | 08.6 | | 131°41.5 | 09.3 | | | | | Zuben'ubi | 136°54.4 | -16°09.2 |
| 17 | 159°58.7 | 33°21.8 | 16.4 | 110°59.5 | 38.1 | | 40°40.3 | 08.5 | | 146°43.8 | 09.4 | | | | | Alphecca | 126°02.4 | 26°37.6 |
| 18 | 175°01.2 | 48°21.2 | N21°15.7 | 126°00.1 | N17°38.6 | | 55°42.3 | N21°08.4 | | 161°46.1 | N03°09.5 | | | | | Antares | 112°14.0 | -26°29.5 |
| 19 | 190°03.6 | 63°20.7 | 15.0 | 141°00.7 | 39.1 | | 70°44.2 | 08.3 | | 176°48.4 | 09.5 | | | | | Atria | 107°06.6 | -69°04.5 |
| 20 | 205°06.1 | 78°20.1 | 14.3 | 156°01.4 | 39.6 | | 85°46.1 | 08.2 | | 191°50.7 | 09.6 | | | | | Sabik | 102°01.1 | -15°45.5 |
| 21 | 220°08.6 | 93°19.6 | · · 13.6 | 171°02.0 | · · 40.1 | | 100°48.1 | · · 08.1 | | 206°53.0 | · · 09.6 | | | | | Shaula | 96°08.3 | -37°07.4 |
| 22 | 235°11.0 | 108°19.0 | 12.9 | 186°02.6 | 40.6 | | 115°50.0 | 08.0 | | 221°55.3 | 09.7 | | | | | Rasalhague | 95°57.1 | 12°32.4 |
| 23 | 250°13.5 | 123°18.5 | 12.2 | 201°03.3 | 41.1 | | 130°51.9 | 07.9 | | 236°57.6 | 09.7 | | | | | Eltanin | 90°41.1 | 51°29.1 |
| Mer.pass. 06:22 | | | ν-0.6' d-0.7' m-3.99 | | | ν0.6' d0.5' m1.29 | | | ν1.9' d-0.1' m-1.84 | | | ν2.3' d0.1' m0.83 | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | | | | |
| 0 | 265°16.0 | 138°17.9 | N21°11.5 | 216°03.9 | N17°41.6 | | 145°53.8 | N21°07.8 | | 251°59.9 | N03°09.8 | | | | | Jun 15 Mon | SHA | Mer.pass |
| 1 | 280°18.4 | 153°17.4 | 10.8 | 231°04.5 | 42.1 | | 160°55.8 | 07.7 | | 267°02.3 | 09.8 | | | | | Venus | 235°27.4 | 14:46 |
| 2 | 295°20.9 | 168°16.8 | 10.1 | 246°05.2 | 42.6 | | 175°57.7 | 07.6 | | 282°04.6 | 09.9 | | | | | Mars | 312°15.8 | 09:37 |
| 3 | 310°23.3 | 183°16.3 | · · 09.4 | 261°05.8 | · · 43.1 | | 190°59.6 | · · 07.6 | | 297°06.9 | · · 09.9 | | | | | Jupiter | 241°03.7 | 14:21 |
| 4 | 325°25.8 | 198°15.7 | 08.6 | 276°06.4 | 43.6 | | 206°01.5 | 07.5 | | 312°09.2 | 10.0 | | | | | Saturn | 346°51.4 | 07:18 |
| 5 | 340°28.3 | 213°15.2 | 07.9 | 291°07.1 | 44.0 | | 221°03.5 | 07.4 | | 327°11.5 | 10.0 | | | | | | | |
| 6 | 355°30.7 | 228°14.6 | N21°07.2 | 306°07.7 | N17°44.5 | | 236°05.4 | N21°07.3 | | 342°13.8 | N03°10.1 | | | | | Jun 16 Tue | SHA | Mer.pass |
| 7 | 10°33.2 | 243°14.1 | 06.5 | 321°08.3 | 45.0 | | 251°07.3 | 07.2 | | 357°16.1 | 10.1 | | | | | Venus | 234°14.5 | 14:46 |
| 8 | 25°35.7 | 258°13.6 | 05.8 | 336°09.0 | 45.5 | | 266°09.2 | 07.1 | | 12°18.5 | 10.2 | | | | | Mars | 311°31.9 | 09:36 |
| 9 | 40°38.1 | 273°13.0 | · · 05.1 | 351°09.6 | · · 46.0 | | 281°11.2 | · · 07.0 | | 27°20.8 | · · 10.2 | | | | | Jupiter | 240°50.8 | 14:18 |
| 10 | 55°40.6 | 288°12.5 | 04.4 | 6°10.2 | 46.5 | | 296°13.1 | 06.9 | | 42°23.1 | 10.3 | | | | | Saturn | 346°47.7 | 07:15 |
| 11 | 70°43.1 | 303°11.9 | 03.6 | 21°10.9 | 47.0 | | 311°15.0 | 06.8 | | 57°25.4 | 10.3 | | | | | | | |
| 12 | 85°45.5 | 318°11.4 | N21°02.9 | 36°11.5 | N17°47.5 | | 326°16.9 | N21°06.7 | | 72°27.7 | N03°10.4 | | | | | Jun 17 Wed | SHA | Mer.pass |
| 13 | 100°48.0 | 333°10.8 | 02.2 | 51°12.1 | 48.0 | | 341°18.8 | 06.6 | | 87°30.0 | 10.4 | | | | | Venus | 233°02.0 | 14:47 |
| 14 | 115°50.5 | 348°10.3 | 01.5 | 66°12.7 | 48.5 | | 356°20.8 | 06.5 | | 102°32.3 | 10.5 | | | | | Mars | 310°47.9 | 09:35 |
| 15 | 130°52.9 | 3°09.8 | · · 00.8 | 81°13.4 | · · 49.0 | | 11°22.7 | · · 06.4 | | 117°34.7 | · · 10.5 | | | | | Jupiter | 2 | |

| h | | Sun | | Moon | | | |
|-----|--|-----------------------|----------|------------|-------|----------|-------------|
| Mon | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 179°54.0 | N23°17.9 | 182°06.2 | 0.3' | N27°56.3 | 1.1' 61.3' |
| 1 | | 194°53.9 | 18.1 | 196°25.4 | 0.3' | 27°57.3 | 0.9' 61.3' |
| 2 | | 209°53.8 | 18.2 | 210°44.7 | 0.2' | 27°58.2 | 0.6' 61.3' |
| 3 | | 224°53.6 | 18.3 | 225°04.0 | 0.2' | 27°58.8 | 0.4' 61.3' |
| 4 | | 239°53.5 | 18.4 | 239°23.2 | 0.2' | 27°59.2 | 0.2' 61.3' |
| 5 | | 254°53.4 | 18.5 | 253°42.4 | 0.2' | 27°59.4 | -0.0' 61.3' |
| 6 | | 269°53.2 | N23°18.6 | 268°01.7 | 0.3' | N27°59.4 | -0.3' 61.3' |
| 7 | | 284°53.1 | 18.7 | 282°20.9 | 0.3' | 27°59.1 | -0.5' 61.3' |
| 8 | | 299°53.0 | 18.8 | 296°40.2 | 0.3' | 27°58.6 | -0.7' 61.3' |
| 9 | | 314°52.8 | 18.9 | 310°59.5 | 0.3' | 27°57.9 | -0.9' 61.3' |
| 10 | | 329°52.7 | 19.0 | 325°18.8 | 0.3' | 27°56.9 | -1.2' 61.3' |
| 11 | | 344°52.6 | 19.1 | 339°38.1 | 0.4' | 27°55.7 | -1.4' 61.3' |
| 12 | | 359°52.4 | N23°19.2 | 353°57.5 | 0.4' | N27°54.3 | -1.6' 61.3' |
| 13 | | 14°52.3 | 19.3 | 8°16.8 | 0.4' | 27°52.7 | -1.8' 61.3' |
| 14 | | 29°52.2 | 19.4 | 22°36.3 | 0.5' | 27°50.9 | -2.1' 61.2' |
| 15 | | 44°52.0 | 19.5 | 36°55.7 | 0.5' | 27°48.8 | -2.3' 61.2' |
| 16 | | 59°51.9 | 19.6 | 51°15.2 | 0.5' | 27°46.5 | -2.5' 61.2' |
| 17 | | 74°51.7 | 19.7 | 65°34.8 | 0.6' | 27°44.0 | -2.7' 61.2' |
| 18 | | 89°51.6 | N23°19.8 | 79°54.4 | 0.6' | N27°41.3 | -2.9' 61.2' |
| 19 | | 104°51.5 | 19.9 | 94°14.0 | 0.7' | 27°38.4 | -3.2' 61.2' |
| 20 | | 119°51.3 | 20.0 | 108°33.7 | 0.8' | 27°35.2 | -3.4' 61.2' |
| 21 | | 134°51.2 | 20.1 | 122°53.5 | 0.8' | 27°31.8 | -3.6' 61.2' |
| 22 | | 149°51.1 | 20.2 | 137°13.3 | 0.9' | 27°28.2 | -3.8' 61.2' |
| 23 | | 164°50.9 | 20.3 | 151°33.2 | 1.0' | 27°24.4 | -4.0' 61.1' |
| | | SD = 15.7' $d = 0.1'$ | | SD = 16.7' | | | |

| Tue | | GHA | Dec | GHA | ν | Dec | d HP |
|-----|--|-----------------------|----------|------------|-------|----------|-------------|
| 0 | | 179°50.8 | N23°20.4 | 165°53.1 | 1.0' | N27°20.4 | -4.2' 61.1' |
| 1 | | 194°50.7 | 20.5 | 180°13.2 | 1.1' | 27°16.1 | -4.4' 61.1' |
| 2 | | 209°50.5 | 20.5 | 194°33.3 | 1.2' | 27°11.7 | -4.7' 61.1' |
| 3 | | 224°50.4 | 20.6 | 208°53.5 | 1.3' | 27°07.0 | -4.9' 61.1' |
| 4 | | 239°50.3 | 20.7 | 223°13.8 | 1.4' | 27°02.2 | -5.1' 61.1' |
| 5 | | 254°50.1 | 20.8 | 237°34.1 | 1.5' | 26°57.1 | -5.3' 61.1' |
| 6 | | 269°50.0 | N23°20.9 | 251°54.6 | 1.5' | N26°51.8 | -5.5' 61.0' |
| 7 | | 284°49.8 | 21.0 | 266°15.1 | 1.6' | 26°46.3 | -5.7' 61.0' |
| 8 | | 299°49.7 | 21.1 | 280°35.8 | 1.7' | 26°40.6 | -5.9' 61.0' |
| 9 | | 314°49.6 | 21.2 | 294°56.5 | 1.8' | 26°34.7 | -6.1' 61.0' |
| 10 | | 329°49.4 | 21.2 | 309°17.3 | 1.9' | 26°28.7 | -6.3' 61.0' |
| 11 | | 344°49.3 | 21.3 | 323°38.3 | 2.0' | 26°22.4 | -6.5' 60.9' |
| 12 | | 359°49.2 | N23°21.4 | 337°59.3 | 2.2' | N26°15.9 | -6.7' 60.9' |
| 13 | | 14°49.0 | 21.5 | 352°20.5 | 2.3' | 26°09.2 | -6.9' 60.9' |
| 14 | | 29°48.9 | 21.6 | 6°41.7 | 2.4' | 26°02.4 | -7.0' 60.9' |
| 15 | | 44°48.8 | 21.7 | 21°03.1 | 2.5' | 25°55.3 | -7.2' 60.9' |
| 16 | | 59°48.6 | 21.7 | 35°24.6 | 2.6' | 25°48.1 | -7.4' 60.8' |
| 17 | | 74°48.5 | 21.8 | 49°46.2 | 2.7' | 25°40.7 | -7.6' 60.8' |
| 18 | | 89°48.3 | N23°21.9 | 64°07.9 | 2.8' | N25°33.1 | -7.8' 60.8' |
| 19 | | 104°48.2 | 22.0 | 78°29.8 | 3.0' | 25°25.3 | -8.0' 60.8' |
| 20 | | 119°48.1 | 22.1 | 92°51.7 | 3.1' | 25°17.3 | -8.1' 60.7' |
| 21 | | 134°47.9 | 22.1 | 107°13.8 | 3.2' | 25°09.2 | -8.3' 60.7' |
| 22 | | 149°47.8 | 22.2 | 121°36.0 | 3.3' | 25°00.8 | -8.5' 60.7' |
| 23 | | 164°47.7 | 22.3 | 135°58.4 | 3.5' | 24°52.4 | -8.7' 60.7' |
| | | SD = 15.7' $d = 0.1'$ | | SD = 16.7' | | | |

| Wed | | GHA | Dec | GHA | ν | Dec | d HP |
|-----|--|-----------------------|----------|------------|-------|----------|--------------|
| 0 | | 179°47.5 | N23°22.4 | 150°20.8 | 3.6' | N24°43.7 | -8.8' 60.6' |
| 1 | | 194°47.4 | 22.4 | 164°43.4 | 3.7' | 24°34.9 | -9.0' 60.6' |
| 2 | | 209°47.3 | 22.5 | 179°06.2 | 3.9' | 24°25.9 | -9.2' 60.6' |
| 3 | | 224°47.1 | 22.6 | 193°29.0 | 4.0' | 24°16.7 | -9.3' 60.6' |
| 4 | | 239°47.0 | 22.7 | 207°52.0 | 4.1' | 24°07.4 | -9.5' 60.5' |
| 5 | | 254°46.8 | 22.7 | 222°15.2 | 4.3' | 23°57.9 | -9.6' 60.5' |
| 6 | | 269°46.7 | N23°22.8 | 236°38.4 | 4.4' | N23°48.2 | -9.8' 60.5' |
| 7 | | 284°46.6 | 22.9 | 251°01.8 | 4.5' | 23°38.4 | -9.9' 60.5' |
| 8 | | 299°46.4 | 22.9 | 265°25.4 | 4.7' | 23°28.5 | -10.1' 60.4' |
| 9 | | 314°46.3 | 23.0 | 279°49.1 | 4.8' | 23°18.4 | -10.2' 60.4' |
| 10 | | 329°46.2 | 23.1 | 294°12.9 | 5.0' | 23°08.1 | -10.4' 60.4' |
| 11 | | 344°46.0 | 23.1 | 308°36.8 | 5.1' | 22°57.8 | -10.5' 60.3' |
| 12 | | 359°45.9 | N23°23.2 | 323°00.9 | 5.2' | N22°47.2 | -10.7' 60.3' |
| 13 | | 14°45.8 | 23.3 | 337°25.2 | 5.4' | 22°36.5 | -10.8' 60.3' |
| 14 | | 29°45.6 | 23.3 | 351°49.5 | 5.5' | 22°25.7 | -11.0' 60.2' |
| 15 | | 44°45.5 | 23.4 | 6°14.1 | 5.7' | 22°14.8 | -11.1' 60.2' |
| 16 | | 59°45.3 | 23.5 | 20°38.7 | 5.8' | 22°03.7 | -11.2' 60.2' |
| 17 | | 74°45.2 | 23.5 | 35°03.5 | 5.9' | 21°52.4 | -11.4' 60.1' |
| 18 | | 89°45.1 | N23°23.6 | 49°28.5 | 6.1' | N21°41.1 | -11.5' 60.1' |
| 19 | | 104°44.9 | 23.7 | 63°53.6 | 6.2' | 21°29.6 | -11.6' 60.1' |
| 20 | | 119°44.8 | 23.7 | 78°18.8 | 6.4' | 21°18.0 | -11.7' 60.1' |
| 21 | | 134°44.7 | 23.8 | 92°44.2 | 6.5' | 21°06.3 | -11.8' 60.0' |
| 22 | | 149°44.5 | 23.8 | 107°09.7 | 6.7' | 20°54.4 | -12.0' 60.0' |
| 23 | | 164°44.4 | 23.9 | 121°35.3 | 6.8' | 20°42.5 | -12.1' 60.0' |
| | | SD = 15.7' $d = 0.1'$ | | SD = 16.5' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | | | | | | |
| N 70° | | | | | | |
| 68° | | | | | | |
| 66° | | | | | | |
| 64° | //// | //// | 01:32 | 22:30 | //// | //// |
| 62° | //// | //// | 02:10 | 21:52 | //// | //// |
| 60° | //// | 00:52 | 02:36 | 21:26 | 23:11 | //// |
| N 58° | //// | 01:41 | 02:56 | 21:05 | 22:21 | //// |
| 56° | //// | 02:11 | 03:13 | 20:49 | 21:51 | //// |
| 54° | 00:48 | 02:33 | 03:27 | 20:35 | 21:29 | 23:15 |
| 52° | 01:33 | 02:51 | 03:39 | 20:22 | 21:11 | 22:29 |
| 50° | 02:00 | 03:06 | 03:50 | 20:11 | 20:56 | 22:01 |
| 45° | 02:46 | 03:35 | 04:13 | 19:49 | 20:26 | 21:16 |
| N 40° | 03:16 | 03:58 | 04:31 | 19:31 | 20:04 | 20:45 |
| 35° | 03:39 | 04:16 | 04:46 | 19:16 | 19:46 | 20:22 |
| 30° | 03:58 | 04:31 | 04:59 | 19:03 | 19:30 | 20:04 |
| 20° | 04:27 | 04:56 | 05:21 | 18:41 | 19:05 | 19:35 |
| N 10° | 04:49 | 05:16 | 05:40 | 18:22 | 18:45 | 19:12 |
| 0° | 05:08 | 05:35 | 05:57 | 18:04 | 18:27 | 18:53 |
| S 10° | 05:25 | 05:52 | 06:14 | 17:47 | 18:10 | 18:36 |
| 20° | 05:41 | 06:09 | 06:33 | 17:28 | 17:52 | 18:20 |
| 30° | 05:58 | 06:28 | 06:54 | 17:07 | 17:34 | 18:04 |
| 35° | 06:07 | 06:38 | 07:06 | 16:55 | 17:23 | 17:55 |
| 40° | 06:16 | 06:50 | 07:21 | 16:41 | 17:11 | 17:45 |
| 45° | 06:26 | 07:04 | 07:37 | 16:24 | 16:58 | 17:35 |
| S 50° | 06:38 | 07:20 | 07:58 | 16:03 | 16:42 | 17:23 |
| 52° | 06:43 | 07:27 | 08:08 | 15:53 | 16:34 | 17:18 |
| 54° | 06:49 | 07:35 | 08:19 | 15:42 | 16:26 | 17:12 |
| 56° | 06:55 | 07:44 | 08:32 | 15:30 | 16:17 | 17:06 |
| 58° | 07:02 | 07:54 | 08:46 | 15:15 | 16:07 | 17:00 |
| S 60° | 07:09 | 08:06 | 09:04 | 14:58 | 15:55 | 16:52 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | | | | | | |
| N 70° | | | | | | |
| 68° | | | | | | |
| 66° | | | | | | |
| 64° | | | 03:44 | | | 00:36 |
| 62° | 00:25 | 02:08 | 04:24 | 23:56 | 23:56 | 23:53 |
| 60° | 01:32 | 02:58 | 04:51 | 23:06 | 23:28 | 23:36 |
| N 58° | 02:07 | 03:29 | 05:12 | 22:35 | 23:06 | 23:21 |
| 56° | 02:33 | 03:52 | 05:30 | 22:11 | 22:48 | 23:09 |
| 54° | 02:53 | 04:11 | 05:44 | 21:52 | 22:33 | 22:58 |
| 52° | 03:11 | 04:27 | 05:57 | 21:35 | 22:19 | 22:48 |
| 50° | 03:25 | 04:41 | 06:08 | 21:21 | 22:08 | 22:39 |
| 45° | 03:55 | 05:09 | 06:32 | 20:53 | 21:43 | 22:21 |
| N 40° | 04:19 | 05:31 | 06:50 | 20:30 | 21:24 | 22:05 |
| 35° | 04:38 | 05:50 | 07:06 | 20:11 | 21:07 | 21:52 |
| 30° | 04:54 | 06:06 | 07:19 | 19:55 | 20:53 | 21:41 |
| 20° | 05:22 | 06:32 | 07:42 | 19:27 | 20:28 | 21:21 |
| N 10° | 05:47 | 06:55 | 08:02 | 19:04 | 20:07 | 21:04 |
| 0° | 06:09 | 07:16 | 08:20 | 18:41 | 19:47 | 20:48 |
| S 10° | 06:32 | 07:38 | 08:38 | 18:19 | 19:27 | 20:32 |
| 20° | 06:56 | 08:01 | 08:58 | 17:55 | 19:06 | 20:14 |
| 30° | 07:24 | 08:27 | 09:20 | 17:27 | 18:40 | 19:54 |
| 35° | 07:41 | 08:43 | 09:33 | 17:11 | 18:26 | 19:42 |
| 40° | 08:00 | 09:01 | 09:48 | 16:51 | 18:08 | 19:28 |
| 45° | 08:24 | 09:22 | 10:06 | 16:28 | 17:47 | 19:11 |
| S 50° | 08:54 | 09:50 | 10:27 | 15:58 | 17:21 | 18:51 |
| 52° | 09:09 | 10:03 | 10:38 | 15:43 | 17:08 | 18:41 |
| 54° | 09:27 | 10:18 | 10:50 | 15:25 | 16:53 | 18:30 |
| 56° | 09:48 | 10:36 | 11:03 | 15:04 | 16:36 | 18:17 |
| 58° | 10:15 | 10:58 | 11:18 | 14:38 | 16:14 | 18:03 |
| S 60° | 10:52 | 11:25 | 11:37 | 14:01 | 15:47 | 17:45 |

| Day | Sun | | Mer. Pass | Moon | | Age |
|-----|--|----------------------------------|-----------|----------------|----------------|-----|
| | Eqn. of Time 00 ^h mm:ss | Time 12 ^h mm:ss | | Upper hh:mm | Lower hh:mm | |
| 15 | 00:24 | 00:30 | 12:01 | 12:25 | --:-- | |
| 16 | 00:37 | 00:43 | 12:01 | 13:32 | 00:59 | |
| 17 | 00:50 | 00:56 | 12:01 | 14:34 | 02:04 | |

June 18, 19, 20 UT (Thu., Fri., Sat.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | | | | | | | | | |
|-----------------|----------|----------------------|----------|----------|-------------------|----------|----------|---------------------|----------|---------|-------------------|-----|------------|----------|----------|-------|--|--|--|--|--|--|--|--|--|--|
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | | | | | | | | | |
| 0 | 266°15.1 | 138°04.9 | N20°54.2 | 216°19.1 | N17°53.4 | 146°40.0 | N21°05.5 | 252°55.5 | N03°11.0 | | | | Alpheratz | 357°33.6 | 29°14.1 | | | | | | | | | | | |
| 1 | 281°17.6 | 153°04.4 | 53.5 | 231°19.7 | 53.9 | 161°41.9 | 05.4 | 267°57.8 | 11.1 | | | | Ankaa | 353°06.0 | -42°09.5 | | | | | | | | | | | |
| 2 | 296°20.0 | 168°03.9 | 52.8 | 246°20.3 | 54.4 | 176°43.9 | 05.3 | 283°00.1 | 11.1 | | | | Schedar | 349°29.8 | 56°40.7 | | | | | | | | | | | |
| 3 | 311°22.5 | 183°03.3 | · · 52.0 | 261°21.0 | · · 54.9 | 191°45.8 | · · 05.2 | 298°02.4 | · · 11.2 | | | | Diphda | 348°46.2 | -17°50.3 | | | | | | | | | | | |
| 4 | 326°25.0 | 198°02.8 | 51.3 | 276°21.6 | 55.4 | 206°47.7 | 05.1 | 313°04.8 | 11.2 | | | | Achernar | 335°19.6 | -57°05.8 | | | | | | | | | | | |
| 5 | 341°27.4 | 213°02.3 | 50.6 | 291°22.2 | 55.9 | 221°49.6 | 05.0 | 328°07.1 | 11.3 | | | | Hamal | 327°50.0 | 23°35.2 | | | | | | | | | | | |
| 6 | 356°29.9 | 228°01.7 | N20°49.8 | 306°22.8 | N17°56.4 | 236°51.5 | N21°04.9 | 343°09.4 | N03°11.3 | | | | Polaris | 313°47.5 | 89°22.3 | | | | | | | | | | | |
| 7 | 11°32.3 | 243°01.2 | 49.1 | 321°23.5 | 56.9 | 251°53.5 | 04.8 | 358°11.7 | 11.4 | | | | Acamar | 315°11.2 | -40°11.7 | | | | | | | | | | | |
| 8 | 26°34.8 | 258°00.7 | 48.4 | 336°24.1 | 57.3 | 266°55.4 | 04.7 | 13°14.0 | 11.4 | | | | Menkar | 314°05.1 | 4°11.6 | | | | | | | | | | | |
| 9 | 41°37.3 | 273°00.2 | · · 47.6 | 351°24.7 | · · 57.8 | 281°57.3 | · · 04.6 | 28°16.3 | · · 11.5 | | | | Mirfak | 308°26.9 | 49°57.2 | | | | | | | | | | | |
| 10 | 56°39.7 | 287°59.6 | 46.9 | 6°25.4 | 58.3 | 296°59.2 | 04.5 | 43°18.7 | 11.5 | | | | Aldebaran | 290°38.6 | 16°33.7 | | | | | | | | | | | |
| 11 | 71°42.2 | 302°59.1 | 46.1 | 21°26.0 | 58.8 | 312°01.2 | 04.4 | 58°21.0 | 11.6 | | | | Rigel | 281°03.1 | -8°10.2 | | | | | | | | | | | |
| 12 | 86°44.7 | 317°58.6 | N20°45.4 | 36°26.6 | N17°59.3 | 327°03.1 | N21°04.3 | 73°23.3 | N03°11.6 | | | | Capella | 280°20.6 | 46°01.4 | | | | | | | | | | | |
| 13 | 101°47.1 | 332°58.1 | 44.7 | 51°27.3 | 17°59.8 | 342°05.0 | 04.2 | 88°25.6 | 11.7 | | | | Bellatrix | 278°21.9 | 6°22.4 | | | | | | | | | | | |
| 14 | 116°49.6 | 347°57.5 | 43.9 | 66°27.9 | 18°00.3 | 357°06.9 | 04.1 | 103°27.9 | 11.7 | | | | Elnath | 278°00.7 | 28°37.7 | | | | | | | | | | | |
| 15 | 131°52.1 | 2°57.0 | · · 43.2 | 81°28.5 | · · 00.8 | 12°08.9 | · · 04.0 | 118°30.3 | · · 11.8 | | | | Alnilam | 275°36.9 | -1°11.1 | | | | | | | | | | | |
| 16 | 146°54.5 | 17°56.5 | 42.4 | 96°29.1 | 01.2 | 27°10.8 | 03.9 | 133°32.6 | 11.8 | | | | Betelgeuse | 270°51.1 | 7°24.7 | | | | | | | | | | | |
| 17 | 161°57.0 | 32°56.0 | 41.7 | 111°29.8 | 01.7 | 42°12.7 | 03.8 | 148°34.9 | 11.9 | | | | Canopus | 263°52.4 | -52°42.6 | | | | | | | | | | | |
| 18 | 176°59.5 | 47°55.4 | N20°40.9 | 126°30.4 | N18°02.2 | 57°14.6 | N21°03.7 | 163°37.2 | N03°11.9 | | | | Sirius | 258°25.5 | -16°45.2 | | | | | | | | | | | |
| 19 | 192°01.9 | 62°54.9 | 40.2 | 141°31.0 | 02.7 | 72°16.5 | 03.6 | 178°39.5 | 12.0 | | | | Adhara | 255°05.3 | -29°00.5 | | | | | | | | | | | |
| 20 | 207°04.4 | 77°54.4 | 39.4 | 156°31.7 | 03.2 | 87°18.5 | 03.5 | 193°41.8 | 12.0 | | | | Procyon | 244°49.9 | 5°09.4 | | | | | | | | | | | |
| 21 | 222°06.8 | 92°53.9 | · · 38.7 | 171°32.3 | · · 03.7 | 102°20.4 | · · 03.4 | 208°44.2 | · · 12.1 | | | | Pollux | 243°16.2 | 27°57.8 | | | | | | | | | | | |
| 22 | 237°09.3 | 107°53.4 | 37.9 | 186°32.9 | 04.1 | 117°22.3 | 03.3 | 223°46.5 | 12.1 | | | | Avior | 234°14.8 | -59°35.8 | | | | | | | | | | | |
| 23 | 252°11.8 | 122°52.8 | 37.2 | 201°33.6 | 04.6 | 132°24.2 | 03.2 | 238°48.8 | 12.2 | | | | Suhail | 222°45.7 | -43°32.6 | | | | | | | | | | | |
| Mer.pass. 06:14 | | ν-0.5' d-0.7' m-3.99 | | | ν0.6' d0.5' m1.29 | | | ν1.9' d-0.1' m-1.83 | | | ν2.3' d0.1' m0.82 | | | | | | | | | | | | | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | | | | | | | | | |
| 0 | 267°14.2 | 137°52.3 | N20°36.4 | 216°34.2 | N18°05.1 | 147°26.1 | N21°03.1 | 253°51.1 | N03°12.2 | | | | | | | | | | | | | | | | | |
| 1 | 282°16.7 | 152°51.8 | 35.7 | 231°34.8 | 05.6 | 162°28.1 | 03.0 | 268°53.4 | 12.3 | | | | | | | | | | | | | | | | | |
| 2 | 297°19.2 | 167°51.3 | 34.9 | 246°35.4 | 06.1 | 177°30.0 | 02.9 | 283°55.8 | 12.3 | | | | | | | | | | | | | | | | | |
| 3 | 312°21.6 | 182°50.8 | · · 34.2 | 261°36.1 | · · 06.6 | 192°31.9 | · · 02.8 | 298°58.1 | · · 12.4 | | | | | | | | | | | | | | | | | |
| 4 | 327°24.1 | 197°50.3 | 33.4 | 276°36.7 | 07.0 | 207°33.8 | 02.7 | 314°00.4 | 12.4 | | | | | | | | | | | | | | | | | |
| 5 | 342°26.6 | 212°49.8 | 32.7 | 291°37.3 | 07.5 | 222°35.8 | 02.6 | 329°02.7 | 12.5 | | | | | | | | | | | | | | | | | |
| 6 | 357°29.0 | 227°49.2 | N20°31.9 | 306°38.0 | N18°08.0 | 237°37.7 | N21°02.5 | 344°05.0 | N03°12.5 | | | | | | | | | | | | | | | | | |
| 7 | 12°31.5 | 242°48.7 | 31.2 | 321°38.6 | 08.5 | 252°39.6 | 02.4 | 359°07.4 | 12.6 | | | | | | | | | | | | | | | | | |
| 8 | 27°33.9 | 257°48.2 | 30.4 | 336°39.2 | 09.0 | 267°41.5 | 02.3 | 14°09.7 | 12.6 | | | | | | | | | | | | | | | | | |
| 9 | 42°36.4 | 272°47.7 | · · 29.6 | 351°39.8 | · · 09.4 | 282°43.4 | · · 02.2 | 29°12.0 | · · 12.6 | | | | | | | | | | | | | | | | | |
| 10 | 57°38.9 | 287°47.2 | 28.9 | 6°40.5 | 09.9 | 297°45.4 | 02.1 | 44°14.3 | 12.7 | | | | | | | | | | | | | | | | | |
| 11 | 72°41.3 | 302°46.7 | 28.1 | 21°41.1 | 10.4 | 312°47.3 | 02.0 | 59°16.6 | 12.7 | | | | | | | | | | | | | | | | | |
| 12 | 87°43.8 | 317°46.2 | N20°27.4 | 36°41.7 | N18°10.9 | 327°49.2 | N21°01.9 | 74°19.0 | N03°12.8 | | | | | | | | | | | | | | | | | |
| 13 | 102°46.3 | 332°45.7 | 26.6 | 51°42.4 | 11.4 | 342°51.1 | 01.8 | 89°21.3 | 12.8 | | | | | | | | | | | | | | | | | |
| 14 | 117°48.7 | 347°45.2 | 25.8 | 66°43.0 | 11.8 | 357°53.0 | 01.7 | 104°23.6 | 12.9 | | | | | | | | | | | | | | | | | |
| 15 | 132°51.2 | 2°44.7 | · · 25.1 | 81°43.6 | · · 12.3 | 12°55.0 | · · 01.6 | 119°25.9 | · · 12.9 | | | | | | | | | | | | | | | | | |
| 16 | 147°53.7 | 17°44.1 | 24.3 | 96°44.2 | 12.8 | 27°56.9 | 01.5 | 134°28.3 | 13.0 | | | | | | | | | | | | | | | | | |
| 17 | 162°56.1 | 32°43.6 | 23.5 | 111°44.9 | 13.3 | 42°58.8 | 01.4 | 149°30.6 | 13.0 | | | | | | | | | | | | | | | | | |
| 18 | 177°58.6 | 47°43.1 | N20°22.8 | 126°45.5 | N18°13.8 | 58°00.7 | N21°01.3 | 164°32.9 | N03°13.1 | | | | | | | | | | | | | | | | | |
| 19 | 193°01.1 | 62°42.6 | 22.0 | 141°46.1 | 14.2 | 73°02.6 | 01.2 | 179°35.2 | 13.1 | | | | | | | | | | | | | | | | | |
| 20 | 208°03.5 | 77°42.1 | 21.2 | 156°46.8 | 14.7 | 88°04.6 | 01.1 | 194°37.5 | 13.2 | | | | | | | | | | | | | | | | | |
| 21 | 223°06.0 | 92°41.6 | · · 20.5 | 171°47.4 | · · 15.2 | 103°06.5 | · · 01.0 | 209°39.9 | · · 13.2 | | | | | | | | | | | | | | | | | |
| 22 | 238°08.4 | 107°41.1 | 19.7 | 186°48.0 | 15.7 | 118°08.4 | 00.9 | 224°42.2 | 13.3 | | | | | | | | | | | | | | | | | |
| 23 | 253°10.9 | 122°40.6 | 18.9 | 201°48.6 | 16.1 | 133°10.3 | 00.8 | 239°44.5 | 13.3 | | | | | | | | | | | | | | | | | |
| Mer.pass. 06:10 | | ν-0.5' d-0.8' m-4.00 | | | ν0.6' d0.5' m1.29 | | | ν1.9' d-0.1' m-1.83 | | | ν2.3' d0.0' m0.82 | | | | | | | | | | | | | | | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | | | | | | | | | |
| 0 | 268°13.4 | 137°40.1 | N20°18.2 | 216°49.3 | N18°16.6 | 148°12.2 | N21°00.7 | 254°46.8 | N03°13.4 | | | | | | | | | | | | | | | | | |
| 1 | 283°15.8 | 152°39.6 | 17.4 | 231°49.9 | 17.1 | 163°14.2 | 00.6 | 269°49.2 | 13.4 | | | | | | | | | | | | | | | | | |
| 2 | 298°18.3 | 167°39.1 | 16.6 | 246°50.5 | 17.6 | 178°16.1 | 00.5 | 284°51.5 | 13.5 | | | | | | | | | | | | | | | | | |
| 3 | 313°20.8 | 182°38.6 | · · 15.8 | 261°51.2 | · · 18.0 | 193°18.0 | · · 00.4 | 299°53.8 | · · 13.5 | | | | | | | | | | | | | | | | | |
| 4 | 328°23.2 | 197°38.1 | 15.1 | 276°51.8 | 18.5 | 208°19.9 | 00.3 | 314°56.1 | 13.6 | | | | | | | | | | | | | | | | | |
| 5 | 343°25.7 | 212°37.6 | 14.3 | 291°52.4 | 19.0 | 223°21.8 | 00.2 | 329°58.4 | 13.6 | | | | | | | | | | | | | | | | | |
| 6 | 358°28.2 | 227°37.1 | N20°13.5 | 306°53.0 | N18°19.5 | 238°23.8 | N21°00.1 | 345°00.8 | N03°13.7 | | | | | | | | | | | | | | | | | |
| 7 | 13°30.6 | 242°36.6 | 12.7 | 321°53.7 | 19.9 | 253°25.7 | 21°00.0 | 0°03.1 | 13.7 | | | | | | | | | | | | | | | | | |


| h | Sun | | | Moon | | | | |
|------------|----------|----------|------------|------------|-------|----------|--------|-------|
| Thu | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 179°44.2 | N23°24.0 | | 136°01.1 | 6.9' | N20°30.4 | -12.2' | 59.9' |
| 1 | 194°44.1 | 24.0 | | 150°27.1 | 7.1' | 20°18.2 | -12.3' | 59.9' |
| 2 | 209°44.0 | 24.1 | | 164°53.1 | 7.2' | 20°05.9 | -12.4' | 59.8' |
| 3 | 224°43.8 | • • 24.1 | | 179°19.4 | 7.4' | 19°53.5 | -12.5' | 59.8' |
| 4 | 239°43.7 | 24.2 | | 193°45.7 | 7.5' | 19°41.0 | -12.6' | 59.8' |
| 5 | 254°43.6 | 24.2 | | 208°12.2 | 7.6' | 19°28.3 | -12.7' | 59.7' |
| 6 | 269°43.4 | N23°24.3 | | 222°38.9 | 7.8' | N19°15.6 | -12.8' | 59.7' |
| 7 | 284°43.3 | 24.3 | | 237°05.6 | 7.9' | 19°02.8 | -12.9' | 59.7' |
| 8 | 299°43.2 | 24.4 | | 251°32.5 | 8.0' | 18°49.9 | -13.0' | 59.6' |
| 9 | 314°43.0 | • • 24.4 | | 265°59.6 | 8.2' | 18°36.9 | -13.1' | 59.6' |
| 10 | 329°42.9 | 24.5 | | 280°26.8 | 8.3' | 18°23.7 | -13.2' | 59.6' |
| 11 | 344°42.7 | 24.6 | | 294°54.1 | 8.5' | 18°10.5 | -13.3' | 59.5' |
| 12 | 359°42.6 | N23°24.6 | | 309°21.6 | 8.6' | N17°57.2 | -13.4' | 59.5' |
| 13 | 14°42.5 | 24.6 | | 323°49.1 | 8.7' | 17°43.9 | -13.5' | 59.5' |
| 14 | 29°42.3 | 24.7 | | 338°16.9 | 8.9' | 17°30.4 | -13.5' | 59.4' |
| 15 | 44°42.2 | • • 24.7 | | 352°44.7 | 9.0' | 17°16.8 | -13.6' | 59.4' |
| 16 | 59°42.1 | 24.8 | | 7°12.7 | 9.1' | 17°03.2 | -13.7' | 59.3' |
| 17 | 74°41.9 | 24.8 | | 21°40.8 | 9.2' | 16°49.5 | -13.8' | 59.3' |
| 18 | 89°41.8 | N23°24.9 | | 36°09.1 | 9.4' | N16°35.7 | -13.9' | 59.3' |
| 19 | 104°41.6 | 24.9 | | 50°37.4 | 9.5' | 16°21.9 | -13.9' | 59.2' |
| 20 | 119°41.5 | 25.0 | | 65°05.9 | 9.6' | 16°07.9 | -14.0' | 59.2' |
| 21 | 134°41.4 | • • 25.0 | | 79°34.6 | 9.8' | 15°53.9 | -14.1' | 59.1' |
| 22 | 149°41.2 | 25.1 | | 94°03.3 | 9.9' | 15°39.9 | -14.1' | 59.1' |
| 23 | 164°41.1 | 25.1 | | 108°32.2 | 10.0' | 15°25.7 | -14.2' | 59.1' |
| SD = 15.7' | | | $d = 0.1'$ | SD = 16.3' | | | | |

| Fri | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|----------|-------|------------|--------|-------|
| 0 | 179°41.0 | N23°25.1 | | 123°01.2 | 10.1' | N15°11.5 | -14.3' | 59.0' |
| 1 | 194°40.8 | 25.2 | | 137°30.3 | 10.2' | 14°57.3 | -14.3' | 59.0' |
| 2 | 209°40.7 | 25.2 | | 151°59.5 | 10.4' | 14°43.0 | -14.4' | 59.0' |
| 3 | 224°40.5 | 25.3 | | 166°28.9 | 10.5' | 14°28.6 | -14.4' | 58.9' |
| 4 | 239°40.4 | 25.3 | | 180°58.4 | 10.6' | 14°14.1 | -14.5' | 58.9' |
| 5 | 254°40.3 | 25.3 | | 195°28.0 | 10.7' | 13°59.6 | -14.5' | 58.8' |
| 6 | 269°40.1 | N23°25.4 | | 209°57.7 | 10.8' | N13°45.1 | -14.6' | 58.8' |
| 7 | 284°40.0 | 25.4 | | 224°27.5 | 10.9' | 13°30.5 | -14.6' | 58.8' |
| 8 | 299°39.9 | 25.4 | | 238°57.4 | 11.0' | 13°15.8 | -14.7' | 58.7' |
| 9 | 314°39.7 | 25.5 | | 253°27.5 | 11.2' | 13°01.1 | -14.7' | 58.7' |
| 10 | 329°39.6 | 25.5 | | 267°57.6 | 11.3' | 12°46.4 | -14.8' | 58.6' |
| 11 | 344°39.4 | 25.5 | | 282°27.9 | 11.4' | 12°31.6 | -14.8' | 58.6' |
| 12 | 359°39.3 | N23°25.6 | | 296°58.2 | 11.5' | N12°16.8 | -14.9' | 58.6' |
| 13 | 14°39.2 | 25.6 | | 311°28.7 | 11.6' | 12°01.9 | -14.9' | 58.5' |
| 14 | 29°39.0 | 25.6 | | 325°59.3 | 11.7' | 11°47.0 | -15.0' | 58.5' |
| 15 | 44°38.9 | 25.7 | | 340°30.0 | 11.8' | 11°32.0 | -15.0' | 58.4' |
| 16 | 59°38.8 | 25.7 | | 355°00.8 | 11.9' | 11°17.1 | -15.0' | 58.4' |
| 17 | 74°38.6 | 25.7 | | 9°31.6 | 12.0' | 11°02.0 | -15.1' | 58.4' |
| 18 | 89°38.5 | N23°25.7 | | 24°02.6 | 12.1' | N10°47.0 | -15.1' | 58.3' |
| 19 | 104°38.4 | 25.8 | | 38°33.7 | 12.2' | 10°31.9 | -15.1' | 58.3' |
| 20 | 119°38.2 | 25.8 | | 53°04.9 | 12.3' | 10°16.8 | -15.1' | 58.2' |
| 21 | 134°38.1 | 25.8 | | 67°36.1 | 12.4' | 10°01.6 | -15.2' | 58.2' |
| 22 | 149°37.9 | 25.9 | | 82°07.5 | 12.5' | 09°46.5 | -15.2' | 58.2' |
| 23 | 164°37.8 | 25.9 | | 96°38.9 | 12.5' | 09°31.3 | -15.2' | 58.1' |
| SD = 15.7' | | | $d = 0.0'$ | | | SD = 16.1' | | |

| Sat | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|----------|-------|------------|--------|-------|
| 0 | 179°37.7 | N23°25.9 | | 111°10.5 | 12.6' | N09°16.0 | -15.2' | 58.1' |
| 1 | 194°37.5 | 25.9 | | 125°42.1 | 12.7' | 09°00.8 | -15.3' | 58.0' |
| 2 | 209°37.4 | 25.9 | | 140°13.8 | 12.8' | 08°45.5 | -15.3' | 58.0' |
| 3 | 224°37.3 | 26.0 | | 154°45.6 | 12.9' | 08°30.2 | -15.3' | 58.0' |
| 4 | 239°37.1 | 26.0 | | 169°17.5 | 13.0' | 08°14.9 | -15.3' | 57.9' |
| 5 | 254°37.0 | 26.0 | | 183°49.5 | 13.0' | 07°59.6 | -15.3' | 57.9' |
| 6 | 269°36.8 | N23°26.0 | | 198°21.5 | 13.1' | N07°44.3 | -15.4' | 57.9' |
| 7 | 284°36.7 | 26.0 | | 212°53.7 | 13.2' | 07°28.9 | -15.4' | 57.8' |
| 8 | 299°36.6 | 26.1 | | 227°25.9 | 13.3' | 07°13.6 | -15.4' | 57.8' |
| 9 | 314°36.4 | 26.1 | | 241°58.2 | 13.4' | 06°58.2 | -15.4' | 57.7' |
| 10 | 329°36.3 | 26.1 | | 256°30.5 | 13.4' | 06°42.8 | -15.4' | 57.7' |
| 11 | 344°36.2 | 26.1 | | 271°03.0 | 13.5' | 06°27.4 | -15.4' | 57.7' |
| 12 | 359°36.0 | N23°26.1 | | 285°35.5 | 13.6' | N06°12.0 | -15.4' | 57.6' |
| 13 | 14°35.9 | 26.1 | | 300°08.0 | 13.6' | 05°56.6 | -15.4' | 57.6' |
| 14 | 29°35.7 | 26.2 | | 314°40.7 | 13.7' | 05°41.2 | -15.4' | 57.5' |
| 15 | 44°35.6 | 26.2 | | 329°13.4 | 13.8' | 05°25.8 | -15.4' | 57.5' |
| 16 | 59°35.5 | 26.2 | | 343°46.2 | 13.8' | 05°10.3 | -15.4' | 57.5' |
| 17 | 74°35.3 | 26.2 | | 358°19.0 | 13.9' | 04°54.9 | -15.4' | 57.4' |
| 18 | 89°35.2 | N23°26.2 | | 12°51.9 | 14.0' | N04°39.5 | -15.4' | 57.4' |
| 19 | 104°35.1 | 26.2 | | 27°24.9 | 14.0' | 04°24.1 | -15.4' | 57.3' |
| 20 | 119°34.9 | 26.2 | | 41°57.9 | 14.1' | 04°08.6 | -15.4' | 57.3' |
| 21 | 134°34.8 | 26.2 | | 56°31.0 | 14.1' | 03°53.2 | -15.4' | 57.3' |
| 22 | 149°34.7 | 26.2 | | 71°04.2 | 14.2' | 03°37.8 | -15.4' | 57.2' |
| 23 | 164°34.5 | 26.2 | | 85°37.4 | 14.3' | 03°22.4 | -15.4' | 57.2' |
| SD = 15.7' | | | $d = 0.0'$ | | | SD = 15.8' | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | | | | | | |
| N 70° | | | | | | |
| 68° | | | | | | |
| 66° | | | | | | |
| 64° | //// | //// | 01:31 | 22:32 | //// | //// |
| 62° | //// | //// | 02:09 | 21:54 | //// | //// |
| 60° | //// | 00:49 | 02:36 | 21:27 | 23:14 | //// |
| N 58° | //// | 01:40 | 02:56 | 21:07 | 22:23 | //// |
| 56° | //// | 02:10 | 03:13 | 20:50 | 21:53 | //// |
| 54° | 00:45 | 02:33 | 03:27 | 20:36 | 21:30 | 23:18 |
| 52° | 01:32 | 02:51 | 03:39 | 20:23 | 21:12 | 22:31 |
| 50° | 02:00 | 03:06 | 03:50 | 20:12 | 20:57 | 22:03 |
| 45° | 02:46 | 03:35 | 04:13 | 19:50 | 20:27 | 21:17 |
| N 40° | 03:16 | 03:58 | 04:31 | 19:32 | 20:05 | 20:46 |
| 35° | 03:40 | 04:16 | 04:46 | 19:17 | 19:46 | 20:23 |
| 30° | 03:58 | 04:32 | 04:59 | 19:04 | 19:31 | 20:05 |
| 20° | 04:27 | 04:57 | 05:21 | 18:42 | 19:06 | 19:35 |
| N 10° | 04:50 | 05:17 | 05:40 | 18:23 | 18:46 | 19:13 |
| 0° | 05:09 | 05:35 | 05:58 | 18:05 | 18:28 | 18:54 |
| S 10° | 05:26 | 05:52 | 06:15 | 17:48 | 18:10 | 18:37 |
| 20° | 05:42 | 06:10 | 06:34 | 17:29 | 17:53 | 18:21 |
| 30° | 05:59 | 06:29 | 06:55 | 17:08 | 17:34 | 18:04 |
| 35° | 06:07 | 06:39 | 07:07 | 16:55 | 17:24 | 17:55 |
| 40° | 06:17 | 06:51 | 07:22 | 16:41 | 17:12 | 17:46 |
| 45° | 06:27 | 07:05 | 07:38 | 16:24 | 16:58 | 17:35 |
| S 50° | 06:39 | 07:21 | 07:59 | 16:04 | 16:42 | 17:24 |
| 52° | 06:44 | 07:28 | 08:09 | 15:54 | 16:35 | 17:18 |
| 54° | 06:50 | 07:36 | 08:20 | 15:43 | 16:26 | 17:13 |
| 56° | 06:56 | 07:45 | 08:33 | 15:30 | 16:17 | 17:07 |
| 58° | 07:03 | 07:56 | 08:48 | 15:15 | 16:07 | 17:00 |
| S 60° | 07:11 | 08:07 | 09:05 | 14:58 | 15:55 | 16:52 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|----------------|----------------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | | 06:54 | 09:28 | | 01:26 | 00:33 23:56 |
| N 70° | 03:56 | 07:21 | 09:38 | 02:31 | 00:56 | 00:20 23:52 |
| 68° | 05:07 | 07:42 | 09:47 | 01:18 | 00:34 | 00:09 23:49 |
| 66° | 05:44 | 07:58 | 09:54 | 00:40 | 00:16 | 00:00 23:46 |
| 64° | 06:09 | 08:11 | 09:59 | 00:14 | 00:02 23:52 | 23:44 |
| 62° | 06:29 | 08:22 | 10:04 | 23:49 | 23:46 | 23:42 |
| 60° | 06:45 | 08:31 | 10:09 | 23:39 | 23:40 | 23:40 |
| N 58° | 06:59 | 08:39 | 10:12 | 23:30 | 23:35 | 23:38 |
| 56° | 07:11 | 08:46 | 10:16 | 23:21 | 23:30 | 23:37 |
| 54° | 07:21 | 08:53 | 10:19 | 23:14 | 23:26 | 23:35 |
| 52° | 07:30 | 08:58 | 10:21 | 23:08 | 23:22 | 23:34 |
| 50° | 07:38 | 09:03 | 10:24 | 23:02 | 23:19 | 23:33 |
| 45° | 07:55 | 09:14 | 10:29 | 22:49 | 23:11 | 23:31 |
| N 40° | 08:09 | 09:23 | 10:34 | 22:38 | 23:05 | 23:29 |
| 35° | 08:20 | 09:31 | 10:37 | 22:29 | 23:00 | 23:27 |
| 30° | 08:31 | 09:38 | 10:41 | 22:21 | 22:55 | 23:25 |
| 20° | 08:48 | 09:49 | 10:46 | 22:07 | 22:46 | 23:22 |
| N 10° | 09:03 | 10:00 | 10:51 | 21:54 | 22:39 | 23:20 |
| 0° | 09:17 | 10:09 | 10:56 | 21:43 | 22:32 | 23:18 |
| S 10° | 09:31 | 10:18 | 11:01 | 21:31 | 22:25 | 23:15 |
| 20° | 09:46 | 10:28 | 11:06 | 21:18 | 22:17 | 23:13 |
| 30° | 10:03 | 10:40 | 11:12 | 21:03 | 22:08 | 23:10 |
| 35° | 10:13 | 10:46 | 11:15 | 20:55 | 22:03 | 23:08 |
| 40° | 10:24 | 10:54 | 11:19 | 20:45 | 21:57 | 23:06 |
| 45° | 10:38 | 11:02 | 11:23 | 20:33 | 21:51 | 23:03 |
| S 50° | 10:54 | 11:13 | 11:28 | 20:19 | 21:42 | 23:01 |
| 52° | 11:01 | 11:17 | 11:30 | 20:12 | 21:38 | 22:59 |
| 54° | 11:09 | 11:23 | 11:33 | 20:05 | 21:34 | 22:58 |
| 56° | 11:18 | 11:28 | 11:36 | 19:57 | 21:30 | 22:56 |
| 58° | 11:29 | 11:35 | 11:39 | 19:47 | 21:24 | 22:55 |
| S 60° | 11:41 | 11:42 | 11:42 | 19:36 | 21:18 | 22:53 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-------|-----------|-------|---|
| | Eqn.of Time | | Mer. | Mer.Pass. | | Age |
| | 00 ^h | 12 ^h | Pass | Upper | Lower | 3-5 |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 12-30% |
| 18 | 01:03 | 01:10 | 12:01 | 15:30 | 03:03 |  |
| 19 | 01:16 | 01:23 | 12:01 | 16:21 | 03:56 | |
| 20 | 01:29 | 01:36 | 12:02 | 17:07 | 04:44 | |

June 21, 22, 23 UT (Sun., Mon., Tue.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------------------|----------|----------|-------------------|----------|----------|---------------------|----------|---------|-------------------|-----|--------|-----|-----|
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 269°12.5 | 137°28.3 | N19°59.4 | 217°04.3 | N18°27.9 | 148°58.3 | N20°58.3 | 255°42.6 | N03°14.5 | | | | | | |
| 1 | 284°15.0 | 152°27.8 | 58.6 | 232°05.0 | 28.4 | 164°00.2 | 58.2 | 270°44.9 | 14.6 | | | | | | |
| 2 | 299°17.4 | 167°27.3 | 57.8 | 247°05.6 | 28.9 | 179°02.1 | 58.1 | 285°47.3 | 14.6 | | | | | | |
| 3 | 314°19.9 | 182°26.9 | · · 57.0 | 262°06.2 | · · 29.3 | 194°04.1 | · · 58.0 | 300°49.6 | · · 14.6 | | | | | | |
| 4 | 329°22.4 | 197°26.4 | 56.2 | 277°06.8 | 29.8 | 209°06.0 | 57.9 | 315°51.9 | 14.7 | | | | | | |
| 5 | 344°24.8 | 212°25.9 | 55.4 | 292°07.5 | 30.3 | 224°07.9 | 57.8 | 330°54.2 | 14.7 | | | | | | |
| 6 | 359°27.3 | 227°25.4 | N19°54.6 | 307°08.1 | N18°30.7 | 239°09.8 | N20°57.7 | 345°56.6 | N03°14.8 | | | | | | |
| 7 | 14°29.8 | 242°24.9 | 53.8 | 322°08.7 | 31.2 | 254°11.7 | 57.6 | 0°58.9 | 14.8 | | | | | | |
| 8 | 29°32.2 | 257°24.5 | 53.0 | 337°09.3 | 31.7 | 269°13.6 | 57.5 | 16°01.2 | 14.9 | | | | | | |
| 9 | 44°34.7 | 272°24.0 | · · 52.2 | 352°10.0 | · · 32.1 | 284°15.6 | · · 57.4 | 31°03.6 | · · 14.9 | | | | | | |
| 10 | 59°37.2 | 287°23.5 | 51.4 | 7°10.6 | 32.6 | 299°17.5 | 57.2 | 46°05.9 | 15.0 | | | | | | |
| 11 | 74°39.6 | 302°23.0 | 50.6 | 22°11.2 | 33.1 | 314°19.4 | 57.1 | 61°08.2 | 15.0 | | | | | | |
| 12 | 89°42.1 | 317°22.6 | N19°49.8 | 37°11.9 | N18°33.5 | 329°21.3 | N20°57.0 | 76°10.5 | N03°15.1 | | | | | | |
| 13 | 104°44.5 | 332°22.1 | 49.0 | 52°12.5 | 34.0 | 344°23.2 | 56.9 | 91°12.9 | 15.1 | | | | | | |
| 14 | 119°47.0 | 347°21.6 | 48.2 | 67°13.1 | 34.4 | 359°25.1 | 56.8 | 106°15.2 | 15.1 | | | | | | |
| 15 | 134°49.5 | 2°21.1 | · · 47.4 | 82°13.7 | · · 34.9 | 14°27.1 | · · 56.7 | 121°17.5 | · · 15.2 | | | | | | |
| 16 | 149°51.9 | 17°20.7 | 46.6 | 97°14.4 | 35.4 | 29°29.0 | 56.6 | 136°19.8 | 15.2 | | | | | | |
| 17 | 164°54.4 | 32°20.2 | 45.7 | 112°15.0 | 35.8 | 44°30.9 | 56.5 | 151°22.2 | 15.3 | | | | | | |
| 18 | 179°56.9 | 47°19.7 | N19°44.9 | 127°15.6 | N18°36.3 | 59°32.8 | N20°56.4 | 166°24.5 | N03°15.3 | | | | | | |
| 19 | 194°59.3 | 62°19.3 | 44.1 | 142°16.2 | 36.8 | 74°34.7 | 56.3 | 181°26.8 | 15.4 | | | | | | |
| 20 | 210°01.8 | 77°18.8 | 43.3 | 157°16.9 | 37.2 | 89°36.7 | 56.2 | 196°29.2 | 15.4 | | | | | | |
| 21 | 225°04.3 | 92°18.3 | · · 42.5 | 172°17.5 | · · 37.7 | 104°38.6 | · · 56.1 | 211°31.5 | · · 15.5 | | | | | | |
| 22 | 240°06.7 | 107°17.8 | 41.7 | 187°18.1 | 38.1 | 119°40.5 | 56.0 | 226°33.8 | 15.5 | | | | | | |
| 23 | 255°09.2 | 122°17.4 | 40.9 | 202°18.7 | 38.6 | 134°42.4 | 55.9 | 241°36.1 | 15.6 | | | | | | |
| Mer.pass. 06:02 | | ν-0.5' d-0.8' m-4.01 | | | ν0.6' d0.5' m1.29 | | | ν1.9' d-0.1' m-1.83 | | | ν2.3' d0.0' m0.81 | | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 270°11.7 | 137°16.9 | N19°40.1 | 217°19.4 | N18°39.1 | 149°44.3 | N20°55.8 | 256°38.5 | N03°15.6 | | | | | | |
| 1 | 285°14.1 | 152°16.4 | 39.3 | 232°20.0 | 39.5 | 164°46.2 | 55.7 | 271°40.8 | 15.6 | | | | | | |
| 2 | 300°16.6 | 167°16.0 | 38.4 | 247°20.6 | 40.0 | 179°48.2 | 55.6 | 286°43.1 | 15.7 | | | | | | |
| 3 | 315°19.0 | 182°15.5 | · · 37.6 | 262°21.2 | · · 40.4 | 194°50.1 | · · 55.5 | 301°45.5 | · · 15.7 | | | | | | |
| 4 | 330°21.5 | 197°15.1 | 36.8 | 277°21.9 | 40.9 | 209°52.0 | 55.4 | 316°47.8 | 15.8 | | | | | | |
| 5 | 345°24.0 | 212°14.6 | 36.0 | 292°22.5 | 41.4 | 224°53.9 | 55.3 | 331°50.1 | 15.8 | | | | | | |
| 6 | 0°26.4 | 227°14.1 | N19°35.2 | 307°23.1 | N18°41.8 | 239°55.8 | N20°55.2 | 346°52.5 | N03°15.9 | | | | | | |
| 7 | 15°28.9 | 242°13.7 | 34.4 | 322°23.7 | 42.3 | 254°57.7 | 55.1 | 1°54.8 | 15.9 | | | | | | |
| 8 | 30°31.4 | 257°13.2 | 33.5 | 337°24.4 | 42.7 | 269°59.6 | 55.0 | 16°57.1 | 16.0 | | | | | | |
| 9 | 45°33.8 | 272°12.7 | · · 32.7 | 352°25.0 | · · 43.2 | 285°01.6 | · · 54.9 | 31°59.4 | · · 16.0 | | | | | | |
| 10 | 60°36.3 | 287°12.3 | 31.9 | 7°25.6 | 43.6 | 300°03.5 | 54.8 | 47°01.8 | 16.0 | | | | | | |
| 11 | 75°38.8 | 302°11.8 | 31.1 | 22°26.2 | 44.1 | 315°05.4 | 54.7 | 62°04.1 | 16.1 | | | | | | |
| 12 | 90°41.2 | 317°11.4 | N19°30.2 | 37°26.9 | N18°44.6 | 330°07.3 | N20°54.6 | 77°06.4 | N03°16.1 | | | | | | |
| 13 | 105°43.7 | 332°10.9 | 29.4 | 52°27.5 | 45.0 | 345°09.2 | 54.5 | 92°08.8 | 16.2 | | | | | | |
| 14 | 120°46.1 | 347°10.4 | 28.6 | 67°28.1 | 45.5 | 0°11.1 | 54.4 | 107°11.1 | 16.2 | | | | | | |
| 15 | 135°48.6 | 2°10.0 | · · 27.8 | 82°28.7 | · · 45.9 | 15°13.1 | · · 54.3 | 122°13.4 | · · 16.3 | | | | | | |
| 16 | 150°51.1 | 17°09.5 | 26.9 | 97°29.4 | 46.4 | 30°15.0 | 54.2 | 137°15.8 | 16.3 | | | | | | |
| 17 | 165°53.5 | 32°09.1 | 26.1 | 112°30.0 | 46.8 | 45°16.9 | 54.1 | 152°18.1 | 16.4 | | | | | | |
| 18 | 180°56.0 | 47°08.6 | N19°25.3 | 127°30.6 | N18°47.3 | 60°18.8 | N20°54.0 | 167°20.4 | N03°16.4 | | | | | | |
| 19 | 195°58.5 | 62°08.2 | 24.5 | 142°31.2 | 47.7 | 75°20.7 | 53.9 | 182°22.8 | 16.4 | | | | | | |
| 20 | 211°00.9 | 77°07.7 | 23.6 | 157°31.9 | 48.2 | 90°22.6 | 53.7 | 197°25.1 | 16.5 | | | | | | |
| 21 | 226°03.4 | 92°07.3 | · · 22.8 | 172°32.5 | · · 48.6 | 105°24.6 | · · 53.6 | 212°27.4 | · · 16.5 | | | | | | |
| 22 | 241°05.9 | 107°06.8 | 22.0 | 187°33.1 | 49.1 | 120°26.5 | 53.5 | 227°29.8 | 16.6 | | | | | | |
| 23 | 256°08.3 | 122°06.4 | 21.1 | 202°33.7 | 49.5 | 135°28.4 | 53.4 | 242°32.1 | 16.6 | | | | | | |
| Mer.pass. 05:58 | | ν-0.5' d-0.8' m-4.01 | | | ν0.6' d0.5' m1.29 | | | ν1.9' d-0.1' m-1.83 | | | ν2.3' d0.0' m0.81 | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 271°10.8 | 137°05.9 | N19°20.3 | 217°34.4 | N18°50.0 | 150°30.3 | N20°53.3 | 257°34.4 | N03°16.7 | | | | | | |
| 1 | 286°13.3 | 152°05.5 | 19.5 | 232°35.0 | 50.5 | 165°32.2 | 53.2 | 272°36.8 | 16.7 | | | | | | |
| 2 | 301°15.7 | 167°05.0 | 18.6 | 247°35.6 | 50.9 | 180°34.1 | 53.1 | 287°39.1 | 16.7 | | | | | | |
| 3 | 316°18.2 | 182°04.6 | · · 17.8 | 262°36.2 | · · 51.4 | 195°36.0 | · · 53.0 | 302°41.4 | · · 16.8 | | | | | | |
| 4 | 331°20.6 | 197°04.1 | 17.0 | 277°36.9 | 51.8 | 210°38.0 | 52.9 | 317°43.8 | 16.8 | | | | | | |
| 5 | 346°23.1 | 212°03.7 | 16.1 | 292°37.5 | 52.3 | 225°39.9 | 52.8 | 332°46.1 | 16.9 | | | | | | |
| 6 | 1°25.6 | 227°03.2 | N19°15.3 | 307°38.1 | N18°52.7 | 240°41.8 | N20°52.7 | 347°48.4 | N03°16.9 | | | | | | |
| 7 | 16°28.0 | 242°02.8 | 14.4 | 322°38.7 | 53.2 | 255°43.7 | 52.6 | 2°50.8 | 17.0 | | | | | | |
| 8 | 31°30.5 | 257°02.3 | 13.6 | 337°39.4 | 53.6 | 270°45.6 | 52.5 | 17°53.1 | 17.0 | | | | | | |
| 9 | 46°33.0 | 272°01.9 | · · 12.8 | 352°40.0 | · · 54.1 | 285°47.5 | · · 52.4 | 32°55.4 | · · 17.0 | | | | | | |
| 10 | 61°35.4 | 287°01.5 | 11.9 | 7°40.6 | 54.5 | 300°49.4 | 52.3 | 47°57.8 | 17.1 | | | | | | |
| 11 | 76°37.9 | 302°01.0 | 11.1 | 22°41.2 | 55.0 | 315°51.4 | 52.2 | 63°00.1 | 17.1 | | | | | | |
| 12 | 91°40.4 | 317°00.6 | N19°10.2 | 37°41.8 | N18°55.4 | 330°53.3 | N20°52.1 | 78°02.4 | N03°17.2 | | | | | | |
| 13 | 106°42.8 | 332°00.1 | 09.4 | 52°42.5 | 55.8 | 345°55.2 | 52.0 | 93°04.8 | 17.2 | | | | | | |
| 14 | 121°45.3 | 346°59.7 | 08.6 | 67°43.1 | 56.3 | 0°57.1 | 51.9 | 108°07.1 | 17.3 | | | | | | |
| 15 | 136°47.7 | 1°59.3 | · · 07.7 | 82°43.7 | · · 56.7 | 15°59.0 | · · 51.8 | 123°09.4 | · · 17.3 | | | | | | |
| 16 | 151°50.2 | 16°58.8 | 06.9 | 97°44.3 | 57.2 | 31°00.9 | 51.7 | 138°11.8 | 17.3 | | | | | | |
| 17 | 166°52.7 | 31°58.4 | 06.0 | 112°45.0 | 57.6 | 46°02.8 | 51.6 | 153°14.1 | 17.4 | | | | | | |
| 18 | 181°55.1 | 46°57.9 | N19°05.2 | 127°45.6 | N18°58.1 | 61°04.8 | N20°51.5 | 168°16.4 | N03°17.4 | | | | | | |
| 19 | 196°57.6 | 61°57.5 | 04.3 | 142°46.2 | 58.5 | 76°06.7 | 51.4 | 183°18.8 | 17.5 | | | | | | |
| 20 | 212°00.1 | 76°57.1 | 03.5 | 157°46.8 | 59.0 | 91°08.6 | 51.2 | 198°21.1 | 17.5 | | | | | | |
| 21 | 227°02.5 | 91°56.6 | · · 02.6 | 172°47.5 | · · 59.4 | 106°10.5 | · · 51.1 | 213°23.4 | · · 17.6 | | | | | | |
| 22 | 242°05.0 | 106°56.2 | 01.8 | 187°48.1 | 18°59.9 | 121°12.4 | 51.0 | 228°25.8 | 17.6 | | | | | | |
| 23 | 257°07.5 | 121°55.8 | 00.9 | 202°48.7 | 19°00.3 | 136°14.3 | 50.9 | 243°28.1 | 17.6 | | | | | | |
| Mer.pass. 05:54 | | ν-0.4' d-0.8' m-4.01 | | | ν0.6' d0.5' m1.29 | | | ν1.9' d-0.1' m-1.82 | | | ν2.3' d0.0' m0.81 | | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.5 | 29°14.1 |
| Ankaa | 353°06.0 | -42°09.4 |
| Schedar | 349°29.8 | 56°40.7 |
| Diphda | 348°46.2 | -17°50.3 |
| Achernar | 335°19.5 | -57°05.8 |
| Hamal | 327°50.0 | 23°35.2 |
| Polaris | 313°46.5 | 89°22.3 |
| Acamar | 315°11.2 | -40°11.7 |
| Menkar | 314°05.1 | 4°11.6 |
| Mirfak | 308°26.9 | 49°57.2 |
| Aldebaran | 290°38.6 | 16°33.7 |
| Rigel | 281°03.0 | -8°10.2 |
| Capella | 280°20.6 | 46°01.4 |
| Bellatrix | 278°21.9 | 6°22.4 |
| Elnath | 278°00.7 | 28°37.7 |
| Alnilam | 275°36.8 | -1°11.1 |
| Betelgeuse | 270°51.1 | 7°24.7 |
| Canopus | 263°52.4 | -52°42.6 |
| Sirius | 258°25.5 | -16°45.2 |
| Adhara | 255°05.3 | -29°00.5 |
| Procyon | 244°49.9 | 5°09.4 |
| Pollux | 243°16.2 | 27°57.8 |
| Avior | 234°14.8 | -59°35.8 |
| Suhail | 222°45.8 | -43°32.5 |
| Miaplacidus | 221°38.7 | -69°49.8 |
| Alphard | 217°46.8 | -8°46.5 |
| Regulus | 207°33.3 | 11 |

| h | Sun | | | Moon | | | | |
|------------|----------|----------|------------|------------|-------|----------|--------|-------|
| Sun | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 179°34.4 | N23°26.3 | | 100°10.6 | 14.3' | N03°07.0 | -15.4' | 57.2' |
| 1 | 194°34.2 | 26.3 | | 114°43.9 | 14.4' | 02°51.6 | -15.4' | 57.1' |
| 2 | 209°34.1 | 26.3 | | 129°17.3 | 14.4' | 02°36.2 | -15.4' | 57.1' |
| 3 | 224°34.0 | •• 26.3 | | 143°50.7 | 14.5' | 02°20.8 | -15.4' | 57.0' |
| 4 | 239°33.8 | 26.3 | | 158°24.2 | 14.5' | 02°05.4 | -15.4' | 57.0' |
| 5 | 254°33.7 | 26.3 | | 172°57.7 | 14.6' | 01°50.1 | -15.3' | 57.0' |
| 6 | 269°33.6 | N23°26.3 | | 187°31.2 | 14.6' | N01°34.7 | -15.3' | 56.9' |
| 7 | 284°33.4 | 26.3 | | 202°04.8 | 14.6' | 01°19.4 | -15.3' | 56.9' |
| 8 | 299°33.3 | 26.3 | | 216°38.5 | 14.7' | 01°04.1 | -15.3' | 56.9' |
| 9 | 314°33.2 | •• 26.3 | | 231°12.2 | 14.7' | 00°48.8 | -15.3' | 56.8' |
| 10 | 329°33.0 | 26.3 | | 245°45.9 | 14.8' | 00°33.5 | -15.3' | 56.8' |
| 11 | 344°32.9 | 26.3 | | 260°19.7 | 14.8' | 00°18.2 | -15.3' | 56.8' |
| 12 | 359°32.7 | N23°26.3 | | 274°53.5 | 14.8' | N00°02.9 | -15.2' | 56.7' |
| 13 | 14°32.6 | 26.3 | | 289°27.3 | 14.9' | S00°12.3 | 15.2' | 56.7' |
| 14 | 29°32.5 | 26.3 | | 304°01.2 | 14.9' | 00°27.5 | 15.2' | 56.6' |
| 15 | 44°32.3 | •• 26.3 | | 318°35.1 | 14.9' | 00°42.7 | 15.2' | 56.6' |
| 16 | 59°32.2 | 26.3 | | 333°09.0 | 15.0' | 00°57.9 | 15.1' | 56.6' |
| 17 | 74°32.1 | 26.2 | | 347°43.0 | 15.0' | 01°13.0 | 15.1' | 56.5' |
| 18 | 89°31.9 | N23°26.2 | | 2°17.0 | 15.0' | S01°28.1 | 15.1' | 56.5' |
| 19 | 104°31.8 | 26.2 | | 16°51.0 | 15.1' | 01°43.2 | 15.1' | 56.5' |
| 20 | 119°31.7 | 26.2 | | 31°25.1 | 15.1' | 01°58.3 | 15.0' | 56.4' |
| 21 | 134°31.5 | •• 26.2 | | 45°59.2 | 15.1' | 02°13.4 | 15.0' | 56.4' |
| 22 | 149°31.4 | 26.2 | | 60°33.3 | 15.1' | 02°28.4 | 15.0' | 56.4' |
| 23 | 164°31.2 | 26.2 | | 75°07.4 | 15.2' | 02°43.4 | 15.0' | 56.3' |
| SD = 15.7' | | | $d = 0.0'$ | SD = 15.6' | | | | |

| Mon | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------|----------|----------|-------------|------------|-------|----------|-------|-------|
| 0 | 179°31.1 | N23°26.2 | | 89°41.6 | 15.2' | S02°58.4 | 14.9' | 56.3' |
| 1 | 194°31.0 | 26.2 | | 104°15.7 | 15.2' | 03°13.3 | 14.9' | 56.3' |
| 2 | 209°30.8 | 26.2 | | 118°49.9 | 15.2' | 03°28.2 | 14.9' | 56.2' |
| 3 | 224°30.7 | •• 26.2 | | 133°24.1 | 15.2' | 03°43.1 | 14.8' | 56.2' |
| 4 | 239°30.6 | 26.1 | | 147°58.4 | 15.2' | 03°57.9 | 14.8' | 56.2' |
| 5 | 254°30.4 | 26.1 | | 162°32.6 | 15.3' | 04°12.7 | 14.8' | 56.1' |
| 6 | 269°30.3 | N23°26.1 | | 177°06.9 | 15.3' | S04°27.5 | 14.7' | 56.1' |
| 7 | 284°30.2 | 26.1 | | 191°41.1 | 15.3' | 04°42.2 | 14.7' | 56.1' |
| 8 | 299°30.0 | 26.1 | | 206°15.4 | 15.3' | 04°56.9 | 14.7' | 56.0' |
| 9 | 314°29.9 | •• 26.1 | | 220°49.7 | 15.3' | 05°11.6 | 14.6' | 56.0' |
| 10 | 329°29.7 | 26.0 | | 235°24.0 | 15.3' | 05°26.2 | 14.6' | 56.0' |
| 11 | 344°29.6 | 26.0 | | 249°58.3 | 15.3' | 05°40.8 | 14.6' | 56.0' |
| 12 | 359°29.5 | N23°26.0 | | 264°32.6 | 15.3' | S05°55.4 | 14.5' | 55.9' |
| 13 | 14°29.3 | 26.0 | | 279°07.0 | 15.3' | 06°09.9 | 14.5' | 55.9' |
| 14 | 29°29.2 | 26.0 | | 293°41.3 | 15.3' | 06°24.4 | 14.4' | 55.9' |
| 15 | 44°29.1 | •• 25.9 | | 308°15.6 | 15.3' | 06°38.8 | 14.4' | 55.8' |
| 16 | 59°28.9 | 25.9 | | 322°50.0 | 15.3' | 06°53.2 | 14.4' | 55.8' |
| 17 | 74°28.8 | 25.9 | | 337°24.3 | 15.3' | 07°07.6 | 14.3' | 55.8' |
| 18 | 89°28.7 | N23°25.9 | | 351°58.6 | 15.3' | S07°21.9 | 14.3' | 55.7' |
| 19 | 104°28.5 | 25.8 | | 6°33.0 | 15.3' | 07°36.1 | 14.2' | 55.7' |
| 20 | 119°28.4 | 25.8 | | 21°07.3 | 15.3' | 07°50.3 | 14.2' | 55.7' |
| 21 | 134°28.3 | •• 25.8 | | 35°41.6 | 15.3' | 08°04.5 | 14.1' | 55.7' |
| 22 | 149°28.1 | 25.8 | | 50°15.9 | 15.3' | 08°18.6 | 14.1' | 55.6' |
| 23 | 164°28.0 | 25.7 | | 64°50.2 | 15.3' | 08°32.7 | 14.0' | 55.6' |
| SD = 15.7' | | | $d = -0.0'$ | SD = 15.4' | | | | |

| Tue | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------|----------|----------|-------------|------------|-------|----------|-------|-------|
| 0 | 179°27.8 | N23°25.7 | | 79°24.6 | 15.3' | S08°46.8 | 14.0' | 55.6' |
| 1 | 194°27.7 | 25.7 | | 93°58.9 | 15.3' | 09°00.7 | 13.9' | 55.5' |
| 2 | 209°27.6 | 25.7 | | 108°33.1 | 15.3' | 09°14.7 | 13.9' | 55.5' |
| 3 | 224°27.4 | •• 25.6 | | 123°07.4 | 15.3' | 09°28.6 | 13.8' | 55.5' |
| 4 | 239°27.3 | 25.6 | | 137°41.7 | 15.3' | 09°42.4 | 13.8' | 55.5' |
| 5 | 254°27.2 | 25.6 | | 152°15.9 | 15.2' | 09°56.2 | 13.7' | 55.4' |
| 6 | 269°27.0 | N23°25.5 | | 166°50.2 | 15.2' | S10°09.9 | 13.7' | 55.4' |
| 7 | 284°26.9 | 25.5 | | 181°24.4 | 15.2' | 10°23.6 | 13.6' | 55.4' |
| 8 | 299°26.8 | 25.5 | | 195°58.6 | 15.2' | 10°37.2 | 13.6' | 55.4' |
| 9 | 314°26.6 | •• 25.4 | | 210°32.8 | 15.2' | 10°50.8 | 13.5' | 55.3' |
| 10 | 329°26.5 | 25.4 | | 225°07.0 | 15.2' | 11°04.3 | 13.5' | 55.3' |
| 11 | 344°26.4 | 25.4 | | 239°41.2 | 15.1' | 11°17.7 | 13.4' | 55.3' |
| 12 | 359°26.2 | N23°25.3 | | 254°15.3 | 15.1' | S11°31.1 | 13.3' | 55.3' |
| 13 | 14°26.1 | 25.3 | | 268°49.4 | 15.1' | 11°44.5 | 13.3' | 55.2' |
| 14 | 29°26.0 | 25.2 | | 283°23.5 | 15.1' | 11°57.8 | 13.2' | 55.2' |
| 15 | 44°25.8 | •• 25.2 | | 297°57.6 | 15.1' | 12°11.0 | 13.2' | 55.2' |
| 16 | 59°25.7 | 25.2 | | 312°31.6 | 15.0' | 12°24.2 | 13.1' | 55.2' |
| 17 | 74°25.6 | 25.1 | | 327°05.7 | 15.0' | 12°37.3 | 13.0' | 55.1' |
| 18 | 89°25.4 | N23°25.1 | | 341°39.7 | 15.0' | S12°50.3 | 13.0' | 55.1' |
| 19 | 104°25.3 | 25.0 | | 356°13.7 | 14.9' | 13°03.3 | 12.9' | 55.1' |
| 20 | 119°25.2 | 25.0 | | 10°47.6 | 14.9' | 13°16.2 | 12.9' | 55.1' |
| 21 | 134°25.0 | •• 25.0 | | 25°21.5 | 14.9' | 13°29.1 | 12.8' | 55.0' |
| 22 | 149°24.9 | 24.9 | | 39°55.4 | 14.9' | 13°41.9 | 12.7' | 55.0' |
| 23 | 164°24.7 | 24.9 | | 54°29.3 | 14.8' | 13°54.6 | 12.7' | 55.0' |
| SD = 15.7' | | | $d = -0.0'$ | SD = 15.2' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | □ | □ | □ | □ | □ | □ |
| 66° | □ | □ | □ | □ | □ | □ |
| 64° | //// | //// | 01:31 | 22:33 | //// | //// |
| 62° | //// | //// | 02:10 | 21:54 | //// | //// |
| 60° | //// | 00:49 | 02:36 | 21:28 | 23:14 | //// |
| N 58° | //// | 01:41 | 02:57 | 21:07 | 22:23 | //// |
| 56° | //// | 02:11 | 03:13 | 20:51 | 21:53 | //// |
| 54° | 00:45 | 02:33 | 03:28 | 20:36 | 21:31 | 23:18 |
| 52° | 01:33 | 02:51 | 03:40 | 20:24 | 21:13 | 22:31 |
| 50° | 02:01 | 03:06 | 03:51 | 20:13 | 20:58 | 22:03 |
| 45° | 02:46 | 03:36 | 04:13 | 19:51 | 20:28 | 21:18 |
| N 40° | 03:17 | 03:59 | 04:32 | 19:32 | 20:05 | 20:47 |
| 35° | 03:40 | 04:17 | 04:47 | 19:17 | 19:47 | 20:24 |
| 30° | 03:59 | 04:32 | 05:00 | 19:04 | 19:32 | 20:05 |
| 20° | 04:28 | 04:57 | 05:22 | 18:42 | 19:07 | 19:36 |
| N 10° | 04:51 | 05:18 | 05:41 | 18:23 | 18:46 | 19:13 |
| 0° | 05:10 | 05:36 | 05:58 | 18:06 | 18:28 | 18:54 |
| S 10° | 05:27 | 05:53 | 06:16 | 17:48 | 18:11 | 18:37 |
| 20° | 05:43 | 06:10 | 06:34 | 17:30 | 17:54 | 18:21 |
| 30° | 05:59 | 06:29 | 06:56 | 17:08 | 17:35 | 18:05 |
| 35° | 06:08 | 06:40 | 07:08 | 16:56 | 17:24 | 17:56 |
| 40° | 06:18 | 06:52 | 07:22 | 16:42 | 17:12 | 17:47 |
| 45° | 06:28 | 07:05 | 07:39 | 16:25 | 16:59 | 17:36 |
| S 50° | 06:40 | 07:21 | 08:00 | 16:04 | 16:43 | 17:24 |
| 52° | 06:45 | 07:29 | 08:10 | 15:54 | 16:35 | 17:19 |
| 54° | 06:51 | 07:37 | 08:21 | 15:43 | 16:27 | 17:13 |
| 56° | 06:57 | 07:46 | 08:34 | 15:30 | 16:18 | 17:07 |
| 58° | 07:04 | 07:56 | 08:48 | 15:16 | 16:08 | 17:00 |
| S 60° | 07:11 | 08:08 | 09:06 | 14:58 | 15:56 | 16:53 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | 11:40 | 13:47 | 16:02 | 23:24 | 22:49 | 22:04 |
| N 70° | 11:40 | 13:37 | 15:38 | 23:28 | 23:02 | 22:30 |
| 68° | 11:40 | 13:29 | 15:20 | 23:31 | 23:12 | 22:50 |
| 66° | 11:40 | 13:22 | 15:06 | 23:34 | 23:20 | 23:06 |
| 64° | 11:40 | 13:17 | 14:54 | 23:36 | 23:28 | 23:19 |
| 62° | 11:40 | 13:12 | 14:44 | 23:38 | 23:34 | 23:30 |
| 60° | 11:40 | 13:08 | 14:35 | 23:40 | 23:39 | 23:40 |
| N 58° | 11:40 | 13:04 | 14:28 | 23:41 | 23:44 | 23:48 |
| 56° | 11:40 | 13:01 | 14:22 | 23:43 | 23:49 | 23:55 |
| 54° | 11:40 | 12:58 | 14:16 | 23:44 | 23:52 | •• •• |
| 52° | 11:40 | 12:56 | 14:11 | 23:45 | 23:56 | •• •• |
| 50° | 11:40 | 12:54 | 14:06 | 23:46 | 23:59 | •• •• |
| 45° | 11:40 | 12:48 | 13:56 | 23:49 | •• •• | 00:06 |
| N 40° | 11:40 | 12:44 | 13:47 | 23:51 | •• •• | 00:12 |
| 35° | 11:40 | 12:41 | 13:40 | 23:52 | •• •• | 00:17 |
| 30° | 11:40 | 12:38 | 13:34 | 23:54 | •• •• | 00:22 |
| 20° | 11:40 | 12:32 | 13:23 | 23:56 | •• •• | 00:30 |
| N 10° | 11:40 | 12:27 | 13:14 | 23:59 | •• •• | 00:37 |
| 0° | 11:40 | 12:23 | 13:05 | •• •• | 00:01 | 00:43 |
| S 10° | 11:40 | 12:19 | 12:57 | •• •• | 00:03 | 00:50 |
| 20° | 11:41 | 12:14 | 12:48 | •• •• | 00:05 | 00:57 |
| 30° | 11:41 | 12:09 | 12:37 | •• •• | 00:08 | 01:05 |
| 35° | 11:41 | 12:06 | 12:31 | •• •• | 00:09 | 01:09 |
| 40° | 11:41 | 12:02 | 12:25 | •• •• | 00:11 | 01:15 |
| 45° | 11:41 | 11:59 | 12:17 | •• •• | 00:13 | 01:21 |
| S 50° | 11:41 | 11:54 | 12:07 | •• •• | 00:15 | 01:28 |
| 52° | 11:41 | 11:52 | 12:03 | •• •• | 00:17 | 01:32 |
| 54° | 11:41 | 11:50 | 11:59 | •• •• | 00:18 | 01:36 |
| 56° | 11:42 | 11:47 | 11:53 | •• •• | 00:19 | 01:40 |
| 58° | 11:42 | 11:44 | 11:48 | •• •• | 00:21 | 01:44 |
| S 60° | 11:42 | 11:41 | 11:41 | •• •• | 00:22 | 01:50 |

| Day | Sun | | | Moon | | |
|-----|--------------------------|--------------------------|--------------|----------------|----------------|----------------------|
| | Eqn.of Time | | Mer. Pass | Mer.Pass. | | Age 6-8 41-61% |
| | 00 ^h mm:ss | 12 ^h mm:ss | | Upper hh:mm | Lower hh:mm | |
| | | | | | | |
| 21 | 01:42 | 01:49 | 12:02 | 17:51 | 05:29 | |
| 22 | 01:56 | 02:02 | 12:02 | 18:33 | 06:12 | |
| 23 | 02:09 | 02:15 | 12:02 | 19:16 | 06:54 | |

June 24, 25, 26 UT (Wed., Thu., Fri.)

| | Aries | | Venus | | Mars | | Jupiter | | Saturn | | Stars | | | |
|-----------------|----------|----------------------|----------|-------------------|----------|---------------------|----------|-------------------|----------|---------------------|-------|------------|-------------------|----------|
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | |
| 0 | 272°09.9 | 136°55.3 | N19°00.1 | 217°49.3 | N19°00.8 | 151°16.2 | N20°50.8 | 258°30.4 | N03°17.7 | | | Alpheratz | 357°33.5 29°14.1 | |
| 1 | 287°12.4 | 151°54.9 | 18°59.2 | 232°50.0 | 01.2 | 166°18.2 | 50.7 | 273°32.8 | 17.7 | | | Ankaa | 353°06.0 -42°09.4 | |
| 2 | 302°14.9 | 166°54.5 | 58.4 | 247°50.6 | 01.6 | 181°20.1 | 50.6 | 288°35.1 | 17.8 | | | Schedar | 349°29.7 56°40.7 | |
| 3 | 317°17.3 | 181°54.0 | •• 57.5 | 262°51.2 | •• 02.1 | 196°22.0 | •• 50.5 | 303°37.5 | •• 17.8 | | | Diphda | 348°46.1 -17°50.3 | |
| 4 | 332°19.8 | 196°53.6 | 56.7 | 277°51.8 | 02.5 | 211°23.9 | 50.4 | 318°39.8 | 17.9 | | | Achernar | 335°19.5 -57°05.8 | |
| 5 | 347°22.2 | 211°53.2 | 55.8 | 292°52.4 | 03.0 | 226°25.8 | 50.3 | 333°42.1 | 17.9 | | | Hamal | 327°50.0 23°35.2 | |
| 6 | 2°24.7 | 226°52.8 | N18°54.9 | 307°53.1 | N19°03.4 | 241°27.7 | N20°50.2 | 348°44.5 | N03°17.9 | | | Polaris | 313°45.2 89°22.3 | |
| 7 | 17°27.2 | 241°52.3 | 54.1 | 322°53.7 | 03.9 | 256°29.6 | 50.1 | 3°46.8 | 18.0 | | | Acamar | 315°11.2 -40°11.7 | |
| 8 | 32°29.6 | 256°51.9 | 53.2 | 337°54.3 | 04.3 | 271°31.6 | 50.0 | 18°49.1 | 18.0 | | | Menkar | 314°05.1 4°11.6 | |
| 9 | 47°32.1 | 271°51.5 | •• 52.4 | 352°54.9 | •• 04.7 | 286°33.5 | •• 49.9 | 33°51.5 | •• 18.1 | | | Mirfak | 308°26.9 49°57.2 | |
| 10 | 62°34.6 | 286°51.0 | 51.5 | 7°55.6 | 05.2 | 301°35.4 | 49.8 | 48°53.8 | 18.1 | | | Aldebaran | 290°38.6 16°33.7 | |
| 11 | 77°37.0 | 301°50.6 | 50.6 | 22°56.2 | 05.6 | 316°37.3 | 49.7 | 63°56.2 | 18.1 | | | Rigel | 281°03.0 -8°10.2 | |
| 12 | 92°39.5 | 316°50.2 | N18°49.8 | 37°56.8 | N19°06.1 | 331°39.2 | N20°49.6 | 78°58.5 | N03°18.2 | | | Capella | 280°20.6 46°01.4 | |
| 13 | 107°42.0 | 331°49.8 | 48.9 | 52°57.4 | 06.5 | 346°41.1 | 49.5 | 94°00.8 | 18.2 | | | Bellatrix | 278°21.9 6°22.4 | |
| 14 | 122°44.4 | 346°49.4 | 48.1 | 67°58.0 | 06.9 | 1°43.0 | 49.4 | 109°03.2 | 18.3 | | | Elnath | 278°00.7 28°37.7 | |
| 15 | 137°46.9 | 1°48.9 | •• 47.2 | 82°58.7 | •• 07.4 | 16°44.9 | •• 49.2 | 124°05.5 | •• 18.3 | | | Alnilam | 275°36.8 -1°11.1 | |
| 16 | 152°49.4 | 16°48.5 | 46.3 | 97°59.3 | 07.8 | 31°46.9 | 49.1 | 139°07.8 | 18.3 | | | Betelgeuse | 270°51.1 7°24.7 | |
| 17 | 167°51.8 | 31°48.1 | 45.5 | 112°59.9 | 08.3 | 46°48.8 | 49.0 | 154°10.2 | 18.4 | | | Canopus | 263°52.4 -52°42.6 | |
| 18 | 182°54.3 | 46°47.7 | N18°44.6 | 128°00.5 | N19°08.7 | 61°50.7 | N20°48.9 | 169°12.5 | N03°18.4 | | | Sirius | 258°25.5 -16°45.1 | |
| 19 | 197°56.7 | 61°47.3 | 43.7 | 143°01.2 | 09.1 | 76°52.6 | 48.8 | 184°14.9 | 18.5 | | | Adhara | 255°05.3 -29°00.5 | |
| 20 | 212°59.2 | 76°46.8 | 42.9 | 158°01.8 | 09.6 | 91°54.5 | 48.7 | 199°17.2 | 18.5 | | | Procyon | 244°49.9 5°09.4 | |
| 21 | 228°01.7 | 91°46.4 | •• 42.0 | 173°02.4 | •• 10.0 | 106°56.4 | •• 48.6 | 214°19.5 | •• 18.6 | | | Pollux | 243°16.2 27°57.8 | |
| 22 | 243°04.1 | 106°46.0 | 41.1 | 188°03.0 | 10.4 | 121°58.3 | 48.5 | 229°21.9 | 18.6 | | | Avior | 234°14.8 -59°35.8 | |
| 23 | 258°06.6 | 121°45.6 | 40.3 | 203°03.6 | 10.9 | 137°00.2 | 48.4 | 244°24.2 | 18.6 | | | Suhail | 222°45.8 -43°32.5 | |
| Mer.pass. 05:50 | | ν-0.4' d-0.9' m-4.02 | | ν0.6' d0.4' m1.30 | | ν1.9' d-0.1' m-1.82 | | ν2.3' d0.0' m0.80 | | Miaplacidus | | | 221°38.7 -69°49.8 | |
| | | | | | | | | | | Alphard | | | 217°46.8 -8°46.5 | |
| | | | | | | | | | | Regulus | | | 207°33.3 11°50.3 | |
| | | | | | | | | | | Dubhe | | | 193°39.8 61°36.7 | |
| | | | | | | | | | | Denebola | | | 182°23.8 14°25.5 | |
| | | | | | | | | | | Gienah | | | 175°42.3 -17°41.5 | |
| | | | | | | | | | | Acrux | | | 172°58.7 -63°15.1 | |
| | | | | | | | | | | Gacrux | | | 171°50.2 -57°16.0 | |
| | | | | | | | | | | Alioth | | | 166°11.8 55°49.2 | |
| | | | | | | | | | | Spica | | | 158°20.9 -11°18.1 | |
| | | | | | | | | | | Alkaid | | | 152°50.8 49°11.0 | |
| | | | | | | | | | | Hadar | | | 148°34.0 -60°30.3 | |
| | | | | | | | | | | Menkent | | | 147°56.0 -36°30.2 | |
| | | | | | | | | | | Arcturus | | | 145°46.6 19°02.7 | |
| | | | | | | | | | | Rigil Kent. | | | 139°38.2 -60°56.9 | |
| | | | | | | | | | | Kochab | | | 137°19.1 74°03.0 | |
| | | | | | | | | | | Zuben'ubi | | | 136°54.5 -16°09.2 | |
| | | | | | | | | | | Alphecca | | | 126°02.4 26°37.6 | |
| | | | | | | | | | | Antares | | | 112°14.0 -26°29.5 | |
| | | | | | | | | | | Atria | | | 107°06.6 -69°04.6 | |
| | | | | | | | | | | Sabik | | | 102°01.1 -15°45.5 | |
| | | | | | | | | | | Shaula | | | 96°08.3 -37°07.4 | |
| | | | | | | | | | | Rasalhague | | | 95°57.1 12°32.5 | |
| | | | | | | | | | | Eltanin | | | 90°41.1 51°29.1 | |
| | | | | | | | | | | Kaus Aust. | | | 83°30.5 -34°22.3 | |
| | | | | | | | | | | Vega | | | 80°32.0 38°48.5 | |
| | | | | | | | | | | Nunki | | | 75°45.9 -26°15.8 | |
| | | | | | | | | | | Altair | | | 61°58.5 8°56.3 | |
| | | | | | | | | | | Peacock | | | 53°03.3 -56°38.8 | |
| | | | | | | | | | | Deneb | | | 49°24.6 45°22.4 | |
| | | | | | | | | | | Enif | | | 33°37.4 9°59.8 | |
| | | | | | | | | | | Al Na'ir | | | 27°31.2 -46°49.7 | |
| | | | | | | | | | | Fomalhaut | | | 15°13.1 -29°28.7 | |
| | | | | | | | | | | Scheat | | | 13°43.9 28°13.5 | |
| | | | | | | | | | | Markab | | | 13°28.6 15°20.8 | |
| | | | | | | | | | | Jun 24 Wed | | | SHA | Mer.pass |
| | | | | | | | | | | Venus | | | 224°45.4 | 14:53 |
| | | | | | | | | | | Mars | | | 305°39.4 | 09:28 |
| | | | | | | | | | | Jupiter | | | 239°06.3 | 13:53 |
| | | | | | | | | | | Saturn | | | 346°20.5 | 06:45 |
| | | | | | | | | | | Jun 25 Thu | | | SHA | Mer.pass |
| | | | | | | | | | | Venus | | | 223°36.1 | 14:53 |
| | | | | | | | | | | Mars | | | 304°55.2 | 09:27 |
| | | | | | | | | | | Jupiter | | | 238°53.1 | 13:50 |
| | | | | | | | | | | Saturn | | | 346°17.5 | 06:41 |
| | | | | | | | | | | Jun 26 Fri | | | SHA | Mer.pass |
| | | | | | | | | | | Venus | | | 222°27.2 | 14:54 |
| | | | | | | | | | | Mars | | | 304°11.0 | 09:26 |
| | | | | | | | | | | Jupiter | | | 238°39.8 | 13:47 |
| | | | | | | | | | | Saturn | | | 346°14.5 | 06:37 |
| | | | | | | | | | | Horizontal parallax | | | | |
| | | | | | | | | | | Venus: | | | 0.1 | |
| | | | | | | | | | | Mars: | | | 0.1 | |
| Mer.pass. 05:43 | | ν-0.4' d-0.9' m-4.03 | | ν0.6' d0.4' m1.30 | | ν1.9' d-0.1' m-1.82 | | ν2.3' d0.0' m0.80 | | | | | | |


| Sun | | | Moon | | | | |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| h | GHA | Dec | GHA | ν | Dec | d | HP |
| Wed | | | | | | | |
| 0 | 179°24.6 | N23°24.8 | 69°03.1 | 14.8' | S14°07.3 | 12.6' | 55.0' |
| 1 | 194°24.5 | 24.8 | 83°36.9 | 14.8' | 14°19.9 | 12.5' | 54.9' |
| 2 | 209°24.3 | 24.7 | 98°10.7 | 14.7' | 14°32.4 | 12.5' | 54.9' |
| 3 | 224°24.2 | · · 24.7 | 112°44.4 | 14.7' | 14°44.9 | 12.4' | 54.9' |
| 4 | 239°24.1 | 24.6 | 127°18.1 | 14.7' | 14°57.3 | 12.3' | 54.9' |
| 5 | 254°23.9 | 24.6 | 141°51.8 | 14.6' | 15°09.6 | 12.3' | 54.9' |
| 6 | 269°23.8 | N23°24.5 | 156°25.4 | 14.6' | S15°21.9 | 12.2' | 54.8' |
| 7 | 284°23.7 | 24.5 | 170°59.0 | 14.6' | 15°34.1 | 12.1' | 54.8' |
| 8 | 299°23.5 | 24.4 | 185°32.5 | 14.5' | 15°46.2 | 12.0' | 54.8' |
| 9 | 314°23.4 | · · 24.4 | 200°06.0 | 14.5' | 15°58.2 | 12.0' | 54.8' |
| 10 | 329°23.3 | 24.3 | 214°39.5 | 14.4' | 16°10.2 | 11.9' | 54.8' |
| 11 | 344°23.1 | 24.3 | 229°12.9 | 14.4' | 16°22.1 | 11.8' | 54.7' |
| 12 | 359°23.0 | N23°24.2 | 243°46.3 | 14.4' | S16°33.9 | 11.8' | 54.7' |
| 13 | 14°22.9 | 24.2 | 258°19.7 | 14.3' | 16°45.7 | 11.7' | 54.7' |
| 14 | 29°22.7 | 24.1 | 272°53.0 | 14.3' | 16°57.4 | 11.6' | 54.7' |
| 15 | 44°22.6 | · · 24.1 | 287°26.3 | 14.2' | 17°09.0 | 11.5' | 54.7' |
| 16 | 59°22.5 | 24.0 | 301°59.5 | 14.2' | 17°20.5 | 11.4' | 54.6' |
| 17 | 74°22.3 | 23.9 | 316°32.7 | 14.1' | 17°31.9 | 11.4' | 54.6' |
| 18 | 89°22.2 | N23°23.9 | 331°05.8 | 14.1' | S17°43.3 | 11.3' | 54.6' |
| 19 | 104°22.1 | 23.8 | 345°38.9 | 14.0' | 17°54.6 | 11.2' | 54.6' |
| 20 | 119°21.9 | 23.8 | 0°12.0 | 14.0' | 18°05.8 | 11.1' | 54.6' |
| 21 | 134°21.8 | · · 23.7 | 14°45.0 | 14.0' | 18°16.9 | 11.0' | 54.6' |
| 22 | 149°21.7 | 23.6 | 29°17.9 | 13.9' | 18°27.9 | 11.0' | 54.5' |
| 23 | 164°21.5 | 23.6 | 43°50.8 | 13.9' | 18°38.9 | 10.9' | 54.5' |
| SD = 15.7' $d = -0.0'$ | | | SD = 15.0' | | | | |

| Sun | | | Moon | | | | |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| h | GHA | Dec | GHA | ν | Dec | d | HP |
| Thu | | | | | | | |
| 0 | 179°21.4 | N23°23.5 | 58°23.7 | 13.8' | S18°49.8 | 10.8' | 54.5' |
| 1 | 194°21.3 | 23.5 | 72°56.5 | 13.8' | 19°00.6 | 10.7' | 54.5' |
| 2 | 209°21.1 | 23.4 | 87°29.3 | 13.7' | 19°11.3 | 10.6' | 54.5' |
| 3 | 224°21.0 | · · 23.3 | 102°02.0 | 13.7' | 19°21.9 | 10.5' | 54.5' |
| 4 | 239°20.9 | 23.3 | 116°34.6 | 13.6' | 19°32.4 | 10.5' | 54.4' |
| 5 | 254°20.7 | 23.2 | 131°07.3 | 13.6' | 19°42.9 | 10.4' | 54.4' |
| 6 | 269°20.6 | N23°23.1 | 145°39.8 | 13.5' | S19°53.3 | 10.3' | 54.4' |
| 7 | 284°20.5 | 23.1 | 160°12.3 | 13.5' | 20°03.5 | 10.2' | 54.4' |
| 8 | 299°20.3 | 23.0 | 174°44.8 | 13.4' | 20°13.7 | 10.1' | 54.4' |
| 9 | 314°20.2 | · · 22.9 | 189°17.2 | 13.4' | 20°23.8 | 10.0' | 54.4' |
| 10 | 329°20.1 | 22.9 | 203°49.6 | 13.3' | 20°33.8 | 9.9' | 54.4' |
| 11 | 344°19.9 | 22.8 | 218°21.9 | 13.2' | 20°43.7 | 9.8' | 54.3' |
| 12 | 359°19.8 | N23°22.7 | 232°54.1 | 13.2' | S20°53.6 | 9.7' | 54.3' |
| 13 | 14°19.7 | 22.6 | 247°26.3 | 13.1' | 21°03.3 | 9.6' | 54.3' |
| 14 | 29°19.6 | 22.6 | 261°58.4 | 13.1' | 21°12.9 | 9.5' | 54.3' |
| 15 | 44°19.4 | · · 22.5 | 276°30.5 | 13.0' | 21°22.5 | 9.4' | 54.3' |
| 16 | 59°19.3 | 22.4 | 291°02.6 | 13.0' | 21°31.9 | 9.3' | 54.3' |
| 17 | 74°19.2 | 22.3 | 305°34.6 | 12.9' | 21°41.3 | 9.3' | 54.3' |
| 18 | 89°19.0 | N23°22.3 | 320°06.5 | 12.9' | S21°50.5 | 9.2' | 54.3' |
| 19 | 104°18.9 | 22.2 | 334°38.4 | 12.8' | 21°59.7 | 9.1' | 54.2' |
| 20 | 119°18.8 | 22.1 | 349°10.2 | 12.8' | 22°08.7 | 9.0' | 54.2' |
| 21 | 134°18.6 | · · 22.0 | 3°41.9 | 12.7' | 22°17.7 | 8.9' | 54.2' |
| 22 | 149°18.5 | 22.0 | 18°13.6 | 12.7' | 22°26.5 | 8.8' | 54.2' |
| 23 | 164°18.4 | 21.9 | 32°45.3 | 12.6' | 22°35.3 | 8.7' | 54.2' |
| SD = 15.7' $d = -0.1'$ | | | SD = 14.9' | | | | |

| Sun | | | Moon | | | | |
|------------------------|----------|----------|------------|-------|----------|------|-------|
| h | GHA | Dec | GHA | ν | Dec | d | HP |
| Fri | | | | | | | |
| 0 | 179°18.2 | N23°21.8 | 47°16.9 | 12.5' | S22°44.0 | 8.6' | 54.2' |
| 1 | 194°18.1 | 21.7 | 61°48.4 | 12.5' | 22°52.5 | 8.5' | 54.2' |
| 2 | 209°18.0 | 21.6 | 76°19.9 | 12.4' | 23°01.0 | 8.3' | 54.2' |
| 3 | 224°17.8 | · · 21.6 | 90°51.4 | 12.4' | 23°09.3 | 8.2' | 54.2' |
| 4 | 239°17.7 | 21.5 | 105°22.7 | 12.3' | 23°17.6 | 8.1' | 54.1' |
| 5 | 254°17.6 | 21.4 | 119°54.0 | 12.3' | 23°25.7 | 8.0' | 54.1' |
| 6 | 269°17.4 | N23°21.3 | 134°25.3 | 12.2' | S23°33.7 | 7.9' | 54.1' |
| 7 | 284°17.3 | 21.2 | 148°56.5 | 12.2' | 23°41.7 | 7.8' | 54.1' |
| 8 | 299°17.2 | 21.1 | 163°27.7 | 12.1' | 23°49.5 | 7.7' | 54.1' |
| 9 | 314°17.1 | · · 21.1 | 177°58.8 | 12.0' | 23°57.2 | 7.6' | 54.1' |
| 10 | 329°16.9 | 21.0 | 192°29.8 | 12.0' | 24°04.8 | 7.5' | 54.1' |
| 11 | 344°16.8 | 20.9 | 207°00.8 | 11.9' | 24°12.3 | 7.4' | 54.1' |
| 12 | 359°16.7 | N23°20.8 | 221°31.8 | 11.9' | S24°19.7 | 7.3' | 54.1' |
| 13 | 14°16.5 | 20.7 | 236°02.6 | 11.8' | 24°27.0 | 7.2' | 54.1' |
| 14 | 29°16.4 | 20.6 | 250°33.5 | 11.8' | 24°34.1 | 7.1' | 54.1' |
| 15 | 44°16.3 | · · 20.5 | 265°04.3 | 11.7' | 24°41.2 | 6.9' | 54.1' |
| 16 | 59°16.1 | 20.4 | 279°35.0 | 11.7' | 24°48.1 | 6.8' | 54.0' |
| 17 | 74°16.0 | 20.3 | 294°05.7 | 11.6' | 24°54.9 | 6.7' | 54.0' |
| 18 | 89°15.9 | N23°20.3 | 308°36.3 | 11.6' | S25°01.7 | 6.6' | 54.0' |
| 19 | 104°15.7 | 20.2 | 323°06.8 | 11.5' | 25°08.3 | 6.5' | 54.0' |
| 20 | 119°15.6 | 20.1 | 337°37.4 | 11.5' | 25°14.7 | 6.4' | 54.0' |
| 21 | 134°15.5 | · · 20.0 | 352°07.8 | 11.4' | 25°21.1 | 6.2' | 54.0' |
| 22 | 149°15.4 | 19.9 | 6°38.2 | 11.4' | 25°27.4 | 6.1' | 54.0' |
| 23 | 164°15.2 | 19.8 | 21°08.6 | 11.3' | 25°33.5 | 6.0' | 54.0' |
| SD = 15.7' $d = -0.1'$ | | | SD = 14.8' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | □ | □ | □ | □ | □ | □ |
| 66° | □ | □ | □ | □ | □ | □ |
| 64° | //// | //// | 01:33 | 22:32 | //// | //// |
| 62° | //// | //// | 02:11 | 21:54 | //// | //// |
| 60° | //// | 00:52 | 02:37 | 21:28 | 23:12 | //// |
| N 58° | //// | 01:42 | 02:58 | 21:07 | 22:23 | //// |
| 56° | //// | 02:12 | 03:14 | 20:51 | 21:53 | //// |
| 54° | 00:48 | 02:34 | 03:29 | 20:36 | 21:31 | 23:17 |
| 52° | 01:34 | 02:52 | 03:41 | 20:24 | 21:13 | 22:31 |
| 50° | 02:02 | 03:07 | 03:52 | 20:13 | 20:58 | 22:03 |
| 45° | 02:47 | 03:37 | 04:14 | 19:51 | 20:28 | 21:18 |
| N 40° | 03:18 | 04:00 | 04:32 | 19:33 | 20:06 | 20:47 |
| 35° | 03:41 | 04:18 | 04:47 | 19:18 | 19:48 | 20:24 |
| 30° | 04:00 | 04:33 | 05:00 | 19:05 | 19:32 | 20:06 |
| 20° | 04:29 | 04:58 | 05:22 | 18:43 | 19:07 | 19:37 |
| N 10° | 04:51 | 05:18 | 05:41 | 18:24 | 18:47 | 19:14 |
| 0° | 05:10 | 05:36 | 05:59 | 18:06 | 18:29 | 18:55 |
| S 10° | 05:27 | 05:54 | 06:16 | 17:49 | 18:12 | 18:38 |
| 20° | 05:43 | 06:11 | 06:35 | 17:30 | 17:54 | 18:22 |
| 30° | 06:00 | 06:30 | 06:56 | 17:09 | 17:36 | 18:05 |
| 35° | 06:09 | 06:40 | 07:09 | 16:57 | 17:25 | 17:57 |
| 40° | 06:18 | 06:52 | 07:23 | 16:43 | 17:13 | 17:47 |
| 45° | 06:28 | 07:06 | 07:39 | 16:26 | 17:00 | 17:37 |
| S 50° | 06:40 | 07:22 | 08:00 | 16:05 | 16:44 | 17:25 |
| 52° | 06:45 | 07:29 | 08:10 | 15:55 | 16:36 | 17:20 |
| 54° | 06:51 | 07:37 | 08:21 | 15:44 | 16:28 | 17:14 |
| 56° | 06:57 | 07:46 | 08:34 | 15:32 | 16:19 | 17:08 |
| 58° | 07:04 | 07:57 | 08:48 | 15:17 | 16:09 | 17:01 |
| S 60° | 07:12 | 08:08 | 09:06 | 14:59 | 15:57 | 16:54 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | 18:04 | ■ | ■ | 21:35 | ■ | ■ |
| 68° | 17:23 | ■ | ■ | 22:17 | ■ | ■ |
| 66° | 16:56 | 19:05 | ■ | 22:46 | 22:12 | ■ |
| 64° | 16:35 | 18:24 | 20:38 | 23:08 | 22:53 | 22:19 |
| 62° | 16:18 | 17:56 | 19:40 | 23:26 | 23:22 | 23:17 |
| 60° | 16:04 | 17:35 | 19:07 | 23:41 | 23:44 | 23:51 |
| N 58° | 15:52 | 17:18 | 18:42 | 23:53 | · · | 00:01 |
| 56° | 15:42 | 17:03 | 18:23 | · · | 00:04 | 00:17 |
| 54° | 15:33 | 16:51 | 18:07 | 00:02 | 00:14 | 00:30 |
| 52° | 15:25 | 16:40 | 17:53 | 00:08 | 00:22 | 00:41 |
| 50° | 15:18 | 16:30 | 17:41 | 00:13 | 00:30 | 00:51 |
| 45° | 15:03 | 16:10 | 17:16 | 00:25 | 00:47 | 01:13 |
| N 40° | 14:50 | 15:53 | 16:56 | 00:35 | 01:00 | 01:30 |
| 35° | 14:40 | 15:40 | 16:39 | 00:43 | 01:12 | 01:45 |
| 30° | 14:31 | 15:28 | 16:25 | 00:51 | 01:22 | 01:57 |
| 20° | 14:15 | 15:07 | 16:01 | 01:04 | 01:40 | 02:19 |
| N 10° | 14:01 | 14:50 | 15:40 | 01:15 | 01:55 | 02:38 |
| 0° | 13:49 | 14:34 | 15:21 | 01:26 | 02:10 | 02:56 |
| S 10° | 13:36 | 14:17 | 15:02 | 01:37 | 02:25 | 03:14 |
| 20° | 13:22 | 14:00 | 14:41 | 01:48 | 02:40 | 03:33 |
| 30° | 13:07 | 13:40 | 14:17 | 02:01 | 02:58 | 03:55 |
| 35° | 12:58 | 13:29 | 14:04 | 02:09 | 03:09 | 04:09 |
| 40° | 12:48 | 13:16 | 13:48 | 02:18 | 03:21 | 04:24 |
| 45° | 12:37 | 13:00 | 13:29 | 02:28 | 03:35 | 04:42 |
| S 50° | 12:23 | 12:41 | 13:05 | 02:41 | 03:53 | 05:04 |
| 52° | 12:16 | 12:33 | 12:54 | 02:46 | 04:01 | 05:15 |
| 54° | 12:09 | 12:23 | 12:41 | 02:53 | 04:10 | 05:27 |
| 56° | 12:01 | 12:11 | 12:27 | 03:00 | 04:21 | 05:42 |
| 58° | 11:52 | 11:59 | 12:10 | 03:08 | 04:33 | 05:58 |
| S 60° | 11:42 | 11:44 | 11:49 | 03:18 | 04:47 | 06:18 |

| Day | Sun | | | Moon | | |
|-----|--------------------------|--------------------------|-----------------------|----------------|----------------|---|
| | Eqn.of Time | | Mer. Pass hh:mm | Mer.Pass. | | Age 9-11 70-86% |
| | 00 ^h mm:ss | 12 ^h mm:ss | | Upper hh:mm | Lower hh:mm | |
| | | | | | | |
| 24 | 02:22 | 02:28 | 12:02 | 19:59 | 07:37 |  |
| 25 | 02:34 | 02:41 | 12:03 | 20:45 | 08:22 | |
| 26 | 02:47 | 02:53 | 12:03 | 21:33 | 09:08 | |

June 27, 28, 29 UT (Sat., Sun., Mon.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|----------------------|----------|-------------------|----------|---------------------|----------|-------------------|----------|--|
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | |
| 0 | 275°07.3 | 136°26.1 | N17°56.7 | 218°34.1 | N19°31.9 | 153°33.9 | N20°43.2 | 261°19.0 | N03°20.5 | |
| 1 | 290°09.8 | 151°25.7 | 55.8 | 233°34.7 | 32.3 | 168°35.8 | 43.1 | 276°21.4 | 20.6 | |
| 2 | 305°12.3 | 166°25.3 | 54.9 | 248°35.3 | 32.7 | 183°37.7 | 43.0 | 291°23.7 | 20.6 | |
| 3 | 320°14.7 | 181°24.9 | · · 54.0 | 263°35.9 | · · 33.1 | 198°39.6 | · · 42.8 | 306°26.1 | · · 20.7 | |
| 4 | 335°17.2 | 196°24.6 | 53.0 | 278°36.5 | 33.6 | 213°41.5 | 42.7 | 321°28.4 | 20.7 | |
| 5 | 350°19.7 | 211°24.2 | 52.1 | 293°37.2 | 34.0 | 228°43.4 | 42.6 | 336°30.8 | 20.7 | |
| 6 | 5°22.1 | 226°23.8 | N17°51.2 | 308°37.8 | N19°34.4 | 243°45.3 | N20°42.5 | 351°33.1 | N03°20.8 | |
| 7 | 20°24.6 | 241°23.4 | 50.3 | 323°38.4 | 34.8 | 258°47.2 | 42.4 | 6°35.4 | 20.8 | |
| 8 | 35°27.1 | 256°23.1 | 49.4 | 338°39.0 | 35.2 | 273°49.2 | 42.3 | 21°37.8 | 20.8 | |
| 9 | 50°29.5 | 271°22.7 | · · 48.5 | 353°39.6 | · · 35.6 | 288°51.1 | · · 42.2 | 36°40.1 | · · 20.9 | |
| 10 | 65°32.0 | 286°22.3 | 47.6 | 8°40.3 | 36.1 | 303°53.0 | 42.1 | 51°42.5 | 20.9 | |
| 11 | 80°34.5 | 301°21.9 | 46.7 | 23°40.9 | 36.5 | 318°54.9 | 42.0 | 66°44.8 | 20.9 | |
| 12 | 95°36.9 | 316°21.6 | N17°45.7 | 38°41.5 | N19°36.9 | 333°56.8 | N20°41.9 | 81°47.2 | N03°21.0 | |
| 13 | 110°39.4 | 331°21.2 | 44.8 | 53°42.1 | 37.3 | 348°58.7 | 41.8 | 96°49.5 | 21.0 | |
| 14 | 125°41.8 | 346°20.8 | 43.9 | 68°42.7 | 37.7 | 4°00.6 | 41.7 | 111°51.9 | 21.1 | |
| 15 | 140°44.3 | 1°20.5 | · · 43.0 | 83°43.3 | · · 38.1 | 19°02.5 | · · 41.5 | 126°54.2 | · · 21.1 | |
| 16 | 155°46.8 | 16°20.1 | 42.1 | 98°44.0 | 38.6 | 34°04.4 | 41.4 | 141°56.6 | 21.1 | |
| 17 | 170°49.2 | 31°19.7 | 41.2 | 113°44.6 | 39.0 | 49°06.3 | 41.3 | 156°58.9 | 21.2 | |
| 18 | 185°51.7 | 46°19.3 | N17°40.2 | 128°45.2 | N19°39.4 | 64°08.2 | N20°41.2 | 172°01.3 | N03°21.2 | |
| 19 | 200°54.2 | 61°19.0 | 39.3 | 143°45.8 | 39.8 | 79°10.2 | 41.1 | 187°03.6 | 21.2 | |
| 20 | 215°56.6 | 76°18.6 | 38.4 | 158°46.4 | 40.2 | 94°12.1 | 41.0 | 202°06.0 | 21.3 | |
| 21 | 230°59.1 | 91°18.2 | · · 37.5 | 173°47.1 | · · 40.6 | 109°14.0 | · · 40.9 | 217°08.3 | · · 21.3 | |
| 22 | 246°01.6 | 106°17.9 | 36.5 | 188°47.7 | 41.0 | 124°15.9 | 40.8 | 232°10.7 | 21.3 | |
| 23 | 261°04.0 | 121°17.5 | 35.6 | 203°48.3 | 41.5 | 139°17.8 | 40.7 | 247°13.0 | 21.4 | |
| Mer.pass. 05:39 | | ν-0.4' d-0.9' m-4.03 | | ν0.6' d0.4' m1.30 | | ν1.9' d-0.1' m-1.82 | | ν2.3' d0.0' m0.79 | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | |
| 0 | 276°06.5 | 136°17.2 | N17°34.7 | 218°48.9 | N19°41.9 | 154°19.7 | N20°40.6 | 262°15.4 | N03°21.4 | |
| 1 | 291°08.9 | 151°16.8 | 33.8 | 233°49.5 | 42.3 | 169°21.6 | 40.5 | 277°17.7 | 21.5 | |
| 2 | 306°11.4 | 166°16.4 | 32.8 | 248°50.2 | 42.7 | 184°23.5 | 40.3 | 292°20.1 | 21.5 | |
| 3 | 321°13.9 | 181°16.1 | · · 31.9 | 263°50.8 | · · 43.1 | 199°25.4 | · · 40.2 | 307°22.4 | · · 21.5 | |
| 4 | 336°16.3 | 196°15.7 | 31.0 | 278°51.4 | 43.5 | 214°27.3 | 40.1 | 322°24.8 | 21.6 | |
| 5 | 351°18.8 | 211°15.3 | 30.1 | 293°52.0 | 43.9 | 229°29.2 | 40.0 | 337°27.1 | 21.6 | |
| 6 | 6°21.3 | 226°15.0 | N17°29.1 | 308°52.6 | N19°44.3 | 244°31.1 | N20°39.9 | 352°29.5 | N03°21.6 | |
| 7 | 21°23.7 | 241°14.6 | 28.2 | 323°53.2 | 44.7 | 259°33.1 | 39.8 | 7°31.8 | 21.7 | |
| 8 | 36°26.2 | 256°14.3 | 27.3 | 338°53.9 | 45.2 | 274°35.0 | 39.7 | 22°34.2 | 21.7 | |
| 9 | 51°28.7 | 271°13.9 | · · 26.3 | 353°54.5 | · · 45.6 | 289°36.9 | · · 39.6 | 37°36.5 | · · 21.7 | |
| 10 | 66°31.1 | 286°13.6 | 25.4 | 8°55.1 | 46.0 | 304°38.8 | 39.5 | 52°38.9 | 21.8 | |
| 11 | 81°33.6 | 301°13.2 | 24.5 | 23°55.7 | 46.4 | 319°40.7 | 39.4 | 67°41.2 | 21.8 | |
| 12 | 96°36.1 | 316°12.9 | N17°23.6 | 38°56.3 | N19°46.8 | 334°42.6 | N20°39.3 | 82°43.6 | N03°21.8 | |
| 13 | 111°38.5 | 331°12.5 | 22.6 | 53°57.0 | 47.2 | 349°44.5 | 39.1 | 97°45.9 | 21.9 | |
| 14 | 126°41.0 | 346°12.1 | 21.7 | 68°57.6 | 47.6 | 4°46.4 | 39.0 | 112°48.3 | 21.9 | |
| 15 | 141°43.4 | 1°11.8 | · · 20.7 | 83°58.2 | · · 48.0 | 19°48.3 | · · 38.9 | 127°50.6 | · · 21.9 | |
| 16 | 156°45.9 | 16°11.4 | 19.8 | 98°58.8 | 48.4 | 34°50.2 | 38.8 | 142°53.0 | 22.0 | |
| 17 | 171°48.4 | 31°11.1 | 18.9 | 113°59.4 | 48.8 | 49°52.1 | 38.7 | 157°55.3 | 22.0 | |
| 18 | 186°50.8 | 46°10.7 | N17°17.9 | 129°00.0 | N19°49.2 | 64°54.0 | N20°38.6 | 172°57.7 | N03°22.1 | |
| 19 | 201°53.3 | 61°10.4 | 17.0 | 144°00.7 | 49.6 | 79°55.9 | 38.5 | 188°00.1 | 22.1 | |
| 20 | 216°55.8 | 76°10.0 | 16.1 | 159°01.3 | 50.0 | 94°57.9 | 38.4 | 203°02.4 | 22.1 | |
| 21 | 231°58.2 | 91°09.7 | · · 15.1 | 174°01.9 | · · 50.5 | 109°59.8 | · · 38.3 | 218°04.8 | · · 22.2 | |
| 22 | 247°00.7 | 106°09.3 | 14.2 | 189°02.5 | 50.9 | 125°01.7 | 38.2 | 233°07.1 | 22.2 | |
| 23 | 262°03.2 | 121°09.0 | 13.2 | 204°03.1 | 51.3 | 140°03.6 | 38.1 | 248°09.5 | 22.2 | |
| Mer.pass. 05:35 | | ν-0.4' d-0.9' m-4.04 | | ν0.6' d0.4' m1.30 | | ν1.9' d-0.1' m-1.81 | | ν2.4' d0.0' m0.79 | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | |
| 0 | 277°05.6 | 136°08.6 | N17°12.3 | 219°03.7 | N19°51.7 | 155°05.5 | N20°37.9 | 263°11.8 | N03°22.3 | |
| 1 | 292°08.1 | 151°08.3 | 11.4 | 234°04.4 | 52.1 | 170°07.4 | 37.8 | 278°14.2 | 22.3 | |
| 2 | 307°10.6 | 166°08.0 | 10.4 | 249°05.0 | 52.5 | 185°09.3 | 37.7 | 293°16.5 | 22.3 | |
| 3 | 322°13.0 | 181°07.6 | · · 09.5 | 264°05.6 | · · 52.9 | 200°11.2 | · · 37.6 | 308°18.9 | · · 22.4 | |
| 4 | 337°15.5 | 196°07.3 | 08.5 | 279°06.2 | 53.3 | 215°13.1 | 37.5 | 323°21.2 | 22.4 | |
| 5 | 352°17.9 | 211°06.9 | 07.6 | 294°06.8 | 53.7 | 230°15.0 | 37.4 | 338°23.6 | 22.4 | |
| 6 | 7°20.4 | 226°06.6 | N17°06.6 | 309°07.5 | N19°54.1 | 245°16.9 | N20°37.3 | 353°25.9 | N03°22.5 | |
| 7 | 22°22.9 | 241°06.2 | 05.7 | 324°08.1 | 54.5 | 260°18.8 | 37.2 | 8°28.3 | 22.5 | |
| 8 | 37°25.3 | 256°05.9 | 04.8 | 339°08.7 | 54.9 | 275°20.7 | 37.1 | 23°30.6 | 22.5 | |
| 9 | 52°27.8 | 271°05.6 | · · 03.8 | 354°09.3 | · · 55.3 | 290°22.6 | · · 37.0 | 38°33.0 | · · 22.6 | |
| 10 | 67°30.3 | 286°05.2 | 02.9 | 9°09.9 | 55.7 | 305°24.5 | 36.8 | 53°35.4 | 22.6 | |
| 11 | 82°32.7 | 301°04.9 | 01.9 | 24°10.5 | 56.1 | 320°26.5 | 36.7 | 68°37.7 | 22.6 | |
| 12 | 97°35.2 | 316°04.6 | N17°01.0 | 39°11.2 | N19°56.5 | 335°28.4 | N20°36.6 | 83°40.1 | N03°22.7 | |
| 13 | 112°37.7 | 331°04.2 | 17°00.0 | 54°11.8 | 56.9 | 350°30.3 | 36.5 | 98°42.4 | 22.7 | |
| 14 | 127°40.1 | 346°03.9 | 16°59.1 | 69°12.4 | 57.3 | 5°32.2 | 36.4 | 113°44.8 | 22.7 | |
| 15 | 142°42.6 | 1°03.5 | · · 58.1 | 84°13.0 | · · 57.7 | 20°34.1 | · · 36.3 | 128°47.1 | · · 22.8 | |
| 16 | 157°45.1 | 16°03.2 | 57.2 | 99°13.6 | 58.1 | 35°36.0 | 36.2 | 143°49.5 | 22.8 | |
| 17 | 172°47.5 | 31°02.9 | 56.2 | 114°14.2 | 58.5 | 50°37.9 | 36.1 | 158°51.8 | 22.8 | |
| 18 | 187°50.0 | 46°02.5 | N16°55.2 | 129°14.9 | N19°58.9 | 65°39.8 | N20°36.0 | 173°54.2 | N03°22.9 | |
| 19 | 202°52.4 | 61°02.2 | 54.3 | 144°15.5 | 59.3 | 80°41.7 | 35.8 | 188°56.6 | 22.9 | |
| 20 | 217°54.9 | 76°01.9 | 53.3 | 159°16.1 | 19°57.9 | 95°43.6 | 35.7 | 203°58.9 | 22.9 | |
| 21 | 232°57.4 | 91°01.5 | · · 52.4 | 174°16.7 | 20°00.1 | 110°45.5 | · · 35.6 | 219°01.3 | · · 23.0 | |
| 22 | 247°59.8 | 106°01.2 | 51.4 | 189°17.3 | 00.5 | 125°47.4 | 35.5 | 234°03.6 | 23.0 | |
| 23 | 263°02.3 | 121°00.9 | 50.5 | 204°17.9 | 00.9 | 140°49.3 | 35.4 | 249°06.0 | 23.0 | |
| Mer.pass. 05:31 | | ν-0.3' d-0.9' m-4.04 | | ν0.6' d0.4' m1.30 | | ν1.9' d-0.1' m-1.81 | | ν2.4' d0.0' m0.78 | | |

| | SHA | Dec |
|---------------------|----------|----------|
| Alpheratz | 357°33.5 | 29°14.1 |
| Ankaa | 353°06.0 | -42°09.4 |
| Schedar | 349°29.7 | 56°40.7 |
| Diphda | 348°46.1 | -17°50.3 |
| Achernar | 335°19.5 | -57°05.8 |
| Hamal | 327°50.0 | 23°35.2 |
| Polaris | 313°43.7 | 89°22.3 |
| Acamar | 315°11.1 | -40°11.7 |
| Menkar | 314°05.1 | 4°11.6 |
| Mirfak | 308°26.9 | 49°57.1 |
| Aldebaran | 290°38.5 | 16°33.7 |
| Rigel | 281°03.0 | -8°10.2 |
| Capella | 280°20.6 | 46°01.4 |
| Bellatrix | 278°21.9 | 6°22.4 |
| Elnath | 278°00.7 | 28°37.7 |
| Alnilam | 275°36.8 | -1°11.1 |
| Betelgeuse | 270°51.1 | 7°24.7 |
| Canopus | 263°52.4 | -52°42.5 |
| Sirius | 258°25.5 | -16°45.1 |
| Adhara | 255°05.3 | -29°00.5 |
| Procyon | 244°49.9 | 5°09.4 |
| Pollux | 243°16.2 | 27°57.8 |
| Avior | 234°14.8 | -59°35.8 |
| Suhail | 222°45.8 | -43°32.5 |
| Miaplacidus | 221°38.7 | -69°49.8 |
| Alphard | 217°46.8 | -8°46.5 |
| Regulus | 207°33.3 | 11°50.3 |
| Dubhe | 193°39.8 | 61°36.7 |
| Denebola | 182°23.8 | 14°25.5 |
| Gienah | 175°42.3 | -17°41.5 |
| Acrux | 172°58.7 | -63°15.1 |
| Gacrux | 171°50.3 | -57°16.0 |
| Alioth | 166°11.8 | 55°49.2 |
| Spica | 158°20.9 | -11°18.1 |
| Alkaid | 152°50.9 | 49°11.1 |
| Hadar | 148°34.0 | -60°30.3 |
| Menkent | 147°56.0 | -36°30.2 |
| Arcturus | 145°46.6 | 19°02.7 |
| Rigel Kent. | 139°38.2 | -60°56.9 |
| Kochab | 137°19.1 | 74°03.0 |
| Zuben'ubi | 136°54.5 | -16°09.2 |
| Alphecca | 126°02.4 | 26°37.6 |
| Antares | 112°14.0 | -26°29.5 |
| Atria | 107°06.6 | -69°04.6 |
| Sabik | 102°01.0 | -15°45.5 |
| Shaula | 96°08.3 | -37°07.4 |
| Rasalhague | 95°57.1 | 12°32.5 |
| Eltanin | 90°41.1 | 51°29.1 |
| Kaus Aust. | 83°30.5 | -34°22.3 |
| Vega | 80°32.0 | 38°48.5 |
| Nunki | 75°45.9 | -26°15.8 |
| Altair | 61°58.5 | 8°56.3 |
| Peacock | 53°03.3 | -56°38.8 |
| Deneb | 49°24.6 | 45°22.4 |
| Enif | 33°37.4 | 9°59.8 |
| Al Na'ir | 27°31.1 | -46°49.7 |
| Fomalhaut | 15°13.0 | -29°28.7 |
| Scheat | 13°43.9 | 28°13.5 |
| Markab | 13°28.6 | 15°20.8 |
| Jun 27 Sat | SHA | Mer.pass |
| Venus | 221°18.7 | 14:55 |
| Mars | 303°26.7 | 09:25 |
| Jupiter | 238°26.5 | 13:44 |
| Saturn | 346°11.7 | 06:34 |
| Jun 28 Sun | SHA | Mer.pass |
| Venus | 220°10.7 | 14:55 |
| Mars | 302°42.4 | 09:24 |
| Jupiter | 238°13.2 | 13:41 |
| Saturn | 346°08.9 | 06:30 |
| Jun 29 Mon | SHA | Mer.pass |
| Venus | 219°03.0 | 14:56 |
| Mars | 301°58.1 | 09:23 |
| Jupiter | 237°59.9 | 13:38 |
| Saturn | 346°06.2 | 06:26 |
| Horizontal parallax | | |
| Venus: | 0.1 | |
| Mars: | 0.1 | |


| h | | Sun | | Moon | | | |
|-----|--|------------------------|----------|------------|-------|----------|------------|
| Sat | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 179°15.1 | N23°19.7 | 35°38.9 | 11.3' | S25°39.5 | 5.9' 54.0' |
| 1 | | 194°15.0 | 19.6 | 50°09.2 | 11.2' | 25°45.4 | 5.8' 54.0' |
| 2 | | 209°14.8 | 19.5 | 64°39.4 | 11.2' | 25°51.2 | 5.7' 54.0' |
| 3 | | 224°14.7 | •• 19.4 | 79°09.6 | 11.1' | 25°56.8 | 5.5' 54.0' |
| 4 | | 239°14.6 | 19.3 | 93°39.7 | 11.1' | 26°02.4 | 5.4' 54.0' |
| 5 | | 254°14.5 | 19.2 | 108°09.8 | 11.0' | 26°07.8 | 5.3' 54.0' |
| 6 | | 269°14.3 | N23°19.1 | 122°39.8 | 11.0' | S26°13.1 | 5.2' 54.0' |
| 7 | | 284°14.2 | 19.0 | 137°09.8 | 10.9' | 26°18.2 | 5.0' 54.0' |
| 8 | | 299°14.1 | 18.9 | 151°39.7 | 10.9' | 26°23.3 | 4.9' 54.0' |
| 9 | | 314°13.9 | •• 18.8 | 166°09.6 | 10.8' | 26°28.2 | 4.8' 53.9' |
| 10 | | 329°13.8 | 18.7 | 180°39.4 | 10.8' | 26°33.0 | 4.7' 53.9' |
| 11 | | 344°13.7 | 18.6 | 195°09.2 | 10.8' | 26°37.7 | 4.6' 53.9' |
| 12 | | 359°13.5 | N23°18.5 | 209°39.0 | 10.7' | S26°42.2 | 4.4' 53.9' |
| 13 | | 14°13.4 | 18.4 | 224°08.7 | 10.7' | 26°46.7 | 4.3' 53.9' |
| 14 | | 29°13.3 | 18.3 | 238°38.4 | 10.6' | 26°51.0 | 4.2' 53.9' |
| 15 | | 44°13.2 | •• 18.1 | 253°08.1 | 10.6' | 26°55.1 | 4.0' 53.9' |
| 16 | | 59°13.0 | 18.0 | 267°37.7 | 10.6' | 26°59.2 | 3.9' 53.9' |
| 17 | | 74°12.9 | 17.9 | 282°07.2 | 10.5' | 27°03.1 | 3.8' 53.9' |
| 18 | | 89°12.8 | N23°17.8 | 296°36.8 | 10.5' | S27°06.9 | 3.7' 53.9' |
| 19 | | 104°12.6 | 17.7 | 311°06.3 | 10.5' | 27°10.5 | 3.5' 53.9' |
| 20 | | 119°12.5 | 17.6 | 325°35.7 | 10.4' | 27°14.1 | 3.4' 53.9' |
| 21 | | 134°12.4 | •• 17.5 | 340°05.1 | 10.4' | 27°17.5 | 3.3' 53.9' |
| 22 | | 149°12.3 | 17.4 | 354°34.5 | 10.4' | 27°20.8 | 3.1' 53.9' |
| 23 | | 164°12.1 | 17.3 | 9°03.9 | 10.3' | 27°23.9 | 3.0' 53.9' |
| | | SD = 15.7' $d = -0.1'$ | | SD = 14.7' | | | |

| Sun | | GHA | Dec | GHA | ν | Dec | d HP |
|-----|--|------------------------|----------|------------|-------|----------|-------------|
| 0 | | 179°12.0 | N23°17.1 | 23°33.2 | 10.3' | S27°26.9 | 2.9' 53.9' |
| 1 | | 194°11.9 | 17.0 | 38°02.5 | 10.3' | 27°29.8 | 2.7' 53.9' |
| 2 | | 209°11.8 | 16.9 | 52°31.8 | 10.2' | 27°32.5 | 2.6' 53.9' |
| 3 | | 224°11.6 | •• 16.8 | 67°01.0 | 10.2' | 27°35.2 | 2.5' 53.9' |
| 4 | | 239°11.5 | 16.7 | 81°30.3 | 10.2' | 27°37.6 | 2.4' 53.9' |
| 5 | | 254°11.4 | 16.6 | 95°59.5 | 10.2' | 27°40.0 | 2.2' 53.9' |
| 6 | | 269°11.2 | N23°16.5 | 110°28.6 | 10.1' | S27°42.2 | 2.1' 53.9' |
| 7 | | 284°11.1 | 16.3 | 124°57.8 | 10.1' | 27°44.3 | 2.0' 53.9' |
| 8 | | 299°11.0 | 16.2 | 139°26.9 | 10.1' | 27°46.2 | 1.8' 53.9' |
| 9 | | 314°10.9 | •• 16.1 | 153°56.0 | 10.1' | 27°48.1 | 1.7' 53.9' |
| 10 | | 329°10.7 | 16.0 | 168°25.1 | 10.1' | 27°49.8 | 1.6' 53.9' |
| 11 | | 344°10.6 | 15.9 | 182°54.1 | 10.0' | 27°51.3 | 1.4' 53.9' |
| 12 | | 359°10.5 | N23°15.7 | 197°23.2 | 10.0' | S27°52.7 | 1.3' 53.9' |
| 13 | | 14°10.4 | 15.6 | 211°52.2 | 10.0' | 27°54.0 | 1.1' 53.9' |
| 14 | | 29°10.2 | 15.5 | 226°21.2 | 10.0' | 27°55.2 | 1.0' 53.9' |
| 15 | | 44°10.1 | •• 15.4 | 240°50.2 | 10.0' | 27°56.2 | 0.9' 53.9' |
| 16 | | 59°10.0 | 15.2 | 255°19.2 | 10.0' | 27°57.0 | 0.7' 53.9' |
| 17 | | 74°09.8 | 15.1 | 269°48.2 | 10.0' | 27°57.8 | 0.6' 53.9' |
| 18 | | 89°09.7 | N23°15.0 | 284°17.1 | 10.0' | S27°58.4 | 0.5' 53.9' |
| 19 | | 104°09.6 | 14.9 | 298°46.1 | 9.9' | 27°58.9 | 0.3' 53.9' |
| 20 | | 119°09.5 | 14.7 | 313°15.0 | 9.9' | 27°59.2 | 0.2' 53.9' |
| 21 | | 134°09.3 | •• 14.6 | 327°44.0 | 9.9' | 27°59.4 | 0.1' 53.9' |
| 22 | | 149°09.2 | 14.5 | 342°12.9 | 9.9' | 27°59.5 | -0.1' 53.9' |
| 23 | | 164°09.1 | 14.3 | 356°41.8 | 9.9' | 27°59.4 | -0.2' 53.9' |
| | | SD = 15.7' $d = -0.1'$ | | SD = 14.7' | | | |

| Mon | | GHA | Dec | GHA | ν | Dec | d HP |
|-----|--|------------------------|----------|------------|-------|----------|-------------|
| 0 | | 179°09.0 | N23°14.2 | 11°10.7 | 9.9' | S27°59.2 | -0.3' 53.9' |
| 1 | | 194°08.8 | 14.1 | 25°39.7 | 9.9' | 27°58.8 | -0.5' 53.9' |
| 2 | | 209°08.7 | 13.9 | 40°08.6 | 9.9' | 27°58.4 | -0.6' 53.9' |
| 3 | | 224°08.6 | •• 13.8 | 54°37.5 | 9.9' | 27°57.7 | -0.8' 53.9' |
| 4 | | 239°08.5 | 13.7 | 69°06.4 | 9.9' | 27°57.0 | -0.9' 53.9' |
| 5 | | 254°08.3 | 13.5 | 83°35.4 | 9.9' | 27°56.1 | -1.0' 53.9' |
| 6 | | 269°08.2 | N23°13.4 | 98°04.3 | 9.9' | S27°55.1 | -1.2' 53.9' |
| 7 | | 284°08.1 | 13.3 | 112°33.2 | 9.9' | 27°53.9 | -1.3' 54.0' |
| 8 | | 299°08.0 | 13.1 | 127°02.2 | 10.0' | 27°52.6 | -1.4' 54.0' |
| 9 | | 314°07.8 | •• 13.0 | 141°31.1 | 10.0' | 27°51.2 | -1.6' 54.0' |
| 10 | | 329°07.7 | 12.9 | 156°00.1 | 10.0' | 27°49.6 | -1.7' 54.0' |
| 11 | | 344°07.6 | 12.7 | 170°29.1 | 10.0' | 27°47.9 | -1.8' 54.0' |
| 12 | | 359°07.5 | N23°12.6 | 184°58.1 | 10.0' | S27°46.1 | -2.0' 54.0' |
| 13 | | 14°07.3 | 12.4 | 199°27.1 | 10.0' | 27°44.1 | -2.1' 54.0' |
| 14 | | 29°07.2 | 12.3 | 213°56.1 | 10.0' | 27°42.0 | -2.2' 54.0' |
| 15 | | 44°07.1 | •• 12.2 | 228°25.1 | 10.0' | 27°39.8 | -2.4' 54.0' |
| 16 | | 59°07.0 | 12.0 | 242°54.2 | 10.1' | 27°37.4 | -2.5' 54.0' |
| 17 | | 74°06.8 | 11.9 | 257°23.2 | 10.1' | 27°34.9 | -2.6' 54.0' |
| 18 | | 89°06.7 | N23°11.7 | 271°52.3 | 10.1' | S27°32.2 | -2.8' 54.0' |
| 19 | | 104°06.6 | 11.6 | 286°21.4 | 10.1' | 27°29.5 | -2.9' 54.0' |
| 20 | | 119°06.5 | 11.4 | 300°50.6 | 10.2' | 27°26.6 | -3.0' 54.0' |
| 21 | | 134°06.3 | •• 11.3 | 315°19.7 | 10.2' | 27°23.5 | -3.2' 54.0' |
| 22 | | 149°06.2 | 11.2 | 329°48.9 | 10.2' | 27°20.3 | -3.3' 54.0' |
| 23 | | 164°06.1 | 11.0 | 344°18.1 | 10.2' | 27°17.0 | -3.4' 54.0' |
| | | SD = 15.7' $d = -0.1'$ | | SD = 14.7' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| N 70° | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 68° | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 66° | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 64° | //// | //// | 01:37 | 22:29 | //// | //// |
| 62° | //// | //// | 02:13 | 21:52 | //// | //// |
| 60° | //// | 00:57 | 02:39 | 21:27 | 23:08 | //// |
| N 58° | //// | 01:45 | 03:00 | 21:07 | 22:21 | //// |
| 56° | //// | 02:14 | 03:16 | 20:50 | 21:52 | //// |
| 54° | 00:52 | 02:36 | 03:30 | 20:36 | 21:30 | 23:13 |
| 52° | 01:36 | 02:54 | 03:42 | 20:24 | 21:12 | 22:29 |
| 50° | 02:04 | 03:09 | 03:53 | 20:13 | 20:58 | 22:02 |
| 45° | 02:49 | 03:38 | 04:16 | 19:51 | 20:28 | 21:18 |
| N 40° | 03:19 | 04:01 | 04:34 | 19:33 | 20:06 | 20:47 |
| 35° | 03:42 | 04:19 | 04:48 | 19:18 | 19:48 | 20:24 |
| 30° | 04:01 | 04:34 | 05:01 | 19:05 | 19:33 | 20:06 |
| 20° | 04:30 | 04:59 | 05:23 | 18:43 | 19:08 | 19:37 |
| N 10° | 04:52 | 05:19 | 05:42 | 18:24 | 18:47 | 19:15 |
| 0° | 05:11 | 05:37 | 06:00 | 18:07 | 18:29 | 18:56 |
| S 10° | 05:28 | 05:54 | 06:17 | 17:50 | 18:12 | 18:39 |
| 20° | 05:44 | 06:11 | 06:35 | 17:31 | 17:55 | 18:23 |
| 30° | 06:00 | 06:30 | 06:56 | 17:10 | 17:37 | 18:06 |
| 35° | 06:09 | 06:41 | 07:09 | 16:58 | 17:26 | 17:58 |
| 40° | 06:18 | 06:52 | 07:23 | 16:44 | 17:14 | 17:48 |
| 45° | 06:29 | 07:06 | 07:40 | 16:27 | 17:01 | 17:38 |
| S 50° | 06:40 | 07:22 | 08:00 | 16:07 | 16:45 | 17:27 |
| 52° | 06:45 | 07:29 | 08:10 | 15:57 | 16:38 | 17:21 |
| 54° | 06:51 | 07:37 | 08:21 | 15:46 | 16:30 | 17:16 |
| 56° | 06:57 | 07:46 | 08:33 | 15:33 | 16:21 | 17:10 |
| 58° | 07:04 | 07:56 | 08:48 | 15:19 | 16:10 | 17:03 |
| S 60° | 07:11 | 08:08 | 09:05 | 15:01 | 15:59 | 16:55 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | ■ | ■ | ■ | ■ | ■ | ■ |
| 68° | ■ | ■ | ■ | ■ | ■ | ■ |
| 66° | ■ | ■ | ■ | ■ | ■ | ■ |
| 64° | ■ | ■ | ■ | ■ | ■ | ■ |
| 62° | 21:29 | ■ | 23:10 | 23:11 | ■ | ■ |
| 60° | 20:33 | 21:41 | 22:17 | •• •• | 00:08 | 00:47 |
| N 58° | 20:01 | 21:04 | 21:45 | 00:15 | 00:40 | 01:24 |
| 56° | 19:37 | 20:37 | 21:21 | 00:35 | 01:05 | 01:50 |
| 54° | 19:17 | 20:17 | 21:02 | 00:52 | 01:25 | 02:11 |
| 52° | 19:01 | 19:59 | 20:45 | 01:06 | 01:41 | 02:28 |
| 50° | 18:47 | 19:44 | 20:31 | 01:19 | 01:55 | 02:43 |
| 45° | 18:18 | 19:14 | 20:02 | 01:44 | 02:24 | 03:13 |
| N 40° | 17:56 | 18:51 | 19:40 | 02:05 | 02:47 | 03:36 |
| 35° | 17:37 | 18:32 | 19:21 | 02:22 | 03:06 | 03:56 |
| 30° | 17:21 | 18:15 | 19:05 | 02:37 | 03:22 | 04:12 |
| 20° | 16:55 | 17:47 | 18:38 | 03:02 | 03:49 | 04:40 |
| N 10° | 16:32 | 17:23 | 18:15 | 03:24 | 04:13 | 05:04 |
| 0° | 16:10 | 17:01 | 17:53 | 03:44 | 04:35 | 05:26 |
| S 10° | 15:49 | 16:39 | 17:31 | 04:05 | 04:57 | 05:48 |
| 20° | 15:26 | 16:15 | 17:07 | 04:27 | 05:20 | 06:12 |
| 30° | 15:00 | 15:47 | 16:40 | 04:52 | 05:48 | 06:40 |
| 35° | 14:44 | 15:31 | 16:24 | 05:07 | 06:04 | 06:56 |
| 40° | 14:26 | 15:12 | 16:05 | 05:25 | 06:23 | 07:15 |
| 45° | 14:05 | 14:49 | 15:42 | 05:46 | 06:46 | 07:38 |
| S 50° | 13:37 | 14:19 | 15:13 | 06:13 | 07:15 | 08:08 |
| 52° | 13:24 | 14:05 | 14:59 | 06:26 | 07:30 | 08:22 |
| 54° | 13:09 | 13:48 | 14:42 | 06:41 | 07:47 | 08:39 |
| 56° | 12:51 | 13:28 | 14:22 | 06:59 | 08:07 | 08:59 |
| 58° | 12:29 | 13:02 | 13:57 | 07:20 | 08:32 | 09:24 |
| S 60° | 12:01 | 12:28 | 13:23 | 07:48 | 09:07 | 09:58 |

| Day | Sun | | Mer. Pass | Moon | | Age 12-14 92-99% |
|-----|---|----------------------------------|-----------|-----------------------------|----------------|---|
| | Eqn.of Time 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 27 | 03:00 | 03:06 | 12:03 | 22:22 | 09:57 |  |
| 28 | 03:12 | 03:18 | 12:03 | 23:14 | 10:48 | |
| 29 | 03:24 | 03:30 | 12:04 | —:— | 11:39 | |

June 30, 01, 02 UT (Tue., Wed., Thu.)

| | Aries | Venus | Mars | Jupiter | Saturn | Stars | | | | | | |
|-----------------|----------|----------------------|----------|-------------------|----------|---------------------|----------|-------------------|----------|-------------|----------|----------|
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | |
| 0 | 278°04.8 | 136°00.6 | N16°49.5 | 219°18.6 | N20°01.3 | 155°51.2 | N20°35.3 | 264°08.3 | N03°23.1 | Alpheratz | 357°33.5 | 29°14.1 |
| 1 | 293°07.2 | 151°00.2 | 48.6 | 234°19.2 | 01.7 | 170°53.1 | 35.2 | 279°10.7 | 23.1 | Ankaa | 353°05.9 | -42°09.4 |
| 2 | 308°09.7 | 165°59.9 | 47.6 | 249°19.8 | 02.1 | 185°55.0 | 35.1 | 294°13.1 | 23.1 | Schedar | 349°29.6 | 56°40.7 |
| 3 | 323°12.2 | 180°59.6 | · · 46.6 | 264°20.4 | · · 02.5 | 200°57.0 | · · 35.0 | 309°15.4 | · · 23.2 | Diphda | 348°46.1 | -17°50.3 |
| 4 | 338°14.6 | 195°59.2 | 45.7 | 279°21.0 | 02.9 | 215°58.9 | 34.9 | 324°17.8 | 23.2 | Achernar | 335°19.5 | -57°05.8 |
| 5 | 353°17.1 | 210°58.9 | 44.7 | 294°21.6 | 03.2 | 231°00.8 | 34.7 | 339°20.1 | 23.2 | Hamal | 327°50.0 | 23°35.2 |
| 6 | 8°19.6 | 225°58.6 | N16°43.8 | 309°22.3 | N20°03.6 | 246°02.7 | N20°34.6 | 354°22.5 | N03°23.3 | Polaris | 313°42.2 | 89°22.3 |
| 7 | 23°22.0 | 240°58.3 | 42.8 | 324°22.9 | 04.0 | 261°04.6 | 34.5 | 9°24.8 | 23.3 | Acamar | 315°11.1 | -40°11.7 |
| 8 | 38°24.5 | 255°58.0 | 41.8 | 339°23.5 | 04.4 | 276°06.5 | 34.4 | 24°27.2 | 23.3 | Menkar | 314°05.1 | 4°11.7 |
| 9 | 53°26.9 | 270°57.6 | · · 40.9 | 354°24.1 | · · 04.8 | 291°08.4 | · · 34.3 | 39°29.6 | · · 23.4 | Mirfak | 308°26.8 | 49°57.1 |
| 10 | 68°29.4 | 285°57.3 | 39.9 | 9°24.7 | 05.2 | 306°10.3 | 34.2 | 54°31.9 | 23.4 | Aldebaran | 290°38.5 | 16°33.7 |
| 11 | 83°31.9 | 300°57.0 | 38.9 | 24°25.3 | 05.6 | 321°12.2 | 34.1 | 69°34.3 | 23.4 | Rigel | 281°03.0 | -8°10.2 |
| 12 | 98°34.3 | 315°56.7 | N16°38.0 | 39°25.9 | N20°06.0 | 336°14.1 | N20°34.0 | 84°36.6 | N03°23.5 | Capella | 280°20.5 | 46°01.4 |
| 13 | 113°36.8 | 330°56.3 | 37.0 | 54°26.6 | 06.4 | 351°16.0 | 33.9 | 99°39.0 | 23.5 | Bellatrix | 278°21.9 | 6°22.4 |
| 14 | 128°39.3 | 345°56.0 | 36.0 | 69°27.2 | 06.8 | 6°17.9 | 33.7 | 114°41.4 | 23.5 | Elnath | 278°00.7 | 28°37.7 |
| 15 | 143°41.7 | 0°55.7 | · · 35.1 | 84°27.8 | · · 07.2 | 21°19.8 | · · 33.6 | 129°43.7 | · · 23.5 | Alnilam | 275°36.8 | -1°11.1 |
| 16 | 158°44.2 | 15°55.4 | 34.1 | 99°28.4 | 07.6 | 36°21.7 | 33.5 | 144°46.1 | 23.6 | Betelgeuse | 270°51.1 | 7°24.7 |
| 17 | 173°46.7 | 30°55.1 | 33.1 | 114°29.0 | 08.0 | 51°23.6 | 33.4 | 159°48.4 | 23.6 | Canopus | 263°52.4 | -52°42.5 |
| 18 | 188°49.1 | 45°54.8 | N16°32.2 | 129°29.6 | N20°08.3 | 66°25.5 | N20°33.3 | 174°50.8 | N03°23.6 | Sirius | 258°25.5 | -16°45.1 |
| 19 | 203°51.6 | 60°54.4 | 31.2 | 144°30.3 | 08.7 | 81°27.4 | 33.2 | 189°53.2 | 23.7 | Adhara | 255°05.3 | -29°00.5 |
| 20 | 218°54.1 | 75°54.1 | 30.2 | 159°30.9 | 09.1 | 96°29.3 | 33.1 | 204°55.5 | 23.7 | Procyon | 244°49.9 | 5°09.4 |
| 21 | 233°56.5 | 90°53.8 | · · 29.3 | 174°31.5 | · · 09.5 | 111°31.3 | · · 33.0 | 219°57.9 | · · 23.7 | Pollux | 243°16.2 | 27°57.8 |
| 22 | 248°59.0 | 105°53.5 | 28.3 | 189°32.1 | 09.9 | 126°33.2 | 32.8 | 235°00.2 | 23.8 | Avior | 234°14.8 | -59°35.8 |
| 23 | 264°01.4 | 120°53.2 | 27.3 | 204°32.7 | 10.3 | 141°35.1 | 32.7 | 250°02.6 | 23.8 | Suhail | 222°45.8 | -43°32.5 |
| Mer.pass. 05:27 | | ν-0.3' d-1.0' m-4.05 | | ν0.6' d0.4' m1.30 | | ν1.9' d-0.1' m-1.81 | | ν2.4' d0.0' m0.78 | | Miaplacidus | 221°38.8 | -69°49.7 |
| | | | | | | | | | | Alphard | 217°46.8 | -8°46.5 |
| | | | | | | | | | | Regulus | 207°33.3 | 11°50.3 |
| | | | | | | | | | | Dubhe | 193°39.8 | 61°36.7 |
| | | | | | | | | | | Denebola | 182°23.8 | 14°25.5 |
| | | | | | | | | | | Gienah | 175°42.3 | -17°41.5 |
| | | | | | | | | | | Acrux | 172°58.7 | -63°15.1 |
| | | | | | | | | | | Gacrux | 171°50.3 | -57°16.0 |
| | | | | | | | | | | Alioth | 166°11.8 | 55°49.2 |
| | | | | | | | | | | Spica | 158°20.9 | -11°18.1 |
| | | | | | | | | | | Alkaid | 152°50.9 | 49°11.1 |
| | | | | | | | | | | Hadar | 148°34.0 | -60°30.3 |
| | | | | | | | | | | Menkent | 147°56.0 | -36°30.2 |
| | | | | | | | | | | Arcturus | 145°46.6 | 19°02.7 |
| | | | | | | | | | | Rigel Kent. | 139°38.2 | -60°57.0 |
| | | | | | | | | | | Kochab | 137°19.2 | 74°03.0 |
| | | | | | | | | | | Zuben'ubi | 136°54.5 | -16°09.2 |
| | | | | | | | | | | Alphecca | 126°02.4 | 26°37.6 |
| | | | | | | | | | | Antares | 112°14.0 | -26°29.5 |
| | | | | | | | | | | Atria | 107°06.6 | -69°04.6 |
| | | | | | | | | | | Sabik | 102°01.0 | -15°45.5 |
| | | | | | | | | | | Shaula | 96°08.3 | -37°07.4 |
| | | | | | | | | | | Rasalhague | 95°57.1 | 12°32.5 |
| | | | | | | | | | | Eltanin | 90°41.1 | 51°29.1 |
| | | | | | | | | | | Kaus Aust. | 83°30.5 | -34°22.3 |
| | | | | | | | | | | Vega | 80°32.0 | 38°48.5 |
| | | | | | | | | | | Nunki | 75°45.9 | -26°15.8 |
| | | | | | | | | | | Altair | 61°58.4 | 8°56.3 |
| | | | | | | | | | | Peacock | 53°03.3 | -56°38.8 |
| | | | | | | | | | | Deneb | 49°24.6 | 45°22.4 |
| | | | | | | | | | | Enif | 33°37.4 | 9°59.8 |
| | | | | | | | | | | Al Na'ir | 27°31.1 | -46°49.7 |
| | | | | | | | | | | Fomalhaut | 15°13.0 | -29°28.7 |
| | | | | | | | | | | Scheat | 13°43.9 | 28°13.5 |
| | | | | | | | | | | Markab | 13°28.5 | 15°20.9 |
| | | | | | | | | | | | | |
| Jun 30 Tue | | SHA | | Mer.pass | | | | | | | | |
| | | Venus | | 217°55.8 | | 14:56 | | | | | | |
| | | Mars | | 301°13.8 | | 09:22 | | | | | | |
| | | Jupiter | | 237°46.5 | | 13:35 | | | | | | |
| | | Saturn | | 346°03.6 | | 06:22 | | | | | | |
| | | | | | | | | | | | | |
| Jul 01 Wed | | SHA | | Mer.pass | | | | | | | | |
| | | Venus | | 216°49.0 | | 14:57 | | | | | | |
| | | Mars | | 300°29.4 | | 09:21 | | | | | | |
| | | Jupiter | | 237°33.1 | | 13:32 | | | | | | |
| | | Saturn | | 346°01.0 | | 06:19 | | | | | | |
| | | | | | | | | | | | | |
| Jul 02 Thu | | SHA | | Mer.pass | | | | | | | | |
| | | Venus | | 215°42.6 | | 14:57 | | | | | | |
| | | Mars | | 299°45.0 | | 09:20 | | | | | | |
| | | Jupiter | | 237°19.6 | | 13:29 | | | | | | |
| | | Saturn | | 345°58.6 | | 06:15 | | | | | | |
| | | | | | | | | | | | | |
| | | Horizontal parallax | | | | | | | | | | |
| | | Venus: | | 0.1 | | | | | | | | |
| | | Mars: | | 0.1 | | | | | | | | |
| | | | | | | | | | | | | |
| Mer.pass. 05:19 | | ν-0.3' d-1.0' m-4.06 | | ν0.6' d0.4' m1.30 | | ν1.9' d-0.1' m-1.81 | | ν2.4' d0.0' m0.77 | | | | |


| h | Sun | | | Moon | | | |
|------------|----------|----------|-------------|----------|-------|----------|-------------|
| Tue | GHA | Dec | | GHA | ν | Dec | d HP |
| 0 | 179°06.0 | N23°10.9 | | 358°47.3 | 10.3' | S27°13.6 | -3.6' 54.0' |
| 1 | 194°05.9 | 10.7 | | 13°16.6 | 10.3' | 27°10.0 | -3.7' 54.0' |
| 2 | 209°05.7 | 10.6 | | 27°45.8 | 10.3' | 27°06.3 | -3.8' 54.1' |
| 3 | 224°05.6 | •• 10.4 | | 42°15.2 | 10.3' | 27°02.5 | -4.0' 54.1' |
| 4 | 239°05.5 | 10.3 | | 56°44.5 | 10.4' | 26°58.5 | -4.1' 54.1' |
| 5 | 254°05.4 | 10.1 | | 71°13.9 | 10.4' | 26°54.4 | -4.2' 54.1' |
| 6 | 269°05.2 | N23°10.0 | | 85°43.3 | 10.4' | S26°50.2 | -4.4' 54.1' |
| 7 | 284°05.1 | 09.8 | | 100°12.7 | 10.5' | 26°45.8 | -4.5' 54.1' |
| 8 | 299°05.0 | 09.7 | | 114°42.2 | 10.5' | 26°41.3 | -4.6' 54.1' |
| 9 | 314°04.9 | •• 09.5 | | 129°11.7 | 10.5' | 26°36.7 | -4.7' 54.1' |
| 10 | 329°04.7 | 09.3 | | 143°41.2 | 10.6' | 26°32.0 | -4.9' 54.1' |
| 11 | 344°04.6 | 09.2 | | 158°10.8 | 10.6' | 26°27.1 | -5.0' 54.1' |
| 12 | 359°04.5 | N23°09.0 | | 172°40.4 | 10.7' | S26°22.1 | -5.1' 54.1' |
| 13 | 14°04.4 | 08.9 | | 187°10.1 | 10.7' | 26°17.0 | -5.2' 54.1' |
| 14 | 29°04.3 | 08.7 | | 201°39.7 | 10.7' | 26°11.7 | -5.4' 54.1' |
| 15 | 44°04.1 | •• 08.6 | | 216°09.5 | 10.8' | 26°06.4 | -5.5' 54.2' |
| 16 | 59°04.0 | 08.4 | | 230°39.3 | 10.8' | 26°00.9 | -5.6' 54.2' |
| 17 | 74°03.9 | 08.2 | | 245°09.1 | 10.9' | 25°55.2 | -5.7' 54.2' |
| 18 | 89°03.8 | N23°08.1 | | 259°38.9 | 10.9' | S25°49.5 | -5.9' 54.2' |
| 19 | 104°03.7 | 07.9 | | 274°08.8 | 10.9' | 25°43.6 | -6.0' 54.2' |
| 20 | 119°03.5 | 07.8 | | 288°38.8 | 11.0' | 25°37.6 | -6.1' 54.2' |
| 21 | 134°03.4 | •• 07.6 | | 303°08.8 | 11.0' | 25°31.5 | -6.2' 54.2' |
| 22 | 149°03.3 | 07.4 | | 317°38.8 | 11.1' | 25°25.3 | -6.4' 54.2' |
| 23 | 164°03.2 | 07.3 | | 332°08.9 | 11.1' | 25°18.9 | -6.5' 54.2' |
| SD = 15.7' | | | $d = -0.1'$ | | | | |

| Wed | GHA | Dec | | GHA | ν | Dec | d HP |
|------------|----------|----------|-------------|----------|-------|----------|-------------|
| 0 | 179°03.0 | N23°07.1 | | 346°39.0 | 11.2' | S25°12.4 | -6.6' 54.2' |
| 1 | 194°02.9 | 06.9 | | 1°09.2 | 11.2' | 25°05.8 | -6.7' 54.2' |
| 2 | 209°02.8 | 06.8 | | 15°39.4 | 11.3' | 24°59.1 | -6.8' 54.3' |
| 3 | 224°02.7 | •• 06.6 | | 30°09.7 | 11.3' | 24°52.3 | -7.0' 54.3' |
| 4 | 239°02.6 | 06.4 | | 44°40.0 | 11.4' | 24°45.3 | -7.1' 54.3' |
| 5 | 254°02.4 | 06.3 | | 59°10.4 | 11.4' | 24°38.3 | -7.2' 54.3' |
| 6 | 269°02.3 | N23°06.1 | | 73°40.8 | 11.5' | S24°31.1 | -7.3' 54.3' |
| 7 | 284°02.2 | 05.9 | | 88°11.2 | 11.5' | 24°23.8 | -7.4' 54.3' |
| 8 | 299°02.1 | 05.8 | | 102°41.8 | 11.6' | 24°16.4 | -7.5' 54.3' |
| 9 | 314°02.0 | •• 05.6 | | 117°12.3 | 11.6' | 24°08.8 | -7.6' 54.3' |
| 10 | 329°01.8 | 05.4 | | 131°43.0 | 11.7' | 24°01.2 | -7.8' 54.3' |
| 11 | 344°01.7 | 05.3 | | 146°13.6 | 11.7' | 23°53.4 | -7.9' 54.4' |
| 12 | 359°01.6 | N23°05.1 | | 160°44.4 | 11.8' | S23°45.6 | -8.0' 54.4' |
| 13 | 14°01.5 | 04.9 | | 175°15.1 | 11.8' | 23°37.6 | -8.1' 54.4' |
| 14 | 29°01.4 | 04.7 | | 189°46.0 | 11.9' | 23°29.5 | -8.2' 54.4' |
| 15 | 44°01.2 | •• 04.6 | | 204°16.8 | 11.9' | 23°21.3 | -8.3' 54.4' |
| 16 | 59°01.1 | 04.4 | | 218°47.8 | 12.0' | 23°13.0 | -8.4' 54.4' |
| 17 | 74°01.0 | 04.2 | | 233°18.8 | 12.0' | 23°04.6 | -8.5' 54.4' |
| 18 | 89°00.9 | N23°04.0 | | 247°49.8 | 12.1' | S22°56.0 | -8.6' 54.4' |
| 19 | 104°00.8 | 03.9 | | 262°20.9 | 12.1' | 22°47.4 | -8.7' 54.5' |
| 20 | 119°00.7 | 03.7 | | 276°52.1 | 12.2' | 22°38.7 | -8.8' 54.5' |
| 21 | 134°00.5 | •• 03.5 | | 291°23.3 | 12.3' | 22°29.8 | -8.9' 54.5' |
| 22 | 149°00.4 | 03.3 | | 305°54.5 | 12.3' | 22°20.9 | -9.1' 54.5' |
| 23 | 164°00.3 | 03.1 | | 320°25.8 | 12.4' | 22°11.8 | -9.2' 54.5' |
| SD = 15.7' | | | $d = -0.2'$ | | | | |

| Thu | GHA | Dec | | GHA | ν | Dec | d HP |
|------------|----------|----------|-------------|----------|-------|----------|--------------|
| 0 | 179°00.2 | N23°03.0 | | 334°57.2 | 12.4' | S22°02.7 | -9.3' 54.5' |
| 1 | 194°00.1 | 02.8 | | 349°28.6 | 12.5' | 21°53.4 | -9.4' 54.5' |
| 2 | 208°59.9 | 02.6 | | 4°00.1 | 12.5' | 21°44.1 | -9.5' 54.5' |
| 3 | 223°59.8 | •• 02.4 | | 18°31.6 | 12.6' | 21°34.6 | -9.6' 54.6' |
| 4 | 238°59.7 | 02.2 | | 33°03.2 | 12.6' | 21°25.0 | -9.7' 54.6' |
| 5 | 253°59.6 | 02.0 | | 47°34.8 | 12.7' | 21°15.4 | -9.8' 54.6' |
| 6 | 268°59.5 | N23°01.9 | | 62°06.5 | 12.7' | S21°05.6 | -9.9' 54.6' |
| 7 | 283°59.4 | 01.7 | | 76°38.3 | 12.8' | 20°55.8 | -9.9' 54.6' |
| 8 | 298°59.2 | 01.5 | | 91°10.1 | 12.8' | 20°45.8 | -10.0' 54.6' |
| 9 | 313°59.1 | •• 01.3 | | 105°41.9 | 12.9' | 20°35.8 | -10.1' 54.6' |
| 10 | 328°59.0 | 01.1 | | 120°13.8 | 13.0' | 20°25.7 | -10.2' 54.7' |
| 11 | 343°58.9 | 00.9 | | 134°45.8 | 13.0' | 20°15.4 | -10.3' 54.7' |
| 12 | 358°58.8 | N23°00.7 | | 149°17.8 | 13.1' | S20°05.1 | -10.4' 54.7' |
| 13 | 13°58.7 | 00.5 | | 163°49.8 | 13.1' | 19°54.7 | -10.5' 54.7' |
| 14 | 28°58.5 | 00.3 | | 178°21.9 | 13.2' | 19°44.2 | -10.6' 54.7' |
| 15 | 43°58.4 | •• 00.2 | | 192°54.1 | 13.2' | 19°33.6 | -10.7' 54.7' |
| 16 | 58°58.3 | 23°00.0 | | 207°26.3 | 13.3' | 19°22.9 | -10.8' 54.8' |
| 17 | 73°58.2 | 22°59.8 | | 221°58.6 | 13.3' | 19°12.1 | -10.9' 54.8' |
| 18 | 88°58.1 | N22°59.6 | | 236°30.9 | 13.4' | S19°01.3 | -11.0' 54.8' |
| 19 | 103°58.0 | 59.4 | | 251°03.3 | 13.4' | 18°50.3 | -11.0' 54.8' |
| 20 | 118°57.8 | 59.2 | | 265°35.7 | 13.5' | 18°39.3 | -11.1' 54.8' |
| 21 | 133°57.7 | •• 59.0 | | 280°08.2 | 13.5' | 18°28.1 | -11.2' 54.8' |
| 22 | 148°57.6 | 58.8 | | 294°40.7 | 13.6' | 18°16.9 | -11.3' 54.8' |
| 23 | 163°57.5 | 58.6 | | 309°13.2 | 13.6' | 18°05.6 | -11.4' 54.9' |
| SD = 15.7' | | | $d = -0.2'$ | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| N 70° | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 68° | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 66° | //// | //// | 00:20 | 23:40 | //// | //// |
| 64° | //// | //// | 01:41 | 22:25 | //// | //// |
| 62° | //// | //// | 02:17 | 21:50 | //// | //// |
| 60° | //// | 01:03 | 02:42 | 21:25 | 23:02 | //// |
| N 58° | //// | 01:49 | 03:02 | 21:05 | 22:18 | //// |
| 56° | //// | 02:17 | 03:18 | 20:49 | 21:50 | //// |
| 54° | 00:58 | 02:39 | 03:32 | 20:35 | 21:29 | 23:08 |
| 52° | 01:40 | 02:56 | 03:44 | 20:23 | 21:11 | 22:27 |
| 50° | 02:06 | 03:11 | 03:55 | 20:12 | 20:57 | 22:01 |
| 45° | 02:51 | 03:40 | 04:17 | 19:50 | 20:28 | 21:17 |
| N 40° | 03:21 | 04:02 | 04:35 | 19:33 | 20:05 | 20:47 |
| 35° | 03:44 | 04:20 | 04:50 | 19:18 | 19:48 | 20:24 |
| 30° | 04:02 | 04:35 | 05:02 | 19:05 | 19:33 | 20:06 |
| 20° | 04:31 | 05:00 | 05:24 | 18:44 | 19:08 | 19:37 |
| N 10° | 04:53 | 05:20 | 05:43 | 18:25 | 18:48 | 19:15 |
| 0° | 05:12 | 05:38 | 06:00 | 18:08 | 18:30 | 18:56 |
| S 10° | 05:28 | 05:55 | 06:17 | 17:50 | 18:13 | 18:39 |
| 20° | 05:44 | 06:12 | 06:36 | 17:32 | 17:56 | 18:24 |
| 30° | 06:00 | 06:30 | 06:57 | 17:11 | 17:38 | 18:07 |
| 35° | 06:09 | 06:41 | 07:09 | 16:59 | 17:27 | 17:59 |
| 40° | 06:18 | 06:52 | 07:23 | 16:45 | 17:16 | 17:50 |
| 45° | 06:28 | 07:06 | 07:39 | 16:29 | 17:02 | 17:40 |
| S 50° | 06:40 | 07:21 | 08:00 | 16:08 | 16:47 | 17:28 |
| 52° | 06:45 | 07:29 | 08:09 | 15:59 | 16:39 | 17:23 |
| 54° | 06:51 | 07:37 | 08:20 | 15:48 | 16:31 | 17:17 |
| 56° | 06:57 | 07:46 | 08:32 | 15:35 | 16:22 | 17:11 |
| 58° | 07:03 | 07:56 | 08:47 | 15:21 | 16:12 | 17:05 |
| S 60° | 07:11 | 08:07 | 09:04 | 15:04 | 16:01 | 16:57 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|----------------|---------|-------|-------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | ■ | ■ | ■ | ■ | ■ | ■ |
| 68° | ■ | ■ | 01:23 23:59 | ■ | ■ | 02:19 |
| 66° | ■ | ■ | 00:04 23:33 | ■ | ■ | 03:37 |
| 64° | 23:56 | 23:27 | 23:13 | ■ | 02:03 | 04:13 |
| 62° | 23:05 | 23:00 | 22:56 | 01:05 | 02:55 | 04:39 |
| 60° | 22:33 | 22:39 | 22:42 | 01:57 | 03:26 | 04:59 |
| N 58° | 22:09 | 22:22 | 22:30 | 02:29 | 03:49 | 05:16 |
| 56° | 21:49 | 22:08 | 22:20 | 02:53 | 04:08 | 05:30 |
| 54° | 21:33 | 21:55 | 22:10 | 03:12 | 04:24 | 05:42 |
| 52° | 21:19 | 21:44 | 22:02 | 03:28 | 04:38 | 05:52 |
| 50° | 21:07 | 21:34 | 21:55 | 03:42 | 04:50 | 06:01 |
| 45° | 20:42 | 21:13 | 21:39 | 04:10 | 05:14 | 06:21 |
| N 40° | 20:21 | 20:56 | 21:26 | 04:33 | 05:34 | 06:37 |
| 35° | 20:05 | 20:42 | 21:14 | 04:51 | 05:50 | 06:50 |
| 30° | 19:50 | 20:30 | 21:05 | 05:07 | 06:04 | 07:02 |
| 20° | 19:25 | 20:08 | 20:48 | 05:33 | 06:28 | 07:22 |
| N 10° | 19:03 | 19:50 | 20:33 | 05:56 | 06:48 | 07:39 |
| 0° | 18:43 | 19:32 | 20:19 | 06:17 | 07:07 | 07:55 |
| S 10° | 18:23 | 19:15 | 20:05 | 06:38 | 07:26 | 08:11 |
| 20° | 18:01 | 18:56 | 19:49 | 07:01 | 07:46 | 08:27 |
| 30° | 17:36 | 18:34 | 19:32 | 07:27 | 08:09 | 08:47 |
| 35° | 17:21 | 18:21 | 19:22 | 07:43 | 08:23 | 08:58 |
| 40° | 17:04 | 18:06 | 19:10 | 08:00 | 08:38 | 09:10 |
| 45° | 16:43 | 17:49 | 18:56 | 08:22 | 08:57 | 09:25 |
| S 50° | 16:17 | 17:27 | 18:40 | 08:49 | 09:20 | 09:44 |
| 52° | 16:04 | 17:16 | 18:32 | 09:02 | 09:31 | 09:52 |
| 54° | 15:49 | 17:04 | 18:23 | 09:17 | 09:43 | 10:02 |
| 56° | 15:32 | 16:50 | 18:13 | 09:35 | 09:58 | 10:12 |
| 58° | 15:11 | 16:34 | 18:01 | 09:56 | 10:14 | 10:25 |
| S 60° | 14:44 | 16:15 | 17:48 | 10:23 | 10:34 | 10:39 |

| Day | Sun | | Mer. Pass hh:mm | Moon | | Age 15-17 100-96% |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|---|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 30 | 03:36 | 03:42 | 12:04 | 00:05 | 12:30 |  |
| 01 | 03:48 | 03:54 | 12:04 | 00:55 | 13:20 | |
| 02 | 03:59 | 04:05 | 12:04 | 01:43 | 14:07 | |

July 03, 04, 05 UT (Fri., Sat., Sun.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------------------|----------|----------|-------------------|----------|----------|---------------------|----------|---------|-------------------|-----|--------|-----|-----|
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 281°02.2 | 135°38.8 | N15°38.9 | 220°02.8 | N20°28.9 | 158°08.4 | N20°27.2 | 266°58.4 | N03°25.3 | | | | | | |
| 1 | 296°04.7 | 150°38.5 | 37.9 | 235°03.4 | 29.3 | 173°10.3 | 27.1 | 282°00.8 | 25.3 | | | | | | |
| 2 | 311°07.1 | 165°38.2 | 36.9 | 250°04.1 | 29.6 | 188°12.2 | 27.0 | 297°03.2 | 25.3 | | | | | | |
| 3 | 326°09.6 | 180°37.9 | · · 35.9 | 265°04.7 | · · 30.0 | 203°14.1 | · · 26.9 | 312°05.5 | · · 25.3 | | | | | | |
| 4 | 341°12.0 | 195°37.7 | 34.9 | 280°05.3 | 30.4 | 218°16.0 | 26.8 | 327°07.9 | 25.4 | | | | | | |
| 5 | 356°14.5 | 210°37.4 | 33.9 | 295°05.9 | 30.8 | 233°17.9 | 26.7 | 342°10.3 | 25.4 | | | | | | |
| 6 | 11°17.0 | 225°37.1 | N15°32.9 | 310°06.5 | N20°31.1 | 248°19.8 | N20°26.5 | 357°12.6 | N03°25.4 | | | | | | |
| 7 | 26°19.4 | 240°36.8 | 31.9 | 325°07.1 | 31.5 | 263°21.7 | 26.4 | 12°15.0 | 25.4 | | | | | | |
| 8 | 41°21.9 | 255°36.6 | 30.8 | 340°07.7 | 31.9 | 278°23.6 | 26.3 | 27°17.4 | 25.5 | | | | | | |
| 9 | 56°24.4 | 270°36.3 | · · 29.8 | 355°08.4 | · · 32.2 | 293°25.5 | · · 26.2 | 42°19.7 | · · 25.5 | | | | | | |
| 10 | 71°26.8 | 285°36.0 | 28.8 | 10°09.0 | 32.6 | 308°27.4 | 26.1 | 57°22.1 | 25.5 | | | | | | |
| 11 | 86°29.3 | 300°35.8 | 27.8 | 25°09.6 | 33.0 | 323°29.3 | 26.0 | 72°24.5 | 25.6 | | | | | | |
| 12 | 101°31.8 | 315°35.5 | N15°26.8 | 40°10.2 | N20°33.3 | 338°31.2 | N20°25.9 | 87°26.9 | N03°25.6 | | | | | | |
| 13 | 116°34.2 | 330°35.2 | 25.8 | 55°10.8 | 33.7 | 353°33.1 | 25.7 | 102°29.2 | 25.6 | | | | | | |
| 14 | 131°36.7 | 345°35.0 | 24.8 | 70°11.4 | 34.1 | 8°35.0 | 25.6 | 117°31.6 | 25.6 | | | | | | |
| 15 | 146°39.1 | 0°34.7 | · · 23.8 | 85°12.0 | · · 34.4 | 23°36.9 | · · 25.5 | 132°34.0 | · · 25.7 | | | | | | |
| 16 | 161°41.6 | 15°34.4 | 22.8 | 100°12.6 | 34.8 | 38°38.8 | 25.4 | 147°36.3 | 25.7 | | | | | | |
| 17 | 176°44.1 | 30°34.2 | 21.7 | 115°13.3 | 35.2 | 53°40.7 | 25.3 | 162°38.7 | 25.7 | | | | | | |
| 18 | 191°46.5 | 45°33.9 | N15°20.7 | 130°13.9 | N20°35.5 | 68°42.6 | N20°25.2 | 177°41.1 | N03°25.7 | | | | | | |
| 19 | 206°49.0 | 60°33.6 | 19.7 | 145°14.5 | 35.9 | 83°44.5 | 25.1 | 192°43.4 | 25.8 | | | | | | |
| 20 | 221°51.5 | 75°33.4 | 18.7 | 160°15.1 | 36.3 | 98°46.4 | 24.9 | 207°45.8 | 25.8 | | | | | | |
| 21 | 236°53.9 | 90°33.1 | · · 17.7 | 175°15.7 | · · 36.6 | 113°48.3 | · · 24.8 | 222°48.2 | · · 25.8 | | | | | | |
| 22 | 251°56.4 | 105°32.8 | 16.7 | 190°16.3 | 37.0 | 128°50.2 | 24.7 | 237°50.6 | 25.9 | | | | | | |
| 23 | 266°58.9 | 120°32.6 | 15.7 | 205°16.9 | 37.3 | 143°52.1 | 24.6 | 252°52.9 | 25.9 | | | | | | |
| Mer.pass. 05:15 | | ν-0.3' d-1.0' m-4.06 | | | ν0.6' d0.4' m1.30 | | | ν1.9' d-0.1' m-1.81 | | | ν2.4' d0.0' m0.77 | | | | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 282°01.3 | 135°32.3 | N15°14.6 | 220°17.6 | N20°37.7 | 158°54.0 | N20°24.5 | 267°55.3 | N03°25.9 | | | | | | |
| 1 | 297°03.8 | 150°32.1 | 13.6 | 235°18.2 | 38.1 | 173°55.9 | 24.4 | 282°57.7 | 25.9 | | | | | | |
| 2 | 312°06.3 | 165°31.8 | 12.6 | 250°18.8 | 38.4 | 188°57.8 | 24.3 | 298°00.0 | 26.0 | | | | | | |
| 3 | 327°08.7 | 180°31.5 | · · 11.6 | 265°19.4 | · · 38.8 | 203°59.7 | · · 24.1 | 313°02.4 | · · 26.0 | | | | | | |
| 4 | 342°11.2 | 195°31.3 | 10.6 | 280°20.0 | 39.2 | 219°01.6 | 24.0 | 328°04.8 | 26.0 | | | | | | |
| 5 | 357°13.6 | 210°31.0 | 09.5 | 295°20.6 | 39.5 | 234°03.5 | 23.9 | 343°07.2 | 26.0 | | | | | | |
| 6 | 12°16.1 | 225°30.8 | N15°08.5 | 310°21.2 | N20°39.9 | 249°05.4 | N20°23.8 | 358°09.5 | N03°26.1 | | | | | | |
| 7 | 27°18.6 | 240°30.5 | 07.5 | 325°21.8 | 40.2 | 264°07.3 | 23.7 | 13°11.9 | 26.1 | | | | | | |
| 8 | 42°21.0 | 255°30.3 | 06.5 | 340°22.5 | 40.6 | 279°09.2 | 23.6 | 28°14.3 | 26.1 | | | | | | |
| 9 | 57°23.5 | 270°30.0 | · · 05.5 | 355°23.1 | · · 41.0 | 294°11.1 | · · 23.4 | 43°16.7 | · · 26.1 | | | | | | |
| 10 | 72°26.0 | 285°29.7 | 04.4 | 10°23.7 | 41.3 | 309°13.0 | 23.3 | 58°19.0 | 26.2 | | | | | | |
| 11 | 87°28.4 | 300°29.5 | 03.4 | 25°24.3 | 41.7 | 324°14.9 | 23.2 | 73°21.4 | 26.2 | | | | | | |
| 12 | 102°30.9 | 315°29.2 | N15°02.4 | 40°24.9 | N20°42.0 | 339°16.8 | N20°23.1 | 88°23.8 | N03°26.2 | | | | | | |
| 13 | 117°33.4 | 330°29.0 | 01.4 | 55°25.5 | 42.4 | 354°18.7 | 23.0 | 103°26.1 | 26.2 | | | | | | |
| 14 | 132°35.8 | 345°28.7 | 15°00.3 | 70°26.1 | 42.8 | 9°20.6 | 22.9 | 118°28.5 | 26.3 | | | | | | |
| 15 | 147°38.3 | 0°28.5 | 14°59.3 | 85°26.7 | · · 43.1 | 24°22.5 | · · 22.8 | 133°30.9 | · · 26.3 | | | | | | |
| 16 | 162°40.8 | 15°28.2 | 58.3 | 100°27.4 | 43.5 | 39°24.4 | 22.6 | 148°33.3 | 26.3 | | | | | | |
| 17 | 177°43.2 | 30°28.0 | 57.3 | 115°28.0 | 43.8 | 54°26.3 | 22.5 | 163°35.6 | 26.3 | | | | | | |
| 18 | 192°45.7 | 45°27.7 | N14°56.2 | 130°28.6 | N20°44.2 | 69°28.2 | N20°22.4 | 178°38.0 | N03°26.4 | | | | | | |
| 19 | 207°48.1 | 60°27.5 | 55.2 | 145°29.2 | 44.5 | 84°30.1 | 22.3 | 193°40.4 | 26.4 | | | | | | |
| 20 | 222°50.6 | 75°27.3 | 54.2 | 160°29.8 | 44.9 | 99°32.0 | 22.2 | 208°42.8 | 26.4 | | | | | | |
| 21 | 237°53.1 | 90°27.0 | · · 53.1 | 175°30.4 | · · 45.3 | 114°33.9 | · · 22.1 | 223°45.1 | · · 26.4 | | | | | | |
| 22 | 252°55.5 | 105°26.8 | 52.1 | 190°31.0 | 45.6 | 129°35.8 | 22.0 | 238°47.5 | 26.5 | | | | | | |
| 23 | 267°58.0 | 120°26.5 | 51.1 | 205°31.6 | 46.0 | 144°37.7 | 21.8 | 253°49.9 | 26.5 | | | | | | |
| Mer.pass. 05:11 | | ν-0.3' d-1.0' m-4.07 | | | ν0.6' d0.4' m1.30 | | | ν1.9' d-0.1' m-1.81 | | | ν2.4' d0.0' m0.76 | | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 283°00.5 | 135°26.3 | N14°50.0 | 220°32.3 | N20°46.3 | 159°39.7 | N20°21.7 | 268°52.3 | N03°26.5 | | | | | | |
| 1 | 298°02.9 | 150°26.0 | 49.0 | 235°32.9 | 46.7 | 174°41.6 | 21.6 | 283°54.6 | 26.5 | | | | | | |
| 2 | 313°05.4 | 165°25.8 | 48.0 | 250°33.5 | 47.0 | 189°43.5 | 21.5 | 298°57.0 | 26.6 | | | | | | |
| 3 | 328°07.9 | 180°25.5 | · · 47.0 | 265°34.1 | · · 47.4 | 204°45.4 | · · 21.4 | 313°59.4 | · · 26.6 | | | | | | |
| 4 | 343°10.3 | 195°25.3 | 45.9 | 280°34.7 | 47.7 | 219°47.3 | 21.3 | 329°01.8 | 26.6 | | | | | | |
| 5 | 358°12.8 | 210°25.1 | 44.9 | 295°35.3 | 48.1 | 234°49.2 | 21.1 | 344°04.1 | 26.6 | | | | | | |
| 6 | 13°15.2 | 225°24.8 | N14°43.8 | 310°35.9 | N20°48.4 | 249°51.1 | N20°21.0 | 359°06.5 | N03°26.7 | | | | | | |
| 7 | 28°17.7 | 240°24.6 | 42.8 | 325°36.5 | 48.8 | 264°53.0 | 20.9 | 14°08.9 | 26.7 | | | | | | |
| 8 | 43°20.2 | 255°24.3 | 41.8 | 340°37.1 | 49.1 | 279°54.9 | 20.8 | 29°11.3 | 26.7 | | | | | | |
| 9 | 58°22.6 | 270°24.1 | · · 40.7 | 355°37.8 | · · 49.5 | 294°56.8 | · · 20.7 | 44°13.6 | · · 26.7 | | | | | | |
| 10 | 73°25.1 | 285°23.9 | 39.7 | 10°38.4 | 49.9 | 309°58.7 | 20.6 | 59°16.0 | 26.8 | | | | | | |
| 11 | 88°27.6 | 300°23.6 | 38.7 | 25°39.0 | 50.2 | 325°00.6 | 20.4 | 74°18.4 | 26.8 | | | | | | |
| 12 | 103°30.0 | 315°23.4 | N14°37.6 | 40°39.6 | N20°50.6 | 340°02.5 | N20°20.3 | 89°20.8 | N03°26.8 | | | | | | |
| 13 | 118°32.5 | 330°23.2 | 36.6 | 55°40.2 | 50.9 | 355°04.4 | 20.2 | 104°23.2 | 26.8 | | | | | | |
| 14 | 133°35.0 | 345°22.9 | 35.6 | 70°40.8 | 51.3 | 10°06.3 | 20.1 | 119°25.5 | 26.9 | | | | | | |
| 15 | 148°37.4 | 0°22.7 | · · 34.5 | 85°41.4 | · · 51.6 | 25°08.2 | · · 20.0 | 134°27.9 | · · 26.9 | | | | | | |
| 16 | 163°39.9 | 15°22.5 | 33.5 | 100°42.0 | 52.0 | 40°10.1 | 19.9 | 149°30.3 | 26.9 | | | | | | |
| 17 | 178°42.4 | 30°22.2 | 32.4 | 115°42.7 | 52.3 | 55°12.0 | 19.8 | 164°32.7 | 26.9 | | | | | | |
| 18 | 193°44.8 | 45°22.0 | N14°31.4 | 130°43.3 | N20°52.6 | 70°13.9 | N20°19.6 | 179°35.0 | N03°27.0 | | | | | | |
| 19 | 208°47.3 | 60°21.8 | 30.3 | 145°43.9 | 53.0 | 85°15.8 | 19.5 | 194°37.4 | 27.0 | | | | | | |
| 20 | 223°49.7 | 75°21.5 | 29.3 | 160°44.5 | 53.3 | 100°17.7 | 19.4 | 209°39.8 | 27.0 | | | | | | |
| 21 | 238°52.2 | 90°21.3 | · · 28.3 | 175°45.1 | · · 53.7 | 115°19.6 | · · 19.3 | 224°42.2 | · · 27.0 | | | | | | |
| 22 | 253°54.7 | 105°21.1 | 27.2 | 190°45.7 | 54.0 | 130°21.5 | 19.2 | 239°44.6 | 27.1 | | | | | | |
| 23 | 268°57.1 | 120°20.9 | 26.2 | 205°46.3 | 54.4 | 145°23.4 | 19.1 | 254°46.9 | 27.1 | | | | | | |
| Mer.pass. 05:07 | | ν-0.2' d-1.0' m-4.07 | | | ν0.6' d0.4' m1.30 | | | ν1.9' d-0.1' m-1.80 | | | ν2.4' d0.0' m0.76 | | | | |

| Stars | | |
|-------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°33.4 | 29°14.1 |
| Ankaa | 353°05.9 | -42°09.4 |
| Schedar | 349°29.6 | 56°40.7 |
| Diphda | 348°46.1 | -17°50.3 |
| Achernar | 335°19.4 | -57°05.8 |
| Hamal | 327°49.9 | 23°35.2 |
| Polaris | 313°40.9 | 89°22.3 |
| Acamar | 315°11.1 | -40°11.6 |
| Menkar | 314°05.0 | 4°11.7 |
| Mirfak | 308°26.8 | 49°57.1 |
| Aldebaran | 290°38.5 | 16°33.7 |
| Rigel | 281°03.0 | -8°10.2 |
| Capella | 280°20.5 | 46°01.4 |
| Bellatrix | 278°21.9 | 6°22.4 |
| Elnath | 278°00.7 | 28°37.7 |
| Alnilam | 275°36.8 | -1°11.1 |
| Betelgeuse | 270°51.1 | 7°24.7 |
| Canopus | 263°52.4 | -52°42.5 |
| Sirius | 258°25.5 | -16°45.1 |
| Adhara | 255°05.3 | -29°00.5 |
| Procyon | 244°49.9 | 5°09.4 |
| Pollux | 243°16.2 | 27°57.8 |
| Avior | 234°14.8 | -59°35.8 |
| Suhail | 222°45.8 | -43°32.5 |
| Miaplacidus | 221°38.8 | -69°49.7 |
| Alphard | 217°46.8 | -8°46.5 |
| Regulus | 207°33.3 | 11°50.3 |
| Dubhe | 193°39.8 | 61°36.7 |
| Denebola | 182°23.8 | 14°25.5 |
| Gienah | 175°42.4 | -17°41.5 |
| Acrux | 172°58.8 | -63°15.1 |
| Gacrux | 171°50.3 | -57°16.0 |
| Alioth | 166°11.9 | 55°49.2 |
| Spica | 158°20.9 | -11°18.1 |
| Alkaid | 152°50.9 | 49°11.1 |
| Hadar | 148°34.0 | -60°30.3 |
| Menkent | 147°56.0 | -36°30.2 |
| Arcturus | 145°46.6 | 19°02.7 |
| Rigel Kent. | 139°38.3 | -60°57.0 |
| Kochab | 137°19.2 | 74°03.0 |
| Zuben'ubi | 136°54.5 | -16°09.2 |
| Alphecca | 126°02.4 | -26°37.6 |
| Antares | 112°14.0 | -26°29.5 |
| Atria | 107°06.6 | -69°04.6 |
| Sabik | 102°01.0 | -15°45.5 |
| Shaula | 96°08.3 | -37°07.4 |
| Rasalhague | 95°57.1 | 12°32.5 |
| Eltanin | 90°41.1 | 51°29.1 |
| Kaus Aust. | 83°30.5 | -34°22.3 |
| Vega | 80°32.0 | 38°48.5 |
| Nunki | 75°45.9 | -26°15.8 |
| Altair | 61°58.4 | 8°56.3 |
| Peacock | 53°03.2 | -56°38.8 |
| Deneb | 49°24.5 | 45°22.4 |
| Enif | 33°37.3 | 9°59.8 |
| Al Na'ir | 27°31.1 | -46°49.7 |
| Fomalhaut | 15°13.0 | -29°28.7 |
| Scheat | 13°43.8 | 28°13.5 |
| Markab | 13°28.5 | 15°20.9 |

| Jul 03 Fri | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 214°36.6 | 14:58 |
| Mars | 299°00.6 | 09:19 |
| Jupiter | 237°06.2 | 13:26 |
| Saturn | 345°56.2 | 06:11 |

| Jul 04 Sat | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 213°31.0 | 14:58 |
| Mars | 298°16.2 | 09:18 |
| Jupiter | 236°52.7 | 13:23 |
| Saturn | 345°54.0 | 06:07 |

| Jul 05 Sun | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 212°25.8 | 14:58 |
| Mars | 297°31.8 | 09:17 |
| Jupiter | 236°39.2 | 13:20 |
| Saturn | 345°51.8 | 06:04 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.1 |
| Mars: | 0.1 |


| h | Sun | | Moon | | | | |
|------------------------|----------|----------|------------|-------|----------|--------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| Fri | | | | | | | |
| 0 | 178°57.4 | N22°58.4 | 323°45.9 | 13.7' | S17°54.3 | -11.5' | 54.9' |
| 1 | 193°57.3 | 58.2 | 338°18.5 | 13.7' | 17°42.8 | -11.5' | 54.9' |
| 2 | 208°57.1 | 58.0 | 352°51.2 | 13.8' | 17°31.3 | -11.6' | 54.9' |
| 3 | 223°57.0 | · · 57.8 | 7°24.0 | 13.8' | 17°19.6 | -11.7' | 54.9' |
| 4 | 238°56.9 | 57.6 | 21°56.8 | 13.8' | 17°08.0 | -11.8' | 55.0' |
| 5 | 253°56.8 | 57.4 | 36°29.6 | 13.9' | 16°56.2 | -11.9' | 55.0' |
| 6 | 268°56.7 | N22°57.2 | 51°02.5 | 13.9' | S16°44.3 | -11.9' | 55.0' |
| 7 | 283°56.6 | 57.0 | 65°35.5 | 14.0' | 16°32.4 | -12.0' | 55.0' |
| 8 | 298°56.5 | 56.8 | 80°08.5 | 14.0' | 16°20.4 | -12.1' | 55.0' |
| 9 | 313°56.3 | · · 56.6 | 94°41.5 | 14.1' | 16°08.3 | -12.2' | 55.0' |
| 10 | 328°56.2 | 56.4 | 109°14.5 | 14.1' | 15°56.1 | -12.2' | 55.1' |
| 11 | 343°56.1 | 56.2 | 123°47.7 | 14.2' | 15°43.9 | -12.3' | 55.1' |
| 12 | 358°56.0 | N22°56.0 | 138°20.8 | 14.2' | S15°31.6 | -12.4' | 55.1' |
| 13 | 13°55.9 | 55.8 | 152°54.0 | 14.2' | 15°19.2 | -12.4' | 55.1' |
| 14 | 28°55.8 | 55.6 | 167°27.2 | 14.3' | 15°06.8 | -12.5' | 55.1' |
| 15 | 43°55.7 | · · 55.3 | 182°00.5 | 14.3' | 14°54.2 | -12.6' | 55.2' |
| 16 | 58°55.5 | 55.1 | 196°33.8 | 14.4' | 14°41.7 | -12.7' | 55.2' |
| 17 | 73°55.4 | 54.9 | 211°07.2 | 14.4' | 14°29.0 | -12.7' | 55.2' |
| 18 | 88°55.3 | N22°54.7 | 225°40.6 | 14.4' | S14°16.3 | -12.8' | 55.2' |
| 19 | 103°55.2 | 54.5 | 240°14.0 | 14.5' | 14°03.5 | -12.9' | 55.2' |
| 20 | 118°55.1 | 54.3 | 254°47.5 | 14.5' | 13°50.6 | -12.9' | 55.3' |
| 21 | 133°55.0 | · · 54.1 | 269°21.0 | 14.5' | 13°37.7 | -13.0' | 55.3' |
| 22 | 148°54.9 | 53.9 | 283°54.5 | 14.6' | 13°24.7 | -13.1' | 55.3' |
| 23 | 163°54.8 | 53.7 | 298°28.0 | 14.6' | 13°11.7 | -13.1' | 55.3' |
| SD = 15.7' $d = -0.2'$ | | | SD = 15.0' | | | | |

| Sat | Sun | | Moon | | | | |
|------------------------|----------|----------|------------|-------|----------|--------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°54.6 | N22°53.4 | 313°01.6 | 14.6' | S12°58.5 | -13.2' | 55.3' |
| 1 | 193°54.5 | 53.2 | 327°35.3 | 14.7' | 12°45.4 | -13.2' | 55.4' |
| 2 | 208°54.4 | 53.0 | 342°08.9 | 14.7' | 12°32.1 | -13.3' | 55.4' |
| 3 | 223°54.3 | · · 52.8 | 356°42.6 | 14.7' | 12°18.8 | -13.4' | 55.4' |
| 4 | 238°54.2 | 52.6 | 11°16.3 | 14.7' | 12°05.5 | -13.4' | 55.4' |
| 5 | 253°54.1 | 52.4 | 25°50.1 | 14.8' | 11°52.1 | -13.5' | 55.4' |
| 6 | 268°54.0 | N22°52.1 | 40°23.8 | 14.8' | S11°38.6 | -13.5' | 55.5' |
| 7 | 283°53.9 | 51.9 | 54°57.6 | 14.8' | 11°25.1 | -13.6' | 55.5' |
| 8 | 298°53.8 | 51.7 | 69°31.5 | 14.8' | 11°11.5 | -13.6' | 55.5' |
| 9 | 313°53.6 | · · 51.5 | 84°05.3 | 14.9' | 10°57.8 | -13.7' | 55.5' |
| 10 | 328°53.5 | 51.3 | 98°39.2 | 14.9' | 10°44.1 | -13.8' | 55.5' |
| 11 | 343°53.4 | 51.0 | 113°13.1 | 14.9' | 10°30.4 | -13.8' | 55.6' |
| 12 | 358°53.3 | N22°50.8 | 127°47.0 | 14.9' | S10°16.6 | -13.9' | 55.6' |
| 13 | 13°53.2 | 50.6 | 142°21.0 | 15.0' | 10°02.7 | -13.9' | 55.6' |
| 14 | 28°53.1 | 50.4 | 156°54.9 | 15.0' | 09°48.8 | -14.0' | 55.6' |
| 15 | 43°53.0 | · · 50.1 | 171°28.9 | 15.0' | 09°34.9 | -14.0' | 55.7' |
| 16 | 58°52.9 | 49.9 | 186°02.9 | 15.0' | 09°20.9 | -14.1' | 55.7' |
| 17 | 73°52.8 | 49.7 | 200°36.9 | 15.0' | 09°06.8 | -14.1' | 55.7' |
| 18 | 88°52.6 | N22°49.5 | 215°10.9 | 15.0' | S08°52.7 | -14.1' | 55.7' |
| 19 | 103°52.5 | 49.2 | 229°45.0 | 15.1' | 08°38.6 | -14.2' | 55.8' |
| 20 | 118°52.4 | 49.0 | 244°19.0 | 15.1' | 08°24.4 | -14.2' | 55.8' |
| 21 | 133°52.3 | · · 48.8 | 258°53.1 | 15.1' | 08°10.1 | -14.3' | 55.8' |
| 22 | 148°52.2 | 48.5 | 273°27.2 | 15.1' | 07°55.8 | -14.3' | 55.8' |
| 23 | 163°52.1 | 48.3 | 288°01.3 | 15.1' | 07°41.5 | -14.4' | 55.9' |
| SD = 15.7' $d = -0.2'$ | | | SD = 15.1' | | | | |

| Sun | Sun | | Moon | | | | |
|------------------------|----------|----------|------------|-------|----------|--------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°52.0 | N22°48.1 | 302°35.4 | 15.1' | S07°27.1 | -14.4' | 55.9' |
| 1 | 193°51.9 | 47.8 | 317°09.5 | 15.1' | 07°12.7 | -14.5' | 55.9' |
| 2 | 208°51.8 | 47.6 | 331°43.6 | 15.1' | 06°58.3 | -14.5' | 55.9' |
| 3 | 223°51.7 | · · 47.4 | 346°17.7 | 15.1' | 06°43.8 | -14.5' | 56.0' |
| 4 | 238°51.6 | 47.2 | 0°51.8 | 15.1' | 06°29.3 | -14.6' | 56.0' |
| 5 | 253°51.4 | 46.9 | 15°26.0 | 15.1' | 06°14.7 | -14.6' | 56.0' |
| 6 | 268°51.3 | N22°46.7 | 30°00.1 | 15.1' | S06°00.1 | -14.6' | 56.0' |
| 7 | 283°51.2 | 46.4 | 44°34.2 | 15.1' | 05°45.4 | -14.7' | 56.1' |
| 8 | 298°51.1 | 46.2 | 59°08.4 | 15.1' | 05°30.7 | -14.7' | 56.1' |
| 9 | 313°51.0 | · · 46.0 | 73°42.5 | 15.1' | 05°16.0 | -14.7' | 56.1' |
| 10 | 328°50.9 | 45.7 | 88°16.6 | 15.1' | 05°01.3 | -14.8' | 56.1' |
| 11 | 343°50.8 | 45.5 | 102°50.8 | 15.1' | 04°46.5 | -14.8' | 56.2' |
| 12 | 358°50.7 | N22°45.3 | 117°24.9 | 15.1' | S04°31.7 | -14.8' | 56.2' |
| 13 | 13°50.6 | 45.0 | 131°59.0 | 15.1' | 04°16.8 | -14.9' | 56.2' |
| 14 | 28°50.5 | 44.8 | 146°33.1 | 15.1' | 04°02.0 | -14.9' | 56.2' |
| 15 | 43°50.4 | · · 44.5 | 161°07.3 | 15.1' | 03°47.1 | -14.9' | 56.3' |
| 16 | 58°50.3 | 44.3 | 175°41.4 | 15.1' | 03°32.1 | -15.0' | 56.3' |
| 17 | 73°50.2 | 44.0 | 190°15.4 | 15.1' | 03°17.2 | -15.0' | 56.3' |
| 18 | 88°50.1 | N22°43.8 | 204°49.5 | 15.1' | S03°02.2 | -15.0' | 56.3' |
| 19 | 103°49.9 | 43.6 | 219°23.6 | 15.1' | 02°47.1 | -15.0' | 56.4' |
| 20 | 118°49.8 | 43.3 | 233°57.6 | 15.0' | 02°32.1 | -15.1' | 56.4' |
| 21 | 133°49.7 | · · 43.1 | 248°31.7 | 15.0' | 02°17.0 | -15.1' | 56.4' |
| 22 | 148°49.6 | 42.8 | 263°05.7 | 15.0' | 02°01.9 | -15.1' | 56.5' |
| 23 | 163°49.5 | 42.6 | 277°39.7 | 15.0' | 01°46.8 | -15.1' | 56.5' |
| SD = 15.7' $d = -0.2'$ | | | SD = 15.2' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | □ | □ | □ | □ | □ | □ |
| 66° | //// | //// | 00:41 | 23:22 | //// | //// |
| 64° | //// | //// | 01:47 | 22:20 | //// | //// |
| 62° | //// | //// | 02:21 | 21:47 | //// | //// |
| 60° | //// | 01:11 | 02:46 | 21:22 | 22:55 | //// |
| N 58° | //// | 01:53 | 03:05 | 21:03 | 22:14 | //// |
| 56° | //// | 02:21 | 03:21 | 20:47 | 21:47 | //// |
| 54° | 01:05 | 02:42 | 03:35 | 20:34 | 21:27 | 23:01 |
| 52° | 01:44 | 02:59 | 03:47 | 20:22 | 21:10 | 22:24 |
| 50° | 02:10 | 03:13 | 03:57 | 20:11 | 20:55 | 21:58 |
| 45° | 02:53 | 03:42 | 04:19 | 19:50 | 20:27 | 21:15 |
| N 40° | 03:23 | 04:04 | 04:36 | 19:32 | 20:05 | 20:46 |
| 35° | 03:45 | 04:22 | 04:51 | 19:18 | 19:47 | 20:23 |
| 30° | 04:03 | 04:36 | 05:04 | 19:05 | 19:32 | 20:05 |
| 20° | 04:32 | 05:01 | 05:25 | 18:44 | 19:08 | 19:37 |
| N 10° | 04:54 | 05:21 | 05:44 | 18:25 | 18:48 | 19:15 |
| 0° | 05:12 | 05:38 | 06:01 | 18:08 | 18:31 | 18:57 |
| S 10° | 05:29 | 05:55 | 06:18 | 17:51 | 18:14 | 18:40 |
| 20° | 05:45 | 06:12 | 06:36 | 17:33 | 17:57 | 18:24 |
| 30° | 06:01 | 06:30 | 06:56 | 17:13 | 17:39 | 18:08 |
| 35° | 06:09 | 06:41 | 07:09 | 17:01 | 17:29 | 18:00 |
| 40° | 06:18 | 06:52 | 07:22 | 16:47 | 17:17 | 17:51 |
| 45° | 06:28 | 07:05 | 07:39 | 16:30 | 17:04 | 17:41 |
| S 50° | 06:39 | 07:21 | 07:59 | 16:10 | 16:49 | 17:30 |
| 52° | 06:44 | 07:28 | 08:08 | 16:01 | 16:41 | 17:25 |
| 54° | 06:50 | 07:36 | 08:19 | 15:50 | 16:34 | 17:19 |
| 56° | 06:56 | 07:44 | 08:31 | 15:38 | 16:25 | 17:13 |
| 58° | 07:02 | 07:54 | 08:45 | 15:24 | 16:15 | 17:07 |
| S 60° | 07:09 | 08:05 | 09:02 | 15:07 | 16:04 | 17:00 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------------|----------------|-------|---------|-------|-------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | 01:43 | 00:10 23:27 | 22:53 | 03:38 | 06:43 | 08:58 |
| N 70° | 00:36 23:47 | 23:16 | 22:50 | 04:43 | 07:04 | 09:06 |
| 68° | 23:29 | 23:07 | 22:48 | 05:18 | 07:20 | 09:12 |
| 66° | 23:14 | 23:00 | 22:47 | 05:43 | 07:33 | 09:17 |
| 64° | 23:02 | 22:53 | 22:45 | 06:03 | 07:44 | 09:22 |
| 62° | 22:52 | 22:48 | 22:44 | 06:18 | 07:53 | 09:26 |
| 60° | 22:43 | 22:43 | 22:43 | 06:31 | 08:01 | 09:29 |
| N 58° | 22:35 | 22:39 | 22:42 | 06:42 | 08:08 | 09:32 |
| 56° | 22:28 | 22:35 | 22:41 | 06:52 | 08:14 | 09:35 |
| 54° | 22:22 | 22:31 | 22:40 | 07:00 | 08:19 | 09:37 |
| 52° | 22:16 | 22:28 | 22:39 | 07:08 | 08:24 | 09:39 |
| 50° | 22:11 | 22:25 | 22:38 | 07:15 | 08:28 | 09:41 |
| 45° | 22:00 | 22:19 | 22:37 | 07:29 | 08:37 | 09:45 |
| N 40° | 21:51 | 22:14 | 22:36 | 07:41 | 08:45 | 09:49 |
| 35° | 21:43 | 22:09 | 22:34 | 07:51 | 08:52 | 09:52 |
| 30° | 21:36 | 22:05 | 22:34 | 08:00 | 08:57 | 09:55 |
| 20° | 21:24 | 21:58 | 22:32 | 08:15 | 09:07 | 09:59 |
| N 10° | 21:13 | 21:52 | 22:30 | 08:28 | 09:16 | 10:03 |
| 0° | 21:03 | 21:46 | 22:29 | 08:40 | 09:24 | 10:07 |
| S 10° | 20:53 | 21:40 | 22:28 | 08:52 | 09:32 | 10:10 |
| 20° | 20:42 | 21:34 | 22:26 | 09:05 | 09:40 | 10:14 |
| 30° | 20:30 | 21:27 | 22:24 | 09:20 | 09:50 | 10:18 |
| 35° | 20:23 | 21:23 | 22:23 | 09:28 | 09:55 | 10:21 |
| 40° | 20:14 | 21:18 | 22:22 | 09:38 | 10:01 | 10:24 |
| 45° | 20:05 | 21:13 | 22:21 | 09:49 | 10:09 | 10:27 |
| S 50° | 19:53 | 21:06 | 22:20 | 10:02 | 10:17 | 10:30 |
| 52° | 19:47 | 21:03 | 22:19 | 10:08 | 10:21 | 10:32 |
| 54° | 19:41 | 21:00 | 22:18 | 10:15 | 10:25 | 10:34 |
| 56° | 19:35 | 20:56 | 22:17 | 10:23 | 10:30 | 10:36 |
| 58° | 19:27 | 20:52 | 22:16 | 10:31 | 10:35 | 10:38 |
| S 60° | 19:18 | 20:47 | 22:15 | 10:41 | 10:41 | 10:41 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|--------------|-----------|-------|---|
| | Eqn.of Time | | Mer. Pass | Mer.Pass. | | Age 18-20 92-78% |
| | 00 ^h | 12 ^h | | Upper | Lower | |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | |
| 03 | 04:10 | 04:16 | 12:04 | 02:29 | 14:52 |  |
| 04 | 04:21 | 04:27 | 12:04 | 03:14 | 15:35 | |
| 05 | 04:32 | 04:37 | 12:05 | 03:56 | 16:18 | |

July 06, 07, 08 UT (Mon., Tue., Wed.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------------------|----------|----------|-------------------|----------|----------|---------------------|----------|---------|-------------------|-----|--------|-----|-----|
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 283°59.6 | 135°20.6 | N14°25.1 | 220°46.9 | N20°54.7 | 160°25.3 | N20°18.9 | 269°49.3 | N03°27.1 | | | | | | |
| 1 | 299°02.1 | 150°20.4 | 24.1 | 235°47.5 | 55.1 | 175°27.2 | 18.8 | 284°51.7 | 27.1 | | | | | | |
| 2 | 314°04.5 | 165°20.2 | 23.0 | 250°48.2 | 55.4 | 190°29.1 | 18.7 | 299°54.1 | 27.1 | | | | | | |
| 3 | 329°07.0 | 180°20.0 | · · 22.0 | 265°48.8 | · · 55.8 | 205°31.0 | · · 18.6 | 314°56.4 | · · 27.2 | | | | | | |
| 4 | 344°09.5 | 195°19.7 | 20.9 | 280°49.4 | 56.1 | 220°32.9 | 18.5 | 329°58.8 | 27.2 | | | | | | |
| 5 | 359°11.9 | 210°19.5 | 19.9 | 295°50.0 | 56.5 | 235°34.8 | 18.4 | 345°01.2 | 27.2 | | | | | | |
| 6 | 14°14.4 | 225°19.3 | N14°18.9 | 310°50.6 | N20°56.8 | 250°36.7 | N20°18.2 | 0°03.6 | N03°27.2 | | | | | | |
| 7 | 29°16.9 | 240°19.1 | 17.8 | 325°51.2 | 57.1 | 265°38.6 | 18.1 | 15°06.0 | 27.3 | | | | | | |
| 8 | 44°19.3 | 255°18.8 | 16.8 | 340°51.8 | 57.5 | 280°40.5 | 18.0 | 30°08.3 | 27.3 | | | | | | |
| 9 | 59°21.8 | 270°18.6 | · · 15.7 | 355°52.4 | · · 57.8 | 295°42.4 | · · 17.9 | 45°10.7 | · · 27.3 | | | | | | |
| 10 | 74°24.2 | 285°18.4 | 14.7 | 10°53.0 | 58.2 | 310°44.3 | 17.8 | 60°13.1 | 27.3 | | | | | | |
| 11 | 89°26.7 | 300°18.2 | 13.6 | 25°53.7 | 58.5 | 325°46.2 | 17.7 | 75°15.5 | 27.4 | | | | | | |
| 12 | 104°29.2 | 315°18.0 | N14°12.6 | 40°54.3 | N20°58.9 | 340°48.1 | N20°17.5 | 90°17.9 | N03°27.4 | | | | | | |
| 13 | 119°31.6 | 330°17.7 | 11.5 | 55°54.9 | 59.2 | 355°50.0 | 17.4 | 105°20.2 | 27.4 | | | | | | |
| 14 | 134°34.1 | 345°17.5 | 10.5 | 70°55.5 | 59.5 | 10°51.9 | 17.3 | 120°22.6 | 27.4 | | | | | | |
| 15 | 149°36.6 | 0°17.3 | · · 09.4 | 85°56.1 | 20°59.9 | 25°53.8 | · · 17.2 | 135°25.0 | · · 27.4 | | | | | | |
| 16 | 164°39.0 | 15°17.1 | 08.3 | 100°56.7 | 21°00.2 | 40°55.7 | 17.1 | 150°27.4 | 27.5 | | | | | | |
| 17 | 179°41.5 | 30°16.9 | 07.3 | 115°57.3 | 00.6 | 55°57.6 | 17.0 | 165°29.8 | 27.5 | | | | | | |
| 18 | 194°44.0 | 45°16.7 | N14°06.2 | 130°57.9 | N21°00.9 | 70°59.5 | N20°16.8 | 180°32.2 | N03°27.5 | | | | | | |
| 19 | 209°46.4 | 60°16.5 | 05.2 | 145°58.5 | 01.2 | 86°01.4 | 16.7 | 195°34.5 | 27.5 | | | | | | |
| 20 | 224°48.9 | 75°16.2 | 04.1 | 160°59.2 | 01.6 | 101°03.3 | 16.6 | 210°36.9 | 27.6 | | | | | | |
| 21 | 239°51.3 | 90°16.0 | · · 03.1 | 175°59.8 | · · 01.9 | 116°05.2 | · · 16.5 | 225°39.3 | · · 27.6 | | | | | | |
| 22 | 254°53.8 | 105°15.8 | 02.0 | 191°00.4 | 02.3 | 131°07.1 | 16.4 | 240°41.7 | 27.6 | | | | | | |
| 23 | 269°56.3 | 120°15.6 | 01.0 | 206°01.0 | 02.6 | 146°09.0 | 16.3 | 255°44.1 | 27.6 | | | | | | |
| Mer.pass. 05:03 | | ν-0.2' d-1.0' m-4.08 | | | ν0.6' d0.3' m1.30 | | | ν1.9' d-0.1' m-1.80 | | | ν2.4' d0.0' m0.75 | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 284°58.7 | 135°15.4 | N13°59.9 | 221°01.6 | N21°02.9 | 161°10.9 | N20°16.1 | 270°46.4 | N03°27.6 | | | | | | |
| 1 | 300°01.2 | 150°15.2 | 58.8 | 236°02.2 | 03.3 | 176°12.8 | 16.0 | 285°48.8 | 27.7 | | | | | | |
| 2 | 315°03.7 | 165°15.0 | 57.8 | 251°02.8 | 03.6 | 191°14.7 | 15.9 | 300°51.2 | 27.7 | | | | | | |
| 3 | 330°06.1 | 180°14.8 | · · 56.7 | 266°03.4 | · · 04.0 | 206°16.6 | · · 15.8 | 315°53.6 | · · 27.7 | | | | | | |
| 4 | 345°08.6 | 195°14.6 | 55.7 | 281°04.0 | 04.3 | 221°18.5 | 15.7 | 330°56.0 | 27.7 | | | | | | |
| 5 | 0°11.1 | 210°14.4 | 54.6 | 296°04.7 | 04.6 | 236°20.4 | 15.5 | 345°58.4 | 27.7 | | | | | | |
| 6 | 15°13.5 | 225°14.1 | N13°53.5 | 311°05.3 | N21°05.0 | 251°22.3 | N20°15.4 | 1°00.7 | N03°27.8 | | | | | | |
| 7 | 30°16.0 | 240°13.9 | 52.5 | 326°05.9 | 05.3 | 266°24.2 | 15.3 | 16°03.1 | 27.8 | | | | | | |
| 8 | 45°18.5 | 255°13.7 | 51.4 | 341°06.5 | 05.6 | 281°26.1 | 15.2 | 31°05.5 | 27.8 | | | | | | |
| 9 | 60°20.9 | 270°13.5 | · · 50.4 | 356°07.1 | · · 06.0 | 296°28.0 | · · 15.1 | 46°07.9 | · · 27.8 | | | | | | |
| 10 | 75°23.4 | 285°13.3 | 49.3 | 11°07.7 | 06.3 | 311°29.9 | 15.0 | 61°10.3 | 27.9 | | | | | | |
| 11 | 90°25.8 | 300°13.1 | 48.2 | 26°08.3 | 06.6 | 326°31.8 | 14.8 | 76°12.7 | 27.9 | | | | | | |
| 12 | 105°28.3 | 315°12.9 | N13°47.2 | 41°08.9 | N21°07.0 | 341°33.7 | N20°14.7 | 91°15.0 | N03°27.9 | | | | | | |
| 13 | 120°30.8 | 330°12.7 | 46.1 | 56°09.5 | 07.3 | 356°35.6 | 14.6 | 106°17.4 | 27.9 | | | | | | |
| 14 | 135°33.2 | 345°12.5 | 45.0 | 71°10.2 | 07.6 | 11°37.5 | 14.5 | 121°19.8 | 27.9 | | | | | | |
| 15 | 150°35.7 | 0°12.3 | · · 44.0 | 86°10.8 | · · 08.0 | 26°39.4 | · · 14.4 | 136°22.2 | · · 28.0 | | | | | | |
| 16 | 165°38.2 | 15°12.1 | 42.9 | 101°11.4 | 08.3 | 41°41.2 | 14.3 | 151°24.6 | 28.0 | | | | | | |
| 17 | 180°40.6 | 30°11.9 | 41.8 | 116°12.0 | 08.6 | 56°43.1 | 14.1 | 166°27.0 | 28.0 | | | | | | |
| 18 | 195°43.1 | 45°11.7 | N13°40.8 | 131°12.6 | N21°09.0 | 71°45.0 | N20°14.0 | 181°29.4 | N03°28.0 | | | | | | |
| 19 | 210°45.6 | 60°11.5 | 39.7 | 146°13.2 | 09.3 | 86°46.9 | 13.9 | 196°31.7 | 28.0 | | | | | | |
| 20 | 225°48.0 | 75°11.3 | 38.6 | 161°13.8 | 09.6 | 101°48.8 | 13.8 | 211°34.1 | 28.1 | | | | | | |
| 21 | 240°50.5 | 90°11.1 | · · 37.6 | 176°14.4 | · · 10.0 | 116°50.7 | · · 13.7 | 226°36.5 | · · 28.1 | | | | | | |
| 22 | 255°53.0 | 105°10.9 | 36.5 | 191°15.0 | 10.3 | 131°52.6 | 13.5 | 241°38.9 | 28.1 | | | | | | |
| 23 | 270°55.4 | 120°10.7 | 35.4 | 206°15.6 | 10.6 | 146°54.5 | 13.4 | 256°41.3 | 28.1 | | | | | | |
| Mer.pass. 04:59 | | ν-0.2' d-1.1' m-4.08 | | | ν0.6' d0.3' m1.30 | | | ν1.9' d-0.1' m-1.80 | | | ν2.4' d0.0' m0.75 | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 285°57.9 | 135°10.5 | N13°34.4 | 221°16.3 | N21°10.9 | 161°56.4 | N20°13.3 | 271°43.7 | N03°28.1 | | | | | | |
| 1 | 301°00.3 | 150°10.4 | 33.3 | 236°16.9 | 11.3 | 176°58.3 | 13.2 | 286°46.1 | 28.2 | | | | | | |
| 2 | 316°02.8 | 165°10.2 | 32.2 | 251°17.5 | 11.6 | 192°00.2 | 13.1 | 301°48.4 | 28.2 | | | | | | |
| 3 | 331°05.3 | 180°10.0 | · · 31.2 | 266°18.1 | · · 11.9 | 207°02.1 | · · 13.0 | 316°50.8 | · · 28.2 | | | | | | |
| 4 | 346°07.7 | 195°09.8 | 30.1 | 281°18.7 | 12.3 | 222°04.0 | 12.8 | 331°53.2 | 28.2 | | | | | | |
| 5 | 1°10.2 | 210°09.6 | 29.0 | 296°19.3 | 12.6 | 237°05.9 | 12.7 | 346°55.6 | 28.2 | | | | | | |
| 6 | 16°12.7 | 225°09.4 | N13°27.9 | 311°19.9 | N21°12.9 | 252°07.8 | N20°12.6 | 1°58.0 | N03°28.3 | | | | | | |
| 7 | 31°15.1 | 240°09.2 | 26.9 | 326°20.5 | 13.2 | 267°09.7 | 12.5 | 17°00.4 | 28.3 | | | | | | |
| 8 | 46°17.6 | 255°09.0 | 25.8 | 341°21.1 | 13.6 | 282°11.6 | 12.4 | 32°02.8 | 28.3 | | | | | | |
| 9 | 61°20.1 | 270°08.8 | · · 24.7 | 356°21.7 | · · 13.9 | 297°13.5 | · · 12.2 | 47°05.2 | · · 28.3 | | | | | | |
| 10 | 76°22.5 | 285°08.6 | 23.6 | 11°22.4 | 14.2 | 312°15.4 | 12.1 | 62°07.5 | 28.3 | | | | | | |
| 11 | 91°25.0 | 300°08.5 | 22.6 | 26°23.0 | 14.5 | 327°17.3 | 12.0 | 77°09.9 | 28.4 | | | | | | |
| 12 | 106°27.4 | 315°08.3 | N13°21.5 | 41°23.6 | N21°14.9 | 342°19.2 | N20°11.9 | 92°12.3 | N03°28.4 | | | | | | |
| 13 | 121°29.9 | 330°08.1 | 20.4 | 56°24.2 | 15.2 | 357°21.1 | 11.8 | 107°14.7 | 28.4 | | | | | | |
| 14 | 136°32.4 | 345°07.9 | 19.3 | 71°24.8 | 15.5 | 12°23.0 | 11.6 | 122°17.1 | 28.4 | | | | | | |
| 15 | 151°34.8 | 0°07.7 | · · 18.3 | 86°25.4 | · · 15.8 | 27°24.9 | · · 11.5 | 137°19.5 | · · 28.4 | | | | | | |
| 16 | 166°37.3 | 15°07.5 | 17.2 | 101°26.0 | 16.2 | 42°26.8 | 11.4 | 152°21.9 | 28.5 | | | | | | |
| 17 | 181°39.8 | 30°07.4 | 16.1 | 116°26.6 | 16.5 | 57°28.7 | 11.3 | 167°24.3 | 28.5 | | | | | | |
| 18 | 196°42.2 | 45°07.2 | N13°15.0 | 131°27.2 | N21°16.8 | 72°30.6 | N20°11.2 | 182°26.6 | N03°28.5 | | | | | | |
| 19 | 211°44.7 | 60°07.0 | 13.9 | 146°27.9 | 17.1 | 87°32.5 | 11.1 | 197°29.0 | 28.5 | | | | | | |
| 20 | 226°47.2 | 75°06.8 | 12.9 | 161°28.5 | 17.5 | 102°34.4 | 10.9 | 212°31.4 | 28.5 | | | | | | |
| 21 | 241°49.6 | 90°06.6 | · · 11.8 | 176°29.1 | · · 17.8 | 117°36.3 | · · 10.8 | 227°33.8 | · · 28.5 | | | | | | |
| 22 | 256°52.1 | 105°06.5 | 10.7 | 191°29.7 | 18.1 | 132°38.2 | 10.7 | 242°36.2 | 28.6 | | | | | | |
| 23 | 271°54.6 | 120°06.3 | 09.6 | 206°30.3 | 18.4 | 147°40.1 | 10.6 | 257°38.6 | 28.6 | | | | | | |
| Mer.pass. 04:55 | | ν-0.2' d-1.1' m-4.09 | | | ν0.6' d0.3' m1.30 | | | ν1.9' d-0.1' m-1.80 | | | ν2.4' d0.0' m0.75 | | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.4 | 29°14.1 |
| Ankaa | 353°05.9 | -42°09.4 |
| Schedar | 349°29.6 | 56°40.8 |
| Diphda | 348°46.0 | -17°50.3 |
| Achernar | 335°19.4 | -57°05.8 |
| Hamal | 327°49.9 | 23°35.2 |
| Polaris | 313°39.7 | 89°22.3 |
| Acamar | 315°11.1 | -40°11.6 |
| Menkar | 314°05.0 | 4°11.7 |
| Mirfak | 308°26.8 | 49°57.1 |
| Aldebaran | 290°38.5 | 16°33.7 |
| Rigel | 281°03.0 | -8°10.2 |
| Capella | 280°20.5 | 46°01.4 |
| Bellatrix | 278°21.9 | 6°22.4 |
| Elnath | 278°00.7 | 28°37.7 |
| Alnilam | 275°36.8 | -1°11.1 |
| Betelgeuse | 270°51.1 | 7°24.7 |
| Canopus | 263°52.4 | -52°42.5 |
| Sirius | 258°25.5 | -16°45.1 |
| Adhara | 255°05.3 | -29°00.4 |
| Procyon | 244°49.9 | 5°09.4 |
| Pollux | 243°16.2 | 27°57.8 |
| Avior | 234°14.9 | -59°35.7 |
| Suhail | 222°45.8 | -43°32.5 |
| Miaplacidus | 221°38.8 | -69°49.7 |
| Alphard | 217°46.8 | -8°46.4 |
| Regulus | 207°33.4 | 11°5 |

| h | Sun | | | Moon | | | |
|------------|----------|----------|------------|----------|-------|----------|--------|
| | GHA | Dec | | GHA | ν | Dec | d |
| Mon | | | | | | | HP |
| 0 | 178°49.4 | N22°42.3 | | 292°13.7 | 15.0' | S01°31.7 | -15.2' |
| 1 | 193°49.3 | 42.1 | | 306°47.6 | 14.9' | 01°16.5 | -15.2' |
| 2 | 208°49.2 | 41.8 | | 321°21.6 | 14.9' | 01°01.4 | -15.2' |
| 3 | 223°49.1 | 41.6 | | 335°55.5 | 14.9' | 00°46.2 | -15.2' |
| 4 | 238°49.0 | 41.3 | | 350°29.4 | 14.9' | 00°31.0 | -15.2' |
| 5 | 253°48.9 | 41.1 | | 5°03.3 | 14.8' | 00°15.7 | -15.2' |
| 6 | 268°48.8 | N22°40.8 | | 19°37.1 | 14.8' | S00°00.5 | -15.3' |
| 7 | 283°48.7 | 40.6 | | 34°10.9 | 14.8' | N00°14.8 | 15.3' |
| 8 | 298°48.6 | 40.3 | | 48°44.7 | 14.8' | 00°30.0 | 15.3' |
| 9 | 313°48.5 | 40.1 | | 63°18.5 | 14.7' | 00°45.3 | 15.3' |
| 10 | 328°48.4 | 39.8 | | 77°52.2 | 14.7' | 01°00.6 | 15.3' |
| 11 | 343°48.3 | 39.6 | | 92°25.9 | 14.7' | 01°15.9 | 15.3' |
| 12 | 358°48.2 | N22°39.3 | | 106°59.6 | 14.6' | N01°31.2 | 15.3' |
| 13 | 13°48.1 | 39.0 | | 121°33.2 | 14.6' | 01°46.6 | 15.3' |
| 14 | 28°48.0 | 38.8 | | 136°06.8 | 14.5' | 02°01.9 | 15.3' |
| 15 | 43°47.9 | 38.5 | | 150°40.3 | 14.5' | 02°17.3 | 15.3' |
| 16 | 58°47.7 | 38.3 | | 165°13.8 | 14.5' | 02°32.6 | 15.4' |
| 17 | 73°47.6 | 38.0 | | 179°47.3 | 14.4' | 02°48.0 | 15.4' |
| 18 | 88°47.5 | N22°37.8 | | 194°20.7 | 14.4' | N03°03.3 | 15.4' |
| 19 | 103°47.4 | 37.5 | | 208°54.1 | 14.3' | 03°18.7 | 15.4' |
| 20 | 118°47.3 | 37.2 | | 223°27.4 | 14.3' | 03°34.0 | 15.4' |
| 21 | 133°47.2 | 37.0 | | 238°00.7 | 14.2' | 03°49.4 | 15.4' |
| 22 | 148°47.1 | 36.7 | | 253°33.9 | 14.2' | 04°04.8 | 15.4' |
| 23 | 163°47.0 | 36.4 | | 267°07.1 | 14.1' | 04°20.1 | 15.4' |
| SD = 15.7' | | | SD = 15.4' | | | | |
| d = -0.2' | | | | | | | |

| Tue | Sun | | | Moon | | | |
|------------|----------|----------|------------|----------|-------|----------|-------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 178°46.9 | N22°36.2 | | 281°40.3 | 14.1' | N04°35.5 | 15.4' |
| 1 | 193°46.8 | 35.9 | | 296°13.3 | 14.0' | 04°50.8 | 15.4' |
| 2 | 208°46.7 | 35.6 | | 310°46.4 | 14.0' | 05°06.2 | 15.3' |
| 3 | 223°46.6 | 35.4 | | 325°19.4 | 13.9' | 05°21.5 | 15.3' |
| 4 | 238°46.5 | 35.1 | | 339°52.3 | 13.9' | 05°36.9 | 15.3' |
| 5 | 253°46.4 | 34.8 | | 354°25.1 | 13.8' | 05°52.2 | 15.3' |
| 6 | 268°46.3 | N22°34.6 | | 8°57.9 | 13.7' | N06°07.5 | 15.3' |
| 7 | 283°46.2 | 34.3 | | 23°30.7 | 13.7' | 06°22.8 | 15.3' |
| 8 | 298°46.1 | 34.0 | | 38°03.4 | 13.6' | 06°38.1 | 15.3' |
| 9 | 313°46.0 | 33.8 | | 52°36.0 | 13.6' | 06°53.4 | 15.3' |
| 10 | 328°45.9 | 33.5 | | 67°08.5 | 13.5' | 07°08.7 | 15.3' |
| 11 | 343°45.8 | 33.2 | | 81°41.0 | 13.4' | 07°24.0 | 15.2' |
| 12 | 358°45.7 | N22°33.0 | | 96°13.4 | 13.3' | N07°39.2 | 15.2' |
| 13 | 13°45.6 | 32.7 | | 110°45.8 | 13.3' | 07°54.4 | 15.2' |
| 14 | 28°45.5 | 32.4 | | 125°18.1 | 13.2' | 08°09.6 | 15.2' |
| 15 | 43°45.4 | 32.1 | | 139°50.3 | 13.1' | 08°24.8 | 15.2' |
| 16 | 58°45.3 | 31.9 | | 154°22.4 | 13.1' | 08°40.0 | 15.1' |
| 17 | 73°45.2 | 31.6 | | 168°54.5 | 13.0' | 08°55.1 | 15.1' |
| 18 | 88°45.1 | N22°31.3 | | 183°26.4 | 12.9' | N09°10.2 | 15.1' |
| 19 | 103°45.0 | 31.0 | | 197°58.3 | 12.8' | 09°25.3 | 15.1' |
| 20 | 118°44.9 | 30.8 | | 212°30.2 | 12.7' | 09°40.4 | 15.0' |
| 21 | 133°44.8 | 30.5 | | 227°01.9 | 12.7' | 09°55.4 | 15.0' |
| 22 | 148°44.7 | 30.2 | | 241°33.6 | 12.6' | 10°10.4 | 15.0' |
| 23 | 163°44.6 | 29.9 | | 256°05.1 | 12.5' | 10°25.4 | 14.9' |
| SD = 15.7' | | | SD = 15.6' | | | | |
| d = -0.3' | | | | | | | |

| Wed | Sun | | | Moon | | | |
|------------|----------|----------|------------|----------|-------|----------|-------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 178°44.5 | N22°29.6 | | 270°36.6 | 12.4' | N10°40.3 | 14.9' |
| 1 | 193°44.4 | 29.4 | | 285°08.0 | 12.3' | 10°55.2 | 14.9' |
| 2 | 208°44.3 | 29.1 | | 299°39.4 | 12.2' | 11°10.1 | 14.8' |
| 3 | 223°44.2 | 28.8 | | 314°10.6 | 12.1' | 11°24.9 | 14.8' |
| 4 | 238°44.1 | 28.5 | | 328°41.7 | 12.0' | 11°39.7 | 14.8' |
| 5 | 253°44.0 | 28.2 | | 343°12.8 | 12.0' | 11°54.5 | 14.7' |
| 6 | 268°43.9 | N22°27.9 | | 357°43.7 | 11.9' | N12°09.2 | 14.7' |
| 7 | 283°43.8 | 27.7 | | 12°14.6 | 11.8' | 12°23.9 | 14.6' |
| 8 | 298°43.7 | 27.4 | | 26°45.3 | 11.7' | 12°38.5 | 14.6' |
| 9 | 313°43.7 | 27.1 | | 41°16.0 | 11.6' | 12°53.1 | 14.5' |
| 10 | 328°43.6 | 26.8 | | 55°46.6 | 11.5' | 13°07.6 | 14.5' |
| 11 | 343°43.5 | 26.5 | | 70°17.0 | 11.4' | 13°22.1 | 14.4' |
| 12 | 358°43.4 | N22°26.2 | | 84°47.4 | 11.3' | N13°36.6 | 14.4' |
| 13 | 13°43.3 | 25.9 | | 99°17.7 | 11.2' | 13°50.9 | 14.3' |
| 14 | 28°43.2 | 25.6 | | 113°47.8 | 11.1' | 14°05.3 | 14.3' |
| 15 | 43°43.1 | 25.4 | | 128°17.9 | 10.9' | 14°19.5 | 14.2' |
| 16 | 58°43.0 | 25.1 | | 142°47.8 | 10.8' | 14°33.8 | 14.2' |
| 17 | 73°42.9 | 24.8 | | 157°17.6 | 10.7' | 14°47.9 | 14.1' |
| 18 | 88°42.8 | N22°24.5 | | 171°47.4 | 10.6' | N15°02.0 | 14.0' |
| 19 | 103°42.7 | 24.2 | | 186°17.0 | 10.5' | 15°16.1 | 14.0' |
| 20 | 118°42.6 | 23.9 | | 200°46.5 | 10.4' | 15°30.0 | 13.9' |
| 21 | 133°42.5 | 23.6 | | 215°15.9 | 10.3' | 15°44.0 | 13.8' |
| 22 | 148°42.4 | 23.3 | | 229°45.2 | 10.2' | 15°57.8 | 13.8' |
| 23 | 163°42.3 | 23.0 | | 244°14.3 | 10.0' | 16°11.6 | 13.7' |
| SD = 15.7' | | | SD = 15.8' | | | | |
| d = -0.3' | | | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | | | | | | |
| N 70° | | | | | | |
| 68° | | | | | | |
| 66° | //// | //// | 00:58 | 23:08 | //// | //// |
| 64° | //// | //// | 01:54 | 22:14 | //// | //// |
| 62° | //// | //// | 02:26 | 21:42 | //// | //// |
| 60° | //// | 01:20 | 02:50 | 21:19 | 22:48 | //// |
| N 58° | //// | 01:59 | 03:09 | 21:00 | 22:10 | //// |
| 56° | //// | 02:25 | 03:24 | 20:45 | 21:44 | //// |
| 54° | 01:13 | 02:45 | 03:38 | 20:32 | 21:24 | 22:54 |
| 52° | 01:49 | 03:02 | 03:49 | 20:20 | 21:07 | 22:19 |
| 50° | 02:14 | 03:16 | 04:00 | 20:10 | 20:53 | 21:55 |
| 45° | 02:56 | 03:44 | 04:21 | 19:49 | 20:25 | 21:13 |
| N 40° | 03:25 | 04:06 | 04:38 | 19:31 | 20:04 | 20:45 |
| 35° | 03:47 | 04:23 | 04:53 | 19:17 | 19:46 | 20:23 |
| 30° | 04:05 | 04:38 | 05:05 | 19:05 | 19:32 | 20:05 |
| 20° | 04:33 | 05:02 | 05:26 | 18:44 | 19:08 | 19:37 |
| N 10° | 04:55 | 05:22 | 05:44 | 18:25 | 18:48 | 19:15 |
| 0° | 05:13 | 05:39 | 06:01 | 18:09 | 18:31 | 18:57 |
| S 10° | 05:29 | 05:55 | 06:18 | 17:52 | 18:15 | 18:41 |
| 20° | 05:45 | 06:12 | 06:36 | 17:34 | 17:58 | 18:25 |
| 30° | 06:00 | 06:30 | 06:56 | 17:14 | 17:40 | 18:10 |
| 35° | 06:09 | 06:40 | 07:08 | 17:02 | 17:30 | 18:01 |
| 40° | 06:18 | 06:51 | 07:22 | 16:49 | 17:19 | 17:53 |
| 45° | 06:27 | 07:04 | 07:38 | 16:33 | 17:06 | 17:43 |
| S 50° | 06:38 | 07:19 | 07:57 | 16:13 | 16:51 | 17:32 |
| 52° | 06:43 | 07:26 | 08:07 | 16:04 | 16:44 | 17:27 |
| 54° | 06:49 | 07:34 | 08:17 | 15:53 | 16:36 | 17:22 |
| 56° | 06:54 | 07:43 | 08:29 | 15:41 | 16:27 | 17:16 |
| 58° | 07:01 | 07:52 | 08:43 | 15:27 | 16:18 | 17:10 |
| S 60° | 07:08 | 08:03 | 08:59 | 15:11 | 16:07 | 17:03 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | 22:20 | 21:42 | 20:43 | 11:05 | 13:18 | 15:58 |
| N 70° | 22:26 | 21:57 | 21:18 | 11:03 | 13:05 | 15:25 |
| 68° | 22:30 | 22:10 | 21:43 | 11:02 | 12:56 | 15:02 |
| 66° | 22:34 | 22:20 | 22:03 | 11:00 | 12:47 | 14:44 |
| 64° | 22:37 | 22:29 | 22:19 | 11:00 | 12:41 | 14:29 |
| 62° | 22:40 | 22:36 | 22:32 | 10:59 | 12:35 | 14:17 |
| 60° | 22:42 | 22:43 | 22:44 | 10:58 | 12:30 | 14:07 |
| N 58° | 22:45 | 22:48 | 22:54 | 10:57 | 12:25 | 13:58 |
| 56° | 22:47 | 22:53 | 23:02 | 10:57 | 12:21 | 13:50 |
| 54° | 22:48 | 22:58 | 23:10 | 10:56 | 12:18 | 13:44 |
| 52° | 22:50 | 23:02 | 23:17 | 10:56 | 12:15 | 13:38 |
| 50° | 22:52 | 23:06 | 23:23 | 10:55 | 12:12 | 13:32 |
| 45° | 22:55 | 23:14 | 23:37 | 10:54 | 12:06 | 13:20 |
| N 40° | 22:58 | 23:21 | 23:48 | 10:54 | 12:00 | 13:10 |
| 35° | 23:00 | 23:27 | 23:58 | 10:53 | 11:56 | 13:02 |
| 30° | 23:02 | 23:33 | | 10:52 | 11:52 | 12:55 |
| 20° | 23:06 | 23:42 | | 10:51 | 11:45 | 12:42 |
| N 10° | 23:09 | 23:50 | | 10:50 | 11:39 | 12:31 |
| 0° | 23:12 | 23:58 | | 10:49 | 11:34 | 12:21 |
| S 10° | 23:16 | | 00:06 | 10:49 | 11:28 | 12:11 |
| 20° | 23:19 | | 00:14 | 10:48 | 11:22 | 12:00 |
| 30° | 23:23 | | 00:24 | 10:47 | 11:16 | 11:48 |
| 35° | 23:25 | | 00:30 | 10:46 | 11:12 | 11:41 |
| 40° | 23:28 | | 00:36 | 10:45 | 11:08 | 11:33 |
| 45° | 23:31 | | 00:44 | 10:44 | 11:03 | 11:23 |
| S 50° | 23:35 | | 00:53 | 10:43 | 10:57 | 11:12 |
| 52° | 23:37 | | 00:57 | 10:43 | 10:54 | 11:07 |
| 54° | 23:38 | | 01:02 | 10:42 | 10:51 | 11:01 |
| 56° | 23:41 | | 01:07 | 10:42 | 10:48 | 10:55 |
| 58° | 23:43 | | 01:13 | 10:41 | 10:44 | 10:48 |
| S 60° | 23:45 | | 01:20 | 10:41 | 10:40 | 10:40 |

| Day | Sun | | Mer. Pass | Moon | | Age 21-23 69-48% |
|-----|-----------------------------------|-----------------------|-----------|-----------------------|-------------|------------------|
| | Eqn.of Time 00 ^h mm:ss | 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 06 | 04:42 | 04:47 | 12:05 | 04:39 | 17:01 | |
| 07 | 04:52 | 04:57 | 12:05 | 05:23 | 17:46 | |
| 08 | 05:02 | 05:07 | 12:05 | 06:09 | 18:34 | |

July 09, 10, 11 UT (Thu., Fri., Sat.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|----------------------|----------|-------------------|----------|---------------------|----------|-------------------|----------|----------|
| Thu | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 286°57.0 | | 135°06.1 | N13°08.5 | 221°30.9 | N21°18.7 | 162°42.0 | N20°10.5 | 272°41.0 | N03°28.6 |
| 1 | 301°59.5 | | 150°05.9 | 07.5 | 236°31.5 | 19.1 | 177°43.9 | 10.3 | 287°43.4 | 28.6 |
| 2 | 317°01.9 | | 165°05.7 | 06.4 | 251°32.1 | 19.4 | 192°45.8 | 10.2 | 302°45.8 | 28.6 |
| 3 | 332°04.4 | | 180°05.6 | •• 05.3 | 266°32.7 | •• 19.7 | 207°47.7 | •• 10.1 | 317°48.2 | •• 28.7 |
| 4 | 347°06.9 | | 195°05.4 | 04.2 | 281°33.3 | 20.0 | 222°49.6 | 10.0 | 332°50.5 | 28.7 |
| 5 | 2°09.3 | | 210°05.2 | 03.1 | 296°33.9 | 20.3 | 237°51.5 | 09.9 | 347°52.9 | 28.7 |
| 6 | 17°11.8 | | 225°05.0 | N13°02.0 | 311°34.6 | N21°20.7 | 252°53.4 | N20°09.7 | 2°55.3 | N03°28.7 |
| 7 | 32°14.3 | | 240°04.9 | 13°00.9 | 326°35.2 | 21.0 | 267°55.3 | 09.6 | 17°57.7 | 28.7 |
| 8 | 47°16.7 | | 255°04.7 | 12°59.9 | 341°35.8 | 21.3 | 282°57.2 | 09.5 | 33°00.1 | 28.7 |
| 9 | 62°19.2 | | 270°04.5 | •• 58.8 | 356°36.4 | •• 21.6 | 297°59.1 | •• 09.4 | 48°02.5 | •• 28.8 |
| 10 | 77°21.7 | | 285°04.4 | 57.7 | 11°37.0 | 21.9 | 313°01.0 | 09.3 | 63°04.9 | 28.8 |
| 11 | 92°24.1 | | 300°04.2 | 56.6 | 26°37.6 | 22.3 | 328°02.9 | 09.1 | 78°07.3 | 28.8 |
| 12 | 107°26.6 | | 315°04.0 | N12°55.5 | 41°38.2 | N21°22.6 | 343°04.8 | N20°09.0 | 93°09.7 | N03°28.8 |
| 13 | 122°29.1 | | 330°03.8 | 54.4 | 56°38.8 | 22.9 | 358°06.7 | 08.9 | 108°12.1 | 28.8 |
| 14 | 137°31.5 | | 345°03.7 | 53.3 | 71°39.4 | 23.2 | 13°08.6 | 08.8 | 123°14.5 | 28.9 |
| 15 | 152°34.0 | | 0°03.5 | •• 52.3 | 86°40.0 | •• 23.5 | 28°10.5 | •• 08.7 | 138°16.9 | •• 28.9 |
| 16 | 167°36.4 | | 15°03.3 | 51.2 | 101°40.7 | 23.8 | 43°12.4 | 08.5 | 153°19.2 | 28.9 |
| 17 | 182°38.9 | | 30°03.2 | 50.1 | 116°41.3 | 24.1 | 58°14.3 | 08.4 | 168°21.6 | 28.9 |
| 18 | 197°41.4 | | 45°03.0 | N12°49.0 | 131°41.9 | N21°24.5 | 73°16.2 | N20°08.3 | 183°24.0 | N03°28.9 |
| 19 | 212°43.8 | | 60°02.8 | 47.9 | 146°42.5 | 24.8 | 88°18.1 | 08.2 | 198°26.4 | 28.9 |
| 20 | 227°46.3 | | 75°02.7 | 46.8 | 161°43.1 | 25.1 | 103°20.0 | 08.1 | 213°28.8 | 29.0 |
| 21 | 242°48.8 | | 90°02.5 | •• 45.7 | 176°43.7 | •• 25.4 | 118°21.9 | •• 07.9 | 228°31.2 | •• 29.0 |
| 22 | 257°51.2 | | 105°02.4 | 44.6 | 191°44.3 | 25.7 | 133°23.7 | 07.8 | 243°33.6 | 29.0 |
| 23 | 272°53.7 | | 120°02.2 | 43.5 | 206°44.9 | 26.0 | 148°25.6 | 07.7 | 258°36.0 | 29.0 |
| Mer.pass. 04:51 | | ν-0.2' d-1.1' m-4.10 | | ν0.6' d0.3' m1.30 | | ν1.9' d-0.1' m-1.80 | | ν2.4' d0.0' m0.74 | | |
| Fri | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 287°56.2 | | 135°02.0 | N12°42.4 | 221°45.5 | N21°26.3 | 163°27.5 | N20°07.6 | 273°38.4 | N03°29.0 |
| 1 | 302°58.6 | | 150°01.9 | 41.3 | 236°46.1 | 26.7 | 178°29.4 | 07.5 | 288°40.8 | 29.0 |
| 2 | 318°01.1 | | 165°01.7 | 40.2 | 251°46.8 | 27.0 | 193°31.3 | 07.3 | 303°43.2 | 29.1 |
| 3 | 333°03.5 | | 180°01.6 | •• 39.1 | 266°47.4 | •• 27.3 | 208°33.2 | •• 07.2 | 318°45.6 | •• 29.1 |
| 4 | 348°06.0 | | 195°01.4 | 38.0 | 281°48.0 | 27.6 | 223°35.1 | 07.1 | 333°48.0 | 29.1 |
| 5 | 3°08.5 | | 210°01.2 | 37.0 | 296°48.6 | 27.9 | 238°37.0 | 07.0 | 348°50.4 | 29.1 |
| 6 | 18°10.9 | | 225°01.1 | N12°35.9 | 311°49.2 | N21°28.2 | 253°38.9 | N20°06.9 | 3°52.8 | N03°29.1 |
| 7 | 33°13.4 | | 240°00.9 | 34.8 | 326°49.8 | 28.5 | 268°40.8 | 06.7 | 18°55.2 | 29.1 |
| 8 | 48°15.9 | | 255°00.8 | 33.7 | 341°50.4 | 28.8 | 283°42.7 | 06.6 | 33°57.5 | 29.2 |
| 9 | 63°18.3 | | 270°00.6 | •• 32.6 | 356°51.0 | •• 29.1 | 298°44.6 | •• 06.5 | 48°59.9 | •• 29.2 |
| 10 | 78°20.8 | | 285°00.5 | 31.5 | 11°51.6 | 29.4 | 313°46.5 | 06.4 | 64°02.3 | 29.2 |
| 11 | 93°23.3 | | 300°00.3 | 30.4 | 26°52.2 | 29.8 | 328°48.4 | 06.3 | 79°04.7 | 29.2 |
| 12 | 108°25.7 | | 315°00.1 | N12°29.3 | 41°52.8 | N21°30.1 | 343°50.3 | N20°06.1 | 94°07.1 | N03°29.2 |
| 13 | 123°28.2 | | 330°00.0 | 28.2 | 56°53.5 | 30.4 | 358°52.2 | 06.0 | 109°09.5 | 29.2 |
| 14 | 138°30.7 | | 344°59.8 | 27.1 | 71°54.1 | 30.7 | 13°54.1 | 05.9 | 124°11.9 | 29.3 |
| 15 | 153°33.1 | | 359°59.7 | •• 26.0 | 86°54.7 | •• 31.0 | 28°56.0 | •• 05.8 | 139°14.3 | •• 29.3 |
| 16 | 168°35.6 | | 14°59.5 | 24.9 | 101°55.3 | 31.3 | 43°57.9 | 05.7 | 154°16.7 | 29.3 |
| 17 | 183°38.0 | | 29°59.4 | 23.8 | 116°55.9 | 31.6 | 58°59.8 | 05.5 | 169°19.1 | 29.3 |
| 18 | 198°40.5 | | 44°59.2 | N12°22.7 | 131°56.5 | N21°31.9 | 74°01.7 | N20°05.4 | 184°21.5 | N03°29.3 |
| 19 | 213°43.0 | | 59°59.1 | 21.6 | 146°57.1 | 32.2 | 89°03.6 | 05.3 | 199°23.9 | 29.3 |
| 20 | 228°45.4 | | 74°58.9 | 20.5 | 161°57.7 | 32.5 | 104°05.5 | 05.2 | 214°26.3 | 29.3 |
| 21 | 243°47.9 | | 89°58.8 | •• 19.4 | 176°58.3 | •• 32.8 | 119°07.4 | •• 05.1 | 229°28.7 | •• 29.4 |
| 22 | 258°50.4 | | 104°58.6 | 18.3 | 191°58.9 | 33.1 | 134°09.3 | 04.9 | 244°31.1 | 29.4 |
| 23 | 273°52.8 | | 119°58.5 | 17.2 | 206°59.6 | 33.4 | 149°11.2 | 04.8 | 259°33.5 | 29.4 |
| Mer.pass. 04:47 | | ν-0.2' d-1.1' m-4.10 | | ν0.6' d0.3' m1.30 | | ν1.9' d-0.1' m-1.80 | | ν2.4' d0.0' m0.74 | | |
| Sat | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 288°55.3 | | 134°58.4 | N12°16.0 | 222°00.2 | N21°33.7 | 164°13.1 | N20°04.7 | 274°35.9 | N03°29.4 |
| 1 | 303°57.8 | | 149°58.2 | 14.9 | 237°00.8 | 34.0 | 179°15.0 | 04.6 | 289°38.3 | 29.4 |
| 2 | 319°00.2 | | 164°58.1 | 13.8 | 252°01.4 | 34.3 | 194°16.9 | 04.5 | 304°40.7 | 29.4 |
| 3 | 334°02.7 | | 179°57.9 | •• 12.7 | 267°02.0 | •• 34.6 | 209°18.8 | •• 04.3 | 319°43.1 | •• 29.5 |
| 4 | 349°05.2 | | 194°57.8 | 11.6 | 282°02.6 | 34.9 | 224°20.7 | 04.2 | 334°45.5 | 29.5 |
| 5 | 4°07.6 | | 209°57.6 | 10.5 | 297°03.2 | 35.2 | 239°22.6 | 04.1 | 349°47.9 | 29.5 |
| 6 | 19°10.1 | | 224°57.5 | N12°09.4 | 312°03.8 | N21°35.5 | 254°24.5 | N20°04.0 | 4°50.3 | N03°29.5 |
| 7 | 34°12.5 | | 239°57.4 | 08.3 | 327°04.4 | 35.9 | 269°26.3 | 03.8 | 19°52.7 | 29.5 |
| 8 | 49°15.0 | | 254°57.2 | 07.2 | 342°05.0 | 36.2 | 284°28.2 | 03.7 | 34°55.1 | 29.5 |
| 9 | 64°17.5 | | 269°57.1 | •• 06.1 | 357°05.6 | •• 36.5 | 299°30.1 | •• 03.6 | 49°57.5 | •• 29.5 |
| 10 | 79°19.9 | | 284°56.9 | 05.0 | 12°06.3 | 36.8 | 314°32.0 | 03.5 | 64°59.9 | 29.6 |
| 11 | 94°22.4 | | 299°56.8 | 03.9 | 27°06.9 | 37.1 | 329°33.9 | 03.4 | 80°02.3 | 29.6 |
| 12 | 109°24.9 | | 314°56.7 | N12°02.8 | 42°07.5 | N21°37.4 | 344°35.8 | N20°03.2 | 95°04.7 | N03°29.6 |
| 13 | 124°27.3 | | 329°56.5 | 01.7 | 57°08.1 | 37.7 | 359°37.7 | 03.1 | 110°07.1 | 29.6 |
| 14 | 139°29.8 | | 344°56.4 | 12°00.5 | 72°08.7 | 38.0 | 14°39.6 | 03.0 | 125°09.5 | 29.6 |
| 15 | 154°32.3 | | 359°56.2 | 11°59.4 | 87°09.3 | •• 38.2 | 29°41.5 | •• 02.9 | 140°11.9 | •• 29.6 |
| 16 | 169°34.7 | | 14°56.1 | 58.3 | 102°09.9 | 38.5 | 44°43.4 | 02.8 | 155°14.3 | 29.6 |
| 17 | 184°37.2 | | 29°56.0 | 57.2 | 117°10.5 | 38.8 | 59°45.3 | 02.6 | 170°16.7 | 29.7 |
| 18 | 199°39.7 | | 44°55.8 | N11°56.1 | 132°11.1 | N21°39.1 | 74°47.2 | N20°02.5 | 185°19.1 | N03°29.7 |
| 19 | 214°42.1 | | 59°55.7 | 55.0 | 147°11.7 | 39.4 | 89°49.1 | 02.4 | 200°21.5 | 29.7 |
| 20 | 229°44.6 | | 74°55.6 | 53.9 | 162°12.3 | 39.7 | 104°51.0 | 02.3 | 215°23.9 | 29.7 |
| 21 | 244°47.0 | | 89°55.4 | •• 52.8 | 177°13.0 | •• 40.0 | 119°52.9 | •• 02.1 | 230°26.3 | •• 29.7 |
| 22 | 259°49.5 | | 104°55.3 | 51.6 | 192°13.6 | 40.3 | 134°54.8 | 02.0 | 245°28.7 | 29.7 |
| 23 | 274°52.0 | | 119°55.2 | 50.5 | 207°14.2 | 40.6 | 149°56.7 | 01.9 | 260°31.1 | 29.7 |
| Mer.pass. 04:44 | | ν-0.1' d-1.1' m-4.11 | | ν0.6' d0.3' m1.30 | | ν1.9' d-0.1' m-1.80 | | ν2.4' d0.0' m0.73 | | |

| | SHA | Dec |
|---------------------|----------|----------|
| Alpheratz | 357°33.4 | 29°14.1 |
| Ankaa | 353°05.8 | -42°09.4 |
| Schedar | 349°29.5 | 56°40.8 |
| Diphda | 348°46.0 | -17°50.3 |
| Achernar | 335°19.4 | -57°05.8 |
| Hamal | 327°49.9 | 23°35.2 |
| Polaris | 313°38.1 | 89°22.2 |
| Acamar | 315°11.0 | -40°11.6 |
| Menkar | 314°05.0 | 4°11.7 |
| Mirfak | 308°26.8 | 49°57.1 |
| Aldebaran | 290°38.5 | 16°33.7 |
| Rigel | 281°03.0 | -8°10.2 |
| Capella | 280°20.5 | 46°01.4 |
| Bellatrix | 278°21.8 | 6°22.4 |
| Elnath | 278°00.6 | 28°37.7 |
| Alnilam | 275°36.8 | -1°11.0 |
| Betelgeuse | 270°51.1 | 7°24.7 |
| Canopus | 263°52.4 | -52°42.5 |
| Sirius | 258°25.5 | -16°45.1 |
| Adhara | 255°05.3 | -29°00.4 |
| Procyon | 244°49.9 | 5°09.4 |
| Pollux | 243°16.2 | 27°57.7 |
| Avior | 234°14.9 | -59°35.7 |
| Suhail | 222°45.8 | -43°32.5 |
| Miaplacidus | 221°38.9 | -69°49.7 |
| Alphard | 217°46.8 | -8°46.4 |
| Regulus | 207°33.4 | 11°50.3 |
| Dubhe | 193°39.9 | 61°36.7 |
| Denebola | 182°23.8 | 14°25.5 |
| Gienah | 175°42.4 | -17°41.5 |
| Acrux | 172°58.8 | -63°15.1 |
| Gacrux | 171°50.3 | -57°16.0 |
| Alioth | 166°11.9 | 55°49.2 |
| Spica | 158°21.0 | -11°18.1 |
| Alkaid | 152°50.9 | 49°11.1 |
| Hadar | 148°34.0 | -60°30.3 |
| Menkent | 147°56.0 | -36°30.2 |
| Arcturus | 145°46.7 | 19°02.7 |
| Rigel Kent. | 139°38.3 | -60°57.0 |
| Kochab | 137°19.3 | 74°03.0 |
| Zuben'ubi | 136°54.5 | -16°09.2 |
| Alphecca | 126°02.5 | 26°37.6 |
| Antares | 112°14.0 | -26°29.5 |
| Atria | 107°06.6 | -69°04.6 |
| Sabik | 102°01.0 | -15°45.5 |
| Shaula | 96°08.3 | -37°07.4 |
| Rasalhague | 95°57.1 | 12°32.5 |
| Eltanin | 90°41.1 | 51°29.2 |
| Kaus Aust. | 83°30.5 | -34°22.3 |
| Vega | 80°32.0 | 38°48.5 |
| Nunki | 75°45.8 | -26°15.8 |
| Altair | 61°58.4 | 8°56.4 |
| Peacock | 53°03.2 | -56°38.8 |
| Deneb | 49°24.5 | 45°22.4 |
| Enif | 33°37.3 | 9°59.8 |
| Al Na'ir | 27°31.0 | -46°49.7 |
| Fomalhaut | 15°12.9 | -29°28.7 |
| Scheat | 13°43.8 | 28°13.5 |
| Markab | 13°28.5 | 15°20.9 |
| Jul 09 Thu | SHA | Mer.pass |
| Venus | 208°09.1 | 15:00 |
| Mars | 294°33.9 | 09:14 |
| Jupiter | 235°45.0 | 13:08 |
| Saturn | 345°44.0 | 05:48 |
| Jul 10 Fri | SHA | Mer.pass |
| Venus | 207°05.9 | 15:00 |
| Mars | 293°49.4 | 09:13 |
| Jupiter | 235°31.4 | 13:05 |
| Saturn | 345°42.2 | 05:45 |
| Jul 11 Sat | SHA | Mer.pass |
| Venus | 206°03.1 | 15:00 |
| Mars | 293°04.9 | 09:12 |
| Jupiter | 235°17.8 | 13:01 |
| Saturn | 345°40.6 | 05:41 |
| Horizontal parallax | | |

| h | | Sun | | Moon | | | |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°42.2 | N22°22.7 | 258°43.4 | 9.9' | N16°25.3 | 13.6' | 58.8' |
| 1 | 193°42.1 | 22.4 | 273°12.3 | 9.8' | 16°38.9 | 13.6' | 58.8' |
| 2 | 208°42.0 | 22.1 | 287°41.1 | 9.7' | 16°52.5 | 13.5' | 58.9' |
| 3 | 223°41.9 | · · 21.8 | 302°09.8 | 9.6' | 17°05.9 | 13.4' | 58.9' |
| 4 | 238°41.8 | 21.5 | 316°38.4 | 9.4' | 17°19.3 | 13.3' | 58.9' |
| 5 | 253°41.8 | 21.2 | 331°06.8 | 9.3' | 17°32.7 | 13.2' | 59.0' |
| 6 | 268°41.7 | N22°20.9 | 345°35.2 | 9.2' | N17°45.9 | 13.2' | 59.0' |
| 7 | 283°41.6 | 20.6 | 0°03.4 | 9.1' | 17°59.1 | 13.1' | 59.0' |
| 8 | 298°41.5 | 20.3 | 14°31.4 | 9.0' | 18°12.1 | 13.0' | 59.1' |
| 9 | 313°41.4 | · · 20.0 | 28°59.4 | 8.8' | 18°25.1 | 12.9' | 59.1' |
| 10 | 328°41.3 | 19.7 | 43°27.2 | 8.7' | 18°38.0 | 12.8' | 59.1' |
| 11 | 343°41.2 | 19.4 | 57°54.9 | 8.6' | 18°50.8 | 12.7' | 59.2' |
| 12 | 358°41.1 | N22°19.1 | 72°22.5 | 8.4' | N19°03.5 | 12.6' | 59.2' |
| 13 | 13°41.0 | 18.8 | 86°49.9 | 8.3' | 19°16.1 | 12.5' | 59.2' |
| 14 | 28°40.9 | 18.5 | 101°17.2 | 8.2' | 19°28.6 | 12.4' | 59.3' |
| 15 | 43°40.8 | · · 18.2 | 115°44.4 | 8.1' | 19°41.1 | 12.3' | 59.3' |
| 16 | 58°40.7 | 17.9 | 130°11.5 | 7.9' | 19°53.4 | 12.2' | 59.3' |
| 17 | 73°40.6 | 17.6 | 144°38.4 | 7.8' | 20°05.6 | 12.1' | 59.4' |
| 18 | 88°40.6 | N22°17.3 | 159°05.2 | 7.7' | N20°17.7 | 12.0' | 59.4' |
| 19 | 103°40.5 | 16.9 | 173°31.8 | 7.5' | 20°29.7 | 11.9' | 59.4' |
| 20 | 118°40.4 | 16.6 | 187°58.4 | 7.4' | 20°41.6 | 11.8' | 59.4' |
| 21 | 133°40.3 | · · 16.3 | 202°24.7 | 7.3' | 20°53.4 | 11.7' | 59.5' |
| 22 | 148°40.2 | 16.0 | 216°51.0 | 7.1' | 21°05.0 | 11.5' | 59.5' |
| 23 | 163°40.1 | 15.7 | 231°17.1 | 7.0' | 21°16.6 | 11.4' | 59.5' |
| SD = 15.7' $d = -0.3'$ | | | SD = 16.0' | | | | |
| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°40.0 | N22°15.4 | 245°43.1 | 6.9' | N21°28.0 | 11.3' | 59.6' |
| 1 | 193°39.9 | 15.1 | 260°09.0 | 6.7' | 21°39.3 | 11.2' | 59.6' |
| 2 | 208°39.8 | 14.8 | 274°34.7 | 6.6' | 21°50.5 | 11.1' | 59.6' |
| 3 | 223°39.7 | · · 14.4 | 289°00.3 | 6.4' | 22°01.6 | 10.9' | 59.7' |
| 4 | 238°39.7 | 14.1 | 303°25.7 | 6.3' | 22°12.5 | 10.8' | 59.7' |
| 5 | 253°39.6 | 13.8 | 317°51.0 | 6.2' | 22°23.3 | 10.7' | 59.7' |
| 6 | 268°39.5 | N22°13.5 | 332°16.2 | 6.0' | N22°34.0 | 10.5' | 59.7' |
| 7 | 283°39.4 | 13.2 | 346°41.2 | 5.9' | 22°44.5 | 10.4' | 59.8' |
| 8 | 298°39.3 | 12.9 | 1°06.1 | 5.8' | 22°54.9 | 10.3' | 59.8' |
| 9 | 313°39.2 | · · 12.5 | 15°30.9 | 5.6' | 23°05.2 | 10.1' | 59.8' |
| 10 | 328°39.1 | 12.2 | 29°55.5 | 5.5' | 23°15.3 | 10.0' | 59.9' |
| 11 | 343°39.0 | 11.9 | 44°20.1 | 5.4' | 23°25.3 | 9.8' | 59.9' |
| 12 | 358°38.9 | N22°11.6 | 58°44.4 | 5.2' | N23°35.2 | 9.7' | 59.9' |
| 13 | 13°38.9 | 11.3 | 73°08.7 | 5.1' | 23°44.9 | 9.6' | 59.9' |
| 14 | 28°38.8 | 10.9 | 87°32.8 | 5.0' | 23°54.4 | 9.4' | 60.0' |
| 15 | 43°38.7 | · · 10.6 | 101°56.7 | 4.8' | 24°03.8 | 9.3' | 60.0' |
| 16 | 58°38.6 | 10.3 | 116°20.6 | 4.7' | 24°13.1 | 9.1' | 60.0' |
| 17 | 73°38.5 | 10.0 | 130°44.3 | 4.6' | 24°22.2 | 8.9' | 60.1' |
| 18 | 88°38.4 | N22°09.6 | 145°07.9 | 4.5' | N24°31.1 | 8.8' | 60.1' |
| 19 | 103°38.3 | 09.3 | 159°31.3 | 4.3' | 24°39.9 | 8.6' | 60.1' |
| 20 | 118°38.2 | 09.0 | 173°54.7 | 4.2' | 24°48.5 | 8.5' | 60.1' |
| 21 | 133°38.2 | · · 08.7 | 188°17.9 | 4.1' | 24°57.0 | 8.3' | 60.2' |
| 22 | 148°38.1 | 08.3 | 202°40.9 | 3.9' | 25°05.3 | 8.1' | 60.2' |
| 23 | 163°38.0 | 08.0 | 217°03.9 | 3.8' | 25°13.4 | 8.0' | 60.2' |
| SD = 15.7' $d = -0.3'$ | | | SD = 16.2' | | | | |
| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°37.9 | N22°07.7 | 231°26.7 | 3.7' | N25°21.4 | 7.8' | 60.2' |
| 1 | 193°37.8 | 07.4 | 245°49.4 | 3.6' | 25°29.2 | 7.6' | 60.3' |
| 2 | 208°37.7 | 07.0 | 260°12.0 | 3.5' | 25°36.8 | 7.4' | 60.3' |
| 3 | 223°37.6 | · · 06.7 | 274°34.5 | 3.3' | 25°44.2 | 7.3' | 60.3' |
| 4 | 238°37.6 | 06.4 | 288°56.8 | 3.2' | 25°51.5 | 7.1' | 60.3' |
| 5 | 253°37.5 | 06.0 | 303°19.0 | 3.1' | 25°58.6 | 6.9' | 60.4' |
| 6 | 268°37.4 | N22°05.7 | 317°41.2 | 3.0' | N26°05.5 | 6.7' | 60.4' |
| 7 | 283°37.3 | 05.4 | 332°03.2 | 2.9' | 26°12.2 | 6.5' | 60.4' |
| 8 | 298°37.2 | 05.0 | 346°25.1 | 2.8' | 26°18.7 | 6.4' | 60.4' |
| 9 | 313°37.1 | · · 04.7 | 0°46.9 | 2.7' | 26°25.1 | 6.2' | 60.4' |
| 10 | 328°37.1 | 04.4 | 15°08.6 | 2.6' | 26°31.3 | 6.0' | 60.5' |
| 11 | 343°37.0 | 04.0 | 29°30.1 | 2.5' | 26°37.2 | 5.8' | 60.5' |
| 12 | 358°36.9 | N22°03.7 | 43°51.6 | 2.4' | N26°43.0 | 5.6' | 60.5' |
| 13 | 13°36.8 | 03.3 | 58°13.0 | 2.3' | 26°48.6 | 5.4' | 60.5' |
| 14 | 28°36.7 | 03.0 | 72°34.3 | 2.2' | 26°54.0 | 5.2' | 60.5' |
| 15 | 43°36.6 | · · 02.7 | 86°55.5 | 2.1' | 26°59.2 | 5.0' | 60.6' |
| 16 | 58°36.6 | 02.3 | 101°16.6 | 2.0' | 27°04.2 | 4.8' | 60.6' |
| 17 | 73°36.5 | 02.0 | 115°37.6 | 1.9' | 27°09.1 | 4.6' | 60.6' |
| 18 | 88°36.4 | N22°01.7 | 129°58.5 | 1.8' | N27°13.7 | 4.4' | 60.6' |
| 19 | 103°36.3 | 01.3 | 144°19.3 | 1.8' | 27°18.1 | 4.2' | 60.6' |
| 20 | 118°36.2 | 01.0 | 158°40.1 | 1.7' | 27°22.3 | 4.0' | 60.7' |
| 21 | 133°36.1 | · · 00.6 | 173°00.8 | 1.6' | 27°26.3 | 3.8' | 60.7' |
| 22 | 148°36.1 | 22°00.3 | 187°21.4 | 1.5' | 27°30.1 | 3.6' | 60.7' |
| 23 | 163°36.0 | 21°59.9 | 201°41.9 | 1.5' | 27°33.6 | 3.4' | 60.7' |
| SD = 15.7' $d = -0.3'$ | | | SD = 16.4' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | | | | | | |
| N 70° | | | | | | |
| 68° | | | | | | |
| 66° | //// | //// | 01:12 | 22:54 | //// | //// |
| 64° | //// | //// | 02:01 | 22:07 | //// | //// |
| 62° | //// | //// | 02:32 | 21:37 | //// | //// |
| 60° | //// | 01:29 | 02:55 | 21:15 | 22:39 | //// |
| N 58° | //// | 02:05 | 03:13 | 20:57 | 22:05 | //// |
| 56° | //// | 02:30 | 03:28 | 20:42 | 21:40 | //// |
| 54° | 01:22 | 02:49 | 03:41 | 20:29 | 21:21 | 22:47 |
| 52° | 01:55 | 03:05 | 03:52 | 20:18 | 21:04 | 22:15 |
| 50° | 02:18 | 03:19 | 04:02 | 20:08 | 20:51 | 21:52 |
| 45° | 02:59 | 03:47 | 04:23 | 19:47 | 20:23 | 21:11 |
| N 40° | 03:27 | 04:08 | 04:40 | 19:30 | 20:03 | 20:43 |
| 35° | 03:49 | 04:25 | 04:54 | 19:16 | 19:45 | 20:21 |
| 30° | 04:07 | 04:39 | 05:06 | 19:04 | 19:31 | 20:04 |
| 20° | 04:34 | 05:03 | 05:27 | 18:43 | 19:08 | 19:37 |
| N 10° | 04:56 | 05:22 | 05:45 | 18:26 | 18:48 | 19:15 |
| 0° | 05:13 | 05:39 | 06:02 | 18:09 | 18:31 | 18:57 |
| S 10° | 05:29 | 05:56 | 06:18 | 17:53 | 18:15 | 18:41 |
| 20° | 05:45 | 06:12 | 06:36 | 17:35 | 17:59 | 18:26 |
| 30° | 06:00 | 06:30 | 06:56 | 17:15 | 17:41 | 18:11 |
| 35° | 06:08 | 06:39 | 07:07 | 17:04 | 17:32 | 18:03 |
| 40° | 06:17 | 06:50 | 07:21 | 16:50 | 17:21 | 17:54 |
| 45° | 06:26 | 07:03 | 07:36 | 16:35 | 17:08 | 17:45 |
| S 50° | 06:37 | 07:18 | 07:56 | 16:16 | 16:53 | 17:34 |
| 52° | 06:42 | 07:25 | 08:05 | 16:06 | 16:46 | 17:29 |
| 54° | 06:47 | 07:32 | 08:15 | 15:56 | 16:39 | 17:24 |
| 56° | 06:52 | 07:41 | 08:26 | 15:45 | 16:31 | 17:19 |
| 58° | 06:59 | 07:50 | 08:40 | 15:31 | 16:21 | 17:13 |
| S 60° | 07:05 | 08:01 | 08:55 | 15:16 | 16:11 | 17:06 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | | | | | | |
| N 70° | | | | | | |
| 68° | 20:53 | | | 17:42 | | |
| 66° | 21:36 | | | 17:00 | | |
| 64° | 22:06 | 21:41 | | 16:31 | 18:58 | |
| 62° | 22:29 | 22:26 | 22:25 | 16:10 | 18:14 | 20:28 |
| 60° | 22:47 | 22:55 | 23:18 | 15:52 | 17:45 | 19:35 |
| N 58° | 23:02 | 23:18 | 23:51 | 15:38 | 17:23 | 19:03 |
| 56° | 23:15 | 23:37 | · · · | 15:25 | 17:04 | 18:39 |
| 54° | 23:27 | 23:53 | · · · | 15:15 | 16:49 | 18:20 |
| 52° | 23:37 | · · · | 00:06 | 15:05 | 16:36 | 18:03 |
| 50° | 23:46 | · · · | 00:19 | 14:57 | 16:24 | 17:49 |
| 45° | · · · | 00:06 | 00:43 | 14:39 | 16:00 | 17:21 |
| N 40° | · · · | 00:22 | 01:04 | 14:24 | 15:41 | 16:58 |
| 35° | · · · | 00:35 | 01:20 | 14:12 | 15:25 | 16:40 |
| 30° | 00:07 | 00:47 | 01:35 | 14:01 | 15:12 | 16:24 |
| 20° | 00:22 | 01:07 | 02:00 | 13:43 | 14:48 | 15:57 |
| N 10° | 00:35 | 01:25 | 02:21 | 13:27 | 14:28 | 15:34 |
| 0° | 00:47 | 01:42 | 02:42 | 13:12 | 14:09 | 15:12 |
| S 10° | 01:00 | 01:59 | 03:02 | 12:58 | 13:51 | 14:51 |
| 20° | 01:13 | 02:17 | 03:24 | 12:42 | 13:31 | 14:27 |
| 30° | 01:29 | 02:38 | 03:50 | 12:24 | 13:08 | 14:01 |
| 35° | 01:38 | 02:50 | 04:05 | 12:14 | 12:55 | 13:45 |
| 40° | 01:48 | 03:05 | 04:22 | 12:02 | 12:39 | 13:27 |
| 45° | 02:01 | 03:22 | 04:44 | 11:48 | 12:21 | 13:05 |
| S 50° | 02:16 | 03:43 | 05:11 | 11:32 | 11:58 | 12:37 |
| 52° | 02:23 | 03:53 | 05:24 | 11:24 | 11:48 | 12:23 |
| 54° | 02:31 | 04:05 | 05:39 | 11:15 | 11:35 | 12:08 |
| 56° | 02:40 | 04:18 | 05:57 | 11:05 | 11:22 | 11:49 |
| 58° | 02:50 | 04:33 | 06:19 | 10:54 | 11:05 | 11:27 |
| S 60° | 03:02 | 04:52 | 06:48 | 10:42 | 10:46 | 11:58 |

| Day | Sun | | Mer. Pass | Moon | | Age 24-26 37-17% |
|-----|-------------------------------|----------------------------|-----------|-----------------------|-----------------------|------------------|
| | Eqn. of 00 ^h mm:ss | Time 12 ^h mm:ss | | Upper Mer. Pass hh:mm | Lower Mer. Pass hh:mm | |
| 09 | 05:11 | 05:16 | 12:05 | 07:00 | 19:27 | |
| 10 | 05:20 | 05:24 | 12:05 | 07:55 | 20:25 | |
| 11 | 05:28 | 05:32 | 12:06 | 08:57 | 21:29 | |

July 12, 13, 14 UT (Sun., Mon., Tue.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|----------------------|----------|-------------------|----------|---------------------|----------|-------------------|----------|----------|
| Sun | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 289°54.4 | | 134°55.1 | N11°49.4 | 222°14.8 | N21°40.9 | 164°58.6 | N20°01.8 | 275°33.5 | N03°29.8 |
| 1 | 304°56.9 | | 149°54.9 | 48.3 | 237°15.4 | 41.2 | 180°00.5 | 01.7 | 290°35.9 | 29.8 |
| 2 | 319°59.4 | | 164°54.8 | 47.2 | 252°16.0 | 41.5 | 195°02.4 | 01.5 | 305°38.3 | 29.8 |
| 3 | 335°01.8 | | 179°54.7 | · · 46.1 | 267°16.6 | · · 41.8 | 210°04.3 | · · 01.4 | 320°40.7 | · · 29.8 |
| 4 | 350°04.3 | | 194°54.5 | 44.9 | 282°17.2 | 42.1 | 225°06.2 | 01.3 | 335°43.1 | 29.8 |
| 5 | 5°06.8 | | 209°54.4 | 43.8 | 297°17.8 | 42.4 | 240°08.1 | 01.2 | 350°45.5 | 29.8 |
| 6 | 20°09.2 | | 224°54.3 | N11°42.7 | 312°18.4 | N21°42.7 | 255°10.0 | N20°01.0 | 5°47.9 | N03°29.8 |
| 7 | 35°11.7 | | 239°54.2 | 41.6 | 327°19.1 | 43.0 | 270°11.9 | 00.9 | 20°50.3 | 29.8 |
| 8 | 50°14.2 | | 254°54.0 | 40.5 | 342°19.7 | 43.3 | 285°13.8 | 00.8 | 35°52.7 | 29.9 |
| 9 | 65°16.6 | | 269°53.9 | · · 39.4 | 357°20.3 | · · 43.6 | 300°15.6 | · · 00.7 | 50°55.1 | · · 29.9 |
| 10 | 80°19.1 | | 284°53.8 | 38.2 | 12°20.9 | 43.9 | 315°17.5 | 00.6 | 65°57.5 | 29.9 |
| 11 | 95°21.5 | | 299°53.7 | 37.1 | 27°21.5 | 44.1 | 330°19.4 | 00.4 | 80°59.9 | 29.9 |
| 12 | 110°24.0 | | 314°53.5 | N11°36.0 | 42°22.1 | N21°44.4 | 345°21.3 | N20°00.3 | 96°02.3 | N03°29.9 |
| 13 | 125°26.5 | | 329°53.4 | 34.9 | 57°22.7 | 44.7 | 0°23.2 | 00.2 | 111°04.7 | 29.9 |
| 14 | 140°28.9 | | 344°53.3 | 33.8 | 72°23.3 | 45.0 | 15°25.1 | 20°00.1 | 126°07.1 | 29.9 |
| 15 | 155°31.4 | | 359°53.2 | · · 32.6 | 87°23.9 | · · 45.3 | 30°27.0 | 19°59.9 | 141°09.5 | · · 30.0 |
| 16 | 170°33.9 | | 14°53.1 | 31.5 | 102°24.5 | 45.6 | 45°28.9 | 59.8 | 156°11.9 | 30.0 |
| 17 | 185°36.3 | | 29°52.9 | 30.4 | 117°25.1 | 45.9 | 60°30.8 | 59.7 | 171°14.3 | 30.0 |
| 18 | 200°38.8 | | 44°52.8 | N11°29.3 | 132°25.8 | N21°46.2 | 75°32.7 | N19°59.6 | 186°16.7 | N03°30.0 |
| 19 | 215°41.3 | | 59°52.7 | 28.1 | 147°26.4 | 46.5 | 90°34.6 | 59.5 | 201°19.1 | 30.0 |
| 20 | 230°43.7 | | 74°52.6 | 27.0 | 162°27.0 | 46.7 | 105°36.5 | 59.3 | 216°21.5 | 30.0 |
| 21 | 245°46.2 | | 89°52.5 | · · 25.9 | 177°27.6 | · · 47.0 | 120°38.4 | · · 59.2 | 231°23.9 | · · 30.0 |
| 22 | 260°48.7 | | 104°52.4 | 24.8 | 192°28.2 | 47.3 | 135°40.3 | 59.1 | 246°26.4 | 30.0 |
| 23 | 275°51.1 | | 119°52.2 | 23.7 | 207°28.8 | 47.6 | 150°42.2 | 59.0 | 261°28.8 | 30.0 |
| Mer.pass. 04:40 | | ν-0.1' d-1.1' m-4.11 | | ν0.6' d0.3' m1.31 | | ν1.9' d-0.1' m-1.80 | | ν2.4' d0.0' m0.73 | | |
| Mon | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 290°53.6 | | 134°52.1 | N11°22.5 | 222°29.4 | N21°47.9 | 165°44.1 | N19°58.8 | 276°31.2 | N03°30.1 |
| 1 | 305°56.0 | | 149°52.0 | 21.4 | 237°30.0 | 48.2 | 180°46.0 | 58.7 | 291°33.6 | 30.1 |
| 2 | 320°58.5 | | 164°51.9 | 20.3 | 252°30.6 | 48.5 | 195°47.9 | 58.6 | 306°36.0 | 30.1 |
| 3 | 336°01.0 | | 179°51.8 | · · 19.2 | 267°31.2 | · · 48.8 | 210°49.8 | · · 58.5 | 321°38.4 | · · 30.1 |
| 4 | 351°03.4 | | 194°51.7 | 18.0 | 282°31.8 | 49.0 | 225°51.7 | 58.4 | 336°40.8 | 30.1 |
| 5 | 6°05.9 | | 209°51.6 | 16.9 | 297°32.5 | 49.3 | 240°53.6 | 58.2 | 351°43.2 | 30.1 |
| 6 | 21°08.4 | | 224°51.5 | N11°15.8 | 312°33.1 | N21°49.6 | 255°55.5 | N19°58.1 | 6°45.6 | N03°30.1 |
| 7 | 36°10.8 | | 239°51.3 | 14.6 | 327°33.7 | 49.9 | 270°57.4 | 58.0 | 21°48.0 | 30.1 |
| 8 | 51°13.3 | | 254°51.2 | 13.5 | 342°34.3 | 50.2 | 285°59.3 | 57.9 | 36°50.4 | 30.2 |
| 9 | 66°15.8 | | 269°51.1 | · · 12.4 | 357°34.9 | · · 50.5 | 301°01.1 | · · 57.7 | 51°52.8 | · · 30.2 |
| 10 | 81°18.2 | | 284°51.0 | 11.3 | 12°35.5 | 50.7 | 316°03.0 | 57.6 | 66°55.2 | 30.2 |
| 11 | 96°20.7 | | 299°50.9 | 10.1 | 27°36.1 | 51.0 | 331°04.9 | 57.5 | 81°57.6 | 30.2 |
| 12 | 111°23.2 | | 314°50.8 | N11°09.0 | 42°36.7 | N21°51.3 | 346°06.8 | N19°57.4 | 97°00.0 | N03°30.2 |
| 13 | 126°25.6 | | 329°50.7 | 07.9 | 57°37.3 | 51.6 | 1°08.7 | 57.2 | 112°02.4 | 30.2 |
| 14 | 141°28.1 | | 344°50.6 | 06.7 | 72°37.9 | 51.9 | 16°10.6 | 57.1 | 127°04.9 | 30.2 |
| 15 | 156°30.5 | | 359°50.5 | · · 05.6 | 87°38.5 | · · 52.2 | 31°12.5 | · · 57.0 | 142°07.3 | · · 30.2 |
| 16 | 171°33.0 | | 14°50.4 | 04.5 | 102°39.2 | 52.4 | 46°14.4 | 56.9 | 157°09.7 | 30.2 |
| 17 | 186°35.5 | | 29°50.3 | 03.3 | 117°39.8 | 52.7 | 61°16.3 | 56.8 | 172°12.1 | 30.3 |
| 18 | 201°37.9 | | 44°50.2 | N11°02.2 | 132°40.4 | N21°53.0 | 76°18.2 | N19°56.6 | 187°14.5 | N03°30.3 |
| 19 | 216°40.4 | | 59°50.1 | 11°01.1 | 147°41.0 | 53.3 | 91°20.1 | 56.5 | 202°16.9 | 30.3 |
| 20 | 231°42.9 | | 74°50.0 | 10°59.9 | 162°41.6 | 53.6 | 106°22.0 | 56.4 | 217°19.3 | 30.3 |
| 21 | 246°45.3 | | 89°49.9 | · · 58.8 | 177°42.2 | · · 53.8 | 121°23.9 | · · 56.3 | 232°21.7 | · · 30.3 |
| 22 | 261°47.8 | | 104°49.8 | 57.7 | 192°42.8 | 54.1 | 136°25.8 | 56.1 | 247°24.1 | 30.3 |
| 23 | 276°50.3 | | 119°49.7 | 56.5 | 207°43.4 | 54.4 | 151°27.7 | 56.0 | 262°26.5 | 30.3 |
| Mer.pass. 04:36 | | ν-0.1' d-1.1' m-4.12 | | ν0.6' d0.3' m1.31 | | ν1.9' d-0.1' m-1.79 | | ν2.4' d0.0' m0.72 | | |
| Tue | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 291°52.7 | | 134°49.6 | N10°55.4 | 222°44.0 | N21°54.7 | 166°29.6 | N19°55.9 | 277°28.9 | N03°30.3 |
| 1 | 306°55.2 | | 149°49.5 | 54.3 | 237°44.6 | 54.9 | 181°31.5 | 55.8 | 292°31.3 | 30.3 |
| 2 | 321°57.7 | | 164°49.4 | 53.1 | 252°45.3 | 55.2 | 196°33.4 | 55.6 | 307°33.8 | 30.3 |
| 3 | 337°00.1 | | 179°49.3 | · · 52.0 | 267°45.9 | · · 55.5 | 211°35.3 | · · 55.5 | 322°36.2 | · · 30.4 |
| 4 | 352°02.6 | | 194°49.2 | 50.9 | 282°46.5 | 55.8 | 226°37.2 | 55.4 | 337°38.6 | 30.4 |
| 5 | 7°05.0 | | 209°49.1 | 49.7 | 297°47.1 | 56.1 | 241°39.1 | 55.3 | 352°41.0 | 30.4 |
| 6 | 22°07.5 | | 224°49.0 | N10°48.6 | 312°47.7 | N21°56.3 | 256°40.9 | N19°55.1 | 7°43.4 | N03°30.4 |
| 7 | 37°10.0 | | 239°48.9 | 47.5 | 327°48.3 | 56.6 | 271°42.8 | 55.0 | 22°45.8 | 30.4 |
| 8 | 52°12.4 | | 254°48.8 | 46.3 | 342°48.9 | 56.9 | 286°44.7 | 54.9 | 37°48.2 | 30.4 |
| 9 | 67°14.9 | | 269°48.7 | · · 45.2 | 357°49.5 | · · 57.2 | 301°46.6 | · · 54.8 | 52°50.6 | · · 30.4 |
| 10 | 82°17.4 | | 284°48.6 | 44.0 | 12°50.1 | 57.4 | 316°48.5 | 54.7 | 67°53.0 | 30.4 |
| 11 | 97°19.8 | | 299°48.5 | 42.9 | 27°50.7 | 57.7 | 331°50.4 | 54.5 | 82°55.4 | 30.4 |
| 12 | 112°22.3 | | 314°48.4 | N10°41.8 | 42°51.3 | N21°58.0 | 346°52.3 | N19°54.4 | 97°57.9 | N03°30.4 |
| 13 | 127°24.8 | | 329°48.4 | 40.6 | 57°52.0 | 58.3 | 1°54.2 | 54.3 | 113°00.3 | 30.5 |
| 14 | 142°27.2 | | 344°48.3 | 39.5 | 72°52.6 | 58.5 | 16°56.1 | 54.2 | 128°02.7 | 30.5 |
| 15 | 157°29.7 | | 359°48.2 | · · 38.4 | 87°53.2 | · · 58.8 | 31°58.0 | · · 54.0 | 143°05.1 | · · 30.5 |
| 16 | 172°32.2 | | 14°48.1 | 37.2 | 102°53.8 | 59.1 | 46°59.9 | 53.9 | 158°07.5 | 30.5 |
| 17 | 187°34.6 | | 29°48.0 | 36.1 | 117°54.4 | 59.3 | 62°01.8 | 53.8 | 173°09.9 | 30.5 |
| 18 | 202°37.1 | | 44°47.9 | N10°34.9 | 132°55.0 | N21°59.6 | 77°03.7 | N19°53.7 | 188°12.3 | N03°30.5 |
| 19 | 217°39.5 | | 59°47.8 | 33.8 | 147°55.6 | 21°59.9 | 92°05.6 | 53.5 | 203°14.7 | 30.5 |
| 20 | 232°42.0 | | 74°47.7 | 32.6 | 162°56.2 | 22°00.2 | 107°07.5 | 53.4 | 218°17.2 | 30.5 |
| 21 | 247°44.5 | | 89°47.7 | · · 31.5 | 177°56.8 | · · 00.4 | 122°09.4 | · · 53.3 | 233°19.6 | · · 30.5 |
| 22 | 262°46.9 | | 104°47.6 | 30.4 | 192°57.4 | 00.7 | 137°11.3 | 53.2 | 248°22.0 | 30.5 |
| 23 | 277°49.4 | | 119°47.5 | 29.2 | 207°58.1 | 01.0 | 152°13.2 | 53.0 | 263°24.4 | 30.5 |
| Mer.pass. 04:32 | | ν-0.1' d-1.1' m-4.13 | | ν0.6' d0.3' m1.31 | | ν1.9' d-0.1' m-1.79 | | ν2.4' d0.0' m0.72 | | |

| | SHA | Dec |
|---------------------|----------|----------|
| Alpheratz | 357°33.4 | 29°14.2 |
| Ankaa | 353°05.8 | -42°09.4 |
| Schedar | 349°29.5 | 56°40.8 |
| Diphda | 348°46.0 | -17°50.3 |
| Achernar | 335°19.3 | -57°05.8 |
| Hamal | 327°49.8 | 23°35.2 |
| Polaris | 313°36.3 | 89°22.2 |
| Acamar | 315°11.0 | -40°11.6 |
| Menkar | 314°05.0 | 4°11.7 |
| Mirfak | 308°26.7 | 49°57.1 |
| Aldebaran | 290°38.4 | 16°33.7 |
| Rigel | 281°02.9 | -8°10.2 |
| Capella | 280°20.4 | 46°01.4 |
| Bellatrix | 278°21.8 | 6°22.5 |
| Elnath | 278°00.6 | 28°37.7 |
| Alnilam | 275°36.8 | -1°11.0 |
| Betelgeuse | 270°51.0 | 7°24.7 |
| Canopus | 263°52.4 | -52°42.5 |
| Sirius | 258°25.5 | -16°45.1 |
| Adhara | 255°05.3 | -29°00.4 |
| Procyon | 244°49.9 | 5°09.4 |
| Pollux | 243°16.1 | 27°57.7 |
| Avior | 234°14.9 | -59°35.7 |
| Suhail | 222°45.8 | -43°32.5 |
| Miaplacidus | 221°38.9 | -69°49.7 |
| Alphard | 217°46.8 | -8°46.4 |
| Regulus | 207°33.4 | 11°50.3 |
| Dubhe | 193°39.9 | 61°36.7 |
| Denebola | 182°23.8 | 14°25.5 |
| Gienah | 175°42.4 | -17°41.5 |
| Acrux | 172°58.8 | -63°15.1 |
| Gacrux | 171°50.4 | -57°16.0 |
| Alioth | 166°11.9 | 55°49.2 |
| Spica | 158°21.0 | -11°18.1 |
| Alkaid | 152°50.9 | 49°11.1 |
| Hadar | 148°34.1 | -60°30.3 |
| Menkent | 147°56.0 | -36°30.2 |
| Arcturus | 145°46.7 | 19°02.8 |
| Rigel Kent. | 139°38.3 | -60°57.0 |
| Kochab | 137°19.4 | 74°03.0 |
| Zuben'ubi | 136°54.5 | -16°09.2 |
| Alphecca | 126°02.5 | 26°37.6 |
| Antares | 112°14.0 | -26°29.5 |
| Atria | 107°06.6 | -69°04.6 |
| Sabik | 102°01.0 | -15°45.5 |
| Shaula | 96°08.3 | -37°07.4 |
| Rasalhague | 95°57.1 | 12°32.5 |
| Eltanin | 90°41.1 | 51°29.2 |
| Kaus Aust. | 83°30.4 | -34°22.3 |
| Vega | 80°31.9 | 38°48.5 |
| Nunki | 75°45.8 | -26°15.8 |
| Altair | 61°58.4 | 8°56.4 |
| Peacock | 53°03.2 | -56°38.8 |
| Deneb | 49°24.5 | 45°22.5 |
| Enif | 33°37.3 | 9°59.9 |
| Al Na'ir | 27°31.0 | -46°49.7 |
| Fomalhaut | 15°12.9 | -29°28.7 |
| Scheat | 13°43.8 | 28°13.6 |
| Markab | 13°28.5 | 15°20.9 |
| Jul 12 Sun | SHA | Mer.pass |
| Venus | 205°00.6 | 15:00 |
| Mars | 292°20.3 | 09:11 |
| Jupiter | 235°04.1 | 12:58 |
| Saturn | 345°39.0 | 05:37 |
| Jul 13 Mon | SHA | Mer.pass |
| Venus | 203°58.6 | 15:01 |
| Mars | 291°35.8 | 09:10 |
| Jupiter | 234°50.5 | 12:55 |
| Saturn | 345°37.6 | 05:33 |
| Jul 14 Tue | SHA | Mer.pass |
| Venus | 202°56.9 | 15:01 |
| Mars | 290°51.3 | 09:09 |
| Jupiter | 234°36.9 | 12:52 |
| Saturn | 345°36.2 | 05:29 |
| Horizontal parallax | | |


| h | Sun | | | | Moon | | | |
|------------------------|----------|----------|----------|------------|----------|-------|-------|--|
| Sun | GHA | Dec | GHA | ν | Dec | d | HP | |
| 0 | 178°35.9 | N21°59.6 | 216°02.4 | 1.4' | N27°37.0 | 3.2' | 60.7' | |
| 1 | 193°35.8 | 59.3 | 230°22.8 | 1.3' | 27°40.2 | 3.0' | 60.7' | |
| 2 | 208°35.7 | 58.9 | 244°43.1 | 1.3' | 27°43.1 | 2.7' | 60.8' | |
| 3 | 223°35.7 | •• 58.6 | 259°03.4 | 1.2' | 27°45.9 | 2.5' | 60.8' | |
| 4 | 238°35.6 | 58.2 | 273°23.6 | 1.2' | 27°48.4 | 2.3' | 60.8' | |
| 5 | 253°35.5 | 57.9 | 287°43.8 | 1.1' | 27°50.7 | 2.1' | 60.8' | |
| 6 | 268°35.4 | N21°57.5 | 302°03.9 | 1.1' | N27°52.8 | 1.9' | 60.8' | |
| 7 | 283°35.3 | 57.2 | 316°23.9 | 1.0' | 27°54.7 | 1.7' | 60.8' | |
| 8 | 298°35.3 | 56.8 | 330°44.0 | 1.0' | 27°56.4 | 1.5' | 60.8' | |
| 9 | 313°35.2 | •• 56.5 | 345°03.9 | 0.9' | 27°57.9 | 1.2' | 60.8' | |
| 10 | 328°35.1 | 56.1 | 359°23.9 | 0.9' | 27°59.1 | 1.0' | 60.9' | |
| 11 | 343°35.0 | 55.8 | 13°43.8 | 0.9' | 28°00.1 | 0.8' | 60.9' | |
| 12 | 358°34.9 | N21°55.4 | 28°03.7 | 0.9' | N28°00.9 | 0.6' | 60.9' | |
| 13 | 13°34.9 | 55.1 | 42°23.6 | 0.8' | 28°01.5 | 0.4' | 60.9' | |
| 14 | 28°34.8 | 54.7 | 56°43.4 | 0.8' | 28°01.9 | 0.1' | 60.9' | |
| 15 | 43°34.7 | •• 54.4 | 71°03.2 | 0.8' | 28°02.0 | -0.1' | 60.9' | |
| 16 | 58°34.6 | 54.0 | 85°23.0 | 0.8' | 28°02.0 | -0.3' | 60.9' | |
| 17 | 73°34.5 | 53.6 | 99°42.8 | 0.8' | 28°01.7 | -0.5' | 60.9' | |
| 18 | 88°34.5 | N21°53.3 | 114°02.6 | 0.8' | N28°01.2 | -0.7' | 60.9' | |
| 19 | 103°34.4 | 52.9 | 128°22.4 | 0.8' | 28°00.4 | -1.0' | 60.9' | |
| 20 | 118°34.3 | 52.6 | 142°42.1 | 0.8' | 27°59.5 | -1.2' | 60.9' | |
| 21 | 133°34.2 | •• 52.2 | 157°01.9 | 0.8' | 27°58.3 | -1.4' | 61.0' | |
| 22 | 148°34.2 | 51.9 | 171°21.7 | 0.8' | 27°56.9 | -1.6' | 61.0' | |
| 23 | 163°34.1 | 51.5 | 185°41.5 | 0.8' | 27°55.3 | -1.8' | 61.0' | |
| SD = 15.7' $d = -0.3'$ | | | | SD = 16.6' | | | | |

| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|----------|------------|----------|-------|-------|
| 0 | 178°34.0 | N21°51.1 | 200°01.3 | 0.8' | N27°53.4 | -2.1' | 61.0' |
| 1 | 193°33.9 | 50.8 | 214°21.2 | 0.9' | 27°51.4 | -2.3' | 61.0' |
| 2 | 208°33.9 | 50.4 | 228°41.0 | 0.9' | 27°49.1 | -2.5' | 61.0' |
| 3 | 223°33.8 | 50.0 | 243°00.9 | 0.9' | 27°46.6 | -2.7' | 61.0' |
| 4 | 238°33.7 | 49.7 | 257°20.8 | 0.9' | 27°43.9 | -2.9' | 61.0' |
| 5 | 253°33.6 | 49.3 | 271°40.8 | 1.0' | 27°41.0 | -3.1' | 61.0' |
| 6 | 268°33.6 | N21°49.0 | 286°00.7 | 1.0' | N27°37.9 | -3.4' | 61.0' |
| 7 | 283°33.5 | 48.6 | 300°20.8 | 1.1' | 27°34.5 | -3.6' | 61.0' |
| 8 | 298°33.4 | 48.2 | 314°40.8 | 1.1' | 27°30.9 | -3.8' | 61.0' |
| 9 | 313°33.3 | 47.9 | 329°00.9 | 1.2' | 27°27.1 | -4.0' | 61.0' |
| 10 | 328°33.3 | 47.5 | 343°21.1 | 1.2' | 27°23.1 | -4.2' | 61.0' |
| 11 | 343°33.2 | 47.1 | 357°41.3 | 1.3' | 27°18.9 | -4.4' | 61.0' |
| 12 | 358°33.1 | N21°46.8 | 12°01.5 | 1.3' | N27°14.5 | -4.6' | 61.0' |
| 13 | 13°33.0 | 46.4 | 26°21.9 | 1.4' | 27°09.9 | -4.8' | 61.0' |
| 14 | 28°33.0 | 46.0 | 40°42.2 | 1.4' | 27°05.0 | -5.1' | 61.0' |
| 15 | 43°32.9 | 45.7 | 55°02.7 | 1.5' | 27°00.0 | -5.3' | 61.0' |
| 16 | 58°32.8 | 45.3 | 69°23.2 | 1.6' | 26°54.7 | -5.5' | 61.0' |
| 17 | 73°32.7 | 44.9 | 83°43.8 | 1.7' | 26°49.2 | -5.7' | 61.0' |
| 18 | 88°32.7 | N21°44.5 | 98°04.5 | 1.7' | N26°43.5 | -5.9' | 61.0' |
| 19 | 103°32.6 | 44.2 | 112°25.2 | 1.8' | 26°37.7 | -6.1' | 61.0' |
| 20 | 118°32.5 | 43.8 | 126°46.0 | 1.9' | 26°31.6 | -6.3' | 60.9' |
| 21 | 133°32.4 | 43.4 | 141°06.9 | 2.0' | 26°25.3 | -6.5' | 60.9' |
| 22 | 148°32.4 | 43.0 | 155°27.9 | 2.1' | 26°18.8 | -6.7' | 60.9' |
| 23 | 163°32.3 | 42.7 | 169°49.0 | 2.2' | 26°12.2 | -6.9' | 60.9' |
| SD = 15.7' $d = -0.4'$ | | | | SD = 16.6' | | | |

| Tue | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|----------|------------|----------|--------|-------|
| 0 | 178°32.2 | N21°42.3 | 184°10.1 | 2.3' | N26°05.3 | -7.1' | 60.9' |
| 1 | 193°32.2 | 41.9 | 198°31.4 | 2.4' | 25°58.2 | -7.3' | 60.9' |
| 2 | 208°32.1 | 41.5 | 212°52.7 | 2.5' | 25°51.0 | -7.4' | 60.9' |
| 3 | 223°32.0 | 41.2 | 227°14.2 | 2.6' | 25°43.5 | -7.6' | 60.9' |
| 4 | 238°31.9 | 40.8 | 241°35.7 | 2.7' | 25°35.9 | -7.8' | 60.9' |
| 5 | 253°31.9 | 40.4 | 255°57.4 | 2.8' | 25°28.1 | -8.0' | 60.9' |
| 6 | 268°31.8 | N21°40.0 | 270°19.2 | 2.9' | N25°20.1 | -8.2' | 60.9' |
| 7 | 283°31.7 | 39.6 | 284°41.0 | 3.0' | 25°11.9 | -8.4' | 60.8' |
| 8 | 298°31.7 | 39.3 | 299°03.0 | 3.1' | 25°03.5 | -8.6' | 60.8' |
| 9 | 313°31.6 | 38.9 | 313°25.1 | 3.2' | 24°55.0 | -8.7' | 60.8' |
| 10 | 328°31.5 | 38.5 | 327°47.3 | 3.3' | 24°46.2 | -8.9' | 60.8' |
| 11 | 343°31.5 | 38.1 | 342°09.6 | 3.4' | 24°37.3 | -9.1' | 60.8' |
| 12 | 358°31.4 | N21°37.7 | 356°32.0 | 3.5' | N24°28.3 | -9.2' | 60.8' |
| 13 | 13°31.3 | 37.4 | 10°54.5 | 3.7' | 24°19.0 | -9.4' | 60.8' |
| 14 | 28°31.3 | 37.0 | 25°17.2 | 3.8' | 24°09.6 | -9.6' | 60.7' |
| 15 | 43°31.2 | 36.6 | 39°40.0 | 3.9' | 24°00.0 | -9.7' | 60.7' |
| 16 | 58°31.1 | 36.2 | 54°02.9 | 4.0' | 23°50.3 | -9.9' | 60.7' |
| 17 | 73°31.0 | 35.8 | 68°25.9 | 4.1' | 23°40.3 | -10.1' | 60.7' |
| 18 | 88°31.0 | N21°35.4 | 82°49.0 | 4.3' | N23°30.3 | -10.2' | 60.7' |
| 19 | 103°30.9 | 35.0 | 97°12.3 | 4.4' | 23°20.0 | -10.4' | 60.7' |
| 20 | 118°30.8 | 34.6 | 111°35.7 | 4.5' | 23°09.7 | -10.5' | 60.6' |
| 21 | 133°30.8 | 34.3 | 125°59.2 | 4.6' | 22°59.1 | -10.7' | 60.6' |
| 22 | 148°30.7 | 33.9 | 140°22.8 | 4.8' | 22°48.4 | -10.8' | 60.6' |
| 23 | 163°30.6 | 33.5 | 154°46.6 | 4.9' | 22°37.6 | -11.0' | 60.6' |
| SD = 15.7' $d = -0.4'$ | | | | SD = 16.6' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | □ | □ | □ | □ | □ | □ |
| 66° | //// | //// | 01:26 | 22:41 | //// | //// |
| 64° | //// | //// | 02:10 | 22:00 | //// | //// |
| 62° | //// | 00:31 | 02:38 | 21:32 | 23:31 | //// |
| 60° | //// | 01:38 | 03:00 | 21:10 | 22:30 | //// |
| N 58° | //// | 02:11 | 03:17 | 20:53 | 21:59 | //// |
| 56° | 00:29 | 02:35 | 03:32 | 20:39 | 21:35 | 23:34 |
| 54° | 01:30 | 02:54 | 03:45 | 20:26 | 21:17 | 22:39 |
| 52° | 02:01 | 03:09 | 03:56 | 20:15 | 21:01 | 22:09 |
| 50° | 02:23 | 03:23 | 04:05 | 20:06 | 20:48 | 21:47 |
| 45° | 03:02 | 03:50 | 04:26 | 19:45 | 20:21 | 21:08 |
| N 40° | 03:30 | 04:10 | 04:42 | 19:29 | 20:01 | 20:41 |
| 35° | 03:51 | 04:27 | 04:56 | 19:15 | 19:44 | 20:20 |
| 30° | 04:08 | 04:41 | 05:08 | 19:03 | 19:30 | 20:03 |
| 20° | 04:35 | 05:04 | 05:28 | 18:43 | 19:07 | 19:36 |
| N 10° | 04:56 | 05:23 | 05:46 | 18:26 | 18:48 | 19:15 |
| 0° | 05:14 | 05:40 | 06:02 | 18:09 | 18:32 | 18:58 |
| S 10° | 05:30 | 05:56 | 06:18 | 17:53 | 18:16 | 18:42 |
| 20° | 05:45 | 06:12 | 06:35 | 17:36 | 18:00 | 18:27 |
| 30° | 05:59 | 06:29 | 06:55 | 17:17 | 17:43 | 18:12 |
| 35° | 06:07 | 06:39 | 07:06 | 17:05 | 17:33 | 18:04 |
| 40° | 06:16 | 06:49 | 07:19 | 16:53 | 17:23 | 17:56 |
| 45° | 06:25 | 07:02 | 07:35 | 16:37 | 17:10 | 17:47 |
| S 50° | 06:35 | 07:16 | 07:53 | 16:19 | 16:56 | 17:37 |
| 52° | 06:40 | 07:23 | 08:02 | 16:10 | 16:49 | 17:32 |
| 54° | 06:45 | 07:30 | 08:12 | 16:00 | 16:42 | 17:27 |
| 56° | 06:50 | 07:38 | 08:23 | 15:49 | 16:34 | 17:22 |
| 58° | 06:56 | 07:47 | 08:36 | 15:36 | 16:25 | 17:16 |
| S 60° | 07:03 | 07:57 | 08:51 | 15:21 | 16:15 | 17:09 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | □ | □ | □ | □ | □ | □ |
| 66° | □ | □ | □ | □ | □ | 23:13 |
| 64° | □ | □ | 00:04 | □ | 23:31 | 22:33 |
| 62° | 23:11 | | 01:27 | 22:03 | 22:08 | 22:05 |
| 60° | | 00:19 | 02:03 | 20:55 | 21:31 | 21:43 |
| N 58° | | 00:54 | 02:29 | 20:20 | 21:04 | 21:25 |
| 56° | 00:15 | 01:19 | 02:50 | 19:55 | 20:43 | 21:10 |
| 54° | 00:35 | 01:40 | 03:07 | 19:34 | 20:25 | 20:57 |
| 52° | 00:51 | 01:57 | 03:22 | 19:17 | 20:10 | 20:46 |
| 50° | 01:06 | 02:12 | 03:34 | 19:02 | 19:57 | 20:36 |
| 45° | 01:35 | 02:41 | 04:00 | 18:33 | 19:30 | 20:14 |
| N 40° | 01:57 | 03:04 | 04:21 | 18:09 | 19:09 | 19:57 |
| 35° | 02:16 | 03:24 | 04:38 | 17:50 | 18:51 | 19:42 |
| 30° | 02:33 | 03:40 | 04:53 | 17:33 | 18:36 | 19:29 |
| 20° | 03:00 | 04:08 | 05:18 | 17:05 | 18:09 | 19:07 |
| N 10° | 03:24 | 04:32 | 05:39 | 16:41 | 17:47 | 18:47 |
| 0° | 03:47 | 04:54 | 05:59 | 16:19 | 17:25 | 18:29 |
| S 10° | 04:09 | 05:16 | 06:19 | 15:56 | 17:04 | 18:11 |
| 20° | 04:33 | 05:40 | 06:41 | 15:32 | 16:41 | 17:51 |
| 30° | 05:01 | 06:08 | 07:05 | 15:03 | 16:14 | 17:28 |
| 35° | 05:18 | 06:24 | 07:20 | 14:47 | 15:58 | 17:15 |
| 40° | 05:37 | 06:43 | 07:37 | 14:27 | 15:39 | 16:59 |
| 45° | 06:01 | 07:06 | 07:56 | 14:03 | 15:17 | 16:40 |
| S 50° | 06:31 | 07:35 | 08:21 | 13:33 | 14:48 | 16:16 |
| 52° | 06:46 | 07:50 | 08:33 | 13:18 | 14:34 | 16:05 |
| 54° | 07:04 | 08:07 | 08:47 | 13:00 | 14:17 | 15:52 |
| 56° | 07:25 | 08:27 | 09:02 | 12:39 | 13:58 | 15:37 |
| 58° | 07:52 | 08:51 | 09:21 | 12:12 | 13:33 | 15:19 |
| S 60° | 08:30 | 09:25 | 09:43 | 11:34 | 13:00 | 14:57 |

| Day | Sun | | Mer. Pass hh:mm | Moon | | Age 27-0 9-0% |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|---|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 12 | 05:36 | 05:40 | 12:06 | 10:03 | 22:36 |  |
| 13 | 05:44 | 05:48 | 12:06 | 11:10 | 23:43 | |
| 14 | 05:51 | 05:54 | 12:06 | 12:14 | --:-- | |

July 15, 16, 17 UT (Wed., Thu., Fri.)

| | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|----------------------|----------|----------|-------------------|----------|----------|---------------------|----------|----------|-------------------|--------|-----|--|-------------|-------------------|--|
| Wed | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | | SHA | Dec | |
| 0 | 292°51.9 | 134°47.4 | N10°28.1 | 222°58.7 | N22°01.2 | | 167°15.1 | N19°52.9 | | 278°26.8 | N03°30.6 | | | | | Alpheratz | 357°33.3 29°14.2 | |
| 1 | 307°54.3 | 149°47.3 | 26.9 | 237°59.3 | 01.5 | | 182°17.0 | 52.8 | | 293°29.2 | 30.6 | | | | | Ankaa | 353°05.8 -42°09.4 | |
| 2 | 322°56.8 | 164°47.2 | 25.8 | 252°59.9 | 01.8 | | 197°18.8 | 52.7 | | 308°31.6 | 30.6 | | | | | Schedar | 349°29.5 56°40.8 | |
| 3 | 337°59.3 | 179°47.2 | •• 24.6 | 268°00.5 | •• 02.0 | | 212°20.7 | •• 52.5 | | 323°34.0 | •• 30.6 | | | | | Diphda | 348°46.0 -17°50.2 | |
| 4 | 353°01.7 | 194°47.1 | 23.5 | 283°01.1 | 02.3 | | 227°22.6 | 52.4 | | 338°36.5 | 30.6 | | | | | Achernar | 335°19.3 -57°05.7 | |
| 5 | 8°04.2 | 209°47.0 | 22.4 | 298°01.7 | 02.6 | | 242°24.5 | 52.3 | | 353°38.9 | 30.6 | | | | | Hamal | 327°49.8 23°35.2 | |
| 6 | 23°06.6 | 224°46.9 | N10°21.2 | 313°02.3 | N22°02.8 | | 257°26.4 | N19°52.2 | | 8°41.3 | N03°30.6 | | | | | Polaris | 313°34.8 89°22.2 | |
| 7 | 38°09.1 | 239°46.8 | 20.1 | 328°02.9 | 03.1 | | 272°28.3 | 52.0 | | 23°43.7 | 30.6 | | | | | Acamar | 315°11.0 -40°11.6 | |
| 8 | 53°11.6 | 254°46.8 | 18.9 | 343°03.5 | 03.4 | | 287°30.2 | 51.9 | | 38°46.1 | 30.6 | | | | | Menkar | 314°04.9 4°11.7 | |
| 9 | 68°14.0 | 269°46.7 | •• 17.8 | 358°04.2 | •• 03.6 | | 302°32.1 | •• 51.8 | | 53°48.5 | •• 30.6 | | | | | Mirfak | 308°26.7 49°57.2 | |
| 10 | 83°16.5 | 284°46.6 | 16.6 | 13°04.8 | 03.9 | | 317°34.0 | 51.7 | | 68°50.9 | 30.6 | | | | | Aldebaran | 290°38.4 16°33.8 | |
| 11 | 98°19.0 | 299°46.5 | 15.5 | 28°05.4 | 04.2 | | 332°35.9 | 51.5 | | 83°53.4 | 30.6 | | | | | Rigel | 281°02.9 -8°10.2 | |
| 12 | 113°21.4 | 314°46.5 | N10°14.3 | 43°06.0 | N22°04.4 | | 347°37.8 | N19°51.4 | | 98°55.8 | N03°30.7 | | | | | Capella | 280°20.4 46°01.4 | |
| 13 | 128°23.9 | 329°46.4 | 13.2 | 58°06.6 | 04.7 | | 2°39.7 | 51.3 | | 113°58.2 | 30.7 | | | | | Bellatrix | 278°21.8 6°22.5 | |
| 14 | 143°26.4 | 344°46.3 | 12.0 | 73°07.2 | 05.0 | | 17°41.6 | 51.2 | | 129°00.6 | 30.7 | | | | | Elnath | 278°00.6 28°37.7 | |
| 15 | 158°28.8 | 359°46.2 | •• 10.9 | 88°07.8 | •• 05.2 | | 32°43.5 | •• 51.0 | | 144°03.0 | •• 30.7 | | | | | Alnilam | 275°36.7 -1°11.0 | |
| 16 | 173°31.3 | 14°46.2 | 09.7 | 103°08.4 | 05.5 | | 47°45.4 | 50.9 | | 159°05.4 | 30.7 | | | | | Betelgeuse | 270°51.0 7°24.8 | |
| 17 | 188°33.8 | 29°46.1 | 08.6 | 118°09.0 | 05.8 | | 62°47.3 | 50.8 | | 174°07.9 | 30.7 | | | | | Canopus | 263°52.4 -52°42.4 | |
| 18 | 203°36.2 | 44°46.0 | N10°07.4 | 133°09.6 | N22°06.0 | | 77°49.2 | N19°50.7 | | 189°10.3 | N03°30.7 | | | | | Sirius | 258°25.5 -16°45.1 | |
| 19 | 218°38.7 | 59°45.9 | 06.3 | 148°10.3 | 06.3 | | 92°51.1 | 50.5 | | 204°12.7 | 30.7 | | | | | Adhara | 255°05.2 -29°00.4 | |
| 20 | 233°41.1 | 74°45.9 | 05.1 | 163°10.9 | 06.5 | | 107°53.0 | 50.4 | | 219°15.1 | 30.7 | | | | | Procyon | 244°49.8 5°09.4 | |
| 21 | 248°43.6 | 89°45.8 | •• 04.0 | 178°11.5 | •• 06.8 | | 122°54.8 | •• 50.3 | | 234°17.5 | •• 30.7 | | | | | Pollux | 243°16.1 27°57.7 | |
| 22 | 263°46.1 | 104°45.7 | 02.8 | 193°12.1 | 07.1 | | 137°56.7 | 50.2 | | 249°19.9 | 30.7 | | | | | Avior | 234°14.9 -59°35.7 | |
| 23 | 278°48.5 | 119°45.7 | 01.7 | 208°12.7 | 07.3 | | 152°58.6 | 50.0 | | 264°22.4 | 30.7 | | | | | Suhail | 222°45.8 -43°32.5 | |
| Mer.pass. 04:28 | | | ν-0.1' d-1.1' m-4.13 | | | ν0.6' d0.3' m1.31 | | | ν1.9' d-0.1' m-1.79 | | | ν2.4' d0.0' m0.71 | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | | | | |
| 0 | 293°51.0 | 134°45.6 | N10°00.5 | 223°13.3 | N22°07.6 | | 168°00.5 | N19°49.9 | | 279°24.8 | N03°30.7 | | | | | Miaplacidus | 221°38.9 -69°49.7 | |
| 1 | 308°53.5 | 149°45.5 | 09°59.4 | 238°13.9 | 07.9 | | 183°02.4 | 49.8 | | 294°27.2 | 30.7 | | | | | Alphard | 217°46.8 -8°46.4 | |
| 2 | 323°55.9 | 164°45.5 | 58.2 | 253°14.5 | 08.1 | | 198°04.3 | 49.7 | | 309°29.6 | 30.8 | | | | | Regulus | 207°33.4 11°50.3 | |
| 3 | 338°58.4 | 179°45.4 | •• 57.1 | 268°15.1 | •• 08.4 | | 213°06.2 | •• 49.5 | | 324°32.0 | •• 30.8 | | | | | Dubhe | 193°39.9 61°36.7 | |
| 4 | 354°00.9 | 194°45.3 | 55.9 | 283°15.7 | 08.6 | | 228°08.1 | 49.4 | | 339°34.4 | 30.8 | | | | | Denebola | 182°23.8 14°25.5 | |
| 5 | 9°03.3 | 209°45.3 | 54.8 | 298°16.4 | 08.9 | | 243°10.0 | 49.3 | | 354°36.9 | 30.8 | | | | | Gienah | 175°42.4 -17°41.5 | |
| 6 | 24°05.8 | 224°45.2 | N09°53.6 | 313°17.0 | N22°09.2 | | 258°11.9 | N19°49.2 | | 9°39.3 | N03°30.8 | | | | | Acrux | 172°58.9 -63°15.1 | |
| 7 | 39°08.3 | 239°45.1 | 52.5 | 328°17.6 | 09.4 | | 273°13.8 | 49.0 | | 24°41.7 | 30.8 | | | | | Gacrux | 171°50.4 -57°16.0 | |
| 8 | 54°10.7 | 254°45.1 | 51.3 | 343°18.2 | 09.7 | | 288°15.7 | 48.9 | | 39°44.1 | 30.8 | | | | | Alioth | 166°11.9 55°49.2 | |
| 9 | 69°13.2 | 269°45.0 | •• 50.1 | 358°18.8 | •• 09.9 | | 303°17.6 | •• 48.8 | | 54°46.5 | •• 30.8 | | | | | Spica | 158°21.0 -11°18.1 | |
| 10 | 84°15.6 | 284°45.0 | 49.0 | 13°19.4 | 10.2 | | 318°19.5 | 48.7 | | 69°48.9 | 30.8 | | | | | Alkaid | 152°51.0 49°11.1 | |
| 11 | 99°18.1 | 299°44.9 | 47.8 | 28°20.0 | 10.4 | | 333°21.4 | 48.5 | | 84°51.4 | 30.8 | | | | | Hadar | 148°34.1 -60°30.4 | |
| 12 | 114°20.6 | 314°44.8 | N09°46.7 | 43°20.6 | N22°10.7 | | 348°23.3 | N19°48.4 | | 99°53.8 | N03°30.8 | | | | | Menkent | 147°56.0 -36°30.2 | |
| 13 | 129°23.0 | 329°44.8 | 45.5 | 58°21.2 | 11.0 | | 3°25.2 | 48.3 | | 114°56.2 | 30.8 | | | | | Arcturus | 145°46.7 19°02.8 | |
| 14 | 144°25.5 | 344°44.7 | 44.4 | 73°21.8 | 11.2 | | 18°27.1 | 48.2 | | 129°58.6 | 30.8 | | | | | Rigel Kent. | 139°38.3 -60°57.0 | |
| 15 | 159°28.0 | 359°44.7 | •• 43.2 | 88°22.5 | •• 11.5 | | 33°29.0 | •• 48.0 | | 145°01.0 | •• 30.8 | | | | | Kochab | 137°19.4 74°03.0 | |
| 16 | 174°30.4 | 14°44.6 | 42.0 | 103°23.1 | 11.7 | | 48°30.8 | 47.9 | | 160°03.5 | 30.8 | | | | | Zuben'ubi | 136°54.5 -16°09.2 | |
| 17 | 189°32.9 | 29°44.5 | 40.9 | 118°23.7 | 12.0 | | 63°32.7 | 47.8 | | 175°05.9 | 30.9 | | | | | Alphecca | 126°02.5 26°37.6 | |
| 18 | 204°35.4 | 44°44.5 | N09°39.7 | 133°24.3 | N22°12.2 | | 78°34.6 | N19°47.7 | | 190°08.3 | N03°30.9 | | | | | Antares | 112°14.0 -26°29.5 | |
| 19 | 219°37.8 | 59°44.4 | 38.6 | 148°24.9 | 12.5 | | 93°36.5 | 47.5 | | 205°10.7 | 30.9 | | | | | Atria | 107°06.6 -69°04.7 | |
| 20 | 234°40.3 | 74°44.4 | 37.4 | 163°25.5 | 12.7 | | 108°38.4 | 47.4 | | 220°13.1 | 30.9 | | | | | Sabik | 102°01.0 -15°45.5 | |
| 21 | 249°42.8 | 89°44.3 | •• 36.3 | 178°26.1 | •• 13.0 | | 123°40.3 | •• 47.3 | | 235°15.6 | •• 30.9 | | | | | Shaula | 96°08.3 -37°07.4 | |
| 22 | 264°45.2 | 104°44.3 | 35.1 | 193°26.7 | 13.2 | | 138°42.2 | 47.2 | | 250°18.0 | 30.9 | | | | | Rasalhague | 95°57.1 12°32.5 | |
| 23 | 279°47.7 | 119°44.2 | 33.9 | 208°27.3 | 13.5 | | 153°44.1 | 47.0 | | 265°20.4 | 30.9 | | | | | Eltanin | 90°41.1 51°29.2 | |
| Mer.pass. 04:24 | | | ν-0.1' d-1.2' m-4.14 | | | ν0.6' d0.3' m1.31 | | | ν1.9' d-0.1' m-1.79 | | | ν2.4' d0.0' m0.71 | | | | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | | | | |
| 0 | 294°50.1 | 134°44.2 | N09°32.8 | 223°28.0 | N22°13.7 | | 168°46.0 | N19°46.9 | | 280°22.8 | N03°30.9 | | | | | Jul 15 Wed | SHA Mer.pass | |
| 1 | 309°52.6 | 149°44.1 | 31.6 | 238°28.6 | 14.0 | | 183°47.9 | 46.8 | | 295°25.2 | 30.9 | | | | | Venus | 201°55.5 15:01 | |
| 2 | 324°55.1 | 164°44.1 | 30.5 | 253°29.2 | 14.2 | | 198°49.8 | 46.7 | | 310°27.7 | 30.9 | | | | | Mars | 290°06.8 09:08 | |
| 3 | 339°57.5 | 179°44.0 | •• 29.3 | 268°29.8 | •• 14.5 | | 213°51.7 | •• 46.5 | | 325°30.1 | •• 30.9 | | | | | Jupiter | 234°23.2 12:49 | |
| 4 | 355°00.0 | 194°44.0 | 28.1 | 283°30.4 | 14.7 | | 228°53.6 | 46.4 | | 340°32.5 | 30.9 | | | | | Saturn | 345°34.9 05:25 | |
| 5 | 10°02.5 | 209°43.9 | 27.0 | 298°31.0 | 15.0 | | 243°55.5 | 46.3 | | 355°34.9 | 30.9 | | | | | | | |
| 6 | 25°04.9 | 224°43.9 | N09°25.8 | 313°31.6 | N22°15.2 | | 258°57.4 | N19°46.2 | | 10°37.4 | N03°30.9 | | | | | Jul 16 Thu | SHA Mer.pass | |
| 7 | 40°07.4 | 239°43.8 | 24.6 | 328°32.2 | 15.5 | | 273°59.3 | 46.0 | | 25°39.8 | 30.9 | | | | | Venus | 200°54.6 15:01 | |
| 8 | 55°09.9 | 254°43.8 | 23.5 | 343°32.8 | 15.7 | | 289°01.2 | 45.9 | | 40°42.2 | 30.9 | | | | | Mars | 289°22.3 09:07 | |
| 9 | 70°12.3 | 269°43.7 | •• 22.3 | 358° | | | | | | | | | | | | | | |

| h | Sun | | | Moon | | | |
|------------|----------|----------|-------------|------------|-------|----------|--------|
| | GHA | Dec | | GHA | ν | Dec | d |
| Wed | | | | | | | HP |
| 0 | 178°30.6 | N21°33.1 | | 169°10.5 | 5.0' | N22°26.6 | -11.1' |
| 1 | 193°30.5 | 32.7 | | 183°34.5 | 5.2' | 22°15.5 | -11.3' |
| 2 | 208°30.4 | 32.3 | | 197°58.7 | 5.3' | 22°04.2 | -11.4' |
| 3 | 223°30.4 | 31.9 | | 212°23.0 | 5.4' | 21°52.8 | -11.6' |
| 4 | 238°30.3 | 31.5 | | 226°47.4 | 5.6' | 21°41.2 | -11.7' |
| 5 | 253°30.3 | 31.1 | | 241°11.9 | 5.7' | 21°29.5 | -11.8' |
| 6 | 268°30.2 | N21°30.7 | | 255°36.6 | 5.8' | N21°17.7 | -12.0' |
| 7 | 283°30.1 | 30.3 | | 270°01.4 | 5.9' | 21°05.8 | -12.1' |
| 8 | 298°30.1 | 29.9 | | 284°26.4 | 6.1' | 20°53.7 | -12.2' |
| 9 | 313°30.0 | 29.5 | | 298°51.5 | 6.2' | 20°41.5 | -12.3' |
| 10 | 328°29.9 | 29.1 | | 313°16.7 | 6.3' | 20°29.2 | -12.5' |
| 11 | 343°29.9 | 28.7 | | 327°42.0 | 6.5' | 20°16.7 | -12.6' |
| 12 | 358°29.8 | N21°28.3 | | 342°07.5 | 6.6' | N20°04.1 | -12.7' |
| 13 | 13°29.7 | 27.9 | | 356°33.1 | 6.7' | 19°51.4 | -12.8' |
| 14 | 28°29.7 | 27.5 | | 10°58.8 | 6.9' | 19°38.6 | -12.9' |
| 15 | 43°29.6 | 27.1 | | 25°24.7 | 7.0' | 19°25.7 | -13.0' |
| 16 | 58°29.5 | 26.7 | | 39°50.7 | 7.1' | 19°12.7 | -13.1' |
| 17 | 73°29.5 | 26.3 | | 54°16.8 | 7.3' | 18°59.6 | -13.2' |
| 18 | 88°29.4 | N21°25.9 | | 68°43.1 | 7.4' | N18°46.3 | -13.3' |
| 19 | 103°29.4 | 25.5 | | 83°09.5 | 7.5' | 18°33.0 | -13.4' |
| 20 | 118°29.3 | 25.1 | | 97°36.0 | 7.7' | 18°19.5 | -13.5' |
| 21 | 133°29.2 | 24.7 | | 112°02.7 | 7.8' | 18°06.0 | -13.6' |
| 22 | 148°29.2 | 24.3 | | 126°29.4 | 7.9' | 17°52.4 | -13.7' |
| 23 | 163°29.1 | 23.9 | | 140°56.3 | 8.0' | 17°38.6 | -13.8' |
| SD = 15.7' | | | $d = -0.4'$ | SD = 16.5' | | | |

| Thu | Sun | | | Moon | | | |
|------------|----------|----------|-------------|------------|-------|----------|--------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 178°29.1 | N21°23.5 | | 155°23.4 | 8.2' | N17°24.8 | -13.9' |
| 1 | 193°29.0 | 23.1 | | 169°50.5 | 8.3' | 17°10.9 | -14.0' |
| 2 | 208°28.9 | 22.7 | | 184°17.8 | 8.4' | 16°56.9 | -14.1' |
| 3 | 223°28.9 | 22.3 | | 198°45.2 | 8.5' | 16°42.8 | -14.2' |
| 4 | 238°28.8 | 21.9 | | 213°12.8 | 8.7' | 16°28.7 | -14.2' |
| 5 | 253°28.8 | 21.5 | | 227°40.4 | 8.8' | 16°14.4 | -14.3' |
| 6 | 268°28.7 | N21°21.1 | | 242°08.2 | 8.9' | N16°00.1 | -14.4' |
| 7 | 283°28.6 | 20.6 | | 256°36.1 | 9.0' | 15°45.7 | -14.5' |
| 8 | 298°28.6 | 20.2 | | 271°04.2 | 9.1' | 15°31.2 | -14.5' |
| 9 | 313°28.5 | 19.8 | | 285°32.3 | 9.3' | 15°16.7 | -14.6' |
| 10 | 328°28.5 | 19.4 | | 300°00.6 | 9.4' | 15°02.0 | -14.7' |
| 11 | 343°28.4 | 19.0 | | 314°29.0 | 9.5' | 14°47.4 | -14.8' |
| 12 | 358°28.3 | N21°18.6 | | 328°57.5 | 9.6' | N14°32.6 | -14.8' |
| 13 | 13°28.3 | 18.2 | | 343°26.1 | 9.7' | 14°17.8 | -14.9' |
| 14 | 28°28.2 | 17.8 | | 357°54.8 | 9.8' | 14°02.9 | -14.9' |
| 15 | 43°28.2 | 17.3 | | 12°23.7 | 10.0' | 13°48.0 | -15.0' |
| 16 | 58°28.1 | 16.9 | | 26°52.6 | 10.1' | 13°33.0 | -15.1' |
| 17 | 73°28.1 | 16.5 | | 41°21.7 | 10.2' | 13°17.9 | -15.1' |
| 18 | 88°28.0 | N21°16.1 | | 55°50.9 | 10.3' | N13°02.8 | -15.2' |
| 19 | 103°27.9 | 15.7 | | 70°20.2 | 10.4' | 12°47.7 | -15.2' |
| 20 | 118°27.8 | 15.3 | | 84°49.6 | 10.5' | 12°32.4 | -15.3' |
| 21 | 133°27.8 | 14.8 | | 99°19.1 | 10.6' | 12°17.2 | -15.3' |
| 22 | 148°27.8 | 14.4 | | 113°48.7 | 10.7' | 12°01.9 | -15.3' |
| 23 | 163°27.7 | 14.0 | | 128°18.4 | 10.8' | 11°46.5 | -15.4' |
| SD = 15.7' | | | $d = -0.4'$ | SD = 16.3' | | | |

| Fri | Sun | | | Moon | | | |
|------------|----------|----------|-------------|------------|-------|----------|--------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 178°27.7 | N21°13.6 | | 142°48.3 | 10.9' | N11°31.2 | -15.4' |
| 1 | 193°27.6 | 13.1 | | 157°18.2 | 11.0' | 11°15.7 | -15.5' |
| 2 | 208°27.6 | 12.7 | | 171°48.2 | 11.1' | 11°00.3 | -15.5' |
| 3 | 223°27.5 | 12.3 | | 186°18.3 | 11.2' | 10°44.8 | -15.5' |
| 4 | 238°27.4 | 11.9 | | 200°48.6 | 11.3' | 10°29.2 | -15.6' |
| 5 | 253°27.4 | 11.5 | | 215°18.9 | 11.4' | 10°13.6 | -15.6' |
| 6 | 268°27.3 | N21°11.0 | | 229°49.3 | 11.5' | N09°58.0 | -15.6' |
| 7 | 283°27.3 | 10.6 | | 244°19.8 | 11.6' | 09°42.4 | -15.7' |
| 8 | 298°27.2 | 10.2 | | 258°50.4 | 11.7' | 09°26.7 | -15.7' |
| 9 | 313°27.2 | 9.7 | | 273°21.1 | 11.8' | 09°11.0 | -15.7' |
| 10 | 328°27.1 | 9.3 | | 287°51.9 | 11.9' | 08°55.3 | -15.7' |
| 11 | 343°27.1 | 8.9 | | 302°22.8 | 12.0' | 08°39.6 | -15.8' |
| 12 | 358°27.0 | N21°08.5 | | 316°53.7 | 12.0' | N08°23.8 | -15.8' |
| 13 | 13°27.0 | 8.0 | | 331°24.8 | 12.1' | 08°08.1 | -15.8' |
| 14 | 28°26.9 | 7.6 | | 345°55.9 | 12.2' | 07°52.3 | -15.8' |
| 15 | 43°26.9 | 7.2 | | 0°27.1 | 12.3' | 07°36.4 | -15.8' |
| 16 | 58°26.8 | 6.7 | | 14°58.4 | 12.4' | 07°20.6 | -15.8' |
| 17 | 73°26.8 | 6.3 | | 29°29.8 | 12.5' | 07°04.8 | -15.9' |
| 18 | 88°26.7 | N21°05.9 | | 44°01.2 | 12.5' | N06°48.9 | -15.9' |
| 19 | 103°26.7 | 5.4 | | 58°32.8 | 12.6' | 06°33.0 | -15.9' |
| 20 | 118°26.6 | 5.0 | | 73°04.4 | 12.7' | 06°17.2 | -15.9' |
| 21 | 133°26.6 | 4.6 | | 87°36.0 | 12.8' | 06°01.3 | -15.9' |
| 22 | 148°26.5 | 4.1 | | 102°07.8 | 12.8' | 05°45.4 | -15.9' |
| 23 | 163°26.5 | 3.7 | | 116°39.6 | 12.9' | 05°29.5 | -15.9' |
| SD = 15.7' | | | $d = -0.4'$ | SD = 16.1' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | | | | | | |
| N 70° | | | | | | |
| 68° | | | | | | |
| 66° | //// | //// | 01:40 | 22:29 | //// | //// |
| 64° | //// | //// | 02:18 | 21:52 | //// | //// |
| 62° | //// | 00:57 | 02:45 | 21:26 | 23:09 | //// |
| 60° | //// | 01:48 | 03:05 | 21:05 | 22:21 | //// |
| N 58° | //// | 02:18 | 03:22 | 20:49 | 21:52 | //// |
| 56° | 00:52 | 02:41 | 03:36 | 20:35 | 21:30 | 23:15 |
| 54° | 01:39 | 02:59 | 03:48 | 20:23 | 21:12 | 22:31 |
| 52° | 02:07 | 03:14 | 03:59 | 20:12 | 20:57 | 22:03 |
| 50° | 02:28 | 03:27 | 04:09 | 20:03 | 20:45 | 21:43 |
| 45° | 03:06 | 03:53 | 04:28 | 19:43 | 20:19 | 21:05 |
| N 40° | 03:33 | 04:13 | 04:45 | 19:27 | 19:59 | 20:39 |
| 35° | 03:54 | 04:29 | 04:58 | 19:14 | 19:43 | 20:18 |
| 30° | 04:10 | 04:43 | 05:10 | 19:02 | 19:29 | 20:01 |
| 20° | 04:37 | 05:05 | 05:30 | 18:43 | 19:07 | 19:35 |
| N 10° | 04:57 | 05:24 | 05:47 | 18:26 | 18:48 | 19:15 |
| 0° | 05:14 | 05:40 | 06:03 | 18:10 | 18:32 | 18:58 |
| S 10° | 05:30 | 05:56 | 06:18 | 17:54 | 18:17 | 18:42 |
| 20° | 05:44 | 06:11 | 06:35 | 17:37 | 18:01 | 18:28 |
| 30° | 05:59 | 06:28 | 06:54 | 17:18 | 17:44 | 18:14 |
| 35° | 06:06 | 06:38 | 07:05 | 17:07 | 17:35 | 18:06 |
| 40° | 06:14 | 06:48 | 07:18 | 16:55 | 17:25 | 17:58 |
| 45° | 06:23 | 07:00 | 07:33 | 16:40 | 17:13 | 17:49 |
| S 50° | 06:33 | 07:14 | 07:51 | 16:22 | 16:59 | 17:39 |
| 52° | 06:38 | 07:20 | 07:59 | 16:13 | 16:52 | 17:35 |
| 54° | 06:43 | 07:27 | 08:09 | 16:04 | 16:45 | 17:30 |
| 56° | 06:48 | 07:35 | 08:20 | 15:53 | 16:38 | 17:25 |
| 58° | 06:53 | 07:44 | 08:32 | 15:40 | 16:29 | 17:19 |
| S 60° | 06:59 | 07:54 | 08:47 | 15:26 | 16:19 | 17:13 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|----------------|-------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | | 03:24 | 06:35 | | 00:26 23:04 | 22:21 |
| N 70° | | 04:15 | 06:52 | 23:34 | 22:45 | 22:14 |
| 68° | | 04:46 | 07:05 | 23:01 | 22:30 | 22:08 |
| 66° | 02:34 | 05:09 | 07:15 | 22:37 | 22:17 | 22:02 |
| 64° | 03:13 | 05:27 | 07:24 | 22:17 | 22:07 | 21:58 |
| 62° | 03:40 | 05:41 | 07:31 | 22:02 | 21:58 | 21:54 |
| 60° | 04:01 | 05:53 | 07:37 | 21:48 | 21:50 | 21:51 |
| N 58° | 04:18 | 06:04 | 07:43 | 21:37 | 21:43 | 21:48 |
| 56° | 04:32 | 06:13 | 07:48 | 21:27 | 21:37 | 21:45 |
| 54° | 04:44 | 06:21 | 07:52 | 21:18 | 21:32 | 21:42 |
| 52° | 04:55 | 06:28 | 07:56 | 21:10 | 21:27 | 21:40 |
| 50° | 05:05 | 06:35 | 08:00 | 21:02 | 21:22 | 21:38 |
| 45° | 05:25 | 06:48 | 08:08 | 20:47 | 21:12 | 21:33 |
| N 40° | 05:41 | 07:00 | 08:14 | 20:34 | 21:04 | 21:30 |
| 35° | 05:55 | 07:09 | 08:19 | 20:23 | 20:57 | 21:26 |
| 30° | 06:07 | 07:18 | 08:24 | 20:13 | 20:51 | 21:23 |
| 20° | 06:27 | 07:32 | 08:33 | 19:56 | 20:40 | 21:18 |
| N 10° | 06:44 | 07:45 | 08:40 | 19:42 | 20:30 | 21:14 |
| 0° | 07:01 | 07:56 | 08:47 | 19:28 | 20:21 | 21:09 |
| S 10° | 07:17 | 08:08 | 08:54 | 19:14 | 20:11 | 21:05 |
| 20° | 07:34 | 08:20 | 09:01 | 18:59 | 20:02 | 21:00 |
| 30° | 07:54 | 08:34 | 09:09 | 18:41 | 19:50 | 20:55 |
| 35° | 08:05 | 08:42 | 09:14 | 18:31 | 19:43 | 20:52 |
| 40° | 08:18 | 08:52 | 09:19 | 18:19 | 19:36 | 20:48 |
| 45° | 08:34 | 09:02 | 09:25 | 18:05 | 19:27 | 20:44 |
| S 50° | 08:53 | 09:15 | 09:32 | 17:48 | 19:16 | 20:39 |
| 52° | 09:02 | 09:21 | 09:36 | 17:40 | 19:11 | 20:36 |
| 54° | 09:11 | 09:28 | 09:39 | 17:30 | 19:05 | 20:34 |
| 56° | 09:23 | 09:35 | 09:43 | 17:20 | 18:59 | 20:31 |
| 58° | 09:35 | 09:43 | 09:48 | 17:08 | 18:52 | 20:28 |
| S 60° | 09:50 | 09:52 | 09:53 | 16:54 | 18:44 | 20:24 |

| Day | Sun | | Mer. Pass | Moon | | Age 1-3 1-9% |
|-----|------------------------------------|-----------------------|-----------|------------------------------------|--|--------------|
| | Eqn. of Time 00 ^h mm:ss | 12 ^h mm:ss | | Mer. Pass. Upper hh:mm Lower hh:mm | | |
| 15 | 05:58 | 06:01 | 12:06 | 13:14 00:45 | | |
| 16 | 06:04 | 06:07 | 12:06 | 14:09 01:42 | | |
| 17 | 06:09 | 06:12 | 12:06 | 14:58 02:34 | | |

July 18, 19, 20 UT (Sat., Sun., Mon.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------------------|----------|----------|-------------------|----------|----------|---------------------|----------|---------|-------------------|-----|--------|-----|-----|
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 295°49.3 | 134°43.1 | N09°04.8 | 223°42.6 | N22°19.7 | 169°31.5 | N19°43.9 | 281°21.0 | N03°31.0 | | | | | | |
| 1 | 310°51.7 | 149°43.0 | 03.7 | 238°43.2 | 19.9 | 184°33.4 | 43.7 | 296°23.4 | 31.0 | | | | | | |
| 2 | 325°54.2 | 164°43.0 | 02.5 | 253°43.8 | 20.2 | 199°35.3 | 43.6 | 311°25.8 | 31.0 | | | | | | |
| 3 | 340°56.7 | 179°43.0 | · · 01.3 | 268°44.4 | · · 20.4 | 214°37.1 | · · 43.5 | 326°28.3 | · · 31.0 | | | | | | |
| 4 | 355°59.1 | 194°42.9 | 09°00.2 | 283°45.1 | 20.7 | 229°39.0 | 43.4 | 341°30.7 | 31.0 | | | | | | |
| 5 | 11°01.6 | 209°42.9 | 08°59.0 | 298°45.7 | 20.9 | 244°40.9 | 43.2 | 356°33.1 | 31.0 | | | | | | |
| 6 | 26°04.1 | 224°42.9 | N08°57.8 | 313°46.3 | N22°21.1 | 259°42.8 | N19°43.1 | 11°35.5 | N03°31.0 | | | | | | |
| 7 | 41°06.5 | 239°42.8 | 56.7 | 328°46.9 | 21.4 | 274°44.7 | 43.0 | 26°38.0 | 31.0 | | | | | | |
| 8 | 56°09.0 | 254°42.8 | 55.5 | 343°47.5 | 21.6 | 289°46.6 | 42.9 | 41°40.4 | 31.0 | | | | | | |
| 9 | 71°11.5 | 269°42.8 | · · 54.3 | 358°48.1 | · · 21.9 | 304°48.5 | · · 42.7 | 56°42.8 | · · 31.0 | | | | | | |
| 10 | 86°13.9 | 284°42.7 | 53.2 | 13°48.7 | 22.1 | 319°50.4 | 42.6 | 71°45.2 | 31.0 | | | | | | |
| 11 | 101°16.4 | 299°42.7 | 52.0 | 28°49.3 | 22.3 | 334°52.3 | 42.5 | 86°47.7 | 31.0 | | | | | | |
| 12 | 116°18.9 | 314°42.7 | N08°50.8 | 43°49.9 | N22°22.6 | 349°54.2 | N19°42.4 | 101°50.1 | N03°31.0 | | | | | | |
| 13 | 131°21.3 | 329°42.7 | 49.6 | 58°50.6 | 22.8 | 4°56.1 | 42.2 | 116°52.5 | 31.0 | | | | | | |
| 14 | 146°23.8 | 344°42.6 | 48.5 | 73°51.2 | 23.1 | 19°58.0 | 42.1 | 131°54.9 | 31.0 | | | | | | |
| 15 | 161°26.2 | 359°42.6 | · · 47.3 | 88°51.8 | · · 23.3 | 34°59.9 | · · 42.0 | 146°57.4 | · · 31.0 | | | | | | |
| 16 | 176°28.7 | 14°42.6 | 46.1 | 103°52.4 | 23.5 | 50°01.8 | 41.8 | 161°59.8 | 31.0 | | | | | | |
| 17 | 191°31.2 | 29°42.5 | 44.9 | 118°53.0 | 23.8 | 65°03.7 | 41.7 | 177°02.2 | 31.0 | | | | | | |
| 18 | 206°33.6 | 44°42.5 | N08°43.8 | 133°53.6 | N22°24.0 | 80°05.6 | N19°41.6 | 192°04.7 | N03°31.1 | | | | | | |
| 19 | 221°36.1 | 59°42.5 | 42.6 | 148°54.2 | 24.2 | 95°07.5 | 41.5 | 207°07.1 | 31.1 | | | | | | |
| 20 | 236°38.6 | 74°42.5 | 41.4 | 163°54.8 | 24.5 | 110°09.3 | 41.3 | 222°09.5 | 31.1 | | | | | | |
| 21 | 251°41.0 | 89°42.4 | · · 40.3 | 178°55.5 | · · 24.7 | 125°11.2 | · · 41.2 | 237°11.9 | · · 31.1 | | | | | | |
| 22 | 266°43.5 | 104°42.4 | 39.1 | 193°56.1 | 24.9 | 140°13.1 | 41.1 | 252°14.4 | 31.1 | | | | | | |
| 23 | 281°46.0 | 119°42.4 | 37.9 | 208°56.7 | 25.2 | 155°15.0 | 40.9 | 267°16.8 | 31.1 | | | | | | |
| Mer.pass. 04:16 | | ν-0.0' d-1.2' m-4.16 | | | ν0.6' d0.2' m1.31 | | | ν1.9' d-0.1' m-1.79 | | | ν2.4' d0.0' m0.70 | | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 296°48.4 | 134°42.4 | N08°36.7 | 223°57.3 | N22°25.4 | 170°16.9 | N19°40.8 | 282°19.2 | N03°31.1 | | | | | | |
| 1 | 311°50.9 | 149°42.3 | 35.6 | 238°57.9 | 25.6 | 185°18.8 | 40.7 | 297°21.6 | 31.1 | | | | | | |
| 2 | 326°53.3 | 164°42.3 | 34.4 | 253°58.5 | 25.9 | 200°20.7 | 40.6 | 312°24.1 | 31.1 | | | | | | |
| 3 | 341°55.8 | 179°42.3 | · · 33.2 | 268°59.1 | · · 26.1 | 215°22.6 | · · 40.4 | 327°26.5 | · · 31.1 | | | | | | |
| 4 | 356°58.3 | 194°42.3 | 32.0 | 283°59.7 | 26.3 | 230°24.5 | 40.3 | 342°28.9 | 31.1 | | | | | | |
| 5 | 12°00.7 | 209°42.3 | 30.9 | 299°00.3 | 26.6 | 245°26.4 | 40.2 | 357°31.4 | 31.1 | | | | | | |
| 6 | 27°03.2 | 224°42.2 | N08°29.7 | 314°01.0 | N22°26.8 | 260°28.3 | N19°40.1 | 12°33.8 | N03°31.1 | | | | | | |
| 7 | 42°05.7 | 239°42.2 | 28.5 | 329°01.6 | 27.0 | 275°30.2 | 39.9 | 27°36.2 | 31.1 | | | | | | |
| 8 | 57°08.1 | 254°42.2 | 27.3 | 344°02.2 | 27.3 | 290°32.1 | 39.8 | 42°38.7 | 31.1 | | | | | | |
| 9 | 72°10.6 | 269°42.2 | · · 26.1 | 359°02.8 | · · 27.5 | 305°34.0 | · · 39.7 | 57°41.1 | · · 31.1 | | | | | | |
| 10 | 87°13.1 | 284°42.2 | 25.0 | 14°03.4 | 27.7 | 320°35.9 | 39.5 | 72°43.5 | 31.1 | | | | | | |
| 11 | 102°15.5 | 299°42.2 | 23.8 | 29°04.0 | 28.0 | 335°37.8 | 39.4 | 87°45.9 | 31.1 | | | | | | |
| 12 | 117°18.0 | 314°42.1 | N08°22.6 | 44°04.6 | N22°28.2 | 350°39.7 | N19°39.3 | 102°48.4 | N03°31.1 | | | | | | |
| 13 | 132°20.5 | 329°42.1 | 21.4 | 59°05.2 | 28.4 | 5°41.5 | 39.2 | 117°50.8 | 31.1 | | | | | | |
| 14 | 147°22.9 | 344°42.1 | 20.3 | 74°05.9 | 28.7 | 20°43.4 | 39.0 | 132°53.2 | 31.1 | | | | | | |
| 15 | 162°25.4 | 359°42.1 | · · 19.1 | 89°06.5 | · · 28.9 | 35°45.3 | · · 38.9 | 147°55.7 | · · 31.1 | | | | | | |
| 16 | 177°27.8 | 14°42.1 | 17.9 | 104°07.1 | 29.1 | 50°47.2 | 38.8 | 162°58.1 | 31.1 | | | | | | |
| 17 | 192°30.3 | 29°42.1 | 16.7 | 119°07.7 | 29.3 | 65°49.1 | 38.6 | 178°00.5 | 31.1 | | | | | | |
| 18 | 207°32.8 | 44°42.1 | N08°15.5 | 134°08.3 | N22°29.6 | 80°51.0 | N19°38.5 | 193°03.0 | N03°31.1 | | | | | | |
| 19 | 222°35.2 | 59°42.1 | 14.4 | 149°08.9 | 29.8 | 95°52.9 | 38.4 | 208°05.4 | 31.1 | | | | | | |
| 20 | 237°37.7 | 74°42.0 | 13.2 | 164°09.5 | 30.0 | 110°54.8 | 38.3 | 223°07.8 | 31.1 | | | | | | |
| 21 | 252°40.2 | 89°42.0 | · · 12.0 | 179°10.1 | · · 30.3 | 125°56.7 | · · 38.1 | 238°10.3 | · · 31.1 | | | | | | |
| 22 | 267°42.6 | 104°42.0 | 10.8 | 194°10.8 | 30.5 | 140°58.6 | 38.0 | 253°12.7 | 31.1 | | | | | | |
| 23 | 282°45.1 | 119°42.0 | 09.6 | 209°11.4 | 30.7 | 156°00.5 | 37.9 | 268°15.1 | 31.1 | | | | | | |
| Mer.pass. 04:12 | | ν-0.0' d-1.2' m-4.16 | | | ν0.6' d0.2' m1.31 | | | ν1.9' d-0.1' m-1.79 | | | ν2.4' d0.0' m0.70 | | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 297°47.6 | 134°42.0 | N08°08.5 | 224°12.0 | N22°30.9 | 171°02.4 | N19°37.8 | 283°17.6 | N03°31.1 | | | | | | |
| 1 | 312°50.0 | 149°42.0 | 07.3 | 239°12.6 | 31.2 | 186°04.3 | 37.6 | 298°20.0 | 31.1 | | | | | | |
| 2 | 327°52.5 | 164°42.0 | 06.1 | 254°13.2 | 31.4 | 201°06.2 | 37.5 | 313°22.4 | 31.1 | | | | | | |
| 3 | 342°54.9 | 179°42.0 | · · 04.9 | 269°13.8 | · · 31.6 | 216°08.1 | · · 37.4 | 328°24.9 | · · 31.1 | | | | | | |
| 4 | 357°57.4 | 194°42.0 | 03.7 | 284°14.4 | 31.8 | 231°10.0 | 37.2 | 343°27.3 | 31.1 | | | | | | |
| 5 | 12°59.9 | 209°42.0 | 02.6 | 299°15.0 | 32.1 | 246°11.9 | 37.1 | 358°29.7 | 31.1 | | | | | | |
| 6 | 28°02.3 | 224°42.0 | N08°01.4 | 314°15.7 | N22°32.3 | 261°13.7 | N19°37.0 | 13°32.2 | N03°31.1 | | | | | | |
| 7 | 43°04.8 | 239°42.0 | 08°00.2 | 329°16.3 | 32.5 | 276°15.6 | 36.9 | 28°34.6 | 31.1 | | | | | | |
| 8 | 58°07.3 | 254°42.0 | 07°59.0 | 344°16.9 | 32.7 | 291°17.5 | 36.7 | 43°37.0 | 31.1 | | | | | | |
| 9 | 73°09.7 | 269°42.0 | · · 57.8 | 359°17.5 | · · 33.0 | 306°19.4 | · · 36.6 | 58°39.5 | · · 31.1 | | | | | | |
| 10 | 88°12.2 | 284°42.0 | 56.6 | 14°18.1 | 33.2 | 321°21.3 | 36.5 | 73°41.9 | 31.1 | | | | | | |
| 11 | 103°14.7 | 299°42.0 | 55.5 | 29°18.7 | 33.4 | 336°23.2 | 36.3 | 88°44.3 | 31.1 | | | | | | |
| 12 | 118°17.1 | 314°42.0 | N07°54.3 | 44°19.3 | N22°33.6 | 351°25.1 | N19°36.2 | 103°46.8 | N03°31.1 | | | | | | |
| 13 | 133°19.6 | 329°42.0 | 53.1 | 59°19.9 | 33.8 | 6°27.0 | 36.1 | 118°49.2 | 31.1 | | | | | | |
| 14 | 148°22.1 | 344°42.0 | 51.9 | 74°20.6 | 34.1 | 21°28.9 | 36.0 | 133°51.6 | 31.1 | | | | | | |
| 15 | 163°24.5 | 359°42.0 | · · 50.7 | 89°21.2 | · · 34.3 | 36°30.8 | · · 35.8 | 148°54.1 | · · 31.1 | | | | | | |
| 16 | 178°27.0 | 14°42.0 | 49.5 | 104°21.8 | 34.5 | 51°32.7 | 35.7 | 163°56.5 | 31.1 | | | | | | |
| 17 | 193°29.4 | 29°42.0 | 48.3 | 119°22.4 | 34.7 | 66°34.6 | 35.6 | 178°58.9 | 31.1 | | | | | | |
| 18 | 208°31.9 | 44°42.0 | N07°47.2 | 134°23.0 | N22°34.9 | 81°36.5 | N19°35.4 | 194°01.4 | N03°31.1 | | | | | | |
| 19 | 223°34.4 | 59°42.0 | 46.0 | 149°23.6 | 35.2 | 96°38.4 | 35.3 | 209°03.8 | 31.1 | | | | | | |
| 20 | 238°36.8 | 74°42.0 | 44.8 | 164°24.2 | 35.4 | 111°40.3 | 35.2 | 224°06.2 | 31.1 | | | | | | |
| 21 | 253°39.3 | 89°42.0 | · · 43.6 | 179°24.9 | · · 35.6 | 126°42.2 | · · 35.0 | 239°08.7 | · · 31.1 | | | | | | |
| 22 | 268°41.8 | 104°42.0 | 42.4 | 194°25.5 | 35.8 | 141°44.0 | 34.9 | 254°11.1 | 31.1 | | | | | | |
| 23 | 283°44.2 | 119°42.0 | 41.2 | 209°26.1 | 36.0 | 156°45.9 | 34.8 | 269°13.6 | 31.1 | | | | | | |
| Mer.pass. 04:08 | | ν-0.0' d-1.2' m-4.17 | | | ν0.6' d0.2' m1.31 | | | ν1.9' d-0.1' m-1.79 | | | ν2.4' d0.0' m0.69 | | | | |

| Stars | | |
|---------------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°33.3 | 29°14.2 |
| Ankaa | 353°05.7 | -42°09.4 |
| Schedar | 349°29.4 | 56°40.8 |
| Diphda | 348°45.9 | -17°50.2 |
| Achernar | 335°19.2 | -57°05.7 |
| Hamal | 327°49.8 | 23°35.2 |
| Polaris | 313°33.4 | 89°22.2 |
| Acamar | 315°11.0 | -40°11.6 |
| Menkar | 314°04.9 | 4°11.7 |
| Mirfak | 308°26.6 | 49°57.2 |
| Aldebaran | 290°38.4 | 16°33.8 |
| Rigel | 281°02.9 | -8°10.1 |
| Capella | 280°20.4 | 46°01.4 |
| Bellatrix | 278°21.8 | 6°22.5 |
| Elnath | 278°00.6 | 28°37.7 |
| Alnilam | 275°36.7 | -1°11.0 |
| Betelgeuse | 270°51.0 | 7°24.8 |
| Canopus | 263°52.4 | -52°42.4 |
| Sirius | 258°25.5 | -16°45.1 |
| Adhara | 255°05.2 | -29°00.4 |
| Procyon | 244°49.8 | 5°09.4 |
| Pollux | 243°16.1 | 27°57.7 |
| Avior | 234°14.9 | -59°35.7 |
| Suhail | 222°45.8 | -43°32.4 |
| Miaplacidus | 221°38.9 | -69°49.7 |
| Alphard | 217°46.8 | -8°46.4 |
| Regulus | 207°33.4 | 11°50.3 |
| Dubhe | 193°39.9 | 61°36.7 |
| Denebola | 182°23.8 | 14°25.5 |
| Gienah | 175°42.4 | -17°41.5 |
| Acrux | 172°58.9 | -63°15.1 |
| Gacrux | 171°50.4 | -57°16.0 |
| Alioth | 166°12.0 | 55°49.2 |
| Spica | 158°21.0 | -11°18.1 |
| Alkaid | 152°51.0 | 49°11.1 |
| Hadar | 148°34.1 | -60°30.4 |
| Menkent | 147°56.1 | -36°30.2 |
| Arcturus | 145°46.7 | 19°02.8 |
| Rigel Kent. | 139°38.4 | -60°57.0 |
| Kochab | 137°19.5 | 74°03.0 |
| Zuben'ubi | 136°54.5 | -16°09.2 |
| Alphecca | 126°02.5 | 26°37.6 |
| Antares | 112°14.0 | -26°29.5 |
| Atria | 107°06.6 | -69°04.7 |
| Sabik | 102°01.0 | -15°45.5 |
| Shaula | 96°08.3 | -37°07.4 |
| Rasalhague | 95°57.1 | 12°32.5 |
| Eltanin | 90°41.1 | 51°29.2 |
| Kaus Aust. | 83°30.4 | -34°22.3 |
| Vega | 80°31.9 | 38°48.6 |
| Nunki | 75°45.8 | -26°15.8 |
| Altair | 61°58.4 | 8°56.4 |
| Peacock | 53°03.1 | -56°38.8 |
| Deneb | 49°24.5 | 45°22.5 |
| Enif | 33°37.3 | 9°59.9 |
| Al Na'ir | 27°30.9 | -46°49.7 |
| Fomalhaut | 15°12.9 | -29°28.7 |
| Scheat | 13°43.7 | 28°13.6 |
| Markab | 13°28.4 | 15°20.9 |
| | | |
| Jul 18 Sat | SHA | Mer.pass |
| Venus | 198°53.8 | 15:01 |
| Mars | 287°53.3 | 09:05 |
| Jupiter | 233°42.2 | 12:40 |
| Saturn | 345°31.7 | 05:14 |
| | | |
| Jul 19 Sun | SHA | Mer.pass |
| Venus | 197°53.9 | 15:01 |
| Mars | 287°08.9 | 09:04 |
| Jupiter | 233°28.5 | 12:37 |
| Saturn | 345°30.8 | 05:10 |
| | | |
| Jul 20 Mon | SHA | Mer.pass |
| Venus | 196°54.5 | 15:01 |
| Mars | 286°24.4 | 09:03 |
| Jupiter | 233°14.8 | 12:34 |
| Saturn | 345°30.0 | 05:06 |
| | | |
| Horizontal parallax | | |
| Venus: | | 0.2 |
| Mars: | | 0.1 |

| h | | Sun | | Moon | | | |
|------------------------|----------|----------|------------|-------|----------|--------|-------|
| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°26.4 | N21°03.3 | 131°11.5 | 13.0' | N05°13.6 | -15.9' | 58.2' |
| 1 | 193°26.4 | 02.8 | 145°43.5 | 13.0' | 04°57.7 | -15.9' | 58.2' |
| 2 | 208°26.3 | 02.4 | 160°15.5 | 13.1' | 04°41.8 | -15.9' | 58.1' |
| 3 | 223°26.3 | · · 02.0 | 174°47.6 | 13.2' | 04°25.9 | -15.9' | 58.1' |
| 4 | 238°26.2 | 01.5 | 189°19.8 | 13.2' | 04°10.0 | -15.9' | 58.1' |
| 5 | 253°26.2 | 01.1 | 203°52.0 | 13.3' | 03°54.1 | -15.9' | 58.0' |
| 6 | 268°26.1 | N21°00.6 | 218°24.3 | 13.4' | N03°38.2 | -15.9' | 58.0' |
| 7 | 283°26.1 | 21°00.2 | 232°56.7 | 13.4' | 03°22.3 | -15.9' | 58.0' |
| 8 | 298°26.0 | 20°59.8 | 247°29.1 | 13.5' | 03°06.4 | -15.9' | 57.9' |
| 9 | 313°26.0 | · · 59.3 | 262°01.5 | 13.5' | 02°50.5 | -15.9' | 57.9' |
| 10 | 328°25.9 | 58.9 | 276°34.1 | 13.6' | 02°34.7 | -15.9' | 57.8' |
| 11 | 343°25.9 | 58.4 | 291°06.6 | 13.6' | 02°18.8 | -15.8' | 57.8' |
| 12 | 358°25.8 | N20°58.0 | 305°39.3 | 13.7' | N02°03.0 | -15.8' | 57.8' |
| 13 | 13°25.8 | 57.5 | 320°11.9 | 13.7' | 01°47.1 | -15.8' | 57.7' |
| 14 | 28°25.7 | 57.1 | 334°44.7 | 13.8' | 01°31.3 | -15.8' | 57.7' |
| 15 | 43°25.7 | · · 56.7 | 349°17.5 | 13.8' | 01°15.5 | -15.8' | 57.6' |
| 16 | 58°25.6 | 56.2 | 3°50.3 | 13.9' | 00°59.7 | -15.8' | 57.6' |
| 17 | 73°25.6 | 55.8 | 18°23.2 | 13.9' | 00°44.0 | -15.7' | 57.6' |
| 18 | 88°25.5 | N20°55.3 | 32°56.1 | 14.0' | N00°28.2 | -15.7' | 57.5' |
| 19 | 103°25.5 | 54.9 | 47°29.1 | 14.0' | N00°12.5 | -15.7' | 57.5' |
| 20 | 118°25.5 | 54.4 | 62°02.1 | 14.1' | S00°03.2 | 15.7' | 57.4' |
| 21 | 133°25.4 | · · 54.0 | 76°35.1 | 14.1' | 00°18.9 | 15.7' | 57.4' |
| 22 | 148°25.4 | 53.5 | 91°08.2 | 14.1' | 00°34.6 | 15.6' | 57.4' |
| 23 | 163°25.3 | 53.1 | 105°41.4 | 14.2' | 00°50.2 | 15.6' | 57.3' |
| SD = 15.7' $d = -0.4'$ | | | SD = 15.9' | | | | |

| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 178°25.3 | N20°52.6 | 120°14.5 | 14.2' | S01°05.8 | 15.6' | 57.3' |
| 1 | 193°25.2 | 52.2 | 134°47.7 | 14.2' | 01°21.4 | 15.6' | 57.3' |
| 2 | 208°25.2 | 51.7 | 149°21.0 | 14.3' | 01°36.9 | 15.5' | 57.2' |
| 3 | 223°25.1 | · · 51.3 | 163°54.3 | 14.3' | 01°52.5 | 15.5' | 57.2' |
| 4 | 238°25.1 | 50.8 | 178°27.6 | 14.3' | 02°08.0 | 15.5' | 57.1' |
| 5 | 253°25.1 | 50.4 | 193°00.9 | 14.4' | 02°23.4 | 15.4' | 57.1' |
| 6 | 268°25.0 | N20°49.9 | 207°34.3 | 14.4' | S02°38.9 | 15.4' | 57.1' |
| 7 | 283°25.0 | 49.4 | 222°07.7 | 14.4' | 02°54.3 | 15.4' | 57.0' |
| 8 | 298°24.9 | 49.0 | 236°41.1 | 14.4' | 03°09.6 | 15.3' | 57.0' |
| 9 | 313°24.9 | · · 48.5 | 251°14.5 | 14.5' | 03°25.0 | 15.3' | 57.0' |
| 10 | 328°24.9 | 48.1 | 265°48.0 | 14.5' | 03°40.3 | 15.3' | 56.9' |
| 11 | 343°24.8 | 47.6 | 280°21.5 | 14.5' | 03°55.5 | 15.2' | 56.9' |
| 12 | 358°24.8 | N20°47.2 | 294°55.0 | 14.5' | S04°10.8 | 15.2' | 56.8' |
| 13 | 13°24.7 | 46.7 | 309°28.5 | 14.6' | 04°25.9 | 15.1' | 56.8' |
| 14 | 28°24.7 | 46.2 | 324°02.1 | 14.6' | 04°41.1 | 15.1' | 56.8' |
| 15 | 43°24.7 | · · 45.8 | 338°35.7 | 14.6' | 04°56.2 | 15.1' | 56.7' |
| 16 | 58°24.6 | 45.3 | 353°09.2 | 14.6' | 05°11.3 | 15.0' | 56.7' |
| 17 | 73°24.6 | 44.9 | 7°42.9 | 14.6' | 05°26.3 | 15.0' | 56.7' |
| 18 | 88°24.5 | N20°44.4 | 22°16.5 | 14.6' | S05°41.3 | 14.9' | 56.6' |
| 19 | 103°24.5 | 43.9 | 36°50.1 | 14.6' | 05°56.2 | 14.9' | 56.6' |
| 20 | 118°24.5 | 43.5 | 51°23.7 | 14.7' | 06°11.1 | 14.9' | 56.6' |
| 21 | 133°24.4 | · · 43.0 | 65°57.4 | 14.7' | 06°26.0 | 14.8' | 56.5' |
| 22 | 148°24.4 | 42.5 | 80°31.1 | 14.7' | 06°40.8 | 14.8' | 56.5' |
| 23 | 163°24.3 | 42.1 | 95°04.7 | 14.7' | 06°55.5 | 14.7' | 56.4' |
| SD = 15.7' $d = -0.5'$ | | | SD = 15.6' | | | | |

| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 178°24.3 | N20°41.6 | 109°38.4 | 14.7' | S07°10.2 | 14.7' | 56.4' |
| 1 | 193°24.3 | 41.1 | 124°12.1 | 14.7' | 07°24.9 | 14.6' | 56.4' |
| 2 | 208°24.2 | 40.7 | 138°45.8 | 14.7' | 07°39.5 | 14.6' | 56.3' |
| 3 | 223°24.2 | · · 40.2 | 153°19.5 | 14.7' | 07°54.1 | 14.5' | 56.3' |
| 4 | 238°24.2 | 39.7 | 167°53.2 | 14.7' | 08°08.6 | 14.5' | 56.3' |
| 5 | 253°24.1 | 39.3 | 182°26.9 | 14.7' | 08°23.0 | 14.4' | 56.2' |
| 6 | 268°24.1 | N20°38.8 | 197°00.6 | 14.7' | S08°37.4 | 14.4' | 56.2' |
| 7 | 283°24.0 | 38.3 | 211°34.3 | 14.7' | 08°51.8 | 14.3' | 56.2' |
| 8 | 298°24.0 | 37.9 | 226°08.0 | 14.7' | 09°06.1 | 14.2' | 56.1' |
| 9 | 313°24.0 | · · 37.4 | 240°41.6 | 14.7' | 09°20.3 | 14.2' | 56.1' |
| 10 | 328°23.9 | 36.9 | 255°15.3 | 14.7' | 09°34.5 | 14.1' | 56.1' |
| 11 | 343°23.9 | 36.4 | 269°49.0 | 14.7' | 09°48.7 | 14.1' | 56.0' |
| 12 | 358°23.9 | N20°36.0 | 284°22.7 | 14.7' | S10°02.7 | 14.0' | 56.0' |
| 13 | 13°23.8 | 35.5 | 298°56.3 | 14.7' | 10°16.7 | 14.0' | 56.0' |
| 14 | 28°23.8 | 35.0 | 313°30.0 | 14.6' | 10°30.7 | 13.9' | 55.9' |
| 15 | 43°23.8 | · · 34.6 | 328°03.7 | 14.6' | 10°44.6 | 13.8' | 55.9' |
| 16 | 58°23.7 | 34.1 | 342°37.3 | 14.6' | 10°58.4 | 13.8' | 55.9' |
| 17 | 73°23.7 | 33.6 | 357°10.9 | 14.6' | 11°12.2 | 13.7' | 55.8' |
| 18 | 88°23.7 | N20°33.1 | 11°44.5 | 14.6' | S11°25.9 | 13.7' | 55.8' |
| 19 | 103°23.6 | 32.6 | 26°18.1 | 14.6' | 11°39.6 | 13.6' | 55.8' |
| 20 | 118°23.6 | 32.2 | 40°51.7 | 14.6' | 11°53.2 | 13.5' | 55.8' |
| 21 | 133°23.6 | · · 31.7 | 55°25.3 | 14.6' | 12°06.7 | 13.5' | 55.7' |
| 22 | 148°23.5 | 31.2 | 69°58.8 | 14.5' | 12°20.2 | 13.4' | 55.7' |
| 23 | 163°23.5 | 30.7 | 84°32.4 | 14.5' | 12°33.6 | 13.3' | 55.7' |
| SD = 15.7' $d = -0.5'$ | | | SD = 15.4' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | | | | | | |
| N 70° | | | | | | |
| 68° | //// | //// | 00:46 | 23:17 | //// | //// |
| 66° | //// | //// | 01:53 | 22:16 | //// | //// |
| 64° | //// | //// | 02:27 | 21:43 | //// | //// |
| 62° | //// | 01:15 | 02:52 | 21:19 | 22:53 | //// |
| 60° | //// | 01:58 | 03:12 | 21:00 | 22:12 | //// |
| N 58° | //// | 02:26 | 03:28 | 20:44 | 21:45 | //// |
| 56° | 01:09 | 02:47 | 03:41 | 20:31 | 21:24 | 22:59 |
| 54° | 01:48 | 03:04 | 03:53 | 20:19 | 21:07 | 22:22 |
| 52° | 02:14 | 03:18 | 04:03 | 20:09 | 20:53 | 21:57 |
| 50° | 02:34 | 03:31 | 04:12 | 20:00 | 20:41 | 21:38 |
| 45° | 03:10 | 03:56 | 04:31 | 19:41 | 20:16 | 21:02 |
| N 40° | 03:36 | 04:15 | 04:47 | 19:25 | 19:57 | 20:36 |
| 35° | 03:56 | 04:31 | 05:00 | 19:12 | 19:41 | 20:16 |
| 30° | 04:12 | 04:45 | 05:11 | 19:01 | 19:28 | 20:00 |
| 20° | 04:38 | 05:07 | 05:31 | 18:42 | 19:06 | 19:34 |
| N 10° | 04:58 | 05:25 | 05:47 | 18:25 | 18:48 | 19:14 |
| 0° | 05:15 | 05:41 | 06:03 | 18:10 | 18:32 | 18:58 |
| S 10° | 05:30 | 05:56 | 06:18 | 17:55 | 18:17 | 18:43 |
| 20° | 05:44 | 06:11 | 06:34 | 17:38 | 18:02 | 18:29 |
| 30° | 05:58 | 06:27 | 06:53 | 17:20 | 17:46 | 18:15 |
| 35° | 06:05 | 06:36 | 07:04 | 17:09 | 17:37 | 18:08 |
| 40° | 06:13 | 06:46 | 07:16 | 16:57 | 17:27 | 18:00 |
| 45° | 06:21 | 06:58 | 07:30 | 16:43 | 17:15 | 17:52 |
| S 50° | 06:31 | 07:11 | 07:48 | 16:25 | 17:02 | 17:42 |
| 52° | 06:35 | 07:17 | 07:56 | 16:17 | 16:56 | 17:38 |
| 54° | 06:40 | 07:24 | 08:06 | 16:08 | 16:49 | 17:33 |
| 56° | 06:45 | 07:32 | 08:16 | 15:57 | 16:41 | 17:29 |
| 58° | 06:50 | 07:40 | 08:28 | 15:45 | 16:33 | 17:23 |
| S 60° | 06:56 | 07:49 | 08:42 | 15:31 | 16:24 | 17:18 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | 08:58 | 11:10 | 13:24 | 21:47 | 21:13 | 20:32 |
| N 70° | 09:02 | 11:04 | 13:06 | 21:48 | 21:22 | 20:52 |
| 68° | 09:06 | 10:59 | 12:52 | 21:49 | 21:30 | 21:08 |
| 66° | 09:08 | 10:55 | 12:40 | 21:49 | 21:36 | 21:22 |
| 64° | 09:10 | 10:51 | 12:31 | 21:50 | 21:41 | 21:33 |
| 62° | 09:12 | 10:49 | 12:23 | 21:50 | 21:46 | 21:42 |
| 60° | 09:14 | 10:46 | 12:16 | 21:50 | 21:50 | 21:50 |
| N 58° | 09:16 | 10:44 | 12:10 | 21:51 | 21:54 | 21:57 |
| 56° | 09:17 | 10:42 | 12:04 | 21:51 | 21:57 | 22:04 |
| 54° | 09:18 | 10:40 | 12:00 | 21:51 | 22:00 | 22:09 |
| 52° | 09:19 | 10:38 | 11:55 | 21:52 | 22:03 | 22:14 |
| 50° | 09:20 | 10:37 | 11:52 | 21:52 | 22:05 | 22:19 |
| 45° | 09:22 | 10:34 | 11:43 | 21:52 | 22:10 | 22:29 |
| N 40° | 09:24 | 10:31 | 11:36 | 21:53 | 22:15 | 22:38 |
| 35° | 09:26 | 10:29 | 11:30 | 21:53 | 22:19 | 22:45 |
| 30° | 09:27 | 10:27 | 11:25 | 21:53 | 22:22 | 22:52 |
| 20° | 09:29 | 10:24 | 11:16 | 21:54 | 22:28 | 23:03 |
| N 10° | 09:32 | 10:21 | 11:08 | 21:54 | 22:34 | 23:13 |
| 0° | 09:33 | 10:18 | 11:01 | 21:55 | 22:39 | 23:22 |
| S 10° | 09:35 | 10:15 | 10:54 | 21:55 | 22:44 | 23:31 |
| 20° | 09:38 | 10:12 | 10:46 | 21:56 | 22:49 | 23:41 |
| 30° | 09:40 | 10:09 | 10:38 | 21:56 | 22:55 | 23:53 |
| 35° | 09:41 | 10:07 | 10:33 | 21:56 | 22:59 | · · · |
| 40° | 09:43 | 10:05 | 10:27 | 21:57 | 23:03 | · · · |
| 45° | 09:45 | 10:03 | 10:21 | 21:57 | 23:07 | · · · |
| S 50° | 09:47 | 10:00 | 10:13 | 21:57 | 23:13 | · · · |
| 52° | 09:48 | 09:59 | 10:10 | 21:57 | 23:15 | · · · |
| 54° | 09:49 | 09:57 | 10:06 | 21:58 | 23:18 | · · · |
| 56° | 09:50 | 09:56 | 10:02 | 21:58 | 23:22 | · · · |
| 58° | 09:51 | 09:54 | 09:57 | 21:58 | 23:25 | · · · |
| S 60° | 09:53 | 09:52 | 09:52 | 21:58 | 23:29 | · · · |

| Day | Sun | | Mer. Pass | Moon | | Age 4-6 17-36% |
|-----|-----------------------------------|-----------------------|-----------|-----------------------|-------------|----------------|
| | Eqn.of Time 00 ^h mm:ss | 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 18 | 06:14 | 06:17 | 12:06 | 15:44 | 03:21 | |
| 19 | 06:19 | 06:21 | 12:06 | 16:28 | 04:06 | |
| 20 | 06:23 | 06:25 | 12:06 | 17:12 | 04:50 | |

July 21, 22, 23 UT (Tue., Wed., Thu.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|---------------------|----------|----------|-------------------|----------|----------|---------------------|-------------|----------|--------------------|------------|-----|----------|-------|--|--|
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | |
| 0 | 298°46.7 | 134°42.0 | N07°40.0 | 224°26.7 | N22°36.2 | 171°47.8 | N19°34.7 | 284°16.0 | N03°31.1 | Alpheratz | 357°33.3 | 29°14.2 | | | | | | |
| 1 | 313°49.2 | 149°42.0 | 38.8 | 239°27.3 | 36.5 | 186°49.7 | 34.5 | 299°18.4 | 31.1 | Ankaa | 353°05.7 | -42°09.4 | | | | | | |
| 2 | 328°51.6 | 164°42.0 | 37.7 | 254°27.9 | 36.7 | 201°51.6 | 34.4 | 314°20.9 | 31.1 | Schedar | 349°29.4 | 56°40.8 | | | | | | |
| 3 | 343°54.1 | 179°42.0 | •• 36.5 | 269°28.5 | •• 36.9 | 216°53.5 | •• 34.3 | 329°23.3 | •• 31.1 | Diphda | 348°45.9 | -17°50.2 | | | | | | |
| 4 | 358°56.6 | 194°42.1 | 35.3 | 284°29.1 | 37.1 | 231°55.4 | 34.1 | 344°25.7 | 31.1 | Achernar | 335°19.2 | -57°05.7 | | | | | | |
| 5 | 13°59.0 | 209°42.1 | 34.1 | 299°29.8 | 37.3 | 246°57.3 | 34.0 | 359°28.2 | 31.1 | Hamal | 327°49.8 | 23°35.3 | | | | | | |
| 6 | 29°01.5 | 224°42.1 | N07°32.9 | 314°30.4 | N22°37.5 | 261°59.2 | N19°33.9 | 14°30.6 | N03°31.1 | Polaris | 313°31.8 | 89°22.2 | | | | | | |
| 7 | 44°03.9 | 239°42.1 | 31.7 | 329°31.0 | 37.8 | 277°01.1 | 33.8 | 29°33.1 | 31.1 | Acamar | 315°10.9 | -40°11.6 | | | | | | |
| 8 | 59°06.4 | 254°42.1 | 30.5 | 344°31.6 | 38.0 | 292°03.0 | 33.6 | 44°35.5 | 31.1 | Menkar | 314°04.9 | 4°11.7 | | | | | | |
| 9 | 74°08.9 | 269°42.1 | •• 29.3 | 359°32.2 | •• 38.2 | 307°04.9 | •• 33.5 | 59°37.9 | •• 31.1 | Mirfak | 308°26.6 | 49°57.2 | | | | | | |
| 10 | 89°11.3 | 284°42.1 | 28.2 | 14°32.8 | 38.4 | 322°06.8 | 33.4 | 74°40.4 | 31.1 | Aldebaran | 290°38.4 | 16°33.8 | | | | | | |
| 11 | 104°13.8 | 299°42.1 | 27.0 | 29°33.4 | 38.6 | 337°08.7 | 33.2 | 89°42.8 | 31.1 | Rigel | 281°02.9 | -8°10.1 | | | | | | |
| 12 | 119°16.3 | 314°42.1 | N07°25.8 | 44°34.1 | N22°38.8 | 352°10.6 | N19°33.1 | 104°45.2 | N03°31.1 | Capella | 280°20.4 | 46°01.4 | | | | | | |
| 13 | 134°18.7 | 329°42.2 | 24.6 | 59°34.7 | 39.0 | 7°12.5 | 33.0 | 119°47.7 | 31.1 | Bellatrix | 278°21.8 | 6°22.5 | | | | | | |
| 14 | 149°21.2 | 344°42.2 | 23.4 | 74°35.3 | 39.3 | 22°14.4 | 32.9 | 134°50.1 | 31.1 | Elnath | 278°00.6 | 28°37.7 | | | | | | |
| 15 | 164°23.7 | 359°42.2 | •• 22.2 | 89°35.9 | •• 39.5 | 37°16.2 | •• 32.7 | 149°52.6 | •• 31.1 | Alnilam | 275°36.7 | -1°11.0 | | | | | | |
| 16 | 179°26.1 | 14°42.2 | 21.0 | 104°36.5 | 39.7 | 52°18.1 | 32.6 | 164°55.0 | 31.1 | Betelgeuse | 270°51.0 | 7°24.8 | | | | | | |
| 17 | 194°28.6 | 29°42.2 | 19.8 | 119°37.1 | 39.9 | 67°20.0 | 32.5 | 179°57.4 | 31.1 | Canopus | 263°52.3 | -52°42.4 | | | | | | |
| 18 | 209°31.0 | 44°42.2 | N07°18.6 | 134°37.7 | N22°40.1 | 82°21.9 | N19°32.3 | 194°59.9 | N03°31.0 | Sirius | 258°25.4 | -16°45.1 | | | | | | |
| 19 | 224°33.5 | 59°42.3 | 17.4 | 149°38.4 | 40.3 | 97°23.8 | 32.2 | 210°02.3 | 31.0 | Adhara | 255°05.2 | -29°00.4 | | | | | | |
| 20 | 239°36.0 | 74°42.3 | 16.2 | 164°39.0 | 40.5 | 112°25.7 | 32.1 | 225°04.8 | 31.0 | Procyon | 244°49.8 | 5°09.5 | | | | | | |
| 21 | 254°38.4 | 89°42.3 | •• 15.0 | 179°39.6 | •• 40.7 | 127°27.6 | •• 31.9 | 240°07.2 | •• 31.0 | Pollux | 243°16.1 | 27°57.7 | | | | | | |
| 22 | 269°40.9 | 104°42.3 | 13.9 | 194°40.2 | 40.9 | 142°29.5 | 31.8 | 255°09.6 | 31.0 | Avior | 234°14.9 | -59°35.7 | | | | | | |
| 23 | 284°43.4 | 119°42.4 | 12.7 | 209°40.8 | 41.1 | 157°31.4 | 31.7 | 270°12.1 | 31.0 | Suhail | 222°45.8 | -43°32.4 | | | | | | |
| Mer.pass. 04:04 | | | ν0.0' d-1.2' m-4.18 | | | ν0.6' d0.2' m1.31 | | | ν1.9' d-0.1' m-1.79 | | | ν2.4' d-0.0' m0.69 | | | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 299°45.8 | 134°42.4 | N07°11.5 | 224°41.4 | N22°41.4 | 172°33.3 | N19°31.6 | 285°14.5 | N03°31.0 | Regulus | 207°33.4 | 11°50.3 | | | | | | |
| 1 | 314°48.3 | 149°42.4 | 10.3 | 239°42.0 | 41.6 | 187°35.2 | 31.4 | 300°17.0 | 31.0 | Dubhe | 193°39.9 | 61°36.7 | | | | | | |
| 2 | 329°50.8 | 164°42.4 | 09.1 | 254°42.7 | 41.8 | 202°37.1 | 31.3 | 315°19.4 | 31.0 | Denebola | 182°23.8 | 14°25.5 | | | | | | |
| 3 | 344°53.2 | 179°42.4 | •• 07.9 | 269°43.3 | •• 42.0 | 217°39.0 | •• 31.2 | 330°21.8 | •• 31.0 | Gienah | 175°42.4 | -17°41.4 | | | | | | |
| 4 | 359°55.7 | 194°42.5 | 06.7 | 284°43.9 | 42.2 | 232°40.9 | 31.0 | 345°24.3 | 31.0 | Acrux | 172°58.9 | -63°15.1 | | | | | | |
| 5 | 14°58.2 | 209°42.5 | 05.5 | 299°44.5 | 42.4 | 247°42.8 | 30.9 | 0°26.7 | 31.0 | Gacrux | 171°50.4 | -57°16.0 | | | | | | |
| 6 | 30°00.6 | 224°42.5 | N07°04.3 | 314°45.1 | N22°42.6 | 262°44.7 | N19°30.8 | 15°29.2 | N03°31.0 | Alioth | 166°12.0 | 55°49.2 | | | | | | |
| 7 | 45°03.1 | 239°42.5 | 03.1 | 329°45.7 | 42.8 | 277°46.6 | 30.6 | 30°31.6 | 31.0 | Spica | 158°21.0 | -11°18.0 | | | | | | |
| 8 | 60°05.5 | 254°42.6 | 01.9 | 344°46.3 | 43.0 | 292°48.4 | 30.5 | 45°34.1 | 31.0 | Alkaid | 152°51.0 | 49°11.1 | | | | | | |
| 9 | 75°08.0 | 269°42.6 | 07°00.7 | 359°47.0 | •• 43.2 | 307°50.3 | •• 30.4 | 60°36.5 | •• 31.0 | Hadar | 148°34.1 | -60°30.4 | | | | | | |
| 10 | 90°10.5 | 284°42.6 | 06°59.5 | 14°47.6 | 43.4 | 322°52.2 | 30.3 | 75°38.9 | 31.0 | Menkent | 147°56.1 | -36°30.2 | | | | | | |
| 11 | 105°12.9 | 299°42.7 | 58.3 | 29°48.2 | 43.6 | 337°54.1 | 30.1 | 90°41.4 | 31.0 | Arcturus | 145°46.7 | 19°02.8 | | | | | | |
| 12 | 120°15.4 | 314°42.7 | N06°57.1 | 44°48.8 | N22°43.8 | 352°56.0 | N19°30.0 | 105°43.8 | N03°31.0 | Rigel Kent. | 139°38.4 | -60°57.0 | | | | | | |
| 13 | 135°17.9 | 329°42.7 | 55.9 | 59°49.4 | 44.0 | 7°57.9 | 29.9 | 120°46.3 | 31.0 | Kochab | 137°19.5 | 74°03.0 | | | | | | |
| 14 | 150°20.3 | 344°42.7 | 54.7 | 74°50.0 | 44.2 | 22°59.8 | 29.7 | 135°48.7 | 31.0 | Zuben'ubi | 136°54.5 | -16°09.2 | | | | | | |
| 15 | 165°22.8 | 359°42.8 | •• 53.6 | 89°50.7 | •• 44.4 | 38°01.7 | •• 29.6 | 150°51.2 | •• 31.0 | Alphecca | 126°02.5 | 26°37.7 | | | | | | |
| 16 | 180°25.3 | 14°42.8 | 52.4 | 104°51.3 | 44.6 | 53°03.6 | 29.5 | 165°53.6 | 31.0 | Antares | 112°14.0 | -26°29.5 | | | | | | |
| 17 | 195°27.7 | 29°42.8 | 51.2 | 119°51.9 | 44.8 | 68°05.5 | 29.3 | 180°56.0 | 31.0 | Atria | 107°06.7 | -69°04.7 | | | | | | |
| 18 | 210°30.2 | 44°42.9 | N06°50.0 | 134°52.5 | N22°45.0 | 83°07.4 | N19°29.2 | 195°58.5 | N03°31.0 | Sabik | 102°01.0 | -15°45.5 | | | | | | |
| 19 | 225°32.7 | 59°42.9 | 48.8 | 149°53.1 | 45.2 | 98°09.3 | 29.1 | 211°00.9 | 31.0 | Shaula | 96°08.3 | -37°07.4 | | | | | | |
| 20 | 240°35.1 | 74°42.9 | 47.6 | 164°53.7 | 45.4 | 113°11.2 | 29.0 | 226°03.4 | 31.0 | Rasalhague | 95°57.1 | 12°32.5 | | | | | | |
| 21 | 255°37.6 | 89°43.0 | •• 46.4 | 179°54.3 | •• 45.6 | 128°13.1 | •• 28.8 | 241°05.8 | •• 31.0 | Eltanin | 90°41.1 | 51°29.2 | | | | | | |
| 22 | 270°40.0 | 104°43.0 | 45.2 | 194°55.0 | 45.8 | 143°15.0 | 28.7 | 256°08.3 | 31.0 | Kaus Aust. | 83°30.4 | -34°22.3 | | | | | | |
| 23 | 285°42.5 | 119°43.0 | 44.0 | 209°55.6 | 46.0 | 158°16.9 | 28.6 | 271°10.7 | 30.9 | Vega | 80°32.0 | 38°48.6 | | | | | | |
| Mer.pass. 04:00 | | | ν0.0' d-1.2' m-4.19 | | | ν0.6' d0.2' m1.30 | | | ν1.9' d-0.1' m-1.79 | | | ν2.4' d-0.0' m0.68 | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 300°45.0 | 134°43.1 | N06°42.8 | 224°56.2 | N22°46.2 | 173°18.8 | N19°28.4 | 286°13.1 | N03°30.9 | Al Na'ir | 27°30.9 | -46°49.7 | | | | | | |
| 1 | 315°47.4 | 149°43.1 | 41.6 | 239°56.8 | 46.4 | 188°20.6 | 28.3 | 301°15.6 | 30.9 | Fomalhaut | 15°12.8 | -29°28.7 | | | | | | |
| 2 | 330°49.9 | 164°43.2 | 40.4 | 254°57.4 | 46.6 | 203°22.5 | 28.2 | 316°18.0 | 30.9 | Scheat | 13°43.7 | 28°13.6 | | | | | | |
| 3 | 345°52.4 | 179°43.2 | •• 39.2 | 269°58.0 | •• 46.8 | 218°24.4 | •• 28.0 | 331°20.5 | •• 30.9 | Markab | 13°28.4 | 15°20.9 | | | | | | |
| 4 | 0°54.8 | 194°43.2 | 38.0 | 284°58.7 | 47.0 | 233°26.3 | 27.9 | 346°22.9 | 30.9 | | | | Jul 21 Tue | SHA | Mer.pass | | | |
| 5 | 15°57.3 | 209°43.3 | 36.8 | 299°59.3 | 47.2 | 248°28.2 | 27.8 | 1°25.4 | 30.9 | Venus | 195°55.3 | 15:01 | | | | | | |
| 6 | 30°59.8 | 224°43.3 | N06°35.6 | 314°59.9 | N22°47.4 | 263°30.1 | N19°27.6 | 16°27.8 | N03°30.9 | Mars | 285°40.0 | 09:02 | | | | | | |
| 7 | 46°02.2 | 239°43.4 | 34.4 | 330°00.5 | 47.6 | 278°32.0 | 27.5 | 31°30.3 | 30.9 | Jupiter | 233°01.1 | 12:31 | | | | | | |
| 8 | 61°04.7 | 254°43.4 | 33.2 | 345°01.1 | 47.8 | 293°33.9 | 27.4 | 46°32.7 | 30.9 | Saturn | 345°29.3 | 05:02 | | | | | | |
| 9 | 76°07.1 | 269°43.4 | •• 32.0 | 0°01.7 | •• 48.0 | 308°35.8 | •• 27.3 | 61°35.2 | •• 30.9 | | | | Jul 22 Wed | SHA | Mer.pass | | | |
| 10 | 91°09.6 | 284°43.5 | 30.8 | 15°02.3 | 48.2 | 323°37.7 | 27.1 | 76°37.6 | 30.9 | Venus | 194°56.5 | 15:01 | | | | | | |
| 11 | 106°12.1 | 299°43.5 | 29.6 | 30°03.0 | 48.4 | 338°39.6 | 27.0 | 91°40.0 | 30.9 | Mars | 284°55.6 | 09:01 | | | | | | |
| 12 | 121°14.5 | 314°43.6 | N06°28.4 | 45°03.6 | N22°48.6 | 353°41.5 | N19°26.9 | 106°42.5 | N03°30.9 | Jupiter | 232°47.5 | 12:28 | | | | | | |
| 13 | 136°17.0 | 329°43.6 | 27.2 | 60°04.2 | 48.8 | 8°43.4 | 26.7 | 121°44.9 | 30.9 | Saturn | 345°28.7 | 04:58 | | | | | | |
| 14 | 151°19.5 | 344°43.7 | 26.0 | 75°04.8 | 49.0 | 23°45.3 | 26.6 | 136°47.4 | 30.9 | | | | Jul 23 Thu | SHA | Mer.pass | | | |
| 15 | 166°21.9 | 359°43.7 | •• 24.8 | 90°05.4 | •• 49.2 | 38°47.2 | •• 26.5 | 151°49.8 | •• 30.9 | Venus | 193°58.1 | 15:01 | | | | | | |
| 16 | 181°24.4 | 14°43.7 | 23.6 | 105°06.0 | 49.4 | 53°49.1 | 26.3 | 166°52.3 | 30.9 | Mars | 284°11.2 | 09:00 | | | | | | |
| 17 | 196°26.9 | 29°43 | | | | | | | | | | | | | | | | |

| h | Sun | | | Moon | | | |
|------------|----------|----------|-------------|----------|-------|------------|-------|
| | GHA | Dec | | GHA | ν | Dec | d |
| Tue 0 | 178°23.5 | N20°30.3 | | 99°05.9 | 14.5' | S12°46.9 | 13.3' |
| 1 | 193°23.4 | 29.8 | | 113°39.4 | 14.5' | 13°00.1 | 13.2' |
| 2 | 208°23.4 | 29.3 | | 128°12.9 | 14.5' | 13°13.3 | 13.1' |
| 3 | 223°23.4 | 28.8 | | 142°46.3 | 14.4' | 13°26.5 | 13.1' |
| 4 | 238°23.3 | 28.3 | | 157°19.8 | 14.4' | 13°39.5 | 13.0' |
| 5 | 253°23.3 | 27.8 | | 171°53.2 | 14.4' | 13°52.5 | 12.9' |
| 6 | 268°23.3 | N20°27.4 | | 186°26.5 | 14.4' | S14°05.4 | 12.8' |
| 7 | 283°23.2 | 26.9 | | 200°59.9 | 14.3' | 14°18.3 | 12.8' |
| 8 | 298°23.2 | 26.4 | | 215°33.2 | 14.3' | 14°31.0 | 12.7' |
| 9 | 313°23.2 | 25.9 | | 230°06.6 | 14.3' | 14°43.7 | 12.6' |
| 10 | 328°23.2 | 25.4 | | 244°39.8 | 14.3' | 14°56.4 | 12.6' |
| 11 | 343°23.1 | 24.9 | | 259°13.1 | 14.2' | 15°08.9 | 12.5' |
| 12 | 358°23.1 | N20°24.4 | | 273°46.3 | 14.2' | S15°21.4 | 12.4' |
| 13 | 13°23.1 | 24.0 | | 288°19.5 | 14.2' | 15°33.8 | 12.3' |
| 14 | 28°23.0 | 23.5 | | 302°52.7 | 14.1' | 15°46.1 | 12.2' |
| 15 | 43°23.0 | 23.0 | | 317°25.8 | 14.1' | 15°58.4 | 12.2' |
| 16 | 58°23.0 | 22.5 | | 331°58.9 | 14.1' | 16°10.5 | 12.1' |
| 17 | 73°23.0 | 22.0 | | 346°32.0 | 14.0' | 16°22.6 | 12.0' |
| 18 | 88°22.9 | N20°21.5 | | 1°05.0 | 14.0' | S16°34.6 | 11.9' |
| 19 | 103°22.9 | 21.0 | | 15°38.0 | 14.0' | 16°46.6 | 11.9' |
| 20 | 118°22.9 | 20.5 | | 30°10.9 | 13.9' | 16°58.4 | 11.8' |
| 21 | 133°22.9 | 20.0 | | 44°43.9 | 13.9' | 17°10.2 | 11.7' |
| 22 | 148°22.8 | 19.5 | | 59°16.8 | 13.9' | 17°21.9 | 11.6' |
| 23 | 163°22.8 | 19.1 | | 73°49.6 | 13.8' | 17°33.5 | 11.5' |
| SD = 15.7' | | | $d = -0.5'$ | | | SD = 15.2' | |

| Wed | Sun | | | Moon | | | |
|------------|----------|----------|-------------|----------|-------|------------|-------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 178°22.8 | N20°18.6 | | 88°22.4 | 13.8' | S17°45.0 | 11.4' |
| 1 | 193°22.8 | 18.1 | | 102°55.2 | 13.7' | 17°56.5 | 11.4' |
| 2 | 208°22.7 | 17.6 | | 117°27.9 | 13.7' | 18°07.8 | 11.3' |
| 3 | 223°22.7 | 17.1 | | 132°00.6 | 13.7' | 18°19.1 | 11.2' |
| 4 | 238°22.7 | 16.6 | | 146°33.3 | 13.6' | 18°30.3 | 11.1' |
| 5 | 253°22.7 | 16.1 | | 161°05.9 | 13.6' | 18°41.4 | 11.0' |
| 6 | 268°22.6 | N20°15.6 | | 175°38.5 | 13.5' | S18°52.4 | 10.9' |
| 7 | 283°22.6 | 15.1 | | 190°11.0 | 13.5' | 19°03.3 | 10.8' |
| 8 | 298°22.6 | 14.6 | | 204°43.5 | 13.4' | 19°14.1 | 10.7' |
| 9 | 313°22.6 | 14.1 | | 219°15.9 | 13.4' | 19°24.9 | 10.7' |
| 10 | 328°22.5 | 13.6 | | 233°48.3 | 13.4' | 19°35.5 | 10.6' |
| 11 | 343°22.5 | 13.1 | | 248°20.7 | 13.3' | 19°46.1 | 10.5' |
| 12 | 358°22.5 | N20°12.6 | | 262°53.0 | 13.3' | S19°56.6 | 10.4' |
| 13 | 13°22.5 | 12.1 | | 277°25.2 | 13.2' | 20°07.0 | 10.3' |
| 14 | 28°22.4 | 11.6 | | 291°57.4 | 13.2' | 20°17.2 | 10.2' |
| 15 | 43°22.4 | 11.1 | | 306°29.6 | 13.1' | 20°27.4 | 10.1' |
| 16 | 58°22.4 | 10.6 | | 321°01.7 | 13.1' | 20°37.5 | 10.0' |
| 17 | 73°22.4 | 10.1 | | 335°33.8 | 13.0' | 20°47.5 | 9.9' |
| 18 | 88°22.4 | N20°09.6 | | 350°05.9 | 13.0' | S20°57.4 | 9.8' |
| 19 | 103°22.3 | 09.1 | | 4°37.8 | 12.9' | 21°07.3 | 9.7' |
| 20 | 118°22.3 | 08.6 | | 19°09.8 | 12.9' | 21°17.0 | 9.6' |
| 21 | 133°22.3 | 08.0 | | 33°41.7 | 12.8' | 21°26.6 | 9.5' |
| 22 | 148°22.3 | 07.5 | | 48°13.5 | 12.8' | 21°36.1 | 9.4' |
| 23 | 163°22.3 | 07.0 | | 62°45.3 | 12.7' | 21°45.5 | 9.3' |
| SD = 15.7' | | | $d = -0.5'$ | | | SD = 15.0' | |

| Thu | Sun | | | Moon | | | |
|------------|----------|----------|-------------|----------|-------|------------|------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 178°22.2 | N20°06.5 | | 77°17.0 | 12.7' | S21°54.8 | 9.2' |
| 1 | 193°22.2 | 06.0 | | 91°48.7 | 12.6' | 22°04.1 | 9.1' |
| 2 | 208°22.2 | 05.5 | | 106°20.4 | 12.6' | 22°13.2 | 9.0' |
| 3 | 223°22.2 | 05.0 | | 120°51.9 | 12.5' | 22°22.2 | 8.9' |
| 4 | 238°22.2 | 04.5 | | 135°23.5 | 12.5' | 22°31.1 | 8.8' |
| 5 | 253°22.1 | 04.0 | | 149°55.0 | 12.4' | 22°39.9 | 8.7' |
| 6 | 268°22.1 | N20°03.5 | | 164°26.4 | 12.4' | S22°48.6 | 8.6' |
| 7 | 283°22.1 | 02.9 | | 178°57.8 | 12.3' | 22°57.2 | 8.5' |
| 8 | 298°22.1 | 02.4 | | 193°29.2 | 12.3' | 23°05.7 | 8.4' |
| 9 | 313°22.1 | 01.9 | | 208°00.4 | 12.2' | 23°14.1 | 8.3' |
| 10 | 328°22.1 | 01.4 | | 222°31.7 | 12.2' | 23°22.4 | 8.2' |
| 11 | 343°22.0 | 00.9 | | 237°02.9 | 12.1' | 23°30.6 | 8.1' |
| 12 | 358°22.0 | N20°00.4 | | 251°34.0 | 12.1' | S23°38.6 | 8.0' |
| 13 | 13°22.0 | 19°59.9 | | 266°05.1 | 12.0' | 23°46.6 | 7.8' |
| 14 | 28°22.0 | 59.3 | | 280°36.1 | 12.0' | 23°54.4 | 7.7' |
| 15 | 43°22.0 | 58.8 | | 295°07.1 | 11.9' | 24°02.2 | 7.6' |
| 16 | 58°22.0 | 58.3 | | 309°38.1 | 11.9' | 24°09.8 | 7.5' |
| 17 | 73°21.9 | 57.8 | | 324°09.0 | 11.8' | 24°17.3 | 7.4' |
| 18 | 88°21.9 | N19°57.3 | | 338°39.8 | 11.8' | S24°24.7 | 7.3' |
| 19 | 103°21.9 | 56.8 | | 353°10.6 | 11.7' | 24°32.0 | 7.2' |
| 20 | 118°21.9 | 56.2 | | 7°41.3 | 11.7' | 24°39.2 | 7.1' |
| 21 | 133°21.9 | 55.7 | | 22°12.0 | 11.6' | 24°46.3 | 7.0' |
| 22 | 148°21.9 | 55.2 | | 36°42.6 | 11.6' | 24°53.2 | 6.8' |
| 23 | 163°21.9 | 54.7 | | 51°13.2 | 11.5' | 25°00.1 | 6.7' |
| SD = 15.7' | | | $d = -0.5'$ | | | SD = 14.9' | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | //// | //// | 01:14 | 22:52 | //// | //// |
| 66° | //// | //// | 02:05 | 22:04 | //// | //// |
| 64° | //// | //// | 02:37 | 21:34 | //// | //// |
| 62° | //// | 01:31 | 03:00 | 21:12 | 22:38 | //// |
| 60° | //// | 02:08 | 03:18 | 20:54 | 22:03 | //// |
| N 58° | //// | 02:33 | 03:33 | 20:39 | 21:38 | //// |
| 56° | 01:23 | 02:53 | 03:46 | 20:26 | 21:18 | 22:46 |
| 54° | 01:57 | 03:09 | 03:57 | 20:15 | 21:02 | 22:14 |
| 52° | 02:21 | 03:23 | 04:07 | 20:05 | 20:49 | 21:50 |
| 50° | 02:39 | 03:35 | 04:16 | 19:56 | 20:37 | 21:32 |
| 45° | 03:14 | 03:59 | 04:34 | 19:38 | 20:13 | 20:58 |
| N 40° | 03:39 | 04:18 | 04:49 | 19:23 | 19:54 | 20:33 |
| 35° | 03:59 | 04:34 | 05:02 | 19:11 | 19:39 | 20:14 |
| 30° | 04:15 | 04:47 | 05:13 | 19:00 | 19:26 | 19:58 |
| 20° | 04:40 | 05:08 | 05:32 | 18:41 | 19:05 | 19:33 |
| N 10° | 04:59 | 05:25 | 05:48 | 18:25 | 18:47 | 19:14 |
| 0° | 05:15 | 05:41 | 06:03 | 18:10 | 18:32 | 18:58 |
| S 10° | 05:30 | 05:55 | 06:18 | 17:55 | 18:18 | 18:43 |
| 20° | 05:43 | 06:10 | 06:34 | 17:40 | 18:03 | 18:30 |
| 30° | 05:57 | 06:26 | 06:52 | 17:22 | 17:47 | 18:17 |
| 35° | 06:04 | 06:35 | 07:02 | 17:11 | 17:39 | 18:10 |
| 40° | 06:11 | 06:44 | 07:14 | 17:00 | 17:29 | 18:02 |
| 45° | 06:19 | 06:55 | 07:28 | 16:46 | 17:18 | 17:54 |
| S 50° | 06:28 | 07:08 | 07:45 | 16:29 | 17:05 | 17:45 |
| 52° | 06:32 | 07:14 | 07:53 | 16:21 | 16:59 | 17:41 |
| 54° | 06:37 | 07:21 | 08:02 | 16:12 | 16:53 | 17:37 |
| 56° | 06:41 | 07:28 | 08:12 | 16:02 | 16:46 | 17:32 |
| 58° | 06:46 | 07:36 | 08:23 | 15:51 | 16:38 | 17:27 |
| S 60° | 06:52 | 07:45 | 08:36 | 15:37 | 16:29 | 17:22 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | 16:09 | ■ | ■ | 19:20 | ■ | ■ |
| N 70° | 15:22 | ■ | ■ | 20:09 | ■ | ■ |
| 68° | 14:52 | 17:24 | ■ | 20:40 | 19:42 | ■ |
| 66° | 14:29 | 16:31 | ■ | 21:04 | 20:36 | ■ |
| 64° | 14:12 | 15:59 | 18:02 | 21:22 | 21:09 | 20:44 |
| 62° | 13:58 | 15:36 | 17:19 | 21:38 | 21:33 | 21:29 |
| 60° | 13:46 | 15:17 | 16:50 | 21:51 | 21:53 | 21:58 |
| N 58° | 13:35 | 15:02 | 16:28 | 22:02 | 22:09 | 22:21 |
| 56° | 13:27 | 14:49 | 16:10 | 22:12 | 22:23 | 22:39 |
| 54° | 13:19 | 14:37 | 15:55 | 22:20 | 22:35 | 22:54 |
| 52° | 13:12 | 14:27 | 15:42 | 22:28 | 22:45 | 23:08 |
| 50° | 13:05 | 14:18 | 15:30 | 22:35 | 22:55 | 23:20 |
| 45° | 12:52 | 14:00 | 15:06 | 22:50 | 23:15 | 23:44 |
| N 40° | 12:41 | 13:44 | 14:47 | 23:03 | 23:31 | |
| 35° | 12:31 | 13:32 | 14:32 | 23:13 | 23:45 | |
| 30° | 12:23 | 13:20 | 14:18 | 23:23 | 23:57 | |
| 20° | 12:09 | 13:01 | 13:55 | 23:39 | | 00:17 |
| N 10° | 11:56 | 12:45 | 13:35 | 23:53 | | 00:35 |
| 0° | 11:45 | 12:30 | 13:17 | | 00:06 | 00:52 |
| S 10° | 11:34 | 12:15 | 12:58 | | 00:20 | 01:09 |
| 20° | 11:21 | 11:59 | 12:39 | | 00:34 | 01:27 |
| 30° | 11:08 | 11:40 | 12:16 | | 00:51 | 01:48 |
| 35° | 11:00 | 11:29 | 12:03 | 00:00 | 01:00 | 02:01 |
| 40° | 10:51 | 11:17 | 11:48 | 00:07 | 01:11 | 02:15 |
| 45° | 10:41 | 11:03 | 11:30 | 00:16 | 01:24 | 02:32 |
| S 50° | 10:28 | 10:46 | 11:08 | 00:27 | 01:40 | 02:53 |
| 52° | 10:22 | 10:38 | 10:57 | 00:32 | 01:48 | 03:03 |
| 54° | 10:16 | 10:29 | 10:45 | 00:38 | 01:56 | 03:14 |
| 56° | 10:09 | 10:18 | 10:32 | 00:44 | 02:06 | 03:27 |
| 58° | 10:01 | 10:07 | 10:16 | 00:51 | 02:17 | 03:43 |
| S 60° | 09:52 | 09:54 | 09:57 | 00:59 | 02:29 | 04:01 |

| Day | Sun | | | Moon | | |
|-----|---|--------------------------|--------------------|-----------------------------|----------------|----------------------|
| | Eqn.of Time 00 ^h mm:ss | 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 7-9 46-65% |
| 21 | 06:26 | 06:28 | 12:06 | 17:56 | 05:33 | |
| 22 | 06:29 | 06:30 | 12:07 | 18:41 | 06:18 | |
| 23 | 06:31 | 06:32 | 12:07 | 19:28 | 07:04 | |


July 24, 25, 26 UT (Fri., Sat., Sun.)

| | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|---------------------|----------|----------|-------------------|----------|----------|---------------------|---------|-----|--------------------|--------|---------------------|----------|----------|--|--|
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | |
| 0 | 301°44.1 | 134°44.1 | N06°14.0 | 225°11.0 | N22°50.9 | 174°04.2 | N19°25.3 | 287°11.9 | N03°30.8 | | | | | Alpheratz | 357°33.3 | 29°14.2 | | |
| 1 | 316°46.6 | 149°44.2 | 12.8 | 240°11.6 | 51.1 | 189°06.1 | 25.2 | 302°14.3 | 30.8 | | | | | Ankaa | 353°05.7 | -42°09.4 | | |
| 2 | 331°49.0 | 164°44.2 | 11.6 | 255°12.2 | 51.3 | 204°08.0 | 25.0 | 317°16.8 | 30.8 | | | | | Schedar | 349°29.4 | 56°40.8 | | |
| 3 | 346°51.5 | 179°44.3 | •• 10.4 | 270°12.8 | •• 51.5 | 219°09.9 | •• 24.9 | 332°19.2 | •• 30.8 | | | | | Diphda | 348°45.9 | -17°50.2 | | |
| 4 | 1°54.0 | 194°44.3 | 09.2 | 285°13.4 | 51.7 | 234°11.8 | 24.8 | 347°21.7 | 30.8 | | | | | Achernar | 335°19.2 | -57°05.7 | | |
| 5 | 16°56.4 | 209°44.4 | 07.9 | 300°14.1 | 51.9 | 249°13.7 | 24.6 | 2°24.1 | 30.8 | | | | | Hamal | 327°49.7 | 23°35.3 | | |
| 6 | 31°58.9 | 224°44.5 | N06°06.7 | 315°14.7 | N22°52.1 | 264°15.6 | N19°24.5 | 17°26.6 | N03°30.8 | | | | | Polaris | 313°30.1 | 89°22.2 | | |
| 7 | 47°01.4 | 239°44.5 | 05.5 | 330°15.3 | 52.3 | 279°17.5 | 24.4 | 32°29.0 | 30.8 | | | | | Acamar | 315°10.9 | -40°11.6 | | |
| 8 | 62°03.8 | 254°44.6 | 04.3 | 345°15.9 | 52.5 | 294°19.4 | 24.2 | 47°31.5 | 30.8 | | | | | Menkar | 314°04.9 | 4°11.7 | | |
| 9 | 77°06.3 | 269°44.6 | •• 03.1 | 0°16.5 | •• 52.6 | 309°21.3 | •• 24.1 | 62°33.9 | •• 30.8 | | | | | Mirfak | 308°26.6 | 49°57.2 | | |
| 10 | 92°08.8 | 284°44.7 | 01.9 | 15°17.1 | 52.8 | 324°23.2 | 24.0 | 77°36.4 | 30.7 | | | | | Aldebaran | 290°38.4 | 16°33.8 | | |
| 11 | 107°11.2 | 299°44.7 | 06°00.7 | 30°17.8 | 53.0 | 339°25.0 | 23.8 | 92°38.8 | 30.7 | | | | | Rigel | 281°02.9 | -8°10.1 | | |
| 12 | 122°13.7 | 314°44.8 | N05°59.5 | 45°18.4 | N22°53.2 | 354°26.9 | N19°23.7 | 107°41.3 | N03°30.7 | | | | | Capella | 280°20.3 | 46°01.4 | | |
| 13 | 137°16.1 | 329°44.9 | 58.3 | 60°19.0 | 53.4 | 9°28.8 | 23.6 | 122°43.7 | 30.7 | | | | | Bellatrix | 278°21.8 | 6°22.5 | | |
| 14 | 152°18.6 | 344°44.9 | 57.1 | 75°19.6 | 53.6 | 24°30.7 | 23.4 | 137°46.2 | 30.7 | | | | | Elnath | 278°00.5 | 28°37.7 | | |
| 15 | 167°21.1 | 359°45.0 | •• 55.9 | 90°20.2 | •• 53.8 | 39°32.6 | •• 23.3 | 152°48.6 | •• 30.7 | | | | | Alnilam | 275°36.7 | -1°11.0 | | |
| 16 | 182°23.5 | 14°45.0 | 54.7 | 105°20.8 | 53.9 | 54°34.5 | 23.2 | 167°51.1 | 30.7 | | | | | Betelgeuse | 270°51.0 | 7°24.8 | | |
| 17 | 197°26.0 | 29°45.1 | 53.5 | 120°21.5 | 54.1 | 69°36.4 | 23.1 | 182°53.5 | 30.7 | | | | | Canopus | 263°52.3 | -52°42.4 | | |
| 18 | 212°28.5 | 44°45.2 | N05°52.3 | 135°22.1 | N22°54.3 | 84°38.3 | N19°22.9 | 197°56.0 | N03°30.7 | | | | | Sirius | 258°25.4 | -16°45.1 | | |
| 19 | 227°30.9 | 59°45.2 | 51.1 | 150°22.7 | 54.5 | 99°40.2 | 22.8 | 212°58.4 | 30.7 | | | | | Adhara | 255°05.2 | -29°00.4 | | |
| 20 | 242°33.4 | 74°45.3 | 49.9 | 165°23.3 | 54.7 | 114°42.1 | 22.7 | 228°00.9 | 30.7 | | | | | Procyon | 244°49.8 | 5°09.5 | | |
| 21 | 257°35.9 | 89°45.3 | •• 48.7 | 180°23.9 | •• 54.9 | 129°44.0 | •• 22.5 | 243°03.3 | •• 30.7 | | | | | Pollux | 243°16.1 | 27°57.7 | | |
| 22 | 272°38.3 | 104°45.4 | 47.5 | 195°24.5 | 55.0 | 144°45.9 | 22.4 | 258°05.8 | 30.7 | | | | | Avior | 234°14.9 | -59°35.7 | | |
| 23 | 287°40.8 | 119°45.5 | 46.3 | 210°25.2 | 55.2 | 159°47.8 | 22.3 | 273°08.2 | 30.7 | | | | | Suhail | 222°45.8 | -43°32.4 | | |
| Mer.pass. 03:52 | | | ν0.1' d-1.2' m-4.20 | | | ν0.6' d0.2' m1.30 | | | ν1.9' d-0.1' m-1.79 | | | ν2.4' d-0.0' m0.67 | | | | | | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 302°43.3 | 134°45.5 | N05°45.0 | 225°25.8 | N22°55.4 | 174°49.7 | N19°22.1 | 288°10.7 | N03°30.6 | | | | | Dubhe | 193°39.9 | 61°36.6 | | |
| 1 | 317°45.7 | 149°45.6 | 43.8 | 240°26.4 | 55.6 | 189°51.6 | 22.0 | 303°13.1 | 30.6 | | | | | Denebola | 182°23.8 | 14°25.5 | | |
| 2 | 332°48.2 | 164°45.7 | 42.6 | 255°27.0 | 55.8 | 204°53.5 | 21.9 | 318°15.6 | 30.6 | | | | | Gienah | 175°42.4 | -17°41.4 | | |
| 3 | 347°50.6 | 179°45.7 | •• 41.4 | 270°27.6 | •• 56.0 | 219°55.4 | •• 21.7 | 333°18.0 | •• 30.6 | | | | | Acrux | 172°58.9 | -63°15.1 | | |
| 4 | 2°53.1 | 194°45.8 | 40.2 | 285°28.3 | 56.1 | 234°57.3 | 21.6 | 348°20.5 | 30.6 | | | | | Gacrux | 171°50.4 | -57°16.0 | | |
| 5 | 17°55.6 | 209°45.9 | 39.0 | 300°28.9 | 56.3 | 249°59.1 | 21.5 | 3°22.9 | 30.6 | | | | | Alioth | 166°12.0 | 55°49.2 | | |
| 6 | 32°58.0 | 224°45.9 | N05°37.8 | 315°29.5 | N22°56.5 | 265°01.0 | N19°21.3 | 18°25.4 | N03°30.6 | | | | | Spica | 158°21.0 | -11°18.0 | | |
| 7 | 48°00.5 | 239°46.0 | 36.6 | 330°30.1 | 56.7 | 280°02.9 | 21.2 | 33°27.8 | 30.6 | | | | | Alkaid | 152°51.0 | 49°11.1 | | |
| 8 | 63°03.0 | 254°46.1 | 35.4 | 345°30.7 | 56.9 | 295°04.8 | 21.1 | 48°30.3 | 30.6 | | | | | Hadar | 148°34.1 | -60°30.4 | | |
| 9 | 78°05.4 | 269°46.2 | •• 34.2 | 0°31.3 | •• 57.0 | 310°06.7 | •• 20.9 | 63°32.8 | •• 30.6 | | | | | Menkent | 147°56.1 | -36°30.2 | | |
| 10 | 93°07.9 | 284°46.2 | 33.0 | 15°32.0 | 57.2 | 325°08.6 | 20.8 | 78°35.2 | 30.6 | | | | | Arcturus | 145°46.7 | 19°02.8 | | |
| 11 | 108°10.4 | 299°46.3 | 31.8 | 30°32.6 | 57.4 | 340°10.5 | 20.7 | 93°37.7 | 30.6 | | | | | Rigel Kent. | 139°38.4 | -60°57.0 | | |
| 12 | 123°12.8 | 314°46.4 | N05°30.6 | 45°33.2 | N22°57.6 | 355°12.4 | N19°20.5 | 108°40.1 | N03°30.6 | | | | | Kochab | 137°19.6 | 74°03.0 | | |
| 13 | 138°15.3 | 329°46.4 | 29.3 | 60°33.8 | 57.8 | 10°14.3 | 20.4 | 123°42.6 | 30.5 | | | | | Zuben'ubi | 136°54.5 | -16°09.2 | | |
| 14 | 153°17.8 | 344°46.5 | 28.1 | 75°34.4 | 57.9 | 25°16.2 | 20.3 | 138°45.0 | 30.5 | | | | | Alphecca | 126°02.5 | 26°37.7 | | |
| 15 | 168°20.2 | 359°46.6 | •• 26.9 | 90°35.1 | •• 58.1 | 40°18.1 | •• 20.1 | 153°47.5 | •• 30.5 | | | | | Antares | 112°14.0 | -26°29.5 | | |
| 16 | 183°22.7 | 14°46.7 | 25.7 | 105°35.7 | 58.3 | 55°20.0 | 20.0 | 168°49.9 | 30.5 | | | | | Atria | 107°06.7 | -69°04.7 | | |
| 17 | 198°25.1 | 29°46.7 | 24.5 | 120°36.3 | 58.5 | 70°21.9 | 19.9 | 183°52.4 | 30.5 | | | | | Sabik | 102°01.0 | -15°45.5 | | |
| 18 | 213°27.6 | 44°46.8 | N05°23.3 | 135°36.9 | N22°58.6 | 85°23.8 | N19°19.7 | 198°54.8 | N03°30.5 | | | | | Shaula | 96°08.3 | -37°07.4 | | |
| 19 | 228°30.1 | 59°46.9 | 22.1 | 150°37.5 | 58.8 | 100°25.7 | 19.6 | 213°57.3 | 30.5 | | | | | Rasalhague | 95°57.1 | 12°32.5 | | |
| 20 | 243°32.5 | 74°47.0 | 20.9 | 165°38.2 | 59.0 | 115°27.6 | 19.5 | 228°59.8 | 30.5 | | | | | Eltanin | 90°41.1 | 51°29.3 | | |
| 21 | 258°35.0 | 89°47.1 | •• 19.7 | 180°38.8 | •• 59.2 | 130°29.5 | •• 19.3 | 244°02.2 | •• 30.5 | | | | | Kaus Aust. | 83°30.4 | -34°22.3 | | |
| 22 | 273°37.5 | 104°47.1 | 18.5 | 195°39.4 | 59.3 | 145°31.4 | 19.2 | 259°04.7 | 30.5 | | | | | Vega | 80°32.0 | 38°48.6 | | |
| 23 | 288°39.9 | 119°47.2 | 17.2 | 210°40.0 | 59.5 | 160°33.3 | 19.1 | 274°07.1 | 30.5 | | | | | Nunki | 75°45.8 | -26°15.8 | | |
| Mer.pass. 03:48 | | | ν0.1' d-1.2' m-4.21 | | | ν0.6' d0.2' m1.30 | | | ν1.9' d-0.1' m-1.79 | | | ν2.5' d-0.0' m0.67 | | | | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 303°42.4 | 134°47.3 | N05°16.0 | 225°40.6 | N22°59.7 | 175°35.1 | N19°19.0 | 289°09.6 | N03°30.4 | | | | | Jul 24 Fri | SHA | Mer.pass | | |
| 1 | 318°44.9 | 149°47.4 | 14.8 | 240°41.2 | 22°59.9 | 190°37.0 | 18.8 | 304°12.0 | 30.4 | | | | | Venus | 193°00.0 | 15:01 | | |
| 2 | 333°47.3 | 164°47.5 | 13.6 | 255°41.9 | 23°00.0 | 205°38.9 | 18.7 | 319°14.5 | 30.4 | | | | | Mars | 283°26.9 | 08:59 | | |
| 3 | 348°49.8 | 179°47.5 | •• 12.4 | 270°42.5 | •• 00.2 | 220°40.8 | •• 18.6 | 334°17.0 | •• 30.4 | | | | | Jupiter | 232°20.1 | 12:22 | | |
| 4 | 3°52.2 | 194°47.6 | 11.2 | 285°43.1 | 00.4 | 235°42.7 | 18.4 | 349°19.4 | 30.4 | | | | | Saturn | 345°27.8 | 04:50 | | |
| 5 | 18°54.7 | 209°47.7 | 10.0 | 300°43.7 | 00.6 | 250°44.6 | 18.3 | 4°21.9 | 30.4 | | | | | | | | | |
| 6 | 33°57.2 | 224°47.8 | N05°08.8 | 315°44.3 | N23°00.7 | 265°46.5 | N19°18.2 | 19°24.3 | N03°30.4 | | | | | | | | | |
| 7 | 48°59.6 | 239°47.9 | 07.6 | 330°45.0 | 00.9 | 280°48.4 | 18.0 | 34°26.8 | 30.4 | | | | | | | | | |
| 8 | 64°02.1 | 254°47.9 | 06.3 | 345°45.6 | 01.1 | 295°50.3 | 17.9 | 49°29.2 | 30.4 | | | | | | | | | |
| 9 | 79°04.6 | 269°48.0 | •• 05.1 | 0°46.2 | •• 01.2 | 310°52.2 | •• 17.8 | 64°31.7 | •• 30.4 | | | | | | | | | |
| 10 | 94°07.0 | 284°48.1 | 03.9 | 15°46.8 | 01.4 | 325°54.1 | 17.6 | 79°34.2 | 30.3 | | | | | | | | | |
| 11 | 109°09.5 | 299°48.2 | 02.7 | 30°47.4 | 01.6 | 340°56.0 | 17.5 | 94°36.6 | 30.3 | | | | | | | | | |
| 12 | 124°12.0 | 314°48.3 | N05°01.5 | 45°48.1 | N23°01.7 | 355°57.9 | N19°17.4 | 109°39.1 | N03°30.3 | | | | | | | | | |
| 13 | 139°14.4 | 329°48.4 | 05°00.3 | 60°48.7 | 01.9 | 10°59.8 | 17.2 | 124°41.5 | 30.3 | | | | | | | | | |
| 14 | 154°16.9 | 344°48.5 | 04°59.1 | 75°49.3 | 02.1 | 26°01.7 | 17.1 | 139°44.0 | 30.3 | | | | | | | | | |
| 15 | 169°19.4 | 359°48.6 | •• 57.9 | 90°49.9 | •• 02.3 | 41°03.6 | •• 17.0 | 154°46.4 | •• 30.3 | | | | | | | | | |
| 16 | 184°21.8 | 14°48.6 | 56.6 | 105°50.5 | 02.4 | 56°05.5 | 16.8 | 169°48.9 | 30.3 | | | | | | | | | |
| 17 | 199°24.3 | 29°48.7 | 55.4 | 120°51.2 | 02.6 | 71°07.4 | 16.7 | 184°51.4 | 30.3 | | | | | | | | | |
| 18 | 214°26.7 | 44°48.8 | N04°54.2 | 135°51.8 | N23°02.8 | 86°09.2 | N19°16.6 | 199°53.8 | N03°30.3 | | | | | | | | | |
| 19 | 229°29.2 | 59°48.9 | 53.0 | 150°52.4 | 02.9 | 101°11.1 | 16.4 | 214°56.3 | 30.3 | | | | | | | | | |
| 20 | 244°31.7 | 74°49.0 | 51.8 | 165°53.0 | 03.1 | 116°13.0 | 16.3 | 229°58.7 | 30.2 | | | | | | | | | |
| 21 | 259°34.1 | 89°49.1 | •• 50.6 | 180°53.6 | •• 03.3 | 131°14.9 | •• 16.2 | 245°01.2 | •• 30.2 | | | | | | | | | |
| 22 | 274°36.6 | 104°49.2 | 49.4 | 195°54.3 | 03.4 | 146°16.8 | 16.0 | 260°03.7 | 30.2 | | | | | | | | | |
| 23 | 289°39.1 | 119°49.3 | 48.1 | 210°54.9 | 03.6 | 161°18.7 | 15.9 | 275°06.1 | 30.2 | | | | | | | | | |
| Mer.pass. 03:45 | | | ν0.1' d-1.2' m-4.22 | | | ν0.6' d0.2' m1.30 | | | ν1.9' d-0.1' m-1.78 | | | ν2.5' d-0.0' m0.66 | | | | | | |
| | | | | | | | | | | | | | | Horizontal parallax | | | | |
| | | | | | | | | | | | | | | Venus: | | 0.2 | | |
| | | | | | | | | | | | | | | Mars: | | 0.1 | | |

| h | Sun | | | Moon | | | |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°21.8 | N19°54.2 | 65°43.8 | 11.5' | S25°06.8 | 6.6' | 54.2' |
| 1 | 193°21.8 | 53.6 | 80°14.3 | 11.4' | 25°13.4 | 6.5' | 54.2' |
| 2 | 208°21.8 | 53.1 | 94°44.7 | 11.4' | 25°19.9 | 6.4' | 54.2' |
| 3 | 223°21.8 | · · 52.6 | 109°15.1 | 11.3' | 25°26.2 | 6.3' | 54.2' |
| 4 | 238°21.8 | 52.1 | 123°45.5 | 11.3' | 25°32.5 | 6.1' | 54.2' |
| 5 | 253°21.8 | 51.5 | 138°15.8 | 11.3' | 25°38.6 | 6.0' | 54.1' |
| 6 | 268°21.8 | N19°51.0 | 152°46.0 | 11.2' | S25°44.6 | 5.9' | 54.1' |
| 7 | 283°21.8 | 50.5 | 167°16.2 | 11.2' | 25°50.5 | 5.8' | 54.1' |
| 8 | 298°21.7 | 50.0 | 181°46.4 | 11.1' | 25°56.3 | 5.7' | 54.1' |
| 9 | 313°21.7 | · · 49.4 | 196°16.5 | 11.1' | 26°02.0 | 5.5' | 54.1' |
| 10 | 328°21.7 | 48.9 | 210°46.6 | 11.0' | 26°07.5 | 5.4' | 54.1' |
| 11 | 343°21.7 | 48.4 | 225°16.6 | 11.0' | 26°12.9 | 5.3' | 54.1' |
| 12 | 358°21.7 | N19°47.8 | 239°46.6 | 10.9' | S26°18.2 | 5.2' | 54.1' |
| 13 | 13°21.7 | 47.3 | 254°16.5 | 10.9' | 26°23.4 | 5.0' | 54.1' |
| 14 | 28°21.7 | 46.8 | 268°46.4 | 10.9' | 26°28.4 | 4.9' | 54.1' |
| 15 | 43°21.7 | · · 46.3 | 283°16.3 | 10.8' | 26°33.3 | 4.8' | 54.1' |
| 16 | 58°21.7 | 45.7 | 297°46.1 | 10.8' | 26°38.1 | 4.7' | 54.1' |
| 17 | 73°21.7 | 45.2 | 312°15.9 | 10.7' | 26°42.8 | 4.5' | 54.1' |
| 18 | 88°21.6 | N19°44.7 | 326°45.6 | 10.7' | S26°47.3 | 4.4' | 54.1' |
| 19 | 103°21.6 | 44.1 | 341°15.3 | 10.7' | 26°51.8 | 4.3' | 54.1' |
| 20 | 118°21.6 | 43.6 | 355°45.0 | 10.6' | 26°56.0 | 4.2' | 54.0' |
| 21 | 133°21.6 | · · 43.1 | 10°14.6 | 10.6' | 27°00.2 | 4.0' | 54.0' |
| 22 | 148°21.6 | 42.5 | 24°44.2 | 10.5' | 27°04.2 | 3.9' | 54.0' |
| 23 | 163°21.6 | 42.0 | 39°13.8 | 10.5' | 27°08.1 | 3.8' | 54.0' |
| SD = 15.7' $d = -0.5'$ | | | SD = 14.8' | | | | |
| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°21.6 | N19°41.5 | 53°43.3 | 10.5' | S27°11.9 | 3.6' | 54.0' |
| 1 | 193°21.6 | 40.9 | 68°12.7 | 10.4' | 27°15.6 | 3.5' | 54.0' |
| 2 | 208°21.6 | 40.4 | 82°42.2 | 10.4' | 27°19.1 | 3.4' | 54.0' |
| 3 | 223°21.6 | · · 39.8 | 97°11.6 | 10.4' | 27°22.5 | 3.3' | 54.0' |
| 4 | 238°21.6 | 39.3 | 111°41.0 | 10.3' | 27°25.7 | 3.1' | 54.0' |
| 5 | 253°21.6 | 38.8 | 126°10.3 | 10.3' | 27°28.9 | 3.0' | 54.0' |
| 6 | 268°21.6 | N19°38.2 | 140°39.7 | 10.3' | S27°31.9 | 2.9' | 54.0' |
| 7 | 283°21.6 | 37.7 | 155°08.9 | 10.3' | 27°34.7 | 2.7' | 54.0' |
| 8 | 298°21.6 | 37.1 | 169°38.2 | 10.2' | 27°37.5 | 2.6' | 54.0' |
| 9 | 313°21.6 | · · 36.6 | 184°07.4 | 10.2' | 27°40.1 | 2.5' | 54.0' |
| 10 | 328°21.5 | 36.1 | 198°36.6 | 10.2' | 27°42.6 | 2.3' | 54.0' |
| 11 | 343°21.5 | 35.5 | 213°05.8 | 10.2' | 27°44.9 | 2.2' | 54.0' |
| 12 | 358°21.5 | N19°35.0 | 227°35.0 | 10.1' | S27°47.1 | 2.1' | 54.0' |
| 13 | 13°21.5 | 34.4 | 242°04.1 | 10.1' | 27°49.2 | 1.9' | 54.0' |
| 14 | 28°21.5 | 33.9 | 256°33.2 | 10.1' | 27°51.1 | 1.8' | 54.0' |
| 15 | 43°21.5 | · · 33.4 | 271°02.3 | 10.1' | 27°52.9 | 1.7' | 54.0' |
| 16 | 58°21.5 | 32.8 | 285°31.4 | 10.1' | 27°54.6 | 1.5' | 54.0' |
| 17 | 73°21.5 | 32.3 | 300°00.4 | 10.0' | 27°56.1 | 1.4' | 54.0' |
| 18 | 88°21.5 | N19°31.7 | 314°29.5 | 10.0' | S27°57.5 | 1.3' | 54.0' |
| 19 | 103°21.5 | 31.2 | 328°58.5 | 10.0' | 27°58.8 | 1.1' | 54.0' |
| 20 | 118°21.5 | 30.6 | 343°27.5 | 10.0' | 27°59.9 | 1.0' | 54.0' |
| 21 | 133°21.5 | · · 30.1 | 357°56.5 | 10.0' | 28°00.9 | 0.9' | 54.0' |
| 22 | 148°21.5 | 29.5 | 12°25.5 | 10.0' | 28°01.8 | 0.7' | 54.0' |
| 23 | 163°21.5 | 29.0 | 26°54.4 | 9.9' | 28°02.5 | 0.6' | 54.0' |
| SD = 15.7' $d = -0.5'$ | | | SD = 14.7' | | | | |
| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°21.5 | N19°28.4 | 41°23.4 | 9.9' | S28°03.1 | 0.5' | 54.0' |
| 1 | 193°21.5 | 27.9 | 55°52.3 | 9.9' | 28°03.6 | 0.3' | 54.0' |
| 2 | 208°21.5 | 27.3 | 70°21.2 | 9.9' | 28°03.9 | 0.2' | 54.0' |
| 3 | 223°21.5 | · · 26.8 | 84°50.2 | 9.9' | 28°04.1 | 0.0' | 54.0' |
| 4 | 238°21.5 | 26.2 | 99°19.1 | 9.9' | 28°04.1 | -0.1' | 54.0' |
| 5 | 253°21.5 | 25.7 | 113°48.0 | 9.9' | 28°04.0 | -0.2' | 54.0' |
| 6 | 268°21.5 | N19°25.1 | 128°16.9 | 9.9' | S28°03.8 | -0.4' | 54.0' |
| 7 | 283°21.5 | 24.6 | 142°45.8 | 9.9' | 28°03.4 | -0.5' | 54.0' |
| 8 | 298°21.5 | 24.0 | 157°14.7 | 9.9' | 28°03.0 | -0.6' | 54.0' |
| 9 | 313°21.5 | · · 23.5 | 171°43.6 | 9.9' | 28°02.3 | -0.8' | 54.0' |
| 10 | 328°21.5 | 22.9 | 186°12.5 | 9.9' | 28°01.5 | -0.9' | 54.0' |
| 11 | 343°21.5 | 22.4 | 200°41.4 | 9.9' | 28°00.6 | -1.0' | 54.0' |
| 12 | 358°21.5 | N19°21.8 | 215°10.3 | 9.9' | S27°59.6 | -1.2' | 54.0' |
| 13 | 13°21.5 | 21.2 | 229°39.2 | 9.9' | 27°58.4 | -1.3' | 54.0' |
| 14 | 28°21.5 | 20.7 | 244°08.1 | 9.9' | 27°57.1 | -1.5' | 54.0' |
| 15 | 43°21.5 | · · 20.1 | 258°37.0 | 9.9' | 27°55.7 | -1.6' | 54.1' |
| 16 | 58°21.5 | 19.6 | 273°05.9 | 9.9' | 27°54.1 | -1.7' | 54.1' |
| 17 | 73°21.5 | 19.0 | 287°34.9 | 9.9' | 27°52.4 | -1.9' | 54.1' |
| 18 | 88°21.5 | N19°18.4 | 302°03.8 | 10.0' | S27°50.5 | -2.0' | 54.1' |
| 19 | 103°21.5 | 17.9 | 316°32.8 | 10.0' | 27°48.5 | -2.1' | 54.1' |
| 20 | 118°21.6 | 17.3 | 331°01.7 | 10.0' | 27°46.4 | -2.3' | 54.1' |
| 21 | 133°21.6 | · · 16.8 | 345°30.7 | 10.0' | 27°44.1 | -2.4' | 54.1' |
| 22 | 148°21.6 | 16.2 | 359°59.7 | 10.0' | 27°41.7 | -2.5' | 54.1' |
| 23 | 163°21.6 | 15.6 | 14°28.7 | 10.0' | 27°39.2 | -2.7' | 54.1' |
| SD = 15.7' $d = -0.5'$ | | | SD = 14.7' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | //// | //// | 01:35 | 22:32 | //// | //// |
| 66° | //// | //// | 02:18 | 21:52 | //// | //// |
| 64° | //// | 00:44 | 02:46 | 21:25 | 23:18 | //// |
| 62° | //// | 01:45 | 03:07 | 21:04 | 22:24 | //// |
| 60° | //// | 02:18 | 03:25 | 20:47 | 21:53 | //// |
| N 58° | 00:40 | 02:41 | 03:39 | 20:33 | 21:30 | 23:23 |
| 56° | 01:36 | 03:00 | 03:51 | 20:21 | 21:12 | 22:34 |
| 54° | 02:06 | 03:15 | 04:02 | 20:10 | 20:57 | 22:05 |
| 52° | 02:28 | 03:28 | 04:11 | 20:01 | 20:44 | 21:43 |
| 50° | 02:45 | 03:40 | 04:20 | 19:53 | 20:33 | 21:26 |
| 45° | 03:18 | 04:03 | 04:38 | 19:35 | 20:10 | 20:54 |
| N 40° | 03:43 | 04:21 | 04:52 | 19:21 | 19:52 | 20:30 |
| 35° | 04:01 | 04:36 | 05:04 | 19:09 | 19:37 | 20:11 |
| 30° | 04:17 | 04:48 | 05:15 | 18:58 | 19:24 | 19:56 |
| 20° | 04:41 | 05:09 | 05:33 | 18:40 | 19:04 | 19:32 |
| N 10° | 05:00 | 05:26 | 05:49 | 18:24 | 18:47 | 19:13 |
| 0° | 05:16 | 05:41 | 06:03 | 18:10 | 18:32 | 18:58 |
| S 10° | 05:29 | 05:55 | 06:17 | 17:56 | 18:18 | 18:44 |
| 20° | 05:42 | 06:09 | 06:33 | 17:41 | 18:04 | 18:31 |
| 30° | 05:55 | 06:24 | 06:50 | 17:23 | 17:49 | 18:18 |
| 35° | 06:02 | 06:33 | 07:00 | 17:13 | 17:41 | 18:11 |
| 40° | 06:09 | 06:42 | 07:11 | 17:02 | 17:31 | 18:04 |
| 45° | 06:17 | 06:53 | 07:25 | 16:49 | 17:21 | 17:57 |
| S 50° | 06:25 | 07:05 | 07:41 | 16:32 | 17:09 | 17:48 |
| 52° | 06:29 | 07:11 | 07:49 | 16:25 | 17:03 | 17:45 |
| 54° | 06:33 | 07:17 | 07:57 | 16:16 | 16:57 | 17:41 |
| 56° | 06:37 | 07:24 | 08:07 | 16:07 | 16:50 | 17:36 |
| 58° | 06:42 | 07:31 | 08:18 | 15:56 | 16:42 | 17:32 |
| S 60° | 06:47 | 07:40 | 08:30 | 15:44 | 16:34 | 17:27 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | ■ | ■ | ■ | ■ | ■ | ■ |
| 68° | ■ | ■ | ■ | ■ | ■ | ■ |
| 66° | ■ | ■ | ■ | ■ | ■ | ■ |
| 64° | ■ | ■ | ■ | ■ | ■ | ■ |
| 62° | 19:07 | ■ | 21:30 | 21:22 | ■ | 22:34 |
| 60° | 18:20 | 19:35 | 20:22 | 22:10 | 22:41 | 23:42 |
| N 58° | 17:49 | 18:58 | 19:47 | 22:41 | 23:18 | · · · |
| 56° | 17:26 | 18:32 | 19:21 | 23:04 | 23:44 | · · · |
| 54° | 17:08 | 18:11 | 19:01 | 23:23 | · · · | 00:05 |
| 52° | 16:52 | 17:54 | 18:44 | 23:39 | · · · | 00:22 |
| 50° | 16:38 | 17:39 | 18:29 | 23:53 | · · · | 00:37 |
| 45° | 16:10 | 17:09 | 18:00 | · · · | 00:21 | 01:07 |
| N 40° | 15:49 | 16:46 | 17:37 | 00:04 | 00:44 | 01:31 |
| 35° | 15:31 | 16:26 | 17:18 | 00:20 | 01:02 | 01:50 |
| 30° | 15:15 | 16:10 | 17:01 | 00:35 | 01:18 | 02:07 |
| 20° | 14:49 | 15:42 | 16:34 | 00:59 | 01:45 | 02:35 |
| N 10° | 14:26 | 15:18 | 16:10 | 01:20 | 02:08 | 02:59 |
| 0° | 14:05 | 14:56 | 15:48 | 01:40 | 02:30 | 03:21 |
| S 10° | 13:45 | 14:34 | 15:25 | 02:00 | 02:51 | 03:43 |
| 20° | 13:22 | 14:10 | 15:02 | 02:21 | 03:15 | 04:07 |
| 30° | 12:57 | 13:43 | 14:34 | 02:46 | 03:42 | 04:35 |
| 35° | 12:42 | 13:26 | 14:17 | 03:00 | 03:58 | 04:52 |
| 40° | 12:24 | 13:07 | 13:58 | 03:17 | 04:17 | 05:11 |
| 45° | 12:03 | 12:45 | 13:35 | 03:38 | 04:39 | 05:34 |
| S 50° | 11:37 | 12:15 | 13:05 | 04:03 | 05:08 | 06:04 |
| 52° | 11:24 | 12:01 | 12:51 | 04:16 | 05:22 | 06:19 |
| 54° | 11:09 | 11:44 | 12:33 | 04:30 | 05:39 | 06:36 |
| 56° | 10:52 | 11:24 | 12:13 | 04:47 | 05:59 | 06:57 |
| 58° | 10:32 | 11:00 | 11:47 | 05:07 | 06:23 | 07:22 |
| S 60° | 10:06 | 10:26 | 11:11 | 05:32 | 06:57 | 07:58 |

| Day | Sun | | Mer. Pass | Moon | | Age 10-12 74-88% |
|-----|--|----------------------------------|-----------|----------------|----------------|---|
| | Eqn. of Time 00 ^h mm:ss | Time 12 ^h mm:ss | | Upper hh:mm | Lower hh:mm | |
| 24 | 06:33 | 06:33 | 12:07 | 20:18 | 07:53 |  |
| 25 | 06:34 | 06:34 | 12:07 | 21:09 | 08:43 | |
| 26 | 06:34 | 06:34 | 12:07 | 22:00 | 09:34 | |

July 27, 28, 29 UT (Mon., Tue., Wed.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------|----------|---------------------|----------|-------------------|----------|---------------------|----------|--------------------|----------|---------|-----|-----|--------|-----|-----|
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 304°41.5 | 134°49.4 | N04°46.9 | 225°55.5 | N23°03.8 | 176°20.6 | N19°15.8 | 290°08.6 | N03°30.2 | | | | | | |
| 1 | 319°44.0 | 149°49.5 | 45.7 | 240°56.1 | 03.9 | 191°22.5 | 15.6 | 305°11.0 | 30.2 | | | | | | |
| 2 | 334°46.5 | 164°49.6 | 44.5 | 255°56.7 | 04.1 | 206°24.4 | 15.5 | 320°13.5 | 30.2 | | | | | | |
| 3 | 349°48.9 | 179°49.7 | · · 43.3 | 270°57.4 | · · 04.2 | 221°26.3 | · · 15.4 | 335°16.0 | · · 30.2 | | | | | | |
| 4 | 4°51.4 | 194°49.8 | 42.1 | 285°58.0 | 04.4 | 236°28.2 | 15.2 | 350°18.4 | 30.2 | | | | | | |
| 5 | 19°53.9 | 209°49.9 | 40.9 | 300°58.6 | 04.6 | 251°30.1 | 15.1 | 5°20.9 | 30.1 | | | | | | |
| 6 | 34°56.3 | 224°50.0 | N04°39.6 | 315°59.2 | N23°04.7 | 266°32.0 | N19°15.0 | 20°23.3 | N03°30.1 | | | | | | |
| 7 | 49°58.8 | 239°50.1 | 38.4 | 330°59.8 | 04.9 | 281°33.9 | 14.8 | 35°25.8 | 30.1 | | | | | | |
| 8 | 65°01.2 | 254°50.2 | 37.2 | 346°00.5 | 05.1 | 296°35.8 | 14.7 | 50°28.3 | 30.1 | | | | | | |
| 9 | 80°03.7 | 269°50.3 | · · 36.0 | 1°01.1 | · · 05.2 | 311°37.7 | · · 14.6 | 65°30.7 | · · 30.1 | | | | | | |
| 10 | 95°06.2 | 284°50.4 | 34.8 | 16°01.7 | 05.4 | 326°39.6 | 14.4 | 80°33.2 | 30.1 | | | | | | |
| 11 | 110°08.6 | 299°50.5 | 33.6 | 31°02.3 | 05.5 | 341°41.5 | 14.3 | 95°35.7 | 30.1 | | | | | | |
| 12 | 125°11.1 | 314°50.6 | N04°32.4 | 46°02.9 | N23°05.7 | 356°43.4 | N19°14.2 | 110°38.1 | N03°30.1 | | | | | | |
| 13 | 140°13.6 | 329°50.7 | 31.1 | 61°03.6 | 05.9 | 11°45.3 | 14.0 | 125°40.6 | 30.0 | | | | | | |
| 14 | 155°16.0 | 344°50.8 | 29.9 | 76°04.2 | 06.0 | 26°47.1 | 13.9 | 140°43.0 | 30.0 | | | | | | |
| 15 | 170°18.5 | 359°50.9 | · · 28.7 | 91°04.8 | · · 06.2 | 41°49.0 | · · 13.8 | 155°45.5 | · · 30.0 | | | | | | |
| 16 | 185°21.0 | 14°51.0 | 27.5 | 106°05.4 | 06.3 | 56°50.9 | 13.6 | 170°48.0 | 30.0 | | | | | | |
| 17 | 200°23.4 | 29°51.1 | 26.3 | 121°06.1 | 06.5 | 71°52.8 | 13.5 | 185°50.4 | 30.0 | | | | | | |
| 18 | 215°25.9 | 44°51.2 | N04°25.1 | 136°06.7 | N23°06.7 | 86°54.7 | N19°13.4 | 200°52.9 | N03°30.0 | | | | | | |
| 19 | 230°28.4 | 59°51.3 | 23.8 | 151°07.3 | 06.8 | 101°56.6 | 13.2 | 215°55.4 | 30.0 | | | | | | |
| 20 | 245°30.8 | 74°51.4 | 22.6 | 166°07.9 | 07.0 | 116°58.5 | 13.1 | 230°57.8 | 30.0 | | | | | | |
| 21 | 260°33.3 | 89°51.5 | · · 21.4 | 181°08.5 | · · 07.1 | 132°00.4 | · · 13.0 | 246°00.3 | · · 30.0 | | | | | | |
| 22 | 275°35.7 | 104°51.6 | 20.2 | 196°09.2 | 07.3 | 147°02.3 | 12.8 | 261°02.8 | 29.9 | | | | | | |
| 23 | 290°38.2 | 119°51.7 | 19.0 | 211°09.8 | 07.5 | 162°04.2 | 12.7 | 276°05.2 | 29.9 | | | | | | |
| Mer.pass. | 03:41 | ν0.1' d-1.2' m-4.23 | | ν0.6' d0.2' m1.30 | | ν1.9' d-0.1' m-1.78 | | ν2.5' d-0.0' m0.66 | | | | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 305°40.7 | 134°51.8 | N04°17.8 | 226°10.4 | N23°07.6 | 177°06.1 | N19°12.6 | 291°07.7 | N03°29.9 | | | | | | |
| 1 | 320°43.1 | 149°51.9 | 16.5 | 241°11.0 | 07.8 | 192°08.0 | 12.4 | 306°10.1 | 29.9 | | | | | | |
| 2 | 335°45.6 | 164°52.0 | 15.3 | 256°11.7 | 07.9 | 207°09.9 | 12.3 | 321°12.6 | 29.9 | | | | | | |
| 3 | 350°48.1 | 179°52.1 | · · 14.1 | 271°12.3 | · · 08.1 | 222°11.8 | · · 12.2 | 336°15.1 | · · 29.9 | | | | | | |
| 4 | 5°50.5 | 194°52.2 | 12.9 | 286°12.9 | 08.2 | 237°13.7 | 12.0 | 351°17.5 | 29.9 | | | | | | |
| 5 | 20°53.0 | 209°52.4 | 11.7 | 301°13.5 | 08.4 | 252°15.6 | 11.9 | 6°20.0 | 29.9 | | | | | | |
| 6 | 35°55.5 | 224°52.5 | N04°10.5 | 316°14.1 | N23°08.5 | 267°17.5 | N19°11.7 | 21°22.5 | N03°29.8 | | | | | | |
| 7 | 50°57.9 | 239°52.6 | 09.2 | 331°14.8 | 08.7 | 282°19.4 | 11.6 | 36°24.9 | 29.8 | | | | | | |
| 8 | 66°00.4 | 254°52.7 | 08.0 | 346°15.4 | 08.8 | 297°21.3 | 11.5 | 51°27.4 | 29.8 | | | | | | |
| 9 | 81°02.9 | 269°52.8 | · · 06.8 | 1°16.0 | · · 09.0 | 312°23.2 | · · 11.3 | 66°29.9 | · · 29.8 | | | | | | |
| 10 | 96°05.3 | 284°52.9 | 05.6 | 16°16.6 | 09.2 | 327°25.1 | 11.2 | 81°32.3 | 29.8 | | | | | | |
| 11 | 111°07.8 | 299°53.0 | 04.4 | 31°17.3 | 09.3 | 342°26.9 | 11.1 | 96°34.8 | 29.8 | | | | | | |
| 12 | 126°10.2 | 314°53.2 | N04°03.2 | 46°17.9 | N23°09.5 | 357°28.8 | N19°10.9 | 111°37.3 | N03°29.8 | | | | | | |
| 13 | 141°12.7 | 329°53.3 | 01.9 | 61°18.5 | 09.6 | 12°30.7 | 10.8 | 126°39.7 | 29.7 | | | | | | |
| 14 | 156°15.2 | 344°53.4 | 04°00.7 | 76°19.1 | 09.8 | 27°32.6 | 10.7 | 141°42.2 | 29.7 | | | | | | |
| 15 | 171°17.6 | 359°53.5 | 03°59.5 | 91°19.7 | · · 09.9 | 42°34.5 | · · 10.5 | 156°44.7 | · · 29.7 | | | | | | |
| 16 | 186°20.1 | 14°53.6 | 58.3 | 106°20.4 | 10.1 | 57°36.4 | 10.4 | 171°47.1 | 29.7 | | | | | | |
| 17 | 201°22.6 | 29°53.7 | 57.1 | 121°21.0 | 10.2 | 72°38.3 | 10.3 | 186°49.6 | 29.7 | | | | | | |
| 18 | 216°25.0 | 44°53.9 | N03°55.8 | 136°21.6 | N23°10.4 | 87°40.2 | N19°10.1 | 201°52.1 | N03°29.7 | | | | | | |
| 19 | 231°27.5 | 59°54.0 | 54.6 | 151°22.2 | 10.5 | 102°42.1 | 10.0 | 216°54.5 | 29.7 | | | | | | |
| 20 | 246°30.0 | 74°54.1 | 53.4 | 166°22.9 | 10.7 | 117°44.0 | 09.9 | 231°57.0 | 29.6 | | | | | | |
| 21 | 261°32.4 | 89°54.2 | · · 52.2 | 181°23.5 | · · 10.8 | 132°45.9 | · · 09.7 | 246°59.5 | · · 29.6 | | | | | | |
| 22 | 276°34.9 | 104°54.3 | 51.0 | 196°24.1 | 11.0 | 147°47.8 | 09.6 | 262°01.9 | 29.6 | | | | | | |
| 23 | 291°37.3 | 119°54.5 | 49.7 | 211°24.7 | 11.1 | 162°49.7 | 09.5 | 277°04.4 | 29.6 | | | | | | |
| Mer.pass. | 03:37 | ν0.1' d-1.2' m-4.24 | | ν0.6' d0.2' m1.30 | | ν1.9' d-0.1' m-1.78 | | ν2.5' d-0.0' m0.65 | | | | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 306°39.8 | 134°54.6 | N03°48.5 | 226°25.4 | N23°11.3 | 177°51.6 | N19°09.3 | 292°06.9 | N03°29.6 | | | | | | |
| 1 | 321°42.3 | 149°54.7 | 47.3 | 241°26.0 | 11.4 | 192°53.5 | 09.2 | 307°09.3 | 29.6 | | | | | | |
| 2 | 336°44.7 | 164°54.8 | 46.1 | 256°26.6 | 11.6 | 207°55.4 | 09.1 | 322°11.8 | 29.6 | | | | | | |
| 3 | 351°47.2 | 179°54.9 | · · 44.9 | 271°27.2 | · · 11.7 | 222°57.3 | · · 08.9 | 337°14.3 | · · 29.6 | | | | | | |
| 4 | 6°49.7 | 194°55.1 | 43.6 | 286°27.8 | 11.8 | 237°59.2 | 08.8 | 352°16.7 | 29.5 | | | | | | |
| 5 | 21°52.1 | 209°55.2 | 42.4 | 301°28.5 | 12.0 | 253°01.1 | 08.7 | 7°19.2 | 29.5 | | | | | | |
| 6 | 36°54.6 | 224°55.3 | N03°41.2 | 316°29.1 | N23°12.1 | 268°03.0 | N19°08.5 | 22°21.7 | N03°29.5 | | | | | | |
| 7 | 51°57.1 | 239°55.4 | 40.0 | 331°29.7 | 12.3 | 283°04.9 | 08.4 | 37°24.2 | 29.5 | | | | | | |
| 8 | 66°59.5 | 254°55.6 | 38.8 | 346°30.3 | 12.4 | 298°06.8 | 08.3 | 52°26.6 | 29.5 | | | | | | |
| 9 | 82°02.0 | 269°55.7 | · · 37.5 | 1°31.0 | · · 12.6 | 313°08.6 | · · 08.1 | 67°29.1 | · · 29.5 | | | | | | |
| 10 | 97°04.5 | 284°55.8 | 36.3 | 16°31.6 | 12.7 | 328°10.5 | 08.0 | 82°31.6 | 29.4 | | | | | | |
| 11 | 112°06.9 | 299°56.0 | 35.1 | 31°32.2 | 12.9 | 343°12.4 | 07.9 | 97°34.0 | 29.4 | | | | | | |
| 12 | 127°09.4 | 314°56.1 | N03°33.9 | 46°32.8 | N23°13.0 | 358°14.3 | N19°07.7 | 112°36.5 | N03°29.4 | | | | | | |
| 13 | 142°11.8 | 329°56.2 | 32.7 | 61°33.5 | 13.1 | 13°16.2 | 07.6 | 127°39.0 | 29.4 | | | | | | |
| 14 | 157°14.3 | 344°56.3 | 31.4 | 76°34.1 | 13.3 | 28°18.1 | 07.5 | 142°41.4 | 29.4 | | | | | | |
| 15 | 172°16.8 | 359°56.5 | · · 30.2 | 91°34.7 | · · 13.4 | 43°20.0 | · · 07.3 | 157°43.9 | · · 29.4 | | | | | | |
| 16 | 187°19.2 | 14°56.6 | 29.0 | 106°35.3 | 13.6 | 58°21.9 | 07.2 | 172°46.4 | 29.4 | | | | | | |
| 17 | 202°21.7 | 29°56.7 | 27.8 | 121°36.0 | 13.7 | 73°23.8 | 07.1 | 187°48.9 | 29.3 | | | | | | |
| 18 | 217°24.2 | 44°56.9 | N03°26.6 | 136°36.6 | N23°13.9 | 88°25.7 | N19°06.9 | 202°51.3 | N03°29.3 | | | | | | |
| 19 | 232°26.6 | 59°57.0 | 25.3 | 151°37.2 | 14.0 | 103°27.6 | 06.8 | 217°53.8 | 29.3 | | | | | | |
| 20 | 247°29.1 | 74°57.1 | 24.1 | 166°37.8 | 14.1 | 118°29.5 | 06.6 | 232°56.3 | 29.3 | | | | | | |
| 21 | 262°31.6 | 89°57.3 | · · 22.9 | 181°38.5 | · · 14.3 | 133°31.4 | · · 06.5 | 247°58.7 | · · 29.3 | | | | | | |
| 22 | 277°34.0 | 104°57.4 | 21.7 | 196°39.1 | 14.4 | 148°33.3 | 06.4 | 263°01.2 | 29.3 | | | | | | |
| 23 | 292°36.5 | 119°57.5 | 20.5 | 211°39.7 | 14.6 | 163°35.2 | 06.2 | 278°03.7 | 29.2 | | | | | | |
| Mer.pass. | 03:33 | ν0.1' d-1.2' m-4.25 | | ν0.6' d0.1' m1.30 | | ν1.9' d-0.1' m-1.78 | | ν2.5' d-0.0' m0.65 | | | | | | | |

| | SHA | Dec |
|-------------|----------|-----------|
| Alpheratz | 357°33.2 | 29°14.2 |
| Ankaa | 353°05.7 | -42°09.4 |
| Schedar | 349°29.3 | 56°40.8 |
| Diphda | 348°45.9 | -17°50.2 |
| Achernar | 335°19.1 | -57°05.7 |
| Hamal | 327°49.7 | 23°35.3 |
| Polaris | 313°28.4 | 89°22.2 |
| Acamar | 315°10.9 | -40°11.6 |
| Menkar | 314°04.9 | 4°11.7 |
| Mirfak | 308°26.5 | 49°57.2 |
| Aldebaran | 290°38.3 | 16°33.8 |
| Rigel | 281°02.9 | -8°10.1 |
| Capella | 280°20.3 | 46°01.3 |
| Bellatrix | 278°21.7 | 6°22.5 |
| Elnath | 278°00.5 | 28°37.7 |
| Alnilam | 275°36.7 | -1°11.0 |
| Betelgeuse | 270°51.0 | 7°24.8 |
| Canopus | 263°52.3 | -52°42.4 |
| Sirius | 258°25.4 | -16°45.0 |
| Adhara | 255°05.2 | -29°00.4 |
| Procyon | 244°49.8 | 5°09.5 |
| Pollux | 243°16.1 | 27°57.7 |
| Avior | 234°14.9 | -59°35.6 |
| Suhail | 222°45.8 | -43°32.4 |
| Miaplacidus | 221°38.9 | -69°49.6 |
| Alphard | 217°46.8 | -8°46.4 |
| Regulus | 207°33.4 | 11°50.3 |
| Dubhe | 193°39.9 | 61°36.6 |
| Denebola | 182°23.8 | 14°25.5 |
| Gienah | 175°42.4 | -17°41.4 |
| Acrux | 172°59.0 | -63°15.1 |
| Gacrux | 171°50.4 | -57°16.0 |
| Alioth | 166°12.0 | 55°49.2 |
| Spica | 158°21.0 | -11°18.0 |
| Alkaid | 152°51.0 | 49°11.1</ |

| h | | Sun | | Moon | | | |
|-----|--|------------------------|----------|------------|-------|----------|-------------|
| Mon | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 178°21.6 | N19°15.1 | 28°57.7 | 10.0' | S27°36.5 | -2.8' 54.1' |
| 1 | | 193°21.6 | 14.5 | 43°26.8 | 10.1' | 27°33.7 | -2.9' 54.1' |
| 2 | | 208°21.6 | 14.0 | 57°55.8 | 10.1' | 27°30.8 | -3.1' 54.1' |
| 3 | | 223°21.6 | •• 13.4 | 72°24.9 | 10.1' | 27°27.7 | -3.2' 54.1' |
| 4 | | 238°21.6 | 12.8 | 86°54.0 | 10.1' | 27°24.5 | -3.3' 54.1' |
| 5 | | 253°21.6 | 12.3 | 101°23.2 | 10.1' | 27°21.1 | -3.5' 54.1' |
| 6 | | 268°21.6 | N19°11.7 | 115°52.3 | 10.2' | S27°17.7 | -3.6' 54.1' |
| 7 | | 283°21.6 | 11.1 | 130°21.5 | 10.2' | 27°14.1 | -3.7' 54.2' |
| 8 | | 298°21.6 | 10.6 | 144°50.7 | 10.2' | 27°10.3 | -3.9' 54.2' |
| 9 | | 313°21.6 | •• 10.0 | 159°19.9 | 10.2' | 27°06.5 | -4.0' 54.2' |
| 10 | | 328°21.6 | 09.4 | 173°49.1 | 10.3' | 27°02.5 | -4.1' 54.2' |
| 11 | | 343°21.7 | 08.9 | 188°18.4 | 10.3' | 26°58.3 | -4.3' 54.2' |
| 12 | | 358°21.7 | N19°08.3 | 202°47.7 | 10.3' | S26°54.1 | -4.4' 54.2' |
| 13 | | 13°21.7 | 07.7 | 217°17.1 | 10.4' | 26°49.7 | -4.5' 54.2' |
| 14 | | 28°21.7 | 07.1 | 231°46.4 | 10.4' | 26°45.1 | -4.7' 54.2' |
| 15 | | 43°21.7 | •• 06.6 | 246°15.8 | 10.4' | 26°40.5 | -4.8' 54.2' |
| 16 | | 58°21.7 | 06.0 | 260°45.3 | 10.5' | 26°35.7 | -4.9' 54.2' |
| 17 | | 73°21.7 | 05.4 | 275°14.7 | 10.5' | 26°30.8 | -5.0' 54.2' |
| 18 | | 88°21.7 | N19°04.9 | 289°44.2 | 10.5' | S26°25.7 | -5.2' 54.2' |
| 19 | | 103°21.7 | 04.3 | 304°13.8 | 10.6' | 26°20.6 | -5.3' 54.3' |
| 20 | | 118°21.7 | 03.7 | 318°43.3 | 10.6' | 26°15.3 | -5.4' 54.3' |
| 21 | | 133°21.8 | •• 03.1 | 333°12.9 | 10.6' | 26°09.9 | -5.6' 54.3' |
| 22 | | 148°21.8 | 02.6 | 347°42.6 | 10.7' | 26°04.3 | -5.7' 54.3' |
| 23 | | 163°21.8 | 02.0 | 2°12.3 | 10.7' | 25°58.6 | -5.8' 54.3' |
| | | SD = 15.7' $d = -0.6'$ | | SD = 14.8' | | | |

| Tue | | GHA | Dec | GHA | ν | Dec | d HP |
|-----|--|------------------------|----------|------------|-------|----------|-------------|
| 0 | | 178°21.8 | N19°01.4 | 16°42.0 | 10.8' | S25°52.8 | -5.9' 54.3' |
| 1 | | 193°21.8 | 00.8 | 31°11.8 | 10.8' | 25°46.9 | -6.1' 54.3' |
| 2 | | 208°21.8 | 19°00.3 | 45°41.6 | 10.8' | 25°40.8 | -6.2' 54.3' |
| 3 | | 223°21.8 | 18°59.7 | 60°11.4 | 10.9' | 25°34.7 | -6.3' 54.3' |
| 4 | | 238°21.8 | 59.1 | 74°41.3 | 10.9' | 25°28.4 | -6.4' 54.3' |
| 5 | | 253°21.9 | 58.5 | 89°11.2 | 11.0' | 25°21.9 | -6.5' 54.4' |
| 6 | | 268°21.9 | N18°58.0 | 103°41.2 | 11.0' | S25°15.4 | -6.7' 54.4' |
| 7 | | 283°21.9 | 57.4 | 118°11.2 | 11.1' | 25°08.7 | -6.8' 54.4' |
| 8 | | 298°21.9 | 56.8 | 132°41.3 | 11.1' | 25°01.9 | -6.9' 54.4' |
| 9 | | 313°21.9 | •• 56.2 | 147°11.4 | 11.2' | 24°55.0 | -7.0' 54.4' |
| 10 | | 328°21.9 | 55.6 | 161°41.6 | 11.2' | 24°48.0 | -7.1' 54.4' |
| 11 | | 343°21.9 | 55.1 | 176°11.8 | 11.2' | 24°40.9 | -7.3' 54.4' |
| 12 | | 358°22.0 | N18°54.5 | 190°42.0 | 11.3' | S24°33.6 | -7.4' 54.4' |
| 13 | | 13°22.0 | 53.9 | 205°12.3 | 11.3' | 24°26.2 | -7.5' 54.5' |
| 14 | | 28°22.0 | 53.3 | 219°42.7 | 11.4' | 24°18.7 | -7.6' 54.5' |
| 15 | | 43°22.0 | •• 52.7 | 234°13.0 | 11.4' | 24°11.1 | -7.7' 54.5' |
| 16 | | 58°22.0 | 52.1 | 248°43.5 | 11.5' | 24°03.4 | -7.8' 54.5' |
| 17 | | 73°22.0 | 51.6 | 263°14.0 | 11.5' | 23°55.5 | -8.0' 54.5' |
| 18 | | 88°22.0 | N18°51.0 | 277°44.5 | 11.6' | S23°47.6 | -8.1' 54.5' |
| 19 | | 103°22.1 | 50.4 | 292°15.1 | 11.6' | 23°39.5 | -8.2' 54.5' |
| 20 | | 118°22.1 | 49.8 | 306°45.8 | 11.7' | 23°31.3 | -8.3' 54.5' |
| 21 | | 133°22.1 | •• 49.2 | 321°16.4 | 11.7' | 23°23.0 | -8.4' 54.6' |
| 22 | | 148°22.1 | 48.6 | 335°47.2 | 11.8' | 23°14.6 | -8.5' 54.6' |
| 23 | | 163°22.1 | 48.0 | 350°18.0 | 11.8' | 23°06.1 | -8.6' 54.6' |
| | | SD = 15.7' $d = -0.6'$ | | SD = 14.8' | | | |

| Wed | | GHA | Dec | GHA | ν | Dec | d HP |
|-----|--|------------------------|----------|------------|-------|----------|--------------|
| 0 | | 178°22.2 | N18°47.4 | 4°48.8 | 11.9' | S22°57.4 | -8.7' 54.6' |
| 1 | | 193°22.2 | 46.9 | 19°19.7 | 11.9' | 22°48.7 | -8.8' 54.6' |
| 2 | | 208°22.2 | 46.3 | 33°50.7 | 12.0' | 22°39.9 | -9.0' 54.6' |
| 3 | | 223°22.2 | •• 45.7 | 48°21.7 | 12.0' | 22°30.9 | -9.1' 54.6' |
| 4 | | 238°22.2 | 45.1 | 62°52.7 | 12.1' | 22°21.9 | -9.2' 54.6' |
| 5 | | 253°22.2 | 44.5 | 77°23.8 | 12.2' | 22°12.7 | -9.3' 54.7' |
| 6 | | 268°22.3 | N18°43.9 | 91°55.0 | 12.2' | S22°03.4 | -9.4' 54.7' |
| 7 | | 283°22.3 | 43.3 | 106°26.2 | 12.3' | 21°54.0 | -9.5' 54.7' |
| 8 | | 298°22.3 | 42.7 | 120°57.4 | 12.3' | 21°44.6 | -9.6' 54.7' |
| 9 | | 313°22.3 | •• 42.1 | 135°28.7 | 12.4' | 21°35.0 | -9.7' 54.7' |
| 10 | | 328°22.4 | 41.5 | 150°00.1 | 12.4' | 21°25.3 | -9.8' 54.7' |
| 11 | | 343°22.4 | 40.9 | 164°31.5 | 12.5' | 21°15.5 | -9.9' 54.7' |
| 12 | | 358°22.4 | N18°40.3 | 179°03.0 | 12.5' | S21°05.6 | -10.0' 54.8' |
| 13 | | 13°22.4 | 39.7 | 193°34.5 | 12.6' | 20°55.6 | -10.1' 54.8' |
| 14 | | 28°22.4 | 39.1 | 208°06.1 | 12.6' | 20°45.6 | -10.2' 54.8' |
| 15 | | 43°22.5 | •• 38.6 | 222°37.7 | 12.7' | 20°35.4 | -10.3' 54.8' |
| 16 | | 58°22.5 | 38.0 | 237°09.4 | 12.7' | 20°25.1 | -10.4' 54.8' |
| 17 | | 73°22.5 | 37.4 | 251°41.1 | 12.8' | 20°14.7 | -10.5' 54.8' |
| 18 | | 88°22.5 | N18°36.8 | 266°12.9 | 12.8' | S20°04.3 | -10.6' 54.9' |
| 19 | | 103°22.6 | 36.2 | 280°44.7 | 12.9' | 19°53.7 | -10.7' 54.9' |
| 20 | | 118°22.6 | 35.6 | 295°16.6 | 12.9' | 19°43.1 | -10.7' 54.9' |
| 21 | | 133°22.6 | •• 35.0 | 309°48.5 | 13.0' | 19°32.3 | -10.8' 54.9' |
| 22 | | 148°22.6 | 34.4 | 324°20.5 | 13.0' | 19°21.5 | -10.9' 54.9' |
| 23 | | 163°22.6 | 33.8 | 338°52.5 | 13.1' | 19°10.5 | -11.0' 54.9' |
| | | SD = 15.7' $d = -0.6'$ | | SD = 14.9' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| N 70° | //// | //// | 00:36 | 23:21 | //// | //// |
| 68° | //// | //// | 01:53 | 22:15 | //// | //// |
| 66° | //// | //// | 02:30 | 21:40 | //// | //// |
| 64° | //// | 01:13 | 02:55 | 21:15 | 22:54 | //// |
| 62° | //// | 01:58 | 03:15 | 20:56 | 22:11 | //// |
| 60° | //// | 02:27 | 03:31 | 20:40 | 21:43 | //// |
| N 58° | 01:06 | 02:49 | 03:45 | 20:27 | 21:22 | 23:01 |
| 56° | 01:48 | 03:06 | 03:56 | 20:15 | 21:05 | 22:22 |
| 54° | 02:15 | 03:21 | 04:07 | 20:05 | 20:51 | 21:56 |
| 52° | 02:35 | 03:33 | 04:16 | 19:56 | 20:39 | 21:36 |
| 50° | 02:51 | 03:44 | 04:24 | 19:48 | 20:28 | 21:20 |
| 45° | 03:23 | 04:06 | 04:41 | 19:32 | 20:06 | 20:49 |
| N 40° | 03:46 | 04:24 | 04:55 | 19:18 | 19:48 | 20:26 |
| 35° | 04:04 | 04:38 | 05:06 | 19:06 | 19:34 | 20:08 |
| 30° | 04:19 | 04:50 | 05:17 | 18:56 | 19:22 | 19:54 |
| 20° | 04:42 | 05:10 | 05:34 | 18:39 | 19:02 | 19:30 |
| N 10° | 05:01 | 05:27 | 05:49 | 18:24 | 18:46 | 19:12 |
| 0° | 05:16 | 05:41 | 06:03 | 18:10 | 18:32 | 18:57 |
| S 10° | 05:29 | 05:55 | 06:17 | 17:56 | 18:18 | 18:44 |
| 20° | 05:42 | 06:08 | 06:32 | 17:42 | 18:05 | 18:32 |
| 30° | 05:54 | 06:23 | 06:48 | 17:25 | 17:51 | 18:19 |
| 35° | 06:00 | 06:31 | 06:58 | 17:16 | 17:43 | 18:13 |
| 40° | 06:07 | 06:40 | 07:09 | 17:05 | 17:34 | 18:07 |
| 45° | 06:14 | 06:50 | 07:22 | 16:52 | 17:24 | 17:59 |
| S 50° | 06:22 | 07:01 | 07:37 | 16:36 | 17:12 | 17:52 |
| 52° | 06:26 | 07:07 | 07:45 | 16:29 | 17:07 | 17:48 |
| 54° | 06:29 | 07:13 | 07:53 | 16:21 | 17:01 | 17:44 |
| 56° | 06:33 | 07:19 | 08:02 | 16:12 | 16:55 | 17:40 |
| 58° | 06:38 | 07:26 | 08:12 | 16:02 | 16:47 | 17:36 |
| S 60° | 06:42 | 07:34 | 08:24 | 15:50 | 16:39 | 17:32 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | ■ | ■ | 23:18 | ■ | ■ | ■ |
| 68° | ■ | ■ | 22:26 | ■ | ■ | ■ |
| 66° | ■ | 22:37 | 21:53 | ■ | ■ | 00:56 |
| 64° | ■ | 21:46 | 21:29 | ■ | ■ | 01:46 |
| 62° | 21:19 | 21:14 | 21:09 | •• •• | 00:30 | 02:17 |
| 60° | 20:42 | 20:50 | 20:54 | •• •• | 01:07 | 02:41 |
| N 58° | 20:15 | 20:31 | 20:40 | 00:16 | 01:33 | 02:59 |
| 56° | 19:54 | 20:15 | 20:28 | 00:41 | 01:54 | 03:15 |
| 54° | 19:37 | 20:01 | 20:18 | 01:02 | 02:11 | 03:28 |
| 52° | 19:22 | 19:49 | 20:09 | 01:18 | 02:26 | 03:40 |
| 50° | 19:09 | 19:38 | 20:01 | 01:33 | 02:38 | 03:50 |
| 45° | 18:42 | 19:16 | 19:43 | 02:02 | 03:04 | 04:11 |
| N 40° | 18:21 | 18:58 | 19:29 | 02:25 | 03:25 | 04:28 |
| 35° | 18:03 | 18:43 | 19:17 | 02:44 | 03:42 | 04:43 |
| 30° | 17:48 | 18:29 | 19:06 | 03:00 | 03:57 | 04:55 |
| 20° | 17:22 | 18:07 | 18:47 | 03:27 | 04:22 | 05:16 |
| N 10° | 17:00 | 17:47 | 18:31 | 03:51 | 04:43 | 05:35 |
| 0° | 16:39 | 17:28 | 18:16 | 04:12 | 05:03 | 05:52 |
| S 10° | 16:18 | 17:10 | 18:01 | 04:34 | 05:23 | 06:09 |
| 20° | 15:55 | 16:50 | 17:44 | 04:57 | 05:44 | 06:27 |
| 30° | 15:29 | 16:27 | 17:26 | 05:24 | 06:08 | 06:47 |
| 35° | 15:14 | 16:13 | 17:15 | 05:40 | 06:22 | 06:59 |
| 40° | 14:56 | 15:58 | 17:02 | 05:59 | 06:39 | 07:13 |
| 45° | 14:34 | 15:39 | 16:47 | 06:21 | 06:59 | 07:29 |
| S 50° | 14:06 | 15:15 | 16:28 | 06:49 | 07:23 | 07:49 |
| 52° | 13:53 | 15:04 | 16:19 | 07:03 | 07:35 | 07:58 |
| 54° | 13:37 | 14:51 | 16:09 | 07:18 | 07:48 | 08:09 |
| 56° | 13:19 | 14:36 | 15:58 | 07:37 | 08:04 | 08:20 |
| 58° | 12:56 | 14:18 | 15:45 | 08:00 | 08:22 | 08:34 |
| S 60° | 12:26 | 13:56 | 15:30 | 08:30 | 08:44 | 08:50 |

| Day | Sun | | | Moon | | |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|-------------------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 13-15 94-100% |
| 27 | 06:34 | 06:33 | 12:07 | 22:51 | 10:26 | |
| 28 | 06:33 | 06:32 | 12:07 | 23:40 | 11:16 | |
| 29 | 06:31 | 06:30 | 12:07 | --- | 12:04 | |

July 30, 31, 01 UT (Thu., Fri., Sat.)

| | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|---------------------|----------|----------|-------------------|----------|----------|---------------------|--|-----|--------------------|--------|---------------------|-----|-------|--|--|
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | |
| 0 | 307°39.0 | 134°57.7 | N03°19.2 | 226°40.3 | N23°14.7 | 178°37.1 | N19°06.1 | 293°06.2 | N03°29.2 | <div>Alpheratz 357°33.2 29°14.2</div> <div>Ankaa 353°05.6 -42°09.4</div> <div>Schedar 349°29.3 56°40.8</div> <div>Diphda 348°45.8 -17°50.2</div> <div>Achernar 335°19.1 -57°05.7</div> <div>Hamal 327°49.7 23°35.3</div> <div>Polaris 313°26.8 89°22.2</div> <div>Acamar 315°10.8 -40°11.5</div> <div>Menkar 314°04.8 4°11.7</div> <div>Mirfak 308°26.5 49°57.2</div> <div>Aldebaran 290°38.3 16°33.8</div> <div>Rigel 281°02.8 -8°10.1</div> <div>Capella 280°20.3 46°01.3</div> <div>Bellatrix 278°21.7 6°22.5</div> <div>Elnath 278°00.5 28°37.7</div> <div>Alnilam 275°36.6 -1°11.0</div> <div>Betelgeuse 270°50.9 7°24.8</div> <div>Canopus 263°52.3 -52°42.4</div> <div>Sirius 258°25.4 -16°45.0</div> <div>Adhara 255°05.2 -29°00.3</div> <div>Procyon 244°49.8 5°09.5</div> <div>Pollux 243°16.1 27°57.7</div> <div>Avior 234°14.9 -59°35.6</div> <div>Suhail 222°45.8 -43°32.4</div> <div>Miaplacidus 221°39.0 -69°49.6</div> <div>Alphard 217°46.8 -8°46.4</div> <div>Regulus 207°33.4 11°50.3</div> <div>Dubhe 193°39.9 61°36.6</div> <div>Denebola 182°23.8 14°25.5</div> <div>Gienah 175°42.4 -17°41.4</div> <div>Acrux 172°59.0 -63°15.1</div> <div>Gacrux 171°50.5 -57°16.0</div> <div>Alioth 166°12.0 55°49.2</div> <div>Spica 158°21.0 -11°18.0</div> <div>Alkaid 152°51.0 49°11.1</div> <div>Hadar 148°34.2 -60°30.4</div> <div>Menkent 147°56.1 -36°30.2</div> <div>Arcturus 145°46.7 19°02.8</div> <div>Rigel Kent. 139°38.5 -60°57.0</div> <div>Kochab 137°19.7 74°03.0</div> <div>Zuben'ubi 136°54.5 -16°09.2</div> <div>Alphecca 126°02.5 26°37.7</div> <div>Antares 112°14.0 -26°29.5</div> <div>Atria 107°06.7 -69°04.7</div> <div>Sabik 102°01.0 -15°45.5</div> <div>Shaula 96°08.3 -37°07.4</div> <div>Rasalhague 95°57.1 12°32.5</div> <div>Eltanin 90°41.1 51°29.3</div> <div>Kaus Aust. 83°30.4 -34°22.3</div> <div>Vega 80°32.0 38°48.6</div> <div>Nunki 75°45.8 -26°15.8</div> <div>Altair 61°58.4 8°56.4</div> <div>Peacock 53°03.1 -56°38.9</div> <div>Deneb 49°24.4 45°22.6</div> <div>Enif 33°37.2 9°59.9</div> <div>Al Na'ir 27°30.8 -46°49.7</div> <div>Fomalhaut 15°12.8 -29°28.6</div> <div>Scheat 13°43.6 28°13.6</div> <div>Markab 13°28.3 15°21.0</div> | | | | | | | | |
| 1 | 322°41.4 | 149°57.8 | 18.0 | 241°41.0 | 14.8 | 193°39.0 | 06.0 | 308°08.6 | 29.2 | | | | | | | | | |
| 2 | 337°43.9 | 164°58.0 | 16.8 | 256°41.6 | 15.0 | 208°40.9 | 05.8 | 323°11.1 | 29.2 | | | | | | | | | |
| 3 | 352°46.3 | 179°58.1 | •• 15.6 | 271°42.2 | •• 15.1 | 223°42.8 | •• 05.7 | 338°13.6 | •• 29.2 | | | | | | | | | |
| 4 | 7°48.8 | 194°58.2 | 14.4 | 286°42.8 | 15.3 | 238°44.7 | 05.6 | 353°16.0 | 29.2 | | | | | | | | | |
| 5 | 22°51.3 | 209°58.4 | 13.1 | 301°43.5 | 15.4 | 253°46.6 | 05.4 | 8°18.5 | 29.2 | | | | | | | | | |
| 6 | 37°53.7 | 224°58.5 | N03°11.9 | 316°44.1 | N23°15.5 | 268°48.5 | N19°05.3 | 23°21.0 | N03°29.1 | | | | | | | | | |
| 7 | 52°56.2 | 239°58.6 | 10.7 | 331°44.7 | 15.7 | 283°50.4 | 05.2 | 38°23.5 | 29.1 | | | | | | | | | |
| 8 | 67°58.7 | 254°58.8 | 09.5 | 346°45.3 | 15.8 | 298°52.3 | 05.0 | 53°25.9 | 29.1 | | | | | | | | | |
| 9 | 83°01.1 | 269°58.9 | •• 08.2 | 1°46.0 | •• 15.9 | 313°54.2 | •• 04.9 | 68°28.4 | •• 29.1 | | | | | | | | | |
| 10 | 98°03.6 | 284°59.1 | 07.0 | 16°46.6 | 16.1 | 328°56.1 | 04.7 | 83°30.9 | 29.1 | | | | | | | | | |
| 11 | 113°06.1 | 299°59.2 | 05.8 | 31°47.2 | 16.2 | 343°58.0 | 04.6 | 98°33.4 | 29.1 | | | | | | | | | |
| 12 | 128°08.5 | 314°59.4 | N03°04.6 | 46°47.8 | N23°16.3 | 358°59.9 | N19°04.5 | 113°35.8 | N03°29.0 | | | | | | | | | |
| 13 | 143°11.0 | 329°59.5 | 03.4 | 61°48.5 | 16.5 | 14°01.7 | 04.3 | 128°38.3 | 29.0 | | | | | | | | | |
| 14 | 158°13.5 | 344°59.6 | 02.1 | 76°49.1 | 16.6 | 29°03.6 | 04.2 | 143°40.8 | 29.0 | | | | | | | | | |
| 15 | 173°15.9 | 359°59.8 | 03°00.9 | 91°49.7 | •• 16.7 | 44°05.5 | •• 04.1 | 158°43.3 | •• 29.0 | | | | | | | | | |
| 16 | 188°18.4 | 14°59.9 | 02°59.7 | 106°50.3 | 16.9 | 59°07.4 | 03.9 | 173°45.7 | 29.0 | | | | | | | | | |
| 17 | 203°20.8 | 30°00.1 | 58.5 | 121°51.0 | 17.0 | 74°09.3 | 03.8 | 188°48.2 | 29.0 | | | | | | | | | |
| 18 | 218°23.3 | 45°00.2 | N02°57.2 | 136°51.6 | N23°17.1 | 89°11.2 | N19°03.7 | 203°50.7 | N03°28.9 | | | | | | | | | |
| 19 | 233°25.8 | 60°00.4 | 56.0 | 151°52.2 | 17.3 | 104°13.1 | 03.5 | 218°53.2 | 28.9 | | | | | | | | | |
| 20 | 248°28.2 | 75°00.5 | 54.8 | 166°52.9 | 17.4 | 119°15.0 | 03.4 | 233°55.6 | 28.9 | | | | | | | | | |
| 21 | 263°30.7 | 90°00.7 | •• 53.6 | 181°53.5 | •• 17.5 | 134°16.9 | •• 03.2 | 248°58.1 | •• 28.9 | | | | | | | | | |
| 22 | 278°33.2 | 105°00.8 | 52.4 | 196°54.1 | 17.7 | 149°18.8 | 03.1 | 264°00.6 | 28.9 | | | | | | | | | |
| 23 | 293°35.6 | 120°01.0 | 51.1 | 211°54.7 | 17.8 | 164°20.7 | 03.0 | 279°03.1 | 28.9 | | | | | | | | | |
| Mer.pass. 03:29 | | | ν0.1' d-1.2' m-4.26 | | | ν0.6' d0.1' m1.30 | | | ν1.9' d-0.1' m-1.78 | | | ν2.5' d-0.0' m0.64 | | | | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 308°38.1 | 135°01.1 | N02°49.9 | 226°55.4 | N23°17.9 | 179°22.6 | N19°02.8 | 294°05.5 | N03°28.8 | | | | | | | | | |
| 1 | 323°40.6 | 150°01.3 | 48.7 | 241°56.0 | 18.1 | 194°24.5 | 02.7 | 309°08.0 | 28.8 | | | | | | | | | |
| 2 | 338°43.0 | 165°01.4 | 47.5 | 256°56.6 | 18.2 | 209°26.4 | 02.6 | 324°10.5 | 28.8 | | | | | | | | | |
| 3 | 353°45.5 | 180°01.6 | •• 46.2 | 271°57.2 | •• 18.3 | 224°28.3 | •• 02.4 | 339°13.0 | •• 28.8 | | | | | | | | | |
| 4 | 8°47.9 | 195°01.7 | 45.0 | 286°57.9 | 18.5 | 239°30.2 | 02.3 | 354°15.4 | 28.8 | | | | | | | | | |
| 5 | 23°50.4 | 210°01.9 | 43.8 | 301°58.5 | 18.6 | 254°32.1 | 02.2 | 9°17.9 | 28.7 | | | | | | | | | |
| 6 | 38°52.9 | 225°02.0 | N02°42.6 | 316°59.1 | N23°18.7 | 269°34.0 | N19°02.0 | 24°20.4 | N03°28.7 | | | | | | | | | |
| 7 | 53°55.3 | 240°02.2 | 41.3 | 331°59.7 | 18.8 | 284°35.9 | 01.9 | 39°22.9 | 28.7 | | | | | | | | | |
| 8 | 68°57.8 | 255°02.3 | 40.1 | 347°00.4 | 19.0 | 299°37.8 | 01.8 | 54°25.4 | 28.7 | | | | | | | | | |
| 9 | 84°00.3 | 270°02.5 | •• 38.9 | 2°01.0 | •• 19.1 | 314°39.7 | •• 01.6 | 69°27.8 | •• 28.7 | | | | | | | | | |
| 10 | 99°02.7 | 285°02.6 | 37.7 | 17°01.6 | 19.2 | 329°41.6 | 01.5 | 84°30.3 | 28.7 | | | | | | | | | |
| 11 | 114°05.2 | 300°02.8 | 36.5 | 32°02.3 | 19.4 | 344°43.5 | 01.3 | 99°32.8 | 28.6 | | | | | | | | | |
| 12 | 129°07.7 | 315°03.0 | N02°35.2 | 47°02.9 | N23°19.5 | 359°45.4 | N19°01.2 | 114°35.3 | N03°28.6 | | | | | | | | | |
| 13 | 144°10.1 | 330°03.1 | 34.0 | 62°03.5 | 19.6 | 14°47.3 | 01.1 | 129°37.7 | 28.6 | | | | | | | | | |
| 14 | 159°12.6 | 345°03.3 | 32.8 | 77°04.1 | 19.7 | 29°49.2 | 00.9 | 144°40.2 | 28.6 | | | | | | | | | |
| 15 | 174°15.1 | 0°03.4 | •• 31.6 | 92°04.8 | •• 19.9 | 44°51.1 | •• 00.8 | 159°42.7 | •• 28.6 | | | | | | | | | |
| 16 | 189°17.5 | 15°03.6 | 30.3 | 107°05.4 | 20.0 | 59°53.0 | 00.7 | 174°45.2 | 28.5 | | | | | | | | | |
| 17 | 204°20.0 | 30°03.8 | 29.1 | 122°06.0 | 20.1 | 74°54.8 | 00.5 | 189°47.7 | 28.5 | | | | | | | | | |
| 18 | 219°22.4 | 45°03.9 | N02°27.9 | 137°06.7 | N23°20.2 | 89°56.7 | N19°00.4 | 204°50.1 | N03°28.5 | | | | | | | | | |
| 19 | 234°24.9 | 60°04.1 | 26.7 | 152°07.3 | 20.4 | 104°58.6 | 00.3 | 219°52.6 | 28.5 | | | | | | | | | |
| 20 | 249°27.4 | 75°04.2 | 25.4 | 167°07.9 | 20.5 | 120°00.5 | 00.1 | 234°55.1 | 28.5 | | | | | | | | | |
| 21 | 264°29.8 | 90°04.4 | •• 24.2 | 182°08.5 | •• 20.6 | 135°02.4 | 19°00.0 | 249°57.6 | •• 28.5 | | | | | | | | | |
| 22 | 279°32.3 | 105°04.6 | 23.0 | 197°09.2 | 20.7 | 150°04.3 | 18°59.8 | 265°00.1 | 28.4 | | | | | | | | | |
| 23 | 294°34.8 | 120°04.7 | 21.8 | 212°09.8 | 20.8 | 165°06.2 | 59.7 | 280°02.5 | 28.4 | | | | | | | | | |
| Mer.pass. 03:25 | | | ν0.2' d-1.2' m-4.26 | | | ν0.6' d0.1' m1.30 | | | ν1.9' d-0.1' m-1.78 | | | ν2.5' d-0.0' m0.64 | | | | | | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 309°37.2 | 135°04.9 | N02°20.5 | 227°10.4 | N23°21.0 | 180°08.1 | N18°59.6 | 295°05.0 | N03°28.4 | | | | | | | | | |
| 1 | 324°39.7 | 150°05.0 | 19.3 | 242°11.1 | 21.1 | 195°10.0 | 59.4 | 310°07.5 | 28.4 | | | | | | | | | |
| 2 | 339°42.2 | 165°05.2 | 18.1 | 257°11.7 | 21.2 | 210°11.9 | 59.3 | 325°10.0 | 28.4 | | | | | | | | | |
| 3 | 354°44.6 | 180°05.4 | •• 16.9 | 272°12.3 | •• 21.3 | 225°13.8 | •• 59.2 | 340°12.5 | •• 28.3 | | | | | | | | | |
| 4 | 9°47.1 | 195°05.5 | 15.6 | 287°12.9 | 21.5 | 240°15.7 | 59.0 | 355°14.9 | 28.3 | | | | | | | | | |
| 5 | 24°49.6 | 210°05.7 | 14.4 | 302°13.6 | 21.6 | 255°17.6 | 58.9 | 10°17.4 | 28.3 | | | | | | | | | |
| 6 | 39°52.0 | 225°05.9 | N02°13.2 | 317°14.2 | N23°21.7 | 270°19.5 | N18°58.8 | 25°19.9 | N03°28.3 | | | | | | | | | |
| 7 | 54°54.5 | 240°06.0 | 12.0 | 332°14.8 | 21.8 | 285°21.4 | 58.6 | 40°22.4 | 28.3 | | | | | | | | | |
| 8 | 69°56.9 | 255°06.2 | 10.8 | 347°15.5 | 21.9 | 300°23.3 | 58.5 | 55°24.9 | 28.2 | | | | | | | | | |
| 9 | 84°59.4 | 270°06.4 | •• 09.5 | 2°16.1 | •• 22.1 | 315°25.2 | •• 58.3 | 70°27.3 | •• 28.2 | | | | | | | | | |
| 10 | 100°01.9 | 285°06.6 | 08.3 | 17°16.7 | 22.2 | 330°27.1 | 58.2 | 85°29.8 | 28.2 | | | | | | | | | |
| 11 | 115°04.3 | 300°06.7 | 07.1 | 32°17.3 | 22.3 | 345°29.0 | 58.1 | 100°32.3 | 28.2 | | | | | | | | | |
| 12 | 130°06.8 | 315°06.9 | N02°05.9 | 47°18.0 | N23°22.4 | 0°30.9 | N18°57.9 | 115°34.8 | N03°28.2 | | | | | | | | | |
| 13 | 145°09.3 | 330°07.1 | 04.6 | 62°18.6 | 22.5 | 15°32.8 | 57.8 | 130°37.3 | 28.1 | | | | | | | | | |
| 14 | 160°11.7 | 345°07.2 | 03.4 | 77°19.2 | 22.6 | 30°34.7 | 57.7 | 145°39.7 | 28.1 | | | | | | | | | |
| 15 | 175°14.2 | 0°07.4 | •• 02.2 | 92°19.9 | •• 22.8 | 45°36.6 | •• 57.5 | 160°42.2 | •• 28.1 | | | | | | | | | |
| 16 | 190°16.7 | 15°07.6 | 02°01.0 | 107°20.5 | 22.9 | 60°38.5 | 57.4 | 175°44.7 | 28.1 | | | | | | | | | |
| 17 | 205°19.1 | 30°07.8 | 01°59.7 | 122°21.1 | 23.0 | 75°40.4 | 57.2 | 190°47.2 | 28.1 | | | | | | | | | |
| 18 | 220°21.6 | 45°07.9 | N01°58.5 | 137°21.8 | N23°23.1 | 90°42.3 | N18°57.1 | 205°49.7 | N03°28.0 | | | | | | | | | |
| 19 | 235°24.0 | 60°08.1 | 57.3 | 152°22.4 | 23.2 | 105°44.2 | 57.0 | 220°52.2 | 28.0 | | | | | | | | | |
| 20 | 250°26.5 | 75°08.3 | 56.1 | 167°23.0 | 23.3 | 120°46.1 | 56.8 | 235°54.6 | 28.0 | | | | | | | | | |
| 21 | 265°29.0 | 90°08.5 | •• 54.8 | 182°23.6 | •• 23.5 | 135°48.0 | •• 56.7 | 250°57.1 | •• 28.0 | | | | | | | | | |
| 22 | 280°31.4 | 105°08.6 | 53.6 | 197°24.3 | 23.6 | 150°49.9 | 56.6 | 265°59.6 | 28.0 | | | | | | | | | |
| 23 | 295°33.9 | 120°08.8 | 52.4 | 212°24.9 | 23.7 | 165°51.8 | 56.4 | 281°02.1 | 27.9 | | | | | | | | | |
| Mer.pass. 03:21 | | | ν0.2' d-1.2' m-4.27 | | | ν0.6' d0.1' m1.30 | | | ν1.9' d-0.1' m-1.78 | | | ν2.5' d-0.0' m0.63 | | | | | | |
| | | | | | | | | | | | | | | Horizontal parallax | | | | |
| | | | | | | | | | | | | | | Venus: | 0.2 | | | |
| | | | | | | | | | | | | | | Mars: | 0.1 | | | |

| h | | Sun | | Moon | | | |
|-----|--|------------------------|----------|------------|-------|----------|--------------|
| Thu | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 178°22.7 | N18°33.2 | 353°24.6 | 13.1' | S18°59.5 | -11.1' 54.9' |
| 1 | | 193°22.7 | 32.6 | 7°56.8 | 13.2' | 18°48.4 | -11.2' 55.0' |
| 2 | | 208°22.7 | 32.0 | 22°28.9 | 13.2' | 18°37.2 | -11.3' 55.0' |
| 3 | | 223°22.7 | · · 31.4 | 37°01.2 | 13.3' | 18°25.9 | -11.4' 55.0' |
| 4 | | 238°22.8 | 30.7 | 51°33.5 | 13.3' | 18°14.6 | -11.5' 55.0' |
| 5 | | 253°22.8 | 30.1 | 66°05.8 | 13.4' | 18°03.1 | -11.5' 55.0' |
| 6 | | 268°22.8 | N18°29.5 | 80°38.2 | 13.4' | S17°51.6 | -11.6' 55.0' |
| 7 | | 283°22.9 | 28.9 | 95°10.6 | 13.5' | 17°39.9 | -11.7' 55.1' |
| 8 | | 298°22.9 | 28.3 | 109°43.1 | 13.5' | 17°28.2 | -11.8' 55.1' |
| 9 | | 313°22.9 | · · 27.7 | 124°15.6 | 13.6' | 17°16.4 | -11.9' 55.1' |
| 10 | | 328°22.9 | 27.1 | 138°48.2 | 13.6' | 17°04.6 | -11.9' 55.1' |
| 11 | | 343°23.0 | 26.5 | 153°20.8 | 13.7' | 16°52.6 | -12.0' 55.1' |
| 12 | | 358°23.0 | N18°25.9 | 167°53.4 | 13.7' | S16°40.6 | -12.1' 55.1' |
| 13 | | 13°23.0 | 25.3 | 182°26.1 | 13.7' | 16°28.5 | -12.2' 55.2' |
| 14 | | 28°23.0 | 24.7 | 196°58.9 | 13.8' | 16°16.3 | -12.3' 55.2' |
| 15 | | 43°23.1 | · · 24.1 | 211°31.7 | 13.8' | 16°04.0 | -12.3' 55.2' |
| 16 | | 58°23.1 | 23.5 | 226°04.5 | 13.9' | 15°51.7 | -12.4' 55.2' |
| 17 | | 73°23.1 | 22.9 | 240°37.4 | 13.9' | 15°39.3 | -12.5' 55.2' |
| 18 | | 88°23.2 | N18°22.2 | 255°10.3 | 14.0' | S15°26.8 | -12.6' 55.3' |
| 19 | | 103°23.2 | 21.6 | 269°43.3 | 14.0' | 15°14.3 | -12.6' 55.3' |
| 20 | | 118°23.2 | 21.0 | 284°16.3 | 14.0' | 15°01.6 | -12.7' 55.3' |
| 21 | | 133°23.2 | · · 20.4 | 298°49.3 | 14.1' | 14°48.9 | -12.8' 55.3' |
| 22 | | 148°23.3 | 19.8 | 313°22.4 | 14.1' | 14°36.2 | -12.8' 55.3' |
| 23 | | 163°23.3 | 19.2 | 327°55.5 | 14.2' | 14°23.3 | -12.9' 55.3' |
| | | SD = 15.7' $d = -0.6'$ | | SD = 15.0' | | | |
| Fri | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 178°23.3 | N18°18.6 | 342°28.7 | 14.2' | S14°10.4 | -13.0' 55.4' |
| 1 | | 193°23.4 | 18.0 | 357°01.9 | 14.2' | 13°57.4 | -13.0' 55.4' |
| 2 | | 208°23.4 | 17.3 | 11°35.1 | 14.3' | 13°44.4 | -13.1' 55.4' |
| 3 | | 223°23.4 | · · 16.7 | 26°08.4 | 14.3' | 13°31.3 | -13.2' 55.4' |
| 4 | | 238°23.5 | 16.1 | 40°41.7 | 14.3' | 13°18.1 | -13.2' 55.4' |
| 5 | | 253°23.5 | 15.5 | 55°15.0 | 14.4' | 13°04.9 | -13.3' 55.5' |
| 6 | | 268°23.5 | N18°14.9 | 69°48.4 | 14.4' | S12°51.6 | -13.4' 55.5' |
| 7 | | 283°23.6 | 14.3 | 84°21.8 | 14.4' | 12°38.2 | -13.4' 55.5' |
| 8 | | 298°23.6 | 13.6 | 98°55.3 | 14.5' | 12°24.8 | -13.5' 55.5' |
| 9 | | 313°23.6 | · · 13.0 | 113°28.7 | 14.5' | 12°11.3 | -13.5' 55.5' |
| 10 | | 328°23.7 | 12.4 | 128°02.2 | 14.5' | 11°57.8 | -13.6' 55.5' |
| 11 | | 343°23.7 | 11.8 | 142°35.8 | 14.6' | 11°44.2 | -13.7' 55.6' |
| 12 | | 358°23.7 | N18°11.2 | 157°09.3 | 14.6' | S11°30.5 | -13.7' 55.6' |
| 13 | | 13°23.8 | 10.5 | 171°42.9 | 14.6' | 11°16.8 | -13.8' 55.6' |
| 14 | | 28°23.8 | 09.9 | 186°16.6 | 14.6' | 11°03.0 | -13.8' 55.6' |
| 15 | | 43°23.8 | · · 09.3 | 200°50.2 | 14.7' | 10°49.2 | -13.9' 55.6' |
| 16 | | 58°23.9 | 08.7 | 215°23.9 | 14.7' | 10°35.3 | -13.9' 55.7' |
| 17 | | 73°23.9 | 08.1 | 229°57.6 | 14.7' | 10°21.4 | -14.0' 55.7' |
| 18 | | 88°23.9 | N18°07.4 | 244°31.3 | 14.7' | S10°07.4 | -14.0' 55.7' |
| 19 | | 103°24.0 | 06.8 | 259°05.0 | 14.8' | 09°53.4 | -14.1' 55.7' |
| 20 | | 118°24.0 | 06.2 | 273°38.8 | 14.8' | 09°39.3 | -14.1' 55.7' |
| 21 | | 133°24.1 | · · 05.6 | 288°12.6 | 14.8' | 09°25.2 | -14.2' 55.8' |
| 22 | | 148°24.1 | 04.9 | 302°46.4 | 14.8' | 09°11.0 | -14.2' 55.8' |
| 23 | | 163°24.1 | 04.3 | 317°20.3 | 14.9' | 08°56.8 | -14.3' 55.8' |
| | | SD = 15.7' $d = -0.6'$ | | SD = 15.1' | | | |
| Sat | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 178°24.2 | N18°03.7 | 331°54.1 | 14.9' | S08°42.5 | -14.3' 55.8' |
| 1 | | 193°24.2 | 03.1 | 346°28.0 | 14.9' | 08°28.2 | -14.4' 55.8' |
| 2 | | 208°24.2 | 02.4 | 1°01.9 | 14.9' | 08°13.9 | -14.4' 55.9' |
| 3 | | 223°24.3 | · · 01.8 | 15°35.8 | 14.9' | 07°59.5 | -14.4' 55.9' |
| 4 | | 238°24.3 | 01.2 | 30°09.7 | 14.9' | 07°45.0 | -14.5' 55.9' |
| 5 | | 253°24.4 | 18°00.5 | 44°43.6 | 14.9' | 07°30.5 | -14.5' 55.9' |
| 6 | | 268°24.4 | N17°59.9 | 59°17.6 | 15.0' | S07°16.0 | -14.6' 55.9' |
| 7 | | 283°24.4 | 59.3 | 73°51.5 | 15.0' | 07°01.5 | -14.6' 56.0' |
| 8 | | 298°24.5 | 58.7 | 88°25.5 | 15.0' | 06°46.9 | -14.6' 56.0' |
| 9 | | 313°24.5 | · · 58.0 | 102°59.5 | 15.0' | 06°32.2 | -14.7' 56.0' |
| 10 | | 328°24.5 | 57.4 | 117°33.4 | 15.0' | 06°17.5 | -14.7' 56.0' |
| 11 | | 343°24.6 | 56.8 | 132°07.4 | 15.0' | 06°02.8 | -14.7' 56.0' |
| 12 | | 358°24.6 | N17°56.1 | 146°41.4 | 15.0' | S05°48.1 | -14.8' 56.1' |
| 13 | | 13°24.7 | 55.5 | 161°15.4 | 15.0' | 05°33.3 | -14.8' 56.1' |
| 14 | | 28°24.7 | 54.9 | 175°49.5 | 15.0' | 05°18.5 | -14.8' 56.1' |
| 15 | | 43°24.8 | · · 54.2 | 190°23.5 | 15.0' | 05°03.6 | -14.9' 56.1' |
| 16 | | 58°24.8 | 53.6 | 204°57.5 | 15.0' | 04°48.8 | -14.9' 56.1' |
| 17 | | 73°24.8 | 53.0 | 219°31.5 | 15.0' | 04°33.9 | -14.9' 56.2' |
| 18 | | 88°24.9 | N17°52.3 | 234°05.5 | 15.0' | S04°18.9 | -15.0' 56.2' |
| 19 | | 103°24.9 | 51.7 | 248°39.6 | 15.0' | 04°04.0 | -15.0' 56.2' |
| 20 | | 118°25.0 | 51.1 | 263°13.6 | 15.0' | 03°49.0 | -15.0' 56.2' |
| 21 | | 133°25.0 | · · 50.4 | 277°47.6 | 15.0' | 03°34.0 | -15.0' 56.3' |
| 22 | | 148°25.0 | 49.8 | 292°21.6 | 15.0' | 03°18.9 | -15.1' 56.3' |
| 23 | | 163°25.1 | 49.1 | 306°55.6 | 15.0' | 03°03.9 | -15.1' 56.3' |
| | | SD = 15.8' $d = -0.6'$ | | SD = 15.2' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | | | | | | |
| N 70° | //// | //// | 01:17 | 22:47 | //// | //// |
| 68° | //// | //// | 02:10 | 21:59 | //// | //// |
| 66° | //// | //// | 02:42 | 21:28 | //// | //// |
| 64° | //// | 01:33 | 03:05 | 21:06 | 22:34 | //// |
| 62° | //// | 02:11 | 03:23 | 20:48 | 21:58 | //// |
| 60° | //// | 02:37 | 03:38 | 20:33 | 21:33 | //// |
| N 58° | 01:25 | 02:57 | 03:51 | 20:20 | 21:14 | 22:43 |
| 56° | 01:59 | 03:13 | 04:02 | 20:10 | 20:58 | 22:11 |
| 54° | 02:23 | 03:27 | 04:12 | 20:00 | 20:45 | 21:47 |
| 52° | 02:42 | 03:39 | 04:20 | 19:52 | 20:33 | 21:29 |
| 50° | 02:57 | 03:49 | 04:28 | 19:44 | 20:23 | 21:14 |
| 45° | 03:27 | 04:10 | 04:44 | 19:28 | 20:02 | 20:44 |
| N 40° | 03:49 | 04:27 | 04:57 | 19:15 | 19:45 | 20:23 |
| 35° | 04:07 | 04:41 | 05:09 | 19:04 | 19:32 | 20:05 |
| 30° | 04:21 | 04:52 | 05:18 | 18:54 | 19:20 | 19:51 |
| 20° | 04:44 | 05:12 | 05:35 | 18:38 | 19:01 | 19:29 |
| N 10° | 05:01 | 05:27 | 05:50 | 18:23 | 18:45 | 19:11 |
| 0° | 05:16 | 05:41 | 06:03 | 18:10 | 18:32 | 18:57 |
| S 10° | 05:29 | 05:54 | 06:16 | 17:57 | 18:19 | 18:44 |
| 20° | 05:41 | 06:07 | 06:30 | 17:43 | 18:06 | 18:33 |
| 30° | 05:52 | 06:21 | 06:46 | 17:27 | 17:52 | 18:21 |
| 35° | 05:58 | 06:29 | 06:55 | 17:18 | 17:45 | 18:15 |
| 40° | 06:04 | 06:37 | 07:06 | 17:07 | 17:36 | 18:09 |
| 45° | 06:11 | 06:47 | 07:18 | 16:55 | 17:27 | 18:02 |
| S 50° | 06:18 | 06:58 | 07:33 | 16:40 | 17:16 | 17:55 |
| 52° | 06:22 | 07:03 | 07:40 | 16:33 | 17:11 | 17:52 |
| 54° | 06:25 | 07:08 | 07:48 | 16:26 | 17:05 | 17:48 |
| 56° | 06:29 | 07:14 | 07:56 | 16:17 | 16:59 | 17:45 |
| 58° | 06:33 | 07:21 | 08:06 | 16:08 | 16:53 | 17:41 |
| S 60° | 06:37 | 07:29 | 08:17 | 15:56 | 16:45 | 17:37 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | 22:40 | 21:50 | 21:14 | | 04:09 | 06:31 |
| N 70° | 22:11 | 21:36 | 21:09 | 01:55 | 04:37 | 06:43 |
| 68° | 21:49 | 21:25 | 21:05 | 02:46 | 04:57 | 06:52 |
| 66° | 21:31 | 21:16 | 21:02 | 03:18 | 05:13 | 06:59 |
| 64° | 21:17 | 21:08 | 20:59 | 03:41 | 05:26 | 07:05 |
| 62° | 21:05 | 21:01 | 20:57 | 03:59 | 05:37 | 07:11 |
| 60° | 20:55 | 20:55 | 20:55 | 04:14 | 05:46 | 07:15 |
| N 58° | 20:46 | 20:50 | 20:53 | 04:27 | 05:54 | 07:19 |
| 56° | 20:38 | 20:45 | 20:51 | 04:38 | 06:01 | 07:23 |
| 54° | 20:31 | 20:41 | 20:49 | 04:48 | 06:07 | 07:26 |
| 52° | 20:24 | 20:37 | 20:48 | 04:56 | 06:13 | 07:29 |
| 50° | 20:18 | 20:33 | 20:46 | 05:04 | 06:18 | 07:32 |
| 45° | 20:06 | 20:26 | 20:44 | 05:20 | 06:29 | 07:37 |
| N 40° | 19:55 | 20:19 | 20:41 | 05:33 | 06:38 | 07:42 |
| 35° | 19:47 | 20:14 | 20:39 | 05:44 | 06:45 | 07:46 |
| 30° | 19:39 | 20:09 | 20:37 | 05:54 | 06:52 | 07:50 |
| 20° | 19:25 | 20:00 | 20:34 | 06:10 | 07:03 | 07:56 |
| N 10° | 19:13 | 19:53 | 20:31 | 06:25 | 07:13 | 08:01 |
| 0° | 19:02 | 19:45 | 20:28 | 06:38 | 07:23 | 08:06 |
| S 10° | 18:50 | 19:38 | 20:26 | 06:51 | 07:32 | 08:11 |
| 20° | 18:38 | 19:31 | 20:23 | 07:06 | 07:42 | 08:16 |
| 30° | 18:24 | 19:22 | 20:20 | 07:22 | 07:53 | 08:22 |
| 35° | 18:16 | 19:17 | 20:18 | 07:31 | 07:59 | 08:25 |
| 40° | 18:07 | 19:11 | 20:16 | 07:41 | 08:06 | 08:29 |
| 45° | 17:56 | 19:04 | 20:13 | 07:54 | 08:15 | 08:33 |
| S 50° | 17:42 | 18:56 | 20:10 | 08:09 | 08:25 | 08:39 |
| 52° | 17:36 | 18:52 | 20:09 | 08:16 | 08:29 | 08:41 |
| 54° | 17:29 | 18:48 | 20:07 | 08:23 | 08:34 | 08:43 |
| 56° | 17:21 | 18:44 | 20:06 | 08:32 | 08:40 | 08:46 |
| 58° | 17:13 | 18:39 | 20:04 | 08:41 | 08:46 | 08:49 |
| S 60° | 17:02 | 18:33 | 20:02 | 08:52 | 08:53 | 08:53 |

| Day | Sun | | Mer. Pass hh:mm | Moon | | Age 16-18 100-94% |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|-------------------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 30 | 06:29 | 06:28 | 12:06 | 00:27 | 12:50 | |
| 31 | 06:27 | 06:25 | 12:06 | 01:12 | 13:34 | |
| 01 | 06:23 | 06:21 | 12:06 | 01:56 | 14:17 | |

August 02, 03, 04 UT (Sun., Mon., Tue.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|---------------------|----------|----------|-------------------|----------|----------|---------------------|----------|---------|--------------------|-----|--------|-----|-----|
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 310°36.4 | 135°09.0 | N01°51.2 | 227°25.5 | N23°23.8 | 180°53.7 | N18°56.3 | 296°04.6 | N03°27.9 | | | | | | |
| 1 | 325°38.8 | 150°09.2 | 49.9 | 242°26.2 | 23.9 | 195°55.6 | 56.2 | 311°07.1 | 27.9 | | | | | | |
| 2 | 340°41.3 | 165°09.3 | 48.7 | 257°26.8 | 24.0 | 210°57.5 | 56.0 | 326°09.5 | 27.9 | | | | | | |
| 3 | 355°43.8 | 180°09.5 | · · 47.5 | 272°27.4 | · · 24.1 | 225°59.3 | · · 55.9 | 341°12.0 | · · 27.9 | | | | | | |
| 4 | 10°46.2 | 195°09.7 | 46.3 | 287°28.1 | 24.2 | 241°01.2 | 55.7 | 356°14.5 | 27.8 | | | | | | |
| 5 | 25°48.7 | 210°09.9 | 45.0 | 302°28.7 | 24.4 | 256°03.1 | 55.6 | 11°17.0 | 27.8 | | | | | | |
| 6 | 40°51.2 | 225°10.1 | N01°43.8 | 317°29.3 | N23°24.5 | 271°05.0 | N18°55.5 | 26°19.5 | N03°27.8 | | | | | | |
| 7 | 55°53.6 | 240°10.2 | 42.6 | 332°30.0 | 24.6 | 286°06.9 | 55.3 | 41°22.0 | 27.8 | | | | | | |
| 8 | 70°56.1 | 255°10.4 | 41.4 | 347°30.6 | 24.7 | 301°08.8 | 55.2 | 56°24.5 | 27.8 | | | | | | |
| 9 | 85°58.5 | 270°10.6 | · · 40.1 | 2°31.2 | · · 24.8 | 316°10.7 | · · 55.1 | 71°26.9 | · · 27.7 | | | | | | |
| 10 | 101°01.0 | 285°10.8 | 38.9 | 17°31.8 | 24.9 | 331°12.6 | 54.9 | 86°29.4 | 27.7 | | | | | | |
| 11 | 116°03.5 | 300°11.0 | 37.7 | 32°32.5 | 25.0 | 346°14.5 | 54.8 | 101°31.9 | 27.7 | | | | | | |
| 12 | 131°05.9 | 315°11.2 | N01°36.5 | 47°33.1 | N23°25.1 | 1°16.4 | N18°54.6 | 116°34.4 | N03°27.7 | | | | | | |
| 13 | 146°08.4 | 330°11.3 | 35.2 | 62°33.7 | 25.2 | 16°18.3 | 54.5 | 131°36.9 | 27.6 | | | | | | |
| 14 | 161°10.9 | 345°11.5 | 34.0 | 77°34.4 | 25.3 | 31°20.2 | 54.4 | 146°39.4 | 27.6 | | | | | | |
| 15 | 176°13.3 | 0°11.7 | · · 32.8 | 92°35.0 | · · 25.5 | 46°22.1 | · · 54.2 | 161°41.9 | · · 27.6 | | | | | | |
| 16 | 191°15.8 | 15°11.9 | 31.6 | 107°35.6 | 25.6 | 61°24.0 | 54.1 | 176°44.3 | 27.6 | | | | | | |
| 17 | 206°18.3 | 30°12.1 | 30.3 | 122°36.3 | 25.7 | 76°25.9 | 54.0 | 191°46.8 | 27.6 | | | | | | |
| 18 | 221°20.7 | 45°12.3 | N01°29.1 | 137°36.9 | N23°25.8 | 91°27.8 | N18°53.8 | 206°49.3 | N03°27.5 | | | | | | |
| 19 | 236°23.2 | 60°12.5 | 27.9 | 152°37.5 | 25.9 | 106°29.7 | 53.7 | 221°51.8 | 27.5 | | | | | | |
| 20 | 251°25.6 | 75°12.7 | 26.7 | 167°38.2 | 26.0 | 121°31.6 | 53.5 | 236°54.3 | 27.5 | | | | | | |
| 21 | 266°28.1 | 90°12.8 | · · 25.4 | 182°38.8 | · · 26.1 | 136°33.5 | · · 53.4 | 251°56.8 | · · 27.5 | | | | | | |
| 22 | 281°30.6 | 105°13.0 | 24.2 | 197°39.4 | 26.2 | 151°35.4 | 53.3 | 266°59.3 | 27.4 | | | | | | |
| 23 | 296°33.0 | 120°13.2 | 23.0 | 212°40.1 | 26.3 | 166°37.3 | 53.1 | 282°01.8 | 27.4 | | | | | | |
| Mer.pass. 03:17 | | ν0.2' d-1.2' m-4.28 | | | ν0.6' d0.1' m1.30 | | | ν1.9' d-0.1' m-1.78 | | | ν2.5' d-0.0' m0.63 | | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 311°35.5 | 135°13.4 | N01°21.8 | 227°40.7 | N23°26.4 | 181°39.2 | N18°53.0 | 297°04.2 | N03°27.4 | | | | | | |
| 1 | 326°38.0 | 150°13.6 | 20.5 | 242°41.3 | 26.5 | 196°41.1 | 52.9 | 312°06.7 | 27.4 | | | | | | |
| 2 | 341°40.4 | 165°13.8 | 19.3 | 257°42.0 | 26.6 | 211°43.0 | 52.7 | 327°09.2 | 27.4 | | | | | | |
| 3 | 356°42.9 | 180°14.0 | · · 18.1 | 272°42.6 | · · 26.7 | 226°44.9 | · · 52.6 | 342°11.7 | · · 27.3 | | | | | | |
| 4 | 11°45.4 | 195°14.2 | 16.9 | 287°43.2 | 26.8 | 241°46.8 | 52.4 | 357°14.2 | 27.3 | | | | | | |
| 5 | 26°47.8 | 210°14.4 | 15.6 | 302°43.9 | 26.9 | 256°48.7 | 52.3 | 12°16.7 | 27.3 | | | | | | |
| 6 | 41°50.3 | 225°14.6 | N01°14.4 | 317°44.5 | N23°27.0 | 271°50.6 | N18°52.2 | 27°19.2 | N03°27.3 | | | | | | |
| 7 | 56°52.8 | 240°14.8 | 13.2 | 332°45.1 | 27.1 | 286°52.5 | 52.0 | 42°21.7 | 27.2 | | | | | | |
| 8 | 71°55.2 | 255°15.0 | 12.0 | 347°45.8 | 27.2 | 301°54.4 | 51.9 | 57°24.2 | 27.2 | | | | | | |
| 9 | 86°57.7 | 270°15.2 | · · 10.7 | 2°46.4 | · · 27.3 | 316°56.3 | · · 51.8 | 72°26.6 | · · 27.2 | | | | | | |
| 10 | 102°00.1 | 285°15.4 | 09.5 | 17°47.0 | 27.4 | 331°58.2 | 51.6 | 87°29.1 | 27.2 | | | | | | |
| 11 | 117°02.6 | 300°15.6 | 08.3 | 32°47.7 | 27.5 | 347°00.1 | 51.5 | 102°31.6 | 27.2 | | | | | | |
| 12 | 132°05.1 | 315°15.7 | N01°07.1 | 47°48.3 | N23°27.6 | 2°02.0 | N18°51.3 | 117°34.1 | N03°27.1 | | | | | | |
| 13 | 147°07.5 | 330°15.9 | 05.8 | 62°48.9 | 27.8 | 17°03.9 | 51.2 | 132°36.6 | 27.1 | | | | | | |
| 14 | 162°10.0 | 345°16.1 | 04.6 | 77°49.6 | 27.9 | 32°05.8 | 51.1 | 147°39.1 | 27.1 | | | | | | |
| 15 | 177°12.5 | 0°16.3 | · · 03.4 | 92°50.2 | · · 28.0 | 47°07.7 | · · 50.9 | 162°41.6 | · · 27.1 | | | | | | |
| 16 | 192°14.9 | 15°16.5 | 02.2 | 107°50.8 | 28.0 | 62°09.6 | 50.8 | 177°44.1 | 27.0 | | | | | | |
| 17 | 207°17.4 | 30°16.7 | 01°00.9 | 122°51.5 | 28.1 | 77°11.5 | 50.6 | 192°46.6 | 27.0 | | | | | | |
| 18 | 222°19.9 | 45°16.9 | N00°59.7 | 137°52.1 | N23°28.2 | 92°13.4 | N18°50.5 | 207°49.1 | N03°27.0 | | | | | | |
| 19 | 237°22.3 | 60°17.1 | 58.5 | 152°52.7 | 28.3 | 107°15.3 | 50.4 | 222°51.5 | 27.0 | | | | | | |
| 20 | 252°24.8 | 75°17.4 | 57.3 | 167°53.4 | 28.4 | 122°17.2 | 50.2 | 237°54.0 | 26.9 | | | | | | |
| 21 | 267°27.3 | 90°17.6 | · · 56.0 | 182°54.0 | · · 28.5 | 137°19.1 | · · 50.1 | 252°56.5 | · · 26.9 | | | | | | |
| 22 | 282°29.7 | 105°17.8 | 54.8 | 197°54.6 | 28.6 | 152°21.0 | 50.0 | 267°59.0 | 26.9 | | | | | | |
| 23 | 297°32.2 | 120°18.0 | 53.6 | 212°55.3 | 28.7 | 167°22.9 | 49.8 | 283°01.5 | 26.9 | | | | | | |
| Mer.pass. 03:13 | | ν0.2' d-1.2' m-4.29 | | | ν0.6' d0.1' m1.30 | | | ν1.9' d-0.1' m-1.78 | | | ν2.5' d-0.0' m0.62 | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 312°34.6 | 135°18.2 | N00°52.4 | 227°55.9 | N23°28.8 | 182°24.8 | N18°49.7 | 298°04.0 | N03°26.9 | | | | | | |
| 1 | 327°37.1 | 150°18.4 | 51.1 | 242°56.5 | 28.9 | 197°26.7 | 49.5 | 313°06.5 | 26.8 | | | | | | |
| 2 | 342°39.6 | 165°18.6 | 49.9 | 257°57.2 | 29.0 | 212°28.6 | 49.4 | 328°09.0 | 26.8 | | | | | | |
| 3 | 357°42.0 | 180°18.8 | · · 48.7 | 272°57.8 | · · 29.1 | 227°30.5 | · · 49.3 | 343°11.5 | · · 26.8 | | | | | | |
| 4 | 12°44.5 | 195°19.0 | 47.5 | 287°58.4 | 29.2 | 242°32.4 | 49.1 | 358°14.0 | 26.8 | | | | | | |
| 5 | 27°47.0 | 210°19.2 | 46.2 | 302°59.1 | 29.3 | 257°34.3 | 49.0 | 13°16.5 | 26.7 | | | | | | |
| 6 | 42°49.4 | 225°19.4 | N00°45.0 | 317°59.7 | N23°29.4 | 272°36.2 | N18°48.9 | 28°19.0 | N03°26.7 | | | | | | |
| 7 | 57°51.9 | 240°19.6 | 43.8 | 333°00.4 | 29.5 | 287°38.0 | 48.7 | 43°21.4 | 26.7 | | | | | | |
| 8 | 72°54.4 | 255°19.8 | 42.6 | 348°01.0 | 29.6 | 302°39.9 | 48.6 | 58°23.9 | 26.7 | | | | | | |
| 9 | 87°56.8 | 270°20.0 | · · 41.3 | 3°01.6 | · · 29.7 | 317°41.8 | · · 48.4 | 73°26.4 | · · 26.6 | | | | | | |
| 10 | 102°59.3 | 285°20.2 | 40.1 | 18°02.3 | 29.8 | 332°43.7 | 48.3 | 88°28.9 | 26.6 | | | | | | |
| 11 | 118°01.7 | 300°20.5 | 38.9 | 33°02.9 | 29.9 | 347°45.6 | 48.2 | 103°31.4 | 26.6 | | | | | | |
| 12 | 133°04.2 | 315°20.7 | N00°37.7 | 48°03.5 | N23°30.0 | 2°47.5 | N18°48.0 | 118°33.9 | N03°26.6 | | | | | | |
| 13 | 148°06.7 | 330°20.9 | 36.4 | 63°04.2 | 30.1 | 17°49.4 | 47.9 | 133°36.4 | 26.5 | | | | | | |
| 14 | 163°09.1 | 345°21.1 | 35.2 | 78°04.8 | 30.1 | 32°51.3 | 47.7 | 148°38.9 | 26.5 | | | | | | |
| 15 | 178°11.6 | 0°21.3 | · · 34.0 | 93°05.4 | · · 30.2 | 47°53.2 | · · 47.6 | 163°41.4 | · · 26.5 | | | | | | |
| 16 | 193°14.1 | 15°21.5 | 32.8 | 108°06.1 | 30.3 | 62°55.1 | 47.5 | 178°43.9 | 26.5 | | | | | | |
| 17 | 208°16.5 | 30°21.7 | 31.5 | 123°06.7 | 30.4 | 77°57.0 | 47.3 | 193°46.4 | 26.4 | | | | | | |
| 18 | 223°19.0 | 45°21.9 | N00°30.3 | 138°07.3 | N23°30.5 | 92°58.9 | N18°47.2 | 208°48.9 | N03°26.4 | | | | | | |
| 19 | 238°21.5 | 60°22.2 | 29.1 | 153°08.0 | 30.6 | 108°00.8 | 47.0 | 223°51.4 | 26.4 | | | | | | |
| 20 | 253°23.9 | 75°22.4 | 27.9 | 168°08.6 | 30.7 | 123°02.7 | 46.9 | 238°53.9 | 26.4 | | | | | | |
| 21 | 268°26.4 | 90°22.6 | · · 26.6 | 183°09.3 | · · 30.8 | 138°04.6 | · · 46.8 | 253°56.4 | · · 26.3 | | | | | | |
| 22 | 283°28.9 | 105°22.8 | 25.4 | 198°09.9 | 30.9 | 153°06.5 | 46.6 | 268°58.9 | 26.3 | | | | | | |
| 23 | 298°31.3 | 120°23.0 | 24.2 | 213°10.5 | 31.0 | 168°08.4 | 46.5 | 284°01.4 | 26.3 | | | | | | |
| Mer.pass. 03:09 | | ν0.2' d-1.2' m-4.30 | | | ν0.6' d0.1' m1.30 | | | ν1.9' d-0.1' m-1.78 | | | ν2.5' d-0.0' m0.62 | | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.2 | 29°14.2 |
| Ankaa | 353°05.6 | -42°09.4 |
| Schedar | 349°29.3 | 56°40.9 |
| Diphda | 348°45.8 | -17°50.2 |
| Achernar | 335°19.1 | -57°05.7 |
| Hamal | 327°49.7 | 23°35.3 |
| Polaris | 313°25.4 | 89°22.2 |
| Acamar | 315°10.8 | -40°11.5 |
| Menkar | 314°04.8 | 4°11.7 |
| Mirfak | 308°26.5 | 49°57.2 |
| Aldebaran | 290°38.3 | 16°33.8 |
| Rigel | 281°02.8 | -8°10.1 |
| Capella | 280°20.3 | 46°01.3 |
| Bellatrix | 278°21.7 | 6°22.5 |
| Elnath | 278°00.5 | 28°37.7 |
| Alnilam | 275°36.6 | -1°11.0 |
| Betelgeuse | 270°50.9 | 7°24.8 |
| Canopus | 263°52.3 | -52°42.3 |
| Sirius | 258°25.4 | -16°45.0 |
| Adhara | 255°05.2 | -29°00.3 |
| Procyon | 244°49.8 | 5°09.5 |
| Pollux | 243°16.1 | 27°57.7 |
| Avior | 234°14.9 | -59°35.6 |
| Suhail | 222°45.8 | -43°32.4 |
| Miaplacidus | 221°39.0 | -69°49.6 |
| Alphard | 217°46.8 | -8°46.4 |
| Regulus | 207°33.4 | 11 |


| h | | Sun | | Moon | | | |
|------------------------|----------|----------|------------|-------|----------|--------|-------|
| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°25.1 | N17°48.5 | 321°29.6 | 15.0' | S02°48.8 | -15.1' | 56.3' |
| 1 | 193°25.2 | 47.9 | 336°03.6 | 15.0' | 02°33.7 | -15.1' | 56.3' |
| 2 | 208°25.2 | 47.2 | 350°37.6 | 15.0' | 02°18.5 | -15.2' | 56.4' |
| 3 | 223°25.3 | · · 46.6 | 5°11.6 | 15.0' | 02°03.4 | -15.2' | 56.4' |
| 4 | 238°25.3 | 45.9 | 19°45.5 | 15.0' | 01°48.2 | -15.2' | 56.4' |
| 5 | 253°25.4 | 45.3 | 34°19.5 | 14.9' | 01°33.0 | -15.2' | 56.4' |
| 6 | 268°25.4 | N17°44.7 | 48°53.4 | 14.9' | S01°17.8 | -15.2' | 56.5' |
| 7 | 283°25.4 | 44.0 | 63°27.3 | 14.9' | 01°02.6 | -15.2' | 56.5' |
| 8 | 298°25.5 | 43.4 | 78°01.3 | 14.9' | 00°47.4 | -15.2' | 56.5' |
| 9 | 313°25.5 | · · 42.7 | 92°35.1 | 14.9' | 00°32.1 | -15.3' | 56.5' |
| 10 | 328°25.6 | 42.1 | 107°09.0 | 14.9' | 00°16.8 | -15.3' | 56.5' |
| 11 | 343°25.6 | 41.4 | 121°42.9 | 14.8' | S00°01.6 | -15.3' | 56.6' |
| 12 | 358°25.7 | N17°40.8 | 136°16.7 | 14.8' | N00°13.7 | 15.3' | 56.6' |
| 13 | 13°25.7 | 40.2 | 150°50.5 | 14.8' | 00°29.0 | 15.3' | 56.6' |
| 14 | 28°25.8 | 39.5 | 165°24.3 | 14.8' | 00°44.3 | 15.3' | 56.6' |
| 15 | 43°25.8 | · · 38.9 | 179°58.1 | 14.7' | 00°59.6 | 15.3' | 56.7' |
| 16 | 58°25.9 | 38.2 | 194°31.8 | 14.7' | 01°14.9 | 15.3' | 56.7' |
| 17 | 73°25.9 | 37.6 | 209°05.6 | 14.7' | 01°30.3 | 15.3' | 56.7' |
| 18 | 88°26.0 | N17°36.9 | 223°39.3 | 14.7' | N01°45.6 | 15.3' | 56.7' |
| 19 | 103°26.0 | 36.3 | 238°12.9 | 14.6' | 02°00.9 | 15.3' | 56.7' |
| 20 | 118°26.1 | 35.6 | 252°46.5 | 14.6' | 02°16.3 | 15.3' | 56.8' |
| 21 | 133°26.1 | · · 35.0 | 267°20.1 | 14.6' | 02°31.6 | 15.3' | 56.8' |
| 22 | 148°26.2 | 34.3 | 281°53.7 | 14.5' | 02°46.9 | 15.3' | 56.8' |
| 23 | 163°26.2 | 33.7 | 296°27.3 | 14.5' | 03°02.3 | 15.3' | 56.8' |
| SD = 15.8' $d = -0.6'$ | | | SD = 15.4' | | | | |

| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 178°26.3 | N17°33.0 | 311°00.8 | 14.5' | N03°17.6 | 15.3' | 56.9' |
| 1 | 193°26.3 | 32.4 | 325°34.2 | 14.4' | 03°33.0 | 15.3' | 56.9' |
| 2 | 208°26.4 | 31.7 | 340°07.6 | 14.4' | 03°48.3 | 15.3' | 56.9' |
| 3 | 223°26.4 | · · 31.1 | 354°41.0 | 14.3' | 04°03.6 | 15.3' | 56.9' |
| 4 | 238°26.5 | 30.4 | 9°14.4 | 14.3' | 04°18.9 | 15.3' | 56.9' |
| 5 | 253°26.5 | 29.8 | 23°47.7 | 14.3' | 04°34.2 | 15.3' | 57.0' |
| 6 | 268°26.6 | N17°29.1 | 38°21.0 | 14.2' | N04°49.6 | 15.3' | 57.0' |
| 7 | 283°26.6 | 28.5 | 52°54.2 | 14.2' | 05°04.8 | 15.3' | 57.0' |
| 8 | 298°26.7 | 27.8 | 67°27.4 | 14.1' | 05°20.1 | 15.3' | 57.0' |
| 9 | 313°26.7 | · · 27.2 | 82°00.5 | 14.1' | 05°35.4 | 15.3' | 57.1' |
| 10 | 328°26.8 | 26.5 | 96°33.6 | 14.0' | 05°50.7 | 15.2' | 57.1' |
| 11 | 343°26.8 | 25.8 | 111°06.6 | 14.0' | 06°05.9 | 15.2' | 57.1' |
| 12 | 358°26.9 | N17°25.2 | 125°39.6 | 13.9' | N06°21.1 | 15.2' | 57.1' |
| 13 | 13°26.9 | 24.5 | 140°12.5 | 13.9' | 06°36.4 | 15.2' | 57.2' |
| 14 | 28°27.0 | 23.9 | 154°45.4 | 13.8' | 06°51.6 | 15.2' | 57.2' |
| 15 | 43°27.0 | · · 23.2 | 169°18.2 | 13.8' | 07°06.7 | 15.2' | 57.2' |
| 16 | 58°27.1 | 22.6 | 183°51.0 | 13.7' | 07°21.9 | 15.1' | 57.2' |
| 17 | 73°27.1 | 21.9 | 198°23.7 | 13.7' | 07°37.0 | 15.1' | 57.3' |
| 18 | 88°27.2 | N17°21.2 | 212°56.4 | 13.6' | N07°52.1 | 15.1' | 57.3' |
| 19 | 103°27.2 | 20.6 | 227°29.0 | 13.5' | 08°07.2 | 15.1' | 57.3' |
| 20 | 118°27.3 | 19.9 | 242°01.5 | 13.5' | 08°22.3 | 15.0' | 57.3' |
| 21 | 133°27.4 | · · 19.3 | 256°34.0 | 13.4' | 08°37.3 | 15.0' | 57.4' |
| 22 | 148°27.4 | 18.6 | 271°06.4 | 13.3' | 08°52.4 | 15.0' | 57.4' |
| 23 | 163°27.5 | 17.9 | 285°38.7 | 13.3' | 09°07.3 | 15.0' | 57.4' |
| SD = 15.8' $d = -0.7'$ | | | SD = 15.5' | | | | |

| Tue | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 178°27.5 | N17°17.3 | 300°11.0 | 13.2' | N09°22.3 | 14.9' | 57.4' |
| 1 | 193°27.6 | 16.6 | 314°43.2 | 13.1' | 09°37.2 | 14.9' | 57.4' |
| 2 | 208°27.6 | 15.9 | 329°15.4 | 13.1' | 09°52.1 | 14.9' | 57.5' |
| 3 | 223°27.7 | · · 15.3 | 343°47.5 | 13.0' | 10°07.0 | 14.8' | 57.5' |
| 4 | 238°27.7 | 14.6 | 358°19.5 | 12.9' | 10°21.8 | 14.8' | 57.5' |
| 5 | 253°27.8 | 13.9 | 12°51.4 | 12.9' | 10°36.6 | 14.8' | 57.5' |
| 6 | 268°27.9 | N17°13.3 | 27°23.3 | 12.8' | N10°51.3 | 14.7' | 57.6' |
| 7 | 283°27.9 | 12.6 | 41°55.0 | 12.7' | 11°06.1 | 14.7' | 57.6' |
| 8 | 298°28.0 | 12.0 | 56°26.8 | 12.6' | 11°20.7 | 14.6' | 57.6' |
| 9 | 313°28.0 | · · 11.3 | 70°58.4 | 12.6' | 11°35.4 | 14.6' | 57.6' |
| 10 | 328°28.1 | 10.6 | 85°29.9 | 12.5' | 11°50.0 | 14.5' | 57.7' |
| 11 | 343°28.2 | 10.0 | 100°01.4 | 12.4' | 12°04.5 | 14.5' | 57.7' |
| 12 | 358°28.2 | N17°09.3 | 114°32.8 | 12.3' | N12°19.0 | 14.5' | 57.7' |
| 13 | 13°28.3 | 08.6 | 129°04.1 | 12.2' | 12°33.4 | 14.4' | 57.7' |
| 14 | 28°28.3 | 07.9 | 143°35.4 | 12.1' | 12°47.8 | 14.4' | 57.8' |
| 15 | 43°28.4 | · · 07.3 | 158°06.5 | 12.1' | 13°02.2 | 14.3' | 57.8' |
| 16 | 58°28.4 | 06.6 | 172°37.6 | 12.0' | 13°16.5 | 14.2' | 57.8' |
| 17 | 73°28.5 | 05.9 | 187°08.5 | 11.9' | 13°30.8 | 14.2' | 57.8' |
| 18 | 88°28.6 | N17°05.3 | 201°39.4 | 11.8' | N13°44.9 | 14.1' | 57.9' |
| 19 | 103°28.6 | 04.6 | 216°10.2 | 11.7' | 13°59.1 | 14.1' | 57.9' |
| 20 | 118°28.7 | 03.9 | 230°40.9 | 11.6' | 14°13.2 | 14.0' | 57.9' |
| 21 | 133°28.8 | · · 03.2 | 245°11.5 | 11.5' | 14°27.2 | 14.0' | 57.9' |
| 22 | 148°28.8 | 02.6 | 259°42.0 | 11.4' | 14°41.2 | 13.9' | 58.0' |
| 23 | 163°28.9 | 01.9 | 274°12.5 | 11.3' | 14°55.1 | 13.8' | 58.0' |
| SD = 15.8' $d = -0.7'$ | | | SD = 15.7' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | //// | //// | 01:43 | 22:23 | //// | //// |
| 68° | //// | //// | 02:25 | 21:43 | //// | //// |
| 66° | //// | 00:53 | 02:53 | 21:16 | 23:08 | //// |
| 64° | //// | 01:51 | 03:14 | 20:56 | 22:17 | //// |
| 62° | //// | 02:23 | 03:31 | 20:39 | 21:46 | //// |
| 60° | 00:48 | 02:46 | 03:45 | 20:25 | 21:24 | 23:15 |
| N 58° | 01:40 | 03:05 | 03:57 | 20:14 | 21:06 | 22:28 |
| 56° | 02:10 | 03:20 | 04:08 | 20:03 | 20:51 | 22:00 |
| 54° | 02:32 | 03:33 | 04:17 | 19:55 | 20:38 | 21:39 |
| 52° | 02:49 | 03:44 | 04:25 | 19:47 | 20:27 | 21:21 |
| 50° | 03:04 | 03:54 | 04:32 | 19:39 | 20:17 | 21:07 |
| 45° | 03:32 | 04:14 | 04:48 | 19:24 | 19:58 | 20:39 |
| N 40° | 03:53 | 04:30 | 05:00 | 19:12 | 19:42 | 20:19 |
| 35° | 04:10 | 04:43 | 05:11 | 19:01 | 19:29 | 20:02 |
| 30° | 04:23 | 04:54 | 05:20 | 18:52 | 19:18 | 19:48 |
| 20° | 04:45 | 05:13 | 05:36 | 18:36 | 18:59 | 19:27 |
| N 10° | 05:02 | 05:28 | 05:50 | 18:22 | 18:44 | 19:10 |
| 0° | 05:16 | 05:41 | 06:03 | 18:10 | 18:31 | 18:56 |
| S 10° | 05:28 | 05:53 | 06:15 | 17:57 | 18:19 | 18:44 |
| 20° | 05:39 | 06:06 | 06:29 | 17:44 | 18:07 | 18:33 |
| 30° | 05:50 | 06:19 | 06:44 | 17:29 | 17:54 | 18:22 |
| 35° | 05:56 | 06:26 | 06:53 | 17:20 | 17:47 | 18:17 |
| 40° | 06:02 | 06:34 | 07:03 | 17:10 | 17:39 | 18:11 |
| 45° | 06:08 | 06:43 | 07:14 | 16:58 | 17:30 | 18:05 |
| S 50° | 06:15 | 06:53 | 07:29 | 16:44 | 17:20 | 17:58 |
| 52° | 06:17 | 06:58 | 07:35 | 16:38 | 17:15 | 17:56 |
| 54° | 06:21 | 07:03 | 07:42 | 16:31 | 17:10 | 17:53 |
| 56° | 06:24 | 07:09 | 07:50 | 16:23 | 17:04 | 17:49 |
| 58° | 06:28 | 07:15 | 08:00 | 16:14 | 16:58 | 17:46 |
| S 60° | 06:31 | 07:22 | 08:10 | 16:03 | 16:51 | 17:42 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | 20:41 | 20:06 | 19:17 | 08:40 | 10:50 | 13:16 |
| N 70° | 20:45 | 20:18 | 19:44 | 08:41 | 10:41 | 12:52 |
| 68° | 20:47 | 20:28 | 20:04 | 08:42 | 10:34 | 12:34 |
| 66° | 20:49 | 20:36 | 20:20 | 08:43 | 10:28 | 12:19 |
| 64° | 20:51 | 20:43 | 20:33 | 08:43 | 10:23 | 12:07 |
| 62° | 20:53 | 20:49 | 20:45 | 08:44 | 10:18 | 11:57 |
| 60° | 20:54 | 20:54 | 20:54 | 08:44 | 10:14 | 11:49 |
| N 58° | 20:55 | 20:59 | 21:03 | 08:44 | 10:11 | 11:41 |
| 56° | 20:57 | 21:03 | 21:11 | 08:45 | 10:08 | 11:35 |
| 54° | 20:58 | 21:06 | 21:17 | 08:45 | 10:06 | 11:29 |
| 52° | 20:58 | 21:10 | 21:23 | 08:45 | 10:03 | 11:24 |
| 50° | 20:59 | 21:13 | 21:29 | 08:46 | 10:01 | 11:19 |
| 45° | 21:01 | 21:20 | 21:41 | 08:46 | 09:56 | 11:09 |
| N 40° | 21:03 | 21:26 | 21:51 | 08:47 | 09:52 | 11:01 |
| 35° | 21:04 | 21:31 | 22:00 | 08:47 | 09:49 | 10:53 |
| 30° | 21:05 | 21:35 | 22:07 | 08:47 | 09:46 | 10:47 |
| 20° | 21:08 | 21:43 | 22:20 | 08:48 | 09:41 | 10:36 |
| N 10° | 21:10 | 21:50 | 22:32 | 08:48 | 09:37 | 10:27 |
| 0° | 21:11 | 21:56 | 22:43 | 08:49 | 09:32 | 10:18 |
| S 10° | 21:13 | 22:03 | 22:54 | 08:49 | 09:28 | 10:09 |
| 20° | 21:15 | 22:10 | 23:06 | 08:50 | 09:24 | 10:00 |
| 30° | 21:18 | 22:18 | 23:20 | 08:50 | 09:19 | 09:49 |
| 35° | 21:19 | 22:22 | 23:28 | 08:50 | 09:16 | 09:43 |
| 40° | 21:21 | 22:28 | 23:37 | 08:51 | 09:13 | 09:36 |
| 45° | 21:23 | 22:34 | 23:48 | 08:51 | 09:09 | 09:28 |
| S 50° | 21:25 | 22:41 | · · · | 08:51 | 09:04 | 09:19 |
| 52° | 21:26 | 22:45 | · · · | 08:52 | 09:02 | 09:14 |
| 54° | 21:27 | 22:49 | · · · | 08:52 | 09:00 | 09:10 |
| 56° | 21:28 | 22:53 | · · · | 08:52 | 08:58 | 09:04 |
| 58° | 21:29 | 22:58 | · · · | 08:52 | 08:55 | 08:58 |
| S 60° | 21:31 | 23:03 | · · · | 08:52 | 08:52 | 08:52 |

| Day | Sun | | Mer. Pass | Moon | | Age 19-21 89-72% |
|-----|-----------------------------------|-----------------------|-----------|-----------------------|-------------|---|
| | Eqn.of Time 00 ^h mm:ss | 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 02 | 06:19 | 06:17 | 12:06 | 02:39 | 15:00 |  |
| 03 | 06:15 | 06:13 | 12:06 | 03:22 | 15:44 | |
| 04 | 06:10 | 06:07 | 12:06 | 04:07 | 16:30 | |

August 05, 06, 07 UT (Wed., Thu., Fri.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|---------------------|----------|----------|-------------------|----------|----------|---------------------|----------|---------|--------------------|-----|--------|-----|-----|
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 313°33.8 | 135°23.2 | N00°23.0 | 228°11.2 | N23°31.0 | 183°10.3 | N18°46.4 | 299°03.9 | N03°26.3 | | | | | | |
| 1 | 328°36.2 | 150°23.5 | 21.8 | 243°11.8 | 31.1 | 198°12.2 | 46.2 | 314°06.3 | 26.2 | | | | | | |
| 2 | 343°38.7 | 165°23.7 | 20.5 | 258°12.4 | 31.2 | 213°14.1 | 46.1 | 329°08.8 | 26.2 | | | | | | |
| 3 | 358°41.2 | 180°23.9 | •• 19.3 | 273°13.1 | •• 31.3 | 228°16.0 | •• 45.9 | 344°11.3 | •• 26.2 | | | | | | |
| 4 | 13°43.6 | 195°24.1 | 18.1 | 288°13.7 | 31.4 | 243°17.9 | 45.8 | 359°13.8 | 26.2 | | | | | | |
| 5 | 28°46.1 | 210°24.3 | 16.9 | 303°14.4 | 31.5 | 258°19.8 | 45.7 | 14°16.3 | 26.1 | | | | | | |
| 6 | 43°48.6 | 225°24.6 | N00°15.6 | 318°15.0 | N23°31.6 | 273°21.7 | N18°45.5 | 29°18.8 | N03°26.1 | | | | | | |
| 7 | 58°51.0 | 240°24.8 | 14.4 | 333°15.6 | 31.7 | 288°23.6 | 45.4 | 44°21.3 | 26.1 | | | | | | |
| 8 | 73°53.5 | 255°25.0 | 13.2 | 348°16.3 | 31.7 | 303°25.5 | 45.2 | 59°23.8 | 26.1 | | | | | | |
| 9 | 88°56.0 | 270°25.2 | •• 12.0 | 3°16.9 | •• 31.8 | 318°27.4 | •• 45.1 | 74°26.3 | •• 26.0 | | | | | | |
| 10 | 103°58.4 | 285°25.5 | 10.7 | 18°17.5 | 31.9 | 333°29.3 | 45.0 | 89°28.8 | 26.0 | | | | | | |
| 11 | 119°00.9 | 300°25.7 | 09.5 | 33°18.2 | 32.0 | 348°31.2 | 44.8 | 104°31.3 | 26.0 | | | | | | |
| 12 | 134°03.3 | 315°25.9 | N00°08.3 | 48°18.8 | N23°32.1 | 3°33.1 | N18°44.7 | 119°33.8 | N03°26.0 | | | | | | |
| 13 | 149°05.8 | 330°26.1 | 07.1 | 63°19.5 | 32.2 | 18°35.0 | 44.5 | 134°36.3 | 25.9 | | | | | | |
| 14 | 164°08.3 | 345°26.4 | 05.8 | 78°20.1 | 32.2 | 33°36.9 | 44.4 | 149°38.8 | 25.9 | | | | | | |
| 15 | 179°10.7 | 0°26.6 | •• 04.6 | 93°20.7 | •• 32.3 | 48°38.8 | •• 44.3 | 164°41.3 | •• 25.9 | | | | | | |
| 16 | 194°13.2 | 15°26.8 | 03.4 | 108°21.4 | 32.4 | 63°40.7 | 44.1 | 179°43.8 | 25.8 | | | | | | |
| 17 | 209°15.7 | 30°27.0 | 02.2 | 123°22.0 | 32.5 | 78°42.6 | 44.0 | 194°46.3 | 25.8 | | | | | | |
| 18 | 224°18.1 | 45°27.3 | N00°00.9 | 138°22.7 | N23°32.6 | 93°44.5 | N18°43.9 | 209°48.8 | N03°25.8 | | | | | | |
| 19 | 239°20.6 | 60°27.5 | S00°00.3 | 153°23.3 | 32.7 | 108°46.4 | 43.7 | 224°51.3 | 25.8 | | | | | | |
| 20 | 254°23.1 | 75°27.7 | 01.5 | 168°23.9 | 32.7 | 123°48.3 | 43.6 | 239°53.8 | 25.7 | | | | | | |
| 21 | 269°25.5 | 90°28.0 | •• 02.7 | 183°24.6 | •• 32.8 | 138°50.2 | •• 43.4 | 254°56.3 | •• 25.7 | | | | | | |
| 22 | 284°28.0 | 105°28.2 | 03.9 | 198°25.2 | 32.9 | 153°52.1 | 43.3 | 269°58.8 | 25.7 | | | | | | |
| 23 | 299°30.5 | 120°28.4 | 05.2 | 213°25.8 | 33.0 | 168°54.0 | 43.2 | 285°01.3 | 25.7 | | | | | | |
| Mer.pass. 03:05 | | ν0.2' d-1.2' m-4.31 | | | ν0.6' d0.1' m1.30 | | | ν1.9' d-0.1' m-1.78 | | | ν2.5' d-0.0' m0.61 | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 314°32.9 | 135°28.7 | S00°06.4 | 228°26.5 | N23°33.1 | 183°55.9 | N18°43.0 | 300°03.8 | N03°25.6 | | | | | | |
| 1 | 329°35.4 | 150°28.9 | 07.6 | 243°27.1 | 33.1 | 198°57.8 | 42.9 | 315°06.3 | 25.6 | | | | | | |
| 2 | 344°37.8 | 165°29.1 | 08.8 | 258°27.8 | 33.2 | 213°59.7 | 42.7 | 330°08.8 | 25.6 | | | | | | |
| 3 | 359°40.3 | 180°29.4 | •• 10.1 | 273°28.4 | •• 33.3 | 229°01.6 | •• 42.6 | 345°11.3 | •• 25.6 | | | | | | |
| 4 | 14°42.8 | 195°29.6 | 11.3 | 288°29.0 | 33.4 | 244°03.5 | 42.5 | 0°13.8 | 25.5 | | | | | | |
| 5 | 29°45.2 | 210°29.8 | 12.5 | 303°29.7 | 33.4 | 259°05.4 | 42.3 | 15°16.3 | 25.5 | | | | | | |
| 6 | 44°47.7 | 225°30.1 | S00°13.7 | 318°30.3 | N23°33.5 | 274°07.3 | N18°42.2 | 30°18.8 | N03°25.5 | | | | | | |
| 7 | 59°50.2 | 240°30.3 | 15.0 | 333°31.0 | 33.6 | 289°09.2 | 42.0 | 45°21.3 | 25.4 | | | | | | |
| 8 | 74°52.6 | 255°30.5 | 16.2 | 348°31.6 | 33.7 | 304°11.1 | 41.9 | 60°23.8 | 25.4 | | | | | | |
| 9 | 89°55.1 | 270°30.8 | •• 17.4 | 3°32.2 | •• 33.8 | 319°13.0 | •• 41.8 | 75°26.3 | •• 25.4 | | | | | | |
| 10 | 104°57.6 | 285°31.0 | 18.6 | 18°32.9 | 33.8 | 334°14.9 | 41.6 | 90°28.8 | 25.4 | | | | | | |
| 11 | 120°00.0 | 300°31.2 | 19.9 | 33°33.5 | 33.9 | 349°16.8 | 41.5 | 105°31.3 | 25.3 | | | | | | |
| 12 | 135°02.5 | 315°31.5 | S00°21.1 | 48°34.2 | N23°34.0 | 4°18.7 | N18°41.3 | 120°33.8 | N03°25.3 | | | | | | |
| 13 | 150°05.0 | 330°31.7 | 22.3 | 63°34.8 | 34.1 | 19°20.6 | 41.2 | 135°36.3 | 25.3 | | | | | | |
| 14 | 165°07.4 | 345°32.0 | 23.5 | 78°35.4 | 34.1 | 34°22.5 | 41.1 | 150°38.8 | 25.3 | | | | | | |
| 15 | 180°09.9 | 0°32.2 | •• 24.7 | 93°36.1 | •• 34.2 | 49°24.4 | •• 40.9 | 165°41.3 | •• 25.2 | | | | | | |
| 16 | 195°12.3 | 15°32.4 | 26.0 | 108°36.7 | 34.3 | 64°26.3 | 40.8 | 180°43.8 | 25.2 | | | | | | |
| 17 | 210°14.8 | 30°32.7 | 27.2 | 123°37.4 | 34.4 | 79°28.2 | 40.6 | 195°46.3 | 25.2 | | | | | | |
| 18 | 225°17.3 | 45°32.9 | S00°28.4 | 138°38.0 | N23°34.4 | 94°30.1 | N18°40.5 | 210°48.8 | N03°25.1 | | | | | | |
| 19 | 240°19.7 | 60°33.2 | 29.6 | 153°38.7 | 34.5 | 109°32.0 | 40.4 | 225°51.3 | 25.1 | | | | | | |
| 20 | 255°22.2 | 75°33.4 | 30.9 | 168°39.3 | 34.6 | 124°33.9 | 40.2 | 240°53.8 | 25.1 | | | | | | |
| 21 | 270°24.7 | 90°33.7 | •• 32.1 | 183°39.9 | •• 34.6 | 139°35.8 | •• 40.1 | 255°56.3 | •• 25.1 | | | | | | |
| 22 | 285°27.1 | 105°33.9 | 33.3 | 198°40.6 | 34.7 | 154°37.7 | 39.9 | 270°58.8 | 25.0 | | | | | | |
| 23 | 300°29.6 | 120°34.1 | 34.5 | 213°41.2 | 34.8 | 169°39.6 | 39.8 | 286°01.3 | 25.0 | | | | | | |
| Mer.pass. 03:01 | | ν0.2' d1.2' m-4.32 | | | ν0.6' d0.1' m1.30 | | | ν1.9' d-0.1' m-1.78 | | | ν2.5' d-0.0' m0.61 | | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 315°32.1 | 135°34.4 | S00°35.7 | 228°41.9 | N23°34.9 | 184°41.5 | N18°39.7 | 301°03.8 | N03°25.0 | | | | | | |
| 1 | 330°34.5 | 150°34.6 | 37.0 | 243°42.5 | 34.9 | 199°43.4 | 39.5 | 316°06.3 | 24.9 | | | | | | |
| 2 | 345°37.0 | 165°34.9 | 38.2 | 258°43.1 | 35.0 | 214°45.3 | 39.4 | 331°08.8 | 24.9 | | | | | | |
| 3 | 0°39.5 | 180°35.1 | •• 39.4 | 273°43.8 | •• 35.1 | 229°47.2 | •• 39.2 | 346°11.3 | •• 24.9 | | | | | | |
| 4 | 15°41.9 | 195°35.4 | 40.6 | 288°44.4 | 35.1 | 244°49.1 | 39.1 | 1°13.8 | 24.9 | | | | | | |
| 5 | 30°44.4 | 210°35.6 | 41.9 | 303°45.1 | 35.2 | 259°51.0 | 39.0 | 16°16.4 | 24.8 | | | | | | |
| 6 | 45°46.8 | 225°35.9 | S00°43.1 | 318°45.7 | N23°35.3 | 274°52.9 | N18°38.8 | 31°18.9 | N03°24.8 | | | | | | |
| 7 | 60°49.3 | 240°36.1 | 44.3 | 333°46.4 | 35.3 | 289°54.8 | 38.7 | 46°21.4 | 24.8 | | | | | | |
| 8 | 75°51.8 | 255°36.4 | 45.5 | 348°47.0 | 35.4 | 304°56.7 | 38.5 | 61°23.9 | 24.7 | | | | | | |
| 9 | 90°54.2 | 270°36.6 | •• 46.7 | 3°47.6 | •• 35.5 | 319°58.6 | •• 38.4 | 76°26.4 | •• 24.7 | | | | | | |
| 10 | 105°56.7 | 285°36.9 | 48.0 | 18°48.3 | 35.6 | 335°00.5 | 38.3 | 91°28.9 | 24.7 | | | | | | |
| 11 | 120°59.2 | 300°37.1 | 49.2 | 33°48.9 | 35.6 | 350°02.4 | 38.1 | 106°31.4 | 24.7 | | | | | | |
| 12 | 136°01.6 | 315°37.4 | S00°50.4 | 48°49.6 | N23°35.7 | 5°04.3 | N18°38.0 | 121°33.9 | N03°24.6 | | | | | | |
| 13 | 151°04.1 | 330°37.6 | 51.6 | 63°50.2 | 35.8 | 20°06.2 | 37.8 | 136°36.4 | 24.6 | | | | | | |
| 14 | 166°06.6 | 345°37.9 | 52.8 | 78°50.9 | 35.8 | 35°08.1 | 37.7 | 151°38.9 | 24.6 | | | | | | |
| 15 | 181°09.0 | 0°38.1 | •• 54.1 | 93°51.5 | •• 35.9 | 50°10.0 | •• 37.6 | 166°41.4 | •• 24.5 | | | | | | |
| 16 | 196°11.5 | 15°38.4 | 55.3 | 108°52.1 | 35.9 | 65°11.9 | 37.4 | 181°43.9 | 24.5 | | | | | | |
| 17 | 211°13.9 | 30°38.7 | 56.5 | 123°52.8 | 36.0 | 80°13.8 | 37.3 | 196°46.4 | 24.5 | | | | | | |
| 18 | 226°16.4 | 45°38.9 | S00°57.7 | 138°53.4 | N23°36.1 | 95°15.7 | N18°37.1 | 211°48.9 | N03°24.4 | | | | | | |
| 19 | 241°18.9 | 60°39.2 | 00°58.9 | 153°54.1 | 36.1 | 110°17.6 | 37.0 | 226°51.4 | 24.4 | | | | | | |
| 20 | 256°21.3 | 75°39.4 | 01°00.2 | 168°54.7 | 36.2 | 125°19.6 | 36.9 | 241°53.9 | 24.4 | | | | | | |
| 21 | 271°23.8 | 90°39.7 | •• 01.4 | 183°55.4 | •• 36.3 | 140°21.5 | •• 36.7 | 256°56.4 | •• 24.4 | | | | | | |
| 22 | 286°26.3 | 105°39.9 | 02.6 | 198°56.0 | 36.3 | 155°23.4 | 36.6 | 271°58.9 | 24.3 | | | | | | |
| 23 | 301°28.7 | 120°40.2 | 03.8 | 213°56.7 | 36.4 | 170°25.3 | 36.4 | 287°01.5 | 24.3 | | | | | | |
| Mer.pass. 02:57 | | ν0.2' d1.2' m-4.33 | | | ν0.6' d0.1' m1.29 | | | ν1.9' d-0.1' m-1.78 | | | ν2.5' d-0.0' m0.60 | | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.2 | 29°14.3 |
| Ankaa | 353°05.6 | -42°09.4 |
| Schedar | 349°29.2 | 56°40.9 |
| Diphda | 348°45.8 | -17°50.2 |
| Achernar | 335°19.0 | -57°05.7 |
| Hamal | 327°49.7 | 23°35.3 |
| Polaris | 313°23.7 | 89°22.2 |
| Acamar | 315°10.8 | -40°11.5 |
| Menkar | 314°04.8 | 4°11.8 |
| Mirfak | 308°26.4 | 49°57.2 |
| Aldebaran | 290°38.3 | 16°33.8 |
| Rigel | 281°02.8 | -8°10.1 |
| Capella | 280°20.2 | 46°01.3 |
| Bellatrix | 278°21.7 | 6°22.5 |
| Elnath | 278°00.4 | 28°37.7 |
| Alnilam | 275°36.6 | -1°11.0 |
| Betelgeuse | 270°50.9 | 7°24.8 |
| Canopus | 263°52.3 | -52°42.3 |
| Sirius | 258°25.4 | -16°45.0 |
| Adhara | 255°05.2 | -29°00.3 |
| Procyon | 244°49.8 | 5°09.5 |
| Pollux | 243°16.1 | 27°57.7 |
| Avior | 234°14.9 | -59°35.6 |
| Suhail | 222°45.8 | -43°32.4 |
| Miaplacidus | 221°39.0 | -69°49.6 |
| Alphard | 217°46.8 | -8°46.4 |
| Regulus | 207°33.4 | 11°5 |

| h | | Sun | | Moon | | | |
|------------|----------|-------------|------------|-------|----------|-------|-------|
| Wed | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°28.9 | N17°01.2 | 288°42.8 | 11.2' | N15°08.9 | 13.8' | 58.0' |
| 1 | 193°29.0 | 17°00.6 | 303°13.0 | 11.1' | 15°22.7 | 13.7' | 58.0' |
| 2 | 208°29.1 | 16°59.9 | 317°43.2 | 11.0' | 15°36.4 | 13.6' | 58.1' |
| 3 | 223°29.1 | •• 59.2 | 332°13.2 | 10.9' | 15°50.0 | 13.6' | 58.1' |
| 4 | 238°29.2 | 58.5 | 346°43.1 | 10.8' | 16°03.6 | 13.5' | 58.1' |
| 5 | 253°29.2 | 57.9 | 1°13.0 | 10.7' | 16°17.1 | 13.4' | 58.1' |
| 6 | 268°29.3 | N16°57.2 | 15°42.7 | 10.6' | N16°30.5 | 13.4' | 58.2' |
| 7 | 283°29.4 | 56.5 | 30°12.3 | 10.5' | 16°43.9 | 13.3' | 58.2' |
| 8 | 298°29.4 | 55.8 | 44°41.9 | 10.4' | 16°57.2 | 13.2' | 58.2' |
| 9 | 313°29.5 | •• 55.1 | 59°11.3 | 10.3' | 17°10.4 | 13.1' | 58.2' |
| 10 | 328°29.6 | 54.5 | 73°40.6 | 10.2' | 17°23.5 | 13.0' | 58.3' |
| 11 | 343°29.6 | 53.8 | 88°09.8 | 10.1' | 17°36.5 | 13.0' | 58.3' |
| 12 | 358°29.7 | N16°53.1 | 102°38.9 | 10.0' | N17°49.5 | 12.9' | 58.3' |
| 13 | 13°29.8 | 52.4 | 117°07.9 | 9.9' | 18°02.3 | 12.8' | 58.3' |
| 14 | 28°29.8 | 51.7 | 131°36.8 | 9.8' | 18°15.1 | 12.7' | 58.4' |
| 15 | 43°29.9 | •• 51.1 | 146°05.6 | 9.7' | 18°27.8 | 12.6' | 58.4' |
| 16 | 58°30.0 | 50.4 | 160°34.2 | 9.6' | 18°40.5 | 12.5' | 58.4' |
| 17 | 73°30.0 | 49.7 | 175°02.8 | 9.4' | 18°53.0 | 12.4' | 58.4' |
| 18 | 88°30.1 | N16°49.0 | 189°31.2 | 9.3' | N19°05.4 | 12.3' | 58.5' |
| 19 | 103°30.2 | 48.3 | 203°59.6 | 9.2' | 19°17.7 | 12.2' | 58.5' |
| 20 | 118°30.2 | 47.6 | 218°27.8 | 9.1' | 19°30.0 | 12.1' | 58.5' |
| 21 | 133°30.3 | •• 47.0 | 232°55.9 | 9.0' | 19°42.1 | 12.0' | 58.5' |
| 22 | 148°30.4 | 46.3 | 247°23.8 | 8.9' | 19°54.2 | 11.9' | 58.6' |
| 23 | 163°30.4 | 45.6 | 261°51.7 | 8.7' | 20°06.1 | 11.8' | 58.6' |
| SD = 15.8' | | $d = -0.7'$ | SD = 15.8' | | | | |

| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|-------------|------------|-------|----------|-------|-------|
| 0 | 178°30.5 | N16°44.9 | 276°19.5 | 8.6' | N20°17.9 | 11.7' | 58.6' |
| 1 | 193°30.6 | 44.2 | 290°47.1 | 8.5' | 20°29.7 | 11.6' | 58.6' |
| 2 | 208°30.6 | 43.5 | 305°14.6 | 8.4' | 20°41.3 | 11.5' | 58.7' |
| 3 | 223°30.7 | •• 42.8 | 319°42.0 | 8.3' | 20°52.8 | 11.4' | 58.7' |
| 4 | 238°30.8 | 42.2 | 334°09.3 | 8.2' | 21°04.2 | 11.3' | 58.7' |
| 5 | 253°30.8 | 41.5 | 348°36.4 | 8.0' | 21°15.5 | 11.2' | 58.7' |
| 6 | 268°30.9 | N16°40.8 | 3°03.5 | 7.9' | N21°26.7 | 11.1' | 58.8' |
| 7 | 283°31.0 | 40.1 | 17°30.4 | 7.8' | 21°37.8 | 11.0' | 58.8' |
| 8 | 298°31.0 | 39.4 | 31°57.2 | 7.7' | 21°48.7 | 10.8' | 58.8' |
| 9 | 313°31.1 | •• 38.7 | 46°23.9 | 7.6' | 21°59.6 | 10.7' | 58.8' |
| 10 | 328°31.2 | 38.0 | 60°50.4 | 7.4' | 22°10.3 | 10.6' | 58.8' |
| 11 | 343°31.3 | 37.3 | 75°16.9 | 7.3' | 22°20.9 | 10.5' | 58.9' |
| 12 | 358°31.3 | N16°36.6 | 89°43.2 | 7.2' | N22°31.3 | 10.3' | 58.9' |
| 13 | 13°31.4 | 36.0 | 104°09.4 | 7.1' | 22°41.7 | 10.2' | 58.9' |
| 14 | 28°31.5 | 35.3 | 118°35.5 | 7.0' | 22°51.9 | 10.1' | 58.9' |
| 15 | 43°31.5 | •• 34.6 | 133°01.4 | 6.8' | 23°02.0 | 9.9' | 59.0' |
| 16 | 58°31.6 | 33.9 | 147°27.3 | 6.7' | 23°11.9 | 9.8' | 59.0' |
| 17 | 73°31.7 | 33.2 | 161°53.0 | 6.6' | 23°21.7 | 9.7' | 59.0' |
| 18 | 88°31.8 | N16°32.5 | 176°18.6 | 6.5' | N23°31.4 | 9.5' | 59.0' |
| 19 | 103°31.8 | 31.8 | 190°44.1 | 6.4' | 23°40.9 | 9.4' | 59.1' |
| 20 | 118°31.9 | 31.1 | 205°09.4 | 6.2' | 23°50.4 | 9.3' | 59.1' |
| 21 | 133°32.0 | •• 30.4 | 219°34.7 | 6.1' | 23°59.6 | 9.1' | 59.1' |
| 22 | 148°32.1 | 29.7 | 233°59.8 | 6.0' | 24°08.7 | 9.0' | 59.1' |
| 23 | 163°32.1 | 29.0 | 248°24.8 | 5.9' | 24°17.7 | 8.8' | 59.2' |
| SD = 15.8' | | $d = -0.7'$ | SD = 16.0' | | | | |

| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|-------------|------------|-------|----------|------|-------|
| 0 | 178°32.2 | N16°28.3 | 262°49.7 | 5.8' | N24°26.5 | 8.7' | 59.2' |
| 1 | 193°32.3 | 27.6 | 277°14.5 | 5.7' | 24°35.2 | 8.5' | 59.2' |
| 2 | 208°32.3 | 26.9 | 291°39.1 | 5.5' | 24°43.7 | 8.4' | 59.2' |
| 3 | 223°32.4 | •• 26.2 | 306°03.6 | 5.4' | 24°52.1 | 8.2' | 59.2' |
| 4 | 238°32.5 | 25.5 | 320°28.1 | 5.3' | 25°00.3 | 8.1' | 59.3' |
| 5 | 253°32.6 | 24.8 | 334°52.4 | 5.2' | 25°08.4 | 7.9' | 59.3' |
| 6 | 268°32.6 | N16°24.1 | 349°16.6 | 5.1' | N25°16.3 | 7.8' | 59.3' |
| 7 | 283°32.7 | 23.4 | 3°40.6 | 5.0' | 25°24.1 | 7.6' | 59.3' |
| 8 | 298°32.8 | 22.7 | 18°04.6 | 4.9' | 25°31.7 | 7.4' | 59.4' |
| 9 | 313°32.9 | •• 22.0 | 32°28.5 | 4.8' | 25°39.1 | 7.3' | 59.4' |
| 10 | 328°33.0 | 21.3 | 46°52.2 | 4.6' | 25°46.3 | 7.1' | 59.4' |
| 11 | 343°33.0 | 20.6 | 61°15.9 | 4.5' | 25°53.4 | 6.9' | 59.4' |
| 12 | 358°33.1 | N16°19.9 | 75°39.4 | 4.4' | N26°00.4 | 6.8' | 59.4' |
| 13 | 13°33.2 | 19.2 | 90°02.9 | 4.3' | 26°07.1 | 6.6' | 59.5' |
| 14 | 28°33.3 | 18.5 | 104°26.2 | 4.2' | 26°13.7 | 6.4' | 59.5' |
| 15 | 43°33.3 | •• 17.8 | 118°49.4 | 4.1' | 26°20.1 | 6.2' | 59.5' |
| 16 | 58°33.4 | 17.1 | 133°12.5 | 4.0' | 26°26.4 | 6.1' | 59.5' |
| 17 | 73°33.5 | 16.4 | 147°35.6 | 3.9' | 26°32.5 | 5.9' | 59.5' |
| 18 | 88°33.6 | N16°15.7 | 161°58.5 | 3.8' | N26°38.4 | 5.7' | 59.6' |
| 19 | 103°33.6 | 15.0 | 176°21.3 | 3.7' | 26°44.1 | 5.5' | 59.6' |
| 20 | 118°33.7 | 14.3 | 190°44.1 | 3.7' | 26°49.6 | 5.4' | 59.6' |
| 21 | 133°33.8 | •• 13.6 | 205°06.7 | 3.6' | 26°55.0 | 5.2' | 59.6' |
| 22 | 148°33.9 | 12.9 | 219°29.3 | 3.5' | 27°00.1 | 5.0' | 59.6' |
| 23 | 163°34.0 | 12.2 | 233°51.8 | 3.4' | 27°05.1 | 4.8' | 59.7' |
| SD = 15.8' | | $d = -0.7'$ | SD = 16.1' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | //// | 00:58 | 23:01 | //// | //// |
| N 70° | //// | //// | 02:04 | 22:02 | //// | //// |
| 68° | //// | //// | 02:40 | 21:29 | //// | //// |
| 66° | //// | 01:23 | 03:04 | 21:04 | 22:41 | //// |
| 64° | //// | 02:06 | 03:24 | 20:46 | 22:01 | //// |
| 62° | //// | 02:34 | 03:39 | 20:30 | 21:34 | //// |
| 60° | 01:15 | 02:56 | 03:52 | 20:18 | 21:14 | 22:50 |
| N 58° | 01:54 | 03:13 | 04:04 | 20:07 | 20:57 | 22:14 |
| 56° | 02:20 | 03:27 | 04:13 | 19:57 | 20:43 | 21:49 |
| 54° | 02:40 | 03:39 | 04:22 | 19:49 | 20:31 | 21:30 |
| 52° | 02:56 | 03:49 | 04:29 | 19:41 | 20:21 | 21:14 |
| 50° | 03:10 | 03:59 | 04:36 | 19:34 | 20:12 | 21:01 |
| 45° | 03:36 | 04:18 | 04:51 | 19:20 | 19:53 | 20:34 |
| N 40° | 03:57 | 04:33 | 05:03 | 19:08 | 19:38 | 20:14 |
| 35° | 04:13 | 04:46 | 05:13 | 18:58 | 19:26 | 19:59 |
| 30° | 04:26 | 04:56 | 05:22 | 18:49 | 19:15 | 19:46 |
| 20° | 04:46 | 05:14 | 05:37 | 18:34 | 18:58 | 19:25 |
| N 10° | 05:03 | 05:28 | 05:50 | 18:21 | 18:43 | 19:09 |
| 0° | 05:16 | 05:41 | 06:02 | 18:09 | 18:31 | 18:56 |
| S 10° | 05:27 | 05:53 | 06:15 | 17:57 | 18:19 | 18:45 |
| 20° | 05:38 | 06:04 | 06:27 | 17:45 | 18:08 | 18:34 |
| 30° | 05:48 | 06:17 | 06:42 | 17:30 | 17:55 | 18:24 |
| 35° | 05:53 | 06:24 | 06:50 | 17:22 | 17:49 | 18:19 |
| 40° | 05:59 | 06:31 | 06:59 | 17:13 | 17:41 | 18:14 |
| 45° | 06:04 | 06:39 | 07:10 | 17:02 | 17:33 | 18:08 |
| S 50° | 06:10 | 06:49 | 07:24 | 16:49 | 17:23 | 18:02 |
| 52° | 06:13 | 06:54 | 07:30 | 16:42 | 17:19 | 17:59 |
| 54° | 06:16 | 06:58 | 07:37 | 16:36 | 17:14 | 17:57 |
| 56° | 06:19 | 07:04 | 07:44 | 16:28 | 17:09 | 17:54 |
| 58° | 06:22 | 07:09 | 07:53 | 16:20 | 17:03 | 17:51 |
| S 60° | 06:25 | 07:16 | 08:03 | 16:10 | 16:57 | 17:47 |

| Lat. | Moonrise | | | Moonset | | |
|-------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| N 70° | 18:36 | <input type="checkbox"/> | <input type="checkbox"/> | 15:44 | <input type="checkbox"/> | <input type="checkbox"/> |
| 68° | 19:26 | <input type="checkbox"/> | <input type="checkbox"/> | 14:55 | <input type="checkbox"/> | <input type="checkbox"/> |
| 66° | 19:58 | 19:05 | <input type="checkbox"/> | 14:25 | 17:12 | <input type="checkbox"/> |
| 64° | 20:22 | 20:03 | <input type="checkbox"/> | 14:02 | 16:14 | <input type="checkbox"/> |
| 62° | 20:41 | 20:37 | 20:34 | 13:44 | 15:41 | 17:49 |
| 60° | 20:56 | 21:02 | 21:16 | 13:29 | 15:17 | 17:07 |
| N 58° | 21:10 | 21:22 | 21:45 | 13:17 | 14:58 | 16:38 |
| 56° | 21:21 | 21:39 | 22:08 | 13:06 | 14:42 | 16:16 |
| 54° | 21:32 | 21:53 | 22:26 | 12:57 | 14:28 | 15:58 |
| 52° | 21:41 | 22:05 | 22:42 | 12:48 | 14:16 | 15:43 |
| 50° | 21:49 | 22:16 | 22:56 | 12:41 | 14:05 | 15:30 |
| 45° | 22:07 | 22:40 | 23:23 | 12:25 | 13:44 | 15:02 |
| N 40° | 22:21 | 22:58 | 23:46 | 12:12 | 13:26 | 14:41 |
| 35° | 22:33 | 23:14 | •• •• | 12:01 | 13:11 | 14:23 |
| 30° | 22:44 | 23:28 | •• •• | 11:51 | 12:58 | 14:08 |
| 20° | 23:03 | 23:51 | •• •• | 11:35 | 12:37 | 13:42 |
| N 10° | 23:19 | •• •• | 00:11 | 11:20 | 12:18 | 13:20 |
| 0° | 23:34 | •• •• | 00:31 | 11:07 | 12:00 | 12:59 |
| S 10° | 23:50 | •• •• | 00:50 | 10:54 | 11:43 | 12:38 |
| 20° | •• •• | 00:07 | 01:11 | 10:40 | 11:25 | 12:16 |
| 30° | •• •• | 00:26 | 01:35 | 10:24 | 11:03 | 11:51 |
| 35° | •• •• | 00:37 | 01:49 | 10:14 | 10:51 | 11:36 |
| 40° | •• •• | 00:50 | 02:06 | 10:04 | 10:37 | 11:18 |
| 45° | •• •• | 01:06 | 02:25 | 09:51 | 10:20 | 10:58 |
| S 50° | 00:01 | 01:25 | 02:51 | 09:36 | 09:59 | 10:32 |
| 52° | 00:08 | 01:34 | 03:03 | 09:29 | 09:50 | 10:19 |
| 54° | 00:15 | 01:45 | 03:17 | 09:22 | 09:39 | 10:04 |
| 56° | 00:22 | 01:56 | 03:33 | 09:13 | 09:26 | 09:48 |
| 58° | 00:31 | 02:10 | 03:53 | 09:03 | 09:12 | 09:28 |
| S 60° | 00:41 | 02:26 | 04:17 | 08:52 | 08:55 | 09:03 |

| Day | Sun | | | Moon | | |
|-----|-------------------------------------|----------------------------------|-----------------------|------------------------------|----------------|------------------------|
| | Eqn. of 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer. Pass. Upper hh:mm | Lower hh:mm | Age 22-24 62-40% |
| 05 | 06:04 | 06:01 | 12:06 | 04:55 | 17:21 | |
| 06 | 05:58 | 05:55 | 12:06 | 05:47 | 18:15 | |
| 07 | 05:51 | 05:48 | 12:06 | 06:45 | 19:15 | |

August 08, 09, 10 UT (Sat., Sun., Mon.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|--------------------|----------|----------|-------------------|----------|----------|---------------------|---------|-----|--------------------|--------|-------------|-------------------|-------|--|--|
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | |
| 0 | 316°31.2 | 135°40.5 | S01°05.1 | 228°57.3 | N23°36.5 | 185°27.2 | N18°36.3 | 302°04.0 | N03°24.3 | | | | | Alpheratz | 357°33.1 29°14.3 | | | |
| 1 | 331°33.7 | 150°40.7 | 06.3 | 243°57.9 | 36.5 | 200°29.1 | 36.2 | 317°06.5 | 24.2 | | | | | Ankaa | 353°05.6 -42°09.4 | | | |
| 2 | 346°36.1 | 165°41.0 | 07.5 | 258°58.6 | 36.6 | 215°31.0 | 36.0 | 332°09.0 | 24.2 | | | | | Schedar | 349°29.2 56°40.9 | | | |
| 3 | 1°38.6 | 180°41.2 | · · 08.7 | 273°59.2 | · · 36.6 | 230°32.9 | · · 35.9 | 347°11.5 | · · 24.2 | | | | | Diphda | 348°45.8 -17°50.2 | | | |
| 4 | 16°41.1 | 195°41.5 | 09.9 | 288°59.9 | 36.7 | 245°34.8 | 35.7 | 2°14.0 | 24.1 | | | | | Achernar | 335°19.0 -57°05.7 | | | |
| 5 | 31°43.5 | 210°41.8 | 11.2 | 304°00.5 | 36.8 | 260°36.7 | 35.6 | 17°16.5 | 24.1 | | | | | Hamal | 327°49.6 23°35.3 | | | |
| 6 | 46°46.0 | 225°42.0 | S01°12.4 | 319°01.2 | N23°36.8 | 275°38.6 | N18°35.5 | 32°19.0 | N03°24.1 | | | | | Polaris | 313°21.8 89°22.2 | | | |
| 7 | 61°48.4 | 240°42.3 | 13.6 | 334°01.8 | 36.9 | 290°40.5 | 35.3 | 47°21.5 | 24.1 | | | | | Acamar | 315°10.8 -40°11.5 | | | |
| 8 | 76°50.9 | 255°42.5 | 14.8 | 349°02.5 | 37.0 | 305°42.4 | 35.2 | 62°24.0 | 24.0 | | | | | Menkar | 314°04.8 4°11.8 | | | |
| 9 | 91°53.4 | 270°42.8 | · · 16.0 | 4°03.1 | · · 37.0 | 320°44.3 | · · 35.0 | 77°26.5 | · · 24.0 | | | | | Mirfak | 308°26.4 49°57.2 | | | |
| 10 | 106°55.8 | 285°43.1 | 17.3 | 19°03.8 | 37.1 | 335°46.2 | 34.9 | 92°29.0 | 24.0 | | | | | Aldebaran | 290°38.2 16°33.8 | | | |
| 11 | 121°58.3 | 300°43.3 | 18.5 | 34°04.4 | 37.1 | 350°48.1 | 34.8 | 107°31.6 | 23.9 | | | | | Rigel | 281°02.8 -8°10.1 | | | |
| 12 | 137°00.8 | 315°43.6 | S01°19.7 | 49°05.0 | N23°37.2 | 5°50.0 | N18°34.6 | 122°34.1 | N03°23.9 | | | | | Capella | 280°20.2 46°01.3 | | | |
| 13 | 152°03.2 | 330°43.9 | 20.9 | 64°05.7 | 37.2 | 20°51.9 | 34.5 | 137°36.6 | 23.9 | | | | | Bellatrix | 278°21.7 6°22.5 | | | |
| 14 | 167°05.7 | 345°44.1 | 22.1 | 79°06.3 | 37.3 | 35°53.8 | 34.3 | 152°39.1 | 23.8 | | | | | Elnath | 278°00.4 28°37.7 | | | |
| 15 | 182°08.2 | 0°44.4 | · · 23.3 | 94°07.0 | · · 37.4 | 50°55.7 | · · 34.2 | 167°41.6 | · · 23.8 | | | | | Alnilam | 275°36.6 -1°11.0 | | | |
| 16 | 197°10.6 | 15°44.7 | 24.6 | 109°07.6 | 37.4 | 65°57.6 | 34.1 | 182°44.1 | 23.8 | | | | | Betelgeuse | 270°50.9 7°24.8 | | | |
| 17 | 212°13.1 | 30°44.9 | 25.8 | 124°08.3 | 37.5 | 80°59.5 | 33.9 | 197°46.6 | 23.7 | | | | | Canopus | 263°52.2 -52°42.3 | | | |
| 18 | 227°15.6 | 45°45.2 | S01°27.0 | 139°08.9 | N23°37.5 | 96°01.4 | N18°33.8 | 212°49.1 | N03°23.7 | | | | | Sirius | 258°25.4 -16°45.0 | | | |
| 19 | 242°18.0 | 60°45.5 | 28.2 | 154°09.6 | 37.6 | 111°03.3 | 33.6 | 227°51.6 | 23.7 | | | | | Adhara | 255°05.1 -29°00.3 | | | |
| 20 | 257°20.5 | 75°45.8 | 29.4 | 169°10.2 | 37.6 | 126°05.2 | 33.5 | 242°54.1 | 23.7 | | | | | Procyon | 244°49.8 5°09.5 | | | |
| 21 | 272°22.9 | 90°46.0 | · · 30.7 | 184°10.9 | · · 37.7 | 141°07.1 | · · 33.3 | 257°56.7 | · · 23.6 | | | | | Pollux | 243°16.0 27°57.7 | | | |
| 22 | 287°25.4 | 105°46.3 | 31.9 | 199°11.5 | 37.8 | 156°09.0 | 33.2 | 272°59.2 | 23.6 | | | | | Avior | 234°14.8 -59°35.6 | | | |
| 23 | 302°27.9 | 120°46.6 | 33.1 | 214°12.2 | 37.8 | 171°10.9 | 33.1 | 288°01.7 | 23.6 | | | | | Suhail | 222°45.8 -43°32.4 | | | |
| Mer.pass. 02:53 | | | ν0.3' d1.2' m-4.34 | | | ν0.6' d0.1' m1.29 | | | ν1.9' d-0.1' m-1.78 | | | ν2.5' d-0.0' m0.60 | | | | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 317°30.3 | 135°46.8 | S01°34.3 | 229°12.8 | N23°37.9 | 186°12.8 | N18°32.9 | 303°04.2 | N03°23.5 | | | | | Miaplacidus | 221°39.0 -69°49.6 | | | |
| 1 | 332°32.8 | 150°47.1 | 35.5 | 244°13.5 | 37.9 | 201°14.7 | 32.8 | 318°06.7 | 23.5 | | | | | Alphard | 217°46.8 -8°46.4 | | | |
| 2 | 347°35.3 | 165°47.4 | 36.7 | 259°14.1 | 38.0 | 216°16.6 | 32.6 | 333°09.2 | 23.5 | | | | | Regulus | 207°33.4 11°50.3 | | | |
| 3 | 2°37.7 | 180°47.7 | · · 38.0 | 274°14.7 | · · 38.0 | 231°18.5 | · · 32.5 | 348°11.7 | · · 23.4 | | | | | Dubhe | 193°40.0 61°36.6 | | | |
| 4 | 17°40.2 | 195°47.9 | 39.2 | 289°15.4 | 38.1 | 246°20.4 | 32.4 | 3°14.2 | 23.4 | | | | | Denebola | 182°23.8 14°25.5 | | | |
| 5 | 32°42.7 | 210°48.2 | 40.4 | 304°16.0 | 38.1 | 261°22.3 | 32.2 | 18°16.7 | 23.4 | | | | | Gienah | 175°42.4 -17°41.4 | | | |
| 6 | 47°45.1 | 225°48.5 | S01°41.6 | 319°16.7 | N23°38.2 | 276°24.2 | N18°32.1 | 33°19.3 | N03°23.3 | | | | | Acrux | 172°59.1 -63°15.0 | | | |
| 7 | 62°47.6 | 240°48.8 | 42.8 | 334°17.3 | 38.2 | 291°26.1 | 31.9 | 48°21.8 | 23.3 | | | | | Gacrux | 171°50.5 -57°16.0 | | | |
| 8 | 77°50.1 | 255°49.0 | 44.1 | 349°18.0 | 38.3 | 306°28.0 | 31.8 | 63°24.3 | 23.3 | | | | | Alioth | 166°12.1 55°49.1 | | | |
| 9 | 92°52.5 | 270°49.3 | · · 45.3 | 4°18.6 | · · 38.3 | 321°29.9 | · · 31.7 | 78°26.8 | · · 23.2 | | | | | Spica | 158°21.0 -11°18.0 | | | |
| 10 | 107°55.0 | 285°49.6 | 46.5 | 19°19.3 | 38.4 | 336°31.8 | 31.5 | 93°29.3 | 23.2 | | | | | Alkaid | 152°51.1 49°11.1 | | | |
| 11 | 122°57.4 | 300°49.9 | 47.7 | 34°19.9 | 38.4 | 351°33.7 | 31.4 | 108°31.8 | 23.2 | | | | | Hadar | 148°34.3 -60°30.3 | | | |
| 12 | 137°59.9 | 315°50.2 | S01°48.9 | 49°20.6 | N23°38.5 | 6°35.6 | N18°31.2 | 123°34.3 | N03°23.1 | | | | | Menkent | 147°56.1 -36°30.2 | | | |
| 13 | 153°02.4 | 330°50.4 | 50.1 | 64°21.2 | 38.5 | 21°37.5 | 31.1 | 138°36.8 | 23.1 | | | | | Arcturus | 145°46.8 19°02.8 | | | |
| 14 | 168°04.8 | 345°50.7 | 51.4 | 79°21.9 | 38.6 | 36°39.4 | 31.0 | 153°39.4 | 23.1 | | | | | Rigel Kent. | 139°38.5 -60°57.0 | | | |
| 15 | 183°07.3 | 0°51.0 | · · 52.6 | 94°22.5 | · · 38.6 | 51°41.3 | · · 30.8 | 168°41.9 | · · 23.0 | | | | | Kochab | 137°19.9 74°03.0 | | | |
| 16 | 198°09.8 | 15°51.3 | 53.8 | 109°23.2 | 38.7 | 66°43.2 | 30.7 | 183°44.4 | 23.0 | | | | | Zuben'ubi | 136°54.6 -16°09.2 | | | |
| 17 | 213°12.2 | 30°51.6 | 55.0 | 124°23.8 | 38.7 | 81°45.1 | 30.5 | 198°46.9 | 23.0 | | | | | Alphecca | 126°02.6 26°37.7 | | | |
| 18 | 228°14.7 | 45°51.9 | S01°56.2 | 139°24.5 | N23°38.8 | 96°47.0 | N18°30.4 | 213°49.4 | N03°23.0 | | | | | Antares | 112°14.1 -26°29.5 | | | |
| 19 | 243°17.2 | 60°52.1 | 57.4 | 154°25.1 | 38.8 | 111°49.0 | 30.2 | 228°51.9 | 22.9 | | | | | Atria | 107°06.8 -69°04.7 | | | |
| 20 | 258°19.6 | 75°52.4 | 58.7 | 169°25.8 | 38.9 | 126°50.9 | 30.1 | 243°54.4 | 22.9 | | | | | Sabik | 102°01.1 -15°45.5 | | | |
| 21 | 273°22.1 | 90°52.7 | 01°59.9 | 184°26.4 | · · 38.9 | 141°52.8 | · · 30.0 | 258°57.0 | · · 22.9 | | | | | Shaula | 96°08.3 -37°07.4 | | | |
| 22 | 288°24.6 | 105°53.0 | 02°01.1 | 199°27.1 | 39.0 | 156°54.7 | 29.8 | 273°59.5 | 22.8 | | | | | Rasalhague | 95°57.1 12°32.6 | | | |
| 23 | 303°27.0 | 120°53.3 | 02.3 | 214°27.7 | 39.0 | 171°56.6 | 29.7 | 289°02.0 | 22.8 | | | | | Eltanin | 90°41.2 51°29.3 | | | |
| Mer.pass. 02:50 | | | ν0.3' d1.2' m-4.35 | | | ν0.6' d0.1' m1.29 | | | ν1.9' d-0.1' m-1.78 | | | ν2.5' d-0.0' m0.59 | | | | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 318°29.5 | 135°53.6 | S02°03.5 | 229°28.4 | N23°39.1 | 186°58.5 | N18°29.5 | 304°04.5 | N03°22.8 | | | | | Aug 08 Sat | SHA Mer.pass | | | |
| 1 | 333°31.9 | 150°53.8 | 04.7 | 244°29.0 | 39.1 | 202°00.4 | 29.4 | 319°07.0 | 22.7 | | | | | Venus | 179°09.3 14:57 | | | |
| 2 | 348°34.4 | 165°54.1 | 05.9 | 259°29.7 | 39.2 | 217°02.3 | 29.3 | 334°09.5 | 22.7 | | | | | Mars | 272°26.1 08:44 | | | |
| 3 | 3°36.9 | 180°54.4 | · · 07.2 | 274°30.3 | · · 39.2 | 232°04.2 | · · 29.1 | 349°12.1 | · · 22.7 | | | | | Jupiter | 228°56.0 11:37 | | | |
| 4 | 18°39.3 | 195°54.7 | 08.4 | 289°31.0 | 39.3 | 247°06.1 | 29.0 | 4°14.6 | 22.6 | | | | | Saturn | 345°32.8 03:51 | | | |
| 5 | 33°41.8 | 210°55.0 | 09.6 | 304°31.6 | 39.3 | 262°08.0 | 28.8 | 19°17.1 | 22.6 | | | | | | | | | |
| 6 | 48°44.3 | 225°55.3 | S02°10.8 | 319°32.3 | N23°39.3 | 277°09.9 | N18°28.7 | 34°19.6 | N03°22.6 | | | | | | | | | |
| 7 | 63°46.7 | 240°55.6 | 12.0 | 334°32.9 | 39.4 | 292°11.8 | 28.5 | 49°22.1 | 22.5 | | | | | | | | | |
| 8 | 78°49.2 | 255°55.9 | 13.2 | 349°33.6 | 39.4 | 307°13.7 | 28.4 | 64°24.6 | 22.5 | | | | | | | | | |
| 9 | 93°51.7 | 270°56.2 | · · 14.5 | 4°34.2 | · · 39.5 | 322°15.6 | · · 28.3 | 79°27.1 | · · 22.5 | | | | | | | | | |
| 10 | 108°54.1 | 285°56.5 | 15.7 | 19°34.9 | 39.5 | 337°17.5 | 28.1 | 94°29.7 | 22.4 | | | | | | | | | |
| 11 | 123°5 | | | | | | | | | | | | | | | | | |

| h | Sun | | | | Moon | | | |
|------------------------|----------|----------|----------|------------|----------|-------|-------|--|
| Sat | GHA | Dec | GHA | ν | Dec | d | HP | |
| 0 | 178°34.0 | N16°11.5 | 248°14.2 | 3.3' | N27°09.9 | 4.6' | 59.7' | |
| 1 | 193°34.1 | 10.8 | 262°36.5 | 3.2' | 27°14.5 | 4.4' | 59.7' | |
| 2 | 208°34.2 | 10.0 | 276°58.7 | 3.1' | 27°18.9 | 4.2' | 59.7' | |
| 3 | 223°34.3 | · · 09.3 | 291°20.8 | 3.1' | 27°23.2 | 4.0' | 59.7' | |
| 4 | 238°34.4 | 08.6 | 305°42.9 | 3.0' | 27°27.2 | 3.9' | 59.7' | |
| 5 | 253°34.4 | 07.9 | 320°04.9 | 2.9' | 27°31.1 | 3.7' | 59.8' | |
| 6 | 268°34.5 | N16°07.2 | 334°26.8 | 2.8' | N27°34.7 | 3.5' | 59.8' | |
| 7 | 283°34.6 | 06.5 | 348°48.7 | 2.8' | 27°38.2 | 3.3' | 59.8' | |
| 8 | 298°34.7 | 05.8 | 3°10.5 | 2.7' | 27°41.5 | 3.1' | 59.8' | |
| 9 | 313°34.8 | · · 05.1 | 17°32.2 | 2.7' | 27°44.5 | 2.9' | 59.8' | |
| 10 | 328°34.9 | 04.4 | 31°53.8 | 2.6' | 27°47.4 | 2.7' | 59.8' | |
| 11 | 343°34.9 | 03.6 | 46°15.4 | 2.5' | 27°50.1 | 2.5' | 59.9' | |
| 12 | 358°35.0 | N16°02.9 | 60°37.0 | 2.5' | N27°52.6 | 2.3' | 59.9' | |
| 13 | 13°35.1 | 02.2 | 74°58.4 | 2.4' | 27°54.8 | 2.1' | 59.9' | |
| 14 | 28°35.2 | 01.5 | 89°19.9 | 2.4' | 27°56.9 | 1.9' | 59.9' | |
| 15 | 43°35.3 | · · 00.8 | 103°41.3 | 2.3' | 27°58.8 | 1.7' | 59.9' | |
| 16 | 58°35.4 | 16°00.1 | 118°02.6 | 2.3' | 28°00.5 | 1.5' | 59.9' | |
| 17 | 73°35.4 | 15°59.4 | 132°23.9 | 2.3' | 28°01.9 | 1.3' | 60.0' | |
| 18 | 88°35.5 | N15°58.6 | 146°45.1 | 2.2' | N28°03.2 | 1.1' | 60.0' | |
| 19 | 103°35.6 | 57.9 | 161°06.4 | 2.2' | 28°04.3 | 0.9' | 60.0' | |
| 20 | 118°35.7 | 57.2 | 175°27.5 | 2.2' | 28°05.1 | 0.6' | 60.0' | |
| 21 | 133°35.8 | · · 56.5 | 189°48.7 | 2.1' | 28°05.8 | 0.4' | 60.0' | |
| 22 | 148°35.9 | 55.8 | 204°09.8 | 2.1' | 28°06.2 | 0.2' | 60.0' | |
| 23 | 163°35.9 | 55.1 | 218°30.9 | 2.1' | 28°06.4 | 0.0' | 60.0' | |
| SD = 15.8' $d = -0.7'$ | | | | SD = 16.3' | | | | |
| Sun | GHA | Dec | GHA | ν | Dec | d | HP | |
| 0 | 178°36.0 | N15°54.3 | 232°52.0 | 2.1' | N28°06.5 | -0.2' | 60.1' | |
| 1 | 193°36.1 | 53.6 | 247°13.0 | 2.0' | 28°06.3 | -0.4' | 60.1' | |
| 2 | 208°36.2 | 52.9 | 261°34.1 | 2.0' | 28°05.9 | -0.6' | 60.1' | |
| 3 | 223°36.3 | · · 52.2 | 275°55.1 | 2.0' | 28°05.3 | -0.8' | 60.1' | |
| 4 | 238°36.4 | 51.5 | 290°16.1 | 2.0' | 28°04.5 | -1.0' | 60.1' | |
| 5 | 253°36.5 | 50.7 | 304°37.1 | 2.0' | 28°03.5 | -1.2' | 60.1' | |
| 6 | 268°36.6 | N15°50.0 | 318°58.1 | 2.0' | N28°02.3 | -1.4' | 60.1' | |
| 7 | 283°36.6 | 49.3 | 333°19.1 | 2.0' | 28°00.9 | -1.6' | 60.1' | |
| 8 | 298°36.7 | 48.6 | 347°40.2 | 2.0' | 27°59.2 | -1.8' | 60.1' | |
| 9 | 313°36.8 | · · 47.9 | 2°01.2 | 2.0' | 27°57.4 | -2.0' | 60.2' | |
| 10 | 328°36.9 | 47.1 | 16°22.2 | 2.0' | 27°55.3 | -2.3' | 60.2' | |
| 11 | 343°37.0 | 46.4 | 30°43.2 | 2.0' | 27°53.1 | -2.5' | 60.2' | |
| 12 | 358°37.1 | N15°45.7 | 45°04.3 | 2.1' | N27°50.6 | -2.7' | 60.2' | |
| 13 | 13°37.2 | 45.0 | 59°25.3 | 2.1' | 27°47.9 | -2.9' | 60.2' | |
| 14 | 28°37.3 | 44.2 | 73°46.4 | 2.1' | 27°45.1 | -3.1' | 60.2' | |
| 15 | 43°37.4 | · · 43.5 | 88°07.5 | 2.1' | 27°42.0 | -3.3' | 60.2' | |
| 16 | 58°37.4 | 42.8 | 102°28.7 | 2.2' | 27°38.7 | -3.5' | 60.2' | |
| 17 | 73°37.5 | 42.1 | 116°49.8 | 2.2' | 27°35.2 | -3.7' | 60.2' | |
| 18 | 88°37.6 | N15°41.3 | 131°11.0 | 2.2' | N27°31.5 | -3.9' | 60.2' | |
| 19 | 103°37.7 | 40.6 | 145°32.3 | 2.3' | 27°27.6 | -4.1' | 60.2' | |
| 20 | 118°37.8 | 39.9 | 159°53.5 | 2.3' | 27°23.5 | -4.3' | 60.2' | |
| 21 | 133°37.9 | · · 39.1 | 174°14.9 | 2.4' | 27°19.2 | -4.5' | 60.2' | |
| 22 | 148°38.0 | 38.4 | 188°36.2 | 2.4' | 27°14.7 | -4.7' | 60.3' | |
| 23 | 163°38.1 | 37.7 | 202°57.6 | 2.5' | 27°09.9 | -4.9' | 60.3' | |
| SD = 15.8' $d = -0.7'$ | | | | SD = 16.4' | | | | |
| Mon | GHA | Dec | GHA | ν | Dec | d | HP | |
| 0 | 178°38.2 | N15°37.0 | 217°19.1 | 2.5' | N27°05.0 | -5.1' | 60.3' | |
| 1 | 193°38.3 | 36.2 | 231°40.6 | 2.6' | 26°59.9 | -5.3' | 60.3' | |
| 2 | 208°38.4 | 35.5 | 246°02.2 | 2.6' | 26°54.6 | -5.5' | 60.3' | |
| 3 | 223°38.4 | · · 34.8 | 260°23.8 | 2.7' | 26°49.1 | -5.7' | 60.3' | |
| 4 | 238°38.5 | 34.0 | 274°45.5 | 2.7' | 26°43.4 | -5.9' | 60.3' | |
| 5 | 253°38.6 | 33.3 | 289°07.2 | 2.8' | 26°37.5 | -6.1' | 60.3' | |
| 6 | 268°38.7 | N15°32.6 | 303°29.0 | 2.9' | N26°31.4 | -6.3' | 60.3' | |
| 7 | 283°38.8 | 31.8 | 317°50.9 | 2.9' | 26°25.1 | -6.5' | 60.3' | |
| 8 | 298°38.9 | 31.1 | 332°12.8 | 3.0' | 26°18.6 | -6.7' | 60.3' | |
| 9 | 313°39.0 | · · 30.4 | 346°34.9 | 3.1' | 26°12.0 | -6.9' | 60.3' | |
| 10 | 328°39.1 | 29.6 | 0°56.9 | 3.2' | 26°05.1 | -7.0' | 60.3' | |
| 11 | 343°39.2 | 28.9 | 15°19.1 | 3.2' | 25°58.1 | -7.2' | 60.3' | |
| 12 | 358°39.3 | N15°28.2 | 29°41.4 | 3.3' | N25°50.8 | -7.4' | 60.3' | |
| 13 | 13°39.4 | 27.4 | 44°03.7 | 3.4' | 25°43.4 | -7.6' | 60.3' | |
| 14 | 28°39.5 | 26.7 | 58°26.1 | 3.5' | 25°35.8 | -7.8' | 60.3' | |
| 15 | 43°39.6 | · · 26.0 | 72°48.6 | 3.6' | 25°28.1 | -8.0' | 60.3' | |
| 16 | 58°39.7 | 25.2 | 87°11.2 | 3.7' | 25°20.1 | -8.1' | 60.3' | |
| 17 | 73°39.8 | 24.5 | 101°33.9 | 3.8' | 25°12.0 | -8.3' | 60.3' | |
| 18 | 88°39.9 | N15°23.8 | 115°56.6 | 3.9' | N25°03.6 | -8.5' | 60.3' | |
| 19 | 103°40.0 | 23.0 | 130°19.5 | 3.9' | 24°55.2 | -8.7' | 60.3' | |
| 20 | 118°40.0 | 22.3 | 144°42.4 | 4.0' | 24°46.5 | -8.8' | 60.3' | |
| 21 | 133°40.1 | · · 21.6 | 159°05.5 | 4.1' | 24°37.7 | -9.0' | 60.3' | |
| 22 | 148°40.2 | 20.8 | 173°28.6 | 4.2' | 24°28.6 | -9.2' | 60.3' | |
| 23 | 163°40.3 | 20.1 | 187°51.8 | 4.3' | 24°19.5 | -9.3' | 60.3' | |
| SD = 15.8' $d = -0.7'$ | | | | SD = 16.4' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | //// | 01:35 | 22:28 | //// | //// |
| N 70° | //// | //// | 02:23 | 21:43 | //// | //// |
| 68° | //// | 00:28 | 02:53 | 21:14 | 23:22 | //// |
| 66° | //// | 01:46 | 03:16 | 20:53 | 22:20 | //// |
| 64° | //// | 02:21 | 03:33 | 20:36 | 21:46 | //// |
| 62° | 00:26 | 02:46 | 03:48 | 20:22 | 21:23 | 23:27 |
| 60° | 01:35 | 03:05 | 04:00 | 20:10 | 21:04 | 22:31 |
| N 58° | 02:07 | 03:20 | 04:10 | 19:59 | 20:49 | 22:01 |
| 56° | 02:30 | 03:34 | 04:19 | 19:51 | 20:36 | 21:38 |
| 54° | 02:48 | 03:45 | 04:27 | 19:43 | 20:25 | 21:21 |
| 52° | 03:03 | 03:55 | 04:34 | 19:36 | 20:15 | 21:06 |
| 50° | 03:16 | 04:04 | 04:41 | 19:29 | 20:06 | 20:54 |
| 45° | 03:41 | 04:22 | 04:54 | 19:16 | 19:48 | 20:29 |
| N 40° | 04:00 | 04:36 | 05:06 | 19:05 | 19:34 | 20:10 |
| 35° | 04:15 | 04:48 | 05:15 | 18:55 | 19:22 | 19:55 |
| 30° | 04:28 | 04:58 | 05:24 | 18:47 | 19:12 | 19:43 |
| 20° | 04:48 | 05:15 | 05:38 | 18:33 | 18:56 | 19:23 |
| N 10° | 05:03 | 05:29 | 05:51 | 18:20 | 18:42 | 19:08 |
| 0° | 05:16 | 05:41 | 06:02 | 18:09 | 18:30 | 18:55 |
| S 10° | 05:27 | 05:52 | 06:14 | 17:58 | 18:19 | 18:45 |
| 20° | 05:36 | 06:03 | 06:26 | 17:46 | 18:09 | 18:35 |
| 30° | 05:46 | 06:14 | 06:39 | 17:32 | 17:57 | 18:26 |
| 35° | 05:51 | 06:21 | 06:47 | 17:24 | 17:51 | 18:21 |
| 40° | 05:55 | 06:28 | 06:56 | 17:16 | 17:44 | 18:16 |
| 45° | 06:01 | 06:35 | 07:06 | 17:05 | 17:36 | 18:11 |
| S 50° | 06:06 | 06:44 | 07:19 | 16:53 | 17:27 | 18:06 |
| 52° | 06:08 | 06:49 | 07:25 | 16:47 | 17:23 | 18:03 |
| 54° | 06:11 | 06:53 | 07:31 | 16:41 | 17:19 | 18:01 |
| 56° | 06:13 | 06:58 | 07:38 | 16:34 | 17:14 | 17:59 |
| 58° | 06:16 | 07:03 | 07:46 | 16:26 | 17:09 | 17:56 |
| S 60° | 06:19 | 07:09 | 07:55 | 16:17 | 17:03 | 17:53 |

| Lat. | Moonrise | | | Moonset | | |
|-------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| N 70° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 20:59 |
| 62° | 20:37 | 22:32 | · · · | 20:00 | 20:22 | 20:19 |
| 60° | 21:56 | 23:22 | · · · | 18:41 | 19:32 | 19:51 |
| N 58° | 22:32 | 23:53 | · · · | 18:05 | 19:00 | 19:29 |
| 56° | 22:59 | · · · | 00:16 | 17:39 | 18:37 | 19:11 |
| 54° | 23:19 | · · · | 00:36 | 17:18 | 18:17 | 18:56 |
| 52° | 23:37 | · · · | 00:52 | 17:01 | 18:01 | 18:43 |
| 50° | 23:51 | · · · | 01:05 | 16:46 | 17:47 | 18:31 |
| 45° | · · · | 00:22 | 01:34 | 16:16 | 17:18 | 18:07 |
| N 40° | · · · | 00:45 | 01:56 | 15:52 | 16:55 | 17:47 |
| 35° | 00:04 | 01:04 | 02:14 | 15:33 | 16:37 | 17:31 |
| 30° | 00:20 | 01:21 | 02:30 | 15:17 | 16:20 | 17:17 |
| 20° | 00:47 | 01:49 | 02:57 | 14:49 | 15:53 | 16:52 |
| N 10° | 01:10 | 02:13 | 03:20 | 14:24 | 15:29 | 16:31 |
| 0° | 01:32 | 02:36 | 03:41 | 14:02 | 15:07 | 16:11 |
| S 10° | 01:53 | 02:59 | 04:02 | 13:40 | 14:45 | 15:51 |
| 20° | 02:17 | 03:23 | 04:25 | 13:15 | 14:21 | 15:29 |
| 30° | 02:44 | 03:51 | 04:51 | 12:47 | 13:53 | 15:04 |
| 35° | 03:01 | 04:08 | 05:07 | 12:31 | 13:36 | 14:49 |
| 40° | 03:20 | 04:28 | 05:25 | 12:12 | 13:17 | 14:32 |
| 45° | 03:43 | 04:51 | 05:47 | 11:48 | 12:54 | 14:11 |
| S 50° | 04:12 | 05:22 | 06:14 | 11:18 | 12:23 | 13:45 |
| 52° | 04:27 | 05:37 | 06:27 | 11:03 | 12:08 | 13:32 |
| 54° | 04:44 | 05:54 | 06:42 | 10:46 | 11:51 | 13:17 |
| 56° | 05:04 | 06:15 | 07:00 | 10:26 | 11:30 | 13:00 |
| 58° | 05:30 | 06:42 | 07:22 | 10:00 | 11:03 | 12:38 |
| S 60° | 06:05 | 07:20 | 07:50 | 09:24 | 10:26 | 12:11 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-------|-----------|-------|--------|
| | Eqn.of Time | | Mer. | Mer.Pass. | | Age |
| | 00 ^h | 12 ^h | Pass | Upper | Lower | 25-27 |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 29-10% |
| 08 | 05:44 | 05:40 | 12:06 | 07:47 | 20:19 | |
| 09 | 05:36 | 05:32 | 12:06 | 08:52 | 21:24 | |
| 10 | 05:27 | 05:23 | 12:05 | 09:56 | 22:27 | |

August 11, 12, 13 UT (Tue., Wed., Thu.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------|----------|----------|--------------|----------|-------------|----------|---------------|----------|--------------|---------|-----|-----|--------|-------------|----------|----------|--|--|
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | |
| 0 | 319°28.6 | 136°00.6 | S02°32.7 | 229°44.0 | N23°40.1 | 187°44.2 | N18°26.1 | 305°04.9 | N03°21.9 | | | | | Alpheratz | 357°33.1 | 29°14.3 | | |
| 1 | 334°31.1 | 151°00.9 | 33.9 | 244°44.7 | 40.1 | 202°46.1 | 26.0 | 320°07.4 | 21.9 | | | | | Ankaa | 353°05.5 | -42°09.4 | | |
| 2 | 349°33.6 | 166°01.2 | 35.1 | 259°45.3 | 40.2 | 217°48.0 | 25.9 | 335°10.0 | 21.9 | | | | | Schedar | 349°29.2 | 56°40.9 | | |
| 3 | 4°36.0 | 181°01.5 | •• 36.3 | 274°46.0 | •• 40.2 | 232°49.9 | •• 25.7 | 350°12.5 | •• 21.8 | | | | | Diphda | 348°45.8 | -17°50.2 | | |
| 4 | 19°38.5 | 196°01.8 | 37.5 | 289°46.6 | 40.2 | 247°51.8 | 25.6 | 5°15.0 | 21.8 | | | | | Achernar | 335°19.0 | -57°05.7 | | |
| 5 | 34°40.9 | 211°02.1 | 38.7 | 304°47.3 | 40.3 | 262°53.7 | 25.4 | 20°17.5 | 21.8 | | | | | Hamal | 327°49.6 | 23°35.3 | | |
| 6 | 49°43.4 | 226°02.4 | S02°39.9 | 319°47.9 | N23°40.3 | 277°55.6 | N18°25.3 | 35°20.0 | N03°21.7 | | | | | Polaris | 313°20.1 | 89°22.2 | | |
| 7 | 64°45.9 | 241°02.7 | 41.1 | 334°48.6 | 40.3 | 292°57.5 | 25.1 | 50°22.6 | 21.7 | | | | | Acamar | 315°10.7 | -40°11.5 | | |
| 8 | 79°48.3 | 256°03.0 | 42.3 | 349°49.3 | 40.4 | 307°59.4 | 25.0 | 65°25.1 | 21.7 | | | | | Menkar | 314°04.7 | 4°11.8 | | |
| 9 | 94°50.8 | 271°03.3 | •• 43.6 | 4°49.9 | •• 40.4 | 323°01.3 | •• 24.9 | 80°27.6 | •• 21.6 | | | | | Mirfak | 308°26.4 | 49°57.2 | | |
| 10 | 109°53.3 | 286°03.7 | 44.8 | 19°50.6 | 40.4 | 338°03.2 | 24.7 | 95°30.1 | 21.6 | | | | | Aldebaran | 290°38.2 | 16°33.8 | | |
| 11 | 124°55.7 | 301°04.0 | 46.0 | 34°51.2 | 40.5 | 353°05.1 | 24.6 | 110°32.6 | 21.6 | | | | | Rigel | 281°02.8 | -8°10.1 | | |
| 12 | 139°58.2 | 316°04.3 | S02°47.2 | 49°51.9 | N23°40.5 | 8°07.0 | N18°24.4 | 125°35.2 | N03°21.5 | | | | | Capella | 280°20.2 | 46°01.3 | | |
| 13 | 155°00.7 | 331°04.6 | 48.4 | 64°52.5 | 40.5 | 23°08.9 | 24.3 | 140°37.7 | 21.5 | | | | | Bellatrix | 278°21.6 | 6°22.5 | | |
| 14 | 170°03.1 | 346°04.9 | 49.6 | 79°53.2 | 40.6 | 38°10.8 | 24.2 | 155°40.2 | 21.5 | | | | | Elnath | 278°00.4 | 28°37.7 | | |
| 15 | 185°05.6 | 1°05.2 | •• 50.8 | 94°53.8 | •• 40.6 | 53°12.7 | •• 24.0 | 170°42.7 | •• 21.4 | | | | | Alnilam | 275°36.6 | -1°11.0 | | |
| 16 | 200°08.0 | 16°05.5 | 52.0 | 109°54.5 | 40.6 | 68°14.6 | 23.9 | 185°45.2 | 21.4 | | | | | Betelgeuse | 270°50.9 | 7°24.8 | | |
| 17 | 215°10.5 | 31°05.8 | 53.2 | 124°55.2 | 40.7 | 83°16.5 | 23.7 | 200°47.8 | 21.3 | | | | | Canopus | 263°52.2 | -52°42.3 | | |
| 18 | 230°13.0 | 46°06.1 | S02°54.5 | 139°55.8 | N23°40.7 | 98°18.4 | N18°23.6 | 215°50.3 | N03°21.3 | | | | | Sirius | 258°25.3 | -16°45.0 | | |
| 19 | 245°15.4 | 61°06.4 | 55.7 | 154°56.5 | 40.7 | 113°20.3 | 23.4 | 230°52.8 | 21.3 | | | | | Adhara | 255°05.1 | -29°00.3 | | |
| 20 | 260°17.9 | 76°06.7 | 56.9 | 169°57.1 | 40.8 | 128°22.2 | 23.3 | 245°55.3 | 21.2 | | | | | Procyon | 244°49.7 | 5°09.5 | | |
| 21 | 275°20.4 | 91°07.1 | •• 58.1 | 184°57.8 | •• 40.8 | 143°24.2 | •• 23.2 | 260°57.8 | •• 21.2 | | | | | Pollux | 243°16.0 | 27°57.7 | | |
| 22 | 290°22.8 | 106°07.4 | 02°59.3 | 199°58.4 | 40.8 | 158°26.1 | 23.0 | 276°00.4 | 21.2 | | | | | Avior | 234°14.8 | -59°35.6 | | |
| 23 | 305°25.3 | 121°07.7 | 03°00.5 | 214°59.1 | 40.9 | 173°28.0 | 22.9 | 291°02.9 | 21.1 | | | | | Suhail | 222°45.8 | -43°32.3 | | |
| Mer.pass. | 02:42 | •• 0.3' | d1.2' m-4.37 | •• 0.7' | d0.0' m1.29 | •• 1.9' | d-0.1' m-1.79 | •• 2.5' | d-0.0' m0.58 | | | | | Miaplacidus | 221°39.0 | -69°49.6 | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | Alphard | 217°46.8 | -8°46.4 | | |
| 0 | 320°27.8 | 136°08.0 | S03°01.7 | 229°59.7 | N23°40.9 | 188°29.9 | N18°22.7 | 306°05.4 | N03°21.1 | | | | | Regulus | 207°33.3 | 11°50.3 | | |
| 1 | 335°30.2 | 151°08.3 | 02.9 | 245°00.4 | 40.9 | 203°31.8 | 22.6 | 321°07.9 | 21.1 | | | | | Dubhe | 193°40.0 | 61°36.6 | | |
| 2 | 350°32.7 | 166°08.6 | 04.1 | 260°01.1 | 40.9 | 218°33.7 | 22.4 | 336°10.5 | 21.0 | | | | | Denebola | 182°23.8 | 14°25.5 | | |
| 3 | 5°35.2 | 181°09.0 | •• 05.3 | 275°01.7 | •• 41.0 | 233°35.6 | •• 22.3 | 351°13.0 | •• 21.0 | | | | | Gienah | 175°42.4 | -17°41.4 | | |
| 4 | 20°37.6 | 196°09.3 | 06.5 | 290°02.4 | 41.0 | 248°37.5 | 22.2 | 6°15.5 | 21.0 | | | | | Acrux | 172°59.1 | -63°15.0 | | |
| 5 | 35°40.1 | 211°09.6 | 07.8 | 305°03.0 | 41.0 | 263°39.4 | 22.0 | 21°18.0 | 20.9 | | | | | Gacrux | 171°50.5 | -57°15.9 | | |
| 6 | 50°42.5 | 226°09.9 | S03°09.0 | 320°03.7 | N23°41.1 | 278°41.3 | N18°21.9 | 36°20.6 | N03°20.9 | | | | | Alioth | 166°12.1 | 55°49.1 | | |
| 7 | 65°45.0 | 241°10.2 | 10.2 | 335°04.3 | 41.1 | 293°43.2 | 21.7 | 51°23.1 | 20.8 | | | | | Spica | 158°21.0 | -11°18.0 | | |
| 8 | 80°47.5 | 256°10.5 | 11.4 | 350°05.0 | 41.1 | 308°45.1 | 21.6 | 66°25.6 | 20.8 | | | | | Alkaid | 152°51.1 | 49°11.0 | | |
| 9 | 95°49.9 | 271°10.9 | •• 12.6 | 5°05.7 | •• 41.1 | 323°47.0 | •• 21.5 | 81°28.1 | •• 20.8 | | | | | Hadar | 148°34.3 | -60°30.3 | | |
| 10 | 110°52.4 | 286°11.2 | 13.8 | 20°06.3 | 41.2 | 338°48.9 | 21.3 | 96°30.7 | 20.7 | | | | | Menkent | 147°56.1 | -36°30.2 | | |
| 11 | 125°54.9 | 301°11.5 | 15.0 | 35°07.0 | 41.2 | 353°50.8 | 21.2 | 111°33.2 | 20.7 | | | | | Arcturus | 145°46.8 | 19°02.8 | | |
| 12 | 140°57.3 | 316°11.8 | S03°16.2 | 50°07.6 | N23°41.2 | 8°52.7 | N18°21.0 | 126°35.7 | N03°20.7 | | | | | Rigel Kent. | 139°38.5 | -60°57.0 | | |
| 13 | 155°59.8 | 331°12.2 | 17.4 | 65°08.3 | 41.2 | 23°54.6 | 20.9 | 141°38.2 | 20.6 | | | | | Kochab | 137°19.9 | 74°03.0 | | |
| 14 | 171°02.3 | 346°12.5 | 18.6 | 80°09.0 | 41.3 | 38°56.5 | 20.7 | 156°40.7 | 20.6 | | | | | Zuben'ubi | 136°54.6 | -16°09.2 | | |
| 15 | 186°04.7 | 1°12.8 | •• 19.8 | 95°09.6 | •• 41.3 | 53°58.5 | •• 20.6 | 171°43.3 | •• 20.5 | | | | | Alphecca | 126°02.6 | 26°37.7 | | |
| 16 | 201°07.2 | 16°13.1 | 21.0 | 110°10.3 | 41.3 | 69°00.4 | 20.5 | 186°45.8 | 20.5 | | | | | Antares | 112°14.1 | -26°29.5 | | |
| 17 | 216°09.7 | 31°13.4 | 22.2 | 125°10.9 | 41.3 | 84°02.3 | 20.3 | 201°48.3 | 20.5 | | | | | Atria | 107°06.8 | -69°04.7 | | |
| 18 | 231°12.1 | 46°13.8 | S03°23.4 | 140°11.6 | N23°41.4 | 99°04.2 | N18°20.2 | 216°50.9 | N03°20.4 | | | | | Sabik | 102°01.1 | -15°45.5 | | |
| 19 | 246°14.6 | 61°14.1 | 24.7 | 155°12.2 | 41.4 | 114°06.1 | 20.0 | 231°53.4 | 20.4 | | | | | Shaula | 96°08.3 | -37°07.4 | | |
| 20 | 261°17.0 | 76°14.4 | 25.9 | 170°12.9 | 41.4 | 129°08.0 | 19.9 | 246°55.9 | 20.4 | | | | | Rasalhague | 95°57.1 | 12°32.6 | | |
| 21 | 276°19.5 | 91°14.8 | •• 27.1 | 185°13.6 | •• 41.4 | 144°09.9 | •• 19.7 | 261°58.4 | •• 20.3 | | | | | Eltanin | 90°41.2 | 51°29.3 | | |
| 22 | 291°22.0 | 106°15.1 | 28.3 | 200°14.2 | 41.5 | 159°11.8 | 19.6 | 277°01.0 | 20.3 | | | | | Kaus Aust. | 83°30.4 | -34°22.3 | | |
| 23 | 306°24.4 | 121°15.4 | 29.5 | 215°14.9 | 41.5 | 174°13.7 | 19.5 | 292°03.5 | 20.2 | | | | | Vega | 80°32.0 | 38°48.7 | | |
| Mer.pass. | 02:38 | •• 0.3' | d1.2' m-4.38 | •• 0.7' | d0.0' m1.29 | •• 1.9' | d-0.1' m-1.79 | •• 2.5' | d-0.0' m0.58 | | | | | Nunki | 75°45.8 | -26°15.8 | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | Altair | 61°58.3 | 8°56.5 | | |
| 0 | 321°26.9 | 136°15.7 | S03°30.7 | 230°15.5 | N23°41.5 | 189°15.6 | N18°19.3 | 307°06.0 | N03°20.2 | | | | | Peacock | 53°03.0 | -56°38.9 | | |
| 1 | 336°29.4 | 151°16.1 | 31.9 | 245°16.2 | 41.5 | 204°17.5 | 19.2 | 322°08.5 | 20.2 | | | | | Deneb | 49°24.4 | 45°22.6 | | |
| 2 | 351°31.8 | 166°16.4 | 33.1 | 260°16.9 | 41.5 | 219°19.4 | 19.0 | 337°11.1 | 20.1 | | | | | Enif | 33°37.2 | 10°00.0 | | |
| 3 | 6°34.3 | 181°16.7 | •• 34.3 | 275°17.5 | •• 41.6 | 234°21.3 | •• 18.9 | 352°13.6 | •• 20.1 | | | | | Al Na'ir | 27°30.8 | -46°49.7 | | |
| 4 | 21°36.8 | 196°17.1 | 35.5 | 290°18.2 | 41.6 | 249°23.2 | 18.7 | 7°16.1 | 20.1 | | | | | Fomalhaut | 15°12.7 | -29°28.6 | | |
| 5 | 36°39.2 | 211°17.4 | 36.7 | 305°18.8 | 41.6 | 264°25.1 | 18.6 | 22°18.6 | 20.0 | | | | | Scheat | 13°43.6 | 28°13.7 | | |
| 6 | 51°41.7 | 226°17.7 | S03°37.9 | 320°19.5 | N23°41.6 | 279°27.0 | N18°18.5 | 37°21.2 | N03°20.0 | | | | | Markab | 13°28.3 | 15°21.0 | | |
| 7 | 66°44.2 | 241°18.1 | 39.1 | 335°20.2 | 41.6 | 294°29.0 | 18.3 | 52°23.7 | 19.9 | | | | | | | | | |
| 8 | 81°46.6 | 256°18.4 | 40.3 | 350°20.8 | 41.7 | 309°30.9 | 18.2 | 67°26.2 | 19.9 | | | | | | | | | |
| 9 | 96°49.1 | 271°18.7 | •• 41.5 | 5°21.5 | •• 41.7 | 324°32.8 | •• 18.0 | 82°28.8 | •• 19.9 | | | | | | | | | |
| 10 | 111°51.5 | 286°19.1 | 42.7 | 20°22.2 | 41.7 | 339°34.7 | 17.9 | 97°31.3 | 19.8 | | | | | | | | | |
| 11 | 126°54.0 | 301°19.4 | 43.9 | 35°22.8 | 41.7 | 354°36.6 | 17.7 | 112°33.8 | 19.8 | | | | | | | | | |
| 12 | 141°56.5 | 316°19.7 | S03°45.1 | 50°23.5 | N23°41.7 | 9°38.5 | N18°17.6 | 127°36.3 | N03°19.8 | | | | | | | | | |
| 13 | 156°58.9 | 331°20.1 | 46.3 | 65°24.1 | 41.8 | 24°40.4 | 17.5 | 142°38.9 | 19.7 | | | | | | | | | |
| 14 | 172°01.4 | 346°20.4 | 47.5 | 80°24.8 | 41.8 | 39°42.3 | 17.3 | 157°41.4 | 19.7 | | | | | | | | | |
| 15 | 187°03.9 | 1°20.7 | •• 48.7 | 95°25.5 | •• 41.8 | 54°44.2 | •• 17.2 | 172°43.9 | •• 19.6 | | | | | | | | | |
| 16 | 202°06.3 | 16°21.1 | 49.9 | 110°26.1 | 41.8 | 69°46.1 | 17.0 | 187°46.5 | 19.6 | | | | | | | | | |
| 17 | 217°08.8 | 31°21.4 | 51.1 | 125°26.8 | 41.8 | 84°48.0 | 16.9 | 202°49.0 | 19.6 | | | | | | | | | |
| 18 | 232°11.3 | 46°21.8 | S03°52.3 | 140°27.5 | N23°41.8 | 99°49.9 | N18°16.7 | 217°51.5 | N03°19.5 | | | | | | | | | |
| 19 | 247°13.7 | 61°22.1 | 53.5 | 155°28.1 | 41.8 | 114°51.8 | 16.6 | 232°54.0 | 19.5 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |

| h | Sun | | | Moon | | | |
|------------|----------|----------|-------------|------------|-------|----------|--------------|
| Tue | GHA | Dec | | GHA | ν | Dec | d HP |
| 0 | 178°40.4 | N15°19.3 | | 202°15.2 | 4.4' | N24°10.1 | -9.5' 60.3' |
| 1 | 193°40.5 | 18.6 | | 216°38.6 | 4.5' | 24°00.6 | -9.7' 60.2' |
| 2 | 208°40.6 | 17.9 | | 231°02.2 | 4.6' | 23°51.0 | -9.8' 60.2' |
| 3 | 223°40.7 | 17.1 | | 245°25.8 | 4.7' | 23°41.1 | -10.0' 60.2' |
| 4 | 238°40.8 | 16.4 | | 259°49.6 | 4.9' | 23°31.1 | -10.1' 60.2' |
| 5 | 253°40.9 | 15.6 | | 274°13.4 | 5.0' | 23°21.0 | -10.3' 60.2' |
| 6 | 268°41.0 | N15°14.9 | | 288°37.4 | 5.1' | N23°10.7 | -10.5' 60.2' |
| 7 | 283°41.1 | 14.1 | | 303°01.4 | 5.2' | 23°00.2 | -10.6' 60.2' |
| 8 | 298°41.2 | 13.4 | | 317°25.6 | 5.3' | 22°49.6 | -10.8' 60.2' |
| 9 | 313°41.3 | 12.7 | | 331°49.9 | 5.4' | 22°38.9 | -10.9' 60.2' |
| 10 | 328°41.4 | 11.9 | | 346°14.3 | 5.5' | 22°28.0 | -11.0' 60.2' |
| 11 | 343°41.5 | 11.2 | | 0°38.8 | 5.6' | 22°16.9 | -11.2' 60.2' |
| 12 | 358°41.6 | N15°10.4 | | 15°03.4 | 5.7' | N22°05.7 | -11.3' 60.2' |
| 13 | 13°41.7 | 09.7 | | 29°28.2 | 5.8' | 21°54.4 | -11.5' 60.1' |
| 14 | 28°41.8 | 08.9 | | 43°53.0 | 6.0' | 21°42.9 | -11.6' 60.1' |
| 15 | 43°41.9 | 08.2 | | 58°18.0 | 6.1' | 21°31.3 | -11.7' 60.1' |
| 16 | 58°42.0 | 07.4 | | 72°43.0 | 6.2' | 21°19.6 | -11.9' 60.1' |
| 17 | 73°42.1 | 06.7 | | 87°08.2 | 6.3' | 21°07.7 | -12.0' 60.1' |
| 18 | 88°42.2 | N15°06.0 | | 101°33.5 | 6.4' | N20°55.7 | -12.1' 60.1' |
| 19 | 103°42.3 | 05.2 | | 115°58.9 | 6.5' | 20°43.5 | -12.3' 60.1' |
| 20 | 118°42.4 | 04.5 | | 130°24.4 | 6.6' | 20°31.3 | -12.4' 60.1' |
| 21 | 133°42.5 | 03.7 | | 144°50.1 | 6.8' | 20°18.9 | -12.5' 60.0' |
| 22 | 148°42.6 | 03.0 | | 159°15.8 | 6.9' | 20°06.4 | -12.6' 60.0' |
| 23 | 163°42.7 | 02.2 | | 173°41.7 | 7.0' | 19°53.7 | -12.8' 60.0' |
| SD = 15.8' | | | $d = -0.7'$ | SD = 16.4' | | | |

| Wed | GHA | Dec | | GHA | ν | Dec | d HP |
|------------|----------|----------|-------------|------------|-------|----------|--------------|
| 0 | 178°42.9 | N15°01.5 | | 188°07.7 | 7.1' | N19°41.0 | -12.9' 60.0' |
| 1 | 193°43.0 | 00.7 | | 202°33.8 | 7.2' | 19°28.1 | -13.0' 60.0' |
| 2 | 208°43.1 | 15°00.0 | | 217°00.0 | 7.3' | 19°15.1 | -13.1' 60.0' |
| 3 | 223°43.2 | 14°59.2 | | 231°26.3 | 7.4' | 19°02.0 | -13.2' 60.0' |
| 4 | 238°43.3 | 58.5 | | 245°52.8 | 7.6' | 18°48.8 | -13.3' 59.9' |
| 5 | 253°43.4 | 57.7 | | 260°19.3 | 7.7' | 18°35.5 | -13.4' 59.9' |
| 6 | 268°43.5 | N14°57.0 | | 274°46.0 | 7.8' | N18°22.1 | -13.5' 59.9' |
| 7 | 283°43.6 | 56.2 | | 289°12.8 | 7.9' | 18°08.6 | -13.6' 59.9' |
| 8 | 298°43.7 | 55.4 | | 303°39.7 | 8.0' | 17°54.9 | -13.7' 59.9' |
| 9 | 313°43.8 | 54.7 | | 318°06.7 | 8.1' | 17°41.2 | -13.8' 59.9' |
| 10 | 328°43.9 | 53.9 | | 332°33.8 | 8.2' | 17°27.4 | -13.9' 59.8' |
| 11 | 343°44.0 | 53.2 | | 347°01.0 | 8.3' | 17°13.5 | -14.0' 59.8' |
| 12 | 358°44.1 | N14°52.4 | | 1°28.4 | 8.5' | N16°59.5 | -14.1' 59.8' |
| 13 | 13°44.2 | 51.7 | | 15°55.8 | 8.6' | 16°45.4 | -14.2' 59.8' |
| 14 | 28°44.3 | 50.9 | | 30°23.4 | 8.7' | 16°31.2 | -14.3' 59.8' |
| 15 | 43°44.4 | 50.2 | | 44°51.1 | 8.8' | 16°16.9 | -14.4' 59.7' |
| 16 | 58°44.5 | 49.4 | | 59°18.8 | 8.9' | 16°02.5 | -14.4' 59.7' |
| 17 | 73°44.6 | 48.7 | | 73°46.7 | 9.0' | 15°48.1 | -14.5' 59.7' |
| 18 | 88°44.8 | N14°47.9 | | 88°14.7 | 9.1' | N15°33.6 | -14.6' 59.7' |
| 19 | 103°44.9 | 47.1 | | 102°42.8 | 9.2' | 15°19.0 | -14.7' 59.6' |
| 20 | 118°45.0 | 46.4 | | 117°11.0 | 9.3' | 15°04.3 | -14.8' 59.6' |
| 21 | 133°45.1 | 45.6 | | 131°39.3 | 9.4' | 14°49.5 | -14.8' 59.6' |
| 22 | 148°45.2 | 44.9 | | 146°07.8 | 9.5' | 14°34.7 | -14.9' 59.6' |
| 23 | 163°45.3 | 44.1 | | 160°36.3 | 9.6' | 14°19.8 | -15.0' 59.6' |
| SD = 15.8' | | | $d = -0.7'$ | SD = 16.4' | | | |

| Thu | GHA | Dec | | GHA | ν | Dec | d HP |
|------------|----------|----------|-------------|------------|-------|----------|--------------|
| 0 | 178°45.4 | N14°43.3 | | 175°04.9 | 9.7' | N14°04.9 | -15.0' 59.5' |
| 1 | 193°45.5 | 42.6 | | 189°33.6 | 9.8' | 13°49.8 | -15.1' 59.5' |
| 2 | 208°45.6 | 41.8 | | 204°02.4 | 9.9' | 13°34.7 | -15.2' 59.5' |
| 3 | 223°45.7 | 41.1 | | 218°31.4 | 10.0' | 13°19.6 | -15.2' 59.5' |
| 4 | 238°45.8 | 40.3 | | 233°00.4 | 10.1' | 13°04.4 | -15.3' 59.4' |
| 5 | 253°46.0 | 39.5 | | 247°29.5 | 10.2' | 12°49.1 | -15.3' 59.4' |
| 6 | 268°46.1 | N14°38.8 | | 261°58.7 | 10.3' | N12°33.8 | -15.4' 59.4' |
| 7 | 283°46.2 | 38.0 | | 276°28.0 | 10.4' | 12°18.4 | -15.4' 59.4' |
| 8 | 298°46.3 | 37.3 | | 290°57.4 | 10.5' | 12°02.9 | -15.5' 59.3' |
| 9 | 313°46.4 | 36.5 | | 305°26.9 | 10.6' | 11°47.4 | -15.5' 59.3' |
| 10 | 328°46.5 | 35.7 | | 319°56.5 | 10.7' | 11°31.9 | -15.6' 59.3' |
| 11 | 343°46.6 | 35.0 | | 334°26.2 | 10.8' | 11°16.3 | -15.6' 59.3' |
| 12 | 358°46.7 | N14°34.2 | | 348°56.0 | 10.9' | N11°00.7 | -15.7' 59.2' |
| 13 | 13°46.8 | 33.4 | | 3°25.9 | 11.0' | 10°45.0 | -15.7' 59.2' |
| 14 | 28°47.0 | 32.7 | | 17°55.8 | 11.0' | 10°29.3 | -15.8' 59.2' |
| 15 | 43°47.1 | 31.9 | | 32°25.9 | 11.1' | 10°13.5 | -15.8' 59.1' |
| 16 | 58°47.2 | 31.1 | | 46°56.0 | 11.2' | 09°57.8 | -15.8' 59.1' |
| 17 | 73°47.3 | 30.4 | | 61°26.2 | 11.3' | 09°41.9 | -15.9' 59.1' |
| 18 | 88°47.4 | N14°29.6 | | 75°56.5 | 11.4' | N09°26.1 | -15.9' 59.1' |
| 19 | 103°47.5 | 28.8 | | 90°26.8 | 11.5' | 09°10.2 | -15.9' 59.0' |
| 20 | 118°47.6 | 28.1 | | 104°57.3 | 11.5' | 08°54.2 | -16.0' 59.0' |
| 21 | 133°47.7 | 27.3 | | 119°27.8 | 11.6' | 08°38.3 | -16.0' 59.0' |
| 22 | 148°47.9 | 26.5 | | 133°58.5 | 11.7' | 08°22.3 | -16.0' 58.9' |
| 23 | 163°48.0 | 25.8 | | 148°29.1 | 11.8' | 08°06.3 | -16.0' 58.9' |
| SD = 15.8' | | | $d = -0.8'$ | SD = 16.2' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | //// | 02:02 | 22:02 | //// | //// |
| N 70° | //// | //// | 02:40 | 21:25 | //// | //// |
| 68° | //// | 01:16 | 03:07 | 21:00 | 22:45 | //// |
| 66° | //// | 02:04 | 03:27 | 20:41 | 22:01 | //// |
| 64° | //// | 02:34 | 03:43 | 20:25 | 21:32 | //// |
| 62° | 01:08 | 02:56 | 03:56 | 20:12 | 21:11 | 22:54 |
| 60° | 01:51 | 03:14 | 04:07 | 20:02 | 20:54 | 22:14 |
| N 58° | 02:19 | 03:28 | 04:17 | 19:52 | 20:40 | 21:48 |
| 56° | 02:39 | 03:40 | 04:25 | 19:44 | 20:28 | 21:28 |
| 54° | 02:56 | 03:51 | 04:32 | 19:36 | 20:18 | 21:12 |
| 52° | 03:10 | 04:00 | 04:39 | 19:30 | 20:08 | 20:58 |
| 50° | 03:22 | 04:09 | 04:45 | 19:24 | 20:00 | 20:47 |
| 45° | 03:46 | 04:26 | 04:58 | 19:11 | 19:43 | 20:23 |
| N 40° | 04:04 | 04:39 | 05:09 | 19:01 | 19:30 | 20:06 |
| 35° | 04:18 | 04:51 | 05:18 | 18:52 | 19:19 | 19:51 |
| 30° | 04:30 | 05:00 | 05:26 | 18:44 | 19:09 | 19:39 |
| 20° | 04:49 | 05:16 | 05:39 | 18:31 | 18:54 | 19:21 |
| N 10° | 05:03 | 05:29 | 05:51 | 18:19 | 18:41 | 19:06 |
| 0° | 05:15 | 05:40 | 06:02 | 18:08 | 18:30 | 18:55 |
| S 10° | 05:26 | 05:51 | 06:12 | 17:58 | 18:20 | 18:45 |
| 20° | 05:35 | 06:01 | 06:24 | 17:47 | 18:09 | 18:36 |
| 30° | 05:43 | 06:12 | 06:37 | 17:34 | 17:59 | 18:27 |
| 35° | 05:48 | 06:18 | 06:44 | 17:27 | 17:53 | 18:23 |
| 40° | 05:52 | 06:24 | 06:52 | 17:18 | 17:47 | 18:19 |
| 45° | 05:57 | 06:31 | 07:02 | 17:09 | 17:39 | 18:14 |
| S 50° | 06:01 | 06:40 | 07:14 | 16:57 | 17:31 | 18:10 |
| 52° | 06:03 | 06:43 | 07:19 | 16:52 | 17:28 | 18:08 |
| 54° | 06:05 | 06:47 | 07:25 | 16:46 | 17:24 | 18:06 |
| 56° | 06:08 | 06:52 | 07:32 | 16:39 | 17:19 | 18:03 |
| 58° | 06:10 | 06:57 | 07:39 | 16:32 | 17:14 | 18:01 |
| S 60° | 06:12 | 07:02 | 07:47 | 16:24 | 17:09 | 17:59 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | | | 03:24 | | 21:46 | 20:52 |
| N 70° | | 00:25 | 03:51 | 22:49 | 21:17 | 20:39 |
| 68° | | 01:33 | 04:11 | 21:40 | 20:55 | 20:29 |
| 66° | | 02:09 | 04:26 | 21:03 | 20:38 | 20:21 |
| 64° | 00:08 | 02:34 | 04:39 | 20:36 | 20:23 | 20:14 |
| 62° | 00:48 | 02:54 | 04:49 | 20:15 | 20:11 | 20:07 |
| 60° | 01:15 | 03:10 | 04:58 | 19:58 | 20:01 | 20:02 |
| N 58° | 01:36 | 03:23 | 05:06 | 19:44 | 19:52 | 19:57 |
| 56° | 01:53 | 03:35 | 05:13 | 19:31 | 19:44 | 19:53 |
| 54° | 02:08 | 03:45 | 05:19 | 19:21 | 19:37 | 19:49 |
| 52° | 02:21 | 03:54 | 05:25 | 19:11 | 19:30 | 19:45 |
| 50° | 02:32 | 04:02 | 05:30 | 19:02 | 19:25 | 19:42 |
| 45° | 02:55 | 04:19 | 05:40 | 18:44 | 19:12 | 19:35 |
| N 40° | 03:14 | 04:33 | 05:49 | 18:28 | 19:01 | 19:29 |
| 35° | 03:29 | 04:44 | 05:57 | 18:15 | 18:52 | 19:24 |
| 30° | 03:42 | 04:54 | 06:03 | 18:04 | 18:44 | 19:19 |
| 20° | 04:05 | 05:12 | 06:15 | 17:45 | 18:30 | 19:11 |
| N 10° | 04:25 | 05:27 | 06:25 | 17:27 | 18:18 | 19:04 |
| 0° | 04:43 | 05:41 | 06:34 | 17:11 | 18:07 | 18:58 |
| S 10° | 05:01 | 05:55 | 06:43 | 16:55 | 17:55 | 18:51 |
| 20° | 05:21 | 06:10 | 06:53 | 16:37 | 17:42 | 18:43 |
| 30° | 05:43 | 06:27 | 07:04 | 16:17 | 17:28 | 18:35 |
| 35° | 05:56 | 06:36 | 07:10 | 16:05 | 17:19 | 18:30 |
| 40° | 06:11 | 06:48 | 07:17 | 15:51 | 17:10 | 18:25 |
| 45° | 06:29 | 07:01 | 07:26 | 15:35 | 16:58 | 18:18 |
| S 50° | 06:51 | 07:16 | 07:36 | 15:14 | 16:44 | 18:10 |
| 52° | 07:01 | 07:24 | 07:40 | 15:05 | 16:37 | 18:06 |
| 54° | 07:13 | 07:32 | 07:46 | 14:53 | 16:30 | 18:02 |
| 56° | 07:26 | 07:41 | 07:51 | 14:41 | 16:22 | 17:58 |
| 58° | 07:41 | 07:51 | 07:57 | 14:26 | 16:13 | 17:53 |
| S 60° | 08:00 | 08:03 | 08:04 | 14:09 | 16:02 | 17:47 |

| Day | Sun | | Mer. Pass | Moon | | Age 28-1 4-0% |
|-----|------------------------------|----------------------------|-----------|-----------------------|-------------|---------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 11 | 05:18 | 05:13 | 12:05 | 10:57 | 23:26 | |
| 12 | 05:09 | 05:04 | 12:05 | 11:54 | -- | |
| 13 | 04:58 | 04:53 | 12:05 | 12:46 | 00:20 | |

August 14, 15, 16 UT (Fri., Sat., Sun.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------|----------|--------------------|----------|-------------------|----------|--|---------------------|----------|--|--------------------|----------|--|--------|-----|--|-------------|----------|----------|
| Fri | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | | SHA | Dec | |
| 0 | 322°26.0 | 136°23.8 | S03°59.5 | 230°31.4 | N23°41.9 | | 190°01.4 | N18°15.9 | | 308°06.7 | N03°19.3 | | | | | Alpheratz | 357°33.1 | 29°14.3 |
| 1 | 337°28.5 | 151°24.2 | 04°00.7 | 245°32.1 | 41.9 | | 205°03.3 | 15.7 | | 323°09.2 | 19.3 | | | | | Ankaa | 353°05.5 | -42°09.4 |
| 2 | 352°31.0 | 166°24.5 | 01.9 | 260°32.8 | 41.9 | | 220°05.2 | 15.6 | | 338°11.8 | 19.2 | | | | | Schedar | 349°29.1 | 56°40.9 |
| 3 | 7°33.4 | 181°24.9 | · · 03.1 | 275°33.4 | · · 42.0 | | 235°07.1 | · · 15.5 | | 353°14.3 | · · 19.2 | | | | | Diphda | 348°45.7 | -17°50.2 |
| 4 | 22°35.9 | 196°25.2 | 04.3 | 290°34.1 | 42.0 | | 250°09.0 | 15.3 | | 8°16.8 | 19.1 | | | | | Achernar | 335°18.9 | -57°05.7 |
| 5 | 37°38.4 | 211°25.5 | 05.5 | 305°34.7 | 42.0 | | 265°10.9 | 15.2 | | 23°19.3 | 19.1 | | | | | Hamal | 327°49.6 | 23°35.3 |
| 6 | 52°40.8 | 226°25.9 | S04°06.7 | 320°35.4 | N23°42.0 | | 280°12.8 | N18°15.0 | | 38°21.9 | N03°19.1 | | | | | Polaris | 313°18.7 | 89°22.3 |
| 7 | 67°43.3 | 241°26.2 | 07.9 | 335°36.1 | 42.0 | | 295°14.7 | 14.9 | | 53°24.4 | 19.0 | | | | | Acamar | 315°10.7 | -40°11.5 |
| 8 | 82°45.8 | 256°26.6 | 09.1 | 350°36.7 | 42.0 | | 310°16.6 | 14.7 | | 68°26.9 | 19.0 | | | | | Menkar | 314°04.7 | 4°11.8 |
| 9 | 97°48.2 | 271°26.9 | · · 10.3 | 5°37.4 | · · 42.0 | | 325°18.5 | · · 14.6 | | 83°29.5 | · · 18.9 | | | | | Mirfak | 308°26.3 | 49°57.2 |
| 10 | 112°50.7 | 286°27.3 | 11.5 | 20°38.1 | 42.0 | | 340°20.4 | 14.5 | | 98°32.0 | 18.9 | | | | | Aldebaran | 290°38.2 | 16°33.8 |
| 11 | 127°53.1 | 301°27.6 | 12.7 | 35°38.7 | 42.0 | | 355°22.4 | 14.3 | | 113°34.5 | 18.9 | | | | | Rigel | 281°02.7 | -8°10.1 |
| 12 | 142°55.6 | 316°28.0 | S04°13.9 | 50°39.4 | N23°42.1 | | 10°24.3 | N18°14.2 | | 128°37.1 | N03°18.8 | | | | | Capella | 280°20.1 | 46°01.3 |
| 13 | 157°58.1 | 331°28.3 | 15.1 | 65°40.1 | 42.1 | | 25°26.2 | 14.0 | | 143°39.6 | 18.8 | | | | | Bellatrix | 278°21.6 | 6°22.5 |
| 14 | 173°00.5 | 346°28.7 | 16.3 | 80°40.7 | 42.1 | | 40°28.1 | 13.9 | | 158°42.1 | 18.7 | | | | | Elnath | 278°00.4 | 28°37.7 |
| 15 | 188°03.0 | 1°29.0 | · · 17.5 | 95°41.4 | · · 42.1 | | 55°30.0 | · · 13.7 | | 173°44.7 | · · 18.7 | | | | | Alnilam | 275°36.5 | -1°11.0 |
| 16 | 203°05.5 | 16°29.4 | 18.7 | 110°42.1 | 42.1 | | 70°31.9 | 13.6 | | 188°47.2 | 18.7 | | | | | Betelgeuse | 270°50.8 | 7°24.8 |
| 17 | 218°07.9 | 31°29.8 | 19.9 | 125°42.7 | 42.1 | | 85°33.8 | 13.5 | | 203°49.7 | 18.6 | | | | | Canopus | 263°52.2 | -52°42.3 |
| 18 | 233°10.4 | 46°30.1 | S04°21.1 | 140°43.4 | N23°42.1 | | 100°35.7 | N18°13.3 | | 218°52.3 | N03°18.6 | | | | | Sirius | 258°25.3 | -16°45.0 |
| 19 | 248°12.9 | 61°30.5 | 22.3 | 155°44.1 | 42.1 | | 115°37.6 | 13.2 | | 233°54.8 | 18.5 | | | | | Adhara | 255°05.1 | -29°00.3 |
| 20 | 263°15.3 | 76°30.8 | 23.5 | 170°44.7 | 42.1 | | 130°39.5 | 13.0 | | 248°57.3 | 18.5 | | | | | Procyon | 244°49.7 | 5°09.5 |
| 21 | 278°17.8 | 91°31.2 | · · 24.7 | 185°45.4 | · · 42.1 | | 145°41.4 | · · 12.9 | | 263°59.9 | · · 18.5 | | | | | Pollux | 243°16.0 | 27°57.7 |
| 22 | 293°20.2 | 106°31.5 | 25.9 | 200°46.1 | 42.1 | | 160°43.3 | 12.7 | | 279°02.4 | 18.4 | | | | | Avior | 234°14.8 | -59°35.5 |
| 23 | 308°22.7 | 121°31.9 | 27.1 | 215°46.7 | 42.1 | | 175°45.3 | 12.6 | | 294°04.9 | 18.4 | | | | | Suhail | 222°45.8 | -43°32.3 |
| Mer.pass. | 02:30 | ν0.3' d1.2' m-4.41 | | ν0.7' d0.0' m1.28 | | | ν1.9' d-0.1' m-1.79 | | | ν2.5' d-0.0' m0.57 | | | | | | Miaplacidus | 221°39.0 | -69°49.5 |
| Sat | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | | Alphard | 217°46.8 | -8°46.4 |
| 0 | 323°25.2 | 136°32.3 | S04°28.3 | 230°47.4 | N23°42.1 | | 190°47.2 | N18°12.5 | | 309°07.5 | N03°18.3 | | | | | Regulus | 207°33.3 | 11°50.3 |
| 1 | 338°27.6 | 151°32.6 | 29.5 | 245°48.1 | 42.1 | | 205°49.1 | 12.3 | | 324°10.0 | 18.3 | | | | | Dubhe | 193°40.0 | 61°36.6 |
| 2 | 353°30.1 | 166°33.0 | 30.7 | 260°48.7 | 42.2 | | 220°51.0 | 12.2 | | 339°12.5 | 18.3 | | | | | Denebola | 182°23.8 | 14°25.5 |
| 3 | 8°32.6 | 181°33.3 | · · 31.9 | 275°49.4 | · · 42.2 | | 235°52.9 | · · 12.0 | | 354°15.1 | · · 18.3 | | | | | Gienah | 175°42.5 | -17°41.4 |
| 4 | 23°35.0 | 196°33.7 | 33.1 | 290°50.1 | 42.2 | | 250°54.8 | 11.9 | | 9°17.6 | 18.2 | | | | | Acrux | 172°59.1 | -63°15.0 |
| 5 | 38°37.5 | 211°34.1 | 34.3 | 305°50.7 | 42.2 | | 265°56.7 | 11.7 | | 24°20.1 | 18.1 | | | | | Gacrux | 171°50.6 | -57°15.9 |
| 6 | 53°40.0 | 226°34.4 | S04°35.5 | 320°51.4 | N23°42.2 | | 280°58.6 | N18°11.6 | | 39°22.7 | N03°18.1 | | | | | Alioth | 166°12.1 | 55°49.1 |
| 7 | 68°42.4 | 241°34.8 | 36.7 | 335°52.1 | 42.2 | | 296°00.5 | 11.5 | | 54°25.2 | 18.0 | | | | | Spica | 158°21.0 | -11°18.0 |
| 8 | 83°44.9 | 256°35.1 | 37.9 | 350°52.7 | 42.2 | | 311°02.4 | 11.3 | | 69°27.7 | 18.0 | | | | | Alkaid | 152°51.1 | 49°11.0 |
| 9 | 98°47.4 | 271°35.5 | · · 39.0 | 5°53.4 | · · 42.2 | | 326°04.3 | · · 11.2 | | 84°30.3 | · · 18.0 | | | | | Hadar | 148°34.3 | -60°30.3 |
| 10 | 113°49.8 | 286°35.9 | 40.2 | 20°54.1 | 42.2 | | 341°06.3 | 11.0 | | 99°32.8 | 17.9 | | | | | Menkent | 147°56.2 | -36°30.2 |
| 11 | 128°52.3 | 301°36.2 | 41.4 | 35°54.7 | 42.2 | | 356°08.2 | 10.9 | | 114°35.3 | 17.9 | | | | | Arcturus | 145°46.8 | 19°02.8 |
| 12 | 143°54.7 | 316°36.6 | S04°42.6 | 50°55.4 | N23°42.2 | | 11°10.1 | N18°10.7 | | 129°37.9 | N03°17.8 | | | | | Rigel Kent. | 139°38.6 | -60°57.0 |
| 13 | 158°57.2 | 331°37.0 | 43.8 | 65°56.1 | 42.2 | | 26°12.0 | 10.6 | | 144°40.4 | 17.8 | | | | | Kochab | 137°20.0 | 74°03.0 |
| 14 | 173°59.7 | 346°37.3 | 45.0 | 80°56.8 | 42.2 | | 41°13.9 | 10.4 | | 159°43.0 | 17.8 | | | | | Zuben'ubi | 136°54.6 | -16°09.2 |
| 15 | 189°02.1 | 1°37.7 | · · 46.2 | 95°57.4 | · · 42.2 | | 56°15.8 | · · 10.3 | | 174°45.5 | · · 17.7 | | | | | Alphecca | 126°02.6 | 26°37.7 |
| 16 | 204°04.6 | 16°38.1 | 47.4 | 110°58.1 | 42.2 | | 71°17.7 | 10.2 | | 189°48.0 | 17.7 | | | | | Antares | 112°14.1 | -26°29.5 |
| 17 | 219°07.1 | 31°38.5 | 48.6 | 125°58.8 | 42.2 | | 86°19.6 | 10.0 | | 204°50.6 | 17.6 | | | | | Atria | 107°06.8 | -69°04.7 |
| 18 | 234°09.5 | 46°38.8 | S04°49.8 | 140°59.4 | N23°42.2 | | 101°21.5 | N18°09.9 | | 219°53.1 | N03°17.6 | | | | | Sabik | 102°01.1 | -15°45.5 |
| 19 | 249°12.0 | 61°39.2 | 51.0 | 156°00.1 | 42.2 | | 116°23.4 | 09.7 | | 234°55.6 | 17.6 | | | | | Shaula | 96°08.3 | -37°07.4 |
| 20 | 264°14.5 | 76°39.6 | 52.2 | 171°00.8 | 42.2 | | 131°25.3 | 09.6 | | 249°58.2 | 17.5 | | | | | Rasalhague | 95°57.1 | 12°32.6 |
| 21 | 279°16.9 | 91°39.9 | · · 53.4 | 186°01.4 | · · 42.2 | | 146°27.3 | · · 09.4 | | 265°00.7 | · · 17.5 | | | | | Eltanin | 90°41.2 | 51°29.3 |
| 22 | 294°19.4 | 106°40.3 | 54.5 | 201°02.1 | 42.2 | | 161°29.2 | 09.3 | | 280°03.2 | 17.4 | | | | | Kaus Aust. | 83°30.5 | -34°22.3 |
| 23 | 309°21.8 | 121°40.7 | 55.7 | 216°02.8 | 42.2 | | 176°31.1 | 09.2 | | 295°05.8 | 17.4 | | | | | Vega | 80°32.0 | 38°48.7 |
| Mer.pass. | 02:26 | ν0.4' d1.2' m-4.42 | | ν0.7' d0.0' m1.28 | | | ν1.9' d-0.1' m-1.79 | | | ν2.5' d-0.0' m0.56 | | | | | | Nunki | 75°45.8 | -26°15.8 |
| Sun | GHA | GHA | Dec | GHA | Dec | | GHA | Dec | | GHA | Dec | | GHA | Dec | | Altair | 61°58.4 | 8°56.5 |
| 0 | 324°24.3 | 136°41.1 | S04°56.9 | 231°03.5 | N23°42.2 | | 191°33.0 | N18°09.0 | | 310°08.3 | N03°17.3 | | | | | Peacock | 53°03.0 | -56°38.9 |
| 1 | 339°26.8 | 151°41.4 | 58.1 | 246°04.1 | 42.2 | | 206°34.9 | 08.9 | | 325°10.9 | 17.3 | | | | | Deneb | 49°24.4 | 45°22.6 |
| 2 | 354°29.2 | 166°41.8 | 04°59.3 | 261°04.8 | 42.2 | | 221°36.8 | 08.7 | | 340°13.4 | 17.3 | | | | | Enif | 33°37.2 | 10°00.0 |
| 3 | 9°31.7 | 181°42.2 | 05°00.5 | 276°05.5 | · · 42.2 | | 236°38.7 | · · 08.6 | | 355°15.9 | · · 17.2 | | | | | Al Na'ir | 27°30.8 | -46°49.7 |
| 4 | 24°34.2 | 196°42.6 | 01.7 | 291°06.1 | 42.2 | | 251°40.6 | 08.4 | | 10°18.5 | 17.2 | | | | | Fomalhaut | 15°12.7 | -29°28.7 |
| 5 | 39°36.6 | 211°42.9 | 02.9 | 306°06.8 | 42.2 | | 266°42.5 | 08.3 | | 25°21.0 | 17.1 | | | | | Scheat | 13°43.6 | 28°13.7 |
| 6 | 54°39.1 | 226°43.3 | S05°04.1 | 321°07.5 | N23°42.2 | | 281°44.4 | N18°08.1 | | 40°23.6 | N03°17.1 | | | | | Markab | 13°28.3 | 15°21.0 |
| 7 | 69°41.6 | 241°43.7 | 05.3 | 336°08.2 | 42.1 | | 296°46.4 | 08.0 | | 55°26.1 | 17.0 | | | | | Aug 14 Fri | SHA | Mer.pass |
| 8 | 84°44.0 | 256°44.1 | 06.4 | 351°08.8 | 42.1 | | 311°48.3 | 07.9 | | 70°28.6 | 17.0 | | | | | Venus | 173°57.8 | 14:54 |
| 9 | 99°46.5 | 271°44.5 | · · 07.6 | 6°09.5 | · · 42.1 | | 326°50.2 | · · 07.7 | | 85°31.2 | · · 17.0 | | | | | Mars | 268°05.4 | 08:38 |
| 10 | 114°49.0 | 286°44.8 | 08.8 | 21°10.2 | 42.1 | | 341°52.1 | 07.6 | | 100°33.7 | 16.9 | | | | | Jupiter | 227°35.3 | 11:18 |
| 11 | 129°51.4 | 301°45.2 | 10.0 | 36°10.8 | 42.1 | | 356°54.0 | 07.4 | | 115°36.2 | 16.9 | | | | | Saturn | 345°40.7 | 03:27 |
| 12 | 144°53.9 | 316°45.6 | S05°11.2 | 51°11.5 | N23°42.1 | | 11°55.9 | N18°07.3 | | 130°38.8 | N03°16.8 | | | | | Aug 15 Sat | SHA | Mer.pass |
| 13 | 159°56.3 | 331°46.0 | 12.4 | 66°12.2 | 42.1 | | 26°57.8 | 07.1 | | 145°41.3 | 16.8 | | | | | Venus | 173°07.1 | 14:53 |
| 14 | 174°58.8 | 346°46.4 | 13.6 | 81°12.9 | 42.1 | | 41°59.7 | 07.0 | | 160°43.9 | 16.8 | | | | | Mars | 267°22.2 | 08:36 |
| 15 | 190°01.3 | 1°46.7 | · · 14.8 | 96°13.5 | · · 42.1 | | 57°01.6 | · · 06.9 | | 175°46.4 | · · 16.7 | | | | | Jupiter | 227°22.0 | 11:15 |
| 16 | 205°03.7 | 16°47.1 | 15.9 | 111°14.2 | 42.1 | | 72°03.5 | 06.7 | | 190°48.9 | 16.7 | | | | | Saturn | 345°42.3 | 03:23 |
| 17 | 220°06.2 | 31°47.5 | 17.1 | 126°14.9 | 42.1 | | 87°05.5 | 06.6 | | 205°51.5 | 16.6 | | | | | Aug 16 Sun | SHA | Mer.pass |
| 18 | 235°08.7 | 46°47.9 | S05°18.3 | 141°15.6 | N23°42.1 | | 102°07.4 | N18°06.4 | | 220°54.0 | N03°16.6 | | | | | | | |

| h | Sun | | Moon | | | | |
|------------------------|----------|----------|----------|-------|----------|--------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| Fri | | | | | | | |
| 0 | 178°48.1 | N14°25.0 | 162°59.9 | 11.8' | N07°50.3 | -16.1' | 58.9' |
| 1 | 193°48.2 | 24.2 | 177°30.7 | 11.9' | 07°34.2 | -16.1' | 58.8' |
| 2 | 208°48.3 | 23.5 | 192°01.7 | 12.0' | 07°18.2 | -16.1' | 58.8' |
| 3 | 223°48.4 | · · 22.7 | 206°32.7 | 12.1' | 07°02.1 | -16.1' | 58.8' |
| 4 | 238°48.6 | 21.9 | 221°03.7 | 12.1' | 06°46.0 | -16.1' | 58.7' |
| 5 | 253°48.7 | 21.1 | 235°34.8 | 12.2' | 06°29.8 | -16.1' | 58.7' |
| 6 | 268°48.8 | N14°20.4 | 250°06.0 | 12.3' | N06°13.7 | -16.2' | 58.7' |
| 7 | 283°48.9 | 19.6 | 264°37.3 | 12.3' | 05°57.5 | -16.2' | 58.7' |
| 8 | 298°49.0 | 18.8 | 279°08.6 | 12.4' | 05°41.4 | -16.2' | 58.6' |
| 9 | 313°49.1 | · · 18.1 | 293°40.0 | 12.5' | 05°25.2 | -16.2' | 58.6' |
| 10 | 328°49.3 | 17.3 | 308°11.5 | 12.5' | 05°09.0 | -16.2' | 58.6' |
| 11 | 343°49.4 | 16.5 | 322°43.0 | 12.6' | 04°52.8 | -16.2' | 58.5' |
| 12 | 358°49.5 | N14°15.7 | 337°14.6 | 12.6' | N04°36.7 | -16.2' | 58.5' |
| 13 | 13°49.6 | 15.0 | 351°46.2 | 12.7' | 04°20.5 | -16.2' | 58.5' |
| 14 | 28°49.7 | 14.2 | 6°17.9 | 12.8' | 04°04.3 | -16.2' | 58.4' |
| 15 | 43°49.8 | · · 13.4 | 20°49.7 | 12.8' | 03°48.1 | -16.2' | 58.4' |
| 16 | 58°50.0 | 12.6 | 35°21.5 | 12.9' | 03°31.9 | -16.2' | 58.4' |
| 17 | 73°50.1 | 11.9 | 49°53.4 | 12.9' | 03°15.7 | -16.2' | 58.3' |
| 18 | 88°50.2 | N14°11.1 | 64°25.3 | 13.0' | N02°59.5 | -16.2' | 58.3' |
| 19 | 103°50.3 | 10.3 | 78°57.3 | 13.0' | 02°43.3 | -16.2' | 58.3' |
| 20 | 118°50.4 | 09.5 | 93°29.3 | 13.1' | 02°27.1 | -16.2' | 58.2' |
| 21 | 133°50.6 | · · 08.8 | 108°01.4 | 13.1' | 02°11.0 | -16.2' | 58.2' |
| 22 | 148°50.7 | 08.0 | 122°33.5 | 13.2' | 01°54.8 | -16.1' | 58.2' |
| 23 | 163°50.8 | 07.2 | 137°05.7 | 13.2' | 01°38.7 | -16.1' | 58.1' |
| SD = 15.8' $d = -0.8'$ | | | | | | | |
| SD = 16.1' | | | | | | | |

| Sat | Sun | | Moon | | | | |
|------------------------|----------|----------|----------|-------|----------|--------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°50.9 | N14°06.4 | 151°37.9 | 13.3' | N01°22.5 | -16.1' | 58.1' |
| 1 | 193°51.0 | 05.6 | 166°10.1 | 13.3' | 01°06.4 | -16.1' | 58.1' |
| 2 | 208°51.2 | 04.9 | 180°42.4 | 13.3' | 00°50.3 | -16.1' | 58.0' |
| 3 | 223°51.3 | · · 04.1 | 195°14.8 | 13.4' | 00°34.2 | -16.1' | 58.0' |
| 4 | 238°51.4 | 03.3 | 209°47.2 | 13.4' | 00°18.2 | -16.1' | 57.9' |
| 5 | 253°51.5 | 02.5 | 224°19.6 | 13.5' | N00°02.1 | -16.0' | 57.9' |
| 6 | 268°51.6 | N14°01.7 | 238°52.1 | 13.5' | S00°13.9 | -16.0' | 57.9' |
| 7 | 283°51.8 | 01.0 | 253°24.6 | 13.5' | 00°29.9 | 16.0' | 57.8' |
| 8 | 298°51.9 | 14°00.2 | 267°57.1 | 13.6' | 00°45.9 | 16.0' | 57.8' |
| 9 | 313°52.0 | 13°59.4 | 282°29.7 | 13.6' | 01°01.9 | 15.9' | 57.8' |
| 10 | 328°52.1 | 58.6 | 297°02.3 | 13.6' | 01°17.8 | 15.9' | 57.7' |
| 11 | 343°52.3 | 57.8 | 311°34.9 | 13.7' | 01°33.7 | 15.9' | 57.7' |
| 12 | 358°52.4 | N13°57.1 | 326°07.6 | 13.7' | S01°49.6 | 15.9' | 57.7' |
| 13 | 13°52.5 | 56.3 | 340°40.3 | 13.7' | 02°05.5 | 15.8' | 57.6' |
| 14 | 28°52.6 | 55.5 | 355°13.0 | 13.8' | 02°21.3 | 15.8' | 57.6' |
| 15 | 43°52.8 | · · 54.7 | 9°45.8 | 13.8' | 02°37.1 | 15.8' | 57.6' |
| 16 | 58°52.9 | 53.9 | 24°18.5 | 13.8' | 02°52.9 | 15.7' | 57.5' |
| 17 | 73°53.0 | 53.1 | 38°51.3 | 13.8' | 03°08.6 | 15.7' | 57.5' |
| 18 | 88°53.1 | N13°52.3 | 53°24.2 | 13.8' | S03°24.3 | 15.7' | 57.5' |
| 19 | 103°53.3 | 51.6 | 67°57.0 | 13.9' | 03°39.9 | 15.6' | 57.4' |
| 20 | 118°53.4 | 50.8 | 82°29.9 | 13.9' | 03°55.6 | 15.6' | 57.4' |
| 21 | 133°53.5 | · · 50.0 | 97°02.8 | 13.9' | 04°11.2 | 15.5' | 57.4' |
| 22 | 148°53.6 | 49.2 | 111°35.7 | 13.9' | 04°26.7 | 15.5' | 57.3' |
| 23 | 163°53.8 | 48.4 | 126°08.6 | 13.9' | 04°42.2 | 15.5' | 57.3' |
| SD = 15.8' $d = -0.8'$ | | | | | | | |
| SD = 15.8' | | | | | | | |

| Sun | Sun | | Moon | | | | |
|------------------------|----------|----------|----------|-------|----------|-------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 178°53.9 | N13°47.6 | 140°41.6 | 14.0' | S04°57.7 | 15.4' | 57.2' |
| 1 | 193°54.0 | 46.8 | 155°14.5 | 14.0' | 05°13.1 | 15.4' | 57.2' |
| 2 | 208°54.1 | 46.0 | 169°47.5 | 14.0' | 05°28.5 | 15.3' | 57.2' |
| 3 | 223°54.3 | · · 45.3 | 184°20.5 | 14.0' | 05°43.8 | 15.3' | 57.1' |
| 4 | 238°54.4 | 44.5 | 198°53.5 | 14.0' | 05°59.1 | 15.2' | 57.1' |
| 5 | 253°54.5 | 43.7 | 213°26.5 | 14.0' | 06°14.4 | 15.2' | 57.1' |
| 6 | 268°54.6 | N13°42.9 | 227°59.5 | 14.0' | S06°29.6 | 15.2' | 57.0' |
| 7 | 283°54.8 | 42.1 | 242°32.5 | 14.0' | 06°44.7 | 15.1' | 57.0' |
| 8 | 298°54.9 | 41.3 | 257°05.6 | 14.0' | 06°59.8 | 15.1' | 57.0' |
| 9 | 313°55.0 | · · 40.5 | 271°38.6 | 14.0' | 07°14.9 | 15.0' | 56.9' |
| 10 | 328°55.2 | 39.7 | 286°11.7 | 14.1' | 07°29.9 | 15.0' | 56.9' |
| 11 | 343°55.3 | 38.9 | 300°44.7 | 14.1' | 07°44.8 | 14.9' | 56.9' |
| 12 | 358°55.4 | N13°38.1 | 315°17.8 | 14.1' | S07°59.7 | 14.8' | 56.8' |
| 13 | 13°55.5 | 37.3 | 329°50.8 | 14.1' | 08°14.6 | 14.8' | 56.8' |
| 14 | 28°55.7 | 36.6 | 344°23.9 | 14.1' | 08°29.3 | 14.7' | 56.8' |
| 15 | 43°55.8 | · · 35.8 | 358°56.9 | 14.1' | 08°44.1 | 14.7' | 56.7' |
| 16 | 58°55.9 | 35.0 | 13°30.0 | 14.1' | 08°58.8 | 14.6' | 56.7' |
| 17 | 73°56.1 | 34.2 | 28°03.1 | 14.1' | 09°13.4 | 14.6' | 56.7' |
| 18 | 88°56.2 | N13°33.4 | 42°36.1 | 14.0' | S09°27.9 | 14.5' | 56.6' |
| 19 | 103°56.3 | 32.6 | 57°09.2 | 14.0' | 09°42.4 | 14.4' | 56.6' |
| 20 | 118°56.5 | 31.8 | 71°42.2 | 14.0' | 09°56.9 | 14.4' | 56.6' |
| 21 | 133°56.6 | · · 31.0 | 86°15.2 | 14.0' | 10°11.3 | 14.3' | 56.5' |
| 22 | 148°56.7 | 30.2 | 100°48.3 | 14.0' | 10°25.6 | 14.3' | 56.5' |
| 23 | 163°56.9 | 29.4 | 115°21.3 | 14.0' | 10°39.8 | 14.2' | 56.5' |
| SD = 15.8' $d = -0.8'$ | | | | | | | |
| SD = 15.6' | | | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | //// | 02:24 | 21:39 | //// | //// |
| N 70° | //// | //// | 02:56 | 21:09 | 23:31 | //// |
| 68° | //// | 01:43 | 03:19 | 20:46 | 22:19 | //// |
| 66° | //// | 02:21 | 03:37 | 20:29 | 21:44 | //// |
| 64° | //// | 02:47 | 03:52 | 20:15 | 21:19 | 23:35 |
| 62° | 01:32 | 03:07 | 04:04 | 20:03 | 21:00 | 22:31 |
| 60° | 02:06 | 03:23 | 04:14 | 19:53 | 20:44 | 21:59 |
| N 58° | 02:30 | 03:36 | 04:23 | 19:44 | 20:31 | 21:36 |
| 56° | 02:49 | 03:47 | 04:31 | 19:37 | 20:20 | 21:18 |
| 54° | 03:04 | 03:57 | 04:38 | 19:30 | 20:10 | 21:03 |
| 52° | 03:17 | 04:06 | 04:44 | 19:24 | 20:02 | 20:51 |
| 50° | 03:28 | 04:14 | 04:50 | 19:18 | 19:54 | 20:40 |
| 45° | 03:50 | 04:30 | 05:02 | 19:07 | 19:38 | 20:18 |
| N 40° | 04:07 | 04:42 | 05:12 | 18:57 | 19:26 | 20:01 |
| 35° | 04:21 | 04:53 | 05:20 | 18:49 | 19:15 | 19:47 |
| 30° | 04:32 | 05:02 | 05:27 | 18:41 | 19:06 | 19:36 |
| 20° | 04:50 | 05:17 | 05:40 | 18:29 | 18:52 | 19:19 |
| N 10° | 05:04 | 05:29 | 05:51 | 18:18 | 18:40 | 19:05 |
| 0° | 05:15 | 05:40 | 06:01 | 18:08 | 18:29 | 18:54 |
| S 10° | 05:25 | 05:50 | 06:11 | 17:58 | 18:20 | 18:45 |
| 20° | 05:33 | 05:59 | 06:22 | 17:47 | 18:10 | 18:36 |
| 30° | 05:41 | 06:09 | 06:34 | 17:36 | 18:00 | 18:28 |
| 35° | 05:45 | 06:15 | 06:41 | 17:29 | 17:55 | 18:25 |
| 40° | 05:49 | 06:20 | 06:48 | 17:21 | 17:49 | 18:21 |
| 45° | 05:52 | 06:27 | 06:57 | 17:12 | 17:43 | 18:17 |
| S 50° | 05:56 | 06:34 | 07:08 | 17:01 | 17:35 | 18:13 |
| 52° | 05:58 | 06:38 | 07:13 | 16:57 | 17:32 | 18:12 |
| 54° | 06:00 | 06:41 | 07:19 | 16:51 | 17:28 | 18:10 |
| 56° | 06:02 | 06:45 | 07:25 | 16:45 | 17:24 | 18:08 |
| 58° | 06:04 | 06:50 | 07:32 | 16:38 | 17:20 | 18:06 |
| S 60° | 06:06 | 06:55 | 07:39 | 16:31 | 17:15 | 18:05 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | 06:03 | 08:21 | 10:36 | 20:14 | 19:40 | 19:02 |
| N 70° | 06:13 | 08:20 | 10:23 | 20:11 | 19:45 | 19:17 |
| 68° | 06:20 | 08:19 | 10:14 | 20:09 | 19:50 | 19:29 |
| 66° | 06:26 | 08:18 | 10:06 | 20:07 | 19:53 | 19:39 |
| 64° | 06:31 | 08:17 | 09:59 | 20:05 | 19:57 | 19:48 |
| 62° | 06:36 | 08:16 | 09:53 | 20:03 | 19:59 | 19:55 |
| 60° | 06:40 | 08:16 | 09:48 | 20:02 | 20:02 | 20:01 |
| N 58° | 06:43 | 08:15 | 09:44 | 20:01 | 20:04 | 20:07 |
| 56° | 06:46 | 08:15 | 09:40 | 20:00 | 20:06 | 20:12 |
| 54° | 06:49 | 08:14 | 09:37 | 19:59 | 20:08 | 20:17 |
| 52° | 06:51 | 08:14 | 09:33 | 19:58 | 20:09 | 20:21 |
| 50° | 06:53 | 08:13 | 09:31 | 19:57 | 20:11 | 20:24 |
| 45° | 06:58 | 08:13 | 09:25 | 19:55 | 20:14 | 20:33 |
| N 40° | 07:02 | 08:12 | 09:19 | 19:53 | 20:16 | 20:39 |
| 35° | 07:06 | 08:11 | 09:15 | 19:52 | 20:19 | 20:45 |
| 30° | 07:09 | 08:11 | 09:11 | 19:51 | 20:21 | 20:50 |
| 20° | 07:14 | 08:10 | 09:05 | 19:49 | 20:24 | 20:59 |
| N 10° | 07:19 | 08:10 | 08:59 | 19:47 | 20:27 | 21:07 |
| 0° | 07:23 | 08:09 | 08:54 | 19:45 | 20:30 | 21:15 |
| S 10° | 07:27 | 08:08 | 08:48 | 19:43 | 20:33 | 21:23 |
| 20° | 07:32 | 08:08 | 08:43 | 19:41 | 20:37 | 21:31 |
| 30° | 07:37 | 08:07 | 08:37 | 19:39 | 20:40 | 21:40 |
| 35° | 07:40 | 08:07 | 08:33 | 19:38 | 20:42 | 21:45 |
| 40° | 07:43 | 08:06 | 08:29 | 19:36 | 20:45 | 21:51 |
| 45° | 07:47 | 08:06 | 08:24 | 19:34 | 20:47 | 21:58 |
| S 50° | 07:52 | 08:05 | 08:19 | 19:32 | 20:51 | 22:07 |
| 52° | 07:54 | 08:05 | 08:16 | 19:31 | 20:52 | 22:11 |
| 54° | 07:56 | 08:05 | 08:14 | 19:30 | 20:54 | 22:15 |
| 56° | 07:58 | 08:05 | 08:11 | 19:29 | 20:56 | 22:20 |
| 58° | 08:01 | 08:04 | 08:07 | 19:27 | 20:58 | 22:26 |
| S 60° | 08:04 | 08:04 | 08:04 | 19:26 | 21:00 | 22:32 |

| Day |
|-----|
|-----|

August 17, 18, 19 UT (Mon., Tue., Wed.)

| Aries | | Venus | | Mars | | Jupiter | | Saturn | | Stars | | |
|-----------------|----------|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|-------------------------------|----------|----------|
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | |
| 0 | 325°23.5 | 136°50.2 | S05°25.4 | 231°19.6 | N23°42.0 | 192°18.8 | N18°05.6 | 311°09.3 | N03°16.3 | Alpheratz | 357°33.1 | 29°14.3 |
| 1 | 340°25.9 | 151°50.6 | 26.6 | 246°20.3 | 42.0 | 207°20.7 | 05.4 | 326°11.8 | 16.3 | Ankaa | 353°05.5 | -42°09.4 |
| 2 | 355°28.4 | 166°51.0 | 27.8 | 261°20.9 | 42.0 | 222°22.7 | 05.3 | 341°14.4 | 16.2 | Schedar | 349°29.1 | 56°40.9 |
| 3 | 10°30.8 | 181°51.4 | · · 29.0 | 276°21.6 | · · 42.0 | 237°24.6 | · · 05.1 | 356°16.9 | · · 16.2 | Diphda | 348°45.7 | -17°50.2 |
| 4 | 25°33.3 | 196°51.8 | 30.2 | 291°22.3 | 42.0 | 252°26.5 | 05.0 | 11°19.4 | 16.1 | Achernar | 335°18.9 | -57°05.7 |
| 5 | 40°35.8 | 211°52.2 | 31.3 | 306°23.0 | 42.0 | 267°28.4 | 04.8 | 26°22.0 | 16.1 | Hamal | 327°49.6 | 23°35.3 |
| 6 | 55°38.2 | 226°52.6 | S05°32.5 | 321°23.7 | N23°41.9 | 282°30.3 | N18°04.7 | 41°24.5 | N03°16.1 | Polaris | 313°17.1 | 89°22.3 |
| 7 | 70°40.7 | 241°53.0 | 33.7 | 336°24.3 | 41.9 | 297°32.2 | 04.5 | 56°27.1 | 16.0 | Acamar | 315°10.7 | -40°11.5 |
| 8 | 85°43.2 | 256°53.4 | 34.9 | 351°25.0 | 41.9 | 312°34.1 | 04.4 | 71°29.6 | 16.0 | Menkar | 314°04.7 | 4°11.8 |
| 9 | 100°45.6 | 271°53.8 | · · 36.1 | 6°25.7 | · · 41.9 | 327°36.0 | · · 04.3 | 86°32.1 | · · 15.9 | Mirfak | 308°26.3 | 49°57.2 |
| 10 | 115°48.1 | 286°54.2 | 37.3 | 21°26.4 | 41.9 | 342°37.9 | 04.1 | 101°34.7 | 15.9 | Aldebaran | 290°38.2 | 16°33.8 |
| 11 | 130°50.6 | 301°54.6 | 38.4 | 36°27.0 | 41.9 | 357°39.9 | 04.0 | 116°37.2 | 15.8 | Rigel | 281°02.7 | -8°10.1 |
| 12 | 145°53.0 | 316°55.0 | S05°39.6 | 51°27.7 | N23°41.9 | 12°41.8 | N18°03.8 | 131°39.8 | N03°15.8 | Capella | 280°20.1 | 46°20.3 |
| 13 | 160°55.5 | 331°55.4 | 40.8 | 66°28.4 | 41.9 | 27°43.7 | 03.7 | 146°42.3 | 15.8 | Bellatrix | 278°21.6 | 6°22.5 |
| 14 | 175°57.9 | 346°55.8 | 42.0 | 81°29.1 | 41.8 | 42°45.6 | 03.5 | 161°44.9 | 15.7 | Elnath | 278°00.3 | 28°37.7 |
| 15 | 191°00.4 | 1°56.2 | · · 43.2 | 96°29.7 | · · 41.8 | 57°47.5 | · · 03.4 | 176°47.4 | · · 15.7 | Alnilam | 275°36.5 | -1°11.0 |
| 16 | 206°02.9 | 16°56.6 | 44.3 | 111°30.4 | 41.8 | 72°49.4 | 03.3 | 191°50.0 | 15.6 | Betelgeuse | 270°50.8 | 7°24.8 |
| 17 | 221°05.3 | 31°57.0 | 45.5 | 126°31.1 | 41.8 | 87°51.3 | 03.1 | 206°52.5 | 15.6 | Canopus | 263°52.2 | -52°42.3 |
| 18 | 236°07.8 | 46°57.4 | S05°46.7 | 141°31.8 | N23°41.8 | 102°53.2 | N18°03.0 | 221°55.0 | N03°15.5 | Sirius | 258°25.3 | -16°45.0 |
| 19 | 251°10.3 | 61°57.8 | 47.9 | 156°32.4 | 41.8 | 117°55.2 | 02.8 | 236°57.6 | 15.5 | Adhara | 255°05.1 | -29°00.3 |
| 20 | 266°12.7 | 76°58.2 | 49.1 | 171°33.1 | 41.7 | 132°57.1 | 02.7 | 252°00.1 | 15.4 | Procyon | 244°49.7 | 5°09.5 |
| 21 | 281°15.2 | 91°58.6 | · · 50.2 | 186°33.8 | · · 41.7 | 147°59.0 | · · 02.5 | 267°02.7 | · · 15.4 | Pollux | 243°16.0 | 27°57.7 |
| 22 | 296°17.7 | 106°59.0 | 51.4 | 201°34.5 | 41.7 | 163°00.9 | 02.4 | 282°05.2 | 15.4 | Avior | 234°14.8 | -59°35.5 |
| 23 | 311°20.1 | 121°59.4 | 52.6 | 216°35.2 | 41.7 | 178°02.8 | 02.2 | 297°07.8 | 15.3 | Suhail | 222°45.8 | -43°32.3 |
| Mer.pass. 02:18 | | ν0.4' d1.2' m-4.44 | | ν0.7' d-0.0' m1.28 | | ν1.9' d-0.1' m-1.79 | | ν2.5' d-0.0' m0.55 | | Miaplacidus 221°38.9 -69°49.5 | | |
| | | | | | | | | | | Alphard 217°46.8 -8°46.4 | | |
| | | | | | | | | | | Regulus 207°33.3 11°50.3 | | |
| | | | | | | | | | | Dubhe 193°40.0 61°36.5 | | |
| | | | | | | | | | | Denebola 182°23.9 14°25.5 | | |
| | | | | | | | | | | Gienah 175°42.5 -17°41.4 | | |
| | | | | | | | | | | Acrux 172°59.1 -63°15.0 | | |
| | | | | | | | | | | Gacrux 171°50.6 -57°15.9 | | |
| | | | | | | | | | | Alioth 166°12.2 55°49.1 | | |
| | | | | | | | | | | Spica 158°21.1 -11°18.0 | | |
| | | | | | | | | | | Alkaid 152°51.2 49°11.0 | | |
| | | | | | | | | | | Hadar 148°34.3 -60°30.3 | | |
| | | | | | | | | | | Menkent 147°56.2 -36°30.2 | | |
| | | | | | | | | | | Arcturus 145°46.8 19°02.8 | | |
| | | | | | | | | | | Rigel Kent. 139°38.6 -60°57.0 | | |
| | | | | | | | | | | Kochab 137°20.0 74°03.0 | | |
| | | | | | | | | | | Zuben'ubi 136°54.6 -16°09.2 | | |
| | | | | | | | | | | Alphecca 126°02.6 26°37.7 | | |
| | | | | | | | | | | Antares 112°14.1 -26°29.5 | | |
| | | | | | | | | | | Atria 107°06.9 -69°04.7 | | |
| | | | | | | | | | | Sabik 102°01.1 -15°45.5 | | |
| | | | | | | | | | | Shaula 96°08.3 -37°07.4 | | |
| | | | | | | | | | | Rasalhague 95°57.1 12°32.6 | | |
| | | | | | | | | | | Eltanin 90°41.3 51°29.3 | | |
| | | | | | | | | | | Kaus Aust. 83°30.5 -34°22.3 | | |
| | | | | | | | | | | Vega 80°32.0 38°48.7 | | |
| | | | | | | | | | | Nunki 75°45.8 -26°15.8 | | |
| | | | | | | | | | | Altair 61°58.4 8°56.5 | | |
| Mer.pass. 02:14 | | ν0.4' d1.2' m-4.45 | | ν0.7' d-0.0' m1.28 | | ν1.9' d-0.1' m-1.79 | | ν2.5' d-0.0' m0.55 | | Peacock 53°03.1 -56°38.9 | | |
| | | | | | | | | | | Deneb 49°24.4 45°22.7 | | |
| | | | | | | | | | | Enif 33°37.2 10°00.0 | | |
| | | | | | | | | | | Al Na'ir 27°30.8 -46°49.7 | | |
| | | | | | | | | | | Fomalhaut 15°12.7 -29°28.7 | | |
| | | | | | | | | | | Scheat 13°43.6 28°13.7 | | |
| | | | | | | | | | | Markab 13°28.3 15°21.0 | | |
| | | | | | | | | | | Aug 17 Mon SHA Mer.pass | | |
| | | | | | | | | | | Venus 171°26.8 14:52 | | |
| | | | | | | | | | | Mars 265°56.1 08:34 | | |
| | | | | | | | | | | Jupiter 226°55.4 11:09 | | |
| | | | | | | | | | | Saturn 345°45.8 03:15 | | |
| | | | | | | | | | | Aug 18 Tue SHA Mer.pass | | |
| | | | | | | | | | | Venus 170°37.2 14:52 | | |
| | | | | | | | | | | Mars 265°13.3 08:33 | | |
| | | | | | | | | | | Jupiter 226°42.1 11:06 | | |
| | | | | | | | | | | Saturn 345°47.7 03:11 | | |
| | | | | | | | | | | Aug 19 Wed SHA Mer.pass | | |
| | | | | | | | | | | Venus 169°48.0 14:51 | | |
| | | | | | | | | | | Mars 264°30.4 08:32 | | |
| | | | | | | | | | | Jupiter 226°28.9 11:03 | | |
| | | | | | | | | | | Saturn 345°49.7 03:07 | | |
| | | | | | | | | | | Horizontal parallax | | |
| | | | | | | | | | | Venus: 0.2 | | |
| | | | | | | | | | | Mars: 0.1 | | |
| Mer.pass. 02:10 | | ν0.4' d1.2' m-4.46 | | ν0.7' d-0.0' m1.28 | | ν1.9' d-0.1' m-1.79 | | ν2.5' d-0.0' m0.54 | | | | |

| h | Sun | | | | Moon | | | | |
|------------------------|----------|----------|--|------------|----------|-------|----------|-------|-------|
| Mon | GHA | Dec | | | GHA | ν | Dec | d | HP |
| 0 | 178°57.0 | N13°28.6 | | | 129°54.3 | 14.0' | S10°54.0 | 14.1' | 56.4' |
| 1 | 193°57.1 | 27.8 | | | 144°27.3 | 14.0' | 11°08.2 | 14.1' | 56.4' |
| 2 | 208°57.2 | 27.0 | | | 159°00.3 | 14.0' | 11°22.2 | 14.0' | 56.4' |
| 3 | 223°57.4 | · · 26.2 | | | 173°33.3 | 14.0' | 11°36.2 | 13.9' | 56.3' |
| 4 | 238°57.5 | 25.4 | | | 188°06.2 | 14.0' | 11°50.1 | 13.9' | 56.3' |
| 5 | 253°57.6 | 24.6 | | | 202°39.2 | 13.9' | 12°04.0 | 13.8' | 56.3' |
| 6 | 268°57.8 | N13°23.8 | | | 217°12.1 | 13.9' | S12°17.8 | 13.7' | 56.2' |
| 7 | 283°57.9 | 23.0 | | | 231°45.1 | 13.9' | 12°31.5 | 13.7' | 56.2' |
| 8 | 298°58.0 | 22.2 | | | 246°18.0 | 13.9' | 12°45.2 | 13.6' | 56.2' |
| 9 | 313°58.2 | · · 21.4 | | | 260°50.9 | 13.9' | 12°58.8 | 13.5' | 56.1' |
| 10 | 328°58.3 | 20.6 | | | 275°23.7 | 13.9' | 13°12.3 | 13.4' | 56.1' |
| 11 | 343°58.4 | 19.8 | | | 289°56.6 | 13.8' | 13°25.7 | 13.4' | 56.1' |
| 12 | 358°58.6 | N13°19.0 | | | 304°29.4 | 13.8' | S13°39.1 | 13.3' | 56.0' |
| 13 | 13°58.7 | 18.2 | | | 319°02.2 | 13.8' | 13°52.4 | 13.2' | 56.0' |
| 14 | 28°58.9 | 17.4 | | | 333°35.0 | 13.8' | 14°05.6 | 13.1' | 56.0' |
| 15 | 43°59.0 | · · 16.6 | | | 348°07.8 | 13.7' | 14°18.7 | 13.1' | 55.9' |
| 16 | 58°59.1 | 15.8 | | | 2°40.5 | 13.7' | 14°31.8 | 13.0' | 55.9' |
| 17 | 73°59.3 | 15.0 | | | 17°13.2 | 13.7' | 14°44.7 | 12.9' | 55.9' |
| 18 | 88°59.4 | N13°14.2 | | | 31°45.9 | 13.7' | S14°57.7 | 12.8' | 55.9' |
| 19 | 103°59.5 | 13.4 | | | 46°18.6 | 13.6' | 15°10.5 | 12.7' | 55.8' |
| 20 | 118°59.7 | 12.6 | | | 60°51.3 | 13.6' | 15°23.2 | 12.7' | 55.8' |
| 21 | 133°59.8 | · · 11.8 | | | 75°23.9 | 13.6' | 15°35.9 | 12.6' | 55.8' |
| 22 | 148°59.9 | 11.0 | | | 89°56.5 | 13.6' | 15°48.5 | 12.5' | 55.7' |
| 23 | 164°00.1 | 10.2 | | | 104°29.0 | 13.5' | 16°01.0 | 12.4' | 55.7' |
| SD = 15.8' $d = -0.8'$ | | | | SD = 15.4' | | | | | |
| Tue | GHA | Dec | | | GHA | ν | Dec | d | HP |
| 0 | 179°00.2 | N13°09.4 | | | 119°01.6 | 13.5' | S16°13.4 | 12.3' | 55.7' |
| 1 | 194°00.4 | 08.6 | | | 133°34.1 | 13.5' | 16°25.7 | 12.3' | 55.6' |
| 2 | 209°00.5 | 07.8 | | | 148°06.5 | 13.4' | 16°38.0 | 12.2' | 55.6' |
| 3 | 224°00.6 | · · 07.0 | | | 162°39.0 | 13.4' | 16°50.2 | 12.1' | 55.6' |
| 4 | 239°00.8 | 06.2 | | | 177°11.4 | 13.4' | 17°02.2 | 12.0' | 55.6' |
| 5 | 254°00.9 | 05.3 | | | 191°43.7 | 13.3' | 17°14.2 | 11.9' | 55.5' |
| 6 | 269°01.0 | N13°04.5 | | | 206°16.1 | 13.3' | S17°26.1 | 11.8' | 55.5' |
| 7 | 284°01.2 | 03.7 | | | 220°48.4 | 13.3' | 17°38.0 | 11.7' | 55.5' |
| 8 | 299°01.3 | 02.9 | | | 235°20.7 | 13.2' | 17°49.7 | 11.6' | 55.5' |
| 9 | 314°01.5 | · · 02.1 | | | 249°52.9 | 13.2' | 18°01.3 | 11.6' | 55.4' |
| 10 | 329°01.6 | 01.3 | | | 264°25.1 | 13.2' | 18°12.9 | 11.5' | 55.4' |
| 11 | 344°01.7 | 13°00.5 | | | 278°57.3 | 13.1' | 18°24.3 | 11.4' | 55.4' |
| 12 | 359°01.9 | N12°59.7 | | | 293°29.4 | 13.1' | S18°35.7 | 11.3' | 55.3' |
| 13 | 14°02.0 | 58.9 | | | 308°01.5 | 13.1' | 18°47.0 | 11.2' | 55.3' |
| 14 | 29°02.2 | 58.1 | | | 322°33.6 | 13.0' | 18°58.2 | 11.1' | 55.3' |
| 15 | 44°02.3 | · · 57.3 | | | 337°05.6 | 13.0' | 19°09.3 | 11.0' | 55.3' |
| 16 | 59°02.4 | 56.4 | | | 351°37.6 | 12.9' | 19°20.3 | 10.9' | 55.2' |
| 17 | 74°02.6 | 55.6 | | | 6°09.5 | 12.9' | 19°31.2 | 10.8' | 55.2' |
| 18 | 89°02.7 | N12°54.8 | | | 20°41.4 | 12.9' | S19°42.0 | 10.7' | 55.2' |
| 19 | 104°02.9 | 54.0 | | | 35°13.3 | 12.8' | 19°52.7 | 10.6' | 55.2' |
| 20 | 119°03.0 | 53.2 | | | 49°45.1 | 12.8' | 20°03.3 | 10.5' | 55.1' |
| 21 | 134°03.1 | · · 52.4 | | | 64°16.9 | 12.7' | 20°13.8 | 10.4' | 55.1' |
| 22 | 149°03.3 | 51.6 | | | 78°48.6 | 12.7' | 20°24.2 | 10.3' | 55.1' |
| 23 | 164°03.4 | 50.8 | | | 93°20.3 | 12.7' | 20°34.5 | 10.2' | 55.1' |
| SD = 15.8' $d = -0.8'$ | | | | SD = 15.2' | | | | | |
| Wed | GHA | Dec | | | GHA | ν | Dec | d | HP |
| 0 | 179°03.6 | N12°49.9 | | | 107°51.9 | 12.6' | S20°44.7 | 10.1' | 55.1' |
| 1 | 194°03.7 | 49.1 | | | 122°23.6 | 12.6' | 20°54.9 | 10.0' | 55.0' |
| 2 | 209°03.9 | 48.3 | | | 136°55.1 | 12.5' | 21°04.9 | 9.9' | 55.0' |
| 3 | 224°04.0 | · · 47.5 | | | 151°26.7 | 12.5' | 21°14.8 | 9.8' | 55.0' |
| 4 | 239°04.1 | 46.7 | | | 165°58.1 | 12.4' | 21°24.6 | 9.7' | 55.0' |
| 5 | 254°04.3 | 45.9 | | | 180°29.6 | 12.4' | 21°34.3 | 9.6' | 54.9' |
| 6 | 269°04.4 | N12°45.0 | | | 195°01.0 | 12.4' | S21°43.9 | 9.5' | 54.9' |
| 7 | 284°04.6 | 44.2 | | | 209°32.3 | 12.3' | 21°53.4 | 9.4' | 54.9' |
| 8 | 299°04.7 | 43.4 | | | 224°03.6 | 12.3' | 22°02.8 | 9.3' | 54.9' |
| 9 | 314°04.9 | · · 42.6 | | | 238°34.9 | 12.2' | 22°12.1 | 9.2' | 54.9' |
| 10 | 329°05.0 | 41.8 | | | 253°06.1 | 12.2' | 22°21.3 | 9.1' | 54.8' |
| 11 | 344°05.2 | 41.0 | | | 267°37.3 | 12.1' | 22°30.4 | 9.0' | 54.8' |
| 12 | 359°05.3 | N12°40.1 | | | 282°08.4 | 12.1' | S22°39.3 | 8.9' | 54.8' |
| 13 | 14°05.4 | 39.3 | | | 296°39.5 | 12.0' | 22°48.2 | 8.8' | 54.8' |
| 14 | 29°05.6 | 38.5 | | | 311°10.6 | 12.0' | 22°56.9 | 8.6' | 54.8' |
| 15 | 44°05.7 | · · 37.7 | | | 325°41.6 | 12.0' | 23°05.6 | 8.5' | 54.7' |
| 16 | 59°05.9 | 36.9 | | | 340°12.5 | 11.9' | 23°14.1 | 8.4' | 54.7' |
| 17 | 74°06.0 | 36.1 | | | 354°43.4 | 11.9' | 23°22.5 | 8.3' | 54.7' |
| 18 | 89°06.2 | N12°35.2 | | | 9°14.3 | 11.8' | S23°30.8 | 8.2' | 54.7' |
| 19 | 104°06.3 | 34.4 | | | 23°45.1 | 11.8' | 23°39.0 | 8.1' | 54.7' |
| 20 | 119°06.5 | 33.6 | | | 38°15.9 | 11.7' | 23°47.1 | 8.0' | 54.6' |
| 21 | 134°06.6 | · · 32.8 | | | 52°46.6 | 11.7' | 23°55.1 | 7.9' | 54.6' |
| 22 | 149°06.8 | 31.9 | | | 67°17.3 | 11.6' | 24°02.9 | 7.7' | 54.6' |
| 23 | 164°06.9 | 31.1 | | | 81°48.0 | 11.6' | 24°10.7 | 7.6' | 54.6' |
| SD = 15.8' $d = -0.8'$ | | | | SD = 15.0' | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | //// | 02:44 | 21:19 | //// | //// |
| N 70° | //// | 01:13 | 03:11 | 20:53 | 22:44 | //// |
| 68° | //// | 02:05 | 03:32 | 20:33 | 21:57 | //// |
| 66° | //// | 02:36 | 03:48 | 20:17 | 21:28 | //// |
| 64° | 01:04 | 02:59 | 04:01 | 20:05 | 21:06 | 22:54 |
| 62° | 01:51 | 03:17 | 04:12 | 19:54 | 20:48 | 22:12 |
| 60° | 02:19 | 03:31 | 04:21 | 19:45 | 20:34 | 21:45 |
| N 58° | 02:40 | 03:44 | 04:30 | 19:37 | 20:22 | 21:24 |
| 56° | 02:57 | 03:54 | 04:37 | 19:30 | 20:12 | 21:08 |
| 54° | 03:11 | 04:03 | 04:43 | 19:23 | 20:03 | 20:54 |
| 52° | 03:23 | 04:11 | 04:49 | 19:18 | 19:55 | 20:43 |
| 50° | 03:34 | 04:18 | 04:54 | 19:13 | 19:48 | 20:32 |
| 45° | 03:55 | 04:34 | 05:05 | 19:02 | 19:33 | 20:12 |
| N 40° | 04:11 | 04:46 | 05:14 | 18:53 | 19:21 | 19:56 |
| 35° | 04:24 | 04:56 | 05:22 | 18:45 | 19:12 | 19:43 |
| 30° | 04:34 | 05:04 | 05:29 | 18:38 | 19:03 | 19:33 |
| 20° | 04:51 | 05:18 | 05:41 | 18:27 | 18:49 | 19:16 |
| N 10° | 05:04 | 05:29 | 05:51 | 18:17 | 18:38 | 19:03 |
| 0° | 05:15 | 05:39 | 06:01 | 18:07 | 18:28 | 18:53 |
| S 10° | 05:23 | 05:48 | 06:10 | 17:58 | 18:20 | 18:44 |
| 20° | 05:31 | 05:57 | 06:20 | 17:48 | 18:11 | 18:37 |
| 30° | 05:38 | 06:06 | 06:31 | 17:37 | 18:02 | 18:30 |
| 35° | 05:41 | 06:11 | 06:37 | 17:31 | 17:57 | 18:27 |
| 40° | 05:45 | 06:16 | 06:44 | 17:24 | 17:52 | 18:24 |
| 45° | 05:48 | 06:22 | 06:53 | 17:16 | 17:46 | 18:20 |
| S 50° | 05:51 | 06:29 | 07:03 | 17:06 | 17:39 | 18:17 |
| 52° | 05:53 | 06:32 | 07:07 | 17:01 | 17:36 | 18:16 |
| 54° | 05:54 | 06:35 | 07:12 | 16:56 | 17:33 | 18:15 |
| 56° | 05:55 | 06:39 | 07:18 | 16:51 | 17:30 | 18:13 |
| 58° | 05:57 | 06:43 | 07:24 | 16:44 | 17:26 | 18:12 |
| S 60° | 05:58 | 06:47 | 07:31 | 16:37 | 17:22 | 18:11 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | 13:04 | ■ | ■ | 18:09 | ■ | ■ |
| N 70° | 12:34 | 15:32 | ■ | 18:41 | 17:19 | ■ |
| 68° | 12:12 | 14:28 | ■ | 19:04 | 18:24 | ■ |
| 66° | 11:55 | 13:53 | 16:25 | 19:23 | 19:00 | 18:06 |
| 64° | 11:41 | 13:28 | 15:25 | 19:38 | 19:26 | 19:07 |
| 62° | 11:30 | 13:09 | 14:51 | 19:51 | 19:46 | 19:41 |
| 60° | 11:20 | 12:53 | 14:27 | 20:02 | 20:03 | 20:07 |
| N 58° | 11:12 | 12:40 | 14:07 | 20:11 | 20:17 | 20:27 |
| 56° | 11:04 | 12:28 | 13:51 | 20:20 | 20:29 | 20:43 |
| 54° | 10:58 | 12:18 | 13:38 | 20:27 | 20:40 | 20:57 |
| 52° | 10:52 | 12:09 | 13:26 | 20:34 | 20:49 | 21:10 |
| 50° | 10:46 | 12:01 | 13:15 | 20:40 | 20:58 | 21:21 |
| 45° | 10:35 | 11:45 | 12:53 | 20:53 | 21:16 | 21:44 |
| N 40° | 10:26 | 11:31 | 12:36 | 21:04 | 21:31 | 22:02 |
| 35° | 10:18 | 11:19 | 12:21 | 21:13 | 21:43 | 22:18 |
| 30° | 10:11 | 11:09 | 12:08 | 21:21 | 21:55 | 22:31 |
| 20° | 09:58 | 10:52 | 11:46 | 21:35 | 22:14 | 22:55 |
| N 10° | 09:48 | 10:37 | 11:28 | 21:48 | 22:30 | 23:15 |
| 0° | 09:38 | 10:23 | 11:10 | 22:00 | 22:46 | 23:33 |
| S 10° | 09:29 | 10:10 | 10:53 | 22:12 | 23:01 | 23:52 |
| 20° | 09:18 | 09:55 | 10:35 | 22:24 | 23:18 | · · · |
| 30° | 09:07 | 09:39 | 10:13 | 22:39 | 23:38 | · · · |
| 35° | 09:00 | 09:29 | 10:01 | 22:47 | 23:49 | · · · |
| 40° | 08:53 | 09:18 | 09:47 | 22:57 | · · · | 00:02 |
| 45° | 08:44 | 09:05 | 09:31 | 23:09 | · · · | 00:18 |
| S 50° | 08:33 | 08:50 | 09:10 | 23:22 | · · · | 00:37 |
| 52° | 08:28 | 08:43 | 09:01 | 23:29 | · · · | 00:46 |
| 54° | 08:23 | 08:35 | 08:50 | 23:36 | · · · | 00:56 |
| 56° | 08:17 | 08:26 | 08:37 | 23:44 | · · · | 01:08 |
| 58° | 08:11 | 08:16 | 08:23 | 23:54 | · · · | 01:21 |
| S 60° | 08:03 | 08:04 | 08:07 | · · · | 00:04 | 01:37 |

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August 20, 21, 22 UT (Thu., Fri., Sat.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|----------|
| Thu | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 328°20.9 | | 137°20.1 | S06°50.0 | 232°08.6 | N23°40.4 | 194°36.6 | N17°55.2 | 314°12.6 | N03°13.0 |
| 1 | 343°23.3 | | 152°20.5 | 51.2 | 247°09.3 | 40.4 | 209°38.5 | 55.0 | 329°15.2 | 13.0 |
| 2 | 358°25.8 | | 167°21.0 | 52.3 | 262°10.0 | 40.3 | 224°40.4 | 54.9 | 344°17.7 | 13.0 |
| 3 | 13°28.3 | | 182°21.4 | · · 53.5 | 277°10.7 | · · 40.3 | 239°42.3 | · · 54.7 | 359°20.3 | · · 12.9 |
| 4 | 28°30.7 | | 197°21.8 | 54.6 | 292°11.4 | 40.3 | 254°44.2 | 54.6 | 14°22.8 | 12.9 |
| 5 | 43°33.2 | | 212°22.3 | 55.8 | 307°12.0 | 40.2 | 269°46.2 | 54.4 | 29°25.4 | 12.8 |
| 6 | 58°35.7 | | 227°22.7 | S06°57.0 | 322°12.7 | N23°40.2 | 284°48.1 | N17°54.3 | 44°27.9 | N03°12.8 |
| 7 | 73°38.1 | | 242°23.2 | 58.1 | 337°13.4 | 40.2 | 299°50.0 | 54.1 | 59°30.5 | 12.7 |
| 8 | 88°40.6 | | 257°23.6 | 06°59.3 | 352°14.1 | 40.1 | 314°51.9 | 54.0 | 74°33.1 | 12.7 |
| 9 | 103°43.0 | | 272°24.1 | 07°00.5 | 7°14.8 | · · 40.1 | 329°53.8 | · · 53.9 | 89°35.6 | · · 12.6 |
| 10 | 118°45.5 | | 287°24.5 | 01.6 | 22°15.5 | 40.0 | 344°55.7 | 53.7 | 104°38.2 | 12.6 |
| 11 | 133°48.0 | | 302°25.0 | 02.8 | 37°16.2 | 40.0 | 359°57.7 | 53.6 | 119°40.7 | 12.5 |
| 12 | 148°50.4 | | 317°25.4 | S07°03.9 | 52°16.9 | N23°40.0 | 14°59.6 | N17°53.4 | 134°43.3 | N03°12.5 |
| 13 | 163°52.9 | | 332°25.9 | 05.1 | 67°17.5 | 39.9 | 30°01.5 | 53.3 | 149°45.8 | 12.4 |
| 14 | 178°55.4 | | 347°26.3 | 06.3 | 82°18.2 | 39.9 | 45°03.4 | 53.1 | 164°48.4 | 12.4 |
| 15 | 193°57.8 | | 2°26.8 | · · 07.4 | 97°18.9 | · · 39.9 | 60°05.3 | · · 53.0 | 179°50.9 | · · 12.3 |
| 16 | 209°00.3 | | 17°27.2 | 08.6 | 112°19.6 | 39.8 | 75°07.2 | 52.8 | 194°53.5 | 12.3 |
| 17 | 224°02.8 | | 32°27.7 | 09.7 | 127°20.3 | 39.8 | 90°09.2 | 52.7 | 209°56.0 | 12.2 |
| 18 | 239°05.2 | | 47°28.1 | S07°10.9 | 142°21.0 | N23°39.7 | 105°11.1 | N17°52.5 | 224°58.6 | N03°12.2 |
| 19 | 254°07.7 | | 62°28.6 | 12.0 | 157°21.7 | 39.7 | 120°13.0 | 52.4 | 240°01.1 | 12.1 |
| 20 | 269°10.1 | | 77°29.0 | 13.2 | 172°22.4 | 39.7 | 135°14.9 | 52.3 | 255°03.7 | 12.1 |
| 21 | 284°12.6 | | 92°29.5 | · · 14.4 | 187°23.1 | · · 39.6 | 150°16.8 | · · 52.1 | 270°06.3 | · · 12.0 |
| 22 | 299°15.1 | | 107°29.9 | 15.5 | 202°23.8 | 39.6 | 165°18.7 | 52.0 | 285°08.8 | 12.0 |
| 23 | 314°17.5 | | 122°30.4 | 16.7 | 217°24.4 | 39.5 | 180°20.7 | 51.8 | 300°11.4 | 11.9 |
| Mer.pass. 02:06 | | ν0.4' d1.2' m-4.47 | | ν0.7' d-0.0' m1.27 | | ν1.9' d-0.1' m-1.79 | | ν2.6' d-0.0' m0.54 | | |
| Fri | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 329°20.0 | | 137°30.8 | S07°17.8 | 232°25.1 | N23°39.5 | 195°22.6 | N17°51.7 | 315°13.9 | N03°11.9 |
| 1 | 344°22.5 | | 152°31.3 | 19.0 | 247°25.8 | 39.5 | 210°24.5 | 51.5 | 330°16.5 | 11.8 |
| 2 | 359°24.9 | | 167°31.8 | 20.1 | 262°26.5 | 39.4 | 225°26.4 | 51.4 | 345°19.0 | 11.8 |
| 3 | 14°27.4 | | 182°32.2 | · · 21.3 | 277°27.2 | · · 39.4 | 240°28.3 | · · 51.2 | 0°21.6 | · · 11.7 |
| 4 | 29°29.9 | | 197°32.7 | 22.5 | 292°27.9 | 39.3 | 255°30.2 | 51.1 | 15°24.1 | 11.7 |
| 5 | 44°32.3 | | 212°33.1 | 23.6 | 307°28.6 | 39.3 | 270°32.2 | 51.0 | 30°26.7 | 11.7 |
| 6 | 59°34.8 | | 227°33.6 | S07°24.8 | 322°29.3 | N23°39.2 | 285°34.1 | N17°50.8 | 45°29.3 | N03°11.6 |
| 7 | 74°37.3 | | 242°34.1 | 25.9 | 337°30.0 | 39.2 | 300°36.0 | 50.7 | 60°31.8 | 11.6 |
| 8 | 89°39.7 | | 257°34.5 | 27.1 | 352°30.7 | 39.2 | 315°37.9 | 50.5 | 75°34.4 | 11.5 |
| 9 | 104°42.2 | | 272°35.0 | · · 28.2 | 7°31.4 | · · 39.1 | 330°39.8 | · · 50.4 | 90°36.9 | · · 11.5 |
| 10 | 119°44.6 | | 287°35.5 | 29.4 | 22°32.1 | 39.1 | 345°41.7 | 50.2 | 105°39.5 | 11.4 |
| 11 | 134°47.1 | | 302°35.9 | 30.5 | 37°32.7 | 39.0 | 0°43.7 | 50.1 | 120°42.0 | 11.4 |
| 12 | 149°49.6 | | 317°36.4 | S07°31.7 | 52°33.4 | N23°39.0 | 15°45.6 | N17°49.9 | 135°44.6 | N03°11.3 |
| 13 | 164°52.0 | | 332°36.9 | 32.8 | 67°34.1 | 38.9 | 30°47.5 | 49.8 | 150°47.2 | 11.3 |
| 14 | 179°54.5 | | 347°37.3 | 34.0 | 82°34.8 | 38.9 | 45°49.4 | 49.6 | 165°49.7 | 11.2 |
| 15 | 194°57.0 | | 2°37.8 | · · 35.1 | 97°35.5 | · · 38.8 | 60°51.3 | · · 49.5 | 180°52.3 | · · 11.2 |
| 16 | 209°59.4 | | 17°38.3 | 36.3 | 112°36.2 | 38.8 | 75°53.2 | 49.4 | 195°54.8 | 11.1 |
| 17 | 225°01.9 | | 32°38.7 | 37.4 | 127°36.9 | 38.7 | 90°55.2 | 49.2 | 210°57.4 | 11.1 |
| 18 | 240°04.4 | | 47°39.2 | S07°38.6 | 142°37.6 | N23°38.7 | 105°57.1 | N17°49.1 | 225°59.9 | N03°11.0 |
| 19 | 255°06.8 | | 62°39.7 | 39.7 | 157°38.3 | 38.6 | 120°59.0 | 48.9 | 241°02.5 | 11.0 |
| 20 | 270°09.3 | | 77°40.1 | 40.9 | 172°39.0 | 38.6 | 136°00.9 | 48.8 | 256°05.1 | 10.9 |
| 21 | 285°11.8 | | 92°40.6 | · · 42.0 | 187°39.7 | · · 38.6 | 151°02.8 | · · 48.6 | 271°07.6 | · · 10.9 |
| 22 | 300°14.2 | | 107°41.1 | 43.2 | 202°40.4 | 38.5 | 166°04.8 | 48.5 | 286°10.2 | 10.8 |
| 23 | 315°16.7 | | 122°41.6 | 44.3 | 217°41.1 | 38.5 | 181°06.7 | 48.3 | 301°12.7 | 10.8 |
| Mer.pass. 02:02 | | ν0.5' d1.2' m-4.49 | | ν0.7' d-0.0' m1.27 | | ν1.9' d-0.1' m-1.79 | | ν2.6' d-0.0' m0.53 | | |
| Sat | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 330°19.1 | | 137°42.0 | S07°45.5 | 232°41.8 | N23°38.4 | 196°08.6 | N17°48.2 | 316°15.3 | N03°10.7 |
| 1 | 345°21.6 | | 152°42.5 | 46.6 | 247°42.5 | 38.4 | 211°10.5 | 48.0 | 331°17.9 | 10.7 |
| 2 | 0°24.1 | | 167°43.0 | 47.8 | 262°43.2 | 38.3 | 226°12.4 | 47.9 | 346°20.4 | 10.6 |
| 3 | 15°26.5 | | 182°43.5 | · · 48.9 | 277°43.9 | · · 38.3 | 241°14.3 | · · 47.8 | 1°23.0 | · · 10.6 |
| 4 | 30°29.0 | | 197°44.0 | 50.1 | 292°44.6 | 38.2 | 256°16.3 | 47.6 | 16°25.5 | 10.5 |
| 5 | 45°31.5 | | 212°44.4 | 51.2 | 307°45.2 | 38.2 | 271°18.2 | 47.5 | 31°28.1 | 10.5 |
| 6 | 60°33.9 | | 227°44.9 | S07°52.4 | 322°45.9 | N23°38.1 | 286°20.1 | N17°47.3 | 46°30.7 | N03°10.4 |
| 7 | 75°36.4 | | 242°45.4 | 53.5 | 337°46.6 | 38.1 | 301°22.0 | 47.2 | 61°33.2 | 10.4 |
| 8 | 90°38.9 | | 257°45.9 | 54.7 | 352°47.3 | 38.0 | 316°23.9 | 47.0 | 76°35.8 | 10.3 |
| 9 | 105°41.3 | | 272°46.4 | · · 55.8 | 7°48.0 | · · 37.9 | 331°25.9 | · · 46.9 | 91°38.3 | · · 10.3 |
| 10 | 120°43.8 | | 287°46.8 | 57.0 | 22°48.7 | 37.9 | 346°27.8 | 46.7 | 106°40.9 | 10.2 |
| 11 | 135°46.3 | | 302°47.3 | 58.1 | 37°49.4 | 37.8 | 1°29.7 | 46.6 | 121°43.5 | 10.2 |
| 12 | 150°48.7 | | 317°47.8 | S07°59.2 | 52°50.1 | N23°37.8 | 16°31.6 | N17°46.4 | 136°46.0 | N03°10.1 |
| 13 | 165°51.2 | | 332°48.3 | 08°00.4 | 67°50.8 | 37.7 | 31°33.5 | 46.3 | 151°48.6 | 10.1 |
| 14 | 180°53.6 | | 347°48.8 | 01.5 | 82°51.5 | 37.7 | 46°35.5 | 46.2 | 166°51.1 | 10.0 |
| 15 | 195°56.1 | | 2°49.3 | · · 02.7 | 97°52.2 | · · 37.6 | 61°37.4 | · · 46.0 | 181°53.7 | · · 10.0 |
| 16 | 210°58.6 | | 17°49.8 | 03.8 | 112°52.9 | 37.6 | 76°39.3 | 45.9 | 196°56.3 | 09.9 |
| 17 | 226°01.0 | | 32°50.2 | 05.0 | 127°53.6 | 37.5 | 91°41.2 | 45.7 | 211°58.8 | 09.9 |
| 18 | 241°03.5 | | 47°50.7 | S08°06.1 | 142°54.3 | N23°37.5 | 106°43.1 | N17°45.6 | 227°01.4 | N03°09.8 |
| 19 | 256°06.0 | | 62°51.2 | 07.2 | 157°55.0 | 37.4 | 121°45.1 | 45.4 | 242°03.9 | 09.7 |
| 20 | 271°08.4 | | 77°51.7 | 08.4 | 172°55.7 | 37.4 | 136°47.0 | 45.3 | 257°06.5 | 09.7 |
| 21 | 286°10.9 | | 92°52.2 | · · 09.5 | 187°56.4 | · · 37.3 | 151°48.9 | · · 45.1 | 272°09.1 | · · 09.6 |
| 22 | 301°13.4 | | 107°52.7 | 10.7 | 202°57.1 | 37.2 | 166°50.8 | 45.0 | 287°11.6 | 09.6 |
| 23 | 316°15.8 | | 122°53.2 | 11.8 | 217°57.8 | 37.2 | 181°52.7 | 44.8 | 302°14.2 | 09.5 |
| Mer.pass. 01:58 | | ν0.5' d1.1' m-4.50 | | ν0.7' d-0.0' m1.27 | | ν1.9' d-0.1' m-1.79 | | ν2.6' d-0.1' m0.53 | | |

| Stars | | |
|---------------------|-----------|-----------|
| | SHA | Dec |
| Alpheratz | 357° 33.1 | 29° 14.3 |
| Ankaa | 353° 05.5 | -42° 09.4 |
| Schedar | 349° 29.1 | 56° 40.9 |
| Diphda | 348° 45.7 | -17° 50.2 |
| Achernar | 335° 18.9 | -57° 05.7 |
| Hamal | 327° 49.5 | 23° 35.3 |
| Polaris | 313° 15.3 | 89° 22.3 |
| Acamar | 315° 10.7 | -40° 11.5 |
| Menkar | 314° 04.7 | 4° 11.8 |
| Mirfak | 308° 26.3 | 49° 57.2 |
| Aldebaran | 290° 38.1 | 16° 33.8 |
| Rigel | 281° 02.7 | -8° 10.1 |
| Capella | 280° 20.1 | 46° 01.3 |
| Bellatrix | 278° 21.6 | 6° 22.5 |
| Elnath | 278° 00.3 | 28° 37.7 |
| Alnilam | 275° 36.5 | -1° 11.0 |
| Betelgeuse | 270° 50.8 | 7° 24.8 |
| Canopus | 263° 52.1 | -52° 42.3 |
| Sirius | 258° 25.3 | -16° 45.0 |
| Adhara | 255° 05.1 | -29° 00.3 |
| Procyon | 244° 49.7 | 5° 09.5 |
| Pollux | 243° 16.0 | 27° 57.7 |
| Avior | 234° 14.8 | -59° 35.5 |
| Suhail | 222° 45.8 | -43° 32.3 |
| Miaplacidus | 221° 38.9 | -69° 49.5 |
| Alphard | 217° 46.8 | -8° 46.4 |
| Regulus | 207° 33.3 | 11° 50.3 |
| Dubhe | 193° 40.0 | 61° 36.5 |
| Denebola | 182° 23.9 | 14° 25.5 |
| Gienah | 175° 42.5 | -17° 41.4 |
| Acrux | 172° 59.1 | -63° 15.0 |
| Gacrux | 171° 50.6 | -57° 15.9 |
| Alioth | 166° 12.2 | 55° 49.1 |
| Spica | 158° 21.1 | -11° 18.0 |
| Alkaid | 152° 51.2 | 49° 11.0 |
| Hadar | 148° 34.4 | -60° 30.3 |
| Menkent | 147° 56.2 | -36° 30.2 |
| Arcturus | 145° 46.8 | 19° 02.8 |
| Rigel Kent. | 139° 38.6 | -60° 57.0 |
| Kochab | 137° 20.1 | 74° 03.0 |
| Zuben'ubi | 136° 54.6 | -16° 09.2 |
| Alphecca | 126° 02.6 | 26° 37.7 |
| Antares | 112° 14.1 | -26° 29.5 |
| Atria | 107° 06.9 | -69° 04.7 |
| Sabik | 102° 01.1 | -15° 45.4 |
| Shaula | 96° 08.3 | -37° 07.4 |
| Rasalhague | 95° 57.1 | 12° 32.6 |
| Eltanin | 90° 41.3 | 51° 29.3 |
| Kaus Aust. | 83° 30.5 | -34° 22.3 |
| Vega | 80° 32.0 | 38° 48.7 |
| Nunki | 75° 45.8 | -26° 15.8 |
| Altair | 61° 58.4 | 8° 56.5 |
| Peacock | 53° 03.1 | -56° 38.9 |
| Deneb | 49° 24.4 | 45° 22.7 |
| Enif | 33° 37.1 | 10° 00.0 |
| Al Na'ir | 27° 30.8 | -46° 49.8 |
| Fomalhaut | 15° 12.7 | -29° 28.7 |
| Scheat | 13° 43.6 | 28° 13.7 |
| Markab | 13° 28.2 | 15° 21.1 |
| Aug 20 Thu | SHA | Mer.pass |
| Venus | 168° 59.2 | 14:50 |
| Mars | 263° 47.7 | 08:31 |
| Jupiter | 226° 15.7 | 11:00 |
| Saturn | 345° 51.8 | 03:03 |
| Aug 21 Fri | SHA | Mer.pass |
| Venus | 168° 10.8 | 14:49 |
| Mars | 263° 05.1 | 08:30 |
| Jupiter | 226° 02.6 | 10:57 |
| Saturn | 345° 53.9 | 02:59 |
| Aug 22 Sat | SHA | Mer.pass |
| Venus | 167° 22.9 | 14:49 |
| Mars | 262° 22.6 | 08:29 |
| Jupiter | 225° 49.4 | 10:54 |
| Saturn | 345° 56.2 | 02:54 |
| Horizontal parallax | | |
| Venus: | | 0.2 |
| Mars: | | 0.1 |

| h | | Sun | | Moon | | | |
|------------------------|----------|----------|------------|-------|----------|-------|-------|
| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 179°07.1 | N12°30.3 | 96°18.6 | 11.6' | S24°18.3 | 7.5' | 54.6' |
| 1 | 194°07.2 | 29.5 | 110°49.1 | 11.5' | 24°25.8 | 7.4' | 54.6' |
| 2 | 209°07.4 | 28.7 | 125°19.6 | 11.5' | 24°33.2 | 7.3' | 54.5' |
| 3 | 224°07.5 | · · 27.8 | 139°50.1 | 11.4' | 24°40.5 | 7.2' | 54.5' |
| 4 | 239°07.7 | 27.0 | 154°20.5 | 11.4' | 24°47.7 | 7.0' | 54.5' |
| 5 | 254°07.8 | 26.2 | 168°50.9 | 11.3' | 24°54.7 | 6.9' | 54.5' |
| 6 | 269°08.0 | N12°25.4 | 183°21.2 | 11.3' | S25°01.6 | 6.8' | 54.5' |
| 7 | 284°08.1 | 24.5 | 197°51.5 | 11.3' | 25°08.4 | 6.7' | 54.5' |
| 8 | 299°08.3 | 23.7 | 212°21.8 | 11.2' | 25°15.1 | 6.6' | 54.5' |
| 9 | 314°08.4 | · · 22.9 | 226°52.0 | 11.2' | 25°21.7 | 6.4' | 54.4' |
| 10 | 329°08.6 | 22.1 | 241°22.2 | 11.1' | 25°28.1 | 6.3' | 54.4' |
| 11 | 344°08.7 | 21.2 | 255°52.3 | 11.1' | 25°34.5 | 6.2' | 54.4' |
| 12 | 359°08.9 | N12°20.4 | 270°22.4 | 11.0' | S25°40.7 | 6.1' | 54.4' |
| 13 | 14°09.0 | 19.6 | 284°52.4 | 11.0' | 25°46.8 | 6.0' | 54.4' |
| 14 | 29°09.2 | 18.8 | 299°22.4 | 11.0' | 25°52.7 | 5.8' | 54.4' |
| 15 | 44°09.3 | · · 17.9 | 313°52.4 | 10.9' | 25°58.6 | 5.7' | 54.4' |
| 16 | 59°09.5 | 17.1 | 328°22.3 | 10.9' | 26°04.3 | 5.6' | 54.4' |
| 17 | 74°09.6 | 16.3 | 342°52.2 | 10.8' | 26°09.9 | 5.5' | 54.3' |
| 18 | 89°09.8 | N12°15.4 | 357°22.0 | 10.8' | S26°15.3 | 5.3' | 54.3' |
| 19 | 104°09.9 | 14.6 | 11°51.8 | 10.8' | 26°20.7 | 5.2' | 54.3' |
| 20 | 119°10.1 | 13.8 | 26°21.6 | 10.7' | 26°25.9 | 5.1' | 54.3' |
| 21 | 134°10.2 | · · 13.0 | 40°51.3 | 10.7' | 26°31.0 | 5.0' | 54.3' |
| 22 | 149°10.4 | 12.1 | 55°21.0 | 10.7' | 26°35.9 | 4.8' | 54.3' |
| 23 | 164°10.5 | 11.3 | 69°50.7 | 10.6' | 26°40.8 | 4.7' | 54.3' |
| SD = 15.8' $d = -0.8'$ | | | SD = 14.9' | | | | |
| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 179°10.7 | N12°10.5 | 84°20.3 | 10.6' | S26°45.5 | 4.6' | 54.3' |
| 1 | 194°10.8 | 09.6 | 98°49.9 | 10.6' | 26°50.1 | 4.5' | 54.3' |
| 2 | 209°11.0 | 08.8 | 113°19.5 | 10.5' | 26°54.5 | 4.3' | 54.2' |
| 3 | 224°11.1 | · · 08.0 | 127°49.0 | 10.5' | 26°58.8 | 4.2' | 54.2' |
| 4 | 239°11.3 | 07.1 | 142°18.5 | 10.5' | 27°03.0 | 4.1' | 54.2' |
| 5 | 254°11.4 | 06.3 | 156°48.0 | 10.4' | 27°07.1 | 3.9' | 54.2' |
| 6 | 269°11.6 | N12°05.5 | 171°17.4 | 10.4' | S27°11.0 | 3.8' | 54.2' |
| 7 | 284°11.8 | 04.6 | 185°46.8 | 10.4' | 27°14.8 | 3.7' | 54.2' |
| 8 | 299°11.9 | 03.8 | 200°16.2 | 10.3' | 27°18.5 | 3.5' | 54.2' |
| 9 | 314°12.1 | · · 03.0 | 214°45.5 | 10.3' | 27°22.0 | 3.4' | 54.2' |
| 10 | 329°12.2 | 02.1 | 229°14.8 | 10.3' | 27°25.5 | 3.3' | 54.2' |
| 11 | 344°12.4 | 01.3 | 243°44.1 | 10.3' | 27°28.7 | 3.2' | 54.2' |
| 12 | 359°12.5 | N12°00.5 | 258°13.4 | 10.2' | S27°31.9 | 3.0' | 54.2' |
| 13 | 14°12.7 | 11°59.6 | 272°42.6 | 10.2' | 27°34.9 | 2.9' | 54.2' |
| 14 | 29°12.8 | 58.8 | 287°11.8 | 10.2' | 27°37.8 | 2.8' | 54.2' |
| 15 | 44°13.0 | · · 58.0 | 301°41.0 | 10.2' | 27°40.5 | 2.6' | 54.2' |
| 16 | 59°13.2 | 57.1 | 316°10.2 | 10.1' | 27°43.2 | 2.5' | 54.2' |
| 17 | 74°13.3 | 56.3 | 330°39.3 | 10.1' | 27°45.7 | 2.4' | 54.2' |
| 18 | 89°13.5 | N11°55.5 | 345°08.4 | 10.1' | S27°48.0 | 2.2' | 54.1' |
| 19 | 104°13.6 | 54.6 | 359°37.5 | 10.1' | 27°50.2 | 2.1' | 54.1' |
| 20 | 119°13.8 | 53.8 | 14°06.6 | 10.1' | 27°52.3 | 2.0' | 54.1' |
| 21 | 134°13.9 | · · 53.0 | 28°35.7 | 10.0' | 27°54.3 | 1.8' | 54.1' |
| 22 | 149°14.1 | 52.1 | 43°04.7 | 10.0' | 27°56.1 | 1.7' | 54.1' |
| 23 | 164°14.3 | 51.3 | 57°33.8 | 10.0' | 27°57.8 | 1.5' | 54.1' |
| SD = 15.8' $d = -0.8'$ | | | SD = 14.8' | | | | |
| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 179°14.4 | N11°50.4 | 72°02.8 | 10.0' | S27°59.3 | 1.4' | 54.1' |
| 1 | 194°14.6 | 49.6 | 86°31.8 | 10.0' | 28°00.7 | 1.3' | 54.1' |
| 2 | 209°14.7 | 48.8 | 101°00.8 | 10.0' | 28°02.0 | 1.1' | 54.1' |
| 3 | 224°14.9 | · · 47.9 | 115°29.7 | 10.0' | 28°03.1 | 1.0' | 54.1' |
| 4 | 239°15.0 | 47.1 | 129°58.7 | 10.0' | 28°04.2 | 0.9' | 54.1' |
| 5 | 254°15.2 | 46.2 | 144°27.7 | 9.9' | 28°05.0 | 0.7' | 54.1' |
| 6 | 269°15.4 | N11°45.4 | 158°56.6 | 9.9' | S28°05.8 | 0.6' | 54.1' |
| 7 | 284°15.5 | 44.6 | 173°25.5 | 9.9' | 28°06.4 | 0.5' | 54.1' |
| 8 | 299°15.7 | 43.7 | 187°54.5 | 9.9' | 28°06.8 | 0.3' | 54.1' |
| 9 | 314°15.8 | · · 42.9 | 202°23.4 | 9.9' | 28°07.2 | 0.2' | 54.1' |
| 10 | 329°16.0 | 42.0 | 216°52.3 | 9.9' | 28°07.3 | 0.1' | 54.1' |
| 11 | 344°16.2 | 41.2 | 231°21.2 | 9.9' | 28°07.4 | -0.1' | 54.1' |
| 12 | 359°16.3 | N11°40.4 | 245°50.1 | 9.9' | S28°07.3 | -0.2' | 54.1' |
| 13 | 14°16.5 | 39.5 | 260°19.1 | 9.9' | 28°07.1 | -0.4' | 54.1' |
| 14 | 29°16.6 | 38.7 | 274°48.0 | 9.9' | 28°06.7 | -0.5' | 54.1' |
| 15 | 44°16.8 | · · 37.8 | 289°16.9 | 9.9' | 28°06.3 | -0.6' | 54.1' |
| 16 | 59°17.0 | 37.0 | 303°45.8 | 9.9' | 28°05.6 | -0.8' | 54.1' |
| 17 | 74°17.1 | 36.1 | 318°14.7 | 9.9' | 28°04.9 | -0.9' | 54.1' |
| 18 | 89°17.3 | N11°35.3 | 332°43.6 | 9.9' | S28°04.0 | -1.0' | 54.1' |
| 19 | 104°17.4 | 34.5 | 347°12.5 | 9.9' | 28°02.9 | -1.2' | 54.1' |
| 20 | 119°17.6 | 33.6 | 1°41.5 | 9.9' | 28°01.8 | -1.3' | 54.1' |
| 21 | 134°17.8 | · · 32.8 | 16°10.4 | 9.9' | 28°00.5 | -1.4' | 54.1' |
| 22 | 149°17.9 | 31.9 | 30°39.3 | 9.9' | 27°59.0 | -1.6' | 54.1' |
| 23 | 164°18.1 | 31.1 | 45°08.3 | 10.0' | 27°57.5 | -1.7' | 54.1' |
| SD = 15.8' $d = -0.8'$ | | | SD = 14.8' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | //// | 03:02 | 20:59 | 23:32 | //// |
| N 70° | //// | 01:44 | 03:26 | 20:37 | 22:14 | //// |
| 68° | //// | 02:24 | 03:44 | 20:20 | 21:38 | //// |
| 66° | //// | 02:50 | 03:58 | 20:06 | 21:12 | 23:37 |
| 64° | 01:32 | 03:10 | 04:10 | 19:54 | 20:53 | 22:28 |
| 62° | 02:07 | 03:27 | 04:20 | 19:44 | 20:37 | 21:55 |
| 60° | 02:32 | 03:40 | 04:29 | 19:36 | 20:24 | 21:31 |
| N 58° | 02:51 | 03:51 | 04:36 | 19:29 | 20:13 | 21:13 |
| 56° | 03:06 | 04:01 | 04:43 | 19:22 | 20:04 | 20:58 |
| 54° | 03:19 | 04:09 | 04:48 | 19:17 | 19:56 | 20:46 |
| 52° | 03:30 | 04:17 | 04:54 | 19:11 | 19:48 | 20:35 |
| 50° | 03:40 | 04:23 | 04:59 | 19:07 | 19:42 | 20:25 |
| 45° | 03:59 | 04:37 | 05:09 | 18:57 | 19:28 | 20:06 |
| N 40° | 04:14 | 04:49 | 05:17 | 18:48 | 19:17 | 19:51 |
| 35° | 04:26 | 04:58 | 05:24 | 18:41 | 19:08 | 19:39 |
| 30° | 04:37 | 05:06 | 05:31 | 18:35 | 19:00 | 19:29 |
| 20° | 04:52 | 05:19 | 05:42 | 18:24 | 18:47 | 19:14 |
| N 10° | 05:04 | 05:30 | 05:51 | 18:15 | 18:37 | 19:02 |
| 0° | 05:14 | 05:39 | 06:00 | 18:06 | 18:28 | 18:52 |
| S 10° | 05:22 | 05:47 | 06:08 | 17:58 | 18:19 | 18:44 |
| 20° | 05:29 | 05:55 | 06:17 | 17:49 | 18:12 | 18:37 |
| 30° | 05:35 | 06:03 | 06:28 | 17:39 | 18:03 | 18:31 |
| 35° | 05:38 | 06:08 | 06:34 | 17:33 | 17:59 | 18:29 |
| 40° | 05:41 | 06:12 | 06:40 | 17:27 | 17:54 | 18:26 |
| 45° | 05:43 | 06:18 | 06:48 | 17:19 | 17:49 | 18:24 |
| S 50° | 05:46 | 06:24 | 06:57 | 17:10 | 17:43 | 18:21 |
| 52° | 05:47 | 06:26 | 07:01 | 17:06 | 17:41 | 18:20 |
| 54° | 05:48 | 06:29 | 07:06 | 17:01 | 17:38 | 18:19 |
| 56° | 05:49 | 06:32 | 07:11 | 16:56 | 17:35 | 18:18 |
| 58° | 05:50 | 06:36 | 07:16 | 16:51 | 17:32 | 18:18 |
| S 60° | 05:51 | 06:39 | 07:23 | 16:44 | 17:28 | 18:17 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | ██ | ██ | ██ | ██ | ██ | ██ |
| N 70° | ██ | ██ | ██ | ██ | ██ | ██ |
| 68° | ██ | ██ | ██ | ██ | ██ | ██ |
| 66° | ██ | ██ | ██ | ██ | ██ | ██ |
| 64° | ██ | ██ | ██ | ██ | ██ | ██ |
| 62° | 16:39 | 18:41 | ██ | 19:35 | 19:19 | ██ |
| 60° | 16:00 | 17:23 | 18:22 | 20:15 | 20:37 | 21:26 |
| N 58° | 15:32 | 16:48 | 17:44 | 20:43 | 21:13 | 22:03 |
| 56° | 15:11 | 16:22 | 17:18 | 21:05 | 21:39 | 22:29 |
| 54° | 14:54 | 16:02 | 16:57 | 21:23 | 21:59 | 22:50 |
| 52° | 14:39 | 15:45 | 16:40 | 21:38 | 22:16 | 23:08 |
| 50° | 14:26 | 15:30 | 16:25 | 21:51 | 22:31 | 23:23 |
| 45° | 13:59 | 15:00 | 15:54 | 22:18 | 23:01 | 23:53 |
| N 40° | 13:38 | 14:37 | 15:31 | 22:40 | 23:24 | · · · |
| 35° | 13:21 | 14:18 | 15:12 | 22:58 | 23:43 | · · · |
| 30° | 13:06 | 14:02 | 14:55 | 23:13 | · · · | 00:00 |
| 20° | 12:41 | 13:35 | 14:27 | 23:39 | · · · | 00:28 |
| N 10° | 12:19 | 13:11 | 14:03 | · · · | 00:02 | 00:52 |
| 0° | 11:59 | 12:49 | 13:41 | · · · | 00:23 | 01:14 |
| S 10° | 11:39 | 12:27 | 13:18 | · · · | 00:44 | 01:36 |
| 20° | 11:17 | 12:04 | 12:54 | 00:13 | 01:07 | 02:00 |
| 30° | 10:53 | 11:37 | 12:26 | 00:36 | 01:33 | 02:28 |
| 35° | 10:38 | 11:21 | 12:10 | 00:50 | 01:49 | 02:45 |
| 40° | 10:21 | 11:02 | 11:50 | 01:06 | 02:07 | 03:04 |
| 45° | 10:01 | 10:40 | 11:27 | 01:25 | 02:29 | 03:27 |
| S 50° | 09:36 | 10:11 | 10:57 | 01:49 | 02:57 | 03:57 |
| 52° | 09:24 | 09:57 | 10:42 | 02:01 | 03:11 | 04:12 |
| 54° | 09:11 | 09:41 | 10:25 | 02:14 | 03:27 | 04:29 |
| 56° | 08:55 | 09:22 | 10:04 | 02:30 | 03:46 | 04:50 |
| 58° | 08:36 | 08:59 | 09:38 | 02:48 | 04:09 | 05:16 |
| S 60° | 08:13 | 08:27 | 09:02 | 03:11 | 04:40 | 05:52 |

| Day | Sun | | Mer. Pass hh:mm | Moon | | Age 8-10 49-68% |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|-----------------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 20 | 03:32 | 03:25 | 12:03 | 18:11 | 05:46 | |
| 21 | 03:17 | 03:10 | 12:03 | 19:02 | 06:36 | |
| 22 | 03:02 | 02:55 | 12:03 | 19:53 | 07:27 | |

August 23, 24, 25 UT (Sun., Mon., Tue.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | | Stars | |
|-----------------|----------|--|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|---------------------|--------------------|
| Sun | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec |
| 0 | 331°18.3 | | 137°53.7 | S08°12.9 | 232°58.5 | N23°37.1 | 196°54.7 | N17°44.7 | 317°16.8 | N03°09.5 | Alpheratz | 357°33.1 29°14.3 |
| 1 | 346°20.7 | | 152°54.2 | 14.1 | 247°59.2 | 37.1 | 211°56.6 | 44.6 | 332°19.3 | 09.4 | Ankaa | 353°05.5 -42°09.4 |
| 2 | 1°23.2 | | 167°54.7 | 15.2 | 262°59.9 | 37.0 | 226°58.5 | 44.4 | 347°21.9 | 09.4 | Schedar | 349°29.1 56°41.0 |
| 3 | 16°25.7 | | 182°55.2 | •• 16.4 | 278°00.6 | •• 37.0 | 242°00.4 | •• 44.3 | 2°24.4 | •• 09.3 | Diphda | 348°45.7 -17°50.2 |
| 4 | 31°28.1 | | 197°55.7 | 17.5 | 293°01.3 | 36.9 | 257°02.3 | 44.1 | 17°27.0 | 09.3 | Achernar | 335°18.8 -57°05.7 |
| 5 | 46°30.6 | | 212°56.2 | 18.6 | 308°02.0 | 36.8 | 272°04.3 | 44.0 | 32°29.6 | 09.2 | Hamal | 327°49.5 23°35.4 |
| 6 | 61°33.1 | | 227°56.7 | S08°19.8 | 323°02.7 | N23°36.8 | 287°06.2 | N17°43.8 | 47°32.1 | N03°09.2 | Polaris | 313°13.6 89°22.3 |
| 7 | 76°35.5 | | 242°57.2 | 20.9 | 338°03.4 | 36.7 | 302°08.1 | 43.7 | 62°34.7 | 09.1 | Acamar | 315°10.6 -40°11.5 |
| 8 | 91°38.0 | | 257°57.7 | 22.0 | 353°04.1 | 36.7 | 317°10.0 | 43.5 | 77°37.3 | 09.1 | Menkar | 314°04.7 4°11.8 |
| 9 | 106°40.5 | | 272°58.2 | •• 23.2 | 8°04.8 | •• 36.6 | 332°11.9 | •• 43.4 | 92°39.8 | •• 09.0 | Mirfak | 308°26.2 49°57.2 |
| 10 | 121°42.9 | | 287°58.7 | 24.3 | 23°05.5 | 36.5 | 347°13.9 | 43.2 | 107°42.4 | 09.0 | Aldebaran | 290°38.1 16°33.8 |
| 11 | 136°45.4 | | 302°59.2 | 25.4 | 38°06.2 | 36.5 | 2°15.8 | 43.1 | 122°44.9 | 08.9 | Rigel | 281°02.7 -8°10.1 |
| 12 | 151°47.9 | | 317°59.7 | S08°26.6 | 53°06.9 | N23°36.4 | 17°17.7 | N17°43.0 | 137°47.5 | N03°08.9 | Capella | 280°20.0 46°01.3 |
| 13 | 166°50.3 | | 333°00.2 | 27.7 | 68°07.6 | 36.4 | 32°19.6 | 42.8 | 152°50.1 | 08.8 | Bellatrix | 278°21.5 6°22.5 |
| 14 | 181°52.8 | | 348°00.7 | 28.9 | 83°08.3 | 36.3 | 47°21.5 | 42.7 | 167°52.6 | 08.8 | Elnath | 278°00.3 28°37.7 |
| 15 | 196°55.2 | | 3°01.2 | •• 30.0 | 98°09.0 | •• 36.2 | 62°23.5 | •• 42.5 | 182°55.2 | •• 08.7 | Alnilam | 275°36.5 -1°11.0 |
| 16 | 211°57.7 | | 18°01.7 | 31.1 | 113°09.7 | 36.2 | 77°25.4 | 42.4 | 197°57.8 | 08.7 | Betelgeuse | 270°50.8 7°24.8 |
| 17 | 227°00.2 | | 33°02.2 | 32.3 | 128°10.4 | 36.1 | 92°27.3 | 42.2 | 213°00.3 | 08.6 | Canopus | 263°52.1 -52°42.3 |
| 18 | 242°02.6 | | 48°02.7 | S08°33.4 | 143°11.1 | N23°36.1 | 107°29.2 | N17°42.1 | 228°02.9 | N03°08.6 | Sirius | 258°25.3 -16°45.0 |
| 19 | 257°05.1 | | 63°03.2 | 34.5 | 158°11.8 | 36.0 | 122°31.1 | 41.9 | 243°05.5 | 08.5 | Adhara | 255°05.1 -29°00.3 |
| 20 | 272°07.6 | | 78°03.7 | 35.7 | 173°12.5 | 35.9 | 137°33.1 | 41.8 | 258°08.0 | 08.5 | Procyon | 244°49.7 5°09.5 |
| 21 | 287°10.0 | | 93°04.2 | •• 36.8 | 188°13.2 | •• 35.9 | 152°35.0 | •• 41.6 | 273°10.6 | •• 08.4 | Pollux | 243°16.0 27°57.7 |
| 22 | 302°12.5 | | 108°04.7 | 37.9 | 203°13.9 | 35.8 | 167°36.9 | 41.5 | 288°13.2 | 08.4 | Avior | 234°14.8 -59°35.5 |
| 23 | 317°15.0 | | 123°05.3 | 39.0 | 218°14.6 | 35.7 | 182°38.8 | 41.4 | 303°15.7 | 08.3 | Suhail | 222°45.8 -43°32.3 |
| Mer.pass. 01:54 | | | •0.5' d1.1' m-4.51 | | •0.7' d-0.1' m1.27 | | •1.9' d-0.1' m-1.79 | | •2.6' d-0.1' m0.52 | | Miaplacidus | 221°38.9 -69°49.5 |
| | | | | | | | | | | | Alphard | 217°46.7 -8°46.4 |
| | | | | | | | | | | | Regulus | 207°33.3 11°50.3 |
| | | | | | | | | | | | Dubhe | 193°40.0 61°36.5 |
| | | | | | | | | | | | Denebola | 182°23.9 14°25.5 |
| | | | | | | | | | | | Gienah | 175°42.5 -17°41.4 |
| | | | | | | | | | | | Acrux | 172°59.1 -63°15.0 |
| | | | | | | | | | | | Gacrux | 171°50.6 -57°15.9 |
| | | | | | | | | | | | Alioth | 166°12.2 55°49.1 |
| | | | | | | | | | | | Spica | 158°21.1 -11°18.0 |
| | | | | | | | | | | | Alkaid | 152°51.2 49°11.0 |
| | | | | | | | | | | | Hadar | 148°34.4 -60°30.3 |
| | | | | | | | | | | | Menkent | 147°56.2 -36°30.2 |
| | | | | | | | | | | | Arcturus | 145°46.8 19°02.8 |
| | | | | | | | | | | | Rigel Kent. | 139°38.7 -60°57.0 |
| | | | | | | | | | | | Kochab | 137°20.2 74°03.0 |
| | | | | | | | | | | | Zuben'ubi | 136°54.6 -16°09.2 |
| | | | | | | | | | | | Alphecca | 126°02.6 26°37.7 |
| | | | | | | | | | | | Antares | 112°14.1 -26°29.5 |
| | | | | | | | | | | | Atria | 107°06.9 -69°04.7 |
| | | | | | | | | | | | Sabik | 102°01.1 -15°45.4 |
| | | | | | | | | | | | Shaula | 96°08.4 -37°07.5 |
| | | | | | | | | | | | Rasalhague | 95°57.2 12°32.6 |
| | | | | | | | | | | | Eltanin | 90°41.3 51°29.4 |
| | | | | | | | | | | | Kaus Aust. | 83°30.5 -34°22.3 |
| | | | | | | | | | | | Vega | 80°32.0 38°48.7 |
| | | | | | | | | | | | Nunki | 75°45.8 -26°15.8 |
| | | | | | | | | | | | Altair | 61°58.4 8°56.5 |
| | | | | | | | | | | | Peacock | 53°03.1 -56°38.9 |
| | | | | | | | | | | | Deneb | 49°24.5 45°22.7 |
| | | | | | | | | | | | Enif | 33°37.1 10°00.0 |
| | | | | | | | | | | | Al Na'ir | 27°30.7 -46°49.8 |
| | | | | | | | | | | | Fomalhaut | 15°12.7 -29°28.7 |
| | | | | | | | | | | | Scheat | 13°43.5 28°13.8 |
| | | | | | | | | | | | Markab | 13°28.2 15°21.1 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Aug 23 Sun | SHA |
| | | | | | | | | | | | Venus | 166°35.4 14:48 |
| | | | | | | | | | | | Mars | 261°40.2 08:28 |
| | | | | | | | | | | | Jupiter | 225°36.4 10:51 |
| | | | | | | | | | | | Saturn | 345°58.5 02:50 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Aug 24 Mon | SHA |
| | | | | | | | | | | | Venus | 165°48.4 14:47 |
| | | | | | | | | | | | Mars | 260°57.9 08:27 |
| | | | | | | | | | | | Jupiter | 225°23.3 10:48 |
| | | | | | | | | | | | Saturn | 346°00.9 02:46 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Aug 25 Tue | SHA |
| | | | | | | | | | | | Venus | 165°01.8 14:46 |
| | | | | | | | | | | | Mars | 260°15.7 08:25 |
| | | | | | | | | | | | Jupiter | 225°10.3 10:45 |
| | | | | | | | | | | | Saturn | 346°03.3 02:42 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Horizontal parallax | |
| | | | | | | | | | | | Venus: | 0.2 |
| | | | | | | | | | | | Mars: | 0.1 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Mer.pass. 01:47 | •0.5' d1.1' m-4.53 |
| | | | | | | | | | | | •0.7' d-0.1' m1.26 | |
| | | | | | | | | | | | •1.9' d-0.1' m-1.80 | |
| | | | | | | | | | | | •2.6' d-0.1' m0.51 | |


| Sun | | | Moon | | | | |
|-------------|----------|----------|------------|-------|----------|-------|-------|
| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 179°18.3 | N11°30.2 | 59°37.2 | 10.0' | S27°55.7 | -1.8' | 54.2' |
| 1 | 194°18.4 | 29.4 | 74°06.2 | 10.0' | 27°53.9 | -2.0' | 54.2' |
| 2 | 209°18.6 | 28.5 | 88°35.2 | 10.0' | 27°51.9 | -2.1' | 54.2' |
| 3 | 224°18.7 | 27.7 | 103°04.2 | 10.0' | 27°49.8 | -2.3' | 54.2' |
| 4 | 239°18.9 | 26.8 | 117°33.2 | 10.0' | 27°47.5 | -2.4' | 54.2' |
| 5 | 254°19.1 | 26.0 | 132°02.2 | 10.0' | 27°45.1 | -2.5' | 54.2' |
| 6 | 269°19.2 | N11°25.2 | 146°31.2 | 10.1' | S27°42.6 | -2.7' | 54.2' |
| 7 | 284°19.4 | 24.3 | 161°00.3 | 10.1' | 27°40.0 | -2.8' | 54.2' |
| 8 | 299°19.6 | 23.5 | 175°29.3 | 10.1' | 27°37.2 | -2.9' | 54.2' |
| 9 | 314°19.7 | 22.6 | 189°58.4 | 10.1' | 27°34.2 | -3.1' | 54.2' |
| 10 | 329°19.9 | 21.8 | 204°27.5 | 10.1' | 27°31.2 | -3.2' | 54.2' |
| 11 | 344°20.1 | 20.9 | 218°56.7 | 10.2' | 27°28.0 | -3.3' | 54.2' |
| 12 | 359°20.2 | N11°20.1 | 233°25.8 | 10.2' | S27°24.7 | -3.5' | 54.2' |
| 13 | 14°20.4 | 19.2 | 247°55.0 | 10.2' | 27°21.2 | -3.6' | 54.2' |
| 14 | 29°20.6 | 18.4 | 262°24.2 | 10.2' | 27°17.6 | -3.7' | 54.2' |
| 15 | 44°20.7 | 17.5 | 276°53.4 | 10.2' | 27°13.9 | -3.9' | 54.2' |
| 16 | 59°20.9 | 16.7 | 291°22.7 | 10.3' | 27°10.0 | -4.0' | 54.3' |
| 17 | 74°21.1 | 15.8 | 305°51.9 | 10.3' | 27°06.0 | -4.1' | 54.3' |
| 18 | 89°21.2 | N11°15.0 | 320°21.2 | 10.3' | S27°01.9 | -4.3' | 54.3' |
| 19 | 104°21.4 | 14.1 | 334°50.6 | 10.4' | 26°57.7 | -4.4' | 54.3' |
| 20 | 119°21.6 | 13.3 | 349°19.9 | 10.4' | 26°53.3 | -4.5' | 54.3' |
| 21 | 134°21.7 | 12.4 | 3°49.3 | 10.4' | 26°48.8 | -4.6' | 54.3' |
| 22 | 149°21.9 | 11.6 | 18°18.7 | 10.4' | 26°44.1 | -4.8' | 54.3' |
| 23 | 164°22.1 | 10.7 | 32°48.2 | 10.5' | 26°39.4 | -4.9' | 54.3' |
| SD = 15.8' | | | SD = 14.8' | | | | |
| $d = -0.8'$ | | | | | | | |

| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
|-------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 179°22.2 | N11°09.8 | 47°17.6 | 10.5' | S26°34.5 | -5.0' | 54.3' |
| 1 | 194°22.4 | 09.0 | 61°47.2 | 10.5' | 26°29.4 | -5.2' | 54.3' |
| 2 | 209°22.6 | 08.1 | 76°16.7 | 10.6' | 26°24.3 | -5.3' | 54.3' |
| 3 | 224°22.7 | 07.3 | 90°46.3 | 10.6' | 26°19.0 | -5.4' | 54.4' |
| 4 | 239°22.9 | 06.4 | 105°15.9 | 10.7' | 26°13.6 | -5.5' | 54.4' |
| 5 | 254°23.1 | 05.6 | 119°45.6 | 10.7' | 26°08.0 | -5.7' | 54.4' |
| 6 | 269°23.2 | N11°04.7 | 134°15.2 | 10.7' | S26°02.4 | -5.8' | 54.4' |
| 7 | 284°23.4 | 03.9 | 148°45.0 | 10.8' | 25°56.6 | -5.9' | 54.4' |
| 8 | 299°23.6 | 03.0 | 163°14.7 | 10.8' | 25°50.7 | -6.0' | 54.4' |
| 9 | 314°23.7 | 02.2 | 177°44.5 | 10.8' | 25°44.6 | -6.2' | 54.4' |
| 10 | 329°23.9 | 01.3 | 192°14.4 | 10.9' | 25°38.4 | -6.3' | 54.4' |
| 11 | 344°24.1 | 11°00.4 | 206°44.2 | 10.9' | 25°32.1 | -6.4' | 54.4' |
| 12 | 359°24.2 | N10°59.6 | 221°14.2 | 11.0' | S25°25.7 | -6.5' | 54.5' |
| 13 | 14°24.4 | 58.7 | 235°44.1 | 11.0' | 25°19.2 | -6.7' | 54.5' |
| 14 | 29°24.6 | 57.9 | 250°14.1 | 11.0' | 25°12.5 | -6.8' | 54.5' |
| 15 | 44°24.8 | 57.0 | 264°44.2 | 11.1' | 25°05.8 | -6.9' | 54.5' |
| 16 | 59°24.9 | 56.2 | 279°14.2 | 11.1' | 24°58.9 | -7.0' | 54.5' |
| 17 | 74°25.1 | 55.3 | 293°44.4 | 11.2' | 24°51.8 | -7.1' | 54.5' |
| 18 | 89°25.3 | N10°54.4 | 308°14.5 | 11.2' | S24°44.7 | -7.3' | 54.5' |
| 19 | 104°25.4 | 53.6 | 322°44.7 | 11.3' | 24°37.4 | -7.4' | 54.6' |
| 20 | 119°25.6 | 52.7 | 337°15.0 | 11.3' | 24°30.0 | -7.5' | 54.6' |
| 21 | 134°25.8 | 51.9 | 351°45.3 | 11.3' | 24°22.5 | -7.6' | 54.6' |
| 22 | 149°25.9 | 51.0 | 6°15.7 | 11.4' | 24°14.9 | -7.7' | 54.6' |
| 23 | 164°26.1 | 50.1 | 20°46.0 | 11.4' | 24°07.2 | -7.9' | 54.6' |
| SD = 15.8' | | | SD = 14.8' | | | | |
| $d = -0.9'$ | | | | | | | |

| Tue | GHA | Dec | GHA | ν | Dec | d | HP |
|-------------|----------|----------|------------|-------|----------|--------|-------|
| 0 | 179°26.3 | N10°49.3 | 35°16.5 | 11.5' | S23°59.3 | -8.0' | 54.6' |
| 1 | 194°26.5 | 48.4 | 49°47.0 | 11.5' | 23°51.4 | -8.1' | 54.6' |
| 2 | 209°26.6 | 47.6 | 64°17.5 | 11.6' | 23°43.3 | -8.2' | 54.7' |
| 3 | 224°26.8 | 46.7 | 78°48.1 | 11.6' | 23°35.1 | -8.3' | 54.7' |
| 4 | 239°27.0 | 45.8 | 93°18.7 | 11.7' | 23°26.8 | -8.4' | 54.7' |
| 5 | 254°27.2 | 45.0 | 107°49.4 | 11.7' | 23°18.4 | -8.5' | 54.7' |
| 6 | 269°27.3 | N10°44.1 | 122°20.1 | 11.8' | S23°09.8 | -8.6' | 54.7' |
| 7 | 284°27.5 | 43.3 | 136°50.8 | 11.8' | 23°01.2 | -8.8' | 54.7' |
| 8 | 299°27.7 | 42.4 | 151°21.6 | 11.9' | 22°52.4 | -8.9' | 54.7' |
| 9 | 314°27.8 | 41.5 | 165°52.5 | 11.9' | 22°43.6 | -9.0' | 54.8' |
| 10 | 329°28.0 | 40.7 | 180°23.4 | 12.0' | 22°34.6 | -9.1' | 54.8' |
| 11 | 344°28.2 | 39.8 | 194°54.3 | 12.0' | 22°25.5 | -9.2' | 54.8' |
| 12 | 359°28.4 | N10°38.9 | 209°25.3 | 12.0' | S22°16.3 | -9.3' | 54.8' |
| 13 | 14°28.5 | 38.1 | 223°56.4 | 12.1' | 22°07.0 | -9.4' | 54.8' |
| 14 | 29°28.7 | 37.2 | 238°27.5 | 12.1' | 21°57.6 | -9.5' | 54.8' |
| 15 | 44°28.9 | 36.3 | 252°58.6 | 12.2' | 21°48.1 | -9.6' | 54.9' |
| 16 | 59°29.1 | 35.5 | 267°29.8 | 12.2' | 21°38.5 | -9.7' | 54.9' |
| 17 | 74°29.2 | 34.6 | 282°01.1 | 12.3' | 21°28.8 | -9.8' | 54.9' |
| 18 | 89°29.4 | N10°33.7 | 296°32.3 | 12.3' | S21°18.9 | -9.9' | 54.9' |
| 19 | 104°29.6 | 32.9 | 311°03.7 | 12.4' | 21°09.0 | -10.0' | 54.9' |
| 20 | 119°29.8 | 32.0 | 325°35.1 | 12.4' | 20°59.0 | -10.1' | 54.9' |
| 21 | 134°29.9 | 31.1 | 340°06.5 | 12.5' | 20°48.9 | -10.2' | 55.0' |
| 22 | 149°30.1 | 30.3 | 354°38.0 | 12.5' | 20°38.6 | -10.3' | 55.0' |
| 23 | 164°30.3 | 29.4 | 9°09.5 | 12.6' | 20°28.3 | -10.4' | 55.0' |
| SD = 15.8' | | | SD = 14.9' | | | | |
| $d = -0.9'$ | | | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | 01:15 | 03:20 | 20:41 | 22:38 | //// |
| N 70° | //// | 02:09 | 03:40 | 20:22 | 21:50 | //// |
| 68° | //// | 02:41 | 03:56 | 20:06 | 21:20 | //// |
| 66° | 01:05 | 03:04 | 04:08 | 19:54 | 20:58 | 22:50 |
| 64° | 01:53 | 03:22 | 04:19 | 19:44 | 20:40 | 22:07 |
| 62° | 02:22 | 03:36 | 04:28 | 19:35 | 20:26 | 21:39 |
| 60° | 02:43 | 03:48 | 04:36 | 19:27 | 20:15 | 21:19 |
| N 58° | 03:00 | 03:58 | 04:43 | 19:21 | 20:04 | 21:02 |
| 56° | 03:14 | 04:07 | 04:48 | 19:15 | 19:56 | 20:48 |
| 54° | 03:26 | 04:15 | 04:54 | 19:10 | 19:48 | 20:37 |
| 52° | 03:36 | 04:22 | 04:59 | 19:05 | 19:41 | 20:27 |
| 50° | 03:45 | 04:28 | 05:03 | 19:01 | 19:35 | 20:18 |
| 45° | 04:04 | 04:41 | 05:12 | 18:52 | 19:22 | 20:00 |
| N 40° | 04:18 | 04:52 | 05:20 | 18:44 | 19:12 | 19:46 |
| 35° | 04:29 | 05:00 | 05:27 | 18:37 | 19:04 | 19:35 |
| 30° | 04:39 | 05:08 | 05:33 | 18:32 | 18:56 | 19:26 |
| 20° | 04:53 | 05:20 | 05:42 | 18:22 | 18:45 | 19:11 |
| N 10° | 05:05 | 05:30 | 05:51 | 18:14 | 18:35 | 19:00 |
| 0° | 05:14 | 05:38 | 05:59 | 18:06 | 18:27 | 18:51 |
| S 10° | 05:21 | 05:46 | 06:07 | 17:58 | 18:19 | 18:44 |
| 20° | 05:27 | 05:53 | 06:15 | 17:50 | 18:12 | 18:38 |
| 30° | 05:32 | 06:00 | 06:24 | 17:41 | 18:05 | 18:33 |
| 35° | 05:35 | 06:04 | 06:30 | 17:35 | 18:01 | 18:31 |
| 40° | 05:37 | 06:08 | 06:36 | 17:30 | 17:57 | 18:29 |
| 45° | 05:39 | 06:13 | 06:43 | 17:23 | 17:53 | 18:27 |
| S 50° | 05:40 | 06:18 | 06:51 | 17:15 | 17:48 | 18:25 |
| 52° | 05:41 | 06:20 | 06:55 | 17:11 | 17:45 | 18:25 |
| 54° | 05:42 | 06:23 | 06:59 | 17:07 | 17:43 | 18:24 |
| 56° | 05:42 | 06:25 | 07:04 | 17:02 | 17:40 | 18:24 |
| 58° | 05:43 | 06:28 | 07:09 | 16:57 | 17:38 | 18:23 |
| S 60° | 05:43 | 06:31 | 07:14 | 16:51 | 17:34 | 18:23 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | ■ | ■ | ■ | ■ | ■ | ■ |
| 68° | ■ | ■ | 21:04 | ■ | ■ | 23:57 |
| 66° | ■ | ■ | 20:17 | ■ | ■ | ■ |
| 64° | ■ | 20:10 | 19:47 | ■ | 23:09 | |
| 62° | 19:36 | 19:29 | 19:24 | 21:59 | 23:49 | |
| 60° | 18:49 | 19:01 | 19:05 | 22:45 | | 00:17 |
| N 58° | 18:19 | 18:39 | 18:50 | 23:14 | | 00:38 |
| 56° | 17:56 | 18:21 | 18:36 | 23:37 | | 00:56 |
| 54° | 17:37 | 18:06 | 18:25 | 23:56 | | 01:11 |
| 52° | 17:22 | 17:52 | 18:15 | | 00:11 | 01:23 |
| 50° | 17:08 | 17:41 | 18:06 | | 00:25 | 01:35 |
| 45° | 16:40 | 17:17 | 17:46 | | 00:52 | 01:58 |
| N 40° | 16:18 | 16:57 | 17:30 | 00:16 | 01:14 | 02:16 |
| 35° | 15:59 | 16:41 | 17:17 | 00:35 | 01:32 | 02:32 |
| 30° | 15:43 | 16:27 | 17:05 | 00:52 | 01:47 | 02:45 |
| 20° | 15:17 | 16:03 | 16:45 | 01:19 | 02:13 | 03:08 |
| N 10° | 14:53 | 15:42 | 16:27 | 01:43 | 02:36 | 03:28 |
| 0° | 14:32 | 15:22 | 16:11 | 02:05 | 02:56 | 03:46 |
| S 10° | 14:10 | 15:03 | 15:54 | 02:28 | 03:17 | 04:04 |
| 20° | 13:47 | 14:42 | 15:36 | 02:51 | 03:39 | 04:23 |
| 30° | 13:20 | 14:17 | 15:16 | 03:19 | 04:05 | 04:45 |
| 35° | 13:04 | 14:03 | 15:04 | 03:35 | 04:20 | 04:58 |
| 40° | 12:45 | 13:46 | 14:50 | 03:54 | 04:37 | 05:13 |
| 45° | 12:23 | 13:26 | 14:33 | 04:17 | 04:58 | 05:31 |
| S 50° | 11:54 | 13:01 | 14:13 | 04:46 | 05:24 | 05:52 |
| 52° | 11:40 | 12:48 | 14:03 | 05:00 | 05:36 | 06:03 |
| 54° | 11:23 | 12:34 | 13:52 | 05:17 | 05:51 | 06:14 |
| 56° | 11:04 | 12:18 | 13:39 | 05:37 | 06:08 | 06:27 |
| 58° | 10:39 | 11:58 | 13:24 | 06:01 | 06:28 | 06:43 |
| S 60° | 10:06 | 11:33 | 13:07 | 06:35 | 06:53 | 07:01 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|--------------|-----------|-------|---|
| | Eqn.of Time | | Mer. Pass | Mer.Pass. | | Age 11-13 76-90% |
| | 00 ^h | 12 ^h | | Upper | Lower | |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | |
| 23 | 02:47 | 02:39 | 12:03 | 20:44 | 08:19 |  |
| 24 | 02:31 | 02:23 | 12:02 | 21:34 | 09:09 | |
| 25 | 02:15 | 02:07 | 12:02 | 22:22 | 09:58 | |

August 26, 27, 28 UT (Wed., Thu., Fri.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | | Stars | |
|-----------------|----------|--|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|---------------------|---------------------|
| Wed | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec |
| 0 | 334°15.7 | | 138°31.4 | S09°34.0 | 233°49.4 | N23°32.2 | 199°13.1 | N17°34.2 | 320°21.6 | N03°05.7 | Alpheratz | 357°33.0 29°14.3 |
| 1 | 349°18.2 | | 153°32.0 | 35.1 | 248°50.1 | 32.2 | 214°15.0 | 34.1 | 335°24.2 | 05.6 | Ankaa | 353°05.4 -42°09.4 |
| 2 | 4°20.6 | | 168°32.5 | 36.2 | 263°50.8 | 32.1 | 229°16.9 | 33.9 | 350°26.7 | 05.6 | Schedar | 349°29.0 56°41.0 |
| 3 | 19°23.1 | | 183°33.1 | •• 37.3 | 278°51.5 | •• 32.0 | 244°18.8 | •• 33.8 | 5°29.3 | •• 05.5 | Diphda | 348°45.7 -17°50.2 |
| 4 | 34°25.6 | | 198°33.6 | 38.4 | 293°52.2 | 31.9 | 259°20.8 | 33.6 | 20°31.9 | 05.4 | Achernar | 335°18.8 -57°05.7 |
| 5 | 49°28.0 | | 213°34.2 | 39.5 | 308°52.9 | 31.8 | 274°22.7 | 33.5 | 35°34.5 | 05.4 | Hamal | 327°49.5 23°35.4 |
| 6 | 64°30.5 | | 228°34.7 | S09°40.6 | 323°53.6 | N23°31.8 | 289°24.6 | N17°33.3 | 50°37.0 | N03°05.3 | Polaris | 313°12.0 89°22.3 |
| 7 | 79°33.0 | | 243°35.3 | 41.7 | 338°54.3 | 31.7 | 304°26.5 | 33.2 | 65°39.6 | 05.3 | Acamar | 315°10.6 -40°11.5 |
| 8 | 94°35.4 | | 258°35.9 | 42.8 | 353°55.1 | 31.6 | 319°28.5 | 33.0 | 80°42.2 | 05.2 | Menkar | 314°04.6 4°11.8 |
| 9 | 109°37.9 | | 273°36.4 | •• 43.9 | 8°55.8 | •• 31.5 | 334°30.4 | •• 32.9 | 95°44.8 | •• 05.2 | Mirfak | 308°26.2 49°57.2 |
| 10 | 124°40.3 | | 288°37.0 | 45.0 | 23°56.5 | 31.4 | 349°32.3 | 32.7 | 110°47.3 | 05.1 | Aldebaran | 290°38.1 16°33.8 |
| 11 | 139°42.8 | | 303°37.6 | 46.2 | 38°57.2 | 31.3 | 4°34.2 | 32.6 | 125°49.9 | 05.1 | Rigel | 281°02.6 -8°10.1 |
| 12 | 154°45.3 | | 318°38.1 | S09°47.3 | 53°57.9 | N23°31.3 | 19°36.2 | N17°32.5 | 140°52.5 | N03°05.0 | Capella | 280°20.0 46°01.3 |
| 13 | 169°47.7 | | 333°38.7 | 48.4 | 68°58.6 | 31.2 | 34°38.1 | 32.3 | 155°55.0 | 04.9 | Bellatrix | 278°21.5 6°22.5 |
| 14 | 184°50.2 | | 348°39.2 | 49.5 | 83°59.4 | 31.1 | 49°40.0 | 32.2 | 170°57.6 | 04.9 | Elnath | 278°00.3 28°37.8 |
| 15 | 199°52.7 | | 3°39.8 | •• 50.6 | 99°00.1 | •• 31.0 | 64°41.9 | •• 32.0 | 186°00.2 | •• 04.8 | Alnilam | 275°36.5 -1°10.9 |
| 16 | 214°55.1 | | 18°40.4 | 51.7 | 114°00.8 | 30.9 | 79°43.9 | 31.9 | 201°02.8 | 04.8 | Betelgeuse | 270°50.8 7°24.8 |
| 17 | 229°57.6 | | 33°41.0 | 52.8 | 129°01.5 | 30.8 | 94°45.8 | 31.7 | 216°05.3 | 04.7 | Canopus | 263°52.1 -52°42.3 |
| 18 | 245°00.1 | | 48°41.5 | S09°53.9 | 144°02.2 | N23°30.8 | 109°47.7 | N17°31.6 | 231°07.9 | N03°04.7 | Sirius | 258°25.2 -16°45.0 |
| 19 | 260°02.5 | | 63°42.1 | 55.0 | 159°02.9 | 30.7 | 124°49.7 | 31.4 | 246°10.5 | 04.6 | Adhara | 255°05.0 -29°00.3 |
| 20 | 275°05.0 | | 78°42.7 | 56.1 | 174°03.7 | 30.6 | 139°51.6 | 31.3 | 261°13.1 | 04.5 | Procyon | 244°49.7 5°09.5 |
| 21 | 290°07.5 | | 93°43.2 | •• 57.2 | 189°04.4 | •• 30.5 | 154°53.5 | •• 31.1 | 276°15.6 | •• 04.5 | Pollux | 243°15.9 27°57.7 |
| 22 | 305°09.9 | | 108°43.8 | 58.3 | 204°05.1 | 30.4 | 169°55.4 | 31.0 | 291°18.2 | 04.4 | Avior | 234°14.8 -59°35.5 |
| 23 | 320°12.4 | | 123°44.4 | 59.4 | 219°05.8 | 30.3 | 184°57.4 | 30.8 | 306°20.8 | 04.4 | Suhail | 222°45.7 -43°32.3 |
| Mer.pass. 01:43 | | | •0.6' d1.1' m-4.55 | | •0.7' d-0.1' m1.26 | | •1.9' d-0.1' m-1.80 | | •2.6' d-0.1' m0.51 | | Miaplacidus | 221°38.9 -69°49.5 |
| | | | | | | | | | | | Alphard | 217°46.7 -8°46.4 |
| | | | | | | | | | | | Regulus | 207°33.3 11°50.3 |
| | | | | | | | | | | | Dubhe | 193°40.0 61°36.5 |
| | | | | | | | | | | | Denebola | 182°23.9 14°25.5 |
| | | | | | | | | | | | Gienah | 175°42.5 -17°41.4 |
| | | | | | | | | | | | Acrux | 172°59.2 -63°15.0 |
| | | | | | | | | | | | Gacrux | 171°50.6 -57°15.9 |
| | | | | | | | | | | | Alioth | 166°12.2 55°49.1 |
| | | | | | | | | | | | Spica | 158°21.1 -11°18.0 |
| | | | | | | | | | | | Alkaid | 152°51.2 49°11.0 |
| | | | | | | | | | | | Hadar | 148°34.4 -60°30.3 |
| | | | | | | | | | | | Menkent | 147°56.2 -36°30.2 |
| | | | | | | | | | | | Arcturus | 145°46.8 19°02.8 |
| | | | | | | | | | | | Rigel Kent. | 139°38.7 -60°57.0 |
| | | | | | | | | | | | Kochab | 137°20.2 74°03.0 |
| | | | | | | | | | | | Zuben'ubi | 136°54.6 -16°09.2 |
| | | | | | | | | | | | Alphecca | 126°02.6 26°37.7 |
| | | | | | | | | | | | Antares | 112°14.1 -26°29.5 |
| | | | | | | | | | | | Atria | 107°07.0 -69°04.7 |
| | | | | | | | | | | | Sabik | 102°01.1 -15°45.4 |
| | | | | | | | | | | | Shaula | 96°08.4 -37°07.5 |
| | | | | | | | | | | | Rasalhague | 95°57.2 12°32.6 |
| | | | | | | | | | | | Eltanin | 90°41.3 51°29.4 |
| | | | | | | | | | | | Kaus Aust. | 83°30.5 -34°22.3 |
| | | | | | | | | | | | Vega | 80°32.1 38°48.7 |
| | | | | | | | | | | | Nunki | 75°45.8 -26°15.8 |
| | | | | | | | | | | | Altair | 61°58.4 8°56.5 |
| | | | | | | | | | | | Peacock | 53°03.1 -56°38.9 |
| | | | | | | | | | | | Deneb | 49°24.5 45°22.7 |
| | | | | | | | | | | | Enif | 33°37.1 10°00.0 |
| | | | | | | | | | | | Al Na'ir | 27°30.7 -46°49.8 |
| | | | | | | | | | | | Fomalhaut | 15°12.7 -29°28.7 |
| | | | | | | | | | | | Scheat | 13°43.5 28°13.8 |
| | | | | | | | | | | | Markab | 13°28.2 15°21.1 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Aug 26 Wed | SHA |
| | | | | | | | | | | | Venus | 164°15.7 14:45 |
| | | | | | | | | | | | Mars | 259°33.6 08:24 |
| | | | | | | | | | | | Jupiter | 224°57.4 10:42 |
| | | | | | | | | | | | Saturn | 346°05.9 02:38 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Aug 27 Thu | SHA |
| | | | | | | | | | | | Venus | 163°30.1 14:44 |
| | | | | | | | | | | | Mars | 258°51.7 08:23 |
| | | | | | | | | | | | Jupiter | 224°44.4 10:39 |
| | | | | | | | | | | | Saturn | 346°08.5 02:34 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Aug 28 Fri | SHA |
| | | | | | | | | | | | Venus | 162°45.1 14:43 |
| | | | | | | | | | | | Mars | 258°09.8 08:22 |
| | | | | | | | | | | | Jupiter | 224°31.6 10:36 |
| | | | | | | | | | | | Saturn | 346°11.2 02:30 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Horizontal parallax | |
| | | | | | | | | | | | Venus: | 0.3 |
| | | | | | | | | | | | Mars: | 0.1 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Mer.pass. 01:35 | •0.6' d1.1' m-4.57 |
| | | | | | | | | | | | Mer.pass. 01:35 | •0.7' d-0.1' m1.25 |
| | | | | | | | | | | | Mer.pass. 01:35 | •1.9' d-0.1' m-1.80 |
| | | | | | | | | | | | Mer.pass. 01:35 | •2.6' d-0.1' m0.50 |


| h | | Sun | | Moon | | | |
|------------|----------|-------------|------------|-------|----------|--------|-------|
| Wed | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 179°30.5 | N10°28.5 | 23°41.1 | 12.6' | S20°17.9 | -10.5' | 55.0' |
| 1 | 194°30.6 | 27.7 | 38°12.7 | 12.7' | 20°07.3 | -10.6' | 55.0' |
| 2 | 209°30.8 | 26.8 | 52°44.3 | 12.7' | 19°56.7 | -10.7' | 55.1' |
| 3 | 224°31.0 | · · 25.9 | 67°16.1 | 12.8' | 19°46.0 | -10.8' | 55.1' |
| 4 | 239°31.2 | 25.1 | 81°47.8 | 12.8' | 19°35.2 | -10.9' | 55.1' |
| 5 | 254°31.4 | 24.2 | 96°19.6 | 12.9' | 19°24.3 | -11.0' | 55.1' |
| 6 | 269°31.5 | N10°23.3 | 110°51.5 | 12.9' | S19°13.3 | -11.1' | 55.1' |
| 7 | 284°31.7 | 22.5 | 125°23.4 | 12.9' | 19°02.2 | -11.2' | 55.2' |
| 8 | 299°31.9 | 21.6 | 139°55.3 | 13.0' | 18°51.0 | -11.3' | 55.2' |
| 9 | 314°32.1 | · · 20.7 | 154°27.3 | 13.0' | 18°39.7 | -11.4' | 55.2' |
| 10 | 329°32.2 | 19.9 | 168°59.3 | 13.1' | 18°28.4 | -11.5' | 55.2' |
| 11 | 344°32.4 | 19.0 | 183°31.4 | 13.1' | 18°16.9 | -11.5' | 55.2' |
| 12 | 359°32.6 | N10°18.1 | 198°03.5 | 13.2' | S18°05.3 | -11.6' | 55.2' |
| 13 | 14°32.8 | 17.2 | 212°35.7 | 13.2' | 17°53.7 | -11.7' | 55.3' |
| 14 | 29°33.0 | 16.4 | 227°07.9 | 13.3' | 17°42.0 | -11.8' | 55.3' |
| 15 | 44°33.1 | · · 15.5 | 241°40.2 | 13.3' | 17°30.2 | -11.9' | 55.3' |
| 16 | 59°33.3 | 14.6 | 256°12.4 | 13.3' | 17°18.3 | -12.0' | 55.3' |
| 17 | 74°33.5 | 13.8 | 270°44.8 | 13.4' | 17°06.3 | -12.1' | 55.3' |
| 18 | 89°33.7 | N10°12.9 | 285°17.2 | 13.4' | S16°54.3 | -12.1' | 55.4' |
| 19 | 104°33.8 | 12.0 | 299°49.6 | 13.5' | 16°42.1 | -12.2' | 55.4' |
| 20 | 119°34.0 | 11.1 | 314°22.0 | 13.5' | 16°29.9 | -12.3' | 55.4' |
| 21 | 134°34.2 | · · 10.3 | 328°54.5 | 13.5' | 16°17.6 | -12.4' | 55.4' |
| 22 | 149°34.4 | 09.4 | 343°27.1 | 13.6' | 16°05.2 | -12.5' | 55.5' |
| 23 | 164°34.6 | 08.5 | 357°59.6 | 13.6' | 15°52.7 | -12.5' | 55.5' |
| SD = 15.8' | | $d = -0.9'$ | SD = 15.0' | | | | |

| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|-------------|------------|-------|----------|--------|-------|
| 0 | 179°34.7 | N10°07.7 | 12°32.3 | 13.7' | S15°40.2 | -12.6' | 55.5' |
| 1 | 194°34.9 | 06.8 | 27°04.9 | 13.7' | 15°27.6 | -12.7' | 55.5' |
| 2 | 209°35.1 | 05.9 | 41°37.6 | 13.7' | 15°14.9 | -12.8' | 55.5' |
| 3 | 224°35.3 | · · 05.0 | 56°10.3 | 13.8' | 15°02.1 | -12.8' | 55.6' |
| 4 | 239°35.5 | 04.2 | 70°43.1 | 13.8' | 14°49.3 | -12.9' | 55.6' |
| 5 | 254°35.7 | 03.3 | 85°15.9 | 13.8' | 14°36.4 | -13.0' | 55.6' |
| 6 | 269°35.8 | N10°02.4 | 99°48.7 | 13.9' | S14°23.4 | -13.1' | 55.6' |
| 7 | 284°36.0 | 01.5 | 114°21.6 | 13.9' | 14°10.3 | -13.1' | 55.6' |
| 8 | 299°36.2 | 10°00.6 | 128°54.5 | 13.9' | 13°57.2 | -13.2' | 55.7' |
| 9 | 314°36.4 | 09°59.8 | 143°27.4 | 14.0' | 13°44.0 | -13.3' | 55.7' |
| 10 | 329°36.6 | 58.9 | 158°00.4 | 14.0' | 13°30.7 | -13.3' | 55.7' |
| 11 | 344°36.7 | 58.0 | 172°33.4 | 14.0' | 13°17.4 | -13.4' | 55.7' |
| 12 | 359°36.9 | N09°57.1 | 187°06.4 | 14.1' | S13°04.0 | -13.5' | 55.7' |
| 13 | 14°37.1 | 56.3 | 201°39.5 | 14.1' | 12°50.5 | -13.5' | 55.8' |
| 14 | 29°37.3 | 55.4 | 216°12.6 | 14.1' | 12°37.0 | -13.6' | 55.8' |
| 15 | 44°37.5 | · · 54.5 | 230°45.7 | 14.1' | 12°23.4 | -13.7' | 55.8' |
| 16 | 59°37.7 | 53.6 | 245°18.8 | 14.2' | 12°09.7 | -13.7' | 55.8' |
| 17 | 74°37.8 | 52.8 | 259°52.0 | 14.2' | 11°56.0 | -13.8' | 55.9' |
| 18 | 89°38.0 | N09°51.9 | 274°25.2 | 14.2' | S11°42.2 | -13.8' | 55.9' |
| 19 | 104°38.2 | 51.0 | 288°58.4 | 14.3' | 11°28.3 | -13.9' | 55.9' |
| 20 | 119°38.4 | 50.1 | 303°31.7 | 14.3' | 11°14.4 | -14.0' | 55.9' |
| 21 | 134°38.6 | · · 49.2 | 318°05.0 | 14.3' | 11°00.5 | -14.0' | 55.9' |
| 22 | 149°38.8 | 48.4 | 332°38.3 | 14.3' | 10°46.4 | -14.1' | 56.0' |
| 23 | 164°38.9 | 47.5 | 347°11.6 | 14.3' | 10°32.4 | -14.1' | 56.0' |
| SD = 15.8' | | $d = -0.9'$ | SD = 15.1' | | | | |

| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|-------------|------------|-------|----------|--------|-------|
| 0 | 179°39.1 | N09°46.6 | 1°44.9 | 14.4' | S10°18.2 | -14.2' | 56.0' |
| 1 | 194°39.3 | 45.7 | 16°18.3 | 14.4' | 10°04.0 | -14.2' | 56.0' |
| 2 | 209°39.5 | 44.8 | 30°51.7 | 14.4' | 09°49.8 | -14.3' | 56.0' |
| 3 | 224°39.7 | · · 43.9 | 45°25.1 | 14.4' | 09°35.5 | -14.3' | 56.1' |
| 4 | 239°39.9 | 43.1 | 59°58.5 | 14.4' | 09°21.2 | -14.4' | 56.1' |
| 5 | 254°40.0 | 42.2 | 74°31.9 | 14.5' | 09°06.8 | -14.4' | 56.1' |
| 6 | 269°40.2 | N09°41.3 | 89°05.4 | 14.5' | S08°52.3 | -14.5' | 56.1' |
| 7 | 284°40.4 | 40.4 | 103°38.9 | 14.5' | 08°37.8 | -14.5' | 56.2' |
| 8 | 299°40.6 | 39.5 | 118°12.4 | 14.5' | 08°23.3 | -14.6' | 56.2' |
| 9 | 314°40.8 | · · 38.7 | 132°45.9 | 14.5' | 08°08.7 | -14.6' | 56.2' |
| 10 | 329°41.0 | 37.8 | 147°19.4 | 14.5' | 07°54.1 | -14.7' | 56.2' |
| 11 | 344°41.2 | 36.9 | 161°52.9 | 14.5' | 07°39.4 | -14.7' | 56.2' |
| 12 | 359°41.3 | N09°36.0 | 176°26.4 | 14.5' | S07°24.7 | -14.8' | 56.3' |
| 13 | 14°41.5 | 35.1 | 191°00.0 | 14.6' | 07°09.9 | -14.8' | 56.3' |
| 14 | 29°41.7 | 34.2 | 205°33.5 | 14.6' | 06°55.1 | -14.8' | 56.3' |
| 15 | 44°41.9 | · · 33.4 | 220°07.1 | 14.6' | 06°40.2 | -14.9' | 56.3' |
| 16 | 59°42.1 | 32.5 | 234°40.7 | 14.6' | 06°25.4 | -14.9' | 56.4' |
| 17 | 74°42.3 | 31.6 | 249°14.2 | 14.6' | 06°10.4 | -15.0' | 56.4' |
| 18 | 89°42.5 | N09°30.7 | 263°47.8 | 14.6' | S05°55.5 | -15.0' | 56.4' |
| 19 | 104°42.7 | 29.8 | 278°21.4 | 14.6' | 05°40.5 | -15.0' | 56.4' |
| 20 | 119°42.8 | 28.9 | 292°55.0 | 14.6' | 05°25.5 | -15.1' | 56.4' |
| 21 | 134°43.0 | · · 28.0 | 307°28.6 | 14.6' | 05°10.4 | -15.1' | 56.5' |
| 22 | 149°43.2 | 27.2 | 322°02.2 | 14.6' | 04°55.3 | -15.1' | 56.5' |
| 23 | 164°43.4 | 26.3 | 336°35.8 | 14.6' | 04°40.2 | -15.2' | 56.5' |
| SD = 15.8' | | $d = -0.9'$ | SD = 15.3' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | 01:49 | 03:36 | 20:23 | 22:06 | //// |
| N 70° | //// | 02:29 | 03:53 | 20:07 | 21:28 | //// |
| 68° | //// | 02:56 | 04:07 | 19:53 | 21:03 | 23:29 |
| 66° | 01:34 | 03:16 | 04:19 | 19:42 | 20:43 | 22:22 |
| 64° | 02:10 | 03:32 | 04:28 | 19:33 | 20:28 | 21:48 |
| 62° | 02:35 | 03:45 | 04:36 | 19:25 | 20:15 | 21:25 |
| 60° | 02:54 | 03:56 | 04:43 | 19:19 | 20:05 | 21:06 |
| N 58° | 03:09 | 04:06 | 04:49 | 19:13 | 19:56 | 20:51 |
| 56° | 03:22 | 04:14 | 04:54 | 19:07 | 19:48 | 20:39 |
| 54° | 03:33 | 04:21 | 04:59 | 19:03 | 19:41 | 20:28 |
| 52° | 03:43 | 04:27 | 05:04 | 18:58 | 19:34 | 20:19 |
| 50° | 03:51 | 04:33 | 05:07 | 18:55 | 19:29 | 20:11 |
| 45° | 04:08 | 04:45 | 05:16 | 18:46 | 19:17 | 19:54 |
| N 40° | 04:21 | 04:55 | 05:23 | 18:39 | 19:07 | 19:41 |
| 35° | 04:32 | 05:03 | 05:29 | 18:34 | 19:00 | 19:31 |
| 30° | 04:41 | 05:10 | 05:34 | 18:28 | 18:53 | 19:22 |
| 20° | 04:54 | 05:21 | 05:43 | 18:20 | 18:42 | 19:08 |
| N 10° | 05:05 | 05:30 | 05:51 | 18:12 | 18:33 | 18:58 |
| 0° | 05:13 | 05:37 | 05:58 | 18:05 | 18:26 | 18:50 |
| S 10° | 05:19 | 05:44 | 06:05 | 17:58 | 18:19 | 18:44 |
| 20° | 05:25 | 05:51 | 06:13 | 17:51 | 18:13 | 18:39 |
| 30° | 05:29 | 05:57 | 06:21 | 17:42 | 18:07 | 18:34 |
| 35° | 05:31 | 06:00 | 06:26 | 17:38 | 18:03 | 18:33 |
| 40° | 05:32 | 06:04 | 06:31 | 17:32 | 18:00 | 18:31 |
| 45° | 05:34 | 06:08 | 06:38 | 17:26 | 17:56 | 18:30 |
| S 50° | 05:35 | 06:12 | 06:45 | 17:19 | 17:52 | 18:29 |
| 52° | 05:35 | 06:14 | 06:48 | 17:16 | 17:50 | 18:29 |
| 54° | 05:35 | 06:16 | 06:52 | 17:12 | 17:48 | 18:29 |
| 56° | 05:35 | 06:18 | 06:56 | 17:08 | 17:46 | 18:29 |
| 58° | 05:35 | 06:21 | 07:01 | 17:03 | 17:44 | 18:29 |
| S 60° | 05:35 | 06:23 | 07:06 | 16:58 | 17:41 | 18:29 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | 21:22 | 20:18 | 19:38 | ■ | 01:18 | 03:56 |
| N 70° | 20:41 | 20:00 | 19:31 | ■ | 01:57 | 04:12 |
| 68° | 20:13 | 19:45 | 19:24 | · · | 02:24 | 04:24 |
| 66° | 19:51 | 19:33 | 19:19 | 00:42 | 02:44 | 04:34 |
| 64° | 19:34 | 19:23 | 19:15 | 01:12 | 03:00 | 04:43 |
| 62° | 19:19 | 19:15 | 19:11 | 01:34 | 03:14 | 04:50 |
| 60° | 19:07 | 19:07 | 19:07 | 01:52 | 03:25 | 04:56 |
| N 58° | 18:56 | 19:01 | 19:04 | 02:06 | 03:35 | 05:02 |
| 56° | 18:47 | 18:55 | 19:01 | 02:19 | 03:43 | 05:06 |
| 54° | 18:39 | 18:50 | 18:59 | 02:30 | 03:50 | 05:11 |
| 52° | 18:32 | 18:45 | 18:57 | 02:40 | 03:57 | 05:14 |
| 50° | 18:25 | 18:41 | 18:54 | 02:48 | 04:03 | 05:18 |
| 45° | 18:10 | 18:31 | 18:50 | 03:06 | 04:16 | 05:25 |
| N 40° | 17:59 | 18:23 | 18:46 | 03:21 | 04:26 | 05:32 |
| 35° | 17:48 | 18:17 | 18:43 | 03:33 | 04:35 | 05:37 |
| 30° | 17:39 | 18:11 | 18:40 | 03:44 | 04:43 | 05:42 |
| 20° | 17:24 | 18:00 | 18:35 | 04:03 | 04:57 | 05:50 |
| N 10° | 17:10 | 17:51 | 18:30 | 04:19 | 05:08 | 05:57 |
| 0° | 16:57 | 17:42 | 18:26 | 04:33 | 05:19 | 06:03 |
| S 10° | 16:45 | 17:34 | 18:22 | 04:48 | 05:30 | 06:10 |
| 20° | 16:31 | 17:24 | 18:17 | 05:04 | 05:41 | 06:17 |
| 30° | 16:15 | 17:14 | 18:12 | 05:22 | 05:54 | 06:24 |
| 35° | 16:06 | 17:07 | 18:09 | 05:32 | 06:02 | 06:29 |
| 40° | 15:55 | 17:00 | 18:06 | 05:44 | 06:10 | 06:34 |
| 45° | 15:42 | 16:52 | 18:02 | 05:58 | 06:20 | 06:39 |
| S 50° | 15:27 | 16:42 | 17:57 | 06:14 | 06:32 | 06:46 |
| 52° | 15:20 | 16:37 | 17:55 | 06:22 | 06:37 | 06:49 |
| 54° | 15:12 | 16:32 | 17:52 | 06:31 | 06:43 | 06:53 |
| 56° | 15:03 | 16:27 | 17:50 | 06:40 | 06:50 | 06:57 |
| 58° | 14:53 | 16:20 | 17:47 | 06:52 | 06:57 | 07:01 |
| S 60° | 14:41 | 16:13 | 17:43 | 07:04 | 07:05 | 07:05 |

| Day | Sun | | | Moon | | |
|-----|--|----------------------------------|--------------------|------------------------------|----------------|---|
| | Eqn. of Time 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer. Pass. Upper hh:mm | Lower hh:mm | Age 14-16 95-100% |
| 26 | 01:58 | 01:50 | 12:02 | 23:08 | 10:45 |  |
| 27 | 01:41 | 01:32 | 12:02 | 23:53 | 11:31 | |
| 28 | 01:24 | 01:15 | 12:01 | —:— | 12:15 | |

August 29, 30, 31 UT (Sat., Sun., Mon.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | | Stars | | |
|-----------------|----------|--------------------|----------|----------|--------------------|----------|---------------------|----------|--------------------|-----|---------------------|------------|-------------------|
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec |
| 0 | 337°13.1 | 139°13.7 | S10°52.7 | 234°41.2 | N23°25.8 | 201°31.9 | N17°23.7 | 323°27.1 | N03°01.6 | | | Alpheratz | 357°33.0 29°14.4 |
| 1 | 352°15.6 | 154°14.3 | 53.8 | 249°41.9 | 25.7 | 216°33.8 | 23.5 | 338°29.7 | 01.5 | | | Ankaa | 353°05.4 -42°09.4 |
| 2 | 7°18.0 | 169°14.9 | 54.9 | 264°42.7 | 25.6 | 231°35.7 | 23.4 | 353°32.3 | 01.5 | | | Schedar | 349°29.0 56°41.0 |
| 3 | 22°20.5 | 184°15.6 | •• 56.0 | 279°43.4 | •• 25.5 | 246°37.6 | •• 23.2 | 8°34.9 | •• 01.4 | | | Diphda | 348°45.7 -17°50.2 |
| 4 | 37°23.0 | 199°16.2 | 57.1 | 294°44.1 | 25.4 | 261°39.6 | 23.1 | 23°37.5 | 01.3 | | | Achernar | 335°18.8 -57°05.7 |
| 5 | 52°25.4 | 214°16.8 | 58.1 | 309°44.8 | 25.3 | 276°41.5 | 23.0 | 38°40.0 | 01.3 | | | Hamal | 327°49.5 23°35.4 |
| 6 | 67°27.9 | 229°17.4 | S10°59.2 | 324°45.6 | N23°25.2 | 291°43.4 | N17°22.8 | 53°42.6 | N03°01.2 | | | Polaris | 313°10.7 89°22.3 |
| 7 | 82°30.4 | 244°18.1 | 11°00.3 | 339°46.3 | 25.1 | 306°45.4 | 22.7 | 68°45.2 | 01.2 | | | Acamar | 315°10.6 -40°11.5 |
| 8 | 97°32.8 | 259°18.7 | 01.4 | 354°47.0 | 24.9 | 321°47.3 | 22.5 | 83°47.8 | 01.1 | | | Menkar | 314°04.6 4°11.8 |
| 9 | 112°35.3 | 274°19.3 | •• 02.4 | 9°47.8 | •• 24.8 | 336°49.2 | •• 22.4 | 98°50.4 | •• 01.0 | | | Mirfak | 308°26.2 49°57.2 |
| 10 | 127°37.8 | 289°20.0 | 03.5 | 24°48.5 | 24.7 | 351°51.2 | 22.2 | 113°53.0 | 01.0 | | | Aldebaran | 290°38.1 16°33.8 |
| 11 | 142°40.2 | 304°20.6 | 04.6 | 39°49.2 | 24.6 | 6°53.1 | 22.1 | 128°55.5 | 00.9 | | | Rigel | 281°02.6 -8°10.1 |
| 12 | 157°42.7 | 319°21.2 | S11°05.6 | 54°49.9 | N23°24.5 | 21°55.0 | N17°21.9 | 143°58.1 | N03°00.9 | | | Capella | 280°20.0 46°01.3 |
| 13 | 172°45.1 | 334°21.9 | 06.7 | 69°50.7 | 24.4 | 36°57.0 | 21.8 | 159°00.7 | 00.8 | | | Bellatrix | 278°21.5 6°22.5 |
| 14 | 187°47.6 | 349°22.5 | 07.8 | 84°51.4 | 24.3 | 51°58.9 | 21.6 | 174°03.3 | 00.7 | | | Elnath | 278°00.2 28°37.8 |
| 15 | 202°50.1 | 4°23.1 | •• 08.9 | 99°52.1 | •• 24.2 | 67°00.8 | •• 21.5 | 189°05.9 | •• 00.7 | | | Alnilam | 275°36.4 -1°10.9 |
| 16 | 217°52.5 | 19°23.8 | 09.9 | 114°52.9 | 24.1 | 82°02.7 | 21.3 | 204°08.5 | 00.6 | | | Betelgeuse | 270°50.7 7°24.8 |
| 17 | 232°55.0 | 34°24.4 | 11.0 | 129°53.6 | 24.0 | 97°04.7 | 21.2 | 219°11.0 | 00.6 | | | Canopus | 263°52.1 -52°42.2 |
| 18 | 247°57.5 | 49°25.0 | S11°12.1 | 144°54.3 | N23°23.9 | 112°06.6 | N17°21.1 | 234°13.6 | N03°00.5 | | | Sirius | 258°25.2 -16°45.0 |
| 19 | 262°59.9 | 64°25.7 | 13.1 | 159°55.1 | 23.8 | 127°08.5 | 20.9 | 249°16.2 | 00.4 | | | Adhara | 255°05.0 -29°00.3 |
| 20 | 278°02.4 | 79°26.3 | 14.2 | 174°55.8 | 23.7 | 142°10.5 | 20.8 | 264°18.8 | 00.4 | | | Procyon | 244°49.6 5°09.5 |
| 21 | 293°04.9 | 94°27.0 | •• 15.3 | 189°56.5 | •• 23.6 | 157°12.4 | •• 20.6 | 279°21.4 | •• 00.3 | | | Pollux | 243°15.9 27°57.7 |
| 22 | 308°07.3 | 109°27.6 | 16.3 | 204°57.3 | 23.5 | 172°14.3 | 20.5 | 294°24.0 | 00.3 | | | Avior | 234°14.7 -59°35.5 |
| 23 | 323°09.8 | 124°28.2 | 17.4 | 219°58.0 | 23.4 | 187°16.3 | 20.3 | 309°26.6 | 00.2 | | | Suhail | 222°45.7 -43°32.3 |
| Mer.pass. 01:31 | | ν0.6' d1.1' m-4.58 | | | ν0.7' d-0.1' m1.25 | | ν1.9' d-0.1' m-1.80 | | ν2.6' d-0.1' m0.49 | | Miaplacidus | | 221°38.9 -69°49.5 |
| | | | | | | | | | | | Alphard | | 217°46.7 -8°46.4 |
| | | | | | | | | | | | Regulus | | 207°33.3 11°50.3 |
| | | | | | | | | | | | Dubhe | | 193°40.0 61°36.5 |
| | | | | | | | | | | | Denebola | | 182°23.9 14°25.5 |
| | | | | | | | | | | | Gienah | | 175°42.5 -17°41.4 |
| | | | | | | | | | | | Acrux | | 172°59.2 -63°15.0 |
| | | | | | | | | | | | Gacrux | | 171°50.6 -57°15.9 |
| | | | | | | | | | | | Alioth | | 166°12.2 55°49.1 |
| | | | | | | | | | | | Spica | | 158°21.1 -11°18.0 |
| | | | | | | | | | | | Alkaid | | 152°51.2 49°11.0 |
| | | | | | | | | | | | Hadar | | 148°34.4 -60°30.3 |
| | | | | | | | | | | | Menkent | | 147°56.2 -36°30.2 |
| | | | | | | | | | | | Arcturus | | 145°46.8 19°02.8 |
| | | | | | | | | | | | Rigel Kent. | | 139°38.7 -60°57.0 |
| | | | | | | | | | | | Kochab | | 137°20.3 74°03.0 |
| | | | | | | | | | | | Zuben'ubi | | 136°54.6 -16°09.2 |
| | | | | | | | | | | | Alphecca | | 126°02.7 26°37.7 |
| | | | | | | | | | | | Antares | | 112°14.1 -26°29.5 |
| | | | | | | | | | | | Atria | | 107°07.0 -69°04.8 |
| | | | | | | | | | | | Sabik | | 102°01.1 -15°45.4 |
| | | | | | | | | | | | Shaula | | 96°08.4 -37°07.5 |
| | | | | | | | | | | | Rasalhague | | 95°57.2 12°32.6 |
| | | | | | | | | | | | Eltanin | | 90°41.3 51°29.4 |
| | | | | | | | | | | | Kaus Aust. | | 83°30.5 -34°22.3 |
| | | | | | | | | | | | Vega | | 80°32.1 38°48.7 |
| | | | | | | | | | | | Nunki | | 75°45.8 -26°15.8 |
| | | | | | | | | | | | Altair | | 61°58.4 8°56.5 |
| | | | | | | | | | | | Peacock | | 53°03.1 -56°39.0 |
| | | | | | | | | | | | Deneb | | 49°24.5 45°22.7 |
| | | | | | | | | | | | Enif | | 33°37.1 10°00.0 |
| | | | | | | | | | | | Al Na'ir | | 27°30.7 -46°49.8 |
| | | | | | | | | | | | Fomalhaut | | 15°12.6 -29°28.7 |
| | | | | | | | | | | | Scheat | | 13°43.5 28°13.8 |
| | | | | | | | | | | | Markab | | 13°28.2 15°21.1 |
| | | | | | | | | | | | Aug 29 Sat | | SHA Mer.pass |
| | | | | | | | | | | | Venus | | 162°00.6 14:42 |
| | | | | | | | | | | | Mars | | 257°28.1 08:21 |
| | | | | | | | | | | | Jupiter | | 224°18.7 10:33 |
| | | | | | | | | | | | Saturn | | 346°14.0 02:26 |
| | | | | | | | | | | | Aug 30 Sun | | SHA Mer.pass |
| | | | | | | | | | | | Venus | | 161°16.6 14:41 |
| | | | | | | | | | | | Mars | | 256°46.5 08:20 |
| | | | | | | | | | | | Jupiter | | 224°05.9 10:29 |
| | | | | | | | | | | | Saturn | | 346°16.9 02:22 |
| | | | | | | | | | | | Aug 31 Mon | | SHA Mer.pass |
| | | | | | | | | | | | Venus | | 160°33.3 14:40 |
| | | | | | | | | | | | Mars | | 256°05.0 08:19 |
| | | | | | | | | | | | Jupiter | | 223°53.2 10:26 |
| | | | | | | | | | | | Saturn | | 346°19.8 02:18 |
| | | | | | | | | | | | Horizontal parallax | | |
| | | | | | | | | | | | Venus: | | 0.3 |
| | | | | | | | | | | | Mars: | | 0.1 |
| Mer.pass. 01:23 | | ν0.7' d1.1' m-4.61 | | | ν0.7' d-0.1' m1.25 | | ν1.9' d-0.1' m-1.80 | | ν2.6' d-0.1' m0.48 | | | | |


| h | Sun | | | Moon | | | | |
|------------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| Sat | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 179°43.6 | N09°25.4 | | 351°09.4 | 14.6' | S04°25.0 | -15.2' | 56.5' |
| 1 | 194°43.8 | 24.5 | | 5°43.0 | 14.6' | 04°09.8 | -15.2' | 56.5' |
| 2 | 209°44.0 | 23.6 | | 20°16.5 | 14.6' | 03°54.6 | -15.2' | 56.6' |
| 3 | 224°44.2 | · · 22.7 | | 34°50.1 | 14.6' | 03°39.3 | -15.3' | 56.6' |
| 4 | 239°44.3 | 21.8 | | 49°23.7 | 14.6' | 03°24.1 | -15.3' | 56.6' |
| 5 | 254°44.5 | 20.9 | | 63°57.3 | 14.6' | 03°08.8 | -15.3' | 56.6' |
| 6 | 269°44.7 | N09°20.1 | | 78°30.8 | 14.6' | S02°53.5 | -15.3' | 56.7' |
| 7 | 284°44.9 | 19.2 | | 93°04.4 | 14.5' | 02°38.1 | -15.4' | 56.7' |
| 8 | 299°45.1 | 18.3 | | 107°38.0 | 14.5' | 02°22.7 | -15.4' | 56.7' |
| 9 | 314°45.3 | · · 17.4 | | 122°11.5 | 14.5' | 02°07.3 | -15.4' | 56.7' |
| 10 | 329°45.5 | 16.5 | | 136°45.0 | 14.5' | 01°51.9 | -15.4' | 56.7' |
| 11 | 344°45.7 | 15.6 | | 151°18.5 | 14.5' | 01°36.5 | -15.4' | 56.8' |
| 12 | 359°45.9 | N09°14.7 | | 165°52.0 | 14.5' | S01°21.1 | -15.5' | 56.8' |
| 13 | 14°46.0 | 13.8 | | 180°25.5 | 14.5' | 01°05.6 | -15.5' | 56.8' |
| 14 | 29°46.2 | 12.9 | | 194°59.0 | 14.5' | 00°50.1 | -15.5' | 56.8' |
| 15 | 44°46.4 | · · 12.0 | | 209°32.5 | 14.4' | 00°34.6 | -15.5' | 56.8' |
| 16 | 59°46.6 | 11.2 | | 224°05.9 | 14.4' | 00°19.1 | -15.5' | 56.9' |
| 17 | 74°46.8 | 10.3 | | 238°39.3 | 14.4' | S00°03.6 | -15.5' | 56.9' |
| 18 | 89°47.0 | N09°09.4 | | 253°12.7 | 14.4' | N00°11.9 | 15.5' | 56.9' |
| 19 | 104°47.2 | 08.5 | | 267°46.1 | 14.4' | 00°27.5 | 15.5' | 56.9' |
| 20 | 119°47.4 | 07.6 | | 282°19.5 | 14.3' | 00°43.0 | 15.6' | 57.0' |
| 21 | 134°47.6 | · · 06.7 | | 296°52.8 | 14.3' | 00°58.6 | 15.6' | 57.0' |
| 22 | 149°47.8 | 05.8 | | 311°26.1 | 14.3' | 01°14.1 | 15.6' | 57.0' |
| 23 | 164°48.0 | 04.9 | | 325°59.4 | 14.3' | 01°29.7 | 15.6' | 57.0' |
| SD = 15.8' $d = -0.9'$ | | | SD = 15.4' | | | | | |

| Sun | GHA | Dec | | GHA | ν | Dec | d | HP |
|-------------------------|----------|----------|------------|----------|-------|----------|-------|-------|
| 0 | 179°48.1 | N09°04.0 | | 340°32.6 | 14.2' | N01°45.3 | 15.6' | 57.0' |
| 1 | 194°48.3 | 03.1 | | 355°05.9 | 14.2' | 02°00.9 | 15.6' | 57.1' |
| 2 | 209°48.5 | 02.2 | | 9°39.1 | 14.2' | 02°16.4 | 15.6' | 57.1' |
| 3 | 224°48.7 | 01.3 | | 24°12.2 | 14.1' | 02°32.0 | 15.6' | 57.1' |
| 4 | 239°48.9 | 00°00.4 | | 38°45.4 | 14.1' | 02°47.6 | 15.6' | 57.1' |
| 5 | 254°49.1 | 08°59.5 | | 53°18.5 | 14.1' | 03°03.2 | 15.6' | 57.1' |
| 6 | 269°49.3 | N08°58.7 | | 67°51.5 | 14.0' | N03°18.7 | 15.6' | 57.2' |
| 7 | 284°49.5 | 57.8 | | 82°24.6 | 14.0' | 03°34.3 | 15.6' | 57.2' |
| 8 | 299°49.7 | 56.9 | | 96°57.6 | 14.0' | 03°49.9 | 15.6' | 57.2' |
| 9 | 314°49.9 | 56.0 | | 111°30.5 | 13.9' | 04°05.4 | 15.5' | 57.2' |
| 10 | 329°50.1 | 55.1 | | 126°03.5 | 13.9' | 04°21.0 | 15.5' | 57.2' |
| 11 | 344°50.3 | 54.2 | | 140°36.3 | 13.8' | 04°36.5 | 15.5' | 57.3' |
| 12 | 359°50.5 | N08°53.3 | | 155°09.2 | 13.8' | N04°52.0 | 15.5' | 57.3' |
| 13 | 14°50.6 | 52.4 | | 169°42.0 | 13.8' | 05°07.5 | 15.5' | 57.3' |
| 14 | 29°50.8 | 51.5 | | 184°14.8 | 13.7' | 05°23.0 | 15.5' | 57.3' |
| 15 | 44°51.0 | 50.6 | | 198°47.5 | 13.7' | 05°38.5 | 15.5' | 57.3' |
| 16 | 59°51.2 | 49.7 | | 213°20.1 | 13.6' | 05°54.0 | 15.5' | 57.4' |
| 17 | 74°51.4 | 48.8 | | 227°52.8 | 13.6' | 06°09.5 | 15.4' | 57.4' |
| 18 | 89°51.6 | N08°47.9 | | 242°25.3 | 13.5' | N06°24.9 | 15.4' | 57.4' |
| 19 | 104°51.8 | 47.0 | | 256°57.9 | 13.5' | 06°40.3 | 15.4' | 57.4' |
| 20 | 119°52.0 | 46.1 | | 271°30.3 | 13.4' | 06°55.7 | 15.4' | 57.4' |
| 21 | 134°52.2 | 45.2 | | 286°02.8 | 13.4' | 07°11.1 | 15.4' | 57.5' |
| 22 | 149°52.4 | 44.3 | | 300°35.1 | 13.3' | 07°26.5 | 15.3' | 57.5' |
| 23 | 164°52.6 | 43.4 | | 315°07.5 | 13.3' | 07°41.8 | 15.3' | 57.5' |
| SD = 15.8' d = -0.9' | | | SD = 15.6' | | | | | |

| Mon | GHA | Dec | | GHA | ν | Dec | d | HP |
|-------------------------|----------|----------|------------|----------|-------|----------|-------|-------|
| 0 | 179°52.8 | N08°42.5 | | 329°39.7 | 13.2' | N07°57.1 | 15.3' | 57.5' |
| 1 | 194°53.0 | 41.6 | | 344°11.9 | 13.2' | 08°12.4 | 15.2' | 57.5' |
| 2 | 209°53.2 | 40.7 | | 358°44.1 | 13.1' | 08°27.6 | 15.2' | 57.6' |
| 3 | 224°53.4 | 39.8 | | 13°16.2 | 13.0' | 08°42.8 | 15.2' | 57.6' |
| 4 | 239°53.6 | 38.9 | | 27°48.2 | 13.0' | 08°58.0 | 15.2' | 57.6' |
| 5 | 254°53.8 | 38.0 | | 42°20.2 | 12.9' | 09°13.2 | 15.1' | 57.6' |
| 6 | 269°54.0 | N08°37.1 | | 56°52.1 | 12.8' | N09°28.3 | 15.1' | 57.6' |
| 7 | 284°54.2 | 36.2 | | 71°23.9 | 12.8' | 09°43.4 | 15.0' | 57.7' |
| 8 | 299°54.3 | 35.3 | | 85°55.7 | 12.7' | 09°58.4 | 15.0' | 57.7' |
| 9 | 314°54.5 | 34.4 | | 100°27.5 | 12.7' | 10°13.4 | 15.0' | 57.7' |
| 10 | 329°54.7 | 33.5 | | 114°59.1 | 12.6' | 10°28.4 | 14.9' | 57.7' |
| 11 | 344°54.9 | 32.6 | | 129°30.7 | 12.5' | 10°43.3 | 14.9' | 57.7' |
| 12 | 359°55.1 | N08°31.7 | | 144°02.2 | 12.4' | N10°58.2 | 14.8' | 57.8' |
| 13 | 14°55.3 | 30.8 | | 158°33.7 | 12.4' | 11°13.1 | 14.8' | 57.8' |
| 14 | 29°55.5 | 29.9 | | 173°05.0 | 12.3' | 11°27.9 | 14.8' | 57.8' |
| 15 | 44°55.7 | 29.0 | | 187°36.3 | 12.2' | 11°42.6 | 14.7' | 57.8' |
| 16 | 59°55.9 | 28.1 | | 202°07.6 | 12.2' | 11°57.3 | 14.7' | 57.8' |
| 17 | 74°56.1 | 27.2 | | 216°38.7 | 12.1' | 12°12.0 | 14.6' | 57.8' |
| 18 | 89°56.3 | N08°26.3 | | 231°09.8 | 12.0' | N12°26.6 | 14.6' | 57.9' |
| 19 | 104°56.5 | 25.4 | | 245°40.8 | 11.9' | 12°41.1 | 14.5' | 57.9' |
| 20 | 119°56.7 | 24.5 | | 260°11.8 | 11.9' | 12°55.6 | 14.4' | 57.9' |
| 21 | 134°56.9 | 23.6 | | 274°42.6 | 11.8' | 13°10.0 | 14.4' | 57.9' |
| 22 | 149°57.1 | 22.7 | | 289°13.4 | 11.7' | 13°24.4 | 14.3' | 57.9' |
| 23 | 164°57.3 | 21.8 | | 303°44.1 | 11.6' | 13°38.8 | 14.3' | 58.0' |
| SD = 15.8' d = -0.9' | | | SD = 15.7' | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | 02:16 | 03:51 | 20:06 | 21:39 | //// |
| N 70° | //// | 02:48 | 04:06 | 19:52 | 21:09 | //// |
| 68° | 01:09 | 03:11 | 04:19 | 19:40 | 20:47 | 22:42 |
| 66° | 01:57 | 03:29 | 04:28 | 19:31 | 20:30 | 21:59 |
| 64° | 02:26 | 03:43 | 04:37 | 19:23 | 20:16 | 21:31 |
| 62° | 02:47 | 03:54 | 04:44 | 19:16 | 20:05 | 21:11 |
| 60° | 03:04 | 04:04 | 04:50 | 19:10 | 19:55 | 20:54 |
| N 58° | 03:18 | 04:13 | 04:55 | 19:04 | 19:47 | 20:41 |
| 56° | 03:30 | 04:20 | 05:00 | 19:00 | 19:39 | 20:29 |
| 54° | 03:40 | 04:27 | 05:05 | 18:56 | 19:33 | 20:20 |
| 52° | 03:49 | 04:33 | 05:08 | 18:52 | 19:27 | 20:11 |
| 50° | 03:56 | 04:38 | 05:12 | 18:48 | 19:22 | 20:03 |
| 45° | 04:12 | 04:49 | 05:19 | 18:41 | 19:11 | 19:48 |
| N 40° | 04:25 | 04:58 | 05:26 | 18:35 | 19:03 | 19:36 |
| 35° | 04:34 | 05:05 | 05:31 | 18:30 | 18:55 | 19:26 |
| 30° | 04:43 | 05:11 | 05:36 | 18:25 | 18:49 | 19:18 |
| 20° | 04:55 | 05:22 | 05:44 | 18:17 | 18:39 | 19:06 |
| N 10° | 05:05 | 05:30 | 05:51 | 18:10 | 18:32 | 18:56 |
| 0° | 05:12 | 05:36 | 05:57 | 18:04 | 18:25 | 18:49 |
| S 10° | 05:18 | 05:42 | 06:04 | 17:58 | 18:19 | 18:44 |
| 20° | 05:22 | 05:48 | 06:10 | 17:51 | 18:13 | 18:39 |
| 30° | 05:26 | 05:54 | 06:18 | 17:44 | 18:08 | 18:36 |
| 35° | 05:27 | 05:56 | 06:22 | 17:40 | 18:05 | 18:35 |
| 40° | 05:28 | 05:59 | 06:27 | 17:35 | 18:02 | 18:34 |
| 45° | 05:29 | 06:03 | 06:32 | 17:30 | 17:59 | 18:33 |
| S 50° | 05:29 | 06:06 | 06:39 | 17:23 | 17:56 | 18:33 |
| 52° | 05:29 | 06:08 | 06:42 | 17:20 | 17:55 | 18:34 |
| 54° | 05:28 | 06:09 | 06:45 | 17:17 | 17:53 | 18:34 |
| 56° | 05:28 | 06:11 | 06:49 | 17:14 | 17:51 | 18:34 |
| 58° | 05:28 | 06:13 | 06:53 | 17:10 | 17:49 | 18:35 |
| S 60° | 05:27 | 06:15 | 06:57 | 17:05 | 17:48 | 18:36 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | 19:05 | 18:30 | 17:47 | 06:09 | 08:20 | 10:41 |
| N 70° | 19:05 | 18:39 | 18:08 | 06:14 | 08:14 | 10:22 |
| 68° | 19:06 | 18:46 | 18:24 | 06:17 | 08:10 | 10:08 |
| 66° | 19:06 | 18:53 | 18:38 | 06:20 | 08:06 | 09:56 |
| 64° | 19:06 | 18:58 | 18:49 | 06:23 | 08:03 | 09:47 |
| 62° | 19:07 | 19:02 | 18:58 | 06:25 | 08:00 | 09:39 |
| 60° | 19:07 | 19:06 | 19:07 | 06:26 | 07:58 | 09:32 |
| N 58° | 19:07 | 19:10 | 19:14 | 06:28 | 07:56 | 09:26 |
| 56° | 19:07 | 19:13 | 19:20 | 06:30 | 07:54 | 09:20 |
| 54° | 19:07 | 19:16 | 19:26 | 06:31 | 07:52 | 09:16 |
| 52° | 19:07 | 19:19 | 19:32 | 06:32 | 07:51 | 09:11 |
| 50° | 19:08 | 19:21 | 19:36 | 06:33 | 07:49 | 09:07 |
| 45° | 19:08 | 19:26 | 19:47 | 06:35 | 07:46 | 08:59 |
| N 40° | 19:08 | 19:31 | 19:55 | 06:37 | 07:44 | 08:52 |
| 35° | 19:08 | 19:35 | 20:03 | 06:39 | 07:42 | 08:46 |
| 30° | 19:09 | 19:38 | 20:10 | 06:40 | 07:40 | 08:41 |
| 20° | 19:09 | 19:44 | 20:21 | 06:43 | 07:36 | 08:32 |
| N 10° | 19:09 | 19:49 | 20:31 | 06:45 | 07:33 | 08:24 |
| 0° | 19:10 | 19:54 | 20:41 | 06:47 | 07:31 | 08:16 |
| S 10° | 19:10 | 19:59 | 20:51 | 06:49 | 07:28 | 08:09 |
| 20° | 19:11 | 20:05 | 21:01 | 06:51 | 07:25 | 08:01 |
| 30° | 19:11 | 20:11 | 21:13 | 06:53 | 07:22 | 07:52 |
| 35° | 19:11 | 20:15 | 21:20 | 06:54 | 07:20 | 07:47 |
| 40° | 19:12 | 20:19 | 21:29 | 06:56 | 07:18 | 07:41 |
| 45° | 19:12 | 20:24 | 21:38 | 06:58 | 07:16 | 07:35 |
| S 50° | 19:13 | 20:30 | 21:49 | 07:00 | 07:13 | 07:27 |
| 52° | 19:13 | 20:32 | 21:55 | 07:00 | 07:11 | 07:23 |
| 54° | 19:13 | 20:35 | 22:01 | 07:01 | 07:10 | 07:19 |
| 56° | 19:13 | 20:39 | 22:07 | 07:03 | 07:08 | 07:15 |
| 58° | 19:14 | 20:42 | 22:15 | 07:04 | 07:06 | 07:10 |
| S 60° | 19:14 | 20:47 | 22:23 | 07:05 | 07:05 | 07:04 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|--------------|-----------|-------|---|
| | Eqn.of Time | | Mer. Pass | Mer.Pass. | | Age 17-19 99-91% |
| | 00 ^h | 12 ^h | | Upper | Lower | |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | |
| 29 | 01:06 | 00:57 | 12:01 | 00:36 | 12:58 |  |
| 30 | 00:47 | 00:38 | 12:01 | 01:20 | 13:42 | |
| 31 | 00:29 | 00:19 | 12:00 | 02:05 | 14:29 | |

September 01, 02, 03 UT (Tue., Wed., Thu.)

| h | Aries | | | Venus | | Mars | | Jupiter | | Saturn | |
|---------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------|-----|
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 340°10.5 | 140°01.1 | S12°09.0 | 235°34.1 | N23°17.8 | 203°51.0 | N17°13.2 | 326°33.3 | N02°57.2 | | |
| 1 | 355°13.0 | 155°01.8 | 10.0 | 250°34.8 | 17.6 | 218°53.0 | 13.0 | 341°35.9 | 57.2 | | |
| 2 | 10°15.5 | 170°02.5 | 11.1 | 265°35.6 | 17.5 | 233°54.9 | 12.9 | 356°38.5 | 57.1 | | |
| 3 | 25°17.9 | 185°03.2 | •• 12.1 | 280°36.3 | •• 17.4 | 248°56.8 | •• 12.7 | 11°41.1 | •• 57.0 | | |
| 4 | 40°20.4 | 200°03.9 | 13.1 | 295°37.1 | 17.3 | 263°58.8 | 12.6 | 26°43.7 | 57.0 | | |
| 5 | 55°22.8 | 215°04.6 | 14.2 | 310°37.8 | 17.1 | 279°00.7 | 12.4 | 41°46.3 | 56.9 | | |
| 6 | 70°25.3 | 230°05.3 | S12°15.2 | 325°38.6 | N23°17.0 | 294°02.7 | N17°12.3 | 56°48.9 | N02°56.9 | | |
| 7 | 85°27.8 | 245°06.0 | 16.3 | 340°39.3 | 16.9 | 309°04.6 | 12.1 | 71°51.5 | 56.8 | | |
| 8 | 100°30.2 | 260°06.7 | 17.3 | 355°40.0 | 16.8 | 324°06.5 | 12.0 | 86°54.1 | 56.7 | | |
| 9 | 115°32.7 | 275°07.4 | •• 18.3 | 10°40.8 | •• 16.7 | 339°08.5 | •• 11.8 | 101°56.7 | •• 56.7 | | |
| 10 | 130°35.2 | 290°08.1 | 19.4 | 25°41.5 | 16.5 | 354°10.4 | 11.7 | 116°59.3 | 56.6 | | |
| 11 | 145°37.6 | 305°08.8 | 20.4 | 40°42.3 | 16.4 | 9°12.3 | 11.5 | 132°01.9 | 56.5 | | |
| 12 | 160°40.1 | 320°09.5 | S12°21.4 | 55°43.0 | N23°16.3 | 24°14.3 | N17°11.4 | 147°04.4 | N02°56.5 | | |
| 13 | 175°42.6 | 335°10.2 | 22.5 | 70°43.8 | 16.2 | 39°16.2 | 11.2 | 162°07.0 | 56.4 | | |
| 14 | 190°45.0 | 350°10.9 | 23.5 | 85°44.5 | 16.0 | 54°18.2 | 11.1 | 177°09.6 | 56.4 | | |
| 15 | 205°47.5 | 5°11.7 | •• 24.5 | 100°45.3 | •• 15.9 | 69°20.1 | •• 11.0 | 192°12.2 | •• 56.3 | | |
| 16 | 220°50.0 | 20°12.4 | 25.6 | 115°46.0 | 15.8 | 84°22.0 | 10.8 | 207°14.8 | 56.2 | | |
| 17 | 235°52.4 | 35°13.1 | 26.6 | 130°46.8 | 15.6 | 99°24.0 | 10.7 | 222°17.4 | 56.2 | | |
| 18 | 250°54.9 | 50°13.8 | S12°27.6 | 145°47.5 | N23°15.5 | 114°25.9 | N17°10.5 | 237°20.0 | N02°56.1 | | |
| 19 | 265°57.3 | 65°14.5 | 28.6 | 160°48.2 | 15.4 | 129°27.8 | 10.4 | 252°22.6 | 56.0 | | |
| 20 | 280°59.8 | 80°15.2 | 29.7 | 175°49.0 | 15.3 | 144°29.8 | 10.2 | 267°25.2 | 56.0 | | |
| 21 | 296°02.3 | 95°16.0 | •• 30.7 | 190°49.7 | •• 15.1 | 159°31.7 | •• 10.1 | 282°27.8 | •• 55.9 | | |
| 22 | 311°04.7 | 110°16.7 | 31.7 | 205°50.5 | 15.0 | 174°33.7 | 09.9 | 297°30.4 | 55.9 | | |
| 23 | 326°07.2 | 125°17.4 | 32.8 | 220°51.2 | 14.9 | 189°35.6 | 09.8 | 312°33.0 | 55.8 | | |
| Mer.pass. 01:19 | | | | | | | | | | | |
| ν0.7' d1.0' m-4.62 | | | | | | | | | | | |
| ν0.7' d-0.1' m1.24 | | | | | | | | | | | |
| ν1.9' d-0.1' m-1.80 | | | | | | | | | | | |
| ν2.6' d-0.1' m0.48 | | | | | | | | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 341°09.7 | 140°18.1 | S12°33.8 | 235°52.0 | N23°14.8 | 204°37.5 | N17°09.6 | 327°35.6 | N02°55.7 | | |
| 1 | 356°12.1 | 155°18.8 | 34.8 | 250°52.7 | 14.6 | 219°39.5 | 09.5 | 342°38.1 | 55.7 | | |
| 2 | 11°14.6 | 170°19.6 | 35.8 | 265°53.5 | 14.5 | 234°41.4 | 09.3 | 357°40.7 | 55.6 | | |
| 3 | 26°17.1 | 185°20.3 | •• 36.9 | 280°54.2 | •• 14.4 | 249°43.3 | •• 09.2 | 12°43.3 | •• 55.5 | | |
| 4 | 41°19.5 | 200°21.0 | 37.9 | 295°55.0 | 14.2 | 264°45.3 | 09.1 | 27°45.9 | 55.5 | | |
| 5 | 56°22.0 | 215°21.8 | 38.9 | 310°55.7 | 14.1 | 279°47.2 | 08.9 | 42°48.5 | 55.4 | | |
| 6 | 71°24.5 | 230°22.5 | S12°39.9 | 325°56.5 | N23°14.0 | 294°49.2 | N17°08.8 | 57°51.1 | N02°55.4 | | |
| 7 | 86°26.9 | 245°23.2 | 41.0 | 340°57.2 | 13.8 | 309°51.1 | 08.6 | 72°53.7 | 55.3 | | |
| 8 | 101°29.4 | 260°23.9 | 42.0 | 355°58.0 | 13.7 | 324°53.0 | 08.5 | 87°56.3 | 55.2 | | |
| 9 | 116°31.8 | 275°24.7 | •• 43.0 | 10°58.7 | •• 13.6 | 339°55.0 | •• 08.3 | 102°58.9 | •• 55.2 | | |
| 10 | 131°34.3 | 290°25.4 | 44.0 | 25°59.5 | 13.5 | 354°56.9 | 08.2 | 118°01.5 | 55.1 | | |
| 11 | 146°36.8 | 305°26.1 | 45.0 | 41°00.2 | 13.3 | 9°58.9 | 08.0 | 133°04.1 | 55.0 | | |
| 12 | 161°39.2 | 320°26.9 | S12°46.1 | 56°01.0 | N23°13.2 | 25°00.8 | N17°07.9 | 148°06.7 | N02°55.0 | | |
| 13 | 176°41.7 | 335°27.6 | 47.1 | 71°01.7 | 13.1 | 40°02.7 | 07.7 | 163°09.3 | 54.9 | | |
| 14 | 191°44.2 | 350°28.4 | 48.1 | 86°02.5 | 12.9 | 55°04.7 | 07.6 | 178°11.9 | 54.8 | | |
| 15 | 206°46.6 | 5°29.1 | •• 49.1 | 101°03.2 | •• 12.8 | 70°06.6 | •• 07.4 | 193°14.5 | •• 54.8 | | |
| 16 | 221°49.1 | 20°29.8 | 50.1 | 116°04.0 | 12.7 | 85°08.6 | 07.3 | 208°17.1 | 54.7 | | |
| 17 | 236°51.6 | 35°30.6 | 51.1 | 131°04.7 | 12.5 | 100°10.5 | 07.1 | 223°19.7 | 54.7 | | |
| 18 | 251°54.0 | 50°31.3 | S12°52.2 | 146°05.5 | N23°12.4 | 115°12.4 | N17°07.0 | 238°22.3 | N02°54.6 | | |
| 19 | 266°56.5 | 65°32.1 | 53.2 | 161°06.2 | 12.3 | 130°14.4 | 06.9 | 253°24.9 | 54.5 | | |
| 20 | 281°58.9 | 80°32.8 | 54.2 | 176°07.0 | 12.1 | 145°16.3 | 06.7 | 268°27.5 | 54.5 | | |
| 21 | 297°01.4 | 95°33.6 | •• 55.2 | 191°07.7 | •• 12.0 | 160°18.2 | •• 06.6 | 283°30.0 | •• 54.4 | | |
| 22 | 312°03.9 | 110°34.3 | 56.2 | 206°08.5 | 11.9 | 175°20.2 | 06.4 | 298°32.6 | 54.3 | | |
| 23 | 327°06.3 | 125°35.1 | 57.2 | 221°09.2 | 11.7 | 190°22.1 | 06.3 | 313°35.2 | 54.3 | | |
| Mer.pass. 01:15 | | | | | | | | | | | |
| ν0.7' d1.0' m-4.63 | | | | | | | | | | | |
| ν0.7' d-0.1' m1.24 | | | | | | | | | | | |
| ν1.9' d-0.1' m-1.81 | | | | | | | | | | | |
| ν2.6' d-0.1' m0.47 | | | | | | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 342°08.8 | 140°35.8 | S12°58.2 | 236°10.0 | N23°11.6 | 205°24.1 | N17°06.1 | 328°37.8 | N02°54.2 | | |
| 1 | 357°11.3 | 155°36.6 | 12°59.3 | 251°10.7 | 11.5 | 220°26.0 | 06.0 | 343°40.4 | 54.1 | | |
| 2 | 12°13.7 | 170°37.3 | 13°00.3 | 266°11.5 | 11.3 | 235°28.0 | 05.8 | 358°43.0 | 54.1 | | |
| 3 | 27°16.2 | 185°38.1 | •• 01.3 | 281°12.2 | •• 11.2 | 250°29.9 | •• 05.7 | 13°45.6 | •• 54.0 | | |
| 4 | 42°18.7 | 200°38.8 | 02.3 | 296°13.0 | 11.0 | 265°31.8 | 05.5 | 28°48.2 | 54.0 | | |
| 5 | 57°21.1 | 215°39.6 | 03.3 | 311°13.7 | 10.9 | 280°33.8 | 05.4 | 43°50.8 | 53.9 | | |
| 6 | 72°23.6 | 230°40.4 | S13°04.3 | 326°14.5 | N23°10.8 | 295°35.7 | N17°05.2 | 58°53.4 | N02°53.8 | | |
| 7 | 87°26.1 | 245°41.1 | 05.3 | 341°15.3 | 10.6 | 310°37.7 | 05.1 | 73°56.0 | 53.8 | | |
| 8 | 102°28.5 | 260°41.9 | 06.3 | 356°16.0 | 10.5 | 325°39.6 | 05.0 | 88°58.6 | 53.7 | | |
| 9 | 117°31.0 | 275°42.6 | •• 07.3 | 11°16.8 | •• 10.4 | 340°41.5 | •• 04.8 | 104°01.2 | •• 53.6 | | |
| 10 | 132°33.4 | 290°43.4 | 08.3 | 26°17.5 | 10.2 | 355°43.5 | 04.7 | 119°03.8 | 53.6 | | |
| 11 | 147°35.9 | 305°44.2 | 09.3 | 41°18.3 | 10.1 | 10°45.4 | 04.5 | 134°06.4 | 53.5 | | |
| 12 | 162°38.4 | 320°44.9 | S13°10.3 | 56°19.0 | N23°09.9 | 25°47.4 | N17°04.4 | 149°09.0 | N02°53.4 | | |
| 13 | 177°40.8 | 335°45.7 | 11.4 | 71°19.8 | 09.8 | 40°49.3 | 04.2 | 164°11.6 | 53.4 | | |
| 14 | 192°43.3 | 350°46.5 | 12.4 | 86°20.5 | 09.7 | 55°51.2 | 04.1 | 179°14.2 | 53.3 | | |
| 15 | 207°45.8 | 5°47.2 | •• 13.4 | 101°21.3 | •• 09.5 | 70°53.2 | •• 03.9 | 194°16.8 | •• 53.2 | | |
| 16 | 222°48.2 | 20°48.0 | 14.4 | 116°22.1 | 09.4 | 85°55.1 | 03.8 | 209°19.4 | 53.2 | | |
| 17 | 237°50.7 | 35°48.8 | 15.4 | 131°22.8 | 09.3 | 100°57.1 | 03.6 | 224°22.0 | 53.1 | | |
| 18 | 252°53.2 | 50°49.5 | S13°16.4 | 146°23.6 | N23°09.1 | 115°59.0 | N17°03.5 | 239°24.6 | N02°53.1 | | |
| 19 | 267°55.6 | 65°50.3 | 17.4 | 161°24.3 | 09.0 | 131°00.9 | 03.3 | 254°27.2 | 53.0 | | |
| 20 | 282°58.1 | 80°51.1 | 18.4 | 176°25.1 | 08.8 | 146°02.9 | 03.2 | 269°29.8 | 52.9 | | |
| 21 | 298°00.6 | 95°51.9 | •• 19.4 | 191°25.8 | •• 08.7 | 161°04.8 | •• 03.1 | 284°32.4 | •• 52.9 | | |
| 22 | 313°03.0 | 110°52.6 | 20.4 | 206°26.6 | 08.5 | 176°06.8 | 02.9 | 299°35.0 | 52.8 | | |
| 23 | 328°05.5 | 125°53.4 | 21.4 | 221°27.4 | 08.4 | 191°08.7 | 02.8 | 314°37.6 | 52.7 | | |
| Mer.pass. 01:11 | | | | | | | | | | | |
| ν0.8' d1.0' m-4.64 | | | | | | | | | | | |
| ν0.8' d-0.1' m1.24 | | | | | | | | | | | |
| ν1.9' d-0.1' m-1.81 | | | | | | | | | | | |
| ν2.6' d-0.1' m0.47 | | | | | | | | | | | |

| Stars | | |
|-------------|-----------|-----------|
| | SHA | Dec |
| Alpheratz | 357° 33.0 | 29° 14.4 |
| Ankaa | 353° 05.4 | -42° 09.4 |
| Schedar | 349° 29.0 | 56° 41.0 |
| Diphda | 348° 45.6 | -17° 50.2 |
| Achernar | 335° 18.8 | -57° 05.8 |
| Hamal | 327° 49.4 | 23° 35.4 |
| Polaris | 313° 09.1 | 89° 22.3 |
| Acamar | 315° 10.6 | -40° 11.5 |
| Menkar | 314° 04.6 | 4° 11.8 |
| Mirfak | 308° 26.1 | 49° 57.2 |
| Aldebaran | 290° 38.1 | 16° 33.8 |
| Rigel | 281° 02.6 | -8° 10.1 |
| Capella | 280° 20.0 | 46° 01.3 |
| Bellatrix | 278° 21.5 | 6° 22.5 |
| Elnath | 278° 00.2 | 28° 37.8 |
| Alnilam | 275° 36.4 | -1° 10.9 |
| Betelgeuse | 270° 50.7 | 7° 24.8 |
| Canopus | 263° 52.0 | -52° 42.2 |
| Sirius | 258° 25.2 | -16° 45.0 |
| Adhara | 255° 05.0 | -29° 00.2 |
| Procyon | 244° 49.6 | 5° 09.5 |
| Pollux | 243° 15.9 | 27° 57.7 |
| Avior | 234° 14.7 | -59° 35.5 |
| Suhail | 222° 45.7 | -43° 32.3 |
| Miaplacidus | 221° 38.9 | -69° 49.4 |
| Alphard | 217° 46.7 | -8° 46.3 |
| Regulus | 207° 33.3 | 11° 50.3 |
| Dubhe | 193° 40.0 | 61° 36.5 |
| Denebola | 182° 23.9 | 14° 25.5 |
| Gienah | 175° 42.5 | -17° 41.4 |
| Acrux | 172° 59.2 | -63° 14.9 |
| Gacrux | 171° 50.6 | -57° 15.9 |
| Alioth | 166° 12.2 | 55° 49.1 |
| Spica | 158° 21.1 | -11° 18.0 |
| Alkaid | 152° 51.2 | 49° 11.0 |
| Hadar | 148° 34.4 | -60° 30.3 |
| Menkent | 147° 56.2 | -36° 30.2 |
| Arcturus | 145° 46.8 | 19° 02.8 |
| Rigel Kent. | 139° 38.7 | -60° 56.9 |
| Kochab | 137° 20.3 | 74° 03.0 |
| Zuben'ubi | 136° 54.6 | -16° 09.2 |
| Alphecca | 126° 02.7 | 26° 37.7 |
| Antares | 112° 14.2 | -26° 29.5 |
| Atria | 107° 07.1 | -69° 04.7 |
| Sabik | 102° 01.2 | -15° 45.4 |
| Shaula | 96° 08.4 | -37° 07.5 |
| Rasalhague | 95° 57.2 | 12° 32.6 |
| Eltanin | 90° 41.4 | 51° 29.4 |
| Kaus Aust. | 83° 30.5 | -34° 22.3 |
| Vega | 80° 32.1 | 38° 48.7 |
| Nunki | 75° 45.9 | -26° 15.8 |
| Altair | 61° 58.4 | 8° 56.5 |
| Peacock | 53° 03.1 | -56° 39.0 |
| Deneb | 49° 24.5 | 45° 22.7 |
| Enif | 33° 37.1 | 10° 00.0 |
| Al Na'ir | 27° 30.7 | -46° 49.8 |
| Fomalhaut | 15° 12.6 | -29° 28.7 |
| Scheat | 13° 43.5 | 28° 13.8 |
| Markab | 13° 28.2 | 15° 21.1 |

| Sep 01 Tue | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 159° 50.6 | 14:39 |
| Mars | 255° 23.6 | 08:17 |
| Jupiter | 223° 40.5 | 10:23 |
| Saturn | 346° 22.8 | 02:13 |

| Sep 02 Wed | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 159° 08.5 | 14:38 |
| Mars | 254° 42.3 | 08:16 |
| Jupiter | 223° 27.9 | 10:20 |
| Saturn | 346° 25.9 | 02:09 |


| Sep 03 Thu | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 158° 27.0 | 14:37 |
| Mars | 254° 01.2 | 08:15 |
| Jupiter | 223° 15.3 | 10:17 |
| Saturn | 346° 29.0 | 02:05 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.3 |
| Mars: | 0.1 |

| h | Sun | | | Moon | | | | |
|------------|----------|----------|-------------|------------|-------|----------|-------|-------|
| Tue | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 179°57.5 | N08°20.9 | | 318°14.7 | 11.5' | N13°53.0 | 14.2' | 58.0' |
| 1 | 194°57.7 | 20.0 | | 332°45.2 | 11.4' | 14°07.2 | 14.1' | 58.0' |
| 2 | 209°57.9 | 19.0 | | 347°15.7 | 11.4' | 14°21.4 | 14.1' | 58.0' |
| 3 | 224°58.1 | • • 18.1 | | 1°46.0 | 11.3' | 14°35.5 | 14.0' | 58.0' |
| 4 | 239°58.3 | 17.2 | | 16°16.3 | 11.2' | 14°49.5 | 13.9' | 58.0' |
| 5 | 254°58.5 | 16.3 | | 30°46.5 | 11.1' | 15°03.4 | 13.9' | 58.1' |
| 6 | 269°58.7 | N08°15.4 | | 45°16.6 | 11.0' | N15°17.3 | 13.8' | 58.1' |
| 7 | 284°58.9 | 14.5 | | 59°46.6 | 10.9' | 15°31.1 | 13.7' | 58.1' |
| 8 | 299°59.1 | 13.6 | | 74°16.5 | 10.8' | 15°44.8 | 13.7' | 58.1' |
| 9 | 314°59.3 | • • 12.7 | | 88°46.4 | 10.7' | 15°58.5 | 13.6' | 58.1' |
| 10 | 329°59.5 | 11.8 | | 103°16.1 | 10.7' | 16°12.1 | 13.5' | 58.1' |
| 11 | 344°59.7 | 10.9 | | 117°45.7 | 10.6' | 16°25.6 | 13.4' | 58.2' |
| 12 | 359°59.9 | N08°10.0 | | 132°15.3 | 10.5' | N16°39.0 | 13.3' | 58.2' |
| 13 | 15°00.1 | 09.1 | | 146°44.8 | 10.4' | 16°52.3 | 13.3' | 58.2' |
| 14 | 30°00.3 | 08.2 | | 161°14.1 | 10.3' | 17°05.6 | 13.2' | 58.2' |
| 15 | 45°00.5 | • • 07.3 | | 175°43.4 | 10.2' | 17°18.8 | 13.1' | 58.2' |
| 16 | 60°00.7 | 06.4 | | 190°12.6 | 10.1' | 17°31.9 | 13.0' | 58.2' |
| 17 | 75°00.9 | 05.4 | | 204°41.7 | 10.0' | 17°44.9 | 12.9' | 58.3' |
| 18 | 90°01.1 | N08°04.5 | | 219°10.7 | 9.9' | N17°57.8 | 12.8' | 58.3' |
| 19 | 105°01.3 | 03.6 | | 233°39.6 | 9.8' | 18°10.7 | 12.7' | 58.3' |
| 20 | 120°01.5 | 02.7 | | 248°08.3 | 9.7' | 18°23.4 | 12.7' | 58.3' |
| 21 | 135°01.7 | • • 01.8 | | 262°37.0 | 9.6' | 18°36.1 | 12.6' | 58.3' |
| 22 | 150°01.9 | 00.9 | | 277°05.6 | 9.5' | 18°48.6 | 12.5' | 58.3' |
| 23 | 165°02.1 | 00.0 | | 291°34.1 | 9.4' | 19°01.1 | 12.4' | 58.4' |
| SD = 15.8' | | | $d = -0.9'$ | SD = 15.8' | | | | |
| Wed | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°02.3 | N07°59.1 | | 306°02.5 | 9.3' | N19°13.4 | 12.3' | 58.4' |
| 1 | 195°02.5 | 58.2 | | 320°30.8 | 9.2' | 19°25.7 | 12.2' | 58.4' |
| 2 | 210°02.7 | 57.3 | | 334°59.0 | 9.1' | 19°37.9 | 12.1' | 58.4' |
| 3 | 225°02.9 | • • 56.3 | | 349°27.0 | 9.0' | 19°49.9 | 12.0' | 58.4' |
| 4 | 240°03.1 | 55.4 | | 3°55.0 | 8.9' | 20°01.9 | 11.8' | 58.4' |
| 5 | 255°03.3 | 54.5 | | 18°22.9 | 8.8' | 20°13.7 | 11.7' | 58.5' |
| 6 | 270°03.5 | N07°53.6 | | 32°50.7 | 8.7' | N20°25.5 | 11.6' | 58.5' |
| 7 | 285°03.7 | 52.7 | | 47°18.3 | 8.6' | 20°37.1 | 11.5' | 58.5' |
| 8 | 300°03.9 | 51.8 | | 61°45.9 | 8.5' | 20°48.6 | 11.4' | 58.5' |
| 9 | 315°04.1 | • • 50.9 | | 76°13.4 | 8.4' | 21°00.0 | 11.3' | 58.5' |
| 10 | 330°04.3 | 50.0 | | 90°40.7 | 8.2' | 21°11.3 | 11.2' | 58.5' |
| 11 | 345°04.5 | 49.0 | | 105°08.0 | 8.1' | 21°22.5 | 11.1' | 58.5' |
| 12 | 0°04.7 | N07°48.1 | | 119°35.1 | 8.0' | N21°33.6 | 10.9' | 58.6' |
| 13 | 15°04.9 | 47.2 | | 134°02.1 | 7.9' | 21°44.5 | 10.8' | 58.6' |
| 14 | 30°05.1 | 46.3 | | 148°29.1 | 7.8' | 21°55.3 | 10.7' | 58.6' |
| 15 | 45°05.3 | • • 45.4 | | 162°55.9 | 7.7' | 22°06.0 | 10.6' | 58.6' |
| 16 | 60°05.5 | 44.5 | | 177°22.6 | 7.6' | 22°16.6 | 10.4' | 58.6' |
| 17 | 75°05.7 | 43.6 | | 191°49.2 | 7.5' | 22°27.0 | 10.3' | 58.6' |
| 18 | 90°05.9 | N07°42.6 | | 206°15.7 | 7.4' | N22°37.4 | 10.2' | 58.7' |
| 19 | 105°06.1 | 41.7 | | 220°42.1 | 7.3' | 22°47.5 | 10.1' | 58.7' |
| 20 | 120°06.3 | 40.8 | | 235°08.4 | 7.2' | 22°57.6 | 9.9' | 58.7' |
| 21 | 135°06.5 | • • 39.9 | | 249°34.6 | 7.1' | 23°07.5 | 9.8' | 58.7' |
| 22 | 150°06.7 | 39.0 | | 264°00.7 | 7.0' | 23°17.3 | 9.7' | 58.7' |
| 23 | 165°06.9 | 38.1 | | 278°26.7 | 6.9' | 23°27.0 | 9.5' | 58.7' |
| SD = 15.8' | | | $d = -0.9'$ | SD = 15.9' | | | | |
| Thu | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°07.1 | N07°37.2 | | 292°52.6 | 6.8' | N23°36.5 | 9.4' | 58.7' |
| 1 | 195°07.3 | 36.2 | | 307°18.4 | 6.7' | 23°45.9 | 9.2' | 58.7' |
| 2 | 210°07.5 | 35.3 | | 321°44.0 | 6.6' | 23°55.1 | 9.1' | 58.8' |
| 3 | 225°07.7 | • • 34.4 | | 336°09.6 | 6.5' | 24°04.2 | 8.9' | 58.8' |
| 4 | 240°08.0 | 33.5 | | 350°35.1 | 6.4' | 24°13.1 | 8.8' | 58.8' |
| 5 | 255°08.2 | 32.6 | | 5°00.4 | 6.3' | 24°22.0 | 8.7' | 58.8' |
| 6 | 270°08.4 | N07°31.7 | | 19°25.7 | 6.2' | N24°30.6 | 8.5' | 58.8' |
| 7 | 285°08.6 | 30.7 | | 33°50.9 | 6.1' | 24°39.1 | 8.4' | 58.8' |
| 8 | 300°08.8 | 29.8 | | 48°15.9 | 6.0' | 24°47.5 | 8.2' | 58.8' |
| 9 | 315°09.0 | • • 28.9 | | 62°40.9 | 5.9' | 24°55.7 | 8.1' | 58.9' |
| 10 | 330°09.2 | 28.0 | | 77°05.8 | 5.8' | 25°03.7 | 7.9' | 58.9' |
| 11 | 345°09.4 | 27.1 | | 91°30.5 | 5.7' | 25°11.6 | 7.7' | 58.9' |
| 12 | 0°09.6 | N07°26.2 | | 105°55.2 | 5.6' | N25°19.4 | 7.6' | 58.9' |
| 13 | 15°09.8 | 25.2 | | 120°19.8 | 5.5' | 25°27.0 | 7.4' | 58.9' |
| 14 | 30°10.0 | 24.3 | | 134°44.3 | 5.4' | 25°34.4 | 7.3' | 58.9' |
| 15 | 45°10.2 | • • 23.4 | | 149°08.7 | 5.3' | 25°41.6 | 7.1' | 58.9' |
| 16 | 60°10.4 | 22.5 | | 163°33.0 | 5.2' | 25°48.7 | 6.9' | 58.9' |
| 17 | 75°10.6 | 21.6 | | 177°57.2 | 5.1' | 25°55.7 | 6.8' | 59.0' |
| 18 | 90°10.8 | N07°20.6 | | 192°21.3 | 5.0' | N26°02.5 | 6.6' | 59.0' |
| 19 | 105°11.0 | 19.7 | | 206°45.4 | 4.9' | 26°09.1 | 6.4' | 59.0' |
| 20 | 120°11.2 | 18.8 | | 221°09.3 | 4.9' | 26°15.5 | 6.3' | 59.0' |
| 21 | 135°11.4 | • • 17.9 | | 235°33.2 | 4.8' | 26°21.8 | 6.1' | 59.0' |
| 22 | 150°11.6 | 17.0 | | 249°56.9 | 4.7' | 26°27.9 | 5.9' | 59.0' |
| 23 | 165°11.8 | 16.0 | | 264°20.6 | 4.6' | 26°33.8 | 5.8' | 59.0' |
| SD = 15.8' | | | $d = -0.9'$ | SD = 16.0' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | 02:38 | 04:06 | 19:50 | 21:16 | //// |
| N 70° | 00:10 | 03:05 | 04:19 | 19:37 | 20:50 | 23:15 |
| 68° | 01:40 | 03:25 | 04:30 | 19:27 | 20:31 | 22:12 |
| 66° | 02:16 | 03:40 | 04:38 | 19:19 | 20:16 | 21:39 |
| 64° | 02:40 | 03:53 | 04:46 | 19:12 | 20:04 | 21:15 |
| 62° | 02:59 | 04:03 | 04:52 | 19:06 | 19:54 | 20:57 |
| 60° | 03:14 | 04:12 | 04:57 | 19:01 | 19:45 | 20:43 |
| N 58° | 03:27 | 04:20 | 05:02 | 18:56 | 19:38 | 20:30 |
| 56° | 03:37 | 04:27 | 05:06 | 18:52 | 19:31 | 20:20 |
| 54° | 03:47 | 04:33 | 05:10 | 18:48 | 19:25 | 20:11 |
| 52° | 03:55 | 04:38 | 05:13 | 18:45 | 19:20 | 20:03 |
| 50° | 04:02 | 04:43 | 05:16 | 18:42 | 19:15 | 19:56 |
| 48° | 04:16 | 04:53 | 05:23 | 18:35 | 19:06 | 19:42 |
| N 40° | 04:28 | 05:01 | 05:29 | 18:30 | 18:58 | 19:31 |
| 38° | 04:37 | 05:08 | 05:33 | 18:25 | 18:51 | 19:22 |
| 36° | 04:45 | 05:13 | 05:38 | 18:21 | 18:46 | 19:14 |
| 34° | 04:56 | 05:22 | 05:45 | 18:14 | 18:37 | 19:03 |
| N 10° | 05:05 | 05:30 | 05:51 | 18:08 | 18:30 | 18:54 |
| 0° | 05:11 | 05:36 | 05:56 | 18:03 | 18:24 | 18:48 |
| S 10° | 05:16 | 05:41 | 06:02 | 17:58 | 18:19 | 18:43 |
| 20° | 05:20 | 05:46 | 06:08 | 17:52 | 18:14 | 18:40 |
| 30° | 05:22 | 05:50 | 06:14 | 17:46 | 18:10 | 18:37 |
| 35° | 05:23 | 05:53 | 06:18 | 17:42 | 18:07 | 18:37 |
| 40° | 05:24 | 05:55 | 06:22 | 17:38 | 18:05 | 18:37 |
| 45° | 05:23 | 05:57 | 06:27 | 17:33 | 18:03 | 18:37 |
| S 50° | 05:23 | 06:00 | 06:32 | 17:28 | 18:00 | 18:38 |
| 52° | 05:22 | 06:01 | 06:35 | 17:25 | 17:59 | 18:38 |
| 54° | 05:22 | 06:02 | 06:38 | 17:22 | 17:58 | 18:39 |
| 56° | 05:21 | 06:04 | 06:41 | 17:19 | 17:57 | 18:40 |
| 58° | 05:20 | 06:05 | 06:44 | 17:16 | 17:56 | 18:41 |
| S 60° | 05:18 | 06:06 | 06:48 | 17:12 | 17:54 | 18:42 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|--------------------------|--------------------------|---------|--------------------------|--------------------------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | 16:18 | <input type="checkbox"/> | <input type="checkbox"/> | 13:53 | <input type="checkbox"/> | <input type="checkbox"/> |
| N 70° | 17:17 | <input type="checkbox"/> | <input type="checkbox"/> | 12:55 | <input type="checkbox"/> | <input type="checkbox"/> |
| 68° | 17:53 | <input type="checkbox"/> | <input type="checkbox"/> | 12:22 | <input type="checkbox"/> | <input type="checkbox"/> |
| 66° | 18:18 | 17:42 | <input type="checkbox"/> | 11:58 | 14:24 | <input type="checkbox"/> |
| 64° | 18:38 | 18:23 | 17:36 | 11:39 | 13:45 | 16:31 |
| 62° | 18:54 | 18:51 | 18:47 | 11:24 | 13:18 | 15:21 |
| 60° | 19:08 | 19:12 | 19:23 | 11:11 | 12:57 | 14:46 |
| N 58° | 19:20 | 19:30 | 19:49 | 11:00 | 12:40 | 14:20 |
| 56° | 19:30 | 19:45 | 20:09 | 10:51 | 12:25 | 14:00 |
| 54° | 19:39 | 19:58 | 20:26 | 10:43 | 12:13 | 13:43 |
| 52° | 19:48 | 20:09 | 20:41 | 10:35 | 12:02 | 13:29 |
| 50° | 19:55 | 20:20 | 20:54 | 10:29 | 11:53 | 13:17 |
| 45° | 20:11 | 20:41 | 21:21 | 10:14 | 11:32 | 12:51 |
| N 40° | 20:24 | 20:59 | 21:42 | 10:03 | 11:16 | 12:30 |
| 35° | 20:35 | 21:13 | 21:59 | 09:53 | 11:02 | 12:14 |
| 30° | 20:45 | 21:26 | 22:15 | 09:44 | 10:51 | 11:59 |
| 20° | 21:02 | 21:48 | 22:41 | 09:29 | 10:30 | 11:34 |
| N 10° | 21:17 | 22:07 | 23:03 | 09:16 | 10:13 | 11:13 |
| 0° | 21:31 | 22:26 | 23:24 | 09:04 | 09:57 | 10:53 |
| S 10° | 21:45 | 22:44 | 23:45 | 08:53 | 09:40 | 10:33 |
| 20° | 22:01 | 23:03 | •• •• | 08:40 | 09:23 | 10:12 |
| 30° | 22:19 | 23:26 | •• •• | 08:25 | 09:03 | 09:48 |
| 35° | 22:29 | 23:40 | •• •• | 08:17 | 08:52 | 09:34 |
| 40° | 22:41 | 23:55 | •• •• | 08:08 | 08:39 | 09:17 |
| 45° | 22:55 | •• •• | 00:14 | 07:56 | 08:23 | 08:57 |
| S 50° | 23:12 | •• •• | 00:37 | 07:43 | 08:04 | 08:33 |
| 52° | 23:21 | •• •• | 00:49 | 07:37 | 07:55 | 08:21 |
| 54° | 23:30 | •• •• | 01:01 | 07:30 | 07:45 | 08:08 |
| 56° | 23:40 | •• •• | 01:16 | 07:23 | 07:34 | 07:52 |
| 58° | 23:52 | •• •• | 01:34 | 07:14 | 07:21 | 07:34 |
| S 60° | •• •• | 00:06 | 01:55 | 07:05 | 07:07 | 07:12 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-------|-----------|-------|---|
| | Eqn. of Time | | Mer. | Mer.Pass. | | Age |
| | 00 ^h | 12 ^h | Pass | Upper | Lower | 20-22 |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 84-65% |
| 01 | 00:10 | 00:00 | 12:00 | 02:53 | 15:18 |  |
| 02 | 00:09 | 00:19 | 12:00 | 03:44 | 16:11 | |
| 03 | 00:29 | 00:38 | 11:59 | 04:39 | 17:09 | |

September 04, 05, 06 UT (Fri., Sat., Sun.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------|----------|--------------|----------|---------------|----------|---------------|----------|---------------|----------|---------|-----|-----|--------|-----|-----|
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 343°07.9 | 140°54.2 | S13°22.4 | 236°28.1 | N23°08.3 | 206°10.7 | N17°02.6 | 329°40.2 | N02°52.7 | | | | | | |
| 1 | 358°10.4 | 155°55.0 | 23.4 | 251°28.9 | 08.1 | 221°12.6 | 02.5 | 344°42.8 | 52.6 | | | | | | |
| 2 | 13°12.9 | 170°55.8 | 24.4 | 266°29.6 | 08.0 | 236°14.5 | 02.3 | 359°45.4 | 52.5 | | | | | | |
| 3 | 28°15.3 | 185°56.6 | •• 25.4 | 281°30.4 | •• 07.8 | 251°16.5 | •• 02.2 | 14°48.0 | •• 52.5 | | | | | | |
| 4 | 43°17.8 | 200°57.3 | 26.4 | 296°31.1 | 07.7 | 266°18.4 | 02.0 | 29°50.6 | 52.4 | | | | | | |
| 5 | 58°20.3 | 215°58.1 | 27.3 | 311°31.9 | 07.6 | 281°20.4 | 01.9 | 44°53.2 | 52.3 | | | | | | |
| 6 | 73°22.7 | 230°58.9 | S13°28.3 | 326°32.7 | N23°07.4 | 296°22.3 | N17°01.7 | 59°55.8 | N02°52.3 | | | | | | |
| 7 | 88°25.2 | 245°59.7 | 29.3 | 341°33.4 | 07.3 | 311°24.3 | 01.6 | 74°58.4 | 52.2 | | | | | | |
| 8 | 103°27.7 | 261°00.5 | 30.3 | 356°34.2 | 07.1 | 326°26.2 | 01.4 | 90°01.0 | 52.1 | | | | | | |
| 9 | 118°30.1 | 276°01.3 | •• 31.3 | 11°34.9 | •• 07.0 | 341°28.1 | •• 01.3 | 105°03.6 | •• 52.1 | | | | | | |
| 10 | 133°32.6 | 291°02.1 | 32.3 | 26°35.7 | 06.8 | 356°30.1 | 01.1 | 120°06.2 | 52.0 | | | | | | |
| 11 | 148°35.1 | 306°02.9 | 33.3 | 41°36.5 | 06.7 | 11°32.0 | 01.0 | 135°08.8 | 51.9 | | | | | | |
| 12 | 163°37.5 | 321°03.7 | S13°34.3 | 56°37.2 | N23°06.5 | 26°34.0 | N17°00.9 | 150°11.4 | N02°51.9 | | | | | | |
| 13 | 178°40.0 | 336°04.5 | 35.3 | 71°38.0 | 06.4 | 41°35.9 | 00.7 | 165°14.0 | 51.8 | | | | | | |
| 14 | 193°42.4 | 351°05.3 | 36.3 | 86°38.7 | 06.3 | 56°37.9 | 00.6 | 180°16.6 | 51.8 | | | | | | |
| 15 | 208°44.9 | 6°06.1 | •• 37.3 | 101°39.5 | •• 06.1 | 71°39.8 | •• 00.4 | 195°19.2 | •• 51.7 | | | | | | |
| 16 | 223°47.4 | 21°06.9 | 38.2 | 116°40.3 | 06.0 | 86°41.7 | 00.3 | 210°21.8 | 51.6 | | | | | | |
| 17 | 238°49.8 | 36°07.7 | 39.2 | 131°41.0 | 05.8 | 101°43.7 | 00.1 | 225°24.4 | 51.6 | | | | | | |
| 18 | 253°52.3 | 51°08.5 | S13°40.2 | 146°41.8 | N23°05.7 | 116°45.6 | N17°00.0 | 240°27.0 | N02°51.5 | | | | | | |
| 19 | 268°54.8 | 66°09.3 | 41.2 | 161°42.6 | 05.5 | 131°47.6 | 16°59.8 | 255°29.6 | 51.4 | | | | | | |
| 20 | 283°57.2 | 81°10.1 | 42.2 | 176°43.3 | 05.4 | 146°49.5 | 59.7 | 270°32.2 | 51.4 | | | | | | |
| 21 | 298°59.7 | 96°10.9 | •• 43.2 | 191°44.1 | •• 05.2 | 161°51.5 | •• 59.5 | 285°34.8 | •• 51.3 | | | | | | |
| 22 | 314°02.2 | 111°11.7 | 44.2 | 206°44.8 | 05.1 | 176°53.4 | 59.4 | 300°37.4 | 51.2 | | | | | | |
| 23 | 329°04.6 | 126°12.5 | 45.1 | 221°45.6 | 04.9 | 191°55.4 | 59.2 | 315°40.0 | 51.2 | | | | | | |
| Mer.pass. | 01:07 | ••0.8' d1.0' | m-4.65 | ••0.8' d-0.1' | m1.23 | ••1.9' d-0.1' | m-1.81 | ••2.6' d-0.1' | m0.46 | | | | | | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 344°07.1 | 141°13.3 | S13°46.1 | 236°46.4 | N23°04.8 | 206°57.3 | N16°59.1 | 330°42.6 | N02°51.1 | | | | | | |
| 1 | 359°09.5 | 156°14.1 | 47.1 | 251°47.1 | 04.6 | 221°59.2 | 59.0 | 345°45.2 | 51.0 | | | | | | |
| 2 | 14°12.0 | 171°14.9 | 48.1 | 266°47.9 | 04.5 | 237°01.2 | 58.8 | 0°47.8 | 51.0 | | | | | | |
| 3 | 29°14.5 | 186°15.8 | •• 49.1 | 281°48.7 | •• 04.3 | 252°03.1 | •• 58.7 | 15°50.4 | •• 50.9 | | | | | | |
| 4 | 44°16.9 | 201°16.6 | 50.1 | 296°49.4 | 04.2 | 267°05.1 | 58.5 | 30°53.0 | 50.8 | | | | | | |
| 5 | 59°19.4 | 216°17.4 | 51.0 | 311°50.2 | 04.0 | 282°07.0 | 58.4 | 45°55.6 | 50.8 | | | | | | |
| 6 | 74°21.9 | 231°18.2 | S13°52.0 | 326°51.0 | N23°03.9 | 297°09.0 | N16°58.2 | 60°58.2 | N02°50.7 | | | | | | |
| 7 | 89°24.3 | 246°19.0 | 53.0 | 341°51.7 | 03.7 | 312°10.9 | 58.1 | 76°00.8 | 50.6 | | | | | | |
| 8 | 104°26.8 | 261°19.9 | 54.0 | 356°52.5 | 03.6 | 327°12.9 | 57.9 | 91°03.4 | 50.6 | | | | | | |
| 9 | 119°29.3 | 276°20.7 | •• 54.9 | 11°53.3 | •• 03.4 | 342°14.8 | •• 57.8 | 106°06.0 | •• 50.5 | | | | | | |
| 10 | 134°31.7 | 291°21.5 | 55.9 | 26°54.0 | 03.3 | 357°16.7 | 57.6 | 121°08.6 | 50.4 | | | | | | |
| 11 | 149°34.2 | 306°22.3 | 56.9 | 41°54.8 | 03.1 | 12°18.7 | 57.5 | 136°11.2 | 50.4 | | | | | | |
| 12 | 164°36.7 | 321°23.1 | S13°57.9 | 56°55.5 | N23°03.0 | 27°20.6 | N16°57.3 | 151°13.8 | N02°50.3 | | | | | | |
| 13 | 179°39.1 | 336°24.0 | 58.8 | 71°56.3 | 02.8 | 42°22.6 | 57.2 | 166°16.4 | 50.2 | | | | | | |
| 14 | 194°41.6 | 351°24.8 | 13°59.8 | 86°57.1 | 02.7 | 57°24.5 | 57.1 | 181°19.0 | 50.2 | | | | | | |
| 15 | 209°44.0 | 6°25.6 | 14°00.8 | 101°57.8 | •• 02.5 | 72°26.5 | •• 56.9 | 196°21.6 | •• 50.1 | | | | | | |
| 16 | 224°46.5 | 21°26.5 | 01.8 | 116°58.6 | 02.4 | 87°28.4 | 56.8 | 211°24.2 | 50.0 | | | | | | |
| 17 | 239°49.0 | 36°27.3 | 02.7 | 131°59.4 | 02.2 | 102°30.4 | 56.6 | 226°26.8 | 50.0 | | | | | | |
| 18 | 254°51.4 | 51°28.1 | S14°03.7 | 147°00.2 | N23°02.1 | 117°32.3 | N16°56.5 | 241°29.4 | N02°49.9 | | | | | | |
| 19 | 269°53.9 | 66°29.0 | 04.7 | 162°00.9 | 01.9 | 132°34.3 | 56.3 | 256°32.0 | 49.8 | | | | | | |
| 20 | 284°56.4 | 81°29.8 | 05.7 | 177°01.7 | 01.8 | 147°36.2 | 56.2 | 271°34.7 | 49.8 | | | | | | |
| 21 | 299°58.8 | 96°30.6 | •• 06.6 | 192°02.5 | •• 01.6 | 162°38.2 | •• 56.0 | 286°37.3 | •• 49.7 | | | | | | |
| 22 | 315°01.3 | 111°31.5 | 07.6 | 207°03.2 | 01.5 | 177°40.1 | 55.9 | 301°39.9 | 49.6 | | | | | | |
| 23 | 330°03.8 | 126°32.3 | 08.6 | 222°04.0 | 01.3 | 192°42.0 | 55.7 | 316°42.5 | 49.6 | | | | | | |
| Mer.pass. | 01:03 | ••0.8' d1.0' | m-4.66 | ••0.8' d-0.1' | m1.23 | ••1.9' d-0.1' | m-1.81 | ••2.6' d-0.1' | m0.46 | | | | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 345°06.2 | 141°33.2 | S14°09.5 | 237°04.8 | N23°01.1 | 207°44.0 | N16°55.6 | 331°45.1 | N02°49.5 | | | | | | |
| 1 | 0°08.7 | 156°34.0 | 10.5 | 252°05.5 | 01.0 | 222°45.9 | 55.4 | 346°47.7 | 49.4 | | | | | | |
| 2 | 15°11.2 | 171°34.9 | 11.5 | 267°06.3 | 00.8 | 237°47.9 | 55.3 | 1°50.3 | 49.4 | | | | | | |
| 3 | 30°13.6 | 186°35.7 | •• 12.4 | 282°07.1 | •• 00.7 | 252°49.8 | •• 55.2 | 16°52.9 | •• 49.3 | | | | | | |
| 4 | 45°16.1 | 201°36.6 | 13.4 | 297°07.8 | 00.5 | 267°51.8 | 55.0 | 31°55.5 | 49.2 | | | | | | |
| 5 | 60°18.5 | 216°37.4 | 14.4 | 312°08.6 | 00.4 | 282°53.7 | 54.9 | 46°58.1 | 49.2 | | | | | | |
| 6 | 75°21.0 | 231°38.3 | S14°15.3 | 327°09.4 | N23°00.2 | 297°55.7 | N16°54.7 | 62°00.7 | N02°49.1 | | | | | | |
| 7 | 90°23.5 | 246°39.1 | 16.3 | 342°10.2 | 23°00.1 | 312°57.6 | 54.6 | 77°03.3 | 49.0 | | | | | | |
| 8 | 105°25.9 | 261°40.0 | 17.2 | 357°10.9 | 22°59.9 | 327°59.6 | 54.4 | 92°05.9 | 49.0 | | | | | | |
| 9 | 120°28.4 | 276°40.8 | •• 18.2 | 12°11.7 | •• 59.7 | 343°01.5 | •• 54.3 | 107°08.5 | •• 48.9 | | | | | | |
| 10 | 135°30.9 | 291°41.7 | 19.2 | 27°12.5 | 59.6 | 358°03.5 | 54.1 | 122°11.1 | 48.8 | | | | | | |
| 11 | 150°33.3 | 306°42.5 | 20.1 | 42°13.2 | 59.4 | 13°05.4 | 54.0 | 137°13.7 | 48.8 | | | | | | |
| 12 | 165°35.8 | 321°43.4 | S14°21.1 | 57°14.0 | N22°59.3 | 28°07.4 | N16°53.8 | 152°16.3 | N02°48.7 | | | | | | |
| 13 | 180°38.3 | 336°44.3 | 22.0 | 72°14.8 | 59.1 | 43°09.3 | 53.7 | 167°18.9 | 48.6 | | | | | | |
| 14 | 195°40.7 | 351°45.1 | 23.0 | 87°15.6 | 58.9 | 58°11.3 | 53.5 | 182°21.5 | 48.6 | | | | | | |
| 15 | 210°43.2 | 6°46.0 | •• 24.0 | 102°16.3 | •• 58.8 | 73°13.2 | •• 53.4 | 197°24.2 | •• 48.5 | | | | | | |
| 16 | 225°45.7 | 21°46.8 | 24.9 | 117°17.1 | 58.6 | 88°15.2 | 53.3 | 212°26.8 | 48.4 | | | | | | |
| 17 | 240°48.1 | 36°47.7 | 25.9 | 132°17.9 | 58.5 | 103°17.1 | 53.1 | 227°29.4 | 48.4 | | | | | | |
| 18 | 255°50.6 | 51°48.6 | S14°26.8 | 147°18.6 | N22°58.3 | 118°19.0 | N16°53.0 | 242°32.0 | N02°48.3 | | | | | | |
| 19 | 270°53.0 | 66°49.4 | 27.8 | 162°19.4 | 58.2 | 133°21.0 | 52.8 | 257°34.6 | 48.2 | | | | | | |
| 20 | 285°55.5 | 81°50.3 | 28.7 | 177°20.2 | 58.0 | 148°22.9 | 52.7 | 272°37.2 | 48.2 | | | | | | |
| 21 | 300°58.0 | 96°51.2 | •• 29.7 | 192°21.0 | •• 57.8 | 163°24.9 | •• 52.5 | 287°39.8 | •• 48.1 | | | | | | |
| 22 | 316°00.4 | 111°52.1 | 30.6 | 207°21.7 | 57.7 | 178°26.8 | 52.4 | 302°42.4 | 48.0 | | | | | | |
| 23 | 331°02.9 | 126°52.9 | 31.6 | 222°22.5 | 57.5 | 193°28.8 | 52.2 | 317°45.0 | 48.0 | | | | | | |
| Mer.pass. | 00:59 | ••0.8' d1.0' | m-4.68 | ••0.8' d-0.2' | m1.23 | ••1.9' d-0.1' | m-1.81 | ••2.6' d-0.1' | m0.45 | | | | | | |

| Stars | | |
|---------------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°33.0 | 29°14.4 |
| Ankaa | 353°05.4 | -42°09.4 |
| Schedar | 349°29.0 | 56°41.0 |
| Diphda | 348°45.6 | -17°50.2 |
| Achernar | 335°18.7 | -57°05.8 |
| Hamal | 327°49.4 | 23°35.4 |
| Polaris | 313°07.3 | 89°22.3 |
| Acamar | 315°10.5 | -40°11.5 |
| Menkar | 314°04.6 | 4°11.8 |
| Mirfak | 308°26.1 | 49°57.2 |
| Aldebaran | 290°38.0 | 16°33.8 |
| Rigel | 281°02.6 | -8°10.0 |
| Capella | 280°19.9 | 46°01.3 |
| Bellatrix | 278°21.5 | 6°22.5 |
| Elnath | 278°00.2 | 28°37.8 |
| Alnilam | 275°36.4 | -1°10.9 |
| Betelgeuse | 270°50.7 | 7°24.8 |
| Canopus | 263°52.0 | -52°42.2 |
| Sirius | 258°25.2 | -16°45.0 |
| Adhara | 255°05.0 | -29°00.2 |
| Procyon | 244°49.6 | 5°09.5 |
| Pollux | 243°15.9 | 27°57.7 |
| Avior | 234°14.7 | -59°35.5 |
| Suhail | 222°45.7 | -43°32.2 |
| Miaplacidus | 221°38.9 | -69°49.4 |
| Alphard | 217°46.7 | -8°46.3 |
| Regulus | 207°33.3 | 11°50.3 |
| Dubhe | 193°40.0 | 61°36.5 |
| Denebola | 182°23.9 | 14°25.5 |
| Gienah | 175°42.5 | -17°41.4 |
| Acrux | 172°59.2 | -63°14.9 |
| Gacrux | 171°50.6 | -57°15.9 |
| Alioth | 166°12.2 | 55°49.0 |
| Spica | 158°21.1 | -11°18.0 |
| Alkaid | 152°51.3 | 49°11.0 |
| Hadar | 148°34.5 | -60°30.3 |
| Menkent | 147°56.2 | -36°30.2 |
| Arcturus | 145°46.9 | 19°02.8 |
| Rigil Kent. | 139°38.8 | -60°56.9 |
| Kochab | 137°20.4 | 74°02.9 |
| Zuben'ubi | 136°54.6 | -16°09.2 |
| Alphecca | 126°02.7 | 26°37.7 |
| Antares | 112°14.2 | -26°29.5 |
| Atria | 107°07.1 | -69°04.7 |
| Sabik | 102°01.2 | -15°45.4 |
| Shaula | 96°08.4 | -37°07.5 |
| Rasalhague | 95°57.2 | 12°32.6 |
| Eltanin | 90°41.4 | 51°29.4 |
| Kaus Aust. | 83°30.5 | -34°22.3 |
| Vega | 80°32.1 | 38°48.7 |
| Nunki | 75°45.9 | -26°15.8 |
| Altair | 61°58.4 | 8°56.5 |
| Peacock | 53°03.1 | -56°39.0 |
| Deneb | 49°24.5 | 45°22.7 |
| Enif | 33°37.1 | 10°00.0 |
| Al Na'ir | 27°30.7 | -46°49.8 |
| Fomalhaut | 15°12.6 | -29°28.7 |
| Scheat | 13°43.5 | 28°13.8 |
| Markab | 13°28.2 | 15°21.1 |
| | | |
| Sep 04 Fri | SHA | Mer.pass |
| Venus | 157°46.3 | 14:36 |
| Mars | 253°20.2 | 08:14 |
| Jupiter | 223°02.7 | 10:14 |
| Saturn | 346°32.2 | 02:01 |
| | | |
| Sep 05 Sat | SHA | Mer.pass |
| Venus | 157°06.2 | 14:34 |
| Mars | 252°39.3 | 08:12 |
| Jupiter | 222°50.2 | 10:11 |
| Saturn | 346°35.5 | 01:57 |
| | | |
| Sep 06 Sun | SHA | Mer.pass |
| Venus | 156°26.9 | 14:33 |
| Mars | 251°58.5 | 08:11 |
| Jupiter | 222°37.8 | 10:08 |
| Saturn | 346°38.8 | 01:53 |
| | | |
| Horizontal parallax | | |
| Venus: | 0.3 | |
| Mars: | 0.1 | |

| h | Sun | | | Moon | | | | |
|------------|----------|----------|-------------|------------|-------|----------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| Fri | | | | | | | | |
| 0 | 180°12.1 | N07°15.1 | | 278°44.3 | 4.5' | N26°39.5 | 5.6' | 59.0' |
| 1 | 195°12.3 | 14.2 | | 293°07.8 | 4.5' | 26°45.1 | 5.4' | 59.0' |
| 2 | 210°12.5 | 13.3 | | 307°31.3 | 4.4' | 26°50.5 | 5.2' | 59.1' |
| 3 | 225°12.7 | · · 12.4 | | 321°54.6 | 4.3' | 26°55.8 | 5.0' | 59.1' |
| 4 | 240°12.9 | 11.4 | | 336°18.0 | 4.2' | 27°00.8 | 4.9' | 59.1' |
| 5 | 255°13.1 | 10.5 | | 350°41.2 | 4.2' | 27°05.7 | 4.7' | 59.1' |
| 6 | 270°13.3 | N07°09.6 | | 5°04.4 | 4.1' | N27°10.4 | 4.5' | 59.1' |
| 7 | 285°13.5 | 08.7 | | 19°27.5 | 4.0' | 27°14.9 | 4.3' | 59.1' |
| 8 | 300°13.7 | 07.7 | | 33°50.5 | 4.0' | 27°19.2 | 4.1' | 59.1' |
| 9 | 315°13.9 | · · 06.8 | | 48°13.5 | 3.9' | 27°23.3 | 4.0' | 59.1' |
| 10 | 330°14.1 | 05.9 | | 62°36.4 | 3.8' | 27°27.3 | 3.8' | 59.1' |
| 11 | 345°14.3 | 05.0 | | 76°59.2 | 3.8' | 27°31.1 | 3.6' | 59.2' |
| 12 | 0°14.5 | N07°04.1 | | 91°22.0 | 3.7' | N27°34.7 | 3.4' | 59.2' |
| 13 | 15°14.7 | 03.1 | | 105°44.8 | 3.7' | 27°38.1 | 3.2' | 59.2' |
| 14 | 30°14.9 | 02.2 | | 120°07.4 | 3.6' | 27°41.3 | 3.0' | 59.2' |
| 15 | 45°15.2 | · · 01.3 | | 134°30.1 | 3.6' | 27°44.3 | 2.8' | 59.2' |
| 16 | 60°15.4 | 07°00.4 | | 148°52.7 | 3.5' | 27°47.1 | 2.6' | 59.2' |
| 17 | 75°15.6 | 06°59.4 | | 163°15.2 | 3.5' | 27°49.8 | 2.5' | 59.2' |
| 18 | 90°15.8 | N06°58.5 | | 177°37.7 | 3.4' | N27°52.2 | 2.3' | 59.2' |
| 19 | 105°16.0 | 57.6 | | 192°00.1 | 3.4' | 27°54.5 | 2.1' | 59.2' |
| 20 | 120°16.2 | 56.7 | | 206°22.5 | 3.4' | 27°56.6 | 1.9' | 59.2' |
| 21 | 135°16.4 | · · 55.7 | | 220°44.9 | 3.3' | 27°58.4 | 1.7' | 59.3' |
| 22 | 150°16.6 | 54.8 | | 235°07.3 | 3.3' | 28°00.1 | 1.5' | 59.3' |
| 23 | 165°16.8 | 53.9 | | 249°29.6 | 3.3' | 28°01.6 | 1.3' | 59.3' |
| SD = 15.9' | | | $d = -0.9'$ | SD = 16.1' | | | | |
| Sat | | | | | | | | |
| 0 | 180°17.0 | N06°53.0 | | 263°51.8 | 3.2' | N28°02.9 | 1.1' | 59.3' |
| 1 | 195°17.2 | 52.0 | | 278°14.1 | 3.2' | 28°04.0 | 0.9' | 59.3' |
| 2 | 210°17.4 | 51.1 | | 292°36.3 | 3.2' | 28°04.9 | 0.7' | 59.3' |
| 3 | 225°17.7 | · · 50.2 | | 306°58.5 | 3.2' | 28°05.6 | 0.5' | 59.3' |
| 4 | 240°17.9 | 49.3 | | 321°20.7 | 3.2' | 28°06.2 | 0.3' | 59.3' |
| 5 | 255°18.1 | 48.3 | | 335°42.9 | 3.2' | 28°06.5 | 0.1' | 59.3' |
| 6 | 270°18.3 | N06°47.4 | | 350°05.0 | 3.1' | N28°06.6 | -0.1' | 59.3' |
| 7 | 285°18.5 | 46.5 | | 4°27.2 | 3.1' | 28°06.5 | -0.3' | 59.3' |
| 8 | 300°18.7 | 45.5 | | 18°49.3 | 3.1' | 28°06.3 | -0.5' | 59.3' |
| 9 | 315°18.9 | · · 44.6 | | 33°11.4 | 3.1' | 28°05.8 | -0.7' | 59.3' |
| 10 | 330°19.1 | 43.7 | | 47°33.5 | 3.1' | 28°05.1 | -0.9' | 59.4' |
| 11 | 345°19.3 | 42.8 | | 61°55.7 | 3.1' | 28°04.3 | -1.1' | 59.4' |
| 12 | 0°19.5 | N06°41.8 | | 76°17.8 | 3.1' | N28°03.2 | -1.3' | 59.4' |
| 13 | 15°19.7 | 40.9 | | 90°39.9 | 3.1' | 28°01.9 | -1.5' | 59.4' |
| 14 | 30°20.0 | 40.0 | | 105°02.0 | 3.1' | 28°00.5 | -1.6' | 59.4' |
| 15 | 45°20.2 | · · 39.0 | | 119°24.2 | 3.2' | 27°58.9 | -1.8' | 59.4' |
| 16 | 60°20.4 | 38.1 | | 133°46.3 | 3.2' | 27°57.0 | -2.0' | 59.4' |
| 17 | 75°20.6 | 37.2 | | 148°08.5 | 3.2' | 27°55.0 | -2.2' | 59.4' |
| 18 | 90°20.8 | N06°36.3 | | 162°30.7 | 3.2' | N27°52.7 | -2.4' | 59.4' |
| 19 | 105°21.0 | 35.3 | | 176°52.9 | 3.2' | 27°50.3 | -2.6' | 59.4' |
| 20 | 120°21.2 | 34.4 | | 191°15.1 | 3.3' | 27°47.7 | -2.8' | 59.4' |
| 21 | 135°21.4 | · · 33.5 | | 205°37.4 | 3.3' | 27°44.9 | -3.0' | 59.4' |
| 22 | 150°21.6 | 32.5 | | 219°59.7 | 3.3' | 27°41.8 | -3.2' | 59.4' |
| 23 | 165°21.8 | 31.6 | | 234°22.0 | 3.3' | 27°38.6 | -3.4' | 59.4' |
| SD = 15.9' | | | $d = -0.9'$ | SD = 16.2' | | | | |
| Sun | | | | | | | | |
| 0 | 180°22.1 | N06°30.7 | | 248°44.3 | 3.4' | N27°35.2 | -3.6' | 59.4' |
| 1 | 195°22.3 | 29.7 | | 263°06.7 | 3.4' | 27°31.6 | -3.8' | 59.4' |
| 2 | 210°22.5 | 28.8 | | 277°29.1 | 3.5' | 27°27.9 | -4.0' | 59.4' |
| 3 | 225°22.7 | · · 27.9 | | 291°51.6 | 3.5' | 27°23.9 | -4.2' | 59.4' |
| 4 | 240°22.9 | 27.0 | | 306°14.1 | 3.5' | 27°19.7 | -4.4' | 59.4' |
| 5 | 255°23.1 | 26.0 | | 320°36.6 | 3.6' | 27°15.3 | -4.5' | 59.4' |
| 6 | 270°23.3 | N06°25.1 | | 334°59.2 | 3.6' | N27°10.8 | -4.7' | 59.5' |
| 7 | 285°23.5 | 24.2 | | 349°21.8 | 3.7' | 27°06.1 | -4.9' | 59.5' |
| 8 | 300°23.7 | 23.2 | | 3°44.5 | 3.7' | 27°01.1 | -5.1' | 59.5' |
| 9 | 315°24.0 | · · 22.3 | | 18°07.3 | 3.8' | 26°56.0 | -5.3' | 59.5' |
| 10 | 330°24.2 | 21.4 | | 32°30.1 | 3.9' | 26°50.7 | -5.5' | 59.5' |
| 11 | 345°24.4 | 20.4 | | 46°52.9 | 3.9' | 26°45.3 | -5.7' | 59.5' |
| 12 | 0°24.6 | N06°19.5 | | 61°15.8 | 4.0' | N26°39.6 | -5.8' | 59.5' |
| 13 | 15°24.8 | 18.6 | | 75°38.8 | 4.0' | 26°33.7 | -6.0' | 59.5' |
| 14 | 30°25.0 | 17.6 | | 90°01.9 | 4.1' | 26°27.7 | -6.2' | 59.5' |
| 15 | 45°25.2 | · · 16.7 | | 104°25.0 | 4.2' | 26°21.5 | -6.4' | 59.5' |
| 16 | 60°25.4 | 15.8 | | 118°48.1 | 4.2' | 26°15.1 | -6.6' | 59.5' |
| 17 | 75°25.6 | 14.8 | | 133°11.4 | 4.3' | 26°08.5 | -6.7' | 59.5' |
| 18 | 90°25.9 | N06°13.9 | | 147°34.7 | 4.4' | N26°01.8 | -6.9' | 59.5' |
| 19 | 105°26.1 | 13.0 | | 161°58.1 | 4.5' | 25°54.9 | -7.1' | 59.5' |
| 20 | 120°26.3 | 12.0 | | 176°21.5 | 4.5' | 25°47.8 | -7.3' | 59.5' |
| 21 | 135°26.5 | · · 11.1 | | 190°45.1 | 4.6' | 25°40.5 | -7.4' | 59.5' |
| 22 | 150°26.7 | 10.2 | | 205°08.7 | 4.7' | 25°33.1 | -7.6' | 59.5' |
| 23 | 165°26.9 | 09.2 | | 219°32.4 | 4.8' | 25°25.5 | -7.8' | 59.5' |
| SD = 15.9' | | | $d = -0.9'$ | SD = 16.2' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | //// | 02:58 | 04:21 | 19:33 | 20:54 | //// |
| N 70° | 01:17 | 03:21 | 04:32 | 19:23 | 20:33 | 22:30 |
| 68° | 02:03 | 03:38 | 04:41 | 19:14 | 20:16 | 21:48 |
| 66° | 02:32 | 03:51 | 04:48 | 19:07 | 20:03 | 21:21 |
| 64° | 02:53 | 04:03 | 04:54 | 19:01 | 19:52 | 21:00 |
| 62° | 03:10 | 04:12 | 05:00 | 18:56 | 19:43 | 20:44 |
| 60° | 03:24 | 04:20 | 05:04 | 18:52 | 19:35 | 20:31 |
| N 58° | 03:35 | 04:27 | 05:08 | 18:48 | 19:29 | 20:20 |
| 56° | 03:45 | 04:33 | 05:12 | 18:44 | 19:23 | 20:11 |
| 54° | 03:53 | 04:38 | 05:15 | 18:41 | 19:18 | 20:02 |
| 52° | 04:01 | 04:43 | 05:18 | 18:38 | 19:13 | 19:55 |
| 50° | 04:07 | 04:48 | 05:21 | 18:36 | 19:09 | 19:49 |
| 45° | 04:21 | 04:57 | 05:27 | 18:30 | 19:00 | 19:36 |
| N 40° | 04:31 | 05:04 | 05:31 | 18:25 | 18:53 | 19:25 |
| 35° | 04:39 | 05:10 | 05:36 | 18:21 | 18:47 | 19:17 |
| 30° | 04:46 | 05:15 | 05:39 | 18:18 | 18:42 | 19:10 |
| 20° | 04:57 | 05:23 | 05:45 | 18:12 | 18:34 | 19:00 |
| N 10° | 05:05 | 05:29 | 05:51 | 18:07 | 18:28 | 18:52 |
| 0° | 05:10 | 05:35 | 05:55 | 18:02 | 18:23 | 18:47 |
| S 10° | 05:15 | 05:39 | 06:00 | 17:57 | 18:18 | 18:43 |
| 20° | 05:17 | 05:43 | 06:05 | 17:53 | 18:15 | 18:40 |
| 30° | 05:19 | 05:47 | 06:11 | 17:47 | 18:11 | 18:39 |
| 35° | 05:19 | 05:48 | 06:14 | 17:44 | 18:09 | 18:39 |
| 40° | 05:19 | 05:50 | 06:17 | 17:41 | 18:08 | 18:39 |
| 45° | 05:18 | 05:52 | 06:21 | 17:37 | 18:06 | 18:40 |
| S 50° | 05:16 | 05:54 | 06:26 | 17:32 | 18:04 | 18:42 |
| 52° | 05:16 | 05:55 | 06:28 | 17:30 | 18:04 | 18:43 |
| 54° | 05:15 | 05:55 | 06:31 | 17:28 | 18:03 | 18:44 |
| 56° | 05:13 | 05:56 | 06:33 | 17:25 | 18:02 | 18:45 |
| 58° | 05:12 | 05:57 | 06:36 | 17:22 | 18:02 | 18:47 |
| S 60° | 05:10 | 05:58 | 06:39 | 17:19 | 18:01 | 18:49 |

| Lat. | Moonrise | | | Moonset | | |
|-------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| N 70° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64° | <input type="checkbox"/> | <input type="checkbox"/> | 21:05 | <input type="checkbox"/> | <input type="checkbox"/> | 19:36 |
| 62° | 18:45 | 19:54 | 22:07 | 17:32 | 18:35 | 18:33 |
| 60° | 19:51 | 20:58 | 22:41 | 16:26 | 17:31 | 17:58 |
| N 58° | 20:25 | 21:32 | 23:06 | 15:52 | 16:57 | 17:33 |
| 56° | 20:51 | 21:57 | 23:26 | 15:26 | 16:32 | 17:12 |
| 54° | 21:11 | 22:18 | 23:42 | 15:06 | 16:11 | 16:56 |
| 52° | 21:28 | 22:34 | 23:57 | 14:49 | 15:54 | 16:41 |
| 50° | 21:43 | 22:49 | · · · | 14:35 | 15:40 | 16:28 |
| 45° | 22:13 | 23:18 | · · · | 14:05 | 15:10 | 16:02 |
| N 40° | 22:36 | 23:41 | · · · | 13:42 | 14:47 | 15:41 |
| 35° | 22:55 | · · · | 00:00 | 13:23 | 14:28 | 15:23 |
| 30° | 23:12 | · · · | 00:16 | 13:07 | 14:11 | 15:08 |
| 20° | 23:40 | · · · | 00:44 | 12:39 | 13:43 | 14:42 |
| N 10° | · · · | 00:04 | 01:07 | 12:16 | 13:19 | 14:20 |
| 0° | · · · | 00:26 | 01:29 | 11:54 | 12:56 | 13:59 |
| S 10° | · · · | 00:49 | 01:51 | 11:32 | 12:34 | 13:38 |
| 20° | 00:08 | 01:13 | 02:15 | 11:08 | 12:10 | 13:15 |
| 30° | 00:35 | 01:41 | 02:42 | 10:40 | 11:41 | 12:49 |
| 35° | 00:51 | 01:58 | 02:59 | 10:24 | 11:25 | 12:33 |
| 40° | 01:09 | 02:18 | 03:17 | 10:05 | 11:05 | 12:15 |
| 45° | 01:31 | 02:42 | 03:40 | 09:43 | 10:41 | 11:53 |
| S 50° | 02:00 | 03:12 | 04:09 | 09:14 | 10:11 | 11:25 |
| 52° | 02:14 | 03:27 | 04:23 | 08:59 | 09:56 | 11:11 |
| 54° | 02:30 | 03:45 | 04:39 | 08:43 | 09:38 | 10:55 |
| 56° | 02:49 | 04:06 | 04:59 | 08:23 | 09:17 | 10:36 |
| 58° | 03:13 | 04:33 | 05:23 | 07:59 | 08:49 | 10:12 |
| S 60° | 03:45 | 05:12 | 05:54 | 07:27 | 08:11 | 09:41 |

| Day | Sun | | | Moon | | |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|------------------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 23-25 54-31% |
| 04 | 00:48 | 00:58 | 11:59 | 05:39 | 18:10 | |
| 05 | 01:08 | 01:18 | 11:59 | 06:41 | 19:13 | |
| 06 | 01:28 | 01:38 | 11:58 | 07:44 | 20:15 | |

September 07, 08, 09 UT (Mon., Tue., Wed.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|---------------------|----------|--|----------|----------|----------|----------|----------|----------|----------|----------|
| Mon | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 346°05.4 | | 141°53.8 | S14°32.5 | 237°23.3 | N22°57.3 | 208°30.7 | N16°52.1 | 332°47.6 | N02°47.9 |
| 1 | 1°07.8 | | 156°54.7 | 33.5 | 252°24.1 | 57.2 | 223°32.7 | 51.9 | 347°50.2 | 47.8 |
| 2 | 16°10.3 | | 171°55.6 | 34.4 | 267°24.8 | 57.0 | 238°34.6 | 51.8 | 2°52.8 | 47.8 |
| 3 | 31°12.8 | | 186°56.4 | •• 35.4 | 282°25.6 | •• 56.9 | 253°36.6 | •• 51.6 | 17°55.4 | •• 47.7 |
| 4 | 46°15.2 | | 201°57.3 | 36.3 | 297°26.4 | 56.7 | 268°38.5 | 51.5 | 32°58.0 | 47.6 |
| 5 | 61°17.7 | | 216°58.2 | 37.3 | 312°27.2 | 56.5 | 283°40.5 | 51.4 | 48°00.6 | 47.6 |
| 6 | 76°20.2 | | 231°59.1 | S14°38.2 | 327°27.9 | N22°56.4 | 298°42.4 | N16°51.2 | 63°03.3 | N02°47.5 |
| 7 | 91°22.6 | | 247°00.0 | 39.2 | 342°28.7 | 56.2 | 313°44.4 | 51.1 | 78°05.9 | 47.4 |
| 8 | 106°25.1 | | 262°00.9 | 40.1 | 357°29.5 | 56.1 | 328°46.3 | 50.9 | 93°08.5 | 47.4 |
| 9 | 121°27.5 | | 277°01.8 | •• 41.1 | 12°30.3 | •• 55.9 | 343°48.3 | •• 50.8 | 108°11.1 | •• 47.3 |
| 10 | 136°30.0 | | 292°02.7 | 42.0 | 27°31.1 | 55.7 | 358°50.2 | 50.6 | 123°13.7 | 47.2 |
| 11 | 151°32.5 | | 307°03.5 | 43.0 | 42°31.8 | 55.6 | 13°52.2 | 50.5 | 138°16.3 | 47.1 |
| 12 | 166°34.9 | | 322°04.4 | S14°43.9 | 57°32.6 | N22°55.4 | 28°54.1 | N16°50.3 | 153°18.9 | N02°47.1 |
| 13 | 181°37.4 | | 337°05.3 | 44.8 | 72°33.4 | 55.2 | 43°56.1 | 50.2 | 168°21.5 | 47.0 |
| 14 | 196°39.9 | | 352°06.2 | 45.8 | 87°34.2 | 55.1 | 58°58.0 | 50.0 | 183°24.1 | 46.9 |
| 15 | 211°42.3 | | 7°07.1 | •• 46.7 | 102°34.9 | •• 54.9 | 74°00.0 | •• 49.9 | 198°26.7 | •• 46.9 |
| 16 | 226°44.8 | | 22°08.0 | 47.7 | 117°35.7 | 54.7 | 89°01.9 | 49.7 | 213°29.3 | 46.8 |
| 17 | 241°47.3 | | 37°08.9 | 48.6 | 132°36.5 | 54.6 | 104°03.9 | 49.6 | 228°31.9 | 46.7 |
| 18 | 256°49.7 | | 52°09.8 | S14°49.5 | 147°37.3 | N22°54.4 | 119°05.8 | N16°49.5 | 243°34.6 | N02°46.7 |
| 19 | 271°52.2 | | 67°10.7 | 50.5 | 162°38.1 | 54.2 | 134°07.8 | 49.3 | 258°37.2 | 46.6 |
| 20 | 286°54.6 | | 82°11.6 | 51.4 | 177°38.8 | 54.1 | 149°09.7 | 49.2 | 273°39.8 | 46.5 |
| 21 | 301°57.1 | | 97°12.5 | •• 52.3 | 192°39.6 | •• 53.9 | 164°11.7 | •• 49.0 | 288°42.4 | •• 46.5 |
| 22 | 316°59.6 | | 112°13.5 | 53.3 | 207°40.4 | 53.7 | 179°13.6 | 48.9 | 303°45.0 | 46.4 |
| 23 | 332°02.0 | | 127°14.4 | 54.2 | 222°41.2 | 53.6 | 194°15.6 | 48.7 | 318°47.6 | 46.3 |
| Mer.pass. 00:55 | | | | | | | | | | |
| ν0.9' d1.0' m-4.69 | | | | | | | | | | |
| ν0.8' d-0.2' m1.22 | | | | | | | | | | |
| ν1.9' d-0.1' m-1.81 | | | | | | | | | | |
| ν2.6' d-0.1' m0.45 | | | | | | | | | | |
| Tue | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 347°04.5 | | 142°15.3 | S14°55.2 | 237°42.0 | N22°53.4 | 209°17.5 | N16°48.6 | 333°50.2 | N02°46.3 |
| 1 | 2°07.0 | | 157°16.2 | 56.1 | 252°42.7 | 53.2 | 224°19.5 | 48.4 | 348°52.8 | 46.2 |
| 2 | 17°09.4 | | 172°17.1 | 57.0 | 267°43.5 | 53.1 | 239°21.4 | 48.3 | 3°55.4 | 46.1 |
| 3 | 32°11.9 | | 187°18.0 | •• 58.0 | 282°44.3 | •• 52.9 | 254°23.4 | •• 48.1 | 18°58.0 | •• 46.1 |
| 4 | 47°14.4 | | 202°18.9 | 58.9 | 297°45.1 | 52.7 | 269°25.4 | 48.0 | 34°00.6 | 46.0 |
| 5 | 62°16.8 | | 217°19.8 | 14°59.8 | 312°45.9 | 52.6 | 284°27.3 | 47.9 | 49°03.3 | 45.9 |
| 6 | 77°19.3 | | 232°20.8 | S15°00.7 | 327°46.6 | N22°52.4 | 299°29.3 | N16°47.7 | 64°05.9 | N02°45.8 |
| 7 | 92°21.8 | | 247°21.7 | 01.7 | 342°47.4 | 52.2 | 314°31.2 | 47.6 | 79°08.5 | 45.8 |
| 8 | 107°24.2 | | 262°22.6 | 02.6 | 357°48.2 | 52.1 | 329°33.2 | 47.4 | 94°11.1 | 45.7 |
| 9 | 122°26.7 | | 277°23.5 | •• 03.5 | 12°49.0 | •• 51.9 | 344°35.1 | •• 47.3 | 109°13.7 | •• 45.6 |
| 10 | 137°29.1 | | 292°24.5 | 04.5 | 27°49.8 | 51.7 | 359°37.1 | 47.1 | 124°16.3 | 45.6 |
| 11 | 152°31.6 | | 307°25.4 | 05.4 | 42°50.6 | 51.5 | 14°39.0 | 47.0 | 139°18.9 | 45.5 |
| 12 | 167°34.1 | | 322°26.3 | S15°06.3 | 57°51.3 | N22°51.4 | 29°41.0 | N16°46.8 | 154°21.5 | N02°45.4 |
| 13 | 182°36.5 | | 337°27.2 | 07.2 | 72°52.1 | 51.2 | 44°42.9 | 46.7 | 169°24.1 | 45.4 |
| 14 | 197°39.0 | | 352°28.2 | 08.2 | 87°52.9 | 51.0 | 59°44.9 | 46.5 | 184°26.8 | 45.3 |
| 15 | 212°41.5 | | 7°29.1 | •• 09.1 | 102°53.7 | •• 50.9 | 74°46.8 | •• 46.4 | 199°29.4 | •• 45.2 |
| 16 | 227°43.9 | | 22°30.0 | 10.0 | 117°54.5 | 50.7 | 89°48.8 | 46.2 | 214°32.0 | 45.2 |
| 17 | 242°46.4 | | 37°31.0 | 10.9 | 132°55.3 | 50.5 | 104°50.7 | 46.1 | 229°34.6 | 45.1 |
| 18 | 257°48.9 | | 52°31.9 | S15°11.8 | 147°56.0 | N22°50.3 | 119°52.7 | N16°46.0 | 244°37.2 | N02°45.0 |
| 19 | 272°51.3 | | 67°32.9 | 12.8 | 162°56.8 | 50.2 | 134°54.6 | 45.8 | 259°39.8 | 45.0 |
| 20 | 287°53.8 | | 82°33.8 | 13.7 | 177°57.6 | 50.0 | 149°56.6 | 45.7 | 274°42.4 | 44.9 |
| 21 | 302°56.3 | | 97°34.7 | •• 14.6 | 192°58.4 | •• 49.8 | 164°58.5 | •• 45.5 | 289°45.0 | •• 44.8 |
| 22 | 317°58.7 | | 112°35.7 | 15.5 | 207°59.2 | 49.7 | 180°00.5 | 45.4 | 304°47.6 | 44.7 |
| 23 | 333°01.2 | | 127°36.6 | 16.4 | 223°00.0 | 49.5 | 195°02.5 | 45.2 | 319°50.3 | 44.7 |
| Mer.pass. 00:52 | | | | | | | | | | |
| ν0.9' d0.9' m-4.70 | | | | | | | | | | |
| ν0.8' d-0.2' m1.22 | | | | | | | | | | |
| ν2.0' d-0.1' m-1.82 | | | | | | | | | | |
| ν2.6' d-0.1' m0.45 | | | | | | | | | | |
| Wed | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 348°03.6 | | 142°37.6 | S15°17.4 | 238°00.8 | N22°49.3 | 210°04.4 | N16°45.1 | 334°52.9 | N02°44.6 |
| 1 | 3°06.1 | | 157°38.5 | 18.3 | 253°01.6 | 49.1 | 225°06.4 | 44.9 | 349°55.5 | 44.5 |
| 2 | 18°08.6 | | 172°39.5 | 19.2 | 268°02.3 | 49.0 | 240°08.3 | 44.8 | 4°58.1 | 44.5 |
| 3 | 33°11.0 | | 187°40.4 | •• 20.1 | 283°03.1 | •• 48.8 | 255°10.3 | •• 44.6 | 20°00.7 | •• 44.4 |
| 4 | 48°13.5 | | 202°41.4 | 21.0 | 298°03.9 | 48.6 | 270°12.2 | 44.5 | 35°03.3 | 44.3 |
| 5 | 63°16.0 | | 217°42.3 | 21.9 | 313°04.7 | 48.4 | 285°14.2 | 44.4 | 50°05.9 | 44.3 |
| 6 | 78°18.4 | | 232°43.3 | S15°22.8 | 328°05.5 | N22°48.3 | 300°16.1 | N16°44.2 | 65°08.5 | N02°44.2 |
| 7 | 93°20.9 | | 247°44.3 | 23.8 | 343°06.3 | 48.1 | 315°18.1 | 44.1 | 80°11.2 | 44.1 |
| 8 | 108°23.4 | | 262°45.2 | 24.7 | 358°07.1 | 47.9 | 330°20.0 | 43.9 | 95°13.8 | 44.0 |
| 9 | 123°25.8 | | 277°46.2 | •• 25.6 | 13°07.9 | •• 47.7 | 345°22.0 | •• 43.8 | 110°16.4 | •• 44.0 |
| 10 | 138°28.3 | | 292°47.1 | 26.5 | 28°08.6 | 47.6 | 0°23.9 | 43.6 | 125°19.0 | 43.9 |
| 11 | 153°30.7 | | 307°48.1 | 27.4 | 43°09.4 | 47.4 | 15°25.9 | 43.5 | 140°21.6 | 43.8 |
| 12 | 168°33.2 | | 322°49.1 | S15°28.3 | 58°10.2 | N22°47.2 | 30°27.9 | N16°43.3 | 155°24.2 | N02°43.8 |
| 13 | 183°35.7 | | 337°50.0 | 29.2 | 73°11.0 | 47.0 | 45°29.8 | 43.2 | 170°26.8 | 43.7 |
| 14 | 198°38.1 | | 352°51.0 | 30.1 | 88°11.8 | 46.9 | 60°31.8 | 43.0 | 185°29.4 | 43.6 |
| 15 | 213°40.6 | | 7°52.0 | •• 31.0 | 103°12.6 | •• 46.7 | 75°33.7 | •• 42.9 | 200°32.1 | •• 43.6 |
| 16 | 228°43.1 | | 22°53.0 | 31.9 | 118°13.4 | 46.5 | 90°35.7 | 42.8 | 215°34.7 | 43.5 |
| 17 | 243°45.5 | | 37°53.9 | 32.8 | 133°14.2 | 46.3 | 105°37.6 | 42.6 | 230°37.3 | 43.4 |
| 18 | 258°48.0 | | 52°54.9 | S15°33.7 | 148°15.0 | N22°46.1 | 120°39.6 | N16°42.5 | 245°39.9 | N02°43.4 |
| 19 | 273°50.5 | | 67°55.9 | 34.6 | 163°15.8 | 46.0 | 135°41.5 | 42.3 | 260°42.5 | 43.3 |
| 20 | 288°52.9 | | 82°56.9 | 35.5 | 178°16.5 | 45.8 | 150°43.5 | 42.2 | 275°45.1 | 43.2 |
| 21 | 303°55.4 | | 97°57.8 | •• 36.4 | 193°17.3 | •• 45.6 | 165°45.5 | •• 42.0 | 290°47.7 | •• 43.1 |
| 22 | 318°57.9 | | 112°58.8 | 37.3 | 208°18.1 | 45.4 | 180°47.4 | 41.9 | 305°50.4 | 43.1 |
| 23 | 334°00.3 | | 127°59.8 | 38.2 | 223°18.9 | 45.3 | 195°49.4 | 41.7 | 320°53.0 | 43.0 |
| Mer.pass. 00:48 | | | | | | | | | | |
| ν0.9' d0.9' m-4.71 | | | | | | | | | | |
| ν0.8' d-0.2' m1.22 | | | | | | | | | | |
| ν2.0' d-0.1' m-1.82 | | | | | | | | | | |
| ν2.6' d-0.1' m0.44 | | | | | | | | | | |

| Stars | | |
|---------------------|-----------|-----------|
| | SHA | Dec |
| Alpheratz | 357° 33.0 | 29° 14.4 |
| Ankaa | 353° 05.4 | -42° 09.4 |
| Schedar | 349° 28.9 | 56° 41.0 |
| Diphda | 348° 45.6 | -17° 50.2 |
| Achernar | 335° 18.7 | -57° 05.8 |
| Hamal | 327° 49.4 | 23° 35.4 |
| Polaris | 313° 05.7 | 89° 22.3 |
| Acamar | 315° 10.5 | -40° 11.5 |
| Menkar | 314° 04.5 | 4° 11.8 |
| Mirfak | 308° 26.1 | 49° 57.2 |
| Aldebaran | 290° 38.0 | 16° 33.8 |
| Rigel | 281° 02.6 | -8° 10.0 |
| Capella | 280° 19.9 | 46° 01.3 |
| Bellatrix | 278° 21.4 | 6° 22.5 |
| Elnath | 278° 00.2 | 28° 37.8 |
| Alnilam | 275° 36.4 | -1° 10.9 |
| Betelgeuse | 270° 50.7 | 7° 24.8 |
| Canopus | 263° 52.0 | -52° 42.2 |
| Sirius | 258° 25.2 | -16° 44.9 |
| Adhara | 255° 05.0 | -29° 00.2 |
| Procyon | 244° 49.6 | 5° 09.5 |
| Pollux | 243° 15.9 | 27° 57.7 |
| Avior | 234° 14.7 | -59° 35.4 |
| Suhail | 222° 45.7 | -43° 32.2 |
| Miaplacidus | 221° 38.8 | -69° 49.4 |
| Alphard | 217° 46.7 | -8° 46.3 |
| Regulus | 207° 33.3 | 11° 50.3 |
| Dubhe | 193° 40.0 | 61° 36.4 |
| Denebola | 182° 23.9 | 14° 25.5 |
| Gienah | 175° 42.5 | -17° 41.4 |
| Acrux | 172° 59.2 | -63° 14.9 |
| Gacrux | 171° 50.6 | -57° 15.9 |
| Alioth | 166° 12.2 | 55° 49.0 |
| Spica | 158° 21.1 | -11° 18.0 |
| Alkaid | 152° 51.3 | 49° 11.0 |
| Hadar | 148° 34.5 | -60° 30.3 |
| Menkent | 147° 56.2 | -36° 30.2 |
| Arcturus | 145° 46.9 | 19° 02.7 |
| Rigel Kent. | 139° 38.8 | -60° 56.9 |
| Kochab | 137° 20.4 | 74° 02.9 |
| Zuben'ubi | 136° 54.7 | -16° 09.2 |
| Alphecca | 126° 02.7 | 26° 37.7 |
| Antares | 112° 14.2 | -26° 29.5 |
| Atria | 107° 07.1 | -69° 04.7 |
| Sabik | 102° 01.2 | -15° 45.4 |
| Shaula | 96° 08.4 | -37° 07.5 |
| Rasalhague | 95° 57.2 | 12° 32.6 |
| Eltanin | 90° 41.4 | 51° 29.4 |
| Kaus Aust. | 83° 30.5 | -34° 22.3 |
| Vega | 80° 32.1 | 38° 48.8 |
| Nunki | 75° 45.9 | -26° 15.8 |
| Altair | 61° 58.4 | 8° 56.5 |
| Peacock | 53° 03.1 | -56° 39.0 |
| Deneb | 49° 24.5 | 45° 22.8 |
| Enif | 33° 37.1 | 10° 00.0 |
| Al Na'ir | 27° 30.7 | -46° 49.8 |
| Fomalhaut | 15° 12.6 | -29° 28.7 |
| Scheat | 13° 43.5 | 28° 13.8 |
| Markab | 13° 28.2 | 15° 21.1 |
| Sep 07 Mon | SHA | Mer.pass |
| Venus | 155° 48.4 | 14:32 |
| Mars | 251° 17.9 | 08:10 |
| Jupiter | 222° 25.4 | 10:05 |
| Saturn | 346° 42.2 | 01:49 |
| Sep 08 Tue | SHA | Mer.pass |
| Venus | 155° 10.8 | 14:30 |
| Mars | 250° 37.5 | 08:09 |
| Jupiter | 222° 13.0 | 10:02 |
| Saturn | 346° 45.7 | 01:44 |
| Sep 09 Wed | SHA | Mer.pass |
| Venus | 154° 33.9 | 14:29 |
| Mars | 249° 57.1 | 08:08 |
| Jupiter | 222° 00.8 | 09:58 |
| Saturn | 346° 49.2 | 01:40 |
| Horizontal parallax | | |
| Venus: | 0.3 | |
| Mars: | 0.1 | |

| h | Sun | | | Moon | | | | |
|------------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| Mon | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°27.1 | N06°08.3 | | 233°56.1 | 4.9' | N25°17.7 | -8.0' | 59.5' |
| 1 | 195°27.3 | 07.4 | | 248°20.0 | 4.9' | 25°09.7 | -8.1' | 59.5' |
| 2 | 210°27.6 | 06.4 | | 262°43.9 | 5.0' | 25°01.6 | -8.3' | 59.5' |
| 3 | 225°27.8 | · · 05.5 | | 277°08.0 | 5.1' | 24°53.3 | -8.4' | 59.5' |
| 4 | 240°28.0 | 04.6 | | 291°32.1 | 5.2' | 24°44.9 | -8.6' | 59.5' |
| 5 | 255°28.2 | 03.6 | | 305°56.3 | 5.3' | 24°36.3 | -8.8' | 59.5' |
| 6 | 270°28.4 | N06°02.7 | | 320°20.5 | 5.4' | N24°27.5 | -8.9' | 59.5' |
| 7 | 285°28.6 | 01.7 | | 334°44.9 | 5.5' | 24°18.6 | -9.1' | 59.5' |
| 8 | 300°28.8 | 06°00.8 | | 349°09.4 | 5.6' | 24°09.5 | -9.2' | 59.5' |
| 9 | 315°29.0 | 05°59.9 | | 3°33.9 | 5.6' | 24°00.3 | -9.4' | 59.5' |
| 10 | 330°29.3 | 58.9 | | 17°58.6 | 5.7' | 23°50.9 | -9.6' | 59.5' |
| 11 | 345°29.5 | 58.0 | | 32°23.3 | 5.8' | 23°41.3 | -9.7' | 59.4' |
| 12 | 0°29.7 | N05°57.1 | | 46°48.1 | 5.9' | N23°31.6 | -9.9' | 59.4' |
| 13 | 15°29.9 | 56.1 | | 61°13.1 | 6.0' | 23°21.7 | -10.0' | 59.4' |
| 14 | 30°30.1 | 55.2 | | 75°38.1 | 6.1' | 23°11.7 | -10.1' | 59.4' |
| 15 | 45°30.3 | · · 54.2 | | 90°03.2 | 6.2' | 23°01.6 | -10.3' | 59.4' |
| 16 | 60°30.5 | 53.3 | | 104°28.4 | 6.3' | 22°51.3 | -10.4' | 59.4' |
| 17 | 75°30.8 | 52.4 | | 118°53.7 | 6.4' | 22°40.9 | -10.6' | 59.4' |
| 18 | 90°31.0 | N05°51.4 | | 133°19.2 | 6.5' | N22°30.3 | -10.7' | 59.4' |
| 19 | 105°31.2 | 50.5 | | 147°44.7 | 6.6' | 22°19.6 | -10.9' | 59.4' |
| 20 | 120°31.4 | 49.6 | | 162°10.3 | 6.7' | 22°08.7 | -11.0' | 59.4' |
| 21 | 135°31.6 | · · 48.6 | | 176°36.0 | 6.8' | 21°57.7 | -11.1' | 59.4' |
| 22 | 150°31.8 | 47.7 | | 191°01.8 | 6.9' | 21°46.6 | -11.3' | 59.4' |
| 23 | 165°32.0 | 46.7 | | 205°27.7 | 7.0' | 21°35.4 | -11.4' | 59.4' |
| SD = 15.9' $d = -0.9'$ | | | SD = 16.2' | | | | | |

| Tue | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|--------|-------|
| 0 | 180°32.3 | N05°45.8 | 219°53.7 | 7.1' | N21°24.0 | -11.5' | 59.4' |
| 1 | 195°32.5 | 44.9 | 234°19.8 | 7.2' | 21°12.5 | -11.6' | 59.4' |
| 2 | 210°32.7 | 43.9 | 248°46.0 | 7.3' | 21°00.8 | -11.8' | 59.4' |
| 3 | 225°32.9 | · · 43.0 | 263°12.4 | 7.4' | 20°49.0 | -11.9' | 59.4' |
| 4 | 240°33.1 | 42.0 | 277°38.8 | 7.5' | 20°37.2 | -12.0' | 59.4' |
| 5 | 255°33.3 | 41.1 | 292°05.3 | 7.6' | 20°25.1 | -12.1' | 59.3' |
| 6 | 270°33.5 | N05°40.2 | 306°31.9 | 7.7' | N20°13.0 | -12.3' | 59.3' |
| 7 | 285°33.8 | 39.2 | 320°58.6 | 7.8' | 20°00.7 | -12.4' | 59.3' |
| 8 | 300°34.0 | 38.3 | 335°25.4 | 7.9' | 19°48.4 | -12.5' | 59.3' |
| 9 | 315°34.2 | · · 37.3 | 349°52.4 | 8.0' | 19°35.9 | -12.6' | 59.3' |
| 10 | 330°34.4 | 36.4 | 4°19.4 | 8.1' | 19°23.3 | -12.7' | 59.3' |
| 11 | 345°34.6 | 35.5 | 18°46.5 | 8.2' | 19°10.6 | -12.8' | 59.3' |
| 12 | 0°34.8 | N05°34.5 | 33°13.7 | 8.3' | N18°57.8 | -12.9' | 59.3' |
| 13 | 15°35.0 | 33.6 | 47°41.0 | 8.4' | 18°44.8 | -13.0' | 59.3' |
| 14 | 30°35.3 | 32.6 | 62°08.5 | 8.5' | 18°31.8 | -13.1' | 59.3' |
| 15 | 45°35.5 | · · 31.7 | 76°36.0 | 8.6' | 18°18.7 | -13.2' | 59.3' |
| 16 | 60°35.7 | 30.8 | 91°03.6 | 8.7' | 18°05.4 | -13.3' | 59.2' |
| 17 | 75°35.9 | 29.8 | 105°31.3 | 8.8' | 17°52.1 | -13.4' | 59.2' |
| 18 | 90°36.1 | N05°28.9 | 119°59.1 | 8.9' | N17°38.7 | -13.5' | 59.2' |
| 19 | 105°36.3 | 27.9 | 134°27.0 | 9.0' | 17°25.1 | -13.6' | 59.2' |
| 20 | 120°36.6 | 27.0 | 148°55.0 | 9.1' | 17°11.5 | -13.7' | 59.2' |
| 21 | 135°36.8 | · · 26.0 | 163°23.1 | 9.2' | 16°57.8 | -13.8' | 59.2' |
| 22 | 150°37.0 | 25.1 | 177°51.3 | 9.3' | 16°44.0 | -13.9' | 59.2' |
| 23 | 165°37.2 | 24.2 | 192°19.6 | 9.4' | 16°30.1 | -14.0' | 59.2' |
| SD = 15.9' $d = -0.9'$ | | | SD = 16.2' | | | | |

| Wed | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|--------|-------|
| 0 | 180°37.4 | N05°23.2 | 206°48.0 | 9.5' | N16°16.1 | -14.1' | 59.1' |
| 1 | 195°37.6 | 22.3 | 221°16.5 | 9.6' | 16°02.1 | -14.2' | 59.1' |
| 2 | 210°37.8 | 21.3 | 235°45.1 | 9.7' | 15°47.9 | -14.2' | 59.1' |
| 3 | 225°38.1 | · · 20.4 | 250°13.7 | 9.8' | 15°33.7 | -14.3' | 59.1' |
| 4 | 240°38.3 | 19.4 | 264°42.5 | 9.9' | 15°19.4 | -14.4' | 59.1' |
| 5 | 255°38.5 | 18.5 | 279°11.4 | 9.9' | 15°05.0 | -14.5' | 59.1' |
| 6 | 270°38.7 | N05°17.6 | 293°40.3 | 10.0' | N14°50.5 | -14.5' | 59.1' |
| 7 | 285°38.9 | 16.6 | 308°09.3 | 10.1' | 14°36.0 | -14.6' | 59.0' |
| 8 | 300°39.1 | 15.7 | 322°38.4 | 10.2' | 14°21.4 | -14.7' | 59.0' |
| 9 | 315°39.4 | · · 14.7 | 337°07.7 | 10.3' | 14°06.7 | -14.8' | 59.0' |
| 10 | 330°39.6 | 13.8 | 351°36.9 | 10.4' | 13°51.9 | -14.8' | 59.0' |
| 11 | 345°39.8 | 12.8 | 6°06.3 | 10.5' | 13°37.1 | -14.9' | 59.0' |
| 12 | 0°40.0 | N05°11.9 | 20°35.8 | 10.6' | N13°22.2 | -14.9' | 59.0' |
| 13 | 15°40.2 | 10.9 | 35°05.3 | 10.6' | 13°07.3 | -15.0' | 59.0' |
| 14 | 30°40.4 | 10.0 | 49°35.0 | 10.7' | 12°52.3 | -15.1' | 58.9' |
| 15 | 45°40.7 | · · 09.1 | 64°04.7 | 10.8' | 12°37.2 | -15.1' | 58.9' |
| 16 | 60°40.9 | 08.1 | 78°34.5 | 10.9' | 12°22.1 | -15.2' | 58.9' |
| 17 | 75°41.1 | 07.2 | 93°04.4 | 11.0' | 12°06.9 | -15.2' | 58.9' |
| 18 | 90°41.3 | N05°06.2 | 107°34.3 | 11.0' | N11°51.6 | -15.3' | 58.9' |
| 19 | 105°41.5 | 05.3 | 122°04.4 | 11.1' | 11°36.4 | -15.3' | 58.8' |
| 20 | 120°41.7 | 04.3 | 136°34.5 | 11.2' | 11°21.0 | -15.4' | 58.8' |
| 21 | 135°42.0 | · · 03.4 | 151°04.7 | 11.3' | 11°05.6 | -15.4' | 58.8' |
| 22 | 150°42.2 | 02.4 | 165°34.9 | 11.3' | 10°50.2 | -15.5' | 58.8' |
| 23 | 165°42.4 | 01.5 | 180°05.3 | 11.4' | 10°34.7 | -15.5' | 58.8' |
| SD = 15.9' $d = -0.9'$ | | | SD = 16.1' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 00:36 | 03:16 | 04:35 | 19:17 | 20:35 | 22:58 |
| N 70° | 01:48 | 03:36 | 04:44 | 19:09 | 20:16 | 22:00 |
| 68° | 02:23 | 03:50 | 04:51 | 19:02 | 20:02 | 21:27 |
| 66° | 02:47 | 04:02 | 04:58 | 18:56 | 19:50 | 21:04 |
| 64° | 03:06 | 04:12 | 05:03 | 18:51 | 19:41 | 20:46 |
| 62° | 03:21 | 04:21 | 05:07 | 18:46 | 19:33 | 20:32 |
| 60° | 03:33 | 04:28 | 05:11 | 18:43 | 19:26 | 20:20 |
| N 58° | 03:43 | 04:34 | 05:15 | 18:39 | 19:20 | 20:10 |
| 56° | 03:52 | 04:39 | 05:18 | 18:36 | 19:15 | 20:02 |
| 54° | 04:00 | 04:44 | 05:21 | 18:34 | 19:10 | 19:54 |
| 52° | 04:06 | 04:48 | 05:23 | 18:31 | 19:06 | 19:47 |
| 50° | 04:12 | 04:52 | 05:25 | 18:29 | 19:02 | 19:42 |
| 45° | 04:25 | 05:00 | 05:30 | 18:24 | 18:54 | 19:30 |
| N 40° | 04:34 | 05:07 | 05:34 | 18:20 | 18:48 | 19:20 |
| 35° | 04:42 | 05:12 | 05:38 | 18:17 | 18:43 | 19:13 |
| 30° | 04:48 | 05:17 | 05:41 | 18:14 | 18:38 | 19:07 |
| 20° | 04:58 | 05:24 | 05:46 | 18:09 | 18:31 | 18:57 |
| N 10° | 05:05 | 05:29 | 05:50 | 18:05 | 18:26 | 18:51 |
| 0° | 05:10 | 05:34 | 05:54 | 18:01 | 18:22 | 18:46 |
| S 10° | 05:13 | 05:37 | 05:58 | 17:57 | 18:18 | 18:43 |
| 20° | 05:15 | 05:40 | 06:02 | 17:53 | 18:15 | 18:41 |
| 30° | 05:15 | 05:43 | 06:07 | 17:49 | 18:13 | 18:40 |
| 35° | 05:15 | 05:44 | 06:10 | 17:46 | 18:12 | 18:41 |
| 40° | 05:14 | 05:45 | 06:12 | 17:43 | 18:11 | 18:42 |
| 45° | 05:13 | 05:46 | 06:16 | 17:40 | 18:10 | 18:44 |
| S 50° | 05:10 | 05:47 | 06:20 | 17:37 | 18:09 | 18:46 |
| 52° | 05:09 | 05:48 | 06:21 | 17:35 | 18:09 | 18:48 |
| 54° | 05:07 | 05:48 | 06:23 | 17:33 | 18:08 | 18:49 |
| 56° | 05:06 | 05:48 | 06:26 | 17:31 | 18:08 | 18:51 |
| 58° | 05:03 | 05:49 | 06:28 | 17:29 | 18:08 | 18:53 |
| S 60° | 05:01 | 05:49 | 06:31 | 17:26 | 18:08 | 18:56 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | | | 00:02 | | 20:42 | 19:25 |
| N 70° | | | 00:48 | | 19:54 | 19:07 |
| 68° | 22:00 | · · · | 01:18 | 20:45 | 19:23 | 18:52 |
| 66° | 23:12 | · · · | 01:39 | 19:33 | 18:59 | 18:40 |
| 64° | 23:48 | · · · | 01:57 | 18:56 | 18:41 | 18:30 |
| 62° | · · · | 00:14 | 02:11 | 18:29 | 18:25 | 18:21 |
| 60° | · · · | 00:34 | 02:23 | 18:08 | 18:12 | 18:14 |
| N 58° | · · · | 00:50 | 02:33 | 17:51 | 18:01 | 18:07 |
| 56° | · · · | 01:04 | 02:42 | 17:37 | 17:51 | 18:01 |
| 54° | · · · | 01:16 | 02:49 | 17:24 | 17:43 | 17:56 |
| 52° | · · · | 01:26 | 02:56 | 17:13 | 17:35 | 17:51 |
| 50° | 00:09 | 01:36 | 03:03 | 17:03 | 17:28 | 17:47 |
| 45° | 00:34 | 01:55 | 03:16 | 16:42 | 17:12 | 17:37 |
| N 40° | 00:54 | 02:11 | 03:27 | 16:25 | 17:00 | 17:29 |
| 35° | 01:11 | 02:25 | 03:37 | 16:10 | 16:49 | 17:22 |
| 30° | 01:26 | 02:36 | 03:45 | 15:58 | 16:40 | 17:16 |
| 20° | 01:50 | 02:56 | 03:59 | 15:36 | 16:23 | 17:05 |
| N 10° | 02:11 | 03:13 | 04:11 | 15:17 | 16:09 | 16:56 |
| 0° | 02:31 | 03:29 | 04:23 | 14:59 | 15:55 | 16:47 |
| S 10° | 02:51 | 03:45 | 04:34 | 14:41 | 15:41 | 16:38 |
| 20° | 03:12 | 04:02 | 04:46 | 14:22 | 15:26 | 16:28 |
| 30° | 03:36 | 04:21 | 05:00 | 13:59 | 15:09 | 16:17 |
| 35° | 03:50 | 04:32 | 05:08 | 13:46 | 14:59 | 16:10 |
| 40° | 04:06 | 04:45 | 05:17 | 13:31 | 14:48 | 16:03 |
| 45° | 04:25 | 05:00 | 05:27 | 13:12 | 14:34 | 15:54 |
| S 50° | 04:50 | 05:18 | 05:40 | 12:49 | 14:17 | 15:43 |
| 52° | 05:01 | 05:27 | 05:46 | 12:38 | 14:09 | 15:38 |
| 54° | 05:14 | 05:37 | 05:52 | 12:26 | 14:00 | 15:33 |
| 56° | 05:29 | 05:47 | 05:59 | 12:11 | 13:50 | 15:27 |
| 58° | 05:47 | 06:00 | 06:07 | 11:54 | 13:39 | 15:20 |
| S 60° | 06:09 | 06:14 | 06:16 | 11:33 | 13:25 | 15:12 |

| Day | Sun | | | Moon | | |
|-----|---|----------------------------------|-----------------------|-----------------------------|----------------|-----------------------|
| | Eqn.of Time 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 26-28 21-6% |
| 07 | 01:49 | 01:59 | 11:58 | 08:45 | 21:14 | |
| 08 | 02:09 | 02:19 | 11:58 | 09:42 | 22:09 | |
| 09 | 02:30 | 02:40 | 11:57 | 10:35 | 23:00 | |

September 10, 11, 12 UT (Thu., Fri., Sat.)

| | Aries | | Venus | | Mars | | Jupiter | | Saturn | | Stars | | |
|-----------------|----------|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|-----|-------|-------------|-------------------|
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec |
| 0 | 349°02.8 | 143°00.8 | S15°39.1 | 238°19.7 | N22°45.1 | 210°51.3 | N16°41.6 | 335°55.6 | N02°42.9 | | | Alpheratz | 357°33.0 29°14.4 |
| 1 | 4°05.2 | 158°01.8 | 40.0 | 253°20.5 | 44.9 | 225°53.3 | 41.4 | 350°58.2 | 42.9 | | | Ankaa | 353°05.4 -42°09.4 |
| 2 | 19°07.7 | 173°02.8 | 40.9 | 268°21.3 | 44.7 | 240°55.2 | 41.3 | 6°00.8 | 42.8 | | | Schedar | 349°28.9 56°41.1 |
| 3 | 34°10.2 | 188°03.8 | · · 41.8 | 283°22.1 | · · 44.5 | 255°57.2 | · · 41.2 | 21°03.4 | · · 42.7 | | | Diphda | 348°45.6 -17°50.2 |
| 4 | 49°12.6 | 203°04.8 | 42.7 | 298°22.9 | 44.4 | 270°59.2 | 41.0 | 36°06.0 | 42.6 | | | Achernar | 335°18.7 -57°05.8 |
| 5 | 64°15.1 | 218°05.7 | 43.6 | 313°23.7 | 44.2 | 286°01.1 | 40.9 | 51°08.7 | 42.6 | | | Hamal | 327°49.4 23°35.4 |
| 6 | 79°17.6 | 233°06.7 | S15°44.5 | 328°24.5 | N22°44.0 | 301°03.1 | N16°40.7 | 66°11.3 | N02°42.5 | | | Polaris | 313°04.4 89°22.3 |
| 7 | 94°20.0 | 248°07.7 | 45.4 | 343°25.3 | 43.8 | 316°05.0 | 40.6 | 81°13.9 | 42.4 | | | Acamar | 315°10.5 -40°11.5 |
| 8 | 109°22.5 | 263°08.7 | 46.3 | 358°26.1 | 43.6 | 331°07.0 | 40.4 | 96°16.5 | 42.4 | | | Menkar | 314°04.5 4°11.8 |
| 9 | 124°25.0 | 278°09.7 | · · 47.2 | 13°26.9 | · · 43.4 | 346°08.9 | · · 40.3 | 111°19.1 | · · 42.3 | | | Mirfak | 308°26.0 49°57.3 |
| 10 | 139°27.4 | 293°10.7 | 48.1 | 28°27.7 | 43.3 | 1°10.9 | 40.1 | 126°21.7 | 42.2 | | | Aldebaran | 290°38.0 16°33.8 |
| 11 | 154°29.9 | 308°11.7 | 49.0 | 43°28.5 | 43.1 | 16°12.9 | 40.0 | 141°24.4 | 42.2 | | | Rigel | 281°02.5 -8°10.0 |
| 12 | 169°32.4 | 323°12.8 | S15°49.8 | 58°29.2 | N22°42.9 | 31°14.8 | N16°39.8 | 156°27.0 | N02°42.1 | | | Capella | 280°19.8 46°01.3 |
| 13 | 184°34.8 | 338°13.8 | 50.7 | 73°30.0 | 42.7 | 46°16.8 | 39.7 | 171°29.6 | 42.0 | | | Bellatrix | 278°21.4 6°22.5 |
| 14 | 199°37.3 | 353°14.8 | 51.6 | 88°30.8 | 42.5 | 61°18.7 | 39.6 | 186°32.2 | 41.9 | | | Elnath | 278°00.1 28°37.8 |
| 15 | 214°39.7 | 8°15.8 | · · 52.5 | 103°31.6 | · · 42.3 | 76°20.7 | · · 39.4 | 201°34.8 | · · 41.9 | | | Alnilam | 275°36.4 -1°10.9 |
| 16 | 229°42.2 | 23°16.8 | 53.4 | 118°32.4 | 42.2 | 91°22.6 | 39.3 | 216°37.4 | 41.8 | | | Betelgeuse | 270°50.6 7°24.8 |
| 17 | 244°44.7 | 38°17.8 | 54.3 | 133°33.2 | 42.0 | 106°24.6 | 39.1 | 231°40.0 | 41.7 | | | Canopus | 263°51.9 -52°42.2 |
| 18 | 259°47.1 | 53°18.8 | S15°55.2 | 148°34.0 | N22°41.8 | 121°26.6 | N16°39.0 | 246°42.7 | N02°41.7 | | | Sirius | 258°25.1 -16°44.9 |
| 19 | 274°49.6 | 68°19.8 | 56.0 | 163°34.8 | 41.6 | 136°28.5 | 38.8 | 261°45.3 | 41.6 | | | Adhara | 255°04.9 -29°00.2 |
| 20 | 289°52.1 | 83°20.9 | 56.9 | 178°35.6 | 41.4 | 151°30.5 | 38.7 | 276°47.9 | 41.5 | | | Procyon | 244°49.6 5°09.5 |
| 21 | 304°54.5 | 98°21.9 | · · 57.8 | 193°36.4 | · · 41.2 | 166°32.4 | · · 38.5 | 291°50.5 | · · 41.5 | | | Pollux | 243°15.8 27°57.7 |
| 22 | 319°57.0 | 113°22.9 | 58.7 | 208°37.2 | 41.1 | 181°34.4 | 38.4 | 306°53.1 | 41.4 | | | Avior | 234°14.6 -59°35.4 |
| 23 | 334°59.5 | 128°23.9 | 59.6 | 223°38.0 | 40.9 | 196°36.3 | 38.2 | 321°55.7 | 41.3 | | | Suhail | 222°45.7 -43°32.2 |
| Mer.pass. 00:44 | | ν1.0' d0.9' m-4.72 | | ν0.8' d-0.2' m1.21 | | ν2.0' d-0.1' m-1.82 | | ν2.6' d-0.1' m0.44 | | | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | |
| 0 | 350°01.9 | 143°24.9 | S16°00.5 | 238°38.8 | N22°40.7 | 211°38.3 | N16°38.1 | 336°58.4 | N02°41.2 | | | | |
| 1 | 5°04.4 | 158°26.0 | 01.3 | 253°39.6 | 40.5 | 226°40.3 | 38.0 | 352°01.0 | 41.2 | | | | |
| 2 | 20°06.8 | 173°27.0 | 02.2 | 268°40.4 | 40.3 | 241°42.2 | 37.8 | 7°03.6 | 41.1 | | | | |
| 3 | 35°09.3 | 188°28.0 | · · 03.1 | 283°41.2 | · · 40.1 | 256°44.2 | · · 37.7 | 22°06.2 | · · 41.0 | | | | |
| 4 | 50°11.8 | 203°29.1 | 04.0 | 298°42.0 | 39.9 | 271°46.1 | 37.5 | 37°08.8 | 41.0 | | | | |
| 5 | 65°14.2 | 218°30.1 | 04.8 | 313°42.8 | 39.8 | 286°48.1 | 37.4 | 52°11.4 | 40.9 | | | | |
| 6 | 80°16.7 | 233°31.1 | S16°05.7 | 328°43.6 | N22°39.6 | 301°50.1 | N16°37.2 | 67°14.1 | N02°40.8 | | | | |
| 7 | 95°19.2 | 248°32.2 | 06.6 | 343°44.4 | 39.4 | 316°52.0 | 37.1 | 82°16.7 | 40.7 | | | | |
| 8 | 110°21.6 | 263°33.2 | 07.5 | 358°45.2 | 39.2 | 331°54.0 | 36.9 | 97°19.3 | 40.7 | | | | |
| 9 | 125°24.1 | 278°34.3 | · · 08.3 | 13°46.0 | · · 39.0 | 346°55.9 | · · 36.8 | 112°21.9 | · · 40.6 | | | | |
| 10 | 140°26.6 | 293°35.3 | 09.2 | 28°46.8 | 38.8 | 1°57.9 | 36.7 | 127°24.5 | 40.5 | | | | |
| 11 | 155°29.0 | 308°36.3 | 10.1 | 43°47.6 | 38.6 | 16°59.9 | 36.5 | 142°27.2 | 40.5 | | | | |
| 12 | 170°31.5 | 323°37.4 | S16°10.9 | 58°48.4 | N22°38.4 | 32°01.8 | N16°36.4 | 157°29.8 | N02°40.4 | | | | |
| 13 | 185°34.0 | 338°38.4 | 11.8 | 73°49.2 | 38.3 | 47°03.8 | 36.2 | 172°32.4 | 40.3 | | | | |
| 14 | 200°36.4 | 353°39.5 | 12.7 | 88°50.0 | 38.1 | 62°05.7 | 36.1 | 187°35.0 | 40.2 | | | | |
| 15 | 215°38.9 | 8°40.5 | · · 13.5 | 103°50.8 | · · 37.9 | 77°07.7 | · · 35.9 | 202°37.6 | · · 40.2 | | | | |
| 16 | 230°41.3 | 23°41.6 | 14.4 | 118°51.6 | 37.7 | 92°09.7 | 35.8 | 217°40.2 | 40.1 | | | | |
| 17 | 245°43.8 | 38°42.7 | 15.3 | 133°52.4 | 37.5 | 107°11.6 | 35.6 | 232°42.9 | 40.0 | | | | |
| 18 | 260°46.3 | 53°43.7 | S16°16.1 | 148°53.2 | N22°37.3 | 122°13.6 | N16°35.5 | 247°45.5 | N02°40.0 | | | | |
| 19 | 275°48.7 | 68°44.8 | 17.0 | 163°54.0 | 37.1 | 137°15.5 | 35.3 | 262°48.1 | 39.9 | | | | |
| 20 | 290°51.2 | 83°45.8 | 17.9 | 178°54.8 | 36.9 | 152°17.5 | 35.2 | 277°50.7 | 39.8 | | | | |
| 21 | 305°53.7 | 98°46.9 | · · 18.7 | 193°55.7 | · · 36.7 | 167°19.5 | · · 35.1 | 292°53.3 | · · 39.7 | | | | |
| 22 | 320°56.1 | 113°48.0 | 19.6 | 208°56.5 | 36.5 | 182°21.4 | 34.9 | 307°56.0 | 39.7 | | | | |
| 23 | 335°58.6 | 128°49.0 | 20.5 | 223°57.3 | 36.3 | 197°23.4 | 34.8 | 322°58.6 | 39.6 | | | | |
| Mer.pass. 00:40 | | ν1.0' d0.9' m-4.73 | | ν0.8' d-0.2' m1.21 | | ν2.0' d-0.1' m-1.82 | | ν2.6' d-0.1' m0.43 | | | | | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | |
| 0 | 351°01.1 | 143°50.1 | S16°21.3 | 238°58.1 | N22°36.2 | 212°25.3 | N16°34.6 | 338°01.2 | N02°39.5 | | | | |
| 1 | 6°03.5 | 158°51.2 | 22.2 | 253°58.9 | 36.0 | 227°27.3 | 34.5 | 353°03.8 | 39.5 | | | | |
| 2 | 21°06.0 | 173°52.2 | 23.0 | 268°59.7 | 35.8 | 242°29.3 | 34.3 | 8°06.4 | 39.4 | | | | |
| 3 | 36°08.4 | 188°53.3 | · · 23.9 | 284°00.5 | · · 35.6 | 257°31.2 | · · 34.2 | 23°09.0 | · · 39.3 | | | | |
| 4 | 51°10.9 | 203°54.4 | 24.7 | 299°01.3 | 35.4 | 272°33.2 | 34.0 | 38°11.7 | 39.2 | | | | |
| 5 | 66°13.4 | 218°55.5 | 25.6 | 314°02.1 | 35.2 | 287°35.2 | 33.9 | 53°14.3 | 39.2 | | | | |
| 6 | 81°15.8 | 233°56.5 | S16°26.5 | 329°02.9 | N22°35.0 | 302°37.1 | N16°33.8 | 68°16.9 | N02°39.1 | | | | |
| 7 | 96°18.3 | 248°57.6 | 27.3 | 344°03.7 | 34.8 | 317°39.1 | 33.6 | 83°19.5 | 39.0 | | | | |
| 8 | 111°20.8 | 263°58.7 | 28.2 | 359°04.5 | 34.6 | 332°41.0 | 33.5 | 98°22.1 | 39.0 | | | | |
| 9 | 126°23.2 | 278°59.8 | · · 29.0 | 14°05.3 | · · 34.4 | 347°43.0 | · · 33.3 | 113°24.8 | · · 38.9 | | | | |
| 10 | 141°25.7 | 294°00.9 | 29.9 | 29°06.1 | 34.2 | 2°45.0 | 33.2 | 128°27.4 | 38.8 | | | | |
| 11 | 156°28.2 | 309°02.0 | 30.7 | 44°06.9 | 34.0 | 17°46.9 | 33.0 | 143°30.0 | 38.7 | | | | |
| 12 | 171°30.6 | 324°03.0 | S16°31.6 | 59°07.7 | N22°33.8 | 32°48.9 | N16°32.9 | 158°32.6 | N02°38.7 | | | | |
| 13 | 186°33.1 | 339°04.1 | 32.4 | 74°08.6 | 33.6 | 47°50.9 | 32.7 | 173°35.2 | 38.6 | | | | |
| 14 | 201°35.6 | 354°05.2 | 33.3 | 89°09.4 | 33.5 | 62°52.8 | 32.6 | 188°37.9 | 38.5 | | | | |
| 15 | 216°38.0 | 9°06.3 | · · 34.1 | 104°10.2 | · · 33.3 | 77°54.8 | · · 32.5 | 203°40.5 | · · 38.4 | | | | |
| 16 | 231°40.5 | 24°07.4 | 35.0 | 119°11.0 | 33.1 | 92°56.7 | 32.3 | 218°43.1 | 38.4 | | | | |
| 17 | 246°42.9 | 39°08.5 | 35.8 | 134°11.8 | 32.9 | 107°58.7 | 32.2 | 233°45.7 | 38.3 | | | | |
| 18 | 261°45.4 | 54°09.6 | S16°36.6 | 149°12.6 | N22°32.7 | 123°00.7 | N16°32.0 | 248°48.3 | N02°38.2 | | | | |
| 19 | 276°47.9 | 69°10.7 | 37.5 | 164°13.4 | 32.5 | 138°02.6 | 31.9 | 263°51.0 | 38.2 | | | | |
| 20 | 291°50.3 | 84°11.8 | 38.3 | 179°14.2 | 32.3 | 153°04.6 | 31.7 | 278°53.6 | 38.1 | | | | |
| 21 | 306°52.8 | 99°12.9 | · · 39.2 | 194°15.0 | · · 32.1 | 168°06.6 | · · 31.6 | 293°56.2 | · · 38.0 | | | | |
| 22 | 321°55.3 | 114°14.0 | 40.0 | 209°15.8 | 31.9 | 183°08.5 | 31.4 | 308°58.8 | 37.9 | | | | |
| 23 | 336°57.7 | 129°15.1 | 40.8 | 224°16.7 | 31.7 | 198°10.5 | 31.3 | 324°01.4 | 37.9 | | | | |
| Mer.pass. 00:36 | | ν1.1' d0.9' m-4.74 | | ν0.8' d-0.2' m1.21 | | ν2.0' d-0.1' m-1.82 | | ν2.6' d-0.1' m0.43 | | | | | |
| | | | | | | | | | | | | SHA | Dec |
| | | | | | | | | | | | | Alpheratz | 357°33.0 29°14.4 |
| | | | | | | | | | | | | Ankaa | 353°05.4 -42°09.4 |
| | | | | | | | | | | | | Schedar | 349°28.9 56°41.1 |
| | | | | | | | | | | | | Diphda | 348°45.6 -17°50.2 |
| | | | | | | | | | | | | Achernar | 335°18.7 -57°05.8 |
| | | | | | | | | | | | | Hamal | 327°49.4 23°35.4 |
| | | | | | | | | | | | | Polaris | 313°04.4 89°22.3 |
| | | | | | | | | | | | | Acamar | 315°10.5 -40°11.5 |
| | | | | | | | | | | | | Menkar | 314°04.5 4°11.8 |
| | | | | | | | | | | | | Mirfak | 308°26.0 49°57.3 |
| | | | | | | | | | | | | Aldebaran | 290°38.0 16°33.8 |
| | | | | | | | | | | | | Rigel | 281°02.5 -8°10.0 |
| | | | | | | | | | | | | Capella | 280°19.8 46°01.3 |
| | | | | | | | | | | | | Bellatrix | 278°21.4 6°22.5 |
| | | | | | | | | | | | | Elnath | 278°00.1 28°37.8 |
| | | | | | | | | | | | | Alnilam | 275°36.4 -1°10.9 |
| | | | | | | | | | | | | Betelgeuse | 270°50.6 7°24.8 |
| | | | | | | | | | | | | Canopus | 263°51.9 -52°42.2 |
| | | | | | | | | | | | | Sirius | 258°25.1 -16°44.9 |
| | | | | | | | | | | | | Adhara | 255°04.9 -29°00.2 |
| | | | | | | | | | | | | Procyon | 244°49.6 5°09.5 |
| | | | | | | | | | | | | Pollux | 243°15.8 27°57.7 |
| | | | | | | | | | | | | Avior | 234°14.6 -59°35.4 |
| | | | | | | | | | | | | Suhail | 222°45.7 -43°32.2 |
| | | | | | | | | | | | | Miaplacidus | 221°38.8 -69°49.4 |
| | | | | | | | | | | | | Alphard | 217°46.7 -8°46.3 |
| | | | | | | | | | | | | Regulus | 207°33.3 11°50.3 |
| | | | | | | | | | | | | Dubhe | 193°40.0 61°36.4 |
| | | | | | | | | | | | | Denebola | 182°23.9 14°25.5 |
| | | | | | | | | | | | | Gienah | 175°42.5 -17°41.4 |
| | | | | | | | | | | | | Acrux | 172°59.2 -63°14.9 |
| | | | | | | | | | | | | Gacrux | 171°50.7 -57°15.8 |
| | | | | | | | | | | | | Alioth | 166°12.2 55°49.0 |
| | | | | | | | | | | | | Spica | 158°21.1 -11°18.0 |
| | | | | | | | | | | | | Alkaid | 152°51.3 49°11.0 |
| | | | | | | | | | | | | Hadar | 148°34.5 -60°30.3 |
| | | | | | | | | | | | | Menkent | 147°56.3 -36°30.1 |
| | | | | | | | | | | | | Arcturus | 145°46.9 19°02.7 |
| | | | | | | | | | | | | Rigel Kent. | 139°38.8 -60°56.9 |
| | | | | | | | | | | | | Kochab | 137°20.5 74°02.9 |
| | | | | | | | | | | | | Zuben'ubi | 136°54.7 -16°09.2 |
| | | | | | | | | | | | | Alphecca | 126°02.7 26°37.7 |
| | | | | | | | | | | | | Antares | 112°14.2 -26°29.5 |
| | | | | | | | | | | | | Atria | 107°07.2 -69°04.8 |
| | | | | | | | | | | | | Sabik | 102°01.2 -15°45.4 |
| | | | | | | | | | | | | Shaula | 96°08.4 -37°07.5 |
| | | | | | | | | | | | | Rasalhague | 95°57.2 12°32.6 |
| | | | | | | | | | | | | Eltanin | 90°41.4 51°29.4 |
| | | | | | | | | | | | | Kaus Aust. | 83°30.5 -34°22.4 |
| | | | | | | | | | | | | Vega | 80°32.1 38°48.8 |
| | | | | | | | | | | | | Nunki | 75°45.9 -26°15.8 |
| | | | | | | | | | | | | Altair | 61°58.4 8°56.5 |
| | | | | | | | | | | | | Peacock | 53°03.1 -56°39.0 |
| | | | | | | | | | | | | Deneb | 49°24.5 45°22.8 |
| | | | | | | | | | | | | Enif | 33°37.1 10°00.0 |
| | | | | | | | | | | | | Al Na'ir | 27°30.7 -46°49.8 |
| | | | | | | | | | | | | Fomalhaut | 15°12.6 -29°28.7 |
| | | | | | | | | | | | | | |

| h | | Sun | | Moon | | | |
|------------------------|--|----------|----------|------------|-------|----------|--------------|
| Thu | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 180°42.6 | N05°00.5 | 194°35.7 | 11.5' | N10°19.2 | -15.6' 58.8' |
| 1 | | 195°42.8 | 04°59.6 | 209°06.2 | 11.6' | 10°03.6 | -15.6' 58.7' |
| 2 | | 210°43.1 | 58.6 | 223°36.8 | 11.6' | 09°48.0 | -15.7' 58.7' |
| 3 | | 225°43.3 | •• 57.7 | 238°07.4 | 11.7' | 09°32.3 | -15.7' 58.7' |
| 4 | | 240°43.5 | 56.8 | 252°38.1 | 11.8' | 09°16.6 | -15.7' 58.7' |
| 5 | | 255°43.7 | 55.8 | 267°08.8 | 11.8' | 09°00.9 | -15.8' 58.7' |
| 6 | | 270°43.9 | N04°54.9 | 281°39.7 | 11.9' | N08°45.1 | -15.8' 58.6' |
| 7 | | 285°44.1 | 53.9 | 296°10.6 | 12.0' | 08°29.3 | -15.8' 58.6' |
| 8 | | 300°44.4 | 53.0 | 310°41.5 | 12.0' | 08°13.5 | -15.9' 58.6' |
| 9 | | 315°44.6 | •• 52.0 | 325°12.6 | 12.1' | 07°57.6 | -15.9' 58.6' |
| 10 | | 330°44.8 | 51.1 | 339°43.7 | 12.2' | 07°41.8 | -15.9' 58.6' |
| 11 | | 345°45.0 | 50.1 | 354°14.8 | 12.2' | 07°25.9 | -15.9' 58.5' |
| 12 | | 0°45.2 | N04°49.2 | 8°46.0 | 12.3' | N07°09.9 | -16.0' 58.5' |
| 13 | | 15°45.4 | 48.2 | 23°17.3 | 12.3' | 06°54.0 | -16.0' 58.5' |
| 14 | | 30°45.7 | 47.3 | 37°48.6 | 12.4' | 06°38.0 | -16.0' 58.5' |
| 15 | | 45°45.9 | •• 46.3 | 52°20.0 | 12.4' | 06°22.0 | -16.0' 58.4' |
| 16 | | 60°46.1 | 45.4 | 66°51.5 | 12.5' | 06°06.0 | -16.0' 58.4' |
| 17 | | 75°46.3 | 44.4 | 81°23.0 | 12.6' | 05°49.9 | -16.1' 58.4' |
| 18 | | 90°46.5 | N04°43.5 | 95°54.5 | 12.6' | N05°33.9 | -16.1' 58.4' |
| 19 | | 105°46.8 | 42.5 | 110°26.1 | 12.7' | 05°17.8 | -16.1' 58.3' |
| 20 | | 120°47.0 | 41.6 | 124°57.8 | 12.7' | 05°01.7 | -16.1' 58.3' |
| 21 | | 135°47.2 | •• 40.6 | 139°29.5 | 12.8' | 04°45.6 | -16.1' 58.3' |
| 22 | | 150°47.4 | 39.7 | 154°01.2 | 12.8' | 04°29.5 | -16.1' 58.3' |
| 23 | | 165°47.6 | 38.7 | 168°33.0 | 12.8' | 04°13.4 | -16.1' 58.3' |
| SD = 15.9' d = -0.9' | | | | SD = 16.0' | | | |
| Fri | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 180°47.9 | N04°37.8 | 183°04.9 | 12.9' | N03°57.3 | -16.1' 58.2' |
| 1 | | 195°48.1 | 36.8 | 197°36.8 | 12.9' | 03°41.2 | -16.1' 58.2' |
| 2 | | 210°48.3 | 35.9 | 212°08.7 | 13.0' | 03°25.1 | -16.1' 58.2' |
| 3 | | 225°48.5 | •• 34.9 | 226°40.7 | 13.0' | 03°08.9 | -16.1' 58.2' |
| 4 | | 240°48.7 | 34.0 | 241°12.7 | 13.1' | 02°52.8 | -16.1' 58.1' |
| 5 | | 255°48.9 | 33.0 | 255°44.8 | 13.1' | 02°36.7 | -16.1' 58.1' |
| 6 | | 270°49.2 | N04°32.1 | 270°16.9 | 13.1' | N02°20.6 | -16.1' 58.1' |
| 7 | | 285°49.4 | 31.1 | 284°49.0 | 13.2' | 02°04.4 | -16.1' 58.1' |
| 8 | | 300°49.6 | 30.2 | 299°21.2 | 13.2' | 01°48.3 | -16.1' 58.0' |
| 9 | | 315°49.8 | •• 29.2 | 313°53.4 | 13.2' | 01°32.2 | -16.1' 58.0' |
| 10 | | 330°50.0 | 28.3 | 328°25.6 | 13.3' | 01°16.1 | -16.1' 58.0' |
| 11 | | 345°50.3 | 27.3 | 342°57.9 | 13.3' | 01°00.0 | -16.1' 57.9' |
| 12 | | 0°50.5 | N04°26.4 | 357°30.2 | 13.3' | N00°43.9 | -16.1' 57.9' |
| 13 | | 15°50.7 | 25.4 | 12°02.6 | 13.4' | 00°27.9 | -16.1' 57.9' |
| 14 | | 30°50.9 | 24.5 | 26°34.9 | 13.4' | N00°11.8 | -16.0' 57.9' |
| 15 | | 45°51.1 | •• 23.5 | 41°07.3 | 13.4' | S00°04.2 | 16.0' 57.8' |
| 16 | | 60°51.4 | 22.6 | 55°39.8 | 13.5' | 00°20.3 | 16.0' 57.8' |
| 17 | | 75°51.6 | 21.6 | 70°12.2 | 13.5' | 00°36.3 | 16.0' 57.8' |
| 18 | | 90°51.8 | N04°20.7 | 84°44.7 | 13.5' | S00°52.3 | 16.0' 57.8' |
| 19 | | 105°52.0 | 19.7 | 99°17.2 | 13.5' | 01°08.3 | 16.0' 57.7' |
| 20 | | 120°52.2 | 18.7 | 113°49.8 | 13.6' | 01°24.2 | 15.9' 57.7' |
| 21 | | 135°52.5 | •• 17.8 | 128°22.3 | 13.6' | 01°40.1 | 15.9' 57.7' |
| 22 | | 150°52.7 | 16.8 | 142°54.9 | 13.6' | 01°56.1 | 15.9' 57.7' |
| 23 | | 165°52.9 | 15.9 | 157°27.5 | 13.6' | 02°11.9 | 15.9' 57.6' |
| SD = 15.9' d = -1.0' | | | | SD = 15.9' | | | |
| Sat | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 180°53.1 | N04°14.9 | 172°00.1 | 13.6' | S02°27.8 | 15.8' 57.6' |
| 1 | | 195°53.3 | 14.0 | 186°32.7 | 13.6' | 02°43.6 | 15.8' 57.6' |
| 2 | | 210°53.6 | 13.0 | 201°05.4 | 13.7' | 02°59.4 | 15.8' 57.5' |
| 3 | | 225°53.8 | •• 12.1 | 215°38.0 | 13.7' | 03°15.2 | 15.7' 57.5' |
| 4 | | 240°54.0 | 11.1 | 230°10.7 | 13.7' | 03°30.9 | 15.7' 57.5' |
| 5 | | 255°54.2 | 10.2 | 244°43.4 | 13.7' | 03°46.7 | 15.7' 57.5' |
| 6 | | 270°54.4 | N04°09.2 | 259°16.1 | 13.7' | S04°02.3 | 15.6' 57.4' |
| 7 | | 285°54.7 | 08.3 | 273°48.8 | 13.7' | 04°18.0 | 15.6' 57.4' |
| 8 | | 300°54.9 | 07.3 | 288°21.6 | 13.7' | 04°33.6 | 15.6' 57.4' |
| 9 | | 315°55.1 | •• 06.4 | 302°54.3 | 13.7' | 04°49.2 | 15.5' 57.3' |
| 10 | | 330°55.3 | 05.4 | 317°27.0 | 13.8' | 05°04.7 | 15.5' 57.3' |
| 11 | | 345°55.5 | 04.4 | 331°59.8 | 13.8' | 05°20.2 | 15.5' 57.3' |
| 12 | | 0°55.8 | N04°03.5 | 346°32.5 | 13.8' | S05°35.6 | 15.4' 57.3' |
| 13 | | 15°56.0 | 02.5 | 1°05.3 | 13.8' | 05°51.0 | 15.4' 57.2' |
| 14 | | 30°56.2 | 01.6 | 15°38.1 | 13.8' | 06°06.4 | 15.3' 57.2' |
| 15 | | 45°56.4 | 04°00.6 | 30°10.8 | 13.8' | 06°21.7 | 15.3' 57.2' |
| 16 | | 60°56.6 | 03°59.7 | 44°43.6 | 13.8' | 06°37.0 | 15.2' 57.1' |
| 17 | | 75°56.9 | 58.7 | 59°16.4 | 13.8' | 06°52.3 | 15.2' 57.1' |
| 18 | | 90°57.1 | N03°57.8 | 73°49.2 | 13.8' | S07°07.4 | 15.1' 57.1' |
| 19 | | 105°57.3 | 56.8 | 88°21.9 | 13.8' | 07°22.6 | 15.1' 57.1' |
| 20 | | 120°57.5 | 55.8 | 102°54.7 | 13.8' | 07°37.7 | 15.0' 57.0' |
| 21 | | 135°57.7 | •• 54.9 | 117°27.5 | 13.8' | 07°52.7 | 15.0' 57.0' |
| 22 | | 150°58.0 | 53.9 | 132°00.2 | 13.8' | 08°07.7 | 14.9' 57.0' |
| 23 | | 165°58.2 | 53.0 | 146°33.0 | 13.8' | 08°22.7 | 14.9' 56.9' |
| SD = 15.9' d = -1.0' | | | | SD = 15.7' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 01:27 | 03:33 | 04:49 | 19:02 | 20:16 | 22:16 |
| N 70° | 02:12 | 03:50 | 04:56 | 18:55 | 20:00 | 21:35 |
| 68° | 02:41 | 04:03 | 05:02 | 18:49 | 19:48 | 21:08 |
| 66° | 03:01 | 04:13 | 05:07 | 18:44 | 19:38 | 20:48 |
| 64° | 03:18 | 04:22 | 05:11 | 18:40 | 19:29 | 20:33 |
| 62° | 03:31 | 04:29 | 05:15 | 18:37 | 19:22 | 20:20 |
| 60° | 03:42 | 04:35 | 05:18 | 18:33 | 19:16 | 20:09 |
| N 58° | 03:51 | 04:41 | 05:21 | 18:31 | 19:11 | 20:00 |
| 56° | 03:59 | 04:46 | 05:24 | 18:28 | 19:06 | 19:52 |
| 54° | 04:06 | 04:50 | 05:26 | 18:26 | 19:02 | 19:46 |
| 52° | 04:12 | 04:54 | 05:28 | 18:24 | 18:58 | 19:40 |
| 50° | 04:18 | 04:57 | 05:30 | 18:23 | 18:55 | 19:34 |
| 45° | 04:29 | 05:04 | 05:34 | 18:19 | 18:48 | 19:23 |
| N 40° | 04:37 | 05:10 | 05:37 | 18:16 | 18:43 | 19:15 |
| 35° | 04:44 | 05:14 | 05:40 | 18:13 | 18:38 | 19:08 |
| 30° | 04:50 | 05:18 | 05:42 | 18:10 | 18:34 | 19:03 |
| 20° | 04:59 | 05:24 | 05:47 | 18:06 | 18:29 | 18:54 |
| N 10° | 05:05 | 05:29 | 05:50 | 18:03 | 18:24 | 18:49 |
| 0° | 05:09 | 05:33 | 05:53 | 18:00 | 18:21 | 18:45 |
| S 10° | 05:11 | 05:36 | 05:57 | 17:57 | 18:18 | 18:42 |
| 20° | 05:12 | 05:38 | 06:00 | 17:54 | 18:16 | 18:41 |
| 30° | 05:12 | 05:39 | 06:03 | 17:50 | 18:14 | 18:42 |
| 35° | 05:11 | 05:40 | 06:05 | 17:48 | 18:14 | 18:43 |
| 40° | 05:09 | 05:41 | 06:08 | 17:46 | 18:13 | 18:45 |
| 45° | 05:07 | 05:41 | 06:10 | 17:44 | 18:13 | 18:47 |
| S 50° | 05:04 | 05:41 | 06:13 | 17:41 | 18:13 | 18:51 |
| 52° | 05:02 | 05:41 | 06:15 | 17:40 | 18:13 | 18:52 |
| 54° | 05:00 | 05:41 | 06:16 | 17:38 | 18:13 | 18:55 |
| 56° | 04:58 | 05:41 | 06:18 | 17:37 | 18:14 | 18:57 |
| 58° | 04:55 | 05:41 | 06:20 | 17:35 | 18:14 | 19:00 |
| S 60° | 04:52 | 05:40 | 06:22 | 17:33 | 18:14 | 19:03 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | 03:06 | 05:29 | 07:44 | 18:43 | 18:08 | 17:33 |
| N 70° | 03:21 | 05:32 | 07:37 | 18:36 | 18:10 | 17:43 |
| 68° | 03:34 | 05:35 | 07:31 | 18:30 | 18:11 | 17:51 |
| 66° | 03:44 | 05:38 | 07:27 | 18:25 | 18:12 | 17:58 |
| 64° | 03:52 | 05:39 | 07:23 | 18:21 | 18:13 | 18:04 |
| 62° | 03:59 | 05:41 | 07:20 | 18:17 | 18:13 | 18:09 |
| 60° | 04:05 | 05:43 | 07:17 | 18:14 | 18:14 | 18:14 |
| N 58° | 04:11 | 05:44 | 07:14 | 18:11 | 18:14 | 18:18 |
| 56° | 04:15 | 05:45 | 07:12 | 18:09 | 18:15 | 18:21 |
| 54° | 04:20 | 05:46 | 07:10 | 18:06 | 18:15 | 18:24 |
| 52° | 04:23 | 05:47 | 07:08 | 18:04 | 18:16 | 18:27 |
| 50° | 04:27 | 05:48 | 07:06 | 18:02 | 18:16 | 18:30 |
| 45° | 04:34 | 05:50 | 07:03 | 17:58 | 18:17 | 18:36 |
| N 40° | 04:41 | 05:51 | 07:00 | 17:54 | 18:18 | 18:41 |
| 35° | 04:46 | 05:53 | 06:57 | 17:51 | 18:18 | 18:45 |
| 30° | 04:51 | 05:54 | 06:55 | 17:48 | 18:19 | 18:49 |
| 20° | 04:59 | 05:56 | 06:51 | 17:43 | 18:20 | 18:55 |
| N 10° | 05:06 | 05:58 | 06:48 | 17:39 | 18:20 | 19:01 |
| 0° | 05:12 | 05:59 | 06:45 | 17:35 | 18:21 | 19:06 |
| S 10° | 05:19 | 06:01 | 06:42 | 17:31 | 18:22 | 19:12 |
| 20° | 05:26 | 06:03 | 06:39 | 17:26 | 18:23 | 19:17 |
| 30° | 05:34 | 06:05 | 06:35 | 17:21 | 18:23 | 19:24 |
| 35° | 05:38 | 06:06 | 06:33 | 17:18 | 18:24 | 19:28 |
| 40° | 05:44 | 06:08 | 06:30 | 17:15 | 18:24 | 19:32 |
| 45° | 05:49 | 06:09 | 06:28 | 17:11 | 18:25 | 19:37 |
| S 50° | 05:57 | 06:11 | 06:25 | 17:06 | 18:26 | 19:43 |
| 52° | 06:00 | 06:12 | 06:23 | 17:04 | 18:26 | 19:46 |
| 54° | 06:03 | 06:13 | 06:22 | 17:01 | 18:26 | 19:49 |
| 56° | 06:07 | 06:14 | 06:20 | 16:59 | 18:27 | 19:53 |
| 58° | 06:12 | 06:15 | 06:18 | 16:55 | 18:27 | 19:57 |
| S 60° | 06:16 | 06:16 | 06:16 | 16:52 | 18:28 | 20:01 |

| Day | Sun | | | Moon | | |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|---------------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 29-1 2-1% |
| 10 | 02:50 | 03:01 | 11:57 | 11:24 | 23:47 | |
| 11 | 03:11 | 03:22 | 11:57 | 12:10 | --:-- | |
| 12 | 03:32 | 03:43 | 11:56 | 12:56 | 00:33 | |

September 13, 14, 15 UT (Sun., Mon., Tue.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|--|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| Sun | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 352°00.2 | | 144°16.3 | S16°41.7 | 239°17.5 | N22°31.5 | 213°12.5 | N16°31.1 | 339°04.1 | N02°37.8 |
| 1 | 7°02.7 | | 159°17.4 | 42.5 | 254°18.3 | 31.3 | 228°14.4 | 31.0 | 354°06.7 | 37.7 |
| 2 | 22°05.1 | | 174°18.5 | 43.4 | 269°19.1 | 31.1 | 243°16.4 | 30.9 | 9°09.3 | 37.7 |
| 3 | 37°07.6 | | 189°19.6 | · · 44.2 | 284°19.9 | · · 30.9 | 258°18.3 | · · 30.7 | 24°11.9 | · · 37.6 |
| 4 | 52°10.0 | | 204°20.7 | 45.0 | 299°20.7 | 30.7 | 273°20.3 | 30.6 | 39°14.6 | 37.5 |
| 5 | 67°12.5 | | 219°21.8 | 45.9 | 314°21.5 | 30.5 | 288°22.3 | 30.4 | 54°17.2 | 37.4 |
| 6 | 82°15.0 | | 234°23.0 | S16°46.7 | 329°22.3 | N22°30.3 | 303°24.2 | N16°30.3 | 69°19.8 | N02°37.4 |
| 7 | 97°17.4 | | 249°24.1 | 47.5 | 344°23.2 | 30.1 | 318°26.2 | 30.1 | 84°22.4 | 37.3 |
| 8 | 112°19.9 | | 264°25.2 | 48.4 | 359°24.0 | 29.9 | 333°28.2 | 30.0 | 99°25.0 | 37.2 |
| 9 | 127°22.4 | | 279°26.4 | · · 49.2 | 14°24.8 | · · 29.7 | 348°30.1 | · · 29.8 | 114°27.7 | · · 37.1 |
| 10 | 142°24.8 | | 294°27.5 | 50.0 | 29°25.6 | 29.5 | 3°32.1 | 29.7 | 129°30.3 | 37.1 |
| 11 | 157°27.3 | | 309°28.6 | 50.9 | 44°26.4 | 29.3 | 18°34.1 | 29.6 | 144°32.9 | 37.0 |
| 12 | 172°29.8 | | 324°29.7 | S16°51.7 | 59°27.2 | N22°29.1 | 33°36.0 | N16°29.4 | 159°35.5 | N02°36.9 |
| 13 | 187°32.2 | | 339°30.9 | 52.5 | 74°28.0 | 28.9 | 48°38.0 | 29.3 | 174°38.1 | 36.9 |
| 14 | 202°34.7 | | 354°32.0 | 53.3 | 89°28.9 | 28.7 | 63°40.0 | 29.1 | 189°40.8 | 36.8 |
| 15 | 217°37.2 | | 9°33.2 | · · 54.2 | 104°29.7 | · · 28.5 | 78°41.9 | · · 29.0 | 204°43.4 | · · 36.7 |
| 16 | 232°39.6 | | 24°34.3 | 55.0 | 119°30.5 | 28.3 | 93°43.9 | 28.8 | 219°46.0 | 36.6 |
| 17 | 247°42.1 | | 39°35.5 | 55.8 | 134°31.3 | 28.1 | 108°45.9 | 28.7 | 234°48.6 | 36.6 |
| 18 | 262°44.5 | | 54°36.6 | S16°56.6 | 149°32.1 | N22°27.9 | 123°47.8 | N16°28.5 | 249°51.3 | N02°36.5 |
| 19 | 277°47.0 | | 69°37.7 | 57.5 | 164°32.9 | 27.7 | 138°49.8 | 28.4 | 264°53.9 | 36.4 |
| 20 | 292°49.5 | | 84°38.9 | 58.3 | 179°33.7 | 27.5 | 153°51.8 | 28.3 | 279°56.5 | 36.3 |
| 21 | 307°51.9 | | 99°40.0 | · · 59.1 | 194°34.6 | · · 27.3 | 168°53.7 | · · 28.1 | 294°59.1 | · · 36.3 |
| 22 | 322°54.4 | | 114°41.2 | 16°59.9 | 209°35.4 | 27.1 | 183°55.7 | 28.0 | 310°01.7 | 36.2 |
| 23 | 337°56.9 | | 129°42.4 | 17°00.7 | 224°36.2 | 26.9 | 198°57.7 | 27.8 | 325°04.4 | 36.1 |
| Mer.pass. 00:32 | | | ·1.1' d0.8' m-4.75 | | ·0.8' d-0.2' m1.20 | | ·2.0' d-0.1' m-1.83 | | ·2.6' d-0.1' m0.42 | |
| | | | | | | | | | | |
| Mon | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 352°59.3 | | 144°43.5 | S17°01.6 | 239°37.0 | N22°26.7 | 213°59.6 | N16°27.7 | 340°07.0 | N02°36.1 |
| 1 | 8°01.8 | | 159°44.7 | 02.4 | 254°37.8 | 26.5 | 229°01.6 | 27.5 | 355°09.6 | 36.0 |
| 2 | 23°04.3 | | 174°45.8 | 03.2 | 269°38.7 | 26.3 | 244°03.6 | 27.4 | 10°12.2 | 35.9 |
| 3 | 38°06.7 | | 189°47.0 | · · 04.0 | 284°39.5 | · · 26.1 | 259°05.5 | · · 27.2 | 25°14.9 | · · 35.8 |
| 4 | 53°09.2 | | 204°48.2 | 04.8 | 299°40.3 | 25.9 | 274°07.5 | 27.1 | 40°17.5 | 35.8 |
| 5 | 68°11.7 | | 219°49.3 | 05.6 | 314°41.1 | 25.7 | 289°09.5 | 27.0 | 55°20.1 | 35.7 |
| 6 | 83°14.1 | | 234°50.5 | S17°06.4 | 329°41.9 | N22°25.5 | 304°11.4 | N16°26.8 | 70°22.7 | N02°35.6 |
| 7 | 98°16.6 | | 249°51.7 | 07.3 | 344°42.7 | 25.3 | 319°13.4 | 26.7 | 85°25.4 | 35.5 |
| 8 | 113°19.0 | | 264°52.9 | 08.1 | 359°43.6 | 25.1 | 334°15.4 | 26.5 | 100°28.0 | 35.5 |
| 9 | 128°21.5 | | 279°54.0 | · · 08.9 | 14°44.4 | · · 24.8 | 349°17.3 | · · 26.4 | 115°30.6 | · · 35.4 |
| 10 | 143°24.0 | | 294°55.2 | 09.7 | 29°45.2 | 24.6 | 4°19.3 | 26.2 | 130°33.2 | 35.3 |
| 11 | 158°26.4 | | 309°56.4 | 10.5 | 44°46.0 | 24.4 | 19°21.3 | 26.1 | 145°35.9 | 35.3 |
| 12 | 173°28.9 | | 324°57.6 | S17°11.3 | 59°46.9 | N22°24.2 | 34°23.2 | N16°26.0 | 160°38.5 | N02°35.2 |
| 13 | 188°31.4 | | 339°58.8 | 12.1 | 74°47.7 | 24.0 | 49°25.2 | 25.8 | 175°41.1 | 35.1 |
| 14 | 203°33.8 | | 354°59.9 | 12.9 | 89°48.5 | 23.8 | 64°27.2 | 25.7 | 190°43.7 | 35.0 |
| 15 | 218°36.3 | | 10°01.1 | · · 13.7 | 104°49.3 | · · 23.6 | 79°29.1 | · · 25.5 | 205°46.3 | · · 35.0 |
| 16 | 233°38.8 | | 25°02.3 | 14.5 | 119°50.1 | 23.4 | 94°31.1 | 25.4 | 220°49.0 | 34.9 |
| 17 | 248°41.2 | | 40°03.5 | 15.3 | 134°51.0 | 23.2 | 109°33.1 | 25.2 | 235°51.6 | 34.8 |
| 18 | 263°43.7 | | 55°04.7 | S17°16.1 | 149°51.8 | N22°23.0 | 124°35.0 | N16°25.1 | 250°54.2 | N02°34.7 |
| 19 | 278°46.1 | | 70°05.9 | 16.9 | 164°52.6 | 22.8 | 139°37.0 | 24.9 | 265°56.8 | 34.7 |
| 20 | 293°48.6 | | 85°07.1 | 17.7 | 179°53.4 | 22.6 | 154°39.0 | 24.8 | 280°59.5 | 34.6 |
| 21 | 308°51.1 | | 100°08.3 | · · 18.5 | 194°54.3 | · · 22.4 | 169°40.9 | · · 24.7 | 296°02.1 | · · 34.5 |
| 22 | 323°53.5 | | 115°09.5 | 19.3 | 209°55.1 | 22.2 | 184°42.9 | 24.5 | 311°04.7 | 34.4 |
| 23 | 338°56.0 | | 130°10.7 | 20.1 | 224°55.9 | 22.0 | 199°44.9 | 24.4 | 326°07.3 | 34.4 |
| Mer.pass. 00:28 | | | ·1.2' d0.8' m-4.76 | | ·0.8' d-0.2' m1.20 | | ·2.0' d-0.1' m-1.83 | | ·2.6' d-0.1' m0.42 | |
| | | | | | | | | | | |
| Tue | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 353°58.5 | | 145°11.9 | S17°20.9 | 239°56.7 | N22°21.7 | 214°46.9 | N16°24.2 | 341°10.0 | N02°34.3 |
| 1 | 9°00.9 | | 160°13.1 | 21.7 | 254°57.5 | 21.5 | 229°48.8 | 24.1 | 356°12.6 | 34.2 |
| 2 | 24°03.4 | | 175°14.3 | 22.5 | 269°58.4 | 21.3 | 244°50.8 | 23.9 | 11°15.2 | 34.1 |
| 3 | 39°05.9 | | 190°15.5 | · · 23.3 | 284°59.2 | · · 21.1 | 259°52.8 | · · 23.8 | 26°17.8 | · · 34.1 |
| 4 | 54°08.3 | | 205°16.8 | 24.1 | 300°00.0 | 20.9 | 274°54.7 | 23.6 | 41°20.5 | 34.0 |
| 5 | 69°10.8 | | 220°18.0 | 24.9 | 315°00.8 | 20.7 | 289°56.7 | 23.5 | 56°23.1 | 33.9 |
| 6 | 84°13.3 | | 235°19.2 | S17°25.7 | 330°01.7 | N22°20.5 | 304°58.7 | N16°23.4 | 71°25.7 | N02°33.9 |
| 7 | 99°15.7 | | 250°20.4 | 26.5 | 345°02.5 | 20.3 | 320°00.6 | 23.2 | 86°28.3 | 33.8 |
| 8 | 114°18.2 | | 265°21.6 | 27.2 | 0°03.3 | 20.1 | 335°02.6 | 23.1 | 101°31.0 | 33.7 |
| 9 | 129°20.6 | | 280°22.9 | · · 28.0 | 15°04.2 | · · 19.9 | 350°04.6 | · · 22.9 | 116°33.6 | · · 33.6 |
| 10 | 144°23.1 | | 295°24.1 | 28.8 | 30°05.0 | 19.6 | 5°06.6 | 22.8 | 131°36.2 | 33.6 |
| 11 | 159°25.6 | | 310°25.3 | 29.6 | 45°05.8 | 19.4 | 20°08.5 | 22.6 | 146°38.8 | 33.5 |
| 12 | 174°28.0 | | 325°26.6 | S17°30.4 | 60°06.6 | N22°19.2 | 35°10.5 | N16°22.5 | 161°41.5 | N02°33.4 |
| 13 | 189°30.5 | | 340°27.8 | 31.2 | 75°07.5 | 19.0 | 50°12.5 | 22.4 | 176°44.1 | 33.3 |
| 14 | 204°33.0 | | 355°29.0 | 31.9 | 90°08.3 | 18.8 | 65°14.4 | 22.2 | 191°46.7 | 33.3 |
| 15 | 219°35.4 | | 10°30.3 | · · 32.7 | 105°09.1 | · · 18.6 | 80°16.4 | · · 22.1 | 206°49.4 | · · 33.2 |
| 16 | 234°37.9 | | 25°31.5 | 33.5 | 120°09.9 | 18.4 | 95°18.4 | 21.9 | 221°52.0 | 33.1 |
| 17 | 249°40.4 | | 40°32.7 | 34.3 | 135°10.8 | 18.2 | 110°20.4 | 21.8 | 236°54.6 | 33.0 |
| 18 | 264°42.8 | | 55°34.0 | S17°35.1 | 150°11.6 | N22°18.0 | 125°22.3 | N16°21.6 | 251°57.2 | N02°33.0 |
| 19 | 279°45.3 | | 70°35.2 | 35.8 | 165°12.4 | 17.7 | 140°24.3 | 21.5 | 266°59.9 | 32.9 |
| 20 | 294°47.7 | | 85°36.5 | 36.6 | 180°13.3 | 17.5 | 155°26.3 | 21.3 | 282°02.5 | 32.8 |
| 21 | 309°50.2 | | 100°37.7 | · · 37.4 | 195°14.1 | · · 17.3 | 170°28.2 | · · 21.2 | 297°05.1 | · · 32.7 |
| 22 | 324°52.7 | | 115°39.0 | 38.2 | 210°14.9 | 17.1 | 185°30.2 | 21.1 | 312°07.7 | 32.7 |
| 23 | 339°55.1 | | 130°40.2 | 38.9 | 225°15.8 | 16.9 | 200°32.2 | 20.9 | 327°10.4 | 32.6 |
| Mer.pass. 00:24 | | | ·1.2' d0.8' m-4.77 | | ·0.8' d-0.2' m1.19 | | ·2.0' d-0.1' m-1.83 | | ·2.6' d-0.1' m0.42 | |

| Stars | | |
|-------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°33.0 | 29°14.4 |
| Ankaa | 353°05.4 | -42°09.4 |
| Schedar | 349°28.9 | 56°41.1 |
| Diphda | 348°45.6 | -17°50.2 |
| Achernar | 335°18.7 | -57°05.8 |
| Hamal | 327°49.4 | 23°35.4 |
| Polaris | 313°03.0 | 89°22.3 |
| Acamar | 315°10.5 | -40°11.5 |
| Menkar | 314°04.5 | 4°11.8 |
| Mirfak | 308°26.0 | 49°57.3 |
| Aldebaran | 290°38.0 | 16°33.8 |
| Rigel | 281°02.5 | -8°10.0 |
| Capella | 280°19.8 | 46°01.3 |
| Bellatrix | 278°21.4 | 6°22.5 |
| Elnath | 278°00.1 | 28°37.8 |
| Alnilam | 275°36.3 | -1°10.9 |
| Betelgeuse | 270°50.6 | 7°24.8 |
| Canopus | 263°51.9 | -52°42.2 |
| Sirius | 258°25.1 | -16°44.9 |
| Adhara | 255°04.9 | -29°00.2 |
| Procyon | 244°49.6 | 5°09.5 |
| Pollux | 243°15.8 | 27°57.7 |
| Avior | 234°14.6 | -59°35.4 |
| Suhail | 222°45.7 | -43°32.2 |
| Miaplacidus | 221°38.8 | -69°49.4 |
| Alphard | 217°46.7 | -8°46.3 |
| Regulus | 207°33.3 | 11°50.3 |
| Dubhe | 193°40.0 | 61°36.4 |
| Denebola | 182°23.9 | 14°25.4 |
| Gienah | 175°42.5 | -17°41.4 |
| Acrux | 172°59.2 | -63°14.9 |
| Gacrux | 171°50.7 | -57°15.8 |
| Alioth | 166°12.3 | 55°49.0 |
| Spica | 158°21.1 | -11°18.0 |
| Alkaid | 152°51.3 | 49°11.0 |
| Hadar | 148°34.5 | -60°30.3 |
| Menkent | 147°56.3 | -36°30.1 |
| Arcturus | 145°46.9 | 19°02.7 |
| Rigel Kent. | 139°38.8 | -60°56.9 |
| Kochab | 137°20.5 | 74°02.9 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.7 | 26°37.7 |
| Antares | 112°14.2 | -26°29.5 |
| Atria | 107°07.2 | -69°04.7 |
| Sabik | 102°01.2 | -15°45.4 |
| Shaula | 96°08.5 | -37°07.5 |
| Rasalhague | 95°57.2 | 12°32.6 |
| Eltanin | 90°41.5 | 51°29.4 |
| Kaus Aust. | 83°30.6 | -34°22.4 |
| Vega | 80°32.2 | 38°48.8 |
| Nunki | 75°45.9 | -26°15.8 |
| Altair | 61°58.4 | 8°56.5 |
| Peacock | 53°03.1 | -56°39.0 |
| Deneb | 49°24.5 | 45°22.8 |
| Enif | 33°37.1 | 10°00.0 |
| Al Na'ir | 27°30.7 | -46°49.8 |
| Fomalhaut | 15°12.6 | -29°28.7 |
| Scheat | 13°43.5 | 28°13.8 |
| Markab | 13°28.2 | 15°21.1 |

| Sep 13 Sun | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 152°16.1 | 14:22 |
| Mars | 247°17.3 | 08:02 |
| Jupiter | 221°12.3 | 09:46 |
| Saturn | 347°03.9 | 01:23 |

| Sep 14 Mon | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 151°44.2 | 14:20 |
| Mars | 246°37.7 | 08:01 |
| Jupiter | 221°00.3 | 09:43 |
| Saturn | 347°07.7 | 01:19 |

| Sep 15 Tue | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 151°13.4 | 14:18 |
| Mars | 245°58.3 | 08:00 |
| Jupiter | 220°48.4 | 09:40 |
| Saturn | 347°11.5 | 01:15 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.3 |
| Mars: | 0.1 |

| h | Sun | | | Moon | | | |
|------------|----------|----------|-------------|----------|-------|------------|-------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 180°58.4 | N03°52.0 | | 161°05.7 | 13.7' | S08°37.5 | 14.8' |
| 1 | 195°58.6 | 51.1 | | 175°38.5 | 13.7' | 08°52.4 | 14.8' |
| 2 | 210°58.8 | 50.1 | | 190°11.2 | 13.7' | 09°07.1 | 14.7' |
| 3 | 225°59.1 | 49.2 | | 204°43.9 | 13.7' | 09°21.9 | 14.7' |
| 4 | 240°59.3 | 48.2 | | 219°16.7 | 13.7' | 09°36.5 | 14.6' |
| 5 | 255°59.5 | 47.2 | | 233°49.4 | 13.7' | 09°51.1 | 14.5' |
| 6 | 270°59.7 | N03°46.3 | | 248°22.1 | 13.7' | S10°05.7 | 14.5' |
| 7 | 286°00.0 | 45.3 | | 262°54.8 | 13.7' | 10°20.2 | 14.4' |
| 8 | 301°00.2 | 44.4 | | 277°27.4 | 13.7' | 10°34.6 | 14.4' |
| 9 | 316°00.4 | 43.4 | | 292°00.1 | 13.6' | 10°48.9 | 14.3' |
| 10 | 331°00.6 | 42.5 | | 306°32.7 | 13.6' | 11°03.2 | 14.2' |
| 11 | 346°00.8 | 41.5 | | 321°05.4 | 13.6' | 11°17.5 | 14.2' |
| 12 | 1°01.1 | N03°40.5 | | 335°38.0 | 13.6' | S11°31.6 | 14.1' |
| 13 | 16°01.3 | 39.6 | | 350°10.6 | 13.6' | 11°45.7 | 14.0' |
| 14 | 31°01.5 | 38.6 | | 4°43.1 | 13.6' | 11°59.8 | 14.0' |
| 15 | 46°01.7 | 37.7 | | 19°15.7 | 13.5' | 12°13.7 | 13.9' |
| 16 | 61°01.9 | 36.7 | | 33°48.2 | 13.5' | 12°27.6 | 13.8' |
| 17 | 76°02.2 | 35.7 | | 48°20.7 | 13.5' | 12°41.4 | 13.8' |
| 18 | 91°02.4 | N03°34.8 | | 62°53.2 | 13.5' | S12°55.2 | 13.7' |
| 19 | 106°02.6 | 33.8 | | 77°25.7 | 13.5' | 13°08.9 | 13.6' |
| 20 | 121°02.8 | 32.9 | | 91°58.2 | 13.4' | 13°22.5 | 13.5' |
| 21 | 136°03.1 | 31.9 | | 106°30.6 | 13.4' | 13°36.0 | 13.5' |
| 22 | 151°03.3 | 31.0 | | 121°03.0 | 13.4' | 13°49.5 | 13.4' |
| 23 | 166°03.5 | 30.0 | | 135°35.4 | 13.4' | 14°02.9 | 13.3' |
| SD = 15.9' | | | $d = -1.0'$ | | | SD = 15.5' | |

| Mon | GHA | Dec | | GHA | ν | Dec | d |
|------------|----------|----------|-------------|----------|-------|------------|-------|
| 0 | 181°03.7 | N03°29.0 | | 150°07.7 | 13.3' | S14°16.2 | 13.2' |
| 1 | 196°03.9 | 28.1 | | 164°40.1 | 13.3' | 14°29.4 | 13.1' |
| 2 | 211°04.2 | 27.1 | | 179°12.4 | 13.3' | 14°42.5 | 13.1' |
| 3 | 226°04.4 | 26.2 | | 193°44.6 | 13.2' | 14°55.6 | 13.0' |
| 4 | 241°04.6 | 25.2 | | 208°16.9 | 13.2' | 15°08.6 | 12.9' |
| 5 | 256°04.8 | 24.2 | | 222°49.1 | 13.2' | 15°21.5 | 12.8' |
| 6 | 271°05.1 | N03°23.3 | | 237°21.3 | 13.2' | S15°34.3 | 12.7' |
| 7 | 286°05.3 | 22.3 | | 251°53.4 | 13.1' | 15°47.1 | 12.7' |
| 8 | 301°05.5 | 21.4 | | 266°25.5 | 13.1' | 15°59.7 | 12.6' |
| 9 | 316°05.7 | 20.4 | | 280°57.6 | 13.1' | 16°12.3 | 12.5' |
| 10 | 331°05.9 | 19.4 | | 295°29.7 | 13.0' | 16°24.8 | 12.4' |
| 11 | 346°06.2 | 18.5 | | 310°01.7 | 13.0' | 16°37.2 | 12.3' |
| 12 | 1°06.4 | N03°17.5 | | 324°33.7 | 13.0' | S16°49.5 | 12.2' |
| 13 | 16°06.6 | 16.6 | | 339°05.7 | 12.9' | 17°01.8 | 12.1' |
| 14 | 31°06.8 | 15.6 | | 353°37.6 | 12.9' | 17°13.9 | 12.0' |
| 15 | 46°07.0 | 14.6 | | 8°09.5 | 12.9' | 17°25.9 | 12.0' |
| 16 | 61°07.3 | 13.7 | | 22°41.3 | 12.8' | 17°37.9 | 11.9' |
| 17 | 76°07.5 | 12.7 | | 37°13.2 | 12.8' | 17°49.8 | 11.8' |
| 18 | 91°07.7 | N03°11.8 | | 51°44.9 | 12.7' | S18°01.5 | 11.7' |
| 19 | 106°07.9 | 10.8 | | 66°16.7 | 12.7' | 18°13.2 | 11.6' |
| 20 | 121°08.2 | 09.8 | | 80°48.4 | 12.7' | 18°24.8 | 11.5' |
| 21 | 136°08.4 | 08.9 | | 95°20.1 | 12.6' | 18°36.3 | 11.4' |
| 22 | 151°08.6 | 07.9 | | 109°51.7 | 12.6' | 18°47.7 | 11.3' |
| 23 | 166°08.8 | 07.0 | | 124°23.3 | 12.6' | 18°59.0 | 11.2' |
| SD = 15.9' | | | $d = -1.0'$ | | | SD = 15.3' | |

| Tue | GHA | Dec | | GHA | ν | Dec | d |
|------------|----------|----------|-------------|----------|-------|------------|-------|
| 0 | 181°09.0 | N03°06.0 | | 138°54.9 | 12.5' | S19°10.2 | 11.1' |
| 1 | 196°09.3 | 05.0 | | 153°26.4 | 12.5' | 19°21.3 | 11.0' |
| 2 | 211°09.5 | 04.1 | | 167°57.9 | 12.4' | 19°32.3 | 10.9' |
| 3 | 226°09.7 | 03.1 | | 182°29.3 | 12.4' | 19°43.3 | 10.8' |
| 4 | 241°09.9 | 02.1 | | 197°00.7 | 12.4' | 19°54.1 | 10.7' |
| 5 | 256°10.2 | 01.2 | | 211°32.1 | 12.3' | 20°04.8 | 10.6' |
| 6 | 271°10.4 | N03°00.2 | | 226°03.4 | 12.3' | S20°15.4 | 10.5' |
| 7 | 286°10.6 | 02°59.3 | | 240°34.7 | 12.2' | 20°25.9 | 10.4' |
| 8 | 301°10.8 | 58.3 | | 255°05.9 | 12.2' | 20°36.3 | 10.3' |
| 9 | 316°11.1 | 57.3 | | 269°37.1 | 12.2' | 20°46.6 | 10.2' |
| 10 | 331°11.3 | 56.4 | | 284°08.3 | 12.1' | 20°56.8 | 10.1' |
| 11 | 346°11.5 | 55.4 | | 298°39.4 | 12.1' | 21°06.9 | 10.0' |
| 12 | 1°11.7 | N02°54.4 | | 313°10.5 | 12.0' | S21°16.9 | 9.9' |
| 13 | 16°11.9 | 53.5 | | 327°41.5 | 12.0' | 21°26.8 | 9.8' |
| 14 | 31°12.2 | 52.5 | | 342°12.5 | 11.9' | 21°36.5 | 9.7' |
| 15 | 46°12.4 | 51.6 | | 356°43.4 | 11.9' | 21°46.2 | 9.6' |
| 16 | 61°12.6 | 50.6 | | 11°14.3 | 11.9' | 21°55.8 | 9.4' |
| 17 | 76°12.8 | 49.6 | | 25°45.2 | 11.8' | 22°05.2 | 9.3' |
| 18 | 91°13.1 | N02°48.7 | | 40°16.0 | 11.8' | S22°14.5 | 9.2' |
| 19 | 106°13.3 | 47.7 | | 54°46.8 | 11.7' | 22°23.8 | 9.1' |
| 20 | 121°13.5 | 46.7 | | 69°17.5 | 11.7' | 22°32.9 | 9.0' |
| 21 | 136°13.7 | 45.8 | | 83°48.2 | 11.7' | 22°41.9 | 8.9' |
| 22 | 151°13.9 | 44.8 | | 98°18.9 | 11.6' | 22°50.8 | 8.8' |
| 23 | 166°14.2 | 43.9 | | 112°49.5 | 11.6' | 22°59.6 | 8.7' |
| SD = 15.9' | | | $d = -1.0'$ | | | SD = 15.2' | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 01:59 | 03:50 | 05:02 | 18:46 | 19:58 | 21:45 |
| N 70° | 02:33 | 04:04 | 05:08 | 18:41 | 19:45 | 21:13 |
| 68° | 02:57 | 04:15 | 05:13 | 18:36 | 19:34 | 20:51 |
| 66° | 03:15 | 04:24 | 05:17 | 18:32 | 19:25 | 20:33 |
| 64° | 03:29 | 04:31 | 05:20 | 18:29 | 19:18 | 20:20 |
| 62° | 03:41 | 04:37 | 05:23 | 18:27 | 19:12 | 20:08 |
| 60° | 03:50 | 04:43 | 05:25 | 18:24 | 19:07 | 19:59 |
| N 58° | 03:59 | 04:48 | 05:28 | 18:22 | 19:02 | 19:51 |
| 56° | 04:06 | 04:52 | 05:29 | 18:20 | 18:58 | 19:44 |
| 54° | 04:12 | 04:55 | 05:31 | 18:19 | 18:54 | 19:37 |
| 52° | 04:18 | 04:59 | 05:33 | 18:17 | 18:51 | 19:32 |
| 50° | 04:23 | 05:02 | 05:34 | 18:16 | 18:48 | 19:27 |
| 45° | 04:33 | 05:08 | 05:37 | 18:13 | 18:42 | 19:17 |
| N 40° | 04:41 | 05:13 | 05:40 | 18:11 | 18:38 | 19:10 |
| 35° | 04:47 | 05:17 | 05:42 | 18:09 | 18:34 | 19:04 |
| 30° | 04:52 | 05:20 | 05:44 | 18:07 | 18:31 | 18:59 |
| 20° | 04:59 | 05:25 | 05:47 | 18:04 | 18:26 | 18:51 |
| N 10° | 05:04 | 05:29 | 05:50 | 18:01 | 18:22 | 18:47 |
| 0° | 05:08 | 05:32 | 05:52 | 17:59 | 18:20 | 18:44 |
| S 10° | 05:09 | 05:34 | 05:55 | 17:57 | 18:18 | 18:42 |
| 20° | 05:10 | 05:35 | 05:57 | 17:54 | 18:16 | 18:42 |
| 30° | 05:08 | 05:36 | 06:00 | 17:52 | 18:16 | 18:44 |
| 35° | 05:07 | 05:36 | 06:01 | 17:51 | 18:16 | 18:45 |
| 40° | 05:04 | 05:36 | 06:03 | 17:49 | 18:16 | 18:48 |
| 45° | 05:01 | 05:35 | 06:05 | 17:47 | 18:17 | 18:51 |
| S 50° | 04:57 | 05:35 | 06:07 | 17:45 | 18:18 | 18:55 |
| 52° | 04:55 | 05:34 | 06:08 | 17:44 | 18:18 | 18:57 |
| 54° | 04:52 | 05:34 | 06:09 | 17:44 | 18:19 | 19:00 |
| 56° | 04:50 | 05:33 | 06:10 | 17:42 | 18:19 | 19:03 |
| 58° | 04:46 | 05:32 | 06:11 | 17:41 | 18:20 | 19:06 |
| S 60° | 04:43 | 05:31 | 06:12 | 17:40 | 18:21 | 19:10 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | 10:04 | 13:12 | ■ | 16:49 | 15:18 | ■ |
| N 70° | 09:44 | 12:10 | ■ | 17:12 | 16:22 | ■ |
| 68° | 09:29 | 11:35 | 14:42 | 17:29 | 16:58 | 15:30 |
| 66° | 09:16 | 11:11 | 13:21 | 17:43 | 17:24 | 16:52 |
| 64° | 09:06 | 10:52 | 12:44 | 17:55 | 17:44 | 17:30 |
| 62° | 08:57 | 10:36 | 12:18 | 18:05 | 18:01 | 17:56 |
| 60° | 08:50 | 10:23 | 11:58 | 18:14 | 18:15 | 18:17 |
| N 58° | 08:43 | 10:12 | 11:42 | 18:21 | 18:27 | 18:35 |
| 56° | 08:37 | 10:03 | 11:28 | 18:28 | 18:37 | 18:49 |
| 54° | 08:32 | 09:54 | 11:16 | 18:34 | 18:46 | 19:02 |
| 52° | 08:28 | 09:47 | 11:05 | 18:40 | 18:54 | 19:13 |
| 50° | 08:24 | 09:40 | 10:56 | 18:45 | 19:02 | 19:23 |
| 45° | 08:15 | 09:26 | 10:36 | 18:56 | 19:18 | 19:44 |
| N 40° | 08:07 | 09:14 | 10:20 | 19:05 | 19:31 | 20:01 |
| 35° | 08:01 | 09:04 | 10:06 | 19:12 | 19:42 | 20:15 |
| 30° | 07:55 | 08:55 | 09:55 | 19:19 | 19:52 | 20:28 |
| 20° | 07:46 | 08:40 | 09:35 | 19:31 | 20:09 | 20:49 |
| N 10° | 07:37 | 08:27 | 09:18 | 19:42 | 20:24 | 21:08 |
| 0° | 07:30 | 08:15 | 09:02 | 19:51 | 20:37 | 21:25 |
| S 10° | 07:22 | 08:03 | 08:46 | 20:01 | 20:52 | 21:43 |
| 20° | 07:14 | 07:51 | 08:29 | 20:12 | 21:07 | 22:02 |
| 30° | 07:05 | 07:36 | 08:10 | 20:24 | 21:24 | 22:23 |
| 35° | 07:00 | 07:28 | 07:59 | 20:31 | 21:34 | 22:36 |
| 40° | 06:54 | 07:19 | 07:46 | 20:39 | 21:46 | 22:51 |
| 45° | 06:47 | 07:08 | 07:31 | 20:49 | 21:59 | 23:09 |
| S 50° | 06:39 | 06:54 | 07:13 | 21:00 | 22:16 | 23:31 |
| 52° | 06:35 | 06:48 | 07:05 | 21:06 | 22:24 | 23:42 |
| 54° | 06:31 | 06:42 | 06:55 | 21:12 | 22:33 | 23:54 |
| 56° | 06:26 | 06:34 | 06:44 | 21:18 | 22:43 | |
| 58° | 06:21 | 06:26 | 06:32 | 21:26 | 22:55 | |
| S 60° | 06:16 | 06:16 | 06:18 | 21:34 | 23:08 | |

| Day | Sun | | | Moon | | |
|-----|---|----------------------------------|-----------------------|-----------------------------|----------------|---------------------|
| | Eqn.of Time 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 2-4 4-16% |
| 13 | 03:54 | 04:04 | 11:56 | 13:41 | 01:18 | |
| 14 | 04:15 | 04:26 | 11:56 | 14:26 | 02:03 | |
| 15 | 04:36 | 04:47 | 11:55 | 15:14 | 02:50 | |

September 16, 17, 18 UT (Wed., Thu., Fri.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|---------------------|----------|--|----------|----------|----------|----------|----------|----------|----------|----------|
| Wed | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 354°57.6 | | 145°41.5 | S17°39.7 | 240°16.6 | N22°16.7 | 215°34.2 | N16°20.8 | 342°13.0 | N02°32.5 |
| 1 | 10°00.1 | | 160°42.8 | 40.5 | 255°17.4 | 16.5 | 230°36.1 | 20.6 | 357°15.6 | 32.5 |
| 2 | 25°02.5 | | 175°44.0 | 41.3 | 270°18.3 | 16.2 | 245°38.1 | 20.5 | 12°18.2 | 32.4 |
| 3 | 40°05.0 | | 190°45.3 | •• 42.0 | 285°19.1 | •• 16.0 | 260°40.1 | •• 20.3 | 27°20.9 | •• 32.3 |
| 4 | 55°07.5 | | 205°46.6 | 42.8 | 300°19.9 | 15.8 | 275°42.0 | 20.2 | 42°23.5 | 32.2 |
| 5 | 70°09.9 | | 220°47.8 | 43.6 | 315°20.7 | 15.6 | 290°44.0 | 20.1 | 57°26.1 | 32.2 |
| 6 | 85°12.4 | | 235°49.1 | S17°44.3 | 330°21.6 | N22°15.4 | 305°46.0 | N16°19.9 | 72°28.8 | N02°32.1 |
| 7 | 100°14.9 | | 250°50.4 | 45.1 | 345°22.4 | 15.2 | 320°48.0 | 19.8 | 87°31.4 | 32.0 |
| 8 | 115°17.3 | | 265°51.6 | 45.9 | 0°23.2 | 15.0 | 335°49.9 | 19.6 | 102°34.0 | 31.9 |
| 9 | 130°19.8 | | 280°52.9 | •• 46.6 | 15°24.1 | •• 14.7 | 350°51.9 | •• 19.5 | 117°36.6 | •• 31.9 |
| 10 | 145°22.2 | | 295°54.2 | 47.4 | 30°24.9 | 14.5 | 5°53.9 | 19.3 | 132°39.3 | 31.8 |
| 11 | 160°24.7 | | 310°55.5 | 48.1 | 45°25.7 | 14.3 | 20°55.9 | 19.2 | 147°41.9 | 31.7 |
| 12 | 175°27.2 | | 325°56.8 | S17°48.9 | 60°26.6 | N22°14.1 | 35°57.8 | N16°19.1 | 162°44.5 | N02°31.6 |
| 13 | 190°29.6 | | 340°58.0 | 49.7 | 75°27.4 | 13.9 | 50°59.8 | 18.9 | 177°47.1 | 31.6 |
| 14 | 205°32.1 | | 355°59.3 | 50.4 | 90°28.2 | 13.7 | 66°01.8 | 18.8 | 192°49.8 | 31.5 |
| 15 | 220°34.6 | | 11°00.6 | •• 51.2 | 105°29.1 | •• 13.4 | 81°03.8 | •• 18.6 | 207°52.4 | •• 31.4 |
| 16 | 235°37.0 | | 26°01.9 | 51.9 | 120°29.9 | 13.2 | 96°05.7 | 18.5 | 222°55.0 | 31.3 |
| 17 | 250°39.5 | | 41°03.2 | 52.7 | 135°30.8 | 13.0 | 111°07.7 | 18.3 | 237°57.7 | 31.3 |
| 18 | 265°42.0 | | 56°04.5 | S17°53.4 | 150°31.6 | N22°12.8 | 126°09.7 | N16°18.2 | 253°00.3 | N02°31.2 |
| 19 | 280°44.4 | | 71°05.8 | 54.2 | 165°32.4 | 12.6 | 141°11.7 | 18.0 | 268°02.9 | 31.1 |
| 20 | 295°46.9 | | 86°07.1 | 55.0 | 180°33.3 | 12.3 | 156°13.6 | 17.9 | 283°05.5 | 31.0 |
| 21 | 310°49.4 | | 101°08.4 | •• 55.7 | 195°34.1 | •• 12.1 | 171°15.6 | •• 17.8 | 298°08.2 | •• 31.0 |
| 22 | 325°51.8 | | 116°09.7 | 56.5 | 210°34.9 | 11.9 | 186°17.6 | 17.6 | 313°10.8 | 30.9 |
| 23 | 340°54.3 | | 131°11.0 | 57.2 | 225°35.8 | 11.7 | 201°19.6 | 17.5 | 328°13.4 | 30.8 |
| Mer.pass. 00:20 | | | | | | | | | | |
| ν1.3' d0.8' m-4.78 | | | | | | | | | | |
| ν0.8' d-0.2' m1.19 | | | | | | | | | | |
| ν2.0' d-0.1' m-1.83 | | | | | | | | | | |
| ν2.6' d-0.1' m0.41 | | | | | | | | | | |
| Thu | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 355°56.7 | | 146°12.3 | S17°58.0 | 240°36.6 | N22°11.5 | 216°21.5 | N16°17.3 | 343°16.1 | N02°30.7 |
| 1 | 10°59.2 | | 161°13.7 | 58.7 | 255°37.4 | 11.2 | 231°23.5 | 17.2 | 358°18.7 | 30.7 |
| 2 | 26°01.7 | | 176°15.0 | 17°59.4 | 270°38.3 | 11.0 | 246°25.5 | 17.0 | 13°21.3 | 30.6 |
| 3 | 41°04.1 | | 191°16.3 | 18°00.2 | 285°39.1 | •• 10.8 | 261°27.5 | •• 16.9 | 28°23.9 | •• 30.5 |
| 4 | 56°06.6 | | 206°17.6 | 00.9 | 300°40.0 | 10.6 | 276°29.4 | 16.8 | 43°26.6 | 30.4 |
| 5 | 71°09.1 | | 221°18.9 | 01.7 | 315°40.8 | 10.4 | 291°31.4 | 16.6 | 58°29.2 | 30.4 |
| 6 | 86°11.5 | | 236°20.2 | S18°02.4 | 330°41.6 | N22°10.1 | 306°33.4 | N16°16.5 | 73°31.8 | N02°30.3 |
| 7 | 101°14.0 | | 251°21.6 | 03.2 | 345°42.5 | 09.9 | 321°35.4 | 16.3 | 88°34.5 | 30.2 |
| 8 | 116°16.5 | | 266°22.9 | 03.9 | 0°43.3 | 09.7 | 336°37.3 | 16.2 | 103°37.1 | 30.1 |
| 9 | 131°18.9 | | 281°24.2 | •• 04.6 | 15°44.2 | •• 09.5 | 351°39.3 | •• 16.0 | 118°39.7 | •• 30.1 |
| 10 | 146°21.4 | | 296°25.6 | 05.4 | 30°45.0 | 09.3 | 6°41.3 | 15.9 | 133°42.3 | 30.0 |
| 11 | 161°23.9 | | 311°26.9 | 06.1 | 45°45.8 | 09.0 | 21°43.3 | 15.8 | 148°45.0 | 29.9 |
| 12 | 176°26.3 | | 326°28.2 | S18°06.9 | 60°46.7 | N22°08.8 | 36°45.2 | N16°15.6 | 163°47.6 | N02°29.8 |
| 13 | 191°28.8 | | 341°29.6 | 07.6 | 75°47.5 | 08.6 | 51°47.2 | 15.5 | 178°50.2 | 29.8 |
| 14 | 206°31.2 | | 356°30.9 | 08.3 | 90°48.4 | 08.4 | 66°49.2 | 15.3 | 193°52.9 | 29.7 |
| 15 | 221°33.7 | | 11°32.3 | •• 09.1 | 105°49.2 | •• 08.2 | 81°51.2 | •• 15.2 | 208°55.5 | •• 29.6 |
| 16 | 236°36.2 | | 26°33.6 | 09.8 | 120°50.0 | 07.9 | 96°53.1 | 15.0 | 223°58.1 | 29.5 |
| 17 | 251°38.6 | | 41°35.0 | 10.5 | 135°50.9 | 07.7 | 111°55.1 | 14.9 | 239°00.7 | 29.5 |
| 18 | 266°41.1 | | 56°36.3 | S18°11.2 | 150°51.7 | N22°07.5 | 126°57.1 | N16°14.8 | 254°03.4 | N02°29.4 |
| 19 | 281°43.6 | | 71°37.7 | 12.0 | 165°52.6 | 07.3 | 141°59.1 | 14.6 | 269°06.0 | 29.3 |
| 20 | 296°46.0 | | 86°39.0 | 12.7 | 180°53.4 | 07.0 | 157°01.1 | 14.5 | 284°08.6 | 29.2 |
| 21 | 311°48.5 | | 101°40.4 | •• 13.4 | 195°54.3 | •• 06.8 | 172°03.0 | •• 14.3 | 299°11.3 | •• 29.2 |
| 22 | 326°51.0 | | 116°41.8 | 14.2 | 210°55.1 | 06.6 | 187°05.0 | 14.2 | 314°13.9 | 29.1 |
| 23 | 341°53.4 | | 131°43.1 | 14.9 | 225°55.9 | 06.4 | 202°07.0 | 14.0 | 329°16.5 | 29.0 |
| Mer.pass. 00:16 | | | | | | | | | | |
| ν1.3' d0.7' m-4.78 | | | | | | | | | | |
| ν0.8' d-0.2' m1.18 | | | | | | | | | | |
| ν2.0' d-0.1' m-1.83 | | | | | | | | | | |
| ν2.6' d-0.1' m0.41 | | | | | | | | | | |
| Fri | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 356°55.9 | | 146°44.5 | S18°15.6 | 240°56.8 | N22°06.1 | 217°09.0 | N16°13.9 | 344°19.2 | N02°28.9 |
| 1 | 11°58.3 | | 161°45.9 | 16.3 | 255°57.6 | 05.9 | 232°10.9 | 13.8 | 359°21.8 | 28.9 |
| 2 | 27°00.8 | | 176°47.2 | 17.0 | 270°58.5 | 05.7 | 247°12.9 | 13.6 | 14°24.4 | 28.8 |
| 3 | 42°03.3 | | 191°48.6 | •• 17.8 | 285°59.3 | •• 05.5 | 262°14.9 | •• 13.5 | 29°27.0 | •• 28.7 |
| 4 | 57°05.7 | | 206°50.0 | 18.5 | 301°00.2 | 05.2 | 277°16.9 | 13.3 | 44°29.7 | 28.6 |
| 5 | 72°08.2 | | 221°51.3 | 19.2 | 316°01.0 | 05.0 | 292°18.9 | 13.2 | 59°32.3 | 28.6 |
| 6 | 87°10.7 | | 236°52.7 | S18°19.9 | 331°01.9 | N22°04.8 | 307°20.8 | N16°13.0 | 74°34.9 | N02°28.5 |
| 7 | 102°13.1 | | 251°54.1 | 20.6 | 346°02.7 | 04.6 | 322°22.8 | 12.9 | 89°37.6 | 28.4 |
| 8 | 117°15.6 | | 266°55.5 | 21.3 | 1°03.6 | 04.3 | 337°24.8 | 12.8 | 104°40.2 | 28.3 |
| 9 | 132°18.1 | | 281°56.9 | •• 22.1 | 16°04.4 | •• 04.1 | 352°26.8 | •• 12.6 | 119°42.8 | •• 28.3 |
| 10 | 147°20.5 | | 296°58.3 | 22.8 | 31°05.2 | 03.9 | 7°28.8 | 12.5 | 134°45.5 | 28.2 |
| 11 | 162°23.0 | | 311°59.7 | 23.5 | 46°06.1 | 03.7 | 22°30.7 | 12.3 | 149°48.1 | 28.1 |
| 12 | 177°25.5 | | 327°01.1 | S18°24.2 | 61°06.9 | N22°03.4 | 37°32.7 | N16°12.2 | 164°50.7 | N02°28.0 |
| 13 | 192°27.9 | | 342°02.5 | 24.9 | 76°07.8 | 03.2 | 52°34.7 | 12.0 | 179°53.4 | 28.0 |
| 14 | 207°30.4 | | 357°03.9 | 25.6 | 91°08.6 | 03.0 | 67°36.7 | 11.9 | 194°56.0 | 27.9 |
| 15 | 222°32.8 | | 12°05.3 | •• 26.3 | 106°09.5 | •• 02.7 | 82°38.7 | •• 11.8 | 209°58.6 | •• 27.8 |
| 16 | 237°35.3 | | 27°06.7 | 27.0 | 121°10.3 | 02.5 | 97°40.6 | 11.6 | 225°01.3 | 27.7 |
| 17 | 252°37.8 | | 42°08.1 | 27.7 | 136°11.2 | 02.3 | 112°42.6 | 11.5 | 240°03.9 | 27.7 |
| 18 | 267°40.2 | | 57°09.5 | S18°28.4 | 151°12.0 | N22°02.1 | 127°44.6 | N16°11.3 | 255°06.5 | N02°27.6 |
| 19 | 282°42.7 | | 72°10.9 | 29.1 | 166°12.9 | 01.8 | 142°46.6 | 11.2 | 270°09.1 | 27.5 |
| 20 | 297°45.2 | | 87°12.3 | 29.8 | 181°13.7 | 01.6 | 157°48.6 | 11.0 | 285°11.8 | 27.4 |
| 21 | 312°47.6 | | 102°13.7 | •• 30.5 | 196°14.6 | •• 01.4 | 172°50.5 | •• 10.9 | 300°14.4 | •• 27.4 |
| 22 | 327°50.1 | | 117°15.1 | 31.2 | 211°15.4 | 01.1 | 187°52.5 | 10.8 | 315°17.0 | 27.3 |
| 23 | 342°52.6 | | 132°16.6 | 31.9 | 226°16.3 | 00.9 | 202°54.5 | 10.6 | 330°19.7 | 27.2 |
| Mer.pass. 00:12 | | | | | | | | | | |
| ν1.4' d0.7' m-4.79 | | | | | | | | | | |
| ν0.8' d-0.2' m1.18 | | | | | | | | | | |
| ν2.0' d-0.1' m-1.84 | | | | | | | | | | |
| ν2.6' d-0.1' m0.40 | | | | | | | | | | |

| Stars | | |
|---------------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°33.0 | 29°14.4 |
| Ankaa | 353°05.4 | -42°09.4 |
| Schedar | 349°28.9 | 56°41.1 |
| Diphda | 348°45.6 | -17°50.2 |
| Achernar | 335°18.6 | -57°05.8 |
| Hamal | 327°49.3 | 23°35.4 |
| Polaris | 313°01.5 | 89°22.3 |
| Acamar | 315°10.4 | -40°11.5 |
| Menkar | 314°04.5 | 4°11.8 |
| Mirfak | 308°26.0 | 49°57.3 |
| Aldebaran | 290°37.9 | 16°33.8 |
| Rigel | 281°02.5 | -8°10.0 |
| Capella | 280°19.8 | 46°01.3 |
| Bellatrix | 278°21.4 | 6°22.5 |
| Elnath | 278°00.1 | 28°37.8 |
| Alnilam | 275°36.3 | -1°10.9 |
| Betelgeuse | 270°50.6 | 7°24.8 |
| Canopus | 263°51.9 | -52°42.2 |
| Sirius | 258°25.1 | -16°44.9 |
| Adhara | 255°04.9 | -29°00.2 |
| Procyon | 244°49.5 | 5°09.5 |
| Pollux | 243°15.8 | 27°57.7 |
| Avior | 234°14.6 | -59°35.4 |
| Suhail | 222°45.6 | -43°32.2 |
| Miaplacidus | 221°38.8 | -69°49.4 |
| Alphard | 217°46.7 | -8°46.3 |
| Regulus | 207°33.3 | 11°50.3 |
| Dubhe | 193°40.0 | 61°36.4 |
| Denebola | 182°23.9 | 14°25.4 |
| Gienah | 175°42.5 | -17°41.4 |
| Acrux | 172°59.2 | -63°14.9 |
| Gacrux | 171°50.7 | -57°15.8 |
| Alioth | 166°12.3 | 55°49.0 |
| Spica | 158°21.1 | -11°18.0 |
| Alkaid | 152°51.3 | 49°10.9 |
| Hadar | 148°34.5 | -60°30.2 |
| Menkent | 147°56.3 | -36°30.1 |
| Arcturus | 145°46.9 | 19°02.7 |
| Rigel Kent. | 139°38.8 | -60°56.9 |
| Kochab | 137°20.6 | 74°02.9 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.7 | 26°37.7 |
| Antares | 112°14.2 | -26°29.5 |
| Atria | 107°07.2 | -69°04.7 |
| Sabik | 102°01.2 | -15°45.4 |
| Shaula | 96°08.5 | -37°07.5 |
| Rasalhague | 95°57.3 | 12°32.6 |
| Eltanin | 90°41.5 | 51°29.4 |
| Kaus Aust. | 83°30.6 | -34°22.4 |
| Vega | 80°32.2 | 38°48.8 |
| Nunki | 75°45.9 | -26°15.8 |
| Altair | 61°58.4 | 8°56.5 |
| Peacock | 53°03.1 | -56°39.0 |
| Deneb | 49°24.5 | 45°22.8 |
| Enif | 33°37.1 | 10°00.0 |
| Al Na'ir | 27°30.7 | -46°49.8 |
| Fomalhaut | 15°12.6 | -29°28.7 |
| Scheat | 13°43.5 | 28°13.9 |
| Markab | 13°28.2 | 15°21.1 |
| | | |
| Sep 16 Wed | SHA | Mer.pass |
| Venus | 150°43.9 | 14:16 |
| Mars | 245°19.0 | 07:58 |
| Jupiter | 220°36.6 | 09:36 |
| Saturn | 347°15.4 | 01:11 |
| | | |
| Sep 17 Thu | SHA | Mer.pass |
| Venus | 150°15.6 | 14:14 |
| Mars | 244°39.9 | 07:57 |
| Jupiter | 220°24.8 | 09:33 |
| Saturn | 347°19.3 | 01:07 |
| | | |
| Sep 18 Fri | SHA | Mer.pass |
| Venus | 149°48.6 | 14:12 |
| Mars | 244°00.9 | 07:56 |
| Jupiter | 220°13.1 | 09:30 |
| Saturn | 347°23.3 | 01:03 |
| | | |
| Horizontal parallax | | |
| Venus: | 0.3 | |
| Mars: | 0.1 | |

| h | | Sun | | Moon | | | |
|------------------------|-----------|-----------|------------|-------|-----------|-------|-------|
| Wed | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 181° 14.4 | N02° 42.9 | 127° 20.1 | 11.5' | S23° 08.2 | 8.6' | 55.0' |
| 1 | 196° 14.6 | 41.9 | 141° 50.6 | 11.5' | 23° 16.8 | 8.4' | 55.0' |
| 2 | 211° 14.8 | 41.0 | 156° 21.1 | 11.4' | 23° 25.2 | 8.3' | 55.0' |
| 3 | 226° 15.1 | · · 40.0 | 170° 51.6 | 11.4' | 23° 33.5 | 8.2' | 54.9' |
| 4 | 241° 15.3 | 39.0 | 185° 22.0 | 11.4' | 23° 41.7 | 8.1' | 54.9' |
| 5 | 256° 15.5 | 38.1 | 199° 52.3 | 11.3' | 23° 49.8 | 8.0' | 54.9' |
| 6 | 271° 15.7 | N02° 37.1 | 214° 22.7 | 11.3' | S23° 57.8 | 7.9' | 54.9' |
| 7 | 286° 16.0 | 36.1 | 228° 52.9 | 11.2' | 24° 05.7 | 7.7' | 54.9' |
| 8 | 301° 16.2 | 35.2 | 243° 23.2 | 11.2' | 24° 13.4 | 7.6' | 54.8' |
| 9 | 316° 16.4 | · · 34.2 | 257° 53.4 | 11.2' | 24° 21.0 | 7.5' | 54.8' |
| 10 | 331° 16.6 | 33.3 | 272° 23.6 | 11.1' | 24° 28.5 | 7.4' | 54.8' |
| 11 | 346° 16.8 | 32.3 | 286° 53.7 | 11.1' | 24° 35.9 | 7.3' | 54.8' |
| 12 | 1° 17.1 | N02° 31.3 | 301° 23.8 | 11.0' | S24° 43.1 | 7.1' | 54.8' |
| 13 | 16° 17.3 | 30.4 | 315° 53.8 | 11.0' | 24° 50.3 | 7.0' | 54.7' |
| 14 | 31° 17.5 | 29.4 | 330° 23.8 | 11.0' | 24° 57.3 | 6.9' | 54.7' |
| 15 | 46° 17.7 | · · 28.4 | 344° 53.8 | 10.9' | 25° 04.2 | 6.8' | 54.7' |
| 16 | 61° 18.0 | 27.5 | 359° 23.7 | 10.9' | 25° 10.9 | 6.6' | 54.7' |
| 17 | 76° 18.2 | 26.5 | 13° 53.6 | 10.9' | 25° 17.6 | 6.5' | 54.7' |
| 18 | 91° 18.4 | N02° 25.5 | 28° 23.5 | 10.8' | S25° 24.1 | 6.4' | 54.7' |
| 19 | 106° 18.6 | 24.6 | 42° 53.3 | 10.8' | 25° 30.5 | 6.3' | 54.6' |
| 20 | 121° 18.9 | 23.6 | 57° 23.1 | 10.7' | 25° 36.7 | 6.1' | 54.6' |
| 21 | 136° 19.1 | · · 22.6 | 71° 52.8 | 10.7' | 25° 42.9 | 6.0' | 54.6' |
| 22 | 151° 19.3 | 21.7 | 86° 22.5 | 10.7' | 25° 48.9 | 5.9' | 54.6' |
| 23 | 166° 19.5 | 20.7 | 100° 52.2 | 10.6' | 25° 54.8 | 5.8' | 54.6' |
| SD = 15.9' d = -1.0' | | | SD = 15.0' | | | | |
| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 181° 19.7 | N02° 19.7 | 115° 21.9 | 10.6' | S26° 00.6 | 5.6' | 54.6' |
| 1 | 196° 20.0 | 18.8 | 129° 51.5 | 10.6' | 26° 06.2 | 5.5' | 54.5' |
| 2 | 211° 20.2 | 17.8 | 144° 21.1 | 10.5' | 26° 11.7 | 5.4' | 54.5' |
| 3 | 226° 20.4 | · · 16.8 | 158° 50.6 | 10.5' | 26° 17.1 | 5.3' | 54.5' |
| 4 | 241° 20.6 | 15.9 | 173° 20.1 | 10.5' | 26° 22.4 | 5.1' | 54.5' |
| 5 | 256° 20.9 | 14.9 | 187° 49.6 | 10.5' | 26° 27.5 | 5.0' | 54.5' |
| 6 | 271° 21.1 | N02° 13.9 | 202° 19.1 | 10.4' | S26° 32.5 | 4.9' | 54.5' |
| 7 | 286° 21.3 | 13.0 | 216° 48.5 | 10.4' | 26° 37.3 | 4.7' | 54.5' |
| 8 | 301° 21.5 | 12.0 | 231° 17.9 | 10.4' | 26° 42.1 | 4.6' | 54.5' |
| 9 | 316° 21.8 | · · 11.0 | 245° 47.3 | 10.3' | 26° 46.7 | 4.5' | 54.4' |
| 10 | 331° 22.0 | 10.1 | 260° 16.6 | 10.3' | 26° 51.2 | 4.3' | 54.4' |
| 11 | 346° 22.2 | 09.1 | 274° 45.9 | 10.3' | 26° 55.5 | 4.2' | 54.4' |
| 12 | 1° 22.4 | N02° 08.1 | 289° 15.2 | 10.3' | S26° 59.7 | 4.1' | 54.4' |
| 13 | 16° 22.6 | 07.2 | 303° 44.5 | 10.2' | 27° 03.8 | 4.0' | 54.4' |
| 14 | 31° 22.9 | 06.2 | 318° 13.7 | 10.2' | 27° 07.8 | 3.8' | 54.4' |
| 15 | 46° 23.1 | · · 05.2 | 332° 42.9 | 10.2' | 27° 11.6 | 3.7' | 54.4' |
| 16 | 61° 23.3 | 04.3 | 347° 12.1 | 10.2' | 27° 15.3 | 3.6' | 54.4' |
| 17 | 76° 23.5 | 03.3 | 1° 41.3 | 10.1' | 27° 18.8 | 3.4' | 54.3' |
| 18 | 91° 23.8 | N02° 02.3 | 16° 10.4 | 10.1' | S27° 22.2 | 3.3' | 54.3' |
| 19 | 106° 24.0 | 01.4 | 30° 39.6 | 10.1' | 27° 25.5 | 3.2' | 54.3' |
| 20 | 121° 24.2 | 02° 00.4 | 45° 08.7 | 10.1' | 27° 28.7 | 3.0' | 54.3' |
| 21 | 136° 24.4 | 01° 59.4 | 59° 37.8 | 10.1' | 27° 31.7 | 2.9' | 54.3' |
| 22 | 151° 24.7 | 58.5 | 74° 06.8 | 10.1' | 27° 34.6 | 2.8' | 54.3' |
| 23 | 166° 24.9 | 57.5 | 88° 35.9 | 10.0' | 27° 37.3 | 2.6' | 54.3' |
| SD = 15.9' d = -1.0' | | | SD = 14.9' | | | | |
| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 181° 25.1 | N01° 56.5 | 103° 04.9 | 10.0' | S27° 39.9 | 2.5' | 54.3' |
| 1 | 196° 25.3 | 55.6 | 117° 34.0 | 10.0' | 27° 42.4 | 2.3' | 54.3' |
| 2 | 211° 25.5 | 54.6 | 132° 03.0 | 10.0' | 27° 44.8 | 2.2' | 54.3' |
| 3 | 226° 25.8 | · · 53.6 | 146° 32.0 | 10.0' | 27° 47.0 | 2.1' | 54.3' |
| 4 | 241° 26.0 | 52.7 | 161° 01.0 | 10.0' | 27° 49.1 | 1.9' | 54.3' |
| 5 | 256° 26.2 | 51.7 | 175° 29.9 | 10.0' | 27° 51.0 | 1.8' | 54.2' |
| 6 | 271° 26.4 | N01° 50.7 | 189° 58.9 | 10.0' | S27° 52.8 | 1.7' | 54.2' |
| 7 | 286° 26.7 | 49.8 | 204° 27.9 | 9.9' | 27° 54.5 | 1.5' | 54.2' |
| 8 | 301° 26.9 | 48.8 | 218° 56.8 | 9.9' | 27° 56.0 | 1.4' | 54.2' |
| 9 | 316° 27.1 | · · 47.8 | 233° 25.7 | 9.9' | 27° 57.4 | 1.3' | 54.2' |
| 10 | 331° 27.3 | 46.9 | 247° 54.7 | 9.9' | 27° 58.7 | 1.1' | 54.2' |
| 11 | 346° 27.6 | 45.9 | 262° 23.6 | 9.9' | 27° 59.8 | 1.0' | 54.2' |
| 12 | 1° 27.8 | N01° 44.9 | 276° 52.5 | 9.9' | S28° 00.8 | 0.9' | 54.2' |
| 13 | 16° 28.0 | 44.0 | 291° 21.4 | 9.9' | 28° 01.7 | 0.7' | 54.2' |
| 14 | 31° 28.2 | 43.0 | 305° 50.4 | 9.9' | 28° 02.4 | 0.6' | 54.2' |
| 15 | 46° 28.5 | · · 42.0 | 320° 19.3 | 9.9' | 28° 03.0 | 0.4' | 54.2' |
| 16 | 61° 28.7 | 41.1 | 334° 48.2 | 9.9' | 28° 03.4 | 0.3' | 54.2' |
| 17 | 76° 28.9 | 40.1 | 349° 17.1 | 9.9' | 28° 03.7 | 0.2' | 54.2' |
| 18 | 91° 29.1 | N01° 39.1 | 3° 46.0 | 9.9' | S28° 03.9 | 0.0' | 54.2' |
| 19 | 106° 29.3 | 38.1 | 18° 14.9 | 9.9' | 28° 04.0 | -0.1' | 54.2' |
| 20 | 121° 29.6 | 37.2 | 32° 43.9 | 9.9' | 28° 03.9 | -0.2' | 54.2' |
| 21 | 136° 29.8 | · · 36.2 | 47° 12.8 | 9.9' | 28° 03.6 | -0.4' | 54.2' |
| 22 | 151° 30.0 | 35.2 | 61° 41.7 | 9.9' | 28° 03.3 | -0.5' | 54.2' |
| 23 | 166° 30.2 | 34.3 | 76° 10.6 | 9.9' | 28° 02.8 | -0.6' | 54.2' |
| SD = 15.9' d = -1.0' | | | SD = 14.8' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 02:24 | 04:05 | 05:16 | 18:30 | 19:40 | 21:19 |
| N 70° | 02:51 | 04:17 | 05:20 | 18:27 | 19:29 | 20:53 |
| 68° | 03:11 | 04:26 | 05:23 | 18:23 | 19:20 | 20:34 |
| 66° | 03:27 | 04:34 | 05:26 | 18:21 | 19:13 | 20:19 |
| 64° | 03:40 | 04:40 | 05:29 | 18:19 | 19:07 | 20:07 |
| 62° | 03:50 | 04:46 | 05:31 | 18:17 | 19:02 | 19:57 |
| 60° | 03:59 | 04:50 | 05:32 | 18:15 | 18:57 | 19:48 |
| N 58° | 04:06 | 04:54 | 05:34 | 18:14 | 18:53 | 19:41 |
| 56° | 04:13 | 04:58 | 05:35 | 18:12 | 18:50 | 19:35 |
| 54° | 04:18 | 05:01 | 05:37 | 18:11 | 18:47 | 19:29 |
| 52° | 04:23 | 05:04 | 05:38 | 18:10 | 18:44 | 19:24 |
| 50° | 04:28 | 05:06 | 05:39 | 18:09 | 18:42 | 19:20 |
| 45° | 04:37 | 05:11 | 05:41 | 18:07 | 18:37 | 19:11 |
| N 40° | 04:44 | 05:16 | 05:43 | 18:06 | 18:33 | 19:05 |
| 35° | 04:49 | 05:19 | 05:44 | 18:04 | 18:29 | 18:59 |
| 30° | 04:54 | 05:22 | 05:46 | 18:03 | 18:27 | 18:55 |
| 20° | 05:00 | 05:26 | 05:48 | 18:01 | 18:23 | 18:49 |
| N 10° | 05:04 | 05:29 | 05:50 | 17:59 | 18:20 | 18:45 |
| 0° | 05:07 | 05:31 | 05:51 | 17:58 | 18:18 | 18:42 |
| S 10° | 05:07 | 05:32 | 05:53 | 17:56 | 18:17 | 18:42 |
| 20° | 05:07 | 05:32 | 05:54 | 17:55 | 18:17 | 18:43 |
| 30° | 05:04 | 05:32 | 05:56 | 17:54 | 18:17 | 18:45 |
| 35° | 05:02 | 05:32 | 05:57 | 17:53 | 18:18 | 18:47 |
| 40° | 04:59 | 05:31 | 05:58 | 17:52 | 18:19 | 18:50 |
| 45° | 04:56 | 05:30 | 05:59 | 17:51 | 18:20 | 18:54 |
| S 50° | 04:50 | 05:28 | 06:00 | 17:50 | 18:22 | 19:00 |
| 52° | 04:48 | 05:27 | 06:01 | 17:49 | 18:23 | 19:02 |
| 54° | 04:45 | 05:26 | 06:01 | 17:49 | 18:24 | 19:06 |
| 56° | 04:41 | 05:25 | 06:02 | 17:48 | 18:25 | 19:09 |
| 58° | 04:38 | 05:24 | 06:03 | 17:48 | 18:27 | 19:13 |
| S 60° | 04:33 | 05:22 | 06:03 | 17:47 | 18:28 | 19:18 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | ██ | ██ | ██ | ██ | ██ | ██ |
| N 70° | ██ | ██ | ██ | ██ | ██ | ██ |
| 68° | ██ | ██ | ██ | ██ | ██ | ██ |
| 66° | ██ | ██ | ██ | ██ | ██ | ██ |
| 64° | 14:58 | ██ | ██ | 16:58 | ██ | ██ |
| 62° | 14:05 | 15:57 | ██ | 17:51 | 17:44 | ██ |
| 60° | 13:33 | 15:03 | 16:13 | 18:24 | 18:39 | 19:16 |
| N 58° | 13:09 | 14:30 | 15:36 | 18:48 | 19:12 | 19:53 |
| 56° | 12:50 | 14:06 | 15:09 | 19:07 | 19:36 | 20:20 |
| 54° | 12:34 | 13:47 | 14:48 | 19:24 | 19:55 | 20:41 |
| 52° | 12:21 | 13:31 | 14:31 | 19:38 | 20:12 | 20:58 |
| 50° | 12:09 | 13:17 | 14:16 | 19:50 | 20:26 | 21:13 |
| 45° | 11:44 | 12:48 | 13:46 | 20:16 | 20:55 | 21:43 |
| N 40° | 11:24 | 12:26 | 13:22 | 20:36 | 21:18 | 22:07 |
| 35° | 11:08 | 12:07 | 13:03 | 20:53 | 21:36 | 22:26 |
| 30° | 10:54 | 11:52 | 12:46 | 21:08 | 21:53 | 22:43 |
| 20° | 10:30 | 11:25 | 12:18 | 21:33 | 22:20 | 23:10 |
| N 10° | 10:10 | 11:02 | 11:54 | 21:54 | 22:43 | 23:35 |
| 0° | 09:51 | 10:41 | 11:32 | 22:15 | 23:05 | 23:57 |
| S 10° | 09:32 | 10:19 | 11:10 | 22:35 | 23:27 | · · · |
| 20° | 09:11 | 09:57 | 10:46 | 22:57 | 23:51 | · · · |
| 30° | 08:48 | 09:31 | 10:18 | 23:22 | · · · | 00:18 |
| 35° | 08:34 | 09:15 | 10:02 | 23:37 | · · · | 00:35 |
| 40° | 08:19 | 08:57 | 09:42 | 23:54 | · · · | 00:53 |
| 45° | 08:00 | 08:36 | 09:19 | · · · | 00:15 | 01:16 |
| S 50° | 07:37 | 08:09 | 08:50 | · · · | 00:42 | 01:46 |
| 52° | 07:26 | 07:55 | 08:35 | · · · | 00:55 | 02:00 |
| 54° | 07:14 | 07:40 | 08:18 | · · · | 01:10 | 02:17 |
| 56° | 06:59 | 07:22 | 07:58 | 00:07 | 01:27 | 02:37 |
| 58° | 06:43 | 07:01 | 07:33 | 00:23 | 01:48 | 03:02 |
| S 60° | 06:23 | 06:33 | 06:58 | 00:43 | 02:16 | 03:37 |

| Day | Sun | | | Moon | | |
|-----|---|----------------------------------|-----------------------|-----------------------------|----------------|----------------------|
| | Eqn.of Time 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 5-7 24-42% |
| 16 | 04:58 | 05:08 | 11:55 | 16:03 | 03:38 | |
| 17 | 05:19 | 05:30 | 11:55 | 16:53 | 04:28 | |
| 18 | 05:40 | 05:51 | 11:54 | 17:44 | 05:19 | |

September 19, 20, 21 UT (Sat., Sun., Mon.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|----------|
| Sat | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 357°55.0 | | 147°18.0 | S18°32.6 | 241°17.1 | N22°00.7 | 217°56.5 | N16°10.5 | 345°22.3 | N02°27.1 |
| 1 | 12°57.5 | | 162°19.4 | 33.3 | 256°18.0 | 00.5 | 232°58.5 | 10.3 | 0°24.9 | 27.1 |
| 2 | 28°00.0 | | 177°20.9 | 34.0 | 271°18.8 | 00.2 | 248°00.4 | 10.2 | 15°27.6 | 27.0 |
| 3 | 43°02.4 | | 192°22.3 | · · 34.7 | 286°19.7 | 22°00.0 | 263°02.4 | · · 10.1 | 30°30.2 | · · 26.9 |
| 4 | 58°04.9 | | 207°23.7 | 35.4 | 301°20.5 | 21°59.8 | 278°04.4 | 09.9 | 45°32.8 | 26.8 |
| 5 | 73°07.3 | | 222°25.2 | 36.1 | 316°21.4 | 59.5 | 293°06.4 | 09.8 | 60°35.5 | 26.8 |
| 6 | 88°09.8 | | 237°26.6 | S18°36.8 | 331°22.2 | N21°59.3 | 308°08.4 | N16°09.6 | 75°38.1 | N02°26.7 |
| 7 | 103°12.3 | | 252°28.0 | 37.5 | 346°23.1 | 59.1 | 323°10.3 | 09.5 | 90°40.7 | 26.6 |
| 8 | 118°14.7 | | 267°29.5 | 38.2 | 1°23.9 | 58.8 | 338°12.3 | 09.3 | 105°43.4 | 26.5 |
| 9 | 133°17.2 | | 282°30.9 | · · 38.9 | 16°24.8 | · · 58.6 | 353°14.3 | · · 09.2 | 120°46.0 | · · 26.5 |
| 10 | 148°19.7 | | 297°32.4 | 39.5 | 31°25.7 | 58.4 | 8°16.3 | 09.1 | 135°48.6 | 26.4 |
| 11 | 163°22.1 | | 312°33.8 | 40.2 | 46°26.5 | 58.1 | 23°18.3 | 08.9 | 150°51.3 | 26.3 |
| 12 | 178°24.6 | | 327°35.3 | S18°40.9 | 61°27.4 | N21°57.9 | 38°20.3 | N16°08.8 | 165°53.9 | N02°26.2 |
| 13 | 193°27.1 | | 342°36.7 | 41.6 | 76°28.2 | 57.7 | 53°22.2 | 08.6 | 180°56.5 | 26.2 |
| 14 | 208°29.5 | | 357°38.2 | 42.3 | 91°29.1 | 57.4 | 68°24.2 | 08.5 | 195°59.2 | 26.1 |
| 15 | 223°32.0 | | 12°39.7 | · · 43.0 | 106°29.9 | · · 57.2 | 83°26.2 | · · 08.3 | 211°01.8 | · · 26.0 |
| 16 | 238°34.5 | | 27°41.1 | 43.6 | 121°30.8 | 57.0 | 98°28.2 | 08.2 | 226°04.4 | 25.9 |
| 17 | 253°36.9 | | 42°42.6 | 44.3 | 136°31.6 | 56.7 | 113°30.2 | 08.1 | 241°07.1 | 25.9 |
| 18 | 268°39.4 | | 57°44.1 | S18°45.0 | 151°32.5 | N21°56.5 | 128°32.2 | N16°07.9 | 256°09.7 | N02°25.8 |
| 19 | 283°41.8 | | 72°45.5 | 45.7 | 166°33.3 | 56.3 | 143°34.1 | 07.8 | 271°12.3 | 25.7 |
| 20 | 298°44.3 | | 87°47.0 | 46.3 | 181°34.2 | 56.0 | 158°36.1 | 07.6 | 286°15.0 | 25.6 |
| 21 | 313°46.8 | | 102°48.5 | · · 47.0 | 196°35.1 | · · 55.8 | 173°38.1 | · · 07.5 | 301°17.6 | · · 25.5 |
| 22 | 328°49.2 | | 117°50.0 | 47.7 | 211°35.9 | 55.6 | 188°40.1 | 07.4 | 316°20.2 | 25.5 |
| 23 | 343°51.7 | | 132°51.5 | 48.4 | 226°36.8 | 55.3 | 203°42.1 | 07.2 | 331°22.9 | 25.4 |
| Mer.pass. 00:08 | | ν1.4' d0.7' m-4.80 | | ν0.9' d-0.2' m1.17 | | ν2.0' d-0.1' m-1.84 | | ν2.6' d-0.1' m0.40 | | |

| Sun | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|----------|
| 0 | 358°54.2 | | 147°52.9 | S18°49.0 | 241°37.6 | N21°55.1 | 218°44.1 | N16°07.1 | 346°25.5 | N02°25.3 |
| 1 | 13°56.6 | | 162°54.4 | 49.7 | 256°38.5 | 54.9 | 233°46.0 | 06.9 | 1°28.1 | 25.2 |
| 2 | 28°59.1 | | 177°55.9 | 50.4 | 271°39.3 | 54.6 | 248°48.0 | 06.8 | 16°30.8 | 25.2 |
| 3 | 44°01.6 | | 192°57.4 | · · 51.0 | 286°40.2 | · · 54.4 | 263°50.0 | · · 06.8 | 31°33.4 | · · 25.1 |
| 4 | 59°04.0 | | 207°58.9 | 51.7 | 301°41.1 | 54.2 | 278°52.0 | 06.5 | 46°36.0 | 25.0 |
| 5 | 74°06.5 | | 223°00.4 | 52.4 | 316°41.9 | 53.9 | 293°54.0 | 06.4 | 61°38.7 | 24.9 |
| 6 | 89°08.9 | | 238°01.9 | S18°53.0 | 331°42.8 | N21°53.7 | 308°56.0 | N16°06.2 | 76°41.3 | N02°24.9 |
| 7 | 104°11.4 | | 253°03.4 | 53.7 | 346°43.6 | 53.5 | 323°58.0 | 06.1 | 91°43.9 | 24.8 |
| 8 | 119°13.9 | | 268°04.9 | 54.3 | 1°44.5 | 53.2 | 338°59.9 | 05.9 | 106°46.6 | 24.7 |
| 9 | 134°16.3 | | 283°06.4 | · · 55.0 | 16°45.4 | · · 53.0 | 354°01.9 | · · 05.8 | 121°49.2 | · · 24.6 |
| 10 | 149°18.8 | | 298°07.9 | 55.7 | 31°46.2 | 52.7 | 9°03.9 | 05.7 | 136°51.8 | 24.6 |
| 11 | 164°21.3 | | 313°09.4 | 56.3 | 46°47.1 | 52.5 | 24°05.9 | 05.5 | 151°54.5 | 24.5 |
| 12 | 179°23.7 | | 328°11.0 | S18°57.0 | 61°47.9 | N21°52.3 | 39°07.9 | N16°05.4 | 166°57.1 | N02°24.4 |
| 13 | 194°26.2 | | 343°12.5 | 57.6 | 76°48.8 | 52.0 | 54°09.9 | 05.2 | 181°59.7 | 24.3 |
| 14 | 209°28.7 | | 358°14.0 | 58.3 | 91°49.7 | 51.8 | 69°11.9 | 05.1 | 197°02.4 | 24.3 |
| 15 | 224°31.1 | | 13°15.5 | · · 58.9 | 106°50.5 | · · 51.6 | 84°13.8 | · · 04.9 | 212°05.0 | · · 24.2 |
| 16 | 239°33.6 | | 28°17.1 | 18°59.6 | 121°51.4 | 51.3 | 99°15.8 | 04.8 | 227°07.6 | 24.1 |
| 17 | 254°36.1 | | 43°18.6 | 19°00.2 | 136°52.3 | 51.1 | 114°17.8 | 04.7 | 242°10.3 | 24.0 |
| 18 | 269°38.5 | | 58°20.1 | S19°00.9 | 151°53.1 | N21°50.8 | 129°19.8 | N16°04.5 | 257°12.9 | N02°24.0 |
| 19 | 284°41.0 | | 73°21.7 | 01.5 | 166°54.0 | 50.6 | 144°21.8 | 04.4 | 272°15.5 | 23.9 |
| 20 | 299°43.4 | | 88°23.2 | 02.2 | 181°54.8 | 50.4 | 159°23.8 | 04.2 | 287°18.2 | 23.8 |
| 21 | 314°45.9 | | 103°24.7 | · · 02.8 | 196°55.7 | · · 50.1 | 174°25.8 | · · 04.1 | 302°20.8 | · · 23.7 |
| 22 | 329°48.4 | | 118°26.3 | 03.5 | 211°56.6 | 49.9 | 189°27.7 | 04.0 | 317°23.4 | 23.6 |
| 23 | 344°50.8 | | 133°27.8 | 04.1 | 226°57.4 | 49.7 | 204°29.7 | 03.8 | 332°26.1 | 23.6 |
| Mer.pass. 00:04 | | ν1.5' d0.7' m-4.80 | | ν0.9' d-0.2' m1.17 | | ν2.0' d-0.1' m-1.84 | | ν2.6' d-0.1' m0.40 | | |

| Mon | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|----------|
| 0 | 359°53.3 | | 148°29.4 | S19°04.8 | 241°58.3 | N21°49.4 | 219°31.7 | N16°03.7 | 347°28.7 | N02°23.5 |
| 1 | 14°55.8 | | 163°30.9 | 05.4 | 256°59.2 | 49.2 | 234°33.7 | 03.5 | 2°31.3 | 23.4 |
| 2 | 29°58.2 | | 178°32.5 | 06.0 | 272°00.0 | 48.9 | 249°35.7 | 03.4 | 17°34.0 | 23.3 |
| 3 | 45°00.7 | | 193°34.0 | · · 06.7 | 287°00.9 | · · 48.7 | 264°37.7 | · · 03.3 | 32°36.6 | · · 23.3 |
| 4 | 60°03.2 | | 208°35.6 | 07.3 | 302°01.8 | 48.4 | 279°39.7 | 03.1 | 47°39.2 | 23.2 |
| 5 | 75°05.6 | | 223°37.2 | 07.9 | 317°02.6 | 48.2 | 294°41.7 | 03.0 | 62°41.9 | 23.1 |
| 6 | 90°08.1 | | 238°38.7 | S19°08.6 | 332°03.5 | N21°48.0 | 309°43.6 | N16°02.8 | 77°44.5 | N02°23.0 |
| 7 | 105°10.6 | | 253°40.3 | 09.2 | 347°04.4 | 47.7 | 324°45.6 | 02.7 | 92°47.1 | 23.0 |
| 8 | 120°13.0 | | 268°41.9 | 09.8 | 2°05.2 | 47.5 | 339°47.6 | 02.5 | 107°49.8 | 22.9 |
| 9 | 135°15.5 | | 283°43.4 | · · 10.5 | 17°06.1 | · · 47.2 | 354°49.6 | · · 02.4 | 122°52.4 | · · 22.8 |
| 10 | 150°17.9 | | 298°45.0 | 11.1 | 32°07.0 | 47.0 | 9°51.6 | 02.3 | 137°55.0 | 22.7 |
| 11 | 165°20.4 | | 313°46.6 | 11.7 | 47°07.8 | 46.8 | 24°53.6 | 02.1 | 152°57.7 | 22.7 |
| 12 | 180°22.9 | | 328°48.2 | S19°12.4 | 62°08.7 | N21°46.5 | 39°55.6 | N16°02.0 | 168°00.3 | N02°22.6 |
| 13 | 195°25.3 | | 343°49.8 | 13.0 | 77°09.6 | 46.3 | 54°57.6 | 01.8 | 183°03.0 | 22.5 |
| 14 | 210°27.8 | | 358°51.3 | 13.6 | 92°10.4 | 46.0 | 69°59.6 | 01.7 | 198°05.6 | 22.4 |
| 15 | 225°30.3 | | 13°52.9 | · · 14.2 | 107°11.3 | · · 45.8 | 85°01.5 | · · 01.6 | 213°08.2 | · · 22.3 |
| 16 | 240°32.7 | | 28°54.5 | 14.8 | 122°12.2 | 45.5 | 100°03.5 | 01.4 | 228°10.9 | 22.3 |
| 17 | 255°35.2 | | 43°56.1 | 15.5 | 137°13.0 | 45.3 | 115°05.5 | 01.3 | 243°13.5 | 22.2 |
| 18 | 270°37.7 | | 58°57.7 | S19°16.1 | 152°13.9 | N21°45.1 | 130°07.5 | N16°01.1 | 258°16.1 | N02°22.1 |
| 19 | 285°40.1 | | 73°59.3 | 16.7 | 167°14.8 | 44.8 | 145°09.5 | 01.0 | 273°18.8 | 22.0 |
| 20 | 300°42.6 | | 89°00.9 | 17.3 | 182°15.6 | 44.6 | 160°11.5 | 00.9 | 288°21.4 | 22.0 |
| 21 | 315°45.0 | | 104°02.5 | · · 17.9 | 197°16.5 | · · 44.3 | 175°13.5 | · · 00.7 | 303°24.0 | · · 21.9 |
| 22 | 330°47.5 | | 119°04.1 | 18.6 | 212°17.4 | 44.1 | 190°15.5 | 00.6 | 318°26.7 | 21.8 |
| 23 | 345°50.0 | | 134°05.7 | 19.2 | 227°18.3 | 43.8 | 205°17.5 | 00.4 | 333°29.3 | 21.7 |
| Mer.pass. 23:57 | | ν1.6' d0.6' m-4.81 | | ν0.9' d-0.2' m1.16 | | ν2.0' d-0.1' m-1.84 | | ν2.6' d-0.1' m0.39 | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.0 | 29°14.4 |
| Ankaa | 353°05.3 | -42°09.4 |
| Schedar | 349°28.9 | 56°41.1 |
| Diphda | 348°45.6 | -17°50.2 |
| Achernar | 335°18.6 | -57°05.8 |
| Hamal | 327°49.3 | 23°35.4 |
| Polaris | 313°00.0 | 89°22.4 |
| Acamar | 315°10.4 | -40°11.5 |
| Menkar | 314°04.5 | 4°11.8 |
| Mirfak | 308°25.9 | 49°57.3 |
| Aldebaran | 290°37.9 | -16°33.8 |
| Rigel | 281°02.5 | -8°10.0 |
| Capella | 280°19.7 | 46°01.3 |
| Bellatrix | 278°21.3 | 6°22.5 |
| Elnath | 278°00.1 | 28°37.8 |
| Alnilam | 275°36.3 | -1°10.9 |
| Betelgeuse | 270°50.6 | 7°24.8 |
| Canopus | 263°51.9 | -52°42.2 |
| Sirius | 258°25.1 | -16°44.9 |
| Adhara | 255°04.9 | -29°00.2 |
| Procyon | 244°49.5 | 5°09.5 |
| Pollux | 243°15.8 | 27°57.7 |
| Avior | 234°14.6 | -59°35.4 |
| Suhail | 222°45.6 | -43°32.2 |
| Miaplacidus | 221°38.7 | -69°49.4 |
| Alphard | 217°46.6 | -8°46.3 |
| Regulus | 207°33.2 | 11°50.3 |
| Dubhe | 193°39.9 | 61°36.4 |
| Denebola | 182°23.8 | 14°25.4 |
| Gienah | 175°42.5 | -17°41.4 |
| Acrux | 172°59.2 | -63°14.9 |
| Gacrux | 171°50.7 | -57°15.8 |
| Alioth | 166°12.3 | 55°49.0 |
| Spica | 158°21.1 | -11°18.0 |
| Alkaid | 152°51.3 | 49°10.9 |
| Hadar | 148°34.5 | -60°30.2 |
| Menkent | 147°56.3 | -36°30.1 |
| Arcturus | 145°46.9 | 19°02.7 |
| Rigel Kent. | 139°38.8 | -60°56.9 |
| Kochab | 137°20.6 | 74°02.9 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.7 | 26°37.7 |
| Antares | 112°14.2 | -26°29.5 |
| Atria | 107°07.3 | -69°04.7 |
| Sabik | 102°01.2 | -15°45.4 |
| Shaula | 96°08.5 | -37°07.5 |
| Rasalhague | 95°57.3 | 12°32.6 |
| Eltanin | 90°41.5 | 51°29.4 |
| Kaus Aust. | 83°30.6 | -34°22.4 |
| Vega | 80°32.2 | 38°48.8 |
| Nunki | 75°45.9 | -26°15.8 |
| Altair | 61°58.4 | 8°56.5 |
| Peacock | 53°03.2 | -56°39.0 |
| Deneb | 49°24.5 | 45°22.8 |
| Enif | 33°37.1 | 10°00.1 |
| Al Na'ir | 27°30.7 | -46°49.8 |
| Fomalhaut | 15°12.6 | -29°28.7 |
| Scheat | 13°43.5 | 28°13.9 |
| Markab | 13°28.2 | 15°21.1 |

| Sep 19 Sat | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 149°23.0 | 14:09 |
| Mars | 243°22.1 | 07:54 |
| Jupiter | 220°01.5 | 09:27 |
| Saturn | 347°27.3 | 00:58 |

| Sep 20 Sun | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 148°58.8 | 14:07 |
| Mars | 242°43.5 | 07:53 |
| Jupiter | 219°49.9 | 09:24 |
| Saturn | 347°31.3 | 00:54 |

| Sep 21 Mon | SHA | Mer |
|------------|-----|-----|
|------------|-----|-----|

| h | | Sun | | Moon | | | |
|-----|--|------------------------|----------|------------|-------|----------|-------------|
| Sat | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 181°30.5 | N01°33.3 | 90°39.6 | 10.0' | S28°02.1 | -0.8' 54.2' |
| 1 | | 196°30.7 | 32.3 | 105°08.5 | 10.0' | 28°01.4 | -0.9' 54.2' |
| 2 | | 211°30.9 | 31.4 | 119°37.5 | 10.0' | 28°00.5 | -1.0' 54.2' |
| 3 | | 226°31.1 | · · 30.4 | 134°06.5 | 10.0' | 27°59.4 | -1.2' 54.2' |
| 4 | | 241°31.4 | 29.4 | 148°35.5 | 10.0' | 27°58.2 | -1.3' 54.2' |
| 5 | | 256°31.6 | 28.5 | 163°04.5 | 10.0' | 27°56.9 | -1.4' 54.2' |
| 6 | | 271°31.8 | N01°27.5 | 177°33.5 | 10.0' | S27°55.5 | -1.6' 54.2' |
| 7 | | 286°32.0 | 26.5 | 192°02.5 | 10.0' | 27°53.9 | -1.7' 54.2' |
| 8 | | 301°32.2 | 25.6 | 206°31.5 | 10.1' | 27°52.2 | -1.9' 54.2' |
| 9 | | 316°32.5 | · · 24.6 | 221°00.6 | 10.1' | 27°50.3 | -2.0' 54.2' |
| 10 | | 331°32.7 | 23.6 | 235°29.6 | 10.1' | 27°48.3 | -2.1' 54.2' |
| 11 | | 346°32.9 | 22.6 | 249°58.7 | 10.1' | 27°46.2 | -2.3' 54.2' |
| 12 | | 1°33.1 | N01°21.7 | 264°27.8 | 10.1' | S27°44.0 | -2.4' 54.2' |
| 13 | | 16°33.4 | 20.7 | 278°57.0 | 10.1' | 27°41.6 | -2.5' 54.2' |
| 14 | | 31°33.6 | 19.7 | 293°26.1 | 10.2' | 27°39.0 | -2.7' 54.2' |
| 15 | | 46°33.8 | · · 18.8 | 307°55.3 | 10.2' | 27°36.4 | -2.8' 54.2' |
| 16 | | 61°34.0 | 17.8 | 322°24.5 | 10.2' | 27°33.6 | -2.9' 54.2' |
| 17 | | 76°34.3 | 16.8 | 336°53.7 | 10.2' | 27°30.7 | -3.1' 54.2' |
| 18 | | 91°34.5 | N01°15.9 | 351°22.9 | 10.3' | S27°27.6 | -3.2' 54.2' |
| 19 | | 106°34.7 | 14.9 | 5°52.2 | 10.3' | 27°24.5 | -3.3' 54.2' |
| 20 | | 121°34.9 | 13.9 | 20°21.5 | 10.3' | 27°21.1 | -3.4' 54.2' |
| 21 | | 136°35.1 | · · 12.9 | 34°50.8 | 10.3' | 27°17.7 | -3.6' 54.2' |
| 22 | | 151°35.4 | 12.0 | 49°20.1 | 10.4' | 27°14.1 | -3.7' 54.2' |
| 23 | | 166°35.6 | 11.0 | 63°49.5 | 10.4' | 27°10.4 | -3.8' 54.2' |
| | | SD = 15.9' $d = -1.0'$ | | SD = 14.8' | | | |

| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|-------------|----------|------------|----------|-------|-------|
| 0 | 181°35.8 | N01°10.0 | 78°18.9 | 10.4' | S27°06.6 | -4.0' | 54.2' |
| 1 | 196°36.0 | 09.1 | 92°48.3 | 10.5' | 27°02.6 | -4.1' | 54.2' |
| 2 | 211°36.3 | 08.1 | 107°17.8 | 10.5' | 26°58.5 | -4.2' | 54.3' |
| 3 | 226°36.5 | · · 07.1 | 121°47.3 | 10.5' | 26°54.3 | -4.4' | 54.3' |
| 4 | 241°36.7 | 06.2 | 136°16.8 | 10.6' | 26°49.9 | -4.5' | 54.3' |
| 5 | 256°36.9 | 05.2 | 150°46.4 | 10.6' | 26°45.4 | -4.6' | 54.3' |
| 6 | 271°37.1 | N01°04.2 | 165°15.9 | 10.6' | S26°40.8 | -4.7' | 54.3' |
| 7 | 286°37.4 | 03.2 | 179°45.6 | 10.7' | 26°36.1 | -4.9' | 54.3' |
| 8 | 301°37.6 | 02.3 | 194°15.2 | 10.7' | 26°31.2 | -5.0' | 54.3' |
| 9 | 316°37.8 | · · 01.3 | 208°44.9 | 10.7' | 26°26.2 | -5.1' | 54.3' |
| 10 | 331°38.0 | 01°00.3 | 223°14.6 | 10.8' | 26°21.1 | -5.2' | 54.3' |
| 11 | 346°38.3 | 00°59.4 | 237°44.4 | 10.8' | 26°15.9 | -5.4' | 54.3' |
| 12 | 1°38.5 | N00°58.4 | 252°14.2 | 10.8' | S26°10.5 | -5.5' | 54.3' |
| 13 | 16°38.7 | 57.4 | 266°44.0 | 10.9' | 26°05.0 | -5.6' | 54.3' |
| 14 | 31°38.9 | 56.4 | 281°13.9 | 10.9' | 25°59.4 | -5.7' | 54.4' |
| 15 | 46°39.1 | · · 55.5 | 295°43.8 | 11.0' | 25°53.6 | -5.9' | 54.4' |
| 16 | 61°39.4 | 54.5 | 310°13.8 | 11.0' | 25°47.8 | -6.0' | 54.4' |
| 17 | 76°39.6 | 53.5 | 324°43.8 | 11.0' | 25°41.8 | -6.1' | 54.4' |
| 18 | 91°39.8 | N00°52.6 | 339°13.8 | 11.1' | S25°35.7 | -6.2' | 54.4' |
| 19 | 106°40.0 | 51.6 | 353°43.9 | 11.1' | 25°29.4 | -6.4' | 54.4' |
| 20 | 121°40.3 | 50.6 | 8°14.0 | 11.2' | 25°23.1 | -6.5' | 54.4' |
| 21 | 136°40.5 | · · 49.7 | 22°44.1 | 11.2' | 25°16.6 | -6.6' | 54.4' |
| 22 | 151°40.7 | 48.7 | 37°14.3 | 11.2' | 25°10.0 | -6.7' | 54.4' |
| 23 | 166°40.9 | 47.7 | 51°44.6 | 11.3' | 25°03.3 | -6.8' | 54.5' |
| SD = 15.9' | | $d = -1.0'$ | | SD = 14.8' | | | |

| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
|------------|----------|----------|-------------|-------|------------|-------|-------|
| 0 | 181°41.1 | N00°46.7 | 66°14.8 | 11.3' | S24°56.5 | -7.0' | 54.5' |
| 1 | 196°41.4 | 45.8 | 80°45.2 | 11.4' | 24°49.5 | -7.1' | 54.5' |
| 2 | 211°41.6 | 44.8 | 95°15.5 | 11.4' | 24°42.4 | -7.2' | 54.5' |
| 3 | 226°41.8 | · · 43.8 | 109°45.9 | 11.5' | 24°35.2 | -7.3' | 54.5' |
| 4 | 241°42.0 | 42.9 | 124°16.4 | 11.5' | 24°27.9 | -7.4' | 54.5' |
| 5 | 256°42.3 | 41.9 | 138°46.9 | 11.5' | 24°20.5 | -7.5' | 54.5' |
| 6 | 271°42.5 | N00°40.9 | 153°17.4 | 11.6' | S24°13.0 | -7.7' | 54.6' |
| 7 | 286°42.7 | 39.9 | 167°48.0 | 11.6' | 24°05.3 | -7.8' | 54.6' |
| 8 | 301°42.9 | 39.0 | 182°18.6 | 11.7' | 23°57.6 | -7.9' | 54.6' |
| 9 | 316°43.1 | · · 38.0 | 196°49.3 | 11.7' | 23°49.7 | -8.0' | 54.6' |
| 10 | 331°43.4 | 37.0 | 211°20.0 | 11.8' | 23°41.7 | -8.1' | 54.6' |
| 11 | 346°43.6 | 36.1 | 225°50.8 | 11.8' | 23°33.6 | -8.2' | 54.6' |
| 12 | 1°43.8 | N00°35.1 | 240°21.6 | 11.8' | S23°25.3 | -8.3' | 54.6' |
| 13 | 16°44.0 | 34.1 | 254°52.4 | 11.9' | 23°17.0 | -8.4' | 54.7' |
| 14 | 31°44.3 | 33.1 | 269°23.3 | 11.9' | 23°08.6 | -8.6' | 54.7' |
| 15 | 46°44.5 | · · 32.2 | 283°54.2 | 12.0' | 23°00.0 | -8.7' | 54.7' |
| 16 | 61°44.7 | 31.2 | 298°25.2 | 12.0' | 22°51.3 | -8.8' | 54.7' |
| 17 | 76°44.9 | 30.2 | 312°56.3 | 12.1' | 22°42.6 | -8.9' | 54.7' |
| 18 | 91°45.1 | N00°29.3 | 327°27.3 | 12.1' | S22°33.7 | -9.0' | 54.7' |
| 19 | 106°45.4 | 28.3 | 341°58.5 | 12.2' | 22°24.7 | -9.1' | 54.8' |
| 20 | 121°45.6 | 27.3 | 356°29.6 | 12.2' | 22°15.6 | -9.2' | 54.8' |
| 21 | 136°45.8 | · · 26.3 | 11°00.8 | 12.3' | 22°06.4 | -9.3' | 54.8' |
| 22 | 151°46.0 | 25.4 | 25°32.1 | 12.3' | 21°57.1 | -9.4' | 54.8' |
| 23 | 166°46.3 | 24.4 | 40°03.4 | 12.3' | 21°47.7 | -9.5' | 54.8' |
| SD = 15.9' | | | $d = -1.0'$ | | SD = 14.9' | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 02:45 | 04:20 | 05:29 | 18:15 | 19:24 | 20:57 |
| N 70° | 03:08 | 04:30 | 05:32 | 18:13 | 19:14 | 20:35 |
| 68° | 03:25 | 04:37 | 05:34 | 18:11 | 19:07 | 20:18 |
| 66° | 03:39 | 04:44 | 05:36 | 18:09 | 19:01 | 20:05 |
| 64° | 03:50 | 04:49 | 05:37 | 18:08 | 18:56 | 19:55 |
| 62° | 03:59 | 04:54 | 05:38 | 18:07 | 18:51 | 19:46 |
| 60° | 04:07 | 04:58 | 05:39 | 18:06 | 18:48 | 19:38 |
| N 58° | 04:13 | 05:01 | 05:40 | 18:05 | 18:44 | 19:32 |
| 56° | 04:19 | 05:04 | 05:41 | 18:04 | 18:42 | 19:26 |
| 54° | 04:24 | 05:06 | 05:42 | 18:04 | 18:39 | 19:21 |
| 52° | 04:29 | 05:09 | 05:43 | 18:03 | 18:37 | 19:17 |
| 50° | 04:33 | 05:11 | 05:43 | 18:03 | 18:35 | 19:13 |
| 45° | 04:41 | 05:15 | 05:45 | 18:02 | 18:31 | 19:05 |
| N 40° | 04:47 | 05:19 | 05:46 | 18:01 | 18:28 | 18:59 |
| 35° | 04:52 | 05:21 | 05:46 | 18:00 | 18:25 | 18:55 |
| 30° | 04:55 | 05:23 | 05:47 | 17:59 | 18:23 | 18:51 |
| 20° | 05:01 | 05:26 | 05:48 | 17:58 | 18:20 | 18:46 |
| N 10° | 05:04 | 05:28 | 05:49 | 17:57 | 18:18 | 18:43 |
| 0° | 05:06 | 05:30 | 05:50 | 17:57 | 18:17 | 18:41 |
| S 10° | 05:06 | 05:30 | 05:51 | 17:56 | 18:17 | 18:41 |
| 20° | 05:04 | 05:30 | 05:52 | 17:56 | 18:18 | 18:43 |
| 30° | 05:01 | 05:28 | 05:52 | 17:55 | 18:19 | 18:47 |
| 35° | 04:58 | 05:27 | 05:52 | 17:55 | 18:20 | 18:50 |
| 40° | 04:54 | 05:26 | 05:53 | 17:55 | 18:22 | 18:53 |
| 45° | 04:50 | 05:24 | 05:53 | 17:55 | 18:24 | 18:58 |
| S 50° | 04:44 | 05:21 | 05:53 | 17:54 | 18:27 | 19:04 |
| 52° | 04:41 | 05:20 | 05:54 | 17:54 | 18:28 | 19:08 |
| 54° | 04:37 | 05:19 | 05:54 | 17:54 | 18:29 | 19:11 |
| 56° | 04:33 | 05:17 | 05:54 | 17:54 | 18:31 | 19:15 |
| 58° | 04:29 | 05:15 | 05:54 | 17:54 | 18:33 | 19:20 |
| S 60° | 04:24 | 05:13 | 05:54 | 17:54 | 18:35 | 19:25 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | ■ | ■ | ■ | ■ | ■ | ■ |
| 68° | ■ | ■ | ■ | ■ | ■ | ■ |
| 66° | ■ | ■ | 18:47 | ■ | ■ | 21:56 |
| 64° | ■ | 18:42 | 18:06 | ■ | 20:19 | 22:36 |
| 62° | 17:50 | 17:42 | 17:37 | 19:26 | 21:18 | 23:04 |
| 60° | 16:52 | 17:08 | 17:15 | 20:23 | 21:51 | 23:25 |
| N 58° | 16:19 | 16:44 | 16:57 | 20:56 | 22:16 | 23:42 |
| 56° | 15:54 | 16:24 | 16:42 | 21:21 | 22:35 | 23:56 |
| 54° | 15:34 | 16:07 | 16:29 | 21:40 | 22:52 | · · · |
| 52° | 15:18 | 15:53 | 16:18 | 21:57 | 23:05 | · · · |
| 50° | 15:03 | 15:40 | 16:08 | 22:11 | 23:18 | · · · |
| 45° | 14:34 | 15:14 | 15:46 | 22:40 | 23:43 | · · · |
| N 40° | 14:12 | 14:54 | 15:29 | 23:02 | · · · | 00:03 |
| 35° | 13:53 | 14:36 | 15:14 | 23:21 | · · · | 00:19 |
| 30° | 13:36 | 14:22 | 15:02 | 23:37 | · · · | 00:34 |
| 20° | 13:09 | 13:56 | 14:40 | · · · | 00:03 | 00:58 |
| N 10° | 12:45 | 13:34 | 14:21 | · · · | 00:27 | 01:18 |
| 0° | 12:23 | 13:14 | 14:03 | · · · | 00:48 | 01:38 |
| S 10° | 12:01 | 12:53 | 13:45 | 00:19 | 01:09 | 01:57 |
| 20° | 11:38 | 12:31 | 13:26 | 00:43 | 01:32 | 02:18 |
| 30° | 11:10 | 12:06 | 13:04 | 01:11 | 01:59 | 02:41 |
| 35° | 10:54 | 11:51 | 12:51 | 01:27 | 02:14 | 02:55 |
| 40° | 10:35 | 11:33 | 12:35 | 01:46 | 02:32 | 03:11 |
| 45° | 10:12 | 11:12 | 12:17 | 02:10 | 02:54 | 03:30 |
| S 50° | 09:42 | 10:45 | 11:55 | 02:39 | 03:21 | 03:53 |
| 52° | 09:28 | 10:32 | 11:44 | 02:54 | 03:35 | 04:05 |
| 54° | 09:11 | 10:17 | 11:32 | 03:11 | 03:50 | 04:17 |
| 56° | 08:51 | 09:59 | 11:17 | 03:31 | 04:08 | 04:32 |
| 58° | 08:25 | 09:37 | 11:01 | 03:57 | 04:30 | 04:49 |
| S 60° | 07:50 | 09:09 | 10:40 | 04:32 | 04:59 | 05:10 |

| Day | Sun | | | Moon | | |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|-----------------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 8-10 51-70% |
| 19 | 06:02 | 06:13 | 11:54 | 18:36 | 06:10 | |
| 20 | 06:23 | 06:34 | 11:53 | 19:26 | 07:01 | |
| 21 | 06:45 | 06:55 | 11:53 | 20:14 | 07:50 | |


September 22, 23, 24 UT (Tue., Wed., Thu.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|--------------------|----------|----------|--------------------|----------|----------|---------------------|-------------|----------|--------------------|--------|-----|-----|-------|--|--|
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | |
| 0 | 0°52.4 | 149°07.4 | S19°19.8 | 242°19.1 | N21°43.6 | 220°19.4 | N16°00.3 | 348°31.9 | N02°21.7 | Alpheratz | 357°33.0 | 29°14.5 | | | | | | |
| 1 | 15°54.9 | 164°09.0 | 20.4 | 257°20.0 | 43.4 | 235°21.4 | 00.2 | 3°34.6 | 21.6 | Ankaa | 353°05.3 | -42°09.5 | | | | | | |
| 2 | 30°57.4 | 179°10.6 | 21.0 | 272°20.9 | 43.1 | 250°23.4 | 16°00.0 | 18°37.2 | 21.5 | Schedar | 349°28.9 | 56°41.1 | | | | | | |
| 3 | 45°59.8 | 194°12.2 | •• 21.6 | 287°21.7 | •• 42.9 | 265°25.4 | 15°59.9 | 33°39.9 | •• 21.4 | Diphda | 348°45.6 | -17°50.2 | | | | | | |
| 4 | 61°02.3 | 209°13.8 | 22.2 | 302°22.6 | 42.6 | 280°27.4 | 59.7 | 48°42.5 | 21.4 | Achernar | 335°18.6 | -57°05.8 | | | | | | |
| 5 | 76°04.8 | 224°15.5 | 22.8 | 317°23.5 | 42.4 | 295°29.4 | 59.6 | 63°45.1 | 21.3 | Hamal | 327°49.3 | 23°35.4 | | | | | | |
| 6 | 91°07.2 | 239°17.1 | S19°23.4 | 332°24.4 | N21°42.1 | 310°31.4 | N15°59.5 | 78°47.8 | N02°21.2 | Polaris | 312°58.7 | 89°22.4 | | | | | | |
| 7 | 106°09.7 | 254°18.7 | 24.0 | 347°25.2 | 41.9 | 325°33.4 | 59.3 | 93°50.4 | 21.1 | Acamar | 315°10.4 | -40°11.5 | | | | | | |
| 8 | 121°12.2 | 269°20.4 | 24.6 | 2°26.1 | 41.6 | 340°35.4 | 59.2 | 108°53.0 | 21.0 | Menkar | 314°04.4 | 4°11.8 | | | | | | |
| 9 | 136°14.6 | 284°22.0 | •• 25.2 | 17°27.0 | •• 41.4 | 355°37.4 | •• 59.0 | 123°55.7 | •• 21.0 | Mirfak | 308°25.9 | 49°57.3 | | | | | | |
| 10 | 151°17.1 | 299°23.7 | 25.8 | 32°27.9 | 41.1 | 10°39.4 | 58.9 | 138°58.3 | 20.9 | Aldebaran | 290°37.9 | 16°33.8 | | | | | | |
| 11 | 166°19.5 | 314°25.3 | 26.4 | 47°28.7 | 40.9 | 25°41.4 | 58.7 | 154°00.9 | 20.8 | Rigel | 281°02.4 | -8°10.0 | | | | | | |
| 12 | 181°22.0 | 329°27.0 | S19°27.0 | 62°29.6 | N21°40.6 | 40°43.3 | N15°58.6 | 169°03.6 | N02°20.7 | Capella | 280°19.7 | 46°01.3 | | | | | | |
| 13 | 196°24.5 | 344°28.6 | 27.6 | 77°30.5 | 40.4 | 55°45.3 | 58.5 | 184°06.2 | 20.7 | Bellatrix | 278°21.3 | 6°22.5 | | | | | | |
| 14 | 211°26.9 | 359°30.3 | 28.2 | 92°31.4 | 40.2 | 70°47.3 | 58.3 | 199°08.9 | 20.6 | Elnath | 278°00.0 | 28°37.8 | | | | | | |
| 15 | 226°29.4 | 14°31.9 | •• 28.8 | 107°32.2 | •• 39.9 | 85°49.3 | •• 58.2 | 214°11.5 | •• 20.5 | Alnilam | 275°36.3 | -1°10.9 | | | | | | |
| 16 | 241°31.9 | 29°33.6 | 29.4 | 122°33.1 | 39.7 | 100°51.3 | 58.0 | 229°14.1 | 20.4 | Betelgeuse | 270°50.6 | 7°24.8 | | | | | | |
| 17 | 256°34.3 | 44°35.2 | 30.0 | 137°34.0 | 39.4 | 115°53.3 | 57.9 | 244°16.8 | 20.4 | Canopus | 263°51.8 | -52°42.2 | | | | | | |
| 18 | 271°36.8 | 59°36.9 | S19°30.6 | 152°34.9 | N21°39.2 | 130°55.3 | N15°57.8 | 259°19.4 | N02°20.3 | Sirius | 258°25.1 | -16°44.9 | | | | | | |
| 19 | 286°39.3 | 74°38.6 | 31.2 | 167°35.7 | 38.9 | 145°57.3 | 57.6 | 274°22.0 | 20.2 | Adhara | 255°04.8 | -29°00.2 | | | | | | |
| 20 | 301°41.7 | 89°40.2 | 31.7 | 182°36.6 | 38.7 | 160°59.3 | 57.5 | 289°24.7 | 20.1 | Procyon | 244°49.5 | 5°09.5 | | | | | | |
| 21 | 316°44.2 | 104°41.9 | •• 32.3 | 197°37.5 | •• 38.4 | 176°01.3 | •• 57.3 | 304°27.3 | •• 20.0 | Pollux | 243°15.7 | 27°57.6 | | | | | | |
| 22 | 331°46.7 | 119°43.6 | 32.9 | 212°38.4 | 38.2 | 191°03.3 | 57.2 | 319°30.0 | 20.0 | Avior | 234°14.5 | -59°35.4 | | | | | | |
| 23 | 346°49.1 | 134°45.3 | 33.5 | 227°39.2 | 37.9 | 206°05.3 | 57.1 | 334°32.6 | 19.9 | Suhail | 222°45.6 | -43°32.2 | | | | | | |
| Mer.pass. 23:53 | | | ν1.6' d0.6' m-4.81 | | | ν0.9' d-0.2' m1.16 | | | ν2.0' d-0.1' m-1.85 | | | ν2.6' d-0.1' m0.39 | | | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 1°51.6 | 149°47.0 | S19°34.1 | 242°40.1 | N21°37.7 | 221°07.3 | N15°56.9 | 349°35.2 | N02°19.8 | Regulus | 207°33.2 | 11°50.2 | | | | | | |
| 1 | 16°54.0 | 164°48.7 | 34.7 | 257°41.0 | 37.4 | 236°09.3 | 56.8 | 4°37.9 | 19.7 | Dubhe | 193°39.9 | 61°36.3 | | | | | | |
| 2 | 31°56.5 | 179°50.3 | 35.2 | 272°41.9 | 37.2 | 251°11.2 | 56.6 | 19°40.5 | 19.7 | Denebola | 182°23.8 | 14°25.4 | | | | | | |
| 3 | 46°59.0 | 194°52.0 | •• 35.8 | 287°42.8 | •• 36.9 | 266°13.2 | •• 56.5 | 34°43.1 | •• 19.6 | Gienah | 175°42.5 | -17°41.4 | | | | | | |
| 4 | 62°01.4 | 209°53.7 | 36.4 | 302°43.6 | 36.7 | 281°15.2 | 56.4 | 49°45.8 | 19.5 | Acrux | 172°59.2 | -63°14.9 | | | | | | |
| 5 | 77°03.9 | 224°55.4 | 37.0 | 317°44.5 | 36.4 | 296°17.2 | 56.2 | 64°48.4 | 19.4 | Gacrux | 171°50.7 | -57°15.8 | | | | | | |
| 6 | 92°06.4 | 239°57.1 | S19°37.5 | 332°45.4 | N21°36.2 | 311°19.2 | N15°56.1 | 79°51.1 | N02°19.4 | Alioth | 166°12.3 | 55°49.0 | | | | | | |
| 7 | 107°08.8 | 254°58.8 | 38.1 | 347°46.3 | 35.9 | 326°21.2 | 55.9 | 94°53.7 | 19.3 | Spica | 158°21.1 | -11°18.0 | | | | | | |
| 8 | 122°11.3 | 270°00.5 | 38.7 | 2°47.2 | 35.7 | 341°23.2 | 55.8 | 109°56.3 | 19.2 | Alkaid | 152°51.3 | 49°10.9 | | | | | | |
| 9 | 137°13.8 | 285°02.2 | •• 39.2 | 17°48.0 | •• 35.4 | 356°25.2 | •• 55.7 | 124°59.0 | •• 19.1 | Hadar | 148°34.5 | -60°30.2 | | | | | | |
| 10 | 152°16.2 | 300°04.0 | 39.8 | 32°48.9 | 35.2 | 11°27.2 | 55.5 | 140°01.6 | 19.0 | Menkent | 147°56.3 | -36°30.1 | | | | | | |
| 11 | 167°18.7 | 315°05.7 | 40.4 | 47°49.8 | 34.9 | 26°29.2 | 55.4 | 155°04.2 | 19.0 | Arcturus | 145°46.9 | 19°02.7 | | | | | | |
| 12 | 182°21.1 | 330°07.4 | S19°40.9 | 62°50.7 | N21°34.7 | 41°31.2 | N15°55.2 | 170°06.9 | N02°18.9 | Rigel Kent. | 139°38.9 | -60°56.9 | | | | | | |
| 13 | 197°23.6 | 345°09.1 | 41.5 | 77°51.6 | 34.4 | 56°33.2 | 55.1 | 185°09.5 | 18.8 | Kochab | 137°20.7 | 74°02.9 | | | | | | |
| 14 | 212°26.1 | 0°10.8 | 42.1 | 92°52.4 | 34.2 | 71°35.2 | 55.0 | 200°12.2 | 18.7 | Zuben'ubi | 136°54.7 | -16°09.1 | | | | | | |
| 15 | 227°28.5 | 15°12.6 | •• 42.6 | 107°53.3 | •• 33.9 | 86°37.2 | •• 54.8 | 215°14.8 | •• 18.7 | Alphecca | 126°02.8 | 26°37.7 | | | | | | |
| 16 | 242°31.0 | 30°14.3 | 43.2 | 122°54.2 | 33.7 | 101°39.2 | 54.7 | 230°17.4 | 18.6 | Antares | 112°14.2 | -26°29.5 | | | | | | |
| 17 | 257°33.5 | 45°16.0 | 43.8 | 137°55.1 | 33.4 | 116°41.2 | 54.5 | 245°20.1 | 18.5 | Atria | 107°07.3 | -69°04.7 | | | | | | |
| 18 | 272°35.9 | 60°17.8 | S19°44.3 | 152°56.0 | N21°33.1 | 131°43.2 | N15°54.4 | 260°22.7 | N02°18.4 | Sabik | 102°01.2 | -15°45.4 | | | | | | |
| 19 | 287°38.4 | 75°19.5 | 44.9 | 167°56.9 | 32.9 | 146°45.2 | 54.3 | 275°25.3 | 18.4 | Shaula | 96°08.5 | -37°07.5 | | | | | | |
| 20 | 302°40.9 | 90°21.3 | 45.4 | 182°57.7 | 32.6 | 161°47.2 | 54.1 | 290°28.0 | 18.3 | Rasalhague | 95°57.3 | 12°32.6 | | | | | | |
| 21 | 317°43.3 | 105°23.0 | •• 46.0 | 197°58.6 | •• 32.4 | 176°49.2 | •• 54.0 | 305°30.6 | •• 18.2 | Eltanin | 90°41.5 | 51°29.4 | | | | | | |
| 22 | 332°45.8 | 120°24.7 | 46.5 | 212°59.5 | 32.1 | 191°51.1 | 53.9 | 320°33.3 | 18.1 | Kaus Aust. | 83°30.6 | -34°22.4 | | | | | | |
| 23 | 347°48.3 | 135°26.5 | 47.1 | 228°00.4 | 31.9 | 206°53.1 | 53.7 | 335°35.9 | 18.0 | Vega | 80°32.2 | 38°48.8 | | | | | | |
| Mer.pass. 23:49 | | | ν1.7' d0.6' m-4.81 | | | ν0.9' d-0.2' m1.15 | | | ν2.0' d-0.1' m-1.85 | | | ν2.6' d-0.1' m0.38 | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 2°50.7 | 150°28.3 | S19°47.6 | 243°01.3 | N21°31.6 | 221°55.1 | N15°53.6 | 350°38.5 | N02°18.0 | Al Na'ir | 27°30.7 | -46°49.9 | | | | | | |
| 1 | 17°53.2 | 165°30.0 | 48.2 | 258°02.2 | 31.4 | 236°57.1 | 53.4 | 5°41.2 | 17.9 | Fomalhaut | 15°12.6 | -29°28.7 | | | | | | |
| 2 | 32°55.6 | 180°31.8 | 48.7 | 273°03.1 | 31.1 | 251°59.1 | 53.3 | 20°43.8 | 17.8 | Scheat | 13°43.5 | 28°13.9 | | | | | | |
| 3 | 47°58.1 | 195°33.5 | •• 49.3 | 288°03.9 | •• 30.9 | 267°01.1 | •• 53.2 | 35°46.4 | •• 17.7 | Markab | 13°28.2 | 15°21.1 | | | | | | |
| 4 | 63°00.6 | 210°35.3 | 49.8 | 303°04.8 | 30.6 | 282°03.1 | 53.0 | 50°49.1 | 17.7 | | | | | | | | | |
| 5 | 78°03.0 | 225°37.1 | 50.3 | 318°05.7 | 30.4 | 297°05.1 | 52.9 | 65°51.7 | 17.6 | Sep 22 Tue | SHA | Mer.pass | | | | | | |
| 6 | 93°05.5 | 240°38.8 | S19°50.9 | 333°06.6 | N21°30.1 | 312°07.1 | N15°52.7 | 80°54.4 | N02°17.5 | Venus | 148°14.9 | 14:02 | | | | | | |
| 7 | 108°08.0 | 255°40.6 | 51.4 | 348°07.5 | 29.8 | 327°09.1 | 52.6 | 95°57.0 | 17.4 | Mars | 241°26.7 | 07:50 | | | | | | |
| 8 | 123°10.4 | 270°42.4 | 52.0 | 3°08.4 | 29.6 | 342°11.1 | 52.5 | 110°59.6 | 17.4 | Jupiter | 219°27.0 | 09:17 | | | | | | |
| 9 | 138°12.9 | 285°44.2 | •• 52.5 | 18°09.3 | •• 29.3 | 357°13.1 | •• 52.3 | 126°02.3 | •• 17.3 | Saturn | 347°39.5 | 00:46 | | | | | | |
| 10 | 153°15.4 | 300°46.0 | 53.0 | 33°10.1 | 29.1 | 12°15.1 | 52.2 | 141°04.9 | 17.2 | | | | | | | | | |
| 11 | 168°17.8 | 315°47.8 | 53.6 | 48°11.0 | 28.8 | 27°17.1 | 52.0 | 156°07.6 | 17.1 | Sep 23 Wed | SHA | Mer.pass | | | | | | |
| 12 | 183°20.3 | 330°49.5 | S19°54.1 | 63°11.9 | N21°28.6 | 42°19.1 | N15°51.9 | 171°10.2 | N02°17.0 | Venus | 147°55.4 | 13:59 | | | | | | |
| 13 | 198°22.8 | 345°51.3 | 54.6 | 78°12.8 | 28.3 | 57°21.1 | 51.8 | 186°12.8 | 17.0 | Mars | 240°48.5 | 07:49 | | | | | | |
| 14 | 213°25.2 | 0°53.1 | 55.2 | 93°13.7 | 28.0 | 72°23.1 | 51.6 | 201°15.5 | 16.9 | Jupiter | 219°15.7 | 09:14 | | | | | | |
| 15 | 228°27.7 | 15°54.9 | •• 55.7 | 108°14.6 | •• 27.8 | 87 | | | | | | | | | | | | |

| h | Sun | | | Moon | | | |
|------------|----------|----------|-----------|----------|-------|------------|--------|
| | GHA | Dec | | GHA | ν | Dec | d |
| Tue | | | | | | | HP |
| 0 | 181°46.5 | N00°23.4 | | 54°34.7 | 12.4' | S21°38.2 | -9.6' |
| 1 | 196°46.7 | 22.4 | | 69°06.1 | 12.4' | 21°28.5 | -9.7' |
| 2 | 211°46.9 | 21.5 | | 83°37.6 | 12.5' | 21°18.8 | -9.8' |
| 3 | 226°47.1 | 20.5 | | 98°09.1 | 12.5' | 21°09.0 | -9.9' |
| 4 | 241°47.4 | 19.5 | | 112°40.6 | 12.6' | 20°59.1 | -10.0' |
| 5 | 256°47.6 | 18.6 | | 127°12.1 | 12.6' | 20°49.0 | -10.1' |
| 6 | 271°47.8 | N00°17.6 | | 141°43.8 | 12.7' | S20°38.9 | -10.2' |
| 7 | 286°48.0 | 16.6 | | 156°15.4 | 12.7' | 20°28.7 | -10.3' |
| 8 | 301°48.2 | 15.6 | | 170°47.1 | 12.7' | 20°18.3 | -10.4' |
| 9 | 316°48.5 | 14.7 | | 185°18.9 | 12.8' | 20°07.9 | -10.5' |
| 10 | 331°48.7 | 13.7 | | 199°50.6 | 12.8' | 19°57.4 | -10.6' |
| 11 | 346°48.9 | 12.7 | | 214°22.5 | 12.9' | 19°46.8 | -10.7' |
| 12 | 1°49.1 | N00°11.8 | | 228°54.3 | 12.9' | S19°36.1 | -10.8' |
| 13 | 16°49.3 | 10.8 | | 243°26.2 | 13.0' | 19°25.3 | -10.9' |
| 14 | 31°49.6 | 09.8 | | 257°58.2 | 13.0' | 19°14.4 | -11.0' |
| 15 | 46°49.8 | 08.8 | | 272°30.2 | 13.0' | 19°03.4 | -11.1' |
| 16 | 61°50.0 | 07.9 | | 287°02.2 | 13.1' | 18°52.3 | -11.2' |
| 17 | 76°50.2 | 06.9 | | 301°34.3 | 13.1' | 18°41.1 | -11.3' |
| 18 | 91°50.5 | N00°05.9 | | 316°06.4 | 13.2' | S18°29.8 | -11.4' |
| 19 | 106°50.7 | 04.9 | | 330°38.6 | 13.2' | 18°18.4 | -11.5' |
| 20 | 121°50.9 | 04.0 | | 345°10.8 | 13.2' | 18°07.0 | -11.5' |
| 21 | 136°51.1 | 03.0 | | 359°43.0 | 13.3' | 17°55.4 | -11.6' |
| 22 | 151°51.3 | 02.0 | | 14°15.3 | 13.3' | 17°43.8 | -11.7' |
| 23 | 166°51.6 | 01.1 | | 28°47.6 | 13.3' | 17°32.1 | -11.8' |
| SD = 15.9' | | | d = -1.0' | | | SD = 15.0' | |
| Wed | | | | | | | HP |
| 0 | 181°51.8 | N00°00.1 | | 43°19.9 | 13.4' | S17°20.3 | -11.9' |
| 1 | 196°52.0 | S00°00.9 | | 57°52.3 | 13.4' | 17°08.4 | -12.0' |
| 2 | 211°52.2 | 01.9 | | 72°24.7 | 13.5' | 16°56.4 | -12.1' |
| 3 | 226°52.4 | 02.8 | | 86°57.2 | 13.5' | 16°44.4 | -12.1' |
| 4 | 241°52.7 | 03.8 | | 101°29.7 | 13.5' | 16°32.2 | -12.2' |
| 5 | 256°52.9 | 04.8 | | 116°02.2 | 13.6' | 16°20.0 | -12.3' |
| 6 | 271°53.1 | S00°05.8 | | 130°34.7 | 13.6' | S16°07.7 | -12.4' |
| 7 | 286°53.3 | 06.7 | | 145°07.3 | 13.6' | 15°55.3 | -12.5' |
| 8 | 301°53.5 | 07.7 | | 159°39.9 | 13.7' | 15°42.8 | -12.5' |
| 9 | 316°53.8 | 08.7 | | 174°12.6 | 13.7' | 15°30.3 | -12.6' |
| 10 | 331°54.0 | 09.6 | | 188°45.3 | 13.7' | 15°17.6 | -12.7' |
| 11 | 346°54.2 | 10.6 | | 203°18.0 | 13.7' | 15°04.9 | -12.8' |
| 12 | 1°54.4 | S00°11.6 | | 217°50.7 | 13.8' | S14°52.2 | -12.9' |
| 13 | 16°54.6 | 12.6 | | 232°23.5 | 13.8' | 14°39.3 | -12.9' |
| 14 | 31°54.9 | 13.5 | | 246°56.3 | 13.8' | 14°26.4 | -13.0' |
| 15 | 46°55.1 | 14.5 | | 261°29.2 | 13.9' | 14°13.4 | -13.1' |
| 16 | 61°55.3 | 15.5 | | 276°02.0 | 13.9' | 14°00.3 | -13.2' |
| 17 | 76°55.5 | 16.5 | | 290°34.9 | 13.9' | 13°47.1 | -13.2' |
| 18 | 91°55.7 | S00°17.4 | | 305°07.8 | 13.9' | S13°33.9 | -13.3' |
| 19 | 106°56.0 | 18.4 | | 319°40.8 | 14.0' | 13°20.6 | -13.4' |
| 20 | 121°56.2 | 19.4 | | 334°13.7 | 14.0' | 13°07.2 | -13.4' |
| 21 | 136°56.4 | 20.3 | | 348°46.7 | 14.0' | 12°53.8 | -13.5' |
| 22 | 151°56.6 | 21.3 | | 3°19.7 | 14.0' | 12°40.3 | -13.6' |
| 23 | 166°56.8 | 22.3 | | 17°52.7 | 14.1' | 12°26.7 | -13.6' |
| SD = 15.9' | | | d = -1.0' | | | SD = 15.1' | |
| Thu | | | | | | | HP |
| 0 | 181°57.1 | S00°23.3 | | 32°25.8 | 14.1' | S12°13.1 | -13.7' |
| 1 | 196°57.3 | 24.2 | | 46°58.9 | 14.1' | 11°59.4 | -13.8' |
| 2 | 211°57.5 | 25.2 | | 61°32.0 | 14.1' | 11°45.6 | -13.8' |
| 3 | 226°57.7 | 26.2 | | 76°05.1 | 14.1' | 11°31.8 | -13.9' |
| 4 | 241°57.9 | 27.2 | | 90°38.2 | 14.1' | 11°17.9 | -14.0' |
| 5 | 256°58.1 | 28.1 | | 105°11.3 | 14.2' | 11°03.9 | -14.0' |
| 6 | 271°58.4 | S00°29.1 | | 119°44.5 | 14.2' | S10°49.9 | -14.1' |
| 7 | 286°58.6 | 30.1 | | 134°17.7 | 14.2' | 10°35.8 | -14.1' |
| 8 | 301°58.8 | 31.0 | | 148°50.9 | 14.2' | 10°21.7 | -14.2' |
| 9 | 316°59.0 | 32.0 | | 163°24.1 | 14.2' | 10°07.5 | -14.3' |
| 10 | 331°59.2 | 33.0 | | 177°57.3 | 14.2' | 09°53.2 | -14.3' |
| 11 | 346°59.5 | 34.0 | | 192°30.5 | 14.2' | 09°38.9 | -14.4' |
| 12 | 1°59.7 | S00°34.9 | | 207°03.8 | 14.3' | S09°24.5 | -14.4' |
| 13 | 16°59.9 | 35.9 | | 221°37.0 | 14.3' | 09°10.1 | -14.5' |
| 14 | 32°00.1 | 36.9 | | 236°10.3 | 14.3' | 08°55.6 | -14.5' |
| 15 | 47°00.3 | 37.9 | | 250°43.6 | 14.3' | 08°41.1 | -14.6' |
| 16 | 62°00.6 | 38.8 | | 265°16.9 | 14.3' | 08°26.5 | -14.6' |
| 17 | 77°00.8 | 39.8 | | 279°50.1 | 14.3' | 08°11.9 | -14.7' |
| 18 | 92°01.0 | S00°40.8 | | 294°23.4 | 14.3' | S07°57.2 | -14.7' |
| 19 | 107°01.2 | 41.8 | | 308°56.7 | 14.3' | 07°42.5 | -14.8' |
| 20 | 122°01.4 | 42.7 | | 323°30.0 | 14.3' | 07°27.7 | -14.8' |
| 21 | 137°01.6 | 43.7 | | 338°03.3 | 14.3' | 07°12.8 | -14.9' |
| 22 | 152°01.9 | 44.7 | | 352°36.6 | 14.3' | 06°58.0 | -14.9' |
| 23 | 167°02.1 | 45.6 | | 7°09.9 | 14.3' | 06°43.1 | -15.0' |
| SD = 15.9' | | | d = 1.0' | | | SD = 15.3' | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 03:04 | 04:34 | 05:43 | 17:59 | 19:07 | 20:36 |
| N 70° | 03:24 | 04:42 | 05:44 | 17:59 | 19:00 | 20:17 |
| 68° | 03:38 | 04:48 | 05:44 | 17:58 | 18:54 | 20:03 |
| 66° | 03:50 | 04:54 | 05:45 | 17:58 | 18:49 | 19:52 |
| 64° | 04:00 | 04:58 | 05:46 | 17:57 | 18:45 | 19:43 |
| 62° | 04:08 | 05:02 | 05:46 | 17:57 | 18:41 | 19:35 |
| 60° | 04:15 | 05:05 | 05:46 | 17:57 | 18:38 | 19:28 |
| N 58° | 04:21 | 05:08 | 05:47 | 17:57 | 18:36 | 19:22 |
| 56° | 04:26 | 05:10 | 05:47 | 17:57 | 18:34 | 19:18 |
| 54° | 04:30 | 05:12 | 05:47 | 17:56 | 18:32 | 19:13 |
| 52° | 04:34 | 05:14 | 05:48 | 17:56 | 18:30 | 19:10 |
| 50° | 04:37 | 05:15 | 05:48 | 17:56 | 18:28 | 19:06 |
| 45° | 04:44 | 05:19 | 05:48 | 17:56 | 18:25 | 18:59 |
| N 40° | 04:50 | 05:21 | 05:48 | 17:56 | 18:23 | 18:54 |
| 35° | 04:54 | 05:23 | 05:49 | 17:56 | 18:21 | 18:50 |
| 30° | 04:57 | 05:25 | 05:49 | 17:55 | 18:19 | 18:47 |
| 20° | 05:01 | 05:27 | 05:49 | 17:55 | 18:17 | 18:43 |
| N 10° | 05:04 | 05:28 | 05:49 | 17:55 | 18:16 | 18:41 |
| 0° | 05:04 | 05:28 | 05:49 | 17:56 | 18:16 | 18:40 |
| S 10° | 05:04 | 05:28 | 05:49 | 17:56 | 18:17 | 18:41 |
| 20° | 05:01 | 05:27 | 05:49 | 17:56 | 18:18 | 18:44 |
| 30° | 04:57 | 05:25 | 05:48 | 17:57 | 18:21 | 18:49 |
| 35° | 04:53 | 05:23 | 05:48 | 17:57 | 18:22 | 18:52 |
| 40° | 04:49 | 05:21 | 05:48 | 17:58 | 18:25 | 18:56 |
| 45° | 04:44 | 05:18 | 05:47 | 17:58 | 18:27 | 19:02 |
| S 50° | 04:37 | 05:15 | 05:47 | 17:59 | 18:31 | 19:09 |
| 52° | 04:33 | 05:13 | 05:47 | 17:59 | 18:33 | 19:13 |
| 54° | 04:29 | 05:11 | 05:46 | 18:00 | 18:35 | 19:17 |
| 56° | 04:25 | 05:09 | 05:46 | 18:00 | 18:37 | 19:22 |
| 58° | 04:20 | 05:06 | 05:46 | 18:00 | 18:40 | 19:27 |
| S 60° | 04:14 | 05:04 | 05:45 | 18:01 | 18:43 | 19:33 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | ■ | 18:51 | 18:06 | ■ | ■ | 01:08 |
| N 70° | 19:21 | 18:27 | 17:54 | 23:01 | | 01:30 |
| 68° | 18:40 | 18:08 | 17:45 | 23:41 | | 01:47 |
| 66° | 18:12 | 17:52 | 17:37 | | 00:08 | 02:01 |
| 64° | 17:50 | 17:39 | 17:30 | | 00:28 | 02:12 |
| 62° | 17:33 | 17:29 | 17:25 | | 00:45 | 02:22 |
| 60° | 17:18 | 17:19 | 17:19 | | 00:58 | 02:30 |
| N 58° | 17:06 | 17:11 | 17:15 | | 01:10 | 02:37 |
| 56° | 16:55 | 17:04 | 17:11 | | 01:20 | 02:43 |
| 54° | 16:45 | 16:57 | 17:07 | 00:09 | 01:29 | 02:49 |
| 52° | 16:37 | 16:52 | 17:04 | 00:20 | 01:37 | 02:54 |
| 50° | 16:29 | 16:46 | 17:01 | 00:30 | 01:44 | 02:59 |
| 45° | 16:13 | 16:35 | 16:54 | 00:50 | 01:59 | 03:08 |
| N 40° | 15:59 | 16:25 | 16:49 | 01:06 | 02:11 | 03:16 |
| 35° | 15:48 | 16:17 | 16:44 | 01:20 | 02:21 | 03:23 |
| 30° | 15:37 | 16:10 | 16:40 | 01:32 | 02:31 | 03:29 |
| 20° | 15:20 | 15:57 | 16:33 | 01:52 | 02:46 | 03:40 |
| N 10° | 15:05 | 15:46 | 16:26 | 02:10 | 03:00 | 03:49 |
| 0° | 14:50 | 15:36 | 16:20 | 02:26 | 03:12 | 03:57 |
| S 10° | 14:36 | 15:25 | 16:14 | 02:42 | 03:25 | 04:05 |
| 20° | 14:20 | 15:14 | 16:07 | 02:59 | 03:38 | 04:14 |
| 30° | 14:02 | 15:01 | 16:00 | 03:19 | 03:53 | 04:24 |
| 35° | 13:52 | 14:53 | 15:55 | 03:30 | 04:02 | 04:30 |
| 40° | 13:40 | 14:45 | 15:50 | 03:43 | 04:11 | 04:36 |
| 45° | 13:25 | 14:35 | 15:45 | 03:59 | 04:23 | 04:43 |
| S 50° | 13:08 | 14:23 | 15:38 | 04:18 | 04:37 | 04:52 |
| 52° | 13:00 | 14:17 | 15:35 | 04:26 | 04:43 | 04:56 |
| 54° | 12:50 | 14:11 | 15:31 | 04:36 | 04:50 | 05:01 |
| 56° | 12:40 | 14:04 | 15:27 | 04:47 | 04:58 | 05:06 |
| 58° | 12:28 | 13:56 | 15:23 | 05:00 | 05:07 | 05:11 |
| S 60° | 12:14 | 13:46 | 15:18 | 05:15 | 05:17 | 05:17 |

| Day | Sun | | | Moon | | |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|---|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 11-13 78-92% |
| 22 | 07:06 | 07:17 | 11:53 | 21:01 | 08:38 |  |
| 23 | 07:27 | 07:38 | 11:52 | 21:46 | 09:24 | |
| 24 | 07:48 | 07:59 | 11:52 | 22:30 | 10:08 | |

September 25, 26, 27 UT (Fri., Sat., Sun.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------|----------|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|---------|-----|-----|--------|-----|-----|
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 3°49.9 | 151°11.3 | S20°00.4 | 243°22.6 | N21°25.5 | 222°43.1 | N15°50.2 | 351°41.9 | N02°16.1 | | | | | | |
| 1 | 18°52.3 | 166°13.1 | 00.9 | 258°23.5 | 25.2 | 237°45.1 | 50.1 | 6°44.5 | 16.0 | | | | | | |
| 2 | 33°54.8 | 181°15.0 | 01.4 | 273°24.4 | 25.0 | 252°47.1 | 50.0 | 21°47.1 | 16.0 | | | | | | |
| 3 | 48°57.2 | 196°16.8 | · · 01.9 | 288°25.3 | · · 24.7 | 267°49.1 | · · 49.8 | 36°49.8 | · · 15.9 | | | | | | |
| 4 | 63°59.7 | 211°18.6 | 02.4 | 303°26.2 | 24.4 | 282°51.1 | 49.7 | 51°52.4 | 15.8 | | | | | | |
| 5 | 79°02.2 | 226°20.5 | 02.9 | 318°27.1 | 24.2 | 297°53.1 | 49.5 | 66°55.1 | 15.7 | | | | | | |
| 6 | 94°04.6 | 241°22.3 | S20°03.4 | 333°28.0 | N21°23.9 | 312°55.1 | N15°49.4 | 81°57.7 | N02°15.6 | | | | | | |
| 7 | 109°07.1 | 256°24.2 | 03.9 | 348°28.9 | 23.7 | 327°57.1 | 49.3 | 97°00.3 | 15.6 | | | | | | |
| 8 | 124°09.6 | 271°26.0 | 04.4 | 3°29.8 | 23.4 | 342°59.1 | 49.1 | 112°03.0 | 15.5 | | | | | | |
| 9 | 139°12.0 | 286°27.9 | · · 04.9 | 18°30.6 | · · 23.1 | 358°01.1 | · · 49.0 | 127°05.6 | · · 15.4 | | | | | | |
| 10 | 154°14.5 | 301°29.7 | 05.4 | 33°31.5 | 22.9 | 13°03.1 | 48.8 | 142°08.3 | 15.3 | | | | | | |
| 11 | 169°17.0 | 316°31.6 | 05.9 | 48°32.4 | 22.6 | 28°05.1 | 48.7 | 157°10.9 | 15.3 | | | | | | |
| 12 | 184°19.4 | 331°33.5 | S20°06.4 | 63°33.3 | N21°22.4 | 43°07.1 | N15°48.6 | 172°13.5 | N02°15.2 | | | | | | |
| 13 | 199°21.9 | 346°35.3 | 06.9 | 78°34.2 | 22.1 | 58°09.1 | 48.4 | 187°16.2 | 15.1 | | | | | | |
| 14 | 214°24.4 | 1°37.2 | 07.4 | 93°35.1 | 21.8 | 73°11.1 | 48.3 | 202°18.8 | 15.0 | | | | | | |
| 15 | 229°26.8 | 16°39.1 | · · 07.9 | 108°36.0 | · · 21.6 | 88°13.1 | · · 48.2 | 217°21.5 | · · 15.0 | | | | | | |
| 16 | 244°29.3 | 31°41.0 | 08.4 | 123°36.9 | 21.3 | 103°15.1 | 48.0 | 232°24.1 | 14.9 | | | | | | |
| 17 | 259°31.7 | 46°42.9 | 08.9 | 138°37.8 | 21.0 | 118°17.1 | 47.9 | 247°26.7 | 14.8 | | | | | | |
| 18 | 274°34.2 | 61°44.7 | S20°09.4 | 153°38.7 | N21°20.8 | 133°19.1 | N15°47.7 | 262°29.4 | N02°14.7 | | | | | | |
| 19 | 289°36.7 | 76°46.6 | 09.9 | 168°39.6 | 20.5 | 148°21.1 | 47.6 | 277°32.0 | 14.6 | | | | | | |
| 20 | 304°39.1 | 91°48.5 | 10.4 | 183°40.5 | 20.3 | 163°23.1 | 47.5 | 292°34.7 | 14.6 | | | | | | |
| 21 | 319°41.6 | 106°50.4 | · · 10.9 | 198°41.4 | · · 20.0 | 178°25.1 | · · 47.3 | 307°37.3 | · · 14.5 | | | | | | |
| 22 | 334°44.1 | 121°52.3 | 11.3 | 213°42.3 | 19.7 | 193°27.1 | 47.2 | 322°39.9 | 14.4 | | | | | | |
| 23 | 349°46.5 | 136°54.2 | 11.8 | 228°43.2 | 19.5 | 208°29.1 | 47.0 | 337°42.6 | 14.3 | | | | | | |
| Mer.pass. | 23:41 | ν1.8' d0.5' m-4.82 | | ν0.9' d-0.3' m1.14 | | ν2.0' d-0.1' m-1.86 | | ν2.6' d-0.1' m0.38 | | | | | | | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 4°49.0 | 151°56.1 | S20°12.3 | 243°44.1 | N21°19.2 | 223°31.1 | N15°46.9 | 352°45.2 | N02°14.3 | | | | | | |
| 1 | 19°51.5 | 166°58.0 | 12.8 | 258°45.0 | 18.9 | 238°33.2 | 46.8 | 7°47.9 | 14.2 | | | | | | |
| 2 | 34°53.9 | 182°00.0 | 13.3 | 273°45.9 | 18.7 | 253°35.2 | 46.6 | 22°50.5 | 14.1 | | | | | | |
| 3 | 49°56.4 | 197°01.9 | · · 13.7 | 288°46.8 | · · 18.4 | 268°37.2 | · · 46.6 | 37°53.1 | · · 14.0 | | | | | | |
| 4 | 64°58.8 | 212°03.8 | 14.2 | 303°47.7 | 18.2 | 283°39.2 | 46.4 | 52°55.8 | 13.9 | | | | | | |
| 5 | 80°01.3 | 227°05.7 | 14.7 | 318°48.6 | 17.9 | 298°41.2 | 46.2 | 67°58.4 | 13.9 | | | | | | |
| 6 | 95°03.8 | 242°07.6 | S20°15.2 | 333°49.5 | N21°17.6 | 313°43.2 | N15°46.1 | 83°01.1 | N02°13.8 | | | | | | |
| 7 | 110°06.2 | 257°09.6 | 15.6 | 348°50.4 | 17.4 | 328°45.2 | 45.9 | 98°03.7 | 13.7 | | | | | | |
| 8 | 125°08.7 | 272°11.5 | 16.1 | 3°51.3 | 17.1 | 343°47.2 | 45.8 | 113°06.3 | 13.6 | | | | | | |
| 9 | 140°11.2 | 287°13.4 | · · 16.6 | 18°52.2 | · · 16.8 | 358°49.2 | · · 45.7 | 128°09.0 | · · 13.6 | | | | | | |
| 10 | 155°13.6 | 302°15.4 | 17.0 | 33°53.1 | 16.6 | 13°51.2 | 45.5 | 143°11.6 | 13.5 | | | | | | |
| 11 | 170°16.1 | 317°17.3 | 17.5 | 48°54.0 | 16.3 | 28°53.2 | 45.4 | 158°14.3 | 13.4 | | | | | | |
| 12 | 185°18.6 | 332°19.2 | S20°17.9 | 63°54.9 | N21°16.0 | 43°55.2 | N15°45.3 | 173°16.9 | N02°13.3 | | | | | | |
| 13 | 200°21.0 | 347°21.2 | 18.4 | 78°55.8 | 15.8 | 58°57.2 | 45.1 | 188°19.6 | 13.2 | | | | | | |
| 14 | 215°23.5 | 2°23.1 | 18.9 | 93°56.7 | 15.5 | 73°59.2 | 45.0 | 203°22.2 | 13.2 | | | | | | |
| 15 | 230°26.0 | 17°25.1 | · · 19.3 | 108°57.6 | · · 15.2 | 89°01.2 | · · 44.8 | 218°24.8 | · · 13.1 | | | | | | |
| 16 | 245°28.4 | 32°27.1 | 19.8 | 123°58.5 | 15.0 | 104°03.2 | 44.7 | 233°27.5 | 13.0 | | | | | | |
| 17 | 260°30.9 | 47°29.0 | 20.2 | 138°59.4 | 14.7 | 119°05.2 | 44.6 | 248°30.1 | 12.9 | | | | | | |
| 18 | 275°33.3 | 62°31.0 | S20°20.7 | 154°00.3 | N21°14.4 | 134°07.2 | N15°44.4 | 263°32.8 | N02°12.9 | | | | | | |
| 19 | 290°35.8 | 77°33.0 | 21.1 | 169°01.2 | 14.2 | 149°09.2 | 44.3 | 278°35.4 | 12.8 | | | | | | |
| 20 | 305°38.3 | 92°34.9 | 21.6 | 184°02.1 | 13.9 | 164°11.2 | 44.2 | 293°38.0 | 12.7 | | | | | | |
| 21 | 320°40.7 | 107°36.9 | · · 22.0 | 199°03.1 | · · 13.6 | 179°13.3 | · · 44.0 | 308°40.7 | · · 12.6 | | | | | | |
| 22 | 335°43.2 | 122°38.9 | 22.5 | 214°04.0 | 13.4 | 194°15.3 | 43.9 | 323°43.3 | 12.5 | | | | | | |
| 23 | 350°45.7 | 137°40.9 | 22.9 | 229°04.9 | 13.1 | 209°17.3 | 43.7 | 338°46.0 | 12.5 | | | | | | |
| Mer.pass. | 23:37 | ν1.9' d0.5' m-4.81 | | ν0.9' d-0.3' m1.14 | | ν2.0' d-0.1' m-1.86 | | ν2.6' d-0.1' m0.37 | | | | | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 5°48.1 | 152°42.8 | S20°23.4 | 244°05.8 | N21°12.8 | 224°19.3 | N15°43.6 | 353°48.6 | N02°12.4 | | | | | | |
| 1 | 20°50.6 | 167°44.8 | 23.8 | 259°06.7 | 12.6 | 239°21.3 | 43.5 | 8°51.2 | 12.3 | | | | | | |
| 2 | 35°53.1 | 182°46.8 | 24.3 | 274°07.6 | 12.3 | 254°23.3 | 43.3 | 23°53.9 | 12.2 | | | | | | |
| 3 | 50°55.5 | 197°48.8 | · · 24.7 | 289°08.5 | · · 12.0 | 269°25.3 | · · 43.2 | 38°56.5 | · · 12.2 | | | | | | |
| 4 | 65°58.0 | 212°50.8 | 25.1 | 304°09.4 | 11.8 | 284°27.3 | 43.1 | 53°59.2 | 12.1 | | | | | | |
| 5 | 81°00.4 | 227°52.8 | 25.6 | 319°10.3 | 11.5 | 299°29.3 | 42.9 | 69°01.8 | 12.0 | | | | | | |
| 6 | 96°02.9 | 242°54.8 | S20°26.0 | 334°11.2 | N21°11.2 | 314°31.3 | N15°42.8 | 84°04.5 | N02°11.9 | | | | | | |
| 7 | 111°05.4 | 257°56.8 | 26.4 | 349°12.1 | 11.0 | 329°33.3 | 42.6 | 99°07.1 | 11.8 | | | | | | |
| 8 | 126°07.8 | 272°58.8 | 26.9 | 4°13.0 | 10.7 | 344°35.3 | 42.5 | 114°09.7 | 11.8 | | | | | | |
| 9 | 141°10.3 | 288°00.8 | · · 27.3 | 19°13.9 | · · 10.4 | 359°37.3 | · · 42.4 | 129°12.4 | · · 11.7 | | | | | | |
| 10 | 156°12.8 | 303°02.9 | 27.7 | 34°14.8 | 10.2 | 14°39.3 | 42.2 | 144°15.0 | 11.6 | | | | | | |
| 11 | 171°15.2 | 318°04.9 | 28.2 | 49°15.8 | 09.9 | 29°41.4 | 42.1 | 159°17.7 | 11.5 | | | | | | |
| 12 | 186°17.7 | 333°06.9 | S20°28.6 | 64°16.7 | N21°09.6 | 44°43.4 | N15°42.0 | 174°20.3 | N02°11.5 | | | | | | |
| 13 | 201°20.2 | 348°08.9 | 29.0 | 79°17.6 | 09.4 | 59°45.4 | 41.8 | 189°22.9 | 11.4 | | | | | | |
| 14 | 216°22.6 | 3°11.0 | 29.4 | 94°18.5 | 09.1 | 74°47.4 | 41.7 | 204°25.6 | 11.3 | | | | | | |
| 15 | 231°25.1 | 18°13.0 | · · 29.8 | 109°19.4 | · · 08.8 | 89°49.4 | · · 41.5 | 219°28.2 | · · 11.2 | | | | | | |
| 16 | 246°27.6 | 33°15.0 | 30.3 | 124°20.3 | 08.5 | 104°51.4 | 41.4 | 234°30.9 | 11.1 | | | | | | |
| 17 | 261°30.0 | 48°17.1 | 30.7 | 139°21.2 | 08.3 | 119°53.4 | 41.3 | 249°33.5 | 11.1 | | | | | | |
| 18 | 276°32.5 | 63°19.1 | S20°31.1 | 154°22.1 | N21°08.0 | 134°55.4 | N15°41.1 | 264°36.2 | N02°11.0 | | | | | | |
| 19 | 291°34.9 | 78°21.2 | 31.5 | 169°23.0 | 07.7 | 149°57.4 | 41.0 | 279°38.8 | 10.9 | | | | | | |
| 20 | 306°37.4 | 93°23.2 | 31.9 | 184°24.0 | 07.5 | 164°59.4 | 40.9 | 294°41.4 | 10.8 | | | | | | |
| 21 | 321°39.9 | 108°25.3 | · · 32.3 | 199°24.9 | · · 07.2 | 180°01.4 | · · 40.7 | 309°44.1 | · · 10.8 | | | | | | |
| 22 | 336°42.3 | 123°27.3 | 32.7 | 214°25.8 | 06.9 | 195°03.5 | 40.6 | 324°46.7 | 10.7 | | | | | | |
| 23 | 351°44.8 | 138°29.4 | 33.1 | 229°26.7 | 06.6 | 210°05.5 | 40.4 | 339°49.4 | 10.6 | | | | | | |
| Mer.pass. | 23:33 | ν2.0' d0.4' m-4.81 | | ν0.9' d-0.3' m1.13 | | ν2.0' d-0.1' m-1.86 | | ν2.6' d-0.1' m0.37 | | | | | | | |

| Stars | | |
|---------------------|-----------|-----------|
| | SHA | Dec |
| Alpheratz | 357° 33.0 | 29° 14.5 |
| Ankaa | 353° 05.3 | -42° 09.5 |
| Schedar | 349° 28.9 | 56° 41.1 |
| Diphda | 348° 45.6 | -17° 50.2 |
| Achernar | 335° 18.6 | -57° 05.8 |
| Hamal | 327° 49.3 | 23° 35.4 |
| Polaris | 312° 57.6 | 89° 22.4 |
| Acamar | 315° 10.4 | -40° 11.5 |
| Menkar | 314° 04.4 | 4° 11.8 |
| Mirfak | 308° 25.9 | 49° 57.3 |
| Aldebaran | 290° 37.9 | 16° 33.3 |
| Rigel | 281° 02.4 | -8° 10.0 |
| Capella | 280° 19.7 | 46° 01.4 |
| Bellatrix | 278° 21.3 | 6° 22.5 |
| Elnath | 278° 00.0 | 28° 37.8 |
| Alnilam | 275° 36.2 | -1° 10.9 |
| Betelgeuse | 270° 50.5 | 7° 24.8 |
| Canopus | 263° 51.8 | -52° 42.2 |
| Sirius | 258° 25.0 | -16° 44.9 |
| Adhara | 255° 04.8 | -29° 00.2 |
| Procyon | 244° 49.5 | 5° 09.5 |
| Pollux | 243° 15.7 | 27° 57.6 |
| Avior | 234° 14.5 | -59° 35.4 |
| Suhail | 222° 45.6 | -43° 32.2 |
| Miaplacidus | 221° 38.7 | -69° 49.3 |
| Alphard | 217° 46.6 | -8° 46.3 |
| Regulus | 207° 33.2 | 11° 50.2 |
| Dubhe | 193° 39.9 | 61° 36.3 |
| Denebola | 182° 23.8 | 14° 25.4 |
| Gienah | 175° 42.5 | -17° 41.4 |
| Acrux | 172° 59.2 | -63° 14.8 |
| Gacrux | 171° 50.7 | -57° 15.8 |
| Alioth | 166° 12.3 | 55° 48.9 |
| Spica | 158° 21.1 | -11° 18.0 |
| Alkaid | 152° 51.3 | 49° 10.9 |
| Hadar | 148° 34.6 | -60° 30.2 |
| Menkent | 147° 56.3 | -36° 30.1 |
| Arcturus | 145° 46.9 | 19° 02.7 |
| Rigil Kent. | 139° 38.9 | -60° 56.9 |
| Kochab | 137° 20.7 | 74° 02.9 |
| Zuben'ubi | 136° 54.7 | -16° 09.1 |
| Alphecca | 126° 02.8 | 26° 37.7 |
| Antares | 112° 14.3 | -26° 29.5 |
| Atria | 107° 07.4 | -69° 04.7 |
| Sabik | 102° 01.2 | -15° 45.4 |
| Shaula | 96° 08.5 | -37° 07.5 |
| Rasalhague | 95° 57.3 | 12° 32.6 |
| Eltanin | 90° 41.6 | 51° 29.4 |
| Kaus Aust. | 83° 30.6 | -34° 22.4 |
| Vega | 80° 32.2 | 38° 48.8 |
| Nunki | 75° 45.9 | -26° 15.8 |
| Altair | 61° 58.5 | 8° 56.5 |
| Peacock | 53° 03.2 | -56° 39.0 |
| Deneb | 49° 24.6 | 45° 22.8 |
| Enif | 33° 37.2 | 10° 00.1 |
| Al Na'ir | 27° 30.7 | -46° 49.9 |
| Fomalhaut | 15° 12.6 | -29° 28.7 |
| Scheat | 13° 43.5 | 28° 13.9 |
| Markab | 13° 28.2 | 15° 21.2 |
| | | |
| Sep 25 Fri | SHA | Mer.pass |
| Venus | 147° 21.4 | 13:54 |
| Mars | 239° 32.8 | 07:46 |
| Jupiter | 218° 53.2 | 09:08 |
| Saturn | 347° 52.0 | 00:33 |
| | | |
| Sep 26 Sat | SHA | Mer.pass |
| Venus | 147° 07.1 | 13:50 |
| Mars | 238° 55.1 | 07:45 |
| Jupiter | 218° 42.2 | 09:05 |
| Saturn | 347° 56.2 | 00:29 |
| | | |
| Sep 27 Sun | SHA | Mer.pass |
| Venus | 146° 54.7 | 13:47 |
| Mars | 238° 17.6 | 07:43 |
| Jupiter | 218° 31.1 | 09:02 |
| Saturn | 348° 00.5 | 00:25 |
| | | |
| Horizontal parallax | | |
| | Venus: | 0.4 |
| | Mars: | 0.1 |

| h | | Sun | | Moon | | | |
|-----|--|----------|----------|----------|-------|----------|--------------|
| Fri | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 182°02.3 | S00°46.6 | 21°43.2 | 14.3' | S06°28.1 | -15.0' 56.6' |
| 1 | | 197°02.5 | 47.6 | 36°16.5 | 14.3' | 06°13.1 | -15.0' 56.7' |
| 2 | | 212°02.7 | 48.6 | 50°49.8 | 14.3' | 05°58.0 | -15.1' 56.7' |
| 3 | | 227°02.9 | · · 49.5 | 65°23.1 | 14.3' | 05°43.0 | -15.1' 56.7' |
| 4 | | 242°03.2 | 50.5 | 79°56.4 | 14.3' | 05°27.8 | -15.2' 56.7' |
| 5 | | 257°03.4 | 51.5 | 94°29.7 | 14.3' | 05°12.7 | -15.2' 56.8' |
| 6 | | 272°03.6 | S00°52.5 | 109°03.0 | 14.3' | S04°57.5 | -15.2' 56.8' |
| 7 | | 287°03.8 | 53.4 | 123°36.3 | 14.3' | 04°42.2 | -15.3' 56.8' |
| 8 | | 302°04.0 | 54.4 | 138°09.6 | 14.3' | 04°26.9 | -15.3' 56.8' |
| 9 | | 317°04.3 | · · 55.4 | 152°42.8 | 14.2' | 04°11.6 | -15.3' 56.9' |
| 10 | | 332°04.5 | 56.3 | 167°16.1 | 14.2' | 03°56.3 | -15.4' 56.9' |
| 11 | | 347°04.7 | 57.3 | 181°49.3 | 14.2' | 03°40.9 | -15.4' 56.9' |
| 12 | | 2°04.9 | S00°58.3 | 196°22.5 | 14.2' | S03°25.5 | -15.4' 57.0' |
| 13 | | 17°05.1 | 00°59.3 | 210°55.7 | 14.2' | 03°10.1 | -15.5' 57.0' |
| 14 | | 32°05.3 | 01°00.2 | 225°28.9 | 14.2' | 02°54.6 | -15.5' 57.0' |
| 15 | | 47°05.6 | · · 01.2 | 240°02.1 | 14.2' | 02°39.1 | -15.5' 57.0' |
| 16 | | 62°05.8 | 02.2 | 254°35.3 | 14.1' | 02°23.6 | -15.5' 57.1' |
| 17 | | 77°06.0 | 03.2 | 269°08.4 | 14.1' | 02°08.1 | -15.6' 57.1' |
| 18 | | 92°06.2 | S01°04.1 | 283°41.5 | 14.1' | S01°52.5 | -15.6' 57.1' |
| 19 | | 107°06.4 | 05.1 | 298°14.6 | 14.1' | 01°36.9 | -15.6' 57.1' |
| 20 | | 122°06.6 | 06.1 | 312°47.7 | 14.1' | 01°21.3 | -15.6' 57.2' |
| 21 | | 137°06.9 | · · 07.1 | 327°20.8 | 14.0' | 01°05.6 | -15.7' 57.2' |
| 22 | | 152°07.1 | 08.0 | 341°53.8 | 14.0' | 00°50.0 | -15.7' 57.2' |
| 23 | | 167°07.3 | 09.0 | 356°26.8 | 14.0' | 00°34.3 | -15.7' 57.3' |

SD = 15.9' $d = 1.0'$

SD = 15.4'

| Sat | | GHA | Dec | GHA | ν | Dec | d HP |
|-----|--|----------|----------|----------|-------|----------|--------------|
| 0 | | 182°07.5 | S01°10.0 | 10°59.8 | 14.0' | S00°18.6 | -15.7' 57.3' |
| 1 | | 197°07.7 | 10.9 | 25°32.8 | 13.9' | S00°02.9 | -15.7' 57.3' |
| 2 | | 212°07.9 | 11.9 | 40°05.7 | 13.9' | N00°12.8 | 15.7' 57.3' |
| 3 | | 227°08.1 | · · 12.9 | 54°38.6 | 13.9' | 00°28.5 | 15.7' 57.4' |
| 4 | | 242°08.4 | 13.9 | 69°11.5 | 13.8' | 00°44.3 | 15.8' 57.4' |
| 5 | | 257°08.6 | 14.8 | 83°44.3 | 13.8' | 01°00.0 | 15.8' 57.4' |
| 6 | | 272°08.8 | S01°15.8 | 98°17.2 | 13.8' | N01°15.8 | 15.8' 57.4' |
| 7 | | 287°09.0 | 16.8 | 112°49.9 | 13.7' | 01°31.6 | 15.8' 57.5' |
| 8 | | 302°09.2 | 17.8 | 127°22.7 | 13.7' | 01°47.4 | 15.8' 57.5' |
| 9 | | 317°09.4 | · · 18.7 | 141°55.4 | 13.7' | 02°03.2 | 15.8' 57.5' |
| 10 | | 332°09.7 | 19.7 | 156°28.0 | 13.6' | 02°19.0 | 15.8' 57.5' |
| 11 | | 347°09.9 | 20.7 | 171°00.7 | 13.6' | 02°34.8 | 15.8' 57.6' |
| 12 | | 2°10.1 | S01°21.6 | 185°33.3 | 13.6' | N02°50.6 | 15.8' 57.6' |
| 13 | | 17°10.3 | 22.6 | 200°05.8 | 13.5' | 03°06.4 | 15.8' 57.6' |
| 14 | | 32°10.5 | 23.6 | 214°38.3 | 13.5' | 03°22.2 | 15.8' 57.6' |
| 15 | | 47°10.7 | · · 24.6 | 229°10.8 | 13.4' | 03°38.0 | 15.8' 57.7' |
| 16 | | 62°10.9 | 25.5 | 243°43.2 | 13.4' | 03°53.8 | 15.8' 57.7' |
| 17 | | 77°11.2 | 26.5 | 258°15.6 | 13.3' | 04°09.6 | 15.8' 57.7' |
| 18 | | 92°11.4 | S01°27.5 | 272°47.9 | 13.3' | N04°25.3 | 15.8' 57.7' |
| 19 | | 107°11.6 | 28.5 | 287°20.2 | 13.2' | 04°41.1 | 15.8' 57.8' |
| 20 | | 122°11.8 | 29.4 | 301°52.5 | 13.2' | 04°56.9 | 15.8' 57.8' |
| 21 | | 137°12.0 | · · 30.4 | 316°24.7 | 13.1' | 05°12.7 | 15.8' 57.8' |
| 22 | | 152°12.2 | 31.4 | 330°56.8 | 13.1' | 05°28.4 | 15.7' 57.8' |
| 23 | | 167°12.4 | 32.3 | 345°28.9 | 13.0' | 05°44.1 | 15.7' 57.9' |

SD = 15.9' $d = 1.0'$

SD = 15.6'


| Sun | | GHA | Dec | GHA | ν | Dec | d HP |
|-----|--|----------|----------|----------|-------|----------|-------------|
| 0 | | 182°12.7 | S01°33.3 | 0°00.9 | 13.0' | N05°59.9 | 15.7' 57.9' |
| 1 | | 197°12.9 | 34.3 | 14°32.9 | 12.9' | 06°15.6 | 15.7' 57.9' |
| 2 | | 212°13.1 | 35.3 | 29°04.8 | 12.9' | 06°31.3 | 15.7' 57.9' |
| 3 | | 227°13.3 | · · 36.2 | 43°36.7 | 12.8' | 06°46.9 | 15.7' 58.0' |
| 4 | | 242°13.5 | 37.2 | 58°08.5 | 12.8' | 07°02.6 | 15.6' 58.0' |
| 5 | | 257°13.7 | 38.2 | 72°40.3 | 12.7' | 07°18.2 | 15.6' 58.0' |
| 6 | | 272°13.9 | S01°39.2 | 87°11.9 | 12.6' | N07°33.8 | 15.6' 58.0' |
| 7 | | 287°14.2 | 40.1 | 101°43.6 | 12.6' | 07°49.4 | 15.6' 58.1' |
| 8 | | 302°14.4 | 41.1 | 116°15.1 | 12.5' | 08°05.0 | 15.5' 58.1' |
| 9 | | 317°14.6 | · · 42.1 | 130°46.6 | 12.4' | 08°20.5 | 15.5' 58.1' |
| 10 | | 332°14.8 | 43.0 | 145°18.1 | 12.4' | 08°36.0 | 15.5' 58.1' |
| 11 | | 347°15.0 | 44.0 | 159°49.5 | 12.3' | 08°51.5 | 15.4' 58.1' |
| 12 | | 2°15.2 | S01°45.0 | 174°20.8 | 12.2' | N09°06.9 | 15.4' 58.2' |
| 13 | | 17°15.4 | 46.0 | 188°52.0 | 12.2' | 09°22.3 | 15.4' 58.2' |
| 14 | | 32°15.6 | 46.9 | 203°23.2 | 12.1' | 09°37.7 | 15.3' 58.2' |
| 15 | | 47°15.9 | · · 47.9 | 217°54.3 | 12.0' | 09°53.0 | 15.3' 58.2' |
| 16 | | 62°16.1 | 48.9 | 232°25.3 | 12.0' | 10°08.3 | 15.3' 58.3' |
| 17 | | 77°16.3 | 49.9 | 246°56.3 | 11.9' | 10°23.6 | 15.2' 58.3' |
| 18 | | 92°16.5 | S01°50.8 | 261°27.2 | 11.8' | N10°38.8 | 15.2' 58.3' |
| 19 | | 107°16.7 | 51.8 | 275°58.0 | 11.7' | 10°54.0 | 15.1' 58.3' |
| 20 | | 122°16.9 | 52.8 | 290°28.7 | 11.7' | 11°09.1 | 15.1' 58.3' |
| 21 | | 137°17.1 | · · 53.7 | 304°59.4 | 11.6' | 11°24.2 | 15.0' 58.4' |
| 22 | | 152°17.3 | 54.7 | 319°30.0 | 11.5' | 11°39.2 | 15.0' 58.4' |
| 23 | | 167°17.6 | 55.7 | 334°00.5 | 11.4' | 11°54.2 | 14.9' 58.4' |

SD = 15.9' $d = 1.0'$

SD = 15.8'

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 03:22 | 04:48 | 05:56 | 17:44 | 18:51 | 20:17 |
| N 70° | 03:38 | 04:55 | 05:56 | 17:45 | 18:46 | 20:01 |
| 68° | 03:51 | 04:59 | 05:55 | 17:46 | 18:41 | 19:49 |
| 66° | 04:01 | 05:03 | 05:55 | 17:46 | 18:37 | 19:39 |
| 64° | 04:10 | 05:07 | 05:54 | 17:47 | 18:34 | 19:31 |
| 62° | 04:17 | 05:10 | 05:54 | 17:47 | 18:31 | 19:24 |
| 60° | 04:22 | 05:12 | 05:54 | 17:48 | 18:29 | 19:18 |
| N 58° | 04:28 | 05:14 | 05:53 | 17:48 | 18:27 | 19:13 |
| 56° | 04:32 | 05:16 | 05:53 | 17:49 | 18:26 | 19:09 |
| 54° | 04:36 | 05:17 | 05:53 | 17:49 | 18:24 | 19:05 |
| 52° | 04:39 | 05:19 | 05:52 | 17:49 | 18:23 | 19:02 |
| 50° | 04:42 | 05:20 | 05:52 | 17:49 | 18:22 | 18:59 |
| 45° | 04:48 | 05:22 | 05:52 | 17:50 | 18:19 | 18:53 |
| N 40° | 04:53 | 05:24 | 05:51 | 17:51 | 18:18 | 18:49 |
| 35° | 04:56 | 05:26 | 05:51 | 17:51 | 18:16 | 18:46 |
| 30° | 04:59 | 05:27 | 05:50 | 17:52 | 18:16 | 18:43 |
| 20° | 05:02 | 05:28 | 05:50 | 17:53 | 18:15 | 18:40 |
| N 10° | 05:04 | 05:28 | 05:49 | 17:54 | 18:15 | 18:39 |
| 0° | 05:03 | 05:27 | 05:48 | 17:55 | 18:15 | 18:39 |
| S 10° | 05:02 | 05:26 | 05:47 | 17:56 | 18:17 | 18:41 |
| 20° | 04:58 | 05:24 | 05:46 | 17:57 | 18:19 | 18:45 |
| 30° | 04:53 | 05:21 | 05:45 | 17:58 | 18:22 | 18:50 |
| 35° | 04:49 | 05:19 | 05:44 | 17:59 | 18:25 | 18:54 |
| 40° | 04:44 | 05:16 | 05:43 | 18:00 | 18:28 | 18:59 |
| 45° | 04:38 | 05:12 | 05:42 | 18:02 | 18:31 | 19:06 |
| S 50° | 04:30 | 05:08 | 05:40 | 18:03 | 18:36 | 19:14 |
| 52° | 04:26 | 05:06 | 05:40 | 18:04 | 18:38 | 19:18 |
| 54° | 04:21 | 05:03 | 05:39 | 18:05 | 18:40 | 19:23 |
| 56° | 04:16 | 05:01 | 05:38 | 18:06 | 18:43 | 19:28 |
| 58° | 04:10 | 04:58 | 05:37 | 18:07 | 18:46 | 19:34 |
| S 60° | 04:04 | 04:54 | 05:36 | 18:08 | 18:50 | 19:41 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | 17:31 | 16:57 | 16:18 | 03:27 | 05:39 | 07:56 |
| N 70° | 17:28 | 17:02 | 16:34 | 03:36 | 05:38 | 07:44 |
| 68° | 17:26 | 17:07 | 16:46 | 03:43 | 05:36 | 07:34 |
| 66° | 17:24 | 17:11 | 16:56 | 03:49 | 05:35 | 07:25 |
| 64° | 17:22 | 17:14 | 17:05 | 03:53 | 05:34 | 07:19 |
| 62° | 17:21 | 17:17 | 17:13 | 03:58 | 05:34 | 07:13 |
| 60° | 17:19 | 17:19 | 17:19 | 04:01 | 05:33 | 07:08 |
| N 58° | 17:18 | 17:21 | 17:25 | 04:04 | 05:32 | 07:03 |
| 56° | 17:17 | 17:23 | 17:30 | 04:07 | 05:32 | 06:59 |
| 54° | 17:16 | 17:25 | 17:35 | 04:10 | 05:31 | 06:56 |
| 52° | 17:15 | 17:27 | 17:39 | 04:12 | 05:31 | 06:52 |
| 50° | 17:15 | 17:28 | 17:43 | 04:14 | 05:31 | 06:49 |
| 45° | 17:13 | 17:31 | 17:52 | 04:18 | 05:30 | 06:43 |
| N 40° | 17:11 | 17:34 | 17:59 | 04:22 | 05:29 | 06:38 |
| 35° | 17:10 | 17:37 | 18:05 | 04:25 | 05:28 | 06:33 |
| 30° | 17:09 | 17:39 | 18:10 | 04:28 | 05:28 | 06:29 |
| 20° | 17:07 | 17:43 | 18:20 | 04:33 | 05:27 | 06:23 |
| N 10° | 17:06 | 17:46 | 18:28 | 04:37 | 05:26 | 06:17 |
| 0° | 17:04 | 17:49 | 18:36 | 04:41 | 05:25 | 06:11 |
| S 10° | 17:03 | 17:52 | 18:44 | 04:45 | 05:24 | 06:05 |
| 20° | 17:01 | 17:56 | 18:53 | 04:49 | 05:24 | 06:00 |
| 30° | 16:59 | 18:00 | 19:02 | 04:53 | 05:23 | 05:53 |
| 35° | 16:58 | 18:02 | 19:08 | 04:56 | 05:22 | 05:49 |
| 40° | 16:57 | 18:05 | 19:15 | 04:59 | 05:21 | 05:45 |
| 45° | 16:55 | 18:08 | 19:23 | 05:02 | 05:21 | 05:40 |
| S 50° | 16:54 | 18:11 | 19:32 | 05:06 | 05:20 | 05:34 |
| 52° | 16:53 | 18:13 | 19:36 | 05:08 | 05:19 | 05:31 |
| 54° | 16:52 | 18:15 | 19:41 | 05:10 | 05:19 | 05:28 |
| 56° | 16:51 | 18:17 | 19:46 | 05:12 | 05:18 | 05:25 |
| 58° | 16:50 | 18:19 | 19:52 | 05:15 | 05:18 | 05:21 |
| S 60° | 16:49 | 18:22 | 19:59 | 05:17 | 05:17 | 05:17 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-------|-----------|-------|---|
| | Eqn. of Time | | Mer. | Mer.Pass. | | Age |
| | 00 ^h | 12 ^h | Pass | Upper | Lower | 14-16 |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 97-100% |
| 25 | 08:09 | 08:20 | 11:52 | 23:15 | 10:52 |  |
| 26 | 08:30 | 08:40 | 11:51 | —:— | 11:37 | |
| 27 | 08:51 | 09:01 | 11:51 | 00:00 | 12:23 | |

September 28, 29, 30 UT (Mon., Tue., Wed.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|---------------------|----------|--|----------|----------|----------|----------|----------|----------|----------|----------|
| Mon | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 6°47.3 | | 153°31.5 | S20°33.5 | 244°27.6 | N21°06.4 | 225°07.5 | N15°40.3 | 354°52.0 | N02°10.5 |
| 1 | 21°49.7 | | 168°33.5 | 34.0 | 259°28.5 | 06.1 | 240°09.5 | 40.2 | 9°54.6 | 10.4 |
| 2 | 36°52.2 | | 183°35.6 | 34.4 | 274°29.4 | 05.8 | 255°11.5 | 40.0 | 24°57.3 | 10.4 |
| 3 | 51°54.7 | | 198°37.7 | · · 34.8 | 289°30.3 | · · 05.6 | 270°13.5 | · · 39.9 | 39°59.9 | · · 10.3 |
| 4 | 66°57.1 | | 213°39.8 | 35.2 | 304°31.3 | 05.3 | 285°15.5 | 39.8 | 55°02.6 | 10.2 |
| 5 | 81°59.6 | | 228°41.9 | 35.6 | 319°32.2 | 05.0 | 300°17.5 | 39.6 | 70°05.2 | 10.1 |
| 6 | 97°02.0 | | 243°43.9 | S20°35.9 | 334°33.1 | N21°04.7 | 315°19.5 | N15°39.5 | 85°07.9 | N02°10.1 |
| 7 | 112°04.5 | | 258°46.0 | 36.3 | 349°34.0 | 04.5 | 330°21.6 | 39.4 | 100°10.5 | 10.0 |
| 8 | 127°07.0 | | 273°48.1 | 36.7 | 4°34.9 | 04.2 | 345°23.6 | 39.2 | 115°13.1 | 09.9 |
| 9 | 142°09.4 | | 288°50.2 | · · 37.1 | 19°35.8 | · · 03.9 | 0°25.6 | · · 39.1 | 130°15.8 | · · 09.8 |
| 10 | 157°11.9 | | 303°52.3 | 37.5 | 34°36.8 | 03.7 | 15°27.6 | 38.9 | 145°18.4 | 09.7 |
| 11 | 172°14.4 | | 318°54.4 | 37.9 | 49°37.7 | 03.4 | 30°29.6 | 38.8 | 160°21.1 | 09.7 |
| 12 | 187°16.8 | | 333°56.5 | S20°38.3 | 64°38.6 | N21°03.1 | 45°31.6 | N15°38.7 | 175°23.7 | N02°09.6 |
| 13 | 202°19.3 | | 348°58.6 | 38.7 | 79°39.5 | 02.8 | 60°33.6 | 38.5 | 190°26.4 | 09.5 |
| 14 | 217°21.8 | | 4°00.8 | 39.1 | 94°40.4 | 02.6 | 75°35.6 | 38.4 | 205°29.0 | 09.4 |
| 15 | 232°24.2 | | 19°02.9 | · · 39.4 | 109°41.3 | · · 02.3 | 90°37.6 | · · 38.3 | 220°31.6 | · · 09.4 |
| 16 | 247°26.7 | | 34°05.0 | 39.8 | 124°42.3 | 02.0 | 105°39.7 | 38.1 | 235°34.3 | 09.3 |
| 17 | 262°29.2 | | 49°07.1 | 40.2 | 139°43.2 | 01.7 | 120°41.7 | 38.0 | 250°36.9 | 09.2 |
| 18 | 277°31.6 | | 64°09.2 | S20°40.6 | 154°44.1 | N21°01.5 | 135°43.7 | N15°37.9 | 265°39.6 | N02°09.1 |
| 19 | 292°34.1 | | 79°11.4 | 40.9 | 169°45.0 | 01.2 | 150°45.7 | 37.7 | 280°42.2 | 09.0 |
| 20 | 307°36.5 | | 94°13.5 | 41.3 | 184°45.9 | 00.9 | 165°47.7 | 37.6 | 295°44.8 | 09.0 |
| 21 | 322°39.0 | | 109°15.7 | · · 41.7 | 199°46.9 | · · 00.6 | 180°49.7 | · · 37.4 | 310°47.5 | · · 08.9 |
| 22 | 337°41.5 | | 124°17.8 | 42.1 | 214°47.8 | 00.4 | 195°51.7 | 37.3 | 325°50.1 | 08.8 |
| 23 | 352°43.9 | | 139°19.9 | 42.4 | 229°48.7 | 00.1 | 210°53.8 | 37.2 | 340°52.8 | 08.7 |
| Mer.pass. 23:29 | | | | | | | | | | |
| v2.1' d0.4' m-4.81 | | | | | | | | | | |
| v0.9' d-0.3' m1.13 | | | | | | | | | | |
| v2.0' d-0.1' m-1.86 | | | | | | | | | | |
| v2.6' d-0.1' m0.36 | | | | | | | | | | |
| Tue | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 7°46.4 | | 154°22.1 | S20°42.8 | 244°49.6 | N20°59.8 | 225°55.8 | N15°37.0 | 355°55.4 | N02°08.7 |
| 1 | 22°48.9 | | 169°24.2 | 43.2 | 259°50.5 | 59.5 | 240°57.8 | 36.9 | 10°58.1 | 08.6 |
| 2 | 37°51.3 | | 184°26.4 | 43.5 | 274°51.5 | 59.3 | 255°59.8 | 36.8 | 26°00.7 | 08.5 |
| 3 | 52°53.8 | | 199°28.6 | · · 43.9 | 289°52.4 | · · 59.0 | 271°01.8 | · · 36.6 | 41°03.3 | · · 08.4 |
| 4 | 67°56.3 | | 214°30.7 | 44.2 | 304°53.3 | 58.7 | 286°03.8 | 36.5 | 56°06.0 | 08.3 |
| 5 | 82°58.7 | | 229°32.9 | 44.6 | 319°54.2 | 58.4 | 301°05.8 | 36.4 | 71°08.6 | 08.3 |
| 6 | 98°01.2 | | 244°35.1 | S20°45.0 | 334°55.1 | N20°58.1 | 316°07.9 | N15°36.2 | 86°11.3 | N02°08.2 |
| 7 | 113°03.7 | | 259°37.2 | 45.3 | 349°56.1 | 57.9 | 331°09.9 | 36.1 | 101°13.9 | 08.1 |
| 8 | 128°06.1 | | 274°39.4 | 45.7 | 4°57.0 | 57.6 | 346°11.9 | 35.9 | 116°16.6 | 08.0 |
| 9 | 143°08.6 | | 289°41.6 | · · 46.0 | 19°57.9 | · · 57.3 | 1°13.9 | · · 35.8 | 131°19.2 | · · 08.0 |
| 10 | 158°11.0 | | 304°43.8 | 46.4 | 34°58.8 | 57.0 | 16°15.9 | 35.7 | 146°21.8 | 07.9 |
| 11 | 173°13.5 | | 319°46.0 | 46.7 | 49°59.8 | 56.8 | 31°17.9 | 35.5 | 161°24.5 | 07.8 |
| 12 | 188°16.0 | | 334°48.2 | S20°47.1 | 65°00.7 | N20°56.5 | 46°19.9 | N15°35.4 | 176°27.1 | N02°07.7 |
| 13 | 203°18.4 | | 349°50.4 | 47.4 | 80°01.6 | 56.2 | 61°22.0 | 35.3 | 191°29.8 | 07.6 |
| 14 | 218°20.9 | | 4°52.6 | 47.7 | 95°02.5 | 55.9 | 76°24.0 | 35.1 | 206°32.4 | 07.6 |
| 15 | 233°23.4 | | 19°54.8 | · · 48.1 | 110°03.5 | · · 55.6 | 91°26.0 | · · 35.0 | 221°35.1 | · · 07.5 |
| 16 | 248°25.8 | | 34°57.0 | 48.4 | 125°04.4 | 55.4 | 106°28.0 | 34.9 | 236°37.7 | 07.4 |
| 17 | 263°28.3 | | 49°59.2 | 48.8 | 140°05.3 | 55.1 | 121°30.0 | 34.7 | 251°40.3 | 07.3 |
| 18 | 278°30.8 | | 65°01.4 | S20°49.1 | 155°06.2 | N20°54.8 | 136°32.0 | N15°34.6 | 266°43.0 | N02°07.3 |
| 19 | 293°33.2 | | 80°03.6 | 49.4 | 170°07.2 | 54.5 | 151°34.1 | 34.5 | 281°45.6 | 07.2 |
| 20 | 308°35.7 | | 95°05.8 | 49.8 | 185°08.1 | 54.3 | 166°36.1 | 34.3 | 296°48.3 | 07.1 |
| 21 | 323°38.1 | | 110°08.0 | · · 50.1 | 200°09.0 | · · 54.0 | 181°38.1 | · · 34.2 | 311°50.9 | · · 07.0 |
| 22 | 338°40.6 | | 125°10.3 | 50.4 | 215°09.9 | 53.7 | 196°40.1 | 34.0 | 326°53.6 | 06.9 |
| 23 | 353°43.1 | | 140°12.5 | 50.7 | 230°10.9 | 53.4 | 211°42.1 | 33.9 | 341°56.2 | 06.9 |
| Mer.pass. 23:25 | | | | | | | | | | |
| v2.2' d0.4' m-4.80 | | | | | | | | | | |
| v0.9' d-0.3' m1.12 | | | | | | | | | | |
| v2.0' d-0.1' m-1.87 | | | | | | | | | | |
| v2.6' d-0.1' m0.36 | | | | | | | | | | |
| Wed | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 8°45.5 | | 155°14.7 | S20°51.1 | 245°11.8 | N20°53.1 | 226°44.1 | N15°33.8 | 356°58.9 | N02°06.8 |
| 1 | 23°48.0 | | 170°17.0 | 51.4 | 260°12.7 | 52.9 | 241°46.2 | 33.6 | 12°01.5 | 06.7 |
| 2 | 38°50.5 | | 185°19.2 | 51.7 | 275°13.6 | 52.6 | 256°48.2 | 33.5 | 27°04.1 | 06.6 |
| 3 | 53°52.9 | | 200°21.5 | · · 52.0 | 290°14.6 | · · 52.3 | 271°50.2 | · · 33.4 | 42°06.8 | · · 06.6 |
| 4 | 68°55.4 | | 215°23.7 | 52.3 | 305°15.5 | 52.0 | 286°52.2 | 33.2 | 57°09.4 | 06.5 |
| 5 | 83°57.9 | | 230°26.0 | 52.7 | 320°16.4 | 51.7 | 301°54.2 | 33.1 | 72°12.1 | 06.4 |
| 6 | 99°00.3 | | 245°28.2 | S20°53.0 | 335°17.4 | N20°51.5 | 316°56.2 | N15°33.0 | 87°14.7 | N02°06.3 |
| 7 | 114°02.8 | | 260°30.5 | 53.3 | 350°18.3 | 51.2 | 331°58.3 | 32.8 | 102°17.4 | 06.2 |
| 8 | 129°05.3 | | 275°32.7 | 53.6 | 5°19.2 | 50.9 | 347°00.3 | 32.7 | 117°20.0 | 06.2 |
| 9 | 144°07.7 | | 290°35.0 | · · 53.9 | 20°20.2 | · · 50.6 | 2°02.3 | · · 32.6 | 132°22.6 | · · 06.1 |
| 10 | 159°10.2 | | 305°37.3 | 54.2 | 35°21.1 | 50.3 | 17°04.3 | 32.4 | 147°25.3 | 06.0 |
| 11 | 174°12.6 | | 320°39.6 | 54.5 | 50°22.0 | 50.0 | 32°06.3 | 32.3 | 162°27.9 | 05.9 |
| 12 | 189°15.1 | | 335°41.8 | S20°54.8 | 65°22.9 | N20°49.8 | 47°08.4 | N15°32.2 | 177°30.6 | N02°05.9 |
| 13 | 204°17.6 | | 350°44.1 | 55.1 | 80°23.9 | 49.5 | 62°10.4 | 32.0 | 192°33.2 | 05.8 |
| 14 | 219°20.0 | | 5°46.4 | 55.4 | 95°24.8 | 49.2 | 77°12.4 | 31.9 | 207°35.9 | 05.7 |
| 15 | 234°22.5 | | 20°48.7 | · · 55.7 | 110°25.7 | · · 48.9 | 92°14.4 | · · 31.7 | 222°38.5 | · · 05.6 |
| 16 | 249°25.0 | | 35°51.0 | 56.0 | 125°26.7 | 48.6 | 107°16.4 | 31.6 | 237°41.1 | 05.5 |
| 17 | 264°27.4 | | 50°53.3 | 56.3 | 140°27.6 | 48.4 | 122°18.5 | 31.5 | 252°43.8 | 05.5 |
| 18 | 279°29.9 | | 65°55.6 | S20°56.6 | 155°28.5 | N20°48.1 | 137°20.5 | N15°31.3 | 267°46.4 | N02°05.4 |
| 19 | 294°32.4 | | 80°57.9 | 56.9 | 170°29.5 | 47.8 | 152°22.5 | 31.2 | 282°49.1 | 05.3 |
| 20 | 309°34.8 | | 96°00.2 | 57.2 | 185°30.4 | 47.5 | 167°24.5 | 31.1 | 297°51.7 | 05.2 |
| 21 | 324°37.3 | | 111°02.5 | · · 57.5 | 200°31.3 | · · 47.2 | 182°26.5 | · · 30.9 | 312°54.4 | · · 05.2 |
| 22 | 339°39.8 | | 126°04.8 | 57.8 | 215°32.3 | 46.9 | 197°28.6 | 30.8 | 327°57.0 | 05.1 |
| 23 | 354°42.2 | | 141°07.1 | 58.0 | 230°33.2 | 46.7 | 212°30.6 | 30.7 | 342°59.7 | 05.0 |
| Mer.pass. 23:21 | | | | | | | | | | |
| v2.2' d0.3' m-4.79 | | | | | | | | | | |
| v0.9' d-0.3' m1.12 | | | | | | | | | | |
| v2.0' d-0.1' m-1.87 | | | | | | | | | | |
| v2.6' d-0.1' m0.35 | | | | | | | | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.0 | 29°14.5 |
| Ankaa | 353°05.3 | -42°09.5 |
| Schedar | 349°28.9 | 56°41.2 |
| Diphda | 348°45.5 | -17°50.2 |
| Achernar | 335°18.6 | -57°05.8 |
| Hamal | 327°49.3 | 23°35.4 |
| Polaris | 312°56.4 | 89°22.4 |
| Acamar | 315°10.4 | -40°11.6 |
| Menkar | 314°04.4 | 4°11.8 |
| Mirfak | 308°25.9 | 49°57.3 |
| Aldebaran | 290°37.8 | 16°33.8 |
| Rigel | 281°02.4 | -8°10.0 |
| Capella | 280°19.7 | 46°01.4 |
| Bellatrix | 278°21.3 | 6°22.5 |
| Elnath | 278°00.0 | 28°37.8 |
| Alnilam | 275°36.2 | -1°10.9 |
| Betelgeuse | 270°50.5 | 7°24.8 |
| Canopus | 263°51.8 | -52°42.2 |
| Sirius | 258°25.0 | -16°44.9 |
| Adhara | 255°04.8 | -29°00.2 |
| Procyon | 244°49.5 | 5°09.5 |
| Pollux | 243°15.7 | 27°57.6 |
| Avior | 234°14.5 | -59°35.4 |
| Suhail | 222°45.6 | -43°32.2 |
| Miaplacidus | 221°38.6 | -69°49.3 |
| Alphard | 217°46.6 | -8°46.3 |
| Regulus | 207°33.2 | 11°50.2 |
| Dubhe | 193°39.9 | 61°36.3 |
| Denebola | 182°23.8 | 14°25.4 |
| Gienah | 175°42.5 | -17°41.3 |
| Acrux | 172°59.2 | -63°14.8 |
| Gacrux | 171°50.7 | -57°15.8 |
| Alioth | 166°12.3 | 55°48.9 |
| Spica | 158°21.1 | -11°18.0 |
| Alkaid | 152°51.3 | 49°10.9 |
| Hadard | 148°34.6 | -60°30.2 |
| Menkent | 147°56.3 | -36°30.1 |
| Arcturus | 145°46.9 | 19°02.7 |
| Rigel Kent. | 139°38.9 | -60°56.9 |
| Kochab | 137°20.7 | 74°02.8 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.6 |
| Antares | 112°14.3 | -26°2 |

| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|------------|-------|----------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 182°17.8 | S01°56.7 | | 348°30.9 | 11.3' | N12°09.2 | 14.9' | 58.4' |
| 1 | 197°18.0 | 57.6 | | 3°01.3 | 11.3' | 12°24.0 | 14.8' | 58.4' |
| 2 | 212°18.2 | 58.6 | | 17°31.5 | 11.2' | 12°38.9 | 14.8' | 58.5' |
| 3 | 227°18.4 | 01°59.6 | | 32°01.7 | 11.1' | 12°53.7 | 14.7' | 58.5' |
| 4 | 242°18.6 | 02°00.5 | | 46°31.8 | 11.0' | 13°08.4 | 14.7' | 58.5' |
| 5 | 257°18.8 | 01.5 | | 61°01.8 | 10.9' | 13°23.0 | 14.6' | 58.5' |
| 6 | 272°19.0 | S02°02.5 | | 75°31.8 | 10.8' | N13°37.6 | 14.5' | 58.5' |
| 7 | 287°19.2 | 03.5 | | 90°01.6 | 10.8' | 13°52.2 | 14.5' | 58.5' |
| 8 | 302°19.5 | 04.4 | | 104°31.4 | 10.7' | 14°06.6 | 14.4' | 58.6' |
| 9 | 317°19.7 | · · 05.4 | | 119°01.0 | 10.6' | 14°21.0 | 14.3' | 58.6' |
| 10 | 332°19.9 | 06.4 | | 133°30.6 | 10.5' | 14°35.4 | 14.3' | 58.6' |
| 11 | 347°20.1 | 07.4 | | 148°00.1 | 10.4' | 14°49.6 | 14.2' | 58.6' |
| 12 | 2°20.3 | S02°08.3 | | 162°29.5 | 10.3' | N15°03.8 | 14.1' | 58.6' |
| 13 | 17°20.5 | 09.3 | | 176°58.8 | 10.2' | 15°18.0 | 14.0' | 58.7' |
| 14 | 32°20.7 | 10.3 | | 191°28.1 | 10.1' | 15°32.0 | 14.0' | 58.7' |
| 15 | 47°20.9 | · · 11.2 | | 205°57.2 | 10.0' | 15°46.0 | 13.9' | 58.7' |
| 16 | 62°21.1 | 12.2 | | 220°26.2 | 9.9' | 15°59.9 | 13.8' | 58.7' |
| 17 | 77°21.4 | 13.2 | | 234°55.2 | 9.8' | 16°13.7 | 13.7' | 58.7' |
| 18 | 92°21.6 | S02°14.2 | | 249°24.0 | 9.8' | N16°27.4 | 13.6' | 58.7' |
| 19 | 107°21.8 | 15.1 | | 263°52.8 | 9.7' | 16°41.1 | 13.6' | 58.7' |
| 20 | 122°22.0 | 16.1 | | 278°21.4 | 9.6' | 16°54.6 | 13.5' | 58.8' |
| 21 | 137°22.2 | · · 17.1 | | 292°50.0 | 9.5' | 17°08.1 | 13.4' | 58.8' |
| 22 | 152°22.4 | 18.0 | | 307°18.5 | 9.4' | 17°21.5 | 13.3' | 58.8' |
| 23 | 167°22.6 | 19.0 | | 321°46.8 | 9.3' | 17°34.8 | 13.2' | 58.8' |
| SD = 16.0' $d = 1.0'$ | | | | SD = 15.9' | | | | |

| Tue | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|------------|-------|----------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 182°22.8 | S02°20.0 | | 336°15.1 | 9.2' | N17°48.0 | 13.1' | 58.8' |
| 1 | 197°23.0 | 21.0 | | 350°43.3 | 9.1' | 18°01.1 | 13.0' | 58.8' |
| 2 | 212°23.2 | 21.9 | | 5°11.3 | 9.0' | 18°14.1 | 12.9' | 58.9' |
| 3 | 227°23.4 | · · 22.9 | | 19°39.3 | 8.9' | 18°27.1 | 12.8' | 58.9' |
| 4 | 242°23.7 | 23.9 | | 34°07.2 | 8.8' | 18°39.9 | 12.7' | 58.9' |
| 5 | 257°23.9 | 24.8 | | 48°34.9 | 8.7' | 18°52.6 | 12.6' | 58.9' |
| 6 | 272°24.1 | S02°25.8 | | 63°02.6 | 8.6' | N19°05.2 | 12.5' | 58.9' |
| 7 | 287°24.3 | 26.8 | | 77°30.2 | 8.5' | 19°17.7 | 12.4' | 58.9' |
| 8 | 302°24.5 | 27.8 | | 91°57.6 | 8.4' | 19°30.1 | 12.3' | 58.9' |
| 9 | 317°24.7 | · · 28.7 | | 106°25.0 | 8.3' | 19°42.4 | 12.2' | 58.9' |
| 10 | 332°24.9 | 29.7 | | 120°52.3 | 8.2' | 19°54.6 | 12.1' | 59.0' |
| 11 | 347°25.1 | 30.7 | | 135°19.4 | 8.1' | 20°06.7 | 12.0' | 59.0' |
| 12 | 2°25.3 | S02°31.6 | | 149°46.5 | 8.0' | N20°18.6 | 11.8' | 59.0' |
| 13 | 17°25.5 | 32.6 | | 164°13.4 | 7.9' | 20°30.5 | 11.7' | 59.0' |
| 14 | 32°25.7 | 33.6 | | 178°40.3 | 7.7' | 20°42.2 | 11.6' | 59.0' |
| 15 | 47°25.9 | · · 34.6 | | 193°07.0 | 7.6' | 20°53.8 | 11.5' | 59.0' |
| 16 | 62°26.2 | 35.5 | | 207°33.7 | 7.5' | 21°05.3 | 11.4' | 59.0' |
| 17 | 77°26.4 | 36.5 | | 222°00.2 | 7.4' | 21°16.7 | 11.2' | 59.0' |
| 18 | 92°26.6 | S02°37.5 | | 236°26.6 | 7.3' | N21°27.9 | 11.1' | 59.0' |
| 19 | 107°26.8 | 38.4 | | 250°53.0 | 7.2' | 21°39.0 | 11.0' | 59.1' |
| 20 | 122°27.0 | 39.4 | | 265°19.2 | 7.1' | 21°50.0 | 10.9' | 59.1' |
| 21 | 137°27.2 | · · 40.4 | | 279°45.4 | 7.0' | 22°00.9 | 10.7' | 59.1' |
| 22 | 152°27.4 | 41.4 | | 294°11.4 | 6.9' | 22°11.6 | 10.6' | 59.1' |
| 23 | 167°27.6 | 42.3 | | 308°37.3 | 6.8' | 22°22.2 | 10.5' | 59.1' |
| SD = 16.0' $d = 1.0'$ | | | | SD = 16.0' | | | | |

| Wed | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|------------|-------|----------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 182°27.8 | S02°43.3 | | 323°03.1 | 6.7' | N22°32.7 | 10.3' | 59.1' |
| 1 | 197°28.0 | 44.3 | | 337°28.9 | 6.6' | 22°43.0 | 10.2' | 59.1' |
| 2 | 212°28.2 | 45.2 | | 351°54.5 | 6.5' | 22°53.2 | 10.0' | 59.1' |
| 3 | 227°28.4 | · · 46.2 | | 6°20.0 | 6.4' | 23°03.2 | 9.9' | 59.1' |
| 4 | 242°28.6 | 47.2 | | 20°45.5 | 6.3' | 23°13.1 | 9.8' | 59.1' |
| 5 | 257°28.8 | 48.1 | | 35°10.8 | 6.2' | 23°22.9 | 9.6' | 59.1' |
| 6 | 272°29.0 | S02°49.1 | | 49°36.0 | 6.1' | N23°32.5 | 9.5' | 59.2' |
| 7 | 287°29.3 | 50.1 | | 64°01.2 | 6.0' | 23°42.0 | 9.3' | 59.2' |
| 8 | 302°29.5 | 51.1 | | 78°26.2 | 5.9' | 23°51.3 | 9.2' | 59.2' |
| 9 | 317°29.7 | · · 52.0 | | 92°51.2 | 5.9' | 24°00.5 | 9.0' | 59.2' |
| 10 | 332°29.9 | 53.0 | | 107°16.0 | 5.8' | 24°09.5 | 8.9' | 59.2' |
| 11 | 347°30.1 | 54.0 | | 121°40.8 | 5.7' | 24°18.4 | 8.7' | 59.2' |
| 12 | 2°30.3 | S02°54.9 | | 136°05.4 | 5.6' | N24°27.1 | 8.6' | 59.2' |
| 13 | 17°30.5 | 55.9 | | 150°30.0 | 5.5' | 24°35.6 | 8.4' | 59.2' |
| 14 | 32°30.7 | 56.9 | | 164°54.5 | 5.4' | 24°44.0 | 8.2' | 59.2' |
| 15 | 47°30.9 | · · 57.8 | | 179°18.9 | 5.3' | 24°52.3 | 8.1' | 59.2' |
| 16 | 62°31.1 | 58.8 | | 193°43.2 | 5.2' | 25°00.4 | 7.9' | 59.2' |
| 17 | 77°31.3 | 02°59.8 | | 208°07.4 | 5.1' | 25°08.3 | 7.8' | 59.2' |
| 18 | 92°31.5 | S03°00.8 | | 222°31.5 | 5.0' | N25°16.0 | 7.6' | 59.2' |
| 19 | 107°31.7 | 01.7 | | 236°55.6 | 5.0' | 25°23.6 | 7.4' | 59.2' |
| 20 | 122°31.9 | 02.7 | | 251°19.5 | 4.9' | 25°31.1 | 7.3' | 59.2' |
| 21 | 137°32.1 | · · 03.7 | | 265°43.4 | 4.8' | 25°38.3 | 7.1' | 59.2' |
| 22 | 152°32.3 | 04.6 | | 280°07.2 | 4.7' | 25°45.4 | 6.9' | 59.3' |
| 23 | 167°32.5 | 05.6 | | 294°30.9 | 4.6' | 25°52.3 | 6.7' | 59.3' |
| SD = 16.0' $d = 1.0'$ | | | | SD = 16.1' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 03:38 | 05:02 | 06:10 | 17:29 | 18:36 | 19:58 |
| N 70° | 03:52 | 05:07 | 06:07 | 17:31 | 18:32 | 19:45 |
| 68° | 04:03 | 05:10 | 06:06 | 17:33 | 18:28 | 19:35 |
| 66° | 04:12 | 05:13 | 06:04 | 17:35 | 18:26 | 19:26 |
| 64° | 04:19 | 05:15 | 06:03 | 17:36 | 18:23 | 19:20 |
| 62° | 04:25 | 05:17 | 06:02 | 17:38 | 18:22 | 19:14 |
| 60° | 04:30 | 05:19 | 06:01 | 17:39 | 18:20 | 19:09 |
| N 58° | 04:34 | 05:21 | 06:00 | 17:40 | 18:19 | 19:05 |
| 56° | 04:38 | 05:22 | 05:59 | 17:41 | 18:18 | 19:01 |
| 54° | 04:42 | 05:23 | 05:58 | 17:41 | 18:17 | 18:58 |
| 52° | 04:44 | 05:24 | 05:57 | 17:42 | 18:16 | 18:55 |
| 50° | 04:47 | 05:25 | 05:57 | 17:43 | 18:15 | 18:53 |
| 45° | 04:52 | 05:26 | 05:55 | 17:44 | 18:14 | 18:48 |
| N 40° | 04:56 | 05:27 | 05:54 | 17:46 | 18:13 | 18:44 |
| 35° | 04:59 | 05:28 | 05:53 | 17:47 | 18:12 | 18:41 |
| 30° | 05:01 | 05:28 | 05:52 | 17:48 | 18:12 | 18:40 |
| 20° | 05:03 | 05:28 | 05:50 | 17:50 | 18:12 | 18:37 |
| N 10° | 05:03 | 05:28 | 05:49 | 17:52 | 18:13 | 18:37 |
| 0° | 05:02 | 05:26 | 05:47 | 17:54 | 18:14 | 18:38 |
| S 10° | 05:00 | 05:24 | 05:45 | 17:55 | 18:16 | 18:41 |
| 20° | 04:56 | 05:21 | 05:43 | 17:58 | 18:20 | 18:45 |
| 30° | 04:49 | 05:17 | 05:41 | 18:00 | 18:24 | 18:52 |
| 35° | 04:45 | 05:14 | 05:40 | 18:02 | 18:27 | 18:57 |
| 40° | 04:39 | 05:11 | 05:38 | 18:03 | 18:31 | 19:03 |
| 45° | 04:32 | 05:07 | 05:36 | 18:05 | 18:35 | 19:10 |
| S 50° | 04:23 | 05:01 | 05:34 | 18:08 | 18:40 | 19:19 |
| 52° | 04:18 | 04:59 | 05:33 | 18:09 | 18:43 | 19:24 |
| 54° | 04:13 | 04:56 | 05:31 | 18:10 | 18:46 | 19:29 |
| 56° | 04:07 | 04:53 | 05:30 | 18:12 | 18:49 | 19:35 |
| 58° | 04:01 | 04:49 | 05:29 | 18:13 | 18:53 | 19:42 |
| S 60° | 03:53 | 04:45 | 05:27 | 18:15 | 18:57 | 19:49 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|--------------------------|--------------------------|---------|--------------------------|--------------------------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | 15:18 | <input type="checkbox"/> | <input type="checkbox"/> | 10:41 | <input type="checkbox"/> | <input type="checkbox"/> |
| N 70° | 15:53 | <input type="checkbox"/> | <input type="checkbox"/> | 10:07 | <input type="checkbox"/> | <input type="checkbox"/> |
| 68° | 16:19 | 15:27 | <input type="checkbox"/> | 09:43 | 12:25 | <input type="checkbox"/> |
| 66° | 16:39 | 16:12 | <input type="checkbox"/> | 09:24 | 11:41 | <input type="checkbox"/> |
| 64° | 16:56 | 16:43 | 16:18 | 09:10 | 11:12 | 13:37 |
| 62° | 17:09 | 17:06 | 17:03 | 08:57 | 10:50 | 12:52 |
| 60° | 17:21 | 17:24 | 17:33 | 08:47 | 10:33 | 12:23 |
| N 58° | 17:31 | 17:40 | 17:56 | 08:38 | 10:18 | 12:01 |
| 56° | 17:40 | 17:53 | 18:14 | 08:30 | 10:05 | 11:43 |
| 54° | 17:47 | 18:05 | 18:30 | 08:23 | 09:55 | 11:27 |
| 52° | 17:55 | 18:15 | 18:44 | 08:17 | 09:45 | 11:14 |
| 50° | 18:01 | 18:24 | 18:56 | 08:11 | 09:36 | 11:02 |
| 45° | 18:15 | 18:44 | 19:21 | 07:59 | 09:18 | 10:39 |
| N 40° | 18:26 | 19:00 | 19:41 | 07:49 | 09:04 | 10:19 |
| 35° | 18:36 | 19:13 | 19:57 | 07:41 | 08:51 | 10:03 |
| 30° | 18:45 | 19:25 | 20:12 | 07:33 | 08:40 | 09:50 |
| 20° | 19:00 | 19:45 | 20:37 | 07:21 | 08:22 | 09:26 |
| N 10° | 19:13 | 20:03 | 20:58 | 07:10 | 08:06 | 09:06 |
| 0° | 19:26 | 20:20 | 21:19 | 06:59 | 07:51 | 08:47 |
| S 10° | 19:39 | 20:37 | 21:39 | 06:49 | 07:36 | 08:29 |
| 20° | 19:52 | 20:55 | 22:01 | 06:38 | 07:21 | 08:09 |
| 30° | 20:08 | 21:17 | 22:26 | 06:26 | 07:03 | 07:46 |
| 35° | 20:17 | 21:29 | 22:41 | 06:18 | 06:52 | 07:32 |
| 40° | 20:28 | 21:43 | 22:59 | 06:10 | 06:40 | 07:17 |
| 45° | 20:40 | 22:01 | 23:20 | 06:01 | 06:26 | 06:59 |
| S 50° | 20:56 | 22:22 | 23:47 | 05:50 | 06:09 | 06:36 |
| 52° | 21:03 | 22:32 | · · · | 05:44 | 06:02 | 06:25 |
| 54° | 21:11 | 22:44 | · · · | 05:39 | 05:53 | 06:13 |
| 56° | 21:20 | 22:57 | · · · | 05:32 | 05:43 | 05:59 |
| 58° | 21:30 | 23:13 | · · · | 05:25 | 05:32 | 05:43 |
| S 60° | 21:42 | 23:31 | · · · | 05:17 | 05:19 | 05:23 |

| | Aries | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 9°44.7 | 156°09.5 | S20°58.3 | 245°34.1 | N20°46.4 | 227°32.6 | N15°30.5 | 358°02.3 | N02°04.9 |
| 1 | 24°47.1 | 171°11.8 | 58.6 | 260°35.1 | 46.1 | 242°34.6 | 30.4 | 13°04.9 | 04.8 |
| 2 | 39°49.6 | 186°14.1 | 58.9 | 275°36.0 | 45.8 | 257°36.6 | 30.3 | 28°07.6 | 04.8 |
| 3 | 54°52.1 | 201°16.4 | •• 59.2 | 290°37.0 | •• 45.5 | 272°38.7 | •• 30.1 | 43°10.2 | •• 04.7 |
| 4 | 69°54.5 | 216°18.8 | 59.4 | 305°37.9 | 45.2 | 287°40.7 | 30.0 | 58°12.9 | 04.6 |
| 5 | 84°57.0 | 231°21.1 | 20°59.7 | 320°38.8 | 45.0 | 302°42.7 | 29.9 | 73°15.5 | 04.5 |
| 6 | 99°59.5 | 246°23.5 | S21°00.0 | 335°39.8 | N20°44.7 | 317°44.7 | N15°29.7 | 88°18.2 | N02°04.5 |
| 7 | 115°01.9 | 261°25.8 | 00.2 | 350°40.7 | 44.4 | 332°46.7 | 29.6 | 103°20.8 | 04.4 |
| 8 | 130°04.4 | 276°28.2 | 00.5 | 5°41.6 | 44.1 | 347°48.8 | 29.5 | 118°23.4 | 04.3 |
| 9 | 145°06.9 | 291°30.5 | •• 00.8 | 20°42.6 | •• 43.8 | 2°50.8 | •• 29.3 | 133°26.1 | •• 04.2 |
| 10 | 160°09.6 | 306°32.9 | 01.0 | 35°43.5 | 43.5 | 17°52.8 | 29.2 | 148°28.7 | 04.1 |
| 11 | 175°11.8 | 321°35.2 | 01.3 | 50°44.4 | 43.2 | 32°54.8 | 29.1 | 163°31.4 | 04.1 |
| 12 | 190°14.3 | 336°37.6 | S21°01.6 | 65°45.4 | N20°43.0 | 47°56.9 | N15°28.9 | 178°34.0 | N02°04.0 |
| 13 | 205°16.7 | 351°40.0 | 01.8 | 80°46.3 | 42.7 | 62°58.9 | 28.8 | 193°36.7 | 03.9 |
| 14 | 220°19.2 | 6°42.4 | 02.1 | 95°47.3 | 42.4 | 78°00.9 | 28.7 | 208°39.3 | 03.8 |
| 15 | 235°21.6 | 21°44.7 | •• 02.3 | 110°48.2 | •• 42.1 | 93°02.9 | •• 28.5 | 223°42.0 | •• 03.8 |
| 16 | 250°24.1 | 36°47.1 | 02.6 | 125°49.1 | 41.8 | 108°05.0 | 28.4 | 238°44.6 | 03.7 |
| 17 | 265°26.6 | 51°49.5 | 02.8 | 140°50.1 | 41.5 | 123°07.0 | 28.3 | 253°47.2 | 03.6 |
| 18 | 280°29.0 | 66°51.9 | S21°03.1 | 155°51.0 | N20°41.2 | 138°09.0 | N15°28.1 | 268°49.9 | N02°03.5 |
| 19 | 295°31.5 | 81°54.3 | 03.3 | 170°52.0 | 41.0 | 153°11.0 | 28.0 | 283°52.5 | 03.5 |
| 20 | 310°34.0 | 96°56.7 | 03.6 | 185°52.9 | 40.7 | 168°13.0 | 27.9 | 298°55.2 | 03.4 |
| 21 | 325°36.4 | 111°59.1 | •• 03.8 | 200°53.8 | •• 40.4 | 183°15.1 | •• 27.7 | 313°57.8 | •• 03.3 |
| 22 | 340°38.9 | 127°01.5 | 04.0 | 215°54.8 | 40.1 | 198°17.1 | 27.6 | 329°00.5 | 03.2 |
| 23 | 355°41.4 | 142°03.9 | 04.3 | 230°55.7 | 39.8 | 213°19.1 | 27.5 | 344°03.1 | 03.1 |
| Mer.pass. 23:17 | | ν2.3' d0.3' m-4.78 | | ν0.9' d-0.3' m1.11 | | ν2.0' d-0.1' m-1.87 | | ν2.6' d-0.1' m0.35 | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 10°43.8 | 157°06.3 | S21°04.5 | 245°56.7 | N20°39.5 | 228°21.1 | N15°27.3 | 359°05.8 | N02°03.1 |
| 1 | 25°46.3 | 172°08.7 | 04.8 | 260°57.6 | 39.2 | 243°23.2 | 27.2 | 14°08.4 | 03.0 |
| 2 | 40°48.7 | 187°11.1 | 05.0 | 275°58.6 | 38.9 | 258°25.2 | 27.0 | 29°11.0 | 02.9 |
| 3 | 55°51.2 | 202°13.6 | •• 05.2 | 290°59.5 | •• 38.7 | 273°27.2 | •• 26.9 | 44°13.7 | •• 02.8 |
| 4 | 70°53.7 | 217°16.0 | 05.5 | 306°00.4 | 38.4 | 288°29.2 | 26.8 | 59°16.3 | 02.8 |
| 5 | 85°56.1 | 232°18.4 | 05.7 | 321°01.4 | 38.1 | 303°31.3 | 26.6 | 74°19.0 | 02.7 |
| 6 | 100°58.6 | 247°20.8 | S21°05.9 | 336°02.3 | N20°37.8 | 318°33.3 | N15°26.5 | 89°21.6 | N02°02.6 |
| 7 | 116°01.1 | 262°23.3 | 06.1 | 351°03.3 | 37.5 | 333°35.3 | 26.4 | 104°24.3 | 02.5 |
| 8 | 131°03.5 | 277°25.7 | 06.4 | 6°04.2 | 37.2 | 348°37.3 | 26.2 | 119°26.9 | 02.4 |
| 9 | 146°06.0 | 292°28.2 | | | | | | | |

| Oct 01 Thu | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 146° 24.8 | 13:33 |
| Mars | 235° 49.5 | 07:37 |
| Jupiter | 217° 47.9 | 08:49 |
| Saturn | 348° 17.6 | 00:08 |

| Oct 02 Fri | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 146° 22.5 | 13:29 |
| Mars | 235° 12.9 | 07:36 |
| Jupiter | 217° 37.3 | 08:45 |
| Saturn | 348° 21.9 | 00:04 |

| Oct 03 Sat | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 146° 22.3 | 13:25 |
| Mars | 234° 36.4 | 07:34 |
| Jupiter | 217° 26.8 | 08:42 |
| Saturn | 348° 26.3 | 23:55 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.4 |
| Mars: | 0.1 |

| h | Sun | | | Moon | | | | |
|------------|----------|----------|------------|----------|-------|------------|------|-------|
| Thu | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 182°32.7 | S03°06.6 | | 308°54.6 | 4.6' | N25°59.1 | 6.6' | 59.3' |
| 1 | 197°32.9 | 07.5 | | 323°18.1 | 4.5' | 26°05.6 | 6.4' | 59.3' |
| 2 | 212°33.1 | 08.5 | | 337°41.6 | 4.4' | 26°12.0 | 6.2' | 59.3' |
| 3 | 227°33.3 | 09.5 | | 352°05.0 | 4.3' | 26°18.3 | 6.0' | 59.3' |
| 4 | 242°33.5 | 10.5 | | 6°28.4 | 4.3' | 26°24.3 | 5.9' | 59.3' |
| 5 | 257°33.7 | 11.4 | | 20°51.7 | 4.2' | 26°30.2 | 5.7' | 59.3' |
| 6 | 272°34.0 | S03°12.4 | | 35°14.9 | 4.1' | N26°35.9 | 5.5' | 59.3' |
| 7 | 287°34.2 | 13.4 | | 49°38.0 | 4.1' | 26°41.4 | 5.3' | 59.3' |
| 8 | 302°34.4 | 14.3 | | 64°01.1 | 4.0' | 26°46.7 | 5.1' | 59.3' |
| 9 | 317°34.6 | 15.3 | | 78°24.1 | 4.0' | 26°51.9 | 5.0' | 59.3' |
| 10 | 332°34.8 | 16.3 | | 92°47.1 | 3.9' | 26°56.8 | 4.8' | 59.3' |
| 11 | 347°35.0 | 17.2 | | 107°10.0 | 3.9' | 27°01.6 | 4.6' | 59.3' |
| 12 | 2°35.2 | S03°18.2 | | 121°32.9 | 3.8' | N27°06.2 | 4.4' | 59.3' |
| 13 | 17°35.4 | 19.2 | | 135°55.7 | 3.7' | 27°10.6 | 4.2' | 59.3' |
| 14 | 32°35.6 | 20.1 | | 150°18.4 | 3.7' | 27°14.9 | 4.0' | 59.3' |
| 15 | 47°35.8 | 21.1 | | 164°41.1 | 3.7' | 27°18.9 | 3.9' | 59.3' |
| 16 | 62°36.0 | 22.1 | | 179°03.8 | 3.6' | 27°22.7 | 3.7' | 59.3' |
| 17 | 77°36.2 | 23.0 | | 193°26.4 | 3.6' | 27°26.4 | 3.5' | 59.3' |
| 18 | 92°36.4 | S03°24.0 | | 207°48.9 | 3.5' | N27°29.9 | 3.3' | 59.3' |
| 19 | 107°36.6 | 25.0 | | 222°11.5 | 3.5' | 27°33.2 | 3.1' | 59.3' |
| 20 | 122°36.8 | 26.0 | | 236°33.9 | 3.5' | 27°36.3 | 2.9' | 59.3' |
| 21 | 137°37.0 | 26.9 | | 250°56.4 | 3.4' | 27°39.2 | 2.7' | 59.3' |
| 22 | 152°37.2 | 27.9 | | 265°18.8 | 3.4' | 27°41.9 | 2.5' | 59.3' |
| 23 | 167°37.4 | 28.9 | | 279°41.2 | 3.4' | 27°44.4 | 2.3' | 59.3' |
| SD = 16.0' | | | $d = 1.0'$ | | | SD = 16.2' | | |

| Fri | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|----------|-------|------------|-------|-------|
| 0 | 182°37.6 | S03°29.8 | | 294°03.6 | 3.3' | N27°46.7 | 2.1' | 59.3' |
| 1 | 197°37.8 | 30.8 | | 308°25.9 | 3.3' | 27°48.8 | 1.9' | 59.3' |
| 2 | 212°38.0 | 31.8 | | 322°48.3 | 3.3' | 27°50.8 | 1.7' | 59.3' |
| 3 | 227°38.2 | 32.7 | | 337°10.6 | 3.3' | 27°52.5 | 1.5' | 59.3' |
| 4 | 242°38.4 | 33.7 | | 351°32.8 | 3.3' | 27°54.1 | 1.4' | 59.3' |
| 5 | 257°38.6 | 34.7 | | 5°55.1 | 3.3' | 27°55.4 | 1.2' | 59.3' |
| 6 | 272°38.8 | S03°35.6 | | 20°17.4 | 3.2' | N27°56.6 | 1.0' | 59.3' |
| 7 | 287°39.0 | 36.6 | | 34°39.6 | 3.2' | 27°57.6 | 0.8' | 59.3' |
| 8 | 302°39.2 | 37.6 | | 49°01.9 | 3.2' | 27°58.3 | 0.6' | 59.3' |
| 9 | 317°39.4 | 38.5 | | 63°24.1 | 3.2' | 27°58.9 | 0.4' | 59.3' |
| 10 | 332°39.6 | 39.5 | | 77°46.3 | 3.2' | 27°59.3 | 0.2' | 59.3' |
| 11 | 347°39.8 | 40.5 | | 92°08.6 | 3.2' | 27°59.5 | -0.0' | 59.3' |
| 12 | 2°40.0 | S03°41.4 | | 106°30.8 | 3.2' | N27°59.5 | -0.2' | 59.3' |
| 13 | 17°40.2 | 42.4 | | 120°53.0 | 3.3' | 27°59.2 | -0.4' | 59.3' |
| 14 | 32°40.4 | 43.4 | | 135°15.3 | 3.3' | 27°58.8 | -0.6' | 59.3' |
| 15 | 47°40.6 | 44.3 | | 149°37.6 | 3.3' | 27°58.2 | -0.8' | 59.3' |
| 16 | 62°40.8 | 45.3 | | 163°59.8 | 3.3' | 27°57.5 | -1.0' | 59.3' |
| 17 | 77°41.0 | 46.3 | | 178°22.1 | 3.3' | 27°56.5 | -1.2' | 59.3' |
| 18 | 92°41.2 | S03°47.2 | | 192°44.4 | 3.3' | N27°55.3 | -1.4' | 59.3' |
| 19 | 107°41.4 | 48.2 | | 207°06.8 | 3.4' | 27°53.9 | -1.6' | 59.3' |
| 20 | 122°41.6 | 49.2 | | 221°29.1 | 3.4' | 27°52.4 | -1.8' | 59.3' |
| 21 | 137°41.8 | 50.1 | | 235°51.5 | 3.4' | 27°50.6 | -2.0' | 59.3' |
| 22 | 152°42.0 | 51.1 | | 250°13.9 | 3.4' | 27°48.6 | -2.1' | 59.2' |
| 23 | 167°42.1 | 52.1 | | 264°36.4 | 3.5' | 27°46.5 | -2.3' | 59.2' |
| SD = 16.0' | | | $d = 1.0'$ | | | SD = 16.2' | | |

| Sat | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|----------|-------|------------|-------|-------|
| 0 | 182°42.3 | S03°53.0 | | 278°58.9 | 3.5' | N27°44.2 | -2.5' | 59.2' |
| 1 | 197°42.5 | 54.0 | | 293°21.4 | 3.6' | 27°41.6 | -2.7' | 59.2' |
| 2 | 212°42.7 | 55.0 | | 307°43.9 | 3.6' | 27°38.9 | -2.9' | 59.2' |
| 3 | 227°42.9 | 55.9 | | 322°06.5 | 3.6' | 27°36.0 | -3.1' | 59.2' |
| 4 | 242°43.1 | 56.9 | | 336°29.2 | 3.7' | 27°32.9 | -3.3' | 59.2' |
| 5 | 257°43.3 | 57.9 | | 350°51.9 | 3.7' | 27°29.6 | -3.5' | 59.2' |
| 6 | 272°43.5 | S03°58.8 | | 5°14.6 | 3.8' | N27°26.2 | -3.7' | 59.2' |
| 7 | 287°43.7 | 03°59.8 | | 19°37.4 | 3.8' | 27°22.5 | -3.8' | 59.2' |
| 8 | 302°43.9 | 04°00.8 | | 34°00.2 | 3.9' | 27°18.7 | -4.0' | 59.2' |
| 9 | 317°44.1 | 01.7 | | 48°23.1 | 3.9' | 27°14.6 | -4.2' | 59.2' |
| 10 | 332°44.3 | 02.7 | | 62°46.1 | 4.0' | 27°10.4 | -4.4' | 59.2' |
| 11 | 347°44.5 | 03.7 | | 77°09.1 | 4.1' | 27°06.0 | -4.6' | 59.2' |
| 12 | 2°44.7 | S04°04.6 | | 91°32.1 | 4.1' | N27°01.4 | -4.8' | 59.2' |
| 13 | 17°44.9 | 05.6 | | 105°55.3 | 4.2' | 26°56.7 | -4.9' | 59.2' |
| 14 | 32°45.1 | 06.6 | | 120°18.4 | 4.3' | 26°51.7 | -5.1' | 59.2' |
| 15 | 47°45.3 | 07.5 | | 134°41.7 | 4.3' | 26°46.6 | -5.3' | 59.2' |
| 16 | 62°45.5 | 08.5 | | 149°05.0 | 4.4' | 26°41.3 | -5.5' | 59.2' |
| 17 | 77°45.7 | 09.5 | | 163°28.4 | 4.5' | 26°35.8 | -5.7' | 59.1' |
| 18 | 92°45.9 | S04°10.4 | | 177°51.9 | 4.5' | N26°30.2 | -5.8' | 59.1' |
| 19 | 107°46.1 | 11.4 | | 192°15.4 | 4.6' | 26°24.4 | -6.0' | 59.1' |
| 20 | 122°46.3 | 12.4 | | 206°39.1 | 4.7' | 26°18.4 | -6.2' | 59.1' |
| 21 | 137°46.4 | 13.3 | | 221°02.7 | 4.8' | 26°12.2 | -6.3' | 59.1' |
| 22 | 152°46.6 | 14.3 | | 235°26.5 | 4.9' | 26°05.8 | -6.5' | 59.1' |
| 23 | 167°46.8 | 15.2 | | 249°50.4 | 4.9' | 25°59.3 | -6.7' | 59.1' |
| SD = 16.0' | | | $d = 1.0'$ | | | SD = 16.2' | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 03:54 | 05:16 | 06:23 | 17:13 | 18:20 | 19:41 |
| N 70° | 04:06 | 05:19 | 06:19 | 17:17 | 18:18 | 19:30 |
| 68° | 04:15 | 05:21 | 06:16 | 17:21 | 18:16 | 19:21 |
| 66° | 04:22 | 05:23 | 06:14 | 17:23 | 18:14 | 19:14 |
| 64° | 04:28 | 05:24 | 06:11 | 17:26 | 18:13 | 19:08 |
| 62° | 04:33 | 05:25 | 06:09 | 17:28 | 18:12 | 19:04 |
| 60° | 04:38 | 05:26 | 06:08 | 17:30 | 18:11 | 18:59 |
| N 58° | 04:41 | 05:27 | 06:06 | 17:31 | 18:10 | 18:56 |
| 56° | 04:44 | 05:28 | 06:05 | 17:33 | 18:10 | 18:53 |
| 54° | 04:47 | 05:28 | 06:04 | 17:34 | 18:09 | 18:50 |
| 52° | 04:50 | 05:29 | 06:02 | 17:35 | 18:09 | 18:48 |
| 50° | 04:52 | 05:29 | 06:01 | 17:36 | 18:09 | 18:46 |
| 45° | 04:56 | 05:30 | 05:59 | 17:39 | 18:08 | 18:42 |
| N 40° | 04:59 | 05:30 | 05:57 | 17:41 | 18:08 | 18:39 |
| 35° | 05:01 | 05:30 | 05:55 | 17:43 | 18:08 | 18:37 |
| 30° | 05:02 | 05:30 | 05:54 | 17:44 | 18:08 | 18:36 |
| 20° | 05:04 | 05:29 | 05:51 | 17:47 | 18:09 | 18:35 |
| N 10° | 05:03 | 05:28 | 05:49 | 17:50 | 18:11 | 18:35 |
| 0° | 05:01 | 05:25 | 05:46 | 17:53 | 18:13 | 18:37 |
| S 10° | 04:58 | 05:22 | 05:44 | 17:55 | 18:16 | 18:41 |
| 20° | 04:53 | 05:19 | 05:41 | 17:58 | 18:20 | 18:46 |
| 30° | 04:45 | 05:13 | 05:37 | 18:02 | 18:26 | 18:54 |
| 35° | 04:40 | 05:10 | 05:35 | 18:04 | 18:29 | 18:59 |
| 40° | 04:34 | 05:06 | 05:33 | 18:06 | 18:34 | 19:06 |
| 45° | 04:26 | 05:01 | 05:30 | 18:09 | 18:39 | 19:14 |
| S 50° | 04:16 | 04:55 | 05:27 | 18:13 | 18:45 | 19:24 |
| 52° | 04:11 | 04:52 | 05:26 | 18:14 | 18:48 | 19:29 |
| 54° | 04:05 | 04:48 | 05:24 | 18:16 | 18:52 | 19:35 |
| 56° | 03:59 | 04:44 | 05:22 | 18:18 | 18:56 | 19:42 |
| 58° | 03:51 | 04:40 | 05:20 | 18:20 | 19:00 | 19:49 |
| S 60° | 03:43 | 04:35 | 05:18 | 18:22 | 19:05 | 19:58 |

| Lat. | Moonrise | | | Moonset | | |
|-------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| N 70° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 62° | 17:02 | 17:39 | 19:42 | 15:01 | 16:36 | 16:43 |
| 60° | 17:54 | 18:48 | 20:22 | 14:09 | 15:27 | 16:03 |
| N 58° | 18:26 | 19:23 | 20:49 | 13:37 | 14:52 | 15:35 |
| 56° | 18:50 | 19:49 | 21:11 | 13:13 | 14:26 | 15:13 |
| 54° | 19:10 | 20:09 | 21:28 | 12:54 | 14:05 | 14:55 |
| 52° | 19:26 | 20:26 | 21:43 | 12:38 | 13:48 | 14:40 |
| 50° | 19:40 | 20:41 | 21:56 | 12:24 | 13:34 | 14:27 |
| 45° | 20:09 | 21:11 | 22:23 | 11:56 | 13:04 | 13:59 |
| N 40° | 20:32 | 21:34 | 22:44 | 11:33 | 12:41 | 13:38 |
| 35° | 20:51 | 21:53 | 23:02 | 11:15 | 12:21 | 13:20 |
| 30° | 21:07 | 22:09 | 23:17 | 10:59 | 12:05 | 13:04 |
| 20° | 21:34 | 22:37 | 23:42 | 10:32 | 11:37 | 12:37 |
| N 10° | 21:58 | 23:01 | 23:42 | 10:09 | 11:13 | 12:14 |
| 0° | 22:20 | 23:23 | 23:42 | 09:48 | 10:50 | 11:53 |
| S 10° | 22:42 | 23:45 | 23:42 | 09:26 | 10:28 | 11:31 |
| 20° | 23:06 | 23:42 | 00:09 | 09:03 | 10:04 | 11:08 |
| 30° | 23:34 | 23:42 | 00:37 | 08:37 | 09:36 | 10:41 |
| 35° | 23:51 | 23:42 | 00:53 | 08:21 | 09:19 | 10:25 |
| 40° | 23:51 | 00:10 | 01:13 | 08:03 | 08:59 | 10:06 |
| 45° | 23:51 | 00:34 | 01:36 | 07:41 | 08:36 | 09:43 |
| S 50° | 23:51 | 01:04 | 02:05 | 07:13 | 08:06 | 09:14 |
| 52° | 00:00 | 01:19 | 02:20 | 07:00 | 07:51 | 09:00 |
| 54° | 00:15 | 01:36 | 02:37 | 06:44 | 07:33 | 08:43 |
| 56° | 00:33 | 01:57 | 02:57 | 06:26 | 07:12 | 08:24 |
| 58° | 00:55 | 02:23 | 03:22 | 06:04 | 06:46 | 07:59 |
| S 60° | 01:23 | 03:00 | 03:56 | 05:35 | 06:09 | 07:25 |

| Day | Sun | | | Moon | | |
|-----|--------------------------|--------------------------|-----------------------|----------------|----------------|------------------------|
| | Eqn.of Time | | Mer. Pass hh:mm | Mer.Pass. | | Age 20-22 78-57% |
| | 00 ^h mm:ss | 12 ^h mm:ss | | Upper hh:mm | Lower hh:mm | |
| | | | | | | |
| 01 | 10:11 | 10:21 | 11:50 | 03:33 | 16:04 | |
| 02 | 10:30 | 10:40 | 11:49 | 04:35 | 17:07 | |
| 03 | 10:49 | 10:59 | 11:49 | 05:38 | 18:09 | |

October 04, 05, 06 UT (Sun., Mon., Tue.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------|----------|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|---------|-----|-----|--------|-----|-----|
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA |
| 0 | 12°42.1 | 159°06.5 | S21°13.6 | 246°42.3 | N20°25.5 | 229°58.5 | N15°20.9 | 1°12.7 | N01°59.3 | | | | | | |
| 1 | 27°44.6 | 174°09.1 | 13.8 | 261°43.2 | 25.2 | 245°00.5 | 20.8 | 16°15.3 | 59.3 | | | | | | |
| 2 | 42°47.0 | 189°11.7 | 13.9 | 276°44.2 | 25.0 | 260°02.6 | 20.7 | 31°18.0 | 59.2 | | | | | | |
| 3 | 57°49.5 | 204°14.3 | •• 14.0 | 291°45.1 | •• 24.7 | 275°04.6 | •• 20.5 | 46°20.6 | •• 59.1 | | | | | | |
| 4 | 72°52.0 | 219°16.9 | 14.2 | 306°46.1 | 24.4 | 290°06.6 | 20.4 | 61°23.3 | 59.0 | | | | | | |
| 5 | 87°54.4 | 234°19.5 | 14.3 | 321°47.1 | 24.1 | 305°08.7 | 20.3 | 76°25.9 | 59.0 | | | | | | |
| 6 | 102°56.9 | 249°22.1 | S21°14.4 | 336°48.0 | N20°23.8 | 320°10.7 | N15°20.1 | 91°28.6 | N01°58.9 | | | | | | |
| 7 | 117°59.4 | 264°24.7 | 14.6 | 351°49.0 | 23.5 | 335°12.7 | 20.0 | 106°31.2 | 58.8 | | | | | | |
| 8 | 133°01.8 | 279°27.3 | 14.7 | 6°49.9 | 23.2 | 350°14.8 | 19.9 | 121°33.8 | 58.7 | | | | | | |
| 9 | 148°04.3 | 294°30.0 | •• 14.8 | 21°50.9 | •• 22.9 | 5°16.8 | •• 19.8 | 136°36.5 | •• 58.6 | | | | | | |
| 10 | 163°06.7 | 309°32.6 | 14.9 | 36°51.9 | 22.6 | 20°18.8 | 19.6 | 151°39.1 | 58.6 | | | | | | |
| 11 | 178°09.2 | 324°35.2 | 15.0 | 51°52.8 | 22.3 | 35°20.9 | 19.5 | 166°41.8 | 58.5 | | | | | | |
| 12 | 193°11.7 | 339°37.9 | S21°15.2 | 66°53.8 | N20°22.0 | 50°22.9 | N15°19.4 | 181°44.4 | N01°58.4 | | | | | | |
| 13 | 208°14.1 | 354°40.5 | 15.3 | 81°54.7 | 21.7 | 65°24.9 | 19.2 | 196°47.1 | 58.3 | | | | | | |
| 14 | 223°16.6 | 9°43.2 | 15.4 | 96°55.7 | 21.4 | 80°27.0 | 19.1 | 211°49.7 | 58.3 | | | | | | |
| 15 | 238°19.1 | 24°45.8 | •• 15.5 | 111°56.7 | •• 21.1 | 95°29.0 | •• 19.0 | 226°52.4 | •• 58.2 | | | | | | |
| 16 | 253°21.5 | 39°48.5 | 15.6 | 126°57.6 | 20.8 | 110°31.0 | 18.8 | 241°55.0 | 58.1 | | | | | | |
| 17 | 268°24.0 | 54°51.1 | 15.7 | 141°58.6 | 20.5 | 125°33.1 | 18.7 | 256°57.6 | 58.0 | | | | | | |
| 18 | 283°26.5 | 69°53.8 | S21°15.8 | 156°59.6 | N20°20.2 | 140°35.1 | N15°18.6 | 272°00.3 | N01°57.9 | | | | | | |
| 19 | 298°28.9 | 84°56.4 | 15.9 | 172°00.5 | 19.9 | 155°37.1 | 18.4 | 287°02.9 | 57.9 | | | | | | |
| 20 | 313°31.4 | 99°59.1 | 16.0 | 187°01.5 | 19.6 | 170°39.2 | 18.3 | 302°05.6 | 57.8 | | | | | | |
| 21 | 328°33.8 | 115°01.8 | •• 16.1 | 202°02.4 | •• 19.3 | 185°41.2 | •• 18.2 | 317°08.2 | •• 57.7 | | | | | | |
| 22 | 343°36.3 | 130°04.5 | 16.2 | 217°03.4 | 19.0 | 200°43.3 | 18.0 | 332°10.9 | 57.6 | | | | | | |
| 23 | 358°38.8 | 145°07.1 | 16.3 | 232°04.4 | 18.7 | 215°45.3 | 17.9 | 347°13.5 | 57.6 | | | | | | |
| Mer.pass. | 23:05 | ν2.6' d0.1' m-4.74 | | ν1.0' d-0.3' m1.09 | | ν2.0' d-0.1' m-1.88 | | ν2.6' d-0.1' m0.33 | | | | | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 13°41.2 | 160°09.8 | S21°16.4 | 247°05.3 | N20°18.4 | 230°47.3 | N15°17.8 | 2°16.2 | N01°57.5 | | | | | | |
| 1 | 28°43.7 | 175°12.5 | 16.5 | 262°06.3 | 18.1 | 245°49.4 | 17.7 | 17°18.8 | 57.4 | | | | | | |
| 2 | 43°46.2 | 190°15.2 | 16.6 | 277°07.3 | 17.8 | 260°51.4 | 17.5 | 32°21.5 | 57.3 | | | | | | |
| 3 | 58°48.6 | 205°17.9 | •• 16.7 | 292°08.2 | •• 17.5 | 275°53.4 | •• 17.4 | 47°24.1 | •• 57.3 | | | | | | |
| 4 | 73°51.1 | 220°20.6 | 16.8 | 307°09.2 | 17.2 | 290°55.5 | 17.3 | 62°26.7 | 57.2 | | | | | | |
| 5 | 88°53.6 | 235°23.3 | 16.8 | 322°10.2 | 16.9 | 305°57.5 | 17.1 | 77°29.4 | 57.1 | | | | | | |
| 6 | 103°56.0 | 250°26.0 | S21°16.9 | 337°11.1 | N20°16.6 | 320°59.5 | N15°17.0 | 92°32.0 | N01°57.0 | | | | | | |
| 7 | 118°58.5 | 265°28.7 | 17.0 | 352°12.1 | 16.3 | 336°01.6 | 16.9 | 107°34.7 | 56.9 | | | | | | |
| 8 | 134°01.0 | 280°31.4 | 17.1 | 7°13.1 | 16.0 | 351°03.6 | 16.7 | 122°37.3 | 56.9 | | | | | | |
| 9 | 149°03.4 | 295°34.2 | •• 17.1 | 22°14.0 | •• 15.7 | 6°05.7 | •• 16.6 | 137°40.0 | •• 56.8 | | | | | | |
| 10 | 164°05.9 | 310°36.9 | 17.2 | 37°15.0 | 15.4 | 21°07.7 | 16.5 | 152°42.6 | 56.7 | | | | | | |
| 11 | 179°08.3 | 325°39.6 | 17.3 | 52°16.0 | 15.1 | 36°09.7 | 16.3 | 167°45.3 | 56.6 | | | | | | |
| 12 | 194°10.8 | 340°42.3 | S21°17.3 | 67°16.9 | N20°14.8 | 51°11.8 | N15°16.2 | 182°47.9 | N01°56.6 | | | | | | |
| 13 | 209°13.3 | 355°45.1 | 17.4 | 82°17.9 | 14.5 | 66°13.8 | 16.1 | 197°50.5 | 56.5 | | | | | | |
| 14 | 224°15.7 | 10°47.8 | 17.5 | 97°18.9 | 14.2 | 81°15.8 | 16.0 | 212°53.2 | 56.4 | | | | | | |
| 15 | 239°18.2 | 25°50.6 | •• 17.5 | 112°19.9 | •• 13.9 | 96°17.9 | •• 15.8 | 227°55.8 | •• 56.3 | | | | | | |
| 16 | 254°20.7 | 40°53.3 | 17.6 | 127°20.8 | 13.6 | 111°19.9 | 15.7 | 242°58.5 | 56.3 | | | | | | |
| 17 | 269°23.1 | 55°56.1 | 17.6 | 142°21.8 | 13.3 | 126°22.0 | 15.6 | 258°01.1 | 56.2 | | | | | | |
| 18 | 284°25.6 | 70°58.8 | S21°17.7 | 157°22.8 | N20°13.0 | 141°24.0 | N15°15.4 | 273°03.8 | N01°56.1 | | | | | | |
| 19 | 299°28.1 | 86°01.6 | 17.8 | 172°23.7 | 12.7 | 156°26.0 | 15.3 | 288°06.4 | 56.0 | | | | | | |
| 20 | 314°30.5 | 101°04.3 | 17.8 | 187°24.7 | 12.4 | 171°28.1 | 15.2 | 303°09.1 | 55.9 | | | | | | |
| 21 | 329°33.0 | 116°07.1 | •• 17.9 | 202°25.7 | •• 12.1 | 186°30.1 | •• 15.0 | 318°11.7 | •• 55.9 | | | | | | |
| 22 | 344°35.5 | 131°09.9 | 17.9 | 217°26.7 | 11.8 | 201°32.2 | 14.9 | 333°14.3 | 55.8 | | | | | | |
| 23 | 359°37.9 | 146°12.6 | 17.9 | 232°27.6 | 11.5 | 216°34.2 | 14.8 | 348°17.0 | 55.7 | | | | | | |
| Mer.pass. | 23:01 | ν2.7' d0.1' m-4.72 | | ν1.0' d-0.3' m1.08 | | ν2.0' d-0.1' m-1.89 | | ν2.6' d-0.1' m0.33 | | | | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 14°40.4 | 161°15.4 | S21°18.0 | 247°28.6 | N20°11.2 | 231°36.2 | N15°14.7 | 3°19.6 | N01°55.6 | | | | | | |
| 1 | 29°42.8 | 176°18.2 | 18.0 | 262°29.6 | 10.9 | 246°38.3 | 14.5 | 18°22.3 | 55.6 | | | | | | |
| 2 | 44°45.3 | 191°21.0 | 18.1 | 277°30.5 | 10.6 | 261°40.3 | 14.4 | 33°24.9 | 55.5 | | | | | | |
| 3 | 59°47.8 | 206°23.8 | •• 18.1 | 292°31.5 | •• 10.3 | 276°42.4 | •• 14.3 | 48°27.6 | •• 55.4 | | | | | | |
| 4 | 74°50.2 | 221°26.6 | 18.1 | 307°32.5 | 10.0 | 291°44.4 | 14.1 | 63°30.2 | 55.3 | | | | | | |
| 5 | 89°52.7 | 236°29.3 | 18.1 | 322°33.5 | 09.7 | 306°46.4 | 14.0 | 78°32.9 | 55.2 | | | | | | |
| 6 | 104°55.2 | 251°32.1 | S21°18.2 | 337°34.4 | N20°09.4 | 321°48.5 | N15°13.9 | 93°35.5 | N01°55.2 | | | | | | |
| 7 | 119°57.6 | 266°35.0 | 18.2 | 352°35.4 | 09.1 | 336°50.5 | 13.7 | 108°38.2 | 55.1 | | | | | | |
| 8 | 135°00.1 | 281°37.8 | 18.2 | 7°36.4 | 08.8 | 351°52.6 | 13.6 | 123°40.8 | 55.0 | | | | | | |
| 9 | 150°02.6 | 296°40.6 | •• 18.2 | 22°37.4 | •• 08.5 | 6°54.6 | •• 13.5 | 138°43.4 | •• 54.9 | | | | | | |
| 10 | 165°05.0 | 311°43.4 | 18.3 | 37°38.3 | 08.2 | 21°56.6 | 13.4 | 153°46.1 | 54.9 | | | | | | |
| 11 | 180°07.5 | 326°46.2 | 18.3 | 52°39.3 | 07.9 | 36°58.7 | 13.2 | 168°48.7 | 54.8 | | | | | | |
| 12 | 195°10.0 | 341°49.0 | S21°18.3 | 67°40.3 | N20°07.6 | 52°00.7 | N15°13.1 | 183°51.4 | N01°54.7 | | | | | | |
| 13 | 210°12.4 | 356°51.9 | 18.3 | 82°41.3 | 07.3 | 67°02.8 | 13.0 | 198°54.0 | 54.6 | | | | | | |
| 14 | 225°14.9 | 11°54.7 | 18.3 | 97°42.2 | 07.0 | 82°04.8 | 12.8 | 213°56.7 | 54.6 | | | | | | |
| 15 | 240°17.3 | 26°57.5 | •• 18.3 | 112°43.2 | •• 06.7 | 97°06.9 | •• 12.7 | 228°59.3 | •• 54.5 | | | | | | |
| 16 | 255°19.8 | 42°00.4 | 18.3 | 127°44.2 | 06.4 | 112°08.9 | 12.6 | 244°02.0 | 54.4 | | | | | | |
| 17 | 270°22.3 | 57°03.2 | 18.3 | 142°45.2 | 06.1 | 127°10.9 | 12.4 | 259°04.6 | 54.3 | | | | | | |
| 18 | 285°24.7 | 72°06.0 | S21°18.3 | 157°46.2 | N20°05.8 | 142°13.0 | N15°12.3 | 274°07.2 | N01°54.2 | | | | | | |
| 19 | 300°27.2 | 87°08.9 | 18.3 | 172°47.1 | 05.5 | 157°15.0 | 12.2 | 289°09.9 | 54.2 | | | | | | |
| 20 | 315°29.7 | 102°11.7 | 18.3 | 187°48.1 | 05.2 | 172°17.1 | 12.1 | 304°12.5 | 54.1 | | | | | | |
| 21 | 330°32.1 | 117°14.6 | •• 18.3 | 202°49.1 | •• 04.9 | 187°19.1 | •• 11.9 | 319°15.2 | •• 54.0 | | | | | | |
| 22 | 345°34.6 | 132°17.5 | 18.3 | 217°50.1 | 04.6 | 202°21.2 | 11.8 | 334°17.8 | 53.9 | | | | | | |
| 23 | 0°37.1 | 147°20.3 | 18.3 | 232°51.1 | 04.3 | 217°23.2 | 11.7 | 349°20.5 | 53.9 | | | | | | |
| Mer.pass. | 22:58 | ν2.8' d0.0' m-4.69 | | ν1.0' d-0.3' m1.08 | | ν2.0' d-0.1' m-1.89 | | ν2.6' d-0.1' m0.33 | | | | | | | |

| Stars | | |
|-------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°32.9 | 29°14.5 |
| Ankaa | 353°05.3 | -42°09.5 |
| Schedar | 349°28.8 | 56°41.2 |
| Diphda | 348°45.5 | -17°50.2 |
| Achernar | 335°18.5 | -57°05.9 |
| Hamal | 327°49.3 | 23°35.5 |
| Polaris | 312°53.6 | 89°22.4 |
| Acamar | 315°10.3 | -40°11.6 |
| Menkar | 314°04.4 | 4°11.8 |
| Mirfak | 308°25.8 | 49°57.3 |
| Aldebaran | 290°37.8 | 16°33.9 |
| Rigel | 281°02.4 | -8°10.0 |
| Capella | 280°19.6 | 46°01.4 |
| Bellatrix | 278°21.2 | 6°22.5 |
| Elnath | 277°59.9 | 28°37.8 |
| Alnilam | 275°36.2 | -1°10.9 |
| Betelgeuse | 270°50.5 | 7°24.8 |
| Canopus | 263°51.7 | -52°42.2 |
| Sirius | 258°25.0 | -16°44.9 |
| Adhara | 255°04.8 | -29°00.2 |
| Procyon | 244°49.4 | 5°09.5 |
| Pollux | 243°15.6 | 27°57.6 |
| Avior | 234°14.4 | -59°35.4 |
| Suhail | 222°45.5 | -43°32.2 |
| Miaplacidus | 221°38.5 | -69°49.3 |
| Alphard | 217°46.6 | -8°46.3 |
| Regulus | 207°33.2 | 11°50.2 |
| Dubhe | 193°39.9 | 61°36.3 |
| Denebola | 182°23.8 | 14°25.4 |
| Gienah | 175°42.4 | -17°41.3 |
| Acrux | 172°59.2 | -63°14.8 |
| Gacrux | 171°50.6 | -57°15.7 |
| Alioth | 166°12.3 | 55°48.9 |
| Spica | 158°21.1 | -11°18.0 |
| Alkaid | 152°51.3 | 49°10.9 |
| Hadar | 148°34.6 | -60°30.2 |
| Menkent | 147°56.3 | -36°30.1 |
| Arcturus | 145°46.9 | 19°02.7 |
| Rigel Kent. | 139°38.9 | -60°56.8 |
| Kochab | 137°20.8 | 74°02.8 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.6 |
| Antares | 112°14.3 | -26°29.5 |
| Atria | 107°07.4 | -69°04.7 |
| Sabik | 102°01.3 | -15°45.4 |
| Shaula | 96°08.6 | -37°07.4 |
| Rasalhague | 95°57.3 | 12°32.6 |
| Eltanin | 90°41.6 | 51°29.4 |
| Kaus Aust. | 83°30.7 | -34°22.4 |
| Vega | 80°32.3 | 38°48.8 |
| Nunki | 75°46.0 | -26°15.8 |
| Altair | 61°58.5 | 8°56.5 |
| Peacock | 53°03.2 | -56°39.0 |
| Deneb | 49°24.6 | 45°22.8 |
| Enif | 33°37.2 | 10°00.1 |
| Al Na'ir | 27°30.8 | -46°49.9 |
| Fomalhaut | 15°12.6 | -29°28.7 |
| Scheat | 13°43.5 | 28°13.9 |
| Markab | 13°28.2 | 15°21.2 |

| Oct 04 Sun | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 146°24.4 | 13:21 |
| Mars | 234°00.2 | 07:33 |
| Jupiter | 217°16.4 | 08:39 |
| Saturn | 348°30.6 | 23:51 |

| Oct 05 Mon | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 146°28.6 | 13:17 |
| Mars | 233°24.1 | 07:31 |
| Jupiter | 217°06.1 | 08:36 |
| Saturn | 348°34.9 | 23:47 |

| Oct 06 Tue | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 146°35.0 | 13:13 |
| Mars | 232°48.2 | 07:30 |
| Jupiter | 216°55.9 | 08:32 |
| Saturn | 348°39.3 | 23:43 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.5 |
| Mars: | 0.1 |

| h | Sun | | | Moon | | | |
|-----------------------|----------|----------|--|------------|-------|----------|--------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 182°47.0 | S04°16.2 | | 264°14.3 | 5.0' | N25°52.6 | -6.9' |
| 1 | 197°47.2 | 17.2 | | 278°38.3 | 5.1' | 25°45.8 | -7.0' |
| 2 | 212°47.4 | 18.1 | | 293°02.4 | 5.2' | 25°38.8 | -7.2' |
| 3 | 227°47.6 | · · 19.1 | | 307°26.6 | 5.3' | 25°31.6 | -7.3' |
| 4 | 242°47.8 | 20.1 | | 321°50.9 | 5.4' | 25°24.2 | -7.5' |
| 5 | 257°48.0 | 21.0 | | 336°15.2 | 5.4' | 25°16.7 | -7.7' |
| 6 | 272°48.2 | S04°22.0 | | 350°39.7 | 5.5' | N25°09.0 | -7.8' |
| 7 | 287°48.4 | 23.0 | | 5°04.2 | 5.6' | 25°01.2 | -8.0' |
| 8 | 302°48.6 | 23.9 | | 19°28.9 | 5.7' | 24°53.2 | -8.1' |
| 9 | 317°48.8 | · · 24.9 | | 33°53.6 | 5.8' | 24°45.1 | -8.3' |
| 10 | 332°49.0 | 25.9 | | 48°18.4 | 5.9' | 24°36.8 | -8.5' |
| 11 | 347°49.1 | 26.8 | | 62°43.3 | 6.0' | 24°28.3 | -8.6' |
| 12 | 2°49.3 | S04°27.8 | | 77°08.3 | 6.1' | N24°19.7 | -8.8' |
| 13 | 17°49.5 | 28.7 | | 91°33.4 | 6.2' | 24°11.0 | -8.9' |
| 14 | 32°49.7 | 29.7 | | 105°58.6 | 6.3' | 24°02.1 | -9.1' |
| 15 | 47°49.9 | · · 30.7 | | 120°23.9 | 6.4' | 23°53.0 | -9.2' |
| 16 | 62°50.1 | 31.6 | | 134°49.3 | 6.5' | 23°43.8 | -9.3' |
| 17 | 77°50.3 | 32.6 | | 149°14.8 | 6.6' | 23°34.5 | -9.5' |
| 18 | 92°50.5 | S04°33.6 | | 163°40.3 | 6.7' | N23°25.0 | -9.6' |
| 19 | 107°50.7 | 34.5 | | 178°06.0 | 6.8' | 23°15.4 | -9.8' |
| 20 | 122°50.9 | 35.5 | | 192°31.8 | 6.9' | 23°05.6 | -9.9' |
| 21 | 137°51.0 | · · 36.4 | | 206°57.7 | 7.0' | 22°55.7 | -10.0' |
| 22 | 152°51.2 | 37.4 | | 221°23.7 | 7.1' | 22°45.7 | -10.2' |
| 23 | 167°51.4 | 38.4 | | 235°49.8 | 7.2' | 22°35.5 | -10.3' |
| SD = 16.0' $d = 1.0'$ | | | | SD = 16.1' | | | |

| Mon | Sun | | | Moon | | | |
|-----------------------|----------|----------|--|------------|-------|----------|--------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 182°51.6 | S04°39.3 | | 250°15.9 | 7.3' | N22°25.2 | -10.4' |
| 1 | 197°51.8 | 40.3 | | 264°42.2 | 7.4' | 22°14.7 | -10.6' |
| 2 | 212°52.0 | 41.3 | | 279°08.6 | 7.5' | 22°04.2 | -10.7' |
| 3 | 227°52.2 | · · 42.2 | | 293°35.1 | 7.6' | 21°53.5 | -10.8' |
| 4 | 242°52.4 | 43.2 | | 308°01.7 | 7.7' | 21°42.7 | -10.9' |
| 5 | 257°52.6 | 44.1 | | 322°28.4 | 7.8' | 21°31.7 | -11.1' |
| 6 | 272°52.8 | S04°45.1 | | 336°55.2 | 7.9' | N21°20.6 | -11.2' |
| 7 | 287°52.9 | 46.1 | | 351°22.1 | 8.0' | 21°09.4 | -11.3' |
| 8 | 302°53.1 | 47.0 | | 5°49.1 | 8.1' | 20°58.1 | -11.4' |
| 9 | 317°53.3 | · · 48.0 | | 20°16.2 | 8.2' | 20°46.7 | -11.5' |
| 10 | 332°53.5 | 49.0 | | 34°43.4 | 8.3' | 20°35.2 | -11.7' |
| 11 | 347°53.7 | 49.9 | | 49°10.7 | 8.4' | 20°23.5 | -11.8' |
| 12 | 2°53.9 | S04°50.9 | | 63°38.1 | 8.5' | N20°11.7 | -11.9' |
| 13 | 17°54.1 | 51.8 | | 78°05.6 | 8.6' | 19°59.8 | -12.0' |
| 14 | 32°54.3 | 52.8 | | 92°33.2 | 8.7' | 19°47.8 | -12.1' |
| 15 | 47°54.4 | · · 53.8 | | 107°00.9 | 8.8' | 19°35.7 | -12.2' |
| 16 | 62°54.6 | 54.7 | | 121°28.7 | 8.9' | 19°23.5 | -12.3' |
| 17 | 77°54.8 | 55.7 | | 135°56.6 | 9.0' | 19°11.2 | -12.4' |
| 18 | 92°55.0 | S04°56.6 | | 150°24.6 | 9.1' | N18°58.8 | -12.5' |
| 19 | 107°55.2 | 57.6 | | 164°52.7 | 9.2' | 18°46.3 | -12.6' |
| 20 | 122°55.4 | 58.6 | | 179°20.9 | 9.3' | 18°33.7 | -12.7' |
| 21 | 137°55.6 | 04°59.5 | | 193°49.2 | 9.4' | 18°20.9 | -12.8' |
| 22 | 152°55.7 | 05°00.5 | | 208°17.6 | 9.5' | 18°08.1 | -12.9' |
| 23 | 167°55.9 | 01.4 | | 222°46.0 | 9.6' | 17°55.2 | -13.0' |
| SD = 16.0' $d = 1.0'$ | | | | SD = 16.1' | | | |

| Tue | Sun | | | Moon | | | |
|-----------------------|----------|----------|--|------------|-------|----------|--------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 182°56.1 | S05°02.4 | | 237°14.6 | 9.7' | N17°42.2 | -13.1' |
| 1 | 197°56.3 | 03.4 | | 251°43.3 | 9.8' | 17°29.1 | -13.2' |
| 2 | 212°56.5 | 04.3 | | 266°12.1 | 9.9' | 17°16.0 | -13.3' |
| 3 | 227°56.7 | · · 05.3 | | 280°40.9 | 10.0' | 17°02.7 | -13.4' |
| 4 | 242°56.9 | 06.2 | | 295°09.9 | 10.0' | 16°49.3 | -13.4' |
| 5 | 257°57.0 | 07.2 | | 309°38.9 | 10.1' | 16°35.9 | -13.5' |
| 6 | 272°57.2 | S05°08.2 | | 324°08.1 | 10.2' | N16°22.4 | -13.6' |
| 7 | 287°57.4 | 09.1 | | 338°37.3 | 10.3' | 16°08.8 | -13.7' |
| 8 | 302°57.6 | 10.1 | | 353°06.6 | 10.4' | 15°55.1 | -13.8' |
| 9 | 317°57.8 | · · 11.0 | | 7°36.0 | 10.5' | 15°41.3 | -13.8' |
| 10 | 332°58.0 | 12.0 | | 22°05.5 | 10.6' | 15°27.5 | -13.9' |
| 11 | 347°58.1 | 13.0 | | 36°35.1 | 10.7' | 15°13.5 | -14.0' |
| 12 | 2°58.3 | S05°13.9 | | 51°04.7 | 10.8' | N14°59.6 | -14.1' |
| 13 | 17°58.5 | 14.9 | | 65°34.5 | 10.8' | 14°45.5 | -14.1' |
| 14 | 32°58.7 | 15.8 | | 80°04.3 | 10.9' | 14°31.4 | -14.2' |
| 15 | 47°58.9 | · · 16.8 | | 94°34.2 | 11.0' | 14°17.2 | -14.3' |
| 16 | 62°59.1 | 17.7 | | 109°04.2 | 11.1' | 14°02.9 | -14.3' |
| 17 | 77°59.2 | 18.7 | | 123°34.3 | 11.2' | 13°48.6 | -14.4' |
| 18 | 92°59.4 | S05°19.7 | | 138°04.5 | 11.2' | N13°34.2 | -14.5' |
| 19 | 107°59.6 | 20.6 | | 152°34.7 | 11.3' | 13°19.7 | -14.5' |
| 20 | 122°59.8 | 21.6 | | 167°05.0 | 11.4' | 13°05.2 | -14.6' |
| 21 | 138°00.0 | · · 22.5 | | 181°35.4 | 11.5' | 12°50.6 | -14.6' |
| 22 | 153°00.1 | 23.5 | | 196°05.9 | 11.5' | 12°36.0 | -14.7' |
| 23 | 168°00.3 | 24.5 | | 210°36.5 | 11.6' | 12°21.3 | -14.7' |
| SD = 16.0' $d = 1.0'$ | | | | SD = 16.0' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 04:09 | 05:29 | 06:37 | 16:58 | 18:05 | 19:25 |
| N 70° | 04:18 | 05:30 | 06:31 | 17:04 | 18:04 | 19:16 |
| 68° | 04:26 | 05:31 | 06:27 | 17:08 | 18:03 | 19:08 |
| 66° | 04:32 | 05:32 | 06:23 | 17:12 | 18:03 | 19:02 |
| 64° | 04:37 | 05:33 | 06:20 | 17:15 | 18:03 | 18:58 |
| 62° | 04:41 | 05:33 | 06:17 | 17:18 | 18:02 | 18:54 |
| 60° | 04:45 | 05:33 | 06:15 | 17:21 | 18:02 | 18:50 |
| N 58° | 04:48 | 05:34 | 06:13 | 17:23 | 18:02 | 18:47 |
| 56° | 04:51 | 05:34 | 06:11 | 17:25 | 18:02 | 18:45 |
| 54° | 04:53 | 05:34 | 06:09 | 17:27 | 18:02 | 18:43 |
| 52° | 04:55 | 05:34 | 06:07 | 17:28 | 18:02 | 18:41 |
| 50° | 04:56 | 05:34 | 06:06 | 17:30 | 18:02 | 18:39 |
| 45° | 05:00 | 05:34 | 06:03 | 17:33 | 18:03 | 18:36 |
| N 40° | 05:02 | 05:33 | 06:00 | 17:36 | 18:03 | 18:34 |
| 35° | 05:03 | 05:32 | 05:58 | 17:39 | 18:04 | 18:33 |
| 30° | 05:04 | 05:32 | 05:56 | 17:41 | 18:05 | 18:32 |
| 20° | 05:04 | 05:30 | 05:52 | 17:45 | 18:07 | 18:32 |
| N 10° | 05:03 | 05:27 | 05:48 | 17:48 | 18:09 | 18:34 |
| 0° | 05:00 | 05:24 | 05:45 | 17:52 | 18:12 | 18:36 |
| S 10° | 04:56 | 05:21 | 05:42 | 17:55 | 18:16 | 18:41 |
| 20° | 04:50 | 05:16 | 05:38 | 17:59 | 18:21 | 18:47 |
| 30° | 04:41 | 05:10 | 05:34 | 18:04 | 18:28 | 18:56 |
| 35° | 04:36 | 05:06 | 05:31 | 18:06 | 18:32 | 19:02 |
| 40° | 04:29 | 05:01 | 05:28 | 18:09 | 18:37 | 19:09 |
| 45° | 04:20 | 04:55 | 05:25 | 18:13 | 18:43 | 19:18 |
| S 50° | 04:08 | 04:48 | 05:21 | 18:17 | 18:50 | 19:30 |
| 52° | 04:03 | 04:44 | 05:19 | 18:19 | 18:54 | 19:35 |
| 54° | 03:57 | 04:41 | 05:17 | 18:21 | 18:58 | 19:42 |
| 56° | 03:50 | 04:36 | 05:14 | 18:24 | 19:02 | 19:49 |
| 58° | 03:42 | 04:31 | 05:12 | 18:27 | 19:07 | 19:57 |
| S 60° | 03:32 | 04:26 | 05:09 | 18:30 | 19:13 | 20:07 |

| Lat. | Moonrise | | | Moonset | | |
|-------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 17:57 |
| N 70° | <input type="checkbox"/> | 21:53 | · · · | <input type="checkbox"/> | 18:34 | 17:32 |
| 68° | <input type="checkbox"/> | 22:37 | · · · | <input type="checkbox"/> | 17:49 | 17:13 |
| 66° | 20:25 | 23:05 | · · · | 18:05 | 17:19 | 16:58 |
| 64° | 21:16 | 23:27 | · · · | 17:13 | 16:56 | 16:45 |
| 62° | 21:47 | 23:44 | · · · | 16:41 | 16:38 | 16:35 |
| 60° | 22:11 | 23:58 | · · · | 16:17 | 16:23 | 16:25 |
| N 58° | 22:29 | · · · | 00:10 | 15:58 | 16:10 | 16:17 |
| 56° | 22:45 | · · · | 00:21 | 15:42 | 15:59 | 16:10 |
| 54° | 22:58 | · · · | 00:30 | 15:28 | 15:49 | 16:03 |
| 52° | 23:10 | · · · | 00:38 | 15:16 | 15:40 | 15:57 |
| 50° | 23:20 | · · · | 00:45 | 15:05 | 15:32 | 15:52 |
| 45° | 23:41 | · · · | 01:01 | 14:42 | 15:15 | 15:41 |
| N 40° | 23:59 | · · · | 01:13 | 14:24 | 15:01 | 15:31 |
| 35° | · · · | 00:13 | 01:24 | 14:08 | 14:49 | 15:23 |
| 30° | · · · | 00:26 | 01:33 | 13:55 | 14:38 | 15:15 |
| 20° | · · · | 00:47 | 01:49 | 13:32 | 14:20 | 15:02 |
| N 10° | 00:04 | 01:06 | 02:03 | 13:12 | 14:04 | 14:51 |
| 0° | 00:25 | 01:23 | 02:16 | 12:53 | 13:49 | 14:40 |
| S 10° | 00:45 | 01:40 | 02:29 | 12:34 | 13:34 | 14:30 |
| 20° | 01:07 | 01:58 | 02:43 | 12:13 | 13:17 | 14:18 |
| 30° | 01:32 | 02:19 | 02:59 | 11:50 | 12:58 | 14:05 |
| 35° | 01:47 | 02:31 | 03:08 | 11:36 | 12:47 | 13:57 |
| 40° | 02:04 | 02:45 | 03:18 | 11:19 | 12:34 | 13:48 |
| 45° | 02:24 | 03:01 | 03:30 | 11:00 | 12:19 | 13:38 |
| S 50° | 02:50 | 03:22 | 03:45 | 10:35 | 12:00 | 13:25 |
| 52° | 03:02 | 03:31 | 03:51 | 10:23 | 11:51 | 13:19 |
| 54° | 03:16 | 03:42 | 03:59 | 10:10 | 11:41 | 13:12 |
| 56° | 03:33 | 03:54 | 04:07 | 09:54 | 11:30 | 13:05 |
| 58° | 03:52 | 04:08 | 04:16 | 09:35 | 11:17 | 12:57 |
| S 60° | 04:16 | 04:24 | 04:27 | 09:11 | 11:01 | 12:47 |

| Day | Sun | | | Moon | | |
|-----|---|----------------------------------|-----------------------|-----------------------------|----------------|------------------------|
| | Eqn.of Time 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 23-25 45-24% |
| 04 | 11:08 | 11:17 | 11:49 | 06:39 | 19:08 | |
| 05 | 11:26 | 11:36 | 11:48 | 07:36 | 20:03 | |
| 06 | 11:44 | 11:53 | 11:48 | 08:29 | 20:53 | |

October 07, 08, 09 UT (Wed., Thu., Fri.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------|----------|---------------------|----------|----------|--------------------|----------|----------|---------------------|----------|---------|--------------------|-----|--------|-----|-----|
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 15°39.5 | 162°23.2 | S21°18.3 | 247°52.0 | N20°04.0 | 232°25.2 | N15°11.5 | 4°23.1 | N01°53.8 | | | | | | |
| 1 | 30°42.0 | 177°26.1 | 18.3 | 262°53.0 | 03.7 | 247°27.3 | 11.4 | 19°25.8 | 53.7 | | | | | | |
| 2 | 45°44.4 | 192°28.9 | 18.3 | 277°54.0 | 03.4 | 262°29.3 | 11.3 | 34°28.4 | 53.6 | | | | | | |
| 3 | 60°46.9 | 207°31.8 | •• 18.2 | 292°55.0 | •• 03.0 | 277°31.4 | •• 11.2 | 49°31.0 | •• 53.6 | | | | | | |
| 4 | 75°49.4 | 222°34.7 | 18.2 | 307°56.0 | 02.7 | 292°33.4 | 11.0 | 64°33.7 | 53.5 | | | | | | |
| 5 | 90°51.8 | 237°37.6 | 18.2 | 322°56.9 | 02.4 | 307°35.5 | 10.9 | 79°36.3 | 53.4 | | | | | | |
| 6 | 105°54.3 | 252°40.5 | S21°18.2 | 337°57.9 | N20°02.1 | 322°37.5 | N15°10.8 | 94°39.0 | N01°53.3 | | | | | | |
| 7 | 120°56.8 | 267°43.4 | 18.1 | 352°58.9 | 01.8 | 337°39.6 | 10.6 | 109°41.6 | 53.3 | | | | | | |
| 8 | 135°59.2 | 282°46.3 | 18.1 | 7°59.9 | 01.5 | 352°41.6 | 10.5 | 124°44.3 | 53.2 | | | | | | |
| 9 | 151°01.7 | 297°49.2 | •• 18.1 | 23°00.9 | •• 01.2 | 7°43.6 | •• 10.4 | 139°46.9 | •• 53.1 | | | | | | |
| 10 | 166°04.2 | 312°52.1 | 18.0 | 38°01.9 | 00.9 | 22°45.7 | 10.3 | 154°49.6 | 53.0 | | | | | | |
| 11 | 181°06.6 | 327°55.0 | 18.0 | 53°02.8 | 00.6 | 37°47.7 | 10.1 | 169°52.2 | 52.9 | | | | | | |
| 12 | 196°09.1 | 342°57.9 | S21°18.0 | 68°03.8 | N20°00.3 | 52°49.8 | N15°10.0 | 184°54.8 | N01°52.9 | | | | | | |
| 13 | 211°11.6 | 358°00.8 | 17.9 | 83°04.8 | 20°00.0 | 67°51.8 | 09.9 | 199°57.5 | 52.8 | | | | | | |
| 14 | 226°14.0 | 13°03.8 | 17.9 | 98°05.8 | 19°59.7 | 82°53.9 | 09.7 | 215°00.1 | 52.7 | | | | | | |
| 15 | 241°16.5 | 28°06.7 | •• 17.8 | 113°06.8 | •• 59.4 | 97°55.9 | •• 09.6 | 230°02.8 | •• 52.6 | | | | | | |
| 16 | 256°18.9 | 43°09.6 | 17.8 | 128°07.8 | 59.1 | 112°58.0 | 09.5 | 245°05.4 | 52.6 | | | | | | |
| 17 | 271°21.4 | 58°12.6 | 17.7 | 143°08.8 | 58.8 | 128°00.0 | 09.4 | 260°08.1 | 52.5 | | | | | | |
| 18 | 286°23.9 | 73°15.5 | S21°17.7 | 158°09.7 | N19°58.5 | 143°02.1 | N15°09.2 | 275°10.7 | N01°52.4 | | | | | | |
| 19 | 301°26.3 | 88°18.4 | 17.6 | 173°10.7 | 58.2 | 158°04.1 | 09.1 | 290°13.4 | 52.3 | | | | | | |
| 20 | 316°28.8 | 103°21.4 | 17.6 | 188°11.7 | 57.8 | 173°06.2 | 09.0 | 305°16.0 | 52.3 | | | | | | |
| 21 | 331°31.3 | 118°24.3 | •• 17.5 | 203°12.7 | •• 57.5 | 188°08.2 | •• 08.8 | 320°18.7 | •• 52.2 | | | | | | |
| 22 | 346°33.7 | 133°27.3 | 17.4 | 218°13.7 | 57.2 | 203°10.3 | 08.7 | 335°21.3 | 52.1 | | | | | | |
| 23 | 1°36.2 | 148°30.2 | 17.4 | 233°14.7 | 56.9 | 218°12.3 | 08.6 | 350°23.9 | 52.0 | | | | | | |
| Mer.pass. | 22:54 | ν2.9' d-0.0' m-4.67 | | | ν1.0' d-0.3' m1.07 | | | ν2.0' d-0.1' m-1.89 | | | ν2.6' d-0.1' m0.34 | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 16°38.7 | 163°33.2 | S21°17.3 | 248°15.7 | N19°56.6 | 233°14.3 | N15°08.5 | 5°26.6 | N01°52.0 | | | | | | |
| 1 | 31°41.1 | 178°36.2 | 17.2 | 263°16.7 | 56.3 | 248°16.4 | 08.3 | 20°29.2 | 51.9 | | | | | | |
| 2 | 46°43.6 | 193°39.1 | 17.1 | 278°17.6 | 56.0 | 263°18.4 | 08.2 | 35°31.9 | 51.8 | | | | | | |
| 3 | 61°46.0 | 208°42.1 | •• 17.1 | 293°18.6 | •• 55.7 | 278°20.5 | •• 08.1 | 50°34.5 | •• 51.7 | | | | | | |
| 4 | 76°48.5 | 223°45.1 | 17.0 | 308°19.6 | 55.4 | 293°22.5 | 07.9 | 65°37.2 | 51.6 | | | | | | |
| 5 | 91°51.0 | 238°48.1 | 16.9 | 323°20.6 | 55.1 | 308°24.6 | 07.8 | 80°39.8 | 51.6 | | | | | | |
| 6 | 106°53.4 | 253°51.0 | S21°16.8 | 338°21.6 | N19°54.8 | 323°26.6 | N15°07.7 | 95°42.5 | N01°51.5 | | | | | | |
| 7 | 121°55.9 | 268°54.0 | 16.8 | 353°22.6 | 54.5 | 338°28.7 | 07.6 | 110°45.1 | 51.4 | | | | | | |
| 8 | 136°58.4 | 283°57.0 | 16.7 | 8°23.6 | 54.2 | 353°30.7 | 07.4 | 125°47.7 | 51.3 | | | | | | |
| 9 | 152°00.8 | 299°00.0 | •• 16.6 | 23°24.6 | •• 53.8 | 8°32.8 | •• 07.3 | 140°50.4 | •• 51.3 | | | | | | |
| 10 | 167°03.3 | 314°03.0 | 16.5 | 38°25.6 | 53.5 | 23°34.8 | 07.2 | 155°53.0 | 51.2 | | | | | | |
| 11 | 182°05.8 | 329°06.0 | 16.4 | 53°26.6 | 53.2 | 38°36.9 | 07.1 | 170°55.7 | 51.1 | | | | | | |
| 12 | 197°08.2 | 344°09.0 | S21°16.3 | 68°27.6 | N19°52.9 | 53°38.9 | N15°06.9 | 185°58.3 | N01°51.0 | | | | | | |
| 13 | 212°10.7 | 359°12.0 | 16.2 | 83°28.6 | 52.6 | 68°41.0 | 06.8 | 201°01.0 | 51.0 | | | | | | |
| 14 | 227°13.2 | 14°15.0 | 16.1 | 98°29.5 | 52.3 | 83°43.0 | 06.7 | 216°03.6 | 50.9 | | | | | | |
| 15 | 242°15.6 | 29°18.0 | •• 16.0 | 113°30.5 | •• 52.0 | 98°45.1 | •• 06.5 | 231°06.3 | •• 50.8 | | | | | | |
| 16 | 257°18.1 | 44°21.1 | 15.9 | 128°31.5 | 51.7 | 113°47.1 | 06.4 | 246°08.9 | 50.7 | | | | | | |
| 17 | 272°20.5 | 59°24.1 | 15.8 | 143°32.5 | 51.4 | 128°49.2 | 06.3 | 261°11.5 | 50.7 | | | | | | |
| 18 | 287°23.0 | 74°27.1 | S21°15.7 | 158°33.5 | N19°51.1 | 143°51.2 | N15°06.2 | 276°14.2 | N01°50.6 | | | | | | |
| 19 | 302°25.5 | 89°30.2 | 15.6 | 173°34.5 | 50.8 | 158°53.3 | 06.0 | 291°16.8 | 50.5 | | | | | | |
| 20 | 317°27.9 | 104°33.2 | 15.4 | 188°35.5 | 50.4 | 173°55.3 | 05.9 | 306°19.5 | 50.4 | | | | | | |
| 21 | 332°30.4 | 119°36.2 | •• 15.3 | 203°36.5 | •• 50.1 | 188°57.4 | •• 05.8 | 321°22.1 | •• 50.4 | | | | | | |
| 22 | 347°32.9 | 134°39.3 | 15.2 | 218°37.5 | 49.8 | 203°59.5 | 05.7 | 336°24.8 | 50.3 | | | | | | |
| 23 | 2°35.3 | 149°42.3 | 15.1 | 233°38.5 | 49.5 | 219°01.5 | 05.5 | 351°27.4 | 50.2 | | | | | | |
| Mer.pass. | 22:50 | ν3.0' d-0.1' m-4.64 | | | ν1.0' d-0.3' m1.06 | | | ν2.0' d-0.1' m-1.90 | | | ν2.6' d-0.1' m0.34 | | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 17°37.8 | 164°45.4 | S21°15.0 | 248°39.5 | N19°49.2 | 234°03.6 | N15°05.4 | 6°30.1 | N01°50.1 | | | | | | |
| 1 | 32°40.3 | 179°48.4 | 14.8 | 263°40.5 | 48.9 | 249°05.6 | 05.3 | 21°32.7 | 50.0 | | | | | | |
| 2 | 47°42.7 | 194°51.5 | 14.7 | 278°41.5 | 48.6 | 264°07.7 | 05.1 | 36°35.3 | 50.0 | | | | | | |
| 3 | 62°45.2 | 209°54.5 | •• 14.6 | 293°42.5 | •• 48.3 | 279°09.7 | •• 05.0 | 51°38.0 | •• 49.9 | | | | | | |
| 4 | 77°47.6 | 224°57.6 | 14.4 | 308°43.5 | 48.0 | 294°11.8 | 04.9 | 66°40.6 | 49.8 | | | | | | |
| 5 | 92°50.1 | 240°00.7 | 14.3 | 323°44.5 | 47.6 | 309°13.8 | 04.8 | 81°43.3 | 49.7 | | | | | | |
| 6 | 107°52.6 | 255°03.7 | S21°14.2 | 338°45.5 | N19°47.3 | 324°15.9 | N15°04.6 | 96°45.9 | N01°49.7 | | | | | | |
| 7 | 122°55.0 | 270°06.8 | 14.0 | 353°46.5 | 47.0 | 339°17.9 | 04.5 | 111°48.6 | 49.6 | | | | | | |
| 8 | 137°57.5 | 285°09.9 | 13.9 | 8°47.5 | 46.7 | 354°20.0 | 04.4 | 126°51.2 | 49.5 | | | | | | |
| 9 | 153°00.0 | 300°13.0 | •• 13.7 | 23°48.5 | •• 46.4 | 9°22.0 | •• 04.3 | 141°53.8 | •• 49.4 | | | | | | |
| 10 | 168°02.4 | 315°16.1 | 13.6 | 38°49.5 | 46.1 | 24°24.1 | 04.1 | 156°56.5 | 49.4 | | | | | | |
| 11 | 183°04.9 | 330°19.2 | 13.4 | 53°50.5 | 45.8 | 39°26.1 | 04.0 | 171°59.1 | 49.3 | | | | | | |
| 12 | 198°07.4 | 345°22.3 | S21°13.3 | 68°51.5 | N19°45.5 | 54°28.2 | N15°03.9 | 187°01.8 | N01°49.2 | | | | | | |
| 13 | 213°09.8 | 0°25.4 | 13.1 | 83°52.5 | 45.2 | 69°30.2 | 03.8 | 202°04.4 | 49.1 | | | | | | |
| 14 | 228°12.3 | 15°28.5 | 13.0 | 98°53.5 | 44.8 | 84°32.3 | 03.6 | 217°07.1 | 49.1 | | | | | | |
| 15 | 243°14.8 | 30°31.6 | •• 12.8 | 113°54.5 | •• 44.5 | 99°34.4 | •• 03.5 | 232°09.7 | •• 49.0 | | | | | | |
| 16 | 258°17.2 | 45°34.7 | 12.6 | 128°55.5 | 44.2 | 114°36.4 | 03.4 | 247°12.4 | 48.9 | | | | | | |
| 17 | 273°19.7 | 60°37.8 | 12.5 | 143°56.5 | 43.9 | 129°38.5 | 03.2 | 262°15.0 | 48.8 | | | | | | |
| 18 | 288°22.1 | 75°40.9 | S21°12.3 | 158°57.5 | N19°43.6 | 144°40.5 | N15°03.1 | 277°17.6 | N01°48.8 | | | | | | |
| 19 | 303°24.6 | 90°44.0 | 12.1 | 173°58.5 | 43.3 | 159°42.6 | 03.0 | 292°20.3 | 48.7 | | | | | | |
| 20 | 318°27.1 | 105°47.1 | 12.0 | 188°59.5 | 43.0 | 174°44.6 | 02.9 | 307°22.9 | 48.6 | | | | | | |
| 21 | 333°29.5 | 120°50.3 | •• 11.8 | 204°00.5 | •• 42.7 | 189°46.7 | •• 02.7 | 322°25.6 | •• 48.5 | | | | | | |
| 22 | 348°32.0 | 135°53.4 | 11.6 | 219°01.5 | 42.3 | 204°48.7 | 02.6 | 337°28.2 | 48.5 | | | | | | |
| 23 | 3°34.5 | 150°56.5 | 11.4 | 234°02.5 | 42.0 | 219°50.8 | 02.5 | 352°30.9 | 48.4 | | | | | | |
| Mer.pass. | 22:46 | ν3.1' d-0.1' m-4.60 | | | ν1.0' d-0.3' m1.06 | | | ν2.1' d-0.1' m-1.90 | | | ν2.6' d-0.1' m0.35 | | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°32.9 | 29°14.5 |
| Ankaa | 353°05.3 | -42°09.5 |
| Schedar | 349°28.8 | 56°41.2 |
| Diphda | 348°45.5 | -17°50.2 |
| Achernar | 335°18.5 | -57°05.9 |
| Hamal | 327°49.2 | 23°35.5 |
| Polaris | 312°52.7 | 89°22.4 |
| Acamar | 315°10.3 | -40°11.6 |
| Menkar | 314°04.4 | 4°11.8 |
| Mirfak | 308°25.8 | 49°57.3 |
| Aldebaran | 290°37.8 | 16°33.9 |
| Rigel | 281°02.3 | -8°10.0 |
| Capella | 280°19.6 | 46°01.4 |
| Bellatrix | 278°21.2 | 6°22.5 |
| Elnath | 277°59.9 | 28°37.8 |
| Alnilam | 275°36.2 | -1°10.9 |
| Betelgeuse | 270°50.4 | 7°24.8 |
| Canopus | 263°51.7 | -52°42.2 |
| Sirius | 258°24.9 | -16°44.9 |
| Adhara | 255°04.7 | -29°00.2 |
| Procyon | 244°49.4 | 5°09.5 |
| Pollux | 243°15.6 | 27°57.6 |
| Avior | 234°14.4 | -59°35.4 |
| Suhail | 222°45.5 | -43°32.2 |
| Miaplacidus | 221°38.5 | -69°49.3 |
| Alphard | 217°46.5 | -8°46.3 |
| Regulus | 207°33.2 | 11°50.2 |
| Dubhe | 193°39.8 | 61°36.3 |

| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|----------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| Wed | | | | | | | | |
| 0 | 183°00.5 | S05°25.4 | | 225°07.1 | 11.7' | N12°06.5 | -14.8' | 58.3' |
| 1 | 198°00.7 | 26.4 | | 239°37.8 | 11.8' | 11°51.7 | -14.9' | 58.2' |
| 2 | 213°00.9 | 27.3 | | 254°08.6 | 11.8' | 11°36.9 | -14.9' | 58.2' |
| 3 | 228°01.0 | · · 28.3 | | 268°39.4 | 11.9' | 11°22.0 | -15.0' | 58.2' |
| 4 | 243°01.2 | 29.2 | | 283°10.3 | 12.0' | 11°07.0 | -15.0' | 58.2' |
| 5 | 258°01.4 | 30.2 | | 297°41.3 | 12.0' | 10°52.0 | -15.0' | 58.2' |
| 6 | 273°01.6 | S05°31.1 | | 312°12.3 | 12.1' | N10°37.0 | -15.1' | 58.2' |
| 7 | 288°01.8 | 32.1 | | 326°43.4 | 12.2' | 10°21.9 | -15.1' | 58.1' |
| 8 | 303°01.9 | 33.1 | | 341°14.6 | 12.2' | 10°06.7 | -15.2' | 58.1' |
| 9 | 318°02.1 | · · 34.0 | | 355°45.9 | 12.3' | 09°51.5 | -15.2' | 58.1' |
| 10 | 333°02.3 | 35.0 | | 10°17.2 | 12.4' | 09°36.3 | -15.3' | 58.1' |
| 11 | 348°02.5 | 35.9 | | 24°48.5 | 12.4' | 09°21.1 | -15.3' | 58.1' |
| 12 | 3°02.7 | S05°36.9 | | 39°20.0 | 12.5' | N09°05.8 | -15.3' | 58.1' |
| 13 | 18°02.8 | 37.8 | | 53°51.5 | 12.5' | 08°50.5 | -15.4' | 58.0' |
| 14 | 33°03.0 | 38.8 | | 68°23.0 | 12.6' | 08°35.1 | -15.4' | 58.0' |
| 15 | 48°03.2 | · · 39.8 | | 82°54.6 | 12.7' | 08°19.7 | -15.4' | 58.0' |
| 16 | 63°03.4 | 40.7 | | 97°26.3 | 12.7' | 08°04.3 | -15.5' | 58.0' |
| 17 | 78°03.6 | 41.7 | | 111°58.0 | 12.8' | 07°48.8 | -15.5' | 58.0' |
| 18 | 93°03.7 | S05°42.6 | | 126°29.8 | 12.8' | N07°33.3 | -15.5' | 58.0' |
| 19 | 108°03.9 | 43.6 | | 141°01.6 | 12.9' | 07°17.8 | -15.5' | 57.9' |
| 20 | 123°04.1 | 44.5 | | 155°33.5 | 12.9' | 07°02.3 | -15.6' | 57.9' |
| 21 | 138°04.3 | · · 45.5 | | 170°05.4 | 13.0' | 06°46.7 | -15.6' | 57.9' |
| 22 | 153°04.4 | 46.4 | | 184°37.4 | 13.0' | 06°31.2 | -15.6' | 57.9' |
| 23 | 168°04.6 | 47.4 | | 199°09.4 | 13.1' | 06°15.6 | -15.6' | 57.9' |
| SD = 16.0' $d = 1.0'$ | | | | | | | | |
| SD = 15.9' | | | | | | | | |

| Thu | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|----------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 183°04.8 | S05°48.3 | | 213°41.5 | 13.1' | N05°59.9 | -15.6' | 57.9' |
| 1 | 198°05.0 | 49.3 | | 228°13.6 | 13.2' | 05°44.3 | -15.7' | 57.8' |
| 2 | 213°05.2 | 50.3 | | 242°45.8 | 13.2' | 05°28.6 | -15.7' | 57.8' |
| 3 | 228°05.3 | · · 51.2 | | 257°18.0 | 13.3' | 05°12.9 | -15.7' | 57.8' |
| 4 | 243°05.5 | 52.2 | | 271°50.2 | 13.3' | 04°57.3 | -15.7' | 57.8' |
| 5 | 258°05.7 | 53.1 | | 286°22.5 | 13.3' | 04°41.6 | -15.7' | 57.8' |
| 6 | 273°05.9 | S05°54.1 | | 300°54.9 | 13.4' | N04°25.8 | -15.7' | 57.7' |
| 7 | 288°06.0 | 55.0 | | 315°27.2 | 13.4' | 04°10.1 | -15.7' | 57.7' |
| 8 | 303°06.2 | 56.0 | | 329°59.6 | 13.4' | 03°54.4 | -15.7' | 57.7' |
| 9 | 318°06.4 | · · 56.9 | | 344°32.1 | 13.5' | 03°38.6 | -15.8' | 57.7' |
| 10 | 333°06.6 | 57.9 | | 359°04.6 | 13.5' | 03°22.9 | -15.8' | 57.7' |
| 11 | 348°06.7 | 58.8 | | 13°37.1 | 13.5' | 03°07.1 | -15.8' | 57.6' |
| 12 | 3°06.9 | S05°59.8 | | 28°09.6 | 13.6' | N02°51.4 | -15.8' | 57.6' |
| 13 | 18°07.1 | 06°00.7 | | 42°42.2 | 13.6' | 02°35.6 | -15.8' | 57.6' |
| 14 | 33°07.3 | 01.7 | | 57°14.8 | 13.6' | 02°19.8 | -15.8' | 57.6' |
| 15 | 48°07.4 | · · 02.6 | | 71°47.5 | 13.7' | 02°04.1 | -15.8' | 57.6' |
| 16 | 63°07.6 | 03.6 | | 86°20.1 | 13.7' | 01°48.3 | -15.8' | 57.5' |
| 17 | 78°07.8 | 04.6 | | 100°52.8 | 13.7' | 01°32.5 | -15.8' | 57.5' |
| 18 | 93°07.9 | S06°05.5 | | 115°25.6 | 13.7' | N01°16.8 | -15.8' | 57.5' |
| 19 | 108°08.1 | 06.5 | | 129°58.3 | 13.8' | 01°01.0 | -15.7' | 57.5' |
| 20 | 123°08.3 | 07.4 | | 144°31.1 | 13.8' | 00°45.3 | -15.7' | 57.5' |
| 21 | 138°08.5 | · · 08.4 | | 159°03.9 | 13.8' | 00°29.5 | -15.7' | 57.4' |
| 22 | 153°08.6 | 09.3 | | 173°36.7 | 13.8' | N00°13.8 | -15.7' | 57.4' |
| 23 | 168°08.8 | 10.3 | | 188°09.5 | 13.9' | S00°01.9 | 15.7' | 57.4' |
| SD = 16.0' $d = 1.0'$ | | | | | | | | |
| SD = 15.8' | | | | | | | | |

| Fri | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|----------|-------|----------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 183°09.0 | S06°11.2 | | 202°42.4 | 13.9' | S00°17.7 | 15.7' | 57.4' |
| 1 | 198°09.2 | 12.2 | | 217°15.3 | 13.9' | 00°33.4 | 15.7' | 57.4' |
| 2 | 213°09.3 | 13.1 | | 231°48.2 | 13.9' | 00°49.0 | 15.7' | 57.3' |
| 3 | 228°09.5 | · · 14.1 | | 246°21.1 | 13.9' | 01°04.7 | 15.7' | 57.3' |
| 4 | 243°09.7 | 15.0 | | 260°54.0 | 13.9' | 01°20.4 | 15.6' | 57.3' |
| 5 | 258°09.8 | 16.0 | | 275°26.9 | 14.0' | 01°36.0 | 15.6' | 57.3' |
| 6 | 273°10.0 | S06°16.9 | | 289°59.9 | 14.0' | S01°51.6 | 15.6' | 57.3' |
| 7 | 288°10.2 | 17.9 | | 304°32.9 | 14.0' | 02°07.2 | 15.6' | 57.2' |
| 8 | 303°10.3 | 18.8 | | 319°05.8 | 14.0' | 02°22.8 | 15.6' | 57.2' |
| 9 | 318°10.5 | · · 19.8 | | 333°38.8 | 14.0' | 02°38.4 | 15.5' | 57.2' |
| 10 | 333°10.7 | 20.7 | | 348°11.8 | 14.0' | 02°53.9 | 15.5' | 57.2' |
| 11 | 348°10.9 | 21.7 | | 2°44.8 | 14.0' | 03°09.4 | 15.5' | 57.1' |
| 12 | 3°11.0 | S06°22.6 | | 17°17.8 | 14.0' | S03°24.9 | 15.5' | 57.1' |
| 13 | 18°11.2 | 23.6 | | 31°50.8 | 14.0' | 03°40.4 | 15.4' | 57.1' |
| 14 | 33°11.4 | 24.5 | | 46°23.8 | 14.0' | 03°55.8 | 15.4' | 57.1' |
| 15 | 48°11.5 | · · 25.5 | | 60°56.9 | 14.0' | 04°11.2 | 15.4' | 57.1' |
| 16 | 63°11.7 | 26.4 | | 75°29.9 | 14.0' | 04°26.6 | 15.3' | 57.0' |
| 17 | 78°11.9 | 27.4 | | 90°02.9 | 14.0' | 04°41.9 | 15.3' | 57.0' |
| 18 | 93°12.0 | S06°28.3 | | 104°35.9 | 14.0' | S04°57.2 | 15.3' | 57.0' |
| 19 | 108°12.2 | 29.3 | | 119°08.9 | 14.0' | 05°12.5 | 15.2' | 57.0' |
| 20 | 123°12.4 | 30.2 | | 133°42.0 | 14.0' | 05°27.8 | 15.2' | 56.9' |
| 21 | 138°12.5 | · · 31.2 | | 148°15.0 | 14.0' | 05°43.0 | 15.2' | 56.9' |
| 22 | 153°12.7 | 32.1 | | 162°48.0 | 14.0' | 05°58.1 | 15.1' | 56.9' |
| 23 | 168°12.9 | 33.0 | | 177°21.0 | 14.0' | 06°13.3 | 15.1' | 56.9' |
| SD = 16.0' $d = 1.0'$ | | | | | | | | |
| SD = 15.6' | | | | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 04:23 | 05:43 | 06:51 | 16:42 | 17:50 | 19:09 |
| N 70° | 04:31 | 05:42 | 06:44 | 16:50 | 17:51 | 19:01 |
| 68° | 04:37 | 05:42 | 06:38 | 16:56 | 17:51 | 18:56 |
| 66° | 04:42 | 05:42 | 06:33 | 17:01 | 17:52 | 18:51 |
| 64° | 04:46 | 05:41 | 06:29 | 17:05 | 17:52 | 18:47 |
| 62° | 04:49 | 05:41 | 06:25 | 17:09 | 17:53 | 18:44 |
| 60° | 04:52 | 05:40 | 06:22 | 17:12 | 17:53 | 18:41 |
| N 58° | 04:55 | 05:40 | 06:19 | 17:15 | 17:54 | 18:39 |
| 56° | 04:57 | 05:40 | 06:17 | 17:17 | 17:54 | 18:37 |
| 54° | 04:58 | 05:39 | 06:15 | 17:19 | 17:55 | 18:36 |
| 52° | 05:00 | 05:39 | 06:13 | 17:22 | 17:55 | 18:34 |
| 50° | 05:01 | 05:38 | 06:11 | 17:24 | 17:56 | 18:33 |
| 45° | 05:03 | 05:37 | 06:07 | 17:28 | 17:57 | 18:31 |
| N 40° | 05:05 | 05:36 | 06:03 | 17:31 | 17:58 | 18:30 |
| 35° | 05:05 | 05:35 | 06:00 | 17:34 | 18:00 | 18:29 |
| 30° | 05:06 | 05:33 | 05:57 | 17:37 | 18:01 | 18:29 |
| 20° | 05:05 | 05:31 | 05:53 | 17:42 | 18:04 | 18:30 |
| N 10° | 05:03 | 05:27 | 05:48 | 17:47 | 18:08 | 18:32 |
| 0° | 04:59 | 05:23 | 05:44 | 17:51 | 18:12 | 18:36 |
| S 10° | 04:54 | 05:19 | 05:40 | 17:55 | 18:16 | 18:41 |
| 20° | 04:47 | 05:13 | 05:35 | 18:00 | 18:22 | 18:48 |
| 30° | 04:38 | 05:06 | 05:30 | 18:05 | 18:30 | 18:58 |
| 35° | 04:31 | 05:01 | 05:27 | 18:09 | 18:34 | 19:05 |
| 40° | 04:23 | 04:56 | 05:23 | 18:12 | 18:40 | 19:13 |
| 45° | 04:14 | 04:49 | 05:19 | 18:17 | 18:47 | 19:22 |
| S 50° | 04:01 | 04:41 | 05:14 | 18:22 | 18:55 | 19:35 |
| 52° | 03:55 | 04:37 | 05:12 | 18:24 | 18:59 | 19:41 |
| 54° | 03:48 | 04:33 | 05:09 | 18:27 | 19:04 | 19:48 |
| 56° | 03:41 | 04:28 | 05:06 | 18:30 | 19:09 | 19:56 |
| 58° | 03:32 | 04:23 | 05:03 | 18:33 | 19:14 | 20:05 |
| S 60° | 03:21 | 04:16 | 05:00 | 18:37 | 19:21 | 20:16 |

| Lat. | Moonrise | | | Moonset | | |
|--------------|----------|-------|-------|---------|-------|-------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | 00:19 | 02:46 | 05:00 | 17:10 | 16:34 | 16:01 |
| N 70° | 00:41 | 02:54 | 04:57 | 16:59 | 16:32 | 16:07 |
| 68° | 00:58 | 03:00 | 04:55 | 16:50 | 16:31 | 16:12 |
| 66° | 01:11 | 03:05 | 04:53 | 16:43 | 16:29 | 16:16 |
| 64° | 01:22 | 03:10 | 04:52 | 16:36 | 16:28 | 16:20 |
| 62° | 01:32 | 03:13 | 04:51 | 16:31 | 16:27 | 16:23 |
| 60° | 01:40 | 03:17 | 04:50 | 16:26 | 16:26 | 16:26 |
| N 58° | 01:47 | 03:19 | 04:49 | 16:22 | 16:25 | 16:29 |
| 56° | 01:53 | 03:22 | 04:48 | 16:18 | 16:25 | 16:31 |
| 54° | 01:59 | 03:24 | 04:47 | 16:14 | 16:24 | 16:33 |
| 52° | 02:04 | 03:26 | 04:47 | 16:11 | 16:23 | 16:35 |
| 50° | 02:08 | 03:28 | 04:46 | 16:08 | 16:23 | 16:36 |
| 45° | 02:18 | 03:32 | 04:45 | 16:02 | 16:21 | 16:40 |
| N 40° | 02:26 | 03:36 | 04:44 | 15:57 | 16:20 | 16:43 |
| 35° | 02:32 | 03:38 | 04:43 | 15:52 | 16:19 | 16:46 |
| 30° | 02:38 | 03:41 | 04:42 | 15:48 | 16:19 | 16:48 |
| 20° | 02:49 | 03:45 | 04:40 | 15:41 | 16:17 | 16:52 |
| N 10° | 02:58 | 03:49 | 04:39 | 15:35 | 16:16 | 16:56 |
| 0° | 03:06 | 03:53 | 04:38 | 15:29 | 16:15 | 16:59 |
| S 10° | 03:15 | 03:57 | 04:37 | 15:23 | 16:13 | 17:03 |
| 20° | 03:23 | 04:00 | 04:36 | 15:16 | 16:12 | 17:06 |
| 30° | 03:33 | 04:05 | 04:35 | 15:09 | 16:10 | 17:11 |
| 35° | 03:39 | 04:07 | 04:34 | 15:04 | 16:09 | 17:13 |
| 40° | 03:46 | 04:10 | 04:33 | 14:59 | 16:08 | 17:16 |
| 45° | 03:53 | 04:13 | 04:32 | 14:54 | 16:07 | 17:19 |
| S 50° | 04:02 | 04:17 | 04:31 | 14:47 | 16:06 | 17:23 |
| 52° | 04:07 | 04:19 | 04:31 | 14:43 | 16:05 | 17:24 |
| 54° | 04:11 | 04:21 | 04:30 | 14:40 | 16:04 | 17:26 |
| 56° | 04:16 | 04:23 | 04:29 | 14:36 | 16:03 | 17:29 |
| 58° | 04:22 | 04:26 | 04:29 | 14:31 | 16:02 | 17:31 |
| S 60° | 04:28 | 04:28 | 04:28 | 14:26 | 16:01 | 17:34 |

October 10, 11, 12 UT (Sat., Sun., Mon.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------|----------|--|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| Sat | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 18°36.9 | | 165°59.7 | S21°11.2 | 249°03.5 | N19°41.7 | 234°52.9 | N15°02.4 | 7°33.5 | N01°48.3 |
| 1 | 33°39.4 | | 181°02.8 | 11.1 | 264°04.5 | 41.4 | 249°54.9 | 02.2 | 22°36.2 | 48.2 |
| 2 | 48°41.9 | | 196°06.0 | 10.9 | 279°05.5 | 41.1 | 264°57.0 | 02.1 | 37°38.8 | 48.2 |
| 3 | 63°44.3 | | 211°09.1 | •• 10.7 | 294°06.5 | •• 40.8 | 279°59.0 | •• 02.0 | 52°41.4 | •• 48.1 |
| 4 | 78°46.8 | | 226°12.3 | 10.5 | 309°07.5 | 40.5 | 295°01.1 | 01.9 | 67°44.1 | 48.0 |
| 5 | 93°49.2 | | 241°15.4 | 10.3 | 324°08.5 | 40.2 | 310°03.1 | 01.7 | 82°46.7 | 47.9 |
| 6 | 108°51.7 | | 256°18.6 | S21°10.1 | 339°09.5 | N19°39.8 | 325°05.2 | N15°01.6 | 97°49.4 | N01°47.8 |
| 7 | 123°54.2 | | 271°21.8 | 09.9 | 354°10.6 | 39.5 | 340°07.3 | 01.5 | 112°52.0 | 47.8 |
| 8 | 138°56.6 | | 286°24.9 | 09.7 | 9°11.6 | 39.2 | 355°09.3 | 01.4 | 127°54.7 | 47.7 |
| 9 | 153°59.1 | | 301°28.1 | •• 09.5 | 24°12.6 | •• 38.9 | 10°11.4 | •• 01.2 | 142°57.3 | •• 47.6 |
| 10 | 169°01.6 | | 316°31.3 | 09.3 | 39°13.6 | 38.6 | 25°13.4 | 01.1 | 157°59.9 | 47.5 |
| 11 | 184°04.0 | | 331°34.4 | 09.1 | 54°14.6 | 38.3 | 40°15.5 | 01.0 | 173°02.6 | 47.5 |
| 12 | 199°06.5 | | 346°37.6 | S21°08.9 | 69°15.6 | N19°38.0 | 55°17.6 | N15°00.9 | 188°05.2 | N01°47.4 |
| 13 | 214°09.0 | | 1°40.8 | 08.6 | 84°16.6 | 37.6 | 70°19.6 | 00.7 | 203°07.9 | 47.3 |
| 14 | 229°11.4 | | 16°44.0 | 08.4 | 99°17.6 | 37.3 | 85°21.7 | 00.6 | 218°10.5 | 47.2 |
| 15 | 244°13.9 | | 31°47.2 | •• 08.2 | 114°18.6 | •• 37.0 | 100°23.7 | •• 00.5 | 233°13.2 | •• 47.2 |
| 16 | 259°16.4 | | 46°50.4 | 08.0 | 129°19.6 | 36.7 | 115°25.8 | 00.4 | 248°15.8 | 47.1 |
| 17 | 274°18.8 | | 61°53.6 | 07.8 | 144°20.6 | 36.4 | 130°27.8 | 00.2 | 263°18.5 | 47.0 |
| 18 | 289°21.3 | | 76°56.8 | S21°07.5 | 159°21.7 | N19°36.1 | 145°29.9 | N15°00.1 | 278°21.1 | N01°46.9 |
| 19 | 304°23.7 | | 92°00.0 | 07.3 | 174°22.7 | 35.7 | 160°32.0 | 15°00.0 | 293°23.7 | 46.9 |
| 20 | 319°26.2 | | 107°03.2 | 07.1 | 189°23.7 | 35.4 | 175°34.0 | 14°59.9 | 308°26.4 | 46.8 |
| 21 | 334°28.7 | | 122°06.4 | •• 06.8 | 204°24.7 | •• 35.1 | 190°36.1 | •• 59.7 | 323°29.0 | •• 46.7 |
| 22 | 349°31.1 | | 137°09.6 | 06.6 | 219°25.7 | 34.8 | 205°38.1 | 59.6 | 338°31.7 | 46.6 |
| 23 | 4°33.6 | | 152°12.9 | 06.4 | 234°26.7 | 34.5 | 220°40.2 | 59.5 | 353°34.3 | 46.6 |
| Mer.pass. | 22:42 | | ν3.1' d-0.2' m-4.57 | | ν1.0' d-0.3' m1.05 | | ν2.1' d-0.1' m-1.90 | | ν2.6' d-0.1' m0.36 | |

| Sun | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------|----------|--|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| 0 | 19°36.1 | | 167°16.1 | S21°06.1 | 249°27.7 | N19°34.2 | 235°42.3 | N14°59.4 | 8°37.0 | N01°46.5 |
| 1 | 34°38.5 | | 182°19.3 | 05.9 | 264°28.7 | 33.9 | 250°44.3 | 59.2 | 23°39.6 | 46.4 |
| 2 | 49°41.0 | | 197°22.5 | 05.6 | 279°29.8 | 33.5 | 265°46.4 | 59.1 | 38°42.2 | 46.3 |
| 3 | 64°43.5 | | 212°25.8 | •• 05.4 | 294°30.8 | •• 33.2 | 280°48.5 | •• 59.0 | 53°44.9 | •• 46.3 |
| 4 | 79°45.9 | | 227°29.0 | 05.1 | 309°31.8 | 32.9 | 295°50.5 | 58.9 | 68°47.5 | 46.2 |
| 5 | 94°48.4 | | 242°32.3 | 04.9 | 324°32.8 | 32.6 | 310°52.6 | 58.7 | 83°50.2 | 46.1 |
| 6 | 109°50.9 | | 257°35.5 | S21°04.6 | 339°33.8 | N19°32.3 | 325°54.6 | N14°58.6 | 98°52.8 | N01°46.0 |
| 7 | 124°53.3 | | 272°38.8 | 04.4 | 354°34.8 | 32.0 | 340°56.7 | 58.5 | 113°55.5 | 46.0 |
| 8 | 139°55.8 | | 287°42.0 | 04.1 | 9°35.8 | 31.6 | 355°58.8 | 58.4 | 128°58.1 | 45.9 |
| 9 | 154°58.2 | | 302°45.3 | •• 03.8 | 24°36.9 | •• 31.3 | 11°00.8 | •• 58.2 | 144°00.7 | •• 45.8 |
| 10 | 170°00.7 | | 317°48.5 | 03.6 | 39°37.9 | 31.0 | 26°02.9 | 58.1 | 159°03.4 | 45.7 |
| 11 | 185°03.2 | | 332°51.8 | 03.3 | 54°38.9 | 30.7 | 41°04.9 | 58.0 | 174°06.0 | 45.7 |
| 12 | 200°05.6 | | 347°55.1 | S21°03.0 | 69°39.9 | N19°30.4 | 56°07.0 | N14°57.9 | 189°08.7 | N01°45.6 |
| 13 | 215°08.1 | | 2°58.3 | 02.8 | 84°40.9 | 30.1 | 71°09.1 | 57.7 | 204°11.3 | 45.5 |
| 14 | 230°10.6 | | 18°01.6 | 02.5 | 99°41.9 | 29.7 | 86°11.1 | 57.6 | 219°14.0 | 45.4 |
| 15 | 245°13.0 | | 33°04.9 | •• 02.2 | 114°43.0 | •• 29.4 | 101°13.2 | •• 57.5 | 234°16.6 | •• 45.4 |
| 16 | 260°15.5 | | 48°08.2 | 01.9 | 129°44.0 | 29.1 | 116°15.3 | 57.4 | 249°19.2 | 45.3 |
| 17 | 275°18.0 | | 63°11.4 | 01.6 | 144°45.0 | 28.8 | 131°17.3 | 57.2 | 264°21.9 | 45.2 |
| 18 | 290°20.4 | | 78°14.7 | S21°01.3 | 159°46.0 | N19°28.5 | 146°19.4 | N14°57.1 | 279°24.5 | N01°45.1 |
| 19 | 305°22.9 | | 93°18.0 | 01.1 | 174°47.0 | 28.1 | 161°21.5 | 57.0 | 294°27.2 | 45.1 |
| 20 | 320°25.3 | | 108°21.3 | 00.8 | 189°48.1 | 27.8 | 176°23.5 | 56.9 | 309°29.8 | 45.0 |
| 21 | 335°27.8 | | 123°24.6 | •• 00.5 | 204°49.1 | •• 27.5 | 191°25.6 | •• 56.8 | 324°32.5 | •• 44.9 |
| 22 | 350°30.3 | | 138°27.9 | 21°00.2 | 219°50.1 | 27.2 | 206°27.7 | 56.6 | 339°35.1 | 44.8 |
| 23 | 5°32.7 | | 153°31.2 | 20°59.9 | 234°51.1 | 26.9 | 221°29.7 | 56.5 | 354°37.7 | 44.8 |
| Mer.pass. | 22:38 | | ν3.2' d-0.2' m-4.52 | | ν1.0' d-0.3' m1.04 | | ν2.1' d-0.1' m-1.91 | | ν2.6' d-0.1' m0.36 | |

| Mon | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------|----------|--|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| 0 | 20°35.2 | | 168°34.5 | S20°59.6 | 249°52.1 | N19°26.6 | 236°31.8 | N14°56.4 | 9°40.4 | N01°44.7 |
| 1 | 35°37.7 | | 183°37.8 | 59.3 | 264°53.2 | 26.2 | 251°33.8 | 56.3 | 24°43.0 | 44.6 |
| 2 | 50°40.1 | | 198°41.1 | 59.0 | 279°54.2 | 25.9 | 266°35.9 | 56.1 | 39°45.7 | 44.5 |
| 3 | 65°42.6 | | 213°44.5 | •• 58.7 | 294°55.2 | •• 25.6 | 281°38.0 | •• 56.0 | 54°48.3 | •• 44.5 |
| 4 | 80°45.1 | | 228°47.8 | 58.3 | 309°56.2 | 25.3 | 296°40.0 | 55.9 | 69°51.0 | 44.4 |
| 5 | 95°47.5 | | 243°51.1 | 58.0 | 324°57.2 | 25.0 | 311°42.1 | 55.8 | 84°53.6 | 44.3 |
| 6 | 110°50.0 | | 258°54.4 | S20°57.7 | 339°58.3 | N19°24.6 | 326°44.2 | N14°55.6 | 99°56.2 | N01°44.2 |
| 7 | 125°52.5 | | 273°57.8 | 57.4 | 354°59.3 | 24.3 | 341°46.2 | 55.5 | 114°58.9 | 44.2 |
| 8 | 140°54.9 | | 289°01.1 | 57.1 | 10°00.3 | 24.0 | 356°48.3 | 55.4 | 130°01.5 | 44.1 |
| 9 | 155°57.4 | | 304°04.4 | •• 56.7 | 25°01.3 | •• 23.7 | 11°50.4 | •• 55.3 | 145°04.2 | •• 44.0 |
| 10 | 170°59.8 | | 319°07.8 | 56.4 | 40°02.4 | 23.4 | 26°52.4 | 55.1 | 160°06.8 | 43.9 |
| 11 | 186°02.3 | | 334°11.1 | 56.1 | 55°03.4 | 23.0 | 41°54.5 | 55.0 | 175°09.5 | 43.9 |
| 12 | 201°04.8 | | 349°14.5 | S20°55.8 | 70°04.4 | N19°22.7 | 56°56.6 | N14°54.9 | 190°12.1 | N01°43.8 |
| 13 | 216°07.2 | | 4°17.8 | 55.4 | 85°05.4 | 22.4 | 71°58.6 | 54.8 | 205°14.7 | 43.7 |
| 14 | 231°09.7 | | 19°21.2 | 55.1 | 100°06.5 | 22.1 | 87°00.7 | 54.7 | 220°17.4 | 43.7 |
| 15 | 246°12.2 | | 34°24.5 | •• 54.7 | 115°07.5 | •• 21.8 | 102°02.8 | •• 54.5 | 235°20.0 | •• 43.6 |
| 16 | 261°14.6 | | 49°27.9 | 54.4 | 130°08.5 | 21.5 | 117°04.8 | 54.4 | 250°22.7 | 43.5 |
| 17 | 276°17.1 | | 64°31.2 | 54.1 | 145°09.5 | 21.1 | 132°06.9 | 54.3 | 265°25.3 | 43.4 |
| 18 | 291°19.6 | | 79°34.6 | S20°53.7 | 160°10.6 | N19°20.8 | 147°09.0 | N14°54.2 | 280°28.0 | N01°43.4 |
| 19 | 306°22.0 | | 94°38.0 | 53.4 | 175°11.6 | 20.5 | 162°11.1 | 54.0 | 295°30.6 | 43.3 |
| 20 | 321°24.5 | | 109°41.4 | 53.0 | 190°12.6 | 20.2 | 177°13.1 | 53.9 | 310°33.2 | 43.2 |
| 21 | 336°27.0 | | 124°44.7 | •• 52.7 | 205°13.7 | •• 19.8 | 192°15.2 | •• 53.8 | 325°35.9 | •• 43.1 |
| 22 | 351°29.4 | | 139°48.1 | 52.3 | 220°14.7 | 19.5 | 207°17.3 | 53.7 | 340°38.5 | 43.1 |
| 23 | 6°31.9 | | 154°51.5 | 51.9 | 235°15.7 | 19.2 | 222°19.3 | 53.6 | 355°41.2 | 43.0 |
| Mer.pass. | 22:34 | | ν3.3' d-0.3' m-4.48 | | ν1.0' d-0.3' m1.03 | | ν2.1' d-0.1' m-1.91 | | ν2.6' d-0.1' m0.37 | |

| | SHA | Dec |
|---------------------|----------|----------|
| Alpheratz | 357°32.9 | 29°14.5 |
| Ankaa | 353°05.3 | -42°09.5 |
| Schedar | 349°28.8 | 56°41.2 |
| Diphda | 348°45.5 | -17°50.2 |
| Achernar | 335°18.5 | -57°05.9 |
| Hamal | 327°49.2 | 23°35.5 |
| Polaris | 312°51.8 | 89°22.5 |
| Acamar | 315°10.3 | -40°11.6 |
| Menkar | 314°04.4 | 4°11.8 |
| Mirfak | 308°25.8 | 49°57.3 |
| Aldebaran | 290°37.8 | 16°33.9 |
| Rigel | 281°02.3 | -8°10.0 |
| Capella | 280°19.5 | 46°01.4 |
| Bellatrix | 278°21.2 | 6°22.5 |
| Elnath | 277°59.9 | 28°37.8 |
| Alnilam | 275°36.1 | -1°10.9 |
| Betelgeuse | 270°50.4 | 7°24.8 |
| Canopus | 263°51.6 | -52°42.2 |
| Sirius | 258°24.9 | -16°44.9 |
| Adhara | 255°04.7 | -29°00.2 |
| Procyon | 244°49.4 | 5°09.5 |
| Pollux | 243°15.6 | 27°57.6 |
| Avior | 234°14.3 | -59°35.4 |
| Suhail | 222°45.5 | -43°32.2 |
| Miaplacidus | 221°38.4 | -69°49.3 |
| Alphard | 217°46.5 | -8°46.3 |
| Regulus | 207°33.1 | 11°50.2 |
| Dubhe | 193°39.8 | 61°36.3 |
| Denebola | 182°23.8 | 14°25.4 |
| Gienah | 175°42.4 | -17°41.3 |
| Acrux | 172°59.2 | -63°14.8 |
| Gacrux | 171°50.6 | -57°15.7 |
| Alioth | 166°12.3 | 55°48.9 |
| Spica | 158°21.1 | -11°18.0 |
| Alkaid | 152°51.3 | 49°10.8 |
| Hadar | 148°34.6 | -60°30.2 |
| Menkent | 147°56.3 | -36°30.1 |
| Arcturus | 145°46.9 | 19°02.7 |
| Rigil Kent. | 139°38.9 | -60°56.8 |
| Kochab | 137°20.9 | 74°02.8 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.6 |
| Antares | 112°14.3 | -26°29.5 |
| Atria | 107°07.5 | -69°04.7 |
| Sabik | 102°01.3 | -15°45.4 |
| Shaula | 96°08.6 | -37°07.4 |
| Rasalhague | 95°57.4 | 12°32.6 |
| Eltanin | 90°41.7 | 51°29.4 |
| Kaus Aust. | 83°30.7 | -34°22.4 |
| Vega | 80°32.3 | 38°48.8 |
| Nunki | 75°46.0 | -26°15.8 |
| Altair | 61°58.5 | 8°56.5 |
| Peacock | 53°03.3 | -56°39.1 |
| Deneb | 49°24.7 | 45°22.9 |
| Enif | 33°37.2 | 10°00.1 |
| Al Na'ir | 27°30.8 | -46°49.9 |
| Fomalhaut | 15°12.6 | -29°28.7 |
| Scheat | 13°43.5 | 28°13.9 |
| Markab | 13°28.2 | 15°21.2 |
| Oct 10 Sat | SHA | Mer.pass |
| Venus | 147°22.8 | 12:53 |
| Mars | 230°26.6 | 07:23 |
| Jupiter | 216°15.9 | 08:19 |
| Saturn | 348°56.6 | 23:26 |
| Oct 11 Sun | SHA | Mer.pass |
| Venus | 147°40.0 | 12:48 |
| Mars | 229°51.7 | 07:22 |
| Jupiter | 216°06.2 | 08:16 |
| Saturn | 349°00.9 | 23:21 |
| Oct 12 Mon | SHA | Mer.pass |
| Venus | 147°59.3 | 12:43 |
| Mars | 229°16.9 | 07:20 |
| Jupiter | 215°56.6 | 08:13 |
| Saturn | 349°05.2 | 23:17 |
| Horizontal parallax | | |
| Venus: | 0.5 | |
| Mars: | 0.1 | |

| h | Sun | | | Moon | | | |
|-----------------------|----------|----------|------------|-------|----------|-------|-------|
| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 183°13.1 | S06°34.0 | 191°54.0 | 14.0' | S06°28.4 | 15.1' | 56.9' |
| 1 | 198°13.2 | 34.9 | 206°27.0 | 14.0' | 06°43.4 | 15.0' | 56.8' |
| 2 | 213°13.4 | 35.9 | 221°00.0 | 14.0' | 06°58.4 | 15.0' | 56.8' |
| 3 | 228°13.6 | · · 36.8 | 235°33.0 | 14.0' | 07°13.4 | 14.9' | 56.8' |
| 4 | 243°13.7 | 37.8 | 250°05.9 | 14.0' | 07°28.3 | 14.9' | 56.8' |
| 5 | 258°13.9 | 38.7 | 264°38.9 | 13.9' | 07°43.2 | 14.8' | 56.7' |
| 6 | 273°14.0 | S06°39.7 | 279°11.8 | 13.9' | S07°58.0 | 14.8' | 56.7' |
| 7 | 288°14.2 | 40.6 | 293°44.8 | 13.9' | 08°12.8 | 14.7' | 56.7' |
| 8 | 303°14.4 | 41.6 | 308°17.7 | 13.9' | 08°27.6 | 14.7' | 56.7' |
| 9 | 318°14.5 | · · 42.5 | 322°50.6 | 13.9' | 08°42.3 | 14.6' | 56.7' |
| 10 | 333°14.7 | 43.5 | 337°23.5 | 13.9' | 08°56.9 | 14.6' | 56.6' |
| 11 | 348°14.9 | 44.4 | 351°56.4 | 13.9' | 09°11.5 | 14.5' | 56.6' |
| 12 | 3°15.0 | S06°45.4 | 6°29.2 | 13.8' | S09°26.0 | 14.5' | 56.6' |
| 13 | 18°15.2 | 46.3 | 21°02.1 | 13.8' | 09°40.5 | 14.4' | 56.6' |
| 14 | 33°15.4 | 47.2 | 35°34.9 | 13.8' | 09°55.0 | 14.4' | 56.5' |
| 15 | 48°15.5 | · · 48.2 | 50°07.7 | 13.8' | 10°09.3 | 14.3' | 56.5' |
| 16 | 63°15.7 | 49.1 | 64°40.5 | 13.8' | 10°23.7 | 14.3' | 56.5' |
| 17 | 78°15.9 | 50.1 | 79°13.2 | 13.7' | 10°37.9 | 14.2' | 56.5' |
| 18 | 93°16.0 | S06°51.0 | 93°46.0 | 13.7' | S10°52.1 | 14.1' | 56.4' |
| 19 | 108°16.2 | 52.0 | 108°18.7 | 13.7' | 11°06.3 | 14.1' | 56.4' |
| 20 | 123°16.4 | 52.9 | 122°51.4 | 13.7' | 11°20.3 | 14.0' | 56.4' |
| 21 | 138°16.5 | · · 53.9 | 137°24.1 | 13.6' | 11°34.4 | 14.0' | 56.4' |
| 22 | 153°16.7 | 54.8 | 151°56.7 | 13.6' | 11°48.3 | 13.9' | 56.4' |
| 23 | 168°16.8 | 55.7 | 166°29.3 | 13.6' | 12°02.2 | 13.8' | 56.3' |
| SD = 16.0' $d = 0.9'$ | | | SD = 15.5' | | | | |

| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 183°17.0 | S06°56.7 | 181°01.9 | 13.6' | S12°16.0 | 13.8' | 56.3' |
| 1 | 198°17.2 | 57.6 | 195°34.5 | 13.5' | 12°29.8 | 13.7' | 56.3' |
| 2 | 213°17.3 | 58.6 | 210°07.0 | 13.5' | 12°43.5 | 13.6' | 56.3' |
| 3 | 228°17.5 | 06°59.5 | 224°39.5 | 13.5' | 12°57.1 | 13.6' | 56.2' |
| 4 | 243°17.7 | 07°00.5 | 239°12.0 | 13.4' | 13°10.7 | 13.5' | 56.2' |
| 5 | 258°17.8 | 01.4 | 253°44.5 | 13.4' | 13°24.2 | 13.4' | 56.2' |
| 6 | 273°18.0 | S07°02.3 | 268°16.9 | 13.4' | S13°37.6 | 13.3' | 56.2' |
| 7 | 288°18.1 | 03.3 | 282°49.3 | 13.4' | 13°51.0 | 13.3' | 56.1' |
| 8 | 303°18.3 | 04.2 | 297°21.6 | 13.3' | 14°04.2 | 13.2' | 56.1' |
| 9 | 318°18.5 | · · 05.2 | 311°53.9 | 13.3' | 14°17.4 | 13.1' | 56.1' |
| 10 | 333°18.6 | 06.1 | 326°26.2 | 13.3' | 14°30.6 | 13.1' | 56.1' |
| 11 | 348°18.8 | 07.1 | 340°58.5 | 13.2' | 14°43.6 | 13.0' | 56.1' |
| 12 | 3°18.9 | S07°08.0 | 355°30.7 | 13.2' | S14°56.6 | 12.9' | 56.0' |
| 13 | 18°19.1 | 08.9 | 10°02.9 | 13.1' | 15°09.5 | 12.8' | 56.0' |
| 14 | 33°19.3 | 09.9 | 24°35.0 | 13.1' | 15°22.3 | 12.7' | 56.0' |
| 15 | 48°19.4 | · · 10.8 | 39°07.1 | 13.1' | 15°35.0 | 12.7' | 56.0' |
| 16 | 63°19.6 | 11.8 | 53°39.2 | 13.0' | 15°47.7 | 12.6' | 55.9' |
| 17 | 78°19.7 | 12.7 | 68°11.2 | 13.0' | 16°00.3 | 12.5' | 55.9' |
| 18 | 93°19.9 | S07°13.7 | 82°43.2 | 13.0' | S16°12.8 | 12.4' | 55.9' |
| 19 | 108°20.0 | 14.6 | 97°15.2 | 12.9' | 16°25.2 | 12.3' | 55.9' |
| 20 | 123°20.2 | 15.5 | 111°47.1 | 12.9' | 16°37.5 | 12.2' | 55.8' |
| 21 | 138°20.4 | · · 16.5 | 126°19.0 | 12.8' | 16°49.7 | 12.2' | 55.8' |
| 22 | 153°20.5 | 17.4 | 140°50.9 | 12.8' | 17°01.9 | 12.1' | 55.8' |
| 23 | 168°20.7 | 18.4 | 155°22.7 | 12.8' | 17°14.0 | 12.0' | 55.8' |
| SD = 16.0' $d = 0.9'$ | | | SD = 15.4' | | | | |

| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 183°20.8 | S07°19.3 | 169°54.4 | 12.7' | S17°25.9 | 11.9' | 55.8' |
| 1 | 198°21.0 | 20.2 | 184°26.1 | 12.7' | 17°37.8 | 11.8' | 55.7' |
| 2 | 213°21.2 | 21.2 | 198°57.8 | 12.6' | 17°49.6 | 11.7' | 55.7' |
| 3 | 228°21.3 | · · 22.1 | 213°29.5 | 12.6' | 18°01.3 | 11.6' | 55.7' |
| 4 | 243°21.5 | 23.0 | 228°01.1 | 12.6' | 18°13.0 | 11.5' | 55.7' |
| 5 | 258°21.6 | 24.0 | 242°32.6 | 12.5' | 18°24.5 | 11.4' | 55.6' |
| 6 | 273°21.8 | S07°24.9 | 257°04.1 | 12.5' | S18°35.9 | 11.3' | 55.6' |
| 7 | 288°21.9 | 25.9 | 271°35.6 | 12.4' | 18°47.2 | 11.2' | 55.6' |
| 8 | 303°22.1 | 26.8 | 286°07.0 | 12.4' | 18°58.5 | 11.1' | 55.6' |
| 9 | 318°22.2 | · · 27.7 | 300°38.4 | 12.3' | 19°09.6 | 11.0' | 55.6' |
| 10 | 333°22.4 | 28.7 | 315°09.8 | 12.3' | 19°20.7 | 11.0' | 55.5' |
| 11 | 348°22.6 | 29.6 | 329°41.1 | 12.3' | 19°31.6 | 10.9' | 55.5' |
| 12 | 3°22.7 | S07°30.6 | 344°12.3 | 12.2' | S19°42.5 | 10.8' | 55.5' |
| 13 | 18°22.9 | 31.5 | 358°43.5 | 12.2' | 19°53.2 | 10.7' | 55.5' |
| 14 | 33°23.0 | 32.4 | 13°14.7 | 12.1' | 20°03.9 | 10.6' | 55.4' |
| 15 | 48°23.2 | · · 33.4 | 27°45.8 | 12.1' | 20°14.4 | 10.4' | 55.4' |
| 16 | 63°23.3 | 34.3 | 42°16.9 | 12.0' | 20°24.9 | 10.3' | 55.4' |
| 17 | 78°23.5 | 35.2 | 56°47.9 | 12.0' | 20°35.2 | 10.2' | 55.4' |
| 18 | 93°23.6 | S07°36.2 | 71°18.9 | 11.9' | S20°45.5 | 10.1' | 55.4' |
| 19 | 108°23.8 | 37.1 | 85°49.8 | 11.9' | 20°55.6 | 10.0' | 55.3' |
| 20 | 123°23.9 | 38.1 | 100°20.7 | 11.9' | 21°05.6 | 9.9' | 55.3' |
| 21 | 138°24.1 | · · 39.0 | 114°51.6 | 11.8' | 21°15.6 | 9.8' | 55.3' |
| 22 | 153°24.2 | 39.9 | 129°22.4 | 11.8' | 21°25.4 | 9.7' | 55.3' |
| 23 | 168°24.4 | 40.9 | 143°53.2 | 11.7' | 21°35.1 | 9.6' | 55.3' |
| SD = 16.0' $d = 0.9'$ | | | SD = 15.2' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 04:37 | 05:56 | 07:05 | 16:27 | 17:35 | 18:53 |
| N 70° | 04:43 | 05:54 | 06:56 | 16:36 | 17:37 | 18:48 |
| 68° | 04:48 | 05:52 | 06:49 | 16:43 | 17:39 | 18:43 |
| 66° | 04:52 | 05:51 | 06:43 | 16:49 | 17:41 | 18:40 |
| 64° | 04:55 | 05:50 | 06:38 | 16:54 | 17:42 | 18:37 |
| 62° | 04:57 | 05:49 | 06:33 | 16:59 | 17:43 | 18:35 |
| 60° | 04:59 | 05:48 | 06:29 | 17:03 | 17:45 | 18:33 |
| N 58° | 05:01 | 05:47 | 06:26 | 17:06 | 17:46 | 18:31 |
| 56° | 05:03 | 05:46 | 06:23 | 17:10 | 17:47 | 18:30 |
| 54° | 05:04 | 05:45 | 06:20 | 17:12 | 17:48 | 18:29 |
| 52° | 05:05 | 05:44 | 06:18 | 17:15 | 17:49 | 18:28 |
| 50° | 05:06 | 05:43 | 06:15 | 17:17 | 17:50 | 18:27 |
| 45° | 05:07 | 05:41 | 06:10 | 17:22 | 17:52 | 18:26 |
| N 40° | 05:08 | 05:39 | 06:06 | 17:27 | 17:54 | 18:25 |
| 35° | 05:08 | 05:37 | 06:03 | 17:30 | 17:56 | 18:25 |
| 30° | 05:07 | 05:35 | 05:59 | 17:34 | 17:58 | 18:26 |
| 20° | 05:06 | 05:31 | 05:54 | 17:40 | 18:02 | 18:27 |
| N 10° | 05:03 | 05:27 | 05:48 | 17:45 | 18:06 | 18:31 |
| 0° | 04:58 | 05:23 | 05:43 | 17:50 | 18:11 | 18:35 |
| S 10° | 04:53 | 05:17 | 05:38 | 17:55 | 18:16 | 18:41 |
| 20° | 04:45 | 05:11 | 05:33 | 18:01 | 18:23 | 18:49 |
| 30° | 04:34 | 05:02 | 05:27 | 18:07 | 18:32 | 19:00 |
| 35° | 04:27 | 04:57 | 05:23 | 18:11 | 18:37 | 19:07 |
| 40° | 04:18 | 04:51 | 05:19 | 18:16 | 18:43 | 19:16 |
| 45° | 04:08 | 04:44 | 05:14 | 18:21 | 18:51 | 19:27 |
| S 50° | 03:54 | 04:34 | 05:08 | 18:27 | 19:00 | 19:41 |
| 52° | 03:48 | 04:30 | 05:05 | 18:30 | 19:05 | 19:48 |
| 54° | 03:40 | 04:25 | 05:02 | 18:33 | 19:10 | 19:55 |
| 56° | 03:32 | 04:20 | 04:59 | 18:36 | 19:15 | 20:04 |
| 58° | 03:22 | 04:14 | 04:55 | 18:40 | 19:22 | 20:14 |
| S 60° | 03:10 | 04:07 | 04:51 | 18:44 | 19:29 | 20:26 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | 07:13 | 09:46 | ■ | 15:23 | 14:26 | ■ |
| N 70° | 07:00 | 09:13 | 12:50 | 15:39 | 15:01 | 13:03 |
| 68° | 06:49 | 08:49 | 11:10 | 15:52 | 15:27 | 14:43 |
| 66° | 06:41 | 08:31 | 10:32 | 16:03 | 15:46 | 15:23 |
| 64° | 06:33 | 08:17 | 10:05 | 16:12 | 16:02 | 15:50 |
| 62° | 06:27 | 08:04 | 09:45 | 16:19 | 16:16 | 16:12 |
| 60° | 06:22 | 07:54 | 09:28 | 16:26 | 16:27 | 16:29 |
| N 58° | 06:17 | 07:45 | 09:14 | 16:32 | 16:37 | 16:44 |
| 56° | 06:13 | 07:37 | 09:03 | 16:37 | 16:46 | 16:56 |
| 54° | 06:09 | 07:31 | 08:52 | 16:42 | 16:53 | 17:07 |
| 52° | 06:06 | 07:24 | 08:43 | 16:47 | 17:00 | 17:17 |
| 50° | 06:03 | 07:19 | 08:35 | 16:51 | 17:07 | 17:26 |
| 45° | 05:56 | 07:07 | 08:17 | 16:59 | 17:20 | 17:45 |
| N 40° | 05:50 | 06:57 | 08:03 | 17:06 | 17:31 | 18:00 |
| 35° | 05:46 | 06:49 | 07:51 | 17:13 | 17:41 | 18:13 |
| 30° | 05:42 | 06:41 | 07:41 | 17:18 | 17:50 | 18:24 |
| 20° | 05:34 | 06:29 | 07:23 | 17:28 | 18:04 | 18:44 |
| N 10° | 05:28 | 06:18 | 07:08 | 17:36 | 18:17 | 19:01 |
| 0° | 05:23 | 06:08 | 06:54 | 17:44 | 18:30 | 19:17 |
| S 10° | 05:17 | 05:57 | 06:40 | 17:52 | 18:42 | 19:33 |
| 20° | 05:11 | 05:47 | 06:25 | 18:00 | 18:55 | 19:50 |
| 30° | 05:04 | 05:35 | 06:08 | 18:10 | 19:10 | 20:10 |
| 35° | 05:00 | 05:28 | 05:58 | 18:16 | 19:19 | 20:22 |
| 40° | 04:56 | 05:20 | 05:46 | 18:22 | 19:29 | 20:35 |
| 45° | 04:51 | 05:11 | 05:33 | 18:30 | 19:41 | 20:51 |
| S 50° | 04:45 | 05:00 | 05:17 | 18:39 | 19:55 | 21:11 |
| 52° | 04:42 | 04:55 | 05:10 | 18:43 | 20:02 | 21:20 |
| 54° | 04:39 | 04:49 | 05:02 | 18:48 | 20:10 | 21:31 |
| 56° | 04:36 | 04:43 | 04:52 | 18:53 | 20:18 | 21:43 |
| 58° | 04:32 | 04:36 | 04:42 | 18:59 | 20:28 | 21:57 |
| S 60° | 04:28 | 04:29 | 04:30 | 19:06 | 20:39 | 22:13 |

| Day | Sun | | | Moon | | |
|-----|---|--------------------------|-----------------------|-----------------------------|----------------|--------------------|
| | Eqn.of Time 00 ^h mm:ss | 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 0-2 1-2% |
| 10 | 12:52 | 13:00 | 11:47 | 11:33 | 23:56 | |
| 11 | 13:08 | 13:16 | 11:47 | 12:19 | —:— | |
| 12 | 13:23 | 13:31 | 11:46 | 13:05 | 00:42 | |

| h | Aries | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 21°34.3 | 169°54.9 | S20°51.6 | 250°16.7 | N19°18.9 | 237°21.4 | N14°53.4 | 10°43.8 | N01°42.9 |
| 1 | 36°36.8 | 184°58.3 | 51.2 | 265°17.8 | 18.6 | 252°23.5 | 53.3 | 25°46.5 | 42.8 |
| 2 | 51°39.3 | 200°01.7 | 50.8 | 280°18.8 | 18.2 | 267°25.5 | 53.2 | 40°49.1 | 42.8 |
| 3 | 66°41.7 | 215°05.1 | • • 50.5 | 295°19.8 | • • 17.9 | 282°27.6 | • • 53.1 | 55°51.7 | • • 42.7 |
| 4 | 81°44.2 | 230°08.5 | 50.1 | 310°20.9 | 17.6 | 297°29.7 | 52.9 | 70°54.4 | 42.6 |
| 5 | 96°46.7 | 245°11.9 | 49.7 | 325°21.9 | 17.3 | 312°31.7 | 52.8 | 85°57.0 | 42.5 |
| 6 | 111°49.1 | 260°15.3 | S20°49.4 | 340°22.9 | N19°17.0 | 327°33.8 | N14°52.7 | 100°59.7 | N01°42.5 |
| 7 | 126°51.6 | 275°18.7 | 49.0 | 355°24.0 | 16.6 | 342°35.9 | 52.6 | 116°02.3 | 42.4 |
| 8 | 141°54.1 | 290°22.1 | 48.6 | 10°25.0 | 16.3 | 357°38.0 | 52.5 | 131°04.9 | 42.3 |
| 9 | 156°56.5 | 305°25.5 | • • 48.2 | 25°26.0 | • • 16.0 | 12°40.0 | • • 52.3 | 146°07.6 | • • 42.2 |
| 10 | 171°59.0 | 320°28.9 | 47.8 | 40°27.1 | 15.7 | 27°42.1 | 52.2 | 161°10.2 | 42.2 |
| 11 | 187°01.4 | 335°32.3 | 47.4 | 55°28.1 | 15.4 | 42°44.2 | 52.1 | 176°12.9 | 42.1 |
| 12 | 202°03.9 | 350°35.8 | S20°47.0 | 70°29.1 | N19°15.0 | 57°46.2 | N14°52.0 | 191°15.5 | N01°42.0 |
| 13 | 217°06.4 | 5°39.2 | 46.6 | 85°30.2 | 14.7 | 72°48.3 | 51.8 | 206°18.2 | 41.9 |
| 14 | 232°08.8 | 20°42.6 | 46.2 | 100°31.2 | 14.4 | 87°50.4 | 51.7 | 221°20.8 | 41.9 |
| 15 | 247°11.3 | 35°46.1 | • • 45.8 | 115°32.2 | • • 14.1 | 102°52.5 | • • 51.6 | 236°23.4 | • • 41.8 |
| 16 | 262°13.8 | 50°49.5 | 45.4 | 130°33.3 | 13.7 | 117°54.5 | 51.5 | 251°26.1 | 41.7 |
| 17 | 277°16.2 | 65°52.9 | 45.0 | 145°34.3 | 13.4 | 132°56.6 | 51.4 | 266°28.7 | 41.7 |
| 18 | 292°18.7 | 80°56.4 | S20°44.6 | 160°35.3 | N19°13.1 | 147°58.7 | N14°51.2 | 281°31.4 | N01°41.6 |
| 19 | 307°21.2 | 95°59.8 | 44.2 | 175°36.4 | 12.8 | 163°00.8 | 51.1 | 296°34.0 | 41.5 |
| 20 | 322°23.6 | 111°03.3 | 43.8 | 190°37.4 | 12.5 | 178°02.8 | 51.0 | 311°36.6 | 41.4 |
| 21 | 337°26.1 | 126°06.7 | • • 43.4 | 205°38.4 | • • 12.1 | 193°04.9 | • • 50.9 | 326°39.3 | • • 41.4 |
| 22 | 352°28.6 | 141°10.2 | 43.0 | 220°39.5 | 11.8 | 208°07.0 | 50.8 | 341°41.9 | 41.3 |
| 23 | 7°31.0 | 156°13.6 | 42.5 | 235°40.5 | 11.5 | 223°09.0 | 50.6 | 356°44.6 | 41.2 |
| <hr/> | | | | | | | | | |
| Mer.pass. 22:30 | | ν3.4' d-0.4' m-4.43 | | ν1.0' d-0.3' m1.03 | | ν2.1' d-0.1' m-1.92 | | ν2.6' d-0.1' m0.37 | |

| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| 0 | 22°33.5 | 171°17.1 | S20°42.1 | 250°41.6 | N19°11.2 | 238°11.1 | N14°50.5 | 11°47.2 | N01°41.1 |
| 1 | 37°35.9 | 186°20.6 | 41.7 | 265°42.6 | 10.8 | 253°13.2 | 50.4 | 26°49.9 | 41.1 |
| 2 | 52°38.4 | 201°24.0 | 41.3 | 280°43.6 | 10.5 | 268°15.3 | 50.3 | 41°52.5 | 41.0 |
| 3 | 67°40.9 | 216°27.5 | · · 40.8 | 295°44.7 | · · 10.2 | 283°17.3 | · · 50.1 | 56°55.1 | · · 40.9 |
| 4 | 82°43.3 | 231°31.0 | 40.4 | 310°45.7 | 09.9 | 298°19.4 | 50.0 | 71°57.8 | 40.8 |
| 5 | 97°45.8 | 246°34.4 | 40.0 | 325°46.7 | 09.5 | 313°21.5 | 49.9 | 87°00.4 | 40.8 |
| 6 | 112°48.3 | 261°37.9 | S20°39.5 | 340°47.8 | N19°09.2 | 328°23.6 | N14°49.8 | 102°03.1 | N01°40.7 |
| 7 | 127°50.7 | 276°41.4 | 39.1 | 355°48.8 | 08.9 | 343°25.6 | 49.7 | 117°05.7 | 40.6 |
| 8 | 142°53.2 | 291°44.9 | 38.7 | 10°49.9 | 08.6 | 358°27.7 | 49.5 | 132°08.3 | 40.6 |
| 9 | 157°55.7 | 306°48.4 | · · 38.2 | 25°50.9 | · · 08.3 | 13°29.8 | · · 49.4 | 147°11.0 | · · 40.5 |
| 10 | 172°58.1 | 321°51.9 | 37.8 | 40°52.0 | 07.9 | 28°31.9 | 49.3 | 162°13.6 | 40.4 |
| 11 | 188°00.6 | 336°55.3 | 37.3 | 55°53.0 | 07.6 | 43°34.0 | 49.2 | 177°16.3 | 40.3 |
| 12 | 203°03.1 | 351°58.8 | S20°36.9 | 70°54.0 | N19°07.3 | 58°36.0 | N14°49.1 | 192°18.9 | N01°40.3 |
| 13 | 218°05.5 | 7°02.3 | 36.4 | 85°55.1 | 07.0 | 73°38.1 | 48.9 | 207°21.5 | 40.2 |
| 14 | 233°08.0 | 22°05.8 | 35.9 | 100°56.1 | 06.6 | 88°40.2 | 48.8 | 222°24.2 | 40.1 |
| 15 | 248°10.4 | 37°09.3 | · · 35.5 | 115°57.2 | · · 06.3 | 103°42.3 | · · 48.7 | 237°26.8 | · · 40.0 |
| 16 | 263°12.9 | 52°12.9 | 35.0 | 130°58.2 | 06.0 | 118°44.3 | 48.6 | 252°29.5 | 40.0 |
| 17 | 278°15.4 | 67°16.4 | 34.5 | 145°59.2 | 05.7 | 133°46.4 | 48.5 | 267°32.1 | 39.9 |
| 18 | 293°17.8 | 82°19.9 | S20°34.1 | 161°00.3 | N19°05.3 | 148°48.5 | N14°48.3 | 282°34.7 | N01°39.8 |
| 19 | 308°20.3 | 97°23.4 | 33.6 | 176°01.3 | 05.0 | 163°50.6 | 48.2 | 297°37.4 | 39.7 |
| 20 | 323°22.8 | 112°26.9 | 33.1 | 191°02.4 | 04.7 | 178°52.6 | 48.1 | 312°40.0 | 39.7 |
| 21 | 338°25.2 | 127°30.4 | · · 32.7 | 206°03.4 | · · 04.4 | 193°54.7 | · · 48.0 | 327°42.7 | · · 39.6 |
| 22 | 353°27.7 | 142°34.0 | 32.2 | 221°04.5 | 04.0 | 208°56.8 | 47.9 | 342°45.3 | 39.5 |
| 23 | 8°30.2 | 157°37.5 | 31.7 | 236°05.5 | 03.7 | 223°58.9 | 47.7 | 357°48.0 | 39.5 |
| Mer.pass. 22:26 | | ν3.5' d-0.4' m-4.37 | | ν1.0' d-0.3' m1.02 | | ν2.1' d-0.1' m-1.92 | | ν2.6' d-0.1' m0.38 | |

| Th | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| 0 | 23°32.6 | 172°41.0 | S20°31.2 | 251°06.6 | N19°03.4 | 239°01.0 | N14°47.6 | 12°50.6 | N01°39.4 |
| 1 | 38°35.1 | 187°44.5 | 30.7 | 266°07.6 | 03.1 | 254°03.0 | 47.5 | 27°53.2 | 39.3 |
| 2 | 53°37.5 | 202°48.1 | 30.2 | 281°08.7 | 02.7 | 269°05.1 | 47.4 | 42°55.9 | 39.2 |
| 3 | 68°40.0 | 217°51.6 | · · 29.7 | 296°09.7 | · · 02.4 | 284°07.2 | · · 47.3 | 57°58.5 | · · 39.2 |
| 4 | 83°42.5 | 232°55.1 | 29.3 | 311°10.8 | 02.1 | 299°09.3 | 47.1 | 73°01.2 | 39.1 |
| 5 | 98°44.9 | 247°58.7 | 28.8 | 326°11.8 | 01.8 | 314°11.4 | 47.0 | 88°03.8 | 39.0 |
| 6 | 113°47.4 | 263°02.2 | S20°28.3 | 341°12.8 | N19°01.4 | 329°13.4 | N14°46.9 | 103°06.4 | N01°38.9 |
| 7 | 128°49.9 | 278°05.8 | 27.8 | 356°13.9 | 01.1 | 344°15.5 | 46.8 | 118°09.1 | 38.9 |
| 8 | 143°52.3 | 293°09.3 | 27.3 | 11°14.9 | 00.8 | 359°17.6 | 46.7 | 133°11.7 | 38.8 |
| 9 | 158°54.8 | 308°12.9 | · · 26.7 | 26°16.0 | · · 00.5 | 14°19.7 | · · 46.5 | 148°14.4 | · · 38.7 |
| 10 | 173°57.3 | 323°16.4 | 26.2 | 41°17.0 | 19°00.1 | 29°21.8 | 46.4 | 163°17.0 | 38.7 |
| 11 | 188°59.7 | 338°20.0 | 25.7 | 56°18.1 | 18°59.8 | 44°23.8 | 46.3 | 178°19.6 | 38.6 |
| 12 | 204°02.2 | 353°23.6 | S20°25.2 | 71°19.1 | N18°59.5 | 59°25.9 | N14°46.2 | 193°22.3 | N01°38.5 |
| 13 | 219°04.7 | 8°27.1 | 24.7 | 86°20.2 | 59.1 | 74°28.0 | 46.1 | 208°24.9 | 38.4 |
| 14 | 234°07.1 | 23°30.7 | 24.2 | 101°21.2 | 58.8 | 89°30.1 | 45.9 | 223°27.6 | 38.4 |
| 15 | 249°09.6 | 38°34.3 | · · 23.7 | 116°22.3 | · · 58.5 | 104°32.2 | · · 45.8 | 238°30.2 | · · 38.3 |
| 16 | 264°12.0 | 53°37.8 | 23.1 | 131°23.4 | 58.2 | 119°34.2 | 45.7 | 253°32.8 | 38.2 |
| 17 | 279°14.5 | 68°41.4 | 22.6 | 146°24.4 | 57.8 | 134°36.3 | 45.6 | 268°35.5 | 38.1 |
| 18 | 294°17.0 | 83°45.0 | S20°22.1 | 161°25.5 | N18°57.5 | 149°38.4 | N14°45.5 | 283°38.1 | N01°38.1 |
| 19 | 309°19.4 | 98°48.6 | 21.5 | 176°26.5 | 57.2 | 164°40.5 | 45.4 | 298°40.8 | 38.0 |
| 20 | 324°21.9 | 113°52.1 | 21.0 | 191°27.6 | 56.9 | 179°42.6 | 45.2 | 313°43.4 | 37.9 |
| 21 | 339°24.4 | 128°55.7 | · · 20.5 | 206°28.6 | · · 56.5 | 194°44.7 | · · 45.1 | 328°46.0 | · · 37.9 |
| 22 | 354°26.8 | 143°59.3 | 19.9 | 221°29.7 | 56.2 | 209°46.7 | 45.0 | 343°48.7 | 37.8 |
| 23 | 9°29.3 | 159°02.9 | 19.4 | 236°30.7 | 55.9 | 224°48.8 | 44.9 | 358°51.3 | 37.7 |
| Mer.pass. 22:22 | | ν3.5' d-0.5' m-4.31 | | ν1.0' d-0.3' m1.01 | | ν2.1' d-0.1' m-1.92 | | ν2.6' d-0.1' m0.38 | |

<https://pypi.org/project/skyalmanac/>


| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|----------|-------|----------|------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| Tue 0 | 183°24.5 | S07°41.8 | | 158°23.9 | 11.7' | S21°44.7 | 9.5' | 55.2' |
| 1 | 198°24.7 | 42.7 | | 172°54.6 | 11.6' | 21°54.2 | 9.4' | 55.2' |
| 2 | 213°24.9 | 43.7 | | 187°25.2 | 11.6' | 22°03.6 | 9.3' | 55.2' |
| 3 | 228°25.0 | · · 44.6 | | 201°55.8 | 11.5' | 22°12.9 | 9.2' | 55.2' |
| 4 | 243°25.2 | 45.5 | | 216°26.3 | 11.5' | 22°22.0 | 9.1' | 55.1' |
| 5 | 258°25.3 | 46.5 | | 230°56.8 | 11.5' | 22°31.1 | 8.9' | 55.1' |
| 6 | 273°25.5 | S07°47.4 | | 245°27.3 | 11.4' | S22°40.0 | 8.8' | 55.1' |
| 7 | 288°25.6 | 48.3 | | 259°57.7 | 11.4' | 22°48.8 | 8.7' | 55.1' |
| 8 | 303°25.8 | 49.3 | | 274°28.0 | 11.3' | 22°57.5 | 8.6' | 55.1' |
| 9 | 318°25.9 | · · 50.2 | | 288°58.4 | 11.3' | 23°06.1 | 8.5' | 55.1' |
| 10 | 333°26.1 | 51.1 | | 303°28.6 | 11.2' | 23°14.6 | 8.4' | 55.0' |
| 11 | 348°26.2 | 52.1 | | 317°58.9 | 11.2' | 23°23.0 | 8.2' | 55.0' |
| 12 | 3°26.4 | S07°53.0 | | 332°29.1 | 11.2' | S23°31.2 | 8.1' | 55.0' |
| 13 | 18°26.5 | 53.9 | | 346°59.2 | 11.1' | 23°39.4 | 8.0' | 55.0' |
| 14 | 33°26.7 | 54.9 | | 1°29.3 | 11.1' | 23°47.4 | 7.9' | 55.0' |
| 15 | 48°26.8 | · · 55.8 | | 15°59.4 | 11.0' | 23°55.3 | 7.8' | 54.9' |
| 16 | 63°26.9 | 56.7 | | 30°29.4 | 11.0' | 24°03.0 | 7.7' | 54.9' |
| 17 | 78°27.1 | 57.7 | | 44°59.4 | 10.9' | 24°10.7 | 7.5' | 54.9' |
| 18 | 93°27.2 | S07°58.6 | | 59°29.4 | 10.9' | S24°18.2 | 7.4' | 54.9' |
| 19 | 108°27.4 | 07°59.5 | | 73°59.3 | 10.9' | 24°25.6 | 7.3' | 54.9' |
| 20 | 123°27.5 | 08°00.5 | | 88°29.1 | 10.8' | 24°32.9 | 7.2' | 54.8' |
| 21 | 138°27.7 | · · 01.4 | | 102°59.0 | 10.8' | 24°40.1 | 7.0' | 54.8' |
| 22 | 153°27.8 | 02.3 | | 117°28.8 | 10.8' | 24°47.1 | 6.9' | 54.8' |
| 23 | 168°28.0 | 03.3 | | 131°58.5 | 10.7' | 24°54.0 | 6.8' | 54.8' |
| SD = 16.0' $d = 0.9'$ | | | | | | | | |

| Wed | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|----------|-------|----------|------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 183°28.1 | S08°04.2 | | 146°28.2 | 10.7' | S25°00.8 | 6.7' | 54.8' |
| 1 | 198°28.3 | 05.1 | | 160°57.9 | 10.6' | 25°07.5 | 6.5' | 54.8' |
| 2 | 213°28.4 | 06.0 | | 175°27.6 | 10.6' | 25°14.1 | 6.4' | 54.7' |
| 3 | 228°28.6 | · · 07.0 | | 189°57.2 | 10.6' | 25°20.5 | 6.3' | 54.7' |
| 4 | 243°28.7 | 07.9 | | 204°26.7 | 10.5' | 25°26.8 | 6.2' | 54.7' |
| 5 | 258°28.9 | 08.8 | | 218°56.3 | 10.5' | 25°32.9 | 6.0' | 54.7' |
| 6 | 273°29.0 | S08°09.8 | | 233°25.8 | 10.5' | S25°39.0 | 5.9' | 54.7' |
| 7 | 288°29.1 | 10.7 | | 247°55.2 | 10.4' | 25°44.9 | 5.8' | 54.7' |
| 8 | 303°29.3 | 11.6 | | 262°24.7 | 10.4' | 25°50.7 | 5.7' | 54.6' |
| 9 | 318°29.4 | · · 12.6 | | 276°54.1 | 10.4' | 25°56.3 | 5.5' | 54.6' |
| 10 | 333°29.6 | 13.5 | | 291°23.5 | 10.3' | 26°01.8 | 5.4' | 54.6' |
| 11 | 348°29.7 | 14.4 | | 305°52.8 | 10.3' | 26°07.2 | 5.3' | 54.6' |
| 12 | 3°29.9 | S08°15.3 | | 320°22.1 | 10.3' | S26°12.5 | 5.1' | 54.6' |
| 13 | 18°30.0 | 16.3 | | 334°51.4 | 10.3' | 26°17.6 | 5.0' | 54.6' |
| 14 | 33°30.2 | 17.2 | | 349°20.7 | 10.2' | 26°22.6 | 4.9' | 54.6' |
| 15 | 48°30.3 | · · 18.1 | | 3°49.9 | 10.2' | 26°27.5 | 4.7' | 54.5' |
| 16 | 63°30.4 | 19.1 | | 18°19.1 | 10.2' | 26°32.3 | 4.6' | 54.5' |
| 17 | 78°30.6 | 20.0 | | 32°48.3 | 10.2' | 26°36.9 | 4.5' | 54.5' |
| 18 | 93°30.7 | S08°20.9 | | 47°17.5 | 10.1' | S26°41.3 | 4.3' | 54.5' |
| 19 | 108°30.9 | 21.8 | | 61°46.6 | 10.1' | 26°45.7 | 4.2' | 54.5' |
| 20 | 123°31.0 | 22.8 | | 76°15.7 | 10.1' | 26°49.9 | 4.1' | 54.5' |
| 21 | 138°31.2 | · · 23.7 | | 90°44.8 | 10.1' | 26°54.0 | 3.9' | 54.5' |
| 22 | 153°31.3 | 24.6 | | 105°13.9 | 10.1' | 26°57.9 | 3.8' | 54.4' |
| 23 | 168°31.4 | 25.5 | | 119°42.9 | 10.0' | 27°01.7 | 3.7' | 54.4' |
| SD = 16.0' $d = 0.9'$ | | | | | | | | |

| Thu | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|----------|-------|----------|------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 183°31.6 | S08°26.5 | | 134°12.0 | 10.0' | S27°05.4 | 3.5' | 54.4' |
| 1 | 198°31.7 | 27.4 | | 148°41.0 | 10.0' | 27°09.0 | 3.4' | 54.4' |
| 2 | 213°31.9 | 28.3 | | 163°10.0 | 10.0' | 27°12.4 | 3.3' | 54.4' |
| 3 | 228°32.0 | · · 29.2 | | 177°39.0 | 10.0' | 27°15.7 | 3.1' | 54.4' |
| 4 | 243°32.1 | 30.2 | | 192°07.9 | 10.0' | 27°18.8 | 3.0' | 54.4' |
| 5 | 258°32.3 | 31.1 | | 206°36.9 | 9.9' | 27°21.8 | 2.9' | 54.4' |
| 6 | 273°32.4 | S08°32.0 | | 221°05.8 | 9.9' | S27°24.7 | 2.7' | 54.3' |
| 7 | 288°32.6 | 32.9 | | 235°34.8 | 9.9' | 27°27.4 | 2.6' | 54.3' |
| 8 | 303°32.7 | 33.9 | | 250°03.7 | 9.9' | 27°30.0 | 2.5' | 54.3' |
| 9 | 318°32.8 | · · 34.8 | | 264°32.6 | 9.9' | 27°32.5 | 2.3' | 54.3' |
| 10 | 333°33.0 | 35.7 | | 279°01.5 | 9.9' | 27°34.8 | 2.2' | 54.3' |
| 11 | 348°33.1 | 36.6 | | 293°30.4 | 9.9' | 27°37.0 | 2.1' | 54.3' |
| 12 | 3°33.3 | S08°37.6 | | 307°59.2 | 9.9' | S27°39.1 | 1.9' | 54.3' |
| 13 | 18°33.4 | 38.5 | | 322°28.1 | 9.9' | 27°41.0 | 1.8' | 54.3' |
| 14 | 33°33.5 | 39.4 | | 336°57.0 | 9.9' | 27°42.8 | 1.7' | 54.3' |
| 15 | 48°33.7 | · · 40.3 | | 351°25.9 | 9.9' | 27°44.4 | 1.5' | 54.3' |
| 16 | 63°33.8 | 41.3 | | 5°54.7 | 9.9' | 27°45.9 | 1.4' | 54.3' |
| 17 | 78°33.9 | 42.2 | | 20°23.6 | 9.9' | 27°47.3 | 1.2' | 54.2' |
| 18 | 93°34.1 | S08°43.1 | | 34°52.5 | 9.9' | S27°48.6 | 1.1' | 54.2' |
| 19 | 108°34.2 | 44.0 | | 49°21.3 | 9.9' | 27°49.7 | 1.0' | 54.2' |
| 20 | 123°34.4 | 44.9 | | 63°50.2 | 9.9' | 27°50.6 | 0.8' | 54.2' |
| 21 | 138°34.5 | · · 45.9 | | 78°19.1 | 9.9' | 27°51.5 | 0.7' | 54.2' |
| 22 | 153°34.6 | 46.8 | | 92°47.9 | 9.9' | 27°52.2 | 0.6' | 54.2' |
| 23 | 168°34.8 | 47.7 | | 107°16.8 | 9.9' | 27°52.7 | 0.4' | 54.2' |
| SD = 16.0' $d = 0.9'$ | | | | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 04:51 | 06:09 | 07:19 | 16:11 | 17:21 | 18:39 |
| N 70° | 04:55 | 06:06 | 07:09 | 16:22 | 17:24 | 18:35 |
| 68° | 04:58 | 06:03 | 07:00 | 16:31 | 17:27 | 18:31 |
| 66° | 05:01 | 06:00 | 06:53 | 16:38 | 17:30 | 18:29 |
| 64° | 05:03 | 05:58 | 06:47 | 16:44 | 17:32 | 18:27 |
| 62° | 05:05 | 05:56 | 06:41 | 16:49 | 17:34 | 18:25 |
| 60° | 05:06 | 05:55 | 06:37 | 16:54 | 17:36 | 18:24 |
| N 58° | 05:08 | 05:53 | 06:33 | 16:58 | 17:38 | 18:23 |
| 56° | 05:08 | 05:52 | 06:29 | 17:02 | 17:39 | 18:22 |
| 54° | 05:09 | 05:50 | 06:26 | 17:05 | 17:41 | 18:22 |
| 52° | 05:10 | 05:49 | 06:23 | 17:08 | 17:42 | 18:21 |
| 50° | 05:10 | 05:48 | 06:20 | 17:11 | 17:44 | 18:21 |
| 45° | 05:11 | 05:45 | 06:14 | 17:17 | 17:47 | 18:21 |
| N 40° | 05:11 | 05:42 | 06:09 | 17:22 | 17:49 | 18:21 |
| 35° | 05:10 | 05:40 | 06:05 | 17:27 | 17:52 | 18:21 |
| 30° | 05:09 | 05:37 | 06:01 | 17:30 | 17:54 | 18:22 |
| 20° | 05:07 | 05:32 | 05:54 | 17:37 | 17:59 | 18:25 |
| N 10° | 05:03 | 05:27 | 05:48 | 17:43 | 18:05 | 18:29 |
| 0° | 04:58 | 05:22 | 05:43 | 17:49 | 18:10 | 18:34 |
| S 10° | 04:51 | 05:16 | 05:37 | 17:55 | 18:17 | 18:41 |
| 20° | 04:42 | 05:08 | 05:31 | 18:02 | 18:24 | 18:50 |
| 30° | 04:30 | 04:59 | 05:23 | 18:09 | 18:34 | 19:02 |
| 35° | 04:23 | 04:53 | 05:19 | 18:14 | 18:40 | 19:10 |
| 40° | 04:13 | 04:46 | 05:14 | 18:19 | 18:47 | 19:20 |
| 45° | 04:02 | 04:38 | 05:08 | 18:25 | 18:55 | 19:31 |
| S 50° | 03:47 | 04:28 | 05:01 | 18:32 | 19:05 | 19:47 |
| 52° | 03:40 | 04:23 | 04:58 | 18:35 | 19:10 | 19:54 |
| 54° | 03:32 | 04:18 | 04:55 | 18:38 | 19:16 | 20:02 |
| 56° | 03:22 | 04:12 | 04:51 | 18:42 | 19:22 | 20:12 |
| 58° | 03:11 | 04:05 | 04:47 | 18:47 | 19:29 | 20:23 |
| S 60° | 02:59 | 03:57 | 04:42 | 18:52 | 19:37 | 20:36 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | ■ | ■ | ■ | ■ | ■ | ■ |
| 68° | ■ | ■ | ■ | ■ | ■ | ■ |
| 66° | 13:22 | ■ | ■ | 14:14 | ■ | ■ |
| 64° | 12:05 | ■ | ■ | 15:31 | ■ | ■ |
| 62° | 11:29 | 13:18 | 15:07 | 16:08 | 16:04 | 16:02 |
| 60° | 11:04 | 12:36 | 13:56 | 16:34 | 16:46 | 17:13 |
| N 58° | 10:43 | 12:08 | 13:21 | 16:55 | 17:14 | 17:48 |
| 56° | 10:27 | 11:46 | 12:55 | 17:12 | 17:36 | 18:14 |
| 54° | 10:13 | 11:29 | 12:35 | 17:27 | 17:55 | 18:34 |
| 52° | 10:00 | 11:13 | 12:18 | 17:40 | 18:10 | 18:51 |
| 50° | 09:50 | 11:00 | 12:04 | 17:51 | 18:23 | 19:06 |
| 45° | 09:27 | 10:33 | 11:34 | 18:14 | 18:51 | 19:36 |
| N 40° | 09:09 | 10:12 | 11:11 | 18:33 | 19:13 | 19:59 |
| 35° | 08:54 | 09:55 | 10:52 | 18:49 | 19:31 | 20:18 |
| 30° | 08:41 | 09:40 | 10:36 | 19:03 | 19:46 | 20:34 |
| 20° | 08:19 | 09:14 | 10:08 | 19:26 | 20:12 | 21:02 |
| N 10° | 08:00 | 08:52 | 09:45 | 19:47 | 20:35 | 21:26 |
| 0° | 07:42 | 08:32 | 09:23 | 20:06 | 20:56 | 21:48 |
| S 10° | 07:24 | 08:12 | 09:01 | 20:25 | 21:18 | 22:10 |
| 20° | 07:06 | 07:50 | 08:38 | 20:46 | 21:41 | 22:34 |
| 30° | 06:44 | 07:25 | 08:11 | 21:09 | 22:07 | 23:02 |
| 35° | 06:32 | 07:10 | 07:55 | 21:24 | 22:23 | 23:18 |
| 40° | 06:17 | 06:53 | 07:36 | 21:40 | 22:41 | 23:37 |
| 45° | 06:00 | 06:33 | 07:14 | 21:59 | 23:03 | · · · |
| S 50° | 05:39 | 06:08 | 06:45 | 22:24 | 23:31 | · · · |
| 52° | 05:29 | 05:55 | 06:31 | 22:36 | 23:45 | · · · |
| 54° | 05:18 | 05:41 | 06:15 | 22:49 | · · · | 00:01 |
| 56° | 05:06 | 05:25 | 05:56 | 23:05 | · · · | 00:20 |
| 58° | 04:51 | 05:06 | 05:32 | 23:24 | · · · | 00:44 |
| S 60° | 04:34 | 04:42 | 05:01 | 23:48 | · · · | 01:15 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-------|-----------|-------|---|
| | Eqn.of Time | | Mer. | Mer.Pass. | | Age |
| | 00 ^h | 12 ^h | Pass | Upper | Lower | 3-5 |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 6-18% |
| 13 | 13:38 | 13:45 | 11:46 | 13:54 | 01:29 |  |
| 14 | 13:53 | 13:59 | 11:46 | 14:44 | 02:19 | |
| 15 | 14:06 | 14:13 | 11:46 | 15:36 | 03:10 | |

October 16, 17, 18 UT (Fri., Sat., Sun.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|---------|-----|-----|--------|-----|-----|
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 24°31.8 | 174°06.5 | S20°18.9 | 251°31.8 | N18°55.6 | 239°50.9 | N14°44.8 | 13°53.9 | N01°37.6 | | | | | | |
| 1 | 39°34.2 | 189°10.1 | 18.3 | 266°32.8 | 55.2 | 254°53.0 | 44.6 | 28°56.6 | 37.6 | | | | | | |
| 2 | 54°36.7 | 204°13.7 | 17.8 | 281°33.9 | 54.9 | 269°55.1 | 44.5 | 43°59.2 | 37.5 | | | | | | |
| 3 | 69°39.2 | 219°17.3 | •• 17.2 | 296°34.9 | •• 54.6 | 284°57.2 | •• 44.4 | 59°01.9 | •• 37.4 | | | | | | |
| 4 | 84°41.6 | 234°20.9 | 16.7 | 311°36.0 | 54.2 | 299°59.2 | 44.3 | 74°04.5 | 37.4 | | | | | | |
| 5 | 99°44.1 | 249°24.5 | 16.1 | 326°37.1 | 53.9 | 315°01.3 | 44.2 | 89°07.1 | 37.3 | | | | | | |
| 6 | 114°46.5 | 264°28.1 | S20°15.5 | 341°38.1 | N18°53.6 | 330°03.4 | N14°44.1 | 104°09.8 | N01°37.2 | | | | | | |
| 7 | 129°49.0 | 279°31.7 | 15.0 | 356°39.2 | 53.3 | 345°05.5 | 43.9 | 119°12.4 | 37.1 | | | | | | |
| 8 | 144°51.5 | 294°35.3 | 14.4 | 11°40.2 | 52.9 | 0°07.6 | 43.8 | 134°15.1 | 37.1 | | | | | | |
| 9 | 159°53.9 | 309°38.9 | •• 13.9 | 26°41.3 | •• 52.6 | 15°09.7 | •• 43.7 | 149°17.7 | •• 37.0 | | | | | | |
| 10 | 174°56.4 | 324°42.6 | 13.3 | 41°42.3 | 52.3 | 30°11.7 | 43.6 | 164°20.3 | 36.9 | | | | | | |
| 11 | 189°58.9 | 339°46.2 | 12.7 | 56°43.4 | 52.0 | 45°13.8 | 43.5 | 179°23.0 | 36.9 | | | | | | |
| 12 | 205°01.3 | 354°49.8 | S20°12.1 | 71°44.5 | N18°51.6 | 60°15.9 | N14°43.3 | 194°25.6 | N01°36.8 | | | | | | |
| 13 | 220°03.8 | 9°53.4 | 11.6 | 86°45.5 | 51.3 | 75°18.0 | 43.2 | 209°28.3 | 36.7 | | | | | | |
| 14 | 235°06.3 | 24°57.0 | 11.0 | 101°46.6 | 51.0 | 90°20.1 | 43.1 | 224°30.9 | 36.6 | | | | | | |
| 15 | 250°08.7 | 40°00.7 | •• 10.4 | 116°47.6 | •• 50.6 | 105°22.2 | •• 43.0 | 239°33.5 | •• 36.6 | | | | | | |
| 16 | 265°11.2 | 55°04.3 | 09.8 | 131°48.7 | 50.3 | 120°24.3 | 42.9 | 254°36.2 | 36.5 | | | | | | |
| 17 | 280°13.7 | 70°07.9 | 09.2 | 146°49.8 | 50.0 | 135°26.3 | 42.8 | 269°38.8 | 36.4 | | | | | | |
| 18 | 295°16.1 | 85°11.6 | S20°08.6 | 161°50.8 | N18°49.7 | 150°28.4 | N14°42.6 | 284°41.4 | N01°36.4 | | | | | | |
| 19 | 310°18.6 | 100°15.2 | 08.1 | 176°51.9 | 49.3 | 165°30.5 | 42.5 | 299°44.1 | 36.3 | | | | | | |
| 20 | 325°21.0 | 115°18.8 | 07.5 | 191°52.9 | 49.0 | 180°32.6 | 42.4 | 314°46.7 | 36.2 | | | | | | |
| 21 | 340°23.5 | 130°22.5 | •• 06.9 | 206°54.0 | •• 48.7 | 195°34.7 | •• 42.3 | 329°49.4 | •• 36.1 | | | | | | |
| 22 | 355°26.0 | 145°26.1 | 06.3 | 221°55.1 | 48.3 | 210°36.8 | 42.2 | 344°52.0 | 36.1 | | | | | | |
| 23 | 10°28.4 | 160°29.8 | 05.7 | 236°56.1 | 48.0 | 225°38.9 | 42.0 | 359°54.6 | 36.0 | | | | | | |
| Mer.pass. | 22:18 | ν3.6' d-0.5' m-4.25 | | ν1.1' d-0.3' m1.00 | | ν2.1' d-0.1' m-1.93 | | ν2.6' d-0.1' m0.39 | | | | | | | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 25°30.9 | 175°33.4 | S20°05.1 | 251°57.2 | N18°47.7 | 240°41.0 | N14°41.9 | 14°57.3 | N01°35.9 | | | | | | |
| 1 | 40°33.4 | 190°37.1 | 04.5 | 266°58.3 | 47.4 | 255°43.0 | 41.8 | 29°59.9 | 35.8 | | | | | | |
| 2 | 55°35.8 | 205°40.7 | 03.9 | 281°59.3 | 47.0 | 270°45.1 | 41.7 | 45°02.6 | 35.8 | | | | | | |
| 3 | 70°38.3 | 220°44.4 | •• 03.2 | 297°00.4 | •• 46.7 | 285°47.2 | •• 41.6 | 60°05.2 | •• 35.7 | | | | | | |
| 4 | 85°40.8 | 235°48.0 | 02.6 | 312°01.5 | 46.4 | 300°49.3 | 41.5 | 75°07.8 | 35.6 | | | | | | |
| 5 | 100°43.2 | 250°51.7 | 02.0 | 327°02.5 | 46.0 | 315°51.4 | 41.3 | 90°10.5 | 35.6 | | | | | | |
| 6 | 115°45.7 | 265°55.3 | S20°01.4 | 342°03.6 | N18°45.7 | 330°53.5 | N14°41.2 | 105°13.1 | N01°35.5 | | | | | | |
| 7 | 130°48.1 | 280°59.0 | 00.8 | 357°04.6 | 45.4 | 345°55.6 | 41.1 | 120°15.7 | 35.4 | | | | | | |
| 8 | 145°50.6 | 296°02.7 | 20°00.2 | 12°05.7 | 45.0 | 0°57.7 | 41.0 | 135°18.4 | 35.4 | | | | | | |
| 9 | 160°53.1 | 311°06.3 | 19°59.5 | 27°06.8 | •• 44.7 | 15°59.8 | •• 40.9 | 150°21.0 | •• 35.3 | | | | | | |
| 10 | 175°55.5 | 326°10.0 | 58.9 | 42°07.8 | 44.4 | 31°01.8 | 40.8 | 165°23.7 | 35.2 | | | | | | |
| 11 | 190°58.0 | 341°13.7 | 58.3 | 57°08.9 | 44.1 | 46°03.9 | 40.6 | 180°26.3 | 35.1 | | | | | | |
| 12 | 206°00.5 | 356°17.3 | S19°57.7 | 72°10.0 | N18°43.7 | 61°06.0 | N14°40.5 | 195°28.9 | N01°35.1 | | | | | | |
| 13 | 221°02.9 | 11°21.0 | 57.0 | 87°11.0 | 43.4 | 76°08.1 | 40.4 | 210°31.6 | 35.0 | | | | | | |
| 14 | 236°05.4 | 26°24.7 | 56.4 | 102°12.1 | 43.1 | 91°10.2 | 40.3 | 225°34.2 | 34.9 | | | | | | |
| 15 | 251°07.9 | 41°28.4 | •• 55.7 | 117°13.2 | •• 42.7 | 106°12.3 | •• 40.2 | 240°36.8 | •• 34.9 | | | | | | |
| 16 | 266°10.3 | 56°32.1 | 55.1 | 132°14.3 | 42.4 | 121°14.4 | 40.1 | 255°39.5 | 34.8 | | | | | | |
| 17 | 281°12.8 | 71°35.7 | 54.5 | 147°15.3 | 42.1 | 136°16.5 | 39.9 | 270°42.1 | 34.7 | | | | | | |
| 18 | 296°15.3 | 86°39.4 | S19°53.8 | 162°16.4 | N18°41.7 | 151°18.6 | N14°39.8 | 285°44.8 | N01°34.6 | | | | | | |
| 19 | 311°17.7 | 101°43.1 | 53.2 | 177°17.5 | 41.4 | 166°20.7 | 39.7 | 300°47.4 | 34.6 | | | | | | |
| 20 | 326°20.2 | 116°46.8 | 52.5 | 192°18.5 | 41.1 | 181°22.8 | 39.6 | 315°50.0 | 34.5 | | | | | | |
| 21 | 341°22.6 | 131°50.5 | •• 51.9 | 207°19.6 | •• 40.8 | 196°24.9 | •• 39.5 | 330°52.7 | •• 34.4 | | | | | | |
| 22 | 356°25.1 | 146°54.2 | 51.2 | 222°20.7 | 40.4 | 211°26.9 | 39.4 | 345°55.3 | 34.4 | | | | | | |
| 23 | 11°27.6 | 161°57.9 | 50.6 | 237°21.7 | 40.1 | 226°29.0 | 39.3 | 0°57.9 | 34.3 | | | | | | |
| Mer.pass. | 22:14 | ν3.6' d-0.6' m-4.18 | | ν1.1' d-0.3' m1.00 | | ν2.1' d-0.1' m-1.93 | | ν2.6' d-0.1' m0.39 | | | | | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 26°30.0 | 177°01.6 | S19°49.9 | 252°22.8 | N18°39.8 | 241°31.1 | N14°39.1 | 16°00.6 | N01°34.2 | | | | | | |
| 1 | 41°32.5 | 192°05.3 | 49.2 | 267°23.9 | 39.4 | 256°33.2 | 39.0 | 31°03.2 | 34.1 | | | | | | |
| 2 | 56°35.0 | 207°09.0 | 48.6 | 282°25.0 | 39.1 | 271°35.3 | 38.9 | 46°05.9 | 34.1 | | | | | | |
| 3 | 71°37.4 | 222°12.7 | •• 47.9 | 297°26.0 | •• 38.8 | 286°37.4 | •• 38.8 | 61°08.5 | •• 34.0 | | | | | | |
| 4 | 86°39.9 | 237°16.4 | 47.2 | 312°27.1 | 38.4 | 301°39.5 | 38.7 | 76°11.1 | 33.9 | | | | | | |
| 5 | 101°42.4 | 252°20.1 | 46.6 | 327°28.2 | 38.1 | 316°41.6 | 38.6 | 91°13.8 | 33.9 | | | | | | |
| 6 | 116°44.8 | 267°23.8 | S19°45.9 | 342°29.3 | N18°37.8 | 331°43.7 | N14°38.4 | 106°16.4 | N01°33.8 | | | | | | |
| 7 | 131°47.3 | 282°27.5 | 45.2 | 357°30.3 | 37.4 | 346°45.8 | 38.3 | 121°19.0 | 33.7 | | | | | | |
| 8 | 146°49.8 | 297°31.2 | 44.5 | 12°31.4 | 37.1 | 1°47.9 | 38.2 | 136°21.7 | 33.7 | | | | | | |
| 9 | 161°52.2 | 312°34.9 | •• 43.8 | 27°32.5 | •• 36.8 | 16°50.0 | •• 38.1 | 151°24.3 | •• 33.6 | | | | | | |
| 10 | 176°54.7 | 327°38.6 | 43.2 | 42°33.6 | 36.4 | 31°52.1 | 38.0 | 166°26.9 | 33.5 | | | | | | |
| 11 | 191°57.1 | 342°42.3 | 42.5 | 57°34.6 | 36.1 | 46°54.2 | 37.9 | 181°29.6 | 33.4 | | | | | | |
| 12 | 206°59.6 | 357°46.1 | S19°41.8 | 72°35.7 | N18°35.8 | 61°56.3 | N14°37.8 | 196°32.2 | N01°33.4 | | | | | | |
| 13 | 222°02.1 | 12°49.8 | 41.1 | 87°36.8 | 35.5 | 76°58.4 | 37.6 | 211°34.9 | 33.3 | | | | | | |
| 14 | 237°04.5 | 27°53.5 | 40.4 | 102°37.9 | 35.1 | 92°00.4 | 37.5 | 226°37.5 | 33.2 | | | | | | |
| 15 | 252°07.0 | 42°57.2 | •• 39.7 | 117°38.9 | •• 34.8 | 107°02.5 | •• 37.4 | 241°40.1 | •• 33.2 | | | | | | |
| 16 | 267°09.5 | 58°00.9 | 39.0 | 132°40.0 | 34.5 | 122°04.6 | 37.3 | 256°42.8 | 33.1 | | | | | | |
| 17 | 282°11.9 | 73°04.7 | 38.3 | 147°41.1 | 34.1 | 137°06.7 | 37.2 | 271°45.4 | 33.0 | | | | | | |
| 18 | 297°14.4 | 88°08.4 | S19°37.6 | 162°42.2 | N18°33.8 | 152°08.8 | N14°37.1 | 286°48.0 | N01°32.9 | | | | | | |
| 19 | 312°16.9 | 103°12.1 | 36.9 | 177°43.2 | 33.5 | 167°10.9 | 36.9 | 301°50.7 | 32.9 | | | | | | |
| 20 | 327°19.3 | 118°15.9 | 36.2 | 192°44.3 | 33.1 | 182°13.0 | 36.8 | 316°53.3 | 32.8 | | | | | | |
| 21 | 342°21.8 | 133°19.6 | •• 35.5 | 207°45.4 | •• 32.8 | 197°15.1 | •• 36.7 | 331°55.9 | •• 32.7 | | | | | | |
| 22 | 357°24.3 | 148°23.3 | 34.8 | 222°46.5 | 32.5 | 212°17.2 | 36.6 | 346°58.6 | 32.7 | | | | | | |
| 23 | 12°26.7 | 163°27.0 | 34.1 | 237°47.6 | 32.1 | 227°19.3 | 36.5 | 2°01.2 | 32.6 | | | | | | |
| Mer.pass. | 22:10 | ν3.7' d-0.7' m-4.11 | | ν1.1' d-0.3' m0.99 | | ν2.1' d-0.1' m-1.94 | | ν2.6' d-0.1' m0.40 | | | | | | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°32.9 | 29°14.5 |
| Ankaa | 353°05.3 | -42°09.5 |
| Schedar | 349°28.8 | 56°41.2 |
| Diphda | 348°45.5 | -17°50.2 |
| Achernar | 335°18.5 | -57°05.9 |
| Hamal | 327°49.2 | 23°35.5 |
| Polaris | 312°49.6 | 89°22.5 |
| Acamar | 315°10.3 | -40°11.6 |
| Menkar | 314°04.3 | 4°11.8 |
| Mirfak | 308°25.7 | 49°57.4 |
| Aldebaran | 290°37.7 | 16°33.9 |
| Rigel | 281°02.3 | -8°10.1 |
| Capella | 280°19.5 | 46°01.4 |
| Bellatrix | 278°21.1 | 6°22.5 |
| Elnath | 277°59.8 | 28°37.8 |
| Alnilam | 275°36.1 | -1°10.9 |
| Betelgeuse | 270°50.4 | 7°24.8 |
| Canopus | 263°51.6 | -52°42.2 |
| Sirius | 258°24.9 | -16°45.0 |
| Adhara | 255°04.7 | -29°00.2 |
| Procyon | 244°49.3 | 5°09.4 |
| Pollux | 243°15.5 | 27°57.6 |
| Avior | 234°14.3 | -59°35.4 |
| Suhail | 222°45.4 | -43°32.2 |
| Miaplacidus | 221°38.3 | -69°49.3 |
| Alphard | 217°46.5 | -8°46.4 |
| Regulus | 207°33.1 | 11°50.2 |
| Dubhe | 193°39.8 | 61°36.2 |
| Denebola | 182°23.8 | 14°25.4 |
| Gienah | 175°42.4 | -17°41.3 |
| Acrux | 172°59.2 | -63°14.8 |
| Gacrux | 171°50.6 | -57°15.7 |
| Alioth | 166°12.3 | 55°48.8 |
| Spica | 158°21.1 | -11°18.0 |
| Alkaid | 152°51.4 | 49°10.8 |
| Hadar | 148°34.6 | -60°30.1 |
| Menkent | 147°56.3 | -36°30.1 |
| Arcturus | 145°46.9 | 19°02.7 |
| Rigel Kent. | 139°38.9 | -60°56.8 |
| Kochab | 137°20.9 | 74°02.7 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.6 |
| Antares | 112°14.3 | -26°29.5 |
| Atria | 107°07.6 | -69°04.7 |
| Sabik | 102°01.3 | -15°45.4 |
| Shaula | 96°08.6 | -37°07.4 |
| Rasalhague | 95°57.4 | 12°32.6 |
| Eltanin | 90°41.7 | 51°29.4 |
| Kaus Aust. | 83°30.7 | -34°22.3 |
| Vega | 80°32.4 | 38°48.8 |
| Nunki | 75°46.0 | -26°15.8 |
| Altair | 61°58.5 | 8°56.5 |
| Peacock | 53°03.3 | -56°39.1 |
| Deneb | 49°24.7 | 45°22.9 |
| Enif | 33°37.2 | 10°00.1 |
| Al Na'ir | 27°30.8 | -46°49.9 |
| Fomalhaut | 15°12.6 | -29°28.8 |
| Scheat | 13°43.5 | 28°13.9 |
| Markab | 13°28.2 | 15°21.2 |

| Oct 16 Fri | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 149°34.7 | 12:21 |
| Mars | 227°00.0 | 07:13 |
| Jupiter | 215°19.1 | 07:59 |
| Saturn | 349°22.2 | 23:00 |

| Oct 17 Sat | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 150°02.5 | 12:15 |
| Mars | 226°26.3 | 07:12 |
| Jupiter | 215°10.1 | 07:56 |
| Saturn | 349°26.4 | 22:56 |

| Oct 18 Sun | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 150°31.5 | 12:09 |
| Mars | 225°52.8 | 07:10 |
| Jupiter | 215°01.1 | 07:53 |
| Saturn | 349°30.5 | 22:52 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.5 |
| Mars: | 0.1 |

| h | Sun | | | Moon | | | | |
|------------|----------|----------|------------|------------|-------|----------|-------|-------|
| Fri | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 183°34.9 | S08°48.6 | | 121°45.7 | 9.9' | S27°53.1 | 0.3' | 54.2' |
| 1 | 198°35.0 | 49.5 | | 136°14.6 | 9.9' | 27°53.4 | 0.2' | 54.2' |
| 2 | 213°35.2 | 50.5 | | 150°43.5 | 9.9' | 27°53.6 | 0.0' | 54.2' |
| 3 | 228°35.3 | 51.4 | | 165°12.4 | 9.9' | 27°53.6 | -0.1' | 54.2' |
| 4 | 243°35.4 | 52.3 | | 179°41.3 | 9.9' | 27°53.5 | -0.3' | 54.2' |
| 5 | 258°35.6 | 53.2 | | 194°10.2 | 9.9' | 27°53.2 | -0.4' | 54.2' |
| 6 | 273°35.7 | S08°54.1 | | 208°39.2 | 10.0' | S27°52.8 | -0.5' | 54.2' |
| 7 | 288°35.8 | 55.1 | | 223°08.1 | 10.0' | 27°52.3 | -0.7' | 54.2' |
| 8 | 303°36.0 | 56.0 | | 237°37.1 | 10.0' | 27°51.7 | -0.8' | 54.1' |
| 9 | 318°36.1 | 56.9 | | 252°06.0 | 10.0' | 27°50.9 | -0.9' | 54.1' |
| 10 | 333°36.2 | 57.8 | | 266°35.0 | 10.0' | 27°49.9 | -1.1' | 54.1' |
| 11 | 348°36.4 | 58.7 | | 281°04.1 | 10.0' | 27°48.9 | -1.2' | 54.1' |
| 12 | 3°36.5 | S08°59.7 | | 295°33.1 | 10.1' | S27°47.7 | -1.3' | 54.1' |
| 13 | 18°36.6 | 09°00.6 | | 310°02.1 | 10.1' | 27°46.4 | -1.5' | 54.1' |
| 14 | 33°36.8 | 01.5 | | 324°31.2 | 10.1' | 27°44.9 | -1.6' | 54.1' |
| 15 | 48°36.9 | 02.4 | | 339°00.3 | 10.1' | 27°43.3 | -1.7' | 54.1' |
| 16 | 63°37.0 | 03.3 | | 353°29.4 | 10.1' | 27°41.6 | -1.9' | 54.1' |
| 17 | 78°37.2 | 04.2 | | 7°58.5 | 10.2' | 27°39.7 | -2.0' | 54.1' |
| 18 | 93°37.3 | S09°05.2 | | 22°27.7 | 10.2' | S27°37.7 | -2.1' | 54.1' |
| 19 | 108°37.4 | 06.1 | | 36°56.9 | 10.2' | 27°35.6 | -2.3' | 54.1' |
| 20 | 123°37.5 | 07.0 | | 51°26.1 | 10.2' | 27°33.3 | -2.4' | 54.1' |
| 21 | 138°37.7 | 07.9 | | 65°55.3 | 10.3' | 27°30.9 | -2.5' | 54.1' |
| 22 | 153°37.8 | 08.8 | | 80°24.6 | 10.3' | 27°28.4 | -2.7' | 54.1' |
| 23 | 168°37.9 | 09.7 | | 94°53.9 | 10.3' | 27°25.7 | -2.8' | 54.1' |
| SD = 16.0' | | | $d = 0.9'$ | SD = 14.8' | | | | |

| Sat | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|------------|-------|----------|-------|-------|
| 0 | 183°38.1 | S09°10.7 | | 109°23.2 | 10.4' | S27°22.9 | -2.9' | 54.1' |
| 1 | 198°38.2 | 11.6 | | 123°52.6 | 10.4' | 27°20.0 | -3.0' | 54.1' |
| 2 | 213°38.3 | 12.5 | | 138°21.9 | 10.4' | 27°17.0 | -3.2' | 54.1' |
| 3 | 228°38.5 | 13.4 | | 152°51.4 | 10.4' | 27°13.8 | -3.3' | 54.1' |
| 4 | 243°38.6 | 14.3 | | 167°20.8 | 10.5' | 27°10.5 | -3.4' | 54.1' |
| 5 | 258°38.7 | 15.2 | | 181°50.3 | 10.5' | 27°07.1 | -3.6' | 54.1' |
| 6 | 273°38.8 | S09°16.2 | | 196°19.8 | 10.5' | S27°03.5 | -3.7' | 54.1' |
| 7 | 288°39.0 | 17.1 | | 210°49.3 | 10.6' | 26°59.8 | -3.8' | 54.1' |
| 8 | 303°39.1 | 18.0 | | 225°18.9 | 10.6' | 26°56.0 | -3.9' | 54.1' |
| 9 | 318°39.2 | 18.9 | | 239°48.5 | 10.7' | 26°52.1 | -4.1' | 54.1' |
| 10 | 333°39.3 | 19.8 | | 254°18.2 | 10.7' | 26°48.0 | -4.2' | 54.1' |
| 11 | 348°39.5 | 20.7 | | 268°47.9 | 10.7' | 26°43.8 | -4.3' | 54.1' |
| 12 | 3°39.6 | S09°21.6 | | 283°17.6 | 10.8' | S26°39.5 | -4.4' | 54.1' |
| 13 | 18°39.7 | 22.5 | | 297°47.4 | 10.8' | 26°35.0 | -4.6' | 54.1' |
| 14 | 33°39.9 | 23.5 | | 312°17.2 | 10.8' | 26°30.4 | -4.7' | 54.2' |
| 15 | 48°40.0 | 24.4 | | 326°47.0 | 10.9' | 26°25.7 | -4.8' | 54.2' |
| 16 | 63°40.1 | 25.3 | | 341°16.9 | 10.9' | 26°20.9 | -4.9' | 54.2' |
| 17 | 78°40.2 | 26.2 | | 355°46.9 | 11.0' | 26°16.0 | -5.1' | 54.2' |
| 18 | 93°40.4 | S09°27.1 | | 10°16.8 | 11.0' | S26°10.9 | -5.2' | 54.2' |
| 19 | 108°40.5 | 28.0 | | 24°46.8 | 11.1' | 26°05.7 | -5.3' | 54.2' |
| 20 | 123°40.6 | 28.9 | | 39°16.9 | 11.1' | 26°00.4 | -5.4' | 54.2' |
| 21 | 138°40.7 | 29.8 | | 53°47.0 | 11.1' | 25°55.0 | -5.6' | 54.2' |
| 22 | 153°40.9 | 30.7 | | 68°17.1 | 11.2' | 25°49.4 | -5.7' | 54.2' |
| 23 | 168°41.0 | 31.7 | | 82°47.3 | 11.2' | 25°43.7 | -5.8' | 54.2' |
| SD = 16.0' | | | $d = 0.9'$ | SD = 14.8' | | | | |

| Sun | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|------------|-------|----------|-------|-------|
| 0 | 183°41.1 | S09°32.6 | | 97°17.5 | 11.3' | S25°37.9 | -5.9' | 54.2' |
| 1 | 198°41.2 | 33.5 | | 111°47.8 | 11.3' | 25°32.0 | -6.0' | 54.2' |
| 2 | 213°41.3 | 34.4 | | 126°18.1 | 11.4' | 25°26.0 | -6.2' | 54.2' |
| 3 | 228°41.5 | 35.3 | | 140°48.5 | 11.4' | 25°19.8 | -6.3' | 54.2' |
| 4 | 243°41.6 | 36.2 | | 155°18.9 | 11.5' | 25°13.6 | -6.4' | 54.2' |
| 5 | 258°41.7 | 37.1 | | 169°49.3 | 11.5' | 25°07.2 | -6.5' | 54.3' |
| 6 | 273°41.8 | S09°38.0 | | 184°19.8 | 11.5' | S25°00.7 | -6.6' | 54.3' |
| 7 | 288°42.0 | 38.9 | | 198°50.4 | 11.6' | 24°54.0 | -6.7' | 54.3' |
| 8 | 303°42.1 | 39.8 | | 213°21.0 | 11.6' | 24°47.3 | -6.8' | 54.3' |
| 9 | 318°42.2 | 40.7 | | 227°51.6 | 11.7' | 24°40.5 | -7.0' | 54.3' |
| 10 | 333°42.3 | 41.6 | | 242°22.3 | 11.7' | 24°33.5 | -7.1' | 54.3' |
| 11 | 348°42.4 | 42.6 | | 256°53.0 | 11.8' | 24°26.4 | -7.2' | 54.3' |
| 12 | 3°42.6 | S09°43.5 | | 271°23.8 | 11.8' | S24°19.2 | -7.3' | 54.3' |
| 13 | 18°42.7 | 44.4 | | 285°54.7 | 11.9' | 24°11.9 | -7.4' | 54.3' |
| 14 | 33°42.8 | 45.3 | | 300°25.5 | 11.9' | 24°04.5 | -7.5' | 54.3' |
| 15 | 48°42.9 | 46.2 | | 314°56.5 | 12.0' | 23°57.0 | -7.6' | 54.4' |
| 16 | 63°43.0 | 47.1 | | 329°27.4 | 12.0' | 23°49.3 | -7.7' | 54.4' |
| 17 | 78°43.2 | 48.0 | | 343°58.5 | 12.1' | 23°41.6 | -7.9' | 54.4' |
| 18 | 93°43.3 | S09°48.9 | | 358°29.5 | 12.1' | S23°33.7 | -8.0' | 54.4' |
| 19 | 108°43.4 | 49.8 | | 13°00.6 | 12.2' | 23°25.8 | -8.1' | 54.4' |
| 20 | 123°43.5 | 50.7 | | 27°31.8 | 12.2' | 23°17.7 | -8.2' | 54.4' |
| 21 | 138°43.6 | 51.6 | | 42°03.0 | 12.3' | 23°09.5 | -8.3' | 54.4' |
| 22 | 153°43.7 | 52.5 | | 56°34.3 | 12.3' | 23°01.2 | -8.4' | 54.4' |
| 23 | 168°43.9 | 53.4 | | 71°05.6 | 12.4' | 22°52.9 | -8.5' | 54.5' |
| SD = 16.0' | | | $d = 0.9'$ | SD = 14.8' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 05:04 | 06:22 | 07:34 | 15:55 | 17:06 | 18:24 |
| N 70° | 05:07 | 06:17 | 07:21 | 16:08 | 17:11 | 18:22 |
| 68° | 05:09 | 06:13 | 07:11 | 16:18 | 17:16 | 18:20 |
| 66° | 05:11 | 06:10 | 07:03 | 16:27 | 17:19 | 18:18 |
| 64° | 05:12 | 06:07 | 06:56 | 16:34 | 17:23 | 18:17 |
| 62° | 05:13 | 06:04 | 06:50 | 16:40 | 17:25 | 18:16 |
| 60° | 05:13 | 06:02 | 06:44 | 16:45 | 17:28 | 18:16 |
| N 58° | 05:14 | 05:59 | 06:39 | 16:50 | 17:30 | 18:15 |
| 56° | 05:14 | 05:57 | 06:35 | 16:54 | 17:32 | 18:15 |
| 54° | 05:15 | 05:56 | 06:32 | 16:58 | 17:34 | 18:15 |
| 52° | 05:15 | 05:54 | 06:28 | 17:02 | 17:36 | 18:15 |
| 50° | 05:15 | 05:52 | 06:25 | 17:05 | 17:38 | 18:15 |
| 45° | 05:14 | 05:48 | 06:18 | 17:12 | 17:42 | 18:16 |
| N 40° | 05:14 | 05:45 | 06:12 | 17:18 | 17:45 | 18:16 |
| 35° | 05:13 | 05:42 | 06:08 | 17:23 | 17:48 | 18:18 |
| 30° | 05:11 | 05:39 | 06:03 | 17:27 | 17:51 | 18:19 |
| 20° | 05:07 | 05:33 | 05:55 | 17:35 | 17:57 | 18:23 |
| N 10° | 05:03 | 05:27 | 05:49 | 17:42 | 18:03 | 18:28 |
| 0° | 04:57 | 05:21 | 05:42 | 17:49 | 18:10 | 18:34 |
| S 10° | 04:49 | 05:14 | 05:35 | 17:55 | 18:17 | 18:42 |
| 20° | 04:40 | 05:06 | 05:28 | 18:03 | 18:25 | 18:52 |
| 30° | 04:27 | 04:55 | 05:20 | 18:11 | 18:36 | 19:05 |
| 35° | 04:18 | 04:49 | 05:15 | 18:16 | 18:42 | 19:13 |
| 40° | 04:08 | 04:42 | 05:10 | 18:22 | 18:50 | 19:23 |
| 45° | 03:56 | 04:33 | 05:03 | 18:29 | 18:59 | 19:36 |
| S 50° | 03:40 | 04:21 | 04:55 | 18:36 | 19:11 | 19:52 |
| 52° | 03:32 | 04:16 | 04:52 | 18:40 | 19:16 | 20:00 |
| 54° | 03:23 | 04:10 | 04:48 | 18:44 | 19:22 | 20:09 |
| 56° | 03:13 | 04:03 | 04:43 | 18:49 | 19:29 | 20:20 |
| 58° | 03:01 | 03:56 | 04:38 | 18:54 | 19:37 | 20:32 |
| S 60° | 02:47 | 03:47 | 04:33 | 19:00 | 19:46 | 20:47 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | ██ | ██ | ██ | ██ | ██ | ██ |
| N 70° | ██ | ██ | ██ | ██ | ██ | ██ |
| 68° | ██ | ██ | ██ | ██ | ██ | ██ |
| 66° | ██ | ██ | 17:28 | ██ | ██ | 18:56 |
| 64° | ██ | ██ | 16:23 | ██ | ██ | 20:00 |
| 62° | 15:55 | 15:52 | 15:48 | 17:01 | 18:50 | 20:34 |
| 60° | 14:48 | 15:12 | 15:23 | 18:08 | 19:29 | 20:59 |
| N 58° | 14:13 | 14:45 | 15:03 | 18:43 | 19:56 | 21:19 |
| 56° | 13:48 | 14:23 | 14:46 | 19:08 | 20:17 | 21:35 |
| 54° | 13:28 | 14:05 | 14:31 | 19:28 | 20:35 | 21:49 |
| 52° | 13:11 | 13:50 | 14:19 | 19:45 | 20:50 | 22:01 |
| 50° | 12:56 | 13:37 | 14:08 | 20:00 | 21:03 | 22:12 |
| 45° | 12:27 | 13:10 | 13:45 | 20:29 | 21:29 | 22:34 |
| N 40° | 12:04 | 12:48 | 13:26 | 20:52 | 21:50 | 22:52 |
| 35° | 11:44 | 12:31 | 13:11 | 21:11 | 22:07 | 23:07 |
| 30° | 11:28 | 12:15 | 12:57 | 21:27 | 22:22 | 23:19 |
| 20° | 11:00 | 11:49 | 12:34 | 21:54 | 22:48 | 23:41 |
| N 10° | 10:37 | 11:26 | 12:14 | 22:18 | 23:09 | |
| 0° | 10:15 | 11:05 | 11:55 | 22:39 | 23:29 | |
| S 10° | 09:52 | 10:44 | 11:36 | 23:01 | 23:49 | |
| 20° | 09:29 | 10:22 | 11:15 | 23:24 | | 00:11 |
| 30° | 09:01 | 09:55 | 10:52 | 23:51 | | 00:36 |
| 35° | 08:45 | 09:40 | 10:38 | | 00:07 | 00:50 |
| 40° | 08:26 | 09:22 | 10:22 | | 00:26 | 01:07 |
| 45° | 08:03 | 09:00 | 10:02 | 00:00 | 00:48 | 01:27 |
| S 50° | 07:33 | 08:32 | 09:38 | 00:30 | 01:16 | 01:52 |
| 52° | 07:19 | 08:18 | 09:27 | 00:44 | 01:30 | 02:04 |
| 54° | 07:02 | 08:02 | 09:13 | 01:01 | 01:46 | 02:18 |
| 56° | 06:41 | 07:44 | 08:58 | 01:21 | 02:05 | 02:34 |
| 58° | 06:16 | 07:21 | 08:39 | 01:47 | 02:28 | 02:53 |
| S 60° | 05:41 | 06:50 | 08:16 | 02:22 | 02:59 | 03:16 |

| Day | Sun | | | Moon | | |
|-----|--------------------------|--------------------------|--------------|----------------|----------------|----------------------|
| | Eqn.of Time | | Mer. Pass | Mer.Pass. | | Age 6-8 26-44% |
| | 00 ^h mm:ss | 12 ^h mm:ss | | Upper hh:mm | Lower hh:mm | |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | |
| 16 | 14:20 | 14:26 | 11:46 | 16:27 | 04:01 | |
| 17 | 14:32 | 14:38 | 11:45 | 17:17 | 04:52 | |
| 18 | 14:44 | 14:50 | 11:45 | 18:06 | 05:42 | |

October 19, 20, 21 UT (Mon., Tue., Wed.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------|----------|--|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| Mon | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 27°29.2 | | 178°30.8 | S19°33.4 | 252°48.6 | N18°31.8 | 242°21.4 | N14°36.4 | 17°03.9 | N01°32.5 |
| 1 | 42°31.6 | | 193°34.5 | 32.6 | 267°49.7 | 31.5 | 257°23.5 | 36.3 | 32°06.5 | 32.5 |
| 2 | 57°34.1 | | 208°38.3 | 31.9 | 282°50.8 | 31.1 | 272°25.6 | 36.1 | 47°09.1 | 32.4 |
| 3 | 72°36.6 | | 223°42.0 | •• 31.2 | 297°51.9 | •• 30.8 | 287°27.7 | •• 36.0 | 62°11.8 | •• 32.3 |
| 4 | 87°39.0 | | 238°45.7 | 30.5 | 312°53.0 | 30.5 | 302°29.8 | 35.9 | 77°14.4 | 32.2 |
| 5 | 102°41.5 | | 253°49.5 | 29.8 | 327°54.1 | 30.1 | 317°31.9 | 35.8 | 92°17.0 | 32.2 |
| 6 | 117°44.0 | | 268°53.2 | S19°29.0 | 342°55.1 | N18°29.8 | 332°34.0 | N14°35.7 | 107°19.7 | N01°32.1 |
| 7 | 132°46.4 | | 283°57.0 | 28.3 | 357°56.2 | 29.5 | 347°36.1 | 35.6 | 122°22.3 | 32.0 |
| 8 | 147°48.9 | | 299°00.7 | 27.6 | 12°57.3 | 29.1 | 2°38.2 | 35.5 | 137°24.9 | 32.0 |
| 9 | 162°51.4 | | 314°04.5 | •• 26.8 | 27°58.4 | •• 28.8 | 17°40.3 | •• 35.3 | 152°27.6 | •• 31.9 |
| 10 | 177°53.8 | | 329°08.2 | 26.1 | 42°59.5 | 28.5 | 32°42.4 | 35.2 | 167°30.2 | 31.8 |
| 11 | 192°56.3 | | 344°12.0 | 25.4 | 58°00.6 | 28.1 | 47°44.5 | 35.1 | 182°32.8 | 31.8 |
| 12 | 207°58.7 | | 359°15.7 | S19°24.6 | 73°01.6 | N18°27.8 | 62°46.6 | N14°35.0 | 197°35.5 | N01°31.7 |
| 13 | 223°01.2 | | 14°19.5 | 23.9 | 88°02.7 | 27.5 | 77°48.7 | 34.9 | 212°38.1 | 31.6 |
| 14 | 238°03.7 | | 29°23.2 | 23.1 | 103°03.8 | 27.1 | 92°50.8 | 34.8 | 227°40.8 | 31.6 |
| 15 | 253°06.1 | | 44°27.0 | •• 22.4 | 118°04.9 | •• 26.8 | 107°52.9 | •• 34.7 | 242°43.4 | •• 31.5 |
| 16 | 268°08.6 | | 59°30.7 | 21.6 | 133°06.0 | 26.5 | 122°55.0 | 34.6 | 257°46.0 | 31.4 |
| 17 | 283°11.1 | | 74°34.5 | 20.9 | 148°07.1 | 26.1 | 137°57.1 | 34.4 | 272°48.7 | 31.3 |
| 18 | 298°13.5 | | 89°38.3 | S19°20.1 | 163°08.2 | N18°25.8 | 152°59.2 | N14°34.3 | 287°51.3 | N01°31.3 |
| 19 | 313°16.0 | | 104°42.0 | 19.4 | 178°09.2 | 25.5 | 168°01.3 | 34.2 | 302°53.9 | 31.2 |
| 20 | 328°18.5 | | 119°45.8 | 18.6 | 193°10.3 | 25.1 | 183°03.4 | 34.1 | 317°56.6 | 31.1 |
| 21 | 343°20.9 | | 134°49.6 | •• 17.9 | 208°11.4 | •• 24.8 | 198°05.5 | •• 34.0 | 332°59.2 | •• 31.1 |
| 22 | 358°23.4 | | 149°53.3 | 17.1 | 223°12.5 | 24.5 | 213°07.6 | 33.9 | 348°01.8 | 31.0 |
| 23 | 13°25.9 | | 164°57.1 | 16.3 | 238°13.6 | 24.1 | 228°09.7 | 33.8 | 3°04.5 | 30.9 |
| Mer.pass. | 22:06 | | ν3.7' d-0.7' m-4.14 | | ν1.1' d-0.3' m0.98 | | ν2.1' d-0.1' m-1.94 | | ν2.6' d-0.1' m0.40 | |
| Tue | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 28°28.3 | | 180°00.9 | S19°15.6 | 253°14.7 | N18°23.8 | 243°11.8 | N14°33.6 | 18°07.1 | N01°30.9 |
| 1 | 43°30.8 | | 195°04.6 | 14.8 | 268°15.8 | 23.5 | 258°13.9 | 33.5 | 33°09.7 | 30.8 |
| 2 | 58°33.2 | | 210°08.4 | 14.0 | 283°16.9 | 23.1 | 273°16.0 | 33.4 | 48°12.4 | 30.7 |
| 3 | 73°35.7 | | 225°12.2 | •• 13.2 | 298°18.0 | •• 22.8 | 288°18.1 | •• 33.3 | 63°15.0 | •• 30.7 |
| 4 | 88°38.2 | | 240°15.9 | 12.5 | 313°19.0 | 22.5 | 303°20.2 | 33.2 | 78°17.6 | 30.6 |
| 5 | 103°40.6 | | 255°19.7 | 11.7 | 328°20.1 | 22.1 | 318°22.3 | 33.1 | 93°20.3 | 30.5 |
| 6 | 118°43.1 | | 270°23.5 | S19°10.9 | 343°21.2 | N18°21.8 | 333°24.4 | N14°33.0 | 108°22.9 | N01°30.4 |
| 7 | 133°45.6 | | 285°27.3 | 10.1 | 358°22.3 | 21.5 | 348°26.5 | 32.9 | 123°25.5 | 30.4 |
| 8 | 148°48.0 | | 300°31.0 | 09.3 | 13°23.4 | 21.1 | 3°28.6 | 32.7 | 138°28.2 | 30.3 |
| 9 | 163°50.5 | | 315°34.8 | •• 08.6 | 28°24.5 | •• 20.8 | 18°30.7 | •• 32.6 | 153°30.8 | •• 30.2 |
| 10 | 178°53.0 | | 330°38.6 | 07.8 | 43°25.6 | 20.5 | 33°32.8 | 32.5 | 168°33.4 | 30.2 |
| 11 | 193°55.4 | | 345°42.4 | 07.0 | 58°26.7 | 20.1 | 48°35.0 | 32.4 | 183°36.1 | 30.1 |
| 12 | 208°57.9 | | 0°46.1 | S19°06.2 | 73°27.8 | N18°19.8 | 63°37.1 | N14°32.3 | 198°38.7 | N01°30.0 |
| 13 | 224°00.4 | | 15°49.9 | 05.4 | 88°28.9 | 19.5 | 78°39.2 | 32.2 | 213°41.3 | 30.0 |
| 14 | 239°02.8 | | 30°53.7 | 04.6 | 103°30.0 | 19.1 | 93°41.3 | 32.1 | 228°44.0 | 29.9 |
| 15 | 254°05.3 | | 45°57.5 | •• 03.8 | 118°31.1 | •• 18.8 | 108°43.4 | •• 32.0 | 243°46.6 | •• 29.8 |
| 16 | 269°07.7 | | 61°01.3 | 03.0 | 133°32.2 | 18.5 | 123°45.5 | 31.9 | 258°49.2 | 29.8 |
| 17 | 284°10.2 | | 76°05.0 | 02.2 | 148°33.3 | 18.1 | 138°47.6 | 31.7 | 273°51.9 | 29.7 |
| 18 | 299°12.7 | | 91°08.8 | S19°01.4 | 163°34.3 | N18°17.8 | 153°49.7 | N14°31.6 | 288°54.5 | N01°29.6 |
| 19 | 314°15.1 | | 106°12.6 | 19°00.6 | 178°35.4 | 17.4 | 168°51.8 | 31.5 | 303°57.1 | 29.6 |
| 20 | 329°17.6 | | 121°16.4 | 18°59.8 | 193°36.5 | 17.1 | 183°53.9 | 31.4 | 318°59.8 | 29.5 |
| 21 | 344°20.1 | | 136°20.2 | •• 59.0 | 208°37.6 | •• 16.8 | 198°56.0 | •• 31.3 | 334°02.4 | •• 29.4 |
| 22 | 359°22.5 | | 151°24.0 | 58.2 | 223°38.7 | 16.4 | 213°58.1 | 31.2 | 349°05.0 | 29.4 |
| 23 | 14°25.0 | | 166°27.8 | 57.4 | 238°39.8 | 16.1 | 229°00.2 | 31.1 | 4°07.7 | 29.3 |
| Mer.pass. | 22:02 | | ν3.8' d-0.8' m-4.23 | | ν1.1' d-0.3' m0.97 | | ν2.1' d-0.1' m-1.95 | | ν2.6' d-0.1' m0.41 | |
| Wed | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 29°27.5 | | 181°31.6 | S18°56.5 | 253°40.9 | N18°15.8 | 244°02.3 | N14°31.0 | 19°10.3 | N01°29.2 |
| 1 | 44°29.9 | | 196°35.3 | 55.7 | 268°42.0 | 15.4 | 259°04.4 | 30.8 | 34°12.9 | 29.1 |
| 2 | 59°32.4 | | 211°39.1 | 54.9 | 283°43.1 | 15.1 | 274°06.5 | 30.7 | 49°15.6 | 29.1 |
| 3 | 74°34.8 | | 226°42.9 | •• 54.1 | 298°44.2 | •• 14.8 | 289°08.7 | •• 30.6 | 64°18.2 | •• 29.0 |
| 4 | 89°37.3 | | 241°46.7 | 53.3 | 313°45.3 | 14.4 | 304°10.8 | 30.5 | 79°20.8 | 28.9 |
| 5 | 104°39.8 | | 256°50.5 | 52.4 | 328°46.4 | 14.1 | 319°12.9 | 30.4 | 94°23.5 | 28.9 |
| 6 | 119°42.2 | | 271°54.3 | S18°51.6 | 343°47.5 | N18°13.8 | 334°15.0 | N14°30.3 | 109°26.1 | N01°28.8 |
| 7 | 134°44.7 | | 286°58.1 | 50.8 | 358°48.6 | 13.4 | 349°17.1 | 30.2 | 124°28.7 | 28.7 |
| 8 | 149°47.2 | | 302°01.9 | 49.9 | 13°49.7 | 13.1 | 4°19.2 | 30.1 | 139°31.4 | 28.7 |
| 9 | 164°49.6 | | 317°05.7 | •• 49.1 | 28°50.8 | •• 12.8 | 19°21.3 | •• 30.0 | 154°34.0 | •• 28.6 |
| 10 | 179°52.1 | | 332°09.5 | 48.3 | 43°51.9 | 12.4 | 34°23.4 | 29.8 | 169°36.6 | 28.5 |
| 11 | 194°54.6 | | 347°13.3 | 47.4 | 58°53.0 | 12.1 | 49°25.5 | 29.7 | 184°39.3 | 28.5 |
| 12 | 209°57.0 | | 2°17.1 | S18°46.6 | 73°54.1 | N18°11.7 | 64°27.6 | N14°29.6 | 199°41.9 | N01°28.4 |
| 13 | 224°59.5 | | 17°20.9 | 45.8 | 88°55.2 | 11.4 | 79°29.7 | 29.5 | 214°44.5 | 28.3 |
| 14 | 240°02.0 | | 32°24.7 | 44.9 | 103°56.3 | 11.1 | 94°31.9 | 29.4 | 229°47.2 | 28.3 |
| 15 | 255°04.4 | | 47°28.5 | •• 44.1 | 118°57.4 | •• 10.7 | 109°34.0 | •• 29.3 | 244°49.8 | •• 28.2 |
| 16 | 270°06.9 | | 62°32.3 | 43.2 | 133°58.5 | 10.4 | 124°36.1 | 29.2 | 259°52.4 | 28.1 |
| 17 | 285°09.3 | | 77°36.1 | 42.4 | 148°59.6 | 10.1 | 139°38.2 | 29.1 | 274°55.1 | 28.1 |
| 18 | 300°11.8 | | 92°39.9 | S18°41.5 | 164°00.8 | N18°09.7 | 154°40.3 | N14°29.0 | 289°57.7 | N01°28.0 |
| 19 | 315°14.3 | | 107°43.7 | 40.7 | 179°01.9 | 09.4 | 169°42.4 | 28.9 | 305°00.3 | 27.9 |
| 20 | 330°16.7 | | 122°47.5 | 39.8 | 194°03.0 | 09.1 | 184°44.5 | 28.7 | 320°02.9 | 27.9 |
| 21 | 345°19.2 | | 137°51.3 | •• 39.0 | 209°04.1 | •• 08.7 | 199°46.6 | •• 28.6 | 335°05.6 | •• 27.8 |
| 22 | 0°21.7 | | 152°55.1 | 38.1 | 224°05.2 | 08.4 | 214°48.7 | 28.5 | 350°08.2 | 27.7 |
| 23 | 15°24.1 | | 167°58.9 | 37.3 | 239°06.3 | 08.0 | 229°50.9 | 28.4 | 5°10.8 | 27.7 |
| Mer.pass. | 21:59 | | ν3.8' d-0.8' m-4.26 | | ν1.1' d-0.3' m0.96 | | ν2.1' d-0.1' m-1.95 | | ν2.6' d-0.1' m0.41 | |

| | SHA | Dec |
|---------------------|----------|----------|
| Alpheratz | 357°32.9 | 29°14.5 |
| Ankaa | 353°05.3 | -42°09.6 |
| Schedar | 349°28.8 | 56°41.3 |
| Diphda | 348°45.5 | -17°50.2 |
| Achernar | 335°18.5 | -57°05.9 |
| Hamal | 327°49.2 | 23°35.5 |
| Polaris | 312°48.7 | 89°22.5 |
| Acamar | 315°10.3 | -40°11.6 |
| Menkar | 314°04.3 | 4°11.8 |
| Mirfak | 308°25.7 | 49°57.4 |
| Aldebaran | 290°37.7 | 16°33.9 |
| Rigel | 281°02.3 | -8°10.1 |
| Capella | 280°19.4 | 46°01.4 |
| Bellatrix | 278°21.1 | 6°22.5 |
| Elnath | 277°59.8 | 28°37.8 |
| Alnilam | 275°36.1 | -1°11.0 |
| Betelgeuse | 270°50.3 | 7°24.8 |
| Canopus | 263°51.5 | -52°42.2 |
| Sirius | 258°24.8 | -16°45.0 |
| Adhara | 255°04.6 | -29°00.2 |
| Procyon | 244°49.3 | 5°09.4 |
| Pollux | 243°15.5 | 27°57.6 |
| Avior | 234°14.2 | -59°35.4 |
| Suhail | 222°45.4 | -43°32.2 |
| Miaplacidus | 221°38.3 | -69°49.3 |
| Alphard | 217°46.5 | -8°46.4 |
| Regulus | 207°33.1 | 11°50.2 |
| Dubhe | 193°39.7 | 61°36.2 |
| Denebola | 182°23.7 | 14°25.4 |
| Gienah | 175°42.4 | -17°41.3 |
| Acrux | 172°59.1 | -63°14.7 |
| Gacrux | 171°50.6 | -57°15.7 |
| Alioth | 166°12.2 | 55°48.8 |
| Spica | 158°21.1 | -11°18.0 |
| Alkaid | 152°51.3 | 49°10.8 |
| Hadar | 148°34.6 | -60°30.1 |
| Menkent | 147°56.3 | -36°30.1 |
| Arcturus | 145°46.9 | 19°02.6 |
| Rigel Kent. | 139°38.9 | -60°56.8 |
| Kochab | 137°21.0 | 74°02.7 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.6 |
| Antares | 112°14.3 | -26°29.5 |
| Atria | 107°07.6 | -69°04.7 |
| Sabik | 102°01.3 | -15°45.4 |
| Shaula | 96°08.6 | -37°07.4 |
| Rasalhague | 95°57.4 | 12°32.6 |
| Eltanin | 90°41.8 | 51°29.4 |
| Kaus Aust. | 83°30.7 | -34°22.3 |
| Vega | 80°32.4 | 38°48.8 |
| Nunki | 75°46.0 | -26°15.8 |
| Altair | 61°58.5 | 8°56.5 |
| Peacock | 53°03.4 | -56°39.1 |
| Deneb | 49°24.7 | 45°22.9 |
| Enif | 33°37.2 | 10°00.1 |
| Al Na'ir | 27°30.8 | -46°49.9 |
| Fomalhaut | 15°12.7 | -29°28.8 |
| Scheat | 13°43.5 | 28°14.0 |
| Markab | 13°28.2 | 15°21.2 |
| Oct 19 Mon | SHA | Mer.pass |
| Venus | 151°01.6 | 12:03 |
| Mars | 225°19.5 | 07:08 |
| Jupiter | 214°52.2 | 07:49 |
| Saturn | 349°34.7 | 22:48 |
| Oct 20 Tue | SHA | Mer.pass |
| Venus | 151°32.5 | 11:57 |
| Mars | 224°46.4 | 07:07 |
| Jupiter | 214°43.5 | 07:46 |
| Saturn | 349°38.8 | 22:44 |
| Oct 21 Wed | SHA | Mer.pass |
| Venus | 152°04.1 | 11:51 |
| Mars | 224°13.5 | 07:05 |
| Jupiter | 214°34.9 | 07:43 |
| Saturn | 349°42.8 | 22:39 |
| Horizontal parallax | | |
| Venus: | 0.5 | |
| Mars: | 0.1 | |

| h | Sun | | | Moon | | | | |
|------------|----------|----------|------------|------------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 183°44.0 | S09°54.3 | | 85°36.9 | 12.4' | S22°44.4 | -8.6' | 54.5' |
| 1 | 198°44.1 | 55.2 | | 100°08.3 | 12.5' | 22°35.8 | -8.7' | 54.5' |
| 2 | 213°44.2 | 56.1 | | 114°39.8 | 12.5' | 22°27.0 | -8.8' | 54.5' |
| 3 | 228°44.3 | · · 57.0 | | 129°11.3 | 12.5' | 22°18.2 | -8.9' | 54.5' |
| 4 | 243°44.4 | 57.9 | | 143°42.8 | 12.6' | 22°09.3 | -9.0' | 54.5' |
| 5 | 258°44.6 | 58.8 | | 158°14.4 | 12.6' | 22°00.3 | -9.1' | 54.6' |
| 6 | 273°44.7 | S09°59.7 | | 172°46.1 | 12.7' | S21°51.2 | -9.2' | 54.6' |
| 7 | 288°44.8 | 10°00.6 | | 187°17.7 | 12.7' | 21°42.0 | -9.3' | 54.6' |
| 8 | 303°44.9 | 01.5 | | 201°49.5 | 12.8' | 21°32.6 | -9.4' | 54.6' |
| 9 | 318°45.0 | · · 02.4 | | 216°21.3 | 12.8' | 21°23.2 | -9.5' | 54.6' |
| 10 | 333°45.1 | 03.3 | | 230°53.1 | 12.9' | 21°13.7 | -9.6' | 54.6' |
| 11 | 348°45.3 | 04.2 | | 245°25.0 | 12.9' | 21°04.1 | -9.7' | 54.7' |
| 12 | 3°45.4 | S10°05.1 | | 259°56.9 | 13.0' | S20°54.4 | -9.8' | 54.7' |
| 13 | 18°45.5 | 06.1 | | 274°28.8 | 13.0' | 20°44.6 | -9.9' | 54.7' |
| 14 | 33°45.6 | 07.0 | | 289°00.8 | 13.0' | 20°34.7 | -10.0' | 54.7' |
| 15 | 48°45.7 | · · 07.9 | | 303°32.9 | 13.1' | 20°24.7 | -10.1' | 54.7' |
| 16 | 63°45.8 | 08.8 | | 318°05.0 | 13.1' | 20°14.6 | -10.2' | 54.7' |
| 17 | 78°45.9 | 09.6 | | 332°37.1 | 13.2' | 20°04.4 | -10.3' | 54.8' |
| 18 | 93°46.0 | S10°10.5 | | 347°09.3 | 13.2' | S19°54.1 | -10.4' | 54.8' |
| 19 | 108°46.2 | 11.4 | | 1°41.5 | 13.3' | 19°43.7 | -10.5' | 54.8' |
| 20 | 123°46.3 | 12.3 | | 16°13.8 | 13.3' | 19°33.2 | -10.6' | 54.8' |
| 21 | 138°46.4 | · · 13.2 | | 30°46.1 | 13.3' | 19°22.7 | -10.7' | 54.8' |
| 22 | 153°46.5 | 14.1 | | 45°18.4 | 13.4' | 19°12.0 | -10.7' | 54.9' |
| 23 | 168°46.6 | 15.0 | | 59°50.8 | 13.4' | 19°01.3 | -10.8' | 54.9' |
| SD = 16.0' | | | $d = 0.9'$ | SD = 14.9' | | | | |

| Tue | Sun | | | Moon | | | | |
|------------|----------|----------|------------|------------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 183°46.7 | S10°15.9 | | 74°23.3 | 13.5' | S18°50.4 | -10.9' | 54.9' |
| 1 | 198°46.8 | 16.8 | | 88°55.7 | 13.5' | 18°39.5 | -11.0' | 54.9' |
| 2 | 213°46.9 | 17.7 | | 103°28.2 | 13.5' | 18°28.5 | -11.1' | 55.0' |
| 3 | 228°47.0 | · · 18.6 | | 118°00.8 | 13.6' | 18°17.4 | -11.2' | 55.0' |
| 4 | 243°47.2 | 19.5 | | 132°33.4 | 13.6' | 18°06.2 | -11.3' | 55.0' |
| 5 | 258°47.3 | 20.4 | | 147°06.0 | 13.7' | 17°54.9 | -11.4' | 55.0' |
| 6 | 273°47.4 | S10°21.3 | | 161°38.7 | 13.7' | S17°43.6 | -11.4' | 55.0' |
| 7 | 288°47.5 | 22.2 | | 176°11.4 | 13.7' | 17°32.1 | -11.5' | 55.1' |
| 8 | 303°47.6 | 23.1 | | 190°44.1 | 13.8' | 17°20.6 | -11.6' | 55.1' |
| 9 | 318°47.7 | · · 24.0 | | 205°16.9 | 13.8' | 17°09.0 | -11.7' | 55.1' |
| 10 | 333°47.8 | 24.9 | | 219°49.7 | 13.8' | 16°57.3 | -11.8' | 55.1' |
| 11 | 348°47.9 | 25.8 | | 234°22.5 | 13.9' | 16°45.5 | -11.9' | 55.2' |
| 12 | 3°48.0 | S10°26.7 | | 248°55.4 | 13.9' | S16°33.7 | -11.9' | 55.2' |
| 13 | 18°48.1 | 27.6 | | 263°28.3 | 13.9' | 16°21.7 | -12.0' | 55.2' |
| 14 | 33°48.2 | 28.5 | | 278°01.2 | 14.0' | 16°09.7 | -12.1' | 55.2' |
| 15 | 48°48.3 | · · 29.4 | | 292°34.2 | 14.0' | 15°57.6 | -12.2' | 55.3' |
| 16 | 63°48.4 | 30.3 | | 307°07.2 | 14.0' | 15°45.4 | -12.3' | 55.3' |
| 17 | 78°48.6 | 31.2 | | 321°40.2 | 14.1' | 15°33.2 | -12.3' | 55.3' |
| 18 | 93°48.7 | S10°32.0 | | 336°13.3 | 14.1' | S15°20.9 | -12.4' | 55.3' |
| 19 | 108°48.8 | 32.9 | | 350°46.3 | 14.1' | 15°08.5 | -12.5' | 55.4' |
| 20 | 123°48.9 | 33.8 | | 5°19.5 | 14.1' | 14°56.0 | -12.6' | 55.4' |
| 21 | 138°49.0 | · · 34.7 | | 19°52.6 | 14.2' | 14°43.4 | -12.6' | 55.4' |
| 22 | 153°49.1 | 35.6 | | 34°25.8 | 14.2' | 14°30.8 | -12.7' | 55.4' |
| 23 | 168°49.2 | 36.5 | | 48°59.0 | 14.2' | 14°18.1 | -12.8' | 55.5' |
| SD = 16.1' | | | $d = 0.9'$ | SD = 15.0' | | | | |

| Wed | Sun | | | Moon | | | | |
|------------|----------|----------|------------|------------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 183°49.3 | S10°37.4 | | 63°32.2 | 14.2' | S14°05.3 | -12.9' | 55.5' |
| 1 | 198°49.4 | 38.3 | | 78°05.4 | 14.3' | 13°52.5 | -12.9' | 55.5' |
| 2 | 213°49.5 | 39.2 | | 92°38.7 | 14.3' | 13°39.5 | -13.0' | 55.6' |
| 3 | 228°49.6 | · · 40.1 | | 107°12.0 | 14.3' | 13°26.5 | -13.1' | 55.6' |
| 4 | 243°49.7 | 41.0 | | 121°45.3 | 14.3' | 13°13.5 | -13.1' | 55.6' |
| 5 | 258°49.8 | 41.9 | | 136°18.6 | 14.3' | 13°00.3 | -13.2' | 55.6' |
| 6 | 273°49.9 | S10°42.7 | | 150°51.9 | 14.4' | S12°47.1 | -13.3' | 55.7' |
| 7 | 288°50.0 | 43.6 | | 165°25.3 | 14.4' | 12°33.9 | -13.3' | 55.7' |
| 8 | 303°50.1 | 44.5 | | 179°58.7 | 14.4' | 12°20.5 | -13.4' | 55.7' |
| 9 | 318°50.2 | · · 45.4 | | 194°32.1 | 14.4' | 12°07.1 | -13.5' | 55.8' |
| 10 | 333°50.3 | 46.3 | | 209°05.5 | 14.4' | 11°53.7 | -13.5' | 55.8' |
| 11 | 348°50.4 | 47.2 | | 223°38.9 | 14.4' | 11°40.1 | -13.6' | 55.8' |
| 12 | 3°50.5 | S10°48.1 | | 238°12.4 | 14.5' | S11°26.6 | -13.7' | 55.8' |
| 13 | 18°50.6 | 49.0 | | 252°45.8 | 14.5' | 11°12.9 | -13.7' | 55.9' |
| 14 | 33°50.7 | 49.8 | | 267°19.3 | 14.5' | 10°59.2 | -13.8' | 55.9' |
| 15 | 48°50.8 | · · 50.7 | | 281°52.8 | 14.5' | 10°45.4 | -13.8' | 55.9' |
| 16 | 63°50.9 | 51.6 | | 296°26.3 | 14.5' | 10°31.6 | -13.9' | 56.0' |
| 17 | 78°51.0 | 52.5 | | 310°59.8 | 14.5' | 10°17.7 | -14.0' | 56.0' |
| 18 | 93°51.1 | S10°53.4 | | 325°33.3 | 14.5' | S10°03.7 | -14.0' | 56.0' |
| 19 | 108°51.2 | 54.3 | | 340°06.8 | 14.5' | 09°49.7 | -14.1' | 56.1' |
| 20 | 123°51.3 | 55.2 | | 354°40.3 | 14.5' | 09°35.6 | -14.1' | 56.1' |
| 21 | 138°51.4 | · · 56.0 | | 9°13.9 | 14.5' | 09°21.5 | -14.2' | 56.1' |
| 22 | 153°51.5 | 56.9 | | 23°47.4 | 14.5' | 09°07.3 | -14.2' | 56.2' |
| 23 | 168°51.6 | 57.8 | | 38°20.9 | 14.5' | 08°53.0 | -14.3' | 56.2' |
| SD = 16.1' | | | $d = 0.9'$ | SD = 15.1' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 05:17 | 06:35 | 07:49 | 15:39 | 16:52 | 18:10 |
| N 70° | 05:18 | 06:29 | 07:34 | 15:54 | 16:59 | 18:09 |
| 68° | 05:19 | 06:24 | 07:23 | 16:06 | 17:04 | 18:09 |
| 66° | 05:20 | 06:19 | 07:13 | 16:15 | 17:09 | 18:08 |
| 64° | 05:20 | 06:15 | 07:05 | 16:24 | 17:13 | 18:08 |
| 62° | 05:20 | 06:12 | 06:58 | 16:31 | 17:17 | 18:08 |
| 60° | 05:20 | 06:09 | 06:52 | 16:37 | 17:20 | 18:08 |
| N 58° | 05:20 | 06:06 | 06:46 | 16:42 | 17:23 | 18:08 |
| 56° | 05:20 | 06:03 | 06:42 | 16:47 | 17:25 | 18:08 |
| 54° | 05:20 | 06:01 | 06:37 | 16:51 | 17:28 | 18:09 |
| 52° | 05:20 | 05:59 | 06:33 | 16:55 | 17:30 | 18:09 |
| 50° | 05:19 | 05:57 | 06:30 | 16:59 | 17:32 | 18:09 |
| 45° | 05:18 | 05:52 | 06:22 | 17:07 | 17:37 | 18:11 |
| N 40° | 05:17 | 05:48 | 06:16 | 17:13 | 17:41 | 18:12 |
| 35° | 05:15 | 05:44 | 06:10 | 17:19 | 17:45 | 18:14 |
| 30° | 05:13 | 05:41 | 06:05 | 17:24 | 17:48 | 18:16 |
| 20° | 05:08 | 05:34 | 05:56 | 17:33 | 17:55 | 18:21 |
| N 10° | 05:03 | 05:27 | 05:49 | 17:41 | 18:02 | 18:27 |
| 0° | 04:56 | 05:20 | 05:41 | 17:48 | 18:09 | 18:34 |
| S 10° | 04:48 | 05:13 | 05:34 | 17:56 | 18:17 | 18:42 |
| 20° | 04:37 | 05:03 | 05:26 | 18:04 | 18:26 | 18:53 |
| 30° | 04:23 | 04:52 | 05:17 | 18:13 | 18:38 | 19:07 |
| 35° | 04:14 | 04:45 | 05:11 | 18:19 | 18:45 | 19:16 |
| 40° | 04:03 | 04:37 | 05:05 | 18:25 | 18:53 | 19:27 |
| 45° | 03:50 | 04:27 | 04:58 | 18:33 | 19:03 | 19:41 |
| S 50° | 03:33 | 04:15 | 04:49 | 18:41 | 19:16 | 19:59 |
| 52° | 03:24 | 04:09 | 04:45 | 18:46 | 19:22 | 20:07 |
| 54° | 03:15 | 04:03 | 04:41 | 18:50 | 19:28 | 20:17 |
| 56° | 03:03 | 03:55 | 04:36 | 18:55 | 19:36 | 20:28 |
| 58° | 02:50 | 03:47 | 04:30 | 19:01 | 19:44 | 20:42 |
| S 60° | 02:35 | 03:37 | 04:24 | 19:07 | 19:54 | 20:58 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | ■ | 17:30 | 16:34 | ■ | 22:10 | |
| N 70° | 18:30 | 16:55 | 16:18 | 19:34 | 22:43 | |
| 68° | 17:11 | 16:30 | 16:05 | 20:52 | 23:07 | |
| 66° | 16:32 | 16:10 | 15:54 | 21:29 | 23:25 | |
| 64° | 16:06 | 15:54 | 15:45 | 21:55 | 23:39 | |
| 62° | 15:45 | 15:41 | 15:37 | 22:15 | 23:52 | |
| 60° | 15:27 | 15:30 | 15:30 | 22:31 | | 00:02 |
| N 58° | 15:13 | 15:20 | 15:24 | 22:45 | | 00:11 |
| 56° | 15:01 | 15:11 | 15:19 | 22:57 | | 00:19 |
| 54° | 14:50 | 15:03 | 15:14 | 23:07 | | 00:26 |
| 52° | 14:40 | 14:56 | 15:10 | 23:16 | | 00:32 |
| 50° | 14:31 | 14:50 | 15:06 | 23:24 | | 00:37 |
| 45° | 14:13 | 14:36 | 14:57 | 23:41 | | 00:49 |
| N 40° | 13:58 | 14:25 | 14:50 | 23:55 | | 00:59 |
| 35° | 13:45 | 14:16 | 14:43 | | 00:07 | 01:08 |
| 30° | 13:34 | 14:07 | 14:38 | | 00:17 | 01:15 |
| 20° | 13:15 | 13:52 | 14:28 | | 00:35 | 01:28 |
| N 10° | 12:58 | 13:40 | 14:20 | 00:00 | 00:50 | 01:38 |
| 0° | 12:42 | 13:27 | 14:12 | 00:18 | 01:04 | 01:49 |
| S 10° | 12:26 | 13:15 | 14:03 | 00:35 | 01:18 | 01:59 |
| 20° | 12:09 | 13:02 | 13:55 | 00:54 | 01:33 | 02:09 |
| 30° | 11:49 | 12:47 | 13:45 | 01:15 | 01:50 | 02:22 |
| 35° | 11:38 | 12:38 | 13:39 | 01:27 | 02:00 | 02:29 |
| 40° | 11:24 | 12:28 | 13:33 | 01:42 | 02:11 | 02:37 |
| 45° | 11:09 | 12:16 | 13:25 | 01:58 | 02:24 | 02:46 |
| S 50° | 10:49 | 12:02 | 13:16 | 02:19 | 02:40 | 02:57 |
| 52° | 10:40 | 11:55 | 13:11 | 02:29 | 02:47 | 03:02 |
| 54° | 10:30 | 11:48 | 13:07 | 02:40 | 02:55 | 03:07 |
| 56° | 10:18 | 11:39 | 13:01 | 02:52 | 03:05 | 03:13 |
| 58° | 10:04 | 11:30 | 12:56 | 03:06 | 03:15 | 03:20 |
| S 60° | 09:48 | 11:19 | 12:49 | 03:23 | 03:27 | 03:28 |

October 22, 23, 24 UT (Thu., Fri., Sat.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------|----------|--|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| Thu | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 30°26.6 | | 183°02.7 | S18°36.4 | 254°07.4 | N18°07.7 | 244°53.0 | N14°28.3 | 20°13.5 | N01°27.6 |
| 1 | 45°29.1 | | 198°06.5 | 35.5 | 269°08.5 | 07.4 | 259°55.1 | 28.2 | 35°16.1 | 27.5 |
| 2 | 60°31.5 | | 213°10.3 | 34.7 | 284°09.6 | 07.0 | 274°57.2 | 28.1 | 50°18.7 | 27.5 |
| 3 | 75°34.0 | | 228°14.1 | •• 33.8 | 299°10.7 | •• 06.7 | 289°59.3 | •• 28.0 | 65°21.4 | •• 27.4 |
| 4 | 90°36.5 | | 243°17.9 | 32.9 | 314°11.8 | 06.4 | 305°01.4 | 27.9 | 80°24.0 | 27.3 |
| 5 | 105°38.9 | | 258°21.7 | 32.1 | 329°12.9 | 06.0 | 320°03.5 | 27.8 | 95°26.6 | 27.3 |
| 6 | 120°41.4 | | 273°25.5 | S18°31.2 | 344°14.0 | N18°05.7 | 335°05.6 | N14°27.6 | 110°29.3 | N01°27.2 |
| 7 | 135°43.8 | | 288°29.3 | 30.3 | 359°15.1 | 05.3 | 350°07.8 | 27.5 | 125°31.9 | 27.1 |
| 8 | 150°46.3 | | 303°33.1 | 29.4 | 14°16.3 | 05.0 | 5°09.9 | 27.4 | 140°34.5 | 27.1 |
| 9 | 165°48.8 | | 318°36.9 | •• 28.6 | 29°17.4 | •• 04.7 | 20°12.0 | •• 27.3 | 155°37.2 | •• 27.0 |
| 10 | 180°51.2 | | 333°40.7 | 27.7 | 44°18.5 | 04.3 | 35°14.1 | 27.2 | 170°39.8 | 26.9 |
| 11 | 195°53.7 | | 348°44.5 | 26.8 | 59°19.6 | 04.0 | 50°16.2 | 27.1 | 185°42.4 | 26.8 |
| 12 | 210°56.2 | | 3°48.3 | S18°25.9 | 74°20.7 | N18°03.7 | 65°18.3 | N14°27.0 | 200°45.0 | N01°26.8 |
| 13 | 225°58.6 | | 18°52.1 | 25.0 | 89°21.8 | 03.3 | 80°20.4 | 26.9 | 215°47.7 | 26.7 |
| 14 | 241°01.1 | | 33°55.9 | 24.2 | 104°22.9 | 03.0 | 95°22.6 | 26.8 | 230°50.3 | 26.6 |
| 15 | 256°03.6 | | 48°59.7 | •• 23.3 | 119°24.0 | •• 02.7 | 110°24.7 | •• 26.7 | 245°52.9 | •• 26.6 |
| 16 | 271°06.0 | | 64°03.5 | 22.4 | 134°25.1 | 02.3 | 125°26.8 | 26.6 | 260°55.6 | 26.5 |
| 17 | 286°08.5 | | 79°07.3 | 21.5 | 149°26.3 | 02.0 | 140°28.9 | 26.4 | 275°58.2 | 26.4 |
| 18 | 301°10.9 | | 94°11.2 | S18°20.6 | 164°27.4 | N18°01.6 | 155°31.0 | N14°26.3 | 291°00.8 | N01°26.4 |
| 19 | 316°13.4 | | 109°15.0 | 19.7 | 179°28.5 | 01.3 | 170°33.1 | 26.2 | 306°03.5 | 26.3 |
| 20 | 331°15.9 | | 124°18.8 | 18.8 | 194°29.6 | 01.0 | 185°35.3 | 26.1 | 321°06.1 | 26.2 |
| 21 | 346°18.3 | | 139°22.6 | •• 17.9 | 209°30.7 | •• 00.6 | 200°37.4 | •• 26.0 | 336°08.7 | •• 26.2 |
| 22 | 1°20.8 | | 154°26.4 | 17.0 | 224°31.8 | 18°00.3 | 215°39.5 | 25.9 | 351°11.3 | 26.1 |
| 23 | 16°23.3 | | 169°30.2 | 16.1 | 239°32.9 | 17°59.9 | 230°41.6 | 25.8 | 6°14.0 | 26.0 |
| Mer.pass. | 21:55 | | ν3.8' d-0.9' m-4.25 | | ν1.1' d-0.3' m0.95 | | ν2.1' d-0.1' m-1.95 | | ν2.6' d-0.1' m0.41 | |
| Fri | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 31°25.7 | | 184°34.0 | S18°15.2 | 254°34.1 | N17°59.6 | 245°43.7 | N14°25.7 | 21°16.6 | N01°26.0 |
| 1 | 46°28.2 | | 199°37.8 | 14.3 | 269°35.2 | 59.3 | 260°45.8 | 25.6 | 36°19.2 | 25.9 |
| 2 | 61°30.7 | | 214°41.6 | 13.4 | 284°36.3 | 58.9 | 275°48.0 | 25.5 | 51°21.9 | 25.9 |
| 3 | 76°33.1 | | 229°45.4 | •• 12.5 | 299°37.4 | •• 58.6 | 290°50.1 | •• 25.4 | 66°24.5 | •• 25.8 |
| 4 | 91°35.6 | | 244°49.2 | 11.6 | 314°38.5 | 58.3 | 305°52.2 | 25.2 | 81°27.1 | 25.7 |
| 5 | 106°38.1 | | 259°53.0 | 10.7 | 329°39.6 | 57.9 | 320°54.3 | 25.1 | 96°29.8 | 25.7 |
| 6 | 121°40.5 | | 274°56.8 | S18°09.8 | 344°40.8 | N17°57.6 | 335°56.4 | N14°25.0 | 111°32.4 | N01°25.6 |
| 7 | 136°43.0 | | 290°00.6 | 08.9 | 359°41.9 | 57.2 | 350°58.6 | 24.9 | 126°35.0 | 25.5 |
| 8 | 151°45.4 | | 305°04.4 | 08.0 | 14°43.0 | 56.9 | 6°00.7 | 24.8 | 141°37.6 | 25.5 |
| 9 | 166°47.9 | | 320°08.2 | •• 07.0 | 29°44.1 | •• 56.6 | 21°02.8 | •• 24.7 | 156°40.3 | •• 25.4 |
| 10 | 181°50.4 | | 335°12.0 | 06.1 | 44°45.2 | 56.2 | 36°04.9 | 24.6 | 171°42.9 | 25.3 |
| 11 | 196°52.8 | | 350°15.8 | 05.2 | 59°46.3 | 55.9 | 51°07.0 | 24.5 | 186°45.5 | 25.3 |
| 12 | 211°55.3 | | 5°19.6 | S18°04.3 | 74°47.5 | N17°55.6 | 66°09.2 | N14°24.4 | 201°48.2 | N01°25.2 |
| 13 | 226°57.8 | | 20°23.4 | 03.4 | 89°48.6 | 55.2 | 81°11.3 | 24.3 | 216°50.8 | 25.1 |
| 14 | 242°00.2 | | 35°27.2 | 02.4 | 104°49.7 | 54.9 | 96°13.4 | 24.2 | 231°53.4 | 25.1 |
| 15 | 257°02.7 | | 50°31.0 | •• 01.5 | 119°50.8 | •• 54.5 | 111°15.5 | •• 24.1 | 246°56.0 | •• 25.0 |
| 16 | 272°05.2 | | 65°34.8 | 18°00.6 | 134°51.9 | 54.2 | 126°17.6 | 24.0 | 261°58.7 | 24.9 |
| 17 | 287°07.6 | | 80°38.6 | 17°59.7 | 149°53.1 | 53.9 | 141°19.8 | 23.8 | 277°01.3 | 24.9 |
| 18 | 302°10.1 | | 95°42.4 | S17°58.7 | 164°54.2 | N17°53.5 | 156°21.9 | N14°23.7 | 292°03.9 | N01°24.8 |
| 19 | 317°12.5 | | 110°46.2 | 57.8 | 179°55.3 | 53.2 | 171°24.0 | 23.6 | 307°06.6 | 24.7 |
| 20 | 332°15.0 | | 125°50.0 | 56.9 | 194°56.4 | 52.8 | 186°26.1 | 23.5 | 322°09.2 | 24.7 |
| 21 | 347°17.5 | | 140°53.8 | •• 55.9 | 209°57.6 | •• 52.5 | 201°28.2 | •• 23.4 | 337°11.8 | •• 24.6 |
| 22 | 2°19.9 | | 155°57.6 | 55.0 | 224°58.7 | 52.2 | 216°30.4 | 23.3 | 352°14.4 | 24.5 |
| 23 | 17°22.4 | | 171°01.4 | 54.1 | 239°59.8 | 51.8 | 231°32.5 | 23.2 | 7°17.1 | 24.5 |
| Mer.pass. | 21:51 | | ν3.8' d-0.9' m-4.23 | | ν1.1' d-0.3' m0.94 | | ν2.1' d-0.1' m-1.96 | | ν2.6' d-0.1' m0.42 | |
| Sat | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 32°24.9 | | 186°05.2 | S17°53.1 | 255°00.9 | N17°51.5 | 246°34.6 | N14°23.1 | 22°19.7 | N01°24.4 |
| 1 | 47°27.3 | | 201°09.0 | 52.2 | 270°02.1 | 51.2 | 261°36.7 | 23.0 | 37°22.3 | 24.3 |
| 2 | 62°29.8 | | 216°12.8 | 51.3 | 285°03.2 | 50.8 | 276°38.9 | 22.9 | 52°24.9 | 24.3 |
| 3 | 77°32.3 | | 231°16.6 | •• 50.3 | 300°04.3 | •• 50.5 | 291°41.0 | •• 22.8 | 67°27.6 | •• 24.2 |
| 4 | 92°34.7 | | 246°20.4 | 49.4 | 315°05.4 | 50.1 | 306°43.1 | 22.7 | 82°30.2 | 24.1 |
| 5 | 107°37.2 | | 261°24.2 | 48.4 | 330°06.6 | 49.8 | 321°45.2 | 22.6 | 97°32.8 | 24.1 |
| 6 | 122°39.7 | | 276°28.0 | S17°47.5 | 345°07.7 | N17°49.5 | 336°47.3 | N14°22.5 | 112°35.5 | N01°24.0 |
| 7 | 137°42.1 | | 291°31.8 | 46.5 | 0°08.8 | 49.1 | 351°49.5 | 22.4 | 127°38.1 | 23.9 |
| 8 | 152°44.6 | | 306°35.6 | 45.6 | 15°09.9 | 48.8 | 6°51.6 | 22.2 | 142°40.7 | 23.9 |
| 9 | 167°47.0 | | 321°39.4 | •• 44.6 | 30°11.1 | •• 48.4 | 21°53.7 | •• 22.1 | 157°43.3 | •• 23.8 |
| 10 | 182°49.5 | | 336°43.2 | 43.7 | 45°12.2 | 48.1 | 36°55.8 | 22.0 | 172°46.0 | 23.7 |
| 11 | 197°52.0 | | 351°47.0 | 42.7 | 60°13.3 | 47.8 | 51°58.0 | 21.9 | 187°48.6 | 23.7 |
| 12 | 212°54.4 | | 6°50.8 | S17°41.8 | 75°14.5 | N17°47.4 | 67°00.1 | N14°21.8 | 202°51.2 | N01°23.6 |
| 13 | 227°56.9 | | 21°54.6 | 40.8 | 90°15.6 | 47.1 | 82°02.2 | 21.7 | 217°53.8 | 23.6 |
| 14 | 242°59.4 | | 36°58.4 | 39.9 | 105°16.7 | 46.7 | 97°04.3 | 21.6 | 232°56.5 | 23.5 |
| 15 | 258°01.8 | | 52°02.1 | •• 38.9 | 120°17.8 | •• 46.4 | 112°06.5 | •• 21.5 | 247°59.1 | •• 23.4 |
| 16 | 273°04.3 | | 67°05.9 | 38.0 | 135°19.0 | 46.1 | 127°08.6 | 21.4 | 263°01.7 | 23.4 |
| 17 | 288°06.8 | | 82°09.7 | 37.0 | 150°20.1 | 45.7 | 142°10.7 | 21.3 | 278°04.4 | 23.3 |
| 18 | 303°09.2 | | 97°13.5 | S17°36.0 | 165°21.2 | N17°45.4 | 157°12.9 | N14°21.2 | 293°07.0 | N01°23.2 |
| 19 | 318°11.7 | | 112°17.3 | 35.1 | 180°22.4 | 45.0 | 172°15.0 | 21.1 | 308°09.6 | 23.2 |
| 20 | 333°14.1 | | 127°21.1 | 34.1 | 195°23.5 | 44.7 | 187°17.1 | 21.0 | 323°12.2 | 23.1 |
| 21 | 348°16.6 | | 142°24.9 | •• 33.2 | 210°24.6 | •• 44.4 | 202°19.2 | •• 20.9 | 338°14.9 | •• 23.0 |
| 22 | 3°19.1 | | 157°28.6 | 32.2 | 225°25.8 | 44.0 | 217°21.4 | 20.8 | 353°17.5 | 23.0 |
| 23 | 18°21.5 | | 172°32.4 | 31.2 | 240°26.9 | 43.7 | 232°23.5 | 20.7 | 8°20.1 | 22.9 |
| Mer.pass. | 21:47 | | ν3.8' d-0.9' m-4.20 | | ν1.1' d-0.3' m0.93 | | ν2.1' d-0.1' m-1.96 | | ν2.6' d-0.1' m0.42 | |

| | SHA | Dec |
|---------------------|----------|----------|
| Alpheratz | 357°32.9 | 29°14.5 |
| Ankaa | 353°05.3 | -42°09.6 |
| Schedar | 349°28.8 | 56°41.3 |
| Diphda | 348°45.5 | -17°50.2 |
| Achernar | 335°18.5 | -57°05.9 |
| Hamal | 327°49.2 | 23°35.5 |
| Polaris | 312°48.1 | 89°22.5 |
| Acamar | 315°10.3 | -40°11.6 |
| Menkar | 314°04.3 | 4°11.8 |
| Mirfak | 308°25.7 | 49°57.4 |
| Aldebaran | 290°37.7 | 16°33.9 |
| Rigel | 281°02.2 | -8°10.1 |
| Capella | 280°19.4 | 46°01.4 |
| Bellatrix | 278°21.1 | 6°22.5 |
| Elnath | 277°59.8 | 28°37.8 |
| Alnilam | 275°36.1 | -1°11.0 |
| Betelgeuse | 270°50.3 | 7°24.8 |
| Canopus | 263°51.5 | -52°42.2 |
| Sirius | 258°24.8 | -16°45.0 |
| Adhara | 255°04.6 | -29°00.2 |
| Procyon | 244°49.3 | 5°09.4 |
| Pollux | 243°15.5 | 27°57.6 |
| Avior | 234°14.2 | -59°35.4 |
| Suhail | 222°45.4 | -43°32.2 |
| Miaplacidus | 221°38.3 | -69°49.3 |
| Alphard | 217°46.4 | -8°46.4 |
| Regulus | 207°33.1 | 11°50.2 |
| Dubhe | 193°39.7 | 61°36.2 |
| Denebola | 182°23.7 | 14°25.3 |
| Gienah | 175°42.4 | -17°41.3 |
| Acrux | 172°59.1 | -63°14.7 |
| Gacrux | 171°50.6 | -57°15.7 |
| Alioth | 166°12.2 | 55°48.8 |
| Spica | 158°21.1 | -11°18.0 |
| Alkaid | 152°51.3 | 49°10.8 |
| Hadar | 148°34.6 | -60°30.1 |
| Menkent | 147°56.3 | -36°30.1 |
| Arcturus | 145°46.9 | 19°02.6 |
| Rigel Kent. | 139°38.9 | -60°56.8 |
| Kochab | 137°21.0 | 74°02.7 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.6 |
| Antares | 112°14.3 | -26°29.5 |
| Atria | 107°07.6 | -69°04.7 |
| Sabik | 102°01.3 | -15°45.4 |
| Shaula | 96°08.6 | -37°07.4 |
| Rasalhague | 95°57.4 | 12°32.6 |
| Eltanin | 90°41.8 | 51°29.4 |
| Kaus Aust. | 83°30.7 | -34°22.3 |
| Vega | 80°32.4 | 38°48.8 |
| Nunki | 75°46.1 | -26°15.8 |
| Altair | 61°58.6 | 8°56.5 |
| Peacock | 53°03.4 | -56°39.1 |
| Deneb | 49°24.7 | 45°22.9 |
| Enif | 33°37.2 | 10°00.1 |
| Al Na'ir | 27°30.9 | -46°49.9 |
| Fomalhaut | 15°12.7 | -29°28.8 |
| Scheat | 13°43.5 | 28°14.0 |
| Markab | 13°28.2 | 15°21.2 |
| Oct 22 Thu | SHA | Mer.pass |
| Venus | 152°36.1 | 11:45 |
| Mars | 223°40.8 | 07:03 |
| Jupiter | 214°26.4 | 07:39 |
| Saturn | 349°46.9 | 22:35 |
| Oct 23 Fri | SHA | Mer.pass |
| Venus | 153°08.3 | 11:39 |
| Mars | 223°08.3 | 07:01 |
| Jupiter | 214°18.0 | 07:36 |
| Saturn | 349°50.9 | 22:31 |
| Oct 24 Sat | SHA | Mer.pass |
| Venus | 153°40.4 | 11:33 |
| Mars | 222°36.1 | 06:59 |
| Jupiter | 214°09.7 | 07:33 |
| Saturn | 349°54.8 | 22:27 |
| Horizontal parallax | | |
| Venus: | 0.5 | |
| Mars: | 0.1 | |


| h | Sun | | Moon | | | | |
|-----------------------|----------|----------|------------|-------|----------|--------|-------|
| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 183°51.7 | S10°58.7 | 52°54.5 | 14.5' | S08°38.7 | -14.4' | 56.2' |
| 1 | 198°51.8 | 10°59.6 | 67°28.0 | 14.5' | 08°24.4 | -14.4' | 56.3' |
| 2 | 213°51.9 | 11°00.5 | 82°01.6 | 14.5' | 08°10.0 | -14.5' | 56.3' |
| 3 | 228°52.0 | · · 01.4 | 96°35.1 | 14.5' | 07°55.5 | -14.5' | 56.3' |
| 4 | 243°52.1 | 02.2 | 111°08.7 | 14.5' | 07°41.0 | -14.6' | 56.3' |
| 5 | 258°52.2 | 03.1 | 125°42.2 | 14.5' | 07°26.5 | -14.6' | 56.4' |
| 6 | 273°52.3 | S11°04.0 | 140°15.7 | 14.5' | S07°11.9 | -14.7' | 56.4' |
| 7 | 288°52.4 | 04.9 | 154°49.3 | 14.5' | 06°57.2 | -14.7' | 56.4' |
| 8 | 303°52.5 | 05.8 | 169°22.8 | 14.5' | 06°42.5 | -14.7' | 56.5' |
| 9 | 318°52.6 | · · 06.6 | 183°56.3 | 14.5' | 06°27.8 | -14.8' | 56.5' |
| 10 | 333°52.7 | 07.5 | 198°29.8 | 14.5' | 06°13.0 | -14.8' | 56.5' |
| 11 | 348°52.8 | 08.4 | 213°03.3 | 14.5' | 05°58.1 | -14.9' | 56.6' |
| 12 | 3°52.9 | S11°09.3 | 227°36.8 | 14.5' | S05°43.3 | -14.9' | 56.6' |
| 13 | 18°52.9 | 10.2 | 242°10.3 | 14.5' | 05°28.3 | -15.0' | 56.6' |
| 14 | 33°53.0 | 11.1 | 256°43.7 | 14.5' | 05°13.4 | -15.0' | 56.7' |
| 15 | 48°53.1 | · · 11.9 | 271°17.2 | 14.4' | 04°58.4 | -15.0' | 56.7' |
| 16 | 63°53.2 | 12.8 | 285°50.6 | 14.4' | 04°43.3 | -15.1' | 56.7' |
| 17 | 78°53.3 | 13.7 | 300°24.0 | 14.4' | 04°28.2 | -15.1' | 56.8' |
| 18 | 93°53.4 | S11°14.6 | 314°57.4 | 14.4' | S04°13.1 | -15.2' | 56.8' |
| 19 | 108°53.5 | 15.5 | 329°30.8 | 14.4' | 03°58.0 | -15.2' | 56.8' |
| 20 | 123°53.6 | 16.3 | 344°04.2 | 14.3' | 03°42.8 | -15.2' | 56.9' |
| 21 | 138°53.7 | · · 17.2 | 358°37.5 | 14.3' | 03°27.5 | -15.3' | 56.9' |
| 22 | 153°53.8 | 18.1 | 13°10.9 | 14.3' | 03°12.3 | -15.3' | 56.9' |
| 23 | 168°53.9 | 19.0 | 27°44.2 | 14.3' | 02°57.0 | -15.3' | 57.0' |
| SD = 16.1' $d = 0.9'$ | | | SD = 15.3' | | | | |

| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|------------|-------|----------|--------|-------|
| 0 | 183°54.0 | S11°19.8 | 42°17.4 | 14.3' | S02°41.6 | -15.4' | 57.0' |
| 1 | 198°54.1 | 20.7 | 56°50.7 | 14.2' | 02°26.3 | -15.4' | 57.0' |
| 2 | 213°54.1 | 21.6 | 71°23.9 | 14.2' | 02°10.9 | -15.4' | 57.1' |
| 3 | 228°54.2 | · · 22.5 | 85°57.1 | 14.2' | 01°55.5 | -15.4' | 57.1' |
| 4 | 243°54.3 | 23.3 | 100°30.3 | 14.1' | 01°40.0 | -15.5' | 57.2' |
| 5 | 258°54.4 | 24.2 | 115°03.4 | 14.1' | 01°24.6 | -15.5' | 57.2' |
| 6 | 273°54.5 | S11°25.1 | 129°36.5 | 14.1' | S01°09.1 | -15.5' | 57.2' |
| 7 | 288°54.6 | 26.0 | 144°09.6 | 14.0' | 00°53.5 | -15.5' | 57.3' |
| 8 | 303°54.7 | 26.8 | 158°42.7 | 14.0' | 00°38.0 | -15.6' | 57.3' |
| 9 | 318°54.8 | · · 27.7 | 173°15.7 | 14.0' | 00°22.4 | -15.6' | 57.3' |
| 10 | 333°54.8 | 28.6 | 187°48.6 | 13.9' | S00°06.8 | -15.6' | 57.4' |
| 11 | 348°54.9 | 29.5 | 202°21.6 | 13.9' | N00°08.8 | 15.6' | 57.4' |
| 12 | 3°55.0 | S11°30.3 | 216°54.5 | 13.9' | N00°24.4 | 15.6' | 57.4' |
| 13 | 18°55.1 | 31.2 | 231°27.3 | 13.8' | 00°40.0 | 15.7' | 57.5' |
| 14 | 33°55.2 | 32.1 | 246°00.1 | 13.8' | 00°55.7 | 15.7' | 57.5' |
| 15 | 48°55.3 | · · 33.0 | 260°32.9 | 13.7' | 01°11.4 | 15.7' | 57.5' |
| 16 | 63°55.4 | 33.8 | 275°05.6 | 13.7' | 01°27.1 | 15.7' | 57.6' |
| 17 | 78°55.5 | 34.7 | 289°38.3 | 13.6' | 01°42.8 | 15.7' | 57.6' |
| 18 | 93°55.5 | S11°35.6 | 304°11.0 | 13.6' | N01°58.5 | 15.7' | 57.6' |
| 19 | 108°55.6 | 36.5 | 318°43.6 | 13.5' | 02°14.2 | 15.7' | 57.7' |
| 20 | 123°55.7 | 37.3 | 333°16.1 | 13.5' | 02°30.0 | 15.7' | 57.7' |
| 21 | 138°55.8 | · · 38.2 | 347°48.6 | 13.4' | 02°45.7 | 15.8' | 57.7' |
| 22 | 153°55.9 | 39.1 | 2°21.1 | 13.4' | 03°01.5 | 15.8' | 57.8' |
| 23 | 168°56.0 | 39.9 | 16°53.5 | 13.3' | 03°17.2 | 15.8' | 57.8' |
| SD = 16.1' $d = 0.9'$ | | | SD = 15.5' | | | | |

| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|------------|-------|----------|-------|-------|
| 0 | 183°56.0 | S11°40.8 | 31°25.8 | 13.3' | N03°33.0 | 15.8' | 57.8' |
| 1 | 198°56.1 | 41.7 | 45°58.1 | 13.2' | 03°48.7 | 15.8' | 57.9' |
| 2 | 213°56.2 | 42.5 | 60°30.3 | 13.2' | 04°04.5 | 15.8' | 57.9' |
| 3 | 228°56.3 | · · 43.4 | 75°02.5 | 13.1' | 04°20.3 | 15.8' | 57.9' |
| 4 | 243°56.4 | 44.3 | 89°34.6 | 13.1' | 04°36.0 | 15.8' | 58.0' |
| 5 | 258°56.5 | 45.2 | 104°06.7 | 13.0' | 04°51.8 | 15.8' | 58.0' |
| 6 | 273°56.5 | S11°46.0 | 118°38.7 | 12.9' | N05°07.5 | 15.8' | 58.0' |
| 7 | 288°56.6 | 46.9 | 133°10.6 | 12.9' | 05°23.3 | 15.7' | 58.1' |
| 8 | 303°56.7 | 47.8 | 147°42.5 | 12.8' | 05°39.0 | 15.7' | 58.1' |
| 9 | 318°56.8 | · · 48.6 | 162°14.3 | 12.7' | 05°54.8 | 15.7' | 58.1' |
| 10 | 333°56.9 | 49.5 | 176°46.0 | 12.7' | 06°10.5 | 15.7' | 58.2' |
| 11 | 348°56.9 | 50.4 | 191°17.7 | 12.6' | 06°26.2 | 15.7' | 58.2' |
| 12 | 3°57.0 | S11°51.2 | 205°49.3 | 12.5' | N06°41.9 | 15.7' | 58.2' |
| 13 | 18°57.1 | 52.1 | 220°20.8 | 12.5' | 06°57.6 | 15.7' | 58.3' |
| 14 | 33°57.2 | 53.0 | 234°52.3 | 12.4' | 07°13.3 | 15.7' | 58.3' |
| 15 | 48°57.3 | · · 53.8 | 249°23.7 | 12.3' | 07°28.9 | 15.6' | 58.3' |
| 16 | 63°57.3 | 54.7 | 263°55.0 | 12.2' | 07°44.6 | 15.6' | 58.4' |
| 17 | 78°57.4 | 55.6 | 278°26.3 | 12.2' | 08°00.2 | 15.6' | 58.4' |
| 18 | 93°57.5 | S11°56.4 | 292°57.4 | 12.1' | N08°15.8 | 15.6' | 58.4' |
| 19 | 108°57.6 | 57.3 | 307°28.5 | 12.0' | 08°31.3 | 15.5' | 58.5' |
| 20 | 123°57.6 | 58.1 | 321°59.6 | 11.9' | 08°46.9 | 15.5' | 58.5' |
| 21 | 138°57.7 | · · 59.0 | 336°30.5 | 11.9' | 09°02.4 | 15.5' | 58.5' |
| 22 | 153°57.8 | 11°59.9 | 351°01.4 | 11.8' | 09°17.9 | 15.5' | 58.5' |
| 23 | 168°57.9 | 12°00.7 | 5°32.1 | 11.7' | 09°33.3 | 15.4' | 58.6' |
| SD = 16.1' $d = 0.9'$ | | | SD = 15.8' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 05:29 | 06:49 | 08:05 | 15:22 | 16:38 | 17:57 |
| N 70° | 05:29 | 06:41 | 07:48 | 15:39 | 16:46 | 17:57 |
| 68° | 05:29 | 06:34 | 07:34 | 15:53 | 16:53 | 17:58 |
| 66° | 05:29 | 06:29 | 07:23 | 16:04 | 16:59 | 17:58 |
| 64° | 05:28 | 06:24 | 07:14 | 16:14 | 17:04 | 17:59 |
| 62° | 05:28 | 06:20 | 07:06 | 16:22 | 17:08 | 17:59 |
| 60° | 05:27 | 06:16 | 06:59 | 16:28 | 17:12 | 18:00 |
| N 58° | 05:27 | 06:12 | 06:53 | 16:35 | 17:15 | 18:01 |
| 56° | 05:26 | 06:09 | 06:48 | 16:40 | 17:18 | 18:02 |
| 54° | 05:25 | 06:07 | 06:43 | 16:45 | 17:21 | 18:02 |
| 52° | 05:25 | 06:04 | 06:39 | 16:49 | 17:24 | 18:03 |
| 50° | 05:24 | 06:02 | 06:35 | 16:53 | 17:26 | 18:04 |
| 45° | 05:22 | 05:56 | 06:26 | 17:02 | 17:32 | 18:06 |
| N 40° | 05:20 | 05:51 | 06:19 | 17:09 | 17:37 | 18:08 |
| 35° | 05:17 | 05:47 | 06:13 | 17:15 | 17:41 | 18:11 |
| 30° | 05:15 | 05:43 | 06:07 | 17:21 | 17:45 | 18:13 |
| 20° | 05:09 | 05:35 | 05:58 | 17:31 | 17:53 | 18:19 |
| N 10° | 05:03 | 05:28 | 05:49 | 17:39 | 18:01 | 18:26 |
| 0° | 04:55 | 05:20 | 05:41 | 17:48 | 18:09 | 18:33 |
| S 10° | 04:46 | 05:11 | 05:33 | 17:56 | 18:18 | 18:43 |
| 20° | 04:35 | 05:01 | 05:24 | 18:05 | 18:28 | 18:54 |
| 30° | 04:20 | 04:49 | 05:14 | 18:15 | 18:40 | 19:10 |
| 35° | 04:10 | 04:41 | 05:08 | 18:22 | 18:48 | 19:19 |
| 40° | 03:58 | 04:33 | 05:01 | 18:28 | 18:57 | 19:31 |
| 45° | 03:44 | 04:22 | 04:53 | 18:37 | 19:08 | 19:46 |
| S 50° | 03:25 | 04:09 | 04:43 | 18:46 | 19:21 | 20:05 |
| 52° | 03:16 | 04:02 | 04:39 | 18:51 | 19:28 | 20:14 |
| 54° | 03:06 | 03:55 | 04:34 | 18:56 | 19:35 | 20:25 |
| 56° | 02:54 | 03:47 | 04:28 | 19:02 | 19:43 | 20:37 |
| 58° | 02:40 | 03:38 | 04:22 | 19:08 | 19:52 | 20:52 |
| S 60° | 02:22 | 03:28 | 04:15 | 19:15 | 20:03 | 21:10 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | 15:57 | 15:24 | 14:49 | 00:38 | 02:50 | 05:03 |
| N 70° | 15:51 | 15:26 | 15:00 | 00:52 | 02:53 | 04:56 |
| 68° | 15:45 | 15:27 | 15:08 | 01:03 | 02:55 | 04:50 |
| 66° | 15:41 | 15:28 | 15:15 | 01:12 | 02:57 | 04:45 |
| 64° | 15:37 | 15:29 | 15:21 | 01:20 | 02:59 | 04:41 |
| 62° | 15:33 | 15:30 | 15:26 | 01:26 | 03:01 | 04:38 |
| 60° | 15:31 | 15:31 | 15:31 | 01:32 | 03:02 | 04:35 |
| N 58° | 15:28 | 15:31 | 15:35 | 01:37 | 03:03 | 04:32 |
| 56° | 15:25 | 15:32 | 15:39 | 01:41 | 03:04 | 04:30 |
| 54° | 15:23 | 15:32 | 15:42 | 01:45 | 03:05 | 04:28 |
| 52° | 15:21 | 15:33 | 15:45 | 01:48 | 03:06 | 04:26 |
| 50° | 15:20 | 15:33 | 15:48 | 01:51 | 03:07 | 04:24 |
| 45° | 15:16 | 15:34 | 15:54 | 01:58 | 03:08 | 04:20 |
| N 40° | 15:12 | 15:35 | 15:59 | 02:04 | 03:10 | 04:17 |
| 35° | 15:10 | 15:36 | 16:03 | 02:09 | 03:11 | 04:15 |
| 30° | 15:07 | 15:36 | 16:07 | 02:13 | 03:12 | 04:12 |
| 20° | 15:03 | 15:38 | 16:14 | 02:20 | 03:13 | 04:08 |
| N 10° | 14:59 | 15:39 | 16:20 | 02:26 | 03:15 | 04:05 |
| 0° | 14:55 | 15:40 | 16:26 | 02:32 | 03:16 | 04:01 |
| S 10° | 14:52 | 15:41 | 16:32 | 02:38 | 03:18 | 03:58 |
| 20° | 14:48 | 15:42 | 16:38 | 02:44 | 03:19 | 03:54 |
| 30° | 14:43 | 15:43 | 16:45 | 02:51 | 03:20 | 03:50 |
| 35° | 14:41 | 15:44 | 16:49 | 02:55 | 03:21 | 03:48 |
| 40° | 14:38 | 15:44 | 16:54 | 03:00 | 03:22 | 03:45 |
| 45° | 14:34 | 15:45 | 16:59 | 03:05 | 03:23 | 03:42 |
| S 50° | 14:30 | 15:47 | 17:06 | 03:11 | 03:25 | 03:39 |
| 52° | 14:28 | 15:47 | 17:09 | 03:14 | 03:25 | 03:37 |
| 54° | 14:26 | 15:48 | 17:13 | 03:17 | 03:26 | 03:35 |
| 56° | 14:24 | 15:49 | 17:16 | 03:21 | 03:27 | 03:33 |
| 58° | 14:22 | 15:49 | 17:21 | 03:24 | 03:28 | 03:31 |
| S 60° | 14:19 | 15:50 | 17:25 | 03:29 | 03:29 | 03:29 |

| Day | Sun | | Mer. Pass | Moon | | Age |
|-----|-------------------------|----------------------|-----------|------------------|-------|---|
| | Eqn. of 00 ^h | Time 12 ^h | | Mer. Pass. Upper | Lower | |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 12-14 80-94% |
| 22 | 15:27 | 15:31 | 11:44 | 21:06 | 08:44 |  |
| 23 | 15:36 | 15:40 | 11:44 | 21:50 | 09:28 | |

October 25, 26, 27 UT (Sun., Mon., Tue.)

| h | Aries | | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|--------|-----|
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 33°24.0 | 187°36.2 | S17°30.3 | 255°28.0 | N17°43.3 | 247°25.6 | N14°20.6 | 23°22.7 | N01°22.8 | | |
| 1 | 48°26.5 | 202°40.0 | 29.3 | 270°29.2 | 43.0 | 262°27.7 | 20.4 | 38°25.4 | 22.8 | | |
| 2 | 63°28.9 | 217°43.8 | 28.3 | 285°30.3 | 42.7 | 277°29.9 | 20.3 | 53°28.0 | 22.7 | | |
| 3 | 78°31.4 | 232°47.6 | •• 27.4 | 300°31.4 | •• 42.3 | 292°32.0 | •• 20.2 | 68°30.6 | •• 22.7 | | |
| 4 | 93°33.9 | 247°51.3 | 26.4 | 315°32.6 | 42.0 | 307°34.1 | 20.1 | 83°33.2 | 22.6 | | |
| 5 | 108°36.3 | 262°55.1 | 25.4 | 330°33.7 | 41.6 | 322°36.3 | 20.0 | 98°35.9 | 22.5 | | |
| 6 | 123°38.8 | 277°58.9 | S17°24.4 | 345°34.8 | N17°41.3 | 337°38.4 | N14°19.9 | 113°38.5 | N01°22.5 | | |
| 7 | 138°41.3 | 293°02.7 | 23.5 | 0°36.0 | 41.0 | 352°40.5 | 19.8 | 128°41.1 | 22.4 | | |
| 8 | 153°43.7 | 308°06.4 | 22.5 | 15°37.1 | 40.6 | 7°42.6 | 19.7 | 143°43.7 | 22.3 | | |
| 9 | 168°46.2 | 323°10.2 | •• 21.5 | 30°38.2 | •• 40.3 | 22°44.8 | •• 19.6 | 158°46.4 | •• 22.3 | | |
| 10 | 183°48.6 | 338°14.0 | 20.5 | 45°39.4 | 39.9 | 37°46.9 | 19.5 | 173°49.0 | 22.2 | | |
| 11 | 198°51.1 | 353°17.7 | 19.6 | 60°40.5 | 39.6 | 52°49.0 | 19.4 | 188°51.6 | 22.1 | | |
| 12 | 213°53.6 | 8°21.5 | S17°18.6 | 75°41.7 | N17°39.3 | 67°51.2 | N14°19.3 | 203°54.2 | N01°22.1 | | |
| 13 | 228°56.0 | 23°25.3 | 17.6 | 90°42.8 | 38.9 | 82°53.3 | 19.2 | 218°56.9 | 22.0 | | |
| 14 | 243°58.5 | 38°29.1 | 16.6 | 105°43.9 | 38.6 | 97°55.4 | 19.1 | 233°59.5 | 21.9 | | |
| 15 | 259°01.0 | 53°32.8 | •• 15.6 | 120°45.1 | •• 38.2 | 112°57.6 | •• 19.0 | 249°02.1 | •• 21.9 | | |
| 16 | 274°03.4 | 68°36.6 | 14.6 | 135°46.2 | 37.9 | 127°59.7 | 18.9 | 264°04.7 | 21.8 | | |
| 17 | 289°05.9 | 83°40.4 | 13.7 | 150°47.3 | 37.6 | 143°01.8 | 18.8 | 279°07.4 | 21.8 | | |
| 18 | 304°08.4 | 98°44.1 | S17°12.7 | 165°48.5 | N17°37.2 | 158°03.9 | N14°18.7 | 294°10.0 | N01°21.7 | | |
| 19 | 319°10.8 | 113°47.9 | 11.7 | 180°49.6 | 36.9 | 173°06.1 | 18.6 | 309°12.6 | 21.6 | | |
| 20 | 334°13.3 | 128°51.6 | 10.7 | 195°50.8 | 36.5 | 188°08.2 | 18.5 | 324°15.2 | 21.6 | | |
| 21 | 349°15.8 | 143°55.4 | •• 09.7 | 210°51.9 | •• 36.2 | 203°10.3 | •• 18.4 | 339°17.9 | •• 21.5 | | |
| 22 | 4°18.2 | 158°59.2 | 08.7 | 225°53.1 | 35.9 | 218°12.5 | 18.3 | 354°20.5 | 21.4 | | |
| 23 | 19°20.7 | 174°02.9 | 07.7 | 240°54.2 | 35.5 | 233°14.6 | 18.2 | 9°23.1 | 21.4 | | |
| Mer.pass. | 21:43 | ν3.8' d-1.0' m-4.20 | | ν1.1' d-0.3' m0.93 | | ν2.1' d-0.1' m-1.97 | | ν2.6' d-0.1' m0.43 | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 34°23.1 | 189°06.7 | S17°06.7 | 255°55.3 | N17°35.2 | 248°16.7 | N14°18.0 | 24°25.7 | N01°21.3 | | |
| 1 | 49°25.6 | 204°10.4 | 05.7 | 270°56.5 | 34.8 | 263°18.9 | 17.9 | 39°28.4 | 21.2 | | |
| 2 | 64°28.1 | 219°14.2 | 04.7 | 285°57.6 | 34.5 | 278°21.0 | 17.8 | 54°31.0 | 21.2 | | |
| 3 | 79°30.5 | 234°17.9 | •• 03.8 | 300°58.8 | •• 34.2 | 293°23.1 | •• 17.7 | 69°33.6 | •• 21.1 | | |
| 4 | 94°33.0 | 249°21.7 | 02.8 | 315°59.9 | 33.8 | 308°25.3 | 17.6 | 84°36.2 | 21.1 | | |
| 5 | 109°35.5 | 264°25.4 | 01.8 | 331°01.1 | 33.5 | 323°27.4 | 17.5 | 99°38.9 | 21.0 | | |
| 6 | 124°37.9 | 279°29.2 | S17°00.8 | 346°02.2 | N17°33.1 | 338°29.5 | N14°17.4 | 114°41.5 | N01°20.9 | | |
| 7 | 139°40.4 | 294°32.9 | 16°59.8 | 1°03.3 | 32.8 | 353°31.7 | 17.3 | 129°44.1 | 20.9 | | |
| 8 | 154°42.9 | 309°36.7 | 58.8 | 16°04.5 | 32.5 | 8°33.8 | 17.2 | 144°46.7 | 20.8 | | |
| 9 | 169°45.3 | 324°40.4 | •• 57.8 | 31°05.6 | •• 32.1 | 23°35.9 | •• 17.1 | 159°49.4 | •• 20.7 | | |
| 10 | 184°47.8 | 339°44.2 | 56.8 | 46°06.8 | 31.8 | 38°38.1 | 17.0 | 174°52.0 | 20.7 | | |
| 11 | 199°50.2 | 354°47.9 | 55.8 | 61°07.9 | 31.4 | 53°40.2 | 16.9 | 189°54.6 | 20.6 | | |
| 12 | 214°52.7 | 9°51.6 | S16°54.8 | 76°09.1 | N17°31.1 | 68°42.4 | N14°16.8 | 204°57.2 | N01°20.6 | | |
| 13 | 229°55.2 | 24°55.4 | 53.8 | 91°10.2 | 30.7 | 83°44.5 | 16.7 | 219°59.9 | 20.5 | | |
| 14 | 244°57.6 | 39°59.1 | 52.8 | 106°11.4 | 30.4 | 98°46.6 | 16.6 | 235°02.5 | 20.4 | | |
| 15 | 260°00.1 | 55°02.8 | •• 51.8 | 121°12.5 | •• 30.1 | 113°48.8 | •• 16.5 | 250°05.1 | •• 20.4 | | |
| 16 | 275°02.6 | 70°06.6 | 50.7 | 136°13.7 | 29.7 | 128°50.9 | 16.4 | 265°07.7 | 20.3 | | |
| 17 | 290°05.0 | 85°10.3 | 49.7 | 151°14.8 | 29.4 | 143°53.0 | 16.3 | 280°10.3 | 20.2 | | |
| 18 | 305°07.5 | 100°14.0 | S16°48.7 | 166°16.0 | N17°29.0 | 158°55.2 | N14°16.2 | 295°13.0 | N01°20.2 | | |
| 19 | 320°10.0 | 115°17.8 | 47.7 | 181°17.1 | 28.7 | 173°57.3 | 16.1 | 310°15.6 | 20.1 | | |
| 20 | 335°12.4 | 130°21.5 | 46.7 | 196°18.3 | 28.4 | 188°59.4 | 16.0 | 325°18.2 | 20.1 | | |
| 21 | 350°14.9 | 145°25.2 | •• 45.7 | 211°19.4 | •• 28.0 | 204°01.6 | •• 15.9 | 340°20.8 | •• 20.0 | | |
| 22 | 5°17.4 | 160°28.9 | 44.7 | 226°20.6 | 27.7 | 219°03.7 | 15.8 | 355°23.5 | 19.9 | | |
| 23 | 20°19.8 | 175°32.7 | 43.7 | 241°21.7 | 27.3 | 234°05.9 | 15.7 | 10°26.1 | 19.9 | | |
| Mer.pass. | 21:39 | ν3.8' d-1.0' m-4.22 | | ν1.1' d-0.3' m0.92 | | ν2.1' d-0.1' m-1.97 | | ν2.6' d-0.1' m0.43 | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 35°22.3 | 190°36.4 | S16°42.7 | 256°22.9 | N17°27.0 | 249°08.0 | N14°15.6 | 25°28.7 | N01°19.8 | | |
| 1 | 50°24.7 | 205°40.1 | 41.7 | 271°24.0 | 26.7 | 264°10.1 | 15.5 | 40°31.3 | 19.7 | | |
| 2 | 65°27.2 | 220°43.8 | 40.7 | 286°25.2 | 26.3 | 279°12.3 | 15.4 | 55°33.9 | 19.7 | | |
| 3 | 80°29.7 | 235°47.5 | •• 39.6 | 301°26.3 | •• 26.0 | 294°14.4 | •• 15.3 | 70°36.6 | •• 19.6 | | |
| 4 | 95°32.1 | 250°51.3 | 38.6 | 316°27.5 | 25.6 | 309°16.6 | 15.2 | 85°39.2 | 19.6 | | |
| 5 | 110°34.6 | 265°55.0 | 37.6 | 331°28.6 | 25.3 | 324°18.7 | 15.1 | 100°41.8 | 19.5 | | |
| 6 | 125°37.1 | 280°58.7 | S16°36.6 | 346°29.8 | N17°24.9 | 339°20.8 | N14°15.0 | 115°44.4 | N01°19.4 | | |
| 7 | 140°39.5 | 296°02.4 | 35.6 | 1°30.9 | 24.6 | 354°23.0 | 14.9 | 130°47.1 | 19.4 | | |
| 8 | 155°42.0 | 311°06.1 | 34.6 | 16°32.1 | 24.3 | 9°25.1 | 14.8 | 145°49.7 | 19.3 | | |
| 9 | 170°44.5 | 326°09.8 | •• 33.6 | 31°33.2 | •• 23.9 | 24°27.3 | •• 14.7 | 160°52.3 | •• 19.2 | | |
| 10 | 185°46.9 | 341°13.5 | 32.5 | 46°34.4 | 23.6 | 39°29.4 | 14.6 | 175°54.9 | 19.2 | | |
| 11 | 200°49.4 | 356°17.2 | 31.5 | 61°35.5 | 23.2 | 54°31.5 | 14.5 | 190°57.5 | 19.1 | | |
| 12 | 215°51.9 | 11°20.9 | S16°30.5 | 76°36.7 | N17°22.9 | 69°33.7 | N14°14.4 | 206°00.2 | N01°19.1 | | |
| 13 | 230°54.3 | 26°24.6 | 29.5 | 91°37.9 | 22.6 | 84°35.8 | 14.3 | 221°02.8 | 19.0 | | |
| 14 | 245°56.8 | 41°28.3 | 28.5 | 106°39.0 | 22.2 | 99°38.0 | 14.2 | 236°05.4 | 18.9 | | |
| 15 | 260°59.2 | 56°32.0 | •• 27.5 | 121°40.2 | •• 21.9 | 114°40.1 | •• 14.1 | 251°08.0 | •• 18.9 | | |
| 16 | 276°01.7 | 71°35.7 | 26.4 | 136°41.3 | 21.5 | 129°42.2 | 14.0 | 266°10.6 | 18.8 | | |
| 17 | 291°04.2 | 86°39.4 | 25.4 | 151°42.5 | 21.2 | 144°44.4 | 13.9 | 281°13.3 | 18.8 | | |
| 18 | 306°06.6 | 101°43.1 | S16°24.4 | 166°43.6 | N17°20.8 | 159°46.5 | N14°13.8 | 296°15.9 | N01°18.7 | | |
| 19 | 321°09.1 | 116°46.7 | 23.4 | 181°44.8 | 20.5 | 174°48.7 | 13.7 | 311°18.5 | 18.6 | | |
| 20 | 336°11.6 | 131°50.4 | 22.3 | 196°46.0 | 20.2 | 189°50.8 | 13.6 | 326°21.1 | 18.6 | | |
| 21 | 351°14.0 | 146°54.1 | •• 21.3 | 211°47.1 | •• 19.8 | 204°53.0 | •• 13.5 | 341°23.7 | •• 18.5 | | |
| 22 | 6°16.5 | 161°57.8 | 20.3 | 226°48.3 | 19.5 | 219°55.1 | 13.4 | 356°26.4 | 18.4 | | |
| 23 | 21°19.0 | 177°01.5 | 19.3 | 241°49.4 | 19.1 | 234°57.2 | 13.2 | 11°29.0 | 18.4 | | |
| Mer.pass. | 21:35 | ν3.7' d-1.0' m-4.25 | | ν1.2' d-0.3' m0.91 | | ν2.1' d-0.1' m-1.98 | | ν2.6' d-0.1' m0.44 | | | |

| Stars | | |
|-------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°32.9 | 29°14.5 |
| Ankaa | 353°05.3 | -42°09.6 |
| Schedar | 349°28.8 | 56°41.3 |
| Diphda | 348°45.5 | -17°50.2 |
| Achernar | 335°18.5 | -57°06.0 |
| Hamal | 327°49.2 | 23°35.5 |
| Polaris | 312°47.5 | 89°22.5 |
| Acamar | 315°10.2 | -40°11.7 |
| Menkar | 314°04.3 | 4°11.8 |
| Mirfak | 308°25.7 | 49°57.4 |
| Aldebaran | 290°37.7 | 16°33.9 |
| Rigel | 281°02.2 | -8°10.1 |
| Capella | 280°19.4 | 46°01.4 |
| Bellatrix | 278°21.1 | 6°22.5 |
| Elnath | 277°59.8 | 28°37.8 |
| Alnilam | 275°36.0 | -1°11.0 |
| Betelgeuse | 270°50.3 | 7°24.8 |
| Canopus | 263°51.5 | -52°42.3 |
| Sirius | 258°24.8 | -16°45.0 |
| Adhara | 255°04.6 | -29°00.2 |
| Procyon | 244°49.2 | 5°09.4 |
| Pollux | 243°15.5 | 27°57.6 |
| Avior | 234°14.2 | -59°35.4 |
| Suhail | 222°45.3 | -43°32.2 |
| Miaplacidus | 221°38.2 | -69°49.3 |
| Alphard | 217°46.4 | -8°46.4 |
| Regulus | 207°33.0 | 11°50.2 |
| Dubhe | 193°39.7 | 61°36.2 |
| Denebola | 182°23.7 | 14°25.3 |
| Gienah | 175°42.4 | -17°41.3 |
| Acrux | 172°59.1 | -63°14.7 |
| Gacrux | 171°50.5 | -57°15.7 |
| Alioth | 166°12.2 | 55°48.8 |
| Spica | 158°21.1 | -11°18.0 |
| Alkaid | 152°51.3 | 49°10.7 |
| Hadar | 148°34.6 | -60°30.1 |
| Menkent | 147°56.3 | -36°30.0 |
| Arcturus | 145°46.9 | 19°02.6 |
| Rigel Kent. | 139°38.9 | -60°56.8 |
| Kochab | 137°21.0 | 74°02.7 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.6 |
| Antares | 112°14.3 | -26°29.5 |
| Atria | 107°07.7 | -69°04.7 |
| Sabik | 102°01.4 | -15°45.4 |
| Shaula | 96°08.7 | -37°07.4 |
| Rasalhague | 95°57.4 | 12°32.6 |
| Eltanin | 90°41.8 | 51°29.3 |
| Kaus Aust. | 83°30.8 | -34°22.3 |
| Vega | 80°32.4 | 38°48.8 |
| Nunki | 75°46.1 | -26°15.8 |
| Altair | 61°58.6 | 8°56.5 |
| Peacock | 53°03.4 | -56°39.1 |
| Deneb | 49°24.8 | 45°22.9 |
| Enif | 33°37.2 | 10°00.1 |
| Al Na'ir | 27°30.9 | -46°49.9 |
| Fomalhaut | 15°12.7 | -29°28.8 |
| Scheat | 13°43.5 | 28°14.0 |
| Markab | 13°28.2 | 15°21.2 |

| Oct 25 Sun | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 154°12.2 | 11:27 |
| Mars | 222°04.0 | 06:58 |
| Jupiter | 214°01.6 | 07:29 |
| Saturn | 349°58.7 | 22:23 |

| Oct 26 Mon | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 154°43.5 | 11:21 |
| Mars | 221°32.2 | 06:56 |
| Jupiter | 213°53.6 | 07:26 |
| Saturn | 350°02.6 | 22:18 |

| Oct 27 Tue | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 155°14.1 | 11:15 |
| Mars | 221°00.6 | 06:54 |
| Jupiter | 213°45.7 | 07:22 |
| Saturn | 350°06.4 | 22:14 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.5 |
| Mars: | 0.1 |


| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|------------|----------|-------|----------|-------|-------|
| Sun | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 183°58.0 | S12°01.6 | | 20°02.8 | 11.6' | N09°48.8 | 15.4' | 58.6' |
| 1 | 198°58.0 | 02.5 | | 34°33.4 | 11.5' | 10°04.2 | 15.4' | 58.6' |
| 2 | 213°58.1 | 03.3 | | 49°04.0 | 11.4' | 10°19.5 | 15.3' | 58.7' |
| 3 | 228°58.2 | · · 04.2 | | 63°34.4 | 11.4' | 10°34.9 | 15.3' | 58.7' |
| 4 | 243°58.3 | 05.0 | | 78°04.8 | 11.3' | 10°50.1 | 15.2' | 58.7' |
| 5 | 258°58.3 | 05.9 | | 92°35.0 | 11.2' | 11°05.4 | 15.2' | 58.8' |
| 6 | 273°58.4 | S12°06.8 | | 107°05.2 | 11.1' | N11°20.6 | 15.2' | 58.8' |
| 7 | 288°58.5 | 07.6 | | 121°35.3 | 11.0' | 11°35.7 | 15.1' | 58.8' |
| 8 | 303°58.6 | 08.5 | | 136°05.3 | 10.9' | 11°50.9 | 15.1' | 58.8' |
| 9 | 318°58.6 | · · 09.3 | | 150°35.2 | 10.8' | 12°05.9 | 15.0' | 58.9' |
| 10 | 333°58.7 | 10.2 | | 165°05.0 | 10.7' | 12°20.9 | 15.0' | 58.9' |
| 11 | 348°58.8 | 11.1 | | 179°34.7 | 10.6' | 12°35.9 | 14.9' | 58.9' |
| 12 | 3°58.8 | S12°11.9 | | 194°04.3 | 10.5' | N12°50.8 | 14.9' | 59.0' |
| 13 | 18°58.9 | 12.8 | | 208°33.9 | 10.4' | 13°05.7 | 14.8' | 59.0' |
| 14 | 33°59.0 | 13.6 | | 223°03.3 | 10.3' | 13°20.5 | 14.7' | 59.0' |
| 15 | 48°59.1 | · · 14.5 | | 237°32.6 | 10.2' | 13°35.2 | 14.7' | 59.0' |
| 16 | 63°59.1 | 15.4 | | 252°01.8 | 10.1' | 13°49.9 | 14.6' | 59.1' |
| 17 | 78°59.2 | 16.2 | | 266°31.0 | 10.0' | 14°04.6 | 14.6' | 59.1' |
| 18 | 93°59.3 | S12°17.1 | | 281°00.0 | 9.9' | N14°19.1 | 14.5' | 59.1' |
| 19 | 108°59.3 | 17.9 | | 295°28.9 | 9.8' | 14°33.6 | 14.4' | 59.1' |
| 20 | 123°59.4 | 18.8 | | 309°57.7 | 9.7' | 14°48.0 | 14.4' | 59.2' |
| 21 | 138°59.5 | · · 19.6 | | 324°26.4 | 9.6' | 15°02.4 | 14.3' | 59.2' |
| 22 | 153°59.6 | 20.5 | | 338°55.0 | 9.5' | 15°16.7 | 14.2' | 59.2' |
| 23 | 168°59.6 | 21.3 | | 353°23.5 | 9.4' | 15°30.9 | 14.1' | 59.2' |
| SD = 16.1' $d = 0.9'$ | | | SD = 16.0' | | | | | |

| Mon | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|------------|-------|----------|-------|-------|
| 0 | 183°59.7 | S12°22.2 | | 7°51.9 | 9.3' | N15°45.0 | 14.1' | 59.3' |
| 1 | 198°59.8 | 23.1 | | 22°20.2 | 9.2' | 15°59.1 | 14.0' | 59.3' |
| 2 | 213°59.8 | 23.9 | | 36°48.4 | 9.1' | 16°13.1 | 13.9' | 59.3' |
| 3 | 228°59.9 | · · 24.8 | | 51°16.5 | 9.0' | 16°27.0 | 13.8' | 59.3' |
| 4 | 244°00.0 | 25.6 | | 65°44.4 | 8.9' | 16°40.8 | 13.7' | 59.4' |
| 5 | 259°00.0 | 26.5 | | 80°12.3 | 8.7' | 16°54.5 | 13.6' | 59.4' |
| 6 | 274°00.1 | S12°27.3 | | 94°40.0 | 8.6' | N17°08.2 | 13.6' | 59.4' |
| 7 | 289°00.2 | 28.2 | | 109°07.7 | 8.5' | 17°21.7 | 13.5' | 59.4' |
| 8 | 304°00.2 | 29.0 | | 123°35.2 | 8.4' | 17°35.2 | 13.4' | 59.5' |
| 9 | 319°00.3 | · · 29.9 | | 138°02.6 | 8.3' | 17°48.6 | 13.3' | 59.5' |
| 10 | 334°00.4 | 30.7 | | 152°29.9 | 8.2' | 18°01.8 | 13.2' | 59.5' |
| 11 | 349°00.4 | 31.6 | | 166°57.1 | 8.1' | 18°15.0 | 13.1' | 59.5' |
| 12 | 4°00.5 | S12°32.4 | | 181°24.1 | 8.0' | N18°28.1 | 13.0' | 59.5' |
| 13 | 19°00.6 | 33.3 | | 195°51.1 | 7.8' | 18°41.1 | 12.9' | 59.6' |
| 14 | 34°00.6 | 34.1 | | 210°17.9 | 7.7' | 18°54.0 | 12.8' | 59.6' |
| 15 | 49°00.7 | · · 35.0 | | 224°44.7 | 7.6' | 19°06.7 | 12.7' | 59.6' |
| 16 | 64°00.7 | 35.8 | | 239°11.3 | 7.5' | 19°19.4 | 12.6' | 59.6' |
| 17 | 79°00.8 | 36.7 | | 253°37.8 | 7.4' | 19°31.9 | 12.4' | 59.6' |
| 18 | 94°00.9 | S12°37.5 | | 268°04.1 | 7.3' | N19°44.4 | 12.3' | 59.7' |
| 19 | 109°00.9 | 38.4 | | 282°30.4 | 7.2' | 19°56.7 | 12.2' | 59.7' |
| 20 | 124°01.0 | 39.2 | | 296°56.6 | 7.0' | 20°08.9 | 12.1' | 59.7' |
| 21 | 139°01.1 | · · 40.1 | | 311°22.6 | 6.9' | 20°21.0 | 12.0' | 59.7' |
| 22 | 154°01.1 | 40.9 | | 325°48.5 | 6.8' | 20°33.0 | 11.9' | 59.7' |
| 23 | 169°01.2 | 41.8 | | 340°14.3 | 6.7' | 20°44.8 | 11.7' | 59.7' |
| SD = 16.1' | | | $d = 0.9'$ | SD = 16.2' | | | | |

| Tue | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|------------|-------|----------|-------|-------|
| 0 | 184°01.2 | S12°42.6 | | 354°40.0 | 6.6' | N20°56.6 | 11.6' | 59.8' |
| 1 | 199°01.3 | 43.5 | | 9°05.6 | 6.5' | 21°08.2 | 11.5' | 59.8' |
| 2 | 214°01.4 | 44.3 | | 23°31.1 | 6.3' | 21°19.6 | 11.3' | 59.8' |
| 3 | 229°01.4 | · · 45.2 | | 37°56.4 | 6.2' | 21°31.0 | 11.2' | 59.8' |
| 4 | 244°01.5 | 46.0 | | 52°21.6 | 6.1' | 21°42.2 | 11.1' | 59.8' |
| 5 | 259°01.5 | 46.8 | | 66°46.8 | 6.0' | 21°53.3 | 10.9' | 59.8' |
| 6 | 274°01.6 | S12°47.7 | | 81°11.8 | 5.9' | N22°04.2 | 10.8' | 59.8' |
| 7 | 289°01.7 | 48.5 | | 95°36.7 | 5.8' | 22°15.0 | 10.7' | 59.9' |
| 8 | 304°01.7 | 49.4 | | 110°01.4 | 5.7' | 22°25.7 | 10.5' | 59.9' |
| 9 | 319°01.8 | · · 50.2 | | 124°26.1 | 5.6' | 22°36.2 | 10.4' | 59.9' |
| 10 | 334°01.8 | 51.1 | | 138°50.7 | 5.5' | 22°46.5 | 10.2' | 59.9' |
| 11 | 349°01.9 | 51.9 | | 153°15.1 | 5.3' | 22°56.8 | 10.1' | 59.9' |
| 12 | 4°02.0 | S12°52.8 | | 167°39.5 | 5.2' | N23°06.9 | 9.9' | 59.9' |
| 13 | 19°02.0 | 53.6 | | 182°03.7 | 5.1' | 23°16.8 | 9.8' | 59.9' |
| 14 | 34°02.1 | 54.4 | | 196°27.8 | 5.0' | 23°26.6 | 9.6' | 59.9' |
| 15 | 49°02.1 | · · 55.3 | | 210°51.9 | 4.9' | 23°36.2 | 9.5' | 60.0' |
| 16 | 64°02.2 | 56.1 | | 225°15.8 | 4.8' | 23°45.7 | 9.3' | 60.0' |
| 17 | 79°02.2 | 57.0 | | 239°39.6 | 4.7' | 23°55.0 | 9.2' | 60.0' |
| 18 | 94°02.3 | S12°57.8 | | 254°03.3 | 4.6' | N24°04.1 | 9.0' | 60.0' |
| 19 | 109°02.3 | 58.6 | | 268°26.9 | 4.5' | 24°13.1 | 8.8' | 60.0' |
| 20 | 124°02.4 | 12°59.5 | | 282°50.4 | 4.4' | 24°21.9 | 8.7' | 60.0' |
| 21 | 139°02.5 | 13°00.3 | | 297°13.8 | 4.3' | 24°30.6 | 8.5' | 60.0' |
| 22 | 154°02.5 | 01.2 | | 311°37.2 | 4.2' | 24°39.1 | 8.3' | 60.0' |
| 23 | 169°02.6 | 02.0 | | 326°00.4 | 4.1' | 24°47.4 | 8.2' | 60.0' |
| SD = 16.1' | | | $d = 0.8'$ | SD = 16.3' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 05:42 | 07:02 | 08:21 | 15:05 | 16:24 | 17:44 |
| N 70° | 05:40 | 06:53 | 08:02 | 15:25 | 16:34 | 17:46 |
| 68° | 05:39 | 06:45 | 07:46 | 15:40 | 16:42 | 17:47 |
| 66° | 05:38 | 06:38 | 07:34 | 15:53 | 16:49 | 17:49 |
| 64° | 05:36 | 06:32 | 07:23 | 16:04 | 16:54 | 17:50 |
| 62° | 05:35 | 06:27 | 07:14 | 16:12 | 17:00 | 17:51 |
| 60° | 05:34 | 06:23 | 07:07 | 16:20 | 17:04 | 17:53 |
| N 58° | 05:33 | 06:19 | 07:00 | 16:27 | 17:08 | 17:54 |
| 56° | 05:32 | 06:15 | 06:54 | 16:33 | 17:12 | 17:55 |
| 54° | 05:31 | 06:12 | 06:49 | 16:38 | 17:15 | 17:56 |
| 52° | 05:29 | 06:09 | 06:44 | 16:43 | 17:18 | 17:58 |
| 50° | 05:28 | 06:06 | 06:40 | 16:48 | 17:21 | 17:59 |
| 45° | 05:26 | 06:00 | 06:30 | 16:57 | 17:27 | 18:02 |
| N 40° | 05:23 | 05:54 | 06:22 | 17:05 | 17:33 | 18:05 |
| 35° | 05:20 | 05:49 | 06:15 | 17:12 | 17:38 | 18:08 |
| 30° | 05:17 | 05:45 | 06:09 | 17:18 | 17:43 | 18:11 |
| 20° | 05:10 | 05:36 | 05:59 | 17:29 | 17:51 | 18:17 |
| N 10° | 05:03 | 05:28 | 05:49 | 17:38 | 18:00 | 18:25 |
| 0° | 04:55 | 05:19 | 05:41 | 17:47 | 18:09 | 18:33 |
| S 10° | 04:45 | 05:10 | 05:32 | 17:56 | 18:18 | 18:43 |
| 20° | 04:33 | 04:59 | 05:22 | 18:06 | 18:29 | 18:56 |
| 30° | 04:16 | 04:46 | 05:11 | 18:18 | 18:43 | 19:12 |
| 35° | 04:06 | 04:38 | 05:04 | 18:24 | 18:51 | 19:23 |
| 40° | 03:54 | 04:28 | 04:57 | 18:32 | 19:01 | 19:35 |
| 45° | 03:38 | 04:17 | 04:48 | 18:41 | 19:12 | 19:51 |
| S 50° | 03:18 | 04:02 | 04:38 | 18:51 | 19:27 | 20:11 |
| 52° | 03:09 | 03:56 | 04:33 | 18:56 | 19:34 | 20:21 |
| 54° | 02:57 | 03:48 | 04:27 | 19:02 | 19:42 | 20:33 |
| 56° | 02:44 | 03:39 | 04:21 | 19:08 | 19:50 | 20:46 |
| 58° | 02:28 | 03:29 | 04:14 | 19:15 | 20:01 | 21:02 |
| S 60° | 02:09 | 03:18 | 04:07 | 19:23 | 20:12 | 21:23 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|--------------------------|--------------------------|---------|--------------------------|--------------------------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | 14:03 | <input type="checkbox"/> | <input type="checkbox"/> | 07:31 | <input type="checkbox"/> | <input type="checkbox"/> |
| N 70° | 14:27 | 13:26 | <input type="checkbox"/> | 07:10 | 10:00 | <input type="checkbox"/> |
| 68° | 14:45 | 14:10 | <input type="checkbox"/> | 06:53 | 09:17 | <input type="checkbox"/> |
| 66° | 15:00 | 14:40 | 13:54 | 06:40 | 08:49 | 11:34 |
| 64° | 15:13 | 15:02 | 14:46 | 06:29 | 08:28 | 10:43 |
| 62° | 15:23 | 15:20 | 15:18 | 06:20 | 08:11 | 10:12 |
| 60° | 15:32 | 15:35 | 15:42 | 06:13 | 07:57 | 09:48 |
| N 58° | 15:40 | 15:48 | 16:02 | 06:06 | 07:45 | 09:30 |
| 56° | 15:47 | 15:59 | 16:18 | 06:00 | 07:35 | 09:14 |
| 54° | 15:54 | 16:09 | 16:32 | 05:54 | 07:26 | 09:01 |
| 52° | 15:59 | 16:18 | 16:44 | 05:50 | 07:18 | 08:49 |
| 50° | 16:05 | 16:26 | 16:55 | 05:45 | 07:11 | 08:39 |
| 45° | 16:16 | 16:43 | 17:18 | 05:36 | 06:55 | 08:17 |
| N 40° | 16:26 | 16:57 | 17:36 | 05:28 | 06:43 | 08:00 |
| 35° | 16:34 | 17:09 | 17:52 | 05:21 | 06:32 | 07:46 |
| 30° | 16:41 | 17:20 | 18:05 | 05:16 | 06:23 | 07:33 |
| 20° | 16:53 | 17:38 | 18:28 | 05:06 | 06:07 | 07:12 |
| N 10° | 17:05 | 17:54 | 18:48 | 04:57 | 05:53 | 06:53 |
| 0° | 17:15 | 18:09 | 19:07 | 04:49 | 05:40 | 06:36 |
| S 10° | 17:26 | 18:24 | 19:26 | 04:41 | 05:27 | 06:19 |
| 20° | 17:37 | 18:40 | 19:47 | 04:32 | 05:13 | 06:01 |
| 30° | 17:50 | 18:59 | 20:11 | 04:22 | 04:58 | 05:40 |
| 35° | 17:58 | 19:10 | 20:25 | 04:16 | 04:49 | 05:27 |
| 40° | 18:07 | 19:23 | 20:41 | 04:10 | 04:39 | 05:13 |
| 45° | 18:17 | 19:38 | 21:01 | 04:03 | 04:27 | 04:57 |
| S 50° | 18:30 | 19:57 | 21:25 | 03:54 | 04:12 | 04:37 |
| 52° | 18:35 | 20:06 | 21:38 | 03:50 | 04:06 | 04:27 |
| 54° | 18:42 | 20:16 | 21:51 | 03:45 | 03:58 | 04:17 |
| 56° | 18:49 | 20:27 | 22:07 | 03:41 | 03:50 | 04:04 |
| 58° | 18:57 | 20:40 | 22:26 | 03:35 | 03:41 | 03:51 |
| S 60° | 19:07 | 20:56 | 22:50 | 03:29 | 03:30 | 03:34 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-------|-----------|-------|---|
| | Eqn.of Time | | Mer. | Mer.Pass. | | Age |
| | 00 ^h | 12 ^h | Pass | Upper | Lower | 15-17 |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 98-99% |
| 25 | 15:52 | 15:55 | 11:44 | 23:27 | 11:02 |  |
| 26 | 15:59 | 16:02 | 11:44 | —:— | 11:54 | |
| 27 | 16:05 | 16:08 | 11:44 | 00:22 | 12:51 | |

October 28, 29, 30 UT (Wed., Thu., Fri.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------|---------------------|----------|----------|--------------------|----------|----------|---------------------|---------|-----|--------------------|--------|--|--|
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 36°21.4 | 192°05.1 | S16°18.3 | 256°50.6 | N17°18.8 | 249°59.4 | N14°13.1 | 26°31.6 | N01°18.3 | | | | | | |
| 1 | 51°23.9 | 207°08.8 | 17.2 | 271°51.8 | 18.5 | 265°01.5 | 13.0 | 41°34.2 | 18.3 | | | | | | |
| 2 | 66°26.3 | 222°12.5 | 16.2 | 286°52.9 | 18.1 | 280°03.7 | 12.9 | 56°36.8 | 18.2 | | | | | | |
| 3 | 81°28.8 | 237°16.2 | •• 15.2 | 301°54.1 | •• 17.8 | 295°05.8 | •• 12.8 | 71°39.5 | •• 18.1 | | | | | | |
| 4 | 96°31.3 | 252°19.8 | 14.2 | 316°55.2 | 17.4 | 310°08.0 | 12.7 | 86°42.1 | 18.1 | | | | | | |
| 5 | 111°33.7 | 267°23.5 | 13.1 | 331°56.4 | 17.1 | 325°10.1 | 12.6 | 101°44.7 | 18.0 | | | | | | |
| 6 | 126°36.2 | 282°27.2 | S16°12.1 | 346°57.6 | N17°16.7 | 340°12.2 | N14°12.5 | 116°47.3 | N01°18.0 | | | | | | |
| 7 | 141°38.7 | 297°30.8 | 11.1 | 1°58.7 | 16.4 | 355°14.4 | 12.4 | 131°49.9 | 17.9 | | | | | | |
| 8 | 156°41.1 | 312°34.5 | 10.1 | 16°59.9 | 16.1 | 10°16.5 | 12.3 | 146°52.6 | 17.8 | | | | | | |
| 9 | 171°43.6 | 327°38.1 | •• 09.0 | 32°01.1 | •• 15.7 | 25°18.7 | •• 12.2 | 161°55.2 | •• 17.8 | | | | | | |
| 10 | 186°46.1 | 342°41.8 | 08.0 | 47°02.2 | 15.4 | 40°20.8 | 12.1 | 176°57.8 | 17.7 | | | | | | |
| 11 | 201°48.5 | 357°45.4 | 07.0 | 62°03.4 | 15.0 | 55°23.0 | 12.0 | 192°00.4 | 17.7 | | | | | | |
| 12 | 216°51.0 | 12°49.1 | S16°06.0 | 77°04.6 | N17°14.7 | 70°25.1 | N14°12.0 | 207°03.0 | N01°17.6 | | | | | | |
| 13 | 231°53.5 | 27°52.7 | 04.9 | 92°05.7 | 14.3 | 85°27.3 | 11.9 | 222°05.7 | 17.5 | | | | | | |
| 14 | 246°55.9 | 42°56.4 | 03.9 | 107°06.9 | 14.0 | 100°29.4 | 11.8 | 237°08.3 | 17.5 | | | | | | |
| 15 | 261°58.4 | 58°00.0 | •• 02.9 | 122°08.1 | •• 13.7 | 115°31.6 | •• 11.7 | 252°10.9 | •• 17.4 | | | | | | |
| 16 | 277°00.8 | 73°03.7 | 01.8 | 137°09.2 | 13.3 | 130°33.7 | 11.6 | 267°13.5 | 17.3 | | | | | | |
| 17 | 292°03.3 | 88°07.3 | 16°00.8 | 152°10.4 | 13.0 | 145°35.9 | 11.5 | 282°16.1 | 17.3 | | | | | | |
| 18 | 307°05.8 | 103°11.0 | S15°59.8 | 167°11.6 | N17°12.6 | 160°38.0 | N14°11.4 | 297°18.8 | N01°17.2 | | | | | | |
| 19 | 322°08.2 | 118°14.6 | 58.8 | 182°12.7 | 12.3 | 175°40.2 | 11.3 | 312°21.4 | 17.2 | | | | | | |
| 20 | 337°10.7 | 133°18.2 | 57.7 | 197°13.9 | 11.9 | 190°42.3 | 11.2 | 327°24.0 | 17.1 | | | | | | |
| 21 | 352°13.2 | 148°21.9 | •• 56.7 | 212°15.1 | •• 11.6 | 205°44.5 | •• 11.1 | 342°26.6 | •• 17.0 | | | | | | |
| 22 | 7°15.6 | 163°25.5 | 55.7 | 227°16.2 | 11.3 | 220°46.6 | 11.0 | 357°29.2 | 17.0 | | | | | | |
| 23 | 22°18.1 | 178°29.1 | 54.6 | 242°17.4 | 10.9 | 235°48.7 | 10.9 | 12°31.8 | 16.9 | | | | | | |
| Mer.pass. 21:31 | | | ν3.7' d-1.0' m-4.27 | | | ν1.2' d-0.3' m0.90 | | | ν2.1' d-0.1' m-1.98 | | | ν2.6' d-0.1' m0.44 | | | |
| | | | | | | | | | | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 37°20.6 | 193°32.7 | S15°53.6 | 257°18.6 | N17°10.6 | 250°50.9 | N14°10.8 | 27°34.5 | N01°16.9 | | | | | | |
| 1 | 52°23.0 | 208°36.4 | 52.6 | 272°19.7 | 10.2 | 265°53.0 | 10.7 | 42°37.1 | 16.8 | | | | | | |
| 2 | 67°25.5 | 223°40.0 | 51.5 | 287°20.9 | 09.9 | 280°55.2 | 10.6 | 57°39.7 | 16.7 | | | | | | |
| 3 | 82°28.0 | 238°43.6 | •• 50.5 | 302°22.1 | •• 09.6 | 295°57.3 | •• 10.5 | 72°42.3 | •• 16.7 | | | | | | |
| 4 | 97°30.4 | 253°47.2 | 49.5 | 317°23.2 | 09.2 | 310°59.5 | 10.4 | 87°44.9 | 16.6 | | | | | | |
| 5 | 112°32.9 | 268°50.8 | 48.5 | 332°24.4 | 08.9 | 326°01.6 | 10.3 | 102°47.5 | 16.6 | | | | | | |
| 6 | 127°35.3 | 283°54.4 | S15°47.4 | 347°25.6 | N17°08.5 | 341°03.8 | N14°10.2 | 117°50.2 | N01°16.5 | | | | | | |
| 7 | 142°37.8 | 298°58.0 | 46.4 | 2°26.8 | 08.2 | 356°05.9 | 10.1 | 132°52.8 | 16.4 | | | | | | |
| 8 | 157°40.3 | 314°01.6 | 45.4 | 17°27.9 | 07.8 | 11°08.1 | 10.0 | 147°55.4 | 16.4 | | | | | | |
| 9 | 172°42.7 | 329°05.2 | •• 44.3 | 32°29.1 | •• 07.5 | 26°10.2 | •• 09.9 | 162°58.0 | •• 16.3 | | | | | | |
| 10 | 187°45.2 | 344°08.8 | 43.3 | 47°30.3 | 07.2 | 41°12.4 | 09.8 | 178°00.6 | 16.3 | | | | | | |
| 11 | 202°47.7 | 359°12.4 | 42.3 | 62°31.5 | 06.8 | 56°14.6 | 09.7 | 193°03.3 | 16.2 | | | | | | |
| 12 | 217°50.1 | 14°16.0 | S15°41.2 | 77°32.6 | N17°06.5 | 71°16.7 | N14°09.6 | 208°05.9 | N01°16.2 | | | | | | |
| 13 | 232°52.6 | 29°19.6 | 40.2 | 92°33.8 | 06.1 | 86°18.9 | 09.5 | 223°08.5 | 16.1 | | | | | | |
| 14 | 247°55.1 | 44°23.2 | 39.2 | 107°35.0 | 05.8 | 101°21.0 | 09.4 | 238°11.1 | 16.0 | | | | | | |
| 15 | 262°57.5 | 59°26.8 | •• 38.1 | 122°36.2 | •• 05.4 | 116°23.2 | •• 09.3 | 253°13.7 | •• 16.0 | | | | | | |
| 16 | 278°00.0 | 74°30.4 | 37.1 | 137°37.3 | 05.1 | 131°25.3 | 09.2 | 268°16.3 | 15.9 | | | | | | |
| 17 | 293°02.5 | 89°34.0 | 36.1 | 152°38.5 | 04.8 | 146°27.5 | 09.1 | 283°19.0 | 15.9 | | | | | | |
| 18 | 308°04.9 | 104°37.6 | S15°35.0 | 167°39.7 | N17°04.4 | 161°29.6 | N14°09.0 | 298°21.6 | N01°15.8 | | | | | | |
| 19 | 323°07.4 | 119°41.1 | 34.0 | 182°40.9 | 04.1 | 176°31.8 | 08.9 | 313°24.2 | 15.7 | | | | | | |
| 20 | 338°09.8 | 134°44.7 | 33.0 | 197°42.0 | 03.7 | 191°33.9 | 08.8 | 328°26.8 | 15.7 | | | | | | |
| 21 | 353°12.3 | 149°48.3 | •• 32.0 | 212°43.2 | •• 03.4 | 206°36.1 | •• 08.7 | 343°29.4 | •• 15.6 | | | | | | |
| 22 | 8°14.8 | 164°51.9 | 30.9 | 227°44.4 | 03.0 | 221°38.2 | 08.6 | 358°32.0 | 15.6 | | | | | | |
| 23 | 23°17.2 | 179°55.4 | 29.9 | 242°45.6 | 02.7 | 236°40.4 | 08.5 | 13°34.6 | 15.5 | | | | | | |
| Mer.pass. 21:27 | | | ν3.6' d-1.0' m-4.26 | | | ν1.2' d-0.3' m0.89 | | | ν2.1' d-0.1' m-1.99 | | | ν2.6' d-0.1' m0.45 | | | |
| | | | | | | | | | | | | | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 38°19.7 | 194°59.0 | S15°28.9 | 257°46.7 | N17°02.4 | 251°42.5 | N14°08.4 | 28°37.3 | N01°15.4 | | | | | | |
| 1 | 53°22.2 | 210°02.5 | 27.8 | 272°47.9 | 02.0 | 266°44.7 | 08.3 | 43°39.9 | 15.4 | | | | | | |
| 2 | 68°24.6 | 225°06.1 | 26.8 | 287°49.1 | 01.7 | 281°46.9 | 08.2 | 58°42.5 | 15.3 | | | | | | |
| 3 | 83°27.1 | 240°09.7 | •• 25.8 | 302°50.3 | •• 01.3 | 296°49.0 | •• 08.1 | 73°45.1 | •• 15.3 | | | | | | |
| 4 | 98°29.6 | 255°13.2 | 24.7 | 317°51.5 | 01.0 | 311°51.2 | 08.0 | 88°47.7 | 15.2 | | | | | | |
| 5 | 113°32.0 | 270°16.8 | 23.7 | 332°52.6 | 00.6 | 326°53.3 | 07.9 | 103°50.3 | 15.1 | | | | | | |
| 6 | 128°34.5 | 285°20.3 | S15°22.7 | 347°53.8 | N17°00.3 | 341°55.5 | N14°07.8 | 118°53.0 | N01°15.1 | | | | | | |
| 7 | 143°37.0 | 300°23.9 | 21.7 | 2°55.0 | 17°00.0 | 356°57.6 | 07.7 | 133°55.6 | 15.0 | | | | | | |
| 8 | 158°39.4 | 315°27.4 | 20.6 | 17°56.2 | 16°59.6 | 11°59.8 | 07.6 | 148°58.2 | 15.0 | | | | | | |
| 9 | 173°41.9 | 330°30.9 | •• 19.6 | 32°57.4 | •• 59.3 | 27°01.9 | •• 07.5 | 164°00.8 | •• 14.9 | | | | | | |
| 10 | 188°44.3 | 345°34.5 | 18.6 | 47°58.6 | 58.9 | 42°04.1 | 07.5 | 179°03.4 | 14.9 | | | | | | |
| 11 | 203°46.8 | 0°38.0 | 17.5 | 62°59.7 | 58.6 | 57°06.3 | 07.4 | 194°06.0 | 14.8 | | | | | | |
| 12 | 218°49.3 | 15°41.5 | S15°16.5 | 78°00.9 | N16°58.2 | 72°08.4 | N14°07.3 | 209°08.6 | N01°14.7 | | | | | | |
| 13 | 233°51.7 | 30°45.1 | 15.5 | 93°02.1 | 57.9 | 87°10.6 | 07.2 | 224°11.3 | 14.7 | | | | | | |
| 14 | 248°54.2 | 45°48.6 | 14.4 | 108°03.3 | 57.6 | 102°12.7 | 07.1 | 239°13.9 | 14.6 | | | | | | |
| 15 | 263°56.7 | 60°52.1 | •• 13.4 | 123°04.5 | •• 57.2 | 117°14.9 | •• 07.0 | 254°16.5 | •• 14.6 | | | | | | |
| 16 | 278°59.1 | 75°55.6 | 12.4 | 138°05.7 | 56.9 | 132°17.0 | 06.9 | 269°19.1 | 14.5 | | | | | | |
| 17 | 294°01.6 | 90°59.2 | 11.4 | 153°06.9 | 56.5 | 147°19.2 | 06.8 | 284°21.7 | 14.4 | | | | | | |
| 18 | 309°04.1 | 106°02.7 | S15°10.3 | 168°08.0 | N16°56.2 | 162°21.4 | N14°06.7 | 299°24.3 | N01°14.4 | | | | | | |
| 19 | 324°06.5 | 121°06.2 | 09.3 | 183°09.2 | 55.8 | 177°23.5 | 06.6 | 314°26.9 | 14.3 | | | | | | |
| 20 | 339°09.0 | 136°09.7 | 08.3 | 198°10.4 | 55.5 | 192°25.7 | 06.5 | 329°29.6 | 14.3 | | | | | | |
| 21 | 354°11.5 | 151°13.2 | •• 07.3 | 213°11.6 | •• 55.2 | 207°27.8 | •• 06.4 | 344°32.2 | •• 14.2 | | | | | | |
| 22 | 9°13.9 | 166°16.7 | 06.2 | 228°12.8 | 54.8 | 222°30.0 | 06.3 | 359°34.8 | 14.2 | | | | | | |
| 23 | 24°16.4 | 181°20.2 | 05.2 | 243°14.0 | 54.5 | 237°32.2 | 06.2 | 14°37.4 | 14.1 | | | | | | |
| Mer.pass. 21:23 | | | ν3.6' d-1.0' m-4.20 | | | ν1.2' d-0.3' m0.88 | | | ν2.2' d-0.1' m-1.99 | | | ν2.6' d-0.1' m0.45 | | | |

| | SHA | Dec |
|------------|----------|----------|
| Alpheratz | 357°32.9 | 29°14.6 |
| Ankaa | 353°05.3 | -42°09.6 |
| Schedar | 349°28.8 | 56°41.3 |
| Diphda | 348°45.5 | -17°50.3 |
| Achernar | 335°18.5 | -57°06.0 |
| Hamal | 327°49.2 | 23°35.5 |
| Polaris | 312°46.5 | 89°22.6 |
| Acamar | 315°10.2 | -40°11.7 |
| Menkar | 314°04.3 | 4°11.8 |
| Mirfak | 308°25.6 | 49°57.4 |
| Aldebaran | 290°37.6 | 16°33.9 |
| Rigel | 281°02.2 | -8°10.1 |
| Capella | 280°19.4 | 46°01.4 |
| Bellatrix | 278°21.1 | 6°22.5 |
| Elnath | 277°59.7 | 28°37.8 |
| Alnilam | 275°36.0 | -1°11.0 |
| Betelgeuse | 270°50.3 | 7°24.8 |
| Canopus | 263°51.5 | -52°42.3 |
| Sirius | 258°24.8 | -16°45.0 |
| Adhara | 255°04.6 | -29° |

| h | Sun | | | Moon | | | | |
|------------|----------|----------|------------|----------|-------|------------|------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| Wed | | | | | | | | |
| 0 | 184°02.6 | S13°02.8 | | 340°23.5 | 4.0' | N24°55.6 | 8.0' | 60.0' |
| 1 | 199°02.7 | 03.7 | | 354°46.5 | 3.9' | 25°03.6 | 7.8' | 60.0' |
| 2 | 214°02.7 | 04.5 | | 9°09.5 | 3.8' | 25°11.4 | 7.6' | 60.1' |
| 3 | 229°02.8 | · · 05.4 | | 23°32.3 | 3.8' | 25°19.0 | 7.5' | 60.1' |
| 4 | 244°02.8 | 06.2 | | 37°55.1 | 3.7' | 25°26.5 | 7.3' | 60.1' |
| 5 | 259°02.9 | 07.0 | | 52°17.7 | 3.6' | 25°33.8 | 7.1' | 60.1' |
| 6 | 274°02.9 | S13°07.9 | | 66°40.3 | 3.5' | N25°40.9 | 6.9' | 60.1' |
| 7 | 289°03.0 | 08.7 | | 81°02.8 | 3.4' | 25°47.8 | 6.7' | 60.1' |
| 8 | 304°03.0 | 09.5 | | 95°25.3 | 3.4' | 25°54.5 | 6.6' | 60.1' |
| 9 | 319°03.1 | · · 10.4 | | 109°47.6 | 3.3' | 26°01.1 | 6.4' | 60.1' |
| 10 | 334°03.1 | 11.2 | | 124°09.9 | 3.2' | 26°07.5 | 6.2' | 60.1' |
| 11 | 349°03.2 | 12.0 | | 138°32.1 | 3.1' | 26°13.7 | 6.0' | 60.1' |
| 12 | 4°03.2 | S13°12.9 | | 152°54.2 | 3.1' | N26°19.7 | 5.8' | 60.1' |
| 13 | 19°03.3 | 13.7 | | 167°16.3 | 3.0' | 26°25.5 | 5.6' | 60.1' |
| 14 | 34°03.3 | 14.5 | | 181°38.3 | 2.9' | 26°31.1 | 5.4' | 60.1' |
| 15 | 49°03.4 | · · 15.4 | | 196°00.2 | 2.9' | 26°36.5 | 5.2' | 60.1' |
| 16 | 64°03.4 | 16.2 | | 210°22.1 | 2.8' | 26°41.8 | 5.0' | 60.1' |
| 17 | 79°03.5 | 17.0 | | 224°43.9 | 2.8' | 26°46.8 | 4.9' | 60.1' |
| 18 | 94°03.5 | S13°17.9 | | 239°05.6 | 2.7' | N26°51.6 | 4.7' | 60.1' |
| 19 | 109°03.6 | 18.7 | | 253°27.3 | 2.6' | 26°56.3 | 4.5' | 60.1' |
| 20 | 124°03.6 | 19.5 | | 267°49.0 | 2.6' | 27°00.8 | 4.3' | 60.1' |
| 21 | 139°03.7 | · · 20.4 | | 282°10.6 | 2.5' | 27°05.0 | 4.1' | 60.1' |
| 22 | 154°03.7 | 21.2 | | 296°32.1 | 2.5' | 27°09.1 | 3.9' | 60.1' |
| 23 | 169°03.7 | 22.0 | | 310°53.6 | 2.5' | 27°13.0 | 3.7' | 60.1' |
| | | | | | | | | |
| SD = 16.1' | | | $d = 0.8'$ | | | SD = 16.4' | | |

| Thu | Sun | | | Moon | | | | |
|------------|----------|----------|------------|----------|-------|------------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 184°03.8 | S13°22.9 | | 325°15.1 | 2.4' | N27°16.6 | 3.5' | 60.1' |
| 1 | 199°03.8 | 23.7 | | 339°36.5 | 2.4' | 27°20.1 | 3.3' | 60.1' |
| 2 | 214°03.9 | 24.5 | | 353°57.9 | 2.4' | 27°23.4 | 3.1' | 60.1' |
| 3 | 229°03.9 | · · 25.3 | | 8°19.3 | 2.3' | 27°26.4 | 2.9' | 60.1' |
| 4 | 244°04.0 | 26.2 | | 22°40.6 | 2.3' | 27°29.3 | 2.7' | 60.1' |
| 5 | 259°04.0 | 27.0 | | 37°01.9 | 2.3' | 27°31.9 | 2.5' | 60.1' |
| 6 | 274°04.1 | S13°27.8 | | 51°23.2 | 2.3' | N27°34.4 | 2.3' | 60.1' |
| 7 | 289°04.1 | 28.7 | | 65°44.4 | 2.2' | 27°36.6 | 2.0' | 60.1' |
| 8 | 304°04.1 | 29.5 | | 80°05.7 | 2.2' | 27°38.7 | 1.8' | 60.1' |
| 9 | 319°04.2 | · · 30.3 | | 94°26.9 | 2.2' | 27°40.5 | 1.6' | 60.1' |
| 10 | 334°04.2 | 31.1 | | 108°48.1 | 2.2' | 27°42.2 | 1.4' | 60.1' |
| 11 | 349°04.3 | 32.0 | | 123°09.3 | 2.2' | 27°43.6 | 1.2' | 60.0' |
| 12 | 4°04.3 | S13°32.8 | | 137°30.5 | 2.2' | N27°44.8 | 1.0' | 60.0' |
| 13 | 19°04.3 | 33.6 | | 151°51.7 | 2.2' | 27°45.9 | 0.8' | 60.0' |
| 14 | 34°04.4 | 34.4 | | 166°12.9 | 2.2' | 27°46.7 | 0.6' | 60.0' |
| 15 | 49°04.4 | · · 35.3 | | 180°34.1 | 2.2' | 27°47.3 | 0.4' | 60.0' |
| 16 | 64°04.5 | 36.1 | | 194°55.3 | 2.2' | 27°47.7 | 0.2' | 60.0' |
| 17 | 79°04.5 | 36.9 | | 209°16.6 | 2.2' | 27°47.9 | 0.0' | 60.0' |
| 18 | 94°04.5 | S13°37.7 | | 223°37.8 | 2.2' | N27°47.9 | -0.2' | 60.0' |
| 19 | 109°04.6 | 38.6 | | 237°59.0 | 2.3' | 27°47.7 | -0.4' | 60.0' |
| 20 | 124°04.6 | 39.4 | | 252°20.3 | 2.3' | 27°47.3 | -0.6' | 60.0' |
| 21 | 139°04.7 | · · 40.2 | | 266°41.6 | 2.3' | 27°46.7 | -0.8' | 60.0' |
| 22 | 154°04.7 | 41.0 | | 281°02.9 | 2.3' | 27°45.9 | -1.0' | 60.0' |
| 23 | 169°04.7 | 41.8 | | 295°24.2 | 2.4' | 27°44.9 | -1.2' | 60.0' |
| | | | | | | | | |
| SD = 16.1' | | | $d = 0.8'$ | | | SD = 16.4' | | |

| Fri | Sun | | | Moon | | | | |
|------------|----------|----------|------------|----------|-------|------------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 184°04.8 | S13°42.7 | | 309°45.6 | 2.4' | N27°43.7 | -1.4' | 59.9' |
| 1 | 199°04.8 | 43.5 | | 324°07.0 | 2.4' | 27°42.3 | -1.6' | 59.9' |
| 2 | 214°04.8 | 44.3 | | 338°28.4 | 2.5' | 27°40.6 | -1.8' | 59.9' |
| 3 | 229°04.9 | · · 45.1 | | 352°49.9 | 2.5' | 27°38.8 | -2.0' | 59.9' |
| 4 | 244°04.9 | 45.9 | | 7°11.4 | 2.6' | 27°36.8 | -2.2' | 59.9' |
| 5 | 259°05.0 | 46.8 | | 21°33.0 | 2.6' | 27°34.6 | -2.4' | 59.9' |
| 6 | 274°05.0 | S13°47.6 | | 35°54.6 | 2.7' | N27°32.2 | -2.6' | 59.9' |
| 7 | 289°05.0 | 48.4 | | 50°16.3 | 2.7' | 27°29.5 | -2.8' | 59.9' |
| 8 | 304°05.1 | 49.2 | | 64°38.0 | 2.8' | 27°26.7 | -3.0' | 59.9' |
| 9 | 319°05.1 | · · 50.0 | | 78°59.7 | 2.8' | 27°23.7 | -3.2' | 59.8' |
| 10 | 334°05.1 | 50.9 | | 93°21.6 | 2.9' | 27°20.5 | -3.4' | 59.8' |
| 11 | 349°05.2 | 51.7 | | 107°43.4 | 2.9' | 27°17.1 | -3.6' | 59.8' |
| 12 | 4°05.2 | S13°52.5 | | 122°05.4 | 3.0' | N27°13.5 | -3.8' | 59.8' |
| 13 | 19°05.2 | 53.3 | | 136°27.4 | 3.1' | 27°09.7 | -4.0' | 59.8' |
| 14 | 34°05.3 | 54.1 | | 150°49.5 | 3.1' | 27°05.8 | -4.2' | 59.8' |
| 15 | 49°05.3 | · · 54.9 | | 165°11.6 | 3.2' | 27°01.6 | -4.4' | 59.8' |
| 16 | 64°05.3 | 55.8 | | 179°33.8 | 3.3' | 26°57.2 | -4.5' | 59.8' |
| 17 | 79°05.3 | 56.6 | | 193°56.1 | 3.4' | 26°52.7 | -4.7' | 59.7' |
| 18 | 94°05.4 | S13°57.4 | | 208°18.5 | 3.5' | N26°48.0 | -4.9' | 59.7' |
| 19 | 109°05.4 | 58.2 | | 222°41.0 | 3.5' | 26°43.0 | -5.1' | 59.7' |
| 20 | 124°05.4 | 59.0 | | 237°03.5 | 3.6' | 26°37.9 | -5.3' | 59.7' |
| 21 | 139°05.5 | 13°59.8 | | 251°26.1 | 3.7' | 26°32.7 | -5.5' | 59.7' |
| 22 | 154°05.5 | 14°00.6 | | 265°48.8 | 3.8' | 26°27.2 | -5.6' | 59.7' |
| 23 | 169°05.5 | 01.5 | | 280°11.6 | 3.9' | 26°21.6 | -5.8' | 59.6' |
| | | | | | | | | |
| SD = 16.1' | | | $d = 0.8'$ | | | SD = 16.3' | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 05:54 | 07:16 | 08:38 | 14:47 | 16:10 | 17:31 |
| N 70° | 05:51 | 07:04 | 08:16 | 15:10 | 16:22 | 17:34 |
| 68° | 05:49 | 06:55 | 07:58 | 15:28 | 16:31 | 17:37 |
| 66° | 05:47 | 06:47 | 07:44 | 15:42 | 16:39 | 17:39 |
| 64° | 05:44 | 06:41 | 07:33 | 15:54 | 16:45 | 17:42 |
| 62° | 05:43 | 06:35 | 07:23 | 16:04 | 16:51 | 17:44 |
| 60° | 05:41 | 06:30 | 07:14 | 16:12 | 16:57 | 17:46 |
| N 58° | 05:39 | 06:25 | 07:07 | 16:20 | 17:01 | 17:47 |
| 56° | 05:37 | 06:21 | 07:00 | 16:26 | 17:05 | 17:49 |
| 54° | 05:36 | 06:18 | 06:55 | 16:32 | 17:09 | 17:51 |
| 52° | 05:34 | 06:14 | 06:49 | 16:37 | 17:13 | 17:52 |
| 50° | 05:33 | 06:11 | 06:45 | 16:42 | 17:16 | 17:54 |
| 45° | 05:29 | 06:04 | 06:34 | 16:53 | 17:23 | 17:57 |
| N 40° | 05:26 | 05:58 | 06:26 | 17:01 | 17:29 | 18:01 |
| 35° | 05:22 | 05:52 | 06:18 | 17:09 | 17:35 | 18:05 |
| 30° | 05:19 | 05:47 | 06:12 | 17:16 | 17:40 | 18:08 |
| 20° | 05:11 | 05:37 | 06:00 | 17:27 | 17:50 | 18:16 |
| N 10° | 05:03 | 05:28 | 05:50 | 17:37 | 17:59 | 18:24 |
| 0° | 04:54 | 05:19 | 05:40 | 17:47 | 18:08 | 18:33 |
| S 10° | 04:44 | 05:09 | 05:31 | 17:57 | 18:19 | 18:44 |
| 20° | 04:30 | 04:57 | 05:20 | 18:08 | 18:30 | 18:57 |
| 30° | 04:13 | 04:43 | 05:08 | 18:20 | 18:45 | 19:15 |
| 35° | 04:02 | 04:34 | 05:01 | 18:27 | 18:54 | 19:26 |
| 40° | 03:49 | 04:24 | 04:53 | 18:35 | 19:04 | 19:39 |
| 45° | 03:33 | 04:12 | 04:43 | 18:45 | 19:17 | 19:56 |
| S 50° | 03:11 | 03:56 | 04:32 | 18:57 | 19:32 | 20:18 |
| 52° | 03:01 | 03:49 | 04:27 | 19:02 | 19:40 | 20:28 |
| 54° | 02:49 | 03:41 | 04:21 | 19:08 | 19:48 | 20:41 |
| 56° | 02:34 | 03:31 | 04:14 | 19:15 | 19:58 | 20:56 |
| 58° | 02:17 | 03:21 | 04:07 | 19:22 | 20:09 | 21:14 |
| S 60° | 01:55 | 03:08 | 03:58 | 19:31 | 20:22 | 21:36 |

| Lat. | Moonrise | | | Moonset | | |
|-------|-------------|-------------|-------------|-------------|-------------|-------------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| N 70° | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| 68° | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| 66° | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| 64° | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> | <div></div> |
| 62° | 15:19 | 15:40 | 17:21 | 12:20 | 14:15 | 14:49 |
| 60° | 15:59 | 16:42 | 18:06 | 11:40 | 13:13 | 14:03 |
| N 58° | 16:27 | 17:16 | 18:35 | 11:13 | 12:39 | 13:34 |
| 56° | 16:49 | 17:41 | 18:58 | 10:51 | 12:14 | 13:11 |
| 54° | 17:07 | 18:01 | 19:16 | 10:33 | 11:53 | 12:52 |
| 52° | 17:22 | 18:18 | 19:32 | 10:18 | 11:37 | 12:36 |
| 50° | 17:36 | 18:33 | 19:46 | 10:05 | 11:22 | 12:22 |
| 45° | 18:03 | 19:02 | 20:13 | 09:39 | 10:53 | 11:54 |
| N 40° | 18:25 | 19:25 | 20:35 | 09:17 | 10:30 | 11:32 |
| 35° | 18:43 | 19:44 | 20:53 | 09:00 | 10:11 | 11:13 |
| 30° | 18:59 | 20:01 | 21:08 | 08:45 | 09:54 | 10:57 |
| 20° | 19:25 | 20:28 | 21:35 | 08:19 | 09:27 | 10:30 |
| N 10° | 19:48 | 20:52 | 21:57 | 07:57 | 09:03 | 10:07 |
| 0° | 20:10 | 21:15 | 22:18 | 07:37 | 08:41 | 09:45 |
| S 10° | 20:31 | 21:37 | 22:39 | 07:16 | 08:18 | 09:23 |
| 20° | 20:55 | 22:01 | 23:02 | 06:54 | 07:55 | 09:00 |
| 30° | 21:22 | 22:29 | 23:28 | 06:29 | 07:27 | 08:32 |
| 35° | 21:38 | 22:45 | 23:43 | 06:14 | 07:11 | 08:16 |
| 40° | 21:57 | 23:04 | | 05:57 | 06:52 | 07:57 |
| 45° | 22:19 | 23:28 | | 05:36 | 06:28 | 07:34 |
| S 50° | 22:48 | 23:57 | | 05:11 | 05:59 | 07:04 |
| 52° | 23:03 | | 00:12 | 04:58 | 05:45 | 06:50 |
| 54° | 23:19 | | 00:29 | 04:44 | 05:28 | 06:33 |
| 56° | 23:39 | | 00:50 | 04:28 | 05:08 | 06:12 |
| 58° | | 00:04 | 01:15 | 04:08 | 04:43 | 05:47 |
| S 60° | | 00:38 | 01:50 | 03:44 | 04:09 | 05:12 |

October 31, 01, 02 UT (Sat., Sun., Mon.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------|---------------------|----------|----------|--------------------|----------|----------|---------------------|---------|-----|--------------------|--------|-----|-----|
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 39°18.8 | 196°23.7 | S15°04.2 | 258°15.2 | N16°54.1 | 252°34.3 | N14°06.1 | 29°40.0 | N01°14.0 | | | | | | |
| 1 | 54°21.3 | 211°27.2 | 03.2 | 273°16.3 | 53.8 | 267°36.5 | 06.0 | 44°42.6 | 14.0 | | | | | | |
| 2 | 69°23.8 | 226°30.7 | 02.1 | 288°17.5 | 53.4 | 282°38.6 | 05.9 | 59°45.2 | 13.9 | | | | | | |
| 3 | 84°26.2 | 241°34.2 | · · 01.1 | 303°18.7 | · · 53.1 | 297°40.8 | · · 05.8 | 74°47.9 | · · 13.9 | | | | | | |
| 4 | 99°28.7 | 256°37.7 | 15°00.1 | 318°19.9 | 52.8 | 312°43.0 | 05.7 | 89°50.5 | 13.8 | | | | | | |
| 5 | 114°31.2 | 271°41.1 | 14°59.1 | 333°21.1 | 52.4 | 327°45.1 | 05.6 | 104°53.1 | 13.8 | | | | | | |
| 6 | 129°33.6 | 286°44.6 | S14°58.0 | 348°22.3 | N16°52.1 | 342°47.3 | N14°05.5 | 119°55.7 | N01°13.7 | | | | | | |
| 7 | 144°36.1 | 301°48.1 | 57.0 | 3°23.5 | 51.7 | 357°49.4 | 05.4 | 134°58.3 | 13.6 | | | | | | |
| 8 | 159°38.6 | 316°51.6 | 56.0 | 18°24.7 | 51.4 | 12°51.6 | 05.4 | 150°00.9 | 13.6 | | | | | | |
| 9 | 174°41.0 | 331°55.0 | · · 55.0 | 33°25.9 | · · 51.1 | 27°53.8 | · · 05.3 | 165°03.5 | · · 13.5 | | | | | | |
| 10 | 189°43.5 | 346°58.5 | 53.9 | 48°27.1 | 50.7 | 42°55.9 | 05.2 | 180°06.1 | 13.5 | | | | | | |
| 11 | 204°46.0 | 2°02.0 | 52.9 | 63°28.3 | 50.4 | 57°58.1 | 05.1 | 195°08.8 | 13.4 | | | | | | |
| 12 | 219°48.4 | 17°05.4 | S14°51.9 | 78°29.5 | N16°50.0 | 73°00.3 | N14°05.0 | 210°11.4 | N01°13.4 | | | | | | |
| 13 | 234°50.9 | 32°08.9 | 50.9 | 93°30.6 | 49.7 | 88°02.4 | 04.9 | 225°14.0 | 13.3 | | | | | | |
| 14 | 249°53.3 | 47°12.4 | 49.9 | 108°31.8 | 49.3 | 103°04.6 | 04.8 | 240°16.6 | 13.2 | | | | | | |
| 15 | 264°55.8 | 62°15.8 | · · 48.8 | 123°33.0 | · · 49.0 | 118°06.7 | · · 04.7 | 255°19.2 | · · 13.2 | | | | | | |
| 16 | 279°58.3 | 77°19.3 | 47.8 | 138°34.2 | 48.7 | 133°08.9 | 04.6 | 270°21.8 | 13.1 | | | | | | |
| 17 | 295°00.7 | 92°22.7 | 46.8 | 153°35.4 | 48.3 | 148°11.1 | 04.5 | 285°24.4 | 13.1 | | | | | | |
| 18 | 310°03.2 | 107°26.1 | S14°45.8 | 168°36.6 | N16°48.0 | 163°13.2 | N14°04.4 | 300°27.0 | N01°13.0 | | | | | | |
| 19 | 325°05.7 | 122°29.6 | 44.8 | 183°37.8 | 47.6 | 178°15.4 | 04.3 | 315°29.6 | 13.0 | | | | | | |
| 20 | 340°08.1 | 137°33.0 | 43.8 | 198°39.0 | 47.3 | 193°17.6 | 04.2 | 330°32.3 | 12.9 | | | | | | |
| 21 | 355°10.6 | 152°36.5 | · · 42.7 | 213°40.2 | · · 46.9 | 208°19.7 | · · 04.1 | 345°34.9 | · · 12.8 | | | | | | |
| 22 | 10°13.1 | 167°39.9 | 41.7 | 228°41.4 | 46.6 | 223°21.9 | 04.0 | 0°37.5 | 12.8 | | | | | | |
| 23 | 25°15.5 | 182°43.3 | 40.7 | 243°42.6 | 46.3 | 238°24.1 | 03.9 | 15°40.1 | 12.7 | | | | | | |
| Mer.pass. 21:19 | | | ν3.5' d-1.0' m-4.09 | | | ν1.2' d-0.3' m0.87 | | | ν2.2' d-0.1' m-2.00 | | | ν2.6' d-0.1' m0.46 | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 40°18.0 | 197°46.7 | S14°39.7 | 258°43.8 | N16°45.9 | 253°26.2 | N14°03.9 | 30°42.7 | N01°12.7 | | | | | | |
| 1 | 55°20.4 | 212°50.2 | 38.7 | 273°45.0 | 45.6 | 268°28.4 | 03.8 | 45°45.3 | 12.6 | | | | | | |
| 2 | 70°22.9 | 227°53.6 | 37.7 | 288°46.2 | 45.2 | 283°30.6 | 03.7 | 60°47.9 | 12.6 | | | | | | |
| 3 | 85°25.4 | 242°57.0 | · · 36.7 | 303°47.4 | · · 44.9 | 298°32.7 | · · 03.6 | 75°50.5 | · · 12.5 | | | | | | |
| 4 | 100°27.8 | 258°00.4 | 35.6 | 318°48.6 | 44.5 | 313°34.9 | 03.5 | 90°53.1 | 12.4 | | | | | | |
| 5 | 115°30.3 | 273°03.8 | 34.6 | 333°49.8 | 44.2 | 328°37.1 | 03.4 | 105°55.8 | 12.4 | | | | | | |
| 6 | 130°32.8 | 288°07.2 | S14°33.6 | 348°51.0 | N16°43.9 | 343°39.2 | N14°03.3 | 120°58.4 | N01°12.3 | | | | | | |
| 7 | 145°35.2 | 303°10.6 | 32.6 | 3°52.2 | 43.5 | 358°41.4 | 03.2 | 136°01.0 | 12.3 | | | | | | |
| 8 | 160°37.7 | 318°14.0 | 31.6 | 18°53.4 | 43.2 | 13°43.6 | 03.1 | 151°03.6 | 12.2 | | | | | | |
| 9 | 175°40.2 | 333°17.4 | · · 30.6 | 33°54.6 | · · 42.8 | 28°45.7 | · · 03.0 | 166°06.2 | · · 12.2 | | | | | | |
| 10 | 190°42.6 | 348°20.8 | 29.6 | 48°55.8 | 42.5 | 43°47.9 | 02.9 | 181°08.8 | 12.1 | | | | | | |
| 11 | 205°45.1 | 3°24.2 | 28.6 | 63°57.0 | 42.1 | 58°50.1 | 02.8 | 196°11.4 | 12.1 | | | | | | |
| 12 | 220°47.6 | 18°27.6 | S14°27.6 | 78°58.2 | N16°41.8 | 73°52.2 | N14°02.7 | 211°14.0 | N01°12.0 | | | | | | |
| 13 | 235°50.0 | 33°31.0 | 26.6 | 93°59.4 | 41.5 | 88°54.4 | 02.6 | 226°16.6 | 11.9 | | | | | | |
| 14 | 250°52.5 | 48°34.3 | 25.5 | 109°00.6 | 41.1 | 103°56.6 | 02.6 | 241°19.2 | 11.9 | | | | | | |
| 15 | 265°54.9 | 63°37.7 | · · 24.5 | 124°01.8 | · · 40.8 | 118°58.7 | · · 02.5 | 256°21.9 | · · 11.8 | | | | | | |
| 16 | 280°57.4 | 78°41.1 | 23.5 | 139°03.0 | 40.4 | 134°00.9 | 02.4 | 271°24.5 | 11.8 | | | | | | |
| 17 | 295°59.9 | 93°44.5 | 22.5 | 154°04.2 | 40.1 | 149°03.1 | 02.3 | 286°27.1 | 11.7 | | | | | | |
| 18 | 311°02.3 | 108°47.8 | S14°21.5 | 169°05.4 | N16°39.7 | 164°05.3 | N14°02.2 | 301°29.7 | N01°11.7 | | | | | | |
| 19 | 326°04.8 | 123°51.2 | 20.5 | 184°06.6 | 39.4 | 179°07.4 | 02.1 | 316°32.3 | 11.6 | | | | | | |
| 20 | 341°07.3 | 138°54.6 | 19.5 | 199°07.8 | 39.1 | 194°09.6 | 02.0 | 331°34.9 | 11.6 | | | | | | |
| 21 | 356°09.7 | 153°57.9 | · · 18.5 | 214°09.0 | · · 38.7 | 209°11.8 | · · 01.9 | 346°37.5 | · · 11.5 | | | | | | |
| 22 | 11°12.2 | 169°01.3 | 17.5 | 229°10.3 | 38.4 | 224°13.9 | 01.8 | 1°40.1 | 11.4 | | | | | | |
| 23 | 26°14.7 | 184°04.6 | 16.5 | 244°11.5 | 38.0 | 239°16.1 | 01.7 | 16°42.7 | 11.4 | | | | | | |
| Mer.pass. 21:15 | | | ν3.4' d-1.0' m-4.17 | | | ν1.2' d-0.3' m0.86 | | | ν2.2' d-0.1' m-2.00 | | | ν2.6' d-0.1' m0.46 | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 41°17.1 | 199°08.0 | S14°15.5 | 259°12.7 | N16°37.7 | 254°18.3 | N14°01.6 | 31°45.3 | N01°11.3 | | | | | | |
| 1 | 56°19.6 | 214°11.3 | 14.5 | 274°13.9 | 37.3 | 269°20.5 | 01.5 | 46°47.9 | 11.3 | | | | | | |
| 2 | 71°22.1 | 229°14.6 | 13.5 | 289°15.1 | 37.0 | 284°22.6 | 01.5 | 61°50.6 | 11.2 | | | | | | |
| 3 | 86°24.5 | 244°18.0 | · · 12.5 | 304°16.3 | · · 36.7 | 299°24.8 | · · 01.4 | 76°53.2 | · · 11.2 | | | | | | |
| 4 | 101°27.0 | 259°21.3 | 11.5 | 319°17.5 | 36.3 | 314°27.0 | 01.3 | 91°55.8 | 11.1 | | | | | | |
| 5 | 116°29.4 | 274°24.6 | 10.5 | 334°18.7 | 36.0 | 329°29.1 | 01.2 | 106°58.4 | 11.1 | | | | | | |
| 6 | 131°31.9 | 289°28.0 | S14°09.6 | 349°19.9 | N16°35.6 | 344°31.3 | N14°01.1 | 122°01.0 | N01°11.0 | | | | | | |
| 7 | 146°34.4 | 304°31.3 | 08.6 | 4°21.1 | 35.3 | 359°33.5 | 01.0 | 137°03.6 | 10.9 | | | | | | |
| 8 | 161°36.8 | 319°34.6 | 07.6 | 19°22.3 | 34.9 | 14°35.7 | 00.9 | 152°06.2 | 10.9 | | | | | | |
| 9 | 176°39.3 | 334°37.9 | · · 06.6 | 34°23.6 | · · 34.6 | 29°37.8 | · · 00.8 | 167°08.8 | · · 10.8 | | | | | | |
| 10 | 191°41.8 | 349°41.2 | 05.6 | 49°24.8 | 34.3 | 44°40.0 | 00.7 | 182°11.4 | 10.8 | | | | | | |
| 11 | 206°44.2 | 4°44.5 | 04.6 | 64°26.0 | 33.9 | 59°42.2 | 00.6 | 197°14.0 | 10.7 | | | | | | |
| 12 | 221°46.7 | 19°47.8 | S14°03.6 | 79°27.2 | N16°33.6 | 74°44.4 | N14°00.5 | 212°16.6 | N01°10.7 | | | | | | |
| 13 | 236°49.2 | 34°51.2 | 02.6 | 94°28.4 | 33.2 | 89°46.5 | 00.5 | 227°19.2 | 10.6 | | | | | | |
| 14 | 251°51.6 | 49°54.4 | 01.6 | 109°29.6 | 32.9 | 104°48.7 | 00.4 | 242°21.8 | 10.6 | | | | | | |
| 15 | 266°54.1 | 64°57.7 | 14°00.6 | 124°30.8 | · · 32.6 | 119°50.9 | · · 00.3 | 257°24.5 | · · 10.5 | | | | | | |
| 16 | 281°56.6 | 80°01.0 | 13°59.7 | 139°32.0 | 32.2 | 134°53.1 | 00.2 | 272°27.1 | 10.5 | | | | | | |
| 17 | 296°59.0 | 95°04.3 | 58.7 | 154°33.3 | 31.9 | 149°55.2 | 00.1 | 287°29.7 | 10.4 | | | | | | |
| 18 | 312°01.5 | 110°07.6 | S13°57.7 | 169°34.5 | N16°31.5 | 164°57.4 | N14°00.0 | 302°32.3 | N01°10.3 | | | | | | |
| 19 | 327°03.9 | 125°10.9 | 56.7 | 184°35.7 | 31.2 | 179°59.6 | 13°59.9 | 317°34.9 | 10.3 | | | | | | |
| 20 | 342°06.4 | 140°14.2 | 55.7 | 199°36.9 | 30.8 | 195°01.8 | 59.8 | 332°37.5 | 10.2 | | | | | | |
| 21 | 357°08.9 | 155°17.4 | · · 54.8 | 214°38.1 | · · 30.5 | 210°03.9 | · · 59.7 | 347°40.1 | · · 10.2 | | | | | | |
| 22 | 12°11.3 | 170°20.7 | 53.8 | 229°39.3 | 30.2 | 225°06.1 | 59.6 | 2°42.7 | 10.1 | | | | | | |
| 23 | 27°13.8 | 185°24.0 | 52.8 | 244°40.6 | 29.8 | 240°08.3 | 59.6 | 17°45.3 | 10.1 | | | | | | |
| Mer.pass. 21:11 | | | ν3.3' d-1.0' m-4.25 | | | ν1.2' d-0.3' m0.85 | | | ν2.2' d-0.1' m-2.01 | | | ν2.6' d-0.1' m0.47 | | | |

| Stars | | |
|----------------------------|------------|-----------------|
| | SHA | Dec |
| Alpheratz | 357°32.9 | 29°14.6 |
| Ankaa | 353°05.3 | -42°09.6 |
| Schedar | 349°28.8 | 56°41.3 |
| Diphda | 348°45.5 | -17°50.3 |
| Achernar | 335°18.5 | -57°06.0 |
| Hamal | 327°49.2 | 23°35.5 |
| Polaris | 312°45.8 | 89°22.6 |
| Acamar | 315°10.2 | -40°11.7 |
| Menkar | 314°04.3 | 4°11.8 |
| Mirfak | 308°25.6 | 49°57.4 |
| Aldebaran | 290°37.6 | 16°33.9 |
| Rigel | 281°02.2 | -8°10.1 |
| Capella | 280°19.3 | 46°01.4 |
| Bellatrix | 278°21.0 | 6°22.5 |
| Elnath | 277°59.7 | 28°37.8 |
| Alnilam | 275°36.0 | -1°11.0 |
| Betelgeuse | 270°50.3 | 7°24.8 |
| Canopus | 263°51.4 | -52°42.3 |
| Sirius | 258°24.8 | -16°45.0 |
| Adhara | 255°04.5 | -29°00.3 |
| Procyon | 244°49.2 | 5°09.4 |
| Pollux | 243°15.4 | 27°57.6 |
| Avior | 234°14.1 | -59°35.4 |
| Suhail | 222°45.3 | -43°32.2 |
| Miaplacidus | 221°38.1 | -69°49.3 |
| Alphard | 217°46.4 | -8°46.4 |
| Regulus | 207°33.0 | 11°50.2 |
| Dubhe | 193°39.6 | 61°36.1 |
| Denebola | 182°23.7 | 14°25.3 |
| Gienah | 175°42.3 | -17°41.3 |
| Acrux | 172°59.0 | -63°14.7 |
| Gacrux | 171°50.5 | -57°15.6 |
| Alioth | 166°12.2 | 55°48.7 |
| Spica | 158°21.1 | -11°18.0 |
| Alkaid | 152°51.3 | 49°10.7 |
| Hadar | 148°34.5 | -60°30.1 |
| Menkent | 147°56.3 | -36°30.0 |
| Arcturus | 145°46.9 | 19°02.6 |
| Rigel Kent. | 139°38.9 | -60°56.7 |
| Kochab | 137°21.0 | 74°02.7 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.5 |
| Antares | 112°14.3 | -26°29.5 |
| Atria | 107°07.7 | -69°04.6 |
| Sabik | 102°01.4 | -15°45.4 |
| Shaula | 96°08.7 | -37°07.4 |
| Rasalhague | 95°57.4 | 12°32.6 |
| Eltanin | 90°41.8 | 51°29.3 |
| Kaus Aust. | 83°30.8 | -34°22.3 |
| Vega | 80°32.4 | 38°48.7 |
| Nunki | 75°46.1 | -26°15.8 |
| Altair | 61°58.6 | 8°56.5 |
| Peacock | 53°03.5 | -56°39.1 |
| Deneb | 49°24.8 | 45°22.9 |
| Enif | 33°37.3 | 10°00.1 |
| Al Na'ir | 27°30.9 | -46°50.0 |
| Fomalhaut | 15°12.7 | -29°28.8 |
| Scheat | 13°43.6 | 28°14.0 |
| Markab | 13°28.2 | 15°21.2 |
| Oct 31 Sat | SHA | Mer.pass |
| Venus | 157°04.9 | 10:52 |
| Mars | 218°56.3 | 06:46 |
| Jupiter | 213°15.5 | 07:09 |
| Saturn | 350°21.2 | 21:58 |
| Nov 01 Sun | SHA | Mer.pass |
| Venus | 157°28.8 | 10:46 |
| Mars | 218°25.8 | 06:45 |
| Jupiter | 213°08.2 | 07:05 |
| Saturn | 350°24.7 | 21:53 |
| Nov 02 Mon | SHA | Mer.pass |
| Venus | 157°50.8 | 10:41 |
| Mars | 217°55.5 | 06:43 |
| Jupiter | 213°01.2 | 07:02 |
| Saturn | 350°28.2 | 21:49 |
| Horizontal parallax | | |
| | Venus: | 0.5 |
| | Mars: | 0.1 |

| h | Sun | | | Moon | | | |
|------------|----------|----------|------------|----------|-------|----------|-----------|
| | GHA | Dec | | GHA | ν | Dec | d |
| Sat | | | | | | | HP |
| 0 | 184°05.6 | S14°02.3 | | 294°34.5 | 4.0' | N26°15.7 | -6.0' |
| 1 | 199°05.6 | 03.1 | | 308°57.4 | 4.1' | 26°09.7 | -6.2' |
| 2 | 214°05.6 | 03.9 | | 323°20.5 | 4.2' | 26°03.6 | -6.3' |
| 3 | 229°05.6 | · · 04.7 | | 337°43.7 | 4.2' | 25°57.2 | -6.5' |
| 4 | 244°05.7 | 05.5 | | 352°06.9 | 4.3' | 25°50.7 | -6.7' |
| 5 | 259°05.7 | 06.3 | | 6°30.2 | 4.4' | 25°44.0 | -6.9' |
| 6 | 274°05.7 | S14°07.1 | | 20°53.7 | 4.5' | N25°37.1 | -7.0' |
| 7 | 289°05.7 | 07.9 | | 35°17.2 | 4.6' | 25°30.1 | -7.2' |
| 8 | 304°05.8 | 08.7 | | 49°40.9 | 4.7' | 25°22.9 | -7.4' |
| 9 | 319°05.8 | · · 09.6 | | 64°04.6 | 4.8' | 25°15.5 | -7.5' |
| 10 | 334°05.8 | 10.4 | | 78°28.5 | 5.0' | 25°08.0 | -7.7' |
| 11 | 349°05.9 | 11.2 | | 92°52.4 | 5.1' | 25°00.3 | -7.8' |
| 12 | 4°05.9 | S14°12.0 | | 107°16.5 | 5.2' | N24°52.5 | -8.0' |
| 13 | 19°05.9 | 12.8 | | 121°40.6 | 5.3' | 24°44.5 | -8.2' |
| 14 | 34°05.9 | 13.6 | | 136°04.9 | 5.4' | 24°36.3 | -8.3' |
| 15 | 49°05.9 | · · 14.4 | | 150°29.3 | 5.5' | 24°28.0 | -8.5' |
| 16 | 64°06.0 | 15.2 | | 164°53.8 | 5.6' | 24°19.5 | -8.6' |
| 17 | 79°06.0 | 16.0 | | 179°18.4 | 5.7' | 24°10.9 | -8.8' |
| 18 | 94°06.0 | S14°16.8 | | 193°43.1 | 5.8' | N24°02.1 | -8.9' |
| 19 | 109°06.0 | 17.6 | | 208°07.9 | 5.9' | 23°53.2 | -9.1' |
| 20 | 124°06.1 | 18.4 | | 222°32.9 | 6.1' | 23°44.1 | -9.2' |
| 21 | 139°06.1 | · · 19.2 | | 236°57.9 | 6.2' | 23°34.9 | -9.4' |
| 22 | 154°06.1 | 20.0 | | 251°23.1 | 6.3' | 23°25.6 | -9.5' |
| 23 | 169°06.1 | 20.8 | | 265°48.4 | 6.4' | 23°16.1 | -9.6' |
| SD = 16.1' | | | d = 0.8' | | | | |
| | | | SD = 16.3' | | | | |

| Sun | Sun | | | Moon | | | |
|------------|----------|----------|------------|----------|-------|----------|--------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 184°06.1 | S14°21.6 | | 280°13.8 | 6.5' | N23°06.4 | -9.8' |
| 1 | 199°06.2 | 22.4 | | 294°39.3 | 6.6' | 22°56.7 | -9.9' |
| 2 | 214°06.2 | 23.2 | | 309°04.9 | 6.7' | 22°46.8 | -10.0' |
| 3 | 229°06.2 | · · 24.0 | | 323°30.7 | 6.9' | 22°36.7 | -10.2' |
| 4 | 244°06.2 | 24.8 | | 337°56.5 | 7.0' | 22°26.6 | -10.3' |
| 5 | 259°06.2 | 25.6 | | 352°22.5 | 7.1' | 22°16.3 | -10.4' |
| 6 | 274°06.3 | S14°26.4 | | 6°48.6 | 7.2' | N22°05.8 | -10.6' |
| 7 | 289°06.3 | 27.2 | | 21°14.8 | 7.3' | 21°55.3 | -10.7' |
| 8 | 304°06.3 | 28.0 | | 35°41.1 | 7.4' | 21°44.6 | -10.8' |
| 9 | 319°06.3 | · · 28.8 | | 50°07.5 | 7.6' | 21°33.8 | -10.9' |
| 10 | 334°06.3 | 29.6 | | 64°34.1 | 7.7' | 21°22.9 | -11.0' |
| 11 | 349°06.3 | 30.4 | | 79°00.8 | 7.8' | 21°11.8 | -11.2' |
| 12 | 4°06.4 | S14°31.2 | | 93°27.5 | 7.9' | N21°00.7 | -11.3' |
| 13 | 19°06.4 | 32.0 | | 107°54.4 | 8.0' | 20°49.4 | -11.4' |
| 14 | 34°06.4 | 32.8 | | 122°21.5 | 8.1' | 20°38.0 | -11.5' |
| 15 | 49°06.4 | · · 33.6 | | 136°48.6 | 8.2' | 20°26.5 | -11.6' |
| 16 | 64°06.4 | 34.4 | | 151°15.8 | 8.4' | 20°14.9 | -11.7' |
| 17 | 79°06.4 | 35.2 | | 165°43.2 | 8.5' | 20°03.2 | -11.8' |
| 18 | 94°06.4 | S14°36.0 | | 180°10.6 | 8.6' | N19°51.4 | -11.9' |
| 19 | 109°06.5 | 36.8 | | 194°38.2 | 8.7' | 19°39.4 | -12.0' |
| 20 | 124°06.5 | 37.6 | | 209°05.9 | 8.8' | 19°27.4 | -12.1' |
| 21 | 139°06.5 | · · 38.4 | | 223°33.7 | 8.9' | 19°15.3 | -12.2' |
| 22 | 154°06.5 | 39.2 | | 238°01.6 | 9.0' | 19°03.0 | -12.3' |
| 23 | 169°06.5 | 40.0 | | 252°29.7 | 9.1' | 18°50.7 | -12.4' |
| SD = 16.1' | | | d = 0.8' | | | | |
| | | | SD = 16.1' | | | | |

| Mon | Sun | | | Moon | | | |
|------------|----------|----------|------------|----------|-------|----------|--------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 184°06.5 | S14°40.8 | | 266°57.8 | 9.2' | N18°38.3 | -12.5' |
| 1 | 199°06.5 | 41.6 | | 281°26.0 | 9.4' | 18°25.8 | -12.6' |
| 2 | 214°06.5 | 42.4 | | 295°54.4 | 9.5' | 18°13.1 | -12.7' |
| 3 | 229°06.6 | · · 43.2 | | 310°22.9 | 9.6' | 18°00.4 | -12.8' |
| 4 | 244°06.6 | 44.0 | | 324°51.4 | 9.7' | 17°47.6 | -12.9' |
| 5 | 259°06.6 | 44.7 | | 339°20.1 | 9.8' | 17°34.8 | -13.0' |
| 6 | 274°06.6 | S14°45.5 | | 353°48.9 | 9.9' | N17°21.8 | -13.1' |
| 7 | 289°06.6 | 46.3 | | 8°17.8 | 10.0' | 17°08.7 | -13.1' |
| 8 | 304°06.6 | 47.1 | | 22°46.7 | 10.1' | 16°55.6 | -13.2' |
| 9 | 319°06.6 | · · 47.9 | | 37°15.8 | 10.2' | 16°42.4 | -13.3' |
| 10 | 334°06.6 | 48.7 | | 51°45.0 | 10.3' | 16°29.1 | -13.4' |
| 11 | 349°06.6 | 49.5 | | 66°14.3 | 10.4' | 16°15.7 | -13.4' |
| 12 | 4°06.6 | S14°50.3 | | 80°43.7 | 10.5' | N16°02.3 | -13.5' |
| 13 | 19°06.6 | 51.1 | | 95°13.2 | 10.6' | 15°48.8 | -13.6' |
| 14 | 34°06.6 | 51.8 | | 109°42.8 | 10.7' | 15°35.2 | -13.7' |
| 15 | 49°06.7 | · · 52.6 | | 124°12.5 | 10.8' | 15°21.5 | -13.7' |
| 16 | 64°06.7 | 53.4 | | 138°42.3 | 10.9' | 15°07.8 | -13.8' |
| 17 | 79°06.7 | 54.2 | | 153°12.1 | 11.0' | 14°54.0 | -13.9' |
| 18 | 94°06.7 | S14°55.0 | | 167°42.1 | 11.1' | N14°40.1 | -13.9' |
| 19 | 109°06.7 | 55.8 | | 182°12.2 | 11.2' | 14°26.2 | -14.0' |
| 20 | 124°06.7 | 56.6 | | 196°42.3 | 11.2' | 14°12.2 | -14.1' |
| 21 | 139°06.7 | · · 57.3 | | 211°12.6 | 11.3' | 13°58.1 | -14.1' |
| 22 | 154°06.7 | 58.1 | | 225°42.9 | 11.4' | 13°44.0 | -14.2' |
| 23 | 169°06.7 | 58.9 | | 240°13.3 | 11.5' | 13°29.8 | -14.2' |
| SD = 16.1' | | | d = 0.8' | | | | |
| | | | SD = 16.0' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|--------------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 06:06 | 07:29 | 08:57 | 14:29 | 15:56 | 17:19 |
| N 70° | 06:02 | 07:16 | 08:30 | 14:55 | 16:10 | 17:24 |
| 68° | 05:58 | 07:06 | 08:11 | 15:15 | 16:20 | 17:27 |
| 66° | 05:55 | 06:57 | 07:55 | 15:31 | 16:29 | 17:31 |
| 64° | 05:52 | 06:49 | 07:42 | 15:44 | 16:37 | 17:34 |
| 62° | 05:50 | 06:43 | 07:31 | 15:55 | 16:43 | 17:36 |
| 60° | 05:47 | 06:37 | 07:22 | 16:04 | 16:49 | 17:39 |
| N 58° | 05:45 | 06:32 | 07:14 | 16:12 | 16:54 | 17:41 |
| 56° | 05:43 | 06:27 | 07:07 | 16:19 | 16:59 | 17:43 |
| 54° | 05:41 | 06:23 | 07:00 | 16:26 | 17:03 | 17:45 |
| 52° | 05:39 | 06:19 | 06:55 | 16:32 | 17:07 | 17:47 |
| 50° | 05:37 | 06:16 | 06:50 | 16:37 | 17:11 | 17:49 |
| 45° | 05:33 | 06:08 | 06:38 | 16:48 | 17:19 | 17:54 |
| N 40° | 05:29 | 06:01 | 06:29 | 16:58 | 17:26 | 17:58 |
| 35° | 05:25 | 05:55 | 06:21 | 17:06 | 17:32 | 18:02 |
| 30° | 05:21 | 05:49 | 06:14 | 17:13 | 17:38 | 18:06 |
| 20° | 05:13 | 05:39 | 06:01 | 17:25 | 17:48 | 18:14 |
| N 10° | 05:04 | 05:29 | 05:51 | 17:37 | 17:58 | 18:23 |
| 0° | 04:54 | 05:19 | 05:40 | 17:47 | 18:08 | 18:33 |
| S 10° | 04:43 | 05:08 | 05:30 | 17:58 | 18:19 | 18:45 |
| 20° | 04:28 | 04:55 | 05:18 | 18:09 | 18:32 | 18:59 |
| 30° | 04:10 | 04:40 | 05:05 | 18:22 | 18:47 | 19:18 |
| 35° | 03:59 | 04:31 | 04:58 | 18:30 | 18:57 | 19:29 |
| 40° | 03:45 | 04:20 | 04:49 | 18:39 | 19:08 | 19:43 |
| 45° | 03:27 | 04:07 | 04:39 | 18:49 | 19:21 | 20:01 |
| S 50° | 03:04 | 03:50 | 04:27 | 19:02 | 19:38 | 20:24 |
| 52° | 02:53 | 03:42 | 04:21 | 19:08 | 19:46 | 20:36 |
| 54° | 02:40 | 03:34 | 04:14 | 19:14 | 19:55 | 20:49 |
| 56° | 02:24 | 03:24 | 04:07 | 19:21 | 20:05 | 21:06 |
| 58° | 02:05 | 03:12 | 03:59 | 19:29 | 20:17 | 21:25 |
| S 60° | 01:40 | 02:58 | 03:50 | 19:39 | 20:31 | 21:51 |

| Lat. | Moonrise | | | Moonset | | |
|--------------|--------------------------|--------------------------|-------|--------------------------|--------------------------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | <input type="checkbox"/> | <input type="checkbox"/> | 21:43 | <input type="checkbox"/> | <input type="checkbox"/> | 16:26 |
| N 70° | <input type="checkbox"/> | 18:53 | 22:12 | <input type="checkbox"/> | 17:26 | 15:55 |
| 68° | <input type="checkbox"/> | 20:03 | 22:33 | <input type="checkbox"/> | 16:14 | 15:32 |
| 66° | <input type="checkbox"/> | 20:40 | 22:49 | <input type="checkbox"/> | 15:37 | 15:14 |
| 64° | 18:49 | 21:05 | 23:03 | 15:29 | 15:10 | 14:59 |
| 62° | 19:26 | 21:25 | 23:14 | 14:51 | 14:49 | 14:46 |
| 60° | 19:53 | 21:41 | 23:24 | 14:24 | 14:32 | 14:35 |
| N 58° | 20:14 | 21:55 | 23:32 | 14:02 | 14:17 | 14:26 |
| 56° | 20:31 | 22:06 | 23:39 | 13:45 | 14:05 | 14:18 |
| 54° | 20:45 | 22:17 | 23:46 | 13:30 | 13:54 | 14:10 |
| 52° | 20:57 | 22:26 | 23:51 | 13:17 | 13:44 | 14:04 |
| 50° | 21:08 | 22:34 | 23:57 | 13:05 | 13:36 | 13:58 |
| 45° | 21:31 | 22:51 | · · · | 12:41 | 13:17 | 13:45 |
| N 40° | 21:50 | 23:05 | · · · | 12:22 | 13:02 | 13:34 |
| 35° | 22:05 | 23:16 | · · · | 12:06 | 12:49 | 13:25 |
| 30° | 22:18 | 23:26 | · · · | 11:52 | 12:38 | 13:16 |
| 20° | 22:41 | 23:44 | · · · | 11:28 | 12:18 | 13:02 |
| N 10° | 23:00 | 23:59 | · · · | 11:07 | 12:01 | 12:50 |
| 0° | 23:18 | · · · | 00:13 | 10:47 | 11:45 | 12:38 |
| S 10° | 23:36 | · · · | 00:27 | 10:28 | 11:29 | 12:26 |
| 20° | 23:55 | · · · | 00:42 | 10:06 | 11:11 | 12:13 |
| 30° | · · · | 00:17 | 00:59 | 09:42 | 10:51 | 11:58 |
| 35° | · · · | 00:30 | 01:09 | 09:27 | 10:39 | 11:49 |
| 40° | 00:01 | 00:45 | 01:20 | 09:10 | 10:25 | 11:39 |
| 45° | 00:22 | 01:03 | 01:34 | 08:49 | 10:09 | 11:28 |
| S 50° | 00:49 | 01:24 | 01:50 | 08:24 | 09:49 | 11:13 |
| 52° | 01:02 | 01:35 | 01:57 | 08:11 | 09:39 | 11:07 |
| 54° | 01:16 | 01:46 | 02:05 | 07:56 | 09:28 | 10:59 |
| 56° | 01:34 | 01:59 | 02:15 | 07:40 | 09:16 | 10:51 |
| 58° | 01:55 | 02:14 | 02:25 | 07:19 | 09:01 | 10:41 |
| S 60° | 02:21 | 02:32 | 02:37 | 06:53 | 08:44 | 10:30 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|--------------|-----------|-------|------------------------|
| | Eqn.of Time | | Mer. Pass | Mer.Pass. | | Age 21-23 71-48% |
| | 00 ^h | 12 ^h | | Upper | Lower | |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | |
| 31 | 16:22 | 16:23 | 11:44 | 04:33 | 17:03 | |
| 01 | 16:25 | 16:25 | 11:44 | 05:32 | 17:59 | |
| 02 | 16:26 | 16:27 | 11:44 | 06:26 | 18:51 | |

November 03, 04, 05 UT (Tue., Wed., Thu.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|---------------------|----------|----------|--------------------|----------|----------|---------------------|---------|-----|--------------------|--------|-------------|----------|----------|--|--|
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | |
| 0 | 42°16.3 | 200°27.2 | S13°51.8 | 259°41.8 | N16°29.5 | 255°10.5 | N13°59.5 | 32°47.9 | N01°10.0 | | | | | Alpheratz | 357°33.0 | 29°14.6 | | |
| 1 | 57°18.7 | 215°30.5 | 50.8 | 274°43.0 | 29.1 | 270°12.6 | 59.4 | 47°50.5 | 10.0 | | | | | Ankaa | 353°05.3 | -42°09.6 | | |
| 2 | 72°21.2 | 230°33.8 | 49.9 | 289°44.2 | 28.8 | 285°14.8 | 59.3 | 62°53.1 | 09.9 | | | | | Schedar | 349°28.8 | 56°41.3 | | |
| 3 | 87°23.7 | 245°37.0 | · · 48.9 | 304°45.4 | · · 28.4 | 300°17.0 | · · 59.2 | 77°55.7 | · · 09.9 | | | | | Diphda | 348°45.5 | -17°50.3 | | |
| 4 | 102°26.1 | 260°40.3 | 47.9 | 319°46.6 | 28.1 | 315°19.2 | 59.1 | 92°58.3 | 09.8 | | | | | Achernar | 335°18.5 | -57°06.0 | | |
| 5 | 117°28.6 | 275°43.5 | 46.9 | 334°47.9 | 27.8 | 330°21.4 | 59.0 | 108°00.9 | 09.8 | | | | | Hamal | 327°49.2 | 23°35.5 | | |
| 6 | 132°31.0 | 290°46.8 | S13°46.0 | 349°49.1 | N16°27.4 | 345°23.5 | N13°58.9 | 123°03.5 | N01°09.7 | | | | | Polaris | 312°45.4 | 89°22.6 | | |
| 7 | 147°33.5 | 305°50.0 | 45.0 | 4°50.3 | 27.1 | 0°25.7 | 58.8 | 138°06.2 | 09.6 | | | | | Acamar | 315°10.2 | -40°11.7 | | |
| 8 | 162°36.0 | 320°53.2 | 44.0 | 19°51.5 | 26.7 | 15°27.9 | 58.8 | 153°08.8 | 09.6 | | | | | Menkar | 314°04.3 | 4°11.8 | | |
| 9 | 177°38.4 | 335°56.5 | · · 43.1 | 34°52.8 | · · 26.4 | 30°30.1 | · · 58.7 | 168°11.4 | · · 09.5 | | | | | Mirfak | 308°25.6 | 49°57.4 | | |
| 10 | 192°40.9 | 350°59.7 | 42.1 | 49°54.0 | 26.0 | 45°32.3 | 58.6 | 183°14.0 | 09.5 | | | | | Aldebaran | 290°37.6 | 16°33.9 | | |
| 11 | 207°43.4 | 6°02.9 | 41.1 | 64°55.2 | 25.7 | 60°34.4 | 58.5 | 198°16.6 | 09.4 | | | | | Rigel | 281°02.2 | -8°10.1 | | |
| 12 | 222°45.8 | 21°06.1 | S13°40.2 | 79°56.4 | N16°25.4 | 75°36.6 | N13°58.4 | 213°19.2 | N01°09.4 | | | | | Capella | 280°19.3 | 46°01.4 | | |
| 13 | 237°48.3 | 36°09.3 | 39.2 | 94°57.6 | 25.0 | 90°38.8 | 58.3 | 228°21.8 | 09.3 | | | | | Bellatrix | 278°21.0 | 6°22.5 | | |
| 14 | 252°50.8 | 51°12.6 | 38.2 | 109°58.9 | 24.7 | 105°41.0 | 58.2 | 243°24.4 | 09.3 | | | | | Elnath | 277°59.7 | 28°37.8 | | |
| 15 | 267°53.2 | 66°15.8 | · · 37.3 | 125°00.1 | · · 24.3 | 120°43.2 | · · 58.1 | 258°27.0 | · · 09.2 | | | | | Alnilam | 275°36.0 | -1°11.0 | | |
| 16 | 282°55.7 | 81°19.0 | 36.3 | 140°01.3 | 24.0 | 135°45.3 | 58.0 | 273°29.6 | 09.2 | | | | | Betelgeuse | 270°50.2 | 7°24.8 | | |
| 17 | 297°58.2 | 96°22.2 | 35.4 | 155°02.5 | 23.7 | 150°47.5 | 58.0 | 288°32.2 | 09.1 | | | | | Canopus | 263°51.4 | -52°42.3 | | |
| 18 | 313°00.6 | 111°25.4 | S13°34.4 | 170°03.8 | N16°23.3 | 165°49.7 | N13°57.9 | 303°34.8 | N01°09.1 | | | | | Sirius | 258°24.7 | -16°45.0 | | |
| 19 | 328°03.1 | 126°28.6 | 33.4 | 185°05.0 | 23.0 | 180°51.9 | 57.8 | 318°37.4 | 09.0 | | | | | Adhara | 255°04.5 | -29°00.3 | | |
| 20 | 343°05.5 | 141°31.8 | 32.5 | 200°06.2 | 22.6 | 195°54.1 | 57.7 | 333°40.0 | 09.0 | | | | | Procyon | 244°49.2 | 5°09.4 | | |
| 21 | 358°08.0 | 156°35.0 | · · 31.5 | 215°07.4 | · · 22.3 | 210°56.2 | · · 57.6 | 348°42.6 | · · 08.9 | | | | | Pollux | 243°15.4 | 27°57.6 | | |
| 22 | 13°10.5 | 171°38.1 | 30.6 | 230°08.7 | 21.9 | 225°58.4 | 57.5 | 3°45.2 | 08.9 | | | | | Avior | 234°14.0 | -59°35.4 | | |
| 23 | 28°12.9 | 186°41.3 | 29.6 | 245°09.9 | 21.6 | 241°00.6 | 57.4 | 18°47.8 | 08.8 | | | | | Suhail | 222°45.2 | -43°32.2 | | |
| Mer.pass. 21:07 | | | ν3.3' d-1.0' m-4.31 | | | ν1.2' d-0.3' m0.83 | | | ν2.2' d-0.1' m-2.02 | | | ν2.6' d-0.1' m0.47 | | | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 43°15.4 | 201°44.5 | S13°28.7 | 260°11.1 | N16°21.3 | 256°02.8 | N13°57.3 | 33°50.4 | N01°08.7 | | | | | Miaplacidus | 221°38.0 | -69°49.3 | | |
| 1 | 58°17.9 | 216°47.7 | 27.7 | 275°12.3 | 20.9 | 271°05.0 | 57.3 | 48°53.0 | 08.7 | | | | | Alphard | 217°46.3 | -8°46.4 | | |
| 2 | 73°20.3 | 231°50.8 | 26.8 | 290°13.6 | 20.6 | 286°07.2 | 57.2 | 63°55.6 | 08.6 | | | | | Regulus | 207°33.0 | 11°50.1 | | |
| 3 | 88°22.8 | 246°54.0 | · · 25.8 | 305°14.8 | · · 20.2 | 301°09.3 | · · 57.1 | 78°58.2 | · · 08.6 | | | | | Dubhe | 193°39.6 | 61°36.1 | | |
| 4 | 103°25.3 | 261°57.2 | 24.9 | 320°16.0 | 19.9 | 316°11.5 | 57.0 | 94°00.8 | 08.5 | | | | | Denebola | 182°23.7 | 14°25.3 | | |
| 5 | 118°27.7 | 277°00.3 | 23.9 | 335°17.3 | 19.6 | 331°13.7 | 56.9 | 109°03.4 | 08.5 | | | | | Gienah | 175°42.3 | -17°41.4 | | |
| 6 | 133°30.2 | 292°03.5 | S13°23.0 | 350°18.5 | N16°19.2 | 346°15.9 | N13°56.8 | 124°06.0 | N01°08.4 | | | | | Acrux | 172°59.0 | -63°14.7 | | |
| 7 | 148°32.6 | 307°06.6 | 22.0 | 5°19.7 | 18.9 | 1°18.1 | 56.7 | 139°08.6 | 08.4 | | | | | Gacrux | 171°50.5 | -57°15.6 | | |
| 8 | 163°35.1 | 322°09.8 | 21.1 | 20°21.0 | 18.5 | 16°20.3 | 56.6 | 154°11.2 | 08.3 | | | | | Alioth | 166°12.2 | 55°48.7 | | |
| 9 | 178°37.6 | 337°12.9 | · · 20.2 | 35°22.2 | · · 18.2 | 31°22.5 | · · 56.6 | 169°13.9 | · · 08.3 | | | | | Spica | 158°21.0 | -11°18.0 | | |
| 10 | 193°40.0 | 352°16.1 | 19.2 | 50°23.4 | 17.8 | 46°24.6 | 56.5 | 184°16.5 | 08.2 | | | | | Alkaid | 152°51.3 | 49°10.7 | | |
| 11 | 208°42.5 | 7°19.2 | 18.3 | 65°24.6 | 17.5 | 61°26.8 | 56.4 | 199°19.1 | 08.2 | | | | | Hadar | 148°34.5 | -60°30.1 | | |
| 12 | 223°45.0 | 22°22.3 | S13°17.3 | 80°25.9 | N16°17.2 | 76°29.0 | N13°56.3 | 214°21.7 | N01°08.1 | | | | | Menkent | 147°56.3 | -36°30.0 | | |
| 13 | 238°47.4 | 37°25.5 | 16.4 | 95°27.1 | 16.8 | 91°31.2 | 56.2 | 229°24.3 | 08.1 | | | | | Arcturus | 145°46.9 | 19°02.6 | | |
| 14 | 253°49.9 | 52°28.6 | 15.5 | 110°28.3 | 16.5 | 106°33.4 | 56.1 | 244°26.9 | 08.0 | | | | | Rigel Kent. | 139°38.9 | -60°56.7 | | |
| 15 | 268°52.4 | 67°31.7 | · · 14.5 | 125°29.6 | · · 16.1 | 121°35.6 | · · 56.0 | 259°29.5 | · · 08.0 | | | | | Kochab | 137°21.0 | 74°02.6 | | |
| 16 | 283°54.8 | 82°34.8 | 13.6 | 140°30.8 | 15.8 | 136°37.8 | 56.0 | 274°32.1 | 07.9 | | | | | Zuben'ubi | 136°54.7 | -16°09.1 | | |
| 17 | 298°57.3 | 97°37.9 | 12.7 | 155°32.0 | 15.5 | 151°40.0 | 55.9 | 289°34.7 | 07.9 | | | | | Alphecca | 126°02.8 | 26°37.5 | | |
| 18 | 313°59.8 | 112°41.1 | S13°11.7 | 170°33.3 | N16°15.1 | 166°42.1 | N13°55.8 | 304°37.3 | N01°07.8 | | | | | Antares | 112°14.3 | -26°29.5 | | |
| 19 | 329°02.2 | 127°44.2 | 10.8 | 185°34.5 | 14.8 | 181°44.3 | 55.7 | 319°39.9 | 07.8 | | | | | Atria | 107°07.7 | -69°04.6 | | |
| 20 | 344°04.7 | 142°47.3 | 09.9 | 200°35.8 | 14.4 | 196°46.5 | 55.6 | 334°42.5 | 07.7 | | | | | Sabik | 102°01.4 | -15°45.4 | | |
| 21 | 359°07.1 | 157°50.4 | · · 09.0 | 215°37.0 | · · 14.1 | 211°48.7 | · · 55.5 | 349°45.1 | · · 07.7 | | | | | Shaula | 96°08.7 | -37°07.4 | | |
| 22 | 14°09.6 | 172°53.5 | 08.0 | 230°38.2 | 13.8 | 226°50.9 | 55.4 | 4°47.7 | 07.6 | | | | | Rasalhague | 95°57.4 | 12°32.6 | | |
| 23 | 29°12.1 | 187°56.6 | 07.1 | 245°39.5 | 13.4 | 241°53.1 | 55.4 | 19°50.3 | 07.6 | | | | | Eltanin | 90°41.9 | 51°29.3 | | |
| Mer.pass. 21:04 | | | ν3.2' d-1.0' m-4.38 | | | ν1.2' d-0.3' m0.82 | | | ν2.2' d-0.1' m-2.02 | | | ν2.6' d-0.1' m0.48 | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | |
| 0 | 44°14.5 | 202°59.6 | S13°06.2 | 260°40.7 | N16°13.1 | 256°55.3 | N13°55.3 | 34°52.9 | N01°07.5 | | | | | Kaus Aust. | 83°30.8 | -34°22.3 | | |
| 1 | 59°17.0 | 218°02.7 | 05.3 | 275°41.9 | 12.7 | 271°57.5 | 55.2 | 49°55.5 | 07.4 | | | | | Vega | 80°32.5 | 38°48.7 | | |
| 2 | 74°19.5 | 233°05.8 | 04.3 | 290°43.2 | 12.4 | 286°59.6 | 55.1 | 64°58.1 | 07.4 | | | | | Nunki | 75°46.1 | -26°15.8 | | |
| 3 | 89°21.9 | 248°08.9 | · · 03.4 | 305°44.4 | · · 12.0 | 302°01.8 | · · 55.0 | 80°00.7 | · · 07.3 | | | | | Altair | 61°58.6 | 8°56.5 | | |
| 4 | 104°24.4 | 263°12.0 | 02.5 | 320°45.7 | 11.7 | 317°04.0 | 54.9 | 95°03.3 | 07.3 | | | | | Peacock | 53°03.5 | -56°39.1 | | |
| 5 | 119°26.9 | 278°15.0 | 01.6 | 335°46.9 | 11.4 | 332°06.2 | 54.8 | 110°05.9 | 07.2 | | | | | Deneb | 49°24.8 | 45°22.9 | | |
| 6 | 134°29.3 | 293°18.1 | S13°00.7 | 350°48.1 | N16°11.0 | 347°08.4 | N13°54.8 | 125°08.5 | N01°07.2 | | | | | Enif | 33°37.3 | 10°00.1 | | |
| 7 | 149°31.8 | 308°21.1 | 12°59.8 | 5°49.4 | 10.7 | 2°10.6 | 54.8 | 140°11.1 | 07.1 | | | | | Al Na'ir | 27°30.9 | -46°50.0 | | |
| 8 | 164°34.3 | 323°24.2 | 58.9 | 20°50.6 | 10.3 | 17°12.8 | 54.6 | 155°13.7 | 07.1 | | | | | Fomalhaut | 15°12.7 | -29°28.8 | | |
| 9 | 179°36.7 | 338°27.3 | · · 58.0 | 35°51.9 | · · 10.0 | 32°15.0 | · · 54.5 | 170°16.3 | · · 07.0 | | | | | Scheat | 13°43.6 | 28°14.0 | | |
| 10 | 194°39.2 | 353°30.3 | 57.0 | 50°53.1 | 09.7 | 47°17.2 | 54.4 | 185°18.9 | 07.0 | | | | | Markab | 13°28.2 | 15°21.2 | | |
| 11 | 209°41.6 | 8°33.4 | 56.1 | 65°54.3 | 09.3 | 62°19.4 | 54.3 | 200°21.5 | 06.9 | | | | | | | | | |
| 12 | 224°44.1 | 23°36.4 | S12°55.2 | 80°55.6 | N16°09.0 | 77°21.6 | N13°54.3 | 215°24.1 | N01°06.9 | | | | | | | | | |
| 13 | 239°46.6 | 38°39.4 | 54.3 | 95°56.8 | 08.6 | 92°23.8 | 54.2 | 230°26.7 | 06.8 | | | | | | | | | |
| 14 | 254°49.0 | 53°42.5 | 53.4 | 110°58.1 | 08.3 | 107°25.9 | 54.1 | 245°29.3 | 06.8 | | | | | | | | | |
| 15 | 269°51.5 | 68°45.5 | · · 52.5 | 125°59.3 | · · 08.0 | 122°28.1 | · · 54.0 | 260°31.9 | · · 06.7 | | | | | | | | | |
| 16 | 284°54.0 | 83°48.5 | 51.6 | 141°00.6 | 07.6 | 137°30.3 | 53.9 | 275°34.5 | 06.7 | | | | | | | | | |
| 17 | 299°56.4 | 98°51.6 | 50.7 | 156°01.8 | 07.3 | 152°32.5 | 53.8 | 290°37.1 | 06.6 | | | | | | | | | |
| 18 | 314°58.9 | 113°54.6 | S12°49.8 | 171°03.1 | N16°06.9 | 167°34.7 | N13°53.7 | 305°39.7 | N01°06.6 | | | | | | | | | |
| 19 | 330°01.4 | 128°57.6 | 48.9 | 186°04.3 | 06.6 | 182°36.9 | 53.7 | 320°42.3 | 06.5 | | | | | | | | | |
| 20 | 345°03.8 | 144°00.6 | 48.0 | 201°05.5 | 06.3 | 197°39.1 | 53.6 | 335°44.9 | 06.5 | | | | | | | | | |
| 21 | 0°06.3 | 159°03.6 | · · 47.1 | 216°06.8 | · · 05.9 | 212°41.3 | · · 53.5 | 350°47.5 | · · 06.4 | | | | | | | | | |
| 22 | 15°08.7 | 174°06.6 | 46.2 | 231°08.0 | 05.6 | 227°43.5 | 53.4 | 5°50.1 | 06.4 | | | | | | | | | |
| 23 | 30°11.2 | 189°09.6 | 45.4 | 246°09.3 | 05.2 | 242°45.7 | 53.3 | 20°52.7 | 06.3 | | | | | | | | | |
| Mer.pass. 21:00 | | | ν3.1' d-0.9' m-4.44 | | | ν1.2' d-0.3' m0.81 | | | ν2.2' d-0.1' m-2.03 | | | ν2.6' d-0.1' m0.48 | | | | | | |

| Nov 03 Tue | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 158°11.0 | 10:36 |
| Mars | 217°25.5 | 06:41 |
| Jupiter | 212°54.2 | 06:58 |
| Saturn | 350°31.7 | 21:45 |

| Nov 04 Wed | SHA | Mer.pass |
|------------|-----|----------|
| Venus | 1 | |

| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|----------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| Tue | | | | | | | | |
| 0 | 184°06.7 | S14°59.7 | | 254°43.8 | 11.6' | N13°15.6 | -14.3' | 58.2' |
| 1 | 199°06.7 | 15°00.5 | | 269°14.4 | 11.7' | 13°01.3 | -14.3' | 58.1' |
| 2 | 214°06.7 | 01.3 | | 283°45.1 | 11.8' | 12°47.0 | -14.4' | 58.1' |
| 3 | 229°06.7 | · · 02.0 | | 298°15.9 | 11.8' | 12°32.6 | -14.4' | 58.1' |
| 4 | 244°06.7 | 02.8 | | 312°46.7 | 11.9' | 12°18.1 | -14.5' | 58.1' |
| 5 | 259°06.7 | 03.6 | | 327°17.6 | 12.0' | 12°03.6 | -14.5' | 58.1' |
| 6 | 274°06.7 | S15°04.4 | | 341°48.7 | 12.1' | N11°49.1 | -14.6' | 58.0' |
| 7 | 289°06.7 | 05.2 | | 356°19.7 | 12.2' | 11°34.5 | -14.6' | 58.0' |
| 8 | 304°06.7 | 05.9 | | 10°50.9 | 12.2' | 11°19.9 | -14.7' | 58.0' |
| 9 | 319°06.7 | · · 06.7 | | 25°22.1 | 12.3' | 11°05.2 | -14.7' | 58.0' |
| 10 | 334°06.7 | 07.5 | | 39°53.4 | 12.4' | 10°50.4 | -14.8' | 57.9' |
| 11 | 349°06.7 | 08.3 | | 54°24.8 | 12.5' | 10°35.7 | -14.8' | 57.9' |
| 12 | 4°06.7 | S15°09.1 | | 68°56.3 | 12.5' | N10°20.9 | -14.8' | 57.9' |
| 13 | 19°06.7 | 09.8 | | 83°27.8 | 12.6' | 10°06.0 | -14.9' | 57.9' |
| 14 | 34°06.7 | 10.6 | | 97°59.4 | 12.7' | 09°51.2 | -14.9' | 57.9' |
| 15 | 49°06.7 | · · 11.4 | | 112°31.1 | 12.7' | 09°36.2 | -14.9' | 57.8' |
| 16 | 64°06.7 | 12.2 | | 127°02.8 | 12.8' | 09°21.3 | -15.0' | 57.8' |
| 17 | 79°06.7 | 12.9 | | 141°34.6 | 12.9' | 09°06.3 | -15.0' | 57.8' |
| 18 | 94°06.7 | S15°13.7 | | 156°06.5 | 12.9' | N08°51.3 | -15.0' | 57.8' |
| 19 | 109°06.7 | 14.5 | | 170°38.4 | 13.0' | 08°36.3 | -15.1' | 57.7' |
| 20 | 124°06.7 | 15.3 | | 185°10.4 | 13.1' | 08°21.2 | -15.1' | 57.7' |
| 21 | 139°06.7 | · · 16.0 | | 199°42.5 | 13.1' | 08°06.1 | -15.1' | 57.7' |
| 22 | 154°06.7 | 16.8 | | 214°14.6 | 13.2' | 07°51.0 | -15.2' | 57.7' |
| 23 | 169°06.7 | 17.6 | | 228°46.8 | 13.2' | 07°35.8 | -15.2' | 57.7' |
| SD = 16.1' $d = 0.8'$ | | | | | | | | |
| SD = 15.9' | | | | | | | | |

| Wed | GHA | Dec | | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|--|----------|-------|----------|--------|-------|
| 0 | 184°06.7 | S15°18.4 | | 243°19.0 | 13.3' | N07°20.6 | -15.2' | 57.6' |
| 1 | 199°06.7 | 19.1 | | 257°51.3 | 13.3' | 07°05.4 | -15.2' | 57.6' |
| 2 | 214°06.7 | 19.9 | | 272°23.6 | 13.4' | 06°50.2 | -15.2' | 57.6' |
| 3 | 229°06.6 | · · 20.7 | | 286°56.0 | 13.4' | 06°35.0 | -15.3' | 57.6' |
| 4 | 244°06.6 | 21.4 | | 301°28.4 | 13.5' | 06°19.7 | -15.3' | 57.5' |
| 5 | 259°06.6 | 22.2 | | 316°00.9 | 13.5' | 06°04.4 | -15.3' | 57.5' |
| 6 | 274°06.6 | S15°23.0 | | 330°33.5 | 13.6' | N05°49.1 | -15.3' | 57.5' |
| 7 | 289°06.6 | 23.8 | | 345°06.1 | 13.6' | 05°33.8 | -15.3' | 57.5' |
| 8 | 304°06.6 | 24.5 | | 359°38.7 | 13.7' | 05°18.5 | -15.3' | 57.5' |
| 9 | 319°06.6 | · · 25.3 | | 14°11.4 | 13.7' | 05°03.2 | -15.3' | 57.4' |
| 10 | 334°06.6 | 26.1 | | 28°44.1 | 13.8' | 04°47.8 | -15.4' | 57.4' |
| 11 | 349°06.6 | 26.8 | | 43°16.9 | 13.8' | 04°32.5 | -15.4' | 57.4' |
| 12 | 4°06.6 | S15°27.6 | | 57°49.7 | 13.9' | N04°17.1 | -15.4' | 57.4' |
| 13 | 19°06.6 | 28.4 | | 72°22.6 | 13.9' | 04°01.7 | -15.4' | 57.3' |
| 14 | 34°06.5 | 29.1 | | 86°55.5 | 13.9' | 03°46.3 | -15.4' | 57.3' |
| 15 | 49°06.5 | · · 29.9 | | 101°28.4 | 14.0' | 03°30.9 | -15.4' | 57.3' |
| 16 | 64°06.5 | 30.7 | | 116°01.4 | 14.0' | 03°15.5 | -15.4' | 57.3' |
| 17 | 79°06.5 | 31.4 | | 130°34.4 | 14.0' | 03°00.2 | -15.4' | 57.3' |
| 18 | 94°06.5 | S15°32.2 | | 145°07.4 | 14.1' | N02°44.8 | -15.4' | 57.2' |
| 19 | 109°06.5 | 33.0 | | 159°40.5 | 14.1' | 02°29.4 | -15.4' | 57.2' |
| 20 | 124°06.5 | 33.7 | | 174°13.6 | 14.1' | 02°14.0 | -15.4' | 57.2' |
| 21 | 139°06.5 | · · 34.5 | | 188°46.7 | 14.2' | 01°58.6 | -15.4' | 57.2' |
| 22 | 154°06.4 | 35.3 | | 203°19.9 | 14.2' | 01°43.2 | -15.4' | 57.1' |
| 23 | 169°06.4 | 36.0 | | 217°53.0 | 14.2' | 01°27.8 | -15.4' | 57.1' |
| SD = 16.1' $d = 0.8'$ | | | | | | | | |
| SD = 15.7' | | | | | | | | |

| Thu | GHA | Dec | | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|--|----------|-------|----------|--------|-------|
| 0 | 184°06.4 | S15°36.8 | | 232°26.3 | 14.2' | N01°12.4 | -15.4' | 57.1' |
| 1 | 199°06.4 | 37.5 | | 246°59.5 | 14.3' | 00°57.0 | -15.4' | 57.1' |
| 2 | 214°06.4 | 38.3 | | 261°32.8 | 14.3' | 00°41.6 | -15.4' | 57.1' |
| 3 | 229°06.4 | · · 39.1 | | 276°06.0 | 14.3' | 00°26.2 | -15.4' | 57.0' |
| 4 | 244°06.4 | 39.8 | | 290°39.4 | 14.3' | N00°10.9 | -15.4' | 57.0' |
| 5 | 259°06.3 | 40.6 | | 305°12.7 | 14.3' | S00°04.5 | 15.3' | 57.0' |
| 6 | 274°06.3 | S15°41.3 | | 319°46.0 | 14.4' | S00°19.8 | 15.3' | 57.0' |
| 7 | 289°06.3 | 42.1 | | 334°19.4 | 14.4' | 00°35.1 | 15.3' | 56.9' |
| 8 | 304°06.3 | 42.9 | | 348°52.8 | 14.4' | 00°50.4 | 15.3' | 56.9' |
| 9 | 319°06.3 | · · 43.6 | | 3°26.2 | 14.4' | 01°05.7 | 15.3' | 56.9' |
| 10 | 334°06.3 | 44.4 | | 17°59.6 | 14.4' | 01°21.0 | 15.3' | 56.9' |
| 11 | 349°06.2 | 45.1 | | 32°33.0 | 14.4' | 01°36.3 | 15.3' | 56.9' |
| 12 | 4°06.2 | S15°45.9 | | 47°06.5 | 14.4' | S01°51.6 | 15.2' | 56.8' |
| 13 | 19°06.2 | 46.6 | | 61°39.9 | 14.5' | 02°06.8 | 15.2' | 56.8' |
| 14 | 34°06.2 | 47.4 | | 76°13.4 | 14.5' | 02°22.0 | 15.2' | 56.8' |
| 15 | 49°06.2 | · · 48.2 | | 90°46.8 | 14.5' | 02°37.2 | 15.2' | 56.8' |
| 16 | 64°06.1 | 48.9 | | 105°20.3 | 14.5' | 02°52.4 | 15.1' | 56.8' |
| 17 | 79°06.1 | 49.7 | | 119°53.8 | 14.5' | 03°07.5 | 15.1' | 56.7' |
| 18 | 94°06.1 | S15°50.4 | | 134°27.3 | 14.5' | S03°22.6 | 15.1' | 56.7' |
| 19 | 109°06.1 | 51.2 | | 149°00.8 | 14.5' | 03°37.7 | 15.1' | 56.7' |
| 20 | 124°06.1 | 51.9 | | 163°34.3 | 14.5' | 03°52.8 | 15.0' | 56.7' |
| 21 | 139°06.0 | · · 52.7 | | 178°07.7 | 14.5' | 04°07.9 | 15.0' | 56.6' |
| 22 | 154°06.0 | 53.4 | | 192°41.2 | 14.5' | 04°22.9 | 15.0' | 56.6' |
| 23 | 169°06.0 | 54.2 | | 207°14.7 | 14.5' | 04°37.9 | 15.0' | 56.6' |
| SD = 16.1' $d = 0.8'$ | | | | | | | | |
| SD = 15.6' | | | | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 06:18 | 07:43 | 09:16 | 14:09 | 15:43 | 17:07 |
| N 70° | 06:12 | 07:28 | 08:46 | 14:40 | 15:58 | 17:13 |
| 68° | 06:08 | 07:16 | 08:23 | 15:03 | 16:10 | 17:18 |
| 66° | 06:04 | 07:06 | 08:06 | 15:20 | 16:20 | 17:22 |
| 64° | 06:00 | 06:58 | 07:52 | 15:34 | 16:28 | 17:26 |
| 62° | 05:57 | 06:50 | 07:40 | 15:46 | 16:36 | 17:29 |
| 60° | 05:54 | 06:44 | 07:30 | 15:56 | 16:42 | 17:32 |
| N 58° | 05:51 | 06:38 | 07:21 | 16:05 | 16:48 | 17:35 |
| 56° | 05:49 | 06:33 | 07:13 | 16:13 | 16:53 | 17:38 |
| 54° | 05:46 | 06:28 | 07:06 | 16:20 | 16:58 | 17:40 |
| 52° | 05:44 | 06:24 | 07:00 | 16:26 | 17:02 | 17:42 |
| 50° | 05:42 | 06:20 | 06:55 | 16:32 | 17:06 | 17:45 |
| 45° | 05:37 | 06:12 | 06:42 | 16:44 | 17:15 | 17:50 |
| N 40° | 05:32 | 06:04 | 06:32 | 16:54 | 17:23 | 17:55 |
| 35° | 05:27 | 05:57 | 06:24 | 17:03 | 17:29 | 17:59 |
| 30° | 05:23 | 05:51 | 06:16 | 17:11 | 17:35 | 18:04 |
| 20° | 05:14 | 05:40 | 06:03 | 17:24 | 17:47 | 18:13 |
| N 10° | 05:04 | 05:29 | 05:51 | 17:36 | 17:58 | 18:23 |
| 0° | 04:54 | 05:19 | 05:40 | 17:47 | 18:08 | 18:33 |
| S 10° | 04:42 | 05:07 | 05:29 | 17:58 | 18:20 | 18:46 |
| 20° | 04:27 | 04:54 | 05:17 | 18:10 | 18:34 | 19:01 |
| 30° | 04:07 | 04:38 | 05:03 | 18:25 | 18:50 | 19:20 |
| 35° | 03:55 | 04:28 | 04:55 | 18:33 | 19:00 | 19:33 |
| 40° | 03:40 | 04:16 | 04:46 | 18:42 | 19:12 | 19:48 |
| 45° | 03:22 | 04:02 | 04:35 | 18:53 | 19:26 | 20:06 |
| S 50° | 02:58 | 03:45 | 04:21 | 19:07 | 19:44 | 20:31 |
| 52° | 02:45 | 03:36 | 04:15 | 19:13 | 19:52 | 20:44 |
| 54° | 02:31 | 03:27 | 04:08 | 19:20 | 20:02 | 20:58 |
| 56° | 02:14 | 03:16 | 04:01 | 19:28 | 20:13 | 21:16 |
| 58° | 01:53 | 03:03 | 03:52 | 19:37 | 20:26 | 21:38 |
| S 60° | 01:24 | 02:48 | 03:42 | 19:47 | 20:41 | 22:08 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | · · · | 00:17 | 02:29 | 15:32 | 14:56 | 14:24 |
| N 70° | · · · | 00:28 | 02:30 | 15:19 | 14:52 | 14:27 |
| 68° | · · · | 00:37 | 02:30 | 15:07 | 14:48 | 14:30 |
| 66° | · · · | 00:44 | 02:31 | 14:58 | 14:45 | 14:32 |
| 64° | · · · | 00:50 | 02:31 | 14:50 | 14:42 | 14:34 |
| 62° | · · · | 00:55 | 02:32 | 14:43 | 14:40 | 14:36 |
| 60° | · · · | 01:00 | 02:32 | 14:37 | 14:38 | 14:38 |
| N 58° | · · · | 01:04 | 02:32 | 14:32 | 14:36 | 14:39 |
| 56° | · · · | 01:07 | 02:32 | 14:27 | 14:34 | 14:40 |
| 54° | · · · | 01:11 | 02:33 | 14:23 | 14:32 | 14:42 |
| 52° | · · · | 01:14 | 02:33 | 14:19 | 14:31 | 14:43 |
| 50° | · · · | 01:16 | 02:33 | 14:15 | 14:30 | 14:43 |
| 45° | 00:08 | 01:22 | 02:33 | 14:07 | 14:27 | 14:46 |
| N 40° | 00:17 | 01:27 | 02:34 | 14:01 | 14:25 | 14:47 |
| 35° | 00:25 | 01:31 | 02:34 | 13:55 | 14:23 | 14:49 |
| 30° | 00:32 | 01:34 | 02:34 | 13:50 | 14:21 | 14:50 |
| 20° | 00:44 | 01:40 | 02:35 | 13:41 | 14:18 | 14:52 |
| N 10° | 00:54 | 01:46 | 02:35 | 13:34 | 14:15 | 14:54 |
| 0° | 01:04 | 01:51 | 02:35 | 13:26 | 14:12 | 14:56 |
| S 10° | 01:13 | 01:56 | 02:36 | 13:19 | 14:09 | 14:58 |
| 20° | 01:24 | 02:01 | 02:36 | 13:11 | 14:06 | 15:00 |
| 30° | 01:35 | 02:07 | 02:37 | 13:02 | 14:03 | 15:02 |
| 35° | 01:42 | 02:11 | 02:37 | 12:57 | 14:01 | 15:04 |
| 40° | 01:49 | 02:14 | 02:37 | 12:51 | 13:59 | 15:05 |
| 45° | 01:58 | 02:19 | 02:38 | 12:44 | 13:56 | 15:07 |
| S 50° | 02:09 | 02:24 | 02:38 | 12:35 | 13:53 | 15:09 |
| 52° | 02:14 | 02:27 | 02:38 | 12:31 | 13:52 | 15:10 |
| 54° | 02:19 | 02:30 | 02:39 | 12:27 | 13:50 | 15:11 |
| 56° | 02:25 | 02:32 | 02:39 | 12:22 | 13:48 | 15:12 |
| 58° | 02:31 | 02:36 | 02:39 | 12:16 | 13:46 | 15:14 |
| S 60° | 02:39 | 02:39 | 02:40 | 12:10 | 13:44 | 15:15 |

November 06, 07, 08 UT (Fri., Sat., Sun.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|--|
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | |
| 0 | 45°13.7 | 204°12.6 | S12°44.5 | 261°10.5 | N16°04.9 | 257°47.9 | N13°53.2 | 35°55.3 | N01°06.3 | |
| 1 | 60°16.1 | 219°15.6 | 43.6 | 276°11.8 | 04.6 | 272°50.1 | 53.2 | 50°57.9 | 06.2 | |
| 2 | 75°18.6 | 234°18.6 | 42.7 | 291°13.0 | 04.2 | 287°52.3 | 53.1 | 66°00.4 | 06.2 | |
| 3 | 90°21.1 | 249°21.6 | · · 41.8 | 306°14.3 | · · 03.9 | 302°54.5 | · · 53.0 | 81°03.0 | · · 06.1 | |
| 4 | 105°23.5 | 264°24.6 | 40.9 | 321°15.5 | 03.5 | 317°56.7 | 52.9 | 96°05.6 | 06.1 | |
| 5 | 120°26.0 | 279°27.5 | 40.1 | 336°16.8 | 03.2 | 332°58.9 | 52.8 | 111°08.2 | 06.0 | |
| 6 | 135°28.5 | 294°30.5 | S12°39.2 | 351°18.0 | N16°02.9 | 348°01.1 | N13°52.7 | 126°10.8 | N01°06.0 | |
| 7 | 150°30.9 | 309°33.5 | 38.3 | 6°19.3 | 02.5 | 3°03.3 | 52.7 | 141°13.4 | 05.9 | |
| 8 | 165°33.4 | 324°36.4 | 37.4 | 21°20.5 | 02.2 | 18°05.5 | 52.6 | 156°16.0 | 05.9 | |
| 9 | 180°35.9 | 339°39.4 | · · 36.5 | 36°21.8 | · · 01.8 | 33°07.7 | · · 52.5 | 171°18.6 | · · 05.8 | |
| 10 | 195°38.3 | 354°42.4 | 35.7 | 51°23.0 | 01.5 | 48°09.9 | 52.4 | 186°21.2 | 05.8 | |
| 11 | 210°40.8 | 9°45.3 | 34.8 | 66°24.3 | 01.2 | 63°12.0 | 52.3 | 201°23.8 | 05.7 | |
| 12 | 225°43.2 | 24°48.3 | S12°33.9 | 81°25.5 | N16°00.8 | 78°14.2 | N13°52.2 | 216°26.4 | N01°05.7 | |
| 13 | 240°45.7 | 39°51.2 | 33.1 | 96°26.8 | 00.5 | 93°16.4 | 52.2 | 231°29.0 | 05.6 | |
| 14 | 255°48.2 | 54°54.1 | 32.2 | 111°28.0 | 16°00.1 | 108°18.6 | 52.1 | 246°31.6 | 05.6 | |
| 15 | 270°50.6 | 69°57.1 | · · 31.3 | 126°29.3 | 15°59.8 | 123°20.8 | · · 52.0 | 261°34.2 | · · 05.5 | |
| 16 | 285°53.1 | 85°00.0 | 30.5 | 141°30.6 | 59.5 | 138°23.0 | 51.9 | 276°36.8 | 05.5 | |
| 17 | 300°55.6 | 100°03.0 | 29.6 | 156°31.8 | 59.1 | 153°25.2 | 51.8 | 291°39.4 | 05.4 | |
| 18 | 315°58.0 | 115°05.9 | S12°28.7 | 171°33.1 | N15°58.8 | 168°27.4 | N13°51.8 | 306°42.0 | N01°05.4 | |
| 19 | 331°00.5 | 130°08.8 | 27.9 | 186°34.3 | 58.4 | 183°29.6 | 51.7 | 321°44.6 | 05.4 | |
| 20 | 346°03.0 | 145°11.7 | 27.0 | 201°35.6 | 58.1 | 198°31.8 | 51.6 | 336°47.2 | 05.3 | |
| 21 | 1°05.4 | 160°14.6 | · · 26.2 | 216°36.8 | · · 57.8 | 213°34.0 | · · 51.5 | 351°49.8 | · · 05.3 | |
| 22 | 16°07.9 | 175°17.5 | 25.3 | 231°38.1 | 57.4 | 228°36.2 | 51.4 | 6°52.4 | 05.2 | |
| 23 | 31°10.3 | 190°20.5 | 24.5 | 246°39.4 | 57.1 | 243°38.4 | 51.3 | 21°55.0 | 05.2 | |
| Mer.pass. 20:56 | | ν3.0' d-0.9' m-4.50 | | ν1.2' d-0.3' m0.80 | | ν2.2' d-0.1' m-2.03 | | ν2.6' d-0.0' m0.48 | | |

| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| 0 | 46°12.8 | 205°23.4 | S12°23.6 | 261°40.6 | N15°56.7 | 258°40.6 | N13°51.3 | 36°57.6 | N01°05.1 |
| 1 | 61°15.3 | 220°26.3 | 22.7 | 276°41.9 | 56.4 | 273°42.8 | 51.2 | 52°00.2 | 05.1 |
| 2 | 76°17.7 | 235°29.2 | 21.9 | 291°43.1 | 56.1 | 288°45.1 | 51.1 | 67°02.8 | 05.0 |
| 3 | 91°20.2 | 250°32.0 | · · 21.1 | 306°44.4 | · · 55.7 | 303°47.3 | · · 51.0 | 82°05.4 | · · 05.0 |
| 4 | 106°22.7 | 265°34.9 | 20.2 | 321°45.6 | 55.4 | 318°49.5 | 50.9 | 97°07.9 | 04.9 |
| 5 | 121°25.1 | 280°37.8 | 19.4 | 336°46.9 | 55.0 | 333°51.7 | 50.9 | 112°10.5 | 04.9 |
| 6 | 136°27.6 | 295°40.7 | S12°18.5 | 351°48.2 | N15°54.7 | 348°53.9 | N13°50.8 | 127°13.1 | N01°04.8 |
| 7 | 151°30.1 | 310°43.6 | 17.7 | 6°49.4 | 54.4 | 3°56.1 | 50.7 | 142°15.7 | 04.8 |
| 8 | 166°32.5 | 325°46.4 | 16.8 | 21°50.7 | 54.0 | 18°58.3 | 50.6 | 157°18.3 | 04.7 |
| 9 | 181°35.0 | 340°49.3 | · · 16.0 | 36°52.0 | · · 53.7 | 34°00.5 | · · 50.5 | 172°20.9 | · · 04.7 |
| 10 | 196°37.5 | 355°52.2 | 15.2 | 51°53.2 | 53.4 | 49°02.7 | 50.5 | 187°23.5 | 04.6 |
| 11 | 211°39.9 | 10°55.0 | 14.3 | 66°54.5 | 53.0 | 64°04.9 | 50.4 | 202°26.1 | 04.6 |
| 12 | 226°42.4 | 25°57.9 | S12°13.5 | 81°55.7 | N15°52.7 | 79°07.1 | N13°50.3 | 217°28.7 | N01°04.5 |
| 13 | 241°44.8 | 41°00.7 | 12.7 | 96°57.0 | 52.3 | 94°09.3 | 50.2 | 232°31.3 | 04.5 |
| 14 | 256°47.3 | 56°03.6 | 11.8 | 111°58.3 | 52.0 | 109°11.5 | 50.1 | 247°33.9 | 04.4 |
| 15 | 271°49.8 | 71°06.4 | · · 11.0 | 126°59.5 | · · 51.7 | 124°13.7 | · · 50.1 | 262°36.5 | · · 04.4 |
| 16 | 286°52.2 | 86°09.3 | 10.2 | 142°00.8 | 51.3 | 139°15.9 | 50.0 | 277°39.1 | 04.3 |
| 17 | 301°54.7 | 101°12.1 | 09.4 | 157°02.1 | 51.0 | 154°18.1 | 49.9 | 292°41.7 | 04.3 |
| 18 | 316°57.2 | 116°14.9 | S12°08.5 | 172°03.3 | N15°50.6 | 169°20.3 | N13°49.8 | 307°44.3 | N01°04.2 |
| 19 | 331°59.6 | 131°17.8 | 07.7 | 187°04.6 | 50.3 | 184°22.5 | 49.7 | 322°46.8 | 04.2 |
| 20 | 347°02.1 | 146°20.6 | 06.9 | 202°05.9 | 50.0 | 199°24.7 | 49.7 | 337°49.4 | 04.2 |
| 21 | 2°04.6 | 161°23.4 | · · 06.1 | 217°07.1 | · · 49.6 | 214°26.9 | · · 49.6 | 352°52.0 | · · 04.1 |
| 22 | 17°07.0 | 176°26.2 | 05.3 | 232°08.4 | 49.3 | 229°29.1 | 49.5 | 7°54.6 | 04.1 |
| 23 | 32°09.5 | 191°29.0 | 04.5 | 247°09.7 | 49.0 | 244°31.3 | 49.4 | 22°57.2 | 04.0 |
| Mer.pass. 20:52 | | ν2.9' d-0.9' m-4.55 | | ν1.3' d-0.3' m0.79 | | ν2.2' d-0.1' m-2.04 | | ν2.6' d-0.0' m0.49 | |

| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| 0 | 47°12.0 | 206°31.9 | S12°03.6 | 262°10.9 | N15°48.6 | 259°33.6 | N13°49.3 | 37°59.8 | N01°04.0 |
| 1 | 62°14.4 | 221°34.7 | 02.8 | 277°12.2 | 48.3 | 274°35.8 | 49.3 | 53°02.4 | 03.9 |
| 2 | 77°16.9 | 236°37.5 | 02.0 | 292°13.5 | 47.9 | 289°38.0 | 49.2 | 68°05.0 | 03.9 |
| 3 | 92°19.3 | 251°40.3 | · · 01.2 | 307°14.7 | · · 47.6 | 304°40.2 | · · 49.1 | 83°07.6 | · · 03.8 |
| 4 | 107°21.8 | 266°43.0 | 12°00.4 | 322°16.0 | 47.3 | 319°42.4 | 49.0 | 98°10.2 | 03.8 |
| 5 | 122°24.3 | 281°45.8 | 11°59.6 | 337°17.3 | 46.9 | 334°44.6 | 48.9 | 113°12.8 | 03.7 |
| 6 | 137°26.7 | 296°48.6 | S11°58.8 | 352°18.6 | N15°46.6 | 349°46.8 | N13°48.9 | 128°15.4 | N01°03.7 |
| 7 | 152°29.2 | 311°51.4 | 58.0 | 7°19.8 | 46.2 | 4°49.0 | 48.8 | 143°18.0 | 03.6 |
| 8 | 167°31.7 | 326°54.2 | 57.2 | 22°21.1 | 45.9 | 19°51.2 | 48.7 | 158°20.5 | 03.6 |
| 9 | 182°34.1 | 341°57.0 | · · 56.4 | 37°22.4 | · · 45.6 | 34°53.4 | · · 48.6 | 173°23.1 | · · 03.5 |
| 10 | 197°36.6 | 356°59.7 | 55.6 | 52°23.7 | 45.2 | 49°55.6 | 48.5 | 188°25.7 | 03.5 |
| 11 | 212°39.1 | 12°02.5 | 54.8 | 67°24.9 | 44.9 | 64°57.9 | 48.5 | 203°28.3 | 03.4 |
| 12 | 227°41.5 | 27°05.3 | S11°54.0 | 82°26.2 | N15°44.6 | 80°00.1 | N13°48.4 | 218°30.9 | N01°03.4 |
| 13 | 242°44.0 | 42°08.0 | 53.2 | 97°27.5 | 44.2 | 95°02.3 | 48.3 | 233°33.5 | 03.4 |
| 14 | 257°46.4 | 57°10.8 | 52.5 | 112°28.7 | 43.9 | 110°04.5 | 48.2 | 248°36.1 | 03.3 |
| 15 | 272°48.9 | 72°13.5 | · · 51.7 | 127°30.0 | · · 43.5 | 125°06.7 | · · 48.2 | 263°38.7 | · · 03.3 |
| 16 | 287°51.4 | 87°16.3 | 50.9 | 142°31.3 | 43.2 | 140°08.9 | 48.1 | 278°41.3 | 03.2 |
| 17 | 302°53.8 | 102°19.0 | 50.1 | 157°32.6 | 42.9 | 155°11.1 | 48.0 | 293°43.9 | 03.2 |
| 18 | 317°56.3 | 117°21.7 | S11°49.3 | 172°33.9 | N15°42.5 | 170°13.3 | N13°47.9 | 308°46.4 | N01°03.1 |
| 19 | 332°58.8 | 132°24.5 | 48.5 | 187°35.1 | 42.2 | 185°15.6 | 47.8 | 323°49.0 | 03.1 |
| 20 | 348°01.2 | 147°27.2 | 47.8 | 202°36.4 | 41.9 | 200°17.8 | 47.8 | 338°51.6 | 03.0 |
| 21 | 3°03.7 | 162°29.9 | · · 47.0 | 217°37.7 | · · 41.5 | 215°20.0 | · · 47.7 | 353°54.2 | · · 03.0 |
| 22 | 18°06.2 | 177°32.7 | 46.2 | 232°39.0 | 41.2 | 230°22.2 | 47.6 | 8°56.8 | 02.9 |
| 23 | 33°08.6 | 192°35.4 | 45.4 | 247°40.2 | 40.8 | 245°24.4 | 47.5 | 23°59.4 | 02.9 |
| Mer.pass. 20:48 | | ν2.8' d-0.8' m-4.60 | | ν1.3' d-0.3' m0.78 | | ν2.2' d-0.1' m-2.04 | | ν2.6' d-0.0' m0.49 | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.0 | 29°14.6 |
| Ankaa | 353°05.3 | -42°09.6 |
| Schedar | 349°28.8 | 56°41.3 |
| Diphda | 348°45.5 | -17°50.3 |
| Achernar | 335°18.5 | -57°06.0 |
| Hamal | 327°49.2 | 23°35.5 |
| Polaris | 312°45.1 | 89°22.6 |
| Acamar | 315°10.2 | -40°11.7 |
| Menkar | 314°04.3 | 4°11.8 |
| Mirfak | 308°25.6 | 49°57.4 |
| Aldebaran | 290°37.6 | 16°33.9 |
| Rigel | 281°02.2 | -8°10.1 |
| Capella | 280°19.3 | 46°01.4 |
| Bellatrix | 278°21.0 | 6°22.5 |
| Elnath | 277°59.7 | 28°37.8 |
| Alnilam | 275°36.0 | -1°11.0 |
| Betelgeuse | 270°50.2 | 7°24.8 |
| Canopus | 263°51.4 | -52°42.3 |
| Sirius | 258°24.7 | -16°45.0 |
| Adhara | 255°04.5 | -29°00.3 |
| Procyon | 244°49.2 | 5°09.4 |
| Pollux | 243°15.4 | 27°57.6 |
| Avior | 234°14.0 | -59°35.4 |
| Suhail | 222°45.2 | -43°32.2 |
| Miaplacidus | 221°38.0 | -69°49.3 |
| Alphard | 217°46.3 | -8°46.4 |
| Regulus | 207°33.0 | 11°50.1 |
| Dubhe | 193°39.5 | 61°36.1 |
| Denebola | 182°23.7 | 14°25.3 |
| Gienah | 175°42.3 | -17°41.4 |
| Acrux | 172°59.0 | -63°14.7 |
| Gacrux | 171°50.4 | -57°15.6 |
| Alioth | 166°12.2 | 55°48.7 |
| Spica | 158°21.0 | -11°18.0 |
| Alkaid | 152°51.3 | 49°10.7 |
| Hadar | 148°34.5 | -60°30.0 |
| Menkent | 147°56.2 | -36°30.0 |
| Arcturus | 145°46.9 | 19°02.6 |
| Rigel Kent. | 139°38.9 | -60°56.7 |
| Kochab | 137°21.0 | 74°02.6 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.5 |
| Antares | 112°14.3 | -26°29.5 |
| Atria | 107°07.7 | -69°04.6 |
| Sabik | 102°01.4 | -15°45.4 |
| Shaula | 96°08.7 | -37°07.4 |
| Rasalhague | 95°57.4 | 12°32.6 |
| Eltanin | 90°41.9 | 51°29.3 |
| Kaus Aust. | 83°30.8 | -34°22.3 |
| Vega | 80°32.5 | 38°48.7 |
| Nunki | 75°46.1 | -26°15.8 |
| Altair | 61°58.6 | 8°56.5 |
| Peacock | 53°03.5 | -56°39.1 |
| Deneb | 49°24.8 | 45°22.9 |
| Enif | 33°37.3 | 10°00.1 |
| Al Na'ir | 27°30.9 | -46°50.0 |
| Fomalhaut | 15°12.7 | -29°28.8 |
| Scheat | 13°43.6 | 28°14.0 |
| Markab | 13°28.2 | 15°21.2 |

| Nov 06 Fri | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 158°58.9 | 10:21 |
| Mars | 215°56.9 | 06:35 |
| Jupiter | 212°34.2 | 06:48 |
| Saturn | 350°41.6 | 21:33 |

| Nov 07 Sat | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 159°10.5 | 10:16 |
| Mars | 215°27.8 | 06:33 |
| Jupiter | 212°27.8 | 06:44 |
| Saturn | 350°44.8 | 21:28 |

| Nov 08 Sun | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 159°19.9 | 10:12 |
| Mars | 214°59.0 | 06:31 |
| Jupiter | 212°21.6 | 06:41 |
| Saturn | 350°47.9 | 21:24 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.5 |
| Mars: | 0.1 |


| h | Sun | | | Moon | | | | |
|------------|----------|----------|------------|------------|-------|----------|-------|-------|
| Fri | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 184°06.0 | S15°54.9 | | 221°48.2 | 14.5' | S04°52.8 | 14.9' | 56.6' |
| 1 | 199°05.9 | 55.7 | | 236°21.7 | 14.5' | 05°07.8 | 14.9' | 56.6' |
| 2 | 214°05.9 | 56.4 | | 250°55.2 | 14.5' | 05°22.7 | 14.9' | 56.5' |
| 3 | 229°05.9 | • • 57.2 | | 265°28.7 | 14.5' | 05°37.5 | 14.8' | 56.5' |
| 4 | 244°05.9 | 57.9 | | 280°02.2 | 14.5' | 05°52.3 | 14.8' | 56.5' |
| 5 | 259°05.8 | 58.7 | | 294°35.7 | 14.5' | 06°07.1 | 14.8' | 56.5' |
| 6 | 274°05.8 | S15°59.4 | | 309°09.1 | 14.5' | S06°21.9 | 14.7' | 56.5' |
| 7 | 289°05.8 | 16°00.2 | | 323°42.6 | 14.4' | 06°36.6 | 14.7' | 56.4' |
| 8 | 304°05.8 | 00.9 | | 338°16.0 | 14.4' | 06°51.3 | 14.6' | 56.4' |
| 9 | 319°05.7 | • • 01.7 | | 352°49.4 | 14.4' | 07°06.0 | 14.6' | 56.4' |
| 10 | 334°05.7 | 02.4 | | 7°22.9 | 14.4' | 07°20.6 | 14.6' | 56.4' |
| 11 | 349°05.7 | 03.2 | | 21°56.3 | 14.4' | 07°35.1 | 14.5' | 56.4' |
| 12 | 4°05.7 | S16°03.9 | | 36°29.7 | 14.4' | S07°49.7 | 14.5' | 56.3' |
| 13 | 19°05.6 | 04.7 | | 51°03.1 | 14.4' | 08°04.1 | 14.4' | 56.3' |
| 14 | 34°05.6 | 05.4 | | 65°36.4 | 14.3' | 08°18.6 | 14.4' | 56.3' |
| 15 | 49°05.6 | • • 06.2 | | 80°09.8 | 14.3' | 08°33.0 | 14.3' | 56.3' |
| 16 | 64°05.5 | 06.9 | | 94°43.1 | 14.3' | 08°47.3 | 14.3' | 56.3' |
| 17 | 79°05.5 | 07.6 | | 109°16.4 | 14.3' | 09°01.6 | 14.2' | 56.2' |
| 18 | 94°05.5 | S16°08.4 | | 123°49.7 | 14.3' | S09°15.8 | 14.2' | 56.2' |
| 19 | 109°05.5 | 09.1 | | 138°23.0 | 14.2' | 09°30.1 | 14.2' | 56.2' |
| 20 | 124°05.4 | 09.9 | | 152°56.2 | 14.2' | 09°44.2 | 14.1' | 56.2' |
| 21 | 139°05.4 | • • 10.6 | | 167°29.4 | 14.2' | 09°58.3 | 14.0' | 56.2' |
| 22 | 154°05.4 | 11.4 | | 182°02.7 | 14.2' | 10°12.3 | 14.0' | 56.1' |
| 23 | 169°05.3 | 12.1 | | 196°35.8 | 14.2' | 10°26.3 | 13.9' | 56.1' |
| SD = 16.1' | | | $d = 0.8'$ | SD = 15.4' | | | | |

| Sat | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|------------|-------|----------|-------|-------|
| 0 | 184°05.3 | S16°12.8 | | 211°09.0 | 14.1' | S10°40.3 | 13.9' | 56.1' |
| 1 | 199°05.3 | 13.6 | | 225°42.1 | 14.1' | 10°54.2 | 13.8' | 56.1' |
| 2 | 214°05.2 | 14.3 | | 240°15.2 | 14.1' | 11°08.0 | 13.8' | 56.0' |
| 3 | 229°05.2 | 15.1 | | 254°48.3 | 14.0' | 11°21.8 | 13.7' | 56.0' |
| 4 | 244°05.2 | 15.8 | | 269°21.3 | 14.0' | 11°35.5 | 13.7' | 56.0' |
| 5 | 259°05.1 | 16.5 | | 283°54.4 | 14.0' | 11°49.1 | 13.6' | 56.0' |
| 6 | 274°05.1 | S16°17.3 | | 298°27.3 | 14.0' | S12°02.7 | 13.5' | 56.0' |
| 7 | 289°05.1 | 18.0 | | 313°00.3 | 13.9' | 12°16.3 | 13.5' | 55.9' |
| 8 | 304°05.0 | 18.7 | | 327°33.2 | 13.9' | 12°29.8 | 13.4' | 55.9' |
| 9 | 319°05.0 | 19.5 | | 342°06.1 | 13.9' | 12°43.2 | 13.3' | 55.9' |
| 10 | 334°05.0 | 20.2 | | 356°39.0 | 13.8' | 12°56.5 | 13.3' | 55.9' |
| 11 | 349°04.9 | 20.9 | | 11°11.8 | 13.8' | 13°09.8 | 13.2' | 55.9' |
| 12 | 4°04.9 | S16°21.7 | | 25°44.6 | 13.8' | S13°23.0 | 13.2' | 55.9' |
| 13 | 19°04.8 | 22.4 | | 40°17.3 | 13.7' | 13°36.2 | 13.1' | 55.8' |
| 14 | 34°04.8 | 23.1 | | 54°50.1 | 13.7' | 13°49.2 | 13.0' | 55.8' |
| 15 | 49°04.8 | 23.9 | | 69°22.8 | 13.6' | 14°02.3 | 12.9' | 55.8' |
| 16 | 64°04.7 | 24.6 | | 83°55.4 | 13.6' | 14°15.2 | 12.9' | 55.8' |
| 17 | 79°04.7 | 25.3 | | 98°28.0 | 13.6' | 14°28.1 | 12.8' | 55.8' |
| 18 | 94°04.7 | S16°26.1 | | 113°00.6 | 13.5' | S14°40.9 | 12.7' | 55.7' |
| 19 | 109°04.6 | 26.8 | | 127°33.1 | 13.5' | 14°53.6 | 12.7' | 55.7' |
| 20 | 124°04.6 | 27.5 | | 142°05.6 | 13.5' | 15°06.3 | 12.6' | 55.7' |
| 21 | 139°04.5 | 28.3 | | 156°38.0 | 13.4' | 15°18.9 | 12.5' | 55.7' |
| 22 | 154°04.5 | 29.0 | | 171°10.5 | 13.4' | 15°31.4 | 12.4' | 55.7' |
| 23 | 169°04.5 | 29.7 | | 185°42.8 | 13.3' | 15°43.8 | 12.4' | 55.6' |
| SD = 16.1' | | | $d = 0.7'$ | SD = 15.3' | | | | |

| Sun | GHA | Dec | | GHA | ν | Dec | d | HP |
|------------|----------|----------|------------|------------|-------|----------|-------|-------|
| 0 | 184°04.4 | S16°30.5 | | 200°15.1 | 13.3' | S15°56.1 | 12.3' | 55.6' |
| 1 | 199°04.4 | 31.2 | | 214°47.4 | 13.2' | 16°08.4 | 12.2' | 55.6' |
| 2 | 214°04.3 | 31.9 | | 229°19.7 | 13.2' | 16°20.6 | 12.1' | 55.6' |
| 3 | 229°04.3 | 32.6 | | 243°51.9 | 13.2' | 16°32.7 | 12.0' | 55.6' |
| 4 | 244°04.3 | 33.4 | | 258°24.0 | 13.1' | 16°44.8 | 12.0' | 55.5' |
| 5 | 259°04.2 | 34.1 | | 272°56.1 | 13.1' | 16°56.7 | 11.9' | 55.5' |
| 6 | 274°04.2 | S16°34.8 | | 287°28.2 | 13.0' | S17°08.6 | 11.8' | 55.5' |
| 7 | 289°04.1 | 35.5 | | 302°00.2 | 13.0' | 17°20.4 | 11.7' | 55.5' |
| 8 | 304°04.1 | 36.3 | | 316°32.2 | 12.9' | 17°32.1 | 11.6' | 55.5' |
| 9 | 319°04.0 | 37.0 | | 331°04.1 | 12.9' | 17°43.7 | 11.5' | 55.4' |
| 10 | 334°04.0 | 37.7 | | 345°36.0 | 12.8' | 17°55.2 | 11.4' | 55.4' |
| 11 | 349°03.9 | 38.4 | | 0°07.8 | 12.8' | 18°06.7 | 11.4' | 55.4' |
| 12 | 4°03.9 | S16°39.2 | | 14°39.6 | 12.7' | S18°18.0 | 11.3' | 55.4' |
| 13 | 19°03.9 | 39.9 | | 29°11.3 | 12.7' | 18°29.3 | 11.2' | 55.4' |
| 14 | 34°03.8 | 40.6 | | 43°43.0 | 12.6' | 18°40.5 | 11.1' | 55.4' |
| 15 | 49°03.8 | 41.3 | | 58°14.7 | 12.6' | 18°51.6 | 11.0' | 55.3' |
| 16 | 64°03.7 | 42.1 | | 72°46.3 | 12.5' | 19°02.5 | 10.9' | 55.3' |
| 17 | 79°03.7 | 42.8 | | 87°17.8 | 12.5' | 19°13.4 | 10.8' | 55.3' |
| 18 | 94°03.6 | S16°43.5 | | 101°49.3 | 12.4' | S19°24.2 | 10.7' | 55.3' |
| 19 | 109°03.6 | 44.2 | | 116°20.8 | 12.4' | 19°35.0 | 10.6' | 55.3' |
| 20 | 124°03.5 | 44.9 | | 130°52.2 | 12.3' | 19°45.6 | 10.5' | 55.2' |
| 21 | 139°03.5 | 45.7 | | 145°23.5 | 12.3' | 19°56.1 | 10.4' | 55.2' |
| 22 | 154°03.4 | 46.4 | | 159°54.8 | 12.3' | 20°06.5 | 10.3' | 55.2' |
| 23 | 169°03.4 | 47.1 | | 174°26.1 | 12.2' | 20°16.8 | 10.2' | 55.2' |
| SD = 16.1' | | | $d = 0.7'$ | SD = 15.2' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 06:30 | 07:57 | 09:38 | 13:48 | 15:29 | 16:56 |
| N 70° | 06:23 | 07:40 | 09:02 | 14:24 | 15:46 | 17:03 |
| 68° | 06:17 | 07:26 | 08:36 | 14:50 | 16:00 | 17:09 |
| 66° | 06:12 | 07:15 | 08:17 | 15:09 | 16:11 | 17:14 |
| 64° | 06:08 | 07:06 | 08:01 | 15:25 | 16:20 | 17:18 |
| 62° | 06:04 | 06:58 | 07:48 | 15:38 | 16:29 | 17:22 |
| 60° | 06:00 | 06:51 | 07:37 | 15:49 | 16:36 | 17:26 |
| N 58° | 05:57 | 06:45 | 07:28 | 15:59 | 16:42 | 17:29 |
| 56° | 05:54 | 06:39 | 07:20 | 16:07 | 16:48 | 17:32 |
| 54° | 05:51 | 06:34 | 07:12 | 16:14 | 16:53 | 17:35 |
| 52° | 05:49 | 06:29 | 07:06 | 16:21 | 16:57 | 17:38 |
| 50° | 05:46 | 06:25 | 07:00 | 16:27 | 17:02 | 17:40 |
| 45° | 05:40 | 06:15 | 06:47 | 16:40 | 17:11 | 17:46 |
| N 40° | 05:35 | 06:07 | 06:36 | 16:51 | 17:20 | 17:52 |
| 35° | 05:30 | 06:00 | 06:27 | 17:00 | 17:27 | 17:57 |
| 30° | 05:25 | 05:54 | 06:18 | 17:09 | 17:33 | 18:02 |
| 20° | 05:15 | 05:41 | 06:04 | 17:23 | 17:46 | 18:12 |
| N 10° | 05:05 | 05:30 | 05:52 | 17:35 | 17:57 | 18:22 |
| 0° | 04:54 | 05:19 | 05:40 | 17:47 | 18:09 | 18:34 |
| S 10° | 04:41 | 05:06 | 05:28 | 17:59 | 18:21 | 18:47 |
| 20° | 04:25 | 04:52 | 05:16 | 18:12 | 18:35 | 19:03 |
| 30° | 04:05 | 04:35 | 05:01 | 18:27 | 18:53 | 19:23 |
| 35° | 03:52 | 04:25 | 04:52 | 18:36 | 19:03 | 19:36 |
| 40° | 03:36 | 04:13 | 04:42 | 18:46 | 19:16 | 19:52 |
| 45° | 03:17 | 03:58 | 04:31 | 18:58 | 19:31 | 20:12 |
| S 50° | 02:51 | 03:39 | 04:16 | 19:12 | 19:49 | 20:38 |
| 52° | 02:38 | 03:30 | 04:10 | 19:19 | 19:59 | 20:51 |
| 54° | 02:22 | 03:20 | 04:02 | 19:26 | 20:09 | 21:07 |
| 56° | 02:04 | 03:08 | 03:54 | 19:35 | 20:21 | 21:27 |
| 58° | 01:40 | 02:55 | 03:45 | 19:44 | 20:35 | 21:52 |
| S 60° | 01:05 | 02:39 | 03:34 | 19:55 | 20:51 | 22:28 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | 04:38 | 06:58 | ■ | 13:49 | 13:04 | ■ |
| N 70° | 04:29 | 06:34 | 09:05 | 14:01 | 13:30 | 12:35 |
| 68° | 04:22 | 06:16 | 08:24 | 14:11 | 13:49 | 13:17 |
| 66° | 04:16 | 06:02 | 07:56 | 14:20 | 14:05 | 13:46 |
| 64° | 04:10 | 05:50 | 07:35 | 14:27 | 14:18 | 14:08 |
| 62° | 04:06 | 05:41 | 07:18 | 14:33 | 14:29 | 14:26 |
| 60° | 04:02 | 05:32 | 07:04 | 14:38 | 14:39 | 14:41 |
| N 58° | 03:59 | 05:25 | 06:52 | 14:43 | 14:47 | 14:53 |
| 56° | 03:56 | 05:19 | 06:42 | 14:47 | 14:55 | 15:04 |
| 54° | 03:53 | 05:13 | 06:33 | 14:51 | 15:01 | 15:14 |
| 52° | 03:50 | 05:08 | 06:25 | 14:54 | 15:07 | 15:23 |
| 50° | 03:48 | 05:03 | 06:18 | 14:57 | 15:13 | 15:31 |
| 45° | 03:43 | 04:53 | 06:03 | 15:04 | 15:24 | 15:47 |
| N 40° | 03:39 | 04:45 | 05:50 | 15:10 | 15:34 | 16:01 |
| 35° | 03:36 | 04:38 | 05:40 | 15:15 | 15:42 | 16:13 |
| 30° | 03:33 | 04:32 | 05:31 | 15:19 | 15:50 | 16:23 |
| 20° | 03:28 | 04:21 | 05:15 | 15:27 | 16:03 | 16:41 |
| N 10° | 03:23 | 04:12 | 05:01 | 15:34 | 16:14 | 16:56 |
| 0° | 03:19 | 04:03 | 04:48 | 15:40 | 16:25 | 17:11 |
| S 10° | 03:15 | 03:55 | 04:36 | 15:46 | 16:35 | 17:25 |
| 20° | 03:11 | 03:46 | 04:22 | 15:53 | 16:47 | 17:41 |
| 30° | 03:06 | 03:35 | 04:07 | 16:01 | 17:00 | 17:59 |
| 35° | 03:03 | 03:30 | 03:58 | 16:06 | 17:08 | 18:10 |
| 40° | 03:00 | 03:23 | 03:48 | 16:11 | 17:16 | 18:22 |
| 45° | 02:56 | 03:15 | 03:37 | 16:17 | 17:27 | 18:36 |
| S 50° | 02:52 | 03:06 | 03:23 | 16:24 | 17:39 | 18:54 |
| 52° | 02:50 | 03:02 | 03:16 | 16:27 | 17:45 | 19:02 |
| 54° | 02:48 | 02:57 | 03:09 | 16:31 | 17:51 | 19:12 |
| 56° | 02:45 | 02:52 | 03:01 | 16:35 | 17:58 | 19:22 |
| 58° | 02:43 | 02:47 | 02:52 | 16:40 | 18:07 | 19:34 |
| S 60° | 02:40 | 02:40 | 02:42 | 16:45 | 18:16 | 19:49 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-------|-----------|-------|---|
| | Eqn.of Time | | Mer. | Mer.Pass. | | Age |
| | 00 ^h | 12 ^h | Pass | Upper | Lower | 27-29 |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 11-2% |
| 06 | 16:24 | 16:23 | 11:44 | 09:30 | 21:52 |  |
| 07 | 16:21 | 16:20 | 11:44 | 10:14 | 22:36 | |
| 08 | 16:18 | 16:16 | 11:44 | 10:59 | 23:23 | |

November 09, 10, 11 UT (Mon., Tue., Wed.)

| h | Aries | Venus | | Mars | | Jupiter | | Saturn | |
|--------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 48°11.1 | 207°38.1 | S11°44.7 | 262°41.5 | N15°40.5 | 260°26.6 | N13°47.5 | 39°02.0 | N01°02.9 |
| 1 | 63°13.6 | 222°40.8 | 43.9 | 277°42.8 | 40.2 | 275°28.8 | 47.4 | 54°04.6 | 02.8 |
| 2 | 78°16.0 | 237°43.5 | 43.1 | 292°44.1 | 39.8 | 290°31.0 | 47.3 | 69°07.2 | 02.8 |
| 3 | 93°18.5 | 252°46.2 | · · 42.4 | 307°45.4 | · · 39.5 | 305°33.3 | · · 47.2 | 84°09.7 | · · 02.7 |
| 4 | 108°20.9 | 267°48.9 | 41.6 | 322°46.6 | 39.2 | 320°35.5 | 47.1 | 99°12.3 | 02.7 |
| 5 | 123°23.4 | 282°51.6 | 40.9 | 337°47.9 | 38.8 | 335°37.7 | 47.1 | 114°14.9 | 02.6 |
| 6 | 138°25.9 | 297°54.3 | S11°40.1 | 352°49.2 | N15°38.5 | 350°39.9 | N13°47.0 | 129°17.5 | N01°02.6 |
| 7 | 153°28.3 | 312°57.0 | 39.3 | 7°50.5 | 38.2 | 5°42.1 | 46.9 | 144°20.1 | 02.5 |
| 8 | 168°30.8 | 327°59.7 | 38.6 | 22°51.8 | 37.8 | 20°44.3 | 46.8 | 159°22.7 | 02.5 |
| 9 | 183°33.3 | 343°02.3 | · · 37.8 | 37°53.1 | · · 37.5 | 35°46.6 | · · 46.8 | 174°25.3 | · · 02.4 |
| 10 | 198°35.7 | 358°05.0 | 37.1 | 52°54.3 | 37.1 | 50°48.8 | 46.7 | 189°27.9 | 02.4 |
| 11 | 213°38.2 | 13°07.7 | 36.3 | 67°55.6 | 36.8 | 65°51.0 | 46.6 | 204°30.5 | 02.4 |
| 12 | 228°40.7 | 28°10.3 | S11°35.6 | 82°56.9 | N15°36.5 | 80°53.2 | N13°46.5 | 219°33.0 | N01°02.3 |
| 13 | 243°43.1 | 43°13.0 | 34.8 | 97°58.2 | 36.1 | 95°55.4 | 46.5 | 234°35.6 | 02.3 |
| 14 | 258°45.6 | 58°15.7 | 34.1 | 112°59.5 | 35.8 | 110°57.6 | 46.4 | 249°38.2 | 02.2 |
| 15 | 273°48.1 | 73°18.3 | · · 33.3 | 128°00.8 | · · 35.5 | 125°59.9 | · · 46.3 | 264°40.8 | · · 02.2 |
| 16 | 288°50.5 | 88°21.0 | 32.6 | 143°02.1 | 35.1 | 141°02.1 | 46.2 | 279°43.4 | 02.1 |
| 17 | 303°53.0 | 103°23.6 | 31.9 | 158°03.3 | 34.8 | 156°04.3 | 46.2 | 294°46.0 | 02.1 |
| 18 | 318°55.4 | 118°26.3 | S11°31.1 | 173°04.6 | N15°34.5 | 171°06.5 | N13°46.1 | 309°48.6 | N01°02.0 |
| 19 | 333°57.9 | 133°28.9 | 30.4 | 188°05.9 | 34.1 | 186°08.7 | 46.0 | 324°51.2 | 02.0 |
| 20 | 349°00.4 | 148°31.5 | 29.7 | 203°07.2 | 33.8 | 201°10.9 | 45.9 | 339°53.7 | 02.0 |
| 21 | 4°02.8 | 163°34.2 | · · 28.9 | 218°08.5 | · · 33.4 | 216°13.2 | · · 45.9 | 354°56.3 | · · 01.9 |
| 22 | 19°05.3 | 178°36.8 | 28.2 | 233°09.8 | 33.1 | 231°15.4 | 45.8 | 9°58.9 | 01.9 |
| 23 | 34°07.8 | 193°39.4 | 27.5 | 248°11.1 | 32.8 | 246°17.6 | 45.7 | 25°01.5 | 01.8 |
| Mer.pass. 20:44 | | | | | | | | | |
| $\nu 2.7' d-0.8' m-4.64$ | | | | | | | | | |
| $\nu 1.3' d-0.3' m0.77$ | | | | | | | | | |
| $\nu 2.2' d-0.1' m-2.05$ | | | | | | | | | |
| $\nu 2.6' d-0.0' m0.50$ | | | | | | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 49°10.2 | 208°42.0 | S11°26.7 | 263°12.4 | N15°32.4 | 261°19.8 | N13°45.6 | 40°04.1 | N01°01.8 |
| 1 | 64°12.7 | 223°44.7 | 26.0 | 278°13.7 | 32.1 | 276°22.0 | 45.6 | 55°06.7 | 01.7 |
| 2 | 79°15.2 | 238°47.3 | 25.3 | 293°14.9 | 31.8 | 291°24.3 | 45.5 | 70°09.3 | 01.7 |
| 3 | 94°17.6 | 253°49.9 | · · 24.6 | 308°16.2 | · · 31.4 | 306°26.5 | · · 45.4 | 85°11.8 | · · 01.6 |
| 4 | 109°20.1 | 268°52.5 | 23.9 | 323°17.5 | 31.1 | 321°28.7 | 45.3 | 100°14.4 | 01.6 |
| 5 | 124°22.5 | 283°55.1 | 23.1 | 338°18.8 | 30.8 | 336°30.9 | 45.3 | 115°17.0 | 01.6 |
| 6 | 139°25.0 | 298°57.7 | S11°22.4 | 353°20.1 | N15°30.4 | 351°33.2 | N13°45.2 | 130°19.6 | N01°01.5 |
| 7 | 154°27.5 | 314°00.3 | 21.7 | 8°21.4 | 30.4 | 6°35.4 | 45.1 | 145°22.2 | 01.5 |
| 8 | 169°29.9 | 329°02.9 | 21.0 | 23°22.7 | 29.8 | 21°37.6 | 45.0 | 160°24.8 | 01.4 |
| 9 | 184°32.4 | 344°05.4 | · · 20.3 | 38°24.0 | · · 29.4 | 36°39.8 | · · 45.0 | 175°27.3 | · · 01.4 |
| 10 | 199°34.9 | 359°08.0 | 19.6 | 53°25.3 | 29.1 | 51°42.0 | 44.9 | 190°29.9 | 01.3 |
| 11 | 214°37.3 | 14°10.6 | 18.9 | 68°26.6 | 28.8 | 66°44.3 | 44.8 | 205°32.5 | 01.3 |
| 12 | 229°39.8 | 29°13.2 | S11°18.2 | 83°27.9 | N15°28.4 | 81°46.5 | N13°44.7 | 220°35.1 | N01°01.3 |
| 13 | 244°42.3 | 44°15.7 | 17.5 | 98°29.2 | 28.1 | 96°48.7 | 44.7 | 235°37.7 | 01.2 |
| 14 | 259°44.7 | 59°18.3 | 16.8 | 113°30.5 | 27.7 | 111°50.9 | 44.6 | 250°40.3 | 01.2 |
| 15 | 274°47.2 | 74°20.9 | · · 16.1 | 128°31.8 | · · 27.4 | 126°53.2 | · · 44.5 | 265°42.9 | · · 01.1 |
| 16 | 289°49.7 | 89°23.4 | 15.4 | 143°33.1 | 27.1 | 141°55.4 | 44.4 | 280°45.4 | 01.1 |
| 17 | 304°52.1 | 104°26.0 | 14.7 | 158°34.4 | 26.7 | 156°57.6 | 44.4 | 295°48.0 | 01.0 |
| 18 | 319°54.6 | 119°28.5 | S11°14.0 | 173°35.7 | N15°26.4 | 171°59.8 | N13°44.3 | 310°50.6 | N01°01.0 |
| 19 | 334°57.0 | 134°31.1 | 13.3 | 188°37.0 | 26.1 | 187°02.1 | 44.2 | 325°53.2 | 01.0 |
| 20 | 349°59.5 | 149°33.6 | 12.6 | 203°38.3 | 25.7 | 202°04.3 | 44.1 | 340°55.8 | 00.9 |
| 21 | 5°02.0 | 164°36.1 | · · 11.9 | 218°39.6 | · · 25.4 | 217°06.5 | · · 44.1 | 355°58.4 | · · 00.9 |
| 22 | 20°04.4 | 179°38.7 | 11.2 | 233°40.9 | 25.1 | 232°08.7 | 44.0 | 11°00.9 | 00.8 |
| 23 | 35°06.9 | 194°41.2 | 10.6 | 248°42.2 | 24.7 | 247°11.0 | 43.9 | 26°03.5 | 00.8 |
| Mer.pass. 20:40 | | | | | | | | | |
| $\nu 2.6' d-0.7' m-4.68$ | | | | | | | | | |
| $\nu 1.3' d-0.3' m0.75$ | | | | | | | | | |
| $\nu 2.2' d-0.1' m-2.06$ | | | | | | | | | |
| $\nu 2.6' d-0.0' m0.50$ | | | | | | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 50°09.4 | 209°43.7 | S11°09.9 | 263°43.5 | N15°24.4 | 262°13.2 | N13°43.8 | 41°06.1 | N01°00.7 |
| 1 | 65°11.8 | 224°46.3 | 09.2 | 278°44.8 | 24.1 | 277°15.4 | 43.8 | 56°08.7 | 00.7 |
| 2 | 80°14.3 | 239°48.8 | 08.5 | 293°46.1 | 23.7 | 292°17.6 | 43.7 | 71°11.3 | 00.7 |
| 3 | 95°16.8 | 254°51.3 | · · 07.8 | 308°47.4 | · · 23.4 | 307°19.9 | · · 43.6 | 86°13.9 | · · 00.6 |
| 4 | 110°19.2 | 269°53.8 | 07.2 | 323°48.7 | 23.1 | 322°22.1 | 43.6 | 101°16.4 | 00.6 |
| 5 | 125°21.7 | 284°56.3 | 06.5 | 338°50.0 | 22.7 | 337°24.3 | 43.5 | 116°19.0 | 00.5 |
| 6 | 140°24.2 | 299°58.8 | S11°05.8 | 353°51.3 | N15°22.4 | 352°26.6 | N13°43.4 | 131°21.6 | N01°00.5 |
| 7 | 155°26.6 | 315°01.3 | 05.2 | 8°52.6 | 22.1 | 7°28.8 | 43.3 | 146°24.2 | 00.4 |
| 8 | 170°29.1 | 330°03.8 | 04.5 | 23°53.9 | 21.7 | 22°31.0 | 43.3 | 161°26.8 | 00.4 |
| 9 | 185°31.5 | 345°06.3 | · · 03.8 | 38°55.2 | · · 21.4 | 37°33.2 | · · 43.2 | 176°29.3 | · · 00.4 |
| 10 | 200°34.0 | 0°08.8 | 03.2 | 53°56.5 | 21.1 | 52°35.5 | 43.1 | 191°31.9 | 00.3 |
| 11 | 215°36.5 | 15°11.3 | 02.5 | 68°57.8 | 20.7 | 67°37.7 | 43.1 | 206°34.5 | 00.3 |
| 12 | 230°38.9 | 30°13.7 | S11°01.9 | 83°59.1 | N15°20.4 | 82°39.9 | N13°43.0 | 221°37.1 | N01°00.2 |
| 13 | 245°41.4 | 45°16.2 | 01.2 | 99°00.4 | 20.1 | 97°42.2 | 42.9 | 236°39.7 | 00.2 |
| 14 | 260°43.9 | 60°18.7 | 11°00.5 | 114°01.7 | 19.7 | 112°44.4 | 42.8 | 251°42.3 | 00.2 |
| 15 | 275°46.3 | 75°21.1 | 10°59.9 | 129°03.0 | · · 19.4 | 127°46.6 | · · 42.8 | 266°44.8 | · · 00.1 |
| 16 | 290°48.8 | 90°23.6 | 59.2 | 144°04.3 | 19.1 | 142°48.9 | 42.7 | 281°47.4 | 00.1 |
| 17 | 305°51.3 | 105°26.1 | 58.6 | 159°05.7 | 18.7 | 157°51.1 | 42.6 | 296°50.0 | 00.0 |
| 18 | 320°53.7 | 120°28.5 | S10°58.0 | 174°07.0 | N15°18.4 | 172°53.3 | N13°42.6 | 311°52.6 | N01°00.0 |
| 19 | 335°56.2 | 135°31.0 | 57.3 | 189°08.3 | 18.1 | 187°55.5 | 42.5 | 326°55.2 | 00°59.9 |
| 20 | 350°58.7 | 150°33.4 | 56.7 | 204°09.6 | 17.7 | 202°57.8 | 42.4 | 341°57.7 | 59.9 |
| 21 | 6°01.1 | 165°35.9 | · · 56.0 | 219°10.9 | · · 17.4 | 218°00.0 | · · 42.3 | 357°00.3 | · · 59.9 |
| 22 | 21°03.6 | 180°38.3 | 55.4 | 234°12.2 | 17.1 | 233°02.2 | 42.3 | 12°02.9 | 59.8 |
| 23 | 36°06.0 | 195°40.7 | 54.8 | 249°13.5 | 16.7 | 248°04.5 | 42.2 | 27°05.5 | 59.8 |
| Mer.pass. 20:36 | | | | | | | | | |
| $\nu 2.5' d-0.7' m-4.71$ | | | | | | | | | |
| $\nu 1.3' d-0.3' m0.74$ | | | | | | | | | |
| $\nu 2.2' d-0.1' m-2.06$ | | | | | | | | | |
| $\nu 2.6' d-0.0' m0.51$ | | | | | | | | | |

| Stars | | |
|---------------------|-----------|-----------|
| | SHA | Dec |
| Alpheratz | 357° 33.0 | 29° 14.6 |
| Ankaa | 353° 05.4 | -42° 09.6 |
| Schedar | 349° 28.9 | 56° 41.4 |
| Diphda | 348° 45.5 | -17° 50.3 |
| Achernar | 335° 18.5 | -57° 06.0 |
| Hamal | 327° 49.2 | 23° 35.5 |
| Polaris | 312° 44.6 | 89° 22.6 |
| Acamar | 315° 10.2 | -40° 11.7 |
| Menkar | 314° 04.3 | 4° 11.8 |
| Mirfak | 308° 25.6 | 49° 57.5 |
| Aldebaran | 290° 37.6 | 16° 33.9 |
| Rigel | 281° 02.1 | -8° 10.1 |
| Capella | 280° 19.3 | 46° 01.4 |
| Bellatrix | 278° 21.0 | 6° 22.5 |
| Elnath | 277° 59.7 | 28° 37.8 |
| Alnilam | 275° 35.9 | -1° 11.0 |
| Betelgeuse | 270° 50.2 | 7° 24.8 |
| Canopus | 263° 51.4 | -52° 42.3 |
| Sirius | 258° 24.7 | -16° 45.0 |
| Adhara | 255° 04.5 | -29° 00.3 |
| Procyon | 244° 49.1 | 5° 09.4 |
| Pollux | 243° 15.3 | 27° 57.6 |
| Avior | 234° 14.0 | -59° 35.4 |
| Suhail | 222° 45.2 | -43° 32.2 |
| Miaplacidus | 221° 37.9 | -69° 49.3 |
| Alphard | 217° 46.3 | -8° 46.4 |
| Regulus | 207° 32.9 | 11° 50.1 |
| Dubhe | 193° 39.5 | 61° 36.1 |
| Denebola | 182° 23.6 | 14° 25.3 |
| Gienah | 175° 42.3 | -17° 41.4 |
| Acrux | 172° 58.9 | -63° 14.7 |
| Gacrux | 171° 50.4 | -57° 15.6 |
| Alioth | 166° 12.1 | 55° 48.7 |
| Spica | 158° 21.0 | -11° 18.0 |
| Alkaid | 152° 51.3 | 49° 10.7 |
| Hadar | 148° 34.5 | -60° 30.0 |
| Menkent | 147° 56.2 | -36° 30.0 |
| Arcturus | 145° 46.9 | 19° 02.6 |
| Rigel Kent. | 139° 38.9 | -60° 56.7 |
| Kochab | 137° 21.1 | 74° 02.6 |
| Zuben'ubi | 136° 54.7 | -16° 09.1 |
| Alphecca | 126° 02.8 | 26° 37.5 |
| Antares | 112° 14.4 | -26° 29.5 |
| Atria | 107° 07.7 | -69° 04.6 |
| Sabik | 102° 01.4 | -15° 45.4 |
| Shaula | 96° 08.7 | -37° 07.4 |
| Rasalhague | 95° 57.4 | 12° 32.5 |
| Eltanin | 90° 41.9 | 51° 29.3 |
| Kaus Aust. | 83° 30.8 | -34° 22.3 |
| Vega | 80° 32.5 | 38° 48.7 |
| Nunki | 75° 46.1 | -26° 15.8 |
| Altair | 61° 58.6 | 8° 56.5 |
| Peacock | 53° 03.5 | -56° 39.1 |
| Deneb | 49° 24.9 | 45° 22.9 |
| Enif | 33° 37.3 | 10° 00.1 |
| Al Na'ir | 27° 31.0 | -46° 50.0 |
| Fomalhaut | 15° 12.7 | -29° 28.8 |
| Scheat | 13° 43.6 | 28° 14.0 |
| Markab | 13° 28.3 | 15° 21.2 |
| | | |
| Nov 09 Mon | SHA | Mer.pass |
| Venus | 159° 27.0 | 10:08 |
| Mars | 214° 30.4 | 06:29 |
| Jupiter | 212° 15.5 | 06:37 |
| Saturn | 350° 50.9 | 21:20 |
| | | |
| Nov 10 Tue | SHA | Mer.pass |
| Venus | 159° 31.8 | 10:03 |
| Mars | 214° 02.1 | 06:27 |
| Jupiter | 212° 09.6 | 06:34 |
| Saturn | 350° 53.9 | 21:16 |
| | | |
| Nov 11 Wed | SHA | Mer.pass |
| Venus | 159° 34.4 | 09:59 |
| Mars | 213° 34.1 | 06:25 |
| Jupiter | 212° 03.8 | 06:30 |
| Saturn | 350° 56.7 | 21:12 |
| | | |
| Horizontal parallax | | |
| Venus: | 0.5 | |
| Mars: | 0.1 | |

| h | Sun | | | Moon | | | |
|-----------------------|-----|----------|----------|------------|-------|----------|-------------|
| | Mon | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 184°03.3 | S16°47.8 | 188°57.3 | 12.2' | S20°27.1 | 10.1' 55.2' |
| 1 | | 199°03.3 | 48.5 | 203°28.4 | 12.1' | 20°37.2 | 10.0' 55.2' |
| 2 | | 214°03.2 | 49.2 | 217°59.5 | 12.1' | 20°47.2 | 9.9' 55.1' |
| 3 | | 229°03.2 | · · 50.0 | 232°30.6 | 12.0' | 20°57.1 | 9.8' 55.1' |
| 4 | | 244°03.1 | 50.7 | 247°01.6 | 12.0' | 21°06.9 | 9.7' 55.1' |
| 5 | | 259°03.1 | 51.4 | 261°32.5 | 11.9' | 21°16.6 | 9.6' 55.1' |
| 6 | | 274°03.0 | S16°52.1 | 276°03.4 | 11.9' | S21°26.3 | 9.5' 55.1' |
| 7 | | 289°03.0 | 52.8 | 290°34.3 | 11.8' | 21°35.8 | 9.4' 55.1' |
| 8 | | 304°02.9 | 53.5 | 305°05.1 | 11.8' | 21°45.2 | 9.3' 55.0' |
| 9 | | 319°02.9 | · · 54.2 | 319°35.8 | 11.7' | 21°54.5 | 9.2' 55.0' |
| 10 | | 334°02.8 | 55.0 | 334°06.5 | 11.7' | 22°03.6 | 9.1' 55.0' |
| 11 | | 349°02.8 | 55.7 | 348°37.2 | 11.6' | 22°12.7 | 9.0' 55.0' |
| 12 | | 4°02.7 | S16°56.4 | 3°07.8 | 11.6' | S22°21.7 | 8.9' 55.0' |
| 13 | | 19°02.7 | 57.1 | 17°38.4 | 11.5' | 22°30.5 | 8.7' 55.0' |
| 14 | | 34°02.6 | 57.8 | 32°08.9 | 11.5' | 22°39.3 | 8.6' 54.9' |
| 15 | | 49°02.5 | · · 58.5 | 46°39.3 | 11.4' | 22°47.9 | 8.5' 54.9' |
| 16 | | 64°02.5 | 59.2 | 61°09.7 | 11.4' | 22°56.4 | 8.4' 54.9' |
| 17 | | 79°02.4 | 16°59.9 | 75°40.1 | 11.3' | 23°04.9 | 8.3' 54.9' |
| 18 | | 94°02.4 | S17°00.6 | 90°10.4 | 11.3' | S23°13.1 | 8.2' 54.9' |
| 19 | | 109°02.3 | 01.3 | 104°40.7 | 11.2' | 23°21.3 | 8.1' 54.9' |
| 20 | | 124°02.3 | 02.0 | 119°10.9 | 11.2' | 23°29.4 | 8.0' 54.8' |
| 21 | | 139°02.2 | · · 02.8 | 133°41.1 | 11.1' | 23°37.3 | 7.8' 54.8' |
| 22 | | 154°02.1 | 03.5 | 148°11.2 | 11.1' | 23°45.2 | 7.7' 54.8' |
| 23 | | 169°02.1 | 04.2 | 162°41.3 | 11.0' | 23°52.9 | 7.6' 54.8' |
| SD = 16.1' $d = 0.7'$ | | | | SD = 15.0' | | | |
| Tue | | | | | | | |
| | Mon | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 184°02.0 | S17°04.9 | 177°11.4 | 11.0' | S24°00.5 | 7.5' 54.8' |
| 1 | | 199°02.0 | 05.6 | 191°41.4 | 11.0' | 24°08.0 | 7.4' 54.8' |
| 2 | | 214°01.9 | 06.3 | 206°11.3 | 10.9' | 24°15.3 | 7.2' 54.8' |
| 3 | | 229°01.8 | · · 07.0 | 220°41.2 | 10.9' | 24°22.6 | 7.1' 54.7' |
| 4 | | 244°01.8 | 07.7 | 235°11.1 | 10.8' | 24°29.7 | 7.0' 54.7' |
| 5 | | 259°01.7 | 08.4 | 249°40.9 | 10.8' | 24°36.7 | 6.9' 54.7' |
| 6 | | 274°01.7 | S17°09.1 | 264°10.7 | 10.7' | S24°43.6 | 6.8' 54.7' |
| 7 | | 289°01.6 | 09.8 | 278°40.4 | 10.7' | 24°50.3 | 6.6' 54.7' |
| 8 | | 304°01.5 | 10.5 | 293°10.1 | 10.7' | 24°57.0 | 6.5' 54.7' |
| 9 | | 319°01.5 | · · 11.2 | 307°39.8 | 10.6' | 25°03.5 | 6.4' 54.6' |
| 10 | | 334°01.4 | 11.9 | 322°09.4 | 10.6' | 25°09.8 | 6.3' 54.6' |
| 11 | | 349°01.4 | 12.6 | 336°39.0 | 10.5' | 25°16.1 | 6.1' 54.6' |
| 12 | | 4°01.3 | S17°13.3 | 351°08.6 | 10.5' | S25°22.2 | 6.0' 54.6' |
| 13 | | 19°01.2 | 14.0 | 5°38.1 | 10.5' | 25°28.2 | 5.9' 54.6' |
| 14 | | 34°01.2 | 14.7 | 20°07.5 | 10.4' | 25°34.1 | 5.8' 54.6' |
| 15 | | 49°01.1 | · · 15.4 | 34°37.0 | 10.4' | 25°39.9 | 5.6' 54.6' |
| 16 | | 64°01.0 | 16.1 | 49°06.4 | 10.4' | 25°45.5 | 5.5' 54.5' |
| 17 | | 79°01.0 | 16.8 | 63°35.8 | 10.3' | 25°51.0 | 5.4' 54.5' |
| 18 | | 94°00.9 | S17°17.5 | 78°05.1 | 10.3' | S25°56.4 | 5.2' 54.5' |
| 19 | | 109°00.8 | 18.2 | 92°34.4 | 10.3' | 26°01.6 | 5.1' 54.5' |
| 20 | | 124°00.8 | 18.9 | 107°03.7 | 10.2' | 26°06.7 | 5.0' 54.5' |
| 21 | | 139°00.7 | · · 19.6 | 121°32.9 | 10.2' | 26°11.7 | 4.9' 54.5' |
| 22 | | 154°00.6 | 20.3 | 136°02.1 | 10.2' | 26°16.5 | 4.7' 54.5' |
| 23 | | 169°00.6 | 20.9 | 150°31.3 | 10.2' | 26°21.3 | 4.6' 54.5' |
| SD = 16.1' $d = 0.7'$ | | | | SD = 14.9' | | | |
| Wed | | | | | | | |
| | Mon | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 184°00.5 | S17°21.6 | 165°00.5 | 10.1' | S26°25.9 | 4.5' 54.4' |
| 1 | | 199°00.4 | 22.3 | 179°29.6 | 10.1' | 26°30.3 | 4.3' 54.4' |
| 2 | | 214°00.4 | 23.0 | 193°58.7 | 10.1' | 26°34.6 | 4.2' 54.4' |
| 3 | | 229°00.3 | · · 23.7 | 208°27.8 | 10.1' | 26°38.8 | 4.1' 54.4' |
| 4 | | 244°00.2 | 24.4 | 222°56.9 | 10.0' | 26°42.9 | 3.9' 54.4' |
| 5 | | 259°00.2 | 25.1 | 237°25.9 | 10.0' | 26°46.8 | 3.8' 54.4' |
| 6 | | 274°00.1 | S17°25.8 | 251°54.9 | 10.0' | S26°50.6 | 3.7' 54.4' |
| 7 | | 289°00.0 | 26.5 | 266°23.9 | 10.0' | 26°54.3 | 3.5' 54.4' |
| 8 | | 304°00.0 | 27.2 | 280°52.9 | 10.0' | 26°57.8 | 3.4' 54.3' |
| 9 | | 318°59.9 | · · 27.9 | 295°21.9 | 9.9' | 27°01.2 | 3.3' 54.3' |
| 10 | | 333°59.8 | 28.5 | 309°50.8 | 9.9' | 27°04.4 | 3.1' 54.3' |
| 11 | | 348°59.7 | 29.2 | 324°19.7 | 9.9' | 27°07.6 | 3.0' 54.3' |
| 12 | | 3°59.7 | S17°29.9 | 338°48.6 | 9.9' | S27°10.6 | 2.9' 54.3' |
| 13 | | 18°59.6 | 30.6 | 353°17.5 | 9.9' | 27°13.4 | 2.7' 54.3' |
| 14 | | 33°59.5 | 31.3 | 7°46.4 | 9.9' | 27°16.1 | 2.6' 54.3' |
| 15 | | 48°59.5 | · · 32.0 | 22°15.3 | 9.9' | 27°18.7 | 2.4' 54.3' |
| 16 | | 63°59.4 | 32.7 | 36°44.2 | 9.9' | 27°21.2 | 2.3' 54.3' |
| 17 | | 78°59.3 | 33.3 | 51°13.0 | 9.8' | 27°23.5 | 2.2' 54.2' |
| 18 | | 93°59.2 | S17°34.0 | 65°41.9 | 9.8' | S27°25.7 | 2.0' 54.2' |
| 19 | | 108°59.2 | 34.7 | 80°10.7 | 9.8' | 27°27.7 | 1.9' 54.2' |
| 20 | | 123°59.1 | 35.4 | 94°39.5 | 9.8' | 27°29.6 | 1.8' 54.2' |
| 21 | | 138°59.0 | · · 36.1 | 109°08.4 | 9.8' | 27°31.4 | 1.6' 54.2' |
| 22 | | 153°58.9 | 36.8 | 123°37.2 | 9.8' | 27°33.0 | 1.5' 54.2' |
| 23 | | 168°58.9 | 37.4 | 138°06.0 | 9.8' | 27°34.5 | 1.4' 54.2' |
| SD = 16.1' $d = 0.7'$ | | | | SD = 14.8' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 06:41 | 08:11 | 10:02 | 13:24 | 15:16 | 16:45 |
| N 70° | 06:33 | 07:52 | 09:19 | 14:08 | 15:35 | 16:54 |
| 68° | 06:26 | 07:37 | 08:50 | 14:37 | 15:50 | 17:00 |
| 66° | 06:20 | 07:25 | 08:28 | 14:59 | 16:02 | 17:06 |
| 64° | 06:15 | 07:14 | 08:11 | 15:16 | 16:13 | 17:11 |
| 62° | 06:11 | 07:05 | 07:57 | 15:30 | 16:22 | 17:16 |
| 60° | 06:07 | 06:58 | 07:45 | 15:42 | 16:29 | 17:20 |
| N 58° | 06:03 | 06:51 | 07:35 | 15:52 | 16:36 | 17:24 |
| 56° | 06:00 | 06:45 | 07:26 | 16:01 | 16:42 | 17:27 |
| 54° | 05:56 | 06:39 | 07:18 | 16:09 | 16:48 | 17:31 |
| 52° | 05:53 | 06:34 | 07:11 | 16:16 | 16:53 | 17:34 |
| 50° | 05:51 | 06:30 | 07:04 | 16:23 | 16:58 | 17:37 |
| 45° | 05:44 | 06:19 | 06:51 | 16:37 | 17:08 | 17:43 |
| N 40° | 05:38 | 06:11 | 06:39 | 16:48 | 17:17 | 17:49 |
| 35° | 05:33 | 06:03 | 06:29 | 16:58 | 17:25 | 17:55 |
| 30° | 05:27 | 05:56 | 06:21 | 17:07 | 17:32 | 18:00 |
| 20° | 05:16 | 05:43 | 06:06 | 17:22 | 17:45 | 18:11 |
| N 10° | 05:06 | 05:31 | 05:53 | 17:35 | 17:57 | 18:22 |
| 0° | 04:54 | 05:19 | 05:40 | 17:47 | 18:09 | 18:34 |
| S 10° | 04:40 | 05:06 | 05:28 | 18:00 | 18:22 | 18:48 |
| 20° | 04:23 | 04:51 | 05:14 | 18:14 | 18:37 | 19:05 |
| 30° | 04:02 | 04:33 | 04:59 | 18:29 | 18:55 | 19:26 |
| 35° | 03:49 | 04:22 | 04:50 | 18:39 | 19:06 | 19:40 |
| 40° | 03:32 | 04:09 | 04:39 | 18:49 | 19:19 | 19:56 |
| 45° | 03:12 | 03:54 | 04:27 | 19:02 | 19:35 | 20:17 |
| S 50° | 02:44 | 03:34 | 04:12 | 19:17 | 19:55 | 20:45 |
| 52° | 02:30 | 03:24 | 04:05 | 19:24 | 20:05 | 20:59 |
| 54° | 02:14 | 03:14 | 03:57 | 19:32 | 20:16 | 21:16 |
| 56° | 01:53 | 03:01 | 03:48 | 19:41 | 20:29 | 21:38 |
| 58° | 01:26 | 02:46 | 03:38 | 19:51 | 20:43 | 22:06 |
| S 60° | 00:43 | 02:29 | 03:27 | 20:03 | 21:02 | 22:54 |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | ■ | ■ | ■ | ■ | ■ | ■ |
| 68° | ■ | ■ | ■ | ■ | ■ | ■ |
| 66° | 10:09 | ■ | ■ | 13:12 | ■ | ■ |
| 64° | 09:28 | 11:44 | ■ | 13:54 | 13:21 | ■ |
| 62° | 09:00 | 10:45 | 12:30 | 14:23 | 14:21 | 14:22 |
| 60° | 08:38 | 10:11 | 11:36 | 14:45 | 14:55 | 15:16 |
| N 58° | 08:21 | 09:47 | 11:05 | 15:03 | 15:20 | 15:48 |
| 56° | 08:06 | 09:27 | 10:41 | 15:18 | 15:39 | 16:12 |
| 54° | 07:53 | 09:11 | 10:21 | 15:32 | 15:56 | 16:31 |
| 52° | 07:42 | 08:57 | 10:05 | 15:43 | 16:10 | 16:48 |
| 50° | 07:33 | 08:45 | 09:51 | 15:53 | 16:23 | 17:02 |
| 45° | 07:12 | 08:20 | 09:23 | 16:15 | 16:49 | 17:31 |
| N 40° | 06:56 | 08:00 | 09:00 | 16:32 | 17:09 | 17:53 |
| 35° | 06:42 | 07:43 | 08:42 | 16:47 | 17:27 | 18:12 |
| 30° | 06:30 | 07:29 | 08:26 | 17:00 | 17:41 | 18:28 |
| 20° | 06:09 | 07:05 | 08:00 | 17:22 | 18:07 | 18:55 |
| N 10° | 05:52 | 06:44 | 07:37 | 17:41 | 18:28 | 19:18 |
| 0° | 05:35 | 06:25 | 07:15 | 17:59 | 18:49 | 19:40 |
| S 10° | 05:19 | 06:05 | 06:54 | 18:17 | 19:09 | 20:02 |
| 20° | 05:02 | 05:45 | 06:31 | 18:36 | 19:31 | 20:26 |
| 30° | 04:42 | 05:21 | 06:05 | 18:58 | 19:57 | 20:53 |
| 35° | 04:30 | 05:07 | 05:50 | 19:12 | 20:12 | 21:09 |
| 40° | 04:17 | 04:51 | 05:32 | 19:27 | 20:29 | 21:28 |
| 45° | 04:02 | 04:32 | 05:10 | 19:45 | 20:51 | 21:50 |
| S 50° | 03:43 | 04:09 | 04:43 | 20:08 | 21:17 | 22:19 |
| 52° | 03:34 | 03:57 | 04:29 | 20:19 | 21:30 | 22:33 |
| 54° | 03:24 | 03:45 | 04:14 | 20:31 | 21:45 | 22:50 |
| 56° | 03:13 | 03:30 | 03:56 | 20:45 | 22:03 | 23:10 |
| 58° | 03:00 | 03:13 | 03:34 | 21:02 | 22:25 | 23:34 |
| S 60° | 02:45 | 02:52 | 03:06 | 21:22 | 22:52 | · · · |

| Day | Sun | | | Moon | | |
|-----|---|----------------------------------|-----------------------|-----------------------------|----------------|--------------------|
| | Eqn.of Time 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 0-2 0-3% |
| 09 | 16:13 | 16:11 | 11:44 | 11:47 | —:— | |
| 10 | 16:08 | 16:05 | 11:44 | 12:37 | 00:12 | |
| 11 | 16:02 | 15:59 | 11:44 | 13:28 | 01:02 | |

November 12, 13, 14 UT (Thu., Fri., Sat.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|--|
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | |
| 0 | 51°08.5 | 210°43.2 | S10°54.1 | 264°14.8 | N15°16.4 | 263°06.7 | N13°42.1 | 42°08.1 | N00°59.7 | |
| 1 | 66°11.0 | 225°45.6 | 53.5 | 279°16.1 | 16.1 | 278°08.9 | 42.1 | 57°10.6 | 59.7 | |
| 2 | 81°13.4 | 240°48.0 | 52.9 | 294°17.5 | 15.7 | 293°11.2 | 42.0 | 72°13.2 | 59.7 | |
| 3 | 96°15.9 | 255°50.4 | · · 52.2 | 309°18.8 | · · 15.4 | 308°13.4 | · · 41.9 | 87°15.8 | · · 59.6 | |
| 4 | 111°18.4 | 270°52.9 | 51.6 | 324°20.1 | 15.1 | 323°15.6 | 41.8 | 102°18.4 | 59.6 | |
| 5 | 126°20.8 | 285°55.3 | 51.0 | 339°21.4 | 14.8 | 338°17.9 | 41.8 | 117°20.9 | 59.5 | |
| 6 | 141°23.3 | 300°57.7 | S10°50.4 | 354°22.7 | N15°14.4 | 353°20.1 | N13°41.7 | 132°23.5 | N00°59.5 | |
| 7 | 156°25.8 | 316°00.1 | 49.7 | 9°24.0 | 14.1 | 8°22.3 | 41.6 | 147°26.1 | 59.5 | |
| 8 | 171°28.2 | 331°02.5 | 49.1 | 24°25.3 | 13.8 | 23°24.6 | 41.6 | 162°28.7 | 59.4 | |
| 9 | 186°30.7 | 346°04.9 | · · 48.5 | 39°26.7 | · · 13.4 | 38°26.8 | · · 41.5 | 177°31.3 | · · 59.4 | |
| 10 | 201°33.2 | 1°07.3 | 47.9 | 54°28.0 | 13.1 | 53°29.1 | 41.4 | 192°33.8 | 59.3 | |
| 11 | 216°35.6 | 16°09.7 | 47.3 | 69°29.3 | 12.8 | 68°31.3 | 41.4 | 207°36.4 | 59.3 | |
| 12 | 231°38.1 | 31°12.1 | S10°46.7 | 84°30.6 | N15°12.4 | 83°33.5 | N13°41.3 | 222°39.0 | N00°59.3 | |
| 13 | 246°40.5 | 46°14.4 | 46.1 | 99°31.9 | 12.1 | 98°35.8 | 41.2 | 237°41.6 | 59.2 | |
| 14 | 261°43.0 | 61°16.8 | 45.5 | 114°33.3 | 11.8 | 113°38.0 | 41.1 | 252°44.2 | 59.2 | |
| 15 | 276°45.5 | 76°19.2 | · · 44.8 | 129°34.6 | · · 11.4 | 128°40.2 | · · 41.1 | 267°46.7 | · · 59.1 | |
| 16 | 291°47.9 | 91°21.6 | 44.2 | 144°35.9 | 11.1 | 143°42.5 | 41.0 | 282°49.3 | 59.1 | |
| 17 | 306°50.4 | 106°23.9 | 43.6 | 159°37.2 | 10.8 | 158°44.7 | 40.9 | 297°51.9 | 59.1 | |
| 18 | 321°52.9 | 121°26.3 | S10°43.0 | 174°38.5 | N15°10.4 | 173°46.9 | N13°40.9 | 312°54.5 | N00°59.0 | |
| 19 | 336°55.3 | 136°28.6 | 42.5 | 189°39.9 | 10.1 | 188°49.2 | 40.8 | 327°57.0 | 59.0 | |
| 20 | 351°57.8 | 151°31.0 | 41.9 | 204°41.2 | 09.8 | 203°51.4 | 40.7 | 342°59.6 | 58.9 | |
| 21 | 7°00.3 | 166°33.3 | · · 41.3 | 219°42.5 | · · 09.5 | 218°53.7 | · · 40.7 | 358°02.2 | · · 58.9 | |
| 22 | 22°02.7 | 181°35.7 | 40.7 | 234°43.8 | 09.1 | 233°55.9 | 40.6 | 13°04.8 | 58.9 | |
| 23 | 37°05.2 | 196°38.0 | 40.1 | 249°45.1 | 08.8 | 248°58.1 | 40.5 | 28°07.3 | 58.8 | |
| Mer.pass. 20:32 | | ν2.4' d-0.6' m-4.74 | | ν1.3' d-0.3' m0.73 | | ν2.2' d-0.1' m-2.07 | | ν2.6' d-0.0' m0.51 | | |

| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------|----------|--------------------------|----------|-------------------------|----------|--------------------------|----------|-------------------------|----------|
| 0 | 52°07.6 | 211°40.4 | S10°39.5 | 264°46.5 | N15°08.5 | 264°00.4 | N13°40.5 | 43°09.9 | N00°58.8 |
| 1 | 67°10.1 | 226°42.7 | 38.9 | 279°47.8 | 08.1 | 279°02.6 | 40.4 | 58°12.5 | 58.7 |
| 2 | 82°12.6 | 241°45.0 | 38.3 | 294°49.1 | 07.8 | 294°04.9 | 40.3 | 73°15.1 | 58.7 |
| 3 | 97°15.0 | 256°47.4 | •• 37.8 | 309°50.4 | •• 07.5 | 309°07.1 | •• 40.2 | 88°17.7 | •• 58.7 |
| 4 | 112°17.5 | 271°49.7 | 37.2 | 324°51.8 | 07.1 | 324°09.3 | 40.2 | 103°20.2 | 58.6 |
| 5 | 127°20.0 | 286°52.0 | 36.6 | 339°53.1 | 06.8 | 339°11.6 | 40.1 | 118°22.8 | 58.6 |
| 6 | 142°22.4 | 301°54.3 | S10°36.0 | 354°54.4 | N15°06.5 | 354°13.8 | N13°40.0 | 133°25.4 | N00°58.5 |
| 7 | 157°24.9 | 316°56.7 | 35.5 | 9°55.7 | 06.1 | 9°16.1 | 40.0 | 148°28.0 | 58.5 |
| 8 | 172°27.4 | 331°59.0 | 34.9 | 24°57.1 | 05.8 | 24°18.3 | 39.9 | 163°30.5 | 58.5 |
| 9 | 187°29.8 | 347°01.3 | •• 34.3 | 39°58.4 | •• 05.5 | 39°20.6 | •• 39.8 | 178°33.1 | •• 58.4 |
| 10 | 202°32.3 | 2°03.6 | 33.7 | 54°59.7 | 05.2 | 54°22.8 | 39.8 | 193°35.7 | 58.4 |
| 11 | 217°34.8 | 17°05.9 | 33.2 | 70°01.1 | 04.8 | 69°25.0 | 39.7 | 208°38.3 | 58.3 |
| 12 | 232°37.2 | 32°08.2 | S10°32.6 | 85°02.4 | N15°04.5 | 84°27.3 | N13°39.6 | 223°40.8 | N00°58.3 |
| 13 | 247°39.7 | 47°10.4 | 32.1 | 100°03.7 | 04.2 | 99°29.5 | 39.6 | 238°43.4 | 58.3 |
| 14 | 262°42.1 | 62°12.7 | 31.5 | 115°05.0 | 03.8 | 114°31.8 | 39.5 | 253°46.0 | 58.2 |
| 15 | 277°44.6 | 77°15.0 | •• 30.9 | 130°06.4 | •• 03.5 | 129°34.0 | •• 39.4 | 268°48.6 | •• 58.2 |
| 16 | 292°47.1 | 92°17.3 | 30.4 | 145°07.7 | 03.2 | 144°36.3 | 39.4 | 283°51.1 | 58.2 |
| 17 | 307°49.5 | 107°19.6 | 29.8 | 160°09.0 | 02.9 | 159°38.5 | 39.3 | 298°53.7 | 58.1 |
| 18 | 322°52.0 | 122°21.8 | S10°29.3 | 175°10.4 | N15°02.5 | 174°40.7 | N13°39.2 | 313°56.3 | N00°58.1 |
| 19 | 337°54.5 | 137°24.1 | 28.7 | 190°11.7 | 02.2 | 189°43.0 | 39.2 | 328°58.8 | 58.0 |
| 20 | 352°56.9 | 152°26.4 | 28.2 | 205°13.0 | 01.9 | 204°45.2 | 39.1 | 344°01.4 | 58.0 |
| 21 | 7°59.4 | 167°28.6 | •• 27.7 | 220°14.4 | •• 01.5 | 219°47.5 | •• 39.0 | 359°04.0 | •• 58.0 |
| 22 | 23°01.9 | 182°30.9 | 27.1 | 235°15.7 | 01.2 | 234°49.7 | 39.0 | 14°06.6 | 57.9 |
| 23 | 38°04.3 | 197°33.1 | 26.6 | 250°17.0 | 00.9 | 249°52.0 | 38.9 | 29°09.1 | 57.9 |
| Mer.pass. | 20:28 | $\nu 2.3' d-0.6' m-4.77$ | | $\nu 1.3' d-0.3' m0.72$ | | $\nu 2.2' d-0.1' m-2.07$ | | $\nu 2.6' d-0.0' m0.52$ | |

| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------|----------|--------------------------|----------|-------------------------|----------|--------------------------|----------|-------------------------|----------|
| 0 | 53°06.8 | 212°35.4 | S10°26.0 | 265°18.4 | N15°00.6 | 264°54.2 | N13°38.8 | 44°11.7 | N00°57.9 |
| 1 | 68°09.3 | 227°37.6 | 25.5 | 280°19.7 | 15°00.2 | 279°56.5 | 38.8 | 59°14.3 | 57.8 |
| 2 | 83°11.7 | 242°39.9 | 25.0 | 295°21.0 | 14°59.9 | 294°58.7 | 38.7 | 74°16.9 | 57.8 |
| 3 | 98°14.2 | 257°42.1 | •• 24.4 | 310°22.4 | •• 59.6 | 310°01.0 | •• 38.6 | 89°19.4 | •• 57.7 |
| 4 | 113°16.6 | 272°44.4 | 23.9 | 325°23.7 | 59.2 | 325°03.2 | 38.6 | 104°22.0 | 57.7 |
| 5 | 128°19.1 | 287°46.6 | 23.4 | 340°25.1 | 58.9 | 340°05.4 | 38.5 | 119°24.6 | 57.7 |
| 6 | 143°21.6 | 302°48.8 | S10°22.8 | 355°26.4 | N14°58.6 | 355°07.7 | N13°38.4 | 134°27.1 | N00°57.6 |
| 7 | 158°24.0 | 317°51.0 | 22.3 | 10°27.7 | 58.3 | 10°09.9 | 38.4 | 149°29.7 | 57.6 |
| 8 | 173°26.5 | 332°53.2 | 21.8 | 25°29.1 | 57.9 | 25°12.2 | 38.3 | 164°32.3 | 57.6 |
| 9 | 188°29.0 | 347°55.5 | •• 21.3 | 40°30.4 | •• 57.6 | 40°14.4 | •• 38.2 | 179°34.9 | •• 57.5 |
| 10 | 203°31.4 | 2°57.7 | 20.8 | 55°31.7 | 57.3 | 55°16.7 | 38.2 | 194°37.4 | 57.5 |
| 11 | 218°33.9 | 17°59.9 | 20.2 | 70°33.1 | 56.9 | 70°18.9 | 38.1 | 209°40.0 | 57.4 |
| 12 | 233°36.4 | 33°02.1 | S10°19.7 | 85°34.4 | N14°56.6 | 85°21.2 | N13°38.1 | 224°42.6 | N00°57.4 |
| 13 | 248°38.8 | 48°04.3 | 19.2 | 100°35.8 | 56.3 | 100°23.4 | 38.0 | 239°45.1 | 57.4 |
| 14 | 263°41.3 | 63°06.5 | 18.7 | 115°37.1 | 56.0 | 115°25.7 | 37.9 | 254°47.7 | 57.3 |
| 15 | 278°43.8 | 78°08.7 | •• 18.2 | 130°38.4 | •• 55.6 | 130°27.9 | •• 37.9 | 269°50.3 | •• 57.3 |
| 16 | 293°46.2 | 93°10.9 | 17.7 | 145°39.8 | 55.3 | 145°30.2 | 37.8 | 284°52.9 | 57.3 |
| 17 | 308°48.7 | 108°13.1 | 17.2 | 160°41.1 | 55.0 | 160°32.4 | 37.7 | 299°55.4 | 57.2 |
| 18 | 323°51.1 | 123°15.2 | S10°16.7 | 175°42.5 | N14°54.7 | 175°34.7 | N13°37.7 | 314°58.0 | N00°57.2 |
| 19 | 338°53.6 | 138°17.4 | 16.2 | 190°43.8 | 54.3 | 190°36.9 | 37.6 | 330°00.6 | 57.1 |
| 20 | 353°56.1 | 153°19.6 | 15.7 | 205°45.2 | 54.0 | 205°39.2 | 37.5 | 345°03.1 | 57.1 |
| 21 | 8°58.5 | 168°21.8 | •• 15.2 | 220°46.5 | •• 53.7 | 220°41.4 | •• 37.5 | 0°05.7 | •• 57.1 |
| 22 | 24°01.0 | 183°23.9 | 14.7 | 235°47.9 | 53.4 | 235°43.7 | 37.4 | 15°08.3 | 57.0 |
| 23 | 39°03.5 | 198°26.1 | 14.2 | 250°49.2 | 53.0 | 250°46.0 | 37.3 | 30°10.9 | 57.0 |
| Mer.pass. | 20:24 | $\nu 2.2' d-0.5' m-4.80$ | | $\nu 1.3' d-0.3' m0.71$ | | $\nu 2.2' d-0.1' m-2.08$ | | $\nu 2.6' d-0.0' m0.52$ | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.0 | 29°14.6 |
| Ankaa | 353°05.4 | -42°09.6 |
| Schedar | 349°28.9 | 56°41.4 |
| Diphda | 348°45.5 | -17°50.3 |
| Achernar | 335°18.5 | -57°06.1 |
| Hamal | 327°49.2 | 23°35.5 |
| Polaris | 312°44.1 | 89°22.7 |
| Acamar | 315°10.2 | -40°11.7 |
| Menkar | 314°04.2 | 4°11.8 |
| Mirfak | 308°25.6 | 49°57.5 |
| Aldebaran | 290°37.6 | 16°33.9 |
| Rigel | 281°02.1 | -8°10.1 |
| Capella | 280°19.2 | 46°01.4 |
| Bellatrix | 278°21.0 | 6°22.5 |
| Elnath | 277°59.6 | 28°37.8 |
| Alnilam | 275°35.9 | -1°11.0 |
| Betelgeuse | 270°50.2 | 7°24.8 |
| Canopus | 263°51.3 | -52°42.3 |
| Sirius | 258°24.7 | -16°45.0 |
| Adhara | 255°04.4 | -29°00.3 |
| Procyon | 244°49.1 | 5°09.4 |
| Pollux | 243°15.3 | 27°57.6 |
| Avior | 234°13.9 | -59°35.4 |
| Suhail | 222°45.2 | -43°32.2 |
| Miaplacidus | 221°37.9 | -69°49.3 |
| Alphard | 217°46.3 | -8°46.4 |
| Regulus | 207°32.9 | 11°50.1 |
| Dubhe | 193°39.5 | 61°36.1 |
| Denebola | 182°23.6 | 14°25.3 |
| Gienah | 175°42.3 | -17°41.4 |
| Acrux | 172°58.9 | -63°14.7 |
| Gacrux | 171°50.4 | -57°15.6 |
| Alioth | 166°12.1 | 55°48.7 |
| Spica | 158°21.0 | -11°18.0 |
| Alkaid | 152°51.3 | 49°10.6 |
| Hadar | 148°34.5 | -60°30.0 |
| Menkent | 147°56.2 | -36°30.0 |
| Arcturus | 145°46.9 | 19°02.5 |
| Rigel Kent. | 139°38.9 | -60°56.7 |
| Kochab | 137°21.1 | 74°02.6 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.5 |
| Antares | 112°14.3 | -26°29.4 |
| Atria | 107°07.7 | -69°04.6 |
| Sabik | 102°01.4 | -15°45.4 |
| Shaula | 96°08.7 | -37°07.4 |
| Rasalhague | 95°57.4 | 12°32.5 |
| Eltanin | 90°41.9 | 51°29.3 |
| Kaus Aust. | 83°30.8 | -34°22.3 |
| Vega | 80°32.5 | 38°48.7 |
| Nunki | 75°46.1 | -26°15.8 |
| Altair | 61°58.6 | 8°56.5 |
| Peacock | 53°03.5 | -56°39.1 |
| Deneb | 49°24.9 | 45°22.9 |
| Enif | 33°37.3 | 10°00.1 |
| Al Na'ir | 27°31.0 | -46°50.0 |
| Fomalhaut | 15°12.7 | -29°28.8 |
| Scheat | 13°43.6 | 28°14.0 |
| Markab | 13°28.3 | 15°21.2 |

| Nov 12 Thu | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 159°34.7 | 09:56 |
| Mars | 213°06.3 | 06:22 |
| Jupiter | 211°58.2 | 06:27 |
| Saturn | 350°59.5 | 21:08 |

| Nov 13 Fri | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 159°32.7 | 09:52 |
| Mars | 212°38.8 | 06:20 |
| Jupiter | 211°52.7 | 06:23 |
| Saturn | 351°02.3 | 21:04 |

| Nov 14 Sat | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 159°28.6 | 09:48 |
| Mars | 212°11.6 | 06:18 |
| Jupiter | 211°47.4 | 06:19 |
| Saturn | 351°04.9 | 21:00 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.4 |
| Mars: | 0.1 |

| h | Sun | | | Moon | | | |
|----|----------|----------|--|----------|-------|----------|-------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 183°58.8 | S17°38.1 | | 152°34.8 | 9.8' | S27°35.9 | 1.2' |
| 1 | 198°58.7 | 38.8 | | 167°03.7 | 9.8' | 27°37.1 | 1.1' |
| 2 | 213°58.6 | 39.5 | | 181°32.5 | 9.8' | 27°38.2 | 1.0' |
| 3 | 228°58.6 | 40.2 | | 196°01.3 | 9.8' | 27°39.1 | 0.8' |
| 4 | 243°58.5 | 40.8 | | 210°30.1 | 9.8' | 27°40.0 | 0.7' |
| 5 | 258°58.4 | 41.5 | | 224°59.0 | 9.8' | 27°40.6 | 0.5' |
| 6 | 273°58.3 | S17°42.2 | | 239°27.8 | 9.9' | S27°41.2 | 0.4' |
| 7 | 288°58.2 | 42.9 | | 253°56.7 | 9.9' | 27°41.6 | 0.3' |
| 8 | 303°58.2 | 43.5 | | 268°25.5 | 9.9' | 27°41.9 | 0.1' |
| 9 | 318°58.1 | 44.2 | | 282°54.4 | 9.9' | 27°42.0 | 0.0' |
| 10 | 333°58.0 | 44.9 | | 297°23.3 | 9.9' | 27°42.0 | -0.1' |
| 11 | 348°57.9 | 45.6 | | 311°52.2 | 9.9' | 27°41.9 | -0.3' |
| 12 | 3°57.8 | S17°46.2 | | 326°21.1 | 9.9' | S27°41.6 | -0.4' |
| 13 | 18°57.8 | 46.9 | | 340°50.0 | 9.9' | 27°41.2 | -0.5' |
| 14 | 33°57.7 | 47.6 | | 355°18.9 | 10.0' | 27°40.7 | -0.7' |
| 15 | 48°57.6 | 48.3 | | 9°47.9 | 10.0' | 27°40.0 | -0.8' |
| 16 | 63°57.5 | 48.9 | | 24°16.9 | 10.0' | 27°39.2 | -0.9' |
| 17 | 78°57.4 | 49.6 | | 38°45.9 | 10.0' | 27°38.3 | -1.1' |
| 18 | 93°57.4 | S17°50.3 | | 53°14.9 | 10.0' | S27°37.2 | -1.2' |
| 19 | 108°57.3 | 50.9 | | 67°43.9 | 10.1' | 27°36.0 | -1.3' |
| 20 | 123°57.2 | 51.6 | | 82°13.0 | 10.1' | 27°34.6 | -1.5' |
| 21 | 138°57.1 | 52.3 | | 96°42.0 | 10.1' | 27°33.2 | -1.6' |
| 22 | 153°57.0 | 52.9 | | 111°11.1 | 10.1' | 27°31.6 | -1.7' |
| 23 | 168°56.9 | 53.6 | | 125°40.3 | 10.2' | 27°29.8 | -1.9' |

SD = 16.1' $d = 0.7'$

SD = 14.8'

| Fri | Sun | | | Moon | | | |
|-----|----------|----------|--|----------|-------|----------|-------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 183°56.9 | S17°54.3 | | 140°09.4 | 10.2' | S27°27.9 | -2.0' |
| 1 | 198°56.8 | 54.9 | | 154°38.6 | 10.2' | 27°25.9 | -2.1' |
| 2 | 213°56.7 | 55.6 | | 169°07.8 | 10.2' | 27°23.8 | -2.3' |
| 3 | 228°56.6 | 56.3 | | 183°37.0 | 10.3' | 27°21.5 | -2.4' |
| 4 | 243°56.5 | 56.9 | | 198°06.3 | 10.3' | 27°19.1 | -2.5' |
| 5 | 258°56.4 | 57.6 | | 212°35.6 | 10.3' | 27°16.6 | -2.7' |
| 6 | 273°56.3 | S17°58.3 | | 227°04.9 | 10.4' | S27°13.9 | -2.8' |
| 7 | 288°56.2 | 58.9 | | 241°34.3 | 10.4' | 27°11.2 | -2.9' |
| 8 | 303°56.2 | 59.6 | | 256°03.7 | 10.4' | 27°08.2 | -3.0' |
| 9 | 318°56.1 | 60.3 | | 270°33.2 | 10.5' | 27°05.2 | -3.2' |
| 10 | 333°56.0 | 60.9 | | 285°02.6 | 10.5' | 27°02.0 | -3.3' |
| 11 | 348°55.9 | 61.6 | | 299°32.1 | 10.5' | 26°58.7 | -3.4' |
| 12 | 3°55.8 | S18°02.2 | | 314°01.7 | 10.6' | S26°55.3 | -3.6' |
| 13 | 18°55.7 | 62.9 | | 328°31.3 | 10.6' | 26°51.7 | -3.7' |
| 14 | 33°55.6 | 63.6 | | 343°00.9 | 10.7' | 26°48.1 | -3.8' |
| 15 | 48°55.5 | 64.2 | | 357°30.6 | 10.7' | 26°44.2 | -3.9' |
| 16 | 63°55.4 | 64.9 | | 12°00.3 | 10.7' | 26°40.3 | -4.1' |
| 17 | 78°55.4 | 65.5 | | 26°30.0 | 10.8' | 26°36.3 | -4.2' |
| 18 | 93°55.3 | S18°06.2 | | 40°59.8 | 10.8' | S26°32.1 | -4.3' |
| 19 | 108°55.2 | 66.9 | | 55°29.7 | 10.9' | 26°27.8 | -4.4' |
| 20 | 123°55.1 | 67.5 | | 69°59.5 | 10.9' | 26°23.3 | -4.6' |
| 21 | 138°55.0 | 68.2 | | 84°29.5 | 11.0' | 26°18.8 | -4.7' |
| 22 | 153°54.9 | 68.8 | | 98°59.4 | 11.0' | 26°14.1 | -4.8' |
| 23 | 168°54.8 | 69.5 | | 113°29.4 | 11.1' | 26°09.3 | -4.9' |

SD = 16.2' $d = 0.7'$

SD = 14.7'

| Sat | Sun | | | Moon | | | |
|-----|----------|----------|--|----------|-------|----------|-------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 183°54.7 | S18°10.1 | | 127°59.5 | 11.1' | S26°04.4 | -5.0' |
| 1 | 198°54.6 | 10.8 | | 142°29.6 | 11.2' | 25°59.4 | -5.2' |
| 2 | 213°54.5 | 11.4 | | 156°59.8 | 11.2' | 25°54.2 | -5.3' |
| 3 | 228°54.4 | 12.1 | | 171°30.0 | 11.3' | 25°48.9 | -5.4' |
| 4 | 243°54.3 | 12.7 | | 186°00.2 | 11.3' | 25°43.5 | -5.5' |
| 5 | 258°54.2 | 13.4 | | 200°30.5 | 11.4' | 25°38.0 | -5.6' |
| 6 | 273°54.1 | S18°14.0 | | 215°00.9 | 11.4' | S25°32.4 | -5.7' |
| 7 | 288°54.0 | 14.7 | | 229°31.3 | 11.5' | 25°26.6 | -5.9' |
| 8 | 303°53.9 | 15.4 | | 244°01.7 | 11.5' | 25°20.8 | -6.0' |
| 9 | 318°53.8 | 16.0 | | 258°32.2 | 11.6' | 25°14.8 | -6.1' |
| 10 | 333°53.8 | 16.6 | | 273°02.8 | 11.6' | 25°08.7 | -6.2' |
| 11 | 348°53.7 | 17.3 | | 287°33.4 | 11.7' | 25°02.5 | -6.3' |
| 12 | 3°53.6 | S18°17.9 | | 302°04.1 | 11.7' | S24°56.2 | -6.4' |
| 13 | 18°53.5 | 18.6 | | 316°34.8 | 11.8' | 24°49.7 | -6.5' |
| 14 | 33°53.4 | 19.2 | | 331°05.5 | 11.8' | 24°43.2 | -6.7' |
| 15 | 48°53.3 | 19.9 | | 345°36.3 | 11.9' | 24°36.5 | -6.8' |
| 16 | 63°53.2 | 20.5 | | 0°07.2 | 11.9' | 24°29.7 | -6.9' |
| 17 | 78°53.1 | 21.2 | | 14°38.1 | 12.0' | 24°22.8 | -7.0' |
| 18 | 93°53.0 | S18°21.8 | | 29°09.1 | 12.0' | S24°15.9 | -7.1' |
| 19 | 108°52.9 | 22.5 | | 43°40.1 | 12.1' | 24°08.8 | -7.2' |
| 20 | 123°52.8 | 23.1 | | 58°11.2 | 12.1' | 24°01.5 | -7.3' |
| 21 | 138°52.7 | 23.7 | | 72°42.3 | 12.2' | 23°54.2 | -7.4' |
| 22 | 153°52.6 | 24.4 | | 87°13.5 | 12.2' | 23°46.8 | -7.5' |
| 23 | 168°52.5 | 25.0 | | 101°44.8 | 12.3' | 23°39.3 | -7.6' |

SD = 16.2' $d = 0.7'$

SD = 14.7'

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 06:52 | 08:25 | 10:33 | 12:54 | 15:03 | 16:35 |
| N 70° | 06:43 | 08:04 | 09:37 | 13:51 | 15:24 | 16:44 |
| 68° | 06:35 | 07:47 | 09:03 | 14:24 | 15:40 | 16:52 |
| 66° | 06:28 | 07:34 | 08:40 | 14:48 | 15:54 | 16:59 |
| 64° | 06:23 | 07:22 | 08:21 | 15:07 | 16:05 | 17:05 |
| 62° | 06:18 | 07:13 | 08:06 | 15:22 | 16:15 | 17:10 |
| 60° | 06:13 | 07:04 | 07:53 | 15:35 | 16:23 | 17:15 |
| N 58° | 06:09 | 06:57 | 07:42 | 15:46 | 16:31 | 17:19 |
| 56° | 06:05 | 06:50 | 07:32 | 15:56 | 16:37 | 17:23 |
| 54° | 06:01 | 06:44 | 07:24 | 16:04 | 16:43 | 17:26 |
| 52° | 05:58 | 06:39 | 07:16 | 16:12 | 16:49 | 17:30 |
| 50° | 05:55 | 06:34 | 07:09 | 16:19 | 16:54 | 17:33 |
| 45° | 05:48 | 06:23 | 06:55 | 16:33 | 17:05 | 17:40 |
| N 40° | 05:41 | 06:14 | 06:43 | 16:45 | 17:14 | 17:47 |
| 35° | 05:35 | 06:06 | 06:32 | 16:56 | 17:23 | 17:53 |
| 30° | 05:29 | 05:58 | 06:23 | 17:05 | 17:30 | 17:59 |
| 20° | 05:18 | 05:45 | 06:08 | 17:21 | 17:44 | 18:10 |
| N 10° | 05:06 | 05:32 | 05:54 | 17:35 | 17:57 | 18:22 |
| 0° | 04:54 | 05:19 | 05:41 | 17:48 | 18:10 | 18:35 |
| S 10° | 04:39 | 05:05 | 05:28 | 18:01 | 18:23 | 18:49 |
| 20° | 04:22 | 04:50 | 05:13 | 18:15 | 18:39 | 19:07 |
| 30° | 04:00 | 04:31 | 04:57 | 18:32 | 18:58 | 19:29 |
| 35° | 03:46 | 04:20 | 04:47 | 18:42 | 19:10 | 19:43 |
| 40° | 03:29 | 04:06 | 04:36 | 18:53 | 19:23 | 20:01 |
| 45° | 03:07 | 03:50 | 04:23 | 19:06 | 19:40 | 20:23 |
| S 50° | 02:38 | 03:29 | 04:07 | 19:22 | 20:01 | 20:52 |
| 52° | 02:23 | 03:19 | 04:00 | 19:30 | 20:11 | 21:07 |
| 54° | 02:05 | 03:07 | 03:52 | 19:38 | 20:23 | 21:26 |
| 56° | 01:42 | 02:54 | 03:42 | 19:48 | 20:36 | 21:49 |
| 58° | 01:11 | 02:38 | 03:32 | 19:59 | 20:52 | 22:23 |
| S 60° | 00:03 | 02:19 | 03:19 | 20:11 | 21:12 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | ██ | ██ | ██ | ██ | ██ | ██ |
| N 70° | ██ | ██ | ██ | ██ | ██ | ██ |
| 68° | ██ | ██ | ██ | ██ | ██ | ██ |
| 66° | ██ | ██ | ██ | ██ | ██ | ██ |
| 64° | ██ | ██ | 14:40 | ██ | ██ | 17:28 |
| 62° | 13:46 | 13:58 | 13:57 | 14:53 | 16:28 | 18:11 |
| 60° | 12:39 | 13:13 | 13:28 | 16:00 | 17:12 | 18:39 |
| N 58° | 12:05 | 12:43 | 13:06 | 16:35 | 17:42 | 19:01 |
| 56° | 11:39 | 12:21 | 12:48 | 17:00 | 18:04 | 19:19 |
| 54° | 11:19 | 12:02 | 12:32 | 17:20 | 18:22 | 19:34 |
| 52° | 11:02 | 11:47 | 12:19 | 17:37 | 18:38 | 19:47 |
| 50° | 10:48 | 11:33 | 12:07 | 17:52 | 18:51 | 19:58 |
| 45° | 10:18 | 11:05 | 11:43 | 18:21 | 19:19 | 20:22 |
| N 40° | 09:55 | 10:43 | 11:23 | 18:44 | 19:40 | 20:40 |
| 35° | 09:36 | 10:25 | 11:07 | 19:03 | 19:58 | 20:56 |
| 30° | 09:20 | 10:09 | 10:53 | 19:19 | 20:13 | 21:10 |
| 20° | 08:53 | 09:43 | 10:28 | 19:46 | 20:39 | 21:33 |
| N 10° | 08:29 | 09:20 | 10:07 | 20:10 | 21:02 | 21:53 |
| 0° | 08:07 | 08:58 | 09:48 | 20:32 | 21:22 | 22:11 |
| S 10° | 07:45 | 08:37 | 09:28 | 20:54 | 21:43 | 22:29 |
| 20° | 07:21 | 08:14 | 09:07 | 21:17 | 22:05 | 22:49 |
| 30° | 06:54 | 07:47 | 08:42 | 21:44 | 22:31 | 23:11 |
| 35° | 06:38 | 07:31 | 08:28 | 22:00 | 22:46 | 23:25 |
| 40° | 06:19 | 07:13 | 08:11 | 22:19 | 23:03 | 23:40 |
| 45° | 05:56 | 06:50 | 07:51 | 22:42 | 23:24 | 23:58 |
| S 50° | 05:27 | 06:22 | 07:26 | 23:10 | 23:50 | |
| 52° | 05:13 | 06:08 | 07:13 | 23:24 | | 00:02 |
| 54° | 04:56 | 05:52 | 06:59 | 23:41 | | 00:17 |
| 56° | 04:36 | 05:33 | 06:43 | | 00:00 | 00:34 |
| 58° | 04:12 | 05:09 | 06:23 | | 00:24 | 00:54 |
| S 60° | 03:38 | 04:37 | 05:58 | 00:08 | 00:56 | 01:19 |

| Day | Sun | | | Moon | | |
|-----|---|--------------------------|-----------------------|-----------------------------|----------------|---------------------|
| | Eqn.of Time 00 ^h mm:ss | 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 3-5 7-19% |
| 12 | 15:55 | 15:51 | 11:44 | 14:19 | 01:54 | |
| 13 | 15:47 | 15:43 | 11:44 | 15:10 | 02:45 | |
| 14 | 15:39 | 15:34 | 11:44 | 16:00 | 03:35 | |

November 15, 16, 17 UT (Sun., Mon., Tue.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|--|
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | |
| 0 | 54°05.9 | 213°28.2 | S10°13.7 | 265°50.5 | N14°52.7 | 265°48.2 | N13°37.3 | 45°13.4 | N00°57.0 | |
| 1 | 69°08.4 | 228°30.4 | 13.2 | 280°51.9 | 52.4 | 280°50.5 | 37.2 | 60°16.0 | 56.9 | |
| 2 | 84°10.9 | 243°32.6 | 12.7 | 295°53.2 | 52.0 | 295°52.7 | 37.2 | 75°18.6 | 56.9 | |
| 3 | 99°13.3 | 258°34.7 | · · 12.3 | 310°54.6 | · · 51.7 | 310°55.0 | · · 37.1 | 90°21.1 | · · 56.9 | |
| 4 | 114°15.8 | 273°36.8 | 11.8 | 325°55.9 | 51.4 | 325°57.2 | 37.0 | 105°23.7 | 56.8 | |
| 5 | 129°18.3 | 288°39.0 | 11.3 | 340°57.3 | 51.1 | 340°59.5 | 37.0 | 120°26.3 | 56.8 | |
| 6 | 144°20.7 | 303°41.1 | S10°10.8 | 355°58.6 | N14°50.7 | 356°01.7 | N13°36.9 | 135°28.8 | N00°56.8 | |
| 7 | 159°23.2 | 318°43.3 | 10.3 | 11°00.0 | 50.4 | 11°04.0 | 36.8 | 150°31.4 | 56.7 | |
| 8 | 174°25.6 | 333°45.4 | 09.9 | 26°01.3 | 50.1 | 26°06.2 | 36.8 | 165°34.0 | 56.7 | |
| 9 | 189°28.1 | 348°47.5 | · · 09.4 | 41°02.7 | · · 49.8 | 41°08.5 | · · 36.7 | 180°36.5 | · · 56.6 | |
| 10 | 204°30.6 | 3°49.6 | 08.9 | 56°04.0 | 49.4 | 56°10.7 | 36.6 | 195°39.1 | 56.6 | |
| 11 | 219°33.0 | 18°51.8 | 08.5 | 71°05.4 | 49.1 | 71°13.0 | 36.6 | 210°41.7 | 56.6 | |
| 12 | 234°35.5 | 33°53.9 | S10°08.0 | 86°06.7 | N14°48.8 | 86°15.3 | N13°36.5 | 225°44.2 | N00°56.5 | |
| 13 | 249°38.0 | 48°56.0 | 07.5 | 101°08.1 | 48.5 | 101°17.5 | 36.5 | 240°46.8 | 56.5 | |
| 14 | 264°40.4 | 63°58.1 | 07.1 | 116°09.4 | 48.1 | 116°19.8 | 36.4 | 255°49.4 | 56.5 | |
| 15 | 279°42.9 | 79°00.2 | · · 06.6 | 131°10.8 | · · 47.8 | 131°22.0 | · · 36.3 | 270°51.9 | · · 56.4 | |
| 16 | 294°45.4 | 94°02.3 | 06.2 | 146°12.2 | 47.5 | 146°24.3 | 36.3 | 285°54.5 | 56.4 | |
| 17 | 309°47.8 | 109°04.4 | 05.7 | 161°13.5 | 47.2 | 161°26.5 | 36.2 | 300°57.1 | 56.4 | |
| 18 | 324°50.3 | 124°06.5 | S10°05.3 | 176°14.9 | N14°46.8 | 176°28.8 | N13°36.1 | 315°59.7 | N00°56.3 | |
| 19 | 339°52.7 | 139°08.6 | 04.8 | 191°16.2 | 46.5 | 191°31.1 | 36.1 | 331°02.2 | 56.3 | |
| 20 | 354°55.2 | 154°10.7 | 04.3 | 206°17.6 | 46.2 | 206°33.3 | 36.0 | 346°04.8 | 56.3 | |
| 21 | 9°57.7 | 169°12.8 | · · 03.9 | 221°18.9 | · · 45.9 | 221°35.6 | · · 36.0 | 1°07.4 | · · 56.2 | |
| 22 | 25°00.1 | 184°14.8 | 03.5 | 236°20.3 | 45.5 | 236°37.8 | 35.9 | 16°09.9 | 56.2 | |
| 23 | 40°02.6 | 199°16.9 | 03.0 | 251°21.6 | 45.2 | 251°40.1 | 35.8 | 31°12.5 | 56.2 | |
| Mer.pass. 20:20 | | ν2.2' d-0.5' m-4.82 | | ν1.3' d-0.3' m0.69 | | ν2.3' d-0.1' m-2.09 | | ν2.6' d-0.0' m0.53 | | |

| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| 0 | 55°05.1 | 214°19.0 | S10°02.6 | 266°23.0 | N14°44.9 | 266°42.4 | N13°35.8 | 46°15.0 | N00°56.1 |
| 1 | 70°07.5 | 229°21.0 | 02.1 | 281°24.4 | 44.6 | 281°44.6 | 35.7 | 61°17.6 | 56.1 |
| 2 | 85°10.0 | 244°23.1 | 01.7 | 296°25.7 | 44.2 | 296°46.9 | 35.7 | 76°20.2 | 56.1 |
| 3 | 100°12.5 | 259°25.2 | •• 01.3 | 311°27.1 | •• 43.9 | 311°49.1 | •• 35.6 | 91°22.7 | •• 56.0 |
| 4 | 115°14.9 | 274°27.2 | 00.8 | 326°28.4 | 43.6 | 326°51.4 | 35.5 | 106°25.3 | 56.0 |
| 5 | 130°17.4 | 289°29.3 | 00.4 | 341°29.8 | 43.3 | 341°53.7 | 35.5 | 121°27.9 | 55.9 |
| 6 | 145°19.9 | 304°31.3 | S10°00.0 | 356°31.2 | N14°43.0 | 356°55.9 | N13°35.4 | 136°30.4 | N00°55.9 |
| 7 | 160°22.3 | 319°33.4 | 09°59.5 | 11°32.5 | 42.6 | 11°58.2 | 35.3 | 151°33.0 | 55.9 |
| 8 | 175°24.8 | 334°35.4 | 59.1 | 26°33.9 | 42.3 | 27°00.4 | 35.3 | 166°35.6 | 55.8 |
| 9 | 190°27.2 | 349°37.5 | •• 58.7 | 41°35.2 | •• 42.0 | 42°02.7 | •• 35.2 | 181°38.1 | •• 55.8 |
| 10 | 205°29.7 | 4°39.5 | 58.3 | 56°36.6 | 41.7 | 57°05.0 | 35.2 | 196°40.7 | 55.8 |
| 11 | 220°32.2 | 19°41.5 | 57.9 | 71°38.0 | 41.3 | 72°07.2 | 35.1 | 211°43.3 | 55.7 |
| 12 | 235°34.6 | 34°43.6 | S09°57.4 | 86°39.3 | N14°41.0 | 87°09.5 | N13°35.0 | 226°45.8 | N00°55.7 |
| 13 | 250°37.1 | 49°45.6 | 57.0 | 101°40.7 | 40.7 | 102°11.8 | 35.0 | 241°48.4 | 55.7 |
| 14 | 265°39.6 | 64°47.6 | 56.6 | 116°42.1 | 40.4 | 117°14.0 | 34.9 | 256°51.0 | 55.6 |
| 15 | 280°42.0 | 79°49.6 | •• 56.2 | 131°43.4 | •• 40.0 | 132°16.3 | •• 34.9 | 271°53.5 | •• 55.6 |
| 16 | 295°44.5 | 94°51.6 | 55.8 | 146°44.8 | 39.7 | 147°18.5 | 34.8 | 286°56.1 | 55.6 |
| 17 | 310°47.0 | 109°53.7 | 55.4 | 161°46.2 | 39.4 | 162°20.8 | 34.7 | 301°58.7 | 55.5 |
| 18 | 325°49.4 | 124°55.7 | S09°55.0 | 176°47.5 | N14°39.1 | 177°23.1 | N13°34.7 | 317°01.2 | N00°55.5 |
| 19 | 340°51.9 | 139°57.7 | 54.6 | 191°48.9 | 38.8 | 192°25.3 | 34.6 | 332°03.8 | 55.5 |
| 20 | 355°54.4 | 154°59.7 | 54.2 | 206°50.3 | 38.4 | 207°27.6 | 34.6 | 347°06.3 | 55.4 |
| 21 | 10°56.8 | 170°01.7 | •• 53.8 | 221°51.6 | •• 38.1 | 222°29.9 | •• 34.5 | 2°08.9 | •• 55.4 |
| 22 | 25°59.3 | 185°03.7 | 53.4 | 236°53.0 | 37.8 | 237°32.1 | 34.4 | 17°11.5 | 55.4 |
| 23 | 41°01.7 | 200°05.7 | 53.0 | 251°54.4 | 37.5 | 252°34.4 | 34.4 | 32°14.0 | 55.3 |
| Mer.pass. 20:16 | | ν2.1' d-0.4' m-4.84 | | ν1.4' d-0.3' m0.68 | | ν2.3' d-0.1' m-2.09 | | ν2.6' d-0.0' m0.53 | |

| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| 0 | 56°04.2 | 215°07.6 | S09°52.6 | 266°55.7 | N14°37.2 | 267°36.7 | N13°34.3 | 47°16.6 | N00°55.3 |
| 1 | 71°06.7 | 230°09.6 | 52.2 | 281°57.1 | 36.8 | 282°38.9 | 34.3 | 62°19.2 | 55.3 |
| 2 | 86°09.1 | 245°11.6 | 51.8 | 296°58.5 | 36.5 | 297°41.2 | 34.2 | 77°21.7 | 55.2 |
| 3 | 101°11.6 | 260°13.6 | •• 51.4 | 311°59.8 | •• 36.2 | 312°43.5 | •• 34.1 | 92°24.3 | •• 55.2 |
| 4 | 116°14.1 | 275°15.6 | 51.0 | 327°01.2 | 35.9 | 327°45.7 | 34.1 | 107°26.8 | 55.2 |
| 5 | 131°16.5 | 290°17.5 | 50.6 | 342°02.6 | 35.5 | 342°48.0 | 34.0 | 122°29.4 | 55.1 |
| 6 | 146°19.0 | 305°19.5 | S09°50.3 | 357°04.0 | N14°35.2 | 357°50.3 | N13°34.0 | 137°32.0 | N00°55.1 |
| 7 | 161°21.5 | 320°21.4 | 49.9 | 12°05.3 | 34.9 | 12°52.5 | 33.9 | 152°34.5 | 55.1 |
| 8 | 176°23.9 | 335°23.4 | 49.5 | 27°06.7 | 34.6 | 27°54.8 | 33.9 | 167°37.1 | 55.0 |
| 9 | 191°26.4 | 350°25.4 | •• 49.1 | 42°08.1 | •• 34.3 | 42°57.1 | •• 33.8 | 182°39.7 | •• 55.0 |
| 10 | 206°28.8 | 5°27.3 | 48.8 | 57°09.5 | 33.9 | 57°59.3 | 33.7 | 197°42.2 | 55.0 |
| 11 | 221°31.3 | 20°29.3 | 48.4 | 72°10.8 | 33.6 | 73°01.6 | 33.7 | 212°44.8 | 55.0 |
| 12 | 236°33.8 | 35°31.2 | S09°48.0 | 87°12.2 | N14°33.3 | 88°03.9 | N13°33.6 | 227°47.3 | N00°54.9 |
| 13 | 251°36.2 | 50°33.2 | 47.7 | 102°13.6 | 33.0 | 103°06.2 | 33.6 | 242°49.9 | 54.9 |
| 14 | 266°38.7 | 65°35.1 | 47.3 | 117°15.0 | 32.7 | 118°08.4 | 33.5 | 257°52.5 | 54.9 |
| 15 | 281°41.2 | 80°37.0 | •• 46.9 | 132°16.3 | •• 32.3 | 133°10.7 | •• 33.4 | 272°55.0 | •• 54.8 |
| 16 | 296°43.6 | 95°39.0 | 46.6 | 147°17.7 | 32.0 | 148°13.0 | 33.4 | 287°57.6 | 54.8 |
| 17 | 311°46.1 | 110°40.9 | 46.2 | 162°19.1 | 31.7 | 163°15.2 | 33.3 | 303°00.1 | 54.8 |
| 18 | 326°48.6 | 125°42.8 | S09°45.9 | 177°20.5 | N14°31.4 | 178°17.5 | N13°33.3 | 318°02.7 | N00°54.7 |
| 19 | 341°51.0 | 140°44.7 | 45.5 | 192°21.8 | 31.1 | 193°19.8 | 33.2 | 333°05.3 | 54.7 |
| 20 | 356°53.5 | 155°46.6 | 45.1 | 207°23.2 | 30.7 | 208°22.1 | 33.2 | 348°07.8 | 54.7 |
| 21 | 11°56.0 | 170°48.6 | •• 44.8 | 222°24.6 | •• 30.4 | 223°24.3 | •• 33.1 | 3°10.4 | •• 54.6 |
| 22 | 26°58.4 | 185°50.5 | 44.4 | 237°26.0 | 30.1 | 238°26.6 | 33.0 | 18°12.9 | 54.6 |
| 23 | 42°00.9 | 200°52.4 | 44.1 | 252°27.4 | 29.8 | 253°28.9 | 33.0 | 33°15.5 | 54.6 |
| Mer.pass. 20:12 | | ν2.0' d-0.4' m-4.85 | | ν1.4' d-0.3' m0.67 | | ν2.3' d-0.1' m-2.10 | | ν2.6' d-0.0' m0.54 | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.0 | 29°14.6 |
| Ankaa | 353°05.4 | -42°09.6 |
| Schedar | 349°28.9 | 56°41.4 |
| Diphda | 348°45.5 | -17°50.3 |
| Achernar | 335°18.5 | -57°06.1 |
| Hamal | 327°49.1 | 23°35.5 |
| Polaris | 312°43.9 | 89°22.7 |
| Acamar | 315°10.2 | -40°11.7 |
| Menkar | 314°04.2 | 4°11.8 |
| Mirfak | 308°25.5 | 49°57.5 |
| Aldebaran | 290°37.5 | 16°33.9 |
| Rigel | 281°02.1 | -8°10.1 |
| Capella | 280°19.2 | 46°01.4 |
| Bellatrix | 278°21.0 | 6°22.5 |
| Elnath | 277°59.6 | 28°37.8 |
| Alnilam | 275°35.9 | -1°11.0 |
| Betelgeuse | 270°50.2 | 7°24.8 |
| Canopus | 263°51.3 | -52°42.3 |
| Sirius | 258°24.7 | -16°45.0 |
| Adhara | 255°04.4 | -29°00.3 |
| Procyon | 244°49.1 | 5°09.4 |
| Pollux | 243°15.3 | 27°57.6 |
| Avior | 234°13.9 | -59°35.4 |
| Suhail | 222°45.1 | -43°32.2 |
| Miaplacidus | 221°37.8 | -69°49.3 |
| Alphard | 217°46.2 | -8°46.4 |
| Regulus | 207°32.9 | 11°50.1 |
| Dubhe | 193°39.4 | 61°36.1 |
| Denebola | 182°23.6 | 14°25.3 |
| Gienah | 175°42.2 | -17°41.4 |
| Acrux | 172°58.9 | -63°14.7 |
| Gacrux | 171°50.4 | -57°15.6 |
| Alioth | 166°12.1 | 55°48.6 |
| Spica | 158°21.0 | -11°18.0 |
| Alkaid | 152°51.3 | 49°10.6 |
| Hadar | 148°34.4 | -60°30.0 |
| Menkent | 147°56.2 | -36°30.0 |
| Arcturus | 145°46.9 | 19°02.5 |
| Rigel Kent. | 139°38.8 | -60°56.7 |
| Kochab | 137°21.0 | 74°02.6 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.5 |
| Antares | 112°14.3 | -26°29.4 |
| Atria | 107°07.7 | -69°04.6 |
| Sabik | 102°01.4 | -15°45.4 |
| Shaula | 96°08.7 | -37°07.4 |
| Rasalhague | 95°57.4 | 12°32.5 |
| Eltanin | 90°41.9 | 51°29.3 |
| Kaus Aust. | 83°30.8 | -34°22.3 |
| Vega | 80°32.5 | 38°48.7 |
| Nunki | 75°46.1 | -26°15.8 |
| Altair | 61°58.6 | 8°56.5 |
| Peacock | 53°03.6 | -56°39.1 |
| Deneb | 49°24.9 | 45°22.9 |
| Enif | 33°37.3 | 10°00.1 |
| Al Na'ir | 27°31.0 | -46°50.0 |
| Fomalhaut | 15°12.7 | -29°28.8 |
| Scheat | 13°43.6 | 28°14.0 |
| Markab | 13°28.3 | 15°21.2 |

| Nov 15 Sun | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 159°22.3 | 09:45 |
| Mars | 211°44.6 | 06:16 |
| Jupiter | 211°42.3 | 06:16 |
| Saturn | 351°07.5 | 20:56 |

| Nov 16 Mon | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 159°13.9 | 09:41 |
| Mars | 211°17.9 | 06:14 |
| Jupiter | 211°37.3 | 06:12 |
| Saturn | 351°10.0 | 20:51 |

| Nov 17 Tue | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 159°03.4 | 09:38 |
| Mars | 210°51.5 | 06:12 |
| Jupiter | 211°32.5 | 06:09 |
| Saturn | 351°12.4 | 20:47 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.4 |
| Mars: | 0.1 |

| h | Sun | | | Moon | | | |
|-----------------------|----------|----------|------------|-------|----------|--------|-------|
| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 183°52.4 | S18°25.7 | 116°16.1 | 12.4' | S23°31.6 | -7.7' | 54.1' |
| 1 | 198°52.3 | 26.3 | 130°47.4 | 12.4' | 23°23.9 | -7.8' | 54.1' |
| 2 | 213°52.1 | 27.0 | 145°18.8 | 12.5' | 23°16.0 | -8.0' | 54.1' |
| 3 | 228°52.0 | · · 27.6 | 159°50.3 | 12.5' | 23°08.1 | -8.1' | 54.1' |
| 4 | 243°51.9 | 28.2 | 174°21.8 | 12.6' | 23°00.0 | -8.2' | 54.1' |
| 5 | 258°51.8 | 28.9 | 188°53.4 | 12.6' | 22°51.9 | -8.3' | 54.1' |
| 6 | 273°51.7 | S18°29.5 | 203°25.0 | 12.7' | S22°43.6 | -8.4' | 54.2' |
| 7 | 288°51.6 | 30.1 | 217°56.7 | 12.7' | 22°35.3 | -8.5' | 54.2' |
| 8 | 303°51.5 | 30.8 | 232°28.4 | 12.8' | 22°26.8 | -8.6' | 54.2' |
| 9 | 318°51.4 | · · 31.4 | 247°00.2 | 12.8' | 22°18.2 | -8.7' | 54.2' |
| 10 | 333°51.3 | 32.0 | 261°32.0 | 12.9' | 22°09.6 | -8.8' | 54.2' |
| 11 | 348°51.2 | 32.7 | 276°03.9 | 12.9' | 22°00.8 | -8.9' | 54.2' |
| 12 | 3°51.1 | S18°33.3 | 290°35.8 | 13.0' | S21°52.0 | -9.0' | 54.2' |
| 13 | 18°51.0 | 34.0 | 305°07.8 | 13.0' | 21°43.0 | -9.0' | 54.2' |
| 14 | 33°50.9 | 34.6 | 319°39.9 | 13.1' | 21°34.0 | -9.1' | 54.2' |
| 15 | 48°50.8 | · · 35.2 | 334°12.0 | 13.1' | 21°24.8 | -9.2' | 54.3' |
| 16 | 63°50.7 | 35.8 | 348°44.1 | 13.2' | 21°15.6 | -9.3' | 54.3' |
| 17 | 78°50.6 | 36.5 | 3°16.3 | 13.3' | 21°06.3 | -9.4' | 54.3' |
| 18 | 93°50.5 | S18°37.1 | 17°48.6 | 13.3' | S20°56.8 | -9.5' | 54.3' |
| 19 | 108°50.3 | 37.7 | 32°20.9 | 13.4' | 20°47.3 | -9.6' | 54.3' |
| 20 | 123°50.2 | 38.4 | 46°53.2 | 13.4' | 20°37.7 | -9.7' | 54.3' |
| 21 | 138°50.1 | · · 39.0 | 61°25.6 | 13.5' | 20°28.0 | -9.8' | 54.3' |
| 22 | 153°50.0 | 39.6 | 75°58.1 | 13.5' | 20°18.2 | -9.9' | 54.3' |
| 23 | 168°49.9 | 40.3 | 90°30.6 | 13.6' | 20°08.3 | -10.0' | 54.4' |
| SD = 16.2' $d = 0.6'$ | | | SD = 14.8' | | | | |

| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|------------|-------|----------|--------|-------|
| 0 | 183°49.8 | S18°40.9 | 105°03.1 | 13.6' | S19°58.4 | -10.1' | 54.4' |
| 1 | 198°49.7 | 41.5 | 119°35.7 | 13.6' | 19°48.3 | -10.1' | 54.4' |
| 2 | 213°49.6 | 42.1 | 134°08.4 | 13.7' | 19°38.2 | -10.2' | 54.4' |
| 3 | 228°49.5 | · · 42.8 | 148°41.1 | 13.7' | 19°27.9 | -10.3' | 54.4' |
| 4 | 243°49.3 | 43.4 | 163°13.8 | 13.8' | 19°17.6 | -10.4' | 54.4' |
| 5 | 258°49.2 | 44.0 | 177°46.6 | 13.8' | 19°07.2 | -10.5' | 54.5' |
| 6 | 273°49.1 | S18°44.6 | 192°19.5 | 13.9' | S18°56.7 | -10.6' | 54.5' |
| 7 | 288°49.0 | 45.3 | 206°52.4 | 13.9' | 18°46.1 | -10.7' | 54.5' |
| 8 | 303°48.9 | 45.9 | 221°25.3 | 14.0' | 18°35.5 | -10.7' | 54.5' |
| 9 | 318°48.8 | · · 46.5 | 235°58.3 | 14.0' | 18°24.7 | -10.8' | 54.5' |
| 10 | 333°48.7 | 47.1 | 250°31.3 | 14.1' | 18°13.9 | -10.9' | 54.5' |
| 11 | 348°48.6 | 47.7 | 265°04.3 | 14.1' | 18°03.0 | -11.0' | 54.6' |
| 12 | 3°48.4 | S18°48.4 | 279°37.4 | 14.1' | S17°52.0 | -11.1' | 54.6' |
| 13 | 18°48.3 | 49.0 | 294°10.6 | 14.2' | 17°41.0 | -11.1' | 54.6' |
| 14 | 33°48.2 | 49.6 | 308°43.8 | 14.2' | 17°29.8 | -11.2' | 54.6' |
| 15 | 48°48.1 | · · 50.2 | 323°17.0 | 14.3' | 17°18.6 | -11.3' | 54.6' |
| 16 | 63°48.0 | 50.8 | 337°50.3 | 14.3' | 17°07.3 | -11.4' | 54.6' |
| 17 | 78°47.9 | 51.5 | 352°23.6 | 14.3' | 16°55.9 | -11.5' | 54.7' |
| 18 | 93°47.7 | S18°52.1 | 6°56.9 | 14.4' | S16°44.4 | -11.5' | 54.7' |
| 19 | 108°47.6 | 52.7 | 21°30.3 | 14.4' | 16°32.9 | -11.6' | 54.7' |
| 20 | 123°47.5 | 53.3 | 36°03.7 | 14.5' | 16°21.3 | -11.7' | 54.7' |
| 21 | 138°47.4 | · · 53.9 | 50°37.2 | 14.5' | 16°09.6 | -11.8' | 54.7' |
| 22 | 153°47.3 | 54.5 | 65°10.7 | 14.5' | 15°57.9 | -11.8' | 54.8' |
| 23 | 168°47.1 | 55.1 | 79°44.2 | 14.6' | 15°46.0 | -11.9' | 54.8' |
| SD = 16.2' $d = 0.6'$ | | | SD = 14.8' | | | | |

| Tue | GHA | Dec | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|------------|-------|----------|--------|-------|
| 0 | 183°47.0 | S18°55.8 | 94°17.8 | 14.6' | S15°34.1 | -12.0' | 54.8' |
| 1 | 198°46.9 | 56.4 | 108°51.4 | 14.6' | 15°22.2 | -12.0' | 54.8' |
| 2 | 213°46.8 | 57.0 | 123°25.0 | 14.7' | 15°10.1 | -12.1' | 54.9' |
| 3 | 228°46.7 | · · 57.6 | 137°58.6 | 14.7' | 14°58.0 | -12.2' | 54.9' |
| 4 | 243°46.5 | 58.2 | 152°32.3 | 14.7' | 14°45.8 | -12.3' | 54.9' |
| 5 | 258°46.4 | 58.8 | 167°06.1 | 14.8' | 14°33.5 | -12.3' | 54.9' |
| 6 | 273°46.3 | S18°59.4 | 181°39.8 | 14.8' | S14°21.2 | -12.4' | 54.9' |
| 7 | 288°46.2 | 19°00.0 | 196°13.6 | 14.8' | 14°08.8 | -12.5' | 55.0' |
| 8 | 303°46.1 | 00.6 | 210°47.4 | 14.8' | 13°56.4 | -12.5' | 55.0' |
| 9 | 318°45.9 | · · 01.3 | 225°21.2 | 14.9' | 13°43.8 | -12.6' | 55.0' |
| 10 | 333°45.8 | 01.9 | 239°55.1 | 14.9' | 13°31.2 | -12.7' | 55.0' |
| 11 | 348°45.7 | 02.5 | 254°29.0 | 14.9' | 13°18.6 | -12.7' | 55.1' |
| 12 | 3°45.6 | S19°03.1 | 269°02.9 | 14.9' | S13°05.9 | -12.8' | 55.1' |
| 13 | 18°45.4 | 03.7 | 283°36.8 | 15.0' | 12°53.1 | -12.9' | 55.1' |
| 14 | 33°45.3 | 04.3 | 298°10.8 | 15.0' | 12°40.2 | -12.9' | 55.1' |
| 15 | 48°45.2 | · · 04.9 | 312°44.7 | 15.0' | 12°27.3 | -13.0' | 55.2' |
| 16 | 63°45.1 | 05.5 | 327°18.7 | 15.0' | 12°14.3 | -13.0' | 55.2' |
| 17 | 78°44.9 | 06.1 | 341°52.8 | 15.0' | 12°01.3 | -13.1' | 55.2' |
| 18 | 93°44.8 | S19°06.7 | 356°26.8 | 15.1' | S11°48.2 | -13.2' | 55.2' |
| 19 | 108°44.7 | 07.3 | 11°00.8 | 15.1' | 11°35.0 | -13.2' | 55.3' |
| 20 | 123°44.6 | 07.9 | 25°34.9 | 15.1' | 11°21.8 | -13.3' | 55.3' |
| 21 | 138°44.4 | · · 08.5 | 40°09.0 | 15.1' | 11°08.6 | -13.3' | 55.3' |
| 22 | 153°44.3 | 09.1 | 54°43.1 | 15.1' | 10°55.2 | -13.4' | 55.4' |
| 23 | 168°44.2 | 09.7 | 69°17.2 | 15.1' | 10°41.8 | -13.4' | 55.4' |
| SD = 16.2' $d = 0.6'$ | | | SD = 14.9' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 07:03 | 08:39 | 11:31 | 11:57 | 14:49 | 16:25 |
| N 70° | 06:52 | 08:15 | 09:56 | 13:32 | 15:13 | 16:36 |
| 68° | 06:44 | 07:57 | 09:18 | 14:11 | 15:31 | 16:45 |
| 66° | 06:36 | 07:43 | 08:51 | 14:38 | 15:46 | 16:52 |
| 64° | 06:30 | 07:30 | 08:31 | 14:58 | 15:58 | 16:59 |
| 62° | 06:24 | 07:20 | 08:14 | 15:15 | 16:09 | 17:05 |
| 60° | 06:19 | 07:11 | 08:00 | 15:28 | 16:18 | 17:10 |
| N 58° | 06:14 | 07:03 | 07:49 | 15:40 | 16:26 | 17:14 |
| 56° | 06:10 | 06:56 | 07:38 | 15:50 | 16:33 | 17:19 |
| 54° | 06:06 | 06:50 | 07:30 | 15:59 | 16:39 | 17:23 |
| 52° | 06:03 | 06:44 | 07:22 | 16:07 | 16:45 | 17:26 |
| 50° | 05:59 | 06:39 | 07:14 | 16:15 | 16:50 | 17:30 |
| 45° | 05:51 | 06:27 | 06:59 | 16:30 | 17:02 | 17:38 |
| N 40° | 05:44 | 06:17 | 06:46 | 16:43 | 17:12 | 17:45 |
| 35° | 05:38 | 06:08 | 06:35 | 16:54 | 17:21 | 17:51 |
| 30° | 05:32 | 06:00 | 06:26 | 17:03 | 17:29 | 17:58 |
| 20° | 05:19 | 05:46 | 06:09 | 17:20 | 17:43 | 18:10 |
| N 10° | 05:07 | 05:33 | 05:55 | 17:35 | 17:57 | 18:22 |
| 0° | 04:54 | 05:19 | 05:41 | 17:48 | 18:10 | 18:36 |
| S 10° | 04:39 | 05:05 | 05:27 | 18:02 | 18:25 | 18:51 |
| 20° | 04:21 | 04:49 | 05:13 | 18:17 | 18:41 | 19:09 |
| 30° | 03:58 | 04:29 | 04:55 | 18:35 | 19:01 | 19:32 |
| 35° | 03:43 | 04:17 | 04:45 | 18:45 | 19:13 | 19:47 |
| 40° | 03:25 | 04:03 | 04:34 | 18:56 | 19:27 | 20:05 |
| 45° | 03:03 | 03:46 | 04:20 | 19:10 | 19:44 | 20:28 |
| S 50° | 02:32 | 03:24 | 04:03 | 19:27 | 20:07 | 20:59 |
| 52° | 02:16 | 03:14 | 03:56 | 19:35 | 20:17 | 21:16 |
| 54° | 01:56 | 03:01 | 03:47 | 19:44 | 20:30 | 21:36 |
| 56° | 01:31 | 02:47 | 03:37 | 19:54 | 20:44 | 22:02 |
| 58° | 00:53 | 02:30 | 03:25 | 20:06 | 21:01 | 22:42 |
| S 60° | //// | 02:09 | 03:12 | 20:19 | 21:23 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | ■ | 16:17 | 15:02 | ■ | 19:07 | 21:53 |
| N 70° | ■ | 15:24 | 14:40 | ■ | 19:59 | 22:13 |
| 68° | 15:48 | 14:51 | 14:23 | 18:00 | 20:30 | 22:28 |
| 66° | 14:52 | 14:26 | 14:10 | 18:54 | 20:53 | 22:40 |
| 64° | 14:19 | 14:07 | 13:58 | 19:27 | 21:11 | 22:50 |
| 62° | 13:55 | 13:52 | 13:48 | 19:50 | 21:26 | 22:59 |
| 60° | 13:35 | 13:38 | 13:40 | 20:09 | 21:38 | 23:06 |
| N 58° | 13:19 | 13:27 | 13:32 | 20:25 | 21:49 | 23:12 |
| 56° | 13:05 | 13:17 | 13:26 | 20:38 | 21:58 | 23:18 |
| 54° | 12:53 | 13:08 | 13:20 | 20:49 | 22:06 | 23:23 |
| 52° | 12:43 | 13:00 | 13:14 | 20:59 | 22:13 | 23:28 |
| 50° | 12:33 | 12:53 | 13:10 | 21:08 | 22:20 | 23:32 |
| 45° | 12:13 | 12:38 | 12:59 | 21:27 | 22:34 | 23:40 |
| N 40° | 11:57 | 12:25 | 12:50 | 21:43 | 22:45 | 23:48 |
| 35° | 11:43 | 12:14 | 12:43 | 21:55 | 22:55 | 23:54 |
| 30° | 11:31 | 12:05 | 12:36 | 22:07 | 23:03 | · · · |
| 20° | 11:10 | 11:49 | 12:24 | 22:26 | 23:18 | · · · |
| N 10° | 10:52 | 11:34 | 12:14 | 22:42 | 23:30 | · · · |
| 0° | 10:35 | 11:21 | 12:04 | 22:57 | 23:42 | · · · |
| S 10° | 10:18 | 11:07 | 11:55 | 23:13 | 23:53 | · · · |
| 20° | 10:00 | 10:53 | 11:44 | 23:29 | · · · | 00:06 |
| 30° | 09:39 | 10:36 | 11:32 | 23:47 | · · · | 00:20 |
| 35° | 09:27 | 10:26 | 11:25 | 23:58 | · · · | 00:28 |
| 40° | 09:13 | 10:15 | 11:18 | · · · | 00:10 | 00:37 |
| 45° | 08:56 | 10:02 | 11:08 | · · · | 00:25 | 00:48 |
| S 50° | 08:34 | 09:45 | 10:57 | 00:20 | 00:42 | 01:00 |
| 52° | 08:24 | 09:38 | 10:52 | 00:30 | 00:51 | 01:06 |
| 54° | 08:13 | 09:29 | 10:46 | 00:42 | 01:00 | 01:13 |
| 56° | 08:00 | 09:20 | 10:40 | 00:56 | 01:10 | 01:20 |
| 58° | 07:45 | 09:09 | 10:32 | 01:11 | 01:22 | 01:28 |
| S 60° | 07:26 | 08:56 | 10:24 | 01:30 | 01:35 | 01:37 |

| Day | Sun | | | Moon | | |
|-----|------------------------------------|----------------------------------|-----------------------|-----------------------------|----------------|----------------------|
| | Eqn.of 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 6-8 27-45% |
| 15 | 15:29 | 15:24 | 11:45 | 16:46 | 04:23 | |
| 16 | 15:19 | 15:14 | 11:45 | 17:31 | 05:09 | |
| 17 | 15:08 | 15:02 | 11:45 | 18:15 | 05:53 | |

November 18, 19, 20 UT (Wed., Thu., Fri.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|--|
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | |
| 0 | 57°03.3 | 215°54.3 | S09°43.8 | 267°28.7 | N14°29.5 | 268°31.1 | N13°32.9 | 48°18.1 | N00°54.5 | |
| 1 | 72°05.8 | 230°56.2 | 43.4 | 282°30.1 | 29.1 | 283°33.4 | 32.9 | 63°20.6 | 54.5 | |
| 2 | 87°08.3 | 245°58.1 | 43.1 | 297°31.5 | 28.8 | 298°35.7 | 32.8 | 78°23.2 | 54.5 | |
| 3 | 102°10.7 | 261°00.0 | · · 42.7 | 312°32.9 | · · 28.5 | 313°38.0 | · · 32.8 | 93°25.7 | · · 54.4 | |
| 4 | 117°13.2 | 276°01.9 | 42.4 | 327°34.3 | 28.2 | 328°40.2 | 32.7 | 108°28.3 | 54.4 | |
| 5 | 132°15.7 | 291°03.7 | 42.1 | 342°35.7 | 27.9 | 343°42.5 | 32.7 | 123°30.8 | 54.4 | |
| 6 | 147°18.1 | 306°05.6 | S09°41.7 | 357°37.0 | N14°27.6 | 358°44.8 | N13°32.6 | 138°33.4 | N00°54.4 | |
| 7 | 162°20.6 | 321°07.5 | 41.4 | 12°38.4 | 27.2 | 13°47.1 | 32.5 | 153°36.0 | 54.3 | |
| 8 | 177°23.1 | 336°09.4 | 41.1 | 27°39.8 | 26.9 | 28°49.3 | 32.5 | 168°38.5 | 54.3 | |
| 9 | 192°25.5 | 351°11.3 | · · 40.7 | 42°41.2 | · · 26.6 | 43°51.6 | · · 32.4 | 183°41.1 | · · 54.3 | |
| 10 | 207°28.0 | 6°13.1 | 40.4 | 57°42.6 | 26.3 | 58°53.9 | 32.4 | 198°43.6 | 54.2 | |
| 11 | 222°30.5 | 21°15.0 | 40.1 | 72°44.0 | 26.0 | 73°56.2 | 32.3 | 213°46.2 | 54.2 | |
| 12 | 237°32.9 | 36°16.9 | S09°39.8 | 87°45.4 | N14°25.6 | 88°58.4 | N13°32.3 | 228°48.8 | N00°54.2 | |
| 13 | 252°35.4 | 51°18.7 | 39.4 | 102°46.7 | 25.3 | 104°00.7 | 32.2 | 243°51.3 | 54.1 | |
| 14 | 267°37.8 | 66°20.6 | 39.1 | 117°48.1 | 25.0 | 119°03.0 | 32.1 | 258°53.9 | 54.1 | |
| 15 | 282°40.3 | 81°22.4 | · · 38.8 | 132°49.5 | · · 24.7 | 134°05.3 | · · 32.1 | 273°56.4 | · · 54.1 | |
| 16 | 297°42.8 | 96°24.3 | 38.5 | 147°50.9 | 24.4 | 149°07.6 | 32.0 | 288°59.0 | 54.1 | |
| 17 | 312°45.2 | 111°26.1 | 38.2 | 162°52.3 | 24.1 | 164°09.8 | 32.0 | 304°01.5 | 54.0 | |
| 18 | 327°47.7 | 126°28.0 | S09°37.9 | 177°53.7 | N14°23.7 | 179°12.1 | N13°31.9 | 319°04.1 | N00°54.0 | |
| 19 | 342°50.2 | 141°29.8 | 37.6 | 192°55.1 | 23.4 | 194°14.4 | 31.9 | 334°06.6 | 54.0 | |
| 20 | 357°52.6 | 156°31.6 | 37.3 | 207°56.5 | 23.1 | 209°16.7 | 31.8 | 349°09.2 | 53.9 | |
| 21 | 12°55.1 | 171°33.5 | · · 37.0 | 222°57.9 | · · 22.8 | 224°18.9 | · · 31.8 | 4°11.8 | · · 53.9 | |
| 22 | 27°57.6 | 186°35.3 | 36.7 | 237°59.3 | 22.5 | 239°21.2 | 31.7 | 19°14.3 | 53.9 | |
| 23 | 43°00.0 | 201°37.1 | 36.4 | 253°00.7 | 22.2 | 254°23.5 | 31.7 | 34°16.9 | 53.8 | |
| Mer.pass. 20:08 | | ν1.9' d-0.3' m-4.87 | | ν1.4' d-0.3' m0.65 | | ν2.3' d-0.1' m-2.10 | | ν2.6' d-0.0' m0.54 | | |

| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| 0 | 58°02.5 | 216°38.9 | S09°36.1 | 268°02.0 | N14°21.8 | 269°25.8 | N13°31.6 | 49°19.4 | N00°53.8 |
| 1 | 73°04.9 | 231°40.8 | 35.8 | 283°03.4 | 21.5 | 284°28.1 | 31.5 | 64°22.0 | 53.8 |
| 2 | 88°07.4 | 246°42.6 | 35.5 | 298°04.8 | 21.2 | 299°30.3 | 31.5 | 79°24.5 | 53.8 |
| 3 | 103°09.9 | 261°44.4 | · · 35.2 | 313°06.2 | · · 20.9 | 314°32.6 | · · 31.4 | 94°27.1 | · · 53.7 |
| 4 | 118°12.3 | 276°46.2 | 34.9 | 328°07.6 | 20.6 | 329°34.9 | 31.4 | 109°29.6 | 53.7 |
| 5 | 133°14.8 | 291°48.0 | 34.6 | 343°09.0 | 20.3 | 344°37.2 | 31.3 | 124°32.2 | 53.7 |
| 6 | 148°17.3 | 306°49.8 | S09°34.3 | 358°10.4 | N14°20.0 | 359°39.5 | N13°31.3 | 139°34.8 | N00°53.6 |
| 7 | 163°19.7 | 321°51.6 | 34.0 | 13°11.8 | 19.6 | 14°41.8 | 31.2 | 154°37.3 | 53.6 |
| 8 | 178°22.2 | 336°53.4 | 33.7 | 28°13.2 | 19.3 | 29°44.0 | 31.2 | 169°39.9 | 53.6 |
| 9 | 193°24.7 | 351°55.2 | · · 33.5 | 43°14.6 | · · 19.0 | 44°46.3 | · · 31.1 | 184°42.4 | · · 53.5 |
| 10 | 208°27.1 | 6°57.0 | 33.2 | 58°16.0 | 18.7 | 59°48.6 | 31.1 | 199°45.0 | 53.5 |
| 11 | 223°29.6 | 21°58.8 | 32.9 | 73°17.4 | 18.4 | 74°50.9 | 31.0 | 214°47.5 | 53.5 |
| 12 | 238°32.1 | 37°00.5 | S09°32.6 | 88°18.8 | N14°18.1 | 89°53.2 | N13°31.0 | 229°50.1 | N00°53.5 |
| 13 | 253°34.5 | 52°02.3 | 32.4 | 103°20.2 | 17.7 | 104°55.4 | 30.9 | 244°52.6 | 53.4 |
| 14 | 268°37.0 | 67°04.1 | 32.1 | 118°21.6 | 17.4 | 119°57.7 | 30.8 | 259°55.2 | 53.4 |
| 15 | 283°39.4 | 82°05.9 | · · 31.8 | 133°23.0 | · · 17.1 | 135°00.0 | · · 30.8 | 274°57.7 | · · 53.4 |
| 16 | 298°41.9 | 97°07.6 | 31.6 | 148°24.4 | 16.8 | 150°02.3 | 30.7 | 290°00.3 | 53.3 |
| 17 | 313°44.4 | 112°09.4 | 31.3 | 163°25.8 | 16.5 | 165°04.6 | 30.7 | 305°02.8 | 53.3 |
| 18 | 328°46.8 | 127°11.2 | S09°31.0 | 178°27.2 | N14°16.2 | 180°06.9 | N13°30.6 | 320°05.4 | N00°53.3 |
| 19 | 343°49.3 | 142°12.9 | 30.8 | 193°28.6 | 15.9 | 195°09.2 | 30.6 | 335°08.0 | 53.3 |
| 20 | 358°51.8 | 157°14.7 | 30.5 | 208°30.0 | 15.5 | 210°11.4 | 30.5 | 350°10.5 | 53.2 |
| 21 | 13°54.2 | 172°16.4 | · · 30.2 | 223°31.4 | · · 15.2 | 225°13.7 | · · 30.5 | 5°13.1 | · · 53.2 |
| 22 | 28°56.7 | 187°18.2 | 30.0 | 238°32.8 | 14.9 | 240°16.0 | 30.4 | 20°15.6 | 53.2 |
| 23 | 43°59.2 | 202°19.9 | 29.7 | 253°34.2 | 14.6 | 255°18.3 | 30.4 | 35°18.2 | 53.2 |
| Mer.pass. 20:05 | | ν1.8' d-0.3' m-4.88 | | ν1.4' d-0.3' m0.64 | | ν2.3' d-0.1' m-2.11 | | ν2.6' d-0.0' m0.55 | |

| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| 0 | 59°01.6 | 217°21.7 | S09°29.5 | 268°35.6 | N14°14.3 | 270°20.6 | N13°30.3 | 50°20.7 | N00°53.1 |
| 1 | 74°04.1 | 232°23.4 | 29.2 | 283°37.0 | 14.0 | 285°22.9 | 30.3 | 65°23.3 | 53.1 |
| 2 | 89°06.6 | 247°25.2 | 29.0 | 298°38.4 | 13.7 | 300°25.2 | 30.2 | 80°25.8 | 53.1 |
| 3 | 104°09.0 | 262°26.9 | · · 28.7 | 313°39.9 | · · 13.4 | 315°27.5 | · · 30.2 | 95°28.4 | · · 53.0 |
| 4 | 119°11.5 | 277°28.6 | 28.5 | 328°41.3 | 13.0 | 330°29.7 | 30.1 | 110°30.9 | 53.0 |
| 5 | 134°13.9 | 292°30.4 | 28.3 | 343°42.7 | 12.7 | 345°32.0 | 30.1 | 125°33.5 | 53.0 |
| 6 | 149°16.4 | 307°32.1 | S09°28.0 | 358°44.1 | N14°12.4 | 0°34.3 | N13°30.0 | 140°36.0 | N00°53.0 |
| 7 | 164°18.9 | 322°33.8 | 27.8 | 13°45.5 | 12.1 | 15°36.6 | 30.0 | 155°38.6 | 52.9 |
| 8 | 179°21.3 | 337°35.5 | 27.5 | 28°46.9 | 11.8 | 30°38.9 | 29.9 | 170°41.1 | 52.9 |
| 9 | 194°23.8 | 352°37.2 | · · 27.3 | 43°48.3 | · · 11.5 | 45°41.2 | · · 29.9 | 185°43.7 | · · 52.9 |
| 10 | 209°26.3 | 7°38.9 | 27.1 | 58°49.7 | 11.2 | 60°43.5 | 29.8 | 200°46.2 | 52.8 |
| 11 | 224°28.7 | 22°40.6 | 26.8 | 73°51.1 | 10.9 | 75°45.8 | 29.8 | 215°48.8 | 52.8 |
| 12 | 239°31.2 | 37°42.4 | S09°26.6 | 88°52.5 | N14°10.5 | 90°48.1 | N13°29.7 | 230°51.3 | N00°52.8 |
| 13 | 254°33.7 | 52°44.1 | 26.4 | 103°54.0 | 10.2 | 105°50.3 | 29.7 | 245°53.9 | 52.8 |
| 14 | 269°36.1 | 67°45.8 | 26.2 | 118°55.4 | 09.9 | 120°52.6 | 29.6 | 260°56.4 | 52.7 |
| 15 | 284°38.6 | 82°47.4 | · · 25.9 | 133°56.8 | · · 09.6 | 135°54.9 | · · 29.6 | 275°59.0 | · · 52.7 |
| 16 | 299°41.0 | 97°49.1 | 25.7 | 148°58.2 | 09.3 | 150°57.2 | 29.5 | 291°01.5 | 52.7 |
| 17 | 314°43.5 | 112°50.8 | 25.5 | 163°59.6 | 09.0 | 165°59.5 | 29.5 | 306°04.1 | 52.7 |
| 18 | 329°46.0 | 127°52.5 | S09°25.3 | 179°01.0 | N14°08.7 | 181°01.8 | N13°29.4 | 321°06.6 | N00°52.6 |
| 19 | 344°48.4 | 142°54.2 | 25.1 | 194°02.4 | 08.4 | 196°04.1 | 29.4 | 336°09.2 | 52.6 |
| 20 | 359°50.9 | 157°55.9 | 24.9 | 209°03.9 | 08.1 | 211°06.4 | 29.3 | 351°11.7 | 52.6 |
| 21 | 14°53.4 | 172°57.5 | · · 24.6 | 224°05.3 | · · 07.7 | 226°08.7 | · · 29.3 | 6°14.3 | · · 52.6 |
| 22 | 29°55.8 | 187°59.2 | 24.4 | 239°06.7 | 07.4 | 241°11.0 | 29.2 | 21°16.8 | 52.5 |
| 23 | 44°58.3 | 203°00.9 | 24.2 | 254°08.1 | 07.1 | 256°13.3 | 29.2 | 36°19.4 | 52.5 |
| Mer.pass. 20:01 | | ν1.7' d-0.2' m-4.89 | | ν1.4' d-0.3' m0.63 | | ν2.3' d-0.1' m-2.12 | | ν2.6' d-0.0' m0.55 | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.0 | 29°14.6 |
| Ankaa | 353°05.4 | -42°09.7 |
| Schedar | 349°28.9 | 56°41.4 |
| Diphda | 348°45.5 | -17°50.3 |
| Achernar | 335°18.6 | -57°06.1 |
| Hamal | 327°49.1 | 23°35.5 |
| Polaris | 312°44.0 | 89°22.7 |
| Acamar | 315°10.2 | -40°11.8 |
| Menkar | 314°04.2 | 4°11.8 |
| Mirfak | 308°25.5 | 49°57.5 |
| Aldebaran | 290°37.5 | 16°33.9 |
| Rigel | 281°02.1 | -8°10.1 |
| Capella | 280°19.2 | 46°01.4 |
| Bellatrix | 278°20.9 | 6°22.5 |
| Elnath | 277°59.6 | 28°37.8 |
| Alnilam | 275°35.9 | -1°11.0 |
| Betelgeuse | 270°50.1 | 7°24.8 |
| Canopus | 263°51.3 | -52°42.4 |
| Sirius | 258°24.6 | -16°45.1 |
| Adhara | 255°04.4 | -29°00.3 |
| Procyon | 244°49.1 | 5°09.4 |
| Pollux | 243°15.3 | 27°57.6 |
| Avior | 234°13.9 | -59°35.4 |
| Suhail | 222°45.1 | -43°32.2 |
| Miaplacidus | 221°37.8 | -69°49.3 |
| Alphard | 217°46.2 | -8°46.4 |
| Regulus | 207°32.9 | 11°50.1 |
| Dubhe | 193°39.4 | 61°36.1 |
| Denebola | 182°23.6 | 14°25.3 |
| Gienah | 175°42.2 | -17°41.4 |
| Acrux | 172°58.8 | -63°14.7 |
| Gacrux | 171°50.3 | -57°15.6 |
| Alioth | 166°12.1 | 55°48.6 |
| Spica | 158°21.0 | -11°18.0 |
| Alkaid | 152°51.3 | 49°10.6 |
| Hadar | 148°34.4 | -60°30.0 |
| Menkent | 147°56.2 | -36°30.0 |
| Arcturus | 145°46.8 | 19°02.5 |
| Rigel Kent. | 139°38.8 | -60°56.7 |
| Kochab | 137°21.0 | 74°02.5 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.5 |
| Antares | 112°14.3 | -26°29.4 |
| Atria | 107°07.7 | -69°04.6 |
| Sabik | 102°01.4 | -15°45.4 |
| Shaula | 96°08.7 | -37°07.4 |
| Rasalhague | 95°57.5 | 12°32.5 |
| Eltanin | 90°41.9 | 51°29.3 |
| Kaus Aust. | 83°30.8 | -34°22.3 |
| Vega | 80°32.5 | 38°48.7 |
| Nunki | 75°46.1 | -26°15.8 |
| Altair | 61°58.7 | 8°56.5 |
| Peacock | 53°03.6 | -56°39.1 |
| Deneb | 49°24.9 | 45°22.9 |
| Enif | 33°37.3 | 10°00.1 |
| Al Na'ir | 27°31.0 | -46°50.0 |
| Fomalhaut | 15°12.7 | -29°28.8 |
| Scheat | 13°43.6 | 28°14.0 |
| Markab | 13°28.3 | 15°21.2 |

| Nov 18 Wed | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 158°50.9 | 09:35 |
| Mars | 210°25.4 | 06:10 |
| Jupiter | 211°27.8 | 06:05 |
| Saturn | 351°14.7 | 20:43 |

| Nov 19 Thu | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 158°36.5 | 09:32 |
| Mars | 209°59.6 | 06:07 |
| Jupiter | 211°23.3 | 06:01 |
| Saturn | 351°16.9 | 20:39 |

| Nov 20 Fri | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 158°20.1 | 09:29 |
| Mars | 209°34.0 | 06:05 |
| Jupiter | 211°19.0 | 05:58 |
| Saturn | 351°19.1 | 20:35 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.4 |
| Mars: | 0.1 |

| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|----------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| Wed | | | | | | | | |
| 0 | 183°44.1 | S19°10.3 | | 83°51.3 | 15.1' | S10°28.4 | -13.5' | 55.4' |
| 1 | 198°43.9 | 10.9 | | 98°25.5 | 15.1' | 10°14.9 | -13.6' | 55.4' |
| 2 | 213°43.8 | 11.5 | | 112°59.6 | 15.2' | 10°01.3 | -13.6' | 55.5' |
| 3 | 228°43.7 | · · 12.1 | | 127°33.8 | 15.2' | 09°47.7 | -13.7' | 55.5' |
| 4 | 243°43.5 | 12.7 | | 142°07.9 | 15.2' | 09°34.1 | -13.7' | 55.5' |
| 5 | 258°43.4 | 13.3 | | 156°42.1 | 15.2' | 09°20.3 | -13.8' | 55.6' |
| 6 | 273°43.3 | S19°13.9 | | 171°16.3 | 15.2' | S09°06.6 | -13.8' | 55.6' |
| 7 | 288°43.2 | 14.5 | | 185°50.5 | 15.2' | 08°52.7 | -13.9' | 55.6' |
| 8 | 303°43.0 | 15.1 | | 200°24.7 | 15.2' | 08°38.9 | -13.9' | 55.6' |
| 9 | 318°42.9 | · · 15.7 | | 214°58.9 | 15.2' | 08°24.9 | -14.0' | 55.7' |
| 10 | 333°42.8 | 16.3 | | 229°33.1 | 15.2' | 08°11.0 | -14.0' | 55.7' |
| 11 | 348°42.6 | 16.9 | | 244°07.2 | 15.2' | 07°57.0 | -14.1' | 55.7' |
| 12 | 3°42.5 | S19°17.4 | | 258°41.4 | 15.2' | S07°42.9 | -14.1' | 55.8' |
| 13 | 18°42.4 | 18.0 | | 273°15.6 | 15.2' | 07°28.8 | -14.2' | 55.8' |
| 14 | 33°42.2 | 18.6 | | 287°49.8 | 15.2' | 07°14.6 | -14.2' | 55.8' |
| 15 | 48°42.1 | · · 19.2 | | 302°24.0 | 15.2' | 07°00.4 | -14.3' | 55.9' |
| 16 | 63°42.0 | 19.8 | | 316°58.2 | 15.2' | 06°46.1 | -14.3' | 55.9' |
| 17 | 78°41.8 | 20.4 | | 331°32.4 | 15.2' | 06°31.9 | -14.3' | 55.9' |
| 18 | 93°41.7 | S19°21.0 | | 346°06.5 | 15.2' | S06°17.5 | -14.4' | 56.0' |
| 19 | 108°41.6 | 21.6 | | 0°40.7 | 15.1' | 06°03.1 | -14.4' | 56.0' |
| 20 | 123°41.4 | 22.2 | | 15°14.8 | 15.1' | 05°48.7 | -14.5' | 56.0' |
| 21 | 138°41.3 | · · 22.7 | | 29°49.0 | 15.1' | 05°34.2 | -14.5' | 56.1' |
| 22 | 153°41.2 | 23.3 | | 44°23.1 | 15.1' | 05°19.7 | -14.5' | 56.1' |
| 23 | 168°41.0 | 23.9 | | 58°57.2 | 15.1' | 05°05.2 | -14.6' | 56.1' |
| SD = 16.2' $d = 0.6'$ | | | | | | | | |
| SD = 15.1' | | | | | | | | |

| Thu | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|----------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 183°40.9 | S19°24.5 | | 73°31.3 | 15.1' | S04°50.6 | -14.6' | 56.2' |
| 1 | 198°40.7 | 25.1 | | 88°05.4 | 15.1' | 04°36.0 | -14.7' | 56.2' |
| 2 | 213°40.6 | 25.7 | | 102°39.5 | 15.0' | 04°21.3 | -14.7' | 56.2' |
| 3 | 228°40.5 | · · 26.3 | | 117°13.5 | 15.0' | 04°06.6 | -14.7' | 56.3' |
| 4 | 243°40.3 | 26.8 | | 131°47.5 | 15.0' | 03°51.9 | -14.8' | 56.3' |
| 5 | 258°40.2 | 27.4 | | 146°21.6 | 15.0' | 03°37.1 | -14.8' | 56.3' |
| 6 | 273°40.1 | S19°28.0 | | 160°55.5 | 15.0' | S03°22.3 | -14.8' | 56.4' |
| 7 | 288°39.9 | 28.6 | | 175°29.5 | 14.9' | 03°07.5 | -14.9' | 56.4' |
| 8 | 303°39.8 | 29.2 | | 190°03.5 | 14.9' | 02°52.6 | -14.9' | 56.4' |
| 9 | 318°39.6 | · · 29.7 | | 204°37.4 | 14.9' | 02°37.7 | -14.9' | 56.5' |
| 10 | 333°39.5 | 30.3 | | 219°11.3 | 14.9' | 02°22.8 | -15.0' | 56.5' |
| 11 | 348°39.4 | 30.9 | | 233°45.1 | 14.8' | 02°07.8 | -15.0' | 56.6' |
| 12 | 3°39.2 | S19°31.5 | | 248°19.0 | 14.8' | S01°52.9 | -15.0' | 56.6' |
| 13 | 18°39.1 | 32.0 | | 262°52.8 | 14.8' | 01°37.8 | -15.0' | 56.6' |
| 14 | 33°38.9 | 32.6 | | 277°26.5 | 14.7' | 01°22.8 | -15.1' | 56.7' |
| 15 | 48°38.8 | · · 33.2 | | 292°00.3 | 14.7' | 01°07.7 | -15.1' | 56.7' |
| 16 | 63°38.7 | 33.8 | | 306°34.0 | 14.7' | 00°52.6 | -15.1' | 56.7' |
| 17 | 78°38.5 | 34.3 | | 321°07.6 | 14.6' | 00°37.5 | -15.1' | 56.8' |
| 18 | 93°38.4 | S19°34.9 | | 335°41.3 | 14.6' | S00°22.4 | -15.2' | 56.8' |
| 19 | 108°38.2 | 35.5 | | 350°14.9 | 14.6' | S00°07.2 | -15.2' | 56.8' |
| 20 | 123°38.1 | 36.1 | | 4°48.4 | 14.5' | N00°08.0 | 15.2' | 56.9' |
| 21 | 138°37.9 | · · 36.6 | | 19°21.9 | 14.5' | 00°23.2 | 15.2' | 56.9' |
| 22 | 153°37.8 | 37.2 | | 33°55.4 | 14.4' | 00°38.4 | 15.2' | 57.0' |
| 23 | 168°37.7 | 37.8 | | 48°28.8 | 14.4' | 00°53.6 | 15.3' | 57.0' |
| SD = 16.2' $d = 0.6'$ | | | | | | | | |
| SD = 15.3' | | | | | | | | |

| Fri | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|----------|-------|----------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 183°37.5 | S19°38.3 | | 63°02.2 | 14.3' | N01°08.9 | 15.3' | 57.0' |
| 1 | 198°37.4 | 38.9 | | 77°35.5 | 14.3' | 01°24.2 | 15.3' | 57.1' |
| 2 | 213°37.2 | 39.5 | | 92°08.8 | 14.2' | 01°39.4 | 15.3' | 57.1' |
| 3 | 228°37.1 | · · 40.1 | | 106°42.1 | 14.2' | 01°54.8 | 15.3' | 57.1' |
| 4 | 243°36.9 | 40.6 | | 121°15.3 | 14.1' | 02°10.1 | 15.3' | 57.2' |
| 5 | 258°36.8 | 41.2 | | 135°48.4 | 14.1' | 02°25.4 | 15.3' | 57.2' |
| 6 | 273°36.6 | S19°41.8 | | 150°21.5 | 14.0' | N02°40.7 | 15.4' | 57.3' |
| 7 | 288°36.5 | 42.3 | | 164°54.5 | 14.0' | 02°56.1 | 15.4' | 57.3' |
| 8 | 303°36.3 | 42.9 | | 179°27.5 | 13.9' | 03°11.5 | 15.4' | 57.3' |
| 9 | 318°36.2 | · · 43.4 | | 194°00.4 | 13.9' | 03°26.8 | 15.4' | 57.4' |
| 10 | 333°36.0 | 44.0 | | 208°33.3 | 13.8' | 03°42.2 | 15.4' | 57.4' |
| 11 | 348°35.9 | 44.6 | | 223°06.1 | 13.7' | 03°57.6 | 15.4' | 57.5' |
| 12 | 3°35.7 | S19°45.1 | | 237°38.8 | 13.7' | N04°13.0 | 15.4' | 57.5' |
| 13 | 18°35.6 | 45.7 | | 252°11.5 | 13.6' | 04°28.3 | 15.4' | 57.5' |
| 14 | 33°35.4 | 46.3 | | 266°44.1 | 13.5' | 04°43.7 | 15.4' | 57.6' |
| 15 | 48°35.3 | · · 46.8 | | 281°16.6 | 13.5' | 04°59.1 | 15.4' | 57.6' |
| 16 | 63°35.1 | 47.4 | | 295°49.1 | 13.4' | 05°14.5 | 15.4' | 57.7' |
| 17 | 78°35.0 | 47.9 | | 310°21.5 | 13.3' | 05°29.9 | 15.4' | 57.7' |
| 18 | 93°34.8 | S19°48.5 | | 324°53.9 | 13.3' | N05°45.3 | 15.4' | 57.7' |
| 19 | 108°34.7 | 49.1 | | 339°26.1 | 13.2' | 06°00.6 | 15.4' | 57.8' |
| 20 | 123°34.5 | 49.6 | | 353°58.3 | 13.1' | 06°16.0 | 15.4' | 57.8' |
| 21 | 138°34.4 | · · 50.2 | | 8°30.5 | 13.1' | 06°31.4 | 15.4' | 57.9' |
| 22 | 153°34.2 | 50.7 | | 23°02.5 | 13.0' | 06°46.7 | 15.3' | 57.9' |
| 23 | 168°34.1 | 51.3 | | 37°34.5 | 12.9' | 07°02.1 | 15.3' | 57.9' |
| SD = 16.2' $d = 0.6'$ | | | | | | | | |
| SD = 15.6' | | | | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 07:13 | 08:53 | ■ | ■ | 14:37 | 16:16 |
| N 70° | 07:02 | 08:27 | 10:18 | 13:12 | 15:03 | 16:28 |
| 68° | 06:52 | 08:07 | 09:32 | 13:58 | 15:23 | 16:38 |
| 66° | 06:44 | 07:51 | 09:02 | 14:28 | 15:39 | 16:46 |
| 64° | 06:37 | 07:38 | 08:40 | 14:50 | 15:52 | 16:53 |
| 62° | 06:30 | 07:27 | 08:22 | 15:08 | 16:03 | 17:00 |
| 60° | 06:25 | 07:17 | 08:08 | 15:22 | 16:13 | 17:05 |
| N 58° | 06:20 | 07:09 | 07:55 | 15:35 | 16:21 | 17:10 |
| 56° | 06:15 | 07:01 | 07:45 | 15:46 | 16:29 | 17:15 |
| 54° | 06:11 | 06:55 | 07:35 | 15:55 | 16:35 | 17:19 |
| 52° | 06:07 | 06:49 | 07:27 | 16:04 | 16:42 | 17:23 |
| 50° | 06:03 | 06:43 | 07:19 | 16:11 | 16:47 | 17:27 |
| 45° | 05:55 | 06:31 | 07:03 | 16:27 | 17:00 | 17:35 |
| N 40° | 05:47 | 06:20 | 06:50 | 16:41 | 17:10 | 17:43 |
| 35° | 05:40 | 06:11 | 06:38 | 16:52 | 17:19 | 17:50 |
| 30° | 05:34 | 06:03 | 06:28 | 17:02 | 17:28 | 17:57 |
| 20° | 05:21 | 05:48 | 06:11 | 17:19 | 17:43 | 18:10 |
| N 10° | 05:08 | 05:34 | 05:56 | 17:35 | 17:57 | 18:23 |
| 0° | 04:54 | 05:20 | 05:42 | 17:49 | 18:11 | 18:36 |
| S 10° | 04:39 | 05:05 | 05:27 | 18:03 | 18:26 | 18:52 |
| 20° | 04:20 | 04:48 | 05:12 | 18:19 | 18:43 | 19:11 |
| 30° | 03:56 | 04:28 | 04:54 | 18:37 | 19:03 | 19:35 |
| 35° | 03:41 | 04:15 | 04:44 | 18:48 | 19:16 | 19:50 |
| 40° | 03:22 | 04:01 | 04:32 | 19:00 | 19:31 | 20:09 |
| 45° | 02:59 | 03:43 | 04:17 | 19:14 | 19:49 | 20:33 |
| S 50° | 02:26 | 03:20 | 04:00 | 19:32 | 20:12 | 21:06 |
| 52° | 02:09 | 03:09 | 03:51 | 19:40 | 20:23 | 21:24 |
| 54° | 01:48 | 02:56 | 03:42 | 19:50 | 20:37 | 21:45 |
| 56° | 01:19 | 02:41 | 03:32 | 20:00 | 20:52 | 22:15 |
| 58° | 00:31 | 02:23 | 03:20 | 20:13 | 21:10 | 23:09 |
| S 60° | //// | 02:00 | 03:06 | 20:27 | 21:34 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | 14:22 | 13:49 | 13:17 | · · · | 00:04 | 02:11 |
| N 70° | 14:12 | 13:47 | 13:23 | · · · | 00:12 | 02:09 |
| 68° | 14:03 | 13:45 | 13:28 | · · · | 00:18 | 02:07 |
| 66° | 13:56 | 13:44 | 13:32 | · · · | 00:22 | 02:05 |
| 64° | 13:50 | 13:43 | 13:35 | · · · | 00:27 | 02:04 |
| 62° | 13:45 | 13:42 | 13:38 | · · · | 00:30 | 02:03 |
| 60° | 13:40 | 13:41 | 13:41 | · · · | 00:33 | 02:02 |
| N 58° | 13:36 | 13:40 | 13:44 | · · · | 00:36 | 02:01 |
| 56° | 13:33 | 13:39 | 13:46 | · · · | 00:38 | 02:00 |
| 54° | 13:30 | 13:39 | 13:48 | · · · | 00:40 | 02:00 |
| 52° | 13:27 | 13:38 | 13:50 | · · · | 00:42 | 01:59 |
| 50° | 13:24 | 13:37 | 13:51 | · · · | 00:44 | 01:58 |
| 45° | 13:18 | 13:36 | 13:55 | · · · | 00:48 | 01:57 |
| N 40° | 13:13 | 13:35 | 13:58 | · · · | 00:51 | 01:56 |
| 35° | 13:09 | 13:34 | 14:00 | · · · | 00:54 | 01:55 |
| 30° | 13:05 | 13:33 | 14:03 | 00:00 | 00:56 | 01:54 |
| 20° | 12:58 | 13:32 | 14:07 | 00:09 | 01:00 | 01:53 |
| N 10° | 12:53 | 13:31 | 14:11 | 00:17 | 01:04 | 01:52 |
| 0° | 12:47 | 13:30 | 14:14 | 00:25 | 01:07 | 01:51 |
| S 10° | 12:42 | 13:29 | 14:18 | 00:32 | 01:11 | 01:49 |
| 20° | 12:36 | 13:28 | 14:21 | 00:40 | 01:14 | 01:48 |
| 30° | 12:29 | 13:26 | 14:26 | 00:50 | 01:18 | 01:47 |
| 35° | 12:25 | 13:26 | 14:28 | 00:55 | 01:20 | 01:46 |
| 40° | 12:21 | 13:25 | 14:31 | 01:01 | 01:23 | 01:45 |
| 45° | 12:15 | 13:24 | 14:34 | 01:07 | 01:26 | 01:44 |
| S 50° | 12:09 | 13:23 | 14:38 | 01:16 | 01:29 | 01:43 |
| 52° | 12:06 | 13:22 | 14:40 | 01:19 | 01:31 | 01:42 |
| 54° | 12:03 | 13:21 | 14:42 | 01:23 | 01:32 | 01:41 |
| 56° | 12:00 | 13:21 | 14:45 | 01:28 | 01:34 | 01:41 |
| 58° | 11:56 | 13:20 | 14:47 | 01:33 | 01:36 | 01:40 |
| S 60° | 11:51 | 13:19 | 14:50 | 01:38 | 01:39 | 01:39 |

November 21, 22, 23 UT (Sat., Sun., Mon.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|---------|-----|-----|--------|--|--|
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 60°00.8 | 218°02.6 | S09°24.0 | 269°09.5 | N14°06.8 | 271°15.6 | N13°29.1 | 51°21.9 | N00°52.5 | | | | | | |
| 1 | 75°03.2 | 233°04.2 | 23.8 | 284°10.9 | 06.5 | 286°17.9 | 29.1 | 66°24.5 | 52.4 | | | | | | |
| 2 | 90°05.7 | 248°05.9 | 23.6 | 299°12.4 | 06.2 | 301°20.2 | 29.0 | 81°27.0 | 52.4 | | | | | | |
| 3 | 105°08.2 | 263°07.5 | · · 23.4 | 314°13.8 | · · 05.9 | 316°22.4 | · · 29.0 | 96°29.6 | · · 52.4 | | | | | | |
| 4 | 120°10.6 | 278°09.2 | 23.2 | 329°15.2 | 05.6 | 331°24.7 | 28.9 | 111°32.1 | 52.4 | | | | | | |
| 5 | 135°13.1 | 293°10.8 | 23.0 | 344°16.6 | 05.3 | 346°27.0 | 28.9 | 126°34.7 | 52.3 | | | | | | |
| 6 | 150°15.5 | 308°12.5 | S09°22.8 | 359°18.0 | N14°04.9 | 1°29.3 | N13°28.8 | 141°37.2 | N00°52.3 | | | | | | |
| 7 | 165°18.0 | 323°14.1 | 22.6 | 14°19.5 | 04.6 | 16°31.6 | 28.8 | 156°39.7 | 52.3 | | | | | | |
| 8 | 180°20.5 | 338°15.8 | 22.4 | 29°20.9 | 04.3 | 31°33.9 | 28.7 | 171°42.3 | 52.3 | | | | | | |
| 9 | 195°22.9 | 353°17.4 | · · 22.3 | 44°22.3 | · · 04.0 | 46°36.2 | · · 28.7 | 186°44.8 | · · 52.2 | | | | | | |
| 10 | 210°25.4 | 8°19.1 | 22.1 | 59°23.7 | 03.7 | 61°38.5 | 28.6 | 201°47.4 | 52.2 | | | | | | |
| 11 | 225°27.9 | 23°20.7 | 21.9 | 74°25.1 | 03.4 | 76°40.8 | 28.6 | 216°49.9 | 52.2 | | | | | | |
| 12 | 240°30.3 | 38°22.3 | S09°21.7 | 89°26.6 | N14°03.1 | 91°43.1 | N13°28.5 | 231°52.5 | N00°52.2 | | | | | | |
| 13 | 255°32.8 | 53°23.9 | 21.5 | 104°28.0 | 02.8 | 106°45.4 | 28.5 | 246°55.0 | 52.1 | | | | | | |
| 14 | 270°35.3 | 68°25.6 | 21.3 | 119°29.4 | 02.5 | 121°47.7 | 28.4 | 261°57.6 | 52.1 | | | | | | |
| 15 | 285°37.7 | 83°27.2 | · · 21.2 | 134°30.8 | · · 02.2 | 136°50.0 | · · 28.4 | 277°00.1 | · · 52.1 | | | | | | |
| 16 | 300°40.2 | 98°28.8 | 21.0 | 149°32.3 | 01.9 | 151°52.3 | 28.3 | 292°02.7 | 52.1 | | | | | | |
| 17 | 315°42.6 | 113°30.4 | 20.8 | 164°33.7 | 01.6 | 166°54.6 | 28.3 | 307°05.2 | 52.0 | | | | | | |
| 18 | 330°45.1 | 128°32.0 | S09°20.6 | 179°35.1 | N14°01.2 | 181°56.9 | N13°28.2 | 322°07.8 | N00°52.0 | | | | | | |
| 19 | 345°47.6 | 143°33.6 | 20.5 | 194°36.6 | 00.9 | 196°59.2 | 28.2 | 337°10.3 | 52.0 | | | | | | |
| 20 | 0°50.0 | 158°35.2 | 20.3 | 209°38.0 | 00.6 | 212°01.5 | 28.1 | 352°12.8 | 52.0 | | | | | | |
| 21 | 15°52.5 | 173°36.8 | · · 20.1 | 224°39.4 | · · 00.3 | 227°03.8 | · · 28.1 | 7°15.4 | · · 51.9 | | | | | | |
| 22 | 30°55.0 | 188°38.4 | 20.0 | 239°40.8 | 14°00.0 | 242°06.1 | 28.0 | 22°17.9 | 51.9 | | | | | | |
| 23 | 45°57.4 | 203°40.0 | 19.8 | 254°42.3 | 13°59.7 | 257°08.4 | 28.0 | 37°20.5 | 51.9 | | | | | | |
| Mer.pass. 19:57 ν1.7' d-0.2' m-4.89 ν1.4' d-0.3' m0.61 ν2.3' d-0.0' m-2.12 ν2.5' d-0.0' m0.56 | | | | | | | | | | | | | | | |

| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| 0 | 60°59.9 | 218°41.6 | S09°19.6 | 269°43.7 | N13°59.4 | 272°10.7 | N13°27.9 | 52°23.0 | N00°51.9 |
| 1 | 76°02.4 | 233°43.2 | 19.5 | 284°45.1 | 59.1 | 287°13.0 | 27.9 | 67°25.6 | 51.8 |
| 2 | 91°04.8 | 248°44.8 | 19.3 | 299°46.6 | 58.8 | 302°15.3 | 27.9 | 82°28.1 | 51.8 |
| 3 | 106°07.3 | 263°46.4 | · · 19.2 | 314°48.0 | · · 58.5 | 317°17.6 | · · 27.8 | 97°30.7 | · · 51.8 |
| 4 | 121°09.8 | 278°48.0 | 19.0 | 329°49.4 | 58.2 | 332°19.9 | 27.8 | 112°33.2 | 51.8 |
| 5 | 136°12.2 | 293°49.5 | 18.9 | 344°50.9 | 57.9 | 347°22.2 | 27.7 | 127°35.7 | 51.7 |
| 6 | 151°14.7 | 308°51.1 | S09°18.7 | 359°52.3 | N13°57.6 | 2°24.5 | N13°27.7 | 142°38.3 | N00°51.7 |
| 7 | 166°17.1 | 323°52.7 | 18.6 | 14°53.7 | 57.3 | 17°26.8 | 27.6 | 157°40.8 | 51.7 |
| 8 | 181°19.6 | 338°54.2 | 18.4 | 29°55.2 | 56.9 | 32°29.1 | 27.6 | 172°43.4 | 51.7 |
| 9 | 196°22.1 | 353°55.8 | · · 18.3 | 44°56.6 | · · 56.6 | 47°31.4 | · · 27.5 | 187°45.9 | · · 51.6 |
| 10 | 211°24.5 | 8°57.4 | 18.1 | 59°58.0 | 56.3 | 62°33.7 | 27.5 | 202°48.5 | 51.6 |
| 11 | 226°27.0 | 23°58.9 | 18.0 | 74°59.5 | 56.0 | 77°36.0 | 27.4 | 217°51.0 | 51.6 |
| 12 | 241°29.5 | 39°00.5 | S09°17.9 | 90°00.9 | N13°55.7 | 92°38.3 | N13°27.4 | 232°53.5 | N00°51.6 |
| 13 | 256°31.9 | 54°02.0 | 17.7 | 105°02.3 | 55.4 | 107°40.6 | 27.3 | 247°56.1 | 51.6 |
| 14 | 271°34.4 | 69°03.6 | 17.6 | 120°03.8 | 55.1 | 122°42.9 | 27.3 | 262°58.6 | 51.5 |
| 15 | 286°36.9 | 84°05.1 | · · 17.5 | 135°05.2 | · · 54.8 | 137°45.3 | · · 27.3 | 278°01.2 | · · 51.5 |
| 16 | 301°39.3 | 99°06.7 | 17.3 | 150°06.6 | 54.5 | 152°47.6 | 27.2 | 293°03.7 | 51.5 |
| 17 | 316°41.8 | 114°08.2 | 17.2 | 165°08.1 | 54.2 | 167°49.9 | 27.2 | 308°06.3 | 51.5 |
| 18 | 331°44.3 | 129°09.8 | S09°17.1 | 180°09.5 | N13°53.9 | 182°52.2 | N13°27.1 | 323°08.8 | N00°51.4 |
| 19 | 346°46.7 | 144°11.3 | 16.9 | 195°11.0 | 53.6 | 197°54.5 | 27.1 | 338°11.3 | 51.4 |
| 20 | 1°49.2 | 159°12.8 | 16.8 | 210°12.4 | 53.3 | 212°56.8 | 27.0 | 353°13.9 | 51.4 |
| 21 | 16°51.6 | 174°14.4 | · · 16.7 | 225°13.9 | · · 53.0 | 227°59.1 | · · 27.0 | 8°16.4 | · · 51.4 |
| 22 | 31°54.1 | 189°15.9 | 16.6 | 240°15.3 | 52.7 | 243°01.4 | 26.9 | 23°19.0 | 51.3 |
| 23 | 46°56.6 | 204°17.4 | 16.4 | 255°16.7 | 52.4 | 258°03.7 | 26.9 | 38°21.5 | 51.3 |
| Mer.pass. 19:53 | | ν1.6' d-0.2' m-4.90 | | ν1.4' d-0.3' m0.60 | | ν2.3' d-0.0' m-2.13 | | ν2.5' d-0.0' m0.56 | |

| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|---------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|
| 0 | 61°59.0 | 219°18.9 | S09°16.3 | 270°18.2 | N13°52.1 | 273°06.0 | N13°26.8 | 53°24.0 | N00°51.3 |
| 1 | 77°01.5 | 234°20.4 | 16.2 | 285°19.6 | 51.8 | 288°08.3 | 26.8 | 68°26.6 | 51.3 |
| 2 | 92°04.0 | 249°22.0 | 16.1 | 300°21.1 | 51.5 | 303°10.6 | 26.8 | 83°29.1 | 51.3 |
| 3 | 107°06.4 | 264°23.5 | · · 16.0 | 315°22.5 | · · 51.2 | 318°12.9 | · · 26.7 | 98°31.7 | · · 51.2 |
| 4 | 122°08.9 | 279°25.0 | 15.9 | 330°24.0 | 50.9 | 333°15.2 | 26.7 | 113°34.2 | 51.2 |
| 5 | 137°11.4 | 294°26.5 | 15.8 | 345°25.4 | 50.5 | 348°17.6 | 26.6 | 128°36.7 | 51.2 |
| 6 | 152°13.8 | 309°28.0 | S09°15.7 | 0°26.8 | N13°50.2 | 3°19.9 | N13°26.6 | 143°39.3 | N00°51.2 |
| 7 | 167°16.3 | 324°29.5 | 15.6 | 15°28.3 | 49.9 | 18°22.2 | 26.5 | 158°41.8 | 51.1 |
| 8 | 182°18.8 | 339°31.0 | 15.5 | 30°29.7 | 49.6 | 33°24.5 | 26.5 | 173°44.4 | 51.1 |
| 9 | 197°21.2 | 354°32.5 | · · 15.4 | 45°31.2 | · · 49.3 | 48°26.8 | · · 26.5 | 188°46.9 | · · 51.1 |
| 10 | 212°23.7 | 9°34.0 | 15.3 | 60°32.6 | 49.0 | 63°29.1 | 26.4 | 203°49.4 | 51.1 |
| 11 | 227°26.1 | 24°35.4 | 15.2 | 75°34.1 | 48.7 | 78°31.4 | 26.4 | 218°52.0 | 51.1 |
| 12 | 242°28.6 | 39°36.9 | S09°15.1 | 90°35.5 | N13°48.4 | 93°33.7 | N13°26.3 | 233°54.5 | N00°51.0 |
| 13 | 257°31.1 | 54°38.4 | 15.0 | 105°37.0 | 48.1 | 108°36.0 | 26.3 | 248°57.1 | 51.0 |
| 14 | 272°33.5 | 69°39.9 | 14.9 | 120°38.4 | 47.8 | 123°38.4 | 26.2 | 263°59.6 | 51.0 |
| 15 | 287°36.0 | 84°41.4 | · · 14.8 | 135°39.9 | · · 47.5 | 138°40.7 | · · 26.2 | 279°02.1 | · · 51.0 |
| 16 | 302°38.5 | 99°42.8 | 14.7 | 150°41.3 | 47.2 | 153°43.0 | 26.1 | 294°04.7 | 50.9 |
| 17 | 317°40.9 | 114°44.3 | 14.6 | 165°42.8 | 46.9 | 168°45.3 | 26.1 | 309°07.2 | 50.9 |
| 18 | 332°43.4 | 129°45.8 | S09°14.5 | 180°44.2 | N13°46.6 | 183°47.6 | N13°26.1 | 324°09.8 | N00°50.9 |
| 19 | 347°45.9 | 144°47.2 | 14.4 | 195°45.7 | 46.3 | 198°49.9 | 26.0 | 339°12.3 | 50.9 |
| 20 | 2°48.3 | 159°48.7 | 14.4 | 210°47.1 | 46.0 | 213°52.2 | 26.0 | 354°14.8 | 50.9 |
| 21 | 17°50.8 | 174°50.2 | · · 14.3 | 225°48.6 | · · 45.7 | 228°54.5 | · · 25.9 | 9°17.4 | · · 50.8 |
| 22 | 32°53.2 | 189°51.6 | 14.2 | 240°50.0 | 45.4 | 243°56.9 | 25.9 | 24°19.9 | 50.8 |
| 23 | 47°55.7 | 204°53.1 | 14.1 | 255°51.5 | 45.1 | 258°59.2 | 25.8 | 39°22.4 | 50.8 |
| Mer.pass. 19:49 | | ν1.5' d-0.1' m-4.90 | | ν1.4' d-0.3' m0.58 | | ν2.3' d-0.0' m-2.14 | | ν2.5' d-0.0' m0.57 | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.0 | 29°14.6 |
| Ankaa | 353°05.4 | -42°09.7 |
| Schedar | 349°28.9 | 56°41.4 |
| Diphda | 348°45.6 | -17°50.3 |
| Achernar | 335°18.6 | -57°06.1 |
| Hamal | 327°49.2 | 23°35.5 |
| Polaris | 312°44.0 | 89°22.7 |
| Acamar | 315°10.2 | -40°11.8 |
| Menkar | 314°04.2 | 4°11.8 |
| Mirfak | 308°25.5 | 49°57.5 |
| Aldebaran | 290°37.5 | 16°33.9 |
| Rigel | 281°02.1 | -8°10.1 |
| Capella | 280°19.2 | 46°01.4 |
| Bellatrix | 278°20.9 | 6°22.5 |
| Elnath | 277°59.6 | 28°37.8 |
| Alnilam | 275°35.9 | -1°11.0 |
| Betelgeuse | 270°50.1 | 7°24.8 |
| Canopus | 263°51.3 | -52°42.4 |
| Sirius | 258°24.6 | -16°45.1 |
| Adhara | 255°04.4 | -29°00.3 |
| Procyon | 244°49.0 | 5°09.4 |
| Pollux | 243°15.2 | 27°57.6 |
| Avior | 234°13.8 | -59°35.4 |
| Suhail | 222°45.1 | -43°32.2 |
| Miaplacidus | 221°37.7 | -69°49.3 |
| Alphard | 217°46.2 | -8°46.4 |
| Regulus | 207°32.8 | 11°50.1 |
| Dubhe | 193°39.4 | 61°36.0 |
| Denebola | 182°23.6 | 14°25.2 |
| Gienah | 175°42.2 | -17°41.4 |
| Acrux | 172°58.8 | -63°14.7 |
| Gacrux | 171°50.3 | -57°15.6 |
| Alioth | 166°12.1 | 55°48.6 |
| Spica | 158°21.0 | -11°18.0 |
| Alkaid | 152°51.2 | 49°10.6 |
| Hadar | 148°34.4 | -60°30.0 |
| Menkent | 147°56.2 | -36°30.0 |
| Arcturus | 145°46.8 | 19°02.5 |
| Rigel Kent. | 139°38.8 | -60°56.7 |
| Kochab | 137°21.0 | 74°02.5 |
| Zuben'ubi | 136°54.7 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.4 |
| Antares | 112°14.3 | -26°29.4 |
| Atria | 107°07.7 | -69°04.5 |
| Sabik | 102°01.4 | -15°45.4 |
| Shaula | 96°08.7 | -37°07.4 |
| Rasalhague | 95°57.5 | 12°32.5 |
| Eltanin | 90°42.0 | 51°29.2 |
| Kaus Aust. | 83°30.8 | -34°22.3 |
| Vega | 80°32.5 | 38°48.7 |
| Nunki | 75°46.2 | -26°15.8 |
| Altair | 61°58.7 | 8°56.5 |
| Peacock | 53°03.6 | -56°39.1 |
| Deneb | 49°24.9 | 45°22.9 |
| Enif | 33°37.3 | 10°00.1 |
| Al Na'ir | 27°31.0 | -46°50.0 |
| Fomalhaut | 15°12.8 | -29°28.8 |
| Scheat | 13°43.6 | 28°14.0 |
| Markab | 13°28.3 | 15°21.2 |

| Nov 21 Sat | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 158°01.8 | 09:27 |
| Mars | 209°08.8 | 06:03 |
| Jupiter | 211°14.8 | 05:54 |
| Saturn | 351°21.2 | 20:31 |

| Nov 22 Sun | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 157°41.7 | 09:24 |
| Mars | 208°43.8 | 06:01 |
| Jupiter | 211°10.8 | 05:50 |
| Saturn | 351°23.1 | 20:27 |

| Nov 23 Mon | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 157°19.9 | 09:22 |
| Mars | 208°19.1 | 05:58 |
| Jupiter | 211°07.0 | 05:47 |
| Saturn | 351°25.0 | 20:23 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.4 |
| Mars: | 0.1 |

| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|------------|-------|----------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 183°33.9 | S19°51.8 | | 52°06.4 | 12.8' | N07°17.4 | 15.3' | 58.0' |
| 1 | 198°33.8 | 52.4 | | 66°38.2 | 12.7' | 07°32.7 | 15.3' | 58.0' |
| 2 | 213°33.6 | 52.9 | | 81°09.9 | 12.7' | 07°48.1 | 15.3' | 58.1' |
| 3 | 228°33.5 | · · 53.5 | | 95°41.6 | 12.6' | 08°03.4 | 15.3' | 58.1' |
| 4 | 243°33.3 | 54.1 | | 110°13.2 | 12.5' | 08°18.6 | 15.3' | 58.1' |
| 5 | 258°33.2 | 54.6 | | 124°44.7 | 12.4' | 08°33.9 | 15.2' | 58.2' |
| 6 | 273°33.0 | S19°55.2 | | 139°16.1 | 12.3' | N08°49.1 | 15.2' | 58.2' |
| 7 | 288°32.9 | 55.7 | | 153°47.4 | 12.2' | 09°04.3 | 15.2' | 58.2' |
| 8 | 303°32.7 | 56.3 | | 168°18.6 | 12.1' | 09°19.5 | 15.2' | 58.3' |
| 9 | 318°32.5 | · · 56.8 | | 182°49.7 | 12.0' | 09°34.7 | 15.1' | 58.3' |
| 10 | 333°32.4 | 57.4 | | 197°20.8 | 11.9' | 09°49.9 | 15.1' | 58.4' |
| 11 | 348°32.2 | 57.9 | | 211°51.7 | 11.9' | 10°05.0 | 15.1' | 58.4' |
| 12 | 3°32.1 | S19°58.4 | | 226°22.6 | 11.8' | N10°20.1 | 15.1' | 58.4' |
| 13 | 18°31.9 | 59.0 | | 240°53.3 | 11.7' | 10°35.1 | 15.0' | 58.5' |
| 14 | 33°31.8 | 19°59.5 | | 255°24.0 | 11.6' | 10°50.2 | 15.0' | 58.5' |
| 15 | 48°31.6 | 20°00.1 | | 269°54.6 | 11.5' | 11°05.1 | 15.0' | 58.6' |
| 16 | 63°31.4 | 00.6 | | 284°25.0 | 11.4' | 11°20.1 | 14.9' | 58.6' |
| 17 | 78°31.3 | 01.2 | | 298°55.4 | 11.3' | 11°35.0 | 14.9' | 58.6' |
| 18 | 93°31.1 | S20°01.7 | | 313°25.7 | 11.2' | N11°49.9 | 14.8' | 58.7' |
| 19 | 108°31.0 | 02.3 | | 327°55.8 | 11.1' | 12°04.8 | 14.8' | 58.7' |
| 20 | 123°30.8 | 02.8 | | 342°25.9 | 10.9' | 12°19.6 | 14.8' | 58.8' |
| 21 | 138°30.6 | · · 03.3 | | 356°55.8 | 10.8' | 12°34.3 | 14.7' | 58.8' |
| 22 | 153°30.5 | 03.9 | | 11°25.7 | 10.7' | 12°49.0 | 14.7' | 58.8' |
| 23 | 168°30.3 | 04.4 | | 25°55.4 | 10.6' | 13°03.7 | 14.6' | 58.9' |
| SD = 16.2' $d = 0.6'$ | | | | SD = 15.8' | | | | |

| Sun | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|------------|-------|----------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 183°30.2 | S20°05.0 | | 40°25.0 | 10.5' | N13°18.3 | 14.6' | 58.9' |
| 1 | 198°30.0 | 05.5 | | 54°54.5 | 10.4' | 13°32.9 | 14.5' | 58.9' |
| 2 | 213°29.8 | 06.0 | | 69°23.9 | 10.3' | 13°47.4 | 14.5' | 59.0' |
| 3 | 228°29.7 | · · 06.6 | | 83°53.2 | 10.2' | 14°01.8 | 14.4' | 59.0' |
| 4 | 243°29.5 | 07.1 | | 98°22.4 | 10.1' | 14°16.2 | 14.3' | 59.1' |
| 5 | 258°29.4 | 07.7 | | 112°51.5 | 9.9' | 14°30.6 | 14.3' | 59.1' |
| 6 | 273°29.2 | S20°08.2 | | 127°20.4 | 9.8' | N14°44.8 | 14.2' | 59.1' |
| 7 | 288°29.0 | 08.7 | | 141°49.2 | 9.7' | 14°59.0 | 14.2' | 59.2' |
| 8 | 303°28.9 | 09.3 | | 156°17.9 | 9.6' | 15°13.2 | 14.1' | 59.2' |
| 9 | 318°28.7 | · · 09.8 | | 170°46.5 | 9.5' | 15°27.3 | 14.0' | 59.2' |
| 10 | 333°28.5 | 10.3 | | 185°15.0 | 9.3' | 15°41.3 | 13.9' | 59.3' |
| 11 | 348°28.4 | 10.9 | | 199°43.3 | 9.2' | 15°55.2 | 13.9' | 59.3' |
| 12 | 3°28.2 | S20°11.4 | | 214°11.6 | 9.1' | N16°09.1 | 13.8' | 59.3' |
| 13 | 18°28.0 | 11.9 | | 228°39.7 | 9.0' | 16°22.9 | 13.7' | 59.4' |
| 14 | 33°27.9 | 12.5 | | 243°07.7 | 8.9' | 16°36.6 | 13.6' | 59.4' |
| 15 | 48°27.7 | · · 13.0 | | 257°35.5 | 8.7' | 16°50.3 | 13.6' | 59.4' |
| 16 | 63°27.5 | 13.5 | | 272°03.2 | 8.6' | 17°03.8 | 13.5' | 59.5' |
| 17 | 78°27.4 | 14.0 | | 286°30.8 | 8.5' | 17°17.3 | 13.4' | 59.5' |
| 18 | 93°27.2 | S20°14.6 | | 300°58.3 | 8.3' | N17°30.7 | 13.3' | 59.6' |
| 19 | 108°27.0 | 15.1 | | 315°25.7 | 8.2' | 17°44.0 | 13.2' | 59.6' |
| 20 | 123°26.9 | 15.6 | | 329°52.9 | 8.1' | 17°57.2 | 13.1' | 59.6' |
| 21 | 138°26.7 | · · 16.2 | | 344°20.0 | 8.0' | 18°10.4 | 13.0' | 59.7' |
| 22 | 153°26.5 | 16.7 | | 358°46.9 | 7.8' | 18°23.4 | 12.9' | 59.7' |
| 23 | 168°26.4 | 17.2 | | 13°13.8 | 7.7' | 18°36.3 | 12.8' | 59.7' |
| SD = 16.2' $d = 0.5'$ | | | | SD = 16.1' | | | | |

| Mon | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|------------|-------|----------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 183°26.2 | S20°17.7 | | 27°40.4 | 7.6' | N18°49.2 | 12.7' | 59.7' |
| 1 | 198°26.0 | 18.3 | | 42°07.0 | 7.4' | 19°01.9 | 12.6' | 59.8' |
| 2 | 213°25.9 | 18.8 | | 56°33.5 | 7.3' | 19°14.6 | 12.5' | 59.8' |
| 3 | 228°25.7 | · · 19.3 | | 70°59.8 | 7.2' | 19°27.1 | 12.4' | 59.8' |
| 4 | 243°25.5 | 19.8 | | 85°25.9 | 7.0' | 19°39.5 | 12.3' | 59.9' |
| 5 | 258°25.3 | 20.3 | | 99°52.0 | 6.9' | 19°51.8 | 12.2' | 59.9' |
| 6 | 273°25.2 | S20°20.9 | | 114°17.9 | 6.8' | N20°04.1 | 12.1' | 59.9' |
| 7 | 288°25.0 | 21.4 | | 128°43.6 | 6.6' | 20°16.1 | 12.0' | 60.0' |
| 8 | 303°24.8 | 21.9 | | 143°09.3 | 6.5' | 20°28.1 | 11.9' | 60.0' |
| 9 | 318°24.7 | · · 22.4 | | 157°34.8 | 6.4' | 20°40.0 | 11.7' | 60.0' |
| 10 | 333°24.5 | 22.9 | | 172°00.2 | 6.2' | 20°51.7 | 11.6' | 60.1' |
| 11 | 348°24.3 | 23.5 | | 186°25.4 | 6.1' | 21°03.3 | 11.5' | 60.1' |
| 12 | 3°24.1 | S20°24.0 | | 200°50.5 | 6.0' | N21°14.8 | 11.4' | 60.1' |
| 13 | 18°24.0 | 24.5 | | 215°15.5 | 5.8' | 21°26.2 | 11.2' | 60.1' |
| 14 | 33°23.8 | 25.0 | | 229°40.3 | 5.7' | 21°37.4 | 11.1' | 60.2' |
| 15 | 48°23.6 | · · 25.5 | | 244°05.0 | 5.6' | 21°48.5 | 11.0' | 60.2' |
| 16 | 63°23.4 | 26.0 | | 258°29.6 | 5.4' | 21°59.5 | 10.8' | 60.2' |
| 17 | 78°23.3 | 26.5 | | 272°54.0 | 5.3' | 22°10.3 | 10.7' | 60.2' |
| 18 | 93°23.1 | S20°27.1 | | 287°18.4 | 5.2' | N22°21.0 | 10.6' | 60.3' |
| 19 | 108°22.9 | 27.6 | | 301°42.5 | 5.1' | 22°31.6 | 10.4' | 60.3' |
| 20 | 123°22.7 | 28.1 | | 316°06.6 | 4.9' | 22°42.0 | 10.3' | 60.3' |
| 21 | 138°22.6 | · · 28.6 | | 330°30.5 | 4.8' | 22°52.3 | 10.1' | 60.3' |
| 22 | 153°22.4 | 29.1 | | 344°54.3 | 4.7' | 23°02.4 | 10.0' | 60.4' |
| 23 | 168°22.2 | 29.6 | | 359°18.0 | 4.5' | 23°12.4 | 9.8' | 60.4' |
| SD = 16.2' $d = 0.5'$ | | | | SD = 16.3' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 07:24 | 09:08 | ■ | ■ | 14:24 | 16:08 |
| N 70° | 07:11 | 08:38 | 10:45 | 12:46 | 14:53 | 16:21 |
| 68° | 07:00 | 08:17 | 09:47 | 13:44 | 15:15 | 16:31 |
| 66° | 06:51 | 08:00 | 09:14 | 14:18 | 15:32 | 16:40 |
| 64° | 06:43 | 07:46 | 08:50 | 14:42 | 15:46 | 16:48 |
| 62° | 06:36 | 07:34 | 08:31 | 15:01 | 15:58 | 16:55 |
| 60° | 06:30 | 07:24 | 08:15 | 15:17 | 16:08 | 17:01 |
| N 58° | 06:25 | 07:15 | 08:02 | 15:30 | 16:17 | 17:07 |
| 56° | 06:20 | 07:07 | 07:50 | 15:41 | 16:25 | 17:12 |
| 54° | 06:15 | 07:00 | 07:41 | 15:51 | 16:32 | 17:16 |
| 52° | 06:11 | 06:53 | 07:32 | 16:00 | 16:39 | 17:20 |
| 50° | 06:07 | 06:47 | 07:24 | 16:08 | 16:44 | 17:24 |
| 45° | 05:58 | 06:34 | 07:07 | 16:25 | 16:57 | 17:33 |
| N 40° | 05:50 | 06:23 | 06:53 | 16:39 | 17:08 | 17:42 |
| 35° | 05:43 | 06:14 | 06:41 | 16:51 | 17:18 | 17:49 |
| 30° | 05:36 | 06:05 | 06:31 | 17:01 | 17:27 | 17:56 |
| 20° | 05:23 | 05:49 | 06:13 | 17:19 | 17:43 | 18:09 |
| N 10° | 05:09 | 05:35 | 05:57 | 17:35 | 17:57 | 18:23 |
| 0° | 04:55 | 05:20 | 05:43 | 17:50 | 18:12 | 18:37 |
| S 10° | 04:39 | 05:05 | 05:28 | 18:05 | 18:27 | 18:54 |
| 20° | 04:19 | 04:48 | 05:12 | 18:21 | 18:45 | 19:13 |
| 30° | 03:55 | 04:27 | 04:53 | 18:40 | 19:06 | 19:38 |
| 35° | 03:39 | 04:14 | 04:42 | 18:51 | 19:19 | 19:54 |
| 40° | 03:20 | 03:58 | 04:30 | 19:03 | 19:34 | 20:13 |
| 45° | 02:55 | 03:40 | 04:15 | 19:18 | 19:53 | 20:38 |
| S 50° | 02:21 | 03:16 | 03:56 | 19:37 | 20:18 | 21:13 |
| 52° | 02:02 | 03:04 | 03:48 | 19:46 | 20:29 | 21:32 |
| 54° | 01:39 | 02:50 | 03:38 | 19:55 | 20:43 | 21:56 |
| 56° | 01:07 | 02:35 | 03:27 | 20:07 | 20:59 | 22:29 |
| 58° | /// | 02:15 | 03:14 | 20:19 | 21:19 | /// |
| S 60° | /// | 01:50 | 02:59 | 20:35 | 21:45 | /// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | 12:39 | 11:37 | □ | 04:26 | 07:13 | □ |
| N 70° | 12:55 | 12:15 | □ | 04:13 | 06:37 | □ |
| 68° | 13:08 | 12:41 | 11:47 | 04:03 | 06:12 | 09:01 |
| 66° | 13:19 | 13:02 | 12:36 | 03:54 | 05:53 | 08:14 |
| 64° | 13:28 | 13:19 | 13:07 | 03:47 | 05:38 | 07:43 |
| 62° | 13:35 | 13:33 | 13:31 | 03:40 | 05:25 | 07:21 |
| 60° | 13:42 | 13:44 | 13:50 | 03:35 | 05:15 | 07:03 |
| N 58° | 13:48 | 13:55 | 14:06 | 03:30 | 05:06 | 06:48 |
| 56° | 13:53 | 14:04 | 14:19 | 03:26 | 04:57 | 06:35 |
| 54° | 13:58 | 14:12 | 14:31 | 03:22 | 04:50 | 06:24 |
| 52° | 14:03 | 14:19 | 14:41 | 03:19 | 04:44 | 06:14 |
| 50° | 14:07 | 14:26 | 14:51 | 03:16 | 04:38 | 06:05 |
| 45° | 14:15 | 14:40 | 15:11 | 03:09 | 04:26 | 05:47 |
| N 40° | 14:23 | 14:51 | 15:27 | 03:04 | 04:16 | 05:32 |
| 35° | 14:29 | 15:02 | 15:41 | 02:59 | 04:07 | 05:19 |
| 30° | 14:34 | 15:10 | 15:53 | 02:55 | 04:00 | 05:08 |
| 20° | 14:44 | 15:26 | 16:13 | 02:48 | 03:47 | 04:50 |
| N 10° | 14:53 | 15:39 | 16:32 | 02:42 | 03:35 | 04:33 |
| 0° | 15:01 | 15:52 | 16:49 | 02:36 | 03:25 | 04:18 |
| S 10° | 15:09 | 16:05 | 17:06 | 02:30 | 03:14 | 04:03 |
| 20° | 15:18 | 16:19 | 17:24 | 02:24 | 03:03 | 03:47 |
| 30° | 15:28 | 16:35 | 17:46 | 02:17 | 02:50 | 03:29 |
| 35° | 15:34 | 16:44 | 17:59 | 02:13 | 02:43 | 03:18 |
| 40° | 15:41 | 16:55 | 18:13 | 02:08 | 02:35 | 03:06 |
| 45° | 15:49 | 17:08 | 18:31 | 02:03 | 02:25 | 02:52 |
| S 50° | 15:58 | 17:23 | 18:52 | 01:57 | 02:14 | 02:35 |
| 52° | 16:03 | 17:31 | 19:03 | 01:54 | 02:08 | 02:27 |
| 54° | 16:08 | 17:39 | 19:15 | 01:51 | 02:02 | 02:18 |
| 56° | 16:13 | 17:48 | 19:28 | 01:47 | 01:56 | 02:08 |
| 58° | 16:20 | 17:59 | 19:44 | 01:44 | 01:49 | 01:56 |
| S 60° | 16:27 | 18:11 | 20:04 | 01:39 | 01:40 | 01:43 |

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November 24, 25, 26 UT (Tue., Wed., Thu.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|---------------------|----------|----------|--------------------|----------|----------|---------------------|----------|----------|--------------------|----------|---------|----------|---------|
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 62°58.2 | 219°54.5 | S09°14.0 | 270°53.0 | N13°44.8 | 274°01.5 | N13°25.8 | 54°25.0 | N00°50.8 | 69°27.5 | 50.8 | 84°30.0 | 50.7 | 114°35.1 | 50.7 |
| 1 | 78°00.6 | 234°56.0 | 14.0 | 285°54.4 | 44.5 | 289°03.8 | 25.8 | 69°27.5 | 50.8 | 84°30.0 | 50.7 | 114°35.1 | 50.7 | 129°37.7 | 50.7 |
| 2 | 93°03.1 | 249°57.4 | 13.9 | 300°55.9 | 44.2 | 304°06.1 | 25.7 | 69°27.5 | 50.8 | 84°30.0 | 50.7 | 114°35.1 | 50.7 | 129°37.7 | 50.7 |
| 3 | 108°05.6 | 264°58.9 | •• 13.8 | 315°57.3 | •• 43.9 | 319°08.4 | •• 25.7 | 69°27.5 | 50.8 | 84°30.0 | 50.7 | 114°35.1 | 50.7 | 129°37.7 | 50.7 |
| 4 | 123°08.0 | 280°00.3 | 13.8 | 330°58.8 | 43.6 | 334°10.8 | 25.6 | 69°27.5 | 50.8 | 84°30.0 | 50.7 | 114°35.1 | 50.7 | 129°37.7 | 50.7 |
| 5 | 138°10.5 | 295°01.7 | 13.7 | 346°00.2 | 43.3 | 349°13.1 | 25.6 | 69°27.5 | 50.8 | 84°30.0 | 50.7 | 114°35.1 | 50.7 | 129°37.7 | 50.7 |
| 6 | 153°13.0 | 310°03.2 | S09°13.6 | 1°01.7 | N13°43.0 | 4°15.4 | N13°25.6 | 144°40.2 | N00°50.7 | 159°42.7 | 50.6 | 174°45.3 | 50.6 | 204°50.3 | 50.6 |
| 7 | 168°15.4 | 325°04.6 | 13.6 | 16°03.2 | 42.7 | 19°17.7 | 25.5 | 159°42.7 | 50.6 | 174°45.3 | 50.6 | 204°50.3 | 50.6 | 219°52.9 | 50.5 |
| 8 | 183°17.9 | 340°06.0 | 13.5 | 31°04.6 | 42.4 | 34°20.0 | 25.5 | 159°42.7 | 50.6 | 174°45.3 | 50.6 | 204°50.3 | 50.6 | 219°52.9 | 50.5 |
| 9 | 198°20.4 | 355°07.4 | •• 13.4 | 46°06.1 | •• 42.1 | 49°22.3 | •• 25.4 | 159°42.7 | 50.6 | 174°45.3 | 50.6 | 204°50.3 | 50.6 | 219°52.9 | 50.5 |
| 10 | 213°22.8 | 10°08.9 | 13.4 | 61°07.5 | 41.8 | 64°24.7 | 25.4 | 159°42.7 | 50.6 | 174°45.3 | 50.6 | 204°50.3 | 50.6 | 219°52.9 | 50.5 |
| 11 | 228°25.3 | 25°10.3 | 13.3 | 76°09.0 | 41.5 | 79°27.0 | 25.4 | 159°42.7 | 50.6 | 174°45.3 | 50.6 | 204°50.3 | 50.6 | 219°52.9 | 50.5 |
| 12 | 243°27.7 | 40°11.7 | S09°13.3 | 91°10.5 | N13°41.2 | 94°29.3 | N13°25.3 | 234°55.4 | N00°50.5 | 249°57.9 | 50.5 | 265°00.5 | 50.5 | 280°03.0 | •• 50.5 |
| 13 | 258°30.2 | 55°13.1 | 13.2 | 106°11.9 | 40.9 | 109°31.6 | 25.3 | 249°57.9 | 50.5 | 265°00.5 | 50.5 | 280°03.0 | •• 50.5 | 295°05.5 | 50.4 |
| 14 | 273°32.7 | 70°14.5 | 13.2 | 121°13.4 | 40.6 | 124°33.9 | 25.2 | 249°57.9 | 50.5 | 265°00.5 | 50.5 | 280°03.0 | •• 50.5 | 310°08.1 | 50.4 |
| 15 | 288°35.1 | 85°15.9 | •• 13.1 | 136°14.9 | •• 40.3 | 139°36.3 | •• 25.2 | 249°57.9 | 50.5 | 265°00.5 | 50.5 | 280°03.0 | •• 50.5 | 310°08.1 | 50.4 |
| 16 | 303°37.6 | 100°17.3 | 13.1 | 151°16.3 | 40.0 | 154°38.6 | 25.1 | 249°57.9 | 50.5 | 265°00.5 | 50.5 | 280°03.0 | •• 50.5 | 310°08.1 | 50.4 |
| 17 | 318°40.1 | 115°18.7 | 13.0 | 166°17.8 | 39.7 | 169°40.9 | 25.1 | 249°57.9 | 50.5 | 265°00.5 | 50.5 | 280°03.0 | •• 50.5 | 310°08.1 | 50.4 |
| 18 | 333°42.5 | 130°20.1 | S09°13.0 | 181°19.2 | N13°39.4 | 184°43.2 | N13°25.1 | 325°10.6 | N00°50.4 | 340°13.1 | 50.4 | 355°15.7 | 50.4 | 340°13.1 | 50.4 |
| 19 | 348°45.0 | 145°21.5 | 12.9 | 196°20.7 | 39.1 | 199°45.5 | 25.0 | 340°13.1 | 50.4 | 355°15.7 | 50.4 | 340°13.1 | 50.4 | 340°13.1 | 50.4 |
| 20 | 3°47.5 | 160°22.9 | 12.9 | 211°22.2 | 38.8 | 214°47.9 | 25.0 | 340°13.1 | 50.4 | 355°15.7 | 50.4 | 340°13.1 | 50.4 | 340°13.1 | 50.4 |
| 21 | 18°49.9 | 175°24.3 | •• 12.9 | 226°23.6 | •• 38.5 | 229°50.2 | •• 24.9 | 340°13.1 | 50.4 | 355°15.7 | 50.4 | 340°13.1 | 50.4 | 340°13.1 | 50.4 |
| 22 | 33°52.4 | 190°25.7 | 12.8 | 241°25.1 | 38.2 | 244°52.5 | 24.9 | 340°13.1 | 50.4 | 355°15.7 | 50.4 | 340°13.1 | 50.4 | 340°13.1 | 50.4 |
| 23 | 48°54.9 | 205°27.1 | 12.8 | 256°26.6 | 37.9 | 259°54.8 | 24.9 | 340°13.1 | 50.4 | 355°15.7 | 50.4 | 340°13.1 | 50.4 | 340°13.1 | 50.4 |
| Mer.pass. 19:45 | | ν1.4' d-0.1' m-4.90 | | | ν1.5' d-0.3' m0.57 | | | ν2.3' d-0.0' m-2.14 | | | ν2.5' d-0.0' m0.57 | | | | |

| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|---------------------|----------|----------|--------------------|----------|----------|---------------------|----------|----------|--------------------|----------|---------|----------|---------|
| 0 | 63°57.3 | 220°28.5 | S09°12.8 | 271°28.1 | N13°37.6 | 274°57.1 | N13°24.8 | 55°25.8 | N00°50.3 | 70°28.3 | 50.3 | 85°30.9 | 50.3 | 100°33.4 | •• 50.2 |
| 1 | 78°59.8 | 235°29.8 | 12.7 | 286°29.5 | 37.4 | 289°59.5 | 24.8 | 70°28.3 | 50.3 | 85°30.9 | 50.3 | 100°33.4 | •• 50.2 | 115°35.9 | 50.2 |
| 2 | 94°02.2 | 250°31.2 | 12.7 | 301°31.0 | 37.1 | 305°01.8 | 24.7 | 70°28.3 | 50.3 | 85°30.9 | 50.3 | 100°33.4 | •• 50.2 | 115°35.9 | 50.2 |
| 3 | 109°04.7 | 265°32.6 | •• 12.7 | 316°32.5 | •• 36.8 | 320°04.1 | •• 24.7 | 70°28.3 | 50.3 | 85°30.9 | 50.3 | 100°33.4 | •• 50.2 | 115°35.9 | 50.2 |
| 4 | 124°07.2 | 280°34.0 | 12.6 | 331°33.9 | 36.5 | 335°06.4 | 24.7 | 70°28.3 | 50.3 | 85°30.9 | 50.3 | 100°33.4 | •• 50.2 | 115°35.9 | 50.2 |
| 5 | 139°09.6 | 295°35.3 | 12.6 | 346°35.4 | 36.2 | 350°08.8 | 24.6 | 70°28.3 | 50.3 | 85°30.9 | 50.3 | 100°33.4 | •• 50.2 | 115°35.9 | 50.2 |
| 6 | 154°12.1 | 310°36.7 | S09°12.6 | 1°36.9 | N13°35.9 | 5°11.1 | N13°24.6 | 145°41.0 | N00°50.2 | 160°43.5 | 50.2 | 175°46.1 | 50.1 | 190°48.6 | •• 50.1 |
| 7 | 169°14.6 | 325°38.1 | 12.6 | 16°38.3 | 35.6 | 20°13.4 | 24.6 | 160°43.5 | 50.2 | 175°46.1 | 50.1 | 190°48.6 | •• 50.1 | 205°51.1 | 50.1 |
| 8 | 184°17.0 | 340°39.4 | 12.6 | 31°39.8 | 35.3 | 35°15.7 | 24.5 | 160°43.5 | 50.2 | 175°46.1 | 50.1 | 190°48.6 | •• 50.1 | 205°51.1 | 50.1 |
| 9 | 199°19.5 | 355°40.8 | •• 12.5 | 46°41.3 | •• 35.0 | 50°18.1 | •• 24.5 | 160°43.5 | 50.2 | 175°46.1 | 50.1 | 190°48.6 | •• 50.1 | 205°51.1 | 50.1 |
| 10 | 214°22.0 | 10°42.1 | 12.5 | 61°42.8 | 34.7 | 65°20.4 | 24.4 | 160°43.5 | 50.2 | 175°46.1 | 50.1 | 190°48.6 | •• 50.1 | 205°51.1 | 50.1 |
| 11 | 229°24.4 | 25°43.5 | 12.5 | 76°44.2 | 34.4 | 80°22.7 | 24.4 | 160°43.5 | 50.2 | 175°46.1 | 50.1 | 190°48.6 | •• 50.1 | 205°51.1 | 50.1 |
| 12 | 244°26.9 | 40°44.8 | S09°12.5 | 91°45.7 | N13°34.1 | 95°25.0 | N13°24.4 | 235°56.2 | N00°50.1 | 250°58.7 | 50.0 | 265°01.3 | 50.0 | 281°03.8 | •• 50.0 |
| 13 | 259°29.4 | 55°46.2 | 12.5 | 106°47.2 | 33.8 | 110°27.4 | 24.3 | 235°56.2 | N00°50.1 | 250°58.7 | 50.0 | 265°01.3 | 50.0 | 281°03.8 | •• 50.0 |
| 14 | 274°31.8 | 70°47.5 | 12.5 | 121°48.7 | 33.5 | 125°29.7 | 24.3 | 235°56.2 | N00°50.1 | 250°58.7 | 50.0 | 265°01.3 | 50.0 | 281°03.8 | •• 50.0 |
| 15 | 289°34.3 | 85°48.9 | •• 12.5 | 136°50.1 | •• 33.2 | 140°32.0 | •• 24.2 | 235°56.2 | N00°50.1 | 250°58.7 | 50.0 | 265°01.3 | 50.0 | 281°03.8 | •• 50.0 |
| 16 | 304°36.7 | 100°50.2 | 12.5 | 151°51.6 | 32.9 | 155°34.3 | 24.2 | 235°56.2 | N00°50.1 | 250°58.7 | 50.0 | 265°01.3 | 50.0 | 281°03.8 | •• 50.0 |
| 17 | 319°39.2 | 115°51.5 | 12.4 | 166°53.1 | 32.6 | 170°36.7 | 24.2 | 235°56.2 | N00°50.1 | 250°58.7 | 50.0 | 265°01.3 | 50.0 | 281°03.8 | •• 50.0 |
| 18 | 334°41.7 | 130°52.9 | S09°12.4 | 181°54.6 | N13°32.3 | 185°39.0 | N13°24.1 | 326°11.4 | N00°50.0 | 341°13.9 | 49.9 | 356°16.4 | 49.9 | 371°19.0 | •• 49.9 |
| 19 | 349°44.1 | 145°54.2 | 12.4 | 196°56.1 | 32.0 | 200°41.3 | 24.1 | 341°13.9 | 49.9 | 356°16.4 | 49.9 | 371°19.0 | •• 49.9 | 371°19.0 | •• 49.9 |
| 20 | 4°46.6 | 160°55.5 | 12.4 | 211°57.5 | 31.7 | 215°43.7 | 24.1 | 341°13.9 | 49.9 | 356°16.4 | 49.9 | 371°19.0 | •• 49.9 | 371°19.0 | •• 49.9 |
| 21 | 19°49.1 | 175°56.9 | •• 12.4 | 226°59.0 | •• 31.5 | 230°46.0 | •• 24.0 | 341°13.9 | 49.9 | 356°16.4 | 49.9 | 371°19.0 | •• 49.9 | 371°19.0 | •• 49.9 |
| 22 | 34°51.5 | 190°58.2 | 12.4 | 242°00.5 | 31.2 | 245°48.3 | 24.0 | 341°13.9 | 49.9 | 356°16.4 | 49.9 | 371°19.0 | •• 49.9 | 371°19.0 | •• 49.9 |
| 23 | 49°54.0 | 205°59.5 | 12.5 | 257°02.0 | 30.9 | 260°50.6 | 23.9 | 341°13.9 | 49.9 | 356°16.4 | 49.9 | 371°19.0 | •• 49.9 | 371°19.0 | •• 49.9 |
| Mer.pass. 19:41 | | ν1.4' d-0.0' m-4.91 | | | ν1.5' d-0.3' m0.55 | | | ν2.3' d-0.0' m-2.15 | | | ν2.5' d-0.0' m0.58 | | | | |

| Th | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | |
|-----------------|----------|----------|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|--|
| 0 | 64°56.5 | 221°00.8 | S09°12.5 | 272°03.5 | N13°30.6 | 275°53.0 | N13°23.9 | 56°26.6 | N00°49.9 | |
| 1 | 79°58.9 | 236°02.1 | 12.5 | 287°04.9 | 30.3 | 290°55.3 | 23.9 | 71°29.1 | 49.8 | |
| 2 | 95°01.4 | 251°03.4 | 12.5 | 302°06.4 | 30.0 | 305°57.6 | 23.8 | 86°31.6 | 49.8 | |
| 3 | 110°03.9 | 266°04.7 | · · 12.5 | 317°07.9 | · · 29.7 | 321°00.0 | · · 23.8 | 101°34.1 | · · 49.8 | |
| 4 | 125°06.3 | 281°06.1 | 12.5 | 332°09.4 | 29.4 | 336°02.3 | 23.8 | 116°36.7 | 49.8 | |
| 5 | 140°08.8 | 296°07.4 | 12.5 | 347°10.9 | 29.1 | 351°04.6 | 23.7 | 131°39.2 | 49.8 | |
| 6 | 155°11.2 | 311°08.7 | S09°12.5 | 2°12.4 | N13°28.8 | 6°07.0 | N13°23.7 | 146°41.7 | N00°49.7 | |
| 7 | 170°13.7 | 326°10.0 | 12.5 | 17°13.8 | 28.5 | 21°09.3 | 23.7 | 161°44.3 | 49.7 | |
| 8 | 185°16.2 | 341°11.2 | 12.6 | 32°15.3 | 28.2 | 36°11.6 | 23.6 | 176°46.8 | 49.7 | |
| 9 | 200°18.6 | 356°12.5 | · · 12.6 | 47°16.8 | · · 27.9 | 51°14.0 | · · 23.6 | 191°49.3 | · · 49.7 | |
| 10 | 215°21.1 | 11°13.8 | 12.6 | 62°18.3 | 27.6 | 66°16.3 | 23.5 | 206°51.8 | 49.7 | |
| 11 | 230°23.6 | 26°15.1 | 12.6 | 77°19.8 | 27.4 | 81°18.6 | 23.5 | 221°54.4 | 49.7 | |
| 12 | 245°26.0 | 41°16.4 | S09°12.7 | 92°21.3 | N13°27.1 | 96°20.9 | N13°23.5 | 236°56.9 | N00°49.6 | |
| 13 | 260°28.5 | 56°17.7 | 12.7 | 107°22.8 | 26.8 | 111°23.3 | 23.4 | 251°59.4 | 49.6 | |
| 14 | 275°31.0 | 71°19.0 | 12.7 | 122°24.3 | 26.5 | 126°25.6 | 23.4 | 267°02.0 | 49.6 | |
| 15 | 290°33.4 | 86°20.2 | · · 12.7 | 137°25.7 | · · 26.2 | 141°28.0 | · · 23.4 | 282°04.5 | · · 49.6 | |
| 16 | 305°35.9 | 101°21.5 | 12.8 | 152°27.2 | 25.9 | 156°30.3 | 23.3 | 297°07.0 | 49.6 | |
| 17 | 320°38.4 | 116°22.8 | 12.8 | 167°28.7 | 25.6 | 171°32.6 | 23.3 | 312°09.5 | 49.6 | |
| 18 | 335°40.8 | 131°24.1 | S09°12.8 | 182°30.2 | N13°25.3 | 186°35.0 | N13°23.3 | 327°12.1 | N00°49.6 | |
| 19 | 350°43.3 | 146°25.3 | 12.9 | 197°31.7 | 25.0 | 201°37.3 | 23.2 | 342°14.6 | 49.5 | |
| 20 | 5°45.7 | 161°26.6 | 12.9 | 212°33.2 | 24.7 | 216°39.6 | 23.2 | 357°17.1 | 49.5 | |
| 21 | 20°48.2 | 176°27.8 | · · 13.0 | 227°34.7 | · · 24.5 | 231°42.0 | · · 23.2 | 12°19.6 | · · 49.5 | |
| 22 | 35°50.7 | 191°29.1 | 13.0 | 242°36.2 | 24.2 | 246°44.3 | 23.1 | 27°22.2 | 49.5 | |
| 23 | 50°53.1 | 206°30.4 | 13.1 | 257°37.7 | 23.9 | 261°46.6 | 23.1 | 42°24.7 | 49.5 | |
| Mer.pass. 19:37 | | | ν1.3' d0.0' m-4.91 | | ν1.5' d-0.3' m0.54 | | ν2.3' d-0.0' m-2.16 | | ν2.5' d-0.0' m0.58 | |

| h | Sun | | Moon | | | | |
|-----------------------|----------|----------|----------|-------|----------|------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| Tue | | | | | | | |
| 0 | 183°22.0 | S20°30.1 | 13°41.5 | 4.4' | N23°22.2 | 9.7' | 60.4' |
| 1 | 198°21.9 | 30.6 | 28°04.9 | 4.3' | 23°31.8 | 9.5' | 60.4' |
| 2 | 213°21.7 | 31.1 | 42°28.2 | 4.2' | 23°41.4 | 9.4' | 60.5' |
| 3 | 228°21.5 | · · 31.6 | 56°51.4 | 4.0' | 23°50.7 | 9.2' | 60.5' |
| 4 | 243°21.3 | 32.1 | 71°14.4 | 3.9' | 23°59.9 | 9.0' | 60.5' |
| 5 | 258°21.1 | 32.6 | 85°37.3 | 3.8' | 24°08.9 | 8.9' | 60.5' |
| 6 | 273°21.0 | S20°33.2 | 100°00.1 | 3.7' | N24°17.8 | 8.7' | 60.5' |
| 7 | 288°20.8 | 33.7 | 114°22.8 | 3.6' | 24°26.5 | 8.5' | 60.6' |
| 8 | 303°20.6 | 34.2 | 128°45.4 | 3.4' | 24°35.0 | 8.4' | 60.6' |
| 9 | 318°20.4 | · · 34.7 | 143°07.8 | 3.3' | 24°43.4 | 8.2' | 60.6' |
| 10 | 333°20.2 | 35.2 | 157°30.2 | 3.2' | 24°51.6 | 8.0' | 60.6' |
| 11 | 348°20.1 | 35.7 | 171°52.4 | 3.1' | 24°59.6 | 7.8' | 60.6' |
| 12 | 3°19.9 | S20°36.2 | 186°14.5 | 3.0' | N25°07.4 | 7.7' | 60.7' |
| 13 | 18°19.7 | 36.7 | 200°36.5 | 2.9' | 25°15.1 | 7.5' | 60.7' |
| 14 | 33°19.5 | 37.2 | 214°58.4 | 2.8' | 25°22.5 | 7.3' | 60.7' |
| 15 | 48°19.3 | · · 37.7 | 229°20.2 | 2.7' | 25°29.8 | 7.1' | 60.7' |
| 16 | 63°19.2 | 38.2 | 243°41.9 | 2.6' | 25°36.9 | 6.9' | 60.7' |
| 17 | 78°19.0 | 38.7 | 258°03.5 | 2.5' | 25°43.8 | 6.7' | 60.7' |
| 18 | 93°18.8 | S20°39.2 | 272°25.0 | 2.4' | N25°50.6 | 6.5' | 60.7' |
| 19 | 108°18.6 | 39.7 | 286°46.4 | 2.3' | 25°57.1 | 6.4' | 60.8' |
| 20 | 123°18.4 | 40.2 | 301°07.7 | 2.2' | 26°03.5 | 6.2' | 60.8' |
| 21 | 138°18.2 | · · 40.6 | 315°28.9 | 2.1' | 26°09.6 | 6.0' | 60.8' |
| 22 | 153°18.1 | 41.1 | 329°50.0 | 2.0' | 26°15.6 | 5.8' | 60.8' |
| 23 | 168°17.9 | 41.6 | 344°11.0 | 2.0' | 26°21.4 | 5.6' | 60.8' |
| SD = 16.2' $d = 0.5'$ | | | | | | | |

| Wed | Sun | | Moon | | | | |
|-----------------------|----------|----------|----------|-------|----------|------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 183°17.7 | S20°42.1 | 358°32.0 | 1.9' | N26°27.0 | 5.4' | 60.8' |
| 1 | 198°17.5 | 42.6 | 12°52.9 | 1.8' | 26°32.3 | 5.2' | 60.8' |
| 2 | 213°17.3 | 43.1 | 27°13.7 | 1.7' | 26°37.5 | 5.0' | 60.8' |
| 3 | 228°17.1 | · · 43.6 | 41°34.4 | 1.6' | 26°42.5 | 4.8' | 60.9' |
| 4 | 243°16.9 | 44.1 | 55°55.0 | 1.6' | 26°47.2 | 4.6' | 60.9' |
| 5 | 258°16.8 | 44.6 | 70°15.6 | 1.5' | 26°51.8 | 4.4' | 60.9' |
| 6 | 273°16.6 | S20°45.1 | 84°36.1 | 1.5' | N26°56.2 | 4.2' | 60.9' |
| 7 | 288°16.4 | 45.6 | 98°56.6 | 1.4' | 27°00.3 | 3.9' | 60.9' |
| 8 | 303°16.2 | 46.0 | 113°17.0 | 1.3' | 27°04.3 | 3.7' | 60.9' |
| 9 | 318°16.0 | · · 46.5 | 127°37.3 | 1.3' | 27°08.0 | 3.5' | 60.9' |
| 10 | 333°15.8 | 47.0 | 141°57.6 | 1.2' | 27°11.5 | 3.3' | 60.9' |
| 11 | 348°15.6 | 47.5 | 156°17.8 | 1.2' | 27°14.9 | 3.1' | 60.9' |
| 12 | 3°15.4 | S20°48.0 | 170°38.0 | 1.1' | N27°18.0 | 2.9' | 60.9' |
| 13 | 18°15.2 | 48.5 | 184°58.1 | 1.1' | 27°20.9 | 2.7' | 60.9' |
| 14 | 33°15.1 | 49.0 | 199°18.2 | 1.1' | 27°23.5 | 2.5' | 60.9' |
| 15 | 48°14.9 | · · 49.4 | 213°38.3 | 1.0' | 27°26.0 | 2.3' | 60.9' |
| 16 | 63°14.7 | 49.9 | 227°58.3 | 1.0' | 27°28.3 | 2.0' | 60.9' |
| 17 | 78°14.5 | 50.4 | 242°18.3 | 1.0' | 27°30.3 | 1.8' | 60.9' |
| 18 | 93°14.3 | S20°50.9 | 256°38.3 | 1.0' | N27°32.1 | 1.6' | 60.9' |
| 19 | 108°14.1 | 51.4 | 270°58.3 | 0.9' | 27°33.7 | 1.4' | 60.9' |
| 20 | 123°13.9 | 51.8 | 285°18.2 | 0.9' | 27°35.1 | 1.2' | 60.9' |
| 21 | 138°13.7 | · · 52.3 | 299°38.1 | 0.9' | 27°36.3 | 1.0' | 60.9' |
| 22 | 153°13.5 | 52.8 | 313°58.0 | 0.9' | 27°37.2 | 0.7' | 60.9' |
| 23 | 168°13.3 | 53.3 | 328°17.9 | 0.9' | 27°38.0 | 0.5' | 60.9' |
| SD = 16.2' $d = 0.5'$ | | | | | | | |

| Thu | Sun | | Moon | | | | |
|-----------------------|----------|----------|----------|-------|----------|-------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 183°13.1 | S20°53.8 | 342°37.8 | 0.9' | N27°38.5 | 0.3' | 60.9' |
| 1 | 198°12.9 | 54.2 | 356°57.7 | 0.9' | 27°38.8 | 0.1' | 60.9' |
| 2 | 213°12.8 | 54.7 | 11°17.6 | 0.9' | 27°38.9 | -0.1' | 60.9' |
| 3 | 228°12.6 | · · 55.2 | 25°37.5 | 0.9' | 27°38.8 | -0.3' | 60.9' |
| 4 | 243°12.4 | 55.7 | 39°57.4 | 0.9' | 27°38.4 | -0.6' | 60.9' |
| 5 | 258°12.2 | 56.1 | 54°17.3 | 0.9' | 27°37.9 | -0.8' | 60.9' |
| 6 | 273°12.0 | S20°56.6 | 68°37.3 | 1.0' | N27°37.1 | -1.0' | 60.9' |
| 7 | 288°11.8 | 57.1 | 82°57.2 | 1.0' | 27°36.1 | -1.2' | 60.9' |
| 8 | 303°11.6 | 57.5 | 97°17.2 | 1.0' | 27°34.9 | -1.4' | 60.9' |
| 9 | 318°11.4 | · · 58.0 | 111°37.2 | 1.0' | 27°33.5 | -1.6' | 60.9' |
| 10 | 333°11.2 | 58.5 | 125°57.2 | 1.1' | 27°31.8 | -1.9' | 60.9' |
| 11 | 348°11.0 | 59.0 | 140°17.3 | 1.1' | 27°30.0 | -2.1' | 60.9' |
| 12 | 3°10.8 | S20°59.4 | 154°37.4 | 1.2' | N27°27.9 | -2.3' | 60.9' |
| 13 | 18°10.6 | 20°59.9 | 168°57.6 | 1.2' | 27°25.6 | -2.5' | 60.9' |
| 14 | 33°10.4 | 21°00.4 | 183°17.8 | 1.2' | 27°23.1 | -2.7' | 60.9' |
| 15 | 48°10.2 | · · 00.8 | 197°38.0 | 1.3' | 27°20.4 | -2.9' | 60.9' |
| 16 | 63°10.0 | 01.3 | 211°58.3 | 1.3' | 27°17.5 | -3.1' | 60.9' |
| 17 | 78°09.8 | 01.8 | 226°18.7 | 1.4' | 27°14.4 | -3.3' | 60.8' |
| 18 | 93°09.6 | S21°02.2 | 240°39.1 | 1.5' | N27°11.0 | -3.5' | 60.8' |
| 19 | 108°09.4 | 02.7 | 254°59.5 | 1.5' | 27°07.5 | -3.7' | 60.8' |
| 20 | 123°09.2 | 03.1 | 269°20.1 | 1.6' | 27°03.7 | -4.0' | 60.8' |
| 21 | 138°09.0 | · · 03.6 | 283°40.7 | 1.7' | 26°59.8 | -4.2' | 60.8' |
| 22 | 153°08.8 | 04.1 | 298°01.3 | 1.7' | 26°55.6 | -4.4' | 60.8' |
| 23 | 168°08.6 | 04.5 | 312°22.1 | 1.8' | 26°51.3 | -4.6' | 60.8' |
| SD = 16.2' $d = 0.5'$ | | | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 07:33 | 09:22 | ■ | ■ | 14:11 | 16:00 |
| N 70° | 07:19 | 08:50 | 11:33 | 12:00 | 14:43 | 16:14 |
| 68° | 07:08 | 08:26 | 10:03 | 13:31 | 15:07 | 16:26 |
| 66° | 06:58 | 08:08 | 09:25 | 14:08 | 15:25 | 16:35 |
| 64° | 06:50 | 07:53 | 08:59 | 14:35 | 15:40 | 16:44 |
| 62° | 06:42 | 07:40 | 08:38 | 14:55 | 15:53 | 16:51 |
| 60° | 06:36 | 07:30 | 08:22 | 15:11 | 16:04 | 16:57 |
| N 58° | 06:30 | 07:20 | 08:08 | 15:25 | 16:13 | 17:03 |
| 56° | 06:25 | 07:12 | 07:56 | 15:37 | 16:22 | 17:09 |
| 54° | 06:20 | 07:04 | 07:46 | 15:48 | 16:29 | 17:14 |
| 52° | 06:15 | 06:58 | 07:36 | 15:57 | 16:36 | 17:18 |
| 50° | 06:11 | 06:51 | 07:28 | 16:05 | 16:42 | 17:22 |
| 45° | 06:02 | 06:38 | 07:11 | 16:23 | 16:56 | 17:32 |
| N 40° | 05:53 | 06:27 | 06:56 | 16:37 | 17:07 | 17:40 |
| 35° | 05:45 | 06:17 | 06:44 | 16:50 | 17:17 | 17:48 |
| 30° | 05:38 | 06:07 | 06:33 | 17:00 | 17:26 | 17:56 |
| 20° | 05:24 | 05:51 | 06:15 | 17:19 | 17:43 | 18:10 |
| N 10° | 05:10 | 05:36 | 05:59 | 17:35 | 17:58 | 18:24 |
| 0° | 04:56 | 05:21 | 05:43 | 17:51 | 18:13 | 18:38 |
| S 10° | 04:39 | 05:05 | 05:28 | 18:06 | 18:29 | 18:55 |
| 20° | 04:19 | 04:47 | 05:11 | 18:23 | 18:47 | 19:15 |
| 30° | 03:53 | 04:26 | 04:52 | 18:42 | 19:09 | 19:41 |
| 35° | 03:37 | 04:12 | 04:41 | 18:53 | 19:22 | 19:57 |
| 40° | 03:17 | 03:56 | 04:28 | 19:07 | 19:38 | 20:18 |
| 45° | 02:51 | 03:37 | 04:12 | 19:22 | 19:58 | 20:43 |
| S 50° | 02:16 | 03:12 | 03:53 | 19:41 | 20:23 | 21:20 |
| 52° | 01:56 | 03:00 | 03:44 | 19:51 | 20:35 | 21:40 |
| 54° | 01:31 | 02:46 | 03:34 | 20:01 | 20:50 | 22:06 |
| 56° | 00:54 | 02:29 | 03:23 | 20:13 | 21:07 | 22:45 |
| 58° | //// | 02:08 | 03:09 | 20:26 | 21:28 | //// |
| S 60° | //// | 01:41 | 02:53 | 20:42 | 21:56 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | □ | □ | □ | □ | □ | □ |
| 66° | □ | □ | □ | □ | □ | □ |
| 64° | 12:43 | □ | □ | 10:13 | □ | □ |
| 62° | 13:31 | 13:41 | 14:49 | 09:27 | 11:33 | 12:47 |
| 60° | 14:02 | 14:32 | 15:41 | 08:56 | 10:43 | 11:55 |
| N 58° | 14:25 | 15:03 | 16:13 | 08:33 | 10:12 | 11:23 |
| 56° | 14:44 | 15:27 | 16:37 | 08:15 | 09:48 | 10:59 |
| 54° | 15:00 | 15:47 | 16:56 | 07:59 | 09:29 | 10:39 |
| 52° | 15:14 | 16:03 | 17:12 | 07:46 | 09:12 | 10:23 |
| 50° | 15:26 | 16:17 | 17:26 | 07:34 | 08:59 | 10:09 |
| 45° | 15:52 | 16:46 | 17:55 | 07:10 | 08:30 | 09:40 |
| N 40° | 16:12 | 17:09 | 18:17 | 06:51 | 08:08 | 09:17 |
| 35° | 16:29 | 17:27 | 18:36 | 06:34 | 07:49 | 08:58 |
| 30° | 16:43 | 17:44 | 18:52 | 06:21 | 07:33 | 08:42 |
| 20° | 17:09 | 18:11 | 19:19 | 05:57 | 07:06 | 08:14 |
| N 10° | 17:30 | 18:35 | 19:42 | 05:36 | 06:43 | 07:51 |
| 0° | 17:51 | 18:57 | 20:04 | 05:17 | 06:22 | 07:29 |
| S 10° | 18:11 | 19:19 | 20:25 | 04:59 | 06:00 | 07:07 |
| 20° | 18:33 | 19:43 | 20:48 | 04:38 | 05:37 | 06:43 |
| 30° | 18:59 | 20:10 | 21:15 | 04:15 | 05:10 | 06:15 |
| 35° | 19:14 | 20:27 | 21:31 | 04:01 | 04:55 | 05:58 |
| 40° | 19:32 | 20:46 | 21:50 | 03:46 | 04:36 | 05:39 |
| 45° | 19:53 | 21:09 | 22:12 | 03:27 | 04:14 | 05:16 |
| S 50° | 20:21 | 21:39 | 22:40 | 03:04 | 03:46 | 04:46 |
| 52° | 20:34 | 21:54 | 22:54 | 02:53 | 03:33 | 04:32 |
| 54° | 20:49 | 22:11 | 23:09 | 02:41 | 03:17 | 04:14 |
| 56° | 21:07 | 22:31 | 23:28 | 02:27 | 02:59 | 03:54 |
| 58° | 21:30 | 22:57 | 23:51 | 02:10 | 02:36 | 03:28 |
| S 60° | 21:58 | 23:32 | · · · | 01:50 | 02:07 | 02:53 |

| Day | Sun | | Mer. Pass | Moon | |
|-----|--|----------------------------------|-----------|------------------------------|------------------------|
| | Eqn. of Time 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer. Pass. Upper hh:mm | Age 15-17 99-97% |
| 24 | 13:28 | 13:20 | 11:47 | —:— | 11:34 |
| 25 | 13:11 | 13:02 | 11:47 | 00:06 | 12:39 |
| 26 | 12:53 | 12:43 | 11:47 | 01:13 | 13:46 |

November 27, 28, 29 UT (Fri., Sat., Sun.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------------|----------|----------|--------------------|----------|----------|--------------------|----------|----------|---------------------|---------|-----|--------------------|--------|--|--|
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | |
| 0 | 65°55.6 | 221°31.6 | S09°13.1 | 272°39.2 | N13°23.6 | 276°49.0 | N13°23.1 | 57°27.2 | N00°49.5 | | | | | | |
| 1 | 80°58.1 | 236°32.9 | 13.1 | 287°40.7 | 23.3 | 291°51.3 | 23.0 | 72°29.7 | 49.4 | | | | | | |
| 2 | 96°00.5 | 251°34.1 | 13.2 | 302°42.2 | 23.0 | 306°53.6 | 23.0 | 87°32.3 | 49.4 | | | | | | |
| 3 | 111°03.0 | 266°35.4 | · · 13.2 | 317°43.7 | · · 22.7 | 321°56.0 | · · 23.0 | 102°34.8 | · · 49.4 | | | | | | |
| 4 | 126°05.5 | 281°36.6 | 13.3 | 332°45.2 | 22.4 | 336°58.3 | 22.9 | 117°37.3 | 49.4 | | | | | | |
| 5 | 141°07.9 | 296°37.8 | 13.3 | 347°46.7 | 22.1 | 352°00.7 | 22.9 | 132°39.8 | 49.4 | | | | | | |
| 6 | 156°10.4 | 311°39.1 | S09°13.4 | 2°48.2 | N13°21.9 | 7°03.0 | N13°22.8 | 147°42.4 | N00°49.4 | | | | | | |
| 7 | 171°12.9 | 326°40.3 | 13.5 | 17°49.7 | 21.6 | 22°05.3 | 22.8 | 162°44.9 | 49.3 | | | | | | |
| 8 | 186°15.3 | 341°41.5 | 13.5 | 32°51.2 | 21.3 | 37°07.7 | 22.8 | 177°47.4 | 49.3 | | | | | | |
| 9 | 201°17.8 | 356°42.8 | · · 13.6 | 47°52.7 | · · 21.0 | 52°10.0 | · · 22.7 | 192°49.9 | · · 49.3 | | | | | | |
| 10 | 216°20.2 | 11°44.0 | 13.6 | 62°54.2 | 20.7 | 67°12.4 | 22.7 | 207°52.5 | 49.3 | | | | | | |
| 11 | 231°22.7 | 26°45.2 | 13.7 | 77°55.7 | 20.4 | 82°14.7 | 22.7 | 222°55.0 | 49.3 | | | | | | |
| 12 | 246°25.2 | 41°46.4 | S09°13.8 | 92°57.2 | N13°20.1 | 97°17.0 | N13°22.6 | 237°57.5 | N00°49.3 | | | | | | |
| 13 | 261°27.6 | 56°47.7 | 13.8 | 107°58.7 | 19.8 | 112°19.4 | 22.6 | 253°00.0 | 49.3 | | | | | | |
| 14 | 276°30.1 | 71°48.9 | 13.9 | 123°00.2 | 19.6 | 127°21.7 | 22.6 | 268°02.6 | 49.2 | | | | | | |
| 15 | 291°32.6 | 86°50.1 | · · 14.0 | 138°01.7 | · · 19.3 | 142°24.1 | · · 22.5 | 283°05.1 | · · 49.2 | | | | | | |
| 16 | 306°35.0 | 101°51.3 | 14.0 | 153°03.2 | 19.0 | 157°26.4 | 22.5 | 298°07.6 | 49.2 | | | | | | |
| 17 | 321°37.5 | 116°52.5 | 14.1 | 168°04.7 | 18.7 | 172°28.7 | 22.5 | 313°10.1 | 49.2 | | | | | | |
| 18 | 336°40.0 | 131°53.7 | S09°14.2 | 183°06.2 | N13°18.4 | 187°31.1 | N13°22.5 | 328°12.6 | N00°49.2 | | | | | | |
| 19 | 351°42.4 | 146°54.9 | 14.2 | 198°07.7 | 18.1 | 202°33.4 | 22.4 | 343°15.2 | 49.2 | | | | | | |
| 20 | 6°44.9 | 161°56.1 | 14.3 | 213°09.2 | 17.8 | 217°35.8 | 22.4 | 358°17.7 | 49.2 | | | | | | |
| 21 | 21°47.4 | 176°57.3 | · · 14.4 | 228°10.7 | · · 17.6 | 232°38.1 | · · 22.4 | 13°20.2 | · · 49.1 | | | | | | |
| 22 | 36°49.8 | 191°58.5 | 14.5 | 243°12.2 | 17.3 | 247°40.5 | 22.3 | 28°22.7 | 49.1 | | | | | | |
| 23 | 51°52.3 | 206°59.7 | 14.6 | 258°13.7 | 17.0 | 262°42.8 | 22.3 | 43°25.3 | 49.1 | | | | | | |
| Mer.pass. 19:33 | | | ν1.3' d0.0' m-4.90 | | | ν1.5' d-0.3' m0.52 | | | ν2.3' d-0.0' m-2.16 | | | ν2.5' d-0.0' m0.59 | | | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | |
| 0 | 66°54.7 | 222°00.9 | S09°14.6 | 273°15.2 | N13°16.7 | 277°45.1 | N13°22.3 | 58°27.8 | N00°49.1 | | | | | | |
| 1 | 81°57.2 | 237°02.1 | 14.7 | 288°16.7 | 16.4 | 292°47.5 | 22.2 | 73°30.3 | 49.1 | | | | | | |
| 2 | 96°59.7 | 252°03.3 | 14.8 | 303°18.2 | 16.1 | 307°49.8 | 22.2 | 88°32.8 | 49.1 | | | | | | |
| 3 | 112°02.1 | 267°04.5 | · · 14.9 | 318°19.8 | · · 15.8 | 322°52.2 | · · 22.2 | 103°35.3 | · · 49.1 | | | | | | |
| 4 | 127°04.6 | 282°05.7 | 15.0 | 333°21.3 | 15.6 | 337°54.5 | 22.1 | 118°37.9 | 49.0 | | | | | | |
| 5 | 142°07.1 | 297°06.8 | 15.1 | 348°22.8 | 15.3 | 352°56.9 | 22.1 | 133°40.4 | 49.0 | | | | | | |
| 6 | 157°09.5 | 312°08.0 | S09°15.2 | 3°24.3 | N13°15.0 | 7°59.2 | N13°22.1 | 148°42.9 | N00°49.0 | | | | | | |
| 7 | 172°12.0 | 327°09.2 | 15.3 | 18°25.8 | 14.7 | 23°01.6 | 22.0 | 163°45.4 | 49.0 | | | | | | |
| 8 | 187°14.5 | 342°10.4 | 15.4 | 33°27.3 | 14.4 | 38°03.9 | 22.0 | 178°47.9 | 49.0 | | | | | | |
| 9 | 202°16.9 | 357°11.5 | · · 15.5 | 48°28.8 | · · 14.1 | 53°06.3 | · · 22.0 | 193°50.5 | · · 49.0 | | | | | | |
| 10 | 217°19.4 | 12°12.7 | 15.6 | 63°30.3 | 13.9 | 68°08.6 | 21.9 | 208°53.0 | 49.0 | | | | | | |
| 11 | 232°21.9 | 27°13.9 | 15.6 | 78°31.9 | 13.6 | 83°11.0 | 21.9 | 223°55.5 | 49.0 | | | | | | |
| 12 | 247°24.3 | 42°15.0 | S09°15.7 | 93°33.4 | N13°13.3 | 98°13.3 | N13°21.9 | 238°58.0 | N00°48.9 | | | | | | |
| 13 | 262°26.8 | 57°16.2 | 15.9 | 108°34.9 | 13.0 | 113°15.6 | 21.9 | 254°00.5 | 48.9 | | | | | | |
| 14 | 277°29.2 | 72°17.3 | 16.0 | 123°36.4 | 12.7 | 128°18.0 | 21.8 | 269°03.1 | 48.9 | | | | | | |
| 15 | 292°31.7 | 87°18.5 | · · 16.1 | 138°37.9 | · · 12.4 | 143°20.3 | · · 21.8 | 284°05.6 | · · 48.9 | | | | | | |
| 16 | 307°34.2 | 102°19.6 | 16.2 | 153°39.4 | 12.2 | 158°22.7 | 21.8 | 299°08.1 | 48.9 | | | | | | |
| 17 | 322°36.6 | 117°20.8 | 16.3 | 168°41.0 | 11.9 | 173°25.0 | 21.7 | 314°10.6 | 48.9 | | | | | | |
| 18 | 337°39.1 | 132°21.9 | S09°16.4 | 183°42.5 | N13°11.6 | 188°27.4 | N13°21.7 | 329°13.1 | N00°48.9 | | | | | | |
| 19 | 352°41.6 | 147°23.1 | 16.5 | 198°44.0 | 11.3 | 203°29.7 | 21.7 | 344°15.7 | 48.8 | | | | | | |
| 20 | 7°44.0 | 162°24.2 | 16.6 | 213°45.5 | 11.0 | 218°32.1 | 21.6 | 359°18.2 | 48.8 | | | | | | |
| 21 | 22°46.5 | 177°25.4 | · · 16.7 | 228°47.0 | · · 10.8 | 233°34.4 | · · 21.6 | 14°20.7 | · · 48.8 | | | | | | |
| 22 | 37°49.0 | 192°26.5 | 16.8 | 243°48.6 | 10.5 | 248°36.8 | 21.6 | 29°23.2 | 48.8 | | | | | | |
| 23 | 52°51.4 | 207°27.6 | 17.0 | 258°50.1 | 10.2 | 263°39.1 | 21.6 | 44°25.7 | 48.8 | | | | | | |
| Mer.pass. 19:29 | | | ν1.2' d0.1' m-4.90 | | | ν1.5' d-0.3' m0.51 | | | ν2.3' d-0.0' m-2.17 | | | ν2.5' d-0.0' m0.59 | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | |
| 0 | 67°53.9 | 222°28.8 | S09°17.1 | 273°51.6 | N13°09.9 | 278°41.5 | N13°21.5 | 59°28.2 | N00°48.8 | | | | | | |
| 1 | 82°56.3 | 237°29.9 | 17.2 | 288°53.1 | 09.6 | 293°43.9 | 21.5 | 74°30.8 | 48.8 | | | | | | |
| 2 | 97°58.8 | 252°31.0 | 17.3 | 303°54.6 | 09.4 | 308°46.2 | 21.5 | 89°33.3 | 48.8 | | | | | | |
| 3 | 113°01.3 | 267°32.2 | · · 17.4 | 318°56.2 | · · 09.1 | 323°48.6 | · · 21.4 | 104°35.8 | · · 48.8 | | | | | | |
| 4 | 128°03.7 | 282°33.3 | 17.6 | 333°57.7 | 08.8 | 338°50.9 | 21.4 | 119°38.3 | 48.7 | | | | | | |
| 5 | 143°06.2 | 297°34.4 | 17.7 | 348°59.2 | 08.5 | 353°53.3 | 21.4 | 134°40.8 | 48.7 | | | | | | |
| 6 | 158°08.7 | 312°35.5 | S09°17.8 | 4°00.7 | N13°08.2 | 8°55.6 | N13°21.4 | 149°43.3 | N00°48.7 | | | | | | |
| 7 | 173°11.1 | 327°36.6 | 17.9 | 19°02.3 | 08.0 | 23°58.0 | 21.3 | 164°45.9 | 48.7 | | | | | | |
| 8 | 188°13.6 | 342°37.8 | 18.1 | 34°03.8 | 07.7 | 39°00.3 | 21.3 | 179°48.4 | 48.7 | | | | | | |
| 9 | 203°16.1 | 357°38.9 | · · 18.2 | 49°05.3 | · · 07.4 | 54°02.7 | · · 21.3 | 194°50.9 | · · 48.7 | | | | | | |
| 10 | 218°18.5 | 12°40.0 | 18.3 | 64°06.9 | 07.1 | 69°05.0 | 21.2 | 209°53.4 | 48.7 | | | | | | |
| 11 | 233°21.0 | 27°41.1 | 18.5 | 79°08.4 | 06.8 | 84°07.4 | 21.2 | 224°55.9 | 48.7 | | | | | | |
| 12 | 248°23.5 | 42°42.2 | S09°18.6 | 94°09.9 | N13°06.6 | 99°09.7 | N13°21.2 | 239°58.4 | N00°48.6 | | | | | | |
| 13 | 263°25.9 | 57°43.3 | 18.7 | 109°11.4 | 06.3 | 114°12.1 | 21.2 | 255°01.0 | 48.6 | | | | | | |
| 14 | 278°28.4 | 72°44.4 | 18.9 | 124°13.0 | 06.0 | 129°14.5 | 21.1 | 270°03.5 | 48.6 | | | | | | |
| 15 | 293°30.8 | 87°45.5 | · · 19.0 | 139°14.5 | · · 05.7 | 144°16.8 | · · 21.1 | 285°06.0 | · · 48.6 | | | | | | |
| 16 | 308°33.3 | 102°46.6 | 19.2 | 154°16.0 | 05.5 | 159°19.2 | 21.1 | 300°08.5 | 48.6 | | | | | | |
| 17 | 323°35.8 | 117°47.7 | 19.3 | 169°17.6 | 05.2 | 174°21.5 | 21.1 | 315°11.0 | 48.6 | | | | | | |
| 18 | 338°38.2 | 132°48.8 | S09°19.4 | 184°19.1 | N13°04.9 | 189°23.9 | N13°21.0 | 330°13.5 | N00°48.6 | | | | | | |
| 19 | 353°40.7 | 147°49.8 | 19.6 | 199°20.6 | 04.6 | 204°26.2 | 21.0 | 345°16.0 | 48.6 | | | | | | |
| 20 | 8°43.2 | 162°50.9 | 19.7 | 214°22.2 | 04.3 | 219°28.6 | 21.0 | 0°18.6 | 48.6 | | | | | | |
| 21 | 23°45.6 | 177°52.0 | · · 19.9 | 229°23.7 | · · 04.1 | 234°31.0 | · · 20.9 | 15°21.1 | · · 48.5 | | | | | | |
| 22 | 38°48.1 | 192°53.1 | 20.0 | 244°25.2 | 03.8 | 249°33.3 | 20.9 | 30°23.6 | 48.5 | | | | | | |
| 23 | 53°50.6 | 207°54.2 | 20.2 | 259°26.8 | 03.5 | 264°35.7 | 20.9 | 45°26.1 | 48.5 | | | | | | |
| Mer.pass. 19:25 | | | ν1.1' d0.1' m-4.90 | | | ν1.5' d-0.3' m0.49 | | | ν2.4' d-0.0' m-2.18 | | | ν2.5' d-0.0' m0.60 | | | |

| | SHA | Dec |
|---------------------|----------|----------|
| Alpheratz | 357°33.0 | 29°14.6 |
| Ankaa | 353°05.4 | -42°09.7 |
| Schedar | 349°28.9 | 56°41.4 |
| Diphda | 348°45.6 | -17°50.3 |
| Achernar | 335°18.6 | -57°06.1 |
| Hamal | 327°49.1 | 23°35.5 |
| Polaris | 312°43.7 | 89°22.7 |
| Acamar | 315°10.2 | -40°11.8 |
| Menkar | 314°04.2 | 4°11.8 |
| Mirfak | 308°25.5 | 49°57.5 |
| Aldebaran | 290°37.5 | 16°33.8 |
| Rigel | 281°02.0 | -8°10.2 |
| Capella | 280°19.1 | 46°01.5 |
| Bellatrix | 278°20.9 | 6°22.5 |
| Elnath | 277°59.5 | 28°37.8 |
| Alnilam | 275°35.8 | -1°11.0 |
| Betelgeuse | 270°50.1 | 7°24.7 |
| Canopus | 263°51.2 | -52°42.4 |
| Sirius | 258°24.6 | -16°45.1 |
| Adhara | 255°04.3 | -29°00.4 |
| Procyon | 244°49.0 | 5°09.3 |
| Pollux | 243°15.2 | 27°57.5 |
| Avior | 234°13.7 | -59°35.5 |
| Suhail | 222°45.0 | -43°32.2 |
| Miaplacidus | 221°37.6 | -69°49.3 |
| Alphard | 217°46.1 | -8°46.5 |
| Regulus | 207°32.8 | 11°50.1 |
| Dubhe | 193°39.3 | 61°36.0 |
| Denebola | 182°23.5 | 14°25.2 |
| Gienah | 175°42.2 | -17°41.4 |
| Acrux | 172°58.7 | -63°14.7 |
| Gacrux | 171°50.2 | -57°15.6 |
| Alioth | 166°12.0 | 55°48.6 |
| Spica | 158°20.9 | -11°18.1 |
| Alkaid | 152°51.2 | 49°10.5 |
| Hadar | 148°34.3 | -60°30.0 |
| Menkent | 147°56.1 | -36°30.0 |
| Arcturus | 145°46.8 | 19°02.5 |
| Rigel Kent. | 139°38.7 | -60°56.6 |
| Kochab | 137°21.0 | 74°02.5 |
| Zuben'ubi | 136°54.6 | -16°09.1 |
| Alphecca | 126°02.8 | 26°37.4 |
| Antares | 112°14.3 | -26°29.4 |
| Atria | 107°07.7 | -69°04.5 |
| Sabik | 102°01.4 | -15°45.4 |
| Shaula | 96°08.7 | -37°07.4 |
| Rasalhague | 95°57.4 | 12°32.5 |
| Eltanin | 90°42.0 | 51°29.2 |
| Kaus Aust. | 83°30.8 | -34°22.3 |
| Vega | 80°32.5 | 38°48.7 |
| Nunki | 75°46.2 | -26°15.8 |
| Altair | 61°58.7 | 8°56.5 |
| Peacock | 53°03.6 | -56°39.0 |
| Deneb | 49°25.0 | 45°22.9 |
| Enif | 33°37.3 | 10°00.1 |
| Al Na'ir | 27°31.0 | -46°50.0 |
| Fomalhaut | 15°12.8 | -29°28.8 |
| Scheat | 13°43.6 | 28°14.0 |
| Markab | 13°28.3 | 15°21.2 |
| Nov 27 Fri | SHA | Mer.pass |
| Venus | 155°36.0 | 09:13 |
| Mars | 206°43.6 | 05:49 |
| Jupiter | 210°53.4 | 05:32 |
| Saturn | 351°31.6 | 20:07 |
| Nov 28 Sat | SHA | Mer.pass |
| Venus | 155°06.2 | 09:11 |
| Mars | 206°20.5 | 05:46 |
| Jupiter | 210°50.4 | 05:28 |
| Saturn | 351°33.0 | 20:03 |
| Nov 29 Sun | SHA | Mer.pass |
| Venus | 154°34.9 | 09:09 |
| Mars | 205°57.7 | 05:44 |
| Jupiter | 210°47.6 | 05:24 |
| Saturn | 351°34.4 | 19:59 |
| Horizontal parallax | | |
| Venus: | | 0.4 |
| Mars: | | 0.1 |

| h | | Sun | | Moon | | | |
|-----|--|-----------------------|----------|------------|-------|----------|--------------|
| Fri | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 183°08.4 | S21°05.0 | 326°42.9 | 1.9' | N26°46.7 | -4.8' 60.8' |
| 1 | | 198°08.2 | 05.4 | 341°03.8 | 2.0' | 26°41.9 | -5.0' 60.7' |
| 2 | | 213°08.0 | 05.9 | 355°24.7 | 2.1' | 26°37.0 | -5.2' 60.7' |
| 3 | | 228°07.8 | · · 06.4 | 9°45.8 | 2.1' | 26°31.8 | -5.4' 60.7' |
| 4 | | 243°07.6 | 06.8 | 24°06.9 | 2.2' | 26°26.4 | -5.6' 60.7' |
| 5 | | 258°07.4 | 07.3 | 38°28.2 | 2.3' | 26°20.9 | -5.7' 60.7' |
| 6 | | 273°07.2 | S21°07.7 | 52°49.5 | 2.4' | N26°15.1 | -5.9' 60.7' |
| 7 | | 288°07.0 | 08.2 | 67°10.9 | 2.5' | 26°09.2 | -6.1' 60.7' |
| 8 | | 303°06.8 | 08.6 | 81°32.4 | 2.6' | 26°03.1 | -6.3' 60.6' |
| 9 | | 318°06.6 | · · 09.1 | 95°54.0 | 2.7' | 25°56.8 | -6.5' 60.6' |
| 10 | | 333°06.4 | 09.6 | 110°15.7 | 2.8' | 25°50.3 | -6.7' 60.6' |
| 11 | | 348°06.2 | 10.0 | 124°37.6 | 2.9' | 25°43.6 | -6.9' 60.6' |
| 12 | | 3°06.0 | S21°10.5 | 138°59.5 | 3.0' | N25°36.7 | -7.1' 60.6' |
| 13 | | 18°05.8 | 10.9 | 153°21.5 | 3.1' | 25°29.6 | -7.2' 60.6' |
| 14 | | 33°05.6 | 11.4 | 167°43.6 | 3.2' | 25°22.4 | -7.4' 60.5' |
| 15 | | 48°05.4 | · · 11.8 | 182°05.9 | 3.4' | 25°15.0 | -7.6' 60.5' |
| 16 | | 63°05.2 | 12.3 | 196°28.2 | 3.5' | 25°07.4 | -7.8' 60.5' |
| 17 | | 78°04.9 | 12.7 | 210°50.7 | 3.6' | 24°59.6 | -7.9' 60.5' |
| 18 | | 93°04.7 | S21°13.2 | 225°13.3 | 3.7' | N24°51.7 | -8.1' 60.5' |
| 19 | | 108°04.5 | 13.6 | 239°36.0 | 3.8' | 24°43.6 | -8.3' 60.4' |
| 20 | | 123°04.3 | 14.1 | 253°58.8 | 3.9' | 24°35.3 | -8.4' 60.4' |
| 21 | | 138°04.1 | · · 14.5 | 268°21.7 | 4.1' | 24°26.9 | -8.6' 60.4' |
| 22 | | 153°03.9 | 14.9 | 282°44.8 | 4.2' | 24°18.3 | -8.8' 60.4' |
| 23 | | 168°03.7 | 15.4 | 297°08.0 | 4.3' | 24°09.5 | -8.9' 60.3' |
| | | SD = 16.2' $d = 0.5'$ | | SD = 16.6' | | | |
| Sat | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 183°03.5 | S21°15.8 | 311°31.3 | 4.4' | N24°00.6 | -9.1' 60.3' |
| 1 | | 198°03.3 | 16.3 | 325°54.7 | 4.5' | 23°51.5 | -9.2' 60.3' |
| 2 | | 213°03.1 | 16.7 | 340°18.2 | 4.7' | 23°42.3 | -9.4' 60.3' |
| 3 | | 228°02.9 | · · 17.2 | 354°41.9 | 4.8' | 23°32.9 | -9.5' 60.3' |
| 4 | | 243°02.7 | 17.6 | 9°05.7 | 4.9' | 23°23.3 | -9.7' 60.2' |
| 5 | | 258°02.4 | 18.0 | 23°29.6 | 5.1' | 23°13.6 | -9.8' 60.2' |
| 6 | | 273°02.2 | S21°18.5 | 37°53.7 | 5.2' | N23°03.8 | -10.0' 60.2' |
| 7 | | 288°02.0 | 18.9 | 52°17.9 | 5.3' | 22°53.8 | -10.1' 60.2' |
| 8 | | 303°01.8 | 19.4 | 66°42.2 | 5.4' | 22°43.7 | -10.3' 60.1' |
| 9 | | 318°01.6 | · · 19.8 | 81°06.6 | 5.6' | 22°33.4 | -10.4' 60.1' |
| 10 | | 333°01.4 | 20.2 | 95°31.2 | 5.7' | 22°23.0 | -10.6' 60.1' |
| 11 | | 348°01.2 | 20.7 | 109°55.9 | 5.8' | 22°12.4 | -10.7' 60.1' |
| 12 | | 3°01.0 | S21°21.1 | 124°20.7 | 6.0' | N22°01.7 | -10.8' 60.0' |
| 13 | | 18°00.8 | 21.5 | 138°45.7 | 6.1' | 21°50.9 | -10.9' 60.0' |
| 14 | | 33°00.5 | 22.0 | 153°10.8 | 6.2' | 21°40.0 | -11.1' 60.0' |
| 15 | | 48°00.3 | · · 22.4 | 167°36.0 | 6.4' | 21°28.9 | -11.2' 59.9' |
| 16 | | 63°00.1 | 22.8 | 182°01.4 | 6.5' | 21°17.7 | -11.3' 59.9' |
| 17 | | 77°59.9 | 23.3 | 196°26.9 | 6.6' | 21°06.4 | -11.4' 59.9' |
| 18 | | 92°59.7 | S21°23.7 | 210°52.5 | 6.8' | N20°54.9 | -11.6' 59.9' |
| 19 | | 107°59.5 | 24.1 | 225°18.2 | 6.9' | 20°43.4 | -11.7' 59.8' |
| 20 | | 122°59.3 | 24.6 | 239°44.1 | 7.0' | 20°31.7 | -11.8' 59.8' |
| 21 | | 137°59.0 | · · 25.0 | 254°10.1 | 7.1' | 20°19.9 | -11.9' 59.8' |
| 22 | | 152°58.8 | 25.4 | 268°36.3 | 7.3' | 20°07.9 | -12.0' 59.8' |
| 23 | | 167°58.6 | 25.9 | 283°02.5 | 7.4' | 19°55.9 | -12.1' 59.7' |
| | | SD = 16.2' $d = 0.4'$ | | SD = 16.5' | | | |
| Sun | | GHA | Dec | GHA | ν | Dec | d HP |
| 0 | | 182°58.4 | S21°26.3 | 297°28.9 | 7.5' | N19°43.8 | -12.2' 59.7' |
| 1 | | 197°58.2 | 26.7 | 311°55.5 | 7.7' | 19°31.5 | -12.4' 59.7' |
| 2 | | 212°58.0 | 27.1 | 326°22.1 | 7.8' | 19°19.2 | -12.5' 59.6' |
| 3 | | 227°57.7 | · · 27.6 | 340°48.9 | 7.9' | 19°06.7 | -12.6' 59.6' |
| 4 | | 242°57.5 | 28.0 | 355°15.8 | 8.0' | 18°54.2 | -12.7' 59.6' |
| 5 | | 257°57.3 | 28.4 | 9°42.9 | 8.2' | 18°41.5 | -12.8' 59.5' |
| 6 | | 272°57.1 | S21°28.8 | 24°10.0 | 8.3' | N18°28.8 | -12.8' 59.5' |
| 7 | | 287°56.9 | 29.2 | 38°37.3 | 8.4' | 18°15.9 | -12.9' 59.5' |
| 8 | | 302°56.7 | 29.7 | 53°04.8 | 8.5' | 18°03.0 | -13.0' 59.5' |
| 9 | | 317°56.4 | · · 30.1 | 67°32.3 | 8.7' | 17°50.0 | -13.1' 59.4' |
| 10 | | 332°56.2 | 30.5 | 82°00.0 | 8.8' | 17°36.8 | -13.2' 59.4' |
| 11 | | 347°56.0 | 30.9 | 96°27.7 | 8.9' | 17°23.6 | -13.3' 59.4' |
| 12 | | 2°55.8 | S21°31.3 | 110°55.7 | 9.0' | N17°10.3 | -13.4' 59.3' |
| 13 | | 17°55.6 | 31.8 | 125°23.7 | 9.1' | 16°57.0 | -13.5' 59.3' |
| 14 | | 32°55.3 | 32.2 | 139°51.8 | 9.3' | 16°43.5 | -13.5' 59.3' |
| 15 | | 47°55.1 | · · 32.6 | 154°20.1 | 9.4' | 16°30.0 | -13.6' 59.2' |
| 16 | | 62°54.9 | 33.0 | 168°48.5 | 9.5' | 16°16.4 | -13.7' 59.2' |
| 17 | | 77°54.7 | 33.4 | 183°17.0 | 9.6' | 16°02.7 | -13.8' 59.2' |
| 18 | | 92°54.5 | S21°33.8 | 197°45.6 | 9.7' | N15°48.9 | -13.8' 59.1' |
| 19 | | 107°54.2 | 34.3 | 212°14.3 | 9.8' | 15°35.1 | -13.9' 59.1' |
| 20 | | 122°54.0 | 34.7 | 226°43.2 | 10.0' | 15°21.2 | -14.0' 59.1' |
| 21 | | 137°53.8 | · · 35.1 | 241°12.2 | 10.1' | 15°07.2 | -14.0' 59.1' |
| 22 | | 152°53.6 | 35.5 | 255°41.2 | 10.2' | 14°53.2 | -14.1' 59.0' |
| 23 | | 167°53.3 | 35.9 | 270°10.4 | 10.3' | 14°39.1 | -14.2' 59.0' |
| | | SD = 16.2' $d = 0.4'$ | | SD = 16.3' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 07:42 | 09:36 | ■ | ■ | 13:59 | 15:53 |
| N 70° | 07:27 | 09:00 | ■ | ■ | 14:35 | 16:08 |
| 68° | 07:15 | 08:35 | 10:19 | 13:16 | 15:00 | 16:20 |
| 66° | 07:04 | 08:16 | 09:36 | 13:59 | 15:20 | 16:31 |
| 64° | 06:56 | 08:00 | 09:08 | 14:28 | 15:35 | 16:40 |
| 62° | 06:48 | 07:47 | 08:46 | 14:49 | 15:49 | 16:47 |
| 60° | 06:41 | 07:35 | 08:29 | 15:07 | 16:00 | 16:54 |
| N 58° | 06:35 | 07:25 | 08:14 | 15:21 | 16:10 | 17:01 |
| 56° | 06:29 | 07:17 | 08:02 | 15:34 | 16:19 | 17:06 |
| 54° | 06:24 | 07:09 | 07:51 | 15:45 | 16:27 | 17:11 |
| 52° | 06:19 | 07:02 | 07:41 | 15:54 | 16:34 | 17:16 |
| 50° | 06:15 | 06:55 | 07:33 | 16:03 | 16:40 | 17:21 |
| 45° | 06:05 | 06:41 | 07:14 | 16:21 | 16:54 | 17:31 |
| N 40° | 05:56 | 06:30 | 06:59 | 16:36 | 17:06 | 17:39 |
| 35° | 05:48 | 06:19 | 06:47 | 16:49 | 17:16 | 17:48 |
| 30° | 05:40 | 06:10 | 06:36 | 17:00 | 17:26 | 17:55 |
| 20° | 05:26 | 05:53 | 06:17 | 17:19 | 17:43 | 18:10 |
| N 10° | 05:12 | 05:38 | 06:00 | 17:36 | 17:58 | 18:24 |
| 0° | 04:56 | 05:22 | 05:44 | 17:52 | 18:14 | 18:40 |
| S 10° | 04:39 | 05:06 | 05:28 | 18:08 | 18:30 | 18:57 |
| 20° | 04:19 | 04:47 | 05:11 | 18:25 | 18:49 | 19:17 |
| 30° | 03:52 | 04:25 | 04:52 | 18:45 | 19:11 | 19:44 |
| 35° | 03:36 | 04:11 | 04:40 | 18:56 | 19:25 | 20:01 |
| 40° | 03:15 | 03:55 | 04:27 | 19:10 | 19:42 | 20:21 |
| 45° | 02:48 | 03:35 | 04:11 | 19:26 | 20:02 | 20:48 |
| S 50° | 02:11 | 03:09 | 03:51 | 19:46 | 20:28 | 21:26 |
| 52° | 01:50 | 02:56 | 03:41 | 19:55 | 20:41 | 21:48 |
| 54° | 01:23 | 02:41 | 03:31 | 20:06 | 20:56 | 22:16 |
| 56° | 00:38 | 02:23 | 03:19 | 20:18 | 21:14 | 23:04 |
| 58° | //// | 02:01 | 03:05 | 20:32 | 21:36 | //// |
| S 60° | //// | 01:32 | 02:48 | 20:49 | 22:07 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | □ | □ | 18:58 | □ | □ | 15:01 |
| N 70° | □ | □ | 19:38 | □ | □ | 14:19 |
| 68° | □ | 17:10 | 20:04 | □ | 14:51 | 13:51 |
| 66° | □ | 18:03 | 20:25 | □ | 13:56 | 13:29 |
| 64° | 16:04 | 18:36 | 20:41 | 13:49 | 13:23 | 13:11 |
| 62° | 16:54 | 18:59 | 20:54 | 12:58 | 12:59 | 12:57 |
| 60° | 17:26 | 19:18 | 21:05 | 12:26 | 12:39 | 12:44 |
| N 58° | 17:49 | 19:34 | 21:15 | 12:02 | 12:23 | 12:34 |
| 56° | 18:08 | 19:47 | 21:23 | 11:43 | 12:09 | 12:24 |
| 54° | 18:24 | 19:58 | 21:31 | 11:27 | 11:57 | 12:16 |
| 52° | 18:37 | 20:08 | 21:37 | 11:13 | 11:46 | 12:08 |
| 50° | 18:49 | 20:17 | 21:43 | 11:00 | 11:36 | 12:02 |
| 45° | 19:14 | 20:36 | 21:56 | 10:35 | 11:16 | 11:47 |
| N 40° | 19:33 | 20:51 | 22:07 | 10:14 | 10:59 | 11:35 |
| 35° | 19:50 | 21:04 | 22:16 | 09:57 | 10:45 | 11:25 |
| 30° | 20:04 | 21:15 | 22:24 | 09:42 | 10:33 | 11:15 |
| 20° | 20:28 | 21:35 | 22:37 | 09:17 | 10:12 | 11:00 |
| N 10° | 20:48 | 21:51 | 22:49 | 08:55 | 09:54 | 10:46 |
| 0° | 21:08 | 22:06 | 23:00 | 08:35 | 09:36 | 10:33 |
| S 10° | 21:27 | 22:22 | 23:11 | 08:14 | 09:19 | 10:19 |
| 20° | 21:47 | 22:38 | 23:22 | 07:52 | 09:00 | 10:05 |
| 30° | 22:11 | 22:57 | 23:36 | 07:26 | 08:38 | 09:48 |
| 35° | 22:24 | 23:08 | 23:43 | 07:10 | 08:25 | 09:39 |
| 40° | 22:40 | 23:20 | 23:52 | 06:52 | 08:10 | 09:28 |
| 45° | 22:59 | 23:35 | · · | 06:31 | 07:53 | 09:15 |
| S 50° | 23:23 | 23:52 | · · | 06:03 | 07:30 | 08:59 |
| 52° | 23:34 | · · | 00:01 | 05:50 | 07:20 | 08:51 |
| 54° | 23:46 | · · | 00:10 | 05:34 | 07:08 | 08:42 |
| 56° | · · | 00:01 | 00:20 | 05:16 | 06:54 | 08:33 |
| 58° | · · | 00:18 | 00:32 | 04:54 | 06:37 | 08:22 |
| S 60° | 00:20 | 00:38 | 00:46 | 04:24 | 06:18 | 08:09 |

| Day | Sun | | Mer. Pass | Moon | | Age 18-20 92-74% |
|-----|-------------------------------|----------------------------|-----------|------------------------|-------------|------------------|
| | Eqn. of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer. Pass. Upper hh:mm | Lower hh:mm | |
| 27 | 12:34 | 12:24 | 11:48 | 02:19 | 14:51 | |
| 28 | 12:14 | 12:04 | 11:48 | 03:22 | 15:52 | |
| 29 | 11:54 | 11:43 | 11:48 | 04:20 | 16:46 | |

November 30, 01, 02 UT (Mon., Tue., Wed.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|----------|
| Mon | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 68°53.0 | | 222°55.2 | S09°20.3 | 274°28.3 | N13°03.2 | 279°38.0 | N13°20.9 | 60°28.6 | N00°48.5 |
| 1 | 83°55.5 | | 237°56.3 | 20.5 | 289°29.8 | 03.0 | 294°40.4 | 20.8 | 75°31.1 | 48.5 |
| 2 | 98°58.0 | | 252°57.4 | 20.6 | 304°31.4 | 02.7 | 309°42.8 | 20.8 | 90°33.6 | 48.5 |
| 3 | 114°00.4 | | 267°58.5 | · · 20.8 | 319°32.9 | · · 02.4 | 324°45.1 | · · 20.8 | 105°36.2 | · · 48.5 |
| 4 | 129°02.9 | | 282°59.5 | 21.0 | 334°34.5 | 02.1 | 339°47.5 | 20.8 | 120°38.7 | 48.5 |
| 5 | 144°05.3 | | 298°00.6 | 21.1 | 349°36.0 | 01.9 | 354°49.8 | 20.7 | 135°41.2 | 48.5 |
| 6 | 159°07.8 | | 313°01.7 | S09°21.3 | 4°37.5 | N13°01.6 | 9°52.2 | N13°20.7 | 150°43.7 | N00°48.5 |
| 7 | 174°10.3 | | 328°02.7 | 21.4 | 19°39.1 | 01.3 | 24°54.6 | 20.7 | 165°46.2 | 48.4 |
| 8 | 189°12.7 | | 343°03.8 | 21.6 | 34°40.6 | 01.0 | 39°56.9 | 20.7 | 180°48.7 | 48.4 |
| 9 | 204°15.2 | | 358°04.8 | · · 21.8 | 49°42.2 | · · 00.8 | 54°59.3 | · · 20.6 | 195°51.2 | · · 48.4 |
| 10 | 219°17.7 | | 13°05.9 | 21.9 | 64°43.7 | 00.5 | 70°01.6 | 20.6 | 210°53.7 | 48.4 |
| 11 | 234°20.1 | | 28°06.9 | 22.1 | 79°45.3 | 13°00.2 | 85°04.0 | 20.6 | 225°56.3 | 48.4 |
| 12 | 249°22.6 | | 43°08.0 | S09°22.3 | 94°46.8 | N12°59.9 | 100°06.4 | N13°20.6 | 240°58.8 | N00°48.4 |
| 13 | 264°25.1 | | 58°09.0 | 22.4 | 109°48.3 | 59.7 | 115°08.7 | 20.5 | 255°01.3 | 48.4 |
| 14 | 279°27.5 | | 73°10.1 | 22.6 | 124°49.9 | 59.4 | 130°11.1 | 20.5 | 271°03.8 | 48.4 |
| 15 | 294°30.0 | | 88°11.1 | · · 22.8 | 139°51.4 | · · 59.1 | 145°13.5 | · · 20.5 | 286°06.3 | · · 48.4 |
| 16 | 309°32.5 | | 103°12.1 | 23.0 | 154°53.0 | 58.9 | 160°15.8 | 20.5 | 301°08.8 | 48.4 |
| 17 | 324°34.9 | | 118°13.2 | 23.1 | 169°54.5 | 58.6 | 175°18.2 | 20.4 | 316°11.3 | 48.4 |
| 18 | 339°37.4 | | 133°14.2 | S09°23.3 | 184°56.1 | N12°58.3 | 190°20.5 | N13°20.4 | 331°13.8 | N00°48.3 |
| 19 | 354°39.8 | | 148°15.3 | 23.5 | 199°57.6 | 58.0 | 205°22.9 | 20.4 | 346°16.3 | 48.3 |
| 20 | 9°42.3 | | 163°16.3 | 23.7 | 214°59.2 | 57.8 | 220°25.3 | 20.4 | 1°18.9 | 48.3 |
| 21 | 24°44.8 | | 178°17.3 | · · 23.9 | 230°00.7 | · · 57.5 | 235°27.6 | · · 20.3 | 16°21.4 | · · 48.3 |
| 22 | 39°47.2 | | 193°18.3 | 24.0 | 245°02.3 | 57.2 | 250°30.0 | 20.3 | 31°23.9 | 48.3 |
| 23 | 54°49.7 | | 208°19.4 | 24.2 | 260°03.8 | 57.0 | 265°32.4 | 20.3 | 46°26.4 | 48.3 |
| Mer.pass. 19:21 | | ν1.1' d0.2' m-4.89 | | ν1.5' d-0.3' m0.48 | | ν2.4' d-0.0' m-2.19 | | ν2.5' d-0.0' m0.60 | | |

| Tue | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|----------|
| 0 | 69°52.2 | | 223°20.4 | S09°24.4 | 275°05.4 | N12°56.7 | 280°34.7 | N13°20.3 | 61°28.9 | N00°48.3 |
| 1 | 84°54.6 | | 238°21.4 | 24.6 | 290°06.9 | 56.4 | 295°37.1 | 20.2 | 76°31.4 | 48.3 |
| 2 | 99°57.1 | | 253°22.4 | 24.8 | 305°08.5 | 56.1 | 310°39.5 | 20.2 | 91°33.9 | 48.3 |
| 3 | 114°59.6 | | 268°23.4 | · · 25.0 | 320°10.0 | · · 55.9 | 325°41.8 | · · 20.2 | 106°36.4 | · · 48.3 |
| 4 | 130°02.0 | | 283°24.4 | 25.2 | 335°11.6 | 55.6 | 340°44.2 | 20.2 | 121°38.9 | 48.3 |
| 5 | 145°04.5 | | 298°25.4 | 25.4 | 350°13.1 | 55.3 | 355°46.6 | 20.1 | 136°41.4 | 48.2 |
| 6 | 160°06.9 | | 313°26.5 | S09°25.6 | 5°14.7 | N12°55.1 | 10°48.9 | N13°20.1 | 151°44.0 | N00°48.2 |
| 7 | 175°09.4 | | 328°27.5 | 25.7 | 20°16.2 | 54.8 | 25°61.3 | 20.1 | 166°46.5 | 48.2 |
| 8 | 190°11.9 | | 343°28.5 | 25.9 | 35°17.8 | 54.5 | 40°53.7 | 20.1 | 181°49.0 | 48.2 |
| 9 | 205°14.3 | | 358°29.5 | · · 26.1 | 50°19.4 | · · 54.2 | 55°56.1 | · · 20.1 | 196°51.5 | · · 48.2 |
| 10 | 220°16.8 | | 13°30.5 | 26.3 | 65°20.9 | 54.0 | 70°58.4 | 20.0 | 211°54.0 | 48.2 |
| 11 | 235°19.3 | | 28°31.5 | 26.5 | 80°22.5 | 53.7 | 86°00.8 | 20.0 | 226°56.5 | 48.2 |
| 12 | 250°21.7 | | 43°32.5 | S09°26.7 | 95°24.0 | N12°53.4 | 101°03.2 | N13°20.0 | 241°59.0 | N00°48.2 |
| 13 | 265°24.2 | | 58°33.4 | 26.9 | 110°25.6 | 53.2 | 116°05.5 | 20.0 | 257°01.5 | 48.2 |
| 14 | 280°26.7 | | 73°34.4 | 27.1 | 125°27.1 | 52.9 | 131°07.9 | 19.9 | 272°04.0 | 48.2 |
| 15 | 295°29.1 | | 88°35.4 | · · 27.4 | 140°28.7 | · · 52.6 | 146°10.3 | · · 19.9 | 287°06.5 | · · 48.2 |
| 16 | 310°31.6 | | 103°36.4 | 27.6 | 155°30.3 | 52.4 | 161°12.7 | 19.9 | 302°09.0 | 48.2 |
| 17 | 325°34.1 | | 118°37.4 | 27.8 | 170°31.8 | 52.1 | 176°15.0 | 19.9 | 317°11.5 | 48.2 |
| 18 | 340°36.5 | | 133°38.4 | S09°28.0 | 185°33.4 | N12°51.8 | 191°17.4 | N13°19.9 | 332°14.0 | N00°48.1 |
| 19 | 355°39.0 | | 148°39.4 | 28.2 | 200°35.0 | 51.6 | 206°19.8 | 19.8 | 347°16.5 | 48.1 |
| 20 | 10°41.4 | | 163°40.3 | 28.4 | 215°36.5 | 51.3 | 221°22.1 | 19.8 | 2°19.1 | 48.1 |
| 21 | 25°43.9 | | 178°41.3 | · · 28.6 | 230°38.1 | · · 51.0 | 236°24.5 | · · 19.8 | 17°21.6 | · · 48.1 |
| 22 | 40°46.4 | | 193°42.3 | 28.8 | 245°39.6 | 50.8 | 251°26.9 | 19.8 | 32°24.1 | 48.1 |
| 23 | 55°48.8 | | 208°43.2 | 29.0 | 260°41.2 | 50.5 | 266°29.3 | 19.7 | 47°26.6 | 48.1 |
| Mer.pass. 19:17 | | ν1.0' d0.2' m-4.89 | | ν1.6' d-0.3' m0.46 | | ν2.4' d-0.0' m-2.19 | | ν2.5' d-0.0' m0.61 | | |

| Wed | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|--------------------|----------|--------------------|----------|---------------------|----------|--------------------|----------|----------|
| 0 | 70°51.3 | | 223°44.2 | S09°29.3 | 275°42.8 | N12°50.2 | 281°31.6 | N13°19.7 | 62°29.1 | N00°48.1 |
| 1 | 85°53.8 | | 238°45.2 | 29.5 | 290°44.3 | 50.0 | 296°34.0 | 19.7 | 77°31.6 | 48.1 |
| 2 | 100°56.2 | | 253°46.1 | 29.7 | 305°45.9 | 49.7 | 311°36.4 | 19.7 | 92°34.1 | 48.1 |
| 3 | 115°58.7 | | 268°47.1 | · · 29.9 | 320°47.5 | · · 49.4 | 326°38.8 | · · 19.7 | 107°36.6 | · · 48.1 |
| 4 | 131°01.2 | | 283°48.1 | 30.1 | 335°49.0 | 49.2 | 341°41.1 | 19.6 | 122°39.1 | 48.1 |
| 5 | 146°03.6 | | 298°49.0 | 30.4 | 350°50.6 | 48.9 | 356°43.5 | 19.6 | 137°41.6 | 48.1 |
| 6 | 161°06.1 | | 313°50.0 | S09°30.6 | 5°52.2 | N12°48.6 | 11°45.9 | N13°19.6 | 152°44.1 | N00°48.1 |
| 7 | 176°08.5 | | 328°50.9 | 30.8 | 20°53.8 | 48.4 | 26°48.3 | 19.6 | 167°46.6 | 48.1 |
| 8 | 191°11.0 | | 343°51.9 | 31.0 | 35°55.3 | 48.1 | 41°50.6 | 19.6 | 182°49.1 | 48.1 |
| 9 | 206°13.5 | | 358°52.8 | · · 31.3 | 50°56.9 | · · 47.8 | 56°53.0 | · · 19.5 | 197°51.6 | · · 48.0 |
| 10 | 221°15.9 | | 13°53.8 | 31.5 | 65°58.5 | 47.6 | 71°55.4 | 19.5 | 212°54.1 | 48.0 |
| 11 | 236°18.4 | | 28°54.7 | 31.7 | 81°00.0 | 47.3 | 86°57.8 | 19.5 | 227°56.6 | 48.0 |
| 12 | 251°20.9 | | 43°55.7 | S09°32.0 | 96°01.6 | N12°47.1 | 102°00.2 | N13°19.5 | 242°59.1 | N00°48.0 |
| 13 | 266°23.3 | | 58°56.6 | 32.2 | 111°03.2 | 46.8 | 117°02.5 | 19.5 | 258°01.6 | 48.0 |
| 14 | 281°25.8 | | 73°57.5 | 32.4 | 126°04.8 | 46.5 | 132°04.9 | 19.4 | 273°04.1 | 48.0 |
| 15 | 296°28.3 | | 88°58.5 | · · 32.7 | 141°06.3 | · · 46.3 | 147°07.3 | · · 19.4 | 288°06.6 | · · 48.0 |
| 16 | 311°30.7 | | 103°59.4 | 32.9 | 156°07.9 | 46.0 | 162°09.7 | 19.4 | 303°09.1 | 48.0 |
| 17 | 326°33.2 | | 119°00.3 | 33.1 | 171°09.5 | 45.7 | 177°12.0 | 19.4 | 318°11.6 | 48.0 |
| 18 | 341°35.7 | | 134°01.3 | S09°33.4 | 186°11.1 | N12°45.5 | 192°14.4 | N13°19.4 | 333°14.1 | N00°48.0 |
| 19 | 356°38.1 | | 149°02.2 | 33.6 | 201°12.6 | 45.2 | 207°16.8 | 19.3 | 348°16.7 | 48.0 |
| 20 | 11°40.6 | | 164°03.1 | 33.9 | 216°14.2 | 45.0 | 222°19.2 | 19.3 | 3°19.2 | 48.0 |
| 21 | 26°43.0 | | 179°04.0 | · · 34.1 | 231°15.8 | · · 44.7 | 237°21.6 | · · 19.3 | 18°21.7 | · · 48.0 |
| 22 | 41°45.5 | | 194°05.0 | 34.4 | 246°17.4 | 44.4 | 252°23.9 | 19.3 | 33°24.2 | 48.0 |
| 23 | 56°48.0 | | 209°05.9 | 34.6 | 261°19.0 | 44.2 | 267°26.3 | 19.3 | 48°26.7 | 48.0 |
| Mer.pass. 19:13 | | ν1.0' d0.2' m-4.88 | | ν1.6' d-0.3' m0.44 | | ν2.4' d-0.0' m-2.20 | | ν2.5' d-0.0' m0.61 | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.0 | 29°14.6 |
| Ankaa | 353°05.4 | -42°09.7 |
| Schedar | 349°28.9 | 56°41.4 |
| Diphda | 348°45.6 | -17°50.3 |
| Achernar | 335°18.6 | -57°06.1 |
| Hamal | 327°49.1 | 23°35.5 |
| Polaris | 312°44.0 | 89°22.8 |
| Acamar | 315°10.2 | -40°11.8 |
| Menkar | 314°04.2 | 4°11.8 |
| Mirfak | 308°25.5 | 49°57.5 |
| Aldebaran | 290°37.5 | 16°33.9 |
| Rigel | 281°02.0 | -8°10.2 |
| Capella | 280°19.1 | 46°01.5 |
| Bellatrix | 278°20.9 | 6°22.5 |
| Elnath | 277°59.5 | 28°37.8 |
| Alnilam | 275°35.8 | -1°11.0 |
| Betelgeuse | 270°50.1 | 7°24.7 |
| Canopus | 263°51.2 | -52°42.4 |
| Sirius | 258°24.6 | -16°45.1 |
| Adhara | 255°04.3 | -29°00.4 |
| Procyon | 244°49.0 | 5°09.3 |
| Pollux | 243°15.1 | 27°57.5 |
| Avior | 234°13.7 | -59°35.5 |
| Suhail | 222°45.0 | -43°32.2 |
| Miaplacidus | 221°37.6 | -69°49.4 |
| Alphard | 217°46.1 | -8°46.5 |
| Regulus | 207°32.7 | 11°50.1 |
| Dubhe | 193°39.2 | 61°36.0 |
| Denebola | 182°23.5 | 14°25.2 |
| Gienah | 175°42.1 | -17°41.4 |
| Acrux | 172°58.7 | -63°14.7 |
| Gacrux | 171°50.2 | -57°15.6 |
| Alioth | 166°12.0 | 55°48.6 |
| Spica | 158°20.9 | -11°18.1 |
| Alkaid | 152°51.2 | 49°10.5 |
| Hadar | 148°34.3 | -60°30.0 |
| Menkent | 147°56.1 | -36°30.0 |
| Arcturus | 145°46.8 | 19°02.5 |
| Rigel Kent. | 139°38.7 | -60°56.6 |
| Kochab | 137°21.0 | 74°02.5 |
| Zuben'ubi | 136°54.6 | -16°09.2 |
| Alphecca | 126°02.8 | 26°37.4 |
| Antares | 112°14.3 | -26°29.4 |
| Atria | 107°07.7 | -69°04.5 |
| Sabik | 102°01.3 | -15°45.4 |
| Shaula | 96°08.7 | -37°07.4 |
| Rasalhague | 95°57.4 | 12°32.5 |
| Eltanin | 90°42.0 | 51°29.2 |
| Kaus Aust. | 83°30.8 | -34°22.3 |
| Vega | 80°32.6 | 38°48.6 |
| Nunki | 75°46.2 | -26°15.8 |
| Altair | 61°58.7 | 8°56.5 |
| Peacock | 53°03.6 | -56°39.0 |
| Deneb | 49°25.0 | 45°22.9 |
| Enif | 33°37.4 | 10°00.1 |
| Al Na'ir | 27°31.1 | -46°50.0 |
| Fomalhaut | 15°12.8 | -29°28.8 |
| Scheat | 13°43.6 | 28°14.0 |
| Markab | 13°28.3 | 15°21.2 |

| Nov 30 Mon | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 154°02.2 | 09:08 |
| Mars | 205°35.3 | 05:42 |
| Jupiter | 210°45.0 | 05:21 |
| Saturn | 351°35.6 | 19:55 |

| Dec 01 Tue | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 153°28.2 | 09:06 |
| Mars | 205°13.2 | 05:39 |
| Jupiter | 210°42.6 | 05:17 |
| Saturn | 351°36.7 | 19:51 |

| Dec 02 Wed | SHA | Mer.pass |
|------------|-----|----------|
|------------|-----|----------|

| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 182°53.1 | S21°36.3 | | 284°39.7 | 10.4' | N14°24.9 | -14.2' | 59.0' |
| 1 | 197°52.9 | 36.7 | | 299°09.1 | 10.5' | 14°10.7 | -14.3' | 58.9' |
| 2 | 212°52.7 | 37.1 | | 313°38.6 | 10.6' | 13°56.4 | -14.3' | 58.9' |
| 3 | 227°52.5 | · · 37.5 | | 328°08.2 | 10.7' | 13°42.1 | -14.4' | 58.9' |
| 4 | 242°52.2 | 38.0 | | 342°37.9 | 10.8' | 13°27.7 | -14.5' | 58.8' |
| 5 | 257°52.0 | 38.4 | | 357°07.7 | 10.9' | 13°13.2 | -14.5' | 58.8' |
| 6 | 272°51.8 | S21°38.8 | | 11°37.7 | 11.0' | N12°58.7 | -14.6' | 58.8' |
| 7 | 287°51.6 | 39.2 | | 26°07.7 | 11.1' | 12°44.1 | -14.6' | 58.7' |
| 8 | 302°51.3 | 39.6 | | 40°37.8 | 11.2' | 12°29.5 | -14.7' | 58.7' |
| 9 | 317°51.1 | · · 40.0 | | 55°08.0 | 11.3' | 12°14.9 | -14.7' | 58.7' |
| 10 | 332°50.9 | 40.4 | | 69°38.3 | 11.4' | 12°00.2 | -14.7' | 58.6' |
| 11 | 347°50.6 | 40.8 | | 84°08.7 | 11.5' | 11°45.4 | -14.8' | 58.6' |
| 12 | 2°50.4 | S21°41.2 | | 98°39.2 | 11.6' | N11°30.7 | -14.8' | 58.6' |
| 13 | 17°50.2 | 41.6 | | 113°09.8 | 11.7' | 11°15.8 | -14.9' | 58.5' |
| 14 | 32°50.0 | 42.0 | | 127°40.5 | 11.8' | 11°01.0 | -14.9' | 58.5' |
| 15 | 47°49.7 | · · 42.4 | | 142°11.3 | 11.9' | 10°46.1 | -14.9' | 58.5' |
| 16 | 62°49.5 | 42.8 | | 156°42.1 | 11.9' | 10°31.1 | -15.0' | 58.4' |
| 17 | 77°49.3 | 43.2 | | 171°13.1 | 12.0' | 10°16.1 | -15.0' | 58.4' |
| 18 | 92°49.1 | S21°43.6 | | 185°44.1 | 12.1' | N10°01.1 | -15.0' | 58.4' |
| 19 | 107°48.8 | 44.0 | | 200°15.2 | 12.2' | 09°46.1 | -15.1' | 58.3' |
| 20 | 122°48.6 | 44.4 | | 214°46.4 | 12.3' | 09°31.0 | -15.1' | 58.3' |
| 21 | 137°48.4 | · · 44.8 | | 229°17.7 | 12.4' | 09°15.9 | -15.1' | 58.3' |
| 22 | 152°48.1 | 45.2 | | 243°49.1 | 12.4' | 09°00.8 | -15.2' | 58.2' |
| 23 | 167°47.9 | 45.6 | | 258°20.5 | 12.5' | 08°45.6 | -15.2' | 58.2' |
| SD = 16.2' $d = 0.4'$ | | | SD = 16.1' | | | | | |

| Tue | Sun | | | Moon | | | | |
|-----------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 182°47.7 | S21°45.9 | | 272°52.0 | 12.6' | N08°30.5 | -15.2' | 58.2' |
| 1 | 197°47.4 | 46.3 | | 287°23.6 | 12.7' | 08°15.3 | -15.2' | 58.1' |
| 2 | 212°47.2 | 46.7 | | 301°55.3 | 12.7' | 08°00.0 | -15.2' | 58.1' |
| 3 | 227°47.0 | · · 47.1 | | 316°27.0 | 12.8' | 07°44.8 | -15.3' | 58.1' |
| 4 | 242°46.8 | 47.5 | | 330°58.9 | 12.9' | 07°29.5 | -15.3' | 58.0' |
| 5 | 257°46.5 | 47.9 | | 345°30.7 | 13.0' | 07°14.2 | -15.3' | 58.0' |
| 6 | 272°46.3 | S21°48.3 | | 0°02.7 | 13.0' | N06°58.9 | -15.3' | 58.0' |
| 7 | 287°46.1 | 48.7 | | 14°34.7 | 13.1' | 06°43.6 | -15.3' | 57.9' |
| 8 | 302°45.8 | 49.1 | | 29°06.8 | 13.1' | 06°28.3 | -15.3' | 57.9' |
| 9 | 317°45.6 | · · 49.4 | | 43°38.9 | 13.2' | 06°12.9 | -15.4' | 57.9' |
| 10 | 332°45.4 | 49.8 | | 58°11.1 | 13.3' | 05°57.6 | -15.4' | 57.9' |
| 11 | 347°45.1 | 50.2 | | 72°43.4 | 13.3' | 05°42.2 | -15.4' | 57.8' |
| 12 | 2°44.9 | S21°50.6 | | 87°15.8 | 13.4' | N05°26.8 | -15.4' | 57.8' |
| 13 | 17°44.7 | 51.0 | | 101°48.1 | 13.4' | 05°11.4 | -15.4' | 57.8' |
| 14 | 32°44.4 | 51.4 | | 116°20.6 | 13.5' | 04°56.1 | -15.4' | 57.7' |
| 15 | 47°44.2 | · · 51.8 | | 130°53.1 | 13.6' | 04°40.7 | -15.4' | 57.7' |
| 16 | 62°43.9 | 52.1 | | 145°25.7 | 13.6' | 04°25.3 | -15.4' | 57.7' |
| 17 | 77°43.7 | 52.5 | | 159°58.3 | 13.7' | 04°09.9 | -15.4' | 57.6' |
| 18 | 92°43.5 | S21°52.9 | | 174°30.9 | 13.7' | N03°54.4 | -15.4' | 57.6' |
| 19 | 107°43.2 | 53.3 | | 189°03.6 | 13.8' | 03°39.0 | -15.4' | 57.6' |
| 20 | 122°43.0 | 53.7 | | 203°36.4 | 13.8' | 03°23.6 | -15.4' | 57.5' |
| 21 | 137°42.8 | · · 54.0 | | 218°09.2 | 13.9' | 03°08.2 | -15.4' | 57.5' |
| 22 | 152°42.5 | 54.4 | | 232°42.1 | 13.9' | 02°52.8 | -15.4' | 57.5' |
| 23 | 167°42.3 | 54.8 | | 247°15.0 | 13.9' | 02°37.4 | -15.4' | 57.4' |
| SD = 16.2' $d = 0.4'$ | | | SD = 15.9' | | | | | |

| Wed | Sun | | | Moon | | | | |
|-----------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 182°42.1 | S21°55.2 | | 261°47.9 | 14.0' | N02°22.0 | -15.4' | 57.4' |
| 1 | 197°41.8 | 55.5 | | 276°20.9 | 14.0' | 02°06.6 | -15.4' | 57.4' |
| 2 | 212°41.6 | 55.9 | | 290°53.9 | 14.1' | 01°51.3 | -15.4' | 57.4' |
| 3 | 227°41.3 | · · 56.3 | | 305°27.0 | 14.1' | 01°35.9 | -15.4' | 57.3' |
| 4 | 242°41.1 | 56.7 | | 320°00.1 | 14.1' | 01°20.5 | -15.4' | 57.3' |
| 5 | 257°40.9 | 57.0 | | 334°33.2 | 14.2' | 01°05.2 | -15.3' | 57.3' |
| 6 | 272°40.6 | S21°57.4 | | 349°06.4 | 14.2' | N00°49.8 | -15.3' | 57.2' |
| 7 | 287°40.4 | 57.8 | | 3°39.6 | 14.2' | 00°34.5 | -15.3' | 57.2' |
| 8 | 302°40.2 | 58.1 | | 18°12.8 | 14.3' | 00°19.2 | -15.3' | 57.2' |
| 9 | 317°39.9 | · · 58.5 | | 32°46.1 | 14.3' | N00°03.9 | -15.3' | 57.1' |
| 10 | 332°39.7 | 58.9 | | 47°19.4 | 14.3' | S00°11.4 | 15.3' | 57.1' |
| 11 | 347°39.4 | 59.2 | | 61°52.7 | 14.4' | 00°26.7 | 15.3' | 57.1' |
| 12 | 2°39.2 | S21°59.6 | | 76°26.1 | 14.4' | S00°42.0 | 15.2' | 57.1' |
| 13 | 17°38.9 | 22°00.0 | | 90°59.5 | 14.4' | 00°57.2 | 15.2' | 57.0' |
| 14 | 32°38.7 | 00.3 | | 105°32.9 | 14.4' | 01°12.4 | 15.2' | 57.0' |
| 15 | 47°38.5 | · · 00.7 | | 120°06.3 | 14.4' | 01°27.6 | 15.2' | 57.0' |
| 16 | 62°38.2 | 01.1 | | 134°39.7 | 14.5' | 01°42.8 | 15.2' | 56.9' |
| 17 | 77°38.0 | 01.4 | | 149°13.2 | 14.5' | 01°58.0 | 15.1' | 56.9' |
| 18 | 92°37.7 | S22°01.8 | | 163°46.7 | 14.5' | S02°13.1 | 15.1' | 56.9' |
| 19 | 107°37.5 | 02.2 | | 178°20.2 | 14.5' | 02°28.2 | 15.1' | 56.8' |
| 20 | 122°37.3 | 02.5 | | 192°53.7 | 14.5' | 02°43.3 | 15.1' | 56.8' |
| 21 | 137°37.0 | · · 02.9 | | 207°27.3 | 14.6' | 02°58.3 | 15.0' | 56.8' |
| 22 | 152°36.8 | 03.2 | | 222°00.8 | 14.6' | 03°13.4 | 15.0' | 56.8' |
| 23 | 167°36.5 | 03.6 | | 236°34.4 | 14.6' | 03°28.4 | 15.0' | 56.7' |
| SD = 16.2' $d = 0.4'$ | | | SD = 15.7' | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 07:51 | 09:50 | ■ | ■ | 13:47 | 15:46 |
| N 70° | 07:35 | 09:11 | ■ | ■ | 14:27 | 16:03 |
| 68° | 07:21 | 08:44 | 10:36 | 13:01 | 14:54 | 16:16 |
| 66° | 07:10 | 08:23 | 09:47 | 13:51 | 15:14 | 16:27 |
| 64° | 07:01 | 08:06 | 09:16 | 14:21 | 15:31 | 16:36 |
| 62° | 06:53 | 07:52 | 08:53 | 14:44 | 15:45 | 16:45 |
| 60° | 06:46 | 07:41 | 08:35 | 15:03 | 15:57 | 16:52 |
| N 58° | 06:39 | 07:30 | 08:20 | 15:18 | 16:07 | 16:58 |
| 56° | 06:33 | 07:21 | 08:07 | 15:31 | 16:16 | 17:04 |
| 54° | 06:28 | 07:13 | 07:55 | 15:42 | 16:24 | 17:10 |
| 52° | 06:23 | 07:06 | 07:46 | 15:52 | 16:32 | 17:15 |
| 50° | 06:18 | 06:59 | 07:37 | 16:01 | 16:38 | 17:19 |
| 45° | 06:08 | 06:45 | 07:18 | 16:20 | 16:53 | 17:30 |
| N 40° | 05:59 | 06:32 | 07:02 | 16:35 | 17:05 | 17:39 |
| 35° | 05:50 | 06:22 | 06:49 | 16:48 | 17:16 | 17:47 |
| 30° | 05:43 | 06:12 | 06:38 | 17:00 | 17:26 | 17:55 |
| 20° | 05:28 | 05:55 | 06:19 | 17:19 | 17:43 | 18:10 |
| N 10° | 05:13 | 05:39 | 06:01 | 17:36 | 17:59 | 18:25 |
| 0° | 04:57 | 05:23 | 05:45 | 17:53 | 18:15 | 18:41 |
| S 10° | 04:40 | 05:06 | 05:29 | 18:09 | 18:32 | 18:59 |
| 20° | 04:19 | 04:47 | 05:12 | 18:27 | 18:51 | 19:20 |
| 30° | 03:52 | 04:24 | 04:51 | 18:47 | 19:14 | 19:47 |
| 35° | 03:35 | 04:10 | 04:39 | 18:59 | 19:28 | 20:04 |
| 40° | 03:13 | 03:54 | 04:25 | 19:13 | 19:45 | 20:25 |
| 45° | 02:46 | 03:33 | 04:09 | 19:29 | 20:06 | 20:53 |
| S 50° | 02:07 | 03:06 | 03:49 | 19:50 | 20:33 | 21:33 |
| 52° | 01:45 | 02:53 | 03:39 | 20:00 | 20:46 | 21:55 |
| 54° | 01:15 | 02:37 | 03:28 | 20:11 | 21:02 | 22:26 |
| 56° | 00:17 | 02:19 | 03:15 | 20:24 | 21:21 | 23:32 |
| 58° | /// | 01:55 | 03:01 | 20:38 | 21:45 | /// |
| S 60° | /// | 01:23 | 02:44 | 20:56 | 22:18 | /// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | 21:49 | · · · | 00:06 | 13:54 | 13:16 | 12:43 |
| N 70° | 22:03 | · · · | 00:09 | 13:37 | 13:09 | 12:44 |
| 68° | 22:15 | · · · | 00:12 | 13:23 | 13:03 | 12:45 |
| 66° | 22:24 | · · · | 00:14 | 13:12 | 12:59 | 12:46 |
| 64° | 22:32 | · · · | 00:16 | 13:02 | 12:55 | 12:47 |
| 62° | 22:39 | · · · | 00:17 | 12:54 | 12:51 | 12:48 |
| 60° | 22:45 | · · · | 00:19 | 12:47 | 12:48 | 12:48 |
| N 58° | 22:50 | · · · | 00:20 | 12:40 | 12:45 | 12:49 |
| 56° | 22:54 | · · · | 00:21 | 12:35 | 12:43 | 12:49 |
| 54° | 22:59 | · · · | 00:22 | 12:30 | 12:40 | 12:50 |
| 52° | 23:02 | · · · | 00:23 | 12:25 | 12:38 | 12:50 |
| 50° | 23:05 | · · · | 00:24 | 12:21 | 12:37 | 12:51 |
| 45° | 23:13 | · · · | 00:25 | 12:12 | 12:33 | 12:51 |
| N 40° | 23:18 | · · · | 00:27 | 12:04 | 12:29 | 12:52 |
| 35° | 23:24 | · · · | 00:28 | 11:57 | 12:26 | 12:53 |
| 30° | 23:28 | · · · | 00:29 | 11:52 | 12:23 | 12:53 |
| 20° | 23:36 | · · · | 00:31 | 11:41 | 12:19 | 12:54 |
| N 10° | 23:42 | · · · | 00:33 | 11:32 | 12:15 | 12:55 |
| 0° | 23:49 | · · · | 00:34 | 11:24 | 12:11 | 12:55 |
| S 10° | 23:55 | · · · | 00:36 | 11:15 | 12:07 | 12:56 |
| 20° | · · · | 00:02 | 00:38 | 11:06 | 12:03 | 12:57 |
| 30° | · · · | 00:09 | 00:40 | 10:55 | 11:58 | 12:58 |
| 35° | · · · | 00:14 | 00:41 | 10:49 | 11:55 | 12:58 |
| 40° | · · · | 00:18 | 00:42 | 10:42 | 11:52 | 12:59 |
| 45° | 00:02 | 00:24 | 00:44 | 10:33 | 11:48 | 12:59 |
| S 50° | 00:14 | 00:31 | 00:45 | 10:23 | 11:43 | 13:00 |
| 52° | 00:19 | 00:34 | 00:46 | 10:18 | 11:41 | 13:00 |
| 54° | 00:26 | 00:37 | 00:47 | 10:13 | 11:39 | 13:00 |
| 56° | 00:32 | 00:41 | 00:48 | 10:07 | 11:36 | 13:01 |
| 58° | 00:40 | 00:45 | 00:49 | 10:01 | 11:33 | 13:01 |
| S 60° | 00:49 | 00:50 | 00:50 | 09:53 | 11:30 | 13 |

December 03, 04, 05 UT (Thu., Fri., Sat.)

| h | Aries | | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|--------------------|----------|----------|--------------------|----------|---------------------|----------|--------------------|--------|-----|
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 71°50.4 | 224°06.8 | S09°34.8 | 276°20.5 | N12°43.9 | 282°28.7 | N13°19.3 | 63°29.2 | N00°48.0 | | |
| 1 | 86°52.9 | 239°07.7 | 35.1 | 291°22.1 | 43.6 | 297°31.1 | 19.2 | 78°31.7 | 48.0 | | |
| 2 | 101°55.4 | 254°08.6 | 35.3 | 306°23.7 | 43.4 | 312°33.5 | 19.2 | 93°34.2 | 48.0 | | |
| 3 | 116°57.8 | 269°09.5 | · · 35.6 | 321°25.3 | · · 43.1 | 327°35.9 | · · 19.2 | 108°36.7 | · · 47.9 | | |
| 4 | 132°00.3 | 284°10.5 | 35.8 | 336°26.9 | 42.9 | 342°38.2 | 19.2 | 123°39.2 | 47.9 | | |
| 5 | 147°02.8 | 299°11.4 | 36.1 | 351°28.5 | 42.6 | 357°40.6 | 19.2 | 138°41.7 | 47.9 | | |
| 6 | 162°05.2 | 314°12.3 | S09°36.4 | 6°30.0 | N12°42.3 | 12°43.0 | N13°19.1 | 153°44.2 | N00°47.9 | | |
| 7 | 177°07.7 | 329°13.2 | 36.6 | 21°31.6 | 42.1 | 27°45.4 | 19.1 | 168°46.7 | 47.9 | | |
| 8 | 192°10.2 | 344°14.1 | 36.9 | 36°33.2 | 41.8 | 42°47.8 | 19.1 | 183°49.2 | 47.9 | | |
| 9 | 207°12.6 | 359°15.0 | · · 37.1 | 51°34.8 | · · 41.6 | 57°50.2 | · · 19.1 | 198°51.7 | · · 47.9 | | |
| 10 | 222°15.1 | 14°15.9 | 37.4 | 66°36.4 | 41.3 | 72°52.5 | 19.1 | 213°54.2 | 47.9 | | |
| 11 | 237°17.5 | 29°16.8 | 37.6 | 81°38.0 | 41.1 | 87°54.9 | 19.1 | 228°56.7 | 47.9 | | |
| 12 | 252°20.0 | 44°17.7 | S09°37.9 | 96°39.6 | N12°40.8 | 102°57.3 | N13°19.0 | 243°59.2 | N00°47.9 | | |
| 13 | 267°22.5 | 59°18.5 | 38.2 | 111°41.1 | 40.5 | 117°59.7 | 19.0 | 259°01.7 | 47.9 | | |
| 14 | 282°24.9 | 74°19.4 | 38.4 | 126°42.7 | 40.3 | 133°02.1 | 19.0 | 274°04.2 | 47.9 | | |
| 15 | 297°27.4 | 89°20.3 | · · 38.7 | 141°44.3 | · · 40.0 | 148°04.5 | · · 19.0 | 289°06.7 | · · 47.9 | | |
| 16 | 312°29.9 | 104°21.2 | 39.0 | 156°45.9 | 39.8 | 163°06.9 | 19.0 | 304°09.2 | 47.9 | | |
| 17 | 327°32.3 | 119°22.1 | 39.2 | 171°47.5 | 39.5 | 178°09.3 | 19.0 | 319°11.7 | 47.9 | | |
| 18 | 342°34.8 | 134°23.0 | S09°39.5 | 186°49.1 | N12°39.2 | 193°11.6 | N13°18.9 | 334°14.2 | N00°47.9 | | |
| 19 | 357°37.3 | 149°23.8 | 39.8 | 201°50.7 | 39.0 | 208°14.0 | 18.9 | 349°16.7 | 47.9 | | |
| 20 | 12°39.7 | 164°24.7 | 40.0 | 216°52.3 | 38.7 | 223°16.4 | 18.9 | 4°19.2 | 47.9 | | |
| 21 | 27°42.2 | 179°25.6 | · · 40.3 | 231°53.9 | · · 38.5 | 238°18.8 | · · 18.9 | 19°21.7 | · · 47.9 | | |
| 22 | 42°44.6 | 194°26.5 | 40.6 | 246°55.5 | 38.2 | 253°21.2 | 18.9 | 34°24.2 | 47.9 | | |
| 23 | 57°47.1 | 209°27.3 | 40.9 | 261°57.1 | 38.0 | 268°23.6 | 18.9 | 49°26.7 | 47.9 | | |
| Mer.pass. 19:09 | | ν0.9' d0.2' m-4.88 | | | ν1.6' d-0.3' m0.43 | | ν2.4' d-0.0' m-2.21 | | ν2.5' d-0.0' m0.62 | | |

| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | |
|-----------------|----------|--------------------|----------|----------|--------------------|----------|---------------------|----------|--------------------|--|
| 0 | 72°49.6 | 224°28.2 | S09°41.1 | 276°58.7 | N12°37.7 | 283°26.0 | N13°18.8 | 64°29.1 | N00°47.9 | |
| 1 | 87°52.0 | 239°29.1 | 41.4 | 292°00.3 | 37.5 | 298°28.4 | 18.8 | 79°31.6 | 47.9 | |
| 2 | 102°54.5 | 254°29.9 | 41.7 | 307°01.9 | 37.2 | 313°30.8 | 18.8 | 94°34.1 | 47.9 | |
| 3 | 117°57.0 | 269°30.8 | · · 42.0 | 322°03.5 | · · 36.9 | 328°33.1 | · · 18.8 | 109°36.6 | · · 47.9 | |
| 4 | 132°59.4 | 284°31.7 | 42.2 | 337°05.1 | 36.7 | 343°35.5 | 18.8 | 124°39.1 | 47.9 | |
| 5 | 148°01.9 | 299°32.5 | 42.5 | 352°06.7 | 36.4 | 358°37.9 | 18.8 | 139°41.6 | 47.8 | |
| 6 | 163°04.4 | 314°33.4 | S09°42.8 | 7°08.3 | N12°36.2 | 13°40.3 | N13°18.8 | 154°44.1 | N00°47.8 | |
| 7 | 178°06.8 | 329°34.2 | 43.1 | 22°09.9 | 35.9 | 28°42.7 | 18.7 | 169°46.6 | 47.8 | |
| 8 | 193°09.3 | 344°35.1 | 43.4 | 37°11.5 | 35.7 | 43°45.1 | 18.7 | 184°49.1 | 47.8 | |
| 9 | 208°11.8 | 359°35.9 | · · 43.7 | 52°13.1 | · · 35.4 | 58°47.5 | · · 18.7 | 199°51.6 | · · 47.8 | |
| 10 | 223°14.2 | 14°36.8 | 44.0 | 67°14.7 | 35.2 | 73°49.9 | 18.7 | 214°54.1 | 47.8 | |
| 11 | 238°16.7 | 29°37.6 | 44.2 | 82°16.3 | 34.9 | 88°52.3 | 18.7 | 229°56.6 | 47.8 | |
| 12 | 253°19.1 | 44°38.5 | S09°44.5 | 97°17.9 | N12°34.7 | 103°54.7 | N13°18.7 | 244°59.1 | N00°47.8 | |
| 13 | 268°21.6 | 59°39.3 | 44.8 | 112°19.5 | 34.4 | 118°57.1 | 18.7 | 260°01.6 | 47.8 | |
| 14 | 283°24.1 | 74°40.1 | 45.1 | 127°21.1 | 34.2 | 133°59.5 | 18.6 | 275°04.1 | 47.8 | |
| 15 | 298°26.5 | 89°41.0 | · · 45.4 | 142°22.7 | · · 33.9 | 149°01.9 | · · 18.6 | 290°06.6 | · · 47.8 | |
| 16 | 313°29.0 | 104°41.8 | 45.7 | 157°24.3 | 33.7 | 164°04.2 | 18.6 | 305°09.1 | 47.8 | |
| 17 | 328°31.5 | 119°42.6 | 46.0 | 172°25.9 | 33.4 | 179°06.6 | 18.6 | 320°11.6 | 47.8 | |
| 18 | 343°33.9 | 134°43.5 | S09°46.3 | 187°27.5 | N12°33.1 | 194°09.0 | N13°18.6 | 335°14.1 | N00°47.8 | |
| 19 | 358°36.4 | 149°44.3 | 46.6 | 202°29.1 | 32.9 | 209°11.4 | 18.6 | 350°16.6 | 47.8 | |
| 20 | 13°38.9 | 164°45.1 | 46.9 | 217°30.7 | 32.6 | 224°13.8 | 18.6 | 5°19.1 | 47.8 | |
| 21 | 28°41.3 | 179°46.0 | · · 47.2 | 232°32.3 | · · 32.4 | 239°16.2 | · · 18.5 | 20°21.6 | · · 47.8 | |
| 22 | 43°43.8 | 194°46.8 | 47.5 | 247°33.9 | 32.1 | 254°18.6 | 18.5 | 35°24.0 | 47.8 | |
| 23 | 58°46.3 | 209°47.6 | 47.8 | 262°35.6 | 31.9 | 269°21.0 | 18.5 | 50°26.5 | 47.8 | |
| Mer.pass. 19:06 | | ν0.9' d0.3' m-4.87 | | | ν1.6' d-0.3' m0.41 | | ν2.4' d-0.0' m-2.21 | | ν2.5' d-0.0' m0.62 | |

| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | |
|-----------------|----------|--------------------|----------|----------|--------------------|----------|---------------------|----------|--------------------|--|
| 0 | 73°48.7 | 224°48.4 | S09°48.1 | 277°37.2 | N12°31.6 | 284°23.4 | N13°18.5 | 65°29.0 | N00°47.8 | |
| 1 | 88°51.2 | 239°49.3 | 48.4 | 292°38.8 | 31.4 | 299°25.8 | 18.5 | 80°31.5 | 47.8 | |
| 2 | 103°53.6 | 254°50.1 | 48.7 | 307°40.4 | 31.1 | 314°28.2 | 18.5 | 95°34.0 | 47.8 | |
| 3 | 118°56.1 | 269°50.9 | · · 49.0 | 322°42.0 | · · 30.9 | 329°30.6 | · · 18.5 | 110°36.5 | · · 47.8 | |
| 4 | 133°58.6 | 284°51.7 | 49.3 | 337°43.6 | 30.6 | 344°33.0 | 18.5 | 125°39.0 | 47.8 | |
| 5 | 149°01.0 | 299°52.5 | 49.6 | 352°45.2 | 30.4 | 359°35.4 | 18.4 | 140°41.5 | 47.8 | |
| 6 | 164°03.5 | 314°53.3 | S09°49.9 | 7°46.9 | N12°30.1 | 14°37.8 | N13°18.4 | 155°44.0 | N00°47.8 | |
| 7 | 179°06.0 | 329°54.1 | 50.2 | 22°48.5 | 29.9 | 29°40.2 | 18.4 | 170°46.5 | 47.8 | |
| 8 | 194°08.4 | 344°54.9 | 50.6 | 37°50.1 | 29.7 | 44°42.6 | 18.4 | 185°49.0 | 47.8 | |
| 9 | 209°10.9 | 359°55.7 | · · 50.9 | 52°51.7 | · · 29.4 | 59°45.0 | · · 18.4 | 200°51.5 | · · 47.8 | |
| 10 | 224°13.4 | 14°56.5 | 51.2 | 67°53.3 | 29.2 | 74°47.4 | 18.4 | 215°54.0 | 47.8 | |
| 11 | 239°15.8 | 29°57.3 | 51.5 | 82°54.9 | 28.9 | 89°49.8 | 18.4 | 230°56.5 | 47.8 | |
| 12 | 254°18.3 | 44°58.1 | S09°51.8 | 97°56.6 | N12°28.7 | 104°52.2 | N13°18.4 | 245°58.9 | N00°47.8 | |
| 13 | 269°20.7 | 59°58.9 | 52.1 | 112°58.2 | 28.4 | 119°54.6 | 18.4 | 261°01.4 | 47.8 | |
| 14 | 284°23.2 | 74°59.7 | 52.4 | 127°59.8 | 28.2 | 134°57.0 | 18.3 | 276°03.9 | 47.8 | |
| 15 | 299°25.7 | 90°00.5 | · · 52.8 | 143°01.4 | · · 27.9 | 149°59.4 | · · 18.3 | 291°06.4 | · · 47.8 | |
| 16 | 314°28.1 | 105°01.3 | 53.1 | 158°03.0 | 27.7 | 165°01.8 | 18.3 | 306°08.9 | 47.8 | |
| 17 | 329°30.6 | 120°02.1 | 53.4 | 173°04.7 | 27.4 | 180°04.2 | 18.3 | 321°11.4 | 47.8 | |
| 18 | 344°33.1 | 135°02.9 | S09°53.7 | 188°06.3 | N12°27.2 | 195°06.6 | N13°18.3 | 336°13.9 | N00°47.8 | |
| 19 | 359°35.5 | 150°03.7 | 54.1 | 203°07.9 | 26.9 | 210°09.0 | 18.3 | 351°16.4 | 47.8 | |
| 20 | 14°38.0 | 165°04.4 | 54.4 | 218°09.5 | 26.7 | 225°11.4 | 18.3 | 6°18.9 | 47.8 | |
| 21 | 29°40.5 | 180°05.2 | · · 54.7 | 233°11.2 | · · 26.4 | 240°13.8 | · · 18.3 | 21°21.4 | · · 47.8 | |
| 22 | 44°42.9 | 195°06.0 | 55.0 | 248°12.8 | 26.2 | 255°16.2 | 18.3 | 36°23.8 | 47.8 | |
| 23 | 59°45.4 | 210°06.8 | 55.4 | 263°14.4 | 26.0 | 270°18.6 | 18.2 | 51°26.3 | 47.8 | |
| Mer.pass. 19:02 | | ν0.8' d0.3' m-4.86 | | | ν1.6' d-0.2' m0.40 | | ν2.4' d-0.0' m-2.22 | | ν2.5' d-0.0' m0.63 | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.0 | 29°14.6 |
| Ankaa | 353°05.4 | -42°09.7 |
| Schedar | 349°28.9 | 56°41.4 |
| Diphda | 348°45.6 | -17°50.3 |
| Achernar | 335°18.6 | -57°06.1 |
| Hamal | 327°49.1 | 23°35.5 |
| Polaris | 312°44.4 | 89°22.8 |
| Acamar | 315°10.2 | -40°11.8 |
| Menkar | 314°04.2 | 4°11.8 |
| Mirfak | 308°25.5 | 49°57.5 |
| Aldebaran | 290°37.5 | 16°33.8 |
| Rigel | 281°02.0 | -8°10.2 |
| Capella | 280°19.1 | 46°01.5 |
| Bellatrix | 278°20.9 | 6°22.5 |
| Elnath | 277°59.5 | 28°37.8 |
| Alnilam | 275°35.8 | -1°11.0 |
| Betelgeuse | 270°50.1 | 7°24.7 |
| Canopus | 263°51.2 | -52°42.4 |
| Sirius | 258°24.5 | -16°45.1 |
| Adhara | 255°04.3 | -29°00.4 |
| Procyon | 244°48.9 | 5°09.3 |
| Pollux | 243°15.1 | 27°57.5 |
| Avior | 234°13.7 | -59°35.5 |
| Suhail | 222°45.0 | -43°32.3 |
| Miaplacidus | 221°37.5 | -69°49.4 |
| Alphard | 217°46.1 | -8°46.5 |
| Regulus | 207°32.7 | 11°50.0 |
| Dubhe | 193°39.2 | 61°36.0 |
| Denebola | 182°23.5 | 14°25.2 |
| Gienah | 175°42.1 | -17°41.4 |
| Acrux | 172°58.6 | -63°14.7 |
| Gacrux | 171°50.1 | -57°15.6 |
| Alioth | 166°11.9 | 55°48.5 |
| Spica | 158°20.9 | -11°18.1 |
| Alkaid | 152°51.2 | 49°10.5 |
| Hadar | 148°34.3 | -60°30.0 |
| Menkent | 147°56.1 | -36°30.0 |
| Arcturus | 145°46.8 | 19°02.5 |
| Rigel Kent. | 139°38.7 | -60°56.6 |
| Kochab | 137°20.9 | 74°02.4 |
| Zuben'ubi | 136°54.6 | -16°09.2 |
| Alphecca | 126°02.8 | 26°37.4 |
| Antares | 112°14.3 | -26°29.4 |
| Atria | 107°07.7 | -69°04.5 |
| Sabik | 102°01.3 | -15°45.4 |
| Shaula | 96°08.7 | -37°07.4 |
| Rasalhague | 95°57.4 | 12°32.5 |
| Eltanin | 90°42.0 | 51°29.2 |
| Kaus Aust. | 83°30.8 | -34°22.3 |
| Vega | 80°32.6 | 38°48.6 |
| Nunki | 75°46.2 | -26°15.8 |
| Altair | 61°58.7 | 8°56.5 |
| Peacock | 53°03.7 | -56°39.0 |
| Deneb | 49°25.0 | 45°22.8 |
| Enif | 33°37.4 | 10°00.1 |
| Al Na'ir | 27°31.1 | -46°50.0 |
| Fomalhaut | 15°12.8 | -29°28.8 |
| Scheat | 13°43.7 | 28°14.0 |
| Markab | 13°28.3 | 15°21.2 |

| Dec 03 Thu | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 152°16.4 | 09:03 |
| Mars | 204°30.1 | 05:34 |
| Jupiter | 210°38.3 | 05:09 |
| Saturn | 351°38.7 | 19:43 |

| Dec 04 Fri | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 151°38.6 | 09:02 |
| Mars | 204°09.1 | 05:32 |
| Jupiter | 210°36.4 | 05:05 |
| Saturn | 351°39.6 | 19:39 |

| Dec 05 Sat | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 150°59.7 | 09:00 |
| Mars | 203°48.5 | 05:29</ |

| h | Sun | | Moon | | | | |
|-----------------------|----------|----------|------------|-------|----------|-------|-------|
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 182°36.3 | S22°04.0 | 251°08.0 | 14.6' | S03°43.3 | 14.9' | 56.7' |
| 1 | 197°36.0 | 04.3 | 265°41.5 | 14.6' | 03°58.3 | 14.9' | 56.7' |
| 2 | 212°35.8 | 04.7 | 280°15.1 | 14.6' | 04°13.2 | 14.9' | 56.6' |
| 3 | 227°35.5 | 05.0 | 294°48.8 | 14.6' | 04°28.1 | 14.8' | 56.6' |
| 4 | 242°35.3 | 05.4 | 309°22.4 | 14.6' | 04°42.9 | 14.8' | 56.6' |
| 5 | 257°35.1 | 05.7 | 323°56.0 | 14.6' | 04°57.7 | 14.8' | 56.6' |
| 6 | 272°34.8 | S22°06.1 | 338°29.6 | 14.6' | S05°12.5 | 14.7' | 56.5' |
| 7 | 287°34.6 | 06.4 | 353°03.2 | 14.6' | 05°27.3 | 14.7' | 56.5' |
| 8 | 302°34.3 | 06.8 | 7°36.9 | 14.6' | 05°42.0 | 14.7' | 56.5' |
| 9 | 317°34.1 | 07.1 | 22°10.5 | 14.6' | 05°56.7 | 14.6' | 56.5' |
| 10 | 332°33.8 | 07.5 | 36°44.1 | 14.6' | 06°11.3 | 14.6' | 56.4' |
| 11 | 347°33.6 | 07.8 | 51°17.7 | 14.6' | 06°25.9 | 14.6' | 56.4' |
| 12 | 2°33.3 | S22°08.2 | 65°51.4 | 14.6' | S06°40.4 | 14.5' | 56.4' |
| 13 | 17°33.1 | 08.5 | 80°25.0 | 14.6' | 06°55.0 | 14.5' | 56.4' |
| 14 | 32°32.8 | 08.9 | 94°58.6 | 14.6' | 07°09.4 | 14.4' | 56.3' |
| 15 | 47°32.6 | 09.2 | 109°32.2 | 14.6' | 07°23.9 | 14.4' | 56.3' |
| 16 | 62°32.3 | 09.6 | 124°05.8 | 14.6' | 07°38.3 | 14.3' | 56.3' |
| 17 | 77°32.1 | 09.9 | 138°39.4 | 14.6' | 07°52.6 | 14.3' | 56.2' |
| 18 | 92°31.8 | S22°10.3 | 153°13.0 | 14.6' | S08°06.9 | 14.3' | 56.2' |
| 19 | 107°31.6 | 10.6 | 167°46.6 | 14.6' | 08°21.1 | 14.2' | 56.2' |
| 20 | 122°31.3 | 11.0 | 182°20.1 | 14.6' | 08°35.3 | 14.2' | 56.2' |
| 21 | 137°31.1 | 11.3 | 196°53.7 | 14.5' | 08°49.5 | 14.1' | 56.1' |
| 22 | 152°30.8 | 11.6 | 211°27.2 | 14.5' | 09°03.6 | 14.1' | 56.1' |
| 23 | 167°30.6 | 12.0 | 226°00.7 | 14.5' | 09°17.7 | 14.0' | 56.1' |
| SD = 16.2' $d = 0.4'$ | | | SD = 15.5' | | | | |
| Fri | Sun | | Moon | | | | |
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 182°30.3 | S22°12.3 | 240°34.2 | 14.5' | S09°31.7 | 14.0' | 56.1' |
| 1 | 197°30.1 | 12.7 | 255°07.7 | 14.5' | 09°45.6 | 13.9' | 56.0' |
| 2 | 212°29.8 | 13.0 | 269°41.2 | 14.5' | 09°59.5 | 13.9' | 56.0' |
| 3 | 227°29.6 | 13.3 | 284°14.7 | 14.4' | 10°13.4 | 13.8' | 56.0' |
| 4 | 242°29.3 | 13.7 | 298°48.1 | 14.4' | 10°27.2 | 13.7' | 56.0' |
| 5 | 257°29.1 | 14.0 | 313°21.5 | 14.4' | 10°40.9 | 13.7' | 56.0' |
| 6 | 272°28.8 | S22°14.3 | 327°54.9 | 14.4' | S10°54.6 | 13.6' | 55.9' |
| 7 | 287°28.6 | 14.7 | 342°28.3 | 14.3' | 11°08.3 | 13.6' | 55.9' |
| 8 | 302°28.3 | 15.0 | 357°01.6 | 14.3' | 11°21.8 | 13.5' | 55.9' |
| 9 | 317°28.1 | 15.3 | 11°34.9 | 14.3' | 11°35.4 | 13.5' | 55.9' |
| 10 | 332°27.8 | 15.7 | 26°08.2 | 14.3' | 11°48.8 | 13.4' | 55.8' |
| 11 | 347°27.6 | 16.0 | 40°41.5 | 14.2' | 12°02.2 | 13.3' | 55.8' |
| 12 | 2°27.3 | S22°16.3 | 55°14.8 | 14.2' | S12°15.6 | 13.3' | 55.8' |
| 13 | 17°27.1 | 16.7 | 69°48.0 | 14.2' | 12°28.8 | 13.2' | 55.8' |
| 14 | 32°26.8 | 17.0 | 84°21.2 | 14.2' | 12°42.0 | 13.1' | 55.7' |
| 15 | 47°26.6 | 17.3 | 98°54.3 | 14.1' | 12°55.2 | 13.1' | 55.7' |
| 16 | 62°26.3 | 17.7 | 113°27.5 | 14.1' | 13°08.3 | 13.0' | 55.7' |
| 17 | 77°26.0 | 18.0 | 128°00.6 | 14.1' | 13°21.3 | 13.0' | 55.7' |
| 18 | 92°25.8 | S22°18.3 | 142°33.6 | 14.0' | S13°34.3 | 12.9' | 55.7' |
| 19 | 107°25.5 | 18.6 | 157°06.6 | 14.0' | 13°47.1 | 12.8' | 55.6' |
| 20 | 122°25.3 | 19.0 | 171°39.6 | 14.0' | 14°00.0 | 12.8' | 55.6' |
| 21 | 137°25.0 | 19.3 | 186°12.6 | 13.9' | 14°12.7 | 12.7' | 55.6' |
| 22 | 152°24.8 | 19.6 | 200°45.5 | 13.9' | 14°25.4 | 12.6' | 55.6' |
| 23 | 167°24.5 | 19.9 | 215°18.4 | 13.9' | 14°38.0 | 12.5' | 55.5' |
| SD = 16.2' $d = 0.3'$ | | | SD = 15.3' | | | | |
| Sat | Sun | | Moon | | | | |
| | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 182°24.3 | S22°20.3 | 229°51.3 | 13.8' | S14°50.5 | 12.5' | 55.5' |
| 1 | 197°24.0 | 20.6 | 244°24.1 | 13.8' | 15°03.0 | 12.4' | 55.5' |
| 2 | 212°23.7 | 20.9 | 258°56.9 | 13.7' | 15°15.4 | 12.3' | 55.5' |
| 3 | 227°23.5 | 21.2 | 273°29.6 | 13.7' | 15°27.7 | 12.2' | 55.5' |
| 4 | 242°23.2 | 21.5 | 288°02.3 | 13.7' | 15°40.0 | 12.2' | 55.4' |
| 5 | 257°23.0 | 21.9 | 302°35.0 | 13.6' | 15°52.2 | 12.1' | 55.4' |
| 6 | 272°22.7 | S22°22.2 | 317°07.6 | 13.6' | S16°04.3 | 12.0' | 55.4' |
| 7 | 287°22.5 | 22.5 | 331°40.2 | 13.5' | 16°16.3 | 11.9' | 55.4' |
| 8 | 302°22.2 | 22.8 | 346°12.7 | 13.5' | 16°28.2 | 11.9' | 55.4' |
| 9 | 317°21.9 | 23.1 | 0°45.2 | 13.5' | 16°40.1 | 11.8' | 55.3' |
| 10 | 332°21.7 | 23.4 | 15°17.7 | 13.4' | 16°51.9 | 11.7' | 55.3' |
| 11 | 347°21.4 | 23.8 | 29°50.1 | 13.4' | 17°03.6 | 11.6' | 55.3' |
| 12 | 2°21.2 | S22°24.1 | 44°22.5 | 13.3' | S17°15.2 | 11.5' | 55.3' |
| 13 | 17°20.9 | 24.4 | 58°54.8 | 13.3' | 17°26.7 | 11.5' | 55.3' |
| 14 | 32°20.6 | 24.7 | 73°27.1 | 13.2' | 17°38.2 | 11.4' | 55.2' |
| 15 | 47°20.4 | 25.0 | 87°59.3 | 13.2' | 17°49.6 | 11.3' | 55.2' |
| 16 | 62°20.1 | 25.3 | 102°31.5 | 13.1' | 18°00.8 | 11.2' | 55.2' |
| 17 | 77°19.9 | 25.6 | 117°03.6 | 13.1' | 18°12.0 | 11.1' | 55.2' |
| 18 | 92°19.6 | S22°25.9 | 131°35.7 | 13.0' | S18°23.2 | 11.0' | 55.2' |
| 19 | 107°19.3 | 26.2 | 146°07.7 | 13.0' | 18°34.2 | 10.9' | 55.1' |
| 20 | 122°19.1 | 26.5 | 160°39.7 | 12.9' | 18°45.1 | 10.9' | 55.1' |
| 21 | 137°18.8 | 26.8 | 175°11.7 | 12.9' | 18°56.0 | 10.8' | 55.1' |
| 22 | 152°18.6 | 27.2 | 189°43.6 | 12.8' | 19°06.7 | 10.7' | 55.1' |
| 23 | 167°18.3 | 27.5 | 204°15.4 | 12.8' | 19°17.4 | 10.6' | 55.1' |
| SD = 16.2' $d = 0.3'$ | | | SD = 15.1' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 07:59 | 10:04 | ■ | ■ | 13:36 | 15:41 |
| N 70° | 07:42 | 09:21 | ■ | ■ | 14:19 | 15:58 |
| 68° | 07:28 | 08:52 | 10:55 | 12:44 | 14:48 | 16:12 |
| 66° | 07:16 | 08:30 | 09:57 | 13:43 | 15:10 | 16:24 |
| 64° | 07:06 | 08:12 | 09:24 | 14:16 | 15:28 | 16:34 |
| 62° | 06:58 | 07:58 | 09:00 | 14:40 | 15:42 | 16:42 |
| 60° | 06:50 | 07:46 | 08:41 | 14:59 | 15:54 | 16:50 |
| N 58° | 06:43 | 07:35 | 08:25 | 15:15 | 16:05 | 16:57 |
| 56° | 06:37 | 07:26 | 08:12 | 15:29 | 16:14 | 17:03 |
| 54° | 06:32 | 07:17 | 08:00 | 15:40 | 16:23 | 17:08 |
| 52° | 06:27 | 07:10 | 07:50 | 15:50 | 16:30 | 17:13 |
| 50° | 06:22 | 07:03 | 07:40 | 16:00 | 16:37 | 17:18 |
| 48° | 06:11 | 06:48 | 07:21 | 16:19 | 16:52 | 17:29 |
| N 40° | 06:02 | 06:35 | 07:05 | 16:35 | 17:05 | 17:39 |
| 35° | 05:53 | 06:24 | 06:52 | 16:48 | 17:16 | 17:47 |
| 30° | 05:45 | 06:14 | 06:40 | 17:00 | 17:26 | 17:55 |
| 20° | 05:29 | 05:57 | 06:20 | 17:20 | 17:44 | 18:11 |
| N 10° | 05:14 | 05:40 | 06:03 | 17:37 | 18:00 | 18:26 |
| 0° | 04:58 | 05:24 | 05:46 | 17:54 | 18:16 | 18:42 |
| S 10° | 04:40 | 05:07 | 05:30 | 18:11 | 18:33 | 19:00 |
| 20° | 04:19 | 04:48 | 05:12 | 18:29 | 18:53 | 19:22 |
| 30° | 03:51 | 04:24 | 04:51 | 18:49 | 19:17 | 19:49 |
| 35° | 03:34 | 04:10 | 04:39 | 19:02 | 19:31 | 20:07 |
| 40° | 03:12 | 03:53 | 04:25 | 19:16 | 19:48 | 20:29 |
| 45° | 02:44 | 03:32 | 04:08 | 19:33 | 20:09 | 20:57 |
| S 50° | 02:03 | 03:04 | 03:47 | 19:54 | 20:37 | 21:38 |
| 52° | 01:40 | 02:50 | 03:37 | 20:04 | 20:51 | 22:02 |
| 54° | 01:07 | 02:34 | 03:26 | 20:15 | 21:07 | 22:36 |
| 56° | //// | 02:15 | 03:13 | 20:28 | 21:27 | //// |
| 58° | //// | 01:50 | 02:58 | 20:44 | 21:52 | //// |
| S 60° | //// | 01:14 | 02:39 | 21:02 | 22:29 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | 02:14 | 04:27 | 07:14 | 12:10 | 11:30 | 10:18 |
| N 70° | 02:08 | 04:09 | 06:25 | 12:20 | 11:51 | 11:08 |
| 68° | 02:03 | 03:54 | 05:55 | 12:28 | 12:07 | 11:40 |
| 66° | 01:58 | 03:43 | 05:32 | 12:34 | 12:21 | 12:04 |
| 64° | 01:55 | 03:33 | 05:14 | 12:40 | 12:32 | 12:23 |
| 62° | 01:51 | 03:25 | 05:00 | 12:45 | 12:41 | 12:38 |
| 60° | 01:49 | 03:18 | 04:48 | 12:49 | 12:50 | 12:51 |
| N 58° | 01:46 | 03:12 | 04:38 | 12:53 | 12:57 | 13:03 |
| 56° | 01:44 | 03:06 | 04:29 | 12:56 | 13:03 | 13:12 |
| 54° | 01:42 | 03:01 | 04:21 | 12:59 | 13:09 | 13:21 |
| 52° | 01:40 | 02:57 | 04:13 | 13:02 | 13:14 | 13:29 |
| 50° | 01:39 | 02:53 | 04:07 | 13:04 | 13:19 | 13:36 |
| 45° | 01:35 | 02:45 | 03:53 | 13:10 | 13:29 | 13:51 |
| N 40° | 01:33 | 02:37 | 03:42 | 13:15 | 13:38 | 14:04 |
| 35° | 01:30 | 02:31 | 03:33 | 13:19 | 13:45 | 14:15 |
| 30° | 01:28 | 02:26 | 03:24 | 13:22 | 13:52 | 14:24 |
| 20° | 01:24 | 02:17 | 03:10 | 13:28 | 14:03 | 14:40 |
| N 10° | 01:21 | 02:09 | 02:58 | 13:34 | 14:13 | 14:54 |
| 0° | 01:18 | 02:02 | 02:46 | 13:39 | 14:23 | 15:08 |
| S 10° | 01:15 | 01:54 | 02:35 | 13:44 | 14:32 | 15:21 |
| 20° | 01:12 | 01:47 | 02:22 | 13:50 | 14:42 | 15:36 |
| 30° | 01:09 | 01:38 | 02:09 | 13:56 | 14:54 | 15:52 |
| 35° | 01:07 | 01:33 | 02:01 | 14:00 | 15:01 | 16:02 |
| 40° | 01:05 | 01:27 | 01:52 | 14:04 | 15:09 | 16:13 |
| 45° | 01:02 | 01:21 | 01:41 | 14:09 | 15:18 | 16:26 |
| S 50° | 00:59 | 01:13 | 01:29 | 14:15 | 15:29 | 16:42 |
| 52° | 00:58 | 01:09 | 01:23 | 14:17 | 15:34 | 16:50 |
| 54° | 00:56 | 01:06 | 01:16 | 14:20 | 15:39 | 16:59 |
| 56° | 00:54 | 01:01 | 01:09 | 14:23 | 15:46 | 17:08 |
| 58° | 00:53 | 00:56 | 01:01 | 14:27 | 15:53 | 17:19 |
| S 60° | 00:51 | 00:51 | 00:52 | 14:31 | 16:01 | 17:31 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-------|-----------|-------|--------|
| | Eqn.of Time | | Mer. | Mer.Pass. | | Age |
| | 00 ^h | 12 ^h | Pass | Upper | Lower | 24-26 |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 32-15% |
| 03 | 10:25 | 10:13 | 11:50 | 07:29 | 19:50 | |
| 04 | 10:01 | 09:49 | 11:50 | 08:12 | 20:34 | |
| 05 | 09:37 | 09:25 | 11:51 | 08:57 | 21:20 | |

December 06, 07, 08 UT (Sun., Mon., Tue.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|--------------------|----------|--------------------|----------|---------------------|----------|-------------------|----------|----------|
| Sun | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 74°47.9 | | 225°07.6 | S09°55.7 | 278°16.1 | N12°25.7 | 285°21.0 | N13°18.2 | 66°28.8 | N00°47.8 |
| 1 | 89°50.3 | | 240°08.3 | 56.0 | 293°17.7 | 25.5 | 300°23.5 | 18.2 | 81°31.3 | 47.8 |
| 2 | 104°52.8 | | 255°09.1 | 56.3 | 308°19.3 | 25.2 | 315°25.9 | 18.2 | 96°33.8 | 47.8 |
| 3 | 119°55.2 | | 270°09.9 | •• 56.7 | 323°20.9 | •• 25.0 | 330°28.3 | •• 18.2 | 111°36.3 | •• 47.8 |
| 4 | 134°57.7 | | 285°10.6 | 57.0 | 338°22.6 | 24.7 | 345°30.7 | 18.2 | 126°38.8 | 47.8 |
| 5 | 150°00.2 | | 300°11.4 | 57.3 | 353°24.2 | 24.5 | 0°33.1 | 18.2 | 141°41.3 | 47.8 |
| 6 | 165°02.6 | | 315°12.2 | S09°57.7 | 8°25.8 | N12°24.3 | 15°35.5 | N13°18.2 | 156°43.8 | N00°47.8 |
| 7 | 180°05.1 | | 330°12.9 | 58.0 | 23°27.5 | 24.0 | 30°37.9 | 18.2 | 171°46.2 | 47.8 |
| 8 | 195°07.6 | | 345°13.7 | 58.4 | 38°29.1 | 23.8 | 45°40.3 | 18.2 | 186°48.7 | 47.8 |
| 9 | 210°10.0 | | 0°14.4 | •• 58.7 | 53°30.7 | •• 23.5 | 60°42.7 | •• 18.1 | 201°51.2 | •• 47.8 |
| 10 | 225°12.5 | | 15°15.2 | 59.0 | 68°32.4 | 23.3 | 75°45.1 | 18.1 | 216°53.7 | 47.8 |
| 11 | 240°15.0 | | 30°16.0 | 59.4 | 83°34.0 | 23.0 | 90°47.5 | 18.1 | 231°56.2 | 47.8 |
| 12 | 255°17.4 | | 45°16.7 | S09°59.7 | 98°35.6 | N12°22.8 | 105°49.9 | N13°18.1 | 246°58.7 | N00°47.8 |
| 13 | 270°19.9 | | 60°17.5 | 10°00.1 | 113°37.3 | 22.6 | 120°52.3 | 18.1 | 262°01.2 | 47.8 |
| 14 | 285°22.4 | | 75°18.2 | 00.4 | 128°38.9 | 22.3 | 135°54.8 | 18.1 | 277°03.7 | 47.8 |
| 15 | 300°24.8 | | 90°19.0 | •• 00.7 | 143°40.5 | •• 22.1 | 150°57.2 | •• 18.1 | 292°06.1 | •• 47.8 |
| 16 | 315°27.3 | | 105°19.7 | 01.1 | 158°42.2 | 21.8 | 165°59.6 | 18.1 | 307°08.6 | 47.8 |
| 17 | 330°29.7 | | 120°20.4 | 01.4 | 173°43.8 | 21.6 | 181°02.0 | 18.1 | 322°11.1 | 47.8 |
| 18 | 345°32.2 | | 135°21.2 | S10°01.8 | 188°45.5 | N12°21.4 | 196°04.4 | N13°18.1 | 337°13.6 | N00°47.8 |
| 19 | 0°34.7 | | 150°21.9 | 02.1 | 203°47.1 | 21.1 | 211°06.8 | 18.1 | 352°16.1 | 47.8 |
| 20 | 15°37.1 | | 165°22.7 | 02.5 | 218°48.7 | 20.9 | 226°09.2 | 18.1 | 7°18.6 | 47.8 |
| 21 | 30°39.6 | | 180°23.4 | •• 02.8 | 233°50.4 | •• 20.6 | 241°11.6 | •• 18.1 | 22°21.1 | •• 47.8 |
| 22 | 45°42.1 | | 195°24.1 | 03.2 | 248°52.0 | 20.4 | 256°14.0 | 18.0 | 37°23.5 | 47.8 |
| 23 | 60°44.5 | | 210°24.9 | 03.5 | 263°53.7 | 20.2 | 271°16.5 | 18.0 | 52°26.0 | 47.8 |
| Mer.pass. 18:58 | | ν0.8' d0.3' m-4.86 | | ν1.6' d-0.2' m0.38 | | ν2.4' d-0.0' m-2.23 | | ν2.5' d0.0' m0.63 | | |

| Mon | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|--------------------|----------|--------------------|----------|---------------------|----------|-------------------|----------|----------|
| 0 | 75°47.0 | | 225°25.6 | S10°03.9 | 278°55.3 | N12°19.9 | 286°18.9 | N13°18.0 | 67°28.5 | N00°47.8 |
| 1 | 90°49.5 | | 240°26.3 | 04.2 | 293°57.0 | 19.7 | 301°21.3 | 18.0 | 82°31.0 | 47.8 |
| 2 | 105°51.9 | | 255°27.1 | 04.6 | 308°58.6 | 19.4 | 316°23.7 | 18.0 | 97°33.5 | 47.8 |
| 3 | 120°54.4 | | 270°27.8 | •• 05.0 | 324°00.3 | •• 19.2 | 331°26.1 | •• 18.0 | 112°36.0 | •• 47.8 |
| 4 | 135°56.9 | | 285°28.5 | 05.3 | 339°01.9 | 19.0 | 346°28.5 | 18.0 | 127°38.5 | 47.8 |
| 5 | 150°59.3 | | 300°29.2 | 05.7 | 354°03.5 | 18.7 | 1°30.9 | 18.0 | 142°40.9 | 47.8 |
| 6 | 166°01.8 | | 315°29.9 | S10°06.0 | 9°05.2 | N12°18.5 | 16°33.3 | N13°18.0 | 157°43.4 | N00°47.8 |
| 7 | 181°04.2 | | 330°30.7 | 06.4 | 24°06.8 | 18.3 | 31°35.8 | 18.0 | 172°45.9 | 47.9 |
| 8 | 196°06.7 | | 345°31.4 | 06.7 | 39°08.5 | 18.0 | 46°38.2 | 18.0 | 187°48.4 | 47.9 |
| 9 | 211°09.2 | | 0°32.1 | •• 07.1 | 54°10.1 | •• 17.8 | 61°40.6 | •• 18.0 | 202°50.9 | •• 47.9 |
| 10 | 226°11.6 | | 15°32.8 | 07.5 | 69°11.8 | 17.5 | 76°43.0 | 18.0 | 217°53.4 | 47.9 |
| 11 | 241°14.1 | | 30°33.5 | 07.8 | 84°13.4 | 17.3 | 91°45.4 | 18.0 | 232°55.8 | 47.9 |
| 12 | 256°16.6 | | 45°34.2 | S10°08.2 | 99°15.1 | N12°17.1 | 106°47.8 | N13°17.9 | 247°58.3 | N00°47.9 |
| 13 | 271°19.0 | | 60°34.9 | 08.6 | 114°16.8 | 16.8 | 121°50.3 | 17.9 | 263°00.8 | 47.9 |
| 14 | 286°21.5 | | 75°35.6 | 08.9 | 129°18.4 | 16.6 | 136°52.7 | 17.9 | 278°03.3 | 47.9 |
| 15 | 301°24.0 | | 90°36.3 | •• 09.3 | 144°20.1 | •• 16.4 | 151°55.1 | •• 17.9 | 293°05.8 | •• 47.9 |
| 16 | 316°26.4 | | 105°37.0 | 09.7 | 159°21.7 | 16.1 | 166°57.5 | 17.9 | 308°08.3 | 47.9 |
| 17 | 331°28.9 | | 120°37.7 | 10.0 | 174°23.4 | 15.9 | 181°59.9 | 17.9 | 323°10.7 | 47.9 |
| 18 | 346°31.3 | | 135°38.4 | S10°10.4 | 189°25.0 | N12°15.7 | 197°02.3 | N13°17.9 | 338°13.2 | N00°47.9 |
| 19 | 1°33.8 | | 150°39.1 | 10.8 | 204°26.7 | 15.4 | 212°04.8 | 17.9 | 353°15.7 | 47.9 |
| 20 | 16°36.3 | | 165°39.8 | 11.2 | 219°28.3 | 15.2 | 227°07.2 | 17.9 | 8°18.2 | 47.9 |
| 21 | 31°38.7 | | 180°40.5 | •• 11.5 | 234°30.0 | •• 15.0 | 242°09.6 | •• 17.9 | 23°20.7 | •• 47.9 |
| 22 | 46°41.2 | | 195°41.2 | 11.9 | 249°31.7 | 14.7 | 257°12.0 | 17.9 | 38°23.1 | 47.9 |
| 23 | 61°43.7 | | 210°41.9 | 12.3 | 264°33.3 | 14.5 | 272°14.4 | 17.9 | 53°25.6 | 47.9 |
| Mer.pass. 18:54 | | ν0.7' d0.4' m-4.85 | | ν1.6' d-0.2' m0.36 | | ν2.4' d-0.0' m-2.23 | | ν2.5' d0.0' m0.63 | | |

| Tue | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------------|----------|--------------------|----------|--------------------|----------|---------------------|----------|-------------------|----------|----------|
| 0 | 76°46.1 | | 225°42.6 | S10°12.7 | 279°35.0 | N12°14.3 | 287°16.9 | N13°17.9 | 68°28.1 | N00°47.9 |
| 1 | 91°48.6 | | 240°43.3 | 13.0 | 294°36.6 | 14.0 | 302°19.3 | 17.9 | 83°30.6 | 47.9 |
| 2 | 106°51.1 | | 255°44.0 | 13.4 | 309°38.3 | 13.8 | 317°21.7 | 17.9 | 98°33.1 | 47.9 |
| 3 | 121°53.5 | | 270°44.7 | •• 13.8 | 324°40.0 | •• 13.6 | 332°24.1 | •• 17.9 | 113°35.5 | •• 47.9 |
| 4 | 136°56.0 | | 285°45.3 | 14.2 | 339°41.6 | 13.3 | 347°26.6 | 17.9 | 128°38.0 | 47.9 |
| 5 | 151°58.5 | | 300°46.0 | 14.6 | 354°43.3 | 13.1 | 2°29.0 | 17.9 | 143°40.5 | 47.9 |
| 6 | 167°00.9 | | 315°46.7 | S10°14.9 | 9°45.0 | N12°12.9 | 17°31.4 | N13°17.9 | 158°43.0 | N00°47.9 |
| 7 | 182°03.4 | | 330°47.4 | 15.3 | 24°46.6 | 12.7 | 32°33.8 | 17.9 | 173°45.5 | 47.9 |
| 8 | 197°05.8 | | 345°48.0 | 15.7 | 39°48.3 | 12.4 | 47°36.2 | 17.9 | 188°47.9 | 47.9 |
| 9 | 212°08.3 | | 0°48.7 | •• 16.1 | 54°50.0 | •• 12.2 | 62°38.7 | •• 17.9 | 203°50.4 | •• 48.0 |
| 10 | 227°10.8 | | 15°49.4 | 16.5 | 69°51.6 | 12.0 | 77°41.1 | 17.8 | 218°52.9 | 48.0 |
| 11 | 242°13.2 | | 30°50.1 | 16.9 | 84°53.3 | 11.7 | 92°43.5 | 17.8 | 233°55.4 | 48.0 |
| 12 | 257°15.7 | | 45°50.7 | S10°17.2 | 99°55.0 | N12°11.5 | 107°45.9 | N13°17.8 | 248°57.9 | N00°48.0 |
| 13 | 272°18.2 | | 60°51.4 | 17.6 | 114°56.6 | 11.3 | 122°48.4 | 17.8 | 264°00.3 | 48.0 |
| 14 | 287°20.6 | | 75°52.1 | 18.0 | 129°58.3 | 11.0 | 137°50.8 | 17.8 | 279°02.8 | 48.0 |
| 15 | 302°23.1 | | 90°52.7 | •• 18.4 | 145°00.0 | •• 10.8 | 152°53.2 | •• 17.8 | 294°05.3 | •• 48.0 |
| 16 | 317°25.6 | | 105°53.4 | 18.8 | 160°01.6 | 10.6 | 167°55.6 | 17.8 | 309°07.8 | 48.0 |
| 17 | 332°28.0 | | 120°54.0 | 19.2 | 175°03.3 | 10.4 | 182°58.1 | 17.8 | 324°10.3 | 48.0 |
| 18 | 347°30.5 | | 135°54.7 | S10°19.6 | 190°05.0 | N12°10.1 | 198°00.5 | N13°17.8 | 339°12.7 | N00°48.0 |
| 19 | 2°33.0 | | 150°55.4 | 20.0 | 205°06.7 | 09.9 | 213°02.9 | 17.8 | 354°15.2 | 48.0 |
| 20 | 17°35.4 | | 165°56.0 | 20.4 | 220°08.3 | 09.7 | 228°05.3 | 17.8 | 9°17.7 | 48.0 |
| 21 | 32°37.9 | | 180°56.7 | •• 20.8 | 235°10.0 | •• 09.5 | 243°07.8 | •• 17.8 | 24°20.2 | •• 48.0 |
| 22 | 47°40.3 | | 195°57.3 | 21.2 | 250°11.7 | 09.2 | 258°10.2 | 17.8 | 39°22.6 | 48.0 |
| 23 | 62°42.8 | | 210°58.0 | 21.6 | 265°13.4 | 09.0 | 273°12.6 | 17.8 | 54°25.1 | 48.0 |
| Mer.pass. 18:50 | | ν0.7' d0.4' m-4.84 | | ν1.7' d-0.2' m0.34 | | ν2.4' d-0.0' m-2.24 | | ν2.5' d0.0' m0.64 | | |

| | SHA | Dec |
|-------------|----------|----------|
| Alpheratz | 357°33.0 | 29°14.6 |
| Ankaa | 353°05.5 | -42°09.7 |
| Schedar | 349°29.0 | 56°41.4 |
| Diphda | 348°45.6 | -17°50.3 |
| Achernar | 335°18.7 | -57°06.1 |
| Hamal | 327°49.2 | 23°35.5 |
| Polaris | 312°44.6 | 89°22.8 |
| Acamar | 315°10.2 | -40°11.8 |
| Menkar | 314°04.2 | 4°11.8 |
| Mirfak | 308°25.5 | 49°57.5 |
| Aldebaran | 290°37.5 | 16°33.8 |
| Rigel | 281°02.0 | -8°10.2 |
| Capella | 280°19.1 | 46°01.5 |
| Bellatrix | 278°20.9 | 6°22.5 |
| Elnath | 277°59.5 | 28°37.8 |
| Alnilam | 275°35.8 | -1°11.1 |
| Betelgeuse | 270°50.1 | 7°24.7 |
| Canopus | 263°51.2 | -52°42.5 |
| Sirius | 258°24.5 | -16°45.1 |
| Adhara | 255°04.3 | -29°00.4 |
| Procyon | 244°48.9 | 5°09.3 |
| Pollux | 243°15.1 | 27°57.5 |
| Avior | 234°13.7 | -59°35.5 |
| Suhail | 222°44.9 | -43°32.3 |
| Miaplacidus | 221°37.5 | -69°49.4 |
| Alphard | 217°46.1 | -8°46.5 |
| Regulus | 207°32.7 | 11°50.0 |
| Dubhe | 193°39.1 | 61°36.0 |
| Denebola | 182°23.4 | 14°25.2 |
| Gienah | 175°42.1 | -17°41.4 |
| Acrux | 172°58.6 | -63°14.7 |
| Gacrux | 171°50.1 | -57°15.6 |
| Alioth | 166°11.9 | 55°48.5 |
| Spica | 158°20.8 | -11°18.1 |
| Alkaid | 152°51.1 | 49°10.5 |
| Hadara | 148°34.2 | -60°30.0 |
| Menkent | 147°56.1 | -36°30.0 |
| Arcturus | 145°46.8 | 19°02.4 |
| Rigel Kent. | 139°38.7 | -60°56.6 |
| Kochab | 137°20.9 | 74°02.4 |
| Zuben'ubi | 136°54.6 | -16°09.2 |
| Alphecca | 126°02.8 | 26°37.4 |
| Antares | 112°14.3 | -26°29.4 |
| Atria | 107°07.7 | -69°04.5 |
| Sabik | 102°01.3 | -15°45.4 |
| Shaula | 96°08.7 | -37°07.4 |
| Rasalhague | 95°57.4 | 12°32.5 |
| Eltanin | 90°42.0 | 51°29.2 |
| Kaus Aust. | 83°30.8 | -34°22.3 |
| Vega | 80°32.6 | 38°48.6 |
| Nunki | 75°46.2 | -26°15.8 |
| Altair | 61°58.7 | 8°56.5 |
| Peacock | 53°03.7 | -56°39.0 |
| Deneb | 49°25.0 | 45°22.8 |
| Enif | 33°37.1 | 10°00.1 |
| Al Na'ir | 27°31.1 | -46°50.0 |
| Fomalhaut | 15°12.8 | -29°28.8 |
| Scheat | 13°43.7 | 28°14.0 |
| Markab | 13°28.3 | 15°21.2 |

| Dec 06 Sun | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 150°19.7 | 08:59 |
| Mars | 203°28.2 | 05:26 |
| Jupiter | 210°33.2 | 04:58 |
| Saturn | 351°41.0 | 19:31 |

| Dec 07 Mon | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 149°38.6 | 08:58 |
| Mars | 203°08.3 | 05:24 |
| Jupiter | 210°31.9 | 04:54 |
| Saturn | 351°41.5 | 19:27 |

| Dec 08 Tue | SHA | Mer.pass |
|------------|----------|----------|
| Venus | 148°56.5 | 08:57 |
| Mars | 202°48.8 | 05:21 |
| Jupiter | 210°30.7 | 04:50 |
| Saturn | 351°42.0 | 19:23 |

| h | Sun | | | Moon | | | | |
|------------|----------|----------|------------|------------|-------|----------|-------|-------|
| Sun | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 182°18.0 | S22°27.8 | | 218°47.2 | 12.8' | S19°28.0 | 10.5' | 55.1' |
| 1 | 197°17.8 | 28.1 | | 233°19.0 | 12.7' | 19°38.5 | 10.4' | 55.0' |
| 2 | 212°17.5 | 28.4 | | 247°50.7 | 12.7' | 19°48.9 | 10.3' | 55.0' |
| 3 | 227°17.2 | · · 28.7 | | 262°22.3 | 12.6' | 19°59.2 | 10.2' | 55.0' |
| 4 | 242°17.0 | 29.0 | | 276°53.9 | 12.6' | 20°09.4 | 10.1' | 55.0' |
| 5 | 257°16.7 | 29.3 | | 291°25.5 | 12.5' | 20°19.5 | 10.0' | 55.0' |
| 6 | 272°16.4 | S22°29.6 | | 305°57.0 | 12.4' | S20°29.5 | 9.9' | 55.0' |
| 7 | 287°16.2 | 29.9 | | 320°28.4 | 12.4' | 20°39.4 | 9.8' | 54.9' |
| 8 | 302°15.9 | 30.2 | | 334°59.8 | 12.3' | 20°49.2 | 9.7' | 54.9' |
| 9 | 317°15.7 | · · 30.5 | | 349°31.2 | 12.3' | 20°59.0 | 9.6' | 54.9' |
| 10 | 332°15.4 | 30.8 | | 4°02.5 | 12.2' | 21°08.6 | 9.5' | 54.9' |
| 11 | 347°15.1 | 31.1 | | 18°33.7 | 12.2' | 21°18.1 | 9.4' | 54.9' |
| 12 | 2°14.9 | S22°31.3 | | 33°04.9 | 12.1' | S21°27.5 | 9.3' | 54.9' |
| 13 | 17°14.6 | 31.6 | | 47°36.1 | 12.1' | 21°36.8 | 9.2' | 54.8' |
| 14 | 32°14.3 | 31.9 | | 62°07.2 | 12.0' | 21°46.0 | 9.1' | 54.8' |
| 15 | 47°14.1 | · · 32.2 | | 76°38.2 | 12.0' | 21°55.2 | 9.0' | 54.8' |
| 16 | 62°13.8 | 32.5 | | 91°09.2 | 11.9' | 22°04.2 | 8.9' | 54.8' |
| 17 | 77°13.5 | 32.8 | | 105°40.1 | 11.9' | 22°13.1 | 8.8' | 54.8' |
| 18 | 92°13.3 | S22°33.1 | | 120°11.0 | 11.8' | S22°21.8 | 8.7' | 54.8' |
| 19 | 107°13.0 | 33.4 | | 134°41.8 | 11.8' | 22°30.5 | 8.6' | 54.7' |
| 20 | 122°12.7 | 33.7 | | 149°12.6 | 11.7' | 22°39.1 | 8.5' | 54.7' |
| 21 | 137°12.5 | · · 34.0 | | 163°43.4 | 11.7' | 22°47.6 | 8.4' | 54.7' |
| 22 | 152°12.2 | 34.3 | | 178°14.0 | 11.6' | 22°55.9 | 8.3' | 54.7' |
| 23 | 167°11.9 | 34.5 | | 192°44.7 | 11.6' | 23°04.2 | 8.1' | 54.7' |
| SD = 16.2' | | | $d = 0.3'$ | SD = 15.0' | | | | |
| Mon | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 182°11.7 | S22°34.8 | | 207°15.3 | 11.5' | S23°12.3 | 8.0' | 54.7' |
| 1 | 197°11.4 | 35.1 | | 221°45.8 | 11.5' | 23°20.4 | 7.9' | 54.7' |
| 2 | 212°11.1 | 35.4 | | 236°16.3 | 11.4' | 23°28.3 | 7.8' | 54.6' |
| 3 | 227°10.9 | · · 35.7 | | 250°46.7 | 11.4' | 23°36.1 | 7.7' | 54.6' |
| 4 | 242°10.6 | 36.0 | | 265°17.1 | 11.3' | 23°43.8 | 7.6' | 54.6' |
| 5 | 257°10.3 | 36.2 | | 279°47.5 | 11.3' | 23°51.3 | 7.5' | 54.6' |
| 6 | 272°10.1 | S22°36.5 | | 294°17.7 | 11.2' | S23°58.8 | 7.3' | 54.6' |
| 7 | 287°09.8 | 36.8 | | 308°48.0 | 11.2' | 24°06.1 | 7.2' | 54.6' |
| 8 | 302°09.5 | 37.1 | | 323°18.2 | 11.2' | 24°13.4 | 7.1' | 54.6' |
| 9 | 317°09.2 | · · 37.4 | | 337°48.3 | 11.1' | 24°20.5 | 7.0' | 54.5' |
| 10 | 332°09.0 | 37.6 | | 352°18.4 | 11.1' | 24°27.5 | 6.9' | 54.5' |
| 11 | 347°08.7 | 37.9 | | 6°48.5 | 11.0' | 24°34.4 | 6.8' | 54.5' |
| 12 | 2°08.4 | S22°38.2 | | 21°18.5 | 11.0' | S24°41.1 | 6.6' | 54.5' |
| 13 | 17°08.2 | 38.5 | | 35°48.5 | 10.9' | 24°47.8 | 6.5' | 54.5' |
| 14 | 32°07.9 | 38.7 | | 50°18.4 | 10.9' | 24°54.3 | 6.4' | 54.5' |
| 15 | 47°07.6 | · · 39.0 | | 64°48.3 | 10.8' | 25°00.7 | 6.3' | 54.5' |
| 16 | 62°07.3 | 39.3 | | 79°18.1 | 10.8' | 25°06.9 | 6.2' | 54.5' |
| 17 | 77°07.1 | 39.6 | | 93°47.9 | 10.8' | 25°13.1 | 6.0' | 54.4' |
| 18 | 92°06.8 | S22°39.8 | | 108°17.7 | 10.7' | S25°19.1 | 5.9' | 54.4' |
| 19 | 107°06.5 | 40.1 | | 122°47.4 | 10.7' | 25°25.0 | 5.8' | 54.4' |
| 20 | 122°06.3 | 40.4 | | 137°17.1 | 10.6' | 25°30.8 | 5.7' | 54.4' |
| 21 | 137°06.0 | · · 40.6 | | 151°46.7 | 10.6' | 25°36.5 | 5.5' | 54.4' |
| 22 | 152°05.7 | 40.9 | | 166°16.3 | 10.6' | 25°42.0 | 5.4' | 54.4' |
| 23 | 167°05.4 | 41.2 | | 180°45.9 | 10.5' | 25°47.4 | 5.3' | 54.4' |
| SD = 16.2' | | | $d = 0.3'$ | SD = 14.9' | | | | |
| Tue | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 182°05.2 | S22°41.5 | | 195°15.4 | 10.5' | S25°52.7 | 5.2' | 54.4' |
| 1 | 197°04.9 | 41.7 | | 209°44.9 | 10.5' | 25°57.8 | 5.0' | 54.3' |
| 2 | 212°04.6 | 42.0 | | 224°14.3 | 10.4' | 26°02.9 | 4.9' | 54.3' |
| 3 | 227°04.3 | · · 42.2 | | 238°43.8 | 10.4' | 26°07.8 | 4.8' | 54.3' |
| 4 | 242°04.1 | 42.5 | | 253°13.2 | 10.4' | 26°12.5 | 4.6' | 54.3' |
| 5 | 257°03.8 | 42.8 | | 267°42.5 | 10.3' | 26°17.2 | 4.5' | 54.3' |
| 6 | 272°03.5 | S22°43.0 | | 282°11.8 | 10.3' | S26°21.7 | 4.4' | 54.3' |
| 7 | 287°03.2 | 43.3 | | 296°41.1 | 10.3' | 26°26.1 | 4.3' | 54.3' |
| 8 | 302°03.0 | 43.6 | | 311°10.4 | 10.2' | 26°30.3 | 4.1' | 54.3' |
| 9 | 317°02.7 | · · 43.8 | | 325°39.6 | 10.2' | 26°34.5 | 4.0' | 54.3' |
| 10 | 332°02.4 | 44.1 | | 340°08.8 | 10.2' | 26°38.5 | 3.9' | 54.3' |
| 11 | 347°02.1 | 44.3 | | 354°38.0 | 10.2' | 26°42.3 | 3.7' | 54.2' |
| 12 | 2°01.9 | S22°44.6 | | 9°07.1 | 10.1' | S26°46.1 | 3.6' | 54.2' |
| 13 | 17°01.6 | 44.9 | | 23°36.3 | 10.1' | 26°49.7 | 3.5' | 54.2' |
| 14 | 32°01.3 | 45.1 | | 38°05.4 | 10.1' | 26°53.1 | 3.3' | 54.2' |
| 15 | 47°01.0 | · · 45.4 | | 52°34.5 | 10.1' | 26°56.5 | 3.2' | 54.2' |
| 16 | 62°00.8 | 45.6 | | 67°03.5 | 10.0' | 26°59.7 | 3.1' | 54.2' |
| 17 | 77°00.5 | 45.9 | | 81°32.6 | 10.0' | 27°02.7 | 2.9' | 54.2' |
| 18 | 92°00.2 | S22°46.1 | | 96°01.6 | 10.0' | S27°05.7 | 2.8' | 54.2' |
| 19 | 106°59.9 | 46.4 | | 110°30.6 | 10.0' | 27°08.5 | 2.7' | 54.2' |
| 20 | 121°59.7 | 46.6 | | 124°59.6 | 10.0' | 27°11.2 | 2.5' | 54.2' |
| 21 | 136°59.4 | · · 46.9 | | 139°28.6 | 10.0' | 27°13.7 | 2.4' | 54.1' |
| 22 | 151°59.1 | 47.1 | | 153°57.5 | 9.9' | 27°16.1 | 2.3' | 54.1' |
| 23 | 166°58.8 | 47.4 | | 168°26.5 | 9.9' | 27°18.4 | 2.1' | 54.1' |
| SD = 16.2' | | | $d = 0.3'$ | SD = 14.8' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|-----------------------------------|-----------------------|-----------|-----------------------|-------------|----------------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 08:06 | 10:17 | ■ | ■ | 13:25 | 15:37 |
| N 70° | 07:48 | 09:29 | ■ | ■ | 14:13 | 15:55 |
| 68° | 07:33 | 08:59 | 11:19 | 12:23 | 14:44 | 16:09 |
| 66° | 07:21 | 08:36 | 10:07 | 13:36 | 15:07 | 16:21 |
| 64° | 07:11 | 08:18 | 09:31 | 14:11 | 15:25 | 16:32 |
| 62° | 07:02 | 08:03 | 09:06 | 14:37 | 15:40 | 16:40 |
| 60° | 06:54 | 07:50 | 08:46 | 14:57 | 15:52 | 16:48 |
| N 58° | 06:47 | 07:39 | 08:30 | 15:13 | 16:03 | 16:55 |
| 56° | 06:41 | 07:29 | 08:16 | 15:27 | 16:13 | 17:02 |
| 54° | 06:35 | 07:21 | 08:04 | 15:39 | 16:22 | 17:07 |
| 52° | 06:30 | 07:13 | 07:53 | 15:49 | 16:29 | 17:13 |
| 50° | 06:25 | 07:06 | 07:44 | 15:59 | 16:37 | 17:18 |
| 45° | 06:14 | 06:51 | 07:24 | 16:18 | 16:52 | 17:29 |
| N 40° | 06:04 | 06:38 | 07:08 | 16:35 | 17:05 | 17:39 |
| 35° | 05:55 | 06:27 | 06:55 | 16:48 | 17:16 | 17:48 |
| 30° | 05:47 | 06:17 | 06:43 | 17:00 | 17:26 | 17:56 |
| 20° | 05:31 | 05:58 | 06:22 | 17:20 | 17:44 | 18:12 |
| N 10° | 05:16 | 05:42 | 06:05 | 17:38 | 18:01 | 18:27 |
| 0° | 04:59 | 05:25 | 05:48 | 17:55 | 18:18 | 18:44 |
| S 10° | 04:41 | 05:08 | 05:31 | 18:12 | 18:35 | 19:02 |
| 20° | 04:19 | 04:48 | 05:13 | 18:30 | 18:55 | 19:24 |
| 30° | 03:51 | 04:24 | 04:51 | 18:52 | 19:19 | 19:52 |
| 35° | 03:33 | 04:10 | 04:39 | 19:04 | 19:34 | 20:10 |
| 40° | 03:11 | 03:52 | 04:24 | 19:19 | 19:51 | 20:32 |
| 45° | 02:42 | 03:31 | 04:07 | 19:36 | 20:13 | 21:01 |
| S 50° | 02:00 | 03:02 | 03:46 | 19:58 | 20:41 | 21:44 |
| 52° | 01:36 | 02:48 | 03:36 | 20:08 | 20:55 | 22:09 |
| 54° | 01:00 | 02:32 | 03:24 | 20:20 | 21:12 | 22:45 |
| 56° | //// | 02:11 | 03:11 | 20:33 | 21:33 | //// |
| 58° | //// | 01:45 | 02:55 | 20:49 | 21:59 | //// |
| S 60° | //// | 01:06 | 02:36 | 21:08 | 22:39 | //// |
| Lat. | Moonrise | | | Moonset | | |
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | ■ | ■ | ■ | ■ | ■ | ■ |
| 68° | 08:28 | ■ | ■ | 10:44 | ■ | ■ |
| 66° | 07:34 | ■ | ■ | 11:38 | ■ | ■ |
| 64° | 07:02 | 09:04 | ■ | 12:11 | 11:50 | ■ |
| 62° | 06:39 | 08:21 | 10:05 | 12:36 | 12:34 | 12:35 |
| 60° | 06:20 | 07:52 | 09:20 | 12:55 | 13:03 | 13:20 |
| N 58° | 06:04 | 07:30 | 08:51 | 13:11 | 13:25 | 13:49 |
| 56° | 05:51 | 07:13 | 08:28 | 13:25 | 13:44 | 14:12 |
| 54° | 05:40 | 06:58 | 08:10 | 13:37 | 13:59 | 14:30 |
| 52° | 05:30 | 06:45 | 07:55 | 13:48 | 14:12 | 14:46 |
| 50° | 05:21 | 06:33 | 07:41 | 13:57 | 14:24 | 15:00 |
| 45° | 05:02 | 06:10 | 07:14 | 14:17 | 14:49 | 15:28 |
| N 40° | 04:47 | 05:51 | 06:52 | 14:33 | 15:08 | 15:50 |
| 35° | 04:34 | 05:35 | 06:34 | 14:47 | 15:25 | 16:08 |
| 30° | 04:23 | 05:21 | 06:19 | 14:59 | 15:39 | 16:24 |
| 20° | 04:04 | 04:58 | 05:53 | 15:20 | 16:03 | 16:50 |
| N 10° | 03:47 | 04:38 | 05:31 | 15:38 | 16:24 | 17:13 |
| 0° | 03:32 | 04:20 | 05:10 | 15:55 | 16:44 | 17:35 |
| S 10° | 03:17 | 04:02 | 04:49 | 16:12 | 17:04 | 17:56 |
| 20° | 03:01 | 03:42 | 04:27 | 16:30 | 17:25 | 18:19 |
| 30° | 02:42 | 03:19 | 04:02 | 16:51 | 17:49 | 18:46 |
| 35° | 02:31 | 03:06 | 03:47 | 17:03 | 18:04 | 19:02 |
| 40° | 02:19 | 02:51 | 03:29 | 17:18 | 18:21 | 19:20 |
| 45° | 02:05 | 02:33 | 03:08 | 17:35 | 18:41 | 19:42 |
| S 50° | 01:47 | 02:11 | 02:42 | 17:56 | 19:06 | 20:11 |
| 52° | 01:39 | 02:01 | 02:30 | 18:06 | 19:19 | 20:25 |
| 54° | 01:30 | 01:49 | 02:15 | 18:17 | 19:33 | 20:41 |
| 56° | 01:20 | 01:35 | 01:58 | 18:30 | 19:49 | 21:00 |
| 58° | 01:08 | 01:20 | 01:38 | 18:46 | 20:09 | 21:24 |
| S 60° | 00:55 | 01:01 | 01:13 | 19:04 | 20:34 | 21:55 |
| Day | Sun | | Mer. Pass | Moon | | Age 27-29 9-1% |
| | Eqn.of Time 00 ^h mm:ss | 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 06 | 09:12 | 08:59 | 11:51 | 09:43 | 22:07 | |

December 09, 10, 11 UT (Wed., Thu., Fri.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | | Stars | |
|-----------------|----------|--|--------------------|----------|--------------------|----------|---------------------|----------|-------------------|----------|---------------------|-------------------|
| Wed | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec |
| 0 | 77°45.3 | | 225°58.6 | S10°22.0 | 280°15.0 | N12°08.8 | 288°15.1 | N13°17.8 | 69°27.6 | N00°48.0 | Alpheratz | 357°33.0 29°14.6 |
| 1 | 92°47.7 | | 240°59.3 | 22.4 | 295°16.7 | 08.5 | 303°17.5 | 17.8 | 84°30.1 | 48.0 | Ankaa | 353°05.5 -42°09.7 |
| 2 | 107°50.2 | | 255°59.9 | 22.8 | 310°18.4 | 08.3 | 318°19.9 | 17.8 | 99°32.5 | 48.0 | Schedar | 349°29.0 56°41.4 |
| 3 | 122°52.7 | | 271°00.5 | •• 23.2 | 325°20.1 | •• 08.1 | 333°22.3 | •• 17.8 | 114°35.0 | •• 48.1 | Diphda | 348°45.6 -17°50.3 |
| 4 | 137°55.1 | | 286°01.2 | 23.6 | 340°21.8 | 07.9 | 348°24.8 | 17.8 | 129°37.5 | 48.1 | Achernar | 335°18.7 -57°06.2 |
| 5 | 152°57.6 | | 301°01.8 | 24.0 | 355°23.4 | 07.6 | 3°27.2 | 17.8 | 144°40.0 | 48.1 | Hamal | 327°49.1 23°35.6 |
| 6 | 168°00.1 | | 316°02.5 | S10°24.4 | 10°25.1 | N12°07.4 | 18°29.6 | N13°17.8 | 159°42.5 | N00°48.1 | Polaris | 312°44.9 89°22.8 |
| 7 | 183°02.5 | | 331°03.1 | 24.8 | 25°26.8 | 07.2 | 33°32.1 | 17.8 | 174°44.9 | 48.1 | Acamar | 315°10.2 -40°11.9 |
| 8 | 198°05.0 | | 346°03.7 | 25.2 | 40°28.5 | 07.0 | 48°34.5 | 17.8 | 189°47.4 | 48.1 | Menkar | 314°04.2 4°11.8 |
| 9 | 213°07.5 | | 1°04.4 | •• 25.6 | 55°30.2 | •• 06.8 | 63°36.9 | •• 17.8 | 204°49.9 | •• 48.1 | Mirfak | 308°25.5 49°57.5 |
| 10 | 228°09.9 | | 16°05.0 | 26.0 | 70°31.9 | 06.5 | 78°39.4 | 17.8 | 219°52.4 | 48.1 | Aldebaran | 290°37.5 16°33.8 |
| 11 | 243°12.4 | | 31°05.6 | 26.4 | 85°33.5 | 06.3 | 93°41.8 | 17.8 | 234°54.8 | 48.1 | Rigel | 281°02.0 -8°10.2 |
| 12 | 258°14.8 | | 46°06.2 | S10°26.8 | 100°35.2 | N12°06.1 | 108°44.2 | N13°17.8 | 249°57.3 | N00°48.1 | Capella | 280°19.1 46°01.5 |
| 13 | 273°17.3 | | 61°06.9 | 27.2 | 115°36.9 | 05.9 | 123°46.7 | 17.8 | 264°59.8 | 48.1 | Bellatrix | 278°20.8 6°22.5 |
| 14 | 288°19.8 | | 76°07.5 | 27.6 | 130°38.6 | 05.6 | 138°49.1 | 17.8 | 280°02.3 | 48.1 | Elnath | 277°59.5 28°37.8 |
| 15 | 303°22.2 | | 91°08.1 | •• 28.0 | 145°40.3 | •• 05.4 | 153°51.5 | •• 17.8 | 295°04.7 | •• 48.1 | Alnilam | 275°35.8 -1°11.1 |
| 16 | 318°24.7 | | 106°08.7 | 28.5 | 160°42.0 | 05.2 | 168°54.0 | 17.8 | 310°07.2 | 48.1 | Betelgeuse | 270°50.0 7°24.7 |
| 17 | 333°27.2 | | 121°09.4 | 28.9 | 175°43.7 | 05.0 | 183°56.4 | 17.8 | 325°09.7 | 48.1 | Canopus | 263°51.2 -52°42.5 |
| 18 | 348°29.6 | | 136°10.0 | S10°29.3 | 190°45.4 | N12°04.8 | 198°58.8 | N13°17.8 | 340°12.1 | N00°48.2 | Sirius | 258°24.5 -16°45.1 |
| 19 | 3°32.1 | | 151°10.6 | 29.7 | 205°47.0 | 04.5 | 214°01.3 | 17.8 | 355°14.6 | 48.2 | Adhara | 255°04.3 -29°00.4 |
| 20 | 18°34.6 | | 166°11.2 | 30.1 | 220°48.7 | 04.3 | 229°03.7 | 17.8 | 10°17.1 | 48.2 | Procyon | 244°48.9 5°09.3 |
| 21 | 33°37.0 | | 181°11.8 | •• 30.5 | 235°50.4 | •• 04.1 | 244°06.1 | •• 17.8 | 25°19.6 | •• 48.2 | Pollux | 243°15.1 27°57.5 |
| 22 | 48°39.5 | | 196°12.4 | 30.9 | 250°52.1 | 03.9 | 259°08.6 | 17.8 | 40°22.0 | 48.2 | Avior | 234°13.6 -59°35.5 |
| 23 | 63°42.0 | | 211°13.0 | 31.4 | 265°53.8 | 03.7 | 274°11.0 | 17.8 | 55°24.5 | 48.2 | Suhail | 222°44.9 -43°32.3 |
| Mer.pass. 18:46 | | | •0.6' d0.4' m-4.83 | | •1.7' d-0.2' m0.33 | | •2.4' d-0.0' m-2.25 | | •2.5' d0.0' m0.64 | | Miaplacidus | 221°37.4 -69°49.4 |
| | | | | | | | | | | | Alphard | 217°46.1 -8°46.5 |
| | | | | | | | | | | | Regulus | 207°32.7 11°50.0 |
| | | | | | | | | | | | Dubhe | 193°39.1 61°36.0 |
| | | | | | | | | | | | Denebola | 182°23.4 14°25.2 |
| | | | | | | | | | | | Gienah | 175°42.1 -17°41.4 |
| | | | | | | | | | | | Acrux | 172°58.5 -63°14.7 |
| | | | | | | | | | | | Gacrux | 171°50.1 -57°15.6 |
| | | | | | | | | | | | Alioth | 166°11.9 55°48.5 |
| | | | | | | | | | | | Spica | 158°20.8 -11°18.1 |
| | | | | | | | | | | | Alkaid | 152°51.1 49°10.5 |
| | | | | | | | | | | | Hadar | 148°34.2 -60°30.0 |
| | | | | | | | | | | | Menkent | 147°56.0 -36°30.0 |
| | | | | | | | | | | | Arcturus | 145°46.7 19°02.4 |
| | | | | | | | | | | | Rigel Kent. | 139°38.6 -60°56.6 |
| | | | | | | | | | | | Kochab | 137°20.9 74°02.4 |
| | | | | | | | | | | | Zuben'ubi | 136°54.6 -16°09.2 |
| | | | | | | | | | | | Alphecca | 126°02.8 26°37.4 |
| | | | | | | | | | | | Antares | 112°14.3 -26°29.4 |
| | | | | | | | | | | | Atria | 107°07.6 -69°04.5 |
| | | | | | | | | | | | Sabik | 102°01.3 -15°45.4 |
| | | | | | | | | | | | Shaula | 96°08.7 -37°07.4 |
| | | | | | | | | | | | Rasalhague | 95°57.4 12°32.5 |
| | | | | | | | | | | | Eltanin | 90°42.0 51°29.2 |
| | | | | | | | | | | | Kaus Aust. | 83°30.8 -34°22.3 |
| | | | | | | | | | | | Vega | 80°32.6 38°48.6 |
| | | | | | | | | | | | Nunki | 75°46.2 -26°15.8 |
| | | | | | | | | | | | Altair | 61°58.7 8°56.5 |
| | | | | | | | | | | | Peacock | 53°03.7 -56°39.0 |
| | | | | | | | | | | | Deneb | 49°25.0 45°22.8 |
| | | | | | | | | | | | Enif | 33°37.4 10°00.1 |
| | | | | | | | | | | | Al Na'ir | 27°31.1 -46°50.0 |
| | | | | | | | | | | | Fomalhaut | 15°12.8 -29°28.8 |
| | | | | | | | | | | | Scheat | 13°43.7 28°14.0 |
| | | | | | | | | | | | Markab | 13°28.3 15°21.2 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Dec 09 Wed | SHA |
| | | | | | | | | | | | Venus | 148°13.3 08:56 |
| | | | | | | | | | | | Mars | 202°29.8 05:18 |
| | | | | | | | | | | | Jupiter | 210°29.8 04:46 |
| | | | | | | | | | | | Saturn | 351°42.3 19:19 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Dec 10 Thu | SHA |
| | | | | | | | | | | | Venus | 147°29.2 08:55 |
| | | | | | | | | | | | Mars | 202°11.1 05:16 |
| | | | | | | | | | | | Jupiter | 210°29.0 04:42 |
| | | | | | | | | | | | Saturn | 351°42.6 19:15 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Dec 11 Fri | SHA |
| | | | | | | | | | | | Venus | 146°44.2 08:54 |
| | | | | | | | | | | | Mars | 201°52.8 05:13 |
| | | | | | | | | | | | Jupiter | 210°28.5 04:38 |
| | | | | | | | | | | | Saturn | 351°42.7 19:11 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Horizontal parallax | |
| | | | | | | | | | | | Venus: | 0.3 |
| | | | | | | | | | | | Mars: | 0.1 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Mer.pass. 18:38 | |
| | | | | | | | | | | | •0.6' d0.4' m-4.81 | |
| | | | | | | | | | | | •1.7' d-0.2' m0.29 | |
| | | | | | | | | | | | •2.4' d0.0' m-2.26 | |
| | | | | | | | | | | | •2.5' d0.0' m0.65 | |


| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|----------|-------|----------|-------|-------|
| Wed | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 181°58.6 | S22°47.6 | | 182°55.4 | 9.9' | S27°20.5 | 2.0' | 54.1' |
| 1 | 196°58.3 | 47.9 | | 197°24.3 | 9.9' | 27°22.5 | 1.9' | 54.1' |
| 2 | 211°58.0 | 48.1 | | 211°53.2 | 9.9' | 27°24.4 | 1.7' | 54.1' |
| 3 | 226°57.7 | · · 48.4 | | 226°22.1 | 9.9' | 27°26.1 | 1.6' | 54.1' |
| 4 | 241°57.4 | 48.6 | | 240°51.0 | 9.9' | 27°27.7 | 1.5' | 54.1' |
| 5 | 256°57.2 | 48.9 | | 255°19.9 | 9.9' | 27°29.2 | 1.3' | 54.1' |
| 6 | 271°56.9 | S22°49.1 | | 269°48.8 | 9.9' | S27°30.5 | 1.2' | 54.1' |
| 7 | 286°56.6 | 49.4 | | 284°17.7 | 9.9' | 27°31.7 | 1.1' | 54.1' |
| 8 | 301°56.3 | 49.6 | | 298°46.6 | 9.9' | 27°32.7 | 0.9' | 54.1' |
| 9 | 316°56.0 | · · 49.8 | | 313°15.5 | 9.9' | 27°33.7 | 0.8' | 54.1' |
| 10 | 331°55.8 | 50.1 | | 327°44.3 | 9.9' | 27°34.5 | 0.7' | 54.0' |
| 11 | 346°55.5 | 50.3 | | 342°13.2 | 9.9' | 27°35.1 | 0.5' | 54.0' |
| 12 | 1°55.2 | S22°50.6 | | 356°42.1 | 9.9' | S27°35.6 | 0.4' | 54.0' |
| 13 | 16°54.9 | 50.8 | | 11°11.0 | 9.9' | 27°36.0 | 0.2' | 54.0' |
| 14 | 31°54.6 | 51.0 | | 25°39.9 | 9.9' | 27°36.2 | 0.1' | 54.0' |
| 15 | 46°54.4 | · · 51.3 | | 40°08.8 | 9.9' | 27°36.4 | -0.0' | 54.0' |
| 16 | 61°54.1 | 51.5 | | 54°37.7 | 9.9' | 27°36.3 | -0.2' | 54.0' |
| 17 | 76°53.8 | 51.7 | | 69°06.6 | 9.9' | 27°36.2 | -0.3' | 54.0' |
| 18 | 91°53.5 | S22°52.0 | | 83°35.6 | 9.9' | S27°35.9 | -0.4' | 54.0' |
| 19 | 106°53.2 | 52.2 | | 98°04.5 | 10.0' | 27°35.4 | -0.6' | 54.0' |
| 20 | 121°53.0 | 52.4 | | 112°33.5 | 10.0' | 27°34.9 | -0.7' | 54.0' |
| 21 | 136°52.7 | · · 52.7 | | 127°02.4 | 10.0' | 27°34.2 | -0.8' | 54.0' |
| 22 | 151°52.4 | 52.9 | | 141°31.4 | 10.0' | 27°33.4 | -1.0' | 54.0' |
| 23 | 166°52.1 | 53.1 | | 156°00.4 | 10.0' | 27°32.4 | -1.1' | 54.0' |
| SD = 16.2' $d = 0.2'$ | | | | | | | | |
| SD = 14.8' | | | | | | | | |

| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|----------|-------|----------|-------|-------|
| 0 | 181°51.8 | S22°53.4 | 170°29.4 | 10.0' | S27°31.3 | -1.2' | 54.0' |
| 1 | 196°51.5 | 53.6 | 184°58.5 | 10.1' | 27°30.1 | -1.4' | 54.0' |
| 2 | 211°51.3 | 53.8 | 199°27.5 | 10.1' | 27°28.7 | -1.5' | 54.0' |
| 3 | 226°51.0 | · · 54.0 | 213°56.6 | 10.1' | 27°27.2 | -1.6' | 53.9' |
| 4 | 241°50.7 | 54.3 | 228°25.7 | 10.1' | 27°25.6 | -1.8' | 53.9' |
| 5 | 256°50.4 | 54.5 | 242°54.9 | 10.2' | 27°23.8 | -1.9' | 53.9' |
| 6 | 271°50.1 | S22°54.7 | 257°24.0 | 10.2' | S27°21.9 | -2.0' | 53.9' |
| 7 | 286°49.8 | 55.0 | 271°53.2 | 10.2' | 27°19.9 | -2.2' | 53.9' |
| 8 | 301°49.6 | 55.2 | 286°22.4 | 10.2' | 27°17.7 | -2.3' | 53.9' |
| 9 | 316°49.3 | · · 55.4 | 300°51.6 | 10.3' | 27°15.4 | -2.4' | 53.9' |
| 10 | 331°49.0 | 55.6 | 315°20.9 | 10.3' | 27°13.0 | -2.6' | 53.9' |
| 11 | 346°48.7 | 55.8 | 329°50.2 | 10.3' | 27°10.4 | -2.7' | 53.9' |
| 12 | 1°48.4 | S22°56.1 | 344°19.5 | 10.4' | S27°07.8 | -2.8' | 53.9' |
| 13 | 16°48.1 | 56.3 | 358°48.9 | 10.4' | 27°05.0 | -2.9' | 53.9' |
| 14 | 31°47.8 | 56.5 | 13°18.3 | 10.4' | 27°02.0 | -3.1' | 53.9' |
| 15 | 46°47.6 | · · 56.7 | 27°47.7 | 10.5' | 26°59.0 | -3.2' | 53.9' |
| 16 | 61°47.3 | 56.9 | 42°17.1 | 10.5' | 26°55.8 | -3.3' | 53.9' |
| 17 | 76°47.0 | 57.2 | 56°46.6 | 10.5' | 26°52.4 | -3.5' | 53.9' |
| 18 | 91°46.7 | S22°57.4 | 71°16.2 | 10.6' | S26°49.0 | -3.6' | 53.9' |
| 19 | 106°46.4 | 57.6 | 85°45.7 | 10.6' | 26°45.4 | -3.7' | 53.9' |
| 20 | 121°46.1 | 57.8 | 100°15.4 | 10.7' | 26°41.7 | -3.8' | 53.9' |
| 21 | 136°45.8 | · · 58.0 | 114°45.0 | 10.7' | 26°37.9 | -4.0' | 53.9' |
| 22 | 151°45.6 | 58.2 | 129°14.7 | 10.7' | 26°33.9 | -4.1' | 53.9' |
| 23 | 166°45.3 | 58.4 | 143°44.4 | 10.8' | 26°29.8 | -4.2' | 53.9' |
| SD = 16.2' $d = 0.2'$ | | | | | | | |
| SD = 14.7' | | | | | | | |

| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|----------|-------|----------|-------|-------|
| 0 | 181°45.0 | S22°58.6 | 158°14.2 | 10.8' | S26°25.6 | -4.3' | 53.9' |
| 1 | 196°44.7 | 58.9 | 172°44.1 | 10.9' | 26°21.3 | -4.5' | 53.9' |
| 2 | 211°44.4 | 59.1 | 187°13.9 | 10.9' | 26°16.8 | -4.6' | 53.9' |
| 3 | 226°44.1 | · · 59.3 | 201°43.8 | 11.0' | 26°12.3 | -4.7' | 53.9' |
| 4 | 241°43.8 | 59.5 | 216°13.8 | 11.0' | 26°07.6 | -4.8' | 53.9' |
| 5 | 256°43.6 | 59.7 | 230°43.8 | 11.1' | 26°02.8 | -4.9' | 53.9' |
| 6 | 271°43.3 | S22°59.9 | 245°13.9 | 11.1' | S25°57.8 | -5.1' | 53.9' |
| 7 | 286°43.0 | 23°00.1 | 259°44.0 | 11.2' | 25°52.8 | -5.2' | 53.9' |
| 8 | 301°42.7 | 00.3 | 274°14.1 | 11.2' | 25°47.6 | -5.3' | 53.9' |
| 9 | 316°42.4 | · · 00.5 | 288°44.3 | 11.3' | 25°42.3 | -5.4' | 53.9' |
| 10 | 331°42.1 | 00.7 | 303°14.6 | 11.3' | 25°36.9 | -5.5' | 53.9' |
| 11 | 346°41.8 | 00.9 | 317°44.9 | 11.4' | 25°31.3 | -5.6' | 53.9' |
| 12 | 1°41.5 | S23°01.1 | 332°15.2 | 11.4' | S25°25.7 | -5.8' | 53.9' |
| 13 | 16°41.2 | 01.3 | 346°45.6 | 11.5' | 25°19.9 | -5.9' | 53.9' |
| 14 | 31°41.0 | 01.5 | 1°16.1 | 11.5' | 25°14.1 | -6.0' | 53.9' |
| 15 | 46°40.7 | · · 01.7 | 15°46.6 | 11.6' | 25°08.1 | -6.1' | 53.9' |
| 16 | 61°40.4 | 01.9 | 30°17.2 | 11.6' | 25°01.9 | -6.2' | 53.9' |
| 17 | 76°40.1 | 02.1 | 44°47.8 | 11.7' | 24°55.7 | -6.3' | 53.9' |
| 18 | 91°39.8 | S23°02.3 | 59°18.5 | 11.7' | S24°49.4 | -6.4' | 53.9' |
| 19 | 106°39.5 | 02.5 | 73°49.2 | 11.8' | 24°42.9 | -6.6' | 53.9' |
| 20 | 121°39.2 | 02.7 | 88°20.0 | 11.8' | 24°36.4 | -6.7' | 53.9' |
| 21 | 136°38.9 | · · 02.9 | 102°50.8 | 11.9' | 24°29.7 | -6.8' | 53.9' |
| 22 | 151°38.6 | 03.1 | 117°21.7 | 12.0' | 24°22.9 | -6.9' | 53.9' |
| 23 | 166°38.3 | 03.3 | 131°52.7 | 12.0' | 24°16.0 | -7.0' | 53.9' |
| SD = 16.2' $d = 0.2'$ | | | | | | | |
| SD = 14.7' | | | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 08:12 | 10:29 | ■ | ■ | 13:16 | 15:33 |
| N 70° | 07:53 | 09:37 | ■ | ■ | 14:08 | 15:52 |
| 68° | 07:38 | 09:05 | ■ | ■ | 14:40 | 16:07 |
| 66° | 07:26 | 08:41 | 10:16 | 13:30 | 15:04 | 16:20 |
| 64° | 07:15 | 08:23 | 09:38 | 14:08 | 15:23 | 16:30 |
| 62° | 07:06 | 08:07 | 09:11 | 14:34 | 15:38 | 16:39 |
| 60° | 06:58 | 07:54 | 08:51 | 14:55 | 15:51 | 16:47 |
| N 58° | 06:51 | 07:43 | 08:34 | 15:11 | 16:02 | 16:55 |
| 56° | 06:44 | 07:33 | 08:20 | 15:25 | 16:12 | 17:01 |
| 54° | 06:38 | 07:24 | 08:08 | 15:38 | 16:21 | 17:07 |
| 52° | 06:33 | 07:16 | 07:57 | 15:48 | 16:29 | 17:12 |
| 50° | 06:28 | 07:09 | 07:47 | 15:58 | 16:36 | 17:18 |
| 45° | 06:16 | 06:54 | 07:27 | 16:18 | 16:52 | 17:29 |
| N 40° | 06:06 | 06:40 | 07:11 | 16:35 | 17:05 | 17:39 |
| 35° | 05:57 | 06:29 | 06:57 | 16:48 | 17:17 | 17:48 |
| 30° | 05:49 | 06:19 | 06:45 | 17:01 | 17:27 | 17:57 |
| 20° | 05:33 | 06:00 | 06:24 | 17:21 | 17:45 | 18:13 |
| N 10° | 05:17 | 05:43 | 06:06 | 17:39 | 18:02 | 18:28 |
| 0° | 05:00 | 05:27 | 05:49 | 17:56 | 18:19 | 18:45 |
| S 10° | 04:42 | 05:09 | 05:32 | 18:14 | 18:37 | 19:04 |
| 20° | 04:20 | 04:49 | 05:13 | 18:32 | 18:57 | 19:26 |
| 30° | 03:51 | 04:25 | 04:52 | 18:54 | 19:21 | 19:54 |
| 35° | 03:33 | 04:10 | 04:39 | 19:07 | 19:36 | 20:13 |
| 40° | 03:11 | 03:52 | 04:25 | 19:21 | 19:54 | 20:35 |
| 45° | 02:41 | 03:30 | 04:07 | 19:39 | 20:16 | 21:05 |
| S 50° | 01:58 | 03:01 | 03:45 | 20:01 | 20:45 | 21:49 |
| 52° | 01:32 | 02:47 | 03:35 | 20:11 | 20:59 | 22:15 |
| 54° | 00:53 | 02:30 | 03:23 | 20:23 | 21:17 | 22:54 |
| 56° | //// | 02:09 | 03:09 | 20:37 | 21:38 | //// |
| 58° | //// | 01:41 | 02:53 | 20:53 | 22:06 | //// |
| S 60° | //// | 00:59 | 02:34 | 21:13 | 22:49 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | ■ | ■ | ■ | ■ | ■ | ■ |
| N 70° | ■ | ■ | ■ | ■ | ■ | ■ |
| 68° | ■ | ■ | ■ | ■ | ■ | ■ |
| 66° | ■ | ■ | ■ | ■ | ■ | ■ |
| 64° | ■ | ■ | 13:01 | ■ | ■ | 14:57 |
| 62° | 11:35 | 12:04 | 12:06 | 12:52 | 14:10 | 15:51 |
| 60° | 10:31 | 11:14 | 11:34 | 13:56 | 15:00 | 16:23 |
| N 58° | 09:57 | 10:42 | 11:10 | 14:30 | 15:31 | 16:47 |
| 56° | 09:32 | 10:19 | 10:50 | 14:55 | 15:54 | 17:06 |
| 54° | 09:12 | 10:00 | 10:34 | 15:15 | 16:13 | 17:22 |
| 52° | 08:55 | 09:44 | 10:20 | 15:32 | 16:29 | 17:36 |
| 50° | 08:41 | 09:30 | 10:07 | 15:46 | 16:43 | 17:48 |
| 45° | 08:12 | 09:01 | 09:42 | 16:15 | 17:11 | 18:12 |
| N 40° | 07:49 | 08:39 | 09:21 | 16:38 | 17:33 | 18:32 |
| 35° | 07:30 | 08:20 | 09:04 | 16:57 | 17:51 | 18:49 |
| 30° | 07:14 | 08:04 | 08:50 | 17:13 | 18:07 | 19:03 |
| 20° | 06:47 | 07:37 | 08:25 | 17:41 | 18:33 | 19:27 |
| N 10° | 06:23 | 07:14 | 08:03 | 18:04 | 18:56 | 19:47 |
| 0° | 06:01 | 06:53 | 07:43 | 18:26 | 19:17 | 20:06 |
| S 10° | 05:39 | 06:31 | 07:23 | 18:48 | 19:38 | 20:26 |
| 20° | 05:16 | 06:08 | 07:01 | 19:12 | 20:01 | 20:46 |
| 30° | 04:49 | 05:41 | 06:36 | 19:39 | 20:27 | 21:09 |
| 35° | 04:33 | 05:25 | 06:21 | 19:55 | 20:42 | 21:23 |
| 40° | 04:14 | 05:06 | 06:03 | 20:14 | 21:00 | 21:39 |
| 45° | 03:52 | 04:44 | 05:42 | 20:36 | 21:21 | 21:58 |
| S 50° | 03:23 | 04:15 | 05:16 | 21:05 | 21:48 | 22:21 |
| 52° | 03:09 | 04:01 | 05:03 | 21:19 | 22:01 | 22:32 |
| 54° | 02:53 | 03:44 | 04:48 | 21:36 | 22:16 | 22:45 |
| 56° | 02:34 | 03:25 | 04:31 | 21:55 | 22:34 | 22:59 |
| 58° | 02:10 | 03:01 | 04:10 | 22:20 | 22:55 | 23:16 |
| S 60° | 01:38 | 02:28 | 03:43 | 22:52 | 23:23 | 23:37 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-------|-----------|-------|---|
| | Eqn.of Time | | Mer. | Mer.Pass. | | Age |
| | 00 ^h | 12 ^h | Pass | Upper | Lower | 0-2 |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 0-4% |
| 09 | 07:54 | 07:41 | 11:52 | 12:14 | —:— |  |
| 10 | 07:27 | 07:14 | 11:53 | 13:05 | 00:39 | |
| 11 | 07:00 | 06:46 | 11:53 | 13:55 | 01:30 | |

| Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|-------------------|----------|
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 80°42.7 | 226°40.9 | S10°52.8 | 282°17.7 | N11°53.2 | 291°10.8 | N13°18.0 | 72°25.5 | N00°48.7 |
| 1 | 95°45.2 | 241°41.5 | 53.3 | 297°19.4 | 53.0 | 306°13.2 | 18.0 | 87°27.9 | 48.7 |
| 2 | 110°47.6 | 256°42.0 | 53.7 | 312°21.2 | 52.8 | 321°15.7 | 18.0 | 102°30.4 | 48.7 |
| 3 | 125°50.1 | 271°42.5 | · · 54.2 | 327°22.9 | · · 52.6 | 336°18.1 | · · 18.0 | 117°32.9 | · · 48.7 |
| 4 | 140°52.6 | 286°43.0 | 54.7 | 342°24.6 | 52.4 | 351°20.6 | 18.0 | 132°35.3 | 48.7 |
| 5 | 155°55.0 | 301°43.6 | 55.1 | 357°26.4 | 52.2 | 6°23.0 | 18.0 | 147°37.8 | 48.7 |
| 6 | 170°57.5 | 316°44.1 | S10°55.6 | 12°28.1 | N11°52.0 | 21°25.5 | N13°18.0 | 162°40.2 | N00°48.7 |
| 7 | 185°59.9 | 331°44.6 | 56.0 | 27°29.8 | 51.8 | 36°27.9 | 18.1 | 177°42.7 | 48.8 |
| 8 | 201°02.4 | 346°45.1 | 56.5 | 42°31.6 | 51.6 | 51°30.4 | 18.1 | 192°45.2 | 48.8 |
| 9 | 216°04.9 | 1°45.7 | · · 57.0 | 57°33.3 | · · 51.4 | 66°32.9 | · · 18.1 | 207°47.6 | · · 48.8 |
| 10 | 231°07.3 | 16°46.2 | 57.4 | 72°35.0 | 51.2 | 81°35.3 | 18.1 | 222°50.1 | 48.8 |
| 11 | 246°09.8 | 31°46.7 | 57.9 | 87°36.8 | 51.0 | 96°37.8 | 18.1 | 237°52.6 | 48.8 |
| 12 | 261°12.3 | 46°47.2 | S10°58.4 | 102°38.5 | N11°50.8 | 111°40.2 | N13°18.1 | 252°55.0 | N00°48.8 |
| 13 | 276°14.7 | 61°47.7 | 58.8 | 117°40.3 | 50.6 | 126°42.7 | 18.1 | 267°57.5 | 48.8 |
| 14 | 291°17.2 | 76°48.2 | 59.3 | 132°42.0 | 50.4 | 141°45.1 | 18.1 | 282°59.9 | 48.8 |
| 15 | 306°19.7 | 91°48.7 | 10°59.8 | 147°43.7 | · · 50.2 | 156°47.6 | · · 18.1 | 298°02.4 | · · 48.9 |
| 16 | 321°22.1 | 106°49.2 | 11°00.2 | 162°45.5 | 50.0 | 171°50.1 | 18.1 | 313°04.9 | 48.9 |
| 17 | 336°24.6 | 121°49.7 | 00.7 | 177°47.2 | 49.8 | 186°52.5 | 18.1 | 328°07.3 | 48.9 |
| 18 | 351°27.1 | 136°50.2 | S11°01.2 | 192°49.0 | N11°49.6 | 201°55.0 | N13°18.1 | 343°09.8 | N00°48.9 |
| 19 | 6°29.5 | 151°50.8 | 01.6 | 207°50.7 | 49.4 | 216°57.4 | 18.2 | 358°12.2 | 48.9 |
| 20 | 21°32.0 | 166°51.3 | 02.1 | 222°52.5 | 49.2 | 231°59.9 | 18.2 | 13°14.7 | 48.9 |
| 21 | 36°34.4 | 181°51.8 | · · 02.6 | 237°54.2 | · · 49.0 | 247°02.3 | · · 18.2 | 28°17.2 | · · 48.9 |
| 22 | 51°36.9 | 196°52.3 | 03.1 | 252°55.9 | 48.8 | 262°04.8 | 18.2 | 43°19.6 | 48.9 |
| 23 | 66°39.4 | 211°52.7 | 03.5 | 267°57.7 | 48.6 | 277°07.3 | 18.2 | 58°22.1 | 49.0 |
| Mer.pass. 18:34 | | ν0.5' d0.5' m-4.80 | | ν1.7' d-0.2' m0.27 | | ν2.5' d0.0' m-2.27 | | ν2.5' d0.0' m0.66 | |
| | | | | | | | | | |
| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 81°41.8 | 226°53.2 | S11°04.0 | 282°59.4 | N11°48.4 | 292°09.7 | N13°18.2 | 73°24.5 | N00°49.0 |
| 1 | 96°44.3 | 241°53.7 | 04.5 | 298°01.2 | 48.2 | 307°12.2 | 18.2 | 88°27.0 | 49.0 |
| 2 | 111°46.8 | 256°54.2 | 05.0 | 313°02.9 | 48.0 | 322°14.6 | 18.2 | 103°29.5 | 49.0 |
| 3 | 126°49.2 | 271°54.7 | · · 05.4 | 328°04.7 | · · 47.8 | 337°17.1 | · · 18.2 | 118°31.9 | · · 49.0 |
| 4 | 141°51.7 | 286°55.2 | 05.9 | 343°06.4 | 47.6 | 352°19.6 | 18.2 | 133°34.4 | 49.0 |
| 5 | 156°54.2 | 301°55.7 | 06.4 | 358°08.2 | 47.4 | 7°22.0 | 18.3 | 148°36.8 | 49.0 |
| 6 | 171°56.6 | 316°56.2 | S11°06.9 | 13°09.9 | N11°47.2 | 22°24.5 | N13°18.3 | 163°39.3 | N00°49.1 |
| 7 | 186°59.1 | 331°56.7 | 07.3 | 28°11.7 | 47.0 | 37°27.0 | 18.3 | 178°41.8 | 49.1 |
| 8 | 202°01.6 | 346°57.2 | 07.8 | 43°13.5 | 46.8 | 52°29.4 | 18.3 | 193°44.2 | 49.1 |
| 9 | 217°04.0 | 1°57.6 | · · 08.3 | 58°15.2 | · · 46.6 | 67°31.9 | · · 18.3 | 208°46.7 | · · 49.1 |
| 10 | 232°06.5 | 16°58.1 | 08.8 | 73°17.0 | 46.4 | 82°34.3 | 18.3 | 223°49.1 | 49.1 |
| 11 | 247°08.9 | 31°58.6 | 09.3 | 88°18.7 | 46.2 | 97°36.8 | 18.3 | 238°51.6 | 49.1 |
| 12 | 262°11.4 | 46°59.1 | S11°09.7 | 103°20.5 | N11°46.0 | 112°39.3 | N13°18.3 | 253°54.1 | N00°49.1 |
| 13 | 277°13.9 | 61°59.6 | 10.2 | 118°22.2 | 45.8 | 127°41.7 | 18.3 | 268°56.5 | 49.2 |
| 14 | 292°16.3 | 77°00.0 | 10.7 | 133°24.0 | 45.6 | 142°44.2 | 18.3 | 283°59.0 | 49.2 |
| 15 | 307°18.8 | 92°00.5 | · · 11.2 | 148°25.7 | · · 45.4 | 157°46.7 | · · 18.4 | 299°01.4 | · · 49.2 |
| 16 | 322°21.3 | 107°01.0 | 11.7 | 163°27.5 | 45.2 | 172°49.1 | 18.4 | 314°03.9 | 49.2 |
| 17 | 337°23.7 | 122°01.4 | 12.2 | 178°29.3 | 45.0 | 187°51.6 | 18.4 | 329°06.3 | 49.2 |
| 18 | 352°26.2 | 137°01.9 | S11°12.6 | 193°31.0 | N11°44.8 | 202°54.1 | N13°18.4 | 344°08.8 | N00°49.2 |
| 19 | 7°28.7 | 152°02.4 | 13.1 | 208°32.8 | 44.7 | 217°56.5 | 18.4 | 359°11.3 | 49.2 |
| 20 | 22°31.1 | 167°02.9 | 13.6 | 223°34.6 | 44.5 | 232°59.0 | 18.4 | 14°13.7 | 49.3 |
| 21 | 37°33.6 | 182°03.3 | · · 14.1 | 238°36.3 | · · 44.3 | 248°01.5 | · · 18.4 | 29°16.2 | · · 49.3 |
| 22 | 52°36.0 | 197°03.8 | 14.6 | 253°38.1 | 44.1 | 263°03.9 | 18.4 | 44°18.6 | 49.3 |
| 23 | 67°38.5 | 212°04.2 | 15.1 | 268°39.9 | 43.9 | 278°06.4 | 18.5 | 59°21.1 | 49.3 |
| Mer.pass. 18:30 | | ν0.5' d0.5' m-4.79 | | ν1.7' d-0.2' m0.25 | | ν2.5' d0.0' m-2.28 | | ν2.5' d0.0' m0.66 | |
| | | | | | | | | | |
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 82°41.0 | 227°04.7 | S11°15.6 | 283°41.6 | N11°43.7 | 293°08.9 | N13°18.5 | 74°23.5 | N00°49.3 |
| 1 | 97°43.4 | 242°05.2 | 16.1 | 298°43.4 | 43.5 | 308°11.3 | 18.5 | 89°26.0 | 49.3 |
| 2 | 112°45.9 | 257°05.6 | 16.5 | 313°45.2 | 43.3 | 323°13.8 | 18.5 | 104°28.4 | 49.3 |
| 3 | 127°48.4 | 272°06.1 | · · 17.0 | 328°46.9 | · · 43.1 | 338°16.3 | · · 18.5 | 119°30.9 | · · 49.4 |
| 4 | 142°50.8 | 287°06.5 | 17.5 | 343°48.7 | 42.9 | 353°18.7 | 18.5 | 134°33.4 | 49.4 |
| 5 | 157°53.3 | 302°07.0 | 18.0 | 358°50.5 | 42.7 | 8°21.2 | 18.5 | 149°35.8 | 49.4 |
| 6 | 172°55.8 | 317°07.4 | S11°18.5 | 13°52.2 | N11°42.5 | 23°23.7 | N13°18.5 | 164°38.3 | N00°49.4 |
| 7 | 187°58.2 | 332°07.9 | 19.0 | 28°54.0 | 42.4 | 38°26.1 | 18.6 | 179°40.7 | 49.4 |
| 8 | 203°00.7 | 347°08.3 | 19.5 | 43°55.8 | 42.2 | 53°28.6 | 18.6 | 194°43.2 | 49.4 |
| 9 | 218°03.2 | 2°08.8 | · · 20.0 | 58°57.5 | · · 42.0 | 68°31.1 | · · 18.6 | 209°45.6 | · · 49.5 |
| 10 | 233°05.6 | 17°09.2 | 20.5 | 73°59.3 | 41.8 | 83°33.6 | 18.6 | 224°48.1 | 49.5 |
| 11 | 248°08.1 | 32°09.7 | 21.0 | 89°01.1 | 41.6 | 98°36.0 | 18.6 | 239°50.5 | 49.5 |
| 12 | 263°10.5 | 47°10.1 | S11°21.5 | 104°02.9 | N11°41.4 | 113°38.5 | N13°18.6 | 254°53.0 | N00°49.5 |
| 13 | 278°13.0 | 62°10.6 | 22.0 | 119°04.6 | 41.2 | 128°41.0 | 18.6 | 269°55.4 | 49.5 |
| 14 | 293°15.5 | 77°11.0 | 22.5 | 134°06.4 | 41.0 | 143°43.4 | 18.7 | 284°57.9 | 49.5 |
| 15 | 308°17.9 | 92°11.4 | · · 23.0 | 149°08.2 | · · 40.9 | 158°45.9 | · · 18.7 | 300°00.4 | · · 49.5 |
| 16 | 323°20.4 | 107°11.9 | 23.5 | 164°10.0 | 40.7 | 173°48.4 | 18.7 | 315°02.8 | 49.6 |
| 17 | 338°22.9 | 122°12.3 | 24.0 | 179°11.8 | 40.5 | 188°50.9 | 18.7 | 330°05.3 | 49.6 |
| 18 | 353°25.3 | 137°12.8 | S11°24.5 | 194°13.5 | N11°40.3 | 203°53.3 | N13°18.7 | 345°07.7 | N00°49.6 |
| 19 | 8°27.8 | 152°13.2 | 25.0 | 209°15.3 | 40.1 | 218°55.8 | 18.7 | 0°10.2 | 49.6 |
| 20 | 23°30.3 | 167°13.6 | 25.5 | 224°17.1 | 39.9 | 233°58.3 | 18.7 | 15°12.6 | 49.6 |
| 21 | 38°32.7 | 182°14.1 | · · 26.0 | 239°18.9 | · · 39.7 | 249°00.8 | · · 18.8 | 30°15.1 | · · 49.6 |
| 22 | 53°35.2 | 197°14.5 | 26.5 | 254°20.7 | 39.6 | 264°03.2 | 18.8 | 45°17.5 | 49.7 |
| 23 | 68°37.7 | 212°14.9 | 27.0 | 269°22.5 | 39.4 | 279°05.7 | 18.8 | 60°20.0 | 49.7 |
| Mer.pass. 18:26 | | ν0.5' d0.5' m-4.78 | | ν1.8' d-0.2' m0.23 | | ν2.5' d0.0' m-2.29 | | ν2.5' d0.0' m0.67 | |

| Stars | | |
|---------------------|-----------|-----------|
| | SHA | Dec |
| Alpheratz | 357° 33.0 | 29° 14.6 |
| Ankaa | 353° 05.5 | -42° 09.7 |
| Schedar | 349° 29.0 | 56° 41.4 |
| Diphda | 348° 45.6 | -17° 50.3 |
| Achernar | 335° 18.7 | -57° 06.2 |
| Hamal | 327° 49.1 | 23° 35.6 |
| Polaris | 312° 45.4 | 89° 22.8 |
| Acamar | 315° 10.2 | -40° 11.9 |
| Menkar | 314° 04.2 | 4° 11.8 |
| Mirfak | 308° 25.5 | 49° 57.6 |
| Aldebaran | 290° 37.4 | 16° 33.8 |
| Rigel | 281° 02.0 | -8° 10.2 |
| Capella | 280° 19.0 | 46° 01.5 |
| Bellatrix | 278° 20.8 | 6° 22.5 |
| Elnath | 277° 59.5 | 28° 37.8 |
| Alnilam | 275° 35.8 | -1° 11.1 |
| Betelgeuse | 270° 50.0 | 7° 24.7 |
| Canopus | 263° 51.1 | -52° 42.5 |
| Sirius | 258° 24.5 | -16° 45.2 |
| Adhara | 255° 04.3 | -29° 00.4 |
| Procyon | 244° 48.9 | 5° 09.3 |
| Pollux | 243° 15.1 | 27° 57.5 |
| Avior | 234° 13.6 | -59° 35.5 |
| Suhail | 222° 44.9 | -43° 32.3 |
| Miaplacidus | 221° 37.4 | -69° 49.4 |
| Alphard | 217° 46.0 | -8° 46.5 |
| Regulus | 207° 32.6 | 11° 50.0 |
| Dubhe | 193° 39.0 | 61° 36.0 |
| Denebola | 182° 23.4 | 14° 25.2 |
| Gienah | 175° 42.0 | -17° 41.4 |
| Acrux | 172° 58.5 | -63° 14.7 |
| Gacrux | 171° 50.0 | -57° 15.6 |
| Alioth | 166° 11.8 | 55° 48.5 |
| Spica | 158° 20.8 | -11° 18.1 |
| Alkaid | 152° 51.1 | 49° 10.5 |
| Hadar | 148° 34.2 | -60° 30.0 |
| Menkent | 147° 56.0 | -36° 30.0 |
| Arcturus | 145° 46.7 | 19° 02.4 |
| Rigel Kent. | 139° 38.6 | -60° 56.6 |
| Kochab | 137° 20.9 | 74° 02.4 |
| Zuben'ubi | 136° 54.5 | -16° 09.2 |
| Alphecca | 126° 02.7 | 26° 37.3 |
| Antares | 112° 14.3 | -26° 29.4 |
| Atria | 107° 07.6 | -69° 04.4 |
| Sabik | 102° 01.3 | -15° 45.5 |
| Shaula | 96° 08.6 | -37° 07.4 |
| Rasalhague | 95° 57.4 | 12° 32.4 |
| Eltanin | 90° 42.0 | 51° 29.1 |
| Kaus Aust. | 83° 30.8 | -34° 22.3 |
| Vega | 80° 32.6 | 38° 48.6 |
| Nunki | 75° 46.1 | -26° 15.8 |
| Altair | 61° 58.7 | 8° 56.5 |
| Peacock | 53° 03.7 | -56° 39.0 |
| Deneb | 49° 25.0 | 45° 22.8 |
| Enif | 33° 37.4 | 10° 00.0 |
| Al Na'ir | 27° 31.1 | -46° 50.0 |
| Fomalhaut | 15° 12.8 | -29° 28.9 |
| Scheat | 13° 43.7 | 28° 14.0 |
| Markab | 13° 28.3 | 15° 21.2 |
| Dec 12 Sat | SHA | Mer.pass |
| Venus | 145° 58.2 | 08:53 |
| Mars | 201° 35.0 | 05:10 |
| Jupiter | 210° 28.1 | 04:35 |
| Saturn | 351° 42.8 | 19:07 |
| Dec 13 Sun | SHA | Mer.pass |
| Venus | 145° 11.4 | 08:52 |
| Mars | 201° 17.6 | 05:07 |
| Jupiter | 210° 27.9 | 04:31 |
| Saturn | 351° 42.7 | 19:03 |
| Dec 14 Mon | SHA | Mer.pass |
| Venus | 144° 23.7 | 08:51 |
| Mars | 201° 00.6 | 05:05 |
| Jupiter | 210° 27.9 | 04:27 |
| Saturn | 351° 42.6 | 18:59 |
| Horizontal parallax | | |
| Venus: | 0.3 | |
| Mars: | 0.1 | |


| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|--|------------|-------|----------|-------|-------|
| | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 181°38.1 | S23°03.5 | | 146°23.7 | 12.1' | S24°09.0 | -7.1' | 53.9' |
| 1 | 196°37.8 | 03.7 | | 160°54.7 | 12.1' | 24°01.9 | -7.2' | 53.9' |
| 2 | 211°37.5 | 03.8 | | 175°25.9 | 12.2' | 23°54.7 | -7.3' | 53.9' |
| 3 | 226°37.2 | · · 04.0 | | 189°57.0 | 12.2' | 23°47.4 | -7.4' | 53.9' |
| 4 | 241°36.9 | 04.2 | | 204°28.3 | 12.3' | 23°40.0 | -7.5' | 53.9' |
| 5 | 256°36.6 | 04.4 | | 218°59.6 | 12.4' | 23°32.4 | -7.6' | 53.9' |
| 6 | 271°36.3 | S23°04.6 | | 233°30.9 | 12.4' | S23°24.8 | -7.7' | 53.9' |
| 7 | 286°36.0 | 04.8 | | 248°02.3 | 12.5' | 23°17.1 | -7.8' | 53.9' |
| 8 | 301°35.7 | 05.0 | | 262°33.8 | 12.5' | 23°09.2 | -7.9' | 53.9' |
| 9 | 316°35.4 | · · 05.2 | | 277°05.3 | 12.6' | 23°01.3 | -8.0' | 53.9' |
| 10 | 331°35.1 | 05.3 | | 291°36.9 | 12.6' | 22°53.2 | -8.1' | 54.0' |
| 11 | 346°34.8 | 05.5 | | 306°08.6 | 12.7' | 22°45.1 | -8.2' | 54.0' |
| 12 | 1°34.6 | S23°05.7 | | 320°40.3 | 12.8' | S22°36.9 | -8.3' | 54.0' |
| 13 | 16°34.3 | 05.9 | | 335°12.0 | 12.8' | 22°28.5 | -8.4' | 54.0' |
| 14 | 31°34.0 | 06.1 | | 349°43.9 | 12.9' | 22°20.1 | -8.5' | 54.0' |
| 15 | 46°33.7 | · · 06.3 | | 4°15.7 | 12.9' | 22°11.5 | -8.6' | 54.0' |
| 16 | 61°33.4 | 06.4 | | 18°47.7 | 13.0' | 22°02.9 | -8.7' | 54.0' |
| 17 | 76°33.1 | 06.6 | | 33°19.7 | 13.1' | 21°54.2 | -8.8' | 54.0' |
| 18 | 91°32.8 | S23°06.8 | | 47°51.7 | 13.1' | S21°45.3 | -8.9' | 54.0' |
| 19 | 106°32.5 | 07.0 | | 62°23.8 | 13.2' | 21°36.4 | -9.0' | 54.0' |
| 20 | 121°32.2 | 07.1 | | 76°56.0 | 13.2' | 21°27.4 | -9.1' | 54.0' |
| 21 | 136°31.9 | · · 07.3 | | 91°28.2 | 13.3' | 21°18.3 | -9.2' | 54.0' |
| 22 | 151°31.6 | 07.5 | | 106°00.5 | 13.3' | 21°09.1 | -9.3' | 54.0' |
| 23 | 166°31.3 | 07.7 | | 120°32.8 | 13.4' | 20°59.8 | -9.4' | 54.0' |
| SD = 16.2' $d = 0.2'$ | | | | SD = 14.7' | | | | |

| Sun | GHA | Dec | | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|--|------------|-------|----------|--------|-------|
| 0 | 181°31.0 | S23°07.8 | | 135°05.2 | 13.5' | S20°50.4 | -9.5' | 54.0' |
| 1 | 196°30.7 | 08.0 | | 149°37.7 | 13.5' | 20°41.0 | -9.6' | 54.1' |
| 2 | 211°30.4 | 08.2 | | 164°10.2 | 13.6' | 20°31.4 | -9.6' | 54.1' |
| 3 | 226°30.2 | · · 08.3 | | 178°42.7 | 13.6' | 20°21.8 | -9.7' | 54.1' |
| 4 | 241°29.9 | 08.5 | | 193°15.4 | 13.7' | 20°12.0 | -9.8' | 54.1' |
| 5 | 256°29.6 | 08.7 | | 207°48.0 | 13.7' | 20°02.2 | -9.9' | 54.1' |
| 6 | 271°29.3 | S23°08.9 | | 222°20.8 | 13.8' | S19°52.3 | -10.0' | 54.1' |
| 7 | 286°29.0 | 09.0 | | 236°53.5 | 13.8' | 19°42.3 | -10.1' | 54.1' |
| 8 | 301°28.7 | 09.2 | | 251°26.4 | 13.9' | 19°32.3 | -10.2' | 54.1' |
| 9 | 316°28.4 | · · 09.4 | | 265°59.3 | 13.9' | 19°22.1 | -10.2' | 54.1' |
| 10 | 331°28.1 | 09.5 | | 280°32.2 | 14.0' | 19°11.9 | -10.3' | 54.1' |
| 11 | 346°27.8 | 09.7 | | 295°05.2 | 14.0' | 19°01.5 | -10.4' | 54.1' |
| 12 | 1°27.5 | S23°09.8 | | 309°38.3 | 14.1' | S18°51.1 | -10.5' | 54.2' |
| 13 | 16°27.2 | 10.0 | | 324°11.4 | 14.2' | 18°40.7 | -10.6' | 54.2' |
| 14 | 31°26.9 | 10.2 | | 338°44.5 | 14.2' | 18°30.1 | -10.6' | 54.2' |
| 15 | 46°26.6 | · · 10.3 | | 353°17.7 | 14.3' | 18°19.4 | -10.7' | 54.2' |
| 16 | 61°26.3 | 10.5 | | 7°51.0 | 14.3' | 18°08.7 | -10.8' | 54.2' |
| 17 | 76°26.0 | 10.7 | | 22°24.3 | 14.4' | 17°57.9 | -10.9' | 54.2' |
| 18 | 91°25.7 | S23°10.8 | | 36°57.6 | 14.4' | S17°47.1 | -10.9' | 54.2' |
| 19 | 106°25.4 | 11.0 | | 51°31.0 | 14.5' | 17°36.1 | -11.0' | 54.2' |
| 20 | 121°25.1 | 11.1 | | 66°04.5 | 14.5' | 17°25.1 | -11.1' | 54.3' |
| 21 | 136°24.8 | · · 11.3 | | 80°38.0 | 14.5' | 17°14.0 | -11.2' | 54.3' |
| 22 | 151°24.5 | 11.4 | | 95°11.5 | 14.6' | 17°02.8 | -11.2' | 54.3' |
| 23 | 166°24.2 | 11.6 | | 109°45.1 | 14.6' | 16°51.6 | -11.3' | 54.3' |
| SD = 16.2' $d = 0.2'$ | | | | SD = 14.7' | | | | |

| Mon | GHA | Dec | | GHA | ν | Dec | d | HP |
|-----------------------|----------|----------|--|------------|-------|----------|--------|-------|
| 0 | 181°23.9 | S23°11.7 | | 124°18.8 | 14.7' | S16°40.3 | -11.4' | 54.3' |
| 1 | 196°23.6 | 11.9 | | 138°52.4 | 14.7' | 16°28.9 | -11.5' | 54.3' |
| 2 | 211°23.3 | 12.0 | | 153°26.2 | 14.8' | 16°17.4 | -11.5' | 54.3' |
| 3 | 226°23.0 | · · 12.2 | | 167°59.9 | 14.8' | 16°05.9 | -11.6' | 54.3' |
| 4 | 241°22.7 | 12.3 | | 182°33.7 | 14.9' | 15°54.3 | -11.7' | 54.4' |
| 5 | 256°22.5 | 12.5 | | 197°07.6 | 14.9' | 15°42.6 | -11.7' | 54.4' |
| 6 | 271°22.2 | S23°12.6 | | 211°41.5 | 14.9' | S15°30.9 | -11.8' | 54.4' |
| 7 | 286°21.9 | 12.8 | | 226°15.4 | 15.0' | 15°19.1 | -11.9' | 54.4' |
| 8 | 301°21.6 | 12.9 | | 240°49.4 | 15.0' | 15°07.2 | -11.9' | 54.4' |
| 9 | 316°21.3 | · · 13.1 | | 255°23.4 | 15.1' | 14°55.3 | -12.0' | 54.4' |
| 10 | 331°21.0 | 13.2 | | 269°57.5 | 15.1' | 14°43.3 | -12.1' | 54.5' |
| 11 | 346°20.7 | 13.4 | | 284°31.6 | 15.1' | 14°31.2 | -12.1' | 54.5' |
| 12 | 1°20.4 | S23°13.5 | | 299°05.7 | 15.2' | S14°19.1 | -12.2' | 54.5' |
| 13 | 16°20.1 | 13.7 | | 313°39.9 | 15.2' | 14°06.9 | -12.2' | 54.5' |
| 14 | 31°19.8 | 13.8 | | 328°14.1 | 15.2' | 13°54.7 | -12.3' | 54.5' |
| 15 | 46°19.5 | · · 14.0 | | 342°48.3 | 15.3' | 13°42.3 | -12.4' | 54.5' |
| 16 | 61°19.2 | 14.1 | | 357°22.6 | 15.3' | 13°30.0 | -12.4' | 54.6' |
| 17 | 76°18.9 | 14.2 | | 11°56.9 | 15.3' | 13°17.5 | -12.5' | 54.6' |
| 18 | 91°18.6 | S23°14.4 | | 26°31.2 | 15.4' | S13°05.1 | -12.5' | 54.6' |
| 19 | 106°18.3 | 14.5 | | 41°05.6 | 15.4' | 12°52.5 | -12.6' | 54.6' |
| 20 | 121°18.0 | 14.6 | | 55°39.9 | 15.4' | 12°39.9 | -12.7' | 54.6' |
| 21 | 136°17.7 | · · 14.8 | | 70°14.4 | 15.5' | 12°27.2 | -12.7' | 54.7' |
| 22 | 151°17.4 | 14.9 | | 84°48.8 | 15.5' | 12°14.5 | -12.8' | 54.7' |
| 23 | 166°17.1 | 15.1 | | 99°23.3 | 15.5' | 12°01.7 | -12.8' | 54.7' |
| SD = 16.2' $d = 0.2'$ | | | | SD = 14.8' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 08:17 | 10:41 | ■ | ■ | 13:08 | 15:31 |
| N 70° | 07:58 | 09:44 | ■ | ■ | 14:04 | 15:50 |
| 68° | 07:42 | 09:10 | ■ | ■ | 14:38 | 16:06 |
| 66° | 07:30 | 08:46 | 10:23 | 13:25 | 15:02 | 16:19 |
| 64° | 07:19 | 08:27 | 09:43 | 14:05 | 15:21 | 16:29 |
| 62° | 07:09 | 08:11 | 09:16 | 14:32 | 15:37 | 16:39 |
| 60° | 07:01 | 07:58 | 08:55 | 14:53 | 15:50 | 16:47 |
| N 58° | 06:54 | 07:46 | 08:38 | 15:10 | 16:02 | 16:54 |
| 56° | 06:47 | 07:36 | 08:23 | 15:25 | 16:12 | 17:01 |
| 54° | 06:41 | 07:27 | 08:11 | 15:37 | 16:21 | 17:07 |
| 52° | 06:36 | 07:19 | 08:00 | 15:48 | 16:29 | 17:13 |
| 50° | 06:30 | 07:12 | 07:50 | 15:58 | 16:36 | 17:18 |
| 45° | 06:19 | 06:56 | 07:30 | 16:18 | 16:52 | 17:29 |
| N 40° | 06:09 | 06:43 | 07:13 | 16:35 | 17:06 | 17:40 |
| 35° | 05:59 | 06:31 | 06:59 | 16:49 | 17:17 | 17:49 |
| 30° | 05:51 | 06:21 | 06:47 | 17:01 | 17:28 | 17:57 |
| 20° | 05:35 | 06:02 | 06:26 | 17:22 | 17:46 | 18:14 |
| N 10° | 05:19 | 05:45 | 06:08 | 17:41 | 18:03 | 18:30 |
| 0° | 05:02 | 05:28 | 05:50 | 17:58 | 18:20 | 18:47 |
| S 10° | 04:43 | 05:10 | 05:33 | 18:15 | 18:38 | 19:05 |
| 20° | 04:21 | 04:50 | 05:14 | 18:34 | 18:59 | 19:28 |
| 30° | 03:52 | 04:25 | 04:53 | 18:56 | 19:23 | 19:57 |
| 35° | 03:34 | 04:10 | 04:40 | 19:09 | 19:38 | 20:15 |
| 40° | 03:11 | 03:52 | 04:25 | 19:24 | 19:56 | 20:38 |
| 45° | 02:41 | 03:30 | 04:07 | 19:41 | 20:19 | 21:08 |
| S 50° | 01:56 | 03:01 | 03:45 | 20:04 | 20:48 | 21:53 |
| 52° | 01:30 | 02:46 | 03:34 | 20:14 | 21:03 | 22:20 |
| 54° | 00:48 | 02:28 | 03:22 | 20:27 | 21:20 | 23:02 |
| 56° | //// | 02:07 | 03:08 | 20:41 | 21:42 | //// |
| 58° | //// | 01:38 | 02:52 | 20:57 | 22:11 | //// |
| S 60° | //// | 00:53 | 02:32 | 21:17 | 22:58 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sat | Sun | Mon | Sat | Sun | Mon |
| N 72° | ■ | ■ | 13:29 | ■ | ■ | 19:17 |
| N 70° | ■ | 13:55 | 13:02 | ■ | 17:18 | 19:42 |
| 68° | ■ | 13:12 | 12:41 | ■ | 18:00 | 20:01 |
| 66° | 13:14 | 12:43 | 12:24 | 16:23 | 18:29 | 20:16 |
| 64° | 12:33 | 12:20 | 12:11 | 17:03 | 18:50 | 20:28 |
| 62° | 12:05 | 12:02 | 11:59 | 17:31 | 19:07 | 20:39 |
| 60° | 11:43 | 11:47 | 11:49 | 17:52 | 19:21 | 20:48 |
| N 58° | 11:25 | 11:35 | 11:41 | 18:09 | 19:33 | 20:55 |
| 56° | 11:10 | 11:24 | 11:33 | 18:24 | 19:43 | 21:02 |
| 54° | 10:57 | 11:14 | 11:26 | 18:36 | 19:52 | 21:08 |
| 52° | 10:46 | 11:05 | 11:20 | 18:47 | 20:00 | 21:13 |
| 50° | 10:36 | 10:57 | 11:15 | 18:57 | 20:08 | 21:18 |
| 45° | 10:14 | 10:41 | 11:03 | 19:17 | 20:23 | 21:29 |
| N 40° | 09:57 | 10:27 | 10:52 | 19:34 | 20:36 | 21:37 |
| 35° | 09:42 | 10:15 | 10:44 | 19:47 | 20:46 | 21:45 |
| 30° | 09:30 | 10:05 | 10:36 | 19:59 | 20:56 | 21:51 |
| 20° | 09:08 | 09:47 | 10:23 | 20:20 | 21:12 | 22:02 |
| N 10° | 08:49 | 09:32 | 10:11 | 20:37 | 21:25 | 22:12 |
| 0° | 08:31 | 09:17 | 10:01 | 20:54 | 21:38 | 22:21 |
| S 10° | 08:13 | 09:02 | 09:50 | 21:10 | 21:51 | 22:30 |
| 20° | 07:54 | 08:47 | 09:38 | 21:27 | 22:05 | 22:39 |
| 30° | 07:32 | 08:28 | 09:24 | 21:47 | 22:20 | 22:50 |
| 35° | 07:19 | 08:18 | 09:17 | 21:58 | 22:29 | 22:56 |
| 40° | 07:04 | 08:06 | 09:08 | 22:11 | 22:39 | 23:03 |
| 45° | 06:46 | 07:51 | 08:57 | 22:27 | 22:51 | 23:11 |
| S 50° | 06:23 | 07:34 | 08:44 | 22:46 | 23:05 | 23:21 |
| 52° | 06:13 | 07:25 | 08:38 | 22:55 | 23:12 | 23:25 |
| 54° | 06:00 | 07:16 | 08:32 | 23:05 | 23:19 | 23:30 |
| 56° | 05:46 | 07:05 | 08:24 | 23:16 | 23:27 | 23:36 |
| 58° | 05:30 | 06:53 | 08:16 | 23:29 | 23:36 | 23:42 |
| S 60° | 05:10 | 06:39 | 08:06 | 23:44 | 23:47 | 23:48 |

| Day | Sun | | | Moon | | |
|-----|-----------------|-----------------|-------|-----------|-------|---|
| | Eqn.of Time | | Mer. | Mer.Pass. | | Age |
| | 00 ^h | 12 ^h | Pass | Upper | Lower | 3-5 |
| | mm:ss | mm:ss | hh:mm | hh:mm | hh:mm | 8-21% |
| 12 | 06:32 | 06:18 | 11:54 | 14:42 | 02:19 |  |
| 13 | 06:04 | 05:50 | 11:54 | 15:28 | 03:05 | |
| 14 | 05:36 | 05:21 | 11:55 | 16:11 | 03:49 | |

December 15, 16, 17 UT (Tue., Wed., Thu.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|---------|-----|-----|--------|-----|-----|
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 83°40.1 | 227°15.3 | S11°27.5 | 284°24.2 | N11°39.2 | 294°08.2 | N13°18.8 | 75°22.4 | N00°49.7 | | | | | | |
| 1 | 98°42.6 | 242°15.8 | 28.0 | 299°26.0 | 39.0 | 309°10.7 | 18.8 | 90°24.9 | 49.7 | | | | | | |
| 2 | 113°45.0 | 257°16.2 | 28.5 | 314°27.8 | 38.8 | 324°13.1 | 18.8 | 105°27.3 | 49.7 | | | | | | |
| 3 | 128°47.5 | 272°16.6 | · · 29.0 | 329°29.6 | · · 38.6 | 339°15.6 | · · 18.8 | 120°29.8 | · · 49.8 | | | | | | |
| 4 | 143°50.0 | 287°17.0 | 29.5 | 344°31.4 | 38.5 | 354°18.1 | 18.9 | 135°32.2 | 49.8 | | | | | | |
| 5 | 158°52.4 | 302°17.4 | 30.0 | 359°33.2 | 38.3 | 9°20.6 | 18.9 | 150°34.7 | 49.8 | | | | | | |
| 6 | 173°54.9 | 317°17.9 | S11°30.5 | 14°35.0 | N11°38.1 | 24°23.1 | N13°18.9 | 165°37.1 | N00°49.8 | | | | | | |
| 7 | 188°57.4 | 332°18.3 | 31.0 | 29°36.8 | 37.9 | 39°25.5 | 18.9 | 180°39.6 | 49.8 | | | | | | |
| 8 | 203°59.8 | 347°18.7 | 31.5 | 44°38.5 | 37.7 | 54°28.0 | 18.9 | 195°42.0 | 49.8 | | | | | | |
| 9 | 219°02.3 | 2°19.1 | · · 32.1 | 59°40.3 | · · 37.5 | 69°30.5 | · · 18.9 | 210°44.5 | · · 49.9 | | | | | | |
| 10 | 234°04.8 | 17°19.5 | 32.6 | 74°42.1 | 37.4 | 84°33.0 | 19.0 | 225°46.9 | 49.9 | | | | | | |
| 11 | 249°07.2 | 32°19.9 | 33.1 | 89°43.9 | 37.2 | 99°35.4 | 19.0 | 240°49.4 | 49.9 | | | | | | |
| 12 | 264°09.7 | 47°20.3 | S11°33.6 | 104°45.7 | N11°37.0 | 114°37.9 | N13°19.0 | 255°51.8 | N00°49.9 | | | | | | |
| 13 | 279°12.1 | 62°20.8 | 34.1 | 119°47.5 | 36.8 | 129°40.4 | 19.0 | 270°54.3 | 49.9 | | | | | | |
| 14 | 294°14.6 | 77°21.2 | 34.6 | 134°49.3 | 36.6 | 144°42.9 | 19.0 | 285°56.7 | 49.9 | | | | | | |
| 15 | 309°17.1 | 92°21.6 | · · 35.1 | 149°51.1 | · · 36.5 | 159°45.4 | · · 19.0 | 300°59.2 | · · 50.0 | | | | | | |
| 16 | 324°19.5 | 107°22.0 | 35.6 | 164°52.9 | 36.3 | 174°47.8 | 19.1 | 316°01.6 | 50.0 | | | | | | |
| 17 | 339°22.0 | 122°22.4 | 36.1 | 179°54.7 | 36.1 | 189°50.3 | 19.1 | 331°04.1 | 50.0 | | | | | | |
| 18 | 354°24.5 | 137°22.8 | S11°36.7 | 194°56.5 | N11°35.9 | 204°52.8 | N13°19.1 | 346°06.5 | N00°50.0 | | | | | | |
| 19 | 9°26.9 | 152°23.2 | 37.2 | 209°58.3 | 35.7 | 219°55.3 | 19.1 | 1°09.0 | 50.0 | | | | | | |
| 20 | 24°29.4 | 167°23.6 | 37.7 | 225°00.1 | 35.6 | 234°57.8 | 19.1 | 16°11.4 | 50.1 | | | | | | |
| 21 | 39°31.9 | 182°24.0 | · · 38.2 | 240°01.9 | · · 35.4 | 250°00.3 | · · 19.1 | 31°13.9 | · · 50.1 | | | | | | |
| 22 | 54°34.3 | 197°24.4 | 38.7 | 255°03.7 | 35.2 | 265°02.7 | 19.2 | 46°16.3 | 50.1 | | | | | | |
| 23 | 69°36.8 | 212°24.8 | 39.2 | 270°05.5 | 35.0 | 280°05.2 | 19.2 | 61°18.8 | 50.1 | | | | | | |
| Mer.pass. 18:22 $\nu 0.4'$ $d 0.5'$ m-4.77 $\nu 1.8'$ $d -0.2'$ m0.21 $\nu 2.5'$ $d 0.0'$ m-2.29 $\nu 2.5'$ $d 0.0'$ m0.67 | | | | | | | | | | | | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 84°39.3 | 227°25.2 | S11°39.8 | 285°07.3 | N11°34.9 | 295°07.7 | N13°19.2 | 76°21.2 | N00°50.1 | | | | | | |
| 1 | 99°41.7 | 242°25.6 | 40.3 | 300°09.1 | 34.7 | 310°10.2 | 19.2 | 91°23.7 | 50.1 | | | | | | |
| 2 | 114°44.2 | 257°25.9 | 40.8 | 315°10.9 | 34.5 | 325°12.7 | 19.2 | 106°26.1 | 50.2 | | | | | | |
| 3 | 129°46.6 | 272°26.3 | · · 41.3 | 330°12.7 | · · 34.3 | 340°15.2 | · · 19.3 | 121°28.5 | · · 50.2 | | | | | | |
| 4 | 144°49.1 | 287°26.7 | 41.8 | 345°14.5 | 34.2 | 355°17.6 | 19.3 | 136°31.0 | 50.2 | | | | | | |
| 5 | 159°51.6 | 302°27.1 | 42.4 | 0°16.3 | 34.0 | 10°20.1 | 19.3 | 151°33.4 | 50.2 | | | | | | |
| 6 | 174°54.0 | 317°27.5 | S11°42.9 | 15°18.2 | N11°33.8 | 25°22.6 | N13°19.3 | 166°35.9 | N00°50.2 | | | | | | |
| 7 | 189°56.5 | 332°27.9 | 43.4 | 30°20.0 | 33.6 | 40°25.1 | 19.3 | 181°38.3 | 50.3 | | | | | | |
| 8 | 204°59.0 | 347°28.3 | 43.9 | 45°21.8 | 33.5 | 55°27.6 | 19.4 | 196°40.8 | 50.3 | | | | | | |
| 9 | 220°01.4 | 2°28.6 | · · 44.4 | 60°23.6 | · · 33.3 | 70°30.1 | · · 19.4 | 211°43.2 | · · 50.3 | | | | | | |
| 10 | 235°03.9 | 17°29.0 | 45.0 | 75°25.4 | 33.1 | 85°32.6 | 19.4 | 226°45.7 | 50.3 | | | | | | |
| 11 | 250°06.4 | 32°29.4 | 45.5 | 90°27.2 | 32.9 | 100°35.1 | 19.4 | 241°48.1 | 50.3 | | | | | | |
| 12 | 265°08.8 | 47°29.8 | S11°46.0 | 105°29.0 | N11°32.8 | 115°37.5 | N13°19.4 | 256°50.6 | N00°50.4 | | | | | | |
| 13 | 280°11.3 | 62°30.2 | 46.5 | 120°30.8 | 32.6 | 130°40.0 | 19.4 | 271°53.0 | 50.4 | | | | | | |
| 14 | 295°13.8 | 77°30.5 | 47.1 | 135°32.7 | 32.4 | 145°42.5 | 19.5 | 286°55.4 | 50.4 | | | | | | |
| 15 | 310°16.2 | 92°30.9 | · · 47.6 | 150°34.5 | · · 32.3 | 160°45.0 | · · 19.5 | 301°57.9 | · · 50.4 | | | | | | |
| 16 | 325°18.7 | 107°31.3 | 48.1 | 165°36.3 | 32.1 | 175°47.5 | 19.5 | 317°00.3 | 50.4 | | | | | | |
| 17 | 340°21.1 | 122°31.6 | 48.6 | 180°38.1 | 31.9 | 190°50.0 | 19.5 | 332°02.8 | 50.5 | | | | | | |
| 18 | 355°23.6 | 137°32.0 | S11°49.2 | 195°39.9 | N11°31.7 | 205°52.5 | N13°19.5 | 347°05.2 | N00°50.5 | | | | | | |
| 19 | 10°26.1 | 152°32.4 | 49.7 | 210°41.7 | 31.6 | 220°55.0 | 19.6 | 2°07.7 | 50.5 | | | | | | |
| 20 | 25°28.5 | 167°32.7 | 50.2 | 225°43.6 | 31.4 | 235°57.5 | 19.6 | 17°10.1 | 50.5 | | | | | | |
| 21 | 40°31.0 | 182°33.1 | · · 50.7 | 240°45.4 | · · 31.2 | 250°59.9 | · · 19.6 | 32°12.6 | · · 50.5 | | | | | | |
| 22 | 55°33.5 | 197°33.5 | 51.3 | 255°47.2 | 31.1 | 266°02.4 | 19.6 | 47°15.0 | 50.6 | | | | | | |
| 23 | 70°35.9 | 212°33.8 | 51.8 | 270°49.0 | 30.9 | 281°04.9 | 19.7 | 62°17.4 | 50.6 | | | | | | |
| Mer.pass. 18:18 $\nu 0.4'$ $d 0.5'$ m-4.76 $\nu 1.8'$ $d -0.2'$ m0.20 $\nu 2.5'$ $d 0.0'$ m-2.30 $\nu 2.4'$ $d 0.0'$ m0.67 | | | | | | | | | | | | | | | |
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 85°38.4 | 227°34.2 | S11°52.3 | 285°50.9 | N11°30.7 | 296°07.4 | N13°19.7 | 77°19.9 | N00°50.6 | | | | | | |
| 1 | 100°40.9 | 242°34.6 | 52.9 | 300°52.7 | 30.6 | 311°09.9 | 19.7 | 92°22.3 | 50.6 | | | | | | |
| 2 | 115°43.3 | 257°34.9 | 53.4 | 315°54.5 | 30.4 | 326°12.4 | 19.7 | 107°24.8 | 50.6 | | | | | | |
| 3 | 130°45.8 | 272°35.3 | · · 53.9 | 330°56.3 | · · 30.2 | 341°14.9 | · · 19.7 | 122°27.2 | · · 50.7 | | | | | | |
| 4 | 145°48.2 | 287°35.6 | 54.5 | 345°58.2 | 30.0 | 356°17.4 | 19.8 | 137°29.7 | 50.7 | | | | | | |
| 5 | 160°50.7 | 302°36.0 | 55.0 | 1°00.0 | 29.9 | 11°19.9 | 19.8 | 152°32.1 | 50.7 | | | | | | |
| 6 | 175°53.2 | 317°36.3 | S11°55.5 | 16°01.8 | N11°29.7 | 26°22.4 | N13°19.8 | 167°34.5 | N00°50.7 | | | | | | |
| 7 | 190°55.6 | 332°36.7 | 56.1 | 31°03.6 | 29.5 | 41°24.9 | 19.8 | 182°37.0 | 50.8 | | | | | | |
| 8 | 205°58.1 | 347°37.0 | 56.6 | 46°05.5 | 29.4 | 56°27.4 | 19.8 | 197°39.4 | 50.8 | | | | | | |
| 9 | 221°00.6 | 2°37.4 | · · 57.1 | 61°07.3 | · · 29.2 | 71°29.9 | · · 19.9 | 212°41.9 | · · 50.8 | | | | | | |
| 10 | 236°03.0 | 17°37.7 | 57.7 | 76°09.1 | 29.1 | 86°32.4 | 19.9 | 227°44.3 | 50.8 | | | | | | |
| 11 | 251°05.5 | 32°38.1 | 58.2 | 91°11.0 | 28.9 | 101°34.8 | 19.9 | 242°46.8 | 50.8 | | | | | | |
| 12 | 266°08.0 | 47°38.4 | S11°58.7 | 106°12.8 | N11°28.7 | 116°37.3 | N13°19.9 | 257°49.2 | N00°50.9 | | | | | | |
| 13 | 281°10.4 | 62°38.8 | 59.3 | 121°14.6 | 28.6 | 131°39.8 | 20.0 | 272°51.6 | 50.9 | | | | | | |
| 14 | 296°12.9 | 77°39.1 | 11°59.8 | 136°16.5 | 28.4 | 146°42.3 | 20.0 | 287°54.1 | 50.9 | | | | | | |
| 15 | 311°15.4 | 92°39.5 | 12°00.3 | 151°18.3 | · · 28.2 | 161°44.8 | · · 20.0 | 302°56.5 | · · 50.9 | | | | | | |
| 16 | 326°17.8 | 107°39.8 | 00.9 | 166°20.1 | 28.1 | 176°47.3 | 20.0 | 317°59.0 | 50.9 | | | | | | |
| 17 | 341°20.3 | 122°40.1 | 01.4 | 181°22.0 | 27.9 | 191°49.8 | 20.0 | 333°01.4 | 51.0 | | | | | | |
| 18 | 356°22.7 | 137°40.5 | S12°02.0 | 196°23.8 | N11°27.7 | 206°52.3 | N13°20.1 | 348°03.8 | N00°51.0 | | | | | | |
| 19 | 11°25.2 | 152°40.8 | 02.5 | 211°25.7 | 27.6 | 221°54.8 | 20.1 | 3°06.3 | 51.0 | | | | | | |
| 20 | 26°27.7 | 167°41.1 | 03.0 | 226°27.5 | 27.4 | 236°57.3 | 20.1 | 18°08.7 | 51.0 | | | | | | |
| 21 | 41°30.1 | 182°41.5 | · · 03.6 | 241°29.3 | · · 27.3 | 251°59.8 | · · 20.1 | 33°11.2 | · · 51.1 | | | | | | |
| 22 | 56°32.6 | 197°41.8 | 04.1 | 256°31.2 | 27.1 | 267°02.3 | 20.2 | 48°13.6 | 51.1 | | | | | | |
| 23 | 71°35.1 | 212°42.1 | 04.7 | 271°33.0 | 26.9 | 282°04.8 | 20.2 | 63°16.0 | 51.1 | | | | | | |
| Mer.pass. 18:14 $\nu 0.4'$ $d 0.5'$ m-4.75 $\nu 1.8'$ $d -0.2'$ m0.18 $\nu 2.5'$ $d 0.0'$ m-2.31 $\nu 2.4'$ $d 0.0'$ m0.68 | | | | | | | | | | | | | | | |

| Stars | | |
|---------------------|----------|----------|
| | SHA | Dec |
| Alpheratz | 357°33.1 | 29°14.6 |
| Ankaa | 353°05.5 | -42°09.7 |
| Schedar | 349°29.0 | 56°41.5 |
| Diphda | 348°45.6 | -17°50.3 |
| Achernar | 335°18.7 | -57°06.2 |
| Hamal | 327°49.2 | 23°35.6 |
| Polaris | 312°46.2 | 89°22.8 |
| Acamar | 315°10.2 | -40°11.9 |
| Menkar | 314°04.2 | 4°11.8 |
| Mirfak | 308°25.5 | 49°57.6 |
| Aldebaran | 290°37.4 | 16°33.8 |
| Rigel | 281°02.0 | -8°10.2 |
| Capella | 280°19.0 | 46°01.5 |
| Bellatrix | 278°20.8 | 6°22.5 |
| Elnath | 277°59.5 | 28°37.8 |
| Alnilam | 275°35.8 | -1°11.1 |
| Betelgeuse | 270°50.0 | 7°24.7 |
| Canopus | 263°51.1 | -52°42.5 |
| Sirius | 258°24.5 | -16°45.2 |
| Adhara | 255°04.2 | -29°00.5 |
| Procyon | 244°48.9 | 5°09.3 |
| Pollux | 243°15.0 | 27°57.5 |
| Avior | 234°13.6 | -59°35.6 |
| Suhail | 222°44.8 | -43°32.3 |
| Miaplacidus | 221°37.3 | -69°49.4 |
| Alphard | 217°46.0 | -8°46.5 |
| Regulus | 207°32.6 | 11°50.0 |
| Dubhe | 193°39.0 | 61°36.0 |
| Denebola | 182°23.3 | 14°25.1 |
| Gienah | 175°42.0 | -17°41.4 |
| Acrux | 172°58.4 | -63°14.7 |
| Gacrux | 171°50.0 | -57°15.6 |
| Alioth | 166°11.8 | 55°48.5 |
| Spica | 158°20.8 | -11°18.1 |
| Alkaid | 152°51.0 | 49°10.4 |
| Hadar | 148°34.1 | -60°30.0 |
| Menkent | 147°56.0 | -36°30.0 |
| Arcturus | 145°46.7 | 19°02.4 |
| Rigil Kent. | 139°38.6 | -60°56.6 |
| Kochab | 137°20.8 | 74°02.4 |
| Zuben'ubi | 136°54.5 | -16°09.2 |
| Alphecca | 126°02.7 | 26°37.3 |
| Antares | 112°14.2 | -26°29.4 |
| Atria | 107°07.6 | -69°04.4 |
| Sabik | 102°01.3 | -15°45.5 |
| Shaula | 96°08.6 | -37°07.3 |
| Rasalhague | 95°57.4 | 12°32.4 |
| Eltanin | 90°42.0 | 51°29.1 |
| Kaus Aust. | 83°30.8 | -34°22.3 |
| Vega | 80°32.6 | 38°48.6 |
| Nunki | 75°46.1 | -26°15.8 |
| Altair | 61°58.7 | 8°56.5 |
| Peacock | 53°03.7 | -56°39.0 |
| Deneb | 49°25.0 | 45°22.8 |
| Enif | 33°37.4 | 10°00.0 |
| Al Na'ir | 27°31.1 | -46°50.0 |
| Fomalhaut | 15°12.8 | -29°28.9 |
| Scheat | 13°43.7 | 28°14.0 |
| Markab | 13°28.4 | 15°21.2 |
| | | |
| Dec 15 Tue | SHA | Mer.pass |
| Venus | 143°35.2 | 08:51 |
| Mars | 200°44.1 | 05:02 |
| Jupiter | 210°28.1 | 04:23 |
| Saturn | 351°42.3 | 18:55 |
| | | |
| Dec 16 Wed | SHA | Mer.pass |
| Venus | 142°45.9 | 08:50 |
| Mars | 200°28.1 | 04:59 |
| Jupiter | 210°28.5 | 04:19 |
| Saturn | 351°41.9 | 18:52 |
| | | |
| Dec 17 Thu | SHA | Mer.pass |
| Venus | 141°55.8 | 08:50 |
| Mars | 200°12.5 | 04:56 |
| Jupiter | 210°29.0 | 04:15 |
| Saturn | 351°41.5 | 18:48 |
| | | |
| Horizontal parallax | | |
| Venus: | | 0.3 |
| Mars: | | 0.1 |

| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|------------|----------|-------|----------|--------|-------|
| Tue | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 181°16.8 | S23°15.2 | | 113°57.8 | 15.5' | S11°48.9 | -12.9' | 54.7' |
| 1 | 196°16.5 | 15.3 | | 128°32.3 | 15.6' | 11°36.0 | -12.9' | 54.7' |
| 2 | 211°16.2 | 15.5 | | 143°06.9 | 15.6' | 11°23.1 | -13.0' | 54.8' |
| 3 | 226°15.9 | 15.6 | | 157°41.5 | 15.6' | 11°10.1 | -13.0' | 54.8' |
| 4 | 241°15.6 | 15.7 | | 172°16.1 | 15.6' | 10°57.1 | -13.1' | 54.8' |
| 5 | 256°15.3 | 15.8 | | 186°50.7 | 15.6' | 10°44.0 | -13.1' | 54.8' |
| 6 | 271°15.0 | S23°16.0 | | 201°25.3 | 15.7' | S10°30.8 | -13.2' | 54.8' |
| 7 | 286°14.7 | 16.1 | | 216°00.0 | 15.7' | 10°17.6 | -13.2' | 54.9' |
| 8 | 301°14.4 | 16.2 | | 230°34.7 | 15.7' | 10°04.4 | -13.3' | 54.9' |
| 9 | 316°14.1 | 16.4 | | 245°09.4 | 15.7' | 09°51.1 | -13.3' | 54.9' |
| 10 | 331°13.8 | 16.5 | | 259°44.1 | 15.7' | 09°37.8 | -13.4' | 54.9' |
| 11 | 346°13.5 | 16.6 | | 274°18.8 | 15.7' | 09°24.4 | -13.4' | 54.9' |
| 12 | 1°13.2 | S23°16.7 | | 288°53.6 | 15.8' | S09°10.9 | -13.5' | 55.0' |
| 13 | 16°12.9 | 16.9 | | 303°28.3 | 15.8' | 08°57.5 | -13.5' | 55.0' |
| 14 | 31°12.6 | 17.0 | | 318°03.1 | 15.8' | 08°43.9 | -13.6' | 55.0' |
| 15 | 46°12.3 | 17.1 | | 332°37.9 | 15.8' | 08°30.4 | -13.6' | 55.0' |
| 16 | 61°12.0 | 17.2 | | 347°12.7 | 15.8' | 08°16.8 | -13.7' | 55.1' |
| 17 | 76°11.7 | 17.3 | | 1°47.5 | 15.8' | 08°03.1 | -13.7' | 55.1' |
| 18 | 91°11.4 | S23°17.5 | | 16°22.3 | 15.8' | S07°49.4 | -13.7' | 55.1' |
| 19 | 106°11.0 | 17.6 | | 30°57.1 | 15.8' | 07°35.7 | -13.8' | 55.1' |
| 20 | 121°10.7 | 17.7 | | 45°31.9 | 15.8' | 07°21.9 | -13.8' | 55.2' |
| 21 | 136°10.4 | 17.8 | | 60°06.7 | 15.8' | 07°08.1 | -13.9' | 55.2' |
| 22 | 151°10.1 | 17.9 | | 74°41.6 | 15.8' | 06°54.2 | -13.9' | 55.2' |
| 23 | 166°09.8 | 18.1 | | 89°16.4 | 15.8' | 06°40.3 | -13.9' | 55.2' |
| SD = 16.2' $d = 0.1'$ | | | SD = 14.9' | | | | | |
| Wed | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 181°09.5 | S23°18.2 | | 103°51.2 | 15.8' | S06°26.4 | -14.0' | 55.3' |
| 1 | 196°09.2 | 18.3 | | 118°26.1 | 15.8' | 06°12.4 | -14.0' | 55.3' |
| 2 | 211°08.9 | 18.4 | | 133°00.9 | 15.8' | 05°58.4 | -14.0' | 55.3' |
| 3 | 226°08.6 | 18.5 | | 147°35.7 | 15.8' | 05°44.3 | -14.1' | 55.3' |
| 4 | 241°08.3 | 18.6 | | 162°10.6 | 15.8' | 05°30.2 | -14.1' | 55.4' |
| 5 | 256°08.0 | 18.7 | | 176°45.4 | 15.8' | 05°16.1 | -14.2' | 55.4' |
| 6 | 271°07.7 | S23°18.8 | | 191°20.2 | 15.8' | S05°02.0 | -14.2' | 55.4' |
| 7 | 286°07.4 | 19.0 | | 205°55.0 | 15.8' | 04°47.8 | -14.2' | 55.5' |
| 8 | 301°07.1 | 19.1 | | 220°29.8 | 15.8' | 04°33.6 | -14.2' | 55.5' |
| 9 | 316°06.8 | 19.2 | | 235°04.6 | 15.8' | 04°19.3 | -14.3' | 55.5' |
| 10 | 331°06.5 | 19.3 | | 249°39.4 | 15.8' | 04°05.0 | -14.3' | 55.5' |
| 11 | 346°06.2 | 19.4 | | 264°14.2 | 15.8' | 03°50.7 | -14.3' | 55.6' |
| 12 | 1°05.9 | S23°19.5 | | 278°48.9 | 15.7' | S03°36.4 | -14.4' | 55.6' |
| 13 | 16°05.6 | 19.6 | | 293°23.7 | 15.7' | 03°22.0 | -14.4' | 55.6' |
| 14 | 31°05.3 | 19.7 | | 307°58.4 | 15.7' | 03°07.6 | -14.4' | 55.7' |
| 15 | 46°05.0 | 19.8 | | 322°33.1 | 15.7' | 02°53.2 | -14.5' | 55.7' |
| 16 | 61°04.7 | 19.9 | | 337°07.8 | 15.7' | 02°38.7 | -14.5' | 55.7' |
| 17 | 76°04.4 | 20.0 | | 351°42.5 | 15.7' | 02°24.3 | -14.5' | 55.7' |
| 18 | 91°04.1 | S23°20.1 | | 6°17.2 | 15.6' | S02°09.8 | -14.5' | 55.8' |
| 19 | 106°03.8 | 20.2 | | 20°51.8 | 15.6' | 01°55.2 | -14.5' | 55.8' |
| 20 | 121°03.5 | 20.3 | | 35°26.4 | 15.6' | 01°40.7 | -14.6' | 55.8' |
| 21 | 136°03.2 | 20.4 | | 50°01.0 | 15.6' | 01°26.1 | -14.6' | 55.9' |
| 22 | 151°02.9 | 20.5 | | 64°35.6 | 15.5' | 01°11.5 | -14.6' | 55.9' |
| 23 | 166°02.6 | 20.6 | | 79°10.1 | 15.5' | 00°56.9 | -14.6' | 55.9' |
| SD = 16.2' $d = 0.1'$ | | | SD = 15.1' | | | | | |
| Thu | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 181°02.3 | S23°20.7 | | 93°44.7 | 15.5' | S00°42.3 | -14.7' | 56.0' |
| 1 | 196°01.9 | 20.8 | | 108°19.1 | 15.5' | 00°27.6 | -14.7' | 56.0' |
| 2 | 211°01.6 | 20.9 | | 122°53.6 | 15.4' | S00°12.9 | -14.7' | 56.0' |
| 3 | 226°01.3 | 21.0 | | 137°28.0 | 15.4' | N00°01.8 | 14.7' | 56.1' |
| 4 | 241°01.0 | 21.1 | | 152°02.4 | 15.4' | 00°16.5 | 14.7' | 56.1' |
| 5 | 256°00.7 | 21.2 | | 166°36.8 | 15.3' | 00°31.2 | 14.7' | 56.1' |
| 6 | 271°00.4 | S23°21.2 | | 181°11.1 | 15.3' | N00°45.9 | 14.8' | 56.2' |
| 7 | 286°00.1 | 21.3 | | 195°45.4 | 15.2' | 01°00.7 | 14.8' | 56.2' |
| 8 | 300°59.8 | 21.4 | | 210°19.6 | 15.2' | 01°15.4 | 14.8' | 56.2' |
| 9 | 315°59.5 | 21.5 | | 224°53.8 | 15.2' | 01°30.2 | 14.8' | 56.3' |
| 10 | 330°59.2 | 21.6 | | 239°28.0 | 15.1' | 01°45.0 | 14.8' | 56.3' |
| 11 | 345°58.9 | 21.7 | | 254°02.1 | 15.1' | 01°59.8 | 14.8' | 56.3' |
| 12 | 0°58.6 | S23°21.8 | | 268°36.2 | 15.0' | N02°14.6 | 14.8' | 56.4' |
| 13 | 15°58.3 | 21.9 | | 283°10.2 | 15.0' | 02°29.5 | 14.8' | 56.4' |
| 14 | 30°58.0 | 21.9 | | 297°44.2 | 14.9' | 02°44.3 | 14.8' | 56.4' |
| 15 | 45°57.7 | 22.0 | | 312°18.1 | 14.9' | 02°59.1 | 14.8' | 56.5' |
| 16 | 60°57.4 | 22.1 | | 326°52.0 | 14.8' | 03°14.0 | 14.9' | 56.5' |
| 17 | 75°57.1 | 22.2 | | 341°25.9 | 14.8' | 03°28.8 | 14.9' | 56.5' |
| 18 | 90°56.8 | S23°22.3 | | 355°59.7 | 14.7' | N03°43.7 | 14.9' | 56.6' |
| 19 | 105°56.5 | 22.3 | | 10°33.4 | 14.7' | 03°58.6 | 14.9' | 56.6' |
| 20 | 120°56.1 | 22.4 | | 25°07.1 | 14.6' | 04°13.4 | 14.9' | 56.7' |
| 21 | 135°55.8 | 22.5 | | 39°40.7 | 14.6' | 04°28.3 | 14.9' | 56.7' |
| 22 | 150°55.5 | 22.6 | | 54°14.3 | 14.5' | 04°43.1 | 14.9' | 56.7' |
| 23 | 165°55.2 | 22.7 | | 68°47.8 | 14.4' | 04°58.0 | 14.9' | 56.8' |
| SD = 16.2' $d = 0.1'$ | | | SD = 15.3' | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|--------------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 08:21 | 10:49 | ■ | ■ | 13:02 | 15:30 |
| N 70° | 08:02 | 09:49 | ■ | ■ | 14:02 | 15:50 |
| 68° | 07:46 | 09:15 | ■ | ■ | 14:36 | 16:05 |
| 66° | 07:33 | 08:50 | 10:29 | 13:22 | 15:01 | 16:18 |
| 64° | 07:22 | 08:30 | 09:47 | 14:04 | 15:21 | 16:29 |
| 62° | 07:12 | 08:14 | 09:20 | 14:32 | 15:37 | 16:39 |
| 60° | 07:04 | 08:01 | 08:58 | 14:53 | 15:50 | 16:47 |
| N 58° | 06:56 | 07:49 | 08:41 | 15:10 | 16:02 | 16:55 |
| 56° | 06:50 | 07:39 | 08:26 | 15:25 | 16:12 | 17:01 |
| 54° | 06:44 | 07:30 | 08:14 | 15:38 | 16:21 | 17:08 |
| 52° | 06:38 | 07:22 | 08:02 | 15:49 | 16:30 | 17:13 |
| 50° | 06:33 | 07:14 | 07:53 | 15:58 | 16:37 | 17:18 |
| 45° | 06:21 | 06:58 | 07:32 | 16:19 | 16:53 | 17:30 |
| N 40° | 06:11 | 06:45 | 07:15 | 16:36 | 17:06 | 17:40 |
| 35° | 06:01 | 06:33 | 07:01 | 16:50 | 17:18 | 17:50 |
| 30° | 05:53 | 06:22 | 06:49 | 17:02 | 17:29 | 17:59 |
| 20° | 05:36 | 06:04 | 06:28 | 17:23 | 17:47 | 18:15 |
| N 10° | 05:20 | 05:46 | 06:09 | 17:42 | 18:05 | 18:31 |
| 0° | 05:03 | 05:29 | 05:52 | 17:59 | 18:22 | 18:48 |
| S 10° | 04:44 | 05:11 | 05:34 | 18:17 | 18:40 | 19:07 |
| 20° | 04:22 | 04:51 | 05:15 | 18:36 | 19:00 | 19:30 |
| 30° | 03:53 | 04:26 | 04:54 | 18:58 | 19:25 | 19:59 |
| 35° | 03:34 | 04:11 | 04:41 | 19:11 | 19:40 | 20:17 |
| 40° | 03:11 | 03:53 | 04:26 | 19:26 | 19:59 | 20:40 |
| 45° | 02:41 | 03:30 | 04:08 | 19:44 | 20:21 | 21:11 |
| S 50° | 01:56 | 03:01 | 03:45 | 20:06 | 20:51 | 21:56 |
| 52° | 01:28 | 02:46 | 03:34 | 20:17 | 21:06 | 22:24 |
| 54° | 00:44 | 02:28 | 03:22 | 20:29 | 21:24 | 23:09 |
| 56° | //// | 02:06 | 03:08 | 20:43 | 21:46 | //// |
| 58° | //// | 01:37 | 02:51 | 21:00 | 22:15 | //// |
| S 60° | //// | 00:48 | 02:31 | 21:20 | 23:05 | //// |

| Lat. | Moonrise | | | Moonset | | |
|--------------|----------|-------|-------|---------|-------|-------|
| | Tue | Wed | Thu | Tue | Wed | Thu |
| N 72° | 12:44 | 12:11 | 11:40 | 21:30 | 23:33 | |
| N 70° | 12:31 | 12:06 | 11:43 | 21:41 | 23:34 | |
| 68° | 12:20 | 12:02 | 11:45 | 21:50 | 23:35 | |
| 66° | 12:11 | 11:58 | 11:47 | 21:57 | 23:36 | |
| 64° | 12:03 | 11:55 | 11:48 | 22:03 | 23:37 | |
| 62° | 11:56 | 11:53 | 11:50 | 22:08 | 23:37 | |
| 60° | 11:50 | 11:51 | 11:51 | 22:13 | 23:38 | |
| N 58° | 11:45 | 11:49 | 11:52 | 22:17 | 23:38 | |
| 56° | 11:41 | 11:47 | 11:53 | 22:20 | 23:39 | |
| 54° | 11:36 | 11:45 | 11:54 | 22:23 | 23:39 | |
| 52° | 11:33 | 11:44 | 11:55 | 22:26 | 23:40 | |
| 50° | 11:29 | 11:42 | 11:56 | 22:29 | 23:40 | |
| 45° | 11:22 | 11:40 | 11:57 | 22:34 | 23:41 | |
| N 40° | 11:15 | 11:37 | 11:59 | 22:39 | 23:41 | |
| 35° | 11:10 | 11:35 | 12:00 | 22:43 | 23:42 | |
| 30° | 11:05 | 11:33 | 12:01 | 22:46 | 23:42 | |
| 20° | 10:57 | 11:30 | 12:03 | 22:52 | 23:43 | |
| N 10° | 10:50 | 11:27 | 12:05 | 22:58 | 23:44 | |
| 0° | 10:43 | 11:24 | 12:06 | 23:03 | 23:44 | |
| S 10° | 10:36 | 11:21 | 12:08 | 23:07 | 23:45 | |
| 20° | 10:28 | 11:19 | 12:10 | 23:12 | 23:45 | |
| 30° | 10:20 | 11:15 | 12:12 | 23:18 | 23:46 | |
| 35° | 10:15 | 11:13 | 12:13 | 23:22 | 23:46 | |
| 40° | 10:09 | 11:11 | 12:14 | 23:25 | 23:47 | |
| 45° | 10:03 | 11:09 | 12:16 | 23:30 | 23:47 | |
| S 50° | 09:55 | 11:06 | 12:18 | 23:35 | 23:48 | |
| 52° | 09:51 | 11:04 | 12:19 | 23:37 | 23:48 | 23:59 |
| 54° | 09:47 | 11:03 | 12:20 | 23:39 | 23:48 | 23:57 |
| 56° | 09:43 | 11:01 | 12:21 | 23:42 | 23:48 | 23:55 |
| 58° | 09:38 | 10:59 | 12:22 | 23:45 | 23:49 | 23:52 |
| S 60° | 09:32 | 10:57 | 12:23 | 23:49 | 23:49 | 23:49 |

| Day | Sun | | | Moon | | |
|-----|---|--------------------------|-----------------------|-----------------------------|----------------|----------------------|
| | Eqn.of Time 00 ^h mm:ss | 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 6-8 29-48% |
| 15 | 05:07 | 04:53 | 11:55 | 16:53 | 04:32 | |
| 16 | 04:38 | 04:24 | 11:56 | 17:34 | 05:13 | |
| 17 | 04:09 | 03:54 | 11:56 | 18:17 | 05:55 | |

December 18, 19, 20 UT (Fri., Sat., Sun.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | |
|-----------|----------|--------------------|----------|--------------------|----------|--------------------|----------|-------------------|----------|---------|-----|-----|--------|-----|-----|
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 86°37.5 | 227°42.5 | S12°05.2 | 286°34.9 | N11°26.8 | 297°07.3 | N13°20.2 | 78°18.5 | N00°51.1 | | | | | | |
| 1 | 101°40.0 | 242°42.8 | 05.7 | 301°36.7 | 26.6 | 312°09.8 | 20.2 | 93°20.9 | 51.1 | | | | | | |
| 2 | 116°42.5 | 257°43.1 | 06.3 | 316°38.6 | 26.4 | 327°12.3 | 20.3 | 108°23.3 | 51.2 | | | | | | |
| 3 | 131°44.9 | 272°43.5 | · · 06.8 | 331°40.4 | · · 26.3 | 342°14.8 | · · 20.3 | 123°25.8 | · · 51.2 | | | | | | |
| 4 | 146°47.4 | 287°43.8 | 07.4 | 346°42.2 | 26.1 | 357°17.3 | 20.3 | 138°28.2 | 51.2 | | | | | | |
| 5 | 161°49.9 | 302°44.1 | 07.9 | 1°44.1 | 26.0 | 12°19.8 | 20.3 | 153°30.7 | 51.2 | | | | | | |
| 6 | 176°52.3 | 317°44.4 | S12°08.5 | 16°45.9 | N11°25.8 | 27°22.3 | N13°20.4 | 168°33.1 | N00°51.3 | | | | | | |
| 7 | 191°54.8 | 332°44.7 | 09.0 | 31°47.8 | 25.7 | 42°24.8 | 20.4 | 183°35.5 | 51.3 | | | | | | |
| 8 | 206°57.2 | 347°45.1 | 09.5 | 46°49.6 | 25.5 | 57°27.3 | 20.4 | 198°38.0 | 51.3 | | | | | | |
| 9 | 221°59.7 | 2°45.4 | · · 10.1 | 61°51.5 | · · 25.3 | 72°29.8 | · · 20.4 | 213°40.4 | · · 51.3 | | | | | | |
| 10 | 237°02.2 | 17°45.7 | 10.6 | 76°53.3 | 25.2 | 87°32.3 | 20.5 | 228°42.9 | 51.3 | | | | | | |
| 11 | 252°04.6 | 32°46.0 | 11.2 | 91°55.2 | 25.0 | 102°34.8 | 20.5 | 243°45.3 | 51.4 | | | | | | |
| 12 | 267°07.1 | 47°46.3 | S12°11.7 | 106°57.0 | N11°24.9 | 117°37.3 | N13°20.5 | 258°47.7 | N00°51.4 | | | | | | |
| 13 | 282°09.6 | 62°46.6 | 12.3 | 121°58.9 | 24.7 | 132°39.8 | 20.5 | 273°50.2 | 51.4 | | | | | | |
| 14 | 297°12.0 | 77°47.0 | 12.8 | 137°00.8 | 24.6 | 147°42.3 | 20.6 | 288°52.6 | 51.4 | | | | | | |
| 15 | 312°14.5 | 92°47.3 | · · 13.4 | 152°02.6 | · · 24.4 | 162°44.8 | · · 20.6 | 303°55.0 | · · 51.5 | | | | | | |
| 16 | 327°17.0 | 107°47.6 | 13.9 | 167°04.5 | 24.2 | 177°47.4 | 20.6 | 318°57.5 | 51.5 | | | | | | |
| 17 | 342°19.4 | 122°47.9 | 14.5 | 182°06.3 | 24.1 | 192°49.9 | 20.6 | 333°59.9 | 51.5 | | | | | | |
| 18 | 357°21.9 | 137°48.2 | S12°15.0 | 197°08.2 | N11°23.9 | 207°52.4 | N13°20.7 | 349°02.3 | N00°51.5 | | | | | | |
| 19 | 12°24.3 | 152°48.5 | 15.6 | 212°10.0 | 23.8 | 222°54.9 | 20.7 | 4°04.8 | 51.6 | | | | | | |
| 20 | 27°26.8 | 167°48.8 | 16.1 | 227°11.9 | 23.6 | 237°57.4 | 20.7 | 19°07.2 | 51.6 | | | | | | |
| 21 | 42°29.3 | 182°49.1 | · · 16.7 | 242°13.8 | · · 23.5 | 252°59.9 | · · 20.7 | 34°09.6 | · · 51.6 | | | | | | |
| 22 | 57°31.7 | 197°49.4 | 17.2 | 257°15.6 | 23.3 | 268°02.4 | 20.8 | 49°12.1 | 51.6 | | | | | | |
| 23 | 72°34.2 | 212°49.7 | 17.8 | 272°17.5 | 23.2 | 283°04.9 | 20.8 | 64°14.5 | 51.7 | | | | | | |
| Mer.pass. | 18:11 | ν0.3' d0.5' m-4.74 | | ν1.8' d-0.2' m0.16 | | ν2.5' d0.0' m-2.31 | | ν2.4' d0.0' m0.68 | | | | | | | |

| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------|----------|--------------------|----------|--------------------|----------|--------------------|----------|-------------------|----------|-----|-----|-----|-----|-----|-----|
| 0 | 87°36.7 | 227°50.0 | S12°18.3 | 287°19.3 | N11°23.0 | 298°07.4 | N13°20.8 | 79°17.0 | N00°51.7 | | | | | | |
| 1 | 102°39.1 | 242°50.3 | 18.9 | 302°21.2 | 22.9 | 313°09.9 | 20.8 | 94°19.4 | 51.7 | | | | | | |
| 2 | 117°41.6 | 257°50.6 | 19.4 | 317°23.1 | 22.7 | 328°12.4 | 20.9 | 109°21.8 | 51.7 | | | | | | |
| 3 | 132°44.1 | 272°50.9 | · · 20.0 | 332°24.9 | · · 22.6 | 343°14.9 | · · 20.9 | 124°24.3 | · · 51.8 | | | | | | |
| 4 | 147°46.5 | 287°51.2 | 20.5 | 347°26.8 | 22.4 | 358°17.4 | 20.9 | 139°26.7 | 51.8 | | | | | | |
| 5 | 162°49.0 | 302°51.5 | 21.1 | 2°28.7 | 22.3 | 13°19.9 | 20.9 | 154°29.1 | 51.8 | | | | | | |
| 6 | 177°51.5 | 317°51.8 | S12°21.6 | 17°30.5 | N11°22.1 | 28°22.5 | N13°21.0 | 169°31.6 | N00°51.8 | | | | | | |
| 7 | 192°53.9 | 332°52.1 | 22.2 | 32°32.4 | 22.0 | 43°25.0 | 21.0 | 184°34.0 | 51.9 | | | | | | |
| 8 | 207°56.4 | 347°52.4 | 22.8 | 47°34.3 | 21.8 | 58°27.5 | 21.0 | 199°36.4 | 51.9 | | | | | | |
| 9 | 222°58.8 | 2°52.6 | · · 23.3 | 62°36.2 | · · 21.7 | 73°30.0 | · · 21.1 | 214°38.9 | · · 51.9 | | | | | | |
| 10 | 238°01.3 | 17°52.9 | 23.9 | 77°38.0 | 21.5 | 88°32.5 | 21.1 | 229°41.3 | 51.9 | | | | | | |
| 11 | 253°03.8 | 32°53.2 | 24.4 | 92°39.9 | 21.4 | 103°35.0 | 21.1 | 244°43.7 | 52.0 | | | | | | |
| 12 | 268°06.2 | 47°53.5 | S12°25.0 | 107°41.8 | N11°21.2 | 118°37.5 | N13°21.1 | 259°46.2 | N00°52.0 | | | | | | |
| 13 | 283°08.7 | 62°53.8 | 25.5 | 122°43.6 | 21.1 | 133°40.0 | 21.2 | 274°48.6 | 52.0 | | | | | | |
| 14 | 298°11.2 | 77°54.1 | 26.1 | 137°45.5 | 20.9 | 148°42.5 | 21.2 | 289°51.0 | 52.0 | | | | | | |
| 15 | 313°13.6 | 92°54.3 | · · 26.7 | 152°47.4 | · · 20.8 | 163°45.1 | · · 21.2 | 304°53.5 | · · 52.1 | | | | | | |
| 16 | 328°16.1 | 107°54.6 | 27.2 | 167°49.3 | 20.6 | 178°47.6 | 21.2 | 319°55.9 | 52.1 | | | | | | |
| 17 | 343°18.6 | 122°54.9 | 27.8 | 182°51.2 | 20.5 | 193°50.1 | 21.3 | 334°58.3 | 52.1 | | | | | | |
| 18 | 358°21.0 | 137°55.2 | S12°28.3 | 197°53.0 | N11°20.3 | 208°52.6 | N13°21.3 | 350°00.7 | N00°52.1 | | | | | | |
| 19 | 13°23.5 | 152°55.5 | 28.9 | 212°54.9 | 20.2 | 223°55.1 | 21.3 | 5°03.2 | 52.2 | | | | | | |
| 20 | 28°26.0 | 167°55.7 | 29.4 | 227°56.8 | 20.0 | 238°57.6 | 21.4 | 20°05.6 | 52.2 | | | | | | |
| 21 | 43°28.4 | 182°56.0 | · · 30.0 | 242°58.7 | · · 19.9 | 254°00.1 | · · 21.4 | 35°08.0 | · · 52.2 | | | | | | |
| 22 | 58°30.9 | 197°56.3 | 30.6 | 258°00.6 | 19.7 | 269°02.6 | 21.4 | 50°10.5 | 52.2 | | | | | | |
| 23 | 73°33.3 | 212°56.5 | 31.1 | 273°02.4 | 19.6 | 284°05.2 | 21.5 | 65°12.9 | 52.3 | | | | | | |
| Mer.pass. | 18:07 | ν0.3' d0.6' m-4.73 | | ν1.9' d-0.2' m0.14 | | ν2.5' d0.0' m-2.32 | | ν2.4' d0.0' m0.69 | | | | | | | |

| Sun | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
|-----------|----------|--------------------|----------|--------------------|----------|--------------------|----------|-------------------|----------|-----|-----|-----|-----|-----|-----|
| 0 | 88°35.8 | 227°56.8 | S12°31.7 | 288°04.3 | N11°19.5 | 299°07.7 | N13°21.5 | 80°15.3 | N00°52.3 | | | | | | |
| 1 | 103°38.3 | 242°57.1 | 32.2 | 303°06.2 | 19.3 | 314°10.2 | 21.5 | 95°17.8 | 52.3 | | | | | | |
| 2 | 118°40.7 | 257°57.3 | 32.8 | 318°08.1 | 19.2 | 329°12.7 | 21.5 | 110°20.2 | 52.3 | | | | | | |
| 3 | 133°43.2 | 272°57.6 | · · 33.4 | 333°10.0 | · · 19.0 | 344°15.2 | · · 21.6 | 125°22.6 | · · 52.4 | | | | | | |
| 4 | 148°45.7 | 287°57.9 | 33.9 | 348°11.9 | 18.9 | 359°17.7 | 21.6 | 140°25.1 | 52.4 | | | | | | |
| 5 | 163°48.1 | 302°58.1 | 34.5 | 3°13.7 | 18.7 | 14°20.3 | 21.6 | 155°27.5 | 52.4 | | | | | | |
| 6 | 178°50.6 | 317°58.4 | S12°35.1 | 18°15.6 | N11°18.6 | 29°22.8 | N13°21.7 | 170°29.9 | N00°52.4 | | | | | | |
| 7 | 193°53.1 | 332°58.7 | 35.6 | 33°17.5 | 18.5 | 44°25.3 | 21.7 | 185°32.3 | 52.5 | | | | | | |
| 8 | 208°55.5 | 347°58.9 | 36.2 | 48°19.4 | 18.3 | 59°27.8 | 21.7 | 200°34.8 | 52.5 | | | | | | |
| 9 | 223°58.0 | 2°59.2 | · · 36.8 | 63°21.3 | · · 18.2 | 74°30.3 | · · 21.7 | 215°37.2 | · · 52.5 | | | | | | |
| 10 | 239°00.4 | 17°59.4 | 37.3 | 78°23.2 | 18.0 | 89°32.9 | 21.8 | 230°39.6 | 52.5 | | | | | | |
| 11 | 254°02.9 | 32°59.7 | 37.9 | 93°25.1 | 17.9 | 104°35.4 | 21.8 | 245°42.1 | 52.6 | | | | | | |
| 12 | 269°05.4 | 47°59.9 | S12°38.4 | 108°27.0 | N11°17.7 | 119°37.9 | N13°21.8 | 260°44.5 | N00°52.6 | | | | | | |
| 13 | 284°07.8 | 63°00.2 | 39.0 | 123°28.9 | 17.6 | 134°40.4 | 21.9 | 275°46.9 | 52.6 | | | | | | |
| 14 | 299°10.3 | 78°00.5 | 39.6 | 138°30.8 | 17.5 | 149°42.9 | 21.9 | 290°49.3 | 52.7 | | | | | | |
| 15 | 314°12.8 | 93°00.7 | · · 40.1 | 153°32.7 | · · 17.3 | 164°45.4 | · · 21.9 | 305°51.8 | · · 52.7 | | | | | | |
| 16 | 329°15.2 | 108°01.0 | 40.7 | 168°34.6 | 17.2 | 179°48.0 | 22.0 | 320°54.2 | 52.7 | | | | | | |
| 17 | 344°17.7 | 123°01.2 | 41.3 | 183°36.5 | 17.1 | 194°50.5 | 22.0 | 335°56.6 | 52.7 | | | | | | |
| 18 | 359°20.2 | 138°01.4 | S12°41.8 | 198°38.4 | N11°16.9 | 209°53.0 | N13°22.0 | 350°59.1 | N00°52.8 | | | | | | |
| 19 | 14°22.6 | 153°01.7 | 42.4 | 213°40.3 | 16.8 | 224°55.5 | 22.1 | 6°01.5 | 52.8 | | | | | | |
| 20 | 29°25.1 | 168°01.9 | 43.0 | 228°42.2 | 16.6 | 239°58.1 | 22.1 | 21°03.9 | 52.8 | | | | | | |
| 21 | 44°27.6 | 183°02.2 | · · 43.6 | 243°44.1 | · · 16.5 | 255°00.6 | · · 22.1 | 36°06.3 | · · 52.8 | | | | | | |
| 22 | 59°30.0 | 198°02.4 | 44.1 | 258°46.0 | 16.4 | 270°03.1 | 22.1 | 51°08.8 | 52.9 | | | | | | |
| 23 | 74°32.5 | 213°02.7 | 44.7 | 273°47.9 | 16.2 | 285°05.6 | 22.2 | 66°11.2 | 52.9 | | | | | | |
| Mer.pass. | 18:03 | ν0.3' d0.6' m-4.71 | | ν1.9' d-0.1' m0.12 | | ν2.5' d0.0' m-2.33 | | ν2.4' d0.0' m0.69 | | | | | | | |

| Stars | | |
|---------------------|-----------|-----------|
| | SHA | Dec |
| Alpheratz | 357° 33.1 | 29° 14.6 |
| Ankaa | 353° 05.5 | -42° 09.7 |
| Schedar | 349° 29.0 | 56° 41.5 |
| Diphda | 348° 45.6 | -17° 50.4 |
| Achernar | 335° 18.7 | -57° 06.2 |
| Hamal | 327° 49.2 | 23° 35.6 |
| Polaris | 312° 46.9 | 89° 22.9 |
| Acamar | 315° 10.2 | -40° 11.9 |
| Menkar | 314° 04.2 | 4° 11.8 |
| Mirfak | 308° 25.5 | 49° 57.6 |
| Aldebaran | 290° 37.4 | 16° 33.8 |
| Rigel | 281° 02.0 | -8° 10.2 |
| Capella | 280° 19.0 | 46° 01.5 |
| Bellatrix | 278° 20.8 | 6° 22.4 |
| Elnath | 277° 59.5 | 28° 37.8 |
| Alnilam | 275° 35.8 | -1° 11.1 |
| Betelgeuse | 270° 50.0 | 7° 24.7 |
| Canopus | 263° 51.1 | -52° 42.5 |
| Sirius | 258° 24.5 | -16° 45.2 |
| Adhara | 255° 04.2 | -29° 00.5 |
| Procyon | 244° 48.9 | 5° 09.3 |
| Pollux | 243° 15.0 | 27° 57.5 |
| Avior | 234° 13.5 | -59° 35.6 |
| Suhail | 222° 44.8 | -43° 32.3 |
| Miaplacidus | 221° 37.3 | -69° 49.4 |
| Alphard | 217° 46.0 | -8° 46.5 |
| Regulus | 207° 32.6 | 11° 50.0 |
| Dubhe | 193° 39.0 | 61° 36.0 |
| Denebola | 182° 23.3 | 14° 25.1 |
| Gienah | 175° 42.0 | -17° 41.4 |
| Acrux | 172° 58.4 | -63° 14.7 |
| Gacrux | 171° 50.0 | -57° 15.6 |
| Alioth | 166° 11.8 | 55° 48.5 |
| Spica | 158° 20.8 | -11° 18.1 |
| Alkaid | 152° 51.0 | 49° 10.4 |
| Hadar | 148° 34.1 | -60° 30.0 |
| Menkent | 147° 56.0 | -36° 30.0 |
| Arcturus | 145° 46.7 | 19° 02.4 |
| Rigel Kent. | 139° 38.5 | -60° 56.6 |
| Kochab | 137° 20.8 | 74° 02.4 |
| Zuben'ubi | 136° 54.5 | -16° 09.2 |
| Alphecca | 126° 02.7 | 26° 37.3 |
| Antares | 112° 14.2 | -26° 29.4 |
| Atria | 107° 07.6 | -69° 04.4 |
| Sabik | 102° 01.3 | -15° 45.5 |
| Shaula | 96° 08.6 | -37° 07.3 |
| Rasalhague | 95° 57.4 | 12° 32.4 |
| Eltanin | 90° 42.0 | 51° 29.1 |
| Kaus Aust. | 83° 30.8 | -34° 22.3 |
| Vega | 80° 32.6 | 38° 48.6 |
| Nunki | 75° 46.1 | -26° 15.8 |
| Altair | 61° 58.7 | 8° 56.4 |
| Peacock | 53° 03.7 | -56° 39.0 |
| Deneb | 49° 25.1 | 45° 22.8 |
| Enif | 33° 37.4 | 10° 00.0 |
| Al Na'ir | 27° 31.1 | -46° 50.0 |
| Fomalhaut | 15° 12.9 | -29° 28.9 |
| Scheat | 13° 43.7 | 28° 14.0 |
| Markab | 13° 28.4 | 15° 21.2 |
| | | |
| Dec 18 Fri | SHA | Mer.pass |
| Venus | 141° 04.9 | 08:49 |
| Mars | 199° 57.3 | 04:53 |
| Jupiter | 210° 29.8 | 04:11 |
| Saturn | 351° 40.9 | 18:44 |
| | | |
| Dec 19 Sat | SHA | Mer.pass |
| Venus | 140° 13.3 | 08:48 |
| Mars | 199° 42.7 | 04:50 |
| Jupiter | 210° 30.7 | 04:07 |
| Saturn | 351° 40.3 | 18:40 |
| | | |
| Dec 20 Sun | SHA | Mer.pass |
| Venus | 139° 21.0 | 08:48 |
| Mars | 199° 28.5 | 04:47 |
| Jupiter | 210° 31.9 | 04:03 |
| Saturn | 351° 39.5 | 18:36 |
| | | |
| Horizontal parallax | | |
| Venus: | | 0.3 |
| Mars: | | 0.1 |

| h | Sun | | | Moon | | | | |
|-----------------------|----------|----------|------------|----------|-------|----------|-------|-------|
| Fri | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°54.9 | S23°22.7 | | 83°21.2 | 14.4' | N05°12.9 | 14.9' | 56.8' |
| 1 | 195°54.6 | 22.8 | | 97°54.6 | 14.3' | 05°27.7 | 14.9' | 56.8' |
| 2 | 210°54.3 | 22.9 | | 112°27.9 | 14.3' | 05°42.6 | 14.9' | 56.9' |
| 3 | 225°54.0 | 23.0 | | 127°01.2 | 14.2' | 05°57.4 | 14.8' | 56.9' |
| 4 | 240°53.7 | 23.0 | | 141°34.4 | 14.1' | 06°12.3 | 14.8' | 56.9' |
| 5 | 255°53.4 | 23.1 | | 156°07.5 | 14.1' | 06°27.1 | 14.8' | 57.0' |
| 6 | 270°53.1 | S23°23.2 | | 170°40.6 | 14.0' | N06°42.0 | 14.8' | 57.0' |
| 7 | 285°52.8 | 23.2 | | 185°13.5 | 13.9' | 06°56.8 | 14.8' | 57.1' |
| 8 | 300°52.5 | 23.3 | | 199°46.5 | 13.8' | 07°11.6 | 14.8' | 57.1' |
| 9 | 315°52.2 | 23.4 | | 214°19.3 | 13.8' | 07°26.4 | 14.8' | 57.1' |
| 10 | 330°51.9 | 23.5 | | 228°52.1 | 13.7' | 07°41.2 | 14.8' | 57.2' |
| 11 | 345°51.6 | 23.5 | | 243°24.8 | 13.6' | 07°56.0 | 14.8' | 57.2' |
| 12 | 0°51.2 | S23°23.6 | | 257°57.4 | 13.5' | N08°10.7 | 14.7' | 57.3' |
| 13 | 15°50.9 | 23.6 | | 272°29.9 | 13.5' | 08°25.5 | 14.7' | 57.3' |
| 14 | 30°50.6 | 23.7 | | 287°02.3 | 13.4' | 08°40.2 | 14.7' | 57.3' |
| 15 | 45°50.3 | 23.8 | | 301°34.7 | 13.3' | 08°54.9 | 14.7' | 57.4' |
| 16 | 60°50.0 | 23.8 | | 316°07.0 | 13.2' | 09°09.6 | 14.7' | 57.4' |
| 17 | 75°49.7 | 23.9 | | 330°39.2 | 13.1' | 09°24.3 | 14.6' | 57.5' |
| 18 | 90°49.4 | S23°24.0 | | 345°11.3 | 13.0' | N09°38.9 | 14.6' | 57.5' |
| 19 | 105°49.1 | 24.0 | | 359°43.4 | 12.9' | 09°53.6 | 14.6' | 57.5' |
| 20 | 120°48.8 | 24.1 | | 14°15.3 | 12.8' | 10°08.2 | 14.6' | 57.6' |
| 21 | 135°48.5 | 24.1 | | 28°47.1 | 12.8' | 10°22.7 | 14.5' | 57.6' |
| 22 | 150°48.2 | 24.2 | | 43°18.9 | 12.7' | 10°37.3 | 14.5' | 57.7' |
| 23 | 165°47.9 | 24.3 | | 57°50.6 | 12.6' | 10°51.8 | 14.5' | 57.7' |
| SD = 16.2' $d = 0.1'$ | | | SD = 15.5' | | | | | |
| Sat | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°47.6 | S23°24.3 | | 72°22.1 | 12.5' | N11°06.3 | 14.5' | 57.7' |
| 1 | 195°47.2 | 24.4 | | 86°53.6 | 12.4' | 11°20.7 | 14.4' | 57.8' |
| 2 | 210°46.9 | 24.4 | | 101°25.0 | 12.3' | 11°35.1 | 14.4' | 57.8' |
| 3 | 225°46.6 | 24.5 | | 115°56.3 | 12.2' | 11°49.5 | 14.4' | 57.9' |
| 4 | 240°46.3 | 24.5 | | 130°27.4 | 12.1' | 12°03.9 | 14.3' | 57.9' |
| 5 | 255°46.0 | 24.6 | | 144°58.5 | 12.0' | 12°18.2 | 14.3' | 57.9' |
| 6 | 270°45.7 | S23°24.6 | | 159°29.5 | 11.9' | N12°32.5 | 14.2' | 58.0' |
| 7 | 285°45.4 | 24.7 | | 174°00.3 | 11.8' | 12°46.7 | 14.2' | 58.0' |
| 8 | 300°45.1 | 24.7 | | 188°31.1 | 11.7' | 13°00.9 | 14.1' | 58.1' |
| 9 | 315°44.8 | 24.8 | | 203°01.8 | 11.5' | 13°15.0 | 14.1' | 58.1' |
| 10 | 330°44.5 | 24.8 | | 217°32.3 | 11.4' | 13°29.1 | 14.1' | 58.1' |
| 11 | 345°44.2 | 24.9 | | 232°02.7 | 11.3' | 13°43.2 | 14.0' | 58.2' |
| 12 | 0°43.9 | S23°24.9 | | 246°33.1 | 11.2' | N13°57.2 | 14.0' | 58.2' |
| 13 | 15°43.6 | 25.0 | | 261°03.3 | 11.1' | 14°11.2 | 13.9' | 58.3' |
| 14 | 30°43.2 | 25.0 | | 275°33.4 | 11.0' | 14°25.1 | 13.9' | 58.3' |
| 15 | 45°42.9 | 25.1 | | 290°03.3 | 10.9' | 14°38.9 | 13.8' | 58.3' |
| 16 | 60°42.6 | 25.1 | | 304°33.2 | 10.7' | 14°52.7 | 13.7' | 58.4' |
| 17 | 75°42.3 | 25.2 | | 319°03.0 | 10.6' | 15°06.5 | 13.7' | 58.4' |
| 18 | 90°42.0 | S23°25.2 | | 333°32.6 | 10.5' | N15°20.1 | 13.6' | 58.5' |
| 19 | 105°41.7 | 25.2 | | 348°02.1 | 10.4' | 15°33.8 | 13.6' | 58.5' |
| 20 | 120°41.4 | 25.3 | | 2°31.5 | 10.3' | 15°47.3 | 13.5' | 58.6' |
| 21 | 135°41.1 | 25.3 | | 17°00.7 | 10.1' | 16°00.8 | 13.4' | 58.6' |
| 22 | 150°40.8 | 25.4 | | 31°29.9 | 10.0' | 16°14.2 | 13.4' | 58.6' |
| 23 | 165°40.5 | 25.4 | | 45°58.9 | 9.9' | 16°27.6 | 13.3' | 58.7' |
| SD = 16.2' $d = 0.1'$ | | | SD = 15.7' | | | | | |
| Sun | GHA | Dec | | GHA | ν | Dec | d | HP |
| 0 | 180°40.2 | S23°25.4 | | 60°27.8 | 9.8' | N16°40.9 | 13.2' | 58.7' |
| 1 | 195°39.9 | 25.5 | | 74°56.6 | 9.6' | 16°54.1 | 13.1' | 58.8' |
| 2 | 210°39.5 | 25.5 | | 89°25.2 | 9.5' | 17°07.3 | 13.1' | 58.8' |
| 3 | 225°39.2 | 25.5 | | 103°53.7 | 9.4' | 17°20.3 | 13.0' | 58.8' |
| 4 | 240°38.9 | 25.6 | | 118°22.1 | 9.2' | 17°33.3 | 12.9' | 58.9' |
| 5 | 255°38.6 | 25.6 | | 132°50.3 | 9.1' | 17°46.2 | 12.8' | 58.9' |
| 6 | 270°38.3 | S23°25.6 | | 147°18.4 | 9.0' | N17°59.1 | 12.8' | 59.0' |
| 7 | 285°38.0 | 25.7 | | 161°46.4 | 8.8' | 18°11.8 | 12.7' | 59.0' |
| 8 | 300°37.7 | 25.7 | | 176°14.3 | 8.7' | 18°24.5 | 12.6' | 59.0' |
| 9 | 315°37.4 | 25.7 | | 190°42.0 | 8.6' | 18°37.1 | 12.5' | 59.1' |
| 10 | 330°37.1 | 25.8 | | 205°09.5 | 8.4' | 18°49.6 | 12.4' | 59.1' |
| 11 | 345°36.8 | 25.8 | | 219°37.0 | 8.3' | 19°02.0 | 12.3' | 59.2' |
| 12 | 0°36.5 | S23°25.8 | | 234°04.3 | 8.2' | N19°14.3 | 12.2' | 59.2' |
| 13 | 15°36.1 | 25.8 | | 248°31.4 | 8.0' | 19°26.5 | 12.1' | 59.2' |
| 14 | 30°35.8 | 25.9 | | 262°58.5 | 7.9' | 19°38.6 | 12.0' | 59.3' |
| 15 | 45°35.5 | 25.9 | | 277°25.4 | 7.7' | 19°50.6 | 11.9' | 59.3' |
| 16 | 60°35.2 | 25.9 | | 291°52.1 | 7.6' | 20°02.5 | 11.8' | 59.4' |
| 17 | 75°34.9 | 25.9 | | 306°18.7 | 7.5' | 20°14.3 | 11.7' | 59.4' |
| 18 | 90°34.6 | S23°26.0 | | 320°45.2 | 7.3' | N20°26.1 | 11.6' | 59.4' |
| 19 | 105°34.3 | 26.0 | | 335°11.5 | 7.2' | 20°37.6 | 11.5' | 59.5' |
| 20 | 120°34.0 | 26.0 | | 349°37.7 | 7.0' | 20°49.1 | 11.4' | 59.5' |
| 21 | 135°33.7 | 26.0 | | 4°03.7 | 6.9' | 21°00.5 | 11.3' | 59.6' |
| 22 | 150°33.4 | 26.0 | | 18°29.6 | 6.8' | 21°11.8 | 11.1' | 59.6' |
| 23 | 165°33.1 | 26.1 | | 32°55.4 | 6.6' | 21°22.9 | 11.0' | 59.6' |
| SD = 16.2' $d = 0.0'$ | | | SD = 16.0' | | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|--------------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 08:24 | 10:56 | ■ | ■ | 12:58 | 15:30 |
| N 70° | 08:04 | 09:53 | ■ | ■ | 14:01 | 15:50 |
| 68° | 07:48 | 09:18 | ■ | ■ | 14:36 | 16:06 |
| 66° | 07:35 | 08:52 | 10:33 | 13:21 | 15:02 | 16:19 |
| 64° | 07:24 | 08:33 | 09:51 | 14:03 | 15:21 | 16:30 |
| 62° | 07:14 | 08:17 | 09:22 | 14:32 | 15:38 | 16:40 |
| 60° | 07:06 | 08:03 | 09:01 | 14:53 | 15:51 | 16:48 |
| N 58° | 06:59 | 07:51 | 08:43 | 15:11 | 16:03 | 16:56 |
| 56° | 06:52 | 07:41 | 08:28 | 15:26 | 16:13 | 17:02 |
| 54° | 06:46 | 07:32 | 08:16 | 15:38 | 16:22 | 17:09 |
| 52° | 06:40 | 07:24 | 08:05 | 15:49 | 16:30 | 17:14 |
| 50° | 06:35 | 07:16 | 07:55 | 15:59 | 16:38 | 17:19 |
| 45° | 06:23 | 07:00 | 07:34 | 16:20 | 16:54 | 17:31 |
| N 40° | 06:12 | 06:47 | 07:17 | 16:37 | 17:08 | 17:42 |
| 35° | 06:03 | 06:35 | 07:03 | 16:51 | 17:19 | 17:51 |
| 30° | 05:54 | 06:24 | 06:51 | 17:04 | 17:30 | 18:00 |
| 20° | 05:38 | 06:05 | 06:29 | 17:25 | 17:49 | 18:16 |
| N 10° | 05:22 | 05:48 | 06:11 | 17:43 | 18:06 | 18:33 |
| 0° | 05:05 | 05:31 | 05:53 | 18:01 | 18:23 | 18:50 |
| S 10° | 04:46 | 05:13 | 05:36 | 18:18 | 18:41 | 19:09 |
| 20° | 04:23 | 04:52 | 05:17 | 18:37 | 19:02 | 19:31 |
| 30° | 03:54 | 04:27 | 04:55 | 18:59 | 19:27 | 20:00 |
| 35° | 03:35 | 04:12 | 04:42 | 19:13 | 19:42 | 20:19 |
| 40° | 03:12 | 03:54 | 04:27 | 19:28 | 20:00 | 20:42 |
| 45° | 02:41 | 03:31 | 04:09 | 19:46 | 20:23 | 21:13 |
| S 50° | 01:56 | 03:01 | 03:46 | 20:08 | 20:53 | 21:59 |
| 52° | 01:28 | 02:46 | 03:35 | 20:19 | 21:08 | 22:26 |
| 54° | 00:41 | 02:28 | 03:23 | 20:31 | 21:26 | 23:13 |
| 56° | //// | 02:06 | 03:09 | 20:46 | 21:48 | //// |
| 58° | //// | 01:36 | 02:52 | 21:02 | 22:18 | //// |
| S 60° | //// | 00:46 | 02:31 | 21:23 | 23:09 | //// |

| Lat. | Moonrise | | | Moonset | | |
|--------------|----------|-------|-------|---------|-------|-------|
| | Fri | Sat | Sun | Fri | Sat | Sun |
| N 72° | 11:06 | 10:21 | □ | 01:38 | 04:00 | □ |
| N 70° | 11:18 | 10:46 | 09:47 | 01:30 | 03:38 | 06:22 |
| 68° | 11:27 | 11:05 | 10:31 | 01:24 | 03:21 | 05:40 |
| 66° | 11:34 | 11:20 | 11:01 | 01:18 | 03:08 | 05:12 |
| 64° | 11:41 | 11:33 | 11:23 | 01:13 | 02:56 | 04:50 |
| 62° | 11:47 | 11:44 | 11:41 | 01:09 | 02:47 | 04:33 |
| 60° | 11:52 | 11:53 | 11:57 | 01:06 | 02:39 | 04:19 |
| N 58° | 11:56 | 12:01 | 12:09 | 01:03 | 02:32 | 04:07 |
| 56° | 12:00 | 12:08 | 12:21 | 01:00 | 02:26 | 03:57 |
| 54° | 12:03 | 12:15 | 12:31 | 00:58 | 02:20 | 03:48 |
| 52° | 12:07 | 12:21 | 12:39 | 00:55 | 02:15 | 03:40 |
| 50° | 12:10 | 12:26 | 12:47 | 00:53 | 02:11 | 03:33 |
| 45° | 12:16 | 12:38 | 13:04 | 00:49 | 02:01 | 03:17 |
| N 40° | 12:21 | 12:47 | 13:18 | 00:46 | 01:53 | 03:05 |
| 35° | 12:26 | 12:56 | 13:30 | 00:42 | 01:46 | 02:54 |
| 30° | 12:30 | 13:03 | 13:41 | 00:40 | 01:40 | 02:45 |
| 20° | 12:38 | 13:16 | 13:59 | 00:35 | 01:30 | 02:29 |
| N 10° | 12:44 | 13:27 | 14:15 | 00:31 | 01:21 | 02:15 |
| 0° | 12:50 | 13:38 | 14:30 | 00:27 | 01:12 | 02:02 |
| S 10° | 12:56 | 13:48 | 14:45 | 00:23 | 01:04 | 01:49 |
| 20° | 13:03 | 14:00 | 15:01 | 00:19 | 00:55 | 01:35 |
| 30° | 13:11 | 14:13 | 15:20 | 00:14 | 00:45 | 01:20 |
| 35° | 13:15 | 14:21 | 15:31 | 00:12 | 00:39 | 01:11 |
| 40° | 13:20 | 14:30 | 15:44 | 00:09 | 00:32 | 01:00 |
| 45° | 13:26 | 14:40 | 15:59 | 00:05 | 00:25 | 00:48 |
| S 50° | 13:33 | 14:53 | 16:18 | 00:01 | 00:16 | 00:34 |
| 52° | 13:36 | 14:59 | 16:27 | | 00:12 | 00:27 |
| 54° | 13:40 | 15:05 | 16:37 | | 00:07 | 00:20 |
| 56° | 13:44 | 15:13 | 16:48 | | 00:02 | 00:12 |
| 58° | 13:49 | 15:21 | 17:01 | 23:56 | | 00:02 |
| S 60° | 13:54 | 15:31 | 17:16 | 23:50 | 23:52 | 23:56 |

| Day | Sun | | Mer. Pass | Moon | | Age 9-11 58-78% |
|-----|-------------------------------|----------------------------|-----------|------------------------|-------------|-----------------|
| | Eqn. of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer. Pass. Upper hh:mm | Lower hh:mm | |
| 18 | 03:40 | 03:25 | 11:57 | 19:01 | 06:38 | |
| 19 | 03:10 | 02:55 | 11:57 | 19:50 | 07:25 | |
| 20 | 02:41 | 02:26 | 11:58 | 20:43 | 08:16 | |


December 21, 22, 23 UT (Mon., Tue., Wed.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | | | | |
|-----------------|----------|----------|----------|--------------------|----------|----------|----------|--------------------|----------|---------|-----|--------------------|--------|--|--|-------------------|--|--|--|
| Mon | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | | |
| 0 | 89°34.9 | 228°02.9 | S12°45.3 | 288°49.8 | N11°16.1 | 300°08.1 | N13°22.2 | 81°13.6 | N00°52.9 | | | | | | | | | | |
| 1 | 104°37.4 | 243°03.1 | 45.8 | 303°51.7 | 16.0 | 315°10.7 | 22.2 | 96°16.0 | 53.0 | | | | | | | | | | |
| 2 | 119°39.9 | 258°03.4 | 46.4 | 318°53.6 | 15.8 | 330°13.2 | 22.3 | 111°18.5 | 53.0 | | | | | | | | | | |
| 3 | 134°42.3 | 273°03.6 | · · 47.0 | 333°55.5 | · · 15.7 | 345°15.7 | · · 22.3 | 126°20.9 | · · 53.0 | | | | | | | | | | |
| 4 | 149°44.8 | 288°03.8 | 47.5 | 348°57.4 | 15.6 | 0°18.2 | 22.3 | 141°23.3 | 53.0 | | | | | | | | | | |
| 5 | 164°47.3 | 303°04.1 | 48.1 | 3°59.3 | 15.4 | 15°20.8 | 22.4 | 156°25.7 | 53.1 | | | | | | | | | | |
| 6 | 179°49.7 | 318°04.3 | S12°48.7 | 19°01.2 | N11°15.3 | 30°23.3 | N13°22.4 | 171°28.2 | N00°53.1 | | | | | | | | | | |
| 7 | 194°52.2 | 333°04.5 | 49.3 | 34°03.1 | 15.2 | 45°25.8 | 22.4 | 186°30.6 | 53.1 | | | | | | | | | | |
| 8 | 209°54.7 | 348°04.8 | 49.8 | 49°05.0 | 15.0 | 60°28.3 | 22.5 | 201°33.0 | 53.2 | | | | | | | | | | |
| 9 | 224°57.1 | 3°05.0 | · · 50.4 | 64°07.0 | · · 14.9 | 75°30.9 | · · 22.5 | 216°35.4 | · · 53.2 | | | | | | | | | | |
| 10 | 239°59.6 | 18°05.2 | 51.0 | 79°08.9 | 14.8 | 90°33.4 | 22.5 | 231°37.9 | 53.2 | | | | | | | | | | |
| 11 | 255°02.1 | 33°05.5 | 51.5 | 94°10.8 | 14.6 | 105°35.9 | 22.6 | 246°40.3 | 53.2 | | | | | | | | | | |
| 12 | 270°04.5 | 48°05.7 | S12°52.1 | 109°12.7 | N11°14.5 | 120°38.4 | N13°22.6 | 261°42.7 | N00°53.3 | | | | | | | | | | |
| 13 | 285°07.0 | 63°05.9 | 52.7 | 124°14.6 | 14.4 | 135°41.0 | 22.6 | 276°45.1 | 53.3 | | | | | | | | | | |
| 14 | 300°09.4 | 78°06.1 | 53.3 | 139°16.5 | 14.2 | 150°43.5 | 22.7 | 291°47.6 | 53.3 | | | | | | | | | | |
| 15 | 315°11.9 | 93°06.4 | · · 53.8 | 154°18.5 | · · 14.1 | 165°46.0 | · · 22.7 | 306°50.0 | · · 53.4 | | | | | | | | | | |
| 16 | 330°14.4 | 108°06.6 | 54.4 | 169°20.4 | 14.0 | 180°48.6 | 22.7 | 321°52.4 | 53.4 | | | | | | | | | | |
| 17 | 345°16.8 | 123°06.8 | 55.0 | 184°22.3 | 13.8 | 195°51.1 | 22.8 | 336°54.8 | 53.4 | | | | | | | | | | |
| 18 | 0°19.3 | 138°07.0 | S12°55.6 | 199°24.2 | N11°13.7 | 210°53.6 | N13°22.8 | 351°57.3 | N00°53.4 | | | | | | | | | | |
| 19 | 15°21.8 | 153°07.2 | 56.1 | 214°26.1 | 13.6 | 225°56.1 | 22.8 | 6°59.7 | 53.5 | | | | | | | | | | |
| 20 | 30°24.2 | 168°07.4 | 56.7 | 229°28.1 | 13.5 | 240°58.7 | 22.9 | 22°02.1 | 53.5 | | | | | | | | | | |
| 21 | 45°26.7 | 183°07.7 | · · 57.3 | 244°30.0 | · · 13.3 | 256°01.2 | · · 22.9 | 37°04.5 | · · 53.5 | | | | | | | | | | |
| 22 | 60°29.2 | 198°07.9 | 57.9 | 259°31.9 | 13.2 | 271°03.7 | 22.9 | 52°07.0 | 53.6 | | | | | | | | | | |
| 23 | 75°31.6 | 213°08.1 | 58.4 | 274°33.8 | 13.1 | 286°06.3 | 23.0 | 67°09.4 | 53.6 | | | | | | | | | | |
| Mer.pass. 17:59 | | | | ν0.2' d0.6' m-4.70 | | | | ν1.9' d-0.1' m0.10 | | | | ν2.5' d0.0' m-2.34 | | | | ν2.4' d0.0' m0.69 | | | |
| | | | | | | | | | | | | | | | | | | | |
| Tue | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | | |
| 0 | 90°34.1 | 228°08.3 | S12°59.0 | 289°35.8 | N11°12.9 | 301°08.8 | N13°23.0 | 82°11.8 | N00°53.6 | | | | | | | | | | |
| 1 | 105°36.6 | 243°08.5 | 12°59.6 | 304°37.7 | 12.8 | 316°11.3 | 23.0 | 97°14.2 | 53.6 | | | | | | | | | | |
| 2 | 120°39.0 | 258°08.7 | 13°00.2 | 319°39.6 | 12.7 | 331°13.9 | 23.1 | 112°16.6 | 53.7 | | | | | | | | | | |
| 3 | 135°41.5 | 273°08.9 | · · 00.8 | 334°41.5 | · · 12.6 | 346°16.4 | · · 23.1 | 127°19.1 | · · 53.7 | | | | | | | | | | |
| 4 | 150°43.9 | 288°09.1 | 01.3 | 349°43.5 | 12.4 | 1°18.9 | 23.2 | 142°21.5 | 53.7 | | | | | | | | | | |
| 5 | 165°46.4 | 303°09.3 | 01.9 | 4°45.4 | 12.3 | 16°21.5 | 23.2 | 157°23.9 | 53.8 | | | | | | | | | | |
| 6 | 180°48.9 | 318°09.5 | S13°02.5 | 19°47.3 | N11°12.2 | 31°24.0 | N13°23.2 | 172°26.3 | N00°53.8 | | | | | | | | | | |
| 7 | 195°51.3 | 333°09.7 | 03.1 | 34°49.3 | 12.1 | 46°26.5 | 23.3 | 187°28.8 | 53.8 | | | | | | | | | | |
| 8 | 210°53.8 | 348°09.9 | 03.7 | 49°51.2 | 11.9 | 61°29.1 | 23.3 | 202°31.2 | 53.9 | | | | | | | | | | |
| 9 | 225°56.3 | 3°10.1 | · · 04.2 | 64°53.1 | · · 11.8 | 76°31.6 | · · 23.3 | 217°33.6 | · · 53.9 | | | | | | | | | | |
| 10 | 240°58.7 | 18°10.3 | 04.8 | 79°55.1 | 11.7 | 91°34.1 | 23.4 | 232°36.0 | 53.9 | | | | | | | | | | |
| 11 | 256°01.2 | 33°10.5 | 05.4 | 94°57.0 | 11.6 | 106°36.7 | 23.4 | 247°38.4 | 54.0 | | | | | | | | | | |
| 12 | 271°03.7 | 48°10.7 | S13°06.0 | 109°58.9 | N11°11.4 | 121°39.2 | N13°23.4 | 262°40.9 | N00°54.0 | | | | | | | | | | |
| 13 | 286°06.1 | 63°10.9 | 06.6 | 125°00.9 | 11.3 | 136°41.7 | 23.5 | 277°43.3 | 54.0 | | | | | | | | | | |
| 14 | 301°08.6 | 78°11.1 | 07.1 | 140°02.8 | 11.2 | 151°44.3 | 23.5 | 292°45.7 | 54.0 | | | | | | | | | | |
| 15 | 316°11.1 | 93°11.3 | · · 07.7 | 155°04.7 | · · 11.1 | 166°46.8 | · · 23.5 | 307°48.1 | · · 54.1 | | | | | | | | | | |
| 16 | 331°13.5 | 108°11.5 | 08.3 | 170°06.7 | 11.0 | 181°49.3 | 23.6 | 322°50.5 | 54.1 | | | | | | | | | | |
| 17 | 346°16.0 | 123°11.7 | 08.9 | 185°08.6 | 10.8 | 196°51.9 | 23.6 | 337°53.0 | 54.1 | | | | | | | | | | |
| 18 | 1°18.4 | 138°11.9 | S13°09.5 | 200°10.6 | N11°10.7 | 211°54.4 | N13°23.7 | 352°55.4 | N00°54.2 | | | | | | | | | | |
| 19 | 16°20.9 | 153°12.1 | 10.0 | 215°12.5 | 10.6 | 226°56.9 | 23.7 | 7°57.8 | 54.2 | | | | | | | | | | |
| 20 | 31°23.4 | 168°12.3 | 10.6 | 230°14.4 | 10.5 | 241°59.5 | 23.7 | 23°00.2 | 54.2 | | | | | | | | | | |
| 21 | 46°25.8 | 183°12.5 | · · 11.2 | 245°16.4 | · · 10.4 | 257°02.0 | · · 23.8 | 38°02.6 | · · 54.3 | | | | | | | | | | |
| 22 | 61°28.3 | 198°12.6 | 11.8 | 260°18.3 | 10.2 | 272°04.6 | 23.8 | 53°05.0 | 54.3 | | | | | | | | | | |
| 23 | 76°30.8 | 213°12.8 | 12.4 | 275°20.3 | 10.1 | 287°07.1 | 23.8 | 68°07.5 | 54.3 | | | | | | | | | | |
| Mer.pass. 17:55 | | | | ν0.2' d0.6' m-4.69 | | | | ν1.9' d-0.1' m0.08 | | | | ν2.5' d0.0' m-2.34 | | | | ν2.4' d0.0' m0.70 | | | |
| | | | | | | | | | | | | | | | | | | | |
| Wed | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | | | | | | |
| 0 | 91°33.2 | 228°13.0 | S13°13.0 | 290°22.2 | N11°10.0 | 302°09.6 | N13°23.9 | 83°09.9 | N00°54.4 | | | | | | | | | | |
| 1 | 106°35.7 | 243°13.2 | 13.5 | 305°24.2 | 09.9 | 317°12.2 | 23.9 | 98°12.3 | 54.4 | | | | | | | | | | |
| 2 | 121°38.2 | 258°13.4 | 14.1 | 320°26.1 | 09.8 | 332°14.7 | 24.0 | 113°14.7 | 54.4 | | | | | | | | | | |
| 3 | 136°40.6 | 273°13.5 | · · 14.7 | 335°28.1 | · · 09.6 | 347°17.3 | · · 24.0 | 128°17.1 | · · 54.4 | | | | | | | | | | |
| 4 | 151°43.1 | 288°13.7 | 15.3 | 350°30.0 | 09.5 | 2°19.8 | 24.0 | 143°19.6 | 54.5 | | | | | | | | | | |
| 5 | 166°45.6 | 303°13.9 | 15.9 | 5°32.0 | 09.4 | 17°22.3 | 24.1 | 158°22.0 | 54.5 | | | | | | | | | | |
| 6 | 181°48.0 | 318°14.1 | S13°16.5 | 20°33.9 | N11°09.3 | 32°24.9 | N13°24.1 | 173°24.4 | N00°54.5 | | | | | | | | | | |
| 7 | 196°50.5 | 333°14.3 | 17.0 | 35°35.9 | 09.2 | 47°27.4 | 24.1 | 188°26.8 | 54.6 | | | | | | | | | | |
| 8 | 211°52.9 | 348°14.4 | 17.6 | 50°37.8 | 09.1 | 62°30.0 | 24.2 | 203°29.2 | 54.6 | | | | | | | | | | |
| 9 | 226°55.4 | 3°14.6 | · · 18.2 | 65°39.8 | · · 08.9 | 77°32.5 | · · 24.2 | 218°31.6 | · · 54.6 | | | | | | | | | | |
| 10 | 241°57.9 | 18°14.8 | 18.8 | 80°41.7 | 08.8 | 92°35.0 | 24.3 | 233°34.1 | 54.7 | | | | | | | | | | |
| 11 | 257°00.3 | 33°14.9 | 19.4 | 95°43.7 | 08.7 | 107°37.6 | 24.3 | 248°36.5 | 54.7 | | | | | | | | | | |
| 12 | 272°02.8 | 48°15.1 | S13°20.0 | 110°45.7 | N11°08.6 | 122°40.1 | N13°24.3 | 263°38.9 | N00°54.7 | | | | | | | | | | |
| 13 | 287°05.3 | 63°15.3 | 20.6 | 125°47.6 | 08.5 | 137°42.7 | 24.4 | 278°41.3 | 54.8 | | | | | | | | | | |
| 14 | 302°07.7 | 78°15.4 | 21.1 | 140°49.6 | 08.4 | 152°45.2 | 24.4 | 293°43.7 | 54.8 | | | | | | | | | | |
| 15 | 317°10.2 | 93°15.6 | · · 21.7 | 155°51.5 | · · 08.3 | 167°47.8 | · · 24.5 | 308°46.1 | · · 54.8 | | | | | | | | | | |
| 16 | 332°12.7 | 108°15.8 | 22.3 | 170°53.5 | 08.2 | 182°50.3 | 24.5 | 323°48.5 | 54.9 | | | | | | | | | | |
| 17 | 347°15.1 | 123°15.9 | 22.9 | 185°55.5 | 08.0 | 197°52.8 | 24.5 | 338°51.0 | 54.9 | | | | | | | | | | |
| 18 | 2°17.6 | 138°16.1 | S13°23.5 | 200°57.4 | N11°07.9 | 212°55.4 | N13°24.6 | 353°53.4 | N00°54.9 | | | | | | | | | | |
| 19 | 17°20.1 | 153°16.3 | 24.1 | 215°59.4 | 07.8 | 227°57.9 | 24.6 | 8°55.8 | 55.0 | | | | | | | | | | |
| 20 | 32°22.5 | 168°16.4 | 24.7 | 231°01.4 | 07.7 | 243°00.5 | 24.6 | 23°58.2 | 55.0 | | | | | | | | | | |
| 21 | 47°25.0 | 183°16.6 | · · 25.3 | 246°03.3 | · · 07.6 | 258°03.0 | · · 24.7 | 39°00.6 | · · 55.0 | | | | | | | | | | |
| 22 | 62°27.4 | 198°16.7 | 25.9 | 261°05.3 | 07.5 | 273°05.6 | 24.7 | 54°03.0 | 55.1 | | | | | | | | | | |
| 23 | 77°29.9 | 213°16.9 | 26.4 | 276°07.3 | 07.4 | 288°08.1 | 24.8 | 69°05.5 | 55.1 | | | | | | | | | | |
| Mer.pass. 17:51 | | | | ν0.2' d0.6' m-4.68 | | | | ν1.9' d-0.1' m0.05 | | | | ν2.5' d0.0' m-2.35 | | | | ν2.4' d0.0' m0.70 | | | |

| h | Sun | | | Moon | | | |
|------------|----------|----------|-------------|------------|-------|----------|-------|
| | GHA | Dec | | GHA | ν | Dec | d |
| Mon | | | | | | | HP |
| 0 | 180°32.7 | S23°26.1 | | 47°21.0 | 6.5' | N21°33.9 | 10.9' |
| 1 | 195°32.4 | 26.1 | | 61°46.5 | 6.3' | 21°44.8 | 10.8' |
| 2 | 210°32.1 | 26.1 | | 76°11.8 | 6.2' | 21°55.6 | 10.7' |
| 3 | 225°31.8 | 26.1 | | 90°37.0 | 6.0' | 22°06.3 | 10.5' |
| 4 | 240°31.5 | 26.1 | | 105°02.0 | 5.9' | 22°16.8 | 10.4' |
| 5 | 255°31.2 | 26.1 | | 119°26.9 | 5.8' | 22°27.2 | 10.3' |
| 6 | 270°30.9 | S23°26.2 | | 133°51.7 | 5.6' | N22°37.5 | 10.1' |
| 7 | 285°30.6 | 26.2 | | 148°16.3 | 5.5' | 22°47.6 | 10.0' |
| 8 | 300°30.3 | 26.2 | | 162°40.8 | 5.3' | 22°57.6 | 9.9' |
| 9 | 315°30.0 | 26.2 | | 177°05.1 | 5.2' | 23°07.4 | 9.7' |
| 10 | 330°29.7 | 26.2 | | 191°29.3 | 5.1' | 23°17.1 | 9.6' |
| 11 | 345°29.3 | 26.2 | | 205°53.4 | 4.9' | 23°26.7 | 9.4' |
| 12 | 0°29.0 | S23°26.2 | | 220°17.3 | 4.8' | N23°36.1 | 9.3' |
| 13 | 15°28.7 | 26.2 | | 234°41.1 | 4.6' | 23°45.4 | 9.1' |
| 14 | 30°28.4 | 26.2 | | 249°04.7 | 4.5' | 23°54.5 | 9.0' |
| 15 | 45°28.1 | 26.2 | | 263°28.2 | 4.4' | 24°03.5 | 8.8' |
| 16 | 60°27.8 | 26.2 | | 277°51.6 | 4.2' | 24°12.3 | 8.7' |
| 17 | 75°27.5 | 26.2 | | 292°14.8 | 4.1' | 24°21.0 | 8.5' |
| 18 | 90°27.2 | S23°26.2 | | 306°37.9 | 4.0' | N24°29.5 | 8.3' |
| 19 | 105°26.9 | 26.2 | | 321°00.9 | 3.8' | 24°37.8 | 8.2' |
| 20 | 120°26.6 | 26.2 | | 335°23.7 | 3.7' | 24°46.0 | 8.0' |
| 21 | 135°26.2 | 26.2 | | 349°46.4 | 3.6' | 24°54.0 | 7.8' |
| 22 | 150°25.9 | 26.2 | | 4°09.0 | 3.4' | 25°01.8 | 7.7' |
| 23 | 165°25.6 | 26.2 | | 18°31.4 | 3.3' | 25°09.5 | 7.5' |
| SD = 16.3' | | | $d = 0.0'$ | SD = 16.3' | | | |
| Tue | | | | | | | |
| 0 | 180°25.3 | S23°26.2 | | 32°53.7 | 3.2' | N25°17.0 | 7.3' |
| 1 | 195°25.0 | 26.2 | | 47°15.9 | 3.1' | 25°24.3 | 7.1' |
| 2 | 210°24.7 | 26.2 | | 61°38.0 | 2.9' | 25°31.5 | 7.0' |
| 3 | 225°24.4 | 26.2 | | 76°00.0 | 2.8' | 25°38.4 | 6.8' |
| 4 | 240°24.1 | 26.2 | | 90°21.8 | 2.7' | 25°45.2 | 6.6' |
| 5 | 255°23.8 | 26.2 | | 104°43.5 | 2.6' | 25°51.8 | 6.4' |
| 6 | 270°23.5 | S23°26.2 | | 119°05.1 | 2.5' | N25°58.3 | 6.2' |
| 7 | 285°23.1 | 26.2 | | 133°26.6 | 2.4' | 26°04.5 | 6.1' |
| 8 | 300°22.8 | 26.2 | | 147°47.9 | 2.3' | 26°10.6 | 5.9' |
| 9 | 315°22.5 | 26.2 | | 162°09.2 | 2.2' | 26°16.4 | 5.7' |
| 10 | 330°22.2 | 26.2 | | 176°30.4 | 2.1' | 26°22.1 | 5.5' |
| 11 | 345°21.9 | 26.2 | | 190°51.4 | 2.0' | 26°27.6 | 5.3' |
| 12 | 0°21.6 | S23°26.2 | | 205°12.4 | 1.9' | N26°32.9 | 5.1' |
| 13 | 15°21.3 | 26.1 | | 219°33.2 | 1.8' | 26°37.9 | 4.9' |
| 14 | 30°21.0 | 26.1 | | 233°54.0 | 1.7' | 26°42.8 | 4.7' |
| 15 | 45°20.7 | 26.1 | | 248°14.6 | 1.6' | 26°47.5 | 4.5' |
| 16 | 60°20.4 | 26.1 | | 262°35.2 | 1.5' | 26°52.0 | 4.3' |
| 17 | 75°20.1 | 26.1 | | 276°55.7 | 1.4' | 26°56.3 | 4.1' |
| 18 | 90°19.7 | S23°26.1 | | 291°16.1 | 1.3' | N27°00.4 | 3.9' |
| 19 | 105°19.4 | 26.0 | | 305°36.4 | 1.2' | 27°04.2 | 3.7' |
| 20 | 120°19.1 | 26.0 | | 319°56.6 | 1.2' | 27°07.9 | 3.5' |
| 21 | 135°18.8 | 26.0 | | 334°16.8 | 1.1' | 27°11.3 | 3.2' |
| 22 | 150°18.5 | 26.0 | | 348°36.9 | 1.0' | 27°14.6 | 3.0' |
| 23 | 165°18.2 | 26.0 | | 2°56.9 | 1.0' | 27°17.6 | 2.8' |
| SD = 16.3' | | | $d = -0.0'$ | SD = 16.5' | | | |
| Wed | | | | | | | |
| 0 | 180°17.9 | S23°25.9 | | 17°16.9 | 0.9' | N27°20.4 | 2.6' |
| 1 | 195°17.6 | 25.9 | | 31°36.7 | 0.8' | 27°23.1 | 2.4' |
| 2 | 210°17.3 | 25.9 | | 45°56.6 | 0.8' | 27°25.4 | 2.2' |
| 3 | 225°17.0 | 25.9 | | 60°16.4 | 0.7' | 27°27.6 | 2.0' |
| 4 | 240°16.6 | 25.8 | | 74°36.1 | 0.7' | 27°29.6 | 1.7' |
| 5 | 255°16.3 | 25.8 | | 88°55.7 | 0.6' | 27°31.3 | 1.5' |
| 6 | 270°16.0 | S23°25.8 | | 103°15.4 | 0.6' | N27°32.9 | 1.3' |
| 7 | 285°15.7 | 25.8 | | 117°35.0 | 0.5' | 27°34.2 | 1.1' |
| 8 | 300°15.4 | 25.7 | | 131°54.5 | 0.5' | 27°35.3 | 0.9' |
| 9 | 315°15.1 | 25.7 | | 146°14.0 | 0.5' | 27°36.1 | 0.6' |
| 10 | 330°14.8 | 25.7 | | 160°33.5 | 0.5' | 27°36.8 | 0.4' |
| 11 | 345°14.5 | 25.7 | | 174°53.0 | 0.4' | 27°37.2 | 0.2' |
| 12 | 0°14.2 | S23°25.6 | | 189°12.4 | 0.4' | N27°37.4 | -0.0' |
| 13 | 15°13.9 | 25.6 | | 203°31.8 | 0.4' | 27°37.4 | -0.2' |
| 14 | 30°13.5 | 25.6 | | 217°51.2 | 0.4' | 27°37.2 | -0.5' |
| 15 | 45°13.2 | 25.5 | | 232°10.6 | 0.4' | 27°36.7 | -0.7' |
| 16 | 60°12.9 | 25.5 | | 246°30.0 | 0.4' | 27°36.0 | -0.9' |
| 17 | 75°12.6 | 25.4 | | 260°49.3 | 0.4' | 27°35.1 | -1.1' |
| 18 | 90°12.3 | S23°25.4 | | 275°08.7 | 0.4' | N27°34.0 | -1.3' |
| 19 | 105°12.0 | 25.4 | | 289°28.1 | 0.4' | 27°32.6 | -1.6' |
| 20 | 120°11.7 | 25.3 | | 303°47.5 | 0.4' | 27°31.1 | -1.8' |
| 21 | 135°11.4 | 25.3 | | 318°06.9 | 0.4' | 27°29.3 | -2.0' |
| 22 | 150°11.1 | 25.3 | | 332°26.3 | 0.4' | 27°27.3 | -2.2' |
| 23 | 165°10.8 | 25.2 | | 346°45.7 | 0.4' | 27°25.0 | -2.5' |
| SD = 16.3' | | | $d = -0.0'$ | SD = 16.7' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 08:26 | 10:58 | ■ | ■ | 12:59 | 15:31 |
| N 70° | 08:06 | 09:55 | ■ | ■ | 14:02 | 15:51 |
| 68° | 07:50 | 09:20 | ■ | ■ | 14:38 | 16:07 |
| 66° | 07:37 | 08:54 | 10:35 | 13:22 | 15:03 | 16:20 |
| 64° | 07:26 | 08:34 | 09:53 | 14:05 | 15:23 | 16:31 |
| 62° | 07:16 | 08:18 | 09:24 | 14:33 | 15:39 | 16:41 |
| 60° | 07:08 | 08:05 | 09:02 | 14:55 | 15:52 | 16:49 |
| N 58° | 07:00 | 07:53 | 08:45 | 15:12 | 16:04 | 16:57 |
| 56° | 06:53 | 07:43 | 08:30 | 15:27 | 16:14 | 17:04 |
| 54° | 06:47 | 07:34 | 08:17 | 15:40 | 16:24 | 17:10 |
| 52° | 06:42 | 07:25 | 08:06 | 15:51 | 16:32 | 17:16 |
| 50° | 06:36 | 07:18 | 07:56 | 16:01 | 16:39 | 17:21 |
| 45° | 06:24 | 07:02 | 07:36 | 16:22 | 16:55 | 17:33 |
| N 40° | 06:14 | 06:48 | 07:19 | 16:38 | 17:09 | 17:43 |
| 35° | 06:05 | 06:36 | 07:05 | 16:53 | 17:21 | 17:53 |
| 30° | 05:56 | 06:26 | 06:52 | 17:05 | 17:31 | 18:01 |
| 20° | 05:39 | 06:07 | 06:31 | 17:26 | 17:50 | 18:18 |
| N 10° | 05:23 | 05:49 | 06:12 | 17:45 | 18:08 | 18:34 |
| 0° | 05:06 | 05:32 | 05:55 | 18:02 | 18:25 | 18:51 |
| S 10° | 04:47 | 05:14 | 05:37 | 18:20 | 18:43 | 19:10 |
| 20° | 04:24 | 04:54 | 05:18 | 18:39 | 19:03 | 19:33 |
| 30° | 03:55 | 04:29 | 04:56 | 19:01 | 19:28 | 20:02 |
| 35° | 03:37 | 04:13 | 04:43 | 19:14 | 19:44 | 20:21 |
| 40° | 03:13 | 03:55 | 04:28 | 19:29 | 20:02 | 20:44 |
| 45° | 02:43 | 03:32 | 04:10 | 19:47 | 20:25 | 21:14 |
| S 50° | 01:57 | 03:03 | 03:47 | 20:10 | 20:54 | 22:00 |
| 52° | 01:29 | 02:47 | 03:36 | 20:21 | 21:10 | 22:28 |
| 54° | 00:42 | 02:29 | 03:24 | 20:33 | 21:28 | 23:15 |
| 56° | //// | 02:07 | 03:10 | 20:47 | 21:50 | //// |
| 58° | //// | 01:37 | 02:53 | 21:04 | 22:20 | //// |
| S 60° | //// | 00:46 | 02:32 | 21:25 | 23:11 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Mon | Tue | Wed | Mon | Tue | Wed |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | □ | □ | □ | □ |
| 68° | □ | □ | □ | □ | □ | □ |
| 66° | 10:19 | □ | □ | 07:51 | □ | □ |
| 64° | 11:09 | □ | □ | 07:02 | □ | □ |
| 62° | 11:40 | 11:44 | 12:13 | 06:31 | 08:38 | 10:29 |
| 60° | 12:04 | 12:23 | 13:10 | 06:08 | 07:59 | 09:33 |
| N 58° | 12:24 | 12:50 | 13:43 | 05:49 | 07:32 | 09:00 |
| 56° | 12:40 | 13:12 | 14:08 | 05:34 | 07:11 | 08:35 |
| 54° | 12:53 | 13:30 | 14:28 | 05:21 | 06:54 | 08:15 |
| 52° | 13:06 | 13:45 | 14:44 | 05:09 | 06:39 | 07:58 |
| 50° | 13:16 | 13:58 | 14:59 | 04:59 | 06:26 | 07:44 |
| 45° | 13:39 | 14:26 | 15:28 | 04:38 | 05:59 | 07:15 |
| N 40° | 13:57 | 14:47 | 15:51 | 04:20 | 05:38 | 06:52 |
| 35° | 14:13 | 15:05 | 16:10 | 04:06 | 05:21 | 06:33 |
| 30° | 14:26 | 15:21 | 16:26 | 03:53 | 05:05 | 06:17 |
| 20° | 14:49 | 15:47 | 16:53 | 03:32 | 04:40 | 05:49 |
| N 10° | 15:09 | 16:10 | 17:17 | 03:14 | 04:18 | 05:26 |
| 0° | 15:28 | 16:32 | 17:39 | 02:57 | 03:58 | 05:04 |
| S 10° | 15:47 | 16:53 | 18:01 | 02:40 | 03:37 | 04:42 |
| 20° | 16:07 | 17:17 | 18:25 | 02:22 | 03:16 | 04:18 |
| 30° | 16:31 | 17:44 | 18:53 | 02:01 | 02:50 | 03:50 |
| 35° | 16:45 | 18:00 | 19:09 | 01:49 | 02:36 | 03:34 |
| 40° | 17:01 | 18:18 | 19:28 | 01:35 | 02:19 | 03:15 |
| 45° | 17:21 | 18:41 | 19:51 | 01:18 | 01:58 | 02:52 |
| S 50° | 17:46 | 19:10 | 20:21 | 00:58 | 01:33 | 02:23 |
| 52° | 17:57 | 19:24 | 20:35 | 00:49 | 01:20 | 02:08 |
| 54° | 18:11 | 19:40 | 20:52 | 00:38 | 01:06 | 01:52 |
| 56° | 18:27 | 20:00 | 21:12 | 00:26 | 00:50 | 01:32 |
| 58° | 18:46 | 20:25 | 21:37 | 00:12 | 00:30 | 01:07 |
| S 60° | 19:09 | 20:58 | 22:11 | | 00:06 | 00:34 |

| Day | Sun | | Mer. Pass | Moon | | Age 12-14 87-98% |
|-----|-----------------------------------|-----------------------|-----------|-----------------------|-------------|---|
| | Eqn.of Time 00 ^h mm:ss | 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 21 | 02:11 | 01:56 | 11:58 | 21:43 | 09:12 |  |
| 22 | 01:41 | 01:26 | 11:59 | 22:48 | 10:15 | |
| 23 | 01:12 | 00:57 | 11:59 | 23:55 | 11:21 | |


December 24, 25, 26 UT (Thu., Fri., Sat.)

| h | Aries | | | Venus | | | Mars | | | Jupiter | | | Saturn | | | Stars | | |
|-----------------|----------|----------|--------------------|----------|----------|---------------------|----------|----------|--------------------|---------------------|----------|-------------------|--------|-----|-----|-------|--|--|
| Thu | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | SHA | Dec | | | |
| 0 | 92°32.4 | 228°17.0 | S13°27.0 | 291°09.2 | N11°07.3 | 303°10.7 | N13°24.8 | 84°07.9 | N00°55.1 | Alpheratz | 357°33.1 | 29°14.6 | | | | | | |
| 1 | 107°34.8 | 243°17.2 | 27.6 | 306°11.2 | 07.2 | 318°13.2 | 24.8 | 99°10.3 | 55.2 | Ankaa | 353°05.5 | -42°09.7 | | | | | | |
| 2 | 122°37.3 | 258°17.4 | 28.2 | 321°13.2 | 07.1 | 333°15.8 | 24.9 | 114°12.7 | 55.2 | Schedar | 349°29.1 | 56°41.5 | | | | | | |
| 3 | 137°39.8 | 273°17.5 | •• 28.8 | 336°15.1 | •• 06.9 | 348°18.3 | •• 24.9 | 129°15.1 | •• 55.2 | Diphda | 348°45.6 | -17°50.4 | | | | | | |
| 4 | 152°42.2 | 288°17.7 | 29.4 | 351°17.1 | 06.8 | 3°20.8 | 25.0 | 144°17.5 | 55.3 | Achernar | 335°18.8 | -57°06.2 | | | | | | |
| 5 | 167°44.7 | 303°17.8 | 30.0 | 6°19.1 | 06.7 | 18°23.4 | 25.0 | 159°19.9 | 55.3 | Hamal | 327°49.2 | 23°35.6 | | | | | | |
| 6 | 182°47.2 | 318°18.0 | S13°30.6 | 21°21.1 | N11°06.6 | 33°25.9 | N13°25.1 | 174°22.3 | N00°55.3 | Polaris | 312°48.0 | 89°22.9 | | | | | | |
| 7 | 197°49.6 | 333°18.1 | 31.2 | 36°23.0 | 06.5 | 48°28.5 | 25.1 | 189°24.8 | 55.4 | Acamar | 315°10.3 | -40°11.9 | | | | | | |
| 8 | 212°52.1 | 348°18.2 | 31.7 | 51°25.0 | 06.4 | 63°31.0 | 25.1 | 204°27.2 | 55.4 | Menkar | 314°04.2 | 4°11.8 | | | | | | |
| 9 | 227°54.6 | 3°18.4 | •• 32.3 | 66°27.0 | •• 06.3 | 78°33.6 | •• 25.2 | 219°29.6 | •• 55.4 | Mirfak | 308°25.5 | 49°57.6 | | | | | | |
| 10 | 242°57.0 | 18°18.5 | 32.9 | 81°29.0 | 06.2 | 93°36.1 | 25.2 | 234°32.0 | 55.5 | Aldebaran | 290°37.4 | 16°33.8 | | | | | | |
| 11 | 257°59.5 | 33°18.7 | 33.5 | 96°31.0 | 06.1 | 108°38.7 | 25.3 | 249°34.4 | 55.5 | Rigel | 281°02.0 | -8°10.2 | | | | | | |
| 12 | 273°01.9 | 48°18.8 | S13°34.1 | 111°32.9 | N11°06.0 | 123°41.2 | N13°25.3 | 264°36.8 | N00°55.5 | Capella | 280°19.0 | 46°01.5 | | | | | | |
| 13 | 288°04.4 | 63°19.0 | 34.7 | 126°34.9 | 05.9 | 138°43.8 | 25.3 | 279°39.2 | 55.6 | Bellatrix | 278°20.8 | 6°22.4 | | | | | | |
| 14 | 303°06.9 | 78°19.1 | 35.3 | 141°36.9 | 05.8 | 153°46.3 | 25.4 | 294°41.6 | 55.6 | Elmath | 277°59.4 | 28°37.8 | | | | | | |
| 15 | 318°09.3 | 93°19.2 | •• 35.9 | 156°38.9 | •• 05.7 | 168°48.9 | •• 25.4 | 309°44.1 | •• 55.6 | Alnilam | 275°35.7 | -1°11.1 | | | | | | |
| 16 | 333°11.8 | 108°19.4 | 36.5 | 171°40.9 | 05.6 | 183°51.4 | 25.5 | 324°46.5 | 55.7 | Betelgeuse | 270°50.0 | 7°24.7 | | | | | | |
| 17 | 348°14.3 | 123°19.5 | 37.1 | 186°42.8 | 05.5 | 198°54.0 | 25.5 | 339°48.9 | 55.7 | Canopus | 263°51.1 | -52°42.6 | | | | | | |
| 18 | 3°16.7 | 138°19.6 | S13°37.7 | 201°44.8 | N11°05.4 | 213°56.6 | N13°25.5 | 354°51.3 | N00°55.7 | Sirius | 258°24.5 | -16°45.2 | | | | | | |
| 19 | 18°19.2 | 153°19.8 | 38.3 | 216°46.8 | 05.3 | 228°59.1 | 25.6 | 9°53.7 | 55.8 | Adhara | 255°04.2 | -29°00.5 | | | | | | |
| 20 | 33°21.7 | 168°19.9 | 38.9 | 231°48.8 | 05.2 | 244°01.7 | 25.6 | 24°56.1 | 55.8 | Procyon | 244°48.8 | 5°09.3 | | | | | | |
| 21 | 48°24.1 | 183°20.0 | •• 39.4 | 246°50.8 | •• 05.1 | 259°04.2 | •• 25.7 | 39°58.5 | •• 55.8 | Pollux | 243°15.0 | 27°57.5 | | | | | | |
| 22 | 63°26.6 | 198°20.2 | 40.0 | 261°52.8 | 05.0 | 274°06.8 | 25.7 | 55°00.9 | 55.9 | Avior | 234°13.5 | -59°35.6 | | | | | | |
| 23 | 78°29.1 | 213°20.3 | 40.6 | 276°54.8 | 04.9 | 289°09.3 | 25.8 | 70°03.3 | 55.9 | Suhail | 222°44.8 | -43°32.4 | | | | | | |
| Mer.pass. 17:47 | | | ν0.2' d0.6' m-4.67 | | | ν2.0' d-0.1' m0.03 | | | ν2.5' d0.0' m-2.36 | | | ν2.4' d0.0' m0.70 | | | | | | |
| Fri | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | Denebola | 182°23.3 | 14°25.1 | | | | | | |
| 0 | 93°31.5 | 228°20.4 | S13°41.2 | 291°56.8 | N11°04.8 | 304°11.9 | N13°25.8 | 85°05.8 | N00°55.9 | Gienah | 175°41.9 | -17°41.5 | | | | | | |
| 1 | 108°34.0 | 243°20.6 | 41.8 | 306°58.8 | 04.7 | 319°14.4 | 25.8 | 100°08.2 | 56.0 | Acrux | 172°58.3 | -63°14.7 | | | | | | |
| 2 | 123°36.4 | 258°20.7 | 42.4 | 322°00.7 | 04.6 | 334°17.0 | 25.9 | 115°10.6 | 56.0 | Gacrux | 171°49.9 | -57°15.6 | | | | | | |
| 3 | 138°38.9 | 273°20.8 | •• 43.0 | 337°02.7 | •• 04.5 | 349°19.5 | •• 25.9 | 130°13.0 | •• 56.0 | Alioth | 166°11.7 | 55°48.4 | | | | | | |
| 4 | 153°41.4 | 288°20.9 | 43.6 | 352°04.7 | 04.4 | 4°22.1 | 26.0 | 145°15.4 | 56.1 | Spica | 158°20.7 | -11°18.1 | | | | | | |
| 5 | 168°43.8 | 303°21.1 | 44.2 | 7°06.7 | 04.3 | 19°24.6 | 26.0 | 160°17.8 | 56.1 | Alkaid | 152°51.0 | 49°10.4 | | | | | | |
| 6 | 183°46.3 | 318°21.2 | S13°44.8 | 22°08.7 | N11°04.2 | 34°27.2 | N13°26.1 | 175°20.2 | N00°56.2 | Hadar | 148°34.0 | -60°30.0 | | | | | | |
| 7 | 198°48.8 | 333°21.3 | 45.4 | 37°10.7 | 04.1 | 49°29.8 | 26.1 | 190°22.6 | 56.2 | Menkent | 147°55.9 | -36°30.0 | | | | | | |
| 8 | 213°51.2 | 348°21.4 | 46.0 | 52°12.7 | 04.0 | 64°32.3 | 26.1 | 205°25.0 | 56.2 | Arcturus | 145°46.6 | 19°02.4 | | | | | | |
| 9 | 228°53.7 | 3°21.5 | •• 46.6 | 67°14.7 | •• 03.9 | 79°34.9 | •• 26.2 | 220°27.4 | •• 56.3 | Rigel Kent. | 139°38.4 | -60°56.6 | | | | | | |
| 10 | 243°56.2 | 18°21.6 | 47.2 | 82°16.7 | 03.8 | 94°37.4 | 26.2 | 235°29.8 | 56.3 | Kochab | 137°20.7 | 74°02.3 | | | | | | |
| 11 | 258°58.6 | 33°21.8 | 47.8 | 97°18.7 | 03.7 | 109°40.0 | 26.3 | 250°32.2 | 56.3 | Zuben'ubi | 136°54.4 | -16°09.2 | | | | | | |
| 12 | 274°01.1 | 48°21.9 | S13°48.4 | 112°20.7 | N11°03.6 | 124°42.5 | N13°26.3 | 265°34.7 | N00°56.4 | Alphecca | 126°02.7 | 26°37.3 | | | | | | |
| 13 | 289°03.6 | 63°22.0 | 49.0 | 127°22.7 | 03.5 | 139°45.1 | 26.4 | 280°37.1 | 56.4 | Antares | 112°14.2 | -26°29.4 | | | | | | |
| 14 | 304°06.0 | 78°22.1 | 49.5 | 142°24.7 | 03.4 | 154°47.7 | 26.4 | 295°39.5 | 56.4 | Atria | 107°07.5 | -69°04.4 | | | | | | |
| 15 | 319°08.5 | 93°22.2 | •• 50.1 | 157°26.7 | •• 03.3 | 169°50.2 | •• 26.5 | 310°41.9 | •• 56.5 | Sabik | 102°01.3 | -15°45.5 | | | | | | |
| 16 | 334°10.9 | 108°22.3 | 50.7 | 172°28.8 | 03.2 | 184°52.8 | 26.5 | 325°44.3 | 56.5 | Shaula | 96°08.6 | -37°07.3 | | | | | | |
| 17 | 349°13.4 | 123°22.4 | 51.3 | 187°30.8 | 03.1 | 199°55.3 | 26.5 | 340°46.7 | 56.5 | Rasalhague | 95°57.4 | 12°32.4 | | | | | | |
| 18 | 4°15.9 | 138°22.5 | S13°51.9 | 202°32.8 | N11°03.0 | 214°57.9 | N13°26.6 | 355°49.1 | N00°56.6 | Eltanin | 90°42.0 | 51°29.1 | | | | | | |
| 19 | 19°18.3 | 153°22.6 | 52.5 | 217°34.8 | 02.9 | 230°00.5 | 26.6 | 10°51.5 | 56.6 | Kaus Aust. | 83°30.8 | -34°22.3 | | | | | | |
| 20 | 34°20.8 | 168°22.8 | 53.1 | 232°36.8 | 02.8 | 245°03.0 | 26.7 | 25°53.9 | 56.7 | Vega | 80°32.6 | 38°48.5 | | | | | | |
| 21 | 49°23.3 | 183°22.9 | •• 53.7 | 247°38.8 | •• 02.8 | 260°05.6 | •• 26.7 | 40°56.3 | •• 56.7 | Nunki | 75°46.1 | -26°15.8 | | | | | | |
| 22 | 64°25.7 | 198°23.0 | 54.3 | 262°40.8 | 02.7 | 275°08.1 | 26.8 | 55°58.7 | 56.7 | Altair | 61°58.7 | 8°56.4 | | | | | | |
| 23 | 79°28.2 | 213°23.1 | 54.9 | 277°42.8 | 02.6 | 290°10.7 | 26.8 | 71°01.1 | 56.8 | Peacock | 53°03.7 | -56°39.0 | | | | | | |
| Mer.pass. 17:43 | | | ν0.1' d0.6' m-4.66 | | | ν2.0' d-0.1' m0.01 | | | ν2.6' d0.0' m-2.36 | | | ν2.4' d0.0' m0.71 | | | | | | |
| Sat | GHA | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec | Deneb | 49°25.1 | 45°22.8 | | | | | | |
| 0 | 94°30.7 | 228°23.2 | S13°55.5 | 292°44.8 | N11°02.5 | 305°13.3 | N13°26.9 | 86°03.5 | N00°56.8 | Enif | 33°37.4 | 10°00.0 | | | | | | |
| 1 | 109°33.1 | 243°23.3 | 56.1 | 307°46.9 | 02.4 | 320°15.8 | 26.9 | 101°05.9 | 56.8 | Al Na'ir | 27°31.2 | -46°50.0 | | | | | | |
| 2 | 124°35.6 | 258°23.4 | 56.7 | 322°48.9 | 02.3 | 335°18.4 | 27.0 | 116°08.3 | 56.9 | Fomalhaut | 15°12.9 | -29°28.9 | | | | | | |
| 3 | 139°38.0 | 273°23.5 | •• 57.3 | 337°50.9 | •• 02.2 | 350°21.0 | •• 27.0 | 131°10.8 | •• 56.9 | Scheat | 13°43.7 | 28°14.0 | | | | | | |
| 4 | 154°40.5 | 288°23.6 | 57.9 | 352°52.9 | 02.1 | 5°23.5 | 27.0 | 146°13.2 | 56.9 | Markab | 13°28.4 | 15°21.2 | | | | | | |
| 5 | 169°43.0 | 303°23.7 | 58.5 | 7°54.9 | 02.0 | 20°26.1 | 27.1 | 161°15.6 | 57.0 | Dec 24 Thu | | | | | | | | |
| 6 | 184°45.4 | 318°23.8 | S13°59.1 | 22°56.9 | N11°01.9 | 35°28.6 | N13°27.1 | 176°18.0 | N00°57.0 | Venus | 135°44.7 | 08:47 | | | | | | |
| 7 | 199°47.9 | 333°23.8 | 13°59.7 | 37°59.0 | 01.9 | 50°31.2 | 27.2 | 191°20.4 | 57.1 | Mars | 198°36.9 | 04:35 | | | | | | |
| 8 | 214°50.4 | 348°23.9 | 14°00.3 | 53°01.0 | 01.8 | 65°33.8 | 27.2 | 206°22.8 | 57.1 | Jupiter | 210°38.3 | 03:47 | | | | | | |
| 9 | 229°52.8 | 3°24.0 | •• 00.9 | 68°03.0 | •• 01.7 | 80°36.3 | •• 27.3 | 221°25.2 | •• 57.1 | Saturn | 351°35.5 | 18:21 | | | | | | |
| 10 | 244°55.3 | 18°24.1 | 01.5 | 83°05.0 | 01.6 | 95°38.9 | 27.3 | 236°27.6 | 57.2 | Dec 25 Fri | | | | | | | | |
| 11 | 259°57.8 | 33°24.2 | 02.1 | 98°07.1 | 01.5 | 110°41.5 | 27.4 | 251°30.0 | 57.2 | Venus | 134°48.9 | 08:47 | | | | | | |
| 12 | 275°00.2 | 48°24.3 | S14°02.7 | 113°09.1 | N11°01.4 | 125°44.0 | N13°27.4 | 266°32.4 | N00°57.2 | Mars | 198°25.2 | 04:32 | | | | | | |
| 13 | 290°02.7 | 63°24.4 | 03.3 | 128°11.1 | 01.3 | 140°46.6 | 27.5 | 281°34.8 | 57.3 | Jupiter | 210°40.4 | 03:43 | | | | | | |
| 14 | 305°05.2 | 78°24.5 | 03.9 | 143°13.1 | 01.3 | 155°49.2 | 27.5 | 296°37.2 | 57.3 | Saturn | 351°34.2 | 18:17 | | | | | | |
| 15 | 320°07.6 | 93°24.6 | •• 04.5 | 158°15.2 | •• 01.2 | 170°51.7 | •• 27.6 | 311°39.6 | •• 57.4 | Dec 26 Sat | | | | | | | | |
| 16 | 335°10.1 | 108°24.6 | 05.1 | 173°17.2 | 01.1 | 185°54.3 | 27.6 | 326°42.0 | 57.4 | Venus | 133°52.5 | 08:46 | | | | | | |
| 17 | 350°12.5 | 123°24.7 | 05.7 | 188°19.2 | 01.0 | 200°56.9 | 27.7 | 341°44.4 | 57.4 | Mars | 198°14.2 | 04:28 | | | | | | |
| 18 | 5°15.0 | 138°24.8 | S14°06.3 | 203°21.3 | N11°00.9 | 215°59.4 | N13°27.7 | 356°46.8 | N00°57.5 | Jupiter | 210°42.6 | 03:38 | | | | | | |
| 19 | 20°17.5 | 153°24.9 | 06.9 | 218°23.3 | 00.8 | 231°02.0 | 27.7 | 11°49.2 | 57.5 | Saturn | 351°32.9 | 18:13 | | | | | | |
| 20 | 35°19.9 | 168°25.0 | 07.5 | 233°25.3 | 00.8 | 246°04.6 | 27.8 | 26°51.6 | 57.5 | Horizontal parallax | | | | | | | | |
| 21 | 50°22.4 | 183°25.0 | •• 08.1 | 248°27.4 | •• 00.7 | 261°07.1 | •• 27.8 | 41°54.0 | •• 57.6 | Venus: | 0.2 | | | | | | | |
| 22 | 65°24.9 | 198°25.1 | 08.7 | 263°29.4 | 00.6 | 276°09.7 | 27.9 | 56°56.4 | 57.6 | Mars: | 0.2 | | | | | | | |
| 23 | 80°27.3 | 213°25.2 | 09.3 | 278°31.4 | 00.5 | 291°12.3 | 27.9 | 71°58.8 | 57.7 | | | | | | | | | |
| Mer.pass. 17:39 | | | ν0.1' d0.6' m-4.65 | | | ν2.0' d-0.1' m-0.01 | | | ν2.6' d0.0' m-2.37 | | | ν2.4' d0.0' m0.71 | | | | | | |

| h | | Sun | | Moon | | | |
|-----|----------|------------------------|----------|------------|----------|--------|-------|
| Thu | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 180°10.5 | S23°25.2 | 1°05.1 | 0.5' | N27°22.6 | -2.7' | 61.4' |
| 1 | 195°10.1 | 25.1 | 15°24.6 | 0.5' | 27°19.9 | -2.9' | 61.4' |
| 2 | 210°09.8 | 25.1 | 29°44.1 | 0.5' | 27°17.0 | -3.1' | 61.4' |
| 3 | 225°09.5 | •• 25.0 | 44°03.7 | 0.6' | 27°13.9 | -3.3' | 61.4' |
| 4 | 240°09.2 | 25.0 | 58°23.2 | 0.6' | 27°10.5 | -3.6' | 61.4' |
| 5 | 255°08.9 | 25.0 | 72°42.9 | 0.7' | 27°07.0 | -3.8' | 61.4' |
| 6 | 270°08.6 | S23°24.9 | 87°02.5 | 0.7' | N27°03.2 | -4.0' | 61.4' |
| 7 | 285°08.3 | 24.9 | 101°22.2 | 0.8' | 26°59.2 | -4.2' | 61.4' |
| 8 | 300°08.0 | 24.8 | 115°42.0 | 0.8' | 26°55.0 | -4.4' | 61.4' |
| 9 | 315°07.7 | •• 24.8 | 130°01.8 | 0.9' | 26°50.6 | -4.6' | 61.4' |
| 10 | 330°07.4 | 24.7 | 144°21.7 | 0.9' | 26°46.0 | -4.8' | 61.4' |
| 11 | 345°07.0 | 24.7 | 158°41.6 | 1.0' | 26°41.1 | -5.1' | 61.4' |
| 12 | 0°06.7 | S23°24.6 | 173°01.6 | 1.1' | N26°36.1 | -5.3' | 61.4' |
| 13 | 15°06.4 | 24.6 | 187°21.7 | 1.1' | 26°30.8 | -5.5' | 61.4' |
| 14 | 30°06.1 | 24.5 | 201°41.8 | 1.2' | 26°25.4 | -5.7' | 61.4' |
| 15 | 45°05.8 | •• 24.5 | 216°02.0 | 1.3' | 26°19.7 | -5.9' | 61.4' |
| 16 | 60°05.5 | 24.4 | 230°22.3 | 1.4' | 26°13.8 | -6.1' | 61.4' |
| 17 | 75°05.2 | 24.3 | 244°42.6 | 1.4' | 26°07.7 | -6.3' | 61.4' |
| 18 | 90°04.9 | S23°24.3 | 259°03.1 | 1.5' | N26°01.4 | -6.5' | 61.4' |
| 19 | 105°04.6 | 24.2 | 273°23.6 | 1.6' | 25°54.9 | -6.7' | 61.4' |
| 20 | 120°04.3 | 24.2 | 287°44.2 | 1.7' | 25°48.2 | -6.9' | 61.4' |
| 21 | 135°04.0 | •• 24.1 | 302°04.9 | 1.8' | 25°41.4 | -7.1' | 61.4' |
| 22 | 150°03.6 | 24.1 | 316°25.7 | 1.9' | 25°34.3 | -7.3' | 61.3' |
| 23 | 165°03.3 | 24.0 | 330°46.6 | 2.0' | 25°27.0 | -7.5' | 61.3' |
| | | SD = 16.3' $d = -0.0'$ | | SD = 16.7' | | | |
| Fri | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 180°03.0 | S23°23.9 | 345°07.6 | 2.1' | N25°19.5 | -7.7' | 61.3' |
| 1 | 195°02.7 | 23.9 | 359°28.7 | 2.2' | 25°11.9 | -7.9' | 61.3' |
| 2 | 210°02.4 | 23.8 | 13°49.9 | 2.3' | 25°04.0 | -8.0' | 61.3' |
| 3 | 225°02.1 | •• 23.8 | 28°11.2 | 2.4' | 24°56.0 | -8.2' | 61.3' |
| 4 | 240°01.8 | 23.7 | 42°32.6 | 2.5' | 24°47.7 | -8.4' | 61.3' |
| 5 | 255°01.5 | 23.6 | 56°54.1 | 2.6' | 24°39.3 | -8.6' | 61.3' |
| 6 | 270°01.2 | S23°23.6 | 71°15.8 | 2.7' | N24°30.8 | -8.8' | 61.3' |
| 7 | 285°00.9 | 23.5 | 85°37.5 | 2.9' | 24°22.0 | -8.9' | 61.3' |
| 8 | 300°00.6 | 23.4 | 99°59.4 | 3.0' | 24°13.0 | -9.1' | 61.2' |
| 9 | 315°00.2 | •• 23.4 | 114°21.3 | 3.1' | 24°03.9 | -9.3' | 61.2' |
| 10 | 329°59.9 | 23.3 | 128°43.4 | 3.2' | 23°54.6 | -9.5' | 61.2' |
| 11 | 344°59.6 | 23.2 | 143°05.6 | 3.3' | 23°45.2 | -9.6' | 61.2' |
| 12 | 359°59.3 | S23°23.1 | 157°28.0 | 3.4' | N23°35.5 | -9.8' | 61.2' |
| 13 | 14°59.0 | 23.1 | 171°50.4 | 3.6' | 23°25.8 | -10.0' | 61.2' |
| 14 | 29°58.7 | 23.0 | 186°13.0 | 3.7' | 23°15.8 | -10.1' | 61.1' |
| 15 | 44°58.4 | •• 22.9 | 200°35.7 | 3.8' | 23°05.7 | -10.3' | 61.1' |
| 16 | 59°58.1 | 22.9 | 214°58.5 | 3.9' | 22°55.4 | -10.4' | 61.1' |
| 17 | 74°57.8 | 22.8 | 229°21.5 | 4.1' | 22°45.0 | -10.6' | 61.1' |
| 18 | 89°57.5 | S23°22.7 | 243°44.5 | 4.2' | N22°34.4 | -10.7' | 61.1' |
| 19 | 104°57.2 | 22.6 | 258°07.7 | 4.3' | 22°23.6 | -10.9' | 61.1' |
| 20 | 119°56.9 | 22.6 | 272°31.1 | 4.5' | 22°12.7 | -11.0' | 61.0' |
| 21 | 134°56.5 | •• 22.5 | 286°54.5 | 4.6' | 22°01.7 | -11.2' | 61.0' |
| 22 | 149°56.2 | 22.4 | 301°18.1 | 4.7' | 21°50.5 | -11.3' | 61.0' |
| 23 | 164°55.9 | 22.3 | 315°41.9 | 4.9' | 21°39.2 | -11.5' | 61.0' |
| | | SD = 16.3' $d = -0.1'$ | | SD = 16.7' | | | |
| Sat | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 179°55.6 | S23°22.2 | 330°05.7 | 5.0' | N21°27.7 | -11.6' | 61.0' |
| 1 | 194°55.3 | 22.2 | 344°29.7 | 5.1' | 21°16.1 | -11.7' | 60.9' |
| 2 | 209°55.0 | 22.1 | 358°53.8 | 5.3' | 21°04.3 | -11.9' | 60.9' |
| 3 | 224°54.7 | •• 22.0 | 13°18.1 | 5.4' | 20°52.5 | -12.0' | 60.9' |
| 4 | 239°54.4 | 21.9 | 27°42.5 | 5.5' | 20°40.4 | -12.1' | 60.9' |
| 5 | 254°54.1 | 21.8 | 42°07.0 | 5.7' | 20°28.3 | -12.3' | 60.8' |
| 6 | 269°53.8 | S23°21.7 | 56°31.7 | 5.8' | N20°16.0 | -12.4' | 60.8' |
| 7 | 284°53.5 | 21.7 | 70°56.4 | 5.9' | 20°03.6 | -12.5' | 60.8' |
| 8 | 299°53.2 | 21.6 | 85°21.4 | 6.1' | 19°51.1 | -12.6' | 60.8' |
| 9 | 314°52.9 | •• 21.5 | 99°46.4 | 6.2' | 19°38.5 | -12.7' | 60.7' |
| 10 | 329°52.5 | 21.4 | 114°11.6 | 6.3' | 19°25.8 | -12.9' | 60.7' |
| 11 | 344°52.2 | 21.3 | 128°36.9 | 6.5' | 19°12.9 | -13.0' | 60.7' |
| 12 | 359°51.9 | S23°21.2 | 143°02.4 | 6.6' | N18°59.9 | -13.1' | 60.7' |
| 13 | 14°51.6 | 21.1 | 157°28.0 | 6.7' | 18°46.8 | -13.2' | 60.6' |
| 14 | 29°51.3 | 21.0 | 171°53.7 | 6.9' | 18°33.6 | -13.3' | 60.6' |
| 15 | 44°51.0 | •• 20.9 | 186°19.5 | 7.0' | 18°20.3 | -13.4' | 60.6' |
| 16 | 59°50.7 | 20.8 | 200°45.5 | 7.1' | 18°06.9 | -13.5' | 60.5' |
| 17 | 74°50.4 | 20.7 | 215°11.6 | 7.2' | 17°53.4 | -13.6' | 60.5' |
| 18 | 89°50.1 | S23°20.6 | 229°37.9 | 7.4' | N17°39.8 | -13.7' | 60.5' |
| 19 | 104°49.8 | 20.6 | 244°04.3 | 7.5' | 17°26.2 | -13.8' | 60.5' |
| 20 | 119°49.5 | 20.5 | 258°30.8 | 7.6' | 17°12.4 | -13.9' | 60.4' |
| 21 | 134°49.2 | •• 20.4 | 272°57.4 | 7.8' | 16°58.5 | -14.0' | 60.4' |
| 22 | 149°48.9 | 20.3 | 287°24.2 | 7.9' | 16°44.5 | -14.1' | 60.4' |
| 23 | 164°48.5 | 20.2 | 301°51.0 | 8.0' | 16°30.5 | -14.1' | 60.3' |
| | | SD = 16.3' $d = -0.1'$ | | SD = 16.6' | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 08:27 | 10:57 | ■ | ■ | 13:03 | 15:33 |
| N 70° | 08:07 | 09:55 | ■ | ■ | 14:05 | 15:53 |
| 68° | 07:51 | 09:20 | ■ | ■ | 14:40 | 16:09 |
| 66° | 07:38 | 08:55 | 10:35 | 13:25 | 15:05 | 16:22 |
| 64° | 07:27 | 08:35 | 09:53 | 14:07 | 15:25 | 16:33 |
| 62° | 07:17 | 08:19 | 09:25 | 14:35 | 15:41 | 16:43 |
| 60° | 07:09 | 08:06 | 09:03 | 14:57 | 15:54 | 16:51 |
| N 58° | 07:01 | 07:54 | 08:46 | 15:14 | 16:06 | 16:59 |
| 56° | 06:55 | 07:44 | 08:31 | 15:29 | 16:16 | 17:06 |
| 54° | 06:48 | 07:35 | 08:19 | 15:42 | 16:25 | 17:12 |
| 52° | 06:43 | 07:27 | 08:07 | 15:53 | 16:34 | 17:17 |
| 50° | 06:37 | 07:19 | 07:58 | 16:03 | 16:41 | 17:23 |
| 45° | 06:26 | 07:03 | 07:37 | 16:23 | 16:57 | 17:34 |
| N 40° | 06:15 | 06:49 | 07:20 | 16:40 | 17:11 | 17:45 |
| 35° | 06:06 | 06:38 | 07:06 | 16:54 | 17:22 | 17:54 |
| 30° | 05:57 | 06:27 | 06:53 | 17:07 | 17:33 | 18:03 |
| 20° | 05:41 | 06:08 | 06:32 | 17:28 | 17:52 | 18:19 |
| N 10° | 05:25 | 05:51 | 06:14 | 17:46 | 18:09 | 18:36 |
| 0° | 05:08 | 05:34 | 05:56 | 18:04 | 18:26 | 18:53 |
| S 10° | 04:49 | 05:16 | 05:39 | 18:21 | 18:44 | 19:12 |
| 20° | 04:26 | 04:55 | 05:20 | 18:40 | 19:05 | 19:34 |
| 30° | 03:57 | 04:30 | 04:58 | 19:02 | 19:30 | 20:03 |
| 35° | 03:38 | 04:15 | 04:45 | 19:15 | 19:45 | 20:22 |
| 40° | 03:15 | 03:57 | 04:30 | 19:30 | 20:03 | 20:45 |
| 45° | 02:44 | 03:34 | 04:12 | 19:48 | 20:26 | 21:15 |
| S 50° | 01:59 | 03:04 | 03:49 | 20:11 | 20:55 | 22:01 |
| 52° | 01:31 | 02:49 | 03:38 | 20:22 | 21:11 | 22:29 |
| 54° | 00:45 | 02:31 | 03:26 | 20:34 | 21:28 | 23:14 |
| 56° | //// | 02:09 | 03:12 | 20:48 | 21:51 | //// |
| 58° | //// | 01:39 | 02:55 | 21:05 | 22:20 | //// |
| S 60° | //// | 00:49 | 02:34 | 21:25 | 23:10 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Thu | Fri | Sat | Thu | Fri | Sat |
| N 72° | □ | □ | □ | □ | □ | □ |
| N 70° | □ | □ | 16:29 | □ | □ | 13:01 |
| 68° | □ | □ | 17:11 | □ | □ | 12:17 |
| 66° | □ | 14:49 | 17:39 | □ | 12:34 | 11:48 |
| 64° | □ | 15:41 | 18:01 | □ | 11:41 | 11:25 |
| 62° | 14:01 | 16:13 | 18:17 | 11:04 | 11:08 | 11:07 |
| 60° | 14:42 | 16:37 | 18:31 | 10:23 | 10:44 | 10:52 |
| N 58° | 15:09 | 16:56 | 18:43 | 09:55 | 10:24 | 10:39 |
| 56° | 15:31 | 17:11 | 18:54 | 09:33 | 10:08 | 10:28 |
| 54° | 15:49 | 17:25 | 19:03 | 09:15 | 09:54 | 10:18 |
| 52° | 16:04 | 17:36 | 19:11 | 09:00 | 09:41 | 10:09 |
| 50° | 16:17 | 17:47 | 19:18 | 08:46 | 09:31 | 10:01 |
| 45° | 16:44 | 18:08 | 19:33 | 08:19 | 09:08 | 09:44 |
| N 40° | 17:05 | 18:26 | 19:46 | 07:57 | 08:49 | 09:30 |
| 35° | 17:23 | 18:40 | 19:57 | 07:39 | 08:34 | 09:18 |
| 30° | 17:38 | 18:53 | 20:06 | 07:23 | 08:20 | 09:08 |
| 20° | 18:04 | 19:14 | 20:22 | 06:56 | 07:57 | 08:50 |
| N 10° | 18:26 | 19:33 | 20:36 | 06:33 | 07:37 | 08:34 |
| 0° | 18:47 | 19:50 | 20:48 | 06:12 | 07:17 | 08:19 |
| S 10° | 19:07 | 20:07 | 21:01 | 05:50 | 06:58 | 08:03 |
| 20° | 19:29 | 20:26 | 21:15 | 05:27 | 06:38 | 07:47 |
| 30° | 19:55 | 20:47 | 21:30 | 04:59 | 06:14 | 07:28 |
| 35° | 20:10 | 20:59 | 21:39 | 04:43 | 05:59 | 07:17 |
| 40° | 20:27 | 21:13 | 21:50 | 04:24 | 05:43 | 07:04 |
| 45° | 20:48 | 21:30 | 22:01 | 04:02 | 05:23 | 06:49 |
| S 50° | 21:13 | 21:50 | 22:16 | 03:33 | 04:58 | 06:30 |
| 52° | 21:26 | 22:00 | 22:22 | 03:18 | 04:46 | 06:21 |
| 54° | 21:40 | 22:10 | 22:30 | 03:02 | 04:32 | 06:11 |
| 56° | 21:57 | 22:23 | 22:38 | 02:42 | 04:16 | 06:00 |
| 58° | 22:17 | 22:37 | 22:47 | 02:17 | 03:57 | 05:46 |
| S 60° | 22:41 | 22:53 | 22:58 | 01:43 | 03:33 | 05:31 |

| Day | Sun | | Mer. Pass | Moon | | Age 15-17 100-94% |
|-----|-------------------------------|----------------------------|-----------|------------------------|-------------|---|
| | Eqn. of 00 ^h mm:ss | Time 12 ^h mm:ss | | Mer. Pass. Upper hh:mm | Lower hh:mm | |
| 24 | 00:42 | 00:27 | 12:00 | —:— | 12:29 |  |
| 25 | 00:12 | 00:03 | 12:00 | 01:02 | 13:34 | |
| 26 | 00:18 | 00:32 | 12:01 | 02:05 | 14:34 | |

| h | Sun | | | Moon | | | |
|------------------------|----------|----------|------------|-------|----------|--------|-------|
| Sun | GHA | Dec | GHA | ν | Dec | d | HP |
| 0 | 179°48.2 | S23°20.1 | 316°18.1 | 8.1' | N16°16.3 | -14.2' | 60.3' |
| 1 | 194°47.9 | 20.0 | 330°45.2 | 8.3' | 16°02.1 | -14.3' | 60.3' |
| 2 | 209°47.6 | 19.9 | 345°12.5 | 8.4' | 15°47.8 | -14.4' | 60.2' |
| 3 | 224°47.3 | •• 19.8 | 359°39.8 | 8.5' | 15°33.4 | -14.5' | 60.2' |
| 4 | 239°47.0 | 19.7 | 14°07.4 | 8.6' | 15°19.0 | -14.5' | 60.2' |
| 5 | 254°46.7 | 19.6 | 28°35.0 | 8.8' | 15°04.4 | -14.6' | 60.1' |
| 6 | 269°46.4 | S23°19.4 | 43°02.7 | 8.9' | N14°49.8 | -14.7' | 60.1' |
| 7 | 284°46.1 | 19.3 | 57°30.6 | 9.0' | 14°35.2 | -14.7' | 60.1' |
| 8 | 299°45.8 | 19.2 | 71°58.6 | 9.1' | 14°20.4 | -14.8' | 60.0' |
| 9 | 314°45.5 | •• 19.1 | 86°26.7 | 9.2' | 14°05.6 | -14.9' | 60.0' |
| 10 | 329°45.2 | 19.0 | 100°54.9 | 9.3' | 13°50.8 | -14.9' | 60.0' |
| 11 | 344°44.9 | 18.9 | 115°23.3 | 9.5' | 13°35.9 | -15.0' | 59.9' |
| 12 | 359°44.6 | S23°18.8 | 129°51.7 | 9.6' | N13°20.9 | -15.0' | 59.9' |
| 13 | 14°44.3 | 18.7 | 144°20.3 | 9.7' | 13°05.8 | -15.1' | 59.9' |
| 14 | 29°43.9 | 18.6 | 158°49.0 | 9.8' | 12°50.7 | -15.1' | 59.8' |
| 15 | 44°43.6 | •• 18.5 | 173°17.7 | 9.9' | 12°35.6 | -15.2' | 59.8' |
| 16 | 59°43.3 | 18.4 | 187°46.6 | 10.0' | 12°20.4 | -15.2' | 59.8' |
| 17 | 74°43.0 | 18.2 | 202°15.7 | 10.1' | 12°05.2 | -15.3' | 59.7' |
| 18 | 89°42.7 | S23°18.1 | 216°44.8 | 10.2' | N11°49.9 | -15.3' | 59.7' |
| 19 | 104°42.4 | 18.0 | 231°14.0 | 10.3' | 11°34.5 | -15.4' | 59.6' |
| 20 | 119°42.1 | 17.9 | 245°43.3 | 10.4' | 11°19.1 | -15.4' | 59.6' |
| 21 | 134°41.8 | •• 17.8 | 260°12.7 | 10.5' | 11°03.7 | -15.5' | 59.6' |
| 22 | 149°41.5 | 17.7 | 274°42.3 | 10.6' | 10°48.3 | -15.5' | 59.5' |
| 23 | 164°41.2 | 17.5 | 289°11.9 | 10.7' | 10°32.8 | -15.5' | 59.5' |
| SD = 16.3' $d = -0.1'$ | | | SD = 16.4' | | | | |

| Mon | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|--------|-------|
| 0 | 179°40.9 | S23°17.4 | 303°41.6 | 10.8' | N10°17.2 | -15.6' | 59.5' |
| 1 | 194°40.6 | 17.3 | 318°11.4 | 10.9' | 10°01.7 | -15.6' | 59.4' |
| 2 | 209°40.3 | 17.2 | 332°41.3 | 11.0' | 9°46.1 | -15.6' | 59.4' |
| 3 | 224°40.0 | •• 17.1 | 347°11.4 | 11.1' | 9°30.4 | -15.7' | 59.3' |
| 4 | 239°39.7 | 16.9 | 1°41.5 | 11.2' | 9°14.8 | -15.7' | 59.3' |
| 5 | 254°39.4 | 16.8 | 16°11.7 | 11.3' | 08°59.1 | -15.7' | 59.3' |
| 6 | 269°39.1 | S23°16.7 | 30°42.0 | 11.4' | N08°43.4 | -15.7' | 59.2' |
| 7 | 284°38.8 | 16.6 | 45°12.3 | 11.5' | 08°27.6 | -15.8' | 59.2' |
| 8 | 299°38.4 | 16.4 | 59°42.8 | 11.6' | 08°11.9 | -15.8' | 59.2' |
| 9 | 314°38.1 | •• 16.3 | 74°13.4 | 11.6' | 07°56.1 | -15.8' | 59.1' |
| 10 | 329°37.8 | 16.2 | 88°44.0 | 11.7' | 07°40.3 | -15.8' | 59.1' |
| 11 | 344°37.5 | 16.1 | 103°14.7 | 11.8' | 07°24.5 | -15.8' | 59.0' |
| 12 | 359°37.2 | S23°15.9 | 117°45.5 | 11.9' | N07°08.6 | -15.8' | 59.0' |
| 13 | 14°36.9 | 15.8 | 132°16.4 | 12.0' | 06°52.8 | -15.9' | 59.0' |
| 14 | 29°36.6 | 15.7 | 146°47.4 | 12.0' | 06°36.9 | -15.9' | 58.9' |
| 15 | 44°36.3 | •• 15.5 | 161°18.4 | 12.1' | 06°21.1 | -15.9' | 58.9' |
| 16 | 59°36.0 | 15.4 | 175°49.5 | 12.2' | 06°05.2 | -15.9' | 58.8' |
| 17 | 74°35.7 | 15.3 | 190°20.7 | 12.3' | 05°49.3 | -15.9' | 58.8' |
| 18 | 89°35.4 | S23°15.1 | 204°52.0 | 12.3' | N05°33.4 | -15.9' | 58.8' |
| 19 | 104°35.1 | 15.0 | 219°23.3 | 12.4' | 05°17.5 | -15.9' | 58.7' |
| 20 | 119°34.8 | 14.9 | 233°54.7 | 12.5' | 05°01.6 | -15.9' | 58.7' |
| 21 | 134°34.5 | •• 14.7 | 248°26.2 | 12.5' | 04°45.7 | -15.9' | 58.6' |
| 22 | 149°34.2 | 14.6 | 262°57.7 | 12.6' | 04°29.8 | -15.9' | 58.6' |
| 23 | 164°33.9 | 14.4 | 277°29.3 | 12.7' | 04°13.9 | -15.9' | 58.6' |
| SD = 16.3' $d = -0.1'$ | | | SD = 16.2' | | | | |

| Tue | GHA | Dec | GHA | ν | Dec | d | HP |
|------------------------|----------|----------|------------|-------|----------|--------|-------|
| 0 | 179°33.6 | S23°14.3 | 292°01.0 | 12.7' | N03°58.0 | -15.9' | 58.5' |
| 1 | 194°33.3 | 14.2 | 306°32.7 | 12.8' | 03°42.1 | -15.9' | 58.5' |
| 2 | 209°33.0 | 14.0 | 321°04.5 | 12.9' | 03°26.2 | -15.9' | 58.4' |
| 3 | 224°32.7 | •• 13.9 | 335°36.4 | 12.9' | 03°10.3 | -15.9' | 58.4' |
| 4 | 239°32.4 | 13.7 | 350°08.3 | 13.0' | 02°54.4 | -15.9' | 58.4' |
| 5 | 254°32.1 | 13.6 | 4°40.3 | 13.0' | 02°38.5 | -15.9' | 58.3' |
| 6 | 269°31.8 | S23°13.5 | 19°12.3 | 13.1' | N02°22.7 | -15.9' | 58.3' |
| 7 | 284°31.4 | 13.3 | 33°44.4 | 13.1' | 02°06.8 | -15.8' | 58.3' |
| 8 | 299°31.1 | 13.2 | 48°16.5 | 13.2' | 01°51.0 | -15.8' | 58.2' |
| 9 | 314°30.8 | •• 13.0 | 62°48.7 | 13.2' | 01°35.2 | -15.8' | 58.2' |
| 10 | 329°30.5 | 12.9 | 77°20.9 | 13.3' | 01°19.3 | -15.8' | 58.1' |
| 11 | 344°30.2 | 12.7 | 91°53.2 | 13.3' | 01°03.6 | -15.8' | 58.1' |
| 12 | 359°29.9 | S23°12.6 | 106°25.6 | 13.4' | N00°47.8 | -15.8' | 58.1' |
| 13 | 14°29.6 | 12.4 | 120°57.9 | 13.4' | 00°32.0 | -15.7' | 58.0' |
| 14 | 29°29.3 | 12.3 | 135°30.4 | 13.5' | 00°16.3 | -15.7' | 58.0' |
| 15 | 44°29.0 | •• 12.1 | 150°02.8 | 13.5' | N00°00.5 | -15.7' | 57.9' |
| 16 | 59°28.7 | 12.0 | 164°35.3 | 13.5' | S00°15.2 | 15.7' | 57.9' |
| 17 | 74°28.4 | 11.8 | 179°07.9 | 13.6' | 00°30.8 | 15.7' | 57.9' |
| 18 | 89°28.1 | S23°11.7 | 193°40.5 | 13.6' | S00°46.5 | 15.6' | 57.8' |
| 19 | 104°27.8 | 11.5 | 208°13.1 | 13.7' | 01°02.1 | 15.6' | 57.8' |
| 20 | 119°27.5 | 11.4 | 222°45.7 | 13.7' | 01°17.7 | 15.6' | 57.7' |
| 21 | 134°27.2 | •• 11.2 | 237°18.4 | 13.7' | 01°33.3 | 15.5' | 57.7' |
| 22 | 149°26.9 | 11.1 | 251°51.2 | 13.8' | 01°48.8 | 15.5' | 57.7' |
| 23 | 164°26.6 | 10.9 | 266°23.9 | 13.8' | 02°04.4 | 15.5' | 57.6' |
| SD = 16.3' $d = -0.1'$ | | | SD = 16.0' | | | | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 08:26 | 10:53 | ■ | ■ | 13:11 | 15:37 |
| N 70° | 08:07 | 09:54 | ■ | ■ | 14:09 | 15:56 |
| 68° | 07:51 | 09:20 | ■ | ■ | 14:44 | 16:12 |
| 66° | 07:38 | 08:55 | 10:33 | 13:30 | 15:08 | 16:25 |
| 64° | 07:27 | 08:35 | 09:52 | 14:11 | 15:28 | 16:36 |
| 62° | 07:18 | 08:20 | 09:25 | 14:38 | 15:44 | 16:45 |
| 60° | 07:09 | 08:06 | 09:03 | 15:00 | 15:57 | 16:54 |
| N 58° | 07:02 | 07:55 | 08:46 | 15:17 | 16:09 | 17:01 |
| 56° | 06:55 | 07:44 | 08:32 | 15:32 | 16:19 | 17:08 |
| 54° | 06:49 | 07:35 | 08:19 | 15:44 | 16:28 | 17:14 |
| 52° | 06:44 | 07:27 | 08:08 | 15:55 | 16:36 | 17:20 |
| 50° | 06:38 | 07:20 | 07:58 | 16:05 | 16:43 | 17:25 |
| 45° | 06:27 | 07:04 | 07:38 | 16:25 | 16:59 | 17:36 |
| N 40° | 06:16 | 06:50 | 07:21 | 16:42 | 17:13 | 17:47 |
| 35° | 06:07 | 06:39 | 07:07 | 16:56 | 17:24 | 17:56 |
| 30° | 05:58 | 06:28 | 06:55 | 17:08 | 17:35 | 18:05 |
| 20° | 05:42 | 06:10 | 06:34 | 17:30 | 17:54 | 18:21 |
| N 10° | 05:26 | 05:52 | 06:15 | 17:48 | 18:11 | 18:37 |
| 0° | 05:09 | 05:35 | 05:58 | 18:05 | 18:28 | 18:54 |
| S 10° | 04:50 | 05:17 | 05:40 | 18:23 | 18:46 | 19:13 |
| 20° | 04:28 | 04:57 | 05:21 | 18:42 | 19:06 | 19:35 |
| 30° | 03:59 | 04:32 | 05:00 | 19:03 | 19:31 | 20:04 |
| 35° | 03:40 | 04:17 | 04:47 | 19:16 | 19:46 | 20:23 |
| 40° | 03:17 | 03:59 | 04:32 | 19:31 | 20:04 | 20:46 |
| 45° | 02:47 | 03:36 | 04:14 | 19:49 | 20:26 | 21:16 |
| S 50° | 02:02 | 03:07 | 03:51 | 20:11 | 20:56 | 22:01 |
| 52° | 01:34 | 02:52 | 03:41 | 20:22 | 21:11 | 22:28 |
| 54° | 00:50 | 02:34 | 03:28 | 20:34 | 21:28 | 23:11 |
| 56° | //// | 02:12 | 03:14 | 20:48 | 21:50 | //// |
| 58° | //// | 01:43 | 02:58 | 21:05 | 22:19 | //// |
| S 60° | //// | 00:55 | 02:37 | 21:25 | 23:07 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Sun | Mon | Tue | Sun | Mon | Tue |
| N 72° | 19:02 | 21:31 | 23:45 | 12:24 | 11:38 | 11:04 |
| N 70° | 19:22 | 21:38 | 23:42 | 12:01 | 11:28 | 11:02 |
| 68° | 19:38 | 21:44 | 23:39 | 11:43 | 11:20 | 11:01 |
| 66° | 19:51 | 21:48 | 23:37 | 11:28 | 11:13 | 11:01 |
| 64° | 20:02 | 21:52 | 23:35 | 11:16 | 11:07 | 11:00 |
| 62° | 20:11 | 21:55 | 23:33 | 11:05 | 11:02 | 10:59 |
| 60° | 20:19 | 21:58 | 23:32 | 10:56 | 10:58 | 10:59 |
| N 58° | 20:25 | 22:00 | 23:30 | 10:48 | 10:54 | 10:58 |
| 56° | 20:31 | 22:03 | 23:29 | 10:41 | 10:50 | 10:58 |
| 54° | 20:36 | 22:05 | 23:28 | 10:35 | 10:47 | 10:57 |
| 52° | 20:41 | 22:06 | 23:27 | 10:29 | 10:44 | 10:57 |
| 50° | 20:45 | 22:08 | 23:26 | 10:24 | 10:42 | 10:57 |
| 45° | 20:55 | 22:11 | 23:25 | 10:13 | 10:36 | 10:56 |
| N 40° | 21:02 | 22:14 | 23:23 | 10:03 | 10:31 | 10:55 |
| 35° | 21:09 | 22:17 | 23:22 | 09:55 | 10:27 | 10:55 |
| 30° | 21:15 | 22:19 | 23:21 | 09:48 | 10:23 | 10:54 |
| 20° | 21:24 | 22:23 | 23:19 | 09:36 | 10:16 | 10:53 |
| N 10° | 21:33 | 22:26 | 23:17 | 09:24 | 10:10 | 10:52 |
| 0° | 21:41 | 22:30 | 23:15 | 09:14 | 10:05 | 10:52 |
| S 10° | 21:49 | 22:33 | 23:14 | 09:04 | 09:59 | 10:51 |
| 20° | 21:58 | 22:36 | 23:12 | 08:52 | 09:53 | 10:50 |
| 30° | 22:07 | 22:40 | 23:10 | 08:39 | 09:46 | 10:49 |
| 35° | 22:13 | 22:42 | 23:09 | 08:32 | 09:42 | 10:48 |
| 40° | 22:19 | 22:45 | 23:08 | 08:23 | 09:37 | 10:48 |
| 45° | 22:26 | 22:48 | 23:07 | 08:13 | 09:32 | 10:47 |
| S 50° | 22:35 | 22:51 | 23:05 | 08:00 | 09:25 | 10:46 |
| 52° | 22:39 | 22:53 | 23:05 | 07:54 | 09:22 | 10:45 |
| 54° | 22:44 | 22:54 | 23:04 | 07:48 | 09:19 | 10:45 |
| 56° | 22:48 | 22:56 | 23:03 | 07:40 | 09:15 | 10:44 |
| 58° | 22:54 | 22:58 | 23:02 | 07:32 | 09:11 | 10:44 |
| S 60° | 23:00 | 23:01 | 23:01 | 07:23 | 09:06 | 10:43 |

| Day | Sun | | Mer. Pass | Moon | | Age 18-20 88-69% |
|-----|-----------------------------------|-----------------------|-----------|-----------------------|-------------|------------------|
| | Eqn.of Time 00 ^h mm:ss | 12 ^h mm:ss | | Mer.Pass. Upper hh:mm | Lower hh:mm | |
| 27 | 00:47 | 01:02 | 12:01 | 03:01 | 15:28 | |
| 28 | 01:16 | 01:31 | 12:02 | 03:53 | 16:17 | |
| 29 | 01:46 | 02:00 | 12:02 | 04:41 | 17:04 | |

December 30, 31, 01 UT (Wed., Thu., Fri.)

| h | Aries | | Venus | | Mars | | Jupiter | | Saturn | |
|-----------------|----------|---------------------|----------|---------------------|----------|--------------------|----------|-------------------|----------|----------|
| Wed | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 98°27.2 | | 228°27.9 | S14°53.2 | 296°02.8 | N10°55.7 | 309°20.7 | N13°31.7 | 89°53.7 | N01°00.6 |
| 1 | 113°29.7 | | 243°27.9 | 53.8 | 311°04.9 | 55.7 | 324°23.3 | 31.8 | 104°56.1 | 00.7 |
| 2 | 128°32.1 | | 258°27.9 | 54.4 | 326°07.0 | 55.6 | 339°25.9 | 31.9 | 119°58.5 | 00.7 |
| 3 | 143°34.6 | | 273°27.9 | •• 55.0 | 341°09.1 | •• 55.6 | 354°28.5 | •• 31.9 | 135°00.9 | •• 00.8 |
| 4 | 158°37.1 | | 288°27.9 | 55.6 | 356°11.2 | 55.5 | 9°31.1 | 32.0 | 150°03.3 | 00.8 |
| 5 | 173°39.5 | | 303°27.9 | 56.2 | 11°13.4 | 55.5 | 24°33.7 | 32.0 | 165°05.7 | 00.9 |
| 6 | 188°42.0 | | 318°27.9 | S14°56.8 | 26°15.5 | N10°55.4 | 39°36.2 | N13°32.1 | 180°08.0 | N01°00.9 |
| 7 | 203°44.5 | | 333°27.9 | 57.4 | 41°17.6 | 55.4 | 54°38.8 | 32.1 | 195°10.4 | 00.9 |
| 8 | 218°46.9 | | 348°27.9 | 58.0 | 56°19.7 | 55.3 | 69°41.4 | 32.2 | 210°12.8 | 01.0 |
| 9 | 233°49.4 | | 3°27.9 | •• 58.6 | 71°21.8 | •• 55.3 | 84°44.0 | •• 32.2 | 225°15.2 | •• 01.0 |
| 10 | 248°51.9 | | 18°27.9 | 59.2 | 86°24.0 | 55.2 | 99°46.6 | 32.3 | 240°17.6 | 01.1 |
| 11 | 263°54.3 | | 33°27.8 | 14°59.8 | 101°26.1 | 55.2 | 114°49.2 | 32.4 | 255°20.0 | 01.1 |
| 12 | 278°56.8 | | 48°27.8 | S15°00.4 | 116°28.2 | N10°55.2 | 129°51.8 | N13°32.4 | 270°22.4 | N01°01.2 |
| 13 | 293°59.2 | | 63°27.8 | 01.0 | 131°30.3 | 55.1 | 144°54.4 | 32.5 | 285°24.8 | 01.2 |
| 14 | 309°01.7 | | 78°27.8 | 01.6 | 146°32.4 | 55.1 | 159°57.0 | 32.5 | 300°27.1 | 01.2 |
| 15 | 324°04.2 | | 93°27.8 | •• 02.2 | 161°34.6 | •• 55.0 | 174°59.6 | •• 32.6 | 315°29.5 | •• 01.3 |
| 16 | 339°06.6 | | 108°27.8 | 02.8 | 176°36.7 | 55.0 | 190°02.2 | 32.6 | 330°31.9 | 01.3 |
| 17 | 354°09.1 | | 123°27.8 | 03.4 | 191°38.8 | 54.9 | 205°04.8 | 32.7 | 345°34.3 | 01.4 |
| 18 | 9°11.6 | | 138°27.7 | S15°04.0 | 206°41.0 | N10°54.9 | 220°07.4 | N13°32.8 | 0°36.7 | N01°01.4 |
| 19 | 24°14.0 | | 153°27.7 | 04.6 | 221°43.1 | 54.9 | 235°10.0 | 32.8 | 15°39.1 | 01.5 |
| 20 | 39°16.5 | | 168°27.7 | 05.2 | 236°45.2 | 54.8 | 250°12.6 | 32.9 | 30°41.5 | 01.5 |
| 21 | 54°19.0 | | 183°27.7 | •• 05.8 | 251°47.4 | •• 54.8 | 265°15.2 | •• 32.9 | 45°43.9 | •• 01.6 |
| 22 | 69°21.4 | | 198°27.7 | 06.4 | 266°49.5 | 54.7 | 280°17.8 | 33.0 | 60°46.2 | 01.6 |
| 23 | 84°23.9 | | 213°27.6 | 07.0 | 281°51.6 | 54.7 | 295°20.4 | 33.1 | 75°48.6 | 01.7 |
| Mer.pass. 17:23 | | ν-0.0' d0.6' m-4.60 | | ν2.1' d-0.0' m-0.10 | | ν2.6' d0.1' m-2.40 | | ν2.4' d0.0' m0.72 | | |
| Thu | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 99°26.4 | | 228°27.6 | S15°07.6 | 296°53.8 | N10°54.6 | 310°23.0 | N13°33.1 | 90°51.0 | N01°01.7 |
| 1 | 114°28.8 | | 243°27.6 | 08.2 | 311°55.9 | 54.6 | 325°25.6 | 33.2 | 105°53.4 | 01.7 |
| 2 | 129°31.3 | | 258°27.6 | 08.8 | 326°58.0 | 54.6 | 340°28.2 | 33.2 | 120°55.8 | 01.8 |
| 3 | 144°33.7 | | 273°27.5 | •• 09.4 | 342°00.2 | •• 54.5 | 355°30.8 | •• 33.3 | 135°58.2 | •• 01.8 |
| 4 | 159°36.2 | | 288°27.5 | 10.0 | 357°02.3 | 54.5 | 10°33.4 | 33.3 | 151°00.6 | 01.9 |
| 5 | 174°38.7 | | 303°27.5 | 10.6 | 12°04.4 | 54.5 | 25°36.0 | 33.4 | 166°02.9 | 01.9 |
| 6 | 189°41.1 | | 318°27.4 | S15°11.2 | 27°06.6 | N10°54.4 | 40°38.6 | N13°33.5 | 181°05.3 | N01°02.0 |
| 7 | 204°43.6 | | 333°27.4 | 11.8 | 42°08.7 | 54.4 | 55°41.2 | 33.5 | 196°07.7 | 02.0 |
| 8 | 219°46.1 | | 348°27.4 | 12.4 | 57°10.9 | 54.3 | 70°43.8 | 33.6 | 211°10.1 | 02.1 |
| 9 | 234°48.5 | | 3°27.3 | •• 13.0 | 72°13.0 | •• 54.3 | 85°46.4 | •• 33.6 | 226°12.5 | •• 02.1 |
| 10 | 249°51.0 | | 18°27.3 | 13.6 | 87°15.2 | 54.3 | 100°49.0 | 33.7 | 241°14.9 | 02.1 |
| 11 | 264°53.5 | | 33°27.3 | 14.2 | 102°17.3 | 54.2 | 115°51.6 | 33.8 | 256°17.2 | 02.2 |
| 12 | 279°55.9 | | 48°27.2 | S15°14.8 | 117°19.5 | N10°54.2 | 130°54.2 | N13°33.8 | 271°19.6 | N01°02.2 |
| 13 | 294°58.4 | | 63°27.2 | 15.4 | 132°21.6 | 54.2 | 145°56.8 | 33.9 | 286°22.0 | 02.3 |
| 14 | 310°00.8 | | 78°27.2 | 16.0 | 147°23.8 | 54.1 | 160°59.4 | 33.9 | 301°24.4 | 02.3 |
| 15 | 325°03.3 | | 93°27.1 | •• 16.6 | 162°25.9 | •• 54.1 | 176°02.0 | •• 34.0 | 316°26.8 | •• 02.4 |
| 16 | 340°05.8 | | 108°27.1 | 17.2 | 177°28.1 | 54.1 | 191°04.6 | 34.1 | 331°29.2 | 02.4 |
| 17 | 355°08.2 | | 123°27.0 | 17.8 | 192°30.2 | 54.0 | 206°07.2 | 34.1 | 346°31.5 | 02.5 |
| 18 | 10°10.7 | | 138°27.0 | S15°18.4 | 207°32.4 | N10°54.0 | 221°09.8 | N13°34.2 | 1°33.9 | N01°02.5 |
| 19 | 25°13.2 | | 153°27.0 | 19.0 | 222°34.5 | 54.0 | 236°12.5 | 34.2 | 16°36.3 | 02.6 |
| 20 | 40°15.6 | | 168°26.9 | 19.6 | 237°36.7 | 53.9 | 251°15.1 | 34.3 | 31°38.7 | 02.6 |
| 21 | 55°18.1 | | 183°26.9 | •• 20.2 | 252°38.8 | •• 53.9 | 266°17.7 | •• 34.4 | 46°41.1 | •• 02.7 |
| 22 | 70°20.6 | | 198°26.8 | 20.8 | 267°41.0 | 53.9 | 281°20.3 | 34.4 | 61°43.4 | 02.7 |
| 23 | 85°23.0 | | 213°26.8 | 21.4 | 282°43.2 | 53.9 | 296°22.9 | 34.5 | 76°45.8 | 02.8 |
| Mer.pass. 17:19 | | ν-0.0' d0.6' m-4.59 | | ν2.1' d-0.0' m-0.12 | | ν2.6' d0.1' m-2.40 | | ν2.4' d0.0' m0.73 | | |
| Fri | GHA | | GHA | Dec | GHA | Dec | GHA | Dec | GHA | Dec |
| 0 | 100°25.5 | | 228°26.7 | S15°22.0 | 297°45.3 | N10°53.8 | 311°25.5 | N13°34.5 | 91°48.2 | N01°02.8 |
| 1 | 115°28.0 | | 243°26.7 | 22.6 | 312°47.5 | 53.8 | 326°28.1 | 34.6 | 106°50.6 | 02.8 |
| 2 | 130°30.4 | | 258°26.6 | 23.2 | 327°49.7 | 53.8 | 341°30.7 | 34.7 | 121°53.0 | 02.9 |
| 3 | 145°32.9 | | 273°26.6 | •• 23.8 | 342°51.8 | •• 53.7 | 356°33.3 | •• 34.7 | 136°55.4 | •• 02.9 |
| 4 | 160°35.3 | | 288°26.5 | 24.4 | 357°54.0 | 53.7 | 11°35.9 | 34.8 | 151°57.7 | 03.0 |
| 5 | 175°37.8 | | 303°26.5 | 25.0 | 12°56.2 | 53.7 | 26°38.5 | 34.9 | 167°00.1 | 03.0 |
| 6 | 190°40.3 | | 318°26.4 | S15°25.6 | 27°58.3 | N10°53.7 | 41°41.1 | N13°34.9 | 182°02.5 | N01°03.1 |
| 7 | 205°42.7 | | 333°26.4 | 26.2 | 43°00.5 | 53.6 | 56°43.7 | 35.0 | 197°04.9 | 03.1 |
| 8 | 220°45.2 | | 348°26.3 | 26.8 | 58°02.7 | 53.6 | 71°46.4 | 35.0 | 212°07.3 | 03.2 |
| 9 | 235°47.7 | | 3°26.3 | •• 27.4 | 73°04.8 | •• 53.6 | 86°49.0 | •• 35.1 | 227°09.6 | •• 03.2 |
| 10 | 250°50.1 | | 18°26.2 | 28.0 | 88°07.0 | 53.6 | 101°51.6 | 35.2 | 242°12.0 | 03.3 |
| 11 | 265°52.6 | | 33°26.1 | 28.6 | 103°09.2 | 53.5 | 116°54.2 | 35.2 | 257°14.4 | 03.3 |
| 12 | 280°55.1 | | 48°26.1 | S15°29.2 | 118°11.3 | N10°53.5 | 131°56.8 | N13°35.3 | 272°16.8 | N01°03.4 |
| 13 | 295°57.5 | | 63°26.0 | 29.8 | 133°13.5 | 53.5 | 146°59.4 | 35.4 | 287°19.2 | 03.4 |
| 14 | 311°00.0 | | 78°26.0 | 30.4 | 148°15.7 | 53.5 | 162°02.0 | 35.4 | 302°21.5 | 03.5 |
| 15 | 326°02.5 | | 93°25.9 | •• 31.0 | 163°17.9 | •• 53.5 | 177°04.6 | •• 35.5 | 317°23.9 | •• 03.5 |
| 16 | 341°04.9 | | 108°25.8 | 31.6 | 178°20.1 | 53.4 | 192°07.2 | 35.5 | 332°26.3 | 03.6 |
| 17 | 356°07.4 | | 123°25.8 | 32.2 | 193°22.2 | 53.4 | 207°09.9 | 35.6 | 347°28.7 | 03.6 |
| 18 | 11°09.8 | | 138°25.7 | S15°32.8 | 208°24.4 | N10°53.4 | 222°12.5 | N13°35.7 | 2°31.1 | N01°03.6 |
| 19 | 26°12.3 | | 153°25.6 | 33.4 | 223°26.6 | 53.4 | 237°15.1 | 35.7 | 17°33.4 | 03.7 |
| 20 | 41°14.8 | | 168°25.6 | 34.0 | 238°28.8 | 53.3 | 252°17.7 | 35.8 | 32°35.8 | 03.7 |
| 21 | 56°17.2 | | 183°25.5 | •• 34.6 | 253°31.0 | •• 53.3 | 267°20.3 | •• 35.9 | 47°38.2 | •• 03.8 |
| 22 | 71°19.7 | | 198°25.4 | 35.2 | 268°33.2 | 53.3 | 282°22.9 | 35.9 | 62°40.6 | 03.8 |
| 23 | 86°22.2 | | 213°25.4 | 35.8 | 283°35.3 | 53.3 | 297°25.5 | 36.0 | 77°42.9 | 03.9 |
| Mer.pass. 17:15 | | ν-0.0' d0.6' m-4.58 | | ν2.2' d-0.0' m-0.14 | | ν2.6' d0.1' m-2.41 | | ν2.4' d0.0' m0.73 | | |

| Stars | | |
|-------------|-----------|-----------|
| | SHA | Dec |
| Alpheratz | 357° 33.1 | 29° 14.6 |
| Ankaa | 353° 05.6 | -42° 09.7 |
| Schedar | 349° 29.1 | 56° 41.5 |
| Diphda | 348° 45.6 | -17° 50.4 |
| Achernar | 335° 18.8 | -57° 06.2 |
| Hamal | 327° 49.2 | 23° 35.6 |
| Polaris | 312° 50.1 | 89° 22.9 |
| Acamar | 315° 10.3 | -40° 11.9 |
| Menkar | 314° 04.2 | 4° 11.8 |
| Mirfak | 308° 25.5 | 49° 57.6 |
| Aldebaran | 290° 37.4 | 16° 33.8 |
| Rigel | 281° 02.0 | -8° 10.3 |
| Capella | 280° 19.0 | 46° 01.5 |
| Bellatrix | 278° 20.8 | 6° 22.4 |
| Elnath | 277° 59.4 | 28° 37.8 |
| Anilam | 275° 35.7 | -1° 11.1 |
| Betelgeuse | 270° 50.0 | 7° 24.7 |
| Canopus | 263° 51.1 | -52° 42.6 |
| Sirius | 258° 24.4 | -16° 45.2 |
| Adhara | 255° 04.2 | -29° 00.5 |
| Procyon | 244° 48.8 | 5° 09.3 |
| Pollux | 243° 14.9 | 27° 57.5 |
| Avior | 234° 13.5 | -59° 35.6 |
| Suhail | 222° 44.7 | -43° 32.4 |
| Miaplacidus | 221° 37.1 | -69° 49.5 |
| Alphard | 217° 45.9 | -8° 46.6 |
| Regulus | 207° 32.5 | 11° 50.0 |
| Dubhe | 193° 38.8 | 61° 36.0 |
| Denebola | 182° 23.2 | 14° 25.1 |
| Gienah | 175° 41.9 | -17° 41.5 |
| Acrux | 172° 58.2 | -63° 14.7 |
| Gacrux | 171° 49.8 | -57° 15.6 |
| Alioth | 166° 11.6 | 55° 48.4 |
| Spica | 158° 20.6 | -11° 18.1 |
| Alkaid | 152° 50.9 | 49° 10.4 |
| Hadar | 148° 33.9 | -60° 30.0 |
| Menkent | 147° 55.8 | -36° 30.0 |
| Arcturus | 145° 46.6 | 19° 02.3 |
| Rigel Kent. | 139° 38.4 | -60° 56.6 |
| Kochab | 137° 20.6 | 74° 02.3 |
| Zuben'ubi | 136° 54.4 | -16° 09.2 |
| Alphecca | 126° 02.6 | 26° 37.3 |
| Antares | 112° 14.1 | -26° 29.4 |
| Atria | 107° 07.4 | -69° 04.4 |
| Sabik | 102° 01.2 | -15° 45.5 |
| Shaula | 96° 08.6 | -37° 07.3 |
| Rasalhague | 95° 57.4 | 12° 32.4 |
| Eltanin | 90° 42.0 | 51° 29.0 |
| Kaus Aust. | 83° 30.8 | -34° 22.3 |
| Vega | 80° 32.6 | 38° 48.5 |
| Nunki | 75° 46.1 | -26° 15.8 |
| Altair | 61° 58.7 | 8° 56.4 |
| Peacock | 53° 03.7 | -56° 39.0 |
| Deneb | 49° 25.1 | 45° 22.7 |
| Enif | 33° 37.4 | 10° 00.0 |
| Al Na'ir | 27° 31.2 | -46° 50.0 |
| Fomalhaut | 15° 12.9 | -29° 28.9 |
| Scheat | 13° 43.8 | 28° 14.0 |
| Markab | 13° 28.4 | 15° 21.2 |

| Dec 30 Wed | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 130° 00.7 | 08:46 |
| Mars | 197° 35.6 | 04:15 |
| Jupiter | 210° 53.5 | 03:22 |
| Saturn | 351° 26.5 | 17:58 |

| Dec 31 Thu | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 129° 01.3 | 08:46 |
| Mars | 197° 27.4 | 04:12 |
| Jupiter | 210° 56.6 | 03:18 |
| Saturn | 351° 24.7 | 17:54 |

| Jan 01 Fri | SHA | Mer.pass |
|------------|-----------|----------|
| Venus | 128° 01.2 | 08:46 |
| Mars | 197° 19.8 | 04:08 |
| Jupiter | 211° 00.0 | 03:14 |
| Saturn | 351° 22.7 | 17:50 |

| Horizontal parallax | |
|---------------------|-----|
| Venus: | 0.2 |
| Mars: | 0.2 |

| h | Sun | | | Moon | | | |
|------------|----------|----------|-------------|----------|-------|------------|-------|
| | GHA | Dec | | GHA | ν | Dec | d |
| Wed | | | | | | | HP |
| 0 | 179°26.3 | S23°10.7 | | 280°56.7 | 13.8' | S02°19.9 | 15.5' |
| 1 | 194°26.0 | 10.6 | | 295°29.5 | 13.8' | 02°35.3 | 15.4' |
| 2 | 209°25.7 | 10.4 | | 310°02.4 | 13.9' | 02°50.7 | 15.4' |
| 3 | 224°25.4 | •• 10.3 | | 324°35.2 | 13.9' | 03°06.1 | 15.4' |
| 4 | 239°25.1 | 10.1 | | 339°08.1 | 13.9' | 03°21.5 | 15.3' |
| 5 | 254°24.8 | 09.9 | | 353°41.1 | 13.9' | 03°36.8 | 15.3' |
| 6 | 269°24.5 | S23°09.8 | | 8°14.0 | 14.0' | S03°52.1 | 15.2' |
| 7 | 284°24.2 | 09.6 | | 22°47.0 | 14.0' | 04°07.3 | 15.2' |
| 8 | 299°23.9 | 09.4 | | 37°19.9 | 14.0' | 04°22.6 | 15.2' |
| 9 | 314°23.6 | •• 09.3 | | 51°53.0 | 14.0' | 04°37.7 | 15.1' |
| 10 | 329°23.3 | 09.1 | | 66°26.0 | 14.0' | 04°52.9 | 15.1' |
| 11 | 344°23.0 | 08.9 | | 80°59.0 | 14.1' | 05°07.9 | 15.0' |
| 12 | 359°22.7 | S23°08.8 | | 95°32.1 | 14.1' | S05°23.0 | 15.0' |
| 13 | 14°22.4 | 08.6 | | 110°05.1 | 14.1' | 05°38.0 | 15.0' |
| 14 | 29°22.1 | 08.4 | | 124°38.2 | 14.1' | 05°53.0 | 14.9' |
| 15 | 44°21.8 | •• 08.3 | | 139°11.3 | 14.1' | 06°07.9 | 14.9' |
| 16 | 59°21.5 | 08.1 | | 153°44.4 | 14.1' | 06°22.8 | 14.8' |
| 17 | 74°21.2 | 07.9 | | 168°17.5 | 14.1' | 06°37.6 | 14.8' |
| 18 | 89°20.9 | S23°07.7 | | 182°50.6 | 14.1' | S06°52.4 | 14.7' |
| 19 | 104°20.6 | 07.6 | | 197°23.7 | 14.1' | 07°07.1 | 14.7' |
| 20 | 119°20.3 | 07.4 | | 211°56.9 | 14.1' | 07°21.8 | 14.6' |
| 21 | 134°20.0 | •• 07.2 | | 226°30.0 | 14.1' | 07°36.4 | 14.6' |
| 22 | 149°19.7 | 07.0 | | 241°03.1 | 14.1' | 07°51.0 | 14.5' |
| 23 | 164°19.4 | 06.9 | | 255°36.3 | 14.1' | 08°05.5 | 14.5' |
| SD = 16.3' | | | $d = -0.2'$ | | | SD = 15.7' | |

| Thu | Sun | | | Moon | | | |
|------------|----------|----------|-------------|----------|-------|------------|-------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 179°19.1 | S23°06.7 | | 270°09.4 | 14.1' | S08°20.0 | 14.4' |
| 1 | 194°18.8 | 06.5 | | 284°42.5 | 14.1' | 08°34.4 | 14.4' |
| 2 | 209°18.5 | 06.3 | | 299°15.7 | 14.1' | 08°48.8 | 14.3' |
| 3 | 224°18.2 | •• 06.2 | | 313°48.8 | 14.1' | 09°03.1 | 14.3' |
| 4 | 239°17.9 | 06.0 | | 328°21.9 | 14.1' | 09°17.3 | 14.2' |
| 5 | 254°17.6 | 05.8 | | 342°55.1 | 14.1' | 09°31.5 | 14.1' |
| 6 | 269°17.3 | S23°05.6 | | 357°28.2 | 14.1' | S09°45.7 | 14.1' |
| 7 | 284°17.0 | 05.4 | | 12°01.3 | 14.1' | 09°59.8 | 14.0' |
| 8 | 299°16.7 | 05.2 | | 26°34.4 | 14.1' | 10°13.8 | 14.0' |
| 9 | 314°16.4 | •• 05.1 | | 41°07.5 | 14.1' | 10°27.8 | 13.9' |
| 10 | 329°16.1 | 04.9 | | 55°40.6 | 14.1' | 10°41.7 | 13.8' |
| 11 | 344°15.8 | 04.7 | | 70°13.6 | 14.1' | 10°55.5 | 13.8' |
| 12 | 359°15.5 | S23°04.5 | | 84°46.7 | 14.0' | S11°09.3 | 13.7' |
| 13 | 14°15.2 | 04.3 | | 99°19.7 | 14.0' | 11°23.0 | 13.7' |
| 14 | 29°14.9 | 04.1 | | 113°52.8 | 14.0' | 11°36.7 | 13.6' |
| 15 | 44°14.6 | •• 03.9 | | 128°25.8 | 14.0' | 11°50.2 | 13.5' |
| 16 | 59°14.3 | 03.7 | | 142°58.8 | 14.0' | 12°03.8 | 13.5' |
| 17 | 74°14.0 | 03.6 | | 157°31.8 | 14.0' | 12°17.2 | 13.4' |
| 18 | 89°13.7 | S23°03.4 | | 172°04.7 | 13.9' | S12°30.6 | 13.3' |
| 19 | 104°13.4 | 03.2 | | 186°37.7 | 13.9' | 12°43.9 | 13.3' |
| 20 | 119°13.1 | 03.0 | | 201°10.6 | 13.9' | 12°57.2 | 13.2' |
| 21 | 134°12.8 | •• 02.8 | | 215°43.5 | 13.9' | 13°10.4 | 13.1' |
| 22 | 149°12.5 | 02.6 | | 230°16.4 | 13.9' | 13°23.5 | 13.0' |
| 23 | 164°12.2 | 02.4 | | 244°49.2 | 13.8' | 13°36.5 | 13.0' |
| SD = 16.3' | | | $d = -0.2'$ | | | SD = 15.5' | |

| Fri | Sun | | | Moon | | | |
|------------|----------|----------|-------------|----------|-------|------------|-------|
| | GHA | Dec | | GHA | ν | Dec | d |
| 0 | 179°11.9 | S23°02.2 | | 259°22.1 | 13.8' | S13°49.5 | 12.9' |
| 1 | 194°11.6 | 02.0 | | 273°54.9 | 13.8' | 14°02.4 | 12.8' |
| 2 | 209°11.3 | 01.8 | | 288°27.6 | 13.8' | 14°15.2 | 12.7' |
| 3 | 224°11.1 | •• 01.6 | | 303°00.4 | 13.7' | 14°28.0 | 12.7' |
| 4 | 239°10.8 | 01.4 | | 317°33.1 | 13.7' | 14°40.6 | 12.6' |
| 5 | 254°10.5 | 01.2 | | 332°05.8 | 13.7' | 14°53.2 | 12.5' |
| 6 | 269°10.2 | S23°01.0 | | 346°38.5 | 13.6' | S15°05.8 | 12.4' |
| 7 | 284°09.9 | 00.8 | | 1°11.1 | 13.6' | 15°18.2 | 12.4' |
| 8 | 299°09.6 | 00.6 | | 15°43.8 | 13.6' | 15°30.6 | 12.3' |
| 9 | 314°09.3 | •• 00.4 | | 30°16.3 | 13.5' | 15°42.9 | 12.2' |
| 10 | 329°09.0 | 00.2 | | 44°48.9 | 13.5' | 15°55.1 | 12.1' |
| 11 | 344°08.7 | 23°00.0 | | 59°21.4 | 13.5' | 16°07.2 | 12.0' |
| 12 | 359°08.4 | S22°59.8 | | 73°53.9 | 13.4' | S16°19.3 | 12.0' |
| 13 | 14°08.1 | 59.6 | | 88°26.3 | 13.4' | 16°31.2 | 11.9' |
| 14 | 29°07.8 | 59.3 | | 102°58.7 | 13.4' | 16°43.1 | 11.8' |
| 15 | 44°07.5 | •• 59.1 | | 117°31.1 | 13.3' | 16°54.9 | 11.7' |
| 16 | 59°07.2 | 58.9 | | 132°03.5 | 13.3' | 17°06.6 | 11.6' |
| 17 | 74°06.9 | 58.7 | | 146°35.8 | 13.3' | 17°18.3 | 11.5' |
| 18 | 89°06.6 | S22°58.5 | | 161°08.0 | 13.2' | S17°29.8 | 11.5' |
| 19 | 104°06.3 | 58.3 | | 175°40.3 | 13.2' | 17°41.3 | 11.4' |
| 20 | 119°06.0 | 58.1 | | 190°12.5 | 13.2' | 17°52.6 | 11.3' |
| 21 | 134°05.7 | •• 57.9 | | 204°44.6 | 13.1' | 18°03.9 | 11.2' |
| 22 | 149°05.4 | 57.7 | | 219°16.7 | 13.1' | 18°15.1 | 11.1' |
| 23 | 164°05.2 | 57.4 | | 233°48.8 | 13.0' | 18°26.2 | 11.0' |
| SD = 16.3' | | | $d = -0.2'$ | | | SD = 15.3' | |

| Lat. | Twilight | | Sunrise | Sunset | Twilight | |
|-------|----------|-------|---------|--------|----------|-------|
| | Naut. | Civil | | | Civil | Naut. |
| N 72° | 08:25 | 10:46 | ■ | ■ | 13:20 | 15:41 |
| N 70° | 08:06 | 09:51 | ■ | ■ | 14:15 | 16:01 |
| 68° | 07:50 | 09:18 | ■ | ■ | 14:48 | 16:16 |
| 66° | 07:38 | 08:54 | 10:30 | 13:37 | 15:13 | 16:29 |
| 64° | 07:27 | 08:35 | 09:51 | 14:16 | 15:32 | 16:39 |
| 62° | 07:18 | 08:19 | 09:24 | 14:43 | 15:47 | 16:49 |
| 60° | 07:09 | 08:06 | 09:03 | 15:03 | 16:00 | 16:57 |
| N 58° | 07:02 | 07:54 | 08:46 | 15:20 | 16:12 | 17:04 |
| 56° | 06:56 | 07:44 | 08:31 | 15:35 | 16:22 | 17:11 |
| 54° | 06:50 | 07:36 | 08:19 | 15:47 | 16:31 | 17:17 |
| 52° | 06:44 | 07:28 | 08:08 | 15:58 | 16:39 | 17:22 |
| 50° | 06:39 | 07:20 | 07:59 | 16:08 | 16:46 | 17:27 |
| 45° | 06:27 | 07:05 | 07:38 | 16:28 | 17:02 | 17:39 |
| N 40° | 06:17 | 06:51 | 07:22 | 16:44 | 17:15 | 17:49 |
| 35° | 06:08 | 06:40 | 07:08 | 16:58 | 17:26 | 17:58 |
| 30° | 05:59 | 06:29 | 06:56 | 17:10 | 17:37 | 18:07 |
| 20° | 05:43 | 06:11 | 06:35 | 17:31 | 17:55 | 18:23 |
| N 10° | 05:27 | 05:54 | 06:16 | 17:50 | 18:12 | 18:39 |
| 0° | 05:11 | 05:37 | 05:59 | 18:07 | 18:29 | 18:55 |
| S 10° | 04:52 | 05:19 | 05:42 | 18:24 | 18:47 | 19:14 |
| 20° | 04:30 | 04:59 | 05:23 | 18:43 | 19:07 | 19:36 |
| 30° | 04:01 | 04:34 | 05:01 | 19:04 | 19:32 | 20:05 |
| 35° | 03:43 | 04:19 | 04:49 | 19:17 | 19:47 | 20:23 |
| 40° | 03:20 | 04:01 | 04:34 | 19:32 | 20:05 | 20:46 |
| 45° | 02:50 | 03:39 | 04:16 | 19:50 | 20:27 | 21:16 |
| S 50° | 02:05 | 03:10 | 03:54 | 20:12 | 20:56 | 22:00 |
| 52° | 01:39 | 02:55 | 03:43 | 20:22 | 21:10 | 22:26 |
| 54° | 00:57 | 02:38 | 03:31 | 20:34 | 21:28 | 23:07 |
| 56° | //// | 02:16 | 03:17 | 20:48 | 21:49 | //// |
| 58° | //// | 01:48 | 03:01 | 21:04 | 22:17 | //// |
| S 60° | //// | 01:02 | 02:41 | 21:24 | 23:01 | //// |

| Lat. | Moonrise | | | Moonset | | |
|-------|----------|-------|-------|---------|-------|-------|
| | Wed | Thu | Fri | Wed | Thu | Fri |
| N 72° | •• •• | 01:59 | 04:31 | 10:31 | 09:53 | 08:56 |
| N 70° | •• •• | 01:44 | 03:55 | 10:38 | 10:10 | 09:33 |
| 68° | •• •• | 01:33 | 03:31 | 10:44 | 10:24 | 09:59 |
| 66° | •• •• | 01:23 | 03:12 | 10:48 | 10:35 | 10:20 |
| 64° | •• •• | 01:15 | 02:57 | 10:52 | 10:45 | 10:36 |
| 62° | •• •• | 01:09 | 02:44 | 10:56 | 10:53 | 10:50 |
| 60° | •• •• | 01:03 | 02:34 | 10:59 | 11:00 | 11:01 |
| N 58° | •• •• | 00:58 | 02:24 | 11:02 | 11:06 | 11:11 |
| 56° | •• •• | 00:53 | 02:16 | 11:05 | 11:12 | 11:20 |
| 54° | •• •• | 00:49 | 02:09 | 11:07 | 11:17 | 11:28 |
| 52° | •• •• | 00:46 | 02:03 | 11:09 | 11:21 | 11:35 |
| 50° | •• •• | 00:42 | 01:57 | 11:11 | 11:25 | 11:42 |
| 45° | •• •• | 00:35 | 01:45 | 11:15 | 11:34 | 11:56 |
| N 40° | •• •• | 00:30 | 01:35 | 11:18 | 11:42 | 12:07 |
| 35° | •• •• | 00:25 | 01:26 | 11:21 | 11:48 | 12:17 |
| 30° | •• •• | 00:20 | 01:19 | 11:24 | 11:54 | 12:26 |
| 20° | •• •• | 00:13 | 01:06 | 11:29 | 12:04 | 12:40 |
| N 10° | •• •• | 00:06 | 00:55 | 11:33 | 12:13 | 12:54 |
| 0° | •• •• | 00:00 | 00:44 | 11:37 | 12:21 | 13:06 |
| S 10° | 23:54 | •• •• | 00:34 | 11:41 | 12:29 | 13:18 |
| 20° | 23:47 | •• •• | 00:23 | 11:45 | 12:38 | 13:32 |
| 30° | 23:40 | •• •• | 00:11 | 11:49 | 12:48 | 13:47 |
| 35° | 23:36 | •• •• | 00:03 | 11:52 | 12:54 | 13:56 |
| 40° | 23:31 | 23:55 | •• •• | 11:55 | 13:01 | 14:06 |
| 45° | 23:26 | 23:46 | •• •• | 11:59 | 13:09 | 14:18 |
| S 50° | 23:20 | 23:35 | 23:53 | 12:03 | 13:18 | 14:33 |
| 52° | 23:17 | 23:30 | 23:45 | 12:05 | 13:23 | 14:40 |
| 54° | 23:13 | 23:24 | 23:37 | 12:07 | 13:28 | 14:47 |
| 56° | 23:10 | 23:18 | 23:27 | 12:10 | 13:33 | 14:56 |
| 58° | 23:06 | 23:10 | 23:17 | 12:12 | 13:39 | 15:06 |
| S 60° | 23:02 | 23:03 | 23:05 | 12:15 | 13:46 | 15:17 |

| Day | Sun | | | Moon | | |
|-----|---|----------------------------------|-----------------------|-----------------------------|----------------|------------------------|
| | Eqn.of Time 00 ^h mm:ss | Time 12 ^h mm:ss | Mer. Pass hh:mm | Mer.Pass. Upper hh:mm | Lower hh:mm | Age 21-23 58-38% |
| 30 | 02:15 | 02:29 | 12:02 | 05:26 | 17:48 | |
| 31 | 02:44 | 02:58 | 12:03 | 06:10 | 18:33 | |
| 01 | 03:12 | 03:26 | 12:03 | 06:55 | 19:18 | |