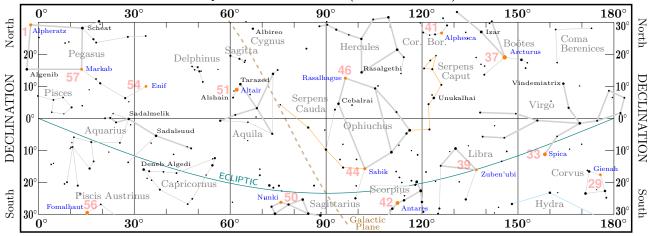
## GENERATED USING SKYFIELD

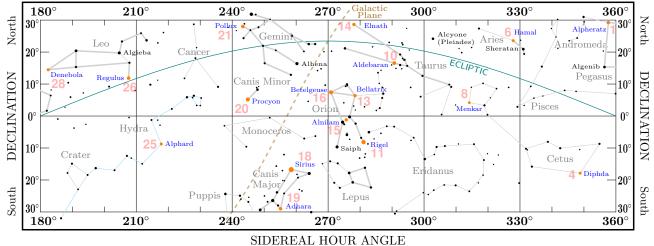
http://rhodesmill.org/skyfield/

#### EQUATORIAL STARS (SHA $0^{\circ}$ to $180^{\circ}$ )



#### SIDEREAL HOUR ANGLE

#### EQUATORIAL STARS (SHA 180° to 360°)



# THE NAUTICAL ALMANAC

# 2026

Author: Andrew Bauer
Original concept from: Enno Rodegerdts

September 6, 2025

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.<sup>1</sup> 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 Januaray 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.<sup>2</sup>) 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  $\Delta T$  and leap second files that ship with Skyfield internally.

The footers mentioned are only displayed as long as 'uselERS = 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 Rodegerdts (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 <a href="http://thenauticalalmanac.com">http://thenauticalalmanac.com</a> has been publishing Celestial Navigation related material with software provided here.

<sup>&</sup>lt;sup>1</sup>https://en.wikipedia.org/wiki/Day\_length\_fluctuations

<sup>&</sup>lt;sup>2</sup>https://hpiers.obspm.fr/eoppc/bul/bulb/explanatory.html

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

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	100°39.73	180°36.35	176°46.96	347°32.27 N21°58.75	103°16.88	
1	115° 42.20	195°35.38 37.22	191°47.34 43.03	2°35.08 58.81	118° 19.21 35.72	Alpheratz 357°33.98 29°14.22 Ankaa 353°6.36 -42°10.09
2	130°44.66	210°34.41 37.09	206°47.72 42.86	17°37.90 58.86	133°21.54 35.65	Ankaa 353°6.36 -42°10.09 Schedar 349°30.11 56°41.11
3	145° 47.13	225°33.44 · · 36.96	221°48.10 · · 42.70	32°40.71 · · 58.92	148°23.88 · · 35.59	Diphda 348°46.47 -17°50.73
4	160° 49.59	240°32.47 36.83	236°48.47 42.53	47°43.52 58.98	163°26.21 35.52	Achernar 335°19.42 -57°6.53
5 6	175° 52.05 190° 54.52	255°31.51 36.70 270°30.54 \$23°36.57	251°48.85 42.36 266°49.23 \$23°42.19	62°46.33 59.03 77°49.14 N21°59.09	178°28.54 35.46 193°30.87 \$03°35.39	Hamal 327°50.13 23°35.26
7	205°56.98	285°29.57 36.44	281°49.61 42.02	92°51.95 59.15	208° 33.21 35.32	Polaris 313°17.86 89°22.69
8	220° 59.45	300°28.61 36.30	296°49.99 41.85	107°54.76 59.20	223° 35.54 35.26	Acamar 315°10.90 -40°12.18
9	$236^{\circ}1.91$	315°27.64 · · 36.16	311°50.37 · · 41.68	122°57.58 · · 59.26	238°37.87 · · 35.19	Menkar 314°5.09 4°11.53 Mirfak 308°26.73 49°57.40
10	251°4.38	330°26.67 36.03	326°50.75 41.50	138°0.39 59.32	253°40.20 35.13	Aldebaran 290°38.37 16°33.73
11	266°6.84	345°25.71 35.89	341°51.13 41.33	153°3.20 59.38	268° 42.54 35.06	Rigel 281°2.76 -8°10.32
12	281°9.30	0°24.74 \$23°35.75	356°51.51 S23°41.16	168°6.01 N21°59.43	283°44.87 \$03°34.99	Capella 280°20.22 46°1.50
13 14	296° 11.77 311° 14.23	15°23.77 35.61 30°22.81 35.46	11°51.89 40.99 26°52.27 40.81	183°8.82 59.49 198°11.64 59.55	298° 47.20 34.93 313° 49.53 34.86	Bellatrix 278°21.67 6°22.39
15	326° 16.70	45°21.84 · · 35.32	41°52.65 · · 40.64	213°14.45 · · 59.60	328°51.86 · · 34.79	Elnath 278°0.46 28°37.78
16	341°19.16	60°20.87 35.18	56°53.03 40.46	228°17.26 59.66	343°54.19 34.73	Alnilam 275°36.57 -1°11.13 Betelgeuse 270°50.86 7°24.70
17	356°21.63	75°19.91 35.03	71°53.41 40.29	243°20.07 59.72	358°56.52 34.66	Betelgeuse 270°50.86 7°24.70 Canopus 263°51.47 -52°42.56
18	11°24.09	90°18.94 <b>S</b> 23°34.88	86°53.79 <b>S</b> 23°40.11	258°22.89 N21°59.77	13°58.86 \$03°34.60	Sirius 258°25.16 -16°45.12
19	26°26.55	105°17.98 34.73	101°54.17 39.94	273°25.70 59.83	29°1.19 34.53	Adhara 255°4.83 -29°0.43
20 21	41°29.02 56°31.48	120°17.01 34.58 135°16.05 · · 34.43	116°54.55 39.76 131°54.93 · · 39.59	288°28.51 59.89 303°31.32 21°59.95	44°3.52 34.46 59°5.85 · · 34.40	Procyon 244°49.65 5°9.45
22	71°33.95	150°15.08 34.28	146°55.31 39.41	318°34.14 22°0.00	74°8.18 34.33	Pollux 243°15.94 27°57.71
23	86°36.41	165°14.12 34.13	161°55.69 39.23	333°36.95 0.06	89°10.51 34.26	Avior 234°13.80 -59°35.43
	17.15		ν0.4' d-0.2' m1.12			Suhail 222°45.34 -43°32.13
ivier.	pass. 17:15	ν-1.0' d-0.1' m-3.90	νυ.4 α-υ.2 m1.12	ν2.8′ d0.1′ m-2.67	ν2.3' d-0.1' m1.01	Miaplacidus 221°37.34 -69°49.22 Alphard 217°46.70 -8°46.29
						Regulus 207°33.36 11°50.29
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.71 61°36.32
0	101°38.88	180°13.15 S23°33.97	176°56.07 \$23°39.05	348°39.76 N22°0.12	104°12.84 S03°34.20	Denebola 182°24.04 14°25.46
1 2	116° 41.34 131° 43.80	195°12.19 33.81 210°11.22 33.66	191°56.45 38.87 206°56.83 38.70	3°42.58 0.17 18°45.39 0.23	119°15.17 34.13 134°17.50 34.06	Gienah 175°42.71 -17°41.14
3	146° 46.27	225°10.26 · · 33.50	221°57.21 · · 38.52	33°48.20 · · 0.29	149°19.83 · · 33.99	Acrux 172°59.15 -63°14.33
4	161° 48.73	240°9.29 33.34	236°57.59 38.34	48°51.02 0.34	164°22.16 33.93	Gacrux 171°50.71 -57°15.29
5	176°51.20	255°8.33 33.18	251°57.97 38.16	63°53.83 0.40	179°24.49 33.86	Alioth 166°12.28 55°48.78 Spica 158°21.51 -11°17.82
6	191°53.66	270°7.37 <b>S</b> 23°33.01	266°58.35 <b>S</b> 23°37.97	78°56.64 N22°0.46	194°26.81 <b>S</b> 03°33.79	Alkaid 152°51.50 49°10.69
7	206°56.13	285°6.40 32.85	281°58.74 37.79	93°59.46 0.52	209°29.14 33.73	Hadar 148°35.09 -60°29.66
8	221°58.59 237°1.05	300°5.44 32.68	296°59.12 37.61	109°2.27 0.57	224°31.47 33.66	Menkent 147°56.81 -36°29.73
9 10	252°3.52	315°4.48 · · 32.52 330°3.51 32.35	311°59.50 · · 37.43 326°59.88 37.25	124°5.09 · · 0.63 139°7.90 0.69	239° 33.80 · · 33.59 254° 36.13	Arcturus 145°47.31 19°2.65
11	267°5.98	345°2.55 32.18	342°0.26 37.25	154°10.72 0.74	269° 38.46 33.46	Rigil Kent. 139°39.50 -60°56.34
12	282°8.45	0°1.59 S23°32.01	357°0.64 <b>S</b> 23°36.88	169°13.53 N22°0.80	284°40.79 \$03°33.39	Kochab 137°20.47 74°2.54 Zuben'ubi 136°55.30 -16°8.96
13	297°10.91	15°0.62 31.84	12°1.02 36.70	184°16.34 0.86	299°43.12 33.32	Zuben'ubi 136°55.30 -16°8.96 Alphecca 126°3.31 26°37.45
14	312° 13.38	29°59.66 31.67	27°1.40 36.51	199°19.16 0.91	314°45.44 33.25	Antares 112°15.15 -26°29.33
15	327° 15.84	44°58.70 · · 31.49	42°1.78 · · 36.33	214°21.97 · · 0.97	329°47.77 · · 33.18	Atria 107°9.16 -69°4.28
16 17	342°18.30 357°20.77	59°57.74 31.32 74°56.77 31.14	57°2.16 36.14 72°2.54 35.95	229°24.79 1.03 244°27.60 1.09	344°50.10 33.12 359°52.43 33.05	Sabik 102°2.17 -15°45.42
18	12°23.23	89°55.81 \$23°30.96	87° 2.92 S23° 35.77	259°30.42 N22°1.14	14°54.75 \$03°32.98	Shaula 96°9.67 -37°7.31
19	27°25.70	104°54.85 30.78	102°3.30 35.58	274°33.23 1.20	29°57.08 32.91	Rasalhague 95°58.12 12°32.39
20	42°28.16	119°53.89 30.60	117°3.68 35.39	289°36.05 1.26	44°59.41 32.84	Eltanin 90°42.34 51°29.00 Kaus Aust. 83°31.84 -34°22.32
21	57°30.63	134°52.93 · · 30.42	132°4.06 · · 35.21	304°38.86 · · 1.31	60°1.74 · · 32.78	Vega 80°33.11 38°48.40
22	72°33.09	149°51.97 30.24	147° 4.44 35.02	319°41.68 1.37	75°4.06 32.71	Nunki 75°47.12 -26°15.88
23	87°35.55	164°51.00 30.05	162°4.82 34.83	334°44.49 1.43	90°6.39 32.64	Altair 61°59.49 8°56.21
Mer.	pass. 17:11	$\nu$ -1.0′ d-0.2′ m-3.90	$ u 0.4' \ d\text{-}0.2' \ \text{m}1.12$	$\nu 2.8' \ d0.1' \ \text{m-}2.67$	$ u 2.3' \ d$ -0.1' m1.01	Peacock 53°5.00 -56°39.18
						Deneb 49°25.67 45°22.48
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°38.24 9°59.69 Al Na'ir 27°32.20 -46°50.28
0	102°38.02	179°50.04 \$23°29.87	177°5.20 \$23°34.64	349°47.31 N22°1.49	105°8.72 <b>S</b> 03°32.57	Fomalhaut 15°13.79 -29°29.21
1	117° 40.48	194°49.08 29.68	192°5.58 34.45	4°50.12 1.54	120°11.04 32.50	Scheat 13°44.57 28°13.59
2	132° 42.95	209°48.12 29.49	207°5.96 34.26	19°52.94 1.60	135°13.37 32.43	Markab 13°29.23 15°20.80
3 4	147° 45.41 162° 47.87	224°47.16 · · 29.30 239°46.20 29.11	222°6.34 · · 34.07 237°6.73 33.88	34°55.76 · · 1.66 49°58.57 1.71	150°15.69 · · 32.37 165°18.02 32.30	Jan 01 Thu SHA Mer.pass
4 5	102 47.87 177°50.34	254°45.24 28.92	252°7.11 33.69	49 58.57 1.71 65°1.39 1.77	180° 20.35 32.33	Venus 79°56.61 11:58
6	192°52.80	269° 44.28 S23° 28.73	267°7.49 \$23°33.49	80°4.20 N22°1.83	195°22.67 S03°32.16	Mars 76°7.22 12:13
7	207° 55.27	284°43.32 28.53	282°7.87 33.30	95°7.02 1.88	210°25.00 32.09	Jupiter 246°52.54 00:50
8	222° 57.73	299° 42.36 28.34	297°8.25 33.11	110°9.84 1.94	225°27.32 32.02	Saturn 2°37.14 17:04
9	238°0.20	314°41.40 · · 28.14	312°8.63 · · 32.92	125°12.65 · · 2.00	240°29.65 · · 31.95	Jan 02 Fri SHA Mer.pass
10	253°2.66	329°40.44 27.94	327°9.01 32.72	140°15.47 2.06	255°31.97 31.88	Venus 78°34.28 12:00
11 12	268°5.12 283°7.59	344°39.48 27.74 359°38.52 \$23°27.54	342°9.39 32.53 357°9.77 \$23°32.33	155°18.28 2.11 170°21.10 N22°2.17	270°34.30 31.82 285°36.62 \$03°31.75	Mars 75°17.20 12:12
13	298° 10.05	14°37.57 27.34	12°10.15 32.14	185°23.92 2.23	300°38.95 31.68	Jupiter 247°0.89 00:45
14	313° 12.52	29°36.61 27.14	27°10.53 31.94	200°26.73 2.28	315°41.27 31.61	Saturn 2°33.96 17:01
15	$328^{\circ}14.98$	44°35.65 · · 26.93	42°10.92 · · 31.75	215°29.55 · · 2.34	330°43.60 · · 31.54	Jan 03 Sat SHA Mer.pass
16	343° 17.45	59°34.69 26.73	57°11.30 31.55	230°32.37 2.40	345°45.92 31.47	Venus 77°12.03 12:01
17	358° 19.91	74°33.73 26.52	72°11.68 31.35	245°35.18 2.45	0°48.24 31.40	Mars 74°27.18 12:11
18 19	13°22.37 28°24.84	89°32.77 <b>S</b> 23°26.31 104°31.82 26.10	87°12.06	260°38.00 N22°2.51 275°40.82 2.57	15°50.57 S03°31.33 30°52.89 31.26	Jupiter 247°9.29 00:41
20	28° 24.84 43° 27.30	104°31.82 26.10 119°30.86 25.89	102°12.44 30.96 117°12.82 30.76	275°40.82 2.57 290°43.63 2.62	45°55.22 31.19	Saturn 2°30.70 16:57
21	58°29.77	134°29.90 · · 25.68	132°13.20 · · 30.56	305°46.45 · · 2.68	60°57.54 · · 31.12	Horizontal parallax
22	73°32.23	149°28.95 25.47	147°13.58 30.36	320°49.27 2.74	75°59.86 31.05	Venus: 0.1
23	88°34.70	164°27.99 25.25	162°13.97 30.16	335°52.09 2.80	91°2.19 30.98	Mars: 0.1
Mer	pass. 17:07	ν-1.0' d-0.2' m-3.90	ν0.4' d-0.2' m1.11	$\nu 2.8' \ d0.1' \ \text{m-}2.67$	ν2.3' d-0.1' m1.01	

h	Su	n	Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°10.05	\$23°1.03	$36^{\circ}44.52$	2.4'	$N26^{\circ}24.22$	6.7'	60.7'
1	194° 9.76	0.83	51°5.95	2.3'	26°30.92	6.5'	60.7'
2	209° 9.46 224° 9.17	0.63 •• 0.43	65°27.30 79°48.55	2.3' 2.2'	26°37.42 26°43.73	6.3' 6.1'	60.7' 60.7'
4	239° 8.87	0.22	94°9.72	2.1'	26°49.84	5.9'	60.7'
5	254°8.58	23°0.02	108°30.79	2.0'	$26^{\circ}55.75$	5.7'	60.7'
6	269°8.29	\$22°59.81	122°51.78	1.9'	N27°1.46	5.5'	60.7'
7 8	284°7.99 299°7.70	59.60 59.39	137°12.69 151°33.52	1.8' 1.8'	27°6.97 27°12.27	5.3' 5.1'	60.7' 60.7'
9	314° 7.41	• • 59.19	165°54.27	1.7'	27° 17.37	4.9'	60.7
10	329°7.11	58.98	$180^{\circ}14.95$	1.6'	$27^{\circ}22.27$	4.7'	60.7'
11	344° 6.82 359° 6.53	58.77	194°35.55	1.5'	27°26.96	4.5'	60.7'
12 13	359°6.53 14°6.23	\$22°58.55 58.34	208°56.09 223°16.57	1.5' 1.4'	N27°31.44 27°35.71	4.3' 4.1'	60.7' 60.8'
14	29° 5.94	58.13	237°36.98	1.4	27°39.77	3.9'	60.8
15	44°5.65	• • 57.92	251°57.34	1.3'	27°43.63	3.6'	60.8'
16	59° 5.36	57.70	266°17.64	1.2'	27°47.26	3.4'	60.8'
17 18	74° 5.06 89° 4.77	57.49 \$22°57.27	280°37.88 294°58.08	1.2' 1.2'	27°50.69 N27°53.90	3.2' 3.0'	60.8' 60.8'
19	104°4 48	57.05	309°18.23	1.1'	27°56.89	2.8'	60.8
20	119° 4.19	56.84	323°38.35	1.1'	27°59.67	2.6'	60.8
21	134°3.90	• • 56.62	337°58.42	1.0'	$28^{\circ}2.23$	2.3'	60.8'
22	149° 3.61	56.40	352°18.46	1.0'	28°4.58	2.1'	60.8'
23	164° 3.31	56.18	6°38.46	1.0'	28°6.71	1.9'	60.8'
	SD = 16.3'	d = -0.2'		SI	D = 16.5'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179° 3.02	\$22°55.96	20°58.44	1.0'	$N28^{\circ}8.61$	1.7'	60.8'
1	194°2.73	55.74	35°18.40	0.9'	28° 10.30	1.5'	60.8'
2	209°2.44 224°2.15	55.52 •• 55.29	49°38.33 63°58.25	0.9' 0.9'	28°11.77 28°13.03	1.3' 1.0'	60.8' 60.8'
4	239° 1.86	55.07	78° 18.15	0.9	28° 14.06	0.8	60.8
5	254° 1.57	54.85	92°38.04	0.9'	28° 14.87	0.6'	60.8'
6	269°1.28	S22°54.62	106°57.93	0.9'	N28° 15.46	0.4'	60.8'
7	284° 0.99	54.39	121°17.82	0.9'	28° 15.83	0.1'	60.8'
8 9	299° 0.70 314° 0.41	54.17 •• 53.94	135°37.71 149°57.60	0.9' 0.9'	28°15.98 28°15.91	-0.1' -0.3'	60.7' 60.7'
10	329° 0.12	53.71	164° 17.50	0.9	28° 15.62	-0.5'	60.7
11	343°59.83	53.48	178°37.41	0.9'	28° 15.11	-0.7'	60.7'
12	358°59.54	S22°53.25	192°57.34	0.9'	N28°14.38	-0.9'	60.7'
13 14	13°59.25 28°58.96	53.02 52.79	207°17.29 221°37.26	1.0' 1.0'	28°13.43 28°12.26	-1.2' -1.4'	60.7'
14 15	28 58.90 43°58.67	52.79 •• 52.56	221 37.26 235°57.26	1.0'	28 12.26 28°10.87	-1.4 -1.6'	60.7' 60.7'
16	58°58.39	52.32	250°17.29	1.1'	28°9.26	-1.8'	60.7'
17	73°58.10	52.09	264°37.36	1.1'	$28^{\circ}7.44$	-2.0'	60.7'
18	88°57.81	\$22°51.85	278°57.46	1.1'	N28°5.40	-2.3'	60.7'
19 20	103°57.52 118°57.23	51.62 51.38	293°17.61 307°37.80	1.2' 1.2'	28°3.14 28°0.67	-2.5' -2 7'	60.7' 60.6'
21	133°56.94	51.15	321°58.03	1.3'	26 0.07 27°57.98	-2.1 -2.9'	60.6
22	148°56.66	50.91	336°18.32	1.3'	27°55.08	-3.1'	60.6'
23	163°56.37	50.67	350°38.67	1.4'	$27^{\circ}51.97$	-3.3'	60.6'
	SD = 16.3'	d = -0.2'		SI	D = 16.6'		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°56.08	S22°50.43	4°59.07	1.5'	N27°48.64	-3.5'	60.6'
1	193°55.79	50.19	19°19.54	1.5'	27° 45.10	-3.7'	60.6'
2 3	208°55.51 223°55.22	49.95 •• 49.71	33°40.07 48°0.67	1.6' 1.7'	27°41.35 27°37.40	-4.0' -4.2'	60.6' 60.6'
3 4	223 55.22 238°54.93	49.71	48 0.67 62°21.34	1.7'	27°33.23	-4.2 -4.4'	60.5
5	253°54.65	49.22	76°42.08	1.8'	$27^{\circ}28.86$	-4.6'	60.5
6	268°54.36	S22°48.98	91°2.91	1.9'	N27°24.29	-4.8'	60.5
7	283°54.07 298°53.79	48.73	105°23.81 119°44.80	2.0' 2.1'	27°19.51 27°14.53	-5.0' -5.2'	60.5'
8 9	298°53.79 313°53.50	48.49 •• 48.24	119°44.80 134°5.87	2.1'	27° 14.53 27° 9.35	-5.2′ -5.4′	60.5' 60.5'
10	328°53.22	47.99	148°27.03	2.3'	27°3.96	-5.6'	60.4
11	343°52.93	47.74	162°48.29	2.3'	$26^{\circ}58.38$	-5.8'	60.4'
12	358°52.65	\$22°47.49	177°9.63	2.4'	N26° 52.61	-6.0'	60.4
13 14	13°52.36 28°52.08	47.25 46.99	191°31.08 205°52.62	2.5' 2.6'	26°46.64 26°40.48	-6.2' -6.4'	60.4' 60.4'
15	43°51.79	· · 46.74	205 52.02 220°14.27	2.8'	26° 34.12	-6.5'	60.3
16	58°51.51	46.49	234°36.02	2.9'	$26^{\circ}27.58$	-6.7'	60.3
17	73°51.22	46.24	248°57.88	3.0'	26°20.85	-6.9'	60.3'
18	88°50.94 103°50.65	\$22°45.98	263°19.84 277°41.92	3.1'	N26°13.93 26°6.83	-7.1'	60.3'
19 20	103°50.65 118°50.37	45.73 45.48	277°41.92 292°4.11	3.2' 3.3'	26°6.83 25°59.55	-7.3' -7.5'	60.3' 60.2'
21	133°50.09	• • 45.22	306°26.41	3.4'	25°52.09	-7.6'	60.2
22	148°49.80	44.96	320°48.83	3.5'	25°44.44	-7.8'	60.2'
23	163°49.52	44.71	335°11.37	3.7'	25°36.63	-8.0'	60.2'
	SD = 16.3'	d = -0.2'		SI	D = 16.5'		

Lat.	Twi	light	Sunrise	Sunset	Tw	ilight
Lat.	Naut.	Civil	Junisc	Juliset	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	80:80	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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	////
<b>S</b> 60°	////	01:09	02:45	21:23	22:56	////
	I					

Lat.		Moonris	e		Moonse	t
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
N 70°						
68°						
66°						
64°						
62°	10:58	10.40	13:35	08:53	00.20	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° 54°	12:45	13:44	15:10	07:07	08:28	09:20
54 52°	13:05 13:21	14:05 14:23	15:28 15:44	06:48 06:32	08:07 07:49	09:02 08:46
50°	13:21	14:23	15:57	06:32	07:49	08:32
45°	14:05	15:08	16:25	05:49	07:04	08:04
N 40°	14:27	15:32	16:46	05:17	06:40	07:42
35°	14:46	15:51	17:04	05:09	06:20	07:42
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
<b>S</b> 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
<b>S</b> 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° <b>S</b> 60°	20:23	21:28	22:01 22:26	00:00	00:39	01:54
3 60	21:01	22:05	22:20		00:00	01:17

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Mer.Pass.		
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	12-14	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	91-100%	
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		

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	103°37.16	179°27.03 \$23°25.04	177°14.35	350°54.90 N22°2.85	106°4.51 \$03°30.91	
1	118°39.62	194°26.08 24.82	192°14.73 29.76	5°57.72 2.91	121°6.83 30.84	Alpheratz 357°33.99 29°14.22 Ankaa 353°6.37 -42°10.08
2	133°42.09	209°25.12 24.60	$207^{\circ}15.11$ 29.56	21°0.54 2.97	136° 9.15 30.77	Ankaa 353°6.37 -42°10.08 Schedar 349°30.12 56°41.11
3	148° 44.55	224°24.16 · · 24.38	222°15.49 · · 29.36	36°3.36 · · 3.02	151°11.48 · · 30.70	Diphda 348°46.47 -17°50.73
4	163° 47.02	239°23.21 24.16	237°15.87 29.16	51°6.17 3.08	166°13.80 30.63	Achernar 335°19.43 -57°6.53
5	178°49.48	254°22.25 23.94	252°16.25 28.95	66°8.99 3.14	181°16.12 30.56	Hamal 327°50.13 23°35.26
6 7	193°51.95 208°54.41	269°21.30 \$23°23.72 284°20.34 23.49	267°16.63 \$23°28.75 282°17.02 28.55	81°11.81 N22°3.19 96°14.63 3.25	196°18.44	Polaris 313°18.82 89°22.71
8	223°56.87	299°19.39 23.27	297°17.40 28.34	111°17.45 3.31	226°23.09 30.35	Acamar 315°10.90 -40°12.19
9	238° 59.34	314°18.43 · · 23.04	312°17.78 · · 28.14	126°20.26 · · 3.37	241°25.41 · · 30.28	Menkar 314°5.09 4°11.53
10	254°1.80	329° 17.48 22.81	327°18.16 27.93	141°23.08 3.42	256°27.73 30.21	Mirfak 308°26.73 49°57.41
11	269°4.27	344°16.52 22.58	342°18.54 27.73	156°25.90 3.48	271°30.05 30.14	Aldebaran 290°38.37 16°33.73 Rigel 281°2.75 -8°10.32
12	284°6.73	359°15.57 <b>S</b> 23°22.35	357°18.92 \$23°27.52	171°28.72 N22°3.54	286°32.37 <b>S</b> 03°30.07	Capella 280°20.21 46°1.51
13	299°9.19	14°14.61 22.12	12°19.31 27.32	186°31.54 3.59	301°34.70 30.00	Bellatrix 278°21.66 6°22.39
14 15	314°11.66 329°14.12	29°13.66 21.88 44°12.71 · · 21.65	$27^{\circ}19.69$ $27.11$ $42^{\circ}20.07$ · · $26.90$	201°34.35 3.65 216°37.17 · · 3.71	316°37.02 29.93 331°39.34 · · 29.86	Elnath 278°0.45 28°37.78
16	344° 16.59	59°11.75 21.41	57°20.45 26.69	231°39.99 3.76	331°39.34 · · 29.86 346°41.66 29.79	Alnilam 275°36.56 -1°11.14
17	359° 19.05	74°10.80 21.18	72°20.83 26.49	246°42.81 3.82	1°43.98 29.72	Betelgeuse 270°50.85 7°24.70
18	14°21.52	89°9.85 \$23°20.94	87°21.22 <b>S</b> 23°26.28	261°45.63 N22°3.88	16°46.30 \$03°29.65	Canopus 263°51.47 -52°42.57
19	29°23.98	104°8.89 20.70	102°21.60 26.07	276°48.45 3.93	31°48.62 29.58	Sirius 258°25.15 -16°45.13 Adhara 255°4.82 -29°0.45
20	44°26.44	119°7.94 20.46	117°21.98 25.86	291°51.27 3.99	46°50.94 29.51	Adhara 255°4.82 -29°0.45 Procyon 244°49.63 5°9.44
21	59°28.91	134°6.99 · · 20.22	132°22.36 · · 25.65	306°54.08 · · 4.05	61°53.26 · · 29.43	Pollux 243°15.91 27°57.71
22	74°31.37	149°6.04 19.97	147°22.74 25.44	321°56.90 4.10	76°55.58 29.36	Avior 234°13.79 -59°35.45
23	89°33.84	164°5.08 19.73	162°23.13 25.23	336°59.72 4.16	91°57.90 29.29	Suhail 222°45.32 -43°32.15
Mer.	pass. 17:03	$\nu$ -1.0' d-0.2' m-3.90	u0.4 $'$ d-0.2 $'$ m1.11	$\nu 2.8' \ d0.1' \ \text{m-}2.68$	$ u 2.3' \ d$ -0.1' m1.01	Miaplacidus 221°37.31 -69°49.24
						Alphard 217°46.67 -8°46.30
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.33 11°50.28
0	104°36.30	179°4.13 \$23°19.48	177°23.51 \$23°25.02	352°2.54 N22°4.22	107° 0.22 \$03° 29.22	Dubhe 193°39.66 61°36.32
1	119°38.77	194°3.18 19.23	192°23.89 24.81	7°5.36 4.28	122°2.54 29.15	Denebola 182°24.00 14°25.44
2	134°41.23	209°2.23 18.99	207°24.27 24.59	22°8.18 4.33	137°4.86 29.08	Gienah 175°42.67 -17°41.15 Acrux 172°59.10 -63°14.34
3	149°43.69	224°1.28 · · 18.74	222°24.65 •• 24.38	37°11.00 · · 4.39	152°7.18 · · 29.01	Gacrux 171°50.67 -57°15.30
4	164°46.16	239°0.33 18.49	237°25.04 24.17	52°13.82 4.45	167° 9.50 28.94	Alioth 166°12.23 55°48.77
5	179°48.62	253°59.38 18.23	252°25.42 23.95	67°16.64 4.50	182°11.81 28.86	Spica 158°21.47 -11°17.83
6	194°51.09	268°58.43 \$23°17.98	267°25.80 \$23°23.74	82°19.46 N22°4.56	197°14.13	Alkaid 152°51.47 49°10.67
7 8	209°53.55 224°56.01	283°57.48 17.73 298°56.53 17.47	282°26.18 23.53 297°26.57 23.31	97°22.28 4.62 112°25.10 4.67	212°16.45 28.72 227°18.77 28.65	Hadar 148°35.04 -60°29.66
9	239° 58.48	313°55.58 · · 17.21	312°26.95 · · 23.10	112 25.10 4.07 127°27.92 · · 4.73	242°21.09 · · 28.58	Menkent 147°56.77 -36°29.74
10	255°0.94	328°54.63 16.95	327°27.33 22.88	142°30.74 4.79	257°23.41 28.51	Arcturus 145°47.28 19°2.63
11	270°3.41	343°53.68 16.70	342°27.71 22.66	157°33.56 4.84	272°25.72 28.43	Rigil Kent. 139°39.45 -60°56.34
12	285°5.87	358°52.73 <b>S</b> 23°16.43	357°28.10 \$23°22.45	172°36.38 N22°4.90	287°28.04 \$03°28.36	Kochab 137°20.41 74°2.53 Zuben'ubi 136°55.27 -16°8.97
13	300°8.34	13°51.78 16.17	12°28.48 22.23	187°39.20 4.96	302°30.36 28.29	Alphecca 126°3.28 26°37.43
14	315° 10.80	28°50.83 15.91	27°28.86 22.01	202°42.02 5.01	317°32.68 28.22	Antares 112°15.12 -26°29.33
15	330° 13.26	43°49.88 · · 15.64	42°29.24 · · 21.79	217°44.84 · · 5.07	332°35.00 · · 28.15	Atria 107°9.10 -69°4.28
16	345° 15.73	58° 48.94 15.38	57°29.63 21.58	232°47.66 5.13	347°37.31 28.07	Sabik 102°2.15 -15°45.43
17 18	0° 18.19 15° 20.66	73°47.99 15.11 88°47.04 \$23°14.84	72°30.01 21.36 87°30.39 \$23°21.14	247°50.48 5.18 262°53.30 N22°5.24	2°39.63 28.00 17°41.95 \$03°27.93	Shaula 96°9.64 -37°7.30
19	30°23.12	103°46.09 14.57	102°30.77 20.92	202 55.30 N22 5.24 277°56.12 5.30	32°44.26 27.86	Rasalhague 95°58.10 12°32.38
20	45°25.58	118° 45.15 14.30	117°31.16 20.70	292°58.94 5.35	47°46.58 27.79	Eltanin 90°42.33 51°28.98
21	60°28.05	133°44.20 · · 14.03	132°31.54 · · 20.48	308°1.76 · · 5.41	62°48.90 · · 27.71	Kaus Aust. 83°31.82 -34°22.32 Vega 80°33.10 38°48.39
22	75°30.51	148°43.25 13.76	147°31.92 20.25	323°4.58 5.47	77°51.21 27.64	Vega 80°33.10 38°48.39 Nunki 75°47.11 -26°15.88
23	90°32.98	163°42.31 13.48	162°32.31 20.03	338°7.40 5.52	92°53.53 27.57	Altair 61°59.48 8°56.20
Mer	pass. 16:59	$\nu$ -1.0' d-0.2' m-3.90	$\nu$ 0.4' d-0.2' m1.10	ν2.8' d0.1' m-2.68	$\nu 2.3' \ d$ -0.1' m1.01	Peacock 53°4.98 -56°39.17
		- 1.0 d 0.2 m 0.50				Deneb 49°25.67 45°22.47
_	6114	6114 B	6114	CU.A. D.	G.1.4 D	Enif 33°38.23 9°59.69
Tue 0	<b>GHA</b> 105° 35.44	<b>GHA Dec</b> 178°41.36 <b>S</b> 23°13.21	<b>GHA Dec</b> 177°32.69 \$23°19.81	<b>GHA Dec</b> 353°10.22 N22°5.58	<b>GHA Dec</b> 107°55.85 <b>S</b> 03°27.50	Al Na'ir 27°32.19 -46°50.27
1	105 35.44 120°37.91	176 41.30 323 13.21 193°40.41 12.93	177 32.09 323 19.01 192°33.07 19.59	8°13.04 5.64	107 55.65 505 27.50 122°58.16 27.42	Fomalhaut 15°13.79 -29°29.21
2	135°40.37	208°39.47 12.65	207°33.46 19.36	23°15.86 5.69	138° 0.48 27.35	Scheat 13°44.57 28°13.58   Markab 13°29.23 15°20.80
3	$150^{\circ}42.83$	223°38.52 · · 12.37	222°33.84 · · 19.14	38°18.68 · · 5.75	153°2.79 · · 27.28	IVIAI KAD 13 29.23 13 20.00
4	$165^{\circ}45.30$	238°37.58 12.09	237°34.22 18.92	53°21.50 5.81	168°5.11 27.21	Jan 04 Sun SHA Mer.pass
5	180°47.76	253°36.63 11.81	252°34.61 18.69	68°24.32 5.86	183°7.43 27.13	Venus 75°49.87 12:03
6	195° 50.23	268°35.69 \$23°11.53	267°34.99 S23°18.47	83°27.14 N22°5.92	198° 9.74 S03° 27.06	Mars 73°37.19 12:11
7	210°52.69	283°34.74 11.24	282°35.37 18.24	98°29.96 5.98	213°12.06 26.99	Jupiter 247°17.74 00:36 Saturn 2°27.35 16:53
8 9	225°55.15 240°57.62	298°33.80 10.96 313°32.85 · · 10.67	297°35.76 18.02 312°36.14 · · 17.79	113°32.78 6.03 128°35.60 · · 6.09	228°14.37 26.91 243°16.69 · · 26.84	Saturn 2°27.35 16:53
10	256°0.08	328° 31.91 10.38	327°36.52 17.56	143°38.43 6.15	258°19.00 26.77	Jan 05 Mon SHA Mer.pass
11	271°2.55	343°30.97 10.09	342°36.91 17.34	158°41.25 6.20	273°21.31 26.69	Venus 74°27.83 12:04
12	286°5.01	358°30.02 <b>S</b> 23°9.80	357°37.29 \$23°17.11	173°44.07 N22°6.26	288°23.63 <b>S</b> 03°26.62	Mars 72° 47.21 12:10
13	301°7.47	13°29.08 9.51	12°37.67 16.88	188°46.89 6.32	303°25.94 26.55	Jupiter 247°26.24 00:32 Saturn 2°23.92 16:49
14	316°9.94	28°28.14 9.21	27°38.06 16.65	203°49.71 6.37	318°28.26 26.47	Saturn 2 23.92 10:49
15	331°12.40	43°27.20 · · 8.92	42°38.44 · · 16.42	218°52.53 · · 6.43	333°30.57 · · 26.40	Jan 06 Tue SHA Mer.pass
16	346° 14.87	58°26.25 8.62	57°38.82 16.19	233°55.35 6.49	348°32.89 26.33	Venus 73°5.92 12:06
17	1°17.33	73°25.31 8.33	72°39.21 15.96 87°39.59 \$23°15.73	248°58.17 6.54 264°1.00 N22°6.60	3°35.20 26.25 18°37.51 \$03°26.18	Mars 71°57.25 12:10
18 19	16° 19.80 31° 22.26	88°24.37 <b>S</b> 23°8.03 103°23.43 7.73	87°39.59 \$23°15.73 102°39.98 15.50	264°1.00 N22°6.60 279°3.82 6.66	18°37.51 S03°26.18 33°39.83 26.11	Jupiter 247°34.78 00:27
20	46°24.72	118°22.49 7.43	102 39.96 15.50 117°40.36 15.27	294°6.64 6.71	48°42.14 26.03	Saturn 2°20.41 16:46
21	61°27.19	133°21.55 · · 7.13	132°40.74 · · 15.04	309°9.46 · · 6.77	63°44.45 · · 25.96	Horizontal parallax
22	$76^{\circ}29.65$	148°20.61 6.82	147°41.13 14.80	324°12.28 6.83	78°46.77 25.89	Venus: 0.1
23	$91^{\circ}32.12$	163°19.67 6.52	162°41.51 14.57	339°15.10 6.88	93°49.08 25.81	Mars: 0.1
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	

h	Su	n	Moon				
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°49.23	S22°44.45	349°34.03	3.8'	N25°28.63	-8.2'	60.2'
1	193°48.95	44.19	3°56.81	3.9'	25°20.47	-8.3'	60.1'
2	208°48.67 223°48.39	43.93 •• 43.67	18° 19.71 32° 42.74	4.0' 4.2'	25°12.14 25°3.63	-8.5' -8.7'	60.1' 60.1'
4	238°48.10	43.41	47°5.89	4.3'	24°54.97	-8.8'	60.1
5	253°47.82	43.14	$61^{\circ}29.17$	4.4'	$24^{\circ}46.13$	-9.0'	60.0'
6	268°47.54	S22°42.88	75°52.58	4.5'	N24°37.14 24°27.99	-9.2'	60.0'
7 8	283°47.26 298°46.97	42.62 42.35	90° 16.12 104° 39.80	4.7' 4.8'	24° 27.99 24° 18.68	-9.3' -9.5'	60.0' 59.9'
9	313°46.69	• • 42.09	119°3.60	4.9'	24°9.21	-9.6'	59.9'
10	328°46.41	41.82	133°27.54	5.1'	23°59.59	-9.8'	59.9'
11	343°46.13 358°45.85	41.55 \$22°41.29	147°51.61 162°15.81	5.2'	23°49.82 N23°39.90	-9.9' -10.1'	59.9'
12 13	13°45.57	41.02	102 15.81 176°40.15	5.3' 5.5'	23° 29.84	-10.1 -10.2'	59.8' 59.8'
14	28°45.29	40.75	191°4.63	5.6'	23°19.63	-10.4	59.8'
15	43°45.00	• • 40.48	205°29.24	5.8'	23°9.28	-10.5'	59.7'
16 17	58°44.72 73°44.44	40.21 39.94	219°53.99 234°18.88	5.9' 6.0'	22°58.79 22°48.16	-10.6' -10.8'	59.7' 59.7'
18	88°44.16	\$22°39.66	248° 43.90	6.2	N22° 37.40	-10.8	59.7'
19	103°43.88	39.39	263°9.07	6.3'	22°26.50	-11.0'	59.6'
20	118°43.60	39.12	277°34.37	6.4'	22° 15.47	-11.2'	59.6'
21 22	133°43.32 148°43.04	· · 38.84 38.57	291°59.81 306°25.39	6.6' 6.7'	22°4.32 21°53.03	-11.3' -11.4'	59.6' 59.5'
23	148 43.04 163°42.77	38.29	300 25.39 320°51.11	6.7 6.9'	21°53.03 21°41.63	-11.4 -11.5'	59.5'
	SD = 16.3'	d = -0.3'			D = 16.4'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°42.49 193°42.21	\$22°38.01 37.74	335° 16.97 349° 42.97	7.0' 7.1'	N21°30.10 21°18.45	-11.6' -11.8'	59.5' 59.4'
2	208°41.93	37.46	4°9.10	7.3'	21°6.69	-11.9'	59.4'
3	223°41.65	• • 37.18	18° 35.38	7.4'	20°54.81	-12.0'	59.4'
4	238°41.37	36.90	33°1.79	7.6'	20°42.82	-12.1'	59.3'
5 6	253°41.09 268°40.82	36.62 \$22°36.34	47°28.34 61°55.03	7.7' 7.8'	20°30.71 N20°18.50	-12.2' -12.3'	59.3' 59.3'
7	283°40.54	36.05	76°21.86	8.0'	20°6.18	-12.4'	59.2'
8	298°40.26	35.77	90°48.82	8.1'	$19^{\circ}53.76$	-12.5'	59.2'
9	313°39.98	• • 35.49	105° 15.92	8.2'	19°41.24	-12.6'	59.2'
10 11	328°39.70 343°39.43	35.20 34.92	119° 43.16 134° 10.53	8.4' 8.5'	19°28.61 19°15.89	-12.7' -12.8'	59.1' 59.1'
12	358°39.15	S22°34.63	148° 38.04	8.6'	N19°3.07	-12.9'	59.1
13	13°38.87	34.34	163°5.68	8.8'	18°50.16	-13.0'	59.0'
14 15	28°38.60 43°38.32	34.05 · · 33.77	177°33.45 192°1.36	8.9' 9.0'	18° 37.16 18° 24.07	-13.1' -13.2'	59.0' 59.0'
16	58°38.05	33.48	206° 29.40	9.0 9.2'	18° 10.89	-13.2 -13.3'	59.0 58.9'
17	73°37.77	33.19	220° 57.57	9.3'	17°57.63	-13.3'	58.9'
18	88°37.49	\$22°32.90	235°25.87	9.4'	N17°44.28	-13.4'	58.8'
19 20	103°37.22 118°36.94	32.60 32.31	249° 54.30 264° 22.86	9.6' 9.7'	17°30.86 17°17.35	-13.5' -13.6'	58.8' 58.8'
21	133°36.67	32.02	278°51.55	9.8'	17°3.77	-13.7'	58.7'
22	148°36.39	31.72	293°20.36	9.9'	16°50.11	-13.7'	58.7'
23	163°36.12	31.43	307°49.31	10.1'	16°36.38	-13.8'	58.7'
	SD = 16.3'	d = -0.3'		SI	D = 16.2'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°35.84	\$22°31.13	$322^{\circ}18.37$	10.2'	N16°22.58	-13.9'	58.6'
1	193°35.57 208°35.29	30.84	336°47.56	10.3'	16°8.71	-13.9'	58.6'
2	208°35.29 223°35.02	30.54 •• 30.24	351°16.87 5°46.31	10.4' 10.6'	15°54.77 15°40.77	-14.0' -14.1'	58.6' 58.5'
4	238°34.75	29.94	20° 15.86	10.7'	15° 26.70	-14.1'	58.5
5	253°34.47	29.64	34°45.54	10.8'	15° 12.57	-14.2'	58.4'
6 7	268°34.20 283°33.93	\$22°29.34 29.04	49° 15.33 63° 45.24	10.9' 11.0'	N14°58.39 14°44.14	-14.2' -14.3'	58.4' 58.4'
8	283°33.93 298°33.65	29.04 28.74	78° 15.27	11.1'	14° 44.14 14° 29.84	-14.3 -14.4'	58.4
9	313°33.38	• • 28.44	92°45.41	11.3'	14° 15.48	-14.4'	58.3'
10	328°33.11	28.14	107° 15.66	11.4'	14°1.07	-14.5'	58.2'
11 12	343°32.83 358°32.56	27.83 \$22° 27.53	121°46.03 136°16.51	11.5' 11.6'	13°46.61 N13°32.10	-14.5' -14.6'	58.2' 58.2'
13	13°32.29	27.22	150° 47.10	11.7'	13° 17.55	-14.6'	58.1'
14	28°32.02	26.91	165° 17.80	11.8'	13°2.95	-14.6'	58.1'
15	43°31.75	• • 26.61	179°48.60	11.9'	12°48.30	-14.7'	58.1'
16 17	58°31.48 73°31.20	26.30 25.99	194° 19.51 208° 50.52	12.0' 12.1'	12°33.61 12°18.88	-14.7' -14.8'	58.0' 58.0'
18	88°30.93	\$22° 25.68	200° 50.52 223° 21.64	12.1	N12°4.12	-14.8	57.9'
19	103°30.66	25.37	237°52.86	12.3'	$11^{\circ}49.31$	-14.8'	57.9'
20	118°30.39	25.06	252°24.18	12.4'	11°34.47	-14.9'	57.9'
21 22	133°30.12 148°29.85	· · 24.75 24.44	266° 55.60 281° 27.12	12.5' 12.6'	11°19.59 11°4.68	-14.9' -14.9'	57.8' 57.8'
23	146 29.65 163°29.58	24.44	295°58.74	12.7'	10°49.74	-14.9 -15.0'	57.6 57.7'
	SD = 16.3'	d = -0.3'		SI	D = 16.0'		

_	Twi	light			Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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	////
<b>S</b> 60°	////	01:19	02:50	21:20	22:49	////
				ı		

Lat.		Moonris	e		Moonset	į.
Lat.	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	22:33	22:34	22:35	03:11	05:07	06:55

		Sun		Moon			
Day	Eqn.of	f Time	Mer.	Mer.Pass.		Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	15-17	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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	Ven	us	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	106°34.58	178° 18.73	S23°6.21	177°41.90	\$23°14.34	354°17.92	N22°6.94	108°51.39	S03°25.74			
1	121°37.04	193°17.79	5.91	192°42.28	14.11	9°20.75	7.00	123°53.70	25.66	Alpheratz	357°34.00	29°14.21 -42°10.08
2	$136^{\circ}39.51$	$208^{\circ}16.85$	5.60	207°42.66	13.87	24°23.57	7.05	$138^{\circ}56.02$	25.59	Ankaa Schedar	353°6.38 349°30.15	-42 10.08 56°41.11
3	151°41.97	223° 15.91	• • 5.29	222°43.05	• • 13.64	39°26.39	• • 7.11	153°58.33	• • 25.52	Diphda	348°46.48	-17°50.73
4	166° 44.44	238°14.97	4.98	237°43.43	13.40	54°29.21	7.16	169°0.64	25.44	Achernar	335°19.46	-57° 6.53
5 6	181°46.90 196°49.36	253°14.03 268°13.09	4.67 \$23°4.35	252°43.82 267°44.20	13.17 \$23°12.93	69°32.03 84°34.86	7.22 N22°7.28	184°2.95 199°5.27	25.37 \$03°25.29	Hamal	$327^{\circ}50.15$	$23^{\circ}35.26$
7	211°51.83	283°12.15	4.04	282°44.59	12.69	99°37.68	7.33	214°7.58	25.22	Polaris	313°20.13	89°22.72
8	226°54.29	298°11.21	3.72	297°44.97	12.46	114°40.50	7.39	229°9.89	25.14	Acamar	315°10.91	-40°12.19
9	241°56.76	313°10.28	• • 3.41	312°45.36	• • 12.22	129°43.32	• • 7.45	244°12.20	• • 25.07	Menkar Mirfak	314°5.10 308°26.74	4°11.52 49°57.41
10	$256^{\circ}59.22$	$328^{\circ}9.34$	3.09	327°45.74	11.98	144°46.14	7.50	$259^{\circ}14.51$	25.00	Aldebaran	290°38.37	16°33.73
11	272°1.68	343°8.40	2.77	342°46.12	11.74	159°48.97	7.56	274° 16.82	24.92	Rigel	281°2.75	-8°10.33
12	287°4.15 302°6.61	358°7.47	\$23°2.45	357°46.51 12°46.89	\$23°11.50	174°51.79 189°54.61	N22°7.62	289°19.13	S03°24.85	Capella	280°20.21	$46^{\circ}1.52$
13 14	302 0.01 317°9.08	13°6.53 28°5.59	2.13 1.81	12 46.89 27°47.28	11.27 11.03	204°57.43	7.67 7.73	304°21.45 319°23.76	24.77 24.70	Bellatrix	$278^{\circ}21.66$	6°22.38
15	332°11.54	43°4.66	. 1.48	42°47.66	10.79	220°0.25	• • 7.79	334°26.07	• • 24.62	Elnath	278° 0.45	28°37.79
16	$347^{\circ}14.01$	58°3.72	1.16	57°48.05	10.55	235°3.08	7.84	349°28.38	24.55	Alnilam	275°36.56	-1°11.14 7°24.70
17	$2^{\circ}16.47$	73°2.79	0.83	72°48.43	10.30	250°5.90	7.90	4°30.69	24.47	Betelgeuse Canopus	270°50.85 263°51.47	-52°42.59
18	17° 18.93	88°1.85	S23°0.50	87°48.82	\$23°10.06	265°8.72	N22°7.95	19°33.00	S03°24.40	Sirius	258°25.14	-16°45.14
19	32°21.40	103°0.92	23°0.17 22°59.84	102°49.20	9.82	280°11.54	8.01	34°35.31	24.32	Adhara	255°4.82	-29°0.46
20 21	47°23.86 62°26.33	117°59.98 132°59.05	. 59.51	117°49.59 132°49.97	9.58 •• 9.34	295°14.37 310°17.19	8.07 •• 8.12	49°37.62 64°39.93	24.25 •• 24.17	Procyon	244°49.62	$5^{\circ}9.44$
22	77° 28.79	147°58.11	59.18	147°50.36	9.09	325°20.01	8.18	79° 42.24	24.17	Pollux	243°15.90	27°57.71
23	92°31.25	162°57.18	58.84	162°50.74	8.85	340°22.83	8.24	94° 44.55	24.02	Avior	234°13.77	-59°35.46
					.2′ m1.09		1′ m-2.68			Suhail	222°45.30 221°37.29	-43°32.16 -69°49.26
ivier.p	pass. 16:51	$\nu$ -0.9' d-0.3	3 m-3.90	νυ.4 a-υ	.2 m1.09	ν2.8 αυ.	1 m-2.08	ν2.3 a-0	.1′ m1.01	Miaplacidus Alphard	221 37.29 217°46.66	-8°46.31
										Regulus	207°33.31	11°50.28
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.61	61°36.32
0	107°33.72		\$22°58.51	177°51.13	\$23°8.61	355°25.66	N22°8.29	109° 46.86	\$03°23.95	Denebola	$182^{\circ}23.98$	$14^{\circ}25.43$
1 2	122°36.18 137°38.65	192°55.31 207°54.38	58.17 57.83	192°51.52 207°51.90	8.36 8.12	10°28.48 25°31.30	8.35 8.40	124°49.17 139°51.48	23.87 23.80	Gienah	175°42.65	-17°41.16
3	152° 41.11	207 54.38 222°53.45	• • 57.50	207 51.90 222°52.29	• • 7.87	40°34.12	• • 8.46	154° 53.78	• • 23.72	Acrux	172°59.06	-63°14.35
4	167°43.57	237°52.52	57.16	237°52.67	7.62	55°36.95	8.52	169°56.09	23.64	Gacrux	171°50.63	-57°15.31
5	182°46.04	$252^{\circ}51.58$	56.81	252°53.06	7.38	70°39.77	8.57	184°58.40	23.57	Alioth Spica	166°12.20 158°21.45	55°48.76 -11°17.84
6	197° 48.50		S22°56.47	267°53.44	\$23°7.13	85°42.59	N22°8.63	200°0.71	S03°23.49	Alkaid	150° 51.43	49°10.66
7	212°50.97	282°49.72	56.13	282°53.83	6.88	100°45.42	8.68	215°3.02	23.42	Hadar	148°35.00	-60°29.67
8 9	227°53.43 242°55.89	297° 48.79 312° 47.86	55.78	297°54.21	6.64	115°48.24	8.74	230°5.33	23.34	Menkent	147°56.74	$-36^{\circ}29.75$
10	242 55.89 257°58.36	312 47.86 327°46.93	55.44 55.09	312°54.60 327°54.99	· · 6.39 6.14	130°51.06 145°53.88	* * 8.80 8.85	245°7.64 260°9.94	· · 23.27 23.19	Arcturus	145°47.25	19°2.62
11	273°0.82	342°46.00	54.74	342°55.37	5.89	160°56.71	8.91	275° 12.25	23.11	Rigil Kent.	139°39.41	-60°56.34
12	288°3.29		S22°54.39	357°55.76	S23°5.64	175°59.53	N22°8.97	290° 14.56	S03°23.04	Kochab	137°20.35	74°2.51
13	303°5.75	$12^{\circ}44.14$	54.04	12°56.14	5.39	191°2.35	9.02	$305^{\circ}16.87$	22.96	Zuben'ubi Alphecca	136°55.25 126°3.26	-16° 8.98 26° 37.42
14	318°8.22	27°43.21	53.69	27°56.53	5.14	206°5.18	9.08	$320^{\circ}19.17$	22.89	Antares	112° 15.10	-26°29.33
15	333° 10.68	42°42.28	• • 53.33	42°56.92	• • 4.89	221°8.00	. 9.13	335°21.48	• • 22.81	Atria	107°9.07	-69°4.27
16 17	348° 13.14 3° 15.61	57° 41.35 72° 40.42	52.98 52.62	57°57.30 72°57.69	4.64 4.38	236°10.82 251°13.65	9.19 9.25	350°23.79 5°26.10	22.73 22.66	Sabik	$102^{\circ}2.13$	-15°45.43
18	18° 18.07		\$2.02 \$22°52.27	87°58.08	523°4.13	266° 16.47	9.25 N22°9.30	20°28.40	\$03°22.58	Shaula	96° 9.62	-37°7.30
19	33°20.54	102°38.57	51.91	102°58.46	3.88	281°19.29	9.36	35°30.71	22.50	Rasalhague	95°58.09	12°32.37
20	48°23.00	117°37.64	51.55	117°58.85	3.63	296°22.11	9.41	50°33.02	22.43	Eltanin Kaus Aust.	90°42.31	51°28.96 -34°22.32
21	63°25.46		•• 51.19	132°59.24	• • 3.37	311°24.94	• • 9.47	65°35.32	• • 22.35	Vega	80°33.09	38°48.37
22	78°27.93	147°35.79	50.82	147°59.62	3.12	326°27.76	9.53	80°37.63	22.28	Nunki		-26°15.88
23	93°30.39	162°34.86	50.46	163°0.01	2.86	341°30.58	9.58	95°39.94	22.20	Altair	61°59.48	$8^{\circ}56.19$
Mer.p	pass. 16:47	$\nu$ -0.9' d-0.3	3′ m-3.90	$\nu$ 0.4′ d-0	.2′ m1.09	$\nu$ 2.8′ d0.	1′ m-2.68	$\nu 2.3' \ d-0$	.1'  m1.02	Peacock		$-56^{\circ}39.16$
										Deneb	49°25.68	45°22.45
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.24	9°59.68
0	108° 32.86	177°33.94		178° 0.40	\$23°2.61	356°33.41	N22°9.64	110° 42.24	S03°22.12	Al Na'ir Fomalhaut	27°32.20 15°13.79	-46°50.27 -29°29.20
1	123°35.32	192°33.01	49.73	193°0.78	2.35	11°36.23	9.69	$125^{\circ}44.55$	22.05	Scheat	13°44.59	28°13.57
2	138° 37.78	207°32.08	49.36	208°1.17	2.10	26°39.05	9.75	140°46.85	21.97	Markab	13°29.24	15°20.79
3	153° 40.25	222°31.16	49.00	223°1.56	1.84	41°41.88	• • 9.81	155°49.16	• • 21.89	lan 07 14/a-1	SHA	
4 5	168° 42.71 183° 45.18	237°30.23 252°29.31	48.63 48.26	238°1.94 253°2.33	1.58 1.33	56°44.70 71°47.52	9.86 9.92	170°51.46 185°53.77	21.81 21.74	Jan 07 Wed Venus	<b>SHA</b> 71°44.15	Mer.pass 12:08
6	198° 47.64	267°28.39		268° 2.72	S23°1.07	86°50.35	N22°9.97	200° 56.07	S03°21.66	Mars	71°7.32	12:09
7	213°50.10	282°27.46	47.51	283°3.10	0.81	101°53.17	10.03	215°58.38	21.58	Jupiter	247°43.34	00:23
8	228°52.57	297°26.54	47.14	298°3.49	0.55	116°55.99	10.08	231°0.69	21.51	Saturn	$2^{\circ}16.81$	16:42
9	243°55.03	312°25.61	• • 46.76	313°3.88	• • 0.29	131°58.82	•• 10.14	246°2.99	• • 21.43	Jan 08 Thu	SHA	Mer.pass
10	258° 57.50	327°24.69	46.38	328° 4.27	23°0.03	147°1.64	10.20	261°5.29	21.35	Venus	70°22.53	12:09
11	273°59.96 289°2.42	342°23.77 357°22.85	46.01 \$22°45.63	343°4.65 358°5.04	22°59.77 \$22°59.51	162°4.46 177°7.29	10.25 N22°10.31	276°7.60 291°9.90	21.27 \$03°21.20	Mars	70°17.41	12:08
12 13	304°4.89	357 22.85 12°21.92	45.25	358° 5.04 13° 5.43	59.25	177 7.29 192°10.11	10.36	306°12.21	21.12		247°51.94	00:18
14	319°7.35	27°21.00	44.87	28° 5.82	58.99	207°12.93	10.42	321°14.51	21.04	Saturn	2°13.14	16:38
15	334°9.82	42°20.08	• • 44.48	43°6.20	• • 58.73	222°15.76	• • 10.47	336° 16.82	• • 20.97	Jan 09 Fri	SHA	Mer.pass
16	349° 12.28	57° 19.16	44.10	58° 6.59	58.47	237°18.58	10.53	351°19.12	20.89	Venus	69°1.08	12:10
17	4°14.75	72°18.24	43.71	73°6.98	58.20	252°21.40	10.59	6°21.42	20.81	Mars	69°27.54	12:08
18	19° 17.21	87° 17.32		88° 7.37 103° 7.75	\$22°57.94	267°24.23	N22°10.64	21°23.73	\$03°20.73	Jupiter	248° 0.55	00:14
19 20	34° 19.67 49° 22.14	102°16.40 117°15.48	42.94 42.55	103° 7.75 118° 8.14	57.68 57.41	282°27.05 297°29.88	10.70 10.75	36°26.03 51°28.33	20.65 20.58	Saturn	2°9.39	16:35
21	64° 24.60		· · 42.35	133° 8.53	57.41	312°32.70	10.75	66° 30.64	. 20.50	Horizoi	ntal parallax	<u></u>
22	79° 27.07	$147^{\circ}13.64$	41.77	148° 8.92	56.88	327°35.52	10.86	81°32.94	20.42		Venus:	0.1
23	94°29.53	162°12.72	41.38	163° 9.31	56.62	342°38.35	10.92	96°35.24	20.34		Mars:	0.1
Mer r	pass. 16:43	ν-0.9' d-0.4	4′ m-3.90	ν0.4′ d-0	.3′ m1.09	ν2.8′ dΩ	1′ m-2.68	ν2.3′ d-0	.1′ m1.02			

h	Su	n	Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°29.31	S22°23.81	310°30.45	12.8'	N10°34.77	-15.0'	57.7'
1	193°29.04	23.49	325°2.25	12.9'	10°19.77	-15.0'	57.7'
2	208°28.77	23.18	339°34.15 354°6.13	13.0'	10°4.75 09°49.70	-15.1'	57.6'
3 4	223°28.50 238°28.23	· · 22.86 22.54	8°38.21	13.1' 13.2'	09 49.70 09°34.62	-15.1' -15.1'	57.6' 57.6'
5	253°27.96	22.23	23°10.37	13.3'	09° 19.52	-15.1'	57.5'
6	268°27.70	S22°21.91	37°42.63	13.3'	N09°4.40	-15.1'	57.5'
7	283°27.43	21.59	52°14.96	13.4'	$08^{\circ}49.26$	-15.2'	57.4'
8	298°27.16	21.27	66°47.38	13.5'	08°34.10	-15.2'	57.4'
9 10	313°26.89 328°26.62	· · 20.95 20.63	81°19.89 95°52.47	13.6' 13.7'	08°18.93 08°3.74	-15.2' -15.2'	57.4' 57.3'
11	343°26.36	20.30	95 52.47 110°25.14	13.7'	06 3.74 07°48.53	-15.2'	57.3'
12	358°26.09	S22°19.98	124°57.88	13.8'	N07°33.31	-15.2'	57.2'
13	13°25.82	19.66	139°30.70	13.9'	$07^{\circ}18.08$	-15.2'	57.2'
14	28°25.55	19.33	154°3.59	14.0'	07°2.84	-15.3'	57.2'
15 16	43°25.29 58°25.02	· · 19.01 18.68	168°36.56 183°9.60	14.0' 14.1'	06°47.59 06°32.33	-15.3' -15.3'	57.1' 57.1'
17	73°24.75	18.35	103 9.00 197°42.72	14.1	06°17.06	-15.3'	57.1'
18	88°24.49	S22°18.02	212°15.90	14.3'	N06°1.79	-15.3'	57.0'
19	103°24.22	17.70	226°49.15	14.3'	$05^{\circ}46.51$	-15.3'	57.0'
20	118°23.96	17.37	241°22.47	14.4'	05°31.22	-15.3'	56.9'
21	133°23.69	• • 17.04	255°55.85	14.4'	05°15.94	-15.3'	56.9'
22 23	148°23.43 163°23.16	16.71 16.37	270°29.30 285°2.81	14.5' 14.6'	05°0.65 04°45.37	-15.3' -15.3'	56.9' 56.8'
20	SD = 16.3'	d = -0.3'			D = 15.7'	20.0	
	שט = 10.3′	a = -0.3		51	J = 15.1'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°22.90	\$22°16.04	299°36.38	14.6'	N04°30.08	-15.3'	56.8'
1	193°22.63	15.71	314°10.01	14.7'	04°14.80	-15.3'	56.8'
2	208°22.37 223°22.10	15.37 •• 15.04	328°43.70 343°17.45	14.7' 14.8'	03°59.52 03°44.24	-15.3' -15.3'	56.7' 56.7'
3 4	223 22.10 238°21.84	· · 15.04 14.70	343 17.45 357°51.25	14.8 14.9'	03 44.24 03°28.97	-15.3'	56.6'
5	253°21.57	14.37	12°25.11	14.9'	03°13.70	-15.3'	56.6'
6	268°21.31	\$22°14.03	26°59.02	15.0'	N02°58.44	-15.3'	56.6'
7	283°21.05	13.69	41°32.98	15.0'	02°43.19	-15.2'	56.5'
8	298°20.78	13.36	56°7.00	15.1'	02°27.95	-15.2'	56.5'
9 10	313°20.52 328°20.26	· · 13.02 12.68	70°41.06 85°15.16	15.1' 15.2'	02°12.72 01°57.49	-15.2' -15.2'	56.5' 56.4'
11	343°20.00	12.34	99°49.32	15.2'	01 57.49 01°42.29	-15.2'	56.4'
12	358°19.73	S22°11.99	114°23.52	15.2'	N01°27.09	-15.2'	56.4'
13	13°19.47	11.65	128°57.76	15.3'	$01^{\circ}11.91$	-15.2'	56.3'
14	28°19.21	11.31	143°32.04	15.3'	00°56.74	-15.2'	56.3'
15 16	43°18.95 58°18.69	· · 10.96 10.62	158° 6.37 172° 40.73	15.4' 15.4'	00°41.59 00°26.45	-15.1' -15.1'	56.3' 56.2'
17	73°18.43	10.02	172 40.73 187°15.13	15.4	N00°11.33	-15.1'	56.2'
18	88°18.16	S22°9.93	201°49.57	15.5'	S00°3.77	15.1'	56.2'
19	103°17.90	9.58	$216^{\circ}24.05$	15.5'	$00^{\circ}18.85$	15.1'	56.1'
20	118°17.64	9.23	230°58.55		00°33.91		56.1'
21 22	133°17.38 148°17.12	· · 8.89 8.54	245°33.09 260°7.66	15.6' 15.6'	00°48.95 01°3.96	15.0' 15.0'	56.1' 56.0'
23	163°16.86	8.19	274°42.27	15.6'	01°18.96	15.0'	56.0'
	SD = 16.3'	d = -0.3'		SI	D = 15.5'		
					20.0		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°16.60 193°16.34	\$22°7.84 7.49	289°16.90 303°51.55	15.7' 15.7'	\$01°33.93 01°48.88	14.9' 14.9'	56.0' 55.9'
2	208°16.08	7.49	318°26.24	15.7'	01 46.88 02°3.80	14.9'	55.9'
3	223°15.83	• • 6.78	333°0.94	15.7'	$02^{\circ}18.70$	14.9'	55.9'
4	238°15.57	6.43	347°35.67	15.8'	02°33.57	14.8'	55.8'
5	253°15.31 268°15.05	6.07 <b>S</b> 22°5.72	2°10.43 16°45.20	15.8'	02°48.41	14.8' 14.8'	55.8'
6 7	268°15.05 283°14.79	\$22°5.72 5.36	16°45.20 31°20.00	15.8' 15.8'	\$03°3.22 03°18.01	14.8' 14.8'	55.8' 55.7'
8	298°14.53	5.01	45°54.81	15.8'	03°32.76	14.7	55.7'
9	313°14.28	• • 4.65	60°29.64	15.8'	03°47.49	14.7'	55.7'
10	328°14.02	4.29	75°4.48	15.9'	04°2.18	14.7'	55.6'
11	343°13.76	3.93	89°39.34	15.9'	04°16.84	14.6'	55.6'
12 13	358°13.50 13°13.25	\$22°3.57 3.21	104°14.22 118°49.10	15.9' 15.9'	\$04°31.47 04°46.06	14.6' 14.6'	55.6' 55.6'
14	28°12.99	2.85	133°24.00	15.9'	05°0.62	14.5	55.5'
15	43°12.74	2.49	147°58.91	15.9'	05°15.15	14.5'	55.5'
16	58°12.48	2.13	162°33.82	15.9'	05°29.64	14.5'	55.5'
17	73°12.22	1.76	177°8.74	15.9'	05°44.09	14.4'	55.4'
18 19	88°11.97 103°11.71	\$22°1.40 1.03	191°43.67 206°18.60	15.9' 15.9'	\$05°58.51 06°12.89	14.4' 14.3'	55.4' 55.4'
20	103°11.71 118°11.46	0.67	206° 18.60 220° 53.54	15.9'	06°12.89 06°27.23	14.3'	55.4' 55.4'
21	133°11.20	22°0.30	235°28.48	15.9'	06°41.53	14.3'	55.3'
22	148°10.95	21°59.93	250°3.42	15.9'	06°55.79	14.2'	55.3'
23	163°10.69	59.57	264°38.36	15.9'	07°10.01	14.2'	55.3'
	SD = 16.3'	d = -0.4'		SI	O = 15.3'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	08:15	10:19			13:55	15:59
<b>N</b> 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 $^{\circ}$	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
<b>N</b> 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
$30^{\circ}$	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
<b>N</b> 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
<b>S</b> $10^{\circ}$	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
$30^{\circ}$	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
<b>S</b> 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	////
<b>S</b> 60°	////	01:30	02:56	21:17	22:41	////

Lat.		Moonris	e		Moonset	t
Lat.	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	22:34	22:33	22:32	08:33	10:05	11:32
		_				

	Sun			Moon			
Day	Eqn.o	Time	Mer.	Mer.	Pass.	Age	
Duy	00 <sup>h</sup>	12 <sup>h</sup>	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	Stars
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	109°31.99	177°11.80 \$22°40.98	178°9.69 \$22°56.35	357°41.17 N22°10.98	111°37.55 \$03°20.27	
1	124°34.46	192°10.89 40.59	193°10.08 56.08	12°43.99 11.03	126°39.85 20.19	Alpheratz 357°34.01 29°14.21 Ankaa 353°6.40 -42°10.08
2	$139^{\circ}36.92$	207°9.97 40.19	208°10.47 55.82	27°46.82 11.09	141°42.15 20.11	Ankaa 353°6.40 -42°10.08 Schedar 349°30.18 56°41.10
3	154°39.39	222°9.05 · · 39.80	223°10.86 · · 55.55	42°49.64 · · 11.14	156° 44.45 · · · 20.03	Diphda 348°46.50 -17°50.73
4	169°41.85	237°8.13 39.40	238°11.25 55.28	57°52.46 11.20	171°46.76 19.95	Achernar 335°19.48 -57°6.53
5 6	184° 44.31 199° 46.78	252°7.22 39.00 267°6.30 <b>S</b> 22°38.60	253°11.64 55.01 268°12.02 \$22°54.75	72°55.29 11.25 87°58.11 N22°11.31	186°49.06 19.87 201°51.36 \$03°19.80	Hamal 327°50.16 23°35.25
7	214°49.24	282°5.39 38.20	283°12.41 54.48	103°0.94 11.36	216°53.66 19.72	Polaris 313°21.41 89°22.73
8	229°51.71	297°4.47 37.79	298°12.80 54.21	118°3.76 11.42	231°55.96 19.64	Acamar 315°10.93 -40°12.20
9	$244^{\circ}54.17$	312°3.55 · · 37.39	313°13.19 · · 53.94	133°6.58 · · 11.48	246°58.27 · · 19.56	Menkar 314°5.11 4°11.52 Mirfak 308°26.76 49°57.42
10	259° 56.63	327°2.64 36.98	328°13.58 53.67	148°9.41 11.53	262°0.57 19.48	Aldebaran 290°38.38 16°33.73
11	274°59.10	342°1.73 36.58	343°13.97 53.40	163°12.23 11.59	277°2.87 19.40	Rigel 281°2.76 -8°10.34
12	290°1.56 305°4.03	357°0.81 \$22°36.17 11°59.90 35.76	358°14.36	178°15.05 N22°11.64 193°17.88 11.70	292°5.17 \$03°19.32 307°7.47 19.25	Capella 280°20.21 46°1.52
13 14	320° 6.49	26°58.98 35.35	13°14.75 52.85 28°15.14 52.58	193°17.88 11.70 208°20.70 11.75	307°7.47 19.25 322°9.77 19.17	Bellatrix 278°21.67 6°22.38
15	335°8.96	41°58.07 · · 34.94	43°15.52 · · 52.31	223°23.52 ·· 11.81	337°12.07 · · 19.09	Elnath 278° 0.45 28° 37.79
16	$350^{\circ}11.42$	56°57.16 34.52	58°15.91 52.03	238°26.35 11.86	352°14.37 19.01	Alnilam 275°36.56 -1°11.15 Betelgeuse 270°50.85 7°24.69
17	5°13.88	71°56.24 34.11	73°16.30 51.76	253°29.17 11.92	7°16.67 18.93	Betelgeuse 270°50.85 7°24.69 Canopus 263°51.47 -52°42.60
18	20° 16.35	86°55.33 \$22°33.69	88°16.69 <b>S</b> 22°51.49	268°32.00 N22°11.97	22°18.97 <b>S</b> 03°18.85	Sirius 258°25.14 -16°45.16
19	35° 18.81	101°54.42 33.28	103°17.08 51.21	283°34.82 12.03 298°37.64 12.08	37°21.27 18.77	Adhara 255°4.82 -29°0.47
20 21	50°21.28 65°23.74	116°53.51 32.86 131°52.60 · · 32.44	118°17.47 50.94 133°17.86 · · 50.66	298°37.64 12.08 313°40.47 · · 12.14	52°23.57 18.69 67°25.87 · · 18.61	Procyon 244°49.61 5°9.43
22	80° 26.20	146°51.69 32.02	148°18.25 50.39	328°43.29 12.19	82°28.17 18.54	Pollux 243°15.90 27°57.71
23	95°28.67	161°50.78 31.60	163°18.64 50.11	343°46.11 12.25	97°30.47 18.46	Avior 234°13.76 -59°35.48
		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	Suhail 222°45.29 -43°32.18
ivier.p	bass. 16:39	ν-0.9 a-0.4 m-3.90	νο.4 <i>a</i> -0.3 m1.09	ν2.8° αυ.1° m-2.08	ν2.3 α-0.1 m1.02	Miaplacidus 221°37.27 -69°49.28 Alphard 217°46.64 -8°46.32
						Regulus 207°33.29 11°50.27
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.58 61°36.32
0	110°31.13	176°49.87 S22°31.18 191°48.96 30.75	178°19.03 \$22°49.83	358°48.94 N22°12.31	112°32.77 \$03°18.38	Denebola 182°23.96 14°25.43
1 2	125°33.60 140°36.06	191°48.96 30.75 206°48.05 30.33	193°19.42 49.55 208°19.81 49.28	13°51.76 12.36 28°54.59 12.42	127°35.07 18.30 142°37.37 18.22	Gienah 175°42.63 -17°41.17
3	155° 38.52	221°47.14 · · 29.90	223°20.20 · · 49.00	43°57.41 · · 12.47	157°39.67 · · 18.14	Acrux 172°59.02 -63°14.36
4	170° 40.99	236°46.23 29.48	238°20.59 48.72	59°0.23 12.53	172°41.97 18.06	Gacrux 171°50.60 -57°15.32
5	185°43.45	251°45.32 29.05	253°20.98 48.44	74°3.06 12.58	187°44.27 17.98	Alioth 166°12.16 55°48.76 Spica 158°21.43 -11°17.85
6	200°45.92	266°44.41 \$22°28.62	268°21.37 S22°48.16	89°5.88 N22°12.64	202°46.57 <b>S</b> 03°17.90	Alkaid 152°51.40 49°10.66
7	215°48.38	281°43.51 28.19	283°21.76 47.88	104°8.70 12.69	217° 48.87 17.82	Hadar 148°34.96 -60°29.67
8 9	230°50.84 245°53.31	296°42.60 27.76 311°41.69 · · 27.32	298°22.15 47.60 313°22.54 · · 47.32	119°11.53 12.75 134°14.35 •• 12.80	232°51.16 17.74 247°53.46 •• 17.66	Menkent 147°56.72 -36°29.75
10	245 55.51 260°55.77	326°40.79 26.89	328°22.93 47.04	149°17.17 12.86	262°55.76 17.58	Arcturus 145°47.23 19°2.61
11	275° 58.24	341°39.88 26.45	343°23.32 46.76	164°20.00 12.91	277°58.06 17.50	Rigil Kent. 139°39.37 -60°56.34
12	291°0.70	356°38.97 \$22°26.02	358°23.71 S22°46.48	179°22.82 N22°12.97	293°0.36 S03°17.42	Kochab 137°20.29 74°2.50
13	$306^{\circ}3.17$	11°38.07 25.58	13°24.10 46.19	194°25.65 13.02	308°2.65 17.34	Zuben'ubi 136°55.23 -16°8.99 Alphecca 126°3.24 26°37.40
14	321°5.63	26°37.16 25.14	28°24.49 45.91	209°28.47 13.08	323°4.95 17.26	Antares 112°15.08 -26°29.34
15	336°8.09	41°36.26 · · 24.70	43°24.89 · · 45.63	224°31.29 · · 13.13	338°7.25 · · 17.18	Atria 107°9.03 -69°4.26
16 17	351° 10.56 6° 13.02	56°35.35 24.26 71°34.45 23.81	58°25.28 45.34 73°25.67 45.06	239°34.12 13.19 254°36.94 13.24	353°9.55 17.10 8°11.84 17.02	Sabik 102°2.12 -15°45.43
18	0 15.02 21°15.49	86°33.55 S22°23.37	88°26.06 <b>\$</b> 22°44.77	269°39.76 N22°13.30	23°14.14 S03°16.94	Shaula 96°9.61 -37°7.30
19	36° 17.95	101°32.64 22.93	103°26.45 44.49	284°42.59 13.35	38°16.44 16.86	Rasalhague 95°58.08 12°32.36
20	51°20.41	116°31.74 22.48	118°26.84 44.20	299°45.41 13.41	53°18.73 16.78	Eltanin 90°42.30 51°28.95 Kaus Aust. 83°31.80 -34°22.31
21	66°22.88	131°30.84 · · 22.03	133°27.23 · · 43.92	314°48.23 · · 13.46	68°21.03 · · 16.70	Vega 80°33.08 38°48.35
22	81°25.34	146°29.94 21.58	148°27.62 43.63	329°51.06 13.52	83°23.33 16.62	Nunki 75°47.09 -26°15.88
23	96°27.81	161°29.03 21.13	163°28.02 43.34	344°53.88 13.57	98°25.62 16.54	Altair 61°59.48 8°56.18
Mer.p	bass. 16:35	$\nu$ -0.9 $'$ <i>d</i> -0.4 $'$ m-3.90	$ u 0.4' \ d$ -0.3' m1.09	$\nu 2.8' \ d0.1' \ \text{m-}2.68$	$ u 2.3' \ d  0.1' \ \text{m} 1.02$	Peacock 53°4.98 -56°39.15
						Deneb 49°25.69 45°22.44
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°38.24 9°59.67
0	111° 30.27	176°28.13 <b>S</b> 22°20.68	178°28.41 \$22°43.05	359°56.70 N22°13.63	113°27.92 <b>S</b> 03°16.46	Al Na'ir 27°32.21 -46°50.26 Fomalhaut 15°13.81 -29°29.20
1	126°32.73	191°27.23 20.23	193°28.80 42.77	14°59.53 13.68	128°30.22 16.37	Scheat 13°44.60 28°13.57
2	141°35.20	206°26.33 19.78	208°29.19 42.48	30°2.35 13.73	143°32.51 16.29	Markab 13°29.25 15°20.78
3	156°37.66 171°40.13	221°25.43 · · 19.32 236°24.53 18.87	223°29.58 · · 42.19 238°29.97 41.90	45°5.17 · · 13.79 60°8.00 13.84	158°34.81 · · 16.21 173°37.10 16.13	Jan 10 Sat SHA Mer.pass
4 5	171 40.13 186° 42.59	236°24.53 18.87 251°23.63 18.41	238°29.97 41.90 253°30.37 41.61	60°8.00 13.84 75°10.82 13.90	173°37.10 16.13 188°39.40 16.05	Jan 10 Sat         SHA         Mer.pass           Venus         67°39.81         12:12
6	201° 45.06	266°22.73 S22°17.95	268°30.76 \$22°41.32	90°13.65 N22°13.95	203°41.70 S03°15.97	Mars 68°37.70 12:07
7	216° 47.52	281°21.83 17.49	283°31.15 41.03	105°16.47 14.01	218°43.99 15.89	Jupiter 248°9.18 00:09
8	231°49.98	296°20.94 17.03	298°31.54 40.74	120°19.29 14.06	233°46.29 15.81	Saturn 2°5.55 16:31
9	246°52.45	311°20.04 · · 16.57	313°31.93 · · 40.45	135°22.12 · · 14.12	248°48.58 · · 15.73	Jan 11 Sun SHA Mer.pass
10	261°54.91	326°19.14 16.11	328°32.33 40.15	150°24.94 14.17	263°50.88 15.65	Venus 66°18.73 12:13
11 12	276° 57.38 291° 59.84	341°18.24 15.65 356°17.35 \$22°15.18	343°32.72 39.86 358°33.11 \$22°39.57	165°27.76 14.23 180°30.59 N22°14.28	278°53.17 15.56 293°55.47 \$03°15.48	Mars 67°47.90 12:06
13	307°2.30	11°16.45 14.71	13°33.50 39.28	195°33.41 14.34	308°57.76 15.40	Jupiter 248°17.81 00:05
14	322°4.77	26° 15.55 14.25	28°33.90 38.98	210°36.23 14.39	324°0.06 15.32	Saturn 2°1.64 16:27
15	337°7.23	41°14.66 · · 13.78	43°34.29 · · 38.69	225°39.06 · · 14.45	339°2.35 · · 15.24	Jan 12 Mon SHA Mer.pass
16	352°9.70	56°13.76 13.31	58°34.68 38.39	240°41.88 14.50	354°4.64 15.16	Venus 64°57.86 12:15
17	7°12.16	71°12.87 12.84	73°35.07 38.10	255°44.70 14.55	9°6.94 15.08	Mars 66°58.14 12:06
18 19	22° 14.63 37° 17.09	86°11.97 S22°12.37 101°11.08 11.89	88°35.47 \$22°37.80 103°35.86 37.51	270°47.52 N22°14.61 285°50.35 14.66	24°9.23 \$03°14.99 39°11.53 14.91	Jupiter 248°26.43 00:00
20	52° 19.55	116°10.19 11.42	103°35.86 37.51 118°36.25 37.21	300°53.17 14.72	54°13.82 14.83	Saturn 1°57.65 16:24
21	67°22.02	131°9.29 · · 10.94	133°36.65 · · 36.91	315°55.99 · · 14.77	69°16.11 · · 14.75	Horizontal parallax
22	82°24.48	146°8.40 10.47	148°37.04 36.62	330°58.82 14.83	84° 18.41 14.67	Venus: 0.1
23	97°26.95	161°7.51 9.99	163°37.43 36.32	346°1.64 14.88	99°20.70 14.59	Mars: 0.1
Mer.p	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	

h	Su	n	Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°10.44	S21°59.20	279° 13.30	15.9'	S07°24.19	14.1'	55.2'
1	193°10.19	58.83	293°48.23	15.9'	$07^{\circ}38.32$	14.1'	55.2'
2	208°9.93	58.46	308°23.17	15.9'	07°52.41	14.0'	55.2'
3	223°9.68	• • 58.09	322°58.10	15.9'	08°6.46	14.0'	55.2'
4 5	238°9.43 253°9.17	57.72 57.34	337°33.02 352°7.94	15.9' 15.9'	08° 20.47 08° 34.43	14.0' 13.9'	55.1' 55.1'
6	268°8.92	57.34 S21°56.97	6° 42.84	15.9'	S08°48.35	13.9	55.1'
7	283°8.67	56.60	21° 17.74	15.9'	09°2.21	13.8'	55.1'
8	298°8.41	56.22	35°52.63	15.9'	09°16.04	13.8'	55.0'
9	313°8.16	• • 55.85	50°27.51	15.9'	$09^{\circ}29.81$	13.7'	55.0'
10	328°7.91	55.47	65°2.38	15.9'	09°43.54	13.7'	55.0'
11	343°7.66 358°7.41	55.09 \$21°54.72	79°37.23 94°12.07	15.8' 15.8'	09°57.21 \$10°10.84	13.6'	55.0'
12 13	13°7.16	54.72	108° 46.89	15.8'	10°24.42	13.6' 13.5'	54.9' 54.9'
14	28°6.91	53.96	123°21.69	15.8'	10° 24.42 10° 37.95	13.5'	54.9'
15	43°6.66	• • 53.58	137° 56.48	15.8'	10°51.42	13.4'	54.9'
16	58°6.41	53.20	152°31.25	15.7'	11°4.84	13.4'	54.9'
17	73°6.16	52.82	167°6.00	15.7'	11° 18.21	13.3'	54.8'
18	88°5.91	S21°52.44	181°40.73	15.7'	S11°31.53	13.3'	54.8'
19	103°5.66 118°5.41	52.05	196° 15.43 210° 50.11	15.7'	11°44.79 11°58.00	13.2'	54.8'
20 21	118° 5.41 133° 5.16	51.67 •• 51.29	210°50.11 225°24.77	15.7' 15.6'	11°58.00 12°11.15	13.2' 13.1'	54.8' 54.7'
22	133 5.10 148°4.91	50.90	239°59.41	15.6'	12 11.15 12°24.24	13.1	54.7'
23	163°4.66	50.52	254°34.01	15.6'	12° 37.28	13.0'	54.7'
	SD = 16.3'	d = -0.4'		ÇГ	0 = 15.1'		
	<u>JD — 10.3</u>	u — -0.4		JL	, — 13.1		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°4.41	\$21°50.13	269°8.59	15.6'	\$12°50.26 13°3.19	12.9'	54.7'
1 2	193°4.16 208°3.92	49.74 49.35	283°43.15 298°17.67	15.5' 15.5'	13°3.19 13°16.05	12.9' 12.8'	54.7' 54.6'
3	223°3.67	48.96	312°52.16	15.5'	13° 28.85	12.7'	54.6'
4	238°3.42	48.58	327° 26.63	15.4'	13°41.60	12.7'	54.6'
5	253°3.17	48.19	342°1.06	15.4'	$13^{\circ}54.28$	12.6'	54.6'
6	268°2.93	S21°47.79	356° 35.45	15.4'	\$14°6.90	12.6'	54.6'
7	283°2.68 298°2.43	47.40	11°9.82 25°44.15	15.3'	14° 19.46 14° 31.95	12.5'	54.6'
8 9	298 2.43 313°2.19	47.01 •• 46.62	25°44.15 40°18.44	15.3' 15.3'	14° 31.95 14° 44.38	12.4' 12.4'	54.5' 54.5'
10	328°1.94	46.22	54° 52.70	15.2'	14° 56.75	12.3'	54.5
11	343°1.70	45.83	69°26.92	15.2'	15°9.05	12.2'	54.5'
12	358°1.45	S21°45.43	84°1.10	15.1'	S15°21.29	12.2'	54.5'
13	13°1.20	45.04	98° 35.24	15.1'	15°33.46	12.1'	54.5'
14 15	28°0.96 43°0.71	44.64 •• 44.24	113°9.34 127°43.41	15.1' 15.0'	15° 45.56 15° 57.60	12.0' 12.0'	54.4' 54.4'
16	58°0.47	43.85	142° 17.43	15.0'	16°9.56	11.9'	54.4
17	73°0.23	43.45	156° 51.40	14.9'	16°21.46	11.8'	54.4'
18	87°59.98	S21°43.05	171°25.34	14.9'	S16°33.29	11.8'	54.4'
19	102°59.74	42.65	185°59.23	14.8'	16°45.04	11.7'	54.4'
20	117°59.50	42.25	200°33.07	14.8'	16°56.73	11.6'	54.4'
21 22	132°59.25 147°59.01	· · 41.84 41.44	215°6.87 229°40.62	14.8' 14.7'	17°8.34 17°19.88	11.5' 11.5'	54.3' 54.3'
23	162°58.77	41.44	244° 14.33	14.7'	17 19.00 17°31.35	11.4	54.3'
	SD = 16.3'	d = -0.4'			0 = 14.9'		
	<u> </u>	<u>u = 0.4</u>		- 56	7 — 14.5		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0 1	177°58.52 192°58.28	\$21°40.63 40.23	258° 47.99 273° 21.59	14.6' 14.6'	\$17°42.74 17°54.06	11.3' 11.2'	54.3' 54.3'
2	207°58.04	40.23 39.82	273 21.59 287°55.15	14.5	17 54.06 18°5.30	11.2'	54.3'
3	222°57.80	• • 39.42	302°28.66	14.5'	18° 16.46	11.1'	54.3'
4	237°57.56	39.01	317°2.12	14.4'	$18^{\circ}27.55$	11.0'	54.2'
5	252°57.32	38.60	331°35.53	14.4'	18° 38.56	10.9'	54.2'
6	267°57.07	S21°38.19	346°8.88	14.3'	\$18°49.49	10.9'	54.2'
7 8	282°56.83 297°56.59	37.78 37.37	0°42.18 15°15.43	14.2' 14.2'	19°0.35 19°11.12	10.8' 10.7'	54.2' 54.2'
9	312°56.35	36.96	15° 15.43 29° 48.62	14.2	19° 11.12 19° 21.81	10.7	54.2' 54.2'
10	327°56.11	36.55	44°21.76	14.1'	19° 32.42	10.5	54.2'
11	342°55.87	36.14	58° 54.85	14.0'	19°42.95	10.4'	54.2'
12	357°55.64	S21°35.73	73° 27.88	14.0'	S19°53.39	10.4'	54.2'
13	12°55.40	35.31	88°0.85	13.9'	20°3.75	10.3'	54.2'
14 15	27°55.16 42°54.92	34.90 •• 34.48	102°33.76 117°6.62	13.9' 13.8'	20°14.03 20°24.22	10.2' 10.1'	54.1' 54.1'
16	42 54.92 57°54.68	34.48	117 0.02 131°39.42	13.7'	20° 24.22 20° 34.33	10.1	54.1'
17	72°54.44	33.65	146° 12.16	13.7'	20° 44.34	9.9'	54.1'
18	87°54.20	S21°33.23	160°44.84	13.6'	S20°54.28	9.8'	54.1'
19	102°53.97	32.82	175°17.46	13.6'	21°4.12	9.8'	54.1'
20	117°53.73	32.40	189°50.02	13.5'	21°13.87	9.7'	54.1'
21 22	132°53.49 147°53.26	· · 31.98 31.56	204°22.53 218°54.97	13.4' 13.4'	21°23.53 21°33.11	9.6' 9.5'	54.1' 54.1'
23	162°53.02	31.14	216 54.97 233°27.35	13.4	21°42.59	9.5 9.4'	54.1
	SD = 16.3'	d = -0.4'			0 = 14.8'		
	<u>JD — 10.3</u>			JL	. — 17.0		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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	////
<b>S</b> 60°	////	01:41	03:02	21:12	22:32	////

Lat.		Moonris	e		Moonset	t
Lat.	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 60°	22:31	22:31	22:33	12:58	14:25	15:54

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	21-23
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	57-37%
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	SHA Dec
0	112°29.41	176°6.62 \$22°9.51	178°37.83 \$22°36.02	1°4.46 N22°14.94	114°22.99	
1	127°31.87	191°5.72 9.03		16°7.29 14.99	129°25.29 14.42	Alpheratz 357°34.02 29°14.20 Ankaa 353°6.42 -42°10.08
2	142°34.34	206°4.83 8.55		31°10.11 15.04	144°27.58 14.34	Ankaa 353°6.42 -42°10.08 Schedar 349°30.20 56°41.10
3	157°36.80	221°3.94 · · 8.06		46°12.93 · · 15.10	159°29.87 · · 14.26	Diphda 348°46.51 -17°50.74
4	172°39.27	236°3.05 7.58		61°15.76 15.15	174°32.16 14.17	Achernar 335°19.51 -57°6.54
5 6	187° 41.73 202° 44.19	251°2.16 7.10 266°1.27 \$22°6.61	253°39.79 34.52 268°40.19 \$22°34.22	76°18.58 15.21 91°21.40 N22°15.26	189°34.46 14.09 204°36.75 \$03°14.01	Hamal 327°50.17 23°35.25
7	217°46.66	281°0.38 6.12		106°24.22 15.32	219°39.04 13.93	Polaris 313°22.52 89°22.73
8	232°49.12	295°59.49 5.63		121°27.05 15.37	234°41.33 13.85	Acamar 315°10.95 -40°12.21
9	247°51.59	310°58.60 · · 5.14	313°41.37 · · 33.32	136°29.87 · · 15.42	249°43.62 · · 13.76	Menkar 314°5.12 4°11.51 Mirfak 308°26.77 49°57.42
10	262°54.05	325° 57.72 4.65		151°32.69 15.48	264°45.92 13.68	Aldebaran 290°38.38 16°33.72
11	277°56.52	340°56.83 4.16		166°35.51 15.53	279°48.21 13.60	Rigel 281°2.76 -8°10.35
12	292°58.98	355°55.94 \$22°3.67	358°42.55	181°38.34 N22°15.59	294°50.50 \$03°13.52	Capella 280°20.22 46°1.53
13 14	308°1.44 323°3.91	10°55.05 3.17 25°54.17 2.68		196°41.16 15.64 211°43.98 15.69	309°52.79 13.43 324°55.08 13.35	Bellatrix 278°21.67 6°22.37
15	338° 6.37	40°53.28 · · 2.18		226°46.81 · · 15.75	339°57.37 · · 13.27	Elnath 278° 0.45 28° 37.79
16	353°8.84	55°52.40 1.69		241°49.63 15.80	354°59.66 13.18	Alnilam 275°36.56 -1°11.16
17	8°11.30	70°51.51 1.19	73°44.53 30.88	256°52.45 15.86	10°1.95 13.10	Betelgeuse 270°50.85 7°24.68 Canopus 263°51.48 -52°42.62
18	23° 13.76	85°50.63 <b>S</b> 22°0.69		271°55.27 N22°15.91	25°4.25 <b>S</b> 03°13.02	Sirius 258°25.14 -16°45.17
19	38° 16.23	100°49.74 22°0.19	103°45.32 30.27	286°58.10 15.96	40°6.54 12.94	Adhara 255°4.81 -29°0.49
20	53° 18.69	115°48.86 21°59.68	118°45.71 29.96	302°0.92 16.02	55°8.83 12.85	Procyon 244°49.61 5°9.42
21 22	68°21.16 83°23.62	130° 47.97 · · · 59.18 145° 47.09 58.67	133°46.11 · · 29.65 148°46.50 29.35	317°3.74 · · 16.07 332°6.56 16.13	70°11.12 · · 12.77 85°13.41 12.69	Pollux 243°15.89 27°57.71
23	98° 26.09	160°46.21 58.17		347°9.38 16.18	100°15.70 12.60	Avior 234°13.75 -59°35.50
						Suhail 222°45.27 -43°32.20
Mer.p	pass. 16:27	ν-0.9' d-0.5' m-3.90	$\nu$ 0.4′ d-0.3′ m1.09	ν2.8′ d0.1′ m-2.68	ν2.3' d-0.1' m1.02	Miaplacidus 221°37.24 -69°49.30 Alphard 217°46.63 -8°46.34
						Regulus 207°33.27 11°50.26
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.55 61°36.33
0	113°28.55	175°45.33 \$21°57.66		2°12.21 N22°16.23	115°17.99 \$03°12.52	Denebola 182°23.94 14°25.42
1 2	128°31.01 143°33.48	190° 44.44 57.15 205° 43.56 56.64		17°15.03 16.29 32°17.85 16.34	130°20.28 12.44 145°22.57 12.35	Gienah 175°42.61 -17°41.18
3	143 33.46 158°35.94	200° 42.68 · · 56.13	208°48.08 28.11 223°48.48 •• 27.80	32°17.85 16.34 47°20.67 · · 16.40	145°22.57 12.35 160°24.86 · · 12.27	Acrux 172°58.97 -63°14.37
4	173° 38.41	235°41.80 55.62		62°23.50 16.45	175°27.15 12.19	Gacrux 171°50.56 -57°15.33
5	188° 40.87	250°40.92 55.11	253°49.27 27.18	77°26.32 16.50	190°29.43 12.10	Alioth 166°12.13 55°48.75 Spica 158°21.40 -11°17.86
6	203°43.34	265°40.04 \$21°54.60	268°49.67 \$22°26.87	92°29.14 N22°16.56	205°31.72 <b>S</b> 03°12.02	Alkaid 152°51.37 49°10.65
7	218° 45.80	280°39.16 54.08		107°31.96 16.61	220°34.01 11.94	Hadar 148°34.91 -60°29.67
8	233°48.26	295°38.28 53.57		122°34.78 16.66	235°36.30 11.85	Menkent 147°56.69 -36°29.76
9 10	248°50.73 263°53.19	310°37.40 · · 53.05 325°36.52 52.53	313°50.86 · · 25.93 328°51.25 25.62	137°37.61 · · 16.72 152°40.43 16.77	250°38.59 · · 11.77 265°40.88 11.68	Arcturus 145°47.21 19°2.60
11	278° 55.66	325°36.52 52.53 340°35.65 52.01	328°51.25 25.62 343°51.65 25.30	152°40.43 16.77 167°43.25 16.83	265° 40.88 11.68 280° 43.17 11.60	Rigil Kent. 139°39.32 -60°56.34
12	293°58.12	355°34.77 S21°51.49	358°52.04 S22°24.99	182°46.07 N22°16.88	295° 45.46 \$03° 11.52	Kochab 137°20.24 74°2.50
13	309°0.58	10°33.89 50.97		197°48.89 16.93	310°47.74 11.43	Zuben'ubi 136°55.20 -16°8.99 Alphecca 126°3.22 26°37.39
14	324°3.05	25°33.02 50.44		212°51.71 16.99	325°50.03 11.35	Antares 112° 15.06 -26° 29.34
15	339°5.51	40°32.14 · · 49.92		227°54.54 · · 17.04	340°52.32 · · 11.26	Atria 107°8.98 -69°4.25
16	354°7.98	55°31.26 49.39		242°57.36 17.09	355°54.61 11.18	Sabik 102°2.10 -15°45.44
17 18	9° 10.44 24° 12.91	70°30.39 48.87 85°29.51 \$21°48.34	73°54.03 23.41 88°54.42 \$22°23.09	258°0.18 17.15 273°3.00 N22°17.20	10°56.90 11.10 25°59.18 \$03°11.01	Shaula 96°9.59 -37°7.30
19	39° 15.37	100°28.64 47.81		288°5.82 17.25	41°1.47 10.93	Rasalhague 95°58.06 12°32.35
20	54° 17.83	115°27.77 47.28		303°8.64 17.31	56°3.76 10.84	Eltanin 90°42.29 51°28.93
21	69°20.30	130°26.89 · · 46.75		318°11.47 · · 17.36	71°6.05 · · 10.76	Kaus Aust. 83°31.78 -34°22.31 Vega 80°33.07 38°48.34
22	84°22.76	145°26.02 46.22		333°14.29 17.41	86°8.33 10.67	Nunki 75°47.08 -26°15.87
23	99°25.23	160°25.15 45.69	163°56.41 21.50	348°17.11 17.47	101°10.62 10.59	Altair 61°59.47 8°56.18
Mer.	pass. 16:23	$\nu$ -0.9' d-0.5' m-3.90	$\nu$ 0.4′ d-0.3′ m1.09	$\nu 2.8' \ d0.1' \ \text{m-}2.68$	$\nu 2.3' \ d\text{-}0.1' \ \text{m}1.02$	Peacock 53°4.98 -56°39.14
						Deneb 49°25.69 45°22.43
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°38.25 9°59.67
0	114°27.69	175°24.27 \$21°45.15		3°19.93 N22°17.52	116°12.91 <b>S</b> 03°10.51	Al Na'ir 27°32.22 -46°50.25 Fomalhaut 15°13.81 -29°29.20
1	$129^{\circ}30.15$	190°23.40 44.62	193°57.21 20.86	18°22.75 17.57	131°15.19 10.42	Scheat 13°44.60 28°13.56
2	144°32.62	205°22.53 44.08		33°25.57 17.63	146°17.48 10.34	Markab 13°29.25 15°20.78
3	159°35.08	220°21.66 · · 43.54		48°28.39 · · 17.68	161°19.77 · · 10.25	
4 5	174° 37.55 189° 40.01	235°20.79 43.00 250°19.92 42.46		63°31.21 17.73 78°34.04 17.79	176°22.05 10.17 191°24.34 10.08	Jan 13 Tue         SHA         Mer.pass           Venus         63°37.21         12:16
6	204° 42.48	265°19.05 S21°41.92		93°36.86 N22°17.84	206°26.63 S03°10.00	Mars 66°8.42 12:05
7	219°44.94	280°18.18 41.38		108°39.68 17.89	221°28.91 9.91	Jupiter 248°35.05 23:51
8	234°47.40	295°17.31 40.83	298°59.99 18.61	123°42.50 17.95	236°31.20 9.83	Saturn 1°53.58 16:20
9	249°49.87	310°16.44 · · 40.29		138°45.32 · · 18.00	251°33.48 · · 9.74	Jan 14 Wed SHA Mer.pass
10	264° 52.33	325°15.57 39.74		153°48.14 18.05	266°35.77 9.66	Venus 62°16.78 12:18
11	279° 54.80 294° 57.26	340°14.71 39.20 355°13.84 \$21°38.65		168°50.96 18.11 183°53.78 N22°18.16	281°38.05 9.57 296°40.34 \$03°9.49	Mars 65°18.74 12:05
12 13	294°57.26 309°59.72	10°12.97 38.10		198°56.60 18.21	311°42.62 9.40	Jupiter 248°43.66 23:47
14	325°2.19	25°12.11 37.55		213°59.42 18.27	326°44.91 9.32	Saturn 1°49.44 16:16
15	340°4.65	40°11.24 · · 37.00	44°2.78 · · 16.34	229°2.24 · · 18.32	341°47.19 · · 9.23	Jan 15 Thu SHA Mer.pass
16	355°7.12	55°10.38 36.45		244°5.06 18.37	356°49.48 9.15	Venus 60°56.58 12:19
17	10°9.58	70°9.51 35.89		259°7.88 18.42	11°51.76 9.06	Mars 64°29.12 12:04
18	25°12.05	85°8.65 <b>S</b> 21°35.34		274°10.70 N22°18.48	26°54.05 \$03°8.97	Jupiter 248°52.24 23:42
19 20	40° 14.51 55° 16.97	100°7.78 34.78 115°6.92 34.22		289°13.52 18.53 304°16.34 18.58	41°56.33 8.89 56°58.62 8.80	Saturn 1°45.22 16:13
21	70° 19.44	130°6.06 · · 33.67		319°19.16 · · 18.64	72°0.90 · · 8.72	Horizontal parallax
22	85°21.90	145°5.19 33.11		334°21.98 18.69	87°3.18 8.63	Venus: 0.1
23	$100^{\circ}24.37$	160°4.33 32.55		349°24.80 18.74	102°5.47 8.55	Mars: 0.1
Mer	pass. 16:19	ν-0.9' d-0.5' m-3.90	ν0.4' d-0.3' m1.09	ν2.8' d0.1' m-2.67	ν2.3' d-0.1' m1.02	

h	Su	n	Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	177°52.78	S21°30.72	247°59.67	13.3'	S21°51.98	9.3'	54.1'
1	192°52.55	30.29	262°31.92	13.2'	$22^{\circ}1.27$	9.2'	54.1'
2	207°52.31	29.87	277°4.12	13.1'	22°10.48	9.1'	54.1'
3	222°52.08 237°51.84	• • 29.45	291°36.25	13.1'	22°19.59	9.0'	54.1'
4 5	237 51.84 252°51.61	29.02 28.60	306°8.32 320°40.33	13.0' 12.9'	22°28.60 22°37.51	8.9' 8.8'	54.1' 54.1'
6	267°51.37	\$21°28.17	335°12.27	12.9'	S22°46.33	8.7'	54.0'
7	282°51.14	27.74	349°44.15	12.8'	22°55.06	8.6'	54.0'
8	297°50.90	27.32	4°15.97	12.8'	23°3.68	8.5'	54.0'
9	312°50.67	• • 26.89	18°47.72	12.7'	$23^{\circ}12.20$	8.4'	54.0'
10	327°50.44	26.46	33°19.41	12.6'	23°20.63	8.3'	54.0'
11 12	342°50.20 357°49.97	26.03 \$21°25.60	47°51.03 62°22.59	12.6' 12.5'	23°28.95 \$23°37.17	8.2' 8.1'	54.0' 54.0'
13	12°49.74	25.17	76°54.09	12.5	23°45.29	8.0'	54.0'
14	27°49.50	24.74	91°25.52	12.4'	23°53.31	7.9'	54.0'
15	42°49.27	• • 24.31	105°56.89	12.3'	24°1.22	7.8'	54.0'
16	57°49.04	23.87	120°28.19	12.2'	24°9.03	7.7'	54.0'
17	72°48.81	23.44	134°59.43	12.2'	24°16.73	7.6'	54.0'
18 19	87°48.58 102°48.35	\$21°23.00 22.57	149°30.61 164°1.72	12.1' 12.0'	\$24°24.33 24°31.81	7.5' 7.4'	54.0' 54.0'
20	102 46.35 117°48.12	22.57	178°32.76	12.0'	24°39.20	7.4	54.0'
21	132°47.89	. 21.70	193°3.74	11.9'	24°46.47	7.2'	54.0'
22	147°47.65	21.26	207°34.66	11.9'	$24^{\circ}53.63$	7.1'	54.0'
23	162°47.42	20.82	222°5.52	11.8'	25°0.68	6.9'	54.0'
	SD = 16.3'	d = -0.4'		SD	= 14.7′		
Wed	GHA	Dec	GHA	ν	Dec	d	НР
0	177°47.20	S21°20.38	236°36.31	11.7'	\$25°7.62	6.8'	54.0'
1	192°46.97	19.94	251°7.03	11.7'	25°14.45	6.7'	54.0'
2	207°46.74	19.50	265°37.70	11.6'	25°21.17	6.6'	54.0'
3 4	222°46.51 237°46.28	· · 19.06 18.62	280°8.30 294°38.84	11.5' 11.5'	25°27.77 25°34.26	6.5' 6.4'	54.0' 54.0'
5	252°46.05	18.18	309°9.31	11.4	25°40.64	6.3	54.0'
6	267°45.82	S21°17.73	323°39.73	11.4'	S25°46.90	6.1'	54.0'
7	282°45.59	17.29	338°10.08	11.3'	$25^{\circ}53.04$	6.0'	54.0'
8	297°45.37	16.85	352°40.37	11.2'	25°59.06	5.9'	54.0'
9	312°45.14 327°44.91	· · 16.40 15.95	7°10.60 21°40.77	11.2' 11.1'	26°4.97 26°10.76	5.8' 5.7'	54.0' 54.0'
10 11	327°44.91 342°44.69	15.95 15.51	36°10.88	11.1	26° 10.76 26° 16.43	5.7° 5.5'	54.0°
12	357°44.46	S21°15.06	50°40.93	11.0'	S26°21.98	5.4	54.0'
13	12°44.23	14.61	65°10.92	10.9'	26°27.41	5.3'	54.1'
14	27°44.01	14.16	79°40.85	10.9'	26°32.72	5.2'	54.1'
15	42°43.78	• • 13.71	94°10.73 108°40.55	10.8'	26° 37.90	5.1' 4.9'	54.1'
16 17	57°43.56 72°43.33	13.26 12.81	108° 40.55 123° 10.31	10.8' 10.7'	26° 42.96 26° 47.90	4.9° 4.8°	54.1' 54.1'
18	87°43.11	S21°12.36	137°40.01	10.6'	\$26°52.72	4.7'	54.1'
19	102°42.88	11.91	152°9.66	10.6'	$26^{\circ}57.40$	4.6'	54.1'
20	117°42.66	11.46	166°39.26	10.5'	27°1.97	4.4'	54.1'
21	132°42.43 147°42.21	• • 11.00	181°8.80 195°38.29	10.5'	27°6.41	4.3'	54.1'
22 23	147°42.21 162°41.99	10.55 10.09	195°38.29 210°7.72	10.4' 10.4'	27° 10.72 27° 14.90	4.2' 4.1'	54.1' 54.1'
23	SD = 16.3'	d = -0.4'	210 1.12		= 14.7'	4.1	34.1
		<u>u = -0.4</u>		30			
Thu	GHA	Dec	GHA	ν 10.2'	Dec	d 20'	HP
0 1	177°41.76 192°41.54	\$21°9.64 9.18	224°37.10 239°6.44	10.3' 10.3'	\$27° 18.95 27° 22.88	3.9' 3.8'	54.1' 54.1'
2	207°41.32	8.72	253°35.72	10.2'	27°26.67	3.7'	54.1'
3	222°41.10	• • 8.26	268°4.96	10.2'	27°30.34	3.5'	54.1'
4	237°40.88	7.80	282°34.14	10.1'	27°33.87	3.4'	54.1'
5 6	252°40.65 267°40.43	7.35 \$21°6.89	297°3.28 311°32.37	10.1' 10.0'	27°37.28 \$27°40.55	3.3' 3.1'	54.1' 54.2'
7	282°40.21	6.42	311 32.37 326°1.42	10.0'	27°43.69	3.0'	54.2'
8	297°39.99	5.96	340°30.42	10.0'	27°46.70	2.9'	54.2'
9	312°39.77	• • 5.50	354°59.38	9.9'	27°49.57	2.7'	54.2'
10	327°39.55	5.04	9°28.30	9.9'	27°52.31	2.6'	54.2'
11 12	342°39.33 357°39.11	4.57 \$21°4.11	23°57.17 38°26.01	9.8' 9.8'	27°54.91 \$27°57.38	2.5' 2.3'	54.2' 54.2'
13	12°38.89	3.64	52°54.81	9.8 9.8'	27°59.71	2.3	54.2'
14	27°38.67	3.18	67°23.56	9.7'	28°1.91	2.1'	54.2'
15	42°38.45	• • 2.71	81°52.29	9.7'	28°3.97	1.9'	54.2'
16	57°38.24	2.25	96°20.97	9.7'	28°5.89	1.8'	54.2'
17 18	72°38.02 87°37.80	1.78 S21°1.31	110°49.62 125°18.24	9.6' 9.6'	28°7.68 \$28°9.33	1.6' 1.5'	54.3' 54.3'
18 19	102°37.58	0.84	125°18.24 139°46.83	9.6'	528° 9.33 28° 10.84	1.5	54.3'
20	117°37.36	21°0.37	154°15.38	9.5'	28° 12.21	1.2'	54.3'
21	132°37.15	20°59.90	168°43.90	9.5'	28° 13.44	1.1'	54.3'
22	147°36.93	59.43	183°12.40	9.5'	28° 14.53	1.0'	54.3'
23	162°36.71	58.96	197°40.87	9.4'	28° 15.48	0.8'	54.3'
	SD = 16.3'	d = -0.5'		SD	= 14.8'		

	Twilight				Twilight		
Lat.		•	Sunrise	Sunset		•	
	Naut.	Civil			Civil	Naut.	
N 72°	08:03	09:55			14:23	16:16	
<b>N</b> 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	
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	////	
<b>S</b> 60°	////	01:52	03:09	21:08	22:23	////	
					N4		

Lat.		Moonris	e		Moonset	:
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
<b>N</b> 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° <b>N</b> 10°	02:06	03:00	03:54	13:16	13:59	14:47
0°	01:48	02:38	03:30	13:35	14:21	15:11
	01:31	02:18	03:08	13:54	14:42	15:33
<b>S</b> 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° 35°	00:36	01:13	01:56	14:55	15:52	16:48
40°	00:24 00:10	00:59 00:42	01:40 01:22	15:09 15:25	16:08 16:26	17:04 17:24
40 45°		00:42	00:59	15:25	16:20	17:24
		00.23				
<b>S</b> 50°	23:58		00:31	16:07	17:15	18:17
52° 54°	23:47		00:17	16:18	17:29	18:32
54° 56°	23:33 23:18	23:42	00:01	16:31 16:46	17:45 18:03	18:49 19:10
56°	23:18	23:42	23:55	16:46	18:03 18:26	19:10 19:37
<b>S</b> 60°	23:00	23:19	23:35	17:04	18:56	20:14
3 00	22:31	22.49	25:10	17:20	10:50	20.14

		Sun			Moon	
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	24-26
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	29-13%
13	08:29	08:40	12:09	07:42	20:06	
14	08:51	09:02	12:09	08:30	20:55	
15	00.12	00.24	12.00	00.21	21.47	

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

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Fri -	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	115°26.83	175°3.47 \$21°31.98	179°6.38 \$22°13.39	4°27.62 N22°18.80	117°7.75 \$03°8.46	
1	130°29.30	190°2.61 31.42	194° 6.78 13.06	19°30.44 18.85	132°10.04 8.37	Alpheratz 357°34.03 29°14.20
2	145°31.76	205°1.75 30.86	209°7.18 12.73	34°33.26 18.90	147°12.32 8.29	Ankaa 353°6.43 -42°10.08
3	160°34.22	220°0.89 · · 30.29	224°7.58 · · 12.40	49°36.08 •• 18.95	162°14.60 · · 8.20	Schedar 349°30.21 56°41.09 Diphda 348°46.51 -17°50.74
4	175°36.69	235°0.03 29.73	239°7.98 12.06	64°38.90 19.01	177°16.89 8.12	Achernar 335°19.54 -57°6.53
5	190°39.15	249°59.17 29.16	254°8.38 11.73	79°41.72 19.06	192°19.17 8.03	Hamal 327°50.17 23°35.25
6	205°41.62	264°58.31 \$21°28.59	269°8.78 \$22°11.40	94°44.54 N22°19.11	207°21.45 S03°7.94 222°23.74 7.86	Polaris 313°23.64 89°22.74
7 8	220° 44.08 235° 46.54	279°57.45 28.02 294°56.59 27.45	284° 9.18 11.07 299° 9.58 10.73	109°47.36 19.16 124°50.18 19.22	222°23.74 7.86 237°26.02 7.77	Acamar 315°10.96 -40°12.21
9	250° 49.01	309°55.73 · · 26.88	314° 9.98 · · 10.40	139°53.00 · · 19.27	252°28.30 · · 7.69	Menkar 314°5.12 4°11.51
10	265°51.47	324°54.88 26.31	329°10.38 10.06	154°55.82 19.32	267°30.58 7.60	Mirfak 308°26.78 49°57.42
11	280°53.94	339°54.02 25.73	344°10.78 9.73	169°58.64 19.37	282°32.87 7.51	Aldebaran 290°38.38 16°33.72
12	295°56.40	354°53.16 S21°25.16	359°11.19 S22°9.40	185°1.46 N22°19.43	297°35.15 \$03°7.43	Rigel 281°2.76 -8°10.36 Capella 280°20.21 46°1.53
13	310°58.87	9°52.31 24.58	14°11.59 9.06	200°4.28 19.48	312°37.43 7.34	Bellatrix 278°21.67 6°22.37
14	326°1.33	24°51.45 24.01	29°11.99 8.72	215°7.10 19.53	327°39.71 7.25	Elnath 278° 0.45 28° 37.79
15 16	341°3.79 356°6.26	39°50.60 · · 23.43 54°49.74 22.85	44°12.39 · · 8.39	230°9.92 · · 19.58	342°41.99 · · 7.17 357°44.28 7.08	Alnilam 275°36.56 -1°11.16
16 17	11°8.72	54°49.74 22.85 69°48.89 22.27	59°12.79 8.05 74°13.19 7.71	245°12.73 19.64 260°15.55 19.69	12°46.56 6.99	Betelgeuse 270°50.84 7°24.68
18	26°11.19	84°48.03 <b>S</b> 21°21.69	89°13.59 <b>S</b> 22°7.38	275°18.37 N22°19.74	27°48.84 S03°6.91	Canopus 263°51.48 -52°42.64
19	41° 13.65	99° 47.18 21.10	104°14.00 7.04	290°21.19 19.79	42°51.12 6.82	Sirius 258°25.14 -16°45.18
20	$56^{\circ}16.12$	114°46.33 20.52	119°14.40 6.70	305°24.01 19.85	57°53.40 6.73	Adhara 255°4.81 -29°0.51
21	71° 18.58	129°45.48 · · 19.93	134°14.80 · · 6.36	320°26.83 · · 19.90	72°55.68 · · 6.65	Procyon 244°49.59 5°9.42 Pollux 243°15.87 27°57.71
22	86°21.04	144°44.62 19.35	149° 15.20 6.02	335°29.65 19.95	87°57.96 6.56	Avior 234°13.74 -59°35.52
23	101°23.51	159°43.77 18.76	164°15.60 5.68	350°32.46 20.00	103°0.24 6.47	Suhail 222°45.26 -43°32.22
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	Miaplacidus 221°37.22 -69°49.32
	·					Alphard 217°46.61 -8°46.35
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.25 11°50.26
0	116°25.97	174°42.92 \$21°18.17	179°16.01 \$22°5.34	5°35.28 N22°20.06	118°2.52 \$03°6.39	Dubhe 193°39.51 61°36.33
1	131°28.44	189°42.07 17.58	194°16.41 5.00	20°38.10 20.11	133°4.80 6.30	Denebola 182°23.91 14°25.41
2	146°30.90	204°41.22 16.99	209°16.81 4.66	35°40.92 20.16	148°7.09 6.21	Gienah 175°42.58 -17°41.20 Acrux 172°58.92 -63°14.39
3	161°33.36	219°40.37 · · 16.40	224°17.21 · · 4.32	50°43.74 · · 20.21	163°9.37 · · 6.13	Gacrux 172 56.92 -03 14.39
4	176°35.83	234°39.52 15.81	239°17.62 3.97	65°46.56 20.26	178° 11.65 6.04	Alioth 166°12.09 55°48.75
5	191°38.29	249°38.67 15.21	254°18.02 3.63	80°49.37 20.32	193°13.93 5.95	Spica 158°21.37 -11°17.87
6	206° 40.76	264°37.83 <b>S</b> 21°14.62	269°18.42 \$22°3.29	95°52.19 N22°20.37	208°16.21 \$03°5.86	Alkaid 152°51.34 49°10.64
7 8	221° 43.22 236° 45.69	279° 36.98 14.02 294° 36.13 13.43	284°18.83 2.95 299°19.23 2.60	110°55.01 20.42 125°57.83 20.47	223°18.49 5.78 238°20.77 5.69	Hadar 148°34.86 -60°29.68
9	251° 48.15	309°35.28 · · 12.83	314°19.63 · · 2.26	141°0.64 · · 20.53	253°23.05 · · 5.60	Menkent 147°56.65 -36°29.77
10	266°50.61	324°34.44 12.23	329°20.04 1.91	156°3.46 20.58	268°25.32 5.51	Arcturus 145°47.18 19°2.59
11	281°53.08	339°33.59 11.63	344°20.44 1.57	171°6.28 20.63	283°27.60 5.43	Rigil Kent. 139°39.27 -60°56.35 Kochab 137°20.18 74°2.49
12	296°55.54	354°32.75 <b>S</b> 21°11.03	359°20.84 <b>S</b> 22°1.22	186°9.10 N22°20.68	298°29.88 <b>S</b> 03°5.34	Zuben'ubi 136°55.17 -16°9.00
13	311°58.01	9°31.90 10.42	14°21.25 0.88	201°11.91 20.73	313°32.16 5.25	Alphecca 126°3.19 26°37.38
14	327°0.47	24°31.06 9.82	29°21.65 0.53	216°14.73 20.79	328°34.44 5.16	Antares 112°15.03 -26°29.34
15	342°2.94	39°30.21 · · 9.22	44°22.05 22°0.18	231°17.55 · · 20.84	343°36.72 · · 5.08	Atria 107°8.92 -69°4.24
16 17	357°5.40 12°7.86	54°29.37 8.61 69°28.53 8.00	59°22.46 21°59.84 74°22.86 59.49	246°20.37 20.89 261°23.18 20.94	358°39.00 4.99 13°41.28 4.90	Sabik 102°2.07 -15°45.44
18	27°10.33	84°27.68 <b>S</b> 21°7.39	89°23.27 <b>S</b> 21°59.14	276°26.00 N22°20.99	28°43.56 S03°4.81	Shaula 96°9.56 -37°7.29
19	42° 12.79	99°26.84 6.79	104°23.67 58.79	291°28.82 21.04	43°45.83 4.72	Rasalhague 95°58.04 12°32.34
20	57° 15.26	114°26.00 6.17	119°24.08 58.44	306°31.63 21.10	58°48.11 4.64	Eltanin 90°42.27 51°28.92 Kaus Aust. 83°31.76 -34°22.30
21	72° 17.72	129°25.16 •• 5.56	134°24.48 · · 58.09	321°34.45 · · 21.15	73°50.39 · · 4.55	Vega 80°33.06 38°48.32
22	87°20.18	144°24.32 4.95	149°24.89 57.75	336°37.27 21.20	88°52.67 4.46	Nunki 75°47.06 -26°15.87
23	102°22.65	159°23.48 4.34	164°25.29 57.40	351°40.08 21.25	103°54.95 4.37	Altair 61°59.46 8°56.17
Mer.	pass. 16:12	$\nu$ -0.9' d-0.6' m-3.90	$\nu$ 0.4′ d-0.3′ m1.09	$\nu 2.8' \ d0.1' \ \text{m-}2.67$	$\nu 2.3' \ d$ -0.1' m1.03	Peacock 53°4.97 -56°39.13
						Deneb 49°25.68 45°22.41
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°38.24 9°59.66
0	117°25.11	174°22.64 <b>S</b> 21°3.72	179°25.69 \$21°57.04	6°42.90 N22°21.30	118°57.22 S03°4.28	Al Na'ir 27°32.22 -46°50.24 Fomalhaut 15°13.81 -29°29.20
1	132° 27.58	189°21.80 3.11	194°26.10 56.69	21°45.72 21.35	133°59.50 4.19	Scheat 13°44.61 28°13.55
2	147°30.04	204°20.96 2.49	209°26.50 56.34	36°48.53 21.41	149°1.78 4.11	Markab 13°29.26 15°20.77
3	162°32.51	219°20.12 · · 1.87	224°26.91 · · 55.99	51°51.35 · · 21.46	164°4.06 · · 4.02	
4	177°34.97	234°19.29 1.25	239°27.32 55.64	66°54.17 21.51	179°6.33 3.93	Jan 16 Fri SHA Mer.pass
5	192°37.43 207°39.90	249°18.45 0.63	254°27.72 55.28	81°56.98 21.56	194°8.61 3.84	Venus 59°36.64 12:20 Mars 63°39.55 12:03
6 7	207° 39.90 222° 42.36	264°17.61 \$21°0.01 279°16.78 20°59.39	269°28.13 S21°54.93 284°28.53 54.58	96°59.80 N22°21.61 112°2.61 21.66	209°10.89 S03°3.75 224°13.16 3.66	Jupiter 249°0.79 23:38
8	237° 44.83	294°15.94 58.77	299°28.94 54.22	127°5.43 21.72	239°15.44 3.58	Saturn 1°40.92 16:09
9	252° 47.29	309°15.10 · · 58.14	314°29.34 · · 53.87	142°8.24 · · 21.77	254°17.72 · · 3.49	
10	267° 49.75	324°14.27 57.52	329°29.75 53.51	157°11.06 21.82	269° 19.99 3.40	Jan 17 Sat SHA Mer.pass
11	282° 52.22	339° 13.44 56.89	344°30.16 53.16	172°13.88 21.87	284°22.27 3.31	Venus 58°16.95 12:22 Mars 62°50.03 12:03
12	297°54.68	354°12.60 \$20°56.26	359°30.56 \$21°52.80	187°16.69 N22°21.92	299°24.55 \$03°3.22	Jupiter 249°9.31 23:33
13	312° 57.15	9°11.77 55.63	14°30.97 52.45	202°19.51 21.97	314°26.82 3.13	Saturn 1°36.55 16:05
14 15	327°59.61 343°2.08	24°10.93 55.00 39°10.10 •• 54.37	29°31.38 52.09 44°31.78 · · 51.73	217°22.32 22.02 232°25.14 · · 22.07	329°29.10 3.04 344°31.37 · · 2.95	
15 16	343°2.08 358°4.54	54°9.27 53.74	59°32.19 51.38	247°27.95 22.13	344°31.37 · · 2.95 359°33.65 2.87	Jan 18 Sun         SHA         Mer.pass           Venus         56°57.53         12:23
17	13°7.00	69°8.44 53.11	74°32.60 51.02	262°30.77 22.18	14°35.93 2.78	Mars 62°0.58 12:02
18	28°9.47	84°7.61 <b>S</b> 20°52.47	89°33.00 S21°50.66	277°33.58 N22°22.23	29°38.20 S03°2.69	Jupiter 249°17.79 23:29
19	43°11.93	99°6.78 51.84	104°33.41 50.30	292°36.40 22.28	44°40.48 2.60	Saturn 1°32.11 16:02
20	58° 14.40	114°5.95 51.20	119°33.82 49.94	307°39.21 22.33	59° 42.75 2.51	
21	73° 16.86	129°5.12 · · 50.57	134°34.22 · · 49.58	322°42.03 · · 22.38	74°45.03 · · 2.42	Horizontal parallax Venus: 0.1
22	88° 19.32	144°4.29 49.93	149°34.63 49.22	337°44.84 22.43	89°47.30 2.33	Venus: 0.1 Mars: 0.1
23	103°21.79	159°3.46 49.29	164°35.04 48.86	352°47.65 22.48	104°49.58 2.24	111013. 0.1
Mer. <sub>I</sub>	pass. 16:08	$\nu$ -0.8′ <i>d</i> -0.6′ m-3.90	$ u 0.4' \ d$ -0.4' m1.09	$ u 2.8' \ d0.1' \ \text{m-}2.67$	$ u 2.3' \ d$ -0.1' m1.03	

h	Su	n		!	Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	177°36.50	S20°58.48	212°9.31	9.4'	\$28°16.30	0.7'	54.3'
1 2	192°36.28 207°36.07	58.01 57.54	226°37.73 241°6.12	9.4' 9.4'	28°16.97 28°17.50	0.5' 0.4'	54.3' 54.3'
3	222° 35.85	• • 57.06	255°34.49	9.4'	28°17.89	0.2'	54.4'
4	237° 35.64	56.58	270°2.85	9.3'	28°18.14	0.1'	54.4'
5 6	252°35.42 267°35.21	56.11 \$20°55.63	284°31.18 298°59.49	9.3' 9.3'	28°18.24 \$28°18.21	-0.0' -0.2'	54.4' 54.4'
7	282° 34.99	55.15	313°27.79	9.3'	28°18.03	-0.2	54.4
8	297°34.78	54.68	$327^{\circ}56.07$	9.3'	28°17.71	-0.5'	54.4'
9	312°34.57 327°34.35	• • 54.20	342°24.34 356°52.59	9.3' 9.2'	28°17.25 28°16.65	-0.6' -0.7'	54.4' 54.4'
10 11	327 34.35 342°34.14	53.72 53.24	350 52.59 11°20.83	9.2 9.2'	28 10.05 28°15.90	-0. <i>1</i> -0.9'	54.4 54.5'
12	357° 33.93	\$20°52.76	25°49.06	9.2'	S28°15.01	-1.0'	54.5'
13	12°33.71	52.27	40°17.29	9.2'	28°13.98 28°12.80	-1.2'	54.5'
14 15	27°33.50 42°33.29	51.79 •• 51.31	54°45.50 69°13.71	9.2' 9.2'	28°12.80 28°11.48	-1.3' -1.5'	54.5' 54.5'
16	57°33.08	50.82	83°41.92	9.2'	28°10.02	-1.6'	54.5'
17	72°32.87	50.34	98°10.12	9.2'	28°8.42	-1.7'	54.5'
18 19	87°32.66 102°32.45	\$20°49.85 49.37	112°38.32 127°6.52	9.2' 9.2'	\$28° 6.67 28° 4.77	-1.9' -2.0'	54.6' 54.6'
20	117° 32.24	48.88	141°34.72	9.2'	28° 2.74	-2.2'	54.6'
21	132° 32.03	• • 48.39	156°2.93	9.2'	28° 0.56	-2.3'	54.6'
22 23	147°31.82 162°31.61	47.91 47.42	170°31.13 184°59.34	9.2' 9.2'	27°58.24 27°55.77	-2.5' -2.6'	54.6' 54.6'
23					0 = 14.8'	-2.0	J <del>1</del> .0
	SD = 16.3'	d = -0.5'		SD	9 = 14.8′		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	177°31.40 192°31.19	\$20°46.93 46.44	199°27.56 213°55.79	9.2' 9.2'	\$27°53.16 27°50.41	-2.8' -2.9'	54.6' 54.7'
2	207°30.98	45.44 45.95	213 55.79 228°24.02	9.2 9.2'	27° 47.52	-2.9 -3.0'	54.7'
3	222°30.77	• • 45.46	242°52.27	9.3'	27°44.48	-3.2'	54.7'
4	237°30.57 252°30.36	44.96	257°20.52	9.3'	27°41.30 27°37.98	-3.3'	54.7'
5 6	252°30.36 267°30.15	44.47 \$20°43.98	271°48.79 286°17.07	9.3' 9.3'	\$27°34.52	-3.5' -3.6'	54.7' 54.7'
7	282°29.94	43.48	300°45.37	9.3'	27°30.91	-3.7'	54.7'
8	297°29.74	42.99	315°13.69	9.3'	27°27.17	-3.9'	54.8'
9 10	312°29.53 327°29.33	· · 42.49 42.00	329°42.02 344°10.37	9.4' 9.4'	27°23.28 27°19.25	-4.0' -4.2'	54.8' 54.8'
11	342°29.12	41.50	358°38.75	9.4'	27°15.08	-4.3'	54.8'
12	357°28.91 12°28.71	\$20°41.00	13°7.14 27°35.56	9.4'	\$27°10.77 27°6.32	-4.5'	54.8'
13 14	27°28.71	40.50 40.01	42°4.00	9.4' 9.5'	27° 0.32 27° 1.72	-4.6' -4.7'	54.8' 54.9'
15	42°28.30	• • 39.51	56°32.47	9.5'	26°56.99	-4.9'	54.9'
16	57°28.10	39.01	71°0.96	9.5'	26°52.12 26°47.12	-5.0'	54.9'
17 18	72°27.89 87°27.69	38.50 \$20°38.00	85°29.48 99°58.03	9.5' 9.6'	26 47.12 \$26°41.97	-5.1' -5.3'	54.9' 54.9'
19	102° 27.49	37.50	114°26.61	9.6'	26°36.68	-5.4'	54.9'
20	117°27.28	37.00	128°55.22	9.6'	26°31.26	0.0	55.0'
21 22	132°27.08 147°26.88	· · 36.49 35.99	143°23.86 157°52.54	9.7' 9.7'	26°25.70 26°20.01	-5.7' -5.8'	55.0' 55.0'
23	162° 26.68	35.48	172°21.24	9.7'	26°14.17	-6.0'	55.0'
	SD = 16.3'	d = -0.5'		SD	0 = 14.9'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	177° 26.47	S20°34.98	186°49.99	9.8'	S26°8.21	-6.1'	55.0'
1	192°26.27	34.47	201°18.77	9.8'	26°2.10	-6.2'	55.0'
2	207°26.07 222°25.87	33.96 •• 33.46	215°47.58 230°16.44	9.9' 9.9'	25°55.87 25°49.50	-6.4' -6.5'	55.1' 55.1'
4	237° 25.67	32.95	244°45.33	9.9'	25°42.99	-6.6'	55.1'
5	252°25.47	32.44	259°14.26	10.0'	25°36.36	-6.8'	55.1'
6 7	267° 25.27 282° 25.07	\$20°31.93 31.42	273°43.23 288°12.24	10.0' 10.1'	\$25°29.59 25°22.69	-6.9' -7.0'	55.1' 55.1'
8	297° 24.87	30.91	302°41.30	10.1	25°15.66	-7.2'	55.2'
9	312° 24.67	• • 30.40	317°10.40	10.1'	25°8.50	-7.3'	55.2'
10 11	327°24.47 342°24.28	29.88 29.37	331°39.54 346°8.72	10.2' 10.2'	25°1.20 24°53.78	-7.4' -7.5'	55.2' 55.2'
12	357° 24.08	S20°28.86	0°37.95	10.2	S24°46.24	-7.7'	55.2'
13	12°23.88	28.34	15°7.23	10.3'	24°38.56	-7.8'	55.3'
14 15	27°23.68 42°23.49	27.83 •• 27.31	29°36.55 44°5.92	10.4' 10.4'	24°30.76 24°22.83	-7.9' -8.1'	55.3' 55.3'
15 16	42 23.49 57°23.29	26.79	58°35.33	10.4	24 22.83 24°14.78	-8.1 -8.2'	55.3'
17	72°23.09	26.28	73°4.80	10.5'	24°6.60	-8.3'	55.3'
18 19	87°22.90 102°22.70	\$20°25.76 25.24	87°34.31 102°3.87	10.6' 10.6'	\$23°58.29 23°49.87	-8.4' -8.5'	55.3' 55.4'
20	102 22.70 117°22.51	25.24 24.72	102 3.87 116°33.48	10.6	23°41.32	-8.5'	55.4'
21	132°22.31	• • 24.20	131°3.14	10.7'	23°32.65	-8.8'	55.4'
22 23	147°22.12 162°21.92	23.68 23.16	145°32.85 160°2.62	10.8' 10.8'	23°23.86 23°14.95	-8.9' -9.0'	55.4' 55.4'
23	$\frac{102 \text{ 21.92}}{\text{SD} = 16.2'}$	d = -0.5'			0 = 15.0'	-9.0	55.4
	JD — 10.2	u — -0.5		30	- 13.0		

Lat.	Twi	ilight	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	07:56	09:43			14:38	16:26
<b>N</b> 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 $58^{\circ}$	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	80:80	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
$N 40^{\circ}$	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
$N 10^{\circ}$	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
<b>S</b> 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
$35^{\circ}$	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
<b>S</b> 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	////
<b>S</b> 60°	////	02:03	03:16	21:02	22:14	////
		Moonris	e		Moonset	:
Lat.	l	_	_	l	_	_

Lat.		Moonris	e		Moonset	:
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°						
<b>N</b> 70°						
68°						
66°						
64°			10:48			13:18
62°	00.47	10:12	10:01	11.00	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° 52°	07:19	08:03	08:33	13:07	14:13	15:30
52° 50°	07:01 06:46	07:46 07:32	08:19 08:07	13:25 13:40	14:29 14:43	15:43 15:55
45°	06:46	07:32	07:42	14:11	15:11	16:19
N 40° 35°	05:52 05:32	06:41 06:22	07:22 07:06	14:35 14:54	15:34 15:52	16:38 16:54
30°	05:32	06:22	06:51	15:11	16:08	17:08
20°	03.13	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	••••	00:20	01:48	21:02	21:23	21:31

		Sun			Moon	
Day	Eqn.o	f Time	Mer.	Mer.	Pass.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	27-0
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	8-1%
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	Vei	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	118°24.25	174°2.63	\$20°48.65	179°35.45	S21°48.50	7°50.47	N22°22.53	119°51.85	S03°2.15			
1	133°26.72	189°1.80	48.00	194°35.85	48.14	22°53.28	22.59	134°54.13	2.06	Alpheratz	357°34.04 353°6.44	29° 14.19 -42° 10.07
2	$148^{\circ}29.18$	204°0.98	47.36	209°36.26	47.78	37°56.10	22.64	149°56.40	1.97	Ankaa Schedar	349°30.23	-42 10.07 56°41.09
3	163°31.65	219°0.15	• • 46.72	224°36.67	• • 47.42	52°58.91	• • 22.69	164°58.68	• • 1.88	Diphda	348°46.52	-17°50.74
4 5	178° 34.11 193° 36.57	233°59.32 248°58.50	46.07 45.43	239°37.08 254°37.49	47.05 46.69	68°1.73 83°4.54	22.74 22.79	180°0.95 195°3.22	1.79 1.70	Achernar	335°19.56	-57°6.53
6	208° 39.04	263° 57.67	\$20°44.78	269°37.89	\$21°46.33	98°7.35	N22° 22.84	210° 5.50	503°1.61	Hamal	327°50.18	23°35.25
7	223°41.50	278° 56.85	44.13	284°38.30	45.96	113°10.17	22.89	225°7.77	1.52	Polaris	313°25.00	89°22.75
8	238°43.97	293°56.03	43.48	299°38.71	45.60	128°12.98	22.94	$240^{\circ}10.05$	1.43	Acamar Menkar	315°10.97 314°5.13	-40° 12.21 4° 11.51
9	253°46.43	308°55.20	• • 42.83	314°39.12	• • 45.24	143°15.79	• • 22.99	255° 12.32	• • 1.34	Mirfak	308°26.79	49°57.43
10	268° 48.89	323°54.38	42.18	329°39.53	44.87	158°18.61	23.04	270°14.59	1.25	Aldebaran	290°38.38	16°33.72
11 12	283°51.36 298°53.82	338°53.56 353°52.73	41.53 \$20°40.88	344°39.94 359°40.35	44.50 \$21°44.14	173°21.42 188°24.23	23.09 N22°23.14	285°16.87 300°19.14	1.16 S03°1.08	Rigel	$281^{\circ}2.76$	-8° 10.36
13	313° 56.29	8°51.91	40.22	14°40.76	43.77	203°27.05	23.20	315°21.41	0.99	Capella	280°20.22	46°1.54
14	328° 58.75	23°51.09	39.57	29°41.17	43.41	218°29.86	23.25	330°23.69	0.89	Bellatrix	278°21.67	6°22.37
15	$344^{\circ}1.22$	38°50.27	• • 38.91	44°41.57	• • 43.04	233°32.67	• • 23.30	345°25.96	• • 0.80	Elnath Alnilam	278°0.45 275°36.56	28°37.79 -1°11.17
16	359°3.68	53°49.45	38.25	59°41.98	42.67	248°35.48	23.35	0°28.23	0.71	Betelgeuse	270°50.84	7°24.68
17	14°6.14	68°48.63	37.59	74°42.39	42.30 \$21°41.93	263°38.30 278°41.11	23.40	15°30.50	0.62	Canopus	263°51.49	-52°42.66
18 19	29°8.61 44°11.07	83°47.81 98°46.99	\$20°36.93 36.27	89°42.80 104°43.21	41.57	278 41.11 293°43.92	N22°23.45 23.50	30°32.78 45°35.05	\$03° 0.53 0.44	Sirius	258°25.13	$-16^{\circ}45.19$
20	59° 13.54	113°46.17	35.61	119°43.62	41.20	308°46.73	23.55	60°37.32	0.35	Adhara	255°4.81	-29°0.52
21	74° 16.00	128°45.36	• • 34.95	134°44.03	• • 40.83	323°49.55	• • 23.60	75°39.59	• • 0.26	Procyon	244°49.58 243°15.86	5°9.41 27°57.71
22	$89^{\circ}18.46$	143°44.54	34.28	149°44.44	40.46	338°52.36	23.65	90°41.87	0.17	Pollux Avior	234° 13.74	-59° 35.54
23	104°20.93	158°43.72	33.62	164°44.85	40.09	353°55.17	23.70	105°44.14	0.08	Suhail	222°45.24	-43°32.23
Mer.p	pass. 16:04	$\nu$ -0.8′ d-0	.6′ m-3.90	$\nu$ 0.4' d-0	0.4′ m1.09	$\nu 2.8' \ d0.$	.1′ m-2.67	$\nu$ 2.3′ d-0	.1′ m1.03	Miaplacidus	221°37.21	-69°49.34
										Alphard	217°46.59	-8°46.36
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.23	11°50.25
0	119°23.39	173°42.91	\$20°32.95	179°45.26	S21°39.71	8°57.98	N22° 23.75	120°46.41	S02°59.99	Dubhe Denebola	193°39.46 182°23.88	61°36.33 14°25.40
1	$134^{\circ}25.86$	188°42.09	32.29	194°45.68	39.34	24°0.79	23.80	135°48.68	$02^{\circ}59.90$	Gienah	175°42.55	-17°41.21
2	149°28.32	203°41.28	31.62	209°46.09	38.97	39°3.61	23.85	150°50.95	59.81	Acrux	172°58.88	-63° 14.40
3	164°30.79	218° 40.46	• • 30.95	224°46.50	• • 38.60	54°6.42	• • 23.90	165°53.22	59.72	Gacrux	171°50.48	$-57^{\circ}15.36$
4 5	179° 33.25 194° 35.71	233°39.65 248°38.83	30.28 29.61	239°46.91 254°47.32	38.23 37.85	69°9.23 84°12.04	23.95 24.00	180°55.50 195°57.77	59.63 59.54	Alioth	166°12.05	55° 48.74
6	209°38.18		S20°28.94	269°47.73	S21°37.48	99°14.85	N22° 24.05	211°0.04	S02°59.45	Spica	158°21.35	-11°17.88
7	224°40.64	278°37.21	28.26	284°48.14	37.11	114°17.66	24.10	226°2.31	59.36	Alkaid Hadar	152°51.30 148°34.82	49°10.63 -60°29.69
8	239°43.11	293°36.40	27.59	299°48.55	36.73	129°20.47	24.15	241°4.58	59.27	Menkent	147°56.62	-36° 29.78
9	254° 45.57	308°35.58	• • 26.91	314°48.96	• • 36.36	144°23.28	• • 24.20	256°6.85	• • 59.17	Arcturus	145°47.15	19°2.58
10	269°48.03	323°34.77	26.24	329°49.38	35.98	159°26.10	24.25	271°9.12	59.08	Rigil Kent.	$139^{\circ}39.23$	$-60^{\circ}56.35$
11 12	284° 50.50 299° 52.96	338°33.96 353°33.15	25.56 \$20°24.88	344°49.79 359°50.20	35.61 \$21°35.23	174°28.91 189°31.72	24.30 N22°24.35	286°11.39 301°13.66	58.99 \$02°58.90	Kochab	137°20.11	74°2.48
13	314°55.43	8°32.34	24.20	14°50.61	34.85	204°34.53	24.40	316° 15.93	58.81	Zuben'ubi	136°55.14	-16°9.01
14	329° 57.89	23°31.53	23.52	29°51.02	34.48	219°37.34	24.45	331°18.20	58.72	Alphecca Antares	126°3.17 112°15.01	26° 37.37 -26° 29.34
15	$345^{\circ}0.35$	38°30.72	• • 22.84	44°51.44	• • 34.10	234°40.15	• • 24.50	$346^{\circ}20.47$	• • 58.63	Atria	107°8.87	-69°4.24
16	0°2.82	53°29.92	22.15	59°51.85	33.72	249°42.96	24.55	1°22.74	58.54	Sabik	102°2.05	-15°45.45
17 18	15°5.28 30°7.75	68°29.11 83°28.30	21.47 \$20°20.79	74°52.26 89°52.67	33.34 \$21°32.96	264°45.77 279°48.58	24.60 N22° 24.65	16°25.01 31°27.28	58.45 \$02°58.35	Shaula	$96^{\circ}9.53$	-37°7.29
19	45° 10.21	98° 27.50	20.10	104°53.09	32.59	294°51.39	24.70	46°29.55	58.26	Rasalhague	95°58.02	12°32.33
20	60°12.68	113°26.69	19.41	119°53.50	32.21	309°54.20	24.75	61°31.82	58.17	Kaus Aust.	90°42.25 83°31.73	51°28.90 -34°22.30
21	75° 15.14	128°25.88	• • 18.72	134°53.91	• • 31.83	324°57.01	• • 24.80	76°34.09	• • 58.08	Vega	80°33.04	-34 22.30 38°48.31
22	90° 17.60	143°25.08	18.04	149°54.33	31.45	339°59.82	24.85	91°36.36	57.99	Nunki	75°47.04	
23	105°20.07	158°24.27	17.35	164°54.74	31.07	355°2.63	24.90	106°38.63	57.90	Altair	$61^{\circ}59.45$	$8^{\circ}56.16$
Mer.p	pass. 16:00	$\nu$ -0.8′ d-0	.7′ m-3.90	$\nu$ 0.4' d-0	).4′ m1.09	$\nu$ 2.8′ d0.	.1′ m-2.67	$\nu$ 2.3′ d-0	.1' m $1.03$	Peacock	53°4.95	-56°39.11
										Deneb	49°25.68	45°22.40
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir	33°38.24 27°32.22	9°59.65 -46°50.23
0	$120^{\circ}22.53$	173°23.47	S20°16.65	179°55.15	S21°30.68	10°5.43	N22°24.95	121°40.90	S02°57.80	Fomalhaut	15°13.82	-40 50.25 -29°29.19
1	135°25.00	188°22.67	15.96	194°55.57	30.30	25°8.24	25.00	136°43.17	57.71	Scheat	13°44.61	28° 13.55
2	150°27.46	203°21.86	15.27	209°55.98	29.92	40°11.05	25.05	151°45.43	57.62	Markab	13°29.26	15°20.77
3 4	165° 29.92 180° 32.39	218°21.06 233°20.26	· · 14.57 13.88	224°56.39 239°56.81	· · 29.54 29.16	55°13.86 70°16.67	· · 25.10 25.15	166° 47.70 181° 49.97	•• 57.53 57.44	Jan 19 Mon	SHA	Mer.pass
5	195°34.85	248° 19.46	13.18	254°57.22	28.77	85°19.48	25.20	196°52.24	57.35	Venus	55°38.38	12:25
6	210°37.32		S20°12.49	269°57.64	S21°28.39	100°22.29	N22°25.25	211°54.51	S02°57.25	Mars	61°11.19	12:01
7	225°39.78	278° 17.86	11.79	284°58.05	28.00	115°25.10	25.30	226°56.78	57.16	Jupiter	249°26.22	23:24
8	240° 42.24	293°17.06	11.09	299°58.46	27.62	130°27.90	25.35	241°59.04	57.07	Saturn	1°27.60	15:58
9 10	255° 44.71 270° 47.17	308° 16.26 323° 15.46	· · 10.39 9.69	314°58.88 329°59.29	27.24	145°30.71 160°33.52	25.40	257°1.31 272°3.58	· · 56.98	Jan 20 Tue	SHA	Mer.pass
10	270 47.17 285°49.64	323 15.46 338°14.66	9.69 8.98	329 59.29 344°59.71	26.85 26.46	175°36.33	25.44 25.49	272 3.58 287°5.85	56.89 56.79	Venus	54°19.51	12:26
12	300°52.10	353° 13.86	\$20°8.28	0°0.12	S21°26.08	190°39.14	N22° 25.54	302°8.12	S02°56.70	Mars	60°21.87	12:01
13	315°54.57	8°13.06	7.58	15°0.54	25.69	205°41.94	25.59	317°10.38	56.61	Jupiter Saturn	249°34.59 1°23.02	23:20 15:54
14	330°57.03	23° 12.27	6.87	30°0.95	25.31	220°44.75	25.64	332°12.65	56.52			
15 16	345°59.49 1°1.96	38°11.47 53°10.68	· · 6.16	45°1.37	· · 24.92	235°47.56 250°50.37	· · 25.69	347°14.92 2°17.18	· · 56.42	Jan 21 Wed	SHA	Mer.pass
16 17	1°1.96 16°4.42	68° 9.88	5.46 4.75	60°1.78 75°2.20	24.53 24.14	265°53.17	25.74 25.79	2°17.18 17°19.45	56.33 56.24	Venus Mars	53°0.94 59°32.62	12:27 12:00
18	31°6.89	83°9.09	\$20°4.04	90°2.62	S21°23.75	280°55.98	N22°25.84	32°21.72	S02°56.15	Jupiter		23:15
19	46°9.35	98°8.29	3.33	105° 3.03	23.36	295°58.79	25.89	47°23.99	56.05	Saturn	1°18.37	15:51
20	61°11.81	113°7.50	2.62	120° 3.45	22.97	311°1.59	25.94	62°26.25	55.96			
21	76° 14.28	128°6.70	1.90	135° 3.86	· · 22.59	326°4.40	· · 25.99	77°28.52	• • 55.87	Horizoi	ntal parallax Venus:	0.1
22 23	91° 16.74 106° 19.21	143°5.91 158°5.12	1.19 0.47	150° 4.28 165° 4.70	22.19 21.80	341°7.21 356°10.01	26.03 26.08	92°30.78 107°33.05	55.78 55.68		Mars:	0.1
Mer.p	pass. 15:56	$\nu$ -0.8′ d-0	.7′ m-3.90	$\nu$ 0.4′ d-0	).4′ m1.09	$\nu 2.8' \ d0.$	.0′ m-2.66	$\nu 2.3' \ d-0$	.1′ m1.03			

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	177°21.73	\$20°22.64	174°32.43	10.9'	\$23°5.92	-9.1'	55.5'
1	192°21.53	22.12	189°2.29	10.9'	22°56.78	-9.3'	55.5'
2	207°21.34	21.59	203°32.21	11.0'	22°47.51	-9.4'	55.5'
3 4	222°21.15 237°20.95	· · 21.07 20.54	218°2.18 232°32.20	11.0' 11.1'	22°38.13 22°28.63	-9.5' -9.6'	55.5' 55.5'
5	252°20.76	20.02	247°2.27	11.1'	22° 19.02	-9.0 -9.7'	55.6'
6	267°20.57	S20° 19.49	261°32.40	11.2'	S22°9.30	-9.8'	55.6'
7	282°20.38	18.97	276°2.58	11.2'	$21^{\circ}59.46$	-10.0'	55.6'
8	297°20.19	18.44	290°32.81	11.3'	21°49.51	-10.1'	55.6'
9 10	312°19.99 327°19.80	· · 17.91 17.38	305°3.09 319°33.43	11.3' 11.4'	21°39.45 21°29.27	-10.2' -10.3'	55.6' 55.7'
11	342°19.61	16.85	334°3.83	11.4'	21°18.99	-10.4	55.7'
12	357°19.42	\$20°16.32	348°34.27	11.5'	S21°8.60	-10.5'	55.7'
13	12°19.23	15.79	3°4.77	11.6'	20°58.10	-10.6'	55.7'
14 15	27°19.04 42°18.85	15.26 •• 14.73	17°35.33 32°5.93	11.6' 11.7'	20°47.50 20°36.79	-10.7' -10.8'	55.7' 55.8'
16	57°18.66	14.73	46° 36.59	11.7'	20° 25.98	-10.6 -10.9'	55.8'
17	72°18.48	13.66	61°7.31	11.8'	20° 15.06	-11.0'	55.8'
18	87°18.29	S20°13.13	75°38.07	11.8'	\$20°4.04	-11.1'	55.8'
19	102°18.10	12.60	90°8.89	11.9'	19°52.91	-11.2'	55.8'
20 21	117°17.91 132°17.72	12.06 •• 11.52	104°39.77 119°10.69	11.9' 12.0'	19°41.69 19°30.37	-11.3' -11.4'	55.9' 55.9'
21	132°17.72 147°17.54	10.99	119° 10.69 133° 41.67	12.0° 12.0°	19° 30.37 19° 18.94	-11.4° -11.5'	55.9'
23	162°17.35	10.99	148° 12.70	12.1'	19° 7.42	-11.6'	55.9'
	SD = 16.2'	d = -0.5'			D = 15.1'		
	JD — 10.2	u — -0.5		JL	_ 15.1		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177°17.16	\$20°9.91	162°43.79	12.1'	\$18°55.81	-11.7'	55.9'
1 2	192°16.98 207°16.79	9.37 8.83	177°14.92 191°46.11	12.2' 12.2'	18°44.09 18°32.29	-11.8' -11.9'	55.9' 56.0'
3	207°16.79 222°16.61	8.83 •• 8.30	206° 17.35	12.2	18° 32.29 18° 20.38	-11.9 -12.0'	56.0'
4	237°16.42	7.75	220° 48.64	12.3'	18°8.39	-12.1'	56.0'
5	252°16.24	7.21	235°19.98	12.4'	17°56.30	-12.2'	56.0'
6	267°16.05	\$20°6.67	249°51.37	12.4'	S17°44.13	-12.3'	56.0'
7	282°15.87 297°15.68	6.13	264°22.82 278°54.31	12.5'	17°31.86 17°19.50	-12.4'	56.1
8 9	297°15.68 312°15.50	5.59 •• 5.04	278°54.31 293°25.85	12.5' 12.6'	17° 19.50 17° 7.06	-12.4' -12.5'	56.1' 56.1'
10	327°15.32	4.50	307°57.44	12.6'	16°54.53	-12.6'	56.1
11	342°15.14	3.95	322°29.07	12.7'	$16^{\circ}41.91$	-12.7'	56.1'
12	357°14.95	520°3.41	337°0.76	12.7'	S16°29.21	-12.8'	56.2'
13 14	12°14.77 27°14.59	2.86 2.31	351°32.49 6°4.27	12.8' 12.8'	16°16.43 16°3.56	-12.9'	56.2' 56.2'
14 15	27 14.59 42°14.41	1.77	0 4.27 20°36.09	12.8 12.9'	10 3.50 15°50.61	-12.9' -13.0'	56.2'
16	57°14.23	1.22	35°7.97	12.9'	15° 37.59	-13.1	56.2'
17	72°14.04	0.67	49°39.88	13.0'	$15^{\circ}24.48$	-13.2'	56.3'
18	87°13.86	\$20°0.12	64°11.84	13.0'	\$15°11.29	-13.3'	56.3'
19 20	102°13.68 117°13.50	19° 59.57 59.02	78° 43.84 93° 15.89	13.0' 13.1'	14°58.03 14°44.69	-13.3'	56.3' 56.3'
21	132°13.32	• • 58.47	107°47.98	13.1'	14° 31.27	-13.5'	56.3'
22	147°13.15	57.92	122°20.11	13.2'	14° 17.78	-13.6'	56.4'
23	162°12.97	57.36	136°52.28	13.2'	14°4.22	-13.6'	56.4'
	SD = 16.2'	d = -0.5'		SI	D = 15.3'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	177°12.79	\$19° 56.81	151°24.50	13.3'	\$13°50.59	-13.7'	56.4
1	192°12.61	56.25	$165^{\circ}56.75$	13.3'	13°36.88	-13.8'	56.4'
2	207°12.43	55.70	180°29.04	13.3'	13°23.11	-13.8'	56.5
3 4	222°12.25 237°12.08	· · 55.14 54.59	195°1.37 209°33.74	13.4' 13.4'	13°9.26 12°55.35	-13.9' -14.0'	56.5' 56.5'
4 5	252°11.90	54.59 54.03	209°33.74 224°6.14	13.4	12°55.35 12°41.37	-14.0' -14.0'	56.5
6	267°11.72	\$19°53.47	238° 38.58	13.5'	\$12°27.33	-14.1'	56.5
7	282°11.55	52.92	253°11.05	13.5'	$12^{\circ}13.22$	-14.2'	56.6'
8	297°11.37	52.36	267°43.56	13.5'	11°59.05	-14.2'	56.6'
9 10	312°11.20 327°11.02	· · 51.80 51.24	282°16.10 296°48.68	13.6' 13.6'	11°44.82 11°30.52	-14.3' -14.4'	56.6' 56.6'
10	327 11.02 342°10.85	51.24 50.68	296 48.68 311°21.28	13.6'	11 30.52 11°16.16	-14.4' -14.4'	56.6
12	357°10.67	\$19°50.12	325° 53.92	13.7'	\$11°1.75	-14.5'	56.7
13	12°10.50	49.56	340°26.59	13.7'	10°47.28	-14.5'	56.7'
14	27°10.32	48.99	354°59.28	13.7'	10°32.75	-14.6'	56.7'
15 16	42°10.15 57°9.98	· · 48.43 47.87	9°32.01 24°4.76	13.8' 13.8'	10°18.16 10°3.52	-14.6' -14.7'	56.7' 56.7'
17	72°9.80	47.87	38° 37.53	13.8'	09°48.83	-14.7' -14.7'	56.8'
18	87°9.63	S19°46.74	53° 10.33	13.8'	S09°34.08	-14.8'	56.8'
19	102°9.46	46.17	67°43.16	13.8'	09°19.28	-14.8'	56.8'
20	117°9.29	45.60	82°16.01	13.9'	09°4.43	-14.9'	56.8'
21 22	132°9.12 147°8.94	· · 45.04 44.47	96° 48.88 111° 21.77	13.9' 13.9'	08°49.53 08°34.59	-14.9' -15.0'	56.8' 56.9'
23	162°8.77	43.90	125° 54.69	13.9'	08° 19.59	-15.0'	56.9
	SD = 16.2'	d = -0.6'		SI	D = 15.4'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	07:48	09:31			14:52	16:35
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	////	02:15	03:24	20:56	22:05	////

Lat.		Moonris	e		Moonset	
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°		11:58	10:48		15:36	18:23
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	03:26	05:04	06:39	21:34	21:34	21:34

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

Day   1974   1974   1975   1	h	Aries	Venus	Mars	Jupiter	Saturn	Stars
1	Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
1 1916 Al 31 398 1 5 5 5 90							
2 1 16 3 100 200 200 200 200 200 200 200 200 200							
1.							
1   10   10   10   10   10   10   10							
11   13   13   13   13   13   13   13	4	181°31.53		240°6.78 19.84	71°24.04 26.33	182°44.38 55.22	
2	5	196°33.99	248°0.38 56.16	255°7.20 19.45	86°26.85 26.38		
6   \$21   \$41.00   \$22   \$23   \$32   \$32   \$32   \$33   \$32   \$33   \$32   \$33   \$32   \$33   \$32   \$33	6	211°36.45	262°59.59 \$19°55.44	270°7.62 <b>S</b> 21°19.06			
Control   Cont							
19							
12   2015  12   2015							
12 3015124 3525487 3195109 0 1012 521169 1914-04 0 1222-067 2 303-250 502-5-07							
13 1919 53 07 97 948 9 59 36 1571054 16.39 206 49.09 20 70 318*4.77 54.38 54.01 13.00 27.00 15.00 27.00 27.00 27.00 15.00 27.00 27.00 15.00 27.00 27.00 15.00 27.00 15.00 27.00 15.00 27.00 15.00 27.00 15.00 15.00 27.00 15.0							
14 311 56.17 2273.30 4.9.63 30*10.96 21138 -15.50 2215.50 26.81 337.703 5.429							
15   247   16   277   17   278   278   289   2							
2-11.0    2-11							
17   17   15   17   15   17   15   17   15   17   15   17   15   17   15   17   15   17   15   17   15   15	16						
27   19	17	17°3.56	67°50.95 47.44	75°12.21 14.70		18° 13.82 54.01	
29   27   13   29   27   27   28   29   27   28   29   28   28   28   28   29   28   28	18	32°6.02	82°50.17 \$19°46.70	90°12.63 <b>S</b> 21°14.30	282°3.31 N22°27.01		
1.0	19						
Polity   P							
23   1071-13-14   1574-627   4302   1681-147   1291   342-1482   27-20   397-514   3.344   3.345   3							
Fr   GHA   CHA   Dec   CHA							
CHA	23	107° 18.34	157° 46.27 43.02	165°14.73 12.30	35/~17.32 27.25		Suhail 222°45.24 -43°32.25
Fig.   CHA   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   Dubbe   137/1362   117/1363   517/1363   137/1362   137/	Mer.	pass. 15:52	$\nu$ -0.8′ <i>d</i> -0.7′ m-3.90	$ u 0.4' \ d$ -0.4' m $1.10$	$\nu$ 2.8′ $d$ 0.0′ m-2.66	$ u 2.3' \ d$ -0.1' m1.03	
Fire CHA							
122°208  172°4549   519°4228   180°1515   521°1190   122°2013   122°297   50°53.35   50°50.25   130°131   14154   1454   150°1557   1150   27°2293   27.34   130°2193   53.65   50°50.27   14162   1	Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	
1 137-2327 187-471 41.54 195-1857 11.50 27-22.93 27.34 138-31.93 53.26 [Gienah 175-42.53 177-41.24] 2 152'2576 74 202'43.93 40.80 210'15.99 11.10 42'25.73 27.39 138'3.193 53.26 [Gienah 175-42.53 177-41.4] 3 167'28.20 43.27 174.31 5 40.05 225'16.41 10.70 57'28.54 27.44 188'3.64 5.33.77 [Gienah 175-42.53 177-185.74] 4 182'30.66 227'49.21 37.31 40.05 225'16.41 10.70 57'28.54 27.44 188'3.64 6 53.07 [Gienah 175-42.53 177-185.74] 6 212'35.59 262'40.82 393'13 82 270'17.67 521'6.49 100'39.94 102'75.88 12'84.35 502'82.79 [Gienah 175-42.53 177-185.74] 6 212'35.59 22'40.82 393'13.82 270'17.67 521'6.49 100'39.94 102'75.88 12'84.35 502'82.79 [Alicah 175-42.53 175-42.24 182'8.94] 7 227'38.00 227'40.80 27'40.00 37.07 8.22 20'17.67 521'6.49 100'39.94 102'72.45 5 22.95 [Alicah 175-42.25 1.12'17.89 12'27'17.39 10'27'2.45 15.32 1.12'17.89 12'27'17.39 10'27'2.45 15.32 1.12'17.89 12'27'17.39 10'27'2.45 15.32 1.12'17.89 12'27'17.39 10'27'2.45 15.32 1.12'17.89 12'27'17.39 10'27'2.45 15.32 1.12'17.89 12'27'17.39 10'27'2.45 15.32 1.12'17.89 12'27'17.39 10'27'	0						
2 152 2574 202 4379 4 080 210*1599 11.10 42*25.73 27.39 153*34.20 53.16 4 Caru 17*2*98.84 63*14.41 10*3*0.46 5 53.07 6	1	137°23.27	187°44.71 41.54	195°15.57 11.50	27°22.93 27.34	138°31.93 53.26	
197-28.00   197-28.00   274-41.5   40.05   225-18.04   10.70   57-28.95   27.44   108-39.46   53.07   53.45   57-15.37   57-15.34   57-45.34	2						
182   3006							
6 212"35.59 262"40.82 S19"37.82 270"17.67 S21"9.49 102"36.94 N.22"27.88 213"43.25 S02"8.27							
227°38.06 277°40.05 37.07 288°18.09 9.09 117°39.74 27.63 228°47.77 52.60 1461ar 11°52°34.78 60°29.09 927°42.98 027°42.95 27.08 243°47.77 52.60 1461ar 11°52°34.78 60°29.09 927°42.98 027°42.98 30°18.50 00°18.51 8.68 132°42.55 27.08 243°47.77 52.60 1461ar 11°52°34.78 60°29.09 927°42.98 310°38.90 93.55 315°18.93 **.28 147°45.35 **.277.3 288°50.03 **.52.00 12°27°45.45 322°37.73 43.83 330°19.55 **.787 162°41.55 27.72 273°52.05 52.41 12°27°45.45 332°59.53 332°39.55 34.07 345°19.78 7.47 177°50.95 27.82 288°45.95 52.02 52.22 120°10.00 120°25.75 15°22°25.75 12°22°37.78 303°56.55 52°22.22 120°10.00 120°25.75 15°22°25.75 12°22°37.78 303°56.55 52.22 120°10.00 12°25.75 15°22°25.75 12°22°35.75 12°22°37 30°35°45.50 52.23 15°32.84 1332°50.30 22°34.64 31.82 2.09°21.06 12°32°3.75 15°20.02 6.65 200°56.55 27.92 318°50.05 52.21 15°20.02 6.65 120°56.55 27.92 318°50.05 10°30.03 52.01 12°23.30 9 30.31 60°21.88 5.43 225°3.96 230.0 4°5.87 51.94 12°3.00 12°3.00 30°10.00 112°30.00 27.72 231°50.20 15°3.15 1.05 122°2.15 11°50.00 12°3.00 112°30.02 27.72 120°25.75 300 315°10.56 122°2.15 11°50.56 122°2.15 11°							
8 242"40.52 292"93.97 36.32 300"18.91 8.66 132"42.95 27.68 243"47.77 52.60 Membert 147"56.60 39"29.79 10 272"45.45 322"93.73 34.83 330"19.55 7.87 162"48.15 27.77 273"52.30 52.41 128"47.91 337"36.95 34.03 348.31 330"19.55 7.87 162"48.15 27.77 273"52.30 52.41 128"52"33.32 0"20.20 521"7.00 192"53.75 10.22"27.87 303"56.82 502"52.25 131 337"52.84 7"354.41 32.57 15"20.20 521"7.00 192"53.75 10.22"27.87 303"56.82 502"52.25 131 315"52.84 7"354.41 32.57 15"20.20 6.66 207"56.55 27.90 334"5.31 52.03 41 332"55.30 22"34.64 31.82 30"21.04 6.25 542"25"93.5 27.90 334"5.31 52.03 41, 41.20 1.20 1.20 1.20 1.20 1.20 1.20 1.20							
9 257"42.98 307"38.50 . 35.58 315"18.93 . 8.28 147"45.35 . 27.73 288"50.03 . 52.50   Actums 145"47.13 192"64.55 202"34.55 202"34.55 202"34.55 201"24.55 201"							
11 287°45.45 s22°37.73 34.83 330°19.35 7.87 162°48.15 27.77 273°82.30 52.41 Rigil Kent. 139°39.15 -60°96.36 12 302°95.38 352°36.18 519°33.32 0°20.20 \$21°7.06 162°53.75 N22°27.87 303°56.82 \$02°52.22 Liben ibi 137°20.05 74°2.27 133°15°26.95 137°20.05 \$21°7.06 162°53.75 N22°27.87 303°56.82 \$02°52.22 Liben ibi 137°20.05 74°2.27 133°15°26.95 133°25.30 2°33.87 3.10.60°45.25 222°59.35 27.96 334°1.34 \$2.03 Alphecca 126°3.14 26°37.36 132°30.32 30°21.04 6.25 222°59.35 27.96 334°1.34 \$2.03 Alphecca 126°3.14 26°37.36 133°25.30 \$31.85 519°28.79 \$238°2.16 \$280.13 346°3.05 \$1.84 \$11°18°2.07 67°32.33 29.55 75°22.31 5.02 \$268°7.76 28.11 19°8.13 \$1.75 \$20.5 \$1.84 \$258°1.05 \$20.5 \$1.84 \$258°1.05 \$20.5 \$1.84 \$258°1.05 \$20.5 \$1.85 \$20.5 \$1.55 \$1.85 \$20.5 \$1.55 \$1.85 \$20.5 \$1.55 \$1.55 \$20.5 \$1.55							
11 287°4791 337°3695 3407 345°1978 747 177°5095 2782 288°54.56 252.31 Kochab 137°52.03 74°2.47 178°203 74°2.47 178°203 74°2.47 178°2.84 7°354.1 32.57 15°20.62 6.65 20°55.25 2796 334°1.34 52.03 18°59.08 52.13 Alphecca 120°3.14 22°37.36 15 347°57.77 37°33.87 1.50 64 5°21.46 5.84 238°2.16 2.80.01 349°3.61 51.94 Alra 107°8.82 69°4.22 17 18°2.70 67°32.33 92.55 75°22.31 5.02 266°7.76 28.11 19°8.13 51.75 18.83 51.68 28°3.15 519°8.79 90°22.73 52°1.46 2.83 10.9°1.68 2.80 6 45°1.75 18.83 51.68 28°1.55 18°2.87 90°22.73 52°1.46 2.83 10.9°1.68 2.80 6 45°1.75 18.83 10.69 18.85 18.93 18.95 18.93 18.91 19.94 18.95 18.93 19.95 18.93 19.95 18.93 19.94 18.95 18.93 19.95 18.95 19.95 18.95 19.95 18.95 19.95 18.95 19.95 18.95 19.95 18.95 19.95 18.95 19.95 18.95 19.95 18.95 19.95 18.95 19.95 18.95 19.95 18.95 19.95 18.95 19.95 19.95 18.95 19.95 19.95 18.95 19.95 19.95 18.95 19.95							
12 302*95.8 352*36.8 159*33.2 0**20*20*52.2**2**55.7 5**20*20**56.55**55.7 5**20*20**20**20**20**20**20**20**20**20	11	287°47.91					
33 317*52.34	12	302°50.38			192°53.75 N22°27.87	303°56.82 S02°52.22	
14 332°55.30 22°34.64 31.82 30°21.04 6.25 222°59.35 27.96 334°1.34 52.03   15 347°5777 37°33.07 31.06 45°21.46 · 5.84 238°21.0 28.01 349°3.61 · 5.194   16 3°0.23 52°33.09 30.31 60°21.88 5.43 253°4.96 28.06 4°5.87 51.84   17 18°2.70 6°23.33 29.55 75°2.31 5.02 268°7.76 28.11 19°8.13 51.75   18 33°5.16 82°31.56 519°28.79 00°22.73 521°4.62 283°10.56 N22°28.16 34°10.39 502°51.65   19 48°7.63 9°3.07 2.80 31 105°23.15 4.21 298°13.36 28.20 49°12.65 51.55 1.66   20 63°10.09 112°30.02 27.27 120°23.57 3.80 313°16.16 28.25 64°14.91 51.46   12 78°12.55 127°9.92.5 -2.65 1 338°24.00 · 3.39 328°18.06 0.23 30 79°171.7 51.37   12 93°15.02 142°28.48 25.75 150°24.42 2.98 343°21.76 28.34 79°171.7 51.37   10 Ner.pass. 15.48   15 °C 40 °C 77′ m-3.90   10 12°3.02 140°28.48 25.75 150°24.42 2.98 343°21.76 28.34 79°12.07 51.18   15 °C 40 °C 77′ m-3.90   10 123°1995 172°205 52 120°21.00   11 38°22.41 187°26.18 23.46 105°25.66 521°2.16 10 12°3.23   1 138°22.41 187°26.18 23.46 105°25.66 521°2.16 13°27.36 N22°28.44 124°23.96 502°51.08   1 138°22.24 1 187°26.18 23.46 105°25.66 0.51 73°33.55 28.63 169°30.74 · 50.80   1 138°32.27 247°23.13 20.39 255°27.38 21°0.10 88°41.35 28.68 199°35.26 50.01   1 128°34.73 260°22.26 519°19.62 20°00.00 1.88 30°29.05 58.03 163°55.34 2.91 128°42.00 1.33°45.95 1.00°3.00 1.20°3.00 1.00°3.05 500°5.00 1.20°3.00							
16 3°0.23 52°33.09 30.31 60°21.88 5.43 25°34.96 28.06 4°5.87 51.84 107.802 31.57 18.27 16.203 32°35.15 18.27 23.3 29.5 75°2.23 5.02 268°7.76 28.11 19°8.13 51.75 5.15 5.15 18.41 18.27 18.27 18.27 18.27 18.27 18.27 18.28 18.28 18.29 18.29 18.20 49°1.26 51.56 51.56 51.56 18.20 1							
18 33-51.6 8°31.56 18°31.56 18°31.56 18°31.56 18°31.56 18°31.57 5°22.31 5.02 266°7.76 28.11 19°8.13 5.1.75 5.137 19 48°7.63 97°30.79 28.03 105°23.15 4.21 298°13.36 28.20 49°12.65 51.56 20 63°10.09 112°30.02 27.27 120°23.57 3.80 313°16.16 28.25 64°14.91 51.46 21 78°12.55 127°29.25 2.56.51 135°24.00 3.39 328°18.96 28.30 79°17.17 51.37 22 93°15.02 142°28.48 2.575 150°24.42 2.98 343°21.76 28.34 94°19.43 51.27 23 108°17.48 157°27.72 24.99 165°24.84 2.57 358°24.56 28.39 04°19.43 51.27  Mer.pass. 15:48 \(\nu - \nu - \							Atria 107°8.82 -69°4.23
19							
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20 63°10.09 112°30.02 27.27 120°23.57 3.80 313°16.16 28.25 64°14.91 51.46 Kaus Aust 33°31.72 29.39 3°15.02 142°28.48 25.75 150°24.42 2.98 343°21.76 28.34 94°19.43 51.27 Vega 80°33.03 38′48°2.23 100°17.48 157°27.72 24.99 165°24.84 2.57 358°24.56 28.39 109°21.70 51.18 Altair 61°59.44 8°56.15 Altair 61°59.45 Altair 61°							
21 78°12.55 127°29.25 · 26.51 135°24.00 · 3.39 328°18.96 · 28.30 7°17.17 · . 51.37 Version of the control of the contr							
22 93°15.02 142°28.48 25.75 150°24.42 2.98 343°21.76 28.34 94°19.43 51.27  Mer.pass. 15:48							
Mer.pass. 15:48   \( \begin{array}{c c c c c c c c c c c c c c c c c c c	22	93°15.02	142°28.48 25.75	150°24.42 2.98	343°21.76 28.34	94° 19.43 51.27	
Mer.pass   15:48   V-0.8' d-0.7' m-3.90   V-0.4' d-0.4' m1.10   V-2.8' d-0.0' m-2.66   V-2.3' d-0.1' m1.03   Peacock   53° 4.95   -56° 39.10   Dene   M-9° 25.66   45° 22.38   M-20° 28.44   M-20° 28.45   M-20° 28.44   M-20° 28.45   M-20° 28.44   M-20° 28.45   M-20° 28.44   M-20° 28.45   M-20° 2	23	108° 17.48	157°27.72 24.99	165°24.84 2.57	358°24.56 28.39	109°21.70 51.18	
Sat         GHA         GHA         Dec         Half 2*0.346         1.38*29.87         20*25.69         519*24.69         2.50*25.09         1.75         28*30.16         28.49         1.39*26.22         50.99         50.99         50.99         50.99         50.99         50.99         50.99         50.99         50.99         50.99         50.99         50.99         50.99         50.99         50.99         50.90         60.21*2         22.25*26.53         1.09*2.50*2         60.93.74         50.80         60.90*74         50.80         60.90*74         50.80         60.90*74         50.80         60.90*74         50.80         60.90*74         60.90*74         50.90         60.61         60.90*74         60.61         60.90*74         60.61         60.90*74         60.61         60.90*74         60.61         60.90*74         60.61         60.90*74         60.61         60.90*74         60.61         60.90*2         70.00*8         70.00*8         70.00*8         70	Meri	nass 15·48	v-0.8' d-0.7' m-3.90	v0.4' d-0.4' m1.10	ν2 8' d0 0' m-2 66	v2 3' d-0.1' m1.03	
Sat GHA GHA Dec 180°22.3 1 180°25.6 5 521°2.16 13°27.3 6 N22°28.4 124°23.0 6 502°5.10.8 15°13.8 22.4 118°3°24.8 180°25.6 521°2.1 6 13°27.3 6 N22°8.4 124°23.0 6 502°5.10.8 15°13.8 22.4 118°3°24.8 124°23.0 6 502°5.10.8 15°13.8 22.4 118°3°24.8 124°23.0 6 502°5.10.8 15°13.8 22.4 118°3°24.8 124°23.0 6 502°5.10.8 15°13.8 22.4 118°3°2.1 118°3°2.1 118°3°2.1 118°3°2.1 118°3°2.1 118°3°2.1 118°3°3.1 118°3°2.1 118°3°3.1 118°3.1 11			- 0.0 d 0.1 m 3.30				
0 123°19.95 172°26.95 \$19°24.23 180°25.26 \$21°2.16 13°27.36 N22°28.44 124°23.96 \$02°51.08 138°2.41 187°26.18 23.46 195°25.69 1.75 28°30.16 28.49 139°26.22 50.99 14.16 138°2.487 202°25.42 22.70 210°26.11 1.33 43°32.95 28.53 154°28.48 50.89 168°27.34 217°24.66 · 21.93 225°26.53 · 0.92 58°35.75 · 28.58 169°30.74 · 50.80 188°32.97 247°23.13 20.39 255°27.38 21°0.10 88°41.35 28.66 199°35.26 50.61 188°32.97 247°23.13 20.39 255°27.38 21°0.10 88°41.35 28.66 199°35.26 50.61 188°3.27 247°23.13 20.39 255°27.38 21°0.10 88°41.35 28.68 199°35.26 50.61 188°3 285°39.37 250°40.84 18.08 300°28.65 58.86 133°49.75 28.82 244°42.04 50.32 249°51.15 23:11 288°47.05 337°18.56 15.76 345°2.99 58.03 163°55.34 28.91 274°46.56 50.13 128°47.05 337°18.56 15.76 345°2.99 57.61 178°58.14 28.96 289°48.82 50.04 123 338°54.44 22°16.28 13.43 30°31.20 56.36 224°6.53 29.10 334°55.99 49.75 28.89 138°51.98 7°17.04 14.21 15°30.78 56.78 209°3.74 29.05 319°53.33 49.85 50.13 138°51.98 7°17.04 14.21 15°30.78 56.78 209°3.74 29.05 319°53.33 49.85 50.40 138°5.94 40.20 138°5.94	_						Enif 33°38.24 9°59.65
1 138°22.41 187°26.18 23.46 195°25.69 1.75 28°30.16 28.49 139°26.22 50.99 2 153°24.87 202°25.42 22.70 210°26.11 1.33 43°32.95 28.53 154°28.48 50.89 3 168°27.34 217°24.66 · 21.93 225°26.53 · 0.92 58°38.75 · 28.58 169°30.74 · 50.80 4 183°29.80 232°23.89 21.16 240°26.96 0.51 73°38.55 28.63 184°33.00 50.70 5 198°32.27 247°23.13 20.39 255°27.38 21°0.10 88°41.35 28.68 199°35.26 50.61 6 213°34.73 262°22.36 519°19.62 270°27.81 S20°99.68 103°44.15 N22°28.72 214°37.52 S02°50.51 7 228°37.19 277°21.60 18.85 285°28.23 59.27 118°46.95 28.77 229°39.78 50.42 8 243°39.66 292°20.84 18.08 300°28.65 58.86 133°49.75 28.82 244°42.04 50.32 10 273°44.59 322°19.32 16.54 330°29.08 · 58.44 148°52.54 · 28.86 259°44.30 · 50.23 110 288°47.05 337°18.56 15.76 345°29.93 57.61 178°58.14 28.96 289°48.82 50.04 12 303°49.51 38°217.80 519°14.99 0°30.35 S20°57.2 114°40.94 N22°99.00 304°51.07 502°49.94 13 318°51.98 7°17.04 14.21 15°30.78 56.78 209°3.74 29.05 319°53.33 49.85 16 3°59.37 52°14.76 11.88 60°32.05 55.53 224°6.53 29.10 334°55.59 49.75 15 348°56.91 37°15.52 · 12.66 45°31.63 · 555.95 239°0.33 · 29.14 349°57.85 · 49.65 16 3°59.37 52°14.76 11.88 60°32.05 55.53 254°12.13 29.19 5°0.11 49.56 18 344°4.30 28°13.25 519°10.32 90°32.90 S20°54.69 284°17.72 N22°9.28 35°4.63 S02°49.37 19 49°6.76 97°12.50 9.53 105°33.33 54.28 299°20.52 29.33 50°6.89 49.27 20 64°9.23 112°11.74 8.75 120°33.76 53.06 314°23.31 29.38 65°9.15 49.18 21 79°11.69 127°10.98 · 7.79 135°34.18 · 53.44 320°26.11 · 29.42 80°11.40 · 49.08 22 94°14.16 142°10.23 7.18 150°34.61 53.02 344°28.91 29.47 95°13.66 48.98 24 100°16.62 157°9.48 6.40 166°35.03 52.60 359°31.70 29.52 110°15.92 48.89  25 100°16.62 157°9.48 6.40 166°35.03 52.60 359°31.70 29.52 110°15.92 48.89							Al Na'ir 27°32.22 -46°50.23
2 153°24.87 200°25.42 22.70 210°26.11 1.33 43°32.95 28.53 154°28.48 50.89 31 168°27.34 217°24.66							
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4 183°29.80 232°23.89 21.16 240°26.96 0.51 73°38.55 28.63 184°33.00 50.70 198°32.27 247°23.13 20.39 255°27.38 21°0.10 88°41.35 28.68 199°35.26 50.61 Venus 51°42.66 12:28 21°34.73 262°22.36 519°19.62 270°7.81 520°59.68 103°44.15 N22°28.72 214°37.52 502°50.51 Mars 58°43.44 11:59 208°37.19 277°21.60 18.85 285°28.23 59.27 118°46.95 28.77 229°39.78 50.42 Jupiter 249°51.15 23:11 824°39.06 292°20.84 18.08 300°28.65 58.86 133°49.75 28.82 244°42.04 50.32 9273°44.59 322°19.32 16.54 330°29.50 58.03 163°55.34 28.91 274°46.56 50.13 1288°47.05 337°18.56 15.76 345°29.93 57.61 178°58.14 28.96 289°48.82 50.04 Mars 55°42.48 11:59 240°51.15 23:11 288°47.05 337°18.56 15.76 345°29.93 57.61 178°58.14 28.96 289°48.82 50.04 Mars 55°50°24.68 12:30 Mars 57°54.43 11:59 348°56.91 37°15.52 12.66 45°31.63 55.53 224°6.53 29.10 334°55.59 49.75 15 348°56.91 37°15.52 12.66 45°31.63 55.95 239°9.33 1.29 15°3.13 49.85 16 3°59.37 52°14.76 11.88 60°32.05 55.53 254°12.13 29.19 5°0.11 49.56 Mars 57°5.32 11:58 11.0 178°38.14 29.96 14.92 29.24 20°2.37 49.46 Mars 57°5.32 11:54 11.0 175°32.48 55.11 269°14.99 29.24 20°2.37 49.46 Mars 57°5.32 11:54 12.30 Mars 57							Markab 13°29.27 15°20.76
5 198°32.27 247°23.13 20.39 255°27.38 21°0.10 88°41.35 28.68 199°35.26 50.61   6 213°34.73 262°22.36 519°19.62 270°27.81 520°59.68 103°44.15 N22°28.72 214°37.52 502°50.51   7 228°37.19 277°21.60 18.85 285°28.23 59.27 118°46.95 28.77 229°39.78 50.42   8 243°39.66 292°20.84 18.08 300°28.65 58.86 133°49.75 28.82 244°42.04 50.32   9 258°42.12 307°20.08 · 17.31 315°29.08 · 58.44 148°52.54 · 28.86 259°44.30 · 50.23   10 273°44.59 322°19.32 16.54 330°29.50 58.03 163°55.34 28.91 274°46.56 50.13   11 288°47.05 337°18.56 15.76 345°29.93 57.61 178°58.14 28.96 289°48.82 50.04   12 303°49.51 352°17.80 519°14.99 0°30.35 520°57.20 194°0.94 N22°29.00 304°51.07 502°49.94   13 318°51.98 7°17.04 14.21 15°30.78 56.78 209°3.74 29.05 319°53.33 49.85   14 333°54.44 22°16.28 13.43 30°31.20 56.36 224°6.53 29.10 334°55.59 49.75   15 348°56.91 37°15.52 · 12.66 45°31.63 · 55.95 239°9.33 · 29.14 349°57.85 · 49.65   16 3°59.37 52°14.76 11.88 60°32.05 55.53 254°12.13 29.19 5°0.11 49.56   17 19°1.83 67°14.01 11.10 75°32.48 55.11 269°14.92 29.24 20°2.37 49.46   18 34°4.30 82°13.25 519°10.32 90°32.90 520°54.69 284°17.72 N22°29.28 35°4.63 502°49.37   19 49°6.76 97°12.50 9.53 105°33.35 54.28 299°20.52 29.33 50°6.89 49.27   20 64°9.23 112°11.74 8.75 120°33.76 53.86 314°23.31 29.38 65°9.15 49.18   21 79°11.69 127°10.98 · 7.97 135°34.18 · 53.44 329°26.11 · 29.42 80°11.40 · 49.08   22 94°14.16 142°10.23 7.18 150°34.61 53.02 344°28.91 29.47 95°13.66 48.98   10 94°16.62 155°9.48 6.40 165°35.03 52.60 359°31.70 29.52 110°15.92 48.89   10 10 10 10 10 10 10 10 10 10 10 10 10 1							Jan 22 Thu SHA Mer.pass
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8 243°39.66 292°20.84 18.08 300°28.65 58.86 133°49.75 28.82 244°42.04 50.32 9 258°42.12 307°20.08 · 17.31 315°29.08 · 58.44 148°52.54 · 28.86 259°44.30 · 50.23 10 273°44.59 322°19.32 16.54 330°29.50 58.03 163°55.34 28.91 274°46.56 50.13 11 288°47.05 337°18.56 15.76 345°29.93 57.61 178°58.14 28.96 289°48.82 50.04 12 303°49.51 352°17.80 \$199°14.99 0°30.35 \$20°57.20 194°0.94 N22°29.00 304°51.07 \$02°49.94 13 318°51.98 7°17.04 14.21 15°30.78 56.78 209°3.74 29.05 310°53.33 49.85 14 333°54.44 22°16.28 13.43 30°31.20 56.36 224°6.53 29.10 334°55.59 49.75 15 348°56.91 37°15.52 · 12.66 45°31.63 · 55.95 239°9.33 · 29.14 349°57.85 · 49.65 16 3°59.37 52°14.76 11.88 60°32.05 55.53 254°12.13 29.19 5°0.11 49.56 18 34°4.30 82°13.25 \$19°10.32 90°32.90 \$20°54.69 284°17.72 N22°29.28 35°4.63 \$02°49.37 19°40°6.76 97°12.50 9.53 105°33.33 54.28 299°20.52 29.33 50°6.89 49.27 20 64°9.23 112°11.74 8.75 120°33.76 53.86 314°23.31 29.38 65°9.15 49.18 19 49°6.76 97°12.50 9.53 105°33.376 53.86 314°23.31 29.38 65°9.15 49.18 19 49°6.76 120°10.98 · 7.97 135°34.18 · 53.44 329°26.11 · 29.42 80°11.40 · 49.08 14.01 15.40							Mars 58°43.44 11:59
9 258°42.12 307°20.08 · · 17.31 315°29.08 · · 58.44 148°52.54 · · 28.86 259°44.30 · · 50.23 10 273°44.59 322°19.32 16.54 330°29.50 58.03 163°55.34 28.91 274°46.56 50.13 11 288°47.05 337°18.56 15.76 345°29.93 57.61 178°58.14 28.96 289°48.82 50.04 12 303°49.51 352°17.80 519°14.99 0°30.35 520°57.20 194°0.94 N22°29.00 304°51.07 502°49.94 13 318°51.98 7°17.04 14.21 15°30.78 56.78 209°3.74 29.05 319°53.33 49.85 14 333°54.44 22°16.28 13.43 30°31.20 56.36 224°6.53 29.10 334°55.59 49.75 15 348°56.91 37°15.52 · · 12.66 45°31.63 · · 55.95 239°9.33 · · · 29.14 349°57.85 · · · 49.65 16 3°59.37 52°14.76 11.88 60°32.05 55.53 254°12.13 29.19 5°0.11 49.56 18 34°4.30 82°13.25 519°10.32 90°32.90 520°54.69 284°17.72 N22°29.28 35°4.63 502°49.37 19 49°6.76 97°12.50 9.53 105°33.33 54.28 299°20.52 29.33 50°6.89 49.27 20 64°9.23 112°11.74 8.75 120°33.76 53.86 314°23.31 29.38 65°9.15 49.18 21 79°11.69 127°10.98 · · 7.97 135°34.18 · · 53.44 329°26.11 · · · 29.42 80°11.40 · · 49.08 22 94°14.16 142°10.23 7.18 150°34.61 53.02 344°28.91 29.47 95°13.66 48.98 1 Mars: 0.1	7	228°37.19	277°21.60 18.85	285°28.23 59.27	118°46.95 28.77	229° 39.78 50.42	Jupiter 249°51.15 23:11
10 273°44.59 322°19.32 16.54 330°29.50 58.03 163°55.34 28.91 274°46.56 50.13 1288°47.05 337°18.56 15.76 345°29.93 57.61 178°58.14 28.96 289°48.82 50.04 12 303°49.51 352°17.80 \$19°14.99 0°30.35 \$20°57.20 194°0.94 N22°29.00 304°51.07 \$02°49.94 13 318°51.98 7°17.04 14.21 15°30.78 56.78 209°3.74 29.05 319°53.33 49.85 14 333°54.44 22°16.28 13.43 30°31.20 56.36 224°6.53 29.10 334°55.59 49.75 15 348°56.91 37°15.52 · · 12.66 45°31.63 · · 55.95 239°9.33 · · 29.14 349°57.85 · · 49.65 16 3°59.37 52°14.76 11.88 60°32.05 55.53 254°12.13 29.19 5°0.11 49.56 17 19°1.83 67°14.01 11.10 75°32.48 55.11 269°14.92 29.24 20°2.37 49.46 18 34°4.30 82°13.25 \$19°10.32 90°32.90 \$20°54.69 284°17.72 N22°29.28 35°4.63 \$02°49.37 19 49°6.76 97°12.50 9.53 105°33.33 54.28 299°20.52 29.33 50°6.89 49.27 20 64°9.23 112°11.74 8.75 120°33.76 53.86 314°23.31 29.38 65°9.15 49.18 12°10.98 · · 7.97 135°34.18 · · 53.44 329°26.11 · · 29.42 80°11.40 · · 49.08 140°10.23 7.18 150°34.61 53.02 344°28.91 29.47 95°13.66 48.98 14.89	8	243°39.66	292°20.84 18.08		133°49.75 28.82	244° 42.04 50.32	Saturn 1°13.65 15:47
10 273 44.59 322 10.52 10.54 330 29.50 58.03 103 55.34 28.91 274 40.50 50.13 11 288 47.05 337 18.56 15.76 345 29.93 57.61 178 58.14 28.96 289 48.82 50.04 12:30 303 49.51 352 17.80 \$19 14.99 0 30.35 \$20 57.20 194 0.94 \$N22 29.00 304 51.07 \$02 49.94 13.33 51.85 1.98 7 0.70 4 14.21 15 30.78 56.78 209 3.74 29.05 319 53.33 49.85 14 333 54.44 22 16.28 13.43 30 31.20 56.36 224 6.53 29.10 334 55.59 49.75 15 348 56.91 37 15.52 12.66 45 31.63 55.95 239 9.33 20.00 16 30 59.37 52 0.14 60 11.88 60 32.05 55.53 254 0.12 13 29.19 5 0.11 49.56 18 34 4.30 82 13.25 \$19 0.10 20 50 32.90 \$20 54.69 284 0.77 2 N22 29.28 35 4.63 \$02 49.37 19 49 6.76 97 12.50 9.53 105 33.33 54.28 299 20.52 29.33 50 6.89 49.27 20 64 9.23 112 11.74 8.75 120 33.76 53.86 314 23.31 29.38 65 9.15 49.18 19 49 6.76 97 12.50 9.53 105 33.37 54.28 299 20.52 29.33 50 6.89 49.27 20 64 9.23 112 11.74 8.75 120 33.76 53.86 314 23.31 29.38 65 9.15 49.18 21 79 0.169 127 0.98 7.797 135 34.18 55.44 329 26.11 29.47 95 13.66 48.98 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.							Jan 23 Fri SHA Mer.nass
11 286 47.05 337 18.56 15.76 345 29.93 57.61 178 88.14 28.96 288 48.82 50.04 12 303° 49.51 352° 17.80 519° 14.99 0° 30.35 520° 57.20 194° 0.94 N22° 29.00 304° 51.07 502° 49.94 13 318° 51.98 7° 17.04 14.21 15° 30.78 56.78 209° 3.74 29.05 319° 53.33 49.85 14 333° 54.44 22° 16.28 13.43 30° 31.20 56.36 224° 6.53 29.10 334° 55.59 49.75 15 348° 56.91 37° 15.52 ·· 12.66 45° 31.63 ·· 55.95 239° 9.33 ·· 29.14 349° 57.85 ·· 49.65 16 3° 59.37 52° 14.76 11.88 60° 32.05 55.53 254° 12.13 29.19 5° 0.11 49.56 17 19° 1.83 67° 14.01 11.10 75° 32.48 55.11 269° 14.92 29.24 20° 2.37 49.46 18 34° 4.30 82° 13.25 519° 10.32 90° 32.90 520° 54.69 284° 17.72 N22° 29.28 35° 4.63 502° 49.37 19 49° 6.76 97° 12.50 9.53 105° 33.33 54.28 299° 20.52 29.33 50° 6.89 49.27 20 64° 9.23 112° 11.74 8.75 120° 33.76 53.86 314° 23.31 29.38 65° 9.15 49.18 21 79° 11.69 127° 10.98 ·· 7.97 135° 34.18 ·· 53.44 329° 26.11 ·· 29.42 80° 11.40 ·· 49.08 22 94° 14.16 142° 10.23 7.18 150° 34.61 53.02 344° 28.91 29.47 95° 13.66 48.98 11:59 249° 57.85 50.04 304° 51.07 502° 49.94 349° 57.85 ·· 49.65 50.01 49.56 50.							
13 318°51.98 7°17.04 14.21 15°30.78 56.78 209°3.74 29.05 319°53.33 49.85 14 333°54.44 22°16.28 13.43 30°31.20 56.36 224°6.53 29.10 334°55.59 49.75 15 348°56.91 37°15.52 · 12.66 45°31.63 · 55.95 239°9.33 · 29.14 349°57.85 · 49.65 16 3°59.37 52°14.76 11.88 60°32.05 55.53 254°12.13 29.19 5°0.11 49.56 18 34°4.30 82°13.25 519°10.32 90°32.90 520°54.69 284°17.72 N22°29.28 35°4.63 502°49.37 19 49°6.76 97°12.50 9.53 105°33.33 54.28 299°20.52 29.33 50°6.89 49.27 20 64°9.23 112°11.74 8.75 120°33.76 53.86 314°23.31 29.38 65°9.15 49.18 21 79°11.69 127°10.98 · 7.97 135°34.18 · 53.44 329°26.11 · 29.42 80°11.40 · 49.08 29.47 10.98 10.23 7.18 150°34.61 53.02 344°28.91 29.47 95°13.66 48.98 10.1 Mars: 0.1 10.1 10.1 10.1 10.1 10.1 10.1 10.2 10.1 10.1							
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15       348°56.91       37°15.52       · · · 12.66       45°31.63       · · 55.95       239°9.33       · · · 29.14       349°57.85       · · · 49.65       Jan 24 Sat       SHA       Mer.pass         16       3°59.37       52°14.76       11.88       60°32.05       55.53       254°12.13       29.19       5°0.11       49.56       Venus       49°7.00       12:31         17       19°1.83       67°14.01       11.10       75°32.48       55.11       269°14.92       29.24       20°2.37       49.46       Mars       57°5.32       11:58         18       34°4.30       82°13.25       519°10.32       90°32.90       520°54.69       284°17.72       N22°29.28       35°4.63       502°49.37       Jupiter       250°7.41       23:02         20       64°9.23       112°11.74       8.75       120°33.76       53.86       314°23.31       29.38       65°9.15       49.18         21       79°11.69       127°10.98       · 7.97       135°34.18       · 53.44       329°26.11       · 29.42       80°11.40       · 49.08         22       94°14.16       142°10.23       7.18       150°34.61       53.02       344°28.91       29.47       95°13.66       48.98         23							Saturn 1°8.86 15:44
16 3°59.37 52°14.76 11.88 60°32.05 55.53 254°12.13 29.19 5°0.11 49.56 Venus 49°7.00 12:31 19°1.83 67°14.01 11.10 75°32.48 55.11 269°14.92 29.24 20°2.37 49.46 Mars 57°5.32 11:58 34°4.30 82°13.25 \$19°10.32 90°32.90 \$20°54.69 284°17.72 N22°29.28 35°4.63 \$02°49.37 19 49°6.76 97°12.50 9.53 105°33.33 54.28 299°20.52 29.33 50°6.89 49.27 20 64°9.23 112°11.74 8.75 120°33.76 53.86 314°23.31 29.38 65°9.15 49.18 21 79°11.69 127°10.98 · 7.97 135°34.18 · 53.44 329°26.11 · 29.42 80°11.40 · 49.08 22 94°14.16 142°10.23 7.18 150°34.61 53.02 344°28.91 29.47 95°13.66 48.98 Venus: 0.1 10°15.92 48.89							Jan 24 Sat SHA Mer.nass
17 19°1.83 67°14.01 11.10 75°32.48 55.11 269°14.92 29.24 20°2.37 49.46 18 34°4.30 82°13.25 \$19°10.32 90°32.90 \$20°54.69 284°17.72 N22°29.28 35°4.63 \$02°49.37   19 49°6.76 97°12.50 9.53 105°33.33 54.28 299°20.52 29.33 50°6.89 49.27   20 64°9.23 112°11.74 8.75 120°33.76 53.86 314°23.31 29.38 65°9.15 49.18   21 79°11.69 127°10.98 · 7.97 135°34.18 · 53.44 329°26.11 · 29.42 80°11.40 · 49.08   22 94°14.16 142°10.23 7.18 150°34.61 53.02 344°28.91 29.47 95°13.66 48.98   23 109°16.62 157°9.48 6.40 165°35.03 52.60 359°31.70 29.52 110°15.92 48.89    Mars 57°5.32 11:58   Jupiter 250°7.41 23:02   Saturn 1°4.01 15:40    Horizontal parallax   Venus: 0.1   Mars 07°5.32 11:58   Mars 07°5.32 11:58   Jupiter 250°7.41 23:02   Saturn 1°4.01 15:40    Horizontal parallax   Venus: 0.1   Mars 07°5.32 11:58    Mars 07°5.32 11:58    Jupiter 250°7.41 23:02    Saturn 1°4.01 15:40    Mars 07°5.32 11:58    Jupiter 250°7.41 23:02    Saturn 1°4.01 15:40    Mars 07°5.32 11:58    Mars 07°5.32 11:58    Jupiter 250°7.41 23:02    Saturn 1°4.01 15:40    Mars 07°5.32 11:58    Mars 07°5.32 11:58    Jupiter 250°7.41 23:02    Saturn 1°4.01 15:40    Mars 07°5.32 11:58    Mars 07°5.32 11:58    Saturn 1°4.01 15:40    Mars 07°5.32 11:58     Saturn 1°4.01 15:40    Saturn 1°4.01 15:40    Mars 07°5.32 11:58    Saturn 1°4.01 15:40     Saturn 1°4.01 15:40     Saturn 1°4.01 15:40     Saturn 1°4.0							•
18       34°4.30       82°13.25       \$19°10.32       90°32.90       \$20°54.69       284°17.72       N22°29.28       35°4.63       \$02°49.37       \$100°46.67       \$100°46.67       \$100°46.67       \$100°46.67       \$100°46.67       \$100°46.67       \$100°46.67       \$100°46.67       \$100°46.67       \$100°46.67       \$100°46.62							
20 64°9.23 112°11.74 8.75 120°33.76 53.86 314°23.31 29.38 65°9.15 49.18 21 79°11.69 127°10.98 · · 7.97 135°34.18 · · 53.44 329°26.11 · · 29.42 80°11.40 · · 49.08 22 94°14.16 142°10.23 7.18 150°34.61 53.02 344°28.91 29.47 95°13.66 48.98 23 109°16.62 157°9.48 6.40 165°35.03 52.60 359°31.70 29.52 110°15.92 48.89  Horizontal parallax Venus: 0.1 Mars: 0.1							· ·
21       79°11.69       127°10.98       · · 7.97       135°34.18       · · 53.44       329°26.11       · · · 29.42       80°11.40       · · 49.08       Horizontal parallax         22       94°14.16       142°10.23       7.18       150°34.61       53.02       344°28.91       29.47       95°13.66       48.98       Venus:       0.1         23       109°16.62       157°9.48       6.40       165°35.03       52.60       359°31.70       29.52       110°15.92       48.89       Mars:       0.1							Saturn 1°4.01 15:40
22 94°14.16 142°10.23 7.18 150°34.61 53.02 344°28.91 29.47 95°13.66 48.98 Venus: 0.1 23 109°16.62 157°9.48 6.40 165°35.03 52.60 359°31.70 29.52 110°15.92 48.89 Mars: 0.1							Horizontal parallax
23 109°16.62 157°9.48 6.40 165°35.03 52.60 359°31.70 29.52 110°15.92 48.89 Mars: 0.1							-
Mer.pass. 15:44 $\nu$ -0.8′ $d$ -0.8′ $m$ -3.90 $\nu$ 0.4′ $d$ -0.4′ $m$ 1.10 $\nu$ 2.8′ $d$ 0.0′ $m$ -2.65 $\nu$ 2.3′ $d$ -0.1′ $m$ 1.03							
	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	

h	Su	n			Moon		
าน	GHA	Dec	GHA	ν	Dec	d	HP
)	177°8.60	<b>S</b> 19°43.33	$140^{\circ}27.62$	13.9'	<b>S</b> 08°4.55	-15.1'	56.9
L	192°8.43	42.76	155°0.57	14.0'	07°49.47	-15.1'	56.9
2	207°8.26	42.19	169°33.53	14.0'	07°34.34	-15.2'	56.9
	222°8.09	• • 41.62	184°6.52	14.0'	07° 19.17	-15.2'	57.0
	237°7.92	41.05	198°39.51	14.0'	07°3.96	-15.3'	57.0
	252°7.76	40.48	213° 12.53	14.0'	06°48.70	-15.3'	57.0
	267°7.59	S19°39.91	227° 45.55	14.0'	S06°33.41	-15.3'	57.0
,	282°7.42	39.33	242°18.59	14.0'	06°18.08	-15.4'	57.0
3	297°7.25	38.76	256°51.63	14.1'	06°2.71	-15.4'	57.1
)	312°7.08	• • 38.18	271°24.69	14.1'	05°47.30	-15.4'	57.1
0	327°6.92	37.61	285°57.76	14.1'	05°31.86	-15.5'	57.1
1	342°6.75	37.03	300°30.83	14.1'	05°16.39	-15.5'	57.1
2	357°6.58	S19°36.46	315°3.91	14.1'	S05°0.88	-15.5'	57.1
3	12°6.42	35.88	329°36.99	14.1'	04°45.34	-15.6'	57.2
4	27°6.25	35.30	344°10.08	14.1'	04°29.77	-15.6'	57.2
5	42°6.09	• • 34.72	358°43.17	14.1'	04°14.17	-15.6'	57.2
6	57°5.92	34.15	13° 16.26	14.1'	03°58.54	-15.7'	57.2
7	72°5.76	33.57	27°49.35	14.1'	03°42.89	-15.7'	57.2
8	87°5.59	\$19°32.99	42°22.44	14.1'	503°27.20	-15.7'	57.3
9	102°5.43	32.40	56°55.53	14.1'	03°11.50	-15.7'	57.3
0	117°5.26	31.82	71°28.61	14.1'	02°55.77	-15.8'	57.3
1	132°5.10	· · 31.24	86°1.69	14.1'	02°40.01	-15.8'	57.3
2	147°4.94	30.66	100°34.77	14.1'	02°24.24	-15.8'	57.3
3	162°4.78	30.07	115°7.83	14.1'	02°8.44	-15.8'	57.4
	SD = 16.2'	d = -0.6'		SI	D = 15.5'		
ri	GHA	Dec	GHA	ν	Dec	d	НР
)	177°4.61	S19°29.49	129°40.89	14.1'	S01°52.63	-15.8'	57.4
	192°4.45	28.91	144° 13.94	14.0'	01°36.79	-15.9'	57.4
2	207°4.29	28.32	158°46.98	14.0'	01°20.94	-15.9'	57.4
3	222°4.13	27.73	173°20.01	14.0'	01°5.08	-15.9'	57.4
	237°3.97	27.15	187°53.03	14.0'	00°49.19	-15.9'	57.5
5	252°3.81	26.56	202°26.03	14.0'	00°33.30	-15.9'	57.5
5	267°3.65	S19°25.97	216°59.01	14.0'	S00°17.39	-15.9'	57.5
7	282°3.49	25.39	231°31.98	13.9'	S00°1.47	-15.9'	57.5
3	297°3.33	24.80	246°4.93	13.9'	N00° 14.46	15.9'	57.5
)	312°3.17	• • 24.21	260°37.86	13.9'	00°30.39	15.9'	57.6
0	327°3.01	23.62	275°10.77	13.9'	00°46.34	16.0'	57.6
1	342°2.85	23.03	289°43.65	13.9'	01°2.29	16.0'	57.6
2	357°2.69	S19°22.43	304°16.52	13.8'	N01° 18.25	16.0'	57.6
3	12°2.53	21.84	318°49.36	13.8'	01°34.22	16.0'	57.6
4	27°2.38	21.25	333°22.17	13.8'	$01^{\circ}50.18$	16.0'	57.7
5	42°2.22	• • 20.66	347°54.96	13.8'	$02^{\circ}6.15$	16.0'	57.7
6	57°2.06	20.06	2°27.71	13.7'	$02^{\circ}22.12$	16.0'	57.7
7	$72^{\circ}1.91$	19.47	17°0.44	13.7'	02°38.08	16.0'	57.7
8	87°1.75	S19°18.87	31°33.14	13.7'	N02°54.05	16.0'	57.7
9	$102^{\circ}1.60$	18.28	46°5.80	13.6'	$03^{\circ}10.01$	16.0'	57.8
0	$117^{\circ}1.44$	17.68	60°38.43	13.6'	03°25.97	16.0'	57.8
1	132°1.28	• • 17.08	$75^{\circ}11.02$	13.6'	03°41.93	15.9'	57.8
2	$147^{\circ}1.13$	16.49	89°43.58	13.5'	03°57.87	15.9'	57.8
3	162°0.98	15.89	104° 16.10	13.5'	04°13.81	15.9'	57.8
	SD = 16.2'	d = -0.6'		SI	D = 15.6'		
at	GHA	Dec	GHA	ν	Dec	d	НР
)	177°0.82	S19° 15.29	118°48.58	13.4'	N04°29.74	15.9'	57.9
	192°0.67	14.69	133°21.02	13.4	04°45.66	15.9'	57.9
2	207° 0.52	14.09	147°53.42	13.4	05°1.57	15.9'	57.9
						15.9'	57.9
₹ .	ააა₀ ∪ ა <b>€</b>	•• 13 //0	16.75.75.79	12 2'	()5~17.47		
	222°0.36 237°0.21	· · 13.49	162°25.78 176°58.09	13.3' 13.3'	05°17.47 05°33.35		57 C
1	237°0.21	12.89	176°58.09	13.3'	$05^{\circ}33.35$	15.9'	
1 5	237°0.21 252°0.06	12.89 12.28	176°58.09 191°30.35	13.3' 13.2'	05°33.35 05°49.21	15.9' 15.8'	58.0
1 5 5	237°0.21 252°0.06 266°59.91	12.89 12.28 \$19° 11.68	176°58.09 191°30.35 206°2.57	13.3' 13.2' 13.2'	05° 33.35 05° 49.21 N06° 5.06	15.9' 15.8' 15.8'	58.0 58.0
1 5 5 7	237°0.21 252°0.06 266°59.91 281°59.75	12.89 12.28 \$19°11.68 11.08	176°58.09 191°30.35 206°2.57 220°34.74	13.3' 13.2' 13.2' 13.1'	05°33.35 05°49.21 N06°5.06 06°20.89	15.9' 15.8' 15.8' 15.8'	58.0 58.0 58.0
1 5 7 3	237° 0.21 252° 0.06 266° 59.91 281° 59.75 296° 59.60	12.89 12.28 \$19°11.68 11.08 10.48	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86	13.3' 13.2' 13.2' 13.1' 13.1'	05°33.35 05°49.21 N06°5.06 06°20.89 06°36.70	15.9' 15.8' 15.8' 15.8' 15.8'	58.0 58.0 58.0 58.0
1 5 7 3	237° 0.21 252° 0.06 266° 59.91 281° 59.75 296° 59.60 311° 59.45	12.89 12.28 \$19°11.68 11.08 10.48 • 9.87	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86 249° 38.92	13.3' 13.2' 13.2' 13.1' 13.1' 13.0'	05° 33.35 05° 49.21 N06° 5.06 06° 20.89 06° 36.70 06° 52.49	15.9' 15.8' 15.8' 15.8' 15.8' 15.8'	58.0 58.0 58.0 58.0 58.0
1 5 7 8 9	237°0.21 252°0.06 266°59.91 281°59.75 296°59.60 311°59.45 326°59.30	12.89 12.28 \$19°11.68 11.08 10.48 • 9.87 9.27	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86 249° 38.92 264° 10.94	13.3' 13.2' 13.2' 13.1' 13.1' 13.0' 13.0'	05° 33.35 05° 49.21 N06° 5.06 06° 20.89 06° 36.70 06° 52.49 07° 8.26	15.9' 15.8' 15.8' 15.8' 15.8' 15.8' 15.7'	58.0 58.0 58.0 58.0 58.0 58.1
1 5 7 3 9 0	237° 0.21 252° 0.06 266° 59.91 281° 59.75 296° 59.60 311° 59.45 326° 59.30 341° 59.15	12.89 12.28 \$19°11.68 11.08 10.48 ••• 9.87 9.27 8.66	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86 249° 38.92 264° 10.94 278° 42.90	13.3' 13.2' 13.2' 13.1' 13.1' 13.0' 13.0' 12.9'	05° 33.35 05° 49.21 N06° 5.06 06° 20.89 06° 36.70 06° 52.49 07° 8.26 07° 24.01	15.9' 15.8' 15.8' 15.8' 15.8' 15.8' 15.7' 15.7'	58.0 58.0 58.0 58.0 58.1 58.1
3 4 5 7 3 9 0 1 2	237°0.21 252°0.06 266°59.91 281°59.75 296°59.60 311°59.45 326°59.30 341°59.15 356°59.00	12.89 12.28 \$19°11.68 11.08 10.48 · · · 9.87 9.27 8.66 \$19°8.05	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86 249° 38.92 264° 10.94 278° 42.90 293° 14.80	13.3' 13.2' 13.2' 13.1' 13.1' 13.0' 13.0' 12.9' 12.8'	05° 33.35 05° 49.21 N06° 5.06 06° 20.89 06° 36.70 06° 52.49 07° 8.26 07° 24.01 N07° 39.73	15.9' 15.8' 15.8' 15.8' 15.8' 15.7' 15.7' 15.7'	58.0 58.0 58.0 58.0 58.1 58.1
1 5 7 3 9 0 1 2 3	237°0.21 252°0.06 266°59.91 281°59.75 296°59.05 311°59.45 326°59.30 341°59.15 356°59.00 11°58.85	12.89 12.28 \$19°11.68 11.08 10.48 • 9.87 9.27 8.66 \$19°8.05 7.45	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86 249° 38.92 264° 10.94 278° 42.90 293° 14.80 307° 46.65	13.3' 13.2' 13.2' 13.1' 13.1' 13.0' 12.9' 12.8' 12.8'	05° 33.35 05° 49.21 N06° 5.06 06° 20.89 06° 36.70 06° 52.49 07° 8.26 07° 24.01 N07° 39.73 07° 55.42	15.9' 15.8' 15.8' 15.8' 15.8' 15.7' 15.7' 15.7' 15.7'	58.0 58.0 58.0 58.0 58.1 58.1 58.1 58.1
1 5 7 7 8 9 0 1 1 2 3 4	237°0.21 252°0.06 266°59.91 281°59.75 296°59.60 311°59.45 326°59.30 341°59.15 356°59.00 11°58.85 26°58.70	12.89 12.28 \$19°11.68 11.08 10.48 • 9.87 9.27 8.66 \$19°8.05 7.45 6.84	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86 249° 38.99 264° 10.94 278° 42.90 293° 14.80 307° 46.65 322° 18.44	13.3' 13.2' 13.2' 13.1' 13.1' 13.0' 13.0' 12.9' 12.8' 12.8' 12.7'	05° 33.35 05° 49.21 N06° 5.06 06° 20.89 06° 36.70 06° 52.49 07° 8.26 07° 24.01 N07° 39.73 07° 55.42 08° 11.09	15.9' 15.8' 15.8' 15.8' 15.8' 15.7' 15.7' 15.7' 15.7' 15.6'	58.0 58.0 58.0 58.0 58.1 58.1 58.1 58.1
1 5 7 7 8 9 0 1 1 2 3 4 5	237°0.21 252°0.06 266°59.91 281°59.75 296°59.60 311°59.45 326°59.30 341°59.15 356°59.00 11°58.85 26°58.70 41°58.55	12.89 12.28 \$19°11.68 11.08 10.48 •• 9.87 9.27 8.66 \$19°8.05 7.45 6.84 •• 6.23	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86 249° 38.92 264° 10.90 293° 14.80 307° 46.65 322° 18.44 336° 50.17	13.3' 13.2' 13.1' 13.1' 13.0' 13.0' 12.9' 12.8' 12.8' 12.7' 12.7'	05° 33.35 05° 49.21 N06° 5.06 06° 20.89 06° 36.70 06° 52.49 07° 8.26 07° 24.01 N07° 39.73 07° 55.42 08° 11.09 08° 26.73	15.9' 15.8' 15.8' 15.8' 15.8' 15.7' 15.7' 15.7' 15.7' 15.6' 15.6'	58.0 58.0 58.0 58.0 58.1 58.1 58.1 58.1 58.2
1 5 7 7 3 9 0 1 1 2 3 4 5 6	237°0.21 252°0.06 266°59.91 281°59.75 296°59.60 311°59.45 326°59.30 341°59.15 356°59.00 11°58.85 26°58.70 41°58.55 56°58.41	12.89 12.28 \$19°11.68 11.08 10.48 •• 9.87 9.27 8.66 \$19°8.05 7.45 6.84 •• 6.23 5.62	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86 249° 38.92 264° 10.94 278° 42.99 293° 14.80 307° 46.65 322° 18.44 336° 50.17 351° 21.84	13.3' 13.2' 13.1' 13.1' 13.0' 13.0' 12.9' 12.8' 12.7' 12.7' 12.6'	05° 33.35 05° 49.21 N06° 5.06 06° 20.89 06° 36.70 06° 52.49 07° 8.26 07° 24.01 N07° 39.73 07° 55.42 08° 11.09 08° 26.73 08° 42.34	15.9' 15.8' 15.8' 15.8' 15.8' 15.7' 15.7' 15.7' 15.6' 15.6' 15.6'	58.0 58.0 58.0 58.0 58.1 58.1 58.1 58.2 58.2
1 5 7 3 3 0 1 2 3 4 5 6 7	237°0.21 252°0.06 266°59.91 281°59.75 296°59.60 311°59.45 326°59.30 341°59.15 356°59.00 11°58.85 26°58.70 41°58.55 56°58.41 71°58.26	12.89 12.28 \$19° 11.68 11.08 10.48 • 9.87 9.27 8.66 \$19° 8.05 7.45 6.84 • 6.23 5.62 5.01	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86 249° 38.92 264° 10.94 278° 42.90 293° 14.80 307° 46.65 322° 18.44 336° 50.17 351° 21.84 5° 53.45	13.3' 13.2' 13.2' 13.1' 13.1' 13.0' 12.9' 12.8' 12.7' 12.7' 12.5'	05° 33.35 05° 49.21 N06° 5.06 06° 20.89 06° 36.70 06° 52.49 07° 8.26 07° 24.01 N07° 39.73 07° 55.42 08° 11.09 08° 26.73 08° 42.34 08° 57.91	15.9' 15.8' 15.8' 15.8' 15.8' 15.7' 15.7' 15.7' 15.6' 15.6' 15.6' 15.5'	58.0 58.0 58.0 58.0 58.1 58.1 58.1 58.1 58.2 58.2 58.2
1 5 7 3 9 0 1 2 3 4 5 6 7 8	237°0.21 252°0.06 266°59.91 281°59.75 296°59.60 311°59.45 326°59.30 341°59.15 356°59.00 11°58.85 26°58.70 41°58.55 56°58.41 71°58.26 86°58.11	12.89 12.28 S19° 11.68 11.08 10.48 · 9.87 9.27 8.66 S19° 8.05 7.45 6.84 · 6.23 5.62 5.01 S19° 4.40	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86 249° 38.92 264° 10.94 278° 42.90 293° 14.80 307° 46.65 322° 18.44 336° 50.17 351° 21.84 5° 53.45 20° 25.00	13.3' 13.2' 13.1' 13.1' 13.0' 12.9' 12.8' 12.7' 12.7' 12.5' 12.5'	05° 33.35 05° 49.21 N06° 5.06 06° 20.89 06° 36.70 06° 52.49 07° 8.26 07° 24.01 N07° 39.73 07° 55.42 08° 11.09 08° 26.73 08° 42.34 08° 57.91 N09° 13.46	15.9' 15.8' 15.8' 15.8' 15.8' 15.7' 15.7' 15.7' 15.6' 15.6' 15.6' 15.5'	58.0 58.0 58.0 58.0 58.1 58.1 58.1 58.2 58.2 58.2
1 5 7 3 9 0 1 2 3 4 5 6 7 8 9	237°0.21 252°0.06 266°59.91 281°59.75 296°59.60 311°59.45 326°59.30 341°59.15 356°59.00 11°58.85 26°58.70 41°58.55 56°58.41 71°58.26 86°58.11 101°57.96	12.89 12.28 \$19°11.68 11.08 10.48 • 9.87 9.27 8.66 \$19°8.05 7.45 6.84 • 6.23 5.62 5.01 \$19°4.40 3.79	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86 249° 38.92 264° 10.94 278° 42.90 293° 14.80 307° 46.65 322° 18.44 336° 50.17 351° 21.84 5° 53.45 20° 25.00 34° 56.48	13.3' 13.2' 13.1' 13.1' 13.0' 12.9' 12.8' 12.7' 12.6' 12.5' 12.5' 12.4'	05° 33.35 05° 49.21 N06° 5.06 06° 20.89 06° 36.70 06° 52.49 07° 8.26 07° 24.01 N07° 39.73 07° 55.42 08° 11.09 08° 26.73 08° 42.34 08° 57.91 N09° 13.46 09° 28.97	15.9' 15.8' 15.8' 15.8' 15.8' 15.7' 15.7' 15.7' 15.6' 15.6' 15.6' 15.5' 15.5'	58.0 58.0 58.0 58.0 58.1 58.1 58.1 58.2 58.2 58.2 58.2 58.2
1 5 7 3 9 0 1 2 3 4 5 6 7 8 9 0	237°0.21 252°0.06 266°59.91 281°59.75 296°59.60 311°59.45 326°59.30 341°59.15 356°59.00 11°58.85 26°58.70 41°58.55 56°58.41 71°58.26 86°58.11 101°57.96 116°57.82	12.89 12.28 \$19°11.68 11.08 10.48 • 9.87 9.27 8.66 \$19°8.05 7.45 6.84 • 6.23 5.62 5.01 \$19°4.40 3.79 3.18	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86 249° 38.92 264° 10.94 278° 42.90 293° 14.80 307° 46.65 322° 18.44 336° 50.17 351° 21.84 5° 53.45 20° 25.00 34° 56.48 49° 27.89	13.3' 13.2' 13.1' 13.1' 13.0' 12.9' 12.8' 12.7' 12.6' 12.5' 12.5' 12.4' 12.3'	05° 33.35 05° 49.21 N06° 5.06 06° 20.89 06° 36.70 06° 52.49 07° 8.26 07° 24.01 N07° 39.73 07° 55.42 08° 11.09 08° 26.73 08° 42.34 08° 57.91 N09° 13.46 09° 28.97 09° 44.44	15.9' 15.8' 15.8' 15.8' 15.8' 15.7' 15.7' 15.7' 15.6' 15.6' 15.6' 15.5' 15.5' 15.5'	58.0 58.0 58.0 58.0 58.1 58.1 58.1 58.2 58.2 58.2 58.2 58.2 58.2 58.3
1 5 7 3 9 0 1 2 3 4 5 6 7 8 9 0 1	237°0.21 252°0.06 266°59.91 281°59.75 296°59.00 311°59.45 326°59.30 341°59.15 356°59.00 11°58.85 26°58.70 41°58.55 56°58.41 71°58.26 86°58.11 101°57.96 116°57.82 131°57.67	12.89 12.28 \$19° 11.68 11.08 10.48 • 9.87 9.27 8.66 \$19° 8.05 7.45 6.84 • 6.23 5.62 5.01 \$19° 4.40 3.79 3.18 • 2.57	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86 249° 38.92 264° 10.94 278° 42.90 293° 14.80 307° 46.65 322° 18.44 336° 50.17 351° 21.84 5° 53.45 20° 25.00 34° 56.48 49° 27.89 63° 59.23	13.3' 13.2' 13.1' 13.1' 13.0' 12.9' 12.8' 12.7' 12.7' 12.5' 12.5' 12.5' 12.4' 12.3' 12.3'	05° 33.35 05° 49.21 N06° 5.06 06° 20.89 06° 36.70 06° 52.49 07° 8.26 07° 24.01 N07° 39.73 07° 55.42 08° 11.09 08° 26.73 08° 42.34 08° 57.91 N09° 13.46 09° 28.97 09° 44.44 09° 59.88	15.9' 15.8' 15.8' 15.8' 15.8' 15.7' 15.7' 15.7' 15.6' 15.6' 15.6' 15.5' 15.5' 15.5' 15.5' 15.4'	58.0 58.0 58.0 58.0 58.1 58.1 58.1 58.2 58.2 58.2 58.2 58.3 58.3
1 5 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 2 3	237°0.21 252°0.06 266°59.91 281°59.75 296°59.60 311°59.45 326°59.30 341°59.15 356°59.00 11°58.85 26°58.70 41°58.55 56°58.41 71°58.26 86°58.11 101°57.96 116°57.82 131°57.67 146°57.52	12.89 12.28 \$19° 11.68 11.08 10.48 • 9.87 9.27 8.66 \$19° 8.05 7.45 6.84 • 6.23 5.62 5.01 \$19° 4.40 3.79 3.18 • 2.57 1.96	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86 249° 38.92 264° 10.94 278° 42.90 293° 14.80 307° 46.65 322° 18.44 336° 50.17 351° 21.84 5° 53.45 20° 25.00 34° 56.48 49° 27.89 63° 59.23 78° 30.51	13.3' 13.2' 13.1' 13.1' 13.0' 12.9' 12.8' 12.7' 12.6' 12.5' 12.5' 12.5' 12.3' 12.3' 12.3'	05° 33.35 05° 49.21 N06° 5.06 06° 20.89 06° 36.70 06° 52.49 07° 8.26 07° 24.01 N07° 39.73 07° 55.42 08° 11.09 08° 26.73 08° 42.34 08° 57.91 N09° 13.46 09° 28.97 09° 44.44 09° 59.88 10° 15.28	15.9' 15.8' 15.8' 15.8' 15.8' 15.7' 15.7' 15.7' 15.6' 15.6' 15.6' 15.5' 15.5' 15.5' 15.5' 15.4' 15.4'	57.9 58.0 58.0 58.0 58.1 58.1 58.1 58.2 58.2 58.2 58.3 58.3 58.3
1 5 7 3 9 0 1 2 3 4 5 6 7 8 9	237°0.21 252°0.06 266°59.91 281°59.75 296°59.00 311°59.45 326°59.30 341°59.15 356°59.00 11°58.85 26°58.70 41°58.55 56°58.41 71°58.26 86°58.11 101°57.96 116°57.82 131°57.67	12.89 12.28 \$19° 11.68 11.08 10.48 • 9.87 9.27 8.66 \$19° 8.05 7.45 6.84 • 6.23 5.62 5.01 \$19° 4.40 3.79 3.18 • 2.57	176° 58.09 191° 30.35 206° 2.57 220° 34.74 235° 6.86 249° 38.92 264° 10.94 278° 42.90 293° 14.80 307° 46.65 322° 18.44 336° 50.17 351° 21.84 5° 53.45 20° 25.00 34° 56.48 49° 27.89 63° 59.23	13.3' 13.2' 13.1' 13.1' 13.0' 12.9' 12.8' 12.7' 12.6' 12.5' 12.4' 12.3' 12.2' 12.1'	05° 33.35 05° 49.21 N06° 5.06 06° 20.89 06° 36.70 06° 52.49 07° 8.26 07° 24.01 N07° 39.73 07° 55.42 08° 11.09 08° 26.73 08° 42.34 08° 57.91 N09° 13.46 09° 28.97 09° 44.44 09° 59.88	15.9' 15.8' 15.8' 15.8' 15.8' 15.7' 15.7' 15.7' 15.6' 15.6' 15.6' 15.5' 15.5' 15.5' 15.5' 15.4'	58.0 58.0 58.0 58.0 58.1 58.1 58.1 58.2 58.2 58.2 58.2 58.3 58.3

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	07:39	09:18			15:07	16:46
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	////	02:26	03:32	20:50	21:55	////
				1		

Lat.		Moonris	e		Moonset	:
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°	10:07	09:32	08:56	20:40	22:53	
<b>N</b> 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	
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	08:12	09:45	11:19	21:33	21:32	21:32

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	4-6	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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		

h	Aries	Venu	us	M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	124° 19.08		S19° 5.61	180°35.46	S20°52.18	14°34.50	N22°29.56	125° 18.18	S02°48.79			
1	139° 21.55	187°7.97	4.82	195°35.89	51.76	29°37.29	29.61	140°20.44	48.70	Alpheratz	357°34.06	29° 14.18
2	154° 24.01	202°7.22	4.03	210°36.31	51.33	44°40.09	29.66	155°22.69	48.60	Ankaa	353°6.47	-42°10.07
3	169° 26.48	217°6.47	• • 3.24	225°36.74	50.91	59°42.88	29.70	170°24.95	• • 48.50	Schedar	349°30.28	56°41.08
4	184° 28.94	232°5.72	2.45	240°37.17	50.49	74°45.68	29.75	185°27.21	48.41	Diphda	348°46.54	-17°50.74
5	199°31.40	247° 4.97	1.66	255°37.59	50.07	89°48.47	29.80	200°29.47	48.31	Achernar	335°19.61	-57°6.53
6	214° 33.87		S19° 0.87	270°38.02	\$20°49.65	104°51.27	N22°29.84	215°31.72	S02°48.21	Hamal	327°50.21	23°35.24
7	229° 36.33	277°3.47	19° 0.07	285°38.45	49.22	119°54.06	29.89	230°33.98	48.12	Polaris	313°28.01	89°22.76
8	244° 38.80		18°59.28	300°38.88	48.80	134°56.86	29.93	245°36.24	48.02	Acamar	315°11.01	-40° 12.22
9	259°41.26		• 58.49	315°39.31	• 48.37	149°59.65	29.98	260°38.49	• • 47.93	Menkar	314°5.15	$4^{\circ}11.50$
10	274°43.72	322°1.22	57.69	330°39.73	47.95	165°2.45	30.03	275°40.75	47.83	Mirfak	308°26.83	49°57.43
11	289°46.19	337°0.47	56.89	345°40.16	47.52	180°5.24	30.07	290°43.01	47.73	Aldebaran	290°38.40	16°33.72
12	304°48.65		518°56.09	0°40.59	\$20°47.10	195°8.03	N22°30.12	305°45.26	S02°47.64	Rigel	281°2.78	-8° 10.37
13	319°51.12	6°58.98	55.30	15°41.02	46.67	210°10.83	30.16	320°47.52	47.54	Capella	280°20.24	$46^{\circ}1.55$
14	334° 53.58	21°58.24	54.50	30°41.45	46.25	225°13.62	30.21	335°49.78	47.44	Bellatrix	278°21.68	6°22.36
15	349° 56.04		• • 53.69	45°41.87	45.82	240°16.41	30.26	350° 52.03	• • 47.35	Elnath	278°0.47	28° 37.80
16	4°58.51	51°56.75	52.89	60°42.30	45.39	255°19.21	30.30	5°54.29	47.25	Alnilam	275°36.57	-1° 11.18
17	20°0.97	66°56.00	52.09	75°42.73	44.97	270°22.00	30.35	20°56.55	47.15	Betelgeuse	270°50.85	$7^{\circ}24.67$
18	35°3.44		518°51.29	90°43.16	S20°44.54	285°24.79	N22°30.39	35°58.80	S02°47.06	Canopus	263°51.52	-52°42.68
19	50°5.90	96°54.52	50.48	105°43.59	44.11	300°27.58	30.44	51°1.06	46.96	Sirius	258°25.14	-16°45.21
20	65°8.37	111°53.77	49.68	120°44.02	43.68	315°30.38	30.48	66°3.31	46.86	Adhara	255°4.81	-29°0.54
21	80° 10.83		• • 48.87	135°44.45	43.25	330°33.17	30.53	81°5.57	• • 46.77	Procyon	244°49.58	5°9.40
22	95° 13.29	141°52.29	48.06	150°44.88	42.82	345°35.96	30.58	96°7.82	46.67	Pollux	243°15.86	27°57.72
23	110° 15.76	156°51.55	47.25	165°45.31	42.39	0°38.75	30.62	111° 10.08	46.57	Avior	234°13.74	-59°35.58
		-				_	_			Suhail	222°45.23	-43°32.27
Mer.p	pass. 15:40	$\nu$ -0.8′ <i>d</i> -0.8	" m-3.90	$\nu$ 0.4′ d-0	.4' m1.10	$\nu 2.8' \ d0$	.0′ m-2.65	$\nu 2.3' \ d-0$	.1' m $1.03$	Miaplacidus	221°37.19	-69°49.37
										Alphard	217°46.57	-8°46.38
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.21	11°50.24
0	125° 18.22		18°46.44	180°45.74	S20°41.96	15°41.54	N22° 30.67	126° 12.34	S02°46.47	Dubhe	193°39.40	61°36.34
1	140° 20.69	186°50.07	45.63	195°46.17	41.53	30°44.34	30.71	141° 14.59	46.38	Denebola	182°23.85	14°25.39
2	155°23.15	201°49.33	44.82	210°46.60	41.10	45°47.13	30.76	156° 16.85	46.28	Gienah	175°42.51	-17°41.23
3	170° 25.61		• • 44.01	225°47.03	40.67	60°49.92	30.80	171° 19.10	• • 46.18	Acrux	172°58.81	-63°14.42
4	185° 28.08	231° 47.85	43.20	240°47.46	40.24	75°52.71	30.85	186°21.36	46.09	Gacrux	171°50.42	-57° 15.38
5	200° 30.54	246°47.12	42.38	255°47.89	39.81	90°55.50	30.89	201°23.61	45.99	Alioth	166°11.98	55°48.74
6	215° 33.01		18°41.57	270°48.32	\$20°39.38	105°58.29	N22° 30.94	216°25.87	S02°45.89	Spica	158°21.30	-11°17.90
7	230° 35.47	276° 45.64	40.75	285°48.75	38.94	121°1.08	30.99	231°28.12	45.79	Alkaid	152°51.24	49° 10.62
8	245° 37.93	291°44.91	39.93	300°49.18	38.51	136°3.87	31.03	246°30.37	45.70	Hadar	148°34.74	-60°29.70
9	260°40.40		• • 39.12	315°49.62	• • 38.08	151°6.66	• • 31.08	261°32.63	• • 45.60	Menkent	147°56.57	-36°29.79
10	275°42.86	321°43.44	38.30	330°50.05	37.64	166°9.45	31.12	276°34.88	45.50	Arcturus	145°47.11	19°2.56
11	290°45.33	336°42.70	37.48	345°50.48	37.21	181°12.24	31.17	291°37.14	45.40	Rigil Kent. Kochab	139°39.15 137°19.98	-60°56.36 74°2.46
12	305°47.79	351°41.97	36.66	0°50.91	S20°36.77	196°15.03	N22°31.21	306°39.39	S02°45.31	Zuben'ubi	136°55.10	-16°9.03
13	$320^{\circ}50.26$	6°41.24	35.84	15°51.34	36.34	211°17.82	31.26	321°41.64	45.21	Alphecca	126°3.12	26°37.35
14	$335^{\circ}52.72$	21°40.50	35.01	30°51.77	35.90	226°20.61	31.30	336°43.90	45.11	Antares	112° 14.96	-26°29.35
15	$350^{\circ}55.18$	36°39.77	• • 34.19	45°52.21	• • 35.46	241°23.40	• • 31.35	351°46.15	• • 45.01	Atria	107°8.77	-69°4.23
16	5°57.65	51°39.04	33.37	60°52.64	35.03	256°26.19	31.39	6°48.41	44.92	Sabik	107 0.77 102°2.01	-15° 45.45
17	$21^{\circ}0.11$	66°38.31	32.54	75°53.07	34.59	271°28.98	31.44	21°50.66	44.82	Shaula	96°9.49	-37°7.29
18	$36^{\circ}2.58$		518°31.71	90°53.50	S20°34.15	286°31.77	N22°31.48	$36^{\circ}52.91$	502°44.72	Rasalhague	95°57.99	12°32.31
19	51°5.04	96°36.85	30.89	105°53.94	33.72	301°34.55	31.53	51°55.17	44.62	Eltanin	90°42.21	51°28.87
20	66°7.50	111°36.12	30.06	120°54.37	33.28	316°37.34	31.57	66°57.42	44.52	Kaus Aust.	83°31.70	-34°22.30
21	$81^{\circ}9.97$	126°35.39	• • 29.23	135°54.80	• • 32.84	331°40.13	• • 31.62	81°59.67	• • 44.43	Vega	80°33.02	38° 48.28
22	96°12.43	141°34.66	28.40	150°55.24	32.40	346°42.92	31.66	97°1.92	44.33	Nunki		-26° 15.87
23	$111^{\circ}14.90$	156°33.94	27.57	165°55.67	31.96	1°45.71	31.71	112°4.18	44.23	Altair	61°59.44	8° 56.15
Merr	pass. 15:36	ν-0.7' d-0.8	' m-3 00	υ0 Δ' d-0	.4' m1.10	1/2 8' d0	.0′ m-2.65	1/2 3' d-0	.1′ m1.03	Peacock	53°4.94	-56° 39.09
14161.	Juss. 15.50	ν σ.ι u-σ.ο		νσ. <del>τ</del> α-υ		<i>ν</i> ∠.υ αυ	.5 11-2.03	ν2.5 u-0	.1 1111.05	Deneb	49°25.68	45°22.37
										Enif	33°38.25	9°59.64
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.23	-46°50.22
0	126° 17.36	171°33.21		180°56.10	\$20°31.52	16°48.49	N22°31.75	127°6.43	502°44.13	Fomalhaut	15°13.83	-29°29.19
1	141°19.83	186°32.48	25.91	195°56.54	31.08	31°51.28	31.80	142°8.68	44.03	Scheat	13°44.63	28° 13.53
2	156° 22.29	201°31.76	25.07	210°56.97	30.64	46°54.07	31.84	157° 10.94	43.94	Markab	13°29.28	15°20.75
3	171°24.75	216°31.03	• • 24.24	225°57.40	• • 30.20	61°56.85	• • 31.88	172° 13.19	• • 43.84			
4	186° 27.22	231°30.31	23.40	240°57.84	29.76	76°59.64	31.93	187° 15.44	43.74	Jan 25 Sun	SHA	Mer.pass
5	201°29.68	246°29.58	22.57	255°58.27	29.32	92°2.43	31.97	$202^{\circ}17.69$	43.64	Venus	47°49.64	12:32
6	216° 32.15		18°21.73	270°58.71	S20°28.88	107°5.21	N22°32.02	217° 19.94	S02°43.54	Mars	56°16.38	11:57
7	231°34.61	276°28.14	20.89	285°59.14	28.43	122°8.00	32.06	232°22.20	43.44	Jupiter	250°15.41	22:57
8	246° 37.07	291°27.41	20.05	300°59.58	27.99	137°10.79	32.11	247°24.45	43.35	Saturn	0°59.09	15:36
9	261°39.54		• • 19.21	316°0.01	• • 27.55	152°13.57	• • 32.15	262°26.70	• • 43.25	Jan 26 Mon	SHA	Mer.pass
10	276°42.00	321°25.97	18.37	331°0.45	27.10	167°16.36	32.20	277°28.95	43.15	Venus	46°32.59	12:33
11	291°44.47	336°25.25	17.53	346°0.88	26.66	182°19.14	32.24	292°31.20	43.05	Mars	55°27.52	11:57
12	306°46.93		518°16.69	1°1.32	\$20°26.22	197°21.93	N22°32.28	307°33.45	S02°42.95	Jupiter	250°23.32	22:53
13	321°49.40	6°23.81	15.84	16°1.75	25.77	212°24.71	32.33	322°35.71	42.85	Saturn	0°54.11	15:33
14	336°51.86	21°23.09	15.00	31°2.19	25.33	227°27.50	32.37	337°37.96	42.75			
15	351°54.32		• • 14.16	46°2.62	• • 24.88	242°30.28	• • 32.42	352°40.21	• • 42.66	Jan 27 Tue	SHA	Mer.pass
16	6° 56.79	51°21.65	13.31	61°3.06	24.44	257°33.07	32.46	7°42.46	42.56	Venus	45°15.85	12:34
17	21°59.25	66°20.93	12.46	76°3.50	23.99	272°35.85	32.51	22°44.71	42.46	Mars	54°38.74	11:56
18	37°1.72	81°20.22 S		91°3.93	\$20°23.54	287°38.64	N22°32.55	37° 46.96	S02°42.36	Jupiter	250°31.13	22:49
19	52°4.18	96° 19.50	10.77	106° 4.37	23.09	302°41.42	32.59	52°49.21	42.26	Saturn	0°49.07	15:29
20	67°6.64	111°18.78	9.92	121°4.81	22.65	317°44.20	32.64	67°51.46	42.16	Horizon	ntal parallax	
21	82°9.11	126°18.07	• • 9.06	136° 5.24	•• 22.20	332°46.99	• • 32.68	82°53.71	· · 42.06	11011201	Venus:	0.1
22 23	97° 11.57 112° 14.04	141° 17.35 156° 16.64	8.21 7.36	151° 5.68	21.75	347°49.77 2°52.55	32.72 32.77	97°55.96	41.96 41.86		Mars:	0.1
				166° 6.12	21.30			112°58.21				
Mer.p	pass. 15:32	ν-0.7′ d-0.8	g' m-3.90	$\nu$ 0.4′ d-0	.4′ m1.10	$\nu$ 2.8′ d0	.0′ m-2.64	$\nu 2.3' \ d-0$	.1′ m1.03			

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	176°57.23	<b>S</b> 19°0.73	$107^{\circ}32.85$	12.1'	$N10^{\circ}45.95$	15.3'	58.3'
1	191°57.09	19°0.12	122°3.92	12.0'	11°1.23	15.2'	58.4'
2	206°56.94 221°56.80	18°59.50 •• 58.89	136°34.91 151°5.82	11.9' 11.8'	11° 16.46 11° 31.64	15.2' 15.1'	58.4' 58.4'
4	236°56.65	58.27	165°36.66	11.8'	11°46.78	15.1'	58.4'
5	251°56.51	57.66	180°7.42	11.7'	12°1.87	15.0'	58.4'
6	266°56.37	<b>S</b> 18° 57.04	194°38.10	11.6'	N12° 16.90	15.0'	58.5'
7	281°56.22	56.42	209°8.70 223°39.21	11.5'	12°31.89	14.9'	58.5'
8 9	296°56.08 311°55.94	55.80 •• 55.18	223° 39.21 238° 9.65	11.4' 11.4'	12°46.82 13°1.70	14.9' 14.8'	58.5' 58.5'
10	326°55.80	54.56	252° 40.00	11.3	13° 16.52	14.8'	58.5'
11	341°55.65	53.94	$267^{\circ}10.26$	11.2'	13°31.29	14.7'	58.6'
12	356°55.51	\$18°53.32	281°40.44	11.1'	N13° 45.99	14.6'	58.6'
13 14	11°55.37 26°55.23	52.70 52.08	296° 10.53 310° 40.54	11.0' 10.9'	14°0.64 14°15.22	14.6' 14.5'	58.6' 58.6'
14 15	20 55.23 41°55.09	52.08 •• 51.46	310 40.54 325°10.45	10.9	14 15.22 14°29.73	14.5'	58.6'
16	56°54.95	50.84	339° 40.27	10.7'	14°44.18	14.4'	58.6'
17	71°54.81	50.21	$354^{\circ}10.00$	10.6'	$14^{\circ}58.57$	14.3'	58.7'
18	86°54.67	S18°49.59	8°39.63	10.5'	N15° 12.88	14.2'	58.7'
19 20	101°54.53 116°54.39	48.96 48.34	23°9.17 37°38.61	10.4' 10.3'	15°27.12 15°41.29	14.2' 14.1'	58.7' 58.7'
21	110 54.39 131°54.26	48.34 •• 47.71	52°7.96	10.3	15 41.29 15°55.39	14.1 14.0'	58.7'
22	146°54.12	47.08	66°37.21	10.2'	16°9.41	13.9'	58.8'
23	161°53.98	46.46	81°6.36	10.1'	16°23.36	13.9'	58.8'
	SD = 16.2'	d = -0.6'		SE	0 = 15.9'		
_							
Mon	<b>GHA</b> 176°53.84	<b>Dec</b> \$18° 45.83	<b>GHA</b> 95°35.41	u 9.9'	Dec N16° 37.22	d 13.8'	<b>HP</b> 58.8'
0 1	176°53.84 191°53.71	\$18°45.83 45.20	95°35.41 110°4.36	9.9° 9.8'	16° 51.01	13.8	58.8'
2	206°53.57	44.57	124°33.21	9.7'	17°4.71	13.6'	58.8'
3	221°53.44	• • 43.94	$139^{\circ}1.95$	9.6'	$17^{\circ}18.32$	13.5'	58.9'
4	236°53.30	43.31	153° 30.59	9.5'	17° 31.86	13.4'	58.9'
5	251°53.16 266°53.03	42.68 \$18° 42.05	167°59.13 182°27.56	9.4' 9.3'	17°45.30 N17°58.65	13.4'	58.9'
6 7	200 53.03 281°52.90	41.42	182 27.50 196°55.88	9.3 9.2'	18° 11.92	13.3' 13.2'	58.9' 58.9'
8	296°52.76	40.79	211°24.10	9.1'	18° 25.09	13.1'	58.9'
9	311°52.63	• • 40.15	225°52.21	9.0'	$18^{\circ}38.16$	13.0'	59.0'
10	326°52.49	39.52	240°20.21	8.9'	18°51.14	12.9'	59.0'
11 12	341°52.36 356°52.23	38.88 \$18° 38.25	254° 48.10 269° 15.88	8.8' 8.7'	19°4.02 N19°16.80	12.8' 12.7'	59.0' 59.0'
12	11°52.23	37.61	269° 15.88 283° 43.55	8. <i>1</i> ′ 8.6′	19° 16.80	12.7	59.0' 59.0'
14	26°51.96	36.98	298° 11.11	8.4'	19°42.06	12.5'	59.0'
15	41°51.83	• • 36.34	$312^{\circ}38.56$	8.3'	$19^{\circ}54.53$	12.4'	59.1'
16	56°51.70	35.70	327°5.89	8.2'	20°6.89	12.3'	59.1'
17 18	71°51.57 86°51.44	35.07 \$18° 34.43	341°33.11 356°0.22	8.1' 8.0'	20°19.15 N20°31.29	12.1' 12.0'	59.1' 59.1'
19	101°51.31	33.79	10°27.22	7.9'	20°43.32	11.9'	59.1'
20	116°51.18	33.15	24°54.10	7.8'	20°55.23		59.1'
21	131°51.05	• • 32.51	$39^{\circ}20.86$	7.7'	21°7.03	11.7'	59.2'
22	146°50.92	31.87	53°47.51	7.5'	21° 18.71	11.6'	59.2'
23	161°50.79	31.23	68°14.05	7.4'	21°30.28	11.4'	59.2'
	SD = 16.2'	d = -0.6'		SE	0 = 16.0'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°50.66	S18°30.59	82°40.47	7.3'	N21°41.71	11.3'	59.2'
1	191°50.53	29.94	97°6.77 111°32.96	7.2'	21°53.03	11.2'	59.2'
2	206°50.41 221°50.28	29.30 •• 28.66	111°32.96 125°59.03	7.1' 7.0'	22°4.22 22°15.28	11.1' 10.9'	59.2' 59.3'
4	236°50.15	28.01	140°24.99	6.8'	22° 26.21	10.9	59.3'
5	251°50.03	27.37	$154^{\circ}50.83$	6.7'	22°37.01	10.7'	59.3'
6	266°49.90	\$18°26.72	169° 16.55	6.6'	N22°47.68	10.5	59.3'
7	281°49.77 296°49.65	26.08 25.43	183° 42.16 198° 7.66	6.5' 6.4'	22°58.21 23°8.61	10.4' 10.3'	59.3' 59.3'
8 9	296°49.65 311°49.52	25.43	198° 7.66 212° 33.04	6.4	23°8.61 23°18.87	10.3	59.3' 59.3'
10	326°49.40	24.14	226°58.30	6.2'	23°28.99	10.1	59.4'
11	341°49.27	23.49	241°23.45	6.0'	23°38.96	9.8'	59.4'
12	356°49.15	\$18° 22.84	255° 48.49	5.9'	N23°48.79	9.7'	59.4'
13 14	11°49.03 26°48.90	22.19 21.54	270° 13.41 284° 38.22	5.8' 5.7'	23°58.48 24°8.01	9.5' 9.4'	59.4' 59.4'
14 15	41°48.78	20.89	284 38.22 299°2.92	5. <i>1</i> 5.6'	24 8.01 24°17.40	9.4 9.2'	59.4 59.4'
16	56°48.66	20.24	313°27.50	5.5'	24°26.64	9.1	59.4'
17	71°48.53	19.59	327°51.98	5.4'	24° 35.72	8.9'	59.5'
18	86°48.41	\$18° 18.93	342° 16.34	5.3'	N24° 44.65	8.8'	59.5'
19 20	101°48.29 116°48.17	18.28 17.63	356°40.60 11°4.74	5.1' 5.0'	24°53.42 25°2.03	8.6' 8.5'	59.5' 59.5'
20	110 48.17 131°48.05	17.03	25°28.78	5.0 4.9'	25 2.03 25° 10.49	8.3'	59.5'
22	146°47.93	16.32	39°52.72	4.8'	25° 18.78	8.1'	59.5'
23	161°47.81	15.66	54°16.54	4.7'	25°26.90	8.0'	59.5'
	SD = 16.2'	d = -0.6'		SE	0 = 16.1'		

	T	Twilight			Twilight		
Lat.		•	Sunrise	Sunset		•	
	Naut.	Civil			Civil	Naut.	
N 72°	07:30	09:05	11:38	12:48	15:21	16:57	
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	////	02:37	03:40	20:43	21:46	////	

Lat.		Moonris	e		Moonset	t .
Lat.	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	12:59	14:45	16:39	21:32	21:33	21:38

		Sun		Moon			
Day	Eqn.of Time   N		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	7-9	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	37-59%	
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		

h	Aries	Venus		M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	127° 16.50		18° 6.51	181°6.55	\$20°20.85	17°55.34	N22°32.81	128°0.46	502°41.77	A lasta a series	357°34.07	29°14.17
1	$142^{\circ}18.97$	$186^{\circ}15.21$	5.65	196°6.99	20.40	32°58.12	32.86	143°2.71	41.67	Alpheratz Ankaa	353° 6.48	-42°10.06
2	157°21.43	201°14.50	4.80	211°7.43	19.95	48°0.90	32.90	158°4.96	41.57	Schedar	349°30.30	56°41.07
3	172°23.89		• 3.94	226°7.87	• • 19.50	63°3.69	• • 32.94	173°7.21	• • 41.47	Diphda	348°46.55	-17°50.74
4 5	187° 26.36 202° 28.82	231°13.08 246°12.37	3.09 2.23	241°8.30 256°8.74	19.05 18.60	78°6.47 93°9.25	32.99 33.03	188°9.46 203°11.71	41.37 41.27	Achernar	$335^{\circ}19.63$	-57° 6.52
6	202 20.02 217°31.29		2.23 18° 1.37	271°9.18	\$20°18.15	93 9.25 108°12.03	N22° 33.07	218° 13.96	\$02°41.17	Hamal	327°50.22	23°35.24
7	232°33.75		18° 0.51	286° 9.62	17.70	123°14.81	33.12	233° 16.21	41.07	Polaris	313°29.16	89°22.77
8	247°36.21	291°10.24 17	7°59.65	301°10.06	17.25	138°17.59	33.16	248° 18.46	40.97	Acamar Menkar	315°11.03 314°5.16	-40°12.23 4°11.50
9	262°38.68		58.79	316°10.50	•• 16.80	153°20.38	• • 33.21	263°20.71	• • 40.87	Mirfak	308°26.84	49°57.43
10	277°41.14	321°8.82	57.93	331°10.93	16.34	168°23.16	33.25	278°22.96	40.77	Aldebaran	290°38.41	16°33.72
11	292°43.61	336°8.11 351°7.40 <b>S</b> 17	57.06 7°56.20	346°11.37 1°11.81	15.89 \$20°15.44	183°25.94	33.29 N22°33.34	293°25.21	40.67	Rigel	281°2.78	-8°10.38
12 13	307° 46.07 322° 48.54	6°6.70	55.33	16°12.25	14.98	198°28.72 213°31.50	33.38	308°27.46 323°29.71	\$02°40.57 40.47	Capella	280°20.24	$46^{\circ}1.56$
14	337°51.00	21°5.99	54.47	31°12.69	14.53	228°34.28	33.42	338°31.96	40.37	Bellatrix	278°21.68	6°22.36
15	352°53.46		53.60	46°13.13	• • 14.07	243°37.06	• • 33.47	353°34.20	• • 40.27	Elnath	278°0.47	28°37.80
16	7°55.93	51°4.58	52.73	61°13.57	13.62	258°39.84	33.51	8°36.45	40.17	Alnilam Betelgeuse	275°36.58 270°50.85	-1°11.19 7°24.67
17	22°58.39	66°3.88	51.87	76°14.01	13.16	273°42.62	33.55	23°38.70	40.07	Canopus	263°51.53	-52°42.70
18	38°0.86		7°51.00	91°14.45	\$20°12.71	288°45.40	N22°33.60	38° 40.95	S02°39.97	Sirius	258°25.14	-16°45.22
19 20	53°3.32 68°5.79	96°2.47 111°1.77	50.13 49.26	106°14.89 121°15.33	12.25 11.79	303°48.18 318°50.96	33.64 33.68	53°43.20 68°45.45	39.87 39.77	Adhara	$255^{\circ}4.81$	-29°0.56
21	83°8.25	126°1.06 · ·		136° 15.77	•• 11.33	333°53.74	• • 33.72	83°47.69	• • 39.67	Procyon	244°49.58	5°9.40
22	98° 10.71	141°0.36	47.51	151°16.21	10.88	348°56.51	33.77	98°49.94	39.57	Pollux	243°15.85	27°57.72
23	113° 13.18	155°59.66	46.64	166°16.65	10.42	3°59.29	33.81	113°52.19	39.47	Avior Suhail	234°13.73 222°45.22	-59°35.60 -43°32.29
Merr	pass. 15:28	$\nu$ -0.7' d-0.9' r	m-3 90	ν0 4' d-0	.4' m1.10	v2 8′ d0	.0′ m-2.64	v2 3' d-0	.1′ m1.03	Miaplacidus	221°37.18	-43 32.29 -69°49.40
		ν σ.τ u σ.σ τ				- V2.0 U0.		- V2.5 U 0	.1 1111.05	Alphard	217°46.56	-8°46.39
ть	CIIA	CHA	D	CIIA	D	CHA	D	CHA	D	Regulus	207°33.19	$11^{\circ}50.24$
Thu 0	<b>GHA</b> 128° 15.64		<b>Dec</b> 7° 45.76	<b>GHA</b> 181°17.09	<b>Dec</b> \$20°9.96	<b>GHA</b> 19°2.07	<b>Dec</b> N22° 33.85	<b>GHA</b> 128°54.44	<b>Dec</b> \$02°39.37	Dubhe	193°39.37	61°36.35
1	143° 18.11	185°58.26	44.89	196° 17.53	9.50	34°4.85	33.90	143°56.68	39.27	Denebola	182°23.82	14°25.39
2	158° 20.57	200°57.56	44.01	211°17.97	9.04	49°7.63	33.94	158°58.93	39.17	Gienah	175°42.49	-17°41.24
3	173°23.04		43.13	226°18.42	• • 8.58	64°10.41	• • 33.98	174°1.18	• • 39.07	Acrux Gacrux	172°58.76 171°50.37	-63°14.44 -57°15.40
4	188°25.50	230°56.16	42.26	241°18.86	8.12	79°13.18	34.02	189°3.43	38.97	Alioth	166°11.95	55°48.74
5	203°27.96	245°55.47	41.38	256°19.30	7.66	94°15.96	34.07	204°5.67	38.87	Spica	158°21.28	-11°17.91
6	218° 30.43		7°40.50	271°19.74	\$20°7.20	109°18.74	N22°34.11	219°7.92	S02°38.77	Alkaid	$152^{\circ}51.21$	$49^{\circ}10.62$
7 8	233° 32.89 248° 35.36	275°54.07 290°53.38	39.62 38.74	286°20.18 301°20.63	6.74 6.28	124°21.51 139°24.29	34.15 34.20	234°10.17 249°12.41	38.67 38.57	Hadar	148°34.69	-60°29.71
9	263°37.82		37.85	316°21.07	• • 5.82	154°27.07	• • 34.24	264° 14.66	• • 38.47	Menkent	147°56.54	-36°29.80
10	278° 40.28	320°51.98	36.97	331°21.51	5.36	169°29.84	34.28	279° 16.91	38.37	Arcturus Rigil Kent.	145°47.08 139°39.10	19°2.55 -60°56.37
11	293°42.75	335°51.29	36.09	346°21.95	4.89	184°32.62	34.32	$294^{\circ}19.15$	38.27	Kigii Keiit.	139 39.10 137°19.93	74° 2.46
12	308°45.21		7°35.20	1°22.40	S20°4.43	199°35.40	N22°34.37	309°21.40	S02°38.17	Zuben'ubi	136°55.07	-16° 9.04
13	323°47.68	5°49.90	34.32	16°22.84	3.97	214°38.17	34.41	324°23.65	38.07	Alphecca	126°3.09	26°37.34
14	338° 50.14 353° 52.61	20°49.21 35°48.52	33.43 32.54	31°23.28 46°23.73	3.50 •• 3.04	229°40.95 244°43.72	34.45 •• 34.49	339°25.89 354°28.14	37.97 · · 37.87	Antares	$112^{\circ}14.93$	-26°29.35
15 16	8°55.07	50°47.83	31.65	61°24.17	2.58	259°46.50	34.54	9°30.39	37.77	Atria	107°8.71	-69°4.22
17	23°57.53	65°47.14	30.76	76°24.61	2.11	274°49.27	34.58	24°32.63	37.67	Sabik	102°1.99	-15°45.46
18	39°0.00	80°46.44 <b>S</b> 17		91°25.06	\$20°1.65	289°52.05	N22°34.62	39°34.88	<b>S</b> 02°37.57	Shaula Rasalhague	96°9.46 95°57.97	-37°7.29 12°32.30
19	54°2.46	95° 45.75	28.98	106°25.50	1.18	304°54.82	34.66	54°37.12	37.47	Eltanin	90°42.19	51°28.85
20	69°4.93	110°45.06	28.09	121°25.94	0.71	319°57.60	34.70	69°39.37	37.36	Kaus Aust.	83°31.68	-34°22.29
21 22	84°7.39 99°9.86	125°44.38 · · · 140°43.69		136°26.39 151°26.83	20°0.25	335°0.37 350°3.14	· · 34.75 34.79	84°41.61 99°43.86	• • 37.26	Vega	$80^{\circ}33.00$	38°48.27
23	99 9.80 114° 12.32	155° 43.00	26.31 25.41	166°27.28	19°59.78 59.31	5°5.92	34.79	99 45.00 114° 46.11	37.16 37.06	Nunki	75°47.00	-26°15.86
										Altair	61°59.42	8°56.14
Mer.	pass. 15:24	$\nu$ -0.7' d-0.9' r	m-3.90	$\nu 0.4' \ d-0$	0.5' m1.10	$\nu^{2.8'} d0.$	.0′ m-2.64	$\nu^{2.2'} d-0$	.1′ m1.03	Peacock Deneb	53°4.92 49°25.67	-56°39.08 45°22.35
										Enif	33°38.24	9°59.64
Fri	GHA		Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.23	-46°50.21
0	129° 14.78	170°42.31 \$17			\$19°58.85	20°8.69	N22° 34.87	129°48.35	S02°36.96	Fomalhaut	15°13.83	-29°29.18
1 2	144° 17.25 159° 19.71	185°41.63 200°40.94	23.62 22.72	196°28.17 211°28.61	58.38 57.91	35°11.46 50°14.24	34.91 34.96	144°50.60 159°52.84	36.86 36.76	Scheat	13°44.63	28°13.52
3	174° 22.18		22.72	226°29.06	57.44	65°17.01	• • 35.00	174°55.09	36.66	Markab	13°29.28	15°20.75
4	189° 24.64	230° 39.57	20.93	241°29.50	56.97	80°19.78	35.04	189°57.33	36.56	Jan 28 Wed	SHA	Mer.pass
5	$204^{\circ}27.11$	245°38.88	20.03	256°29.95	56.50	95°22.55	35.08	204°59.58	36.46	Venus	43°59.42	12:36
6	219°29.57		7°19.13	271°30.39	S19°56.03	110°25.33	N22°35.12	220°1.82	S02°36.35	Mars	53°50.05	11:55
7	234°32.03	275°37.52	18.23	286°30.84	55.56	125°28.10	35.17	235°4.06	36.25	Jupiter	250°38.84	22:44
8 9	249° 34.50 264° 36.96	290°36.83 305°36.15	17.32 16.42	301°31.28 316°31.73	55.09 •• 54.62	140°30.87 155°33.64	35.21 •• 35.25	250°6.31 265°8.55	36.15 · · 36.05	Saturn	0°43.96	15:26
10	204 30.90 279°39.43	305 36.15 · · · 320° 35.47	15.52	310 31.73 331°32.18	54.15	155 33.04 170°36.41	35.25	205 8.55 280°10.80	35.95	Jan 29 Thu	SHA	Mer.pass
11	294°41.89	335°34.79	14.61	346°32.62	53.68	185°39.18	35.33	295° 13.04	35.85	Venus	42°43.32	12:37
12	309°44.35	350°34.11 <b>S</b> 17		1°33.07	S19°53.21	200°41.95	N22°35.37	310° 15.29	S02°35.75	Mars	53°1.45 250°46.43	11:55
13	324°46.82	5°33.43	12.80	16°33.52	52.73	215°44.73	35.42	325°17.53	35.64	Jupiter Saturn	0°38.79	22:40 15:22
14	339° 49.28	20°32.75	11.90	31°33.96	52.26	230°47.50	35.46	340°19.77	35.54			
15 16	354°51.75		· 10.99 10.08	46°34.41	· · 51.79 51.32	245°50.27	· · 35.50	355°22.02 10°24.26	35.44	Jan 30 Fri	SHA	Mer.pass
16 17	9° 54.21 24° 56.68	50°31.39 65°30.71	9.17	61°34.86 76°35.31	51.32 50.84	260°53.04 275°55.81	35.54 35.58	25°26.50	35.34 35.24	Venus Mars	41°27.53 52°12.94	12:38
18	39°59.14		17°8.26	91°35.75	\$19°50.37	290°58.58	N22°35.62	40°28.75	S02°35.14	Jupiter	52 12.94 250°53.91	11:54 22:35
19	55°1.60	95°29.36	7.35	106°36.20	49.89	306°1.34	35.66	55°30.99	35.03	Saturn	0°33.57	15:18
20	70°4.07	110°28.68	6.44	121°36.65	49.42	321°4.11	35.71	70°33.23	34.93			
21	85°6.53		• 5.52	136°37.10	• • 48.94	336°6.88	• • 35.75	85°35.48	• • 34.83	Horizoi	ntal parallax	0.1
22	100°9.00 115°11.46	140°27.33	4.61	151°37.55	48.47 47.99	351°9.65	35.79	100°37.72	34.73		Venus: Mars:	0.1 0.1
23		155°26.65	3.70	166°37.99		6°12.42	35.83	115°39.96	34.63			V.2
Mer.p	pass. 15:20	ν-0.7′ d-0.9′ r	m-3.90	$\nu$ 0.4′ d-0	0.5′ m1.11	$\nu 2.8' \ d0.$	.0′ m-2.63	$\nu 2.2' \ d-0$	.1′ m1.03			

	_	T0.0070 Sec			_ +09.110-	. 555	
h	Su	n			Moon		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176° 47.69	\$18°15.01	68° 40.26	4.6'	N25°34.87	7.8'	59.6'
1 2	191°47.57 206°47.45	14.35 13.70	83°3.88 97°27.40	4.5' 4.4'	25°42.66 25°50.29	7.6' 7.5'	59.6' 59.6'
3	221° 47.33	• • 13.04	111°50.82	4.3'	25°57.74	7.3	59.6'
4	236°47.21	12.38	126° 14.14	4.2'	26°5.03	7.1'	59.6'
5	251°47.09	11.72	140° 37.36	4.1'	26°12.14	6.9'	59.6'
6	266° 46.98	\$18°11.06	155°0.48	4.0'	N26°19.08	6.8'	59.6'
7 8	281°46.86 296°46.74	10.40 9.74	169°23.51 183°46.45	3.9' 3.8'	26°25.83 26°32.42	6.6' 6.4'	59.6' 59.6'
9	311° 46.63	• • 9.08	198° 9.29	3.8'	26°38.82	6.2	59.7'
10	326°46.51	8.42	212°32.05	3.7'	26°45.04	6.0'	59.7'
11	341°46.39	7.76	226° 54.72	3.6'	26°51.08	5.9'	59.7'
12 13	356° 46.28 11° 46.16	\$18°7.10 6.43	241°17.30 255°39.80	3.5' 3.4'	N26°56.93 27°2.60	5.7' 5.5'	59.7' 59.7'
14	26° 46.05	5.77	270°2.22	3.4	27° 2.00	5.3'	59.7'
15	41°45.93	• • 5.11	284° 24.56	3.3'	27°13.38	5.1'	59.7'
16	56° 45.82	4.44	298° 46.83	3.2'	27°18.49	4.9'	59.7'
17	71°45.71 86°45.59	3.78 \$18° 3.11	313°9.01 327°31.13	3.1'	27°23.40 N27°28.13	4.7'	59.7' 59.7'
18 19	101°45.48	2.44	327 31.13 341°53.17	3.0' 3.0'	27°32.66	4.5' 4.3'	59.7' 59.7'
20	116° 45.37	1.78	356° 15.15	2.9'	27°36.99	4.1'	59.8'
21	131°45.25	• • 1.11	10°37.06	2.8'	$27^{\circ}41.14$	3.9'	59.8'
22	146°45.14	18°0.44	24°58.91	2.8'	27°45.08	3.7'	59.8'
23	161°45.03	17°59.77	39°20.70	2.7'	27°48.83	3.6'	59.8'
	SD = 16.2'	d = -0.7'		S	D = 16.2'		
Thu	GHA	Dec	GHA	ν	Dec	d	НР
0	176° 44.92	\$17°59.10	53°42.43	2.7'	N27°52.39	3.4'	59.8'
1	191°44.81	58.43	68°4.11	2.6'	27°55.74	3.2'	59.8'
2	206°44.70	57.76	82°25.73	2.6'	27°58.89	3.0'	59.8'
3 4	221°44.59 236°44.48	· · 57.09 56.42	96°47.30 111°8.83	2.5' 2.5'	28° 1.84 28° 4.59	2.8' 2.5'	59.8' 59.8'
5	250 44.46 251°44.37	55.75	111 0.03 125°30.31	2.5	26 4.59 28°7.14	2.3	59.8'
6	266° 44.26	S17°55.08	139°51.75	2.4'	N28° 9.49	2.1'	59.8'
7	281°44.15	54.40	$154^{\circ}13.15$	2.4'	28°11.63	1.9'	59.8'
8	296° 44.04	53.73	168° 34.52	2.3'	28°13.57	1.7'	59.8'
9 10	311°43.93 326°43.83	· · 53.06 52.38	182°55.86 197°17.16	2.3' 2.3'	28°15.30 28°16.83	1.5' 1.3'	59.8' 59.8'
11	341°43.72	51.71	211° 38.44	2.3'	28°18.16	1.1'	59.8'
12	356°43.61	\$17°51.03	225° 59.69	2.2'	N28°19.27	0.9'	59.8'
13	11°43.51	50.35	240° 20.93	2.2'	28°20.18	0.7'	59.8'
14	26°43.40 41°43.29	49.68 •• 49.00	254° 42.15 269° 3.35	2.2' 2.2'	28°20.89 28°21.38	0.5'	59.8'
15 16	56° 43.19	48.32	209 3.35 283°24.54	2.2'	28°21.67	0.3' 0.1'	59.8' 59.8'
17	71°43.08	47.64	297° 45.72	2.2'	28°21.76	-0.1	59.8'
18	86°42.98	<b>S</b> 17°46.96	312°6.90	2.2'	N28°21.63	-0.3'	59.9'
19	101° 42.87 116° 42.77	46.29 45.61	326°28.08 340°49.26	2.2' 2.2'	28°21.30 28°20.76	-0.5' -0.7'	59.9' 59.9'
20 21	131° 42.77	45.01 •• 44.92	340 49.20 355°10.44	2.2'	28°20.76	-0.7 -1.0'	59.9'
22	146° 42.56	44.24	9°31.63	2.2'	28°19.06	-1.2	59.9'
23	161°42.46	43.56	23°52.83	2.2'	28°17.89	-1.4'	59.9'
	SD = 16.2'	d = -0.7'	-	S	D = 16.3'		
	CIIA		CUA		Б.	,	
Fri 0	<b>GHA</b> 176° 42.36	<b>Dec</b> \$17°42.88	<b>GHA</b> 38° 14.05	ν 2.2'	<b>Dec</b> N28°16.52	d -1.6'	<b>HP</b> 59.9'
1	191°42.26	42.20	52° 35.28	2.3'	28°14.95	-1.8'	59.9'
2	206°42.15	41.51	66° 56.53	2.3'	28°13.17	-2.0'	59.8'
3 4	221° 42.05 236° 41.95	· · 40.83 40.14	81° 17.81 95° 39.11	2.3' 2.3'	28°11.18 28°8.99	-2.2' -2.4'	59.8' 59.8'
4 5	230°41.95 251°41.85	40.14 39.46	95° 39.11 110° 0.44	2.4	28° 8.99 28° 6.59	-2.4 -2.6'	59.8'
6	266°41.75	\$17°38.77	124° 21.80	2.4	N28° 3.98	-2.8'	59.8'
7	281°41.65	38.09	138°43.20	2.4'	28°1.18	-3.0'	59.8'
8	296°41.55 311°41.45	37.40 •• 36.71	153°4.63 167°26.11	2.5' 2.5'	27°58.17 27°54.95	-3.2' -3.4'	59.8' 59.8'
9 10	311 41.45 326°41.35	36.03	107 20.11 181°47.63	2.5 2.6'	27°51.54	-3.4 -3.6'	59.8'
11	341°41.25	35.34	196° 9.20	2.6'	27°47.92	-3.8'	59.8'
12	356°41.16	S17°34.65	210°30.82	2.7'	N27°44.11	-4.0'	59.8'
13	11°41.06	33.96	224° 52.49	2.7'	27°40.09	-4.2'	59.8'
14 15	26°40.96 41°40.86	33.27 •• 32.58	239° 14.22 253° 36.00	2.8' 2.8'	27°35.88 27°31.46	-4.4' -4.6'	59.8' 59.8'
16	56° 40.77	31.89	267° 57.84	2.9'	27°26.86	-4.8'	59.8'
17	71°40.67	31.20	282°19.75	3.0'	27°22.05	-5.0'	59.8'
18	86°40.57	\$17°30.50	296°41.73	3.0'	N27°17.05	-5.2'	59.8'
19 20	101°40.48 116°40.38	29.81 29.12	311°3.77 325°25.88	3.1' 3.2'	27°11.86 27°6.48	-5.4' -5.6'	59.8' 59.8'
20	116°40.38 131°40.29	· · 28.42	325° 25.88 339° 48.07	3.2	27° 0.48 27° 0.90	-5.8'	59.8'
22	146°40.19	27.73	354° 10.33	3.3'	26°55.14	-6.0'	59.8'
23	161°40.10	27.04	8°32.68	3.4'	26°49.18	-6.1'	59.7'
	SD = 16.2'	d = -0.7'	-	S	D = 16.3'		
			-		-		

Lat.	Twilight		Sunrise	Sunset	Twilight		
Lat.	Naut.	Civil	Juliuse	Juliset	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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	00:22	02:48	03:48	20:36	21:36	00:05	

Lat.		Moonris	e		Moonset	
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°						
N 70°						
68°						
66°						
64°						
62°	09:09		10:32	06:11		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° N 10°	13:16 13:39	14:17 14:42	15:24 15:47	02:10 01:49	03:18 02:53	04:22 03:58
0°	13:39	14:42 15:05	16:09	01:49	02:53	03:58
S 10°	14:22	15:28	16:31	01:08	02:08	03:13
20° 30°	14:46	15:52	16:55 17:22	00:46 00:21	01:44	02:49 02:20
35°	15:13 15:29	16:21 16:38	17:22	00:21	01:16 01:00	02:20
40°	15:29	16:58	17:56	••••	00:40	02:03
45°	16:11	17:22	18:19		00:40	01:43
<b>S</b> 50°					00.11	
52°	16:40 16:55	17:53 18:08	18:48 19:02	23:47 23:32		00:48 00:33
54°	17:12	18:26	19:02	23:32		00:33
56°	17:12	18:48	19:10	22:55	23:53	••••
58°	17:57	19:16	20:01	22:29	23:25	
<b>S</b> 60°	18:32	19:57	20:32	21:54	22:44	

	Sun			Moon			
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
Day	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	10-12	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	70-89%	
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		

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	130° 13.93	170°25.98 \$17°2.78	181°38.44 \$19°47.51	21°15.19 N22°35.87	130°42.21	
1	145° 16.39	185°25.31 1.86	196°38.89 47.04	36°17.96 35.91	145°44.45 34.42	Alpheratz 357°34.07 29°14.17
2	160°18.85	200°24.63 0.95	211°39.34 46.56	51°20.72 35.95	160°46.69 34.32	Ankaa 353°6.48 -42°10.05 Schedar 349°30.31 56°41.07
3	$175^{\circ}21.32$	215°23.96 17°0.03	226°39.79 · · 46.08	66°23.49 · · 35.99	175°48.93 · · 34.22	Diphda 348°46.55 -17°50.73
4	190°23.78	230°23.29 16°59.11	241°40.24 45.60	81°26.26 36.03	190°51.18 34.12	Achernar 335°19.65 -57°6.52
5	205°26.25	245°22.62 58.19	256°40.69 45.13	96°29.03 36.08	205°53.42 34.01	Hamal 327°50.22 23°35.24
6 7	220°28.71 235°31.18	260°21.95 \$16°57.27 275°21.28 56.35	271°41.14 S19°44.65 286°41.59 44.17	111°31.79 N22°36.12 126°34.56 36.16	220°55.66	Polaris 313°30.45 89°22.77
8	250°33.64	290°20.61 55.43	301°42.04 43.69	141°37.33 36.20	251°0.15 33.71	Acamar 315°11.04 -40°12.23
9	265°36.10	305°19.94 · · 54.51	316°42.49 · · 43.21	156°40.09 · · 36.24	266°2.39 · · 33.61	Menkar 314°5.16 4°11.50
10	280°38.57	320°19.27 53.58	331°42.94 42.73	171°42.86 36.28	281°4.63 33.50	Mirfak 308°26.85 49°57.44 Aldebaran 290°38.41 16°33.72
11	295°41.03	335°18.60 52.66	346°43.39 42.25	186°45.63 36.32	296°6.87 33.40	Rigel 281°2.78 -8°10.38
12	310° 43.50	350°17.93 \$16°51.73	1°43.84 \$19°41.77	201°48.39 N22°36.36	311°9.11 S02°33.30	Capella 280°20.24 46°1.56
13 14	325° 45.96 340° 48.42	5°17.27 50.81 20°16.60 49.88	16°44.29 41.28 31°44.74 40.80	216°51.16 36.40 231°53.92 36.44	326°11.35 33.20 341°13.60 33.09	Bellatrix 278°21.68 6°22.35
15	355° 50.89	35°15.93 · · 48.95	46°45.19 · · 40.32	246°56.69 · · 36.48	356°15.84 · · 32.99	Elnath 278° 0.47 28° 37.80
16	10°53.35	50°15.27 48.02	61°45.64 39.84	261°59.45 36.52	11°18.08 32.89	Alnilam 275°36.58 -1°11.19
17	25°55.82	65°14.60 47.09	76°46.09 39.35	277°2.22 36.56	26°20.32 32.79	Betelgeuse 270°50.85 7°24.66 Canopus 263°51.54 -52°42.71
18	40°58.28	80°13.94 <b>S</b> 16°46.16	91°46.54 \$19°38.87	292°4.98 N22°36.60	41°22.56 <b>S</b> 02°32.68	Sirius 258°25.14 -16°45.23
19	56°0.75	95°13.28 45.23	106°46.99 38.39	307°7.75 36.65	56°24.80 32.58	Adhara 255°4.81 -29°0.57
20 21	71°3.21 86°5.67	110°12.61 44.30 125°11.95 · · 43.37	121°47.45 37.90 136°47.90 · · 37.42	322°10.51 36.69 337°13.27 · · 36.73	71°27.04 32.48 86°29.28 · · 32.37	Procyon 244°49.57 5°9.39
22	101°8.14	140°11.29 42.44	150 47.90 · · 37.42 151°48.35 36.93	352°16.04 36.77	101°31.52 32.27	Pollux 243°15.84 27°57.72
23	116° 10.60	155°10.63 41.50	166°48.80 36.45	7°18.80 36.81	116° 33.76 32.17	Avior 234°13.73 -59°35.62
N4		ν-0.7' d-0.9' m-3.90	$\nu$ 0.4' d-0.5' m1.11	ν2.8' d0.0' m-2.63		Suhail 222°45.21 -43°32.31   Miaplacidus 221°37.18 -69°49.42
ivier.	pass. 15:17	ν-υ. <i>Γ</i> α-υ.9 m-3.90	νυ.4 α-υ.5 m1.11	ν2.8 αυ.υ m-2.03	$\nu 2.2' \ d$ -0.1' m1.03	Miaplacidus 221°37.18 -69°49.42   Alphard 217°46.54 -8°46.40
						Regulus 207°33.17 11°50.23
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.33 61°36.35
0	131°13.07	170°9.96 \$16°40.57	181°49.26 \$19°35.96	22°21.56 N22°36.85	131°36.00 S02°32.07	Denebola 182°23.80 14°25.38
1 2	146° 15.53 161° 17.99	185°9.30 39.63 200°8.64 38.70	196°49.71 35.48 211°50.16 34.99	37°24.33 36.89 52°27.09 36.93	146°38.24 31.96 161°40.48 31.86	Gienah 175°42.46 -17°41.26
3	176° 20.46	215°7.98 · · 37.76	226°50.61 · · 34.51	67°29.85 · · 36.97	176°42.73 · · 31.76	Acrux 172°58.72 -63°14.46
4	191°22.92	230°7.33 36.82	241°51.07 34.02	82°32.61 37.01	191°44.97 31.65	Gacrux 171°50.34 -57°15.41 Alioth 166°11.91 55°48.74
5	$206^{\circ}25.39$	245°6.67 35.88	256°51.52 33.53	97°35.37 37.05	206° 47.21 31.55	Alioth 166°11.91 55°48.74 Spica 158°21.25 -11°17.93
6	221°27.85	260°6.01 \$16°34.94	271°51.97 \$19°33.04	112°38.14 N22°37.09	221°49.44 <b>S</b> 02°31.45	Alkaid 152°51.17 49°10.61
7	236°30.32	275°5.35 34.00	286°52.43 32.56	127°40.90 37.13	236°51.68 31.35	Hadar 148°34.64 -60°29.72
8	251°32.78 266°35.24	290°4.70 33.06 305°4.04 · · 32.12	301°52.88 32.07 316°53.33 · · 31.58	142°43.66 37.17 157°46.42 · · 37.21	251°53.92 31.24 266°56.16 · · 31.14	Menkent 147°56.50 -36°29.82
10	281° 37.71	320°3.38 31.17	331°53.79 31.09	172°49.18 37.25	281°58.40 31.04	Arcturus 145°47.05 19°2.54
11	296° 40.17	335°2.73 30.23	346°54.24 30.60	187°51.94 37.29	297°0.64 30.93	Rigil Kent. 139°39.04 -60°56.38
12	311°42.64	350°2.07 \$16°29.29	1°54.70 \$19°30.11	202°54.70 N22°37.33	312°2.88 <b>S</b> 02°30.83	Kochab 137°19.86 74°2.45 Zuben'ubi 136°55.04 -16°9.05
13	$326^{\circ}45.10$	5°1.42 28.34	16°55.15 29.62	217°57.46 37.37	327°5.12 30.73	Alphecca 126°3.06 26°37.33
14	341°47.56	20°0.77 27.39	31°55.61 29.13	233°0.22 37.41	342°7.36 30.62	Antares 112°14.90 -26°29.36
15	356° 50.03	35°0.11 · · 26.45	46°56.06 · · 28.64	248°2.98 · · 37.45	357°9.60 · · 30.52	Atria 107°8.64 -69°4.22
16 17	11°52.49 26°54.96	49°59.46 25.50 64°58.81 24.55	61°56.52 28.15 76°56.97 27.65	263°5.74 37.48 278°8.50 37.52	12°11.84 30.42 27°14.08 30.31	Sabik 102°1.96 -15°45.46
18	41°57.42	79°58.16 \$16°23.60	91°57.43 \$19°27.16	293°11.26 N22°37.56	42°16.32 <b>S</b> 02°30.21	Shaula 96°9.43 -37°7.29
19	56° 59.89	94°57.51 22.65	106°57.88 26.67	308°14.02 37.60	57°18.55 30.11	Rasalhague 95°57.94 12°32.29 Eltanin 90°42.17 51°28.84
20	72°2.35	109°56.86 21.70	121°58.34 26.18	323°16.78 37.64	72°20.79 30.00	Eltanin 90°42.17 51°28.84   Kaus Aust. 83°31.65 -34°22.29
21	87°4.81	124°56.21 · · 20.75	136°58.79 · · 25.68	338°19.53 · · 37.68	87°23.03 · · 29.90	Vega 80°32.98 38°48.25
22	102°7.28	139°55.56 19.80	151°59.25 25.19	353°22.29 37.72	102°25.27 29.79	Nunki 75°46.97 -26°15.86
23	117°9.74	154°54.91 18.84	166°59.70 24.70	8°25.05 37.76	117°27.51 29.69	Altair 61°59.40 8°56.13
Mer.p	pass. 15:13	$\nu$ -0.7′ <i>d</i> -0.9′ m-3.91	$ u 0.5' \ d$ -0.5' m1.11	$\nu 2.8' \ d0.0' \ \text{m-}2.62$	$ u 2.2' \ d  0.1' \ \text{m} 1.03$	Peacock 53°4.90 -56°39.06
						Deneb 49°25.67 45°22.34
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°38.23 9°59.63 Al Na'ir 27°32.22 -46°50.19
0	$132^{\circ}12.21$	169°54.26 <b>S</b> 16°17.89	182°0.16	23°27.81 N22°37.80	132°29.75 S02°29.59	Fomalhaut 15°13.83 -29°29.17
1	147° 14.67	184°53.62 16.94	197°0.62 23.71	38°30.56 37.84	147°31.98 29.48	Scheat 13°44.63 28°13.51
2	162° 17.13 177° 19.60	199°52.97 15.98 214°52.32 · · 15.02	212°1.07 23.21 227°1.53 · · 22.72	53°33.32 37.88 68°36.08 · · 37.92	162°34.22 29.38 177°36.46 •• 29.28	Markab 13°29.27 15°20.74
3 4	177 19.00 192°22.06	214 52.32 1 15.02 229°51.68 14.07	242°1.99 22.22	83°38.84 37.96	192°38.70 29.17	Jan 31 Sat SHA Mer.pass
5	207° 24.53	244°51.03 13.11	257°2.45 21.72	98°41.59 38.00	207° 40.94 29.07	Venus 40°12.06 12:39
6	222° 26.99	259°50.39 \$16°12.15	272°2.90 \$19°21.23	113°44.35 N22°38.04	222°43.17 S02°28.96	Mars 51°24.52 11:53
7	237°29.46	274°49.74 11.19	287° 3.36 20.73	128°47.10 38.07	237° 45.41 28.86	Jupiter 251°1.26 22:31
8	252°31.92	289°49.10 10.23	302°3.82 20.23	143°49.86 38.11	252°47.65 28.76	Saturn 0°28.28 15:15
9	267°34.38	304°48.45 · · 9.27	317° 4.28 · · 19.73	158°52.61 · · 38.15	267°49.89 · · 28.65	Feb 01 Sun SHA Mer.pass
10 11	282°36.85 297°39.31	319°47.81 8.31 334°47.17 7.34	332°4.73 19.24 347°5.19 18.74	173°55.37 38.19 188°58.12 38.23	282°52.12 28.55 297°54.36 28.44	Venus 38°56.90 12:40
12	312° 41.78	349°46.53 \$16°6.38	2°5.65 \$19°18.24	204°0.88 N22°38.27	312°56.60 S02°28.34	Mars 50°36.19 11:52
13	327° 44.24	4°45.89 5.42	17°6.11 17.74	219°3.63 38.31	327°58.83 28.24	Jupiter 251°8.50 22:26
14	$342^{\circ}46.70$	19°45.25 4.45	32°6.57 17.24	234°6.39 38.35	343°1.07 28.13	Saturn 0°22.94 15:11
15	357° 49.17	34°44.61 · · 3.49	47°7.03 · · 16.74	249°9.14 · · 38.38	358°3.31 · · 28.03	Feb 02 Mon SHA Mer.pass
16	12°51.63	49°43.97 2.52	62°7.48 16.24	264°11.90 38.42	13°5.54 27.92	Venus 37°42.06 12:41
17	27°54.10 42°56.56	64°43.33 1.55 79°42.69 \$16°0.59	77°7.94 15.74 92°8.40 \$19°15.24	279°14.65 38.46 294°17.40 N22°38.50	28°7.78 27.82 43°10.02 \$02°27.71	Mars 49°47.96 11:52
18 19	42°56.56 57°59.02	94°42.05 15°59.62	107°8.86 14.74	309°20.16	58° 12.25 27.61	Jupiter 251°15.60 22:22 Saturn 0°17.54 15:08
20	73°1.49	109°41.42 58.65	122°9.32 14.24	324°22.91 38.58	73°14.49 27.51	
21	88°3.95	124°40.78 · · 57.68	137° 9.78 · · 13.73	339°25.66 · · 38.62	88°16.72 · · 27.40	Horizontal parallax
22	103°6.42	139° 40.14 56.71	152°10.24 13.23	354°28.41 38.65	103° 18.96 27.30	Venus: 0.1
23	118°8.88	154°39.51 55.73	167°10.70 12.73	9°31.17 38.69	118°21.20 27.19	Mars: 0.1
Mer.p	pass. 15:09	$\nu\text{-}0.6'~d\text{-}1.0'~\text{m-}3.91$	$ u 0.5' \ d \text{-} 0.5' \ \text{m} 1.11$	$\nu 2.8' \ d0.0' \ \text{m-}2.62$	$\nu 2.2' \ d\text{-}0.1' \ \text{m}1.03$	

h	Su	n		-011 -	_ +09.1155 Moon		
Sat 0	<b>GHA</b> 176°40.00	<b>Dec</b> \$17°26.34	<b>GHA</b> 22°55.10	$\nu$ 3.5'	<b>Dec</b> N26° 43.04	d -6.3'	<b>HP</b> 59.7'
1	191°39.91	25.64	37° 17.60	3.6'	26° 36.72	-0.5'	59.7'
2	206°39.82	24.95	51°40.19	3.7'	26°30.21	-6.7'	59.7'
3	221°39.72	• • 24.25	66°2.87	3.8'	$26^{\circ}23.51$	-6.9'	59.7'
4	236°39.63	23.55	80°25.63	3.9'	26° 16.64	-7.1'	59.7'
5 6	251°39.54 266°39.45	22.86 \$17°22.16	94° 48.49 109° 11.44	3.9' 4.0'	26°9.58 N26°2.35	-7.2' -7.4'	59.7' 59.7'
7	281°39.36	21.46	109 11.44 123°34.48	4.0	25° 54.94	-7.4 -7.6'	59.7'
8	296°39.27	20.76	137°57.62	4.2'	25°47.36	-7.8'	59.7'
9	311°39.17	• • 20.06	152°20.86	4.3'	25°39.60	-7.9'	59.6'
10	326°39.08	19.36	166°44.20	4.4'	25°31.67	-8.1'	59.6'
11 12	341°38.99 356°38.90	18.66 \$17°17.96	181°7.64 195°31.18	4.5' 4.6'	25°23.57 N25°15.31	-8.3' -8.4'	59.6' 59.6'
13	11°38.82	17.25	195 31.18 209°54.82	4.0 4.8'	25°6.87	-8.4 -8.6'	59.6'
14	26°38.73	16.55	224° 18.58	4.9'	24°58.28	-8.8'	59.6'
15	41°38.64	• • 15.85	238°42.44	5.0'	$24^{\circ}49.51$	-8.9'	59.6'
16	56°38.55	15.14	253°6.40	5.1'	24° 40.59	-9.1'	59.6'
17 18	71°38.46 86°38.37	14.44 \$17°13.73	267° 30.48 281° 54.67	5.2' 5.3'	24°31.51 N24°22.27	-9.2' -9.4'	59.5' 59.5'
19	101°38.29	13.03	201 54.07 296° 18.97	5.4'	24° 12.88	-9.4 -9.5'	59.5'
20	116°38.20	12.32	310°43.38	5.5'	24°3.33	-9.7'	59.5'
21	131°38.11	• • 11.62	325°7.91	5.6'	23°53.63	-9.8'	59.5'
22	146°38.03	10.91	339°32.55	5.8'	23°43.78	-10.0'	59.5'
23	161°37.94	10.20	353°57.31	5.9'	23°33.78	-10.1'	59.4'
	$SD = 16.2^{\prime}$	d = -0.7'		SI	D = 16.3'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	176°37.86	\$17°9.49	8°22.19	6.0'	N23°23.64	-10.3'	59.4'
1	191°37.77	8.79	22°47.18	6.1'	23° 13.35	-10.4'	59.4'
2	206°37.69	8.08	37° 12.29	6.2'	23°2.92	-10.6'	59.4'
3	221°37.60 236°37.52	• • 7.37	51°37.51 66°2.86	6.3'	22°52.35 22°41.64	-10.7'	59.4'
4 5	236°37.52 251°37.43	6.66 5.95	80°28.33	6.5' 6.6'	22°41.64 22°30.80	-10.8' -11.0'	59.4' 59.3'
6	266°37.35	\$17°5.24	94° 53.91	6.7	N22° 19.82	-11.1'	59.3'
7	281°37.27	4.52	109° 19.62	6.8'	22°8.71	-11.2'	59.3'
8	296°37.19	3.81	123° 45.44	6.9'	21°57.47	-11.4'	59.3'
9	311°37.10	• • 3.10	138° 11.39	7.1'	21°46.11	-11.5'	59.3'
10 11	326°37.02 341°36.94	2.39 1.67	152°37.46 167°3.64	7.2' 7.3'	21°34.61 21°23.00	-11.6' -11.7'	59.2' 59.2'
12	356°36.86	517°0.96	181° 29.95	7.4	N21°11.26	-11.7	59.2'
13	11°36.78	17°0.24	195°56.39	7.6'	20°59.40	-12.0'	59.2'
14	26°36.70	$16^{\circ}59.53$	$210^{\circ}22.94$	7.7'	20°47.43	-12.1'	59.2'
15	41°36.62	• • 58.81	224°49.61	7.8'	20° 35.33	-12.2'	59.1'
16 17	56°36.54 71°36.46	58.10 57.38	239° 16.41 253° 43.32	7.9' 8.0'	20°23.13 20°10.81	-12.3' -12.4'	59.1' 59.1'
18	86°36.38	\$16°56.66	268° 10.36	8.2'	N19°58.39	-12.5'	59.1'
19	101°36.30	55.94	$282^{\circ}37.51$	8.3'	$19^{\circ}45.85$	-12.6'	59.0'
20	116°36.22	55.23	297°4.79	8.4'	19°33.21	-12.7'	59.0'
21	131°36.14 146°36.07	· · 54.51 53.79	311°32.19 325°59.70	8.5'	19°20.47 19°7.63	-12.8' -12.9'	59.0' 59.0'
22 23	146 36.07 161°35.99	53.79 53.07	325 59.70 340° 27.34	8.6' 8.8'	19 7.03 18°54.68	-12.9 -13.0'	59.0 58.9'
23	SD = 16.2'	d = -0.7'	340 27.34		D = 16.2'	-13.0	30.9
	5D = 10.2	a = -0.7		- 51	$D = 10.2^{\circ}$		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°35.91	S16°52.35	354°55.09	8.9'	N18° 41.64	-13.1'	58.9'
1 2	191°35.84 206°35.76	51.63 50.91	9°22.96 23°50.95	9.0' 9.1'	18° 28.51 18° 15.28	-13.2' -13.3'	58.9' 58.9'
3	200 35.70 221°35.68	50.91	25 50.95 38° 19.06	9.1 9.2'	18°1.96	-13.3 -13.4'	58.8'
4	236°35.61	49.46	52° 47.28	9.3'	17° 48.55	-13.5'	58.8'
5	251°35.53	48.74	67° 15.62	9.5'	17°35.05	-13.6'	58.8'
6	266°35.46	\$16°48.01	81°44.08	9.6'	N17°21.47	-13.7'	58.8'
7 8	281°35.38 296°35.31	47.29 46.57	96° 12.65 110° 41.33	9.7' 9.8'	17°7.80 16°54.05	-13.7' -13.8'	58.7' 58.7'
9	311°35.24	• • 45.84	125° 10.13	9.0	16° 40.23	-13.9'	58.7'
10	326°35.16	45.12	139°39.04	10.0'	$16^{\circ}26.32$	-14.0'	58.7'
11	341°35.09	44.39	154°8.06	10.1'	16° 12.34	-14.1'	58.6'
12	356°35.02	\$16°43.66	168° 37.19	10.2'	N15°58.29	-14.1'	58.6'
13 14	11°34.95 26°34.87	42.94 42.21	183°6.43 197°35.78	10.4' 10.5'	15° 44.16 15° 29.96	-14.2' -14.3'	58.6' 58.6'
15	41°34.80	• 41.48	212°5.24	10.5	15° 29.90 15° 15.70	-14.3'	58.5'
16	56°34.73	40.75	226°34.80	10.7'	15°1.37	-14.4'	58.5'
17	71°34.66	40.02	241°4.48	10.8'	14°46.97	-14.5'	58.5'
18	86°34.59	\$16°39.29	255° 34.25	10.9'	N14° 32.51	-14.5'	58.4'
19 20	101°34.52 116°34.45	38.56 37.83	270°4.14 284°34.12	11.0' 11.1'	14°17.99 14°3.42	-14.6' -14.6'	58.4' 58.4'
20	116 34.45 131 34.38	37.83 · · 37.10	284 34.12 299°4.21	11.1	14° 3.42 13° 48.78	-14.6 -14.7'	58.4' 58.4'
22	146°34.31	36.37	313°34.40	11.3'	13°34.09	-14.7'	58.3'
23	161°34.24	35.64	328°4.69	11.4'	13° 19.34	-14.8'	58.3'
	SD = 16.2'	d = -0.7'	-	SI	D = 16.1'		
	JD — 10.2						

Lat.	Twi	light	Sunrise	Sunset	Twi	ilight
Lat.	Naut.	Civil	Junise	Juliset	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
45°	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
35°	06:02	06:32	06:59	17:29	17:55	18:26
30°	05:57	06:25	06:50	17:37	18:02	18:31
20°	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
<b>S</b> 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
<b>S</b> 60°	01:10	02:58	03:56	20:29	21:26	23:09

Lat.		Moonris	е		Moonse	t
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°			15:08			10:54
<b>N</b> 70°			15:45			10:14
68°		13:17	16:10		10:49	09:47
66°		14:08	16:30		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
<b>N</b> 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	80:80
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
<b>N</b> 40°	15:37	16:54	18:09	06:20	07:02	07:35
$35^{\circ}$	15:53	17:07	18:17	06:02	06:48	07:25
$30^{\circ}$	16:07	17:18	18:25	05:47	06:36	07:16
$20^{\circ}$	16:31	17:37	18:38	05:22	06:15	07:00
$N 10^{\circ}$	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	20:42	20:45	20:46	00:25	02:21	04:13

	Sun			Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	13-15	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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	Stars	
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA	Dec
0	133° 11.34	169°38.87 \$15°54.76	182°11.16	24°33.92 N22°38.73	133°23.43		
1	$148^{\circ}13.81$	184°38.24 53.79	197°11.62 11.72	39°36.67 38.77	148° 25.67 26.98	· ·	9° 14.16
2	$163^{\circ}16.27$	199° 37.60 52.81	212°12.08 11.22	54°39.42 38.81	163°27.90 26.88		2° 10.05 6° 41.06
3	178° 18.74	214°36.97 · · 51.84	227°12.54 · · 10.71	69°42.17 · · 38.85	178° 30.14 · · · 26.77		7°50.73
4	193°21.20	229°36.34 50.86	242°13.00 10.21	84°44.92 38.88	193°32.38 26.67		57°6.51
5	208° 23.67	244°35.70 49.89 259°35.07 \$15°48.91	257°13.47 9.70	99°47.67 38.92 114°50.42 N22°38.96	208°34.61 26.56 223°36.85 502°26.46	Hamal 327°50.23 23	3°35.23
6 7	223° 26.13 238° 28.59	259°35.07 \$15°48.91 274°34.44 47.93	272°13.93 \$19°9.20 287°14.39 8.69	129°53.17 39.00	238°39.08 26.35		9°22.78
8	253° 31.06	289°33.81 46.95	302°14.85 8.19	144°55.92 39.04	253°41.32 26.25		0°12.23
9	268° 33.52	304°33.18 · · 45.97	317°15.31 · · 7.68	159°58.67 · · 39.07	268° 43.55 · · 26.14	l .	4°11.50
10	283°35.99	319°32.55 44.99	332°15.77 7.17	175°1.42 39.11	283°45.79 26.04		9° 57.44 6° 33.72
11	298° 38.45	334°31.92 44.01	347°16.24 6.67	190°4.17 39.15	298°48.02 25.93		8° 10.39
12	313° 40.91	349°31.29 \$15°43.03	2°16.70 \$19°6.16	205°6.92 N22°39.19	313°50.26 S02°25.83		46°1.57
13	328° 43.38	4°30.66 42.05 19°30.04 41.06	17°17.16 5.65 32°17.62 5.14	220°9.67 39.23 235°12.42 39.26	328° 52.49 25.72 343° 54.72 25.62		6°22.35
14 15	343° 45.84 358° 48.31	34°29.41 · · 40.08	32°17.62 5.14 47°18.09 • 4.64	235°12.42 39.26 250°15.17 · · 39.30	343°54.72 25.62 358°56.96 •• 25.51		8°37.80
16	13°50.77	49°28.78 39.10	62°18.55 4.13	265°17.92 39.34	13°59.19 25.41		1°11.19
17	28°53.23	64°28.16 38.11	77°19.01 3.62	280°20.66 39.38	29°1.43 25.30		7°24.66
18	43°55.70	79°27.53 <b>S</b> 15°37.12	92°19.47 \$19°3.11	295°23.41 N22°39.41	44°3.66 \$02°25.20		2° 42.73 6° 45.24
19	58°58.16	94°26.91 36.14	107°19.94 2.60	310°26.16 39.45	59°5.90 25.09		0 43.24 29°0.58
20	74°0.63	109°26.28 35.15	122°20.40 2.09	325°28.90 39.49	74°8.13 24.99	Procyon 244°49.57	5°9.39
21	89°3.09 104°5.55	124°25.66 · · 34.16 139°25.03 33.17	137°20.87 · · 1.58	340°31.65 · · 39.53	89°10.36 · · 24.88		7°57.72
22 23	104 5.55 119°8.02	139°25.03 33.17 154°24.41 32.18	152°21.33 1.07 167°21.79 0.55	355°34.40 39.56 10°37.14 39.60	104° 12.60 24.78 119° 14.83 24.67		9°35.64
		-					3°32.32
Mer.	pass. 15:05	ν-0.6' d-1.0' m-3.91	$\nu 0.5' \ d$ -0.5' m1.11	$\nu 2.8' \ d0.0' \ \text{m-}2.61$	$\nu 2.2' \ d$ -0.1' m1.03		9°49.44
							8°46.41 1°50.23
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec		1°36.36
0	$134^{\circ}10.48$	169°23.79 \$15°31.19	182°22.26 <b>S</b> 19°0.04	25°39.89 N22°39.64	134°17.07 <b>S</b> 02°24.57		4°25.37
1	149° 12.95	184°23.17 30.20	197°22.72 18°59.53	40°42.64 39.68	149°19.30 24.46		7°41.27
2	164° 15.41	199°22.55 29.21	212°23.19 59.02	55°45.38 39.71	164°21.53 24.36		3°14.47
3 4	179° 17.88 194° 20.34	214°21.92 · · 28.22 229°21.30 27.22	227°23.65 · · 58.50 242°24.12 57.99	70°48.13 · · 39.75 85°50.87 39.79	179°23.77 · · 24.25 194°26.00 24.14		7° 15.43
5	209° 22.80	244°20.68 26.23	257°24.58 57.48	100°53.62 39.83	209°28.23 24.04		5°48.74
6	224° 25.27	259°20.07 \$15°25.23	272°25.05 \$18°56.96	115°56.36 N22°39.86	224°30.46 S02°23.93	·	1° 17.94
7	239° 27.73	274°19.45 24.24	287°25.51 56.45	130°59.11 39.90	239° 32.70 23.83		9° 10.61 0° 29.73
8	254°30.20	289° 18.83 23.24	302°25.98 55.93	146°1.85 39.94	254°34.93 23.72		6°29.83
9	269°32.66	304°18.21 · · 22.24	317°26.44 · · 55.42	161°4.59 · · 39.97	269° 37.16 · · · 23.62		19°2.53
10	284°35.12	319°17.59 21.24	332°26.91 54.90	176°7.34 40.01	284°39.40 23.51		0°56.38
11 12	299° 37.59 314° 40.05	334°16.98 20.25 349°16.36 \$15°19.25	347°27.37 54.39 2°27.84 \$18°53.87	191°10.08 40.05 206°12.82 N22°40.08	299° 41.63 23.41 314° 43.86 \$02° 23.30	l .	74°2.45
13	329° 42.52	4°15.75 18.25	17°28.31 53.36	200 12.82 N22 40.08 221°15.57 40.12	329°46.09 23.19		16°9.06
14	344° 44.98	19°15.13 17.24	32°28.77 52.84	236°18.31 40.16	344°48.33 23.09	· ·	6°37.32
15	359° 47.44	34°14.52 · · 16.24	47°29.24 · · 52.32	251°21.05 · · 40.19	359°50.56 · · 22.98		6°29.36 69°4.22
16	$14^{\circ}49.91$	49° 13.90 15.24	62°29.71 51.80	266°23.79 40.23	14°52.79 22.88		09 4.22 5°45.47
17	29°52.37	64°13.29 14.24	77°30.17 51.29	281°26.53 40.27	29°55.02 22.77		37°7.29
18	44°54.84	79°12.68 \$15°13.23	92°30.64 \$18°50.77	296°29.28 N22°40.30	44°57.25 S02°22.66		2°32.28
19	59°57.30	94°12.06 12.23	107°31.11 50.25	311°32.02 40.34	59°59.49 22.56		1°28.82
20 21	74°59.76 90°2.23	109°11.45 11.22 124°10.84 · · 10.22	122°31.58 49.73 137°32.04 • 49.21	326°34.76 40.38 341°37.50 • 40.41	75°1.72 22.45 90°3.95 · · 22.35		4°22.29
22	105°4.69	139°10.23 9.21	157 32.54 49.21 152°32.51 48.69	356°40.24 40.45	105°6.18 22.24	_	8°48.24
23	120°7.16	154°9.62 8.20	167°32.98 48.17	11°42.98 40.49	120°8.41 22.13		6° 15.86
Mar	pass. 15:01	ν-0.6' d-1.0' m-3.91	$\nu$ 0.5' d-0.5' m1.11	ν2.7' d0.0' m-2.61	ν2.2' d-0.1' m1.03		8° 56.12 6° 39.05
ivier.	pass. 15.01	ν-0.0 α-1.0 III-3.91	νο.5 α-ο.5 III.11	V2.1 00.0 III-2.01	ν2.2 <b>u</b> -0.1 III1.03		5°22.32
							9°59.62
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°32.21 -46	6°50.18
0 1	135°9.62 150°12.08	169°9.01 \$15°7.19 184°8.40 6.19	182°33.45 \$18°47.65 197°33.92 47.13	26°45.72 N22°40.52 41°48.46 40.56	135°10.64		9°29.17
2	165° 14.55	199°7.79 5.18	212°34.39 46.61	56°51.20 40.60	165°15.11 21.81		8° 13.50
3	180° 17.01	214°7.18 · · 4.17	227°34.85 · · 46.09	71°53.94 · · 40.63	180°17.34 · · 21.71	Markab 13°29.28 15	5°20.74
4	195° 19.48	229°6.58 3.15	242°35.32 45.57	86°56.68 40.67	195°19.57 21.60		1er.pass
5	210° 21.94	244°5.97 2.14	257°35.79 45.04	101°59.42 40.70	210°21.80 21.49	Venus 36°27.53	12:42
6	225° 24.40	259°5.36 \$15°1.13	272°36.26 \$18°44.52	117°2.15 N22°40.74	225°24.03	Mars 48° 59.82	11:51
7	240°26.87	274°4.76 15°0.12	287°36.73 44.00	132°4.89 40.78	240°26.26 21.28	Jupiter 251°22.57 Saturn 0°12.09	22:18 15:04
8 9	255° 29.33 270° 31.80	289°4.15 14°59.10 304°3.55 · · 58.09	302°37.20 43.48 317°37.67 • 42.95	147°7.63 40.81 162°10.37 · · 40.85	255°28.49 21.18 270°30.72 · · 21.07	Saturn 0 12.09	15:04
10	285° 34.26	319°2.94 57.07	332°38.14 42.43	177°13.11 40.89	285°32.95 20.96		1er.pass
11	300° 36.72	334°2.34 56.06	347°38.61 41.90	192°15.84 40.92	300°35.18 20.86	Venus 35°13.31	12:43
12	315°39.19	349°1.73 <b>S</b> 14°55.04	2°39.08 <b>S</b> 18°41.38	207°18.58 N22°40.96	315°37.41 \$02°20.75	Mars 48°11.77 Jupiter 251°29.41	11:50
13	330°41.65	4°1.13 54.02	17°39.55 40.85	222°21.32 40.99	330°39.64 20.64	Saturn 0°6.58	22:13 15:01
14	345°44.12	19°0.53 53.00	32°40.02 40.33	237°24.05 41.03	345°41.87 20.54		
15 16	0°46.58	33°59.93 · · 51.99	47°40.49 · · 39.80	252°26.79 · · 41.06	0°44.10 · · 20.43		10.44
16 17	15° 49.05 30° 51.51	48°59.33 50.97 63°58.72 49.95	62°40.96 39.28 77°41.43 38.75	267°29.52 41.10 282°32.26 41.14	15°46.33 20.32 30°48.56 20.21	Venus 33°59.39	12:44
18	45° 53.97	78°58.12 S14°48.92	92°41.91 \$18°38.22	282 32.20 41.14 297°35.00 N22°41.17	45°50.79 S02°20.11	Mars 47°23.83 Jupiter 251°36.10	11:49 22:09
19	60° 56.44	93°57.52 47.90	107°42.38 37.70	312°37.73 41.21	60°53.02 20.00	Saturn 0°1.02	14:57
20	75°58.90	108°56.92 46.88	122°42.85 37.17	327°40.47 41.24	75°55.25 19.89		
21	91°1.37	123°56.33 · · 45.86	137°43.32 · · 36.64	342°43.20 · · 41.28	90°57.48 · · 19.79	Horizontal parallax	0.1
22	106°3.83	138°55.73 44.83	152°43.79 36.11	357°45.93 41.31	105°59.71 19.68	Venus: Mars:	0.1 0.1
23	121°6.29	153°55.13 43.81	167°44.26 35.59	12°48.67 41.35	121°1.94 19.57	L IVIdIS.	U.1
Mer.	pass. 14:57	ν-0.6′ d-1.0′ m-3.91	$\nu 0.5' \ d$ -0.5' m1.11	$\nu 2.7' \ d0.0' \ \text{m-}2.60$	ν2.2′ d-0.1′ m1.03		

h	Su	Moon					
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	176°34.17	S16°34.91	$342^{\circ}35.08$	11.5'	$N13^{\circ}4.55$	-14.8'	58.3'
1	191°34.11	34.17	357°5.56	11.6'	12°49.70	-14.9'	58.2'
2 3	206°34.04 221°33.97	33.44 •• 32.71	11°36.14 26°6.82	11.7' 11.8'	12°34.80 12°19.86	-14.9' -15.0'	58.2' 58.2'
4	236°33.90	31.97	40°37.60	11.9'	12°4.87	-15.0'	58.1
5	251°33.84	31.24	55°8.47	12.0'	11°49.84	-15.1'	58.1'
6	266°33.77	S16°30.50	69°39.43 84°10.48	12.1'	N11°34.77	-15.1'	58.1'
7 8	281°33.70 296°33.64	29.76 29.03	98°41.62	12.1' 12.2'	11°19.66 11°4.51	-15.2' -15.2'	58.1' 58.0'
9	311°33.57	28.29	113°12.85	12.3'	10°49.32	-15.2'	58.0'
10	326°33.51	27.55	127°44.17	12.4'	10°34.09	-15.3'	58.0'
11	341°33.44 356°33.38	26.81 \$16°26.08	142°15.57 156°47.06	12.5'	10°18.84 N10°3.55	-15.3'	57.9'
12 13	350 33.38 11°33.32	25.34	150 47.00 171°18.64	12.6' 12.7'	09°48.23	-15.3' -15.3'	57.9' 57.9'
14	26°33.25	24.60	185°50.30	12.7'	09°32.88	-15.4'	57.8'
15	41°33.19	• • 23.86	200°22.03	12.8'	09°17.50	-15.4'	57.8'
16 17	56°33.13 71°33.06	23.12 22.38	214°53.85 229°25.75	12.9' 13.0'	09°2.10 08°46.67	-15.4' -15.5'	57.8' 57.7'
18	86°33.00	\$16°21.63	243°57.73	13.1'	N08°31.22	-15.5'	57.7'
19	101°32.94	20.89	258°29.78	13.1'	08°15.74	-15.5'	57.7'
20	116°32.88	20.15	273°1.91	13.2'	08°0.25	-15.5'	57.6'
21 22	131°32.82 146°32.76	· · 19.41 18.66	287°34.11 302°6.39	13.3' 13.3'	07°44.74 07°29.21	-15.5' -15.5'	57.6' 57.6'
23	140 32.70 161°32.70	17.92	302 6.39 316°38.74	13.4'	07 29.21 07°13.67	-15.5 -15.6'	57.6'
	SD = 16.2'	d = -0.7'			D = 15.9'		
Wed	<b>GHA</b> 176°32.64	<b>Dec</b> \$16°17.18	<b>GHA</b> 331°11.16	ν 12 5'	<b>Dec</b> N06°58.11	d -15.6'	HP
0 1	176°32.64 191°32.58	16.43	331°11.16 345°43.64	13.5' 13.6'	06°42.54	-15.6' -15.6'	57.5' 57.5'
2	206°32.52	15.68	0°16.20	13.6'	$06^{\circ}26.95$	-15.6'	57.5'
3	221°32.46	• • 14.94	14°48.82	13.7'	06°11.36	-15.6'	57.4'
4	236°32.40 251°32.34	14.19 13.45	29°21.51 43°54.26	13.8' 13.8'	05°55.75 05°40.14	-15.6' -15.6'	57.4' 57.4'
5 6	266°32.28	\$16°12.70	43 54.20 58°27.07	13.8	N05°24.53	-15.6'	57.4 57.3'
7	281°32.23	11.95	72°59.95	13.9'	05°8.90	-15.6'	57.3'
8	296°32.17	11.20	87°32.88	14.0'	04°53.28	-15.6'	57.3'
9 10	311°32.11 326°32.06	· · 10.45 9.70	102°5.88 116°38.93	14.1' 14.1'	04°37.65 04°22.02	-15.6' -15.6'	57.2' 57.2'
11	341°32.00	9.70 8.95	110 36.93 131°12.04	14.1	04° 22.02	-15.6'	57.2'
12	356°31.94	<b>S</b> 16°8.20	145°45.20	14.2'	N03°50.76	-15.6'	57.1'
13	11°31.89	7.45	160°18.42	14.3'	03°35.13	-15.6'	57.1'
14 15	26°31.83 41°31.78	6.70 • • 5.95	174°51.68 189°25.01	14.3' 14.4'	03°19.50 03°3.88	-15.6' -15.6'	57.1' 57.0'
16	56°31.72	5.20	203°58.38	14.4'	03° 3.00	-15.6'	57.0'
17	71°31.67	4.44	$218^{\circ}31.79$	14.5'	$02^{\circ}32.66$	-15.6'	57.0'
18	86°31.62	S16°3.69	233°5.26	14.5'	N02°17.07 02°1.48	-15.6'	56.9'
19 20	101°31.56 116°31.51	2.94 2.18	247°38.77 262°12.33	14.6' 14.6'	02°1.48 01°45.90	-15.6' -15.6'	56.9' 56.9'
21	131°31.46	. 1.43	276°45.93	14.6'	01°30.33	-15.6'	56.8'
22	146°31.40	16°0.67	$291^{\circ}19.58$	14.7'	$01^{\circ}14.78$	-15.5'	56.8'
23	161°31.35	15°59.92	305°53.26	14.7'	00°59.23	-15.5'	56.8'
	SD = 16.2'	d = -0.7'		SI	O = 15.7'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	176°31.30 191°31.25	\$15°59.16 58.41	320°26.99 335°0.75	14.8' 14.8'	N00°43.71 00°28.20	-15.5' -15.5'	56.7' 56.7'
2	191°31.25 206°31.20	58.41 57.65	335°0.75 349°34.55	14.8'	N00° 12.70	-15.5' -15.5'	56.7'
3	221°31.15	• • 56.89	4°8.39	14.9'	S00°2.77	15.5'	56.6'
4	236°31.10	56.13	18°42.26	14.9'	00°18.23	15.4'	56.6'
5 6	251°31.05 266°31.00	55.37 \$15°54.61	33°16.16 47°50.10	14.9' 15.0'	00°33.66 \$00°49.08	15.4' 15.4'	56.6' 56.5'
7	281°30.95	53.86	62°24.07	15.0'	01°4.47	15.4	56.5
8	296°30.90	53.10	76°58.07	15.0'	01°19.84	15.3'	56.5'
9	311°30.85 326°30.80	• • 52.34	91°32.09 106°6.15	15.1' 15.1'	01°35.19 01°50.51	15.3' 15.3'	56.4' 56.4'
10 11	326°30.80 341°30.75	51.57 50.81	106°6.15 120°40.23	15.1' 15.1'	01°50.51 02°5.81	15.3'	56.4'
12	356°30.71	\$15°50.05	135°14.34	15.1'	S02°21.08	15.2'	56.4
13	11°30.66	49.29	149°48.47	15.2'	02°36.32	15.2'	56.3'
14 15	26°30.61 41°30.57	48.53 •• 47.76	164°22.62 178°56.79	15.2' 15.2'	02°51.53 03°6.71	15.2' 15.2'	56.3' 56.3'
15 16	41°30.57 56°30.52	47.76	178°56.79 193°30.99	15.2'	03°6.71 03°21.86	15.2 15.1'	56.2'
17	71°30.47	46.23	208°5.20	15.2'	03°36.99	15.1	56.2'
18	86°30.43	\$15°45.47	222°39.43	15.2'	S03°52.07	15.1'	56.2'
19 20	101°30.38 116°30.34	44.70 43.94	237°13.68 251°47.94	15.3' 15.3'	04°7.13 04°22.15	15.0' 15.0'	56.1' 56.1'
20	116°30.34 131°30.29	43.94 •• 43.17	251°47.94 266°22.22	15.3'	04°22.15 04°37.13	15.0° 14.9°	56.1
22	146°30.25	42.41	$280^{\circ}56.51$	15.3'	04°52.08	14.9'	56.0'
23	161°30.21	41.64	295°30.81	15.3'	05°7.00	14.9'	56.0'
	SD = 16.2'	d = -0.8'		SI	O = 15.5'		
			-				

	Twi	light		_	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	01:35	03:09	04:05	20:21	21:16	22:47
	ı			ı		

Lat.		Moonris	e		Moonset	t
Lat.	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	20:45	20:44	20:43	05:57	07:33	09:04

	Sun			Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
Luy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	16-18	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	99-89%	
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	Stars
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	136°8.76	168°54.53 <b>S</b> 14°42.78	182°44.74 \$18°35.06	27°51.40 N22°41.38	136°4.17 <b>S</b> 02°19.47	
1	$151^{\circ}11.22$	183°53.94 41.76	197°45.21 34.53	42°54.14 41.42	151°6.40 19.36	Alpheratz 357°34.09 29°14.15 Ankaa 353°6.51 -42°10.04
2	166° 13.69	198°53.34 40.73	212°45.68 34.00	57°56.87 41.45	166° 8.63 19.25	Schedar 349°30.36 56°41.05
3	181° 16.15	213°52.74 · · 39.70	227°46.15 · · 33.47	72°59.60 · · 41.49	181°10.86 · · 19.14	Diphda 348°46.57 -17°50.73
4 5	196° 18.61 211° 21.08	228°52.15 38.67 243°51.55 37.65	242°46.63 32.94 257°47.10 32.41	88°2.33 41.53 103°5.07 41.56	196°13.09 19.04 211°15.32 18.93	Achernar 335°19.70 -57°6.51
6	226° 23.54	258°50.96 \$14°36.62	272°47.57 \$18°31.88	118°7.80 N22°41.60	211 15.52 16.95 226°17.54 <b>S</b> 02°18.82	Hamal 327°50.25 23°35.23
7	241°26.01	273°50.37 35.59	287°48.05 31.35	133°10.53 41.63	241°19.77 18.72	Polaris 313°33.66 89°22.78
8	256°28.47	288°49.77 34.56	302°48.52 30.81	148°13.26 41.67	256° 22.00 18.61	Acamar 315°11.07 -40°12.23 Menkar 314°5.19 4°11.49
9	271°30.93	303°49.18 · · 33.52	317°48.99 · · 30.28	163°15.99 · · 41.70	271°24.23 · · 18.50	Mirfak 308°26.89 49°57.44
10	286°33.40	318°48.59 32.49	332°49.47 29.75	178°18.73 41.74	286°26.46 18.39	Aldebaran 290°38.43 16°33.72
11 12	301°35.86 316°38.33	333°48.00 31.46 348°47.40 \$14°30.43	347°49.94 29.22 2°50.42 \$18°28.68	193°21.46 41.77 208°24.19 N22°41.81	301°28.69 18.29 316°30.91 S02°18.18	Rigel 281°2.81 -8°10.39
13	331° 40.79	3°46.81 29.39	17°50.89 28.15	223°26.92 41.84	331°33.14 18.07	Capella 280°20.28 46°1.57
14	346° 43.25	18°46.22 28.36	32°51.37 27.62	238°29.65 41.88	346°35.37 17.96	Bellatrix 278°21.70 6°22.35
15	1°45.72	33°45.63 · · 27.32	47°51.84 · · 27.08	253°32.38 · · 41.91	1°37.60 · · 17.86	Elnath 278° 0.49 28° 37.81 Alnilam 275° 36.60 -1° 11.20
16	16°48.18	48° 45.05 26.28	62°52.32 26.55	268°35.11 41.94	16°39.83 17.75	Betelgeuse 270°50.87 7°24.66
17	31°50.65	63°44.46 25.25	77°52.79 26.01	283°37.84 41.98	31°42.05 17.64	Canopus 263°51.57 -52°42.74
18 19	46°53.11 61°55.57	78°43.87	92°53.27 \$18°25.48 107°53.74 24.94	298°40.56 N22°42.01 313°43.29 42.05	46°44.28 S02°17.53 61°46.51 17.43	Sirius 258°25.15 -16°45.25
20	76° 58.04	108°42.69 22.13	107 53.74 24.94 122°54.22 24.41	328°46.02 42.08	76° 48.74 17.32	Adhara 255°4.83 -29°0.59
21	92°0.50	123° 42.11 · · 21.09	137°54.69 · · 23.87	343°48.75 · · 42.12	91°50.96 · · 17.21	Procyon 244°49.57 5°9.39
22	107°2.97	138°41.52 20.05	152°55.17 23.33	358°51.48 42.15	106°53.19 17.10	Pollux 243°15.84 27°57.73 Avior 234°13.75 -59°35.65
23	122°5.43	153°40.94 19.01	167°55.65 22.80	13°54.21 42.19	121°55.42 16.99	Suhail 222°45.20 -43°32.34
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	Miaplacidus 221°37.18 -69°49.45
						Alphard 217°46.53 -8°46.42
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.15 11°50.22
0	137°7.89	168°40.35 \$14°17.97	182°56.12 \$18°22.26	28°56.93 N22°42.22	136°57.65	Dubhe 193°39.28 61°36.37
1	$152^{\circ}10.36$	183°39.77 16.93	197°56.60 21.72	43°59.66 42.26	151°59.87 16.78	Denebola 182°23.76 14°25.37 Gienah 175°42.43 -17°41.28
2	$167^{\circ}12.82$	198°39.18 15.88	212°57.08 21.19	59°2.39 42.29	167°2.10 16.67	Acrux 172°58.66 -63°14.49
3	182° 15.29	213°38.60 · · 14.84	227°57.55 · · 20.65	74°5.11 · · 42.32	182°4.33 · · 16.56	Gacrux 171°50.28 -57°15.44
4 5	197° 17.75 212° 20.22	228°38.02 13.79 243°37.43 12.75	242°58.03 20.11 257°58.51 19.57	89°7.84 42.36 104°10.57 42.39	197°6.55 16.45 212°8.78 16.35	Alioth 166°11.84 55°48.74
6	212 20.22 227° 22.68	258°36.85 S14°11.70	272°58.98 \$18°19.03	119°13.29 N22°42.43	212 6.76 10.35 227°11.01 <b>S</b> 02°16.24	Spica 158°21.21 -11°17.94
7	242°25.14	273°36.27 10.66	287°59.46 18.49	134°16.02 42.46	242°13.23 16.13	Alkaid 152°51.11 49°10.61 Hadar 148°34.56 -60°29.74
8	$257^{\circ}27.61$	288°35.69 9.61	302°59.94 17.95	149°18.74 42.49	257° 15.46 16.02	Hadar 148°34.56 -60°29.74 Menkent 147°56.45 -36°29.83
9	272°30.07	303°35.11 · · 8.56	318° 0.42 · · 17.41	164°21.47 · · 42.53	272°17.69 · · 15.91	Arcturus 145°47.00 19°2.53
10	287° 32.54	318°34.53 7.51	333°0.89 16.87	179°24.19 42.56	287°19.91 15.81	Rigil Kent. 139°38.97 -60°56.39
11 12	302°35.00 317°37.46	333°33.95 6.46 348°33.37 \$14°5.41	348°1.37 16.33 3°1.85 \$18°15.79	194°26.92 42.60 209°29.64 N22°42.63	302°22.14 15.70 317°24.36 S02°15.59	Kochab 137°19.72 74°2.45
13	332° 39.93	3°32.79 4.36	18°2.33 15.25	224°32.36 42.66	332°26.59 15.48	Zuben'ubi 136°54.99 -16°9.06
14	347°42.39	18°32.21 3.31	33°2.81 14.70	239°35.09 42.70	347°28.82 15.37	Alphecca 126°3.02 26°37.31 Antares 112°14.85 -26°29.37
15	2°44.86	33°31.64 · · 2.26	48° 3.29 · · 14.16	254°37.81 · · 42.73	2°31.04 · · 15.26	Atria 107°8.54 -69°4.21
16	17° 47.32	48°31.06 1.21	63°3.77 13.62	269°40.53 42.77	17°33.27 15.16	Sabik 102°1.92 -15°45.47
17 18	32° 49.78 47° 52.25	63°30.48 14°0.16 78°29.91 \$13°59.10	78° 4.25 13.08 93° 4.73 \$18° 12.53	284°43.26 42.80 299°45.98 N22°42.83	32°35.49 15.05 47°37.72 S02°14.94	Shaula 96° 9.38 -37° 7.29
19	62°54.71	93°29.33 58.05	108° 5.20 11.99	314°48.70 42.87	62°39.94 14.83	Rasalhague 95°57.91 12°32.27
20	77°57.18	108°28.76 56.99	123° 5.68 11.45	329°51.42 42.90	77°42.17 14.72	Eltanin 90°42.12 51°28.81 Kaus Aust. 83°31.61 -34°22.29
21	92°59.64	123°28.18 · · 55.94	138° 6.16 · · 10.90	344°54.14 · · 42.93	92°44.39 · · 14.61	Kaus Aust. 83°31.61 -34°22.29 Vega 80°32.95 38°48.22
22	108°2.10	138°27.61 54.88	153° 6.64 10.36	359°56.87 42.97	107°46.62 14.50	Nunki 75°46.94 -26°15.86
23	123°4.57	153°27.03 53.82	168°7.13 9.81	14°59.59 43.00	122°48.85 14.40	Altair 61°59.38 8°56.12
Mer.	pass. 14:49	$\nu$ -0.6′ <i>d</i> -1.0′ m-3.91	$ u 0.5' \ d\text{-}0.5' \ \text{m}1.12$	$\nu 2.7' \ d0.0' \ \text{m-}2.59$	$ u 2.2' \ d$ -0.1' m1.02	Peacock 53°4.87 -56°39.04
						Deneb 49°25.66 45°22.31
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°38.23 9°59.62 Al Na'ir 27°32.22 -46°50.17
0	138°7.03	168°26.46 \$13°52.76	183°7.61 <b>S</b> 18°9.27	30°2.31 N22°43.03	137°51.07 <b>S</b> 02°14.29	Fomalhaut 15°13.83 -29°29.16
1	153°9.50	183°25.89 51.71	198°8.09 8.72	45°5.03 43.07	152°53.30 14.18	Scheat 13°44.64 28°13.49
2	168° 11.96	198°25.32 50.65 213°24.74 · · 49.59	213°8.57 8.17	60°7.75 43.10	167°55.52 14.07 182°57.74 · · 13.96	Markab 13°29.28 15°20.73
3 4	183° 14.43 198° 16.89	213°24.74 · · 49.59 228°24.17 48.53	228° 9.05 · · · 7.63 243° 9.53	75°10.47 · · 43.13 90°13.19 43.17	182°57.74 · · 13.96 197°59.97 13.85	Feb 06 Fri SHA Mer.pass
5	213° 10.89	243°23.60 47.47	258°10.01 6.53	105°15.91 43.20	213°2.19 13.74	Venus 32°45.77 12:45
6	228° 21.82	258°23.03 <b>S</b> 13°46.40	273°10.49 \$18°5.99	120°18.63 N22°43.23	228°4.42 S02°13.63	Mars 46°35.98 11:49
7	243° 24.28	273°22.46 45.34	288°10.97 5.44	135°21.34 43.27	243°6.64 13.53	Jupiter 251°42.64 22:05
8	258° 26.75	288°21.89 44.28	303°11.46 4.89	150°24.06 43.30	258°8.87 13.42	Saturn 359°55.41 14:54
9 10	273°29.21 288°31.67	303°21.33 · · 43.22 318°20.76 42.15	318°11.94 · · 4.34 333°12.42 3.79	165°26.78 · · 43.33 180°29.50 43.37	273°11.09 · · 13.31 288°13.32 13.20	Feb 07 Sat SHA Mer.pass
11	303°34.14	318 20.76 42.15 333°20.19 41.09	333 12.42 3.79 348°12.90 3.25	195°32.22 43.40	288° 13.32 13.20 303° 15.54 13.09	Venus 31°32.46 12:46
12	318° 36.60	348°19.62 \$13°40.02	3°13.38 \$18°2.70	210°34.93 N22°43.43	318°17.76 S02°12.98	Mars 45°48.23 11:48
13	333°39.07	3°19.06 38.95	18°13.87 2.15	225°37.65 43.46	333°19.99 12.87	Jupiter 251°49.04 22:00 Saturn 359°49.75 14:50
14	348°41.53	18°18.49 37.89	33°14.35 1.60	240°40.37 43.50	348°22.21 12.76	
15 16	3°43.99	33°17.92 · · 36.82	48°14.83 · · 1.05	255°43.09 · · 43.53	3°24.44 · · 12.65	Feb 08 Sun SHA Mer.pass
16 17	18° 46.46 33° 48.92	48°17.36 35.75 63°16.80 34.68	63°15.32 18°0.49 78°15.80 17°59.94	270°45.80 43.56 285°48.52 43.59	18°26.66 12.54 33°28.88 12.43	Venus 30°19.43 12:47 Mars 45°0.57 11:47
18	48°51.39	78°16.23 S13°33.61	93°16.28 S17°59.39	300°51.23 N22°43.63	48°31.11 S02°12.33	Mars 45° 0.57 11:47 Jupiter 251° 55.27 21:56
19	63°53.85	93°15.67 32.54	108°16.77 58.84	315°53.95 43.66	63°33.33 12.22	Saturn 359°44.04 14:46
20	78°56.31	108°15.10 31.47	123°17.25 58.29	330°56.66 43.69	78° 35.55 12.11	
21 22	93°58.78 109°1.24	123°14.54 · · 30.40 138°13.98 29.33	138°17.73 · · 57.74	345°59.38 · · 43.73 1°2.09 43.76	93°37.78 · · 12.00	Horizontal parallax Venus: 0.1
23	109°1.24 124°3.71	138°13.98 29.33 153°13.42 28.26	153°18.22 57.18 168°18.70 56.63	1°2.09 43.76 16°4.81 43.79	108° 40.00 11.89 123° 42.22 11.78	Mars: 0.1
ivier.	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	

h	Su	n	Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	176°30.16 191°30.12	\$15°40.87	310°5.12 324°39.45	15.3'	\$05°21.87	14.8'	56.0'
1 2	206° 30.12	40.10 39.34	324°39.45 339°13.78	15.3' 15.3'	05°36.71 05°51.51	14.8' 14.8'	56.0' 55.9'
3	221°30.03	• • 38.57	353°48.12	15.3'	06°6.26	14.7'	55.9'
4	236°29.99	37.80	8°22.47	15.4'	06°20.98	14.7'	55.9'
5 6	251°29.95 266°29.91	37.03 \$15°36.26	22°56.82 37°31.17	15.4' 15.4'	06°35.65 \$06°50.28	14.6' 14.6'	55.8' 55.8'
7	281°29.87	35.49	52° 5.53	15.4'	07° 4.87	14.5'	55.8'
8	296°29.83	34.72	66°39.89	15.4'	$07^{\circ}19.42$	14.5'	55.7'
9	311°29.79 326°29.75	• • 33.94	81°14.25 95°48.61	15.4'	07°33.92 07°48.37	14.5'	55.7' 55.7'
10 11	320 29.75 341°29.71	33.17 32.40	95 48.01 110°22.97	15.4' 15.4'	07 48.37 08°2.77	14.4' 14.4'	55.7'
12	356° 29.67	S15°31.63	124°57.33	15.4'	S08°17.13	14.3'	55.6'
13	11°29.63	30.85	139°31.68	15.3'	08°31.44	14.3'	55.6'
14 15	26°29.59 41°29.55	30.08 •• 29.30	154°6.03 168°40.37	15.3' 15.3'	08°45.71 08°59.92	14.2' 14.2'	55.6' 55.6'
16	56° 29.51	28.53	183°14.70	15.3'	09°14.08	14.1'	55.5'
17	71°29.48	27.75	197°49.03	15.3'	09°28.19	14.1'	55.5'
18 19	86°29.44 101°29.40	\$15°26.98 26.20	212°23.35 226°57.66	15.3' 15.3'	\$09°42.25 09°56.25	14.0' 14.0'	55.5' 55.4'
20	116° 29.36	25.42	241°31.96	15.3'	10° 10.20	13.9'	55.4'
21	131°29.33	• • 24.65	256° 6.24	15.3'	10°24.10	13.8'	55.4'
22	146°29.29	23.87	270°40.52	15.3'	10°37.94	13.8'	55.4'
23	161°29.26	23.09	285°14.77	15.2'	10°51.73	13.7'	55.3'
	SD = 16.2'	d = -0.8'		SE	0 = 15.3'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°29.22 191°29.19	\$15°22.31	299°49.02	15.2'	\$11°5.46	13.7'	55.3'
1 2	191°29.19 206°29.15	21.53 20.75	314°23.25 328°57.46	15.2' 15.2'	11°19.13 11°32.74	13.6' 13.6'	55.3' 55.3'
3	221°29.12	• • 19.97	343°31.65	15.2'	11°46.30	13.5'	55.2'
4	236° 29.08	19.19	358°5.82	15.2'	11°59.80	13.4'	55.2'
5 6	251°29.05 266°29.02	18.41 \$15°17.63	12°39.98 27°14.11	15.1' 15.1'	12°13.23 \$12°26.61	13.4' 13.3'	55.2' 55.2'
7	281° 28.98	16.85	41°48.22	15.1'	12°39.92	13.3'	55.2 55.1'
8	296°28.95	16.07	56°22.31	15.1'	12°53.17	13.2'	55.1'
9	311°28.92	11.28	70°56.37 85°30.41	15.0'	13°6.36	13.1'	55.1'
10 11	326°28.89 341°28.86	14.50 13.72	85 30.41 100°4.43	15.0' 15.0'	13°19.48 13°32.54	13.1' 13.0'	55.1' 55.1'
12	356°28.82	S15°12.93	114°38.42	15.0'	<b>S</b> 13°45.54	12.9'	55.0'
13	11°28.79 26°28.76	12.15 11.36	129°12.38 143°46.31	14.9'	13°58.46 14°11.33	12.9' 12.8'	55.0'
14 15	20 28.70 41°28.73	11.30	143 40.31 158°20.21	14.9' 14.9'	14 11.33 14°24.12	12.8	55.0' 55.0'
16	56° 28.70	9.79	172°54.09	14.8'	14°36.85	12.7'	54.9'
17	71°28.67	9.01	187°27.93	14.8'	14°49.50	12.6'	54.9'
18 19	86°28.64 101°28.61	\$15°8.22 7.43	202°1.74 216°35.52	14.8' 14.7'	\$15°2.09 15°14.61	12.5' 12.4'	54.9' 54.9'
20	116° 28.59	6.65	231° 9.26		15°27.06		54.9'
21	131°28.56	5.86	245°42.97	14.7'	15°39.43	12.3'	54.8'
22 23	146°28.53 161°28.50	5.07 4.28	260°16.64 274°50.28	14.6' 14.6'	15°51.73 16°3.96	12.2' 12.2'	54.8' 54.8'
	SD = 16.2'	d = -0.8'			0 = 15.1'		
Sun 0	<b>GHA</b> 176°28.48	<b>Dec</b> \$15°3.49	<b>GHA</b> 289°23.89	u 14.6'	<b>Dec</b> \$16° 16.12	d 12.1'	<b>HP</b> 54.8'
1	191°28.45	2.70	303°57.45	14.5	$16^{\circ}28.20$	12.0'	54.8'
2	206°28.42	1.91	318°30.98	14.5'	16°40.21	11.9'	54.7'
3 4	221°28.40 236°28.37	·· 1.12 15°0.33	333° 4.47 347° 37.91	14.4' 14.4'	16°52.14 17°3.99	11.9' 11.8'	54.7' 54.7'
5	251°28.34	14°59.54	2°11.32	14.4'	17°15.77	11.7'	54.7'
6	266° 28.32	\$14°58.74	16°44.69	14.3'	S17°27.47	11.6'	54.7'
7 8	281°28.29 296°28.27	57.95 57.16	31°18.01 45°51.29	14.3' 14.2'	17°39.09 17°50.63	11.5' 11.5'	54.6' 54.6'
9	311°28.25	56.37	60°24.53	14.2'	18°2.09	11.4'	54.6'
10	326° 28.22	55.57	74°57.73	14.1'	18°13.47	11.3'	54.6'
11 12	341°28.20 356°28.18	54.78 \$14°53.98	89°30.88 104°3.98	14.1' 14.1'	18°24.77 \$18°35.99	11.2' 11.1'	54.6' 54.6'
13	11°28.15	53.19	104 3.98 118°37.04	14.1 14.0'	18°47.12	11.1	54.5'
14	26°28.13	52.39	133°10.05	14.0'	18°58.18	11.0'	54.5'
15 16	41°28.11 56°28.09	• • 51.60 50.80	147°43.02 162°15.93	13.9' 13.9'	19° 9.14 19° 20.02	10.9' 10.8'	54.5' 54.5'
16 17	56°28.09 71°28.06	50.80 50.00	162°15.93 176°48.80	13.9'	19°20.02 19°30.82	10.8	54.5' 54.5'
18	86°28.04	S14°49.20	191°21.62	13.8'	S19°41.53	10.6'	54.5'
19	101°28.02	48.41	205°54.39	13.7'	19°52.15	10.5'	54.5'
20 21	116°28.00 131°27.98	47.61 •• 46.81	220°27.11 234°59.78	13.7' 13.6'	20°2.68 20°13.13	10.4' 10.4'	54.4' 54.4'
22	146°27.96	46.01	249°32.40	13.6'	20°23.49	10.3'	54.4'
23	161°27.94	45.21	264°4.97	13.5'	20°33.75	10.2'	54.4'
	SD = 16.2'	d = -0.8'		SE	0 = 14.9'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	06:47	08:11	09:43	14:47	16:18	17:43
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	01:54	03:19	04:13	20:13	21:07	22:29

Lat.		Moonris	e		Moonset	
Lat.	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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	20:42	20:42	20:42	10:33	12:01	13:31

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
uy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	19-21	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	82-65%	
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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	$139^{\circ}6.17$	$168^{\circ}12.86$	<b>S</b> 13°27.18	183°19.19	S17°56.08	31°7.52	N22°43.82	138°44.45	S02°11.67	Alpheratz	357°34.10	29°14.14
1	154°8.64	183°12.30	26.11	198°19.67	55.52	46°10.24	43.85	153°46.67	11.56	Ankaa	353° 6.52	-42°10.03
2	169°11.10	198°11.74	25.04	213°20.16	54.97	61°12.95	43.89	168°48.89	11.45	Schedar	349°30.37	56°41.04
3	184°13.56	213°11.18	• • 23.96	228°20.64	54.41	76°15.66	• • 43.92	183°51.11	• • 11.34	Diphda	348°46.58	-17°50.73
4 5	199° 16.03 214° 18.49	228°10.62 243°10.06	22.88 21.81	243°21.13 258°21.61	53.86 53.30	91°18.37 106°21.09	43.95 43.98	198°53.34 213°55.56	11.23 11.12	Achernar	$335^{\circ}19.73$	-57°6.50
6	229° 20.96	258° 9.50	\$13°20.73	273°22.10	S17°52.75	121°23.80	N22° 44.02	228°57.78	S02°11.01	Hamal	327°50.26	23°35.22
7	244°23.42	273°8.94	19.65	288°22.58	52.19	136°26.51	44.05	244°0.00	10.90	Polaris Acamar	313°35.03 315°11.09	89°22.78 -40°12.23
8	259° 25.88	288°8.38	18.57	303°23.07	51.64	151°29.22	44.08	259°2.23	10.79	Menkar	314°5.20	4°11.49
9	274°28.35	303°7.83	• • 17.50	318°23.56	• • 51.08	166°31.93	• • 44.11	274°4.45	• • 10.68	Mirfak	308°26.91	49°57.43
10 11	289°30.81 304°33.28	318°7.27 333°6.72	16.42 15.34	333°24.04 348°24.53	50.52 49.97	181°34.65 196°37.36	44.14 44.18	289°6.67 304°8.89	10.57 10.46	Aldebaran	290°38.44	$16^{\circ}33.71$
12	319°35.74	348° 6.16	\$13°14.26	3°25.02	\$17°49.41	211°40.07	N22° 44.21	319° 11.11	S02°10.35	Rigel	281°2.82	-8°10.40
13	334°38.20	3°5.61	13.17	18°25.50	48.85	226°42.78	44.24	334°13.34	10.24	Capella	280°20.29 278°21.71	46°1.57 6°22.35
14	349° 40.67	18°5.05	12.09	33°25.99	48.29	241°45.49	44.27	349° 15.56	10.13	Bellatrix Elnath	278° 0.50	28°37.80
15	4°43.13	33°4.50	• • 11.01	48°26.48	• • 47.73	256°48.20	• • 44.30	4°17.78	• • 10.02	Alnilam	275°36.61	-1°11.20
16 17	19° 45.60 34° 48.06	48°3.94 63°3.39	9.93 8.84	63°26.96 78°27.45	47.18 46.62	271°50.91 286°53.62	44.33 44.37	19°20.00 34°22.22	9.91 9.80	Betelgeuse	270°50.88	$7^{\circ}24.66$
18	49°50.53	78°2.84	\$13°7.76	93°27.94	S17°46.06	301°56.32	N22°44.40	49°24.44	S02°9.69	Canopus	263°51.59	-52°42.75
19	64°52.99	93°2.29	6.67	108°28.43	45.50	316°59.03	44.43	64°26.67	9.58	Sirius Adhara	258°25.16 255°4.84	-16°45.26 -29°0.60
20	79°55.45	108°1.74	5.59	123°28.91	44.94	332°1.74	44.46	79°28.89	9.47	Procyon	244°49.58	5°9.38
21	94°57.92	123°1.18	• • 4.50	138°29.40	• • 44.38	347°4.45	• • 44.49	94°31.11	• • 9.36	Pollux	243°15.84	27°57.73
22 23	110°0.38 125°2.85	138°0.63 153°0.08	3.41 2.33	153°29.89 168°30.38	43.82 43.26	2°7.16 17°9.86	44.52 44.56	109°33.33 124°35.55	9.25 9.14	Avior	$234^{\circ}13.76$	-59°35.67
			_							Suhail	222°45.20	-43°32.36
Mer.p	bass. 14:41	$\nu$ -0.6′ d-1	1′ m-3.91	$\nu$ 0.5′ d-0	0.6′ m1.12	$\nu 2.7' d0$	.0′ m-2.58	$\nu^{2.2'} d^{-0}$	.1′ m1.02	Miaplacidus Alphard	221°37.18 217°46.53	-69°49.47 -8°46.43
										Regulus	207°33.14	11°50.22
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.26	61°36.38
0	140°5.31 155°7.77	167°59.53 182°58.98	\$13°1.24 13°0.15	183°30.87 198°31.36	\$17°42.69	32°12.57 47°15.28	N22°44.59	139° 37.77 154° 39.99	502°9.03	Denebola	$182^{\circ}23.75$	$14^{\circ}25.37$
1 2	155 7.77 170° 10.24	182 58.98 197°58.44	13 0.15 12°59.06	213°31.85	42.13 41.57	47 15.28 62°17.99	44.62 44.65	154 39.99 169°42.21	8.92 8.81	Gienah	175°42.41	-17°41.29
3	185° 12.70	212°57.89	• • 57.97	228°32.34	• • 41.01	77°20.69	• • 44.68	184°44.43	. 8.70	Acrux	172°58.62	-63°14.50
4	$200^{\circ}15.17$	227°57.34	56.88	243°32.83	40.44	92°23.40	44.71	199°46.65	8.59	Gacrux Alioth	171°50.25 166°11.81	-57°15.46 55°48.75
5	215° 17.63	242°56.79	55.79	258°33.31	39.88	107°26.10	44.74	214°48.88	8.48	Spica	158°21.19	-11°17.95
6	230°20.10	257° 56.25	\$12°54.70	273°33.80	\$17°39.32	122°28.81	N22°44.77	229°51.10	S02°8.37	Alkaid	152°51.08	49°10.61
7 8	245°22.56 260°25.02	272°55.70 287°55.15	53.60 52.51	288°34.29 303°34.78	38.75 38.19	137°31.51 152°34.22	44.81 44.84	244°53.32 259°55.54	8.26 8.15	Hadar	148°34.52	-60°29.75
9	275° 27.49	302°54.61	• • 51.42	318°35.28	37.63	167°36.92	• • 44.87	274°57.76	• • 8.04	Menkent	147°56.42	-36°29.84
10	290°29.95	317°54.06	50.32	333°35.77	37.06	182°39.63	44.90	289°59.98	7.93	Arcturus Rigil Kent.	145°46.98 139°38.92	19°2.53 -60°56.40
11	305°32.42	332°53.52	49.23	348°36.26	36.50	197°42.33	44.93	305°2.20	7.82	Kochab	137°19.66	74°2.45
12	320°34.88	347°52.98	\$12°48.13	3°36.75	\$17°35.93	212°45.03	N22°44.96	320°4.42	S02°7.71	Zuben'ubi	136°54.97	-16°9.07
13 14	335°37.34 350°39.81	2°52.43 17°51.89	47.04 45.94	18°37.24 33°37.73	35.37 34.80	227°47.74 242°50.44	44.99 45.02	335°6.64 350°8.86	7.60 7.49	Alphecca	$126^{\circ}2.99$	$26^{\circ}37.31$
15	5° 42.27	32°51.35	• • 44.84	48°38.22	• • 34.23	257°53.14	• • 45.05	5° 11.08	• • 7.38	Antares	112°14.83	-26°29.37
16	20°44.74	47°50.81	43.75	63°38.71	33.67	272°55.85	45.08	20°13.30	7.27	Atria Sabik	107°8.48 102°1.89	-69°4.21 -15°45.47
17	35° 47.20	62°50.26	42.65	78°39.20	33.10	287°58.55	45.11	35° 15.52	7.15	Shaula	96° 9.36	-37°7.28
18	50°49.66		\$12°41.55	93°39.70	S17°32.53	303°1.25	N22°45.14	50° 17.74	S02°7.04	Rasalhague	95°57.89	12°32.27
19 20	65° 52.13 80° 54.59	92°49.18 107°48.64	40.45 39.35	108°40.19 123°40.68	31.96 31.40	318°3.95 333°6.65	45.18 45.21	65°19.95 80°22.17	6.93 6.82	Eltanin	$90^{\circ}42.10$	51°28.80
21	95° 57.06	107 48.04 122°48.10	• • 38.25	138°41.17	30.83	348°9.35	• • 45.24	95°24.39	. 6.71	Kaus Aust.		-34°22.28
22	110°59.52	137°47.56	37.15	153°41.66	30.26	3°12.05	45.27	110°26.61	6.60	Vega Nunki	80°32.93	38°48.21 -26°15.86
23	$126^{\circ}1.99$	152°47.02	36.05	168°42.16	29.69	18°14.75	45.30	125°28.83	6.49	Altair	61°59.37	8°56.11
Mer.p	pass. 14:37	$\nu$ -0.5' d-1	1′ m-3.91	$\nu$ 0.5' d-0	0.6' m1.12	$\nu 2.7' d0$	.0′ m-2.57	$\nu 2.2' \ d-0$	.1′ m1.02	Peacock	53°4.86	-56°39.03
										Deneb	49°25.65	45°22.30
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.23	9°59.61
0	141°4.45		\$12°34.94	183°42.65	S17°29.12	33°17.45		140°31.05	\$02°6.38	Al Na'ir Fomalhaut	27°32.21 15°13.84	-46°50.16 -29°29.16
1	$156^{\circ}6.91$	182°45.95	33.84	198°43.14	28.55	48°20.15	45.36	155°33.27	6.27	Scheat	13°44.65	28°13.48
2	171°9.38	197° 45.41	32.74	213°43.64	27.98	63°22.85	45.39	170°35.49	6.16	Markab	13°29.28	15°20.72
3	186°11.84	212°44.87 227°44.34	• • 31.63	228°44.13	• • 27.41	78°25.55	•• 45.42	185°37.71	• • 6.05	Feb 09 Mon	SHA	Mor pass
4 5	201°14.31 216°16.77	242°43.80	30.53 29.42	243°44.62 258°45.12	26.84 26.27	93°28.25 108°30.95	45.45 45.48	200°39.93 215°42.14	5.93 5.82	Venus	29° 6.69	Mer.pass 12:48
6	231° 19.23		S12°28.32		S17°25.70	123°33.65	N22°45.51	230°44.36	S02°5.71	Mars	44°13.02	11:46
7	$246^{\circ}21.70$	272°42.73	27.21	288°46.11	25.13	138°36.35	45.54	245°46.58	5.60	Jupiter	252°1.35	21:52
8	261°24.16	287°42.20	26.10	303°46.60	24.56	153°39.04	45.57	260°48.80	5.49	Saturn	359°38.27	14:43
9	276°26.63	302°41.66	• • 24.99	318°47.09	• • 23.98	168°41.74	· · 45.60	275°51.02	· · 5.38	Feb 10 Tue	SHA	Mer.pass
10 11	291°29.09 306°31.56	317°41.13 332°40.60	23.89 22.78	333°47.59 348°48.08	23.41 22.84	183°44.44 198°47.13	45.63 45.66	290° 53.24 305° 55.45	5.27 5.16	Venus	$27^{\circ}54.22$	12:48
12	321°34.02	347°40.06	\$12°21.67	3°48.58	\$17°22.27	213°49.83	N22°45.69	320° 57.67	S02°5.04	Mars	43°25.56	11:46
13	336°36.48	2°39.53	20.56	18°49.07	21.69	228°52.53	45.72	335°59.89	4.93	Jupiter Saturn	252°7.26 359°32.46	21:47 14:39
14	351°38.95	17°39.00	19.45	33°49.57	21.12	243°55.22	45.75	351°2.11	4.82			
15 16	6°41.41	32°38.47	17.33	48°50.06	20.54	258°57.92	· · 45.78	6°4.33	· · 4.71	Feb 11 Wed	SHA	Mer.pass
16 17	21°43.88 36°46.34	47°37.94 62°37.41	17.22 16.11	63°50.56 78°51.06	19.97 19.40	274°0.61 289°3.31	45.81 45.84	21°6.54 36°8.76	4.60 4.49	Venus	26°42.04	12:49
18	50 40.34 51°48.80		\$12°15.00	93°51.55	\$17°18.82	304°6.00	N22° 45.87	51°10.98	502°4.38	Mars Jupiter	42°38.20 252°13.00	11:45 21:43
19	66°51.27	92°36.35	13.89	108°52.05	18.25	319°8.70	45.90	66° 13.20	4.26	Saturn	359°26.60	14:36
20	81°53.73	107°35.82	12.77	123°52.54	17.67	334°11.39	45.93	81°15.41	4.15			
21	96°56.20	122°35.29	• • 11.66	138°53.04	17.09	349°14.09	· · 45.96	96°17.63	• • 4.04	Horizoi	ntal parallax Venus:	0.1
22 23	111°58.66 127°1.13	137°34.76 152°34.23	10.54 9.43	153°53.54 168°54.04	16.52 15.94	4°16.78 19°19.47	45.99 46.02	111°19.85 126°22.07	3.93 3.82		Mars:	0.1
ivier.p	bass. 14:33	ν-υ.5' <b>α</b> -1	1′ m-3.91	$\nu$ 0.5' $a$ -0	0.6′ m1.12	ν2.1' αU	.0′ m-2.57	ν2.2' <b>α</b> -0	.1′ m1.02			

h	Su	n	Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	176°27.92	<b>S</b> 14°44.41	278°37.48	13.5'	S20°43.93	10.1'	54.4'
1 2	191°27.90 206°27.89	43.61 42.81	293°9.94 307°42.35	13.4' 13.4'	20°54.01 21°4.01	10.0' 9.9'	54.4' 54.4'
3	200 27.89 221°27.87	• • 42.01	307 42.35 322°14.71	13.4	21°13.91	9.9 9.8'	54.4'
4	236°27.85	41.21	336° 47.01	13.2'	21°23.71	9.7'	54.3'
5	251°27.83	40.40	351° 19.26	13.2'	21°33.42	9.6'	54.3'
6 7	266°27.82 281°27.80	\$14°39.60 38.80	5°51.45 20°23.59	13.1' 13.1'	\$21°43.04 21°52.56	9.5' 9.4'	54.3' 54.3'
8	296°27.78	38.00	34° 55.67	13.1	21° 52.50 22° 1.99	9.4	54.3'
9	311°27.77	• • 37.19	49°27.70	13.0'	22°11.32	9.2'	54.3'
10	326°27.75	36.39	63°59.67	12.9'	22°20.55	9.1'	54.3'
11 12	341°27.73 356°27.72	35.58 \$14°34.78	78°31.59 93°3.44	12.9' 12.8'	22°29.68 \$22°38.71	9.0' 8.9'	54.3' 54.3'
13	11°27.70	33.97	107°35.25	12.7'	22° 47.64	8.8	54.3'
14	26°27.69	33.17	122°6.99	12.7'	22°56.48	8.7'	54.2'
15 16	41°27.68 56°27.66	· · 32.36 31.55	136° 38.68 151° 10.31	12.6' 12.6'	23°5.21 23°13.83	8.6' 8.5'	54.2' 54.2'
17	71°27.65	30.75	165°41.88	12.5'	23°22.36	8.4	54.2'
18	86°27.64	S14°29.94	180° 13.40	12.5'	S23°30.78	8.3'	54.2'
19	101°27.62	29.13	194° 44.85	12.4'	23°39.10	8.2'	54.2'
20 21	116°27.61 131°27.60	28.32 •• 27.51	209° 16.25 223° 47.59	12.3' 12.3'	23°47.31 23°55.42	8.1' 8.0'	54.2' 54.2'
22	146°27.59	26.70	238° 18.88	12.2'	24°3.42	7.9	54.2'
23	161°27.57	25.89	252°50.10	12.2'	24°11.32	7.8'	54.2'
	SD = 16.2'	d = -0.8'		SE	) = 14.8′		
<b>T</b>	CUA	D	CUA		D		LID
Tue 0	<b>GHA</b> 176°27.56	Dec \$14°25.08	<b>GHA</b> 267°21.27	u  12.1'	Dec 524° 19.10	d 7.7'	<b>HP</b> 54.2'
1	191°27.55	24.27	281°52.38	12.1'	24°26.78	7.6'	54.2'
2	206°27.54	23.46	296°23.43	12.0'	24° 34.35	7.5'	54.2'
3 4	221°27.53 236°27.52	· · 22.65 21.84	310°54.42 325°25.35	11.9' 11.9'	24°41.81 24°49.15	7.3' 7.2'	54.2' 54.2'
5	250° 27.52 251° 27.51	21.03	339° 56.23	11.8'	24° 56.39	7.1	54.2'
6	266°27.50	S14°20.21	354°27.04	11.8'	S25°3.52	7.0'	54.2'
7	281°27.49	19.40	8°57.80	11.7'	25° 10.53	6.9'	54.2'
8 9	296°27.49 311°27.48	18.59 •• 17.77	23°28.51 37°59.15	11.6' 11.6'	25° 17.43 25° 24.21	6.8' 6.7'	54.1' 54.1'
10	326°27.47	16.96	52° 29.74	11.5'	25°30.88	6.6'	54.1'
11	341°27.46	16.14	67°0.27	11.5'	25°37.43	6.4'	54.1'
12	356°27.45 11°27.45	\$14° 15.33 14.51	81°30.74 96°1.16	11.4' 11.4'	\$25°43.87 25°50.19	6.3' 6.2'	54.1' 54.1'
13 14	26°27.44	14.51	96 1.16 110°31.52	11.4	25 50.19 25°56.40	6.1	54.1'
15	41°27.43	• • 12.88	125°1.82	11.2'	26°2.48	6.0'	54.1'
16	56°27.43	12.06	139°32.07	11.2'	26°8.45	5.8'	54.1'
17 18	71°27.42 86°27.42	11.24 \$14° 10.43	154°2.27 168°32.41	11.1' 11.1'	26° 14.30 \$26° 20.03	5.7' 5.6'	54.1' 54.1'
19	101°27.41	9.61	183°2.49	11.0'	26°25.63	5.5'	54.1'
20	$116^{\circ}27.41$	8.79	$197^{\circ}32.52$		$26^{\circ}31.12$	5.4'	54.1'
21	131°27.40	• • 7.97	212°2.50	10.9'	26°36.48 26°41.72	5.2'	54.1'
22 23	146°27.40 161°27.40	7.15 6.33	226°32.42 241°2.29	10.9' 10.8'	26°46.84	5.1' 5.0'	54.1' 54.1'
	SD = 16.2'	d = -0.8'			0 = 14.8'		0 1.12
					7 - 11.0		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	176°27.39 191°27.39	\$14°5.51 4.69	255°32.11 270°1.87	10.8' 10.7'	\$26°51.83 26°56.70	4.9' 4.7'	54.1' 54.1'
2	206°27.39	3.87	284°31.59	10.7'	$27^{\circ}1.44$	4.6'	54.1'
3	221°27.38	• • 3.05	299°1.25	10.6'	27°6.06	4.5'	54.2'
4 5	236°27.38 251°27.38	2.23 1.40	313°30.87 328°0.43	10.6' 10.5'	27° 10.55 27° 14.92	4.4' 4.2'	54.2' 54.2'
6	266°27.38	<b>S</b> 14°0.58	342° 29.95	10.5'	\$27° 19.15	4.1	54.2'
7	281°27.38	13°59.76	356°59.42	10.4'	27°23.26	4.0'	54.2'
8 9	296°27.38 311°27.38	58.94 •• 58.11	11°28.84 25°58.22	10.4' 10.3'	27°27.24 27°31.09	3.9' 3.7'	54.2' 54.2'
10	311 27.38 326°27.38	57.29	40° 27.55	10.3'	27°31.09 27°34.81	3.6'	54.2' 54.2'
11	341°27.38	56.46	54°56.83	10.2'	27°38.40	3.5'	54.2'
12	356°27.38	\$13°55.64	69°26.07	10.2'	\$27°41.86	3.3'	54.2'
13 14	11°27.38 26°27.38	54.81 53.99	83°55.27 98°24.42	10.2' 10.1'	27° 45.19 27° 48.39	3.2' 3.1'	54.2' 54.2'
15	41°27.38	53.16	112°53.53	10.1	27°51.45	2.9'	54.2'
16	56°27.38	52.33	127° 22.61	10.0'	27°54.38	2.8'	54.2'
17	71°27.39 86°27.39	51.51	141°51.64	10.0' 10.0'	27°57.18 \$27°59.84	2.7'	54.2'
18 19	86°27.39 101°27.39	\$13°50.68 49.85	156° 20.63 170° 49.58	10.0′ 9.9′	527°59.84 28°2.37	2.5' 2.4'	54.2' 54.2'
20	116°27.39	49.02	$185^{\circ}18.50$	9.9'	28°4.76	2.3'	54.2'
21	131°27.40	• • 48.19	199°47.38	9.8'	28°7.02	2.1'	54.3'
22 23	146°27.40 161°27.41	47.36 46.53	214° 16.22 228° 45.03	9.8' 9.8'	28° 9.14 28° 11.13	2.0' 1.8'	54.3' 54.3'
23	SD = 16.2'	d = -0.8'			0 = 14.8'	1.0	3 7.3
	JD — 10.2	u — -U.0		3L	/ — 14.0		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 60°	02:11	03:29	04:21	20:05	20:57	22:13

Lat.		Moonris	e		Moonset	t
Lat.	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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 10°		00:30	01:22	11:30	12:14	13:03
0°		00:11	01:00	11:47	12:35	13:25
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	20:45	20:53	21:12	15:03	16:35	18:01
		_				

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Mer.Pass.		
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	22-24	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	55-36%	
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.)

23   128°59.41   152°9.44   15.22   169°18.10   47.89   21°28.38   47.38   128°8.40   58.43   Altair   61°59.35   8°56.11     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   Peacock   53°4.83   -56°39.01     Deneb   49°25.63   45°22.28     Enii   33°38.22   9°59.61     O 144°1.87   167°8.93   511°14.08   184°18.60   516°47.30   36°31.06   N22°47.41   143°10.61   501°58.31     1 159°4.33   182°8.43   12.94   199°19.11   46.71   51°33.73   47.43   158°12.83   58.20     Scheat   13°44.64   28°13.47	h	Aries	Venus	Mars	Jupiter	Saturn	Stars
1	Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.							
1	1	$157^{\circ}6.05$					
2 100-113-8	2	172°8.52		213°55.53 14.21	64°27.55 46.10		
1. 2271-136.0							
27 227123 8 277136 9 277105 9 127 0							· ·
7 247*2034 272*203 12*0.03 12*0.49 282*50.0 112*4 132*4 139*4.00 10*2.0 20*10*4.00*2.0 2.92*1 10*20*20*2.0 20*10*2.0 20*10*4.0 2.92*1 10*20*20*2.0 20*10*2.0 20*10*2.0 2.92*1 10*20*20*2.0 20*10*2.0 20*10*2.0 2.92*1 10*20*2.0 20*10*2.0 2.90*2.0 20*10*2.0 20*10*2.0 2.90*2.0 20*10*2.0 2.90*2.0 20*10*2.0 2.90*2.0 20*10*2.0 2.90*2.0 20*10*2.0 2.90*2.0 20*10*2.0 2.90*2.0 20*10*2.0 2.90*2.0 20*10*2.0 2.90*2.0 20*10*2.0 2.90*2.0 20*10*2.0 2.90*2.0 20*10*2.0 2.90*2.0 20*10*2.0 2.90*2.0							
8 227233 0 287205 1159.05 1159.05 20768 25 27 3076 20 20 20 20 20 27 20 27 3076 20 20 20 20 20 20 20 20 20 20 20 20 20							
19   277   297   297   298   298   294   218   299   298							
11 307367 37 327279 5 599 349703 9.00 1907377 6050 30074807 2.04 6 8.04 201713 327279 6 97 307 31 11 307367 37 327279 5 599 349703 1 9.00 1907377 6050 3077480 507749 5 17 48 507 37 4 40 51 57 74 50 5 7 40 5 17 40 5							1
19	10						I .
18 3877-80.0	11	307°30.70	332°27.94 55.99		199°51.77 46.36		
Bellario   19   19   19   19   19   19   19   1							
15   7-40.55   32-22.58   5-15.00   497-20.1   6.07   2007-25.2   4.64.0   6-17.3   7-10.2   1.00							
16   22   41,00   47   523   59,37   64"2.5   6.09   275"5.2   46.5   271"90.7   6.190   1.80   275"5.2   4.18   50"1.0   6.190   275"5.2   4.18   50"1.0   6.190   275"5.2   4.18   50"1.0   6.190   275"5.2   4.18   50"1.0   6.190   275"5.2   4.18   50"1.0   6.190   275"5.2   4.18   50"1.0   6.190   275"5.2   4.18   50"1.0   6.190   275"5.2   4.18   50"1.0   6.190   275"5.2   4.18   50"1.0   6.190   275"5.2   4.18   4.190   6.10   4.190   4.							Elnath 278°0.51 28°37.81
17   37"   37"   38"							
18   52°4796   19°21277   40°571   40							
19							
Procedure   1.4							1
Policy   129-73-00   139-72-12   44-61   154-8-55   2.59   35-91.33   44-69   112-13.94   1.24   1	20	82°52.87	107°23.26 45.87		335°15.96 46.62		
23 18°0.77 15°21.71 44.48 16°6.01 2.01 20°2.40 46.71 12°1.50 1.13 1.13 1.13 1.13 1.13 1.13 1.13 1.1							
Fri GHA  GHA  GHA  Dec  G	23	128°0.27	152°21.71 42.48	169°6.01 2.01	20°24.01 46.71	127°15.26 1.13	
Fig.   GHA	Mer.	pass. 14:29	$\nu$ -0.5' d-1.1' m-3.91	$ u 0.5' \ d$ -0.6' m1.12	$\nu$ 2.7′ $d$ 0.0′ m-2.56	$\nu 2.2' \ d$ -0.1' m1.02	Miaplacidus 221°37.18 -69°49.50
Fig.   GHA   Dec   Deable   193°39.24   61°35.39   61°35.31   61°31.27   61°30.06   61°31.27   61°30.06   61°31.27   61°30.06   61°31.27   61°30.06   61°30.07   61°30.06   61°30.07   61°30.06   61°30.07   61°30.07   61°30.06   61°30.07   61°30.0							
1 188°578 1 182°208 4 0422 199°702 0 34 59°293 8 4677 15°1906 0 01 1 180°397 1 190°702 0 34 59°293 8 4677 15°1906 0 01 1 190°702 0 34 59°293 8 4677 15°1906 0 01 1 190°702 0 34 59°293 8 4677 15°1906 0 01 1 190°2016 3 30°00 214°752 17°025 65°3207 4679 172°210 0 0.9 3 188°1012 212°1965 3 7.96 0 22°802 16°596 6 83°3.75 46.82 187°2412 0 0.8 4 100°237 1 10°203	Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	
1 188°819 182°2068 4022 199°702 0.84 50°2938 4677 187°199 0.091 0							
2 173°7.66 197°20.16 37.90 921°67.20 17°0.25 66°32.07 46.79 172°21.90 0.70 6 3 188°10.12 212°10.65 37.96 220°8.02 16°9.07 37.75 46.82 187°24.12 0.66 63°10.75 41.20 187°24.12 0.66 187°24.							
188   1012   122   121   19.65   37.96   229   80   16   59.67   80   34.74   46.85   202   16.25   202   17.15   59.67   59	2	173°7.66	197°20.16 39.09	214°7.52 17°0.25	65°32.07 46.79	172°21.90 0.79	
203 125 50 227 1913 63 843 247 852 5908 99-374 4 6.85 202 26.33 0.57 6 6 233 175 25 57 1916 1917 196 6 233 175 22 257 1816 2119 175 6 33 43 227 99 20 2 259 90 2 2 25							
218*15.05 257*18.10 \$11*34.65 259*0.02 \$88.50 \$10*0.40.12 46.88 21*7*28.55 0.04 5 50.20*0.34							
248"19.98   227"17.99   33.43   289"10.03   57.32   140"4s.49   46.93   247"32.98   0.32   146"148   125"15.05   146"148   148"148   1							
8 263°22.44   387°17.08   32.29   300°10.33   5674   155°48.17   46.96   262°35.19   0.12   48.38.44   0.28.01   9 278°24.91   300°16.65   331.65   319°11.04   65.61   10°70.85   64.99   277°37.44   0.28°0.01   13 08°29.84   332°15.54   28.89   349°12.04   55.55   185°55.54   47.02   202°39.62   01°99.89   12 323°32.30   347°15.03   511°27.75   4°12.55   516°54.33   215°58.90   N22°47.07   322°44.05   501°99.67   13 338°37.23   17°14.01   25.48   341°13.55   53.21   246°4.26   47.13   337°46.8   59.46   15 8°39.69   32°13.50   24.34   49°14.06   52.62   261°99.94   47.16   7°56.06   59.33   15 8°39.69   32°13.50   24.34   49°14.06   52.62   261°99.94   47.16   7°56.06   59.33   16 33°47.23   17°14.01   7°19.50   140°18.57   516°50.85   306°14.98   N22°47.24   37°55.19   59.10   17 38°44.62   62°12.48   22.07   79°15.07   61.44   291°12.30   47.21   337°46.95   59.10   19 66°49.55   22°11.05   17.51   139°17.08   49.08   351°20.24   47.30   38°17.6   59.10   21 98°54.48   122°10.45   17.51   139°17.08   49.08   351°20.24   47.30   38°17.6   59.14   21 180°54.48   122°10.45   17.51   139°17.08   49.08   351°20.24   47.33   128°84.9   22 118°56.94   137°9.94   15.22   166°18.10   47.89   21°20.25   38.47   38.91   58.20   23 128°59.41   152°9.44   15.22   166°18.10   47.89   21°20.25   38.47   38.91   58.20   24 113°56.94   137°9.94   15.22   166°18.10   46.12   66°36.41   47.46   13°15.04   58.09   58.43   25 1174°68.00   197°7.92   11.79   241°19.01   46.12   66°36.41   47.46   13°15.04   58.09   58.43   24 1174°68.00   197°7.92   11.79   241°19.01   46.12   66°36.41   47.46   13°15.04   58.09   58.20   25 219°1-10   242°6.41   8.36   59°21.13   44.34   1114.44   47.45   13°15.04   58.09   57.75   24 204°11.73   227°6.99   510°3.34   247°4.04   31°17.51   47.40   47.40   47.50   57.55   25 207°14.19   242°6.41   8.36   59°21.13   44.34   1114.44   47.49   47.40   28°37.37   57.50   25 207°15.50   511°17.22   274°21.04   510°37.39   39.80   323°37.4   57.18   25 207°15.50   537°3.30   34°23.67   41.35   14.49   7							
278°2491 302°16.56 - 31.16 319°11.04 - 56.15 170°50.85 - 46.99 277°37.40 02°0.01   13 308°29.34 312°15.54 28.89 349°12.04 54.07 200°56.22 47.05 307°41.83 59.78   13 338°34.76 2°14.52 26.62 19°13.05 53.80 231°1.58 47.10 337°46.26 59.56   13 338°34.76 2°14.52 26.62 19°13.05 53.80 231°1.58 47.10 337°46.26 59.56   14 353°37.33 17°14.01 25.48 34°13.55 53.21 246°4.26 47.13 352°48.8 59.54   15 8°39.69 32°13.50 - 24.34 49°14.06 - 52.62 261°6.94 47.16 7°50.69 59.33   16 23°42.16 47°12.99 23.20 64°14.55 52.03 276°9.62 47.19 22°59.09 59.22   17 38°44.62 62°12.48 22.07 79°15.07 51.44 291°12.30 47.21 37°55.12 59.10   18 553°7.09 77°11.97 511°20.93 94°15.57 516°9.08 50°14.98 N22°57.33 501°58.99   19 66°49.55 92°11.47 19.79 109°16.07 50.26 321°17.66 62 47.27 67°59.55 88.88   12 18 18 52°1.09 10°10.96 18.65 134°17.50 48.49 67 336°20.34 47.30 83°17.6 88.77   21 98°54.48 122°10.45 17.51 139°17.08 49.09 351°23.02 47.33 128°8.40 88.43   122 113°56.94 137°9.94 16.36 134°17.50 48.49 67°25.70 47.33 128°8.40 88.43   122 113°56.94 137°9.94 16.36 134°17.50 48.49 67°25.70 47.35 138°1.60 88.75   122 113°56.94 137°9.94 16.36 134°17.50 48.49 67°25.70 47.35 138°17.08 89.70   123 128°59.41 152°9.44 15.22 169°18.10 47.89 21°28.38 47.38 128°8.40 88.43   144°1.87 167°8.93 511°14.06 18.40 18.40 18.20 18.4							I
10 293°27.37 317°16.05 30.03 334°11.54 55.56 185°35.54 47.02 292°39.62 01°59.89 Rigil Kent. 139°3.867 e00°56.02 470 5 307°48.38 55.78 Rigil Kent. 139°3.867 e00°56.02 470 5 307°48.38 55.78 Rigil Kent. 139°3.867 e00°56.02 470 5 307°48.48 55.02 501°59.67 Rigil Kent. 139°3.867 e00°56.02 470 5 307°49.40 5 501°59.67 Rigil Kent. 139°3.867 e00°56.02 470 5 302°4.05 501°59.67 Rigil Kent. 139°3.867 e00°59.15 Rigil Kent. 139°3.00 Rigil Rigil Kent. 139°3.00 Rigil							
11 308°2984 332°1554 28.99 349°12.04 54.97 200°56.22 47.05 307°41.83 59.78 Kochab 13°36.76 41255 516°543 312°158.90 NZP44707 322°44707 322°45 501°56,							
13 338°34.76   2-14.52   2-6.62   19°13.05   53.80   215°58.99   N22°47.01   337°46.26   59.56   Alpheeca   126°29.79   22°37.30   14 355°37.23   17°14.01   25.48   34°13.55   53.21   246°4.26   47.13   352°48.48   59.44   Antares   112°14.80   26°29.37   15 8°39.99   32°13.50   24.34   49°14.06   55.20   20°69.94   47.16   7°90.69   59.33   Antare   112°14.80   26°29.37   17°36.40   23°42.16   47°12.99   23.20   66°14.56   52.03   276°9.02   47.19   22°52.99   59.22   35°40.40   27°11.97   5112°0.93   49°15.57   516°40.85   306°14.98   N22°47.24   52°57.33   50°18.99   22°19.99   21.30   68°9.55   22°14.7   19.79   100°16.07   50.26   32°127.66   47.27   67°9.95   58.88   52.01   107°19.06   18.65   124°16.58   49.67   336°20.34   47.30   83°1.76   58.77   58.87   22°13°8.99   41.52°9.94   15.22°16.98   49.67   336°20.34   47.30   83°1.76   58.77   58.81	11	308°29.84				307°41.83 59.78	
13 338°34.76 2"14.52 26.62 19°13.05 53.01 231°1.58 47.10 337″46.26 59.56 49.15 338°1.76 10°15.26 11°1	12	323°32.30		4°12.55 \$16°54.38	215°58.90 N22°47.07	322°44.05 S01°59.67	
14 353°37.23 17°14·01 25.48 34°13.55 53.21 240°4.26 47.16 7°50.69 193.3   15 8°3969 32°13.50 12.43 49°14.06 55.26 261°6.94 47.16 7°50.69 193.3   16 23°42.16 47°12.99 23.20 6°4°14.56 52.03 276°9.62 47.19 22°52.90 59.22   364.46 26 2°12.48 22.07 79°15.07 51.44 291°12.30 47.21 35°51.22 59.10   17 8°44.62 62°12.48 22.07 79°15.07 51.44 291°12.30 47.21 35°51.22 59.10   18 53°47.00 77°11.97 511°20.93 4°15.57 516°50.85 306°14.98 N22°47.24 52°57.33 501°58.99   19 68°49.55 92°11.47 19.79 109°16.07 50.26 321°17.66 47.27 67°59.55 58.69   20 83°52.01 107°10.96 18.65 124°16.88 49.67 336′20.34 47.30 83°1.76 58.77   21 98°54.48 122°10.45 17.51 139°17.08 49.08 351°23.02 47.32 98°3.97 8.66 5   22 113°56.94 137°9.94 16.36 154°17.99 48.49 6°25.70 47.35 113°6.19 58.54   Net.pass. 14:25 \$\nu-0.55' d-1.1' m-3.91 \$\nu-0.55' d-0.6' m1.12 \$\nu-2.7' d-0.0' m-2.56 \$\nu-2.2' d-0.1' m1.02 \$							
16 23°42.16 47°12.99 23.20 64°14.56 52.03 276°9.62 47.19 22°52.90 59.22							
18							
Sail							
19   68°49,55   92°11,47   19,79   109°16,07   50.26   321°17,66   47.27   67°59,55   58.88   Eltanin   99°5,160   12°32,27   107°10,96   18.65   124°16,58   49.67   336°20,34   47.30   83°1,76   58.77   58.75   58.78   21°98°54,48   122°10,45   17.51   139°17,08   49.08   331°23.02   47.35   113°6,19   58.54   137°9,94   15.22   169°18,10   47.89   21°28,38   47.31   138°6,19   58.54   Nunki   75°46,90   26°15,85   47.25   113°6,19   58.54   Nunki   75°46,90   26°15,85   47.25   113°6,19   58.54   Nunki   75°46,90   26°15,85   128°18,40							
20 83°52.01 107°10.96 18.65 124°16.58 49.67 336°20.34 47.30 83°1.76 58.77   21 98°84.48 122°10.45 \cdot 1.751 139°17.08 \cdot 4.90 8 331°23.02 \cdot 47.32 98°3.97 \cdot 58.65 22 113°86.94 137°9.94 16.36 154°17.59 48.49 6°25.70 47.35 113°6.19 58.54   23 128°5.941 152°9.44 15.22 169°18.10 47.89 21°28.38 47.38 113°6.19 58.54   24 Mer.pass. 14:25 \(\nu \cdot 0.5 \) \(\nu \cdot 1.1 \) \(\nu \cdot 0.5 \) \(\nu \cdot 0.6 \) \(\nu \cdot 1.1 \) \(\nu \cdot 0.5 \) \(\nu \cdot 0.6 \) \(\nu \cdot 1.1 \) \(\nu \cdot 0.5 \) \(\nu \cdot 0.6 \) \(\nu \cdo 0.6 \) \(\nu \cdot 0.6 \) \(\nu \cdot 0.6 \) \(\nu \cdo 0.6 \) \(\nu \cdot 0.6 \) \(\nu \cdo 0.6 \) \(\nu \cdot 0.6 \) \(\nu \cdo 0.6 \) \(\nu \cdot 0.6 \) \(\nu \cdot 0.6 \) \(\nu \cdo 0.6 \) \(\nu \cdo 0.6							
21 13°5-694 137°9.94 16.36 154°17.59 48.49 6°25.70 47.35 113°6.19 58.54    Mer.pass. 14:25 \(\nu \)-0.5' \(d \)-1.1' \(m \)-3.91 \(\nu \)-0.6' \(d \)-0.6' \(m \)-1.12 \(\nu \)-2.7' \(d \)-0.0' \(m \)-2.56 \(\nu \)-2.2' \(d \)-0.1' \(m \)-1.02 \(\nu \)-2.66 13°3.83 \(\nu \)-3.83 128°8.40 \(58.43\) \(Muski \) 75°46.90 \(-26^{\text{1}} \)-5.85 \(Nuski							
23 128°99.41 157°9.44 15.22 169°18.10 47.89 212°8.38 47.38 128°8.40 58.43	21	98°54.48				98°3.97 · · 58.65	
Ner.pass. 14:25   \$\nu - 0.5' \ d - 1.1' \ m - 3.91   \$\nu 0.5' \ d - 0.6' \ m 1.12   \$\nu 0.5' \ d - 0.1' \ m 1.12   \$\nu 0.5' \ d - 0.1' \ m 1.12   \$\nu 0.5' \ d - 0.1' \ m 1.12   \$\nu 0.5' \ d - 0.1' \ m 1.12   \$\nu 0.5' \ d - 0.1' \ m 1.12   \$\nu 0.5' \ d - 0.1' \ m 1.12   \$\nu 0.5' \ d - 0.1' \ m 1.12   \$\nu 0.5' \ d - 0.1' \ m 1.12   \$\nu 0.5' \ d - 0.1' \ m 1.12   \$\nu 0.5' \ d - 0.1' \ m 1.12   \$\nu 0.5' \ d - 0.1' \ m 1.12   \$\nu 0.5' \ d - 0.1' \ m 1.12   \$\nu 0.5' \ d - 0.1' \ m 1.12   \$\nu 0.5' \ d - 0.1' \ m 1.12   \$\nu 0							
Sat GHA	23	128° 59.41	152°9.44 15.22	169°18.10 47.89	21°28.38 47.38	128°8.40 58.43	Altair 61°59.35 8°56.11
Sat         GHA         GHA         Dec         All Nair         20-20         4.92         4.92         4.92         4.92         4.92         4.92         4.92         4.92         4.93         96°41.76         4.75         203°1.47         57.86         57.75         Mars         41°50.94         11.43         4.94         9.94°26.51         3.73°3.91	Mer.	pass. 14:25	$\nu$ -0.5' d-1.1' m-3.91	$\nu$ 0.5' d-0.6' m1.12	$\nu 2.7' \ d0.0' \ \text{m-}2.56$	$\nu 2.2' \ d$ -0.1' m1.02	Peacock 53°4.83 -56°39.01
Sat GHA CHA CHA CHA CHA CHA CHA CHA CHA CHA C							
0 144°1.87 167°8.93 \$11°14.08 184°18.60 \$16°47.30 36°31.06 N22°47.41 143°10.61 \$01°58.31 15°18.33 2-29°29.15   1 159°4.33 182°8.43 12.94 199°19.11 46.71 51°33.73 47.43 158°12.83 58.20   2 174°6.80 197°7.92 11.79 214°19.61 46.12 66°36.41 47.46 173°15.04 58.09   3 189°9.26 212°7.42 · 10.65 229°20.12 · 45.52 81°39.09 · 47.49 188°17.25 · 57.97   4 204°11.73 227°6.91 9.51 244°20.62 44.93 96°41.76 47.51 203°19.47 57.86   5 219°14.19 242°6.41 8.36 525°21.13 44.34 111°44.44 47.54 218°21.68 57.75   6 234°16.66 257°5.91 \$11°7.22 274°21.64 \$16°43.74 126°47.12 N22°47.57 233°23.89 \$01°57.64   7 249°19.12 272°5.40 6.07 289°22.14 43.15 141°49.79 47.60 248°26.11 57.52   8 264°21.58 287°4.90 4.92 304°22.65 42.56 156°52.47 47.62 263°28.32 57.41   9 279°24.05 302°4.40 · 3.78 319°23.16 · 41.96 171°55.14 · 47.65 278°30.53 · 57.30   10 294°26.51 317°3.90 2.63 334°23.67 41.37 186°57.82 47.68 293°32.74 57.18   11 309°28.98 332°3.40 1.48 349°24.17 40.77 202°0.49 47.70 308°34.96 57.07   12 324°31.44 347°2.90 \$11°0.33 4°24.68 \$16°40.18 217°3.17 N22°47.3 333°37.17 \$01°56.96   13 339°33.90 2°2.40 10°59.18 19°25.19 39.58 232°5.84 47.76 338°39.38 56.84   14 354°36.37 17°1.90 58.03 34°25.70 38.98 247°8.51 47.78 333°41.59 56.73   15 9°38.83 32°1.40 · 56.88 49°26.21 · 38.39 262°11.19 · 47.81 8°43.81 · 56.62   16 24°41.30 47°0.90 55.73 64°26.71 37.79 277°13.86 47.84 23°46.02 56.50   17 39°43.76 62°0.40 54.58 79°27.22 37.19 292°16.53 47.86 38°48.23 56.39   18 54°46.23 76°59.90 \$10°53.43 49°27.73 \$16°36.60 307°19.20 N22°47.89 \$35°50.44 \$01°56.28   19 69°48.69 91°59.40 52.28 109°28.24 36.00 322°21.88 47.92 68°52.65 56.16   24°41.15 160°58.91 51.13 124°28.75 35.40 337°24.55 47.94 83°54.87 56.05   24°18.64 53.79 48.82 154°29.77 34.20 7°29.89 48.00 113°59.29 55.82   110°53.55 151°57.42 47.67 169°30.28 33.60 22°32.56 48.00 129°1.50 55.71   10 14°19.50 14.19 50.81 136°1.50 55.71   10 14°50.81 136°57.91 48.82 154°29.77 34.20 7°29.89 48.00 113°59.29 55.82   11°20°1.50 55.71   10 14°19.50 14.90 50.81 136°1.90 50.81 136°1.90 50.81   10 14°19.50 14.90 50.81	Sat	СНУ	GHA Doc	GHA Doc	GHA Doc	GHA Doc	
1 159°4.33 182°8.43 12.94 199°19.11 46.71 51°33.73 47.43 158°12.83 58.20							
2 174°6.80 197°7.92 11.79 214°19.61 46.12 66°36.41 47.46 173°15.04 58.09 3189°9.26 212°7.42 \cdot \text{10.65} 229°20.12 \cdot \cdot \text{5.52} 81°39.09 \cdot \cdot \cdot \cdot \text{47.54} 188°17.25 \cdot \text{57.75} \dagger{57.75} 4 204°11.73 227°6.91 9.51 244°20.62 44.93 96°41.76 47.51 203°19.47 57.86 5 219°14.19 242°6.41 8.36 259°21.13 44.34 111°44.44 47.54 218°21.68 57.75 86 6 234°16.66 257°5.91 \$11°7.22 274°21.64 \$16°43.74 126°47.12 N22°47.57 233°23.89 \$01°57.64 11.57.52 272°5.40 6.07 289°22.14 43.15 141°49.79 47.60 248°26.11 57.52 39°28.32 57.41 29°279°24.05 302°4.40 \cdot \cdot \cdot \text{3.78} 319°23.16 \cdot \cdot \cdot \cdot \text{4.196} 171°55.14 \cdot \cdot \cdot \cdot \cdot \text{4.765} 278°30.53 \cdot \cd							
\$\$ 189°9.26							
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16       24°41.30       47°0.90       55.73       64°26.71       37.79       277°13.86       47.84       23°46.02       56.50       Venus       23°7.06       12:52         17       39°43.76       62°0.40       54.58       79°27.22       37.19       292°16.53       47.86       38°48.23       56.39       Mars       40°16.73       11:42         18       54°46.23       76°59.90       S10°53.43       94°27.73       S16°36.60       307°19.20       N22°47.89       53°50.44       S01°56.28       Jupiter       252°29.19       21:30         19       69°48.69       91°59.40       52.28       109°28.24       36.00       322°21.88       47.92       68°52.65       56.16       Saturn       359°8.74       14:25         20       84°51.15       106°58.91       51.13       124°28.75       35.40       337°24.55       47.94       83°54.87       56.05       56.16       Saturn       359°8.74       14:25         21       99°53.62       121°58.41       49.97       139°29.26       34.80       352°27.22       47.97       98°57.08       55.93       Horizontal parallax         22       114°56.08       136°57.91       48.82       154°29.77       34.20       7°29.89       <							
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25 125 50.55 151 51.12 11.01 155 50.25 55.00 22 52.50 10.02 125 1.50 55.11							
Mer.pass. 14:22 $\nu$ -0.5′ $d$ -1.1′ m-3.91 $\nu$ 0.5′ $d$ -0.6′ m1.12 $\nu$ 2.7′ $d$ 0.0′ m-2.55 $\nu$ 2.2′ $d$ -0.1′ m1.02							
	Mer. <sub>I</sub>	pass. 14:22	ν-0.5′ d-1.1′ m-3.91	$\nu 0.5' \ d$ -0.6' m1.12	ν2.7′ d0.0′ m-2.55	ν2.2′ d-0.1′ m1.02	

h	Su	n	Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	$176^{\circ}27.41$	S13°45.71	243°13.81	9.7'	S28°12.98	1.7'	54.3'
1	191°27.41	44.87	257°42.56	9.7'	28°14.69	1.6'	54.3'
2	206° 27.42 221° 27.42	44.04 •• 43.21	272°11.27 286°39.95	9.7' 9.7'	28° 16.27 28° 17.71	1.4' 1.3'	54.3' 54.3'
4	236° 27.43	42.38	301°8.61	9.6'	28°19.00	1.2'	54.3'
5	251°27.44	41.55	315°37.23	9.6'	$28^{\circ}20.17$	1.0'	54.3'
6	266° 27.44	\$13°40.72	330°5.83	9.6'	\$28°21.19	0.9'	54.3'
7 8	281°27.45 296°27.46	39.88 39.05	344°34.40 359°2.95	9.5' 9.5'	28°22.07 28°22.81	0.7' 0.6'	54.3' 54.4'
9	311°27.46	• • 38.22	13°31.47	9.5'	28°23.42	0.5	54.4'
10	$326^{\circ}27.47$	37.38	27°59.98	9.5'	$28^{\circ}23.88$	0.3'	54.4'
11	341°27.48	36.55	42°28.46	9.5'	28°24.21 528°24.39	0.2'	54.4'
12 13	356° 27.49 11° 27.50	\$13°35.72 34.88	56°56.91 71°25.36	9.4' 9.4'	528°24.39 28°24.43	0.0' -0.1'	54.4' 54.4'
14	26° 27.51	34.05	85°53.78	9.4'	28°24.33	-0.1	54.4'
15	41°27.52	• • 33.21	100°22.18	9.4'	$28^{\circ}24.09$	-0.4'	54.4'
16	56°27.52	32.37	114°50.57	9.4'	28°23.71	-0.5'	54.5'
17 18	71°27.53 86°27.54	31.54 \$13°30.70	129°18.95 143°47.31	9.4' 9.4'	28°23.19 \$28°22.52	-0.7' -0.8'	54.5' 54.5'
19	101°27.56	29.86	158° 15.66	9.4	28°21.71	-0.8	54.5'
20	116° 27.57	29.02	172°44.00	9.3'	28°20.76	-1.1'	54.5'
21	131°27.58	• • 28.19	187°12.33	9.3'	$28^{\circ}19.67$	-1.2'	54.5'
22	146° 27.59	27.35	201°40.65	9.3'	28°18.44	-1.4'	54.5'
23	161°27.60	26.51	216°8.97	9.3'	28°17.06	-1.5'	54.6'
	SD = 16.2'	d = -0.8'		SD	0 = 14.8'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°27.61	S13°25.67	230°37.28	9.3'	S28°15.54	-1.7'	54.6'
1	191°27.63	24.83	245°5.58	9.3'	28°13.88	-1.8'	54.6'
2	206°27.64 221°27.65	23.99 •• 23.15	259°33.88 274°2.18	9.3' 9.3'	28°12.08 28°10.13	-1.9' -2.1'	54.6' 54.6'
4	236° 27.66	22.31	288°30.48	9.3'	28°8.04	-2.1 -2.2'	54.6
5	251° 27.68	21.47	302°58.77	9.3'	28° 5.81	-2.4'	54.6'
6	266° 27.69	<b>S</b> 13°20.63	317°27.07	9.3'	S28°3.43	-2.5'	54.7'
7	281°27.71	19.78	331°55.37	9.3'	28°0.91	-2.7'	54.7'
8 9	296°27.72 311°27.74	18.94 •• 18.10	346°23.68 0°51.99	9.3' 9.3'	27°58.25 27°55.45	-2.8' -2.9'	54.7' 54.7'
10	326° 27.75	17.26	15°20.30	9.3'	27°52.50	-2.9	54.7'
11	341°27.77	16.41	29°48.63	9.3'	27°49.41	-3.2'	54.7'
12	356° 27.78	<b>S</b> 13°15.57	44°16.96	9.3'	S27°46.18	-3.4'	54.8'
13 14	11°27.80 26°27.82	14.73 13.88	58°45.30 73°13.65	9.4' 9.4'	27°42.81 27°39.30	-3.5' -3.7'	54.8' 54.8'
15	41°27.83	13.00	75 13.05 87°42.02	9.4 9.4'	27°35.64	-3.1' -3.8'	54.8'
16	56° 27.85	12.19	102°10.39	9.4'	27°31.84	-3.9'	54.8'
17	71°27.87	11.34	116°38.78	9.4'	$27^{\circ}27.90$	-4.1'	54.9'
18	86°27.89	\$13°10.50	131°7.19	9.4'	\$27°23.82	-4.2'	54.9'
19 20	101°27.90 116°27.92	9.65 8.81	145°35.61 160°4.05	9.4' 9.5'	27°19.60 27°15.24	-4.4' -4.5'	54.9' 54.9'
21	131° 27.94	• • 7.96	174°32.51	9.5'	27°10.73	-4.6'	54.9'
22	146°27.96	7.11	189° 0.99	9.5'	27°6.09	-4.8'	54.9'
23	161°27.98	6.26	203°29.49	9.5'	27° 1.31	-4.9'	55.0'
	SD = 16.2'	d = -0.8'		SD	0 = 14.9'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°28.00	\$13°5.41	217°58.01	9.5'	\$26°56.38	-5.1'	55.0'
1 2	191°28.02 206°28.04	4.57	232°26.56 246°55.12	9.6' 9.6'	26°51.32 26°46.12	-5.2'	55.0' 55.0'
3	206°28.04 221°28.06	3.72 · · 2.87	240°55.12 261°23.72	9.6° 9.6°	26°40.12 26°40.78	-5.3' -5.5'	55.0' 55.0'
4	236° 28.08	2.02	275°52.33	9.6'	26°35.30	-5.6'	55.1
5	251°28.10	1.17	290°20.98	9.7'	26°29.68	-5.8'	55.1'
6	266°28.12	\$13°0.32 12°59.47	304°49.65 319°18.35	9.7'	\$26°23.93	-5.9'	55.1'
7 8	281°28.15 296°28.17	12°59.47 58.61	319°18.35 333°47.08	9.7' 9.8'	26°18.04 26°12.01	-6.0' -6.2'	55.1' 55.1'
9	311°28.19	57.76	348° 15.84	9.8'	26° 5.84	-6.2'	55.1°
10	326°28.21	56.91	2°44.63	9.8'	$25^{\circ}59.54$	-6.4'	55.2'
11	341°28.24	56.06	17°13.46	9.9'	25°53.11	-6.6'	55.2'
12 13	356°28.26 11°28.29	\$12°55.21 54.35	31°42.31 46°11.20	9.9' 9.9'	\$25°46.54 25°39.83	-6.7' -6.8'	55.2' 55.3'
13 14	26°28.31	54.35 53.50	46°11.20 60°40.13	9.9 10.0'	25°39.83 25°32.99	-6.8 -7.0'	55.3'
15	41°28.33	• • 52.64	75° 9.09	10.0'	25°26.02	-7.1'	55.3'
16	56°28.36	51.79	89°38.08	10.0'	25°18.92	-7.2'	55.3'
17	71°28.38	50.94	104°7.12	10.1'	25°11.68	-7.4'	55.3'
18 19	86°28.41 101°28.43	\$12°50.08 49.23	118°36.19 133°5.29	10.1' 10.1'	\$25°4.31 24°56.81	-7.5' -7.6'	55.4' 55.4'
20	101 26.43 116°28.46	49.23 48.37	133 3.29 147°34.44	10.1	24° 49.18	-7.8'	55.4'
21	131°28.49	• • 47.51	162°3.62	10.2'	24°41.42	-7.9'	55.4'
22	146°28.51	46.66	176°32.85	10.3'	24°33.53	-8.0'	55.5'
23	161°28.54	45.80	191°2.11	10.3'	24°25.51	-8.1'	55.5'
	SD = 16.2'	d = -0.8'		SD	0 = 15.0'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	02:26	03:39	04:29	19:57	20:47	21:59

Lat.	Moonrise			Moonset			
Lut.	Thu	Fri	Sat	Thu	Fri	Sat	
N 72°							
<b>N</b> 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° N 10°	02:38 02:14	03:30 03:06	04:20 03:57	13:29 13:54	14:23 14:47	15:20 15:41	
0°	02:14	03:06	03:57	13:54	14:47 15:09	16:01	
1 -							
<b>S</b> 10° 20°	01:29	02:21	03:15	14:39	15:31	16:21	
30°	01:05 00:37	01:57 01:29	02:52 02:26	15:04 15:32	15:54 16:22	16:42 17:06	
35°	00:37	01:12	02:20	15:32	16:38	17:20	
40°	00:20	00:53	01:52	16:08	16:56	17:37	
45°		00:29	01:31	16:32	17:18	17:56	
<b>S</b> 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	
<b>S</b> 60°	22:00	23:21		19:02	19:30	19:41	

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	25-27
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	28-12%
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	Stars
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	145°1.01	166°56.92 \$10°46.51	184°30.79 \$16°33.00	37°35.23 N22°48.05	144°3.71 S01°55.59	Alpheratz 357°34.10 29°14.13
1 2	160°3.47	181°56.43 45.36	199°31.30 32.41	52°37.90 48.08	159° 5.92 55.48	Ankaa 353°6.53 -42°10.01
3	175°5.94 190°8.40	196°55.93 44.20 211°55.44 • 43.05	214°31.81 31.81 229°32.32 · · 31.21	67°40.57 48.10 82°43.24 •• 48.13	174°8.14 55.37 189°10.35 • 55.25	Schedar 349°30.40 56°41.02
4	205° 10.87	226°54.94 41.89	244°32.83 30.60	97°45.91 48.16	204°12.56 55.14	Diphda 348°46.59 -17°50.72
5	220° 13.33	241°54.45 40.73	259°33.34 30.00	112°48.58 48.18	219° 14.77 55.03	Achernar 335°19.76 -57°6.48 Hamal 327°50.28 23°35.22
6	235° 15.80	256°53.96 <b>S</b> 10°39.57	274°33.85 <b>S</b> 16°29.40	127°51.24 N22°48.21	234°16.98 S01°54.91	Hamal 327°50.28 23°35.22 Polaris 313°37.81 89°22.78
7	250° 18.26	271°53.46 38.42	289°34.36 28.80	142°53.91 48.23	249°19.19 54.80	Acamar 315°11.12 -40°12.22
8 9	265°20.72 280°23.19	286°52.97 37.26 301°52.48 · · 36.10	304°34.87 28.20 319°35.38 •• 27.60	157°56.58 48.26 172°59.25 • 48.29	264°21.40 54.68 279°23.61 • 54.57	Menkar 314°5.22 4°11.49
10	200 23.19 295°25.65	316°51.99 34.94	334°35.90 27.00	188°1.91 48.31	294°25.83 54.46	Mirfak 308°26.94 49°57.43
11	310°28.12	331°51.50 33.78	349°36.41 26.39	203°4.58 48.34	309° 28.04 54.34	Aldebaran 290°38.46 16°33.71
12	325°30.58	346°51.01 \$10°32.62	4°36.92 <b>S</b> 16°25.79	218°7.25 N22°48.36	324°30.25 <b>S</b> 01°54.23	Rigel 281°2.83 -8°10.41 Capella 280°20.31 46°1.58
13	340°33.04	1°50.52 31.46	19°37.43 25.19	233°9.91 48.39	339°32.46 54.11	Bellatrix 278°21.73 6°22.34
14 15	355°35.51 10°37.97	16°50.03 30.30 31°49.54 •• 29.14	34°37.94 24.58 49°38.46 · · 23.98	248°12.58 48.42 263°15.25 • 48.44	354°34.67 54.00 9°36.88 • 53.89	Elnath 278° 0.51 28° 37.81
16	25° 40.44	46°49.05 27.97	64°38.97 23.38	278°17.91 48.47	24°39.09 53.77	Alnilam 275°36.62 -1°11.21
17	40°42.90	61°48.56 26.81	79°39.48 22.77	293°20.57 48.49	39°41.30 53.66	Betelgeuse 270°50.89 7°24.65
18	55° 45.36	76°48.07 <b>S</b> 10°25.65	94°40.00 \$16°22.17	308°23.24 N22°48.52	54°43.51 <b>S</b> 01°53.54	Canopus 263°51.63 -52°42.77 Sirius 258°25.17 -16°45.27
19	70°47.83	91°47.58 24.48	109°40.51 21.56	323°25.90 48.54	69°45.72 53.43	Adhara 255°4.85 -29°0.62
20	85°50.29 100°52.76	106° 47.10 23.32	124°41.02 20.96	338°28.57 48.57 353°31.23 · · 48.59	84°47.93 53.32	Procyon 244°49.58 5°9.37
21 22	100°52.76 115°55.22	121°46.61 · · 22.15 136°46.12 20.99	139°41.54 · · 20.35 154°42.05 19.75	353°31.23 · · 48.59 8°33.89 48.62	99°50.14 · · 53.20 114°52.35 53.09	Pollux 243°15.84 27°57.73
23	130°57.69	151° 45.64 19.82	169°42.56 19.14	23°36.56 48.65	129°54.56 52.97	Avior 234°13.77 -59°35.71
		-				Suhail 222°45.20 -43°32.39 Miaplacidus 221°37.20 -69°49.51
ivier.p	pass. 14:18	ν-0.5' d-1.2' m-3.91	$\nu 0.5' \ d$ -0.6' m1.13	ν2.7' d0.0' m-2.54	ν2.2' d-0.1' m1.02	Miaplacidus 221°37.20 -69°49.51 Alphard 217°46.51 -8°46.45
						Regulus 207°33.12 11°50.21
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.21 61°36.40
0 1	146°0.15 161°2.61	166° 45.15 \$10° 18.66 181° 44.67 17.49	184°43.08	38°39.22 N22°48.67 53°41.88 48.70	144°56.77 S01°52.86 159°58.98 52.74	Denebola 182°23.71 14°25.36
2	176°5.08	196°44.18 16.32	214°44.11 17.32	68°44.54 48.72	175°1.19 52.63	Gienah 175°42.37 -17°41.32
3	191°7.54	211°43.70 · · 15.16	229°44.62 · · 16.71	83°47.20 · · 48.75	190°3.40 · · 52.52	Acrux 172°58.55 -63°14.54   Gacrux 171°50.19 -57°15.49
4	$206^{\circ}10.01$	226°43.21 13.99	244°45.14 16.11	98°49.87 48.77	205°5.61 52.40	Alioth 166°11.75 55°48.75
5	221°12.47	241°42.73 12.82	259°45.65 15.50	113°52.53 48.80	220°7.82 52.29	Spica 158°21.14 -11°17.97
6	236° 14.93 251° 17.40	256° 42.25 \$10° 11.65 271° 41.76 10.48	274°46.17 \$16°14.89 289°46.68 14.28	128°55.19 N22°48.82 143°57.85 48.85	235°10.03 S01°52.17 250°12.24 52.06	Alkaid 152°51.02 49°10.61
7 8	251 17.40 266°19.86	271°41.76 10.48 286°41.28 9.31	289°46.68 14.28 304°47.20 13.67	143°57.85 48.85 159°0.51 48.87	250° 12.24 52.06 265° 14.45 51.94	Hadar 148°34.43 -60°29.77
9	281°22.33	301°40.80 · · 8.14	319°47.71 · · 13.06	174°3.17 · · 48.90	280°16.66 · · 51.83	Menkent 147°56.36 -36°29.87
10	296°24.79	316°40.32 6.97	334°48.23 12.45	189°5.83 48.92	295° 18.87 51.71	Arcturus 145°46.93 19°2.51 Rigil Kent. 139°38.83 -60°56.42
11	311°27.25	331°39.84 5.80	349°48.75 11.85	204°8.48 48.95	310°21.07 51.60	Kochab 137°19.54 74°2.45
12	326°29.72	346°39.36 \$10°4.63	4°49.26 \$16°11.24	219°11.14 N22°48.97	325°23.28	Zuben'ubi 136°54.91 -16°9.09
13 14	341°32.18 356°34.65	1°38.87 3.46 16°38.39 2.28	19°49.78 10.63 34°50.30 10.01	234°13.80 49.00 249°16.46 49.02	340°25.49 51.37 355°27.70 51.26	Alphecca 126°2.94 26°37.29
15	11°37.11	31°37.92 10°1.11	49°50.81 · · 9.40	264°19.12 · · 49.05	10°29.91 · · 51.14	Antares 112°14.77 -26°29.38
16	26°39.58	46°37.44 09°59.94	64°51.33 8.79	279°21.77 49.07	25°32.12 51.03	Atria 107°8.35 -69°4.21 Sabik 102°1.84 -15°45.48
17	41°42.04	61°36.96 58.76	79°51.85 8.18	294°24.43 49.10	40°34.33 50.91	Sabik 102°1.84 -15°45.48   Shaula 96°9.29 -37°7.28
18	56° 44.50	76°36.48 <b>S</b> 09°57.59	94°52.36 \$16°7.57	309°27.09 N22°49.12	55°36.54 <b>S</b> 01°50.80	Rasalhague 95°57.84 12°32.25
19	71°46.97	91°36.00 56.41	109°52.88 6.96	324°29.74 49.14	70°38.75 50.68	Eltanin 90°42.04 51°28.78
20 21	86° 49.43 101° 51.90	106°35.52 55.24 121°35.05 • 54.06	124°53.40 6.35 139°53.92 · · 5.73	339°32.40 49.17 354°35.05 • 49.19	85°40.95 50.57 100°43.16 • 50.45	Kaus Aust. 83°31.53 -34°22.28
22	116° 54.36	136°34.57 52.89	154°54.44 5.12	9°37.71 49.22	115° 45.37 50.34	Vega 80°32.88 38°48.19
23	131° 56.82	151°34.09 51.71	169°54.95 4.51	24°40.37 49.24	130° 47.58 50.22	Nunki 75°46.87 -26°15.85 Altair 61°59.34 8°56.10
Merr	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	Altair 61°59.34 8°56.10 Peacock 53°4.80 -56°39.00
- IVICI.	Jass. 14.14	ν-0.5 d-1.2 III-5.91		ν2.1 d0.0 iii-2.34	ν2.2 d-0.1 III1.01	Deneb 49°25.62 45°22.27
_	6114	6114 B	5114 B	G114 B	6114	Enif 33°38.21 9°59.60
Tue 0	<b>GHA</b> 146° 59.29	<b>GHA Dec</b> 166°33.62 <b>S</b> 09°50.53	<b>GHA Dec</b> 184°55.47 \$16°3.89	<b>GHA Dec</b> 39°43.02 N22°49.27	<b>GHA Dec</b> 145°49.79 <b>S</b> 01°50.11	Al Na'ir 27°32.20 -46°50.14
1	146 59.29 162°1.75	181°33.14 49.35	199°55.99 3.28	54°45.67 49.29	145 49.79 501 50.11 160°52.00 49.99	Fomalhaut 15°13.83 -29°29.14
2	177° 4.22	196°32.67 48.18	214°56.51 2.67	69°48.33 49.31	175°54.20 49.88	Scheat 13°44.64 28°13.47 Markab 13°29.28 15°20.71
3	$192^{\circ}6.68$	211°32.19 · · 47.00	229°57.03 · · 2.05	84°50.98 · · 49.34	190°56.41 · · 49.76	
4	207°9.14	226°31.72 45.82	244°57.55 1.44	99°53.63 49.36	205°58.62 49.65	Feb 15 Sun SHA Mer.pass
5	222°11.61	241°31.24 44.64 256°30.77 500°43.46	259°58.07 0.82	114°56.29 49.39	221°0.83 49.53 236°3.03 \$01°49.42	Venus 21°55.91 12:53 Mars 39°29.78 11:42
6 7	237° 14.07 252° 16.54	256°30.77 S09°43.46 271°30.30 42.28	274°58.59 \$16°0.21 289°59.11 15°59.59	129°58.94 N22°49.41 145°1.59 49.44	236°3.03 S01°49.42 251°5.24 49.30	Jupiter 252°34.22 21:26
8	267° 19.00	286°29.82 41.10	304°59.63 58.98	160°4.24 49.46	266°7.45 49.19	Saturn 359°2.70 14:22
9	$282^{\circ}21.47$	301°29.35 · · 39.92	320°0.15 · · 58.36	175°6.90 · · 49.48	281°9.66 · · 49.07	
10	297°23.93	316°28.88 38.73	335°0.67 57.74	190°9.55 49.51	296°11.87 48.96	Feb 16 Mon         SHA         Mer.pass           Venus         20°45.00         12:53
11	312°26.39	331°28.41 37.55	350°1.19 57.13	205°12.20 49.53	311°14.07 48.84	Mars 38°42.93 11:41
12 13	327°28.86 342°31.32	346°27.93 S09°36.37 1°27.46 35.19	5°1.71 \$15°56.51 20°2.23 55.89	220°14.85 N22°49.56 235°17.50 49.58	326°16.28 S01°48.73 341°18.49 48.61	Jupiter 252°39.07 21:22
14	357°33.79	16°26.99 34.00	35°2.75 55.28	250°20.15 49.60	356°20.69 48.50	Saturn 358°56.62 14:18
15	12°36.25	31°26.52 · · 32.82	50°3.27 · · 54.66	265°22.80 · · 49.63	11°22.90 · · 48.38	Feb 17 Tue SHA Mer.pass
16	27°38.71	46°26.05 31.64	65°3.79 54.04	280°25.45 49.65	26°25.11 48.27	Venus 19°34.33 12:54
17	42°41.18	61°25.58 30.45	80°4.31 53.42	295°28.10 49.67	41°27.32 48.15	Mars 37°56.18 11:40
18 19	57° 43.64 72° 46.11	76°25.11 S09°29.27 91°24.65 28.08	95°4.84 \$15°52.80 110°5.36 52.19	310°30.74 N22°49.70 325°33.39 49.72	56°29.52 S01°48.04 71°31.73 47.92	Jupiter 252°43.73 21:17
20	72 40.11 87°48.57	106°24.18 26.89	125° 5.88 51.57	340°36.04 49.74	86°33.94 47.81	Saturn 358°50.50 14:15
21	102°51.03	121°23.71 · · 25.71	140°6.40 · · 50.95	355°38.69 · · 49.77	101°36.14 · · 47.69	Horizontal parallax
22	117°53.50	136°23.24 24.52	155° 6.92 50.33	10°41.34 49.79	116°38.35 47.58	Venus: 0.1
23	132°55.96	151°22.78 23.33	170°7.45 49.71	25°43.98 49.81	131°40.56 47.46	Mars: 0.1
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	

h	Su	n	Moon				
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	176°28.57	S12°44.94	205°31.42	10.3'	\$24°17.37	-8.3'	55.5'
1	191°28.60	44.09	220°0.77	10.4	24°9.09	-8.4'	55.5'
2 3	206°28.62 221°28.65	43.23 •• 42.37	234°30.16 248°59.59	10.4' 10.5'	24°0.69 23°52.17	-8.5' -8.7'	55.5' 55.6'
4	236°28.68	41.51	263°29.06	10.5'	23°43.52	-8.8'	55.6'
5	251°28.71	40.65	$277^{\circ}58.58$	10.6'	23°34.74	-8.9'	55.6'
6	266°28.74	S12°39.79	292°28.14	10.6'	\$23°25.84	-9.0'	55.6'
7 8	281°28.77 296°28.80	38.93 38.07	306°57.75 321°27.40	10.7' 10.7'	23°16.82 23°7.67	-9.1' -9.3'	55.7' 55.7'
9	311°28.83	37.21	335°57.10	10.7	22°58.41	-9.4'	55.7'
10	326°28.86	36.35	350°26.84	10.8'	22°49.02	-9.5'	55.7'
11	341°28.89 356°28.92	35.49 \$12°34.63	4°56.62 19°26.45	10.8'	22°39.51 522°29.89	-9.6'	55.8'
12 13	350 28.92 11°28.95	33.77	19 20.45 33°56.33	10.9' 10.9'	22°20.14	-9.7' -9.9'	55.8' 55.8'
14	26°28.98	32.91	48°26.25	11.0'	22°10.28	-10.0'	55.8'
15	41°29.01	• • 32.04	62°56.22	11.0'	22°0.30	-10.1'	55.9'
16 17	56°29.05 71°29.08	31.18 30.32	77°26.24 91°56.30	11.1' 11.1'	21°50.21 21°40.00	-10.2' -10.3'	55.9' 55.9'
18	86°29.11	\$12°29.46	106°26.41	11.1	\$21°29.67	-10.3	55.9'
19	101°29.15	28.59	120°56.57	11.2'	21°19.24	-10.6'	56.0'
20	116°29.18	27.73	135°26.77	11.3'	21°8.68	-10.7'	56.0'
21 22	131°29.21 146°29.25	· · 26.86 26.00	149°57.02 164°27.32	11.3' 11.3'	20°58.02 20°47.25	-10.8' -10.9'	56.0' 56.0'
23	140 29.25 161°29.28	25.13	104 27.32 178°57.67	11.3 11.4'	20°47.25 20°36.37	-10.9 -11.0'	56.0'
	SD = 16.2'	d = -0.9'			O = 15.1'		
	JD — 10.2	<u> </u>		ال			
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	176°29.32 191°29.35	\$12°24.27 23.40	193°28.06 207°58.50	11.4' 11.5'	\$20°25.38 20°14.28	-11.1' -11.2'	56.1' 56.1'
2	191°29.35 206°29.39	23.40	207 58.50 222°28.98	11.5'	20°14.28 20°3.07	-11.2	56.1'
3	221°29.42	21.67	236°59.51	11.6'	19°51.76	-11.4'	56.1'
4	236°29.46	20.80	251°30.09	11.6'	19°40.34	-11.5'	56.2'
5 6	251°29.49 266°29.53	19.93 \$12°19.07	266°0.72 280°31.39	11.7' 11.7'	19°28.81 \$19°17.19	-11.6' -11.7'	56.2' 56.2'
7	281°29.57	18.20	295°2.10	11.8'	19°5.46	-11.7	56.2
8	296°29.60	17.33	309°32.87	11.8'	18°53.63	-11.9'	56.3'
9	311°29.64	• • 16.46	324°3.68	11.9'	18°41.70	-12.0'	56.3'
10 11	326°29.68 341°29.72	15.59 14.72	338°34.53 353°5.43	11.9' 11.9'	18°29.67 18°17.54	-12.1' -12.2'	56.3' 56.3'
12	356°29.76	\$12°13.85	7°36.38	12.0'	\$18°5.31	-12.2	56.4
13	11°29.79	12.98	$22^{\circ}7.37$	12.0'	$17^{\circ}52.99$	-12.4'	56.4'
14	26°29.83 41°29.87	12.11	36°38.40	12.1'	17°40.57 17°28.06	-12.5'	56.4
15 16	41°29.87 56°29.91	· · 11.24 10.37	51°9.48 65°40.60	12.1' 12.2'	17°28.06 17°15.45	-12.6' -12.7'	56.4' 56.5'
17	71°29.95	9.50	80°11.76	12.2'	17°2.76	-12.8'	56.5'
18	86°29.99	\$12°8.63	94°42.97	12.2'	\$16°49.97	-12.9'	56.5'
19 20	101°30.03 116°30.07	7.76 6.88	109°14.22 123°45.51	12.3' 12.3'	16°37.09 16°24.12	-13.0'	56.5' 56.6'
21	131°30.12	6.01	138°16.85	12.4	16° 24.12	-13.1'	56.6'
22	146°30.16	5.14	152°48.22	12.4'	$15^{\circ}57.91$	-13.2'	56.6'
23	161°30.20	4.26	167°19.63	12.5'	15°44.68	-13.3'	56.6'
	SD = 16.2'	d = -0.9'		SI	O = 15.3'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	176°30.24	\$12°3.39	181°51.09	12.5'	\$15°31.37	-13.4'	56.7'
1	191°30.28	2.52	196°22.58	12.5'	$15^{\circ}17.97$	-13.5'	56.7'
2	206°30.33 221°30.37	1.64 12°0.77	210°54.12 225°25.69	12.6' 12.6'	15°4.48 14°50.92	-13.6' -13.6'	56.7' 56.7'
3 4	221°30.37 236°30.41	12°0.77 11°59.89	225°25.69 239°57.30	12.6'	14°50.92 14°37.27	-13.6 -13.7'	56.8'
5	251°30.46	59.02	254°28.94	12.7'	$14^{\circ}23.55$	-13.8'	56.8'
6	266°30.50	S11°58.14	269°0.63	12.7'	\$14°9.74	-13.9'	56.8'
7 8	281°30.54 296°30.59	57.26 56.39	283°32.34 298°4.10	12.8' 12.8'	13°55.86 13°41.91	-14.0' -14.0'	56.8' 56.9'
9	311°30.63	55.51	312°35.89	12.8'	13°27.87	-14.0 -14.1'	56.9'
10	326°30.68	54.63	$327^{\circ}7.71$	12.9'	13°13.77	-14.2'	56.9'
11	341°30.72	53.76	341°39.56	12.9'	12°59.59	-14.3'	56.9'
12 13	356°30.77 11°30.81	\$11°52.88 52.00	356°11.45 10°43.37	12.9' 13.0'	\$12°45.34 12°31.02	-14.3' -14.4'	57.0' 57.0'
14	26°30.86	51.12	25°15.32	13.0'	12°16.63	-14.5'	57.0'
15	41°30.91	• • 50.24	39°47.30	13.0'	12°2.17	-14.5'	57.0'
16 17	56°30.95 71°31.00	49.37	54°19.32	13.0'	11°47.64	-14.6'	57.1'
17 18	71°31.00 86°31.05	48.49 \$11°47.61	68°51.35 83°23.42	13.1' 13.1'	11°33.05 <b>S</b> 11°18.39	-14.7' -14.7'	57.1' 57.1'
19	101°31.10	46.73	97°55.52	13.1	11°3.67	-14.8'	57.1
20	116°31.15	45.85	112°27.64	13.1'	10°48.88	-14.8'	57.1'
21 22	131°31.19 146°31.24	· · 44.97 44.08	126°59.78 141°31.95	13.2' 13.2'	10°34.04 10°19.13	-14.9' -15.0'	57.2' 57.2'
23	140 31.24 161°31.29	44.08	141 31.95 156°4.15	13.2'	10 19.13 10°4.17	-15.0'	57.2'
	SD = 16.2'	d = -0.9'			D = 15.5'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
N 72°	06:10	07:30	08:48	15:42	17:00	18:20
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	02:39	03:49	04:38	19:49	20:37	21:45
				1		

Lat.		Moonris	e		Moonset	
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°			09:21			15:38
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	00:57	02:37	04:15	19:45	19:46	19:46
		_				

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

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	147° 58.43	166°22.31 \$09°22.15	185°7.97 \$15°49.09	40°46.63 N22°49.84	146°42.76 S01°47.35	
1	163°0.89	181°21.84 20.96	200°8.49 48.47	55°49.28 49.86	161°44.97 47.23	Alpheratz 357°34.11 29°14.12
2	178°3.35	196°21.38 19.77	215°9.02 47.85	70°51.92 49.88	176° 47.18 47.11	Ankaa 353°6.54 -42°10.01 Schedar 349°30.42 56°41.01
3	193°5.82	211°20.91 · · 18.58	230°9.54 · · 47.23	85°54.57 · · 49.91	191°49.38 · · 47.00	Diphda 348°46.59 -17°50.72
4	208°8.28	226°20.45 17.39	245°10.06 46.60	100°57.21 49.93	206°51.59 46.88	Achernar 335°19.78 -57°6.47
5	223° 10.75	241°19.98 16.20 256°19.52 \$09°15.01	260°10.59 45.98	115°59.86 49.95 131°2.50 N22°49.98	221°53.80 46.77 236°56.00 \$01°46.65	Hamal 327°50.29 23°35.21
6 7	238° 13.21 253° 15.67	256°19.52 \$09°15.01 271°19.05 13.82	275°11.11 \$15°45.36 290°11.63 44.74	131°2.50 N22°49.98 146°5.15 50.00	236°56.00 S01°46.65 251°58.21 46.54	Polaris 313°39.47 89°22.78
8	268° 18.14	286°18.59 12.63	305°12.16 44.12	161°7.79 50.02	267°0.41 46.42	Acamar 315°11.14 -40°12.22
9	283°20.60	301°18.12 · · 11.44	320°12.68 · · 43.49	176°10.43 · · 50.05	282°2.62 · · 46.31	Menkar 314°5.23 4°11.49
10	298°23.07	316°17.66 10.24	335°13.21 42.87	191°13.08 50.07	297°4.83 46.19	Mirfak 308°26.97 49°57.43 Aldebaran 290°38.47 16°33.71
11	313° 25.53	331°17.20 9.05	350°13.73 42.25	206°15.72 50.09	312°7.03 46.07	Rigel 281°2.85 -8°10.41
12	328° 27.99	346°16.74 \$09°7.86	5°14.26 \$15°41.62	221°18.36 N22°50.11	327°9.24 S01°45.96	Capella 280°20.33 46°1.59
13	343°30.46 358°32.92	1°16.27 6.67 16°15.81 5.47	20°14.78 41.00 35°15.31 40.38	236°21.00 50.14 251°23.65 50.16	342°11.44 45.84 357°13.65 45.73	Bellatrix 278°21.74 6°22.34
14 15	13° 35.39	31°15.35 · · 4.28	35°15.31 40.38 50°15.83 · · 39.75	251°23.65 50.16 266°26.29 · · 50.18	357°13.65 45.73 12°15.85 • 45.61	Elnath 278°0.53 28°37.81
16	28° 37.85	46°14.89 3.08	65°16.36 39.13	281°28.93 50.20	27°18.06 45.50	Alnilam 275°36.63 -1°11.21
17	43°40.31	61°14.43 1.89	80°16.89 38.50	296°31.57 50.23	42°20.26 45.38	Betelgeuse 270°50.90 7°24.65
18	58°42.78	76°13.97 <b>S</b> 09°0.69	95°17.41 \$15°37.88	311°34.21 N22°50.25	57°22.47 S01°45.26	Canopus 263°51.65 -52°42.78 Sirius 258°25.18 -16°45.28
19	73°45.24	91°13.51 08°59.50	110° 17.94 37.25	326°36.85 50.27	72°24.68 45.15	Adhara 255°4.86 -29°0.63
20	88° 47.71	106°13.05 58.30	125°18.46 36.62	341°39.49 50.29	87°26.88 45.03	Procyon 244°49.58 5°9.37
21 22	103°50.17 118°52.64	121°12.59 · · 57.11 136°12.13 55.91	140°18.99 · · 36.00 155°19.52 35.37	356°42.13 · · 50.32 11°44.77 50.34	102°29.09 · · 44.92 117°31.29	Pollux 243°15.85 27°57.74
23	133°55.10	150 12.13 55.91 151°11.68 54.71	170°20.04 34.75	26°47.41 50.36	132°33.50 44.68	Avior 234°13.79 -59°35.72
		-				Suhail 222°45.20 -43°32.40
Mer.p	bass. 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	Miaplacidus 221°37.21 -69°49.53
						Alphard 217°46.51 -8°46.45 Regulus 207°33.11 11°50.21
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.19 61°36.41
0	148°57.56	166°11.22 S08°53.51	185°20.57 \$15°34.12	41°50.04 N22°50.38	147°35.70 <b>S</b> 01°44.57	Denebola 182°23.70 14°25.36
1	164°0.03	181°10.76 52.32	200°21.10 33.49	56°52.68 50.41	162°37.91 44.45	Gienah 175°42.35 -17°41.32
2	179°2.49 194°4.96	196°10.30 51.12 211°9.85 •• 49.92	215°21.63 32.86 230°22.15 · · 32.24	71°55.32 50.43 86°57.96 · · 50.45	177°40.11 44.34 192°42.32 •• 44.22	Acrux 172°58.53 -63°14.55
4	209°7.42	211 9.85 49.92 226°9.39 48.72	245°22.68 31.61	102°0.59 50.47	207° 44.52 44.10	Gacrux 171°50.17 -57°15.51
5	224°9.88	241°8.94 47.52	260°23.21 30.98	117°3.23 50.50	222°46.72 43.99	Alioth 166°11.72 55°48.76
6	239° 12.35	256°8.48 \$08°46.32	275°23.74 \$15°30.35	132°5.87 N22°50.52	237°48.93 <b>S</b> 01°43.87	Spica 158°21.12 -11°17.98 Alkaid 152°50.99 49°10.61
7	$254^{\circ}14.81$	271°8.02 45.12	$290^{\circ}24.27$ $29.72$	147°8.50 50.54	252°51.13 43.76	Hadar 148°34.40 -60°29.78
8	269°17.28	286°7.57 43.92	305°24.80 29.09	162°11.14 50.56	267° 53.34 43.64	Menkent 147°56.34 -36°29.88
9	284° 19.74	301°7.12 · · 42.72	320°25.32 · · 28.46	177°13.77 · · 50.58	282°55.54 · · 43.52	Arcturus 145°46.91 19°2.51
10 11	299°22.20 314°24.67	316°6.66 41.51 331°6.21 40.31	335°25.85 27.83 350°26.38 27.20	192°16.41 50.60 207°19.04 50.63	297°57.75 43.41 312°59.95 43.29	Rigil Kent. 139°38.80 -60°56.43
12	329°27.13	346°5.75 \$08°39.11	5°26.91 \$15°26.57	222°21.68 N22°50.65	328°2.16 S01°43.18	Kochab 137°19.47 74°2.45
13	344°29.60	1°5.30 37.91	20°27.44 25.94	237°24.31 50.67	343°4.36 43.06	Zuben'ubi 136°54.89 -16°9.09
14	359°32.06	16°4.85 36.70	35°27.97 25.31	252°26.95 50.69	358°6.56 42.94	Alphecca 126°2.91 26°37.29 Antares 112°14.74 -26°29.38
15	$14^{\circ}34.52$	31°4.40 · · 35.50	50°28.50 · · 24.68	267°29.58 · · 50.71	13°8.77 · · 42.83	Atria 107°8.30 -69°4.21
16	29°36.99	46°3.94 34.30	65°29.03 24.05	282°32.21 50.73	28° 10.97 42.71	Sabik 102°1.82 -15°45.49
17	44°39.45	61°3.49 33.09	80°29.56 23.42	297°34.85 50.76	43°13.18 42.59	Shaula 96°9.27 -37°7.28
18 19	59°41.92 74°44.38	76°3.04 \$08°31.89 91°2.59 30.68	95°30.09 \$15°22.79 110°30.62 22.15	312°37.48 N22°50.78 327°40.11 50.80	58°15.38 S01°42.48 73°17.58 42.36	Rasalhague 95°57.82 12°32.24
20	89° 46.84	106°2.14 29.47	125°31.15 21.52	342°42.74 50.82	88°19.79 42.24	Eltanin 90°42.01 51°28.77
21	104°49.31	121°1.69 · · 28.27	140°31.68 · · 20.89	357°45.37 · · 50.84	103°21.99 · · 42.13	Kaus Aust. 83°31.51 -34°22.28
22	$119^{\circ}51.77$	136°1.24 27.06	155°32.22 20.26	12°48.00 50.86	118° 24.19 42.01	Vega 80°32.86 38°48.18 Nunki 75°46.85 -26°15.85
23	134° 54.24	151°0.79 25.86	170°32.75 19.62	27°50.63 50.88	133°26.40 41.90	Altair 61°59.32 8°56.09
Mer.	pass. 14:02	ν-0.5' d-1.2' m-3.91	ν0.5' d-0.6' m1.13	$\nu$ 2.6' d0.0' m-2.51	ν2.2' d-0.1' m1.01	Peacock 53°4.78 -56°38.99
						Deneb 49°25.61 45°22.25
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°38.20 9°59.59
0	149° 56.70	166°0.34 S08°24.65	185°33.28 \$15°18.99	42°53.26 N22°50.91	148°28.60 S01°41.78	Al Na'ir 27°32.19 -46°50.13
1	164°59.16	180°59.89 23.44	200°33.81 18.36	57°55.89 50.93	163°30.80 41.66	Fomalhaut 15°13.83 -29°29.13 Scheat 13°44.65 28°13.46
2	180°1.63	195°59.44 22.23	215°34.34 17.72	72°58.52 50.95	178°33.01 41.55	Markab 13°29.28 15°20.70
3	195°4.09	210°59.00 · · 21.02	230°34.87 · · 17.09	88°1.15 · · 50.97	193°35.21 · · 41.43	
4	210°6.56	225°58.55 19.82	245°35.41 16.45	103°3.78 50.99	208°37.41 41.31	Feb 18 Wed SHA Mer.pass
5 6	225°9.02 240°11.48	240°58.10 18.61 255°57.65 \$08°17.40	260°35.94 15.82 275°36.47 \$15°15.18	118°6.41 51.01 133°9.04 N22°51.03	223°39.62 41.20 238°41.82 \$01°41.08	Venus 18°23.88 12:55 Mars 37°9.54 11:39
7	240 11.48 255°13.95	270°57.21 16.19	275 30.47 \$15 15.18 290°37.00 14.55	133 9.04 N22 51.03 148°11.67 51.05	253°44.02 40.96	Jupiter 252°48.20 21:13
8	270° 16.41	285°56.76 14.98	305°37.54 13.91	163°14.29 51.07	268° 46.23 40.85	Saturn 358°44.34 14:11
9	285° 18.88	300°56.31 · · 13.77	320°38.07 · · 13.27	178°16.92 · · 51.10	283°48.43 · · 40.73	
10	300°21.34	315°55.87 12.56	335°38.60 12.64	193°19.55 51.12	298° 50.63 40.61	Feb 19 Thu         SHA         Mer.pass           Venus         17°13.66         12:56
11	315°23.80	330°55.42 11.34	350°39.14 12.00	208°22.17 51.14	313°52.83 40.50	Mars 36°23.01 11:38
12	330°26.27	345°54.98	5°39.67 \$15°11.37	223°24.80 N22°51.16	328°55.04 S01°40.38	Jupiter 252°52.48 21:09
13 14	345°28.73 0°31.20	0°54.53 8.92 15°54.09 7.71	20°40.20 10.73 35°40.74 10.09	238°27.42 51.18 253°30.05 51.20	343°57.24 40.26 358°59.44 40.15	Saturn 358°38.14 14:08
15	15° 33.66	30°53.64 · · 6.49	50°41.27 · · 9.45	268°32.67 · · 51.22	14°1.65 · · 40.03	Feb 20 Fri SHA Mer.pass
16	30°36.12	45°53.20 5.28	65°41.81 8.82	283°35.30 51.24	29°3.85 39.91	Venus 16°3.64 12:56
17	45°38.59	60°52.76 4.07	80°42.34 8.18	298°37.92 51.26	44°6.05 39.80	Mars 35°36.58 11:37
18	60°41.05	75°52.31 \$08°2.85	95°42.88 \$15°7.54	313°40.55 N22°51.28	59°8.25 <b>S</b> 01°39.68	Jupiter 252°56.56 21:05
19	75° 43.52	90°51.87 1.64	110°43.41 6.90	328°43.17 51.30	74°10.45 39.56	Saturn 358°31.90 14:04
20	90°45.98 105°48.44	105°51.43 08°0.43 120°50.99 07°59.21	125°43.95 6.26 140°44.48 • 5.62	343°45.79 51.32 358°48.42 •• 51.34	89°12.66 39.44 104°14.86 · · 39.33	Horizontal parallax
21 22	105 48.44 120°50.91	135°50.55 57.99	155°45.02 4.98	358°48.42 · · 51.34 13°51.04 51.36	119°17.06 39.21	Venus: 0.1
23	135°53.37	150°50.11 56.78	170°45.55 4.34	28°53.66 51.38	134°19.26 39.09	Mars: 0.1
	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	
ivier.	,uss. 13.30	ν-0. <del>-</del> u-1.2 III-3.91	νσ.5 α-σ.σ III1.13	ν 2.0 d0.0 iii-2.31	ν Δ. Δ - U.1 III1.U1	

h	Su	n	Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	176°31.34	<b>5</b> 11°42.32	170°36.37	13.2'	S09°49.15	-15.1'	57.2'
1 2	191°31.39 206°31.44	41.44 40.56	185°8.61 199°40.87	13.3' 13.3'	09°34.07 09°18.93	-15.1' -15.2'	57.3' 57.3'
3	200 31.44 221°31.49	• • 39.67	214°13.15	13.3'	09°18.93	-15.2'	57.3'
4	236°31.54	38.79	228°45.45	13.3'	08°48.50	-15.3'	57.3'
5	251°31.59	37.91	243°17.77	13.3'	08°33.21	-15.3'	57.4'
6 7	266°31.64 281°31.69	\$11°37.02 36.14	257°50.10 272°22.46	13.4' 13.4'	\$08°17.87 08°2.47	-15.4' -15.4'	57.4' 57.4'
8	296°31.75	35.26	286°54.83	13.4'	00° 2.47	-15.5'	57.4'
9	311°31.80	• • 34.37	$301^{\circ}27.21$	13.4'	$07^{\circ}31.54$	-15.5'	57.4'
10	326°31.85	33.49	315°59.60	13.4'	07°16.01	-15.6'	57.5
11 12	341°31.90 356°31.96	32.60 \$11°31.72	330°32.01 345°4.43	13.4' 13.4'	07°0.43 \$06°44.81	-15.6' -15.7'	57.5' 57.5'
13	11°32.01	30.83	359°36.87	13.4'	06°29.15	-15.7'	57.5'
14	26°32.06	29.95	$14^{\circ}9.31$	13.4'	$06^{\circ}13.44$	-15.7'	57.6'
15	41°32.12	• • 29.06	28°41.76 43°14.21	13.5'	05°57.70 05°41.92	-15.8'	57.6'
16 17	56°32.17 71°32.22	28.17 27.29	43 14.21 57°46.68	13.5' 13.5'	05 41.92 05°26.10	-15.8' -15.9'	57.6' 57.6'
18	86°32.28	S11°26.40	72°19.15	13.5'	S05°10.24	-15.9'	57.6'
19	101°32.33	25.51	86°51.62	13.5'	04°54.35	-15.9'	57.7'
20 21	116°32.39 131°32.44	24.62 •• 23.73	101°24.10 115°56.58	13.5' 13.5'	04°38.43 04°22.47	-16.0'	57.7' 57.7'
22	131 32.44 146°32.50	22.85	130°29.06	13.5'	04 22.47 04°6.49	-16.0' -16.0'	57.7'
23	161°32.56	21.96	145°1.54	13.5'	03°50.47	-16.0'	57.7'
	SD = 16.2'	d = -0.9'		SI	D = 15.6'		
Thu 0	<b>GHA</b> 176°32.61	Dec \$11°21.07	<b>GHA</b> 159°34.02	u 13.5'	<b>Dec</b> 503°34.43	d -16.1'	<b>HP</b> 57.8'
1	170 32.01 191°32.67	20.18	174°6.50	13.5'	03°18.36	-16.1'	57.8'
2	206°32.73	19.29	188°38.97	13.5'	$03^{\circ}2.26$	-16.1'	57.8'
3	221°32.78	• • 18.40	203°11.44	13.5'	02°46.15	-16.1'	57.8'
4 5	236°32.84 251°32.90	17.51 16.62	217°43.90 232°16.36	13.5' 13.5'	02°30.00 02°13.84	-16.2' -16.2'	57.8' 57.9'
6	266°32.96	S11°15.73	246°48.81	13.4'	S01°57.65	-16.2'	57.9'
7	281°33.02	14.83	261°21.25	13.4'	$01^{\circ}41.45$	-16.2'	57.9'
8	296°33.08	13.94	275°53.69	13.4'	01°25.23	-16.2'	57.9'
9 10	311°33.13 326°33.19	· · 13.05 12.16	290°26.11 304°58.52	13.4' 13.4'	01°8.99 00°52.74	-16.3' -16.3'	57.9' 58.0'
11	341°33.25	11.27	319°30.91	13.4'	00°36.47	-16.3	58.0'
12	356°33.31	S11°10.37	334°3.29	13.4'	S00°20.19	-16.3'	58.0'
13	11°33.37	9.48	348°35.65	13.3'	S00°3.90	-16.3'	58.0'
14 15	26°33.43 41°33.49	8.59 • • 7.69	3°8.00 17°40.33	13.3' 13.3'	N00°12.40 00°28.70	16.3' 16.3'	58.0' 58.0'
16	56°33.56	6.80	32°12.64	13.3'	00°45.02	16.3	58.1'
17	71°33.62	5.90	46°44.93	13.3'	01°1.34	16.3'	58.1'
18 19	86°33.68 101°33.74	\$11°5.01 4.12	61°17.20 75°49.44	13.2' 13.2'	N01°17.67 01°33.99	16.3' 16.3'	58.1' 58.1'
20	116°33.80	3.22	90°21.67		01°50.32	16.3	58.1
21	131°33.87	• • 2.32	104°53.86	13.2'	02°6.65	16.3'	58.2'
22	146°33.93	1.43	119°26.03	13.1'	02°22.98	16.3'	58.2'
23	161°33.99	0.53	133°58.17	13.1'	02°39.31	16.3'	58.2'
	SD = 16.2'	d = -0.9'		SI	D = 15.8'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°34.06	\$10°59.64	148°30.28 163°2.37	13.1'	N02°55.63	16.3'	58.2' 58.2'
1 2	191°34.12 206°34.18	58.74 57.84	163°2.37 177°34.42	13.1' 13.0'	03°11.95 03°28.26	16.3' 16.3'	58.2' 58.2'
3	221°34.25	• 56.94	192°6.44	13.0'	03°44.56	16.3	58.3'
4	236°34.31	56.05	206°38.42	12.9'	04°0.85	16.3'	58.3'
5 6	251°34.38 266°34.44	55.15 \$10°54.25	221°10.37 235°42.28	12.9' 12.9'	04°17.13 N04°33.40	16.3' 16.3'	58.3' 58.3'
7	200 34.44 281°34.51	53.35	250°14.16	12.9	04°49.65	16.3	58.3'
8	296°34.57	52.45	264°46.00	12.8'	$05^{\circ}5.89$	16.2'	58.3'
9	311°34.64	• • 51.55	279°17.80	12.8'	05°22.12	16.2'	58.3'
10 11	326°34.71 341°34.77	50.66 49.76	293°49.55 308°21.27	12.7' 12.7'	05°38.32 05°54.51	16.2' 16.2'	58.4' 58.4'
12	356°34.84	\$10°48.86	306 21.27 322°52.94	12.6'	N06°10.67	16.1	58.4
13	11°34.91	47.96	$337^{\circ}24.56$	12.6'	$06^{\circ}26.81$	16.1'	58.4'
14	26°34.97	47.05	351°56.14	12.5'	06°42.93	16.1'	58.4'
15 16	41°35.04 56°35.11	· · 46.15 45.25	6°27.68 20°59.16	12.5' 12.4'	06°59.02 07°15.09	16.1' 16.0'	58.4' 58.5'
17	71°35.18	45.25	35°30.60	12.4'	07 15.09 07°31.13	16.0'	58.5'
18	86°35.25	S10°43.45	50°1.98	12.3'	N07°47.13	16.0'	58.5'
19	101°35.32	42.55	64°33.31	12.3'	08°3.11	15.9'	58.5'
20 21	116°35.39 131°35.46	41.65 •• 40.74	79°4.59 93°35.82	12.2' 12.2'	08°19.05 08°34.96	15.9' 15.9'	58.5' 58.5'
22	131 35.40 146°35.53	39.84	93 35.62 108°6.99	12.1'	08°50.84	15.8'	58.5'
23	161°35.60	38.94	122°38.10	12.1'	09°6.67	15.8'	58.5'
	SD = 16.2'	d = -0.9'		SI	D = 15.9'		

Lat.	Twilight		Sunrise	Sunset	Twilight	
Lat.	Naut.	Civil	Junise	Juliset	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
<b>N</b> 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° 0°	05:32	05:57	06:18	18:09	18:31	18:55
_	05:25	05:49	06:10	18:17	18:38	19:03
<b>S</b> 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° 35°	04:49	05:19	05:43	18:44	19:08	19:38
40°	04:40 04:28	05:11 05:02	05:38 05:31	18:49 18:56	19:16 19:24	19:47 19:58
45°	04:28	03.02	05:31	19:04	19:35	20:12
				ł		
<b>S</b> 50° 52°	03:55 03:46	04:39 04:32	05:13 05:09	19:13 19:17	19:48 19:54	20:31 20:39
54°	03:46	04:32	05:09	19:17	20:01	20:39
56°	03:30	04.23	04:59	19:27	20:01	21:01
58°	03:24	04:17	04:53	19:33	20:00	21:15
<b>S</b> 60°	02:52	03:58	04:46	19:40	20:28	21:32

Lat.	Moonrise			Moonset			
Lat.	Wed	Thu	Fri	Wed	Thu	Fri	
N 72°	08:33	07:56	07:20	18:05	20:21	22:44	
<b>N</b> 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	
<b>N</b> 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	
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	05:51	07:26	09:02	19:46	19:45	19:44	

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

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	150°55.84	165°49.66 \$07°55.56	185°46.09	43°56.28 N22°51.40	149°21.46 <b>S</b> 01°38.98	
1	165°58.30	180°49.22 54.35	200°46.63 3.06	58°58.91 51.42	164°23.67 38.86	Alpheratz 357°34.12 29°14.11 Ankaa 353°6.55 -42°10.00
2	181°0.77	195°48.78 53.13	215°47.16 2.42	74°1.53 51.44	179°25.87 38.74	Schedar 349°30.44 56°40.99
3 4	196°3.23 211°5.69	210°48.34 · · 51.91	230°47.70 · · 1.78	89°4.15 · · 51.46	194°28.07 · · 38.63	Diphda 348°46.60 -17°50.72
5	211 5.09 226°8.16	225°47.90 50.69 240°47.46 49.48	245°48.23 1.14 260°48.77 15°0.50	104°6.77 51.48 119°9.39 51.50	209°30.27 38.51 224°32.47 38.39	Achernar 335°19.81 -57°6.46
6	241° 10.62	255°47.03 S07°48.26	275°49.31 \$14°59.86	134°12.01 N22°51.52	239°34.68 S01°38.27	Hamal 327°50.31 23°35.21
7	$256^{\circ}13.09$	270°46.59 47.04	290°49.85 59.22	149°14.63 51.54	254°36.88 38.16	Polaris 313°40.98 89°22.77 Acamar 315°11.16 -40°12.22
8	271° 15.55	285°46.15 45.82	305°50.38 58.57	164°17.25 51.56	269°39.08 38.04	Menkar 314°5.25 4°11.48
9	286° 18.01	300°45.71 · · 44.60	320°50.92 · · 57.93	179°19.87 · · 51.58	284°41.28 · · 37.92	Mirfak 308°26.99 49°57.43
10 11	301°20.48 316°22.94	315°45.27 43.38 330°44.84 42.16	335°51.46 57.29 350°52.00 56.65	194°22.48 51.60 209°25.10 51.62	299° 43.48 37.81 314° 45.68 37.69	Aldebaran 290°38.49 16°33.71
12	331° 25.41	345°44.40 S07°40.94	5°52.53 \$14°56.00	224°27.72 N22°51.64	329°47.88 S01°37.57	Rigel 281°2.86 -8°10.41
13	$346^{\circ}27.87$	0°43.96 39.72	20°53.07 55.36	239°30.34 51.66	344°50.08 37.45	Capella 280°20.35 46°1.59 Bellatrix 278°21.76 6°22.34
14	1°30.33	15°43.53 38.50	35°53.61 54.72	254°32.95 51.68	359°52.29 37.34	Elnath 278°0.55 28°37.81
15	16°32.80	30°43.09 · · 37.28	50°54.15 · · 54.07	269°35.57 · · 51.70	14°54.49 · · 37.22	Alnilam 275°36.65 -1°11.21
16 17	31°35.26 46°37.73	45°42.66 36.06 60°42.22 34.83	65°54.69 53.43 80°55.23 52.78	284°38.19 51.72 299°40.80 51.74	29°56.69 37.10 44°58.89 36.98	Betelgeuse 270°50.91 7°24.65
18	61°40.19	75°41.79 S07°33.61	95°55.77 \$14°52.14	314°43.42 N22°51.76	60°1.09 S01°36.87	Canopus 263°51.68 -52°42.79
19	76° 42.65	90°41.35 32.39	110°56.31 51.49	329°46.03 51.78	75°3.29 36.75	Sirius 258°25.20 -16°45.28 Adhara 255°4.88 -29°0.64
20	91°45.12	105°40.92 31.17	125°56.84 50.85	344°48.65 51.80	90°5.49 36.63	Adhara 255°4.88 -29°0.64 Procyon 244°49.59 5°9.37
21	106° 47.58	120°40.48 · · 29.94	140°57.38 · · 50.20	359°51.26 · · 51.82	105°7.69 · · 36.52	Pollux 243°15.86 27°57.74
22 23	121°50.05 136°52.51	135°40.05 28.72 150°39.62 27.49	155°57.92 49.56 170°58.46 48.91	14°53.88 51.84 29°56.49 51.85	120°9.89 36.40 135°12.09 36.28	Avior 234°13.81 -59°35.74
						Suhail 222°45.21 -43°32.42
Mer.p	pass. 13:54	ν-0.4' d-1.2' m-3.91	$\nu 0.5' \ d$ -0.6' m1.13	$\nu 2.6' \ d0.0' \ \text{m-}2.50$	$\nu 2.2' \ d$ -0.1' m1.01	Miaplacidus 221°37.22 -69°49.55
						Alphard 217°46.52 -8°46.46 Regulus 207°33.11 11°50.21
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.18 61°36.43
0	151°54.97	165°39.18	185°59.00 \$14°48.26	44°59.10 N22°51.87	150°14.29	Denebola 182°23.69 14°25.36
1	166° 57.44 181° 59.90	180°38.75 25.05	200°59.54 47.62 216°0.09 46.97	60°1.72 51.89	165°16.49 36.05 180°18.69 35.93	Gienah 175°42.34 -17°41.33
2	181 59.90 197°2.37	195°38.32 23.82 210°37.89 · · 22.59	216°0.09 46.97 231°0.63 •• 46.32	75°4.33 51.91 90°6.94 · · 51.93	180°18.69 35.93 195°20.89 · · 35.81	Acrux 172°58.51 -63°14.57
4	212°4.83	225°37.45 21.37	246°1.17 45.68	105°9.55 51.95	210°23.09 35.69	Gacrux 171°50.15 -57°15.52
5	227°7.30	240°37.02 20.14	261°1.71 45.03	120°12.17 51.97	225°25.29 35.57	Alioth 166°11.70 55°48.77 Spica 158°21.10 -11°17.99
6	242°9.76	255°36.59 <b>S</b> 07°18.92	276°2.25 \$14°44.38	135°14.78 N22°51.99	240°27.50 <b>S</b> 01°35.46	Alkaid 152°50.97 49°10.62
7	257° 12.22	270°36.16 17.69	291°2.79 43.73	150°17.39 52.01	255°29.70 35.34	Hadar 148°34.37 -60°29.79
8 9	272°14.69 287°17.15	285°35.73 16.46 300°35.30 · · 15.23	306°3.33 43.08 321°3.87 •• 42.44	165°20.00 52.03 180°22.61 • 52.04	270° 31.90 35.22 285° 34.10 · · 35.10	Menkent 147°56.32 -36°29.89
10	302° 19.62	315°34.87 14.01	336° 4.42 41.79	195°25.22 52.06	300°36.30 34.99	Arcturus 145°46.89 19°2.51
11	317°22.08	330°34.44 12.78	351°4.96 41.14	210°27.83 52.08	315°38.49 34.87	Rigil Kent. 139°38.76 -60°56.44 Kochab 137°19.41 74°2.45
12	332°24.54	345°34.01 <b>S</b> 07°11.55	6°5.50 \$14°40.49	225°30.44 N22°52.10	330°40.69 <b>S</b> 01°34.75	Zuben'ubi 136°54.87 -16°9.10
13	347°27.01	0°33.58 10.32	21°6.04 39.84	240°33.05 52.12	345°42.89 34.63	Alphecca 126°2.89 26°37.29
14	2°29.47 17°31.94	15°33.15 9.09 30°32.73 · · · 7.86	36°6.59 39.19 51°7.13 · · 38.54	255°35.66 52.14 270°38.26 • 52.16	0°45.09 34.52	Antares 112°14.72 -26°29.39
15 16	32°34.40	45°32.30 6.63	51°7.13 · · 38.54 66°7.67 37.89	285°40.87 52.17	15°47.29 · · 34.40 30°49.49 34.28	Atria 107°8.24 -69°4.21
17	47° 36.86	60°31.87 5.40	81°8.22 37.24	300°43.48 52.19	45°51.69 34.16	Sabik 102°1.80 -15°45.49
18	62°39.33	75°31.44 <b>S</b> 07°4.17	96°8.76 \$14°36.59	315°46.09 N22°52.21	60°53.89 <b>S</b> 01°34.04	Shaula 96° 9.25 -37° 7.28 Rasalhague 95° 57.80 12° 32.24
19	77° 41.79	90°31.02 2.94	111°9.30 35.94	330°48.69 52.23	75°56.09 33.93	Eltanin 90°41.99 51°28.76
20	92°44.26	105°30.59 1.71	126° 9.85 35.28	345°51.30 52.25	90°58.29 33.81	Kaus Aust. 83°31.49 -34°22.27
21 22	107° 46.72 122° 49.18	120°30.16 07°0.48 135°29.74 06°59.25	141°10.39 · · 34.63 156°10.94 33.98	0°53.90 · · 52.27 15°56.51 52.28	106°0.49 · · 33.69 121°2.69 33.57	Vega 80°32.84 38°48.17
23	137°51.65	150°29.31 58.02	171°11.48 33.33	30°59.12 52.30	136°4.89 33.45	Nunki 75°46.84 -26°15.85
		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	Altair 61°59.31 8°56.09 Peacock 53°4.77 -56°38.98
- Ivier.p	pass. 13:50	ν-0.4 α-1.2 m-3.91	νυ.5 α-υ.0 m1.15	ν2.0 d0.0 m-2.49	ν2.2 α-0.1 m1.00	Deneb 49°25.60 45°22.24
						Enif 33°38.20 9°59.59
Mon	GHA	GHA Dec	<b>GHA Dec</b> 186°12.02 <b>S</b> 14°32.68	<b>GHA Dec</b> 46°1.72 N22°52.32	<b>GHA Dec</b> 151°7.09 <b>S</b> 01°33.34	Al Na'ir 27°32.19 -46°50.11
0 1	152°54.11 167°56.58	165°28.89 S06°56.78 180°28.46 55.55	201°12.57 32.02	46°1.72 N22°52.32 61°4.33 52.34	151°7.09 S01°33.34 166°9.29 33.22	Fomalhaut 15°13.83 -29°29.13
2	182°59.04	195°28.04 54.32	216°13.11 31.37	76°6.93 52.36	181°11.49 33.10	Scheat 13°44.65 28°13.45 Markab 13°29.28 15°20.70
3	$198^{\circ}1.51$	210°27.61 · · 53.08	231°13.66 · · 30.72	91°9.53 · · 52.37	196°13.68 · · 32.98	Walkab 13 29.20 13 20.70
4	213°3.97	225°27.19 51.85	246°14.20 30.06	106°12.14 52.39	211°15.88 32.86	Feb 21 Sat SHA Mer.pass
5	228°6.43	240°26.76 50.62	261°14.75 29.41	121°14.74 52.41	226°18.08 32.75	Venus 14°53.83 12:57
6 7	243°8.90 258°11.36	255°26.34 \$06°49.38 270°25.92 48.15	276°15.30 S14°28.76 291°15.84 28.10	136°17.34 N22°52.43 151°19.95 52.45	241°20.28 S01°32.63 256°22.48 32.51	Mars 34°50.25 11:37 Jupiter 253°0.45 21:01
8	273° 13.83	285°25.49 46.91	306°16.39 27.45	166°22.55 52.46	271°24.68 32.39	Saturn 358°25.63 14:01
9	288° 16.29	300°25.07 · · 45.68	321°16.93 · · 26.79	181°25.15 · · 52.48	286° 26.88 · · 32.27	
10	303° 18.75	315°24.65 44.44	336°17.48 26.14	196°27.75 52.50	301°29.08 32.16	Feb 22 Sun SHA Mer.pass Venus 13°44.21 12:58
11	318° 21.22	330°24.23 43.21	351°18.03 25.48	211°30.35 52.52	316°31.27 32.04	Mars 34°4.03 11:36
12 13	333°23.68 348°26.15	345°23.80 \$06°41.97 0°23.38 40.73	6°18.57 \$14°24.83 21°19.12 24.17	226°32.95 N22°52.53 241°35.55 52.55	331°33.47 S01°31.92 346°35.67 31.80	Jupiter 253°4.13 20:56
13 14	348 26.15 3°28.61	15°22.96 39.50	36°19.67 23.51	256°38.15 52.57	1°37.87 31.68	Saturn 358°19.32 13:57
15	18° 31.08	30°22.54 · · 38.26	51°20.21 · · 22.86	271°40.75 · · 52.59	16°40.07 · · 31.56	Feb 23 Mon SHA Mer.pass
16	33°33.54	45°22.12 37.02	66°20.76 22.20	286°43.35 52.60	31°42.27 31.45	Venus 12°34.77 12:58
17	48° 36.00	60°21.70 35.79	81°21.31 21.54	301°45.95 52.62	46°44.46 31.33	Mars 33°17.91 11:35
18	63°38.47	75°21.28 S06°34.55 90°20.86 33.31	96°21.86 \$14°20.89 111°22.41 20.23	316°48.55 N22°52.64	61°46.66 \$01°31.21	Jupiter 253°7.61 20:52
19 20	78° 40.93 93° 43.40	90°20.86 33.31 105°20.44 32.07	111°22.41 20.23 126°22.95 19.57	331°51.15 52.66 346°53.75 52.67	76°48.86 31.09 91°51.06 30.97	Saturn 358°12.97 13:53
21	108° 45.86	120°20.02 · · 30.83	141°23.50 · · 18.92	1°56.34 · · 52.69	106°53.26 · · · 30.85	Horizontal parallax
22	123°48.32	135°19.60 29.59	156°24.05 18.26	16°58.94 52.71	121°55.45 30.74	Venus: 0.1
23	138° 50.79	150°19.18 28.35	171°24.60 17.60	32°1.54 52.73	136°57.65 30.62	Mars: 0.1
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	

h	Su	n	Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	176°35.67	S10°38.03	$137^{\circ}9.15$	12.0'	N09°22.47	15.8'	58.6'
1	191°35.74	37.13	151° 40.15	11.9'	09°38.22	15.7'	58.6'
2	206°35.81 221°35.88	36.23 · · 35.32	166°11.08 180°41.95	11.9' 11.8'	09°53.94 10°9.61	15.7' 15.6'	58.6' 58.6'
4	236°35.95	34.42	195° 12.76	11.7'	10° 25.24	15.6'	58.6'
5	251°36.02	33.51	209° 43.51	11.7'	10°40.82	15.5'	58.6'
6	266°36.09	S10°32.61	224°14.19	11.6'	$N10^{\circ}56.35$	15.5'	58.6'
7	281°36.17	31.70	238° 44.81	11.5'	11°11.83	15.4'	58.7'
8	296°36.24	30.80	253° 15.36	11.5'	11°27.26	15.4'	58.7'
9 10	311°36.31 326°36.39	· · 29.89 28.98	267° 45.83 282° 16.24	11.4' 11.3'	11°42.64 11°57.96	15.3' 15.3'	58.7' 58.7'
11	341°36.46	28.08	296° 46.58	11.3'	12° 13.23	15.2'	58.7'
12	356°36.53	S10°27.17	311° 16.85	11.2'	N12°28.44	15.2'	58.7'
13	11°36.61	26.26	325° 47.05	11.1'	12°43.59	15.1'	58.7'
14	26°36.68 41°36.76	25.36	340°17.17 354°47.21	11.0' 11.0'	12°58.68 13°13.71	15.0'	58.7'
15 16	56°36.83	· · 24.45 23.54	9° 17.18	10.9'	13 13.71 13°28.68	15.0' 14.9'	58.7' 58.8'
17	71°36.91	22.63	23°47.08	10.8	13°43.58	14.8'	58.8'
18	86°36.98	S10°21.72	38° 16.89	10.7'	N13°58.41	14.8'	58.8'
19	101°37.06	20.82	52°46.63	10.7'	14° 13.17	14.7'	58.8'
20	116°37.13 131°37.21	19.91	67° 16.28 81° 45.86	10.6'	14°27.87 14°42.49	14.6'	58.8'
21 22	131 37.21 146°37.29	· · 19.00 18.09	96°15.35	10.5' 10.4'	14 42.49 14°57.03	14.5' 14.5'	58.8' 58.8'
23	161°37.36	17.18	90 15.35 110°44.76	10.4	14 57.03 15° 11.51	14.5 14.4'	58.8'
	SD = 16.2'	d = -0.9'			0 = 16.0'		
		<u>u — -0.9</u>		JL			
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	176°37.44 191°37.52	\$10° 16.27 15.36	125°14.08 139°43.33	10.2' 10.2'	N15°25.90 15°40.22	14.3' 14.2'	58.8' 58.8'
2	206°37.60	15.30 14.45	159 45.55 154°12.48	10.2	15 40.22 15°54.46	14.2'	58.9'
3	221°37.67	• • 13.54	168° 41.55	10.0'	16°8.61	14.1'	58.9'
4	236°37.75	12.63	183° 10.53	9.9'	16°22.68	14.0'	58.9'
5	251°37.83	11.71	197°39.42	9.8'	16°36.67	13.9'	58.9'
6	266°37.91 281°37.99	\$10° 10.80	212°8.23	9.7'	N16° 50.57 17° 4.38	13.8'	58.9'
7 8	281°37.99 296°38.07	9.89 8.98	226°36.94 241°5.57	9.6' 9.5'	17°4.38 17°18.10	13.7' 13.6'	58.9' 58.9'
9	311°38.15	• • 8.07	255°34.10	9.4'	17°31.73	13.5'	58.9'
10	326°38.23	7.15	270°2.54	9.3'	17°45.26	13.4'	58.9'
11	341°38.31	6.24	284°30.89	9.3'	17°58.70	13.3'	58.9'
12	356°38.39	\$10°5.33	298°59.14	9.2'	N18° 12.05	13.2'	58.9'
13 14	11°38.47 26°38.55	4.41 3.50	313°27.30 327°55.37	9.1' 9.0'	18°25.29 18°38.44	13.1' 13.0'	58.9' 59.0'
15	41°38.63	. 2.59	342° 23.34	8.9'	18° 51.48	12.9'	59.0'
16	56°38.71	1.67	$356^{\circ}51.21$	8.8'	19°4.42	12.8'	59.0'
17	71°38.80	10°0.76	11° 18.99	8.7'	19° 17.25	12.7'	59.0'
18	86°38.88 101°38.96	S09°59.84	25°46.68 40°14.26	8.6'	N19°29.98 19°42.59	12.6' 12.5'	59.0' 59.0'
19 20	101 38.96 116°39.04	58.93 58.01	40 14.26 54°41.75	8.5' 8.4'	19 42.59 19°55.10		
21	131°39.13	57.10	69°9.14	8.3'	20°7.50	12.3'	59.0'
22	146°39.21	56.18	83°36.43	8.2'	$20^{\circ}19.78$	12.2'	59.0'
23	161°39.29	55.26	98°3.62	8.1'	20°31.94	12.0'	59.0'
	$SD = 16.2^{\prime}$	d = -0.9'		SE	0 = 16.0'		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	176°39.38	S09° 54.35	112° 30.72	8.0'	N20° 43.99	11.9'	59.0'
1	191°39.46	53.43	126°57.71	7.9'	20°55.92	11.8'	59.0'
2	206°39.54	52.51	141°24.61	7.8'	21°7.73	11.7'	59.0'
3 4	221°39.63 236°39.71	•• 51.60 50.68	155°51.40 170°18.10	7.7' 7.6'	21°19.41 21°30.98	11.6' 11.4'	59.0' 59.0'
4 5	250 39.71 251°39.80	50.08 49.76	170 18.10 184°44.69	7.6 7.5'	21 30.98 21°42.41	11.4	59.0'
6	266°39.89	S09° 48.84	199° 11.19	7.4'	N21°53.72	11.2'	59.1'
7	281°39.97	47.92	213°37.59	7.3'	22°4.90	11.0'	59.1'
8	296°40.06	47.01	228°3.89	7.2'	22°15.95	10.9'	59.1'
9 10	311°40.14 326°40.23	· · 46.09 45.17	242°30.09 256°56.19	7.1' 7.0'	22°26.87 22°37.65	10.8' 10.6'	59.1' 59.1'
11	320 40.23 341°40.32	45.17 44.25	250 50.19 271°22.19	7.0 6.9'	22°48.30	10.6	59.1'
12	356°40.40	S09°43.33	285° 48.09	6.8	N22°58.81	10.4	59.1
13	11°40.49	42.41	300° 13.89	6.7'	23°9.18	10.2'	59.1'
14	26°40.58	41.49	314°39.59	6.6'	23° 19.41	10.1'	59.1'
15 16	41°40.67 56°40.75	· · 40.57 39.65	329°5.20 343°30.71	6.5' 6.4'	23°29.50 23°39.45	9.9' 9.8'	59.1' 59.1'
17	71°40.84	39.05	343 30.71 357°56.12	6.3	23°49.25	9.8 9.7'	59.1'
18	86°40.93	S09°37.81	12°21.44	6.2'	N23°58.90	9.5'	59.1'
19	101°41.02	36.89	26°46.65	6.1'	24°8.40	9.4'	59.1'
20	116°41.11	35.96	41°11.78	6.0'	24° 17.76	9.2'	59.1'
21 22	131°41.20 146°41.29	· · 35.04 34.12	55°36.81 70°1.74	5.9' 5.8'	24°26.96 24°36.01	9.0' 8.9'	59.1' 59.1'
23	161°41.38	33.20	84°26.59	5.7'	24° 44.90	8.7'	59.1'
	SD = 16.2'	d = -0.9'		SI	O = 16.1'		
				J.	10.1		

	Twi	light			Twilight		
Lat.	Naut.	Civil	Sunrise	Sunset	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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	03:04	04:07	04:54	19:31	20:18	21:20	

Lat.		Moonris	e		Moonset	t
Lat.	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
<b>N</b> 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	
<b>N</b> 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	
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	10:41	12:26	14:18	19:43	19:44	19:47

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	4-6	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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	Stars
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	153° 53.25	165°18.76 <b>S</b> 06°27.11	186°25.15 <b>S</b> 14°16.94	47°4.13 N22°52.74	151°59.85 <b>S</b> 01°30.50	
1	$168^{\circ}55.72$	180°18.35 25.87	201°25.70 16.28	62°6.73 52.76	167°2.05 30.38	Alpheratz 357°34.12 29°14 Ankaa 353°6.56 -42°9
2	183°58.18	195°17.93 24.63	216°26.25 15.62	77°9.33 52.78	182°4.24 30.26	Schedar 349°30.44 56°40
3	199°0.64	210°17.51 · · 23.39	231°26.80 · · 14.96	92°11.92 · · 52.79	197°6.44 · · 30.14	Diphda 348°46.61 -17°50
4	214°3.11 229°5.57	225°17.09 22.15 240°16.68 20.91	246°27.35 14.30	107°14.52 52.81	212°8.64 30.02	Achernar 335°19.83 -57°6
5 6	244°8.04	240°16.68 20.91 255°16.26 \$06°19.67	261°27.90 13.64 276°28.45 \$14°12.98	122°17.11 52.83 137°19.70 N22°52.84	227°10.84 29.91 242°13.03 \$01°29.79	Hamal 327°50.31 23°35
7	259° 10.50	270°15.84 18.43	291°29.00 12.32	152°22.30 52.86	257° 15.23 29.67	Polaris 313°42.15 89°22
8	274° 12.97	285°15.43 17.19	306°29.55 11.66	167°24.89 52.88	272° 17.43 29.55	Acamar 315°11.18 -40°12 Menkar 314°5.25 4°11
9	$289^{\circ}15.43$	300°15.01 · · 15.94	321°30.10 · · 11.00	182°27.49 · · 52.89	287°19.63 · · 29.43	Menkar 314°5.25 4°11 Mirfak 308°27.00 49°57
10	304° 17.89	315°14.60 14.70	336°30.65 10.34	197°30.08 52.91	302°21.82 29.31	Aldebaran 290°38.50 16°33
11	319°20.36	330°14.18 13.46	351°31.20 9.68	212°32.67 52.93	317°24.02 29.19	Rigel 281°2.87 -8°10
12 13	334° 22.82 349° 25.29	345°13.77 \$06°12.22 0°13.35 10.97	6°31.75 \$14°9.02 21°32.30 8.36	227°35.26 N22°52.94 242°37.85 52.96	332°26.22 S01°29.08 347°28.42 28.96	Capella 280°20.37 46°1
14	4° 27.75	15°12.94 9.73	36°32.85 7.70	257°40.45 52.98	2°30.61 28.84	Bellatrix 278°21.76 6°22
15	19°30.21	30°12.52 · · 8.48	51°33.40 · · 7.03	272°43.04 · · 52.99	17°32.81 · · 28.72	Elnath 278°0.56 28°37
16	34°32.68	45°12.11 7.24	66°33.95 6.37	287°45.63 53.01	32°35.01 28.60	Alnilam 275°36.66 -1°11 Betelgeuse 270°50.92 7°24
17	49°35.14	60°11.70 6.00	81°34.51 5.71	302°48.22 53.03	47°37.20 28.48	Betelgeuse 270°50.92 7°24 Canopus 263°51.70 -52°42
18	64°37.61	75°11.28	96°35.06 \$14°5.05	317°50.81 N22°53.04	62°39.40 S01°28.36	Sirius 258°25.21 -16°45
19	79°40.07	90°10.87 3.51	111°35.61 4.38	332°53.40 53.06	77°41.60 28.24	Adhara 255°4.89 -29°0
20 21	94° 42.54 109° 45.00	105°10.46 2.26 120°10.05 06°1.01	126°36.16 3.72 141°36.72 · · 3.06	347°55.99 53.08 2°58.58 •• 53.09	92°43.79 28.13 107°45.99 · · 28.01	Procyon 244°49.60 5°9
22	109 45.00 124° 47.46	135°9.63 05°59.77	156°37.27 2.39	18°1.16 53.11	122°48.19 27.89	Pollux 243°15.86 27°57
23	139°49.93	150°9.22 58.52	171°37.82 1.73	33°3.75 53.12	137° 50.38 27.77	Avior 234°13.82 -59°35
_						Suhail 222°45.21 -43°32
ivier.	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	Miaplacidus 221°37.24 -69°49 Alphard 217°46.51 -8°46
						Regulus 207°33.11 11°50
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.17 61°36
0	154° 52.39	165°8.81 S05°57.28	186°38.38 \$14°1.06	48°6.34 N22°53.14	152°52.58 \$01°27.65	Denebola 182°23.68 14°25
1 2	169° 54.86 184° 57.32	180°8.40 56.03 195°7.99 54.78	201°38.93 14°0.40 216°39.48 13°59.73	63°8.93 53.16 78°11.52 53.17	167° 54.78 27.53 182° 56.97 27.41	Gienah 175°42.33 -17°41
3	199°59.79	210°7.58 · · 53.54	231°40.04 · · 59.07	93°14.10 · · 53.19	197°59.17 · · 27.29	Acrux 172°58.48 -63°14
4	215°2.25	225°7.17 52.29	246°40.59 58.40	108°16.69 53.20	213°1.36 27.18	Gacrux 171°50.12 -57°15
5	230°4.71	240°6.76 51.04	261°41.14 57.74	123°19.27 53.22	228°3.56 27.06	Alioth 166°11.68 55°48 Spica 158°21.08 -11°17
6	245°7.18	255°6.35 <b>S</b> 05°49.79	276°41.70 \$13°57.07	138°21.86 N22°53.24	243°5.76 <b>S</b> 01°26.94	Alkaid 152°50.94 49°10
7	260°9.64	270°5.94 48.54	291°42.25 56.41	153°24.45 53.25	258°7.95 26.82	Hadar 148°34.33 -60°29
8 9	275°12.11	285°5.53 47.29	306°42.81 55.74	168°27.03 53.27	273°10.15 26.70 288°12.34 · · 26.58	Menkent 147°56.29 -36°29
10	290° 14.57 305° 17.03	300°5.12 · · 46.05 315°4.71 44.80	321°43.36 · · 55.07 336°43.92 54.41	183°29.61 · · 53.28 198°32.20 53.30	288°12.34 · · 26.58 303°14.54 26.46	Arcturus 145°46.87 19°2
11	320° 19.50	330°4.30 43.55	351°44.47 53.74	213°34.78 53.31	318° 16.74 26.34	Rigil Kent. 139°38.72 -60°56
12	335°21.96	345°3.89 \$05°42.30	6°45.03 \$13°53.07	228°37.37 N22°53.33	333°18.93 <b>S</b> 01°26.22	Kochab 137°19.35 74°2 Zuben'ubi 136°54.85 -16°9
13	$350^{\circ}24.43$	0°3.48 41.05	21°45.58 52.40	243°39.95 53.35	348°21.13 26.10	Zuben'ubi 136°54.85 -16°9 Alphecca 126°2.87 26°37
14	5°26.89	15°3.08 39.80	36°46.14 51.74	258°42.53 53.36	3°23.32 25.98	Antares 112°14.69 -26°29
15	20°29.36	30°2.67 · · 38.55	51°46.69 · · 51.07	273°45.12 · · 53.38	18°25.52 · · 25.87	Atria 107°8.18 -69°4
16 17	35°31.82 50°34.28	45°2.26 37.30 60°1.85 36.05	66°47.25 50.40 81°47.81 49.73	288°47.70 53.39 303°50.28 53.41	33°27.72 25.75 48°29.91 25.63	Sabik 102°1.77 -15°45
18	65°36.75	75°1.45 S05°34.79	96°48.36 \$13°49.06	318°52.86 N22°53.42	63°32.11 S01°25.51	Shaula 96°9.21 -37°7
19	80°39.21	90°1.04 33.54	111°48.92 48.39	333°55.44 53.44	78°34.30 25.39	Rasalhague 95°57.78 12°32
20	95°41.68	105°0.63 32.29	126°49.48 47.73	348°58.02 53.45	93°36.50 25.27	Eltanin 90°41.96 51°28 Kaus Aust. 83°31.46 -34°22
21	$110^{\circ}44.14$	120°0.23 · · 31.04	141°50.03 · · 47.06	4°0.60 · · 53.47	108°38.69 · · 25.15	Vega 80°32.82 38°48.
22	125° 46.61	134°59.82 29.79	156°50.59 46.39	19°3.18 53.48	123°40.89 25.03	Nunki 75°46.81 -26°15
23	140°49.07	149°59.42 28.53	171°51.15 45.72	34°5.76 53.50	138°43.08 24.91	Altair 61°59.29 8°56
Mer.p	pass. 13:38	u-0.4 $'$ d-1.2 $'$ m-3.91	$ u 0.6' \ d$ -0.7' m1.14	$\nu 2.6' \ d0.0' \ \text{m-}2.47$	$ u 2.2' \ d  0.1' \ \text{m} 1.00$	Peacock 53°4.74 -56°38
						Deneb 49°25.58 45°22
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°38.19 9°59 Al Na'ir 27°32.18 -46°50
0	155° 51.53	164°59.01 \$05°27.28	186°51.70 \$13°45.05	49°8.34 N22°53.51	153°45.28 <b>S</b> 01°24.79	Fomalhaut 15°13.82 -29°29
1	170°54.00	179°58.61 26.03	201°52.26 44.38	64°10.92 53.53	168° 47.47 24.67	Scheat 13°44.64 28°13
2	185°56.46	194°58.20 24.78	216°52.82 43.71	79°13.50 53.54	183°49.67 24.55	Markab 13°29.28 15°20
3 4	200°58.93 216°1.39	209°57.80 · · 23.52 224°57.39	231°53.38 · · 43.04 246°53.94 42.36	94°16.08 · · 53.56 109°18.65 53.57	198°51.86 · · 24.43 213°54.06 24.32	Feb 24 Tue SHA Mer.pa
4 5	210 1.39 231°3.85	239°56.99 21.02	240 53.94 42.30 261°54.49 41.69	109 18.05 53.57 124°21.23 53.59	213 54.00 24.32 228°56.25 24.20	Venus 11°25.51 12
6	246°6.32	254°56.59 \$05°19.76	276°55.05 \$13°41.02	139°23.81 N22°53.60	243°58.45 \$01°24.08	Mars 32°31.90 11
7	261°8.78	269°56.18 18.51	291°55.61 40.35	154°26.39 53.62	259°0.64 23.96	Jupiter 253°10.88 20
8	276° 11.25	284°55.78 17.25	306°56.17 39.68	169°28.96 53.63	274°2.84 23.84	Saturn 358°6.60 13
9	291°13.71	299°55.38 · · 16.00	321°56.73 · · 39.01	184°31.54 · · 53.65	289°5.03 · · 23.72	Feb 25 Wed SHA Mer.pa
10 11	306° 16.18 321° 18.64	314°54.97 14.74 329°54.57 13.49	336°57.29 38.33 351°57.85 37.66	199°34.11 53.66 214°36.69 53.68	304°7.23 23.60 319°9.42 23.48	Venus 10°16.42 13
12	321 18.04 336°21.10	344°54.17 \$05°12.23	6°58.41 \$13°36.99	214°36.69 53.68 229°39.26 N22°53.69	319°9.42 23.48 334°11.62 S01°23.36	Mars 31°45.98 11
13	351°23.57	359°53.77 10.98	21°58.97 36.31	244°41.84 53.71	349°13.81 23.24	Jupiter 253°13.95 20
14	6°26.03	14°53.37 9.72	36°59.53 35.64	259°44.41 53.72	4°16.01 23.12	Saturn 358°0.19 13
15	21°28.50	29°52.96 · · 8.46	52°0.09 · · 34.97	274°46.99 · · 53.74	19°18.20 · · 23.00	Feb 26 Thu SHA Mer.pa
16	36°30.96	44°52.56 7.21	67° 0.65 34.29	289°49.56 53.75	34°20.39 22.88	Venus 9°7.48 13
17	51°33.42	59°52.16 5.95	82°1.21 33.62 97°1.77 \$13°32.95	304°52.13 53.76	49°22.59 22.76	Mars 31°0.17 11
18 19	66°35.89 81°38.35	74°51.76 S05°4.69 89°51.36 3.44	97°1.77 \$13°32.95 112°2.33 32.27	319°54.71 N22°53.78 334°57.28 53.79	64°24.78 S01°22.64 79°26.98 22.52	Jupiter 253°16.81 20 Saturn 357°53.75 13
20	96° 40.82	104°50.96 2.18	127°2.89 31.60	349°59.85 53.81	94°29.17 22.40	Saturii 337 33.75 13
21	111° 43.28	119°50.56 05°0.92	142°3.45 · · · 30.92	5°2.42 · · 53.82	109°31.37 · · 22.28	Horizontal parallax
22	126° 45.75	134°50.16 04°59.66	157° 4.01 30.25	20°4.99 53.84	124°33.56 22.16	Venus: 0.1
23	141°48.21	149°49.76 58.40	172°4.57 29.57	35°7.56 53.85	139°35.75 22.04	Mars: 0.1
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	

h	Su	n	Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	176°41.47	S09°32.28	98°51.34	5.7'	N24°53.64	8.6'	59.1'
1	191°41.56	31.35	113° 15.99	5.6'	25°2.22	8.4'	59.1'
2	206°41.65 221°41.74	30.43 •• 29.51	127°40.56 142°5.04	5.5' 5.4'	25°10.65 25°18.91	8.3' 8.1'	59.1' 59.1'
4	236° 41.83	28.58	156° 29.43	5.3'	25°27.01	7.9'	59.1'
5	251°41.93	27.66	$170^{\circ}53.73$	5.2'	25°34.94	7.8'	59.1'
6	266° 42.02	S09°26.74	185° 17.95	5.1'	N25°42.71	7.6'	59.1'
7 8	281° 42.11 296° 42.20	25.81 24.89	199° 42.08 214° 6.13	5.0' 5.0'	25°50.32 25°57.76	7.4' 7.3'	59.1' 59.1'
9	311° 42.30	23.96	228° 30.10	4.9'	26°5.03	7.1	59.1'
10	326°42.39	23.04	242°53.98	4.8'	$26^{\circ}12.12$	6.9'	59.1'
11	341°42.48	22.11	257° 17.78	4.7'	26°19.05	6.8'	59.2'
12 13	356°42.58 11°42.67	S09°21.19 20.26	271°41.51 286°5.16	4.6' 4.6'	N26°25.80 26°32.38	6.6' 6.4'	59.2' 59.2'
14	26° 42.76	19.34	300°28.74	4.5'	26°38.79	6.2	59.2'
15	41°42.86	• • 18.41	$314^{\circ}52.24$	4.4'	26°45.02	6.1'	59.2'
16	56° 42.95	17.48	329° 15.67	4.4'	26°51.07	5.9'	59.2'
17 18	71°43.05 86°43.14	16.56 \$09°15.63	343°39.03 358°2.32	4.3' 4.2'	26°56.94 N27°2.63	5.7' 5.5'	59.2' 59.2'
19	101°43.24	14.70	12° 25.54	4.2'	27°8.14	5.3'	59.2'
20	116° 43.33	13.77	26°48.70	4.1'	27°13.47	5.1'	59.2'
21	131°43.43	• • 12.85	41°11.80	4.0'	27°18.62	5.0'	59.2'
22 23	146°43.52 161°43.62	11.92 10.99	55°34.84 69°57.82	4.0' 3.9'	27°23.58 27°28.36	4.8' 4.6'	59.2' 59.2'
23			09 31.02			4.0	39.2
	SD = 16.2'	d = -0.9'		SI	D = 16.1'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°43.72	S09°10.06	84°20.74	3.9'	N27°32.95	4.4'	59.2'
1	191°43.82	9.13	98° 43.61	3.8'	27°37.36 27°41.58	4.2'	59.2'
2	206°43.91 221°44.01	8.21 •• 7.28	113°6.42 127°29.18	3.8' 3.7'	27°41.58 27°45.60	4.0' 3.8'	59.2' 59.2'
4	236°44.11	6.35	141°51.90	3.7'	27°49.44	3.7	59.2'
5	251° 44.21	5.42	156° 14.57	3.6'	27°53.09	3.5'	59.2'
6	266°44.30	S09°4.49	170°37.20	3.6'	N27°56.55	3.3'	59.2'
7	281°44.40	3.56	184°59.78	3.5'	27°59.82	3.1'	59.2'
8 9	296°44.50 311°44.60	2.63 •• 1.70	199°22.33 213°44.84	3.5' 3.5'	28°2.90 28°5.78	2.9' 2.7'	59.2' 59.2'
10	311 44.60 326°44.70	09°0.77	213 44.84 228°7.32	3.5 3.4'	28° 8.47	2.7	59.2'
11	341° 44.80	08°59.84	242°29.76	3.4'	28°10.97	2.3'	59.2'
12	356°44.90	S08°58.91	256° 52.18	3.4'	N28°13.27	2.1'	59.2'
13	11°45.00	57.97	271°14.57	3.4'	28°15.38	1.9'	59.1'
14 15	26°45.10 41°45.20	57.04 •• 56.11	285°36.93 299°59.28	3.3' 3.3'	28°17.29 28°19.01	1.7' 1.5'	59.1' 59.1'
16	56° 45.30	55.18	314°21.60	3.3'	28°20.53	1.3	59.1'
17	71°45.40	54.25	328° 43.91	3.3'	28°21.86	1.1'	59.1'
18	86° 45.50	S08°53.31	343°6.20	3.3'	N28°22.99	0.9'	59.1'
19	101°45.60	52.38	357°28.49	3.3'	28°23.92	0.7'	59.1'
20 21	116° 45.71 131° 45.81	51.45 •• 50.52	11°50.76 26°13.03	3.3' 3.3'	28°24.66 28°25.20	0.5' 0.3'	59.1' 59.1'
22	146° 45.91	49.58	40°35.29	3.3'	28°25.54	0.1	59.1
23	161°46.01	48.65	54° 57.56	3.3'	28°25.69	-0.1'	59.1'
	SD = 16.2'	d = -0.9'		SI	D = 16.1'		
			CILA		ъ	,	
Thu 0	<b>GHA</b> 176° 46.12	<b>Dec</b> \$08°47.72	<b>GHA</b> 69° 19.83	ν 3.3'	<b>Dec</b> N28°25.64	d -0.2'	<b>HP</b> 59.1'
1	191° 46.22	46.78	83°42.10	3.3'	28°25.39	-0.2 -0.4	59.1
2	206°46.32	45.85	98°4.37	3.3'	28°24.95	-0.6'	59.1'
3	221°46.43	• • 44.91	112° 26.66	3.3'	28°24.31	-0.8'	59.1'
4 5	236° 46.53 251° 46.63	43.98 43.04	126°48.96 141°11.28	3.3' 3.3'	28°23.47 28°22.44	-1.0' -1.2'	59.1' 59.1'
6	251 46.63 266°46.74	508°42.11	141 11.28 155°33.61	3.4'	N28°21.21	-1.2 -1.4'	59.1'
7	281°46.84	41.17	169°55.97	3.4'	28°19.79	-1.6'	59.1'
8	296° 46.95	40.24	184° 18.34	3.4'	28°18.17	-1.8'	59.1'
9	311°47.05	• • 39.30	198° 40.74	3.4'	28°16.35	-2.0'	59.1'
10 11	326° 47.16 341° 47.26	38.37 37.43	213°3.17 227°25.63	3.5' 3.5'	28°14.35 28°12.14	-2.2' -2.4'	59.1' 59.1'
12	356° 47.37	S08°36.49	241°48.13	3.5'	N28° 9.75	-2.6'	59.1
13	11°47.48	35.56	256° 10.66	3.6'	28°7.16	-2.8'	59.1'
14	26°47.58	34.62	270°33.23	3.6'	28° 4.38	-3.0'	59.1'
15 16	41°47.69 56°47.80	· · 33.68 32.75	284°55.83 299°18.48	3.7' 3.7'	28°1.40 27°58.24	-3.2' -3.4'	59.1' 59.0'
16 17	56°47.80 71°47.90	32.75 31.81	299° 18.48 313° 41.18	3.7' 3.7'	27°58.24 27°54.89	-3.4 -3.5'	59.0' 59.0'
18	86°48.01	\$08°30.87	328°3.93	3.8'	N27°51.34	-3.7'	59.0'
19	101°48.12	29.93	342°26.72	3.8'	27°47.61	-3.9'	59.0'
20	116°48.23	28.99	356° 49.57	3.9'	27°43.69	-4.1'	59.0'
21 22	131°48.33 146°48.44	· · 28.06 27.12	11°12.47 25°35.43	4.0' 4.0'	27°39.58 27°35.29	-4.3' -4.5'	59.0' 59.0'
23	161°48.55	26.18	39°58.44	4.1	27°30.81	-4.5' -4.7'	59.0'
	SD = 16.1'	d = -0.9'		SI	D = 16.1'		
				- 51	10.1		

Lat.	Twilight		Sunrise	Sunset	Twilight		
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.	
N 72°	05:29	06:47	07:58	16:30	17:41	18:59	
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	03:16	04:16	05:02	19:23	20:08	21:08	

Lat.		Moonris	e		Moonset	
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
N 70°						
68°						
66°						
64°	06:22			04:43		
62°	07:22	07:06		03:44	06:08	
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° N 10°	11:10 11:33	12:09 12:33	13:12 13:36	00:03	01:09	02:13 01:48
0°	11:53	12:56	13:58		00:45 00:23	01:48
_						
<b>S</b> 10°	12:15	13:18	14:21	00.07	00:01	01:03
20° 30°	12:37 13:04	13:43 14:11	14:45 15:13	23:37 23:10		00:38 00:09
35°	13:04	14:11	15:13	23:10	23:52	00:09
40°	13:19	14:26	15:30	22:34	23:32	
45°	14:00	15:12	16:13	22:33	23:08	
						00.40
<b>S</b> 50° 52°	14:28 14:42	15:43 15:59	16:43 16:57	21:43 21:29	22:37 22:22	23:48 23:33
52°	14:42 14:58	15:59 16:17	16:57 17:15	21:29	22:22	23:33 23:16
56°	15:17	16:17	17:15	20:53	21:41	22:56
58°	15:17	17:07	18:01	20:33	21:41	22:30
S 60°	16:12	17:48	18:37	19:58	20:32	21:55
3 00	10.12	11.70	10.51	19.50	20.52	21.55

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	7-9	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	44-67%	
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	Stars
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	156° 50.67	164°49.36	187°5.14 \$13°28.89	50°10.13 N22°53.86	154°37.95 <b>S</b> 01°21.92	
1	171°53.14	179°48.96 55.89	202°5.70 28.22	65°12.70 53.88	169° 40.14 21.81	Alpheratz 357°34.12 29°14.10 Ankaa 353°6.56 -42°9.97
2	$186^{\circ}55.60$	194°48.56 54.63	217° 6.26 27.54	80°15.27 53.89	184°42.34 21.69	Ankaa 353°6.56 -42°9.97 Schedar 349°30.45 56°40.97
3	201°58.07	209°48.17 · · 53.37	232°6.82 · · 26.87	95°17.84 · · 53.91	199°44.53 · · 21.57	Diphda 348°46.61 -17°50.71
4	217°0.53	224°47.77 52.11	247°7.38 26.19	110°20.41 53.92	214°46.72 21.45	Achernar 335°19.84 -57°6.44
5	232°3.00	239° 47.37 50.85	262°7.95 25.51	125°22.98 53.93	229°48.92 21.33	Hamal 327°50.32 23°35.20
6 7	247°5.46 262°7.92	254°46.97 \$04°49.59 269°46.57 48.33	277°8.51 \$13°24.84 292°9.07 24.16	140°25.55 N22°53.95 155°28.12 53.96	244°51.11 S01°21.21 259°53.30 21.09	Polaris 313°43.37 89°22.76
8	277° 10.39	284°46.18 47.07	307°9.64 23.48	170°30.69 53.98	274°55.50 20.97	Acamar 315°11.19 -40°12.21
9	292° 12.85	299°45.78 · · 45.81	322°10.20 · · 22.80	185°33.25 · · 53.99	289° 57.69 · · 20.85	Menkar 314°5.26 4°11.48
10	$307^{\circ}15.32$	314°45.38 44.55	337°10.76 22.13	200°35.82 54.00	304°59.89 20.73	Mirfak 308°27.02 49°57.42 Aldebaran 290°38.51 16°33.71
11	322° 17.78	329°44.99 43.29	352°11.33 21.45	215°38.39 54.02	320°2.08 20.61	Rigel 281°2.88 -8°10.42
12	337°20.24	344°44.59 \$04°42.03	7°11.89 \$13°20.77	230°40.95 N22°54.03	335°4.27 S01°20.49	Capella 280° 20.37 46° 1.59
13	352°22.71 7°25.17	359°44.19 40.77 14°43.80 39.50	22°12.45 20.09 37°13.02 19.41	245°43.52 54.04 260°46.08 54.06	350°6.47 20.37 5°8.66 20.25	Bellatrix 278°21.77 6°22.33
14 15	22°27.64	29°43.40 · · 38.24	$37^{\circ}13.02$ 19.41 $52^{\circ}13.58$ · · 18.73	260°46.08 54.06 275°48.65 •• 54.07	5°8.66 20.25 20°10.85 · · 20.13	Elnath 278°0.56 28°37.81
16	37°30.10	44°43.01 36.98	67°14.15 18.05	290°51.21 54.08	35°13.05 20.01	Alnilam 275°36.66 -1°11.22
17	52° 32.57	59°42.61 35.72	82°14.71 17.37	305°53.78 54.10	50°15.24 19.89	Betelgeuse 270°50.93 7°24.65
18	67°35.03	74°42.22 <b>S</b> 04°34.46	97°15.28 \$13°16.69	320°56.34 N22°54.11	65°17.43 <b>S</b> 01°19.77	Canopus 263°51.72 -52°42.81 Sirius 258°25.21 -16°45.30
19	82°37.49	89°41.82 33.19	112°15.84 16.01	335°58.91 54.12	80° 19.63 19.65	Adhara 255°4.89 -29°0.66
20	97°39.96	104°41.43 31.93	127°16.41 15.33	351°1.47 54.14	95°21.82 19.53	Procyon 244°49.60 5°9.36
21	112° 42.42	119°41.03 · · 30.67	142°16.97 · · 14.65	6°4.03 · · 54.15	110°24.01 · · 19.41	Pollux 243°15.86 27°57.74
22 23	127° 44.89 142° 47.35	134°40.64 29.40 149°40.24 28.14	157°17.54 13.97 172°18.10 13.29	21°6.59 54.16 36°9.16 54.18	125°26.20 19.29 140°28.40 19.17	Avior 234°13.84 -59°35.77
						Suhail 222°45.21 -43°32.45
Mer. <sub>I</sub>	pass. 13:30	ν-0.4' d-1.3' m-3.91	$\nu 0.6' \ d$ -0.7' m1.14	$\nu$ 2.6′ $d$ 0.0′ $m$ -2.46	$\nu 2.2' \ d$ -0.1' m0.99	Miaplacidus 221°37.25 -69°49.59
						Alphard 217°46.51 -8°46.48 Regulus 207°33.10 11°50.21
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.10 11°50.21 Dubhe 193°39.15 61°36.45
0	$157^{\circ}49.81$	164°39.85 <b>S</b> 04°26.88	187°18.67 <b>S</b> 13°12.61	51°11.72 N22°54.19	155°30.59 <b>S</b> 01°19.05	Denebola 182°23.66 14°25.35
1	172° 52.28	179°39.46 25.61	202°19.23 11.93	66°14.28 54.20	170°32.78 18.93	Gienah 175°42.31 -17°41.36
2	187°54.74	194°39.06 24.35	217°19.80 11.25	81°16.84 54.22	185°34.98 18.81	Acrux 172°58.45 -63°14.61
3 4	202° 57.21 217° 59.67	209°38.67 · · 23.09 224°38.28	232°20.37 ·· 10.57 247°20.93 9.88	96°19.40 · · 54.23 111°21.96 54.24	200° 37.17 · · 18.69 215° 39.36 18.57	Gacrux 171°50.10 -57°15.56
5	233°2.14	239° 37.88 20.56	262°21.50 9.20	126°24.52 54.26	230°41.55 18.45	Alioth 166°11.65 55°48.78
6	248°4.60	254°37.49 S04°19.29	277°22.07 \$13°8.52	141°27.08 N22°54.27	245°43.75 S01°18.33	Spica 158°21.06 -11°18.00
7	263°7.06	269° 37.10 18.03	292°22.63 7.84	156°29.64 54.28	260° 45.94 18.21	Alkaid 152°50.91 49°10.63 Hadar 148°34.28 -60°29.82
8	$278^{\circ}9.53$	284°36.71 16.76	307°23.20 7.15	171°32.20 54.29	275°48.13 18.09	Menkent 147°56.26 -36°29.91
9	293°11.99	299°36.31 · · 15.50	322°23.77 · · 6.47	186°34.76 · · 54.31	290°50.32 · · 17.97	Arcturus 145°46.84 19°2.50
10	308° 14.46	314°35.92 14.23	337°24.34 5.79	201°37.32 54.32	305°52.52 17.85	Rigil Kent. 139°38.67 -60°56.46
11 12	323° 16.92 338° 19.38	329°35.53 12.97 344°35.14 \$04°11.70	352°24.90 5.10 7°25.47 \$13°4.42	216°39.88 54.33 231°42.43 N22°54.34	320°54.71 17.73 335°56.90 \$01°17.61	Kochab 137°19.29 74°2.46
13	353°21.85	359°34.75 10.43	22°26.04 3.74	246°44.99 54.36	350°59.09 17.49	Zuben'ubi 136°54.82 -16°9.11
14	8°24.31	14°34.36 9.17	37°26.61 3.05	261°47.55 54.37	6°1.28 17.37	Alphecca 126°2.84 26°37.28
15	23°26.78	29°33.97 · · 7.90	52°27.18 · · 2.37	276°50.10 · · 54.38	21°3.48 · · 17.25	Antares 112°14.66 -26°29.39 Atria 107°8.10 -69°4.21
16	$38^{\circ}29.24$	44°33.58 6.63	67°27.74 1.68	291°52.66 54.39	$36^{\circ}5.67$ 17.13	Sabik 102°1.74 -15°45.49
17	53°31.71	59°33.19 5.37	82°28.31 1.00	306°55.21 54.41	51°7.86 17.01	Shaula 96°9.18 -37°7.28
18	68°34.17	74°32.80 \$04°4.10	97°28.88 \$13°0.31	321°57.77 N22°54.42	66°10.05 S01°16.89	Rasalhague 95°57.75 12°32.23
19	83°36.63 98°39.10	89°32.41 2.83 104°32.02 1.56	112°29.45 12°59.63 127°30.02 58.94	337°0.32 54.43 352°2.88 54.44	81°12.24 16.77 96°14.44 16.65	Eltanin 90°41.92 51°28.75
20 21	96 39.10 113°41.56	104°32.02 1.56 119°31.63 04°0.30	127°30.02 58.94 142°30.59 •• 58.26	352°2.88 54.44 7°5.43 •• 54.46	96°14.44 16.65 111°16.63 · · 16.52	Kaus Aust. 83°31.43 -34°22.27
22	128° 44.03	134°31.24 03°59.03	157°31.16 57.57	22°7.99 54.47	126° 18.82 16.40	Vega 80°32.79 38°48.16
23	143°46.49	149°30.85 57.76	172°31.73 56.88	37°10.54 54.48	141°21.01 16.28	Nunki 75°46.78 -26°15.84 Altair 61°59.27 8°56.08
Meri	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	Peacock 53°4.70 -56°38.95
IVICI.	pass. 13.20	ν-0.4 u-1.5 III-5.91		ν2.0 d0.0 iii-2.43	ν2.2 d-0.1 1110.99	Deneb 49°25.57 45°22.22
_						Enif 33°38.17 9°59.58
Sun	GHA	<b>GHA Dec</b> 164°30.46 \$03°56.49	<b>GHA Dec</b> 187°32.30 <b>S</b> 12°56.20	<b>GHA Dec</b> 52°13.09 N22°54.49	GHA Dec	Al Na'ir 27°32.16 -46°50.08
0 1	158° 48.95 173° 51.42	179° 30.07 55.22	202°32.87 55.51	52°13.09 N22°54.49 67°15.65 54.51	156°23.20 S01°16.16 171°25.40 16.04	Fomalhaut 15°13.81 -29°29.11
2	188°53.88	194°29.69 53.96	217°33.44 54.82	82°18.20 54.52	186°27.59 15.92	Scheat 13°44.64 28°13.43 Markab 13°29.27 15°20.69
3	203° 56.35	209°29.30 · · 52.69	232°34.01 · · 54.14	97°20.75 · · 54.53	201°29.78 · · 15.80	
4	$218^{\circ}58.81$	224°28.91 51.42	247°34.58 53.45	112°23.30 54.54	216°31.97 15.68	Feb 27 Fri SHA Mer.pass
5	234°1.27	239°28.52 50.15	262°35.15 52.76	127°25.85 54.55	231°34.16 15.56	Venus 7°58.69 13:01
6	249°3.74	254°28.13	277°35.72 \$12°52.07	142°28.41 N22°54.57	246°36.35 S01°15.44	Mars 30° 14.46 11:31
7 8	264°6.20 279°8.67	269° 27.75 47.61 284° 27.36 46.34	292°36.29 51.39 307°36.87 50.70	157°30.96 54.58 172°33.51 54.59	261° 38.54 15.32 276° 40.74 15.20	Jupiter 253°19.46 20:36 Saturn 357°47.27 13:39
9	279 0.07 294°11.13	299°26.97 · · 45.07	322°37.44 · · 50.01	187°36.06 · · 54.60	291°42.93 · · 15.08	
10	309° 13.60	314°26.59 43.80	337°38.01 49.32	202°38.61 54.61	306° 45.12 14.96	Feb 28 Sat SHA Mer.pass
11	$324^{\circ}16.06$	329°26.20 42.53	352°38.58 48.63	217°41.16 54.62	321°47.31 14.84	Venus 6° 50.03 13:02
12	339° 18.52	344°25.81 \$03°41.26	7°39.15 <b>S</b> 12°47.94	232°43.70 N22°54.64	336°49.50 S01°14.72	Mars 29°28.85 11:30 Jupiter 253°21.90 20:32
13	354°20.99	359°25.43 39.99	22°39.72 47.25	247°46.25 54.65	351°51.69 14.60	Saturn 357° 40.78 13:36
14	9°23.45	14°25.04 38.72	37°40.30 46.56	262°48.80 54.66	6°53.88 14.48	
15 16	24°25.92 39°28.38	29°24.66 · · 37.45 44°24.27 36.18	52°40.87 · · 45.88 67°41.44 45.19	277°51.35 · · 54.67 292°53.90 54.68	21°56.07 · · 14.36 36°58.26       14.24	Mar 01 Sun SHA Mer.pass
17	59 28.38 54°30.84	59°23.88 34.90	82°42.02 44.50	307°56.44 54.69	52°0.46 14.12	Venus 5°41.51 13:02 Mars 28°43.35 11:29
18	69°33.31	74°23.50 S03°33.63	97°42.59 \$12°43.80	322°58.99 N22°54.70	67°2.65 S01°14.00	Mars 28°43.35 11:29 Jupiter 253°24.14 20:28
19	84°35.77	89°23.11 32.36	112°43.16 43.11	338°1.54 54.72	82°4.84 13.88	Saturn 357°34.25 13:32
20	99°38.24	104°22.73 31.09	127°43.73 42.42	353°4.08 54.73	97°7.03 13.75	
21	114° 40.70	119°22.34 · · 29.82	142°44.31 · · 41.73	8°6.63 · · 54.74	112°9.22 · · 13.63	Horizontal parallax
22	129° 43.16	134°21.96 28.55	157°44.88 41.04	23°9.17 54.75	127°11.41 13.51	Venus: 0.1 Mars: 0.1
23	144° 45.63	149°21.58 27.27	172°45.46 40.35	38°11.72 54.76	142°13.60 13.39	ivials. U.1
Mer.	pass. 13:23	ν-0.4' d-1.3' m-3.91	ν0.6′ d-0.7′ m1.14	$\nu$ 2.6′ $d$ 0.0′ m-2.44	$\nu 2.2' \ d$ -0.1' m0.99	

h	Su	n	Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	176°48.66	S08°25.24	54°21.52	4.1'	$N27^{\circ}26.14$	-4.8'	59.0'
1	191° 48.77	24.30	68° 44.66	4.2'	27°21.30	-5.0'	59.0'
2	206° 48.88 221° 48.99	23.36	83°7.87 97°31.15	4.3' 4.3'	27°16.27 27°11.06	-5.2' -5.4'	59.0' 59.0'
4	236°49.10	21.48	111°54.49	4.4'	27°5.66	-5.6'	59.0'
5	251°49.21	20.54	126° 17.90	4.5'	27°0.09	-5.7'	59.0'
6	266° 49.32	S08°19.60	140°41.39	4.6'	N26°54.35	-5.9'	58.9'
7 8	281° 49.43 296° 49.54	18.66 17.72	155°4.96 169°28.60	4.6' 4.7'	26°48.42 26°42.32	-6.1' -6.3'	58.9' 58.9'
9	311° 49.65	. 16.78	183°52.31	4. <i>1</i> 4.8'	26°36.04	-0.5 -6.4'	58.9'
10	326° 49.76	15.84	198° 16.11	4.9'	26°29.60	-6.6'	58.9'
11	341°49.87	14.90	212°39.99	5.0'	$26^{\circ}22.98$	-6.8'	58.9'
12	356°49.98	S08°13.96	227°3.96	5.0'	N26°16.18	-7.0'	58.9'
13 14	11°50.10 26°50.21	13.01 12.07	241°28.01 255°52.14	5.1' 5.2'	26°9.23 26°2.10	-7.1' -7.3'	58.9' 58.9'
15	41°50.32	. 11.13	270°16.36	5.3	25°54.80	-7.5'	58.9'
16	56° 50.43	10.19	284°40.68	5.4'	25°47.35	-7.6'	58.9'
17	71°50.55	9.25	299°5.08	5.5'	25°39.72	-7.8'	58.8'
18	86° 50.66 101° 50.77	\$08°8.30 7.36	313°29.58 327°54.16	5.6' 5.7'	N25°31.94 25°23.99	-7.9' -8.1'	58.8' 58.8'
19 20	101°50.77 116°50.89	7.36 6.42	327°54.16 342°18.85	5.7° 5.8'	25° 23.99 25° 15.89	-8.1 -8.3'	58.8'
21	131°51.00	• • 5.47	356° 43.62	5.9'	25°7.63	-8.4	58.8'
22	$146^{\circ}51.11$	4.53	11°8.50	6.0'	$24^{\circ}59.21$	-8.6'	58.8'
23	161°51.23	3.59	25°33.47	6.1'	24°50.64	-8.7'	58.8'
	SD = 16.1'	d = -0.9'		SI	D = 16.1'		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	176°51.34	508°2.64	39°58.54	6.2'	N24°41.91	-8.9'	58.8'
1	191°51.46	1.70	54°23.71	6.3'	24°33.04	-9.0'	58.8'
2	206°51.57 221°51.69	08° 0.75 07° 59.81	68° 48.98 83° 14.35	6.4' 6.5'	24°24.01 24°14.84	-9.2' -9.3'	58.8' 58.7'
3 4	236° 51.80	58.87	97°39.82	6.6	24 14.04 24°5.52	-9.5' -9.5'	58.7'
5	251°51.92	57.92	112°5.40	6.7'	23°56.05	-9.6'	58.7'
6	266° 52.03	S07°56.98	126°31.08	6.8'	N23°46.44	-9.7'	58.7'
7 8	281°52.15 296°52.27	56.03 55.08	140°56.86 155°22.75	6.9' 7.0'	23°36.69 23°26.80	-9.9'	58.7' 58.7'
9	290 52.27 311°52.38	55.08	155 22.75 169°48.74	7.0 7.1'	23°26.80 23°16.78	-10.0' -10.2'	58.7'
10	326° 52.50	53.19	184° 14.84	7.2'	23°6.61	-10.3	58.7'
11	341°52.62	52.25	198°41.04	7.3'	$22^{\circ}56.31$	-10.4'	58.6'
12 13	356°52.74 11°52.85	\$07°51.30 50.35	213°7.35 227°33.76	7.4' 7.5'	N22°45.88 22°35.32	-10.6' -10.7'	58.6' 58.6'
13	26° 52.97	50.35 49.41	242°0.28	7.5 7.6'	22°24.63	-10.7 -10.8'	58.6'
15	41°53.09	• • 48.46	256° 26.91	7.7'	22°13.81	-10.9'	58.6'
16	56° 53.21	47.51	$270^{\circ}53.65$	7.8'	$22^{\circ}2.86$	-11.1'	58.6'
17	71°53.33	46.57	285°20.49 299°47.44	7.9'	21°51.79	-11.2'	58.6'
18 19	86° 53.44 101° 53.56	\$07°45.62 44.67	299°47.44 314°14.50	8.1' 8.2'	N21°40.60 21°29.28	-11.3' -11.4'	58.5' 58.5'
20	116° 53.68	43.72	328°41.66	8.3'		-11.6'	58.5'
21	131°53.80	• • 42.78	343°8.93	8.4'	$21^{\circ}6.30$	-11.7'	58.5'
22	146°53.92	41.83	357°36.31	8.5'	20°54.63	-11.8'	58.5'
23	161°54.04	40.88	12°3.80	8.6'	20°42.85	-11.9'	58.5'
	SD = 16.1'	d = -0.9'		51	D = 16.0'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°54.16	S07°39.93	26°31.39	8.7'	N20°30.96	-12.0'	58.5'
1 2	191°54.28 206°54.40	38.98 38.03	40°59.09 55°26.90	8.8' 8.9'	20°18.96 20°6.85	-12.1' -12.2'	58.4' 58.4'
3	221°54.52	• • 37.08	69°54.81	9.0'	19°54.63	-12.3'	58.4'
4	236° 54.64	36.13	84°22.83	9.1'	19°42.31	-12.4'	58.4'
5	251°54.77	35.18	98°50.95	9.2'	19°29.89	-12.5'	58.4'
6 7	266° 54.89 281° 55.01	\$07°34.23 33.29	113° 19.18 127° 47.51	9.3' 9.4'	N19°17.36 19°4.74	-12.6' -12.7'	58.4' 58.3'
8	296° 55.13	32.33	142° 15.95	9.5	18°52.01	-12.7	58.3'
9	311°55.25	• • 31.38	156° 44.50	9.6'	18°39.20	-12.9'	58.3'
10	326°55.37	30.43	171°13.14	9.7'	18°26.28	-13.0'	58.3'
11 12	341°55.50 356°55.62	29.48 \$07°28.53	185°41.89 200°10.74	9.9' 10.0'	18°13.28 N18°0.18	-13.1' -13.2'	58.3' 58.3'
13	11°55.74	27.58	200 10.74 214°39.70	10.0	17°46.99	-13.2 -13.3'	58.2'
14	$26^{\circ}55.87$	26.63	229°8.75	10.2'	17°33.72	-13.4'	58.2'
15	41°55.99	• • 25.68	243°37.91	10.3'	17°20.36	-13.4'	58.2'
16 17	56° 56.11 71° 56.24	24.73 23.78	258°7.16 272°36.51	10.4' 10.5'	17°6.92 16°53.39	-13.5' -13.6'	58.2' 58.2'
18	86° 56.36	507°22.82	287°5.97	10.6	N16°39.79	-13.7'	58.1
19	101°56.49	21.87	301°35.52	10.6'	$16^{\circ}26.10$	-13.8'	58.1'
20	116° 56.61	20.92	316°5.17	10.7'	16°12.34	-13.8'	58.1'
21 22	131° 56.73 146° 56.86	· · 19.97 19.01	330°34.91 345°4.75	10.8' 10.9'	15°58.50 15°44.59	-13.9' -14.0'	58.1' 58.1'
23	161°56.99	18.06	359°34.68	11.0'	15° 44.59 15° 30.61	-14.0 -14.1'	58.0'
	SD = 16.1'	d = -0.9'		SI	D = 15.9'		
		***					

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	05:15	06:33	07:42	16:45	17:54	19:13
<b>N</b> 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
<b>N</b> 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
45°	05:36	06:10	06:40	17:46	18:15	18:49
<b>N</b> 40°	05:36	06:08	06:35	17:51	18:18	18:49
35°	05:36	06:05	06:31	17:55	18:20	18:49
30°	05:35	06:03	06:27	17:58	18:22	18:50
20°	05:33	05:58	06:21	18:05	18:27	18:52
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	03:26	04:25	05:10	19:14	19:58	20:56

Lat.		Moonris	e		Moonset			
Lat.	Fri	Sat	Sun	Fri	Sat	Sun		
N 72°								
N 70°			12:34			09:01		
68°			13:15			08:18		
66°		11:03	13:43		08:37	07:49		
64°		11:52	14:04		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		
45°	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		
35°	13:36	14:48	15:58	03:55	04:43	05:22		
30°	13:51	15:00	16:08	03:40	04:29	05:11		
20°	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		
<b>S</b> 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		
<b>S</b> 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		
<b>S</b> 60°	18:52	18:57	18:58	23:46		01:38		

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	10-12	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	77-93%	
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		

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	159° 48.09	164°21.19	187°46.03 \$12°39.66	53°14.26 N22°54.77	157°15.79 <b>S</b> 01°13.27	
1	174°50.56	179°20.81 24.73	202°46.60 38.97	68°16.81 54.78	172°17.98 13.15	Alpheratz 357°34.12 29°14.09 Ankaa 353°6.56 -42°9.96
2	189°53.02	194°20.42 23.46	217°47.18 38.27	83°19.35 54.79	187°20.17 13.03	Ankaa 353°6.56 -42°9.96 Schedar 349°30.46 56°40.96
3	204°55.48	209°20.04 · · 22.18	232°47.75 · · 37.58	98°21.89 · · 54.81	202°22.36 · · 12.91	Diphda 348°46.61 -17°50.70
4	219°57.95	224°19.66 20.91	247°48.33 36.89	113°24.44 54.82	217°24.55 12.79 232°26.74 12.67	Achernar 335°19.86 -57°6.43
5 6	235°0.41 250°2.88	239°19.27 19.64 254°18.89 \$03°18.36	262°48.90 36.20 277°49.48 \$12°35.50	128°26.98 54.83 143°29.52 N22°54.84	232°26.74 12.67 247°28.93 \$01°12.55	Hamal 327°50.33 23°35.20
7	265°5.34	269°18.51 17.09	292°50.05 34.81	158°32.06 54.85	262°31.12 12.43	Polaris 313°44.87 89°22.76
8	280°7.81	284°18.13 15.82	307°50.63 34.12	173°34.60 54.86	277°33.31 12.31	Acamar 315°11.21 -40°12.20
9	$295^{\circ}10.27$	299°17.74 · · 14.54	322°51.20 · · 33.42	188°37.14 · · 54.87	292°35.50 · · 12.19	Menkar 314°5.27 4°11.48 Mirfak 308°27.04 49°57.42
10	310°12.73	314°17.36 13.27	337°51.78 32.73	203°39.69 54.88	307° 37.70 12.06	Aldebaran 290°38.52 16°33.71
11	325° 15.20	329°16.98 11.99 344°16.60 \$03°10.72	352°52.35 32.04	218°42.23 54.89	322°39.89 11.94	Rigel 281°2.89 -8°10.42
12 13	340°17.66 355°20.13	344°16.60 \$03°10.72 359°16.21 9.44	7°52.93 \$12°31.34 22°53.51 30.65	233°44.77 N22°54.90 248°47.31 54.91	337°42.08	Capella 280°20.39 46°1.59
14	10° 22.59	14°15.83 8.17	37°54.08 29.95	263°49.84 54.92	7°46.46 11.58	Bellatrix 278°21.78 6°22.34
15	25°25.05	29°15.45 · · 6.90	52°54.66 · · 29.26	278°52.38 · · 54.94	22°48.65 · · 11.46	Elnath 278° 0.58 28° 37.81
16	$40^{\circ}27.52$	44°15.07 5.62	67°55.24 28.56	293°54.92 54.95	37°50.84 11.34	Alnilam 275°36.67 -1°11.22 Betelgeuse 270°50.94 7°24.65
17	55°29.98	59°14.69 4.35	82°55.81 27.87	308°57.46 54.96	52°53.03 11.22	Canopus 263°51.74 -52°42.81
18	70°32.45	74°14.31	97°56.39 \$12°27.17	324°0.00 N22°54.97	67°55.22 S01°11.10	Sirius 258°25.22 -16°45.30
19 20	85°34.91 100°37.37	89°13.93 1.79 104°13.55 03°0.52	112°56.97 26.48 127°57.55 25.78	339°2.54 54.98 354°5.07 54.99	82°57.40 10.98 97°59.59 10.86	Adhara 255°4.91 -29°0.66
21	115° 39.84	119°13.17 02°59.24	142°58.12 · · 25.09	9°7.61 · · 55.00	113°1.78 · · 10.74	Procyon 244°49.61 5°9.36
22	130° 42.30	134°12.79 57.97	157°58.70 24.39	24°10.15 55.01	128°3.97 10.61	Pollux 243°15.87 27°57.75
23	145°44.77	149°12.41 56.69	172°59.28 23.69	39°12.68 55.02	143°6.16 10.49	Avior 234°13.86 -59°35.78 Suhail 222°45.22 -43°32.47
Merr	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	Miaplacidus 221°37.28 -69°49.61
					22.2 3 0.1 1110.55	Alphard 217°46.51 -8°46.48
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.09 11°50.21
o 0	<b>GПА</b> 160° 47.23	164°12.03 S02°55.42	187°59.86 \$12°23.00	54°15.22 N22°55.03	158°8.35 <b>S</b> 01°10.37	Dubhe 193°39.14 61°36.46
1	175° 49.69	179°11.65 54.14	203° 0.43 22.30	69°17.75 55.04	173°10.54 10.25	Denebola 182°23.65 14°25.35 Gienah 175°42.30 -17°41.37
2	$190^{\circ}52.16$	194°11.27 52.86	218° 1.01 21.60	84°20.29 55.05	188° 12.73 10.13	Gienah 175°42.30 -17°41.37 Acrux 172°58.43 -63°14.63
3	205°54.62	209°10.89 · · 51.59	233°1.59 · · 20.91	99°22.82 · · 55.06	203°14.92 · · 10.01	Gacrux 171°50.08 -57°15.58
4	220° 57.09	224°10.51 50.31	248°2.17 20.21	114°25.36 55.07	218°17.11 9.89	Alioth 166°11.62 55°48.79
5 6	235°59.55 251°2.01	239°10.13 49.03 254°9.75 \$02°47.76	263°2.75 19.51 278°3.33 \$12°18.81	129°27.89 55.08 144°30.42 N22°55.09	233°19.30 9.77 248°21.49 \$01°9.65	Spica 158°21.04 -11°18.01
7	266° 4.48	269°9.37 46.48	293°3.91 18.11	159°32.96 55.10	263°23.68 9.53	Alkaid 152°50.89 49°10.63
8	281°6.94	284°8.99 45.20	308° 4.49 17.42	174°35.49 55.11	278°25.87 9.40	Hadar 148°34.25 -60°29.84 Menkent 147°56.24 -36°29.92
9	296°9.41	299°8.61 · · 43.92	323°5.07 · · 16.72	189°38.02 · · 55.12	293°28.06 · · 9.28	Arcturus 145°46.82 19°2.50
10	311°11.87	314°8.24 42.65	338° 5.65 16.02	204°40.55 55.13	308°30.25 9.16	Rigil Kent. 139°38.64 -60°56.47
11 12	326° 14.33 341° 16.80	329°7.86 41.37 344°7.48 \$02°40.09	353°6.23 15.32 8°6.81 \$12°14.62	219°43.09 55.14 234°45.62 N22°55.15	323°32.44 9.04 338°34.63 <b>S</b> 01°8.92	Kochab 137°19.23 74°2.46
13	356° 19.26	359°7.10 38.81	23°7.39 13.92	249°48.15 55.16	353°36.81 8.80	Zuben'ubi 136°54.80 -16°9.12
14	11°21.73	14°6.72 37.54	38°7.97 13.22	264°50.68 55.17	8°39.00 8.68	Alphecca 126°2.82 26°37.28 Antares 112°14.63 -26°29.40
15	$26^{\circ}24.19$	29°6.35 · · 36.26	53°8.55 · · 12.52	279°53.21 · · 55.18	23°41.19 · · 8.56	Antares 112°14.63 -26°29.40 Atria 107°8.05 -69°4.21
16	41°26.65	44°5.97 34.98	68° 9.13 11.82	294°55.74 55.19	38°43.38 8.44	Sabik 102°1.72 -15°45.50
17 18	56°29.12 71°31.58	59°5.59 33.70 74°5.21 \$02°32.42	83°9.71 11.12 98°10.29 \$12°10.42	309°58.27 55.19 325°0.80 N22°55.20	53°45.57 8.32 68°47.76 S01°8.19	Shaula 96°9.15 -37°7.28
19	86°34.05	89°4.84 31.14	113°10.87 9.72	340°3.33 55.21	83°49.95 8.07	Rasalhague 95°57.73 12°32.22
20	101°36.51	104°4.46 29.86	128°11.45 9.02	355°5.86 55.22	98°52.14 7.95	Eltanin 90°41.89 51°28.74 Kaus Aust. 83°31.40 -34°22.27
21	$116^{\circ}38.97$	119°4.08 · · 28.59	143°12.03 · · 8.32	10°8.38 · · 55.23	113°54.33 · · 7.83	Kaus Aust. 83°31.40 -34°22.27 Vega 80°32.77 38°48.15
22	131° 41.44	134°3.71 27.31	158°12.61 7.62	25°10.91 55.24	128° 56.51 7.71	Nunki 75°46.76 -26°15.84
23	146°43.90	149°3.33 26.03	173°13.20 6.92	40°13.44 55.25	143°58.70 7.59	Altair 61°59.25 8°56.08
Mer.p	oass. 13:15	$\nu$ -0.4 $'$ d-1.3 $'$ m-3.92	$ u 0.6' \ d \text{-} 0.7' \ \text{m} 1.14$	$\nu 2.5' \ d0.0' \ \text{m-}2.43$	$\nu 2.2' \ d$ -0.1' m0.99	Peacock 53°4.67 -56°38.94
						Deneb 49°25.55 45°22.21
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°38.16 9°59.58 Al Na'ir 27°32.14 -46°50.07
0	161°46.37	164°2.95 <b>S</b> 02°24.75	188°13.78 <b>S</b> 12°6.22	55°15.97 N22°55.26	159°0.89 <b>S</b> 01°7.47	Fomalhaut 15°13.81 -29°29.10
1	176° 48.83	179°2.58 23.47	203°14.36 5.51	70°18.49 55.27	174°3.08 7.35	Scheat 13°44.63 28°13.42
2	191°51.30	194°2.20 22.19 209°1.83 · · 20.91	218°14.94 4.81	85°21.02 55.28	189° 5.27 7.22	Markab 13°29.27 15°20.69
3 4	206° 53.76 221° 56.22	209°1.83 · · 20.91 224°1.45 19.63	233°15.53 · · 4.11 248°16.11 3.41	100°23.54 · · 55.29 115°26.07 55.30	204°7.46 · · 7.10 219°9.64 6.98	Mar 02 Mon SHA Mer.pass
5	236° 58.69	239°1.08 18.35	263°16.69 2.70	130°28.59 55.31	234°11.83 6.86	Venus 4°33.10 13:03
6	252°1.15	254°0.70 S02°17.07	278°17.27 \$12°2.00	145°31.12 N22°55.31	249°14.02 S01°6.74	Mars 27°57.94 11:28
7	267°3.62	269°0.32 15.79	293°17.86 1.30	160°33.64 55.32	264° 16.21 6.62	Jupiter 253°26.17 20:24
8	282°6.08	283°59.95 14.51	308°18.44 12°0.60	175°36.17 55.33	279°18.40 6.50	Saturn 357°27.70 13:29
9	297°8.54	298°59.57 · · 13.23	323°19.02 11°59.89	190°38.69 · · 55.34	294°20.59 · · 6.38	Mar 03 Tue SHA Mer.pass
10 11	312°11.01 327°13.47	313°59.20 11.95 328°58.83 10.67	338°19.61 59.19 353°20.19 58.49	205°41.21 55.35 220°43.74 55.36	309°22.77 6.25 324°24.96 6.13	Venus 3°24.80 13:04
12	342° 15.94	343°58.45 \$02°9.39	8°20.77 \$11°57.78	235°46.26 N22°55.37	339°27.15 S01°6.01	Mars 27°12.63 11:28
13	357° 18.40	358°58.08 8.11	23°21.36 57.08	250°48.78 55.38	354°29.34 5.89	Jupiter 253°27.99 20:20 Saturn 357°21.12 13:25
14	12°20.86	13°57.70 6.83	38°21.94 56.37	265°51.30 55.38	9°31.53 5.77	
15 16	27°23.33	28°57.33 · · 5.54	53°22.53 · · 55.67	280°53.83 · · 55.39	24°33.71 · · 5.65 39°35.90 5.53	Mar 04 Wed SHA Mer.pass
16 17	42°25.79 57°28.26	43°56.95 4.26 58°56.58 2.98	68°23.11 54.96 83°23.70 54.26	295°56.35 55.40 310°58.87 55.41	39°35.90 5.53 54°38.09 5.40	Venus 2°16.59 13:04 Mars 26°27.41 11:27
18	72°30.72	73°56.21 S02°1.70	98°24.28 \$11°53.55	326°1.39 N22°55.42	69°40.28 S01°5.28	Jupiter 253°29.60 20:16
19	87°33.18	88°55.83 02°0.42	113°24.87 52.85	341°3.91 55.43	84°42.47 5.16	Saturn 357°14.52 13:22
20	102°35.65	103°55.46 01°59.14	128°25.45 52.14	356°6.43 55.44	99° 44.65 5.04	
21 22	117°38.11 132°40.58	118°55.09 · · 57.86 133°54.71 56.57	143°26.04 · · 51.44 158°26.62 50.73	11°8.95 · · 55.44 26°11.47	114°46.84 · · 4.92 129°49.03 4.80	Horizontal parallax Venus: 0.1
23	132 40.56 147° 43.04	148° 54.34 55.29	173°27.21 50.02	41°13.98 55.46	144°51.22 4.68	Mars: 0.1
ivier.p	pass. 13:11	ν-0.4' d-1.3' m-3.92	$ u 0.6' \ d$ -0.7' m1.15	$\nu 2.5' \ d0.0' \ \text{m-}2.42$	$ u 2.2' \ d$ -0.1' m0.98	

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	176°57.11	S07°17.11	$14^{\circ}4.71$	11.1'	$N15^{\circ}16.56$	-14.1'	58.0'
1	191°57.24	16.16	28°34.83	11.2'	15°2.44	-14.2'	58.0'
2	206°57.36 221°57.49	15.20 •• 14.25	43°5.05 57°35.35	11.3' 11.4'	14° 48.25 14° 34.00	-14.3' -14.3'	58.0' 58.0'
4	236°57.61	13.30	72°5.74	11.5'	14° 19.68	-14.4'	57.9'
5	251°57.74	12.34	$86^{\circ}36.23$	11.6'	$14^{\circ}5.30$	-14.4'	57.9'
6	266°57.87	S07°11.39	101°6.80	11.7'	N13°50.86	-14.5'	57.9'
7 8	281°57.99 296°58.12	10.43 9.48	115°37.46 130°8.21	11.7' 11.8'	13°36.36 13°21.81	-14.6' -14.6'	57.9' 57.9'
9	311°58.25	8.52	144°39.04	11.9'	13°7.20	-14.7'	57.8'
10	326°58.38	7.57	159°9.96	12.0'	12°52.53	-14.7'	57.8'
11	341°58.50 356°58.63	6.61	173° 40.96 188° 12.04	12.1'	12°37.81 N12°23.04	-14.8'	57.8'
12 13	11°58.76	\$07°5.66 4.70	202°43.21	12.2' 12.2'	12°8.23	-14.8' -14.9'	57.8' 57.8'
14	26°58.89	3.75	217° 14.45	12.3'	11°53.36	-14.9'	57.7'
15	41°59.02	•• 2.79	231° 45.78	12.4'	11°38.45	-15.0'	57.7'
16	56°59.15 71°59.28	1.84 07°0.88	246° 17.18 260° 48.66	12.5'	11°23.49 11°8.50	-15.0' -15.0'	57.7'
17 18	71 59.28 86°59.40	506° 59.93	275°20.22	12.6' 12.6'	N10°53.45	-15.0	57.7' 57.6'
19	101°59.53	58.97	289°51.85	12.7'	10°38.37	-15.1'	57.6'
20	116°59.66	58.01	304°23.56	12.8'	10°23.25	-15.2'	57.6'
21	131°59.79	• • 57.06	318°55.34	12.9'	10°8.10	-15.2'	57.6'
22 23	146°59.92 162°0.05	56.10 55.14	333°27.19 347°59.11	12.9' 13.0'	09°52.91 09°37.68	-15.2' -15.3'	57.6' 57.5'
_5	SD = 16.1'	d = -1.0'			D = 15.8'	_0.0	-1.5
	JD — 10.1	u — -1.0		اد	J — 13.0°		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177°0.18	S06° 54.18	2°31.10	13.1'	N09°22.42	-15.3'	57.5'
1 2	192°0.31 207°0.45	53.23 52.27	17°3.16 31°35.29	13.1' 13.2'	09°7.13 08°51.81	-15.3' -15.3'	57.5' 57.5'
3	222°0.58	51.31	46°7.48	13.3'	08°36.46	-15.4'	57.4
4	237°0.71	50.35	$60^{\circ}39.74$	13.3'	$08^{\circ}21.09$	-15.4'	57.4'
5	252°0.84	49.40 \$06°48.44	75° 12.07	13.4'	08°5.69 N07°50.26	-15.4'	57.4
6 7	267°0.97 282°1.10	47.48	89°44.45 104°16.90	13.4' 13.5'	07° 34.81	-15.4' -15.5'	57.4' 57.3'
8	297°1.24	46.52	118° 49.41	13.6'	07° 19.34	-15.5'	57.3'
9	312°1.37	• • 45.56	$133^{\circ}21.98$	13.6'	$07^{\circ}3.85$	-15.5'	57.3'
10	327°1.50	44.60	147°54.61	13.7'	06°48.35	-15.5'	57.3'
11 12	342°1.63 357°1.77	43.64 \$06° 42.69	162°27.29 177°0.03	13.7' 13.8'	06°32.82 N06°17.28	-15.5' -15.6'	57.3' 57.2'
13	12°1.90	41.73	191°32.83	13.8'	06°1.72	-15.6'	57.2'
14	27°2.03	40.77	$206^{\circ}5.68$	13.9'	$05^{\circ}46.15$	-15.6'	57.2'
15	42°2.17 57°2.30	39.81	220°38.58 235°11.53	14.0'	05°30.57 05°14.98	-15.6'	57.2'
16 17	72°2.43	38.85 37.89	235 11.53 249°44.54	14.0' 14.1'	05 14.98 04°59.38	-15.6' -15.6'	57.1' 57.1'
18	87°2.57	S06°36.93	264° 17.59	14.1'	N04°43.77	-15.6'	57.1'
19	102°2.70	35.97	278°50.69	14.1'	04°28.15	-15.6'	57.1'
20	117°2.84 132°2.97	35.01 •• 34.05	293°23.84 307°57.03	14.2' 14.2'	04° 12.53 03° 56.91	-15.6' -15.6'	57.0' 57.0'
21 22	132 2.97 147°3.11	33.09	307 57.03 322°30.27	14.2	03°41.28	-15.6'	57.0'
23	162°3.24	32.12	337°3.55	14.3'	03°25.65	-15.6'	57.0'
	SD = 16.1'	d = -1.0'		SI	D = 15.7'		
14/ 1			CIIA		Б.	,	
Wed 0	<b>GHA</b> 177°3.38	<b>Dec</b> \$06°31.16	<b>GHA</b> 351°36.87	u 14.4'	<b>Dec</b> N03° 10.01	d -15.6'	<b>HP</b> 56.9'
1	192°3.51	30.20	6°10.23	14.4'	02°54.38	-15.6'	56.9'
2	207°3.65	29.24	20°43.64	14.4'	02°38.75	-15.6'	56.9'
3 4	222°3.78 237°3.92	· · 28.28 27.32	35°17.08 49°50.56	14.5' 14.5'	02°23.13 02°7.50	-15.6' -15.6'	56.9'
4 5	237° 3.92 252° 4.06	26.36	49°50.56 64°24.07	14.6'	02°7.50 01°51.89	-15.6' -15.6'	56.8' 56.8'
6	267°4.19	S06°25.39	78° 57.63	14.6'	N01°36.28	-15.6'	56.8'
7	282°4.33	24.43	93°31.21	14.6'	01°20.67	-15.6'	56.8'
8	297°4.47 312°4.60	23.47 •• 22.51	108°4.83 122°38.48	14.7' 14.7'	01°5.08 00°49.50	-15.6' -15.6'	56.7' 56.7'
9 10	312°4.60 327°4.74	21.54	122° 38.48 137° 12.16	14.7' 14.7'	00°49.50 00°33.92	-15.6'	56.7'
11	342°4.88	20.58	$151^{\circ}45.87$	14.7'	00°18.36	-15.5'	56.7'
12	357°5.02	S06° 19.62	166° 19.61	14.8'	N00°2.81	-15.5'	56.6'
13 14	12°5.15 27°5.29	18.65 17.69	180°53.38 195°27.17	14.8' 14.8'	\$00°12.72 00°28.24	15.5' 15.5'	56.6' 56.6'
14 15	42°5.43	17.69	210°0.98	14.8'	00°28.24 00°43.74	15.5'	56.5'
16	57°5.57	15.76	224°34.83	14.9'	$00^{\circ}59.22$	15.5'	56.5'
17	72°5.71	14.80	239°8.69	14.9'	01°14.68	15.4'	56.5'
18 19	87°5.85 102°5.98	S06°13.84 12.87	253° 42.58 268° 16.48	14.9' 14.9'	\$01°30.13 01°45.55	15.4' 15.4'	56.5' 56.4'
20	102°5.98 117°6.12	12.87 11.91	282°50.41	14.9' 14.9'	01°45.55 02°0.95	15.4' 15.4'	56.4'
21	132°6.26	10.94	$297^{\circ}24.35$	15.0'	$02^{\circ}16.33$	15.4'	56.4
22	147°6.40	9.98	311°58.31	15.0'	02°31.68	15.3'	56.4'
23	162°6.54	9.02	326°32.29	15.0'	02°47.01	15.3'	56.3'
	SD = 16.1'	d = -1.0'		SI	D = 15.5'		

Lat.	Twi	light	Sunrise	Sunset	Tw	ilight
Lat.	Naut.	Civil	Junise	Juliset	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
45°	05:31	06:05	06:35	17:50	18:19	18:53
<b>N</b> 40°	05:32	06:03	06:31	17:54	18:21	18:52
35°	05:32	06:02	06:27	17:57	18:23	18:52
30°	05:32	06:00	06:24	18:00	18:24	18:52
20°	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	03:37	04:33	05:17	19:05	19:49	20:44

Lat.		Moonris	e		Moonse	t
Lat.	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	18:58	18:57	18:56	03:23	05:01	06:34

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	13-15	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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		

h	Aries	Venus	, ,	Mars	Ju	piter	Sat	urn		Stars	
Thu	GHA	GHA De	ec GHA	A Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	$162^{\circ}45.50$	163°53.97 <b>S</b> 01°5	54.01 188°27	7.79 <b>S</b> 11°49.32	56°16.50	N22°55.47	159°53.41	S01°4.55	Alpheratz	357°34.13	29°14.08
1	177° 47.97		52.73 203°28		71°19.02		174°55.59	4.43	Ankaa	353° 6.57	-42°9.95
2	192°50.43		51.45 218°28				189°57.78	4.31	Schedar	349°30.48	56°40.95
3	207° 52.90	208°52.85 · · · 5			101°24.05		204° 59.97	• • 4.19	Diphda	348°46.62	-17°50.70
4 5	222° 55.36 237° 57.82		18.88 248°30 17.60 263°30		116°26.57 131°29.09		220°2.16 235°4.34	4.07	Achernar	335°19.88	$-57^{\circ}6.41$
6	253°0.29	253°51.73 S01°4			131 29.09 146°31.60		250°6.53	3.95 S01°3.83	Hamal	327°50.34	23°35.19
7	268°2.75		15.03 293°31		161°34.12		265°8.72	3.70	Polaris	313°46.34	89°22.75
8	283°5.22		13.75 308°32				280° 10.90	3.58	Acamar	315°11.23	-40°12.20
9	298°7.68		12.47 323°33		191°39.15		295° 13.09	• • 3.46	Menkar	314°5.28	4°11.48
10	313° 10.14		11.19 338°33				310° 15.28	3.34	Mirfak	308°27.06	49°57.41
11	$328^{\circ}12.61$		39.90 353°34				325°17.47	3.22	Aldebaran	290°38.54 281°2.91	16°33.71 -8°10.42
12	343°15.07	343°49.50 <b>S</b> 01°3					340° 19.65	501°3.10	Rigel Capella	280° 20.42	-6 10.42 46°1.59
13	358° 17.54		37.34 23°35				355°21.84	2.97	Bellatrix	278°21.80	6°22.34
14	13° 20.00		36.05 38°36		266°51.72		10°24.03	2.85	Elnath	278°0.60	28°37.81
15	28° 22.46	28°48.39 · · 3			281°54.23		25°26.21	· · 2.73	Alnilam	275°36.69	-1°11.22
16	43°24.93		33.49 68°37 32.20 83°37		296°56.74		40°28.40	2.61 2.49	Betelgeuse	270°50.96	$7^{\circ}24.65$
17 18	58° 27.39 73° 29.86	58°47.64 3 73°47.27 \$01°3			311°59.25 327°1.77		55°30.59 70°32.78	S01°2.37	Canopus	263°51.77	-52°42.82
19	88° 32.32		29.64 113°38				85°34.96	2.24	Sirius	258°25.24	-16°45.30
20	103°34.78		28.35 128°39		357°6.79		100° 37.15	2.12	Adhara	255°4.92	-29°0.67
21	118° 37.25		27.07 143°40		12°9.30		115°39.34	2.00	Procyon	244°49.62	5°9.36
22	133°39.71		25.78 158°40				130°41.52	1.88	Pollux	243°15.88	27°57.75
23	$148^{\circ}42.18$	148°45.42	24.50 173°41	31 33.02	42°14.32	55.65	145°43.71	1.76	Avior Suhail	234°13.88 222°45.23	-59°35.80 -43°32.48
Mor	pass. 13:07	ν-0.4' d-1.3' m-	3 02 1/0 6'	<i>d</i> -0.7′ m1.15	1/2 5' dC	0.0' m-2.41	1/2 2' d-0	.1′ m0.98	Miaplacidus	221°37.30	-43 32.46 -69°49.62
- IVICI.	pass. 15.07	ν-0. <del>4</del> u-1.5 III-	J.92 VO.0	u-0.7 III1.13		7.0 111-2.41	ν Ζ.Ζ u-0	.1 1110.90	Alphard	217°46.52	-8°46.49
									Regulus	207°33.10	11°50.21
Fri	GHA	GHA De			GHA	Dec	GHA	Dec	Dubhe	193°39.13	61°36.47
0	163° 44.64	163°45.05 S01°2			57°16.83		160° 45.90	S01°1.64	Denebola	182°23.64	$14^{\circ}25.35$
1	178° 47.10		21.93 203°42		72°19.34		175°48.08	1.51	Gienah	175°42.29	$-17^{\circ}41.37$
2	193° 49.57 208° 52.03	193°44.31 2 208°43.94 · · 1	20.65 218°43 19.36 233°43		87°21.85 102°24.35		190°50.27 205°52.46	1.39 · · 1.27	Acrux	172°58.42	-63°14.64
4	223°54.50		19.30 233 43 18.08 248°44		117°26.86		220° 54.64	1.15	Gacrux	171°50.07	-57°15.59
5	238° 56.96		16.79 263°44		132°29.37		235° 56.83	1.03	Alioth	166°11.61	55°48.80
6	253°59.42	253°42.83 <b>S</b> 01°1			147°31.88		250°59.02	S01°0.90	Spica	158°21.03	-11°18.02
7	$269^{\circ}1.89$	268°42.46	14.22 293°46	5.04 27.32	162°34.38	55.70	266°1.20	0.78	Alkaid Hadar	152°50.87 148°34.23	49°10.64 -60°29.85
8	284°4.35	283°42.09	12.94 308°46	5.63 26.61	177°36.89	55.71	281°3.39	0.66	Menkent	146 54.23 147°56.23	-36° 29.93
9	299°6.82	298°41.72 · · 1			192°39.40		296°5.58	• • 0.54	Arcturus	145°46.81	19°2.50
10	314°9.28		10.37 338°47		207°41.90		311°7.76	0.42	Rigil Kent.	139°38.61	-60°56.49
11	329° 11.74	328°40.98	9.09 353°48		222°44.41		326°9.95	0.30	Kochab	137° 19.17	74°2.47
12	344° 14.21		77.80 8°48		237°46.91		341°12.13	S01°0.17	Zuben'ubi	136°54.78	$-16^{\circ}9.13$
13 14	359° 16.67 14° 19.14	358° 40.25 13° 39.88	6.52 23°49 5.23 38°50		252°49.42 267°51.92		356° 14.32 11° 16.51	01°0.05 00°59.93	Alphecca	126°2.80	26°37.28
15	29°21.60		3.94 53°50				26° 18.69	• • 59.81	Antares	112°14.62	-26°29.40
16	44°24.07	43°39.14	2.66 68°51		297°56.93		41°20.88	59.69	Atria	107°8.00	-69°4.21
17	59°26.53	58°38.77	1.37 83°51		312°59.43		56°23.07	59.56	Sabik	102°1.70	-15°45.50
18	74°28.99	73°38.40 S01°			328°1.93		71°25.25	S00°59.44	Shaula	96°9.13	-37°7.29 12°32.22
19	89°31.46	88°38.04 00°5	58.80 113°53	3.14 18.76	343°4.44	55.78	86°27.44	59.32	Rasalhague Eltanin	95°57.71 90°41.87	51°28.73
20	$104^{\circ}33.92$		57.52 128°53	3.73 18.05	358°6.94		101°29.62	59.20	Kaus Aust.	83°31.38	-34°22.27
21	$119^{\circ}36.39$	118°37.30 · · · 5					116°31.81	• • 59.08	Vega	80°32.75	38°48.14
22	134° 38.85		54.95 158°54				131°33.99	58.95	Nunki	75°46.74	-26°15.84
23	149°41.31	148°36.56	53.66 173°55	5.51 15.90	43°14.44	55.81	146°36.18	58.83	Altair	61°59.24	8°56.07
Mer.	pass. 13:03	ν-0.4' d-1.3' m-	3.92 $\nu$ 0.6'	d-0.7' m1.15	$\nu 2.5' \ d0$	0.0′ m-2.40	$\nu 2.2' \ d-0$	.1′ m0.98	Peacock	53°4.65	-56°38.93
									Deneb	49°25.54	45°22.19
C a t	CHA	CHA D	. CU/	N Dee	GHA	Dee	GHA	Dee	Enif	33°38.16	9°59.57
Sat 0	<b>GHA</b> 164° 43.78	<b>GHA D</b> 6 163°36.20 <b>S</b> 00°5		<b>A Dec</b> 5.10 <b>S</b> 11°15.18		<b>Dec</b> N22°55.81	161°38.37	Dec \$00°58.71	Al Na'ir	27°32.14	
1	179°46.24		51.09 203°56				176° 40.55	58.59	Fomalhaut		-29°29.09
2	194°48.71		19.80 218°57				191°42.74	58.47	Scheat Markab	13°44.64 13°29.27	28°13.41
3	209°51.17	208°35.09 · · 4					206°44.92	• • 58.34	IVIAIKAD	15 29.21	15°20.68
4	224°53.63	223°34.72	17.23 248°58	3.48 12.32	118°26.94	55.84	221°47.11	58.22	Mar 05 Thu	SHA	Mer.pass
5	$239^{\circ}56.10$	238°34.36	15.94 263°59	0.07 11.60	133°29.44	55.84	236°49.30	58.10	Venus	1°8.46	13:05
6	254° 58.56	253°33.99 <b>S</b> 00°4					251°51.48	S00°57.98	Mars	25°42.29	11:26
7	270°1.03		13.37 294°0				266°53.67	57.86	Jupiter	253°31.00	20:12
8	285°3.49		12.09 309°C				281°55.85	57.73	Saturn	357°7.90	13:18
9	300°5.95	298°32.89 · · 4					296°58.04	57.61	Mar 06 Fri	SHA	Mer.pass
10	315°8.42 330°10.88		339°2 38.23 354°2				312°0.22 327°2.41	57.49 57.37	Venus	0°0.41	13:05
11 12	330° 10.88 345° 13.35	328° 32.15 343° 31.79 \$00° 3		2.64 7.30 3.24 \$11°6.58			327°2.41 342°4.59	57.37 \$00°57.25	Mars	$24^{\circ}57.26$	11:25
13	0° 15.81		35.65 24°3				357°6.78	57.12	Jupiter	253°32.19	20:08
14	15° 18.27		34.37 39°4				12°8.96	57.00	Saturn	357°1.26	13:15
15	30° 20.74	28°30.69 · · 3					27° 11.15	• • 56.88	Mar 07 Sat	SHA	Mer.pass
16	45°23.20		31.79 69°5				42°13.34	56.76	Venus		13:06
17	60°25.67	58°29.95	80.51 84°6	5.21 2.99	313°59.40	55.91	57° 15.52	56.64	Mars	24°12.32	11:24
18	75°28.13	73°29.59 <b>S</b> 00°2					72°17.71	S00°56.51	l l	253°33.16	20:04
19	90°30.59		27.93 114°7				87° 19.89	56.39	Saturn	356°54.59	13:12
20	105°33.06		26.65 129°8				102°22.08	56.27	Hauter	atal parallar	
21	120° 35.52	118°28.49 · · 2					117°24.26	56.15	Horizo	ntal parallax Venus:	0.1
22	135° 37.99		24.07 159° 9				132°26.45	56.02 55.00		Mars:	0.1
23	150° 40.45		22.79 174°9				147°28.63	55.90		141013.	0.1
Mer.	pass. 12:59	ν-0.4' d-1.3' m-	$0.92  \nu 0.6'$	<i>d</i> -0.7′ m1.15	$\nu$ 2.5′ d0	0.0′ m-2.39	$\nu 2.2' \ d-0$	.1′ m0.98			

	011-010 =	Δ1 = 11-011 = +03.1220 sec					
h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	177°6.68	S06°8.05	341°6.28	15.0'	503°2.31	15.3'	56.3'
1	192°6.82 207°6.96	7.09	355°40.29 10°14.31	15.0'	03°17.59 03°32.83	15.2'	56.3'
2	207 6.96 222°7.10	6.12 • • 5.16	10 14.31 24°48.34	15.0' 15.0'	03 32.83 03°48.05	15.2' 15.2'	56.3' 56.2'
4	237°7.24	4.19	39°22.38	15.1'	04°3.24	15.2'	56.2'
5	252°7.38	3.22	53°56.43	15.1'	04°18.39	15.1'	56.2'
6	267°7.53	S06°2.26	68°30.49	15.1'	S04°33.52	15.1'	56.2'
7	282°7.67	1.29	83°4.56	15.1'	04°48.61	15.1'	56.1'
8 9	297°7.81 312°7.95	06°0.33 05°59.36	97°38.63 112°12.71	15.1' 15.1'	05°3.66 05°18.68	15.0' 15.0'	56.1' 56.1'
10	312 7.93 327°8.09	58.39	126°46.80	15.1'	05°33.67	14.9'	56.1
11	342°8.23	57.43	141°20.88	15.1'	05°48.62	14.9'	56.0'
12	357°8.38	S05°56.46	155°54.97	15.1'	S06° 3.52	14.9'	56.0'
13	12°8.52 27°8.66	55.50 54.53	170°29.06 185°3.16	15.1' 15.1'	06°18.40 06°33.23	14.8' 14.8'	56.0' 56.0'
14 15	42°8.80	54.53 •• 53.56	185 3.16 199°37.25	15.1'	06°48.02	14.8	55.9'
16	57°8.95	52.59	214°11.34	15.1'	07°2.76	14.7'	55.9'
17	72°9.09	51.63	228°45.42	15.1'	$07^{\circ}17.47$	14.7'	55.9'
18	87°9.23	S05°50.66	243°19.50	15.1'	507°32.13	14.6'	55.9'
19 20	102°9.38 117°9.52	49.69 48.72	257°53.58 272°27.65	15.1' 15.1'	07°46.75 08°1.32	14.6' 14.5'	55.8' 55.8'
21	132° 9.66	47.76	212 21.05 287°1.72	15.1	06 1.32 08°15.84	14.5	55.8'
22	147°9.81	46.79	301°35.78	15.0'	08°30.32	14.4'	55.8'
23	162°9.95	45.82	$316^{\circ}9.83$	15.0'	08°44.75	14.4'	55.7'
	SD = 16.1'	d = -1.0'		SE	D = 15.4'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0 1	177°10.10 192°10.24	\$05°44.85 43.88	330°43.87 345°17.89	15.0' 15.0'	\$08°59.13 09°13.46	14.3' 14.3'	55.7' 55.7'
2	207° 10.39	42.92	359°51.91	15.0'	09°13.40	14.2'	55.7'
3	222° 10.53	• • 41.95	14°25.92	15.0'	09°41.97	14.2'	55.6'
4	$237^{\circ}10.68$	40.98	$28^{\circ}59.91$	15.0'	$09^{\circ}56.14$	14.1'	55.6'
5	252°10.82	40.01	43°33.89	15.0'	10°10.26	14.1'	55.6'
6 7	267°10.97 282°11.11	S05°39.04 38.07	58° 7.85 72° 41.80	14.9' 14.9'	\$10°24.33 10°38.34	14.0' 14.0'	55.6' 55.5'
8	297° 11.26	37.10	87°15.72	14.9'	10°52.30	13.9'	55.5'
9	312° 11.40	• • 36.13	101°49.64	14.9'	11°6.20	13.8'	55.5'
10	$327^{\circ}11.55$	35.16	116°23.53	14.9'	11°20.04	13.8'	55.5'
11	342°11.70	34.19	130°57.40	14.9'	11°33.82	13.7'	55.5'
12 13	357° 11.84 12° 11.99	S05°33.22 32.25	145°31.25 160°5.08	14.8' 14.8'	\$11°47.55 12°1.21	13.7' 13.6'	55.4' 55.4'
14	27° 12.13	31.28	174°38.89	14.8	12 1.21 12°14.81	13.5	55.4'
15	42° 12.28	• • 30.31	189°12.68	14.8'	$12^{\circ}28.35$	13.5'	55.4'
16	57° 12.43	29.34	203°46.44	14.7'	12°41.83	13.4'	55.3'
17 18	72° 12.58 87° 12.72	28.37 \$05°27.40	218°20.18 232°53.89	14.7' 14.7'	12°55.24 \$13°8.59	13.3' 13.3'	55.3' 55.3'
19	102° 12.87	26.43	232 53.69 247°27.57	14.7'	13°21.88	13.2	55.3'
20	117° 13.02	25.46	262°1.23	14.6'	13°35.10	13.2'	55.2'
21	132° 13.17	• • 24.49	276°34.86	14.6'	13°48.25	13.1'	55.2'
22	147°13.32	23.52	291°8.46	14.6'	14°1.33	13.0'	55.2'
23	162° 13.46	22.55	305°42.03	14.5'	14°14.35	12.9'	55.2'
	SD = 16.1'	d = -1.0'		SE	O = 15.2'		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	177° 13.61	S05°21.58	$320^{\circ}15.57$	14.5'	S14°27.29	12.9'	55.2'
1	192° 13.76	20.60	334°49.08	14.5'	14°40.17	12.8'	55.1'
2	207° 13.91	19.63	349°22.56	14.4'	14°52.98	12.7'	55.1'
3 4	222°14.06 237°14.21	· · 18.66 17.69	3°56.00 18°29.41	14.4' 14.4'	15°5.71 15°18.37	12.7' 12.6'	55.1' 55.1'
5	252° 14.36	16.72	33°2.79	14.3'	15°30.96	12.5'	55.1'
6	267° 14.51	S05°15.74	47°36.13	14.3'	S15°43.47	12.4'	55.0'
7	282°14.66	14.77	62°9.44	14.3'	15°55.91	12.4'	55.0'
8 9	297°14.81 312°14.96	13.80 •• 12.83	76°42.71 91°15.94	14.2' 14.2'	16°8.28 16°20.56	12.3' 12.2'	55.0' 55.0'
10	312 14.90 327° 15.11	11.85	105°49.14	14.2'	16° 32.77	12.1'	55.0'
11	342° 15.26	10.88	120°22.30	14.1'	16°44.91	12.1'	54.9'
12	357° 15.41	\$05°9.91	134°55.42	14.1'	S16°56.96	12.0'	54.9'
13	12° 15.56	8.94	149°28.50	14.0'	17°8.93	11.9'	54.9'
14 15	27° 15.71 42° 15.86	7.96 •• 6.99	164° 1.54 178° 34.54	14.0' 14.0'	17°20.83 17°32.64	11.8' 11.7'	54.9' 54.9'
16	57° 16.01	6.02	176 34.54 193°7.50	13.9'	17°44.37	11.6'	54.8'
17	72°16.16	5.04	207°40.41	13.9'	17°56.02	11.6'	54.8'
18	87° 16.31	S05°4.07	222°13.29	13.8'	\$18°7.59	11.5'	54.8'
19 20	102° 16.46 117° 16.62	3.10 2.12	236°46.12 251°18.90	13.8' 13.7'	18°19.07 18°30.46	11.4' 11.3'	54.8' 54.8'
20 21	117° 16.62 132° 16.77	2.12 •• 1.15	251°18.90 265°51.65	13.7'	18°30.46 18°41.77	11.3'	54.8' 54.8'
22	147° 16.92	05°0.17	280°24.35	13.7'	18°53.00	11.1'	54.7'
23	162° 17.07	04°59.20	294°57.00	13.6'	19°4.14	11.0'	54.7'
	SD = 16.1'	d = -1.0'		SF	D = 15.0'		
					-0.0		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	03:47	04:41	05:25	18:56	19:39	20:33

Lat.		Moonris	e		Moonset	:
Lat.	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
<b>S</b> 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° 45°	19:23	19:45	20:10	07:45	08:50	09:54 10:05
	19:18	19:36	19:57	07:49	08:57	
<b>S</b> 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° <b>S</b> 60°	18:59	19:02	19:06	08:01	09:27	10:52
<b>5</b> 60°	18:55	18:54	18:54	08:04	09:33	11:03

		Sun			Moon	
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	16-18
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	97-87%
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
0	165° 42.92	163°27.39 \$00°21.50	189°10.39 \$10°57.96	59°16.85 N22°55.95	162°30.82 \$00°55.78
1	180°45.38	178°27.02 20.21	204°10.99 57.24	74°19.34 55.96	177°33.00 55.66
2	195° 47.84	193°26.66 18.93	219°11.59 56.52	89°21.83 55.96	192°35.19 55.54
3	210° 50.31	208°26.29 · · 17.64	234°12.18 · · 55.79	104°24.32 · · 55.97	207°37.37 · · · 55.41
4	225° 52.77	223°25.93 16.35	249°12.78 55.07	119°26.81 55.97	222°39.56 55.29
5	240°55.24	238°25.56 15.06	264°13.38 54.35	134°29.30 55.98	237°41.74 55.17
6	255° 57.70	253°25.20 \$00°13.78	279°13.98 \$10°53.63	149°31.79 N22°55.98	252°43.93 S00°55.05
7	271°0.16	268°24.83 12.49	294°14.58 52.91	164°34.28 55.99	267°46.11 54.92
8	286°2.63	283°24.46 11.20	309°15.17 52.19	179°36.77 55.99	282°48.29 54.80
9	301°5.09	298°24.10 · · 9.91	324°15.77 · · 51.47	194°39.26 · · 56.00	297°50.48 · · 54.68
10	316°7.56	313°23.73 8.63	339°16.37 50.75	209°41.74 56.00	312°52.66 54.56
11	331° 10.02	328°23.37 7.34	354°16.97 50.02	224°44.23 56.01	327°54.85 54.43
12	346° 12.48	343°23.00 S00°6.05	9°17.57 \$10°49.30	239°46.72 N22°56.01	342°57.03 S00°54.31
13	1° 14.95	358°22.64 4.77	24° 18.17 48.58	254°49.21 56.02	357°59.22 54.19
14	16° 17.41	13°22.27 3.48	39° 18.77 47.86	269°51.69 56.02	13°1.40 54.07
15	31° 19.88	28°21.91 · · 2.19	54° 19.37 · · 47.13	284°54.18 · · 56.03	28°3.59 · · 53.95
16	46°22.34	43°21.54 <b>S</b> 00°0.90	69° 19.97 46.41	299°56.66 56.03	43°5.77 53.82
17	61°24.80	58°21.18 N00°0.38	84°20.57 45.69	314°59.15 56.04	58°7.96 53.70
18	76° 27.27	73°20.81 N00°1.67	99°21.17 \$10°44.97	330°1.64 N22°56.04	73°10.14 S00°53.58
19	91°29.73	88° 20.45 2.96	114°21.77 44.24	345°4.12 56.04	88°12.32 53.46
20	106° 32.20	103°20.08 4.25	129°22.37 43.52	0°6.60 56.05	103°14.51 53.33
21	121° 34.66	118° 19.72 · · 5.53	144°22.97 · · 42.80	15°9.09 · · 56.05	118°16.69 · · 53.21
22	136° 37.13	133°19.35 6.82	159°23.57 42.07	30°11.57 56.06	133°18.88 53.09
23	151°39.59	148° 18.99 8.11	174°24.17 41.35	45°14.06 56.06	148°21.06 52.97
Wer.p	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
0	166° 42.05	163°18.62 N00°9.40	189°24.77	60°16.54 N22°56.07	163°23.25
1	181°44.52	178° 18.26 10.69	204°25.37 39.90	75°19.02 56.07	178°25.43 52.72
2	196°46.98	193°17.90 11.97	219°25.97 39.17	90°21.50 56.08	193°27.61 52.60
3	211°49.45	208° 17.53 · · 13.26	234°26.57 · · 38.45	105°23.98 · · 56.08	208°29.80 · · 52.48
4	226°51.91	223°17.17 14.55	249° 27.17 37.72	120°26.47 56.08	223°31.98 52.35
5	241°54.37	238°16.80 15.84	264°27.77 37.00	135°28.95 56.09	238°34.17 52.23
6	256° 56.84	253°16.44 N00°17.12	279°28.38 \$10°36.27	150°31.43 N22°56.09	253°36.35 <b>S</b> 00°52.11
7	271°59.30	268°16.07 18.41	294°28.98 35.55	165°33.91 56.10	268°38.53 51.99
8	$287^{\circ}1.77$	283°15.71 19.70	309°29.58 34.82	180°36.39 56.10	283°40.72 51.86
9	302°4.23	298°15.35 · · 20.99	324°30.18 · · 34.10	195°38.87 · · 56.10	298°42.90 · · 51.74
10	317°6.69	313°14.98 22.28	339°30.78 33.37	210°41.35 56.11	313°45.09 51.62
11	$332^{\circ}9.16$	328°14.62 23.56	354°31.39 32.65	225°43.83 56.11	328°47.27 51.50
12	$347^{\circ}11.62$	343°14.25 N00°24.85	9°31.99 \$10°31.92	240°46.31 N22°56.12	343°49.45 S00°51.37
13	$2^{\circ}14.09$	358°13.89 26.14	24°32.59 31.19	255°48.78 56.12	358°51.64 51.25
14	$17^{\circ}16.55$	13°13.53 27.43	39°33.19 30.47	270°51.26 56.12	13°53.82 51.13
15	$32^{\circ}19.02$	28°13.16 · · 28.71	54°33.80 · · 29.74	285°53.74 · · 56.13	28°56.00 · · 51.01
16	$47^{\circ}21.48$	43°12.80 30.00	69°34.40 29.01	300°56.22 56.13	43°58.19 50.88
17	62°23.94	58°12.43 31.29	84°35.00 28.29	315°58.69 56.13	59°0.37 50.76
18	$77^{\circ}26.41$	73°12.07 N00°32.58	99°35.61 \$10°27.56	331°1.17 N22°56.14	74°2.56 <b>S</b> 00°50.64
19	92°28.87	88° 11.71 33.87	114°36.21 26.83	346°3.64 56.14	89°4.74 50.52
20	107°31.34	103°11.34 35.15	129°36.82 26.10	1°6.12 56.14	104°6.92 50.39
21	122°33.80	118°10.98 · · 36.44	144°37.42 · · 25.38	16°8.60 · · 56.15	119°9.11 • • 50.27
22	137°36.26	133°10.61 37.73	159°38.02 24.65	31°11.07 56.15	134°11.29 50.15
23	152° 38.73	148° 10.25 39.02	174°38.63 23.92	46°13.54 56.16	149°13.47 50.03
Mer r	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
		- 0.1 41.3 11 3.32			
	_				
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	167°41.19	163°9.89 N00°40.30	189°39.23 \$10°23.19	61°16.02 N22°56.16	164°15.66 \$00°49.90
1	182°43.66	178°9.52 41.59	204°39.84 22.46	76°18.49 56.16	179°17.84 49.78
2	197°46.12	193°9.16 42.88	219° 40.44 21.73	91°20.97 56.17	194°20.02 49.66
3	212°48.59	208°8.80 · · 44.17	234°41.05 · · 21.00	106°23.44 · · 56.17	209°22.21 · · 49.54
4	227°51.05	223°8.43 45.46	249°41.65 20.28	121°25.91 56.17	224°24.39 49.41
5	242°53.51	238°8.07 46.74	264° 42.26 19.55	136°28.38 56.17	239°26.57 49.29
6	257°55.98	253°7.71 N00°48.03	279°42.86 \$10°18.82	151°30.86 N22°56.18	254°28.76 S00°49.17
7	272°58.44	268°7.34 49.32	294°43.47 18.09	166°33.33 56.18	269°30.94 49.04
8	288°0.91	283°6.98 50.61	309°44.07 17.36	181°35.80 56.18	284°33.12 48.92
9	303°3.37	298°6.62 · · 51.90	324°44.68 · · 16.63	196°38.27 · · 56.19	299°35.31 · · 48.80
10	318°5.83	313°6.25 53.18	339°45.28 15.90	211°40.74 56.19	314 37.49 48.68
11	333°8.30	328°5.89 54.47	354°45.89 15.17	226°43.21 56.19	329°39.67 48.55
12	348° 10.76	343°5.53 N00°55.76	9°46.50 \$10°14.44	241°45.68 N22°56.20	344°41.86
13	3°13.23	358°5.16 57.05	24°47.10 13.71	256°48.15 56.20	359°44.04 48.31
14	18° 15.69	13°4.80 58.33	39°47.71 12.98	271°50.62 56.20	14°46.22 48.19 \(\begin{array}{cccccccccccccccccccccccccccccccccccc
15	33° 18.15	28°4.44 00°59.62	54°48.31 · · 12.25	286°53.09 · · 56.20	29°48.40 · · 48.06
16	48°20.62	43°4.07 01°0.91	69°48.92 11.51	301°55.56 56.21	44°50.59 47.94
17	63°23.08	58°3.71 2.20	84°49.53 10.78	316°58.02 56.21	59°52.77 47.82
18	78°25.55	73°3.35 N01°3.48	99°50.14 \$10°10.05	332°0.49 N22°56.21	74°54.95 S00°47.69
19	93°28.01	88°2.98 4.77	114°50.74 9.32	347°2.96 56.22	89°57.14 47.57
20	108°30.48	103°2.62 6.06	129°51.35 8.59	2°5.42 56.22	104°59.32 47.45
21 22	123°32.94	118°2.26 · · 7.35 133°1.89 8.63	144°51.96 · · 7.86	17°7.89 · · 56.22	120°1.50 · · 47.33
	138° 35.40		159° 52.56 7.13	32°10.36 56.22	135°3.68 47.20
23	153°37.87	148°1.53 9.92	174°53.17 6.39	47°12.82 56.23	150°5.87 47.08
Mer.	pass. 12:47	$\nu$ -0.4 $'$ $d1.3'$ m-3.92	$ u 0.6' \ d\text{-}0.7' \ \text{m}1.15$	$\nu 2.5' \ d0.0' \ \text{m-}2.37$	$\nu 2.2' \; d\text{-}0.1' \; \text{m}0.97$

	SHA	Dec				
A l - h + -	_					
Alpheratz Ankaa	357°34.13 353°6.57	29°14.07 -42°9.94				
Schedar	349°30.48	56° 40.93				
Diphda	$348^{\circ}46.62$	$-17^{\circ}50.70$				
Achernar	335°19.90	-57°6.40				
Hamal Polaris	327°50.35 313°47.53	23°35.18 89°22.74				
Acamar	315°11.24	-40° 12.19				
Menkar	$314^{\circ}5.30$	4°11.48				
Mirfak	308°27.08	49°57.40				
Aldebaran Rigel	290°38.55 281°2.92	16°33.70 -8°10.42				
Capella	280°20.44	46°1.59				
Bellatrix	$278^{\circ}21.81$	$6^{\circ}22.33$				
Elnath	278°0.61	28° 37.81				
Alnilam Betelgeuse	275°36.70 270°50.97	-1°11.22 7°24.64				
Canopus	263°51.80	-52°42.83				
Sirius	$258^{\circ}25.26$	$-16^{\circ}45.31$				
Adhara	255°4.94	-29°0.67				
Procyon Pollux	244°49.63 243°15.90	5°9.36 27°57.76				
Avior	243 15.90 234°13.90	-59°35.81				
Suhail	222°45.24	-43°32.49				
Miaplacidus	221°37.33	-69°49.64				
Alphard Regulus	217°46.52 207°33.10	-8°46.49 11°50.21				
Dubhe	207°33.10 193°39.13	61°36.49				
Denebola	182°23.64	14°25.36				
Gienah	175°42.28	-17°41.38				
Acrux	172°58.40 171°50.05	-63°14.66 -57°15.61				
Gacrux Alioth	171 50.05 166°11.59	-57 15.01 55°48.81				
Spica	158°21.02	-11° 18.02				
Alkaid	152°50.85	49° 10.65				
Hadar	148°34.20	-60°29.86				
Menkent Arcturus	147°56.21 145°46.79	-36°29.94 19°2.50				
Rigil Kent.	139°38.58	-60°56.50				
Kochab	$137^{\circ}19.13$	$74^{\circ}2.48$				
Zuben'ubi	136°54.76 126°2.78	-16°9.13				
Alphecca Antares	120 2.78 112°14.59	26°37.28 -26°29.40				
Atria	107°7.94	-69°4.21				
Sabik	102°1.68	-15°45.50				
Shaula Rasalhague	96°9.10 95°57.69	-37°7.28 12°32.22				
Eltanin	90°41.84	51°28.73				
Kaus Aust.	83°31.35	-34°22.26				
Vega	80°32.72	38°48.14				
Nunki Altair	75°46.72 61°59.22	-26° 15.84 8° 56.07				
Peacock	53°4.63	-56°38.92				
Deneb	49°25.52	45°22.19				
Enif	33°38.15	9°59.57				
Al Na'ir Fomalhaut	27°32.13 15°13.80	-46°50.05 -29°29.08				
Scheat	15°13.80 13°44.63	-29° 29.08 28° 13.41				
Markab	13°29.26	15°20.67				
Mar 08 Sun	SHA	Mer.pass				
Venus	357°44.48	13:06				
Mars	23°27.48	11:23				
Jupiter	253°33.93	20:00				
Saturn	356°47.90	13:08				
Mar 09 Mon	SHA	Mer.pass				
Venus Mars	356°36.57 22°42.71	13:07 11:22				
Jupiter	253°34.48	19:56				
Saturn	356°41.19	13:05				
Mar 10 Tue	SHA	Mer.pass				
Venus	$355^{\circ}28.69$	13:08				
Mars	21°58.04	11:21				
Jupiter Saturn	253°34.83 356°34.46	19:52 13:01				
		13:01				
Horizon	ital parallax	0.1				
Venus: 0.1 Mars: 0.1						
L		0.1				

Stars

h	Su	n	Moon				
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	177°17.22	S04°58.22	$309^{\circ}29.61$	13.6'	S19°15.19	11.0'	54.7'
1	192°17.38	57.25	324°2.17	13.5'	19°26.15	10.9'	54.7'
2	207°17.53 222°17.68	56.28 •• 55.30	338°34.69 353°7.16	13.5' 13.4'	19° 37.02 19° 47.80	10.8' 10.7'	54.7' 54.7'
4	237°17.84	54.33	7°39.58	13.4'	19°58.49	10.6'	54.6'
5	252°17.99	53.35	$22^{\circ}11.95$	13.3'	$20^{\circ}9.09$	10.5'	54.6'
6	267°18.14	S04°52.38	36°44.28	13.3'	S20°19.60	10.4	54.6'
7 8	282°18.30 297°18.45	51.40 50.43	51° 16.55 65° 48.78	13.2' 13.2'	20°30.02 20°40.34	10.3' 10.2'	54.6' 54.6'
9	312°18.60	• • 49.45	80°20.96	13.1'	20° 50.56	10.1	54.6'
10	327°18.76	48.48	94°53.09	13.1'	$21^{\circ}0.69$	10.0'	54.5'
11	342°18.91	47.50	109°25.17	13.0'	21°10.73	9.9'	54.5'
12 13	357°19.06 12°19.22	\$04°46.52 45.55	123°57.20 138°29.18	13.0' 12.9'	\$21°20.67 21°30.51	9.8' 9.7'	54.5' 54.5'
14	27°19.37	44.57	153°1.11	12.9'	21°40.25	9.6'	54.5'
15	42°19.53	• • 43.60	167°32.98	12.8'	21°49.89	9.5'	54.5'
16	57°19.68	42.62	182°4.81	12.8'	21°59.44 22°8.88	9.4'	54.5'
17 18	72°19.84 87°19.99	41.64 \$04°40.67	196°36.58 211°8.30	12.7' 12.7'	\$22° 18.23	9.3' 9.2'	54.5' 54.4'
19	102°20.15	39.69	225°39.98	12.6'	22° 27.47	9.1'	54.4'
20	117°20.30	38.71	$240^{\circ}11.59$	12.6'	$22^{\circ}36.61$	9.0'	54.4'
21	132°20.46	• • 37.74	254° 43.16	12.5'	22°45.64	8.9'	54.4'
22 23	147°20.62 162°20.77	36.76 35.78	269° 14.67 283° 46.14	12.5' 12.4'	22°54.58 23°3.40	8.8' 8.7'	54.4' 54.4'
23		d = -1.0'				0.1	J 1.7
	SD = 16.1'	a = -1.0'		SL	0 = 14.9'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177°20.93	S04°34.81	298° 17.55	12.4'	\$23°12.13	8.6'	54.4'
1 2	192°21.08 207°21.24	33.83 32.85	312°48.90 327°20.21	12.3' 12.3'	23°20.74 23°29.25	8.5' 8.4'	54.4' 54.3'
3	207°21.24 222°21.40	32.85 · · 31.88	327° 20.21 341° 51.46	12.3'	23° 29.25 23° 37.66	8.4	54.3'
4	237°21.55	30.90	356°22.66	12.1'	23°45.95	8.2'	54.3'
5	252°21.71	29.92	10°53.80	12.1'	23°54.14	8.1'	54.3'
6	267°21.87 282°22.02	S04°28.94	25°24.90 39°55.94	12.0'	\$24°2.22 24°10.18	8.0'	54.3'
7 8	282°22.02 297°22.18	27.96 26.99	54° 26.92	12.0' 11.9'	24° 10.18 24° 18.04	7.9' 7.7'	54.3' 54.3'
9	312°22.34	· · 26.01	68° 57.86	11.9'	24°25.79	7.6'	54.3'
10	327°22.50	25.03	83°28.74	11.8'	$24^{\circ}33.42$	7.5'	54.3'
11	342°22.65	24.05	97°59.58	11.8'	24°40.94 \$24°48.35	7.4'	54.3'
12 13	357°22.81 12°22.97	S04°23.07 22.10	112°30.35 127°1.08	11.7' 11.7'	524°48.35 24°55.64	7.3' 7.2'	54.3' 54.3'
14	27°23.13	21.12	141°31.76	11.6'	25°2.82	7.1	54.2'
15	42°23.29	• • 20.14	$156^{\circ}2.38$	11.6'	$25^{\circ}9.88$	6.9'	54.2'
16	57°23.45	19.16	170°32.95	11.5'	25° 16.83 25° 23.66	6.8'	54.2'
17 18	72°23.60 87°23.76	18.18 \$04° 17.20	185°3.47 199°33.94	11.5' 11.4'	25 23.66 S25°30.38	6.7' 6.6'	54.2' 54.2'
19	102°23.92	16.22	214°4.36	11.4'	25°36.98	6.5	54.2'
20	117°24.08	15.25	228° 34.73	11.3'	25°43.45	6.4'	54.2'
21	132°24.24 147°24.40	· · 14.27 13.29	243°5.05 257°35.32	11.3'	25°49.81 25°56.05	6.2'	54.2'
22 23	147°24.40 162°24.56	13.29	257° 35.32 272° 5.55	11.2' 11.2'	25°56.05 26°2.17	6.1' 6.0'	54.2' 54.2'
25	SD = 16.1'	d = -1.0'			0 = 14.8'	0.0	31.2
	3D = 10.1	<i>u</i> = -1.0		JL	7 — 14.0		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177°24.72	S04°11.33	286°35.72	11.1'	\$26°8.17	5.9'	54.2'
1 2	192°24.88 207°25.04	10.35 9.37	301°5.84 315°35.92	11.1' 11.0'	26° 14.05 26° 19.80	5.8' 5.6'	54.2' 54.2'
3	222°25.20	• • 8.39	330°5.95	11.0'	26°25.44	5.5'	54.2'
4	237°25.36	7.41	344°35.93	10.9'	26° 30.95	5.4'	54.2'
5	252°25.52	6.43	359°5.86	10.9'	26° 36.33	5.3'	54.2'
6 7	267°25.68 282°25.84	S04°5.45 4.47	13°35.75 28°5.59	10.8' 10.8'	\$26°41.60 26°46.73	5.1' 5.0'	54.2' 54.2'
8	297°26.00	3.49	42° 35.39	10.8	26°51.75	4.9'	54.2'
9	312°26.16	· · 2.51	57°5.15	10.7'	26°56.63	4.8'	54.2'
10	327°26.32	1.53	71°34.86	10.7'	27°1.39	4.6'	54.2'
11 12	342°26.48 357°26.64	04°0.55 \$03°59.57	86°4.52 100°34.15	10.6' 10.6'	27°6.03 \$27°10.53	4.5' 4.4'	54.2' 54.2'
13	12°26.80	58.59	115°3.73	10.5	27° 14.91	4.4	54.2'
14	27°26.97	57.61	129°33.27	10.5'	$27^{\circ}19.16$	4.1'	54.2'
15	42°27.13	• • 56.63	144°2.77	10.5'	27°23.28	4.0'	54.2'
16 17	57°27.29 72°27.45	55.64 54.66	158° 32.23 173° 1.65	10.4' 10.4'	27°27.27 27°31.14	3.9' 3.7'	54.2' 54.2'
18	72 27.45 87°27.61	54.00 \$03°53.68	173 1.05 187°31.04	10.4	27 31.14 \$27°34.87	3.6'	54.2'
19	102°27.78	52.70	202°0.38	10.3'	27°38.47	3.5'	54.2'
20	117°27.94	51.72	216°29.69	10.3'	27°41.94	3.3'	54.2'
21 22	132°28.10 147°28.26	· · 50.74 49.76	230°58.96 245°28.20	10.2' 10.2'	27°45.28 27°48.48	3.2' 3.1'	54.2' 54.2'
23	147 28.20 162°28.43	49.76 48.78	245 28.20 259°57.40	10.2'	27 48.48 27°51.56	3.1 2.9'	54.2'
	SD = 16.1'	d = -1.0'			0 = 14.8'		
	- 10.1			JL			

N 72° 0 N 70° 0 68° 0 66° 0	4:28 4:38 4:46 4:52 4:57 5:02	O5:48 05:50 05:51 05:52 05:53	06:55 06:50 06:46 06:43 06:40	17:28 17:33 17:37 17:40	Civil 18:35 18:34 18:32	Naut. 19:56 19:46 19:38
N 70° 0 68° 0 66° 0	4:38 4:46 4:52 4:57 5:02	05:50 05:51 05:52 05:53	06:50 06:46 06:43	17:33 17:37	18:34 18:32	19:46
68° 0	4:46 4:52 4:57 5:02	05:51 05:52 05:53	06:46 06:43	17:37	18:32	
66° 0	4:52 4:57 5:02	05:52 05:53	06:43			19:38
	4:57 5:02	05:53		17.40	10 01	
640 0	5:02		06:40	17:40	18:31	19:31
		OF . F 2	00.40	17:43	18:30	19:26
		05:53	06:37	17:45	18:29	19:21
60° 0	5:05	05:54	06:35	17:47	18:29	19:17
N 58° 0	5:08	05:54	06:33	17:49	18:28	19:14
56° 0	5:11	05:54	06:31	17:51	18:28	19:11
54° 0	5:13	05:54	06:30	17:52	18:28	19:09
52° 0	5:15	05:55	06:28	17:54	18:27	19:07
	5:17	05:55	06:27	17:55	18:27	19:05
45° 0	5:21	05:55	06:24	17:58	18:27	19:01
	5:23	05:54	06:21	18:00	18:27	18:59
35° 0	5:25	05:54	06:19	18:02	18:28	18:57
	5:25	05:53	06:17	18:04	18:28	18:56
	5:26	05:52	06:14	18:08	18:30	18:55
	5:25	05:49	06:10	18:11	18:32	18:56
0° 0	5:22	05:46	06:07	18:14	18:34	18:59
<b>S</b> 10° 0	5:18	05:43	06:04	18:17	18:38	19:02
20° 0	5:13	05:38	06:00	18:20	18:42	19:08
	5:04	05:32	05:56	18:24	18:48	19:16
	4:58	05:28	05:54	18:27	18:52	19:22
	4:51	05:24	05:51	18:29	18:56	19:29
45° 0	4:43	05:18	05:48	18:32	19:02	19:37
	4:32	05:11	05:44	18:36	19:09	19:48
	4:26	05:08	05:42	18:38	19:12	19:53
	4:20	05:04	05:40	18:40	19:16	19:59
	4:13	05:00	05:38	18:42	19:20	20:06
	4:05	04:55	05:35	18:44	19:24	20:14
<b>S</b> 60° 0	3:56	04:50	05:33	18:47	19:30	20:23

Lat.		Moonris	е		Moonset	t
Lat.	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	18:56	19:01	19:14	12:36	14:09	15:39

	Sun				Moon		
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	19-21	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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.)

h	Aries	Venus	Mars	Jupiter	Saturn
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	168° 40.33	163°1.17 N01°11.21	189°53.78 \$10°5.66	62°15.29 N22°56.23	165°8.05 \$00°46.96
1	183° 42.80	178°0.80 12.50	204°54.39 4.93	77°17.75 56.23	180°10.23 46.84
2	198° 45.26	193°0.44 13.78	219°55.00 4.20	92°20.22 56.23	195°12.42 46.71
3	213° 47.72	208°0.08 · · 15.07	234°55.61 · · 3.46	107°22.68 · · 56.23	210°14.60 · · 46.59
4	228° 50.19	222°59.71 16.36	249° 56.21 2.73	122°25.15 56.24	225°16.78 46.47
5	243°52.65	237°59.35 17.65	264° 56.82 2.00	137°27.61 56.24	240°18.96 46.34
6	258° 55.12	252°58.99 N01°18.93	279°57.43 \$10°1.26	152°30.07 N22°56.24	255°21.15 S00°46.22
7	273°57.58	267°58.62 20.22	294°58.04 10°0.53	167°32.54 56.24	270°23.33 46.10
8	289°0.05	282°58.26 21.51	309°58.65 09°59.80	182°35.00 56.25	285°25.51 45.98
9	304°2.51	297°57.90 · · 22.80	324°59.26 · · 59.06	197°37.46 · · 56.25	300°27.69 · · 45.85
10	319°4.97	312°57.54 24.08	339° 59.87 58.33	212°39.92 56.25	315°29.88 45.73
11	334°7.44	327°57.17 25.37	355°0.48 57.60	227°42.38 56.25	330°32.06 45.61
12	349°9.90	342°56.81 N01°26.66	10°1.09 <b>S</b> 09°56.86	242°44.84 N22°56.25	345°34.24 \$00°45.48
13	$4^{\circ}12.37$	357°56.45 27.94	25°1.70 56.13	257°47.30 56.26	0°36.42 45.36
14	$19^{\circ}14.83$	12°56.08 29.23	40°2.31 55.39	272°49.76 56.26	15°38.60 45.24
15	34° 17.29	27°55.72 · · 30.52	55°2.92 · · 54.66	287°52.22 · · 56.26	30°40.79 · · 45.12
16	49° 19.76	42°55.36 31.81	70°3.53 53.92	302°54.68 56.26	45°42.97 44.99
17	64°22.22	57°54.99 33.09	85°4.14 53.19	317°57.14 56.26	60°45.15 44.87
18	79°24.69	72°54.63 N01°34.38	100°4.75 S09°52.45	332°59.60 N22°56.26	75°47.33 <b>S</b> 00°44.75
19	94°27.15	87°54.27 35.67	115°5.36 51.72	348° 2.06 56.27	90°49.52 44.62
20	109°29.62	102°53.90 36.95	130°5.97 50.98	3°4.52 56.27	105°51.70 44.50
21	124°32.08	117°53.54 · · 38.24	145°6.58 · · 50.25	18° 6.98 · · 56.27	120°53.88 · · 44.38
22	139°34.54	132°53.18 39.53	160°7.19 49.51	33° 9.43 56.27	135°56.06 44.26
23	154°37.01	147°52.82 40.81	175°7.80 48.77	48°11.89 56.27	150°58.24 44.13
Mer.p	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	$169^{\circ}39.47$	162°52.45 N01°42.10	190°8.41 <b>S</b> 09°48.04	63°14.35 N22°56.27	166°0.43 <b>S</b> 00°44.01
1	$184^{\circ}41.94$	177°52.09 43.39	205°9.02 47.30	78°16.80 56.28	181°2.61 43.89
2	199°44.40	192°51.73 44.67	220°9.64 46.57	93°19.26 56.28	196°4.79 43.76
3	214°46.86	207°51.36 · · 45.96	235°10.25 · · 45.83	108°21.71 · · 56.28	211°6.97 · · 43.64
4	229°49.33	222°51.00 47.25	250° 10.86 45.09	123°24.17 56.28	226°9.15 43.52
5	244°51.79	237°50.64 48.53	265°11.47 44.36	138°26.62 56.28	241°11.34 43.39
6	259°54.26	252°50.27 N01°49.82	280°12.08 <b>S</b> 09°43.62	153°29.08 N22°56.28	256°13.52 \$00°43.27
7	274°56.72	267°49.91 51.10	295°12.70 42.88	168°31.53 56.28	271°15.70 43.15
8	289°59.18	282°49.55 52.39	310° 13.31 42.14	183°33.99 56.28	286°17.88 43.03
9	305°1.65	297°49.18 · · 53.68	325° 13.92 · · 41.41	198°36.44 · · 56.29	301°20.06 · · 42.90
10	320°4.11	312°48.82 54.96	340° 14.53 40.67	213°38.89 56.29	316°22.25 42.78
11	335°6.58	327°48.46 56.25	355°15.15 39.93	228°41.34 56.29	331°24.43 42.66
12	350°9.04	342°48.09 N01°57.54	10°15.76	243°43.80 N22°56.29	346°26.61 \$00°42.53
13	5°11.51	357°47.73 01°58.82	25°16.37 38.45	258°46.25 56.29	1°28.79 42.41
14	20° 13.97	12°47.37 02°0.11	40°16.99 37.72	273°48.70 56.29	16°30.97 42.29
15	35° 16.43	27° 47.00 · · 1.39	55°17.60 · · 36.98	288°51.15 · · 56.29	31°33.15 · · 42.16
16	50° 18.90	42°46.64 2.68	70°18.21 36.24	303°53.60 56.29	46°35.34 42.04
17	65°21.36 80°23.83	57°46.28 3.96 72°45.91 N02°5.25	85°18.83 35.50 100°19.44 \$09°34.76	318°56.05 56.29 333°58.50 N22°56.29	61°37.52 41.92 76°39.70 \$00°41.80
18 19	95° 26.29	87° 45.55 6.54	115°20.06 34.02	349° 0.95 56.30	91°41.88 41.67
20	95 20.29 110°28.75	102°45.19 7.82	130°20.67 33.28	4°3.40 56.30	106°44.06 41.55
21	110 26.75 125°31.22	117°44.82 · · 9.11	145°21.28 · · 32.54	19° 5.85 · · 56.30	121°46.24 · · 41.43
22	140° 33.68	132°44.46 10.39	160°21.90 31.81	34° 8.30 56.30	136°48.42 41.30
23	155° 36.15	147°44.10 11.68	175°22.51 31.07	49°10.75 56.30	150° 46.42 41.30 151° 50.61 41.18
Mer.p	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
E»:	GHA	GHA Dec	GHA Dec	CHA Dos	GHA Dec
Fri 0	<b>GHA</b> 170°38.61	<b>GHA Dec</b> 162°43.73 N02°12.96	<b>GHA Dec</b> 190°23.13 <b>S</b> 09°30.33	<b>GHA Dec</b> 64°13.19 N22°56.30	<b>GHA Dec</b> 166°52.79 <b>S</b> 00°41.06
1	170 36.01 185°41.08	102 43.73 No2 12.90 177°43.37 14.25	205°23.74 29.59	79°15.64 56.30	181°54.97 40.93
2	200° 43.54	192°43.01 15.53	220° 24.36 28.85	94°18.09 56.30	196°57.15 40.81
3	215° 46.00	207° 42.64 · · 16.82	235°24.97 · · 28.11	109°20.53 · · 56.30	211°59.33 · · · 40.69
4	230° 48.47	222°42.28 18.10	250°25.59 27.37	124°22.98 56.30	227°1.51 40.57 M
5	245°50.93	237°41.92 19.39	265°26.20 26.62	139°25.43 56.30	242°3.69 40.44
6	260°53.40	252°41.55 N02°20.67	280°26.82 S09°25.88	154°27.87 N22°56.30	257°5.87 S00°40.32
7	275°55.86	267°41.19 21.96	295°27.44 25.14	169°30.32 56.30	272°8.06 40.20
8	290°58.32	282°40.82 23.24	310°28.05 24.40	184°32.76 56.30	287°10.24 40.07
9	306°0.79	297°40.46 · · 24.53	325°28.67 · · 23.66	199°35.21 · · 56.30	302°12 42 · · 39 95
10	321°3.25	312°40.10 25.81	340°29.28 22.92	214°37.65 56.30	317°14.60 39.83
11	336°5.72	327°39.73 27.10	355°29.90 22.18	229°40.09 56.30	332°16.78 39.70
12	351°8.18	342°39.37 N02°28.38	10°30.52 <b>S</b> 09°21.44	244°42.54 N22°56.30	347°18.96
13	$6^{\circ}10.65$	357°39.01 29.66	25°31.13 20.70	259°44.98 56.30	2°21.14 39.46
14	21° 13.11	12°38.64 30.95	40°31.75 19.95	274°47.42 56.30	17°23.32 39.33
15	36° 15.57	27°38.28 · · 32.23	55°32.37 · · 19.21	289°49.87 · · 56.30	32°25.51 · · 39.21
16	51° 18.04	42°37.91 33.52	70°32.98 18.47	304°52.31 56.30	47°27.69 39.09
17	66° 20.50	57° 37.55 34.80	85°33.60 17.73	319°54.75 56.30	62°29.87 38.96
18	81°22.97	72°37.19 N02°36.08	100°34.22 <b>S</b> 09°16.98	334°57.19 N22°56.30	77°32.05 S00°38.84
19	96°25.43	87°36.82 37.37	115°34.84 16.24	349°59.63 56.30	92°34.23 38.72
20	111°27.89	102°36.46 38.65	130°35.45 15.50	5°2.07 56.30	107°36.41 38.60
21	126° 30.36	117°36.09 · · 39.94	145°36.07 · · 14.76	20°4.51 · · 56.30	122°38.59 · · 38.47
22	141°32.82	132°35.73 41.22	160°36.69 14.01	35° 6.95 56.30	137° 40.77 38.35
23	156°35.29	147°35.36 42.50	175°37.31 13.27	50°9.39 56.30	152°42.95 38.23
Mer.p	pass. 12:35	$\nu$ -0.4′ $d1.3$ ′ m-3.92	$ u 0.6' \ d$ -0.7' m1.16	$\nu$ 2.4′ $d$ 0.0′ m-2.35	$ u 2.2' \ d$ -0.1' m0.96

Mar 12 Thu Venus Mars Jupiter Saturn	<b>SHA</b> 353°12.98 20°28.94 253°34.87 356°20.95	Mer.pass 13:09 11:19 19:44 12:54
Mar 12 Thu Venus	353°12.98 20°28.94	13:09
Mar 12 Thu		
Saturn	356°27.72	12:58
Jupiter	253°34.96	19:48
Mars	21°13.45	11:20
Mar 11 Wed Venus	<b>SHA</b> 354°20.83	Mer.pass 13:08
Markab	13°29.26	15°20.67
Scheat	13°44.62	28°13.40
Fomalhaut	15°13.79	-29°29.07
Enif Al Na'ir	33°38.13 27°32.11	-46°50.03
Deneb Enif	49°25.50 33°38.13	45°22.18 9°59.57
Peacock	$53^{\circ}4.60$	-56°38.91
Nunki Altair	75°46.69 61°59.20	-26°15.83 8°56.07
Vega Nunki	80°32.69 75°46.69	38°48.14 -26°15.83
Kaus Aust.	83°31.32	-34°22.26
Rasalhague Eltanin	95°57.66 90°41.81	12°32.22 51°28.73
Shaula	96°9.07	-37°7.28
Sabik	$102^{\circ}1.65$	-15°45.50
Antares Atria	112°14.56 107°7.87	-26°29.41 -69°4.22
Alphecca	126°2.75	26°37.28
Zuben'ubi	$136^{\circ}54.74$	$-16^{\circ}9.14$
Rigil Kent. Kochab	139°38.54 137°19.08	-60°56.51 74°2.49
Arcturus	145°46.77	19°2.50
Menkent	$147^{\circ}56.18$	-36°29.95
Alkaid Hadar	152°50.83 148°34.16	49°10.65 -60°29.88
Spica Alkaid	158°21.00 152°50.83	-11°18.03 49°10.65
Alioth	$166^{\circ}11.57$	55°48.82
Acrux Gacrux	172°58.38 171°50.03	-63°14.68 -57°15.63
Gienah	175°42.27	-17°41.39 -63°14.68
Denebola	$182^{\circ}23.63$	14°25.36
Regulus Dubhe	207°33.10 193°39.13	11°50.21 61°36.50
Alphard	$217^{\circ}46.52$	-8°46.50
Miaplacidus	222 45.25 221°37.35	-43 32.51 -69°49.66
Avior Suhail	234°13.92 222°45.25	-59°35.83 -43°32.51
Pollux	243°15.90	27°57.76
Adhara Procyon	255° 4.95 244° 49.64	5°9.36
Sirius	258°25.27	-16°45.31 -29°0.68
Betelgeuse Canopus	263°51.82	-52°42.83
Alnilam	275°36.71 270°50.98	-1°11.22 7°24.64
Elnath	278°0.62	28°37.81
Capella Bellatrix	280°20.45 278°21.82	46°1.59 6°22.33
Rigel	$281^{\circ}2.93$	-8°10.42
Mirfak Aldebaran	308°27.09 290°38.56	49°57.40 16°33.70
Menkar	314°5.30	4°11.48
Acamar	$315^{\circ}11.26$	-40°12.18
Hamal Polaris	327°50.35 313°48.58	23°35.18 89°22.73
Achernar	$335^{\circ}19.91$	-57°6.39
Schedar Diphda	349°30.48 348°46.62	-17°50.69
Ankaa	353° 6.57 349° 30.48	-42°9.93 56°40.92
Alpheratz	357°34.12	29°14.06
Alpheratz	<b>SHA</b> 357°34.12	<b>Dec</b> 29°14.06

Stars

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	177°28.59	S03°47.79	274°26.57	10.1'	S27°54.50	2.8'	54.2'
1	192°28.75	46.81	288°55.70	10.1'	27°57.31	2.7'	54.2'
2	207°28.91 222°29.08	45.83 •• 44.85	303°24.81 317°53.88	10.1' 10.0'	27°59.98 28°2.52	2.5' 2.4'	54.2' 54.2'
4	237°29.24	43.87	332°22.92	10.0'	28°4.92	2.3'	54.2'
5	252°29.40	42.89	$346^{\circ}51.93$	10.0'	28°7.20	2.1'	54.2'
6	267°29.57	S03°41.90	1°20.92	10.0'	\$28°9.33	2.0'	54.2'
7 8	282°29.73 297°29.90	40.92 39.94	15°49.87 30°18.80	9.9' 9.9'	28°11.33 28°13.20	1.9' 1.7'	54.2' 54.2'
9	312°30.06	38.96	44°47.71	9.9'	28° 14.93	1.6'	54.2'
10	327°30.22	37.97	59°16.59	9.9'	$28^{\circ}16.52$	1.5'	54.2'
11	342°30.39	36.99	73°45.44	9.8'	28°17.97	1.3'	54.2'
12 13	357°30.55 12°30.72	\$03°36.01 35.03	88°14.28 102°43.09	9.8' 9.8'	\$28° 19.29 28° 20.47	1.2' 1.0'	54.2' 54.2'
13	27°30.88	34.04	102 43.09 117°11.88	9.8'	28°21.52	0.9'	54.2 54.3'
15	42°31.05	• • 33.06	131°40.65	9.8'	28°22.43	0.8'	54.3'
16	57°31.21	32.08	146°9.40	9.7'	$28^{\circ}23.19$	0.6'	54.3'
17	72°31.38	31.10	160°38.14	9.7'	28°23.82	0.5'	54.3'
18 19	87°31.54 102°31.71	\$03°30.11 29.13	175°6.85 189°35.56	9.7' 9.7'	\$28°24.32 28°24.67	0.4' 0.2'	54.3' 54.3'
20	117°31.87	28.15	204°4.24	9.7'	28° 24.89	0.2	54.3'
21	132°32.04	• • 27.16	218°32.92	9.7'	28°24.96	-0.1'	54.3'
22	147°32.20	26.18	233°1.58	9.7'	28°24.90	-0.2'	54.3'
23	162°32.37	25.20	247°30.23	9.6'	28°24.70	-0.3'	54.3'
	SD = 16.1'	d = -1.0'		SD	0 = 14.8'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177°32.53	S03°24.21	261°58.87	9.6'	S28°24.36	-0.5'	54.3'
1	192°32.70	23.23	276°27.50	9.6'	28°23.87	-0.6'	54.4'
2	207°32.87 222°33.03	22.25 •• 21.26	290°56.12 305°24.74	9.6' 9.6'	28°23.25 28°22.49	-0.8' -0.9'	54.4' 54.4'
4	237°33.20	20.28	319°53.35	9.6'	28°21.59	-0.9	54.4'
5	252°33.37	19.29	334°21.95	9.6'	28° 20.55	-1.2'	54.4'
6	267°33.53	S03°18.31	348°50.55	9.6'	S28°19.37	-1.3'	54.4'
7	282°33.70	17.33	3°19.15	9.6'	28° 18.06	-1.5'	54.4'
8 9	297°33.87 312°34.03	16.34 •• 15.36	17°47.75 32°16.34	9.6' 9.6'	28° 16.60 28° 15.00	-1.6' -1.7'	54.4' 54.4'
10	327°34.20	14.37	46°44.93	9.6'	28° 13.26	-1.9'	54.5
11	342°34.37	13.39	61°13.53	9.6'	28°11.38	-2.0'	54.5'
12	357°34.53	S03°12.41	75°42.13	9.6'	\$28°9.36	-2.2'	54.5'
13 14	12°34.70 27°34.87	11.42 10.44	90°10.73 104°39.34	9.6' 9.6'	28°7.20 28°4.90	-2.3' -2.4'	54.5' 54.5'
15	42°35.04	. 9.45	119°7.95	9.6'	28°2.46	-2.4 -2.6'	54.5'
16	57°35.21	8.47	133°36.57	9.6'	27°59.88	-2.7'	54.5'
17	72°35.37	7.48	148°5.20	9.6'	27°57.17	-2.9'	54.6'
18 19	87°35.54 102°35.71	\$03°6.50 5.51	162°33.83 177°2.47	9.6' 9.7'	\$27°54.31 27°51.31	-3.0' -3.1'	54.6' 54.6'
20	102 35.71 117°35.88	4.53	177 2.47 191°31.13	9.7 9.7'	27°48.17		54.6'
21	132°36.05	• • 3.54	205°59.80	9.7'	27°44.90	-3.4	54.6'
22	147°36.21	2.56	220°28.47	9.7'	$27^{\circ}41.48$	-3.6'	54.6'
23	162°36.38	1.57	234°57.17	9.7'	27°37.93	-3.7'	54.7'
	SD = 16.1'	d = -1.0'		SD	0 = 14.8'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177°36.55	\$03°0.59	249°25.87	9.7'	\$27°34.24	-3.8'	54.7'
1 2	192°36.72 207°36.89	02°59.60 58.62	263°54.60 278°23.33	9.7' 9.8'	27°30.41 27°26.44	-4.0' -4.1'	54.7' 54.7'
3	207 30.89 222°37.06	57.63	276 23.33 292°52.09	9.8'	27°22.33	-4.1 -4.2'	54.7'
4	237°37.23	56.65	307°20.86	9.8'	27°18.09	-4.4'	54.7'
5	252°37.40	55.66	321°49.66	9.8'	27°13.70	-4.5'	54.8'
6 7	267°37.57 282°37.74	\$02°54.68 53.69	336°18.47 350°47.30	9.8' 9.9'	\$27°9.19 27°4.53	-4.7' -4.8'	54.8' 54.8'
8	282°37.74 297°37.91	53.69 52.71	5°16.16	9.9'	26°59.73	-4.8° -4.9°	54.8'
9	312°38.08	51.72	19°45.04	9.9'	26° 54.80	-5.1'	54.8'
10	327°38.25	50.74	34°13.94	9.9'	26°49.74	-5.2'	54.9'
11	342°38.42	49.75	48°42.86	10.0'	26°44.54	-5.3'	54.9'
12 13	357°38.59 12°38.76	S02°48.76 47.78	63°11.82 77°40.79	10.0' 10.0'	\$26°39.20 26°33.73	-5.5' -5.6'	54.9' 54.9'
14	27°38.93	46.79	92°9.79	10.0'	26°28.12	-5.0 -5.7'	54.9'
15	42°39.10	• • 45.81	106°38.82	10.1'	$26^{\circ}22.38$	-5.9'	55.0'
16	57°39.27	44.82	121°7.88	10.1'	26°16.50	-6.0'	55.0'
17	72°39.44 87°39.61	43.83 \$02°42.85	135°36.97 150°6.08	10.1' 10.1'	26°10.49 \$26°4.34	-6.1' -6.3'	55.0'
18 19	87°39.61 102°39.78	\$02°42.85 41.86	150°6.08 164°35.23	10.1	526°4.34 25°58.07	-6.4'	55.0' 55.1'
20	117°39.95	40.88	179°4.40	10.2'	25°51.66	-6.5	55.1'
21	132°40.12	• • 39.89	193°33.61	10.2'	25°45.12	-6.7'	55.1'
22	147°40.29 162°40.46	38.90	208°2.85 222°32.12	10.3'	25°38.44 25°31.64	-6.8'	55.1'
23		37.92	222 32.12	10.3'		-6.9'	55.1'
	SD = 16.1'	d = -1.0'		3L	0 = 14.9'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
	Naut.	Civil	<b>C</b> umico	Canada	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	04:05	04:58	05:40	18:38	19:20	20:12
	Magnrica				Magnes	

Lat.		Moonris	e		Moonset	:
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°						
<b>N</b> 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° N 10°	00:28 00:04	01:21 00:56	02:11 01:47	11:20 11:44	12:12 12:36	13:07 13:30
0°	00:04	00:30	01:47	12:07	12:50	13:50
_						
<b>S</b> 10° 20°	22.47	00:11	01:04	12:29	13:21	14:11
20°	23:47 23:18		00:40 00:13	12:54 13:22	13:45 14:13	14:34 14:59
35°	23:02	23:57	00.13	13:39	14:13	15:15
40°	22:42	23:38		13:58	14:49	15:32
45°	22:18	23:15		14:22	15:12	15:53
<b>S</b> 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
<b>S</b> 60°	19:47	20:55	22:26	16:53	17:33	17:50

	Sun			Moon		
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age
,	00 <sup>h</sup>	12 <sup>h</sup>	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	00.34	00.26	12.00	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
0	171°37.75	162°35.00 N02°43.79	190°37.92 \$09°12.53	65°11.83 N22°56.30	167°45.13 \$00°38.10
1	171 37.73 186°40.22	177°34.64 45.07	205°38.54 11.78	80°14.27 56.30	182°47.31 37.98
2	201°42.68	192°34.27 46.35	220°39.16 11.04	95°16.71 56.30	197°49.49 37.86
3	216°45.14	207°33.91 · · 47.64	235°39.78 ·· 10.30	110°19.14 · · 56.30	212°51.68 · · · 37.73
4	231°47.61	222°33.54 48.92	250°40.40 9.55	125°21.58 56.30	227°53.86 37.61
5	246°50.07	237°33.18 50.20	265°41.02 8.81	140°24.02 56.30	242°56.04 37.49
6	261°52.54	252°32.81 N02°51.48	280°41.64 S09°8.06	155°26.46 N22°56.30	257°58.22 S00°37.36
7	276°55.00	267°32.45 52.77	295° 42.26 7.32	170°28.89 56.30	273°0.40 37.24
8	291°57.46	282°32.08 54.05	310°42.87 6.58	185°31.33 56.30	288°2.58 37.12
9	306° 59.93	297°31.72 · · 55.33	325°43.49 · · 5.83	200°33.76 · · 56.29	303°4.76 · · 36.99
10	322°2.39	312°31.35 56.62	340°44.11 5.09	215°36.20 56.29	318°6.94 36.87
11	337°4.86	327°30.99 57.90	355° 44.73 4.34	230°38.63 56.29	333°9.12 36.75
12	352°7.32	342°30.62 N02°59.18	10°45.35 \$09°3.60	245°41.07 N22°56.29	348°11.30
13	7°9.78	357°30.26 03°0.46	25° 45.97 2.85	260°43.50 56.29	3°13.48 36.50
14	$22^{\circ}12.25$	12°29.89 1.74	40°46.59 2.11	275°45.94 56.29	18°15.66 36.38
15	$37^{\circ}14.71$	27°29.53 · · 3.03	55°47.21 · · 1.36	290°48.37 · · 56.29	33°17.84 · · 36.26
16	52° 17.18	42°29.16 4.31	70°47.83 09°0.62	305°50.80 56.29	48°20.02 36.13
17	67° 19.64	57°28.80 5.59	85°48.45 08°59.87	320°53.24 56.29	63°22.20 36.01
18	82°22.11	72°28.43 N03°6.87	100°49.07 \$08°59.12	335°55.67 N22°56.29	78°24.38 <b>S</b> 00°35.89
19	97°24.57	87°28.07 8.15	115°49.69 58.38	350°58.10 56.29	93°26.56 35.76
20	112°27.03	102°27.70 9.43	130°50.32 57.63	6° 0.53 56.28	108°28.74 35.64
21	127°29.50	117°27.34 · · 10.72	145°50.94 · · 56.89	21°2.96 · · 56.28	123°30.92 · · 35.52
22	142°31.96	132°26.97 12.00	160°51.56 56.14	36° 5.40 56.28	138°33.11 35.39
23	157°34.43	147°26.61 13.28	175°52.18 55.39	51°7.83 56.28	153°35.29 35.27
Mer.p	pass. 12:31	$\nu$ -0.4 $'$ $d1.3'$ m-3.92	$ u 0.6' \ d$ -0.7' m1.16	$\nu$ 2.4′ d-0.0′ m-2.34	ν2.2′ d-0.1′ m0.95
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0 0	172°36.89	162°26.24 N03°14.56	190°52.80 \$08°54.65	66°10.26 N22°56.28	168°37.47 S00°35.15
1	187°39.35	177°25.88 15.84	205°53.42 53.90	81°12.69 56.28	183°39.65 35.02
2	202°41.82	192°25.51 17.12	220° 54.04 53.15	96°15.12 56.28	198°41.83 34.90
3	217°44.28	207°25.14 · · 18.40	235°54.67 · · 52.41	111°17.54 · · 56.28	213°44.01 · · 34.78
4	232°46.75	222°24.78 19.68	250° 55.29 51.66	126°19.97 56.27	228°46.19 34.65
5	247°49.21	237°24.41 20.96	265°55.91 50.91	141°22.40 56.27	243°48.37 34.53
6	262°51.67	252°24.05 N03°22.24	280°56.53	156°24.83 N22°56.27	258°50.55 S00°34.41
7	277°54.14	267°23.68 23.52	295°57.15 49.42	171°27.26 56.27	273°52.73 34.28
8	292°56.60	282°23.31 24.80	310°57.78 48.67	186°29.69 56.27	288°54.91 34.16
9	307° 59.07	297°22.95 · · 26.08	325°58.40 · · 47.92	201°32.11 · · 56.27	303°57.09 · · 34.04
10	323°1.53	312°22.58 27.36	340°59.02 47.17	216°34.54 56.26	318°59.27 33.91
11	338°4.00	327°22.21 28.64	355°59.64 46.42	231°36.96 56.26	334°1.45 33.79
12	353°6.46	342°21.85 N03°29.92	11°0.27 <b>S</b> 08°45.68	246°39.39 N22°56.26	349°3.63 <b>S</b> 00°33.67
13	8°8.92	357°21.48 31.20	26°0.89 44.93	261°41.82 56.26	4°5.81 33.54
14	23°11.39	12°21.12 32.48	41°1.51 44.18	276°44.24 56.26	19°7.99 33.42
15	$38^{\circ}13.85$	27°20.75 · · 33.76	56°2.14 · · 43.43	291°46.67 · · 56.25	34°10.17 · · 33.30
16	$53^{\circ}16.32$	42°20.38 35.04	71°2.76 42.68	306°49.09 56.25	49°12.35 33.17
17	68° 18.78	57°20.02 36.32	86°3.39 41.93	321°51.51 56.25	64°14.53 33.05
18	83°21.24	72°19.65 N03°37.60	101°4.01 <b>S</b> 08°41.18	336°53.94 N22°56.25	79°16.71 <b>S</b> 00°32.93
19	98°23.71	87° 19.28 38.88	116°4.63 40.43	351°56.36 56.25	94°18.89 32.80
20	113°26.17	102° 18.91 40.15	131°5.26 39.68	6°58.78 56.24	109°21.07 32.68
21	128°28.64	117° 18.55 · · 41.43	146°5.88 · · 38.93	22°1.21 · · 56.24	124°23.25 · · 32.56
22	143°31.10	132° 18.18 42.71	161°6.51 38.19	37° 3.63 56.24	139°25.43 32.43
23	158°33.56	147°17.81 43.99	176°7.13 37.44	52°6.05 56.24	154°27.61 32.31
Mer.p	pass. 12:27	$\nu$ -0.4 $'$ $d1.3'$ m-3.92	$ u 0.6' \ d \text{-} 0.7' \ \text{m} 1.16$	$\nu$ 2.4′ <i>d</i> -0.0′ m-2.33	ν2.2′ d-0.1′ m0.95
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	173°36.03	162°17.45 N03°45.27	191°7.75 \$08°36.69	67°8.47 N22°56.24	169°29.79 S00°32.19
1	188° 38.49	177°17.08 46.54	206°8.38 35.94	82°10.89 56.23	184°31.97 32.06
2	203°40.96	192°16.71 47.82	221°9.00 35.19	97°13.31 56.23	199°34.15 31.94
3	218°43.42	207° 16.34 · · 49.10	236°9.63 · · 34.44	112°15.74 · · 56.23	214°36.32 · · · 31.82
4	233°45.89	222°15.98 50.38	251°10.25 33.68	127°18.16 56.23	229°38.50 31.69
5	248°48.35	237° 15.61 51.65	266° 10.88 32.93	142°20.57 56.22	244°40.68 31.57
6	263°50.81	252°15.24 N03°52.93	281°11.51 <b>S</b> 08°32.18	157°22.99 N22°56.22	259°42.86 S00°31.45
7	278°53.28	267°14.87 54.21	296°12.13 31.43	172°25.41 56.22	274°45.04 31.33
8	293°55.74	282°14.50 55.49	311°12.76 30.68	187°27.83 56.22	289°47.22 31.20
9	308° 58.21	297° 14.14 · · · 56.76	326°13.38 · · 29.93	202°30.25 · · 56.21	304°49.40 · · 31.08
10	324°0.67	312° 13.77 58.04	341°14.01 29.18	217°32.67 56.21	319°51.58 30.96
11	339°3.13	327°13.40 03°59.32	356°14.63 28.43	232°35.09 56.21	334°53.76 30.83
12	354°5.60	342°13.03 N04°0.59	11°15.26	247°37.50 N22°56.21	349°55.94 S00°30.71
13	9°8.06	357°12.66 1.87	26°15.89 26.93	262°39.92 56.20	4°58.12 30.59
14	24° 10.53	12°12.29 3.15	41°16.51 26.17	277°42.34 56.20	20°0.30 30.46
15	39° 12.99	27°11.93 · · 4.42	56°17.14 · · 25.42	292°44.75 · · 56.20	35°2.48 · · · 30.34
16	54° 15.45	42°11.56 5.70	71°17.77 24.67	307°47.17 56.19	50°4.66 30.22
17	69° 17.92	57°11.19 6.97	86°18.39 23.92	322°49.58 56.19	65°6.84 30.09
18	84°20.38	72°10.82 N04°8.25	101°19.02	337°52.00 N22°56.19	80°9.02 S00°29.97
19	99°22.85	87°10.45 9.52	116°19.65 22.41	352°54.41 56.19	95°11.20 29.85
20	114°25.31	102°10.08 10.80	131°20.28 21.66	7°56.83 56.18	110°13.38 29.72
21	129° 27.77 144° 30.24	117°9.71 · · 12.07 132°9.34	146°20.90 · · 20.91	22°59.24 · · 56.18	125°15.56 · · 29.60
22 23	144° 30.24 159° 32.70	132°9.34 13.35 147°8.97 14.62	161°21.53 20.16 176°22.16 19.40	38° 1.65 56.18 53° 4.07 56.17	140°17.74 29.48 155°19.91 29.35
			-		
Mer.p	pass. 12:24	u-0.4 $'$ $d1.3'$ m-3.92	$ u 0.6' \ d$ -0.8' m1.16	$\nu$ 2.4′ <i>d</i> -0.0′ m-2.32	$ u 2.2' \ d$ -0.1' m0.95
					<del>_</del>

	Stars	
	SHA	Dec
Alpheratz	357°34.12	29°14.06
Ankaa Schedar	353°6.57 349°30.49	-42°9.91 56°40.91
Diphda	348°46.62	-17°50.68
Achernar	335°19.92	-57°6.37
Hamal Polaris	327°50.36 313°49.74	23°35.18 89°22.73
Acamar	$315^{\circ}11.27$	-40° 12.17
Menkar	314°5.31 308°27.11	4°11.48
Mirfak Aldebaran	308°27.11 290°38.57	49°57.39 16°33.70
Rigel	281°2.94	-8° 10.42
Capella	280°20.47 278°21.83	46°1.59 6°22.33
Bellatrix Elnath	278°0.63	28° 37.81
Alnilam	275°36.72	-1°11.22
Betelgeuse	270°50.99 263°51.85	7°24.64 -52°42.84
Canopus Sirius	258°25.28	-52 42.84 -16°45.31
Adhara	$255^{\circ}4.96$	-29°0.68
Procyon Pollux	244°49.64	5°9.36 27°57.76
Avior	243°15.91 234°13.95	-59°35.84
Suhail	222°45.26	-43°32.52
Miaplacidus	221°37.38	-69°49.67
Alphard Regulus	217°46.52 207°33.10	-8°46.51 11°50.21
Dubhe	193°39.12	61°36.51
Denebola	182°23.62	14°25.36
Gienah Acrux	175°42.26 172°58.36	-17°41.40 -63°14.70
Gacrux	172 56.30 171°50.02	-57° 15.64
Alioth	166°11.55	55°48.83
Spica Alkaid	158°20.98 152°50.81	-11° 18.04 49° 10.66
Hadar	148°34.13	-60°29.89
Menkent	$147^{\circ}56.16$	-36°29.96
Arcturus Rigil Kent.	145°46.75 139°38.50	19°2.50 -60°56.52
Kochab	137°19.03	74°2.50
Zuben'ubi	136°54.72	-16°9.15
Alphecca Antares	126°2.73 112°14.53	26°37.28 -26°29.41
Atria	107°7.81	-69°4.22
Sabik	102°1.62	-15°45.51
Shaula Rasalhague	96°9.03 95°57.64	-37°7.29 12°32.22
Eltanin	90°41.77	51°28.72
Kaus Aust.	83°31.29	-34°22.26
Vega Nunki	80°32.67 75°46.66	38°48.13 -26°15.83
Altair	61°59.18	8°56.07
Peacock	53°4.56	-56°38.89
Deneb Enif	49°25.47 33°38.12	45° 22.17 9° 59.57
Al Na'ir	27°32.09	-46°50.02
Fomalhaut	15°13.78	-29°29.06
Scheat Markab	13°44.61 13°29.25	28° 13.39 15° 20.67
Mar 14 Sat	SHA	Mer.pass
Venus	350°57.25	13:10
Mars	$19^{\circ}0.17$	11:17
Jupiter Saturn	253°34.08 356°7.38	19:36 12:47
Mar 15 Sun	SHA	Mer.pass
Venus	349°49.35	13:11
Mars	18°15.91	11:16
Jupiter Saturn	253°33.37 356°0.58	19:32 12:44
Mar 16 Mon Venus	<b>SHA</b> 348°41.42	Mer.pass 13:11
Mars	17°31.73	11:15
Jupiter	253°32.44	19:28
Saturn	355°53.76	12:40

Horizontal parallax

Venus: Mars:

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	177°40.63	S02°36.93	237°1.43	10.3'	S25°24.71	-7.1'	55.2'
1	192°40.81	35.94	251°30.77	10.4	25° 17.64	-7.2'	55.2'
2	207°40.98 222°41.15	34.96 •• 33.97	266°0.14 280°29.54	10.4' 10.4'	25° 10.45 25° 3.12	-7.3' -7.5'	55.2' 55.2'
4	237°41.32	32.98	294°58.99	10.5	24°55.67	-7.6'	55.3'
5	252°41.49	32.00	309°28.46	10.5'	24°48.09	-7.7'	55.3'
6	267°41.66	S02°31.01	323°57.98	10.5'	\$24°40.38	-7.8'	55.3'
7 8	282°41.84 297°42.01	30.02 29.04	338°27.53 352°57.11	10.6' 10.6'	24°32.54 24°24.58	-8.0' -8.1'	55.3' 55.4'
9	312°42.18	• • 28.05	7°26.74	10.7	24°16.49	-8.2'	55.4'
10	327°42.35	27.06	21°56.40	10.7'	24°8.28	-8.3'	55.4'
11	342°42.53 357°42.70	26.08 \$02°25.09	36° 26.10 50° 55.83	10.7' 10.8'	23°59.94 523°51.48	-8.5' -8.6'	55.4'
12 13	357 42.70 12°42.87	24.10	65° 25.61	10.8	23°42.89	-8.7'	55.5' 55.5'
14	27°43.04	23.12	79°55.42	10.9'	23°34.18	-8.8'	55.5'
15	42°43.22	• • 22.13	94°25.28	10.9'	23°25.35	-9.0'	55.5'
16 17	57°43.39 72°43.56	21.14 20.15	108° 55.17 123° 25.10	10.9' 11.0'	23°16.39 23°7.32	-9.1' -9.2'	55.6' 55.6'
18	87°43.74	502° 19.17	137° 55.07	11.0'	\$22°58.12	-9.2 -9.3	55.6'
19	102°43.91	18.18	152°25.09	11.1'	22°48.81	-9.4'	55.6'
20	117°44.08	17.19	166°55.14	11.1'	22°39.37	-9.6'	55.7'
21 22	132°44.26 147°44.43	· · 16.20 15.22	181°25.23 195°55.36	11.1' 11.2'	22°29.82 22°20.15	-9.7' -9.8'	55.7' 55.7'
23	162°44.60	15.22	210° 25.53	11.2'	22° 20.15 22° 10.36	-9.8 -9.9'	55.8'
-	SD = 16.1'	d = -1.0'			O = 15.0'		
				JI			
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	177°44.78 192°44.95	S02°13.24 12.25	224°55.74 239°26.00	11.3' 11.3'	\$22°0.45 21°50.43	-10.0' -10.1'	55.8' 55.8'
2	192°44.95 207°45.13	12.25 11.27	253° 56.29	11.3	21°50.43 21°40.29	-10.1 -10.3	55.8'
3	222°45.30	• • 10.28	268° 26.62	11.4'	21° 30.04	-10.4	55.9'
4	237°45.47	9.29	282°57.00	11.4'	21°19.68	-10.5'	55.9'
5 6	252°45.65 267°45.82	8.30 \$02°7.32	297°27.41 311°57.86	11.5' 11.5'	21°9.20 \$20°58.61	-10.6' -10.7'	55.9' 56.0'
7	282°46.00	6.33	326° 28.36	11.5'	20°47.91	-10.7 -10.8'	56.0'
8	297°46.17	5.34	340°58.89	11.6'	20°37.10	-10.9'	56.0'
9	312°46.35	• • 4.35	355°29.47	11.6'	20°26.18	-11.0'	56.0'
10 11	327°46.52 342°46.70	3.36 2.38	10°0.08 24°30.73	11.7' 11.7'	20° 15.15 20° 4.01	-11.1' -11.2'	56.1' 56.1'
12	357°46.87	502°1.39	39°1.42	11.7	\$19°52.77	-11.4	56.1
13	12°47.05	02°0.40	53°32.16	11.8'	$19^{\circ}41.42$	-11.5'	56.2'
14	27°47.22	01°59.41	68°2.93 82°33.74	11.8'	19°29.96 19°18.39	-11.6' -11.7'	56.2'
15 16	42°47.40 57°47.57	· · 58.42 57.44	82°33.74 97°4.58	11.8' 11.9'	19° 18.39 19° 6.73	-11.7 -11.8'	56.2' 56.3'
17	72°47.75	56.45	111°35.47	11.9'	18°54.96	-11.9'	56.3'
18	87°47.92	S01°55.46	126°6.39	12.0'	S18°43.09	-12.0'	56.3'
19 20	102°48.10 117°48.27	54.47 53.48	140°37.35 155°8.35	12.0' 12.0'	18°31.11 18°19.04	-12.1'	56.3' 56.4'
21	132°48.45	. 52.50	169° 39.39	12.1'	18°6.86	-12.2	56.4'
22	147°48.63	51.51	184°10.46	12.1'	$17^{\circ}54.59$	-12.4'	56.4'
23	162°48.80	50.52	198°41.56	12.1'	17° 42.21	-12.5'	56.5'
	SD = 16.1'	d = -1.0'		SI	O = 15.2'		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	177°48.98	S01°49.53	213° 12.71	12.2'	S17°29.75	-12.6'	56.5'
1	192°49.15	48.54	227°43.88	12.2'	17° 17.18	-12.7'	56.5'
2	207°49.33 222°49.51	47.55 •• 46.57	242° 15.10 256° 46.34	12.2' 12.3'	17°4.52 16°51.76	-12.8' -12.8'	56.6' 56.6'
3 4	222°49.51 237°49.68	45.58	250° 46.34 271° 17.62	12.3'	16° 38.91	-12.8' -12.9'	56.6'
5	252°49.86	44.59	285°48.93	12.3'	$16^{\circ}25.97$	-13.0'	56.7'
6	267°50.04	S01°43.60	300° 20.28	12.4'	\$16° 12.94	-13.1'	56.7'
7 8	282°50.21 297°50.39	42.61 41.62	314°51.66 329°23.07	12.4' 12.4'	15°59.82 15°46.60	-13.2' -13.3'	56.7' 56.7'
9	312°50.57	• • 40.64	343° 54.51	12.4	15° 40.00	-13.4'	56.8'
10	327°50.74	39.65	358°25.98	12.5'	15° 19.91	-13.5'	56.8'
11	342°50.92	38.66	12°57.48	12.5'	15°6.43	-13.6'	56.8'
12 13	357°51.10 12°51.27	S01°37.67 36.68	27°29.01 42°0.57	12.6' 12.6'	\$14°52.87 14°39.22	-13.6' -13.7'	56.9' 56.9'
14	27°51.45	35.69	56° 32.16	12.6'	14° 25.49	-13.8'	56.9
15	42°51.63	• • 34.70	71°3.77	12.6'	14° 11.67	-13.9'	57.0'
16	57°51.81	33.71	85°35.41 100°7.08	12.7'	13°57.77 13°43.80	-14.0'	57.0'
17 18	72°51.98 87°52.16	32.73 \$01°31.74	100°7.08 114°38.77	12.7' 12.7'	13°43.80 S13°29.74	-14.1' -14.1'	57.0' 57.1'
19	102°52.34	30.75	129° 10.48	12.7'	13° 15.60	-14.1	57.1
20	117°52.52	29.76	143° 42.22	12.8'	13°1.39	-14.3'	57.1'
21 22	132°52.70 147°52.87	· · 28.77 27.78	158° 13.99 172° 45.77	12.8' 12.8'	12°47.10 12°32.73	-14.4' -14.4'	57.2' 57.2'
23	147 52.87 162°53.05	27.78 26.79	172 45.77 187° 17.58	12.8'	12 32.73 12°18.29	-14.4 -14.5'	57.2'
	SD = 16.1'	d = -1.0'			O = 15.4'		
		- 1.0					

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>N</b> 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° N 10°	05:21	05:47	06:08	18:10	18:32	18:57
0°	05:22 05:21	05:46 05:45	06:07 06:06	18:11 18:12	18:32 18:33	18:56 18:57
_						
<b>S</b> 10° 20°	05:19 05:15	05:43 05:40	06:04 06:02	18:14 18:15	18:35 18:37	18:59 19:03
30°	05:15	05:40	06:02	18:17	18:41	19:03
35°	05:04	05:34	05:59	18:18	18:44	19:09
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
<b>S</b> 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
<b>S</b> 60°	04:14	05:05	05:48	18:29	19:11	20:02

Lat.		Moonris	е		Moonset	į.
Lat.	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°		00:04	01:42	17:56	17:58	17:59

	Sun			Moon		
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	25-27
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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
0	174° 35.17	162°8.60 N04°15.90	191°22.79 \$08°18.65	68° 6.48 N22° 56.17	170°22.09
1	189° 37.63	177°8.23 17.17	206°23.41 17.90	83°8.89 56.17	185°24.27 29.11
2	204° 40.09	192°7.86 18.45	200 23.41 17.90 221°24.04 17.14	98°11.30 56.16	200°26.45 28.98
3	219° 42.56	207°7.49 · · 19.72	236°24.67 · · 16.39	113°13.72 · · 56.16	215°28.63 · · 28.86
4	234° 45.02	222°7.12 21.00	251°25.30 15.64	128°16.13 56.16	230°30.81 28.74
5	249°47.49	237°6.75 22.27	266° 25.93 14.88	143°18.54 56.15	245°32.99 28.61
6	264° 49.95	252°6.38 N04°23.54	281°26.56 \$08°14.13	158°20.95 N22°56.15	260°35.17 S00°28.49
7	279°52.41	267°6.01 24.82	296°27.19 13.38	173°23.36 56.15	275°37.35 28.37
8	294°54.88	282°5.64 26.09	311°27.81 12.62	188°25.77 56.14	290°39.53 28.24
9	309°57.34	297°5.27 · · 27.36	326°28.44 · · 11.87	203°28.18 · · 56.14	305°41.71 · · 28.12
10	324°59.81	312°4.90 28.64	341°29.07 11.11	218°30.59 56.14	320°43.89 28.00
11	340°2.27	327°4.53 29.91	356°29.70 10.36	233°33.00 56.13	335°46.07 27.87
12	355°4.74	342°4.16 N04°31.18	11°30.33 \$08°9.61	248°35.41 N22°56.13	350°48.24 \$00°27.75
13	10°7.20	357°3.79 32.45	26°30.96 8.85	263°37.81 56.12	5°50.42 27.63
14	$25^{\circ}9.66$	12°3.42 33.73	41°31.59 8.10	278°40.22 56.12	20°52.60 27.50
15	$40^{\circ}12.13$	27°3.05 · · 35.00	56°32.22 · · 7.34	293°42.63 · · 56.12	35°54.78 · · 27.38
16	55° 14.59	42°2.68 36.27	71°32.85 6.59	308°45.04 56.11	50°56.96 27.26
17	70° 17.06	57°2.31 37.54	86°33.48 5.83	323°47.44 56.11	65°59.14 27.13
18	85° 19.52	72°1.94 N04°38.81	101°34.11 <b>S</b> 08°5.08	338°49.85 N22°56.11	81°1.32 <b>S</b> 00°27.01
19	100°21.98	87°1.56 40.09	116°34.74 4.32	353°52.25 56.10	96°3.50 26.89
20	115° 24.45	102°1.19 41.36	131°35.37 3.57	8°54.66 56.10	111°5.68 26.76
21	130°26.91	117°0.82 · · 42.63	146°36.00 · · 2.81	23°57.07 · · 56.09	126°7.86 · · 26.64
22	145°29.38	132°0.45 43.90	161°36.63 2.05	38°59.47 56.09	141°10.03 26.52
23	160°31.84	147°0.08 45.17	176° 37.26 1.30	54°1.87 56.09	156°12.21 26.39
Mer.p	pass. 12:20	$\nu$ -0.4 $'$ $d1.3'$ m-3.92	$ u 0.6' \ d  0.8' \ \text{m} 1.16$	$\nu$ 2.4′ d-0.0′ m-2.32	ν2.2′ d-0.1′ m0.94
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	175°34.30	161°59.71 N04°46.44	191°37.89 \$08°0.54	69°4.28 N22°56.08	171°14.39 \$00°26.27
1	190°36.77	176°59.33 47.71	206°38.53 07°59.79	84° 6.68 56.08	186°16.57 26.15
2	205°39.23	191°58.96 48.98	221°39.16 59.03	99° 9.09 56.07	201°18.75 26.02
3	220°41.70	206° 58.59 · · 50.25	236°39.79 · · 58.27	114°11.49 · · 56.07	216°20.93 · · 25.90
4	235°44.16	221°58.22 51.52	251°40.42 57.52	129°13.89 56.06	231°23.11 25.78
5	250° 46.62	236°57.84 52.79	266°41.05 56.76	144°16.29 56.06	246°25.29 25.65
6	265°49.09	251°57.47 N04°54.06	281°41.68 <b>S</b> 07°56.00	159°18.70 N22°56.06	261°27.47 \$00°25.53
7	280°51.55	266° 57.10 55.33	296°42.31 55.25	174°21.10 56.05	276°29.64 25.41
8	295°54.02	281°56.72 56.60	311° 42.95 54.49	189°23.50 56.05	291°31.82 25.28
9	$310^{\circ}56.48$	296° 56.35 · · 57.87	326°43.58 · · 53.73	204°25.90 · · 56.04	306°34.00 · · 25.16
10	325°58.94	311°55.98 04°59.14	341°44.21 52.98	219°28.30 56.04	321°36.18 25.04
11	341°1.41	326°55.61 05°0.41	356° 44.84 52.22	234°30.70 56.03	336°38.36 24.91
12	356°3.87	341°55.23 N05°1.67	11°45.48	249°33.10 N22°56.03	351°40.54 \$00°24.79
13	11°6.34	356°54.86 2.94	26°46.11 50.71	264°35.50 56.02	6°42.72 24.67
14	26°8.80	11°54.48 4.21	41°46.74 49.95	279°37.90 56.02	21°44.90 24.54
15	$41^{\circ}11.26$	26°54.11 · · 5.48	56°47.37 · · 49.19	294°40.30 · · 56.01	36°47.07 · · 24.42
16	56° 13.73	41°53.74 6.75	71°48.01 48.43	309°42.70 56.01	51°49.25 24.30
17	$71^{\circ}16.19$	56°53.36 8.01	86°48.64 47.67	324°45.09 56.00	66°51.43 24.17
18	86° 18.66	71°52.99 N05°9.28	101°49.27 \$07°46.92	339°47.49 N22°56.00	81°53.61 S00°24.05
19	101°21.12	86° 52.61 10.55	116°49.91 46.16	354°49.89 55.99	96°55.79 23.93
20	116°23.58	101°52.24 11.82	131°50.54 45.40	9°52.29 55.99	111°57.97 23.80
21	131°26.05	116°51.86 · · 13.08	146°51.17 · · 44.64	24°54.68 · · 55.98	127°0.15 · · 23.68
22	146°28.51	131°51.49 14.35	161°51.81 43.88	39°57.08 55.98	142°2.32 23.56
23	161°30.98	146°51.12 15.62	176°52.44 43.13	54°59.47 55.97	157°4.50 23.43
Mer.p	pass. 12:16	$\nu$ -0.4 $'$ $d1.3'$ m-3.92	$ u 0.6' \ d$ -0.8' m1.16	$\nu$ 2.4′ <i>d</i> -0.0′ m-2.31	ν2.2′ d-0.1′ m0.94
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	176° 33.44	161°50.74 N05°16.88	191°53.08 <b>S</b> 07°42.37	70°1.87 N22°55.97	172°6.68
1	191°35.90	176°50.37 18.15	206°53.71 41.61	85° 4.27 55.96	187°8.86 23.19
2	206° 38.37	191°49.99 19.41	221°54.35 40.85	100° 6.66 55.96	202°11.04 23.06
3	221°40.83	206°49.61 · · 20.68	236°54.98 · · 40.09	115°9.05 · · 55.95	217°13.22 · · 22.94
4	236°43.30	221°49.24 21.94	251°55.61 39.33	130°11.45 55.95	232°15.40 22.82
5	251°45.76	236°48.86 23.21	266° 56.25 38.57	145°13.84 55.94	247°17.57 22.69
6	266° 48.22	251°48.49 N05°24.47	281°56.88 <b>S</b> 07°37.81	160°16.24 N22°55.94	262°19.75 S00°22.57
7	281°50.69	266° 48.11 25.74	296° 57.52 37.05	175°18.63 55.93	277°21.93 22.45
8	296°53.15	281° 47.74 27.00	311°58.15 36.29	190°21.02 55.93	292°24.11 22.32
9	311°55.62	296° 47.36 · · 28.27	326°58.79 · · 35.53	205°23.41 · · 55.92	307°26.29 · · 22.20
10	326°58.08	311°46.98 29.53	341°59.42 34.77	220°25.80 55.92	322 28.47 22.08
11	342°0.54	326°46.61 30.80	357°0.06 34.01	235°28.20 55.91	337°30.64 21.95
12	357°3.01	341°46.23 N05°32.06	12°0.70 S07°33.25	250°30.59 N22°55.90	352°32.82
13	12°5.47	356° 45.85 33.32	27°1.33 32.49	265°32.98 55.90	7°35.00 21.71
14	27°7.94	11°45.48 34.59	42°1.97 31.73	280°35.37 55.89	22°37.18 21.58
15	42° 10.40	26°45.10 · · 35.85	57°2.60 · · 30.97	295°37.76 · · 55.89	37°39.36 · · · 21.46
16	57°12.86	41°44.72 37.11	72°3.24 30.21	310°40.15 55.88	52°41.54 21.34
17	72°15.33	56°44.34 38.38	87°3.88 29.45	325°42.54 55.88	67° 43.71 21.21
18	87°17.79	71°43.97 N05°39.64	102°4.51	340°44.93 N22°55.87	82°45.89 S00°21.09
19	102°20.26	86°43.59 40.90	117°5.15 27.93	355°47.32 55.86	97°48.07 20.97
20	117° 22.72 132° 25.18	101°43.21 42.16	132°5.79 27.17	10°49.70 55.86 25°52.09 · · 55.85	112°50.25 20.84
21 22	132°25.18 147°27.65	116°42.83 · · 43.42 131°42.46 44.69	147°6.42 · · 26.41 162°7.06 25.65	25°52.09 · · 55.85 40°54.48 55.85	127°52.43 · · 20.72 142°54.61 20.60
23	147 27.05 162°30.11	131 42.46 44.09 146°42.08 45.95	102 7.00 25.05 177° 7.70 24.89	55°56.87 55.84	142 54.61 20.60 157°56.78 20.47
Mer.p	pass. 12:12	ν-0.4' d1.3' m-3.92	$\nu 0.6' \ d$ -0.8' m1.17	ν2.4' d-0.0' m-2.30	ν2.2′ d-0.1′ m0.93
					<del></del>

	Julis	
	SHA	Dec
Alpheratz	357°34.12	29°14.05
Ankaa	353° 6.57	-42°9.90
Schedar	$349^{\circ}30.50$	56°40.90
Diphda	348°46.62	-17°50.67
Achernar	335°19.93	-57°6.36
Hamal	327°50.37	23°35.17
Polaris	313°51.05	89°22.72
Acamar	315°11.28 314°5.32	-40°12.16 4°11.48
Menkar Mirfak	314 5.32 308°27.13	4 11.48 49°57.39
Aldebaran	290°38.58	16°33.70
Rigel	281° 2.96	-8°10.42
Capella	280°20.49	46°1.59
Bellatrix	278°21.85	6°22.33
Elnath	278°0.65	28°37.81
Alnilam	275°36.74	-1°11.22
Betelgeuse	270°51.00	7°24.64
Canopus	263°51.88	-52°42.84
Sirius	258°25.29	-16°45.31
Adhara	255°4.98 244°49.66	-29°0.69 5°9.36
Procyon Pollux	244 49.00 243°15.92	5 9.30 27°57.77
Avior	234° 13.97	-59°35.85
Suhail	234 13.97 222°45.27	-43°32.53
Miaplacidus	221°37.42	-69°49.68
Alphard	217°46.53	-8°46.51
Regulus	207°33.10	$11^{\circ}50.21$
Dubhe	$193^{\circ}39.12$	61°36.52
Denebola	$182^{\circ}23.62$	$14^{\circ}25.36$
Gienah	175°42.25	-17°41.41
Acrux	172°58.35	-63°14.71
Gacrux	171°50.01	-57°15.66
Alioth	166°11.54 158°20.97	55°48.85 -11°18.04
Spica Alkaid	158° 20.97 152° 50.79	-11 18.04 49°10.67
Hadar	152 50.79 148°34.11	-60°29.91
Menkent	140° 54.11	-36°29.98
Arcturus	145°46.74	19°2.51
Rigil Kent.	139°38.47	-60°56.54
Kochab	137°18.97	74°2.51
Zuben'ubi	136°54.70	$-16^{\circ}9.15$
Alphecca	$126^{\circ}2.71$	26°37.28
Antares	112°14.51	-26°29.42
Atria	107°7.75	-69°4.23
Sabik	102°1.60	-15°45.51
Shaula Rasalhague	96°9.01 95°57.61	-37°7.29 12°32.21
Eltanin	90°41.74	51°28.72
Kaus Aust.	83°31.27	-34°22.26
Vega	80°32.64	38°48.13
Nunki	75°46.64	-26°15.83
Altair	61°59.16	8°56.07
Peacock	53°4.53	-56°38.89
Deneb	49°25.46	45°22.16
Enif	33°38.11	9°59.57
Al Na'ir	27°32.08	-46°50.01
Fomalhaut	15°13.77	-29°29.05
Scheat Markab	13°44.61 13°29.24	28°13.39 15°20.67
		10 20.07
Mar 17 Tue	SHA	Mer.pass
Venus	347°33.44	13:12
Mars	16°47.62	11:14
Jupiter	253°31.31	19:24
Saturn	355°46.93	12:37
Mar 18 Wed	SHA	Mer.pass
Venus	346°25.40	13:12
Mars	16°3.59	11:13
Jupiter	253°29.98	19:21
Saturn	355°40.09	12:33
Mar 19 Thu	SHA	Mer.pass
Venus	$345^{\circ}17.30$	13:13
Mars	15°19.64	11:12
Jupiter	253°28.43	19:17
Saturn	355°33.24	12:30
Horizor	ıtal parallax	
	Venus:	0.1
	Mars:	0.1

Stars

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	177°53.23	S01°25.80	201°49.40	12.8'	S12°3.77	-14.6'	57.2'
1	192°53.41	24.82	$216^{\circ}21.25$	12.9'	$11^{\circ}49.18$	-14.7'	57.3'
2	207°53.59	23.83	230°53.12	12.9'	11°34.53	-14.7'	57.3'
3 4	222°53.76 237°53.94	· · 22.84 21.85	245°25.00 259°56.90	12.9' 12.9'	11°19.80 11°5.00	-14.8' -14.9'	57.3' 57.4'
5	257 55.94 252°54.12	20.86	259 50.90 274°28.82	12.9'	10°50.13	-14.9'	57.4'
6	267°54.30	S01°19.87	289°0.76	12.9'	\$10°35.20	-15.0'	57.4'
7	282°54.48	18.88	303°32.71	13.0'	10°20.20	-15.1'	57.5'
8	297°54.66	17.89	318°4.67	13.0'	$10^{\circ}5.13$	-15.1'	57.5'
9	312°54.84	• • 16.90	332°36.65	13.0'	09°50.01	-15.2'	57.5'
10 11	327°55.02 342°55.19	15.92 14.93	347°8.63 1°40.63	13.0' 13.0'	09°34.82 09°19.56	-15.3' -15.3'	57.6' 57.6'
12	357°55.37	501°13.94	16°12.64	13.0'	S09°4.25	-15.4	57.6'
13	12°55.55	12.95	30°44.66	13.0'	08°48.88	-15.4'	57.6'
14	27°55.73	11.96	$45^{\circ}16.69$	13.0'	08°33.45	-15.5'	57.7'
15	42°55.91	• • 10.97	59°48.73	13.0'	08°17.97	-15.5'	57.7'
16 17	57°56.09 72°56.27	9.98 8.99	74°20.77 88°52.82	13.0' 13.1'	08°2.43 07°46.83	-15.6' -15.6'	57.7' 57.8'
18	87°56.45	501°8.00	103°24.87	13.1	507°31.19	-15.7'	57.8'
19	102°56.63	7.01	117°56.92	13.1'	07°15.49	-15.7'	57.8'
20	117°56.81	6.02	132°28.98	13.1'	06°59.74	-15.8'	57.9'
21	132°56.99	• • 5.04	147°1.04	13.1'	06°43.94	-15.8'	57.9'
22	147°57.17	4.05	161°33.10	13.1'	06°28.09	-15.9'	57.9'
23	162°57.35	3.06	176°5.17	13.1'	06°12.20	-15.9'	57.9'
	SD = 16.1'	d = -1.0'		SI	O = 15.6'		
Wed	GHA	Dec	GHA	ν	Dec	d	НР
vvea 0	177°57.53	S01°2.07	190°37.22	$\nu$ 13.1'	S05°56.26	-16.0'	пР 58.0'
1	192°57.71	1.08	205°9.28	13.1'	05°40.28	-16.0'	58.0'
2	207°57.89	$01^{\circ}0.09$	$219^{\circ}41.33$	13.0'	$05^{\circ}24.25$	-16.1'	58.0'
3	222°58.07	00°59.10	234°13.38	13.0'	05°8.18	-16.1'	58.1'
4	237°58.25	58.11	248°45.43 263°17.46	13.0'	04°52.07 04°35.93	-16.1'	58.1'
5 6	252°58.43 267°58.61	57.12 \$00°56.13	263°17.46 277°49.49	13.0' 13.0'	504° 19.74	-16.2' -16.2'	58.1' 58.1'
7	282°58.79	55.14	292°21.51	13.0'	04°3.52	-16.3	58.2
8	297°58.97	54.16	306°53.52	13.0'	03°47.26	-16.3'	58.2'
9	$312^{\circ}59.15$	• • 53.17	$321^{\circ}25.52$	13.0'	03°30.97	-16.3'	58.2'
10	327°59.33	52.18	335°57.51	13.0'	03°14.65	-16.4'	58.3'
11	342°59.51	51.19 \$00°50.20	350°29.48 5°1.44	13.0'	02°58.30 \$02°41.92	-16.4'	58.3'
12 13	357°59.69 12°59.87	49.21	5°1.44 19°33.38	12.9' 12.9'	02°25.50	-16.4' -16.4'	58.3' 58.3'
14	28° 0.06	48.22	34°5.31	12.9'	02°23.30	-16.5'	58.4'
15	43°0.24	• • 47.23	48°37.22	12.9'	01°52.60	-16.5'	58.4'
16	58° 0.42	46.24	63°9.11	12.9'	01°36.12	-16.5'	58.4'
17	73° 0.60	45.25	77°40.98	12.8'	01°19.61	-16.5'	58.4'
18 19	88° 0.78 103° 0.96	\$00°44.26 43.27	92°12.83 106°44.65	12.8' 12.8'	\$01°3.07 00°46.52	-16.6' -16.6'	58.5' 58.5'
20	118° 1.14	42.29	121°16.45		00° 40.32		58.5
21	133°1.32	• • 41.30	135°48.23	12.8'	500°13.37	-16.6'	58.6'
22	$148^{\circ}1.51$	40.31	$150^{\circ}19.99$	12.7'	N00°3.24	16.6'	58.6'
23	163°1.69	39.32	164°51.71	12.7'	00°19.85	16.6'	58.6'
	SD = 16.1'	d = -1.0'		SI	O = 15.8'		
Thu	GHA	Dec	GHA	ν	Dec	d	НР
0	178° 1.87	S00°38.33	179°23.41	12.7'	N00°36.48	16.6'	58.6'
1	193°2.05	37.34	193°55.08	12.6'	00°53.12	16.6'	58.7'
2	208°2.23	36.35	208°26.72	12.6'	01°9.77	16.7'	58.7'
3 4	223°2.42 238°2.60	· · 35.36 34.37	222°58.32 237°29.89	12.6' 12.5'	01°26.43 01°43.09	16.7' 16.7'	58.7' 58.7'
4 5	238° 2.60 253° 2.78	34.37 33.38	237 29.89 252°1.43	12.5'	01°43.09 01°59.76	16.7	58.7' 58.7'
6	268° 2.96	S00°32.39	266°32.94	12.5'	N02°16.43	16.7	58.8'
7	283°3.14	31.41	281°4.41	12.4'	02°33.10	16.7'	58.8'
8	298° 3.33	30.42	295°35.84	12.4'	02°49.78	16.7'	58.8'
9	313°3.51	• • 29.43	310°7.23	12.4'	03°6.45	16.7'	58.8'
10 11	328° 3.69 343° 3.87	28.44 27.45	324°38.58 339°9.89	12.3' 12.3'	03°23.12 03°39.79	16.7' 16.7'	58.9' 58.9'
12	343 3.87 358° 4.06	500°26.46	353° 41.16	12.3	N03°56.45	16.7	58.9
13	13° 4.24	25.47	8°12.38	12.2'	04°13.10	16.6'	58.9'
14	28° 4.42	24.48	22°43.56	12.1'	04°29.74	16.6'	58.9'
15	43° 4.60	• • 23.49	37°14.69	12.1'	04°46.38	16.6'	59.0'
16	58° 4.79	22.50	51°45.78	12.0'	05°3.00	16.6'	59.0'
17 18	73° 4.97 88° 5.15	21.52 \$00°20.53	66°16.82 80°47.81	12.0' 11.9'	05°19.60 N05°36.19	16.6' 16.6'	59.0' 59.0'
19	103°5.33	19.54	95°18.75	11.9'	05°52.77	16.6	59.0 59.1'
20	118° 5.52	18.55	109°49.63	11.8'	06°9.32	16.5	59.1
21	133°5.70	• • 17.56	124°20.47	11.8'	$06^{\circ}25.86$	16.5'	59.1'
22	148° 5.88	16.57	138°51.24	11.7'	06°42.37	16.5'	59.1'
23	163°6.07	15.58	153°21.97	11.7'	06°58.86	16.5'	59.1'
	SD = 16.1'	d = -1.0'		SI	O = 16.0'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	04:22	05:13	05:55	18:20	19:01	19:52

Lat.		Moonris	e		Moonset		
Lat.	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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	03:19	04:56	06:33	17:58	17:57	17:56	

		Sun Moon				
Day	Day Eqn.of		Mer.	Mer.	Mer.Pass.	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	28-0
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	5-0%
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	Ven	us	M	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	177° 32.58		N05°47.21	192°8.33	S07°24.13	70°59.25	N22°55.83	172°58.96	S00°20.35			
1	192°35.04	176°41.32	48.47	207°8.97	23.36	86° 1.64	55.83	188°1.14	20.23	Alpheratz	357°34.12	29°14.04
2	207° 37.50	191°40.94	49.73	222°9.61	22.60	101°4.03	55.82	203°3.32	20.10	Ankaa	353°6.57	-42°9.89
3	222°39.97	206°40.56	• • 50.99	$237^{\circ}10.25$	• • 21.84	$116^{\circ}6.41$	• • 55.82	218°5.50	• • 19.98	Schedar	349°30.50	56°40.88 -17°50.67
4	237° 42.43	221°40.18	52.25	252° 10.88	21.08	131°8.80	55.81	233°7.67	19.86	Diphda Achernar	348°46.62 335°19.95	-57°6.34
5	252°44.90	236°39.80	53.51	$267^{\circ}11.52$	20.32	$146^{\circ}11.18$	55.80	248°9.85	19.74	Hamal	327° 50.38	23°35.17
6	267°47.36		N05°54.77	282°12.16	S07°19.56	161°13.57	N22°55.80	263°12.03	S00°19.61	Polaris	313°52.21	89°22.70
7	282°49.82	266°39.05	56.03	297°12.80	18.79	176°15.95	55.79	278°14.21	19.49	Acamar	315°11.30	-40°12.16
8	297° 52.29	281°38.67	57.29	312°13.43	18.03	191°18.34	55.78	293°16.39	19.37	Menkar	314°5.33	4°11.48
9 10	312°54.75 327°57.22	296°38.29 311°37.91	•• 58.55 05°59.81	327°14.07 342°14.71	· · 17.27 16.51	206°20.72 221°23.10	• • 55.78 55.77	308°18.57 323°20.74	· · 19.24 19.12	Mirfak	308°27.15	49°57.38
11	342° 59.68	326° 37.53	05° 59.81	357° 15.35	15.75	236°25.49	55.76	338°22.92	19.12	Aldebaran	290°38.60	16°33.70
12	358°2.15	341°37.15	N06°2.33	12° 15.99	S07°14.98	251°27.87	N22°55.76	353°25.10	S00°18.87	Rigel	281°2.98	-8°10.42
13	13°4.61	356° 36.77	3.58	27° 16.63	14.22	266°30.25	55.75	8°27.28	18.75	Capella	280°20.51	46°1.59
14	28°7.07	11°36.39	4.84	42°17.27	13.46	281°32.63	55.74	23°29.46	18.63	Bellatrix	278°21.87	6°22.33
15	43°9.54	26°36.01	• • 6.10	57° 17.90	• • 12.69	296°35.01	• • 55.74	38°31.63	• • 18.50	Elnath Alnilam	278°0.67 275°36.76	28°37.81 -1°11.22
16	$58^{\circ}12.00$	41°35.62	7.36	$72^{\circ}18.54$	11.93	311°37.40	55.73	53°33.81	18.38	Betelgeuse	270°51.02	7°24.64
17	73° 14.47	56°35.24	8.62	87° 19.18	11.17	326°39.78	55.72	68°35.99	18.26	Canopus	263°51.91	-52°42.84
18	88° 16.93	71°34.86	N06° 9.87	102° 19.82	S07°10.41	341°42.16	N22°55.72	83°38.17	500°18.13	Sirius	258°25.31	-16°45.32
19	103° 19.39	86°34.48	11.13	117°20.46	9.64	356°44.54	55.71	98°40.35	18.01	Adhara	255°5.00	-29°0.69
20 21	118° 21.86 133° 24.32	101°34.10 116°33.72	12.39	132°21.10 147°21.74	8.88 •• 8.12	11°46.92 26°49.30	55.70 •• 55.70	113°42.52 128°44.70	17.89	Procyon	244°49.67	5°9.36
22	148° 26.79	131° 33.34	· · 13.64 14.90	162° 22.38	7.35	41°51.67	55.69	143°46.88	· · 17.76 17.64	Pollux	243°15.94	27°57.77
23	163° 29.25	146°32.95	16.15	177° 23.02	6.59	56°54.05	55.68	158°49.06	17.52	Avior	234°14.00	-59°35.86
										Suhail	222°45.29	-43°32.54
Mer.	pass. 12:08	$\nu$ -0.4′ $d1.3$	3′ m-3.92	$\nu$ 0.6′ d-0	1.8'  m 1.17	$\nu$ 2.4′ d-0	.0′ m-2.29	$\nu$ 2.2′ d-0	.1′ m0.93	Miaplacidus	221°37.45	-69°49.70
										Alphard Regulus	217°46.54 207°33.11	-8°46.51 11°50.21
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.13	61°36.54
0	178°31.71		N06°17.41	192°23.66	S07°5.82	71°56.43	N22°55.68	173°51.24	500°17.39	Denebola	182°23.62	14°25.36
1	193°34.18	176°32.19	18.67	207°24.30	5.06	86°58.81	55.67	188°53.41	17.27	Gienah	175°42.25	-17°41.41
2	208° 36.64 223° 39.11	191°31.81 206°31.42	19.92 •• 21.18	222°24.94 237°25.58	4.30	102° 1.19 117° 3.56	55.66	203°55.59	17.15	Acrux	172°58.35	-63°14.73
4	238° 41.57	200 31.42 221°31.04	22.43	252° 26.22	· · 3.53 2.77	132° 5.94	• • 55.65 55.65	218°57.77 233°59.95	· · 17.02 16.90	Gacrux	171°50.00	-57°15.68
5	253° 44.03	236°30.66	23.68	267°26.86	2.00	147° 8.32	55.64	249°2.13	16.78	Alioth	166°11.53	55°48.86
6	268°46.50		N06°24.94	282°27.50	S07°1.24	162°10.69	N22°55.63	264°4.30	S00°16.65	Spica	158°20.97	-11°18.05 49°10.68
7	283°48.96	266°29.89	26.19	$297^{\circ}28.15$	$07^{\circ}0.47$	$177^{\circ}13.07$	55.63	279°6.48	16.53	Alkaid Hadar	152°50.78 148°34.09	-60°29.92
8	298°51.43	281°29.51	27.45	312°28.79	$06^{\circ}59.71$	192°15.45	55.62	294°8.66	16.41	Menkent	147°56.13	-36°29.98
9	313°53.89	296°29.13	• • 28.70	327°29.43	• • 58.95	207°17.82	•• 55.61	309°10.84	• • 16.28	Arcturus	145°46.73	19°2.51
10	328° 56.35	311°28.74	29.95	342°30.07	58.18	222°20.20	55.60	324°13.01	16.16	Rigil Kent.	139°38.45	-60°56.55
11	343° 58.82	326°28.36	31.21	357°30.71	57.42	237°22.57	55.60	339°15.19	16.04	Kochab	137°18.93	74°2.52
12	359°1.28 14°3.75		N06°32.46	12°31.35 27°31.99	S06°56.65	252°24.94	N22°55.59	354°17.37 9°19.55	S00°15.91	Zuben'ubi	136°54.69	$-16^{\circ}9.16$
13 14	29°6.21	356°27.59 11°27.20	33.71 34.96	42° 32.64	55.89 55.12	267°27.32 282°29.69	55.58 55.57	9 19.55 24°21.73	15.79 15.67	Alphecca	126°2.69	26°37.29
15	44°8.67	26°26.82	• • 36.22	57°33.28	• • 54.36	297°32.06	• • 55.56	39°23.90	15.55	Antares	112°14.49	-26°29.42
16	59° 11.14	41°26.44	37.47	72°33.92	53.59	312°34.44	55.56	54°26.08	15.42	Atria Sabik	107°7.70 102°1.58	-69°4.23 -15°45.51
17	$74^{\circ}13.60$	56°26.05	38.72	87°34.56	52.82	327°36.81	55.55	69°28.26	15.30	Shaula	96°8.98	-37°7.29
18	89° 16.07		N06°39.97	102°35.20	S06°52.06	342°39.18	N22°55.54	84°30.44	S00°15.18	Rasalhague	95°57.60	12°32.22
19	104° 18.53	86°25.28	41.22	117°35.85	51.29	357°41.55	55.53	99°32.62	15.05	Eltanin	90°41.71	51°28.72
20	119°21.00	101°24.89	42.47	132°36.49	50.53	12°43.92	55.53	114°34.79	14.93	Kaus Aust.	83°31.24	-34°22.26
21 22	134° 23.46 149° 25.92	116°24.51 131°24.12	· · 43.72 44.97	147°37.13 162°37.77	•• 49.76 49.00	27°46.29 42°48.66	• • 55.52 55.51	129°36.97 144°39.15	· · 14.81 14.68	Vega	80°32.62	38°48.13
23	164° 28.39	131 24.12 146°23.74	46.22	102 37.77 177°38.42	48.23	57°51.03	55.50	159°41.33	14.56	Nunki		-26°15.83
										Altair	61°59.14	8°56.07
Mer.	pass. 12:04	$\nu$ -0.4′ $d1.3$	3′ m-3.92	$\nu$ 0.6′ d-0	.8′ m1.17	$\nu$ 2.4′ d-0	.0′ m-2.28	$\nu 2.2' \ d-0$	.1′ m0.92	Peacock	53°4.50	-56°38.88
						-				Deneb	49°25.44 33°38.10	45°22.15 9°59.56
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir	27°32.06	-46°50.00
0	179°30.85		N06°47.47	192°39.06	S06°47.46	72°53.40		174°43.50	S00°14.44	Fomalhaut	15° 13.77	-40 50.00 -29°29.04
1	$194^{\circ}33.32$	$176^{\circ}22.96$	48.72	207°39.70	46.70	87°55.77	55.49	189°45.68	14.31	Scheat	13°44.60	28°13.38
2	209° 35.78	191°22.58	49.97	222° 40.35	45.93	102°58.14	55.48	204°47.86	14.19	Markab	13°29.24	15°20.66
3	224° 38.24	206°22.19	• • 51.22	237° 40.99	• • 45.17	118° 0.51	• • 55.47	219°50.04	• • 14.07	14 00 5:	6114	
4 5	239° 40.71 254° 43.17	221°21.80 236°21.42	52.47 53.72	252°41.63 267°42.28	44.40 43.63	133°2.88 148°5.25	55.46 55.45	234°52.21 249°54.39	13.94	Mar 20 Fri Venus	<b>SHA</b> 344°9.12	Mer.pass 13:14
6	269° 45.64		N06°54.96		\$06°42.87		N22° 55.45		13.82 \$00°13.70	Mars	14° 35.76	11:11
7	284° 48.10	266°20.64	56.21	202 42.92 297°43.57	42.10	178° 9.98	55.44	279°58.75	13.57	1	253°26.68	19:13
8	299° 50.56	281°20.25	57.46	312°44.21	41.33	193°12.35	55.43	295°0.93	13.45	Saturn	355°26.39	12:26
9	314°53.03	296°19.87	$06^{\circ}58.71$	327°44.85	• • 40.56	208°14.72	• • 55.42	310°3.10	• • 13.33	M 21 C-+		NA
10	329° 55.49	311°19.48	$06^{\circ}59.95$	342°45.50	39.80	223°17.08	55.41	325°5.28	13.20	Mar 21 Sat Venus	<b>SHA</b> 343°0.86	Mer.pass 13:14
11	344° 57.96	326° 19.09	1.20	357°46.14	39.03	238°19.45	55.40	340°7.46	13.08	Mars	13°51.95	11:10
12	0°0.42	341°18.70	N07°2.45	12°46.79	\$06°38.26	253°21.81	N22°55.39	355°9.64	S00°12.96		253°24.72	19:09
13 14	15°2.88 30°5.35	356° 18.31 11° 17.92	3.69 4.94	27°47.43 42°48.08	37.50 36.73	268°24.18 283°26.54	55.39 55.38	10°11.81 25°13.99	12.84 12.71		$355^{\circ}19.52$	12:23
15	45°7.81	26° 17.53	. 6.18	57° 48.72	35.96	203 20.34 298°28.91	55.37	40°16.17	• • 12.59	Mar 22 Sun	SHA	Mer.pass
16	60° 10.28	41° 17.14	7.43	72°49.37	35.19	313°31.27	55.36	55°18.35	12.47		341°52.50	13:15
17	75° 12.74	56°16.76	8.68	87°50.01	34.43	328°33.64	55.35	70°20.52	12.34	Mars	13°8.21	11:09
18	90° 15.21	71°16.37	$N07^{\circ}9.92$		S06°33.66	343°36.00	N22°55.34	85°22.70	S00°12.22		253°22.55	19:05
19	105° 17.67	86° 15.98	11.16	117°51.30	32.89	358°38.36	55.33	100°24.88	12.10	Saturn	355°12.65	12:19
20	120° 20.13	101°15.59	12.41	132°51.95	32.12	13°40.73	55.33	115°27.06	11.97	Horizon	ntal parallax	
21 22	135°22.60 150°25.06	116° 15.20 131° 14.81	· · 13.65 14.90	147°52.59 162°53.24	· · 31.35 30.59	28°43.09 43°45.45	55.32 55.31	130°29.23 145°31.41	· · 11.85 11.73	11011201	Venus:	0.1
23	165° 27.53	146° 14.41	16.14	102 53.24 177°53.88	29.82	58°47.81	55.30	160°33.59	11.73		Mars:	0.1
		$\nu$ -0.4' d1.2			0.8' m1.17		0.0′ m-2.28		.1′ m0.92			
ivier.	pass. 12:00	ν-υ.4 α1.2		νυ.υ a-υ	0.0 101.17	ν2.4′ <b>α-</b> 0	u III-2.2ŏ	ν2.2 a-0	.1 1110.92			

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°6.25	S00°14.59	$167^{\circ}52.64$	11.6'	$N07^{\circ}15.32$	16.4'	59.1'
1	193°6.43	13.60	182°23.25	11.6'	07°31.75	16.4'	59.2'
2	208° 6.62	12.62	196°53.80	11.5'	07°48.16	16.4	59.2'
3 4	223° 6.80 238° 6.98	· · 11.63	211°24.29 225°54.72	11.4' 11.4'	08°4.53 08°20.88	16.3' 16.3'	59.2' 59.2'
5	250 0.96 253°7.17	9.65	240°25.09	11.4	08°37.18	16.3	59.2'
6	268°7.35	500°8.66	254°55.39	11.2'	N08°53.46	16.2'	59.3'
7	283°7.53	7.67	269°25.63	11.2'	09°9.69	16.2'	59.3'
8	298°7.72	6.68	283°55.80	11.1'	09°25.89	16.2'	59.3'
9	313°7.90	• • 5.70	298°25.91	11.0'	09°42.04	16.1'	59.3'
10	328°8.09	4.71	312°55.95	11.0'	09°58.15	16.1'	59.3'
11 12	343°8.27 358°8.45	3.72 \$00°2.73	327°25.92 341°55.82	10.9' 10.8'	10°14.22 N10°30.24	16.0' 16.0'	59.3' 59.3'
13	13°8.64	1.74	356°25.65	10.8	10°46.21	15.9'	59.4'
14	28°8.82	S00°0.75	$10^{\circ}55.41$	10.7'	11°2.13	15.9'	59.4'
15	43°9.01	N00°0.24	25°25.09	10.6'	11°18.00	15.8'	59.4'
16	58° 9.19	1.22	39°54.71	10.5'	11°33.81	15.8'	59.4'
17 18	73° 9.37 88° 9.56	2.21 N00°3.20	54°24.24 68°53.70	10.5' 10.4'	11°49.57 N12°5.28	15.7' 15.6'	59.4' 59.4'
19	103° 9.74	4.19	83°23.08	10.4	12°20.92	15.6'	59.4'
20	118° 9.93	5.18	97°52.39	10.3	12° 36.50	15.5'	59.4 59.5'
21	133°10.11	6.17	112°21.61	10.1'	12°52.02	15.5'	59.5'
22	148°10.30	7.16	126°50.75	10.1'	13°7.47	15.4'	59.5'
23	163°10.48	8.14	141°19.82	10.0'	13°22.86	15.3'	59.5'
	SD = 16.1'	d = -1.0'		SE	0 = 16.1'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0 0	178°10.67	N00°9.13	БПА 155°48.80	$\nu$ 9.9'	N13°38.18	a 15.2'	пР 59.5'
1	193°10.85	10.12	170°17.70	9.8'	13°53.43	15.2'	59.5'
2	208°11.03	11.11	184°46.51	9.7'	14°8.61	15.1'	59.5'
3	223°11.22	· · 12.10	199°15.24	9.6'	14°23.71	15.0'	59.5'
4	238°11.40 253°11.59	13.08 14.07	213°43.89 228°12.45	9.6'	14°38.74 14°53.69	14.9'	59.5'
5 6	268°11.77	N00°15.06	242°40.92	9.5' 9.4'	N15°8.56	14.9' 14.8'	59.6' 59.6'
7	283°11.96	16.05	257°9.31	9.3'	15°23.35	14.7'	59.6'
8	298°12.14	17.04	271°37.60	9.2'	15°38.05	14.6'	59.6'
9	313°12.33	• 18.02	286°5.81	9.1'	15°52.67	14.5'	59.6'
10	328°12.51	19.01	300°33.93	9.0'	16°7.20	14.4'	59.6'
11	343°12.70 358°12.88	20.00 N00°20.99	315°1.95	8.9'	16°21.64	14.4'	59.6'
12 13	358° 12.88 13° 13.07	21.98	329°29.89 343°57.73	8.8' 8.8'	N16°36.00 16°50.26	14.3' 14.2'	59.6' 59.6'
14	28°13.26	22.96	358°25.48	8.7'	17°4.42	14.1'	59.6'
15	43°13.44	• • 23.95	12°53.14	8.6'	$17^{\circ}18.49$	14.0'	59.6'
16	58°13.63	24.94	27°20.70	8.5'	17°32.46	13.9'	59.6'
17	73°13.81	25.93 N00°26.92	41°48.17	8.4'	17°46.33	13.8'	59.6'
18 19	88°14.00 103°14.18	27.90	56°15.55 70°42.83	8.3' 8.2'	N18°0.09 18°13.75	13.7' 13.6'	59.6' 59.7'
20	118°14.37	28.89	85°10.02	8.1'	18°27.31	13.4	59.7'
21	133°14.55	• • 29.88	99°37.11	8.0'	18°40.76	13.3'	59.7'
22	148°14.74	30.87	114°4.10	7.9'	$18^{\circ}54.10$	13.2'	59.7'
23	163°14.93	31.85	128°31.00	7.8'	19°7.32	13.1'	59.7'
	SD = 16.1'	d = 1.0'		SE	0 = 16.2'		
Sun	GHA	Dec	GHA	ν	Dec	d	НР
0	178°15.11	N00°32.84	142°57.80	7.7'	N19°20.44	13.0'	59.7'
1	193°15.30	33.83	157°24.50	7.6'	19°33.43	12.9'	59.7'
2	208°15.48	34.82	171°51.11	7.5'	19°46.31	12.8'	59.7'
3	223°15.67 238°15.85	• • 35.80	186°17.62 200°44.03	7.4'	19°59.08 20°11.71	12.6'	59.7'
4 5	238°15.85 253°16.04	36.79 37.78	200°44.03 215°10.35	7.3' 7.2'	20°11.71 20°24.23	12.5' 12.4'	59.7' 59.7'
6	268°16.23	N00°38.76	219° 36.57	7.1'	N20°36.62	12.3'	59.7'
7	283°16.41	39.75	244°2.69	7.0'	20°48.89	12.1'	59.7'
8	298°16.60	40.74	258°28.71	6.9'	21°1.03	12.0'	59.7'
9	313°16.79	• • 41.73	272°54.64	6.8'	21°13.03	11.9'	59.7'
10 11	328°16.97 343°17.16	42.71 43.70	287°20.47 301°46.21	6.7' 6.6'	21°24.91 21°36.65	11.7' 11.6'	59.7' 59.7'
12	358°17.34	43.70 N00°44.69	316°11.84	6.5	N21°48.25	11.5	59.7'
13	13°17.53	45.67	330°37.38	6.4'	21°59.72	11.3'	59.7'
14	28°17.72	46.66	345°2.83	6.3'	22°11.05	11.2'	59.7'
15	43°17.90	• • 47.65	359°28.18	6.3'	22°22.24	11.0'	59.7'
16 17	58°18.09 73°18.28	48.63 49.62	13°53.43 28°18.59	6.2' 6.1'	22°33.28 22°44.18	10.9' 10.8'	59.7' 59.7'
18	73°18.28 88°18.46	49.62 N00°50.61	28° 18.59 42° 43.66	6.0'	N22°54.94	10.8	59.7' 59.7'
19	103°18.65	51.59	57°8.63	5.9'	23°5.54	10.5	59.7'
20	118°18.84	52.58	71°33.51	5.8'	23°16.00	10.3'	59.7'
21	133°19.02	• • 53.57	85°58.30	5.7'	23°26.31	10.2'	59.7'
22 23	148°19.21	54.55	100°22.99	5.6'	23°36.46	10.0'	59.7'
			114047.00		220 46 46	0.01	EO 71
23	$\frac{148^{\circ} 19.21}{163^{\circ} 19.40}$ $SD = 16.0'$	$\frac{55.54}{d = 1.0'}$	114°47.60	5.5'	$23^{\circ}46.46$ 0 = $16.3'$	9.8'	59.7'

Lat.	Twi	light	Sunrise	Sunset	Twilight		
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.	
N 72°	03:15	04:45	05:53	18:23	19:32	21:05	
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	04:31	05:21	06:02	18:11	18:52	19:42	

Lat.		Moonris	е		Moonset	
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°	05:09	04:14		22:37		
<b>N</b> 70°	05:21	04:43	03:05	22:11		01:41
68°	05:31	05:05	04:18	21:51		00:29
66°	05:40	05:22	04:56	21:35	23:53	
64°	05:47	05:36	05:23	21:22	23:27	
62°	05:53	05:49	05:44	21:12	23:07	
60°	05:59	05:59	06:01	21:03	22:51	
N 58°	06:04	06:08	06:15	20:55	22:38	
56°	06:08	06:16	06:28	20:48	22:26	
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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	08:13	09:59	11:52	17:56	17:56	17:59

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Mer.Pass.		
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	1-3	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	1-11%	
20	07:35	07:26	12:07	13:15	00:50		
21	07:17	07:08	12:07	14:07	01:40	(2393)	
22	07:00	06:51	12:07	15:02	02:34		

h	Aries	Venus	Mars	Jupiter	Saturn
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	180°29.99	161°14.02 N07°17.38	192°54.53 \$06°29.05	73°50.17 N22°55.29	175°35.77 \$00°11.48
1	195° 32.45	176°13.63 18.63	207°55.18 28.28	88°52.53 55.28	190°37.94 11.36
2	210°34.92	191°13.24 19.87	207 55.16 20.26 222° 55.82 27.51	103°54.90 55.27	205°40.12 11.24
3	225° 37.38	206°12.85 · · 21.11	237°56.47 · · 26.74	118°57.26 · · 55.26	220°42.30 · · 11.11
4	240°39.85	200 12.85 21.11 221°12.46 22.35	252°57.11 25.98	133°59.62 55.25	235°44.48 10.99
5	255° 42.31	236°12.07 23.59	267°57.76 25.21	149° 1.97 55.24	250°46.65 10.87
6	270° 44.78	251°11.67 N07°24.84	282°58.41 S06°24.44	164° 4.33 N22° 55.23	265°48.83 S00°10.74
7	285°47.24	266°11.28 26.08	297°59.05 23.67	179° 6.69 55.23	280°51.01 10.62
8	300°49.70	281°10.89 27.32	312°59.70 22.90	194° 9.05 55.22	295°53.19 10.50
9	315°52.17	296°10.50 · · 28.56	328°0.35 · · 22.13	209°11.41 · · 55.21	310°55.36 · · 10.37
10	330°54.63	311°10.10 29.80	343°0.99 21.36	224°13.77 55.20	325°57.54 10.25
11	345°57.10	326°9.71 31.04	358°1.64 20.59	239°16.12 55.19	340°59.72 10.13
12	0°59.56	341°9.32 N07°32.28	13°2.29 <b>S</b> 06°19.82	254°18.48 N22°55.18	356°1.90 S00°10.00
13	16°2.02	356°8.93 33.52	28°2.94 19.05	269°20.84 55.17	11°4.07 9.88
14	31°4.49	11°8.53 34.76	43°3.58 18.28	284°23.20 55.16	26°6.25 9.76
15	46°6.95	26°8.14 · · 35.99	58°4.23 · · 17.51	299°25.55 · · 55.15	41°8.43 · · 9.64
16	61°9.42	41°7.74 37.23	73°4.88 16.74	314°27.91 55.14	56°10.61 9.51
17	$76^{\circ}11.88$	56°7.35 38.47	88°5.53 15.97	329°30.26 55.13	71°12.78 9.39
18	91° 14.35	71°6.96 N07°39.71	103°6.18 <b>S</b> 06°15.20	344°32.62 N22°55.12	86°14.96 <b>S</b> 00°9.27
19	$106^{\circ}16.81$	86°6.56 40.95	118°6.82 14.43	359°34.97 55.11	101°17.14 9.14
20	121° 19.27	101°6.17 42.18	133°7.47 13.66	14°37.33 55.10	116°19.32 9.02
21	136°21.74	116°5.77 · · 43.42	148°8.12 · · 12.89	29°39.68 · · 55.09	131°21.49 · · 8.90
22	151°24.20	131°5.38 44.66	163°8.77 12.12	44°42.03 55.08	146°23.67 8.77
23	$166^{\circ}26.67$	146°4.98 45.89	178°9.42 11.35	59°44.39 55.07	161°25.85 8.65
Morr	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
-14161.	Juss. 11.JU	ν σ.π α1.Δ III-3.3Δ	ν σ.σ α-σ.σ III1.11	ν Δ. τ U-U.U III-Δ.Δ1	
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0 0	181°29.13	161°4.58 N07°47.13	193°10.07 <b>S</b> 06°10.58	74°46.74 N22°55.06	176°28.03 S00°8.53
1	181 29.13 196°31.59	176° 4.19 48.37	208° 10.71 9.81	89°49.09 55.05	176 28.03 500 8.53 191°30.20 8.41
2	211°34.06	170 4.19 46.57 191°3.79 49.60	208 10.71 9.81 223°11.36 9.04	104°51.45 55.04	206°32.38 8.28
3	211 34.00 226° 36.52	206°3.40 · · 50.84	238°12.01 · · 8.27	119°53.80 · · 55.03	221°34.56 · · 8.16
4	241°38.99	221°3.00 52.07	253°12.66 7.50	134°56.15 55.02	236°36.74 8.04
5	256° 41.45	236°2.60 53.31	268°13.31 6.73	149°58.50 55.01	251°38.91 7.91
6	271°43.92	251°2.21 N07°54.54	283°13.96 S06°5.96	165° 0.85 N22° 55.00	266°41.09 S00°7.79
7	286°46.38	266°1.81 55.77	298° 14.61 5.19	180° 3.20 54.99	281°43.27 7.67
8	301°48.84	281°1.41 57.01	313°15.26 4.42	195° 5.55 54.98	296°45.45 7.54
9	316°51.31	296°1.01 · · 58.24	328°15.91 · · 3.65	210°7.90 · · 54.97	311°47.62 · · 7.42
10	331°53.77	311°0.62 07°59.47	343°16.56 2.88	225°10.25 54.96	326°49.80 7.30
11	346°56.24	326°0.22 08°0.71	358° 17.21 2.10	240°12.60 54.95	341°51.98 7.18
12	1°58.70	340°59.82 N08°1.94	13°17.86 S06°1.33	255°14.95 N22°54.94	356°54.16 S00°7.05
13	17°1.16	355°59.42 3.17	28°18.51 06°0.56	270°17.30 54.93	11°56.33 6.93
14	32°3.63	10°59.02 4.40	43°19.16 05°59.79	285°19.64 54.92	26°58.51 6.81
15	47°6.09	25°58.62 · · 5.63	58° 19.81 · · 59.02	300°21.99 · · 54.91	42°0.69 · · 6.68
16	62°8.56	40°58.22 6.86	73°20.46 58.25	315°24.34 54.90	57°2.87 6.56
17	77° 11.02	55°57.82 8.09	88°21.11 57.48	330°26.69 54.89	72°5.04 6.44
18	92° 13.49	70°57.42 N08°9.33	103°21.76	345°29.03 N22°54.88	87°7.22 <b>S</b> 00°6.32
19	107° 15.95	85°57.02 10.56	118° 22.41 55.93	0°31.38 54.87	102°9.40 6.19
20	122° 18.41	100°56.62 11.78	133°23.06 55.16	15°33.73 54.86	117°11.58 6.07
21	137°20.88	115°56.22 · · 13.01	148°23.71 · · 54.39	30°36.07 · · 54.85	132°13.75 · · 5.95
22	152°23.34	130°55.82 14.24	163°24.37 53.62	45°38.42 54.83	147°15.93 5.82
23	$167^{\circ}25.81$	145°55.42 15.47	178°25.02 52.84	60°40.76 54.82	162°18.11 5.70
Merr	pass. 11:52	ν-0.4' d1.2' m-3.92	$\nu$ 0.6' d-0.8' m1.17	ν2.4' d-0.0' m-2.26	ν2.2' d-0.1' m0.91
	7433. 11.32	- V 0.4 U1.2 III 3.32			- V2.2 U 0.1 1110.91
Wed	GHA	GHA Dec	CHA Dec	GHA Dec	GHA Dec
	<b>GHA</b> 182°28.27	<b>GHA Dec</b> 160°55.02 N08°16.70	<b>GHA Dec</b> 193°25.67 <b>S</b> 05°52.07	<b>GHA Dec</b> 75°43.11 N22°54.81	<b>GHA Dec</b> 177°20.28 <b>S</b> 00°5.58
0 1	182 28.27 197°30.74	175°54.62 17.93	208° 26.32 51.30	90°45.45 54.80	192°22.46 5.46
2	212° 33.20	175 54.62 17.93 190°54.22 19.16	208 26.32 51.30 223°26.97 50.53	90 45.45 54.80 105°47.79 54.79	207°24.64 5.33
3	212 33.20 227°35.66	205°53.82 · · 20.38	238°27.62 · · 49.75	105 47.79 54.79 120°50.14 · · 54.78	207 24.04 5.33 222°26.82 · · 5.21
3 4	242° 38.13	20° 53.42	253°28.28 48.98	135°52.48 54.77	237°28.99 5.09
5	242 36.13 257°40.59	235°53.01 22.84	268°28.93 48.21	150°54.82 54.76	257 26.99 5.09 N 252°31.17 4.96
6	272°43.06	250°52.61 N08°24.06	283°29.58 \$05°47.44	165°57.17 N22°54.75	267°33.35 S00°4.84
7	272 45.00 287°45.52	265°52.21 25.29	298°30.23 46.66	180°59.51 54.74	282°35.53 4.72
8	302°47.98	280°51.81 26.52	313°30.88 45.89	196° 1.85 54.72	297°37.70 4.60
9	317°50.45	295°51.40 · · 27.74	328°31.54 · · 45.12	211° 4.19 · · 54.71	312°39.88 · · 4.47
10	332°52.91	310°51.00 28.97	343°32.19 44.34	226°6.53 54.70	327°42.06 4.35
11	347°55.38	325°50.60 30.19	358°32.84 43.57	241°8.87 54.69	342°44.24 4.23
12	2°57.84	340°50.19 N08°31.42	13°33.49 S05°42.80	256°11.21 N22°54.68	357°46.41 S00°4.10
13	18°0.31	355°49.79 32.64	28°34.15 42.03	271°13.55 54.67	12°48.59 3.98
14	33°2.77	10°49.38 33.86	43°34.80 41.25	286°15.89 54.66	27°50.77 3.86
15	48°5.23	25°48.98 · · 35.09	58°35.45 · · 40.48	301°18.23 · · 54.65	42°52.95 · · 3.74
16	63°7.70	40°48.58 36.31	73°36.11 39.71	316°20.57 54.63	57°55.12 3.61
17	78° 10.16	55°48.17 37.53	88°36.76 38.93	331°22.91 54.62	72°57.30 3.49
18	93°12.63	70°47.77 N08°38.76	103°37.41 S05°38.16	346°25.25 N22°54.61	87°59.48
19	108° 15.09	85°47.36 39.98	118°38.07 37.38	1°27.59 54.60	103°1.66 3.24
20	123° 17.55	100°46.95 41.20	133°38.72 36.61	16°29.93 54.59	118°3.83 3.12
21	$138^{\circ}20.02$	115°46.55 · · 42.42	148°39.37 · · 35.84	31°32.26 · · 54.58	133°6.01 · · 3.00
22	153°22.48	130°46.14 43.64	163°40.03 35.06	46°34.60 54.56	148°8.19 2.88
23	$168^{\circ}24.95$	145°45.74 44.86	178° 40.68 34.29	61°36.94 54.55	163°10.36 2.75
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
		ν σ.τ απ.Δ III-σ.σΔ	ν σ.τ. α σ.σ. IIII.I1	ν 2.5 G 0.0 HI-2.25	

	Stars	
	SHA	Dec
Alpheratz	357°34.11	29°14.03
Ankaa	353°6.57	-42°9.87
Schedar	349°30.49	56° 40.87
Diphda	348°46.62	-17°50.66
Achernar	335°19.96	-57°6.33
Hamal	327°50.38	23°35.16
Polaris	313°52.97	89°22.69
Acamar	$315^{\circ}11.31$	-40°12.15
Menkar	314°5.34	4°11.48
Mirfak	$308^{\circ}27.16$	49°57.37
Aldebaran	290°38.61	16°33.70
Rigel	281°2.99	-8°10.42
Capella	280°20.53	46°1.58
Bellatrix	278°21.88	6°22.33
Elnath	278°0.68	28°37.80
Alnilam	275°36.77	-1°11.22
Betelgeuse	270°51.03	7°24.64 -52°42.84
Canopus	263°51.93 258°25.32	-52 42.84 -16°45.32
Sirius	255°5.02	-10 45.32 -29°0.69
Adhara Procyon	255 5.02 244°49.68	-29°0.69 5°9.35
Procyon	244 49.08 243°15.95	5 9.35 27°57.77
Avior	234° 14.02	-59°35.87
Suhail	234 14.02 222°45.30	-39 33.67 -43°32.55
Miaplacidus	221°37.48	-43 32.33 -69°49.71
Alphard	217°46.55	-8°46.52
Regulus	207°33.11	11°50.21
Dubhe	193°39.14	61°36.55
Denebola	182°23.61	14°25.36
Gienah	175°42.24	-17°41.42
Acrux	172°58.33	-63° 14.75
Gacrux	171°49.99	-57° 15.69
Alioth	166°11.52	55°48.87
Spica	158°20.95	-11°18.05
Alkaid	152°50.76	49° 10.69
Hadar	148°34.05	-60°29.93
Menkent	$147^{\circ}56.11$	-36°29.99
Arcturus	$145^{\circ}46.71$	19°2.51
Rigil Kent.	139°38.42	-60°56.56
Kochab	137°18.90	$74^{\circ}2.53$
Zuben'ubi	136°54.67	$-16^{\circ}9.16$
Alphecca	126°2.67	26° 37.29
Antares	112°14.47	-26°29.42
Atria	107°7.64	-69°4.24
Sabik	102°1.56	-15°45.51
Shaula	96°8.95	-37°7.29
Rasalhague	95°57.57 90°41.68	12°32.22 51°28.73
Eltanin	90°41.68 83°31.21	-34°22.25
Kaus Aust. Vega	80°32.59	-34 22.25 38°48.13
Nunki	75°46.59	-26°15.82
Altair	61°59.12	8° 56.07
Peacock	53°4.47	-56°38.86
Deneb	49°25.41	45°22.15
Enif	33°38.08	9°59.57
Al Na'ir	27°32.05	-46°49.98
Fomalhaut	15°13.75	-29°29.03
Scheat	13°44.59	28° 13.37
Markab	13°29.22	15°20.66
Mar 23 Mon	SHA	Mer.pass
	340°44.03	•
Venus Mars	12°24.54	13:15 11:08
Jupiter	253°20.18	19:02
Saturn	355°5.78	12:16
Mar 24 Tue	<b>SHA</b> 339°35.45	Mer.pass
Venus Mars	339 35.45 11°40.94	13:16 11:07
Jupiter	253°17.61	18:58
Saturn	354°58.90	12:12
Mar 25 Wed Venus	<b>SHA</b> 338°26.75	Mer.pass 13:17
Venus Mars	10°57.40	13:17
Jupiter	253°14.84	18:54
Saturn	354°52.01	12:09
		12.03
Horizon	ital parallax	2.1
I .	Venus:	0.1
	N.A	0.1
	Mars:	0.1

Stars

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h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178° 19.58	$N00^{\circ}56.53$	129°12.11	5.4'	N23°56.30	9.7'	59.7'
1 2	193° 19.77 208° 19.96	57.51	143°36.54 158°0.88	5.3' 5.3'	24°5.99 24°15.51	9.5' 9.4'	59.7'
3	208 19.96 223°20.14	58.50 00°59.49	158 0.88 172°25.13	5.3 5.2'	24 15.51 24°24.88	9.4 9.2'	59.7' 59.7'
4	238° 20.33	01°0.47	186°49.30	5.1'	24°34.08	9.0'	59.7'
5	253° 20.52	1.46	201°13.38	5.0'	24°43.12	8.9'	59.6'
6	268°20.70 283°20.89	N01°2.44	215°37.38 230°1.29	4.9'	N24°51.99 25°0.70	8.7'	59.6'
7 8	283°20.89 298°21.08	3.43 4.42	230° 1.29 244° 25.13	4.8' 4.8'	25° 0.70 25° 9.24	8.5' 8.4'	59.6' 59.6'
9	313°21.27	• • 5.40	258°48.88	4.7'	25°17.61	8.2'	59.6'
10	328°21.45	6.39	$273^{\circ}12.56$	4.6'	$25^{\circ}25.81$	8.0'	59.6'
11	343°21.64 358°21.83	7.37 N01°8.36	287°36.16 301°59.68	4.5' 4.4'	25°33.83 N25°41.68	7.9'	59.6'
12 13	13° 22.02	NU1 8.36 9.34	301°59.68 316°23.13	4.4' 4.4'	N25 41.08 25 49.36	7.7' 7.5'	59.6' 59.6'
14	28° 22.20	10.33	330°46.51	4.3'	25°56.86	7.3'	59.6'
15	43°22.39	• • 11.32	345° 9.81	4.2'	26°4.19	7.1'	59.6'
16	58° 22.58	12.30	359°33.05	4.2'	26°11.33	7.0'	59.6'
17 18	73°22.76 88°22.95	13.29 N01°14.27	13°56.22 28°19.33	4.1' 4.0'	26°18.30 N26°25.08	6.8' 6.6'	59.6' 59.6'
19	103°23.14	15.26	42°42.37	4.0'	26°31.69	6.4	59.6'
20	118°23.33	16.24	57° 5.34	3.9'	26°38.10	6.2'	59.6'
21	133°23.51	• • 17.23	71°28.26	3.9'	26°44.34	6.1'	59.5'
22 23	148°23.70 163°23.89	18.21 19.20	85°51.12 100°13.93	3.8' 3.8'	26°50.39 26°56.25	5.9' 5.7'	59.5' 59.5'
	SD = 16.0'	d = 1.0'			D = 16.3'	J.,1	
	JD = 10.0′	u = 1.0		51	J — 10.3		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°24.08	N01°20.18	114°36.68	3.7'	N27°1.93	5.5'	59.5'
1 2	193°24.27 208°24.45	21.17 22.15	128°59.38 143°22.03	3.6' 3.6'	27°7.42 27°12.72	5.3' 5.1'	59.5' 59.5'
3	206 24.45 223°24.64	. 23.14	143 22.03 157°44.63	3.6'	27 12.72 27°17.83	5.1 4.9'	59.5'
4	238°24.83	24.12	172°7.19	3.5'	27°22.75	4.7'	59.5'
5	253°25.02	25.11	186°29.70	3.5'	27°27.48	4.5'	59.5'
6 7	268°25.20 283°25.39	N01°26.09 27.08	200°52.17 215°14.61	3.4' 3.4'	N27°32.01 27°36.36	4.3' 4.2'	59.5' 59.5'
8	298° 25.58	28.06	229°37.01	3.4'	27°40.51	4.0'	59.5'
9	313°25.77	• • 29.04	243°59.37	3.3'	27°44.46	3.8'	59.4'
10	328°25.96	30.03	258°21.70	3.3'	27°48.23	3.6'	59.4'
11 12	343°26.14 358°26.33	31.01 N01°32.00	272°44.01 287°6.28	3.3' 3.3'	27°51.79 N27°55.17	3.4' 3.2'	59.4' 59.4'
13	13° 26.52	32.98	301°28.54	3.2'	27°58.34	3.0'	59.4'
14	28°26.71	33.97	$315^{\circ}50.77$	3.2'	$28^{\circ}1.32$	2.8'	59.4'
15	43°26.90	• • 34.95	330°12.98	3.2'	28°4.10	2.6'	59.4'
16 17	58° 27.08 73° 27.27	35.93 36.92	344°35.18 358°57.37	3.2' 3.2'	28°6.69 28°9.08	2.4' 2.2'	59.4' 59.3'
18	88° 27.46	N01°37.90	13°19.54	3.2'	N28°11.27	2.0'	59.3'
19	103°27.65	38.89	27°41.70	3.2'	28°13.26	1.8'	59.3'
20	118° 27.84	39.87 •• 40.85	42°3.86 56°26.02		28°15.06	1.6'	59.3'
21 22	133°28.02 148°28.21	41.84	70°48.17	3.2' 3.2'	28°16.66 28°18.06	1.4' 1.2'	59.3' 59.3'
23	163°28.40	42.82	85°10.32	3.2'	28°19.26	1.0'	59.3'
	SD = 16.0'	d = 1.0'		SI	D = 16.2'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d 0.0'	HP
0 1	178°28.59 193°28.78	N01°43.80 44.79	99°32.49 113°54.65	3.2' 3.2'	N28°20.26 28°21.07	0.8' 0.6'	59.3' 59.2'
2	208° 28.97	45.77	128° 16.83	3.2'	28°21.68	0.4	59.2'
3	223°29.15	• • 46.75	142°39.02	3.2'	28°22.09	0.2'	59.2'
4 5	238° 29.34 253° 29.53	47.74 48.72	157° 1.23 171° 23.45	3.2' 3.2'	28°22.30 28°22.32	0.0' -0.2'	59.2' 59.2'
6	268° 29.72	48.72 N01°49.70	171°23.45 185°45.69	3.2	N28° 22.32	-0.2' -0.4'	59.2'
7	283°29.91	50.68	200°7.96	3.3'	28°21.76	-0.6'	59.2'
8	298°30.10	51.67	214°30.25	3.3'	28°21.19	-0.8'	59.1'
9 10	313°30.29 328°30.47	· · 52.65 53.63	228°52.57 243°14.92	3.4' 3.4'	28°20.42 28°19.46	-1.0' -1.2'	59.1' 59.1'
10	328 30.47 343°30.66	53.63 54.62	243 14.92 257°37.30	3.4' 3.4'	28 19.46 28°18.30	-1.2 -1.4'	59.1' 59.1'
12	358° 30.85	N01°55.60	271°59.72	3.5'	N28°16.94	-1.5'	59.1'
13	13°31.04	56.58	286°22.18	3.5'	28°15.40	-1.7'	59.1'
14 15	28°31.23 43°31.42	57.56 •• 58.54	300°44.67 315°7.21	3.5' 3.6'	28°13.66 28°11.72	-1.9' -2.1'	59.1' 59.0'
16	43 31.42 58°31.61	01°59.53	329°29.80	3.6'	28°9.60	-2.1 -2.3'	59.0'
17	73°31.79	02°0.51	343°52.43	3.7'	28°7.28	-2.5'	59.0'
18	88°31.98	N02°1.49	358°15.12	3.7'	N28°4.78	-2.7'	59.0'
19 20	103°32.17 118°32.36	2.47 3.45	12°37.85 27°0.65	3.8' 3.8'	28°2.08 27°59.20	-2.9' -3.1'	59.0' 59.0'
21	118 32.30 133°32.55	· · 4.44	41°23.49	3.8 3.9'	27 59.20 27°56.13	-3.1 -3.3'	59.0'
22	148°32.74	5.42	55°46.40	4.0'	27°52.87	-3.4'	58.9'
23	163°32.93	6.40	70°9.37	4.0'	27°49.42	-3.6'	58.9'
	SD = 16.0'	d = 1.0'		SI	O = 16.2'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	04:39	05:28	06:10	18:02	18:43	19:32

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	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		

h	Aries	Venu	us	M	ars	Jup	oiter	Sati	urn		Stars	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	183°27.41		N08°46.08	193°41.34	S05°33.51	76°39.27	N22°54.54	178°12.54	500°2.63			
1	198°29.88	175°44.92	47.30	208°41.99	32.74	91°41.61	54.53	193°14.72	2.51	Alpheratz	357°34.10	29°14.03
2	213°32.34	190°44.52	48.52	223°42.64	31.97	106°43.95	54.52	208°16.90	2.39	Ankaa	353°6.56 349°30.48	-42°9.86
3	228°34.80	$205^{\circ}44.11$	• • 49.74	238°43.30	• • 31.19	121°46.28	• • 54.51	223°19.07	• • 2.26	Schedar Diphda	349 30.48 348°46.61	56°40.86 -17°50.65
4	243°37.27	220°43.70	50.96	253° 43.95	30.42	136°48.62	54.49	$238^{\circ}21.25$	2.14	Achernar	335°19.96	-57° 6.31
5	258° 39.73	235°43.29	52.18	268°44.61	29.64	151°50.95	54.48	253°23.43	2.02	Hamal	327°50.37	23°35.16
6	273°42.20		N08°53.40	283°45.26	S05°28.87	166°53.28	N22°54.47	268°25.61	S00°1.89	Polaris	313°53.70	89°22.68
7	288° 44.66	265°42.48	54.61	298°45.92	28.09	181°55.62	54.46	283°27.78	1.77	Acamar	315°11.32	-40°12.14
8 9	303° 47.12 318° 49.59	280°42.07 295°41.66	55.83 •• 57.05	313°46.57 328°47.23	27.32 •• 26.55	196°57.95 212°0.29	54.45 •• 54.43	298°29.96 313°32.14	1.65 •• 1.53	Menkar	314°5.34	4°11.48
10	333° 52.05	310°41.25	58.27	343° 47.88	25.77	212 0.29 227° 2.62	54.42	328° 34.32	1.40	Mirfak	$308^{\circ}27.16$	49°57.36
11	348° 54.52	325°40.84	08°59.48	358° 48.54	25.00	242° 4.95	54.41	343°36.49	1.28	Aldebaran	290°38.62	16°33.70
12	3°56.98		N09°0.70	13°49.19	S05°24.22	257°7.28	N22°54.40	358°38.67	S00° 1.16	Rigel	281°3.00	-8°10.42
13	18° 59.45	355°40.02	1.91	28° 49.85	23.45	272° 9.62	54.38	13°40.85	1.04	Capella	280°20.54	46°1.58
14	$34^{\circ}1.91$	10°39.61	3.13	43°50.50	22.67	287°11.95	54.37	28°43.03	0.91	Bellatrix Elnath	278°21.88 278°0.69	6°22.33 28°37.80
15	49°4.37	25°39.20	• • 4.34	$58^{\circ}51.16$	• • 21.90	302°14.28	• • 54.36	43°45.20	• • 0.79	Alnilam	276 0.09 275°36.77	-1°11.22
16	64°6.84	40°38.79	5.56	73°51.82	21.12	317°16.61	54.35	58°47.38	0.67	Betelgeuse	270°51.04	7°24.64
17	79°9.30	55°38.38	6.77	88° 52.47	20.35	332°18.94	54.34	73°49.56	0.54	Canopus	263°51.96	-52°42.84
18	94°11.77		N09°7.99	103°53.13	S05°19.57	347°21.27	N22° 54.32	88°51.73	S00°0.42	Sirius	258°25.33	-16°45.32
19 20	109° 14.23	85°37.56 100°37.15	9.20	118°53.78 133°54.44	18.80	2°23.60 17°25.93	54.31	103°53.91 118°56.09	0.30	Adhara	255°5.03	-29°0.70
21	124° 16.70 139° 19.16		10.41	133 54.44 148°55.10	18.02 •• 17.24	32°28.26	54.30 •• 54.29	133°58.27	0.18 \$00°0.05	Procyon	244°49.69	5° 9.35
22	154°21.62	130°36.32	12.84	163°55.75	16.47	47°30.59	54.27	149°0.44	N00° 0.03	Pollux	243°15.96	27°57.77
23	169°24.09	145°35.91	14.05	178° 56.41	15.69	62°32.92	54.26	164° 2.62	0.19	Avior	234° 14.05	-59°35.88
					_					Suhail	222°45.31	-43°32.56
Mer.	pass. 11:44	$\nu$ -0.4' $d1.2$ '	′ m-3.92	$\nu 0.7' d-0$	.8′ m1.17	$\nu^{2.3'} d-0$	.0′ m-2.25	$\nu 2.2' \ d-0.$	1′ m0.91	Miaplacidus	221°37.51	-69°49.73
										Alphard Regulus	217°46.55 207°33.11	-8°46.52 11°50.21
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		193°39.14	61°36.56
0	184°26.55		N09°15.26	193°57.07	S05°14.92	77°35.24	N22°54.25	179°4.80	N00°0.31	Denebola	182°23.60	14°25.36
1	199°29.02	175°35.08	16.47	208°57.72	14.14	92°37.57	54.23	194°6.98	0.44	Gienah	175°42.23	-17°41.43
2	214° 31.48 229° 33.94	190°34.67 205°34.26	17.68 •• 18.89	223°58.38 238°59.04	13.37 · · 12.59	107°39.90 122°42.23	54.22 •• 54.21	209°9.15 224°11.33	0.56 •• 0.68		172°58.32	-63°14.77
4	244°36.41	200° 33.84	20.10	253° 59.69	11.82	137°44.55	54.21	239°13.51	0.80	1	171°49.97	-57°15.71
5	259°38.87	235°33.43	21.31	269°0.35	11.04	152°46.88	54.18	254°15.69	0.93	Alioth	166°11.51	55°48.88
6	274°41.34		N09°22.52	284°1.01	S05°10.26	167°49.21	N22°54.17	269°17.86	N00°1.05	Spica Alkaid	158° 20.94 152° 50.75	-11°18.06 49°10.70
7	289°43.80	265°32.60	23.73	299°1.66	9.49	182°51.53	54.16	284°20.04	1.17	Hadar	132 30.73 148°34.02	-60°29.95
8	304°46.27	280°32.19	24.94	$314^{\circ}2.32$	8.71	197°53.86	54.14	299°22.22	1.29		147°56.09	-36°30.01
9	319°48.73	295°31.77	• • 26.15	329°2.98	• • 7.93	212°56.18	• • 54.13	314°24.40	• • 1.42	1	145°46.69	19° 2.52
10	334°51.19	310°31.36	27.36	344°3.64	7.16	227°58.51	54.12	329°26.57	1.54	Rigil Kent.	139°38.38	-60°56.58
11 12	349°53.66 4°56.12	325°30.94 340°30.53	28.57 N09°29.77	359°4.30 14°4.95	6.38 \$05°5.61	243°0.83 258°3.16	54.11 N22°54.09	344°28.75 359°30.93	1.66 N00°1.78	Kochab	$137^{\circ}18.86$	74° 2.54
13	19°58.59	355°30.11	30.98	29°5.61	4.83	273° 5.48	54.08	14°33.10	1.91		136°54.64	-16°9.17
14	35°1.05	10°29.69	32.19	44°6.27	4.05	288°7.80	54.07	29°35.28	2.03	Alphecca	126°2.65	26°37.30
15	50°3.51	25°29.28	• • 33.39	59°6.93	• • 3.28	303°10.13	• • 54.05	44°37.46	• • 2.15	Antares Atria	112°14.44 107°7.57	-26°29.43 -69°4.24
16	65°5.98	40°28.86	34.60	74°7.59	2.50	$318^{\circ}12.45$	54.04	59°39.64	2.27	Sabik	107 7.57 102°1.53	-15°45.51
17	80°8.44	55°28.44	35.80	89°8.24	1.72	333°14.77	54.03	74°41.81	2.40	Shaula	96°8.92	-37°7.29
18 19	95° 10.91		N09°37.01	104°8.90	S05°0.95	348°17.09	N22°54.01	89°43.99	N00°2.52	Rasalhague	95°57.54	12°32.22
20	110° 13.37 125° 15.83	85°27.61 100°27.19	38.21 39.42	119°9.56 134°10.22	05°0.17 04°59.39	3°19.41 18°21.74	54.00 53.99	104°46.17 119°48.35	2.64 2.76	Eltanin	90°41.65	51°28.73
21	140° 18.30		• • 40.62	149° 10.22	• 58.62	33°24.06	• • 53.97	134°50.52	. 2.89	Kaus Aust.	83°31.18	-34°22.25
22	155°20.76	130°26.35	41.82	164° 11.54	57.84	48°26.38	53.96	149°52.70	3.01	Vega	80°32.56	38°48.13
23	170°23.23	145°25.93	43.03	179° 12.20	57.06	63°28.70	53.94	164°54.88	3.13	Nunki Altair	75°46.56 61°59.09	-26°15.82 8°56.07
More	pass. 11:40	$\nu$ -0.4' d1.2'	/ m 3 02	10 7' d 0	.8′ m1.18	1,2 3/ d 0	.0′ m-2.24	$\nu 2.2' \ d0.$	1′ m0 01	Peacock	53°4.42	-56°38.85
- IVICI.	pass. 11.40	ν-0.4 01.2	111-3.92	νο.τ u-0	.0 1111.10	ν2.3 u-0	.0 111-2.24	ν2.2 do.	1 1110.91	Deneb	49°25.38	45°22.14
										Enif	33°38.06	9°59.57
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.02	-46°49.96
0	185°25.69		N09°44.23	194°12.86	S04°56.28	78°31.02		179°57.06	N00°3.25	Fomalhaut	15° 13.74	-29°29.02
1 2	200°28.16 215°30.62	175°25.10 190°24.68	45.43 46.63	209°13.51 224°14.17	55.51 54.73	93°33.34 108°35.66	53.92 53.90	194°59.23 210°1.41	3.38 3.50	Scheat	13°44.57	28°13.37
3	215 30.02 230°33.08		40.03	224 14.17 239°14.83	• 53.95	108 35.00 123°37.98	53.89	210 1.41 225°3.59	· · 3.62	Markab	13°29.21	15°20.66
4	245° 35.55	220° 23.84	49.03	254° 15.49	53.18	138°40.30	53.88	240°5.77	3.74	Mar 26 Thu	SHA	Mer.pass
5	260°38.01	235°23.42	50.23	269° 16.15	52.40	153°42.61	53.86	255°7.94	3.87	Venus		13:17
6	275° 40.48		N09°51.43	284° 16.81	S04°51.62	168°44.93	N22° 53.85	270°10.12	N00° 3.99	Mars	$10^{\circ}13.92$	11:05
7	290°42.94	265°22.57	52.63	299° 17.47	50.84	183°47.25	53.83	285°12.30	4.11	Jupiter	253°11.86	18:50
8	305°45.40	280°22.15	53.83	314° 18.13	50.07	198°49.57	53.82	300°14.47	4.23	Saturn	354°45.13	12:05
9	320°47.87	295°21.73	• • 55.03	329° 18.79	• • 49.29	213°51.88	• • 53.81	315°16.65	• • 4.36	Mar 27 Fri	SHA	Mer.pass
10	335°50.33	310°21.31	56.23	344° 19.45	48.51	228°54.20	53.79	330°18.83	4.48	Venus	336°8.94	13:18
11 12	350° 52.80 5° 55.26	325°20.89 340°20.47	57.43 N09°58.63	359°20.11 14°20.77	47.73 \$04°46.95	243°56.52 258°58.83	53.78 N22°53.76	345°21.01 0°23.18	4.60 N00°4.72	Mars	$9^{\circ}30.51$	11:04
13	20° 57.72	355° 20.04	09°59.82	29°21.43	46.18	256 56.65 274° 1.15	53.75	15°25.36	4.84	Jupiter	253°8.69	18:47
14	36°0.19	10°19.62	10°1.02	44°22.09	45.40	289° 3.46	53.74	30°27.54	4.97	Saturn	354°38.25	12:02
15	51°2.65	25°19.20	• • 2.22	59°22.75	• • 44.62	304°5.78	• • 53.72	45°29.72	• • 5.09	Mar 28 Sat	SHA	Mer.pass
16	66°5.12	40°18.77	3.41	74°23.41	43.84	319°8.09	53.71	60°31.89	5.21	Venus		13:19
17	81°7.58	55°18.35	4.61	89°24.08	43.07	334°10.41	53.69	75°34.07	5.33	Mars	8°47.16	11:03
18	96° 10.05		N10° 5.80	104°24.74	S04°42.29	349°12.72	N22°53.68	90°36.25	N00°5.46	Jupiter	253°5.33	18:43
19 20	111° 12.51 126° 14.97	85° 17.50 100° 17.08	7.00 8.19	119°25.40 134°26.06	41.51 40.73	4°15.04 19°17.35	53.67 53.65	105°38.43 120°40.60	5.58 5.70	Saturn	354°31.36	11:58
21	120 14.97 141°17.44	100 17.08 115°16.65	· · 9.39	134 26.06 149°26.72	· · 39.95	34°19.66	53.65	120 40.60 135°42.78	5.70	Horizor	ıtal parallax	
22	156° 19.90	130°16.23	10.58	164° 27.38	39.17	49°21.98	53.62	150°44.96	5.94		Venus:	0.1
23	171°22.37	145°15.80	11.77	179°28.04	38.40	64°24.29	53.61	165°47.14	6.07		Mars:	0.1
Mer	pass. 11:36	$\nu$ -0.4' d1.2'	′ m-3.92	$\nu$ 0.7′ d-0	.8′ m1.18	ν2.3′ d-0	.0′ m-2.23	$\nu 2.2' \ d0.$	1′ m0.91			

h	Su	n	Moon					
Thu	GHA	Dec	GHA	ν	Dec	d	HP	
0	178°33.11	N02°7.38	84°32.40	4.1'	N27°45.79	-3.8'	58.9'	
1	193°33.30	8.36	98°55.50	4.2'	27°41.98	-4.0'	58.9'	
2	208°33.49	9.34	113° 18.66	4.2'	27°37.98	-4.2'	58.9'	
3 4	223°33.68 238°33.87	· · 10.33	127°41.90 142°5.21	4.3' 4.4'	27°33.80 27°29.44	-4.4' -4.5'	58.9' 58.8'	
5	250 33.07 253°34.06	12.29	142 5.21 156°28.59	4.4 4.5'	27°24.90	-4.5 -4.7'	58.8'	
6	268°34.25	N02° 13.27	170°52.04	4.5'	N27°20.18	-4.9'	58.8'	
7	283°34.44	14.25	185° 15.57	4.6'	27° 15.28	-5.1'	58.8'	
8	298°34.62	15.23	199°39.18	4.7'	27° 10.21	-5.2'	58.8'	
9	313°34.81	•• 16.21	214°2.88	4.8'	27°4.96	-5.4'	58.8'	
10	328°35.00	17.19	228°26.65	4.9'	26°59.54	-5.6'	58.7'	
11 12	343°35.19 358°35.38	18.17 N02° 19.15	242°50.51 257°14.45	4.9' 5.0'	26°53.94 N26°48.17	-5.8' -5.9'	58.7' 58.7'	
13	13°35.57	20.13	271°38.48	5.1'	26° 42.24	-5.9 -6.1'	56.7'	
14	28°35.76	21.11	286°2.60	5.2'	26° 36.13	-6.3	58.7'	
15	43°35.95	• • 22.09	300°26.81	5.3'	26° 29.86	-6.4	58.7'	
16	58°36.14	23.07	$314^{\circ}51.11$	5.4'	26°23.42	-6.6'	58.6'	
17	73°36.32	24.05	329° 15.51	5.5'	26° 16.81	-6.8'	58.6'	
18	88°36.51	N02°25.03	343°39.99	5.6'	N26°10.05	-6.9'	58.6'	
19	103°36.70 118°36.89	26.01	358°4.57 12°29.25	5.7' 5.8'	26°3.12 25°56.03	-7.1'	58.6'	
20 21	118 30.89 133°37.08	26.99 •• 27.97	12 29.25 26°54.03	5.8 5.9'	25° 50.03	-7.2' -7.4'	58.6' 58.6'	
22	148°37.27	28.95	41° 18.90	6.0'	25°41.37	-7. <del>4</del>	58.5	
23	163°37.46	29.93	55° 43.88	6.1'	25°33.81	-7.7'	58.5'	
	SD = 16.0'	d = 1.0'		SI	D = 16.1'			
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0 1	178°37.65 193°37.84	N02°30.91 31.89	70°8.95 84°34.12	6.2' 6.3'	N25°26.10 25°18.23	-7.9' -8.0'	58.5' 58.5'	
2	208°38.03	32.87	98°59.40	6.4'	25 16.23 25°10.21	-8.2'	58.5'	
3	223°38.21	• • 33.85	113°24.78	6.5	25°2.04	-8.3	58.5'	
4	238°38.40	34.83	$127^{\circ}50.27$	6.6'	24°53.72	-8.5'	58.4'	
5	253°38.59	35.81	142° 15.85	6.7'	24°45.25	-8.6'	58.4'	
6	268°38.78	N02°36.79	156°41.55 171°7.34	6.8'	N24°36.64 24°27.89	-8.8'	58.4'	
7 8	283°38.97 298°39.16	37.76 38.74	171°7.34 185°33.25	6.9' 7.0'	24° 27.89 24° 18.99	-8.9' -9.0'	58.4' 58.4'	
9	313°39.35	39.72	199° 59.26	7.0	24° 10.99	-9.0 -9.2'	58.4'	
10	328°39.54	40.70	214°25.38	7.2'	24°0.78	-9.3'	58.3'	
11	343°39.73	41.68	228°51.60	7.3'	23°51.47	-9.4'	58.3'	
12	358°39.92	N02°42.66	243° 17.94	7.4'	N23°42.02	-9.6'	58.3'	
13	13°40.10 28°40.29	43.63	257°44.38 272°10.93	7.5'	23°32.44 23°22.72	-9.7'	58.3'	
14 15	28 40.29 43°40 48	44.61 •• 45.59	272 10.93 286°37.58	7.7' 7.8'	23 22.72 23°12.88	-9.8' -10.0'	58.3' 58.2'	
16	58°40.67	46.57	301°4.35	7.9'	23°2.91	-10.1	58.2'	
17	73°40.86	47.55	315°31.23	8.0'	22°52.80	-10.2'	58.2'	
18	88°41.05	N02°48.52	329°58.21	8.1'	N22°42.58	-10.4'	58.2'	
19	103°41.24	49.50	344°25.30	8.2'	22°32.23	-10.5'	58.2'	
20	118°41.43 133°41.62	50.48 •• 51.46	358°52.50 13°19.82	8.3' 8.4'	22°21.75 22°11.16	-10.6' -10.7'	58.2' 58.1'	
21 22	148°41.81	52.43	27° 47.24	8.5'	22°0.45	-10.7 -10.8'	58.1	
23	163°41.99	53.41	42°14.76	8.6'	21°49.62	-10.9'	58.1'	
	SD = 16.0'	d = 1.0'		SI	O = 16.0'			
					2 10.0			
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	178°42.18 193°42.37	N02°54.39	56° 42.40 71° 10.14	8.7' 8.9'	N21°38.67 21°27.61	-11.1'	58.1' 58.1'	
1 2	208°42.56	55.36 56.34	71 10.14 85°38.00	8.9 9.0'	21°16.44	-11.2' -11.3'	58.0'	
3	223°42.75	57.32	100°5.96	9.1'	21°5.15	-11.4	58.0'	
4	238°42.94	58.29	114°34.03	9.2'	20°53.76	-11.5'	58.0'	
5	253°43.13	02°59.27	129°2.20	9.3'	20°42.26	-11.6'	58.0'	
6	268°43.32	N03°0.25	143°30.48	9.4'	N20° 30.66	-11.7'	58.0'	
7	283°43.51 298°43.70	1.22	157°58.87 172°27.37	9.5'	20°18.94 20°7.13	-11.8'	57.9'	
8 9	298°43.70 313°43.88	2.20 · · 3.18	172°27.37 186°55.97	9.6' 9.7'	20°7.13 19°55.22	-11.9' -12.0'	57.9' 57.9'	
10	328°44.07	4.15	201°24.67	9.8'	19° 43.20	-12.1'	57.9'	
11	343°44.26	5.13	215°53.48	9.9'	19°31.09	-12.2'	57.9'	
12	358°44.45	N03°6.10	230°22.39	10.0'	N19°18.88	-12.3'	57.9'	
13	13°44.64	7.08	244°51.41	10.1'	19°6.58	-12.4'	57.8'	
14	28°44.83	8.05	259°20.53	10.2'	18°54.18	-12.5'	57.8'	
15 16	43°45.02 58°45.21	· · 9.03 10.01	273°49.75 288°19.07	10.3' 10.4'	18°41.70 18°29.12	-12.6' -12.7'	57.8' 57.8'	
16 17	73°45.21	10.01	288° 19.07 302° 48.49	10.4	18° 29.12 18° 16.46	-12.7 -12.8'	57.8'	
18	88°45.58	N03° 11.96	317° 18.02	10.6'	N18°3.70	-12.8'	57.7'	
19	103°45.77	12.93	331° 47.64	10.7'	17°50.87	-12.9'	57.7'	
20	118°45.96	13.91	346° 17.36	10.8'	17° 37.95	-13.0'	57.7'	
21	133°46.15 148°46.34	14.88	0°47.18 15°17.09	10.9'	17°24.94 17°11.86	-13.1'	57.7'	
22 23	148°46.34 163°46.53	15.86 16.83	15°17.09 29°47.10	11.0' 11.1'	17°11.86 16°58.70	-13.2' -13.2'	57.7' 57.6'	
23					D = 15.8'	19.2	31.0	
	SD = 16.0'	$\frac{d=1.0'}{}$		51	∫ = 15.8°			

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Juliuse	Juliset	Civil	Naut.
N 72°	02:29	04:11	05:22	18:51	20:03	21:49
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	04:46	05:35	06:17	17:52	18:34	19:22

Lat.		Moonris	e		Moonset	ŧ
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
N 70°			09:10			08:13
68°			10:31			06:50
66°			11:08			06:12
64°		09:18	11:35		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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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	
<b>S</b> 60°	17:01	17:08	17:10	21:24	23:15	

Sum   CHA   OR   OR   OR   OR   OR   OR   OR   O	h	Aries	Venus	Mars	Jupiter	Saturn
0   186"2483   160"1538   180"1267   194"2870   504"37862   79"2860   122"81599   180"4011   506"109   120"1275   53.56   100"312   53.5	Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
1 2017/2729 10971439 1436 20072937 3684 978281 5338 1979149 6.31 2 2117-2776 10971432 15.55 22470303 3600 10971122 3536 21075167 6.43 3 2217-222 217-232 200729 217-232 200729 217-233 30 305150 2075167 6.43 3 2217-222 207129 207129 217-232 207129 217-233 30 305150 2075167 6.43 5 207-247-240 20 207123 21 207-247 207-247-240 207-247-247-240 207-247-247-247-247-247-247-247-247-247-24						l l
2 216*29.76 190*14.92 13:35 226*30.05 30.06 109*31.22 53:36 210*53.67 6.56 6.56 6.56 1 328*35.22 205*14.07 1.06 6.4 239*30.00 3.35 2.05 13.55 2.05*5.85 6.55 6.56 6.56 1 4 246*34.09 2.35*13.24 11.05*2.26*23.35 3.45.00 13.9*35.35 5.35*35 225*5.65 0.65 6.56 1 5 261*37.15 12.35*13.10 1.05*2.26*23.35 3.45.00 13.9*35.35 5.35*35 225*5.00 3.00 6.86 0 1 2.05*2.00 13.						l l
3 221 322 20 205 14 10 - 16.54 209 30.69 - 35.26 124 33.33 - 53.55 205 56.56 6.66 6.06 1 201 321 321 324 1802 201 331 33 34 50 31 31 39 35.55 33 240 320 2 6.68 6.00 1 201 321 321 321 32 34 50 377 154 331 6 53.52 265 0.20 6.00 1 201 321 321 321 321 321 321 321 321 321 32						l l
5 261°37.15 250°12.28 110°20.11 267°23.01 33.72 164°38.16 53.52 256°0.20 6.80 6.20°4.26 267°12.38 100°6.20°4 7.20°4.20 250°12.39 21.00°20.27 33.34 32.17 184°4.278 53.49 256°4.56 7.04 18.30°4.43 220°11.56 22.49 31.4°3.00 31.30°1.09°4.70 33.46 30.1°6.27 7.17 194°4.00 31.30°1.09°4.70 33.46 30.1°6.27 7.17 194°4.00 31.30°4.00 31.30°4.04 7.31°1.10°1.00°2.20°4.30 31.30°4.04 7.31°1.10°1.00°2.20°4.30 31.30°4.04 7.31°1.10°1.10°2.20°5.20°4.30°1.30°4.00°5.31°4.30°1.30°4.00°7.31°1.10°2.20°5.20°4.30°2.00°4.30°2.30°2.24°5.20°1.33.43 346°1.32°7.73.31°2.20°4.30°2.00°4.30°2.30°2.24°5.20°1.33.43 346°1.32°7.73.31°2.20°4.30°2.30°4.30°2.30°4.30°4.30°4.30°4.30°4.30°4.30°4.30°4	3		205°14.10 · · 16.54	239°30.69 · · 35.28	124°33.53 · · 53.55	l l
6	4	246°34.69	220° 13.67 17.73	254°31.35 34.50	139°35.85 53.53	240°58.02 6.68
7 291°42.08 8 500°4.54 280°11.99 22.49 31.74 0.03 1.39 109°45.09 53.48 301°67.37 7.70 1 8 320°4.67.01 290°11.153 22.68 329°31.60 30.61 224°47.39 53.46 310°8.91 7.29 1 10 338°4.01 230°11.04 110°27.23 313°35.39 223°24°7.07 33.45 331°11.05 7.41 1 12 30°54.00 340°10.74 110°27.23 313°35.39 223°47.07 33.45 331°11.05 7.41 1 13 21°56.00 350°8.01 10.74 110°27.23 314°35.59 200°27.27 290°34.33 122°53.04 311°1.05 7.41 1 14 36°59.33 10°9.38 26.62 44°37.97 25.71 280°35.93 53.49 31°19.80 7.90 1 15 52°1.79 25°9.59 30.81 59°36.04 22.93 305°1.24 53.37 46°21.98 8.02 1 16 67°4.26 40°5.22 31.99 74°39.30 25.15 320°35.55 53.35 61°27.15 8.14 1 17 82°6.72 55°8.09 31.89 30.90 24.33 355°3.65 53.34 76°1.76 31 8.50 1 18 97°9.15 70°7.66 310°34.37 104°40.63 504°23.60 380°8.16 N22°53.23 91°28.31 N00°8.39 1 22 147°1.11 100°6.08 30.73 3134°4.95 22.04 20°1.27 7.35 32.9 112°32.68 8.63 1 22 147°1.11 100°6.09 30.10 34.37 104°40.63 504°1.23 50.5 53.5 53.5 53.5 136°35.00 8.75 31.22 121°27.15 10 145°5.50 40.28 179°43.94 19.70 65°19.69 53.22 16°39.40 9.00 1  Mor. pass. 11:32 40.04 d.12°7-3.92 40.74 d.08°1.18 42.23 40.00°2.22 40.23 50°39.40 9.00 1  Mor. pass. 11:32 40.04 d.12°7-3.92 40.74 d.08°1.18 40.23 53.11 20°2.04 31.75 44.4 42.65 20°4.74 40.8 11.8 40.74 50.1 12.75 40.00°4.22 40.00°4.22 40.00°4.22 40.00°4.25 40.00°4	5					
8 906"44.94 280"1.96						
9 \$22'97.01 \$23'94.07 \$10'\$11.00 \$2487 \$448'53.2 \$298.5 \$29'94.07 \$5.345 \$311'10.00 \$7.41 \$13 \$35'\$19.93 \$30'\$11.07 \$2.487 \$448'53.2 \$298.5 \$29'94.07 \$5.345 \$311'10.00 \$7.41 \$11 \$35'\$19.93 \$30'\$13.27 \$7.33 \$30'\$12.30 \$7.90 \$30'\$12.4 \$7.33 \$7.33 \$7.40'\$12.98 \$7.80.2 \$7.90 \$30.5 \$7.2 \$7.33 \$7.33 \$7.40'\$12.98 \$7.80.2 \$7.90 \$30.5 \$7.2 \$7.33 \$7.40'\$12.98 \$7.80.2 \$7.90 \$30.5 \$7.2 \$7.33 \$7.40'\$12.98 \$7.80.2 \$7.90 \$30.5 \$7.2 \$7.5 \$7.80 \$7.20 \$31.8 \$9.39 \$9.90 \$2.13 \$30'\$12.5 \$7.33 \$7.40'\$2.08 \$7.80.2 \$7.20 \$7.2						
10   336*49.47   310*11.10   24.67   344*35.32   29.83   220*44.70   53.44   346*13.27   7.55     12   6*64.60   356*0.61   10*12.25   14*36.65   564*28.27   220*54.32   12*15.44   10*07*.66     13   21*56.66   356*0.61   10*13.32   26.65   26.4*28.27   220*54.32   13*13.27   7.78     14   356*0.33   10*13.32   20.63   24.4*37.07   26.71   200*58.33   3.33*3   31*19.50   7.70     14   36*59.33   10*19.38   20.63   24.4*37.07   26.71   200*58.33   3.33*3   31*19.50   7.70     15   67*4.26   40*52.5   31.99   74*9.30   25.15   320*355   53.35   51*24   15*19.41   5.15     15   67*4.26   40*52.5   31.99   74*9.30   25.15   320*355   53.35   51*24   15*19.41   5.15     15   67*4.26   40*52.5   35.55   10*44.05   50*25.00   350*81.05   30*2*35   33.31*10.65*30.68   8.26     19   112*11.65   85*7.22   35.55   10*44.05   50*25.00   350*81.05   30*2*35   30*2*						
11   351° 51.93   335° 10.07   20.06   399° 35.99   20.05   244° 52.01   53.43   346° 13.27   7.53   13   21° 63.66   340° 10.02   269° 54.81   23.44   20° 37.31   27.49   274° 56.63   53.40   16° 17.60   7.78   14   36° 69.33   10° 13.82   29.62   44° 13.97   274° 56.63   53.40   16° 17.60   7.78   15   52° 17.79   275° 59.59   30.81   59° 38.64   25° 33   30° 12.24   53.37   46° 21.96   8.60   15   52° 17.79   272° 59.59   30.81   59° 38.64   25° 33   30° 12.24   53.37   46° 21.96   8.60   36° 31.98   374° 38.55   310° 38.38   378° 38.55   310° 38.38   31° 38° 38° 38° 38° 38° 38° 38° 38° 38° 38						
12 0"654.40 340"10.24 N10"72.25 14"36.65 S04"28.27 29"54.32 N22"53.42 1"15.4 N00"7.65 113 21"5.66 355"9.03 20.62 44"37.97 26.71 298"58.93 53.41 10"15.76.2 7.78 114 36"59.33 10"19.38 20.62 44"37.97 26.71 298"58.93 30"1.98 00 7.90 115 52"1.79 25"8.95 20.03 11 39"59.05 24.15 320"5.55 3.35 10"24.15 8.14 116 07"4.26 555 80.03 11.99 74"39.30 25.15 320"5.55 3.35 10"24.15 8.14 117 117 117 11.55 85"7.23 33.18 39.55 119"41.20 22.82 5"10.47 75.33 100"30.08 8.13 119 112"11.65 85"7.23 33.18 355 119"41.20 22.82 5"10.47 75.33 100"30.08 8.51 119 112"11.65 85"7.23 37.92 149"42.62 2.21.60 35"15.08 53.38 130"55.04 8.87 121 142"16.58 11.56 37 37.92 149"42.62 2.21.60 35"15.08 53.38 130"55.04 8.87 122 157"19.04 130"5.94 39.10 14"43.28 20.48 50"17.38 53.28 130"55.04 8.87 123 17"2*1.50 145"5.50 40.28 179"4.49 19.70 65"19.69 53.55 166"39.40 99.00  Mer. pass. 11:32						
13 21"56 86 355"9.81 28.44 29"37.31 27.49 24"56.63 35.40 16"17.62 7.78 11 36"56.83 10"9.83 20.62 44"37.97 20.71 28"58.93 53.99 13"19.80 7.70 15 52"1.79 25"8.95 53.81 20.62 44"37.97 20.72 15 52"1.79 25"8.95 53.81 20.62 44"37.97 20.72 15 52"1.79 25"8.95 53.95 15 320"3.55 53.35 46"21.98 8.80 21 17 82"6.72 55"8.09 33.18 68"9.90 52.43 835"5.85 53.35 16"124.15 81.44 17 82"6.72 55"8.09 33.18 68"9.90 52.43 835"5.85 53.35 16"124.15 81.44 17 82"6.72 55"8.09 33.18 68"9.90 52.24 835"5.85 53.35 16"124.15 81.44 17 82"6.72 55"8.09 10"6.83 18 68"9.90 52.24 82"12.77 25.33 4.76"26.33 8.26 18 97"9.18 70"7.66 110"6.80 36.73 144"4.95 22.04 20"12.77 5.32 121"32.86 8.63 18"6.83 115"6.85 115"6.73 4.73 10.75 40 30.10 164"43.28 20.48 80"17.38 53.29 121"32.86 8.63 125"6.35 10.75 40.75						
14   36°99 33   10°9 38   29.02   44°13797   22.71   229°58.95   308°1.24   53.37   40°2.18   8.20°1.16   67°4.26   40°8.52   31.99   74°39.30   25.15   320°3.55   53.35   61°2.41.5   8.14   17°8.26°6.72   55°8.00   33.18   80°9.396   24.38   336°5.85   53.34   70°2.63   8.20°1.18   70°7.06   80°3.47   70°4.37   10°4.05   50°4.26   33.28   50°3.16   82°5.32   10°2.85   10°2.85   8.20°1.18   10°2.11.15   85°7.22   35.55   10°4.40   53.25   50°3.16   82°5.32   10°2.85   10°0.85   8.20°1.18   10°2.11.15   11°2.16   85°7.22   35.55   39°4.16   82°5.32   10°2.85   10°3.06   8.51   8.20°1.18   10°2.11   10°2.11   10°3.05   8.51   1						
15   52"1.79						l l
18   18   19   18   70   76   16   18   19   19   19   19   12   11   11   15   15   18   19   19   18   19   19   18   19   19						l l
18   97°918   70°7.66   N10°4.47   104°4.063   504°23.60   350°8.16   N22°53.23   91°28.51   N00°8.03   8.51   20127°14.11   165   885°1.23   35.55   6.53   34.64   95   22.04   20°12.77   53.29   121°23.86   8.63   22   137°16.16   130°5.94   39.10   104°4.23   20.48   50°17.38   53.26   131°37.22   8.87   8.63   22   157°19.04   130°5.94   39.10   104°4.23   20.48   50°17.38   53.26   151°37.22   8.87   8.63   215°27.21   145°5.50   40.28   170°4.34   19.70   65°16.96   53.25   156°39.40   9.00   166°7.23   170°4.34   19.70   65°16.96   53.25   166°39.40   9.00   166°7.23   166°3.64   9.00   167°2.39   166°5.07   N10°4.14   19.74   65°16.95   53.25   166°39.40   9.00   167°2.39   166°5.07   N10°4.14   19.74   65°1.82   80°2.19   N22°3.23   181°4.15.75   9.24   22.27°2.89   190°4.20   43.83   224°4.59   41.73   110°6.05   53.20   211°4.89   9.63   322°31.36   205°3.77   45.01   239°4.60   16.58   126°3.34   22.21°2.93   166°3.34   46.19   239°4.60   16.58   126°3.34   22.21°2.93   22.21°2.93   46.19   239°4.60   16.58   126°3.34   22.21°2.93   22.22°2.93   22.22°3.34   46.19   239°4.60   15.80   140°3.10   35.17   22.21°2.93   22.21°2.93   22.22°3.34   46.19   239°4.72   23.21°2.93   23.21°2.	16	67°4.26	40°8.52 31.99	74°39.30 25.15		61°24.15 8.14
19   112*11.65   88*7(23   35.55   119*41.29   22.82   5*10.47   55.31   106*30.69   8.51	17	82°6.72			335°5.85 53.34	76°26.33 8.26
20   127"14.11   100"68.00   36.73   134"41.95   22.04   20"12.77   53.29   12"23.86   8.63   22   137"19.04   130"5.94   39.10   164"43.28   20.48   50"17.38   53.26   15"37.02   8.87   39.10   164"43.28   20.48   50"17.38   53.26   15"37.22   8.87   39.10   164"43.28   20.48   50"17.38   53.26   15"37.22   8.87   39.10   164"43.28   20.48   50"17.38   53.26   15"37.22   8.87   39.10   164"43.28   20.48   50"17.38   53.26   15"37.22   8.87   39.10   164"43.28   20.48   50"17.38   53.26   15"37.22   8.87   39.10   164"43.28   20.48   50"17.38   53.26   15"37.22   8.87   39.10   164"43.28   20.48   50"17.38   53.26   16"39.40   9.00   20.27   20	18		70°7.66 N10°34.37			
142"16.58   115"6.37   37.92   149"4.26   21.26   35"15.08   53.28   136"5.80.4   8.75     22						
22   172°19   04   130°6   94   39   10   164°43   28   20   48   50°17   38   53   26   151°37   22   8.87						
Mor.pass. 11:32						
Mon						
Mon GHA GHA Dec GHA D	23	172°21.50	145°5.50 40.28	179°43.94 19.70	65°19.69 53.25	166°39.40 9.00
0 187°23.97 160°5.07 N10°41.47 194°44.61 504°18.92 80°21.99 N22°53.23 181°41.57 N00°0.12 1 202°6.63 157°6.464 42.65 209°45.27 18.14 9°5°42.99 5°3.22 196°43.75 9.24 2 217°28.90 190°4.20 43.83 224°45.94 17.36 110°26.60 53.20 211°45.93 9.36 42 427°33.82 220°3.34 46.19 25°47.26 115.80 140°31.20 53.17 241°50.28 9.61 526°9.69 236°5.90 47.37 269°47.39 15.02 15°5°43.51 526°5.246 9.73 65°2.26°3.92 38°5.90 47.37 269°47.39 15.02 15°5°35.15 136°5°2.46 9.61 526°3.95 29.00 47.37 269°47.39 15.02 15°5°35.15 136°5°2.46 100°8.85 11.00°8.85	Mer.p	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
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10 338° 47.74 309° 50.17 21.41 345° 7.23 52.38 231° 40.14 52.68 332° 55.62 13.26 11 353° 50.21 324° 49.73 22.58 0° 7.90 51.60 246° 42.43 52.66 347° 57.79 13.38 12 8° 52.67 339° 49.28 N11° 23.74 15° 8.56 503° 50.82 261° 44.72 N22° 52.65 2° 59.97 N00° 13.50 13 23° 55.14 354° 48.84 24.91 30° 9.23 50.04 276° 47.01 52.63 18° 2.15 13.62 14 38° 57.60 9° 48.39 26.07 45° 9.90 49.26 291° 49.31 52.61 33° 4.33 13.74 15° 54° 0.06 24° 47.95 ·· 27.24 60° 10.56 ·· 48.48 306° 51.60 ·· 52.60 48° 6.50 ·· 13.87 16 69° 2.53 39° 47.50 28.40 75° 11.23 47.69 321° 53.89 52.58 63° 8.68 13.99 17 84° 4.99 54° 47.06 29.57 90° 11.90 46.91 336° 56.18 52.56 78° 10.86 14.11 18 99° 7.46 69° 46.61 N11° 30.73 105° 12.57 503° 46.13 351° 58.47 N22° 52.55 93° 13.04 N00° 14.23 19 114° 9.92 84° 46.16 31.89 120° 13.23 45.35 7° 0.76 52.53 108° 15.22 14.35 20 129° 12.38 99° 45.72 33.06 135° 13.90 44.57 22° 3.05 52.51 123° 17.39 14.47 21 144° 14.85 114° 45.27 ·· 34.22 150° 14.57 ·· 43.79 37° 5.34 ·· 52.49 138° 19.57 ·· 14.59 22 159° 17.31 129° 44.82 35.38 165° 15.24 43.01 52° 7.63 52.48 153° 21.75 14.72 23 174° 19.78 144° 44.37 36.54 180° 15.91 42.22 67° 9.92 52.46 168° 23.93 14.84						
10  338° 47.74  309° 50.17  21.41  345° 7.23  52.38  231° 40.14  52.68  332° 55.62  13.26   11  353° 50.21  324° 49.73  22.58  0° 7.90  51.60  246° 42.43  52.66  347° 57.79  13.38   12  8° 52.67  339° 49.28  N11° 23.74  15° 8.56  503° 50.82  261° 44.72  N22° 52.65  2° 59.97  N00° 13.50   13  23° 55.14  354° 48.84  24.91  30° 9.23  50.04  276° 47.01  52.63  18° 2.15  13.62   14  38° 57.60  9° 48.39  26.07  45° 9.90  49.26  291° 49.31  52.61  33° 4.33  13.74   15  54° 0.06  24° 47.95  27.24  60° 10.56  48.48  306° 51.60  52.60  48° 6.50  13.87   16  69° 2.53  39° 47.50  28.40  75° 11.23  47.69  321° 53.89  52.58  63° 8.68  13.99   17  84° 4.99  54° 47.06  29.57  90° 11.90  46.91  336° 56.18  52.56  78° 10.86  14.11   18  99° 7.46  69° 46.61  N11° 30.73  105° 12.57  503° 46.13  351° 58.47  N22° 52.55  93° 13.04  N00° 14.23   19  114° 9.92  84° 46.16  31.89  120° 13.23  45.35  7° 0.76  52.53  108° 15.22  14.35   20  129° 12.38  99° 45.72  33.06  135° 13.90  44.57  22° 3.05  52.51  123° 17.39  14.47   21  144° 14.85  114° 45.27  34.22  150° 14.57  43.79  37° 5.34  52.49  138° 19.57  14.59   22  159° 17.31  129° 44.82  35.38  165° 15.24  43.01  52° 7.63  52.48  153° 21.75  14.72   23  174° 19.78  144° 44.37  36.54  180° 15.91  42.22  67° 9.92  52.46  168° 23.93  14.84						
12 8°52.67 339°49.28 N11°23.74 15°8.56 S03°50.82 261°44.72 N22°52.65 2°59.97 N00°13.50 13 23°55.14 354°48.84 24.91 30°9.23 50.04 276°47.01 52.63 18°2.15 13.62 14 38°57.60 9°48.39 26.07 45°9.90 49.26 291°49.31 52.61 33°4.33 13.74 15 54°0.06 24°47.95 · 27.24 60°10.56 · 48.48 306°51.60 · 52.60 48°6.50 · 13.87 16 69°2.53 39°47.50 28.40 75°11.23 47.69 321°53.89 52.58 63°8.68 13.99 17 84°4.99 54°47.06 29.57 90°11.90 46.91 336°56.18 52.56 78°10.86 14.11 18 99°7.46 69°46.61 N11°30.73 105°12.57 S03°46.13 351°58.47 N22°52.55 93°13.04 N00°14.23 19 114°9.92 84°46.16 31.89 120°13.23 45.35 7°0.76 52.53 108°15.22 14.35 20 129°12.38 99°45.72 33.06 135°13.90 44.57 22°3.05 52.51 123°17.39 14.47 21 144°14.85 114°45.27 · 34.22 150°14.57 · 43.79 37°5.34 · 52.49 138°19.57 · 14.59 22 159°17.31 129°44.82 35.38 165°15.24 43.01 52°7.63 52.46 168°23.93 14.84						332°55.62 13.26
13       23°55.14       354°48.84       24.91       30°9.23       50.04       276°47.01       52.63       18°2.15       13.62         14       38°57.60       9°48.39       26.07       45°9.90       49.26       291°49.31       52.61       33°4.33       13.74         15       54°0.06       24°47.95       27.24       60°10.56       48.48       306°51.60       52.60       48°6.50       13.87         16       69°2.53       39°47.50       28.40       75°11.23       47.69       321°53.89       52.58       63°8.68       13.99         17       84°4.99       54°47.06       29.57       90°11.90       46.91       336°56.18       52.56       78°10.86       14.11         18       99°7.46       69°46.61       N11°30.73       105°12.57       503°46.13       351°58.47       N22°52.55       93°13.04       N00°14.23         19       114°9.92       84°46.16       31.89       120°13.23       45.35       7°0.76       52.53       108°15.22       14.35         20       129°12.38       99°45.72       33.06       135°13.90       44.57       22°3.05       52.51       123°17.39       14.47         21       144°14.85       114°45.27       34.2						
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$						
$\begin{array}{cccccccccccccccccccccccccccccccccccc$						l l
16       69°2.53       39°47.50       28.40       75°11.23       47.69       321°53.89       52.58       63°8.68       13.99         17       84°4.99       54°47.06       29.57       90°11.90       46.91       336°56.18       52.56       78°10.86       14.11         18       99°7.46       69°46.61       N11°30.73       105°12.57       503°46.13       351°58.47       N22°52.55       93°13.04       N00°14.23         19       114°9.92       84°46.16       31.89       120°13.23       45.35       7°0.76       52.53       108°15.22       14.35         20       129°12.38       99°45.72       33.06       135°13.90       44.57       22°3.05       52.51       123°17.39       14.47         21       144°14.85       114°45.27       34.22       150°14.57       43.79       37°5.34       52.49       138°19.57       14.59         22       159°17.31       129°44.82       35.38       165°15.24       43.01       52°7.63       52.48       153°21.75       14.72         23       174°19.78       144°44.37       36.54       180°15.91       42.22       67°9.92       52.46       168°23.93       14.84						
17       84°4.99       54°47.06       29.57       90°11.90       46.91       336°56.18       52.56       78°10.86       14.11         18       99°7.46       69°46.61       N11°30.73       105°12.57       503°46.13       351°58.47       N22°52.55       93°13.04       N00°14.23         19       114°9.92       84°46.16       31.89       120°13.23       45.35       7°0.76       52.53       108°15.22       14.35         20       129°12.38       99°45.72       33.06       135°13.90       44.57       22°3.05       52.51       123°17.39       14.47         21       144°14.85       114°45.27       · 34.22       150°14.57       · 43.79       37°5.34       · 52.49       138°19.57       · 14.59         22       159°17.31       129°44.82       35.38       165°15.24       43.01       52°7.63       52.48       153°21.75       14.72         23       174°19.78       144°44.37       36.54       180°15.91       42.22       67°9.92       52.46       168°23.93       14.84						
18       99°7.46       69°46.61       N11°30.73       105°12.57       S03°46.13       351°58.47       N22°52.55       93°13.04       N00°14.23         19       114°9.92       84°46.16       31.89       120°13.23       45.35       7°0.76       52.53       108°15.22       14.35         20       129°12.38       99°45.72       33.06       135°13.90       44.57       22°3.05       52.51       123°17.39       14.47         21       144°14.85       114°45.27       · 34.22       150°14.57       · 43.79       37°5.34       · 52.49       138°19.57       · 14.59         22       159°17.31       129°44.82       35.38       165°15.24       43.01       52°7.63       52.48       153°21.75       14.72         23       174°19.78       144°44.37       36.54       180°15.91       42.22       67°9.92       52.46       168°23.93       14.84						I
19     114°9.92     84°46.16     31.89     120°13.23     45.35     7°0.76     52.53     108°15.22     14.35       20     129°12.38     99°45.72     33.06     135°13.90     44.57     22°3.05     52.51     123°17.39     14.47       21     144°14.85     114°45.27     · 34.22     150°14.57     · 43.79     37°5.34     · 52.49     138°19.57     · 14.59       22     159°17.31     129°44.82     35.38     165°15.24     43.01     52°7.63     52.48     153°21.75     14.72       23     174°19.78     144°44.37     36.54     180°15.91     42.22     67°9.92     52.46     168°23.93     14.84						
21       144°14.85       114°45.27       · · 34.22       150°14.57       · · 43.79       37°5.34       · · 52.49       138°19.57       · · 14.59         22       159°17.31       129°44.82       35.38       165°15.24       43.01       52°7.63       52.48       153°21.75       14.72         23       174°19.78       144°44.37       36.54       180°15.91       42.22       67°9.92       52.46       168°23.93       14.84						
22       159°17.31       129°44.82       35.38       165°15.24       43.01       52°7.63       52.48       153°21.75       14.72         23       174°19.78       144°44.37       36.54       180°15.91       42.22       67°9.92       52.46       168°23.93       14.84						
23 174°19.78 144°44.37 36.54 180°15.91 42.22 67°9.92 52.46 168°23.93 14.84						
Mer.pass. 11:25 $\nu$ -0.4' d1.2' m-3.92 $\nu$ 0.7' d-0.8' m1.18 $\nu$ 2.3' d-0.0' m-2.21 $\nu$ 2.2' d0.1' m0.92						
	Mer.p	ass. 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

	Stars	
	SHA	Dec
Alpheratz	357°34.09	29°14.03
Ankaa	353°6.55 349°30.48	-42°9.84 56°40.85
Schedar Diphda	349 30.48 348°46.61	-17°50.64
Achernar	335°19.96	-57°6.29
Hamal	$327^{\circ}50.38$	$23^{\circ}35.16$
Polaris	313°54.69 315°11.33	89°22.67 -40°12.12
Acamar Menkar	315°11.33 314°5.34	-40° 12.12 4° 11.48
Mirfak	308°27.17	49°57.36
Aldebaran	290°38.63	$16^{\circ}33.70$
Rigel	281°3.01 280°20.55	-8° 10.41 46° 1.58
Capella Bellatrix	280 20.55 278°21.89	40 1.58 6°22.33
Elnath	278°0.70	28°37.80
Alnilam	275°36.79	-1°11.22
Betelgeuse	270°51.05	7°24.64 -52°42.84
Canopus Sirius	263°51.98 258°25.35	-52 42.84 -16°45.32
Adhara	255°5.04	-29°0.70
Procyon	244°49.70	5°9.36
Pollux Avior	243°15.97 234°14.08	27°57.77 -59°35.89
Avior Suhail	234°14.08 222°45.32	-59° 35.89 -43° 32.57
Miaplacidus	221°37.55	-69°49.74
Alphard	217°46.56	-8°46.52
Regulus	207°33.11	11°50.22 61°36.58
Dubhe Denebola	193°39.14 182°23.60	61°36.58 14°25.37
Gienah	175°42.23	-17°41.44
Acrux	$172^{\circ}58.31$	$-63^{\circ}14.79$
Gacrux	171°49.97	-57° 15.73
Alioth Spica	166°11.50 158°20.93	55°48.89 -11°18.06
Alkaid	150° 50.73	49° 10.71
Hadar	$148^{\circ}34.00$	$-60^{\circ}29.97$
Menkent	147°56.07	-36°30.02
Arcturus Rigil Kent.	145°46.68 139°38.36	19°2.52 -60°56.59
Kochab	137°18.81	74°2.55
Zuben'ubi	$136^{\circ}54.63$	$-16^{\circ}9.17$
Alphecca	126°2.63	26°37.30 -26°29.43
Antares Atria	112°14.41 107°7.52	-26°29.43 -69°4.25
Sabik	102°1.50	-15°45.51
Shaula	96°8.89	-37°7.29
Rasalhague	95°57.52	12°32.22
Eltanin Kaus Aust.	90°41.62 83°31.15	51°28.73 -34°22.25
Vega	80°32.54	38°48.13
Nunki	$75^{\circ}46.53$	$\text{-}26^{\circ}15.82$
Altair	61°59.07	8°56.07
Peacock Deneb	53°4.39 49°25.36	-56° 38.85 45° 22.14
Enif	33°38.04	9°59.57
Al Na'ir	27°32.00	$-46^{\circ}49.95$
Fomalhaut	15°13.72	-29°29.01
Scheat Markab	13°44.56 13°29.20	28° 13.37 15° 20.66
Mar 29 Sun Venus	<b>SHA</b> 333°50.55	Mer.pass 13:19
Mars	8°3.87	13:19
Jupiter	253°1.77	18:39
Saturn	354°24.48	11:55
Mar 30 Mon	SHA	Mer.pass
Venus	332°41.10	13:20
Mars Jupiter	7°20.64 252°58.02	11:01 18:36
Saturn	354°17.61	11:52
Mar 31 Tue		
Venus	<b>SHA</b> 331°31.49	Mer.pass 13:21
Mars	6°37.46	10:59
Jupiter	252°54.09	18:32
Saturn	354°10.73	11:48
Horizor	ıtal parallax	
	Venus:	0.1
I	Mars:	0.1

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°46.72	N03° 17.80	44° 17.21	11.2'	N16°45.46	-13.3'	57.6'
1	193°46.91	18.78	58° 47.41	11.3'	16°32.15	-13.4'	57.6'
2 3	208°47.09 223°47.28	19.75 •• 20.73	73° 17.70 87° 48.09	11.4' 11.5'	16° 18.76 16° 5.30	-13.5' -13.5'	57.6' 57.6'
4	238°47.47	21.70	102° 18.57	11.6'	15°51.76	-13.6'	57.5
5	253°47.66	22.67	$116^{\circ}49.13$	11.7'	15°38.16	-13.7'	57.5'
6	268°47.85	N03°23.65	131° 19.79	11.7'	N15°24.49	-13.7'	57.5'
7 8	283°48.04 298°48.23	24.62 25.60	145°50.54 160°21.38	11.8' 11.9'	15° 10.75 14° 56.95	-13.8' -13.9'	57.5' 57.5'
9	313°48.41	26.57	174° 52.30	12.0'	14° 43.08	-13.9'	57.4'
10	328°48.60	27.54	189°23.31	12.1'	14°29.15	-14.0'	57.4'
11	343°48.79	28.52	203°54.40	12.2'	14°15.16	-14.0'	57.4
12 13	358°48.98 13°49.17	N03°29.49 30.46	218° 25.58 232° 56.84	12.3' 12.3'	N14°1.11 13°47.01	-14.1' -14.2'	57.4' 57.4'
14	28°49.36	31.43	247°28.18	12.4	13°32.84	-14.2'	57.4'
15	43°49.55	• • 32.41	$261^{\circ}59.60$	12.5'	$13^{\circ}18.62$	-14.3'	57.3'
16	58°49.73	33.38	276°31.10 291°2.68	12.6'	13°4.35 12°50.03	-14.3'	57.3'
17 18	73°49.92 88°50.11	34.35 N03°35.32	291°2.68 305°34.34	12.7' 12.7'	N12° 35.65	-14.4' -14.4'	57.3' 57.3'
19	103°50.30	36.30	320°6.08	12.8'	12°21.22	-14.5'	57.3'
20	118°50.49	37.27	334° 37.89	12.9'	12°6.75	-14.5'	57.2'
21	133°50.68	38.24	349°9.77 3°41.73	13.0'	11°52.23 11°37.66	-14.6'	57.2'
22 23	148°50.87 163°51.05	39.21 40.18	3°41.73 18°13.76	13.0' 13.1'	11°37.66 11°23.05	-14.6' -14.7'	57.2' 57.2'
	SD = 16.0'	d = 1.0'			D = 15.7'		- · · · <u>-</u>
	JD — 10.0	u — 1.0		اد	J — 1J.1		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°51.24	N03°41.16 42.13	32°45.86 47°18.03	13.2'	N11°8.40	-14.7'	57.2'
1 2	193°51.43 208°51.62	42.13 43.10	47°18.03 61°50.27	13.2' 13.3'	10°53.71 10°38.97	-14.7' -14.8'	57.1' 57.1'
3	223°51.81	• • 44.07	76°22.58	13.4'	10° 24.20	-14.8'	57.1
4	238°51.99	45.04	$90^{\circ}54.96$	13.4'	$10^{\circ}9.39$	-14.8'	57.1'
5	253°52.18	46.01	105°27.40	13.5'	09°54.55 N09°39.66	-14.9'	57.1'
6 7	268°52.37 283°52.56	N03° 46.98 47.95	119°59.90 134°32.47	13.6' 13.6'	09°24.75	-14.9' -14.9'	57.0' 57.0'
8	298°52.75	48.92	149°5.09	13.7'	09°9.80	-15.0'	57.0'
9	313°52.94	• • 49.89	$163^{\circ}37.78$	13.7'	$08^{\circ}54.83$	-15.0'	57.0'
10	328°53.12	50.86	178° 10.53	13.8'	08°39.82	-15.0'	56.9'
11 12	343°53.31 358°53.50	51.83 N03°52.80	192°43.34 207°16.20	13.9' 13.9'	08°24.78 N08°9.72	-15.1' -15.1'	56.9' 56.9'
13	13°53.69	53.77	221°49.13	14.0'	07°54.63	-15.1'	56.9'
14	28°53.88	54.74	$236^{\circ}22.10$	14.0'	$07^{\circ}39.52$	-15.1'	56.9'
15	43°54.06 58°54.25	• • 55.71	250°55.13 265°28.21	14.1' 14.1'	07°24.38 07°9.23	-15.2' -15.2'	56.8'
16 17	58 54.∠5 73°54.44	56.68 57.65	205 28.21 280°1.35	14.1 14.2'	07 9.23 06°54.05	-15.2'	56.8' 56.8'
18	88°54.63	N03°58.62	294°34.53	14.2'	N06°38.85	-15.2'	56.8'
19	103°54.81	03°59.59	309°7.76	14.3'	06°23.63	-15.2'	56.8'
20	118°55.00 133°55.19	04°0.56 •• 1.53	323° 41.05 338° 14.37	14.3' 14.4'	06°8.40 05°53.14		56.7' 56.7'
21 22	133 55.19 148°55.38	2.50	352°47.75	14.4' 14.4'	05 53.14 05°37.88	-15.3' -15.3'	56.7'
23	163°55.57	3.47	7°21.17	14.5'	05°22.60	-15.3'	56.7'
	SD = 16.0'	d = 1.0'		SI	D = 15.6'		
-							
Tue 0	<b>GHA</b> 178°55.75	<b>Dec</b> N04°4.44	<b>GHA</b> 21°54.63	u 14.5'	<b>Dec</b> N05°7.31	d -15.3'	<b>HP</b> 56.7'
1	176 55.75 193°55.94	5.40	36°28.13	14.5'	04° 52.00	-15.3'	56.6'
2	208°56.13	6.37	51°1.68	14.6'	04°36.69	-15.3'	56.6'
3	223°56.32	• • 7.34	65°35.26 80°8.89	14.6'	04°21.37	-15.3'	56.6'
4 5	238°56.50 253°56.69	8.31 9.28	80°8.89 94°42.55	14.7' 14.7'	04°6.04 03°50.70	-15.3' -15.3'	56.6' 56.6'
6	268°56.88	N04° 10.24	109° 16.25	14.7	N03°35.36	-15.3'	56.5
7	283°57.07	11.21	123°49.98	14.8'	03°20.01	-15.4'	56.5'
8	298°57.25	12.18	138°23.75	14.8'	03°4.66	-15.4'	56.5'
9 10	313°57.44 328°57.63	· · 13.15 14.11	152°57.55 167°31.38	14.8' 14.9'	02°49.30 02°33.95	-15.4' -15.4'	56.5' 56.5'
11	343°57.81	15.08	182°5.24	14.9	02° 18.60	-15.4'	56.4
12	358°58.00	N04° 16.05	196°39.14	14.9'	N02°3.24	-15.4'	56.4'
13	13°58.19	17.02	211° 13.06	14.9'	01°47.89	-15.3'	56.4'
14 15	28°58.38 43°58.56	17.98 •• 18.95	225° 47.01 240° 20.98	15.0' 15.0'	01°32.54 01°17.20	-15.3' -15.3'	56.4' 56.4'
16	58°58.75	19.91	254° 54.98	15.0'	$01^{\circ}1.86$	-15.3'	56.3
17	73°58.94	20.88	269°29.00	15.0'	00°46.53	-15.3'	56.3'
18	88°59.12	N04°21.85	284°3.05	15.1'	N00°31.21	-15.3'	56.3'
19 20	103°59.31 118°59.50	22.81 23.78	298° 37.12 313° 11.21	15.1' 15.1'	00°15.89 N00°0.59	-15.3' -15.3'	56.3' 56.3'
21	133°59.68	. 24.74	327°45.32	15.1	S00° 14.71	15.3	56.2'
22	148°59.87	25.71	$342^{\circ}19.45$	15.1'	00°29.99	15.3'	56.2'
23	164°0.06	26.68	356° 53.59	15.2'	00°45.26	15.3'	56.2'
	SD = 16.0'	d = 1.0'		SI	D = 15.5'		

Lat.	Twilight		Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	02:01	03:54	05:07	19:05	20:19	22:17
<b>N</b> 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
<b>N</b> 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 $10^{\circ}$	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
<b>S</b> 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
$35^{\circ}$	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
<b>S</b> 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
<b>S</b> 60°	04:54	05:43	06:24	17:43	18:25	19:13

Lat.		Moonris	e		Moonset			
Lat.	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		
<b>S</b> 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		
<b>S</b> 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		
<b>S</b> 60°	17:10	17:09	17:08	01:00	02:38	04:11		

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	10-12	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	83-95%	
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		

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	189°22.24	159°43.93 N11°37.70	195°16.57 <b>S</b> 03°41.44	82°12.20 N22°52.44	183°26.11 N00°14.96	Alpheratz 357°34.09 29°14.02
1	204°24.71	174°43.48 38.86	210° 17.24 40.66	97°14.49 52.42	198°28.28 15.08	Ankaa 353°6.55 -42°9.83
2	219°27.17	189°43.03 40.02	225°17.91 39.88	112°16.78 52.41	213°30.46 15.20	Schedar 349°30.48 56°40.84
3 4	234°29.63 249°32.10	204°42.58 · · 41.18	240°18.58 · · 39.10 255°19.25 38.31	127°19.07 · · 52.39	228°32.64 · · 15.32	Diphda 348°46.61 -17°50.63
4 5	249 32.10 264°34.56	219° 42.13 42.34 234° 41.68 43.50	255°19.25 38.31 270°19.92 37.53	142°21.36 52.37 157°23.64 52.35	243°34.82 15.44 258°37.00 15.57	Achernar 335°19.97 -57°6.28
6	279° 37.03	249°41.23 N11°44.66	285°20.58 \$03°36.75	172°25.93 N22°52.34	273°39.17 N00°15.69	Hamal 327°50.38 23°35.15
7	294°39.49	264°40.78 45.81	300°21.25 35.97	187°28.21 52.32	288°41.35 15.81	Polaris 313°55.64 89°22.66
8	309°41.95	279°40.33 46.97	315°21.92 35.19	202°30.50 52.30	303°43.53 15.93	Acamar 315°11.34 -40°12.11
9	324°44.42	294°39.88 · · 48.13	330°22.59 · · 34.40	217°32.79 · · 52.28	318°45.71 · · 16.05	Menkar 314°5.35 4°11.48 Mirfak 308°27.19 49°57.35
10	339° 46.88	309°39.43 49.28	345°23.26 33.62	232°35.07 52.27	333°47.89 16.17	Aldebaran 290°38.64 16°33.70
11	354° 49.35	324°38.98 50.44	0°23.93 32.84	247°37.36 52.25	348°50.06 16.29	Rigel 281°3.02 -8°10.41
12	9°51.81	339°38.52 N11°51.59	15°24.60 \$03°32.06 30°25.27 31.28	262°39.64 N22°52.23 277°41.93 52.21	3°52.24 N00°16.42 18°54.42 16.54	Capella 280°20.58 46°1.57
13 14	24° 54.27 39° 56.74	354°38.07 52.75 9°37.62 53.90	30°25.27 31.28 45°25.94 30.49	277°41.93 52.21 292°44.21 52.19	18°54.42 16.54 33°56.60 16.66	Bellatrix 278°21.91 6°22.33
15	54°59.20	24°37.16 · · 55.05	60°26.60 ·· 29.71	307°46.49 · · 52.18	48°58.78 ·· 16.78	Elnath 278° 0.72 28° 37.80
16	70°1.67	39°36.71 56.21	75°27.27 28.93	322°48.78 52.16	64°0.95 16.90	Alnilam 275°36.80 -1°11.22
17	85°4.13	54°36.26 57.36	90°27.94 28.15	337°51.06 52.14	79°3.13 17.02	Betelgeuse 270°51.07 7°24.64 Canopus 263°52.01 -52°42.84
18	100°6.59	69°35.80 N11°58.51	105°28.61	352°53.34 N22°52.12	94°5.31 N00°17.14	Sirius 258°25.36 -16°45.32
19	115°9.06	84°35.35 11°59.66	120°29.28 26.58	7°55.62 52.10	109°7.49 17.26	Adhara 255°5.06 -29°0.69
20	130°11.52 145°13.99	99°34.89 12°0.81 114°34.44 · · 1.96	135°29.95 25.80 150°30.62 · · 25.02	22°57.91 52.09 38°0.19 · · 52.07	124°9.67 17.39	Procyon 244°49.72 5°9.36
21 22	145 13.99 160°16.45	114°34.44 · · 1.96 129°33.98 3.11	150°30.62 · · 25.02 165°31.29 24.23	38° 0.19 · · 52.07 53° 2.47 52.05	139°11.84 · · 17.51 154°14.02 17.63	Pollux 243°15.99 27°57.78
23	175° 18.91	144°33.53 4.26	180°31.96 23.45	68° 4.75 52.03	169°16.20 17.75	Avior 234°14.11 -59°35.89
_						Suhail 222°45.34 -43°32.57
Mer.p	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	$\nu 2.2' \ d0.1' \ m0.92$	Miaplacidus 221°37.59 -69°49.75 Alphard 217°46.57 -8°46.52
						Regulus 207°33.12 11°50.22
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.15 61°36.59
0	190°21.38	159°33.07 N12°5.41	195°32.63	83°7.03 N22°52.01	184°18.38 N00°17.87	Denebola 182°23.60 14°25.37
1	205°23.84	174°32.61 6.56	210°33.30 21.89	98° 9.31 51.99	199°20.56 17.99	Gienah 175°42.23 -17°41.44
2	220°26.31 235°28.77	189°32.16 7.71 204°31.70 · · 8.86	225°33.97 21.10 240°34.64 · · 20.32	113°11.59 51.98 128°13.87 · · 51.96	214°22.74 18.11 229°24.91 · · 18.23	Acrux 172°58.32 -63°14.80
4	250°31.23	219°31.24 10.00	255°35.31 19.54	143°16.15 51.94	244°27.09 18.35	Gacrux 171°49.97 -57°15.74
5	265°33.70	234°30.78 11.15	270°35.98 18.76	158°18.43 51.92	259°29.27 18.48	Alioth 166°11.50 55°48.91
6	280°36.16	249°30.33 N12°12.30	285°36.65 <b>S</b> 03°17.97	173°20.71 N22°51.90	274°31.45 N00°18.60	Spica 158°20.92 -11°18.07 Alkaid 152°50.72 49°10.73
7	295°38.63	264°29.87 13.44	300° 37.32 17.19	188°22.99 51.88	289°33.63 18.72	Hadar 148°33.99 -60°29.98
8	310°41.09	279°29.41 14.59	315° 37.99 16.41	203°25.27 51.86	304°35.81 18.84	Menkent 147°56.07 -36°30.03
9	325° 43.55	294°28.95 · · 15.73	330°38.67 · · 15.62	218°27.54 · · 51.85	319°37.98 · · 18.96	Arcturus 145°46.67 19°2.53
10 11	340°46.02 355°48.48	309°28.49 16.88 324°28.03 18.02	345°39.34 14.84 0°40.01 14.06	233°29.82 51.83 248°32.10 51.81	334°40.16 19.08 349°42.34 19.20	Rigil Kent. 139°38.34 -60°56.61
12	10° 50.95	339°27.57 N12°19.16	15°40.68 \$03°13.27	263°34.38 N22°51.79	4°44.52 N00°19.32	Kochab 137°18.78 74°2.57
13	25°53.41	354°27.11 20.30	30°41.35 12.49	278°36.65 51.77	19°46.70 19.44	Zuben'ubi 136°54.62 -16°9.17
14	40°55.87	9°26.65 21.45	45°42.02 11.71	293°38.93 51.75	34°48.87 19.56	Alphecca 126°2.61 26°37.31 Antares 112°14.40 -26°29.44
15	55°58.34	24°26.19 · · 22.59	60°42.69 · · 10.93	308°41.20 · · 51.73	49°51.05 · · 19.69	Antares 112°14.40 -26°29.44 Atria 107°7.47 -69°4.26
16	71°0.80	39°25.72 23.73	75° 43.36 10.14	323°43.48 51.71	64°53.23 19.81	Sabik 102°1.49 -15°45.51
17	86°3.27	54°25.26 24.87	90°44.03 9.36	338°45.76 51.69	79°55.41 19.93	Shaula 96°8.87 -37°7.30
18	101°5.73	69°24.80 N12°26.01	105°44.71 \$03°8.58 120°45.38 7.79	353°48.03 N22°51.68 8°50.30 51.66	94°57.59 N00°20.05	Rasalhague 95°57.50 12°32.22
19 20	116°8.19 131°10.66	84°24.34 27.15 99°23.87 28.29	120° 45.38 7.79 135° 46.05 7.01	8°50.30 51.66 23°52.58 51.64	109°59.77 20.17 125°1.95 20.29	Eltanin 90°41.59 51°28.73
21	146° 13.12	114°23.41 · · 29.42	150°46.72 · · 6.23	38°54.85 · · 51.62	140°4.12 · · 20.41	Kaus Aust. 83°31.13 -34°22.25
22	161° 15.59	129°22.95 30.56	165° 47.39 5.44	53°57.13 51.60	155°6.30 20.53	Vega 80°32.51 38°48.13
23	176° 18.05	144°22.48 31.70	180°48.06 4.66	68°59.40 51.58	170°8.48 20.65	Nunki 75°46.51 -26°15.82 Altair 61°59.05 8°56.07
Merr	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	Peacock 53°4.36 -56°38.84
- IVICI.	7833. 11.17	ν-0.3 d1.1 III-3.92			V2.2 do.1 mo.32	Deneb 49°25.34 45°22.13
						Enif 33°38.03 9°59.57
Fri 0	<b>GHA</b> 191°20.51	<b>GHA Dec</b> 159°22.02 N12°32.84	<b>GHA Dec</b> 195° 48.74 \$03° 3.88	<b>GHA Dec</b> 84°1.67 N22°51.56	<b>GHA Dec</b> 185°10.66 N00°20.77	Al Na'ir 27°31.98 -46°49.94
1	206° 22.98	174°21.55 33.97	210°49.41 3.09	99° 3.95 51.54	200°12.84 20.90	Fomalhaut 15°13.71 -29°29.00
2	221°25.44	189°21.09 35.11	225°50.08 2.31	114° 6.22 51.52	215°15.02 21.02	Scheat 13°44.55 28°13.36 Markab 13°29.19 15°20.66
3	$236^{\circ}27.91$	204°20.62 · · 36.24	240°50.75 · · 1.53	129°8.49 · · 51.50	230°17.19 · · 21.14	
4	251°30.37	219°20.15 37.38	255°51.42 0.74	144°10.76 51.48	245°19.37 21.26	Apr 01 Wed SHA Mer.pass
5	266°32.83	234°19.69 38.51	270°52.10 02°59.96	159°13.03 51.46	260°21.55 21.38	Venus 330°21.69 13:21
6	281°35.30	249°19.22 N12°39.65	285°52.77 \$02°59.18	174°15.31 N22°51.44	275°23.73 N00°21.50	Mars 5°54.33 10:58 Jupiter 252°49.96 18:28
7	296°37.76 311°40.23	264°18.75 40.78 279°18.29 41.91	300° 53.44 58.39 315° 54.11 57.61	189°17.58 51.42 204°19.85 51.40	290°25.91 21.62 305°28.09 21.74	Saturn 354°3.86 11:45
8 9	311 40.23 326° 42.69	294°17.82 · · 43.04	330°54.79 · · 56.83	219°22.12 · · 51.38	305°28.09 21.74 320°30.27 · · 21.86	
10	341°45.16	309°17.35 44.18	345°55.46 56.04	234°24.39 51.37	335°32.44 21.98	Apr 02 Thu SHA Mer.pass
11	356° 47.62	324°16.88 45.31	0°56.13 55.26	249°26.66 51.35	350°34.62 22.10	Venus 329°11.69 13:22 Mars 5°11.25 10:57
12	11°50.08	339°16.41 N12°46.44	15°56.81 S02°54.47	264°28.93 N22°51.33	5°36.80 N00°22.22	Mars 5°11.25 10:57 Jupiter 252°45.65 18:25
13	26°52.55	354°15.94 47.57	30°57.48 53.69	279°31.19 51.31	20°38.98 22.34	Saturn 353°57.00 11:41
14 15	41°55.01	9°15.47 48.70	45°58.15 52.91	294°33.46 51.29	35°41.16 22.47	
15 16	56° 57.48 71° 59.94	24°15.00 · · 49.82 39°14.53 50.95	60°58.82 · · 52.12 75°59.50 51.34	309°35.73 · · 51.27 324°38.00 51.25	50°43.34 · · 22.59 65°45.52 22.71	Apr 03 Fri         SHA         Mer.pass           Venus         328°1.50         13:23
17	87°2.40	54°14.06 52.08	91°0.17 50.56	339°40.27 51.23	80°47.69 22.83	Venus 328°1.50 13:23 Mars 4°28.22 10:56
18	102°4.87	69°13.59 N12°53.21	106°0.84 S02°49.77	354°42.54 N22°51.21	95°49.87 N00°22.95	Jupiter 252°41.16 18:21
19	117°7.33	84°13.12 54.33	121°1.52 48.99	9°44.80 51.19	110°52.05 23.07	Saturn 353°50.14 11:38
20	132°9.80	99° 12.65 55.46	136°2.19 48.20	24°47.07 51.17	125°54.23 23.19	
21	147°12.26	114°12.17 · · 56.59	151°2.86 · · 47.42	39°49.34 · · 51.15	140°56.41 · · 23.31	Horizontal parallax Venus: 0.1
22 23	162° 14.72 177° 17.19	129°11.70 57.71 144°11.23 58.84	166°3.54 46.64 181°4.21 45.85	54°51.60 51.13 69°53.87 51.11	155°58.59 23.43 171°0.77 23.55	Mars: 0.1
Mer.p	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	

h	Sun		Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°0.25	N04°27.64	11°27.75	15.2'	S01°0.52	15.2'	56.2'
1 2	194°0.43 209°0.62	28.61 29.57	26°1.93 40°36.12	15.2' 15.2'	01°15.76 01°30.99	15.2' 15.2'	56.2' 56.1'
3	209 0.02 224°0.80	30.54	55°10.32	15.2'	01°46.19	15.2'	56.1'
4	239°0.99	31.50	69°44.54	15.2'	02°1.38	15.2'	56.1'
5	254°1.18	32.47	84°18.76	15.2'	02°16.55	15.2'	56.1'
6	269°1.36 284°1.55	N04°33.43 34.39	98°53.00 113°27.24	15.2' 15.3'	\$02°31.71 02°46.84	15.1' 15.1'	56.0' 56.0'
7 8	284 1.55 299°1.74	34.39 35.36	113 27.24 128°1.49	15.3'	02 46.84 03°1.94	15.1'	56.0'
9	314°1.92	36.32	142°35.75	15.3'	03° 17.03	15.1'	56.0'
10	329°2.11	37.29	157°10.02	15.3'	03°32.09	15.0'	56.0'
11 12	344°2.30 359°2.48	38.25 N04°39.21	171°44.29 186°18.56	15.3' 15.3'	03°47.12 \$04°2.13	15.0' 15.0'	55.9' 55.9'
13	14° 2.67	40.18	200°52.84	15.3'	04° 17.12	15.0'	55.9'
14	29°2.85	41.14	215°27.11	15.3'	04°32.07	14.9'	55.9'
15	44°3.04	• • 42.10	230°1.39	15.3'	04°47.00	14.9'	55.9'
16 17	59°3.23 74°3.41	43.07 44.03	244°35.67 259°9.94	15.3' 15.3'	05°1.89 05°16.76	14.9' 14.8'	55.8' 55.8'
18	89°3.60	N04° 44.99	273°44.21	15.3'	505°31.59	14.8	55.8'
19	104°3.78	45.95	288°18.48	15.3'	05°46.39	14.8'	55.8'
20	119°3.97	46.92	302°52.75	15.3'	06°1.15	14.7'	55.8'
21	134°4.16	• • 47.88	317°27.01 332°1.26	15.3'	06° 15.88	14.7'	55.7'
22 23	149°4.34 164°4.53	48.84 49.80	332°1.26 346°35.51	15.2' 15.2'	06° 30.58 06° 45.23	14.7' 14.6'	55.7' 55.7'
	SD = 16.0'	d = 1.0'			$00^{\circ} + 3.23^{\circ}$ $0 = 15.3^{\circ}$		
	JD — 10.0°	u — 1.0		)L	, — 13.3		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°4.71	N04° 50.76	1°9.74	15.2'	\$06°59.85	14.6'	55.7'
1 2	194°4.90 209°5.08	51.73 52.69	15°43.97 30°18.19	15.2' 15.2'	07° 14.44 07° 28.98	14.5' 14.5'	55.7' 55.6'
3	224°5.27	• • 53.65	44°52.39	15.2'	07°43.48	14.5'	55.6'
4	239°5.45	54.61	$59^{\circ}26.59$	15.2'	$07^{\circ}57.94$	14.4'	55.6'
5	254°5.64	55.57	74°0.77	15.2'	08° 12.35	14.4'	55.6'
6 7	269°5.82 284°6.01	N04° 56.53 57.49	88°34.93 103°9.09	15.2' 15.1'	\$08°26.73 08°41.06	14.3' 14.3'	55.6' 55.5'
8	299°6.19	58.45	103 9.09 117°43.22	15.1'	08°55.34	14.2'	55.5'
9	314°6.38	$04^{\circ}59.41$	$132^{\circ}17.34$	15.1'	$09^{\circ}9.58$	14.2'	55.5'
10	329°6.56	05°0.37	146°51.44	15.1'	09°23.77	14.1'	55.5'
11 12	344°6.75 359°6.93	1.33 N05°2.29	161°25.52 175°59.59	15.1' 15.0'	09°37.91 \$09°52.00	14.1' 14.0'	55.5' 55.4'
13	14°7.12	3.25	175 59.59 190°33.63	15.0'	10°6.05	14.0'	55.4'
14	29°7.30	4.21	205°7.65	15.0'	10°20.04	13.9'	55.4'
15	44°7.49	• • 5.17	219°41.65	15.0'	10°33.98	13.9'	55.4'
16 17	59°7.67 74°7.86	6.13 7.09	234°15.63 248°49.58	15.0' 14.9'	10°47.87 11°1.70	13.8' 13.8'	55.4' 55.4'
18	89°8.04	N05°8.05	263°23.51	14.9'	S11°15.48	13.7	55.3'
19	104°8.23	9.01	277°57.42	14.9'	11°29.21	13.7'	55.3'
20	119°8.41	9.97	292°31.29		11°42.88		55.3'
21 22	134°8.60 149°8.78	· · 10.93 11.89	307°5.15 321°38.97	14.8' 14.8'	11°56.49 12°10.04	13.6' 13.5'	55.3' 55.3'
23	164°8.96	12.84	336°12.76	14.8	12°10.04	13.4	55.2'
	SD = 16.0'	d = 1.0'			0 = 15.2'		
	<u> </u>	<u>u = 1.0</u>		JL	7 — 13.2		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°9.15 194°9.33	N05° 13.80	350°46.53 5°20.26	14.7'	\$12°36.97 12°50.34	13.4'	55.2'
1 2	194°9.33 209°9.52	14.76 15.72	5°20.26 19°53.97	14.7' 14.7'	12°50.34 13°3.66	13.3' 13.2'	55.2' 55.2'
3	209 9.32 224°9.70	16.68	34°27.64	14.6'	13° 16.91	13.2'	55.2'
4	239°9.88	17.63	49°1.28	14.6'	13°30.09	13.1'	55.1'
5	254°10.07	18.59	63°34.89	14.6'	13°43.21	13.1'	55.1'
6 7	269°10.25 284°10.44	N05° 19.55 20.50	78°8.46 92°42.00	14.5' 14.5'	\$13°56.27 14°9.26	13.0' 12.9'	55.1' 55.1'
8	299°10.62	21.46	107°15.50	14.5'	14° 22.18	12.9'	55.1'
9	314°10.80	• • 22.42	$121^{\circ}48.97$	14.4'	14°35.04	12.8'	55.1'
10	329°10.99	23.37	136°22.41	14.4	14° 47.82	12.7'	55.0'
11 12	344°11.17 359°11.35	24.33 N05°25.29	150°55.80 165°29.16	14.4' 14.3'	15°0.54 \$15°13.19	12.6' 12.6'	55.0' 55.0'
13	14°11.54	26.24	180°2.48	14.3'	15°25.76	12.5'	55.0'
14	29°11.72	27.20	$194^{\circ}35.76$	14.2'	15°38.27	12.4'	55.0'
15	44°11.90	• 28.15	209°9.00	14.2'	15°50.70	12.4'	55.0'
16 17	59°12.09 74°12.27	29.11 30.07	223°42.19 238°15.35	14.2' 14.1'	16°3.05 16°15.33	12.3' 12.2'	54.9' 54.9'
18	89°12.45	30.07 N05°31.02	252°48.47	14.1	16° 15.33 \$16° 27.54	12.1'	54.9'
19	104°12.63	31.98	267°21.55	14.0'	16°39.67	12.1'	54.9'
20	119°12.82	32.93	281°54.58	14.0'	16°51.72	12.0'	54.9'
21 22	134°13.00 149°13.18	· · 33.89 34.84	296°27.57 311°0.52	13.9' 13.9'	17°3.69 17°15.59	11.9' 11.8'	54.9' 54.8'
22	149°13.18 164°13.37	34.84 35.79	311°0.52 325°33.42	13.9'	17°15.59 17°27.40	11.8	54.8'
	SD = 16.0'	d = 1.0'			0 = 15.1'		25
	JD — 10.0	<u>u — 1.0</u>		JL	- 13.1		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	01:25	03:35	04:51	19:19	20:36	22:55
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 60°	05:01	05:50	06:31	17:34	18:16	19:04

Lat.		Moonris	е		Moonset	
Lat.	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	17:07	17:07	17:07	05:40	07:08	08:38

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	13-15	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	99-99%	
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		

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	192° 19.65	159°10.76 N12°59.96	196°4.88 \$02°45.07	84°56.13 N22°51.09	186°2.95 N00°23.67	
1	207° 22.12	174°10.28 1.08	211°5.56 44.28	99°58.40 51.06	201°5.12 23.79	Alpheratz 357°34.08 29°14.01
2	222° 24.58	189°9.81 2.21	226°6.23 43.50	115°0.66 51.04	216°7.30 23.91	Ankaa 353°6.55 -42°9.81
3	237°27.04	204°9.33 · · 3.33	241°6.91 · · 42.72	130°2.93 · · 51.02	231°9.48 · · 24.03	Schedar 349° 30.48 56° 40.82
4	$252^{\circ}29.51$	219°8.86 4.45	256°7.58 41.93	145°5.19 51.00	246°11.66 24.15	Diphda 348°46.61 -17°50.63 Achernar 335°19.98 -57°6.26
5	$267^{\circ}31.97$	234°8.38 5.57	271°8.25 41.15	160°7.46 50.98	261°13.84 24.27	Hamal 327°50.39 23°35.15
6	282°34.44	249°7.91 N13°6.69	286°8.93 <b>S</b> 02°40.36	175°9.72 N22°50.96	276°16.02 N00°24.40	Polaris 313°56.29 89°22.64
7	297°36.90	264°7.43 7.81	301°9.60 39.58	190°11.98 50.94	291°18.20 24.52	Acamar 315°11.35 -40°12.10
8	312°39.36	279°6.95 8.93	316°10.28 38.80	205°14.25 50.92	306°20.38 24.64	Menkar 314°5.36 4°11.48
9	327°41.83 342°44.29	294°6.48 · · 10.05	331°10.95 · · 38.01 346°11.63 37.23	220°16.51 · · 50.90	321°22.55 · · 24.76	Mirfak 308°27.20 49°57.34
10 11	357° 46.76	309°6.00 11.17 324°5.52 12.29	346°11.63 37.23 1°12.30 36.44	235°18.77 50.88 250°21.03 50.86	336°24.73 24.88 351°26.91 25.00	Aldebaran 290°38.65 16°33.69
12	12°49.22	339°5.04 N13°13.41	16°12.98 S02°35.66	265°23.29 N22°50.84	6°29.09 N00°25.12	Rigel 281°3.04 -8°10.41
13	27°51.69	354°4.57 14.52	31°13.65 34.88	280°25.56 50.82	21°31.27 25.24	Capella 280°20.60 46°1.57
14	42°54.15	9°4.09 15.64	46° 14.32 34.09	295°27.82 50.80	36°33.45 25.36	Bellatrix 278°21.92 6°22.33
15	$57^{\circ}56.61$	24°3.61 · · 16.76	61°15.00 · · 33.31	310°30.08 · · 50.78	51°35.63 · · 25.48	Elnath 278°0.73 28°37.80 Alnilam 275°36.82 -1°11.22
16	$72^{\circ}59.08$	39°3.13 17.87	76°15.67 32.52	325°32.34 50.76	66°37.81 25.60	Alnilam 275°36.82 -1°11.22 Betelgeuse 270°51.08 7°24.64
17	88°1.54	54°2.65 18.99	91°16.35 31.74	340°34.60 50.73	81°39.99 25.72	Canopus 263°52.04 -52°42.84
18	103°4.01	69°2.17 N13°20.10	106°17.02 <b>S</b> 02°30.95	355°36.86 N22°50.71	96°42.17 N00°25.84	Sirius 258°25.38 -16°45.32
19	118°6.47	84°1.69 21.21	121°17.70 30.17	10°39.12 50.69	111°44.34 25.96	Adhara 255°5.08 -29°0.70
20	133°8.93	99°1.21 22.33	136° 18.37 29.39	25°41.38 50.67	126°46.52 26.08	Procyon 244°49.73 5°9.36
21 22	148° 11.40 163° 13.86	114°0.73 · · 23.44 129°0.24 24.55	151°19.05 · · 28.60 166°19.72 27.82	40°43.64 · · 50.65 55°45.90 50.63	141°48.70 · · 26.20 156°50.88 26.32	Pollux 243°16.01 27°57.78
23	103 15.00 178° 16.33	143°59.76 25.66	181°20.40 27.03	55°45.90 50.63 70°48.15 50.61	156°50.88 26.32 171°53.06 26.44	Avior 234°14.14 -59°35.90
		-				Suhail 222°45.36 -43°32.58
Mer.	pass. 11:09	ν-0.5′ d1.1′ m-3.92	$\nu$ 0.7′ <i>d</i> -0.8′ m1.19	$\nu 2.3' \ d$ -0.0' m-2.18	$\nu 2.2' \ d0.1' \ \text{m}0.93$	Miaplacidus 221° 37.63 -69° 49.76
						Alphard 217°46.58 -8°46.53 Regulus 207°33.13 11°50.22
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.13 11°50.22 Dubhe 193°39.17 61°36.60
0	193° 18.79	158°59.28 N13°26.77	196°21.08	85°50.41 N22°50.59	186°55.24 N00°26.56	Denebola 182°23.61 14°25.38
1	208° 21.25	173°58.80 27.88	211°21.75 25.46	100°52.67 50.57	201°57.42 26.68	Gienah 175°42.23 -17°41.45
2	223° 23.72	188°58.31 28.99	226°22.43 24.68	115°54.93 50.54	216°59.60 26.80	Acrux 172°58.31 -63°14.82
3 4	238° 26.18 253° 28.65	203°57.83 ··· 30.10 218°57.35	241°23.10 · · 23.89 256°23.78 23.11	130°57.18 · · 50.52 145°59.44 50.50	232°1.78 · · 26.92 247°3.96	Gacrux 171°49.97 -57°15.76
5	268° 31.11	233°56.86 32.32	271°24.45 22.33	161°1.70 50.48	262°6.14 27.16	Alioth 166°11.50 55°48.92
6	283° 33.57	248°56.38 N13°33.43	286°25.13 S02°21.54	176°3.95 N22°50.46	277°8.31 N00°27.28	Spica 158°20.92 -11°18.07
7	298°36.04	263°55.89 34.53	301°25.81 20.76	191°6.21 50.44	292°10.49 27.40	Alkaid 152°50.72 49°10.74 Hadar 148°33.97 -60°30.00
8	$313^{\circ}38.50$	278°55.41 35.64	316°26.48 19.97	206°8.46 50.42	307°12.67 27.52	Menkent 147°56.06 -36°30.04
9	328°40.97	293°54.92 · · 36.74	331°27.16 · · 19.19	221°10.72 · · 50.39	322°14.85 · · 27.64	Arcturus 145°46.66 19°2.53
10	343°43.43	308°54.43 37.85	346°27.83 18.40	236°12.97 50.37	337°17.03 27.76	Rigil Kent. 139°38.32 -60°56.62
11	358° 45.90 13° 48.36	323°53.95 38.95	1°28.51 17.62 16°29.19 \$02°16.83	251°15.23 50.35	352°19.21 27.88 7°21.39 N00°28.00	Kochab 137°18.76 74°2.58
12 13	28° 50.82	338°53.46 N13°40.06 353°52.97 41.16	16°29.19 \$02°16.83 31°29.86 16.05	266°17.48 N22°50.33 281°19.74 50.31	7°21.39 N00°28.00 22°23.57 28.13	Zuben'ubi 136°54.61 -16°9.18
14	43°53.29	8°52.48 42.26	46°30.54 15.26	296°21.99 50.29	37°25.75 28.25	Alphecca 126°2.60 26°37.32
15	58° 55.75	23°52.00 · · 43.37	61°31.22 · · 14.48	311°24.24 · · 50.26	52°27.93 · · 28.37	Antares 112°14.38 -26°29.44
16	73°58.22	38°51.51 44.47	76°31.89 13.69	326°26.50 50.24	67°30.11 28.49	Atria 107°7.42 -69°4.26 Sabik 102°1.47 -15°45.51
17	89°0.68	53°51.02 45.57	91°32.57 12.91	341°28.75 50.22	82°32.29 28.61	Shaula 96°8.84 -37°7.30
18	104°3.14	68°50.53 N13°46.67	106°33.25 S02°12.12	356°31.00 N22°50.20	97°34.47 N00°28.73	Rasalhague 95°57.49 12°32.23
19	119°5.61	83°50.04 47.77	121°33.92 11.34	11°33.25 50.18	112°36.65 28.85	Eltanin 90°41.56 51°28.74
20 21	134°8.07 149°10.54	98°49.55 48.87 113°49.06 •• 49.97	136°34.60 10.56 151°35.28 · · 9.77	26°35.51 50.15 41°37.76 · · 50.13	127°38.83 28.97 142°41.00 •• 29.09	Kaus Aust. 83°31.11 -34°22.25
22	164° 13.00	128° 48.57 51.07	166°35.95 8.99	56°40.01 50.11	157°43.18 29.21	Vega 80°32.49 38°48.13
23	179° 15.47	143°48.07 52.16	181°36.63 8.20	71°42.26 50.09	172°45.36 29.33	Nunki 75°46.49 -26°15.81
				-		Altair 61°59.04 8°56.08 Peacock 53°4.33 -56°38.83
ivier.	pass. 11:05	ν-0.5′ d1.1′ m-3.92	$\nu 0.7' \ d$ -0.8' m1.19	ν2.3′ d-0.0′ m-2.17	$\nu 2.2' \ d0.1' \ \text{m}0.93$	Deneb 49°25.31 45°22.13
						Enif 33°38.01 9°59.57
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27° 31.96 -46° 49.93
0	194° 17.93	158° 47.58 N13° 53.26	196°37.31	86°44.51 N22°50.07	187°47.54 N00°29.45	Fomalhaut 15°13.70 -29°28.99
1 2	209° 20.39 224° 22.86	173°47.09 54.36 188°46.60 55.45	211°37.98 6.63 226°38.66 5.85	101°46.76 50.04 116°49.01 50.02	202°49.72 29.57 217°51.90 29.69	Scheat 13°44.54 28°13.35
3	239° 25.32	203°46.10 · · 56.55	241°39.34 · · 5.06	131°51.26 · · 50.00	232°54.08 · · 29.81	Markab 13°29.18 15°20.66
4	254° 27.79	218° 45.61 57.64	256° 40.02 4.28	146°53.51 49.98	247°56.26 29.93	Apr 04 Sat SHA Mer.pass
5	269° 30.25	233°45.12 58.74	271°40.69 3.49	161°55.76 49.96	262°58.44 30.05	Venus 326° 51.10 13:24
6	284°32.71	248°44.62 N13°59.83	286°41.37 \$02°2.71	176°58.01 N22°49.93	278°0.62 N00°30.16	Mars 3° 45.23 10:55
7	$299^{\circ}35.18$	263°44.13 14°0.92	301°42.05 1.92	192°0.26 49.91	293°2.80 30.28	Jupiter 252° 36.48 18:17
8	314° 37.64	278°43.63 2.02	316° 42.73 1.14	207°2.50 49.89	308°4.98 30.40	Saturn 353°43.29 11:34
9	329°40.11	293°43.14 · · 3.11	331°43.40 02°0.35	222°4.75 · · 49.87	323°7.16 · · 30.52	Apr 05 Sun SHA Mer.pass
10	344° 42.57	308° 42.64 4.20	346°44.08 01°59.57	237°7.00 49.84	338°9.34 30.64 353°11.52 30.76	Venus 325° 40.49 13:24
11 12	359° 45.03 14° 47.50	323°42.15 5.29 338°41.65 N14°6.38	1°44.76 58.78 16°45.44 \$01°58.00	252° 9.25 49.82 267° 11.49 N22° 49.80	353°11.52 30.76 8°13.70 N00°30.88	Mars 3°2.29 10:54
13	29°49.96	353°41.15 7.47	31°46.11 57.21	282°13.74 49.78	23°15.88 31.00	Jupiter 252°31.62 18:14
14	44° 52.43	8°40.65 8.56	46°46.79 56.43	297°15.99 49.75	38°18.06 31.12	Saturn 353°36.45 11:31
15	59°54.89	23°40.16 · · 9.65	61°47.47 · · 55.64	312°18.23 · · 49.73	53°20.24 · · 31.24	Apr 06 Mon SHA Mer.pass
16	74° 57.36	38°39.66 10.73	76° 48.15 54.86	327°20.48 49.71	68°22.42 31.36	Venus 324°29.65 13:25
17	89°59.82	53°39.16 11.82	91°48.83 54.07	342°22.72 49.68	83°24.60 31.48	Mars 2°19.38 10:53
18	105°2.28	68°38.66 N14°12.91	106°49.50 S01°53.29	357°24.97 N22°49.66	98°26.78 N00°31.60	Jupiter 252°26.58 18:10
19 20	120°4.75 135°7.21	83°38.16 13.99 98°37.66 15.08	121°50.18 52.50 136°50.86 51.72	12°27.21 49.64 27°29.46 49.62	113°28.96 31.72 128°31.14 31.84	Saturn 353°29.61 11:27
21	150°9.68	113°37.16 · · 16.16	150 50.60 51.72 151°51.54 · · 50.93	42°31.70 · · 49.59	143°33.32 · · 31.96	Horizontal parallax
22	165° 12.14	128°36.66 17.25	166° 52.22 50.15	57°33.95 49.57	158°35.50 32.08	Venus: 0.1
23	$180^{\circ}14.60$	143°36.16 18.33	181°52.90 49.36	72°36.19 49.55	173°37.68 32.20	Mars: 0.1
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	

h	Su	n	Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°13.55	N05°36.75	340°6.28	13.8'	<b>S</b> 17°39.13	11.7'	54.8'
1	194°13.73	37.70	354°39.09	13.8'	17°50.79	11.6'	54.8'
2	209°13.91 224°14.09	38.66 •• 39.61	9°11.86 23°44.58	13.7' 13.7'	18°2.36 18°13.84	11.5' 11.4'	54.8' 54.8'
4	239°14.28	40.56	38° 17.25	13.6'	18° 25.25	11.4	54.7'
5	254°14.46	41.52	52°49.88	13.6'	18° 36.56	11.2'	54.7'
6	269°14.64	N05°42.47	67°22.46	13.5'	<b>S</b> 18°47.79	11.1'	54.7'
7	284°14.82	43.42	81°54.99	13.5'	18°58.94	11.1'	54.7'
8	299°15.01	44.38	96°27.48	13.4'	19° 10.00	11.0'	54.7'
9 10	314°15.19 329°15.37	· · 45.33 46.28	110°59.91 125°32.30	13.4' 13.3'	19° 20.97 19° 31.85	10.9' 10.8'	54.7' 54.7'
11	344°15.55	47.23	140°4.64	13.3'	19° 42.64	10.7	54.6'
12	359°15.73	N05°48.19	154°36.93	13.2'	S19°53.34	10.6'	54.6'
13	14°15.91	49.14	169°9.17	13.2'	20°3.94	10.5'	54.6'
14	29°16.10 44°16.28	50.09	183°41.36 198°13.50	13.1' 13.1'	20°14.46 20°24.88	10.4'	54.6'
15 16	59°16.46	•• 51.04 51.99	212° 45.59	13.1	20°24.88 20°35.21	10.3' 10.2'	54.6' 54.6'
17	74°16.64	52.94	227° 17.63	13.0'	20°45.45	10.1	54.6'
18	89°16.82	N05°53.90	241°49.61	12.9'	S20°55.58	10.0'	54.5'
19	104°17.00	54.85	256° 21.55	12.9'	21°5.63	9.9'	54.5'
20	119°17.18	55.80	270°53.43 285°25.27	12.8'	21°15.57	9.8'	54.5'
21 22	134°17.36 149°17.54	•• 56.75 57.70	285°25.27 299°57.05	12.8' 12.7'	21°25.42 21°35.17	9.7' 9.6'	54.5' 54.5'
23	164°17.73	58.65	314°28.78	12.7'	21°44.82	9.5'	54.5
	SD = 16.0'	d = 1.0'			0 = 14.9'		
	JD — 10.0°	u — 1.0	-	)L	— 14.9°		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°17.91	N05°59.60	329°0.46	12.6'	\$21°54.37	9.4'	54.5'
1 2	194°18.09 209°18.27	06°0.55 1.50	343°32.08 358°3.66	12.6' 12.5'	22°3.82 22°13.16	9.3' 9.2'	54.4' 54.4'
3	209 18.27 224°18.45	. 2.45	12°35.18	12.5'	22°22.41	9.2	54.4
4	239°18.63	3.40	27°6.65	12.4'	22°31.55	9.0'	54.4'
5	254°18.81	4.35	41°38.07	12.4'	$22^{\circ}40.58$	8.9'	54.4'
6	269°18.99	N06°5.29	56°9.44	12.3'	S22°49.52	8.8'	54.4'
7 8	284°19.17 299°19.35	6.24 7.19	70°40.75 85°12.01	12.3' 12.2'	22°58.34 23°7.06	8.7' 8.6'	54.4' 54.4'
9	314°19.53	. 8.14	99° 43.22	12.2'	23°15.68	8.5'	54.4'
10	329°19.71	9.09	114° 14.38	12.1'	23°24.18	8.4'	54.3'
11	344°19.89	10.04	128°45.49	12.1'	$23^{\circ}32.58$	8.3'	54.3'
12	359°20.07	N06° 10.98	143° 16.54	12.0'	\$23°40.87	8.2'	54.3'
13 14	14°20.25 29°20.43	11.93 12.88	157° 47.55 172° 18.50	12.0' 11.9'	23°49.05 23°57.12	8.1' 8.0'	54.3' 54.3'
15	44°20.61	13.83	186° 49.40	11.9'	23 57.12 24°5.07	7.8	54.3'
16	59°20.79	14.77	201°20.25	11.8'	24° 12.92	7.7'	54.3'
17	74°20.96	15.72	$215^{\circ}51.05$	11.7'	$24^{\circ}20.65$	7.6'	54.3'
18	89°21.14	N06° 16.67	230°21.80	11.7'	\$24°28.27	7.5'	54.3'
19 20	104°21.32 119°21.50	17.62 18.56	244°52.50 259°23.15	11.6' 11.6'	24°35.78 24°43.17	7.4' 7.3'	54.3' 54.2'
21	134°21.68	19.51	273° 53.74	11.6'	24 43.17 24°50.44	7.3 7.2'	54.2'
22	149°21.86	20.45	288° 24.29	11.5'	24°57.60	7.0'	54.2'
23	164°22.04	21.40	302°54.80	11.5'	$25^{\circ}4.65$	6.9'	54.2'
	SD = 16.0'	d = 0.9'		SE	0 = 14.9'		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°22.22	N06°22.35	317°25.25	ν 11.4'	S25°11.57	6.8'	54.2'
1	194°22.40	23.29	331°55.65	11.4'	$25^{\circ}18.38$	6.7'	54.2'
2	209°22.57	24.24	346°26.01	11.3'	25°25.07	6.6'	54.2'
3 4	224°22.75 239°22.93	· · 25.18 26.13	0°56.32 15°26.58	11.3' 11.2'	25°31.64 25°38.10	6.5' 6.3'	54.2' 54.2'
4 5	239°22.93 254°23.11	26.13	15° 26.58 29° 56.80	11.2'	25° 38.10 25° 44.43	6.2	54.2' 54.2'
6	269°23.29	N06°28.02	44° 26.97	11.1'	\$25°50.64	6.1	54.2'
7	284°23.46	28.96	58° 57.09	11.1'	$25^{\circ}56.73$	6.0'	54.2'
8	299°23.64	29.90	73°27.17	11.0'	26°2.69	5.8'	54.2'
9 10	314°23.82 329°24.00	· · 30.85 31.79	87°57.21 102°27.20	11.0' 10.9'	26°8.54 26°14.26	5.7' 5.6'	54.2' 54.1'
11	344°24.18	31.79	102 27.20 116°57.15	10.9	26° 14.26 26° 19.86	5.5'	54.1'
12	359°24.35	N06°33.68	131° 27.06	10.9'	S26°25.33	5.3'	54.1'
13	14°24.53	34.62	145°56.92	10.8'	26°30.68	5.2'	54.1'
14	29°24.71	35.57	160°26.74	10.8'	26° 35.90	5.1'	54.1'
15 16	44°24.89 59°25.06	· · 36.51 37.45	174° 56.52 189° 26.27	10.7' 10.7'	26°41.00 26°45.97	5.0' 4.8'	54.1' 54.1'
10 17	74°25.24	37.45 38.39	203°55.97	10.7'	26° 50.82	4.8 4.7'	54.1'
18	89°25.42	N06°39.34	218° 25.63	10.6'	S26°55.53	4.6'	54.1'
19	104°25.59	40.28	232°55.26	10.6'	27°0.12	4.5'	54.1'
20	119°25.77	41.22	247°24.85	10.6'	27°4.59	4.3'	54.1'
21 22	134°25.95 149°26.12	· · 42.16 43.10	261°54.40 276°23.92	10.5' 10.5'	27°8.92 27°13.12	4.2' 4.1'	54.1' 54.1'
23	164°26.30	44.04	270 23.92 290°53.40	10.3	27°17.20	3.9'	54.1
	SD = 16.0'	d = 0.9'		SE	0 = 14.8'		
					•		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	05:09	05:57	06:39	17:26	18:07	18:55

Lat.		Moonris	e		Moonset	t
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°	01:07		_	01:16		
<b>N</b> 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
<b>N</b> 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° N 10°	20:31	21:25 21:04	22:19	07:03 07:19	07:43 08:02	08:26 08:48
0°	20:13 19:57	20:44	21:55 21:34	07:19	08:02	08:48
<b>S</b> 10° 20°	19:41 19:23	20:25 20:04	21:12	07:47	08:37	09:29
30°	19:23	20:04 19:41	20:49 20:23	08:03 08:21	08:57 09:19	09:51 10:16
35°	18:52	19:41	20:23	08:31	09:19	10:10
40°	18:39	19:27	19:49	08:43	09:32	10:32
45°	18:24	18:52	19:27	08:58	10:05	11:11
<b>S</b> 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
<b>S</b> 60°	17:08	17:12	17:21	10:09	11:42	13:15

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	16-18	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	96-86%	
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		

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA
0 0	195° 17.07	158°35.66 N14°19.41	196°53.58 \$01°48.58	87°38.43 N22°49.52	188°39.86 N00°32.32	
1	210° 19.53	173°35.16 20.50	211° 54.25 47.79	102°40.68 49.50	203°42.04 32.44	Alpheratz 357°34.07
2	225°22.00	188°34.65 21.58	226°54.93 47.01	117°42.92 49.48	218°44.22 32.56	Ankaa 353°6.54
3	240°24.46	203°34.15 · · 22.66	241°55.61 · · 46.22	132°45.16 · · 49.45	233°46.40 · · 32.68	Schedar 349°30.46 Diphda 348°46.60
4	255° 26.93	218° 33.65 23.74	256° 56.29 45.44	147°47.40 49.43	248°48.58 32.80	Achernar 335°19.98
5	270°29.39	233°33.14 24.82	271°56.97 44.65	162°49.64 49.41	263°50.76 32.92	Hamal 327°50.38
6 7	285°31.85 300°34.32	248°32.64 N14°25.90 263°32.14 26.98	286°57.65 S01°43.87 301°58.33 43.08	177°51.88 N22°49.38 192°54.13 49.36	278°52.94 N00°33.04 293°55.12 33.16	Polaris 313°56.74
8	300 34.32 315°36.78	203 32.14 20.96 278°31.63 28.05	316°59.01 42.30	192°54.13 49.36 207°56.37 49.34	308°57.30 33.28	Acamar 315°11.36
9	330°39.25	293°31.13 · · 29.13	331°59.69 · · 41.51	222°58.61 · · 49.31	323°59.48 · · 33.40	Menkar 314°5.36
10	345°41.71	308°30.62 30.21	347°0.36 40.73	238° 0.85 49.29	339°1.66 33.52	Mirfak 308°27.21
11	$0^{\circ}44.17$	323°30.11 31.28	2°1.04 39.94	253°3.09 49.27	354°3.84 33.64	Aldebaran 290°38.66 Rigel 281°3.05
12	15° 46.64	338°29.61 N14°32.36	17°1.72 <b>S</b> 01°39.16	268°5.33 N22°49.24	9°6.02 N00°33.75	Capella 280°20.61
13	30°49.10	353°29.10 33.43	32°2.40 38.37	283°7.57 49.22	24°8.20 33.87	Bellatrix 278°21.93
14 15	45°51.57	8°28.59 34.51 23°28.09 · · 35.58	47°3.08 37.59 62°3.76 · · 36.80	298° 9.81 49.20	39°10.38 33.99 54°12.56 · · 34.11	Elnath 278° 0.74
16	60° 54.03 75° 56.49	23°28.09 · · 35.58 38°27.58 36.65	62°3.76 · · 36.80 77°4.44 36.02	313°12.04 · · 49.17 328°14.28 49.15	54°12.56 · · 34.11 69°14.74 34.23	Alnilam 275°36.83
17	90°58.96	53°27.07 37.73	92°5.12 35.23	343°16.52 49.12	84°16.92 34.35	Betelgeuse 270°51.09
18	106°1.42	68°26.56 N14°38.80	107°5.80 S01°34.45	358°18.76 N22°49.10	99°19.10 N00°34.47	Canopus 263°52.06
19	121°3.89	83°26.05 39.87	122°6.48 33.66	13°21.00 49.08	114°21.28 34.59	Sirius 258°25.39 Adhara 255°5.10
20	136°6.35	98°25.54 40.94	137°7.16 32.88	28°23.23 49.05	129°23.46 34.71	Procyon 244°49.74
21	151°8.82	113°25.03 · · 42.01	152°7.84 · · 32.09	43°25.47 · · 49.03	144°25.64 · · 34.83	Pollux 243°16.02
22	166°11.28	128°24.52 43.08	167°8.52 31.31	58°27.71 49.01	159°27.82 34.95	Avior 234°14.17
23	181° 13.74	143°24.01 44.15	182°9.20 30.52	73°29.94 48.98	174°30.00 35.07	Suhail 222°45.37
Mer.p	pass. 10:57	u-0.5 $'$ $d1.1'$ m-3.92	$ u 0.7' \; d\text{-}0.8' \; \text{m}1.19$	$\nu 2.2' \ d$ -0.0' m-2.16	$ u 2.2' \ d0.1' \ \text{m}0.93$	Miaplacidus 221°37.67
						Alphard 217°46.59
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.14 Dubhe 193°39.19
0	$196^{\circ}16.21$	158°23.50 N14°45.22	197°9.88 <b>S</b> 01°29.74	88°32.18 N22°48.96	189°32.18 N00°35.19	Denebola 182°23.61
1	211° 18.67	173°22.99 46.28	212° 10.56 28.95	103°34.41 48.93	204°34.36 35.31	Gienah 175°42.22
2	226°21.14	188°22.48 47.35	227° 11.24 28.17	118°36.65 48.91	219°36.54 35.43	Acrux 172°58.31
3	241°23.60	203°21.96 · · 48.42	242°11.92 · · 27.38	133°38.88 · · 48.89	234°38.72 · · 35.54	Gacrux 171°49.96
4 5	256°26.06 271°28.53	218°21.45 49.48 233°20.94 50.55	257°12.60 26.60 272°13.28 25.81	148°41.12 48.86 163°43.35 48.84	249°40.90 35.66 264°43.08 35.78	Alioth 166°11.50
6	286° 30.99	248°20.42 N14°51.61	287°13.96 \$01°25.03	178°45.59 N22°48.81	279°45.26 N00°35.90	Spica 158°20.91
7	301°33.46	263°19.91 52.68	302°14.64 24.24	193°47.82 48.79	294°47.44 36.02	Alkaid 152°50.71
8	316°35.92	278°19.39 53.74	317° 15.32 23.46	208°50.05 48.76	309°49.62 36.14	Hadar 148°33.95 Menkent 147°56.04
9	331°38.39	293°18.88 · · 54.80	332°16.00 · · 22.67	223°52.29 · · 48.74	324°51.80 · · 36.26	Arcturus 145°46.65
10	346° 40.85	308° 18.36 55.86	347° 16.68 21.89	238°54.52 48.72	339°53.99 36.38	Rigil Kent. 139°38.29
11	1°43.31	323°17.85 56.92	2°17.36 21.10	253°56.75 48.69	354°56.17 36.50	Kochab 137°18.73
12	16° 45.78 31° 48.24	338°17.33 N14°57.98 353°16.81 14°59.04	17°18.04 S01°20.32 32°18.72 19.53	268°58.99 N22°48.67	9°58.35 N00°36.62 25°0.53 36.74	Zuben'ubi 136°54.59
13 14	46°50.71	8°16.30 15°0.10	32°18.72 19.53 47°19.41 18.75	284°1.22 48.64 299°3.45 48.62	25°0.53 36.74 40°2.71 36.86	Alphecca 126°2.58
15	61°53.17	23°15.78 · · 1.16	62°20.09 · · 17.96	314° 5.68 · · 48.59	55°4.89 · · 36.97	Antares 112°14.35
16	76°55.63	38°15.26 2.22	77°20.77 17.18	329°7.91 48.57	70°7.07 37.09	Atria 107°7.37 Sabik 102°1.44
17	$91^{\circ}58.10$	53°14.74 3.28	92°21.45 16.39	344°10.14 48.54	85°9.25 37.21	Shaula 96°8.81
18	107°0.56	68°14.22 N15°4.33	107°22.13 <b>S</b> 01°15.61	359°12.37 N22°48.52	100°11.43 N00°37.33	Rasalhague 95°57.46
19	122°3.03	83°13.70 5.39	122°22.81 14.82	14°14.60 48.49	115°13.61 37.45	Eltanin 90°41.53
20	137°5.49 152°7.96	98°13.18 6.44 113°12.66 · · 7.50	137°23.49 14.04 152°24.17 · · 13.25	29°16.83 48.47 44°19.06 • 48.44	130°15.79 37.57 145°17.97 · · 37.69	Kaus Aust. 83°31.07
21 22	167° 10.42	113 12.00 1 7.50 128°12.14 8.55	152°24.17 · · 13.25 167°24.85 12.47	44°19.06 · · 48.44 59°21.29 48.42	145°17.97 · · · 37.69 160°20.15	Vega 80°32.46
23	182° 12.88	143°11.62 9.61	182°25.54 11.68	74°23.52 48.39	175°22.33 37.93	Nunki 75°46.46
				-		Altair 61°59.01 Peacock 53°4.29
ivier.p	bass. 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	$\nu 2.2' \ d0.1' \ m0.93$	Peacock 53°4.29 Deneb 49°25.28
						Enif 33°37.99
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°31.94
0	197° 15.35	158°11.10 N15°10.66	197°26.22 S01°10.90 212°26.90 10.11	89°25.75 N22°48.37 104°27.98 48.34	190°24.52 N00°38.04 205°26.70 38.16	Fomalhaut 15°13.68
1 2	212° 17.81 227° 20.28	173°10.58 11.71 188°10.06 12.76	212°26.90 10.11 227°27.58 9.33	104°27.98 48.34 119°30.21 48.32	205°26.70 38.16 220°28.88 38.28	Scheat 13°44.52
3	242° 22.74	203°9.53 · · 13.81	242°28.26 · · 8.54	134°32.43 · · 48.29	235°31.06 · · 38.40	Markab 13°29.16
4	257° 25.20	218°9.01 14.86	257°28.94 7.76	149°34.66 48.27	250°33.24 38.52	Apr 07 Tue SHA
5	272°27.67	233°8.49 15.91	272°29.62 6.97	164°36.89 48.24	265°35.42 38.64	Venus 323°18.59
6	287°30.13	248°7.96 N15°16.96	287°30.31 S01°6.19	179°39.12 N22°48.22	280°37.60 N00°38.76	Mars 1°36.51
7	302°32.60	263°7.44 18.01	302°30.99 5.40	194°41.34 48.19	295°39.78 38.88	Jupiter 252°21.36
8 9	317°35.06 332°37.53	278°6.91 19.06 293°6.39 · · 20.11	317°31.67 4.62 332°32.35 · · 3.83	209°43.57 48.17 224°45.79 • 48.14	310°41.96 38.99 325°44.14 · · 39.11	Saturn 353°22.79
10	347°39.99	308°5.86 21.15	347°33.03 3.05	239°48.02 48.12	340°46.33 39.23	Apr 08 Wed SHA
11	2° 42.45	323°5.34 22.20	2°33.72 2.26	254°50.25 48.09	355°48.51 39.35	Venus 322°7.29
12	17° 44.92	338°4.81 N15°23.24	17°34.40 <b>S</b> 01°1.48	269°52.47 N22°48.07	10°50.69 N00°39.47	Mars 0°53.67
13	$32^{\circ}47.38$	353°4.28 24.29	32°35.08 01°0.69	284°54.69 48.04	25°52.87 39.59	Jupiter 252°15.97 Saturn 353°15.97
14	47° 49.85	8°3.76 25.33	47°35.76 00°59.91	299°56.92 48.02	40°55.05 39.71	
15 16	62°52.31	23°3.23 · · 26.37	62°36.44 · · 59.12	314°59.14 · · 47.99	55°57.23 · · 39.83	Apr 09 Thu SHA
16 17	77° 54.77 92° 57.24	38°2.70 27.41 53°2.17 28.46	77°37.13 58.34 92°37.81 57.55	330°1.37 47.96 345°3.59 47.94	70°59.41 39.94 86°1.59 40.06	Venus 320°55.75 Mars 0°10.87
18	107°59.70	68°1.64 N15°29.50	107°38.49 \$00°56.77	0°5.81 N22°47.91	101°3.78 N00°40.18	Mars 0°10.87 Jupiter 252°10.40
19	123°2.17	83°1.11 30.54	122°39.17 55.98	15°8.04 47.89	116°5.96 40.30	Saturn 353°9.17
20	138°4.63	98°0.58 31.58	137°39.86 55.20	30°10.26 47.86	131°8.14 40.42	
21	153°7.10	113°0.05 · · 32.62	152°40.54 · · 54.41	45°12.48 · · 47.84	146°10.32 · · 40.54	Horizontal parallax
22	168° 9.56	127° 59.52 33.65	167°41.22 53.63	60°14.70 47.81	161°12.50 40.66	Venus: Mars:
23	183°12.02	142°58.99 34.69	182°41.90 52.84	75°16.93 47.78	176°14.68 40.77	Ivials.
Mer.p	pass. 10:49	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	

Dec  $29^{\circ}14.01$ -42°9.80 56°40.81 -17°50.62  $-57^{\circ}6.24$  $23^{\circ}35.14$ 89°22.63 -40°12.09 4°11.49 49°57.33 16°33.69 -8°10.41  $46^{\circ}1.56$  $6^{\circ}22.33$ 28°37.80 -1°11.22 7°24.64 -52°42.84 -16°45.32 -29°0.70 5°9.36 27°57.78 -59°35.91 -43°32.59 -69°49.77 -8°46.53 11°50.22  $61^{\circ}36.61$  $14^{\circ}25.38$ -17°41.45 -63°14.83 -57°15.77 55°48.94 -11°18.07 49°10.75 -60°30.01 -36°30.05  $19^{\circ}2.54$ -60°56.63  $74^{\circ}2.60$ -16°9.18  $26^{\circ}37.32$ -26°29.44 -69°4.27  $\textbf{-15}^{\circ} \textbf{45.51}$  $-37^{\circ}7.30$  $12^{\circ}32.23$ 51°28.75 -34°22.25 38°48.14 -26° 15.81 8° 56.08 -56°38.82  $45^{\circ}22.13$  $9^{\circ}59.57$  $-46^{\circ}49.91$ -29°28.97 28° 13.35 15°20.66 Mer.pass 13:26 10:52 18:07 11:24 Mer.pass 13:27 10:51 18:03 11:20 Mer.pass 13:28 10:50 18:00 11:17

h	Su	n	Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°26.48	N06°44.99	$305^{\circ}22.85$	10.4'	S27°21.14	3.8'	54.1'
1	194°26.65	45.93	319°52.27	10.4	27°24.96	3.7'	54.1'
2	209°26.83 224°27.00	46.87 •• 47.81	334°21.65 348°51.00	10.4' 10.3'	27°28.64 27°32.19	3.6' 3.4'	54.1' 54.1'
4	239°27.18	48.75	3°20.32	10.3	27°35.61	3.3'	54.1'
5	254°27.36	49.69	$17^{\circ}49.61$	10.3'	$27^{\circ}38.90$	3.2'	54.1'
6	269°27.53	N06°50.63	32°18.88	10.2'	\$27°42.06	3.0'	54.1'
7 8	284°27.71 299°27.88	51.57 52.51	46° 48.11 61° 17.32	10.2' 10.2'	27°45.08 27°47.97	2.9' 2.8'	54.1' 54.1'
9	314°28.06	• • 53.45	75°46.50	10.2'	27°50.73	2.6'	54.1'
10	329°28.23	54.39	$90^{\circ}15.66$	10.1'	27°53.36	2.5'	54.1'
11	344°28.41	55.32	104°44.79	10.1'	27°55.85	2.4'	54.1'
12 13	359°28.58 14°28.76	N06° 56.26 57.20	119°13.90 133°42.99	10.1' 10.1'	\$27°58.20 28°0.43	2.2' 2.1'	54.1' 54.1'
14	29°28.93	58.14	133 42.99 148° 12.05	10.1	28°2.51	2.1	54.1
15	44°29.11	06° 59.08	162°41.10	10.0'	28°4.47	1.8'	54.1'
16	59°29.28	07°0.02	177° 10.12	10.0'	28°6.28	1.7'	54.1'
17	74°29.46	0.95	191°39.13	10.0'	28°7.97	1.5'	54.1'
18 19	89°29.63 104°29.81	N07°1.89 2.83	206°8.12 220°37.10	10.0' 10.0'	\$28° 9.51 28° 10.92	1.4' 1.3'	54.1' 54.1'
20	119°29.98	3.77	235°6.06	9.9'	28° 12.20	1.1'	54.1'
21	134°30.16	• • 4.70	249°35.00	9.9'	28° 13.34	1.0'	54.1'
22	149°30.33	5.64	264°3.94	9.9'	28°14.34	0.9'	54.1'
23	164°30.50	6.58	278° 32.86	9.9'	28° 15.21	0.7'	54.1'
	SD = 16.0'	d = 0.9'		SD	0 = 14.8'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°30.68	N07°7.51	293°1.76	9.9'	S28° 15.93	0.6'	54.1'
1	194°30.85	8.45	307°30.66	9.9'	28° 16.53	0.5'	54.1'
2	209°31.02 224°31.20	9.38 · · 10.32	321°59.55 336°28.44	9.9' 9.9'	28° 16.98 28° 17.30	0.3' 0.2'	54.1' 54.1'
4	239°31.37	11.25	350° 57.31	9.9'	28°17.48	0.2	54.1
5	254°31.55	12.19	5°26.18	9.9'	28° 17.53	-0.1'	54.1'
6	269°31.72	N07° 13.12	19°55.05	9.9'	S28° 17.44	-0.2'	54.1'
7	284°31.89	14.06	34°23.91	9.9'	28° 17.21	-0.4'	54.2'
8 9	299°32.06 314°32.24	14.99 •• 15.93	48°52.77 63°21.63	9.9' 9.9'	28° 16.84 28° 16.34	-0.5' -0.6'	54.2' 54.2'
10	329°32.41	16.86	77°50.48	9.9'	28° 15.70	-0.8	54.2'
11	344°32.58	17.80	$92^{\circ}19.34$	9.9'	$28^{\circ}14.92$	-0.9'	54.2'
12	359°32.76	N07° 18.73	106°48.20	9.9'	\$28°14.00	-1.1'	54.2'
13 14	14°32.93 29°33.10	19.66 20.60	121°17.06 135°45.93	9.9' 9.9'	28° 12.95 28° 11.76	-1.2' -1.3'	54.2' 54.2'
15	44°33.27	21.53	150° 14.80	9.9'	28° 10.43	-1.5'	54.2'
16	59°33.44	22.46	164°43.68	9.9'	28°8.97	-1.6'	54.2'
17	74°33.62	23.40	179°12.56	9.9'	28°7.36	-1.7'	54.2'
18 19	89°33.79 104°33.96	N07°24.33 25.26	193°41.45 208°10.35	9.9' 9.9'	\$28°5.63 28°3.75	-1.9' -2.0'	54.2' 54.2'
20	119°34.13	26.19	200° 10.33 222° 39.26	9.9'	28°1.74		54.3'
21	134°34.30	27.12	237°8.18	9.9'	27°59.59	-2.3'	54.3'
22	149°34.47	28.06	251°37.11	9.9'	27°57.31	-2.4'	54.3'
23	164°34.65	28.99	266°6.06	10.0'	27°54.89	-2.6'	54.3'
	SD = 16.0'	d = 0.9'		SD	0 = 14.8'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	179°34.82 194°34.99	N07°29.92 30.85	280°35.02 295°3.99	10.0' 10.0'	\$27°52.33 27°49.64	-2.7' -2.8'	54.3' 54.3'
2	209°35.16	31.78	309° 32.98	10.0'	27°46.81	-2.0 -3.0'	54.3'
3	224°35.33	• • 32.71	324°1.98	10.0'	$27^{\circ}43.84$	-3.1'	54.3'
4	239°35.50	33.64	338°31.01	10.0'	27°40.74	-3.2'	54.3'
5 6	254°35.67 269°35.84	34.57 N07°35.50	353°0.05 7°29.11	10.1' 10.1'	27°37.51 <b>S</b> 27°34.14	-3.4' -3.5'	54.4' 54.4'
7	284°36.01	36.43	7 29.11 21°58.19	10.1	27° 30.63	-3.5' -3.6'	54.4'
8	299°36.18	37.36	36°27.29	10.1'	$27^{\circ}26.99$	-3.8'	54.4'
9	314°36.35	• • 38.29	50°56.41	10.1'	27°23.22	-3.9'	54.4'
10 11	329°36.52 344°36.69	39.22 40.15	65°25.56 79°54.72	10.2' 10.2'	27° 19.31 27° 15.27	-4.0' -4.2'	54.4' 54.4'
11	344 36.69 359°36.86	40.15 N07°41.08	94°23.92	10.2'	527° 11.10	-4.2 -4.3'	54.4
13	14°37.03	42.00	108°53.14	10.2'	27°6.79	-4.4'	54.5'
14	29°37.20	42.93	123°22.38	10.3'	27°2.35	-4.6'	54.5'
15	44°37.37	• • 43.86	137°51.65	10.3'	26°57.78	-4.7'	54.5'
16 17	59°37.54 74°37.71	44.79 45.72	152°20.95 166°50.27	10.3' 10.4'	26°53.08 26°48.24	-4.8' -5.0'	54.5' 54.5'
18	89°37.88	45.72 N07°46.64	181° 19.63	10.4	20 48.24 \$26°43.28	-5.0 -5.1'	54.5
19	104°38.05	47.57	195°49.01	10.4'	$26^{\circ}38.18$	-5.2'	54.6'
20	119°38.22	48.50	210°18.42	10.4'	26°32.95	-5.4'	54.6'
21	134°38.39 149°38.55	• • 49.42	224° 47.87 239° 17.34	10.5'	26°27.59 26°22.10	-5.5'	54.6'
22 23	149°38.55 164°38.72	50.35 51.28	239°17.34 253°46.85	10.5' 10.5'	26°22.10 26°16.48	-5.6' -5.7'	54.6' 54.6'
	SD = 16.0'	d = 0.9'			0 = 14.8'	J.,	25
					11.0		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Ldl.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	////	02:55	04:19	19:48	21:14	////
$N 70^{\circ}$	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 $58^{\circ}$	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
<b>N</b> 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 $10^{\circ}$	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
<b>S</b> 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
$30^{\circ}$	05:23	05:51	06:15	17:48	18:12	18:40
$35^{\circ}$	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
<b>S</b> 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
<b>S</b> 60°	05:16	06:04	06:46	17:17	17:58	18:46
Lat.		Moonris	e		Moonset	į.

Lat.		Moonris	e		Moonset	:
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N $72^{\circ}$						
<b>N</b> 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
<b>N</b> 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 $10^{\circ}$	22:48	23:39		09:36	10:27	11:20
0°	22:25	23:17		09:58	10:50	11:41
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	17:45	18:39	20:01	14:36	15:30	15:54
		_				

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	19-21	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	79-62%	
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		

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	198° 14.49	157°58.46 N15°35.73	197°42.59 \$00°52.06	90°19.15 N22°47.76	191°16.86 N00°40.89	
1	$213^{\circ}16.95$	172°57.93 36.77	212° 43.27 51.27	105°21.37 47.73	206°19.05 41.01	Alpheratz 357°34.06 29°14.01 Ankaa 353°6.53 -42°9.78
2	$228^{\circ}19.42$	187°57.39 37.80	227° 43.95 50.49	120°23.59 47.71	221°21.23 41.13	
3	243°21.88	202°56.86 · · 38.84	242°44.63 · · 49.70	135°25.81 · · 47.68	236°23.41 · · 41.25	Schedar 349°30.45 56°40.80 Diphda 348°46.59 -17°50.61
4	258°24.34	217°56.33 39.87	257° 45.32 48.92	150°28.03 47.65	251°25.59 41.37	Achernar 335°19.98 -57°6.23
5	273°26.81	232°55.79 40.90	272°46.00 48.13	165°30.25 47.63	266°27.77 41.48	Hamal 327°50.38 23°35.14
6	288° 29.27	247°55.26 N15°41.94 262°54.72 42.97	287°46.68 \$00°47.35	180°32.47 N22°47.60	281°29.95 N00°41.60	Polaris 313°57.25 89°22.61
7 8	303°31.74 318°34.20	262°54.72 42.97 277°54.19 44.00	302°47.37 46.56 317°48.05 45.78	195°34.69 47.58 210°36.91 47.55	296°32.13 41.72 311°34.32 41.84	Acamar 315°11.36 -40°12.08
9	333° 36.67	292°53.65 · · 45.03	332°48.73 · · 44.99	225°39.13 · · 47.52	326°36.50 · · 41.96	Menkar 314°5.36 4°11.49
10	348°39.13	307°53.12 46.06	347°49.42 44.21	240°41.35 47.50	341°38.68 42.08	Mirfak 308°27.21 49°57.32
11	3°41.59	322°52.58 47.09	2°50.10 43.42	255°43.57 47.47	356°40.86 42.19	Aldebaran 290°38.66 16°33.69 Rigel 281°3.05 -8°10.41
12	18° 44.06	337°52.04 N15°48.12	17°50.78 <b>S</b> 00°42.64	270°45.78 N22°47.44	11°43.04 N00°42.31	Rigel 281°3.05 -8°10.41 Capella 280°20.62 46°1.56
13	33° 46.52	352°51.51 49.15	32°51.47 41.86	285°48.00 47.42	26°45.23 42.43	Bellatrix 278°21.94 6°22.33
14	48° 48.99	7°50.97 50.18	47°52.15 41.07	300°50.22 47.39	41°47.41 42.55	Elnath 278°0.75 28°37.80
15 16	63°51.45 78°53.91	22°50.43 ·· 51.20 37°49.89 52.23	62°52.83 · · 40.29 77°53.52 39.50	315°52.44 · · 47.36 330°54.65 47.34	56°49.59 · · 42.67 71°51.77 42.79	Alnilam 275°36.83 -1°11.22
17	93°56.38	52°49.35 53.25	92°54.20 38.72	345°56.87 47.31	86°53.95 42.90	Betelgeuse 270°51.10 7°24.64
18	108° 58.84	67°48.81 N15°54.28	107°54.88 \$00°37.93	0°59.09 N22°47.28	101°56.13 N00°43.02	Canopus 263°52.09 -52°42.83
19	124°1.31	82°48.27 55.30	122°55.57 37.15	16°1.30 47.26	116°58.32 43.14	Sirius 258°25.40 -16°45.32 Adhara 255°5.11 -29°0.70
20	139°3.77	97°47.73 56.33	137° 56.25 36.36	31° 3.52 47.23	132°0.50 43.26	Adhara 255°5.11 -29°0.70 Procyon 244°49.75 5°9.36
21	154°6.23	112°47.19 · · 57.35	152°56.93 · · 35.58	46° 5.73 · · 47.20	147°2.68 · · 43.38	Pollux 243°16.03 27°57.78
22	169°8.70	127° 46.65 58.37	167°57.62 34.79	61°7.95 47.18	162°4.86 43.49	Avior 234°14.20 -59°35.91
23	184°11.16	142°46.11 59.39	182°58.30 34.01	76°10.16 47.15	177°7.04 43.61	Suhail 222°45.39 -43°32.60
Mer.	pass. 10:45	$\nu\text{-}0.5'~d1.0'~\text{m-}3.92$	$\nu 0.7' \ d\text{-}0.8' \ \text{m}1.20$	$\nu$ 2.2′ <i>d</i> -0.0′ m-2.14	$\nu 2.2' \ d0.1' \ \text{m}0.93$	Miaplacidus 221°37.71 -69°49.78
	_					Alphard 217°46.59 -8°46.53
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.14 11°50.22
0	199° 13.63	157°45.57 N16°0.41	197°58.99 \$00°33.22	91°12.38 N22°47.12	192°9.23 N00°43.73	Dubhe 193°39.19 61°36.62 Denebola 182°23.60 14°25.38
1	$214^{\circ}16.09$	172°45.02 1.43	212°59.67 32.44	106°14.59 47.10	207°11.41 43.85	Gienah 175°42.22 -17°41.46
2	$229^{\circ}18.56$	187°44.48 2.45	228°0.35 31.66	121°16.80 47.07	222°13.59 43.97	Acrux 173° 58.30 -63°14.85
3	244°21.02	202°43.94 · · 3.47	243°1.04 · · · 30.87	136°19.02 · · 47.04	237°15.77 · · 44.08	Gacrux 171°49.96 -57°15.79
4	259°23.48	217° 43.39 4.49	258°1.72 30.09	151°21.23 47.02	252°17.95 44.20	Alioth 166°11.49 55°48.95
5 6	274°25.95 289°28.41	232°42.85 5.51 247°42.30 N16°6.52	273°2.41 29.30 288°3.09 \$00°28.52	166°23.44 46.99 181°25.66 N22°46.96	267°20.14 44.32 282°22.32 N00°44.44	Spica 158°20.90 -11°18.08
7	304°30.88	262°41.76 7.54	303°3.77 27.73	196°27.87 46.93	297°24.50 44.56	Alkaid 152°50.70 49°10.76
8	319°33.34	277°41.21 8.55	318° 4.46 26.95	211°30.08 46.91	312°26.68 44.67	Hadar 148°33.93 -60°30.03
9	334°35.80	292°40.67 · · 9.57	333°5.14 · · 26.16	226°32.29 · · 46.88	327°28.87 · · 44.79	Menkent 147°56.02 -36°30.06 Arcturus 145°46.64 19°2.54
10	349°38.27	307°40.12 10.58	348°5.83 25.38	241°34.51 46.85	342°31.05 44.91	Rigil Kent. 139°38.27 -60°56.65
11	4°40.73	322°39.57 11.59	3°6.51 24.60	256°36.72 46.83	357°33.23 45.03	Kochab 137°18.71 74°2.61
12	19° 43.20	337°39.02 N16°12.61	18°7.20 S00°23.81	271°38.93 N22°46.80	12°35.41 N00°45.15	Zuben'ubi 136°54.57 -16°9.18
13 14	34° 45.66 49° 48.12	352°38.48 13.62 7°37.93 14.63	33°7.88 23.03 48°8.56 22.24	286°41.14 46.77 301°43.35 46.74	27°37.59 45.26 42°39.78 45.38	Alphecca 126°2.56 26°37.33
15	64° 50.59	7°37.93 14.63 22°37.38 · · 15.64	63°9.25 · · 21.46	316°45.56 · · 46.72	57°41.96 · · 45.50	Antares 112°14.33 -26°29.44
16	79°53.05	37°36.83 16.65	78°9.93 20.67	331°47.77 46.69	72°44.14 45.62	Atria 107°7.31 -69°4.28
17	94°55.52	52°36.28 17.66	93°10.62 19.89	346°49.98 46.66	87°46.32 45.73	Sabik 102°1.42 -15°45.51 Shaula 96°8.78 -37°7.30
18	109°57.98	67°35.73 N16°18.67	108°11.30 <b>S</b> 00°19.11	1°52.19 N22°46.63	102°48.51 N00°45.85	Shaula 96°8.78 -37°7.30 Rasalhague 95°57.44 12°32.24
19	125°0.45	82°35.18 19.67	123°11.99 18.32	16°54.40 46.61	117°50.69 45.97	Eltanin 90°41.50 51°28.75
20	140°2.91	97°34.63 20.68	138° 12.67 17.54	31°56.60 46.58	132°52.87 46.09	Kaus Aust. 83°31.04 -34°22.25
21	155°5.37	112°34.08 · · 21.69	153°13.36 · · 16.75	46°58.81 · · 46.55	147°55.05 · · 46.21	Vega 80°32.44 38°48.14
22 23	170°7.84 185°10.30	127°33.52 22.69 142°32.97 23.69	168°14.04 15.97 183°14.73 15.19	62°1.02 46.52 77°3.23 46.49	162°57.24 46.32 177°59.42 46.44	Nunki 75°46.43 -26°15.81
		-				Altair 61°58.98 8°56.08
Mer.	pass. 10:41	$\nu$ -0.5′ $d1.0$ ′ m-3.92	ν0.7' d-0.8' m1.20	$\nu 2.2' \ d$ -0.0' m-2.13	$\nu 2.2' \ d0.1' \ m0.93$	Peacock 53°4.24 -56°38.81
						Deneb 49°25.25 45°22.13 Enif 33°37.97 9°59.58
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°31.91 -46°49.90
0	200°12.77	157°32.42 N16°24.70	198°15.41 \$00°14.40	92°5.44 N22°46.47	193°1.60 N00°46.56	Fomalhaut 15°13.66 -29°28.96
1	215° 15.23	172°31.87 25.70	213°16.10 13.62	107°7.64 46.44	208°3.79 46.68	Scheat 13°44.50 28°13.35
2 3	230°17.69 245°20.16	187°31.31 26.70 202°30.76 •• 27.71	228°16.78 12.83 243°17.47 · · 12.05	122°9.85 46.41 137°12.06 • 46.38	223°5.97 46.79 238°8.15 • 46.91	Markab 13°29.14 15°20.66
3 4	245 20.16 260°22.62	202°30.76 ·· 27.71 217°30.20 28.71	258° 18.15 11.27	137°12.06 · · 46.38 152°14.26 46.35	238°8.15 · · 46.91 253°10.33 47.03	Apr 10 Fri SHA Mer.pass
5	275°25.09	232°29.65 29.71	273°18.84 10.48	167°16.47 46.33	268°12.52 47.15	Venus 319°43.97 13:29
6	290° 27.55	247°29.09 N16°30.71	288° 19.52 S00° 9.70	182°18.68 N22°46.30	283°14.70 N00°47.26	Mars 359°28.10 10:49
7	305°30.01	262°28.54 31.71	303°20.21 8.91	197°20.88 46.27	298°16.88 47.38	Jupiter 252°4.66 17:56
8	320°32.48	277°27.98 32.70	318°20.89 8.13	212°23.09 46.24	313°19.07 47.50	Saturn 353°2.38 11:13
9	335°34.94	292°27.42 · · 33.70	333°21.58 · · 7.35	227°25.29 · · 46.21	328°21.25 · · 47.62	Apr 11 Sat SHA Mer.pass
10 11	350°37.41 5°39.87	307°26.86 34.70 322°26.31 35.69	348°22.27 6.56 3°22.95 5.78	242°27.50 46.19 257°29.70 46.16	343°23.43 47.73 358°25.61 47.85	Venus 318°31.94 13:29
12	20°42.34	337°25.75 N16°36.69	18°23.64 \$00°5.00	272°31.90 N22°46.13	13°27.80 N00°47.97	Mars 358° 45.36 10:48
13	35° 44.80	352°25.19 37.68	33°24.32 4.21	287°34.11 46.10	28°29.98 48.08	Jupiter 251°58.75 17:53
14	50° 47.26	7°24.63 38.68	48° 25.01 3.43	302°36.31 46.07	43°32.16 48.20	Saturn 352°55.60 11:10
15	65°49.73	22°24.07 · · 39.67	63°25.69 · · 2.64	317°38.51 · · 46.04	58°34.35 · · 48.32	Apr 12 Sun SHA Mer.pass
16	80°52.19	37°23.51 40.66	78°26.38 1.86	332°40.72 46.02	73°36.53 48.44	Venus 317°19.65 13:30
17	95°54.66	52°22.95 41.65	93°27.06 1.08	347°42.92 45.99	88°38.71 48.55	Mars 358° 2.65 10:46
18 19	110° 57.12 125° 59.58	67°22.39 N16°42.64 82°21.83 43.63	108°27.75 S00°0.29 123°28.44 N00°0.49	2°45.12 N22°45.96 17°47.32 45.93	103°40.90 N00°48.67 118°43.08 48.79	Jupiter 251°52.67 17:49
20	125 59.58 141°2.05	97°21.27 44.62	138°29.12 1.27	32°49.52 45.90	118 43.08 48.79 133°45.26 48.91	Saturn 352°48.84 11:06
21	156°4.51	112°20.70 · · 45.61	153° 29.81 · · 2.06	47°51.73 · · 45.87	148°47.45 · · 49.02	Horizontal parallax
22	171°6.98	127°20.14 46.60	168°30.49 2.84	62°53.93 45.84	163°49.63 49.14	Venus: 0.1
23	186°9.44	142°19.58 47.59	183°31.18 3.62	77°56.13 45.82	178°51.81 49.26	Mars: 0.1
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	

h	Su	n	Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	179°38.89	N07°52.20	$268^{\circ}16.39$	10.6'	S26°10.74	-5.9'	54.7'
1	194°39.06	53.13	282°45.96	10.6'	26°4.86	-6.0'	54.7'
2	209°39.23 224°39.39	54.05 •• 54.98	297°15.57 311°45.21	10.6' 10.7'	25°58.86 25°52.73	-6.1' -6.3'	54.7' 54.7'
4	239° 39.56	55.90	326°14.88	10.7'	25°46.47	-6.4'	54.7'
5	254° 39.73	56.83	340°44.59	10.7'	25°40.08	-6.5	54.7'
6	269°39.90	N07°57.75	355°14.34	10.8'	S25°33.57	-6.6'	54.8'
7	284° 40.07	58.68	9°44.12	10.8'	25°26.94	-6.8'	54.8'
8 9	299° 40.23 314° 40.40	07°59.60 08°0.52	24°13.94 38°43.79	10.9' 10.9'	25°20.17 25°13.29	-6.9' -7.0'	54.8' 54.8'
10	329° 40.57	1.45	53°13.69	10.9	25°6.27	-7.1'	54.8'
11	344°40.73	2.37	67°43.61	11.0'	$24^{\circ}59.14$	-7.3'	54.9'
12	359° 40.90	N08°3.29	82°13.58	11.0'	S24°51.88	-7.4'	54.9'
13 14	14° 41.07 29° 41.23	4.22 5.14	96°43.59 111°13.63	11.0' 11.1'	24°44.50 24°36.99	-7.5' -7.6'	54.9' 54.9'
14 15	29 41.23 44°41.40	. 6.06	111 13.03 125°43.71	11.1	24 36.99 24°29.37	-7.0 -7.7'	54.9 55.0'
16	59°41.57	6.98	140°13.83	11.2'	24°21.62	-7.9'	55.0'
17	74°41.73	7.91	154°43.99	11.2'	$24^{\circ}13.75$	-8.0'	55.0'
18	89°41.90	N08°8.83	169°14.19	11.2'	\$24°5.76	-8.1'	55.0'
19 20	104° 42.06 119° 42.23	9.75 10.67	183°44.43 198°14.71	11.3' 11.3'	23°57.65 23°49.42	-8.2' -8.3'	55.0' 55.1'
21	134° 42.40	• • 11.59	212°45.03	11.4'	23°41.08	-8.5'	55.1'
22	149° 42.56	12.51	227°15.39	11.4'	23°32.61	-8.6'	55.1
23	164° 42.73	13.43	241°45.79	11.4'	23°24.03	-8.7'	55.1'
	SD = 16.0'	d = 0.9'		SI	O = 14.9'		
٠.						,	110
Sat 0	<b>GHA</b> 179° 42.89	<b>Dec</b> N08°14.35	<b>GHA</b> 256°16.23	u 11.5'	Dec 523°15.34	d -8.8'	<b>HP</b> 55.2'
1	194° 43.06	15.27	270°46.71	11.5'	23°6.52	-8.9	55.2'
2	209°43.22	16.19	285°17.23	11.6'	22°57.59	-9.0'	55.2'
3	224° 43.39	• • 17.11	299°47.79	11.6'	22°48.55	-9.2'	55.2'
4 5	239° 43.55 254° 43.72	18.03 18.95	314°18.39 328°49.04	11.6' 11.7'	22°39.39 22°30.11	-9.3' -9.4'	55.3' 55.3'
6	269° 43.88	N08°19.87	343°19.72	11.7'	\$22°20.73	-9.4 -9.5'	55.3'
7	284° 44.05	20.79	357°50.44	11.8'	22°11.23	-9.6'	55.4'
8	299° 44.21	21.71	12°21.20	11.8'	22°1.62	-9.7'	55.4'
9	314° 44.37	• • 22.63	26°52.00	11.8'	21°51.90	-9.8'	55.4'
10 11	329° 44.54 344° 44.70	23.54 24.46	41°22.84 55°53.73	11.9' 11.9'	21°42.07 21°32.12	-9.9' -10.1'	55.4' 55.5'
12	359° 44.87	N08°25.38	70°24.65	12.0'	S21°22.07	-10.2	55.5'
13	14°45.03	26.30	84°55.61	12.0'	21°11.91	-10.3'	55.5'
14	29°45.19	27.21	99°26.61	12.0'	21°1.65	-10.4'	55.5'
15 16	44° 45.36 59° 45.52	· · 28.13 29.05	113°57.64 128°28.72	12.1' 12.1'	20°51.27 20°40.79	-10.5' -10.6'	55.6' 55.6'
17	74° 45.68	29.05 29.96	120 20.72 142°59.84	12.1	20°40.79 20°30.20	-10.0	55.6'
18	89° 45.84	N08°30.88	157°30.99	12.2'	S20°19.51	-10.8'	55.7'
19	104°46.01	31.79	172°2.18	12.2'	20°8.71	-10.9'	55.7'
20	119° 46.17	32.71	186°33.41		19°57.81		55.7'
21 22	134° 46.33 149° 46.50	· · 33.63 34.54	201°4.68 215°35.98	12.3' 12.3'	19°46.80 19°35.70	-11.1' -11.2'	55.8' 55.8'
23	164° 46.66	35.46	230°7.32	12.4'	19°24.49	-11.3'	55.8'
	SD = 16.0'	d = 0.9'		SI	O = 15.0'		
•						,	
Sun 0	<b>GHA</b> 179° 46.82	<b>Dec</b> N08°36.37	<b>GHA</b> 244°38.70	u 12.4'	<b>Dec</b> 519°13.18	d -11.4'	<b>HP</b> 55.8'
1	194°46.98	37.28	259°10.11	12.4'	19° 1.77	-11.4	55.9'
2	209°47.14	38.20	273°41.55	12.5'	18°50.26	-11.6'	55.9'
3	224° 47.30	• • 39.11	288°13.04	12.5'	18°38.65	-11.7'	55.9'
4 5	239° 47.47 254° 47.63	40.03 40.94	302°44.55 317°16.10	12.5' 12.6'	18°26.94 18°15.14	-11.8' -11.9'	56.0' 56.0'
6	269° 47.79	N08°41.85	331° 47.68	12.6'	\$18° 3.24	-11.9	56.0'
7	284°47.95	42.76	$346^{\circ}19.30$	12.6'	$17^{\circ}51.24$	-12.1'	56.1'
8	299° 48.11	43.68	0°50.94	12.7'	17°39.15	-12.2'	56.1
9 10	314° 48.27 329° 48.43	•• 44.59 45.50	15°22.62 29°54.33	12.7' 12.7'	17°26.96 17°14.68	-12.3' -12.4'	56.1' 56.2'
10	329 48.43 344°48.59	45.50 46.41	29 54.33 44°26.08	12.7	17 14.68 17°2.31	-12.4 -12.5'	56.2'
12	359° 48.75	N08°47.32	58° 57.85	12.8'	\$16°49.85	-12.6'	56.2
13	14°48.91	48.24	73°29.65	12.8'	16°37.29	-12.6'	56.3'
14	29°49.07	49.15	88°1.47	12.9'	16°24.64	-12.7'	56.3'
15 16	44° 49.23 59° 49.39	· · 50.06 50.97	102°33.33 117°5.22	12.9' 12.9'	16°11.91 15°59.08	-12.8' -12.9'	56.3' 56.4'
17	74° 49.55	50.97	117 5.22 131°37.13	12.9' 12.9'	15 59.08 15°46.17	-12.9 -13.0'	56.4'
18	89°49.71	N08°52.79	146° 9.06	13.0'	S15°33.17	-13.1	56.4
19	104°49.87	53.70	160°41.03	13.0'	15°20.08	-13.2'	56.5
20	119°50.03 134°50.19	54.61	175°13.01 189°45.02	13.0'	15°6.91 14°53.65	-13.3'	56.5'
21 22	134°50.19 149°50.35	• • 55.52 56.43	189°45.02 204°17.06	13.0' 13.1'	14°53.65 14°40.31	-13.3' -13.4'	56.5' 56.6'
23	164° 50.51	57.33	218°49.11	13.1'	14°26.88	-13.5'	56.6'
	SD = 16.0'	d = 0.9'		SI	D = 15.2'		

Lat.	Twilight		Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	////	02:33	04:02	20:04	21:36	////
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	05:23	06:11	06:53	17:08	17:50	18:38

Lat	Lat. Moonr		e		Moonset	t
Lat.	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		08:52	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 10°		00:39	01:31	12:51	13:37	14:20
20°		00:20	01:16	13:12	13:54	14:33
30°	23:58		00:58	13:35	14:13	14:48
35°	23:45	•• ••	00:47	13:49	14:25	14:56
40°	23:30		00:36	14:05	14:38	15:06
45°	23:12	•• ••	00:22	14:24	14:53	15:17
<b>S</b> 50°	22:49		00:04	14:48	15:12	15:30
52°	22:38	23:56		14:59	15:20	15:37
54°	22:26	23:47	•• ••	15:12	15:30	15:44
56°	22:12	23:37		15:26	15:41	15:51
58°	21:55	23:25		15:43	15:54	16:00
<b>S</b> 60°	21:35	23:11		16:04	16:08	16:10
		_				

	Sun			Moon		
Day	Eqn.of	Eqn.of Time Mer.		Mer.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	22-24
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	52-33%
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.)

h	Aries	Venus	Mars	Jupiter	Saturn	
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	
0	201°11.90	157°19.01 N16°48			193°54.00 N00°49.37	
1	216° 14.37		0.56 213°32.55 5.1		208°56.18 49.49	Alpheratz
2	231° 16.83		0.54 228°33.24 5.9		223°58.36 49.61	Ankaa
3	246° 19.30	202°17.32 · · 5			239°0.55 · · 49.73	Schedar
4	261°21.76		2.51 258°34.61 7.5		254°2.73 49.84	Diphda
5	276° 24.22		3.49 273°35.30 8.3		269°4.91 49.96	Achernar
6	291°26.69	247°15.62 N16°54			284°7.10 N00°50.08	Hamal
7	306° 29.15		6.46 303°36.67 9.8		299°9.28 50.19	Polaris
8	321°31.62		6.44 318° 37.36 10.6		314°11.46 50.31	Acamar
9	336° 34.08	292°13.92 · · 5			329°13.65 · · 50.43	Menkar
10	351°36.54		3.40 348°38.73 12.2		344°15.83 50.54	Mirfak
11	6°39.01	322°12.78 16°59			359°18.01 50.66	Aldebaran
12	21°41.47	337°12.21 N17°0			14°20.20 N00°50.78	Rigel
13	36° 43.94		33 33°40.79 14.5		29°22.38 50.89	Capella
14	51°46.40		31 48°41.48 15.3		44°24.56 51.01	Bellatrix
15	66° 48.87	22°10.50 · · 3	3.28 63°42.16 · · 16.1	.6 318°31.30 · · 45.35	59°26.75 · · 51.13	Elnath
16	81°51.33	37°9.93	.26 78°42.85 16.9	94 333°33.50 45.32	74°28.93 51.25	Alnilam
17	96° 53.79		5.23 93°43.54 17.7		89°31.12 51.36	Betelgeuse
18	111°56.26	67°8.79 N17°6	5.20 108°44.22 N00°18.5	3°37.89 N22°45.26	104°33.30 N00°51.48	Canopus
19	126°58.72	82°8.22	7.18 123°44.91 19.2	9 18°40.08 45.23	119°35.48 51.60	Sirius
20	142°1.19	97°7.64	3.15 138° 45.60 20.0	07 33°42.28 45.20	134°37.67 51.71	Adhara
21	157°3.65	112°7.07 · · · ·	0.12 153°46.28 · · 20.8	35 48°44.47 · · 45.17	149°39.85 · · 51.83	Procyon
22	172°6.11	127°6.50 10	0.09 168°46.97 21.6	64 63°46.67 45.14	164°42.04 51.95	Pollux
23	187°8.58	142°5.92	06 183°47.66 22.4	2 78°48.86 45.11	179°44.22 52.06	Avior
N 4	10.22	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	Suhail
ivier.p	pass. 10:33	$\nu$ -0.6° $a$ 1.0° m-3	92	<i>ν2.2 α</i> -0.0 m-2.12	ν2.2' d0.1' m0.93	Miaplacidus
						Alphard
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus :
0	202°11.04	157°5.35 N17°12	2.03 198°48.34 N00°23.2	93°51.06 N22°45.08	194°46.40 N00°52.18	Dubne
1	217° 13.51		99 213°49.03 23.9	98 108°53.25 45.05	209°48.59 52.30	Gienah
2	232° 15.97	187°4.20 13	.96 228°49.72 24.7		224°50.77 52.41	
3	247° 18.43	202°3.62 · · 14			239°52.96 · · 52.53	Acrux
4	262°20.90	217°3.05	5.89 258°51.09 26.3	3 153°59.83 44.96	254°55.14 52.65	Gacrux
5	277°23.36	232°2.47 16	5.86 273°51.78 27.1	.1 169°2.02 44.93	269°57.32 52.76	Alioth Spica
6	292°25.83	247°1.89 N17°17	7.82 288°52.47 N00°27.9	00 184° 4.21 N22° 44.90	284°59.51 N00°52.88	Alkaid
7	307°28.29	262°1.31 18	3.78 303°53.15 28.6	68 199°6.40 44.87	300°1.69 52.99	Hadar
8	322°30.75	277°0.73	.75 318°53.84 29.4	6 214°8.60 44.84	315°3.88 53.11	Menkent
9	337°33.22	292°0.16 · · 20	0.71 333°54.53 · · 30.2		330°6.06 · · 53.23	Arcturus
10	352°35.68	306°59.58 2	67 348°55.22 31.0	3 244°12.98 44.78	345°8.25 53.34	Rigil Kent.
11	7°38.15		2.63 3°55.90 31.8		0°10.43 53.46	Kochab
12	22°40.61	336°58.42 N17°23	5.59 18°56.59 N00°32.5	i9 274°17.36 N22°44.72	15°12.62 N00°53.58	Zuben'ubi
13	37°43.07	351°57.84 24	.55 33°57.28 33.3	37 289°19.55 44.69	30°14.80 53.69	Alphecca
14	52°45.54		5.51 48°57.97 34.1	.6 304°21.74 44.66	45°16.98 53.81	Antares
15	67°48.00	21°56.67 · · 26	6.46 63°58.65 · · 34.9	94 319°23.93 · · 44.63	60°19.17 · · 53.93	Atria
16	82°50.47		7.42 78°59.34 35.7	'2 334°26.12 44.60	75°21.35 54.04	Sabik
17	97°52.93	51°55.51 28	36.5 94°0.03	60 349°28.31 44.57	90°23.54 54.16	Shaula
18	112°55.39	66°54.93 N17°29	0.33 109°0.72 N00°37.2	28 4°30.49 N22°44.54	105°25.72 N00°54.27	Rasalhague
19	127° 57.86	81°54.34 30	0.28 124°1.40 38.0	07 19°32.68 44.51	120°27.91 54.39	Eltanin
20	143°0.32	96°53.76 33	24 139°2.09 38.8	35 34°34.87 44.48	135°30.09 54.51	Kaus Aust.
21	158°2.79	111°53.17 · · 32	2.19 154°2.78 · · 39.6	3 49°37.06 · · 44.45	150°32.28 · · 54.62	Vega
22	173°5.25	126°52.59 33	3.14 169°3.47 40.4	1 64°39.25 44.42	165°34.46 54.74	Nunki
23	188°7.71	141°52.00 34	09 184°4.16 41.1	.9 79°41.43 44.39	180°36.65 54.86	Altair
Morr	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	$\nu 2.2' \ d0.1' \ m0.93$	Peacock
- IVIEL.	Jass. 10.50	ν-0.0 α1.0 III-3.	92		V2.2 d0.1 1110.93	Deneb
						Enif
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir
0	$203^{\circ}10.18$	156°51.42 N17°35			195°38.83 N00°54.97	Fomalhaut
1	218° 12.64	171°50.83	6.99 214°5.53 42.7	'6 109°45.81 44.32	210°41.02 55.09	Scheat
2	233° 15.11		i.94 229°6.22 43.5		225°43.20 55.20	Markab
3	248° 17.57	201°49.66 · · 3			240°45.39 · · 55.32	
4	263°20.03		3.83 259°7.60 45.1		255°47.57 55.44	Apr 13 Mon
5	278°22.50		0.78 274°8.28 45.8		270°49.76 55.55	Venus
6	293°24.96	246°47.90 N17°40			285°51.94 N00°55.67	Mars
7	308°27.43		67 304°9.66 47.4		300°54.13 55.78	Jupiter
8	323°29.89		2.62 319°10.35 48.2		315°56.31 55.90	Saturn
9	338° 32.36	291°46.13 · · 43			330°58.50 · · 56.02	Apr 14 Tue
10	353°34.82		.50 349°11.73 49.7		346°0.68 56.13	Venus
11	8°37.28		6.44 4°12.41 50.5		1°2.87 56.25	Mars
12	23°39.75	336°44.36 N17°46			16°5.05 N00°56.36	Jupiter
13	38° 42.21		7.32 34°13.79 52.1		31°7.24 56.48	Saturn
14	53° 44.68		3.26 49°14.48 52.9		46°9.42 56.59	
15	68°47.14	21°42.58 · · 49			61°11.61 · · 56.71	Apr 15 Wed
16	83°49.60		0.14 79°15.86 54.4		76°13.79 56.83	Venus
17	98°52.07		07 94°16.54 55.2		91°15.98 56.94	Mars
18	113°54.53	66°40.80 N17°52			106°18.16 N00°57.06	Jupiter
19	128°57.00		1.95 124°17.92 56.8		121°20.35 57.17	Saturn
20	143°59.46		5.88 139°18.61 57.6		136°22.53 57.29	Horizont
21	159°1.92	111°39.01 · · 54			151°24.72 · · 57.40	norizont
22	174°4.39		5.75 169°19.99 59.1		166°26.91 57.52	
23	189°6.85	141°37.82 56	6.68 184°20.68 59.9	95 80°33.84 43.63	181°29.09 57.64	
Mer.r	pass. 10:26	ν-0.6' d0.9' m-3	92 $\nu 0.7' \ d0.8' \ m1.20$	ν2.2' d-0.0' m-2.11	ν2.2' d0.1' m0.93	

	Stars	
	SHA	Dec
Alpheratz	357°34.05	29°14.00
Ankaa Schedar	353°6.52 349°30.44	-42° 9.77 56° 40.79
Diphda	$348^{\circ}46.58$	-17°50.60
Achernar Hamal	335° 19.98 327° 50.38	-57° 6.21 23° 35.14
Polaris	313°57.90	89°22.60
Acamar	315°11.37	-40°12.06
Menkar Mirfak	314°5.36 308°27.22	4°11.49 49°57.31
Aldebaran	290°38.67	16°33.69
Rigel	281°3.06	-8°10.40
Capella Bellatrix	280°20.63 278°21.95	46°1.56 6°22.34
Elnath	278°0.76	28°37.80
Alnilam Betelgeuse	275°36.84 270°51.11	-1°11.21 7°24.65
Canopus	263°52.11	-52°42.83
Sirius	258° 25.42	-16°45.31
Adhara Procyon	255°5.12 244°49.76	-29°0.69 5°9.36
Pollux	$243^{\circ}16.04$	27°57.78
Avior	234° 14.23	-59°35.92 -43°32.60
Suhail Miaplacidus	222°45.41 221°37.75	-43°32.60 -69°49.79
Alphard	$217^{\circ}46.60$	-8°46.53
Regulus	207° 33.15 193° 39.21	11°50.23 61°36.64
Dubhe Denebola	193 39.21 182°23.61	14°25.39
Gienah	175°42.22	-17°41.46
Acrux Gacrux	172°58.31 171°49.96	-63°14.87 -57°15.81
Alioth	166° 11.49	55°48.96
Spica	158° 20.89	-11°18.08
Alkaid Hadar	152° 50.69 148° 33.92	49°10.78 -60°30.04
Menkent	$147^{\circ}56.01$	-36°30.07
Arcturus	145° 46.63 139° 38.25	19°2.55 -60°56.66
Rigil Kent. Kochab	139° 38.25 137° 18.68	74° 2.63
Zuben'ubi	$136^{\circ}54.56$	-16°9.19
Alphecca Antares	126°2.55 112°14.31	26°37.34 -26°29.45
Atria	107°7.26	-69°4.29
Sabik	102°1.40	-15°45.51
Shaula Rasalhague	96°8.76 95°57.42	-37°7.30 12°32.24
Eltanin	90°41.47	51°28.76
Kaus Aust.	83°31.02	-34°22.25 38°48.15
Vega Nunki	80° 32.41 75° 46.41	-26°15.81
Altair	$61^{\circ}58.96$	8°56.09
Peacock Deneb	53°4.21 49°25.23	-56°38.80 45°22.13
Enif	33° 37.95	9°59.58
Al Na'ir	27°31.88	-46°49.89
Fomalhaut Scheat	15° 13.65 13° 44.49	-29°28.95 28°13.35
Markab	13°29.13	15°20.66
Apr 13 Mon	SHA	Mer.pass
Venus	316°7.11	13:31
Mars Jupiter	357° 19.96 251° 46.42	10:45 17:46
Saturn	352°42.09	11:03
Apr 14 Tue	SHA	Mer.pass
Venus Mars	314°54.31 356°37.30	13:32 10:44
Jupiter	251°40.01	17:42
Saturn	352°35.36	10:59
Apr 15 Wed Venus	<b>SHA</b> 313°41.24	Mer.pass 13:33
Mars	$355^{\circ}54.67$	10:43
Jupiter	251°33.44 352°28.65	17:39
Saturn	352°28.65	10:56

 $352^{\circ}28.65$ Horizontal parallax

Venus: Mars:

L	C	+0.0317 sec		-011 -	,		
h	Su				Moon		
Mon 0	<b>GHA</b> 179°50.67	<b>Dec</b> N08° 58.24	<b>GHA</b> 233°21.19	u  13.1'	Dec \$14° 13.38	<i>d</i> −13.6'	HP
1	179 50.67 194°50.82	08° 59.15	247°53.29	13.1	13°59.79	-13.0	56.6' 56.7'
2	209°50.98	09°0.06	262°25.41	13.1	13°46.12	-13.7'	56.7'
3	224°51.14	• • 0.97	276° 57.55	13.2'	13°32.37	-13.8'	56.7'
4	239°51.30	1.87	291°29.70	13.2'	13° 18.54	-13.9'	56.8'
5	254°51.46	2.78	$306^{\circ}1.88$	13.2'	13°4.63	-14.0'	56.8'
6	269°51.62	N09°3.69	320°34.07	13.2'	S12°50.65	-14.1'	56.8'
7	284°51.77	4.60	335°6.28	13.2'	12°36.59	-14.1'	56.9'
8 9	299°51.93 314°52.09	5.50 · · 6.41	349°38.50 4°10.73	13.2' 13.2'	12°22.46 12°8.25	-14.2' -14.3'	56.9' 57.0'
10	329°52.24	7.31	4 10.73 18°42.98	13.3'	12 0.25 11°53.96	-14.3 -14.4'	57.0'
11	344°52.40	8.22	33° 15.24	13.3'	11°39.61	-14.4	57.0'
12	359°52.56	N09°9.13	47° 47.52	13.3'	S11°25.18	-14.5'	57.1'
13	14°52.72	10.03	62° 19.80	13.3'	11°10.68	-14.6'	57.1'
14	29°52.87	10.93	76°52.09	13.3'	10°56.11	-14.6'	57.1'
15	44°53.03	• • 11.84	91°24.39	13.3'	10°41.48	-14.7'	57.2'
16 17	59°53.19 74°53.34	12.74 13.65	105°56.70 120°29.02	13.3' 13.3'	10°26.77 10°12.00	-14.8' -14.8'	57.2' 57.2'
18	89°53.50	N09° 14.55	135°1.34	13.3'	S09°57.16	-14.9	57.3'
19	104°53.65	15.46	149° 33.66	13.3	09°42.26	-15.0'	57.3'
20	119°53.81	16.36	164°5.99	13.3'	09° 27.29	-15.0'	57.4'
21	134°53.96	• • 17.26	178°38.32	13.3'	09°12.26	-15.1'	57.4'
22	149°54.12	18.16	193° 10.66	13.3'	08°57.17	-15.2'	57.4'
23	164°54.28	19.07	207°42.99	13.3'	08°42.02	-15.2'	57.5'
	SD = 15.9'	d = 0.9'		SI	D = 15.4'		
_							
Tue 0	<b>GHA</b> 179°54.43	<b>Dec</b> N09° 19.97	<b>GHA</b> 222° 15.32	u 13.3'	Dec 508° 26.81	d -15.3'	<b>HP</b> 57.5'
1	179 54.43 194°54.59	20.87	222 15.32 236° 47.66	13.3'	08° 11.53	-15.3'	57.5'
2	209°54.74	21.77	251° 19.99	13.3'	07°56.20	-15.4	57.6'
3	224°54.89	• • 22.67	265° 52.31	13.3'	07° 40.82	-15.4'	57.6'
4	239°55.05	23.58	280°24.63	13.3'	07°25.38	-15.5'	57.7'
5	254°55.20	24.48	294°56.95	13.3'	07°9.88	-15.6'	57.7'
6	269°55.36	N09°25.38	309°29.26	13.3'	S06°54.33	-15.6'	57.7'
7	284°55.51	26.28	324°1.56	13.3'	06°38.72	-15.7'	57.8'
8 9	299°55.67 314°55.82	27.18 •• 28.08	338° 33.85 353° 6.13	13.3' 13.3'	06°23.07 06°7.36	-15.7' -15.8'	57.8' 57.8'
10	329°55.97	28.98	7°38.40	13.3'	05°51.61	-15.8'	57.8 57.9'
11	344°56.13	29.88	22° 10.65	13.2'	05°35.81	-15.8'	57.9'
12	359°56.28	N09°30.77	36° 42.90	13.2'	S05° 19.96	-15.9'	57.9'
13	14°56.43	31.67	51° 15.12	13.2'	05°4.06	-15.9'	58.0'
14	29°56.59	32.57	65°47.34	13.2'	04°48.12	-16.0'	58.0'
15	44°56.74	• • 33.47	80° 19.53	13.2'	04°32.14 04°16.11	-16.0'	58.1'
16 17	59°56.89 74°57.04	34.37 35.27	94°51.71 109°23.87	13.2' 13.1'	04°16.11	-16.1' -16.1'	58.1' 58.1'
18	89°57.20	N09°36.16	123° 56.00	13.1'	503°43.94	-16.1	58.2'
19	104°57.35	37.06	138°28.12	13.1'	03° 27.80		58.2'
20	119°57.50	37.96	153°0.21	13.1'	$03^{\circ}11.62$	-16.2'	58.2'
21	134°57.65	• • 38.85	167°32.28	13.0'	02°55.40	-16.3'	58.3'
22	149°57.80	39.75	182°4.32	13.0'	02°39.14	-16.3'	58.3'
23	164°57.96	40.64	196°36.33	13.0'	02°22.86	-16.3'	58.3'
	SD = 15.9'	d = 0.9'		SI	D = 15.7'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°58.11	N09°41.54	211°8.32	13.0'	S02°6.54	-16.3'	58.4'
1	194°58.26	42.44	225°40.28	12.9'	01°50.19	-16.4'	58.4'
2	209°58.41	43.33	240° 12.21	12.9'	01°33.81	-16.4	58.5'
3 4	224°58.56 239°58.71	· · 44.23	254° 44.10 269° 15.97	12.9' 12.8'	01°17.40 01°0.97	-16.4'	58.5'
4 5	239°58.71 254°58.86	45.12 46.01	269° 15.97 283° 47.80	12.8'	01°0.97 00°44.51	-16.5' -16.5'	58.5' 58.6'
6	269°59.01	N09°46.91	298° 19.59	12.8'	S00° 28.02	-16.5	58.6'
7	284°59.16	47.80	312°51.35	12.7'	S00° 11.52	-16.5	58.6'
8	299°59.31	48.70	$327^{\circ}23.07$	12.7'	N00°5.01	16.5'	58.7'
9	314°59.46	• • 49.59	341°54.75	12.6'	00°21.56	16.6'	58.7'
10	329°59.61	50.48	356°26.39	12.6'	00°38.13	16.6'	58.7'
11 12	344°59.76 359°59.91	51.37 N09° 52.27	10° 57.98 25° 29.54	12.6' 12.5'	00°54.71 N01°11.31	16.6' 16.6'	58.8'
13	359 59.91 15°0.06	53.16	40°1.05	12.5'	01°27.93	16.6	58.8' 58.8'
13	30°0.21	54.05	54° 32.52	12.4	01°27.93	16.6	58.9'
15	45°0.36	• • 54.94	69°3.93	12.4'	02°1.20	16.6'	58.9'
16	60°0.51	55.83	83°35.30	12.3'	$02^{\circ}17.84$	16.7'	58.9'
17	75°0.66	56.72	98°6.63	12.3'	$02^{\circ}34.50$	16.7'	59.0'
18	90°0.81	N09° 57.61	112°37.90	12.2'	N02°51.17	16.7'	59.0'
19	105°0.95	58.50	127°9.12	12.2'	03°7.83	16.7'	59.0'
20 21	120°1.10 135°1.25	09°59.39 10°0.28	141°40.28 156°11.39	12.1' 12.1'	03°24.51 03°41.18	16.7' 16.7'	59.1' 59.1'
21	135°1.25 150°1.40	10-0.28	150° 11.39 170° 42.45	12.1	03°41.18 03°57.86	16.7'	59.1' 59.1'
23	165°1.55	2.06	185° 13.45	11.9'	04° 14.53	16.7	59.2'
	SD = 15.9'	d = 0.9'			D = 15.9'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Sunnse	Sunset	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
<b>N</b> 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° 0°	05:04	05:29	05:50	18:10	18:32	18:57
_	05:12	05:36	05:57	18:04	18:25	18:49
<b>S</b> 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° 35°	05:26	05:54	06:18	17:42	18:06	18:34
40°	05:28 05:29	05:57 06:01	06:23 06:28	17:37 17:32	18:03 17:59	18:32 18:31
45°	05:30	06:04	06:34	17:32	17:56	18:30
<b>S</b> 50° 52°	05:30	06:08	06:41 06:44	17:19	17:52	18:29
52°	05:30 05:30	06:10 06:11	06:44 06:47	17:16 17:12	17:50 17:48	18:29 18:29
56°	05:30	06:11	06:51	17:12	17:46	18:29
58°	05:30	06:15	06:55	17:04	17:44	18:29
<b>S</b> 60°	05:29	06:18	07:00	16:59	17:42	18:30
	'			·		

Lat.	Moonrise			Moonset		
Lat.	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	00:46	02:21	03:57	16:10	16:09	16:09

		Sun			Moon	
Day	Eqn.of	Time	Mer.	Mer.Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>	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	80:00	00:00	12:00	10:15	22:38	

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	204°9.32	156°37.22 N17°57.61	199°21.37 N01°0.73	95°36.02 N22°43.60	196°31.28 N00°57.75	
1	219° 11.78	171°36.63 58.54	214°22.05 1.51	110°38.20 43.57	211°33.46 57.87	Alpheratz 357°34.04 29°14.00
2	234° 14.24	186°36.03 17°59.47	229° 22.74 2.29	125°40.38 43.54	226°35.65 57.98	Ankaa 353°6.51 -42°9.75
3	$249^{\circ}16.71$	201°35.43 18°0.40	244°23.43 · · 3.07	140°42.56 · · 43.51	241°37.83 · · 58.10	Schedar 349°30.43 56°40.78 Diphda 348°46.57 -17°50.59
4	$264^{\circ}19.17$	216°34.83 1.33	259°24.12 3.85	155°44.74 43.48	256°40.02 58.21	Achernar 335°19.98 -57°6.19
5	279°21.64	231°34.23 2.25	274°24.81 4.63	170°46.92 43.44	271°42.21 58.33	Hamal 327°50.38 23°35.14
6	294°24.10	246°33.63 N18°3.18	289°25.50 N01°5.41	185°49.10 N22°43.41	286°44.39 N00°58.44	Polaris 313°58.43 89°22.58
7	309° 26.56	261°33.03 4.11	304°26.19 6.19	200°51.28 43.38	301°46.58 58.56	Acamar 315°11.38 -40°12.05
8	324°29.03	276°32.43 5.03	319°26.88 6.97	215°53.45 43.35	316°48.76 58.68	Menkar 314°5.37 4°11.49
9	339°31.49	291°31.83 · · 5.96	334°27.57 · · 7.75	230°55.63 · · 43.31	331°50.95 · · 58.79	Mirfak 308°27.23 49°57.30
10	354° 33.96	306°31.23 6.88	349°28.26 8.53	245°57.81 43.28 260°59.99 43.25	346°53.13 58.91	Aldebaran 290°38.68 16°33.69
11 12	9°36.42 24°38.88	321°30.63 7.80 336°30.03 N18°8.72	4°28.94 9.31 19°29.63 N01°10.09	260°59.99 43.25 276°2.16 N22°43.22	1°55.32 59.02 16°57.51 N00°59.14	Rigel 281°3.08 -8°10.40
13	39°41.35	351°29.42 9.64	34°30.32 10.87	291° 4.34 43.19	31°59.69 59.25	Capella 280°20.65 46°1.55
14	54°43.81	6°28.82 10.56	49° 31.01 11.65	306° 6.52 43.15	47°1.88 59.37	Bellatrix 278°21.96 6°22.34
15	69°46.28	21°28.22 · · 11.48	64°31.70 · · 12.43	321°8.69 · · 43.12	62°4.07 · · 59.48	Elnath 278°0.78 28°37.79
16	84°48.74	36°27.61 12.40	79°32.39 13.21	336°10.87 43.09	77°6.25 59.60	Alnilam 275°36.86 -1°11.21
17	99°51.20	51°27.01 13.32	94°33.08 13.99	351°13.04 43.06	92°8.44 59.71	Betelgeuse 270°51.13 7°24.65
18	114°53.67	66°26.40 N18°14.24	109°33.77 N01°14.77	6°15.22 N22°43.02	107°10.62 N00°59.83	Canopus 263°52.14 -52°42.82   Sirius 258°25.43 -16°45.31
19	$129^{\circ}56.13$	81°25.80 15.15	124° 34.46 15.55	21°17.39 42.99	122°12.81 00°59.94	Sirius 258°25.43 -16°45.31 Adhara 255°5.14 -29°0.69
20	144°58.60	96°25.19 16.07	139° 35.15 16.33	36°19.57 42.96	137°15.00 01°0.06	Procyon 244°49.78 5°9.36
21	160°1.06	111°24.59 · · 16.98	154°35.84 · · 17.11	51°21.74 · · 42.93	152°17.18 · · 0.17	Pollux 243°16.06 27°57.79
22	175°3.52	126°23.98 17.89	169°36.53 17.89	66°23.92 42.89	167°19.37 0.29	Avior 234°14.26 -59°35.92
23	190°5.99	141°23.37 18.81	184°37.22 18.67	81°26.09 42.86	182°21.56 0.40	Suhail 222°45.43 -43°32.61
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	Miaplacidus 221°37.80 -69°49.80
		- 1.1 40.3 111 5.32				Alphard 217°46.62 -8°46.53
<b>-</b> .	CIIA	CHA	CUA	CUA	CHA	Regulus 207°33.16 11°50.23
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.23 61°36.65
0 1	205°8.45 220°10.92	156°22.76 N18°19.72 171°22.15 20.63	199° 37.91 N01° 19.45 214° 38.60 20.23	96°28.27 N22°42.83 111°30.44 42.79	197°23.74 N01°0.52 212°25.93 0.63	Denebola 182°23.61 14°25.39
2	235° 13.38	186°21.55 21.54	214 38.00 20.23 229°39.29 21.01	126°32.61 42.76	227°28.12 0.75	Gienah 175°42.23 -17°41.47
3	250° 15.84	201°20.94 · · 22.45	244°39.98 · · 21.79	141°34.78 · · 42.73	242°30.30 · · 0.86	Acrux 172°58.32 -63°14.88
4	265° 18.31	216°20.33 23.36	259° 40.67 22.57	156°36.96 42.70	257°32.49 0.98	Gacrux 171°49.97 -57°15.82
5	280° 20.77	231°19.72 24.27	274°41.36 23.35	171°39.13 42.66	272°34.68 1.09	Alioth 166°11.49 55°48.98
6	295° 23.24	246°19.11 N18°25.17	289°42.04 N01°24.13	186°41.30 N22°42.63	287°36.86 N01°1.21	Spica 158°20.89 -11°18.08
7	310°25.70	261°18.49 26.08	304°42.73 24.91	201°43.47 42.60	302°39.05 1.32	Alkaid 152°50.69 49°10.79 Hadar 148°33.91 -60°30.06
8	325°28.17	276°17.88 26.98	319°43.42 25.69	216°45.64 42.56	317°41.24 1.44	Hadar 148°33.91 -60°30.06 Menkent 147°56.01 -36°30.08
9	340°30.63	291°17.27 · · 27.89	334°44.11 • • 26.47	231°47.82 · · 42.53	332°43.42 · · 1.55	Arcturus 145°46.63 19°2.56
10	355°33.09	306°16.66 28.79	349°44.80 27.25	246°49.99 42.50	347°45.61 1.67	Rigil Kent. 139°38.24 -60°56.68
11	10°35.56	321°16.05 29.70	4°45.49 28.03	261°52.16 42.46	2°47.80 1.78	Kochab 137°18.66 74°2.64
12	25°38.02	336°15.43 N18°30.60	19°46.18 N01°28.81	276°54.33 N22°42.43	17°49.98 N01°1.90	Zuben'ubi 136°54.55 -16°9.19
13	40°40.49	351°14.82 31.50	34°46.87 29.58	291°56.50 42.40	32°52.17 2.01	Alphecca 126°2.54 26°37.35
14	55° 42.95	6°14.20 32.40	49°47.56 30.36	306°58.67 42.36	47°54.36 2.13	Antares 112°14.29 -26°29.45
15 16	70° 45.41 85° 47.88	21°13.59 · · 33.30 36°12.97 34.20	64°48.25 · · 31.14 79°48.94	322°0.84 · · 42.33 337°3.01 42.30	62°56.54 · · 2.24 77°58.73 2.36	Atria 107°7.22 -69°4.30
16 17	100° 50.34	36°12.97 34.20 51°12.36 35.09	79°48.94 31.92 94°49.63 32.70	337°3.01 42.30 352°5.17 42.26	77°58.73 2.36 93°0.92 2.47	Sabik 102°1.38 -15°45.51
18	115°52.81	66°11.74 N18°35.99	109°50.32 N01°33.48	7°7.34 N22°42.23	108°3.11 N01°2.59	Shaula 96°8.74 -37°7.31
19	130°55.27	81°11.12 36.89	124°51.01 34.26	22°9.51 42.20	123°5.29 2.70	Rasalhague 95°57.40 12°32.24
20	145° 57.73	96° 10.51 37.78	139°51.71 35.04	37°11.68 42.16	138°7.48 2.82	Eltanin 90°41.45 51°28.76
21	161°0.20	111°9.89 · · 38.68	154°52.40 · · 35.81	52°13.85 · · 42.13	153°9.67 · · 2.93	Kaus Aust. 83°31.00 -34°22.25 Vega 80°32.39 38°48.15
22	176°2.66	126°9.27 39.57	169°53.09 36.59	67°16.02 42.09	168°11.85 3.04	Vega 80°32.39 38°48.15 Nunki 75°46.39 -26°15.80
23	191°5.13	141°8.65 40.46	184°53.78 37.37	82°18.18 42.06	183°14.04 3.16	Altair 61°58.95 8°56.09
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	Peacock 53°4.17 -56°38.80
14161.	Puss. 10.10	ν 0.0 α0.9 III-3.92				Deneb 49°25.20 45°22.13
	_					Enif 33°37.94 9°59.58
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°31.86 -46°49.88
0	206°7.59	156°8.03 N18°41.36	199°54.47 N01°38.15	97°20.35 N22°42.03	198°16.23 N01°3.27 213°18.42 3.39	Fomalhaut 15°13.63 -29°28.94
1 2	221° 10.05 236° 12.52	171°7.41 42.25 186°6.79 43.14	214°55.16 38.93 229°55.85 39.71	112°22.52 41.99 127°24.68 41.96		Scheat 13°44.48 28°13.35
3	230° 12.52 251° 14.98	201°6.17 · · 44.03	244° 56.54 · · 40.49	127°24.68 41.96 142°26.85 •• 41.92	228°20.60 3.50 243°22.79 · · 3.62	Markab 13°29.12 15°20.66
4	266° 17.45	216°5.55 44.92	259°57.23 41.26	157°29.02 41.89	258°24.98 3.73	Apr 16 Thu SHA Mer.pass
5	281° 19.91	231°4.93 45.80	274°57.92 42.04	172°31.18 41.86	273°27.17 3.85	Venus 312°27.91 13:34
6	296° 22.37	246°4.31 N18°46.69	289°58.61 N01°42.82	187°33.35 N22°41.82	288°29.35 N01°3.96	Mars 355°12.05 10:42
7	311°24.84	261°3.69 47.58	304°59.30 43.60	202°35.51 41.79	303°31.54 4.07	Jupiter 251°26.71 17:35
8	$326^{\circ}27.30$	276°3.07 48.46	319°59.99 44.38	217°37.68 41.75	318°33.73 4.19	Saturn 352°21.96 10:52
9	341°29.77	291°2.44 · · 49.35	335°0.68 · · 45.15	232°39.84 · · 41.72	333°35.92 · · 4.30	Apr 17 Fri SHA Mer.pass
10	356° 32.23	306°1.82 50.23	350°1.37 45.93	247°42.01 41.69	348°38.10 4.42	Venus 311°14.31 13:35
11	11°34.70	321°1.19 51.11	5°2.06 46.71	262°44.17 41.65	3°40.29 4.53	Mars 354° 29.45 10:41
12	26° 37.16	336°0.57 N18°51.99	20°2.75 N01°47.49	277°46.33 N22°41.62	18°42.48 N01°4.65	Jupiter 251°19.81 17:32
13	41°39.62	350°59.94 52.87	35°3.44 48.26	292°48.50 41.58	33°44.67 4.76	Saturn 352°15.29 10:49
14 15	56° 42.09 71° 44.55	5°59.32 53.75 20°58.69 • 54.63	50°4.13 49.04 65°4.82 · · 49.82	307°50.66 41.55 322°52.82 • 41.51	48°46.86 4.87 63°49.04 • 4.99	
15 16	71°44.55 86°47.02	35°58.07 55.51	65°4.82 · · 49.82 80°5.52 50.60	322°52.82 · · 41.51 337°54.99 41.48	63°49.04 · · 4.99 78°51.23 5.10	Apr 18 Sat SHA Mer.pass
17	101°49.48	50°57.44 56.39	95°6.21 51.37	352°57.15 41.44	93°53.42 5.22	Venus 310°0.44 13:36 Mars 353°46.88 10:40
18	116° 51.94	65°56.81 N18°57.27	110°6.90 N01°52.15	7°59.31 N22°41.41	108°55.61 N01°5.33	Mars 353°46.88 10:40 Jupiter 251°12.76 17:28
19	131°54.41	80°56.18 58.14	125°7.59 52.93	23°1.47 41.38	123°57.80 5.45	Saturn 352°8.64 10:45
20	146° 56.87	95°55.56 59.02	140°8.28 53.71	38° 3.63 41.34	138°59.98 5.56	
21	161°59.34	110°54.93 18°59.89	155°8.97 · · 54.48	53°5.80 · · 41.31	154°2.17 · · 5.67	Horizontal parallax
22	$177^{\circ}1.80$	125°54.30 19°0.76	170°9.66 55.26	68°7.96 41.27	169°4.36 5.79	Venus: 0.1
23	192°4.27	140°53.67 1.64	185°10.35 56.04	83°10.12 41.24	184°6.55 5.90	Mars: 0.1
Mer	pass. 10:14	ν-0.6' d0.9' m-3.92	$\nu 0.7' \ d0.8' \ m1.21$	ν2.2' d-0.0' m-2.09	ν2.2' d0.1' m0.93	

Thu         GHA         Dec         GHA         ν         Dec           0         180°1.69         N10°2.95         199°4.43         11.9'         N04°31.20           1         199°1.84         3.84         214°15.27'         11.8'         05°47.56           2         210°1.99         4.73         228°46.09         11.8'         05°4.53           3         225°2.14         · 5.62         243°16.84         11.7'         05°21.18           4         240°2.28         6.50         25°47.54         11.6'         05°3.782           5         255°2.43         7.39         272°18.17         11.6'         05°54.46           6         270°2.58         N10°8.28         286°48.73         11.5'         N06°11.08           7         285°2.72         9.17         301°19.23         11.4'         06°44.27           9         315°3.01         10.94         330°20.01         11.3'         07°0.64           10         330°3.16         11.82         344°50.30         11.2'         07°17.39           11         345°3.51         11.1'         07°33.92         11.1'         07°33.92           12         0°3.45         N013.60         14.48	d 16.7' 16.7' 16.6' 16.6' 16.6' 16.6' 16.6' 16.5' 16.5' 16.5' 16.3' 16.3' 16.3' 16.2' 16.1' 16.1'	HP 59.2' 59.3' 59.3' 59.4' 59.4' 59.4' 59.5' 59.6' 59.6' 59.6' 59.7' 59.7' 59.7' 59.8' 59.8' 59.8'
1	16.7' 16.6' 16.6' 16.6' 16.6' 16.6' 16.5' 16.5' 16.5' 16.3' 16.3' 16.3' 16.3' 16.2' 16.1'	59.2' 59.3' 59.3' 59.4' 59.4' 59.5' 59.5' 59.6' 59.6' 59.6' 59.7' 59.7' 59.7' 59.8' 59.8' 59.8'
2	16.7' 16.6' 16.6' 16.6' 16.6' 16.6' 16.5' 16.5' 16.5' 16.3' 16.3' 16.3' 16.3' 16.2' 16.1'	59.3' 59.3' 59.4' 59.4' 59.4' 59.5' 59.5' 59.6' 59.6' 59.6' 59.7' 59.7' 59.7' 59.7' 59.8' 59.8'
3	16.6' 16.6' 16.6' 16.6' 16.6' 16.5' 16.5' 16.5' 16.5' 16.3'	59.3' 59.3' 59.4' 59.4' 59.5' 59.5' 59.6' 59.6' 59.6' 59.7' 59.7' 59.7' 59.7' 59.8' 59.8' 59.8'
4	16.6' 16.6' 16.6' 16.6' 16.5' 16.5' 16.5' 16.5' 16.3' 16.3' 16.3' 16.3' 16.3' 16.1' 16.1'	59.3' 59.4' 59.4' 59.4' 59.5' 59.5' 59.6' 59.6' 59.6' 59.7' 59.7' 59.7' 59.8' 59.8'
6	16.6' 16.6' 16.6' 16.5' 16.5' 16.5' 16.5' 16.4' 16.3' 16.3' 16.3' 16.2' 16.1' 16.1'	59.4' 59.4' 59.5' 59.5' 59.6' 59.6' 59.6' 59.6' 59.7' 59.7' 59.7' 59.8' 59.8'
7	16.6' 16.6' 16.5' 16.5' 16.5' 16.5' 16.4' 16.4' 16.3' 16.3' 16.3' 16.2' 16.1' 16.1'	59.4' 59.5' 59.5' 59.6' 59.6' 59.6' 59.6' 59.7' 59.7' 59.7' 59.7' 59.8' 59.8'
8	16.6' 16.6' 16.5' 16.5' 16.5' 16.4' 16.4' 16.3' 16.3' 16.3' 16.2' 16.2' 16.1'	59.4' 59.5' 59.5' 59.6' 59.6' 59.6' 59.6' 59.7' 59.7' 59.7' 59.7' 59.8' 59.8'
9	16.6' 16.5' 16.5' 16.5' 16.4' 16.4' 16.3' 16.3' 16.2' 16.2' 16.1'	59.5' 59.5' 59.5' 59.6' 59.6' 59.6' 59.7' 59.7' 59.7' 59.7' 59.8' 59.8'
10	16.5' 16.5' 16.5' 16.4' 16.4' 16.3' 16.3' 16.3' 16.2' 16.2' 16.1'	59.5' 59.6' 59.6' 59.6' 59.6' 59.6' 59.7' 59.7' 59.7' 59.7' 59.8' 59.8'
12	16.5' 16.4' 16.4' 16.3' 16.3' 16.2' 16.2' 16.1' 16.1'	59.6' 59.6' 59.6' 59.7' 59.7' 59.7' 59.7' 59.8' 59.8'
13	16.5' 16.4' 16.4' 16.3' 16.3' 16.3' 16.2' 16.1' 16.1'	59.6' 59.6' 59.7' 59.7' 59.7' 59.7' 59.8' 59.8' 59.8'
14	16.4' 16.4' 16.3' 16.3' 16.3' 16.2' 16.1' 16.1'	59.6' 59.6' 59.7' 59.7' 59.7' 59.8' 59.8' 59.8'
15	16.4' 16.3' 16.3' 16.3' 16.2' 16.2' 16.1'	59.6' 59.7' 59.7' 59.7' 59.7' 59.8' 59.8' 59.8'
16	16.4' 16.3' 16.3' 16.3' 16.2' 16.2' 16.1' 16.1'	59.7' 59.7' 59.7' 59.7' 59.8' 59.8' 59.8'
18	16.3' 16.2' 16.2' 16.1' 16.1'	59.7' 59.7' 59.8' 59.8' 59.8'
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Fri GHA Dec 0 180°5.19 N10°24.20 187°46.18 10.1' N11°5.98 1 195°5.33 25.08 202°15.26 10.0' 11°22.01 2 210°5.47 25.96 216°44.25 9.9' 11°37.99 3 225°5.62 $\cdot$ 26.84 231°13.15 9.8' 11°53.92 4 240°5.76 27.72 245°41.95 9.7' 12°9.79 5 255°5.90 28.60 260°10.66 9.6' 12°25.61 6 270°6.04 N10°29.48 274°39.28 9.5' N12°41.37 7 285°6.19 30.36 289°7.81 9.4' 12°57.07 8 300°6.33 31.24 303°36.23 9.3' 13°12.70 9 315°6.47 $\cdot$ 32.12 318°4.56 9.2' 13°28.27 10 330°6.61 33.00 332°32.80 9.1' 13°43.78 11 345°6.76 33.88 347°0.93 9.0' 13°59.22 12 0°6.90 N10°34.76 1°28.97 8.9' N14°14.58 13 15°7.04 35.63 15°56.90 8.8' 14°29.87 14 30°7.18 36.51 30°24.73 8.7' 14°45.09 15 45°7.32 $\cdot$ 37.39 44°52.46 8.6' 15°0.23 16 60°7.46 38.27 59°20.09 8.5' 15°15.29 17 75°7.60 39.14 73°47.61 8.4' 15°30.27 18 90°7.74 N10°40.02 88°15.03 8.3' N15°45.17 19 105°7.88 40.89 102°42.35 8.2' 15°59.98 20 120°8.02 41.77 117°9.56 8.1' 16°14.70 21 135°8.16 $\cdot$ 42.65 131°36.66 8.0' 16°29.33 22 150°8.30 43.52 146°3.66 7.9' 16°43.87 23 165°8.44 44.40 160°30.54 7.8' 16°58.32 30°9.42 N10°50.51 261°35.72 7.0' N18°36.61 7°285°9.28 49.64 247°9.59 7.1' 18°9.05 5 255°9.28 49.64 247°9.59 7.1' 18°9.05 5 255°9.28 49.64 247°9.59 7.1' 18°9.05 22 80°27.63 8.8' 19°3.71		
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		HP
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3	16.0'	59.9'
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8 $300^{\circ}6.33$ $31.24$ $303^{\circ}36.23$ $9.3'$ $13^{\circ}12.70$ 9 $315^{\circ}6.47$ $\cdot$ $32.12$ $318^{\circ}4.56$ $9.2'$ $13^{\circ}28.27$ 10 $330^{\circ}6.61$ $33.00$ $332^{\circ}32.80$ $9.1'$ $13^{\circ}43.78$ 11 $345^{\circ}6.76$ $33.88$ $347^{\circ}0.93$ $9.0'$ $13^{\circ}59.22$ 12 $0^{\circ}6.90$ $N10^{\circ}34.76$ $1^{\circ}28.97$ $8.9'$ $N14^{\circ}14.58$ 13 $15^{\circ}7.04$ $35.63$ $15^{\circ}56.90$ $8.8'$ $14^{\circ}29.87$ 14 $30^{\circ}7.18$ $36.51$ $30^{\circ}24.73$ $8.7'$ $14^{\circ}29.87$ 15 $45^{\circ}7.32$ $\cdot$ $37.39$ $44^{\circ}52.46$ $8.6'$ $15^{\circ}0.23$ 16 $60^{\circ}7.46$ $38.27$ $59^{\circ}20.09$ $8.5'$ $15^{\circ}15.29$ 17 $75^{\circ}7.60$ $39.14$ $73^{\circ}47.61$ $8.4'$ $15^{\circ}30.27$ 18 $90^{\circ}7.74$ $N10^{\circ}40.02$ $88^{\circ}15.03$ $8.3'$ $N15^{\circ}45.17$ 19 $105^{\circ}7.88$ $40.89$ $102^{\circ}24.35$ $8.2'$ $15^{\circ}59.98$	15.7'	60.0'
9 315°6.47 ·· 32.12 318°4.56 9.2′ 13°28.27 10 330°6.61 33.00 332°32.80 9.1′ 13°43.78 11 345°6.76 33.88 347°0.93 9.0′ 13°59.22 12 0°6.90 N10°34.76 1°28.97 8.9′ N14°14.58 13 15°7.04 35.63 15°56.90 8.8′ 14°29.87 14 30°7.18 36.51 30°24.73 8.7′ 14°45.09 15 45°7.32 ·· 37.39 44°52.46 8.6′ 15°0.23 16 60°7.46 38.27 59°20.09 8.5′ 15°15.29 17 75°7.60 39.14 73°47.61 8.4′ 15°30.27 18 90°7.74 N10°40.02 88°15.03 8.3′ N15°45.17 19 105°7.88 40.89 102°42.35 8.2′ 15°59.98 20 120°8.02 41.77 117°9.56 8.1′ 16°14.70 21 135°8.16 ·· 42.65 131°36.66 8.0′ 16°29.33 22 150°8.30 43.52 146°3.66 7.9′ 16°43.87 23 165°8.44 44.40 160°30.54 7.8′ 16°58.32	15.6'	60.0'
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11 $345^{\circ}6.76$ $33.88$ $347^{\circ}0.93$ $9.0'$ $13^{\circ}59.22$ 12 $0^{\circ}6.90$ $N10^{\circ}34.76$ $1^{\circ}28.97$ $8.9'$ $N14^{\circ}14.58$ 13 $15^{\circ}7.04$ $35.63$ $15^{\circ}56.90$ $8.8'$ $14^{\circ}29.87$ 14 $30^{\circ}7.18$ $36.51$ $30^{\circ}24.73$ $8.7'$ $14^{\circ}45.09$ 15 $45^{\circ}7.32$ $\cdot 37.39$ $44^{\circ}52.46$ $8.6'$ $15^{\circ}0.23$ 16 $60^{\circ}7.46$ $38.27$ $59^{\circ}20.09$ $8.5'$ $15^{\circ}15.29$ 17 $75^{\circ}7.60$ $39.14$ $73^{\circ}47.61$ $8.4'$ $15^{\circ}30.27$ 18 $90^{\circ}7.74$ $N10^{\circ}40.02$ $88^{\circ}15.03$ $8.3'$ $N15^{\circ}45.17$ 19 $105^{\circ}7.88$ $40.89$ $102^{\circ}42.35$ $8.2'$ $15^{\circ}59.98$ 20 $120^{\circ}8.02$ $41.77$ $117^{\circ}9.56$ $8.1'$ $16^{\circ}41.40$ 21 $135^{\circ}8.16$ $\cdot 42.65$ $131^{\circ}36.66$ $8.0'$ $16^{\circ}43.87$ 23 $165^{\circ}8.44$ $44.40$ $160^{\circ}30.54$ $7.8'$ $16^{\circ}43.87$	15.5' 15.4'	60.1' 60.1'
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Sat         GHA         Dec         GHA         ν         Dec           0         180°8.58         N10°45.27         174°57.33         7.7'         N17°12.67           1         195°8.72         46.14         189°24.00         7.6'         17°26.92           2         210°8.86         47.02         203°50.56         7.5'         17°41.06           3         225°9.00         · 47.89         218°17.01         7.3'         17°55.11           4         240°9.14         48.77         232°43.36         7.2'         18°9.05           5         255°9.28         49.64         247°9.59         7.1'         18°22.88           6         270°9.42         N10°50.51         261°35.72         7.0'         N18°36.61           7         285°9.56         51.38         276°1.73         6.9'         18°50.22           8         300°9.69         52.26         290°27.63         6.8'         19°3.71	14.3'	60.3'
0 180°8.58 N10°45.27 174°57.33 7.7′ N17°12.67 1 195°8.72 46.14 189°24.00 7.6′ 17°26.92 2 210°8.86 47.02 203°50.56 7.5′ 17°41.06 3 225°9.00 · · 47.89 218°17.01 7.3′ 17°55.11 4 240°9.14 48.77 232°43.36 7.2′ 18°9.05 5 255°9.28 49.64 247°9.59 7.1′ 18°22.88 6 270°9.42 N10°50.51 261°35.72 7.0′ N18°36.61 7 285°9.56 51.38 276°1.73 6.9′ 18°50.22 8 300°9.69 52.26 290°27.63 6.8′ 19°3.71		
0 180°8.58 N10°45.27 174°57.33 7.7′ N17°12.67 1 195°8.72 46.14 189°24.00 7.6′ 17°26.92 2 210°8.86 47.02 203°50.56 7.5′ 17°41.06 3 225°9.00 · · 47.89 218°17.01 7.3′ 17°55.11 4 240°9.14 48.77 232°43.36 7.2′ 18°9.05 5 255°9.28 49.64 247°9.59 7.1′ 18°22.88 6 270°9.42 N10°50.51 261°35.72 7.0′ N18°36.61 7 285°9.56 51.38 276°1.73 6.9′ 18°50.22 8 300°9.69 52.26 290°27.63 6.8′ 19°3.71	d	НР
1     195°8.72     46.14     189°24.00     7.6'     17°26.92       2     210°8.86     47.02     203°50.56     7.5'     17°41.06       3     225°9.00     47.89     218°17.01     7.3'     17°55.11       4     240°9.14     48.77     232°43.36     7.2'     18°9.05       5     255°9.28     49.64     247°9.59     7.1'     18°22.88       6     270°9.42     N10°50.51     261°35.72     7.0'     N18°36.61       7     285°9.56     51.38     276°1.73     6.9'     18°50.22       8     300°9.69     52.26     290°27.63     6.8'     19°3.71	14.2'	60.3'
3 225°9.00 · · 47.89 218°17.01 7.3' 17°55.11 4 240°9.14 48.77 232°43.36 7.2' 18°9.05 5 255°9.28 49.64 247°9.59 7.1' 18°22.88 6 270°9.42 N10°50.51 261°35.72 7.0' N18°36.61 7 285°9.56 51.38 276°1.73 6.9' 18°50.22 8 300°9.69 52.26 290°27.63 6.8' 19°3.71	14.1'	60.4'
4 240°9.14 48.77 232°43.36 7.2' 18°9.05 5 255°9.28 49.64 247°9.59 7.1' 18°22.88 6 270°9.42 N10°50.51 261°35.72 7.0' N18°36.61 7 285°9.56 51.38 276°1.73 6.9' 18°50.22 8 300°9.69 52.26 290°27.63 6.8' 19°3.71	14.0'	60.4
5     255°9.28     49.64     247°9.59     7.1'     18°22.88       6     270°9.42     N10°50.51     261°35.72     7.0'     N18°36.61       7     285°9.56     51.38     276°1.73     6.9'     18°50.22       8     300°9.69     52.26     290°27.63     6.8'     19°3.71	13.9' 13.8'	60.4' 60.4'
6 270°9.42 N10°50.51 261°35.72 7.0' N18°36.61 7 285°9.56 51.38 276°1.73 6.9' 18°50.22 8 300°9.69 52.26 290°27.63 6.8' 19°3.71	13.7	60.4
8 300°9.69 52.26 290°27.63 6.8' 19°3.71	13.6'	60.4'
	13.5'	60.4
	13.4' 13.3'	60.4' 60.4'
10 330°9.97 54.00 319°19.10 6.6' 19°30.36	13.1	60.4 60.5'
11 345°10.11 54.87 333°44.67 6.5' 19°43.50	13.0'	60.5'
12 0°10.25 N10°55.74 348°10.13 6.3' N19°56.51	12.9'	60.5'
13 15°10.38 56.61 2°35.48 6.2' 20°9.41 14 30°10.52 57.48 17°0.72 6.1' 20°22.17		60.5' 60.5'
14 30°10.52 57.48 17°0.72 6.1 20°22.17 15 45°10.66 · · 58.35 31°25.84 6.0' 20°34.81	12.8'	60.5
16 60°10.79 10°59.22 45°50.86 5.9' 20°47.31	12.8' 12.6'	60.5
17 75°10.93 11°0.09 60°15.76 5.8' 20°59.68	12.8'	60.5'
18 90°11.07 N11°0.96 74°40.56 5.7' N21°11.92	12.8' 12.6' 12.5' 12.4' 12.2'	60.5'
19 105°11.20 1.83 89°5.24 5.6' 21°24.02 20 120°11.34 2.70 103°29.82 5.5' 21°35.97	12.8' 12.6' 12.5' 12.4' 12.2' 12.1'	60.5' 60.5'
21 135°11.48 · · 3.56 117°54.29 5.4' 21°47.79	12.8' 12.6' 12.5' 12.4' 12.2' 12.1' 12.0'	
22 150°11.61 4.43 132°18.65 5.3' 21°59.46	12.8' 12.6' 12.5' 12.4' 12.2' 12.1'	60.5'
23 165°11.75 5.30 146°42.90 5.1' 22°10.98	12.8' 12.6' 12.5' 12.4' 12.2' 12.1' 12.0' 11.8' 11.7' 11.5'	60.5'
SD = 15.9'  d = 0.9' $SD = 16.5'$	12.8' 12.6' 12.5' 12.4' 12.2' 12.1' 12.0' 11.8' 11.7'	

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	////	01:38	03:28	20:36	22:32	////
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	05:36	06:24	07:07	16:51	17:33	18:22

Lat.		Moonris	е	Moonset			
Lat.	Thu	Fri	Sat	Thu	Fri	Sat	
N 72°	03:41	02:56	01:25	19:27	22:50		
<b>N</b> 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	
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	05:36	07:20	09:12	16:08	16:08	16:10	

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
	00 <sup>h</sup> 12 <sup>h</sup>		Pass	Upper	Lower	28-1	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	3-1%	
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		

h	Aries	Ve	enus	M	ars	Jup	oiter	Sat	turn	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	
0	207°6.73	155°53.04	N19°2.51	200°11.04	N01°56.82	98°12.28	N22°41.20	199°8.74	N01°6.02	
1	222°9.19	170°52.41	3.38	215°11.73	57.59	113°14.44	41.17	214°10.93	6.13	Alph
2	237°11.66	170 52.41 185°51.78	4.25	230°12.42	58.37	128°16.60	41.17	214 10.93 229°13.11	6.24	Α Α
3	252° 14.12	200°51.15	. 5.12	245° 13.12	59.15	143°18.76	• • 41.10	244°15.30	. 6.36	Sc
4	267° 16.59	215°50.51	5.99	260° 13.81	01°59.92	158°20.92	41.10	259°17.49	6.47	D
5	282° 19.05	230°49.88	6.85	275° 14.50	02°0.70	173° 23.08	41.03	274°19.68	6.58	Ach
6	297°21.51	245°49.25	N19°7.72	290° 15.19	N02°1.48	188°25.24	N22°40.99	289°21.87	N01°6.70	H
7	312°23.98	260°48.61	8.59	305° 15.88	2.25	203°27.40	40.96	304°24.06	6.81	P
8	327°26.44	275°47.98	9.45	320° 16.57	3.03	218°29.55	40.92	319°26.25	6.93	Ac
9	342°28.91	290°47.35	. 10.31	335° 17.26	3.81	233°31.71	40.89	334°28.43	• • 7.04	M
10	357°31.37	305°46.71	11.18	350° 17.95	4.58	248°33.87	40.85	349°30.62	7.15	l N
11	12°33.83	320°46.08	12.04	5° 18.65	5.36	263°36.03	40.81	4°32.81	7.27	Alde
12	27°36.30	335°45.44	N19°12.90	20° 19.34	N02° 6.13	278°38.19	N22°40.78	19°35.00	N01°7.38	
13	42°38.76	350°44.81	13.76	35°20.03	6.91	293°40.34	40.74	34°37.19	7.49	Ca
14	57°41.23	5°44.17	14.62	50°20.72	7.69	308°42.50	40.71	49°39.38	7.61	Bel
15	72°43.69	20°43.53	• • 15.48	65°21.41	• • 8.46	323°44.66	40.67	64°41.57	• • 7.72	E
16	87°46.16	35°42.89	16.34	80°22.10	9.24	338°46.81	40.64	79°43.76	7.84	Al
17	102°48.62	50°42.26	17.19	95°22.79	10.01	353°48.97	40.60	94°45.95	7.95	Betel
18	117°51.08	65°41.62	N19°18.05	110°23.49	N02°10.79	8°51.12	N22°40.57	109°48.13	N01°8.06	Car
19	132°53.55	80°40.98	18.90	125°24.18	11.57	23°53.28	40.53	124°50.32	8.18	
20	147°56.01	95°40.34	19.76	140°24.87	12.34	38°55.44	40.50	139°52.51	8.29	A
21	162°58.48	110°39.70	20.61	155°25.56	. 13.12	53°57.59	40.46	154°54.70	• 8.40	Pro
22	178°0.94	125°39.06	21.46	170°26.25	13.89	68°59.75	40.42	169°56.89	8.52	F
23	193°3.41	140°38.42	22.32	185°26.94	14.67	84° 1.90	40.39	184°59.08	8.63	
			_							9
Mer.p	bass. 10:10	u-0.6' d0	0.9′ m-3.92	u 0.7' d0	.8′ m1.21	$\nu$ 2.2′ d-0	.0′ m-2.08	$\nu$ 2.2′ d0	.1' m $0.93$	Miapla
										Al
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Re
0	208°5.87	155°37.78	N19°23.17	200°27.63	N02°15.44	99° 4.05	N22°40.35	200°1.27	N01°8.74	
1	223°8.33	170°37.14	24.02	215°28.33	16.22	114° 6.21	40.32	215°3.46	8.86	Den
2	238° 10.80	185°36.49	24.86	230°29.02	17.00	129°8.36	40.28	230°5.65	8.97	G
3	253° 13.26	200°35.85	25.71	245°29.71	• • 17.77	144°10.52	40.24	245°7.84	• • 9.08	,
4	268° 15.73	215°35.21	26.56	260°30.40	18.55	159°12.67	40.21	260°10.03	9.20	G
5	283° 18.19	230°34.56	27.41	275°31.09	19.32	174°14.82	40.17	275°12.22	9.31	<i>F</i>
6	298° 20.65	245°33.92	N19°28.25	290°31.79	N02°20.10	189°16.97	N22°40.14	290°14.41	N01°9.42	
7	313°23.12	260°33.28	29.10	305°32.48	20.87	204°19.13	40.10	305°16.60	9.54	<i>P</i>
8	328° 25.58	275°32.63	29.94	320°33.17	21.65	219°21.28	40.06	320°18.79	9.65	, I
9	343°28.05	290°31.99	• • 30.78	335°33.86	22.42	234°23.43	• • 40.03	335°20.98	• • 9.76	Me
10	358°30.51	305°31.34	31.62	350° 34.55	23.20	249°25.58	39.99	350°23.17	9.88	Arc
11	13°32.98	320°30.69	32.47	5°35.24	23.97	264°27.73	39.95	5°25.35	9.99	Rigil
12	28°35.44	335°30.05	N19°33.31	20°35.94	N02°24.75	279°29.88	N22°39.92	20°27.54	N01°10.10	Ko
13	43°37.90	350°29.40	34.14	35°36.63	25.52	294°32.04	39.88	35°29.73	10.21	Zube Alp
14	58°40.37	5°28.75	34.98	50°37.32	26.29	309°34.19	39.85	50°31.92	10.33	
15	73°42.83	20°28.11	• • 35.82	65°38.01	• • 27.07	324°36.34	• • 39.81	65°34.11	• • 10.44	Ar
16	88°45.30	35°27.46	36.66	80°38.70	27.84	339°38.49	39.77	80°36.30	10.55	
17	103°47.76	50°26.81	37.49	95°39.40	28.62	354°40.64	39.74	95°38.49	10.67	S
18	118°50.22	65°26.16	N19°38.33	110°40.09	N02°29.39	9°42.79	N22°39.70	110°40.68	N01°10.78	Rasall
19	$133^{\circ}52.69$	80°25.51	39.16	125°40.78	30.17	24°44.94	39.66	125°42.87	10.89	El
20	148°55.15	95°24.86	39.99	140°41.47	30.94	39°47.08	39.63	140°45.06	11.00	Kaus
21	163° 57.62	110°24.21	• • 40.83	155°42.16	• • 31.71	54°49.23	• • 39.59	155°47.25	• • 11.12	11445
22	179°0.08	125°23.56	41.66	170°42.86	32.49	69°51.38	39.55	170°49.45	11.23	
23	194°2.55	140°22.90	42.49	185°43.55	33.26	84°53.53	39.52	185°51.64	11.34	
Merr	pass. 10:06	v-0.6′ d0	0.8′ m-3.92	ν0.7' d0	.8′ m1.21	√2 2′ d-0	.0′ m-2.08	v2 2' d0	.1′ m0.93	Pea
	7433. 10.00	- V 0.0 U0			.0 1111.21	- VZ.Z U O	.0 111 2.00		.1 1110.55	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al
0	209°5.01	155°22.25	N19°43.32	200°44.24	N02°34.04	99°55.68	N22°39.48	200°53.83	N01°11.46	Foma
1	224°7.47	170°21.60	44.14	215°44.93	34.81	114°57.83	39.44	215°56.02	11.57	S
2	239°9.94	185°20.95	44.97	230°45.63	35.58	129°59.97	39.40	230°58.21	11.68	M
3	254° 12.40	200°20.29	• • 45.80	245° 46.32	• • 36.36	145°2.12	• • 39.37	246°0.40	• • 11.79	
4	269° 14.87	215°19.64	46.62	260°47.01	37.13	160° 4.27	39.33	261°2.59	11.91	Apr 19
5	284° 17.33	230°18.99	47.45	275°47.70	37.90	175° 6.41	39.29	276°4.78	12.02	\
6	299° 19.80	245°18.33		290°48.39	N02°38.68	190°8.56	N22°39.26	291°6.97	N01°12.13	
7	314°22.26	260°17.68	49.10	305°49.09	39.45	205°10.71	39.22	306°9.16	12.24	Jı
8	329°24.72	275°17.02	49.92	320°49.78	40.22	220°12.85	39.18	321°11.35	12.36	S
9	344°27.19	290°16.36	• • 50.74	335°50.47	• • 41.00	235°15.00	• • 39.15	336°13.54	12.47	Apr 20
10	359°29.65	305°15.71	51.56	350°51.16	41.77	250°17.14	39.11	351°15.73	12.58	\
11	14°32.12	320°15.05	52.38	5°51.86	42.54	265°19.29	39.07	6°17.92	12.69	
12	29°34.58		N19°53.20	20°52.55	N02°43.32	280°21.43	N22°39.03	21°20.11	N01°12.81	Jı
13	44°37.04	350°13.73	54.02	35°53.24	44.09	295°23.58	39.00	36°22.30	12.92	S
14	59°39.51	5°13.08	54.83	50°53.93	44.86	310°25.72	38.96	51°24.50	13.03	
15	74°41.97	20°12.42	• • 55.65	65°54.63	• • 45.63	325°27.87	• • 38.92	66°26.69	13.14	Apr 21
16	89° 44.44 104° 46.90	35°11.76	56.46	80°55.32	46.41	340°30.01	38.88	81°28.88	13.26	\
17	104° 46.90 119° 49.37	50°11.10	57.28	95°56.01	47.18	355°32.15	38.85 N22°38.81	96°31.07 111°33.26	13.37 No1°12.49	
18 19	119° 49.37 134° 51.83	65°10.44 80°9.78	N19°58.09 58.90	110°56.70 125°57.40	N02°47.95 48.72	10°34.30 25°36.44	N22 38.81 38.77	111°33.26 126°35.45	N01° 13.48 13.59	Jı
	134°51.83 149°54.29	95°9.12		125°57.40 140°58.09		40°38.58		126°35.45 141°37.64		S
20 21	149°54.29 164°56.76	95°9.12 110°8.45	19°59.71 20°0.52	140°58.09 155°58.78	49.50 •• 50.27	40°38.58 55°40.73	38.73 •• 38.70	141°37.64 156°39.83	13.71	F
22	104 50.76 179°59.22	110 8.45 125°7.79	1.33	155 58.78 170°59.47	51.04	55 40.73 70°42.87	38.66	150 39.83 171°42.02	· · 13.82 13.93	'
23	179 59.22 195°1.69	140°7.13	2.14	170 59.47 186°0.17	51.04	85°45.01	38.62	171 42.02 186°44.22	14.04	
Mer.p	bass. 10:02	$\nu$ -0.7′ d0	0.8′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.8′ m1.21	$\nu 2.1' \ d$ -0	.0′ m-2.07	$\nu$ 2.2′ d0	.1'  m0.93	

	Julis	
	SHA	Dec
Alpheratz	357°34.02	29°14.00
Ankaa	$353^{\circ}6.50$	-42° 9.74
Schedar	349°30.41	56°40.77
Diphda	348°46.56	-17°50.58
Achernar	335° 19.98 327° 50.37	-57° 6.17 23° 35.13
Hamal Polaris	327 50.37 313°58.51	23 35.13 89°22.57
Acamar	315° 11.38	-40°12.04
Menkar	314°5.37	4°11.50
Mirfak	308° 27.23	49°57.29
Aldebaran	290°38.69	16°33.69
Rigel	281°3.09	-8°10.39
Capella	280°20.66	46°1.54
Bellatrix	278°21.97	6°22.34
Elnath	278°0.79	28°37.79 -1°11.21
Alnilam	275°36.87 270°51.13	7°24.65
Betelgeuse Canopus	263°52.16	-52°42.82
Sirius	258° 25.45	-16°45.31
Adhara	255°5.16	-29°0.69
Procyon	244°49.79	5° 9.36
Pollux	243°16.07	27°57.78
Avior	234° 14.29	-59°35.92
Suhail	222°45.44	-43°32.61
Miaplacidus	221°37.83	-69°49.81
Alphard	217° 46.63	-8°46.53
Regulus	207°33.17 193°39.25	11°50.23 61°36.66
Dubhe Denebola	193°39.25 182°23.62	61°36.66 14°25.40
Gienah	175° 42.22	-17°41.47
Acrux	173° 58.32	-63°14.90
Gacrux	171°49.96	-57°15.83
Alioth	166° 11.50	55°48.99
Spica	158° 20.89	-11°18.08
Alkaid	$152^{\circ}50.69$	49°10.81
Hadar	148° 33.89	-60°30.07
Menkent	147°56.00	-36°30.08
Arcturus	145°46.62	19°2.56 -60°56.69
Rigil Kent. Kochab	139°38.22 137°18.65	74°2.66
Zuben'ubi	136°54.54	-16° 9.19
Alphecca	126°2.53	26°37.36
Antares	112° 14.27	-26°29.45
Atria	107°7.17	-69°4.31
Sabik	102°1.36	-15°45.51
Shaula	96°8.71	-37°7.30
Rasalhague	95°57.38	12°32.25
Eltanin Kaus Aust.	90°41.42 83°30.97	51°28.78 -34°22.25
	80°32.36	-34 22.25 38°48.16
Vega Nunki	75° 46.36	-26°15.80
Altair	61°58.92	8°56.10
Peacock	53°4.14	-56°38.79
Deneb	49°25.17	45°22.13
Enif	$33^{\circ}37.91$	9°59.59
Al Na'ir	27°31.84	-46°49.86
Fomalhaut	15° 13.61	-29°28.93
Scheat	13°44.45 13°29.10	28°13.35
Markab	13-29.10	15°20.66
Apr 19 Sun	SHA	Mer.pass
Venus	308°46.31	13:37
Mars	353°4.31	10:39
Jupiter	251°5.55	17:25
Saturn	352°2.01	10:42
Apr 20 Mon	SHA	Mer.pass
Venus	307°31.91	13:38
Mars	352°21.77	10:38
Jupiter	250°58.18	17:21
Saturn	351°55.40	10:38
Apr 21 Tue	SHA	Mer.pass
Venus	306° 17.24	13:39
Mars	351°39.23	10:37
Jupiter Saturn	250°50.67 351°48.82	17:18 10:35
		10:35
Horizon	ıtal parallax	
	Venus:	0.1
	Mars:	0.1

	011-010 =	T0.0400 Sec		011	— +09.1372	_ 500	
h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180° 11.88	N11° 6.17	161°7.05	5.0'	N22°22.36	11.2'	60.5'
1	195° 12.02	7.03	175°31.09	4.9'	22°33.58	11.1'	60.5
2	210° 12.15 225° 12.29	7.90	189°55.02 204°18.85	4.8' 4.7'	22°44.65 22°55.57	10.9'	60.6'
3 4	225° 12.29 240° 12.42	· · 8.77 9.63	204 18.85 218°42.58	4.7 4.6'	22°55.57 23°6.34	10.8' 10.6'	60.6' 60.6'
5	255° 12.56	10.50	210 42.30 233°6.20	4.5	23°16.94	10.6	60.6
6	270° 12.69	N11°11.36	247°29.72	4.4'	N23°27.38	10.3	60.6'
7	285° 12.83	12.23	261°53.14	4.3'	23°37.66	10.1'	60.6'
8	$300^{\circ}12.96$	13.09	$276^{\circ}16.46$	4.2'	23°47.78	10.0'	60.6'
9	315° 13.09	•• 13.95	290°39.68	4.1'	23°57.73	9.8'	60.6'
10	330°13.23	14.82	305°2.81	4.0'	24°7.51	9.6'	60.6'
11	345°13.36 0°13.50	15.68 N11°16.55	319°25.84 333°48.78	3.9' 3.8'	24°17.13 N24°26.57	9.4' 9.3'	60.6' 60.5'
12 13	15° 13.63	17.41	333°48.78 348°11.62	3.8'	N24° 26.57 24° 35.84	9.3	60.5
14	30° 13.76	18.27	2°34.37	3.7'	24° 44.93	8.9'	60.5
15	45° 13.89	. 19.13	16°57.04	3.6'	24°53.85	8.7'	60.5
16	60° 14.03	19.99	$31^{\circ}19.61$	3.5'	25°2.59	8.6'	60.5'
17	75° 14.16	20.86	45°42.10	3.4'	25°11.15	8.4'	60.5'
18	90° 14.29	N11°21.72	60°4.51	3.3'	N25°19.53	8.2'	60.5'
19	105°14.42	22.58	74°26.83	3.2'	25°27.72	8.0'	60.5
20 21	120° 14.56 135° 14.69	23.44	88°49.07 103°11.23	3.2' 3.1'	25°35.73 25°43.56	7.8' 7.6'	60.5' 60.5'
22	150°14.82	25.16	105 11.25 117°33.32	3.0'	25° 51.19	7.0 7.4'	60.5
23	165° 14.82	25.10	117 33.32 131°55.33	3.0 2.9'	25°58.64	7.4 7.3'	60.5
23						1.5	
	SD = 15.9'	d = 0.9'		S	D = 16.5'		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180° 15.08	N11°26.88	146°17.27	2.9'	N26°5.90	7.1'	60.5
1	$195^{\circ}15.21$	27.74	160°39.14	2.8'	26°12.96	6.9'	60.5'
2	$210^{\circ}15.34$	28.60	175°0.94	2.7'	26°19.84	6.7'	60.5'
3	225° 15.47	• • 29.45	189°22.67	2.7'	26°26.52	6.5'	60.5
4	240° 15.61	30.31	203°44.35	2.6'	26°33.00	6.3'	60.5
5 6	255° 15.74 270° 15.87	31.17 N11°32.03	218° 5.96 232° 27.51	2.6' 2.5'	26°39.29 N26°45.38	6.1' 5.9'	60.4' 60.4'
7	285° 16.00	32.88	246°49.01	2.4	26°51.27	5.7'	60.4
8	300° 16.13	33.74	261°10.45	2.4	26°56.96	5.5'	60.4
9	315° 16.26	• • 34.60	275°31.85	2.3'	27°2.45	5.3'	60.4'
10	$330^{\circ}16.38$	35.45	289°53.19	2.3'	27°7.74	5.1'	60.4'
11	345° 16.51	36.31	304°14.49	2.3'	27°12.82	4.9'	60.4'
12	0°16.64	N11°37.16	318°35.75	2.2'	N27°17.71	4.7'	60.4
13 14	15° 16.77 30° 16.90	38.02 38.87	332°56.97 347°18.15	2.2' 2.1'	27°22.39 27°26.86	4.5' 4.3'	60.4' 60.3'
15	45° 17.03	39.73	1°39.30	2.1'	27°20.80	4.1	60.3
16	60° 17.16	40.58	16°0.42	2.1'	27°35.19	3.9'	60.3
17	75° 17.29	41.43	$30^{\circ}21.51$	2.1'	27°39.05	3.6'	60.3'
18	90° 17.41	N11°42.29	44°42.57	2.0'	N27°42.70	3.4'	60.3'
19	105° 17.54	43.14	59°3.61	2.0'	27°46.14	3.2'	60.3'
20	120° 17.67	43.99	73°24.63	2.0'	27°49.38	3.0'	60.3'
21 22	135° 17.80 150° 17.92	• • 44.84 45.70	87°45.64 102°6.63	2.0' 2.0'	27°52.40 27°55.22	2.8' 2.6'	60.2' 60.2'
23	165° 18.05	46.55	102 0.03 116°27.61	2.0'	27°57.83	2.4	60.2
	SD = 15.9'	d = 0.9'			D = 16.5'		
	$5D = 15.9^{\circ}$	$a = 0.9^{\circ}$			D = 10.5		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	$180^{\circ}18.18$	N11°47.40	130°48.59	2.0'	N28°0.23	2.2'	60.2'
1	195° 18.30	48.25	145°9.56	2.0'	28°2.42	2.0'	60.2'
2	210° 18.43	49.10	159°30.53	2.0'	28°4.40	1.8'	60.2'
3 4	225° 18.56 240° 18.68	• • 49.95 50.80	173°51.50 188°12.48	2.0' 2.0'	28°6.17 28°7.73	1.6' 1.4'	60.1' 60.1'
4 5	240° 18.68 255° 18.81	50.80 51.65	188° 12.48 202° 33.47	2.0'	28° 7.73 28° 9.08	1.4	60.1
6	270° 18.94	N11°52.50	202 33.47 216°54.47	2.0'	N28°10.23	0.9'	60.1
7	285° 19.06	53.35	231°15.48	2.0'	28°11.16	0.7	60.1
8	300° 19.19	54.20	245°36.51	2.1'	28°11.89	0.5'	60.1'
9	315° 19.31	• • 55.04	259°57.56	2.1'	28°12.40	0.3'	60.0'
10	330° 19.44	55.89	274°18.63	2.1'	28°12.71	0.1'	60.0'
11	345° 19.56	56.74	288°39.74	2.1'	28°12.81	-0.1'	60.0'
12 13	0° 19.69 15° 19.81	N11°57.59 58.43	303°0.87 317°22.03	2.2' 2.2'	N28°12.71 28°12.39	-0.3' -0.5'	60.0' 60.0'
13 14	30° 19.81	58.43 11°59.28	317°22.03 331°43.23	2.2'	28°12.39 28°11.87	-0.5° -0.7'	59.9
15	45° 20.06	12°0.13	346° 4.47	2.3'	28°11.15	-0.7 -0.9'	59.9'
16	60°20.18	0.97	0°25.75	2.3'	28°10.22	-1.1'	59.9'
17	75° 20.31	1.82	14°47.08	2.4'	28°9.08	-1.3'	59.9'
18	90°20.43	N12° 2.66	29°8.45	2.4'	N28°7.74	-1.5'	59.9'
19	105° 20.55	3.51	43°29.88	2.5'	28°6.20	-1.7'	59.8'
20	120°20.68	4.35	57°51.35	2.5'	28°4.46	-1.9'	59.8'
21	135°20.80 150°20.92	• • 5.20	72°12.89 86°34.48	2.6'	28°2.51 28°0.36	-2.1'	59.8'
22 23	150°20.92 165°21.05	6.04 6.88	86°34.48 100°56.13	2.7' 2.7'	28°0.36 27°58.02	-2.3' -2.5'	59.8' 59.7'
23		-	100 30.13			-2.5	39.1
	SD = 15.9'	d = 0.9'		S	D = 16.4'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	////	00:56	03:10	20:53	23:22	////
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	05:43	06:31	07:15	16:42	17:25	18:14

Lat.		Moonris	е	Moonset			
Lat.	Sun	Mon	Tue	Sun	Mon	Tue	
N 72°							
<b>N</b> 70°							
68°							
66°	02:42						
64°	03:25						
62°	03:54	03:50	03:40		00:43	03:09	
60°	04:17	04:29	05:02	•••••	00:05	01:47	
N 58°				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		
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	11:11	13:07	14:31	16:16	16:34	17:27	

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	2-4	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	3-17%	
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		

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	turn		Stars
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA
0	210°4.15	155°6.47	N20°2.95	201°0.86	N02°52.58	100°47.15	N22°38.58	201°46.41	N01° 14.15		
1	225°6.62	170°5.80	3.75	216°1.55	53.36	115°49.29	38.54	216°48.60	14.27	Alpheratz	357°34.00
2	240°9.08	185°5.14	4.56	231°2.25	54.13	130°51.44	38.51	231°50.79	14.38	Ankaa	353°6.48
3	255° 11.54	200°4.47	• • 5.36	246°2.94	• • 54.90	145°53.58	• • 38.47	246°52.98	• • 14.49	Schedar	349°30.38 348°46.55
4	$270^{\circ}14.01$	215°3.81	6.17	261°3.63	55.67	160°55.72	38.43	261°55.17	14.60	Diphda Achernar	348 40.55 335°19.97
5	$285^{\circ}16.47$	230°3.14	6.97	276°4.32	56.44	175°57.86	38.39	276°57.37	14.71	Hamal	327°50.36
6	300° 18.94	245°2.48	N20°7.77	291°5.02	N02°57.22	191°0.00	N22°38.35	291°59.56	N01°14.83	1	313°58.50
7	315°21.40	260°1.81	8.57	306°5.71	57.99	206°2.14	38.32	307°1.75	14.94	Acamar	315°11.38
8	330°23.87	275°1.15	9.37	321°6.40	58.76	221°4.28	38.28	322°3.94	15.05	Menkar	314°5.36
9	345°26.33 0°28.79	290°0.48 304°59.81	• • 10.17	336°7.09 351°7.79	02°59.53 03°0.30	236° 6.42 251° 8.56	• • 38.24	337°6.13 352°8.32	•• 15.16	Mirfak	308°27.22
10 11	15°31.26	319°59.14	10.97 11.77	6°8.48	1.07	266°10.70	38.20 38.16	7°10.52	15.27 15.39	Aldebaran	290°38.69
12	30°33.72	334°58.48	N20°12.57	21°9.17	N03°1.84	281°12.83	N22°38.12	22°12.71	N01° 15.50	Rigel	281°3.09
13	45°36.19	349°57.81	13.36	36°9.87	2.61	296°14.97	38.09	37°14.90	15.61	Capella	280°20.66
14	60°38.65	4°57.14	14.16	51° 10.56	3.38	311°17.11	38.05	52°17.09	15.72	Bellatrix	278°21.97
15	$75^{\circ}41.11$	19°56.47	• • 14.95	66°11.25	• • 4.16	$326^{\circ}19.25$	• • 38.01	67°19.28	• • 15.83	Elnath	278°0.79
16	90°43.58	34°55.80	15.74	81°11.95	4.93	341°21.39	37.97	82°21.48	15.95	Alnilam Betelgeuse	275°36.87 270°51.14
17	105°46.04	49°55.13	16.53	96°12.64	5.70	356°23.52	37.93	97°23.67	16.06	Canopus	263°52.18
18	120°48.51	64°54.46	N20°17.32	111°13.33	N03°6.47	11°25.66	N22°37.89	112°25.86	N01°16.17	Sirius	258°25.45
19	135°50.97	79°53.79	18.11	126° 14.02	7.24	26°27.80	37.85	127°28.05	16.28	Adhara	255°5.17
20	150° 53.44 165° 55.90	94°53.11 109°52.44	18.90 •• 19.69	141°14.72 156°15.41	8.01 • • 8.78	41°29.94 56°32.07	37.82 · · 37.78	142°30.25 157°32.44	16.39	Procyon	244°49.79
21 22	180° 58.36	109 52.44 124°51.77	20.48	171° 16.10	9.55	71°34.21	37.74	157 32.44 172°34.63	· · 16.50 16.61	Pollux	243°16.08
23	196°0.83	139°51.10	21.26	186° 16.80	10.32	86°36.34	37.74	172 34.03 187°36.82	16.73	Avior	234°14.32
-										Suhail	222°45.46
Mer.p	pass. 09:58	$\nu$ -0.7 d0	.8′ m-3.92	$\nu$ 0.7 d0	.8′ m1.21	$\nu$ 2.1′ $d$ -0	0.0′ m-2.06	$\nu$ 2.2′ d0	.1′ m0.93	Miaplacidus Alphard	221°37.88 217°46.63
										Regulus	217 40.03 207°33.17
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.26
0	211°3.29	154°50.42	N20°22.05	201°17.49	N03°11.09	101°38.48	N22°37.66	202°39.02	N01°16.84	Denebola	182°23.61
1	226°5.76	169°49.75	22.83	216°18.18	11.86	116°40.62	37.62	217°41.21	16.95	Gienah	175°42.22
2	241°8.22 256°10.68	184°49.07 199°48.40	23.62 •• 24.40	231° 18.88 246° 19.57	12.63 •• 13.40	131°42.75 146°44.89	37.58 •• 37.54	232°43.40 247°45.59	17.06 •• 17.17		172°58.32
4	271° 13.15	214° 47.72	25.18	261° 20.26	14.17	161°47.02	37.54	262°47.79	17.17		171°49.96
5	286° 15.61	229°47.05	25.96	276°20.96	14.94	176°49.16	37.47	277°49.98	17.39	Alioth	166°11.50
6	301°18.08	244°46.37	N20°26.74	291°21.65	N03°15.71	191°51.29	N22°37.43	292°52.17	N01°17.51	Spica Alkaid	158°20.88 152°50.68
7	$316^{\circ}20.54$	259°45.69	27.52	306°22.34	16.48	206°53.42	37.39	307°54.36	17.62	Hadar	148°33.87
8	331°23.01	274°45.02	28.30	321°23.03	17.25	221°55.56	37.35	322°56.56	17.73		147°55.98
9	346°25.47	289°44.34	• • 29.07	336°23.73	• • 18.02	236°57.69	• • 37.31	337°58.75	• • 17.84	Arcturus	145°46.61
10	1°27.93 16°30.40	304°43.66	29.85	351°24.42	18.79	251°59.82	37.27	353°0.94 8°3.14	17.95	Rigil Kent.	139°38.20
11 12	31°32.86	319°42.98 334°42.30	30.62 N20°31.40	6°25.11 21°25.81	19.55 N03°20.32	267° 1.96 282° 4.09	37.23 N22°37.19	8 3.14 23°5.33	18.06 N01°18.17	Kochab	137°18.64
13	46°35.33	349°41.62	32.17	36° 26.50	21.09	297° 6.22	37.15	38°7.52	18.28	Zuben'ubi	136°54.52
14	61°37.79	4°40.94	32.94	51°27.19	21.86	312°8.36	37.11	53°9.72	18.40	Alphecca	126°2.51
15	$76^{\circ}40.25$	19°40.26	• • 33.71	66°27.89	• • 22.63	327°10.49	• • 37.07	68°11.91	• • 18.51	Antares Atria	112°14.24 107°7.11
16	91°42.72	34°39.58	34.48	81°28.58	23.40	342°12.62	37.03	83°14.10	18.62	Sabik	107 7.11 102°1.33
17	106° 45.18	49°38.90	35.25	96°29.27	24.17	357°14.75	36.99	98°16.30	18.73	Shaula	96°8.67
18	121° 47.65	64°38.22	N20°36.02	111°29.97	N03°24.94	12°16.88	N22°36.95	113°18.49	N01°18.84	Rasalhague	95°57.36
19 20	136° 50.11 151° 52.58	79°37.54 94°36.86	36.79 37.55	126°30.66 141°31.35	25.70 26.47	27°19.01 42°21.14	36.92 36.88	128°20.68 143°22.88	18.95 19.06	Eltanin	90°41.39
21	166°55.04	109°36.17	• • 38.32	156° 32.05	• • 27.24	57°23.27	• • 36.84	158°25.07	19.17	Kaus Aust.	83°30.93
22	181°57.50	124°35.49	39.08	171°32.74	28.01	72°25.40	36.80	173°27.26	19.28	Vega	80°32.33
23	196° 59.97	139°34.81	39.85	186°33.43	28.78	87°27.53	36.76	188°29.46	19.39	Nunki Altair	75°46.33 61°58.89
Morr	pass. 09:54	, 0.7' d0	.8′ m-3.92	10 7' d0	.8′ m1.21	,,2 1' d 0	.0′ m-2.06	1/2 2 <sup>1</sup> d0	.1′ m0.93	Peacock	53°4.09
- Ivier.	Dass. 09.54	ν-0.1 α0	.0 111-3.92		.0 1111.21	ν2.1 <i>u</i> -0	7.0 III-2.00	ν2.2 do	.1 1110.93	Deneb	49°25.14
										Enif	33°37.89
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.80
0	212°2.43		N20°40.61	201°34.13	N03°29.55	102°29.66	N22°36.72	203°31.65	N01°19.50	Fomalhaut	15°13.59
1 2	227°4.90 242°7.36	169°33.44 184°32.75	41.37 42.13	216°34.82 231°35.51	30.31 31.08	117°31.79 132°33.92	36.68 36.64	218°33.84 233°36.04	19.62 19.73	Scheat	13°44.43
3	242 7.36 257°9.82	184 32.75 199°32.07	42.13 • • 42.89	231 35.51 246°36.21	31.08	132 33.92 147°36.05	36.60	233 30.04 248°38.23	19.73	Markab	13°29.07
4	272° 12.29	214°31.38	43.65	261°36.90	32.62	162°38.18	36.56	263°40.43	19.95	Apr 22 Wed	SHA
5	287° 14.75	229°30.69	44.41	276°37.60	33.38	177°40.31	36.52	278°42.62	20.06	Venus	$305^{\circ}2.31$
6	302° 17.22	244°30.01	N20°45.16	291°38.29	N03°34.15	192°42.44	N22°36.48	293°44.81	N01°20.17		350°56.71
7	317° 19.68	259°29.32	45.92	306°38.98	34.92	207°44.57	36.44	308°47.01	20.28		250°43.00
8	332°22.15	274°28.63	46.67	321°39.68	35.69	222°46.69	36.40	323°49.20	20.39	Saturn	351°42.26
9	347°24.61	289°27.94	. 47.43	336° 40.37	36.45	237°48.82	• • 36.36	338°51.40	• • 20.50	Apr 23 Thu	SHA
10 11	2°27.07 17°29.54	304°27.26 319°26.57	48.18 48.93	351°41.06 6°41.76	37.22 37.99	252°50.95 267°53.08	36.32 36.28	353°53.59 8°55.78	20.61 20.72		303°47.13
12	32°32.00	334°25.88	N20°49.68	21° 42.45	N03°38.75	282°55.20	N22°36.23	23°57.98	N01°20.83		350°14.20
13	47° 34.47	349°25.19	50.43	36°43.14	39.52	297°57.33	36.19	39°0.17	20.94		250°35.19
14	$62^{\circ}36.93$	4°24.50	51.18	51°43.84	40.29	312°59.46	36.15	54°2.37	21.05	Saturn	351°35.72
15	77°39.39	19°23.81	• • 51.93	66° 44.53	• • 41.05	328° 1.58	36.11	69°4.56	• • 21.16	Apr 24 Fri	SHA
16	92°41.86	34°23.12	52.68	81°45.22	41.82	343° 3.71	36.07	84°6.76	21.27		302°31.69
17	107° 44.32 122° 46.79	49°22.42	53.42 N20°54.17	96°45.92 111°46.61	42.59 N03°43.35	358° 5.83	36.03 N22°35.99	99°8.95	21.38 N01°21.49		349°31.70
18 19	122° 46.79 137° 49.25	79°21.04	N20 54.17 54.91	111° 46.61 126° 47.30	44.12	13°7.96 28°10.08	N22 35.99 35.95	114°11.15 129°13.34	21.60		250°27.23 351°29.22
20	152°51.72	94°20.35	55.65	141°48.00	44.89	43°12.21	35.93	144°15.54	21.71	Jaturn	JJ1 29.22
21	167°54.18	109° 19.65	• • 56.40	156° 48.69	• • 45.65	58°14.33	• • 35.87	159°17.73	• • 21.82	Horizor	ntal parallax
22	182°56.64	124° 18.96	57.14	171°49.39	46.42	73°16.46	35.83	174°19.92	21.93		Venus:
23	197°59.11	139° 18.27	57.88	186°50.08	47.18	88°18.58	35.79	189°22.12	22.04		Mars:
Mer.p	pass. 09:50	$\nu$ -0.7' d0	.8′ m-3.92	$\nu$ 0.7' d0	.8′ m1.22	$\nu 2.1' \ d-0$	.0′ m-2.05	$\nu$ 2.2' d0	.1′ m0.93		

Dec

29°14.00 -42°9.72

56°40.76

-17°50.56

 $\text{-}57^{\circ}6.15$ 

 $23^{\circ}35.13$ 

89°22.55

-40°12.02 4°11.50

49°57.29 16°33.69

-8°10.39

46°1.54

 $6^{\circ}22.34$ 

28°37.79

-1°11.21 7°24.65 -52°42.81

-16°45.31

-29°0.69

5°9.36 27°57.78

-59°35.93

-43°32.62 -69°49.81

-8°46.54

11°50.23

61°36.67

 $14^{\circ}25.40$ 

 $-17^{\circ}41.48$ 

-63°14.92 -57°15.85

55°49.00 -11°18.09

49°10.82 -60°30.09

-36°30.10

-60°56.70

19°2.57

74°2.67 -16°9.20

26°37.37 -26°29.45

-69°4.32

-15°45.51

 $-37^{\circ}7.31$ 

 $12^{\circ}32.26$ 

51°28.79

-34°22.24 38°48.17

 $-26^{\circ}15.80$ 

 $-56^{\circ}38.78$  $45^{\circ}22.14$ 

8°56.11

 $9^{\circ}59.59$ 

-46°49.85 -29°28.91

28°13.35 15°20.67

Mer.pass

13:40 10:35

17:14

10:31 Mer.pass

13:41 10:34

17:11

10:28

10:33

17:08

10:24

Mer.pass 13:42

0.1

0.1

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°21.17	N12°7.73	115°17.85	2.8'	N27°55.47	-2.7'	59.7'
1	195°21.29 210°21.41	8.57	129°39.63 144°1.49	2.9' 2.9'	27°52.73 27°49.79	-2.9'	59.7' 59.7'
2	210 21.41 225°21.54	9.41 •• 10.25	144 1.49 158°23.41	2.9 3.0'	27 49.79 27°46.66	-3.1' -3.3'	59.7' 59.7'
4	240°21.66	11.09	172°45.41	3.1'	27°43.33	-3.5'	59.6'
5	255°21.78	11.93	187°7.49	3.2'	27°39.81	-3.7'	59.6'
6	270°21.90 285°22.02	N12°12.78 13.62	201°29.64 215°51.88	3.2' 3.3'	N27°36.10 27°32.20	-3.9' -4.1'	59.6' 59.6'
7 8	300°22.14	13.62 14.46	215 51.88 230°14.20	3.4'	27° 28.10	-4.1 -4.3'	59.6 59.5'
9	315°22.26	• • 15.30	244°36.60	3.5'	27°23.82	-4.5'	59.5'
10	330°22.38	16.14	258°59.09	3.6'	27°19.36	-4.7'	59.5'
11 12	345°22.50 0°22.63	16.97 N12°17.81	273°21.68 287°44.35	3.7' 3.8'	27°14.70 N27°9.87	-4.8' -5.0'	59.5' 59.4'
13	0 22.03 15°22.75	18.65	287 44.35 302°7.12	3.8 3.9'	27°4.85	-5.0 -5.2'	59.4 59.4'
14	30°22.87	19.49	316°29.98	4.0'	26°59.65	-5.4'	59.4'
15	45°22.98	• • 20.33	330°52.95	4.1'	26°54.27	-5.6'	59.4'
16	60°23.10 75°23.22	21.16	345°16.01 359°39.17	4.2'	26°48.72 26°42.98	-5.7'	59.3'
17 18	90°23.34	22.00 N12°22.84	359°39.17 14°2.43	4.3' 4.4'	N26°37.07	-5.9' -6.1'	59.3' 59.3'
19	105°23.46	23.67	28°25.80	4.5'	26°30.99	-6.3'	59.3'
20	120°23.58	24.51	42°49.28	4.6'	$26^{\circ}24.74$	-6.4'	59.2'
21	135°23.70	• • 25.35	57°12.86	4.7'	26°18.32	-6.6'	59.2'
22 23	150°23.82 165°23.94	26.18 27.02	71°36.55 86°0.35	4.8' 4.9'	26°11.73 26°4.97	-6.8' -6.9'	59.2' 59.2'
23			00 0.35			-0.9	39.2
	SD = 15.9'	d = 0.8'		SI	D = 16.3'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°24.05	N12°27.85	100°24.26	5.0'	N25°58.05	-7.1'	59.1'
1	195°24.17	28.68	114°48.29	5.1'	25°50.96 25°43.72	-7.2'	59.1'
2	210°24.29 225°24.41	29.52 •• 30.35	129°12.42 143°36.68	5.3' 5.4'	25°43.72 25°36.31	-7.4' -7.6'	59.1' 59.0'
4	240°24.52	31.18	158°1.04	5.5'	25°28.74	-7.0 -7.7'	59.0'
5	255°24.64	32.02	172°25.53	5.6'	25°21.02	-7.9'	59.0'
6	270°24.76	N12°32.85	186°50.13	5.7'	N25°13.15	-8.0'	59.0'
7	285°24.87 300°24.99	33.68	201°14.85 215°39.69	5.8'	25°5.12	-8.2'	58.9'
8 9	300°24.99 315°25.11	34.51 •• 35.34	215°39.69 230°4.64	6.0' 6.1'	24°56.94 24°48.61	-8.3' -8.5'	58.9' 58.9'
10	330°25.22	36.17	244°29.72	6.2	24°40.13	-8.6'	58.9'
11	345°25.34	37.00	258°54.92	6.3'	$24^{\circ}31.51$	-8.8'	58.8'
12	0°25.45	N12°37.83	273°20.24	6.4'	N24°22.74	-8.9'	58.8'
13 14	15°25.57 30°25.69	38.66 39.49	287°45.68 302°11.25	6.6' 6.7'	24°13.84 24°4.79	-9.0' -9.2'	58.8' 58.7'
15	45°25.80	40.32	316°36.94	6.8'	23°55.60	-9.2' -9.3'	58.7'
16	60°25.92	41.15	331°2.75	6.9'	23°46.28	-9.5'	58.7'
17	75°26.03	41.98	345°28.68	7.1'	23°36.82	-9.6'	58.7'
18 19	90°26.14 105°26.26	N12°42.81 43.63	359°54.74 14°20.92	7.2' 7.3'	N23°27.23 23°17.51	-9.7' -9.9'	58.6' 58.6'
20	105 26.20 120°26.37	43.03 44.46	28°47.22	7.3 7.4'	23 17.51 23°7.66		58.6'
21	135°26.49	• • 45.29	43°13.65	7.6'	22°57.68	-10.1	58.6'
22	150°26.60	46.11	57°40.20	7.7'	22°47.58	-10.2'	58.5'
23	165°26.71	46.94	72°6.87	7.8'	22°37.35	-10.3'	58.5'
	SD = 15.9'	d = 0.8'		SI	D = 16.1'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°26.83	N12°47.77	86°33.67	7.9'	N22°27.00	-10.5'	58.5'
1 2	195°26.94 210°27.05	48.59 49.42	101°0.59 115°27.63	8.0' 8.2'	22°16.53 22°5.94	-10.6' -10.7'	58.4' 58.4'
3	210°27.05 225°27.17	49.42 •• 50.24	115°27.63 129°54.80	8.2 8.3'	22°5.94 21°55.24	-10.7' -10.8'	58.4'
4	240°27.28	51.07	144°22.09	8.4	21°44.42	-10.9	58.4
5	255°27.39	51.89	158°49.50	8.5'	21°33.49	-11.0'	58.3'
6	270°27.50	N12°52.71	173°17.04	8.7'	N21°22.44	-11.2'	58.3'
7 8	285°27.62 300°27.73	53.54 54.36	187°44.69 202°12.47	8.8' 8.9'	21°11.29 21°0.03	-11.3' -11.4'	58.3' 58.2'
9	315°27.84	55.18	216°40.36	9.0'	20°48.66	-11.4	58.2'
10	330°27.95	56.00	231°8.38	9.1'	20°37.19	-11.6'	58.2'
11	345°28.06	56.82	245°36.51	9.3'	20°25.62	-11.7'	58.2'
12 13	0°28.17 15°28.28	N12°57.65 58.47	260°4.77 274°33.14	9.4' 9.5'	N20°13.94 20°2.17	-11.8' -11.9'	58.1' 58.1'
13 14	30°28.39	58.47 12°59.29	289°1.63	9.5 9.6'	20 2.17 19°50.30	-11.9 -12.0'	58.1'
15	45°28.50	13°0.11	303°30.24	9.7'	19°38.34	-12.1'	58.0'
16	60°28.62	0.93	317°58.96	9.8'	19°26.28	-12.2'	58.0'
17	75°28.73	1.75	332°27.80	10.0'	19°14.12	-12.2'	58.0'
18 19	90°28.83 105°28.94	N13°2.56 3.38	346°56.75 1°25.82	10.1' 10.2'	N19°1.88 18°49.55	-12.3' -12.4'	58.0' 57.9'
20	120°29.05	4.20	15°55.00	10.2	18°37.13	-12.5'	57.9'
21	135°29.16	• • 5.02	$30^{\circ}24.29$	10.4'	18°24.63	-12.6'	57.9'
22	150°29.27	5.84	44°53.70	10.5	18°12.04	-12.7'	57.9'
23	165°29.38	6.65	59°23.21	10.6'	17°59.37	-12.7'	57.8'
	SD = 15.9'	d = 0.8'		SI	D = 15.9'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	05:49	06:38	07:22	16:34	17:18	18:06

Lat.		Moonris	e		Moonset	į.
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°						
N 70°						
68°			07:47			05:26
66°			08:40			04:33
64°		06:43	09:12		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
<b>S</b> 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
<b>S</b> 60°	15:05	15:16	15:20	19:05	20:56	22:43

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	5-7	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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		

, тр.	20, 20,		aci, Jaii,							
h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	
0	213°1.57	154° 17.57	N20°58.62	201°50.77	N03°47.95	103°20.71	N22°35.75	204°24.31	N01°22.15	
1	228°4.04	169° 16.88	20°59.35	216°51.47	48.72	118°22.83	35.71	219°26.51	22.26	<i>F</i>
2	243°6.50	184°16.18	21°0.09	231°52.16	49.48	133°24.95	35.67	234°28.70	22.37	
3	258°8.96	199°15.48	• • 0.83	246°52.85	• • 50.25	148°27.08	• • 35.62	249°30.90	• • 22.48	
4	273°11.43	214°14.79	1.56	261°53.55	51.01	163°29.20	35.58	264°33.09	22.59	
5	288° 13.89	229°14.09	2.30	276°54.24	51.78	178°31.32	35.54	279°35.29	22.70	-   -
6	303°16.36	244°13.39	N21°3.03	291°54.94	N03°52.54	193°33.45	N22°35.50	294°37.48	N01°22.81	
7	$318^{\circ}18.82$	259°12.70	3.76	306°55.63	53.31	208°35.57	35.46	309°39.68	22.92	
8	$333^{\circ}21.28$	274°12.00	4.49	321°56.32	54.07	223°37.69	35.42	324°41.88	23.03	
9	348°23.75	289°11.30	• • 5.22	336°57.02	• • 54.84	238°39.81	• • 35.38	339°44.07	• • 23.14	
10	$3^{\circ}26.21$	304°10.60	5.95	351°57.71	55.60	253°41.93	35.34	354°46.27	23.25	Δ
11	$18^{\circ}28.68$	$319^{\circ}9.90$	6.68	6°58.40	56.37	268°44.05	35.30	9°48.46	23.36	"
12	33°31.14	334°9.20	N21°7.41	21°59.10	N03°57.13	283°46.18	N22°35.25	24°50.66	N01°23.47	
13	48°33.60	349°8.50	8.14	36°59.79	57.90	298°48.30	35.21	39°52.85	23.58	
14	63°36.07	4°7.80	8.86	52°0.49	58.66	313°50.42	35.17	54°55.05	23.69	
15	78° 38.53	19°7.10	• • 9.59	67°1.18	03°59.43	328°52.54	• • 35.13	69°57.24	• • 23.80	
16	93°41.00	34°6.40	10.31	82°1.87	04°0.19	343°54.66	35.09	84°59.44	23.91	В
17	108°43.46	49°5.70	11.03	97°2.57	0.95	358°56.78	35.05	100°1.64	24.02	.   "
18	123°45.93	64°4.99	N21°11.75	112°3.26	N04°1.72	13°58.90	N22°35.00	115°3.83	N01°24.13	
19	138°48.39	79°4.29	12.47	127°3.95	2.48	29° 1.02	34.96	130°6.03	24.24	
20	153°50.85	94°3.59	13.19	142°4.65	3.25	44°3.13	34.92	145°8.22	24.35	
21	168°53.32	109°2.89	• • 13.91	157°5.34	• • 4.01	59° 5.25	• • 34.88	160°10.42	• • 24.46	
22	183°55.78	124°2.18	14.63	172°6.04	4.77	74°7.37	34.84	175°12.62	24.57	
23	198° 58.25	139°1.48	15.34	187°6.73	5.54	89° 9.49	34.80	190°14.81	24.68	
Mer.	pass. 09:46	$\nu$ -0.7' d0	.7′ m-3.92	$\nu$ 0.7′ d0	.8′ m1.22	$\nu 2.1' \ d-0$	.0′ m-2.05	$\nu$ 2.2′ d0	.1′ m0.93	Mi
•	CIIA	CIIA	Б	CIIA		CIIA	Б	CILA	ъ.	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	
0	214°0.71	154°0.77	N21°16.06	202°7.42	N04°6.30	104°11.61	N22°34.75	205°17.01	N01°24.79	[
1	229°3.17	169°0.07	16.77	217°8.12	7.06	119°13.73 134°15.84	34.71	220°19.20	24.90	
2	244°5.64	183°59.36	17.49	232°8.81 247°9.51	7.83		34.67	235°21.40 250°23.60	25.01	
3	259°8.10 274°10.57	198°58.66 213°57.95	• • 18.20	247 9.51 262° 10.20	• • 8.59	149°17.96 164°20.08	• • 34.63	250°23.60 265°25.79	• • 25.12	
4 5	274 10.57 289° 13.03	213 57.95 228°57.24	18.91 19.62	262 10.20 277° 10.89	9.35 10.12	164 20.08 179°22.20	34.59 34.54	205 25.79 280°27.99	25.23 25.33	
6	304° 15.49	243°56.54	N21°20.33	277 10.89 292°11.59	N04°10.88	179 22.20 194°24.31	N22°34.50	295°30.19	N01° 25.44	
7	319° 17.96	243 50.54 258°55.83	21.04	307° 12.28	11.64	209°26.43	34.46	310°32.38	25.55	
8	334° 20.42	273°55.12	21.04	307 12.28 322°12.97	12.41	209 20.43 224°28.55	34.40	325°34.58	25.66	
9	349°22.89	273 55.12 288°54.41	22.45	322 12.97 337°13.67	13.17	239°30.66	34.38	340°36.77	25.77	
10	4° 25.35	303°53.70	23.16	352° 14.36	13.17	259° 30.00 254° 32.78	34.33	355°38.97	25.88	
11	4 25.35 19° 27.81	318° 52.99	23.86	7° 15.06	14.69	269°34.89	34.33	10°41.17	25.88	Ri
12	34°30.28	333°52.28	N21°24.57	22° 15.75	N04°15.46	284°37.01	N22°34.25	25°43.36	N01°26.10	
13	49° 32.74	348°51.57	25.27	37° 16.44	16.22	299°39.12	34.21	40°45.56	26.21	Z
14	64° 35.21	3°50.86	25.27	52° 17.14	16.22	314°41.24	34.16	55°47.76	26.32	
15	79° 37.67	18° 50.15	26.67	67° 17.83	. 17.74	329°43.35	34.12	70°49.96	. 26.43	
16	94°40.13	33°49.44	27.37	82° 18.53	18.50	344°45.47	34.08	85°52.15	26.53	
17	109°42.60	48°48.73	28.07	97° 19.22	19.27	359°47.58	34.04	100°54.35	26.64	
18	124° 45.06	63°48.01	N21°28.77	112° 19.91	N04°20.03	14°49.70	N22°33.99	115°56.55	N01°26.75	
19	139° 47.53	78° 47.30	29.46	127° 20.61	20.79	29°51.81	33.95	130°58.74	26.86	Ra
20	154°49.99	93°46.59	30.16	142°21.30	21.55	44°53.92	33.91	146°0.94	26.97	
21	169°52.46	108° 45.88	• • 30.85	157° 22.00	22.31	59°56.04	• • 33.86	161°3.14	• • 27.08	Ka
22	184°54.92	123°45.16	31.55	172°22.69	23.07	74°58.15	33.82	176°5.34	27.19	
23	199°57.38	138°44.45	32.24	187°23.38	23.83	90° 0.26	33.78	191°7.53	27.30	
Mer.	pass. 09:42	$\nu$ -0.7′ d0.	.7′ m-3.92	$\nu 0.7' d0$	.8′ m1.22	$\nu 2.1' \ d-0$	.0′ m-2.04	$\nu^{2.2'} d0$	.1′ m0.93	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	
0	214° 59.85	153°43.73	N21°32.93	202°24.08	N04°24.60	105° 2.37		206° 9.73	N01°27.40	Fo
1	230°2.31	168°43.02	33.62	217°24.77	25.36	120° 4.49	33.69	221°11.93	27.51	
2	245°4.78	183°42.30	34.31	232°25.46	26.12	135°6.60	33.65	236°14.12	27.62	
3	260°7.24	198°41.59	• • 35.00	247°26.16	• • 26.88	150° 8.71	• • 33.61	251°16.32	• • 27.73	
4	275°9.70	213°40.87	35.69	262°26.85	27.64	165°10.82	33.56	$266^{\circ}18.52$	27.84	Ap
5	$290^{\circ}12.17$	228°40.15	36.37	277°27.55	28.40	$180^{\circ}12.93$	33.52	281°20.72	27.95	
6	305°14.63	243°39.44	N21°37.06	292°28.24	N04°29.16	195°15.04	N22°33.48	296°22.92	N01°28.06	
7	$320^{\circ}17.10$	258°38.72	37.74	307°28.93	29.92	$210^{\circ}17.16$	33.43	311°25.11	28.16	
8	$335^{\circ}19.56$	273°38.00	38.42	322°29.63	30.68	$225^{\circ}19.27$	33.39	$326^{\circ}27.31$	28.27	
9	$350^{\circ}22.02$	288°37.28	• • 39.11	337°30.32	• • 31.44	240°21.38	• • 33.35	341°29.51	• • 28.38	
10	5°24.49	303°36.56	39.79	352°31.02	32.20	255°23.49	33.30	356°31.71	28.49	Ар
11	$20^{\circ}26.95$	318°35.84	40.47	7°31.71	32.96	270°25.60	33.26	11°33.90	28.60	
12	35°29.42	333°35.12	N21°41.15	22°32.40	N04°33.72	285°27.71	N22°33.22	26°36.10	N01°28.71	
13	$50^{\circ}31.88$	348°34.40	41.82	37°33.10	34.48	$300^{\circ}29.82$	33.17	41°38.30	28.81	
14	65°34.34	3°33.68	42.50	52°33.79	35.24	315°31.93	33.13	56°40.50	28.92	<u> </u>
15	$80^{\circ}36.81$	18°32.96	• • 43.18	67°34.49	• • 36.00	330°34.03	• • 33.09	71°42.70	• • 29.03	Apr
16	95°39.27	33°32.24	43.85	82°35.18	36.76	$345^{\circ}36.14$	33.04	86°44.90	29.14	'
17	$110^{\circ}41.74$	48°31.52	44.53	97° 35.87	37.52	0°38.25	33.00	101°47.09	29.25	
18	125°44.20	63°30.80	N21°45.20	112° 36.57	N04°38.28		N22°32.96	116°49.29	N01°29.35	
19	140°46.66	78°30.07	45.87	127°37.26	39.04	30°42.47	32.91	131°51.49	29.46	
20	155° 49.13	93°29.35	46.54	142° 37.96	39.80	45°44.58	32.87	146°53.69	29.57	
21	170°51.59	108°28.63	• • 47.21	157°38.65	• • 40.56	60°46.68	• • 32.83	161°55.89	• • 29.68	
22	185°54.06	123°27.90	47.88	172°39.34	41.31	75°48.79	32.78	176°58.09	29.79	
23	200°56.52	138°27.18	48.55	187°40.04	42.07	90°50.90	32.74	192°0.28	29.89	
Merr	pass. 09:38	ν-0 7' d0	.7′ m-3.92	νη 7' dη	.8′ m1.22	ν2 1' d-0	.0′ m-2.03	1/2 2/ d0	.1′ m0.93	
		- U.I UU	5.32				2.03		0.33	

	Jiais	
	SHA	Dec
Alpheratz	357°33.98	29°14.00
Ankaa	353°6.46	-42° 9.70
Schedar	349°30.36	56°40.76
Diphda	348°46.53	-17°50.55
Achernar	335°19.96	-57°6.13
Hamal	327°50.35	23°35.13
Polaris	313°58.75 315°11.38	89°22.54 -40°12.00
Acamar Menkar	314°5.36	4°11.51
Mirfak	308° 27.22	4 11.51 49°57.28
Aldebaran	290°38.69	16°33.69
Rigel	281°3.09	-8°10.38
Capella	280° 20.67	46° 1.53
Bellatrix	278°21.98	6°22.34
Elnath	278°0.79	28°37.79
Alnilam	275°36.87	-1°11.20
Betelgeuse	270°51.14	7°24.65
Canopus	263°52.21	-52°42.80
Sirius	258°25.46	-16°45.30
Adhara	255°5.18	-29°0.68
Procyon	244°49.80 243°16.09	5° 9.36 27° 57.79
Pollux Avior	243° 16.09 234° 14.35	-59°35.93
Suhail	234 14.35 222°45.47	-59 35.93 -43°32.62
Miaplacidus	221°37.93	-69°49.82
Alphard	217°46.64	-8°46.53
Regulus	207°33.18	11°50.24
Dubhe	193°39.28	61°36.68
Denebola	$182^{\circ}23.62$	14°25.40
Gienah	$175^{\circ}42.22$	-17°41.48
Acrux	172°58.33	-63°14.93
Gacrux	171°49.97	-57°15.86
Alioth	166°11.50	55°49.02
Spica	158° 20.87	-11°18.09
Alkaid	152°50.67	49°10.83
Hadar Menkent	148°33.86 147°55.97	-60°30.10 -36°30.11
Menkent Arcturus	147°55.97 145°46.60	-36° 30.11 19° 2.57
Rigil Kent.	145 46.60 139°38.18	-60°56.72
Kochab	137°18.63	74°2.69
Zuben'ubi	136°54.51	-16° 9.20
Alphecca	126°2.49	26°37.37
Antares	112°14.22	-26°29.46
Atria	$107^{\circ}7.07$	-69°4.33
Sabik	102°1.31	-15°45.51
Shaula	96°8.65	-37°7.31
Rasalhague	95°57.34	12°32.26
Eltanin	90°41.37 83°30.90	51°28.79 -34°22.25
Kaus Aust.	83°30.90 80°32.31	-34°22.25 38°48.18
Vega Nunki	75°46.30	-26°15.79
Altair	61°58.87	-20 15.79 8°56.11
Peacock	53°4.04	-56°38.78
Deneb	49°25.11	45°22.14
Enif	33° 37.86	9°59.60
Al Na'ir	27°31.77	-46°49.84
Fomalhaut	15° 13.56	-29°28.90
Scheat	$13^{\circ}44.41$	28°13.35
Markab	13°29.05	15°20.67
Apr 25 Sat	SHA	Mer.pass
Venus	301°16.00	13:43
Mars	348°49.20	10:32
Jupiter	250° 19.13	17:04
Saturn	351°22.74	10:21
Apr 26 C	CUV	Mar ====
Apr 26 Sun Venus	<b>SHA</b> 300°0.06	Mer.pass 13:45
Mars	348°6.71	10:31
Jupiter	250° 10.90	17:01
Saturn	351°16.30	10:17
Apr 27 Mon	SHA	Mer.pass
Venus	298°43.89	13:46
Mars	347°24.23 250°2.53	10:30
Jupiter Saturn	250°2.53 351°9.88	16:57 10:14
Saturn	JUL 9.88	10:14
Horizor	ital parallax	
Horizor	Venus: Mars:	0.1 0.1

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h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°29.49	N13°7.47	73°52.84	10.7'	N17°46.62	-12.8'	57.8'
1	195°29.60	8.29	88°22.57	10.8'	17° 33.80	-12.9'	57.8'
2	210°29.71	9.10	102°52.41	10.9'	17°20.89	-13.0'	57.7'
3	225°29.81	• • 9.92	$117^{\circ}22.35$	11.1'	$17^{\circ}7.91$	-13.1'	57.7'
4	240°29.92	10.73	131°52.40	11.2'	16°54.85	-13.1'	57.7'
5	255°30.03	11.55	146°22.56	11.3'	16°41.72	-13.2'	57.7'
6	270°30.14 285°30.24	N13°12.36	160°52.82 175°23.18	11.4'	N16°28.52 16°15.25	-13.3'	57.6'
7 8	300°30.24	13.18 13.99	175 23.18 189°53.65	11.5' 11.6'	16 15.25 16°1.91	-13.3' -13.4'	57.6' 57.6'
9	315°30.46	• • 14.80	204° 24.21	11.7'	15° 48.51	-13.5	57.6'
10	330°30.56	15.62	218°54.87	11.8'	15°35.04	-13.5'	57.5'
11	345°30.67	16.43	233° 25.63	11.9'	15°21.51	-13.6'	57.5'
12	0°30.78	N13°17.24	247°56.49	12.0'	N15°7.91	-13.7'	57.5'
13	15°30.88	18.05	262° 27.45	12.0'	14° 54.25	-13.7'	57.4'
14	30°30.99	18.86	276°58.49	12.1'	14°40.54	-13.8'	57.4'
15 16	45°31.09 60°31.20	· · 19.68 20.49	291°29.64 306°0.87	12.2' 12.3'	14°26.76 14°12.93	-13.8' -13.9'	57.4' 57.4'
17	75°31.31	21.30	320° 32.20	12.4	14 12.93 13°59.05	-13.9'	57.4 57.3'
18	90°31.41	N13°22.11	335°3.61	12.5'	N13°45.11	-14.0'	57.3'
19	105°31.52	22.92	349°35.11	12.6'	13°31.12	-14.0'	57.3'
20	120°31.62	23.72	4°6.71	12.7'	13° 17.08	-14.1'	57.3'
21	135°31.72	• • 24.53	18°38.38	12.8'	13°2.99	-14.1'	57.2'
22	150°31.83	25.34	33° 10.15	12.8'	12°48.85	-14.2'	57.2'
23	165°31.93	26.15	47°41.99	12.9'	12°34.66	-14.2'	57.2'
	SD = 15.9'	d = 0.8'		SI	D = 15.8'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°32.04	N13°26.96	62°13.92	13.0'	N12°20.43	-14.3'	57.2'
1	195°32.14	27.76	76°45.93	13.1'	12°6.15	-14.3'	57.1'
2	210°32.24	28.57	91°18.02	13.2'	11°51.84	-14.4'	57.1'
3	225°32.35	• • 29.38	105°50.19	13.2'	11°37.48	-14.4'	57.1'
4	240°32.45	30.18	120°22.44	13.3'	11°23.07	-14.4'	57.0'
5 6	255°32.55 270°32.65	30.99 N13°31.79	134° 54.76 149° 27.16	13.4' 13.5'	11°8.64 N10°54.16	-14.5' -14.5'	57.0' 57.0'
7	270 32.05 285°32.76	32.60	163°59.63	13.5	10°39.65	-14.5'	57.0'
8	300°32.86	33.40	178° 32.18	13.6'	10° 25.10	-14.5'	56.9'
9	315°32.96	• • 34.21	193°4.79	13.7'	10° 10.51	-14.6'	56.9'
10	330°33.06	35.01	207° 37.48	13.8'	09°55.90	-14.6'	56.9'
11	345°33.16	35.81	222°10.24	13.8'	09°41.25	-14.7'	56.9'
12	0°33.26	N13°36.62	236° 43.06	13.9'	N09°26.57	-14.7'	56.8'
13	15°33.37	37.42	251° 15.95	14.0'	09°11.87	-14.7'	56.8'
14	30°33.47 45°33.57	38.22	265°48.90 280°21.92	14.0' 14.1'	08°57.13 08°42.37	-14.8' -14.8'	56.8' 56.8'
15 16	60°33.67	· · 39.02 39.82	294° 54.99	14.1	08° 27.59	-14.8'	56.7'
17	75°33.77	40.62	309°28.13	14.2'	08° 12.78	-14.8'	56.7'
18	90°33.87	N13°41.42	324°1.33	14.3'	N07° 57.94	-14.9'	56.7'
19	105°33.97	42.22	338°34.59	14.3'	07°43.08	-14.9'	56.7'
20	120°34.07	43.02	353°7.91	14.4'	$07^{\circ}28.21$	-14.9'	56.6'
21	135°34.17	• • 43.82	7°41.28	14.4'	07°13.31	-14.9'	56.6'
22	150°34.27 165°34.36	44.62	22°14.70 36°48.18	14.5' 14.5'	06°58.39 06°43.46	-14.9'	56.6'
23		45.42	30 48.18			-15.0'	56.6'
	SD = 15.9'	d = 0.8'		Si	D = 15.6'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°34.46	N13°46.22	51°21.71	14.6'	N06°28.51	-15.0'	56.6'
1	195°34.56	47.02	65°55.30	14.6'	06°13.54	-15.0'	56.5'
2	210°34.66 225°34.76	47.81 •• 48.61	80°28.93 95°2.61	14.7' 14.7'	05°58.56 05°43.57	-15.0' -15.0'	56.5' 56.5'
3 4	240°34.86	49.41	109° 36.33	14.7	05 43.57 05°28.56	-15.0'	56.5'
5	255°34.95	50.20	124° 10.11	14.8'	05°13.55	-15.0'	56.4'
6	270°35.05	N13°51.00	138° 43.92	14.9'	N04°58.52	-15.0'	56.4'
7	285°35.15	51.79	153° 17.78	14.9'	$04^{\circ}43.48$	-15.0'	56.4'
8	300°35.25	52.59	167°51.68	14.9'	04°28.44	-15.1'	56.4'
9	315°35.34	• • 53.38	182°25.63	15.0'	04°13.39	-15.1'	56.3'
10 11	330°35.44 345°35.54	54.18 54.97	196°59.61 211°33.63	15.0' 15.1'	03°58.33 03°43.27	-15.1' -15.1'	56.3' 56.3'
11	0°35.63	54.97 N13°55.77	211°33.63 226°7.69	15.1'	N03° 28.20	-15.1'	56.3
13	15°35.73	56.56	240°41.78	15.1'	03°13.14	-15.1'	56.2'
14	30°35.82	57.35	255° 15.91	15.2'	02°58.07	-15.1'	56.2'
15	45°35.92	•• 58.14	$269^{\circ}50.07$	15.2'	$02^{\circ}42.99$	-15.1'	56.2'
16	60°36.01	58.93	284° 24.26	15.2'	02°27.92	-15.1'	56.2'
17	75°36.11	13°59.73	298° 58.49	15.3'	02°12.85	-15.1'	56.2'
18 19	90°36.20 105°36.30	N14°0.52 1.31	313°32.74 328°7.02	15.3' 15.3'	N01°57.78 01°42.72	-15.1' -15.1'	56.1' 56.1'
20	105°36.30 120°36.39	2.10	328° 7.02 342° 41.33	15.3'	01°42.72 01°27.66	-15.1' -15.1'	56.1
21	135°36.49	. 2.10	357° 15.67	15.4	01°12.60	-15.1'	56.1
22	150°36.58	3.68	11°50.03	15.4	00° 57.55	-15.0'	56.0'
23	165°36.68	4.46	26°24.41	15.4'	00°42.51	-15.0'	56.0'
	SD = 15.9'	d = 0.8'		SI	D = 15.4'		

	Twi	liaht	I		Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
NI 700			00.01	01.00		
N 72°	////	////	02:31	21:30	////	////
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	05:55	06:44	07:29	16:26	17:10	17:59

Lat.		Moonris	e		Moonset	t
Lat.	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	15:21	15:21	15:20		00:22	01:55

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	8-10	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	60-79%	
25	01:58	02:03	11:58	19:43	07:19		
26	02:08	02:13	11:58	20:28	08:06		
27	02:18	02:23	11:58	21:11	08:50		

h	Aries	Venus	. ,	Mars	Jui	oiter	Sat	urn		Stars
Tue	GHA	GHA De		Dec	GHA	Dec	GHA	Dec		SHA
0 0	215°58.98	153°26.46 N21°4			105°53.00	N22°32.69	207°2.48	N01°30.00		
1	231°1.45		9.88 217°41.4		120°55.11	32.65	222°4.68	30.11	Alpheratz	357°33.97
2	246°3.91		0.55 232°42.1		135°57.22	32.61	237°6.88	30.22	Ankaa	353°6.45
3	261°6.38	198°24.28 · · · 5			$150^{\circ}59.32$	• • 32.56	252°9.08	• • 30.33	Schedar Diphda	349°30.35 348°46.52
4	276°8.84		1.87 262°43.5		166° 1.43	32.52	267°11.28	30.43	Achernar	335°19.95
5	291°11.30		2.54 277°44.2		181°3.54	32.47	282°13.48	30.54	Hamal	327°50.35
6 7	306° 13.77 321° 16.23	243°22.10 N21°5 258°21.37 5	3.20 292°44.8 3.86 307°45.5		196° 5.64 211° 7.75	N22°32.43 32.38	297°15.68 312°17.88	N01°30.65 30.76	Polaris	313°58.98
8	336° 18.70		322°46.2		226° 9.85	32.34	312 17.88 327°20.08	30.86	Acamar	$315^{\circ}11.38$
9	351°21.16	288°19.92 · · 5			241°11.96	• • 32.30	342°22.27	30.97	Menkar	314°5.36
10	$6^{\circ}23.62$		55.83 352°47.6		256°14.06	32.25	357°24.47	31.08	Mirfak	308°27.23 290°38.70
11	21°26.09		6.48 7°48.3		271°16.17	32.21	12°26.67	31.19	Aldebaran Rigel	290 38.70 281°3.10
12	36°28.55	333°17.73 N21°5			286°18.27	N22°32.16	27°28.87	N01°31.30	Capella	280°20.68
13	51°31.02		7.79 37°49.7		301°20.37	32.12	42°31.07	31.40	Bellatrix	278°21.99
14 15	66° 33.48 81° 35.95	3°16.27 5 18°15.54 · · 5	8.44 52°50.4 9.09 67°51.1		316°22.48 331°24.58	32.07 •• 32.03	57°33.27 72°35.47	31.51 •• 31.62	Elnath	278°0.80
16	96°38.41	33°14.81 21°5			346°26.68	31.98	87°37.67	31.72	Alnilam	275°36.89
17	111° 40.87		0.39 97°52.5		1°28.79	31.94	102°39.87	31.83	Betelgeuse	270°51.15
18	126°43.34	63°13.35 N22°	1.04 112°53.2	2 N04°56.47	16°30.89	N22°31.90	117°42.07	N01°31.94	Canopus Sirius	263°52.23 258°25.48
19	141°45.80		1.69 127°53.9		31°32.99	31.85	132°44.27	32.05	Adhara	255°5.20
20	156° 48.27		2.34 142°54.6		46°35.10	31.81	147°46.47	32.15	Procyon	244°49.82
21 22	171°50.73 186°53.19		2.98 157°55.3 3.62 172°56.0		61°37.20 76°39.30	•• 31.76	162°48.67	• • 32.26	Pollux	
23	201°55.66		3.62 172°56.0 4.27 187°56.6		91°41.40	31.72 31.67	177°50.87 192°53.07	32.37 32.48	Avior	$234^{\circ}14.38$
									Suhail	222°45.50
Mer.p	pass. 09:34	$\nu$ -0.7′ $d$ 0.7′ m-3	$\frac{3.92}{2}$ $\frac{\nu 0.7'}{2}$	/0.8′ m1.22	$\nu^{2.1'}$ d-0	0.0′ m-2.03	$\nu^{2.2'}$ d0	.1′ m0.93	Miaplacidus	221°37.97 217°46.65
									Alphard Regulus	217 40.05 207°33.19
Wed	GHA	GHA De		Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.30
0	216°58.12	153°8.95 N22°			106°43.50	N22°31.63	207°55.27	N01°32.58	Denebola	182°23.63
1	232°0.59		5.55 217°58.0 6.19 232°58.7		121°45.60	31.58	222°57.47 237°59.67	32.69	Gienah	175°42.23
2	247°3.05 262°5.51		6.19 232°58.7 6.83 247°59.4		136°47.70 151°49.81	31.54 •• 31.49	257 59.67 253°1.87	32.80 · · 32.90		172°58.34
4	202 5.51 277°7.98		7.47 263°0.1		166°51.91	31.49	268°4.07	33.01		171°49.98
5	292° 10.44		8.10 278°0.8		181°54.01	31.40	283°6.27	33.12	Alioth	166°11.51 158°20.87
6	$307^{\circ}12.91$	243°4.54 N22°	8.74 293°1.5	5 N05°5.54	196°56.11	N22°31.36	298°8.47	N01°33.23	Spica Alkaid	150 20.67 152°50.68
7	322° 15.37		9.37 308°2.2		211°58.21	31.31	313°10.67	33.33	Hadar	148°33.86
8	337° 17.83		0.01 323°2.9		227° 0.31	31.26	328°12.87	33.44		147°55.97
9	352°20.30 7°22.76	288°2.32 · · · 1 303°1.59			242°2.40 257°4.50	• • 31.22	343°15.07 358°17.27	• • 33.55	Arcturus	145°46.60
10 11	7 22.76 22°25.23		.1.27 353°4.3 .1.90 8°5.0		257 4.50 272° 6.60	31.17 31.13	13°19.47	33.65 33.76	Rigil Kent.	139°38.18
12	37°27.69	333°0.11 N22°1			287° 8.70	N22°31.08	28°21.67	N01°33.87	Kochab	137°18.62
13	52°30.15		3.16 38°6.4		302°10.80	31.04	43°23.87	33.97	Zuben'ubi Alphecca	136°54.51 126°2.49
14	67°32.62	2°58.63 1	3.79 53°7.1	0 11.58	317°12.90	30.99	58°26.08	34.08	Antares	120 2.49 112°14.21
15	82°35.08	17°57.89 · · 1			332°15.00	• • 30.95	73°28.28	• • 34.19	Atria	107°7.03
16	97°37.55		5.04 83°8.4		347°17.09	30.90	88°30.48	34.29	Sabik	$102^{\circ}1.30$
17 18	112° 40.01 127° 42.47	47°56.41 1 62°55.67 N22°1	.5.66 98°9.1 .6.28 113°9.8		2°19.19 17°21.29	30.85 N22°30.81	103°32.68 118°34.88	34.40 N01°34.51	Shaula	96°8.63
19	142° 44.94		6.91 128°10.5		32°23.39	30.76	133°37.08	34.61	Rasalhague	95°57.32
20	157° 47.40		7.53 143°11.2		47°25.48	30.72	148°39.28	34.72	Eltanin	90°41.34
21	$172^{\circ}49.87$	107°53.44 · · 1			62°27.58	• • 30.67	163°41.48	• • 34.83	Kaus Aust. Vega	83°30.88 80°32.29
22	187°52.33		.8.77 173°12.6		77°29.68	30.63	178°43.68	34.93	Nunki	75°46.28
23	202°54.79	137°51.96 1	.9.38 188°13.3	4 18.36	92°31.77	30.58	193°45.89	35.04	Altair	61°58.85
Mer.p	pass. 09:31	$\nu$ -0.7 $'$ $d$ 0.6 $'$ m-3	$\nu$ 0.7′ $\sigma$	/0.8′ m1.22	$\nu 2.1' \ d-0$	0.0′ m-2.02	$\nu$ 2.2′ d0	.1'  m $0.93$	Peacock	53°4.01
									Deneb	49°25.09
Thu	GHA	GHA De	c GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.85
0	217° 57.26	152°51.22 N22°2			107°33.87	N22°30.53	208°48.09	N01°35.15	Al Na'ir Fomalhaut	27°31.75 15°13.55
1	232°59.72		0.62 218° 14.7		122°35.96	30.49	223°50.29	35.25	Scheat	13°44.39
2	248°2.19		21.23 233°15.4		137°38.06	30.44	238°52.49	35.36	Markab	13°29.04
3 4	263°4.65 278°7.12	197°48.98 · · · 2 212°48.24	21.84 248°16.1 22.46 263°16.8		152°40.16 167°42.25	· · 30.39 30.35	253°54.69 268°56.89	· · 35.46 35.57	Apr 28 Tue	SHA
4 5	278° 7.12 293° 9.58		2.46 263°16.8 3.07 278°17.5		167°42.25 182°44.35	30.35	268°56.89 283°59.09	35.57 35.68		<b>эпа</b> 297°27.47
6	308° 12.04	242°46.75 N22°2			197°46.44			N01°35.78		346°41.75
7	323° 14.51		4.29 308°18.8		212°48.53	30.21	314°3.50	35.89	Jupiter	249°54.02
8	338° 16.97		4.89 323° 19.5		227°50.63	30.16	329°5.70	36.00	Saturn	351°3.50
9	353° 19.44	287°44.51 · · · 2			242°52.72	• • 30.12	344°7.90	• • 36.10	Apr 29 Wed	SHA
10	8°21.90		6.11 353°20.9		257°54.82	30.07	359°10.10	36.21		296°10.83
11 12	23°24.36 38°26.83	317°43.02 2 332°42.27 N22°2	6.71 8°21.6 7.32 23°22.3		272°56.91 287°59.00	30.02 N22°29.98	14°12.31 29°14.51	36.31 N01°36.42		345°59.26
13	50° 20.03 53° 29.29		7.92 38°23.0		303°1.10	29.93	44°16.71	36.53		249°45.38
14	68°31.76		8.52 53°23.7		318° 3.19	29.88	59° 18.91	36.63	Saturn	350°57.15
15	83°34.22	17°40.02 · · · 2			333° 5.28	• • 29.84	74°21.12	• • 36.74	Apr 30 Thu	SHA
16	98°36.68		9.72 83°25.1		348°7.37	29.79	89°23.32	36.84		294°53.96
17	113°39.15		0.32 98°25.8		3°9.47	29.74	104°25.52	36.95		345°16.77
18 19	128° 41.61 143° 44.08	62°37.77 N22°3 77°37.02 3	30.92 113°26.5 31.51 128°27.2		18°11.56 33°13.65	N22°29.70 29.65	119°27.72 134°29.92	N01°37.06 37.16		249°36.61
20	143 44.06 158° 46.54		32.11 143°27.9		48°15.74	29.60	134 29.92 149°32.13	37.10	Saturn	350°50.83
21	173° 49.00	107°35.52 · · 3			63°17.83	• • 29.56	164°34.33	• • 37.37	Horizor	ntal parallax
22	$188^{\circ}51.47$	122°34.77 3	3.30 173°29.2	9 35.66	$78^{\circ}19.92$	29.51	179°36.53	37.48		Venus:
23	203°53.93	137°34.02 3	3.89 188°29.9	8 36.41	93°22.02	29.46	194°38.74	37.58		Mars:
Mer.p	pass. 09:27	ν-0.7′ d0.6′ m-3	0.7' c	/0.8′ m1.22	$\nu 2.1' d-0$	0.0′ m-2.02	$\nu$ 2.2′ d0	.1′ m0.93		

Dec

29°13.99 -42°9.69

56°40.75 -17°50.54

 $\text{-}57^{\circ}6.12$ 

23°35.13 89°22.52

-40°11.99

4°11.51

49°57.27

16°33.69 -8°10.38

 $46^{\circ}1.53$ 

 $6^{\circ}22.35$ 

28°37.78 -1°11.20 7°24.66 -52°42.80

-16°45.29 -29°0.67

5°9.37 27°57.79

-59°35.93

-43°32.62

-69°49.82 -8°46.53

11°50.24

61°36.69

14°25.41

 $-17^{\circ}41.48$ 

-63°14.94 -57°15.88

55°49.03 -11°18.09

49°10.84 -60°30.12

-36°30.11

19°2.58 -60°56.73 74°2.70

 $-16^{\circ}9.20$ 

26°37.38 -26°29.46

-69°4.34

-15°45.51 -37°7.32

12°32.27 51°28.81

-34°22.25 38°48.19

-26°15.79 8°56.12

-56°38.77 45°22.14

9°59.60 -46°49.83

-29°28.89

28°13.35 15°20.67

Mer.pass

13:47

10:29

16:54

10:10 Mer.pass 13:48 10:28

16:51 10:07 Mer.pass

13:49

10:27

16:47

10:03

0.1

0.1

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°36.77	N14°5.25	40°58.82	15.4'	N00°27.47	-15.0'	56.0'
1	195°36.86	6.04	55°33.24	15.4'	N00°12.45	-15.0'	56.0'
2	210°36.96	6.83	70°7.69	15.5'	S00°2.57	15.0'	56.0'
3 4	225°37.05 240°37.14	· · 7.62 8.40	84°42.16 99°16.64	15.5' 15.5'	00°17.58 00°32.57	15.0' 15.0'	55.9' 55.9'
5	255°37.23	9.19	99 10.04 113°51.14	15.5'	00° 47.55	15.0'	55.9'
6	270°37.33	N14°9.98	128°25.66	15.5'	S01°2.52	15.0'	55.9'
7	285°37.42	10.76	143°0.19	15.5'	$01^{\circ}17.47$	14.9'	55.9'
8	300°37.51	11.55	157°34.73	15.6'	01°32.41	14.9'	55.8'
9	315°37.60	. 12.33	172°9.29	15.6'	01°47.33	14.9'	55.8'
10 11	330°37.69 345°37.79	13.12 13.90	186°43.85 201°18.43	15.6' 15.6'	02°2.24 02°17.13	14.9' 14.9'	55.8' 55.8'
12	0°37.88	N14°14.68	215°53.02	15.6'	S02°31.99	14.8'	55.8'
13	15°37.97	15.47	230°27.61	15.6'	$02^{\circ}46.84$	14.8'	55.7'
14	30°38.06	16.25	245°2.21	15.6'	03°1.67	14.8'	55.7'
15	45°38.15	• • 17.03	259°36.81	15.6'	03°16.47	14.8'	55.7'
16 17	60°38.24 75°38.33	17.81 18.60	274°11.42 288°46.03	15.6' 15.6'	03°31.25 03°46.01	14.8' 14.7'	55.7' 55.7'
18	90°38.42	N14°19.38	303°20.64	15.6'	S04°0.74	14.7	55.6'
19	105°38.51	20.16	317°55.26	15.6'	04°15.45	14.7'	55.6'
20	120°38.60	20.94	332°29.87	15.6'	04°30.13	14.7'	55.6'
21	135°38.69	• • 21.72	347°4.48	15.6'	04°44.79	14.6'	55.6'
22	150°38.77 165°38.86	22.50 23.28	1°39.09 16°13.70	15.6' 15.6'	04°59.42 05°14.01	14.6'	55.6'
23			10 13.70			14.6'	55.5'
	SD = 15.9'	d = 0.8'		SI	D = 15.3'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°38.95	N14°24.05	30°48.30	15.6'	S05°28.58	14.5'	55.5'
1	195°39.04	24.83	45°22.90	15.6'	$05^{\circ}43.12$	14.5'	55.5'
2	210°39.13	25.61	59°57.49	15.6'	05°57.62	14.5'	55.5'
3 4	225°39.21 240°39.30	•• 26.39	74°32.07 89°6.65	15.6'	06°12.09 06°26.53	14.4' 14.4'	55.5'
4 5	240 39.30 255°39.39	27.16 27.94	89 0.05 103°41.21	15.6' 15.6'	06°40.94	14.4 14.4'	55.4' 55.4'
6	270°39.48	N14°28.72	118°15.77	15.5'	S06°55.31	14.3'	55.4'
7	285°39.56	29.49	132°50.31	15.5'	07°9.64	14.3'	55.4'
8	300°39.65	30.27	147°24.84	15.5'	07°23.94	14.3'	55.4'
9	315°39.74	• • 31.04	161°59.36	15.5'	07°38.20	14.2'	55.3'
10 11	330°39.82 345°39.91	31.82 32.59	176°33.86 191°8.34	15.5' 15.5'	07°52.41 08°6.59	14.2' 14.1'	55.3' 55.3'
12	0°39.99	N14°33.37	205°42.81	15.5'	S08°20.73	14.1	55.3'
13	15°40.08	34.14	220°17.27	15.4'	08°34.83	14.1'	55.3'
14	30°40.16	34.91	234°51.70	15.4'	08°48.89	14.0'	55.3'
15	45°40.25	• • 35.68	249°26.12	15.4'	09°2.90	14.0'	55.2'
16 17	60°40.33 75°40.42	36.46 37.23	264°0.51 278°34.89	15.4' 15.4'	09°16.87 09°30.79	13.9' 13.9'	55.2' 55.2'
18	90°40.50	N14°38.00	293°9.24	15.4	S09°44.67	13.8'	55.2'
19	105°40.59	38.77	307°43.57	15.3'	09°58.50	13.8'	55.2'
20	120°40.67	39.54	$322^{\circ}17.87$		$10^{\circ}12.28$	13.7'	55.1'
21	135°40.76	• • 40.31	336°52.15	15.3'	10°26.02	13.7'	55.1'
22 23	150°40.84 165°40.92	41.08 41.85	351°26.41 6°0.64	15.2' 15.2'	10°39.70 10°53.34	13.6' 13.6'	55.1' 55.1'
23	SD = 15.9'	d = 0.8'	0 0.04		D = 15.1'	13.0	33.1
	$\frac{3D = 15.9}{}$	<i>u</i> = 0.6		- 31	$D = 15.1^{\circ}$		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°41.00	N14°42.62	20°34.84	15.2'	S11°6.93	13.5'	55.1'
1 2	195°41.09 210°41.17	43.39 44.15	35°9.01 49°43.16	15.1' 15.1'	11°20.46 11°33.94	13.5' 13.4'	55.1' 55.0'
3	225°41.25	• • 44.92	64°17.27	15.1	11°47.36	13.4	55.0'
4	240°41.33	45.69	78°51.35	15.1'	12°0.74	13.3'	55.0'
5	255°41.42	46.45	93°25.41	15.0'	12°14.05	13.3'	55.0'
6	270°41.50	N14°47.22	107°59.43	15.0'	\$12°27.31	13.2'	55.0'
7	285°41.58 300°41.66	47.99 48.75	122°33.41 137°7.37	15.0' 14.9'	12°40.51 12°53.66	13.1' 13.1'	55.0' 54.9'
8 9	300°41.66 315°41.74	48.75 •• 49.52	151°41.28	14.9'	12°53.66 13°6.74	13.1	54.9' 54.9'
10	330°41.82	50.28	166°15.17	14.8'	13°19.77	13.0'	54.9'
11	345°41.90	51.04	180°49.01	14.8'	13°32.73	12.9'	54.9'
12	0°41.98	N14°51.81	195°22.82	14.8'	\$13°45.64	12.8'	54.9'
13	15°42.06	52.57	209°56.60 224°30.33	14.7'	13°58.48 14°11.26	12.8'	54.9'
14 15	30°42.14 45°42.22	53.33 •• 54.10	224°30.33 239°4.03	14.7' 14.7'	14°11.26 14°23.97	12.7' 12.6'	54.9' 54.8'
16	60°42.30	54.86	253° 37.68	14.6	14° 36.62	12.6'	54.8'
17	75°42.38	55.62	268°11.30	14.6'	14°49.20	12.5'	54.8'
18	90°42.46	N14°56.38	282°44.87	14.5'	\$15°1.72	12.4'	54.8'
19	105°42.54	57.14	297°18.40	14.5'	15°14.17	12.4'	54.8'
20 21	120°42.62 135°42.70	57.90 •• 58.66	311°51.89 326°25.34	14.4' 14.4'	15°26.55 15°38.86	12.3' 12.2'	54.8' 54.8'
22	150°42.77	14°59.42	340°58.74	14.4 14.4'	15 38.80 15°51.10	12.2'	54.8 54.7'
23	165°42.85	15°0.18	355°32.10	14.3'	16°3.27	12.1'	54.7'
	SD = 15.9'	d = 0.8'		SI	D = 15.0'		

Lat.	Twi	Twilight		Sunset	Twi	light
Lat.	Naut.	Civil	Sunrise	Juliset	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:01	06:51	07:36	16:18	17:03	17:52

Lat	Lat. Moonrise			Moonset	t	
Lat.	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
<b>S</b> 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
<b>S</b> 60°	15:20	15:19	15:19	03:24	04:51	06:18

١		Sun				Moon			
	Day	Eqn.of	Time	Mer.	Mer.	Mer.Pass.			
	,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	11-13		
		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	87-97%		
	28	02:27	02:32	11:57	21:53	09:32			
	29	02:36	02:40	11:57	22:35	10:14			
	30	02:44	02:48	11:57	23:18	10:57			

h	Aries	Venus	5	M	ars	Jup	oiter	Sat	urn	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	
	218° 56.40		22°34.48	203°30.68	N05°37.16	108°24.11	N22°29.42	209°40.94	N01° 37.69	
0	216 50.40 233°58.86	167°32.51	35.07	203 30.06 218°31.37	37.10	106 24.11 123°26.20	29.37	209 40.94 224°43.14	37.80	
1 2	233 56.60 249°1.32	182°31.76		216 31.37 233°32.06		123 20.20 138°28.29	29.37	239°45.34		İ
	249 1.32 264°3.79		35.66 · 36.25	233 32.00 248°32.76	38.66 •• 39.41	150 20.29 153°30.38	29.27	254° 47.55	37.90	
3	204 3.79 279°6.25			248 32.76 263°33.45				254 47.55 269°49.75	• • 38.01	
4		212°30.25	36.83		40.16	168°32.47	29.23		38.11	
5	294°8.72	227°29.50	37.42	278°34.14	40.91	183°34.56	29.18	284°51.95	38.22	.
6	309°11.18		22°38.00	293°34.84	N05°41.66	198°36.65	N22°29.13	299°54.16	N01°38.32	
7	324° 13.65	257°27.99	38.59	308°35.53	42.41	213°38.73	29.09	314°56.36	38.43	
8	339° 16.11	272°27.24	39.17	323°36.22	43.16	228°40.82	29.04	329°58.56	38.53	
9	354° 18.57		• 39.75	338°36.92	• • 43.91	243°42.91	• • 28.99	345°0.77	•• 38.64	
10	9°21.04	302°25.72	40.33	353°37.61	44.65	258°45.00	28.94	0°2.97	38.75	
11	24°23.50	317°24.97	40.91	8°38.30	45.40	273°47.09	28.90	15°5.17	38.85	
12	39°25.97		22°41.49	23°39.00	N05°46.15	288°49.18	N22°28.85	30°7.38	N01°38.96	
13	54°28.43	347°23.45	42.06	38°39.69	46.90	303°51.26	28.80	45°9.58	39.06	
14	69°30.89	2°22.70	42.64	53°40.38	47.65	318°53.35	28.75	60°11.78	39.17	
15	84°33.36	17°21.94 •	<ul> <li>43.21</li> </ul>	68°41.08	• • 48.40	333°55.44	• • 28.70	75°13.99	• • 39.27	
16	99°35.82	32°21.18	43.79	83°41.77	49.15	348°57.53	28.66	90°16.19	39.38	
17	114°38.29	47°20.42	44.36	98°42.46	49.90	3°59.61	28.61	105°18.40	39.48	
18	129° 40.75	62° 19.67 N2	22°44.93	113°43.15	N05°50.64	19°1.70	N22°28.56	120°20.60	N01°39.59	
19	144°43.21	77° 18.91	45.50	128° 43.85	51.39	34°3.79	28.51	135°22.80	39.69	
20	159° 45.68	92°18.15	46.07	143°44.54	52.14	49° 5.87	28.47	150°25.01	39.80	
21	174°48.14		• 46.64	158°45.23	52.89	64°7.96	• • 28.42	165°27.21	39.90	
22	189°50.61	122°16.63	47.21	173° 45.23	53.64	79°10.04	28.37	180°29.42	40.01	
23	204°53.07	137° 15.87	47.77	188° 46.62	54.38	94°12.13	28.32	195°31.62	40.01	
										ا!
Mer.	pass. 09:23	ν-0.8' d0.6'	m-3.92	$-\nu$ 0.7' d0	.8′ m1.23	$\nu 2.1' d-0$	.0′ m-2.01	$\nu^{2.2'}$ d0	.1′ m0.93	.   '
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	
0	219°55.54		22°48.34	203°47.31	N05°55.13	109°14.22	N22°28.27	210°33.82	N01°40.22	
1	234° 58.00	167°14.34	48.90	218°48.01	55.88	124°16.30	28.22	225°36.03	40.32	
2	250°0.46	182° 13.58	49.46	233°48.70	56.63	139°18.39	28.18	240°38.23	40.43	
3	265°2.93		• 50.03	248°49.39	• • 57.37	154°20.47	. 28.13	255°40.44	• • 40.53	
4	280°5.39	212°12.06	50.59	263°50.09	58.12	169°22.56	28.08	270°42.64	40.64	
5	295°7.86	227°11.30	51.15	278° 50.78	58.87	184°24.64	28.03	285°44.85	40.74	
6	310° 10.32		22°51.70	293°51.47	N05°59.61	199°26.72	N22°27.98	300°47.05	N01°40.85	
7	325° 12.78	257°9.77	52.26	308°52.16	06° 0.36	214° 28.81	27.94	315°49.26	40.95	
	340° 15.25	272°9.01	52.82	323°52.86		229°30.89	27.89	330°51.46		
8					1.11				41.05	
9	355° 17.71		00.01	338° 53.55	• • 1.85	244°32.97	• • 27.84	345°53.67	• • 41.16	
10	10°20.18	302°7.48	53.93	353°54.24	2.60	259°35.06	27.79	0°55.87	41.26	
11	25°22.64	317°6.71	54.48	8°54.94	3.34	274°37.14	27.74	15°58.08	41.37	
12	40°25.10		22°55.03	23°55.63	N06°4.09	289°39.22	N22°27.69	31°0.28	N01°41.47	İ
13	55° 27.57	$347^{\circ}5.18$	55.58	38°56.32	4.84	304°41.31	27.64	46°2.49	41.58	
14	70°30.03	2°4.42	56.13	53°57.01	5.58	319°43.39	27.60	61°4.69	41.68	
15	85°32.50		• 56.68	68°57.71	• • 6.33	334°45.47	• • 27.55	76°6.90	• • 41.79	
16	100°34.96	32°2.89	57.23	83°58.40	7.07	349°47.55	27.50	$91^{\circ}9.10$	41.89	
17	115°37.43	47°2.12	57.77	98° 59.09	7.82	4°49.63	27.45	$106^{\circ}11.31$	41.99	
18	130°39.89	62°1.35 N2	22°58.32	113°59.78	N06°8.56	19°51.72	N22°27.40	121°13.51	N01°42.10	
19	145°42.35	77°0.59	58.86	129°0.48	9.31	34°53.80	27.35	136°15.72	42.20	
20	160°44.82	91°59.82	59.41	$144^{\circ}1.17$	10.05	49°55.88	27.30	151°17.92	42.31	
21	175° 47.28	106°59.05	22°59.95	159°1.86	• • 10.80	64°57.96	• • 27.25	166°20.13	• • 42.41	
22	190°49.75	121°58.28	23°0.49	174°2.55	11.54	80°0.04	27.20	181°22.33	42.52	
23	205°52.21	136°57.51	1.03	189°3.25	12.29	95°2.12	27.15	196°24.54	42.62	
										!
Mer.	pass. 09:19	ν-0.8' d0.6'	m-3.92	$\frac{\nu 0.7' \ d0}{}$	.7′ m1.23	$\nu 2.1' d-0$	.0′ m-2.01	$\frac{\nu 2.2' \ d0}{}$	.1′ m0.93	
c	GHA	CHA	Des	CHA	Dee	CHA	Daa	GHA	Dag	
Sun	<b>GHA</b> 220°54.67	GHA 151°56.74 N	Dec	GHA	Dec	GHA 110° 4.20	Dec		Dec	
0			123°1.57	204°3.94	N06°13.03	110°4.20	N22°27.11	211°26.75	N01°42.72	
1	235° 57.14	166° 55.98	2.10	219°4.63	13.78	125°6.28	27.06	226°28.95	42.83	
2	250° 59.60	181°55.21	2.64	234°5.33	14.52	140°8.36	27.01	241°31.16	42.93	
3	266°2.07		• • 3.18	249°6.02	• • 15.26	155°10.44	• • 26.96	256°33.36	• • 43.04	F
4	281°4.53	211°53.67	3.71	264°6.71	16.01	170°12.52	26.91	271°35.57	43.14	
5	296°7.00	226°52.89	4.24	279°7.40	16.75	185°14.60	26.86	286°37.77	43.24	
6	311°9.46		23°4.77	294°8.10	N06°17.50	200°16.68	N22°26.81	301°39.98	N01°43.35	
7	326°11.92	256°51.35	5.30	309°8.79	18.24	215°18.76	26.76	316°42.19	43.45	
8	341°14.39	271°50.58	5.83	324°9.48	18.98	230°20.83	26.71	331°44.39	43.56	L
9	356° 16.85	286°49.81	• • 6.36	339° 10.17	•• 19.73	245°22.91	• • 26.66	346°46.60	• • 43.66	ı
10	$11^{\circ}19.32$	301°49.04	6.89	$354^{\circ}10.86$	20.47	260°24.99	26.61	1°48.81	43.76	"
11	$26^{\circ}21.78$	$316^{\circ}48.26$	7.42	$9^{\circ}11.56$	21.21	275°27.07	26.56	$16^{\circ}51.01$	43.87	
12	41°24.24		23°7.94	24° 12.25	N06°21.96	290°29.15	N22°26.51	31°53.22	N01°43.97	
13	$56^{\circ}26.71$	346°46.72	8.47	39°12.94	22.70	305°31.22	26.46	46°55.43	44.07	
14	$71^{\circ}29.17$	1°45.94	8.99	54°13.63	23.44	320°33.30	26.41	61°57.63	44.18	느
15	$86^{\circ}31.64$	$16^{\circ}45.17$	• • 9.51	69°14.33	• • 24.18	335°35.38	• • 26.36	76°59.84	• • 44.28	N
16	101°34.10	31°44.40	10.03	84°15.02	24.93	350°37.46	26.31	92°2.05	44.38	"
17	116°36.56	46°43.62	10.55	99° 15.71	25.67	5°39.53	26.26	107°4.25	44.49	
18	131°39.03		23°11.07	114° 16.40	N06°26.41	20°41.61	N22°26.21	122°6.46	N01°44.59	
19	146°41.49	76° 42.07	11.59	129° 17.10	27.15	35°43.68	26.16	137°8.67	44.70	
20	161°43.96	91°41.30	12.10	144°17.79	27.89	50°45.76	26.11	152° 10.87	44.80	<u> </u>
21	176° 46.42		· 12.62	159° 18.48	28.63	65°47.84	. 26.06	167°13.08	• • 44.90	
22	170°40.42 191°48.89	121°39.74	13.13	174° 19.17	29.38	80°49.91	26.01	182°15.29	45.01	
23	206° 51.35	136°38.97	13.15	189° 19.86	30.12	95°51.99	25.96	197°17.49	45.01	
Mer.	pass. 09:15	$\nu$ -0.8' $d$ 0.5'	m-3.92	$ u$ 0.7 $^{\prime}$ d0	.7′ m1.23	$\nu 2.1' \ d$ -0	.0′ m-2.00	$\nu$ 2.2′ d0	.1' m $0.93$	

	Stars	
	SHA	Dec
Alpheratz	357°33.95	29°13.99
Ankaa Schedar	353°6.44 349°30.33	-42°9.67 56°40.74
Diphda	348°46.51	-17°50.53
Achernar	$335^{\circ}19.94$	-57°6.10
Hamal Polaris	327°50.34 313°58.91	23°35.13 89°22.51
Acamar	315° 11.38	-40°11.98
Menkar	314°5.36	4°11.51
Mirfak Aldebaran	308°27.23 290°38.70	49°57.26 16°33.69
Rigel	281°3.11	-8°10.37
Capella	280°20.69	46°1.52
Bellatrix Elnath	278°21.99 278°0.81	6°22.35 28°37.78
Alnilam	275°36.89	-1°11.19
Betelgeuse	270°51.16	7°24.66
Canopus Sirius	263°52.25 258°25.49	-52°42.79 -16°45.29
Adhara	255°5.21	-29°0.67
Procyon	244° 49.83 243° 16.12	5°9.37
Pollux Avior	243°16.12 234°14.41	27°57.79 -59°35.93
Suhail	222°45.51	-43°32.62
Miaplacidus	221°38.01	-69°49.83
Alphard Regulus	217°46.67 207°33.21	-8°46.53 11°50.25
Dubhe	193°39.33	61°36.70
Denebola	182°23.63	14°25.42
Gienah Acrux	175° 42.23 172° 58.35	-17°41.48 -63°14.95
Gacrux	171°49.99	-57°15.89
Alioth	166°11.52	55°49.04
Spica Alkaid	158° 20.87 152° 50.68	-11°18.09 49°10.86
Hadar	148° 33.86	-60°30.13
Menkent	147°55.97	-36°30.12
Arcturus Rigil Kent.	145°46.60 139°38.17	19°2.59 -60°56.74
Kochab	137° 18.62	74° 2.72
Zuben'ubi	136°54.50	-16°9.20
Alphecca Antares	126°2.48 112°14.20	26°37.40 -26°29.46
Atria	107°7.00	-69°4.35
Sabik	102°1.28	-15°45.51
Shaula Rasalhague	96°8.61 95°57.31	-37°7.32 12°32.28
Eltanin	90°41.32	51°28.82
Kaus Aust.	83°30.86	-34°22.25
Vega Nunki	80°32.27 75°46.26	38°48.20 -26°15.79
Altair	61°58.83	8°56.12
Peacock	53°3.98	-56°38.77
Deneb Enif	49°25.06 33°37.83	45°22.15 9°59.61
Al Na'ir	27°31.73	-46°49.82
Fomalhaut	15° 13.53	-29°28.88
Scheat Markab	13°44.37 13°29.02	28°13.35 15°20.68
May 01 Fri	SHA	Mer.pass
Venus	293°36.87	13:50
Mars Jupiter	344°34.28 249°27.71	10:25 16:44
Saturn	350°44.54	10:44
May 02 Sat	SHA	Mer.pass
Venus	292°19.57	13:52
Mars Jupiter	343°51.78 249°18.68	10:24 16:41
Saturn	350°38.29	09:56
May 03 Sun	SHA	Mer.pass
Venus	291°2.07	13:53
Mars Jupiter	343°9.27 249°9.53	10:23 16:37
Saturn	350°32.07	09:53

Horizontal parallax

Venus: Mars:

h	Su	n	Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°42.93	$N15^{\circ}0.94$	10°5.42	14.3'	<b>S</b> 16°15.36	12.0'	54.7'
1	195°43.01	1.70	24°38.69	14.2'	16°27.39	12.0'	54.7'
2	210°43.08 225°43.16	2.45 · · 3.21	39°11.91 53°45.09	14.2' 14.1'	16°39.34 16°51.21	11.9' 11.8'	54.7' 54.7'
4	240°43.24	3.97	68°18.22	14.1'	17°3.01	11.7'	54.7'
5	255°43.31	4.72	82°51.30	14.0'	$17^{\circ}14.73$	11.6'	54.6'
6	270°43.39	N15°5.48	97°24.34	14.0'	\$17°26.38	11.6'	54.6'
7 8	285°43.46 300°43.54	6.23 6.99	111°57.33 126°30.26	13.9' 13.9'	17°37.95 17°49.44	11.5' 11.4'	54.6' 54.6'
9	315°43.62	• • 7.74	141°3.15	13.8'	18°0.85	11.3'	54.6'
10	330°43.69	8.50	155°35.99	13.8'	$18^{\circ}12.18$	11.2'	54.6'
11	345°43.77	9.25	170°8.78 184°41.52	13.7'	18°23.42	11.2'	54.6'
12 13	0°43.84 15°43.92	N15°10.00 10.76	184°41.52 199°14.20	13.7' 13.6'	\$18°34.59 18°45.67	11.1' 11.0'	54.5' 54.5'
14	30°43.99	11.51	213°46.84	13.6'	18°56.67	10.9'	54.5
15	45°44.06	•• 12.26	228°19.42	13.5'	19°7.58	10.8'	54.5'
16	60°44.14 75°44.21	13.01 13.76	242°51.96 257°24.44	13.5'	19°18.40 19°29.14	10.7'	54.5'
17 18	90°44.21	N15°14.52	257 24.44 271°56.86	13.4' 13.4'	19 29.14 \$19°39.79	10.7' 10.6'	54.5' 54.5'
19	105°44.36	15.27	286°29.24	13.3'	19°50.36	10.5'	54.5'
20	120°44.43	16.02	301°1.56	13.3'	20°0.83	10.4'	54.4'
21	135°44.50 150°44.58	16.76	315°33.83 330°6.04	13.2' 13.2'	20°11.21 20°21.51	10.3'	54.4'
22 23	165°44.65	17.51 18.26	344°38.20	13.1'	20°21.51 20°31.71	10.2' 10.1'	54.4' 54.4'
	SD = 15.9'	d = 0.8'			0 = 14.9'		
	JD = 15.9°	u = 0.0		)L	7 — 14.9		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°44.72	N15°19.01	359°10.31	13.1'	\$20°41.82	10.0'	54.4'
1 2	195°44.79 210°44.86	19.76 20.50	13°42.36 28°14.35	13.0' 12.9'	20°51.83 21°1.75	9.9' 9.8'	54.4' 54.4'
3	225°44.93	• • 21.25	42°46.30	12.9'	21°11.58	9.7'	54.4'
4	240°45.00	22.00	57°18.19	12.8'	$21^{\circ}21.31$	9.6'	54.4'
5	255°45.08	22.74	71°50.02	12.8'	21°30.94	9.5'	54.3'
6 7	270°45.15 285°45.22	N15°23.49 24.23	86°21.80 100°53.52	12.7' 12.7'	\$21°40.47 21°49.91	9.4' 9.3'	54.3' 54.3'
8	300°45.29	24.98	115°25.19	12.6'	21°59.25	9.2'	54.3'
9	315°45.36	• • 25.72	129°56.80	12.6'	22°8.48	9.1'	54.3'
10	330°45.43	26.47	144°28.36 158°59.87	12.5'	22°17.62	9.0'	54.3'
11 12	345°45.49 0°45.56	27.21 N15°27.95	158°59.87 173°31.31	12.4' 12.4'	22°26.65 \$22°35.58	8.9' 8.8'	54.3' 54.3'
13	15°45.63	28.69	188°2.71	12.3'	22°44.41	8.7'	54.3'
14	30°45.70	29.44	202°34.05	12.3'	22°53.14	8.6'	54.3'
15 16	45°45.77 60°45.84	· · 30.18 30.92	217°5.33 231°36.56	12.2' 12.2'	23°1.76 23°10.27	8.5' 8.4'	54.2' 54.2'
17	75°45.91	31.66	231 30.30 246°7.74	12.1'	23°18.68	8.3'	54.2'
18	90°45.97	N15°32.40	260°38.86	12.1'	S23°26.98	8.2'	54.2'
19	105°46.04	33.14	275°9.93	12.0'	23°35.17	8.1'	54.2'
20 21	120°46.11 135°46.17	33.88 •• 34.62	289°40.95 304°11.91	12.0' 11.9'	23°43.26 23°51.23	8.0' 7.9'	54.2' 54.2'
22	150°46.24	35.35	318°42.82	11.9'	23°59.09	7.8'	54.2'
23	165°46.31	36.09	333°13.67	11.8'	24°6.85	7.6'	54.2'
	SD = 15.9'	d = 0.7'		SE	0 = 14.8'		
Sun	<b>GHA</b> 180°46.37	<b>Dec</b> N15°36.83	<b>GHA</b> 347°44.47	u 11.8'	<b>Dec</b> \$24°14.49	d 7.5'	<b>HP</b> 54.2'
0 1	180°46.37 195°46.44	N15°36.83 37.57	347°44.47 2°15.23	11.8	24°14.49 24°22.02	7.5° 7.4'	54.2' 54.2'
2	210°46.51	38.30	16°45.92	11.6'	24°29.44	7.3'	54.1'
3	225°46.57	• • 39.04	31°16.57	11.6'	24°36.74	7.2'	54.1'
4 5	240°46.64 255°46.70	39.77 40.51	45°47.17 60°17.71	11.5' 11.5'	24°43.93 24°51.00	7.1' 7.0'	54.1' 54.1'
6	270°46.77	N15°41.24	74°48.21	11.4'	\$24°57.96	6.8'	54.1'
7	285°46.83	41.98	89°18.65	11.4'	25°4.80	6.7'	54.1'
8	300°46.90	42.71	103°49.05	11.3'	25°11.52	6.6'	54.1'
9 10	315°46.96 330°47.02	· · 43.45 44.18	118°19.40 132°49.70	11.3' 11.3'	25°18.13 25°24.62	6.5' 6.4'	54.1' 54.1'
11	345°47.09	44.10	147°19.95	11.2'	25°30.98	6.2	54.1'
12	0°47.15	N15°45.64	161°50.15	11.2'	\$25°37.23	6.1'	54.1'
13	15°47.21 30°47.28	46.37	176°20.31 190°50.42	11.1'	25°43.36 25°49.37	6.0'	54.1'
14 15	30°47.28 45°47.34	47.11 •• 47.84	190°50.42 205°20.49	11.1' 11.0'	25°49.37 25°55.25	5.9' 5.8'	54.1' 54.1'
16	60°47.40	48.57	219°50.51	11.0'	$26^{\circ}1.02$	5.6'	54.1'
17	75°47.46	49.30	234°20.49	10.9'	26°6.66	5.5'	54.0'
18 19	90°47.52 105°47.59	N15°50.03 50.75	248°50.42 263°20.32	10.9' 10.9'	\$26°12.17 26°17.57	5.4' 5.3'	54.0' 54.0'
20	105°47.59 120°47.65	50.75 51.48	263°20.32 277°50.17	10.9	26° 17.57 26° 22.84	5.3	54.0'
21	135°47.71	• • 52.21	292°19.98	10.8'	$26^{\circ}27.98$	5.0'	54.0'
22	150°47.77	52.94	306°49.74	10.7'	26°33.00	4.9'	54.0'
23	165°47.83	53.67	321°19.47	10.7'	26°37.89	4.8'	54.0'
	SD = 15.9'	d = 0.7'		SE	0 = 14.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Julilise	Juliset	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:07	06:57	07:43	16:10	16:56	17:45
Lat		Moonris	e		Moonset	t .

Lat.	Moonrise			Moonset	t	
Lat.	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	80:80
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
<b>S</b> 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
<b>S</b> 60°	15:20	15:23	15:31	07:48	09:20	10:52

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	221°53.81	151°38.19	N23°14.16	204°20.56	N06°30.86	110°54.06	N22°25.91	212°19.70	N01°45.21
1	236° 56.28	166°37.41	14.67	219°21.25	31.60	125°56.14	25.86	227°21.91	45.32
2	251°58.74	181°36.64	15.18	234°21.94	32.34	140°58.21	25.81	242°24.12	45.42
3	267°1.21	196°35.86	• • 15.69	249°22.63	• • 33.08	156° 0.29	• • 25.76	257°26.32	• • 45.52
4	282°3.67	211°35.08	16.19	264°23.32	33.82	171°2.36	25.71	272°28.53	45.62
5	202 5.07 297°6.13	226°34.30	16.70	279°24.02	34.56	186° 4.43	25.66	287°30.74	45.73
	312°8.60	241°33.52	N23°17.21	279 24.02 294°24.71	N06°35.30	201° 6.51	N22°25.61	302°32.95	
6									N01°45.83
7	327°11.06	256°32.74	17.71	309°25.40	36.04	216°8.58	25.56	317°35.16	45.93
8	342° 13.53	271°31.96	18.21	324°26.09	36.78	231°10.66	25.51	332°37.36	46.04
9	357° 15.99	286°31.18	• • 18.71	339°26.78	• • 37.52	246°12.73	• • 25.46	347°39.57	• • 46.14
10	12° 18.46	301°30.40	19.21	354°27.48	38.26	261°14.80	25.41	2°41.78	46.24
11	27°20.92	316°29.62	19.71	9°28.17	39.00	276°16.87	25.36	17°43.99	46.35
12	42°23.38	331°28.84	N23°20.21	24°28.86	N06°39.74	291°18.95	N22°25.31	32°46.19	N01°46.45
13	57° 25.85	346°28.06	20.71	39° 29.55	40.48	306°21.02	25.26	47°48.40	46.55
14	72°28.31	1°27.28	21.21	54°30.24	41.22	321°23.09	25.21	62°50.61	46.65
15	87°30.78	16°26.50	• • 21.70	69°30.93	• • 41.96	336°25.16	25.16	77°52.82	• • 46.76
	102° 33.24	31°25.72	22.19	84°31.63	42.70	351°27.24	25.10	92°55.03	46.86
16									
17	117°35.70	46°24.94	22.69	99°32.32	43.44	6°29.31	25.05	107°57.24	46.96
18	132°38.17	61°24.15	N23°23.18	114°33.01	N06°44.18	21°31.38	N22°25.00	122°59.44	N01°47.07
19	$147^{\circ}40.63$	76°23.37	23.67	129°33.70	44.92	36°33.45	24.95	$138^{\circ}1.65$	47.17
20	$162^{\circ}43.10$	91°22.59	24.16	$144^{\circ}34.39$	45.66	51°35.52	24.90	153°3.86	47.27
21	177° 45.56	106°21.80	• • 24.65	159°35.08	• • 46.39	66°37.59	• • 24.85	168°6.07	• • 47.37
22	192°48.03	121°21.02	25.13	174°35.78	47.13	81°39.66	24.80	183°8.28	47.48
23	207° 50.49	136° 20.24	25.62	189°36.47	47.87	96°41.73	24.75	198°10.49	47.58
/ler.p	pass. 09:11	ν-0.8' αυ	.5′ m-3.92	νυ. <i>Γ</i> αυ	.7′ m1.23	$\nu$ 2.1 a-0	.1′ m-2.00	ν2.2 d0	.1′ m0.93
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	222°52.95	151° 19.45	N23°26.11	204°37.16	N06°48.61	111°43.80	N22°24.70	213°12.70	N01°47.68
1	237°55.42	166° 18.67	26.59	219°37.85	49.35	126°45.87	24.64	228°14.91	47.78
2	252° 57.88	181°17.88	27.07	234°38.54	50.08	141°47.94	24.59	243°17.11	47.89
3	268° 0.35	196° 17.10	• • 27.55	249°39.23	50.82	156°50.01	• • 24.54	258°19.32	• 47.09
4	283°2.81	211°16.31	28.03	264°39.92	51.56	171°52.08	24.49	273°21.53	48.09
5	298°5.27	226°15.53	28.51	279°40.62	52.30	186°54.15	24.44	288°23.74	48.19
6	313°7.74	241°14.74	N23°28.99	294°41.31	N06°53.03	201°56.22	N22°24.39	303°25.95	N01°48.29
7	328° 10.20	256° 13.95	29.47	309°42.00	53.77	216°58.29	24.34	$318^{\circ}28.16$	48.40
8	343°12.67	271°13.17	29.94	324°42.69	54.51	232°0.36	24.28	333°30.37	48.50
9	358° 15.13	286° 12.38	• • 30.42	339°43.38	• • 55.24	247° 2.42	• • 24.23	348°32.58	• • 48.60
10	13° 17.60	301°11.59	30.89	354°44.07	55.98	262°4.49	24.18	3°34.79	48.70
11	28° 20.06	316° 10.81	31.36	9°44.76	56.72	277° 6.56	24.13	18°37.00	48.81
			N23°31.83		N06°57.45	292°8.63	N22°24.08		N01°48.91
12	43°22.52	331°10.02		24°45.45				33°39.21	
13	58°24.99	346°9.23	32.30	39°46.15	58.19	307°10.69	24.03	48°41.42	49.01
14	73° 27.45	1°8.44	32.77	54°46.84	58.93	322°12.76	23.97	63°43.63	49.11
15	88° 29.92	16°7.65	• • 33.24	69°47.53	06°59.66	337°14.83	• • 23.92	78°45.84	• • 49.21
16	103°32.38	31°6.86	33.71	84°48.22	$07^{\circ}0.40$	352°16.90	23.87	93°48.05	49.32
17	118°34.85	46°6.07	34.17	99°48.91	1.13	7°18.96	23.82	108°50.26	49.42
18	133° 37.31	61°5.28	N23°34.64	114°49.60	$N07^{\circ}1.87$	22°21.03	N22°23.77	123°52.47	N01°49.52
19	148°39.77	76°4.49	35.10	129°50.29	2.60	37°23.10	23.71	138°54.68	49.62
20	163° 42.24	91°3.70	35.56	144°50.98	3.34	52°25.16	23.66	153°56.89	49.72
21	178° 44.70	106°2.91	36.02	159°51.67	• • 4.07	67°27.23	23.61	168°59.10	• • 49.82
22	193°47.17	121°2.12	36.48	174°52.36	4.81	82°29.29	23.56	184°1.31	49.93
23	208°49.63	136°1.33	36.94	189°53.06	5.54	97°31.36	23.51	199°3.52	50.03
1er.p	ass. 09:07	ν-0.8′ d0	.5′ m-3.92	$\nu$ 0.7′ d0	.7′ m1.23	$\nu 2.1' \ d-0$	.1′ m-1.99	$\nu 2.2' d0$	.1′ m0.92
	G114	G114	_	6114	_	G114		6114	
Ved	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	223°52.09	151°0.54	N23°37.40	204°53.75	N07° 6.28	112°33.42		214°5.73	N01°50.13
1	238°54.56	165°59.75	37.86	219°54.44	7.01	127°35.49	23.40	229°7.94	50.23
2	253°57.02	180°58.96	38.31	234°55.13	7.75	142°37.55	23.35	244°10.15	50.33
3	$268^{\circ}59.49$	195°58.16	• • 38.77	249°55.82	• • 8.48	157°39.62	• • 23.30	$259^{\circ}12.36$	• • 50.43
4	$284^{\circ}1.95$	210°57.37	39.22	$264^{\circ}56.51$	9.22	172°41.68	23.24	$274^{\circ}14.57$	50.54
5	299°4.42	225°56.58	39.67	279°57.20	9.95	187°43.75	23.19	289°16.78	50.64
6	314°6.88	240°55.79	N23°40.12	294°57.89		202°45.81	N22°23.14	304°18.99	N01°50.74
7	329°9.34	255°54.99	40.57	309°58.58	11.42	217°47.87	23.09	319°21.20	50.84
8	344°11.81	270°54.20	41.02	324°59.27	12.15	232°49.94	23.03	334°23.41	50.94
9	359° 14.27	285°53.41	• • 41.47	339° 59.27	• • 12.13	247°52.00	• • 22.98	349°25.63	• • 51.04
9 10									
LU	14° 16.74	300°52.61	41.91	355°0.65	13.62	262°54.06	22.93	4°27.84	51.14
	29° 19.20	315°51.82	42.36	10°1.34	14.35	277°56.13	22.88	19°30.05	51.24
11					N07°15.08	292°58.19	N22°22.82	34°32.26	N01°51.35
11 12	44°21.66	330°51.02		40°2.72	15.81	308° 0.25	22.77	49°34.47	51.45
11 12 13	44°21.66 59°24.13	$345^{\circ}50.23$	43.24						
11 12 13	44°21.66		43.24 43.68	55°3.42	16.55	323°2.31	22.72	64°36.68	51.55
11 12 13 14 15	44°21.66 59°24.13	$345^{\circ}50.23$			16.55 •• 17.28	323°2.31 338°4.38	· · 22.66	64°36.68 79°38.89	51.55 •• 51.65
11 12 13 14 15	44°21.66 59°24.13 74°26.59 89°29.06	345°50.23 0°49.43 15°48.64	43.68 •• 44.12	55°3.42 70°4.11	• • 17.28	338° 4.38	• • 22.66	79°38.89	• • 51.65
11 12 13 14 15	44°21.66 59°24.13 74°26.59 89°29.06 104°31.52	345°50.23 0°49.43 15°48.64 30°47.84	43.68 •• 44.12 44.56	55°3.42 70°4.11 85°4.80	· · 17.28 18.01	338° 4.38 353° 6.44	· · 22.66 22.61	79°38.89 94°41.10	· · 51.65 51.75
11 12 13 14 15 16	44°21.66 59°24.13 74°26.59 89°29.06 104°31.52 119°33.99	345°50.23 0°49.43 15°48.64 30°47.84 45°47.05	43.68 •• 44.12 44.56 45.00	55°3.42 70°4.11 85°4.80 100°5.49	17.28 18.01 18.74	338° 4.38 353° 6.44 8° 8.50	· · 22.66 22.61 22.56	79°38.89 94°41.10 109°43.32	•• 51.65 51.75 51.85
11 12 13 14 15 16 17	44°21.66 59°24.13 74°26.59 89°29.06 104°31.52 119°33.99 134°36.45	345° 50.23 0° 49.43 15° 48.64 30° 47.84 45° 47.05 60° 46.25	43.68 • • 44.12 44.56 45.00 N23°45.44	55°3.42 70°4.11 85°4.80 100°5.49 115°6.18	17.28 18.01 18.74 N07°19.48	338° 4.38 353° 6.44 8° 8.50 23° 10.56	· · 22.66 22.61 22.56 N22°22.51	79°38.89 94°41.10 109°43.32 124°45.53	•• 51.65 51.75 51.85 N01° 51.95
11 12 13 14 15 16 17 18	44°21.66 59°24.13 74°26.59 89°29.06 104°31.52 119°33.99 134°36.45 149°38.91	345° 50.23 0° 49.43 15° 48.64 30° 47.84 45° 47.05 60° 46.25 75° 45.45	43.68 • 44.12 44.56 45.00 N23° 45.44 45.87	55°3.42 70°4.11 85°4.80 100°5.49 115°6.18 130°6.87	17.28 18.01 18.74 N07°19.48 20.21	338° 4.38 353° 6.44 8° 8.50 23° 10.56 38° 12.62	· · 22.66 22.61 22.56 N22°22.51 22.45	79°38.89 94°41.10 109°43.32 124°45.53 139°47.74	51.65 51.75 51.85 N01°51.95 52.05
11 12 13 14 15 16 17 18 19 20	44°21.66 59°24.13 74°26.59 89°29.06 104°31.52 119°33.99 134°36.45 149°38.91 164°41.38	345° 50.23 0° 49.43 15° 48.64 30° 47.84 45° 47.05 60° 46.25 75° 45.45 90° 44.66	43.68 • 44.12 44.56 45.00 N23° 45.44 45.87 46.31	55°3.42 70°4.11 85°4.80 100°5.49 115°6.18 130°6.87 145°7.56	17.28 18.01 18.74 N07°19.48 20.21 20.94	338° 4.38 353° 6.44 8° 8.50 23° 10.56 38° 12.62 53° 14.68	· · 22.66 22.61 22.56 N22°22.51 22.45 22.40	79°38.89 94°41.10 109°43.32 124°45.53 139°47.74 154°49.95	51.65 51.75 51.85 N01°51.95 52.05 52.15
11 12 13 14 15 16 17 18 19 20	44°21.66 59°24.13 74°26.59 89°29.06 104°31.52 119°33.99 134°36.45 149°38.91 164°41.38 179°43.84	345° 50.23 0° 49.43 15° 48.64 30° 47.84 45° 47.05 60° 46.25 75° 45.45 90° 44.66 105° 43.86	43.68 · 44.12 44.56 45.00 N23°45.44 45.87 46.31 · 46.74	55° 3.42 70° 4.11 85° 4.80 100° 5.49 115° 6.18 130° 6.87 145° 7.56 160° 8.25	17.28 18.01 18.74 N07°19.48 20.21 20.94 21.67	338° 4.38 353° 6.44 8° 8.50 23° 10.56 38° 12.62 53° 14.68 68° 16.74	· · · 22.66 22.61 22.56 N22°22.51 22.45 22.40 · · · 22.35	79°38.89 94°41.10 109°43.32 124°45.53 139°47.74 154°49.95 169°52.16	** 51.65 51.75 51.85 N01°51.95 52.05 52.15 ** 52.26
11 12 13 14 15 16 17 18 19 20 21	44°21.66 59°24.13 74°26.59 89°29.06 104°31.52 119°33.99 134°36.45 149°38.91 164°41.38 179°43.84 194°46.31	345° 50.23 0° 49.43 15° 48.64 30° 47.84 45° 47.05 60° 46.25 75° 45.45 90° 44.66 105° 43.86 120° 43.06	43.68 • 44.12 44.56 45.00 N23°45.44 45.87 46.31 • 46.74 47.17	55° 3.42 70° 4.11 85° 4.80 100° 5.49 115° 6.18 130° 6.87 145° 7.56 160° 8.25 175° 8.94	17.28 18.01 18.74 N07°19.48 20.21 20.94 21.67 22.40	338° 4.38 353° 6.44 8° 8.50 23° 10.56 38° 12.62 53° 14.68 68° 16.74 83° 18.81	· · · 22.66 22.61 22.56 N22°22.51 22.45 22.40 · · 22.35 22.29	79°38.89 94°41.10 109°43.32 124°45.53 139°47.74 154°49.95 169°52.16 184°54.38	** 51.65 51.75 51.85 N01° 51.95 52.05 52.15 ** 52.26 52.36
11 12 13 14 15 16 17 18 19 20	44°21.66 59°24.13 74°26.59 89°29.06 104°31.52 119°33.99 134°36.45 149°38.91 164°41.38 179°43.84	345° 50.23 0° 49.43 15° 48.64 30° 47.84 45° 47.05 60° 46.25 75° 45.45 90° 44.66 105° 43.86	43.68 · 44.12 44.56 45.00 N23°45.44 45.87 46.31 · 46.74	55° 3.42 70° 4.11 85° 4.80 100° 5.49 115° 6.18 130° 6.87 145° 7.56 160° 8.25	17.28 18.01 18.74 N07°19.48 20.21 20.94 21.67	338° 4.38 353° 6.44 8° 8.50 23° 10.56 38° 12.62 53° 14.68 68° 16.74	· · · 22.66 22.61 22.56 N22°22.51 22.45 22.40 · · · 22.35	79°38.89 94°41.10 109°43.32 124°45.53 139°47.74 154°49.95 169°52.16	** 51.65 51.75 51.85 N01°51.95 52.05 52.15 ** 52.26

	SHA	Dec
Alpheratz	357°33.93	29° 13.99
Ankaa Schedar	353°6.42 349°30.30	-42°9.66 56°40.73
Diphda	349 30.30 348°46.50	-17°50.52
Achernar	335°19.93	-57°6.08
Hamal	327°50.33	23°35.13
Polaris	313°58.62 315°11.38	89°22.49 -40°11.96
Acamar Menkar	314°5.35	4° 11.52
Mirfak	308°27.22	49°57.25
Aldebaran	290°38.70	16°33.69
Rigel Capella	281°3.11 280°20.70	-8°10.37 46°1.51
Bellatrix	278°22.00	6°22.35
Elnath	278°0.81	28°37.77
Alnilam Betelgeuse	275°36.90 270°51.17	-1°11.19 7°24.66
Canopus	263°52.27	-52° 42.78
Sirius	$258^{\circ}25.50$	$-16^{\circ}45.29$
Adhara	255°5.22 244°49.84	-29°0.67 5°9.37
Procyon Pollux	244°49.84 243°16.13	5°9.37 27°57.79
Avior	234°14.44	-59° 35.93
Suhail	222°45.53	-43°32.62
Miaplacidus Alphard	221°38.05 217°46.67	-69°49.83 -8°46.53
Regulus	217 46.67 207°33.21	-8 40.53 11°50.25
Dubhe	193°39.36	61°36.70
Denebola	182°23.64	14° 25.42
Gienah Acrux	175°42.23 172°58.36	-17°41.49 -63°14.97
Gacrux	171°49.99	-57° 15.90
Alioth	166°11.53	55°49.06
Spica Alkaid	158°20.87 152°50.68	-11°18.09 49°10.87
Hadar	148°33.85	-60°30.14
Menkent	$147^{\circ}55.96$	-36°30.13
Arcturus	145°46.59	19°2.60
Rigil Kent. Kochab	139°38.16 137°18.63	-60°56.76 74°2.74
Zuben'ubi	136°54.49	-16°9.20
Alphecca	126°2.47	26°37.41
Antares Atria	112°14.18 107°6.95	-26°29.46 -69°4.36
Sabik	107 0.93 102°1.26	-15° 45.50
Shaula	96°8.58	-37°7.32
Rasalhague	95°57.29 90°41.30	12°32.29 51°28.83
Eltanin Kaus Aust.	90 41.30 83°30.84	-34°22.24
Vega	80°32.24	38°48.21
Nunki	75°46.23	-26°15.78 8°56.13
Altair Peacock	61°58.80 53°3.94	-56°38.76
Deneb	49°25.03	45°22.15
Enif	33°37.80	9°59.62
Al Na'ir Fomalhaut	27°31.70 15°13.51	-46°49.81 -29°28.87
Scheat	13°44.35	28° 13.35
Markab	13°29.00	15°20.68
May 04 Mon	SHA	Mer.pass
Venus	289°44.38	13:54
Mars Jupiter	342°26.74 249°0.25	10:22 16:34
Saturn	350°25.89	09:49
May 05 Tue	SHA	Mer.pass
Venus	288°26.50	13:55
Mars Jupiter	341°44.20 248°50.85	10:21 16:31
Saturn	350°19.74	09:46
May 06 Wed	SHA	Mer.pass
Venus	287°8.45	13:57
Mars	341°1.65	10:20
Jupiter Saturn	248°41.33 350°13.63	16:28 09:42
	ital parallax	
11011201	Venus:	0.1
	Mars:	0.1

h	Su	n	Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°47.89	N15°54.39	335°49.16	10.7'	S26°42.66	4.6'	54.0'
1	195° 47.95	55.12	350°18.82	10.6'	26°47.30	4.5'	54.0'
2	210°48.01 225°48.07	55.84 •• 56.57	4°48.43 19°18.01	10.6' 10.5'	26°51.81 26°56.19	4.4' 4.3'	54.0' 54.0'
4	240° 48.13	57.29	33°47.56	10.5'	27°0.45	4.1'	54.0'
5	255°48.19	58.02	48°17.07	10.5'	27°4.57	4.0'	54.0'
6	270° 48.25	N15°58.74	62°46.55	10.4	\$27°8.57	3.9'	54.0'
7 8	285°48.31 300°48.37	15°59.46 16°0.19	77°15.99 91°45.40	10.4' 10.4'	27°12.44 27°16.17	3.7' 3.6'	54.0' 54.0'
9	315°48.42	. 0.91	106°14.79	10.4	27°19.78	3.5'	54.0'
10	330°48.48	1.63	120°44.14	10.3'	$27^{\circ}23.26$	3.3'	54.0'
11	345° 48.54	2.35	135°13.46 149°42.76	10.3'	27°26.60 527°29.81	3.2'	54.0'
12 13	0°48.60 15°48.65	N16° 3.07 3.80	149°42.76 164°12.03	10.3' 10.2'	27°32.89	3.1' 2.9'	54.0' 54.0'
14	30°48.71	4.52	178°41.28	10.2'	27°35.84	2.8'	54.0'
15	45°48.77	• • 5.24	193°10.50	10.2'	27°38.66	2.7'	54.0'
16	60°48.82	5.95	207°39.69 222°8.87	10.2'	27°41.34 27°43.89	2.5'	54.0'
17 18	75°48.88 90°48.94	6.67 N16°7.39	222°8.87 236°38.02	10.2' 10.1'	\$27°46.30	2.4' 2.3'	54.0' 54.0'
19	105° 48.99	8.11	251°7.15	10.1'	27°48.59	2.1'	54.0'
20	120°49.05	8.83	265°36.26	10.1'	27°50.74	2.0'	54.0'
21	135°49.10	• • 9.54	280°5.36	10.1'	27°52.75	1.9'	54.0'
22 23	150° 49.16 165° 49.21	10.26 10.98	294°34.44 309°3.50	10.1' 10.0'	27°54.63 27°56.37	1.7' 1.6'	54.0' 54.0'
23						1.0	3 7.0
	SD = 15.9'	d = 0.7'		SL	0 = 14.7'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°49.27	N16°11.69	323°32.55	10.0'	\$27°57.98	1.5'	54.0'
1 2	195°49.32 210°49.38	12.41 13.12	338° 1.58 352° 30.60	10.0' 10.0'	27°59.46 28°0.80	1.3' 1.2'	54.0' 54.0'
3	210 49.38 225°49.43	13.12	6°59.62	10.0'	28 0.80 28°2.00	1.1'	54.0'
4	240°49.48	14.55	21°28.62	10.0'	28°3.07	0.9'	54.0'
5	255° 49.54	15.26	35°57.61	10.0'	28°4.00	0.8'	54.0'
6	270°49.59	N16°15.97	50°26.59 64°55.57	10.0'	\$28°4.80 28°5.46	0.7'	54.0'
7 8	285°49.64 300°49.70	16.69 17.40	79°24.54	10.0' 10.0'	28° 5.46 28° 5.99	0.5' 0.4'	54.0' 54.0'
9	315°49.75	. 18.11	93°53.51	10.0'	28°6.38	0.3	54.0'
10	330°49.80	18.82	108°22.47	10.0'	$28^{\circ}6.63$	0.1'	54.0'
11	345°49.85	19.53	122°51.43	10.0'	28°6.75	-0.0'	54.0'
12 13	0°49.90 15°49.95	N16°20.24 20.95	137°20.39 151°49.35	10.0' 10.0'	\$28°6.73 28°6.58	-0.2' -0.3'	54.0' 54.0'
14	30° 50.01	21.66	166°18.31	10.0'	28°6.29	-0.4	54.0'
15	45°50.06	• • 22.37	180°47.28	10.0'	28°5.86	-0.6'	54.0'
16	60°50.11	23.08	195°16.25	10.0'	28°5.30	-0.7'	54.0'
17 18	75°50.16 90°50.21	23.78 N16°24.49	209°45.22 224°14.20	10.0' 10.0'	28°4.60 \$28°3.77	-0.8' -1.0'	54.0' 54.0'
19	105° 50.26	25.20	238°43.19	10.0'	28°2.80	-1.1'	54.0'
20	120°50.31	25.90	253°12.18	10.0'	28°1.69	-1.2'	54.0'
21	135°50.36	• • 26.61	267°41.18	10.0'	28°0.45	-1.4'	54.0'
22 23	150° 50.41 165° 50.45	27.31 28.02	282°10.20 296°39.22	10.0' 10.0'	27°59.08 27°57.57	-1.5' -1.6'	54.0' 54.0'
23						-1.0	J4.0
	SD = 15.9'	d = 0.7'		SL	0 = 14.7'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180° 50.50	$N16^{\circ}28.72$	311°8.26	10.1'	\$27°55.92	-1.8'	54.0'
1 2	195° 50.55 210° 50.60	29.43 30.13	325°37.31 340°6.38	10.1' 10.1'	27°54.14 27°52.22	-1.9' -2.1'	54.0' 54.0'
3	210°50.60 225°50.65	30.13	340° 6.38 354° 35.46	10.1	27°52.22 27°50.17	-2.1' -2.2'	54.0° 54.1'
4	240°50.70	31.54	9°4.56	10.1'	27°47.99	-2.3	54.1'
5	255°50.74	32.24	23°33.68	10.1'	27°45.67	-2.5'	54.1'
6 7	270°50.79 285°50.84	N16°32.94 33.64	38°2.81 52°31.97	10.2' 10.2'	\$27°43.21 27°40.63	-2.6' -2.7'	54.1' 54.1'
8	300° 50.88	34.34	67° 1.14	10.2'	27° 40.03 27° 37.91	-2.1' -2.9'	54.1'
9	315°50.93	• • 35.04	81°30.34	10.2'	27°35.05	-3.0'	54.1'
10	330°50.98	35.74	95°59.56	10.2'	27°32.07	-3.1'	54.1'
11 12	345°51.02 0°51.07	36.44 N16°37.14	110°28.81 124°58.08	10.3' 10.3'	27°28.95 \$27°25.70	-3.3' -3.4'	54.1' 54.1'
13	0 51.07 15°51.11	37.14	124 58.08 139°27.37	10.3'	27°22.31	-3.4 -3.5'	54.1'
14	30°51.16	38.53	153°56.69	10.3'	$27^{\circ}18.80$	-3.6'	54.1'
15	45°51.20	• • 39.23	168°26.04	10.4'	27°15.15	-3.8'	54.1'
16 17	60°51.25 75°51.29	39.93 40.62	182°55.42 197°24.82	10.4' 10.4'	27°11.38 27°7.47	-3.9' -4.0'	54.2' 54.2'
17	75°51.29 90°51.34	40.62 N16°41.32	211°54.26	10.4	\$27° 7.47 \$27° 3.43	-4.0' -4.2'	54.2'
19	105°51.38	42.01	226°23.73	10.5'	26°59.26	-4.3'	54.2'
20	120°51.42	42.71	240°53.23	10.5'	26°54.96	-4.4'	54.2'
21 22	135°51.47 150°51.51	· · 43.40 44.10	255°22.76 269°52.32	10.6' 10.6'	26°50.54 26°45.98	-4.6' -4.7'	54.2' 54.2'
22	150°51.51 165°51.55	44.10 44.79	269°52.32 284°21.92	10.6'	26°45.98 26°41.30	-4.7' -4.8'	54.2'
	SD = 15.9'	d = 0.7'			0 = 14.7'		
	<u> </u>	<u>u — 0.1</u>	-	JL	- 14.1		

N 72° //	ut. Ci		rise Suns	Civil	Naut.
	7// //.				ivaut.
		// 01:	14 22:5	50 ////	////
N 70° //	7// //	// 02:	07 21:5	52 ////	////
	7/ //	// 02:	39 21:1	18 ////	////
	// 01:	29 03:	02 20:5	54 22:31	////
	// 02:		20 20:3		
	// 02:				
60° 01	:19 02:	52 03:	47 20:0	08 21:04	22:41
N 58° 01	:53 03:	08 03:	58 19:5	57 20:47	22:04
56° 02	:17 03:	22 04:	07 19:4	47 20:34	21:39
54° 02	:36 03:	33 04:	16 19:3	39 20:22	21:20
	:51 03:	43 04:	23   19:3	31 20:11	21:04
	:04 03:				
45° 03	:30 04:	11 04:	44   19:1	10 19:43	20:25
N 40° 03	:49 04:	26 04:	55 18:5	59 19:28	20:05
35° 04	:05 04:	38 05:	05 18:4	49 19:16	19:49
	:18 04:	48 05:	14 18:4	40 19:06	19:36
	:38 05:	05 05:	29 18:2	25 18:48	19:16
	:54 05:	19 05:	41 18:1		
0° 05	:07 05:	32 05:	53   18:0	00 18:22	18:47
<b>S</b> 10° 05	:18 05:	43 06:	05 17:4	48 18:10	18:35
	:28 05:	54 06:	17 17:3	36 17:59	18:25
	:38 06:		-		
	:43 06:		-		
1	:48 06:				
45° 05	:53 06:	28 06:	59   16:5	53 17:24	17:59
<b>S</b> 50° 05	:59 06:	38 07:	12 16:4	40 17:15	17:53
	:02 06:	42 07:	18 16:3	34 17:11	17:51
	:04 06:				
	:07 06:				
	:10 06:		_		
<b>S</b> 60° 06	:13 07:	04 07:	50 16:0	02 16:49	17:39

Lat.		Moonris	e		Moonset	:
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°						
<b>N</b> 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° 50°	23:16 23:01	23:53	00:07	05:03 05:16	05:45 05:59	06:39 06:54
45°	23:01	23:23		05:10	06:30	00:54
	-					****
<b>N</b> 40° 35°	22:08 21:49	23:00 22:41	23:44 23:26	06:07 06:25	06:53 07:12	07:47 08:06
30°	21:49	22:41	23:20	06:25	07:12	08:00
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
<b>S</b> 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
<b>S</b> 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° 58°	16:47	17:34	18:38	11:20	12:20	13:02
58° <b>S</b> 60°	16:23 15:50	17:08 16:32	18:15 17:44	11:45 12:18	12:46 13:22	13:25 13:56
3 00	10:50	10:32	17:44	12:18	15:22	15:50

		Sun			Moon	
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	17-19
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	95-84%
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	

		, , ,	,			
h	Aries	Venus	Mars	Jupiter	Saturn	
		- V CITAS				
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	
0	224°51.23	150°41.47 N23°48.03	205°10.32 N07°23.86	113°22.93 N22°22.19	214°58.80 N01°52.56	
1	239°53.70	165°40.67 48.46	220°11.01 24.60	128°24.99 22.13	230°1.01 52.66	'
2	254°56.16	180°39.87 48.89	235°11.70 25.33	143°27.05 22.08	245°3.22 52.76	
3	269°58.63	195°39.07 · · 49.32	250°12.39 · · 26.06	158°29.11 · · 22.03	260°5.44 · · 52.86	
4	285°1.09	210°38.27 49.74	265°13.08 26.79	173°31.17 21.97	275°7.65 52.96	
5	300°3.56	225°37.47 50.17	280° 13.77 27.52	188°33.22 21.92	290°9.86 53.06	
6	315°6.02	240°36.67 N23°50.59	295°14.46 N07°28.25	203°35.28 N22°21.87	305°12.07 N01°53.16	
7	330°8.48	255°35.87 51.01	310° 15.15 28.98	218°37.34 21.81	320°14.29 53.26	
8	345° 10.95	270°35.07 51.43	325° 15.84 29.71	233°39.40 21.76	335°16.50 53.36	
9	0°13.41	285°34.27 · · 51.85	340°16.53 · · 30.44	248°41.46 · · 21.70	350°18.71 · · 53.46	
10	15° 15.88	300°33.47 52.27	355°17.22 31.17	263°43.52 21.65	5°20.92 53.56	
11	30° 18.34	315°32.67 52.69	10°17.91 31.90	278°45.58 21.60	20°23.14 53.66	A
12	45° 20.80	330°31.87 N23°53.10	25°18.60 N07°32.63	293°47.63 N22°21.54	35°25.35 N01°53.76	
	45 20.60 60°23.27		40°19.29 33.36			
13						
14	75°25.73	0°30.27 53.93	55°19.98 34.08	323°51.75 21.44	65°29.78 53.96	
15	90°28.20	15°29.47 · · 54.34	70°20.67 · · 34.81	338°53.81 · · 21.38	80°31.99 · · 54.06	
16	105°30.66	30°28.67 54.75	85°21.36 35.54	353°55.86 21.33	95°34.20 54.16	В
17	120°33.13	45°27.86 55.16	100°22.05 36.27	8°57.92 21.27	110°36.42 54.26	
18	135° 35.59	60°27.06 N23°55.57	115°22.73 N07°37.00	23°59.98 N22°21.22	125°38.63 N01°54.36	
19	150° 38.05	75°26.26 55.98	130° 23.42 37.73	39° 2.03 21.16	140°40.84 54.47	
20	165°40.52	90°25.45 56.39	145°24.11 38.45	54°4.09 21.11	155°43.06 54.57	
21	180°42.98	105°24.65 · · 56.79	160°24.80 · · 39.18	$69^{\circ}6.15$ · · 21.06	170°45.27 · · 54.67	
22	195° 45.45	120°23.85 57.20	175°25.49 39.91	84°8.20 21.00	185°47.48 54.76	
23	210°47.91	135°23.04 57.60	190°26.18 40.64	99°10.26 20.95	200°49.70 54.86	
N 4 - · · ·	00.50	ν-0.8' d0.4' m-3.92	ν0.7' d0.7' m1.23	ν2.1' d-0.1' m-1.98	$\nu 2.2' \ d0.1' \ m0.92$	N4:
ivier.	pass. 08:59	ν-0.8° d0.4° m-3.92	νυ. <i>Γ. α</i> υ. <i>Γ.</i> m1.23	ν2.1' d-0.1' m-1.98	ν2.2' d0.1' m0.92	Mia
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	
0	225°50.37	150°22.24 N23°58.00	205°26.87 N07°41.37	114°12.31 N22°20.89	215°51.91 N01°54.96	
1	240° 52.84	165°21.44 58.40	220°27.56 42.09	129°14.37 20.84	230°54.12 55.06	[
2	255° 55.30	180°20.63 58.80	235°28.25 42.82	144°16.42 20.78	245°56.34 55.16	
	270° 57.77	195°19.83 · · 59.20		159°18.48 · · 20.73	260°58.55 · · 55.26	
3						
4	286°0.23	210°19.02 23°59.60	265°29.63 44.27	174°20.53 20.68	276°0.77 55.36	
5	301°2.70	225°18.22 24°0.00	280°30.32 45.00	189°22.59 20.62	291°2.98 55.46	
6	316°5.16	240°17.41 N24°0.39	295°31.01 N07°45.73	204°24.64 N22°20.57	306°5.19 N01°55.56	
7	331°7.62	255°16.61 0.78	310°31.70 46.45	219°26.70 20.51	321°7.41 55.66	
8	346° 10.09	270°15.80 1.18	325°32.39 47.18	234°28.75 20.46	336°9.62 55.76	
9	1°12.55	285°14.99 · · 1.57	340°33.07 · · 47.91	249°30.80 · · 20.40	351°11.84 · · 55.86	
10	$16^{\circ}15.02$	300°14.19 1.96	355°33.76 48.63	264°32.86 20.35	6°14.05 55.96	Ri
11	31° 17.48	315°13.38 2.35	10°34.45 49.36	279°34.91 20.29	21°16.27 56.06	'
12	46° 19.94	330°12.57 N24°2.74	25°35.14 N07°50.08	294°36.96 N22°20.24	36°18.48 N01°56.16	z
13	61°22.41	345°11.77 3.12	40°35.83 50.81	309°39.02 20.18	51°20.70 56.26	
14	$76^{\circ}24.87$	0°10.96 3.51	55°36.52 51.53	324°41.07 20.13	66°22.91 56.36	'
15	91°27.34	15°10.15 · · 3.89	70°37.21 · · 52.26	339°43.12 · · 20.07	81°25.12 · · 56.46	
16	106° 29.80	30°9.34 4.27	85° 37.90 52.98	354°45.17 20.02	96°27.34 56.56	
17	121°32.27	45°8.54 4.66	100°38.59 53.71	9°47.23 19.96	111°29.55 56.66	
18	136°34.73	60°7.73 N24°5.04	115°39.27 N07°54.43	24°49.28 N22°19.91	126°31.77 N01°56.76	
19	151°37.19	75°6.92 5.42	130°39.96 55.16	39°51.33 19.85	141°33.98 56.86	Ra
20	166°39.66	90°6.11 5.80	145°40.65 55.88	54°53.38 19.80	156°36.20 56.95	
21	181° 42.12	105°5.30 · · 6.17	160°41.34 · · 56.61	69°55.43 · · 19.74	171°38.42 · · 57.05	Ka
22	196° 44.59	120°4.49 6.55	175°42.03 57.33	84°57.48 19.69	186°40.63 57.15	
23	211° 47.05	135°3.68 6.92	190°42.72 58.05	99°59.53 19.63	201°42.85 57.25	
Mer.	pass. 08:55	$\nu$ -0.8' $d$ 0.4' m-3.92	$ u 0.7' \; d0.7' \; { m m} 1.24$	$ u 2.1' \ d$ -0.1' m-1.98	$ u 2.2' \ d0.1' \ m0.92$	
٠.	CIIA	CUA D	CUA D	CIIA D	CUA D	
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	
0	226°49.51	150°2.87 N24°7.30	205°43.41 N07°58.78	115°1.59 N22°19.58	216°45.06 N01°57.35	Fo
1	241°51.98	165°2.06 7.67	220°44.09 07°59.50	130° 3.64 19.52	231°47.28 57.45	
2	256° 54.44	180°1.25 8.04	235°44.78 08°0.22	145° 5.69 19.46	246°49.49 57.55	
3	271°56.91	195°0.44 · · 8.41	250° 45.47 · · 0.95	160°7.74 · · 19.41	261°51.71 · · 57.65	
4	286° 59.37	209°59.63 8.78	265°46.16 1.67	175° 9.79 19.35	276°53.92 57.75	May
5	302°1.83	224°58.82 9.15	280°46.85 2.39	190°11.84 19.30	291°56.14 57.84	
6	317°4.30	239°58.01 N24°9.52	295°47.54 N08°3.12	205°13.89 N22°19.24	306°58.36 N01°57.94	
7	332°6.76	254°57.20 9.88	310°48.22 3.84	220°15.94 19.19	322°0.57 58.04	
8	347°9.23	269°56.39 10.25	325°48.91 4.56	235°17.98 19.13	337°2.79 58.14	
9	2°11.69	284°55.58 · · 10.61	340°49.60 •• 5.28	250°20.03 · · 19.08	352°5.00 · · 58.24	N.A.
10	17° 14.16	299°54.77 10.97	355°50.29 6.01	265°22.08 19.02	7°7.22 58.34	Ma
11	$32^{\circ}16.62$	314°53.96 11.33	10° 50.98 6.73	280°24.13 18.96	22°9.44 58.44	
12	47° 19.08	329°53.14 N24°11.69	25°51.66 N08°7.45	295°26.18 N22°18.91	37°11.65 N01°58.54	
13	$62^{\circ}21.55$	344°52.33 12.05	40°52.35 8.17	310°28.23 18.85	52°13.87 58.63	
14	77°24.01	359°51.52 12.41	55°53.04 8.89	325°30.28 18.80	67°16.09 58.73	
15	92°26.48	14°50.71 · · 12.76	70°53.73 · · 9.61	340°32.32 · · 18.74	82°18.30 · · 58.83	Ma
16	107° 28.94	29°49.89 13.12	85°54.42 10.34	355°34.37 18.68	97°20.52 58.93	ivia
17	122° 31.40	44°49.08 13.47	100°55.10 11.06	10°36.42 18.63	112°22.74 59.03	
18	137°33.87	59°48.27 N24°13.82	115°55.79 N08°11.78	25°38.47 N22°18.57	127°24.95 N01°59.13	
19	152° 36.33	74° 47.45 14.18	130°56.48 12.50	40°40.51 18.51	142°27.17 59.22	
20	167°38.80	89° 46.64 14.53	145° 57.17 13.22	55°42.56 18.46	157°29.39 59.32	
21	182° 41.26	104° 45.82 · · 14.87	145 57.17 13.22 160°57.86 · · 13.94	70°44.61 · · 18.40	172°31.60 · · 59.42	
22	182 41.26 197°43.72	119° 45.01 15.22	175° 58.54 14.66	85°46.65 18.35		
23	212°46.19	134°44.20 15.57	190°59.23 15.38	100°48.70 18.29	202°36.04 59.62	
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	$\nu 2.2' \ d0.1' \ m0.92$	

Ankaa 353°6.40 -42°9.64 Schedar 349°30.27 56°40.73 Diphda 348°46.48 -17°50.51 Achernar 335°19.92 -57°6.06 Hamal 327°50.31 23°35.13 Polaris 313°58.36 89°22.48 Acamar 315°11.37 -40°11.94 Menkar 314°5.34 4°11.52 Mirfak 308°27.20 49°57.24 Aldebaran 290°38.70 16°33.69 Rigel 281°3.11 -8°10.36 Capella 280°20.70 46°1.50 Bellatrix 278°22.00 6°22.35 Elnath 278°0.81 28°37.77 Alnilam 275°36.90 -1°11.19 Betelgeuse 270°51.17 7°24.66 Canopus 263°52.29 -52°42.77 Sirius 258°25.50 -16°45.28 Adhara 255°5.23 -29°0.66 Procyon 244°49.84 5°9.37 Pollux 243°16.13 27°57.79 Avior 234°14.46 -59°35.93 Suhail 222°45.54 -43°32.63 Miaplacidus 221°38.10 -69°49.83 Alphard 217°46.68 -8°46.53 Regulus 207°33.22 11°50.25 Dubhe 193°39.37 61°36.71 Denebola 182°23.64 14°25.42 Gienah 175°42.23 -17°41.49 Acrux 172°58.37 -63°14.98 Gacrux 171°49.99 -57°15.91 Alioth 166°11.54 55°49.07 Spica 158°20.87 -11°18.09 Alkaid 152°50.68 49°10.88 Hadar 148°33.84 -60°30.16 Menkent 147°55.95 -36°30.14 Arcturus 145°46.59 19°2.61 Rigil Kent. 139°38.15 -60°56.77 Kochab 137°18.63 74°2.75 Zuben'ubi 136°54.48 -16°9.20 Alphecca 126°2.46 26°37.42 Antares 112°14.16 -26°29.47 Atria 107°6.91 -69°4.37 Sabik 102°1.24 -15°45.50 Shaula 96°8.56 -37°7.32 Rasalhague 95°57.27 12°32.30 Eltanin 90°41.27 51°28.88 Kaus Aust. 83°30.81 -34°22.24 Nunki 75°46.21 -26°15.78 Altair 61°58.78 8°56.14 Peacock 53°3.89 -56°38.76 Deneb 49°25.00 45°22.24 Nunki 75°46.21 -26°15.78 Altair 107°6.91 -69°4.37 Sabik 102°1.24 -15°45.50 Deneb 49°25.00 45°22.24 Nunki 75°46.21 -26°15.78 Altair 61°58.78 8°56.14 Peacock 53°3.89 -56°38.76 Deneb 49°25.00 45°22.24 Nunki 75°46.21 -26°15.78 Altair 107°6.91 -69°4.37 Sabik 102°1.24 -15°45.90 Saturn 350°7.56 09:39		Stars	
Ankaa 353°6.40 -42°9.64 Schedar 349°30.27 56°40.73 Diphda 348°46.48 -17°50.51 Achernar 355°19.92 -57°6.06 Achernar 313°51.37 -40°11.94 Menkar 314°5.34 4°11.52 Mirfak 308°27.20 49°57.24 Aldebaran 290°38.70 16°33.69 Rigel 281°3.11 -8°10.36 Capella 280°20.70 46°1.50 Bellatrix 278°22.00 6°22.35 Elnath 278°0.81 28°37.77 Alnilam 275°36.90 -1°11.19 Betelgeuse 270°51.17 7°24.66 Adhara 255°5.23 -29°0.66 Arrocy 244°49.84 5°9.37 Pollux 243°16.13 27°57.79 Avior 234°14.46 -59°35.93 Pollux 243°16.13 27°57.79 Avior 234°14.46 -59°35.93 Miaplacidus 221°38.10 -69°49.83 Alphard 217°46.68 -8°46.53 Regulus 207°33.22 11°50.25 Dubhe 193°39.37 61°36.71 Denebola 182°23.64 14°25.42 Gienah 175°42.23 -17°41.49 Acrux 172°58.37 -63°14.98 Gacrux 171°49.99 -57°15.91 Alioth 166°11.54 55°49.07 Spica 158°20.87 -11°18.01 Arcturus 145°46.59 19°2.61 Rigil Kent. 139°38.15 -60°56.14 Arcturus 145°46.59 19°2.61 Rigil Kent. 139°38.15 -60°69.437 Sabik 102°1.24 -15°45.55 Shaula 96°8.56 -37°7.32 Eltanin 90°41.27 51°28.28 Rasalhague 95°57.27 12°32.30 Leneb 49°25.00 45°22.16 Enif 33°37.77 9°59.62 Alvair 27°31.66 -46°49.75 Fomalhaut 15°13.48 -29°28.86 Shaula 96°8.56 -37°7.32 Rasalhague 95°57.27 12°32.30 Leneb 49°25.00 45°22.16 Enif 33°37.77 9°59.62 Alvair 27°31.66 -46°49.75 Fomalhaut 15°13.48 -29°28.86 Shaula 96°8.56 -37°7.32 Rasalhague 95°57.27 12°32.30 May 08 Fri SHA Venus 284°31.87 Mer.pass Venus 284°31.87 Mer.pass Venus 284°31.87 Mer.pass Venus 284°31.87 Mer.pass Venus 284°31.87 Mer.pass Alpieter 248°31.99 15°20.69  May 09 Sat SHA Venus 284°31.87 Mer.pass Venus 284°31.87 Mer.pass Alpieter 248°31.99 15°20.69  May 09 Sat SHA Venus 284°31.87 Mer.pass Alpieter 248°31.99 15°20.69  May 09 Sat SHA Venus 284°31.87 Mer.pass Venus 284°31.87 Mer.pass Alpieter 248°31.99 15°20.69  May 09 Sat SHA Venus 284°31.87 Mer.pass Alpieter 248°31.99 15°20.69  May 09 Sat SHA Venus 284°31.87 Mer.pass Alpieter 248°31.99 15°20.69  May 09 Sat SHA Venus 284°31.87 Mer.pass Alpieter 248°31.99 15°20.69  May 09 Sat SHA Venus 283°13.36 Mer.pass Alpieter 248°31.99 15°20.69  May 09 Sat SHA V		SHA	Dec
Schedar 349°30.27 56°40.73 Diphda 348°46.48 Achernar 327°50.31 23°35.13 Polaris 313°58.36 89°22.48 Acamar 315°11.37 -40°11.94 Menkar 314°5.34 4°11.52 Mirfak 308°27.20 49°57.24 Aldebaran 290°38.70 16°33.69 Rigel 281°3.11 -8°10.36 Capella 280°20.70 46°1.50 Bellatrix 278°0.81 28°37.77 Alnilam 275°36.90 -1°11.19 Betelgeuse 270°51.17 7°24.66 Canopus 263°52.29 -52°42.77 Sirius 258°25.50 -29°0.66 Adhara 255°5.23 -29°0.66 Adhara 255°5.23 -29°0.66 Suhail 221°38.10 -69°49.38 Alphard 217°46.68 -8°46.53 Miaplacidus 221°38.10 -69°49.38 Alphard 217°46.68 -8°46.53 Cienah 175°42.23 -11°15.02 Dubhe 193°39.37 61°36.71 Denebola 182°23.64 14°25.42 Gienah 175°42.23 -17°41.44 Acrux 172°58.37 -63°14.98 Gacrux 171°49.99 -57°15.91 Alioth 166°11.54 55°49.07 Spica 158°20.87 -11°18.03 Alphard 148°33.84 -60°30.16 Menkent 147°55.95 -36°30.14 Arcturus 145°46.59 19°2.61 Rigil Kent. 139°38.15 -60°56.77.2 Al Na'ir 27°31.66 -69°4.37 Sabik 102°1.24 -15°45.55 Shaula 96°8.56 -37°7.32 Rasalhague 95°57.27 12°32.30 Rasalhague 95°57.27 12°32.30 Rasalhague 95°57.27 12°32.30 Rasalhague 95°57.27 12°32.30 Rasalhague 95°57.27 12°32.30 Rasalhague 95°57.27 12°32.30 May 07 Thu ShA Venus 284°31.87 13.59 May 08 Sti ShA Venus 284°31.87 13.59 May 09 Sat ShA Venus 284°31.87 Mer.pass Markab 13°28.97 15°20.69  May 08 Fri ShA Venus 284°31.87 Mer.pass Markab 13°28.97 15°20.69  May 09 Sat ShA Venus 284°31.87 Mer.pass Markab 13°28.97 15°20.69  May 09 Sat ShA Venus 284°31.87 Mer.pass Markab 13°28.97 15°20.69  May 09 Sat ShA Venus 284°31.87 Mer.pass Markab 13°28.97 15°20.69  May 09 Sat ShA Venus 284°31.87 Mer.pass Markab 13°28.97 15°20.69  May 09 Sat ShA Venus 284°31.87 Mer.pass Mars 339°3.65.0 10:18 Mars 339°3.65.0 10:18 Mars 338°53.89 10:17 Saturn 350°1.54 09:35			29°14.00
Diphda			
Achernar 335°19.92 -57°6.06 Hamal 327°50.31 23°35.13 Polaris 313°58.36 89°22.48 Acamar 315°11.37 -40°11.94 Menkar 314°5.34 4°11.52 Mirfak 308°27.20 49°57.24 Aldebaran 290°38.70 16°33.69 Rigel 281°3.11 -8°10.36 Capella 280°20.70 46°1.50 Bellatrix 278°22.00 6°22.35 Elnath 278°0.81 28°37.77 Alnilam 275°36.90 -1°11.19 Betelgeuse 270°51.17 7°24.66 Canopus 263°52.29 -52°42.77 Sirius 258°25.50 -16°45.28 Adhara 255°5.23 -29°0.66 Procyon 244°49.84 5°9.37 Pollux 243°16.13 27°57.79 Avior 234°14.46 -59°35.93 Suhail 222°45.54 -43°32.63 Miaplacidus 221°38.10 -69°49.83 Alphard 217°46.68 -8°46.53 Regulus 207°33.22 11°50.25 Dubhe 193°39.37 61°36.71 Denebola 182°23.64 14°25.42 Gienah 175°42.23 -17°41.49 Acrux 172°58.37 -63°14.98 Gacrux 171°49.99 -57°15.91 Alioth 166°11.54 55°49.07 Spica 158°20.87 -11°18.03 Alkaid 152°50.68 49°10.88 Hadar 148°33.84 -60°30.16 Arcturus 145°46.59 19°2.61 Rigil Kent. 139°38.15 -60°56.77 Kochab 137°18.63 74°2.75 Zuben'ubi 136°54.48 -16°9.20 Alphecca 126°2.46 26°37.42 Antares 112°14.16 -26°29.47 Atria 107°6.91 -69°4.37 Sabik 102°1.24 -15°45.50 Shaula 96°8.56 -37°7.32 Rasalhague 95°57.27 12°32.33 Rasalhague 95°57.27 12°32.33 Rasalhague 95°57.27 12°32.33 Markab 13°28.97 15°20.69  May 07 Thu SHA Mer.pass Venus 283°13.36 14.01 Mars 338°53.89 10:17 Fomalhaut 15°13.48 -29°28.86 Scheat 13°44.32 28°13.36 Markab 13°28.97 15°20.69  May 08 Fri SHA Mer.pass Venus 284°31.87 13:59 May 09 Sat SHA Mer.pass Venus 284°31.87 13:59 Mars 330°36.50 10:18 Jupiter 248°12.07 16:18 Saturn 350°1.54 00:33			
Hamal   327°50.31   23°35.13     Polaris   313°58.36   89°22.48     Acamar   314°5.34   4°11.52     Menkar   314°5.34   4°11.52     Mirfak   308°27.20   49°57.24     Aldebaran   290°38.70   16°33.69     Rigel   281°3.11   -8°10.36     Capella   280°20.70   46°1.50     Bellatrix   278°0.81   28°37.77     Alnilam   275°36.90   -1°11.19     Betelgeuse   270°51.17   7°24.66     Canopus   263°52.29   -52°42.77     Sirius   258°25.50   -16°45.28     Adhara   255°5.23   -29°0.66     Procyon   244°49.84   5°9.37     Pollux   243°16.13   27°57.79     Avior   234°14.46   -59°35.93     Suhail   222°45.54   -43°32.63     Miaplacidus   221°38.10   -69°49.83     Alphard   217°46.68   -8°46.53     Regulus   207°33.22   11°50.25     Dubhe   193°39.37   61°36.71     Denebola   182°23.64   14°25.42     Gienah   175°42.23   -17°41.49     Acrux   172°58.37   -63°14.98     Alkaid   152°50.68   49°10.88     Hadar   148°33.84   -60°30.16     Alkaid   152°50.68   49°10.88     Hadar   148°33.84   -60°30.16     Alkaid   152°50.68   49°10.88     Adhare   147°55.95   -36°30.14     Arcturus   145°46.59   19°2.61     Rigil Kent.   139°38.15   -60°56.77     Kochab   137°18.63   74°2.75     Zuben'ubi   136°54.48   -16°9.20     Alhaica   12°14.16   -26°29.47     Atria   107°6.91   -69°4.37     Sabik   102°1.24   -15°45.50     Shaula   96°8.56   -37°7.32     Rasalhague   95°57.27   12°32.30     Eltanin   90°41.27   51°28.86     Canopus   248°21.94   -50°43.86     Altair   16°58.78   8°56.14     Peacock   53°3.89   -56°38.76     Deneb   49°25.00   45°22.16     Enif   33°37.77   9°59.62     All Na'ir   27°31.66   -46°49.79     Fomalhaut   51°1.48   -29°28.86     Scheat   13°4.32   28°13.36     Mars   339°36.50   10:18     Jupiter   248°21.94   51.50     Scheat   13°4.32   28°13.36     Mars   338°53.89   10:17     Saturn   350°1.54   09:35      May 09 Sat			
Acamar   315°11.37			23°35.13
Menkar   314°5.34   4°11.52   Mirfak   308°27.20   49°57.24   Aldebaran   290°38.70   16°33.69   Rigel   281°3.11   -8°10.36   Capella   280°20.70   46°1.50   Bellatrix   278°0.81   28°37.77   Alnilam   275°36.90   -1°11.19   Betelgeuse   270°51.17   7°24.66   Canopus   263°52.29   -52°42.77   Sirius   258°25.50   -16°45.28   Adhara   255°5.23   -29°0.66   Procyon   244°49.84   5°9.37   Pollux   243°16.13   27°57.79   Avior   234°14.46   -59°35.93   Suhail   222°45.54   -43°32.63   Miaplacidus   221°38.10   -69°49.83   Alphard   217°46.68   -8°46.53   Regulus   207°33.22   11°50.25   Dubhe   193°39.37   61°36.71   Denebola   182°23.64   14°25.42   Gienah   175°42.23   -17°41.49   Acrux   172°58.37   -63°14.98   Gacrux   171°49.99   -57°15.91   Alkaid   152°50.68   49°10.88   Hadar   148°33.84   -60°30.16   Menkent   147°55.95   -36°30.14   Arcturus   145°46.59   19°2.61   Rigil Kent.   139°38.15   -60°56.77   Kochab   137°18.63   74°2.75   Alphecca   126°2.46   26°37.42   Antares   120°14.16   -26°29.47   Atria   107°6.91   -69°4.37   Sabik   102°1.24   -15°45.50   Altair   61°58.78   8°56.14   Peacock   53°3.89   -56°38.76   Fomalhaut   15°13.48   -29°28.86   Altair   61°58.78   8°56.14   Peacock   53°3.89   -56°38.76   Deneb   49°25.00   45°22.16   Enif   33°37.77   9°59.62   Altair   61°58.78   8°56.14   Peacock   53°3.89   -56°38.76   Deneb   49°25.00   45°22.16   Enif   33°37.77   9°59.62   Altair   61°58.78   8°56.14   Peacock   53°3.89   -56°38.76   Deneb   49°25.00   45°22.16   Enif   33°37.77   9°59.62   Altair   61°58.78   8°56.14   Peacock   53°3.89   56°38.76   Deneb   49°25.00   45°22.16   Enif   33°37.77   9°59.62   Altair   61°58.78   8°56.14   Altair   61°58.78   8°56.14   Altair   61°58.7	Polaris	$313^{\circ}58.36$	89°22.48
Mirfak 308°27.20 49°57.24 Aldebaran 290°38.70 16°33.69 Rigel 281°3.11 -8°10.36 Capella 280°20.70 46°1.50 Bellatrix 278°0.81 28°37.77 Alnilam 275°36.90 -1°11.19 Betelgeuse 270°51.17 7°24.66 Canopus 263°52.29 -52°42.77 Sirius 258°25.50 -16°45.28 Adhara 255°5.23 -29°0.66 Procyon 244°49.84 5°9.37 Pollux 243°16.13 27°57.79 Avior 234°14.46 -59°35.93 Pollux 243°16.13 27°57.79 Avior 234°14.46 -59°35.93 Alphard 217°46.68 -8°46.53 Regulus 207°33.22 11°50.25 Dubhe 193°39.37 61°36.71 Denebola 182°23.64 14°25.42 Gienah 175°42.23 -17°41.49 Acrux 172°58.37 -63°14.98 Gacrux 171°49.99 -57°15.91 Alkaid 152°50.68 49°10.88 Hadar 148°33.84 -60°30.16 Menkent 147°55.95 -36°30.14 Arcturus 145°46.59 19°2.61 Rigil Kent. 139°38.15 -60°56.77 Spica 158°20.87 -11°18.09 Alphacca 126°2.46 26°37.42 Antares 112°14.16 -26°29.47 Atria 107°6.91 -69°4.37 Sabik 102°1.24 -15°45.55 Shaula 96°8.56 -37°7.32 Rasalhague 95°57.27 12°32.30 Eltanin 90°41.27 51°28.85 Kaus Aust. 83°30.81 -34°22.24 Vega 80°32.22 38°48.22 Nunki 75°46.21 -26°15.78 Altair 61°58.78 8°56.14 Peacock 53°3.89 -56°38.76 Deneb 49°25.00 45°22.16 Enif 33°37.77 9°59.62 Al Na'ir 27°31.66 -46°49.75 Fomalhaut 15°13.48 -29°28.85 Kaus Aust. 83°30.81 -34°22.24 Vega 80°32.22 38°48.22 Nunki 75°46.21 -26°15.78 Altair 61°58.78 8°56.14 Peacock 53°3.89 -56°38.76 Deneb 49°25.00 45°22.16 Enif 33°37.77 9°59.62 Al Na'ir 27°31.66 -46°49.75 Fomalhaut 15°13.48 -29°28.86 Deneb 49°25.00 45°22.16 Enif 33°37.77 9°59.62 Al Na'ir 27°31.66 -46°49.75 Fomalhaut 15°13.48 -29°28.86 Deneb 49°25.00 45°22.16 Saturn 350°1.54 Mer.pass Venus 283°13.36 14:01 Jupiter 248°21.94 16:21 Saturn 350°1.54 Mer.pass Venus 283°13.36 14:01 Saturn 350°1.54 Mer.pass Horizontal parallax Venus 033°55.55 09:32			-40°11.94
Aldebaran 290° 38.70 16° 33.69 Rigel 281° 3.11 -8° 10.36 Capella 280° 20.70 46° 1.50 Bellatrix 278° 22.00 6° 22.35 Elnath 278° 0.81 28° 37.77 Alnilam 275° 36.90 -1° 11.19 Betelgeuse 270° 51.17 7° 24.66 Canopus 263° 52.29 -52° 42.77 Sirius 258° 25.50 -16° 45.28 Adhara 255° 5.23 -29° 0.66 Procyon 244° 49.84 5° 9.37 Pollux 243° 16.13 27° 57.79 Avior 234° 14.46 -59° 35.93 Suhail 222° 45.54 -43° 32.63 Miaplacidus 221° 38.10 -69° 49.83 Alphard 217° 46.68 -8° 46.53 Regulus 207° 33.22 11° 50.25 Dubhe 193° 39.37 61° 36.71 Denebola 182° 23.64 14° 25.42 Gienah 175° 42.23 -17° 41.49 Acrux 172° 58.37 -63° 14.98 Gacrux 171° 49.99 -57° 15.91 Alioth 166° 11.54 55° 49.07 Spica 158° 20.87 -11° 18.09 Alkaid 152° 50.68 49° 10.88 Hadar 148° 33.84 -60° 30.14 Arcturus 145° 46.59 19° 2.61 Rigil Kent. 139° 38.15 -60° 56.77 Kochab 137° 18.63 74° 2.75 Zuben'ubi 136° 54.48 -60° 30.14 Artares 112° 14.16 -26° 29.47 Atria 107° 6.91 -69° 4.37 Sabik 102° 1.24 -15° 45.50 Shaula 96° 8.56 -37° 7.32 Rasalhague 95° 57.27 12° 32.30 Eltanin 90° 41.27 51° 28.85 Kaus Aust. 83° 30.81 -34° 22.24 Nunki 75° 46.21 -26° 15.78 Altair 61° 58.78 8° 56.14 Peacock 53° 3.89 -56° 38.76 Deneb 49° 25.00 45° 22.16 Enif 33° 37.77 9° 59.60  May 07 Thu SHA Mer.pass Venus 288° 31.36 10.17 Jupiter 248° 31.69 10.18 Jupiter 248° 31.69 10.18 Jupiter 248° 31.69 10.18 Jupiter 248° 31.69 10.19 Jupiter 248° 31.69 10.1			
Rigel 281°3.11 -8°10.36 Capella 280°20.70 46°1.50 Bellatrix 278°0.81 28°37.77 Alnilam 275°36.90 -1°11.19 Betelgeuse 270°51.17 7°24.66 Canopus 263°52.29 -52°42.77 Sirius 258°25.50 -16°45.26 Adhara 255°5.23 -29°0.66 Procyon 244°49.84 5°9.37 Pollux 243°16.13 27°57.79 Avior 234°14.46 -59°35.93 Suhail 222°45.54 -43°32.63 Miaplacidus 211°38.10 -69°49.83 Alphard 217°46.68 -8°46.53 Regulus 207°33.22 11°50.25 Dubhe 193°39.37 61°36.71 Denebola 182°23.64 14°25.42 Gienah 175°42.23 -17°41.49 Acrux 172°58.37 -63°14.98 Gacrux 171°49.99 -57°15.91 Alioth 166°11.54 55°49.07 Spica 158°20.87 -11°18.09 Alkaid 152°50.68 49°10.86 Hadar 148°33.84 -60°30.14 Arcturus 145°46.59 19°2.61 Rigil Kent. 139°38.15 -60°56.77 Kochab 137°18.63 74°2.75 Zuben'ubi 136°54.48 -16°9.20 Alhaecca 126°2.46 26°37.42 Antares 112°14.16 -26°29.47 Atria 107°6.91 -69°4.37 Sabik 102°1.24 -15°45.50 Shaula 96°8.56 -37°7.32 Rasalhague 95°57.27 12°32.30 Eltanin 90°41.27 51°28.85 Kaus Aust. 83°30.81 -34°22.25 Nunki 75°46.21 -26°15.78 Altair 61°58.78 8°56.14 Peacock 53°3.89 -56°38.76 Deneb 49°25.00 45°22.16 Enif 33°37.77 9°59.63  May 07 Thu SHA Mer.pass Venus 288°31.36 49.10.82 Mars 340°19.08 10.19 Jupiter 248°31.69 15.26 Saturn 350°7.56 09.33  May 08 Fri SHA Mer.pass Venus 284°31.87 13.59 May 09 Sat SHA Mer.pass Venus 284°31.87 13.59 May 09 Sat SHA Mer.pass Venus 284°31.87 13.59 May 09 Sat SHA Mer.pass Venus 284°31.87 13.59 May 09 Sat SHA Mer.pass Venus 338°53.89 10.17 Saturn 350°1.54 09.35  May 09 Sat SHA Mer.pass Venus 284°31.87 13.59 May 09 Sat SHA Mer.pass Venus 383°3.89 10.17 Saturn 350°1.54 09.35			
Capella 280°20.70			
Bellatrix 278° 22.00 6° 22.35 Elnath 278° 0.81 28° 37.77 Alnilam 275° 36.90 -1° 11.19 Betelgeuse 270° 51.17 7° 24.66 Canopus 263° 52.29 -52° 42.77 Sirius 258° 25.50 -16° 45.26 Adhara 255° 5.23 -29° 0.66 Procyon 244° 49.84 5° 9.37 Pollux 243° 16.13 27° 57.79 Avior 234° 14.46 -59° 35.93 Suhail 222° 45.54 -43° 32.63 Miaplacidus 221° 38.10 -69° 49.83 Alphard 217° 46.68 -8° 46.53 Regulus 207° 33.22 11° 50.25 Dubhe 193° 39.37 61° 36.71 Denebola 182° 23.64 14° 25.42 Gienah 175° 42.23 -17° 41.49 Acrux 172° 58.37 -63° 14.99 Alkaid 152° 50.68 49° 10.88 Hadar 148° 33.84 -60° 30.16 Alkaid 152° 50.68 49° 10.88 Hadar 148° 33.84 -60° 30.16 Alkaid 152° 50.68 49° 10.88 Hadar 147° 55.95 -36° 30.14 Arcturus 145° 46.59 19° 2.61 Rigil Kent. 139° 38.15 -60° 56.77 Kochab 137° 18.63 74° 2.75 Zuben'ubi 136° 54.48 -16° 9.20 Alhecca 126° 2.46 26° 37.42 Antares 112° 14.16 -26° 29.47 Atria 107° 6.91 -69° 4.37 Sabik 102° 1.24 -15° 45.50 Shaula 96° 8.56 -37° 7.32 Eltanin 90° 41.27 51° 28.85 Kaus Aust. 83° 30.81 -34° 22.26 Nunki 75° 46.21 -26° 15.78 Altair 61° 58.78 8° 56.14 Peacock 53° 3.89 -56° 38.76 Deneb 49° 25.00 45° 22.16 Enif 33° 37.77 9° 59.62 Al Na'ir 27° 31.66 -46° 49.79 Fomalhaut 15° 13.48 -29° 28.86 Scheat 13° 44.32 28° 13.36 Mars 340° 19.08 10:19 Jupiter 248° 31.69 16:24 Saturn 350° 7.56 09:35  May 08 Fri SHA Mer.pass Venus 283° 13.36 13.59 Mars 340° 19.08 10:19 Jupiter 248° 31.69 16:24 Saturn 350° 7.56 09:35  May 09 Sat SHA Mer.pass Venus 283° 13.36 13.59 Mars 330° 55.55 09:32  May 09 Sat SHA Mer.pass Venus 283° 13.36 14.01 Mars 338° 53.89 10:17 Saturn 350° 1.54 09:35  May 09 Sat SHA Mer.pass Venus 283° 13.36 14.01 Mars 338° 53.89 10:17 Saturn 350° 1.54 09:35  May 09 Sat SHA Mer.pass Venus 283° 13.36 14.01 Mars 338° 53.89 10:17 Saturn 350° 1.55 09:32			46°1.50
Alnilam 275°36.90 -1°11.19 Betelgeuse 270°51.17 7°24.66 Canopus 263°52.29 -52°42.77 Sirius 258°25.50 -16°45.28 Adhara 255°5.23 -29°0.66 Procyon 244°49.84 5°9.37 Pollux 243°16.13 27°57.79 Avior 234°14.46 -59°35.93 Suhail 222°45.54 -43°32.63 Miaplacidus 221°38.10 -69°49.83 Alphard 217°46.68 -8°46.53 Regulus 207°33.22 11°50.25 Dubhe 193°39.37 61°36.71 Denebola 182°23.64 14°25.42 Gienah 175°42.23 -17°41.49 Acrux 172°58.37 -63°14.98 Gacrux 171°49.99 -57°15.91 Alioth 166°11.54 55°49.07 Spica 158°20.87 -11°18.03 Alkaid 152°50.68 49°10.88 Hadar 148°33.84 -60°30.16 Menkent 147°55.95 -36°30.14 Arcturus 145°46.59 19°2.61 Rigil Kent. 139°38.15 -60°56.77 Kochab 137°18.63 74°2.75 Zuben'ubi 136°54.48 -16°9.2.04 Alria 107°6.91 -69°4.37 Sabik 102°1.24 -15°45.50 Shaula 96°8.56 -37°7.32 Rasalhague 95°57.27 12°32.30 Eltanin 90°41.27 51°288.28 Kaus Aust. 83°30.81 -34°22.24 Vega 80°32.22 38°48.22 Nunki 75°46.21 -26°15.78 Altair 61°58.78 8°56.14 Peacock 53°3.89 -56°38.76 Deneb 49°25.00 45°22.16 Enif 33°37.77 9°59.62 Al Na'ir 27°31.66 -46°4.97.95 Fomalhaut 15°13.48 -29°28.86 Deneb 49°25.00 45°22.16 Enif 33°37.77 9°59.62 May 07 Thu SHA Mer.pass Venus 288°50.23 13.58 Mars 330°1.54 09:35  May 08 Fri SHA Mer.pass Venus 284°31.87 13.59 Mars 339°36.50 10:18 Jupiter 248°21.94 16:24 Saturn 350°7.56 09:33  Mars 338°53.89 10:17 Saturn 349°55.55 09:32	Bellatrix	278°22.00	$6^{\circ}22.35$
Betelgeuse			
Canopus 263°52.29 -52°42.77 Sirius 258°25.50 -16°45.28 Adhara 255°5.23 -29°0.66 Procyon 244°49.84 5°9.37 Pollux 243°16.13 27°57.79 Avior 234°14.46 -59°35.39 Suhail 222°45.54 -43°32.63 Miaplacidus 211°46.68 -8°46.53 Regulus 207°33.22 11°50.25 Dubhe 193°39.37 61°36.71 Denebola 182°23.64 14°25.42 Acrux 172°58.37 -63°14.98 Gacrux 171°49.99 -57°15.91 Alioth 166°11.54 55°49.07 Spica 158°20.87 -11°18.09 Alkaid 152°50.68 49°10.88 Hadar 148°33.84 -60°30.14 Arcturus 145°46.59 19°2.61 Rigil Kent. 139°38.15 -60°56.77 Kochab 137°18.63 74°2.75 Zuben'ubi 136°54.48 -16°9.20 Alhacea 112°14.16 -26°29.47 Atria 107°6.91 -69°4.37 Sabik 102°1.24 -15°45.50 Shaula 96°8.56 -37°7.32 Rasalhague 95°57.27 12°32.30 Eltanin 90°41.27 51°28.85 Kaus Aust. 83°30.81 -34°22.24 Nunki 75°46.21 -26°15.78 Altair 61°58.78 8°56.14 Peacock 53°3.89 -56°38.76 Deneb 49°25.00 45°22.16 Enif 33°37.77 9°59.62  May 07 Thu SHA Mer.pass Venus 288°31.87 15°20.69  May 07 Thu SHA Mer.pass Venus 288°31.87 15°20.69  May 07 Thu SHA Mer.pass Venus 288°31.87 15°20.69  May 08 Fri SHA Mer.pass Venus 284°31.87 13.59 Mars 339°36.50 10.18 Jupiter 248°21.94 16:21 Saturn 350°7.56 09:33  Mars 338°53.89 10:17 Saturn 350°1.54 09:35  May 09 Sat SHA Mer.pass Venus 283°13.36 14:60 Mars 338°53.89 10:17 Saturn 349°55.55 09:32			
Sirius   258°25.50   -16°45.28			
Adhara 255°5.23 -29°0.66 Procyon 244°49.84 5°9.37 Pollux 243°16.13 27°57.75 Avior 234°14.46 -59°35.93 Suhail 222°45.54 -43°32.63 Miaplacidus 221°38.10 -69°49.83 Alphard 217°46.68 -8°46.53 Regulus 207°33.22 11°50.25 Dubhe 193°39.37 61°36.71 Denebola 182°23.64 14°25.42 Gienah 175°42.23 -17°41.49 Acrux 172°58.37 -63°14.99 Alioth 166°11.54 55°49.07 Spica 158°20.87 -11°18.09 Alkaid 152°50.68 49°10.88 Hadar 148°33.84 -60°30.16 Arcturus 145°46.59 19°2.61 Rigil Kent. 139°38.15 -60°56.77 Kochab 137°18.63 74°2.75 Zuben'ubi 136°54.48 -16°9.20 Alhacca 126°2.46 26°37.42 Antares 112°14.16 -26°29.47 Atria 107°6.91 -69°4.37 Sabik 102°1.24 -15°45.50 Shaula 96°8.56 -37°7.32 Eltanin 90°41.27 51°28.85 Kaus Aust. 83°30.81 -34°22.24 Nunki 75°46.21 -26°15.78 Altair 61°58.78 8°56.14 Peacock 53°3.89 -56°38.76 Deneb 49°25.00 45°22.16 Enif 33°37.77 9°59.62 Al Na'ir 27°31.66 -46°49.79 Fomalhaut 15°13.48 -29°28.86 Scheat 13°44.32 28°13.36 Markab 13°28.97 15°20.69  May 07 Thu SHA Mer.pass Venus 288°50.23 13.56 Saturn 350°7.56 09:35  May 08 Fri SHA Mer.pass Venus 284°31.87 13.59 Mars 339°36.50 10:18 Jupiter 248°21.94 16:21 Saturn 350°7.56 09:35  May 09 Sat SHA Mer.pass Venus 283°13.36 14:01 Saturn 350°1.54 09:35  May 09 Sat SHA Mer.pass Venus 283°13.36 14:01 Saturn 350°5.55 09:32			
Procyon 244°49.84 5°9.37 Pollux 243°16.13 27°57.79 Avior 234°14.46 59°35.93 Suhail 222°45.54 -43°32.63 Miaplacidus 221°38.10 -69°49.83 Alphard 217°46.68 -8°46.53 Regulus 207°33.22 11°50.25 Dubhe 193°39.37 61°36.71 Denebola 182°23.64 14°25.42 Gienah 175°42.23 -17°41.49 Acrux 172°58.37 -63°14.98 Gacrux 171°49.99 -57°15.91 Alioth 166°11.54 55°49.07 Spica 158°20.87 -11°18.09 Alkaid 152°50.68 49°10.88 Hadar 148°33.84 -60°30.16 Menkent 147°55.95 -36°30.14 Arcturus 145°46.59 19°2.61 Rigil Kent. 139°38.15 -60°56.77 Kochab 137°18.63 74°2.75 Zuben'ubi 136°54.48 -16°9.20 Alphecca 126°2.46 26°37.42 Antares 112°14.16 -26°29.47 Atria 107°6.91 -69°4.37 Sabik 102°1.24 -15°45.50 Shaula 96°8.56 -37°7.32 Rasalhague 95°57.27 12°32.30 Eltanin 90°41.27 51°28.85 Kaus Aust. 83°30.81 -34°22.24 Vega 80°32.22 38°48.22 Nunki 75°46.21 -26°15.78 Altair 61°58.78 8°56.14 Peacock 53°3.89 -56°38.76 Deneb 49°25.00 45°22.16 Enif 33°37.77 9°59.62 Al Na'ir 27°31.66 -46°4.97 Fomalhaut 15°13.48 -29°28.86 Scheat 13°44.32 28°13.36 Markab 13°28.97 15°20.69  May 07 Thu SHA Mer.pass Venus 288°50.23 13.56 Mars 340°19.08 10:19 Jupiter 248°31.69 16:24 Saturn 350°7.56 09:33  Mars 330°36.50 10:18 Mars 339°36.50 10:18 Jupiter 248°21.94 16:21 Saturn 350°1.54 09:35  May 09 Sat SHA Mer.pass Venus 283°13.36 14:01 Mars 339°36.50 10:18 Jupiter 248°21.94 16:21 Saturn 350°1.54 09:35  May 09 Sat SHA Mer.pass Venus 283°13.36 14:01 Mars 339°36.50 10:18 Jupiter 248°21.94 16:21 Saturn 350°5.55 09:33	!		
Avior 234°14.46 -59°35.93 Suhail 222°45.54 -43°32.63 Miaplacidus 217°46.68 -8°46.53 Regulus 207°33.22 11°50.25 Dubhe 193°39.37 61°36.71 Denebola 182°23.64 14°25.42 Gienah 175°42.23 -17°41.49 Acrux 172°58.37 -63°14.98 Gacrux 171°49.99 -57°15.91 Alioth 166°11.54 55°49.07 Spica 158°20.87 -11°18.09 Alkaid 152°50.68 49°10.88 Hadar 148°33.84 -60°30.16 Menkent 147°55.95 -36°30.14 Arcturus 145°46.59 19°2.61 Rigil Kent. 139°38.15 -60°56.77 Kochab 137°18.63 74°2.75 Zuben'ubi 136°54.48 -16°9.2.61 Altair 107°6.91 -69°4.37 Sabik 102°1.24 -15°45.50 Shaula 96°8.56 -37°7.32 Rasalhague 95°57.27 12°32.30 Eltanin 90°41.27 51°28.85 Kaus Aust. 83°30.81 -34°22.24 Vega 80°32.22 38°48.22 Nunki 75°46.21 -26°15.78 Altair 61°58.78 8°56.14 Peacock 53°3.89 -56°38.76 Deneb 49°25.00 45°2.16 Enif 33°37.77 9°59.62 Al Na'ir 27°31.66 -46°49.79 Fomalhaut 15°13.48 -29°28.86 Scheat 13°44.32 28°13.36 Markab 13°28.97 15°20.69  May 07 Thu SHA Mer.pass Venus 284°31.87 13:59 Mars 339°36.50 10:18 Jupiter 248°21.94 16:21 Saturn 350°7.56 09:33  Mars 339°36.50 10:18 Jupiter 248°31.69 10:19 Jupiter 248°31.87 13:59 May 08 Fri SHA Mer.pass Venus 284°31.87 13:59 Mars 339°36.50 10:18 Jupiter 248°21.94 16:21 Saturn 350°7.56 09:33  Mars 338°53.89 10:17 Saturn 349°55.55 09:32	!		5°9.37
Suhail   222°45.54	Pollux	$243^{\circ}16.13$	27°57.79
Miaplacidus         221°38.10         -69°49.83           Alphard         217°46.68         -8°46.53           Regulus         207°33.22         11°50.25           Dubhe         193°39.37         61°36.71           Denebola         182°23.64         14°25.42           Gienah         175°42.23         -17°41.49           Acrux         172°58.37         -63°14.98           Gacrux         171°49.99         -57°15.91           Alioth         166°11.54         55°49.07           Spica         158°20.87         -11°18.09           Alkaid         152°50.68         49°10.88           Hadar         148°33.84         -60°30.16           Menkent         147°55.95         -36°30.14           Arcturus         145°46.59         19°2.61           Rigil Kent.         139°38.15         -60°56.77           Kochab         137°18.63         74°2.75           Zuben'ubi         136°54.48         -16°9.20           Alphecca         126°2.46         26°37.42           Antares         112°14.16         -26°29.47           Attria         107°6.91         -69°4.37           Sabik         102°1.24         -15°45.50      <			-59° 35.93
Alphard 217° 46.68 -8° 46.53 Regulus 207° 33.22 11° 50.25 Dubhe 193° 39.37 61° 36.71 Denebola 182° 23.64 14° 25.42 Gienah 175° 42.23 -17° 41.49 Acrux 172° 58.37 -63° 14.99 Alioth 166° 11.54 55° 49.07 Spica 158° 20.87 -11° 18.09 Alkaid 152° 50.68 49° 10.88 Hadar 148° 33.84 -60° 30.16 Arcturus 145° 46.59 19° 2.61 Rigil Kent. 139° 38.15 -60° 56.77 Kochab 137° 18.63 74° 2.75 Zuben'ubi 136° 54.48 -16° 9.20 Alphecca 126° 2.46 26° 37.42 Antares 112° 14.16 -26° 29.47 Atria 107° 6.91 -69° 4.37 Sabik 102° 1.24 -15° 45.50 Shaula 96° 8.56 -37° 7.32 Rasalhague 95° 57.27 12° 32.30 Eltanin 90° 41.27 51° 28.85 Kaus Aust. 83° 30.81 -34° 22.26 Nunki 75° 46.21 -26° 15.78 Altair 61° 58.78 8° 56.14 Peacock 53° 3.89 -56° 38.76 Deneb 49° 25.00 45° 22.16 Enif 33° 37.77 Al Na'ir 27° 31.66 -46° 49.79 Fomalhaut 15° 13.48 -29° 28.86 Markab 13° 28.97 15° 20.69  May 07 Thu Venus 285° 50.23 13.58 Mars 340° 19.08 10:19 Jupiter 248° 21.94 16:21 Saturn 350° 7.56 09:35  May 08 Fri SHA Mer.pass Venus 284° 31.87 13.59 Jupiter 248° 31.87 13.59 Jupiter 248° 21.94 16:21 Saturn 350° 1.54 09:35  May 09 Sat SHA Mer.pass Venus 283° 13.36 14:01 Mars 339° 36.50 10:18 Jupiter 248° 21.94 16:21 Saturn 350° 1.54 09:35  May 09 Sat SHA Mer.pass Venus 283° 13.36 14:01 Mars 339° 36.50 10:18 Jupiter 248° 21.94 16:21 Saturn 350° 1.54 09:35  May 09 Sat SHA Mer.pass Venus 283° 13.36 14:01 Saturn 350° 5.55 09:32			-43°32.63
Regulus         207° 33.22         11° 50.25           Dubhe         193° 39.37         61° 36.71           Denebola         182° 23.64         14° 25.42           Gienah         175° 42.23         -17° 41.49           Acrux         172° 58.37         -63° 14.98           Gacrux         171° 49.99         -57° 15.91           Alioth         166° 11.54         55° 49.07           Alkaid         152° 50.68         49° 10.88           Hadar         148° 33.84         -60° 30.16           Menkent         147° 55.95         -36° 30.14           Arcturus         145° 46.59         19° 2.61           Rigil Kent.         139° 38.15         -60° 56.75           Kochab         137° 18.63         74° 2.75           Zuben'ubi         136° 54.48         -16° 9.20           Alphecca         126° 2.46         26° 37.42           Antares         112° 14.16         -26° 29.47           Atria         107° 6.91         -69° 4.37           Sabik         102° 1.24         -15° 45.50           Shaula         96° 8.56         -37° 7.32           Rasalhague         95° 57.27         12° 32.30           Rasalhague         95° 57.27			
Dubhe         193° 39.37         61° 36.71           Denebola         182° 23.64         14° 25.42           Gienah         175° 42.23         -17° 41.49           Acrux         171° 49.99         -57° 15.91           Alioth         166° 11.54         55° 49.07           Alkaid         152° 50.68         49° 10.88           Hadar         148° 33.84         -60° 30.16           Menkent         147° 55.95         -36° 30.14           Arcturus         145° 46.59         19° 2.61           Kochab         137° 18.63         74° 2.75           Zuben'ubi         136° 54.48         -16° 9.20           Alphecca         126° 2.46         26° 37.42           Antares         112° 14.16         -26° 29.47           Atria         107° 6.91         -69° 4.37           Sabik         102° 1.24         -15° 45.50           Shaula         96° 8.56         -37° 7.32           Rasalhague         95° 57.27         12° 32.30           Eltanin         90° 41.27         51° 28.85           Kaus Aust.         83° 30.81         -34° 22.24           Nunki         75° 46.21         -26° 15.78           Altair         61° 58.78			
Denebola	0		
Gienah 175°42.23 -17°41.49° Acrux 172°58.37 -63°14.98° Gacrux 171°49.99 -57°15.91° Alioth 166°11.54 55°49.07° Spica 158°20.87 -11°18.09° Alkaid 152°50.68 49°10.88° Hadar 148°33.84 -60°30.16° Menkent 147°55.95 -36°30.14° Arcturus 145°46.59 19°2.61° Rigil Kent. 139°38.15 -60°56.77° Kochab 137°18.63 74°2.75° Zuben'ubi 136°54.48 -16°9.20° Alphecca 126°2.46 26°37.42° Antares 112°14.16 -26°29.47° Atria 107°6.91 -69°4.37° Sabik 102°1.24 -15°45.50° Shaula 96°8.56 -37°7.32° Rasalhague 95°57.27 12°32.30° Eltanin 90°41.27 51°28.88° Kaus Aust. 83°30.81 -34°22.24° Vega 80°32.22 38°48.22° Nunki 75°46.21 -26°15.78° Altair 61°58.78 8°56.14° Peacock 53°3.89 -56°38.76° Deneb 49°25.00 45°22.16° Enif 33°37.77 9°59.62° Al Na'ir 27°31.66 -46°49.79° Fomalhaut 15°13.48 -29°28.86° Scheat 13°44.32 28°13.36° Markab 13°28.97 15°20.69°  May 07 Thu SHA Mer.pass Venus 284°31.87 13:59° May 08 Fri SHA Mer.pass Venus 284°31.87 13:59° Mars 339°36.50 10:18° Jupiter 248°21.94 16:21° Saturn 350°7.56 09:33°  May 09 Sat SHA Mer.pass Venus 283°13.36 14:01° Mars 338°53.89 10:17° Saturn 349°55.55 09:32°  Horizontal parallax Venus: 0.1			
Gacrux 171°49.99 -57°15.91 Alioth 166°11.54 55°49.07 Spica 158°20.87 -11°18.09 Alkaid 152°50.68 49°10.88 Hadar 148°33.84 -60°30.16 Menkent 147°55.95 -36°30.14 Arcturus 145°46.59 19°2.61 Rigil Kent. 139°38.15 -60°56.77 Kochab 137°18.63 74°2.75 Zuben'ubi 136°54.48 -16°9.20 Alphecca 126°2.46 26°37.42 Antares 112°14.16 -26°29.47 Atria 107°6.91 -69°4.37 Sabik 102°1.24 -15°45.50 Shaula 96°8.56 -37°7.32 Eltanin 90°41.27 51°28.85 Kaus Aust. 83°30.81 -34°22.24 Nunki 75°46.21 -26°15.78 Altair 61°58.78 8°56.14 Peacock 53°3.89 -56°38.76 Deneb 49°25.00 45°22.16 Enif 33°37.77 9°59.62 Al Na'ir 27°31.66 -46°49.79 Fomalhaut 15°13.48 -29°28.86 Scheat 13°44.32 28°13.36 Markab 13°28.97 15°20.69  May 07 Thu Venus 285°50.23 13:58 Mars 340°19.08 10:19 Jupiter 248°31.69 16:24 Saturn 350°7.56 09:35  May 08 Fri SHA Mer.pass Venus 284°31.87 13:59 Mars 339°36.50 10:18 Jupiter 248°21.94 16:21 Saturn 350°1.54 09:35  May 09 Sat SHA Mer.pass Venus 283°13.36 14:01 Mars 338°53.89 10:17 Saturn 349°55.55 09:32  Horizontal parallax Venus: 0.1	Gienah	$175^{\circ}42.23$	-17°41.49
Alioth 166°11.54 55°49.07 Spica 158°20.87 -11°18.09 Alkaid 152°50.68 49°10.88 Hadar 148°33.84 -60°30.16 Menkent 147°55.95 -36°30.14 Arcturus 145°46.59 19°2.61 Rigil Kent. 139°38.15 -60°56.77 Kochab 137°18.63 74°2.75 Zuben'ubi 136°54.48 -16°9.20 Alphecca 126°2.46 26°37.42 Antares 112°14.16 -26°29.47 Atria 107°6.91 -69°4.37 Sabik 102°1.24 -15°45.50 Shaula 96°8.56 -37°7.32 Rasalhague 95°57.27 12°32.30 Eltanin 90°41.27 51°28.85 Kaus Aust. 83°30.81 -34°22.24 Nunki 75°46.21 -26°15.78 Altair 61°58.78 8°56.14 Peacock 53°3.89 -56°33.77 Al Na'ir 27°31.66 -46°49.79 Fomalhaut 15°13.48 -29°28.86 Scheat 13°44.32 28°13.36 Markab 13°28.97 15°20.69  May 07 Thu SHA Mer.pass Mars 340°19.08 10:19 Jupiter 248°31.69 16:24 Saturn 350°7.56 09:33  May 08 Fri SHA Mer.pass Venus 284°31.87 13:59 Mars 339°36.50 10:18 Jupiter 248°21.94 16:21 Saturn 350°1.54 09:35  May 09 Sat SHA Mer.pass Venus 283°13.36 14:01 Mars 338°53.89 10:17 Saturn 349°55.55 09:32			-63°14.98
Spica 158°20.87 -11°18.09 Alkaid 152°50.68 49°10.88 Hadar 148°33.84 -60°30.16 Menkent 147°55.95 -36°30.14 Arcturus 145°46.59 19°2.61 Rigil Kent. 139°38.15 -60°56.77 Kochab 137°18.63 74°2.75 Zuben'ubi 136°54.48 -16°9.20 Alphecca 126°2.46 26°37.42 Antares 112°14.16 -26°29.47 Atria 107°6.91 -69°4.37 Sabik 102°1.24 -15°45.50 Shaula 96°8.56 -37°7.33 Eltanin 90°41.27 51°28.85 Kaus Aust. 83°30.81 -34°22.24 Nunki 75°46.21 -26°15.78 Altair 61°58.78 8°56.14 Peacock 53°3.89 -56°38.77 Al Na'ir 27°31.66 -46°49.79 Fomalhaut 15°13.48 -29°28.86 Scheat 13°44.32 28°13.36 Markab 13°28.97 15°20.69  May 07 Thu SHA Mer.pass Mars 340°19.08 10:19 Jupiter 248°31.69 16:24 Saturn 350°7.56 09:33  May 08 Fri SHA Mer.pass Venus 284°31.87 13:59 Mars 339°36.50 10:18 Jupiter 248°21.94 16:21 Saturn 350°1.54 09:35  May 09 Sat SHA Mer.pass Venus 283°13.36 14:01 Mars 338°53.89 10:17 Saturn 349°55.55 09:33	!		
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Kochab         137° 18.63         74°2.75           Zuben'ubi         136° 54.48         -16° 9.20           Alphecca         126° 2.46         26° 37.42           Antares         112° 14.16         -26° 29.47           Atria         107° 6.91         -69° 4.37           Sabik         102° 1.24         -15° 45.50           Shaula         96° 8.56         -37° 7.32           Rasalhague         95° 57.27         12° 32.30           Eltanin         90° 41.27         51° 28.85           Kaus Aust.         83° 30.81         -34° 22.24           Vega         80° 32.22         38° 48.22           Nunki         75° 46.21         -26° 15.78           Altair         61° 58.78         8° 56.14           Peacock         53° 3.89         -56° 38.76           Deneb         49° 25.00         45° 22.16           Enif         33° 37.77         9° 59.62           Al Na'ir         27° 31.66         -46° 49.75           Fomalhaut         15° 13.48         -29° 28.86           Scheat         13° 44.32         28° 13.36           Markab         13° 28.97         15° 20.69           May 07 Thu         SHA         Mer.pass			19°2.61
Zuben'ubi         136°54.48         -16°9.20           Alphecca         126°2.46         26°37.42           Antares         112°14.16         -26°29.47           Atria         107°6.91         -69°4.37           Sabik         102°1.24         -15°45.50           Shaula         96°8.56         -37°7.32           Rasalhague         95°57.27         12°32.30           Eltanin         90°41.27         51°28.85           Kaus Aust.         83°30.81         -34°22.24           Vega         80°32.22         38°48.22           Nunki         75°46.21         -26°15.78           Altair         61°58.78         8°56.14           Peacock         53°3.89         -56°38.76           Deneb         49°25.00         45°22.16           Enif         33°37.77         9°59.62           Al Na'ir         27°31.66         -46°49.79           Fomalhaut         15°13.48         -29°28.86           Scheat         13°44.32         28°13.36           Markab         13°28.97         15°20.69           May 07 Thu         SHA         Mer.pass           Venus         288°50.23         13.58           Mars	_		
Alphecca 126°2.46 26°37.42 Antares 112°14.16 -26°29.47 Atria 107°6.91 -69°4.37 Sabik 102°1.24 -15°45.50 Shaula 96°8.56 -37°7.32 Rasalhague 95°57.27 12°32.30 Eltanin 90°41.27 51°28.85 Kaus Aust. 83°30.81 -34°22.24 Vega 80°32.22 38°48.22 Nunki 75°46.21 -26°15.78 Altair 61°58.78 8°56.14 Peacock 53°3.89 -56°38.76 Deneb 49°25.00 45°22.16 Enif 33°37.77 9°59.62 Al Na'ir 27°31.66 -46°49.79 Fomalhaut 15°13.48 -29°28.86 Scheat 13°44.32 28°13.36 Markab 13°28.97 15°20.69  May 07 Thu SHA Mer.pass Mars 340°19.08 10:19 Jupiter 248°31.69 16:24 Saturn 350°7.56 09:33  May 08 Fri SHA Mer.pass Venus 284°31.87 13:59 Mars 339°36.50 10:18 Jupiter 248°21.94 16:21 Saturn 350°1.54 09:35  May 09 Sat SHA Mer.pass Venus 283°13.36 14:01 Mars 338°53.89 10:17 Saturn 349°55.55 09:32  Horizontal parallax Venus: 0.1	l		
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Sabik         102°1.24         -15°45.50           Shaula         96°8.56         -37°7.32           Rasalhague         95°57.27         12°32.30           Eltanin         90°41.27         51°28.85           Kaus Aust.         83°30.81         -34°22.24           Vega         80°32.22         38°48.22           Nunki         75°46.21         -26°15.78           Altair         61°58.78         8°56.14           Peacock         53°3.89         -56°38.76           Deneb         49°25.00         45°22.16           Enif         33°37.77         9°59.62           Al Na'ir         27°31.66         -46°49.79           Fomalhaut         15°13.48         -29°28.86           Scheat         13°44.32         28°13.36           Markab         13°28.97         15°20.09           May 07 Thu         SHA         Mer.pass           Venus         285°50.23         13:58           Mars         340°19.08         10:19           Jupiter         248°31.87         13:58           Venus         284°31.87         13:59           Mars         339°36.50         10:18           Jupiter         248°21.94			-26°29.47
Shaula Rasalhague         96°8.56 95°57.27         -37°7.32 12°32.30           Eltanin         90°41.27         51°28.85           Kaus Aust.         83°30.81         -34°22.24           Vega         80°32.22         38°48.22           Nunki         75°46.21         -26°15.78           Altair         61°58.78         8°56.14           Peacock         53°3.89         -56°38.76           Deneb         49°25.00         45°22.16           Enif         33°37.77         9°59.62           Al Na'ir         27°31.66         -46°49.79           Fomalhaut         15°13.48         -29°28.86           Scheat         13°44.32         28°13.36           Markab         13°28.97         15°20.69           May 07 Thu         SHA         Mer.pass           Mars         340°19.08         10:18           Jupiter         248°31.69         16:24           Saturn         350°7.56         09:39           May 08 Fri         SHA         Mer.pass           Venus         284°31.87         13:59           Mars         339°36.50         10:18           Jupiter         248°21.94         16:21           Saturn	Atria		-69°4.37
Rasalhague         95°57.27         12°32.30           Eltanin         90°41.27         51°28.85           Kaus Aust.         83°30.81         -34°22.24           Vega         80°32.22         38°48.22           Nunki         75°46.21         -26°15.78           Altair         61°58.78         8°56.14           Peacock         53°3.89         -56°38.76           Deneb         49°25.00         45°22.16           Enif         33°37.77         9°59.62           Al Na'ir         27°31.66         -46°49.76           Fomalhaut         15°13.48         -29°28.86           Scheat         13°44.32         28°13.36           Markab         13°28.97         15°20.69           May 07 Thu         SHA         Mer.pass           Mars         340°19.08         10:19           Jupiter         248°31.87         13:59           Mars         330°7.56         09:39           May 08 Fri         SHA         Mer.pass           Venus         284°31.87         13:59           Jupiter         248°21.94         16:21           Saturn         350°1.54         09:35           May 09 Sat         SHA	l		
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Kaus Aust.         83° 30.81         -34° 22.24           Vega         80° 32.22         38° 48.22           Nunki         75° 46.21         -26° 15.78           Altair         61° 58.78         8° 56.14           Peacock         53° 3.89         -56° 38.76           Deneb         49° 25.00         45° 22.16           Enif         33° 37.77         9° 59.62           Al Na'ir         27° 31.66         -46° 49.79           Fomalhaut         15° 13.48         -29° 28.86           Scheat         13° 44.32         28° 13.36           Markab         13° 28.97         15° 20.69           May 07 Thu         SHA         Mer.pass           Venus         288° 50.23         13.58           Mars         340° 19.08         10.19           Jupiter         248° 31.87         13.59           Mars         330° 36.50         10.18           Jupiter         248° 31.87         13.59           Mars         339° 36.50         10.18           Jupiter         248° 21.94         16:21           Saturn         350° 1.54         09:35           May 09 Sat         SHA         Mer.pass           Venus			
Vega         80° 32.22         38° 48.22           Nunki         75° 46.21         -26° 15.78           Altair         61° 58.78         8° 56.14           Peacock         53° 3.89         -56° 38.76           Deneb         49° 25.00         45° 22.16           Enif         33° 37.77         9° 59.62           Al Na'ir         27° 31.66         -46° 49.79           Fomalhaut         15° 13.48         -29° 28.86           Scheat         13° 44.32         28° 13.36           Markab         13° 28.97         15° 20.69           May 07 Thu         SHA         Mer.pass           Jupiter         248° 31.69         10:19           Jupiter         248° 31.69         16:24           Saturn         350° 7.56         09:35           May 08 Fri         SHA         Mer.pass           Jupiter         248° 31.87         13:59           Mars         339° 36.50         10:18           Jupiter         248° 21.94         16:21           Saturn         350° 1.54         09:35           May 09 Sat         SHA         Mer.pass           Venus         283° 13.36         14:01           Mars         <	!		
Altair 61°58.78 8°56.14 Peacock 53°3.89 -56°38.76 Deneb 49°25.00 45°22.16 Enif 33°37.77 9°59.62 Al Na'ir 27°31.66 -46°49.79 Fomalhaut 15°13.48 -29°28.86 Scheat 13°44.32 28°13.36 Markab 13°28.97 15°20.69  May 07 Thu SHA Mer.pass Adv°19.08 10:19 Jupiter 248°31.69 16:24 Saturn 350°7.56 09:39  May 08 Fri SHA Mer.pass Venus 284°31.87 13:58 Mars 340°19.08 10:19 Jupiter 248°31.69 16:24 Saturn 350°7.56 09:39  May 08 Fri SHA Mer.pass Venus 284°31.87 13:59 Mars 339°36.50 10:18 Jupiter 248°21.94 16:21 Saturn 350°1.54 09:35  May 09 Sat SHA Mer.pass Venus 283°13.36 14:01 Mars 338°53.89 10:17 Jupiter 248°12.07 16:18 Saturn 349°55.55 09:32  Horizontal parallax Venus: 0.1			38°48.22
Peacock         53°3.89         -56°38.76           Deneb         49°25.00         45°22.16           Enif         33°37.77         9°59.62           Al Na'ir         27°31.66         -46°49.79           Fomalhaut         15°13.48         -29°28.86           Scheat         13°44.32         28°13.36           Markab         13°28.97         15°20.69           May 07 Thu         SHA         Mer.pass           Venus         285°50.23         13:58           Mars         340°19.08         10:19           Jupiter         248°31.69         16:24           Saturn         350°7.56         09:39           May 08 Fri         SHA         Mer.pass           Venus         284°31.87         13:59           Jupiter         248°21.94         16:21           Saturn         350°1.54         09:35           May 09 Sat         SHA         Mer.pass           Venus         283°13.36         14:01           Mars         338°53.89         10:17           Jupiter         248°12.07         16:18           Saturn         349°55.55         09:32           Horizontal parallax         Venus:			-26° 15.78
Deneb	l		
Enif   33°37.77   9°59.62     Al Na'ir   27°31.66   -46°49.79     Fomalhaut   15°13.48   -29°28.86     Scheat   13°44.32   28°13.36     Markab   13°28.97   15°20.69     May 07 Thu   SHA   Mer.pass     Wenus   248°50.23   13.58     Mars   340°19.08   10.19     Jupiter   248°31.69   16:24     Saturn   350°7.56   09:39     May 08 Fri   SHA   Mer.pass     Venus   284°31.87   13:59     Mars   339°36.50   10:18     Jupiter   248°21.94   16:21     Saturn   350°1.54   09:35     May 09 Sat   SHA   Mer.pass     Venus   283°13.36   14:01     Mars   338°53.89   10:17     Jupiter   248°12.07   16:18     Saturn   349°55.55   09:32     Horizontal parallax   Venus:   0.1	!		
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Scheat Markab         13° 44.32 13° 28.97         28° 13.36 15° 20.69           May 07 Thu Venus         SHA 288° 50.23 340° 19.08         Mer.pass 10:19 16:24 350° 7.56           Jupiter Saturn         248° 31.69 350° 7.56         16:24 09:35           May 08 Fri Venus         SHA 284° 31.87         Mer.pass 13:59 10:18 16:21 248° 21.94           Jupiter Saturn         248° 21.94 350° 1.54         16:21 09:35           May 09 Sat Venus         SHA 283° 13.36         Mer.pass 14:01 14:01 14:01 14:01 14:01 15:16 16:18 5aturn         Mer.pass 10:17 16:18 349° 55.55         09:32           Horizontal parallax Venus:         0.1	!		-29°28.86
May 07 Thu         SHA         Mer.pass           Venus         285°50.23         13:58           Mars         340°19.08         10:19           Jupiter         248°31.69         16:24           Saturn         350°7.56         09:39           May 08 Fri         SHA         Mer.pass           Venus         284°31.87         13:59           Mars         339°36.50         10:18           Jupiter         248°21.94         16:21           Saturn         350°1.54         09:35           May 09 Sat         SHA         Mer.pass           Venus         283°13.36         14:01           Mars         338°53.89         10:17           Jupiter         248°12.07         16:18           Saturn         349°55.55         09:32           Horizontal parallax           Venus:         0.1		$13^{\circ}44.32$	28° 13.36
Venus 285°50.23 13:58 Mars 340°19.08 10:19 Jupiter 248°31.69 16:24 Saturn 350°7.56 09:39  May 08 Fri SHA Mer.pass Venus 284°31.87 13:59 Mars 339°36.50 10:18 Jupiter 248°21.94 16:21 Saturn 350°1.54 09:35  May 09 Sat SHA Mer.pass Venus 283°13.36 14:01 Mars 338°53.89 10:17 Jupiter 248°12.07 16:18 Saturn 349°55.55 09:32  Horizontal parallax Venus: 0.1	Markab	13°28.97	15°20.69
Venus 285°50.23 13:58 Mars 340°19.08 10:19 Jupiter 248°31.69 16:24 Saturn 350°7.56 09:39  May 08 Fri SHA Mer.pass Venus 284°31.87 13:59 Mars 339°36.50 10:18 Jupiter 248°21.94 16:21 Saturn 350°1.54 09:35  May 09 Sat SHA Mer.pass Venus 283°13.36 14:01 Mars 338°53.89 10:17 Jupiter 248°12.07 16:18 Saturn 349°55.55 09:32  Horizontal parallax Venus: 0.1	May 07 Thu	SHA	Mer.pass
Jupiter Saturn         248° 31.69         16:24           Saturn         350° 7.56         09:39           May 08 Fri Venus         SHA         Mer.pass           Venus         284° 31.87         13:59           Mars         339° 36.50         10:18           Jupiter         248° 21.94         16:21           Saturn         350° 1.54         09:35           May 09 Sat Venus         SHA         Mer.pass           Venus         283° 13.36         14:01           Mars         338° 53.89         10:17           Jupiter         248° 12.07         16:18           Saturn         349° 55.55         09:32           Horizontal parallax           Venus:         0.1	Venus	$285^{\circ}50.23$	13:58
Saturn         350°7.56         09:39           May 08 Fri         SHA         Mer.pass           Venus         284°31.87         13:59           Mars         339°36.50         10:18           Jupiter         248°21.94         16:21           Saturn         350°1.54         09:35           May 09 Sat         SHA         Mer.pass           Venus         283°13.36         14:01           Mars         338°53.89         10:17           Jupiter         248°12.07         16:18           Saturn         349°55.55         09:32           Horizontal parallax           Venus:         0.1			10:19
May 08 Fri         SHA         Mer.pass           Venus         284° 31.87         13:59           Mars         339° 36.50         10:18           Jupiter         248° 21.94         16:21           Saturn         350° 1.54         09:35           May 09 Sat         SHA         Mer.pass           Venus         283° 13.36         14:01           Mars         338° 53.89         10:17           Jupiter         248° 12.07         16:18           Saturn         349° 55.55         09:32           Horizontal parallax           Venus:         0.1			16:24
Venus         284° 31.87         13:59           Mars         339° 36.50         10:18           Jupiter         248° 21.94         16:21           Saturn         350° 1.54         09:35           May         09 Sat         SHA         Mer.pass           Venus         283° 13.36         14:01           Mars         338° 53.89         10:17           Jupiter         248° 12.07         16:18           Saturn         349° 55.55         09:32           Horizontal parallax           Venus:         0.1	Saturn	35U~ /.56	U9:39
Mars         339° 36.50         10:18           Jupiter         248° 21.94         16:21           Saturn         350° 1.54         09:35           May 09 Sat         SHA         Mer.pass           Venus         283° 13.36         14:01           Mars         338° 53.89         10:17           Jupiter         248° 12.07         16:18           Saturn         349° 55.55         09:32           Horizontal parallax           Venus:         0.1			Mer.pass
Jupiter   248° 21.94   16:21		284°31.87	13:59
Saturn         350°1.54         09:35           May 09 Sat         SHA         Mer.pass           Venus         283°13.36         14:01           Mars         338°53.89         10:17           Jupiter         248°12.07         16:18           Saturn         349°55.55         09:32           Horizontal parallax           Venus:         0.1	!		
May 09 Sat         SHA         Mer.pass           Venus         283° 13.36         14:01           Mars         338° 53.89         10:17           Jupiter         248° 12.07         16:18           Saturn         349° 55.55         09:32           Horizontal parallax           Venus:         0.1			09:35
Venus 283°13.36 14:01 Mars 338°53.89 10:17 Jupiter 248°12.07 16:18 Saturn 349°55.55 09:32  Horizontal parallax Venus: 0.1			
Mars 338°53.89 10:17 Jupiter 248°12.07 16:18 Saturn 349°55.55 09:32  Horizontal parallax Venus: 0.1			14:01
Jupiter 248° 12.07 16:18 Saturn 349° 55.55 09:32  Horizontal parallax Venus: 0.1	!		10:17
Horizontal parallax Venus: 0.1	l	$248^{\circ}12.07$	16:18
Venus: 0.1	Saturn	349°55.55	09:32
Venus: 0.1	Horizon	ıtal parallax	
Mars: 0.1		Venus:	
·	I	Mars:	0.1

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°51.59	$N16^{\circ}45.48$	298°51.55	10.7'	\$26°36.49	-4.9'	54.2'
1	195°51.64	46.18	313°21.22	10.7'	26°31.55	-5.1'	54.3'
2	210°51.68 225°51.72	46.87 •• 47.56	327°50.92 342°20.66	10.7' 10.8'	26°26.49 26°21.29	-5.2' -5.3'	54.3' 54.3'
4	240°51.76	48.25	356°50.44	10.8	26°15.98	-5.4'	54.3'
5	255°51.80	48.94	11°20.25	10.9'	26°10.53	-5.6'	54.3'
6	270°51.84	N16°49.63	25°50.11	10.9'	S26°4.97	-5.7'	54.3'
7	285°51.89	50.32	40°20.00 54°49.93	10.9'	25°59.27 25°53.46	-5.8'	54.3'
8 9	300°51.93 315°51.97	51.01 •• 51.70	69°19.90	11.0' 11.0'	25°53.46 25°47.52	-5.9' -6.1'	54.3' 54.4'
10	330°52.01	52.38	83°49.92	11.1'	25°41.45	-6.2	54.4'
11	345°52.05	53.07	$98^{\circ}19.97$	11.1'	25°35.27	-6.3'	54.4'
12	0°52.09	N16°53.76	112°50.07	11.1'	S25°28.96	-6.4	54.4'
13 14	15°52.13 30°52.16	54.45 55.13	127°20.20 141°50.38	11.2' 11.2'	25°22.53 25°15.98	-6.5' -6.7'	54.4' 54.4'
15	45°52.20	55.13	141 50.38 156°20.61	11.2	25 15.98 25°9.31	-6.8'	54.4' 54.4'
16	60°52.24	56.50	170°50.87	11.3'	25°2.52	-6.9'	54.5'
17	75°52.28	57.19	185°21.18	11.4'	24°55.61	-7.0'	54.5'
18	90°52.32	N16°57.87	199°51.53	11.4'	\$24°48.58	-7.1'	54.5'
19 20	105°52.36 120°52.39	58.55 59.24	214°21.93 228°52.37	11.4' 11.5'	24°41.44 24°34.18	-7.3' -7.4'	54.5' 54.5'
21	135°52.43	16°59.92	243°22.86	11.5'	24° 26.80	-7. <del>4</del> -7.5'	54.5
22	150°52.47	17°0.60	257°53.39	11.6'	24°19.30	-7.6'	54.6'
23	$165^{\circ}52.50$	1.28	$272^{\circ}23.96$	11.6'	24°11.69	-7.7'	54.6'
	SD = 15.8'	d = 0.7'		SI	D = 14.8'		
Fri 0	<b>GHA</b> 180° 52.54	<b>Dec</b> N17°1.96	<b>GHA</b> 286°54.58	u 11.7'	Dec \$24°3.96	d -7.8'	<b>HP</b> 54.6'
1	195°52.58	2.65	301°25.25	11.7'	23°56.12	-7.8 -8.0'	54.6'
2	210°52.61	3.33	315°55.96	11.8'	23°48.16	-8.1'	54.6'
3	225°52.65	• • 4.01	330°26.72	11.8'	23°40.09	-8.2'	54.6'
4	240°52.68 255°52.72	4.68 5.36	344°57.52 359°28.37	11.8' 11.9'	23°31.91 23°23.62	-8.3'	54.7' 54.7'
5 6	255 52.72 270°52.75	5.30 N17°6.04	13°59.26	11.9'	523°15.22	-8.4' -8.5'	54.7'
7	285°52.79	6.72	28°30.20	12.0'	23°6.70	-8.6'	54.7'
8	300°52.82	7.40	43°1.19	12.0'	22°58.07	-8.7'	54.7'
9	315°52.86	• • 8.07	57°32.22	12.1'	22°49.34	-8.8'	54.8'
10 11	330°52.89 345°52.93	8.75 9.42	72°3.30 86°34.42	12.1' 12.2'	22°40.50 22°31.54	-9.0' -9.1'	54.8' 54.8'
12	0°52.96	N17°10.10	101°5.59	12.2'	S22°22.48	-9.2	54.8'
13	15°52.99	10.77	115°36.81	12.3'	$22^{\circ}13.32$	-9.3'	54.8'
14	30°53.03	11.45	130°8.07	12.3'	22°4.04	-9.4'	54.9'
15 16	45°53.06 60°53.09	· · 12.12 12.80	144°39.37 159°10.72	12.4' 12.4'	21°54.67 21°45.18	-9.5' -9.6'	54.9' 54.9'
17	75°53.12	13.47	173°42.12	12.4'	21°35.60	-9.7'	54.9'
18	90°53.15	N17°14.14	188°13.56	12.5'	S21°25.91	-9.8'	55.0'
19	105°53.19	14.81	202°45.04	12.5'	21°16.11	-9.9'	55.0'
20	120°53.22 135°53.25	15.48 •• 16.15	217°16.57 231°48.14	12.6' 12.6'	21°6.22 20°56.22	-10.0' -10.1'	55.0'
21 22	150°53.28	· · 16.15 16.82	246°19.76	12.7'	20° 46.12	-10.1	55.0' 55.1'
23	165°53.31	17.49	260°51.42	12.7'	20°35.92	-10.3	55.1'
	SD = 15.8'	d = 0.7'	-	SI	D = 14.9'		
C-·	CUA	D	CUA		D-:	.1	LID
Sat 0	<b>GHA</b> 180°53.34	<b>Dec</b> N17°18.16	<b>GHA</b> 275°23.12	u 12.7'	<b>Dec</b> \$20°25.62	d -10.4'	<b>HP</b> 55.1'
1	195°53.37	18.83	289°54.87	12.8'	$20^{\circ}15.23$	-10.5'	55.1'
2	210°53.40	19.50	304°26.65	12.8'	20°4.73	-10.6'	55.2'
3	225°53.43	• • 20.17	318°58.48 333°30.35	12.9'	19°54.14 19°43.45	-10.7'	55.2' 55.2'
4 5	240°53.46 255°53.49	20.84 21.50	333°30.35 348°2.27	12.9' 13.0'	19°43.45 19°32.66	-10.8' -10.9'	55.2' 55.2'
6	270°53.52	N17°22.17	2°34.22	13.0'	\$19°21.78	-11.0'	55.3'
7	285°53.55	22.83	17°6.21	13.0'	19°10.81	-11.1'	55.3'
8	300°53.57 315°53.60	23.50	31°38.24	13.1'	18°59.74 18°48.57	-11.2'	55.3'
9 10	315°53.60 330°53.63	· · 24.16 24.83	46°10.32 60°42.43	13.1' 13.1'	18°48.57 18°37.32	-11.3' -11.3'	55.3' 55.4'
11	345°53.66	25.49	75°14.57	13.1	18°25.97	-11.3 -11.4'	55.4'
12	0°53.69	N17°26.16	89°46.76	13.2'	S18°14.53	-11.5'	55.4'
13	15°53.71	26.82	104°18.98	13.3'	18°3.00	-11.6'	55.4'
14 15	30°53.74 45°53.77	27.48 •• 28.14	118°51.24 133°23.54	13.3' 13.3'	17°51.39 17°39.68	-11.7' -11.8'	55.5' 55.5'
16	60°53.79	28.80	133 23.34 147°55.87	13.4'	17 39.06 17°27.88	-11.6 -11.9'	55.5'
17	75°53.82	29.46	162°28.23	13.4'	17°16.00	-12.0'	55.6'
18	90°53.84	N17°30.12	177°0.63	13.4'	\$17°4.03	-12.1'	55.6'
19	105°53.87 120°53.90	30.78	191°33.06 206°5.52	13.5'	16°51.97 16°39.83	-12.1'	55.6'
20 21	120°53.90 135°53.92	31.44 · · 32.10	206°5.52 220°38.02	13.5' 13.5'	16°39.83 16°27.60	-12.2' -12.3'	55.6' 55.7'
22	150°53.94	32.76	235°10.55	13.6'	16° 15.29	-12.4'	55.7'
23	165°53.97	33.42	249°43.11	13.6'	16°2.90	-12.5'	55.7'
	SD = 15.8'	d = 0.7'		SI	D = 15.0'		

	Twilight		Sunrise	Sunset	Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	////	////	00:25	////	////	////
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:19	07:10	07:57	15:55	16:42	17:33

Lat.		Moonris	e		Moonset	:
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°			_			
<b>N</b> 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° 52°	01:01	01:26	01:44	07:31	08:47	10:06
52° 50°	00:46 00:33	01:14 01:03	01:34 01:26	07:46 07:58	08:59 09:09	10:15 10:23
45°	00:33	00:40	01:20	08:25	09:09	10:23
N 40°	00.00	00:40	01:00	08:46	09:31	10:53
N 40 35°		00:21	00:53	08:46	10:03	10:53
30°	23:52		00:40	09:03	10:03	11:15
20°	23:29		00:29	09:10	10:10	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
<b>S</b> 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
<b>S</b> 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° 58°	19:55 19:36	21:16 21:03	22:40 22:31	13:29 13:48	13:46 14:00	13:58 14:08
<b>S</b> 60°	19:36	21:03	22:31	13:48	14:00	14:08
<b>3</b> 00	13.11		22.20	1		11.17
		Sun			Moon	

h	Aries	` Venus	Mars	Jupiter	Saturn
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	227° 48.65	149°43.38 N24°15.91	205°59.92 N08°16.10	115°50.75 N22°18.23	217°38.25 N01°59.71
1	242°51.12	164°42.57 16.26	221°0.61 16.82	130°52.79 18.18	232°40.47 59.81
2	257° 53.58	179°41.75 16.60	236°1.29 17.54	145°54.84 18.12	247°42.69 01°59.91
3	272°56.05	194°40.94 · · 16.94	251°1.98 · · 18.26	160°56.88 · · 18.06	262°44.91 02°0.01
4	287°58.51	209° 40.12 17.28	266°2.67 18.98	175°58.93 18.01	277°47.12 0.11
5	303°0.97	224°39.31 17.62	281°3.36 19.70	191°0.97 17.95	292°49.34 0.20
6	318°3.44	239°38.49 N24°17.96	296°4.04 N08°20.41	206°3.02 N22°17.89	307°51.56 N02°0.30
7	333°5.90	254°37.67 18.30	311°4.73 21.13	221°5.06 17.84	322°53.78 0.40
8	348°8.37	269°36.86 18.63	326°5.42 21.85	236° 7.11 17.78	337°56.00 0.50
9	3° 10.83 18° 13.29	284°36.04 · · 18.97 299°35.22 19.30	341°6.11 · · 22.57 356°6.79 23.29	251°9.15 · · 17.72 266°11.20 17.67	352°58.21 · · 0.59 8°0.43 0.69
10 11	33° 15.76	314°34.41 19.63	11°7.48 24.01	281°13.24 17.61	8°0.43 0.69 23°2.65 0.79
12	48° 18.22	329°33.59 N24°19.97	26°8.17 N08°24.72	296°15.28 N22°17.55	38°4.87 N02°0.89
13	63°20.69	344°32.77 20.30	41°8.85 25.44	311°17.33 17.49	53°7.09 0.99
14	78°23.15	359°31.96 20.62	56°9.54 26.16	326°19.37 17.44	68°9.30 1.08
15	93°25.61	14°31.14 · · 20.95	71°10.23 · · 26.88	341°21.42 · · 17.38	83°11.52 · · 1.18
16	108°28.08	29°30.32 21.28	86° 10.91 27.59	356°23.46 17.32	98°13.74 1.28
17	123°30.54	44°29.50 21.60	101°11.60 28.31	11°25.50 17.27	113°15.96 1.37
18	138°33.01	59°28.69 N24°21.93	116°12.29 N08°29.03	26°27.54 N22°17.21	128°18.18 N02°1.47
19	153°35.47	74°27.87 22.25	131°12.98 29.74 146°13.66 30.46	41°29.59 17.15	143°20.40 1.57 158°22.61 1.67
20 21	168° 37.94 183° 40.40	89°27.05 22.57 104°26.23 •• 22.89	146°13.66 30.46 161°14.35 · 31.18	56°31.63 17.09 71°33.67 · · 17.04	
22	198° 42.86	119° 25.41 23.21	176° 15.04 31.89	86°35.71 16.98	173°24.83 · · 1.76 188°27.05 1.86
23	213° 45.33	134° 24.59 23.53	191° 15.72 32.61	101°37.75 16.92	203°29.27 1.96
Mer.p	bass. 08:47	ν-0.8' d0.3' m-3.92	ν0.7' d0.7' m1.24	ν2.0′ d-0.1′ m-1.97	ν2.2' d0.1' m0.92
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	228° 47.79	149°23.77 N24°23.85	206°16.41 N08°33.33	116°39.80 N22°16.86	218°31.49 N02°2.06
1	243°50.26	164°22.95 24.16 179°22.13 24.48	221°17.10 34.04 236°17.78 34.76	131°41.84 16.81 146°43.88 16.75	233°33.71 2.15 248°35.93 2.25
2	258° 52.72 273° 55.18	179°22.13 24.48 194°21.31 · · 24.79	236°17.78 34.76 251°18.47 · · 35.47	146°43.88 16.75 161°45.92 · · 16.69	248°35.93 2.25 263°38.15 · · 2.35
4	288° 57.65	209° 20.50 25.10	266° 19.16 36.19	176°47.96 16.63	278°40.37 2.44
5	304°0.11	224°19.68 25.41	281°19.84 36.90	191°50.00 16.58	293°42.59 2.54
6	319°2.58	239°18.85 N24°25.72	296°20.53 N08°37.62	206°52.04 N22°16.52	308°44.81 N02°2.64
7	334°5.04	254° 18.03 26.03	311°21.21 38.33	221°54.08 16.46	323°47.03 2.73
8	349°7.50	269°17.21 26.34	326°21.90 39.05	236°56.12 16.40	338°49.25 2.83
9	4°9.97	284°16.39 · · 26.64	341°22.59 · · 39.76	251°58.16 · · 16.34	353°51.47 · · 2.93
10	19° 12.43	299°15.57 26.95	356°23.27 40.47	267° 0.20 16.29	8°53.68 3.02
11 12	34°14.90 49°17.36	314°14.75 27.25 329°13.93 N24°27.55	11°23.96 41.19 26°24.65 N08°41.90	282°2.24 16.23 297°4.28 N22°16.17	23°55.90 3.12 38°58.12 N02°3.22
13	64° 19.82	344°13.11 27.85	41°25.33 42.62	312° 6.32 16.11	54°0.34 3.31
14	79°22.29	359°12.29 28.15	56°26.02 43.33	327°8.36 16.05	69°2.56 3.41
15	94°24.75	14°11.47 · · 28.45	71°26.70 · · 44.04	342°10.40 · · 16.00	84°4.78 · · 3.51
16	109°27.22	29°10.64 28.75	86°27.39 44.76	357°12.44 15.94	99°7.01 3.60
17	124°29.68	44°9.82 29.05	101°28.08 45.47	12°14.47 15.88	114°9.23 3.70
18	139°32.14	59°9.00 N24°29.34	116°28.76 N08°46.18	27°16.51 N22°15.82	129°11.45 N02°3.80
19	154°34.61	74°8.18 29.64	131°29.45 46.89	42°18.55 15.76	
20	169°37.07 184°39.54	89°7.36 29.93 104°6.53 · · · 30.22	146°30.13 47.61 161°30.82 • 48.32	57°20.59 15.70 72°22.63 · · 15.64	159°15.89 3.99
21 22	199° 42.00	104°6.53 · · · 30.22 119°5.71 30.51	176°31.51 49.03	72°22.63 · · 15.64 87°24.66     15.59	174°18.11 · · 4.09 189°20.33 4.18
23	214° 44.47	134°4.89 30.80	191°32.19 49.74	102°26.70 15.53	204°22.55 4.28
Mer.p	bass. 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°46.93	149°4.06 N24°31.09	206°32.88 N08°50.46	117°28.74 N22°15.47	219°24.77 N02°4.37
1	244°49.39	164°3.24 31.37	221°33.56 51.17	132°30.77 15.41	234°26.99 4.47
2	259°51.86	179°2.42 31.66	236°34.25 51.88	147°32.81 15.35	249°29.21 4.57
3 4	274° 54.32 289° 56.79	194°1.59 · · 31.94 209°0.77 32.23	251° 34.93 · · 52.59 266° 35.62 53.30	162°34.85 · · 15.29 177°36.88	264°31.43 · · 4.66 279°33.65 4.76
4 5	304° 59.25	209 0.77 32.23 223°59.95 32.51	281° 36.30 54.01	177 30.88 15.23 192°38.92 15.18	294°35.88 4.85
6	320°1.71	238°59.12 N24°32.79	296°36.99 N08°54.72	207°40.96 N22°15.12	309°38.10 N02°4.95
7	335°4.18	253°58.30 33.07	311°37.67 55.43	222°42.99 15.06	324°40.32 5.05
8	350°6.64	268° 57.47 33.35	326°38.36 56.14	237°45.03 15.00	339°42.54 5.14
9	5°9.11	283°56.65 · · 33.62	341°39.05 · · 56.85	252°47.06 · · 14.94	354°44.76 · · 5.24
10	20° 11.57	298°55.82 33.90	356° 39.73 57.56	267°49.10 14.88	9°46.98 5.33
11	35° 14.03	313°55.00 34.17	11°40.42 58.27	282°51.13 14.82	24°49.20 5.43
12	50°16.50	328°54.18 N24°34.45	26°41.10 N08°58.98	297°53.17 N22°14.76	39°51.43 N02°5.52
13	65°18.96	343°53.35 34.72	41°41.79 08°59.69	312°55.20 14.70	54°53.65 5.62
14 15	80°21.43 95°23.89	358°52.53 34.99 13°51.70 · · 35.26	56°42.47 09°0.40 71°43.16 · · 1.11	327°57.24 14.64 342°59.27 · · 14.58	69°55.87 5.72 \( \subseteq 84°58.09 \cdot \cdot \cdot 5.81 \)
15 16	95 23.89 110°26.35	28° 50.87 35.53	86° 43.84 1.82	358° 1.31 14.52	100°0.31 5.91
17	110 20.33 125°28.82	43°50.05 35.80	101°44.53 2.53	13° 3.34 14.47	115°2.54 6.00
18	140°31.28	58°49.22 N24°36.06	116°45.21 N09°3.24	28°5.37 N22°14.41	130°4.76 N02°6.10
19	155°33.75	73°48.40 36.33	131°45.90 3.95	43°7.41 14.35	145°6.98 6.19
20	170°36.21	88° 47.57 36.59	146° 46.58 4.65	58° 9.44 14.29	160°9.20 6.29
21	185°38.67	103°46.75 · · 36.85	161°47.27 · · 5.36	73°11.47 · · 14.23	175°11.43 · · 6.38
22	200°41.14	118°45.92 37.11	176° 47.95 6.07	88°13.51 14.17	190°13.65 6.48
23	215°43.60	133°45.09 37.37	191°48.63 6.78	103°15.54 14.11	205°15.87 6.57
Mer.p	bass. 08:39	$\nu$ -0.8 $'$ d0.3 $'$ m-3.92	$ u 0.7' \; d0.7' \; \mathrm{m}1.24$	$ u 2.0' \ d ext{-}0.1' \  ext{m-}1.96$	$\nu 2.2' \ d0.1' \ m0.92$

	Stars	
	SHA	Dec
Alpheratz	357°33.89	29°14.00
Ankaa Schedar	353°6.37	-42°9.63
Schedar Diphda	349°30.25 348°46.46	56° 40.72 -17° 50.49
Achernar	$335^{\circ}19.90$	-57°6.04
Hamal	327°50.30	23°35.13
Polaris Acamar	313°58.24 315°11.37	89°22.46 -40°11.93
Menkar	314°5.33	4° 11.53
Mirfak	308°27.20	49°57.24
Aldebaran Rigel	290°38.70 281°3.12	16°33.69 -8°10.35
Capella	280°20.70	46°1.50
Bellatrix	278°22.00	6°22.36
Elnath Alnilam	278°0.82 275°36.90	28°37.77 -1°11.18
Betelgeuse	270°51.17	7°24.66
Canopus	263°52.31	-52°42.76
Sirius Adhara	258°25.51 255°5.24	-16°45.27 -29°0.65
Procyon	244°49.85	5°9.37
Pollux	243°16.14	27°57.79
Avior Suhail	234°14.49 222°45.56	-59°35.92 -43°32.62
Miaplacidus	221°38.15	-43 32.02 -69°49.83
Alphard	217°46.69	-8°46.53
Regulus	207°33.23	11°50.25
Dubhe Denebola	193°39.39 182°23.65	61°36.71 14°25.43
Gienah	175°42.24	-17°41.49
Acrux	172°58.38	-63°14.99
Gacrux Alioth	171°50.01 166°11.55	-57° 15.92 55° 49.08
Spica	158°20.87	-11° 18.09
Alkaid	152°50.68	49° 10.90
Hadar Menkent	148°33.84 147°55.95	-60°30.17 -36°30.14
Arcturus	145°46.58	19°2.61
Rigil Kent.	139°38.14	-60°56.79
Kochab Zuben'ubi	137°18.63 136°54.47	74°2.77 -16°9.21
Alphecca	126°2.45	26° 37.43
Antares	112°14.14	-26°29.47
Atria Sabik	107°6.87 102°1.22	-69°4.39 -15°45.50
Shaula	96°8.54	-37°7.33
Rasalhague	95°57.25	12°32.30
Eltanin Kaus Aust.	90°41.25 83°30.78	51°28.86 -34°22.25
Vega	80°32.20	38° 48.23
Nunki	75°46.18	-26° 15.78
Altair	61°58.76 53°3.85	8° 56.15 -56° 38.76
Peacock Deneb	53° 3.85 49° 24.97	-56° 38.76 45° 22.17
Enif	33°37.75	9°59.63
Al Na'ir Fomalhaut	27°31.63 15°13.46	-46°49.79 -29°28.84
Scheat	13°44.30	28° 13.36
Markab	13°28.95	15°20.70
May 10 Sun	SHA	Mer.pass
Venus	281°54.73	14:02
Mars Jupiter	338°11.27 248°2.09	10:16 16:14
Saturn	349°49.60	09:28
May 11 Mon	SHA	Mer.pass
Venus	280°35.98	14:03
Mars	337°28.62	10:14
Jupiter Saturn	247°52.00 349°43.70	16:11 09:25
May 12 Tue Venus	<b>SHA</b> 279°17.13	Mer.pass 14:05
Mars	$336^{\circ}45.95$	10:13
Jupiter	247°41.81	16:08
Saturn	349°37.84	09:21
Horizon	tal parallax Venus:	0.1

Venus: Mars:

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°53.99	N17°34.07	$264^{\circ}15.69$	13.6'	<b>S</b> 15°50.42	-12.6'	55.8'
1	195°54.02	34.73	278°48.31	13.6'	15° 37.86	-12.6'	55.8'
2	210°54.04 225°54.06	35.39 •• 36.04	293°20.95 307°53.62	13.7' 13.7'	15°25.22 15°12.50	-12.7' -12.8'	55.8' 55.9'
4	240°54.09	36.70	322° 26.32	13.7'	14°59.70	-12.9'	55.9'
5	255°54.11	37.35	336° 59.05	13.7'	14°46.82	-13.0'	55.9'
6	270°54.13	N17°38.01	351°31.80	13.8'	S14°33.86	-13.0'	55.9'
7	285°54.16 300°54.18	38.66 39.31	6°4.57 20°37.36	13.8' 13.8'	14°20.83 14°7.72	-13.1'	56.0'
8 9	300 54.18 315°54.20	· · 39.31	20 37.30 35°10.18	13.8'	14 7.72 13°54.53	-13.2' -13.3'	56.0' 56.0'
10	330°54.22	40.62	49° 43.02	13.9'	13° 41.27	-13.3'	56.1'
11	345°54.24	41.27	64° 15.88	13.9'	$13^{\circ}27.93$	-13.4'	56.1'
12	0°54.26	N17°41.92	78° 48.76	13.9'	\$13° 14.52	-13.5'	56.1'
13 14	15°54.29 30°54.31	42.57 43.22	93°21.66 107°54.58	13.9' 13.9'	13°1.04 12°47.48	-13.6' -13.6'	56.2' 56.2'
15	45°54.33	• • 43.87	107 54.56 122° 27.52	14.0'	12° 33.86	-13.0 -13.7'	56.2
16	60°54.35	44.52	137°0.47	14.0'	12°20.16	-13.8'	56.3'
17	75°54.37	45.17	151°33.43	14.0'	12°6.39	-13.8'	56.3'
18	90°54.39 105°54.41	N17° 45.82	166°6.41 180°39.40	14.0'	\$11°52.56 11°38.65	-13.9'	56.3'
19 20	105 54.41 120° 54.42	46.46 47.11	180° 39.40 195° 12.41	14.0' 14.0'	11° 38.65 11° 24.68	-14.0' -14.0'	56.4' 56.4'
21	135°54.44	• • 47.76	209° 45.42	14.0'	11° 10.64	-14.1'	56.5
22	150°54.46	48.40	224° 18.45	14.0'	10°56.54	-14.2'	56.5'
23	165°54.48	49.05	238°51.48	14.0'	10°42.37	-14.2'	56.5'
	SD = 15.8'	d = 0.7'		SI	O = 15.2'		
N.A	CUA	Do-	CUA		D	, i	шп
Mon 0	<b>GHA</b> 180°54.50	<b>Dec</b> N17°49.69	<b>GHA</b> 253° 24.52	u 14.0'	Dec \$10°28.14	<i>d</i> -14.3′	<b>HP</b> 56.6'
1	195°54.52	50.34	267° 57.57	14.1'	$10^{\circ}13.84$	-14.4'	56.6
2	210°54.53	50.98	$282^{\circ}30.63$	14.1'	$09^{\circ}59.48$	-14.4'	56.6'
3	225°54.55	• • 51.62	297°3.69	14.1'	09°45.06	-14.5'	56.7'
4 5	240°54.57 255°54.59	52.27 52.91	311°36.75 326°9.82	14.1' 14.1'	09°30.58 09°16.04	-14.5' -14.6'	56.7' 56.7'
6	270°54.60	N17°53.55	340° 42.89	14.1'	S09°1.44	-14.7	56.8'
7	285°54.62	54.19	355° 15.96	14.1'	08°46.78	-14.7'	56.8'
8	300°54.63	54.83	9°49.03	14.1'	08°32.06	-14.8'	56.8'
9	315°54.65	• • 55.47	24°22.09 38°55.15	14.1'	08°17.29 08°2.46	-14.8'	56.9'
10 11	330°54.67 345°54.68	56.11 56.75	53° 28.21	14.1' 14.1'	08 2.46 07°47.57	-14.9' -14.9'	56.9' 57.0'
12	0°54.70	N17°57.39	68°1.27	14.0'	507°32.63	-15.0'	57.0'
13	15°54.71	58.03	$82^{\circ}34.32$	14.0'	$07^{\circ}17.64$	-15.0'	57.0'
14	30°54.73	58.67	97°7.36	14.0'	07°2.60	-15.1'	57.1'
15 16	45°54.74 60°54.75	· · 59.30 17°59.94	111° 40.39 126° 13.41	14.0' 14.0'	06°47.51 06°32.36	-15.1' -15.2'	57.1' 57.1'
17	75°54.77	18°0.58	140° 46.42	14.0'	06° 17.17	-15.2'	57.2'
18	90°54.78	N18°1.21	$155^{\circ}19.42$	14.0'	S06°1.92	-15.3'	57.2'
19	105°54.79	1.85	169°52.40	14.0'	05°46.63	-15.3'	57.3'
20 21	120°54.81 135°54.82	2.48 · · 3.11	184° 25.37 198° 58.32	14.0' 13.9'	05°31.30 05°15.91	-15.4' -15.4'	57.3' 57.3'
22	150°54.83	3.75	213° 31.26	13.9'	05°0.49	-15.5'	57.4'
23	165°54.84	4.38	228°4.18	13.9'	04°45.01	-15.5'	57.4'
	SD = 15.8'	d = 0.6'		SI	D = 15.4'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°54.86	N18°5.01	242°37.08	13.9'	S04° 29.50	-15.6'	57.5'
1	195°54.87	5.64	257°9.95	13.9'	04° 13.94	-15.6'	57.5'
2	210°54.88	6.28	271°42.81	13.8'	03°58.35	-15.6'	57.5'
3 4	225°54.89 240°54.90	· · 6.91 7.54	286° 15.64 300° 48.45	13.8' 13.8'	03°42.71 03°27.04	-15.7' -15.7'	57.6' 57.6'
5	255°54.91	8.17	315°21.23	13.8'	03°11.33	-15.7'	57.7'
6	270°54.92	N18°8.80	329°53.98	13.7'	S02°55.58	-15.8'	57.7'
7	285°54.93	9.42	344°26.70	13.7'	02°39.79	-15.8'	57.7'
8 9	300°54.94 315°54.95	10.05 •• 10.68	358° 59.40 13° 32.06	13.7' 13.6'	02°23.97 02°8.12	-15.9' -15.9'	57.8' 57.8'
10	330°54.96	11.31	28°4.69	13.6'	02 0.12 01°52.24	-15.9'	57.0 57.9'
11	345°54.97	11.93	42° 37.29	13.6'	01°36.32	-15.9'	57.9'
12	0°54.98	N18° 12.56	57°9.85	13.5'	S01°20.38	-16.0'	57.9'
13	15°54.99 30°55.00	13.18 13.81	71°42.37 86°14.86	13.5' 13.4'	01°4.40 00°48.40	-16.0' -16.0'	58.0' 58.0'
14 15	45°55.00	13.81	100° 47.30	13.4'	00°48.40 00°32.37	-16.0° -16.1°	58.0° 58.1°
16	60°55.01	15.06	115° 19.71	13.4'	00° 16.32	-16.1	58.1'
17	75°55.02	15.68	129°52.07	13.3'	S00°0.24	-16.1'	58.1'
18	90°55.03	N18° 16.30	144°24.39	13.3'	N00° 15.86	16.1'	58.2'
19 20	105°55.03 120°55.04	16.93 17.55	158° 56.67 173° 28.90	13.2' 13.2'	00°31.99 00°48.13	16.1' 16.2'	58.2' 58.2'
21	135°55.05	• • 18.17	188°1.08	13.1'	00 46.13 01°4.29	16.2	58.3
22	150°55.05	18.79	$202^{\circ}33.21$	13.1'	01°20.47	16.2'	58.3'
23	165°55.06	19.41	217°5.29	13.0'	01°36.67	16.2'	58.4'
	SD = 15.8'	d = 0.6'		SI	O = 15.7'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Juliuse	Juliset	Civil	Naut.
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:24	07:16	08:04	15:48	16:36	17:27

Lat.		Moonris	e		Moonset	:
Lat.	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
<b>S</b> 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
<b>S</b> 60°	23:52	•• ••	01:24	14:20	14:20	14:20

	Sun					
Day		Time	Mer.	Mer.	Pass.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	23-25
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	49-29%
10	03:36	03:37	11:56	06:35	18:57	
11	03:38	03:39	11:56	07:20	19:42	
12	03:39	03:40	11:56	08:04	20:27	

h	Aries	Venus	Mars	Jupiter	Saturn
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0 0	230° 46.07	148°44.27 N24°37.63	206°49.32 N09°7.49	118°17.57 N22°14.05	220°18.09 N02°6.67
1	245° 48.53	163°43.44 37.89	200 49.32 No9 7.49 221°50.00 8.19	133°19.60 13.99	235°20.32 6.76
2	260° 50.99	178° 42.61 38.15	236°50.69 8.90	148°21.64 13.93	250°22.54 6.86
3	275° 53.46	193°41.79 · · 38.40	251°51.37 · · 9.61	163°23.67 · · 13.87	265°24.76 · · 6.95
4	290°55.92	208° 40.96 38.66	266° 52.06 10.31	178°25.70 13.81	280°26.99 7.05
5	305°58.39	223°40.13 38.91	281°52.74 11.02	193°27.73 13.75	295°29.21 7.14
6	321°0.85	238°39.31 N24°39.16	296°53.43 N09°11.73	208°29.76 N22°13.69	310°31.43 N02°7.24
7	336°3.31	253°38.48 39.41	311°54.11 12.43	223°31.80 13.63	325°33.66 7.33
8	351°5.78	268° 37.65 39.66	326°54.79 13.14	238°33.83 13.57	340°35.88 7.43
9	6°8.24	283°36.82 · · 39.91	341°55.48 · · 13.85	253°35.86 · · 13.51	355°38.10 · · 7.52
10	21° 10.71	298°36.00 40.15	356° 56.16 14.55	268°37.89 13.45	10°40.33 7.62
11	36° 13.17	313°35.17 40.40	11°56.85 15.26	283°39.92 13.39	25°42.55 7.71
12	51° 15.64	328°34.34 N24°40.64	26°57.53 N09°15.96	298°41.95 N22°13.33	40°44.77 N02°7.81
13	66° 18.10	343°33.51 40.89	41°58.22 16.67	313°43.98 13.27	55°47.00 7.90
14	81°20.56	358°32.68 41.13	56°58.90 17.37	328°46.01 13.21	70°49.22 8.00
15	96°23.03	13°31.86 · · 41.37	71°59.58 · · 18.08	343°48.04 · · 13.15	85°51.44 · · 8.09
16	111°25.49	28°31.03 41.61	87°0.27 18.78	358°50.07 13.09	100°53.67 8.19
17	126° 27.96	43°30.20 41.85	102°0.95 19.49	13°52.10 13.03	115°55.89 8.28
18	141°30.42	58°29.37 N24°42.08	117°1.63 N09°20.19	28°54.13 N22°12.97	130°58.12 N02°8.38
19	156° 32.88	73°28.54 42.32	132°2.32 20.89	43°56.16 12.90	146°0.34 8.47
20	171°35.35	88°27.71 42.55	147°3.00 21.60	58°58.19 12.84	161°2.57 8.56
21	186°37.81	103°26.88 · · 42.79	162°3.69 · · 22.30	74°0.22 · · 12.78	176°4.79 · · 8.66
22	201°40.28	118°26.06 43.02	177°4.37 23.01	89°2.24 12.72	191°7.01 8.75
23	216° 42.74	133°25.23 43.25	192°5.05 23.71	104°4.27 12.66	206°9.24 8.85
Mer r	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
		- 0.0 do.0 iii 0.32			
	G11.4	6114	6114	6114	6114
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	231° 45.20	148°24.40 N24°43.48 163°23.57 43.71	207°5.74 N09°24.41	119°6.30 N22°12.60	221°11.46 N02°8.94
1	246° 47.67		222°6.42 25.12	134°8.33 12.54	236°13.69 9.04
2	261°50.13	178°22.74 43.94	237°7.10 25.82	149°10.36 12.48	251°15.91 9.13
3	276°52.60	193°21.91 · · 44.16	252°7.79 · · 26.52	164°12.38 · · 12.42	266°18.14 · · 9.22
4	291°55.06	208°21.08 44.39	267°8.47 27.22	179°14.41 12.36	281°20.36 9.32
5	306°57.52	223°20.25 44.61 238°19.42 N24°44.83	282°9.15 27.93	194°16.44 12.30 209°18.47 N22°12.23	296°22.59 9.41
6	321°59.99		297°9.84 N09°28.63		311°24.81 N02°9.51
7	337°2.45 352°4.92	253°18.59 45.05 268°17.76 45.27	312°10.52 29.33 327°11.20 30.03	224°20.49 12.17 239°22.52 12.11	326°27.04 9.60 341°29.26 9.69
8	352°4.92 7°7.38	268°17.76 45.27 283°16.93 •• 45.49			
9	7 7.38 22°9.84	283 16.93 · · 45.49 298°16.10 45.71	342°11.89 · · 30.73 357°12.57 31.43	254°24.55 · · 12.05 269°26.57 11.99	356°31.49 · · 9.79 11°33.72 9.88
10 11	22 9.84 37°12.31	313° 15.27 45.93	12°13.25 32.14	284°28.60 11.93	26°35.94 9.97
12	57 12.31 52°14.77	328°14.44 N24°46.14	27°13.94 N09°32.84	299°30.63 N22°11.87	41°38.17 N02°10.07
13	67° 17.24	343°13.61 46.35	42°14.62 33.54	314°32.65 11.81	56°40.39 10.16
14	82° 19.70	358°12.78 46.57	57°15.30 34.24	329°34.68 11.74	71°42.62 10.26
15	97°22.17	13°11.95 · · 46.78	72°15.98 · · 34.94	344°36.70 · · 11.68	86°44.84 · · 10.35
16	112°24.63	28°11.12 46.99	87° 16.67 35.64	359°38.73 11.62	101°47.07 10.44
17	112 24.03 127°27.09	43°10.29 47.20	102°17.35 36.34	14°40.75 11.56	116°49.30 10.54
18	142°29.56	58°9.46 N24°47.40	117°18.03 N09°37.04	29°42.78 N22°11.50	131°51.52 N02°10.63
19	157° 32.02	73°8.62 47.61	132°18.72 37.74		146°53.75 10.72
20	172°34.49	88°7.79 47.82	147°19.40 38.44	59°46.83 11.37	161°55.97 10.82
21	187°36.95	103°6.96 · · 48.02	162°20.08 · · 39.14	74°48.85 · · 11.31	176°58.20 · · 10.91
22	202°39.41	118°6.13 48.22	177° 20.76 39.84	89°50.88 11.25	192°0.43 11.00
23	217°41.88	133°5.30 48.42	192°21.45 40.54	104°52.90 11.19	207°2.65 11.10
_					
Mer.p	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
0	232°44.34	148°4.47 N24°48.62	207°22.13 N09°41.23	119°54.93 N22°11.13	222°4.88 N02°11.19
1	247°46.81	163°3.64 48.82	222°22.81 41.93	134°56.95 11.06	237°7.11 11.28
2	$262^{\circ}49.27$	178°2.81 49.02	237°23.49 42.63	149°58.97 11.00	252°9.33 11.38
3	$277^{\circ}51.73$	193°1.97 · · 49.22	252°24.17 · · 43.33	165°1.00 · · 10.94	267°11.56 · · 11.47
4	292°54.20	208°1.14 49.41	267°24.86 44.03	180° 3.02 10.88	282°13.79 11.56 N
5	307°56.66	223°0.31 49.61	282°25.54 44.73	195° 5.04 10.82	297°16.02 11.65
6	322°59.13	237°59.48 N24°49.80	297°26.22 N09°45.42	210°7.07 N22°10.75	312°18.24 N02°11.75
7	338°1.59	252°58.65 49.99	312°26.90 46.12	225° 9.09 10.69	327°20.47 11.84
8	353°4.05	267°57.82 50.18	327°27.59 46.82	240°11.11 10.63	342°22.70 11.93
9	8°6.52	282°56.98 · · 50.37	342°28.27 · · 47.52	255°13.13 · · 10.57	357°24.92 · · 12.03
10	23°8.98	297°56.15 50.56	357°28.95 48.21	270°15.16 10.50	12°27.15 12.12
11	38° 11.45	312°55.32 50.75	12°29.63 48.91	285°17.18 10.44	27°29.38 12.21
12	53° 13.91	327°54.49 N24°50.93	27°30.31 N09°49.61	300°19.20 N22°10.38	42°31.61 N02°12.30
13	68° 16.38	342°53.66 51.12	42°31.00 50.30	315°21.22 10.32	57°33.83 12.40
14	83° 18.84	357°52.82 51.30	57°31.68 51.00	330°23.24 10.25	72°36.06 12.49
15	98°21.30	12°51.99 · · 51.48	72°32.36 · · 51.69	345°25.27 · · 10.19	87°38.29 · · 12.58
16	113°23.77	27°51.16 51.66	87°33.04 52.39	0°27.29 10.13	102°40.52 12.67
17	128°26.23	42°50.33 51.84	102°33.72 53.09	15°29.31 10.07	117°42.75 12.77
18	143°28.70	57°49.49 N24°52.02	117°34.40 N09°53.78	30°31.33 N22°10.00	132°44.97 N02°12.86
19	158°31.16	72°48.66 52.20	132°35.09 54.48	45°33.35 9.94	147°47.20 12.95
20	173°33.62	87°47.83 52.37	147°35.77 55.17	60°35.37 9.88	162°49.43 13.04
21	188°36.09	102°47.00 · · 52.55	162°36.45 · · 55.87	75°37.39 · · 9.82	177°51.66 · · 13.14
22	203°38.55	117°46.16 52.72	177°37.13 56.56	90°39.41 9.75	192°53.89 13.23
23	218°41.02	132°45.33 52.89	192°37.81 57.25	105°41.43 9.69	207°56.12 13.32
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

	0 14.0	
	SHA	Dec
Alpheratz	357°33.87	29°14.00
Ankaa	353°6.36 349°30.22	-42°9.61 56°40.71
Schedar Diphda	349 30.22 348°46.45	-17°50.48
Achernar	335°19.89	-57°6.03
Hamal	327°50.29	23°35.13
Polaris	313°58.04	89°22.45
Acamar	315°11.36	-40°11.91
Menkar Mirfak	314°5.33 308°27.20	4°11.53 49°57.23
Aldebaran	290°38.70	16°33.69
Rigel	281°3.12	-8°10.35
Capella	$280^{\circ}20.71$	46°1.49
Bellatrix	278°22.00	6°22.36
Elnath Alnilam	278°0.82 275°36.91	28°37.77 -1°11.17
Betelgeuse	270°51.18	7°24.67
Canopus	263°52.32	-52°42.75
Sirius	$258^{\circ}25.52$	-16°45.27
Adhara	255° 5.25	-29°0.64
Procyon Pollux	244°49.87 243°16.16	5°9.38 27°57.79
Avior	234° 14.52	-59°35.92
Suhail	222°45.58	-43°32.62
Miaplacidus	221°38.19	-69°49.83
Alphard	217°46.71	-8°46.52
Regulus	207°33.24	11°50.26
Dubhe Denebola	193°39.42 182°23.66	61°36.72 14°25.43
Gienah	175°42.25	-17°41.49
Acrux	172°58.40	-63°15.00
Gacrux	$171^{\circ}50.02$	-57°15.93
Alioth	166°11.57	55°49.09
Spica Alkaid	158°20.87 152°50.69	-11°18.09 49°10.91
Hadar	152 50.09 148°33.84	-60°30.18
Menkent	147°55.95	-36°30.15
Arcturus	$145^{\circ}46.59$	19°2.62
Rigil Kent.	139°38.15	-60°56.80
Kochab	137°18.64	74°2.78
Zuben'ubi Alphecca	136°54.47 126°2.45	-16°9.21 26°37.44
Antares	112° 14.13	-26°29.47
Atria	107° 6.85	-69°4.40
Sabik	$102^{\circ}1.21$	-15°45.50
Shaula	96°8.52	-37°7.33 12°32.31
Rasalhague Eltanin	95°57.24 90°41.23	12 32.31 51°28.87
Kaus Aust.	83°30.76	-34°22.25
Vega	80°32.18	38°48.24
Nunki	75°46.16	-26°15.78
Altair	61°58.74	8°56.16
Peacock Deneb	53°3.82 49°24.95	-56°38.76 45°22.17
Enif	49 24.95 33°37.73	9°59.64
Al Na'ir	27°31.60	-46°49.78
Fomalhaut	15°13.44	-29°28.83
Scheat	13°44.28	28°13.36
Markab	13°28.94	15°20.70
May 13 Wed	SHA	Mer.pass
Venus	277°58.20	14:06
Mars Jupiter	336° 3.25 247° 31.51	10:12 16:05
Saturn	349°32.03	09:17
May 14 Thu	SHA	Mer.pass
Venus	276°39.19	14:07
Mars Jupiter	335°20.53 247°21.10	10:11 16:01
Saturn	349°26.26	09:14
May 15 Fri	SHA	Mer.pass
Venus Mars	275°20.13 334°37.79	14:08 10:10
Jupiter	247°10.58	15:58
Saturn	349°20.54	09:10
Horizon	ıtal parallax	
	Venus:	0.1 0.1
	Mars:	0.1

h	Su	n	Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°55.07	N18°20.03	231°37.32	13.0'	N01°52.88	16.2'	58.4'
1	195°55.07	20.65	246° 9.30	12.9'	02°9.11	16.2	58.4'
2 3	210°55.08 225°55.08	21.27 •• 21.88	260°41.22 275°13.09	12.9' 12.8'	02°25.35 02°41.60	16.3' 16.3'	58.5' 58.5'
4	240°55.09	22.50	289°44.90	12.7'	02°57.86	16.3	58.6'
5	255°55.09	23.12	$304^{\circ}16.65$	12.7'	$03^{\circ}14.13$	16.3'	58.6'
6	270°55.09	N18°23.73	318°48.34	12.6'	N03°30.41	16.3	58.6'
7 8	285°55.10 300°55.10	24.35 24.97	333°19.96 347°51.53	12.6' 12.5'	03°46.69 04°2.98	16.3' 16.3'	58.7' 58.7'
9	315°55.11	• • 25.58	2°23.03	12.4	04° 19.27	16.3	58.8'
10	330°55.11	26.19	$16^{\circ}54.46$	12.4'	04°35.57	16.3'	58.8'
11	345°55.11	26.81	31°25.83	12.3'	04°51.86	16.3	58.8'
12 13	0°55.11 15°55.12	N18°27.42 28.03	45°57.13 60°28.36	12.2' 12.2'	N05°8.15 05°24.44	16.3' 16.3'	58.9' 58.9'
14	30°55.12	28.65	74°59.51	12.1'	05°40.73	16.3	59.0'
15	45°55.12	• • 29.26	89°30.60	12.0'	05°57.00	16.3'	59.0'
16	60°55.12	29.87	104°1.61	11.9'	06°13.28	16.3'	59.0'
17 18	75°55.12 90°55.13	30.48 N18°31.09	118°32.54 133°3.40	11.9' 11.8'	06°29.54 N06°45.79	16.3' 16.2'	59.1' 59.1'
19	105°55.13	31.70	147°34.17	11.7	07°2.03	16.2	59.1'
20	120° 55.13	32.31	162°4.87	11.6'	07°18.25	16.2	59.2'
21	135°55.13	• • 32.92	176°35.49	11.5'	07°34.46	16.2'	59.2'
22	150°55.13	33.52	191°6.02	11.4'	07°50.66	16.2'	59.3'
23	165°55.13	34.13	205°36.47	11.4'	08°6.83	16.2'	59.3'
	SD = 15.8′	d = 0.6'		SE	0 = 15.9'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°55.13	N18°34.74	220°6.83	11.3'	N08°22.98	16.1'	59.3'
1	195°55.13	35.34	234°37.11	11.2'	08°39.11	16.1'	59.4'
2	210°55.13 225°55.12	35.95 •• 36.55	249°7.30 263°37.40	11.1' 11.0'	08°55.22 09°11.30	16.1' 16.1'	59.4' 59.4'
3 4	240°55.12	37.16	203 37.40 278°7.40	10.9'	09 11.30 09°27.35	16.1	59.4 59.5'
5	255°55.12	37.76	292°37.32	10.8'	09°43.38	16.0'	59.5'
6	270°55.12	N18°38.36	307°7.14	10.7'	N09°59.37	16.0'	59.6'
7	285°55.12	38.97	321°36.86	10.6'	10°15.33	15.9'	59.6'
8	300°55.12 315°55.11	39.57	336° 6.49 350° 36.02	10.5'	10°31.25 10°47.14	15.9'	59.6'
9 10	330°55.11	· · 40.17 40.77	5°5.46	10.4' 10.3'	10 47.14 11°2.99	15.8' 15.8'	59.7' 59.7'
11	345°55.11	41.37	19°34.79	10.2	11°18.79	15.8'	59.7'
12	0°55.10	N18°41.97	34°4.02	10.1'	N11°34.56	15.7'	59.8'
13	15°55.10	42.57	48°33.15	10.0'	11°50.28	15.7'	59.8'
14 15	30°55.10 45°55.09	43.17 • • 43.77	63°2.17 77°31.09	9.9' 9.8'	12°5.95 12°21.58	15.6' 15.6'	59.8' 59.9'
16	60°55.09	44.37	91°59.90	9.7'	12°37.15	15.5'	59.9'
17	75°55.08	44.97	106°28.60	9.6'	12°52.67	15.5'	59.9'
18	90°55.08	N18°45.56	120°57.20	9.5'	N13°8.14	15.4'	60.0'
19	105°55.07 120°55.07	46.16	135°25.68 149°54.06	9.4' 9.3'	13°23.55 13°38.90	15.4' 15.3'	60.0'
20 21	120°55.07 135°55.06	46.75 •• 47.35	149°54.06 164°22.32	9.3° 9.1'	13° 38.90 13° 54.19	15.3	60.0' 60.1'
22	150°55.06	47.94	178°50.46	9.0'	14° 9.42	15.2'	60.1
23	165°55.05	48.54	193°18.50	8.9'	14°24.58	15.1'	60.1'
	SD = 15.8'	d = 0.6'		SE	O = 16.2'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°55.04	N18°49.13	207°46.42	8.8'	N14°39.67	15.0'	60.2'
1	195°55.04	49.72	222°14.22	8.7'	14°54.70	15.0'	60.2'
2	210°55.03 225°55.02	50.32 •• 50.91	236°41.90 251°9.47	8.6' 8.4'	15°9.65 15°24.53	14.9'	60.2'
3 4	225°55.02 240°55.01	51.50	251° 9.47 265° 36.91	8.4	15°24.53 15°39.33	14.8' 14.7'	60.2' 60.3'
5	255° 55.01	52.09	280°4.24	8.2'	15°54.06	14.6'	60.3
6	270°55.00	N18°52.68	294°31.45	8.1'	N16°8.70	14.6'	60.3'
7	285°54.99	53.27	308°58.53	8.0'	16°23.26	14.5'	60.4
8 9	300°54.98 315°54.97	53.86 •• 54.45	323°25.49 337°52.33	7.8' 7.7'	16°37.74 16°52.13	14.4' 14.3'	60.4' 60.4'
10	315 54.97 330°54.96	55.04	357 52.33 352°19.04	7.7 7.6'	10 52.13 17°6.42	14.3 14.2'	60.4
11	345° 54.96	55.62	6°45.63	7.5	17°20.63	14.1'	60.5
12	0°54.95	N18°56.21	21°12.10	7.3'	N17°34.74	14.0'	60.5'
13	15°54.94	56.80	35°38.43	7.2'	17°48.76	13.9'	60.5'
14 15	30°54.93 45°54.92	57.38 •• 57.97	50° 4.65 64° 30.73	7.1' 7.0'	18°2.67 18°16.49	13.8' 13.7'	60.5' 60.6'
16	45 54.92 60°54.91	58.55	78°56.69	7.0 6.8'	18 16.49 18°30.20	13.6'	60.6
17	75° 54.90	59.14	93°22.52	6.7'	18°43.80	13.5'	60.6
18	90°54.88	N18°59.72	107°48.22	6.6'	N18°57.30	13.4'	60.6'
19	105°54.87	19° 0.30	122°13.79	6.4'	19°10.69	13.3'	60.7'
20	120° 54.86 135° 54.85	0.88 •• 1.47	136°39.23 151°4.55	6.3' 6.2'	19°23.96 19°37.12	13.2' 13.0'	60.7'
21 22	135°54.85 150°54.84	2.05	151°4.55 165°29.73	6.2'	19°37.12 19°50.15	13.0'	60.7' 60.7'
23	165°54.83	2.63	179°54.79	5.9'	20°3.07	12.8'	60.7
	SD = 15.8'	d = 0.6'		SF	0 = 16.4'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:30	07:22	08:11	15:41	16:30	17:22

Lat.		Moonris	e		Moonset	;
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°	02:09	01:31	00:36	16:22	19:04	
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	02:59	04:38	06:26	14:19	14:19	14:21

	Sun				Moon		
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	26-28	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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		

h	Aries	Venus	Mars	Jupiter	Saturn
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	233°43.48	147°44.50 N24°53.06	207°38.49 N09°57.95	120°43.45 N22°9.63	222°58.35 N02°13.41
1	248° 45.95	162°43.66 53.23	222°39.17 58.64	135°45.47 9.56	238°0.57 13.51
2	263°48.41	177°42.83 53.40	237°39.85 09°59.34	150°47.49 9.50	253°2.80 13.60
3	278°50.87	192°42.00 · · 53.57	252°40.54 10°0.03	165°49.51 · · 9.44	268°5.03 · · 13.69
4	293°53.34	207°41.17 53.73	267°41.22 0.72	180°51.53 9.37	283°7.26 13.78
5	308°55.80	222°40.33 53.90	282°41.90 1.42	195°53.55 9.31	298° 9.49 13.87
6	323°58.27	237°39.50 N24°54.06	297°42.58 N10°2.11	210°55.57 N22°9.25	313°11.72 N02°13.97
7	339°0.73	252°38.67 54.22	312°43.26 2.80	225°57.58 9.18	328° 13.95 14.06
8	354°3.19	267°37.83 54.38	327°43.94 3.50	240°59.60 9.12	343°16.18 14.15
9	9°5.66	282°37.00 · · 54.54	342°44.62 · · 4.19	256° 1.62 · · 9.06	358° 18.41 · · 14.24
10	24°8.12	297°36.17 54.70	357°45.30 4.88	271°3.64 8.99	13°20.64 14.33
11	39° 10.59	312°35.33 54.86	12°45.98 5.57	286° 5.66 8.93	28° 22.87 14.42
12	54° 13.05	327°34.50 N24°55.02	27°46.66 N10°6.26	301°7.67 N22°8.87	43°25.10 N02°14.52
13	69° 15.52	342°33.67 55.17	42°47.34 6.96	316° 9.69 8.80	58°27.33 14.61
14	84° 17.98	357°32.83 55.32	57°48.03 7.65	331°11.71 8.74	73°29.56 14.70
15	99°20.44	12°32.00 · · 55.48	72°48.71 · · 8.34	346°13.73 · · 8.67	88°31.79 · · 14.79
16	114°22.91	27°31.17 55.63	87°49.39 9.03	1°15.74 8.61	103°34.02 14.88
17	129°25.37	42°30.33 55.78	102°50.07 9.72	16°17.76 8.55	118° 36.25 14.97
18	144°27.84	57°29.50 N24°55.93	117°50.75 N10°10.41	31°19.78 N22°8.48	133°38.48 N02°15.07
19	159° 30.30	72°28.67 56.07	132°51.43 11.10	46°21.79 8.42	148° 40.71 15.16
20	174° 32.76	87°27.83 56.22	147°52.11 11.79	61°23.81 8.36	163°42.94 15.25
21	189° 35.23	102°27.00 · · 56.37	162°52.79 · · 12.48	76°25.83 · · 8.29	178°45.17 · · 15.34
22	204° 37.69	117°26.17 56.51	177°53.47 13.17	91°27.84 8.23	193°47.40 15.43
23	204 37.09 219°40.16	132°25.33 56.65	192°54.15 13.86	106°29.86 8.16	208° 49.63 15.52
_					
Mer.p	pass. 08:24	ν-0.8' d0.2' m-3.93	$\nu 0.7' \ d0.7' \ m1.25$	ν2.0′ d-0.1′ m-1.94	ν2.2′ d0.1′ m0.91
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	234° 42.62	147°24.50 N24°56.79	207°54.83 N10°14.55	121°31.87 N22°8.10	223°51.86 N02°15.61
1	234 42.02 249°45.09	162°23.67 56.93	207 54.83 N10 14.55 222°55.51 15.24	136°33.89 8.03	238°54.09 15.70
2	249 45.09 264° 47.55	102 23.07 50.93 177°22.83 57.07	222 55.51 15.24 237°56.19 15.93	150 33.89 8.03 151°35.91 7.97	253° 56.32 15.80
3	264°47.55 279°50.01	177°22.83 57.07 192°22.00 · · 57.21	252°56.87 · · 16.62	151°35.91 7.97 166°37.92 · · 7.91	253°56.32 15.80 268°58.55 · · 15.89
3 4	279 50.01 294° 52.48	207°21.17 57.35	267° 57.55 17.31	181°39.94 7.84	284°0.78 15.98
5	309°54.94	222°20.33 57.48 237°19.50 N24°57.61	282°58.23 18.00 297°58.91 N10°18.69	196°41.95 7.78 211°43.97 N22°7.71	299°3.01 16.07 314°5.25 N02°16.16
6	324°57.41				
7	339°59.87	252°18.66 57.75	312°59.59 19.37	226°45.98 7.65	329°7.48 16.25
8	355°2.33	267°17.83 57.88	328° 0.27 20.06	241°47.99 7.58	344°9.71 16.34
9	10°4.80	282°17.00 · · 58.01	343°0.95 · · 20.75 358°1.63 21.44	256°50.01 · · 7.52	359°11.94 · · 16.43
10	25°7.26	297°16.16 58.14		271°52.02 7.45	14°14.17 16.52
11	40°9.73	312°15.33 58.27	13°2.31 22.13	286°54.04 7.39	29°16.40 16.61
12	55° 12.19	327°14.50 N24°58.39	28°2.99 N10°22.81	301°56.05 N22°7.33	44°18.63 N02°16.70
13	70°14.66	342°13.66 58.52	43°3.67 23.50	316°58.06 7.26	59°20.87 16.79
14	85° 17.12	357°12.83 58.64	58° 4.35 24.19	332°0.08 7.20	74°23.10 16.89
15	100° 19.58	12°12.00 · · 58.76	73°5.03 · · 24.87	347°2.09 · · 7.13	89°25.33 · · 16.98
16	115°22.05	27°11.16 58.89	88°5.70 25.56	2°4.10 7.07	104°27.56 17.07
17	130°24.51	42°10.33 59.01	103°6.38 26.25	17° 6.12 7.00	119°29.79 17.16
18	145°26.98	57°9.49 N24°59.12	118°7.06 N10°26.93	32°8.13 N22°6.94	134°32.03 N02°17.25
19	160° 29.44	72°8.66 59.24	133°7.74 27.62		149°34.26 17.34
20	175°31.91	87°7.83 59.36	148°8.42 28.30	62°12.15 6.81	164° 36.49 17.43
21	190°34.37	102°6.99 · · 59.47	163°9.10 · · 28.99	77°14.17 · · 6.74	179°38.72 · · 17.52
22	205°36.83	117°6.16 59.59	178°9.78 29.67	92°16.18 6.68	194°40.96 17.61
23	220°39.30	132°5.33 59.70	193°10.46 30.36	107°18.19 6.61	209°43.19 17.70
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
0	235°41.76	147°4.49 N24°59.81	208°11.14 N10°31.04	122°20.20 N22°6.55	224°45.42 N02°17.79
1	250°44.23	162°3.66 24°59.92	223°11.82 31.73	137°22.21 6.48	239° 47.66 17.88
2	265°46.69	177°2.83 25°0.03	238°12.50 32.41	152°24.22 6.41	254°49.89 17.97
3	280°49.16	192°1.99 · · 0.14	253° 13.17 · · · 33.10	167°26.23 · · 6.35	269°52.12 · · 18.06
4	295°51.62	207°1.16 0.25	268°13.85 33.78	182°28.25 6.28	284°54.35 18.15
5	310°54.08	222°0.32 0.35	283°14.53 34.46	197°30.26 6.22	299° 56.59 18.24
6	325° 56.55	236°59.49 N25°0.46	298°15.21 N10°35.15	212°32.27 N22°6.15	314°58.82 N02°18.33
7	340°59.01	251°58.66 0.56	313°15.89 35.83	227°34.28 6.09	330° 1.05 18.42
8	356°1.48	266° 57.82 0.66	328°16.57 36.52	242°36.29 6.02	345°3.29 18.51
9	11°3.94	281°56.99 · · 0.76	343°17.25 · · 37.20	257°38.30 · · 5.96	0°5.52 · · 18.60
10	26°6.40	296°56.16 0.86	358°17.93 37.88	272°40.31 5.89	15°7.76 18.69
11	41°8.87	311°55.32 0.96	13° 18.60 38.56	287°42.32 5.82	30°9.99 18.78
12	56° 11.33	326°54.49 N25°1.06	28°19.28 N10°39.25	302°44.33 N22°5.76	45°12.22 N02°18.87
13	71° 13.80	341°53.66 1.15	43°19.96 39.93	317°46.34 5.69	60°14.46 18.96
14	$86^{\circ}16.26$	356°52.82 1.25	58°20.64 40.61	332°48.35 5.63	75°16.69 19.05
15	101° 18.73	11°51.99 · · 1.34	73°21.32 · · 41.29	347°50.36 •• 5.56	90°18.93 · · 19.14
16	$116^{\circ}21.19$	26°51.16 1.43	88°22.00 41.97	2°52.36 5.50	105°21.16 19.23
17	$131^{\circ}23.65$	41°50.32 1.52	103°22.67 42.65	17°54.37 5.43	120°23.39 19.31
18	$146^{\circ}26.12$	56°49.49 N25°1.61	118°23.35 N10°43.34	32°56.38 N22°5.36	135°25.63 N02°19.40
19	161°28.58	71°48.66 1.70	133°24.03 44.02	47°58.39 5.30	150°27.86 19.49
20	176°31.05	86°47.82 1.79	148°24.71 44.70	63°0.40 5.23	165°30.10 19.58
21	191°33.51	101°46.99 · · 1.87	163°25.39 · · 45.38	78°2.41 · · 5.17	180° 32.33 · · 19.67
22	206°35.98	116°46.16 1.96	178°26.06 46.06	93°4.42 5.10	195°34.57 19.76
23	221°38.44	131°45.33 2.04	193°26.74 46.74	108° 6.42 5.03	210°36.80 19.85
Mer r	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
		ν σ.σ ασ.1 III-σ.35	ν σ.τ ασ.τ III1.23	-2.0 d 0.1 III-1.93	do.1 mo.31

Alpheratz	SHA	Dec
	357°33.85	29°14.00
Ankaa	353°6.34	-42° 9.60
Schedar	$349^{\circ}30.19$	$56^{\circ}40.71$
Diphda	348°46.43	-17°50.47
Achernar	335° 19.87	-57°6.01
Hamal	327°50.28	23°35.13
Polaris	313°57.42	89°22.43
Acamar	315°11.36 314°5.32	-40°11.90 4°11.54
Menkar Mirfak	314 5.32 308°27.18	4 11.54 49°57.22
Aldebaran	290°38.69	16°33.69
Rigel	281°3.12	-8°10.34
Capella	280°20.71	46° 1.48
Bellatrix	278°22.01	6°22.36
Elnath	278°0.82	28°37.76
Alnilam	$275^{\circ}36.91$	$-1^{\circ}11.17$
Betelgeuse	$270^{\circ}51.18$	7°24.67
Canopus	263°52.34	-52°42.74
Sirius	258°25.53	-16°45.26
_Adhara	255°5.26	-29°0.64
Procyon	244°49.87	5°9.38
Pollux	243°16.17	27°57.78
Avior	234°14.55 222°45.60	-59°35.91 -43°32.62
Suhail Miaplacidus	222°45.60 221°38.23	-43° 32.62 -69° 49.84
Alphard	221 38.23 217°46.72	-8°46.52
Regulus	217 40.72 207°33.25	11°50.26
Dubhe	193°39.45	61°36.73
Denebola	182°23.66	14°25.44
Gienah	175°42.25	-17°41.49
Acrux	$172^{\circ}58.42$	-63°15.01
Gacrux	$171^{\circ}50.03$	-57°15.94
Alioth	$166^{\circ}11.58$	$55^{\circ}49.10$
Spica	158° 20.87	-11°18.09
Alkaid	152°50.70	49°10.92
Hadar	148°33.84	-60°30.20
Menkent	147°55.95	-36°30.16
Arcturus	145°46.59 139°38.14	19°2.63 -60°56.81
Rigil Kent. Kochab	139 38.14 137°18.66	74°2.80
Zuben'ubi	136°54.47	-16° 9.20
Alphecca	126°2.44	26°37.45
Antares	112° 14.12	-26°29.47
Atria	107°6.82	-69°4.41
Sabik	102°1.20	-15°45.50
Shaula	96°8.50	-37°7.33
Rasalhague	95°57.22	12°32.32
Eltanin	90°41.21	51°28.89
Kaus Aust.	83°30.74	-34°22.25
Vega	80°32.16	38°48.26
Nunki	75°46.14	-26°15.77
Altair Peacock	61°58.72 53°3.78	8°56.17 -56°38.75
Peacock Deneb	53° 3.78 49° 24.92	-56° 38.75 45° 22.18
Enif	33°37.71	9°59.65
Al Na'ir	27°31.57	-46°49.77
Fomalhaut	15° 13.41	-29°28.82
Scheat	13°44.26	28°13.37
Markab	13°28.91	15°20.71
M 10 C :		N4
May 16 Sat	<b>SHA</b> 274°1.02	Mer.pass
Venus Mars	274°1.02 333°55.01	14:10 10:09
Jupiter	246°59.97	15:55
Saturn	349° 14.86	09:07
May 17 Sun	SHA	Mer.pass
Venus	272°41.88	14:11
Mars Jupiter	333° 12.21 246° 49.25	10:08
Jupiter Saturn	349°9.24	15:52 09:03
May 18 Mon	SHA	Mer.pass
Venus	271°22.73	14:12
Mars	332°29.38	10:07
Jupiter	246°38.44	15:49
C - ·	349°3.66	09:00
Saturn		
	ıtal parallax	
	Venus:	0.1
		0.1 0.1

Stars SHA

Dec

Sat         GHA         Dec         GHA         ν           0         180° 54.81         N19° 3.21         194° 19.72         5.8'         N2           1         195° 54.80         3.79         208° 44.51         5.7'         5.4'         5.7'         5.4'         5.7'         5.4'         5.7'         5.4'         5.7'         5.4'         5.7'         5.4'         5.7'         5.4'         5.7'         5.4'         5.7'         5.4'         5.7'         5.4'         5.2'         5.4'         5.2'         5.4'         5.2'         5.4'         5.5'	Dec         d           20°15.87         12.7'           20°28.54         12.5'           20°41.08         12.4'           20°53.49         12.3'           21°5.77         12.1'           21°17.92         12.0'           21°41.80         11.7'           21°53.53         11.6'           22°5.11         11.4'           22°16.55         11.3'	HP 60.8' 60.8' 60.8' 60.8' 60.9' 60.9'
0         180° 54.81         N19° 3.21         194° 19.72         5.8'         N.2           1         195° 54.80         3.79         208° 44.51         5.7'         2           2         210° 54.79         4.37         223° 9.18         5.5'         3           3         225° 54.77         · · · 4.94         237° 33.72         5.4'         2           4         240° 54.76         5.52         251° 58.14         5.3'         5           5         255° 54.75         6.10         266° 22.42         5.2'         2'           6         270° 54.73         N19° 6.68         280° 46.57         5.0'         N2           7         285° 54.72         7.25         295° 10.60         4.9'         2           8         300° 54.71         7.83         309° 34.50         4.8'         3           9         315° 54.69         · 8.40         323° 58.27         4.6'           10         330° 54.68         8.98         338° 21.92         4.5'         2           11         345° 54.66         9.55         352° 45.44         4.4'         2           12         0° 54.65         N19° 10.12         7° 8.84         4.3'         NY </th <th>20°15.87 12.7' 20°28.54 12.5' 20°41.08 12.4' 20°53.49 12.3' 21°5.77 12.1' 21°17.92 12.0' 21°29.93 11.9' 21°41.80 11.7' 21°53.53 11.6' 22°5.11 11.4'</th> <th>60.8° 60.8° 60.8° 60.8° 60.9°</th>	20°15.87 12.7' 20°28.54 12.5' 20°41.08 12.4' 20°53.49 12.3' 21°5.77 12.1' 21°17.92 12.0' 21°29.93 11.9' 21°41.80 11.7' 21°53.53 11.6' 22°5.11 11.4'	60.8° 60.8° 60.8° 60.8° 60.9°
1     195°54.80     3.79     208°44.51     5.7'     2       2     210°54.79     4.37     223°9.18     5.5'     3       3     225°54.77     · 4.94     237°33.72     5.4'     3       4     240°54.76     5.52     251°58.14     5.3'       5     255°54.75     6.10     266°22.42     5.2'     3       6     270°54.73     N19°6.68     280°46.57     5.0'     N1       7     285°54.72     7.25     295°10.60     4.9'     3       8     300°54.71     7.83     309°34.50     4.8'     3       9     315°54.69     · 8.40     323°58.27     4.6'       10     330°54.68     8.98     338°21.92     4.5'     3       11     345°54.66     9.55     352°45.44     4.4'     3       12     0°54.65     N19°10.12     7°8.84     4.3'     N1       13     15°54.63     10.70     21°32.11     4.1'     3	20°28.54 12.5' 20°41.08 12.4' 20°53.49 12.3' 21°5.77 12.1' 21°17.92 12.0' 21°29.93 11.9' 21°41.80 11.7' 21°53.53 11.6' 22°5.11 11.4'	60.8° 60.8° 60.8° 60.9°
2 210°54.79 4.37 223°9.18 5.5' 2 3 225°54.77 · 4.94 237°33.72 5.4' 2 4 240°54.76 5.52 251°58.14 5.3' 5 5 255°54.75 6.10 266°22.42 5.2' 2 6 270°54.73 N19°6.68 280°46.57 5.0' N2 7 285°54.72 7.25 295°10.60 4.9' 2 8 300°54.71 7.83 309°34.50 4.8' 2 9 315°54.69 · 8.40 323°58.27 4.6' 3 10 330°54.68 8.98 338°21.92 4.5' 2 11 345°54.66 9.55 352°45.44 4.4' 2 0°54.65 N19°10.12 7°8.84 4.3' N2 13 15°54.63 10.70 21°32.11 4.1' 2	20°41.08 12.4' 20°53.49 12.3' 21°5.77 12.1' 21°17.92 12.0' 21°29.93 11.9' 21°41.80 11.7' 21°53.53 11.6' 22°5.11 11.4'	60.8° 60.8° 60.9°
3 225°54.77 · · · 4.94 237°33.72 5.4' 240°54.76 5.52 251°58.14 5.3' 5 255°54.75 6.10 266°22.42 5.2' 256°54.73 N19°6.68 280°46.57 5.0' N2 65°54.72 7.25 295°10.60 4.9' 28 300°54.71 7.83 309°34.50 4.8' 29 315°54.69 · · 8.40 323°58.27 4.6' 310°330°54.68 8.98 338°21.92 4.5' 21 345°54.66 9.55 352°45.44 4.4' 21 0°54.65 N19°10.12 7°8.84 4.3' N2 13 15°54.63 10.70 21°32.11 4.1' 23	20°53.49 12.3' 21°5.77 12.1' 21°17.92 12.0' 21°29.93 11.9' 21°41.80 11.7' 21°53.53 11.6' 22°5.11 11.4'	60.8° 60.8° 60.9°
4 240°54.76 5.52 251°58.14 5.3' 5 255°54.75 6.10 266°22.42 5.2' 2 6 270°54.73 N19°6.68 280°46.57 5.0' N2 7 285°54.72 7.25 295°10.60 4.9' 2 8 300°54.71 7.83 309°34.50 4.8' 2 9 315°54.69 · 8.40 323°58.27 4.6' 10 330°54.68 8.98 338°21.92 4.5' 2 11 345°54.66 9.55 352°45.44 4.4' 2 12 0°54.65 N19°10.12 7°8.84 4.3' N2 13 15°54.63 10.70 21°32.11 4.1'	21°5.77 12.1' 21°17.92 12.0' 21°29.93 11.9' 21°41.80 11.7' 21°53.53 11.6' 22°5.11 11.4'	60.8° 60.9°
5         255°54.75         6.10         266°22.42         5.2'         2           6         270°54.73         N19°6.68         280°46.57         5.0'         N2           7         285°54.72         7.25         295°10.60         4.9'         3           8         300°54.71         7.83         309°34.50         4.8'         3           9         315°54.69         · 8.40         323°58.27         4.6'         3           10         330°54.68         8.98         338°21.92         4.5'         3           11         345°54.66         9.55         352°45.44         4.4'         3           12         0°54.65         N19°10.12         7°8.84         4.3'         N           13         15°54.63         10.70         21°32.11         4.1'         3	21°17.92 12.0' 21°29.93 11.9' 21°41.80 11.7' 21°53.53 11.6' 22°5.11 11.4'	60.9
6 270°54.73 N19°6.68 280°46.57 5.0' N2 7 285°54.72 7.25 295°10.60 4.9' 2 8 300°54.71 7.83 309°34.50 4.8' 2 9 315°54.69 · 8.40 323°58.27 4.6' 330°54.68 8.98 338°21.92 4.5' 2 11 345°54.66 9.55 352°45.44 4.4' 2 12 0°54.65 N19°10.12 7°8.84 4.3' N2 13 15°54.63 10.70 21°32.11 4.1' 2	21°29.93 11.9′ 21°41.80 11.7′ 21°53.53 11.6′ 22°5.11 11.4′	60.9
7 285°54.72 7.25 295°10.60 4.9' 1 8 300°54.71 7.83 309°34.50 4.8' 1 9 315°54.69 · · 8.40 323°58.27 4.6' 1 10 330°54.68 8.98 338°21.92 4.5' 1 11 345°54.66 9.55 352°45.44 4.4' 1 12 0°54.65 N19°10.12 7°8.84 4.3' N2 13 15°54.63 10.70 21°32.11 4.1' 1	21°41.80 11.7' 21°53.53 11.6' 22°5.11 11.4'	
8 300°54.71 7.83 309°34.50 4.8' 1 9 315°54.69 · 8.40 323°58.27 4.6' 1 10 330°54.68 8.98 338°21.92 4.5' 1 11 345°54.66 9.55 352°45.44 4.4' 1 12 0°54.65 N19°10.12 7°8.84 4.3' N1 13 15°54.63 10.70 21°32.11 4.1' 1	21°53.53 11.6′ 22°5.11 11.4′	60.9
9 315°54.69 ··· 8.40 323°58.27 4.6' 10 330°54.68 8.98 338°21.92 4.5' 11 345°54.66 9.55 352°45.44 4.4' 12 0°54.65 N19°10.12 7°8.84 4.3' N2 13 15°54.63 10.70 21°32.11 4.1'	22°5.11 11.4'	
10 330°54.68 8.98 338°21.92 4.5' 11 345°54.66 9.55 352°45.44 4.4' 12 0°54.65 N19°10.12 7°8.84 4.3' N113 15°54.63 10.70 21°32.11 4.1' 12		60.9
11 345°54.66 9.55 352°45.44 4.4' 12 0°54.65 N19°10.12 7°8.84 4.3' N1 13 15°54.63 10.70 21°32.11 4.1' 12	22°16.55 11.3°	60.9
12 0°54.65 N19°10.12 7°8.84 4.3' N2 13 15°54.63 10.70 21°32.11 4.1'	22°27.83 11.1'	60.9
13 15°54.63 10.70 21°32.11 4.1'		61.0
	22°38.97 11.0' 22°49.95 10.8'	61.0
14 30°54.61 11.27 35°55.26 4.0'	22 49.95 10.8 23°0.78 10.7'	61.0' 61.0'
	23 0.76 10.7 23°11.45 10.5'	61.0
	23°21.96 10.3'	61.0
	23°32.31 10.2'	61.0
	23°42.49 10.0'	61.1
	23°52.51 9.8'	61.1
20 120° 54.51 14.69 122° 11.64 3.3'	24°2.35 9.7'	61.1
	24° 2.33 9.7' 24° 12.03 9.5'	61.1
	24°12.03° 9.3'	61.1
	24°21.55 9.5' 24°30.86 9.1'	61.1
		01.1
SD = 15.8'  d = 0.6' $SD =$	= 16.6′	
un GHA Dec GHA $ u$	Dec d	НР
	24°40.01 9.0'	61.1
1 195°54.42 17.53 194°2.12 2.8'	24°48.98 8.8'	61.1
2 210°54.40 18.09 208°23.89 2.7'	24°57.77 8.6′	61.1
3 225°54.39 ·· 18.66 222°45.56 2.6'	25°6.37 8.4'	61.1
4 240°54.37 19.22 237°7.12 2.5'	25°14.79 8.2'	61.1
5 255°54.35 19.79 251°28.58 2.4'	25°23.02 8.0'	61.1
6 270°54.33 N19°20.35 265°49.95 2.3' N2	25°31.07 7.9'	61.1
7 285°54.31 20.91 280°11.22 2.2'	25°38.92 7.7'	61.1
8 300°54.29 21.47 294°32.39 2.1'	25°46.58 7.5'	61.1
9 315°54.27 ·· 22.03 308°53.47 2.0'	25°54.04 7.3'	61.2
0 330°54.25 22.60 323°14.47 1.9'	26°1.31 7.1'	61.2
1 345°54.22 23.16 337°35.38 1.8'	26°8.39 6.9'	61.2
	26°15.26 6.7'	61.2
	26°21.93 6.5'	61.2
	26°28.40 6.3'	61.2
	26°34.66 6.1'	61.2
	26°40.72 5.9'	61.2
	26°46.58 5.6'	61.2
	26°52.22 5.4'	61.2
	26°57.66 5.2' 27°2.89 5.0'	61.1
	27°2.89 5.0' 27°7.90 4.8'	61.1
		61.1
		61 1
	27°12.71 4.6'	61.1
3 165°53.95 29.83 149°40.50 1.0'	27°12.71 4.6′ 27°17.29 4.4′	
3 165°53.95 29.83 149°40.50 1.0'	27°12.71 4.6'	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6′ 27°17.29 4.4′	
$3$ $165^{\circ}53.95$ $29.83$ $149^{\circ}40.50$ $1.0^{\circ}$ $3$ $5D = 15.8^{\prime}$ $d = 0.6^{\prime}$ $SD = 0.00$ $SHA$ $Dec$ $SHA$ $V$	27°12.71 4.6' 27°17.29 4.4' = 16.7'	61.1
3 $165^{\circ}53.95$ 29.83 $149^{\circ}40.50$ 1.0' 2 $SD = 15.8'$ $d = 0.6'$ $SD = 180^{\circ}53.93$ $N19^{\circ}30.39$ $164^{\circ}0.54$ 1.0' $N2$	27°12.71 4.6' 27°17.29 4.4' = 16.7'	61.1 HP 61.1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$27^{\circ}12.71$ 4.6' $27^{\circ}17.29$ 4.4' = 16.7' Dec d $27^{\circ}21.67$ 4.2'	HP 61.1' 61.1'
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccc} 27^{\circ}12.71 & 4.6' \\ 27^{\circ}17.29 & 4.4' \\ \hline = 16.7' \\ \hline \textbf{Dec} & d \\ 27^{\circ}21.67 & 4.2' \\ 27^{\circ}25.83 & 3.9' \\ \end{array}$	HP 61.1' 61.1' 61.1'
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′ Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°29.77 3.7′	HP 61.1 61.1 61.1 61.1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′ Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°29.77 3.7′ 27°33.50 3.5′	HP 61.1' 61.1' 61.1' 61.1' 61.1'
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′ Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°29.77 3.7′ 27°37.01 3.5′ 27°40.30 3.1′ 27°43.37 2.9′	HP 61.1' 61.1' 61.1' 61.1' 61.1' 61.1'
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′ Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°29.77 3.7′ 27°33.50 3.5′ 27°40.30 3.1′ 27°43.37 2.9′ 27°46.22 2.6′	61.1'  HP 61.1' 61.1' 61.1' 61.1' 61.1.1 61.1.1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′  Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°29.77 3.7′ 27°33.50 3.5′ 27°37.01 3.3′ 27°43.37 2.9′ 27°44.85 2.4′	61.1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′ Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°29.77 3.7′ 27°33.50 3.5′ 27°40.30 3.1′ 27°43.37 2.9′ 27°46.22 2.6′	61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1. 61.1. 61.1.
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′  Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°29.77 3.7′ 27°33.50 3.5′ 27°37.01 3.3′ 27°43.37 2.9′ 27°44.85 2.4′	61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1.1 61.1.1 61.1.1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′  Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°37.51 3.5′ 27°37.51 3.3′ 27°40.30 3.1′ 27°43.37 2.9′ 27°44.85 2.4′ 27°55.46 2.0′ 27°55.43 1.7′	61.1' HP 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1'
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′  Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°29.77 3.7′ 27°33.50 3.5′ 27°40.30 3.1′ 27°43.37 2.9′ 27°46.22 2.6′ 27°48.85 2.4′ 27°51.26 2.2′ 27°53.46 2.0′ 27°57.18 1.5′ 27°58.70 1.3′ 28°0.01 1.1′	61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.0' 61.0' 61.0'
SD = 15.8′ $d = 0.6′$ SD = 149°40.50 1.0′ SD = 15.8′ $d = 0.6′$ SD = 15.8′ $d = 0.6′$ SD = 15.8′ $d = 0.6′$ SD = 15.8′ $d = 0.6′$ SD = 180°53.93 N19°30.39 164°0.54 1.0′ N2 1 195°53.91 30.94 178°20.53 1.0′ 2 2 10°53.88 31.49 192°40.48 0.9′ 2 2 10°53.88 31.49 192°40.48 0.9′ 2 2 10°53.83 32.59 221°20.27 0.8′ 2 25°553.81 33.14 235°40.11 0.8′ 2 25°553.75 34.24 264°19.72 0.8′ 2 25°53.75 34.24 264°19.72 0.8′ 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′  Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°29.77 3.7′ 27°33.50 3.5′ 27°40.30 3.1′ 27°43.37 2.9′ 27°46.22 2.6′ 27°48.85 2.4′ 27°51.26 2.2′ 27°53.46 2.0′ 27°55.43 1.7′ 27°57.18 1.5′ 27°57.18 1.5′ 28°0.01 1.1′ 28°1.10 0.9′	61.1 HP 61.1 61.1 61.1 61.1 61.1 61.1 61.1 61.0 61.0 61.0 61.0
SD = 15.8′ $d = 0.6′$ SD = 15.8′ $d = 0.6′$ SD = 15.8′ $d = 0.6′$ SD = 15.8′ $d = 0.6′$ SD = 15.8′ $d = 0.6′$ SD = 15.8′ $d = 0.6′$ SD = 15.8′ $d = 0.6′$ SD = 164°0.54 1.0′ N3 1 195°53.91 30.94 178°20.53 1.0′ $d = 0.6$ 2 210°53.88 31.49 192°40.48 0.9′ $d = 0.6$ 2 220°53.86 $d = 0.6$ 3 225°53.86 $d = 0.6$ 2 21°20.27 0.8′ $d = 0.6$ 2 25°53.81 33.14 235°40.11 0.8′ $d = 0.6$ 2 25°53.78 N19°33.69 249°59.93 0.8′ N3 10°53.75 34.24 264°19.72 0.8′ $d = 0.6$ 3 30°53.73 34.79 278°39.50 0.8′ $d = 0.6$ 3 315°53.70 $d = 0.6$ 3 315°53.70 $d = 0.6$ 3 315°53.70 $d = 0.6$ 3 315°53.70 $d = 0.6$ 3 315°53.65 36.43 321°38.73 0.7′ $d = 0.6$ 3 315°53.65 36.43 321°38.73 0.7′ $d = 0.6$ 3 315°53.65 36.43 321°38.73 0.7′ $d = 0.6$ 3 30°53.57 38.07 $d = 0.6$ 37.52 350°18.17 0.7′ $d = 0.6$ 30°53.57 38.07 $d = 0.6$ 37.56 0.7′ N3 36°53.57 38.07 $d = 0.6$ 37.56 0.7′ N5 36°55.54 $d = 0.6$ 38.61 18°57.63 0.7′ $d = 0.6$ 30°53.51 39.15 33°17.36 0.7′	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′  Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°29.77 3.7′ 27°33.50 3.5′ 27°40.30 3.1′ 27°43.37 2.9′ 27°44.85 2.4′ 27°51.26 2.2′ 27°55.43 1.7′ 27°57.18 1.5′ 28°0.01 1.1′ 28°1.10 0.9′ 28°1.96 0.6′	HP 61.1 61.1 61.1 61.1 61.1 61.1 61.1 61.1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′  Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°29.77 3.7′ 27°33.50 3.5′ 27°40.30 3.1′ 27°43.37 2.9′ 27°46.22 2.6′ 27°48.85 2.4′ 27°51.26 2.2′ 27°53.46 2.0′ 27°55.43 1.7′ 27°57.18 1.5′ 27°57.18 1.5′ 28°0.01 1.1′ 28°1.10 0.9′	HPP 61.1 61.1 61.1 61.1 61.1 61.1 61.1 61
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6' 27°17.29 4.4' = 16.7'  Dec d 27°21.67 4.2' 27°25.83 3.9' 27°27.73.50 3.5' 27°37.01 3.3' 27°40.30 3.1' 27°44.37 2.9' 27°48.85 2.4' 27°53.46 2.0' 27°55.46 2.0' 27°57.18 1.5' 27°57.18 1.5' 28°1.0 0.9' 28°1.10 0.9' 28°1.61 0.4' \[ \] \( \) \(	HPP 61.1 61.1 61.1 61.1 61.1 61.1 61.1 61
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6' 27°17.29 4.4' = 16.7'  Dec d 27°21.67 4.2' 27°25.83 3.9' 27°29.77 3.7' 27°37.01 3.3' 27°40.30 3.1' 27°44.37 2.9' 27°46.22 2.6' 27°44.85 2.4' 27°57.18 1.5' 27°57.18 1.5' 27°57.18 1.5' 28°0.01 1.1' 28°1.10 0.9' 28°1.96 0.6' 28°2.61 0.4' 128°3.03 0.2' 28°3.23 -0.0'	HP 61.1 61.1 61.1 61.1 61.1 61.1 61.1 61.
SD = 15.8′ $d = 0.6′$ SD = 149°40.50 1.0′ SD = 15.8′ $d = 0.6′$ SD = 15.8′ $d = 0.6′$ SD = 164°0.54 1.0′ N. SD = 180°53.93 N19°30.39 164°0.54 1.0′ N. SD = 195°53.91 30.94 178°20.53 1.0′ SD = 2210°53.88 31.49 192°40.48 0.9′ SD = 225°53.86 ··· 32.04 207°0.39 0.9′ SD = 255°53.81 33.14 235°40.11 0.8′ SD = 255°53.75 34.24 264°19.72 0.8′ SD = 285°53.75 34.24 264°19.72 0.8′ SD = 315°53.70 ··· 35.34 292°59.25 0.7′ SD = 330°53.68 35.88 307°18.99 0.7′ SD = 35°53.60 37.52 350°18.17 0.7′ SD = 25°53.54 0.31 30°53.57 38.07 4°37.90 0.7′ SD = 25°53.54 0.31 30°53.57 38.07 4°37.90 0.7′ SD = 25°53.54 0.31 30°53.57 38.07 4°37.90 0.7′ SD = 25°53.54 0.31 30°53.57 38.07 4°37.90 0.7′ SD = 25°53.46 N19°40.24 61°56.88 0.8′ N19°40.24 61°56.88 0.8′ N19°40.24 61°56.88 0.8′ N19°40.24 61°56.86 0.8′ N19°40.24 90°36.47 0.8′ N19°40.24 90°36.4	27°12.71 4.6' 27°17.29 4.4' = 16.7'  Dec d 27°21.67 4.2' 27°25.83 3.9' 27°29.77 3.5' 27°37.01 3.3' 27°40.30 3.1' 27°44.37 2.9' 27°46.22 2.6' 27°48.85 2.4' 27°51.26 2.2' 27°55.46 2.0' 27°57.18 1.5' 27°57.18 1.5' 27°57.18 1.5' 28°0.01 1.1' 28°1.10 0.9' 28°1.96 0.6' 28°3.23 -0.0' 28°3.21 -0.2'	HP 61.1 61.1 61.1 61.1 61.1 61.1 61.1 61.1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′  Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°29.77 3.7′ 27°33.50 3.5′ 27°40.30 3.1′ 27°43.37 2.9′ 27°46.22 2.6′ 27°48.85 2.4′ 27°51.26 2.2′ 27°53.46 2.0′ 27°57.18 1.5′ 27°57.18 1.5′ 27°57.18 1.5′ 28°0.01 1.1′ 28°1.10 0.9′ 28°2.61 0.4′ N28°3.03 0.2′ 28°3.21 -0.2′ 28°3.21 -0.2′ 28°2.97 -0.5′	HP 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.0' 61.0' 61.0' 61.0' 61.0' 60.9' 60.9' 60.9' 60.9' 60.9'
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′  Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°29.77 3.7′ 27°33.50 3.5′ 27°40.30 3.1′ 27°43.37 2.9′ 27°46.22 2.6′ 27°48.85 2.4′ 27°51.26 2.2′ 27°53.46 2.0′ 27°55.43 1.7′ 27°55.43 1.7′ 28°1.10 0.9′ 28°2.61 0.4′ 128°1.10 0.9′ 28°2.61 0.4′ 128°3.03 0.2′ 28°3.23 -0.0′ 28°3.21 -0.2′ 28°2.52 -0.7′	HPP 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.0' 61.0' 61.0' 61.0' 61.0' 61.0' 60.9' 60
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′  Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°29.77 3.7′ 27°33.50 3.5′ 27°40.30 3.1′ 27°43.37 2.9′ 27°46.22 2.6′ 27°48.85 2.4′ 27°51.26 2.2′ 27°53.46 2.0′ 27°57.18 1.5′ 27°57.18 1.5′ 27°57.18 1.5′ 28°0.01 1.1′ 28°1.10 0.9′ 28°2.61 0.4′ N28°3.03 0.2′ 28°3.21 -0.2′ 28°3.21 -0.2′ 28°2.97 -0.5′	HP 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.1' 61.0' 61.0' 61.0' 61.0' 61.0' 60.9' 60.9' 60.9' 60.9' 60.9'
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27°12.71 4.6′ 27°17.29 4.4′ = 16.7′  Dec d 27°21.67 4.2′ 27°25.83 3.9′ 27°29.77 3.7′ 27°33.50 3.5′ 27°40.30 3.1′ 27°43.37 2.9′ 27°46.22 2.6′ 27°48.85 2.4′ 27°51.26 2.2′ 27°53.46 2.0′ 27°55.43 1.7′ 27°55.43 1.7′ 28°1.10 0.9′ 28°2.61 0.4′ 128°1.10 0.9′ 28°2.61 0.4′ 128°3.03 0.2′ 28°3.23 -0.0′ 28°3.21 -0.2′ 28°2.52 -0.7′	HP 61.1 61.1 61.1 61.1 61.1 61.1 61.1 61.1

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
<b>N</b> 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	////
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:35	07:27	08:18	15:35	16:25	17:17

Lat.		Moonris	e		Moonset	
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°						
<b>N</b> 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	
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	08:22	10:23	12:08	14:25	14:36	15:12

		Sun		Moon		
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	0-2
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	1-2%
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	

Color	h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Color	Tue	GHA.	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
1 2 200°4.03   100°4.05   2.200   2.200°4.05   4.100   2.200°4.05   2.000°4.05   2							
2 2016-46.88 779-28.89 2.29 2279-377 48.77 48.77 48.77 135712.46 4.87 207-28.97 12.19 12.							
3 221-48 30 191-49 9 - 2.20 257-245 - 99-66 1897-144577 207-67-76 - 2021							
1.							
1.00	4	296°50.76	206°41.16 2.44	268°30.13 50.14	183°16.46 4.70	285°47.98 20.30	· ·
8 337°0.0 205°738.3 237°3.1 30°3.2 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	5	311°53.23	221°40.33 2.51	283°30.81 50.82			
8 337°9.62 206°9.38 273 273 273 274 274 4.4 4.4 385°5.62 2.0.65							
Section   Control   Cont							
1. L. 7-9.8							
11 27°6.00 311°3.33 2.04 13°3.487 5.00°5.58 30°5.58 318°3.65 1.02°1.00°5.102°1.005°1.							
13   771   794   306   545   167   545   565   566   567   545							Aldebaran 290°38.68 16°33.69
14 67°150 36°1234 1.15 68°1036 5.600 3.30°1036 1.00°100 1.00 0.00°101 1.00°							
15   1071   16   117   120   130							
Alcalam   1275-353   1275-353   1275-353   1275-354   1275-355   1275-354   1275-355		$87^{\circ}15.40$					
11   17   20.00   20   20   20   20   20   20	15		11°32.00 · · 3.20	73°37.58 · · 57.59	348°38.53 · · 3.97	91°12.57 · · 21.27	
18   16   16   17   17   18   18   18   18   18   18							
10   10   10   10   10   10   10   10							
20   177*30.19   300   146*240.96   0.97   63*4855   3.63   166*23.75   2.17   1.7   2.27   2.27   2.27   2.27   2.27   2.28   3.20   3.27   2.27   3.27   2.27   3.27   2.27   3.27							Sirius 258°25.53 -16°45.26
129°   129°						_	
22 027°3512							
Page							
More   GHA	23	222°37.58					
March   CHA   CHA   CHA   CHA   Dec   CH	Mori	nacc 09:12	, 0 9/ d0 1/ m 2 02	10 7' d0 7' m1 25	12 0/ d 0 1/ m 1 02	v2 2′ d0 1′ m0 00	
GHA   CHA	ivier.	pass. Uo:12	ν-0.6 d0.1 m-3.93	νο.τ αυ.τ m1.25	ν2.0 α-0.1 m-1.95	V2.2 d0.1 m0.90	
CHA							
2 267°4.51   161°23.69   3.77   223°4.43   4.35   138°68.57   3.99   241°34.94   22.15   22.15   22.15   22.15   23.17°4.17°5   23.15°5.37   23.10°4.58   3.32   23.21°5.37   23.10°4.58   3.32   23.21°3.38   23.10°4.58   23.21°5.38   23.21°2.38   23.21°							1 -
2 267"4497 176"22.85 3.82 238"45.02 5.02 154"0.58 3.23 256"37.18 22.24 Acrus 177"59.42 -69"15.03 20"2.19 42 19"2.02 3.87 25"45.70 159"5.58 3.10 21"39.42 2.23 4 Carus 177"59.42 -69"15.03 4 29"7.49 9.0 20"2.19 30.0 286"4.65 22.42 5 Carus 177"59.0 4 2.69"15.0 3 20"3.0 25							Denebola 182°23.66 14°25.44
282°4744   191°22.02   387   253°4570   570   169°2.58   316   271°394   2233   2242   2334   245°2.59   226°4.16.5   22.42   2245°4.58   239°5.59   226°4.68   236°4.68							Gienah 175°42.25 -17°41.50
4 297"49,99 206"21.9 3,919 266"46,88 6.37 184"4.58 3.09 286"41.65 22.42   Salicity 1.06"11.59 512"65.91 20.20 3.06"43.89 230"1.05 2.09 310"43.89 20"1.05 2.09 310"43.89 22.68   Salicity 1.06"11.59 25"50.70 4.05 313"48.41 8.39 229"1.05 2.09 310"48.13 100"22.59   Salicity 1.06"1.05 2.09 310"48.13 10"2"2.24   Salicity 1.06"2.09 310"2.22 231"1.00 4 .01 33"49.97 6 .07 4"25"1.05 2.09 310"48.13 10"2.24   Salicity 1.06"2.05 2.09 310"48.13 10"2"2.24   Salicity 1.06"2.05 2.09 310"48.13 10"2.05 2.09 310"48.13 10"2.05 2.09 310"48.13 10"2.05 2.09 310"3.05 2.00 310"3.05 2.00 310"3.05 2.00 310"3.05 2.00 310"3.05 2.00 310"3.05 2.00 310"3.05 2.00 310"3.0							
5 312°5237 221°2036 396 283°4705 7.05 199°6.58 3.02 301°48.18 022.59 16.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1							
5 327"54.83 226"19.53 N25"4.01 288"47.73 N11"7.72 214"8.59 N22"2.06 316"6.13 N02"22.59 N02"2.59 N02"2.							
7 342-57.30 251-18.70 4.05 313*48.41 8.39 229*10.59 2.89 331*48.37 22.68 8 357*59.70 266*17.87 4.09 328*49.08 9.07 244*12.59 2.82 346*59.06 22.77 1.00 18.20 18.20 18.2							·
8 357°59.72 206°17.87 4.09 328°49.08 9.07 244°12.59 2.82 346°50.00 22.77 1   9 18°2.72 281°17.04 4.13 348°49.76 1.974 259°14.60 2.69 16°55.08 2.22.75 1   10 28°4.69 296°16.20 4.17 358°50.43 10.41 274°16.60 2.69 16°55.08 2.22.45   11 43°7.15 311°13.73 4.21 13°51.11 1.109 28°918.60 2.62 31°57.52 2.033   12 58°9.62 326°14.54 N25°4.25 228°51.79 N11°11.76 304°20.60 N22°2.55 46°59.56 N02°2.12   13 73°12.08 341°13.71 4.28 43°52.46 12.43 31°2.260 0.24 8 62°1.20 32.29   14 88°14.55 356°12.88 4.32 58°3.31 13.10 334°24.61 2.41 77°4.03 23.29   15 103°17.01 1 11°12.05 4.35 73°3.38 1 13.17 340°2.661 2.35 92°6.67 2.33.9   16 118°19.47 26°11.22 4.39 88°54.49 14.44 4°28.61 2.28 107°8.51 2.39   18 148°24.40 56°9.56 N25°4.45 118°55.84 N11°15.79 34°32.61 N22°2.14 137°12.99 N02°2.364   19 163°2.66 7 71°8.73 4.49 113°35.61 11.37 34°3.61 1.20 1.00 16°71.74 2.38 1   18 148°2.43 0.66°9.56 N25°4.45 118°55.84 N11°15.79 34°3.561 N22°2.14 137°12.99 N02°2.364   18 149°3.13 9 101°7.07 4.53 16°55.84 N11°15.79 34°3.61 1.02 1.00 16°71.74 2.38 1   18 143°3.07 1.07 4.53 16°55.87 17.80 79°3.86 1.04 1.80 12°2.14 2.39   18 149°3.19 101°7.07 4.53 16°55.87 17.80 79°3.86 1.04 1.80 12°2.14 2.39   18 149°3.19 101°7.07 4.53 16°55.84 118°19.81 1.24 1.80 1.20 1.20 1.20 1.20 1.20 1.20 1.20 1.2	7	$342^{\circ}57.30$	251°18.70 4.05			331°48.37 22.68	
9 13°2.22 281°1704 · 4.13 343°49.76 · 9.74 299°14.66 · 2.275 1°52.84 · 22.85   19°2.64   10 28°4.69 296°16.20 4.17 358°50.43   10.41 274°16.66   2.69 16°55.08 2.246   11 43°7.15 311°15.37 4.21 13°51.11 11.09 289°18.66   2.62 31°57.32 2.303   Kochab 13°18.68 74°2.82 2.11 13°19.10   11°11.76 304°2.66 12°2.55 46°59.55 100°23.12   2.10 13°7.86 8   43°2.66 12.43 31°2.56   2.24 1 77°4.03 2.3.0   14 88°14.55 356°12.88   4.32°4.25 28°51.79 11°11.76 304°2.66 12°2.55 46°59.55 100°23.12   14 16°52.84 13.10 334°2.66   2.24 1 77°4.03 2.3.0   14 16°54.58 1.16°2.43 26°3.746   118°103°17.01 11°12.05 · 4.35 73°53.81 · 13.77 349°2.66   2.235 92°6.27 · 23.38   Arta 11°2.41 0.02°6.94   118°11.15   118°11.15   118°1							
11 43°7.15 311°15.37 4.21 13°51.11 11.09 289°18.60 2.62 31°57.32 2.30 3.6 7.4°2.20 12.5 1.5 10.5 10.2°17.10 13.5 10.5 10.2°17.10 13.5 10.5 10.2°17.10 13.5 10.5 10.2°17.10 13.							
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11							May 20 Wed SHA Mer.pass
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17 134°21.08 40°50.50 4.80 104°11.37 31.16 20°18.59 0.56 123°4.51 25.63 18 149°23.54 55°49.67 N25°4.80 119°12.04 N11°31.83 35°20.59 N22°0.49 138°6.75 N02°25.72 19 164°26.01 70°48.84 4.79 134°12.72 32.49 50°22.59 0.42 153°8.99 25.80 20 179°28.47 85°48.02 4.79 149°13.39 33.16 65°24.58 0.35 168°11.23 25.89 21 194°30.94 100°47.19 · · 4.79 164°14.06 · · 33.83 80°26.58 · · 0.28 183°13.47 · · 25.98 22 209°33.40 115°46.36 4.78 179°14.74 34.49 95°28.58 0.21 198°15.71 26.06 23 224°35.86 130°45.54 4.78 194°15.41 35.16 110°30.57 0.14 213°17.96 26.15 Mars 330°20.71 10:04  Horizontal parallax Venus: 0.1  Mars 330°20.71 10:04  Jupiter 246°5.43 15:39  Saturn 348°47.24 08:49  Horizontal parallax Venus: 0.1  Mars 330°20.71 10:04  153°8.99 25.80  Saturn 348°47.24 08:49  Saturn 348°4							
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20 179°28.47 85°48.02 4.79 149°13.39 33.16 65°24.58 0.35 168°11.23 25.89 21 194°30.94 100°47.19 · · 4.79 164°14.06 · · 33.83 80°26.58 · · 0.28 183°13.47 · · 25.98 22 209°33.40 115°46.36 4.78 179°14.74 34.49 95°28.58 0.21 198°15.71 26.06 23 224°35.86 130°45.54 4.78 194°15.41 35.16 110°30.57 0.14 213°17.96 26.15 Mars: 0.1							· ·
21       194°30.94       100°47.19       · · 4.79       164°14.06       · · 33.83       80°26.58       · · 0.28       183°13.47       · · 25.98       Horizontal parallax         22       209°33.40       115°46.36       4.78       179°14.74       34.49       95°28.58       0.21       198°15.71       26.06       Venus:       0.1         23       224°35.86       130°45.54       4.78       194°15.41       35.16       110°30.57       0.14       213°17.96       26.15       Mars:       0.1							Saturn 348 47.24 08:49
22       209°33.40       115°46.36       4.78       179°14.74       34.49       95°28.58       0.21       198°15.71       26.06       Venus:       0.1         23       224°35.86       130°45.54       4.78       194°15.41       35.16       110°30.57       0.14       213°17.96       26.15       Mars:       0.1							Horizontal parallax
25 221 55.00 150 1551 1.10 151 15.11 55.10 110 56.51 6.21 225 21.50 25.15							
Mer.pass. 08:04 $\nu$ -0.8′ d0.0′ m-3.93 $\nu$ 0.7′ d0.7′ m1.26 $\nu$ 2.0′ d-0.1′ m-1.92 $\nu$ 2.2′ d0.1′ m0.90	23	224° 35.86	130°45.54 4.78	194°15.41 35.16	110°30.57 0.14	213°17.96 26.15	Mars: 0.1
	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	Su	n	Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°53.28	N19°43.48	$147^{\circ}55.99$	1.0'	$N28^{\circ}0.95$	-1.1'	60.8'
1	195°53.25	44.02	162°15.97	1.0'	27°59.83	-1.3'	60.8'
2	210°53.22 225°53.19	44.56 •• 45.09	176°35.99 190°56.05	1.1' 1.1'	27°58.51 27°56.96	-1.5' -1.8'	60.8' 60.8'
4	240°53.16	45.63	205°16.17	1.2'	27°55.20	-2.0'	60.8'
5	255°53.13	46.17	$219^{\circ}36.34$	1.2'	$27^{\circ}53.22$	-2.2'	60.7'
6	270°53.10	N19°46.70	233°56.57	1.3'	N27°51.03	-2.4'	60.7'
7 8	285°53.07 300°53.04	47.24 47.77	248°16.86 262°37.22	1.4' 1.4'	27° 48.63 27° 46.02	-2.6' -2.8'	60.7' 60.7'
9	315°53.00	• • 48.30	276°57.64	1.5'	27°43.20	-3.0'	60.7'
10	330°52.97	48.84	291°18.13	1.6'	27°40.16	-3.2'	60.6'
11 12	345°52.94 0°52.91	49.37 N19°49.90	305°38.70 319°59.34	1.6' 1.7'	27°36.92 N27°33.47	-3.4' -3.7'	60.6' 60.6'
13	15°52.87	50.43	334°20.07	1.8'	27°29.82	-3.1' -3.9'	60.6
14	30°52.84	50.96	348°40.87	1.9'	27°25.96	-4.1'	60.5'
15	45°52.81	• • 51.49	3°1.76	2.0'	27°21.90	-4.3'	60.5'
16 17	60°52.77 75°52.74	52.02 52.55	17°22.74 31°43.81	2.1' 2.2'	27°17.63 27°13.17	-4.5' -4.7'	60.5' 60.5'
18	90°52.71	N19°53.08	46°4.97	2.3'	N27°8.51	-4.9	60.4
19	105°52.67	53.61	$60^{\circ}26.23$	2.4'	27°3.65	-5.1'	60.4'
20	120°52.64	54.13	74°47.59	2.5'	26°58.60	-5.2'	60.4'
21 22	135°52.60 150°52.57	•• 54.66 55.19	89°9.04 103°30.60	2.6' 2.7'	26°53.35 26°47.91	-5.4' -5.6'	60.4' 60.3'
23	165°52.53	55.71	103 30.00 117°52.27	2.8'	26°42.28	-5.8'	60.3
	SD = 15.8'	d = 0.5'			D = 16.6'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	180°52.50 195°52.46	N19°56.24 56.76	132°14.04 146°35.93	2.9' 3.0'	N26°36.46 26°30.45	-6.0' -6.2'	60.3' 60.3'
2	210°52.43	50.76 57.28	140 35.93 160°57.92	3.1'	26° 24.26	-6.4'	60.2
3	225°52.39	• • 57.81	175°20.03	3.2'	$26^{\circ}17.89$	-6.6'	60.2'
4	240°52.35	58.33	189°42.26	3.3'	26°11.33	-6.7'	60.2'
5 6	255°52.32 270°52.28	58.85 N19°59.37	204°4.60 218°27.06	3.5' 3.6'	26°4.59 N25°57.68	-6.9' -7.1'	60.1' 60.1'
7	285°52.24	19°59.89	232°49.64	3.7'	25°50.59	-7.1 -7.3	60.1
8	300°52.21	20°0.41	247°12.34	3.8'	25°43.33	-7.4'	60.1'
9	315°52.17	• • 0.93	261°35.17	4.0'	25°35.90	-7.6'	60.0'
10 11	330°52.13 345°52.09	1.45 1.97	275°58.12 290°21.20	4.1' 4.2'	25°28.29 25°20.52	-7.8' -7.9'	60.0' 60.0'
12	0°52.06	N20°2.49	304°44.41	4.3'	N25° 12.58	-8.1	59.9'
13	15°52.02	3.00	319°7.75	4.5'	25°4.48	-8.3'	59.9'
14 15	30°51.98 45°51.94	3.52 •• 4.04	333°31.21 347°54.81	4.6' 4.7'	24°56.22 24°47.80	-8.4' -8.6'	59.9' 59.8'
16	60°51.90	4.55	2°18.54	4.7 4.9'	24° 47.60 24° 39.22	-8.7'	59.8'
17	75°51.86	5.07	16°42.40	5.0'	24°30.48	-8.9'	59.8'
18	90°51.82	N20°5.58	31°6.40	5.1'	N24°21.59	-9.0'	59.8'
19 20	105°51.78 120°51.74	6.09 6.61	45°30.53 59°54.80	5.3' 5.4'	24°12.55 24°3.36	-9.2' -9.3'	59.7' 59.7'
21	135°51.70	7.12	74°19.20	5.5'	24° 54.03	-9.5'	59.7'
22	150°51.66	7.63	88°43.74	5.7'	23°44.55	-9.6'	59.6'
23	165°51.62	8.14	103°8.41	5.8'	23°34.92	-9.8'	59.6'
	SD = 15.8'	d = 0.5'		S	D = 16.4'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
i nu O	180°51.58	N20°8.65	ла 117°33.22	ν 5.9'	N23°25.16	a -9.9'	59.6'
1	195°51.54	9.16	131°58.17	6.1'	23° 15.26	-10.0'	59.5'
2	210°51.50	9.67	146°23.26 160°48.49	6.2'	23°5.22	-10.2'	59.5'
3 4	225°51.46 240°51.42	· · 10.18 10.69	160°48.49 175°13.85	6.4' 6.5'	22°55.05 22°44.74	-10.3' -10.4'	59.5' 59.4'
5	255°51.38	11.19	$189^{\circ}39.35$	6.6'	22°34.31	-10.4	59.4
6	270°51.33	N20°11.70	204°4.99	6.8'	N22°23.74	-10.7'	59.4'
7 8	285°51.29 300°51.25	12.21 12.71	218°30.77 232°56.69	6.9' 7.1'	22°13.05 22°2.24	-10.8' -10.9'	59.3' 59.3'
9	300 51.25 315°51.21	12.71	232 50.09 247°22.74	7.1 7.2'	22 2.24 21°51.31	-10.9 -11.1'	59.3'
10	330°51.16	13.72	261°48.93	7.3'	21°40.25	-11.2'	59.2'
11	345°51.12	14.23	276°15.26	7.5'	21°29.08	-11.3'	59.2'
12 13	0°51.08 15°51.03	N20°14.73 15.23	290°41.73 305°8.33	7.6' 7.7'	N21°17.80 21°6.40	-11.4' -11.5'	59.1' 59.1'
14	30°50.99	15.23	319°35.07	7.7 7.9'	20°54.89	-11.6'	59.1
15	45°50.95	• • 16.24	334°1.95	8.0'	$20^{\circ}43.27$	-11.7'	59.0'
16	60°50.90	16.74	348°28.96	8.1'	20°31.54	-11.8'	59.0'
17 18	75°50.86 90°50.81	17.24 N20°17.74	2°56.11 17°23.39	8.3' 8.4'	20°19.71 N20°7.77	-11.9' -12.0'	59.0' 58.9'
19	105°50.77	18.23	31°50.81	8.5	$19^{\circ}55.74$	-12.1'	58.9
20	120°50.72	18.73	46°18.35	8.7'	19°43.60	-12.2'	58.9'
21 22	135°50.68 150°50.63	· · 19.23 19.73	60°46.03 75°13.85	8.8' 8.9'	19°31.37 19°19.04	-12.3' -12.4'	58.8' 58.8'
23	165°50.59	19.73 20.22	75°13.85 89°41.79	9.1'	19° 19.04 19° 6.62	-12.4 -12.5'	58.8'
	SD = 15.8'	d = 0.5'			D = 16.2'		
		<u> </u>					

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:40	07:33	08:24	15:28	16:20	17:13

Lat.		Moonris	е		Moonset	
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
<b>N</b> 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	
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	13:04	13:23	13:29	16:36	18:29	20:21

		Sun		Moon		
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	3-5
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	7-24%
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	

h	Aries	Ver	nus	M	ars	Jup	oiter	Sat	urn		Stars
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA
0	239°38.33	145°44.71	N25° 4.77	209°16.09	N11°35.82	125°32.57	N22°0.07	228°20.20	N02°26.23		
1	254° 40.79	160°43.88	4.76	224°16.76	36.48	140°34.57	22°0.00	243°22.44	26.32	Alpheratz	
2	269° 43.26	175°43.06	4.75	239°17.43	37.15	155°36.56	21°59.93	258°24.68	26.40	Ankaa	353°6.28
3	284° 45.72	190°42.23	. 4.74	254°18.11	37.81	170°38.56	59.87	273°26.92	26.49	Schedar	349°30.12
4	299° 48.18	205°41.40	4.73	269°18.78	38.48	185°40.55	59.80	288°29.16	26.58	Diphda	348°46.38
5	314° 50.65	220°40.58	4.72	284°19.46	39.14	200°42.55	59.73	303°31.41	26.66	Achernar	
6	329°53.11	235°39.75	N25° 4.70	299°20.13	N11°39.80	215°44.55	N21°59.66	318°33.65	N02°26.75	Hamal	327°50.24
7	344° 55.58	250°38.93	4.69	314°20.80	40.47	230°46.54	59.59	333°35.89	26.83	Polaris	313°56.11
8	359° 58.04	265°38.10	4.67	329°21.48	41.13	245°48.54	59.52	348°38.13	26.92	Acamar	315°11.33
9	15°0.50	280°37.28	• • 4.65	344°22.15	41.79	260°50.53	• • 59.45	3°40.38	• • 27.00	Menkar	314°5.29
10	30°2.97	295°36.45	4.63	359°22.82	42.45	275°52.53	59.38	18° 42.62	27.09	Mirfak	308°27.14
11	45°5.43	310°35.63	4.61	14°23.50	43.12	290°54.52	59.31	33°44.86	27.17	Aldebaran	290°38.67
12	60°7.90	325°34.80	N25° 4.59	29°24.17	N11°43.78	305°56.52	N21°59.24	48°47.10	N02°27.26	Rigel	281°3.11
13	75° 10.36	340°33.98	4.57	44°24.84	44.44	320°58.51	59.17	63°49.35	27.34	Capella	280°20.69
14	90° 12.83	355°33.15	4.54	59°25.52	45.10	336°0.50	59.10	78°51.59	27.43	Bellatrix	278°21.99
15	105° 15.29	10°32.33	• • 4.52	74°26.19	45.76	351°2.50	• • 59.03	93°53.83	27.51	Elnath	278°0.81
16	120° 17.75	25°31.50	4.49	89°26.86	46.42	6°4.49	58.96	108°56.08	27.60	Alnilam	275°36.90
17	135° 20.22	40°30.68	4.46	104°27.54	47.08	21°6.49	58.89	123°58.32	27.68	Betelgeuse	270°51.17
18	150° 22.68	55° 29.85	N25°4.43	119°28.21	N11°47.75	36°8.48	N21°58.81	139°0.56	N02°27.77	Canopus	263°52.36
19	165° 25.15	70°29.03	4.40	134°28.88	48.41	51°10.47	58.74	154°2.81	27.85	Sirius	258°25.53
20	180°27.61	85°28.21	4.37	149°29.56	49.07	66°12.47	58.67	169°5.05	27.94	Adhara	255°5.27
21	195°30.07	100°27.38	• • 4.34	164°30.23	• • 49.73	81°14.46	• • 58.60	184°7.29	• • 28.02	Procyon	244°49.88
22	210°32.54	115° 26.56	4.30	179°30.90	50.39	96°16.45	58.53	199°9.54	28.11	Pollux	243°16.17
23	225°35.00	130°25.74	4.27	194°31.58	51.04	111°18.45	58.46	214°11.78	28.19	Avior	234° 14.60
N 4	00.00		0/ 2.02	- 0.7/ -10	.7′ m1.26	-20/-10	1/ 1.00	- 2 2/ -10	.1′ m0.90	Suhail	222°45.62
ivier.	pass. 08:00	$\nu$ -0.8° $a$ -0	.0′ m-3.93	$\nu$ 0.7 au	./ m1.20	$\nu$ 2.0° $a$ -0	.1′ m-1.92	ν2.2 a0	.1 mu.90	Miaplacidus	221°38.32
										Alphard	217° 46.72 207° 33.26
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207 33.26 193°39.49
0	240°37.47	145°24.91	N25°4.23	209°32.25	N11°51.70	126°20.44	N21°58.39	229°14.03	N02°28.28	Dubhe Denebola	193 39.49 182°23.67
1	$255^{\circ}39.93$	160°24.09	4.19	224°32.92	52.36	141°22.43	58.32	244°16.27	28.36	Gienah	175° 42.26
2	270°42.39	175°23.27	4.15	239°33.59	53.02	156°24.42	58.25	259°18.51	28.45	1	173 42.20 172°58.44
3	285°44.86	190°22.44	• • 4.11	254°34.27	• • 53.68	171°26.42	• • 58.18	274°20.76	• • 28.53		172 50.44 171°50.05
4	$300^{\circ}47.32$	205°21.62	4.07	269°34.94	54.34	186°28.41	58.11	289°23.00	28.61	Alioth	166° 11.60
5	$315^{\circ}49.79$	220°20.80	4.03	284°35.61	55.00	201°30.40	58.04	304°25.25	28.70	Spica	158° 20.87
6	330°52.25	235°19.98	N25° 3.98	299°36.28	N11°55.66	216°32.39	N21°57.97	319°27.49	N02°28.78	Alkaid	150° 20.07 152° 50.71
7	$345^{\circ}54.72$	$250^{\circ}19.16$	3.94	314°36.96	56.31	231°34.38	57.90	334°29.74	28.87	Hadar	148° 33.83
8	$0^{\circ}57.18$	265°18.33	3.89	329°37.63	56.97	246°36.38	57.82	349°31.98	28.95		147°55.94
9	15°59.64	280°17.51	• • 3.84	344°38.30	• • 57.63	261°38.37	• • 57.75	4°34.22	• • 29.04	Arcturus	
10	31°2.11	295°16.69	3.79	359°38.97	58.28	276°40.36	57.68	19°36.47	29.12	Rigil Kent.	139°38.13
11	46°4.57	310° 15.87	3.74	14°39.64	58.94	291°42.35	57.61	34°38.71	29.20	Kochab	137° 18.69
12	61°7.04	325° 15.05	N25° 3.69	29°40.32	N11°59.60	306°44.34	N21°57.54	49°40.96	N02°29.29	Zuben'ubi	136°54.45
13	76°9.50	340°14.23	3.64	44°40.99	12°0.25	321°46.33	57.47	64°43.21	29.37	Alphecca	126°2.42
14	91°11.96	355°13.41	3.59	59°41.66	0.91	336°48.32	57.40	79°45.45	29.46	Antares	112°14.08
15	106° 14.43	10°12.59	• • 3.53	74°42.33	• • 1.57	351°50.31	• • 57.33	94°47.70	• • 29.54	Atria	107°6.74
16	121°16.89	25°11.77	3.47	89°43.00	2.22	6°52.30	57.26	109°49.94	29.62	Sabik	$102^{\circ}1.16$
17	136° 19.36	40° 10.95	3.42	104°43.68	2.88	21°54.29	57.18	124°52.19	29.71	Shaula	96°8.45
18	151°21.82	55° 10.13	N25°3.36	119°44.35	N12°3.53	36°56.29	N21°57.11	139°54.43	N02°29.79	Rasalhague	$95^{\circ}57.19$
19	166° 24.28	70°9.31	3.30	134°45.02	4.19	51°58.28	57.04	154° 56.68	29.88	Eltanin	90°41.18
20	181° 26.75 196° 29.21	85°8.49 100°7.67	3.24 · · 3.17	149°45.69 164°46.36	4.84 •• 5.50	67°0.27 82°2.25	56.97 •• 56.90	169°58.92 185°1.17	29.96 •• 30.04	Kaus Aust.	83°30.68
21 22	211°31.68	115° 6.85	3.11	179°47.03	6.15	97°4.24	56.83	200°3.42	30.04	Vega	80°32.11
23	226° 34.14	130°6.03	3.11	194°47.71	6.81	112°6.23	56.75	215° 5.66	30.13	Nunki	75°46.09
										Altair	61°58.66
Mer.	pass. 07:56	$\nu$ -0.8′ d-0	.0′ m-3.93	$ u$ 0.7 $^{\prime}$ d0	.7′ m1.26	$\nu 2.0' \ d-0$	$.1^\prime$ m-1.91	$\nu$ 2.2′ d0	$.1^\prime$ m $0.90$	Peacock	53°3.69
										Deneb	49° 24.85
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.65
0	241°36.60	145° 5.21	N25° 2.98	209°48.38	N12°7.46	127°8.22	N21°56.68	230°7.91		Al Na'ir	27°31.50
1	256° 39.07	145 5.21 160°4.39	2.91	209 46.36 224°49.05	8.11	142° 10.21	56.61	245° 10.16	30.38	Fomalhaut	15° 13.35
2	271°41.53	100 4.39 175°3.57	2.91	239°49.72	8.77	142 10.21 157°12.20	56.54	260°12.40	30.36	Scheat	13°44.20
3	286° 44.00	190°2.75	• • 2.77	254°50.39	• • 9.42	172°14.19	56.47	275°14.65	30.54	Markab	13°28.86
4	301°46.46	205°1.94	2.70	269°51.06	10.07	187°16.18	56.40	290°16.89	30.63	May 22 Fri	SHA
5	316°48.93	220°1.12	2.63	284°51.73	10.73	202°18.17	56.32	305°19.14	30.71	Venus	266°6.38
6	331°51.39	235°0.30	N25° 2.55	299°52.40	N12°11.38	217°20.16	N21°56.25		N02°30.79	Mars	
7	346° 53.85	249°59.48	2.48	314°53.07	12.03	232°22.14	56.18	335°23.64	30.88	1	245°54.24
8	1°56.32	264°58.67	2.40	329°53.75	12.68	247°24.13	56.11	350°25.88	30.96	Saturn	
9	16° 58.78	279°57.85	2.33	344°54.42	• • 13.33	262°26.12	• • 56.04	5°28.13	• • 31.04		
10	$32^{\circ}1.25$	294°57.03	2.25	359°55.09	13.99	277°28.11	55.96	20°30.38	31.12	May 23 Sat	SHA
11	47°3.71	309°56.21	2.17	14°55.76	14.64	292°30.10	55.89	35°32.62	31.21		264°47.45
12	62°6.17	324°55.40	N25°2.09	29°56.43	N12°15.29	307°32.08	N21°55.82		N02°31.29		328°54.78 245°42.97
13	77°8.64	339° 54.58	2.00	44°57.10	15.94	322°34.07	55.75	65°37.12	31.37	Saturn	348° 36.56
14	92°11.10	354°53.77	1.92	59°57.77	16.59	337°36.06	55.67	80°39.37	31.46	Jatuin	3-0 30.30
15	107° 13.57	9°52.95	• • 1.84	74°58.44	• • 17.24	352°38.05	• • 55.60	95°41.61	• • 31.54	May 24 Sun	SHA
16	122°16.03	24°52.13	1.75	89°59.11	17.89	7°40.03	55.53	110°43.86	31.62		263°28.60
17	137° 18.49	39°51.32	1.66	104°59.78	18.54	22°42.02	55.46	125°46.11	31.70		328° 11.77
18	152° 20.96	54° 50.50	N25° 1.57	120° 0.45	N12°19.19	37°44.01	N21°55.38		N02°31.79		245°31.62
19	167° 23.42	69°49.69	1.48	135°1.12	19.84	52°45.99	55.31	155°50.61	31.87	Saturn	348°31.30
20	182°25.89	84°48.87	1.39	150°1.79	20.49	67°47.98	55.24	170°52.86	31.95	Horizon	ntal parallax
21 22	197° 28.35 212° 30.81	99°48.06 114°47.24	1.30	165°2.46 180°3.13	· · 21.14 21.79	82°49.97 97°51.95	· · 55.17 55.09	185°55.10 200°57.35	• • 32.03	. 10.1201	Venus:
23	212 30.81 227°33.28	114 47.24 129°46.43	1.21 1.11	180 3.13 195°3.80	21.79	97 51.95 112°53.94	55.09 55.02	200 57.35 215°59.60	32.12 32.20		Mars:
Mer.	pass. 07:52	$\nu$ -0.8′ d-0	.1′ m-3.94	$\nu$ 0.7′ d0	.7′ m1.26	$\nu 2.0' \ d-0$	.1′ m-1.91	$\nu 2.2' d0$	.1′ m0.90		

Dec  $29^{\circ}14.01$ -42° 9.56 56°40.71 -17°50.44  $\textbf{-57}^{\circ}\,5.97$  $23^{\circ}35.14$ 89°22.41 -40°11.86 4°11.55 49°57.21 16°33.70 -8°10.32  $46^{\circ}1.47$  $6^{\circ}22.37$ 28°37.76 -1°11.16 7°24.68 -52°42.71 -16°45.25 -29°0.62 5°9.38 27°57.78 -59°35.91 -43°32.62 -69°49.84 -8°46.52 11°50.26  $61^{\circ}36.73$  $14^{\circ}25.44$ -17°41.50 -63°15.04 -57°15.96 55°49.12 -11°18.09 49°10.94 -60°30.22 -36°30.17  $19^{\circ}\,2.65$ -60°56.84  $74^{\circ}\,2.83$ -16°9.21 26°37.47 -26°29.48 -69°4.44  $-15^{\circ}45.50$  $-37^{\circ}7.34$  $12^{\circ}32.34$ 51°28.92 -34°22.25 38°48.28 -26°15.77 8°56.19 -56°38.75  $45^{\circ}22.21$  $9^{\circ}59.67$ -46°49.75 -29°28.80 28°13.39 15°20.73 Mer.pass 14:18 10:02 15:36 08:45 Mer.pass 14:19 10:01 15:33 08:42 Mer.pass 14:20 10:00 15:29 08:38

h	Su	n	Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°50.54	N20°20.72	104°9.86	9.2'	N18°54.11	-12.6'	58.7'
1	195°50.49	21.22	118°38.06	9.3'	18°41.51	-12.7'	58.7'
2	210°50.45	21.71	133°6.40	9.5'	18°28.82	-12.8'	58.6'
3 4	225°50.40 240°50.35	· · 22.20 22.70	147°34.85 162°3.44	9.6' 9.7'	18°16.05 18°3.19	-12.9' -12.9'	58.6' 58.6'
5	255°50.31	23.19	176°32.15	9.8'	17°50.25	-12.9 -13.0'	58.5'
6	270°50.26	N20°23.68	191°0.98	10.0'	N17°37.23	-13.1'	58.5'
7	285°50.21	24.17	205°29.94	10.1'	$17^{\circ}24.13$	-13.2'	58.5'
8	300°50.16	24.67	219°59.02	10.2'	17°10.96	-13.2'	58.4'
9 10	315°50.12 330°50.07	· · 25.16 25.65	234°28.22 248°57.54	10.3' 10.4'	16°57.71 16°44.39	-13.3' -13.4'	58.4' 58.4'
11	345°50.02	26.14	263°26.98	10.4	16° 31.00	-13.4	58.3'
12	0°49.97	N20°26.62	277°56.54	10.7	N16°17.53	-13.5'	58.3'
13	15°49.92	27.11	292°26.22	10.8'	$16^{\circ}4.01$	-13.6'	58.3'
14	30°49.87	27.60	306°56.01	10.9'	15°50.41	-13.7'	58.2'
15	45°49.82	• • 28.09	321°25.92	11.0'	15°36.75	-13.7'	58.2'
16 17	60°49.77 75°49.72	28.57 29.06	335°55.93 350°26.06	11.1' 11.2'	15°23.03 15°9.25	-13.8' -13.8'	58.1' 58.1'
18	90°49.67	N20°29.54	4°56.31	11.4	N14°55.40	-13.9'	58.1
19	105°49.62	30.03	19°26.66	11.5'	14°41.50	-14.0'	58.0'
20	120°49.57	30.51	33°57.12	11.6'	$14^{\circ}27.55$	-14.0'	58.0'
21	135°49.52	• • 30.99	48°27.68	11.7'	14°13.54	-14.1'	58.0'
22	150°49.47 165°49.42	31.48	62°58.35 77°29.13	11.8'	13°59.47 13°45.36	-14.1' -14.2'	57.9'
23		31.96	11-29.13	11.9'		-14.2	57.9'
	SD = 15.8'	d = 0.5'		SI	D = 16.0'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°49.37	N20°32.44	$92^{\circ}0.01$	12.0'	N13°31.20	-14.2'	57.9'
1	195°49.32	32.92	106°30.99	12.1'	13°16.98	-14.3'	57.8'
2	210°49.27 225°49.21	33.40	121°2.07 135°33.25	12.2' 12.3'	13°2.72 12°48.42	-14.3' -14.3'	57.8'
3 4	240°49.16	· · 33.88 34.36	150°4.53	12.3 12.4'	12 48.42 12°34.07	-14.3 -14.4'	57.8' 57.7'
5	255°49.11	34.84	164°35.90	12.5'	12°19.68	-14.4'	57.7'
6	270°49.06	N20°35.31	179°7.37	12.6'	N12°5.25	-14.5'	57.7'
7	285°49.01	35.79	193°38.93	12.7'	11°50.78	-14.5'	57.6'
8	300°48.95	36.27	208°10.58	12.7'	11°36.27	-14.5'	57.6'
9 10	315°48.90 330°48.85	· · 36.74 37.22	222°42.33 237°14.16	12.8' 12.9'	11°21.72 11°7.14	-14.6' -14.6'	57.5' 57.5'
11	345°48.79	37.69	251°46.08	13.0'	10°52.53	-14.6'	57.5'
12	0°48.74	N20°38.17	266°18.09	13.1'	N10°37.88	-14.7'	57.4'
13	15°48.68	38.64	$280^{\circ}50.18$	13.2'	$10^{\circ}23.20$	-14.7'	57.4'
14	30°48.63	39.11	295°22.36	13.3'	10°8.49	-14.7'	57.4'
15 16	45°48.58 60°48.52	· · 39.58 40.05	309°54.61 324°26.95	13.3' 13.4'	09°53.75 09°38.99	-14.8' -14.8'	57.3' 57.3'
17	75°48.47	40.53	338°59.37	13.5'	09°24.20	-14.8'	57.3'
18	90°48.41	N20°41.00	353°31.87	13.6'	N09°9.38	-14.8'	57.2'
19	105°48.36	41.47	8°4.44	13.6'	08°54.54	-14.9'	57.2'
20	120°48.30	41.93	22°37.09			-14.9'	57.2'
21 22	135°48.24 150°48.19	· · 42.40 42.87	37°9.81 51°42.60	13.8' 13.9'	08°24.80 08°9.89	-14.9' -14.9'	57.1' 57.1'
23	165°48.13	42.87	66°15.47	13.9'	08 9.89 07°54.97	-14.9' -14.9'	57.1'
25	SD = 15.8'	d = 0.5'			D = 15.8'	-14.3	37.1
	3D = 15.6	u = 0.5		- 31	D = 15.6°		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°48.08	N20°43.80	80°48.40	14.0'	N07°40.03	-15.0'	57.0'
1 2	195°48.02 210°47.96	44.27 44.73	95°21.40 109°54.47	14.1' 14.1'	07°25.07 07°10.10	-15.0' -15.0'	57.0' 57.0'
3	225°47.91	45.20	109 54.47 124°27.60	14.1	06°55.12	-15.0'	56.9'
4	240°47.85	45.66	139°0.80	14.3'	$06^{\circ}40.12$	-15.0'	56.9'
5	255°47.79	46.13	153°34.06	14.3'	06°25.11	-15.0'	56.9'
6	270°47.73	N20°46.59	168°7.38	14.4'	N06°10.09	-15.0'	56.8'
7 8	285°47.68 300°47.62	47.05 47.51	182°40.76 197°14.20	14.4' 14.5'	05°55.06 05°40.02	-15.0' -15.0'	56.8' 56.8'
9	315°47.56	• • 47.97	211°47.69	14.5	05°24.97	-15.1'	56.8'
10	330°47.50	48.43	226°21.24	14.6'	05°9.91	-15.1'	56.7'
11	345°47.44	48.89	240°54.84	14.7'	04°54.85	-15.1'	56.7'
12	0°47.38	N20°49.35	255°28.50	14.7'	N04°39.79	-15.1'	56.7'
13 14	15°47.32 30°47.26	49.81 50.27	270°2.21 284°35.97	14.8' 14.8'	04°24.72 04°9.65	-15.1' -15.1'	56.6' 56.6'
14 15	45°47.21	50.72	284 35.97 299°9.77	14.8 14.9'	04 9.65 03°54.58	-15.1'	56.6'
16	60°47.15	51.18	313°43.62	14.9'	03°39.51	-15.1	56.5'
17	75°47.09	51.64	328°17.52	14.9'	$03^{\circ}24.44$	-15.1'	56.5'
18	90°47.03	N20°52.09	342°51.47	15.0'	N03°9.37	-15.1'	56.5'
19 20	105°46.97 120°46.90	52.55 53.00	357°25.45 11°59.48	15.0' 15.1'	02°54.31 02°39.24	-15.1' -15.1'	56.4' 56.4'
20	120 46.90 135°46.84	53.00	26°33.55	15.1'	02 39.24 02°24.18	-15.1'	56.4'
22	150°46.78	53.91	41°7.65	15.1'	02°9.13	-15.0'	56.4
23	165°46.72	54.36	55°41.80	15.2'	01°54.08	-15.0'	56.3'
	SD = 15.8'	d = 0.5'		SI	D = 15.6'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
<b>N</b> 72°						
<b>N</b> 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	////
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:44	07:38	08:30	15:23	16:15	17:08

Lat.		Moonris	е	Moonset		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
<b>N</b> 72°	06:17	09:43	12:02	04:36	02:53	02:09
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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	
<b>S</b> 60°	13:31	13:32	13:32	22:05	23:41	

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
- 4,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	6-8	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	34-56%	
22	03:22	03:20	11:57	17:40	05:14		
23	03:17	03:15	11:57	18:27	06:04		
24	03:12	03:10	11:57	19:11	06:49		

h	Aries	Venus	Mars	Jupiter	Saturn
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	242°35.74	144°45.62 N25°1.02	210°4.47 N12°23.08	127°55.92 N21°54.95	231°1.85 N02°32.28
1	257°38.21	159°44.80 0.92	225°5.14 23.73	142°57.91 54.87	246°4.10 32.36
2	272°40.67	174°43.99 0.82	240°5.81 24.38	157°59.90 54.80	261°6.35 32.45
3	287°43.13	189°43.18 · · 0.72	255°6.48 · · 25.03	173°1.88 · · 54.73	276°8.60 · · 32.53
4	302°45.60	204°42.36 0.62	270°7.15 25.68	188°3.87 54.66	291°10.84 32.61
5	$317^{\circ}48.06$	219°41.55 0.52	285°7.82 26.32	203° 5.85 54.58	306°13.09 32.69
6	332°50.53	234°40.74 N25°0.42	300°8.49 N12°26.97	218°7.84 N21°54.51	321°15.34 N02°32.77
7	347°52.99	249°39.92 0.31	$315^{\circ}9.16$ 27.62	233° 9.82 54.44	336°17.59 32.86
8	2°55.46	264°39.11 0.21	330°9.83 28.26	248°11.81 54.36	351°19.84 32.94
9	17°57.92	279°38.30 · · 0.10	345°10.50 · · 28.91	263°13.79 · · 54.29	6°22.09 · · 33.02
10	33°0.38 48°2.85	294°37.49 24°59.99 309°36.68 24°59.88	0°11.17 29.55 15°11.84 30.20	278°15.78 54.22 293°17.76 54.14	21°24.34 33.10 36°26.59 33.18
11 12	48 2.85 63°5.31	309 30.08 24 59.88 324°35.87 N24°59.77	15°11.84 30.20 30°12.51 N12°30.85	293°17.76 54.14 308°19.74 N21°54.07	36°26.59 33.18 51°28.84 N02°33.27
13	78°7.78	339°35.06 59.66	45°13.18 31.49	323°21.73 54.00	66°31.09 33.35
14	93° 10.24	354°34.24 59.55	60° 13.85 32.14	338°23.71 53.92	81°33.34 33.43
15	108° 12.70	9°33.43 · · 59.43	75°14.51 · · 32.78	353°25.70 · · 53.85	96°35.59 · · 33.51
16	123° 15.17	24° 32.62 59.32	90°15.18 33.43	8°27.68 53.78	111°37.84 33.59
17	138° 17.63	39°31.81 59.20	105° 15.85 34.07	23°29.66 53.70	126°40.09 33.67
18	153°20.10	54°31.00 N24°59.08	120°16.52 N12°34.71	38°31.65 N21°53.63	141°42.34 N02°33.75
19	$168^{\circ}22.56$	69°30.19 58.96	135°17.19 35.36	53°33.63 53.56	156°44.59 33.84
20	183°25.02	84°29.38 58.84	150° 17.86 36.00	68°35.61 53.48	171°46.84 33.92
21	198°27.49	99°28.58 · · 58.72	165° 18.53 · · 36.65	83°37.60 · · 53.41	186°49.09 · · 34.00
22	213°29.95	114°27.77 58.60	180°19.20 37.29	98°39.58 53.33	201°51.34 34.08
23	228°32.42	129°26.96 58.47	195°19.87 37.93	113°41.56 53.26	216°53.60 34.16
Mer.p	ass. 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
0	243°34.88	144°26.15 N24°58.35	210°20.53 N12°38.58	128°43.54 N21°53.19	231°55.85 N02°34.24
1	258° 37.34	159°25.34 58.22	225°21.20 39.22	143°45.53 53.11	246°58.10 34.32
2	273°39.81	174°24.53 58.09	240°21.87 39.86	158°47.51 53.04	262°0.35 34.40
3	288° 42.27	189°23.73 · · 57.97	255°22.54 · · 40.50	173°49.49 · · 52.96	277°2.60 · · 34.49
4	303°44.74	204°22.92 57.84	270°23.21 41.14	188°51.47 52.89	292°4.85 34.57
5	318° 47.20	219°22.11 57.70	285°23.88 41.79	203°53.45 52.82	307°7.10 34.65
6	333°49.66	234°21.30 N24°57.57	300°24.54 N12°42.43	218°55.44 N21°52.74	322°9.35 N02°34.73
7 8	348°52.13 3°54.59	249°20.50 57.44 264°19.69 57.30	315°25.21 43.07 330°25.88 43.71	233°57.42 52.67 248°59.40 52.59	337°11.61 34.81 352°13.86 34.89
9	3 54.59 18°57.06	264°19.69 57.30 279°18.89 · · 57.17	330°25.88 43.71 345°26.55 • 44.35	248°59.40 52.59 264°1.38 • 52.52	352°13.86 34.89 7°16.11 · · 34.97
10	33°59.52	294°18.08 57.03	0°27.22 44.99	279° 3.36 52.44	22°18.36 35.05
11	49°1.99	309°17.27 56.89	15°27.88 45.63	294° 5.34 52.37	37°20.61 35.13
12	64°4.45	324°16.47 N24°56.75	30°28.55 N12°46.27	309°7.32 N21°52.30	52°22.87 N02°35.21
13	79°6.91	339° 15.66 56.61	45°29.22 46.91	324° 9.30 52.22	67°25.12 35.29
14	94°9.38	354°14.86 56.47	60°29.89 47.55	339°11.29 52.15	82°27.37 35.37
15	109°11.84	9°14.05 · · 56.32	75°30.55 · · 48.19	354°13.27 · · 52.07	97°29.62 · · 35.45
16	$124^{\circ}14.31$	24°13.25 56.18	90°31.22 48.83	9°15.25 52.00	112°31.88 35.53
17	$139^{\circ}16.77$	39°12.45 56.03	105°31.89 49.47	24°17.23 51.92	127°34.13 35.61
18	154° 19.23	54°11.64 N24°55.89	120°32.56 N12°50.11	39°19.21 N21°51.85	142°36.38 N02°35.69
19	169°21.70	69°10.84 55.74	135°33.22 50.74		157° 38.64 35.77
20	184°24.16	84°10.04 55.59	150°33.89 51.38	69°23.17 51.70	172°40.89 35.85
21	199°26.63	99°9.23 · · 55.44	165°34.56 · · 52.02	84°25.15 · · 51.62	187°43.14 · · 35.93
22 23	214°29.09 229°31.55	114°8.43 55.28	180° 35.23 52.66 195° 35.89 53.29	99°27.13 51.55	202°45.39 36.01
		129°7.63 55.13		114°29.11 51.47	217°47.65 36.09
Mer.p	oass. 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
0	244°34.02	144°6.83 N24°54.98	210°36.56 N12°53.93	129°31.08 N21°51.40	232°49.90 N02°36.17
1	259°36.48	159°6.02 54.82 174°5.22 54.66	225° 37.23 54.57 240° 37.89 55.20	144°33.06 51.32 159°35.04 51.25	247°52.16 36.25
2	274°38.95 289°41.41	174°5.22 54.66 189°4.42 · · 54.51	240° 37.89 55.20 255° 38.56 • 55.84	159° 35.04 51.25 174° 37.02 · · 51.17	262°54.41 36.33 277°56.66 · · 36.41
3 4	289 41.41 304°43.87	204°3.62 54.35	270°39.23 56.48	174 37.02 · · 51.17 189°39.00 51.10	292°58.92 36.49
5	319° 46.34	219°2.82 54.19	285°39.89 57.11	204°40.98 51.02	308°1.17 36.57
6	334° 48.80	234°2.02 N24°54.02	300°40.56 N12°57.75	219°42.96 N21°50.95	323°3.42 N02°36.65
7	349°51.27	249°1.22 53.86	315°41.23 58.38	234°44.94 50.87	338°5.68 36.73
8	4°53.73	264°0.42 53.70	330°41.89 59.02	249°46.91 50.80	353°7.93 36.81
9	19°56.19	278°59.62 · · 53.53	345°42.56 12°59.65	264°48.89 · · 50.72	8°10.19 · · 36.89
10	34°58.66	293°58.82 53.36	$0^{\circ}43.23$ $13^{\circ}0.29$	279°50.87 50.65	23°12.44 36.97
11	50°1.12	308°58.02 53.20	15°43.89 0.92	294°52.85 50.57	38°14.70 37.05
12	65°3.59	323°57.22 N24°53.03	30°44.56 N13°1.56	309°54.83 N21°50.49	53°16.95 N02°37.13
13	80°6.05	338°56.42 52.86	45°45.23 2.19	324°56.80 50.42	68°19.21 37.21
14	95°8.52	353°55.63 52.69	60°45.89 2.83	339°58.78 50.34	83°21.46 37.29 \
15 16	110°10.98	8°54.83 · · 52.51	75°46.56 · · 3.46	$355^{\circ}0.76  \cdot  50.27$ $10^{\circ}2.73  50.19$	98°23.72 · · 37.37
16 17	125° 13.44 140° 15.91	23°54.03 52.34 38°53.23 52.16	90° 47.22 4.09 105° 47.89 4.73	10°2.73 50.19 25°4.71 50.12	113°25.97 37.45 128°28.23 37.53
17 18	140° 15.91 155° 18.37	53°52.44 N24°51.99	105°47.89 4.73 120°48.56 N13°5.36	40°6.69 N21°50.04	128° 28.23 37.53 143° 30.48 N02° 37.61
19	170° 20.84	68°51.64 51.81	135°49.22 5.99	55° 8.66 49.96	158°32.74 37.68
20	185°23.30	83°50.84 51.63	150°49.89 6.62	70°10.64 49.89	173°34.99 37.76
21	200°25.76	98°50.05 · · 51.45	165° 50.55 · · 7.26	85°12.62 · · 49.81	188°37.25 · · 37.84
22	215°28.23	113°49.25 51.27	180°51.22 7.89	100°14.59 49.74	203°39.50 37.92
23	230°30.69	128°48.46 51.09	195°51.88 8.52	115°16.57 49.66	218°41.76 38.00
Merr	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	$\nu 2.3' \ d0.1' \ m0.89$

	Stars	
	SHA	Dec
Alpheratz	357°33.77	29°14.02
Ankaa Schedar	353°6.26 349°30.09	-42° 9.55 56° 40.70
Diphda	349 30.09 348°46.37	-17°50.43
Achernar	335°19.80	-57°5.96
Hamal	327°50.22	23°35.14
Polaris Acamar	313°55.62 315°11.32	89°22.39 -40°11.84
Acamar Menkar	315°11.32 314°5.28	-40° 11.84 4° 11.56
Mirfak	$308^{\circ}27.13$	49°57.20
Aldebaran	290°38.67	16°33.70
Rigel	281°3.11 280°20.69	-8°10.31 46°1.46
Capella Bellatrix	280°20.69 278°21.99	46°1.46 6°22.38
Elnath	278°0.81	28°37.76
Alnilam	275°36.90	-1°11.15
Betelgeuse	270°51.18	7°24.68
Canopus Sirius	263°52.38 258°25.54	-52° 42.70 -16° 45.24
Adhara	255° 5.28	-10 45.24 -29°0.61
Procyon	244°49.88	5°9.39
Pollux	243°16.18	27°57.78
Avior	234°14.63	-59°35.90
Suhail Miaplacidus	222°45.64 221°38.36	-43°32.61 -69°49.83
Alphard	221°38.36 217°46.74	-69° 49.83 -8° 46.51
Regulus	207°33.27	11°50.27
Dubhe	$193^{\circ}39.52$	61°36.74
Denebola	182°23.68	14° 25.45
Gienah Acrux	175°42.27 172°58.47	-17° 41.50 -63° 15.04
Acrux Gacrux	172°58.47 171°50.07	-63° 15.04 -57° 15.97
Alioth	166°11.62	55° 49.13
Spica	158°20.87	-11°18.09
Alkaid	152°50.72	49° 10.96
Hadar Menkent	148°33.85 147°55.95	-60°30.23 -36°30.18
Menkent Arcturus	147°55.95 145°46.58	-36° 30.18 19° 2.65
Rigil Kent.	139°38.13	-60°56.85
Kochab	$137^{\circ}18.71$	74°2.84
Zuben'ubi	136°54.45	-16°9.21
Alphecca Antares	126°2.42 112°14.08	26°37.48 -26°29.48
Antares Atria	112°14.08 107°6.72	-26°29.48 -69°4.45
Sabik	$102^{\circ}1.15$	-15°45.49
Shaula	96°8.44	-37°7.34
Rasalhague	95°57.18	12°32.35
Eltanin Kaus Aust.	90°41.16 83°30.67	51°28.93 -34°22.25
Kaus Aust. Vega	83°30.67 80°32.10	-34°22.25 38°48.30
Nunki	75°46.07	-26° 15.77
Altair	$61^{\circ}58.65$	8°56.19
Peacock	53°3.66	-56°38.75
Deneb Enif	49°24.83 33°37.63	45° 22.22 9° 59.68
Al Na'ir	27°31.47	-46°49.74
Fomalhaut	15°13.33	-29°28.79
Scheat	13°44.18	28° 13.39
Markab	13°28.84	15°20.73
May 25 Mon	SHA	Mer.pass
Venus	262°9.87	14:22
Mars	327°28.73	09:59
Jupiter Saturn	245°20.18 348°26.11	15:26 08:35
May 26 Tue Venus	<b>SHA</b> 260°51.27	Mer.pass 14:23
Mars	326°45.65	09:58
Jupiter	245°8.66	15:23
Saturn	348°20.97	08:31
May 27 Wed	SHA	Mer.pass
Venus	259°32.81	14:24
Mars	326°2.54	09:57
Jupiter	244°57.07	15:20
Saturn	348°15.88	08:27
Horizon	ıtal parallax	
	Venus:	0.1
	Mars:	0.1

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°46.66	N20°54.81	70° 15.98	15.2'	N01°39.04	-15.0'	56.3'
1	195°46.60 210°46.54	55.26 55.71	84°50.19 99°24.44	15.2' 15.3'	01°24.01 01°8.99	-15.0'	56.3' 56.2'
2	210°46.54 225°46.47	55.71	99° 24.44 113° 58.72	15.3'	01°8.99 00°53.98	-15.0' -15.0'	56.2'
4	240°46.41	56.61	128° 33.04	15.3'	00°38.98	-15.0'	56.2'
5	255°46.35	57.06	143°7.38	15.4'	$00^{\circ}23.99$	-15.0'	56.2'
6	270°46.29	N20°57.51	157°41.75	15.4'	N00°9.01	-15.0'	56.1'
7	285°46.22	57.95 58.40	172° 16.15 186° 50.57	15.4'	\$00°5.95 00°20.90	14.9'	56.1
8 9	300°46.16 315°46.10	58.40 •• 58.84	201°25.02	15.4' 15.5'	00°20.90	14.9' 14.9'	56.1' 56.0'
10	330°46.04	59.29	215°59.49	15.5'	00°50.74	14.9'	56.0'
11	345°45.97	20°59.73	230°33.98	15.5'	$01^{\circ}5.64$	14.9'	56.0'
12	0°45.91	N21°0.18	245°8.50	15.5'	S01°20.52	14.9'	56.0'
13 14	15°45.84 30°45.78	0.62 1.06	259° 43.03 274° 17.58	15.6' 15.6'	01°35.38 01°50.23	14.8' 14.8'	55.9' 55.9'
15	45°45.71	1.00	288° 52.15	15.6'	01 50.25 02°5.05	14.8	55.9'
16	60°45.65	1.95	303°26.74	15.6'	02°19.85	14.8'	55.9'
17	75°45.59	2.39	318°1.34	15.6'	02°34.63	14.8'	55.8'
18	90°45.52 105°45.45	N21°2.83 3.27	332°35.95	15.6' 15.6'	\$02°49.38 03°4.11	14.7'	55.8'
19 20	105°45.45 120°45.39	3.27	347°10.58 1°45.21	15.6'	03°4.11	14.7' 14.7'	55.8' 55.8'
21	135°45.32	. 4.15	16° 19.86	15.7'	03°33.50	14.7	55.7'
22	150°45.26	4.58	30°54.51	15.7'	03°48.15	14.6'	55.7'
23	165°45.19	5.02	45°29.17	15.7'	04°2.78	14.6'	55.7'
	SD = 15.8'	d = 0.5'		SI	O = 15.4'		
т.	CUA	D	CUA		D	J	LIP
Tue 0	<b>GHA</b> 180°45.13	<b>Dec</b> N21°5.46	<b>GHA</b> 60°3.84	u 15.7'	<b>Dec</b> \$04° 17.37	d 14.6'	<b>HP</b> 55.7'
1	195°45.06	5.89	74°38.51	15.7'	04°31.94	14.5	55.6'
2	210°44.99	6.33	89° 13.19	15.7'	$04^{\circ}46.48$	14.5'	55.6'
3	225°44.93	• • 6.76	103°47.87	15.7'	05°0.99	14.5'	55.6'
4 5	240°44.86 255°44.79	7.19 7.63	118°22.55 132°57.23	15.7' 15.7'	05° 15.47 05° 29.91	14.4' 14.4'	55.6' 55.5'
6	270°44.72	7.03 N21°8.06	132 57.23 147°31.91	15.7'	505°44.33	14.4	55.5'
7	285°44.66	8.49	162°6.59	15.7'	05°58.70	14.3'	55.5'
8	300°44.59	8.92	176°41.26	15.7'	$06^{\circ}13.05$	14.3'	55.5'
9	315°44.52	• • 9.35	191° 15.94	15.7'	06°27.36	14.3'	55.4'
10 11	330°44.45 345°44.38	9.78 10.21	205° 50.60 220° 25.26	15.7' 15.7'	06°41.63 06°55.87	14.2' 14.2'	55.4' 55.4'
12	0°44.31	N21° 10.64	234°59.91	15.6'	507° 10.06	14.2'	55.4'
13	15°44.24	11.07	249°34.56	15.6'	07°24.22	14.1'	55.3'
14	30°44.18	11.50	264°9.19	15.6'	07°38.34	14.1'	55.3'
15 16	45°44.11 60°44.04	· · 11.92 12.35	278° 43.82 293° 18.43	15.6' 15.6'	07°52.42 08°6.46	14.0' 14.0'	55.3' 55.3'
17	75°43.97	12.78	307°53.03	15.6'	08° 20.46	14.0'	55.3'
18	90°43.90	N21°13.20	322°27.61	15.6'	S08°34.41	13.9'	55.2'
19	105°43.83	13.63	337°2.18	15.6'	08°48.32	13.9'	55.2'
20 21	120°43.76 135°43.69	14.05 •• 14.47	351°36.74 6°11.28	15.5' 15.5'	09°2.19 09°16.01	13.8' 13.8'	55.2' 55.2'
22	150°43.62	14.47	20°45.80	15.5'	09 10.01 09°29.79	13.7	55.2'
23	165°43.54	15.32	35°20.30	15.5'	09°43.52	13.7'	55.1'
	SD = 15.8'	d = 0.4'		SI	D = 15.2'		
Wed	GHA	Dec	GHA	ν	Dec	d	НР
0	180°43.47	N21° 15.74	49°54.78	15.5'	S09° 57.20	13.6'	55.1'
1	195°43.40	16.16	64°29.24	15.4'	$10^{\circ}10.84$	13.6'	55.1'
2	210°43.33	16.58	79°3.68 93°38.10	15.4'	10°24.43	13.5'	55.1'
3 4	225°43.26 240°43.19	· · 17.00 17.41	93°38.10 108°12.49	15.4' 15.4'	10°37.96 10°51.45	13.5' 13.4'	55.1' 55.0'
5	255°43.11	17.41	100° 12.49° 122° 46.86	15.4	10° 51.45 11° 4.88	13.4	55.0'
6	270°43.04	N21°18.25	137°21.20	15.3'	S11° 18.27	13.3'	55.0'
7	285°42.97	18.67	151°55.51	15.3'	11°31.60	13.3'	55.0'
8 9	300°42.90 315°42.82	19.08 •• 19.50	166°29.80 181°4.06	15.3' 15.2'	11°44.88 11°58.10	13.2' 13.2'	55.0' 54.9'
10	330°42.75	19.91	195°38.29	15.2'	11 56.10 12° 11.27	13.1	54.9'
11	345°42.68	20.33	$210^{\circ}12.49$	15.2'	$12^{\circ}24.38$	13.1'	54.9'
12	0°42.60	N21°20.74	224° 46.66	15.1'	\$12°37.43	13.0'	54.9'
13 14	15°42.53 30°42.46	21.15 21.56	239° 20.80 253° 54.91	15.1' 15.1'	12°50.43 13°3.37	12.9' 12.9'	54.9' 54.8'
14 15	45°42.46	. 21.56	253°54.91 268°28.98	15.1 15.0'	13° 3.37 13° 16.25	12.9	54.8'
16	60°42.31	22.39	283°3.01	15.0'	13° 29.07	12.8'	54.8'
17	75°42.23	22.80	297°37.02	15.0'	13°41.83	12.7'	54.8'
18	90°42.16	N21°23.21	312°10.98	14.9'	\$13°54.52	12.6'	54.8'
19 20	105°42.08 120°42.01	23.61 24.02	326° 44.91 341° 18.80	14.9' 14.9'	14°7.16 14°19.73	12.6' 12.5'	54.8' 54.7'
21	135°41.93	• • 24.43	355° 52.66	14.8'	14 19.73 14°32.24	12.4	54.7'
22	150°41.86	24.84	10°26.47	14.8'	14°44.68	12.4'	54.7'
23	165°41.78	25.24	25°0.25	14.7'	14°57.06	12.3'	54.7'
	SD = 15.8'	d = 0.4'		SI	O = 15.0'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Sunset	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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:49	07:43	08:36	15:18	16:11	17:05

Lat.		Moonris	e		Moonset	:
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°	14:08	16:13	18:35	01:36	01:03	00:27 23:35
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	13:31	13:31	13:30	01:11	02:38	04:04

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	9-11
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	66-83%
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	

		, , ,	,		
h	Aries	Venus	Mars	Jupiter	Saturn
	711103				
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	245°33.16	143°47.66 N24°50.90	210°52.55 N13°9.15	130°18.55 N21°49.58	233°44.02 N02°38.08
1	260° 35.62	158°46.87 50.72	225°53.21 9.78	145°20.52 49.51	248°46.27 38.16
					1
2	275° 38.08	173°46.07 50.53	240°53.88 10.41	160°22.50 49.43	263°48.53 38.24
3	290°40.55	188°45.28 •• 50.35	255°54.55 · · 11.04	175°24.47 · · 49.36	278°50.78 · · 38.32
4	305°43.01	203°44.48 50.16	270°55.21 11.67	190°26.45 49.28	293°53.04 38.39
5	320°45.48	218° 43.69 49.97	285°55.88 12.30	205°28.42 49.20	308°55.30 38.47
6	335°47.94	233°42.90 N24°49.78	300°56.54 N13°12.93	220°30.40 N21°49.13	323°57.55 N02°38.55
7	350°50.41	248°42.10 49.59	315°57.21 13.56	235°32.38 49.05	338°59.81 38.63
	5°52.87	263°41.31 49.39	330°57.87 14.19	250°34.35 48.97	
8					
9	20°55.33	278°40.52 · · 49.20	345°58.54 · · 14.82	265°36.33 · · 48.90	9°4.32 · · 38.79
10	35°57.80	293°39.73 49.00	0°59.20 15.45	280°38.30 48.82	24°6.58 38.86
11	51°0.26	308°38.93 48.80	15°59.87 16.08	295°40.27 48.74	39°8.84 38.94
12	66°2.73	323°38.14 N24°48.61	31°0.53 N13°16.71	310°42.25 N21°48.67	54°11.10 N02°39.02
13	81°5.19	338°37.35 48.41	46°1.19 17.34	325°44.22 48.59	69°13.35 39.10
14	96°7.65	353°36.56 48.21	61°1.86 17.96	340°46.20 48.51	84°15.61 39.18
15	111° 10.12	8°35.77 · · 48.01	76°2.52 · · 18.59	355°48.17 · · 48.44	99°17.87 · · 39.26
	126° 12.58	23°34.98 47.80	91°3.19 19.22		I
16					
17	141° 15.05	38°34.19 47.60	106°3.85 19.85	25°52.12 48.28	129°22.38 39.41
18	$156^{\circ}17.51$	53°33.40 N24°47.39	121°4.52 N13°20.47	40°54.09 N21°48.21	144°24.64 N02°39.49
19	171° 19.97	68°32.61 47.19	136°5.18 21.10	55°56.07 48.13	159°26.90 39.57
20	186°22.44	83°31.82 46.98	151°5.85 21.73	70°58.04 48.05	174°29.16 39.64
21	201°24.90	98°31.03 · · 46.77	166° 6.51 · · 22.35	86°0.01 · · 47.98	189°31.41 · · 39.72
22	216°27.37	113°30.24 46.56	181°7.17 22.98	101°1.99 47.90	204°33.67 39.80
23	231°29.83	128°29.46 46.35	196°7.84 23.61	116° 3.96 47.82	219°35.93 39.88
23	231 29.03	126 29.40 40.33	190 7.04 25.01	110 3.90 47.02	219 35.93 39.00
Mer	pass. 07:37	ν-0.8' d-0.2' m-3.94	$\nu$ 0.7' d0.6' m1.26	$\nu 2.0' \ d$ -0.1' m-1.89	ν2.3' d0.1' m0.89
	- 200. 01.01				
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	246°32.30	143°28.67 N24°46.14	211°8.50 N13°24.23	131°5.93 N21°47.74	234°38.19 N02°39.96
	261°34.76	158°27.88 45.92	226°9.17 24.86	146° 7.91 47.67	249°40.45 40.03
1					
2	276° 37.22	173°27.09 45.71	241°9.83 25.48	161°9.88 47.59	264°42.71 40.11
3	291°39.69	188°26.31 •• 45.49	256°10.49 · · 26.11	176°11.85 · · 47.51	279°44.97 · · 40.19
4	306°42.15	203°25.52 45.27	271°11.16 26.73	191°13.82 47.43	294°47.22 40.27
5	321°44.62	218°24.73 45.05	286°11.82 27.35	206°15.80 47.36	309°49.48 40.34
6	336°47.08	233°23.95 N24°44.84	301°12.48 N13°27.98	221°17.77 N21°47.28	324°51.74 N02°40.42
7	351°49.54	248°23.16 44.61	316°13.15 28.60	236°19.74 47.20	339°54.00 40.50
8	6°52.01				
9	21°54.47	278°21.59 · · 44.17	346°14.47 · · 29.85	266°23.68 · · 47.05	9°58.52 · · 40.65
10	36°56.94	293°20.81 43.94	1°15.14 30.47	281°25.65 46.97	25°0.78 40.73
11	51°59.40	308°20.03 43.72	16°15.80 31.10	296°27.63 46.89	40°3.04 40.81
12	67°1.86	323°19.24 N24°43.49	31°16.46 N13°31.72	311°29.60 N21°46.81	55°5.30 N02°40.88
13	82°4.33	338° 18.46 43.26	46°17.13 32.34	326°31.57 46.74	70°7.56 40.96
14	97°6.79	353°17.68 43.03	61°17.79 32.96	341°33.54 46.66	85°9.82 41.04
15	112°9.26	8°16.89 · · 42.80	76°18.45 · · 33.58	356°35.51 · · 46.58	100°12.08 · · 41.11
16	127° 11.72	23°16.11 42.57	91°19.12 34.21	11°37.48 46.50	115°14.34 41.19
17	$142^{\circ}14.19$	38°15.33 42.34	106° 19.78 34.83	26°39.45 46.42	130°16.60 41.27
18	157° 16.65	53°14.55 N24°42.10	121°20.44 N13°35.45	41°41.42 N21°46.35	145°18.86 N02°41.34
19	$172^{\circ}19.11$	68°13.77 41.87	136°21.10 36.07	56°43.39 46.27	160°21.12 41.42
20	187°21.58	83°12.98 41.63	151°21.77 36.69	71°45.36 46.19	175°23.38 41.50
21	202°24.04	98° 12.20 · · 41.40	166°22.43 · · 37.31	86°47.33 · · 46.11	190°25.64 · · 41.57
22	217° 26.51	113°11.42 41.16	181°23.09 37.93	101°49.30 46.03	205°27.90 41.65
23	232°28.97	128°10.64 40.92	196°23.75 38.55	116°51.27 45.96	220°30.16 41.73
Mer	pass. 07:33	ν-0.8' d-0.2' m-3.94	$\nu$ 0.7' d0.6' m1.27	$\nu 2.0' \ d$ -0.1' m-1.89	ν2.3' d0.1' m0.88
IVICI.	pass. 01.33	ν-0.0 u-0.2 III-3.94		ν2.0 d-0.1 III-1.09	
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	247° 31.43	143°9.86 N24°40.68	211°24.42 N13°39.17	131°53.24 N21°45.88	235°32.42 N02°41.80
1	262° 33.90	158°9.09 40.43	226°25.08 39.79	146°55.21 45.80	250°34.68 41.88
					I
2	277°36.36	173°8.31 40.19	241°25.74 40.41	161°57.18 45.72	265°36.95 41.96
3	292°38.83	188°7.53 · · 39.94	256°26.40 · · 41.03	176°59.15 · · 45.64	280°39.21 · · 42.03
4	307°41.29	203°6.75 39.70	271°27.06 41.65	192° 1.12 45.56	295°41.47 42.11 <b>M</b>
5	322°43.76	218°5.97 39.45	286°27.73 42.26	207°3.09 45.49	310°43.73 42.18
6	337°46.22	233°5.20 N24°39.20	301°28.39 N13°42.88	222°5.06 N21°45.41	325°45.99 N02°42.26
7	352°48.68	248°4.42 38.95	316°29.05 43.50	237°7.03 45.33	340°48.25 42.34
8	7°51.15	263°3.64 38.70	331°29.71 44.12	252° 9.00 45.25	355°50.52 42.41
	7 51.15 22°53.61	278°2.86 · · 38.45	346°30.37 · · 44.74		
9					
10	37°56.08	293°2.09 38.20	1°31.04 45.35	282°12.94 45.09	25°55.04 42.56
11	52°58.54	308°1.31 37.94	16°31.70 45.97	297°14.90 45.01	40°57.30 42.64
12	68°1.00	323°0.54 N24°37.69	31°32.36 N13°46.59	312°16.87 N21°44.93	55°59.56 N02°42.72
13	83°3.47	337°59.76 37.43	46° 33.02 47.20	327°18.84 44.86	71°1.83 42.79
14	98°5.93	352°58.99 37.17	61°33.68 47.82	342°20.81 44.78	86°4.09 42.87
15	113°8.40	7°58.21 · · 36.91	76°34.34 · · 48.43	357°22.78 · · 44.70	
16	128° 10.86	22°57.44 36.65	91°35.00 49.05	12°24.74 44.62	116°8.61 43.02
17	143° 13.33	37°56.67 36.39	106°35.66 49.67	27°26.71 44.54	131°10.88 43.09
18	$158^{\circ}15.79$	52°55.89 N24°36.13	121°36.33 N13°50.28	42°28.68 N21°44.46	146°13.14 N02°43.17
19	173° 18.25	67°55.12 35.86	136°36.99 50.90	57°30.65 44.38	161°15.40 43.25
20	188°20.72	82°54.35 35.60	151° 37.65 51.51	72°32.61 44.30	176°17.67 43.32
21	203°23.18	97°53.58 · · 35.33	166°38.31 · · 52.12	87°34.58 · · 44.22	191°19.93 · · 43.40
22	218° 25.65	112°52.81 35.07	181°38.97 52.74	102°36.55 44.14	206°22.19 43.47
	233° 28.11	112 52.61 55.07 127°52.04 34.80			
23	233 Z8.11	121 32.04 34.80	196°39.63 53.35	117°38.52 44.06	221°24.46 43.55
Mer	pass. 07:29	ν-0.8' d-0.2' m-3.94	ν0.7' d0.6' m1.27	ν2.0' d-0.1' m-1.89	ν2.3' d0.1' m0.88
				, 1.0 3 0.1 III 1.09	

	Stars	
	SHA	Dec
Alpheratz	357°33.75	29°14.02
Ankaa Schedar	353°6.24 349°30.06	-42°9.54 56°40.70
Diphda	348°46.35	-17°50.42
Achernar	335°19.78	-57°5.94
Hamal Polaris	327°50.21 313°54.85	23°35.14 89°22.38
Acamar	$315^{\circ}11.31$	-40°11.83
Menkar	314°5.27 308°27.12	4°11.57 49°57.19
Mirfak Aldebaran	308°27.12 290°38.67	49°57.19 16°33.70
Rigel	$281^{\circ}3.11$	-8°10.31
Capella Bellatrix	280°20.69 278°21.99	46°1.46 6°22.38
Elnath	278°21.99	28°37.76
Alnilam	275°36.90	$-1^{\circ}11.15$
Betelgeuse	270°51.18 263°52.39	7°24.68 -52°42.69
Canopus Sirius	258° 25.54	-52 42.09 -16°45.23
Adhara	255°5.29	-29°0.60
Procyon	244°49.89 243°16.19	5°9.39 27°57.78
Pollux Avior	243°16.19 234°14.65	-59°35.89
Suhail	222°45.66	-43°32.60
Miaplacidus	221°38.40	-69°49.83
Alphard Regulus	217°46.75 207°33.28	-8°46.51 11°50.27
Dubhe	193°39.55	61°36.74
Denebola	182°23.69	14°25.46
Gienah Acrux	175°42.28 172°58.49	-17°41.49 -63°15.05
Gacrux	172 50.49 171°50.09	-03 15.05 -57° 15.98
Alioth	166°11.64	55°49.14
Spica	158°20.88 152°50.73	-11°18.09 49°10.97
Alkaid Hadar	152 50.73 148°33.85	-60°30.24
Menkent	$147^{\circ}55.95$	-36°30.18
Arcturus	145°46.59	19°2.66
Rigil Kent. Kochab	139°38.14 137°18.74	-60°56.86 74°2.86
Zuben'ubi	$136^{\circ}54.45$	$-16^{\circ}9.21$
Alphecca	126°2.42	26°37.50
Antares Atria	112°14.07 107°6.70	-26°29.48 -69°4.46
Sabik	102°1.14	-15°45.49
Shaula	96°8.42	-37°7.35
Rasalhague Eltanin	95°57.17 90°41.15	12°32.36 51°28.95
Kaus Aust.	83°30.65	-34°22.25
Vega	80°32.08	38°48.31
Nunki Altair	75°46.05 61°58.63	-26°15.77 8°56.21
Peacock	53°3.63	-56°38.75
Deneb	49°24.81	45°22.23
Enif Al Na'ir	33°37.61 27°31.44	9°59.69 -46°49.74
Fomalhaut	27 31.44 15°13.31	-46 49.74 -29°28.78
Scheat	$13^{\circ}44.15$	28°13.40
Markab	13°28.82	15°20.74
May 28 Thu	SHA	Mer.pass
Venus Mars	258°14.50 325°19.39	14:26 09:56
Jupiter	244°45.39	15:17
Saturn	348°10.86	08:24
May 29 Fri	SHA	Mer.pass
Venus	256°56.37	14:27
Mars Jupiter	324°36.21 244°33.64	09:55 15:14
Saturn	348°5.89	08:20
May 30 Sat	SHA	Mer.pass
Venus	255°38.43	14:28
Mars Jupiter	323°52.98 244°21.81	09:54 15:10
Saturn	348°0.99	08:17
11		

Horizontal parallax

Venus: Mars:

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°41.71	N21°25.65	39°33.98	14.7'	\$15°9.37	12.2'	54.7'
1	195°41.63	26.05	54°7.67	14.7'	$15^{\circ}21.61$	12.2'	54.7'
2	210°41.55	26.46	68°41.32	14.6'	15°33.79	12.1'	54.6'
3	225°41.48	• • 26.86	83°14.93	14.6'	15°45.90	12.0'	54.6'
4	240°41.40	27.27	97°48.50	14.5'	15°57.94	12.0'	54.6'
5 6	255°41.32 270°41.25	27.67 N21°28.07	112°22.02 126°55.49	14.5' 14.4'	16°9.90 \$16°21.80	11.9' 11.8'	54.6' 54.6'
7	285°41.17	28.47	141°28.92	14.4'	16°33.62	11.8	54.6'
8	300°41.09	28.87	156°2.31	14.3'	16°45.37	11.7'	54.6'
9	315°41.02	29.27	170°35.65	14.3'	16°57.05	11.6'	54.5'
10	330°40.94	29.67	185°8.94	14.2'	17°8.65	11.5'	54.5'
11	345°40.86	30.07	199°42.18	14.2'	17°20.18	11.5'	54.5'
12	0°40.78	N21°30.47	214°15.38	14.1'	S17°31.63	11.4'	54.5'
13	15°40.70	30.86	228°48.52	14.1'	17°43.01	11.3'	54.5'
14	30°40.62 45°40.55	31.26 •• 31.66	243°21.62 257°54.67	14.0' 14.0'	17°54.30 18°5.52	11.2' 11.1'	54.5' 54.5'
15 16	45 40.55 60°40.47	32.05	257 54.67 272°27.66	13.9'	18° 16.66	11.1	54.5 54.4'
17	75°40.39	32.45	287°0.61	13.9'	18°27.72	11.0'	54.4'
18	90°40.31	N21°32.84	301°33.50	13.8'	S18°38.69	10.9'	54.4'
19	105°40.23	33.23	316°6.35	13.8'	18°49.59	10.8'	54.4'
20	120°40.15	33.63	330°39.14	13.7'	19°0.40	10.7'	54.4'
21	135°40.07	• • 34.02	$345^{\circ}11.88$	13.7'	$19^{\circ}11.13$	10.6'	54.4'
22	150°39.99	34.41	359°44.56	13.6'	19°21.77	10.6'	54.4'
23	165°39.91	34.80	14°17.19	13.6'	19°32.33	10.5'	54.4'
	SD = 15.8'	d = 0.4'		SE	0 = 14.9'		
F!	CUA	D	CUA		D	.,	LID
Fri 0	<b>GHA</b> 180°39.83	<b>Dec</b> N21°35.19	<b>GHA</b> 28°49.77	u 13.5'	<b>Dec</b> \$19°42.80	<i>d</i> 10.4'	<b>HP</b> 54.3'
1	195°39.75	35.58	43°22.30	13.5'	19°53.19	10.4	54.3'
2	210°39.67	35.97	57°54.76	13.4'	20°3.49	10.2'	54.3'
3	225°39.59	• • 36.36	72°27.18	13.4'	20°13.70	10.1'	54.3'
4	240°39.50	36.75	86°59.54	13.3'	20°23.82	10.0'	54.3'
5	255°39.42	37.13	101°31.85	13.2'	20°33.85	9.9'	54.3'
6	270°39.34	N21°37.52	116°4.09	13.2'	S20°43.79	9.8'	54.3'
7	285°39.26	37.90	130°36.29	13.1'	20°53.63	9.8'	54.3'
8	300°39.18 315°39.10	38.29	145°8.43 159°40.51	13.1' 13.0'	21°3.39 21°13.05	9.7' 9.6'	54.3' 54.2'
9 10	315 39.10 330°39.01	· · 38.67 39.06	159 40.51 174°12.53	13.0'	21 13.05 21°22.61	9.6 9.5'	54.2'
11	345°38.93	39.44	174 12.55 188°44.50	12.9'	21°32.09	9.5 9.4'	54.2'
12	0°38.85	N21°39.82	203°16.42	12.9'	S21°41.46	9.3'	54.2'
13	15°38.76	40.20	217°48.27	12.8'	21°50.74	9.2'	54.2'
14	30°38.68	40.59	232°20.07	12.7'	$21^{\circ}59.92$	9.1'	54.2'
15	45°38.60	• • 40.97	246°51.82	12.7'	22°9.00	9.0'	54.2'
16	60°38.51	41.35	261°23.50	12.6'	22°17.99	8.9'	54.2'
17	75°38.43	41.72	275°55.13	12.6'	22°26.87	8.8'	54.2'
18	90°38.35 105°38.26	N21°42.10 42.48	290°26.70 304°58.22	12.5' 12.5'	\$22°35.66 22°44.34	8.7'	54.2' 54.1'
19 20	105 38.26 120°38.18	42.48 42.86	304 58.22 319°29.68	12.5 12.4'	22° 52.92	8.6' 8.5'	54.1'
21	135°38.09	• • 43.23	334°1.08	12.3'	23°1.39	8.4	54.1
22	150°38.01	43.61	348°32.43	12.3'	23°9.77	8.3'	54.1'
23	165°37.93	43.98	3°3.72	12.2'	23°18.03	8.2'	54.1'
	SD = 15.8'	d = 0.4'		SE	0 = 14.8'		
_							
Sat	<b>GHA</b> 180°37.84	Dec N21°44.36	<b>GHA</b> 17°34.95	ν 12.2'	<b>Dec</b> \$23°26.20	d 0 1'	HP
0 1	180°37.84 195°37.75	N21°44.36 44.73	17°34.95 32°6.13	12.2' 12.1'	23°26.20 23°34.25	8.1' 7.9'	54.1' 54.1'
2	210°37.67	44.73 45.11	46°37.25	12.1'	23°42.20	7.9 7.8'	54.1'
3	225°37.58	• • 45.48	61°8.32	12.0'	23°50.04	7.7'	54.1'
4	240°37.50	45.85	75°39.33	12.0'	23°57.77	7.6'	54.1'
5	255°37.41	46.22	90°10.29	11.9'	24°5.40	7.5'	54.1'
6	270°37.33	N21°46.59	104°41.19	11.8'	S24°12.91	7.4'	54.1'
7	285°37.24	46.96	119°12.03	11.8'	24°20.31	7.3'	54.1'
8	300°37.15	47.33	133°42.83	11.7'	24°27.61	7.2'	54.0'
9 10	315°37.07 330°36.98	• • 47.70 48.07	148°13.57 162°44.25	11.7' 11.6'	24°34.79 24°41.85	7.1' 7.0'	54.0' 54.0'
11	345°36.89	48.07 48.44	102 44.25 177°14.88	11.6'	24 41.85 24°48.80	7.0 6.8'	54.0'
12	0°36.81	N21°48.80	191°45.46	11.5'	\$24°55.64	6.7	54.0'
13	15°36.72	49.17	206°15.99	11.5'	25°2.37	6.6'	54.0'
14	30°36.63	49.53	220°46.47	11.4'	25°8.97	6.5'	54.0'
15	45°36.54	• • 49.90	$235^{\circ}16.89$	11.4'	$25^{\circ}15.47$	6.4'	54.0'
16	60°36.46	50.26	249°47.27	11.3'	25°21.84	6.3'	54.0'
17	75°36.37	50.63	264°17.59	11.3'	25°28.10	6.1'	54.0'
18	90°36.28	N21°50.99	278°47.87	11.2'	\$25°34.23	6.0'	54.0'
19 20	105°36.19 120°36.10	51.35 51.71	293°18.09 307°48.27	11.2' 11.1'	25°40.25 25°46.15	5.9' 5.8'	54.0' 54.0'
20	120° 36.10 135° 36.01	51.71	307°48.27 322°18.40	11.1'	25°51.93	5.8	54.0'
22	150°35.92	52.43	336°48.48	11.1	25°57.59	5.7 5.5'	54.0'
23	165°35.83	52.79	351°18.52	11.0'	26°3.13	5.4'	54.0'
	SD = 15.8'	d = 0.4'			0 = 14.8'		
	<u> </u>	<u>u = 0.4</u>		JL	- 14.0		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
<b>N</b> 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	////
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:53	07:48	08:41	15:13	16:07	17:01

Lat.		Moonris	е		Moonset	:
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
<b>N</b> 70°	20:54		_	00:07 22:50 00:31		_
68°	19:53			23:53		
66°	19:18	21:43		00:50	00:28 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	13:31	13:34	13:40	05:32	07:02	08:34

	Sun			Moon		
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	12-14
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	90-98%
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	

h .	Aries	Venus	Mars	Jupiter	Saturn	Stars
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA
0	248° 30.57	142°51.26 N24°34.53	211° 40.29 N13° 53.97	132°40.48 N21°43.98	236°26.72 N02°43.62	Alpheratz 357°33.72
1 2	263° 33.04 278° 35.50	157°50.49 34.26 172°49.72 33.98	226° 40.95 54.58 241° 41.61 55.19	147° 42.45 43.91 162° 44.42 43.83	251°28.98 43.70 266°31.25 43.77	Ankaa 353° 6.21
3	276 33.30 293°37.97	187°48.95 · · 33.71	256° 42.27 · · 55.81	177°46.38 · · 43.75	281°33.51 · · 43.85	Schedar 349°30.02
4	308° 40.43	202°48.18 33.44	271°42.93 56.42	192°48.35 43.67	296°35.77 43.92	Diphda 348°46.33
5	323°42.90	217°47.42 33.16	286°43.59 57.03	207°50.31 43.59	311°38.04 44.00	Achernar 335°19.76
6	338° 45.36	232°46.65 N24°32.88	301°44.25 N13°57.64	222°52.28 N21°43.51	326°40.30 N02°44.07	Hamal 327°50.19
7	353°47.82	247°45.88 32.61	316°44.91 58.25	237°54.25 43.43	341°42.57 44.15	Polaris 313°53.87
8	8°50.29	262°45.11 32.33	331°45.57 58.87	252°56.21 43.35	356°44.83 44.22	Acamar 315°11.30 Menkar 314°5.26
9	23°52.75	277°44.34 · · 32.05	346°46.23 13°59.48	267°58.18 · · 43.27	11°47.10 · · 44.30	Menkar 314° 5.26 Mirfak 308° 27.10
10	$38^{\circ}55.22$	292°43.58 31.76	1°46.89 14°0.09	283°0.14 43.19	26°49.36 44.37	Aldebaran 290°38.66
11	53° 57.68	307°42.81 31.48	16° 47.55 0.70	298° 2.11 43.11	41°51.62 44.45	Rigel 281° 3.11
12	69°0.14	322°42.04 N24°31.20	31°48.21 N14°1.31	313°4.07 N21°43.03	56°53.89 N02°44.52	Capella 280°20.68
13	84°2.61	337°41.28 30.91	46° 48.87 1.92	328° 6.04 42.95	71°56.15 44.59	Bellatrix 278°21.99
14 15	99°5.07 114°7.54	352°40.51 30.63 7°39.75 · · 30.34	61°49.53 2.53 76°50.19 · · 3.14	343°8.01 42.87 358°9.97 •• 42.79	86°58.42 44.67 102°0.68 •• 44.74	Elnath 278° 0.80
16	114 7.54 129° 10.00	22°38.98 30.05	91°50.85 3.75	13°11.93 42.71	117°2.95 44.82	Alnilam 275°36.90
17	144° 12.47	37°38.22 29.76	106°51.51 4.36	28°13.90 42.63	132°5.22 44.89	Betelgeuse 270°51.17
18	159° 14.93	52°37.46 N24°29.47	121°52.17 N14°4.97	43°15.86 N21°42.55	147°7.48 N02°44.97	Canopus 263°52.40
19	174° 17.39	67° 36.69 29.18	136° 52.83 5.58	58°17.83 42.47	162°9.75 45.04	Sirius 258°25.54
20	189° 19.86	82°35.93 28.88	151°53.49 6.19	73°19.79 42.39	177°12.01 45.11	Adhara 255° 5.29 Procyon 244° 49.89
21	204°22.32	97°35.17 · · 28.59	166°54.15 · · 6.79	88°21.76 · · 42.31	192°14.28 · · 45.19	Procyon 244°49.89 Pollux 243°16.19
22	219°24.79	112°34.40 28.29	181°54.81 7.40	103°23.72 42.23	207°16.54 45.26	Avior 234°14.67
23	234°27.25	127°33.64 28.00	196°55.47 8.01	118°25.69 42.15	222°18.81 45.34	Suhail 222°45.67
Mer.p	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	Miaplacidus 221°38.44
			· · · · · · · · · · · · · · · · · · ·			Alphard 217°46.75
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207° 33.29
0	249°29.72	142°32.88 N24°27.70	211°56.13 N14°8.62	133°27.65 N21°42.07	237°21.08 N02°45.41	Dubhe 193°39.57
1	264°32.18	157°32.12 27.40	226° 56.79 9.22	148°29.61 41.99	252°23.34 45.49	Denebola 182°23.70 Gienah 175°42.28
2	279°34.64	172°31.36 27.10	241°57.44 9.83	163°31.58 41.91	267°25.61 45.56	Acrux 172°58.50
3	294°37.11	187°30.60 · · 26.80	256°58.10 · · 10.44	178°33.54 · · 41.82	282°27.88 · · 45.63	Gacrux 171°50.10
4	309°39.57	202°29.84 26.49	271°58.76 11.04	193°35.50 41.74	297°30.14 45.71	Alioth 166°11.66
5	324° 42.04	217°29.08 26.19	286°59.42 11.65	208°37.47 41.66	312°32.41 45.78	Spica 158°20.88
6	339° 44.50 354° 46.96	232°28.32 N24°25.89 247°27.56 25.58	302°0.08 N14°12.26 317°0.74 12.86	223°39.43 N21°41.58 238°41.39 41.50	327°34.68 N02°45.85 342°36.94 45.93	Alkaid 152°50.74
7 8	9°49.43	247°27.56 25.58 262°26.80 25.27	317°0.74 12.86 332°1.40 13.47	238°41.39 41.50 253°43.36 41.42	342°36.94 45.93 357°39.21 46.00	Hadar 148°33.85
9	24°51.89	277°26.05 · · 24.96	347°2.05 · · 14.07	268°45.32 · · 41.34	12°41.48 · · 46.07	Menkent 147°55.95
10	39°54.36	292°25.29 24.65	2°2.71 14.68	283°47.28 41.26	27°43.74 46.15	Arcturus 145°46.59 Rigil Kent. 139°38.14
11	54° 56.82	307°24.53 24.34	17°3.37 15.28	298°49.24 41.18	42°46.01 46.22	Kochab 137°18.77
12	69°59.29	322°23.78 N24°24.03	32°4.03 N14°15.89	313°51.21 N21°41.10	57°48.28 N02°46.29	Zuben'ubi 136°54.45
13	85°1.75	337°23.02 23.72	47°4.69 16.49	328°53.17 41.02	72°50.55 46.37	Alphecca 126°2.42
14	100°4.21	352°22.26 23.40	62°5.35 17.10	343°55.13 40.94	87°52.81 46.44	Antares 112°14.06
15 16	115°6.68 130°9.14	7°21.51 · · 23.09 22°20.75 22.77	77°6.00 · · 17.70 92°6.66 18.30	358°57.09 · · 40.85 13°59.06 40.77	102°55.08 · · 46.51 117°57.35 46.59	Atria 107° 6.68
17	145° 11.61	37°20.00 22.45	107°7.32 18.91	29°1.02 40.69	132°59.62 46.66	Sabik 102°1.13
18	160°14.07	52°19.24 N24°22.13	122°7.98 N14°19.51	44°2.98 N21°40.61	148°1.89 N02°46.73	Shaula 96°8.40 Rasalhague 95°57.15
19	$175^{\circ}16.53$	67° 18.49 21.81	137°8.63 20.11	59° 4.94 40.53	163°4.15 46.81	Rasalhague 95°57.15 Eltanin 90°41.14
20	$190^{\circ}19.00$	82°17.74 21.49	152°9.29 20.71	74°6.90 40.45	178°6.42 46.88	Kaus Aust. 83°30.63
21	205°21.46	97° 16.98 · · 21.17	$167^{\circ}9.95$ · · 21.32	89°8.86 · · 40.37	193°8.69 · · 46.95	Vega 80°32.07
22	220°23.93	112°16.23 20.84	182°10.61 21.92	104°10.82 40.28	208°10.96 47.03	Nunki 75°46.03
23	235°26.39	127°15.48 20.52	197°11.26 22.52	119°12.79 40.20	223°13.23 47.10	Altair 61°58.61
Mer.p	pass. 07:21	$\nu$ -0.8′ d-0.3′ m-3.95	$ u 0.7' \; d0.6' \; { m m} 1.27$	$ u 2.0' \ d$ -0.1' m-1.88	$ u 2.3' \ d0.1' \ m0.88$	Peacock 53°3.59
						Deneb 49°24.78
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°37.59
0	250°28.86	142°14.73 N24°20.19	212°11.92 N14°23.12	134°14.75 N21°40.12	238°15.50 N02°47.17	Al Na'ir 27°31.41 Fomalhaut 15°13.28
1	265°31.32	157°13.98 19.87	227° 12.58 23.72	149°16.71 40.04	253°17.77 47.24	Scheat 13°44.12
2	280°33.78	172°13.23 19.54	242°13.24 24.32	164°18.67 39.96	268°20.03 47.32	Markab 13°28.79
3	295° 36.25	187°12.48 · · 19.21	257° 13.89 · · 24.92	179°20.63 · · 39.88	283°22.30 · · 47.39	
4	310°38.71	202°11.73 18.88	272°14.55 25.52	194°22.59 39.80	298°24.57 47.46	May 31 Sun SHA
5	325°41.18	217°10.98 18.55	287°15.21 26.12	209°24.55 39.71	313°26.84 47.53	Venus 254°20.69
6	340° 43.64	232°10.23 N24°18.21	302°15.86 N14°26.72	224°26.51 N21°39.63	328°29.11 N02°47.61	Mars 323°9.72 Jupiter 244°9.91
7 8	355° 46.11 10° 48.57	247°9.48 17.88 262°8.73 17.54	317°16.52 27.32 332°17.18 27.92	239°28.47 39.55 254°30.43 39.47	343°31.38 47.68 358°33.65 47.75	Saturn 347°56.14
9	25°51.03	277°7.98 · · 17.21	347°17.83 · · 28.52	269°32.39 · · 39.39	13°35.92 · · 47.82	
10	40°53.50	292°7.24 16.87	2°18.49 29.12	284°34.35 39.30	28°38.19 47.90	Jun 01 Mon SHA
11	55°55.96	307°6.49 16.53	17°19.15 29.72	299°36.31 39.22	43°40.46 47.97	Venus 253°3.17
12	70°58.43	322°5.74 N24°16.19	32°19.80 N14°30.32	314°38.27 N21°39.14	58°42.73 N02°48.04	Mars 322°26.41 Jupiter 243°57.93
13	86°0.89	337°5.00 15.85	47°20.46 30.91	329°40.23 39.06	73°45.00 48.11	Saturn 347°51.36
14	101°3.35	352°4.25 15.51	62°21.12 31.51	344°42.19 38.98	88°47.27 48.18	
15 16	116°5.82 131°8.28	7°3.51 · · 15.16 22°2.76 14.82	77°21.77 · · · 32.11 92°22.43	359°44.15 · · 38.89 14°46.11 38.81	103°49.54 · · 48.26 118°51.81 48.33	Jun 02 Tue SHA
16 17	131 8.28 146° 10.75	37°2.02 14.47	92°22.43 32.71 107°23.09 33.30	14°46.11 38.81 29°48.07 38.73	118°51.81 48.33 133°54.08 48.40	Venus 251°45.87 Mars 321°43.07
18	161° 13.21	52°1.27 N24°14.13	122°23.74 N14°33.90	44°50.02 N21°38.65	148°56.35 N02°48.47	Jupiter 243°45.89
19	176° 15.68	67°0.53 13.78	137°24.40 34.50	59°51.98 38.56	163°58.62 48.54	Saturn 347°46.64
20	191° 18.14	81°59.79 13.43	152°25.05 35.09	74°53.94 38.48	179°0.90 48.61	
21	206°20.60	96°59.04 · · 13.08	167°25.71 · · 35.69	89°55.90 · · 38.40	194°3.17 · · 48.69	Horizontal parallax
22	221°23.07	111°58.30 12.73	182°26.36 36.28	104°57.86 38.32	209°5.44 48.76	Venus: Mars:
23	236°25.53	126° 57.56 12.37	197°27.02 36.88	119°59.82 38.23	224°7.71 48.83	ividis.
Mer.p	pass. 07:17	ν-0.8' d-0.3' m-3.95	$\nu 0.7' \ d0.6' \ m1.27$	ν2.0′ d-0.1′ m-1.88	ν2.3' d0.1' m0.87	

	Stars	
	SHA	Dec
Alpheratz	357°33.72	29°14.03
Ankaa Schedar	353° 6.21 349° 30.02	-42°9.53 56°40.70
Diphda	348°46.33	-17°50.41
Achernar Hamal	335°19.76 327°50.19	-57°5.93 23°35.14
Polaris	313°53.87	89°22.36
Acamar	315°11.30 314°5.26	-40°11.81 4°11.57
Menkar Mirfak	308°27.10	4 11.57 49°57.18
Aldebaran	290°38.66	16°33.70
Rigel Capella	281°3.11 280°20.68	-8°10.30 46°1.45
Bellatrix	$278^{\circ}21.99$	6°22.38
Elnath Alnilam	278°0.80 275°36.90	28°37.75 -1°11.14
Betelgeuse	275 30.90 270°51.17	7°24.68
Canopus	263°52.40	-52°42.68
Sirius Adhara	258°25.54 255°5.29	-16°45.23 -29°0.59
Procyon	244°49.89	5°9.39
Pollux	243°16.19	27°57.78
Avior Suhail	234°14.67 222°45.67	-59°35.88 -43°32.60
Miaplacidus	221°38.44	-69°49.83
Alphard	217°46.75 207°33.29	-8°46.51 11°50.27
Regulus Dubhe	207 33.29 193°39.57	61°36.74
Denebola	182°23.70	14°25.46
Gienah Acrux	175°42.28 172°58.50	-17°41.49 -63°15.06
Gacrux	171°50.10	-57°15.98
Alioth	166°11.66	55°49.15
Spica Alkaid	158°20.88 152°50.74	-11°18.09 49°10.98
Hadar	148°33.85	-60°30.25
Menkent	147°55.95	-36°30.19 19°2.67
Arcturus Rigil Kent.	145°46.59 139°38.14	-60°56.87
Kochab	137°18.77	74°2.87
Zuben'ubi Alphecca	136°54.45 126°2.42	-16°9.21 26°37.51
Antares	112° 14.06	-26°29.48
Atria	107° 6.68	-69°4.47
Sabik Shaula	102°1.13 96°8.40	-15°45.49 -37°7.35
Rasalhague	$95^{\circ}57.15$	12°32.37
Eltanin Kaus Aust.	90°41.14 83°30.63	51°28.97 -34°22.25
Vega	80°32.07	38°48.33
Nunki	75°46.03	-26°15.76
Altair Peacock	61°58.61 53°3.59	8°56.22 -56°38.75
Deneb	49°24.78	45°22.24
Enif	33°37.59	9°59.70
Al Na'ir Fomalhaut	27°31.41 15°13.28	-46°49.73 -29°28.77
Scheat	$13^{\circ}44.12$	28°13.41
Markab	13°28.79	15°20.75
May 31 Sun	SHA	Mer.pass
Venus Mars	254°20.69 323°9.72	14:29 09:53
Jupiter	$244^{\circ}9.91$	15:07
Saturn	347°56.14	08:13
Jun 01 Mon	SHA	Mer.pass
Venus Mars	253° 3.17 322° 26.41	14:31 09:52
Jupiter	243°57.93	15:04
Saturn	347°51.36	08:09
Jun 02 Tue	SHA	Mer.pass
Venus Mars	251°45.87 321°43.07	14:32 09:51
Jupiter	243°45.89	15:01
Saturn	347°46.64	08:06

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°35.75	N21°53.15	5°48.51	10.9'	\$26°8.54	5.3'	54.0'
1	195°35.66	53.51	20° 18.46	10.9'	26° 13.83	5.2'	54.0'
2	210°35.57	53.87	34°48.36	10.9'	26° 19.00	5.0'	53.9'
3 4	225°35.48 240°35.39	•• 54.22 54.58	49° 18.22 63° 48.03	10.8' 10.8'	26° 24.05 26° 28.97	4.9' 4.8'	53.9' 53.9'
5	255°35.30	54.93	78° 17.81	10.7	26°33.76	4.7	53.9'
6	270°35.21	N21°55.29	92°47.54	10.7'	S26°38.43	4.5'	53.9'
7	285°35.11	55.64	$107^{\circ}17.24$	10.7'	$26^{\circ}42.98$	4.4'	53.9'
8	300°35.02	56.00	121°46.89	10.6'	26°47.39	4.3'	53.9'
9	315°34.93 330°34.84	• • 56.35	136° 16.51	10.6'	26°51.68	4.2'	53.9'
10 11	330°34.84 345°34.75	56.70 57.05	150°46.09 165°15.63	10.5' 10.5'	26° 55.84 26° 59.88	4.0' 3.9'	53.9' 53.9'
12	0°34.66	N21°57.40	179° 45.14	10.5	\$27°3.79	3.8'	53.9'
13	15°34.57	57.75	194° 14.61	10.4	27°7.56	3.6'	53.9'
14	30°34.48	58.10	208°44.05	10.4'	$27^{\circ}11.21$	3.5'	53.9'
15	45°34.38	• • 58.45	223°13.46	10.4'	27° 14.73	3.4'	53.9'
16	60°34.29 75°34.20	58.80 59.15	237° 42.83 252° 12.18	10.3'	27° 18.11 27° 21.37	3.3' 3.1'	53.9'
17 18	75°34.20 90°34.11	59.15 N21°59.49	252°12.18 266°41.50	10.3' 10.3'	\$27°24.50	3.1	53.9' 53.9'
19	105°34.01	21°59.84	281° 10.78	10.3	27° 27.49	2.9'	53.9'
20	120°33.92	22°0.19	295°40.05	10.2'	27°30.35	2.7'	53.9'
21	135°33.83	• • 0.53	310°9.28	10.2'	27°33.09	2.6'	53.9'
22	150°33.73	0.87	324°38.49	10.2'	27°35.68	2.5'	53.9'
23	165°33.64	1.22	339°7.68	10.2'	27°38.15	2.3'	53.9'
	SD = 15.8'	d = 0.4'		SD	0 = 14.7'		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	180°33.55	N22°1.56	353° 36.84	10.1'	S27°40.48	2.2'	53.9'
1	195°33.45	1.90	8°5.98	10.1'	$27^{\circ}42.68$	2.1'	53.9'
2	210°33.36	2.24	22°35.10	10.1'	27°44.75	1.9'	53.9'
3	225°33.27	• • 2.59	37°4.21	10.1'	27°46.68	1.8'	53.9'
4 5	240°33.17 255°33.08	2.93 3.27	51°33.29 66°2.36	10.1' 10.1'	27°48.48 27°50.14	1.7' 1.5'	53.9' 53.9'
6	270°32.98	N22°3.60	80°31.41	10.1	\$27°51.67	1.4'	53.9'
7	285°32.89	3.94	95°0.45	10.0'	27°53.06	1.3'	53.9'
8	300°32.79	4.28	$109^{\circ}29.47$	10.0'	$27^{\circ}54.32$	1.1'	53.9'
9	315°32.70	• • 4.62	123°58.49	10.0'	27°55.45	1.0'	53.9'
10	330°32.60 345°32.51	4.95	138° 27.49 152° 56.48	10.0'	27° 56.43 27° 57.29	0.9'	53.9'
11 12	0°32.41	5.29 N22°5.62	152 50.48 167°25.46	10.0' 10.0'	\$27°58.01	0.7' 0.6'	53.9' 53.9'
13	15°32.31	5.96	181°54.44	10.0'	27°58.59	0.4	53.9'
14	30°32.22	6.29	196°23.41	10.0'	27°59.04	0.3'	53.9'
15	45°32.12	• • 6.62	210°52.38	10.0'	27°59.35	0.2'	53.9'
16	60°32.03	6.96	225°21.34	10.0'	27°59.53	0.0'	53.9' 53.9'
17 18	75°31.93 90°31.83	7.29 N22°7.62	239°50.30 254°19.26	10.0' 10.0'	27°59.57 \$27°59.47	-0.1' -0.2'	53.9'
19	105°31.74	7.95	268° 48.22	10.0'	27°59.24	-0.4	53.9'
20	120°31.64	8.28	283°17.19	10.0'	27°58.87	-0.5'	53.9'
21	135°31.54	• • 8.61	297° 46.15	10.0'	27°58.37	-0.6'	53.9'
22	150°31.44	8.94	312° 15.12	10.0'	27°57.73	-0.8'	53.9'
23	165°31.35	9.26	326°44.10	10.0'	27°56.96	-0.9'	53.9'
	SD = 15.8'	d = 0.3'		SD	0 = 14.7'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°31.25	N22°9.59	341°13.08	10.0'	\$27°56.05	-1.0'	53.9'
1	195°31.15	9.92	355°42.07	10.0'	27°55.00	-1.2'	53.9'
2	210°31.05 225°30.95	10.24 •• 10.57	10°11.07 24°40.07	10.0'	27°53.82 27°52.51	-1.3'	53.9'
3 4	225°30.95 240°30.86	10.57	24°40.07 39°9.09	10.0' 10.0'	27°52.51 27°51.06	-1.5' -1.6'	53.9' 53.9'
5	255°30.76	11.21	53° 38.13	10.0'	27°49.47	-1.7'	53.9'
6	270°30.66	N22°11.54	68°7.17	10.1'	S27°47.75	-1.9'	53.9'
7	285°30.56	11.86	82°36.23	10.1'	27°45.90	-2.0'	54.0'
8	300°30.46	12.18	97°5.31	10.1' 10.1'	27°43.91 27°41.79	-2.1'	54.0'
9 10	315°30.36 330°30.26	· · 12.50 12.82	111°34.41 126°3.52	10.1'	27°41.79 27°39.53	-2.3' -2.4'	54.0' 54.0'
10	345°30.26	12.82	120 3.52 140°32.65	10.1	27 39.53 27°37.14	-2.4 -2.5'	54.0'
12	0°30.06	N22° 13.46	155°1.81	10.2'	S27°34.62	-2.7'	54.0'
13	15°29.96	13.78	169°30.98	10.2'	27°31.96	-2.8'	54.0'
14	30°29.86	14.09	184°0.18	10.2'	27°29.17	-2.9'	54.0'
15 16	45°29.76 60°29.66	· · 14.41 14.73	198° 29.40 212° 58.65	10.2' 10.3'	27°26.25 27°23.19	-3.1' -3.2'	54.0' 54.0'
16 17	75°29.56	14.73 15.04	212°58.65 227°27.92	10.3'	27° 23.19 27° 20.01	-3.2' -3.3'	54.0'
18	90°29.46	N22° 15.36	241°57.22	10.3'	\$27°16.69	-3.4	54.0'
19	105°29.36	15.67	256° 26.55	10.4'	27° 13.24	-3.6'	54.0'
20	120°29.26	15.98	270°55.91	10.4'	27°9.66	-3.7'	54.0'
21	135°29.16	• • 16.30	285°25.30	10.4'	27°5.95	-3.8'	54.0'
22 23	150°29.06 165°28.95	16.61 16.92	299°54.72 314°24.17	10.5' 10.5'	27°2.11 26°58.14	-4.0' -4.1'	54.0' 54.0'
23			J14 24.17			-4.1	J4.U
	SD = 15.8'	d = 0.3'		SL	0 = 14.7'		

				. 3		
Lat.	Twi	light	Sunrise	Sunset	Tw	ilight
	Naut.	Civil			Civil	Naut.
N $72^{\circ}$						
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
<b>N</b> 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 $10^{\circ}$	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> $60^{\circ}$	06:57	07:52	08:46	15:09	16:04	16:59
		Moonris	ie .		Moonse	t
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°						
N 70°		_	_		_	
68°						
660						

	Lat.		Moonris	е		Moonse	t
	Lat.	Sun	Mon	Tue	Sun	Mon	Tue
	N $72^{\circ}$						
	<b>N</b> 70°						
	68°						
İ	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° 20°	19:27 18:59	20:19 19:52	21:08 20:41	04:39 05:05	05:25 05:53	06:17 06:44
ł	N 10°	18:36	19:52	20:41	05:05	06:17	07:08
	0°	18:14	19:05	19:57	05:27	06:39	07:00
	<b>S</b> 10°	17:52	18:43	19:35	06:09	07:01	07:52
ł	20°	17:52	18:19	19:35	06:32	07:01	07:52
	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
ł	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
	<b>S</b> 50°	15:37	16:23	17:20	08:21	09:21	10:10
İ	52°	15:24	16:08	17:06	08:35	09:35	10:24
ĺ	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
L	<b>S</b> 60°	13:55	14:29	15:33	10:02	11:14	11:57

h	Aries	Venus		M	ars	Jup	oiter	Sat	urn		Stars
Wed	GHA		Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA
0 0	251°28.00		4°12.02	212° 27.68	N14°37.48	135°1.78	N21°38.15	239°9.98	N02°48.90		
1	266° 30.46	156°56.08	11.66	227°28.33	38.07	150° 3.73	38.07	254°12.25	48.97	Alpheratz	357°33.69
2	281°32.93	171°55.34	11.31	242°28.99	38.66	165° 5.69	37.99	269°14.52	49.04	Ankaa	353°6.18 349°29.98
3	296°35.39	186°54.60 • ·	10.95	257° 29.64	• • 39.26	180°7.65	• • 37.90	$284^{\circ}16.80$	• • 49.11	Schedar Diphda	349° 29.96 348° 46.30
4	311°37.85	201°53.86	10.59	272°30.30	39.85	195° 9.61	37.82	299°19.07	49.19	Achernar	335° 19.73
5	326°40.32	216°53.12 231°52.38 N2	10.23	287°30.95	40.45 N14°41.04	210°11.56	37.74 N21°37.66	314°21.34 329°23.61	49.26	Hamal	327°50.16
6 7	341° 42.78 356° 45.25	231 52.38 Nz 246°51.64	24° 9.87 9.51	302°31.61 317°32.26	41.63	225°13.52 240°15.48	N21 37.00 37.57	329 23.01 344°25.88	N02°49.33 49.40	Polaris	$313^{\circ}52.91$
8	11°47.71	261°50.91	9.15	332° 32.92	42.23	255°17.44	37.49	359°28.16	49.47	Acamar	315°11.28
9	26° 50.17		• 8.78	347° 33.57	• • 42.82	270°19.39	37.41	14°30.43	• • 49.54	Menkar	314°5.24
10	41°52.64	291°49.43	8.42	2°34.23	43.41	285°21.35	37.32	29°32.70	49.61	Mirfak Aldebaran	308°27.07 290°38.64
11	56°55.10	306°48.70	8.05	17°34.88	44.00	300°23.31	37.24	44°34.97	49.68	Rigel	281°3.10
12	71°57.57		24°7.68	32°35.54	N14°44.60	315°25.26	N21°37.16	59°37.25	N02°49.75	Capella	280° 20.67
13 14	87°0.03 102°2.50	336°47.23 351°46.49	7.31 6.94	47°36.19 62°36.85	45.19 45.78	330°27.22 345°29.18	37.07 36.99	74°39.52 89°41.79	49.82 49.90	Bellatrix	$278^{\circ}21.98$
15	102 2.30 117°4.96		• 6.57	77°37.50	46.37	0°31.13	36.91	104°44.07	• • 49.97	Elnath	278°0.79
16	132°7.42	21°45.02	6.20	92°38.16	46.96	15°33.09	36.82	119°46.34	50.04	Alnilam	275°36.89
17	$147^{\circ}9.89$	36°44.29	5.83	$107^{\circ}38.81$	47.55	30°35.05	36.74	134°48.61	50.11	Betelgeuse Canopus	270°51.17 263°52.40
18	162° 12.35		24°5.45	122°39.46	N14°48.14	45°37.00	N21°36.66	149°50.89	N02°50.18		258° 25.54
19	177° 14.82	66° 42.82	5.08	137° 40.12	48.73	60°38.96	36.57	164°53.16	50.25	Adhara	255°5.29
20	192° 17.28 207° 19.74	81°42.09 96°41.36	4.70 • 4.32	152°40.77 167°41.43	49.32 •• 49.91	75°40.91 90°42.87	36.49 •• 36.41	179°55.43 194°57.71	50.32 •• 50.39	Procyon	244°49.89
21 22	207 19.74 222°22.21	96 41.36 · 111°40.63	3.94	182° 42.08	50.50	90 42.87 105°44.83	36.32	194 57.71 209°59.98	•• 50.39 50.46	Pollux	
23	237°24.67	126°39.90	3.56	197° 42.74	51.09	120°46.78	36.24	225°2.25	50.53	Avior	234°14.69
-		$\nu$ -0.7' d-0.4' r		-						Suhail	222°45.68
ivier.p	pass. 07:13	$\nu$ -0.7 a-0.4 r	m-3.95	νο.τ αυ.	.6′ m1.27	ν2.0 a-0	.1′ m-1.88	ν2.3 αυ	.1′ m0.87	Miaplacidus Alphard	221°38.48 217°46.76
										Regulus	207°33.29
Thu	GHA		Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.59
0 1	252°27.14 267°29.60	141°39.17 N2 156°38.44	24°3.18 2.80	212°43.39 227°44.04	N14°51.68 52.27	135°48.74 150°50.69	N21°36.16 36.07	240°4.53 255°6.80	N02°50.60 50.67	Denebola	$182^{\circ}23.70$
2	282°32.07	171°37.71	2.41	242° 44.70	52.27 52.85	165°52.65	35.99	270°9.08	50.74	Gienah	
3	297°34.53		2.41	257° 45.35	• • 53.44	180°54.60	• • 35.90	285°11.35	50.81		172°58.52
4	312°36.99	201°36.25	1.64	272°46.00	54.03	195°56.56	35.82	300°13.63	50.88		171°50.11 166°11.67
5	$327^{\circ}39.46$	216°35.52	1.26	287°46.66	54.62	210°58.51	35.74	315°15.90	50.95	Spica	158° 20.88
6	342°41.92		24°0.87	302°47.31	N14°55.20	226° 0.47	N21°35.65	330°18.18	N02°51.02		152°50.75
7	357°44.39	246°34.07	0.48	317° 47.96	55.79	241°2.42	35.57	345°20.45	51.09	Hadar	148°33.86
8 9	12° 46.85 27° 49.31		24°0.09 3°59.70	332° 48.62 347° 49.27	56.38 •• 56.96	256° 4.38 271° 6.33	35.48 •• 35.40	0°22.73 15°25.00	51.16 •• 51.23		$147^{\circ}55.95$
10	42°51.78	291°31.89	59.70	2°49.92	57.55	271 0.33 286°8.29	35.32	30°27.28	51.30	Arcturus	145°46.59
11	57°54.24	306°31.17	58.91	17°50.58	58.14	301°10.24	35.23	45°29.55	51.37	Rigil Kent.	139°38.14
12	72°56.71		3°58.52	32°51.23	N14°58.72	316°12.19	N21°35.15	60°31.83	N02°51.44	Kochab Zuben'ubi	137° 18.80 136° 54.44
13	$87^{\circ}59.17$	336°29.72	58.12	47°51.88	59.31	331°14.15	35.06	75°34.10	51.51	Alphecca	126°2.41
14	103°1.64	351°29.00	57.72	62°52.54	14°59.89	346°16.10	34.98	90°36.38	51.58	Antares	112°14.04
15	118°4.10		• 57.32	77°53.19 92°53.84	15°0.48	1°18.06	• • 34.90	105°38.66	• • 51.65	Atria	$107^{\circ}6.65$
16 17	133°6.56 148°9.03	21°27.55 36°26.83	56.92 56.52	92 53.84 107°54.49	1.06 1.64	16°20.01 31°21.96	34.81 34.73	120°40.93 135°43.21	51.72 51.79	Sabik	102°1.11
18	163°11.49		3°56.12	122°55.15	N15°2.23	46°23.92	N21°34.64	150°45.48	N02°51.85	Shaula	96°8.38
19	178° 13.96	66°25.38	55.72	137°55.80	2.81	61°25.87	34.56	165°47.76	51.92	Rasalhague	95°57.14 90°41.12
20	193° 16.42	81°24.66	55.31	152°56.45	3.40	76°27.82	34.47	180°50.04	51.99	Eltanin Kaus Aust.	83°30.61
21	208° 18.88		54.91	167°57.10	• • 3.98	91°29.78	• • 34.39	195°52.31	• • 52.06	Vega	80°32.05
22	223°21.35	111°23.22	54.50	182°57.76	4.56	106°31.73	34.30	210°54.59	52.13	Nunki	75°46.01
23	238°23.81	126°22.50	54.09	197°58.41	5.14	121°33.68	34.22	225°56.87	52.20	Altair	$61^{\circ}58.59$
Mer.p	bass. 07:09	$\nu$ -0.7′ <i>d</i> -0.4′ r	m-3.95	u0.7' d0.	.6′ m1.27	$\nu$ 2.0′ d-0	$.1^\prime$ m-1.87	$\nu 2.3' \ d0$	.1' m $0.87$	Peacock	53°3.55
										Deneb	49°24.75
Fri	GHA		Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir	33°37.56 27°31.37
0	253°26.28		3°53.69	212° 59.06	$N15^{\circ}5.73$	136°35.63	$N21^{\circ}34.13$		$N02^{\circ}52.27$	Fomalhaut	15° 13.25
1	268°28.74	156°21.07	53.28	227°59.71	6.31	151°37.59	34.05	256°1.42	52.34	Scheat	13°44.09
2 3	283°31.21 298°33.67	171°20.35 186°19.63	52.87 • 52.45	243°0.36 258°1.02	6.89 • • 7.47	166°39.54 181°41.49	33.96 •• 33.88	271°3.70 286°5.97	52.41 •• 52.47	Markab	13°28.76
3 4	298 33.07 313°36.13	201°18.92	52.45 52.04	258 1.02 273°1.67	8.05	181 41.49 196°43.44	33.79	280 5.97 301°8.25	52.54	Jun 03 Wed	SHA
5	328° 38.60	216° 18.20	51.63	288°2.32	8.63	211°45.40	33.71	316°10.53	52.61		250°28.82
6	343°41.06	231°17.48 N23		303°2.97	N15° 9.21	226°47.35	N21°33.62		N02°52.68	Mars	$320^{\circ}59.68$
7	358° 43.53	246°16.77	50.79	318°3.62	9.79	241°49.30	33.54	$346^{\circ}15.08$	52.75		243°33.78
8	13° 45.99	261°16.05	50.38	333°4.27	10.37	256°51.25	33.45	1°17.36	52.82	Saturn	347°41.98
9	28° 48.45	276° 15.34 · · · · · · · · · · · · · · · · · · ·	49.96	348°4.93 3°5.58	11.52	271°53.20	• • 33.37	16°19.64 31°21.92	· · 52.89	Jun 04 Thu	SHA
10 11	43°50.92 58°53.38	306° 13.91	49.54 49.12	18° 6.23	11.53 12.11	286°55.16 301°57.11	33.28 33.20	46°24.20	52.95 53.02		249°12.03
12	73°55.85	321°13.20 N23		33°6.88	N15°12.69	316°59.06	N21°33.11		N02°53.09		320°16.25
13	88°58.31	336°12.49	48.27	48°7.53	13.27	$332^{\circ}1.01$	33.03	76°28.75	53.16		243°21.60
14	104°0.78	351°11.78	47.85	63°8.18	13.85	347°2.96	32.94	91°31.03	53.23		347°37.39
15	119°3.24		47.42	78°8.83	• • 14.43	2°4.91	• • 32.86	106°33.31	• • 53.30	Jun 05 Fri	SHA
16 17	134°5.70 149°8.17	21°10.35 36°9.64	47.00 46.57	93°9.48 108°10.14	15.01 15.58	17° 6.86 32° 8.81	32.77 32.69	121°35.59 136°37.87	53.36 53.43		247°55.51
18	149 8.17 164° 10.63	51°8.93 N23		108 10.14 123°10.79	N15°16.16	47°10.76	N21°32.60		N02° 53.50	Mars Jupiter	319°32.78 243°9.36
19	179° 13.10	66°8.22	45.71	138° 11.44	16.74	62°12.72	32.52	166°42.43	53.57		347° 32.87
20	$194^{\circ}15.56$	81°7.51	45.28	153° 12.09	17.31	77°14.67	32.43	181°44.71	53.63		
21	209°18.02		44.85	168° 12.74	• • 17.89	92°16.62	• • 32.34	196°46.98	• • 53.70	Horizor	ntal parallax
22 23	224° 20.49 239° 22.95	111°6.10 126°5.39	44.41 43.98	183°13.39 198°14.04	18.47 19.04	107°18.57 122°20.52	32.26 32.17	211°49.26 226°51.54	53.77 53.84		Venus: Mars:
										L	
Mer.p	pass. 07:05	$\nu$ -0.7′ $d$ -0.4′ $r$	m-3.96	$\nu 0.7' d0$	.6′ m1.28	$\nu 2.0' \ d-0$	.1′ m-1.87	$\nu$ 2.3′ d0	.1′ m0.87		

**Dec** 29° 14.03

-42°9.51

56°40.70

-17° 50.40

 $-57^{\circ}5.91$ 

 $23^{\circ}35.15$ 

89°22.35

-40°11.80

4°11.58

49°57.18 16°33.70

 $-8^{\circ}10.29$  $46^{\circ}1.44$ 

 $6^{\circ}22.39$ 

28°37.75

 $-1^{\circ}11.14$ 

7°24.69 -52°42.66

-16°45.22

-29°0.58 5°9.39 27°57.78

-59°35.88

-43°32.60 -69°49.82

-8°46.50

11°50.27

61°36.74

 $14^{\circ}25.46$ 

 $-17^{\circ}41.50$ 

-63°15.07

-57° 15.99

55°49.15 -11°18.09

49°10.99

-60°30.27

-36°30.19

 $19^{\circ}2.68$ 

 $74^{\circ}2.88$ 

-60°56.88

-16°9.21

26°37.52 -26°29.49

-69°4.49

 $-15^{\circ}45.49$ 

 $-37^{\circ}7.35$ 

 $12^{\circ}32.38$ 

51°28.98 -34°22.25

38°48.34 -26°15.76

8°56.23

-56° 38.75

 $45^{\circ}22.26$ 

 $9^{\circ}59.71$ 

-46°49.72 -29°28.76

28°13.42

15°20.76

Mer.pass

Mer.pass

14:33

09:50

14:58

14:34

09:49 14:55

07:58

09:48

14:52

07:55

0.1

0.1

Mer.pass 14:35

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°28.85	N22°17.23	328°53.65	10.5'	\$26°54.04	-4.2'	54.1'
1	195°28.75	17.54	343°23.17	10.6'	$26^{\circ}49.81$	-4.4'	54.1'
2	210°28.65	17.85	357°52.72	10.6'	26°45.46	-4.5'	54.1'
3	225°28.55	• • 18.16	12°22.31	10.6'	26°40.97	-4.6'	54.1'
4 5	240°28.44 255°28.34	18.47 18.78	26°51.94 41°21.60	10.7' 10.7'	26°36.36 26°31.62	-4.7' -4.9'	54.1' 54.1'
6	270°28.24	N22°19.08	55°51.30	10.7	\$26°26.76	-4.9 -5.0'	54.1
7	285°28.14	19.39	70°21.04	10.8	26°21.77	-5.1'	54.1'
8	300°28.03	19.69	84°50.82	10.8'	26°16.65	-5.2'	54.1'
9	315°27.93	• • 20.00	99°20.64	10.9'	26°11.41	-5.4'	54.1'
10	330°27.83	20.30	113°50.50	10.9'	26°6.05	-5.5'	54.1'
11	345°27.72	20.60	128°20.40	10.9'	26°0.56	-5.6'	54.1'
12 13	0°27.62 15°27.52	N22°20.91 21.21	142°50.34 157°20.33	11.0' 11.0'	\$25°54.95 25°49.21	-5.7'	54.2' 54.2'
13 14	30°27.41	21.21	157 20.33 171°50.36	11.1'	25 49.21 25°43.35	-5.9' -6.0'	54.2'
15	45°27.31	21.81	186°20.44	11.1'	25°37.38	-6.1'	54.2'
16	60°27.20	22.11	200°50.56	11.2'	25°31.28	-6.2	54.2'
17	75°27.10	22.41	215°20.72	11.2'	$25^{\circ}25.06$	-6.3'	54.2'
18	90°26.99	N22°22.71	229°50.94	11.3'	S25°18.72	-6.5'	54.2'
19	105°26.89	23.01	244°21.19	11.3'	25°12.26	-6.6'	54.2'
20	120°26.78	23.30	258°51.50 273°21.85	11.4'	25°5.68	-6.7'	54.2'
21 22	135°26.68 150°26.57	· · 23.60 23.90	273°21.85 287°52.25	11.4' 11.4'	24°58.99 24°52.17	-6.8' -6.9'	54.3' 54.3'
23	165°26.47	23.90 24.19	302°22.70	11.5'	24 52.17 24°45.24	-0.9 -7.0'	54.3'
23					0 = 14.7'	1.0	31.3
	SD = 15.8'	d = 0.3'		51	J = 14.7		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°26.36	N22°24.49	316°53.20	11.5'	\$24°38.20	-7.2'	54.3'
1 2	195°26.26 210°26.15	24.78 25.07	331°23.75 345°54.34	11.6' 11.6'	24°31.04 24°23.76	-7.3' -7.4'	54.3' 54.3'
3	210 26.15 225°26.05	25.07	0°24.99	11.7	24 23.76 24°16.37	-7.4 -7.5'	54.3'
4	240°25.94	25.66	14°55.68	11.7'	24°10.37	-7.6'	54.3'
5	255°25.83	25.95	29°26.43	11.8'	24°1.25	-7.7'	54.3'
6	270°25.73	N22°26.24	43°57.23	11.8'	S23°53.53	-7.8'	54.4'
7	285°25.62	26.53	58°28.07	11.9'	23°45.69	-7.9'	54.4'
8	300°25.51	26.82	72°58.97	11.9'	23°37.74	-8.1'	54.4'
9	315°25.41 330°25.30	•• 27.11	87°29.92 102°0.92	12.0'	23°29.68 23°21.51	-8.2'	54.4'
10 11	330°25.30 345°25.19	27.39 27.68	102°0.92 116°31.97	12.1' 12.1'	23° 21.51 23° 13.23	-8.3' -8.4'	54.4' 54.4'
12	0°25.08	N22°27.97	131°3.08	12.1	\$23°4.85	-8.5	54.4
13	15°24.98	28.25	145°34.23	12.2'	22°56.36	-8.6'	54.5'
14	30°24.87	28.54	160°5.44	12.3'	22°47.76	-8.7'	54.5'
15	45°24.76	• • 28.82	174°36.70	12.3'	22°39.05	-8.8'	54.5'
16	60°24.65	29.10	189°8.01	12.4'	22°30.24	-8.9'	54.5'
17 18	75°24.55 90°24.44	29.39 N22°29.67	203°39.37 218°10.78	12.4' 12.5'	22°21.33 <b>5</b> 22°12.31	-9.0' -9.1'	54.5' 54.5'
19	105°24.33	29.95	232°42.24	12.5'	22°3.19	-9.1 -9.2'	54.6'
20	120°24.22	30.23	247°13.76	12.6'	21°53.97	-9.3'	54.6'
21	135°24.11	30.51	261°45.32	12.6'	21°44.65	-9.4'	54.6'
22	150°24.00	30.79	$276^{\circ}16.94$	12.7'	21°35.23	-9.5'	54.6'
23	165°23.89	31.07	290°48.61	12.7'	21°25.70	-9.6'	54.6'
	SD = 15.8'	d = 0.3'		SI	O = 14.8'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°23.78	N22°31.35	305°20.33	12.8'	S21°16.08	-9.7'	54.6'
1	195°23.67	31.63	319°52.10	12.8'	21°6.36	-9.8'	54.7'
2	210°23.57	31.90	334°23.92	12.9'	20°56.54	-9.9'	54.7'
3	225°23.46 240°23.35	•• 32.18	348°55.79 3°27.71	12.9'	20°46.63	-10.0'	54.7'
4 5	240°23.35 255°23.24	32.45 32.73	3°27.71 17°59.68	13.0' 13.0'	20°36.61 20°26.51	-10.1' -10.2'	54.7' 54.7'
6	255 23.24 270°23.13	N22°33.00	32°31.70	13.1'	20 20.51 \$20°16.31	-10.2	54.7'
7	285°23.02	33.28	47°3.77	13.1'	20°6.01	-10.4	54.8'
8	300°22.91	33.55	61°35.88	13.2'	19°55.62	-10.5'	54.8'
9	315°22.79	• • 33.82	76°8.05	13.2'	19°45.14	-10.6'	54.8'
10	330°22.68	34.09	90°40.26	13.3'	19°34.57	-10.7'	54.8'
11	345°22.57	34.36 N22°34.63	105°12.52 119°44.83	13.3'	19°23.91	-10.8'	54.8'
12 13	0°22.46 15°22.35	N22°34.63 34.90	119°44.83 134°17.18	13.4' 13.4'	\$19°13.15 19°2.31	-10.8' -10.9'	54.9' 54.9'
13 14	30°22.24	34.90 35.17	134 17.18 148°49.58	13.4	19 2.31 18°51.38	-10.9 -11.0'	54.9'
15	45°22.13	• • 35.44	163°22.02	13.5'	18°40.36	-11.1'	54.9'
16	60°22.02	35.71	177°54.51	13.5'	18°29.25	-11.2'	54.9'
17	75°21.90	35.97	$192^{\circ}27.05$	13.6'	$18^{\circ}18.06$	-11.3'	55.0'
18	90°21.79	N22°36.24	206°59.63	13.6'	\$18°6.78	-11.4'	55.0'
19	105°21.68	36.50	221°32.25	13.7'	17°55.42	-11.4'	55.0'
20 21	120°21.57 135°21.46	36.77 •• 37.03	236°4.92 250°37.63	13.7' 13.7'	17°43.98 17°32.45	-11.5' -11.6'	55.0' 55.0'
21	135°21.46 150°21.34	37.03 37.29	250°37.63 265°10.38	13.7	17°32.45 17°20.83	-11.6 -11.7'	55.0° 55.1'
23	165°21.23	37.56	279°43.17	13.8'	17° 9.14	-11.7	55.1'
	SD = 15.8'	d = 0.3'			D = 14.9'		
				JI	17.3		

			I	1		
Lat.	Twi	light	Sunrise	Sunset	Twilight	
	Naut.	Civil			Civil	Naut.
N 72°						
<b>N</b> 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	////
<b>N</b> 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
<b>N</b> 40°	03:19	04:00	04:32	19:25	19:57	20:38
$35^{\circ}$	03:41	04:17	04:46	19:10	19:40	20:16
$30^{\circ}$	03:59	04:32	04:59	18:58	19:25	19:58
$20^{\circ}$	04:27	04:55	05:20	18:37	19:01	19:30
<b>N</b> 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
<b>S</b> $10^{\circ}$	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
$35^{\circ}$	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
<b>S</b> 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
<b>S</b> 60°	07:00	07:56	08:51	15:05	16:01	16:56
Lat.		Moonris	se		Moonset	t .
	Wed	Thu	Fri	Wed	Thu	Fri
N 72°						
<b>N</b> 70°						
68°			02:29			05:18
66°			01:42			06:04
610		01.22	01.11		04.24	06.24

Lat.		Moonris	e		Moonset	:
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	16:58	18:30	20:02	12:17	12:25	12:29

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Age		
Day	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	18-20	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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		

h	Aries	Venus	. ,	Mars	lur	oiter	Sat	turn		Stars
Sat	GHA	GHA De		Dec	GHA	Dec	GHA	Dec		SHA
0	254°25.42	141°4.68 N23°4			137°22.47	N21°32.09	241°53.82	N02°53.91	Alpheratz	357°33.67
1 2	269° 27.88 284° 30.35		3.11 228°15.34 2.67 243°15.99		152°24.42 167°26.37	32.00 31.92	256°56.10 271°58.38	53.97 54.04	Ankaa	$353^{\circ}6.16$
3	299°32.81	186°2.57 · · 4			182°28.32	• • 31.83	287° 0.66	• 54.11	Schedar	349°29.95
4	314° 35.27		1.79 273°17.29		197°30.27	31.74	302°2.94	54.18	Diphda	348°46.28
5	329°37.74		1.35 288°17.94		212°32.22	31.66	317°5.22	54.24	Achernar	335°19.70 327°50.14
6	344°40.20	231°0.45 N23°4			227°34.17	N21°31.57	332°7.50	N02°54.31	Hamal Polaris	313°52.11
7	359° 42.67		0.46 318°19.24		242°36.11	31.48	347°9.78	54.38	Acamar	315°11.26
8	14°45.13		0.02 333°19.89		257°38.06	31.40	2°12.07	54.44	Menkar	314°5.22
9 10	29° 47.59 44° 50.06	275°58.35 · · · 3 290°57.64	9.57 348°20.54 9.13 3°21.19		272°40.01 287°41.96	· · 31.31 31.23	17°14.35 32°16.63	• • 54.51 54.58	Mirfak	$308^{\circ}27.05$
11	59°52.52		8.68 18°21.84		302°43.91	31.14	47°18.91	54.65	Aldebaran	290°38.63
12	74° 54.99	320°56.24 N23°3			317°45.86	N21°31.05	62°21.19	N02°54.71	Rigel	281°3.09
13	89°57.45	335°55.54 3	7.78 48°23.14	1 27.08	332°47.81	30.97	77°23.47	54.78	Capella Bellatrix	280°20.66 278°21.97
14	104°59.91		7.33 63°23.79		347°49.76	30.88	92°25.75	54.85	Elnath	278°0.78
15	120°2.38	5°54.14 · · 3			2°51.71	• • 30.79	107°28.03	• • 54.91	Alnilam	275°36.89
16 17	135°4.84 150°7.31		6.42 93°25.09 5.97 108°25.73		17°53.65 32°55.60	30.71 30.62	122°30.31 137°32.60	54.98 55.05	Betelgeuse	$270^{\circ}51.16$
18	165°9.77	50°52.05 N23°3			47°57.55	N21°30.53	157° 34.88	N02°55.11	Canopus	263°52.41
19	180° 12.24		5.06 138°27.03		62°59.50	30.45	167°37.16	55.18	Sirius	258°25.54
20	195° 14.70		4.60 153°27.68		78° 1.45	30.36	182°39.44	55.25	Adhara	255°5.30
21	$210^{\circ}17.16$	95°49.96 · · 3			93°3.39	• • 30.27	197°41.72	•• 55.31	Procyon Pollux	244°49.89 243°16.19
22	225° 19.63		3.68 183°28.98		108°5.34	30.19	212°44.01	55.38	Avior	234°14.71
23	240°22.09	125°48.57 3	3.22 198°29.63	32.79	123°7.29	30.10	227°46.29	55.44	Suhail	222°45.70
Mer.p	pass. 07:01	$\nu$ -0.7' d-0.4' m-3	$\nu 0.7' d$	'0.6' m1.28	$\nu 1.9' \ d-0$	0.1′ m-1.87	$\nu$ 2.3′ d0	.1′ m0.86	Miaplacidus	221°38.52
									Alphard	$217^{\circ}46.76$
Sun	GHA	GHA De	c GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.30
0	255°24.56	140°47.87 N23°3			138° 9.24	N21°30.01	242°48.57	N02°55.51	Dubhe	193°39.61
1	270°27.02		2.29 228°30.92		153°11.18	29.93	257°50.85	55.58	Denebola Gienah	182°23.71 175°42.29
2	$285^{\circ}29.48$	170°46.49 3	1.83 243°31.57	7 34.49	168°13.13	29.84	272°53.14	55.64		175 42.29 172°58.55
3	300°31.95	185°45.79 · · 3			183°15.08	• • 29.75	287°55.42	•• 55.71		171°50.13
4	315°34.41		0.90 273°32.87		198°17.03	29.67	302°57.70	55.78	Alioth	166°11.69
5	330°36.88		0.43 288°33.52		213°18.97	29.58	317°59.99	55.84	Spica	158°20.88
6 7	345°39.34 0°41.80	230°43.72 N23°2 245°43.03 2	9.96 303°34.17 9.49 318°34.83		228°20.92 243°22.87	N21°29.49 29.40	333°2.27 348°4.55	N02°55.91 55.97	Alkaid	152°50.76
8	15° 44.27		9.02 333°35.46		258°24.81	29.32	3°6.84	56.04	Hadar	148°33.87
9	30°46.73	275°41.65 · · 2			273°26.76	29.23	18°9.12	56.10		147°55.95 145°46.59
10	45°49.20	290°40.96 2	8.08 3°36.76	39.03	288°28.71	29.14	33°11.40	56.17	Arcturus Rigil Kent.	145 46.59 139°38.15
11	60°51.66		7.60 18°37.4		303°30.65	29.05	48°13.69	56.24	Kochab	137°18.82
12	75°54.13	320°39.58 N23°2			318°32.60	N21°28.97	63°15.97	N02°56.30	Zuben'ubi	136°54.44
13	90°56.59		6.65 48°38.70		333°34.55	28.88	78°18.25	56.37	Alphecca	$126^{\circ}2.41$
14 15	105° 59.05 121° 1.52	350°38.21 2 5°37.52 · · · 2	6.17 63°39.35 5.69 78°40.00		348°36.49 3°38.44	28.79 •• 28.70	93°20.54 108°22.82	56.43 •• 56.50	Antares	112°14.04
16	136°3.98		5.21 93°40.64		18°40.38	28.62	123°25.11	56.56	Atria	107°6.63
17	151°6.45		4.73 108°41.29		33°42.33	28.53	138°27.39	56.63	Sabik	102°1.10 96°8.37
18	166°8.91	50°35.47 N23°2			48°44.27	N21°28.44	153°29.68	N02°56.69	Shaula Rasalhague	90° 6.37 95° 57.13
19	181°11.37		3.77 138° 42.59		63°46.22	28.35	168°31.96	56.76	Eltanin	90°41.11
20	196° 13.84		3.28 153°43.23		78°48.17	28.27	183°34.25	56.82	Kaus Aust.	83°30.59
21 22	211° 16.30 226° 18.77	95°33.41 · · · 2 110°32.73 2	2.80 168°43.88 2.31 183°44.53		93°50.11 108°52.06	· · 28.18 28.09	198°36.53 213°38.82	· · 56.89 56.95	Vega	80°32.04
23	241°21.23		1.83 198°45.17		108 52.00 123°54.00	28.00	213 36.62 228°41.10	50.95 57.02	Nunki	75°45.99
									Altair	61°58.57
Mer.p	pass. 06:57	$\nu$ -0.7' d-0.5' m-3	$\frac{3.96}{2}  \frac{\nu 0.6'}{2}  d$	0.6′ m1.28	$\nu 1.9' \ d-0$	0.1′ m-1.86	$\nu^{2.3'} d0$	.1′ m0.86	Peacock Deneb	53°3.51 49°24.73
									Enif	49 24.73 33°37.54
Mon	GHA	GHA De		Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.34
0	256°23.69	140°31.37 N23°2			138°55.95	N21°27.91	243°43.39	N02°57.08	Fomalhaut	15°13.22
1	271°26.16		0.85 228°46.47		153°57.89	27.83	258°45.67 273°47.96	57.15 57.21	Scheat	13°44.07
2 3	286°28.62 301°31.09	170°30.01 2 185°29.33 · · 1	0.36 243°47.13 9.87 258°47.76		168°59.84 184°1.78	27.74 •• 27.65	273°47.96 288°50.24	57.21 •• 57.28	Markab	13°28.74
4	316°33.55		9.37 273°48.4		199° 3.73	27.56	303°52.53	57.34	Jun 06 Sat	SHA
5	331°36.01	215°27.97 1	8.88 288°49.09		214° 5.67	27.47	318°54.82	57.41		246°39.27
6	346°38.48	230°27.29 N23°1	8.38 303°49.70	N15°50.30	229°7.61	N21°27.39		N02°57.47		318°49.27
7	1°40.94		7.89 318°50.39		244° 9.56	27.30	348°59.39	57.54		242°57.05
8	16°43.41		7.39 333°50.99		259°11.50	27.21	4°1.67	57.60	Saturn	347°28.41
9 10	31° 45.87 46° 48.33	275°25.26 · · · 1 290°24.58	6.89 348°51.64 6.39 3°52.29		274°13.45 289°15.39	· · 27.12 27.03	19°3.96 34°6.25	· · 57.67 57.73	Jun 07 Sun	SHA
10	46 48.33 61°50.80		5.89 3 52.29 5.89 18° 52.93		289 15.39 304°17.34	27.03 26.94	49°8.53	57.73 57.79	I	245°23.32
12	76°53.26	320°23.23 N23°1			319°19.28	N21°26.85		N02°57.86	Mars	318° 5.72
13	91°55.73		4.89 48° 54.22		334°21.22	26.77	79°13.11	57.92		242°44.68 347°24.02
14	106°58.19		4.39 63°54.87		349°23.17	26.68	94°15.39	57.99		
15	122°0.66	5°21.21 · · 1			4°25.11	• • 26.59	109°17.68	• • 58.05	Jun 08 Mon	SHA
16	137°3.12		3.38 93°56.16		19°27.05	26.50	124°19.97	58.12	Venus	244°7.67
17 18	152°5.58 167°8.05	35°19.86 1 50°19.19 N23°1	2.87 108° 56.83 2.36 123° 57.49		34°29.00 49°30.94	26.41 N21°26.32	139°22.26 154°24.54	58.18 N02°58.24		317°22.13
19	182° 10.51		1.85 138° 58.10		64°32.88	26.23	169°26.83	58.31		242°32.25 347°19.69
20	197° 12.98		1.34 153°58.74		79°34.83	26.14	184°29.12	58.37		
21	212° 15.44	95°17.18 · · 1	0.83 168°59.39	9 • • 58.67	94°36.77	• • 26.06	199°31.41	• • 58.43	Horizoi	ntal parallax
22	227° 17.90		0.32 184°0.03		109°38.71	25.97	214°33.70	58.50		Venus:
23	242°20.37	125°15.84	9.81 199°0.68	3 59.79	124°40.65	25.88	229°35.98	58.56		Mars:
Mer.p	bass. 06:53	$\nu$ -0.7′ <i>d</i> -0.5′ m-3	$\nu$ 0.6′ d	0.6′ m1.28	$\nu 1.9' \ d$ -0	0.1′ m-1.86	$\nu$ 2.3′ d0	.1'~m0.86		

Dec

29°14.04

-42°9.50

56°40.71

-17°50.38 -57°5.89

 $23^{\circ}35.15$ 

89°22.34

40°11.78

4°11.59 49°57.18

16°33.71 -8°10.28

 $46^{\circ}1.44$ 

 $6^{\circ}22.39$ 

28°37.75

 $-1^{\circ}11.13$ 

 $7^{\circ}24.69$ 

-52°42.64 -16°45.21

-29°0.57

-59°35.87

-43°32.59

-69°49.81 -8°46.50

11°50.27

 $61^{\circ}36.74$ 

14°25.46

-17°41.50

-63°15.07

 $-57^{\circ}16.00$ 

55°49.16

-11°18.09

49°11.00

-60°30.28

-36°30.20

 $19^{\circ}2.68$ 

-60°56.89

 $74^{\circ}2.90$ 

-16°9.21

26°37.53

-26°29.49

-69°4.50

 $\text{-}37^{\circ}7.36$ 

 $12^{\circ}32.39$ 

51°29.00

-34°22.26

38°48.36

-26°15.76

8°56.24

-56°38.75

45°22.27

-46°49.71

-29°28.75 28°13.42

15°20.77

Mer.pass

14:36

09:47

14:49

07:51

14:37

09:46

14:45

07:48

14:39

09:45

14:42

07:44

0.1

0.1

Mer.pass

Mer.pass

 $9^{\circ}59.72$ 

 $-15^{\circ}45.49$ 

 $5^{\circ}9.40$ 27°57.78

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°21.12	N22°37.82	294° 16.00	13.9'	\$16°57.36	-11.9'	55.1'
1	195°21.01	38.08	308° 48.87	13.9'	16°45.51	-11.9'	55.1'
2	210°20.89	38.34	323°21.78	13.9'	$16^{\circ}33.58$	-12.0'	55.2'
3	225°20.78	• • 38.60	337°54.73	14.0'	$16^{\circ}21.56$	-12.1'	55.2'
4	240°20.67	38.86	352°27.72	14.0'	16°9.47	-12.2'	55.2'
5	255°20.55	39.12 N22°39.37	7°0.74 21°33.80	14.1'	15°57.30	-12.2'	55.2'
6 7	270°20.44 285°20.33	N22 39.37 39.63	21 33.80 36°6.90	14.1' 14.1'	\$15°45.06 15°32.74	-12.3' -12.4'	55.3' 55.3'
8	300°20.21	39.89	50° 40.03	14.1	15° 20.34	-12.4 -12.5'	55.3'
9	315°20.10	• • 40.14	65° 13.20	14.2'	15°7.87	-12.5'	55.3'
10	330°19.98	40.40	79°46.40	14.2'	14°55.33	-12.6'	55.4'
11	$345^{\circ}19.87$	40.65	94° 19.63	14.3'	14°42.71	-12.7'	55.4'
12	0°19.76	N22°40.90	108°52.89	14.3'	<b>5</b> 14° 30.03	-12.8'	55.4'
13	15°19.64	41.16	123°26.18	14.3'	14° 17.27	-12.8'	55.4'
14 15	30°19.53 45°19.41	41.41 •• 41.66	137°59.51 152°32.86	14.4' 14.4'	14°4.44 13°51.54	-12.9' -13.0'	55.5' 55.5'
15 16	45 19.41 60°19.30	41.91	152 32.80 167°6.25	14.4 14.4'	13 51.54 13°38.57	-13.0'	55.5'
17	75°19.18	42.16	181° 39.66	14.4	13° 25.54	-13.1	55.5'
18	90°19.07	N22°42.41	196° 13.09	14.5'	\$13° 12.44	-13.2'	55.6'
19	105°18.95	42.66	210°46.55	14.5'	12°59.27	-13.2'	55.6'
20	120°18.84	42.91	225°20.04	14.5'	12°46.03	-13.3'	55.6'
21	135°18.72	• • 43.15	239°53.55	14.5'	12°32.73	-13.4'	55.6'
22	150°18.60	43.40	254°27.09	14.6'	12° 19.37	-13.4'	55.7'
23	165°18.49	43.65	269°0.64	14.6'	12°5.94	-13.5'	55.7'
	SD = 15.8'	d = 0.3'		SI	O = 15.0'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°18.37	N22°43.89	283°34.22	14.6'	S11°52.45	-13.6'	55.7'
1	195°18.26	44.13	298°7.82	14.6'	11°38.90	-13.6'	55.7'
2	210°18.14	44.38	312°41.43	14.6'	11°25.28	-13.7'	55.8'
3	225°18.02	• • 44.62	327° 15.07	14.7'	11°11.61	-13.7'	55.8'
4	240°17.91	44.86	341°48.72	14.7'	10°57.88	-13.8'	55.8'
5 6	255°17.79 270°17.67	45.11 N22° 45.35	356°22.39 10°56.07	14.7' 14.7'	10°44.09 \$10°30.24	-13.9' -13.9'	55.9' 55.9'
7	285°17.56	45.59	25°29.77	14.7	10° 16.33	-13.9 -14.0'	55.9'
8	300°17.44	45.83	40°3.48	14.7	10°10.33	-14.0'	56.0'
9	315°17.32	• • 46.06	54° 37.20	14.7'	09°48.34	-14.1'	56.0'
10	330°17.20	46.30	69° 10.93	14.7'	09°34.27	-14.1'	56.0'
11	345°17.09	46.54	83°44.67	14.8'	09°20.14	-14.2'	56.0'
12	0°16.97	N22°46.78	98° 18.43	14.8'	S09°5.96	-14.2'	56.1'
13	15°16.85	47.01	112°52.19	14.8'	08°51.72	-14.3'	56.1'
14	30°16.73	47.25	127°25.95	14.8'	08°37.44	-14.3'	56.1'
15 16	45°16.62 60°16.50	· · 47.48 47.72	141°59.72 156°33.50	14.8' 14.8'	08°23.10 08°8.71	-14.4' -14.4'	56.2' 56.2'
17	75°16.38	47.72 47.95	171°7.27	14.8	00 0.71 07°54.27	-14.4 -14.5'	56.2'
18	90°16.26	N22°48.18	185°41.06	14.8'	S07°39.79	-14.5	56.3'
19	105°16.14	48.42	200° 14.84	14.8'	07° 25.26	-14.6'	56.3'
20	120°16.02	48.65	214°48.62	14.8'	$07^{\circ}10.68$	-14.6'	56.3'
21	135°15.90	• • 48.88	229°22.40	14.8'	$06^{\circ}56.05$	-14.7'	56.4'
22	150°15.79	49.11	243°56.17	14.8'	06°41.38	-14.7'	56.4'
23	165°15.67	49.34	258° 29.95	14.8'	06°26.66	-14.8'	56.4'
	SD = 15.8'	d = 0.2'		SI	D = 15.2'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°15.55	N22°49.56	273°3.71	14.8'	S06°11.90	-14.8'	56.5'
1	195°15.43	49.79	287°37.47	14.8'	05°57.10	-14.8'	56.5'
2	210°15.31 225°15.19	50.02 •• 50.25	302°11.23 316°44.97	14.7' 14.7'	05°42.25 05°27.37	-14.9' -14.9'	56.5' 56.6'
3 4	225°15.19 240°15.07	50.25	310°44.97 331°18.71	14.7' 14.7'	05°27.37 05°12.44	-14.9 -15.0'	56.6
5	255°14.95	50.70	345°52.43	14.7'	04°57.48	-15.0'	56.6'
6	270°14.83	N22° 50.92	0°26.15	14.7'	S04°42.47	-15.0'	56.7'
7	285°14.71	51.14	$14^{\circ}59.84$	14.7'	04°27.43	-15.1'	56.7'
8	300°14.59	51.37	29°33.53	14.7'	04°12.35	-15.1'	56.7'
9	315°14.47	• • 51.59	44°7.19	14.6'	03°57.24	-15.1'	56.8'
10	330°14.35	51.81	58° 40.84	14.6'	03°42.09	-15.2'	56.8'
11 12	345°14.23 0°14.11	52.03 N22° 52.25	73°14.47 87°48.09	14.6' 14.6'	03°26.91 503°11.69	-15.2' -15.2'	56.8' 56.9'
13	15°13.99	N22 52.25 52.47	87 48.09 102°21.67	14.6	02°56.44	-15.2 -15.3'	56.9'
14	30°13.87	52.69	116° 55.24	14.5	02° 41.16	-15.3'	56.9'
15	45°13.74	• • 52.91	131°28.78	14.5'	02°25.85	-15.3	57.0'
16	60°13.62	53.12	$146^{\circ}2.30$	14.5'	$02^{\circ}10.51$	-15.4'	57.0'
17	75°13.50	53.34	$160^{\circ}35.79$	14.5'	$01^{\circ}55.15$	-15.4'	57.0'
18	90°13.38	N22°53.56	175°9.25	14.4'	S01°39.75	-15.4'	57.1'
19	105°13.26	53.77	189°42.69	14.4'	01°24.33	-15.4'	57.1'
20 21	120°13.14 135°13.02	53.99 •• 54.20	204° 16.09 218° 49.46	14.4' 14.3'	01°8.88 00°53.40	-15.5' -15.5'	57.1' 57.2'
21	135°13.02 150°12.89	54.20 54.41	218° 49.46 233° 22.80	14.3'	00°53.40 00°37.91	-15.5' -15.5'	57.2'
23	165°12.77	54.63	247°56.10	14.3	00° 37.91	-15.5'	57.3'
	SD = 15.8'	d = 0.2'			D = 15.4'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
N 70°						
68°						
66°	////	////	00:45	23:18	////	////
64°	////	////	01:45	22:15	////	////
62°	////	////	02:18	21:41	////	////
60°	////	01:10	02:42	21:17	22:50	////
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 10°	23:13	23:52		10:31	11:19	12:06
0°	23:05	23:48		10:42	11:25	12:09
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	21:33	23:02	••••	12:30	12:30	12:30

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	21-23
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	74-54%
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	

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	curn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	257°22.83	140°15.17	N23° 9.29	214°1.32	N16° 0.34	139°42.60	N21°25.79	244°38.27	N02°58.63		эпа	
1	272°25.30	155° 14.51	8.78	214 1.32 229°1.97	0.90	154°44.54	25.70	259°40.56	58.69	Alpheratz	357°33.65	29° 14.05
2				244°2.61				274°42.85		Ankaa	353°6.13	-42°9.49
	287° 27.76	170°13.84	8.26		1.45 · · 2.01	169°46.48	25.61 •• 25.52	289°45.14	58.75 •• 58.82	Schedar	349°29.92	56°40.71
3 4	302° 30.22 317° 32.69	185°13.17 200°12.51	· · 7.74 7.22	259°3.26 274°3.90	2.56	184°48.42 199°50.37	25.43	304°47.43	58.82 58.88	Diphda	348°46.26	-17°50.37
5	332°35.15	200 12.51 215°11.84	6.70	274 3.90 289°4.55	3.11	214°52.31	25.43	319°49.71	58.94	Achernar	335°19.68	-57°5.88
6	347° 37.62	230°11.17	N23° 6.18	304°5.19	N16° 3.67	214 52.31 229°54.25	N21°25.25	334°52.00	N02°59.01	Hamal	327°50.13	23°35.16
7	2°40.08	245° 10.51	5.66	319°5.84	4.22	244°56.19	25.16	349°54.29	59.07	Polaris	313°51.28	89°22.33
8	17° 42.54	260°9.85	5.14	334°6.48	4.22	259°58.13		4°56.58		Acamar	315°11.25	-40°11.76
9	32°45.01	200 9.65 275°9.18	. 4.61		• • 5.33	275° 0.08	25.07 •• 24.98	4 50.56 19°58.87	59.13 •• 59.20	Menkar	314°5.21	4°11.60
10	32 45.01 47°47.47	275 9.16 290°8.52	4.09	349°7.13 4°7.77		275 0.06 290°2.02		35°1.16		Mirfak	308°27.04	49°57.17
11	62°49.94	305°7.86	3.56	19°8.42	5.88 6.43	305° 3.96	24.90 24.81	50°3.45	59.26 59.32	Aldebaran	290°38.63	16°33.71
12	77° 52.40	320°7.20	N23°3.04	34°9.06	N16° 6.99	320° 5.90	N21°24.72	65°5.74	N02°59.38	Rigel	281°3.09	-8°10.27
13	92°54.87	335°6.54	2.51	49°9.70	7.54	335° 7.84	24.63	80°8.03	59.45	Capella	280°20.65	46°1.43
14	107° 57.33	350°5.87	1.98	64° 10.35	8.09	350° 9.78	24.03	95°10.32	59.45	Bellatrix	278°21.97	6°22.40
15	122°59.79	5°5.21	• • 1.45	79° 10.99	• • 8.64	5°11.72	• • 24.45	110°12.61	• • 59.57	Elnath	278°0.78	28°37.75
16	138°2.26	20°4.56	0.92	94°11.64	9.19	20°13.66	24.36	125°14.90	59.64	Alnilam	275°36.89	-1°11.12
17	150° 2.20° 153° 4.72	35°3.90	23°0.38	109° 12.28	9.74	35°15.61	24.27	140°17.19	59.70	Betelgeuse	270°51.16	7°24.70
18	168°7.19	50°3.24	N22°59.85	124° 12.92	N16°10.29	50°17.55	N21°24.18	155°19.48	N02°59.76	Canopus	263°52.42	-52°42.63
19	183°9.65	65°2.58	59.32	139° 13.57	10.84	65°19.49	24.09	170°21.77	59.82	Sirius	258°25.54	-16°45.20
20	198° 12.11	80°1.92	58.78	154° 14.21	11.39	80°21.43	24.00	185°24.06	59.89	Adhara	255°5.30	-29°0.56
21	213° 14.58	95°1.27	• • 58.24	169° 14.85	• • 11.94	95°23.37	23.91	200°26.35	02°59.95	Procyon	244°49.90	5°9.40
22	228° 17.04	110°0.61	57.71	184° 15.50	12.49	110°25.31	23.82	215°28.64	03°0.01	Pollux	243°16.20	27°57.77
23	243° 19.51	124°59.96	57.17	199° 16.14	13.04	125°27.25	23.73	230°30.94	0.07	Avior	234°14.74	-59°35.85
			_		_					Suhail	222°45.71	-43°32.58
Mer.p	pass. 06:49	$\nu$ -0.7′ $d$ -0	).5′ m-3.97	$\nu$ 0.6′ d0	.6′ m1.28	$\nu 1.9' \ d-0$	.1' m-1.86	$\nu$ 2.3′ d0	$.1^\prime$ m0.85	Miaplacidus	221°38.56	-69°49.81
										Alphard	217°46.78	-8°46.49
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.31	11°50.28
0	258°21.97	139°59.30	N22°56.63	214° 16.78	N16°13.59	140°29.19	N21°23.64	245°33.23	N03°0.13	Dubhe	193°39.64	61°36.74
1	273°24.43	154° 58.65	56.09	229° 17.43	14.14	155°31.13	23.55	260°35.52	0.20	Denebola	182°23.72	14°25.47
2	288° 26.90	169°57.99	55.54	244° 18.07	14.69	170°33.07	23.46	275°37.81	0.26	Gienah		-17°41.49
3	303°29.36	184°57.34	• • 55.00	259° 18.71	. 15.23	185°35.01	23.37	290°40.10	0.32	Acrux		-63°15.08
4	318° 31.83	199°56.69	54.46	274° 19.36	15.78	200°36.95	23.28	305°42.39	0.38		171°50.15	-57° 16.00
5	333°34.29	214°56.04	53.91	289°20.00	16.33	215°38.89	23.19	320°44.68	0.44	Alioth	166°11.71	55°49.17
6	348° 36.75	229°55.38	N22°53.37	304°20.64	N16°16.87	230°40.83	N21°23.09	335°46.98	N03°0.51	Spica	158°20.89	-11°18.08
7	3°39.22	244°54.73	52.82	319°21.29	17.42	245°42.77	23.00	350°49.27	0.57	Alkaid	152°50.78	49°11.01
8	18°41.68	259°54.08	52.27	334°21.93	17.97	260°44.71	22.91	5°51.56	0.63	Hadar	148°33.89	-60°30.28
9	33°44.15	274°53.43	51.72	349°22.57	• • 18.51	275°46.65	• • 22.82	20°53.85	0.69		147°55.96	-36°30.20
10	48°46.61	289°52.79	51.17	4°23.21	19.06	290°48.58	22.73	35°56.15	0.75	Arcturus	145°46.60	19°2.69
11	63°49.07	304°52.14	50.62	19°23.86	19.61	305°50.52	22.64	50°58.44	0.81	Rigil Kent.	139°38.16	-60°56.90
12	78°51.54	319°51.49	N22°50.07	34°24.50	N16°20.15	320°52.46	N21°22.55	66°0.73	N03°0.88	Kochab	137° 18.85	74°2.91
13	93°54.00	334°50.84	49.51	49°25.14	20.70	335°54.40	22.46	81°3.02	0.94	Zuben'ubi	136°54.44	-16°9.21
14	108°56.47	349°50.19	48.96	64°25.78	21.24	350°56.34	22.37	96°5.32	1.00	Alphecca	126°2.42	26°37.54
15	123°58.93	4°49.55	• • 48.40	79°26.43	• • 21.78	5°58.28	• • 22.28	111°7.61	• • 1.06	Antares	112°14.04	-26°29.49
16	139°1.40	19°48.90	47.85	94°27.07	22.33	21°0.22	22.19	126°9.90	1.12	Atria Sabik	107°6.63 102°1.09	-69°4.51 -15°45.48
17	154°3.86	34°48.26	47.29	109°27.71	22.87	$36^{\circ}2.16$	22.10	141°12.20	1.18	Shaula	96°8.36	-37°7.36
18	169°6.32	49°47.61	N22°46.73	124°28.35	N16°23.42	51°4.10	N21°22.01	156°14.49	N03°1.24	Rasalhague	95° 57.12	12°32.40
19	184°8.79	64°46.97	46.17	139°28.99	23.96	66° 6.03	21.91	171°16.78	1.31	Eltanin	90°41.10	51° 29.01
20	$199^{\circ}11.25$	79°46.33	45.61	154°29.64	24.50	81°7.97	21.82	$186^{\circ}19.08$	1.37	Kaus Aust.	83°30.58	-34°22.26
21	214° 13.72	94°45.68	• • 45.05	169°30.28	• • 25.04	$96^{\circ}9.91$	• • 21.73	201°21.37	• • 1.43	Vega	80°32.03	38° 48.37
22	$229^{\circ}16.18$	109°45.04	44.48	184°30.92	25.59	111°11.85	21.64	216°23.66	1.49	Nunki	75° 45.97	-26° 15.76
23	244° 18.64	124°44.40	43.92	199°31.56	26.13	126°13.79	21.55	231°25.96	1.55	Altair	61°58.55	8° 56.25
Morr	pass. 06:45	,, 0.7' d.0	).5′ m-3.97	ν0 6' d0	.5′ m1.28	11 0' d 0	.1′ m-1.85	1,2 3, 40	.1′ m0.85	Peacock	53°3.48	-56°38.75
- Ivier.	Jass. 00.45	ν-0.1 α-0	.5 111-5.91	νο.ο αο	.5 1111.20	ν1.9 u-0	.1 111-1.05	ν2.3 d0	.1 1110.05	Deneb	49°24.71	45° 22.28
										Enif	33°37.52	9°59.73
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.31	-46°49.71
0	$259^{\circ}21.11$	139°43.76	N22°43.36	214°32.20	N16°26.67	141°15.72	N21°21.46	246°28.25	N03°1.61	Fomalhaut	15° 13.20	-29°28.74
1	274°23.57	154°43.12	42.79	229°32.85	27.21	156°17.66	21.37	261°30.55	1.67	Scheat	13°44.05	28° 13.43
2	289°26.04	169°42.48	42.22	244°33.49	27.75	171°19.60	21.28	276°32.84	1.73	Markab	13°28.72	15° 20.78
3	304°28.50	184°41.84	• • 41.65	259°34.13	• • 28.29	186°21.54	•• 21.18	291°35.14	•• 1.79			
4	319°30.96	199°41.20	41.08	274°34.77	28.83	201°23.47	21.09	306°37.43	1.85	Jun 09 Tue	SHA	Mer.pass
5	334° 33.43	214°40.57	40.51	289°35.41	29.37	216°25.41	21.00	321°39.73	1.91		242°52.34	14:40
6	349°35.89	229°39.93	N22°39.94	304°36.05	N16°29.91	231°27.35	N21°20.91	336°42.02	N03°1.97		316° 38.49	09:43
7	4°38.36	244°39.29	39.37	319°36.69	30.45	246°29.29	20.82	351°44.32	2.03		242°19.76	14:39
8	19°40.82	259°38.66	38.80	334°37.33	30.99	261°31.22	20.73	6°46.61	2.09	Saturn	347° 15.44	07:40
9	34°43.28	274°38.02	• • 38.22	349°37.98	• • 31.53	276°33.16	• • 20.63	21°48.91	• • 2.16	Jun 10 Wed	SHA	Mer.pass
10	49° 45.75	289°37.38	37.65	4°38.62	32.07	291°35.10	20.54	36°51.20	2.22		241° 37.33	14:41
11	64°48.21	304°36.75	37.07	19°39.26	32.61	306°37.03	20.45	51°53.50	2.28		315° 54.81	09:42
12	79°50.68	319°36.12	N22°36.49	34°39.90	N16°33.15	321°38.97	N21°20.36	66°55.79	N03°2.34	Jupiter	242°7.22	14:36
13	94°53.14	334°35.48	35.92	49°40.54	33.69	336°40.91	20.27	81°58.09	2.40	Saturn	347°11.26	07:37
14	109°55.61	349°34.85	35.34	64°41.18	34.22	351°42.84	20.18	97°0.38	2.46			
15	124°58.07	4°34.22	• • 34.76	79°41.82	• • 34.76	6°44.78	• • 20.08	112°2.68	• • 2.52	Jun 11 Thu	SHA	Mer.pass
16	140°0.53	19°33.59	34.17	94°42.46	35.30	21°46.72	19.99	127°4.98	2.58		240°22.65	14:42
17	155°3.00	34°32.96	33.59	109°43.10	35.83	36°48.65	19.90	142°7.27	2.64	l l	315°11.10	09:41
18	170°5.46	49°32.33	N22°33.01	124° 43.74	N16°36.37	51°50.59	N21°19.81	157°9.57	N03°2.70		241°54.62	14:33
19	185°7.93	64°31.70	32.42	139° 44.38	36.91	66°52.52	19.72	172°11.87	2.76	Saturn	347°7.14	07:33
20	200° 10.39	79°31.07	31.84	154° 45.02	37.44	81°54.46	19.62	187°14.16	2.81	Horizo	ntal parallax	
21	215° 12.85	94°30.44	· · 31.25	169°45.66	· · 37.98	96°56.40	19.53	202°16.46	2.87	71011201	Venus:	0.1
22	230° 15.32 245° 17.78	109°29.81	30.66 30.07	184° 46.30	38.51	111°58.33 127°0.27	19.44	217°18.76 232°21.05	2.93		Mars:	0.1
23	245 11.18	124°29.19	30.07	199°46.94	39.05		19.35		2.99			V.1
Mer.p	pass. 06:41	$\nu$ -0.6' d-0	).6′ m-3.97	$\nu$ 0.6′ d0	.5′ m1.28	$\nu$ 1.9′ d-0	.1' m-1.85	$\nu 2.3' \ d0$	.1' m $0.85$			

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°12.65	N22°54.84	262°29.37	14.2'	S00°6.85	-15.6'	57.3'
1	195°12.53	55.05	277°2.60	14.2'	N00°8.72	15.6'	57.3'
2	210°12.41	55.26	291°35.79	14.1'	00°24.30	15.6'	57.4'
3	225°12.28	• • 55.47	306°8.94	14.1'	00°39.90	15.6'	57.4'
4 5	240°12.16 255°12.04	55.68 55.88	320°42.04 335°15.11	14.1' 14.0'	00°55.52 01°11.15	15.6' 15.6'	57.4' 57.5'
6	270°11.92	N22°56.09	349°48.13	14.0'	N01°26.80	15.7	57.5'
7	285°11.79	56.30	4°21.10	13.9'	01°42.46	15.7'	57.6'
8	300°11.67	56.51	18°54.03	13.9'	01°58.14	15.7'	57.6'
9	315°11.55	• • 56.71	33°26.91	13.8'	$02^{\circ}13.83$	15.7'	57.6'
10	330°11.42	56.92	47°59.73	13.8'	02°29.53	15.7'	57.7'
11	345°11.30	57.12	62°32.51	13.7'	02°45.24	15.7'	57.7'
12 13	0°11.18 15°11.05	N22°57.32 57.52	77°5.23 91°37.90	13.7' 13.6'	N03°0.96 03°16.69	15.7' 15.7'	57.7' 57.8'
13 14	30°10.93	57.52 57.73	91 37.90 106°10.51	13.6'	03 16.69 03°32.42	15.7'	57.8'
15	45°10.80	57.93	120°43.07	13.5'	03°48.16	15.7'	57.0'
16	60°10.68	58.13	135°15.56	13.4'	04°3.90	15.7'	57.9'
17	75°10.56	58.33	149°48.00	13.4'	$04^{\circ}19.65$	15.7'	57.9'
18	90°10.43	N22°58.53	164°20.37	13.3'	N04°35.40	15.7'	58.0'
19	105°10.31	58.73	178°52.68	13.2'	04°51.14	15.7'	58.0'
20	120°10.18	58.92	193°24.93 207°57.11	13.2'	05°6.89	15.7'	58.0'
21 22	135°10.06 150°9.93	· · 59.12 59.32	207 57.11 222°29.22	13.1' 13.0'	05°22.63 05°38.37	15.7' 15.7'	58.1' 58.1'
23	165° 9.81	59.52 59.51	222 29.22 237°1.26	13.0'	05°54.11	15.7'	58.2'
_5	SD = 15.8'					20.1	00.2
	SD = 15.8'	d = 0.2'		51	O = 15.6'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180° 9.69	N22°59.71	251°33.23 266°5.13	12.9'	N06°9.84	15.7'	58.2'
1 2	195° 9.56 210° 9.44	22°59.90 23°0.09	266°5.13 280°36.96	12.8' 12.7'	06°25.56 06°41.28	15.7' 15.7'	58.2' 58.3'
3	225° 9.31	. 0.29	295°8.71	12.7'	06°56.98	15.7	58.3'
4	240°9.18	0.48	309°40.38	12.6'	07°12.67	15.7'	58.4'
5	255° 9.06	0.67	324°11.97	12.5'	07°28.35	15.7'	58.4'
6	270°8.93	N23°0.86	338°43.49	12.4'	N07°44.02	15.6'	58.4'
7	285°8.81	1.05	353°14.92	12.4'	07°59.67	15.6'	58.5'
8	300°8.68	1.24	7°46.28	12.3'	08°15.30	15.6'	58.5'
9 10	315° 8.56 330° 8.43	· · 1.43 1.62	22°17.54 36°48.72	12.2' 12.1'	08°30.91 08°46.50	15.6' 15.6'	58.6' 58.6'
11	345°8.30	1.80	50 46.72 51°19.82	12.1	06 40.50 09°2.07	15.5'	58.6
12	0°8.18	N23°1.99	65°50.83	11.9'	N09°17.62	15.5'	58.7'
13	15°8.05	2.18	80°21.74	11.8'	09°33.14	15.5'	58.7'
14	30°7.93	2.36	94°52.57	11.7'	09°48.64	15.5'	58.7'
15	45°7.80	• • 2.54	109°23.30	11.6'	10°4.11	15.4'	58.8'
16	60° 7.67 75° 7.55	2.73	123°53.94	11.5'	10°19.55	15.4'	58.8'
17 18	75 7.55 90°7.42	2.91 N23°3.09	138°24.48 152°54.92	11.4' 11.3'	10°34.96 N10°50.33	15.4' 15.3'	58.9' 58.9'
19	105°7.29	3.27	167°25.27	11.2'	11°5.67	15.3'	58.9'
20	120°7.17	3.46	181°55.52	11.1'	11°20.98	15.3'	59.0'
21	135°7.04	• • 3.64	196°25.66	11.0'	11°36.24	15.2'	59.0'
22	150°6.91	3.81	210°55.70	10.9'	11°51.47	15.2'	59.0'
23	165°6.78	3.99	225°25.64	10.8'	12°6.65	15.1'	59.1'
	SD = 15.7'	d = 0.2'		SI	O = 15.9'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°6.66	N23°4.17	239°55.47	10.7'	$N12^{\circ}21.80$	15.1'	59.1'
1	195° 6.53	4.35	254°25.20	10.6'	12°36.89	15.1'	59.2'
2	210°6.40	4.52	268°54.81	10.5'	12°51.94	15.0'	59.2'
3 4	225° 6.27 240° 6.15	· · 4.70 4.88	283°24.32 297°53.72	10.4' 10.3'	13°6.95 13°21.90	15.0' 14.9'	59.2' 59.3'
4 5	240° 6.15 255° 6.02	4.88 5.05	312°23.00	10.3	13°21.90 13°36.80	14.9	59.3'
6	270° 5.89	N23°5.22	326°52.17	10.2	N13°51.64	14.8	59.3'
7	285° 5.76	5.40	341°21.23	9.9'	14°6.43	14.7'	59.4'
8	300° 5.64	5.57	355°50.16	9.8'	14°21.16	14.7'	59.4'
9	315°5.51	• • 5.74	10°18.99	9.7'	14°35.83	14.6'	59.5'
10	330° 5.38 345° 5.25	5.91	24°47.69 39°16.27	9.6'	14°50.44	14.5'	59.5'
11 12	345° 5.25 0° 5.12	6.08 N23°6.25	39°16.27 53°44.73	9.5' 9.3'	15°4.99 N15°19.47	14.5' 14.4'	59.5' 59.6'
13	15° 4.99	6.42	68°13.07	9.3 9.2'	15°33.88	14.4	59.6'
14	30° 4.86	6.59	82°41.29	9.1'	15°48.22	14.3'	59.6'
15	45°4.74	• • 6.75	$97^{\circ}9.38$	9.0'	$16^{\circ}2.49$	14.2'	59.7'
16	60°4.61	6.92	111°37.35	8.8'	16°16.69	14.1'	59.7'
17	75° 4.48	7.09	126°5.19	8.7'	16°30.81	14.0'	59.7'
18 19	90° 4.35 105° 4.22	N23°7.25 7.42	140°32.91 155°0.49	8.6' 8.5'	N16°44.85 16°58.82	14.0' 13.9'	59.8' 59.8'
20	105° 4.22 120° 4.09	7.42 7.58	169°27.95	8.3	16°58.82 17°12.70	13.9	59.8'
21	135° 3.96	7.74	183°55.27	8.2'	17°26.49	13.7'	59.9'
22	150° 3.83	7.91	198°22.47	8.1'	17°40.20	13.6'	59.9'
23	165°3.70	8.07	$212^{\circ}49.53$	7.9'	$17^{\circ}53.82$	13.5'	60.0'
	SD = 15.7'	d = 0.2'		SI	D = 16.1'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	07:05	08:02	08:59	15:00	15:57	16:53
		N4				

Lat.		Moonris	e		Moonset	i i
Ldt.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°	00:32 23:58	23:15	21:45	13:35	15:58	19:17
<b>N</b> 70°	00:32	00:06 23:35	22:44	13:31	15:41	18:20
68°	00:32	00:13 23:51	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	00:32	02:06	03:46	12:30	12:30	12:30
	1					

		Sun		Moon			
Day	Eqn.o	f Time	Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	24-26	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	44-23%	
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	Stars
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	260°20.25	139°28.56 N22°29.48	214°47.58 N16°39.58	142°2.20 N21°19.25	247°23.35 N03°3.05	
1	$275^{\circ}22.71$	154°27.93 28.89	229°48.22 40.12	157° 4.14 19.16	262°25.65 3.11	Alpheratz 357°33.62 29°14.05
2	$290^{\circ}25.18$	169°27.31 28.30	244°48.86 40.65	172°6.07 19.07	277°27.94 3.17	Ankaa 353°6.11 -42°9.48 Schedar 349°29.88 56°40.71
3	305° 27.64	184°26.68 · · 27.71	259°49.50 · · 41.19	187°8.01 · · 18.98	292°30.24 · · 3.23	Diphda 348°46.24 -17°50.36
4	320°30.10	199°26.06 27.11	274°50.14 41.72	202°9.94 18.88	307°32.54 3.29	Achernar 335°19.65 -57°5.87
5	335°32.57 350°35.03	214°25.44 26.52 229°24.81 N22°25.92	289°50.78 42.25 304°51.42 N16°42.79	217°11.88 18.79 232°13.81 N21°18.70	322°34.84 3.35 337°37.14 N03°3.41	Hamal 327°50.10 23°35.16
6 7	5°37.50	244°24.19 25.33	304°51.42 N16°42.79 319°52.06 43.32	247°15.75 18.61	337°37.14 N03°3.41 352°39.43 3.47	Polaris 313°50.10 89°22.32
8	20°39.96	259°23.57 24.73	334°52.70 43.85	262°17.68 18.51	7°41.73 3.53	Acamar 315°11.24 -40°11.75
9	35°42.42	274°22.95 · · 24.13	349°53.34 · · 44.38	277°19.62 · · 18.42	22°44.03 · · 3.59	Menkar 314°5.19 4°11.60
10	50°44.89	289°22.33 23.53	4°53.98 44.91	292°21.55 18.33	37°46.33 3.64	Mirfak 308°27.01 49°57.16 Aldebaran 290°38.62 16°33.71
11	65° 47.35	304°21.71 22.93	19°54.62 45.45	307°23.49 18.23	52°48.63 3.70	Rigel 281°3.08 -8°10.27
12	80°49.82	319°21.09 N22°22.33	34°55.26 N16°45.98	322°25.42 N21°18.14	67°50.93 N03°3.76	Capella 280°20.64 46°1.42
13 14	95°52.28 110°54.75	334°20.47 21.72 349°19.85 21.12	49°55.90 46.51 64°56.54 47.04	337°27.36 18.05 352°29.29 17.96	82°53.22 3.82 97°55.52 3.88	Bellatrix 278°21.96 6°22.40
15	125° 57.21	4°19.23 · · 20.51	79°57.17 · · 47.57	7°31.23 · · 17.86	112°57.82 · · 3.94	Elnath 278° 0.77 28° 37.75
16	140°59.67	19°18.62 19.91	94°57.81 48.10	22°33.16 17.77	128°0.12 4.00	Alnilam 275°36.88 -1°11.12
17	156°2.14	34°18.00 19.30	109°58.45 48.63	37°35.09 17.68	143°2.42 4.06	Betelgeuse 270°51.16 7°24.70 Canopus 263°52.42 -52°42.62
18	171°4.60	49°17.39 N22°18.69	124°59.09 N16°49.16	52°37.03 N21°17.58	158°4.72 N03°4.11	Canopus 263°52.42 -52°42.62 Sirius 258°25.54 -16°45.19
19	186°7.07	64°16.77 18.08	139°59.73 49.69	67°38.96 17.49	173°7.02 4.17	Adhara 255°5.31 -29°0.55
20	201°9.53	79°16.16 17.47	155°0.37 50.21	82°40.90 17.40	188°9.32 4.23	Procyon 244°49.90 5°9.40
21	216° 11.99	94°15.54 · · 16.86 109°14.93 16.25	170°1.01 · · 50.74 185°1.64 51.27	97°42.83 ·· 17.30 112°44.76 17.21	203°11.62 · · 4.29	Pollux 243°16.20 27°57.77
22 23	231°14.46 246°16.92	109°14.93 16.25 124°14.32 15.64	185°1.64 51.27 200°2.28 51.80	112°44.76 17.21 127°46.70 17.12	218°13.92 4.35 233°16.22 4.40	Avior 234°14.75 -59°35.85
						Suhail 222°45.72 -43°32.57
Mer.	pass. 06:38	ν-0.6' d-0.6' m-3.98	$\nu$ 0.6′ d0.5′ m1.28	$\nu 1.9' \ d$ -0.1' m-1.85	$\nu 2.3' \ d0.1' \ m0.84$	Miaplacidus 221°38.59 -69°49.80
						Alphard 217°46.78 -8°46.49 Regulus 207°33.32 11°50.28
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.32 11°50.28 Dubhe 193°39.67 61°36.74
0	$261^{\circ}19.39$	139°13.71 N22°15.02	215°2.92 N16°52.33	142°48.63 N21°17.02	248°18.52 N03°4.46	Denebola 182°23.73 14°25.47
1	276°21.85	154°13.10 14.41	230°3.56 52.85	157°50.56 16.93	263°20.82 4.52	Gienah 175°42.31 -17°41.49
2	291°24.32	169°12.48 13.79	245°4.20 53.38	172°52.50 16.84	278°23.12 4.58	Acrux 172°58.59 -63°15.08
3 4	306° 26.78 321° 29.24	184°11.87 · · 13.17 199°11.27 12.55	260°4.84 · · 53.91 275°5.47 54.43	187°54.43 · · 16.74 202°56.36       16.65	293°25.42 · · 4.64 308°27.72 4.69	Gacrux 171°50.17 -57°16.00
5	336° 31.71	214° 10.66 11.94	290°6.11 54.96	202 50.30 10.05 217°58.29 16.55	323°30.02 4.75	Alioth 166°11.73 55°49.18
6	351° 34.17	229°10.05 N22°11.32	305°6.75 N16°55.49	233°0.23 N21°16.46	338°32.32 N03°4.81	Spica 158°20.90 -11°18.08
7	6° 36.64	244°9.44 10.69	320°7.39 56.01	248°2.16 16.37	353°34.63 4.87	Alkaid 152°50.79 49°11.02 Hadar 148°33.90 -60°30.29
8	21°39.10	259°8.83 10.07	335°8.03 56.54	263°4.09 16.27	8°36.93 4.93	Menkent 147°55.96 -36°30.20
9	36°41.56	274°8.23 · · 9.45	350°8.66 · · 57.06	278° 6.03 · · 16.18	23°39.23 · · 4.98	Arcturus 145°46.61 19°2.70
10	51°44.03	289°7.62 8.82	5°9.30 57.59	293°7.96 16.09	38°41.53 5.04	Rigil Kent. 139°38.17 -60°56.91
11 12	66° 46.49 81° 48.96	304°7.02 8.20 319°6.41 N22°7.57	20°9.94 58.11 35°10.58 N16°58.63	308°9.89 15.99 323°11.82 N21°15.90	53°43.83 5.10 68°46.13 N03°5.16	Kochab 137°18.90 74°2.92
13	96°51.42	334°5.81 6.95	50°11.21 59.16	338°13.75 15.80	83°48.44 5.21	Zuben'ubi 136°54.45 -16°9.20
14	111°53.89	349°5.21 6.32	65°11.85 16°59.68	353°15.69 15.71	98°50.74 5.27	Alphecca 126°2.42 26°37.55
15	126° 56.35	4°4.60 · · 5.69	80°12.49 17°0.20	8°17.62 · · 15.62	113°53.04 · · 5.33	Antares 112°14.03 -26°29.49 Atria 107°6.62 -69°4.52
16	141°58.81	19°4.00 5.06	95°13.13 0.73	23°19.55 15.52	128°55.34 5.38	Sabik 102°1.09 -15°45.48
17	157°1.28	34°3.40 4.43	110° 13.76 1.25	38°21.48 15.43	143°57.64 5.44	Shaula 96°8.35 -37°7.36
18	172°3.74	49°2.80 N22°3.79	125°14.40 N17°1.77	53°23.41 N21°15.33	158°59.95 N03°5.50	Rasalhague 95°57.11 12°32.41
19	187°6.21	64°2.20 3.16	140°15.04 2.29	68°25.35 15.24	174°2.25 5.56 189°4.55 5.61	Eltanin 90°41.10 51°29.03
20 21	202°8.67 217°11.14	79°1.60 2.53 94°1.00 · 1.89	155°15.67 2.81 170°16.31 · · 3.34	83°27.28 15.14 98°29.21 · · 15.05	189°4.55 5.61 204°6.85 • 5.67	Kaus Aust. 83°30.56 -34°22.26
22	232° 13.60	109°0.40 1.26	185°16.95 3.86	113°31.14 14.96	219°9.16 5.73	Vega 80°32.01 38°48.39
23	247° 16.06	123°59.81 0.62	200°17.58 4.38	128°33.07 14.86	234°11.46 5.78	Nunki 75°45.96 -26°15.76 Altair 61°58.54 8°56.26
Mer	pass. 06:34	ν-0.6' d-0.6' m-3.98	ν0.6' d0.5' m1.28	$\nu 1.9' \ d$ -0.1' m-1.85	ν2.3' d0.1' m0.84	Peacock 53°3.45 -56°38.76
- IVICI	pass. 00.54	ν-0.0 α-0.0 III-3.90		V1.9 G-0.1 III-1.03	ν2.3 d0.1 iii0.04	Deneb 49°24.68 45°22.30
_						Enif 33°37.50 9°59.74
Sun	<b>GHA</b> 262° 18.53	<b>GHA Dec</b> 138°59.21 N21°59.98	<b>GHA Dec</b> 215°18.22 N17°4.90	<b>GHA Dec</b> 143°35.00 N21°14.77	<b>GHA Dec</b> 249°13.76 N03°5.84	Al Na'ir 27°31.28 -46°49.71
0 1	262° 18.53 277° 20.99	153°58.61 21°59.34	215 18.22 N17 4.90 230° 18.86 5.42	143°35.00 N21°14.77 158°36.93 14.67	249°13.76 N03°5.84 264°16.07 5.90	Fomalhaut 15°13.18 -29°28.73
2	292°23.46	168°58.02 58.70	245° 19.49 5.94	173°38.87 14.58	279°18.37 5.95	Scheat 13°44.02 28°13.44 Markab 13°28.69 15°20.79
3	307° 25.92	183°57.42 · · 58.06	260°20.13 · · 6.46	188°40.80 · · 14.48	294°20.68 · · 6.01	IVIAI KAD 13 20.09 15 20.79
4	$322^{\circ}28.39$	198°56.83 57.42	275°20.77 6.98	203°42.73 14.39	309°22.98 6.07	Jun 12 Fri SHA Mer.pass
5	337°30.85	213°56.23 56.77	290°21.40 7.50	218°44.66 14.29	324°25.28 6.12	Venus 239°8.31 14:43
6	352° 33.31	228°55.64 N21°56.13	305°22.04 N17°8.01	233°46.59 N21°14.20	339°27.59 N03°6.18	Mars 314°27.34 09:40
7 8	7°35.78 22°38.24	243°55.05 55.48 258°54.46 54.84	320°22.68 8.53 335°23.31 9.05	248°48.52 14.10 263°50.45 14.01	354°29.89 6.23 9°32.20 6.29	Jupiter 241°41.96 14:30 Saturn 347°3.10 07:29
9	22° 38.24 37° 40.71	258°54.46 54.84 273°53.87 • 54.19	355°23.31 9.05 350°23.95 • 9.57	278°52.38 · · 13.91	24°34.50 · · 6.35	
10	52°43.17	288°53.28 53.54	5° 24.59 10.08	293°54.31 13.82	39°36.80 6.40	Jun 13 Sat SHA Mer.pass
11	67° 45.63	303°52.69 52.89	20°25.22 10.60	308°56.24 13.72	54°39.11 6.46	Venus 237°54.32 14:44
12	82°48.10	318°52.10 N21°52.24	35°25.86 N17°11.12	323°58.17 N21°13.63	69°41.41 N03°6.52	Mars 313°43.53 09:39 Jupiter 241°29.24 14:27
13	97°50.56	333°51.51 51.59	50°26.49 11.64	339° 0.10 13.53	84°43.72 6.57	Saturn 346°59.13 07:26
14	112°53.03	348°50.92 50.94	65°27.13 12.15	354°2.03 13.44	99°46.02 6.63	
15 16	127°55.49	3°50.33 · · 50.29	80°27.76 · · 12.67 95°28.40 13.18	9°3.96 · · 13.34	114°48.33 · · 6.68	Jun 14 Sun SHA Mer.pass
16 17	142° 57.96 158° 0.42	18°49.75 49.63 33°49.16 48.98	95°28.40 13.18 110°29.04 13.70	24°5.89 13.25 39°7.82 13.15	129°50.64 6.74 144°52.94 6.79	Venus 236°40.68 14:45
18	173°2.88	48°48.58 N21°48.32	125°29.67 N17°14.21	54° 9.75 N21° 13.06	159°55.25 N03°6.85	Mars 312°59.69 09:38 Jupiter 241°16.47 14:24
19	188°5.35	63°47.99 47.67	140°30.31 14.73	69°11.68 12.96	174°57.55 6.91	Saturn 346°55.24 07:22
20	203°7.81	78°47.41 47.01	155°30.94 15.24	84°13.61 12.87	189°59.86 6.96	
21	218° 10.28	93°46.82 · · 46.35	170°31.58 · · 15.76	99°15.54 · · 12.77	205°2.16 · · 7.02	Horizontal parallax
22	233° 12.74	108° 46.24 45.69	185°32.21 16.27	114°17.47 12.67	220°4.47 7.07	Venus: 0.1 Mars: 0.1
23	248° 15.21	123°45.66 45.03	200°32.85 16.78	129°19.40 12.58	235°6.78 7.13	iviais. U.1
Mer.	pass. 06:30	$\nu$ -0.6′ $d$ -0.6′ m-3.98	$ u 0.6' \ d0.5' \ m1.29$	$\nu 1.9' \ d ext{-}0.1' \  ext{m-}1.84$	$\nu 2.3' \ d0.1' \ \text{m}0.84$	

h	Su	n	Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°3.57	N23°8.23	227°16.46	7.8'	N18°7.35	13.4'	60.0'
1 2	195°3.44 210°3.31	8.39 8.55	241°43.25 256°9.92	7.7' 7.5'	18°20.78 18°34.12	13.3' 13.2'	60.0' 60.1'
3	225°3.18	• • 8.71	270°36.44	7.4'	18°47.36	13.1'	60.1
4	240°3.05	8.86	285°2.83	7.3'	19°0.50 19°13.54	13.0'	60.1' 60.1'
5 6	255°2.92 270°2.79	9.02 N23° 9.18	299°29.09 313°55.21	7.1' 7.0'	19°13.54 N19°26.48	12.9' 12.8'	60.1
7	285°2.66	9.33	328°21.19	6.8'	19°39.30	12.7'	60.2'
8	300°2.53	9.49	342°47.03 357°12.74	6.7'	19°52.02 20°4.63	12.6'	60.2'
9 10	315°2.40 330°2.27	• • 9.64 9.80	11°38.31	6.6' 6.4'	20 4.03 20°17.12	12.5' 12.4'	60.3' 60.3'
11	345°2.14	9.95	26°3.74	6.3'	20°29.50	12.3'	60.3'
12 13	0°2.01 15°1.88	N23°10.10 10.26	40°29.03 54°54.18	6.2' 6.0'	N20°41.75 20°53.89	12.1' 12.0'	60.4' 60.4'
14	30°1.75	10.20	69°19.19	5.9'	20 55.69 21°5.90	11.9'	60.4
15	45°1.62	• • 10.56	83°44.06	5.7'	21°17.79	11.8'	60.4'
16 17	60°1.49 75°1.36	10.71 10.86	98°8.80 112°33.39	5.6' 5.5'	21°29.55 21°41.18	11.6' 11.5'	60.5' 60.5'
18	90°1.23	N23°11.00	112 33.39 126°57.85	5.3'	N21°52.68	11.4	60.5
19	105°1.09	11.15	141°22.17	5.2'	22°4.04	11.2'	60.6'
20 21	120°0.96 135°0.83	11.30 •• 11.44	155°46.35 170°10.39	5.0' 4.9'	22°15.26 22°26.35	11.1' 10.9'	60.6' 60.6'
22	150°0.70	11.59	170 10.39 184°34.29	4.8'	22°20.33	10.9	60.6
23	165°0.57	11.73	198°58.06	4.6'	22°48.09	10.7'	60.7'
	SD = 15.7'	d = 0.2'		SI	D = 16.4'		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°0.44	N23°11.88	213°21.69	4.5'	N22°58.74	10.5'	60.7'
1	195°0.31	12.02	227°45.18	4.4'	23°9.24	10.3'	60.7'
2	210°0.17 225°0.04	12.16 •• 12.30	242°8.54 256°31.77	4.2' 4.1'	23°19.59 23°29.79	10.2' 10.0'	60.7' 60.8'
4	239°59.91	12.45	270°54.86	4.0'	23°39.83	9.9'	60.8
5	254°59.78	12.59	285°17.82	3.8'	23°49.71	9.7'	60.8
6 7	269°59.65 284°59.51	N23°12.73 12.86	299°40.64 314°3.34	3.7' 3.6'	N23°59.43 24°8.98	9.6' 9.4'	60.8' 60.9'
8	299° 59.38	13.00	328°25.91	3.4'	24°18.38	9.2'	60.9
9	314°59.25	• • 13.14	342°48.34	3.3'	24°27.60	9.1'	60.9'
10 11	329°59.12 344°58.99	13.28 13.41	357°10.66 11°32.84	3.2' 3.1'	24°36.65 24°45.54	8.9' 8.7'	60.9' 60.9'
12	359° 58.85	N23°13.55	25°54.91	2.9'	N24°54.25	8.5'	61.0'
13 14	14° 58.72 29° 58.59	13.68 13.82	40°16.85 54°38.67	2.8' 2.7'	25°2.78 25°11.13	8.4' 8.2'	61.0' 61.0'
15	44° 58.46	13.62	69° 0.37	2.6'	25°19.30	8.0'	61.0'
16	59° 58.32	14.08	83°21.96	2.5'	25°27.29	7.8'	61.0'
17 18	74°58.19 89°58.06	14.21 N23°14.35	97°43.43 112°4.78	2.4'	25°35.10 N25°42.72	7.6' 7.4'	61.0' 61.1'
19	104° 57.92	14.48	126°26.03	2.1'	25°50.15	7.2'	61.1
20	119°57.79	14.61	140°47.17		25°57.39	7.0'	61.1'
21 22	134° 57.66 149° 57.53	· · 14.73 14.86	155°8.20 169°29.13	1.9' 1.8'	26°4.44 26°11.29	6.9' 6.7'	61.1' 61.1'
23	164° 57.39	14.99	183°49.95	1.7'	26°17.95	6.5	61.1
	SD = 15.7'	d = 0.1'		SI	D = 16.6'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°57.26	N23°15.12	198°10.68	1.6'	N26°24.40	6.3'	61.2'
1	194° 57.13 209° 56.99	15.24 15.37	212°31.31 226°51.85	1.5' 1.4'	26°30.66 26°36.72	6.1' 5.9'	61.2' 61.2'
2	209 56.99 224° 56.86	15.37	226°51.85 241°12.29	1.4'	26° 42.58	5.9 5.6'	61.2
4	239°56.73	15.62	255°32.65	1.3'	26°48.23	5.4'	61.2'
5 6	254° 56.59 269° 56.46	15.74 N23°15.86	269°52.92 284°13.11	1.2' 1.1'	26°53.67 N26°58.90	5.2' 5.0'	61.2' 61.2'
7	284°56.32	15.98	298°33.22	1.0'	27°3.93	4.8'	61.2'
8	299°56.19	16.11	312°53.26	1.0'	27°8.75	4.6'	61.2'
9 10	314° 56.06 329° 55.92	· · 16.23 16.35	327°13.22 341°33.11	0.9' 0.8'	27°13.35 27°17.74	4.4' 4.2'	61.3' 61.3'
11	344°55.79	16.46	355°52.93	0.8	27°21.92	4.2	61.3
12	359°55.65	N23°16.58	10°12.69	0.7'	N27°25.88	3.7'	61.3'
13 14	14°55.52 29°55.39	16.70 16.82	24°32.39 38°52.04	0.6' 0.6'	27°29.62 27°33.15	3.5' 3.3'	61.3' 61.3'
15	44°55.25	16.93	53°11.63	0.5	27°36.46	3.1'	61.3
16	59°55.12	17.05	67°31.17	0.5'	27°39.55	2.9'	61.3'
17 18	74° 54.98 89° 54.85	17.16 N23°17.28	81°50.67 96°10.13	0.5' 0.4'	27°42.42 N27°45.06	2.6' 2.4'	61.3' 61.3'
19	104°54.72	17.39	$110^{\circ}29.54$	0.4'	27°47.49	2.2'	61.3'
20	119°54.58	17.50	124°48.92	0.4'	27°49.69	2.0'	61.3'
21 22	134°54.45 149°54.31	· · 17.61 17.73	139°8.28 153°27.60	0.3' 0.3'	27°51.67 27°53.42	1.8' 1.5'	61.3' 61.3'
23	164°54.18	17.84	167°46.90	0.3'	27°54.95	1.3'	61.3'
	SD = 15.7'	d = 0.1'		SI	D = 16.7'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Juliuse	Juliset	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	07:08	08:04	09:01	14:59	15:56	16:52

Lat.		Moonris	e		Moonset	;
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°						
N 70°						
68°						
66°	23:06			20:00		
64°	00:04 23:49			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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	05:35	07:32	09:29	12:33	12:40	13:01

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	27-29	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	14-2%	
12	00:14	80:00	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	SHA Dec
0	263° 17.67	138°45.08 N21°44.37	215°33.48 N17°17.30	144°21.33 N21°12.48	250°9.08 N03°7.18	
1	278°20.13	153°44.50 43.71	230° 34.12 17.81	159°23.25 12.39	265°11.39 7.24	Alpheratz 357°33.59 29°14.06 Ankaa 353°6.07 -42°9.46
2	293°22.60	168°43.92 43.04	245°34.75 18.32	174°25.18 12.29	280°13.70 7.29	Ankaa 353°6.07 -42°9.46   Schedar 349°29.83 56°40.71
3	308°25.06	183°43.34 · · 42.38	260°35.39 · · 18.83	189°27.11 · · 12.20	295°16.00 · · 7.35	Diphda 348°46.21 -17°50.35
4	323°27.53	198° 42.76 41.71	275°36.02 19.34	204°29.04 12.10	310°18.31 7.40	Achernar 335°19.62 -57°5.85
5	338°29.99	213°42.18 41.05	290°36.66 19.86	219°30.97 12.01	325°20.62 7.46	Hamal 327°50.07 23°35.17
6 7	353°32.46 8°34.92	228°41.60 N21°40.38 243°41.02 39.71	305°37.29 N17°20.37 320°37.93 20.88	234°32.90 N21°11.91 249°34.83 11.81	340°22.93 N03°7.51 355°25.23 7.57	Polaris 313°48.67 89°22.31
8	23°37.38	258°40.45 39.04	335°38.56 21.39	264°36.76 11.72	10°27.54 7.62	Acamar 315°11.21 -40°11.73
9	38°39.85	273°39.87 · · 38.37	350°39.20 · · 21.90	279°38.68 · · 11.62	25°29.85 · · 7.68	Menkar 314°5.17 4°11.61
10	53°42.31	288°39.30 37.70	5°39.83 22.41	294°40.61 11.53	40°32.16 7.73	Mirfak 308°26.98 49°57.16
11	68°44.78	303°38.72 37.03	20° 40.47 22.92	309°42.54 11.43	55°34.46 7.79	Aldebaran 290°38.60 16°33.71 Rigel 281°3.07 -8°10.26
12	83°47.24	318°38.15 N21°36.35	35°41.10 N17°23.43	324°44.47 N21°11.33	70°36.77 N03°7.84	Capella 280°20.62 46°1.41
13	98°49.71	333°37.58 35.68	50°41.74 23.94	339°46.40 11.24	85°39.08 7.90	Bellatrix 278°21.95 6°22.40
14	113°52.17	348°37.00 35.00	65°42.37 24.45	354°48.32 11.14	100°41.39 7.95	Elnath 278° 0.75 28° 37.75
15 16	128° 54.63 143° 57.10	3°36.43 · · 34.33 18°35.86 33.65	80°43.00 · · 24.96 95°43.64 25.46	9°50.25 ·· 11.04 24°52.18 10.95	115°43.70 · · 8.00 130°46.00 8.06	Alnilam 275°36.86 -1°11.11
17	158° 59.56	33°35.29 32.97	110° 44.27 25.97	39°54.11 10.85	145°48.31 8.11	Betelgeuse 270°51.14 7°24.70
18	174°2.03	48°34.72 N21°32.29	125°44.91 N17°26.48	54°56.04 N21°10.76	160°50.62 N03°8.17	Canopus 263°52.42 -52°42.60
19	189°4.49	63°34.15 31.61	140°45.54 26.99	69°57.96 10.66	175°52.93 8.22	Sirius 258°25.54 -16°45.18
20	204°6.96	78°33.58 30.93	155° 46.17 27.49	84°59.89 10.56	190°55.24 8.28	Adhara 255°5.30 -29°0.54 Procyon 244°49.89 5°9.41
21	$219^{\circ}9.42$	93°33.01 · · 30.25	170°46.81 · · 28.00	100° 1.82 · · 10.47	205°57.55 · · 8.33	Procyon 244°49.89 5°9.41 Pollux 243°16.19 27°57.77
22	234° 11.88	108°32.45 29.57	185° 47.44 28.51	115° 3.75 10.37	220°59.86 8.38	Avior 234°14.77 -59°35.84
23	249°14.35	123°31.88 28.88	200°48.08 29.01	130° 5.67 10.27	236°2.17 8.44	Suhail 222°45.73 -43°32.57
Mer.	pass. 06:26	$\nu$ -0.6' d-0.7' m-3.98	$ u 0.6' \ d0.5' \ m1.29$	$\nu 1.9' \ d$ -0.1' m-1.84	$\nu 2.3' \ d0.1' \ m0.83$	Miaplacidus 221°38.62 -69°49.80
	<u>'</u>					Alphard 217°46.78 -8°46.49
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.32 11°50.28
0	264° 16.81	138°31.32 N21°28.20	215°48.71 N17°29.52	145°7.60 N21°10.18	251°4.48 N03°8.49	Dubhe 193°39.69 61°36.74
1	279° 19.28	153°30.75 27.51	230° 49.34 30.02	160°9.53 10.08	266° 6.79 8.55	Denebola 182°23.73 14°25.47
2	294°21.74	168°30.19 26.83	245°49.98 30.53	175°11.45 9.98	281°9.10 8.60	Gienah 175°42.31 -17°41.49 Acrux 172°58.61 -63°15.09
3	309°24.21	183°29.62 · · 26.14	260°50.61 · · 31.03	190°13.38 · · 9.89	296°11.41 · · 8.65	Gacrux 172 58.01 -03 15.09
4	324°26.67	198°29.06 25.45	275°51.24 31.54	205°15.31 9.79	311°13.72 8.71	Alioth 166°11.75 55°49.18
5	339°29.13	213°28.50 24.76	290°51.88 32.04	220°17.23 9.69	326°16.03 8.76	Spica 158°20.90 -11°18.08
6	354°31.60	228°27.93 N21°24.07	305°52.51 N17°32.55	235°19.16 N21°9.60	341°18.34 N03°8.81	Alkaid 152°50.80 49°11.02
7 8	9°34.06 24°36.53	243°27.37 23.38 258°26.81 22.69	320°53.14 33.05 335°53.78 33.55	250°21.09 9.50 265°23.01 9.40	356°20.65 8.87 11°22.96 8.92	Hadar 148°33.90 -60°30.30
9	39°38.99	258° 26.81 22.69 273° 26.25 · · 21.99	335°53.78 33.55 350°54.41 · · 34.06	265°23.01 9.40 280°24.94 • 9.30	11°22.96 8.92 26°25.27 • 8.97	Menkent 147°55.96 -36°30.21
10	54° 41.46	288°25.69 21.30	5°55.04 34.56	295°26.87 9.21	41°27.58 9.03	Arcturus 145°46.61 19°2.71
11	69°43.92	303°25.13 20.60	20°55.68 35.06	310°28.79 9.11	56°29.89 9.08	Rigil Kent. 139°38.17 -60°56.92 Kochab 137°18.94 74°2.93
12	84°46.38	318°24.58 N21°19.91	35°56.31 N17°35.56	325°30.72 N21°9.01	71°32.20 N03°9.13	Zuben'ubi 136°54.44 -16°9.21
13	99° 48.85	333°24.02 19.21	50°56.94 36.06	340°32.65 8.92	86°34.52 9.19	Alphecca 126°2.42 26°37.56
14	114°51.31	348°23.46 18.51	65° 57.58 36.57	355°34.57 8.82	101°36.83 9.24	Antares 112°14.02 -26°29.49
15	129°53.78	3°22.91 · · 17.81	80°58.21 · · 37.07	10°36.50 · · 8.72	116°39.14 · · 9.29	Atria 107°6.59 -69°4.54
16 17	144° 56.24 159° 58.70	18°22.35 17.11 33°21.80 16.41	95°58.84 37.57 110°59.47 38.07	25°38.42 8.62 40°40.35 8.53	131°41.45 9.34 146°43.76 9.40	Sabik 102°1.07 -15°45.48
18	175°1.17	48°21.24 N21°15.71	126°0.11 N17°38.57	55°42.27 N21°8.43	161°46.07 N03°9.45	Shaula 96°8.33 -37°7.37
19	190°3.63	63°20.69 15.01	141°0.74 39.07	70°44.20 8.33	176°48.39 9.50	Rasalhague 95°57.10 12°32.42
20	205°6.10	78°20.14 14.30	156°1.37 39.57	85°46.13 8.23	191°50.70 9.56	Eltanin 90°41.09 51°29.05 Kaus Aust. 83°30.54 -34°22.26
21	220°8.56	93°19.58 · · 13.60	171°2.00 · · 40.07	100°48.05 · · 8.14	206°53.01 · · 9.61	Kaus Aust. 83°30.54 -34°22.26 Vega 80°32.00 38°48.41
22	235°11.03	108°19.03 12.89	186°2.64 40.57	115°49.98 8.04	221°55.32 9.66	Nunki 75°45.93 -26°15.76
23	250°13.49	123°18.48 12.19	201°3.27 41.06	130°51.90 7.94	236°57.64 9.71	Altair 61°58.51 8°56.27
Mer.	pass. 06:22	$\nu$ -0.6' d-0.7' m-3.99	ν0.6' d0.5' m1.29	$\nu 1.9' \ d$ -0.1' m-1.84	$\nu 2.3' \ d0.1' \ m0.83$	Peacock 53°3.41 -56°38.76
	<u></u>					Deneb 49°24.65 45°22.31
\Mod	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°37.47 9°59.75
Wed 0	265°15.95	<b>GHA Dec</b> 138°17.93 N21°11.48	<b>GHA Dec</b> 216°3.90 N17°41.56	<b>GHA Dec</b> 145°53.83 <b>N</b> 21°7.84	251°59.95 N03°9.77	Al Na'ir 27°31.24 -46°49.70
1	280° 18.42	153°17.38 10.77	231°4.53 42.06	160°55.75 7.75	267°2.26 9.82	Fomalhaut 15°13.14 -29°28.72 Scheat 13°43.99 28°13.46
2	295°20.88	168°16.83 10.06	246°5.17 42.56	175°57.68 7.65	282°4.58 9.87	Markab 13°28.66 15°20.80
3	310° 23.35	183°16.29 • • 9.35	261°5.80 · · 43.05	190°59.60 · · 7.55	297°6.89 · · 9.92	
4	325°25.81	198°15.74 8.64	276°6.43 43.55	206° 1.53 7.45	312°9.20 9.97	Jun 15 Mon SHA Mer.pass
5	340°28.28	213°15.19 7.93	291°7.06 44.05	221°3.45 7.36	327°11.52 10.03	Venus 235°27.41 14:46
6 7	355° 30.74 10° 33.20	228°14.65 N21°7.22	306°7.69 N17°44.54	236° 5.38 N21° 7.26 251° 7.30 7.16	342°13.83 N03°10.08	Mars 312°15.81 09:37 Jupiter 241°3.66 14:21
7 8	25° 35.67	243°14.10 6.50 258°13.56 5.79	321°8.33 45.04 336°8.96 45.54	251°7.30 7.16 266°9.23 7.06	357°16.14 10.13 12°18.46 10.18	Saturn 346°51.41 07:18
9	40°38.13	273°13.01 · · 5.07	351°9.59 · · 46.03	281°11.15 · · 6.96	27°20.77 · · 10.23	
10	55° 40.60	288°12.47 4.36	6°10.22 46.53	296°13.07 6.87	42°23.08 10.29	Jun 16 Tue SHA Mer.pass
11	70°43.06	303°11.93 3.64	21°10.85 47.02	311°15.00 6.77	57°25.40 10.34	Venus 234°14.50 14:46
12	85° 45.53	318°11.38 N21°2.92	36°11.48 N17°47.52	326°16.92 N21°6.67	72°27.71 N03°10.39	Mars 311°31.90 09:36 Jupiter 240°50.79 14:18
13	100°47.99	333°10.84 2.20	51°12.12 48.01	341°18.85 6.57	87°30.03 10.44	Saturn 346°47.67 07:15
14	115°50.45	348°10.30 1.48	66° 12.75 48.50	356°20.77 6.47	102°32.34 10.49	
15 16	130° 52.92 145° 55.38	$3^{\circ}9.76  \cdot \cdot  0.76$ $18^{\circ}9.22  21^{\circ}0.04$	81°13.38 · · 49.00 96°14.01 49.49	11°22.70 · · 6.37	117°34.66 · · 10.54 132°36.97 10.60	Jun 17 Wed SHA Mer.pass
16 17	145°55.38 160°57.85	33°8.69 20°59.31	96°14.01 49.49 111°14.64 49.98	26°24.62 6.28 41°26.54 6.18	132°36.97 10.60 147°39.29 10.65	Venus 233°1.98 14:47
18	176° 0.31	48°8.15 N20°58.59	126°15.27 N17°50.48	56°28.47 N21°6.08	162°41.60 N03°10.70	Mars 310°47.95 09:35 Jupiter 240°37.87 14:15
19	191°2.77	63°7.61 57.86	141°15.90 50.97	71°30.39 5.98	177°43.92 10.75	Saturn 346°43.99 07:11
20	206°5.24	78°7.07 57.14	156° 16.53 51.46	86°32.31 5.88	192°46.23 10.80	
21	221°7.70	93°6.54 · · 56.41	171°17.17 · · 51.95	101°34.24 · · 5.78	207°48.55 · · 10.85	Horizontal parallax
22	236° 10.17	108°6.00 55.68	186°17.80 52.44	116°36.16 5.68	222°50.87 10.90	Venus: 0.1
23	251°12.63	123°5.47 54.96	201°18.43 52.94	131°38.09 5.59	237°53.18 10.95	Mars: 0.1
N 4	nace 06·18	$u_{-}0.5'$ d <sub>-</sub> 0.7' m <sub>-</sub> 3.00	u0.6' d0.5' m1.20	10/ 101/ 104	0.0/ /0.1/ 0.00	

 $\nu 1.9'~\textit{d}\text{--}0.1'~\text{m}\text{--}1.84$ 

 $\nu 2.3' \ d0.1' \ \text{m}0.83$ 

 $\nu 0.6'~d0.5'~{\rm m}1.29$ 

 $\nu\text{-}0.5'\ d\text{-}0.7'\ \text{m-}3.99$ 

Mer.pass. 06:18

h	Su	n	Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°54.04	N23°17.95	182°6.18	0.3'	N27°56.26	1.1'	61.3'
1	194°53.91	18.05	$196^{\circ}25.45$	0.3'	27°57.34	0.9'	61.3'
2	209°53.77	18.16	210°44.70	0.2'	27°58.19	0.6'	61.3'
3	224°53.64	• • 18.27	225°3.95	0.2'	27°58.82	0.4'	61.3'
4 5	239°53.50 254°53.37	18.38 18.48	239°23.19 253°42.44	0.2' 0.2'	27°59.23 27°59.40	0.2' -0.0'	61.3' 61.3'
6	269°53.23	N23°18.59	268°1.68	0.2	N27°59.36	-0.0	61.3'
7	284°53.10	18.69	282°20.94	0.3	27°59.08	-0.5	61.3'
8	299°52.96	18.80	296°40.20	0.3'	27° 58.59	-0.7'	61.3'
9	314°52.83	• • 18.90	310°59.48	0.3'	27°57.86	-0.9'	61.3'
10	329°52.69	19.00	325°18.79	0.3'	27°56.91	-1.2'	61.3'
11	344°52.56	19.10	339°38.11	0.4'	27°55.74	-1.4'	61.3'
12 13	359°52.42 14°52.29	N23°19.21 19.31	353°57.46 8°16.84	0.4' 0.4'	N27°54.35 27°52.73	-1.6' -1.8'	61.3' 61.3'
13 14	14 52.29 29°52.15	19.31 19.41	8 10.84 22°36.26	0.4	27°50.88	-1.8 -2.1'	61.2'
15	44°52.02	. 19.50	36°55.72	0.5	27° 48.82	-2.1	61.2
16	59°51.88	19.60	51°15.21	0.5'	27°46.53	-2.5'	61.2'
17	74°51.75	19.70	65°34.76	0.6'	27°44.02	-2.7'	61.2'
18	89°51.61	N23°19.80	79°54.35	0.6'	N27°41.30	-2.9'	61.2'
19	104°51.48	19.89	94°14.00	0.7'	27°38.35	-3.2'	61.2'
20	119°51.34	19.99	108°33.70	0.8'	27°35.19	-3.4'	61.2'
21 22	134°51.20 149°51.07	· · 20.08 20.18	122°53.46 137°13.29	0.8' 0.9'	27°31.81 27°28.21	-3.6' -3.8'	61.2' 61.2'
23	164°50.93	20.16	151° 13.29 151° 33.19	1.0'	27°24.40	-3.6 -4.0'	61.1'
						1.0	02.1
	SD = 15.7'	d = 0.1'		5	D = 16.7'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°50.80	N23°20.36	165°53.15	1.0'	N27°20.37	-4.2'	61.1'
1	194°50.66 209°50.53	20.45 20.55	180°13.19 194°33.30	1.1' 1.2'	27°16.13 27°11.68	-4.4'	61.1' 61.1'
2	209°50.53 224°50.39	20.55	194°33.30 208°53.50	1.3'	27°11.68 27°7.02	-4.7' -4.9'	61.1
4	239°50.25	20.73	208 53.50 223°13.77	1.4'	27°2.16	-4.9 -5.1'	61.1'
5	254°50.12	20.81	237°34.14	1.5'	26°57.08	-5.3'	61.1'
6	269°49.98	N23°20.90	251°54.59	1.5'	N26°51.80	-5.5'	61.0'
7	284°49.85	20.99	$266^{\circ}15.13$	1.6'	26°46.32	-5.7'	61.0'
8	299°49.71	21.08	280°35.77	1.7'	26°40.63	-5.9'	61.0'
9	314°49.57	• • 21.16	294°56.51	1.8'	26°34.75	-6.1'	61.0'
10 11	329°49.44 344°49.30	21.25 21.33	309°17.35 323°38.29	1.9' 2.0'	26°28.67 26°22.38	-6.3' -6.5'	61.0' 60.9'
12	359°49.17	N23°21.42	323 36.29 337°59.33	2.0	N26° 15.91	-6.7'	60.9
13	14°49.03	21.50	352°20.48	2.3'	26°9.24	-6.9'	60.9
14	29°48.89	21.58	6°41.74	2.4'	26°2.38	-7.0'	60.9'
15	44°48.76	• • 21.66	21°3.12	2.5'	25°55.33	-7.2'	60.9'
16	59°48.62	21.74	35°24.60	2.6'	25°48.09	-7.4'	60.8'
17	74°48.48	21.83	49°46.21	2.7'	25°40.67	-7.6'	60.8'
18 19	89°48.35 104°48.21	N23°21.90 21.98	64°7.93 78°29.77	2.8' 3.0'	N25°33.06 25°25.27	-7.8' -8.0'	60.8' 60.8'
20	119°48.08	22.06	92°51.74	3.1'	25° 17.31	-8.1'	60.7
21	134°47.94	• • 22.14	107°13.83	3.2'	25°9.16	-8.3'	60.7
22	149°47.80	22.22	121°36.04	3.3'	25°0.84	-8.5'	60.7'
23	164°47.67	22.29	135°58.38	3.5'	$24^{\circ}52.35$	-8.7'	60.7'
	SD = 15.7'	d = 0.1'		S	D = 16.7'		
Wed	GHA	Dee	GHA		Dee		HP
vvea 0	лана 179° 47.53	<b>Dec</b> N23°22.37	150°20.85	ν 3.6'	<b>Dec</b> N24°43.69	d -8.8'	60.6'
1	194°47.39	22.44	164°43.45	3.7'	24°34.85	-9.0'	60.6
2	209°47.26	22.52	179°6.18	3.9'	$24^{\circ}25.86$	-9.2'	60.6'
3	224°47.12	• • 22.59	193°29.04	4.0'	24° 16.69	-9.3'	60.6'
4	239°46.98	22.66	207°52.04	4.1'	24°7.37	-9.5'	60.5
5	254°46.85 269°46.71	22.73 N23°22.80	222°15.17 236°38.43	4.3'	23°57.88 N23°48.24	-9.6'	60.5'
6 7	269°46.71 284°46.57	N23°22.80 22.87	236°38.43 251°1.84	4.4' 4.5'	N23°48.24 23°38.44	-9.8' -9.9'	60.5' 60.5'
8	299°46.44	22.94	265°25.38	4.7	23°28.49	-10.1	60.4
9	314°46.30	• • 23.01	279°49.06	4.8'	23°18.39	-10.2'	60.4
10	329°46.16	23.08	$294^{\circ}12.87$	5.0'	$23^{\circ}8.15$	-10.4'	60.4'
11	344°46.03	23.15	308°36.83	5.1'	22°57.75	-10.5'	60.3'
12	359°45.89	N23°23.21	323°0.93	5.2'	N22°47.21	-10.7'	60.3'
13 14	14°45.75 29°45.62	23.28 23.35	337°25.17 351°49.55	5.4' 5.5'	22°36.53 22°25.71	-10.8' -11.0'	60.3' 60.2'
14 15	29°45.62 44°45.48	23.35	351 49.55 6°14.07	5.5° 5.7'	22° 25.71 22° 14.76	-11.0 -11.1'	60.2'
16	59°45.34	23.47	20°38.73	5.8'	22°3.67	-11.1	60.2
17	74°45.21	23.54	35°3.53	5.9'	21°52.45	-11.4	60.1
18	89°45.07	N23°23.60	49°28.48	6.1'	N21°41.10	-11.5'	60.1'
19	104°44.93	23.66	63°53.57	6.2'	21°29.62	-11.6'	60.1'
20	119°44.79	23.72	78°18.80	6.4'	21°18.02	-11.7'	60.1'
21 22	134°44.66 149°44.52	· · 23.78 23.84	92°44.17 107°9.68	6.5' 6.7'	21°6.29 20°54.45	-11.8'	60.0' 60.0'
22	149°44.52 164°44.38	23.84	107°9.68 121°35.33	6.8'	20°54.45 20°42.48	-12.0' -12.1'	60.0'
23	SD = 15.7'	d = 0.1'			D = 16.5'	1	55.5
	υ = 15.1'	a = 0.1		5	D = 10.5		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
N 72°						
<b>N</b> 70°						
68°						
66°						
64°	////	////	01:32	22:30	////	////
62°	////	////	02:10	21:52	////	////
60°	////	00:52	02:36	21:26	23:11	////
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 50°	06:38	07:20	07:58	16:03	16:42	17:23
52°	06:43	07:27	80:80	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
<b>S</b> 60°	07:09	08:06	09:04	14:58	15:55	16:52

Lat.		Moonris	е		Moonset	:
Lat.	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° 52°	02:53	04:11	05:44	21:52	22:33 22:19	22:58 22:48
52 50°	03:11 03:25	04:27 04:41	05:57 06:08	21:35 21:21	22:19	22:48
45°	03:55	05:09	06:32	20:53	21:43	22:39
N 40°						
35°	04:19 04:38	05:31 05:50	06:50 07:06	20:30 20:11	21:24 21:07	22:05 21:52
30°	04:54	06:06	07:00	19:55	20:53	21:32
20°	05:22	06:32	07:19	19:33	20:33	21:41
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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	10:52	11:25	11:37	14:01	15:47	17:45

	Sun			Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	0-2	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	0-5%	
15	00:24	00:30	12:01	12:25	-:-		
16	00:37	00:43	12:01	13:32	00:59	(2,236)	
17	00:50	00:56	12:01	14:34	02:04		

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	266° 15.10	138°4.93 N20°54.23	216°19.06 N17°53.43	146°40.01 N21°5.49	252°55.50 N03°11.00	
1	281° 17.56	153°4.40 53.50	231°19.69 53.92	161°41.93 5.39	267°57.81 11.06	Alpheratz 357°33.56 29°14.07
2	296°20.02	168°3.87 52.76	246°20.32 54.41	176°43.86 5.29	283°0.13 11.11	Ankaa 353°6.04 -42°9.45 Schedar 349°29.79 56°40.72
3	$311^{\circ}22.49$	183°3.34 · · 52.03	261°20.95 · · 54.90	191°45.78 · · 5.19	298°2.45 · · 11.16	Schedar 349°29.79 56°40.72 Diphda 348°46.18 -17°50.34
4	326° 24.95	198°2.81 51.30	276°21.58 55.39	206°47.70 5.09	313°4.76 11.21	Achernar 335°19.58 -57°5.83
5	341°27.42	213°2.28 50.57	291°22.21 55.88	221°49.62 4.99	328°7.08 11.26	Hamal 327°50.05 23°35.17
6	356° 29.88	228°1.75 N20°49.83	306°22.84 N17°56.36	236°51.55 N21°4.89	343°9.40 N03°11.31	Polaris 313°47.51 89°22.30
7 8	11°32.34 26°34.81	243°1.22 49.09 258°0.69 48.36	321°23.47 56.85 336°24.10 57.34	251°53.47 4.80 266°55.39 4.70	358°11.71 11.36 13°14.03 11.41	Acamar 315°11.19 -40°11.72
9	41° 37.27	273°0.16 · · 47.62	351°24.73 · · 57.83	281°57.32 · · 4.60	28°16.35 · · 11.46	Menkar 314°5.14 4°11.62
10	56° 39.74	287°59.63 46.88	6°25.36 58.32	296°59.24 4.50	43°18.67 11.51	Mirfak 308°26.95 49°57.16
11	71°42.20	302°59.11 46.14	21°25.99 58.80	312°1.16 4.40	58°20.98 11.56	Aldebaran 290°38.58 16°33.72
12	86°44.67	317°58.58 N20°45.40	36°26.62 N17°59.29	327°3.08 N21°4.30	73°23.30 N03°11.61	Rigel 281°3.05 -8°10.24 Capella 280°20.60 46°1.41
13	$101^{\circ}47.13$	332°58.06 44.66	51°27.25 17°59.78	342°5.01 4.20	88°25.62 11.66	Capella 280°20.60 46°1.41 Bellatrix 278°21.93 6°22.41
14	116°49.59	347°57.53 43.92	66°27.88 18°0.26	357° 6.93 4.10	103°27.94 11.71	Elnath 278° 0.74 28° 37.75
15	131°52.06	2°57.01 · · 43.18	81°28.51 · · 0.75	12°8.85 · · 4.00	118°30.25 · · 11.76	Alnilam 275°36.85 -1°11.10
16	146° 54.52	17°56.49 42.43	96°29.14 1.24	27°10.77 3.90 42°12.69 3.80	133°32.57 11.81	Betelgeuse 270°51.13 7°24.71
17 18	161° 56.99 176° 59.45	32°55.96 41.69 47°55.44 N20°40.94	111°29.77 1.72 126°30.40 N18°2.21	42°12.69 3.80 57°14.62 N21°3.70	148°34.89 11.86 163°37.21 N03°11.91	Canopus 263°52.42 -52°42.58
19	192°1.91	62°54.92 40.19	141°31.03 2.69	72°16.54 3.60	178°39.53 11.96	Sirius 258°25.53 -16°45.17
20	207°4.38	77°54.40 39.45	156°31.66 3.18	87°18.46 3.50	193°41.85 12.01	Adhara 255°5.30 -29°0.52
21	222°6.84	92°53.88 · · 38.70	171°32.29 · · 3.66	102°20.38 · · 3.40	208°44.17 · · 12.06	Procyon 244°49.89 5°9.41
22	$237^{\circ}9.31$	107°53.36 37.95	186°32.92 4.14	117°22.30 3.31	223°46.49 12.11	Pollux 243°16.19 27°57.77
23	$252^{\circ}11.77$	122°52.85 37.20	201°33.55 4.63	132°24.23 3.21	238°48.80 12.16	Avior 234°14.78 -59°35.83 Suhail 222°45.74 -43°32.56
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	$\nu 2.3' \ d0.1' \ m0.82$	Miaplacidus 221°38.66 -69°49.79
IVICI.	Pass. 00.14	- 0.5 u-0.1 III-3.39	- VO.0 UU.J III1.29	ν 1.5 d-0.1 III-1.03	ν Δ.Ο UO.1 IIIU.02	Alphard 217°46.78 -8°46.48
						Regulus 207°33.32 11°50.28
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.70 61°36.73
0	267° 14.24	137°52.33 N20°36.45 152°51.81 35.69	216°34.18 N18°5.11 231°34.81 5.59	147°26.15 N21°3.11 162°28.07 3.01	253°51.12 N03°12.21 268°53.44 12.26	Denebola 182°23.74 14°25.48
1 2	282° 16.70 297° 19.16	152°51.81 35.69 167°51.30 34.94	231°34.81 5.59 246°35.44 6.08	162°28.07 3.01 177°29.99 2.91	268°53.44 12.26 283°55.76 12.31	Gienah 175°42.31 -17°41.49
3	312°21.63	182°50.78 · · 34.19	261°36.07 · · 6.56	192°31.91 · · 2.81	298°58.08 · · 12.36	Acrux 172°58.63 -63°15.09
4	327°24.09	197°50.27 33.43	276°36.70 7.04	207°33.83 2.71	314°0.40 12.40	Gacrux 171°50.19 -57°16.01
5	342°26.56	212°49.75 32.68	291°37.33 7.52	222°35.75 2.61	329°2.72 12.45	Alioth 166°11.76 55°49.18 Spica 158°20.90 -11°18.08
6	357°29.02	227°49.24 N20°31.92	306°37.96 N18°8.00	237°37.67 N21°2.51	344°5.04 N03°12.50	Spica 158°20.90 -11°18.08 Alkaid 152°50.81 49°11.03
7	12°31.48	242°48.73 31.16	321°38.59 8.48	252°39.60 2.41	359°7.36 12.55	Hadar 148°33.91 -60°30.31
8	27°33.95	257°48.21 30.41	336°39.22 8.96	267°41.52 2.31	14°9.68 12.60	Menkent 147°55.96 -36°30.21
9	42°36.41	272°47.70 · · 29.65	351°39.84 · · 9.44	282°43.44 · · 2.21	29°12.00 · · 12.65	Arcturus 145°46.61 19°2.71
10	57° 38.88	287°47.19 28.89	6°40.47 9.92	297°45.36 2.11	44°14.32 12.70	Rigil Kent. 139°38.18 -60°56.93
11	72°41.34	302°46.68 28.13	21°41.10 10.40	312°47.28 2.01	59°16.65 12.75 74°18.97 N03°12.80	Kochab 137°18.97 74°2.94
12 13	87° 43.80 102° 46.27	317°46.17 N20°27.36 332°45.67 26.60	36°41.73 N18°10.88 51°42.36 11.36	327°49.20 N21°1.91 342°51.12 1.81	74°18.97 N03°12.80 89°21.29 12.84	Zuben'ubi 136°54.44 -16°9.21
14	117° 48.73	347°45.16 25.84	66° 42.99 11.84	357°53.04 1.71	104°23.61 12.89	Alphecca 126°2.41 26°37.57
15	132°51.20	2°44.65 · · 25.07	81°43.62 · · 12.32	12°54.96 · · 1.60	119°25.93 · · 12.94	Antares 112°14.01 -26°29.50
16	147° 53.66	17°44.15 24.31	96°44.25 12.80	27°56.88 1.50	134°28.25 12.99	Atria 107°6.58 -69°4.55
17	$162^{\circ}56.13$	32°43.64 23.54	111°44.87 13.27	42°58.80 1.40	149°30.57 13.04	Sabik 102°1.06 -15°45.48 Shaula 96°8.31 -37°7.37
18	177°58.59	47°43.13 N20°22.77	126°45.50 N18°13.75	58°0.72 N21°1.30	164°32.90 N03°13.09	Rasalhague 95°57.09 12°32.43
19	193°1.05	62°42.63 22.01	141°46.13 14.23	73° 2.64 1.20	179°35.22 13.13	Eltanin 90°41.08 51°29.07
20	208°3.52	77°42.13 21.24	156° 46.76 14.71	88° 4.56 1.10	194°37.54 13.18	Kaus Aust. 83°30.52 -34°22.26
21	223°5.98 238°8.45	92°41.62 · · 20.47 107°41.12 19.70	171° 47.39 · · 15.18 186° 48.02 15.66	103°6.48 · · 1.00 118°8.40	209°39.86 · · 13.23	Vega 80°31.98 38°48.42
22 23	258 8.45 253° 10.91	107°41.12 19.70 122°40.62 18.93	186° 48.02 15.66 201° 48.64 16.13	118°8.40 0.90 133°10.32 0.80	224°42.18 13.28 239°44.51 13.33	Nunki 75°45.91 -26°15.76
						Altair 61°58.49 8°56.28
Mer.	pass. 06:10	$\nu$ -0.5' $d$ -0.8' m-4.00	$\nu$ 0.6′ $d$ 0.5′ $m$ 1.29	ν1.9' d-0.1' m-1.83	$\nu 2.3' \ d0.0' \ m0.82$	Peacock 53°3.37 -56°38.76
						Deneb 49°24.63 45°22.33 Enif 33°37.44 9°59.76
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°37.44 9°59.76 Al Na'ir 27°31.21 -46°49.70
0	$268^{\circ}13.37$	137°40.12 N20°18.15	216°49.27 N18°16.61	148°12.24 N21°0.70	254°46.83 N03°13.37	Fomalhaut 15°13.11 -29°28.71
1	283° 15.84	152°39.62 17.38	231°49.90 17.09	163°14.16 0.60	269°49.15 13.42	Scheat 13°43.96 28°13.47
2	298° 18.30	167°39.12 16.61	246°50.53 17.56	178°16.08 0.50	284°51.47 13.47	Markab 13°28.63 15°20.81
3	313° 20.77	182°38.62 · · 15.83	261°51.16 · · 18.03	193°18.00 · · 0.40	299°53.80 · · 13.52	Jun 18 Thu SHA Mer.pass
4 5	328° 23.23 343° 25.69	197°38.12 15.06 212°37.63 14.28	276°51.79 18.51 291°52.41 18.98	208°19.92 0.30 223°21.84 0.19	314°56.12 13.57 329°58.44 13.61	Jun 18 Thu         SHA         Mer.pass           Venus         231°49.84         14:48
6	343 25.09 358° 28.16	212 37.03 14.28 227°37.13 N20°13.50	306°53.04 N18°19.46	238°23.76 N21°0.09	345°0.77 N03°13.66	Mars 310° 3.96 09:34
7	13° 30.62	242°36.63 12.72	321°53.67 19.93	253°25.68 20°59.99	0°3.09 13.71	Jupiter 240°24.91 14:12
8	28° 33.09	257°36.14 11.94	336°54.30 20.40	268°27.60 20°59.89	15°5.41 13.76	Saturn 346°40.40 07:07
9	43°35.55	272°35.64 · · 11.16	351°54.92 · · 20.88	283°29.52 · · 59.79	30°7.74 · · 13.80	
10	58°38.02	287°35.15 10.38	$6^{\circ}55.55$ 21.35	298°31.44 59.69	45°10.06 13.85	Jun 19 Fri         SHA         Mer.pass           Venus         230°38.09         14:49
11	73°40.48	302°34.66 9.60	21°56.18 21.82	313°33.36 59.59	60°12.39 13.90	Mars 309°19.95 09:33
12	88° 42.94	317°34.17 N20°8.82	36°56.81 N18°22.29	328°35.28 N20°59.49	75°14.71 N03°13.94	Jupiter 240°11.91 14:08
13	103° 45.41	332°33.67 8.03	51° 57.43 22.76	343°37.20 59.39	90°17.04 13.99	Saturn 346°36.89 07:04
14 15	118° 47.87	347°33.18 7.25	66° 58.06 23.23	358°39.11 59.28	105°19.36 14.04	
15 16	133° 50.34 148° 52.80	2°32.69 · · 6.46 17°32.20 5.68	81°58.69 · · 23.70 96°59.32 24.17	13°41.03 · · 59.18 28°42.95 59.08	120°21.68 · · 14.09 135°24.01 14.13	Jun 20 Sat SHA Mer.pass
17	146 52.60 163°55.26	32°31.71 4.89	111°59.94 24.64	43°44.87 58.98	150°26.33 14.18	Venus 229°26.75 14:50 Mars 308°35.90 09:32
18	178° 57.73	47°31.23 N20°4.10	127°0.57 N18°25.11	58°46.79 N20°58.88	165°28.66 N03°14.23	Jupiter 239°58.87 14:05
19	194°0.19	62°30.74 3.31	142°1.20 25.58	73°48.71 58.78	180°30.98 14.27	Saturn 346°33.45 07:00
20	209°2.66	77°30.25 2.52	157°1.82 26.05	88°50.63 58.68	195°33.31 14.32	
21	224°5.12	92°29.77 · · 1.73	172°2.45 · · 26.52	103°52.55 · · 58.57	210°35.64 · · 14.37	Horizontal parallax
22	239°7.58	107°29.28 0.94	187°3.08 26.99	118°54.46 58.47	225°37.96 14.41	Venus: 0.1
23	254° 10.05	122°28.80 0.15	202°3.71 27.46	133°56.38 58.37	240°40.29 14.46	Mars: 0.1
Mer.	pass. 06:06	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	

h	Su	n	Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°44.25	N23°23.96	$136^{\circ}1.13$	6.9'	N20°30.40	-12.2'	59.9'
1	194°44.11	24.02	150°27.07	7.1'	20°18.21	-12.3'	59.9'
2	209°43.97 224°43.84	24.07 •• 24.13	164°53.15 179°19.36	7.2'	20°5.90 19°53.49	-12.4'	59.8'
3 4	224 43.84 239°43.70	24.13	179 19.30 193°45.72	7.4' 7.5'	19 53.49 19°40.97	-12.5' -12.6'	59.8' 59.8'
5	254°43.56	24.24	208° 12.22	7.6'	19° 28.35	-12.7'	59.7'
6	269°43.43	N23°24.29	222°38.86	7.8'	N19° 15.62	-12.8'	59.7'
7	284°43.29	24.35	237°5.63	7.9'	19°2.79	-12.9'	59.7'
8	299°43.15	24.40	251°32.54	8.0'	18°49.87	-13.0'	59.6'
9 10	314°43.01 329°42.88	· · 24.45 24.50	265°59.59 280°26.78	8.2' 8.3'	18° 36.85 18° 23.74	-13.1' -13.2'	59.6' 59.6'
11	344°42.74	24.55	294°54.10	8.5'	18° 10.53	-13.2	59.5'
12	359°42.60	N23°24.60	309°21.55	8.6'	N17°57.24	-13.4'	59.5'
13	14°42.47	24.65	323°49.14	8.7'	$17^{\circ}43.86$	-13.5'	59.5'
14	29°42.33	24.70	338°16.86	8.9'	17°30.40	-13.5'	59.4'
15 16	44°42.19 59°42.05	· · 24.74 24.79	352°44.72 7°12.70	9.0' 9.1'	17° 16.85 17° 3.22	-13.6' -13.7'	59.4' 59.3'
17	74°41.92	24.79	21°40.82	9.2'	16°49.52	-13.8'	59.3'
18	89°41.78	N23°24.88	36°9.06	9.4'	N16°35.73	-13.9'	59.3'
19	104°41.64	24.93	50°37.44	9.5'	$16^{\circ}21.87$	-13.9'	59.2'
20	119°41.51	24.97	65°5.94	9.6'	16°7.94	-14.0'	59.2'
21 22	134°41.37 149°41.23	· · 25.01 25.05	79°34.56 94°3.31	9.8' 9.9'	15°53.94 15°39.88	-14.1' -14.1'	59.1' 59.1'
23	164°41.09	25.10	108° 32.19	10.0'	15° 25.74	-14.1 -14.2'	59.1'
	SD = 15.7'	d = 0.1'			D = 16.3'		
	<u>JD = 13.7</u>	<u>u = 0.1</u>		JI	J = 10.5		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°40.96	N23°25.14	123°1.18	10.1'	N15°11.54	-14.3'	59.0'
1 2	194°40.82 209°40.68	25.18 25.22	137°30.30 151°59.54	10.2' 10.4'	14° 57.28 14° 42.95	-14.3' -14.4'	59.0' 59.0'
3	224°40.55	. 25.26	166°28.90	10.5	14° 42.93	-14.4'	58.9'
4	239°40.41	25.29	180°58.37	10.6'	14°14.13	-14.5'	58.9'
5	254°40.27	25.33	195°27.96	10.7'	13°59.64	-14.5'	58.8'
6	269°40.13	N23°25.37	209° 57.67	10.8'	N13°45.09 13°30.49	-14.6'	58.8'
7 8	284°40.00 299°39.86	25.40 25.44	224°27.48 238°57.42	10.9' 11.0'	13° 30.49 13° 15.84	-14.6' -14.7'	58.8' 58.7'
9	314°39.72	• • 25.47	253°27.46	11.2'	13°1.14	-14.7'	58.7'
10	329°39.59	25.51	$267^{\circ}57.61$	11.3'	12°46.40	-14.8'	58.6'
11	344°39.45	25.54	282°27.87	11.4'	12°31.61	-14.8'	58.6'
12	359°39.31	N23°25.57	296° 58.24	11.5'	N12°16.78 12°1.90	-14.9'	58.6'
13 14	14°39.17 29°39.04	25.60 25.63	311°28.71 325°59.29	11.6' 11.7'	12°1.90 11°46.99	-14.9' -15.0'	58.5' 58.5'
15	44°38.90	25.66	340°29.97	11.8'	11°32.04	-15.0'	58.4'
16	59°38.76	25.69	355°0.75	11.9'	$11^{\circ}17.05$	-15.0'	58.4'
17	74°38.63	25.72	9°31.64	12.0'	11°2.03	-15.1'	58.4'
18 19	89°38.49 104°38.35	N23°25.75 25.78	24°2.62 38°33.69	12.1' 12.2'	N10°46.98 10°31.89	-15.1' -15.1'	58.3' 58.3'
20	119°38.21	25.76	53°4.87	12.3'	10° 16.77	-15.1'	58.2
21	134°38.08	• • 25.83	67°36.14	12.4'	10°1.63	-15.2'	58.2'
22	149°37.94	25.85	82°7.50	12.5'	$09^{\circ}46.46$	-15.2'	58.2'
23	164°37.80	25.88	96°38.95	12.5'	09°31.26	-15.2'	58.1'
	SD = 15.7'	d = 0.0'		SI	O = 16.1'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0	179°37.67	N23°25.90	111° 10.49	12.6'	N09° 16.04	-15.2'	58.1'
1	194°37.53	25.92	125°42.12	12.7'	$09^{\circ}0.79$	-15.3'	58.0'
2	209°37.39 224°37.25	25.95	140°13.84	12.8' 12.9'	08° 45.53	-15.3'	58.0'
3 4	224°37.25 239°37.12	· · 25.97 25.99	154° 45.64 169° 17.52	13.0'	08°30.24 08°14.94	-15.3' -15.3'	58.0' 57.9'
5	254°36.98	26.01	183°49.49	13.0'	06 14.94 07°59.62	-15.3'	57.9'
6	269°36.84	N23°26.03	198°21.54	13.1'	N07°44.28	-15.4'	57.9'
7	284°36.71	26.05	212°53.67	13.2'	07°28.93	-15.4'	57.8'
8	299°36.57 314°36.43	26.06	227°25.88 241°58.16	13.3'	07°13.56 06°58.19	-15.4'	57.8'
9 10	314°36.43 329°36.30	· · 26.08 26.10	241°58.16 256°30.52	13.4' 13.4'	06°58.19 06°42.80	-15.4' -15.4'	57.7' 57.7'
11	344°36.16	26.11	271°2.96	13.5'	06° 27.40	-15.4'	57.7'
12	359°36.02	N23°26.13	285°35.46	13.6'	N06°12.00	-15.4'	57.6'
13	14°35.89	26.14	300°8.04	13.6'	05°56.59	-15.4'	57.6'
14 15	29°35.75 44°35.61	26.16 •• 26.17	314°40.68 329°13.39	13.7' 13.8'	05°41.17 05°25.75	-15.4' -15.4'	57.5' 57.5'
15 16	44 35.61 59°35.47	26.17	329°13.39 343°46.17	13.8'	05° 25.75 05° 10.33	-15.4' -15.4'	57.5'
17	74°35.34	26.19	358° 19.02	13.9'	04°54.91	-15.4'	57.4'
18	89°35.20	N23°26.20	12°51.93	14.0'	N04°39.48	-15.4'	57.4'
19	104°35.06	26.21	27°24.89	14.0'	04°24.06	-15.4'	57.3'
20 21	119°34.93 134°34.79	26.22 •• 26.23	41°57.92 56°31.01	14.1' 14.1'	04°8.63 03°53.21	-15.4' -15.4'	57.3' 57.3'
21	134°34.79 149°34.65	26.23	56°31.01 71°4.16	14.1'	03°53.21 03°37.79	-15.4' -15.4'	57.3° 57.2'
23	164°34.52	26.24	85°37.36	14.3'	03°22.38	-15.4'	57.2'
	SD = 15.7'	d = 0.0'		SI	D = 15.8'		
					10.0		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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	////
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	07:11	08:07	09:05	14:58	15:55	16:52
	1			1		

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

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
,	00 <sup>h</sup>	12 <sup>h</sup>	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	

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA
0	269° 12.51	137°28.31 N19°59.36	217°4.33 N18°27.93	148°58.30 N20°58.27	255°42.61 N03°14.51	
1	284° 14.98	152°27.83 58.56	232°4.96 28.39	164° 0.22 58.17	270°44.94 14.55	Alpheratz 357°33.54
2	299° 17.44	167°27.35 57.77	247°5.59 28.86	179° 2.14 58.06	285°47.27 14.60	Ankaa 353° 6.01
3	314° 19.90	182°26.87 · · 56.97	262°6.21 · · 29.33	194° 4.05 · · 57.96	300°49.59 · · 14.65	Schedar 349°29.76
4	329°22.37	197°26.38 56.18	277°6.84 29.79	209° 5.97 57.86	315°51.92 14.69	Diphda 348°46.16
5	344°24.83	212°25.90 55.38	292°7.47 30.26	224°7.89 57.76	330°54.24 14.74	Achernar 335° 19.55
6	359°27.30	227°25.42 N19°54.58	307°8.09 N18°30.73	239° 9.81 N20° 57.66	345°56.57 N03°14.78	Hamal 327°50.03
7	14°29.76	242°24.94 53.78	322°8.72 31.19	254°11.73 57.55	0°58.90 14.83	Polaris 313°46.47
8	29°32.22	257°24.47 52.98	337°9.35 31.66	269°13.64 57.45	16°1.23 14.88	Acamar 315°11.17
9	44°34.69	272°23.99 · · 52.18	352°9.97 · · 32.12	284°15.56 · · 57.35	31°3.55 · · 14.92	Menkar 314°5.13
10	59°37.15	287°23.51 51.38	7°10.60 32.59	299°17.48 57.25	46°5.88 14.97	Mirfak 308°26.93 Aldebaran 290°38.57
11	74°39.62	302°23.04 50.58	22°11.22 33.05	314°19.40 57.15	61°8.21 15.01	
12	89°42.08	317°22.56 N19°49.77	37°11.85 N18°33.51	329°21.31 N20°57.04	76°10.54 N03°15.06	Rigel 281°3.05 Capella 280°20.59
13	104°44.55	332°22.09 48.97	52°12.48 33.98	344°23.23 56.94	91°12.86 15.10	Bellatrix 278°21.93
14	119°47.01	347°21.61 48.17	67°13.10 34.44	359°25.15 56.84	106°15.19 15.15	Elnath 278° 0.73
15	134°49.47	2°21.14 · · 47.36	82°13.73 · · 34.90	14°27.07 · · 56.74	121°17.52 · · 15.20	Alnilam 275°36.85
16	149°51.94	17°20.67 46.55	97° 14.36 35.37	29°28.98 56.63	136°19.85 15.24	Betelgeuse 270°51.13
17	164°54.40	32°20.19 45.75	112°14.98 35.83	44°30.90 56.53	151°22.18 15.29	Canopus 263°52.42
18	179° 56.87	47°19.72 N19°44.94	127°15.61 N18°36.29	59°32.82 N20°56.43	166°24.50 N03°15.33	Sirius 258°25.53
19	194° 59.33	62°19.25 44.13	142°16.23 36.75	74°34.73 56.33	181°26.83 15.38	Adhara 255° 5.30
20	210°1.79	77°18.78 43.32	157°16.86 37.21	89°36.65 56.22	196°29.16 15.42	Procyon 244°49.89
21	225°4.26	92°18.31 · · 42.51	172°17.48 · · 37.67	104°38.57 · · · 56.12 119°40.48 56.02	211°31.49 · · 15.47	Pollux 243°16.19
22	240°6.72 255°9.19	107°17.85 41.70 122°17.38 40.88	187°18.11 38.14 202°18.74 38.60		226°33.82 15.51 241°36.15 15.56	Avior 234°14.80
23	255 9.19					Suhail 222°45.75
Mer.p	pass. 06:02	u-0.5 $'$ $d$ -0.8 $'$ m-4.01	$ u 0.6' \ d0.5' \ m1.29$	$ u 1.9' \ d$ -0.1' m-1.83	$\nu 2.3' \ d0.0' \ m0.81$	Miaplacidus 221°38.70
					-	Alphard 217°46.79
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.33
0	270°11.65	137°16.91 N19°40.07	217°19.36 N18°39.06	149°44.32 N20°55.81	256°38.48 N03°15.60	Dubhe 193°39.73
1	285° 14.11	152°16.44 39.26	232°19.99 39.52	164°46.23 55.71	271°40.81 15.65	Denebola 182°23.75
2	300° 16.58	167°15.98 38.44	247°20.61 39.97	179°48.15 55.61	286°43.14 15.69	Gienah 175°42.33
3	315° 19.04	182°15.51 · · 37.62	262°21.24 · · 40.43	194°50.07 · · 55.50	301°45.47 · · 15.74	Acrux 172°58.67
4	330°21.51	197°15.05 36.81	277°21.86 40.89	209°51.98 55.40	316°47.80 15.78	Gacrux 171°50.22
5	345°23.97	212°14.59 35.99	292°22.49 41.35	224°53.90 55.30	331°50.13 15.83	Alioth 166°11.78
6	0°26.43	227°14.12 N19°35.17	307°23.11 N18°41.81	239°55.82 N20°55.19	346°52.46 N03°15.87	Spica 158°20.91
7	15°28.90	242°13.66 34.35	322°23.74 42.27	254°57.73 55.09	1°54.79 15.91	Alkaid 152°50.83
8	30°31.36	257°13.20 33.53	337°24.36 42.72	269°59.65 54.99	16°57.12 15.96	Hadar 148°33.93 Menkent 147°55.97
9	45°33.83	272°12.74 · · 32.71	352°24.99 · · 43.18	285°1.57 · · 54.88	31°59.45 · · 16.00	Arcturus 147 55.97
10	60°36.29	287°12.28 31.89	7°25.61 43.64	300° 3.48 54.78	47°1.78 16.05	Rigil Kent. 139°38.20
11	75°38.75	302°11.82 31.07	22°26.24 44.09	315° 5.40 54.68	62°4.11 16.09	Kochab 137°19.01
12	90°41.22	317°11.36 N19°30.25	37°26.86 N18°44.55	330°7.31 N20°54.57	77°6.44 N03°16.14	Zuben'ubi 136°54.44
13	105°43.68	332°10.91 29.42	52°27.49 45.01	345° 9.23 54.47	92°8.77 16.18	Alphecca 126°2.42
14	$120^{\circ}46.15$	347°10.45 28.60	67°28.11 45.46	0°11.14 54.37	107°11.10 16.22	Antares 112°14.01
15	135°48.61	2°9.99 · · 27.77	82°28.74 · · 45.92	15°13.06 · · 54.26	122°13.43 · · 16.27	Atria 107° 6.58
16	150°51.08	17°9.54 26.94	97°29.36 46.37	30°14.98 54.16	137°15.76 16.31	Sabik 102°1.06
17	165°53.54	32°9.08 26.12	112°29.99 46.83	45°16.89 54.06	152°18.10 16.36	Shaula 96°8.31
18	180°56.00	47°8.63 N19°25.29	127°30.61 N18°47.28	60°18.81 N20°53.95	167°20.43 N03°16.40	Rasalhague 95°57.09
19	195°58.47	62°8.17 24.46	142°31.24 47.73	75°20.72 53.85	182°22.76 16.44	Eltanin 90°41.08
20	211°0.93	77°7.72 23.63	157°31.86 48.19	90°22.64 53.75	197°25.09 16.49	Kaus Aust. 83°30.51
21	226°3.40	92°7.27 · · 22.80	172°32.49 · · 48.64	105°24.55 · · 53.64	212°27.42 · · 16.53	Vega 80°31.98
22	241°5.86 256°8.32	107°6.82 21.97 122°6.37 21.14	187°33.11 49.09 202°33.74 49.55	120°26.47 53.54 135°28.38 53.44	227°29.76 16.57 242°32.09 16.62	Nunki 75°45.90
23	250 0.32	122°6.37 21.14	202 33.74 49.55	135°28.38 53.44	242°32.09 16.62	Altair 61°58.48
Mer.p	oass. 05:58	u-0.5 $'$ d-0.8 $'$ m-4.01	$ u 0.6' \ d 0.5' \ { m m} 1.29$	$ u 1.9' \ d$ -0.1' m-1.83	$\nu 2.3' \ d0.0' \ m0.81$	Peacock 53° 3.35
						Deneb 49°24.61
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°37.42
0	271° 10.79	137°5.92 N19°20.30	217°34.36 N18°50.00	150°30.30 N20°53.33	257°34.42 N03°16.66	Al Na'ir 27°31.18
1	286° 13.25	152°5.47 19.47	232°34.98 50.45	165°32.21 53.23	272°36.75 16.70	Fomalhaut 15°13.09
2	301° 15.72	167°5.02 18.63	247°35.61 50.90	180°34.13 53.12	287°39.09 16.75	Scheat 13°43.94 Markab 13°28.61
3	316° 18.18	182°4.57 · · 17.80	262°36.23 · · 51.35	195°36.04 · · 53.02	302°41.42 · · 16.79	IVIARKAD 13 28.01
4	331°20.64	197°4.13 16.96	277°36.86 51.80	210°37.96 52.92	317°43.75 16.83	Jun 21 Sun SHA
5	346°23.11	212°3.68 16.13	292°37.48 52.25	225°39.87 52.81	332°46.09 16.88	Venus 228°15.80
6	1°25.57	227°3.23 N19°15.29	307°38.10 N18°52.71	240°41.79 N20°52.71	347°48.42 N03°16.92	Mars 307°51.82
7	16°28.04	242°2.79 14.45	322°38.73 53.15	255°43.70 52.60	2°50.75 16.96	Jupiter 239°45.79
8	31°30.50	257°2.34 13.61	337°39.35 53.60	270°45.62 52.50	17°53.09 17.01	Saturn 346°30.10
9	46°32.96	272°1.90 · · 12.77	352°39.98 · · 54.05	285°47.53 · · 52.40	32°55.42 · · 17.05	Jun 22 Mon SHA
10	61°35.43	287°1.46 11.93	7°40.60 54.50	300°49.45 52.29	47°57.76 17.09	Venus 227° 5.26
11	76°37.89	302°1.02 11.09	22°41.22 54.95	315°51.36 52.19	63°0.09 17.13	Mars 307° 7.71
12	91°40.36	317°0.58 N19°10.24	37°41.85 N18°55.40	330°53.28 N20°52.08	78°2.42 N03°17.18	Jupiter 239°32.67
13	106° 42.82	332°0.14 9.40	52°42.47 55.85	345°55.19 51.98	93°4.76 17.22	Saturn 346°26.83
14	121°45.29	346°59.70 8.56	67°43.09 56.30	0°57.10 51.87	108°7.09 17.26	
15	136° 47.75	1°59.26 · · 7.71	82°43.72 · · 56.74	15°59.02 · · 51.77	123°9.43 · · 17.31	Jun 23 Tue SHA
16	151°50.21	16° 58.82 6.87	97°44.34 57.19	31°0.93 51.66	138°11.76 17.35	Venus 225°55.13
17 18	166° 52.68 181° 55.14	31°58.38 6.02 46°57.94 N19°5.17	112°44.97 57.64 127°45.59 N18°58.08	46°2.85 51.56 61°4.76 N20°51.46	153°14.10 17.39 168°16.43 N03°17.43	Mars 306°23.57
19	196° 57.61	61°57.51 4.32	142°46.21 58.53	76°6.67 51.35	183°18.77 17.47	Jupiter 239°19.51
20	212°0.07	76°57.07 3.47	157°46.84 58.97	91°8.59 51.25	198°21.10 17.52	Saturn 346°23.63
21	227°2.53	91°56.64 · · 2.62	172°47.46 · · 59.42	106°10.50 · · 51.14	213°23.44 · · 17.56	Horizontal parallax
22	242°5.00	106°56.20 1.77	187°48.08 18°59.86	121°12.42 51.04	228°25.78 17.60	Venus:
23	257°7.46	121°55.77 0.92	202°48.70 19°0.31	136°14.33 50.93	243°28.11 17.64	Mars:
ivier.p	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	

**Dec** 29°14.08

-42°9.44

56°40.72 -17°50.33

 $\text{-}57^{\circ}5.82$ 

 $23^{\circ}35.18$ 

 $89^{\circ}22.29$ 

-40°11.70 4°11.63

49°57.16

16°33.72

 $-8^{\circ}10.23$ 

 $46^{\circ}1.41$ 

 $6^{\circ}22.42$ 

28°37.75

 $-1^{\circ}11.09$ 

7°24.72 -52°42.57

-16°45.16

-29°0.51

 $27^{\circ}57.76$ 

-59°35.81

-43°32.55 -69°49.78

-8°46.48

11°50.28

61°36.73 14°25.48

-17°41.49

 $-63^{\circ}15.09$ 

 $-57^{\circ}16.01$ 

55°49.18 -11°18.08

49°11.04

-60°30.32

-36°30.22

19°2.72 -60°56.94

74°2.95 -16°9.21

26°37.58 -26°29.50

-69°4.57 -15°45.48

 $\text{-}37^{\circ}7.38$ 

12°32.44 51°29.08

-34°22.27

38°48.44

-26°15.76

 $-56^{\circ}38.77$ 

45°22.34

9°59.77

-46°49.69 -29°28.71

28°13.48 15°20.82

Mer.pass

14:51

09:31

14:02

06:56 Mer.pass

14:51

09:30 13:59

06:52 Mer.pass 14:52

09:29

13:56 06:49

0.1

0.1

8°56.29

 $5^{\circ}9.42$ 

h	Su	n	Moon				
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°34.38	N23°26.25	$100^{\circ}10.62$	14.3'	N03°6.97	-15.4'	57.2'
1	194°34.24	26.26	114°43.93	14.4'	02°51.58	-15.4'	57.1'
2	209°34.11 224°33.97	26.26 •• 26.27	129° 17.29 143° 50.71	14.4' 14.5'	02°36.18 02°20.80	-15.4' -15.4'	57.1' 57.0'
4	239°33.83	26.27	158° 24.17	14.5'	02°5.43	-15.4	57.0'
5	254°33.70	26.27	$172^{\circ}57.68$	14.6'	$01^{\circ}50.07$	-15.3'	57.0'
6	269°33.56	N23°26.27	187°31.23	14.6'	N01°34.72	-15.3'	56.9'
7 8	284°33.42 299°33.29	26.28 26.28	202°4.83 216°38.48	14.6' 14.7'	01°19.39 01°4.07	-15.3' -15.3'	56.9' 56.9'
9	314°33.15	26.28	231° 12.16	14.7'	00° 48.76	-15.3'	56.8'
10	329°33.01	26.27	245°45.89	14.8'	$00^{\circ}33.47$	-15.3'	56.8'
11	344°32.88 359°32.74	26.27 N23°26.27	260° 19.66 274° 53.46	14.8'	00°18.20 N00°2.95	-15.3'	56.8'
12 13	359 32.74 14°32.60	26.27	274 53.40 289°27.30	14.8' 14.9'	500° 12.29	-15.2' 15.2'	56.7' 56.7'
14	29°32.47	26.26	304°1.18	14.9'	00° 27.50	15.2'	56.6'
15	44°32.33	•• 26.26	318°35.08	14.9'	00°42.70	15.2'	56.6'
16	59°32.20 74°32.06	26.25 26.25	333°9.03 347°43.00	15.0' 15.0'	00°57.87 01°13.02	15.1' 15.1'	56.6'
17 18	89°31.92	20.25 N23°26.24	2°17.00	15.0'	501°28.14	15.1	56.5' 56.5'
19	104°31.79	26.23	16°51.03	15.1'	01°43.24	15.1'	56.5'
20	119°31.65	26.23	31°25.09	15.1'	01°58.32	15.0'	56.4'
21	134°31.51	• • 26.22	45°59.17	15.1'	02°13.37 02°28.39	15.0'	56.4
22 23	149°31.38 164°31.24	26.21 26.20	60°33.28 75°7.41	15.1' 15.2'	02°28.39 02°43.39	15.0' 15.0'	56.4' 56.3'
_5	SD = 15.7'	d = 0.0'	.0 7.11		D = 15.6'		
	<u> </u>	u — 0.0		اد			
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°31.11	N23°26.19	89° 41.57 104° 15.74	15.2'	\$02°58.35 03°13.29	14.9'	56.3'
1 2	194°30.97 209°30.83	26.18 26.16	104° 15.74 118° 49.93	15.2' 15.2'	03°13.29 03°28.19	14.9' 14.9'	56.3' 56.2'
3	224°30.70	26.15	133°24.14	15.2'	03°43.07	14.8'	56.2'
4	239°30.56	26.14	$147^{\circ}58.37$	15.2'	$03^{\circ}57.91$	14.8'	56.2'
5	254°30.43	26.12 N23°26.11	162°32.61 177°6.87	15.3'	04°12.72	14.8'	56.1'
6 7	269°30.29 284°30.15	26.09	177 0.87 191°41.14	15.3' 15.3'	\$04°27.49 04°42.23	14.7' 14.7'	56.1' 56.1'
8	299°30.02	26.07	206° 15.42	15.3'	04°56.94	14.7'	56.0'
9	314°29.88	• • 26.06	220°49.72	15.3'	05°11.60	14.6'	56.0'
10 11	329°29.75 344°29.61	26.04 26.02	235°24.02 249°58.33	15.3' 15.3'	05°26.24 05°40.83	14.6' 14.6'	56.0' 56.0'
12	359°29.47	N23°26.00	249 36.33 264°32.65	15.3'	\$05°55.39	14.5	55.9'
13	14°29.34	25.98	279°6.97	15.3'	06°9.90	14.5'	55.9'
14	29°29.20	25.96	293°41.29	15.3'	06°24.38	14.4'	55.9'
15 16	44°29.07 59°28.93	· · 25.94 25.92	308° 15.62 322° 49.96	15.3' 15.3'	06°38.81 06°53.20	14.4' 14.4'	55.8' 55.8'
17	74°28.80	25.89	337°24.29	15.3'	00° 33.20	14.3'	55.8'
18	89°28.66	N23°25.87	351°58.62	15.3'	<b>S</b> 07°21.86	14.3'	55.7'
19	104°28.53	25.84	6°32.96	15.3'	07°36.13	14.2'	55.7'
20 21	119°28.39 134°28.25	25.82 •• 25.79	21°7.28 35°41.61	15.3' 15.3'	07°50.34 08°4.52	14.2' 14.1'	55.7' 55.7'
22	149°28.12	25.77	50° 15.93	15.3'	08° 18.64	14.1	55.6'
23	164°27.98	25.74	64°50.24	15.3'	$08^{\circ}32.72$	14.0'	55.6'
	SD = 15.7'	d = -0.0'		SI	O = 15.4'		
Tue	GHA	Dec	GHA	ν	Dec	d	НР
0	179°27.85	N23°25.71	79°24.55	15.3'	508° 46.76	14.0'	55.6'
1	194°27.71	25.68	93°58.85	15.3'	09°0.74	13.9'	55.5'
2	209°27.58	25.65	108°33.14	15.3'	09°14.67 09°28.56	13.9'	55.5'
3 4	224°27.44 239°27.31	· · 25.62 25.59	123°7.42 137°41.69	15.3' 15.3'	09°28.56 09°42.39	13.8' 13.8'	55.5' 55.5'
5	254°27.17	25.56	152° 15.95	15.2'	09° 56.17	13.7	55.4'
6	269°27.04	N23°25.53	166° 50.19	15.2'	\$10°9.90	13.7'	55.4'
7	284°26.90	25.49	181°24.42	15.2'	10°23.58	13.6'	55.4'
8 9	299°26.77 314°26.63	25.46 •• 25.42	195°58.63 210°32.83	15.2' 15.2'	10°37.21 10°50.78	13.6' 13.5'	55.4' 55.3'
10	329°26.50	25.39	225°7.00	15.2'	11°4.29	13.5'	55.3'
11	344°26.36	25.35	239°41.16	15.1'	11° 17.75	13.4'	55.3'
12	359°26.23	N23°25.32	254° 15.30	15.1'	\$11°31.15	13.3'	55.3'
13 14	14°26.09 29°25.96	25.28 25.24	268° 49.42 283° 23.52	15.1' 15.1'	11°44.49 11°57.78	13.3' 13.2'	55.2' 55.2'
15	44°25.82	25.20	297°57.60	15.1'	12°11.01	13.2'	55.2'
16	59°25.69	25.16	312° 31.65	15.0'	12°24.18	13.1'	55.2'
17	74°25.55	25.12	327°5.67	15.0'	12°37.28	13.0'	55.1'
18 19	89°25.42 104°25.29	N23°25.08 25.04	341°39.67 356°13.65	15.0' 14.9'	\$12°50.33 13°3.32	13.0' 12.9'	55.1' 55.1'
20	119°25.15	25.00	10°47.60	14.9'	13° 16.24	12.9	55.1'
21	134°25.02	• • 24.95	$25^{\circ}21.52$	14.9'	13°29.10	12.8'	55.0'
22	149°24.88	24.91	39°55.41	14.9'	13°41.90	12.7'	55.0'
23	164°24.75	24.87	54°29.27	14.8'	13°54.63	12.7'	55.0'
	SD = 15.7'	d = -0.0'		SI	O = 15.2'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
<b>N</b> 70°						
68°						
66°						
64°	////	////	01:31	22:33	////	////
62°	////	////	02:10	21:54	////	////
60°	////	00:49	02:36	21:28	23:14	////
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	07:11	80:80	09:06	14:58	15:56	16:53

Lat.		Moonris	e		Moonset	i i
Lat.	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	11:42	11:41	11:41		00:22	01:50

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
- ",	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	6-8	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	41-61%	
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		

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	272°9.93	136°55.34 N19°0.07	217°49.33 N19°0.75	151°16.24 N20°50.83	258°30.45 N03°17.68	
1	287° 12.39	151°54.90 18°59.22	232°49.95 1.20	166°18.16 50.72	273°32.78 17.73	Alpheratz 357°33.51 29°14.09
2	302°14.85	166° 54.47 58.36	247°50.57 1.64	181°20.07 50.62	288°35.12 17.77	Ankaa 353°5.99 -42°9.44 Schedar 349°29.73 56°40.73
3	$317^{\circ}17.32$	181°54.04 · · 57.51	262°51.20 · · 2.08	196°21.98 · · 50.51	303°37.46 · · 17.81	Diphda 348°46.14 -17°50.32
4	332° 19.78	196°53.61 56.65	277°51.82 2.53	211°23.90 50.41	318°39.79 17.85	Achernar 335°19.52 -57°5.81
5	347°22.25	211°53.18 55.80	292°52.44 2.97	226°25.81 50.30	333°42.13 17.89	Hamal 327°50.01 23°35.18
6 7	2°24.71 17°27.18	226°52.76 N18°54.94 241°52.33 54.08	307°53.07 N19°3.41 322°53.69 3.85	241°27.72 N20°50.20 256°29.64 50.09	348°44.47 N03°17.94 3°46.80 17.98	Polaris 313°45.18 89°22.28
8	32°29.64	256°51.90 53.22	337°54.31 4.30	271°31.55 49.99	18°49.14 18.02	Acamar 315°11.15 -40°11.69
9	47°32.10	271°51.47 · · 52.36	352°54.93 · · 4.74	286°33.46 · · 49.88	33°51.48 · · 18.06	Menkar 314°5.11 4°11.64
10	62°34.57	286°51.05 51.50	7°55.56 5.18	301°35.38 49.78	48°53.82 18.10	Mirfak 308°26.90 49°57.15
11	77° 37.03	301°50.62 50.64	22°56.18 5.62	316°37.29 49.67	63°56.15 18.14	Aldebaran 290°38.55 16°33.72 Rigel 281°3.04 -8°10.23
12	92°39.50	316°50.20 N18°49.78	37°56.80 N19°6.06	331°39.20 N20°49.56	78°58.49 N03°18.18	Capella 280°20.58 46°1.40
13	107°41.96	331°49.78 48.92	52°57.42 6.50	346°41.12 49.46	94°0.83 18.22	Bellatrix 278°21.92 6°22.42
14 15	122° 44.42 137° 46.89	346°49.35 48.05 1°48.93 · · 47.19	67° 58.05 6.94 82° 58.67 · · 7.38	1°43.03 49.35 16°44.94 • 49.25	109°3.17 18.27 124°5.51 · · 18.31	Elnath 278° 0.72 28° 37.74
16	152° 49.35	16°48.51 46.33	97°59.29 7.82	31°46.85 49.14	139°7.84 18.35	Alnilam 275°36.84 -1°11.09
17	167°51.82	31°48.09 45.46	112°59.91 8.26	46°48.77 49.04	154°10.18 18.39	Betelgeuse 270°51.12 7°24.72
18	182°54.28	46°47.67 N18°44.59	128°0.53 N19°8.70	61°50.68 N20°48.93	169°12.52 N03°18.43	Canopus 263°52.42 -52°42.55 Sirius 258°25.53 -16°45.15
19	197°56.74	61°47.25 43.73	143°1.16 9.13	76°52.59 48.83	184°14.86 18.47	Adhara 255°5.30 -29°0.50
20	212°59.21	76°46.83 42.86	158°1.78 9.57	91°54.51 48.72	199°17.20 18.51	Procyon 244°49.89 5°9.42
21	228°1.67	91°46.42 · · 41.99	173°2.40 · · 10.01	106°56.42 · · 48.61	214°19.54 · · 18.55	Pollux 243°16.19 27°57.76
22 23	243°4.14 258°6.60	106°46.00 41.12 121°45.58 40.25	188°3.02 10.45 203°3.65 10.88	121°58.33 48.51 137°0.24 48.40	229°21.88 18.59 244°24.22 18.63	Avior 234°14.81 -59°35.80
23	256 0.00			-		Suhail 222°45.76 -43°32.54
Mer.p	pass. 05:50	$\nu$ -0.4′ $d$ -0.9′ m-4.02	$ u 0.6' \ d0.4' \ m1.30$	$ u 1.9' \ d$ -0.1' m-1.82	$\nu 2.3' \ d0.0' \ m0.80$	Miaplacidus 221°38.72 -69°49.77
						Alphard 217°46.80 -8°46.47
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.34 11°50.29 Dubhe 193°39.76 61°36.73
0	273°9.07	136°45.17 N18°39.38	218°4.27 N19°11.32	152°2.15 N20°48.30	259°26.56 N03°18.67	Denebola 182°23.76 14°25.48
1	$288^{\circ}11.53$	151°44.75 38.51	233°4.89 11.76	167° 4.07 48.19	274°28.90 18.71	Gienah 175°42.34 -17°41.48
2	303°13.99	166°44.34 37.64	248°5.51 12.19	182°5.98 48.09	289°31.23 18.75	Acrux 172°58.69 -63°15.09
3	318° 16.46	181°43.93 · · 36.76	263°6.13 · · 12.63	197° 7.89 · · 47.98	304°33.57 · · 18.79	Gacrux 171°50.24 -57°16.01
4 5	333° 18.92 348° 21.39	196° 43.51 35.89 211° 43.10 35.01	278°6.75 13.06 293°7.38 13.50	212° 9.80 47.87 227° 11.72 47.77	319°35.91 18.83 334°38.26 18.87	Alioth 166°11.81 55°49.19
6	3°23.85	226°42.69 N18°34.14	308°8.00 N19°13.93	242°13.63 N20°47.66	349°40.60 N03°18.91	Spica 158°20.92 -11°18.07
7	18° 26.31	241°42.28 33.26	323°8.62 14.36	257°15.54 47.55	4°42.94 18.95	Alkaid 152° 50.85 49° 11.04 Hadar 148° 33.95 -60° 30.32
8	33°28.78	256°41.87 32.38	338°9.24 14.80	272°17.45 47.45	19°45.28 18.99	Hadar 148° 33.95 -60° 30.32 Menkent 147° 55.98 -36° 30.22
9	48°31.24	271°41.46 · · 31.51	353°9.86 · · 15.23	287°19.36 · · 47.34	34°47.62 · · 19.03	Arcturus 145°46.63 19°2.72
10	63°33.71	286°41.05 30.63	8°10.48 15.67	302°21.27 47.24	49°49.96 19.07	Rigil Kent. 139°38.22 -60°56.94
11	78°36.17	301°40.65 29.75	23°11.10 16.10	317°23.19 47.13	64°52.30 19.11	Kochab 137°19.06 74°2.96
12 13	93°38.63 108°41.10	316°40.24 N18°28.87 331°39.83 27.99	38°11.73 N19°16.53 53°12.35 16.96	332°25.10 N20°47.02 347°27.01 46.92	79°54.64 N03°19.15 94°56.98 19.19	Zuben'ubi 136°54.45 -16°9.20
14	123° 43.56	346°39.43 27.11	68°12.97 17.39	2°28.92 46.81	109°59.32 19.23	Alphecca 126°2.43 26°37.59
15	138° 46.03	1°39.02 · · 26.22	83°13.59 · · 17.83	17°30.83 · · 46.70	125°1.66 · · 19.27	Antares 112°14.01 -26°29.50
16	153°48.49	16°38.62 25.34	98°14.21 18.26	32°32.74 46.60	140°4.01 19.31	Atria 107°6.58 -69°4.58 Sabik 102°1.06 -15°45.47
17	168°50.96	31°38.22 24.46	113°14.83 18.69	47°34.65 46.49	155°6.35 19.35	Shaula 96°8.31 -37°7.38
18	183°53.42	46°37.81 N18°23.57	128°15.45 N19°19.12	62°36.57 N20°46.38	170°8.69 N03°19.39	Rasalhague 95°57.09 12°32.45
19	198° 55.88 213° 58.35	61°37.41 22.69	143°16.07 19.55	77°38.48 46.28	185°11.03 19.43	Eltanin 90°41.08 51°29.10
20 21	213 56.35 229°0.81	76° 37.01 21.80 91° 36.61 · · 20.91	158°16.69 19.98 173°17.32 · · 20.41	92°40.39 46.17 107°42.30 • 46.06	200°13.37 19.47 215°15.72 · · 19.51	Kaus Aust. 83°30.50 -34°22.27
22	244°3.28	106°36.21 20.02	188° 17.94 20.84	122°44.21 45.96	230°18.06 19.55	Vega 80°31.97 38°48.45
23	259°5.74	121°35.81 19.14	203°18.56 21.27	137°46.12 45.85	245°20.40 19.58	Nunki 75°45.89 -26°15.76 Altair 61°58.47 8°56.30
Morr	pass. 05:46	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	Peacock 53°3.33 -56°38.77
- Ivier.p	Dass. 05:40	ν-0.4 α-0.9 m-4.02	νο.ο αυ.4 m1.5υ	ν1.9 α-0.1 m-1.62	ν2.3 αυ.υ mu.ου	Deneb 49°24.60 45°22.36
						Enif 33°37.40 9°59.78
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°31.15 -46°49.69
0	274°8.20 289°10.67	136°35.42 N18°18.25 151°35.02 17.36	218°19.18 N19°21.69 233°19.80 22.12	152°48.03 N20°45.74 167°49.94 45.64	260°22.75 N03°19.62 275°25.09 19.66	Fomalhaut 15°13.07 -29°28.70
1 2	304° 13.13	151°35.02 17.36 166°34.62 16.47	248° 20.42 22.55	167°49.94 45.64 182°51.85 45.53	275°25.09 19.66 290°27.43 19.70	Scheat 13°43.92 28°13.49
3	319° 15.60	181°34.23 · · 15.57	263°21.04 · · 22.98	197°53.76 · · 45.42	305°29.78 · · 19.74	Markab 13°28.59 15°20.83
4	334°18.06	196°33.83 14.68	278°21.66 23.40	212°55.68 45.32	320°32.12 19.78	Jun 24 Wed SHA Mer.pass
5	$349^{\circ}20.53$	211°33.44 13.79	293°22.28 23.83	227°57.59 45.21	335°34.46 19.82	Venus 224°45.41 14:53
6	4°22.99	226°33.04 N18°12.90	308°22.90 N19°24.26	242°59.50 N20°45.10	350°36.81 N03°19.86	Mars 305°39.40 09:28
7	19°25.45	241°32.65 12.00	323°23.52 24.68	258° 1.41 44.99	5°39.15 19.89	Jupiter 239°6.32 13:53 Saturn 346°20.52 06:45
8 9	34°27.92	256°32.26 11.11	338°24.14 25.11	273°3.32 44.89	20°41.49 19.93 35°43.84 · · 19.97	Saturn 346°20.52 06:45
10	49°30.38 64°32.85	271°31.86 ·· 10.21 286°31.47 9.31	353°24.76 · · 25.54 8°25.38 25.96	288° 5.23 · · 44.78 303° 7.14 44.67	35°43.84 · · 19.97 50°46.18 20.01	Jun 25 Thu SHA Mer.pass
11	79°35.31	301°31.08 8.42	23°26.00 26.39	318° 9.05 44.57	65°48.53 20.05	Venus 223°36.10 14:53
12	94°37.77	316°30.69 N18°7.52	38°26.62 N19°26.81	333°10.96 N20°44.46	80°50.87 N03°20.09	Mars 304°55.20 09:27
13	$109^{\circ}40.24$	331°30.31 6.62	53°27.24 27.23	348°12.87 44.35	95°53.22 20.12	Jupiter 238° 53.09 13:50 Saturn 346° 17.49 06:41
14	124° 42.70	346°29.92 5.72	68°27.86 27.66	3°14.78 44.24	110°55.56 20.16	
15	139° 45.17	1°29.53 · · 4.82	83°28.48 · · 28.08	18°16.69 · · 44.14	125°57.91 · · 20.20	Jun 26 Fri SHA Mer.pass
16	154° 47.63	16°29.14 3.92	98°29.10 28.50	33°18.60 44.03	141° 0.25 20.24	Venus 222°27.21 14:54
17 18	169°50.10 184°52.56	31°28.76 3.02 46°28.37 N18°2.11	113°29.72 28.93 128°30.34 N19°29.35	48°20.51 43.92 63°22.42 N20°43.81	156°2.60 20.28 171°4.94 N03°20.31	Mars 304°10.97 09:26 Jupiter 238°39.83 13:47
19	199°55.02	61°27.99 1.21	143°30.96 29.77	78°24.33 43.71	186°7.29 20.35	Jupiter 238° 39.83 13:47 Saturn 346° 14.54 06:37
20	214° 57.49	76°27.60 18°0.31	158° 31.58 30.19	93°26.24 43.60	201°9.63 20.39	
21	229° 59.95	91°27.22 17°59.40	173°32.20 · · 30.62	108°28.15 · · 43.49	216°11.98 · · 20.43	Horizontal parallax
22	245°2.42	106°26.84 58.49	188° 32.82 31.04	123°30.06 43.38	231°14.33 20.46	Venus: 0.1
23	260°4.88	121°26.46 57.59	203°33.44 31.46	138°31.97 43.27	246°16.67 20.50	Mars: 0.1
Mer.p	pass. 05:43	$\nu$ -0.4′ $d$ -0.9′ m-4.03	$ u 0.6' \ d0.4' \ m1.30$	$\nu 1.9^{\prime}~d ext{-}0.1^{\prime}~ ext{m-}1.82$	$\nu 2.3' \ d0.0' \ m0.80$	

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°24.61	N23°24.82	69°3.10	14.8'	\$14°7.29	12.6'	55.0'
1	194°24.48	24.77	83°36.89	14.8'	14° 19.90	12.5'	54.9'
2	209°24.35	24.77	98°10.66	14.7	14° 19.90	12.5'	54.9'
3	209 24.33 224°24.21	24.68	112°44.39	14.7	14° 32.43	12.4	54.9'
4	239°24.08	24.63	127°18.09	14.7'	14° 57.29	12.3'	54.9'
5	254°23.94	24.58	141°51.75	14.6'	15°9.62	12.3'	54.9'
6	269°23.81	N23°24.53	156°25.38	14.6'	S15°21.88	12.2'	54.8'
7	284°23.68	24.48	170°58.97	14.6'	15°34.07	12.1'	54.8'
8	299°23.54	24.43	185°32.52	14.5	15°46.19	12.0'	54.8'
9	314°23.41	24.38	200°6.03	14.5'	15°58.23	12.0'	54.8'
10	329°23.27	24.33	214°39.51	14.4	16° 10.21	11.9'	54.8'
11	344°23.14	24.27	229°12.95	14.4	16°22.10	11.8'	54.7'
12	359°23.01	N23°24.22	243°46.34	14.4	S16°33.93	11.8'	54.7'
13	14°22.87	24.17	258°19.69	14.3'	16°45.68	11.7'	54.7'
14	29°22.74	24.11	272°53.01	14.3'	16°57.36	11.6'	54.7'
15	44°22.61	24.05	287°26.28	14.2'	17°8.95	11.5'	54.7'
16	59°22.47	24.00	301°59.50	14.2'	17°20.48	11.4'	54.6'
17	74°22.34	23.94	316°32.69	14.1'	17°31.92	11.4'	54.6'
18	89°22.21	N23°23.88	331°5.83	14.1'	S17°43.28	11.3'	54.6'
19	104°22.07	23.82	345°38.92	14.0'	17°54.57	11.2'	54.6'
20	119°21.94	23.76	0°11.97	14.0'	18°5.78	11.1'	54.6'
21	134°21.81	23.70	14°44.97	14.0'	18° 16.90	11.0'	54.6'
22	149°21.67	23.64	29°17.92	13.9'	18°27.94	11.0'	54.5'
23	164°21.54	23.58	43°50.83	13.9'	18° 38.91	10.9'	54.5'
							-
	SD = 15.7'	d = -0.0'		SE	0 = 15.0'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	НР
0	179°21.41	N23°23.52	58°23.69	13.8'	S18°49.78	10.8'	54.5'
1	194°21.27	23.45	72°56.50	13.8'	$19^{\circ}0.58$	10.7'	54.5'
2	209°21.14	23.39	87°29.27	13.7'	19°11.29	10.6'	54.5'
3	224°21.01	• • 23.33	102°1.98	13.7'	19°21.91	10.5'	54.5'
4	239°20.88	23.26	116°34.64	13.6'	19°32.45	10.5'	54.4'
5	254°20.74	23.19	131°7.26	13.6'	19°42.90	10.4'	54.4'
6	269°20.61	N23°23.13	145°39.82	13.5'	S19°53.26	10.3'	54.4'
7	284°20.48	23.06	160°12.33	13.5'	20°3.54	10.2'	54.4'
8	299°20.35	22.99	174°44.79	13.4'	$20^{\circ}13.72$	10.1'	54.4'
9	314°20.21	• • 22.92	189°17.20	13.4'	20°23.82	10.0'	54.4'
10	329°20.08	22.85	203°49.55	13.3'	20°33.83	9.9'	54.4'
11	344°19.95	22.78	218°21.86	13.2'	20°43.74	9.8'	54.3'
12	359°19.82	N23°22.71	232°54.11	13.2'	S20°53.56	9.7'	54.3'
13	14°19.68	22.64	247°26.30	13.1'	21°3.29	9.6'	54.3'
14	29°19.55	22.57	261°58.45	13.1'	21°12.93	9.5'	54.3'
15	44°19.42	• • 22.50	276°30.54	13.0'	21°22.47	9.4'	54.3'
16	59°19.29	22.42	291°2.57	13.0'	21°31.91	9.3'	54.3'
17	74°19.16	22.35	305°34.55	12.9'	21°41.26	9.3'	54.3'
18	89°19.02	N23°22.27	320°6.48	12.9'	S21°50.52	9.2'	54.3'
19	104°18.89	22.20	334°38.35	12.8'	21°59.67	9.1'	54.2'
20	119°18.76	22.12	349°10.17	12.8'	22°8.73	9.0'	54.2'
21	134°18.63	• • 22.04	3°41.93	12.7'	22°17.69	8.9'	54.2'
22	149°18.50	21.96	18°13.64	12.7'	22°26.55	8.8'	54.2'
23	164°18.37	21.88	32°45.29	12.6'	22°35.31	8.7'	54.2'
	SD = 15.7'	d = -0.1'		SE	0 = 14.9'		
F	CUA	D	CIIA		D	.,	LID
Fri	<b>GHA</b> 179°18.23	Dec	<b>GHA</b> 47°16.89	ν 12.Γ'	<b>Dec</b> \$22°43.96	d o.c.	HP
0 1	179°18.23 194°18.10	N23°21.80 21.72	47°16.89 61°48.43	12.5' 12.5'	22°52.52	8.6' 8.5'	54.2' 54.2'
2	209°17.97	21.72	76°19.92	12.5 12.4'	22 52.52 23°0.97	8.3'	54.2'
3	209 17.97 224°17.84	21.56	70 19.92 90°51.35	12.4'	23 0.97 23°9.32	8.2'	54.2'
3 4	239°17.71	21.48	90 51.35 105°22.73	12.4	23 9.32 23°17.57	8.1'	54.2 54.1'
5	254°17.58	21.40	119°54.05	12.3'	23°25.71	8.0'	54.1'
6	269°17.45	N23°21.31	134°25.31	12.2'	\$23°33.74	7.9	54.1
7	284°17.32	21.23	148°56.53	12.2'	23°41.67	7.8'	54.1'
8	299°17.18	21.14	163°27.68	12.1'	23°49.49	7.7'	54.1'
9	314°17.05	21.06	177°58.78	12.0'	23°57.20	7.6'	54.1'
10	329°16.92	20.97	192°29.83	12.0'	24°4.81	7.5	54.1'
11	344°16.79	20.88	207°0.82	11.9'	24° 12.31	7.4	54.1'
12	359°16.66	N23°20.79	221°31.76	11.9'	S24°19.69	7.3	54.1'
13	14°16.53	20.71	236°2.65	11.8'	24°26.97	7.2'	54.1'
14	29°16.40	20.62	250°33.48	11.8'	24°34.13	7.1	54.1'
15	44°16.27	20.53	265°4.26	11.7'	24°41.18	6.9'	54.1'
16	59°16.14	20.43	279°34.98	11.7'	24°48.12	6.8'	54.0'
17	74°16.01	20.34	294°5.65	11.6'	24°54.95	6.7'	54.0'
18	89°15.88	N23°20.25	308°36.27	11.6'	\$25°1.66	6.6'	54.0'
19	104°15.75	20.16	323°6.84	11.5'	25°8.26	6.5'	54.0'
20	119°15.62	20.06	337°37.36	11.5'	25° 14.74	6.4	54.0'
21	134°15.49	19.97	352°7.82	11.4'	25°21.11	6.2'	54.0'
22	149°15.36	19.87	6°38.24	11.4'	25°27.36	6.1'	54.0'
23	164°15.23	19.78	21°8.60	11.3'	25°33.49	6.0'	54.0'
	SD = 15.7'	d = -0.1'		ÇГ	0 = 14.8'		
	<u> </u>	<u>u – -0.1</u>		JL	_ 17.0		

			2026 Ju	ıne 24 t	to Jun.	26 U
Lat.	<b>Twi</b> Naut.	light Civil	Sunrise	Sunset	<b>Twi</b> Civil	light Naut.
N 72°						
N 70°						
68° 66°						
64°				22:32		////
62°	////	////	01:33	_	////	
62°	////	////	02:11	21:54	////	////
	////	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
<b>N</b> 40°	03:18	04:00	04:32	19:33	20:06	20:47
$35^{\circ}$	03:41	04:18	04:47	19:18	19:48	20:24
$30^{\circ}$	04:00	04:33	05:00	19:05	19:32	20:06
$20^{\circ}$	04:29	04:58	05:22	18:43	19:07	19:37
N $10^{\circ}$	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
<b>S</b> 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
<b>S</b> 50°	06:40	07:22	08:00	16:05	16:44	17:25
52°	06:45	07:22	08:10	15:55	16:36	17:20
54°	06:51	07:29	08:21	15:44	16:28	17:14
56°	06:57	07:46	08:34	15:32	16:19	17:14
58°	07:04	07:57	08:48	15:17	16:09	17:01
<b>S</b> 60°	07:12	08:08	09:06	14:59	15:57	16:54
		Moonris	:0		Moonset	
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°	vved	Tilu		vveu	Tilu	
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°		17:18	18:42	23:53		00:01
56°	15:52	17:18	18:23	23:33	00:04	00:01
54°	15:42 15:33	16:51				
			18:07	00:02	00:14	00:30
52° 50°	15:25 15:18	16:40 16:30	17:53 17:41	00:08	00:22 00:30	00:41 00:51
45°				1		
	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
<b>S</b> 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

30	12.01	12.11	12.21	05.00	07.21	05.72	
58°	11:52	11:59	12:10	03:08	04:33	05:58	
<b>S</b> 60°	11:42	11:44	11:49	03:18	04:47	06:18	
Sun				Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	9-11	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	70-86%	
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		

13:05

12:54

12:41

12:27

02:41

02:46

02:53

03:00

03:53

04:01

04:10

04:21

05:04

05:15

05:27

05:42

12:23

12:16

12:09

12:01

 $\text{S}~50^{\circ}$ 

52°

56°

12:41

12:33

12:23

12:11

h	Aries	Venus	Mars	Jupiter	Saturn	
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	
0	275°7.34	136°26.08 N17°56.68	218°34.06 N19°31.88	153°33.88 N20°43.17	261°19.02 N03°20.54	
1	290°9.81	151°25.70 55.77	233°34.68 32.30	168°35.79 43.06	276°21.37 20.58	Alpheratz
2	305°12.27	166°25.32 54.87	248°35.30 32.72	183°37.70 42.95	291°23.71 20.61	Ankaa Schedar
3	320° 14.74	181°24.94 · · 53.96	263°35.92 · · 33.14	198°39.61 · · 42.84	306°26.06 · · 20.65	Diphda
4	335° 17.20	196°24.56 53.05	278° 36.54 33.56	213°41.52 42.74	321°28.41 20.69	Achernar
5	350° 19.67	211°24.18 52.14	293°37.16 33.98	228°43.43 42.63	336°30.75 20.73	Hamal
6 7	5°22.13 20°24.59	226°23.81 N17°51.22 241°23.43 50.31	308°37.78 N19°34.39 323°38.40 34.81	243°45.33 N20°42.52 258°47.24 42.41	351°33.10 N03°20.76 6°35.45 20.80	Polaris
8	20 24.59 35°27.06	256°23.06 49.40	323°38.40 34.81 338°39.02 35.23	273°49.15 42.30	6°35.45 20.80 21°37.79 20.84	Acamar
9	50°29.52	271°22.68 · · 48.49	353°39.64 · · 35.65	288°51.06 · · 42.19	36°40.14 · · 20.87	Menkar
10	65°31.99	286°22.31 47.57	8°40.25 36.06	303°52.97 42.09	51°42.49 20.91	Mirfak
11	80°34.45	301°21.94 46.66	23°40.87 36.48	318°54.88 41.98	66°44.84 20.95	Aldebaran
12	95°36.92	316°21.56 N17°45.74	38°41.49 N19°36.90	333°56.79 N20°41.87	81°47.19 N03°20.98	Rigel Capella
13	110°39.38	331°21.19 44.82	53°42.11 37.31	348°58.70 41.76	96°49.53 21.02	Bellatrix
14	125°41.84	346°20.82 43.91	68° 42.73 37.73	4°0.61 41.65	111°51.88 21.06	Elnath
15	140°44.31	1°20.45 · · 42.99	83°43.35 · · 38.15	19°2.52 · · 41.54	126°54.23 · · 21.09	Alnilam
16 17	155° 46.77 170° 49.24	16°20.08 42.07 31°19.71 41.15	98° 43.97 38.56 113° 44.59 38.97	34° 4.42 41.44 49° 6.33 41.33	141°56.58 21.13 156°58.93 21.17	Betelgeuse
18	170 49.24 185°51.70	46°19.35 N17°40.23	113 44.59 36.97 128°45.21 N19°39.39	64°8.24 N20°41.22	172°1.28 N03°21.20	Canopus
19	200°54.16	61°18.98 39.31	143°45.82 39.80	79°10.15 41.11	187°3.63 21.24	Sirius
20	215° 56.63	76°18.61 38.39	158°46.44 40.22	94°12.06 41.00	202°5.98 21.27	Adhara
21	230°59.09	91°18.25 · · 37.47	173°47.06 · · 40.63	109°13.97 · · 40.89	217°8.33 · · 21.31	Procyon
22	246°1.56	106°17.88 36.54	188°47.68 41.04	124°15.88 40.78	232°10.68 21.35	Pollux
23	261°4.02	121°17.52 35.62	203°48.30 41.46	139°17.78 40.68	247°13.03 21.38	Avior Suhail
Merr	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	$\nu 2.3' \ d0.0' \ m0.79$	Miaplacidus
						Alphard
_	6114	G114 B	6114	6114	6114	Regulus
Sun	<b>GHA</b> 276°6.49	<b>GHA Dec</b> 136°17.16 N17°34.70	<b>GHA Dec</b> 218° 48.92 N19° 41.87	<b>GHA Dec</b> 154°19.69 N20°40.57	<b>GHA Dec</b> 262°15.38 N03°21.42	Dubhe
0 1	276°6.49 291°8.95	130°17.16 N17°34.70 151°16.79 33.77	218° 48.92 N19° 41.87 233° 49.54 42.28	169°21.60 40.46	262°15.38 NU3°21.42 277°17.73 21.45	Denebola
2	306° 11.41	166° 16.43 32.85	248° 50.15 42.69	184°23.51 40.35	292°20.08 21.49	Gienah
3	321°13.88	181°16.07 · · 31.92	263°50.77 · · 43.10	199°25.42 · · 40.24	307°22.43 · · 21.52	Acrux
4	336° 16.34	196°15.71 30.99	278°51.39 43.52	214°27.33 40.13	322°24.78 21.56	Gacrux
5	351° 18.81	211°15.35 30.06	293°52.01 43.93	229°29.23 40.02	337°27.13 21.60	Alioth Spica
6	6°21.27	226°14.99 N17°29.14	308°52.63 N19°44.34	244°31.14 N20°39.91	352°29.48 N03°21.63	Alkaid
7	21°23.73	241°14.63 28.21	323°53.25 44.75	259°33.05 39.80	7°31.83 21.67	Hadar
8	36°26.20	256° 14.27 27.28	338° 53.86 45.16	274°34.96 39.69	22°34.18 21.70	Menkent
9	51°28.66	271°13.92 · · 26.35	353°54.48 · · 45.57	289°36.87 · · 39.59	37°36.53 · · 21.74	Arcturus
10 11	66°31.13 81°33.59	286°13.56 25.42 301°13.21 24.48	8°55.10 45.98 23°55.72 46.38	304°38.77 39.48 319°40.68 39.37	52°38.88 21.77 67°41.23 21.81	Rigil Kent.
12	96°36.06	316°12.85 N17°23.55	38°56.34 N19°46.79	334°42.59 N20°39.26	82°43.59 N03°21.84	Kochab
13	111°38.52	331°12.50 22.62	53°56.95 47.20	349°44.50 39.15	97°45.94 21.88	Zuben'ubi
14	126° 40.98	346°12.14 21.68	68° 57.57 47.61	4°46.41 39.04	112°48.29 21.91	Alphecca
15	141°43.45	1°11.79 · · 20.75	83°58.19 · · 48.02	19°48.31 · · 38.93	127°50.64 · · 21.95	Antares Atria
16	156° 45.91	16°11.44 19.81	98°58.81 48.42	34°50.22 38.82	142°52.99 21.98	Sabik
17	171°48.38	31°11.09 18.88	113°59.43 48.83	49°52.13 38.71	157°55.35 22.02	Shaula
18	186° 50.84	46°10.74 N17°17.94	129°0.04 N19°49.24	64°54.04 N20°38.60	172°57.70 N03°22.05	Rasalhague
19	201°53.31	61°10.39 17.00	144°0.66 49.64	79°55.94 38.49	188°0.05 22.09	Eltanin
20	216° 55.77 231° 58.23	76°10.04 16.06 91°9.69 · · 15.13	159°1.28 50.05 174°1.90 · · 50.45	94°57.85 38.38 109°59.76 · · 38.27	203°2.40 22.12 218°4.76 · · 22.16	Kaus Aust.
21 22	231 58.23 247°0.70	106°9.34 14.19	174°1.90 · · 50.45 189°2.51 50.86	109°59.76 · · 38.27 125°1.67 38.16	218° 4.76 · · · 22.16 233° 7.11	Vega
23	262°3.16	121°9.00 13.25	204°3.13 51.26	140° 3.57 38.05	248° 9.46 22.23	Nunki
						Altair
Mer.p	pass. 05:35	ν-0.4' d-0.9' m-4.04	$\nu$ 0.6′ $d$ 0.4′ $m$ 1.30	$\nu 1.9' \ d$ -0.1' m-1.81	ν2.4' d0.0' m0.79	Peacock Deneb
						Enif
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir
0	277°5.63	136°8.65 N17°12.30	219°3.75 N19°51.67	155°5.48 N20°37.94	263°11.82 N03°22.26	Fomalhaut
1	292°8.09	151°8.30 11.36	234°4.37 52.07	170°7.39 37.83	278°14.17 22.29	Scheat
2	307°10.55	166°7.96 10.42	249°4.98 52.47	185° 9.29 37.72	293°16.52 22.33	Markab
3 4	322° 13.02 337° 15.48	181°7.62 · · 9.48 196°7.27 8.53	264°5.60 · · 52.88 279°6.22 53.28	200°11.20 · · 37.61 215°13.11 37.50	308°18.88 · · 22.36 323°21.23	Jun 27 Sat
4 5	352° 17.95	211°6.93 7.59	279 6.22 53.28 294°6.83 53.68	230°15.01 37.39	323 21.23 22.40 338°23.59 22.43	Venus
6	7° 20.41	226°6.59 N17°6.64	309°7.45 N19°54.09	245°16.92 N20°37.28	353°25.94 N03°22.46	Mars
7	22°22.88	241°6.25 5.70	324°8.07 54.49	260°18.83 37.17	8°28.29 22.50	Jupiter
8	37°25.34	256°5.91 4.75	339°8.69 54.89	275°20.74 37.06	23°30.65 22.53	Saturn
9	52°27.80	271°5.57 · · 3.80	354°9.30 · · 55.29	290°22.64 · · 36.95	38°33.00 · · 22.57	I 20 C
10	67° 30.27	286°5.23 2.86	9°9.92 55.69	305°24.55 36.84	53°35.36 22.60	Jun 28 Sun Venus
11	82°32.73	301°4.89 1.91	24° 10.54 56.09	320°26.46 36.73	68°37.71 22.63	Mars
12	97°35.20	316°4.55 N17°0.96	39°11.15 N19°56.49	335°28.36 N20°36.62	83°40.07 N03°22.67	Jupiter
13	112°37.66	331°4.22 17°0.01	54°11.77 56.89	350°30.27 36.51	98°42.42 22.70	Saturn
14 15	127° 40.13 142° 42.59	346°3.88 16°59.06 1°3.54 · · 58.11	69°12.39 57.29 84°13.00 · · 57.69	5°32.18 36.40 20°34.08 · · 36.29	113°44.78 22.73 128°47.13 · · 22.77	L 20 54
16	142 42.59 157° 45.05	16°3.21 57.16	99°13.62 58.09	35°35.99 36.18	143°49.49 22.80	Jun 29 Mon Venus
17	172° 47.52	31°2.88 56.20	114°14.24 58.49	50°37.89 36.07	158°51.85 22.83	Mars
18	187°49.98	46°2.54 N16°55.25	129°14.86 N19°58.89	65°39.80 N20°35.96	173°54.20 N03°22.87	Jupiter
19	202°52.45	61°2.21 54.30	144°15.47 59.29	80°41.71 35.85	188°56.56 22.90	Saturn
20	217° 54.91	76°1.88 53.34	159°16.09 19°59.68	95°43.61 35.74	203°58.91 22.93	
21	232°57.37	91°1.55 · · 52.39	174°16.70 20°0.08	110°45.52 · · 35.63	219°1.27 · · 22.97	Horizon
22	247°59.84	106°1.22 51.43	189°17.32 0.48	125°47.43 35.52	234°3.63 23.00	
23	263°2.30	121°0.89 50.47	204°17.94 0.87	140°49.33 35.41	249°5.98 23.03	
Mer.p	pass. 05:31	$\nu$ -0.3′ <i>d</i> -0.9′ m-4.04	$ u 0.6' \ d0.4' \ m1.30$	$\nu 1.9^{\prime}~d ext{-}0.1^{\prime}~ ext{m-}1.81$	$\nu 2.4' \ d0.0' \ m0.78$	

Gienah	175°42.34
Acrux	172°58.71
Gacrux	171°50.25
Alioth	$166^{\circ}11.83$
Spica	158°20.92
Alkaid	152°50.86
Hadar	148°33.96
Menkent	147°55.99
	145°46.63
	139°38.23
	137°19.11
	136°54.45
	126° 2.43
	112° 14.00
	107°6.58
	107 0.56 102°1.05
	96°8.30
	95°57.08
	90°41.07
	83°30.49
Vega	80°31.96
Nunki	75°45.88
Altair	61°58.45
Peacock	53°3.30
Deneb	49°24.57
Enif	33°37.38
Al Na'ir	27°31.13
Fomalhaut	15°13.04
Scheat	13°43.89
Markab	13°28.57
Jun 27 Sat	SHA
Venus	221°18.73
Mars	303°26.72
Jupiter	238°26.53
	346°11.67
	SHA
	220°10.67
	302°42.43
	238°13.21
Saturn	346°8.89
Jun 29 Mon	SHA
	219°3.02
	301°58.12
	237°59.85
Saturn	346°6.19
Horizor	ntal parallax
	Venus:
	Mars:
	Acrux Gacrux Alioth Spica Alkaid Hadar Menkent Arcturus Rigil Kent. Kochab Zuben'ubi Alphecca Antares Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Jun 27 Sat Venus Mars Jupiter Saturn  Jun 28 Sun Venus Mars Jupiter Saturn  Jun 29 Mon Venus Mars Jupiter Saturn  Jun 29 Mon Venus Mars Jupiter Saturn  Jun 29 Mon Venus Mars Jupiter Saturn

Stars SHA

 $357^{\circ}33.48$ 

349°29 68

348°46.11

 $335^{\circ}19.49$ 

 $327^{\circ}49.98$ 

313°43.69

315°11.13

 $314^{\circ}5.09$ 

308°26.87

290°38.54

281°3.02

 $280^{\circ}20.55$ 

 $278^{\circ}21.90$ 

278°0.70

275°36.83

 $270^{\circ}51.11$ 

263°52.41

258°25.52

255°5.29

244°49.89

 $243^{\circ}16.18$ 

234°14.82

222°45.77

221°38.75

217°46.80 207°33.34

193°39.78

182°23.76

 $175^{\circ}42.34$ 

353°5.96

Dec 29°14.10

-42°9.43

56°40.73

-17°50.31

 $\text{-}57^{\circ}5.80$ 

 $23^{\circ}35.19$ 

89°22.27

40°11.68

4°11.64

49°57.15

16°33.73

-8°10.22

 $46^{\circ}1.39$ 

 $6^{\circ}22.43$ 

28°37.74

 $-1^{\circ}11.08$ 

 $7^{\circ}24.72$ 

-52°42.54

-16°45.14

-29°0.49

 $27^{\circ}57.76$ 

-59°35.79

-43°32.53

-69°49.76

-8°46.47

11°50.29

61°36.72

 $14^{\circ}25.49$ 

-17°41.48

-63°15.10

-57°16.01

55°49.19 -11°18.07

49°11.05 -60°30.33

-36°30.22

 $19^{\circ}2.73$ 

74°2.97

-16°9.20

26°37.60 -26°29.50

-69°4.59

-15°45.47

 $\text{-}37^{\circ}7.38$ 

 $12^{\circ}32.46$ 

51°29.12

-34°22.27

38°48.47

-26°15.76 8°56.31

-56°38.77

45°22.38

 $9^{\circ}59.80$ 

-46°49.69

-29°28.69

28°13.50

15°20.85

Mer.pass

14:55

09:25

13:44

06:34

14:55

09:24

13:41

06:30

09:23

13:38

06:26

0.1

0.1

Mer.pass 14:56

Mer.pass

·60°56.95

 $5^{\circ}9.42$ 

h	Su	n	Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179° 15.10	N23°19.68	35°38.91	11.3'	S25°39.50	5.9'	54.0'
1	194°14.97	19.58	50°9.18	11.2'	25°45.40	5.8'	54.0'
2	209°14.84	19.49	64°39.39	11.2'	25°51.17	5.7'	54.0'
3	224° 14.71	• • 19.39	79°9.56	11.1'	25°56.83	5.5'	54.0'
4 5	239°14.58 254°14.45	19.29 19.19	93°39.68 108°9.76	11.1' 11.0'	26°2.36 26°7.78	5.4' 5.3'	54.0' 54.0'
6	269° 14.32	N23° 19.09	100 9.70 122°39.78	11.0'	\$26°13.07	5.2'	54.0'
7	284°14.19	18.98	137°9.76	10.9'	26°18.24	5.0'	54.0'
8	299°14.06	18.88	151°39.70	10.9'	26°23.29	4.9'	54.0'
9	314°13.94	• • 18.78	$166^{\circ}9.59$	10.8'	$26^{\circ}28.21$	4.8'	53.9'
10	329° 13.81	18.68	180°39.44	10.8'	26°33.01	4.7'	53.9'
11	344° 13.68 359° 13.55	18.57	195°9.25	10.8'	26°37.69	4.6'	53.9'
12 13	359° 13.55 14° 13.42	N23°18.47 18.36	209°39.01 224°8.74	10.7' 10.7'	\$26°42.24 26°46.66	4.4' 4.3'	53.9' 53.9'
14	29° 13.29	18.25	238° 38.42	10.7	26°50.96	4.2'	53.9'
15	44°13.16	. 18.15	253°8.06	10.6'	26°55.13	4.0'	53.9'
16	59°13.03	18.04	267°37.67	10.6'	$26^{\circ}59.18$	3.9'	53.9'
17	74°12.91	17.93	282°7.24	10.5'	27°3.09	3.8'	53.9'
18	89° 12.78	N23°17.82	296°36.77	10.5'	\$27°6.88	3.7'	53.9'
19	104° 12.65 119° 12.52	17.71	311°6.26 325°35.72	10.5'	27°10.54 27°14.08	3.5'	53.9'
20 21	119° 12.52 134° 12.39	17.60 •• 17.49	325°35.72 340°5.15	10.4' 10.4'	27°14.08 27°17.48	3.4' 3.3'	53.9' 53.9'
22	149° 12.26	17.38	354° 34.54	10.4	27°20.75	3.1'	53.9'
23	164°12.14	17.26	9°3.90	10.3'	27°23.89	3.0'	53.9'
	SD = 15.7'	d = -0.1'			0 = 14.7'		
		u — -U.1		JL	, — 14.1		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0 1	179° 12.01 194° 11.88	N23°17.15 17.03	23°33.23 38°2.53	10.3' 10.3'	\$27°26.90 27°29.78	2.9' 2.7'	53.9' 53.9'
2	194°11.88 209°11.75	17.03 16.92	38° 2.53 52° 31.80	10.3	27° 29.78 27° 32.53	2.6'	53.9' 53.9'
3	224°11.63	. 16.80	67°1.04	10.2'	27°35.15	2.5'	53.9'
4	239°11.50	16.69	81°30.26	10.2'	27°37.64	2.4'	53.9'
5	254° 11.37	16.57	95° 59.45	10.2'	27°39.99	2.2'	53.9'
6	269°11.24	N23°16.45	110°28.62	10.1'	\$27°42.21	2.1'	53.9'
7 8	284°11.12 299°10.99	16.33 16.21	124°57.76 139°26.88	10.1' 10.1'	27°44.29 27°46.25	2.0' 1.8'	53.9' 53.9'
9	314° 10.86	. 16.09	153° 55.98	10.1	27°48.07	1.7'	53.9'
10	329° 10.73	15.97	168°25.06	10.1'	27°49.75	1.6'	53.9'
11	344°10.61	15.85	$182^{\circ}54.12$	10.0'	$27^{\circ}51.30$	1.4'	53.9'
12	359° 10.48	N23°15.73	197°23.16	10.0'	S27°52.72	1.3'	53.9'
13	14° 10.35 29° 10.23	15.61	211°52.19 226°21.20	10.0' 10.0'	27°54.00 27°55.15	1.1'	53.9'
14 15	29 10.23 44°10.10	15.48 • • 15.36	240°50.20	10.0'	27°56.16	1.0' 0.9'	53.9' 53.9'
16	59°9.97	15.23	255° 19.18	10.0'	27°57.04	0.7	53.9'
17	74°9.85	15.11	269°48.15	10.0'	$27^{\circ}57.78$	0.6'	53.9'
18	89°9.72	N23°14.98	284° 17.12	10.0'	S27°58.39	0.5'	53.9'
19	104°9.60	14.85	298°46.07	9.9'	27°58.86	0.3'	53.9'
20	119°9.47 134°9.34	14.73 •• 14.60	313°15.01 327°43.95	9.9' 9.9'	27°59.20 27°59.40	0.2' 0.1'	53.9' 53.9'
21 22	134 9.34 149°9.22	14.47	342° 12.88	9.9 9.9'	27°59.46	-0.1	53.9'
23	164°9.09	14.34	356°41.81	9.9'	27°59.39	-0.2	53.9'
	SD = 15.7'	d = -0.1'		SE	0 = 14.7'		
Mon 0	<b>GHA</b> 179°8.97	<b>Dec</b> N23°14.21	<b>GHA</b> 11° 10.74	u 9.9'	<b>Dec</b> \$27°59.18	d -0.3'	<b>HP</b> 53.9'
1	179 8.97 194°8.84	14.08	25°39.66	9.9 9.9'	27°58.84	-0.5'	53.9' 53.9'
2	209°8.72	13.94	40°8.59	9.9'	27°58.36	-0.6	53.9'
3	224°8.59	• • 13.81	54°37.51	9.9'	27°57.74	-0.8'	53.9'
4	239°8.46	13.68	69°6.44	9.9'	27°56.99	-0.9'	53.9'
5	254°8.34 269°8.21	13.54 N23°13.41	83°35.37 98°4.30	9.9' 9.9'	27°56.10 \$27°55.08	-1.0' -1.2'	53.9' 53.9'
6 7	269°8.21 284°8.09	N23 13.41 13.27	98°4.30 112°33.24	9.9'	27°53.92	-1.2 -1.3'	53.9° 54.0'
8	299°7.96	13.14	127°2.19	10.0'	27°52.62	-1.4'	54.0'
9	314°7.84	• • 13.00	141°31.15	10.0'	27°51.19	-1.6'	54.0'
10	329°7.71	12.86	156°0.11	10.0'	27°49.63	-1.7'	54.0'
11	344°7.59	12.72	170°29.09	10.0'	27°47.93	-1.8'	54.0'
12 13	359°7.46 14°7.34	N23°12.59 12.45	184°58.08 199°27.08	10.0' 10.0'	\$27°46.09 27°44.12	-2.0' -2.1'	54.0' 54.0'
13 14	14° 7.34 29° 7.22	12.45 12.31	213° 56.10	10.0'	27°44.12 27°42.01	-2.1 -2.2'	54.0'
15	44°7.09	12.16	228°25.13	10.0'	27°39.77	-2.4	54.0'
16	59°6.97	12.02	$242^{\circ}54.18$	10.1'	27°37.39	-2.5'	54.0'
17	74°6.84	11.88	257°23.24	10.1'	27°34.88	-2.6'	54.0'
18	89°6.72	N23°11.74	271°52.33	10.1'	\$27°32.24	-2.8'	54.0'
19 20	104°6.60 119°6.47	11.59 11.45	286°21.44 300°50.56	10.1' 10.2'	27°29.46 27°26.55	-2.9' -3.0'	54.0' 54.0'
21	134°6.35	. 11.30	315° 19.71	10.2'	27°23.51	-3.0' -3.2'	54.0'
22	149°6.22	11.16	329°48.89	10.2'	27°20.33	-3.3'	54.0'
23	164°6.10	11.01	344°18.09	10.2'	27°17.02	-3.4'	54.0'
	SD = 15.7'	d = -0.1'		SE	0 = 14.7'		

	Twi	light			Twilight		
Lat.	Naut. Civil		Sunrise	Sunset	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	////	
<b>N</b> 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° N 10°	04:30	04:59	05:23	18:43	19:08	19:37	
0°	04:52 05:11	05:19 05:37	05:42 06:00	18:24 18:07	18:47 18:29	19:15 18:56	
<b>S</b> 10°							
20°	05:28 05:44	05:54 06:11	06:17 06:35	17:50 17:31	18:12 17:55	18:39 18:23	
30°	06:00	06:30	06:56	17:31	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	
<b>S</b> 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	
<b>S</b> 60°	07:11	80:80	09:05	15:01	15:59	16:55	
Lat.		Moonris	ie .		Moonset	:	
Ldl.	Sat	Sun	Mon	Sat	Sun	Mon	
N 72°							
<b>N</b> 70°							
68°						_	
$66^{\circ}$							
64°							
62°	21:29		23:10	23:11		_	

Lat.		Moonris	е	Moonset		
Lat.	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		80:00	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° 50°	19:01 18:47	19:59 19:44	20:45	01:06	01:41	02:28 02:43
45°	18:47	19:44	20:31 20:02	01:19 01:44	01:55 02:24	02:43
1						
N 40° 35°	17:56 17:37	18:51 18:32	19:40	02:05 02:22	02:47 03:06	03:36 03:56
35°	17:37	18:32 18:15	19:21 19:05	02:22	03:06	03:50
20°	16:55	17:47	18:38	03:02	03:49	04:12
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
<b>S</b> 50°	13:37	14:19	15:13	06:13	07:15	80:80
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° <b>S</b> 60°	12:29 12:01	13:02 12:28	13:57 13:23	07:20 07:48	08:32 09:07	09:24 09:58
3 00	12:01	12:28	15:23	07:48	09:07	09:58

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	278°4.77	136°0.56 N16°49.52	219°18.55 N20°1.27	155°51.24 N20°35.30	264°8.34 N03°23.06	
1	293°7.23	151°0.23 48.56	234° 19.17 1.67	170°53.14 35.19	279°10.70 23.10	Alpheratz 357°33.45 29°14.11
2	308°9.70	165°59.90 47.60	249° 19.79 2.06	185°55.05 35.07	294°13.06 23.13	Ankaa 353°5.93 -42°9.42
3	323°12.16	180°59.58 · · 46.64	264°20.40 · · 2.46	200°56.96 · · 34.96	309°15.41 · · 23.16	Schedar 349°29.64 56°40.74
4	338°14.62	195°59.25 45.68	279°21.02 2.85	215°58.86 34.85	324°17.77 23.19	Diphda 348°46.08 -17°50.30
5	353°17.09	210°58.92 44.72	294°21.64 3.25	231°0.77 34.74	339°20.13 23.23	Achernar 335°19.45 -57°5.79 Hamal 327°49.95 23°35.20
6	8° 19.55	225°58.60 N16°43.76	309°22.25 N20°3.64	246°2.67 N20°34.63	354°22.49 N03°23.26	Polaris 313°42.23 89°22.27
7	23°22.02	240°58.28 42.80	324°22.87 4.03	261°4.58 34.52	9°24.84 23.29	Acamar 315°11.10 -40°11.66
8	38°24.48	255°57.95 41.83	339°23.48 4.43	276°6.48 34.41	24°27.20 23.32	Menkar 314°5.07 4°11.65
9	53°26.95	270°57.63 · · 40.87	354°24.10 · · 4.82	291°8.39 · · 34.30	39°29.56 · · 23.36	Mirfak 308°26.84 49°57.15
10 11	68° 29.41 83° 31.87	285°57.31 39.91 300°56.99 38.94	9°24.72 5.21 24°25.33 5.61	306°10.30 34.19 321°12.20 34.08	54°31.92 23.39 69°34.28 23.42	Aldebaran 290°38.51 16°33.73
12	98° 34.34	315°56.67 N16°37.98	39°25.95 N20°6.00	336°14.11 N20°33.96	84°36.64 N03°23.45	Rigel 281°3.01 -8°10.21
13	113°36.80	330°56.35 37.01	54°26.56 6.39	351°16.01 33.85	99°39.00 23.48	Capella 280°20.53 46°1.39
14	128°39.27	345°56.03 36.04	69°27.18 6.78	6°17.92 33.74	114°41.35 23.52	Bellatrix 278°21.89 6°22.43
15	143°41.73	0°55.71 · · 35.08	84°27.80 · · 7.17	21°19.82 · · 33.63	129°43.71 · · 23.55	Elnath 278°0.68 28°37.74
16	$158^{\circ}44.19$	15°55.39 34.11	99° 28.41 7.56	36°21.73 33.52	144°46.07 23.58	Alnilam 275°36.81 -1°11.07
17	173°46.66	30°55.08 33.14	114°29.03 7.95	51°23.63 33.41	159°48.43 23.61	Betelgeuse 270°51.09 7°24.73 Canopus 263°52.41 -52°42.52
18	188°49.12	45°54.76 N16°32.17	129°29.64 N20°8.34	66°25.54 N20°33.30	174°50.79 N03°23.64	Sirius 258°25.51 -16°45.13
19	203°51.59	60°54.45 31.20	144°30.26 8.73	81°27.44 33.18	189°53.15 23.68	Adhara 255°5.29 -29°0.48
20	218° 54.05	75°54.13 30.23	159° 30.87 9.12	96°29.35 33.07	204°55.51 23.71	Procyon 244°49.88 5°9.42
21 22	233° 56.52 248° 58.98	90°53.82 ·· 29.26 105°53.50 28.29	174°31.49 · · 9.51 189°32.11 9.90	111°31.25 · · 32.96 126°33.16 32.85	219°57.87 · · 23.74 235°0.23 23.77	Pollux 243°16.18 27°57.75
23	264°1.44	120°53.19 27.32	204° 32.72 10.29	141°35.06 32.74	250°2.59 23.80	Avior 234°14.83 -59°35.78
						Suhail 222°45.77 -43°32.52
Mer.p	bass. 05:27	$\nu$ -0.3' d-1.0' m-4.05	ν0.6′ d0.4′ m1.30	$\nu 1.9' \ d$ -0.1' m-1.81	$\nu$ 2.4′ $d$ 0.0′ $m$ 0.78	Miaplacidus 221°38.78 -69°49.75
						Alphard 217°46.80 -8°46.46 Regulus 207°33.34 11°50.29
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.34 11°50.29 Dubhe 193°39.80 61°36.71
0	279°3.91	135°52.88 N16°26.34	219°33.34 N20°10.68	156°36.97 N20°32.63	265°4.95 N03°23.83	Denebola 182°23.77 14°25.49
1	294°6.37	150°52.57 25.37	234°33.95 11.06	171°38.87 32.51	280°7.31 23.86	Gienah 175°42.35 -17°41.48
2	309°8.84	165°52.26 24.40	249°34.57 11.45	186°40.78 32.40	295°9.67 23.89	Acrux 172°58.73 -63°15.10
3	324° 11.30	180°51.95 · · 23.42	264°35.18 · · 11.84	201°42.68 · · 32.29	310°12.03 · · 23.93	Gacrux 171°50.27 -57°16.02
4 5	339° 13.76 354° 16.23	195°51.64 22.45 210°51.33 21.47	279° 35.80 12.23 294° 36.41 12.61	216°44.59 32.18 231°46.49 32.07	325°14.40 23.96 340°16.76 23.99	Alioth 166°11.85 55°49.19
6	9° 18.69	225°51.03 N16°20.49	309°37.03 N20°13.00	246°48.40 N20°31.96	355°19.12 N03°24.02	Spica 158°20.93 -11°18.07
7	24°21.16	240°50.72 19.51	324°37.64 13.38	261°50.30 31.84	10°21.48 24.05	Alkaid 152°50.88 49°11.05
8	39°23.62	255°50.41 18.54	339°38.26 13.77	276°52.21 31.73	25°23.84 24.08	Hadar 148°33.97 -60°30.33 Menkent 147°55.99 -36°30.22
9	54°26.09	270°50.11 · · 17.56	354°38.87 · · 14.15	291°54.11 · · 31.62	40°26.20 · · 24.11	Menkent 147°55.99 -36°30.22 Arcturus 145°46.64 19°2.73
10	69°28.55	285°49.80 16.58	9°39.49 14.54	306°56.02 31.51	55°28.57 24.14	Rigil Kent. 139°38.24 -60°56.96
11	84°31.01	300°49.50 15.60	24°40.10 14.92	321°57.92 31.40	70°30.93 24.17	Kochab 137°19.16 74°2.98
12	99°33.48	315°49.20 N16°14.62	39°40.72 N20°15.31	336°59.83 N20°31.28	85°33.29 N03°24.20	Zuben'ubi 136°54.45 -16°9.20
13 14	114°35.94 129°38.41	330°48.89 13.64 345°48.59 12.65	54°41.33 15.69 69°41.95 16.07	352°1.73 31.17 7°3.63 31.06	100°35.65 24.23 115°38.02 24.26	Alphecca 126°2.43 26°37.61
15	144° 40.87	0°48.29 · · 11.67	84° 42.56 · · 16.46	22°5.54 · · 30.95	130°40.38 · · 24.29	Antares 112°14.00 -26°29.50
16	159° 43.33	15°47.99 10.69	99°43.18 16.84	37°7.44 30.83	145°42.74 24.32	Atria 107°6.57 -69°4.60
17	174° 45.80	30°47.69 9.70	114° 43.79 17.22	52° 9.35 30.72	160°45.10 24.35	Sabik 102°1.04 -15°45.47 Shaula 96°8.29 -37°7.39
18	189°48.26	45°47.39 N16°8.72	129°44.41 N20°17.60	67°11.25 N20°30.61	175°47.47 N03°24.38	Rasalhague 95°57.07 12°32.47
19	204°50.73	60°47.10 7.73	144° 45.02 17.98	82°13.15 30.50	190°49.83 24.41	Eltanin 90°41.07 51°29.13
20	219°53.19	75°46.80 6.75	159° 45.64 18.36	97°15.06 30.38	205°52.19 24.44	Kaus Aust. 83°30.47 -34°22.27
21	234° 55.66	90°46.50 · · 5.76	174°46.25 · · 18.75	112°16.96 · · 30.27	220°54.56 · · 24.47	Vega 80°31.96 38°48.49
22	249°58.12 265°0.58	105°46.21 4.78	189°46.87 19.13	127°18.87 30.16	235°56.92 24.50	Nunki 75°45.86 -26°15.76
23	205 0.56	120°45.91 3.79	204°47.48 19.51	142°20.77 30.05	250°59.29 24.53	Altair 61°58.44 8°56.33
Mer.p	pass. 05:23	$\nu$ -0.3′ $d$ -1.0′ m-4.05	$ u 0.6' \; d0.4' \; { m m} 1.30$	$ u 1.9' \ d$ -0.1' m-1.81	$ u 2.4' \ d0.0' \ m0.78$	Peacock 53°3.26 -56°38.78
						Deneb 49°24.56 45°22.39
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°37.36 9°59.81 Al Na'ir 27°31.09 -46°49.69
0	280°3.05	135°45.62 N16°2.80	219°48.10 N20°19.89	157°22.67 N20°29.93	266°1.65 N03°24.56	Al Na'ir 27°31.09 -46°49.69 Fomalhaut 15°13.01 -29°28.68
1	295°5.51	150°45.32 1.81	234°48.71 20.27	172°24.58 29.82	281°4.01 24.59	Scheat 13°43.86 28°13.51
2	310°7.98	165°45.03 16°0.82	249°49.33 20.64	187°26.48 29.71	296°6.38 24.62	Markab 13°28.54 15°20.86
3	325°10.44	180°44.74 15°59.83	264°49.94 · · 21.02	202°28.39 · · 29.60	311°8.74 · · 24.65	
4	340° 12.90	195°44.44 58.84	279°50.55 21.40	217°30.29 29.48	326°11.11 24.68	Jun 30 Tue SHA Mer.pass
5 6	355° 15.37 10° 17.83	210°44.15 57.85 225°43.86 N15°56.86	294°51.17 21.78 309°51.78 N20°22.16	232°32.19 29.37 247°34.10 N20°29.26	341°13.47 24.71 356°15.84 N03°24.74	Venus 217°55.79 14:56 Mars 301°13.79 09:22
7	25° 20.30	240°43.57 55.86	324°52.40 22.54	262°36.00 29.14	11°18.20 24.77	Jupiter 237°46.47 13:35
8	40°22.76	255°43.29 54.87	339°53.01 22.91	277°37.90 29.03	26°20.57 24.80	Saturn 346°3.57 06:22
9	55°25.23	270°43.00 · · 53.88	354°53.63 · · 23.29	292°39.81 · · 28.92	41°22.93 · · 24.83	
10	70°27.69	285°42.71 52.88	9°54.24 23.67	307°41.71 28.81	56°25.30 24.86	Jul 01 Wed         SHA         Mer.pass           Venus         216°48.97         14:57
11	85°30.15	300°42.42 51.89	24°54.85 24.04	322°43.62 28.69	71°27.66 24.88	Mars 300°29.43 09:21
12	100°32.62	315°42.14 N15°50.89	39°55.47 N20°24.42	337°45.52 N20°28.58	86°30.03 N03°24.91	Jupiter 237°33.06 13:32
13	115°35.08	330°41.85 49.89	54° 56.08 24.79	352°47.42 28.47	101°32.40 24.94	Saturn 346°1.04 06:19
14 15	130°37.55 145°40.01	345°41.57 48.90 0°41.28 •• 47.90	69°56.70 25.17 84°57.31 · · 25.54	7°49.33 28.35 22°51.23 · · 28.24	116°34.76 24.97 131°37.13 •• 25.00	
15 16	145 40.01 160°42.47	15°41.00 46.90	99°57.92 25.92	37°53.13 28.13	146°39.50 25.03	Jul 02 Thu         SHA         Mer.pass           Venus         215°42.57         14:57
17	175° 44.94	30°40.72 45.90	114°58.54 26.29	52°55.04 28.01	161°41.86 25.06	Mars 299°45.05 09:20
18	190°47.40	45°40.44 N15°44.90	129°59.15 N20°26.66	67°56.94 N20°27.90	176°44.23 N03°25.08	Jupiter 237°19.63 13:29
19	205°49.87	60°40.16 43.90	144°59.77 27.04	82°58.84 27.79	191°46.60 25.11	Saturn 345°58.60 06:15
20	220° 52.33	75°39.88 42.90	160°0.38 27.41	98° 0.74 27.67	206°48.96 25.14	
21	235°54.80	90°39.60 · · 41.90	175°0.99 · · 27.78	113° 2.65 · · · 27.56	221°51.33 · · 25.17	Horizontal parallax Venus: 0.1
22 23	250° 57.26 265° 59.72	105°39.32 40.90 120°39.04 39.90	190°1.61 28.15 205°2.22 28.53	128° 4.55 27.45 143° 6.45 27.33	236°53.70 25.20 251°56.07 25.23	Mars: 0.1
			-			
Mer.p	pass. 05:19	u-0.3 $'$ d-1.0 $'$ m-4.06	$ u 0.6' \ d0.4' \ m1.30$	$ u 1.9' \; d$ -0.1 $' \; {\sf m}$ -1.81	$ u 2.4' \ d0.0' \ m0.77$	

h	Su	n	Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°5.98	N23°10.86	358°47.31	10.3'	S27°13.58	-3.6'	54.0'
1	194°5.85	10.71	$13^{\circ}16.56$	10.3'	$27^{\circ}10.00$	-3.7'	54.0'
2	209° 5.73	10.56	27°45.84	10.3'	27°6.30	-3.8'	54.1'
3 4	224° 5.61 239° 5.48	· · 10.41 10.26	42°15.15 56°44.49	10.3' 10.4'	27°2.46 26°58.50	-4.0' -4.1'	54.1' 54.1'
5	254° 5.36	10.20	71°13.86	10.4	26°54.40	-4.1 -4.2'	54.1'
6	269° 5.24	N23°9.96	85°43.26	10.4	S26°50.17	-4.4'	54.1'
7	284°5.12	9.81	$100^{\circ}12.70$	10.5'	$26^{\circ}45.81$	-4.5'	54.1'
8	299°4.99	9.66	114°42.17	10.5'	26°41.33	-4.6'	54.1'
9 10	314° 4.87 329° 4.75	· · 9.50 9.35	129°11.67 143°41.21	10.5' 10.6'	26°36.72 26°31.97	-4.7' -4.9'	54.1' 54.1'
11	344° 4.63	9.33	143 41.21 158°10.79	10.6	26°27.10	-4.9 -5.0'	54.1'
12	359° 4.50	N23°9.04	172°40.40	10.7	S26°22.11	-5.1'	54.1'
13	14°4.38	8.88	$187^{\circ}10.06$	10.7'	$26^{\circ}16.98$	-5.2'	54.1'
14	29°4.26	8.72	201°39.75	10.7'	26°11.73	-5.4'	54.1'
15 16	44° 4.14 59° 4.02	· · 8.56 8.41	216°9.48 230°39.25	10.8' 10.8'	26°6.36 26°0.86	-5.5' -5.6'	54.2' 54.2'
17	74°3.90	8.25	230 39.23 245°9.07	10.6	25°55.24	-5.0 -5.7'	54.2'
18	89° 3.77	N23°8.09	259°38.93	10.9	\$25°49.49	-5.9'	54.2'
19	104°3.65	7.92	274°8.83	10.9'	25°43.62	-6.0'	54.2'
20	119° 3.53	7.76	288°38.77	11.0'	25°37.62	-6.1'	54.2'
21	134° 3.41	• • 7.60	303°8.76	11.0'	25°31.51	-6.2'	54.2'
22 23	149°3.29 164°3.17	7.44 7.27	317°38.80 332°8.88	11.1' 11.1'	25°25.27 25°18.91	-6.4' -6.5'	54.2' 54.2'
23			JJZ 0.00			-0.5	J+.∠
	SD = 15.7'	d = -0.1'		SI	D = 14.7'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°3.05	N23°7.11	$346^{\circ}39.01$	11.2'	\$25°12.43	-6.6'	54.2'
1	194° 2.93	6.94	1°9.18	11.2'	25°5.83	-6.7'	54.2'
2	209°2.80 224°2.68	6.78 •• 6.61	15°39.40 30°9.67	11.3' 11.3'	24°59.12 24°52.28	-6.8' -7.0'	54.3' 54.3'
3 4	239° 2.56	6.45	44°39.99	11.4	24 52.26 24°45.33	-7.0 -7.1'	54.3'
5	254° 2.44	6.28	59°10.36	11.4'	24°38.26	-7.2'	54.3'
6	269° 2.32	N23°6.11	73°40.78	11.5'	\$24°31.07	-7.3'	54.3'
7	284°2.20	5.94	88°11.25	11.5'	24°23.77	-7.4'	54.3'
8	299°2.08	5.77	102°41.77	11.6'	24°16.35	-7.5'	54.3'
9 10	314° 1.96 329° 1.84	· · 5.60 5.43	117°12.34 131°42.96	11.6' 11.7'	24°8.82 24°1.18	-7.6' -7.8'	54.3' 54.3'
11	344°1.72	5.26	131 42.90 146°13.63	11.7	24 1.10 23°53.42	-7.8 -7.9'	54.4'
12	359°1.60	N23°5.08	160°44.36	11.8'	\$23°45.56	-8.0'	54.4'
13	14°1.48	4.91	$175^{\circ}15.13$	11.8'	23°37.58	-8.1'	54.4'
14	29° 1.37	4.73	189°45.96	11.9'	23°29.49	-8.2'	54.4'
15 16	44° 1.25 59° 1.13	· · 4.56 4.38	204°16.84 218°47.78	11.9' 12.0'	23°21.28 23°12.98	-8.3' -8.4'	54.4' 54.4'
17	74° 1.01	4.36 4.21	210 47.76 233°18.77	12.0'	23 12.90 23°4.56	-8.5'	54.4'
18	89° 0.89	N23°4.03	247°49.81	12.1'	\$22°56.03	-8.6'	54.4'
19	104°0.77	3.85	$262^{\circ}20.91$	12.1'	22°47.40	-8.7'	54.5'
20	119° 0.65	3.67	276°52.06		22°38.66	-8.8'	54.5'
21	134° 0.53	• • 3.50	291°23.26	12.3'	22°29.82 22°20.88	-8.9'	54.5'
22 23	149° 0.41 164° 0.30	3.32 3.14	305°54.52 320°25.83	12.3' 12.4'	22°20.88 22°11.82	-9.1' -9.2'	54.5' 54.5'
25	SD = 15.7'	d = -0.2'	320 23.03		D = 14.8'	-9.2	J4.5
	5D = 15.7	$a = -0.2^{\circ}$		31	$J = 14.8^{\circ}$		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°0.18	N23°2.95	334°57.19	12.4'	\$22°2.67	-9.3'	54.5'
1 2	194° 0.06 208° 59.94	2.77 2.59	349°28.61 4°0.08	12.5' 12.5'	21°53.42 21°44.06	-9.4' -9.5'	54.5' 54.5'
3	208 59.94 223 59.82	2.59	4°0.08 18°31.61	12.6'	21°44.06 21°34.60	-9.5° -9.6'	54.5° 54.6'
4	238°59.71	2.41	33°3.19	12.6'	21°25.05	-9.7'	54.6'
5	253°59.59	2.04	47°34.83	12.7'	21°15.39	-9.8'	54.6'
6	268°59.47	N23°1.85	62°6.51	12.7'	\$21°5.64	-9.9'	54.6'
7	283°59.35 298°59.24	1.67 1.48	76°38.26 91°10.05	12.8' 12.8'	20°55.79	-9.9'	54.6'
8 9	298°59.24 313°59.12	1.48	91°10.05 105°41.90	12.8'	20°45.84 20°35.80	-10.0' -10.1'	54.6' 54.6'
10	328°59.00	1.10	120°13.80	13.0'	20°25.66	-10.1	54.7'
11	343°58.89	0.92	134°45.76	13.0'	20°15.43	-10.3'	54.7'
12	358°58.77	N23°0.73	149°17.76	13.1'	\$20°5.11	-10.4'	54.7'
13	13°58.65 28°58.54	0.54	163°49.82 178°21.94	13.1'	19°54.69 19°44.18	-10.5'	54.7'
14 15	28°58.54 43°58.42	0.34 · · 0.15	178°21.94 192°54.10	13.2' 13.2'	19°44.18 19°33.58	-10.6' -10.7'	54.7' 54.7'
16	58°58.30	22°59.96	207°26.32	13.3'	19° 33.30 19° 22.90	-10.7	54.8'
17	73°58.19	22°59.77	221°58.58	13.3'	$19^{\circ}12.12$	-10.9'	54.8'
18	88°58.07	N22°59.57	236°30.90	13.4'	S19°1.25	-11.0'	54.8'
19	103°57.95	59.38	251°3.27	13.4'	18°50.30	-11.0'	54.8'
20 21	118°57.84 133°57.72	59.18 •• 58.99	265°35.69 280°8.16	13.5' 13.5'	18°39.26 18°28.14	-11.1' -11.2'	54.8' 54.8'
22	133 57.72 148°57.61	58.79	280 8.16 294°40.67	13.6'	18 28.14 18°16.93	-11.2 -11.3'	54.8'
23	163°57.49	58.59	309°13.24	13.6'	18°5.64	-11.4'	54.9'
	SD = 15.7'	d = -0.2'		SI	O = 14.9'		

Lat.	Twi	light	Sunrise	Sunset	Tw	ilight
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	07:11	08:07	09:04	15:04	16:01	16:57

Lat.		Moonris	e		Moonset	t
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	14:44	16:15	17:48	10:23	10:34	10:39

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	15-17	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	100-96%	
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		

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	281°2.19	135°38.76 N15°38.89	220°2.83 N20°28.90	158°8.36 N20°27.22	266°58.43 N03°25.25	
1	296°4.65	150°38.48 37.89	235°3.45 29.27	173°10.26 27.11	282°0.80 25.28	Alpheratz 357°33.43 29°14.12
2	311°7.12	165°38.21 36.89	250°4.06 29.64	188°12.16 26.99	297°3.17 25.31	Ankaa 353°5.89 -42°9.41 Schedar 349°29.61 56°40.75
3	326°9.58	180°37.93 · · 35.88	265°4.68 · · 30.01	203°14.06 · · 26.88	312°5.54 · · 25.34	Schedar 349°29.61 56°40.75 Diphda 348°46.06 -17°50.28
4	$341^{\circ}12.04$	195°37.66 34.88	280°5.29 30.38	218°15.97 26.76	327°7.91 25.37	Achernar 335°19.41 -57°5.78
5	$356^{\circ}14.51$	210°37.38 33.87	295°5.90 30.75	233°17.87 26.65	342°10.27 25.39	Hamal 327°49.93 23°35.21
6	11° 16.97	225°37.11 N15°32.86	310°6.52 N20°31.12	248°19.77 N20°26.54	357°12.64 N03°25.42	Polaris 313°40.95 89°22.26
7	26° 19.44	240°36.84 31.86	325°7.13 31.49	263°21.68 26.42	12°15.01 25.45	Acamar 315°11.08 -40°11.65
8	41°21.90	255° 36.57 30.85	340°7.74 31.86	278°23.58 26.31	27°17.38 25.48	Menkar 314°5.04 4°11.67
9	56°24.37	270°36.30 · · 29.84 285°36.03 28.83	355°8.36 · · 32.23 10°8.97 32.59	293°25.48 · · 26.20	42°19.75 · · 25.50	Mirfak 308°26.81 49°57.15
10 11	71°26.83 86°29.29	285°36.03 28.83 300°35.76 27.82	10°8.97 32.59 25°9.58 32.96	308°27.38 26.08 323°29.29 25.97	57°22.12 25.53 72°24.49 25.56	Aldebaran 290°38.50 16°33.74
12	101°31.76	315°35.49 N15°26.81	40°10.20 N20°33.33	338°31.19 N20°25.85	87°26.86 N03°25.59	Rigel 281°2.99 -8°10.20
13	116° 34.22	330°35.22 25.80	55°10.81 33.70	353°33.09 25.74	102°29.23 25.61	Capella 280°20.51 46°1.38
14	131° 36.69	345°34.95 24.79	70°11.42 34.06	8°34.99 25.63	117°31.60 25.64	Bellatrix 278°21.87 6°22.44
15	146°39.15	0°34.68 · · 23.78	85°12.04 · · 34.43	23°36.90 · · 25.51	132°33.97 · · 25.67	Elnath 278°0.67 28°37.74
16	161°41.61	15°34.42 22.76	100°12.65 34.79	38°38.80 25.40	147°36.34 25.69	Alnilam 275°36.80 -1°11.06
17	$176^{\circ}44.08$	30°34.15 21.75	115°13.26 35.16	53°40.70 25.28	162°38.71 25.72	Betelgeuse 270°51.08 7°24.73 Canopus 263°52.40 -52°42.50
18	191°46.54	45°33.89 N15°20.74	130°13.88 N20°35.53	68°42.60 N20°25.17	177°41.08 N03°25.75	Canopus 263°52.40 -52°42.50 Sirius 258°25.50 -16°45.12
19	206°49.01	60°33.62 19.72	145°14.49 35.89	83°44.50 25.05	192°43.45 25.78	Adhara 255°5.28 -29°0.46
20	221°51.47	75°33.36 18.71	160° 15.10 36.26	98°46.41 24.94	207°45.82 25.80	Procyon 244°49.87 5°9.43
21	236°53.93	90°33.10 · · 17.69	175°15.71 · · 36.62	113°48.31 · · 24.83	222°48.19 · · 25.83	Pollux 243°16.17 27°57.75
22	251°56.40	105°32.84 16.67	190°16.33 36.98	128°50.21 24.71	237°50.56 25.86	Avior 234°14.84 -59°35.76
23	266° 58.86	120°32.57 15.66	205°16.94 37.35	143°52.11 24.60	252°52.93 25.88	Suhail 222°45.78 -43°32.51
Mer.	pass. 05:15	$\nu$ -0.3' d-1.0' m-4.06	$ u 0.6' \ d0.4' \ m1.30$	$ u 1.9' \; d$ -0.1' m-1.81	$\nu$ 2.4′ $d$ 0.0′ $m$ 0.77	Miaplacidus 221°38.81 -69°49.74
	<u> </u>					Alphard 217°46.80 -8°46.46
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.35 11°50.29
0 0	282°1.33	135°32.31 N15°14.64	220°17.55 N20°37.71	158°54.01 N20°24.48	267°55.30 N03°25.91	Dubhe 193°39.81 61°36.71
1	297°3.79	150°32.05 13.62	235°18.17 38.07	173°55.92 24.37	282°57.67 25.93	Denebola 182°23.77 14°25.49
2	312°6.26	165°31.80 12.60	250°18.78 38.44	188°57.82 24.25	298° 0.05 25.96	Gienah 175°42.36 -17°41.48
3	327°8.72	180°31.54 · · 11.58	265°19.39 · · 38.80	203°59.72 · · 24.14	313°2.42 · · 25.99	Acrux 172°58.76 -63°15.10
4	342°11.18	195°31.28 10.57	280°20.00 39.16	219° 1.62 24.02	328°4.79 26.01	Gacrux 171°50.29 -57°16.02
5	$357^{\circ}13.65$	210°31.02 9.54	295°20.62 39.52	234° 3.52 23.91	343°7.16 26.04	Alioth 166°11.86 55°49.19 Spica 158°20.93 -11°18.07
6	$12^{\circ}16.11$	225°30.77 N15°8.52	310°21.23 N20°39.88	249°5.43 N20°23.79	358°9.53 N03°26.07	Alkaid 152°50.89 49°11.06
7	$27^{\circ}18.58$	240°30.51 7.50	325°21.84 40.24	264°7.33 23.68	13°11.91 26.09	Hadar 148°34.00 -60°30.34
8	42°21.04	255°30.26 6.48	340°22.45 40.60	279° 9.23 23.56	28°14.28 26.12	Menkent 147°56.00 -36°30.22
9	57°23.50	270°30.00 · · 5.46	355°23.07 · · 40.96	294°11.13 · · 23.45	43°16.65 · · 26.14	Arcturus 145°46.64 19°2.74
10	72°25.97	285°29.75 4.43	10°23.68 41.32	309°13.03 23.33	58°19.03 26.17	Rigil Kent. 139°38.26 -60°56.96
11	87° 28.43	300°29.50 3.41	25°24.29 41.68	324°14.93 23.22	73°21.40 26.20	Kochab 137°19.20 74°2.98
12	102°30.90	315°29.24 N15°2.39 330°28.99 1.36	40°24.90 N20°42.04 55°25.52 42.40	339°16.84 N20°23.10 354°18.74 22.99	88°23.77 N03°26.22 103°26.14 26.25	Zuben'ubi 136°54.46 -16°9.20
13 14	117° 33.36 132° 35.82	330°28.99 1.36 345°28.74 15°0.34	55°25.52 42.40 70°26.13 42.76	354°18.74 22.99 9°20.64 22.87	103°26.14 26.25 118°28.52 26.27	Alphecca 126°2.44 26°37.61
15	147° 38.29	0°28.49 14°59.31	85°26.74 · · 43.12	24°22.54 · · 22.76	133°30.89 · · 26.30	Antares 112°14.00 -26°29.51
16	162° 40.75	15°28.24 58.28	100°27.35 43.47	39°24.44 22.64	148°33.27 26.32	Atria 107°6.58 -69°4.61
17	177°43.22	30°27.99 57.26	115°27.97 43.83	54°26.34 22.53	163°35.64 26.35	Sabik 102°1.04 -15°45.47
18	192°45.68	45°27.75 N14°56.23	130°28.58 N20°44.19	69°28.24 N20°22.41	178°38.01 N03°26.37	Shaula 96°8.28 -37°7.40 Rasalhague 95°57.07 12°32.48
19	207°48.14	60°27.50 55.20	145°29.19 44.54	84°30.15 22.30	193°40.39 26.40	Eltanin 90°41.07 51°29.15
20	222°50.61	75°27.25 54.17	160°29.80 44.90	99°32.05 22.18	208°42.76 26.42	Kaus Aust. 83°30.46 -34°22.28
21	237°53.07	90°27.01 · · 53.14	175°30.42 · · 45.26	114°33.95 · · 22.07	223°45.14 · · 26.45	Vega 80°31.95 38°48.50
22	252°55.54	105°26.76 52.11	190°31.03 45.61	129°35.85 21.95	238°47.51 26.47	Nunki 75°45.85 -26°15.76
23	267°58.00	120°26.52 51.08	205°31.64 45.97	144°37.75 21.84	253°49.89 26.50	Altair 61°58.42 8°56.33
Mer.	pass. 05:11	$\nu$ -0.3' d-1.0' m-4.07	$ u 0.6' \ d0.4' \ m1.30$	$ u 1.9' \ d$ -0.1' m-1.81	$\nu 2.4' \ d0.0' \ m0.76$	Peacock 53°3.24 -56°38.79
	<u>.                                    </u>					Deneb 49°24.54 45°22.41
	CIIA	CIIA	CIIA	CIIA	CIIA	Enif 33°37.34 9°59.82
Sun 0	<b>GHA</b> 283°0.47	<b>GHA Dec</b> 135°26.27 N14°50.05	<b>GHA Dec</b> 220°32.25 N20°46.32	<b>GHA Dec</b> 159°39.65 N20°21.72	<b>GHA Dec</b> 268°52.26 N03°26.52	Al Na'ir 27°31.06 -46°49.69
1	298°2.93	150°26.03 49.02	235°32.86 46.68	174°41.55 21.61	283°54.64 26.55	Fomalhaut 15°12.98 -29°28.68
2	313°5.39	165°25.79 47.99	250°33.48 47.03	189°43.45 21.49	298°57.01 26.57	Scheat 13°43.84 28°13.53
3	328°7.86	180°25.55 · · 46.95	265°34.09 · · 47.38	204°45.35 · · 21.38	313°59.39 · · 26.60	Markab 13°28.52 15°20.87
4	$343^{\circ}10.32$	195°25.31 45.92	280°34.70 47.74	219°47.26 21.26	329°1.76 26.62	Jul 03 Fri SHA Mer.pass
5	$358^{\circ}12.79$	210°25.07 44.88	295°35.31 48.09	234°49.16 21.14	344°4.14 26.65	Venus 214°36.57 14:58
6	13° 15.25	225°24.83 N14°43.85	310°35.92 N20°48.44	249°51.06 N20°21.03	359°6.52 N03°26.67	Mars 299°0.65 09:19
7	$28^{\circ}17.71$	240°24.59 42.81	325° 36.54 48.80	264°52.96 20.91	14°8.89 26.70	Jupiter 237°6.17 13:26
8	43°20.18	255°24.35 41.78	340°37.15 49.15	279°54.86 20.80	29°11.27 26.72	Saturn 345°56.24 06:11
9	58° 22.64	270°24.11 · · 40.74	355° 37.76 · · 49.50	294°56.76 · · 20.68	44°13.64 · · 26.75	Jul 04 Sat SHA Mer.pass
10	73°25.11	285°23.87 39.71	10°38.37 49.85	309°58.66 20.57	59°16.02 26.77	Venus 213°30.99 14:58
11	88° 27.57	300°23.64 38.67	25°38.98 50.20	325° 0.56 20.45	74°18.40 26.79	Mars 298°16.23 09:18
12 13	103° 30.03 118° 32.50	315°23.40 N14°37.63 330°23.17 36.59	40°39.60 N20°50.55 55°40.21 50.90	340°2.46 N20°20.33 355°4.36 20.22	89°20.77 N03°26.82 104°23.15 26.84	Jupiter 236°52.69 13:23
14	133° 34.96	345°22.93 35.55	70°40.82 51.25	10°6.26 20.10	119°25.53 26.87	Saturn 345°53.98 06:07
15	148° 37.43	0°22.70 · · 34.51	85°41.43 · · 51.60	25°8.16 · · 19.99	134°27.91 · · 26.89	Jul 05 Sun SHA Mer.pass
16	163°39.89	15°22.47 33.47	100° 42.04 51.95	40°10.06 19.87	149°30.28 26.91	Venus 212°25.81 14:58
17	178° 42.35	30°22.24 32.43	115° 42.65 52.30	55°11.96 19.75	164°32.66 26.94	Mars 297°31.79 09:17
18	193° 44.82	45°22.01 N14°31.39	130°43.27 N20°52.65	70°13.86 N20°19.64	179°35.04 N03°26.96	Jupiter 236°39.19 13:20
19	208°47.28	60°21.78 30.35	145°43.88 53.00	85°15.76 19.52	194°37.42 26.98	Saturn 345°51.80 06:04
20	223° 49.75	75°21.55 29.31	160°44.49 53.34	100°17.67 19.41	209°39.79 27.01	
21	238° 52.21	90°21.32 · · 28.26	175°45.10 · · 53.69	115°19.57 · · 19.29	224°42.17 · · 27.03	Horizontal parallax
22	253° 54.68	105°21.09 27.22	190° 45.71 54.04	130°21.47 19.17	239°44.55 27.05	Venus: 0.1 Mars: 0.1
23	268°57.14	120°20.86 26.18	205°46.32 54.39	145°23.37 19.06	254°46.93 27.08	IVIAIS: U.1
Mer.	pass. 05:07	$\nu$ -0.2′ d-1.0′ m-4.07	$\nu 0.6' \ d0.4' \ m1.30$	$\nu 1.9^{\prime}~d$ -0.1 $^{\prime}~m$ -1.80	$\nu 2.4' \ d0.0' \ m0.76$	

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178° 57.38	N22°58.40	323°45.85	13.7'	S17°54.27	-11.5'	54.9'
1	193°57.26 208°57.15	58.20	338°18.52 352°51.23	13.7'	17°42.81 17°31.27	-11.5'	54.9'
2	208 57.15 223°57.03	58.00 •• 57.80	7°23.98	13.8' 13.8'	17 31.27 17°19.65	-11.6' -11.7'	54.9' 54.9'
4	238° 56.92	57.60	21°56.79	13.8'	17°7.95	-11.8'	55.0'
5	253° 56.80	57.40	36°29.64	13.9'	16°56.17	-11.9'	55.0'
6 7	268° 56.69 283° 56.57	N22°57.19 56.99	51°2.53 65°35.47	13.9' 14.0'	\$16°44.32 16°32.38	-11.9' -12.0'	55.0' 55.0'
8	298° 56.46	56.79	80°8.45	14.0'	16°20.38	-12.1'	55.0'
9	313°56.34	• • 56.58	94°41.48	14.1'	$16^{\circ}8.29$	-12.2'	55.0'
10	328° 56.23	56.38	109°14.55 123°47.66	14.1'	15°56.13	-12.2'	55.1'
11 12	343°56.12 358°56.00	56.17 N22°55.97	123°47.66 138°20.81	14.2' 14.2'	15°43.90 \$15°31.59	-12.3' -12.4'	55.1' 55.1'
13	13°55.89	55.76	152°54.01	14.2'	15°19.22	-12.4	55.1'
14	28° 55.78	55.55	167°27.24	14.3'	15°6.77	-12.5'	55.1'
15 16	43° 55.66 58° 55.55	• • 55.34 55.14	182°0.52 196°33.83	14.3' 14.4'	14°54.25 14°41.66	-12.6' -12.7'	55.2' 55.2'
17	73° 55.44	54.93	211°7.18	14.4'	14° 41.00	-12.7'	55.2'
18	88° 55.32	N22°54.72	225°40.57	14.4'	S14°16.28	-12.8'	55.2'
19	103°55.21	54.50	240°13.99	14.5'	14°3.49	-12.9'	55.2'
20 21	118° 55.10 133° 54.98	54.29 •• 54.08	254°47.45 269°20.95	14.5' 14.5'	13°50.63 13°37.70	-12.9' -13.0'	55.3' 55.3'
22	148° 54.87	53.87	283°54.48	14.6'	13°24.72	-13.1'	55.3'
23	163°54.76	53.65	298°28.04	14.6'	$13^{\circ}11.66$	-13.1'	55.3'
	SD = 15.7'	d = -0.2'		SI	O = 15.0'		
Ca+		Doc	C   1	•.	Doc	٦	μр
Sat 0	<b>GHA</b> 178° 54.65	<b>Dec</b> N22°53.44	<b>GHA</b> 313° 1.64	u 14.6'	<b>Dec</b> \$12°58.55	d -13.2'	<b>HP</b> 55.3'
1	193°54.53	53.22	327°35.27	14.7'	12°45.37	-13.2'	55.4'
2	208° 54.42	53.01	342°8.92	14.7'	12°32.14	-13.3'	55.4'
3 4	223°54.31 238°54.20	· · 52.79 52.57	356°42.61 11°16.33	14.7' 14.7'	12°18.84 12°5.48	-13.4' -13.4'	55.4' 55.4'
5	253° 54.09	52.36	25°50.08	14.8'	11°52.06	-13.5'	55.4'
6	268°53.98	N22°52.14	40°23.85	14.8'	S11°38.59	-13.5'	55.5'
7	283°53.86 298°53.75	51.92	54°57.65 69°31.47	14.8'	11°25.06 11°11.47	-13.6'	55.5'
8 9	298°53.75 313°53.64	51.70 •• 51.48	84°5.32	14.8' 14.9'	11°11.47 10°57.83	-13.6' -13.7'	55.5' 55.5'
10	328° 53.53	51.25	98°39.20	14.9'	10°44.13	-13.8'	55.5'
11	343°53.42	51.03	113°13.09	14.9'	10°30.38	-13.8'	55.6'
12 13	358° 53.31 13° 53.20	N22°50.81 50.59	127°47.01 142°20.95	14.9' 15.0'	\$10°16.58 10°2.73	-13.9' -13.9'	55.6' 55.6'
14	28° 53.09	50.39	142 20.95 156°54.91	15.0'	09°48.82	-13.9 -14.0'	55.6'
15	43°52.98	• • 50.14	171°28.89	15.0'	09°34.87	-14.0'	55.7'
16	58° 52.87	49.91	186°2.88	15.0'	09°20.86	-14.1'	55.7'
17 18	73°52.76 88°52.65	49.69 N22°49.46	200°36.89 215°10.92	15.0' 15.0'	09°6.81 \$08°52.70	-14.1' -14.1'	55.7' 55.7'
19	103°52.54	49.23	229°44.96	15.1'	08°38.56	-14.2'	55.8'
20	118° 52.43	49.00	244°19.02	15.1'	08°24.36		55.8'
21 22	133°52.32 148°52.21	· · 48.77 48.54	258°53.09 273°27.17	15.1' 15.1'	08°10.12 07°55.84	-14.3' -14.3'	55.8' 55.8'
23	163° 52.21	48.31	273 27.17 288°1.26	15.1	07 55.64 07°41.51	-14.5 -14.4'	55.9'
	SD = 15.7'	d = -0.2'			D = 15.1'		
					- 10:1		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°51.99 193°51.88	N22°48.08 47.85	302°35.36 317°9.47	15.1' 15.1'	\$07°27.14 07°12.73	-14.4' -14.5'	55.9' 55.9'
2	208°51.78	47.62	331° 43.59	15.1'	06°58.28	-14.5'	55.9'
3	223°51.67	• • 47.38	346°17.71	15.1'	06°43.78	-14.5'	56.0'
4 5	238°51.56 253°51.45	47.15 46.92	0°51.84 15°25.97	15.1' 15.1'	06°29.25 06°14.68	-14.6' -14.6'	56.0' 56.0'
6	253°51.45 268°51.34	46.92 N22°46.68	30° 0.10	15.1'	S06° 0.07	-14.6'	56.0'
7	283°51.23	46.44	44°34.24	15.1'	$05^{\circ}45.43$	-14.7'	56.1'
8	298°51.13	46.21	59° 8.38	15.1'	05°30.75	-14.7'	56.1'
9 10	313°51.02 328°50.91	· · 45.97 45.73	73°42.51 88°16.65	15.1' 15.1'	05°16.03 05°1.28	-14.7' -14.8'	56.1' 56.1'
11	343°50.80	45.49	102°50.78	15.1'	04°46.50	-14.8'	56.2'
12	358°50.70	N22°45.25	117°24.91	15.1'	S04°31.68	-14.8'	56.2'
13 14	13°50.59 28°50.48	45.01 44.77	131°59.03 146°33.14	15.1' 15.1'	04°16.84 04°1.96	-14.9' -14.9'	56.2' 56.2'
14 15	43°50.37	• • 44.53	146 33.14 161°7.25	15.1'	04 1.96 03°47.05	-14.9' -14.9'	56.2'
16	58° 50.27	44.29	175°41.35	15.1'	03°32.12	-15.0'	56.3'
17	73°50.16	44.05	190°15.44	15.1'	03°17.15	-15.0'	56.3'
18 19	88° 50.05 103° 49.95	N22°43.80 43.56	204°49.52 219°23.58	15.1' 15.1'	\$03°2.16 02°47.15	-15.0' -15.0'	56.3' 56.4'
20	118° 49.84	43.31	233°57.64	15.1	02° 32.10	-15.1'	56.4
21	133° 49.74	• • 43.07	248°31.67	15.0'	02°17.04	-15.1'	56.4'
22 23	148° 49.63 163° 49.52	42.82 42.58	263°5.69 277°39.69	15.0' 15.0'	02°1.95 01°46.84	-15.1' -15.1'	56.5' 56.5'
23	$\frac{163 \ 49.52}{\text{SD} = 15.7'}$	d = -0.2'	211 39.09		D = 15.2'	-13.1	30.3
	JU — 13.1	u — -U.Z		31	J — 13.Z		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>S</b> 50°	06:39	07:21	07:59	16:10	16:49	17:30
52°	06:44	07:28	80:80	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
<b>S</b> 60°	07:09	08:05	09:02	15:07	16:04	17:00
				ı		

Lat.		Moonris	е		Moonset	
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
<b>N</b> 72°	01:43	00:10 23:27	22:53	03:38	06:43	08:58
<b>N</b> 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
<b>N</b> 58°	22:35	22:39	22:42	06:42	80:80	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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	19:18	20:47	22:15	10:41	10:41	10:41

Color	h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
20   287-906   187-206   187-206   187-206   187-206   187-207   187-207   189-207	Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
1 900°200′ 200′ 300°0001 2 4.00 200°4.00 50.00 50.00 200°4.00 50.00 50.00 200°4.00 50.00													
3 99° 100 99° 107° 100 99° 107° 100 99° 107° 100 99° 100° 100 99° 100° 100° 100° 10	1	299°2.07	150°20.41	24.09	235°47.55	55.08	175°27.17	18.82	284°51.69	27.12			
1	2			23.04		55.42		18.71	299°54.07	27.15			
1.													I
1													
7 20°16.65											Hamal	$327^{\circ}49.91$	23°35.21
8 44*19.93; 255*19.84*1 0.70													
9 99°21.76 207°1862 115.71 35°552.44													
11   167													
1	10	74°24.24	285°18.40	14.66	10°53.05	58.18	310°44.27	17.77	60°13.10	27.33			
19   10   10   10   10   10   10   10													I
14   1347-34.0   3467-175.3   10.45   707-55.40   99.55   107-51.67   17.11   1207-22.03   27.44   16.15   1													
15   160°3556   15°1710   34   100°572   100°173   100°1											Bellatrix	278°21.86	6°22.45
164   304   307   308   15   17   10   30   30   30   30   30   30   30													
17   179"   144   93   156.88   7.29   115"   73.31   73"													I
19   19   19   19   19   19   19   19													
Adiabase   1.59	18	194° 43.96	45° 16.67	N14°6.24	130°57.94	N21°0.91		N20°16.84	180°32.15	N03°27.51			
1.00													
Per													
Mer.pass. 05-03												$243^{\circ}16.17$	27°57.75
Tue													
Change   Change				_									
GHA	Mer.p	pass. 05:03	$\nu$ -0.2' d-1	L.0′ m-4.08	$\nu^{0.6'} d0$	.3′ m1.30	$\nu 1.9' \ d-0$	.1′ m-1.80	$\nu^{2.4'} d0$	.0′ m0.75			
Tue GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec Dubbe 193°993 8 36"95.70  1 30"1.31 135"1.39 133"59.00 12"1.50 12"1.94 101"1.08 102" 298"4.68 10 27.76  1 30"1.31 136"1.41 138"59.00 12"1.50 12"1.94 101"1.08 102 298"4.68 10 27.76  3 33"6.07 10 15"1.50 15"1.50 15"1.70 15"1.72 10"1.09													
284 - S874   139 - 153   139 - 159   139 - 159   127 - 150   151   151   151	Tue	GHA	GHA	Dec	GHA		GHA	Dec	GHA		_		
1 300°1.21 300°1.23 105°1.318 58.84 2.90°2.21 3.38 176°1.276 10.02 288°4.883 27.66 10.02 10.05°1.21 27.88 4.05°1.31 175°4.23 7.02°1.31 1.05°1.31 1													I
3 330°613 180°14.77													I
4 345°8.60   15°14.55   5.66   221°14.55   4.29   221°18.46   15.67   330°55.98   22.73   Alleth   16°11.89   55°49.11   11°8.06   15°13.55   25°14.15   113°13.53   25°14.15   113°13.54   311°5.27   121°4.96   251°22.26   120°15.43   116°3.13   22.77   Alleth   16°11.89   55°49.11   11°8.06   14°11.06   18°13.55   13°13.15   16°3.13											Acrux	$172^{\circ}58.79$	-63°15.10
6 16°13.65 226°14.15 N3°83.34 31°5.27 N3°16.99 240°13.94 250°2.08°2.08°2.08°2.08°2.08°2.08°2.08°2.0													
15"13.53													
8 45°18.45 25°13.14 51.24 326°8.88 5.30 266°24.16 15.31 16°3.13 27.79 8 45°18.45 25°13.14 51.45 15.03 31°5.70 9 60°20.92 270°13.53 50.36 356°7.10 5.59 296°27.96 15.08 46°7.89 27.85 10 75°23.38 285°13.33 40.30 11°7.71 6.30 311°20.86 14.06 61°10.62 27.85 11 00°25.85 300°13.12 48.23 26°8.32 6.63 326°31.75 14.84 67.89 27.85 11 106°26.85 31 315°12.92 N13°47.17 41°8.93 N12°6.97 341°3.36 N20°14.72 91°15.06 005°27.99 13 120°30.77 330°12.72 46.10 56°9.54 7.30 356°35.55 14.61 106°17.43 27.92 14 135°33.24 345°15.22 43.97 86°10.76 7.79 26°39.35 14.37 136°22.20 2.79.65 15 150°35.70 0°12.32 43.97 86°10.76 7.79 26°39.35 14.37 136°22.20 2.79.65 16 165°38.17 15°12.12 42.91 10°11.37 8.30 41°12.55 14.13 10°62.79 27.88 18 155°43.00 45°11.72 N13°40.78 110°11.37 8.30 41°12.55 14.25 131°24.59 27.88 18 155°43.00 45°11.72 N13°40.78 111°11.98 8.03 56°43.15 14.13 106°26.97 28.00 19 210°45.56 60°11.53 38.04 61°11.82 9.90 86°46.95 13.30 106′31.74 28.04 19 210°45.56 60°11.53 38.04 61°11.82 9.90 86°46.95 13.30 106′31.74 28.04 19 220°45.04 00°71.13 38.04 61°11.82 9.90 86°46.95 13.30 106′31.74 28.04 19 220°45.04 00°71.13 38.04 61°11.82 9.90 86°46.95 13.30 106′31.74 28.04 10 220°46.02 75°11.33 38.04 61°11.82 9.90 86°46.95 13.30 106′31.74 28.04 10 220°46.02 75°11.33 38.04 16°11.82 9.90 86°46.95 13.30 106′31.74 28.04 10 220°46.02 75°11.33 38.04 16°11.82 9.90 86°46.95 13.30 106′31.74 28.04 10 220°46.00 75°11.33 38.04 16°11.82 9.90 80°46.95 13.30 106′31.74 28.04 10 220°46.90 90°11.31 30°11.90 100°11													I
8 45°18.45 256°13.74 314°6.49 5.63 281°26.06 15.20 31°5.51 27.81 Menkent 147°5.02 36°3.02 2.00°5.09 46°1.09 27.81 Menkent 147°5.02 36°3.02 2.00°5.09 46°1.09 27.81 Menkent 147°5.02 36°3.02 2.00°5.09 46°1.02 48°1.02	7	$30^{\circ}15.99$	240°13.94	52.48	326°5.88	5.30	$266^{\circ}24.16$	15.31	$16^{\circ}3.13$				
9 60°2993 8 28°5133 3 4930 1177.71 6.30 311°29.86 1.496 61°12.66 27.87 11 07°25.83 27.85 11 07°25.83 20°13.12 48.23 26°8.32 6.63 326°31.75 14.84 76°12.66 27.87 14.89 12.29 112 10°28.31 31°12.92 113°40.74 12°19.15 106°17.43 27°92 112 10°28.31 31°12.92 113°40.74 12°19.15 106°17.43 27°92 112 10°30.77 330°12.72 46.10 56°9.54 7.30 365°35.55 14.61 106°17.43 27°92 112.92 112.92 112.92 49.01 10°11.37 8.30 414.44 12°11.98 1 27.94 111.98 12°7.94 111.98 12°7.94 111.98 11.99 12°7.95 115 150°35.70 0°12.32 43.97 86°10.76 7.97 26°39.35 1.437 136°22.20 27°96 14.71 180°40.63 30°11.92 41.84 116°11.98 8.63 56°43.15 14.13 156°22.00 27°4.00 48°11.72 113°40.91 131°12.95 12°12.90 12°45.56 60°11.53 39.71 146°13.21 9.29 86°46.95 13.90 196°31.74 28.00 12°2.20 12°45.50 60°11.53 39.71 146°13.21 9.29 86°46.95 13.90 196°31.74 28.00 12°2.20													
11 90°5.85 300°13.12 48.23 26°8.32 6.63 326°3.175 1.484 76°12.66 27.87   12 105°3.81 315°12.92 N13°47.17 41°8.03 N21°6.97 34°13.65 N071°4.72 91°15.05 N03°27.93   13 120°3.077 330°12.72 46.10 56°9.54 7.30 366°38.55 1.46.1 106°17.43 27.92   14 138°33.24 345°12.52 45.04 71°0.15 7.63 311°37.45 1.449 121°9.81 27.94   15 150°35.70 0°12.32 43.97 86°10.76 7.97 26°39.35 1.437 136°22.02 27.96   16 166°33.74 15°12.12 42.91 101°11.37 8.30 41°41.25 1.425 115°24.88 27.98   17 180°40.63 30°11.92 41.84 116°11.98 8.63 56°43.15 1.43 121°24.88 27.98   18 199°33.09 45°11.72 N13°40.78 131°12.99 N21°8.96 71°48.05 N20°14.02 181°29.35 N03°8.02   19 210°45.56 60°11.53 39.71 146°13.21 9.92 86°48.95 N20°14.02 181°29.35 N03°8.02   10 225°48.02 75°13.3 38.64 161°13.82 9.93 N1°48.84 13.78 211°24.13 2.80   21 240°50.49 0.90°11.13 37.57 16°14.43 19.96 116°50.74 13.66 226°35.11 28.88   12 240°50.49 0.90°11.13 37.57 16°14.43 19.96 116°50.74 13.66 226°35.15 128.08   12 240°50.49 0.90°11.3 37.57 16°14.43 19.96 116°54.54 13.54 241°8.80 28.10   12 240°50.49 0.90°11.3 37.57 16°14.43 19.96 116°54.54 13.54 241°8.80 28.10   12 316°23.21 105°10.74 35.43 206°15.65 10.62 146°54.54 13.43 256°41.28 28.12   14 30°0.34 150°10.36 33.29 236°15.65 10.62 146°54.54 13.43 256°41.28 28.12   15 30°0.34 150°10.36 33.29 236°16.67 11.27 176°58.34 130°10.36 18.35 22.18 165°10.16 32.22 255°17.48 11.60 11.90°10.29 11.90°10.36 13.39 22°15.87 18.10 10.20 12.20°10.35 11.50°10.35 133°3.24 36°5.00 22.18 150°10.36 133°2.2 255°17.48 11.60 199°0.24 11.29 18.20°10.35 11													
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Wed         GHA         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         No3°24.36         No3°28.14         46°49.69         -29°28.68           1         301°0.34         150°10.36         33.29         236°16.87         11.27         176°58.34         13.19         286°46.06         28.16         Scheat         136°43.82         282°13.54           2         316°2.81         166°10.16         32.22         251°17.48         11.60         11.93         207°2.14         1.29         316°2.81         331°5.27         180°9.97         30.08         281°18.70         12.26         222°4.03         12.83         331°53.22         28.22         28.22         Markab         13°28.50         15°20.88           5         1°10.20         210°9.99         29.01         296°19.31         12.59         223°7.93         12.24         17°0.38         28.24         Markab         13°28.50         15°20.88           6         16°12.66         225°9.40         N13°27.93         311°19.92         N21°12.91         252°7.83         N20°12.00         1°57.99         N30°2.26         Markab         26°25.66         13:17		Ja33. 04.33	ν 0.2 α I			.5 111.50	ν1.5 d 0						
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3 331°5.27 180°9.97 · 31.15 266°18.09 · 11.93 207°2.14 · 12.95 316°50.83 · 28.20   4 346°7.74 195°9.78 30.08 281°18.70 12.26 222°4.03 12.83 331°53.22 28.22   5 1°10.20 210°9.59 29.01 296°19.31 12.59 237°5.93 12.72 346°55.60 28.24   6 16°12.66 225°9.40 N13°27.93 311°19.92 N21°12.91 252°7.83 N20°12.60 1°57.99 N03°28.26   7 31°15.13 240°9.21 26.86 326°20.53 13.24 267°9.73 12.48 17°0.38 28.28   8 46°17.59 255°9.02 25.79 341°2.14 13.57 282°11.63 12.36 32°2.76 28.30   9 61°20.06 270°8.83 · 24.71 356°21.75 · 13.89 297°13.53 · 12.24 47°5.15 · 28.32   10 76°22.52 285°8.65 23.64 11°22.36 14.22 312°15.42 12.12 62°7.54 28.34   11 91°24.98 300°8.46 22.56 26°22.97 14.55 327°17.32 12.00 77°9.93 28.36   12 106°27.45 315°8.27 N13°21.49 41°23.58 N21°14.87 342°19.22 N20°11.89 92°12.32 N03°28.38   13 121°29.91 330°8.09 20.41 56°24.19 15.20 357°21.12 11.77 107°14.70 28.39   14 136°32.38 345°7.90 19.33 71°24.80 15.52 12°23.02 11.65 122°17.09 28.41   15 151°34.84 0°7.72 · 18.26 86°25.41 · 15.85 27°24.92 · 11.53 137°19.48 · 28.43   16 166°37.30 15°7.54 17.18 101°26.02 16.17 42°26.81 11.41 152°21.87 28.45   17 181°39.77 30°7.36 16.10 116°26.63 16.49 57°28.71 11.29 167°24.26 28.47   18 196°42.23 45°7.17 N13°15.02 131°27.24 N21°6.82 72°30.61 N20°11.17 182°26.65 N03°28.49   19 211°44.70 60°6.99 13.94 146°27.85 17.14 87°32.51 11.05 197°29.04 28.51   18 196°42.23 45°7.17 N13°15.02 131°27.24 N21°6.82 72°30.61 N20°11.17 182°26.65 N03°28.49   19 211°44.70 60°6.99 13.94 146°27.85 17.14 87°32.51 11.05 197°29.04 28.51   22 256°52.09 105°6.45 10.70 191°29.68 18.10 132°38.20 10.70 242°36.21 28.56   10 10 10 10 10 10 10 10 10 10 10 10 10 1													
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6 16°12.66 225°9.40 N13°27.93 311°19.92 N21°12.91 252°7.83 N20°12.60 1°57.99 N03°28.26 7 31°15.13 240°9.21 26.86 326°20.53 13.24 267°9.73 12.48 17°0.38 28.28 8 46°17.59 255°9.02 25.79 341°21.14 13.57 282°11.63 12.36 32°2.76 28.30 9 61°20.06 270°8.83 · 24.71 356°21.75 · 13.89 299°13.53 · 12.24 47°5.15 · 28.32 10 76°22.52 285°8.65 23.64 11°22.36 14.22 312°15.42 12.12 62°7.54 28.34 11°91°24.98 300°8.46 22.56 26°22.97 14.55 327°17.32 12.00 77°9.99 28.36 13121°29.91 330°8.09 20.41 56°24.19 15.20 357°21.12 11.77 107°14.70 28.39 14 136°32.38 345°7.90 19.33 71°24.80 15.52 12°23.02 11.65 122°17.09 28.41 151°34.84 0°7.72 · 18.26 86°25.41 · 15.85 27°24.92 · 11.53 137°19.48 · 28.43 16 166°37.30 15°7.54 17.18 101°26.03 16.17 42°26.81 11.41 152°21.87 28.45 17 181°39.77 30°7.36 16.10 116°26.63 16.49 57°28.71 11.29 167°24.26 28.47 18 196°42.23 45°7.17 N13°15.02 131°27.24 N21°16.82 72°30.61 N20°11.17 182°26.65 N03°28.49 199°12.67 N470 60°6.99 13.94 146°27.85 17.14 87°32.51 11.05 197°29.04 28.51 199°29.04 28.51 20°26°47.16 75°6.81 12.86 161°28.46 17.46 102°34.41 10.93 212°31.43 28.53 11.05 197°29.04 28.51 20°26°47.16 75°6.81 12.86 161°28.46 17.46 102°34.41 10.93 212°31.43 28.53 11.24°49.63 90°6.63 · 11.78 176°29.07 · 17.78 117°36.31 · 10.82 227°33.82 · 28.55 22°26°52.09 105°6.45 10.70 191°29.68 18.10 132°38.20 10.70 242°36.21 28.56 28.58 10.10 10.58 257°38.60 28.58 10.10 10.58 257°38.60 28.58 10.10 10.58 257°38.60 28.58 10.10 10.58 257°38.60 28.58 10.10 10.58 257°38.60 28.58 10.10													
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9 61°20.06 270°8.83 · · 24.71 356°21.75 · · · 13.89 297°13.53 · · 12.24 47°5.15 · · · 28.32 10 76°22.52 285°8.65 23.64 11°22.36 14.22 312°15.42 12.12 62°7.54 28.34 11 91°24.98 300°8.46 22.56 26°22.97 14.55 327°17.32 12.00 77°9.93 28.36 12 106°27.45 315°8.27 N13°21.49 41°23.58 N21°14.87 342°19.22 N20°11.89 92°12.32 N03°28.38 13 121°29.91 330°8.09 20.41 56°24.19 15.20 357°21.12 11.77 107°14.70 28.39 14 136°32.38 345°7.90 19.33 71°24.80 15.52 12°23.02 11.65 122°17.09 28.41 15 151°34.84 0°7.72 · · 18.26 86°25.41 · · · 15.85 27°24.92 · · · 11.53 137°19.48 · · · 28.43 16 166°37.30 15°7.54 17.18 101°26.02 16.17 42°26.81 11.41 152°21.87 28.45 19 211°44.70 60°6.99 13.94 146°27.85 17.14 87°32.51 11.29 167°24.26 28.47 19 211°44.70 60°6.99 13.94 146°27.85 17.14 87°32.51 11.05 197°29.04 28.51 212°35°8.56 13:11 Saturn 345°45.79 05:52 12°16.65 14:59													
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12 106 27.45 315 8.27 N13 21.49 41 23.58 N21 14.87 342 19.22 N20 11.89 92 12.32 N03 28.38 121 29.91 330 8.09 20.41 56°24.19 15.20 357°21.12 11.77 107°14.70 28.39 14 136°32.38 345°7.90 19.33 71°24.80 15.52 12°23.02 11.65 122°17.09 28.41 15 151°34.84 0°7.72 ··· 18.26 86°25.41 ··· 15.85 27°24.92 ··· 11.53 137°19.48 ··· 28.43 16 166°37.30 15°7.54 17.18 101°26.02 16.17 42°26.81 11.41 152°21.87 28.45 181°39.77 30°7.36 16.10 116°26.63 16.49 57°28.71 11.29 167°24.26 28.47 181°39.77 30°7.36 16.10 116°26.63 16.49 57°28.71 11.29 167°24.26 28.47 19 211°44.70 60°6.99 13.94 146°27.85 17.14 87°32.51 11.05 197°29.04 28.51 19 211°44.70 60°6.99 13.94 146°27.85 17.14 87°32.51 11.05 197°29.04 28.51 212°31.43 28.53 21 241°49.63 90°6.63 ··· 11.78 176°29.07 ··· 17.78 117°36.31 ··· 10.82 227°33.82 ··· 28.55 120°6.27 9.62 206°30.29 18.43 147°40.10 10.58 257°38.60 28.58 103°28.49 140°25.45 120°6.27 9.62 206°30.29 18.43 147°40.10 10.58 257°38.60 28.58 103°28.49 140°25.45 120°6.27 9.62 206°30.29 18.43 147°40.10 10.58 257°38.60 28.58 103°2.12 13:14 236°12.12 13:14 241°1.70 28.39 140°24.70 28.39 140°24.70 28.39 140°24.70 05:56 14:59 1		91°24.98	300°8.46	22.56	26°22.97	14.55	327°17.32	12.00	77°9.93				
13 121 29.91 330 8.09 20.41 56 24.19 15.20 357 21.12 11.77 107 14.70 28.39 14 136 32.38 345 7.90 19.33 71 24.80 15.52 12 23.02 11.65 122 17.09 28.41 15 151 34.84 0 7.72 · 18.26 86 25.41 · 15.85 27 24.92 · 11.53 137 19.48 · 28.43 16 166 37.30 15 7.54 17.18 101 26.02 16.17 42 26.81 11.41 152 21.87 28.45 17 181 39.77 30 7.36 16.10 116 26.63 16.49 57 28.71 11.29 167 24.26 28.47 18 196 42.23 45 7.17 N13 15.02 131 27.24 N21 16.82 72 30.61 N20 11.17 182 26.65 N03 28.49 19 211 44.70 60 6.99 13.94 146 27.85 17.14 87 32.51 11.05 197 29.04 28.51 20 226 47.16 75 6.81 12.86 161 28.46 17.46 102 34.41 10.93 212 31.43 28.53 21 241 49.63 90 6.63 · 11.78 176 29.07 · 17.78 117 36.31 · 10.82 227 33.82 · 28.55 22 256 52.09 105 6.45 10.70 191 29.68 18.10 132 38.20 10.70 242 36.21 28.56 23 271 54.55 120 6.27 9.62 206 30.29 18.43 147 40.10 10.58 257 38.60 28.58  Saturn 345 47.70 05:56  Saturn 345 47.70 05:56  Saturn 345 47.70 05:56													
15 151°34.84 0°7.72 · 18.26 86°25.41 · 15.85 27°24.92 · 11.53 137°19.48 · 28.43 16 166°37.30 15°7.54 17.18 101°26.02 16.17 42°26.81 11.41 152°21.87 28.45 17 181°39.77 30°7.36 16.10 116°26.63 16.49 57°28.71 11.29 167°24.26 28.47 18 196°42.23 45°7.17 N13°15.02 131°27.24 N21°16.82 72°30.61 N20°11.17 182°26.65 N03°28.49 19 211°44.70 60°6.99 13.94 146°27.85 17.14 87°32.51 11.05 197°29.04 28.51 20 226°47.16 75°6.81 12.86 161°28.46 17.46 102°34.41 10.93 212°31.43 28.53 21 241°49.63 90°6.63 · 11.78 176°29.07 · 17.78 117°36.31 · 10.82 227°33.82 · 28.55 22 256°52.09 105°6.45 10.70 191°29.68 18.10 132°38.20 10.70 242°36.21 28.56 Mars: 0.1  18 196°42.23 45°7.17 N13°15.02 131°27.24 N21°16.82 72°30.61 N20°11.17 182°26.65 N03°28.49 21 241°49.63 90°6.63 · 11.78 176°29.07 · 17.78 117°36.31 · 10.82 227°33.82 · 28.55 22 256°52.09 105°6.45 10.70 191°29.68 18.10 132°38.20 10.70 242°36.21 28.56 Mars: 0.1  23 271°54.55 120°6.27 9.62 206°30.29 18.43 147°40.10 10.58 257°38.60 28.58													I
16       166° 37.30       15° 7.54       17.18       101° 26.02       16.17       42° 26.81       11.41       152° 21.87       28.45       Venus       200° 12.67       14:59         17       181° 39.77       30° 7.36       16.10       116° 26.63       16.49       57° 28.71       11.29       167° 24.26       28.47       Mars       295° 18.38       09:15         18       196° 42.23       45° 7.17       N13° 15.02       131° 27.24       N21° 16.82       72° 30.61       N20° 11.17       182° 26.65       N03° 28.49       Jupiter       235° 58.56       13:11         19       211° 44.70       60° 6.99       13.94       146° 27.85       17.14       87° 32.51       11.05       197° 29.04       28.51       Saturn       345° 45.79       05:52         20       226° 47.16       75° 6.81       12.86       161° 28.46       17.46       102° 34.41       10.93       212° 31.43       28.53       Horizontal parallax         21       241° 49.63       90° 6.63       11.78       176° 9.07       17.78       117° 36.31       10.82       227° 33.82       28.55       Horizontal parallax         22       256° 52.09       105° 6.45       10.70       191° 29.68       18.10       132° 38.20 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>													
17 181°39.77 30°7.36 16.10 116°26.63 16.49 57°28.71 11.29 167°24.26 28.47													
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23 271°54.55 120°6.27 9.62 206°30.29 18.43 147°40.10 10.58 257°38.60 28.58 Mars: 0.1											Horízoi	•	0.1
Mer.pass. 04:55 $\nu$ -0.2' $d$ -1.1' m-4.09 $\nu$ 0.6' $d$ 0.3' m1.30 $\nu$ 1.9' $d$ -0.1' m-1.80 $\nu$ 2.4' $d$ 0.0' m0.75													V
	Mer.p	pass. 04:55	$\nu$ -0.2' d-1	L.1′ m-4.09	$\nu^{0.6'} d0$	.3′ m1.30	$\nu$ 1.9′ d-0	.1′ m-1.80	$\nu$ 2.4′ d0	.0′ m0.75			

	011-010 =	+0.0042 360		-011 -	,		
h	Su	n			Moon		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°49.42 193°49.31	N22° 42.33 42.08	292°13.68 306°47.64	15.0' 14.9'	\$01°31.70 01°16.55	-15.2' -15.2'	56.5' 56.5'
2	208°49.21	41.83	300 47.04 321°21.58	14.9'	01°10.33	-15.2'	56.6'
3	223°49.10	• • 41.58	335°55.50	14.9'	00°46.18	-15.2'	56.6'
4	238°49.00	41.33	350°29.40	14.9'	00°30.97	-15.2'	56.6'
5	253°48.89	41.08	5°3.27	14.8'	$00^{\circ}15.74$	-15.2'	56.7'
6	268°48.79	N22°40.83	19°37.12	14.8'	S00°0.50	-15.3'	56.7'
7	283°48.68 298°48.58	40.58	34° 10.93 48° 44.72	14.8'	N00°14.76 00°30.03	15.3'	56.7'
8 9	298 48.58 313°48.48	40.32 •• 40.07	48 44.72 63°18.48	14.8' 14.7'	00° 45.32	15.3' 15.3'	56.7' 56.8'
10	328°48.37	39.81	77°52.20	14.7'	01°0.62	15.3	56.8
11	343°48.27	39.56	92°25.89	14.7'	01° 15.93	15.3'	56.8'
12	358°48.16	N22°39.30	106°59.55	14.6'	N01°31.24	15.3'	56.9'
13	13°48.06	39.05	121°33.17	14.6'	01°46.57	15.3'	56.9'
14	28°47.96	38.79	136°6.76	14.5'	02°1.91	15.3'	56.9'
15 16	43°47.85 58°47.75	· · 38.53 38.27	150° 40.30 165° 13.81	14.5' 14.5'	02° 17.25 02° 32.60	15.3' 15.4'	56.9' 57.0'
17	73°47.65	38.01	179° 47.28	14.4'	02° 47.96	15.4	57.0'
18	88°47.54	N22°37.75	194°20.70	14.4'	N03°3.31	15.4	57.0'
19	103°47.44	37.49	208°54.08	14.3'	03° 18.67	15.4'	57.1'
20	118°47.34	37.23	223°27.41	14.3'	03°34.04	15.4'	57.1'
21	133°47.24	• • 36.97	238°0.70	14.2'	03°49.40	15.4'	57.1'
22	148°47.13 163°47.03	36.71	252°33.94	14.2'	04°4.76 04°20.13	15.4'	57.2'
23		36.44	267°7.12	14.1'		15.4'	57.2'
	SD = 15.7'	d = -0.2'		SI	D = 15.4'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°46.93	N22°36.18	281°40.26	14.1'	N04°35.49	15.4'	57.2'
1	193°46.83	35.91	296° 13.35	14.0'	04°50.84	15.4'	57.3'
2	208°46.73	35.65	310°46.38	14.0'	05°6.19	15.3'	57.3'
3 4	223°46.62 238°46.52	· · 35.38 35.12	325° 19.36 339° 52.28	13.9' 13.9'	05°21.54 05°36.88	15.3' 15.3'	57.3' 57.3'
5	250°46.42	34.85	354°25.14	13.8'	05°52.21	15.3	57.4'
6	268°46.32	N22°34.58	8° 57.94	13.7'	N06°7.53	15.3'	57.4'
7	283°46.22	34.31	23°30.69	13.7'	06°22.84	15.3'	57.4'
8	298°46.12	34.04	38°3.37	13.6'	06°38.14	15.3'	57.5'
9	313°46.02	• • 33.77	52°35.98	13.6'	06°53.42	15.3'	57.5'
10	328°45.92	33.50	67°8.54	13.5'	07°8.70	15.3'	57.5'
11 12	343°45.82 358°45.72	33.23 N22°32.96	81°41.02 96°13.44	13.4' 13.3'	07°23.95 N07°39.19	15.2' 15.2'	57.6' 57.6'
13	13°45.62	32.68	90 13.44 110°45.79	13.3'	07°54.42	15.2'	57.6'
14	28°45.52	32.41	125° 18.06	13.2'	08°9.62	15.2'	57.7'
15	43°45.42	• • 32.14	139°50.27	13.1'	08°24.80	15.2'	57.7'
16	58°45.32	31.86	154°22.40	13.1'	08°39.96	15.1'	57.7'
17	73°45.22	31.59	168° 54.46	13.0'	08°55.10 N09°10.22	15.1'	57.8'
18 19	88°45.12 103°45.02	N22°31.31 31.03	183°26.44 197°58.34	12.9' 12.8'	09° 25.30	15.1' 15.1'	57.8' 57.8'
20	118°44.92	30.76	212°30.16	12.7'	09° 40.37	15.0'	57.0°
21	133°44.82	• • 30.48	227°1.91	12.7'	09° 55.40	15.0'	57.9'
22	148°44.72	30.20	241°33.57	12.6'	10° 10.40	15.0'	57.9'
23	163°44.63	29.92	256°5.14	12.5'	10°25.38	14.9'	58.0'
	SD = 15.7'	d = -0.3'		SI	D = 15.6'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°44.53	N22°29.64	270°36.63	12.4'	N10°40.32	14.9'	58.0'
1	193°44.43	29.36	285°8.04	12.3'	10°55.23	14.9'	58.0'
2	208°44.33	29.08	299°39.36	12.2'	11° 10.10	14.8'	58.1'
3	223°44.23	• • 28.79	314° 10.59	12.1'	11°24.93	14.8'	58.1'
4 5	238°44.14 253°44.04	28.51 28.23	328°41.72 343°12.77	12.0' 12.0'	11°39.73 11°54.49	14.8' 14.7'	58.1' 58.2'
6	268°43.94	28.23 N22°27.94	343 12.77 357°43.72	11.9'	N12°9.20	14.7	58.2'
7	283°43.85	27.66	12° 14.58	11.8'	12° 23.88	14.6'	58.2'
8	298°43.75	27.37	26°45.34	11.7'	$12^{\circ}38.51$	14.6'	58.3'
9	313°43.65	• • 27.08	41°16.00	11.6'	12°53.09	14.5'	58.3'
10	328°43.56	26.80	55° 46.57 70° 17.03	11.5'	13°7.63 13°22.12	14.5'	58.3'
11 12	343°43.46 358°43.36	26.51 N22°26.22	70°17.03 84°47.40	11.4' 11.3'	N13° 36.55	14.4' 14.4'	58.4' 58.4'
13	13°43.27	25.93	99° 17.66	11.2'	13° 50.94	14.4	58.4'
14	28°43.17	25.64	113° 47.81	11.1'	14°5.27	14.3'	58.5'
15	43°43.07	• • 25.35	128° 17.87	10.9'	14° 19.55	14.2'	58.5'
16	58°42.98	25.06	142°47.81	10.8'	14° 33.77	14.2'	58.5'
17	73°42.88	24.77 N22°24.48	157° 17.65	10.7'	14°47.93 N15°2.03	14.1'	58.6'
18 19	88°42.79 103°42.69	N22~24.48 24.18	171°47.37 186°16.99	10.6' 10.5'	N15°2.03 15°16.07	14.0' 14.0'	58.6' 58.6'
20	118° 42.60	23.89	200° 46.50	10.5	15° 30.04	13.9'	58.7'
21	133°42.50	• • 23.59	215° 15.89	10.3'	15° 43.95	13.8'	58.7'
22	148°42.41	23.30	229° 45.17	10.2'	15° 57.80	13.8'	58.7'
23	163°42.31	23.00	244°14.33	10.0'	16° 11.57	13.7'	58.8'
	SD = 15.7'	d = -0.3'		SI	O = 15.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	07:08	08:03	08:59	15:11	16:07	17:03

		Moonris	ρ.		Moonset	+
Lat.	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° 64°	22:34	22:20 22:29	22:03 22:19	11:00	12:47 12:41	14:44
62°	22:37 22:40	22:29	22:19	11:00 10:59	12:41	14:29 14:17
60°	22:40	22:30	22:32	10:59	12:35	14:17 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° 52°	22:48	22:58	23:10	10:56	12:18	13:44
52 50°	22:50 22:52	23:02 23:06	23:17 23:23	10:56 10:55	12:15 12:12	13:38 13:32
45°	22:52	23:14	23:23	10:55	12:12	13:32
N 40°	22:58	23:21	23:48	10:54	12:00	13:10
35° 30°	23:00 23:02	23:27 23:33	23:58	10:53	11:56	13:02 12:55
20°	23:02	23:33 23:42		10:52 10:51	11:52 11:45	12:55 12:42
N 10°	23:00	23:42		10:51	11:45	12:42
0°	23:12	23:58		10:30	11:34	12:31
	23:16	25.50	00.06	10:49		12:11
<b>S</b> 10° 20°	23:16		00:06 00:14	10:49	11:28 11:22	12:11
30°	23:19		00:14	10:46	11:22	11:48
35°	23:25		00:24	10:47	11:10	11:41
40°	23:28		00:36	10:45	11:08	11:33
45°	23:31		00:44	10:44	11:03	11:23
<b>S</b> 50°	23:35		00:53	10:43	10:57	11:12
52°	23:35		00:53	10:43	10:57	11:12
54°	23:37		01:02	10:43	10:54	11:07
56°	23:41		01:02	10:42	10.51	10:55
58°	23:43		01:07	10:42	10:44	10:33
<b>S</b> 60°	23:45		01:13	10:41	10:44	10:40

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	21-23	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	69-48%	
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		

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	286° 57.02	135°6.10 N13°8.54	221°30.90 N21°18.75	162°42.00 N20°10.46	272°40.99 N03°28.60	
1	301°59.48	150°5.92 7.45	236°31.51 19.07	177°43.90 10.34	287°43.38 28.62	Alpheratz 357°33.38 29°14.14 Ankaa 353°5.84 -42°9.40
2	$317^{\circ}1.95$	165°5.74 6.37	251°32.12 19.39	192°45.80 10.22	302°45.77 28.64	Schedar 349°29.54 56°40.76
3	332°4.41	180°5.57 · · 5.29	266°32.73 · · 19.71	207°47.69 · · 10.10	317°48.16 · · 28.66	Diphda 348°46.02 -17°50.27
4	347°6.87	195°5.39 4.20	281°33.34 20.03	222°49.59 9.98	332°50.55 28.67	Achernar 335°19.35 -57°5.76
5 6	2°9.34 17°11.80	210°5.22 3.12 225°5.04 N13°2.03	296°33.95 20.35 311°34.56 N21°20.66	237°51.49 9.86 252°53.39 N20°9.74	347°52.94 28.69 2°55.33 N03°28.71	Hamal 327°49.88 23°35.22
7	32° 14.27	240°4.87 13°0.95	326°35.17 20.98	267°55.28 9.62	17°57.72 28.73	Polaris 313°38.15 89°22.25
8	47° 16.73	255°4.70 12°59.86	341°35.78 21.30	282°57.18 9.50	33°0.11 28.75	Acamar 315°11.04 -40°11.62
9	62°19.19	270°4.53 · · 58.78	356° 36.39 · · 21.62	297°59.08 · · 9.38	48°2.50 · · 28.76	Menkar 314°5.01 4°11.68
10	$77^{\circ}21.66$	285°4.36 57.69	11°37.00 21.94	313° 0.98 9.26	63°4.89 28.78	Mirfak 308°26.75 49°57.15 Aldebaran 290°38.46 16°33.74
11	92°24.12	300°4.19 56.60	26°37.61 22.25	328° 2.88 9.14	78°7.29 28.80	Rigel 281°2.97 -8°10.18
12	107°26.59	315°4.02 N12°55.52	41°38.22 N21°22.57	343°4.77 N20°9.03	93°9.68 N03°28.82	Capella 280°20.47 46°1.37
13	122°29.05	330°3.85 54.43	56° 38.83 22.89	358° 6.67 8.91	108°12.07 28.84	Bellatrix 278°21.85 6°22.45
14 15	137° 31.52 152° 33.98	345°3.68 53.34 0°3.51 · · 52.25	71°39.44 23.20 86°40.05 · · 23.52	13°8.57 8.79 28°10.47 · · 8.67	123°14.46 28.85 138°16.85 · · 28.87	Elnath 278° 0.64 28° 37.74
16	167°36.44	15°3.34 51.16	101°40.66 23.83	43°12.36 8.55	153°19.25 28.89	Alnilam 275°36.78 -1°11.05
17	182°38.91	30°3.18 50.07	116°41.27 24.15	58°14.26 8.43	168°21.64 28.91	Betelgeuse 270°51.06 7°24.74
18	197°41.37	45°3.01 N12°48.98	131°41.88 N21°24.46	73°16.16 N20°8.31	183°24.03 N03°28.92	Canopus 263° 52.39 -52° 42.47
19	212°43.84	60°2.85 47.89	146°42.49 24.78	88°18.06 8.19	198°26.42 28.94	Sirius 258° 25.49 -16° 45.10 Adhara 255° 5.27 -29° 0.44
20	227°46.30	75°2.68 46.80	161°43.10 25.09	103°19.95 8.07	213°28.82 28.96	Procyon 244°49.87 5°9.44
21	242°48.76	90°2.52 · · 45.71	176°43.71 · · 25.40	118°21.85 · · 7.95	228°31.21 · · 28.97	Pollux 243°16.16 27°57.75
22	257°51.23	105°2.36 44.61	191°44.32 25.72	133°23.75 7.83	243°33.60 28.99	Avior 234°14.86 -59°35.73
23	272°53.69	120°2.19 43.52	206°44.92 26.03	148°25.65 7.71	258°36.00 29.01	Suhail 222°45.80 -43°32.48
Mer.	pass. 04:51	$\nu$ -0.2′ $d$ -1.1′ m-4.10	$ u 0.6' \ d0.3' \ m1.30$	$\nu 1.9' \ d$ -0.1' m-1.80	$ u 2.4' \ d0.0' \ { m m0.74}$	Miaplacidus 221°38.85 -69°49.71
						Alphard 217°46.81 -8°46.44
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.36 11°50.29
0	287° 56.16	135°2.03 N12°42.43	221°45.53 N21°26.34	163°27.54 N20°7.59	273°38.39 N03°29.02	Dubhe 193°39.86 61°36.70 Denebola 182°23.80 14°25.49
1	$302^{\circ}58.62$	150°1.87 41.33	236°46.14 26.65	178°29.44 7.47	288°40.79 29.04	Gienah 175° 42.38 -17° 41.46
2	$318^{\circ}1.09$	165°1.71 40.24	251°46.75 26.97	193°31.34 7.35	303°43.18 29.06	Acrux 172°58.82 -63°15.09
3	333°3.55	180°1.55 · · 39.14	266° 47.36 · · 27.28	208°33.23 · · 7.23	318°45.57 · · 29.07	Gacrux 171°50.34 -57°16.01
4	348°6.01	195°1.39 38.05	281°47.97 27.59	223°35.13 7.11	333°47.97 29.09	Alioth 166°11.91 55°49.19
5 6	3°8.48 18°10.94	210°1.23 36.95 225°1.08 N12°35.86	296°48.58 27.90 311°49.19 N21°28.21	238°37.03 6.99 253°38.93 N20°6.87	348°50.36 29.11 3°52.76 N03°29.12	Spica 158°20.96 -11°18.06
7	33° 13.41	240°0.92 34.76	326°49.80 28.52	268°40.82 6.75	18°55.15 29.14	Alkaid 152°50.93 49°11.07
8	48° 15.87	255°0.76 33.66	341°50.41 28.83	283°42.72 6.62	33°57.55 29.16	Hadar 148°34.04 -60°30.34
9	63° 18.33	270°0.61 · · 32.57	356°51.02 · · 29.14	298°44.62 · · 6.50	48°59.94 · · 29.17	Menkent 147°56.03 -36°30.22
10	78°20.80	285°0.45 31.47	11°51.63 29.45	313°46.51 6.38	64°2.34 29.19	Arcturus 145°46.67 19°2.75 Rigil Kent. 139°38.31 -60°56.97
11	93°23.26	300°0.30 30.37	26°52.24 29.76	328°48.41 6.26	79°4.73 29.21	Kochab 137°19.30 74°3.00
12	108°25.73	315°0.14 N12°29.27	41°52.85 N21°30.06	343°50.31 N20°6.14	94°7.13 N03°29.22	Zuben'ubi 136°54.48 -16°9.20
13	123°28.19	329°59.99 28.17	56° 53.46 30.37	358°52.21 6.02	109°9.53 29.24	Alphecca 126°2.46 26°37.63
14	138° 30.66	344°59.84 27.07 359°59.69 25.97	71°54.07 30.68	13°54.10 5.90 28°56.00 •• 5.78	124°11.92 29.25 139°14.32 · · 29.27	Antares 112°14.01 -26°29.51
15 16	153° 33.12 168° 35.58	359°59.69 · · 25.97 14°59.54 24.87	86°54.68 · · 30.99 101°55.29 31.29	28°56.00 · · 5.78 43°57.90 5.66	139°14.32 · · 29.27 154°16.71 29.28	Atria 107°6.60 -69°4.63
17	183°38.05	29°59.39 23.77	116° 55.90 31.60	58°59.79 5.54	169°19.11 29.30	Sabik 102°1.04 -15°45.46
18	198°40.51	44°59.24 N12°22.67	131°56.51 N21°31.91	74°1.69 N20°5.42	184°21.51 N03°29.32	Shaula 96°8.28 -37°7.40 Rasalhague 95°57.07 12°32.50
19	213°42.98	59°59.09 21.57	146°57.11 32.21	89° 3.59 5.30	199°23.90 29.33	Rasalhague 95°57.07 12°32.50 Eltanin 90°41.08 51°29.18
20	228°45.44	74°58.94 20.46	161°57.72 32.52	104°5.48 5.18	214°26.30 29.35	Kaus Aust. 83°30.46 -34°22.28
21	243°47.90	89°58.79 · · 19.36	176°58.33 · · 32.82	119°7.38 · · 5.06	229°28.70 · · 29.36	Vega 80°31.95 38°48.53
22	258° 50.37	104°58.64 18.26	191°58.94 33.13	134° 9.28 4.94	244°31.09 29.38	Nunki 75°45.84 -26°15.76
23	273°52.83	119°58.50 17.15	206°59.55 33.43	149°11.17 4.81	259°33.49 29.39	Altair 61°58.41 8°56.35
Mer.	pass. 04:47	$\nu$ -0.2′ $d$ -1.1′ m-4.10	$ u 0.6' \ d0.3' \ m1.30$	$ u 1.9' \; d ext{-}0.1' \;  ext{m-}1.80$	$ u 2.4' \ d0.0' \ { m m0.74}$	Peacock 53°3.20 -56°38.80
						Deneb 49°24.51 45°22.44
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°37.31 9°59.84 Al Na'ir 27°31.02 -46°49.69
0	288° 55.30	134°58.35 N12°16.05	222°0.16 N21°33.73	164°13.07 N20°4.69	274°35.89 N03°29.41	Al Na'ir 27°31.02 -46°49.69 Fomalhaut 15°12.94 -29°28.67
1	303° 57.76	149°58.21 14.94	237°0.77 34.04	179°14.97 4.57	289°38.29 29.42	Scheat 13°43.80 28°13.55
2	319°0.23	164°58.06 13.84	252°1.38 34.34	194°16.86 4.45	304°40.69 29.44	Markab 13°28.48 15°20.89
3	334°2.69	179°57.92 · · 12.73	267°1.99 · · 34.64	209°18.76 · · 4.33	319°43.08 · · 29.45	Lui 00 Thur Cilla Manusca
4 5	349°5.15 4°7.62	194°57.78 11.63 209°57.63 10.52	282°2.60 34.95 297°3.21 35.25	224°20.66 4.21 239°22.55 4.09	334°45.48 29.47 349°47.88 29.48	Jul 09 Thu         SHA         Mer.pass           Venus         208°9.08         15:00
6	4 7.02 19° 10.08	224°57.49 N12°9.41	312°3.82 N21°35.55	254°24.45 N20°3.97	4°50.28 N03°29.50	Mars 294°33.88 09:14
7	34° 12.55	239°57.35 8.31	327°4.43 35.85	269°26.35 3.85	19°52.68 29.51	Jupiter 235° 44.98 13:08
8	49° 15.01	254°57.21 7.20	342°5.04 36.15	284°28.24 3.72	34°55.08 29.53	Saturn 345°43.97 05:48
9	64°17.48	269°57.07 · · 6.09	357°5.65 · · 36.45	299°30.14 · · 3.60	49°57.47 · · 29.54	Lul 10 Evi SHA May mass
10	79° 19.94	284°56.93 4.98	12°6.26 36.75	314°32.04 3.48	64°59.87 29.56	Jul 10 Fri         SHA         Mer.pass           Venus         207°5.88         15:00
11	94°22.40	299°56.79 3.87	27°6.86 37.05	329°33.93 3.36	80°2.27 29.57	Mars 293°49.38 09:13
12	109°24.87	314°56.66 N12°2.76	42°7.47 N21°37.35	344°35.83 N20°3.24	95°4.67 N03°29.59	Jupiter 235°31.39 13:05
13 14	124° 27.33 139° 29.80	329°56.52 1.65 344°56.38 12°0.54	57°8.08 37.65 72°8.69 37.95	359°37.73 3.12 14°39.62 3.00	110°7.07 29.60 125°9.47 29.62	Saturn 345°42.23 05:45
15	159° 29.80 154° 32.26	359°56.25 11°59.43	87°9.30 · · 38.25	29°41.52 · · 2.87	140°11.87 · · 29.63	Jul 11 Sat SHA Mer.pass
16	169°34.73	14°56.11 58.32	102°9.91 38.55	44°43.42 2.75	155°14.27 29.64	Venus 206°3.05 15:00
17	184°37.19	29°55.98 57.21	117° 10.52 38.84	59°45.31 2.63	170°16.67 29.66	Mars 293°4.86 09:12
18	199°39.65	44°55.84 N11°56.09	132°11.13 N21°39.14	74°47.21 N20°2.51	185°19.07 N03°29.67	Jupiter 235°17.77 13:01
19	214° 42.12	59°55.71 54.98	147°11.74 39.44	89°49.10 2.39	200°21.47 29.69	Saturn 345°40.59 05:41
20	229° 44.58	74°55.58 53.87	162°12.35 39.74	104°51.00 2.27	215°23.87 29.70	Horizontal parallax
21	244° 47.05 259° 49.51	89°55.44 · · 52.76	177°12.96 · · 40.03 192°13.57 40.33	119°52.90 · · 2.14	230°26.28 · · 29.71 245°28.68	Venus: 0.2
22 23	259 49.51 274°51.97	104°55.31 51.64 119°55.18 50.53	192 13.57 40.33 207°14.18 40.62	134°54.79 2.02 149°56.69 1.90	245°28.68 29.73 260°31.08 29.74	Mars: 0.1
					-	
Mer.	pass. 04:44	$\nu$ -0.1' d-1.1' m-4.11	$ u 0.6' \ d0.3' \ m1.30$	$\nu 1.9' \; d$ -0.1' m-1.80	$\nu$ 2.4′ $d$ 0.0′ m0.73	

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°42.22	N22°22.71	258°43.38	9.9'	$N16^{\circ}25.27$	13.6'	58.8'
1	193°42.13	22.41	273°12.31	9.8'	16°38.90	13.6'	58.8'
2	208°42.03 223°41.94	22.11 •• 21.81	287°41.12 302°9.81	9.7' 9.6'	16°52.46 17°5.94	13.5' 13.4'	58.9' 58.9'
4	238°41.84	21.51	316°38.38	9.0 9.4'	17° 19.34	13.4	58.9'
5	253°41.75	21.21	331°6.83	9.3'	17°32.66	13.2'	59.0'
6	268°41.66	$N22^{\circ}20.91$	$345^{\circ}35.15$	9.2'	$N17^{\circ}45.90$	13.2'	59.0'
7	283°41.57	20.61	0°3.36	9.1'	17°59.06	13.1'	59.0'
8 9	298°41.47 313°41.38	20.31	14°31.43 28°59.39	9.0' 8.8'	18° 12.13 18° 25.11	13.0' 12.9'	59.1' 59.1'
10	313 41.38 328°41.29	19.70	28 59.39 43°27.21	8.7'	18° 38.01	12.9	59.1'
11	343°41.19	19.40	57°54.91	8.6'	18°50.81	12.7'	59.2'
12	358°41.10	N22°19.09	72°22.48	8.4'	$N19^{\circ}3.52$	12.6'	59.2'
13	13°41.01	18.79	86°49.92	8.3'	19° 16.13	12.5'	59.2'
14 15	28°40.92 43°40.83	18.48 •• 18.18	101°17.24 115°44.42	8.2' 8.1'	19°28.65 19°41.06	12.4' 12.3'	59.3' 59.3'
16	58°40.74	17.87	130°11.47	7.9'	19°53.38	12.3	59.3'
17	73°40.64	17.56	144°38.39	7.8'	20°5.59	12.1'	59.4'
18	88°40.55	N22°17.25	$159^{\circ}5.18$	7.7'	N20° 17.70	12.0'	59.4'
19	103°40.46	16.94	173°31.83	7.5'	20°29.69	11.9'	59.4'
20 21	118°40.37 133°40.28	16.63 •• 16.32	187°58.35 202°24.74	7.4' 7.3'	20°41.58 20°53.36	11.8' 11.7'	59.4' 59.5'
22	148°40.19	16.01	216°51.00	7.3 7.1'	20°5.02	11.5	59.5'
23	163°40.10	15.70	231°17.12	7.0'	21°16.57	11.4'	59.5'
	SD = 15.7'	d = -0.3'		SI	D = 16.0'		
Fri	GHA	Dec	GHA	ν	Dec	d	НР
0	178°40.01	N22°15.39	245°43.11	ν 6.9'	N21°28.00	11.3'	59.6'
1	193°39.92	15.07	260°8.96	6.7'	21°39.31	11.2'	59.6'
2	208°39.83	14.76	274°34.67	6.6'	21°50.50	11.1'	59.6'
3	223°39.74 238°39.65	• • 14.44	289°0.26 303°25.70	6.4'	22°1.56 22°12.49	10.9'	59.7'
4 5	253°39.56	14.13 13.81	303 25.70 317°51.01	6.3' 6.2'	22 12.49 22°23.30	10.8' 10.7'	59.7' 59.7'
6	268°39.47	N22°13.50	332°16.19	6.0'	N22°33.98	10.5	59.7'
7	283°39.38	13.18	346°41.23	5.9'	22°44.52	10.4'	59.8'
8	298°39.29	12.86	1°6.14	5.8'	22°54.93	10.3'	59.8'
9	313°39.21 328°39.12	· · 12.54 12.22	15°30.91 29°55.55	5.6' 5.5'	23°5.20 23°15.33	10.1' 10.0'	59.8' 59.9'
10 11	328 39.12 343°39.03	12.22	29 55.55 44°20.05	5.4'	23° 25.33	9.8'	59.9'
12	358°38.94	N22°11.58	58°44.42	5.2'	N23°35.17	9.7'	59.9'
13	13°38.85	11.26	73°8.66	5.1'	23°44.87	9.6'	59.9'
14	28°38.77	10.94	87°32.76	5.0'	23°54.43	9.4'	60.0'
15 16	43°38.68 58°38.59	· · 10.62 10.29	101°56.74 116°20.58	4.8' 4.7'	24°3.83 24°13.08	9.3' 9.1'	60.0' 60.0'
17	73°38.50	9.97	130°44.29	4.6'	24° 13.00	8.9'	60.1
18	88°38.42	N22°9.64	145°7.87	4.5'	N24°31.12	8.8'	60.1'
19	103°38.33	9.32	159°31.33	4.3'	24°39.90	8.6'	60.1'
20	118°38.24 133°38.16	8.99	173°54.65	4.2'	24°48.53 24°56.99	8.5'	60.1'
21 22	133° 38.16 148° 38.07	· · 8.67 8.34	188°17.85 202°40.93	4.1' 3.9'	24°56.99 25°5.28	8.3' 8.1'	60.2' 60.2'
23	163°37.99	8.01	217°3.88	3.8'	25° 13.41	8.0'	60.2'
	SD = 15.7'	d = -0.3'		SI	D = 16.2'		
Sat	CUA	D			D		
0 0	<b>GHA</b> 178°37.90	<b>Dec</b> N22°7.68	<b>GHA</b> 231°26.70	ν 3.7'	<b>Dec</b> N25°21.37	d 7.8'	<b>HP</b> 60.2'
1	193°37.81	7.35	245°49.41	3.6'	25°29.16	7.6'	60.3
2	208°37.73	7.02	260°11.99	3.5'	25°36.78	7.4'	60.3'
3	223°37.64	• • 6.69	274°34.46 288°56.81	3.3' 3.2'	25°44.22 25°51.49	7.3' 7.1'	60.3'
4 5	238°37.56 253°37.47	6.36 6.03	288°56.81 303°19.04	3.2'	25°51.49 25°58.57	7.1° 6.9'	60.3' 60.4'
6	268°37.39	N22°5.70	317°41.16	3.0'	N26°5.48	6.7'	60.4
7	283°37.30	5.36	332°3.17	2.9'	26° 12.21	6.5'	60.4'
8	298°37.22	5.03	346°25.07	2.8'	26° 18.75	6.4'	60.4
9 10	313°37.14 328°37.05	· · 4.69 4.36	0°46.86 15°8.55	2.7' 2.6'	26°25.10 26°31.27	6.2' 6.0'	60.4' 60.5'
11	328 37.05 343°36.97	4.02	29°30.13	2.5'	26° 37.25	5.8'	60.5
12	358°36.89	N22°3.69	43°51.61	2.4'	N26°43.04	5.6'	60.5
13	13°36.80	3.35	58°12.99	2.3'	26°48.63	5.4'	60.5'
14	28°36.72	3.01	72°34.28	2.2'	26°54.03	5.2'	60.5'
15 16	43°36.64 58°36.55	· · 2.67 2.33	86°55.47 101°16.57	2.1' 2.0'	26°59.24 27°4.24	5.0' 4.8'	60.6' 60.6'
17	73°36.47	2.33 1.99	101 10.57 115°37.58	2.0 1.9'	27° 9.05	4.6'	60.6
18	88°36.39	N22°1.65	129°58.50	1.8'	N27° 13.66	4.4'	60.6'
19	103°36.31	1.31	144°19.34	1.8'	27° 18.07	4.2'	60.6'
20	118°36.22 133°36.14	0.97	158°40.10 173°0.78	1.7'	27°22.27	4.0'	60.7'
21 22	133°36.14 148°36.06	· · 0.63 22°0.29	173°0.78 187°21.38	1.6' 1.5'	27°26.27 27°30.06	3.8' 3.6'	60.7' 60.7'
23	163°35.98	21°59.94	201°41.91	1.5'	27°33.65	3.4'	60.7'
	SD = 15.7'	d = -0.3'		SI	D = 16.4'		
	<u> </u>			J.			

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	07:05	08:01	08:55	15:16	16:11	17:06
		Moonris	ρ.		Moonset	+

Lat.		Moonris	e		Moonset	
Lat.	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
<b>S</b> 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° 45°	01:48 02:01	03:05 03:22	04:22 04:44	12:02 11:48	12:39 12:21	13:27
				1		13:05
<b>S</b> 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° 58°	02:40	04:18	05:57	11:05	11:22	11:49
<b>S</b> 60°	02:50 03:02	04:33 04:52	06:19 06:48	10:54 10:42	11:05 10:46	11:27 10:58
3 00	03:02	04:52	00:40	10:42	10:40	10:30

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

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	289° 54.44	134°55.05 N11°49.41		164°58.59 N20°1.78	275°33.48 N03°29.75	
1	304°56.90	149°54.92 48.30		180° 0.48 1.66	290°35.88 29.77	Alpheratz 357°33.35 29°14.16 Ankaa 353°5.81 -42°9.39
2	$319^{\circ}59.37$	164°54.80 47.18		195°2.38 1.54	305°38.28 29.78	Ankaa 353°5.81 -42°9.39 Schedar 349°29.49 56°40.77
3	335°1.83	179°54.67 · · 46.07		210° 4.27 · · 1.41	320°40.68 · · 29.79	Diphda 348°45.99 -17°50.26
4	350°4.30	194°54.54 44.95		225° 6.17 1.29	335°43.09 29.81	Achernar 335°19.31 -57°5.75
5	5°6.76	209°54.41 43.83		240°8.07 1.17	350°45.49 29.82	Hamal 327°49.85 23°35.23
6 7	20°9.22 35°11.69	224°54.29 N11°42.71		255°9.96 N20°1.05	5°47.89 N03°29.83 20°50.29 29.85	Polaris 313°36.34 89°22.24
8	50°14.15	239°54.16 41.60 254°54.04 40.48		270°11.86 0.93 285°13.75 0.80	20°50.29 29.85 35°52.70 29.86	Acamar 315°11.01 -40°11.61
9	65° 16.62	269°53.91 · · 39.36		300°15.65 · · 0.68	50°55.10 · · 29.87	Menkar 314°4.98 4°11.69
10	80° 19.08	284°53.79 38.24		315°17.55 0.56	65°57.50 29.89	Mirfak 308°26.71 49°57.15
11	95°21.55	299°53.67 37.12		330°19.44 0.44	80°59.91 29.90	Aldebaran 290°38.44 16°33.75
12	110°24.01	314°53.55 N11°36.00	42°22.10 N21°44.43	345°21.34 N20°0.31	96°2.31 N03°29.91	Rigel 281°2.95 -8°10.17
13	125°26.47	329°53.42 34.88	57°22.71 44.73	0°23.23 0.19	111°4.71 29.93	Capella 280°20.44 46°1.37 Bellatrix 278°21.83 6°22.45
14	140°28.94	344°53.30 33.76	72°23.32 45.02	15°25.13 20°0.07	126°7.12 29.94	Elnath 278°0.61 28°37.74
15	155°31.40	359°53.18 · · 32.64		30°27.03 19°59.95	141°9.52 · · 29.95	Alnilam 275°36.75 -1°11.04
16	170°33.87	14°53.06 31.52		45°28.92 59.82	156°11.92 29.96	Betelgeuse 270°51.04 7°24.75
17	185°36.33	29°52.94 30.40 44°52.83 N11°29.27		60°30.82 59.70	171°14.33 29.98 186°16.73 N03°29.99	Canopus 263°52.38 -52°42.46
18 19	200°38.80 215°41.26	44°52.83 N11°29.27 59°52.71 28.15		75°32.71 N19°59.58 90°34.61 59.46	186°16.73 N03°29.99 201°19.14 30.00	Sirius 258°25.47 -16°45.09
20	230°43.72	74°52.59 27.03		105°36.50 59.33	216°21.54 30.01	Adhara 255°5.26 -29°0.43
21	245°46.19	89°52.48 · · 25.90		120°38.40 · · 59.21	231°23.95 · · 30.02	Procyon 244°49.85 5°9.44
22	260° 48.65	104°52.36 24.78		135°40.30 59.09	246°26.35 30.04	Pollux 243°16.15 27°57.74
23	275°51.12	119°52.25 23.65	207°28.80 47.61	150°42.19 58.97	261°28.76 30.05	Avior 234°14.86 -59°35.72 Suhail 222°45.80 -43°32.47
Mori	pass. 04:40	ν-0.1' d-1.1' m-4.11	$\nu$ 0.6' d0.3' m1.31	ν1.9' d-0.1' m-1.80	$\nu$ 2.4' d0.0' m0.73	Suhail 222°45.80 -43°32.47 Miaplacidus 221°38.87 -69°49.70
ivier.	yass. U4:4U	ν-υ.1 U-1.1 III-4.11	- VO.U UU.S IIII.SI	ν1.σ u-U.1 III-1.0U	ν Δ.Ψ UU.U IIIU.13	Alphard 217°46.81 -8°46.44
						Regulus 207°33.36 11°50.29
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.87 61°36.69
0	290°53.58	134°52.13 N11°22.53		165°44.09 N19°58.84	276°31.16 N03°30.06	Denebola 182°23.80 14°25.49
1	305°56.05	149°52.02 21.40		180°45.98 58.72	291°33.57 30.07	Gienah 175°42.38 -17°41.46
2	320°58.51 336°0.97	164°51.90 20.28 179°51.79 · · 19.15		195°47.88 58.60 210°49.77 •• 58.48	306°35.97 30.08 321°38.38 · · 30.10	Acrux 172°58.84 -63°15.09
3 4	351°3.44	194°51.68 18.03		225°51.67 58.35	336°40.78 30.11	Gacrux 171°50.35 -57°16.01
5	6°5.90	209°51.57 16.90		240°53.57 58.23	351°43.19 30.12	Alioth 166°11.93 55°49.19
6	21°8.37	224°51.46 N11°15.77		255°55.46 N19°58.11	6°45.60 N03°30.13	Spica 158°20.96 -11°18.06
7	36° 10.83	239°51.35 14.64		270°57.36 57.98	21°48.00 30.14	Alkaid 152°50.95 49°11.07 Hadar 148°34.05 -60°30.35
8	51°13.30	254°51.24 13.52		285°59.25 57.86	36°50.41 30.15	Hadar 148°34.05 -60°30.35 Menkent 147°56.03 -36°30.22
9	66° 15.76	269°51.13 · · 12.39	357°34.89 · · 50.46	301°1.15 · · 57.74	51°52.82 · · 30.17	Arcturus 145°46.67 19°2.75
10	81° 18.22	284°51.02 11.26		316° 3.04 57.62	66°55.22 30.18	Rigil Kent. 139°38.31 -60°56.98
11	96°20.69	299°50.92 10.13		331° 4.94 57.49	81°57.63 30.19	Kochab 137°19.36 74°3.00
12	111°23.15	314°50.81 N11°9.00		346°6.83 N19°57.37	97°0.04 N03°30.20	Zuben'ubi 136°54.48 -16°9.19
13 14	126° 25.62 141° 28.08	329°50.70 7.87 344°50.60 6.74		1°8.73 57.25 16°10.62 57.12	112°2.45 30.21 127°4.85 30.22	Alphecca 126°2.46 26°37.64
15	156° 30.54	359°50.50 · · 5.61		31°12.52 · · 57.00	142°7.26 · · 30.23	Antares 112°14.00 -26°29.51
16	171°33.01	14°50.39 4.48		46°14.42 56.88	157°9.67 30.24	Atria 107°6.60 -69°4.64
17	186°35.47	29°50.29 3.35		61°16.31 56.75	172°12.08 30.25	Sabik 102°1.04 -15°45.46
18	201°37.94	44°50.19 N11°2.21		76°18.21 N19°56.63	187°14.48 N03°30.26	Shaula 96°8.27 -37°7.40 Rasalhague 95°57.07 12°32.51
19	216°40.40	59°50.08 11°1.08	147°40.99 53.28	91°20.10 56.51	202°16.89 30.28	Rasalhague 95°57.07 12°32.51 Eltanin 90°41.09 51°29.20
20	231°42.87	74°49.98 10°59.95		106°22.00 56.38	217°19.30 30.29	Kaus Aust. 83°30.45 -34°22.29
21	246° 45.33	89°49.88 · · 58.81		121°23.89 · · 56.26	232°21.71 · · 30.30	Vega 80°31.94 38°48.55
22	261°47.79	104°49.78 57.68		136°25.79 56.14	247°24.12 30.31	Nunki 75°45.83 -26°15.76
23	276° 50.26	119°49.68 56.55	207°43.42 54.39	151°27.68 56.01	262°26.53 30.32	Altair 61°58.39 8°56.37
Mer.	pass. 04:36	ν-0.1' d-1.1' m-4.12	$\nu 0.6' \ d0.3' \ m1.31$	ν1.9' d-0.1' m-1.79	ν2.4' d0.0' m0.72	Peacock 53°3.17 -56°38.81
			_			Deneb 49°24.50 45°22.46
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°37.29 9°59.86
0 0	291°52.72	134°49.58 N10°55.41		166°29.58 N19°55.89	277°28.94 N03°30.33	Al Na'ir 27°30.99 -46°49.69
1	306°55.19	149°49.49 54.28		181°31.47 55.77	292°31.35 30.34	Fomalhaut 15°12.91 -29°28.66 Scheat 13°43.77 28°13.57
2	321°57.65	164°49.39 53.14		196°33.37 55.64	307°33.76 30.35	Markab 13°28.45 15°20.91
3	$337^{\circ}0.12$	179°49.29 · · 52.01	267°45.86 · · 55.50	211°35.26 · · 55.52	322°36.17 · · 30.36	
4	352°2.58	194°49.20 50.87		226°37.16 55.39	337°38.58 30.37	Jul 12 Sun SHA Mer.pass
5	7°5.04	209°49.10 49.74		241°39.05 55.27	352°40.99 30.38	Venus 205°0.61 15:00
6	22°7.51	224°49.00 N10°48.60		256°40.95 N19°55.15	7°43.40 N03°30.39	Mars 292°20.35 09:11
7	37°9.97	239°48.91 47.46		271°42.84 55.02	22°45.81 30.40	Jupiter 235° 4.15 12:58
8 9	52° 12.44 67° 14.90	254°48.82 46.32 269°48.72 • 45.19		286°44.74 54.90 301°46.63 •• 54.78	37°48.22 30.41 52°50.63 · · · 30.42	Saturn 345°39.04 05:37
9 10	82° 17.37	284°48.63		316°48.53	67°53.04 30.43	Jul 13 Mon SHA Mer.pass
10	97°19.83	284 48.63 44.05 299°48.54 42.91		310 48.53 54.65 331°50.42 54.53	82°55.45 30.44	Venus 203°58.55 15:01
12	112°22.29	314°48.45 N10°41.77		346°52.32 N19°54.40	97°57.86 N03°30.45	Mars 291°35.83 09:10
13	127°24.76	329°48.36 40.63		1°54.22 54.28	113°0.27 30.46	Jupiter 234°50.51 12:55
14	142°27.22	344°48.27 39.49		$16^{\circ}56.11$ 54.16	128°2.68 30.47	Saturn 345°37.58 05:33
15	157° 29.69	359°48.18 · · 38.35		31°58.01 · · 54.03	143°5.09 · · 30.47	Jul 14 Tue SHA Mer.pass
16	172°32.15	14°48.09 37.21		46°59.90 53.91	158°7.51 30.48	Venus 202°56.86 15:01
17	187°34.62	29°48.00 36.07		62°1.80 53.78	173°9.92 30.49	Mars 290°51.31 09:09
18	202°37.08	44°47.92 N10°34.93		77°3.69 N19°53.66	188°12.33 N03°30.50	Jupiter 234°36.85 12:52
19	217°39.54	59° 47.83 33.79 74° 47.74 32.65		92° 5.59 53.54 107° 7.48 53.41	203°14.74 30.51 218°17.15 30.52	Saturn 345°36.21 05:29
20 21	232° 42.01 247° 44.47	74°47.74 32.65 89°47.66 · 31.50		107° 7.48 53.41 122° 9.38 · · 53.29	218°17.15 30.52 233°19.57 · · · 30.53	Horizontal parallax
22	247 44.47 262°46.94	104°47.57 30.36		137°11.27 53.16	248°21.98 30.54	Venus: 0.2
23	277° 49.40	119° 47.49 29.22		152°13.16 53.04	263°24.39 30.55	Mars: 0.1
ivier.	pass. 04:32	ν-0.1′ d-1.1′ m-4.13	$-\frac{\nu 0.6' \ d0.3' \ m1.31}{}$	ν1.9' d-0.1' m-1.79	ν2.4' d0.0' m0.72	

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°35.90	N21°59.60	216°2.38	1.4'	N27°37.02	3.2'	60.7'
1	193°35.82	59.25	230°22.77	1.3'	27°40.19	3.0'	60.7'
2	208° 35.74	58.91	244°43.11	1.3'	27°43.15	2.7'	60.8'
3 4	223° 35.66 238° 35.57	· · 58.56 58.21	259°3.38 273°23.60	1.2' 1.2'	27°45.89 27°48.43	2.5' 2.3'	60.8' 60.8'
5	250 35.57 253°35.49	57.86	287°43.76	1.1'	27°50.74	2.3	60.8
6	268° 35.41	N21°57.52	302°3.87	1.1'	N27°52.85	1.9'	60.8
7	283°35.33	57.17	316°23.94	1.0'	27°54.74	1.7'	60.8'
8	298° 35.25	56.82	330°43.96	1.0'	27°56.41	1.5'	60.8'
9	313°35.18 328°35.10	• • 56.47	345°3.94 359°23.89	0.9' 0.9'	27°57.87 27°59.11	1.2'	60.8'
10 11	343°35.02	56.12 55.76	359 23.89 13°43.81	0.9	27 59.11 28°0.13	1.0' 0.8'	60.9' 60.9'
12	358° 34.94	N21°55.41	28° 3.69	0.9	N28°0.94	0.6'	60.9
13	13°34.86	55.06	42°23.55	0.8'	$28^{\circ}1.52$	0.4'	60.9'
14	28° 34.78	54.71	56°43.39	0.8'	28°1.89	0.1'	60.9'
15 16	43°34.70 58°34.62	• • 54.35 54.00	71°3.21 85°23.01	0.8' 0.8'	28°2.03 28°1.96	-0.1' -0.3'	60.9' 60.9'
17	73° 34.55	53.64	99°42.80	0.8	28°1.67	-0.5'	60.9
18	88° 34.47	N21°53.28	114°2.59	0.8'	N28°1.15	-0.7'	60.9'
19	103°34.39	52.93	128°22.37	0.8'	28°0.42	-1.0'	60.9'
20	118° 34.31	52.57	142°42.15	0.8'	27°59.46	-1.2'	60.9'
21	133°34.24	• • 52.21	157°1.93	0.8'	27°58.29	-1.4'	61.0'
22 23	148° 34.16 163° 34.08	51.85 51.49	171°21.72 185°41.52	0.8' 0.8'	27°56.90 27°55.28	-1.6' -1.8'	61.0' 61.0'
23			103 41.32			-1.0	01.0
	SD = 15.7'	d = -0.3'		S	D = 16.6'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°34.01	$N21^{\circ}51.13$	200°1.34	0.8'	$N27^{\circ}53.45$	-2.1'	61.0'
1	193°33.93	50.77	214°21.17	0.9'	27°51.39	-2.3'	61.0'
2	208° 33.85 223° 33.78	50.41 •• 50.05	228°41.03 243°0.91	0.9' 0.9'	27°49.12 27°46.63	-2.5' -2.7'	61.0' 61.0'
3 4	223 33.78 238°33.70	49.69	243 0.91 257°20.82	0.9	27 40.03 27°43.92	-2.1' -2.9'	61.0'
5	253° 33.63	49.32	271°40.76	1.0'	27°41.00	-3.1'	61.0'
6	268°33.55	N21°48.96	286° 0.73	1.0'	N27°37.86	-3.4'	61.0'
7	283°33.48	48.59	300°20.75	1.1'	27°34.50	-3.6'	61.0'
8	298°33.40	48.23	314°40.81	1.1'	27°30.92	-3.8'	61.0'
9 10	313°33.33 328°33.25	· · 47.86 47.50	329°0.91 343°21.07	1.2' 1.2'	27°27.13 27°23.13	-4.0' -4.2'	61.0' 61.0'
11	343°33.18	47.13	357°41.27	1.3'	27°23.13 27°18.92	-4.2 -4.4'	61.0'
12	358°33.11	N21°46.76	12°1.53	1.3'	N27°14.49	-4.6'	61.0'
13	13°33.03	46.39	$26^{\circ}21.85$	1.4'	$27^{\circ}9.85$	-4.8'	61.0'
14	28°32.96	46.02	40°42.24	1.4'	27°5.01	-5.1'	61.0'
15 16	43°32.88 58°32.81	•• 45.65 45.28	55°2.68 69°23.20	1.5' 1.6'	26°59.95 26°54.69	-5.3' -5.5'	61.0' 61.0'
17	73°32.74	45.26 44.91	83°43.79	1.7	26°49.22	-5.5'	61.0'
18	88° 32.67	N21°44.54	98° 4.45	1.7'	N26°43.55	-5.9'	61.0'
19	103°32.59	44.17	112°25.19	1.8'	26°37.67	-6.1'	61.0'
20	118° 32.52	43.79	126°46.01	1.9'	26°31.60	-6.3'	60.9'
21 22	133°32.45 148°32.38	· · 43.42 43.05	141°6.91 155°27.90	2.0' 2.1'	26°25.32 26°18.84	-6.5' -6.7'	60.9' 60.9'
23	163°32.30	42.67	169°48.97	2.1	26°12.17	-6.9'	60.9
	SD = 15.7'	d = -0.4'		s	D = 16.6'		
	<u> </u>	<u>и — 0.</u> -			10.0		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178° 32.23 193° 32.16	N21°42.29	184°10.14 198°31.39	2.3'	N26°5.30 25°58.24	-7.1'	60.9'
1 2	193° 32.16 208° 32.09	41.92 41.54	198° 31.39 212° 52.75	2.4' 2.5'	25°58.24 25°50.98	-7.3' -7.4'	60.9' 60.9'
3	223° 32.02	• • 41.16	227°14.20	2.6'	25°43.53	-7.6'	60.9'
4	238°31.95	40.79	241°35.75	2.7'	25°35.90	-7.8'	60.9'
5	253°31.88	40.41	255°57.40	2.8'	25°28.08	-8.0'	60.9'
6 7	268°31.81 283°31.74	N21°40.03 39.65	270°19.16 284°41.02	2.9' 3.0'	N25°20.07 25°11.88	-8.2'	60.9'
7 8	283°31.74 298°31.67	39.65 39.27	284°41.02 299°2.99	3.0'	25°11.88 25°3.51	-8.4' -8.6'	60.8' 60.8'
9	313° 31.60	• • 38.88	313°25.07	3.2'	24°54.96	-8.7'	60.8
10	328°31.53	38.50	327°47.26	3.3'	$24^{\circ}46.23$	-8.9'	60.8
11	343°31.46	38.12	342°9.57	3.4'	24°37.33	-9.1'	60.8
12	358°31.39	N21°37.74	356°31.99	3.5'	N24°28.25 24°19.00	-9.2'	60.8'
13 14	13°31.32 28°31.25	37.35 36.97	10°54.53 25°17.18	3.7' 3.8'	24°19.00 24°9.59	-9.4' -9.6'	60.8' 60.7'
15	43°31.19	• • 36.58	39°39.96	3.9'	24° 0.00	-9.0 -9.7'	60.7
16	58°31.12	36.20	54°2.85	4.0'	23°50.26	-9.9'	60.7'
17	73°31.05	35.81	68°25.87	4.1'	23°40.34	-10.1'	60.7'
18	88°30.98	N21°35.42	82°49.01	4.3'	N23°30.27	-10.2'	60.7'
19 20	103°30.91 118°30.85	35.03 34.65	97°12.27 111°35.66	4.4' 4.5'	23°20.04 23°9.66	-10.4' -10.5'	60.7' 60.6'
20	118° 30.85 133° 30.78	34.05	111°35.66 125°59.18	4.6'	23° 9.66 22° 59.12	-10.5' -10.7'	60.6
22	148° 30.71	33.87	140°22.82	4.8'	22°48.43	-10.7	60.6
23	163°30.65	33.48	154°46.59	4.9'	22°37.59	-11.0'	60.6
	SD = 15.7'	d = -0.4'		S	D = 16.6'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
<b>N</b> 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	////
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	07:03	07:57	08:51	15:21	16:15	17:09

N 72°         □         □         □         □           N 70°         □         □         □         □           68°         □         □         □         □           66°         □         □         □         □           66°         □         □         □         □           60°         □         □         □         □           60°         □         □         00:04         □         23:31         22:33           62°         23:11         ···         01:27         22:03         22:08         22:05           60°         ···         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	Lat.		Moonris	e	Moonset			
N 70°         □         □         □         □         □           66°         □<	Lat.	Sun	Mon	Tue	Sun	Mon	Tue	
68° □ □ □ □ □ □ 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 17:25 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° 07:05 08:27 09:02 12:39 13:58 15:37 58° 07:52 08:51 09:21 12:12 13:33 15:19	N 72°							
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 17:25 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° 07:05 08:51 09:21 12:12 13:33 15:19	<b>N</b> 70°							
64° □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□	68°							
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	66°						23:13	
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	64°			00:04		23:31	22:33	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	62°	23:11		01:27	22:03	22:08	22:05	
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           5 10°         04:09         05:16	60°		00:19	02:03	20:55	21:31	21:43	
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         17:35         18:51         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°           20°         04:33			00:54	02:29	20:20	21:04	21:25	
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         17:28           35°         05:18         06:24	56°	00:15	01:19	02:50	19:55	20:43	21:10	
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         17:03         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           40°         05:37         06:43		00:35	01:40	03:07	19:34	20:25	20:57	
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         16:14         17:28           35°         05:18         06:24         07:05         15:03         16:14         17:28           45°         06:01         07:06         07:56         14:03         15:17         16:40           5 50°         06:31         07:35	_							
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         17:28           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		01:06	02:12	03:34	19:02	19:57	20:36	
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         16:14         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         08:31         13:33         14:48         16:16           52°         06:46         07:50	45°	01:35	02:41	04:00	18:33	19:30	20:14	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		01:57	03:04	04:21	18:09	19:09	19:57	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	35°	02:16	03:24	04:38	17:50	18:51	19:42	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			03:40			18:36		
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           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		03:00	04:08	05:18	17:05	18:09	19:07	
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		03:24						
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	0°	03:47	04:54	05:59	16:19	17:25	18:29	
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         08:51         09:21         12:39         13:58         15:37           58°         07:52         08:51         09:21         12:12         13:33         15:19		04:09	05:16	06:19	15:56	17:04	18:11	
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           \$ 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         08:51         09:02         12:39         13:58         15:37           58°         07:52         08:51         09:21         12:12         13:33         15:19		04:33	05:40	06:41	15:32	16:41	17:51	
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         08:51         09:21         12:39         13:58         15:37           58°         07:52         08:51         09:21         12:12         13:33         15:19		05:01	06:08		15:03	16:14		
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		05:18	06:24		14:47	15:58	17:15	
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					1			
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	45°	06:01	07:06	07:56	14:03	15:17	16:40	
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					l			
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	_							
58° 07:52 08:51 09:21 12:12 13:33 15:19								
<b>S</b> 60°   08:30					l			
	<b>S</b> 60°	08:30	09:25	09:43	11:34	13:00	14:57	

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

h	Aries	Venus	N	1ars	Jupiter	Sa	turn		Stars	
Wed	GHA	GHA Dec	GHA	Dec	GHA Dec	GHA	Dec		SHA	Dec
0	292°51.86	134°47.41 N10°28			167°15.06 N19°52.93		N03°30.56			
1	$307^{\circ}54.33$	149° 47.32 26	93 237° 59.27	1.51	182°16.95 52.79	293°29.22	30.56	Alpheratz Ankaa	357°33.32 353°5.78	29°14.17 -42°9.38
2	322°56.79	164° 47.24 25	79 252°59.88		197°18.85 52.67		30.57	Schedar	349°29.45	-42 9.36 56°40.79
3	337° 59.26	179°47.16 · · 24			212°20.74 · · 52.54		• • 30.58	Diphda	348°45.96	-17° 50.25
4	353°1.72		50 283°1.10		227°22.64 52.42		30.59	Achernar	335°19.27	-57°5.74
5 6	8°4.19 23°6.65	209°47.00 22 224°46.92 N10°21	35 298°1.71 21 313°2.32		242°24.53 52.29 257°26.43 N19°52.13		30.60 N03°30.61	Hamal	327°49.82	23°35.24
7	38°9.11		06 328°2.93		272°28.32 52.04		30.61	Polaris	313°34.78	89°22.24
8	53° 11.58		91 343°3.54		287°30.22 51.92		30.62	Acamar	315°10.98	-40°11.60
9	68° 14.04	269°46.69 · · 17			302°32.11 · · 51.79		• • 30.63	Menkar	314°4.95	4°11.70
10	83° 16.51	284°46.61 16	62 13°4.76	3.91	317°34.01 51.67	68°50.95	30.64	Mirfak Aldebaran	308°26.67 290°38.41	49°57.15 16°33.75
11	98° 18.97		47 28°5.37		332°35.90 51.54		30.65	Rigel	281°2.93	-8° 10.16
12	113°21.43	314°46.46 N10°14			347°37.80 N19°51.42		N03°30.65	Capella	280°20.41	46°1.36
13	128° 23.90 143° 26.36		18 58°6.59 03 73°7.20		2°39.69 51.29 17°41.59 51.11		30.66	Bellatrix	278°21.80	6°22.46
14 15	143 20.30 158°28.83	359°46.23 · · 10			17°41.59 51.17 32°43.48 •• 51.09		30.67 •• 30.68	Elnath	278°0.59	28°37.74
16	173°31.29		73 103°8.42		47°45.38 50.92		30.68	Alnilam	275°36.73	-1°11.03
17	188°33.76		58 118°9.03		62°47.27 50.80		30.69	Betelgeuse	270°51.02	7°24.75
18	203°36.22	44°46.02 N10°7	43 133°9.64	N22°6.02	77°49.17 N19°50.67	189°10.27	N03°30.70	Canopus Sirius	263°52.36 258°25.46	-52° 42.44 -16° 45.08
19	218°38.68		28 148° 10.25		92°51.06 50.55		30.71	Adhara	255° 5.25	-29°0.41
20	233°41.15		13 163°10.86		107°52.96 50.42		30.71	Procyon	244°49.84	5°9.44
21	248° 43.61	89°45.81 · · · 3			122°54.85 · · 50.30		• • 30.72	Pollux	243°16.13	27°57.74
22 23	263° 46.08 278° 48.54		83 193°12.08 68 208°12.69		137°56.74 50.17 152°58.64 50.09		30.73 30.74	Avior	$234^{\circ}14.87$	-59°35.70
_		-						Suhail	222°45.80	-43°32.46
Mer.	pass. 04:28	$\nu$ -0.1' d-1.1' m-4	$\nu 0.6' \ d0$	0.3′ m1.31	ν1.9′ d-0.1′ m-1.79	$\nu^{2.4'}$ d0	0.0′ m0.71	Miaplacidus	221°38.89	-69°49.69
					_			Alphard	217°46.80	-8°46.43
Thu	GHA	GHA Dec	GHA	Dec	GHA Dec	GHA	Dec	Regulus Dubhe	207°33.35 193°39.88	11°50.29 61°36.68
0	293°51.00	134°45.60 N10°0	52 223°13.30		168° 0.53 N19° 49.92		N03°30.74	Dubne	193 39.88 182°23.80	14°25.49
1	308°53.47	149°45.53 09°59			183°2.43 49.80		30.75	Gienah	175°42.38	-17°41.46
2	323°55.93		22 253°14.52		198° 4.32 49.67		30.76	Acrux	172°58.86	-63° 15.09
3	338° 58.40	179°45.40 · · 57			213°6.22 · · 49.54		• • 30.76	Gacrux	171°50.37	$-57^{\circ}16.01$
4 5	354°0.86 9°3.33		91 283°15.74 76 298°16.35		228°8.11 49.42 243°10.01 49.29		30.77 30.78	Alioth	166°11.94	55°49.18
6	24°5.79	224°45.21 N09°53			258°11.90 N19°49.17		N03°30.78	Spica	158°20.96	-11°18.06
7	39°8.25		45 328° 17.57		273°13.80 49.04		30.79	Alkaid	152°50.96	49°11.07
8	$54^{\circ}10.72$		30 343°18.18		288°15.69 48.92		30.80	Hadar Menkent	148°34.07 147°56.04	-60°30.35 -36°30.22
9	$69^{\circ}13.18$	269°45.02 · · 50	14 358° 18.79	• • 9.92	303°17.58 · · 48.79	54°46.53	• • 30.80	Arcturus	147 30.04 145°46.67	19°2.75
10	84° 15.65		99 13° 19.40		318°19.48 48.67		30.81	Rigil Kent.	139°38.33	-60°56.98
11	99° 18.11		83 28°20.01		333°21.37 48.54		30.82	Kochab	$137^{\circ}19.41$	74°3.00
12	114°20.57	314°44.83 N09°46			348°23.27 N19°48.42		N03°30.82	Zuben'ubi	136°54.48	$-16^{\circ}9.20$
13 14	129° 23.04 144° 25.50		52 58°21.23 36 73°21.85		3°25.16 48.29 18°27.06 48.10		30.83 30.83	Alphecca	126°2.47	26°37.64
15	159°27.97	359°44.66 · · 43			33°28.95 · · 48.04		• • 30.84	Antares	112°14.00	-26°29.51
16	174°30.43		05 103°23.07		48°30.85 47.93		30.85	Atria	107°6.61	-69°4.66
17	189°32.89		89 118°23.68	11.97	63°32.74 47.79	175°5.88	30.85	Sabik Shaula	102°1.03 96°8.27	-15°45.46 -37°7.41
18	204°35.36	44°44.49 N09°39			78°34.64 N19°47.66	190°8.30	N03°30.86	Rasalhague	95°57.06	12°32.51
19	219°37.82		57 148° 24.90		93°36.53 47.54		30.86	Eltanin	90°41.09	51°29.21
20	234° 40.29		41 163°25.51		108°38.42 47.43		30.87	Kaus Aust.	83°30.43	-34°22.29
21 22	249° 42.75 264° 45.22		26 178°26.12 10 193°26.73		123°40.32 · · 47.28 138°42.21 47.10		· · 30.87 30.88	Vega	80°31.94	38° 48.56
23	279° 47.68		94 208°27.34		153°44.11 47.03		30.88	Nunki	75°45.81	-26°15.76
					-			Altair	61°58.38	8°56.38
Mer.	pass. 04:24	ν-0.1' d-1.2' m-4	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0.3′ m1.31	ν1.9' d-0.1' m-1.79	$\nu^{2.4'}$ d(	0.0′ m0.71	Peacock Deneb	53°3.14 49°24.48	-56°38.81 45°22.48
								Enif	33°37.27	9° 59.87
Fri	GHA	GHA Dec	GHA	Dec	GHA Dec	GHA	Dec	Al Na'ir	27°30.95	-46° 49.69
0	294°50.14	134°44.16 N09°32			168°46.00 N19°46.93			Fomalhaut	15°12.88	-29°28.66
1 2	309°52.61 324°55.07		62 238°28.56 46 253°29.17		183°47.90 46.78 198°49.79 46.69		30.90 30.90	Scheat	13°43.74	28° 13.58
3	339° 57.54	179°44.01 · · 29			213°51.68 · · 46.53		30.90	Markab	13°28.43	15° 20.92
4	355°0.00		13 283°30.39		213 51.06 4 40.50 228°53.58 46.40		30.91	Jul 15 Wed	SHA	Mer.pass
5	10°2.46		97 298°31.00		243°55.47 46.28		30.92	Venus		15:01
6	25°4.93	224°43.86 N09°25			258°57.37 N19°46.1		N03°30.92	Mars	290°6.80	09:08
7	40°7.39		65 328° 32.23		273°59.26 46.02		30.93	Jupiter	234°23.20	12:49
8	55°9.86		49 343°32.84		289°1.16 45.90		30.93	Saturn	345°34.94	05:25
9	70°12.32	269°43.71 · · 22			304°3.05 · · 45.77		30.93	Jul 16 Thu	SHA	Mer.pass
10 11	85° 14.78 100° 17.25		16 13°34.06 00 28°34.67		319° 4.94 45.65 334° 6.84 45.52		30.94 30.94	Venus	$200^{\circ}54.60$	15:01
12	100 17.25 115° 19.71	314°43.58 N09°18			349°8.73 N19°45.39		N03° 30.95	Mars		09:07
13	130°22.18		67 58°35.89		4°10.63 45.27		30.95	Jupiter	234°9.53	12:46
14	145°24.64		50 73°36.50		19°12.52 45.14		30.96	Saturn	345°33.76	05:21
15	160°27.11	359°43.44 · · 15			34°14.42 · · 45.03		• • 30.96	Jul 17 Fri	SHA	Mer.pass
16	175°29.57		17 103°37.72		49°16.31 44.89		30.97	!	199°54.02	15:01
17	190°32.03		01 118°38.33		64°18.20 44.70		30.97	Mars		09:06
18 19	205° 34.50 220° 36.96	44°43.32 N09°11 59°43.28 10	84 133°38.95 68 148°39.56		79°20.10 N19°44.63 94°21.99 44.53		N03°30.97 30.98	Jupiter	233°55.86	12:43
20	235°39.43		51 163°40.17		109°23.89 44.38		30.98	Saturn	345°32.68	05:18
21	250°41.89	89°43.20 · · 8			124°25.78 · · 44.2!		30.99	Horizoi	ntal parallax	
22	265°44.35		18 193°41.39		139°27.68 44.13		30.99		Venus:	0.2
23	280°46.82	119°43.12	01 208°42.00	19.44	154°29.57 44.00	266°18.55	30.99		Mars:	0.1
Mer.	pass. 04:20	ν-0.1' d-1.2' m-4	$\frac{15}{\nu}$ $\frac{15}{\nu}$ $\frac{15}{\nu}$ $\frac{15}{\nu}$	0.3′ m1.31	ν1.9' d-0.1' m-1.79	$-\frac{1}{\nu^{2.4'}} d0$	0.0′ m0.70			

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°30.58	N21°33.09	169°10.49	5.0'	N22°26.60	-11.1'	60.6'
1 2	193°30.51 208°30.45	32.69 32.30	183°34.52 197°58.68	5.2' 5.3'	22°15.47 22°4.19	-11.3' -11.4'	60.5'
3	206 30.45 223°30.38	31.91	212°22.97	5.4'	22 4.19 21°52.78	-11.4	60.5' 60.5'
4	238°30.32	31.52	226°47.39	5.6'	21°41.23	-11.7'	60.5
5	253°30.25	31.12	241°11.94	5.7'	21°29.54	-11.8'	60.5'
6	268°30.19 283°30.12	N21°30.73 30.33	255°36.62 270°1.43	5.8' 5.9'	N21°17.72 21°5.77	-12.0' -12.1'	60.4' 60.4'
7 8	283 30.12 298°30.06	30.33 29.93	270 1.43 284°26.38	5.9 6.1'	21 5.77 20°53.69	-12.1 -12.2'	60.4
9	313°29.99	• • 29.54	298°51.46	6.2'	20°41.48	-12.3'	60.4
10	328°29.93	29.14	313°16.67	6.3'	20°29.15	-12.5'	60.3'
11 12	343°29.87 358°29.80	28.74 N21°28.34	327°42.01 342°7.48	6.5' 6.6'	20°16.70 N20°4.13	-12.6' -12.7'	60.3' 60.3'
13	13°29.74	27.94	356°33.09	6.7	19°51.44	-12. <i>1</i> -12.8'	60.3
14	28°29.67	27.54	10°58.82	6.9'	19°38.64	-12.9'	60.2
15	43°29.61	• • 27.14	25°24.69	7.0'	19°25.72	-13.0'	60.2'
16	58°29.55 73°29.49	26.74	39°50.69 54°16.83	7.1' 7.3'	19°12.70 18°59.57	-13.1' -13.2'	60.2' 60.1'
17 18	73°29.49 88°29.42	26.34 N21°25.94	68°43.09	7.4	N18°46.33	-13.2 -13.3'	60.1
19	103°29.36	25.53	83°9.48	7.5'	18°32.99	-13.4'	60.1
20	118°29.30	25.13	97°36.00	7.7'	$18^{\circ}19.55$	-13.5'	60.1'
21	133°29.24	• • 24.73	112°2.65	7.8'	18°6.01	-13.6'	60.0'
22 23	148°29.18 163°29.12	24.32 23.92	126°29.43 140°56.34	7.9' 8.0'	17°52.37 17°38.64	-13.7' -13.8'	60.0' 60.0'
23			140 30.34			-13.8	00.0
	SD = 15.7'	d = -0.4'		SI	D = 16.5'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°29.05	N21°23.51	155°23.38	8.2'	N17°24.82	-13.9'	59.9'
1	193°28.99	23.10	169°50.54	8.3'	17°10.91	-14.0'	59.9'
2	208°28.93 223°28.87	22.70 •• 22.29	184°17.83 198°45.25	8.4' 8.5'	16°56.91 16°42.82	-14.1' -14.2'	59.9' 59.9'
4	238°28.81	21.88	213°12.78	8.7'	16°28.66	-14.2'	59.9'
5	253°28.75	21.47	227°40.45	8.8'	16°14.41	-14.3'	59.8'
6	268°28.69	N21°21.06	242°8.23	8.9'	N16°0.09	-14.4'	59.8'
7	283°28.63	20.65	256°36.14	9.0'	15°45.68	-14.5'	59.7'
8 9	298°28.58 313°28.52	20.24 •• 19.82	271°4.17 285°32.32	9.1' 9.3'	15°31.21 15°16.66	-14.5' -14.6'	59.7' 59.7'
10	328°28.46	19.41	300° 0.59	9.4	15°2.04	-14.7'	59.6'
11	343°28.40	19.00	314°28.97	9.5'	14°47.35	-14.8'	59.6'
12	358°28.34	N21°18.58	328°57.48	9.6'	N14°32.60	-14.8'	59.6'
13	13°28.28 28°28.23	18.17 17.76	343°26.10 357°54.83	9.7' 9.8'	14°17.78 14°2.91	-14.9'	59.5' 59.5'
14 15	28 28.23 43°28.17	17.76	357 54.83 12°23.68	9.8 10.0'	14 2.91 13°47.97	-14.9' -15.0'	59.5'
16	58°28.11	16.92	26°52.64	10.1'	13°32.97	-15.1'	59.4'
17	73°28.05	16.51	41°21.72	10.2'	13°17.92	-15.1'	59.4'
18	88°28.00	N21°16.09	55°50.90	10.3'	N13°2.81	-15.2'	59.4'
19 20	103°27.94 118°27.88	15.67 15.25	70°20.20 84°49.60	10.4' 10.5'	12°47.66 12°32.45	-15.2' -15.3'	59.3' 59.3'
21	133°27.83	14.83	99°19.11	10.6'	12°17.19	-15.3'	59.2'
22	148°27.77	14.41	$113^{\circ}48.72$	10.7'	$12^{\circ}1.89$	-15.3'	59.2'
23	163°27.72	13.99	128°18.44	10.8'	11°46.55	-15.4'	59.2'
	SD = 15.7'	d = -0.4'		SI	D = 16.3'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°27.66	N21°13.57	$142^{\circ}48.26$	10.9'	$N11^{\circ}31.16$	-15.4'	59.1'
1	193°27.60	13.15	157°18.19	11.0'	11°15.73	-15.5'	59.1'
2	208°27.55 223°27.50	12.73 •• 12.30	171°48.21 186°18.34	11.1' 11.2'	11°0.26 10°44.76	-15.5' -15.5'	59.1' 59.0'
4	238°27.44	11.88	200°48.56	11.3'	10° 44.70 10° 29.22	-15.6'	59.0'
5	253°27.39	11.45	215°18.88	11.4'	10°13.64	-15.6'	59.0'
6	268°27.33	N21°11.03	229°49.29	11.5'	N09°58.04	-15.6'	58.9'
7 8	283°27.28 298°27.23	10.60 10.18	244°19.80 258°50.41	11.6' 11.7'	09°42.40 09°26.74	-15.7' -15.7'	58.9' 58.8'
9	298 27.23 313°27.17	9.75	258 50.41 273°21.10	11.7	09 20.74 09°11.05	-15.7'	58.8'
10	328°27.12	9.32	$287^{\circ}51.88$	11.9'	08°55.33	-15.7'	58.8'
11	343°27.07	8.89	302°22.75	12.0'	08°39.59	-15.8'	58.7'
12	358°27.01 13°26.96	N21°8.46	316°53.71 331°24.76	12.0'	N08°23.83 08°8.05	-15.8'	58.7'
13 14	13°26.96 28°26.91	8.04 7.61	331°24.76 345°55.89	12.1' 12.2'	08°8.05 07°52.25	-15.8' -15.8'	58.7' 58.6'
15	43°26.86	7.17	0°27.10	12.3'	07°36.43	-15.8'	58.6'
16	58°26.81	6.74	14°58.39	12.4'	$07^{\circ}20.60$	-15.8'	58.5'
17	73°26.75	6.31	29°29.77	12.5'	07°4.76	-15.9'	58.5'
18 19	88°26.70 103°26.65	N21°5.88 5.45	44°1.22 58°32.75	12.5' 12.6'	N06°48.90 06°33.03	-15.9' -15.9'	58.5' 58.4'
20	103 26.65 118°26.60	5.45 5.01	73°4.36	12.7	06° 33.03	-15.9' -15.9'	58.4'
21	133°26.55	• • 4.58	87°36.04	12.8'	06°1.27	-15.9'	58.3'
22	148°26.50	4.14	102°7.79	12.8'	05°45.37	-15.9'	58.3'
23	163°26.45	3.71	116°39.62	12.9'	05°29.47	-15.9'	58.3'
	SD = 15.7'	d = -0.4'		SI	D = 16.1'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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	////
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:59	07:54	08:47	15:26	16:19	17:13
	l			ı		

Lat.		Moonris	e	Moonset			
Lat.	Wed	Thu	Fri	Wed	Thu	Fri	
N 72°		03:24	06:35		00:26 23:04	22:21	
<b>N</b> 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	80:80	20:47	21:12	21:33	
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 10°	07:17	80:80	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	
<b>S</b> 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	
<b>S</b> 60°	09:50	09:52	09:53	16:54	18:44	20:24	

		Sun		Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	1-3
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	1-9%
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	Stars
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	295°49.28	134°43.08 N09°4.84	223°42.61 N22°19.68	169°31.46 N19°43.87	281°20.98 N03°31.00	
1	$310^{\circ}51.75$	149°43.05 3.67	238°43.22 19.93	184°33.36 43.75	296°23.40 31.00	Alpheratz 357°33.30 29°14.18 Ankaa 353°5.75 -42°9.38
2	325°54.21	164°43.01 2.51	253°43.83 20.17	199°35.25 43.62	311°25.83 31.00	Schedar 349°29.42 56°40.80
3	340°56.67	179°42.97 · · 1.34	268°44.45 · · 20.41	214°37.15 · · 43.49	326°28.25 · · 31.01	Diphda 348°45.93 -17°50.24
4	355°59.14 11°1.60	194°42.94 09°0.17 209°42.90 08°59.00	283°45.06 20.65 298°45.67 20.89	229°39.04 43.37 244°40.94 43.24	341°30.68 31.01	Achernar 335°19.24 -57°5.74
5 6	26°4.07	209°42.90 08°59.00 224°42.87 N08°57.83	298° 45.67 20.89 313° 46.28 N22° 21.13	244°40.94 43.24 259°42.83 N19°43.11	356°33.10 31.01 11°35.53 N03°31.02	Hamal 327°49.80 23°35.25
7	41°6.53	239°42.84 56.66	328°46.89 21.38	274°44.72 42.99	26°37.95 31.02	Polaris 313°33.41 89°22.24
8	56°8.99	254°42.81 55.49	343°47.50 21.62	289°46.62 42.86	41°40.38 31.02	Acamar 315°10.95 -40°11.59
9	$71^{\circ}11.46$	269°42.77 · · 54.32	358°48.11 · · 21.86	304°48.51 · · 42.73	56°42.81 · · 31.03	Menkar 314° 4.93 4° 11.71 Mirfak 308° 26.65 49° 57.15
10	86° 13.92	284°42.74 53.15	13°48.73 22.10	319°50.41 42.60	71°45.23 31.03	Aldebaran 290°38.39 16°33.76
11	101°16.39	299° 42.71 51.98	28° 49.34 22.33	334°52.30 42.48	86°47.66 31.03	Rigel 281°2.91 -8°10.15
12 13	116° 18.85 131° 21.31	314°42.68 N08°50.81 329°42.65 49.64	43°49.95 N22°22.57 58°50.56 22.81	349°54.19 N19°42.35 4°56.09 42.22	101°50.09 N03°31.04 116°52.51 31.04	Capella 280°20.39 46°1.36
14	146° 23.78	344°42.62 48.47	73°51.17 23.05	19°57.98 42.10	131°54.94 31.04	Bellatrix 278°21.79 6°22.47
15	161°26.24	359°42.59 · · 47.29	88°51.78 · · 23.29	34°59.88 · · 41.97	146°57.37 · · 31.04	Elnath 278° 0.57 28° 37.74
16	$176^{\circ}28.71$	14°42.57 46.12	103°52.39 23.53	50° 1.77 41.84	161°59.80 31.05	Alnilam 275°36.72 -1°11.02   Betelgeuse 270°51.01 7°24.76
17	191°31.17	29°42.54 44.95	118°53.01 23.76	65° 3.67 41.71	177°2.22 31.05	Canopus 263°52.35 -52°42.42
18	206°33.63	44°42.51 N08°43.78	133°53.62 N22°24.00	80°5.56 N19°41.59	192°4.65 N03°31.05	Sirius 258°25.45 -16°45.07
19	221°36.10	59°42.49 42.60 74°42.46 41.43	148°54.23 24.24	95°7.45 41.46 110°9.35 41.33	207°7.08 31.05 222°9.51 31.06	Adhara 255° 5.24 -29° 0.40
20 21	236°38.56 251°41.03	74°42.46 41.43 89°42.44 • 40.26	163°54.84 24.47 178°55.45 •• 24.71	110° 9.35 41.33 125° 11.24 · · 41.20	222°9.51 31.06 237°11.94 · · 31.06	Procyon 244°49.84 5°9.45
22	266° 43.49	104°42.41 39.08	193°56.06 24.94	140°13.14 41.08	252°14.36 31.06	Pollux 243°16.13 27°57.74
23	281°45.96	119°42.39 37.91	208° 56.68 25.18	155°15.03 40.95	267°16.79 31.06	Avior 234°14.87 -59°35.69
_	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	Suhail 222°45.80 -43°32.45 Miaplacidus 221°38.91 -69°49.67
- Ivier.	Ju33. U≒.1U	ν-0.0 u-1.2 III-4.10	νο.υ αυ.∠ III1.31	ν 1.9 U-U.1 III-1.19	νΔ.¬ αυ.υ IIIU./U	Alphard 217°46.80 -8°46.43
•	CIIA	CUA	CUA	CUA	CUA	Regulus 207°33.36 11°50.29
Sun 0	<b>GHA</b> 296° 48.42	<b>GHA Dec</b> 134°42.37 N08°36.73	<b>GHA Dec</b> 223°57.29 N22°25.41	<b>GHA Dec</b> 170°16.92 N19°40.82	<b>GHA Dec</b> 282°19.22 N03°31.07	Dubhe 193°39.89 61°36.67
1	311°50.88	149°42.35 35.56	238° 57.90 25.65	185°18.82 40.69	297°21.65 31.07	Denebola 182°23.81 14°25.49
2	326°53.35	164°42.33 34.38	253°58.51 25.88	200°20.71 40.57	312°24.08 31.07	Gienah 175°42.39 -17°41.46 Acrux 172°58.89 -63°15.09
3	341°55.81	179°42.30 · · 33.21	268°59.12 · · 26.11	215°22.61 · · 40.44	327°26.51 · · 31.07	Gacrux 172 58.89 -03 15.09 Gacrux 171°50.39 -57°16.00
4	356° 58.28	194°42.28 32.03	283°59.74 26.35	230°24.50 40.31	342°28.94 31.07	Alioth 166°11.97 55°49.18
5	12°0.74	209°42.27 30.86	299°0.35 26.58	245°26.39 40.18	357°31.37 31.07	Spica 158°20.97 -11°18.05
6 7	27°3.20 42°5.67	224°42.25 N08°29.68 239°42.23 28.50	314°0.96 N22°26.81 329°1.57 27.05	260°28.29 N19°40.06 275°30.18 39.93	12°33.80 N03°31.08 27°36.23 31.08	Alkaid 152°50.98 49°11.07
8	57°8.13	239° 42.23 28.50 254° 42.21 27.33	329°1.57 27.05 344°2.18 27.28	275°30.18 39.93 290°32.08 39.80	27°36.23 31.08 42°38.66 31.08	Hadar 148°34.10 -60°30.35
9	72° 10.60	269° 42.19 · · · 26.15	359°2.80 · · 27.51	305°33.97 · · 39.67	57°41.09 · · 31.08	Menkent 147°56.05 -36°30.22
10	$87^{\circ}13.06$	284°42.18 24.97	14°3.41 27.74	320°35.86 39.54	72°43.52 31.08	Arcturus 145°46.69 19°2.76 Rigil Kent. 139°38.36 -60°56.99
11	102° 15.52	299° 42.16 23.79	29°4.02 27.97	335°37.76 39.42	87°45.95 31.08	Kochab 137°19.46 74°3.00
12	117° 17.99	314°42.15 N08°22.62	44°4.63 N22°28.20	350°39.65 N19°39.29	102°48.38 N03°31.08	Zuben'ubi 136°54.49 -16°9.19
13 14	132°20.45 147°22.92	329°42.13 21.44 344°42.12 20.26	59°5.25 28.43 74°5.86 28.66	5°41.55 39.16 20°43.44 39.03	117°50.81 31.09 132°53.24 31.09	Alphecca 126°2.48 26°37.65
15	162° 25.38	359°42.10 · · 19.08	89°6.47 · · 28.89	35°45.33 · · 38.90	147°55.67 · · 31.09	Antares 112°14.01 -26°29.51
16	177° 27.84	14°42.09 17.90	104°7.08 29.12	50°47.23 38.78	162°58.10 31.09	Atria 107° 6.63 -69° 4.67 Sabik 102° 1.04 -15° 45.46
17	$192^{\circ}30.31$	29°42.08 16.72	119°7.69 29.35	65°49.12 38.65	178°0.53 31.09	Shaula 96°8.27 -37°7.42
18	207°32.77	44°42.07 N08°15.54	134°8.31 N22°29.57	80°51.02 N19°38.52	193°2.97 N03°31.09	Rasalhague 95°57.07 12°32.52
19	222°35.24	59°42.06 14.36	149°8.92 29.80	95°52.91 38.39	208°5.40 31.09	Eltanin 90°41.10 51°29.22
20 21	237°37.70 252°40.16	74°42.05 13.18 89°42.04 •• 12.00	164°9.53 30.03 179°10.14 · · · 30.26	110°54.81 38.26 125°56.70 · · 38.14	223°7.83 31.09 238°10.26 · · 31.09	Kaus Aust. 83°30.43 -34°22.30
22	267° 42.63	104° 42.03 10.82	194° 10.76 30.48	140°58.59 38.01	253°12.70 31.09	Vega 80°31.95 38°48.57
23	282°45.09	119° 42.02 9.64	209° 11.37 30.71	156° 0.49 37.88	268°15.13 31.09	Nunki 75°45.81 -26°15.76 Altair 61°58.38 8°56.38
Merr	pass. 04:12	ν-0.0' d-1.2' m-4.16	$\nu$ 0.6' d0.2' m1.31	ν1.9' d-0.1' m-1.79	$\nu$ 2.4' $d$ 0.0' $m$ 0.70	Altair 61°58.38 8°56.38   Peacock 53°3.13 -56°38.82
14161.	Juss. U4.12	ν-0.0 u-1.2 m-4.10	νο.υ αυ.Σ IIII.31	ν 1.5 U-0.1 III-1.19	ν2. <del>τ</del> αυ.υ πο.τυ	Deneb 49°24.48 45°22.49
	<b></b>					Enif 33°37.25 9°59.88
Mon	<b>GHA</b> 297° 47.56	<b>GHA Dec</b> 134°42.01 N08°8.46	<b>GHA Dec</b> 224°11.98 N22°30.93	<b>GHA Dec</b> 171°2.38 N19°37.75	<b>GHA Dec</b> 283°17.56 N03°31.09	Al Na'ir 27°30.93 -46°49.69
0 1	312° 50.02	149°42.01 N08 8.46	239° 12.59 31.16	171 2.38 N19 37.75 186° 4.28 37.62	298°19.99 31.09	Fomalhaut 15°12.86 -29°28.66
2	327°52.49	164°42.00 6.10	254°13.21 31.39	201°6.17 37.49	313°22.43 31.09	Scheat 13°43.73 28°13.59 Markab 13°28.41 15°20.93
3	$342^{\circ}54.95$	179°41.99 · · 4.92	269°13.82 · · 31.61	216°8.06 · · 37.37	328°24.86 · · 31.09	
4	357°57.41	194°41.99 3.73	284°14.43 31.83	231° 9.96 37.24	343°27.29 31.09	Jul 18 Sat SHA Mer.pass
5	12°59.88	209°41.98 2.55	299° 15.05 32.06	246°11.85 37.11	358°29.73 31.09	Venus 198°53.80 15:01
6 7	28°2.34 43°4.81	224°41.98 N08°1.37 239°41.98 08°0.19	314°15.66 N22°32.28 329°16.27 32.51	261°13.75 N19°36.98 276°15.64 36.85	13°32.16 N03°31.09 28°34.59 31.09	Mars 287°53.33 09:05   Jupiter 233°42.18 12:40
8	43°4.81 58°7.27	254°41.97 07°59.00	329°16.27 32.51 344°16.88 32.73	270°15.04 30.85 291°17.53 36.72	28°34.59 31.09 43°37.03 31.09	Saturn 345°31.69 05:14
9	73°9.73	269°41.97 · · 57.82	359°17.50 · · 32.95	306°19.43 · · 36.59	58°39.46 · · 31.09	
10	88°12.20	284°41.97 56.63	14° 18.11 33.17	321°21.32 36.47	73°41.90 31.09	Jul 19 Sun         SHA         Mer.pass           Venus         197°53.95         15:01
11	103°14.66	299°41.97 55.45	29° 18.72 33.40	336°23.22 36.34	88°44.33 31.09	Venus 197°53.95 15:01 Mars 287°8.87 09:04
12	118° 17.13	314°41.97 N07°54.27	44°19.34 N22°33.62	351°25.11 N19°36.21	103°46.77 N03°31.09	Jupiter 233°28.50 12:37
13 14	133° 19.59 148° 22.05	329°41.97 53.08 344°41.97 51.90	59°19.95 33.84 74°20.56 34.06	6°27.00 36.08 21°28.90 35.95	118°49.20 31.09 133°51.64 31.09	Saturn 345°30.80 05:10
15	163°24.52	359°41.97 · · 50.71	89°21.18 · · 34.28	36°30.79 · · 35.82	148°54.07 · · 31.09	Jul 20 Mon SHA Mer.pass
16	178° 26.98	14°41.98 49.53	104°21.79 34.50	51°32.69 35.69	163°56.51 31.09	Venus 196°54.46 15:01
17	193°29.45	29°41.98 48.34	119° 22.40 34.72	66°34.58 35.56	178°58.94 31.09	Mars 286°24.43 09:03
18	208°31.91	44°41.98 N07°47.16	134°23.02 N22°34.94	81°36.47 N19°35.44	194°1.38 N03°31.09	Jupiter 233°14.82 12:34
19 20	223°34.37 238°36.84	59°41.99 45.97 74°41.99 44.78	149°23.63 35.16 164°24.24 35.38	96°38.37 35.31 111°40.26 35.18	209°3.81 31.09 224°6.25 31.09	Saturn 345°30.00 05:06
21	253° 39.30	89°42.00 · · 43.60	179° 24.86 · · 35.60	126°42.16 · · 35.05	239°8.68 · · 31.09	Horizontal parallax
22	268° 41.77	104°42.00 42.41	194°25.47 35.81	141°44.05 34.92	254°11.12 31.08	Venus: 0.2
23	283°44.23	119°42.01 41.22	209° 26.08 36.03	156°45.94 34.79	269°13.56 31.08	Mars: 0.1
Mer.r	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	

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°26.40	N21°3.27	131°11.52	13.0'	N05° 13.57	-15.9'	58.2'
1	193°26.35	2.83	145°43.48	13.0'	04°57.67	-15.9'	58.2'
2	208°26.30	2.40	160° 15.52	13.1'	04°41.76	-15.9'	58.1'
3 4	223°26.25 238°26.20	· · 1.96 1.52	174° 47.62 189° 19.78	13.2' 13.2'	04°25.86 04°9.96	-15.9' -15.9'	58.1' 58.1'
5	253°26.16	1.08	203°52.01	13.2	04 9.90 03°54.06	-15.9'	58.0'
6	268°26.11	N21°0.64	218° 24.30	13.4'	N03°38.16	-15.9'	58.0'
7	283°26.06	21°0.20	232°56.65	13.4'	03°22.27	-15.9'	58.0'
8	298°26.01	20°59.76	247°29.06	13.5'	03°6.39	-15.9'	57.9'
9	313°25.96	• • 59.32	262°1.53	13.5'	02°50.52 02°34.65	-15.9'	57.9'
10 11	328°25.92 343°25.87	58.87 58.43	276°34.05 291°6.63	13.6' 13.6'	02° 34.65 02° 18.80	-15.9' -15.8'	57.8' 57.8'
12	358°25.82	N20° 57.99	305°39.26	13.7'	N02°2.96	-15.8'	57.8'
13	13°25.78	57.54	$320^{\circ}11.95$	13.7'	$01^{\circ}47.13$	-15.8'	57.7'
14	28°25.73	57.10	334° 44.68	13.8'	01°31.31	-15.8'	57.7'
15	43°25.68 58°25.64	• • 56.65	349° 17.47 3° 50.30	13.8'	01°15.51 00°59.73	-15.8'	57.6'
16 17	73°25.59	56.21 55.76	3 50.30 18°23.18	13.9' 13.9'	00°59.73	-15.8' -15.7'	57.6' 57.6'
18	88° 25.55	N20°55.31	32°56.11	14.0'	N00°28.22	-15.7'	57.5'
19	103°25.50	54.86	47°29.08	14.0'	N00°12.49	-15.7'	57.5'
20	118°25.46	54.42	62°2.09	14.1'	500°3.21	15.7'	57.4'
21	133°25.41	• • 53.97	76°35.14	14.1'	00°18.89	15.7'	57.4'
22 23	148°25.37 163°25.32	53.52 53.07	91°8.24 105°41.37	14.1' 14.2'	00°34.55 00°50.19	15.6' 15.6'	57.4' 57.3'
23			105 41.57			13.0	31.3
	SD = 15.7'	d = -0.4'		SI	D = 15.9'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°25.28	N20° 52.62	120° 14.54	14.2'	S01°5.80	15.6'	57.3'
1	193°25.24	52.16	134° 47.74	14.2'	$01^{\circ}21.38$	15.6'	57.3'
2	208°25.19	51.71	149°20.98	14.3'	01°36.93	15.5'	57.2'
3 4	223°25.15 238°25.11	· · 51.26 50.81	163°54.26 178°27.56	14.3' 14.3'	01°52.46 02°7.96	15.5' 15.5'	57.2' 57.1'
5	253°25.06	50.35	193°0.90	14.4'	02° 23.42	15.5 15.4'	57.1'
6	268°25.02	N20°49.90	207°34.26	14.4'	S02°38.86	15.4	57.1'
7	283°24.98	49.44	222°7.66	14.4'	$02^{\circ}54.26$	15.4'	57.0'
8	298°24.94	48.99	236°41.08	14.4'	03°9.63	15.3'	57.0'
9	313°24.90	• • 48.53	251°14.52	14.5'	03°24.97 03°40.27	15.3'	57.0'
10 11	328°24.85 343°24.81	48.07 47.61	265°47.99 280°21.48	14.5' 14.5'	03 40.27 03°55.53	15.3' 15.2'	56.9' 56.9'
12	358°24.77	N20°47.16	294°55.00	14.5'	S04° 10.75	15.2'	56.8
13	13°24.73	46.70	309°28.53	14.6'	04°25.94	15.1'	56.8'
14	28°24.69	46.24	324°2.09	14.6'	04°41.09	15.1'	56.8'
15	43°24.65 58°24.61	· · 45.78 45.32	338°35.66 353°9.25	14.6'	04°56.20 05°11.27	15.1'	56.7'
16 17	73°24.57	45.32 44.86	353° 9.25 7° 42.85	14.6' 14.6'	05°11.27 05°26.29	15.0' 15.0'	56.7' 56.7'
18	88°24.53	N20°44.39	22° 16.47	14.6'	S05°41.28	14.9'	56.6'
19	103°24.49	43.93	$36^{\circ}50.10$	14.6'	$05^{\circ}56.22$	14.9'	56.6'
20	118°24.45	43.47	51°23.74		06°11.11		56.6'
21 22	133°24.42 148°24.38	· · 43.00 42.54	65°57.40 80°31.06	14.7' 14.7'	06°25.96 06°40.77	14.8' 14.8'	56.5' 56.5'
23	148 24.38 163°24.34	42.54 42.07	95°4.73	14.7'	06° 40.77	14.8 14.7'	56.4'
	SD = 15.7'	d = -0.5'			D = 15.6'		
					10.0		
Mon	<b>GHA</b> 178°24.30	<b>Dec</b> N20°41.61	<b>GHA</b> 109° 38.41	ν	Dec 507° 10.23	d 14.7'	HP
0 1	178°24.30 193°24.26	N20 41.61 41.14	109° 38.41 124° 12.09	14.7' 14.7'	07° 24.90	14.7' 14.6'	56.4' 56.4'
2	208°24.23	40.68	138° 45.78	14.7'	07°39.51	14.6'	56.3'
3	223°24.19	• • 40.21	153° 19.47	14.7'	07°54.07	14.5'	56.3'
4	238°24.15	39.74	167°53.17	14.7'	08°8.58	14.5'	56.3'
5 6	253°24.11 268°24.08	39.27 N20°38.80	182°26.87 197°0.56	14.7' 14.7'	08°23.04 508°37.44	14.4' 14.4'	56.2' 56.2'
7	283°24.04	38.33	211°34.26	14.7'	08°51.80	14.4	56.2'
8	298°24.01	37.86	226°7.95	14.7'	09°6.10	14.2'	56.1
9	313°23.97	• • 37.39	$240^{\circ}41.64$	14.7'	$09^{\circ}20.34$	14.2'	56.1'
10	328°23.93	36.92	255° 15.33	14.7'	09°34.53	14.1'	56.1'
11 12	343°23.90 358°23.86	36.45 N20°35.98	269° 49.01 284° 22.68	14.7' 14.7'	09°48.66 \$10°2.73	14.1' 14.0'	56.0' 56.0'
13	358 23.86 13°23.83	35.50	284° 22.68 298° 56.35	14.7' 14.7'	10° 16.75	14.0' 14.0'	56.0'
14	28°23.80	35.03	313°30.01	14.6'	10°10.73	13.9'	55.9'
15	43°23.76	• • 34.55	328°3.65	14.6'	$10^{\circ}44.60$	13.8'	55.9'
16	58°23.73	34.08	342°37.29	14.6'	10°58.44	13.8'	55.9'
17	73°23.69 88°23.66	33.60 N20°33.13	357°10.92 11°44.53	14.6'	11°12.22 \$11°25.93	13.7'	55.8'
18 19	88°23.66 103°23.63	N20°33.13 32.65	11° 44.53 26° 18.13	14.6' 14.6'	\$11°25.93 11°39.58	13.7' 13.6'	55.8' 55.8'
20	118°23.59	32.03	40°51.72	14.6'	11°53.17	13.5'	55.8'
21	133°23.56	• • 31.69	55°25.29	14.6'	12°6.70	13.5'	55.7'
22	148°23.53	31.21	69°58.84	14.5'	12°20.16	13.4'	55.7'
23	163°23.50	30.74	84°32.38	14.5'	12°33.55	13.3'	55.7'
	SD = 15.7'	d = -0.5'		SI	D = 15.4'		

Lat.	Twi	light	Sunrise	Sunset	Twi	vilight	
Lat.	Naut.	Civil	Junisc	Junioci	Civil	Naut.	
N 72°							
<b>N</b> 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	////	
<b>N</b> 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	
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	06:56	07:49	08:42	15:31	16:24	17:18	

Lat.		Moonris	e		Moonset	:
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
<b>N</b> 72°	08:58	11:10	13:24	21:47	21:13	20:32
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	09:53	09:52	09:52	21:58	23:29	

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
Day	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	4-6	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	17-36%	
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	SHA Dec
0	298°46.69	134°42.02 N07°40.04	224°26.70 N22°36.25	171°47.84 N19°34.66	284°15.99 N03°31.08	
1	$313^{\circ}49.16$	149°42.02 38.85	239°27.31 36.46	186°49.73 34.53	299°18.43 31.08	Alpheratz 357°33.28 29°14.19 Ankaa 353°5.73 -42°9.38
2	328°51.62	164°42.03 37.66	254°27.92 36.68	201°51.63 34.40	314°20.87 31.08	Schedar 349°29.39 56°40.81
3	343°54.09	179°42.04 · · 36.47	269°28.54 · · 36.90	216°53.52 · · 34.27	329°23.31 · · 31.08	Diphda 348°45.92 -17°50.23
4 5	358° 56.55 13° 59.02	194°42.05 35.28 209°42.06 34.10	284°29.15 37.11 299°29.76 37.33	231°55.41 34.15 246°57.31 34.02	344°25.74 31.08 359°28.18 31.07	Achernar 335°19.21 -57°5.74
6	29°1.48	224°42.07 N07°32.91	314°30.38 N22°37.54	261°59.20 N19°33.89	14°30.62 N03°31.07	Hamal 327°49.77 23°35.25
7	44°3.94	239°42.08 31.72	329°30.99 37.76	277°1.10 33.76	29°33.06 31.07	Polaris 313°31.85 89°22.24
8	59°6.41	254°42.10 30.53	344°31.60 37.97	292°2.99 33.63	44°35.49 31.07	Acamar 315°10.93 -40°11.58 Menkar 314°4.91 4°11.72
9	74°8.87	269°42.11 · · 29.34	359°32.22 · · 38.19	307°4.88 · · 33.50	59°37.93 · · 31.07	Menkar 314°4.91 4°11.72 Mirfak 308°26.62 49°57.15
10	89° 11.34	284° 42.12 28.15	14°32.83 38.40	322°6.78 33.37	74°40.37 31.07	Aldebaran 290°38.38 16°33.76
11 12	104° 13.80 119° 16.26	299°42.14 26.96 314°42.15 N07°25.77	29°33.45 38.61 44°34.06 N22°38.83	337°8.67 33.24 352°10.57 N19°33.11	89°42.81 31.06 104°45.25 N03°31.06	Rigel 281°2.90 -8°10.14
13	134° 18.73	329°42.16 24.58	59°34.67 39.04	7°12.46 32.98	119°47.69 31.06	Capella 280°20.37 46°1.36
14	149°21.19	344°42.18 23.39	74°35.29 39.25	22°14.35 32.85	134°50.12 31.06	Bellatrix 278°21.78 6°22.47
15	$164^{\circ}23.66$	359°42.20 · · 22.20	89°35.90 · · 39.46	37°16.25 · · 32.72	149°52.56 · · 31.06	Elnath 278°0.55 28°37.74 Alnilam 275°36.71 -1°11.02
16	179°26.12	14°42.21 21.01	104°36.52 39.67	52°18.14 32.59	164°55.00 31.05	Betelgeuse 270°50.99 7°24.76
17	194° 28.58	29° 42.23 19.82	119°37.13 39.88	67°20.04 32.46	179°57.44 31.05	Canopus 263°52.34 -52°42.41
18 19	209°31.05 224°33.51	44°42.25 N07°18.63 59°42.27 17.43	134°37.74 N22°40.10 149°38.36 40.31	82°21.93 N19°32.33 97°23.82 32.20	194°59.88 N03°31.05 210°2.32 31.05	Sirius 258°25.44 -16°45.06
20	239° 35.98	74°42.29 16.24	164°38.97 40.52	112°25.72 32.07	225°4.76 31.04	Adhara 255°5.23 -29°0.39
21	254° 38.44	89°42.31 · · 15.05	179°39.59 · · 40.73	127°27.61 · · 31.94	240°7.20 · · 31.04	Procyon 244°49.83 5°9.45 Pollux 243°16.12 27°57.74
22	$269^{\circ}40.91$	104°42.33 13.86	194° 40.20 40.93	142°29.51 31.81	255°9.64 31.04	Pollux 243°16.12 27°57.74 Avior 234°14.87 -59°35.67
23	284°43.37	119°42.35 12.66	209°40.82 41.14	157°31.40 31.68	270°12.08 31.03	Suhail 222°45.81 -43°32.43
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	Miaplacidus 221°38.92 -69°49.66
						Alphard 217°46.81 -8°46.42
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.36 11°50.30
0	299° 45.83	134°42.37 N07°11.47	224°41.43 N22°41.35	172°33.29 N19°31.55	285°14.52 N03°31.03	Dubhe 193°39.91 61°36.66 Denebola 182°23.82 14°25.49
1	314°48.30	149°42.39 10.28	239° 42.04 41.56	187°35.19 31.42	300°16.96 31.03	Gienah 175°42.41 -17°41.45
2	329° 50.76	164°42.42 9.08	254°42.66 41.77	202°37.08 31.29	315°19.40 31.03	Acrux 172°58.92 -63°15.08
3 4	344° 53.23	179°42.44 · · 7.89 194°42.47 6.70	269°43.27 · · 41.98	217°38.98 · · 31.17 232°40.87	330°21.85 · · 31.02 345°24.29 31.02	Gacrux 171°50.42 -57°16.00
5	359° 55.69 14° 58.15	194°42.47 6.70 209°42.49 5.50	284°43.89 42.18 299°44.50 42.39	232°40.87 31.04 247°42.76 30.91	345°24.29 31.02 0°26.73 31.02	Alioth 166°11.99 55°49.18
6	30°0.62	224°42.52 N07°4.31	314°45.12 N22°42.60	262°44.66 N19°30.78	15°29.17 N03°31.01	Spica 158°20.98 -11°18.05
7	45°3.08	239°42.54 3.11	329°45.73 42.80	277°46.55 30.65	30°31.61 31.01	Alkaid 152°51.00 49°11.07 Hadar 148°34.13 -60°30.35
8	60°5.55	254°42.57 1.92	344°46.35 43.01	292°48.45 30.51	45°34.05 31.01	Menkent 147°56.07 -36°30.22
9	75°8.01	269°42.60 07°0.73	359°46.96 · · 43.21	307°50.34 · · 30.38	60°36.50 · · 31.00	Arcturus 145°46.70 19°2.76
10 11	90° 10.47 105° 12.94	284°42.62 06°59.53 299°42.65 58.34	14°47.58 43.42 29°48.19 43.62	322°52.23 30.25 337°54.13 30.12	75°38.94 31.00 90°41.38 31.00	Rigil Kent. 139°38.39 -60°56.99
12	105 12.94 120° 15.40	314°42.68 N06°57.14	44°48.81 N22°43.83	352°56.02 N19°29.99	105°43.82 N03°30.99	Kochab 137°19.52 74°3.01
13	135° 17.87	329°42.71 55.94	59°49.42 44.03	7°57.92 29.86	120°46.26 30.99	Zuben'ubi 136°54.50 -16°9.19 Alphecca 126°2.49 26°37.66
14	$150^{\circ}20.33$	344°42.74 54.75	74°50.04 44.23	22°59.81 29.73	135°48.71 30.98	Antares 112° 14.02 -26° 29.51
15	165°22.80	359°42.77 · · 53.55	89°50.65 · · 44.44	38° 1.71 · · · 29.60	150°51.15 · · 30.98	Atria 107°6.65 -69°4.67
16 17	180° 25.26 195° 27.72	14° 42.81 52.36	104°51.27 44.64	53°3.60 29.47	165°53.59 30.98	Sabik 102°1.04 -15°45.46
18	210° 30.19	29°42.84 51.16 44°42.87 N06°49.96	119°51.88 44.84 134°52.50 N22°45.04	68° 5.49 29.34 83° 7.39 N19° 29.21	180°56.04 30.97 195°58.48 N03°30.97	Shaula 96°8.28 -37°7.42
19	225° 32.65	59° 42.90 48.77	149°53.11 45.24	98° 9.28 29.08	211°0.92 30.96	Rasalhague 95°57.07 12°32.53
20	240°35.12	74°42.94 47.57	164°53.73 45.45	113°11.18 28.95	226°3.37 30.96	Eltanin 90°41.11 51°29.24 Kaus Aust. 83°30.44 -34°22.30
21	255° 37.58	89°42.97 · · 46.37	179°54.34 · · 45.65	128°13.07 · · 28.82	241°5.81 · · 30.96	Vega 80°31.95 38°48.59
22	270° 40.04	104°43.01 45.17	194°54.96 45.85	143°14.96 28.69	256°8.26 30.95	Nunki 75°45.81 -26°15.76
23	285° 42.51	119°43.04 43.98	209°55.57 46.05	158°16.86 28.56	271°10.70 30.95	Altair 61°58.37 8°56.39
Mer.	pass. 04:00	$ u 0.0' \ d\text{-}1.2' \ \text{m-}4.19$	$ u 0.6' \ d0.2' \ m1.30$	$\nu 1.9' \; d$ -0.1' m-1.79	$\nu$ 2.4′ <i>d</i> -0.0′ m0.68	Peacock 53°3.12 -56°38.83
						Deneb 49°24.47 45°22.51 Enif 33°37.24 9°59.89
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°30.91 -46°49.70
0	300°44.97	134°43.08 N06°42.78	224°56.19 N22°46.25	173°18.75 N19°28.43	286°13.15 N03°30.94	Fomalhaut 15°12.85 -29°28.66
1	315° 47.44	149°43.12 41.58	239° 56.80 46.45	188°20.65 28.30	301°15.59 30.94	Scheat 13°43.71 28°13.61
2 3	330° 49.90 345° 52.36	164°43.15 40.38 179°43.19 · · 39.18	254°57.42 46.65 269°58.04 • 46.84	203°22.54 28.17 218°24.43 •• 28.04	316°18.04 30.93 331°20.48 · · 30.93	Markab 13°28.39 15°20.94
4	0°54.83	194°43.23 37.98	284°58.65 47.04	233°26.33 27.91	346°22.93 30.92	Jul 21 Tue SHA Mer.pass
5	15° 57.29	209°43.27 36.78	299°59.27 47.24	248°28.22 27.78	1°25.37 30.92	Venus 195°55.32 15:01
6	30° 59.76	224°43.31 N06°35.58	314°59.88 N22°47.44	263°30.12 N19°27.65	16°27.82 N03°30.91	Mars 285°40.00 09:02
7	46°2.22	239°43.35 34.39	330°0.50 47.64	278°32.01 27.51	31°30.26 30.91	Jupiter 233°1.14 12:31
8 9	61°4.69 76°7.15	254°43.39 33.19 269°43.44 · · 31.99	345°1.11 47.83 0°1.73 • 48.03	293°33.91 27.38 308°35.80 · · 27.25	46°32.71 30.90 61°35.15 · · 30.90	Saturn 345°29.30 05:02
10	76 7.15 91°9.61	284°43.48 30.79	15°2.35 48.23	308 35.80 · · 27.25 323°37.69 27.12	76°37.60 30.89	Jul 22 Wed SHA Mer.pass
11	106° 12.08	299° 43.52 29.59	30°2.96 48.42	338°39.59 26.99	91°40.05 30.89	Venus 194°56.54 15:01
12	121° 14.54	314°43.57 N06°28.39	45°3.58 N22°48.62	353°41.48 N19°26.86	106°42.49 N03°30.88	Mars 284°55.60 09:01 Jupiter 232°47.46 12:28
13	136° 17.01	329°43.61 27.18	60°4.19 48.81	8°43.38 26.73	121°44.94 30.88	Saturn 345°28.69 04:58
14 15	151° 19.47 166° 21.93	344°43.65 25.98 359°43.70 •• 24.78	75°4.81 49.01 90°5.43 • 49.20	23°45.27 26.60 38°47.16 · · 26.47	136°47.39 30.87 151°49.83 · · 30.87	
15 16	181°24.40	14°43.75 23.58	105°6.04 49.40	53°49.06 26.34	151°49.83 · · 30.87 166°52.28 30.86	Jul 23 Thu         SHA         Mer.pass           Venus         193°58.11         15:01
17	196° 26.86	29°43.79 22.38	120°6.66 49.59	68°50.95 26.21	181°54.73 30.86	Mars 284°11.22 09:00
18	211°29.33	44°43.84 N06°21.18	135°7.27 N22°49.78	83°52.85 N19°26.07	196°57.17 N03°30.85	Jupiter 232°33.78 12:25
19	226°31.79	59°43.89 19.98	150°7.89 49.98	98°54.74 25.94	211°59.62 30.84	Saturn 345°28.17 04:54
20 21	241°34.26 256°36.72	74°43.94 18.78 89°43.99 •• 17.57	165°8.51 50.17 180°9.12 · · 50.36	113°56.64 25.81 128°58.53 •• 25.68	227°2.07 30.84 242°4.52 · · 30.83	Horizontal parallax
22	250 30.72 271°39.18	104°44.04 16.37	195°9.74 50.55	144°0.42 25.55	242 4.52 · · 30.83 257°6.97 30.83	Venus: 0.2
23	286°41.65	119°44.09 15.17	210° 10.36 50.74	159° 2.32 25.42	272°9.41 30.82	Mars: 0.1
Mer	pass. 03:56	ν0.0' 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' m0.68	
	pass. 05.50		- 0.0 00.2 1111.30		- 2.1 G 0.0 M0.00	

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°23.47	N20°30.26	99°5.89	14.5'	S12°46.88	13.3'	55.6'
1	193°23.43	29.78	113°39.39	14.5'	13°0.14	13.2'	55.6'
2	208°23.40	29.29	128°12.87	14.5'	13° 13.33	13.1'	55.6'
3	223°23.37	• • 28.81	142°46.32	14.4'	13°26.46	13.1'	55.5'
4 5	238°23.34 253°23.31	28.33 27.85	157°19.75 171°53.16	14.4' 14.4'	13°39.52 13°52.50	13.0' 12.9'	55.5' 55.5'
6	268°23.28	N20° 27.36	171 53.16 186°26.55	14.4	S14°5.42	12.9	55.5'
7	283°23.25	26.88	200°59.91	14.3'	14° 18.26	12.8'	55.4'
8	298°23.22	26.39	215°33.24	14.3'	14°31.03	12.7'	55.4'
9	313°23.19	• • 25.91	230°6.55	14.3'	14°43.73	12.6'	55.4'
10	328°23.16	25.42	244°39.83	14.3'	14°56.36	12.6'	55.4'
11	343°23.13	24.94	259°13.09	14.2'	15°8.91	12.5'	55.3'
12 13	358°23.10 13°23.07	N20°24.45 23.96	273°46.31 288°19.50	14.2' 14.2'	\$15°21.39 15°33.79	12.4' 12.3'	55.3' 55.3'
14	28°23.05	23.47	302°52.66	14.1'	15° 46.12	12.3	55.2'
15	43°23.02	22.98	317°25.79	14.1'	15°58.37	12.2'	55.2'
16	58°22.99	22.50	331°58.89	14.1'	$16^{\circ}10.54$	12.1'	55.2'
17	73°22.96	22.01	$346^{\circ}31.95$	14.0'	$16^{\circ}22.63$	12.0'	55.2'
18	88°22.93	N20°21.51	1°4.98	14.0'	S16°34.64	11.9'	55.1'
19	103°22.91	21.02	15°37.98	14.0'	16° 46.58 16° 58.43	11.9'	55.1'
20 21	118°22.88 133°22.85	20.53	30°10.94 44°43.87	13.9' 13.9'	16°58.43 17°10.20	11.8' 11.7'	55.1' 55.1'
21	133°22.85 148°22.83	· · 20.04 19.55	44 43.87 59°16.75	13.9'	17° 10.20 17° 21.89	11.7	55.1° 55.0'
23	163°22.80	19.05	73°49.60	13.8'	17° 33.50	11.5'	55.0'
	SD = 15.7'	d = -0.5'			0 = 15.2'		
	<u> </u>	<u>u — -0.5</u>		JL	. — 13.2		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°22.78 193°22.75	N20° 18.56 18.06	88°22.42 102°55.19	13.8' 13.7'	\$17°45.02 17°56.47	11.4' 11.4'	55.0' 55.0'
2	193 22.75 208°22.73	18.06 17.57	102 55.19 117°27.92	13.7'	17 50.47 18°7.82	11.4	55.0'
3	208 22.73 223°22.70	17.07	132°0.62	13.7'	18° 19.09	11.2'	54.9'
4	238°22.68	16.58	146°33.27	13.6'	18° 30.28	11.1'	54.9'
5	253°22.65	16.08	161°5.88	13.6'	18°41.37	11.0'	54.9'
6	268°22.63	N20° 15.58	175°38.45	13.5'	S18°52.39	10.9'	54.9'
7	283°22.60	15.08	190°10.98	13.5'	19°3.31	10.8'	54.8'
8	298°22.58	14.58	204°43.47	13.4'	19° 14.14	10.7'	54.8'
9 10	313°22.56 328°22.53	· · 14.08 13.58	219°15.91 233°48.31	13.4' 13.4'	19°24.89 19°35.54	10.7' 10.6'	54.8' 54.8'
11	343°22.51	13.08	248°20.66	13.4	19° 35.54 19° 46.10	10.5	54.8'
12	358°22.49	N20°12.58	262°52.97	13.3'	\$19°56.57	10.4	54.7'
13	13°22.46	12.08	277°25.23	13.2'	20°6.95	10.3'	54.7'
14	28°22.44	11.58	291°57.45	13.2'	$20^{\circ}17.24$	10.2'	54.7'
15	43°22.42	• • 11.08	306°29.62	13.1'	20°27.43	10.1'	54.7'
16 17	58°22.40 73°22.38	10.57 10.07	321°1.74 335°33.82	13.1' 13.0'	20°37.53 20°47.53	10.0' 9.9'	54.7' 54.6'
18	88°22.36	N20°9.56	350°5.85	13.0'	20 47.53 \$20°57.44	9.9	54.6
19	103°22.34	9.06	4°37.84	12.9'	21°7.25	9.7'	54.6'
20	118°22.31	8.55	19°9.77	12.9'	21° 16.96	9.6'	54.6'
21	133°22.29	• • 8.05	33°41.66	12.8'	$21^{\circ}26.58$	9.5'	54.6'
22	148°22.27	7.54	48°13.50	12.8'	21°36.10	9.4'	54.6'
23	163°22.25	7.03	62°45.28	12.7'	21°45.52	9.3'	54.5'
	SD = 15.7'	d = -0.5'		SE	0 = 15.0'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°22.23	N20°6.52	77°17.02	12.7'	S21°54.83	9.2'	54.5'
1	193°22.22	6.01	91°48.72	12.6'	22°4.05	9.1'	54.5'
2 3	208°22.20 223°22.18	5.51 •• 5.00	106°20.36 120°51.95	12.6' 12.5'	22°13.17 22°22.18	9.0' 8.9'	54.5' 54.5'
3 4	223°22.18 238°22.16	• • 5.00 4.48	120°51.95 135°23.49	12.5'	22° 22.18 22° 31.10	8.9 8.8'	54.5'
5	253°22.14	3.97	149°54.98	12.4'	22°39.91	8.7'	54.4'
6	268°22.12	N20°3.46	164°26.42	12.4'	S22°48.61	8.6'	54.4'
7	283°22.11	2.95	178°57.81	12.3'	22°57.21	8.5'	54.4'
8	298°22.09	2.44	193°29.15	12.3'	23°5.71	8.4'	54.4'
9 10	313°22.07 328°22.05	· · 1.92 1.41	208°0.44 222°31.68	12.2' 12.2'	23°14.10 23°22.38	8.3' 8.2'	54.4' 54.4'
10	328 22.05 343°22.04	0.89	222 31.68 237°2.87	12.1'	23 22.38 23°30.55	8.2 8.1'	54.4' 54.4'
12	358°22.02	N20°0.38	251°34.01	12.1'	S23°38.62	8.0'	54.3
13	13°22.00	19°59.86	$266^{\circ}5.10$	12.0'	23°46.58	7.8'	54.3'
14	28°21.99	59.35	$280^{\circ}36.14$	12.0'	$23^{\circ}54.43$	7.7'	54.3'
15	43°21.97	• • 58.83	295°7.13	11.9'	24°2.17	7.6'	54.3'
16	58°21.96	58.31	309°38.06	11.9'	24°9.80	7.5'	54.3'
17 18	73°21.94 88°21.93	57.80 N19° 57.28	324°8.95 338°39.79	11.8' 11.8'	24°17.32 \$24°24.72	7.4' 7.3'	54.3' 54.3'
18	103°21.91	56.76	358 39.79 353°10.58	11.8	24° 32.02	7.3 7.2'	54.3'
20	118°21.90	56.24	7°41.31	11.7'	24° 32.02 24° 39.20	7.1	54.2'
21	133°21.88	• • 55.72	22°12.00	11.6'	$24^{\circ}46.27$	7.0'	54.2'
22	148°21.87	55.20	36°42.64	11.6'	24°53.22	6.8'	54.2'
23	163°21.86	54.68	51°13.23	11.5'	25°0.06	6.7'	54.2'
	SD = 15.7'	d = -0.5'		SE	0 = 14.9'		

Lat.         Naut.         Civil         Sunrise         Sunset           N 72°         □         □         □         □           N 70°         □         □         □         □           68°         ////         01//         02:05         22:04         ///           64°         ////         02:05         22:04         ///           62°         ////         01:31         03:00         21:12         22:13           60°         ////         02:08         03:18         20:54         22:1           N 58°         ////         02:33         03:33         20:39         21:1           56°         01:23         02:53         03:46         20:26         21:           54°         01:57         03:09         03:57         20:15         21:           50°         02:39         03:35         04:16         19:56         20:           50°         03:14         03:59         04:34         19:38         20:           N 40°         03:39         04:18         04:49         19:23         19:	Twilight		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	vil Naut.		
68°         ////         ////         01:14         22:52         ///           66°         ////         ////         02:05         22:04         ///           64°         ////         ////         02:37         21:34         ///           62°         ////         01:31         03:00         21:12         22:           60°         ////         02:08         03:18         20:54         22:           N 58°         ////         02:33         03:33         20:39         21:           56°         01:23         02:53         03:46         20:26         20:5           54°         01:57         03:09         03:57         20:15         21:           52°         02:21         03:23         04:07         20:05         20:           50°         02:39         03:35         04:16         19:56         20:           45°         03:14         03:59         04:34         19:38         20:			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			
64°         ////         ////         02:37         21:34         ///           62°         ////         01:31         03:00         21:12         22:           60°         ////         02:08         03:18         20:54         22:           N 58°         ////         02:33         03:33         20:39         21:           56°         01:23         02:53         03:46         20:26         21:           54°         01:57         03:09         03:57         20:15         21:           52°         02:21         03:23         04:07         20:05         20:           50°         02:39         03:35         04:16         19:56         20:           45°         03:14         03:59         04:34         19:38         20:	'/ ////		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	'/ ////		
60°         ////         02:08         03:18         20:54         22:           N 58°         ////         02:33         03:33         20:39         21:           56°         01:23         02:53         03:46         20:26         21:           54°         01:57         03:09         03:57         20:15         21:           52°         02:21         03:23         04:07         20:05         20:           50°         02:39         03:35         04:16         19:56         20:           45°         03:14         03:59         04:34         19:38         20:	'/ ////		
N 58°         ////         02:33         03:33         20:39         21:           56°         01:23         02:53         03:46         20:26         21:           54°         01:57         03:09         03:57         20:15         21:           52°         02:21         03:23         04:07         20:05         20:           50°         02:39         03:35         04:16         19:56         20:           45°         03:14         03:59         04:34         19:38         20:			
56°         01:23         02:53         03:46         20:26         21:           54°         01:57         03:09         03:57         20:15         21:           52°         02:21         03:23         04:07         20:05         20:           50°         02:39         03:35         04:16         19:56         20:           45°         03:14         03:59         04:34         19:38         20:	03 ////		
54°         01:57         03:09         03:57         20:15         21:           52°         02:21         03:23         04:07         20:05         20:           50°         02:39         03:35         04:16         19:56         20:           45°         03:14         03:59         04:34         19:38         20:	38 ////		
52°         02:21         03:23         04:07         20:05         20:           50°         02:39         03:35         04:16         19:56         20:           45°         03:14         03:59         04:34         19:38         20:	18 22:46		
50° 02:39 03:35 04:16 19:56 20: 45° 03:14 03:59 04:34 19:38 20:	02 22:14		
45° 03:14 03:59 04:34 19:38 20:	49 21:50		
	37 21:32		
N 40° 03:39 04:18 04:49 19:23 19:	13 20:58		
	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		
<b>N</b> 10° 04:59 05:25 05:48 18:25 18:	47 19:14		
0°   05:15	32 18:58		
<b>S</b> 10° 05:30 05:55 06:18 17:55 18:	18 18:43		
20°   05:43	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		
<b>S</b> 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 16:1			
56° 06:41 07:28 08:12 16:02 16:			
58° 06:46 07:36 08:23 15:51 16:			
<b>S</b> 60° 06:52 07:45 08:36 15:37 16:	29 17:22		

Lat.		Moonris	e		Moonset	ŧ
Lat.	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
<b>S</b> 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
<b>S</b> 60°	09:52	09:54	09:57	00:59	02:29	04:01

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	301°44.11	134°44.14 N06°13.97	225°10.97 N22°50.94	174° 4.21 N19° 25.29	287°11.86 N03°30.81	Alpheratz 357°33.26 29°14.20
1	$316^{\circ}46.58$	149°44.19 12.76	240°11.59 51.13	189° 6.11 25.16	302°14.31 30.81	Ankaa 353°5.70 -42°9.37
2	331°49.04	164°44.24 11.56	255° 12.21 51.32	204°8.00 25.02	317°16.76 30.80	Schedar 349°29.35 56°40.82
3	346°51.50	179°44.29 · · 10.36	270° 12.82 · · 51.51	219° 9.90 · · 24.89	332°19.21 · · 30.80	Diphda 348°45.89 -17°50.23
4	1°53.97	194°44.35 9.15	285°13.44 51.70	234°11.79 24.76	347°21.66 30.79	Achernar 335°19.17 -57°5.73
5	16° 56.43	209°44.40 7.95	300°14.06 51.89	249°13.68 24.63	2°24.11 30.78	Hamal 327°49.75 23°35.26
6	31°58.90	224°44.46 N06°6.75	315°14.67 N22°52.07	264°15.58 N19°24.50	17°26.56 N03°30.78	Polaris 313°30.08 89°22.24
7 8	47°1.36 62°3.83	239° 44.51 5.54 254° 44.57 4.34	330°15.29 52.26 345°15.91 52.45	279°17.47 24.37 294°19.37 24.24	32°29.01 30.77 47°31.46 30.76	Acamar 315°10.90 -40°11.57
9	02 3.63 77°6.29	269°44.62 · · 3.13	0°16.52 · · 52.64	309°21.26 · · 24.10	47°31.46 30.76 62°33.91 · · 30.76	Menkar 314°4.89 4°11.72
10	92°8.75	284°44.68 1.93	15°17.14 52.83	324°23.16 23.97	77°36.36 30.75	Mirfak 308°26.58 49°57.15
11	107° 11.22	299°44.74 06°0.72	30°17.76 53.01	339°25.05 23.84	92°38.81 30.74	Aldebaran 290°38.35 16°33.77
12	122° 13.68	314°44.80 N05°59.52	45°18.38 N22°53.20	354°26.94 N19°23.71	107°41.26 N03°30.74	Rigel 281°2.88 -8°10.14
13	$137^{\circ}16.15$	329°44.86 58.31	60° 18.99 53.39	9°28.84 23.58	122°43.71 30.73	Capella 280°20.34 46°1.35
14	$152^{\circ}18.61$	344°44.91 57.11	75° 19.61 53.57	24°30.73 23.45	137°46.16 30.72	Bellatrix 278°21.76 6°22.48 Elnath 278°0.53 28°37.74
15	$167^{\circ}21.07$	359°44.97 · · 55.90	90°20.23 · · 53.76	39°32.63 · · 23.31	152°48.61 · · 30.72	Alnilam 275°36.69 -1°11.01
16	182°23.54	14° 45.04 54.70	105°20.84 53.94	54°34.52 23.18	167°51.06 30.71	Betelgeuse 270°50.98 7°24.77
17	197°26.00	29°45.10 53.49	120°21.46 54.13	69°36.42 23.05	182°53.51 30.70	Canopus 263°52.32 -52°42.40
18	212°28.47	44°45.16 N05°52.29	135°22.08 N22°54.31	84°38.31 N19°22.92	197°55.96 N03°30.69	Sirius 258°25.43 -16°45.05
19	227°30.93	59°45.22 51.08	150°22.70 54.50	99°40.20 22.79	212°58.42 30.69	Adhara 255°5.22 -29°0.38
20	242°33.40	74°45.28 49.87	165°23.31 54.68	114°42.10 22.66	228° 0.87 30.68	Procyon 244°49.82 5°9.45
21	257°35.86	89°45.35 · · 48.67	180°23.93 · · 54.87	129°43.99 · · 22.52	243°3.32 · · 30.67	Pollux 243°16.11 27°57.73
22	272°38.32	104°45.41 47.46	195°24.55 55.05	144°45.89 22.39	258°5.77 30.66	Avior 234°14.87 -59°35.66
23	287° 40.79	119°45.48 46.25	210°25.17 55.23	159°47.78 22.26	273°8.22 30.66	Suhail 222°45.80 -43°32.42
Mer.	pass. 03:52	$ u 0.1' \ d - 1.2' \ m - 4.20 $	$ u 0.6' \ d0.2' \ m1.30$	$\nu 1.9' \; d ext{-}0.1' \;  ext{m-}1.79$	$\nu$ 2.4′ <i>d</i> -0.0′ m0.67	Miaplacidus 221°38.93 -69°49.64
						Alphard 217°46.80 -8°46.42
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.36 11°50.29
0	302°43.25	134°45.54 N05°45.05	225°25.78 N22°55.41	174°49.68 N19°22.13	288°10.68 N03°30.65	Dubhe 193°39.93 61°36.65
1	317° 45.72	149°45.61 43.84	240°26.40 55.60	189°51.57 22.00	303°13.13 30.64	Denebola 182°23.82 14°25.49
2	332°48.18	164°45.67 42.63	255°27.02 55.78	204°53.47 21.86	318°15.58 30.63	Gienah 175°42.41 -17°41.45
3	347° 50.64	179°45.74 · · 41.43	270°27.64 · · 55.96	219°55.36 · · 21.73	333°18.03 · · 30.62	Acrux 172°58.94 -63°15.07
4	$2^{\circ}53.11$	194°45.81 40.22	285°28.26 56.14	234°57.25 21.60	348°20.49 30.62	Gacrux 171°50.43 -57°15.99 Alioth 166°12.01 55°49.18
5	$17^{\circ}55.57$	209°45.88 39.01	300° 28.87 56.32	249°59.15 21.47	3°22.94 30.61	Alioth 166°12.01 55°49.18 Spica 158°20.99 -11°18.05
6	32°58.04	224°45.95 N05°37.80	315°29.49 N22°56.50	265°1.04 N19°21.34	18°25.39 N03°30.60	Alkaid 152°51.02 49°11.07
7	48°0.50	239°46.02 36.59	330°30.11 56.68	280°2.94 21.20	33°27.85 30.59	Hadar 148°34.14 -60°30.35
8	63°2.97	254°46.09 35.39	345°30.73 56.86	295° 4.83 21.07	48°30.30 30.58	Menkent 147°56.08 -36°30.22
9	78°5.43	269°46.16 · · 34.18	0°31.35 · · 57.04	310°6.73 · · 20.94	63°32.75 · · · 30.58	Arcturus 145°46.71 19°2.76
10	93°7.89	284°46.23 32.97	15° 31.97 57.22	325°8.62 20.81	78°35.21 30.57	Rigil Kent. 139°38.41 -60°56.99
11	108° 10.36	299°46.30 31.76	30°32.58 57.40	340°10.52 20.67	93°37.66 30.56	Kochab 137°19.58 74°3.01
12	123° 12.82	314°46.37 N05°30.55 329°46.45 29.34	45°33.20 N22°57.58	355°12.41 N19°20.54	108°40.12 N03°30.55	Zuben'ubi 136°54.51 -16°9.19
13 14	138° 15.29 153° 17.75	329°46.45 29.34 344°46.52 28.13	60°33.82 57.75 75°34.44 57.93	10°14.30 20.41 25°16.20 20.28	123°42.57 30.54 138°45.03 30.53	Alphecca 126°2.50 26°37.66
15	168° 20.21	359°46.59 · · 26.92	90°35.06 · · 58.11	40°18.09 · · 20.14	138°45.03 30.53 153°47.48 · · 30.52	Antares 112°14.02 -26°29.51
16	183°22.68	14°46.67 25.71	105°35.68 58.29	55°19.99 20.01	168°49.94 30.52	Atria 107°6.67 -69°4.68
17	198°25.14	29°46.74 24.50	120°36.29 58.46	70°21.88 19.88	183°52.39 30.51	Sabik 102°1.05 -15°45.46
18	213°27.61	44°46.82 N05°23.29	135°36.91 N22°58.64	85°23.78 N19°19.75	198°54.85 N03°30.50	Shaula 96°8.28 -37°7.42
19	228°30.07	59°46.90 22.08	150° 37.53 58.81	100°25.67 19.61	213°57.30 30.49	Rasalhague 95°57.08 12°32.54 Eltanin 90°41.12 51°29.25
20	243°32.54	74°46.97 20.87	165°38.15 58.99	115°27.57 19.48	228°59.76 30.48	Eltanin 90°41.12 51°29.25 Kaus Aust. 83°30.44 -34°22.30
21	258°35.00	89°47.05 · · 19.66	180°38.77 · · 59.16	130°29.46 · · 19.35	244°2.21 · · 30.47	Vega 80°31.95 38°48.60
22	273°37.46	104°47.13 18.45	195°39.39 59.34	145°31.36 19.22	259°4.67 30.46	Nunki 75°45.81 -26°15.76
23	288°39.93	119° 47.21 17.24	210°40.01 59.51	160°33.25 19.08	274°7.13 30.45	Altair 61°58.37 8°56.41
Mer	pass. 03:48	ν0.1' d-1.2' m-4.21	$\nu$ 0.6' d0.2' m1.30	ν1.9' d-0.1' m-1.79	ν2.5' d-0.0' m0.67	Peacock 53°3.11 -56°38.84
	Puss. 05.10					Deneb 49°24.46 45°22.53
_						Enif 33°37.23 9°59.90
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°30.89 -46°49.70
0	303°42.39	134°47.29 N05°16.03	225°40.63 N22°59.69	175°35.14 N19°18.95	289°9.58 N03°30.44	Fomalhaut 15°12.83 -29°28.65
1 2	318° 44.86 333° 47.32	149° 47.37 14.82 164° 47.45 13.61	240°41.25 22°59.86 255°41.86 23°0.03	190°37.04 18.82 205°38.93 18.69	304°12.04 30.43 319°14.50 30.42	Scheat 13°43.69 28°13.62
3	333 47.32 348°49.79	179° 47.53 · · 12.40	270°42.48 · · 0.21	205 38.93 18.69 220°40.83 · · 18.55	334°16.95 · · 30.41	Markab 13°28.37 15°20.95
4	3°52.25	194°47.61 11.19	285°43.10 0.38	235°42.72 18.42	349°19.41 30.40	Jul 24 Fri SHA Mer.pass
5	18° 54.71	209°47.70 9.98	300°43.72 0.55	250°44.62 18.29	4°21.87 30.39	Venus 193°0.03 15:01
6	33°57.18	224°47.78 N05°8.77	315°44.34 N23°0.72	265°46.51 N19°18.16	19°24.32 N03°30.39	Mars 283°26.86 08:59
7	48° 59.64	239°47.86 7.55	330°44.96 0.89	280°48.41 18.02	34°26.78 30.38	Jupiter 232°20.10 12:22
8	64°2.11	254°47.95 6.34	345°45.58 1.06	295°50.30 17.89	49°29.24 30.37	Saturn 345°27.75 04:50
9	79°4.57	269°48.03 · · 5.13	0°46.20 · · 1.23	310°52.20 · · 17.76	64°31.70 · · 30.36	Iul 25 Cot CLIA Ma
10	94°7.03	284°48.12 3.92	15°46.82 1.41	325°54.09 17.62	79°34.16 30.35	Jul 25 Sat         SHA         Mer.pass           Venus         192°2.29         15:01
11	109°9.50	299°48.21 2.71	30°47.44 1.58	340°55.99 17.49	94°36.61 30.34	Mars 282°42.53 08:58
12	124°11.96	314°48.29 N05°1.49	45°48.06 N23°1.74	355°57.88 N19°17.36	109°39.07 N03°30.33	Jupiter 232°6.42 12:19
13	139° 14.43	329°48.38 05°0.28	60°48.68 1.91	10°59.78 17.23	124°41.53 30.32	Saturn 345°27.42 04:47
14	154° 16.89	344°48.47 04°59.07	75°49.30 2.08	26°1.67 17.09	139°43.99 30.30	
15	169° 19.36	359°48.56 · · 57.86	90°49.92 · · 2.25	41°3.57 · · 16.96	154°46.45 · · 30.29	Jul 26 Sun SHA Mer.pass
16	184°21.82	14°48.65 56.64	105°50.54 2.42	56° 5.46 16.83	169°48.91 30.28	Venus 191°4.90 15:01
17 18	199°24.28 214°26.75	29°48.74 55.43 44°48.83 N04°54.22	120°51.16 2.59 135°51.78 N23°2.75	71°7.35 16.69 86°9.25 N19°16.56	184°51.37 30.27 199°53.83 N03°30.26	Mars 281°58.23 08:57
19	214 20.75 229°29.21	59°48.92 53.00	150°52.40 2.92	101°11.14 16.43	214°56.28 30.25	Jupiter 231°52.75 12:16
20	244°31.68	74°49.01 51.79	165° 53.02 2.92	116°13.04 16.29	229°58.74 30.24	Saturn 345°27.19 04:43
21	259°34.14	89°49.10 · · 50.58	180°53.64 · · 3.25	131°14.93 · · 16.16	245°1.20 · · 30.23	Horizontal parallax
22	274°36.60	104°49.19 49.36	195°54.26 3.42	146°16.83 16.03	260°3.66 30.22	Venus: 0.2
23	289°39.07	119°49.29 48.15	210°54.88 3.59	161°18.72 15.89	275°6.12 30.21	Mars: 0.1
1/100	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	
ivier.	pass. US.43	νο.1 u-1.2 III-4.22		ν 1.9 U-U.1 III-1.10	ν 2.3 α-0.0 III0.00	

h	Sun		Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178° 21.84	N19°54.15	65°43.77	11.5'	S25°6.78	6.6'	54.2'
1	193°21.83 208°21.82	53.63	80°14.26 94°44.71	11.4'	25°13.38 25°19.87	6.5'	54.2'
2	208 21.82 223°21.80	53.11 •• 52.58	94 44.71 109°15.11	11.4' 11.3'	25 19.87 25°26.24	6.4' 6.3'	54.2' 54.2'
4	238°21.79	52.06	123°45.46	11.3'	25°32.50	6.1'	54.2'
5	253°21.78	51.53	$138^{\circ}15.76$	11.3'	25°38.63	6.0'	54.1'
6	268°21.77	N19°51.01	152°46.02	11.2'	\$25°44.65	5.9'	54.1'
7 8	283°21.76 298°21.75	50.48 49.96	167°16.23 181°46.39	11.2' 11.1'	25°50.55 25°56.32	5.8' 5.7'	54.1' 54.1'
9	313°21.73	• • 49.43	101 40.39 196°16.51	11.1	25° 50.32 26° 1.98	5.7 5.5'	54.1'
10	328°21.72	48.90	210°46.58	11.0'	26°7.51	5.4'	54.1'
11	343°21.71	48.37	$225^{\circ}16.61$	11.0'	$26^{\circ}12.92$	5.3'	54.1'
12	358°21.70	N19°47.84	239°46.60	10.9'	\$26°18.21	5.2'	54.1'
13 14	13°21.69 28°21.68	47.31 46.78	254°16.54 268°46.44	10.9' 10.9'	26°23.37 26°28.42	5.0' 4.9'	54.1' 54.1'
15	43°21.67	• • 46.25	283°16.30	10.9	26°33.33	4.8'	54.1'
16	58°21.67	45.72	297°46.12	10.8'	$26^{\circ}38.13$	4.7'	54.1'
17	73°21.66	45.19	312°15.90	10.7'	26°42.80	4.5'	54.1'
18	88°21.65 103°21.64	N19°44.66	326°45.64 341°15.34	10.7' 10.7'	\$26°47.34 26°51.75	4.4'	54.1'
19 20	103°21.64 118°21.63	44.13 43.59	341 15.34 355°45.00	10.7	26°51.75 26°56.04	4.3' 4.2'	54.1' 54.0'
21	133°21.62	• • 43.06	10°14.62	10.6'	27°0.21	4.0'	54.0'
22	148°21.62	42.52	24°44.20	10.5'	$27^{\circ}4.24$	3.9'	54.0'
23	163°21.61	41.99	39°13.75	10.5'	27°8.15	3.8'	54.0'
	SD = 15.7′	d = -0.5'		SD	= 14.8'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0 0	178°21.60	Dec N19°41.45	53°43.27	$\nu$ 10.5'	S27°11.93	а 3.6'	<b>пР</b> 54.0'
1	193°21.59	40.92	68°12.74	10.4'	27°15.58	3.5'	54.0'
2	208°21.59	40.38	82°42.19	10.4'	27°19.10	3.4'	54.0'
3	223°21.58	• • 39.84	97°11.60	10.4'	27°22.49	3.3'	54.0'
4 5	238°21.58 253°21.57	39.30 38.77	111°40.98 126°10.33	10.3' 10.3'	27°25.75 27°28.88	3.1' 3.0'	54.0' 54.0'
6	268°21.56	N19°38.23	140°39.65	10.3	\$27°31.88	2.9'	54.0'
7	283°21.56	37.69	155° 8.94	10.3'	27°34.74	2.7'	54.0'
8	298°21.55	37.15	169°38.20	10.2'	27°37.48	2.6'	54.0'
9	313°21.55	• • 36.61	184°7.44	10.2'	27°40.08 27°42.55	2.5'	54.0'
10 11	328°21.55 343°21.54	36.07 35.52	198°36.65 213°5.83	10.2' 10.2'	27 42.55 27°44.89	2.3' 2.2'	54.0' 54.0'
12	358° 21.54	N19°34.98	227°34.99	10.1'	S27°47.10	2.1'	54.0'
13	13°21.53	34.44	242°4.12	10.1'	27°49.17	1.9'	54.0'
14 15	28°21.53 43°21.53	33.89 · · 33.35	256°33.23 271°2.32	10.1' 10.1'	27°51.11 27°52.92	1.8' 1.7'	54.0' 54.0'
16	58° 21.52	32.81	285°31.40	10.1	27°54.59	1.5'	54.0'
17	73°21.52	32.26	300°0.45	10.0'	27°56.13	1.4'	54.0'
18	88°21.52	N19°31.71	314°29.48	10.0'	S27°57.53	1.3'	54.0'
19	103°21.52 118°21.52	31.17	328°58.50 343°27.50	10.0'	27°58.80 27°59.93	1.1'	54.0' 54.0'
20 21	118 21.52 133°21.51	30.62 •• 30.07	343 27.50 357°56.48	10.0' 10.0'	27 59.93 28°0.93	1.0' 0.9'	54.0'
22	148°21.51	29.53	12°25.46	10.0'	28° 1.79	0.7'	54.0'
23	163°21.51	28.98	26°54.42	9.9'	$28^{\circ}2.52$	0.6'	54.0'
	SD = 15.7'	d = -0.5'		SD	= 14.7'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	$178^{\circ}21.51$	N19°28.43	41°23.37	9.9'	S28°3.11	0.5'	54.0'
1	193°21.51	27.88	55°52.30	9.9'	28° 3.57	0.3'	54.0'
2	208°21.51 223°21.51	27.33 •• 26.78	70°21.23 84°50.15	9.9'	28°3.89 28°4.07	0.2' 0.0'	54.0'
3 4	223°21.51 238°21.51	26.23	84°50.15 99°19.07	9.9' 9.9'	28° 4.07 28° 4.12	-0.1	54.0' 54.0'
5	253°21.51	25.67	113°47.98	9.9'	28° 4.03	-0.2	54.0'
6	268°21.51	N19°25.12	128°16.88	9.9'	\$28°3.81	-0.4'	54.0'
7	283°21.51	24.57	142°45.78	9.9'	28° 3.45	-0.5'	54.0'
8 9	298°21.52 313°21.52	24.01 •• 23.46	157°14.68 171°43.58	9.9' 9.9'	28°2.95 28°2.32	-0.6' -0.8'	54.0' 54.0'
10	328°21.52	22.91	186°12.48	9.9'	28° 1.55	-0.9	54.0'
11	343°21.52	22.35	200°41.38	9.9'	28°0.64	-1.0'	54.0'
12	358°21.52	N19°21.79	215°10.28	9.9'	\$27°59.60	-1.2'	54.0'
13 14	13°21.53 28°21.53	21.24 20.68	229°39.19 244°8.10	9.9' 9.9'	27°58.42 27°57.11	-1.3' -1.5'	54.0' 54.0'
15	43°21.53	. 20.06	258°37.02	9.9 9.9'	27°55.66	-1.5 -1.6'	54.1'
16	58°21.54	19.57	273° 5.94	9.9'	27°54.07	-1.7'	54.1'
17	73°21.54	19.01	287°34.88	9.9'	27°52.35	-1.9'	54.1'
18	88°21.54 103°21.55	N19°18.45	302°3.82 316°32.77	10.0'	\$27°50.49 27°48.50	-2.0'	54.1'
19 20	103°21.55 118°21.55	17.89 17.33	316°32.77 331°1.74	10.0' 10.0'	27°48.50 27°46.37	-2.1' -2.3'	54.1' 54.1'
21	133°21.56	16.77	345°30.72	10.0'	27°44.11	-2.4	54.1'
22	148°21.56	16.21	359°59.71	10.0'	27°41.71	-2.5'	54.1'
23	163°21.57	15.64	14°28.72	10.0'	27°39.17	-2.7'	54.1'
	SD = 15.7'	d = -0.5'		SD	= 14.7'		

Lat.		light	Sunrise	Sunset		light
	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
<b>S</b> 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
<b>S</b> 50°	06:25	07:05	07:41	16:32	17:09	17:48
52°	06:29	07:03	07:41	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
<b>S</b> 60°	06:47	07:40	08:30	15:44	16:34	17:27
		Moonris	e		Moonset	
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
<b>N</b> 72°						
<b>N</b> 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
<b>N</b> 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	23.30		00.22

Lat.		Moonris	e	Moonset		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°						
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	10:06	10:26	11:11	05:32	06:57	07:58

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	10-12	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	74-88%	
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		

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	304°41.53	134°49.38 N04°46.93	225°55.50 N23°3.75	176°20.62 N19°15.76	290°8.58 N03°30.20	
1	$319^{\circ}44.00$	149°49.47 45.72	240°56.12 3.92	191°22.51 15.63	305°11.04 30.19	Alpheratz 357°33.23 29°14.22 Ankaa 353°5.67 -42°9.37
2	334°46.46	164°49.57 44.51	255°56.74 4.08	206°24.41 15.49	320°13.51 30.18	Ankaa 353°5.67 -42°9.37   Schedar 349°29.32 56°40.83
3	349° 48.93	179°49.67 · · 43.29	270°57.36 · · 4.24	221°26.30 · · 15.36	335°15.97 · · 30.17	Diphda 348°45.86 -17°50.22
4	4°51.39	194°49.76 42.08	285°57.98 4.41	236°28.20 15.23	350°18.43 30.15	Achernar 335°19.13 -57°5.73
5 6	19°53.85 34°56.32	209°49.86 40.86 224°49.96 N04°39.65	300° 58.60 4.57 315° 59.22 N23° 4.73	251°30.09 15.09 266°31.99 N19°14.96	5°20.89 30.14 20°23.35 N03°30.13	Hamal 327°49.72 23°35.27
7	49° 58.78	239°50.05 38.43	330°59.84 4.90	281°33.88 14.83	35°25.81 30.12	Polaris 313°28.36 89°22.24
8	65°1.25	254°50.15 37.22	346°0.47 5.06	296°35.78 14.69	50°28.27 30.11	Acamar 315°10.87 -40°11.56
9	80°3.71	269°50.25 · · 36.00	1°1.09 · · 5.22	311°37.67 · · 14.56	65°30.73 · · 30.10	Menkar 314°4.86 4°11.73 Mirfak 308°26.54 49°57.16
10	$95^{\circ}6.18$	284°50.35 34.79	16°1.71 5.38	326°39.57 14.43	80°33.20 30.09	Mirfak 308°26.54 49°57.16 Aldebaran 290°38.33 16°33.77
11	110°8.64	299°50.45 33.57	31°2.33 5.54	341°41.46 14.29	95°35.66 30.07	Rigel 281°2.86 -8°10.13
12	125°11.10	314°50.55 N04°32.36	46°2.95 N23°5.71	356°43.36 N19°14.16	110°38.12 N03°30.06	Capella 280°20.31 46°1.35
13 14	140° 13.57 155° 16.03	329°50.65 31.14 344°50.76 29.92	61°3.57 5.87 76°4.19 6.03	11°45.25 14.02 26°47.15 13.89	125°40.58 30.05 140°43.05 30.04	Bellatrix 278°21.73 6°22.48
15	170° 18.50	359°50.86 · · 28.71	91°4.81 · · 6.19	41°49.04 · · 13.76	155°45.51 · · 30.03	Elnath 278° 0.51 28° 37.74
16	185°20.96	14°50.96 27.49	106°5.44 6.35	56°50.94 13.62	170°47.97 30.01	Alnilam 275°36.67 -1°11.01
17	200°23.42	29°51.07 26.28	121°6.06 6.50	71°52.83 13.49	185°50.43 30.00	Betelgeuse 270°50.95 7°24.77 Canopus 263°52.30 -52°42.38
18	215°25.89	44°51.17 N04°25.06	136°6.68 N23°6.66	86°54.73 N19°13.36	200°52.90 N03°29.99	Canopus 263°52.30 -52°42.38   Sirius 258°25.41 -16°45.04
19	230°28.35	59°51.28 23.84	151°7.30 6.82	101°56.62 13.22	215°55.36 29.98	Adhara 255°5.20 -29°0.36
20	245°30.82	74°51.38 22.63	166°7.92 6.98	116°58.52 13.09	230°57.82 29.97	Procyon 244°49.80 5°9.46
21 22	260° 33.28 275° 35.75	89°51.49 · · 21.41 104°51.59 20.20	181°8.54 · · 7.14 196°9.16 7.29	132°0.41 ·· 12.95 147°2.31 12.82	246°0.29 · · 29.95 261°2.75 29.94	Pollux 243°16.09 27°57.73
23	290°38.21	119°51.70 18.98	211°9.79 7.45	162°4.20 12.69	276°5.22 29.93	Avior 234°14.86 -59°35.64
						Suhail 222°45.80 -43°32.41
Mer.p	pass. 03:41	ν0.1′ d-1.2′ m-4.23	$\nu$ 0.6' d0.2' m1.30	ν1.9' d-0.1' m-1.78	ν2.5' d-0.0' m0.66	Miaplacidus 221°38.94 -69°49.63 Alphard 217°46.80 -8°46.41
						Alphard 217°46.80 -8°46.41 Regulus 207°33.36 11°50.29
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.94 61°36.63
0	305° 40.67	134°51.81 N04°17.76	226°10.41 N23°7.61	177°6.10 N19°12.55	291°7.68 N03°29.92	Denebola 182°23.82 14°25.49
1	320° 43.14	149°51.92 16.54	241°11.03 7.76	192°7.99 12.42	306°10.15 29.90	Gienah 175°42.41 -17°41.44
2	335° 45.60 350° 48.07	164°52.03 15.33 179°52.14 · · 14.11	256°11.65 7.92 271°12.27 • 8.08	207° 9.89 12.29 222° 11.78 · · 12.15	321°12.61 29.89 336°15.07 •• 29.88	Acrux 172°58.96 -63°15.07
4	5°50.53	194°52.25 12.89	286°12.90 8.23	237°13.68 12.02	351°17.54 29.86	Gacrux 171°50.45 -57°15.99
5	20°52.99	209°52.36 11.68	301°13.52 8.39	252°15.57 11.88	6°20.00 29.85	Alioth 166°12.03 55°49.17 Spica 158°21.00 -11°18.04
6	35°55.46	224°52.47 N04°10.46	316°14.14 N23°8.54	267°17.47 N19°11.75	21°22.47 N03°29.84	Spica 158°21.00 -11°18.04   Alkaid 152°51.03 49°11.07
7	50° 57.92	239°52.58 9.24	331°14.76 8.69	282°19.36 11.62	36°24.93 29.83	Hadar 148°34.16 -60°30.35
8	66°0.39	254°52.70 8.02	346°15.39 8.85	297°21.26 11.48	51°27.40 29.81	Menkent 147°56.08 -36°30.22
9	81°2.85	269°52.81 · · 6.80	1°16.01 · · 9.00	312°23.15 · · 11.35	66°29.87 · · 29.80	Arcturus 145°46.72 19°2.76
10 11	96°5.32 111°7.78	284°52.92 5.59 299°53.04 4.37	16° 16.63 9.15 31° 17.25 9.31	327°25.05 11.21 342°26.95 11.08	81°32.33 29.79 96°34.80 29.77	Rigil Kent. 139°38.43 -60°56.99
12	126° 10.24	314°53.15 N04°3.15	46°17.88 N23°9.46	357°28.84 N19°10.95	111°37.26 N03°29.76	Kochab 137°19.64 74°3.01
13	141°12.71	329°53.27 1.93	61°18.50 9.61	12°30.74 10.81	126°39.73 29.75	Zuben'ubi 136°54.51 -16°9.19 Alphecca 126°2.51 26°37.67
14	$156^{\circ}15.17$	344°53.38 04°0.71	76°19.12 9.76	27°32.63 10.68	141°42.20 29.73	Antares 112°14.03 -26°29.51
15	171° 17.64	359°53.50 03°59.50	91° 19.74 · · 9.91	42°34.53 · · 10.54	156°44.66 · · 29.72	Atria 107°6.68 -69°4.69
16	186°20.10	14°53.62 58.28	106°20.37 10.06	57°36.42 10.41	171°47.13 29.71	Sabik 102°1.05 -15°45.46
17 18	201°22.56 216°25.03	29°53.74 57.06 44°53.85 N03°55.84	121°20.99 10.22 136°21.61 N23°10.37	72°38.32 10.27 87°40.21 N19°10.14	186°49.60 29.69 201°52.06 N03°29.68	Shaula 96°8.28 -37°7.43
19	231°27.49	59°53.97 54.62	150°21.01° N25°10.57° 151°22.24° 10.52°	102°42.11 10.01	216°54.53 29.66	Rasalhague 95°57.08 12°32.54
20	246°29.96	74°54.09 53.40	166° 22.86 10.66	117°44.00 9.87	231°57.00 29.65	Eltanin 90°41.13 51°29.27
21	261°32.42	89°54.21 · · 52.18	181°23.48 · · 10.81	132°45.90 · · 9.74	246°59.47 · · 29.64	Kaus Aust. 83°30.43 -34°22.30 Vega 80°31.95 38°48.62
22	276°34.89	104°54.33 50.96	196°24.11 10.96	147°47.79 9.60	262°1.94 29.62	Nunki 75°45.80 -26°15.76
23	291°37.35	119°54.46 49.75	211°24.73 11.11	162°49.69 9.47	277°4.40 29.61	Altair 61°58.36 8°56.42
Mer.p	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	$\nu 2.5' \ d$ -0.0' m0.65	Peacock 53°3.09 -56°38.85
						Deneb 49°24.45 45°22.55
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°37.21 9°59.91
0	306°39.81	134°54.58 N03°48.53	226°25.35 N23°11.26	177°51.58 N19°9.34	292°6.87 N03°29.59	Al Na'ir 27°30.87 -46°49.70 Fomalhaut 15°12.80 -29°28.65
1	321°42.28	149°54.70 47.31	241°25.98 11.41	192°53.48 9.20	307°9.34 29.58	Scheat 13°43.67 28°13.64
2	336° 44.74	164°54.82 46.09	256°26.60 11.55	207°55.38 9.07	322°11.81 29.57	Markab 13°28.35 15°20.97
3	351°47.21	179°54.95 · · 44.87	271°27.22 · · 11.70	222°57.27 · · 8.93	337°14.28 · · 29.55	
4 5	6° 49.67 21° 52.13	194°55.07 43.65 209°55.20 42.43	286°27.85 11.85 301°28.47 11.99	237°59.17 8.80 253°1.06 8.67	352°16.75 29.54 7°19.21 29.52	Jul 27 Mon         SHA         Mer.pass           Venus         190°7.85         15:01
6	21 52.13 36°54.60	209 55.20 42.43 224°55.32 N03°41.21	316°29.09 N23°12.14	268°2.96 N19°8.53	22°21.68 N03°29.51	Mars 281°13.97 08:56
7	51°57.06	239°55.45 39.99	331°29.72 12.28	283°4.86 8.40	37°24.15 29.49	Jupiter 231°39.09 12:13
8	66° 59.53	254°55.57 38.77	346°30.34 12.43	298° 6.75 8.26	52°26.62 29.48	Saturn 345°27.05 04:39
9	82°1.99	269°55.70 · · 37.55	1°30.97 · · 12.57	313°8.65 · · 8.13	67°29.09 · · 29.46	Jul 28 Tue SHA Mer.pass
10	97°4.46	284°55.83 36.33	16°31.59 12.72	328°10.54 7.99	82°31.56 29.45	Venus 189°11.14 15:00
11	112°6.92	299°55.96 35.11	31°32.21 12.86	343°12.44 7.86	97°34.03 29.43	Mars 280°29.73 08:55
12 13	127°9.38 142°11.85	314°56.09 N03°33.89 329°56.22 32.67	46°32.84 N23°13.01 61°33.46 13.15	358°14.34 N19°7.73 13°16.23 7.59	112°36.50 N03°29.42 127°38.97 29.40	Jupiter 231°25.42 12:10
14	157° 14.31	344°56.35 31.45	76°34.09 13.29	28°18.13 7.46	142°41.44 29.39	Saturn 345°27.01 04:35
15	172° 16.78	359°56.48 · · 30.23	91°34.71 · · 13.44	43°20.03 · · 7.32	157°43.91 · · 29.37	Jul 29 Wed SHA Mer.pass
16	$187^{\circ}19.24$	14°56.61 29.01	106°35.34 13.58	58°21.93 7.19	172°46.38 29.36	Venus 188°14.76 15:00
17	202°21.70	29°56.74 27.78	121°35.96 13.72	73°23.82 7.05	187°48.86 29.34	Mars 279°45.54 08:54
18	217°24.17	44°56.87 N03°26.56	136°36.59 N23°13.86	88°25.72 N19°6.91	202°51.33 N03°29.33	Jupiter 231°11.77 12:07
19 20	232°26.63 247°29.10	59°57.01 25.34 74°57.14 24.12	151°37.21 14.00 166°37.84 14.14	103°27.61 6.78 118°29.51 6.64	217°53.80 29.31 232°56.27 29.30	Saturn 345°27.06 04:31
20	247 29.10 262°31.56	89° 57.27 · · · 22.90	181°38.46 · · 14.28	133°31.41 · · 6.51	247°58.74 · · 29.28	Horizontal parallax
22	277°34.02	104°57.41 21.68	196°39.09 14.42	148°33.30 6.37	263°1.21 29.26	Venus: 0.2
23	292°36.49	119°57.54 20.46	211°39.71 14.56	163°35.20 6.24	278°3.68 29.25	Mars: 0.1
Merr	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	

h	Su	n			Moon		
Mon 0	<b>GHA</b> 178°21.57	<b>Dec</b> N19° 15.08	<b>GHA</b> 28° 57.74	u 10.0'	Dec \$27° 36.50	d -2.8'	<b>HP</b> 54.1'
1	178 21.57 193°21.58	14.52	28 57.74 43°26.79	10.0	27°33.70	-2.8 -2.9'	54.1'
2	208°21.59	13.95	57° 55.85	10.1	27°30.76	-3.1'	54.1'
3	223°21.59	• • 13.39	72°24.93	10.1'	27° 27.69	-3.2	54.1'
4	238°21.60	12.83	86°54.03	10.1'	27°24.49	-3.3'	54.1'
5	253°21.61	12.26	101°23.15	10.1'	$27^{\circ}21.15$	-3.5'	54.1'
6	268°21.61	N19°11.69	115°52.30	10.2'	\$27°17.67	-3.6'	54.1'
7	283°21.62	11.13	130°21.47	10.2'	27°14.07	-3.7'	54.2'
8	298°21.63 313°21.64	10.56	144°50.67 159°19.89	10.2'	27° 10.33 27° 6.46	-3.9'	54.2'
9 10	313 21.64 328°21.64	· · 9.99 9.43	159 19.89 173°49.14	10.2' 10.3'	27 0.46 27°2.46	-4.0' -4.1'	54.2' 54.2'
11	343°21.65	8.86	188° 18.41	10.3'	26°58.33	-4.3'	54.2'
12	358°21.66	N19°8.29	202°47.72	10.3'	\$26°54.06	-4.4'	54.2'
13	13°21.67	7.72	217° 17.06	10.4'	$26^{\circ}49.67$	-4.5'	54.2'
14	$28^{\circ}21.68$	7.15	231°46.42	10.4'	26°45.14	-4.7'	54.2'
15	43°21.69	• • 6.58	246° 15.82	10.4'	26°40.49	-4.8'	54.2'
16	58°21.70	6.01	260° 45.25	10.5'	26°35.70	-4.9'	54.2'
17 18	73°21.71 88°21.72	5.44 N19°4.86	275° 14.72 289° 44.22	10.5' 10.5'	26°30.79 \$26°25.74	-5.0' -5.2'	54.2' 54.2'
19	103°21.73	4.29	304° 13.76	10.5	26° 20.57	-5.2 -5.3	54.3'
20	118°21.74	3.72	318° 43.33	10.6'	26° 15.28	-5.4'	54.3'
21	133°21.75	3.14	333° 12.94	10.6'	26°9.85	-5.6'	54.3'
22	148°21.76	2.57	347° 42.58	10.7'	26°4.30	-5.7'	54.3'
23	163°21.78	1.99	2°12.27	10.7'	$25^{\circ}58.62$	-5.8'	54.3'
	SD = 15.7'	d = -0.6'		SI	D = 14.8'		
Tue	GHA	Dec	GHA	ν	Dec	d - 0'	HP
0 1	178°21.79 193°21.80	N19°1.42 0.84	16° 41.99 31° 11.76	10.8' 10.8'	\$25°52.82 25°46.89	-5.9' -6.1'	54.3' 54.3'
2	193°21.80 208°21.81	0.84 19°0.26	45°41.56	10.8	25°40.89 25°40.84	-6.1' -6.2'	54.3'
3	223°21.82	18° 59.69	60°11.41	10.0	25°34.66	-6.3'	54.3'
4	238°21.84	59.11	74°41.30	10.9'	25°28.36	-6.4'	54.3'
5	253°21.85	58.53	89° 11.23	11.0'	25°21.94	-6.5'	54.4'
6	268°21.86	N18° 57.95	103°41.21	11.0'	\$25°15.39	-6.7'	54.4'
7	283°21.88	57.37	118° 11.23	11.1'	25°8.73	-6.8'	54.4'
8	298°21.89	56.79	132°41.29	11.1'	25°1.94	-6.9'	54.4'
9 10	313°21.91 328°21.92	· · 56.21 55.63	147°11.40 161°41.56	11.2' 11.2'	24°55.03 24°48.00	-7.0' -7.1'	54.4' 54.4'
11	343°21.94	55.05 55.05	176° 11.76	11.2'	24°40.86	-7.1 -7.3'	54.4'
12	358°21.95	N18° 54.47	190° 42.01	11.3'	\$24°33.59	-7.4	54.4'
13	13°21.97	53.89	205° 12.31	11.3'	24°26.21	-7.5	54.5'
14	28°21.98	53.30	219°42.65	11.4'	$24^{\circ}18.71$	-7.6'	54.5'
15	43°22.00	• • 52.72	234° 13.05	11.4'	$24^{\circ}11.10$	-7.7'	54.5'
16	58°22.01	52.13	248°43.49	11.5'	24°3.37	-7.8'	54.5'
17	73°22.03 88°22.05	51.55 N18° 50.96	263°13.98 277°44.52	11.5' 11.6'	23°55.52 \$23°47.56	-8.0' -8.1'	54.5'
18 19	103°22.06	50.96 50.38	211 44.52 292°15.11		23°39.49	-8.1 -8.2'	54.5' 54.5'
20	118°22.08	49.79	306° 45.75	11.7'	23°31.30	-8.3	54.5'
21	133°22.10	• • 49.21	321° 16.44	11.7'	23°23.01	-8.4	54.6'
22	148°22.12	48.62	335°47.18	11.8'	23°14.60	-8.5'	54.6'
23	163°22.14	48.03	$350^{\circ}17.97$	11.8'	$23^{\circ}6.08$	-8.6'	54.6'
	SD = 15.7'	d = -0.6'		SI	O = 14.8'		
Wed	GHA	<b>Dec</b> N18° 47.44	GHA 40 40 00	ν	Dec	d	HP
0 1	178°22.15 193°22.17	N18°47.44 46.85	4° 48.82 19° 19.71	11.9' 11.9'	\$22°57.45 22°48.71	-8.7' -8.8'	54.6' 54.6'
2	208°22.19	46.26	33°50.66	12.0'	22° 39.86	-o.o -9.0'	54.6'
3	223°22.21	• • 45.67	48°21.66	12.0'	22°30.91	-9.1'	54.6'
4	238°22.23	45.08	$62^{\circ}52.71$	12.1'	$22^{\circ}21.85$	-9.2'	54.6'
5	253°22.25	44.49	77°23.81	12.2'	22°12.68	-9.3'	54.7'
6	268°22.27	N18°43.90	91°54.96	12.2'	\$22°3.41	-9.4'	54.7'
7	283°22.29 298°22.31	43.31	106°26.17 120°57.43	12.3' 12.3'	21°54.04 21°44.56	-9.5'	54.7'
8 9	298°22.31 313°22.33	42.71 •• 42.12	120°57.43 135°28.74	12.3'	21°44.56 21°34.98	-9.6' -9.7'	54.7' 54.7'
10	313 22.33 328°22.35	41.53	150°0.10	12.4'	21 34.96 21°25.30	-9.7 -9.8'	54.7'
11	343°22.37	40.93	164°31.52	12.5'	21° 15.51	-9.9'	54.7'
	343 22.31				S21°5.63	-10.0'	54.8'
12	358°22.39	N18°40.34	179°2.98	12.5'		10.0	- 4 01
12 13	358°22.39 13°22.42	39.74	193°34.50	12.6'	$20^{\circ}55.64$	-10.1'	54.8'
12 13 14	358°22.39 13°22.42 28°22.44	39.74 39.15	193°34.50 208°6.07	12.6' 12.6'	20°55.64 20°45.56	-10.1' -10.2'	54.8'
12 13 14 15	358°22.39 13°22.42 28°22.44 43°22.46	39.74 39.15 · · 38.55	193° 34.50 208° 6.07 222° 37.70	12.6' 12.6' 12.7'	20°55.64 20°45.56 20°35.38	-10.1' -10.2' -10.3'	54.8' 54.8'
12 13 14 15 16	358°22.39 13°22.42 28°22.44 43°22.46 58°22.48	39.74 39.15 · · 38.55 37.95	193°34.50 208°6.07 222°37.70 237°9.37	12.6' 12.6' 12.7' 12.7'	20°55.64 20°45.56 20°35.38 20°25.11	-10.1' -10.2' -10.3' -10.4'	54.8' 54.8' 54.8'
12 13 14 15 16 17	358°22.39 13°22.42 28°22.44 43°22.46 58°22.48 73°22.51	39.74 39.15 •• 38.55 37.95 37.36	193°34.50 208°6.07 222°37.70 237°9.37 251°41.10	12.6' 12.6' 12.7' 12.7' 12.8'	20°55.64 20°45.56 20°35.38 20°25.11 20°14.73	-10.1' -10.2' -10.3' -10.4' -10.5'	54.8' 54.8' 54.8' 54.8'
12 13 14 15 16	358°22.39 13°22.42 28°22.44 43°22.46 58°22.48	39.74 39.15 · · 38.55 37.95	193°34.50 208°6.07 222°37.70 237°9.37	12.6' 12.6' 12.7' 12.7'	20°55.64 20°45.56 20°35.38 20°25.11	-10.1' -10.2' -10.3' -10.4'	54.8' 54.8' 54.8'
12 13 14 15 16 17	358° 22.39 13° 22.42 28° 22.44 43° 22.46 58° 22.48 73° 22.51 88° 22.53	39.74 39.15 · · 38.55 37.95 37.36 N18°36.76	193° 34.50 208° 6.07 222° 37.70 237° 9.37 251° 41.10 266° 12.88	12.6' 12.6' 12.7' 12.7' 12.8' 12.8'	20°55.64 20°45.56 20°35.38 20°25.11 20°14.73 \$20°4.27	-10.1' -10.2' -10.3' -10.4' -10.5'	54.8' 54.8' 54.8' 54.8' 54.9'
12 13 14 15 16 17 18 19 20 21	358° 22.39 13° 22.42 28° 22.44 43° 22.46 58° 22.48 73° 22.51 88° 22.53 103° 22.55 118° 22.58 133° 22.60	39.74 39.15 · · 38.55 37.95 37.36 N18° 36.76 36.16 35.56 · · 34.96	193° 34.50 208° 6.07 222° 37.70 237° 9.37 251° 41.10 266° 12.88 280° 44.71 295° 16.59 309° 48.52	12.6' 12.6' 12.7' 12.7' 12.8' 12.8' 12.9' 12.9' 13.0'	20° 55.64 20° 45.56 20° 35.38 20° 25.11 20° 14.73 \$20° 4.27 19° 53.71 19° 43.05 19° 32.30	-10.1' -10.2' -10.3' -10.4' -10.5' -10.6' -10.7'	54.8' 54.8' 54.8' 54.8' 54.9' 54.9' 54.9' 54.9'
12 13 14 15 16 17 18 19 20 21 22	358° 22.39 13° 22.42 28° 22.44 43° 22.46 58° 22.48 73° 22.51 88° 22.53 103° 22.55 118° 22.58 133° 22.60 148° 22.62	39.74 39.15 38.55 37.95 37.36 N18° 36.76 36.16 35.56 34.96	193° 34.50 208° 6.07 222° 37.70 237° 9.37 251° 41.10 266° 12.88 280° 44.71 295° 16.59 309° 48.52 324° 20.51	12.6' 12.6' 12.7' 12.7' 12.8' 12.8' 12.9' 12.9' 13.0' 13.0'	20° 55.64 20° 45.56 20° 35.38 20° 25.11 20° 14.73 \$20° 4.27 19° 53.71 19° 43.05 19° 32.30 19° 21.46	-10.1' -10.2' -10.3' -10.4' -10.5' -10.6' -10.7' -10.7' -10.8' -10.9'	54.8' 54.8' 54.8' 54.9' 54.9' 54.9' 54.9' 54.9'
12 13 14 15 16 17 18 19 20 21	358° 22.39 13° 22.42 28° 22.44 43° 22.46 58° 22.48 73° 22.51 88° 22.53 103° 22.55 118° 22.58 133° 22.60	39.74 39.15 · · 38.55 37.95 37.36 N18° 36.76 36.16 35.56 · · 34.96	193° 34.50 208° 6.07 222° 37.70 237° 9.37 251° 41.10 266° 12.88 280° 44.71 295° 16.59 309° 48.52	12.6' 12.6' 12.7' 12.7' 12.8' 12.8' 12.9' 12.9' 13.0'	20° 55.64 20° 45.56 20° 35.38 20° 25.11 20° 14.73 \$20° 4.27 19° 53.71 19° 43.05 19° 32.30	-10.1' -10.2' -10.3' -10.4' -10.5' -10.6' -10.7' -10.7' -10.8'	54.8' 54.8' 54.8' 54.8' 54.9' 54.9' 54.9' 54.9'
12 13 14 15 16 17 18 19 20 21 22	358° 22.39 13° 22.42 28° 22.44 43° 22.46 58° 22.48 73° 22.51 88° 22.53 103° 22.55 118° 22.58 133° 22.60 148° 22.62	39.74 39.15 38.55 37.95 37.36 N18° 36.76 36.16 35.56 34.96	193° 34.50 208° 6.07 222° 37.70 237° 9.37 251° 41.10 266° 12.88 280° 44.71 295° 16.59 309° 48.52 324° 20.51	12.6' 12.6' 12.7' 12.7' 12.8' 12.8' 12.9' 13.0' 13.0' 13.1'	20° 55.64 20° 45.56 20° 35.38 20° 25.11 20° 14.73 \$20° 4.27 19° 53.71 19° 43.05 19° 32.30 19° 21.46	-10.1' -10.2' -10.3' -10.4' -10.5' -10.6' -10.7' -10.7' -10.8' -10.9'	54.8' 54.8' 54.8' 54.9' 54.9' 54.9' 54.9' 54.9'

Lat.	Twi	light	Sunrise	Sunset	Tw	ilight
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:42	07:34	08:24	15:50	16:39	17:32

Lat.		Moonris	e		Moonset	t
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	12:26	13:56	15:30	08:30	08:44	08:50

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Mer.Pass.		
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	13-15	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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		

Thu 0 1 2 3 4 5 6 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 20 21 22 23	GHA  307°38.95 322°41.42 337°43.88 352°46.35 7°48.81 22°51.27 37°53.74 52°56.20 67°58.67 83°1.13 98°3.59 113°6.06 128°8.52 143°10.99 158°13.45 173°15.91 188°18.38 203°20.84 218°23.31 233°25.77 248°28.24 263°30.70 278°33.16 293°35.63	GHA  134°57.68  149°57.82  164°57.95  179°58.09  194°58.23  209°58.37  224°58.51  239°58.65  254°58.79  269°59.91  314°59.36  329°59.50  344°59.64  359°59.79  14°59.93  30°0.08  45°0.23  60°0.37  75°0.52  90°0.67  105°0.82	Dec N03° 19.24 18.02 16.79 15.57 14.35 13.13 N03° 11.91 10.69 9.47 10.8 24 7.02 5.80 N03° 4.58 3.36 2.13 03° 0.91 02° 59.69 58.47 N02° 57.24 56.02 54.80	GHA  226° 40.34  241° 40.96  256° 41.59  271° 42.21  286° 42.84  301° 43.46  316° 44.09  331° 44.71  346° 45.34  1° 45.96  16° 46.59  31° 47.22  46° 47.84  61° 48.47  76° 49.09  91° 49.72  106° 50.35  121° 50.97  136° 51.60° 51.50° 52.23	Dec N23°14.70 14.84 14.98 · 15.12 15.26 15.39 N23°15.53 15.67 15.80 · 15.94 16.08 16.21 N23°16.35 16.48 16.62 · 16.75 16.88 17.02	GHA  178° 37.10  193° 38.99  208° 40.89  223° 42.79  238° 44.68  253° 46.58  268° 48.47  283° 50.37  298° 52.27  313° 54.16  328° 56.06  343° 57.95  358° 59.85  14° 1.75  29° 3.64  44° 5.54  59° 7.44	Dec N19° 6.10 5.97 5.83 ⋅ ⋅ 5.69 5.56 5.42 N19° 5.29 5.15 5.02 ⋅ ⋅ 4.88 4.74 4.61 N19° 4.47 4.34 4.20	GHA 293°6.16 308°8.63 323°11.10 338°13.57 353°16.05 8°18.52 22°20.99 38°23.47 53°25.94 68°28.41 83°30.89 98°33.36 113°35.84 128°38.31 143°40.78	Dec N03°29.23 29.22 29.20 ·· 29.19 29.17 29.15 N03°29.14 29.12 29.10 ·· 29.09 29.07 29.06 N03°29.04 29.02	Alpheratz Ankaa Schedar Diphda Achernar Hamal Polaris Acamar Menkar Mirfak Aldebaran Rigel Capella	SHA  357° 33.21  353° 5.64  349° 29.28  348° 45.84  335° 19.09  327° 49.69  313° 26.85  314° 4.83  308° 26.51  290° 38.30  281° 2.84  280° 20.28  278° 21.71	Dec 29°14.23 -42°9.37 56°40.84 -17°50.21 -57°5.72 23°35.28 89°22.24 -40°11.55 4°11.74 49°57.16 16°33.78 -8°10.12 46°1.35 6°22.49
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	322° 41.42 337° 43.88 352° 46.35 7° 48.81 22° 51.27 37° 53.74 52° 56.20 67° 58.67 83° 1.13 98° 3.59 113° 6.06 128° 8.52 143° 10.99 158° 13.45 173° 15.91 188° 18.38 203° 20.84 218° 23.31 233° 25.77 248° 28.24 263° 30.70 278° 33.16 293° 35.63	149° 57.82 164° 57.95 179° 58.09 194° 58.23 209° 58.37 224° 58.51 239° 58.65 254° 58.79 269° 58.93 284° 59.07 299° 59.21 314° 59.36 329° 59.50 344° 59.64 359° 59.79 14° 59.93 30° 0.08 45° 0.23 60° 0.37 75° 0.52 90° 0.67 105° 0.82	18.02 16.79 15.57 14.35 13.13 N03° 11.91 10.69 9.47 10.69 9.47 10.69 9.47 10.69 9.47 10.69 9.47 10.69 9.47 10.69 9.47 10.69 5.80 10.69	241° 40.96 256° 41.59 271° 42.21 286° 42.84 301° 43.46 316° 44.09 331° 44.71 346° 45.34 1° 45.96 16° 46.59 31° 47.22 46° 47.84 61° 48.47 76° 49.09 91° 49.72 106° 50.35 121° 50.97 136° 51.60	14.84 14.98 15.12 15.26 15.39 N23° 15.53 15.67 15.80 15.94 16.08 16.21 N23° 16.35 16.48 16.62 16.75 16.88 17.02	193° 38.99 208° 40.89 223° 42.79 238° 44.68 253° 46.58 268° 48.47 283° 50.37 298° 52.27 313° 54.16 328° 56.06 343° 57.95 358° 59.85 14° 1.75 29° 3.64 44° 5.54	5.97 5.83 · · 5.69 5.56 5.42 N19°5.29 5.15 5.02 · · 4.88 4.74 4.61 N19°4.47 4.34 4.20	308° 8.63 323° 11.10 338° 13.57 353° 16.05 8° 18.52 23° 20.99 38° 23.47 53° 25.94 68° 28.41 83° 30.89 98° 33.36 113° 35.84 128° 38.31	29.22 29.20 · · 29.19 29.17 29.15 N03°29.14 29.12 29.10 · · 29.09 29.07 29.06 N03°29.04	Ankaa Schedar Diphda Achernar Hamal Polaris Acamar Menkar Mirfak Aldebaran Rigel Capella	353°5.64 349°29.28 348°45.84 335°19.09 327°49.69 313°26.85 315°10.85 314°4.83 308°26.51 290°38.30 281°2.84 280°20.28	-42°9.37 56°40.84 -17°50.21 -57°5.72 23°35.28 89°22.24 -40°11.55 4°11.74 49°57.16 16°33.78 -8°10.12 46°1.35
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	337° 43.88 352° 46.35 7° 48.81 22° 51.27 37° 53.74 52° 56.20 67° 58.67 83° 1.13 98° 3.59 113° 6.06 128° 8.52 143° 10.99 158° 13.45 173° 15.91 188° 18.38 203° 20.84 218° 23.31 233° 25.77 248° 28.24 263° 30.70 278° 33.16 293° 35.63	164° 57.95 179° 58.09 194° 58.23 209° 58.37 224° 58.51 239° 58.65 254° 58.79 269° 58.93 284° 59.07 299° 59.21 314° 59.36 329° 59.50 344° 59.64 359° 59.79 14° 59.93 30° 0.08 45° 0.23 60° 0.37 75° 0.52 90° 0.67 105° 0.82	16.79 14.35 13.13 N03°11.91 10.69 9.47 8.24 7.02 5.80 N03°4.58 3.36 2.13 03°0.91 02°59.69 58.47 N02°57.24 56.02 54.80	256° 41.59 271° 42.21 286° 42.84 301° 43.46 316° 44.09 331° 44.71 346° 45.34 1° 45.96 16° 46.59 31° 47.22 46° 47.84 61° 48.47 76° 49.09 91° 49.72 106° 50.35 121° 50.97 136° 51.60	14.98 15.12 15.26 15.39 N23°15.53 15.67 15.80 15.94 16.08 16.21 N23°16.35 16.48 16.62 16.75 16.88 17.02	208° 40.89 223° 42.79 238° 44.68 253° 46.58 268° 48.47 283° 50.37 298° 52.27 313° 54.16 328° 56.06 343° 57.95 358° 59.85 14° 1.75 29° 3.64 44° 5.54	5.83 · · 5.69 5.56 5.42 N19°5.29 5.15 5.02 · · 4.88 4.74 4.61 N19°4.47 4.34 4.20	323°11.10 338°13.57 353°16.05 8°18.52 23°20.99 38°23.47 53°25.94 68°28.41 83°30.89 98°33.36 113°35.84 128°38.31	29.20 · 29.19 29.17 29.15 N03°29.14 29.12 29.10 · 29.09 29.07 29.06 N03°29.04	Ankaa Schedar Diphda Achernar Hamal Polaris Acamar Menkar Mirfak Aldebaran Rigel Capella	353°5.64 349°29.28 348°45.84 335°19.09 327°49.69 313°26.85 315°10.85 314°4.83 308°26.51 290°38.30 281°2.84 280°20.28	-42°9.37 56° 40.84 -17° 50.21 -57° 5.72 23° 35.28 89° 22.24 -40° 11.55 4° 11.74 49° 57.16 16° 33.78 -8° 10.12 46° 1.35
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	352° 46.35 7° 48.81 22° 51.27 37° 53.74 52° 56.20 67° 58.67 83° 1.13 98° 3.59 113° 6.06 128° 8.52 143° 10.99 158° 13.45 173° 15.91 188° 18.38 203° 20.84 218° 23.31 233° 25.77 248° 28.24 263° 30.70 278° 33.16 293° 35.63	179° 58.09 194° 58.23 209° 58.37 224° 58.51 239° 58.65 254° 58.79 269° 58.93 284° 59.07 299° 59.21 314° 59.36 329° 59.50 344° 59.64 359° 59.79 14° 59.93 30° 0.08 45° 0.23 60° 0.37 75° 0.52 90° 0.67 105° 0.82	15.57 14.35 13.13 N03°11.91 10.69 9.47 1.8.24 7.02 5.80 N03°4.58 3.36 2.13 03°0.91 02°59.69 58.47 N02°57.24 56.02 54.80	271° 42.21 286° 42.84 301° 43.46 316° 44.09 331° 44.71 346° 45.34 1° 45.96 16° 46.59 31° 47.22 46° 47.84 61° 48.47 76° 49.09 91° 49.72 106° 50.35 121° 50.97 136° 51.60	15.12 15.26 15.39 N23°15.53 15.67 15.80 15.94 16.08 16.21 N23°16.35 16.48 16.62 16.75 16.88 17.02	223° 42.79 238° 44.68 253° 46.58 268° 48.47 283° 50.37 298° 52.27 313° 54.16 328° 56.06 343° 57.95 358° 59.85 14° 1.75 29° 3.64 44° 5.54	5.69 5.56 5.42 N19°5.29 5.15 5.02 4.88 4.74 4.61 N19°4.47 4.34 4.20	338° 13.57 353° 16.05 8° 18.52 23° 20.99 38° 23.47 53° 25.94 68° 28.41 83° 30.89 98° 33.36 113° 35.84 128° 38.31	·· 29.19 29.17 29.15 N03° 29.14 29.12 29.10 ·· 29.09 29.07 29.06 N03° 29.04	Diphda Achernar Hamal Polaris Acamar Menkar Mirfak Aldebaran Rigel Capella	349° 29.28 348° 45.84 335° 19.09 327° 49.69 313° 26.85 315° 10.85 314° 4.83 308° 26.51 290° 38.30 281° 2.84 280° 20.28	-17°50.21 -57°5.72 23°35.28 89°22.24 -40°11.55 4°11.74 49°57.16 16°33.78 -8°10.12 46°1.35
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	7°48.81 22°51.27 37°53.74 52°56.20 67°58.67 83°1.13 98°3.59 113°6.06 128°8.52 143°10.99 158°13.45 173°15.91 188°18.38 203°20.84 218°23.31 233°25.77 248°28.24 263°30.70 278°33.16 293°35.63	194° 58.23 209° 58.37 224° 58.51 239° 58.65 254° 58.79 269° 58.93 284° 59.07 299° 59.21 314° 59.36 329° 59.50 344° 59.64 359° 59.79 14° 59.93 30° 0.08 45° 0.23 60° 0.37 75° 0.52 90° 0.67 105° 0.82	14.35 13.13 N03°11.91 10.69 9.47 · · 8.24 7.02 5.80 N03°4.58 3.36 2.13 03°0.91 02°59.69 58.47 N02°57.24 56.02 54.80	286° 42.84 301° 43.46 316° 44.09 331° 44.71 346° 45.34 1° 45.96 16° 46.59 31° 47.22 46° 47.84 61° 48.47 76° 49.09 91° 49.72 106° 50.35 121° 50.97 136° 51.60	15.26 15.39 N23°15.53 15.67 15.80 • 15.94 16.08 16.21 N23°16.35 16.48 16.62 • 16.75 16.88 17.02	238° 44.68 253° 46.58 268° 48.47 283° 50.37 298° 52.27 313° 54.16 328° 56.06 343° 57.95 358° 59.85 14° 1.75 29° 3.64 44° 5.54	5.56 5.42 N19°5.29 5.15 5.02 • 4.88 4.74 4.61 N19°4.47 4.34 4.20	353°16.05 8°18.52 23°20.99 38°23.47 53°25.94 68°28.41 83°30.89 98°33.36 113°35.84 128°38.31	29.17 29.15 N03°29.14 29.12 29.10 •• 29.09 29.07 29.06 N03°29.04	Achernar Hamal Polaris Acamar Menkar Mirfak Aldebaran Rigel Capella	335° 19.09 327° 49.69 313° 26.85 315° 10.85 314° 4.83 308° 26.51 290° 38.30 281° 2.84 280° 20.28	-57°5.72 23°35.28 89°22.24 -40°11.55 4°11.74 49°57.16 16°33.78 -8°10.12 46°1.35
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	22°51.27 37°53.74 52°56.20 67°58.67 83°1.13 98°3.59 113°6.06 128°8.52 143°10.99 158°13.45 173°15.91 188°18.38 203°20.84 218°23.31 233°25.77 248°28.24 263°30.70 278°33.16 293°35.63	209° 58.37 224° 58.51 239° 58.65 254° 58.79 269° 58.93 284° 59.07 299° 59.21 314° 59.36 329° 59.50 344° 59.64 359° 59.79 14° 59.93 30° 0.08 45° 0.23 60° 0.37 75° 0.52 90° 0.67 105° 0.82	13.13 N03°11.91 10.69 9.47 · 8.24 7.02 5.80 N03°4.58 3.36 2.13 03°0.91 02°59.69 58.47 N02°57.24 56.02 54.80	301° 43.46 316° 44.09 331° 44.71 346° 45.34 1° 45.96 16° 46.59 31° 47.22 46° 47.84 61° 48.47 76° 49.09 91° 49.72 106° 50.35 121° 50.97 136° 51.60	15.39 N23°15.53 15.67 15.80 · 15.94 16.08 16.21 N23°16.35 16.48 16.62 · 16.75 16.88 17.02	253° 46.58 268° 48.47 283° 50.37 298° 52.27 313° 54.16 328° 56.06 343° 57.95 358° 59.85 14° 1.75 29° 3.64 44° 5.54	5.42 N19°5.29 5.15 5.02 • 4.88 4.74 4.61 N19°4.47 4.34 4.20	8°18.52 23°20.99 38°23.47 53°25.94 68°28.41 83°30.89 98°33.36 113°35.84 128°38.31	29.15 N03°29.14 29.12 29.10 · 29.09 29.07 29.06 N03°29.04	Hamal Polaris Acamar Menkar Mirfak Aldebaran Rigel Capella	327° 49.69 313° 26.85 315° 10.85 314° 4.83 308° 26.51 290° 38.30 281° 2.84 280° 20.28	23° 35.28 89° 22.24 -40° 11.55 4° 11.74 49° 57.16 16° 33.78 -8° 10.12 46° 1.35
6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	37°53.74 52°56.20 67°58.67 83°1.13 98°3.59 113°6.06 128°8.52 143°10.99 158°13.45 173°15.91 188°18.38 203°20.84 218°23.31 233°25.77 248°28.24 263°30.70 278°33.16 293°35.63	224° 58.51 239° 58.65 254° 58.79 269° 58.93 284° 59.07 299° 59.21 314° 59.36 329° 59.50 344° 59.64 359° 59.79 14° 59.93 30° 0.08 45° 0.23 60° 0.37 75° 0.52 90° 0.67 105° 0.82	N03°11.91 10.69 9.47 · · 8.24 7.02 5.80 N03°4.58 3.36 2.13 03°0.91 02°59.69 58.47 N02°57.24 56.02 54.80	316° 44.09 331° 44.71 346° 45.34 1° 45.96 16° 46.59 31° 47.22 46° 47.84 61° 48.47 76° 49.09 91° 49.72 106° 50.35 121° 50.97 136° 51.60	N23°15.53 15.67 15.80 • 15.94 16.08 16.21 N23°16.35 16.48 16.62 • 16.75 16.88 17.02	268° 48.47 283° 50.37 298° 52.27 313° 54.16 328° 56.06 343° 57.95 358° 59.85 14° 1.75 29° 3.64 44° 5.54	N19° 5.29 5.15 5.02 · · 4.88 4.74 4.61 N19° 4.47 4.34 4.20	23°20.99 38°23.47 53°25.94 68°28.41 83°30.89 98°33.36 113°35.84 128°38.31	N03° 29.14 29.12 29.10 · · 29.09 29.07 29.06 N03° 29.04	Polaris Acamar Menkar Mirfak Aldebaran Rigel Capella	313° 26.85 315° 10.85 314° 4.83 308° 26.51 290° 38.30 281° 2.84 280° 20.28	89°22.24 -40°11.55 4°11.74 49°57.16 16°33.78 -8°10.12 46°1.35
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	67°58.67 83°1.13 98°3.59 113°6.06 128°8.52 143°10.99 158°13.45 173°15.91 188°18.38 203°20.84 218°23.31 233°25.77 248°28.24 263°30.70 278°33.16 293°35.63	254°58.79 269°58.93 284°59.07 299°59.21 314°59.36 329°59.50 344°59.64 359°59.79 14°59.93 30°0.08 45°0.23 60°0.37 75°0.52 90°0.67 105°0.82	9.47 · 8.24 7.02 5.80 N03° 4.58 3.36 2.13 03° 0.91 02° 59.69 58.47 N02° 57.24 56.02 54.80	346° 45.34 1° 45.96 16° 46.59 31° 47.22 46° 47.84 61° 48.47 76° 49.09 91° 49.72 106° 50.35 121° 50.97 136° 51.60	15.67 15.80 15.94 16.08 16.21 N23°16.35 16.48 16.62 16.75 16.88 17.02	298° 52.27 313° 54.16 328° 56.06 343° 57.95 358° 59.85 14° 1.75 29° 3.64 44° 5.54	5.02 • 4.88 4.74 4.61 N19° 4.47 4.34 4.20	53°25.94 68°28.41 83°30.89 98°33.36 113°35.84 128°38.31	29.12 29.10 •• 29.09 29.07 29.06 N03° 29.04	Acamar Menkar Mirfak Aldebaran Rigel Capella	315°10.85 314°4.83 308°26.51 290°38.30 281°2.84 280°20.28	-40°11.55 4°11.74 49°57.16 16°33.78 -8°10.12 46°1.35
9 10 11 12 13 14 15 16 17 18 19 20 21 22	83°1.13 98°3.59 113°6.06 128°8.52 143°10.99 158°13.45 173°15.91 188°18.38 203°20.84 218°23.31 233°25.77 248°28.24 263°30.70 278°33.16 293°35.63	269° 58.93 284° 59.07 299° 59.21 314° 59.36 329° 59.50 344° 59.64 359° 59.79 14° 59.93 30° 0.08 45° 0.23 60° 0.37 75° 0.52 90° 0.67 105° 0.82	*** 8.24 7.02 5.80 ***N03° 4.58 3.36 2.13 03° 0.91 02° 59.69 58.47 ***N02° 57.24 56.02 54.80	1° 45.96 16° 46.59 31° 47.22 46° 47.84 61° 48.47 76° 49.09 91° 49.72 106° 50.35 121° 50.97 136° 51.60	15.94 16.08 16.21 N23°16.35 16.48 16.62 16.75 16.88 17.02	313°54.16 328°56.06 343°57.95 358°59.85 14°1.75 29°3.64 44°5.54	· · 4.88 4.74 4.61 N19° 4.47 4.34 4.20	68°28.41 83°30.89 98°33.36 113°35.84 128°38.31	· · 29.09 29.07 29.06 N03°29.04	Menkar Mirfak Aldebaran Rigel Capella	314°4.83 308°26.51 290°38.30 281°2.84 280°20.28	4°11.74 49°57.16 16°33.78 -8°10.12 46°1.35
10 11 12 13 14 15 16 17 18 19 20 21 22	98° 3.59 113° 6.06 128° 8.52 143° 10.99 158° 13.45 173° 15.91 188° 18.38 203° 20.84 218° 23.31 233° 25.77 248° 28.24 263° 30.70 278° 33.16 293° 35.63	284°59.07 299°59.21 314°59.36 329°59.50 344°59.64 359°59.79 14°59.93 30°0.08 45°0.23 60°0.37 75°0.52 90°0.67 105°0.82	7.02 5.80 N03° 4.58 3.36 2.13 03° 0.91 02° 59.69 58.47 N02° 57.24 56.02 54.80	16° 46.59 31° 47.22 46° 47.84 61° 48.47 76° 49.09 91° 49.72 106° 50.35 121° 50.97 136° 51.60	16.08 16.21 N23°16.35 16.48 16.62 · 16.75 16.88 17.02	328° 56.06 343° 57.95 358° 59.85 14° 1.75 29° 3.64 44° 5.54	4.74 4.61 N19°4.47 4.34 4.20	83°30.89 98°33.36 113°35.84 128°38.31	29.07 29.06 N03°29.04	Mirfak Aldebaran Rigel Capella	308°26.51 290°38.30 281°2.84 280°20.28	49°57.16 16°33.78 -8°10.12 46°1.35
11 12 13 14 15 16 17 18 19 20 21 22	113°6.06 128°8.52 143°10.99 158°13.45 173°15.91 188°18.38 203°20.84 218°23.31 233°25.77 248°28.24 263°30.70 278°33.16 293°35.63	299° 59.21 314° 59.36 329° 59.50 344° 59.64 359° 59.79 14° 59.93 30° 0.08 45° 0.23 60° 0.37 75° 0.52 90° 0.67 105° 0.82	5.80 N03° 4.58 3.36 2.13 03° 0.91 02° 59.69 58.47 N02° 57.24 56.02 54.80	31° 47.22 46° 47.84 61° 48.47 76° 49.09 91° 49.72 106° 50.35 121° 50.97 136° 51.60	16.21 N23°16.35 16.48 16.62 · · 16.75 16.88 17.02	343°57.95 358°59.85 14°1.75 29°3.64 44°5.54	4.61 N19°4.47 4.34 4.20	98°33.36 113°35.84 128°38.31	29.06 N03°29.04	Aldebaran Rigel Capella	290°38.30 281°2.84 280°20.28	16°33.78 -8°10.12 46°1.35
12 13 14 15 16 17 18 19 20 21 22	128°8.52 143°10.99 158°13.45 173°15.91 188°18.38 203°20.84 218°23.31 233°25.77 248°28.24 263°30.70 278°33.16 293°35.63	314°59.36 329°59.50 344°59.64 359°59.79 14°59.93 30°0.08 45°0.23 60°0.37 75°0.52 90°0.67 105°0.82	N03° 4.58 3.36 2.13 03° 0.91 02° 59.69 58.47 N02° 57.24 56.02 54.80	46° 47.84 61° 48.47 76° 49.09 91° 49.72 106° 50.35 121° 50.97 136° 51.60	N23°16.35 16.48 16.62 •• 16.75 16.88 17.02	358°59.85 14°1.75 29°3.64 44°5.54	N19°4.47 4.34 4.20	113°35.84 128°38.31	N03°29.04	Capella	$280^{\circ}20.28$	$46^{\circ}1.35$
13 14 15 16 17 18 19 20 21 22	143°10.99 158°13.45 173°15.91 188°18.38 203°20.84 218°23.31 233°25.77 248°28.24 263°30.70 278°33.16 293°35.63	329°59.50 344°59.64 359°59.79 14°59.93 30°0.08 45°0.23 60°0.37 75°0.52 90°0.67 105°0.82	3.36 2.13 03° 0.91 02° 59.69 58.47 N02° 57.24 56.02 54.80	61° 48.47 76° 49.09 91° 49.72 106° 50.35 121° 50.97 136° 51.60	16.48 16.62 •• 16.75 16.88 17.02	14°1.75 29°3.64 44°5.54	4.34 4.20	128°38.31				
14 15 16 17 18 19 20 21 22	158° 13.45 173° 15.91 188° 18.38 203° 20.84 218° 23.31 233° 25.77 248° 28.24 263° 30.70 278° 33.16 293° 35.63	344°59.64 359°59.79 14°59.93 30°0.08 45°0.23 60°0.37 75°0.52 90°0.67 105°0.82	2.13 03°0.91 02°59.69 58.47 N02°57.24 56.02 54.80	76° 49.09 91° 49.72 106° 50.35 121° 50.97 136° 51.60	16.62 •• 16.75 16.88 17.02	29° 3.64 44° 5.54	4.20		25.02	D.H.	278°21 71	6°22 40
16 17 18 19 20 21 22	173°15.91 188°18.38 203°20.84 218°23.31 233°25.77 248°28.24 263°30.70 278°33.16 293°35.63	359° 59.79 14° 59.93 30° 0.08 45° 0.23 60° 0.37 75° 0.52 90° 0.67 105° 0.82	03°0.91 02°59.69 58.47 N02°57.24 56.02 54.80	91° 49.72 106° 50.35 121° 50.97 136° 51.60	· · 16.75 16.88 17.02	44° 5.54			29.01	Bellatrix		
17 18 19 20 21 22	203°20.84 218°23.31 233°25.77 248°28.24 263°30.70 278°33.16 293°35.63	30°0.08 45°0.23 60°0.37 75°0.52 90°0.67 105°0.82	58.47 N02°57.24 56.02 54.80	121°50.97 136°51.60	17.02	59°7.44	• • 4.06	158°43.26	• • 28.99	Elnath	278°0.48	28°37.74
18 19 20 21 22	218° 23.31 233° 25.77 248° 28.24 263° 30.70 278° 33.16 293° 35.63	45°0.23 60°0.37 75°0.52 90°0.67 105°0.82	N02°57.24 56.02 54.80	136°51.60			3.93	173°45.73	28.97	Alnilam Betelgeuse	275°36.65 270°50.94	-1°11.00 7°24.78
19 20 21 22	233° 25.77 248° 28.24 263° 30.70 278° 33.16 293° 35.63	60°0.37 75°0.52 90°0.67 105°0.82	56.02 54.80			74°9.33	3.79	188°48.21	28.95	Canopus	263°52.29	-52°42.36
20 21 22	248° 28.24 263° 30.70 278° 33.16 293° 35.63	75°0.52 90°0.67 105°0.82	54.80		N23°17.15	89°11.23	N19°3.66	203°50.68	N03°28.94	Sirius	258° 25.40	-16°45.03
21 22	263°30.70 278°33.16 293°35.63	90°0.67 105°0.82		151°52.23	17.28	104°13.12 119°15.02	3.52	218°53.16	28.92	Adhara	255°5.19	-29°0.35
22	278°33.16 293°35.63	105°0.82	• • 53.58	166° 52.85 181° 53.48	17.41 •• 17.55	119 15.02 134°16.92	3.39 · · 3.25	233°55.63 248°58.11	28.90 •• 28.89	Procyon	244°49.79	$5^{\circ}9.46$
	293°35.63		52.35	196° 54.10	17.68	149°18.81	3.23	264° 0.59	28.87	Pollux	243° 16.08	27°57.72
		120°0.97	51.13	211°54.73	17.81	164°20.71	2.98	279°3.06	28.85	Avior	234°14.86	-59°35.63
N 4			.2′ m-4.26		.1′ m1.30	$\nu 1.9' \ d-0.$				Suhail	222°45.80	-43°32.40
ivier.p		$\nu$ 0.1 a-1	.2' m-4.20	$\nu$ 0.6° $a$ 0.	.1' m1.30	$\nu$ 1.9° $a$ -0.	1' m-1.78	$\nu$ 2.5° $a$ -0	.0′ m0.64	Miaplacidus Alphard	221°38.95 217°46.79	-69°49.61 -8°46.40
										Regulus	207°33.35	11°50.29
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.94	61°36.62
0	308°38.09		N02°49.91	226°55.36	N23°17.94	179°22.61	N19°2.84	294°5.54	N03°28.83	Denebola	182°23.83	14°25.49
1	323° 40.56	150°1.27	48.68	241°55.99	18.07	194°24.50	2.71	309°8.01	28.82	Gienah	175°42.42	$-17^{\circ}41.44$
2	338° 43.02 353° 45.48	165°1.42 180°1.57	47.46 •• 46.24	256° 56.61 271° 57.24	18.20 •• 18.33	209°26.40 224°28.30	2.57 •• 2.43	324°10.49 339°12.97	28.80 •• 28.78		172°58.99	-63°15.06
4	8° 47.95	195°1.72	45.02	286° 57.87	18.46	239°30.19	2.43	354°15.44	28.76		171°50.47	-57°15.98
5	23°50.41	210°1.87	43.79	301°58.49	18.59	254°32.09	2.16	9°17.92	28.75	Alioth	166° 12.04 158° 21.00	55°49.16 -11°18.04
6	38°52.88	225°2.03	N02°42.57	$316^{\circ}59.12$	N23°18.72	269°33.98	N19°2.03	24°20.40	N03°28.73	Spica Alkaid	158 21.00 152°51.05	-11 18.04 49°11.06
7	53°55.34	$240^{\circ}2.18$	41.35	331°59.75	18.84	284°35.88	1.89	39°22.87	28.71	Hadar	148°34.19	-60°30.35
8	68°57.80	255°2.34	40.12	347°0.38	18.97	299°37.78	1.75	54°25.35	28.69	Menkent	147°56.10	-36°30.22
9	84°0.27	270°2.49	• • 38.90	2°1.00	• • 19.10	314°39.67	• • 1.62	69°27.83	• • 28.67	Arcturus	145°46.73	19°2.76
10	99°2.73 114°5.20	285°2.65 300°2.80	37.68	17°1.63 32°2.26	19.23	329°41.57 344°43.47	1.48	84°30.31 99°32.78	28.66	Rigil Kent.	139°38.45	-60°56.99
11 12	114 5.20 129°7.66	300 2.80 315°2.96	36.45 N02°35.23	32 2.26 47°2.89	19.35 N23°19.48	344 43.47 359°45.36	1.34 N19°1.21	99 32.78 114°35.26	28.64 N03°28.62	Kochab	137°19.69	74°3.01
13	144° 10.13	330°3.12	34.01	62°3.51	19.61	14°47.26	1.07	129°37.74	28.60	Zuben'ubi	136°54.52	-16°9.19
14	159° 12.59	345°3.27	32.78	77°4.14	19.73	29°49.16	0.94	144°40.22	28.58	Alphecca	126°2.52	26°37.67
15	174° 15.05	0°3.43	• • 31.56	92°4.77	• • 19.86	44°51.05	• • 0.80	159°42.70	• • 28.57	Antares Atria	112°14.03 107°6.70	-26°29.51 -69°4.70
16	$189^{\circ}17.52$	15°3.59	30.34	107°5.40	19.98	59°52.95	0.66	174°45.18	28.55	Sabik	107 0.70 102°1.05	-15°45.46
17	204° 19.98	30°3.75	29.11	122°6.03	20.11	74°54.85	0.53	189°47.65	28.53	Shaula	96°8.28	-37°7.43
18	219°22.45		N02°27.89	137°6.65	N23°20.23	89°56.74	N19°0.39	204°50.13	N03°28.51	Rasalhague	95°57.08	$12^{\circ}32.55$
19	234°24.91	60°4.07	26.66	152°7.28	20.36	104°58.64 120°0.54	0.25	219°52.61	28.49	Eltanin	$90^{\circ}41.15$	$51^{\circ}29.28$
20 21	249°27.37 264°29.84	75°4.23 90°4.40	25.44 •• 24.22	167°7.91 182°8.54	20.48	120 0.54 135°2.43	0.12 18°59.98	234°55.09 249°57.57	28.47 •• 28.45	Kaus Aust.	83°30.43	-34°22.31
22	279°32.30	105°4.56	22.99	197°9.17	20.73	150°4.33	18°59.84	265°0.05	28.43	Vega	80°31.96	38°48.63
23	294°34.77	120°4.72	21.77	212°9.80	20.85	165° 6.23	59.71	280°2.53	28.42	Nunki	75°45.80	-26°15.77
1100			.2′ m-4.26		.1′ m1.30	$\nu$ 1.9′ d-0.			.0′ m0.64	Altair Peacock	61°58.35 53°3.08	8°56.42 -56°38.86
ivier.	pass. 03:25	νο.2 α-1	.2 M-4.20	νο.ο αο.	.1 111.30	$\nu$ 1.9 $a$ -0.	1 111-1.70	ν2.5 <i>a</i> -0	.0 1110.04	Deneb	49°24.45	45°22.56
										Enif	33° 37.20	9°59.92
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.85	-46°49.71
0	309°37.23	135°4.89	N02°20.55	227°10.42	N23°20.97	180°8.12	N18°59.57	295°5.01	N03°28.40	Fomalhaut	15° 12.78	-29°28.65
1 2	324°39.69 339°42.16	150°5.05 165°5.21	19.32 18.10	242°11.05 257°11.68	21.09 21.21	195°10.02 210°11.92	59.44 59.30	310°7.49 325°9.97	28.38 28.36	Scheat	13°43.65	28°13.65
3	354° 44.62	180°5.38	16.87	272° 12.31	•• 21.34	210 11.92 225°13.82	59.16	340°12.45	28.34	Markab	13°28.34	15°20.98
4	9°47.09	195°5.55	15.65	287° 12.94	21.46	240°15.71	59.03	355°14.93	28.32	Jul 30 Thu	SHA	Mer.pass
5	24° 49.55	210°5.71	14.42	302° 13.57	21.58	255°17.61	58.89	10°17.41	28.30	Venus	$187^{\circ}18.73$	<b>1</b> 5:00
6	39°52.01	225°5.88	N02°13.20	317° 14.20	N23°21.70	$270^{\circ}19.51$	N18°58.75	25°19.89	N03°28.28	Mars	279°1.38	08:53
7	54°54.48	240°6.05	11.98	332°14.83	21.82	285°21.40	58.62	40°22.38	28.26	Jupiter	230°58.14	12:04
8	69° 56.94	255°6.21	10.75	347° 15.46	21.94	300°23.30	58.48	55°24.86	28.24	Saturn	345°27.20	04:27
9 10	84°59.41 100°1.87	270°6.38 285°6.55	· · 9.53	2°16.09 17°16.72	· · 22.05	315°25.20 330°27.09	· · 58.34	70°27.34	28.22	Jul 31 Fri	SHA	Mer.pass
10	100°1.87 115°4.33	285°6.55 300°6.72	8.30 7.08	32° 17.35	22.17 22.29	330°27.09 345°28.99	58.21 58.07	85°29.82 100°32.30	28.20 28.18		$186^{\circ}23.02$	15:00
12	130°6.80	315°6.89	N02°5.86	47° 17.97	N23°22.41	0°30.89	N18°57.93	115°34.78	N03°28.16		278° 17.27	08:52
13	145°9.26	330°7.06	4.63	62° 18.60	22.53	15°32.79	57.80	130°37.27	28.14	Jupiter	230°44.51	12:01
14	160°11.73	345°7.24	3.41	77° 19.23	22.64	30°34.68	57.66	145°39.75	28.12	Saturn	345°27.45	04:23
15	175° 14.19	0°7.41	• • 2.18	92° 19.86	• • 22.76	45° 36.58	•• 57.52	160°42.23	•• 28.10	Aug 01 Sat	SHA	Mer.pass
16	190° 16.66	15°7.58	02°0.96	107°20.49	22.88	60°38.48	57.38	175°44.71	28.08	Venus	$185^{\circ}27.66$	15:00
17	205° 19.12	30°7.75	01°59.73	122°21.12	22.99	75°40.37	57.25	190°47.20	28.06		277°33.19	08:51
18 19	220°21.58 235°24.05	45°7.93 60°8.10	N01°58.51 57.28	137°21.75 152°22.38	N23°23.11 23.22	90°42.27 105°44.17	N18°57.11 56.97	205°49.68 220°52.16	N03°28.04		230°30.89	11:58
20	250°26.51	75°8.28	57.28 56.06	152 22.38 167°23.01	23.22	105 44.17 120°46.07	56.84	220 52.16 235°54.65	28.02 28.00	Saturn	345°27.78	04:19
21	265°28.98	90°8.45	• • 54.84	182° 23.64	• • 23.45	135°47.96	• • 56.70	250°57.13	•• 27.98	Horizor	ntal parallax	
22	280°31.44	105°8.63	53.61	197° 24.28	23.57	150°49.86	56.56	265°59.61	27.96		Venus:	0.2
23	295°33.90	120°8.81	52.39	212°24.91	23.68	165°51.76	56.43	281°2.10	27.94		Mars:	0.1
Merr	pass. 03:21	ν0 2/ d-1	.2′ m-4.27	νη 6' dη	.1′ m1.30	$\nu$ 1.9′ d-0.	1′ m-1 78	ν25/ d.0	.0′ m0.63			

h	Su	n	Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°22.67	N18° 33.16	353° 24.63	13.1'	S18°59.52	-11.1'	54.9
1	193°22.70	32.56	7°56.76	13.2'	18°48.41	-11.2'	55.0
2	208°22.72	31.95	22°28.94	13.2'	18° 37.21	-11.3'	55.0
3	223°22.75	• • 31.35	37°1.17	13.3'	18° 25.93	-11.4	55.0
4	238°22.77	30.75	51°33.46	13.3'	18° 14.56	-11.5'	55.0
5	253°22.80	30.14	66°5.79	13.4	18°3.10	-11.5'	55.0
		N18° 29.54	80° 38.17		\$17°51.56		
6	268°22.83			13.4'		-11.6'	55.0
7	283°22.85	28.93	95° 10.59	13.5'	17°39.94	-11.7'	55.1
8	298°22.88	28.33	109°43.06	13.5'	17°28.23	-11.8'	55.1
9	313°22.91	• • 27.72	124° 15.58	13.6'	17° 16.44	-11.9'	55.1
10	328°22.93	27.12	138°48.15	13.6'	17°4.57	-11.9'	55.1
11	343°22.96	26.51	153°20.76	13.7'	16°52.62	-12.0'	55.1
12	358°22.99	N18° 25.90	167°53.42	13.7'	S16°40.59	-12.1'	55.1
13	13°23.02	25.29	182°26.13	13.7'	16°28.49	-12.2'	55.2
14	28°23.04	24.69	196°58.87	13.8'	$16^{\circ}16.30$	-12.3'	55.2
15	43°23.07	• • 24.08	211°31.67	13.8'	16°4.04	-12.3'	55.2
16	58°23.10	23.47	226°4.50	13.9'	15°51.71	-12.4'	55.2
17	73°23.13	22.86	240°37.38	13.9'	15°39.29	-12.5'	55.2
18	88°23.16	N18°22.25	255° 10.30	14.0'	S15°26.81	-12.6'	55.3
19	103°23.19	21.63	269° 43.26	14.0'	15° 14.25	-12.6'	55.3
19 20	103 23.19 118°23.22	21.03	284° 16.26	14.0'	15 14.25 15°1.62	-12.0 -12.7'	55.3
	118°23.22 133°23.25		284° 16.26 298° 49.31	14.1	15°1.62 14°48.92		
21		20.41				-12.8'	55.3
22	148°23.28	19.80	313°22.39	14.1'	14°36.15	-12.8'	55.3
23	163°23.31	19.18	327°55.51	14.2'	14°23.31	-12.9'	55.3
	SD = 15.7'	d = -0.6'		SI	O = 15.0'		
Fri	GHA	Dec	GHA	•.	Dec	d	НР
	178°23.34	N18° 18.57	342° 28.67	u 14.2'	S14° 10.40	-13.0'	55.4
0					13°57.43		
1	193°23.37	17.96	357°1.87	14.2'		-13.0'	55.4
2	208°23.40	17.34	11°35.11	14.3'	13°44.39	-13.1'	55.4
3	223°23.44	• • 16.73	26°8.38	14.3'	13°31.28	-13.2'	55.4
4	238°23.47	16.11	40°41.68	14.3'	13° 18.11	-13.2'	55.4
5	253°23.50	15.49	55°15.03	14.4'	13°4.87	-13.3'	55.5
6	268°23.53	N18° 14.88	69°48.40	14.4'	S12°51.57	-13.4'	55.5
7	283°23.57	14.26	84°21.81	14.4'	12°38.21	-13.4'	55.5
8	298°23.60	13.64	98°55.26	14.5'	12°24.79	-13.5'	55.5
9	313°23.63	• • 13.02	113°28.73	14.5'	$12^{\circ}11.31$	-13.5'	55.5
10	328°23.67	12.40	128°2.24	14.5'	11°57.77	-13.6'	55.5
11	343°23.70	11.78	142°35.77	14.6'	11°44.18	-13.7'	55.6
12	358°23.73	N18°11.16	157°9.34	14.6'	S11°30.52	-13.7'	55.6
13	13°23.77	10.54	171°42.93	14.6'	11° 16.81	-13.8'	55.6
13 14	28°23.80	9.92	186° 16.55	14.6'	11°3.04	-13.8'	55.6
15	43°23.84	• • 9.30	200° 50.20	14.7	10°49.22	-13.9'	55.6
16	58°23.87	8.68	215° 23.88	14.7	10° 49.22 10° 35.35	-13.9'	55.7
10 17	73°23.91	8.06	215 25.00 229°57.58	14.7	10° 35.35	-13.9 -14.0'	55.7
1 <i>1</i> 18	73 23.91 88°23.94	8.06 N18°7.43	244°31.30	14.7	510°7.44	-14.0'	55.7
19	103°23.98	6.81	259°5.05		09°53.41		
20	118°24.02	6.19	273°38.82	14.8'	09°39.33	-14.1'	55.7
21	133°24.05	• • 5.56	288°12.61	14.8'	09°25.21	-14.2'	55.8
22	148°24.09	4.94	302°46.42	14.8'	09°11.03	-14.2'	55.8
23	163°24.13	4.31	317°20.25	14.9'	08°56.81	-14.3'	55.8
	SD = 15.7'	d = -0.6'		SI	O = 15.1'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
ο ατ 0	178°24.16	N18° 3.68	331°54.11	u 14.9'	S08° 42.54	-14.3'	55.8
			331°54.11 346°27.98				
1	193°24.20	3.06		14.9'	08°28.23	-14.4'	55.8
2	208°24.24	2.43	1°1.86	14.9'	08° 13.87	-14.4'	55.9
3	223°24.28	• • 1.80	15°35.76	14.9'	07°59.47	-14.4'	55.9
4	238°24.31	1.17	30°9.68	14.9'	07°45.03	-14.5'	55.9
5	253°24.35	18°0.54	44°43.61	14.9'	07°30.54	-14.5'	55.9
						-14.6'	55.9
6	268°24.39	N17°59.92	59° 17.56	15.0'	S07°16.02		
6 7	268°24.39 283°24.43		73°51.51	15.0' 15.0'	$07^{\circ}1.45$	-14.6'	56.0
	268°24.39	N17°59.92	73°51.51 88°25.48				
7	268°24.39 283°24.43	N17°59.92 59.29	73°51.51	15.0'	$07^{\circ}1.45$	-14.6'	56.0
7 8 9	268°24.39 283°24.43 298°24.47	N17°59.92 59.29 58.66	73°51.51 88°25.48	15.0' 15.0'	07°1.45 06°46.85	-14.6' -14.6'	56.0 56.0
7 8 9 10	268°24.39 283°24.43 298°24.47 313°24.51 328°24.55	N17° 59.92 59.29 58.66 •• 58.02 57.39	73°51.51 88°25.48 102°59.46 117°33.44	15.0' 15.0' 15.0' 15.0'	07°1.45 06°46.85 06°32.21 06°17.54	-14.6' -14.6' -14.7' -14.7'	56.0 56.0 56.0
7 8 9 10 11	268° 24.39 283° 24.43 298° 24.47 313° 24.51 328° 24.55 343° 24.59	N17° 59.92 59.29 58.66 •• 58.02 57.39 56.76	73°51.51 88°25.48 102°59.46 117°33.44 132°7.44	15.0' 15.0' 15.0' 15.0' 15.0'	07°1.45 06°46.85 06°32.21 06°17.54 06°2.82	-14.6' -14.6' -14.7' -14.7' -14.7'	56.0 56.0 56.0 56.0
7 8 9 10 11	268° 24.39 283° 24.43 298° 24.47 313° 24.51 328° 24.55 343° 24.59 358° 24.63	N17° 59.92 59.29 58.66 •• 58.02 57.39 56.76 N17° 56.13	73°51.51 88°25.48 102°59.46 117°33.44 132°7.44 146°41.44	15.0' 15.0' 15.0' 15.0' 15.0' 15.0'	07°1.45 06°46.85 06°32.21 06°17.54 06°2.82 505°48.08	-14.6' -14.6' -14.7' -14.7' -14.7' -14.8'	56.0 56.0 56.0 56.0 56.1
7 8 9 10 11 12	268°24.39 283°24.43 298°24.47 313°24.51 328°24.55 343°24.59 358°24.63 13°24.67	N17° 59.92 59.29 58.66 •• 58.02 57.39 56.76 N17° 56.13 55.50	73° 51.51 88° 25.48 102° 59.46 117° 33.44 132° 7.44 146° 41.44 161° 15.45	15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0'	07°1.45 06°46.85 06°32.21 06°17.54 06°2.82 S05°48.08 05°33.30	-14.6' -14.7' -14.7' -14.7' -14.8' -14.8'	56.0 56.0 56.0 56.1 56.1
7 8 9 10 11 12 13	268° 24.39 283° 24.43 298° 24.47 313° 24.51 328° 24.59 358° 24.63 13° 24.67 28° 24.71	N17° 59.92 59.29 58.66 •• 58.02 57.39 56.76 N17° 56.13 55.50 54.86	73° 51.51 88° 25.48 102° 59.46 117° 33.44 132° 7.44 146° 41.44 161° 15.45 175° 49.46	15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0'	07°1.45 06°46.85 06°32.21 06°17.54 06°2.82 \$05°48.08 05°33.30 05°18.49	-14.6' -14.6' -14.7' -14.7' -14.8' -14.8' -14.8'	56.0 56.0 56.0 56.1 56.1 56.1
7 8 9 10 11 12 13 14	268° 24.39 283° 24.43 298° 24.47 313° 24.51 328° 24.59 358° 24.63 13° 24.67 28° 24.71 43° 24.75	N17° 59.92 59.29 58.66 • 58.02 57.39 56.76 N17° 56.13 55.50 54.86 • 54.23	73° 51.51 88° 25.48 102° 59.46 117° 33.44 132° 7.44 146° 41.44 161° 15.45 175° 49.46 190° 23.47	15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0'	07°1.45 06°46.85 06°32.21 06°17.54 06°2.82 \$05°48.08 05°33.30 05°18.49 05°3.64	-14.6' -14.7' -14.7' -14.7' -14.8' -14.8' -14.8' -14.9'	56.0 56.0 56.0 56.1 56.1 56.1
7 8 9 10 11 12 13 14 15	268° 24.39 283° 24.43 298° 24.47 313° 24.51 328° 24.55 343° 24.59 358° 24.63 13° 24.67 28° 24.71 43° 24.75 58° 24.79	N17° 59.92 59.29 58.66 • 58.02 57.39 56.76 N17° 56.13 55.50 54.86 • 54.23 53.59	73° 51.51 88° 25.48 102° 59.46 117° 33.44 132° 7.44 166° 41.44 161° 15.45 175° 49.46 190° 23.47 204° 57.49	15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0'	07°1.45 06°46.85 06°32.21 06°17.54 06°2.82 S05°48.08 05°33.30 05°18.49 05°3.64 04°48.77	-14.6' -14.6' -14.7' -14.7' -14.8' -14.8' -14.8' -14.9' -14.9'	56.0 56.0 56.0 56.1 56.1 56.1 56.1 56.1
7 8 9 10 11 12 13 14 15 16	268° 24.39 283° 24.43 298° 24.47 313° 24.51 328° 24.55 343° 24.59 358° 24.67 28° 24.71 43° 24.75 58° 24.79 73° 24.83	N17° 59.92 59.29 58.66 • 58.02 57.39 56.76 N17° 56.13 55.50 54.86 • 54.23 53.59 52.96	73° 51.51 88° 25.48 102° 59.46 117° 33.44 132° 7.44 146° 41.44 161° 15.45 175° 49.46 190° 23.47 204° 57.49 219° 31.51	15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0'	07°1.45 06°46.85 06°32.21 06°17.54 06°2.82 S05°48.08 05°33.30 05°18.49 05°3.64 04°48.77 04°33.86	-14.6' -14.7' -14.7' -14.7' -14.8' -14.8' -14.8' -14.9' -14.9'	56.0 56.0 56.0 56.1 56.1 56.1 56.1 56.2
7 8 9 10 11 12 13 14 15 16 17	268° 24.39 283° 24.43 298° 24.47 313° 24.51 328° 24.55 343° 24.59 358° 24.63 13° 24.67 28° 24.71 43° 24.75 58° 24.79 73° 24.83 88° 24.88	N17° 59.92 59.29 58.66 • 58.02 57.39 56.76 N17° 56.13 55.50 54.86 • 54.23 53.59 52.96 N17° 52.32	73° 51.51 88° 25.48 102° 59.46 117° 33.44 132° 7.44 146° 41.44 161° 15.45 175° 49.46 190° 23.47 204° 57.49 219° 31.51 234° 5.53	15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0'	07°1.45 06°46.85 06°32.21 06°17.54 06°2.82 S05°48.08 05°33.30 05°18.49 05°3.64 04°48.77 04°33.86 S04°18.93	-14.6' -14.7' -14.7' -14.7' -14.8' -14.8' -14.9' -14.9' -14.9' -15.0'	56.0 56.0 56.0 56.1 56.1 56.1 56.1 56.2 56.2
7 8 9 10 11 12 13 14 15 16 17	268° 24.39 283° 24.43 298° 24.47 313° 24.51 328° 24.55 343° 24.59 358° 24.63 13° 24.67 28° 24.71 43° 24.75 58° 24.79 73° 24.83 88° 24.88 103° 24.92	N17° 59.92 59.29 58.66 • 58.02 57.39 56.76 N17° 56.13 55.50 54.86 • 54.23 53.59 52.96	73° 51.51 88° 25.48 102° 59.46 117° 33.44 132° 7.44 146° 41.44 161° 15.45 175° 49.46 190° 23.47 204° 57.49 219° 31.51 234° 5.53 248° 39.55	15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0'	07°1.45 06°46.85 06°32.21 06°17.54 06°2.82 S05°48.08 05°33.30 05°18.49 05°3.64 04°48.77 04°33.86 S04°18.93 04°3.96	-14.6' -14.7' -14.7' -14.7' -14.8' -14.8' -14.8' -14.9' -14.9'	56.0 56.0 56.0 56.1 56.1 56.1 56.1 56.2 56.2
7 8 9 10 11 12 13 14 15	268° 24.39 283° 24.43 298° 24.47 313° 24.51 328° 24.59 358° 24.63 13° 24.67 28° 24.71 43° 24.75 58° 24.79 73° 24.83 88° 24.88 103° 24.92 118° 24.96	N17° 59.92 59.29 58.66 • 58.02 57.39 56.76 N17° 56.13 55.50 54.86 • 54.23 53.59 52.96 N17° 52.32	73° 51.51 88° 25.48 102° 59.46 117° 33.44 146° 41.44 161° 15.45 175° 49.46 190° 23.47 204° 57.49 219° 31.51 234° 5.53 248° 39.55 263° 13.57	15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0'	07°1.45 06°46.85 06°32.21 06°17.54 06°2.82 \$05°48.08 05°33.30 05°18.49 05°3.64 04°48.77 04°33.86 \$04°18.93 04°3.96 03°48.97	-14.6' -14.7' -14.7' -14.7' -14.8' -14.8' -14.9' -14.9' -14.9' -15.0'	56.0 56.0 56.0 56.1 56.1 56.1 56.1 56.2 56.2 56.2
7 8 9 10 111 12 13 14 15 16 17 18 19 20	268° 24.39 283° 24.43 298° 24.47 313° 24.51 328° 24.55 343° 24.59 358° 24.63 13° 24.67 28° 24.71 43° 24.75 58° 24.79 73° 24.83 88° 24.88 103° 24.92	N17° 59.92 59.29 58.66 • 58.02 57.39 56.76 N17° 56.13 55.50 54.86 • 54.23 53.59 52.96 N17° 52.32 51.69	73° 51.51 88° 25.48 102° 59.46 117° 33.44 132° 7.44 146° 41.44 161° 15.45 175° 49.46 190° 23.47 204° 57.49 219° 31.51 234° 5.53 248° 39.55	15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0'	07°1.45 06°46.85 06°32.21 06°17.54 06°2.82 S05°48.08 05°33.30 05°18.49 05°3.64 04°48.77 04°33.86 S04°18.93 04°3.96	-14.6' -14.7' -14.7' -14.7' -14.8' -14.8' -14.9' -14.9' -15.0' -15.0'	56.0 56.0 56.0 56.1 56.1 56.1 56.1 56.2 56.2 56.2
7 8 9 10 11 12 13 14 15 16 17	268° 24.39 283° 24.43 298° 24.47 313° 24.51 328° 24.59 358° 24.63 13° 24.67 28° 24.71 43° 24.75 58° 24.79 73° 24.83 88° 24.88 103° 24.92 118° 24.96	N17° 59.92 59.29 58.66 · 58.02 57.39 56.76 N17° 56.13 55.50 54.86 · 54.23 53.59 52.96 N17° 52.32 51.69 51.05	73° 51.51 88° 25.48 102° 59.46 117° 33.44 146° 41.44 161° 15.45 175° 49.46 190° 23.47 204° 57.49 219° 31.51 234° 5.53 248° 39.55 263° 13.57	15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0'	07°1.45 06°46.85 06°32.21 06°17.54 06°2.82 \$05°48.08 05°33.30 05°18.49 05°3.64 04°48.77 04°33.86 \$04°18.93 04°3.96 03°48.97	-14.6' -14.7' -14.7' -14.7' -14.8' -14.8' -14.9' -14.9' -15.0' -15.0'	56.0 56.0 56.0 56.1 56.1 56.1 56.1 56.2 56.2 56.2 56.2 56.3
7 8 9 110 111 112 113 114 115 116 117 118 119 220 221	268° 24.39 283° 24.43 298° 24.47 313° 24.51 328° 24.59 358° 24.63 13° 24.67 28° 24.71 43° 24.75 58° 24.79 73° 24.83 88° 24.88 103° 24.92 118° 24.96 133° 25.00	N17° 59.92 59.29 58.66 58.02 57.39 56.76 N17° 56.13 55.50 54.86 54.23 53.59 52.96 N17° 52.32 51.69 51.05 50.41	73° 51.51 88° 25.48 102° 59.46 117° 33.44 146° 41.44 161° 15.45 175° 49.46 190° 23.47 204° 57.49 219° 31.51 234° 5.53 248° 39.55 263° 13.57 277° 47.59	15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0' 15.0'	07°1.45 06°46.85 06°32.21 06°17.54 06°2.82 505°48.08 05°33.30 05°18.49 05°3.64 04°48.77 04°33.86 504°18.93 04°3.96 03°48.97 03°33.96	-14.6' -14.7' -14.7' -14.8' -14.8' -14.8' -14.9' -14.9' -15.0' -15.0' -15.0'	56.0 56.0 56.0 56.0 56.1 56.1 56.1 56.2 56.2 56.2 56.3 56.3

Lat.	Twi	light	Sunrise	Sunset	Tw	ilight
Lat.	Naut.	Civil	Junise	Juliset	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	////
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 60°	06:37	07:29	08:17	15:56	16:45	17:37
	1			ı		

Lat.		Moonris	e		Moonse	t
Lat.	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	17:02	18:33	20:02	08:52	08:53	08:53

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	16-18
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	100-94%
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	

Sum   GHA   Dec   CHA   Dec	h	Aries	Venus	Mars	Jupiter	Saturn
0 310°93.97 3898 N01°51.10 22°25.54 N25°23.80 320°5.05 N18°5.05 51.5 311°0.06 27.09 1 2 340°41.30 150°91.04 4871 25°75.80 24.00 210°57.45 5.60.13 310°0.05 27.08 1 3 10°42.25 195°9.70 48.07 125°75.80 24.00 210°57.45 5.60.13 31°1.05 5.7 31°4.12 27.08 1 4 10°42.25 195°9.70 46 2.25 195°9.70 46 2.25 195°9.70 5.00 24.05 210°57.45 5.60.13 31°1.05 5.00 27.08 1 5 22°46.09 10°9.88 65.00 300°28.09 24.35 22°1.46 5.00 11°1.70 0.77 2.00 1 6 40°51.15 22°11.00 41 4.15 31°1.20 12°1	Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
1 393°38.83 1 166°9.34						
2 340"41.30 1.30"93.5					105°55 55 56 15	
3 359°43.76 195°9.70 40 40 72°27.73 - 24.14 225°9.35 - 58.88 31°12.03 1.77.86 40 10°12.05 195°9.70 40 40 10°27.98 40 40 10°27.89 40 40 10°27.89 10°27.48 10°27.48 10°27.89 10°27.48 10						
10   40   42   19   99   70   46   26   287   28   60   24   25   24   19   25   55   74   366   14   12   12   12   13   16   16   16   16   16   16   16						
5 22*46.09   120*10.88   45.04   302*28.69   24.36   256*314   55.60   11*17.00   77.22   78.00   24.15   22*11.00   79.00   30.00   3				287° 28.06 24.25		
6 d"6115 2291006 NO1*2811 317:29.32 UN3*2447 271*504 N18*5547 26*19.49 N03*27.80   7 55*38.22 200*10.24 41.36 347*30.58 24.69 301*8.44 55.19 56*24.66 27.77   8 70*56.08 225*10.42 41.36 347*30.58 24.69 301*8.44 55.19 56*24.66 27.77   11 10*13.47 70*0*10.77 77.00 1 27.20 2 2.20 2.20 2.40 310*10.75 55.05 71*2.04 4.27.73   11 10*13.47 70*0*10.77 77.00 1 27.20 2 2.20 2.20 2.40 310*10.75 55.05 71*2.04 4.27.73   12 10*13.47 70*0*10.77 77.00 1 27.20 2 2.20 2.20 2.20 4 13*11.10 10*13.47   13 146*13.40 30*11.34 35.24 62*33.74 25.24 16*18.32 54.50 131*35.60 7.70   14 16*10.86 345*11.53 34.01 77*33.7 52.53 31*20.22 54.37 140*34.0 N03*27.67   15 176*13.33 30*11.34 35.24 62*33.74 25.24 16*18.32 54.50 131*35.60 7.70   15 176*13.33 31*31.34 35.24 62*33.74 25.24 16*18.32 54.50 131*35.60 7.70   15 176*13.33 31*31.34 35.24 62*33.74 25.24 16*18.32 54.50 131*35.60 7.70   15 176*13.33 31*31.34 35.24 62*33.74 25.24 16*18.32 54.50 131*35.60 7.70   15 176*13.33 31*31.34 35.24 62*33.74 25.24 16*18.32 54.50 131*35.60 7.70   15 176*13.33 31*31.34 10*12.17 32.79 92*35.01 2.25.46 46*22.12 54.32 16*16*18.50 7.70   15 176*13.33 31.34 10*12.17 32.79 92*35.01 2.25.46 46*22.12 55.43 16*4.86 7.27   16 221*20.72 45*12.27 NO1*29.11 137*95.90 NO3*25.78 91*27.81 18*23.22 205*4.92 NO3*27.58   10 220*27.31 80*012.48 22.22 197*39.43 26.21 15*35.40 13.83 22 205*4.92 NO3*27.58   20 221*25.65 75*12.65 26.66 16*78.81 7 2.59 91*30.10 13.93 13.35 22.22 197*39.43 26.21 15*35.40 15*33.40 225*4.20 2.74   22 280*39.88 105*13.03 24.22 197*39.43 26.21 15*35.40 53.27 26*59.27 27.45   23 290*39.80 120*13.22 2.29 91*27*00 25.31 16*35.40 53.31 22*22*17.5 27.45   23 290*39.80 120*13.22 2.29 91*27*00 25.31 16*35.40 53.31 22*27.25 27.45   23 290*39.80 120*13.22 2.99 12*4*00.5 25.31 16*35.40 53.31 22*27.75 27.45   23 290*39.80 120*13.22 2.99 12*4*00.5 25.31 16*35.40 53.31 22*27.75 27.45   23 290*39.80 120*13.22 2.99 12*4*00.5 25.31 16*35.40 52.27 27.56   24 314*13.41 16*11.75 10*13.25 10*13.41 10*12.77 20*27.40 10*13.41 10*12.77 20*27.40 10*13.41 10*12.77 20*27.40 10*13.41						
7 55°53.02 240°10.24 4.25°9 332°29.95 24.98 286°6.94 55.33 41°21.97 27.77 9 85°58.54 229°10.61 4.014 2°31.22 2.480 301°8.84 59.19 56°14.46 27.79 9 85°58.54 229°10.61 4.014 2°31.22 2.480 301°8.01 5.03 5.042 60°24.33 27.71 10 101°10.10 288°10.70 38.90 17.73.88 24.91 331°12.03 5.555 71°29.94 2.27.73 11 131°5.04 318°11.16 100°56.46 47°33.11 103°25.13 101°14.30 54.92 60°24.33 27.71 12 131°5.04 318°11.16 100°56.46 47°33.11 103°25.13 10°16.33 101°54.64 116°34.60 103°27.67 13 146°40.330°11.35 3.40 10 77°38.37 25.35 31°00.22 54.37 146°39.37 27.07 14 161°10.66 35°41.15 3.40 10 77°38.37 25.35 31°00.22 54.37 146°39.37 27.07 15 170°13.33 0°11.71 32.79 92°35.01 2.54.6 46°22.12 54.23 16°1.83 6.00 170°4.34 27.60 16 191°15.79 1511.90 31.56 107°35.64 25.57 61°24.02 54.00 170°4.34 27.56 18 19 221°20.78 8 5712.06 20°40.10 131°35.02 27.57 61°24.02 54.00 170°4.83 27.56 18 19 221°20.78 8 5712.06 26.66 107°38.34 25.57 61°24.02 54.00 170°4.34 27.56 18 19 221°20.78 8 5712.06 26.66 107°38.37 25.59 121°3.10 15.36 20°48.38 100°37.73 27.22 221°30.58 10°31.30 24.22 197°39.33 6.21 151°35.00 250°48.39 100°31.31 222 22.99 121°3.01 53.54 222 221°30.58 100°31.30 24.22 197°39.33 6.21 151°35.00 250°44.39 27.49 22.22 221°30.58 100°31.30 24.22 197°39.33 6.21 151°35.00 53.27 220°49.27 40°00.20 130°32.22 2.29 92 122°40.06 26.31 166°37.30 53.33 222°17.57 27.43 224 249.30 100°31.30 24.22 197°39.33 6.21 151°35.00 53.27 220°49.00 100°31.22 2.29 221°40.00 20.31 151°35.00 180°3.29 927°42.44 103°32.74 123°40.70 180°3.20					271°5 04 N18°55 47	
8 70°8608 320°10.12 4.13.6 347°30.8 24.09 30°18.84 55.19 56°24.6 27.75 9 88°8.84 270°10.61 4.014 27.81.2 2.24.08 310°10.73 5.50.5 7.76.64 27.75 10 10°10.10 13.05 30°10.79 3.00 11.73 3.00 10.75 3.00 11.73 3.00 10.75 3.76 3.23.24 2.00 2.340°14.53 54.22 66°29.43 27.71 11 11.116°13.47 300°10.79 3.76 9 3.23.24 2.00 2.340°14.53 54.78 10.113°1.01 27.69 11.11 11.116°1.00 3.00 11.11 11.116°1.00 3.00 11.11 11.116°1.00 3.00 11.11 11.116°1.00 3.00 11.116°1					286°6 04 55.33	
9 85°89.54 270°10.61 · 40.14 2°31.22 · 24.00 316°10.73 · 55.05 71°36.94 · 27.73 11 1116°3.47 93.01 118°3.47 93.01 118°3.47 118.15 24.01 331°11.26 34.01 118°3.47 331°11.27 94 315°11.16 010°3.64 0.00°27.67 131 146°3.40 350°11.38 3.2.46 62°3.37 4 25.24 15°12.33 1°16.43 118°5.46 315°11.00°12.06 0.73 118°3.11 128°5.40 315°11.00°12.06 0.73 118°3.11 128°5.40 315°11.00°12.06 0.73 118°3.11 128°3.40 315°11.00°12.06 0.73 118°3.11 128°3.40 315°11.00°12.01 122.79 92°5.01 24.00 118°3.25 44.23 118°3.80 27.65 118°13.23 418°3.40 313°13.80 92°7.65 118°13.23 418°3.40 313°13.80 92°7.65 118°13.23 418°3.40 313°13.80 92°7.65 118°13.23 418°3.40 313°13.80 92°7.65 118°13.23 418°3.40 313°13.80 92°7.65 118°13.23 418°13.33 418°					301°8 84 55 10	
101°101   101°101   380°1070   389   17°3185   249   381°1263   54.78   101°1301   2776   111   116°347   300°1097   37.69   33°248   25.02   346°1463   54.78   101°1301   2776   121°131°544   315°11.16   300°1376   33°248   25.02   346°1463   18°5464   116°1440   N03°2767   13°110   300°1137   35.24   30°2131   30°2131   35.24   10°1823   54.00   131°36   27.65   116°1838   366°11.53   3.01   77°34.31   2.536   31°20.22   54.37   146°28.37   27.62   27.65   116°1876   30°11.53   3.01   77°34.31   2.536   31°20.22   54.37   146°28.37   27.62   27.65   116°1876   30°12.09   30°10.09   3						
11 116*347 315*116*04*10*15*064 67*33.11*12*3*13.1*12*6.34*10*13*13*116*340*10*32*26*1 13 146*9.40 315*11.6*10*36.0*30*11.34* 35.24* 62*33.74* 25.24* 10*18.32* 54.50* 131*36*6.09* 27.65* 13 146*9.40* 30*11.34* 35.24* 62*33.74* 25.24* 10*18.32* 54.50* 131*36*6.09* 27.65* 14 10*10*10*86 30*11.10* 3.30*10* 77*35* 25.55* 31*20*22* 54.37* 140*30.7* 27.62* 15 17*10*11.35* 30*10* 30*10* 30*10* 27.55* 30*10* 22* 54.57* 140*30.7* 27.62* 16 17*10*11.35* 30*10* 30*10* 30*10* 22*35.40* -25.57* 76*25.5* 53.55* 10*16*41.80* -27.63* 18 221*20*72* 45*12.27* N01*911* 137*36*50* N23*25.89* 106*29.7* 53.55* 20*649.22* N03*27.58* 20*25*12*56* 57* 57* 25.89* 106*29.7* 13.36* 22*25* 108*25*25* 20*25*25*25* 26.66* 167*38.17* 25.99* 106*29.7* 13.36* 22*25* 18.12* 27.52* 22* 22*26*26*28.11* 90*12.84* 25.44* 132*28.80* 26.10* 130*323.1* 53.30* 22*56*7.8* 27.47* 22* 22*39*30.84* 120*13.2* 2.99* 22*40.06* 26.31* 165*35.3* 53.2* 20*56*56* 32* 27.47* 23.2* 23.29* 33.04* 120*13.2* 2.99* 22*40.06* 26.31* 165*35.3* 53.37* 20*5*92.7* 27.45* 23.2* 23.29* 33.04* 120*13.2* 2.99* 22*40.06* 26.31* 165*35.3* 53.37* 20*27* 27.45* 23.2* 23.						
12 131°5.94 315°1.16 M01°56.46 47°3.31 N23°2.513 1°16.43 N23°2.67 131 146°3.40 N30°2.76 131 146°10.86 330°11.37 3.54 10 77°3.37 2.53 13°10.02 54.37 146°3.37 2.76 14 161°10.86 336°11.53 3.40 177°3.37 2.53 31°10.02 54.37 146°3.37 2.76 15 191°15.79 151.90 31.56 107°3.50 4.25.57 76°2.59 53.93 191°4.68 2.76 11 190°4.51 19						
13 166°8.40 330°11.34 35.24 62°33.74 25.24 16°18.32 54.50 131°36.89 27.65 15 176°13.33 360 345°11.53 34.01 7734.37 25.55 31°20.22 54.37 16°39.37 27.02 15 176°13.33 51 05°11.09 33.56 10735.64 25.57 61°24.02 54.00 54.03 17 206°18.26 30°12.09 33.56 10735.64 25.57 61°24.02 54.00 54.03 17 206°18.26 30°12.09 33.56 10735.64 25.57 61°24.02 54.00 1076°43.13 27.36 18 221°20.72 45°12.27 N01°29.11 13735.80 312.55.59 108°36.11 18753.82 206°48.32 N02°7.54 19 221°20.67 241 19 00°12.68 27.60 1173°38.07 12.55.99 108°36.11 18753.82 206°48.32 N02°7.54 19 222°20.67 281 19 00°12.68 27.60 1173°3.17 25.59 118°35.81 1.33 4.00 12.00 1		110 3.47	300 10.97 37.09			101 31.91 27.09
14   161°10.86   345°11.53   30   11.71   32.79   27.85   31°20.22   54.23   164°39.37   27.62   161   191°15.79   161°11.86   315°11.90   30.34   12.27   60.72   6						
15   176°13.33   15°11.71   2.79   92°35.01   25.46   46°22.12   54.23   161°41.48   27.88   17   206°13.69   15°11.09   33.45   12°36.27   25.67   67°25.99   55.99   101°46.48   27.88   17   206°13.69   205°27.27   25°27.27					10 18.32 54.50	
16   191°15.79   15°11.90   30.34   120°32.60   27.56   76°24.02   54.09   176°43.4   27.86   18   221°20.72   20   231.10   230°3.21   137°3.60   N23°25.78   91°27.81   15°45.82   206°49.32   N03°27.54   20   25°23.18   60°12.46   27.89   123°3.53   25.89   106°21.07   15°3.68   221°51.81   27.52   20   25°23.18   60°12.48   27.89   227.58   20   21°3.06   21°3.58   226°24.83   236°52.92   27.49   22   221°3.06   120°13.22   22.99   221°4.00   20.31   166°3.33   53.40   236°13.22   22.99   221°4.00   20.31   166°3.33   53.77   266°59.27   27.45   22   221°3.06   120°13.22   22.99   221°4.00   20.31   166°3.30   53.77   266°59.27   27.45   22   221°4.00   20.31   166°3.30   53.77   266°59.27   27.45   22   221°4.00   20.31   166°3.30   20.31   221°15.67   221°27.40   221°27.40   221°4.00   20.31					31 20.22 54.37	
17   206" 18.26   30" 12.09   30.34   122" 36.27   25.67   76" 25.92   53.99   191" 46.83   27.56   192   236" 23.18   60" 12.46   27.28   152" 37.53   25.89   106" 29.71   181" 53.82   221" 51.81   27.52   221" 30.58   105" 13.03   24.22   27.99   121" 31.61   53.54   53.68   221" 51.81   27.52   221" 30.58   105" 13.03   24.22   27.99   212" 40.06   26.11   151" 35.40   53.54   53.27   266" 59.27   27.45   23   296" 33.24   20" 33.24   22   231" 30.58   105" 13.03   24.22   27.99   212" 40.06   26.31   166" 37.30   53.13   282" 17.5   27.43   27.45						
18   221°20.72   45°12.27   N01°20.11   137°36.06   N23°25.78   91°27.81   N18°58.82   200°40.32   N03°27.54     19   230°32.81   60°12.46   62.789   161°38.17   25.99   121°31.61   53.54   230°54.29   27.49     22   220°30.08   120°13.22   22.29   120°30.08   26.01   136°33.51   53.54   230°54.29   27.49     22   220°30.08   120°13.22   22.99   221°40.06   26.01   136°33.51   53.40   230°53.04   120°13.22   22.99   221°40.06   26.01   136°33.51   53.40   230°53.04   120°13.22   22.99   221°40.06   26.01   136°33.51   53.40   230°53.04   120°13.22   22.99   221°40.06   26.01   136°33.51   53.40   232°17.75   27.43     Mer. pass. 03.17   ν.0.2′ d-1.2′ m-4.28   ν.0.6′ d0.1′ m1.30   ν.1.9′ d-0.1′ m-1.78   ν.2.5′ d-0.0′ m0.63     Mom   GHA   GHA   Dec   GHA   Dec   GHA   Dec   133°36.40   131°35.00   131°35.00   131°35.00   130°37.07   150°13.00   20.54   227°40.00′ N23°26.42   181°39.20   N18°52.99   227°4.24   N03°27.41   230°47.07   150°13.00   10.00°13.20   130°40.10   130°27.20   130						ı
19   296"23.18   60"12.46   57.69   152"37.53   25.89   106"29.71   53.68   221"51.81   27.52   27.49   212"266"28.11   53.06   231"51.81   27.52   27.49						
20   251"25.65   75"12.65   25.66   167"38.17   25.99   121"31.61   53.54   236"54.29   27.49   221   266"52.11   99"12.84   2.54.44   182"38.80   2.61.21   151"35.54   2.55"6.59   27.47   22   228"30.58   165"13.03   24.22   127"30.83   26.21   151"35.54   0.53.27   266"59.27   27.45   27.46   27.4						
22   286   286   11   99   12.84						
22 281°30.58   105°13.03						
Mor pass. 03:17						
Mon						
Mon         GHA         CHA         Dec         GHA         Dec           3 31°37.97         150°13.60         20.54         242°41.33         26.52         106°41.10         52.88         312°6.73         22°3.82           3 36°42.90         180°13.99         118.09         272°42.59         2.633         21°14.40         52.72         23°79.22         27.36           4 11°43.36         19°14.18         16.67         28°74.22         2.633         241°46.79         52.44         31°14.12         27.32         26°44.86         26.94         256°48.69         52.30         12°16.68         27.29         7.75°5.72         240°14.76         11.91         332°45.13         27.14         286°52.49         52.03         42°21.66         27.25         36°57.58         240°14.76         11.91         332°45.13         27.44         286°52.49         52.03         42°21.66         27.25         36°57.68         27°15.16         10.74         2°46.39         27.75         313°58.18         51.74         51.91 <td>23</td> <td>296°33.04</td> <td>120°13.22 22.99</td> <td>212°40.06 26.31</td> <td>166°37.30 53.13</td> <td>282°1.75 27.43</td>	23	296°33.04	120°13.22 22.99	212°40.06 26.31	166°37.30 53.13	282°1.75 27.43
1 316°35.50 135°13.41 N01°21.77 22°40.70 N23°26.42 131°39.20 N18°52.99 32°6.73 2.731 1 326°377 130°13.60 20.54 242°41.33 2.65.2 186°41.10 5.285 31.673 2.731 2 341°40.43 165°13.79 19.32 25°741.96 26.63 211°43.00 52.72 32°6.92.2 27.36 3 356°42.20 180°13.99 1.80.99 272°42.95 2.663 211°43.00 52.72 32°6.92.2 27.36 4 11°45.36 195°14.18 16.87 286°74.23 2.664.3 241°46.79 52.44 37°14.20 27.32 5 26°47.83 210°14.137 15.64 302°43.86 2.694 256°48.66 52.30 12°16.68 27.29 6 41°50.29 225°14.57 N01°14.42 31°74.49 N23°27.04 271°50.59 N18°52.17 27°19.17 N03°27.27 7 55°52.75 240°14.76 13.19 332°45.13 271.14 286°52.40 52.03 42°21.66 27.25 8 71°55.22 255°14.96 11.97 347°45.76 72.24 301°54.38 51.89 57°24.15 27.23 10 102°0.15 285°15.35 9.52 172°40.00 27.24 301°54.38 51.89 57°24.15 27.23 11 117°2.61 300°15.55 8.29 32°47.66 27.55 347°0.08 51.48 102°31.62 27.16 12 132°5.07 315°15.75 N01°7.07 47°48.29 N23°27.76 51.49 11.47°34.11 N03°27.13 13 147°74 330°15.15 4.62 77°49.56 27.85 347°0.08 51.48 102°31.62 27.16 16 192°14.93 13°16.54 2.17 10°50.83 28.05 62°9.37 11°3.08 51.20 132°36.09 27.10 15 177°12.47 016.34 3.39 92°9.20 7.79 5 47°7.67 5.50.2 102°14.58 27.00 16 192°14.93 13°16.55 2.21 10°50.83 28.05 62°9.37 185°5.07 177°44.00 27.04 17 20°717.39 30°16.75 01°0.99 12°251.04 N23°23.27 85 22°13.37 N18°50.51 20°740.56 N03°26.99 19 27°22.32 60°17.15 58.49 15°29.73 28.83 180°24.75 50.27 22°15.54 20°9. 21 20°27.75 90°17.55 5.60 41 182°34.04 122°17.17 50.23 23°77.80 10°27.80 49.96 22°27.50 49.96 22°27.10 50°17.75 55.02 22°59.77 10°518.89 40°17.50 23°1.27°1.40 10°2.28 22°27.10 50°17.75 55.02 22°59.77 10°518.89 10°18.8	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
1 316°35.50 135°13.41 N01°21.77 22°40.70 N23°26.42 131°39.20 N18°52.99 32°6.73 2.731 1 326°377 130°13.60 20.54 242°41.33 2.65.2 186°41.10 5.285 31.673 2.731 2 341°40.43 165°13.79 19.32 25°741.96 26.63 211°43.00 52.72 32°6.92.2 27.36 3 356°42.20 180°13.99 1.80.99 272°42.95 2.663 211°43.00 52.72 32°6.92.2 27.36 4 11°45.36 195°14.18 16.87 286°74.23 2.664.3 241°46.79 52.44 37°14.20 27.32 5 26°47.83 210°14.137 15.64 302°43.86 2.694 256°48.66 52.30 12°16.68 27.29 6 41°50.29 225°14.57 N01°14.42 31°74.49 N23°27.04 271°50.59 N18°52.17 27°19.17 N03°27.27 7 55°52.75 240°14.76 13.19 332°45.13 271.14 286°52.40 52.03 42°21.66 27.25 8 71°55.22 255°14.96 11.97 347°45.76 72.24 301°54.38 51.89 57°24.15 27.23 10 102°0.15 285°15.35 9.52 172°40.00 27.24 301°54.38 51.89 57°24.15 27.23 11 117°2.61 300°15.55 8.29 32°47.66 27.55 347°0.08 51.48 102°31.62 27.16 12 132°5.07 315°15.75 N01°7.07 47°48.29 N23°27.76 51.49 11.47°34.11 N03°27.13 13 147°74 330°15.15 4.62 77°49.56 27.85 347°0.08 51.48 102°31.62 27.16 16 192°14.93 13°16.54 2.17 10°50.83 28.05 62°9.37 11°3.08 51.20 132°36.09 27.10 15 177°12.47 016.34 3.39 92°9.20 7.79 5 47°7.67 5.50.2 102°14.58 27.00 16 192°14.93 13°16.55 2.21 10°50.83 28.05 62°9.37 185°5.07 177°44.00 27.04 17 20°717.39 30°16.75 01°0.99 12°251.04 N23°23.27 85 22°13.37 N18°50.51 20°740.56 N03°26.99 19 27°22.32 60°17.15 58.49 15°29.73 28.83 180°24.75 50.27 22°15.54 20°9. 21 20°27.75 90°17.55 5.60 41 182°34.04 122°17.17 50.23 23°77.80 10°27.80 49.96 22°27.50 49.96 22°27.10 50°17.75 55.02 22°59.77 10°518.89 40°17.50 23°1.27°1.40 10°2.28 22°27.10 50°17.75 55.02 22°59.77 10°518.89 10°18.8		CUA	CHA De-	CUA De-	CUA De-	CHA D
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17   207°17.39   30°16.75   01°0.94   122°51.46   28.15   77°11.47   50.65   192°46.56   27.02     18   222°19.86   45°16.95   N00°59.72   137°52.10   N23°28.25   92°13.37   N18°50.51   207°49.05   N03°26.99     19   237°22.32   60°17.15   58.49   152°52.73   28.35   107°15.27   50.37   222°51.54   26.97     20   252°24.79   75°17.35   57.27   167°53.37   28.44   122°17.17   50.23   237°54.03   26.95     21   267°27.25   90°17.55   56.04   182°54.00   28.54   137°19.06   50.10   252°65.52   26.99     22   282°29.71   105°17.76   54.82   197°54.64   28.64   152°20.96   49.96   267°59.02   26.90     23   297°32.18   120°17.96   53.59   212°55.27   28.74   167°22.86   49.82   283°1.51   26.88     Mer.pass. 03:13   \( \nu \) \(		192° 14.93				
18         222° 19.86         45° 16.95         N00° 59.72         137° 52.10         N23° 28.25         92° 13.37         N18° 50.51         20° 49.05         N03° 26.99           19         237° 22.32         60° 17.15         58.49         152° 52.73         28.35         10° 15.27         50.37         222° 51.54         26.97           20         252° 24.79         75° 17.35         57.27         16° 53.37         28.44         122° 17.17         50.23         23° 56.52         2.26° 92           21         267° 27.25         90° 17.55         5.60.4         182° 54.00         28.64         137° 19.06         50.10         252° 56.52         26.99           22         282° 99.71         105° 17.76         54.82         197° 56.64         28.64         152° 20.96         26° 99.02         26° 99.02         26.99           22         282° 97.11         150° 17.76         54.52         197° 56.64         28.64         152° 20.96         49.98         283° 15.1         26.88           Mer.pass. 03:13         0.02.7 d-1.2′ m-4.29         0.06′ d0.1′ m1.30         0.1.9′ d-0.1′ m-1.78         0.25′ d-0.0′ m0.62           Tue         GHA         Dec         GHA         Dec         GHA         Dec         CHA         0.0°		207° 17.39				ı
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20 252°24.79 75°17.35 57.27 167°53.37 28.44 122°17.17 50.23 237°54.03 26.95 21 267°27.25 90°17.55 · 56.04 182°54.00 · 28.54 137°19.06 · 50.10 252°56.52 · 26.92 22 282°29.71 105°17.76 54.82 197°54.64 28.64 152°20.96 49.96 267°59.02 26.90 23 297°32.18 120°17.96 53.59 212°55.27 28.74 167°22.86 49.82 283°1.51 26.88   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 0 312°34.64 135°18.17 N00°52.37 227°55.91 N23°28.83 182°24.76 N18°49.68 298°4.00 N03°26.85 1 327°37.11 150°18.37 51.14 242°56.54 28.93 197°26.66 49.94 313°6.49 26.83 234°29.57 165°18.58 49.92 257°57.18 29.02 212°28.66 49.94 328°8.98 26.81 3 357°42.03 180°18.78 · 48.69 272°57.81 · 29.12 222°30.46 · 49.27 343°11.48 · 26.78 4 12°44.50 195°18.99 47.47 287°58.45 29.21 242°32.35 49.93 13°16.46 26.73 16.6 242°49.43 225°19.14 N00°45.02 317°59.72 N23°29.40 272°36.15 N18°48.85 28°18.99 N03°26.71 7 57°51.89 240°19.61 43.79 333°0.35 29.50 287°38.05 48.71 43°21.45 26.68 8 72°54.35 255°19.82 42.57 348°0.99 29.59 302°39.95 48.57 58°23.94 26.66 10 102°59.28 285°20.24 40.12 18°2.26 29.78 332°43.75 48.40 73°26.43 · 26.66 11 118°1.75 300°20.45 38.89 33°2.89 29.87 347°45.65 48.40 118°33.91 N03°26.55 12 133°4.21 315°20.67 N00°37.67 48°3.53 N23°29.96 2°47.54 N18°48.80 118°33.91 N03°26.55 12 133°4.21 315°20.67 N00°37.67 48°3.53 N23°29.96 2°47.54 N18°48.02 118°33.91 N03°26.55 11 118°11.60 0°21.30 · 34.00 93°5.44 · 30.24 47°55.24 · 47.60 163°41.40 · 26.49 16 163°9.14 · 345°21.09 35.22 78°4.80 30.15 32°51.34 47.74 148°38.90 26.51 15 178°11.60 0°21.30 · 34.00 93°5.44 · 30.24 47°55.24 · 47.60 163°41.40 · 26.49 12 133°4.21 315°20.67 N00°37.67 48°3.53 N23°29.96 2°47.54 N18°48.02 118°33.91 N03°26.55 11 118°11.60 0°21.30 · 34.00 93°5.44 · 30.24 47°55.24 · 47.60 163°41.40 · 26.49 12 133°4.10 · 15°21.52 · 32.77 108°6.07 30.33 0.51 32°51.34 · 47.74 148°38.90 26.51 15 178°11.60 0°21.30 · 34.00 93°5.44 · 30.24 47°55.24 · 47.60 163°41.40 · 26.49 12 18°62.23 9.90 0 25°23.88 9 10.5°22.81 25.63 130.92 0.50 138°6.68 2						
21 267°27.25 90°17.55 · 56.04 182°54.00 · 28.54 137°19.06 · 50.10 252°56.52 · 26.92 22 282°29.71 105°17.76 54.82 197°54.64 28.64 152°20.96 49.96 267°59.02 26.90 23 297°32.18 120°17.96 53.59 212°55.27 28.74 167°22.86 49.82 283°1.51 26.88 Mer.pass. 03:13 \$\nu 0.2' \ d-1.2' \ m-4.29 \$\nu 0.6' \ d0.1' \ m1.30 \$\nu 1.9' \ d-0.1' \ m-1.78 \$\nu 2.5' \ d-0.0' \ m0.62\$  \[ \textbf{Tue} \textbf{GHA} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GHA} \textbf{Dec} \textbf{GPA} \textbf{Ol}						
22   282°29.71   105°17.76   54.82   197°54.64   28.64   152°20.96   49.96   267°59.02   26.90						
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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 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td></t<>						
Tue         GHA         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec           0         312° 34.64         135° 18.17         N00° 52.37         227° 55.91         N23° 28.83         182° 24.76         N18° 49.68         298° 4.00         N03° 26.85           1         327° 37.11         150° 18.37         51.14         242° 56.54         28.93         197° 26.66         49.54         313° 6.49         26.83           2         342° 39.57         166° 18.58         49.92         257° 57.18         29.02         212° 28.56         49.40         328° 8.98         26.81           3         357° 42.03         180° 18.78         × 48.69         272° 57.81         × 29.12         227° 30.46         × 49.27         343° 11.48         × 26.78           4         12° 44.50         195° 18.99         47.47         287° 58.45         29.21         242° 32.35         49.13         358° 13.97         26.76           5         27° 46.96         210° 19.20         46.24         302° 59.08         29.31         257° 34.25         48.99         13° 16.46         26.73           7         57° 51.89         240° 19.61         43.79         333° 0.35 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
0         312° 34.64         135° 18.17         N00° 52.37         227° 55.91         N23° 28.83         182° 24.76         N18° 49.68         298° 4.00         N03° 26.85           1         327° 37.11         150° 18.37         51.14         242° 56.54         28.93         197° 26.66         49.54         313° 6.49         26.83           2         342° 39.57         165° 18.58         49.92         257° 57.18         29.02         212° 28.56         49.40         328° 8.98         26.81           3         357° 42.03         180° 18.78         · 48.69         272° 57.81         29.12         227° 30.46         · 49.27         343° 11.48         · 26.78           4         12° 44.50         195° 18.99         47.47         287° 58.45         29.21         242° 32.35         49.13         358° 13.97         26.76           5         27° 46.96         210° 19.20         46.24         302° 59.08         29.31         257° 34.25         48.99         13° 16.46         26.73           6         42° 49.43         225° 19.41         N00° 45.02         317° 59.72         N23° 29.40         272° 36.15         N18° 48.85         28° 18.95         N03° 26.71           7         57° 51.89         240° 19.61         43.79 <t< td=""><td>ivier.</td><td>Jass. US:13</td><td>νυ.∠ α-1.∠ m-4.∠9</td><td>νο.υ αυ.1 m1.3υ</td><td>ν1.9 u-U.1 M-1./δ</td><td>ν2.5 α-0.0 m0.02</td></t<>	ivier.	Jass. US:13	νυ.∠ α-1.∠ m-4.∠9	νο.υ αυ.1 m1.3υ	ν1.9 u-U.1 M-1./δ	ν2.5 α-0.0 m0.02
0         312° 34.64         135° 18.17         N00° 52.37         227° 55.91         N23° 28.83         182° 24.76         N18° 49.68         298° 4.00         N03° 26.85           1         327° 37.11         150° 18.37         51.14         242° 56.54         28.93         197° 26.66         49.54         313° 6.49         26.83           2         342° 39.57         165° 18.58         49.92         257° 57.18         29.02         212° 28.56         49.40         328° 8.98         26.81           3         357° 42.03         180° 18.78         · 48.69         272° 57.81         29.12         227° 30.46         · 49.27         343° 11.48         · 26.78           4         12° 44.50         195° 18.99         47.47         287° 58.45         29.21         242° 32.35         49.13         358° 13.97         26.76           5         27° 46.96         210° 19.20         46.24         302° 59.08         29.31         257° 34.25         48.99         13° 16.46         26.73           6         42° 49.43         225° 19.41         N00° 45.02         317° 59.72         N23° 29.40         272° 36.15         N18° 48.85         28° 18.95         N03° 26.71           7         57° 51.89         240° 19.61         43.79 <t< td=""><td>Tue</td><td>СΗΔ</td><td>GHA Dec</td><td>GHA Dec</td><td>GHA Dec</td><td>GHA Dec</td></t<>	Tue	СΗΔ	GHA Dec	GHA Dec	GHA Dec	GHA Dec
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5       27°46.96       210°19.20       46.24       302°59.08       29.31       257°34.25       48.99       13°16.46       26.73         6       42°49.43       225°19.41       N00°45.02       317°59.72       N23°29.40       272°36.15       N18°48.85       28°18.95       N03°26.71         7       57°51.89       240°19.61       43.79       333°0.35       29.50       287°38.05       48.71       43°21.45       26.68         8       72°54.35       255°19.82       42.57       348°0.99       29.59       302°39.95       48.57       58°23.94       26.66         9       87°56.82       270°20.03       · 41.34       3°1.62       29.69       317°41.85       · 48.44       73°26.43       · 26.64         10       102°59.28       285°20.24       40.12       18°2.26       29.78       332°43.75       48.30       88°28.93       26.61         11       118°1.75       300°20.45       38.89       33°2.89       29.87       347°45.65       48.16       103°31.42       26.59         12       133°4.21       315°20.67       N00°37.67       48°3.53       N23°29.96       2°47.54       N18°48.02       118°33.91       N03°26.56         13       148°6.68 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td></t<>						
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7         57°51.89         240°19.61         43.79         333°0.35         29.50         287°38.05         48.71         43°21.45         26.68           8         72°54.35         255°19.82         42.57         348°0.99         29.59         302°39.95         48.57         58°23.94         26.66           9         87°56.82         270°20.03         · 41.34         3°1.62         · 29.69         317°41.85         · 48.44         73°26.43         · 26.64           10         102°59.28         285°20.24         40.12         18°2.26         29.78         332°43.75         48.30         88°28.93         26.61           11         118°1.75         300°20.45         38.89         33°2.89         29.87         347°45.65         48.16         103°31.42         26.59           12         133°4.21         315°20.67         N00°37.67         48°3.53         N23°29.96         2°47.54         N18°48.02         118°33.91         N03°26.56           13         148°6.68         330°20.88         36.45         63°4.17         30.06         17°49.44         47.88         133°36.41         26.54           14         163°9.14         345°21.09         35.22         78°4.80         30.15         32°51.34						
8       72°54.35       255°19.82       42.57       348°0.99       29.59       302°39.95       48.57       58°23.94       26.66         9       87°56.82       270°20.03       · 41.34       3°1.62       · 29.69       317°41.85       · 48.44       73°26.43       · 26.64         10       102°59.28       285°20.24       40.12       18°2.26       29.78       332°43.75       48.30       88°28.93       26.61         11       118°1.75       300°20.45       38.89       33°2.89       29.87       347°45.65       48.16       103°31.42       26.59         12       133°4.21       315°20.67       N00°37.67       48°3.53       N23°29.96       2°47.54       N18°48.02       118°33.91       N03°26.56         13       148°6.68       330°20.88       36.45       63°4.17       30.06       17°49.44       47.88       133°3.641       26.54         14       163°9.14       345°21.09       35.22       78°4.80       30.15       32°51.34       47.74       148°38.90       26.51         15       178°11.60       0°21.30       · 34.00       93°5.44       · 30.24       47°53.24       · 47.60       163°41.40       · 26.49         16       193°14.07       15°21.						
9       87°56.82       270°20.03       · 41.34       3°1.62       · 29.69       317°41.85       · 48.44       73°26.43       · 26.64         10       102°59.28       285°20.24       40.12       18°2.26       29.78       332°43.75       48.30       88°28.93       26.61         11       118°1.75       300°20.45       38.89       33°2.89       29.87       347°45.65       48.16       103°31.42       26.59         12       133°4.21       315°20.67       N00°37.67       48°3.53       N23°29.96       2°47.54       N18°48.02       118°33.91       N03°26.56         13       148°6.68       330°20.88       36.45       63°4.17       30.06       17°49.44       47.88       133°36.41       26.54         14       163°9.14       345°21.09       35.22       78°4.80       30.15       32°51.34       47.74       148°38.90       26.51         15       178°11.60       0°21.30       · 34.00       93°5.44       · 30.24       47°53.24       · 47.60       163°41.40       · 26.49         16       193°14.07       15°21.52       32.77       108°6.07       30.33       62°55.14       47.47       178°43.89       26.46         17       208°16.53       30°21						
10       102°59.28       285°20.24       40.12       18°2.26       29.78       332°43.75       48.30       88°28.93       26.61         11       118°1.75       300°20.45       38.89       33°2.89       29.87       347°45.65       48.16       103°31.42       26.59         12       133°4.21       315°20.67       N00°37.67       48°3.53       N23°29.96       2°47.54       N18°48.02       118°33.91       N03°26.56         13       148°6.68       330°20.88       36.45       63°4.17       30.06       17°49.44       47.88       133°36.41       26.54         14       163°9.14       345°21.09       35.22       78°4.80       30.15       32°51.34       47.74       148°38.90       26.51         15       178°11.60       0°21.30       · 34.00       93°5.44       · 30.24       47°53.24       · 47.60       163°41.40       · 26.49         16       193°14.07       15°21.52       32.77       108°6.07       30.33       62°55.14       47.47       178°43.89       26.46         17       208°16.53       30°21.73       31.55       123°6.71       30.42       77°57.04       47.33       193°46.38       26.44         18       223°19.00       45°21.95 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
11       118°1.75       300°20.45       38.89       33°2.89       29.87       347°45.65       48.16       103°31.42       26.59         12       133°4.21       315°20.67       N00°37.67       48°3.53       N23°29.96       2°47.54       N18°48.02       118°33.91       N03°26.56         13       148°6.68       330°20.88       36.45       63°4.17       30.06       17°49.44       47.88       133°36.41       26.54         14       163°9.14       345°21.09       35.22       78°4.80       30.15       32°51.34       47.74       148°38.90       26.51         15       178°11.60       0°21.30       · 34.00       93°5.44       · 30.24       47°53.24       · 47.60       163°41.40       · 26.49         16       193°14.07       15°21.52       32.77       108°6.07       30.33       62°55.14       47.47       178°43.89       26.46         17       208°16.53       30°21.73       31.55       123°6.71       30.42       77°57.04       47.33       193°46.38       26.44         18       223°19.00       45°21.95       N00°30.32       138°7.35       N23°30.51       92°58.94       N18°47.19       208°48.88       N03°26.41         19       238°21.46						
12       133°4.21       315°20.67       N00°37.67       48°3.53       N23°29.96       2°47.54       N18°48.02       118°33.91       N03°26.56         13       148°6.68       330°20.88       36.45       63°4.17       30.06       17°49.44       47.88       133°36.41       26.54         14       163°9.14       345°21.09       35.22       78°4.80       30.15       32°51.34       47.74       148°38.90       26.51         15       178°11.60       0°21.30       · 34.00       93°5.44       · 30.24       47°53.24       · 47.60       163°41.40       · 26.49         16       193°14.07       15°21.52       32.77       108°6.07       30.33       62°55.14       47.47       178°43.89       26.46         17       208°16.53       30°21.73       31.55       123°6.71       30.42       77°57.04       47.33       193°46.38       26.44         18       223°19.00       45°21.95       N00°30.32       138°7.35       N23°30.51       92°58.94       N18°47.19       208°48.88       N03°26.41         19       238°21.46       60°22.16       29.10       153°7.98       30.60       108°0.84       47.05       223°51.37       26.39         20       253°23.92						
13       148°6.68       330°20.88       36.45       63°4.17       30.06       17°49.44       47.88       133°36.41       26.54         14       163°9.14       345°21.09       35.22       78°4.80       30.15       32°51.34       47.74       148°38.90       26.51         15       178°11.60       0°21.30       34.00       93°5.44       30.24       47°53.24       47.60       163°41.40       26.49         16       193°14.07       15°21.52       32.77       108°6.07       30.33       62°55.14       47.47       178°43.89       26.46         17       208°16.53       30°21.73       31.55       123°6.71       30.42       77°57.04       47.33       193°46.38       26.44         18       223°19.00       45°21.95       N00°30.32       138°7.35       N23°30.51       92°58.94       N18°47.19       208°48.88       N03°26.41         19       238°21.46       60°22.16       29.10       153°7.98       30.60       108°0.84       47.05       223°51.37       26.39         20       253°23.92       75°22.38       27.87       168°8.62       30.69       123°2.74       46.91       238°53.87       26.36         21       268°26.39       90°22.60						
$\begin{array}{cccccccccccccccccccccccccccccccccccc$						
15       178°11.60       0°21.30       ·· 34.00       93°5.44       ·· 30.24       47°53.24       ·· 47.60       163°41.40       ·· 26.49         16       193°14.07       15°21.52       32.77       108°6.07       30.33       62°55.14       47.47       178°43.89       26.46         17       208°16.53       30°21.73       31.55       123°6.71       30.42       77°57.04       47.33       193°46.38       26.44         18       223°19.00       45°21.95       N00°30.32       138°7.35       N23°30.51       92°58.94       N18°47.19       208°48.88       N03°26.41         19       238°21.46       60°22.16       29.10       153°7.98       30.60       108°0.84       47.05       223°51.37       26.39         20       253°23.92       75°22.38       27.87       168°8.62       30.69       123°2.74       46.91       238°53.87       26.36         21       268°26.39       90°22.60       ·· 26.65       183°9.26       ·· 30.78       138°4.64       ·· 46.77       253°56.36       ·· 26.34         22       283°28.85       105°22.81       25.43       198°9.89       30.87       153°6.53       46.63       268°58.86       26.31         23       298°31.32						
16       193°14.07       15°21.52       32.77       108°6.07       30.33       62°55.14       47.47       178°43.89       26.46         17       208°16.53       30°21.73       31.55       123°6.71       30.42       77°57.04       47.33       193°46.38       26.44         18       223°19.00       45°21.95       N00°30.32       138°7.35       N23°30.51       92°58.94       N18°47.19       208°48.88       N03°26.41         19       238°21.46       60°22.16       29.10       153°7.98       30.60       108°0.84       47.05       223°51.37       26.39         20       253°23.92       75°22.38       27.87       168°8.62       30.69       123°2.74       46.91       238°53.87       26.36         21       268°26.39       90°22.60       · 26.65       183°9.26       · 30.78       138°4.64       · 46.77       253°56.36       · 26.34         22       283°28.85       105°22.81       25.43       198°9.89       30.87       153°6.53       46.63       268°58.86       26.31         23       298°31.32       120°23.03       24.20       213°10.53       30.96       168°8.43       46.49       284°1.35       26.29						ſ
17       208°16.53       30°21.73       31.55       123°6.71       30.42       77°57.04       47.33       193°46.38       26.44         18       223°19.00       45°21.95       N00°30.32       138°7.35       N23°30.51       92°58.94       N18°47.19       208°48.88       N03°26.41         19       238°21.46       60°22.16       29.10       153°7.98       30.60       108°0.84       47.05       223°51.37       26.39         20       253°23.92       75°22.38       27.87       168°8.62       30.69       123°2.74       46.91       238°53.87       26.36         21       268°26.39       90°22.60       · 26.65       183°9.26       · 30.78       138°4.64       · 46.77       253°56.36       · 26.34         22       283°28.85       105°22.81       25.43       198°9.89       30.87       153°6.53       46.63       268°58.86       26.31         23       298°31.32       120°23.03       24.20       213°10.53       30.96       168°8.43       46.49       284°1.35       26.29						
18       223°19.00       45°21.95       N00°30.32       138°7.35       N23°30.51       92°58.94       N18°47.19       208°48.88       N03°26.41         19       238°21.46       60°22.16       29.10       153°7.98       30.60       108°0.84       47.05       223°51.37       26.39         20       253°23.92       75°22.38       27.87       168°8.62       30.69       123°2.74       46.91       238°53.87       26.36         21       268°26.39       90°22.60       · · 26.65       183°9.26       · · 30.78       138°4.64       · · 46.77       253°56.36       · · 26.34         22       283°28.85       105°22.81       25.43       198°9.89       30.87       153°6.53       46.63       268°58.86       26.31         23       298°31.32       120°23.03       24.20       213°10.53       30.96       168°8.43       46.49       284°1.35       26.29	16					
19       238°21.46       60°22.16       29.10       153°7.98       30.60       108°0.84       47.05       223°51.37       26.39         20       253°23.92       75°22.38       27.87       168°8.62       30.69       123°2.74       46.91       238°53.87       26.36         21       268°26.39       90°22.60       · · 26.65       183°9.26       · · 30.78       138°4.64       · · 46.77       253°56.36       · · 26.34         22       283°28.85       105°22.81       25.43       198°9.89       30.87       153°6.53       46.63       268°58.86       26.31         23       298°31.32       120°23.03       24.20       213°10.53       30.96       168°8.43       46.49       284°1.35       26.29	17	$208^{\circ}16.53$	30°21.73 31.55	123°6.71 30.42	77°57.04 47.33	193°46.38 26.44
20       253°23.92       75°22.38       27.87       168°8.62       30.69       123°2.74       46.91       238°53.87       26.36         21       268°26.39       90°22.60       26.65       183°9.26       30.78       138°4.64       46.77       253°56.36       26.34         22       283°28.85       105°22.81       25.43       198°9.89       30.87       153°6.53       46.63       268°58.86       26.31         23       298°31.32       120°23.03       24.20       213°10.53       30.96       168°8.43       46.49       284°1.35       26.29	18	223°19.00	45°21.95 N00°30.32	138°7.35 N23°30.51	92°58.94 N18°47.19	
20       253°23.92       75°22.38       27.87       168°8.62       30.69       123°2.74       46.91       238°53.87       26.36         21       268°26.39       90°22.60       26.65       183°9.26       30.78       138°4.64       46.77       253°56.36       26.34         22       283°28.85       105°22.81       25.43       198°9.89       30.87       153°6.53       46.63       268°58.86       26.31         23       298°31.32       120°23.03       24.20       213°10.53       30.96       168°8.43       46.49       284°1.35       26.29	19	238°21.46	60°22.16 29.10	153°7.98 30.60	108°0.84 47.05	223°51.37 26.39
21       268° 26.39       90° 22.60       · · · 26.65       183° 9.26       · · · 30.78       138° 4.64       · · · 46.77       253° 56.36       · · · 26.34         22       283° 28.85       105° 22.81       25.43       198° 9.89       30.87       153° 6.53       46.63       268° 58.86       26.31         23       298° 31.32       120° 23.03       24.20       213° 10.53       30.96       168° 8.43       46.49       284° 1.35       26.29	20	253°23.92	75°22.38 27.87	168°8.62 30.69	123°2.74 46.91	
22       283°28.85       105°22.81       25.43       198°9.89       30.87       153°6.53       46.63       268°58.86       26.31         23       298°31.32       120°23.03       24.20       213°10.53       30.96       168°8.43       46.49       284°1.35       26.29						
23 298°31.32 120°23.03 24.20 213°10.53 30.96 168°8.43 46.49 284°1.35 26.29						
ivier.pass. ub:09				-		
	Mer.p	pass. 03:09	νυ.2' d-1.2' m-4.30	$\nu$ 0.6′ $d$ 0.1′ $m$ 1.30	$\nu$ 1.9′ <i>d</i> -0.1′ m-1.78	ν2.5′ d-0.0′ m0.62

	Jiais	
	SHA	Dec
Alpheratz	357°33.19	29°14.24
Ankaa	353° 5.62	-42°9.37
Schedar	349°29.26	56° 40.86
Diphda	348°45.82	-17°50.21
Achernar	335°19.06	-57°5.72
Hamal	327°49.67	23°35.29
Polaris	313°25.41	89°22.24
Acamar	$315^{\circ}10.82$	-40°11.54
Menkar	314°4.82	4°11.75
Mirfak	$308^{\circ}26.48$	49°57.17
Aldebaran	290°38.29	16°33.78
Rigel	281°2.82	-8°10.11
Capella	280°20.26	46°1.35
Bellatrix	278°21.70	6°22.50
Elnath	278°0.46	28°37.74
Alnilam	275°36.63	-1°10.99
Betelgeuse	270°50.92	7°24.78
Canopus	263°52.27	-52°42.35
Sirius	258°25.39 255°5.18	-16°45.02 -29°0.34
Adhara Procyon	255 5.18 244°49.78	-29 0.34 5°9.47
Pollux	244 49.76 243°16.07	27°57.72
Avior	243 16.07 234°14.86	-59°35.61
Suhail	234 14.60 222°45.80	-43° 32.38
Miaplacidus	221°38.96	-69°49.60
Alphard	217°46.79	-8°46.40
Regulus	207°33.36	11°50.29
Dubhe	193°39.96	61°36.61
Denebola	182°23.84	14° 25.49
Gienah	175°42.43	-17°41.43
Acrux	172°59.02	-63° 15.05
Gacrux	171°50.49	-57° 15.97
Alioth	166°12.06	55°49.16
Spica	158°21.02	-11°18.04
Alkaid	152°51.07	49°11.06
Hadar	148°34.22	-60°30.35
Menkent	$147^{\circ}56.11$	-36°30.21
Arcturus	145°46.74	19°2.77
Rigil Kent.	139°38.48	-60°56.99
Kochab	137° 19.74	74°3.01
Zuben'ubi	136°54.54	-16°9.18
Alphecca	126°2.53	26° 37.67
Antares	112°14.04 107°6.74	-26° 29.52
Atria Sabik	107°6.74 102°1.06	-69°4.71 -15°45.46
Shaula	96°8.29	-15 45.40 -37°7.44
Rasalhague	90 0.29 95°57.09	12° 32.55
Eltanin	90°41.16	51° 29.29
Kaus Aust.	83°30.44	-34° 22.31
Vega	80°31.97	38° 48.64
Nunki	75°45.80	-26° 15.77
Altair	61°58.36	8°56.43
Peacock	53°3.07	-56° 38.87
Deneb	49°24.45	45° 22.58
Enif	$33^{\circ}37.19$	9°59.93
Al Na'ir	$27^{\circ}30.83$	-46°49.72
Fomalhaut	$15^{\circ}12.77$	-29° 28.65
Scheat	13°43.64	28°13.66
Markab	13°28.32	15°20.99
Aug 02 Sun	SHA	Mer.pass
Venus	184°32.62	14:59
Mars	276°49.17	08:50
Jupiter	230°17.29	11:55
Saturn	345°28.21	04:15
Aug 03 Mon	SHA	Mer.pass
Venus	183°37.91	14:59
Mars Jupiter	276°5.19 230°3.70	08:49
Saturn	345°28.74	11:52 04:11
		04.11
Aug 04 Tue	SHA	Mer.pass
Venus	182°43.52	14:59
Mars	275°21.26	08:48
Jupiter	229°50.12	11:49
Saturn	345°29.36	04:07

Horizontal parallax

Venus: Mars: 0.2 0.1

Stars

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h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°25.13	N17°48.50	321°29.61	15.0'	S02°48.77	-15.1'	56.3'
1	193°25.18	47.86	336°3.60	15.0'	02°33.66	-15.1'	56.3'
2	208°25.22	47.22	350°37.58	15.0'	02°18.53 02°3.38	-15.2'	56.4
3 4	223°25.27 238°25.31	• • 46.58 45.94	5° 11.56 19° 45.52	15.0' 15.0'	02°3.38 01°48.21	-15.2' -15.2'	56.4' 56.4'
5	253°25.35	45.30	34° 19.48	14.9'	01°43.21	-15.2'	56.4
6	268°25.40	N17° 44.66	48°53.42	14.9'	S01° 17.82	-15.2'	56.5'
7	283°25.44	44.02	63°27.34	14.9'	$01^{\circ}2.60$	-15.2'	56.5'
8	298°25.49	43.38	78°1.25	14.9'	00°47.36	-15.2'	56.5'
9 10	313°25.54 328°25.58	· · 42.73 42.09	92°35.15 107°9.02	14.9' 14.9'	00°32.11 00°16.85	-15.3' -15.3'	56.5' 56.5'
11	343°25.63	41.45	107 9.02 121° 42.88	14.8'	500°1.57	-15.3'	56.6'
12	358°25.67	N17°40.80	136° 16.72	14.8'	N00°13.71	15.3'	56.6'
13	13°25.72	40.16	150° 50.53	14.8'	00°29.01	15.3'	56.6'
14	28°25.77 43°25.82	39.51 •• 38.86	165°24.33 179°58.10	14.8' 14.7'	00°44.31 00°59.63	15.3' 15.3'	56.6' 56.7'
15 16	43 25.82 58°25.86	38.22	179 58.10 194°31.84	14.7'	00 59.63 01°14.94	15.3'	56.7'
17	73°25.91	37.57	209°5.56	14.7'	01°30.27	15.3'	56.7'
18	88°25.96	N17°36.92	223°39.25	14.7'	N01°45.60	15.3'	56.7'
19	103°26.01	36.28	238° 12.91	14.6'	02°0.93	15.3'	56.7'
20 21	118°26.06 133°26.10	35.63	252°46.55 267°20.15	14.6' 14.6'	02°16.27 02°31.61	15.3' 15.3'	56.8' 56.8'
21	133°26.10 148°26.15	· · 34.98 34.33	267°20.15 281°53.72	14.6 14.5'	02°31.61 02°46.95	15.3'	56.8
23	163°26.20	33.68	296° 27.25	14.5'	03°2.29	15.3'	56.8
	SD = 15.8'	d = -0.6'		SI	D = 15.4'		
Mon	GHA	Dec	GHA	ν 14 Γ'	Dec	d 15.27	HP
0 1	178°26.25 193°26.30	N17°33.03 32.38	311°0.75 325°34.22	14.5' 14.4'	N03°17.62 03°32.96	15.3' 15.3'	56.9' 56.9'
2	208° 26.35	31.73	340°7.65	14.4'	03°48.29	15.3	56.9'
3	223°26.40	• • 31.07	354°41.04	14.3'	04°3.61	15.3'	56.9'
4	238°26.45	30.42	9°14.38	14.3'	04° 18.93	15.3'	56.9'
5	253°26.50	29.77 N17°29.11	23° 47.69 38° 20.96	14.3'	04°34.25 N04°49.55	15.3'	57.0'
6 7	268°26.56 283°26.61	28.46	52°54.18	14.2' 14.2'	05°4.85	15.3' 15.3'	57.0' 57.0'
8	298°26.66	27.81	67°27.36	14.1'	05°20.13	15.3'	57.0'
9	313°26.71	• • 27.15	82°0.49	14.1'	05°35.40	15.3'	57.1'
10	328°26.76	26.50	96°33.57	14.0'	05°50.66	15.2'	57.1'
11	343°26.82 358°26.87	25.84 N17°25.18	111°6.60 125°39.59	14.0' 13.9'	06°5.91 N06°21.14	15.2' 15.2'	57.1' 57.1'
12 13	13°26.92	24.53	125 39.59 140°12.52	13.9'	06°36.36	15.2'	57.1 57.2'
14	28°26.97	23.87	154° 45.40	13.8'	06°51.55	15.2'	57.2'
15	43°27.03	• • 23.21	$169^{\circ}18.23$	13.8'	$07^{\circ}6.73$	15.2'	57.2'
16	58°27.08	22.55	183°51.00	13.7'	07°21.89	15.1'	57.2'
17 18	73°27.14 88°27.19	21.89 N17°21.24	198°23.71 212°56.37	13.7' 13.6'	07°37.03 N07°52.14	15.1' 15.1'	57.3' 57.3'
19	103°27.24	20.58	212 30.37 227°28.96	13.5'	08°7.24	15.1	57.3'
20	118°27.30	19.91	242°1.50		08°22.30		57.3'
21	133°27.35	• • 19.25	256° 33.97	13.4'	08°37.35	15.0'	57.4'
22	148°27.41 163°27.46	18.59	271°6.39 285°38.73	13.3'	08°52.36 09°7.35	15.0'	57.4
23	$\frac{163^{\circ}27.46}{\text{SD} = 15.8'}$	17.93	285 38.73	13.3'		15.0'	57.4'
	$5D = 15.8^{\circ}$	d = -0.7'		- 51	D = 15.5'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0 1	178°27.52 193°27.58	N17° 17.27 16.61	300°11.02 314°43.23	13.2' 13.1'	N09°22.30 09°37.23	14.9' 14.9'	57.4' 57.4'
2	208°27.63	15.94	329° 15.38	13.1	09°52.12	14.9'	57.5'
3	223°27.69	• • 15.28	343°47.45	13.0'	$10^{\circ}6.98$	14.8'	57.5'
4	238°27.75	14.61	358° 19.46	12.9'	10°21.81	14.8'	57.5'
5 6	253°27.80 268°27.86	13.95 N17° 13.28	12°51.40 27°23.26	12.9' 12.8'	10°36.60 N10°51.35	14.8' 14.7'	57.5' 57.6'
о 7	268°27.86 283°27.92	N17 13.28 12.62	41°55.04	12.8	11°6.06	14.7' 14.7'	57.6'
8	298°27.98	11.95	56° 26.75	12.6'	11°20.73	14.6'	57.6'
9	313°28.03	• • 11.29	$70^{\circ}58.39$	12.6'	11°35.36	14.6'	57.6'
10	328°28.09	10.62	85°29.94	12.5'	11°49.95	14.5'	57.7'
11 12	343°28.15 358°28.21	9.95 N17 <sup>o</sup> 9.28	100°1.42 114°32.81	12.4' 12.3'	12°4.50 N12°19.00	14.5' 14.5'	57.7' 57.7'
13	13°28.27	8.61	114 32.01 129°4.12	12.3	12°33.45	14.5	57.7'
14	28°28.33	7.95	143°35.35	12.1'	12°47.85	14.4'	57.8'
15	43°28.39	• • 7.28	158°6.50	12.1'	13°2.20	14.3'	57.8'
16	58°28.45	6.61	172°37.55	12.0'	13° 16.50	14.2'	57.8'
17 18	73°28.51 88°28.57	5.93 N17°5.26	187°8.53 201°39.41	11.9' 11.8'	13°30.75 N13°44.95	14.2' 14.1'	57.8' 57.9'
19	103°28.63	4.59	216° 10.20	11.7'	13° 59.09	14.1	57.9'
20	118°28.69	3.92	$230^{\circ}40.91$	11.6'	14° 13.17	14.0'	57.9'
21	133°28.75	• • 3.25	245°11.52	11.5'	14°27.19	14.0'	57.9'
22 23	148°28.81 163°28.87	2.57 1.90	259° 42.04 274° 12.46	11.4' 11.3'	14°41.16 14°55.06	13.9' 13.8'	58.0' 58.0'
23	SD = 15.8'	d = -0.7'	217 12.40		D = 15.7'	13.0	50.0
	<u> </u>	<u>u = -0.1</u>		اد	J — 13.1		

Lat.	Twi	Twilight		Sunset	Twi	light
Lat.	Naut.	Civil	Sunrise	Juliset	Civil	Naut.
<b>N</b> 72°						
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:31	07:22	08:10	16:03	16:51	17:42

Lat.		Moonris	e		Moonset			
Lat.	Sun	Mon	Tue	Sun	Mon	Tue		
N 72°	20:41	20:06	19:17	08:40	10:50	13:16		
<b>N</b> 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° 45°	20:59 21:01	21:13 21:20	21:29 21:41	08:46 08:46	10:01	11:19 11:09		
					09:56			
N 40°	21:03	21:26	21:51	08:47	09:52	11:01		
35° 30°	21:04	21:31	22:00	08:47	09:49	10:53		
20°	21:05 21:08	21:35 21:43	22:07 22:20	08:47 08:48	09:46 09:41	10:47 10:36		
N 10°	21:10	21:50	22:32	08:48	09:41	10:30		
0°	21:11	21:56	22:43	08:49	09:32	10:18		
<b>S</b> 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		
<b>S</b> 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		
<b>S</b> 60°	21:31	23:03		08:52	08:52	08:52		

	Sun			Moon			
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	19-21	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	89-72%	
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		

h	Aries	Venu	S	M	ars	Jup	oiter	Sat	urn	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	
0 0	313° 33.78		00°22.98	228° 11.17	N23°31.04	183° 10.33	N18°46.36	299°3.85	N03° 26.26	
1	328° 36.24	150°23.47	21.75	243°11.80	31.13	198°12.23	46.22	314°6.35	26.24	
2	343°38.71	165°23.69	20.53	243 11.60 258° 12.44	31.13	213° 14.13	46.22	329°8.84	26.24	İ
3	358° 41.17		. 19.30	273° 13.08	31.31	213 14.13 228°16.03	. 45.94	344°11.34	. 26.19	İ
3 4	13° 43.64	180 23.91 195°24.13	18.08	273 13.08 288°13.72	31.39	243°17.93	45.80	359°13.83	26.16	
5	28° 46.10	210°24.35	16.86	303°14.35	31.48	258° 19.83	45.66	14°16.33	26.13	
6	43° 48.56		00°15.63	318° 14.99	N23°31.56	273°21.73	N18°45.52	29°18.83	N03° 26.11	
7	58° 51.03	240°24.79	14.41	333° 15.63	31.65	288°23.63	45.38	44°21.32	26.08	
8	73° 53.49	255°25.01	13.18	348° 16.27	31.74	303°25.53	45.24	59°23.82	26.06	
9	88° 55.96		• • 11.96	3° 16.91	• • 31.82	318°27.43	• • 45.11	74°26.32	. 26.03	
10	103° 58.42	285°25.46	10.74	18° 17.54	31.90	333°29.33	44.97	89°28.82	26.01	
11	119°0.89	300°25.69	9.51	33°18.18	31.99	348°31.23	44.83	104°31.31	25.98	
12	134°3.35	315°25.91	N00°8.29	48° 18.82	N23°32.07	3°33.13	N18°44.69	119°33.81	N03°25.95	1
13	149°5.81	330°26.14	7.06	63° 19.46	32.16	18°35.03	44.55	134°36.31	25.93	
14	164°8.28	345°26.36	5.84	78°20.10	32.24	33°36.93	44.41	149°38.81	25.90	
15	179° 10.74	0°26.59	• • 4.62	93°20.73	• • 32.32	48°38.83	• • 44.27	164°41.30	25.87	
16	194° 13.21	15°26.82	3.39	108°21.37	32.40	63°40.72	44.13	179°43.80	25.85	
17	209° 15.67	30°27.05	2.17	123°22.01	32.49	78°42.62	43.99	194°46.30	25.82	
18	224° 18.13		N00°0.94	138°22.65	N23°32.57	93°44.52	N18°43.85	209°48.80	N03°25.80	
19	239° 20.60		S00°0.28	153°23.29	32.65	108°46.42	43.71	224°51.30	25.77	
20	254°23.06	75° 27.73	1.50	168°23.93	32.73	123°48.32	43.57	239°53.80	25.74	
21	269°25.53	90°27.96	• • 2.73	183°24.57	• • 32.81	138°50.22	• • 43.43	254°56.30	• • 25.72	
22	284°27.99	105°28.19	3.95	198°25.21	32.89	153°52.12	43.30	269°58.80	25.69	
23	299°30.45	120°28.42	5.17	213°25.85	32.97	168°54.02	43.16	285°1.30	25.66	
N 4	02.05	0.0/ 1.1.0/	4.21	0.6/ 10	1/ 1.20	1.0/ 1.0	1/ 1.70	0.5/ 1.0	0.0' m0.61	
ivier.p	bass. 03:05	$\nu$ 0.2' d-1.2'	m-4.31	$\nu$ 0.6 au	.1′ m1.30	$\nu$ 1.9° $a$ -0.	.1′ m-1.78	$\nu$ 2.5° $a$ -0	0.0° m0.61	.   N
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	
0	314°32.92	135°28.66	S00°6.40	228°26.49	N23°33.05	183°55.92	N18°43.02	300°3.79	N03°25.63	
1	329°35.38	150°28.89	7.62	243°27.13	33.13	198°57.82	42.88	315°6.29	25.61	
2	344° 37.85	165°29.12	8.84	258°27.77	33.21	213°59.72	42.74	330°8.79	25.58	
3	359°40.31	180°29.36	• 10.07	273°28.40	• • 33.29	229°1.62	• • 42.60	345°11.29	• • 25.55	
4	14°42.78	195°29.59	11.29	288°29.04	33.37	244°3.52	42.46	0°13.79	25.53	
5	29°45.24	210°29.82	12.51	303°29.68	33.44	259°5.42	42.32	$15^{\circ}16.29$	25.50	
6	44°47.70		00°13.74	318° 30.32	N23°33.52	274°7.32	N18°42.18	$30^{\circ}18.80$	N03°25.47	
7	59°50.17	240°30.30	14.96	333°30.96	33.60	289° 9.22	42.04	45°21.30	25.44	
8	74°52.63	255°30.53	16.18	348°31.60	33.68	304°11.12	41.90	60°23.80	25.42	
9	89°55.10		• • 17.41	3°32.25	• • 33.75	319°13.02	• • 41.76	75°26.30	•• 25.39	
10	104°57.56	285°31.01	18.63	18°32.89	33.83	334°14.92	41.62	90°28.80	25.36	
11	120°0.02	300°31.24	19.85	33°33.53	33.90	349°16.82	41.48	105°31.30	25.33	
12	135°2.49		$00^{\circ}21.07$	48°34.17	N23°33.98	4°18.72	N18°41.34	120°33.80	N03°25.31	
13	150°4.95	330°31.72	22.30	63°34.81	34.05	19°20.63	41.20	135°36.30	25.28	
14	165°7.42	345°31.96	23.52	78°35.45	34.13	34°22.53	41.06	150°38.81	25.25	
15	180°9.88	0°32.20	• • 24.74	93°36.09	• • 34.20	49°24.43	• • 40.92	165°41.31	• • 25.22	
16	195° 12.35	15°32.44	25.96	108°36.73	34.28	64°26.33	40.78	180°43.81	25.20	
17	210° 14.81	30°32.68	27.19	123°37.37	34.35	79°28.23	40.64	195°46.31	25.17	.
18	225° 17.27		00°28.41	138°38.01	N23°34.42	94°30.13	N18°40.50	210°48.81	N03°25.14	F
19	240°19.74	60°33.17	29.63	153°38.65	34.50	109°32.03	40.36	225°51.32	25.11	
20	255°22.20	75°33.41	30.85	168°39.30	34.57	124°33.93	40.22	240°53.82	25.08	h
21	270°24.67		• • 32.08	183°39.94	• • 34.64	139°35.83	• • 40.08	255°56.32	• • 25.06	
22	285°27.13	105°33.90	33.30	198° 40.58	34.71	154°37.73	39.95	270°58.83	25.03	
23	300°29.59	120°34.15	34.52	213°41.22	34.79	169°39.63	39.81	286°1.33	25.00	.
Mer.p	pass. 03:01	u0.2′ $d$ 1.2′	m-4.32	$\nu$ 0.6′ d0	.1′ m1.30	$\nu$ 1.9′ d-0.	.1′ m-1.78	$\nu 2.5' \ d-0$	.0' m0.61	
										.
	6114	6114			_	6114	_		_	
Fri	GHA	<b>GHA</b> 135°34.39 <b>S</b>	<b>Dec</b> 00°35.74	<b>GHA</b> 228°41.86	<b>Dec</b> N23°34.86	<b>GHA</b> 184°41.53	Dec N19° 20, 67	GHA	<b>Dec</b> N03° 24.97	
0	315°32.06						N18°39.67	301°3.83		
1	330°34.52	150°34.64	36.96	243°42.50	34.93	199°43.43	39.53	316°6.34	24.94	
2	345°36.99 0°39.45	165°34.88	38.19	258° 43.15 273° 43.79	35.00	214°45.33 229°47.23	39.39	331°8.84	24.91	
3 4	0°39.45 15°41.92	180°35.13 195°35.38	· · 39.41 40.63	273°43.79 288°44.43	· · 35.07 35.14	229°47.23 244°49.13	· · 39.25 39.11	346°11.34 1°13.85	· · 24.88 24.86	Au
	30°44.38	195°35.38 210°35.63	40.63 41.85	288° 44.43 303° 45.07	35.14 35.21	244 49.13 259°51.03	39.11 38.97	1°13.85 16°16.35	24.86	Au
5 6	30°44.38 45°46.84		41.85 00°43.07	303°45.07 318°45.72	35.21 N23°35.28	259°51.03 274°52.94	38.97 N18°38.83	31°18.86	24.83 N03°24.80	
7	45°46.84 60°49.31	225°35.88 S	44.30	318° 45.72 333° 46.36	N23 35.28 35.35	274 52.94 289°54.84	38.69	46°21.36	24.77	
8	60°49.31 75°51.77	240°36.12 255°36.37	44.30 45.52	333°46.36 348°47.00	35.35 35.41	289°54.84 304°56.74	38.69 38.55	46°21.36 61°23.87	24.77 24.74	
9	75 51.77 90°54.24		45.52 • 46.74	348 47.00 3°47.65	35.41	304 56.74 319°58.64	38.55	76°26.37	. 24.74	<u> </u>
10	90 54.24 105°56.70	285°36.88	47.96	18° 48.29	35.55	335° 0.54	38.27	91°28.88	24.71	Αι
11	120° 59.16	300°37.13	49.18	33°48.93	35.62	350°2.44	38.12	91 20.00 106°31.38	24.06	
12	136° 1.63		00°50.40	48° 49.57	N23°35.68	5° 4.34	N18°37.98	100° 31.30 121° 33.89	N03° 24.62	
13	150°1.03 151°4.09	330°37.63	51.62	63°50.22	35.75	20° 6.24	37.84	136°36.39	24.59	
14	166°6.56	345°37.89	52.84	78° 50.86	35.82	35°8.14	37.70	150° 30.39 151° 38.90	24.57	
15	181°9.02		• • 54.07	93°51.50	• • 35.88	50°10.04	37.56	166°41.40	• • 24.54	
16	196° 11.49	15°38.40	55.29	108° 52.15	35.95	65°11.95	37.42	181°43.91	24.51	_   <i>*</i>
17	211° 13.95	30°38.65	56.51	123° 52.79	36.01	80°13.85	37.42	196°46.42	24.48	
18	226° 16.41		00°57.73	138°53.44	N23°36.08	95°15.75	N18°37.14	211°48.92	N03°24.45	
19	241°18.88		00°58.95	153°54.08	36.14	110°17.65	37.00	226°51.43	24.42	
20	256°21.34	75°39.42	01°0.17	168°54.72	36.21	125°19.55	36.86	241°53.94	24.39	<u> </u>
21	271°23.81	90°39.68	. 1.39	183°55.37	36.27	140°21.45	36.72	256°56.44	24.36	
22	286° 26.27	105°39.93	2.61	198° 56.01	36.34	155°23.35	36.58	271°58.95	24.33	
23	301°28.73	120°40.19	3.83	213°56.66	36.40	170°25.26	36.44	287°1.46	24.30	
ivier.p	pass. 02:57	$\nu$ 0.2′ d1.2′	ın-4.33	$\nu$ 0.0′ $d0$	.1′ m1.29	$\nu$ 1.9° $d$ -0.	.1′ m-1.78	ν2.5′ d-0	0.0′ m0.60	

	Stars	
	SHA	Dec
Alpheratz	357°33.17	29°14.25
Ankaa Schedar	353°5.60 349°29.23	-42°9.37 56°40.87
Diphda	348°45.81	-17°50.21
Achernar	335°19.03	-57° 5.72
Hamal Polaris	327°49.65 313°23.74	23°35.29 89°22.24
Acamar	315°10.80	-40°11.54
Menkar	314°4.80	4°11.75
Mirfak Aldebaran	308°26.45 290°38.27	49°57.17 16°33.79
Rigel	290 36.27 281°2.80	-8°10.10
Capella	280°20.23	46°1.34
Bellatrix Elnath	278°21.68 278°0.45	6°22.50 28°37.74
Alnilam	276 0.45 275°36.62	-1°10.99
Betelgeuse	$270^{\circ}50.91$	$7^{\circ}24.79$
Canopus	263°52.25	-52°42.34
Sirius Adhara	258°25.37 255°5.17	-16°45.01 -29°0.33
Procyon	244°49.77	5°9.47
Pollux	243°16.06	27°57.72
Avior Suhail	234°14.85 222°45.80	-59°35.59 -43°32.37
Miaplacidus	221°38.96	-69°49.58
Alphard	217°46.79	-8°46.39
Regulus	207°33.36 193°39.97	11°50.29 61°36.60
Dubhe Denebola	193 39.97 182°23.85	14°25.49
Gienah	175°42.44	-17°41.43
Acrux	172°59.04	-63°15.04
Gacrux Alioth	171°50.51 166°12.09	-57°15.96 55°49.15
Spica	158°21.03	-11°18.03
Alkaid	152°51.09	49°11.06
Hadar Menkent	148°34.24 147°56.13	-60°30.34 -36°30.21
Arcturus	147 50.15 145°46.75	19°2.77
Rigil Kent.	139°38.51	-60°56.98
Kochab Zuben'ubi	137°19.80 136°54.55	74°3.01 -16°9.18
Alphecca	126° 2.55	26°37.68
Antares	112°14.06	-26°29.51
Atria Sabik	107°6.77 102°1.07	-69°4.71 -15°45.45
Shaula	96°8.30	-37°7.44
Rasalhague	95°57.10	$12^{\circ}32.56$
Eltanin	90°41.18	51°29.30 -34°22.32
Kaus Aust. Vega	83°30.45 80°31.98	-34° 22.32 38° 48.65
Nunki	75°45.81	-26°15.77
Altair	61°58.36	8°56.44
Peacock Deneb	53°3.07 49°24.44	-56°38.88 45°22.59
Enif	33°37.19	9°59.94
Al Na'ir	27°30.82	-46°49.72
Fomalhaut Scheat	15°12.76 13°43.62	-29°28.65 28°13.67
Markab	13°28.31	15°21.00
Aug 05 Wed	SHA	Mer.pass
Venus Mars	181°49.47 274°37.39	14:58 08:47
Jupiter	229°36.55	11:46
Saturn	345°30.07	04:03
Aug 06 Thu	SHA	Mer.pass
Venus	180°55.74 273°53.57	14:58
Mars Jupiter	273 53.57 229°23.00	08:46 11:43
Saturn	345°30.88	03:59
Aug 07 Fri	SHA	Mer.pass
Venus	180°2.33	14:57
Mars Jupiter	273°9.80 229°9.47	08:45 11:40
Saturn	345°31.77	03:55

Aug 06 Thu	SHA	Mer.pass
Venus	180°55.74	14:58
Mars	273°53.57	08:46
Jupiter	229°23.00	11:43
Saturn	$345^{\circ}30.88$	03:59

Aug 07 Fri	SHA	Mer.pass
Venus	180°2.33	14:57
Mars	273°9.80	08:45
Jupiter	229° 9.47	11:40
Saturn	345°31.77	03:55

Horizontal parallax Venus: Mars:

0.2 0.1

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°28.93	$N17^{\circ}1.23$	288°42.79	11.2'	N15°8.90	13.8'	58.0'
1	193°29.00	17°0.55	303°13.02	11.1'	15°22.67	13.7'	58.0'
2	208°29.06	16°59.88	317°43.16	11.0'	15°36.38	13.6'	58.1'
3 4	223°29.12 238°29.18	· · 59.20 58.53	332°13.19 346°43.13	10.9' 10.8'	15°50.02 16°3.59	13.6' 13.5'	58.1' 58.1'
5	253°29.25	57.85	1°12.97	10.7	16° 17.09	13.4	58.1
6	268°29.31	N16°57.17	15°42.70	10.6'	N16°30.52	13.4'	58.2'
7	283°29.37	56.50	$30^{\circ}12.33$	10.5'	$16^{\circ}43.87$	13.3'	58.2'
8	298°29.44	55.82	44°41.86	10.4'	16°57.15	13.2'	58.2'
9	313°29.50 328°29.57	55.14	59°11.28 73°40.60	10.3' 10.2'	17°10.35 17°23.47	13.1'	58.2' 58.3'
10 11	328 29.57 343°29.63	54.46 53.78	73 40.60 88°9.81	10.2	17 23.47 17°36.51	13.0' 13.0'	58.3'
12	358°29.70	N16°53.10	102°38.91	10.0'	N17°49.47	12.9'	58.3
13	13°29.76	52.42	$117^{\circ}7.91$	9.9'	$18^{\circ}2.35$	12.8'	58.3'
14	28°29.83	51.74	131°36.79	9.8'	18° 15.14	12.7'	58.4'
15 16	43°29.89 58°29.96	· · 51.06 50.38	146°5.57 160°34.23	9.7' 9.6'	18°27.84 18°40.45	12.6' 12.5'	58.4' 58.4'
17	73°30.02	49.70	175°2.79	9.0 9.4'	18°52.97	12.5	58.4'
18	88°30.09	N16°49.01	189°31.23	9.3'	N19°5.40	12.3'	58.5'
19	103°30.16	48.33	203°59.55	9.2'	19°17.74	12.2'	58.5'
20	118°30.22	47.65	218°27.76	9.1'	19°29.98	12.1'	58.5'
21	133°30.29	• • 46.96	232°55.86	9.0'	19°42.12	12.0'	58.5'
22 23	148°30.36 163°30.43	46.28 45.59	247°23.84 261°51.71	8.9' 8.7'	19°54.17 20°6.11	11.9' 11.8'	58.6' 58.6'
23			201 31.71			11.0	30.0
	SD = 15.8'	d = -0.7'		SE	0 = 15.8'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°30.49	N16°44.91	$276^{\circ}19.46$	8.6'	N20°17.95	11.7'	58.6'
1	193°30.56	44.22	290°47.09	8.5'	20°29.68	11.6'	58.6'
2	208°30.63	43.54	305°14.61	8.4'	20°41.31	11.5'	58.7'
3 4	223°30.70 238°30.77	· · 42.85 42.16	319°42.01 334°9.28	8.3' 8.2'	20°52.83 21°4.24	11.4' 11.3'	58.7' 58.7'
5	253°30.84	41.47	348°36.44	8.0'	21°15.54	11.2'	58.7'
6	268°30.91	N16°40.79	3°3.48	7.9'	N21°26.72	11.1'	58.8'
7	283°30.98	40.10	17°30.40	7.8'	21°37.79	11.0'	58.8'
8	298°31.05	39.41	31°57.21	7.7'	21°48.74	10.8'	58.8'
9	313°31.12 328°31.19	• • 38.72	46°23.89 60°50.45	7.6' 7.4'	21°59.58 22°10.29	10.7' 10.6'	58.8' 58.8'
10 11	343°31.26	38.03 37.34	75°16.89	7.4 7.3'	22 10.29 22°20.88	10.6	58.9'
12	358°31.33	N16°36.65	89°43.21	7.2'	N22°31.34	10.3'	58.9'
13	13°31.40	35.96	$104^{\circ}9.41$	7.1'	22°41.68	10.2'	58.9'
14	28°31.47	35.26	118°35.49	7.0'	22°51.89	10.1'	58.9'
15 16	43°31.54 58°31.61	· · 34.57 33.88	133°1.44 147°27.28	6.8' 6.7'	23°1.97 23°11.92	9.9' 9.8'	59.0' 59.0'
17	73°31.69	33.18	161°53.00	6.6'	23°21.73	9.6 9.7'	59.0'
18	88°31.76	N16°32.49	176°18.60	6.5'	N23°31.41	9.5'	59.0'
19	103°31.83	31.80	190°44.07	6.4'	$23^{\circ}40.95$	9.4'	59.1'
20	118°31.90	31.10	205°9.43	6.2'	23°50.35	9.3'	59.1'
21	133°31.98	30.41	219°34.67 233°59.79	6.1'	23°59.61 24°8.73	9.1'	59.1'
22 23	148°32.05 163°32.12	29.71 29.01	233 59.79 248°24.80	6.0' 5.9'	24 8.73 24°17.70	9.0' 8.8'	59.1' 59.2'
25	SD = 15.8'	d = -0.7'	240 24.00		0 = 16.0'	0.0	33.2
	$\frac{3D = 15.6}{}$	a = -0.7		JL.	D = 10.0		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°32.20	N16°28.32	262°49.68	5.8'	N24°26.53	8.7'	59.2'
1 2	193°32.27 208°32.35	27.62 26.92	277°14.45 291°39.10	5.7' 5.5'	24°35.21 24°43.74	8.5' 8.4'	59.2' 59.2'
3	208 32.35 223°32.42	26.22	306°3.64	5.5' 5.4'	24 43.74 24°52.11	8.4 8.2'	59.2'
4	238°32.50	25.53	320°28.06	5.3'	25°0.34	8.1	59.3
5	253°32.57	24.83	334°52.37	5.2'	25°8.40	7.9'	59.3'
6	268°32.65	N16°24.13	349°16.57	5.1'	N25°16.31	7.8'	59.3'
7 8	283°32.72 298°32.80	23.43 22.73	3°40.65 18°4.62	5.0' 4.9'	25°24.06 25°31.66	7.6' 7.4'	59.3' 59.4'
9	298 32.80 313°32.87	22.03	32°28.48	4.9 4.8'	25 31.00 25°39.08	7.4 7.3'	59.4 59.4
10	328°32.95	21.33	46°52.24	4.6'	25°46.35	7.1	59.4'
11	343°33.03	20.62	61°15.88	4.5'	25°53.45	6.9'	59.4'
12	358°33.10	N16°19.92	75°39.42	4.4'	N26°0.38	6.8'	59.4'
13 14	13°33.18 28°33.26	19.22 18.52	90°2.86 104°26.19	4.3' 4.2'	26°7.14 26°13.73	6.6' 6.4'	59.5' 59.5'
14 15	43°33.34	18.52	104 26.19 118°49.42	4.2 4.1'	26°20.15	6.2	59.5' 59.5'
16	58°33.41	17.11	133°12.55	4.0'	26°26.39	6.1	59.5'
17	73°33.49	16.40	147°35.58	3.9'	26°32.46	5.9'	59.5'
18	88°33.57	N16°15.70	161°58.51	3.8'	N26°38.36	5.7'	59.6'
19 20	103°33.65 118°33.73	14.99 14.29	176°21.35 190°44.09	3.7' 3.7'	26°44.07 26°49.60	5.5' 5.4'	59.6' 59.6'
20	118°33.73 133°33.81	14.29	190°44.09 205°6.75	3.7'	26°49.60 26°54.96	5.4	59.6'
22	148°33.89	12.87	219°29.31	3.5'	20° 54.90 27° 0.13	5.0'	59.6'
23	163°33.97	12.17	233°51.78	3.4'	27°5.11	4.8'	59.7'
	SD = 15.8'	d = -0.7'		SE	D = 16.1'		

Lat.	Twilight		Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	////	////	00:58	23:01	////	////
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:25	07:16	08:03	16:10	16:57	17:47

Lat.		Moonris	е		Moonset	:
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°						
<b>N</b> 70°	18:36			15:44		
68°	19:26			14:55		
66°	19:58	19:05		14:25	17:12	
64°	20:22	20:03		14:02	16:14	
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
<b>N</b> 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
<b>N</b> 10°	23:19		00:11	11:20	12:18	13:20
0°	23:34		00:31	11:07	12:00	12:59
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	00:41	02:26	04:17	08:52	08:55	09:03

Sun

Moon

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

h	Aries	Venus	Mars	Jupiter	Saturn
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	316° 31.20	135°40.45 \$01°5.05	228°57.30 N23°36.46	185°27.16 N18°36.30	302°3.96 N03°24.27
1	331° 33.66	150°40.71 6.27	243°57.95 36.52	200°29.06 36.16	317°6.47 24.24
2	346° 36.13	165°40.97 7.49	258°58.59 36.59	215°30.96 36.02	332°8.98 24.21
3	1°38.59	180°41.23 · · 8.71	273°59.24 · · 36.65	230°32.86 · · 35.88	347°11.49 · · 24.18
4	16°41.06	195°41.49 9.93	288°59.88 36.71	245°34.76 35.74	2°13.99 24.15
5	31°43.52	210°41.76 11.15	304° 0.53 36.77	260°36.66 35.60	17°16.50 24.12
6	46° 45.98	225°42.02 <b>S</b> 01°12.37	319°1.17 N23°36.83	275°38.57 N18°35.46	32°19.01 N03°24.09
7	61°48.45	240°42.28 13.59	334°1.82 36.89	290°40.47 35.32	47°21.52 24.06
8	76°50.91	255°42.55 14.81	349°2.46 36.95	305°42.37 35.18	62°24.03 24.03
9	91°53.38	270°42.81 · · 16.03	4°3.11 · · 37.01	320°44.27 · · 35.04	77°26.54 · · 24.00
10	106°55.84	285°43.07 17.25	19° 3.75 37.07	335°46.17 34.90	92°29.05 23.97
11	121°58.31	300°43.34 18.47	34°4.40 37.13	350°48.07 34.76	107°31.56 23.93
12	137°0.77	315°43.61 <b>S</b> 01°19.69	49°5.05 N23°37.19	5°49.98 N18°34.61	122°34.06 N03°23.90
13	152°3.23	330°43.87 20.91	64° 5.69 37.25	20°51.88 34.47	137°36.57 23.87
14	$167^{\circ}5.70$	345°44.14 22.13	79°6.34 37.31	35°53.78 34.33	152°39.08 23.84
15	$182^{\circ}8.16$	0°44.41 · · 23.35	94°6.98 · · 37.36	50°55.68 · · 34.19	167°41.59 · · 23.81
16	$197^{\circ}10.63$	15°44.68 24.57	109°7.63 37.42	65°57.58 34.05	182°44.10 23.78
17	$212^{\circ}13.09$	30°44.94 25.78	124°8.28 37.48	80°59.49 33.91	197°46.61 23.75
18	$227^{\circ}15.55$	45°45.21 <b>S</b> 01°27.00	139°8.92 N23°37.53	96°1.39 N18°33.77	212°49.12 N03°23.72
19	$242^{\circ}18.02$	60°45.48 28.22	154° 9.57 37.59	111°3.29 33.63	227°51.63 23.69
20	257°20.48	75°45.75 29.44	169°10.22 37.65	126°5.19 33.49	242°54.14 23.66
21	272°22.95	90°46.03 · · 30.66	184°10.86 · · 37.70	141°7.10 · · 33.35	257°56.66 · · 23.62
22	287°25.41	105°46.30 31.88	199°11.51 37.76	156° 9.00 33.21	272°59.17 23.59
23	302°27.88	120°46.57 33.10	214°12.16 37.81	171°10.90 33.07	288°1.68 23.56
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
- 10101.	Jass. 02.55	70.5 U1.2 III-4.54		ν1.9 d-0.1 III-1.70	
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	317° 30.34	135°46.84 <b>S</b> 01°34.31	229°12.81 N23°37.87	186°12.80 N18°32.93	303°4.19 N03°23.53
1	332°32.80	150°47.12 35.53	244°13.45 37.92	201°14.70 32.78	318°6.70 23.50
2	$347^{\circ}35.27$	165°47.39 36.75	259°14.10 37.97	216°16.61 32.64	333°9.21 23.47
3	2°37.73	180°47.66 · · 37.97	274°14.75 · · 38.03	231°18.51 · · 32.50	348°11.72 · · 23.44
4	17°40.20	195°47.94 39.19	289°15.40 38.08	246°20.41 32.36	3°14.23 23.40
5	32°42.66	210°48.21 40.40	304°16.04 38.13	261°22.31 32.22	18°16.75 23.37
6	47°45.13	225°48.49 S01°41.62	319°16.69 N23°38.19	276°24.22 N18°32.08	33°19.26 N03°23.34
7	62°47.59	240°48.77 42.84	334°17.34 38.24	291°26.12 31.94	48°21.77 23.31
8	77°50.05	255° 49.04 44.06	349°17.99 38.29	306°28.02 31.80	63°24.28 23.28
9	92°52.52	270°49.32 · · 45.27	4°18.64 · · 38.34	321°29.92 · · 31.66	78°26.80 · · 23.24
10	107°54.98	285°49.60 46.49	19°19.29 38.39	336°31.83 31.52	93°29.31 23.21
11	122° 57.45	300°49.88 47.71	34°19.94 38.44	351°33.73 31.37	108°31.82 23.18
12	137°59.91	315°50.16	49°20.58 N23°38.49	6°35.63 N18°31.23	123°34.34 N03°23.15
13	153°2.38	330°50.44 50.14	64°21.23 38.54	21°37.53 31.09	138°36.85 23.11
14	168°4.84	345°50.72 51.36	79°21.88 38.59	36°39.44 30.95	153°39.36 23.08
15	183°7.30	0°51.00 · · 52.57	94°22.53 · · 38.64	51°41.34 · · 30.81	168°41.88 · · 23.05
16	198°9.77	15°51.28 53.79	109°23.18 38.69	66°43.24 30.67	183°44.39 23.02
17	213°12.23	30°51.57 55.01	124°23.83 38.74	81°45.15 30.53	198°46.90 22.98
18	228° 14.70	45°51.85 S01°56.22	139°24.48 N23°38.79	96°47.05 N18°30.39	213°49.42 N03°22.95
19	243°17.16	60°52.13 57.44	154°25.13 38.84	111°48.95 30.24	228°51.93 22.92
20	258° 19.62	75°52.42 58.66	169°25.78 38.88	126°50.86 30.10	243°54.45 22.89
21	273°22.09	90°52.70 01°59.87	184°26.43 · · 38.93	141°52.76 · · 29.96	258°56.96 · · 22.85
22	288° 24.55	105°52.99 02°1.09	199°27.08 38.98	156°54.66 29.82	273°59.48 22.82
23	303°27.02	120°53.27 2.30	214°27.73 39.03	171°56.56 29.68	289°1.99 22.79
Mer.p	pass. 02:50	$ u 0.3' \ d1.2' \ \text{m-4.35}$	$ u 0.6' \ d0.1' \ { m m} 1.29$	$ u 1.9' \; d ext{-}0.1' \;  ext{m-}1.78$	ν2.5′ <i>d</i> -0.0′ m0.59
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
o (Vion	318° 29.48	135°53.56 S02°3.52	229°28.38 N23°39.07	186°58.47 N18°29.54	304°4.51 N03°22.76
1	318 29.48 333°31.95	150°53.85	244°29.03 39.12	202° 0.37 29.40	319°7.02 22.72
2	348° 34.41	165°54.14 5.95	259°29.68 39.16	217°2.27 29.26	334°9.54 22.69
3	3° 36.87	180°54.42 · · 7.16	274°30.33 · · 39.21	232°4.18 · · 29.11	349°12.05 · · 22.66
4	18° 39.34	195°54.71 8.38	289°30.98 39.25	247°6.08 28.97	4°14.57 22.62
5	33°41.80	210°55.00 9.59	304°31.63 39.30	262°7.98 28.83	19°17.08 22.59
6	48° 44.27	225°55.29 S02°10.81	319°32.28 N23°39.34	277°9.89 N18°28.69	34°19.60 N03°22.56
7	63°46.73	240°55.58 12.02	334°32.93 39.39	292°11.79 28.55	49°22.12 22.52
8	78° 49.20	255°55.88 13.24	349°33.59 39.43	307°13.69 28.41	64°24.63 22.49
9	93°51.66	270°56.17 · · 14.45	4°34.24 · · 39.47	322°15.60 · · 28.27	79°27.15 · · 22.46
10	108° 54.12	285°56.46 15.67	19°34.89 39.51	337°17.50 28.12	94°29.66 22.42
11	123°56.59	300°56.75 16.88	34°35.54 39.56	352°19.41 27.98	109°32.18 22.39
12	138° 59.05	315°57.05 S02°18.10	49°36.19 N23°39.60	7°21.31 N18°27.84	124°34.70 N03°22.35
13	154°1.52	330°57.34 19.31	64°36.84 39.64	22°23.21 27.70	139°37.22 22.32
14	169°3.98	345°57.64 20.52	79°37.50 39.68	37°25.12 27.56	154°39.73 22.29
15	184°6.44	0°57.93 · · 21.74	94°38.15 · · 39.72	52°27.02 · · 27.42	169°42.25 · · 22.25
16	199°8.91	15°58.23 22.95	109°38.80 39.76	67°28.92 27.27	184°44.77 22.22
17	214° 11.37	30°58.52 24.16	124°39.45 39.80	82°30.83 27.13	199°47.29 22.18
18	229° 13.84	45°58.82 <b>S</b> 02°25.38	139°40.11 N23°39.84	97°32.73 N18°26.99	214°49.80 N03°22.15
19	244°16.30	60°59.12 26.59	154°40.76 39.88	112°34.64 26.85	229°52.32 22.12
20	259° 18.77	75°59.42 27.80	169°41.41 39.92	127°36.54 26.71	244°54.84 22.08
21	274°21.23	90°59.71 · · 29.02	184°42.06 · · 39.96	142°38.44 · · 26.57	259°57.36 · · 22.05
22	289°23.69	106°0.01 30.23	199°42.72 40.00	157°40.35 26.42	274°59.88 22.01
23	$304^{\circ}26.16$	121°0.31 31.44	214°43.37 40.04	172°42.25 26.28	290°2.40 21.98
Max	2255 02:46		ν0.7' d0.0' m1.29	ν1.9' d-0.1' m-1.78	ν2.5' d-0.0' m0.59
ivier.	pass. 02:46	ν0.3′ d1.2′ m-4.36	νυ.τ αυ.υ m1.29	ν1.9 α-U.1 m-1./8	ν2.5° α-0.0° m0.59

	Stars	
	SHA	Dec
Alpheratz	357°33.15	29° 14.27
Ankaa	353°5.57	-42°9.37
Schedar	349°29.19	56° 40.88
Diphda	348°45.78	-17°50.20
Achernar	335°19.00	-57°5.72
Hamal	327°49.62	23°35.30
Polaris	313°21.82	89°22.24
Acamar	315°10.77 314°4.77	-40°11.53 4°11.76
Menkar Mirfak	314 4.77 308°26.41	4 11.76 49°57.17
Aldebaran	290°38.24	16°33.79
Rigel	281°2.78	-8° 10.10
Capella	280°20.20	46°1.34
Bellatrix	278°21.65	6°22.50
Elnath	278°0.42	28°37.74
Alnilam	275°36.59	-1°10.98
Betelgeuse	270°50.88	7°24.79
Canopus	263°52.23	-52°42.33
Sirius	258°25.35 255°5.15	-16°45.01 -29°0.32
Adhara Procyon	255 5.15 244°49.76	-29°0.32   5°9.47
Pollux	244 49.70 243°16.04	27°57.71
Avior	234°14.84	-59°35.58
Suhail	222°45.79	-43°32.36
Miaplacidus	221°38.95	-69°49.57
Alphard	217°46.78	-8°46.39
Regulus	$207^{\circ}33.35$	11°50.29
Dubhe	193°39.98	61°36.59
Denebola	182°23.85	14°25.49
Gienah	175°42.44	-17°41.42
Acrux	172°59.05	-63°15.04
Gacrux Alioth	171°50.52 166°12.10	-57° 15.95 55° 49.14
Spica	158°21.03	-11°18.03
Alkaid	150° 21.03	49° 11.05
Hadar	148°34.26	-60° 30.34
Menkent	147°56.14	-36°30.20
Arcturus	145°46.76	19°2.77
Rigil Kent.	$139^{\circ}38.53$	-60°56.98
Kochab	$137^{\circ}19.87$	74°3.00
Zuben'ubi	136°54.55	-16°9.18
Alphecca	126°2.56	26°37.68
Antares	112°14.06 107°6.79	-26°29.51 -69°4.72
Atria Sabik	107 6.79 102°1.07	-09 4.72 -15°45.45
Shaula	96°8.31	-37°7.44
Rasalhague	95°57.11	12° 32.57
Eltanin	90°41.19	51°29.31
Kaus Aust.	83°30.44	-34°22.32
Vega	80°31.98	38°48.67
Nunki	75°45.80	-26° 15.77
Altair	61°58.35	8°56.45
Peacock	53°3.06	-56°38.89
Deneb	49°24.44	45°22.61
Enif Al Na'ir	33°37.17 27°30.80	9°59.95 -46°49.73
Fomalhaut	27 30.80 15°12.74	-46 49.73 -29°28.65
Scheat	13°43.60	28° 13.69
Markab	13°28.29	15°21.01
A 00.C.	CILA	
Aug 08 Sat	<b>SHA</b> 179°9.25	Mer.pass
Venus Mars	272°26.10	14:57 08:44
Jupiter	272 20.10 228°55.96	11:37
Saturn	345°32.76	03:51
Aug 09 Sun	<b>SHA</b> 178°16.50	Mer.pass
Venus Mars	271°42.47	14:57 08:43
Jupiter	271 42.47 228°42.46	11:34
Saturn	345°33.85	03:47
Aug 10 Mon	SHA 177° 24 08	Mer.pass
Venus Mars	177°24.08 270°58.90	14:56 08:42
Jupiter	270 58.90 228°28.99	11:31
Saturn	345°35.02	03:43
Horizor	ntal parallax	0.0
	Venus: Mars:	0.2 0.1
<u> </u>	ividi5:	0.1

Stars

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°34.05	N16°11.46	248°14.17	3.3'	N27°9.91	4.6'	59.7'
1	193°34.13	10.75	262°36.48	3.2'	$27^{\circ}14.52$	4.4'	59.7'
2	208°34.21	10.04	276°58.70	3.1'	27°18.95	4.2'	59.7'
3	223°34.29	• • 9.33	291°20.84	3.1'	27°23.18	4.0'	59.7'
4	238° 34.37 253° 34.45	8.62 7.91	305°42.91 320°4.90	3.0' 2.9'	27°27.23 27°31.08	3.9' 3.7'	59.7'
5 6	253° 34.45 268° 34.53	7.91 N16°7.20	320°4.90 334°26.82	2.8'	N27°34.74	3.7	59.8' 59.8'
7	283°34.61	6.49	348°48.67	2.8'	27°38.20	3.3'	59.8'
8	298°34.69	5.78	3°10.45	2.7'	27°41.47	3.1'	59.8'
9	313°34.78	• • 5.07	17°32.17	2.7'	27°44.54	2.9'	59.8'
10	328°34.86	4.36	31°53.83	2.6'	27°47.42	2.7'	59.8'
11	343°34.94	3.64	46°15.42	2.5'	27°50.10	2.5'	59.9'
12	358° 35.02	N16°2.93	60°36.96	2.5'	N27°52.57	2.3'	59.9'
13	13°35.11 28°35.19	2.22 1.50	74°58.44 89°19.88	2.4' 2.4'	27°54.85 27°56.93	2.1' 1.9'	59.9' 59.9'
14 15	43°35.19	0.79	103°41.26	2.4	27°58.80	1.7'	59.9' 59.9'
16	58°35.36	16°0.07	118° 2.60	2.3'	28°0.47	1.5'	59.9'
17	73°35.44	15°59.36	132°23.89	2.3'	28°1.94	1.3'	60.0'
18	88°35.52	N15°58.64	146°45.15	2.2'	N28°3.20	1.1'	60.0'
19	103°35.61	57.93	161°6.36	2.2'	28°4.26	0.9'	60.0'
20	118°35.69	57.21	175°27.54	2.2'	28°5.11	0.6'	60.0'
21	133°35.78	56.49	189°48.70	2.1'	28°5.76	0.4'	60.0'
22 23	148° 35.86 163° 35.95	55.78 55.06	204° 9.82 218° 30.92	2.1' 2.1'	28°6.21 28°6.44	0.2' 0.0'	60.0' 60.0'
23			210 30.92			0.0	00.0
	SD = 15.8'	d = -0.7'		SI	O = 16.3'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°36.04	N15°54.34	232°51.99	2.1'	N28°6.47	-0.2	60.1'
1	193°36.12	53.62	247°13.05	2.0'	28°6.29	-0.4	60.1'
2	208° 36.21	52.90	261°34.09	2.0'	28°5.90	-0.6'	60.1'
3 4	223° 36.29 238° 36.38	· · 52.18 51.46	275°55.11 290°16.13	2.0' 2.0'	28°5.31 28°4.51	-0.8' -1.0'	60.1' 60.1'
5	250 30.30 253°36.47	50.74	304°37.14	2.0'	28°3.50	-1.0 -1.2'	60.1
6	268° 36.55	N15°50.02	318°58.14	2.0'	N28°2.28	-1.4	60.1
7	283°36.64	49.30	333°19.15	2.0'	28°0.85	-1.6'	60.1'
8	298°36.73	48.57	347°40.16	2.0'	27°59.22	-1.8'	60.1'
9	313°36.82	• • 47.85	2°1.17	2.0'	27°57.38	-2.0'	60.2'
10	328° 36.91	47.13	16°22.19	2.0'	27°55.33	-2.3'	60.2'
11	343°36.99	46.41	30°43.22	2.0'	27°53.07	-2.5'	60.2
12	358° 37.08 13° 37.17	N15°45.68 44.96	45° 4.27 59° 25.34	2.1' 2.1'	N27°50.60 27°47.93	-2.7' -2.9'	60.2'
13 14	28° 37.26	44.96 44.23	59 25.34 73°46.42	2.1'	27 47.93 27°45.05	-2.9 -3.1'	60.2' 60.2'
15	43° 37.35	• • 43.51	88° 7.53	2.1'	27°41.97	-3.3'	60.2
16	58° 37.44	42.78	102°28.67	2.2'	27°38.68	-3.5'	60.2
17	73°37.53	42.06	116°49.84	2.2'	$27^{\circ}35.18$	-3.7'	60.2'
18	88°37.62	N15°41.33	131°11.04	2.2'	N27°31.48	-3.9'	60.2'
19	103°37.71	40.60	145°32.27	2.3'	27°27.58	-4.1'	60.2'
20	118° 37.80	39.88	159°53.55	2.3'	27°23.47	-4.3'	60.2'
21 22	133°37.89 148°37.98	· · 39.15 38.42	174°14.86 188°36.22	2.4' 2.4'	27°19.16 27°14.65	-4.5' -4.7'	60.2' 60.3'
23	146 37.96 163°38.07	37.69	202°57.63	2.4	27 14.05 27°9.94	-4.7 -4.9'	60.3
25	SD = 15.8'	d = -0.7'			0 = 16.4'	1.5	
				JL			
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°38.17 193°38.26	N15°36.96 36.23	217°19.08 231°40.59	2.5' 2.6'	N27°5.02 26°59.91	-5.1' -5.3'	60.3'
1 2	193° 38.26 208° 38.35	36.23 35.50	231 40.59 246° 2.15	2.6'	26°54.60	-5.5'	60.3' 60.3'
3	223° 38.44	• • 34.77	260°23.78	2.7'	26°49.09	-5.7'	60.3
4	238°38.54	34.04	274°45.46	2.7'	26°43.39	-5.9'	60.3
5	253°38.63	33.31	289°7.20	2.8'	26°37.49	-6.1'	60.3'
6	268°38.72	N15°32.58	303°29.01	2.9'	N26°31.40	-6.3'	60.3'
7	283°38.81	31.85	317°50.89	2.9'	26°25.11	-6.5'	60.3'
8	298°38.91 313°39.00	31.11	332°12.83 346°34.85	3.0'	26°18.64 26°11.97	-6.7'	60.3'
9 10	313°39.00 328°39.10	· · 30.38 29.65	346°34.85 0°56.94	3.1' 3.2'	26°11.97 26°5.11	-6.9' -7.0'	60.3' 60.3'
11	343°39.19	29.05	15°19.11	3.2'	25°58.07	-7.0 -7.2'	60.3
12	358° 39.28	N15°28.18	29°41.36	3.3'	N25°50.84	-7.4	60.3
13	13°39.38	27.44	44°3.69	3.4'	$25^{\circ}43.43$	-7.6'	60.3'
14	28° 39.47	26.71	58°26.10	3.5'	25°35.83	-7.8'	60.3'
15	43°39.57	• • 25.97	72°48.60	3.6'	25°28.05	-8.0'	60.3'
16 17	58° 39.67 73° 39.76	25.24	87°11.19 101°33.86	3.7'	25°20.09	-8.1'	60.3'
17 18	73°39.76 88°39.86	24.50 N15°23.76	101°33.86 115°56.62	3.8' 3.9'	25°11.95 N25°3.64	-8.3' -8.5'	60.3' 60.3'
19	103°39.95	23.03	130°19.48	3.9'	24°55.15	-0.5 -8.7'	60.3
20	118° 40.05	22.29	144°42.42	4.0'	24°46.49	-8.8'	60.3
21	133° 40.15	• • 21.55	159° 5.47	4.1'	24°37.65	-9.0'	60.3'
22	148° 40.24	20.81	173°28.61	4.2'	24°28.65	-9.2'	60.3'
23	163°40.34	20.07	187°51.85	4.3'	24°19.47	-9.3'	60.3'
	SD = 15.8'	d = -0.7'		SI	0 = 16.4'	-	-

Lat.	Twilight		Sunrise Sunset		Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>S</b> 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
<b>S</b> 60°	06:19	07:09	07:55	16:17	17:03	17:53

Lat.		Moonris	е		Moonset	
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°						
<b>N</b> 70°						
68°						
66°						
64°						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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:05	07:20	07:50	09:24	10:26	12:11

	Sun				Moon	
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age
- 4,	00 <sup>h</sup>	12 <sup>h</sup>	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	00.56	22.27	

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

h	Aries	Venus	Mars	Jupiter	Saturn
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	319°28.62	136°0.61	229°44.02 N23°40.08	187°44.16 N18°26.14	305°4.91 N03°21.94
1	334°31.09	151°0.92 33.87	244°44.68 40.12	202°46.06 26.00	320°7.43 21.91
2	349°33.55	166°1.22 35.08	259°45.33 40.15	217°47.96 25.86	335°9.95 21.87
3	4°36.02	181°1.52 · · 36.29	274°45.99 · · 40.19	232°49.87 · · 25.72	350°12.47 · · 21.84
4	19°38.48	196°1.82 37.50	289°46.64 40.23	247°51.77 25.57	5°14.99 21.80
5	34°40.94	211°2.13 38.71	304°47.29 40.26	262°53.68 25.43	20°17.51 21.77
6	49°43.41	226°2.43 <b>S</b> 02°39.93	319°47.95 N23°40.30	277°55.58 N18°25.29	35°20.03 N03°21.73
7	64°45.87	241°2.73 41.14	334°48.60 40.33	292°57.49 25.15	50°22.55 21.70
8	79°48.34	256°3.04 42.35	349°49.26 40.37	307°59.39 25.01	65°25.07 21.66
9	94°50.80	271°3.35 · · 43.56	4°49.91 · · 40.40	323°1.30 · · 24.86	80°27.59 · · 21.63
10	109°53.26	286°3.65 44.77	19°50.57 40.44	338° 3.20 24.72	95°30.11 21.59
11	124°55.73	301°3.96 45.98	34°51.22 40.47	353° 5.10 24.58	110°32.63 21.56
12	139°58.19	316°4.27 <b>S</b> 02°47.19	49°51.88 N23°40.51	8°7.01 N18°24.44	125°35.15 N03°21.52
13	155°0.66	331°4.58 48.40	64°52.53 40.54	23°8.91 24.30	140°37.67 21.49
14	170°3.12	346°4.88 49.61	79°53.19 40.57	38°10.82 24.15	155°40.20 21.45
15	185°5.59	1°5.19 · · 50.82	94°53.84 · · 40.61	53°12.72 · · 24.01	170°42.72 · · 21.42
16	200°8.05	16°5.50 52.03	109°54.50 40.64	68°14.63 23.87	185°45.24 21.38
17	215° 10.51	31°5.81 53.24	124°55.15 40.67	83°16.53 23.73	200°47.76 21.35
18	230° 12.98	46°6.13 <b>S</b> 02°54.45	139°55.81 N23°40.70	98°18.44 N18°23.59	215°50.28 N03°21.31
19	245° 15.44	61°6.44 55.66	154°56.46 40.74	113°20.34 23.44	230°52.80 21.28
20	260° 17.91	76°6.75 56.87	169°57.12 40.77	128°22.25 23.30	245°55.33 21.24
21	275°20.37	91°7.06 · · 58.08	184°57.78 · · 40.80	143°24.15 · · 23.16	260°57.85 · · 21.20
22	290°22.83	106°7.38 02°59.29	199°58.43 40.83	158°26.06 23.02	276°0.37 21.17
23	305°25.30	121°7.69 03°0.50	214°59.09 40.86	173° 27.96 22.88	291°2.89 21.13
			·		
Mer.	pass. 02:42	ν0.3′ d1.2′ m-4.37	ν0.7' d0.0' m1.29	ν1.9' d-0.1' m-1.79	ν2.5' d-0.0' m0.58
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	$320^{\circ}27.76$	136°8.00 <b>S</b> 03°1.71	229°59.75 N23°40.89	188°29.87 N18°22.73	306°5.42 N03°21.10
1	$335^{\circ}30.23$	151°8.32 2.92	245°0.40 40.92	203°31.77 22.59	321°7.94 21.06
2	350°32.69	166°8.64 4.13	260°1.06 40.95	218°33.68 22.45	336°10.46 21.02
3	5°35.16	181°8.95 · · 5.34	275°1.72 · · 40.98	233°35.58 · · 22.31	351°12.98 · · 20.99
4	20°37.62	196°9.27 6.55	290°2.37 41.00	248°37.49 22.16	6°15.51 20.95
5	35°40.08	211°9.59 7.75	305°3.03 41.03	263°39.40 22.02	21°18.03 20.91
6	50°42.55	226°9.91 <b>S</b> 03°8.96	320°3.69 N23°41.06	278°41.30 N18°21.88	36°20.55 N03°20.88
7	65°45.01	241°10.22 10.17	335° 4.35 41.09	293°43.21 21.74	51°23.08 20.84
8	80°47.48	256° 10.54 11.38	350°5.00 41.11	308°45.11 21.60	66°25.60 20.80
9	95° 49.94	271°10.86 · · 12.58	5°5.66 · · 41.14	323°47.02 · · 21.45	81°28.13 · · 20.77
10	110°52.40	286°11.18 13.79	20°6.32 41.17	338°48.92 21.31	96°30.65 20.73
11	125°54.87	301°11.51 15.00	35°6.98 41.19	353°50.83 21.17	111°33.18 20.69
12	140°57.33	316°11.83 S03°16.21	50°7.64 N23°41.22	8°52.73 N18°21.03	126°35.70 N03°20.66
13	155°59.80	331°12.15 17.41	65°8.29 41.24	23°54.64 20.88	141°38.22 20.62
14	171°2.26	346°12.47 18.62	80°8.95 41.27	38°56.55 20.74	156°40.75 20.58
15	186°4.72	1°12.80 · · 19.83	95°9.61 · · 41.29	53°58.45 · · 20.60	171°43.27 · · 20.55
16	201°7.19	16°13.12 21.03	110°10.27 41.32	69° 0.36 20.46	186°45.80 20.51
17	216°9.65	31°13.45 22.24	125°10.93 41.34	84°2.26 20.31	201°48.33 20.47
18	231° 12.12	46°13.77 <b>S</b> 03°23.45	140°11.59 N23°41.37	99°4.17 N18°20.17	216°50.85 N03°20.44
19	246° 14.58	61°14.10 24.65	155°12.25 41.39	114°6.08 20.03	231°53.38 20.40
20	261° 17.05	76°14.42 25.86	170°12.91 41.41	129°7.98 19.89	246°55.90 20.36
21	276° 19.51	91°14.75 · · 27.06	185°13.57 · · 41.44	144°9.89 · · 19.74	261°58.43 · · 20.32
22	291°21.97	106°15.08 28.27	200°14.23 41.46	159°11.79 19.60	201 30.43 20.32 277°0.95 20.29
23	306°24.44	121°15.41 29.47	215°14.89 41.48	174°13.70 19.46	292°3.48 20.25
	300 24.44				
Mer.	pass. 02:38	ν0.3′ d1.2′ m-4.38	ν0.7' d0.0' m1.29	$\nu 1.9' \ d$ -0.1' m-1.79	ν2.5' d-0.0' m0.58
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	321°26.90	136°15.74 \$03°30.68	230°15.55 N23°41.50	189°15.61 N18°19.32	307°6.01 N03°20.21
1	336°29.37	151°16.07 31.88	245°16.21 41.52	204°17.51 19.17	322°8.53 20.17
2	351°31.83	166°16.40 33.09	260°16.87 41.54	219°19.42 19.03	337°11.06 20.14
3	6°34.29	181°16.73 · · 34.29	275°17.53 · · 41.56	234°21.33 · · 18.89	352°13.59 · · 20.10
4	21°36.76	196°17.06 35.50	290°18.19 41.58	249°23.23 18.75	7°16.11 20.06
5	36°39.22	211°17.39 36.70	305°18.85 41.60	264° 25.14 18.60	22°18.64 20.02
6	50 39.22 51°41.69	211 17.39 36.70 226°17.73 \$03°37.90	320°19.51 N23°41.62	279°27.04 N18°18.46	37°21.17 N03°19.98
7	66°44.15	241°18.06 39.11	335°20.17 41.64	294°28.95 18.32	52°23.70 19.95
8	81°46.61	256°18.39 40.31	350°20.83 41.66	309°30.86 18.17	67°26.22 19.91
9	96°49.08	271°18.73 · · 41.52	5°21.49 · · 41.68	324°32.76 · · 18.03	82°28.75 · · 19.87
10	90 49.08 111°51.54	286°19.06 42.72	20°22.15 41.70	339°34.67 17.89	97°31.28 19.83
11	111 51.54 126°54.01	301°19.40 43.92	35°22.82 41.72	354°36.58 17.75	112°33.81 19.79
	120 54.01 141°56.47	316°19.73 S03°45.12	50°23.48 N23°41.73	9°38.48 N18°17.60	112 33.81 19.79 127°36.34 N03°19.76
12 13	141 56.47 156° 58.93	310 19.73 S03 45.12 331°20.07 46.33	65°24.14 41.75	24°40.39 17.46	142°38.87 19.72
14	150 58.93 172°1.40	331 20.07 40.33 346°20.41 47.53	80°24.80 41.77	39°42.30 17.32	142 38.87 19.72 157°41.39 19.68
15	172 1.40 187°3.86	1°20.75 · · 48.73	95°25.46 · · 41.79	54°44.21 · · 17.18	172°43.92 · · 19.64
	202°6.33	1°20.75 · · 48.73 16°21.09 49.93	110°26.13 41.80	69°46.11 17.03	
16	202°6.33 217°8.79				
17	217°8.79 232°11.26	31°21.43 51.14 46°21.77 \$03°52.34	125°26.79 41.82 140°27.45 N23°41.83	84°48.02 16.89 99°49.93 N18°16.75	202°48.98 19.56 217°51.51 N03°19.52
18	232°11.26 247°13.72	46°21.77 S03°52.34 61°22.11 53.54		114°51.83 16.60	
19					
20	262°16.18	76°22.45 54.74	170°28.78 41.86	129°53.74 16.46	247°56.57 19.45
21	277° 18.65	91°22.79 · · 55.94	185°29.44 · · 41.88	144°55.65 · · 16.32	262°59.10 · · 19.41
22 23	292°21.11 307°23.58	106°23.13 57.14 121°23.48 58.34	200°30.10 41.89 215°30.77 41.91	159°57.56 16.18	278°1.63 19.37
	301 23.58		215°30.77 41.91	174°59.46 16.03	293°4.16 19.33
Mer.	pass. 02:34	$ u 0.3' \ d1.2' \ \text{m-4.40}$	$\nu 0.7'~d0.0'~{\rm m}1.29$	$\nu 1.9' \ d$ -0.1' m-1.79	$\nu 2.5' \ d$ -0.0' m0.57

	Stars	
	SHA	Dec
Alpheratz	357°33.12	29°14.28
Ankaa Schedar	353°5.54 349°29.16	-42°9.37 56°40.90
Diphda	348°45.75	-17°50.19
Achernar	$335^{\circ}18.96$	-57°5.72
Hamal	327°49.59 313°20.10	23°35.32 89°22.25
Polaris Acamar	313°20.10 315°10.74	-40°11.52
Menkar	314°4.74	$4^{\circ}11.77$
Mirfak	308°26.37	49°57.18
Aldebaran Rigel	290°38.21 281°2.75	16°33.80 -8°10.09
Capella	280°20.16	46°1.34
Bellatrix	278°21.63	6°22.51
Elnath Alnilam	278°0.38 275°36.57	28°37.74 -1°10.97
Betelgeuse	270°50.86	7°24.79
Canopus	263°52.21	$-52^{\circ}42.31$
Sirius	258°25.33	-16°45.00 -29°0.31
Adhara Procyon	255°5.13 244°49.74	-29°0.31 5°9.47
Pollux	243°16.02	27°57.71
Avior	$234^{\circ}14.83$	-59°35.57
Suhail	222°45.78 221°38.96	-43°32.34 -69°49.55
Miaplacidus Alphard	221°38.96 217°46.77	-69°49.55 -8°46.38
Regulus	207°33.34	11°50.29
Dubhe	193°39.97	61°36.57
Denebola Gienah	182°23.84 175°42.44	14°25.49 -17°41.42
Acrux	173° 42.44 172° 59.07	-63°15.03
Gacrux	$171^{\circ}50.53$	-57°15.95
Alioth	166°12.11	55°49.13 -11°18.03
Spica Alkaid	158°21.03 152°51.12	-11 18.03 49°11.05
Hadar	148°34.28	-60°30.34
Menkent	147°56.14	-36°30.20
Arcturus Rigil Kent.	145°46.77 139°38.55	19°2.77 -60°56.98
Kochab	139° 36.33 137° 19.92	74°3.00
Zuben'ubi	$136^{\circ}54.56$	$-16^{\circ}9.18$
Alphecca Antares	126°2.57 112°14.06	26°37.68 -26°29.51
Antares	112 14.06 107°6.81	-20 29.51 -69°4.73
Sabik	$102^{\circ}1.07$	-15°45.45
Shaula	96°8.31 95°57.11	-37°7.44
Rasalhague Eltanin	95 57.11 90°41.21	12°32.57 51°29.32
Kaus Aust.	83°30.44	-34°22.32
Vega	80°31.99	38°48.68
Nunki Altair	75°45.80 61°58.35	-26°15.77 8°56.46
Peacock	53° 3.05	-56°38.90
Deneb	49°24.44	45°22.63
Enif	33°37.16	9°59.96
Al Na'ir Fomalhaut	27°30.78 15°12.71	-46°49.73 -29°28.65
Scheat	13°43.58	$28^{\circ}13.71$
Markab	13°28.27	15°21.02
Aug 11 Tue	SHA	Mer.pass
Venus	176°31.99	14:56
Mars Jupiter	270°15.40 228°15.53	08:41 11:28
Saturn	345°36.29	03:39
Aug 12 Wed	SHA	Mer.pass
Venus	$175^{\circ}40.24$	14:55
Mars	269°31.98 228°2.11	08:40
Jupiter Saturn	345°37.65	11:25 03:35
Aug 13 Thu	SHA	Mer.pass
Venus	174°48.84	14:55
Mars	268°48.64	08:39
Jupiter Saturn	227°48.70 345°39.11	11:22 03:31
	ıtal parallax	
norizon	Venus:	0.2
	Mars:	0.1

h	Su	n	Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°40.44	N15°19.33	202°15.18	4.4'	N24°10.13	-9.5'	60.3'
1	193°40.54	18.59	216°38.62	4.5'	24°0.62	-9.7'	60.2'
2	208°40.63	17.85	231°2.16	4.6'	23°50.96	-9.8'	60.2'
3 4	223°40.73 238°40.83	· · 17.11 16.37	245°25.81 259°49.56	4.7' 4.9'	23°41.13 23°31.14	-10.0' -10.1'	60.2' 60.2'
5	253°40.93	15.63	274°13.41	5.0'	23°20.99	-10.1	60.2
6	268°41.03	N15°14.89	288°37.37	5.1'	N23°10.69	-10.5'	60.2'
7	283°41.13	14.15	303°1.44	5.2'	23°0.23	-10.6'	60.2'
8	298°41.23	13.40	317°25.62	5.3'	22°49.63	-10.8'	60.2'
9 10	313°41.33 328°41.43	· · 12.66 11.92	331°49.91 346°14.30	5.4' 5.5'	22°38.87 22°27.97	-10.9' -11.0'	60.2' 60.2'
11	343°41.53	11.17	0°38.81	5.6'	22°16.92	-11.2'	60.2'
12	358°41.63	N15°10.43	15°3.43	5.7'	N22°5.72	-11.3'	60.2'
13	13°41.73	9.68	29°28.16	5.8'	21°54.39	-11.5'	60.1'
14	28°41.83 43°41.93	8.94	43°53.00 58°17.96	6.0' 6.1'	21°42.91 21°31.30	-11.6' -11.7'	60.1'
15 16	43 41.93 58°42.03	· · 8.19 7.45	58 17.96 72°43.03	6.2	21°19.56	-11.7 -11.9'	60.1' 60.1'
17	73°42.13	6.70	87°8.21	6.3'	21°7.68	-12.0'	60.1'
18	88°42.23	N15°5.95	101°33.50	6.4'	N20°55.66	-12.1'	60.1'
19	103°42.34	5.20	115°58.92	6.5'	20°43.52	-12.3'	60.1'
20	118°42.44	4.46 • • 3.71	130°24.44 144°50.08	6.6'	20°31.26	-12.4'	60.1'
21 22	133°42.54 148°42.64	2.96	144°50.08 159°15.83	6.8' 6.9'	20°18.87 20°6.35	-12.5' -12.6'	60.0' 60.0'
23	163°42.75	2.21	173°41.70	7.0'	19°53.72	-12.8'	60.0
	SD = 15.8'	d = -0.7'			D = 16.4'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°42.85	N15°1.46	188°7.69	7.1'	N19°40.96	-12.9'	60.0'
1 2	193°42.95 208°43.06	0.71 14°59.96	202°33.78 217°0.00	7.2' 7.3'	19°28.09 19°15.11	-13.0' -13.1'	60.0' 60.0'
3	223°43.16	14°59.90	231°26.32	7.4'	19°2.01	-13.1	60.0'
4	238°43.27	58.46	245°52.77	7.6'	18°48.81	-13.3'	59.9'
5	253°43.37	57.71	260°19.32	7.7'	18°35.49	-13.4'	59.9'
6	268°43.48	N14°56.95	274°45.99	7.8'	N18°22.07	-13.5'	59.9'
7 8	283°43.58 298°43.69	56.20 55.45	289°12.77 303°39.67	7.9' 8.0'	18°8.55 17°54.93	-13.6' -13.7'	59.9' 59.9'
9	313°43.79	54.70	318° 6.67	8.1	17°41.20	-13.8'	59.9'
10	328°43.90	53.94	332°33.79	8.2'	17°27.38	-13.9'	59.8'
11	343°44.00	53.19	347°1.02	8.3'	17°13.47	-14.0'	59.8'
12	358°44.11 13°44.22	N14°52.43	1°28.37	8.5'	N16°59.46 16°45.36	-14.1'	59.8'
13 14	28°44.22	51.68 50.92	15°55.82 30°23.38	8.6' 8.7'	16°45.36 16°31.17	-14.2' -14.3'	59.8' 59.8'
15	43°44.43	50.17	44°51.05	8.8'	16°16.89	-14.4'	59.7'
16	58°44.54	49.41	59°18.83	8.9'	16°2.53	-14.4'	59.7'
17	73°44.64	48.65	73°46.72	9.0'	15°48.09	-14.5'	59.7'
18 19	88°44.75 103°44.86	N14°47.90 47.14	88°14.72 102°42.82	9.1' 9.2'	N15°33.57 15°18.96	-14.6' -14.7'	59.7' 59.6'
20	103 44.80 118°44.97	46.38	102 42.82 117°11.03	9.2 9.3'	15 16.90 15°4.29		59.6'
21	133°45.08	• • 45.62	131°39.34	9.4'	14°49.53	-14.8'	59.6'
22	148°45.18	44.87	146°7.75	9.5'	$14^{\circ}34.71$	-14.9'	59.6'
23	163°45.29	44.11	160°36.27	9.6'	14°19.82	-15.0'	59.6'
	SD = 15.8'	d = -0.7'		SI	D = 16.4'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°45.40	N14°43.35	175°4.90	9.7'	N14°4.85	-15.0'	59.5'
1	193°45.51	42.59	189°33.62	9.8'	13°49.82	-15.1'	59.5'
2	208°45.62 223°45.73	41.83	204°2.44 218°31.37	9.9'	13°34.73 13°19.57	-15.2'	59.5'
3 4	223°45.73 238°45.84	· · 41.07 40.31	218°31.37 233°0.39	10.0' 10.1'	13°19.57 13°4.36	-15.2' -15.3'	59.5' 59.4'
5	253°45.95	39.54	247°29.51	10.1	12°49.08	-15.3'	59.4'
6	268°46.06	N14°38.78	261°58.73	10.3'	N12°33.75	-15.4'	59.4'
7	283°46.17	38.02	276°28.04	10.4'	12°18.37	-15.4'	59.4'
8	298°46.28 313°46.39	37.26 •• 36.49	290°57.45 305°26.95	10.5' 10.6'	12°2.93 11°47.44	-15.5' -15.5'	59.3' 59.3'
9 10	313°46.39 328°46.51	35.73	305°26.95 319°56.54	10.6	11°47.44 11°31.90	-15.5' -15.6'	59.3'
11	343°46.62	34.97	334°26.22	10.7	11°16.32	-15.6'	59.3'
12	358°46.73	N14°34.20	348°56.00	10.9'	N11°0.69	-15.7'	59.2'
13	13°46.84	33.44	3°25.86	11.0'	10°45.01	-15.7'	59.2'
14 15	28°46.95 43°47.07	32.67 •• 31.91	17°55.81 32°25.85	11.0' 11.1'	10°29.30 10°13.55	-15.8' -15.8'	59.2' 59.1'
16	58°47.18	31.14	32 25.65 46°55.97	11.1	09°57.76	-15.8'	59.1'
17	73°47.29	30.38	61°26.18	11.3'	09°41.93	-15.9'	59.1'
18	88°47.41	N14°29.61	75°56.47	11.4'	N09°26.07	-15.9'	59.1'
19	103°47.52	28.84	90°26.85	11.5'	09°10.17	-15.9'	59.0'
20 21	118°47.63 133°47.75	28.07 •• 27.31	104°57.30 119°27.84	11.5' 11.6'	08°54.25 08°38.29	-16.0' -16.0'	59.0' 59.0'
22	133 47.75 148°47.86	26.54	119 27.84 133°58.45	11.6	08 38.29 08°22.31	-16.0'	59.0 58.9'
23	163°47.98	25.77	148°29.14	11.8'	08°6.31	-16.0'	58.9'
	SD = 15.8'	d = -0.8'		SI	D = 16.2'		

Lat.         Naut.         Civil         Sunrise         Sunset         Civil           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           60°         01:51         03:14         04:07         20:02         20:54           N 58°         02:19         03:28         04:17         19:52         20:40           56°         02:39         03:40         04:25         19:44         20:28           54°         02:56         03:51         04:32         19:36         20:18           52°         03:10         04:00         04:39         19:30         20:08           50°         03:22         04:09         04:45         19:24         20:00           45°         03:46 <th>ilight</th>	ilight
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Naut.
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	////
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	////
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	////
N 58°         02:19         03:28         04:17         19:52         20:40           56°         02:39         03:40         04:25         19:44         20:28           54°         02:56         03:51         04:32         19:36         20:18           52°         03:10         04:00         04:39         19:30         20:08           50°         03:22         04:09         04:45         19:24         20:00           45°         03:46         04:26         04:58         19:11         19:43	22:54
56°         02:39         03:40         04:25         19:44         20:28           54°         02:56         03:51         04:32         19:36         20:18           52°         03:10         04:00         04:39         19:30         20:08           50°         03:22         04:09         04:45         19:24         20:00           45°         03:46         04:26         04:58         19:11         19:43	22:14
54°         02:56         03:51         04:32         19:36         20:18           52°         03:10         04:00         04:39         19:30         20:08           50°         03:22         04:09         04:45         19:24         20:00           45°         03:46         04:26         04:58         19:11         19:43	21:48
52°     03:10     04:00     04:39     19:30     20:08       50°     03:22     04:09     04:45     19:24     20:00       45°     03:46     04:26     04:58     19:11     19:43	21:28
50° 03:22 04:09 04:45 19:24 20:00 45° 03:46 04:26 04:58 19:11 19:43	21:12
45° 03:46 04:26 04:58 19:11 19:43	20:58
	20:47
N 40° 04.04 04.20 05.00 10.01 10.20	20:23
10 40   04:04 04:59 05:09   19:01 19:50	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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60° 06:12 07:02 07:47 16:24 17:09	17:59

Lat.		Moonris	e		Moonset	
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°			03:24		21:46	20:52
<b>N</b> 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°	80:00	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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	08:00	08:03	08:04	14:09	16:02	17:47

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

h	Aries	Venus	S	M	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	322° 26.04		)3°59.54	230°31.43	N23°41.92	190° 1.37	N18° 15.89	308°6.69	N03° 19.29			
1	337° 28.50		04°0.74	245°32.09	41.93	205°3.28	15.75	323°9.22	19.25	Alpheratz	357°33.11	29°14.30
2	352° 30.97	166°24.51	1.94	260°32.76	41.95	220° 5.19	15.60	338°11.75	19.21	Ankaa	353°5.52	-42°9.37
3	7°33.43		• • 3.14	275°33.42	41.96	235°7.09	. 15.46	353°14.28	19.17	Schedar	349°29.13	56°40.91
4	22°35.90	196°25.20	4.34	290°34.08	41.97	250° 9.00	15.32	$8^{\circ}16.81$	19.13	Diphda	348°45.74	-17°50.19
5	37°38.36	211°25.55	5.54	305°34.75	41.98	265°10.91	15.17	23°19.34	19.09	Achernar	335°18.92 327°49.57	-57°5.72 23°35.33
6	52°40.82		04°6.74	320°35.41	N23°41.99	280°12.82	N18° 15.03	38°21.87	N03°19.06	Hamal Polaris	313° 18.66	23 35.33 89°22.25
7	67°43.29	241°26.24	7.94	335°36.08	42.01	295°14.72	14.89	53°24.41	19.02	Acamar	315° 10.00	-40° 11.52
8	82°45.75	256° 26.59	9.14	350°36.74	42.02	310°16.63	14.75	68°26.94	18.98	Menkar	314°4.72	4°11.78
9	97°48.22		• 10.34	5°37.41	• • 42.03	325°18.54	• • 14.60	83°29.47	• • 18.94	Mirfak	308°26.34	49°57.19
10	112°50.68	286° 27.29	11.54	20°38.07	42.04	340°20.45	14.46	98°32.00	18.90	Aldebaran	290°38.19	16°33.80
11 12	127° 53.14 142° 55.61	301°27.64 316°27.99 <b>S</b> 0	12.74 04°13.94	35°38.74 50°39.40	42.05 N23°42.06	355°22.35 10°24.26	14.32 N18°14.17	113°34.53 128°37.06	18.86 N03° 18.82	Rigel	$281^{\circ}2.73$	-8°10.08
13	157° 58.07	331° 28.34	15.13	65°40.07	42.07	25°26.17	14.03	143°39.60	18.78	Capella	280°20.13	46°1.34
14	173°0.54	346°28.70	16.33	80°40.73	42.07	40°28.08	13.89	158°42.13	18.74	Bellatrix	278°21.61	6°22.52
15	188°3.00		• 17.53	95°41.40	• • 42.08	55°29.99	. 13.74	173°44.66	. 18.70	Elnath	278°0.36	28° 37.75
16	203°5.46	16°29.40	18.73	110°42.06	42.09	70°31.90	13.60	188°47.19	18.66	Alnilam	275°36.55	-1°10.97
17	218°7.93	31°29.76	19.92	125°42.73	42.10	85°33.80	13.46	203°49.73	18.62	Betelgeuse	270°50.84	7°24.80
18	233° 10.39	46°30.11 <b>S</b> 0	04°21.12	140°43.40	N23°42.11	100°35.71	N18° 13.31	218°52.26	N03°18.58	Canopus Sirius	263°52.18 258°25.32	-52°42.30 -16°44.99
19	$248^{\circ}12.86$	61°30.47	22.32	155°44.06	42.11	115°37.62	13.17	233°54.79	18.54	Adhara	255°5.12	-29°0.29
20	263° 15.32	76°30.82	23.51	170°44.73	42.12	130°39.53	13.03	248°57.33	18.50	Procyon	244°49.72	5°9.47
21	278° 17.78		• 24.71	185°45.40	• • 42.13	145°41.44	• • 12.88	263°59.86	• • 18.46	Pollux	243°16.01	27°57.71
22	293° 20.25	106°31.54	25.91	200°46.06	42.13	160°43.35	12.74	279°2.39	18.42	Avior	234°14.82	-59°35.55
23	308°22.71	121°31.90	27.10	215°46.73	42.14	175°45.25	12.60	294°4.93	18.38	Suhail	222°45.78	-43°32.33
Mer.	pass. 02:30	$ u$ 0.3 $^{\prime}$ $d$ 1.2 $^{\prime}$ $_{1}$	m-4.41	$ u$ 0.7 $^{\prime}$ d0	.0′ m1.28	$\nu$ 1.9′ d-0	.1' m-1.79	$\nu 2.5' \ d-0$	0.0′ m0.57	Miaplacidus	221°38.96	-69°49.54
										Alphard	217°46.77	-8°46.38
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.34	11°50.29
0	323°25.18		04°28.30	230°47.40	N23°42.14	190°47.16	N18° 12.45	309°7.46	N03° 18.34	Dubhe Denebola	193°39.98 182°23.85	61°36.56 14°25.48
1	338°27.64	151°32.62	29.49	245°48.06	42.15	205°49.07	12.31	324°10.00	18.29	Gienah	102 23.05 175°42.45	-17°41.41
2	$353^{\circ}30.10$	166°32.98	30.69	260°48.73	42.15	220°50.98	12.17	$339^{\circ}12.53$	18.25		173° 42.43	-63° 15.02
3	8° 32.57		• 31.88	275°49.40	• • 42.16	235°52.89	• • 12.02	354°15.06	• • 18.21	Gacrux	171°50.56	-57° 15.94
4	23°35.03	196°33.70	33.08	290°50.07	42.16	250°54.80	11.88	9°17.60	18.17	Alioth	$166^{\circ}12.13$	55°49.12
5	38° 37.50	211°34.06	34.27	305°50.73	42.17 N23°42.17	265°56.71	11.74	24°20.13	18.13	Spica	158°21.04	-11° 18.03
6 7	53° 39.96 68° 42.43	226°34.42 S0 241°34.78	04°35.47 36.66	320°51.40 335°52.07	N23 42.17 42.17	280°58.61 296°0.52	N18° 11.59 11.45	39°22.67 54°25.20	N03° 18.09 18.05	Alkaid	152°51.14	49° 11.04
8	83°44.89	256°35.15	37.85	350°52.74	42.18	311°2.43	11.31	69°27.74	18.01	Hadar	148°34.31	-60°30.34
9	98° 47.35		• 39.05	5°53.41	• • 42.18	326° 4.34	. 11.16	84°30.27	17.97	Menkent	147°56.16	-36°30.20
10	113°49.82	286°35.88	40.24	20°54.08	42.18	341°6.25	11.02	99°32.81	17.93	Arcturus	145°46.78	19°2.76 -60°56.98
11	128°52.28	301°36.24	41.44	35°54.75	42.18	356°8.16	10.88	114°35.34	17.89	Rigil Kent. Kochab	139°38.58 137°19.97	74°2.99
12	143°54.75		04°42.63	50°55.41	N23°42.18	11°10.07	N18° 10.73	129°37.88	N03°17.84	Zuben'ubi	136° 54.57	-16°9.18
13	158° 57.21	331°36.98	43.82	65°56.08	42.18	26°11.98	10.59	144°40.42	17.80	Alphecca	126°2.58	26° 37.68
14	173°59.67	346°37.34	45.01	80°56.75	42.19	41°13.89	10.45	159°42.95	17.76	Antares	112°14.08	-26° 29.52
15	189°2.14 204°4.60	1°37.71 · 16°38.08	· 46.21	95°57.42 110°58.09	• • 42.19	56°15.80 71°17.71	10.30	174°45.49	17.72	Atria	107°6.85	-69°4.74
16 17	219°7.07	31°38.45	47.40 48.59	110 56.09 125°58.76	42.19 42.19	86°19.62	10.16 10.02	189°48.03 204°50.56	17.68 17.64	Sabik	102°1.09	-15°45.45
18	234°9.53		04°49.78	140°59.43	N23°42.19	101°21.53	N18°9.87	219°53.10	N03° 17.60	Shaula	96°8.32	-37°7.45
19	$249^{\circ}11.99$	61°39.19	50.97	156° 0.10	42.18	116°23.44	9.73	234°55.64	17.55	Rasalhague	95°57.12 90°41.23	12°32.58 51°29.33
20	$264^{\circ}14.46$	76°39.56	52.16	171°0.77	42.18	131°25.34	9.58	249°58.17	17.51	Eltanin Kaus Aust.		-34° 22.33
21	$279^{\circ}16.92$	91°39.94 •	• 53.36	$186^{\circ}1.44$	• • 42.18	146°27.25	• • 9.44	265°0.71	• • 17.47	Vega	80°32.00	38° 48.69
22	294°19.39	106°40.31	54.55	201°2.11	42.18	161°29.16	9.30	280°3.25	17.43	Nunki		-26° 15.78
23	309°21.85	121°40.68	55.74	216°2.78	42.18	176°31.07	9.15	295°5.78	17.39	Altair	61°58.35	8°56.46
Mer.	pass. 02:26	$\nu$ 0.4' d1.2' i	m-4.42	$\nu 0.7' d0$	.0′ m1.28	$\nu 1.9' \ d-0$	.1′ m-1.79	$\nu 2.5' \ d-0$	0.0′ m0.56	Peacock	53°3.05	-56°38.91
	<u>.                                    </u>									Deneb	49°24.44	45°22.64
c	CHA	CHA	Dee	CHA	Dee	CHA	Dee	CHA	Dee	Enif	33°37.15	9°59.97
Sun 0	<b>GHA</b> 324° 24.31	<b>GHA</b> 136°41.06 <b>S</b> 0	<b>Dec</b> 04°56.93	<b>GHA</b> 231°3.45	<b>Dec</b> N23°42.18	<b>GHA</b> 191°32.98	<b>Dec</b> N18° 9.01	<b>GHA</b> 310°8.32	<b>Dec</b> N03° 17.34	Al Na'ir	27°30.77	-46°49.74
1	339° 26.78	151°41.43	58.12	231 3.43 246° 4.12	42.17	206°34.89	8.87	325°10.86	17.30	Fomalhaut	15°12.70	-29°28.65
2	354° 29.24		04°59.31	261°4.80	42.17	221°36.80	8.72	340°13.40	17.26	Scheat Markab	13°43.57 13°28.26	28° 13.72 15° 21.03
3	9°31.71		05°0.50	276° 5.47	• • 42.17	236°38.71	• • 8.58	355°15.94	• • 17.22	iviarkab	13 28.20	10 21.03
4	24°34.17	196°42.56	1.69	291°6.14	42.16	251°40.62	8.43	10°18.47	17.18	Aug 14 Fri	SHA	Mer.pass
5	39°36.63	211°42.94	2.88	$306^{\circ}6.81$	42.16	266°42.53	8.29	25°21.01	17.13		173°57.78	14:54
6	54° 39.10		05°4.06		N23°42.15	281°44.44	N18°8.15	40°23.55	N03°17.09	Mars	268°5.39	08:38
7	69°41.56	241°43.69	5.25	336°8.15	42.15	296°46.35	8.00	55°26.09	17.05		227°35.33	11:18
8	84° 44.03	256° 44.07	6.44	351°8.83	42.14	311°48.26	7.86	70°28.63	17.01	Saturn	345°40.65	03:27
9	99° 46.49		7.63	6° 9.50	• • 42.14	326°50.17	• • 7.72	85°31.17	16.96	Aug 15 Sat	SHA	Mer.pass
10 11	114° 48.95 129° 51.42	286°44.83 301°45.21	8.82 10.01	21°10.17 36°10.84	42.13 42.13	341°52.08 356°54.00	7.57 7.43	100°33.71 115°36.25	16.92 16.88	Venus		14:53
12	129 51.42 144°53.88		0.01 05°11.19	50°10.64	N23°42.12	11°55.91	7.43 N18°7.28	115 30.25 130°38.79	N03° 16.84		267°22.22	08:36
13	159° 56.35	331° 45.98	12.38	66°12.19	42.11	26°57.82	7.14	145°41.32	16.79		227°21.99	11:15
14	174° 58.81	346°46.36	13.57	81°12.86	42.11	41°59.73	7.00	160°43.86	16.75	Saturn	345°42.28	03:23
15	$190^{\circ}1.27$		• 14.75	96°13.53	• • 42.10	57° 1.64	• • 6.85	175°46.40	• • 16.71	Aug 16 Sun	SHA	Mer.pass
16	205°3.74	16°47.13	15.94	111°14.21	42.09	72° 3.55	6.71	190°48.94	16.67	Venus	$172^{\circ}16.74$	14:53
17	220°6.20	31°47.51	17.13	126°14.88	42.08	87° 5.46	6.57	205°51.48	16.62	1	266°39.14	08:35
18	235°8.67 250°11.13	46° 47.90 S0		141°15.55	N23°42.07	102°7.37 117°9.28	N18° 6.42	220°54.03	N03° 16.58	Jupiter	227°8.67	11:12
19 20	265° 13.59	61°48.29 76°48.67	19.50 20.68	156°16.23 171°16.90	42.06 42.06	117 9.28 132°11.19	6.28 6.13	235°56.57 250°59.11	16.54 16.49	Saturn	345°44.01	03:19
21	280° 16.06		• 21.87	171 10.90 186°17.58	• • 42.05	147°13.10	5.99	266°1.65	16.49	Horizo	ntal parallax	
22	295° 18.52	106°49.45	23.05	201°18.25	42.04	162°15.01	5.85	281°4.19	16.41		Venus:	0.2
23	$310^{\circ}20.99$	121°49.84	24.24	$216^{\circ}18.93$	42.03	$177^{\circ}16.92$	5.70	296°6.73	16.36		Mars:	0.1
Mer	pass. 02:22	ν0.4' d1.2' ι	m-4.43	$\nu 0.7' d_{-}0$	0.0' m1.28	ν1.9' d-0	.1′ m-1.79	$\nu 2.5' d-0$	0.0′ m0.56			
	, 02.22											

h	Su	n		Moon					
Fri	GHA	Dec	GHA	ν	Dec	d	HP		
0	178°48.09	N14°25.00	$162^{\circ}59.91$	11.8'	$N07^{\circ}50.28$	-16.1'	58.9'		
1	193°48.21	24.23	177°30.75	11.9'	07°34.22	-16.1'	58.8'		
2	208°48.32 223°48.44	23.46 22.69	192°1.66 206°32.65	12.0' 12.1'	07°18.15 07°2.06	-16.1' -16.1'	58.8' 58.8'		
4	238°48.55	21.92	221°3.71	12.1'	06°45.95	-16.1	58.7'		
5	253°48.67	21.15	235°34.84	12.2'	06°29.83	-16.1'	58.7'		
6	268°48.79	N14°20.38	250°6.03	12.3'	N06° 13.69	-16.2'	58.7'		
7 8	283°48.90 298°49.02	19.61 18.83	264°37.30 279°8.63	12.3' 12.4'	05°57.54 05°41.38	-16.2' -16.2'	58.7' 58.6'		
9	313°49.14	. 18.06	293°40.03	12.4	05 41.36 05°25.20	-16.2'	58.6'		
10	328°49.25	17.29	308° 11.48	12.5'	05°9.03	-16.2'	58.6'		
11	343°49.37	16.51	$322^{\circ}43.01$	12.6'	$04^{\circ}52.84$	-16.2'	58.5'		
12	358°49.49	N14° 15.74	337°14.59	12.6'	N04°36.65	-16.2'	58.5'		
13 14	13°49.61 28°49.73	14.97 14.19	351°46.23 6°17.93	12.7' 12.8'	04°20.46 04°4.26	-16.2' -16.2'	58.5' 58.4'		
15	43°49.84	. 13.42	20°49.69	12.8'	03°48.07	-16.2'	58.4'		
16	58°49.96	12.64	35°21.50	12.9'	03°31.88	-16.2'	58.4'		
17	73°50.08	11.87	49°53.37	12.9'	03°15.69	-16.2'	58.3'		
18	88°50.20 103°50.32	N14°11.09	64°25.29 78°57.27	13.0'	N02°59.50 02°43.32	-16.2'	58.3'		
19 20	103°50.32 118°50.44	10.31 9.54	78°57.27 93°29.29	13.0' 13.1'	02°43.32 02°27.14	-16.2' -16.2'	58.3' 58.2'		
21	133°50.56	8.76	108°1.37	13.1'	02°10.98	-16.2'	58.2'		
22	148°50.68	7.98	122°33.49	13.2'	01°54.82	-16.1'	58.2'		
23	163°50.80	7.20	137°5.66	13.2'	01°38.68	-16.1'	58.1'		
	SD = 15.8′	d = -0.8'		SI	D = 16.1'				
Sat	GHA	Dec	GHA	ν	Dec	d	НР		
0 0	178°50.92	N14°6.42	151°37.87	ν 13.3'	N01°22.54	-16.1'	58.1'		
1	193°51.04	5.64	$166^{\circ}10.13$	13.3'	$01^{\circ}6.42$	-16.1'	58.1'		
2	208°51.16	4.87	180°42.44	13.3'	00°50.32	-16.1'	58.0'		
3 4	223°51.28 238°51.41	· · 4.09 3.31	195°14.78 209°47.17	13.4' 13.4'	00°34.23 00°18.16	-16.1' -16.1'	58.0' 57.9'		
5	250 51.41 253°51.53	2.53	209 47.17 224°19.60	13.5'	N00°2.11	-16.1	57.9'		
6	268°51.65	N14°1.74	238° 52.06	13.5'	S00°13.92	16.0'	57.9'		
7	283°51.77	0.96	253°24.56	13.5'	00°29.93	16.0'	57.8'		
8	298°51.89	14°0.18	267°57.10	13.6'	00°45.92	16.0'	57.8'		
9 10	313°52.02 328°52.14	13°59.40 58.62	282°29.67 297°2.27	13.6' 13.6'	01°1.88 01°17.82	15.9' 15.9'	57.8' 57.7'		
11	343°52.26	57.83	311°34.91	13.7'	01°33.73	15.9'	57.7'		
12	358°52.39	N13°57.05	326°7.58	13.7'	S01°49.62	15.9'	57.7'		
13	13°52.51	56.27	340°40.27	13.7'	02°5.47	15.8'	57.6'		
14 15	28°52.63 43°52.76	55.48 •• 54.70	355°13.00 9°45.75	13.8' 13.8'	02°21.30 02°37.10	15.8' 15.8'	57.6' 57.6'		
16	58°52.88	53.92	24°18.53	13.8'	02°52.86	15.7'	57.5'		
17	73°53.01	53.13	$38^{\circ}51.34$	13.8'	$03^{\circ}8.59$	15.7'	57.5'		
18	88°53.13	N13°52.34	53°24.16	13.8'	503°24.28	15.7'	57.5'		
19 20	103°53.26 118°53.38	51.56 50.77	67°57.01 82°29.88	13.9'	03°39.94 03°55.57	15.6' 15.6'	57.4' 57.4'		
21	133°53.51	• • 49.99	97°2.77	13.9'	03 55.57 04°11.15	15.5	57.4'		
22	148°53.63	49.20	111°35.68	13.9'	04°26.70	15.5'	57.3'		
23	163°53.76	48.41	126°8.61	13.9'	04°42.21	15.5'	57.3'		
	SD = 15.8'	d = -0.8'		SI	D = 15.8'				
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP		
0	178°53.89	N13°47.62	140°41.56	14.0'	S04°57.68	15.4'	57.2'		
1	193°54.01	46.84	155°14.52	14.0'	05°13.10	15.4'	57.2'		
2	208°54.14 223°54.27	46.05 •• 45.26	169°47.49 184°20.48	14.0' 14.0'	05°28.48 05°43.82	15.3' 15.3'	57.2' 57.1'		
4	238°54.39	44.47	198°53.48	14.0'	05°59.11	15.2'	57.1		
5	253°54.52	43.68	213°26.49	14.0'	06°14.36	15.2'	57.1'		
6	268°54.65	N13°42.89	227°59.51	14.0'	S06° 29.56	15.2'	57.0'		
7 8	283°54.78 298°54.90	42.10 41.31	242°32.53 257°5.57	14.0' 14.0'	06°44.71 06°59.81	15.1' 15.1'	57.0' 57.0'		
9	313°55.03	. 40.52	257 5.57 271°38.61	14.0'	00 59.81 07°14.87	15.1	56.9'		
10	328°55.16	39.73	$286^{\circ}11.66$	14.1'	$07^{\circ}29.87$	15.0'	56.9'		
11	343°55.29	38.93	300°44.71	14.1'	07°44.82	14.9'	56.9'		
12 13	358°55.42 13°55.55	N13°38.14 37.35	315°17.77 329°50.82	14.1' 14.1'	\$07°59.72 08°14.56	14.8' 14.8'	56.8' 56.8'		
14	28°55.68	37.35 36.56	329 50.82 344°23.88	14.1'	08° 14.56	14.8 14.7'	56.8'		
15	43°55.81	• • 35.76	358°56.94	14.1'	08°44.08	14.7'	56.7'		
16	58°55.94	34.97	13°30.00	14.1'	08°58.76	14.6'	56.7'		
17	73°56.07 88°56.20	34.18 N13° 33.38	28°3.05 42°36.11	14.1'	09°13.38 \$09°27.94	14.6'	56.7'		
18 19	88°56.20 103°56.33	N13°33.38 32.59	42°36.11 57°9.16	14.0' 14.0'	509°27.94 09°42.44	14.5' 14.4'	56.6' 56.6'		
20	118°56.46	31.79	71°42.20	14.0'	09°56.88	14.4'	56.6'		
21	133°56.59	• • 31.00	86° 15.24	14.0'	10°11.26	14.3'	56.5'		
22 23	148°56.72 163°56.85	30.20 29.40	100°48.27 115°21.29	14.0' 14.0'	10°25.58 10°39.84	14.3' 14.2'	56.5' 56.5'		
23		d = -0.8'	115 21.29			14.2	50.5		
	SD = 15.8'	<u>u = -0.δ</u>		31	D = 15.6'				

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Junset	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:06	06:55	07:39	16:31	17:15	18:05

Lat.		Moonris	e		Moonset	:
Lat.	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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 10°	07:27	80:80	08:48	19:43	20:33	21:23
20°	07:32	80:80	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
<b>S</b> 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
<b>S</b> 60°	08:04	08:04	08:04	19:26	21:00	22:32

		Sun		Moon			
Day	Eqn.of	f Time	Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	2-4	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	2-13%	
14	04:48	04:42	12:05	13:34	01:10		
15	04:36	04:30	12:05	14:20	01:57		
16	04:24	04:18	12:04	15:04	02:42		

h	Aries	Venus	, Mars	Jupiter	Saturn
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	325°23.45	136°50.23	231°19.60 N23°42.02	192°18.84 N18°5.56	311°9.27 N03°16.32
1	340°25.92	151°50.62 26.61	246°20.27 42.01	207°20.75 5.41	326°11.81 16.28
2	355°28.38	166°51.01 27.79	261°20.95 41.99	222°22.66 5.27	341°14.35 16.23
3	10°30.84	181°51.40 · · 28.97	276°21.62 · · 41.98	237°24.57 · · 5.13	356°16.90 · · 16.19
4	25°33.31	196°51.79 30.16	291°22.30 41.97	252°26.48 4.98	11°19.44 16.15
5	40° 35.77	211°52.19 31.34	306°22.98 41.96	267°28.39 4.84	26°21.98 16.10
6	55° 38.24	226°52.58 S05°32.52	321°23.65 N23°41.95	282°30.30 N18°4.69	41°24.52 N03°16.06
7	70° 40.70	241°52.98 33.71	336°24.33 41.93	297°32.22 4.55	56°27.06 16.02
8	85°43.16	256° 53.37 34.89	351°25.00 41.92	312°34.13 4.40	71°29.61 15.97
	100° 45.63				
9					
10	115°48.09	286°54.16 37.25	21°26.35 41.89	342°37.95 4.12	101°34.69 15.88
11	130°50.56	301°54.56 38.44	36°27.03 41.88	357°39.86 3.97	116°37.23 15.84
12	145°53.02	316°54.96	51°27.71 N23°41.86	12°41.77 N18°3.83	131°39.78 N03°15.80
13	160°55.48	331°55.36 40.80	66°28.38 41.85	27°43.69 3.68	146°42.32 15.75
14	175°57.95	346°55.76 41.98	81°29.06 41.83	42°45.60 3.54	161°44.86 15.71
15	191°0.41	1°56.16 · · 43.16	96°29.74 · · 41.82	57°47.51 · · 3.40	176°47.41 · · 15.66
16	206°2.88	16°56.56 44.34	111°30.42 41.80	72°49.42 3.25	191°49.95 15.62
17	221°5.34	31°56.96 45.52	126°31.09 41.79	87°51.33 3.11	206°52.49 15.57
18	236°7.80	46°57.36 <b>S</b> 05°46.70	141°31.77 N23°41.77	102°53.25 N18°2.96	221°55.04 N03°15.53
19	251°10.27	61°57.76 47.88	156°32.45 41.75	117°55.16 2.82	236°57.58 15.49
20	266° 12.73	76°58.16 49.06	171°33.13 41.74	132°57.07 2.67	252°0.13 15.44
21	281°15.20	91°58.57 · · 50.24	186°33.80 · · 41.72	147°58.98 · · 2.53	267°2.67 · · 15.40
22	296° 17.66	106°58.97 51.42	201°34.48 41.70	163°0.89 2.39	282°5.22 15.35
23	311°20.12	121°59.38 52.59	216°35.16 41.68	178° 2.81 2.24	297°7.76 15.31
	pass. 02:18	$\frac{121 \text{ 95.93}}{\nu 0.4' \text{ d}1.2' \text{ m-4.44}}$	$\frac{210~95.10}{\nu 0.7'~d-0.0'~m1.28}$	$\frac{110^{\circ} 2.01^{\circ}}{\nu 1.9^{\circ} d-0.1^{\circ} m-1.79}$	$\frac{257 \text{ V.10}}{\nu 2.5' \text{ d-0.0' m0.55}}$
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	326°22.59	136°59.78	231°35.84 N23°41.67	193°4.72 N18°2.10	312°10.31 N03°15.26
1	341°25.05	152°0.19 54.95	246°36.52 41.65	208° 6.63 1.95	327°12.85 15.22
2	356° 27.52	167°0.60 56.13	261°37.20 41.63	223°8.54 1.81	342°15.40 15.17
3	11°29.98	182°1.01 · · 57.31	276°37.88 · · 41.61	238°10.46 · · 1.66	357°17.94 · · 15.13
4	26°32.44	197°1.41 58.48	291°38.55 41.59	253°12.37 1.52	12°20.49 15.08
5	41°34.91	212°1.82 05°59.66	306°39.23 41.57	268°14.28 1.38	27°23.03 15.04
6	56° 37.37	227°2.23	321°39.91 N23°41.55	283°16.20 N18°1.23	42°25.58 N03°14.99
7	71°39.84	242°2.64 2.01	336°40.59 41.53	298°18.11 1.09	57°28.12 14.95
8	86° 42.30				
	101°44.77				
9					
10	116° 47.23	287°3.88 5.54	21°42.63 41.47	343°23.85 0.65	102°35.76 14.81
11	131°49.69	302°4.29 6.71	36°43.31 41.44	358°25.76 0.51	117°38.31 14.77
12	146°52.16	317°4.71	51°43.99 N23°41.42	13°27.67 N18°0.36	132°40.86 N03°14.72
13	161°54.62	332°5.12 9.06	66°44.67 41.40	28°29.59 0.22	147°43.40 14.68
14	176° 57.09	347°5.54 10.24	81°45.36 41.38	43°31.50 18°0.08	162°45.95 14.63
15	191°59.55	2°5.95 · · 11.41	96°46.04 · · 41.35	58°33.41 17°59.93	177°48.50 · · 14.59
16	207°2.01	17°6.37 12.59	111°46.72 41.33	73°35.33 59.79	192°51.04 14.54
17	222°4.48	32°6.79 13.76	126°47.40 41.31	88°37.24 59.64	207°53.59 14.49
18	237°6.94	47°7.21 <b>S</b> 06°14.93	141°48.08 N23°41.28	103°39.15 N17°59.50	222°56.14 N03°14.45
19	252°9.41	62°7.63 16.11	156°48.76 41.26	118°41.07 59.35	237°58.69 14.40
20	$267^{\circ}11.87$	77°8.05 17.28	171°49.44 41.23	133°42.98 59.21	253°1.23 14.36
21	282°14.33	92°8.47 · · 18.45	186°50.13 · · 41.21	148°44.89 · · 59.06	268°3.78 · · 14.31
22	$297^{\circ}16.80$	107°8.89 19.62	201°50.81 41.18	163°46.81 58.92	283°6.33 14.26
23	$312^{\circ}19.26$	122°9.31 20.79	216°51.49 41.16	178°48.72 58.77	298°8.88 14.22
Mer.p	pass. 02:14	ν0.4' d1.2' m-4.45	ν0.7' d-0.0' m1.28	$\nu 1.9' \ d$ -0.1' m-1.79	ν2.5' d-0.0' m0.55
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	327°21.73	137°9.73 <b>S</b> 06°21.97	231°52.17 N23°41.13	193°50.64 N17°58.63	313°11.43 N03°14.17
1	$342^{\circ}24.19$	152°10.15 23.14	246°52.86 41.10	208°52.55 58.49	328°13.98 14.13
2	357°26.66	167°10.58 24.31	261°53.54 41.08	223°54.46 58.34	343°16.52 14.08
3	12°29.12	182°11.00 · · 25.48	276°54.22 · · 41.05	238°56.38 · · 58.20	358°19.07 · · 14.03
4	27°31.58	197°11.43 26.65	291°54.91 41.02	253°58.29 58.05	13°21.62 13.99
5	42°34.05	212°11.85 27.82	306°55.59 40.99	269° 0.21 57.91	28°24.17 13.94
6	57°36.51	227°12.28 S06°28.99	321°56.27 N23°40.97	284°2.12 N17°57.76	43°26.72 N03°13.89
7	72° 38.98	242°12.71 30.16	336°56.96 40.94	299° 4.03 57.62	58°29.27 13.85
8	87° 41.44	257°13.14 31.33	351°57.64 40.91	314° 5.95 57.47	73°31.82 13.80
9	102°43.90	272°13.57 · · 32.49	6°58.32 · · 40.88	329°7.86 · · 57.33	88°34.37 · · 13.75
10	102 45.90 117°46.37	287°13.99 33.66	21°59.01 40.85	344° 9.78 57.18	103°36.92 13.71
11	117 40.37 132° 48.83	302°14.42 34.83	36°59.69 40.82	359°11.69 57.04	118°39.47 13.66
12	132 46.63 147°51.30	317°14.86 \$06°36.00	52°0.38 N23°40.79	14°13.61 N17°56.89	133°42.02 N03°13.61
	147 51.30 162°53.76	317 14.80 500 30.00 332°15.29 37.17	67°1.06 40.76	29°15.52 56.75	
13		332°15.29 37.17 347°15.72 38.33			
14	177°56.22				_
15	192°58.69	2°16.15 · · 39.50	97°2.43 · · 40.70	59°19.35 · · 56.46	178°49.67 · · 13.47
16	208°1.15	17°16.59 40.67	112°3.12 40.67	74°21.27 56.31	193°52.22 13.43
17	223°3.62	32°17.02 41.83	127°3.80 40.64	89°23.18 56.17	208°54.77 13.38
18	238°6.08	47°17.46 S06°43.00	142°4.49 N23°40.60	104°25.10 N17°56.03	223°57.32 N03°13.33
19	253°8.55	62°17.89 44.17	157° 5.17 40.57	119°27.01 55.88	238°59.87 13.29
20	$268^{\circ}11.01$	77°18.33 45.33	172° 5.86 40.54	134°28.93 55.74	254°2.43 13.24
21	283°13.47	92°18.77 · · 46.50	187°6.55 · · 40.51	149°30.84 · · 55.59	269°4.98 · · 13.19
22	$298^{\circ}15.94$	107°19.20 47.66	202°7.23 40.47	164°32.76 55.45	284°7.53 13.14
23	313°18.40	122°19.64 48.83	217°7.92 40.44	179°34.67 55.30	299°10.08 13.10
Mer.r	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	$\nu 2.5' \ d$ -0.0' m0.54
				21.5 3 0.1 111 1.13	22.0 2 0.0 1110.04

	эпа	Dec
Alpheratz	357°33.10	29°14.31
Ankaa	353°5.50	-42°9.38
Schedar	349°29.11	56°40.93
Diphda	348°45.72	-17°50.19
Achernar	335°18.90	-57°5.73
Hamal	327°49.55	23°35.33
Polaris	313°17.07	89°22.26
Acamar	315°10.69	-40° 11.52
Menkar	314°4.70	4°11.78
Mirfak	308°26.31	49°57.19
Aldebaran	290°38.17	16°33.80
Rigel	281°2.72	-8°10.07
Capella	280°20.11	46°1.34
Bellatrix	278°21.59	6°22.52
Elnath	278°0.34	28° 37.75
Alnilam	275°36.53	-1°10.96
Betelgeuse	270°50.82	7°24.80
Canopus	263°52.16	-52°42.29
Sirius	258°25.30	-16°44.98
Adhara	255°5.10	-29°0.29
Procyon	244°49.71	5°9.48
Pollux	243°15.99	27°57.70
Avior	234°14.81	-59°35.53
Suhail	222°45.77	-43°32.32
Miaplacidus	221°38.95	-69°49.52
Alphard	217°46.77	-8°46.37
Regulus	207°33.34	11°50.29
Dubhe	193°39.99	61°36.55
Denebola	182°23.86	14°25.48
Gienah	175°42.46	-17°41.41
Acrux	172°59.12	-63°15.01
Gacrux	171°50.57	-57° 15.93
Alioth	166°12.15	55°49.12
Spica	158°21.06	-11°18.02
Alkaid	152°51.16	49°11.04
Hadar	148°34.34	-60°30.33
Menkent	147°56.18	-36°30.19
Arcturus	145°46.79	19°2.77
Rigil Kent.	139°38.61	-60°56.97
Kochab	137°20.04	74°2.99
Zuben'ubi	136°54.59	-16°9.17
Alphecca	126°2.60	26°37.69
Antares	112°14.09	-26°29.51 -69°4.74
Atria Sabik	107°6.89 102°1.10	-09 4.74 -15°45.45
Shaula	96°8.34	-15 45.45 -37°7.45
Rasalhague	90 0.34 95°57.13	12° 32.58
Eltanin	90°41.25	51°29.34
Kaus Aust.	83°30.46	-34°22.33
Vega	80°32.02	38° 48.70
Nunki	75°45.82	
Altair	61°58.36	-26°15.78 8°56.47
Peacock	53°3.06	-56°38.92
Deneb	49°24.45	45°22.66
Enif	33°37.15	9°59.98
Al Na'ir	27°30.77	9 59.96 -46°49.75
Fomalhaut	27 30.77 15°12.69	-46 49.75 -29°28.66
Scheat	13°43.57	-29 28.00 28°13.73
Markab	13°28.25	26 13.73 15°21.04
IVIAINAD	15 20.25	15 21.07
Aug 17 Mon	SHA	Mer.pass
Venus	171°26.78	14:52
Mars	265°56.15	08:34
Jupiter	226°55.38	11:09
Saturn	345°45.82	03:15
A 10 T	CIIA	NA
Aug 18 Tue	SHA 170° 27 20	Mer.pass
Venus	170°37.20	14:52
Mars	265°13.25 226°42.13	08:33
Jupiter Saturn	226°42.13 345°47.72	11:06 03:11
Saturn	J4J 41.12	U3:11
	SHA	Mer.pass
Aug 19 Wed	169°48.00	14:51
Aug 19 Wed Venus		08:32
_	264°30.45	
Venus	264°30.45 226°28.91	11:03
Venus Mars		
Venus Mars Jupiter Saturn	226°28.91 345°49.70	11:03
Venus Mars Jupiter Saturn	226°28.91 345°49.70 ntal parallax	11:03 03:07
Venus Mars Jupiter Saturn	226°28.91 345°49.70	11:03

Stars SHA

Dec

h	Su	n	Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°56.98	$N13^{\circ}28.61$	$129^{\circ}54.30$	14.0'	<b>S</b> 10° 54.03	14.1'	56.4'
1	193°57.12	27.81	144°27.30	14.0'	11°8.16	14.1'	56.4
2 3	208°57.25 223°57.38	27.01 •• 26.21	159°0.30 173°33.28	14.0' 14.0'	11°22.22 11°36.21	14.0' 13.9'	56.4' 56.3'
4	238°57.51	25.42	188°6.24	14.0'	11°50.14	13.9'	56.3
5	253°57.65	24.62	202°39.20	13.9'	12°4.00	13.8'	56.3'
6 7	268°57.78 283°57.91	N13°23.82 23.02	217° 12.14 231° 45.06	13.9' 13.9'	\$12°17.80 12°31.52	13.7' 13.7'	56.2' 56.2'
8	298°58.05	22.22	246° 17.97	13.9'	12°45.17	13.6'	56.2
9	313°58.18	• • 21.42	260°50.86	13.9'	$12^{\circ}58.75$	13.5'	56.1'
10	328°58.31 343°58.45	20.62	275°23.73 289°56.58	13.9'	13°12.26 13°25.70	13.4'	56.1
11 12	358° 58.58	19.82 N13° 19.02	304°29.41	13.8' 13.8'	\$13°39.06	13.4' 13.3'	56.1' 56.0'
13	13°58.72	18.22	319°2.22	13.8'	13°52.35	13.2'	56.0'
14	28°58.85	17.41	333°35.01	13.8'	14°5.56	13.1'	56.0'
15 16	43°58.99 58°59.12	· · 16.61 15.81	348°7.78 2°40.53	13.7' 13.7'	14° 18.70 14° 31.76	13.1' 13.0'	55.9' 55.9'
17	73°59.26	15.01	17° 13.25	13.7'	14°44.75	12.9'	55.9'
18	88°59.40	N13°14.20	31° 45.94	13.7'	S14°57.65	12.8'	55.9'
19 20	103°59.53 118°59.67	13.40 12.60	46° 18.61 60° 51.26	13.6' 13.6'	15° 10.48 15° 23.23	12.7' 12.7'	55.8' 55.8'
21	133°59.80	12.00	75°23.87	13.6'	15° 25.25 15° 35.89	12.6'	55.8'
22	148°59.94	10.99	89°56.46	13.6'	15°48.48	12.5'	55.7'
23	164°0.08	10.18	104°29.02	13.5'	16°0.98	12.4'	55.7'
	SD = 15.8'	d = -0.8'		SE	0 = 15.4'		
Tue	GHA	Dec	GHA	ν	Dec	d	НР
0	179°0.22	N13°9.38	119°1.55	ν 13.5'	S16° 13.40	12.3'	55.7'
1	194°0.35	8.57	133°34.05	13.5'	16°25.73	12.3'	55.6'
2 3	209°0.49 224°0.63	7.77	148°6.53 162°38.96	13.4' 13.4'	16°37.99 16°50.15	12.2' 12.1'	55.6'
3 4	224 0.63 239°0.77	· · 6.96 6.15	162 38.96 177°11.37	13.4	10 50.15 17°2.23	12.1	55.6' 55.6'
5	254°0.91	5.34	191°43.75	13.3'	$17^{\circ}14.23$	11.9'	55.5'
6	269°1.04	N13°4.54	206° 16.09	13.3'	\$17°26.14	11.8'	55.5'
7 8	284°1.18 299°1.32	3.73 2.92	220° 48.40 235° 20.67	13.3' 13.2'	17°37.96 17°49.69	11.7' 11.6'	55.5' 55.5'
9	314°1.46	2.11	249° 52.91	13.2'	18°1.33	11.6'	55.4'
10	329°1.60	1.30	264°25.11	13.2'	18° 12.88	11.5'	55.4'
11	344°1.74 359°1.88	13°0.49 N12°59.68	278° 57.28 293° 29.41	13.1' 13.1'	18°24.34 \$18°35.71	11.4' 11.3'	55.4' 55.3'
12 13	359°1.88 14°2.02	N12 59.68 58.87	293° 29.41 308° 1.50	13.1'	18° 46.99	11.3	55.3'
14	29°2.16	58.06	322° 33.56	13.0'	18°58.17	11.1'	55.3'
15	44°2.30	• • 57.25	337°5.58	13.0'	19°9.26	11.0'	55.3'
16 17	59°2.44 74°2.58	56.44 55.63	351°37.56 6°9.50	12.9' 12.9'	19°20.26 19°31.16	10.9' 10.8'	55.2' 55.2'
18	89°2.72	N12°54.82	20°41.40	12.9'	S19°41.96	10.7'	55.2'
19	104°2.87	54.01	35° 13.26	12.8'	19°52.67	10.6'	55.2'
20 21	119°3.01 134°3.15	53.19 •• 52.38	49° 45.08 64° 16.86	12.8' 12.7'	20°3.28 20°13.80	10.5' 10.4'	55.1' 55.1'
22	149°3.29	51.57	78° 48.60	12.7'	20°24.21	10.4	55.1'
23	164°3.43	50.75	93°20.29	12.7'	20°34.53	10.2'	55.1'
	SD = 15.8'	d = -0.8'		SE	0 = 15.2'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°3.58	N12°49.94	$107^{\circ}51.95$	12.6'	S20°44.75	10.1'	55.1'
1 2	194°3.72 209°3.86	49.13 48.31	122°23.56 136°55.13	12.6' 12.5'	20°54.86 21°4.88	10.0' 9.9'	55.0' 55.0'
3	209 3.80 224°4.01	48.31	150 55.13 151°26.66	12.5'	21 4.88 21°14.79	9.9 9.8'	55.0'
4	239°4.15	46.68	$165^{\circ}58.14$	12.4'	21°24.60	9.7'	55.0'
5	254°4.29 269°4.44	45.87 N12° 45.05	180°29.59 195°0.98	12.4' 12.4'	21°34.31 <b>S</b> 21°43.91	9.6' 9.5'	54.9' 54.9'
6 7	269°4.44 284°4.58	44.23	195°0.98 209°32.34	12.4	21°53.41	9.5° 9.4'	54.9' 54.9'
8	299°4.72	43.42	224°3.65	12.3'	$22^{\circ}2.81$	9.3'	54.9'
9	314°4.87	• • 42.60	238°34.91	12.2'	22°12.10	9.2'	54.9'
10 11	329°5.01 344°5.16	41.78 40.96	253°6.14 267°37.31	12.2' 12.1'	22°21.28 22°30.35	9.1' 9.0'	54.8' 54.8'
12	359°5.30	N12°40.15	282°8.45	12.1'	S22°39.32	8.9'	54.8'
13	14°5.45	39.33	296°39.54	12.0'	22°48.18	8.8'	54.8'
14 15	29°5.60 44°5.74	38.51 •• 37.69	311° 10.58 325° 41.58	12.0' 12.0'	22°56.93 23°5.57	8.6' 8.5'	54.8' 54.7'
16	59°5.89	36.87	340° 12.54	11.9'	23° 14.10	8.4'	54.7'
17	74°6.03	36.05	354° 43.45	11.9'	23°22.52	8.3'	54.7'
18	89°6.18	N12°35.23	9°14.31	11.8'	\$23°30.83	8.2'	54.7'
19 20	104°6.33 119°6.47	34.41 33.59	23° 45.13 38° 15.91	11.8' 11.7'	23°39.03 23°47.11	8.1' 8.0'	54.7' 54.6'
21	134°6.62	• • 32.77	52° 46.64	11.7'	23°55.09	7.9'	54.6'
22	149°6.77	31.95	67° 17.33	11.6'	24°2.94	7.7'	54.6'
23	164°6.92	31.12	81°47.97	11.6'	24°10.69	7.6'	54.6'
	SD = 15.8'	d = -0.8'		SE	0 = 15.0'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	05:58	06:47	07:31	16:37	17:22	18:11

Lat.		Moonris	e		Moonset	:
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°	13:04			18:09		
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	08:03	08:04	08:07		00:04	01:37

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Age		
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	5-7	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	21-39%	
17	04:12	04:06	12:04	15:49	03:27		
18	03:59	03:52	12:04	16:35	04:12		
19	03:46	03:39	12:04	17:22	04:58		

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

h	Aries	Venus		Mars	Ju	piter	Sa	turn		Stars	
Thu	GHA	GHA De	c GHA	A Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	$328^{\circ}20.87$	137°20.08 <b>S</b> 06°4	19.99 232°8	8.60 N23°40.40			314°12.63	$N03^{\circ}13.05$	Alphoratz	357°33.08	29° 14.32
1	343°23.33	152° 20.52	51.15 247°9	.29 40.37			329°15.19	13.00	Alpheratz	353° 5.48	-42°9.38
2	358° 25.79	167°20.96	52.32 262°9	0.98 40.34			344°17.74	12.95	Ankaa Schedar	349°29.08	-42 9.36 56°40.94
3	13°28.26	182°21.41 · · · !					359°20.29	•• 12.91	Diphda	348°45.71	-17°50.19
4	28° 30.72		54.64 292°11				14°22.84	12.86	Achernar	335°18.87	-57°5.73
5	43°33.19		55.81 307°12				29°25.40	12.81	Hamal	327°49.53	23°35.34
6	58° 35.65	227°22.73 S06°!					44°27.95	N03°12.76	Polaris	313°15.29	89°22.26
7	73°38.11		58.13 337°13 59.29 352°14				59°30.50	12.72	Acamar	315°10.66	-40°11.52
8 9	88° 40.58 103° 43.04		59.29 352°14 0.45 7°14				74°33.05 89°35.61	12.67 •• 12.62	Menkar	314°4.68	4°11.79
10	103° 45.04 118° 45.51	287° 24.52	1.61 22°15				104°38.16	12.57	Mirfak	308°26.27	49°57.19
11	133° 47.97	302°24.96	2.77 37°16				119°40.71	12.52	Aldebaran	290°38.14	16°33.81
12	148° 50.44	317°25.41 S07°	3.93 52°16				134°43.27	N03° 12.48	Rigel	281°2.69	-8° 10.07
13	163°52.90	332°25.86	5.09 67°17				149°45.82	12.43	Capella	280°20.07	46°1.34
14	$178^{\circ}55.36$	347°26.31	6.25 82°18		45°3.41	53.13	164°48.38	12.38	Bellatrix	278°21.57	6°22.52
15	193°57.83	2°26.76 · ·	7.41 97°18	39.86	60°5.32	. 52.98	179°50.93	• • 12.33	Elnath Alnilam	278°0.32 275°36.51	28°37.75 -1°10.96
16	209°0.29	17°27.21	8.57 112°19				194°53.48	12.28	Betelgeuse	270°50.80	7°24.80
17	224°2.76	32°27.67	9.73 127°20				209°56.04	12.23	Canopus	263°52.14	-52°42.28
18	239°5.22	47°28.12 S07°					224°58.59	N03°12.19	Sirius	258°25.28	-16°44.98
19	254°7.68		.2.05 157°21				240°1.15	12.14	Adhara	255°5.08	-29°0.28
20	269° 10.15		.3.21 172°22				255°3.70	12.09	Procyon	244°49.70	5°9.48
21 22	284° 12.61 299° 15.08	92°29.48 · · 1 107°29.94	.4.36 187°23 .5.52 202°23				270°6.26 285°8.81	12.04	Pollux	243°15.98	27°57.70
23	314° 17.54		.6.68 217°24				300°11.37	11.99 11.94	Avior	234°14.79	-59°35.52
									Suhail	222°45.76	-43°32.30
Mer.	pass. 02:06	$ u 0.4' \ d1.2' \ { m m-4}$	$47   \nu 0.7'$	<i>d</i> -0.0′ m1.27	$\nu$ 1.9′ d-0	$0.1'   ext{m-}1.79$	$\nu$ 2.6′ d-0	0.0'  m 0.54	Miaplacidus	221°38.94	-69°49.51
									Alphard	217°46.76 207°33.33	-8°46.37 11°50.29
Fri	GHA	GHA De	ec GHA	A Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	207 33.33 193°39.99	61°36.53
0	$329^{\circ}20.01$	137°30.85 S07°					315°13.92	N03°11.89	Denebola	182°23.86	14° 25.48
1	344° 22.47		.8.99 247°25				330°16.48	11.85	Gienah	175°42.46	-17°41.40
2	359°24.93		20.15 262°26				345°19.03	11.80	Acrux		-63°15.00
3	14° 27.40	182°32.22 · · · 2					0°21.59	•• 11.75	Gacrux	171°50.58	-57° 15.92
4 5	29° 29.86 44° 32.33		22.46 292°27 23.61 307°28				15°24.15 30°26.70	11.70 11.65	Alioth	$166^{\circ}12.17$	55°49.11
6	59° 34.79	227°33.61 S07°2					45°29.26	N03°11.60	Spica	158°21.06	-11° 18.02
7	74° 37.25		25.92 337°29				60°31.82	11.55	Alkaid	152°51.18	49°11.03
8	89° 39.72		27.07 352°30				75°34.37	11.50	Hadar	148°34.35	-60°30.32
9	104°42.18	272°35.00 · · 2					90°36.93	• • 11.45		147°56.19 145°46.80	-36°30.19
10	119°44.65	287°35.46	29.38 22°32	2.05 39.06	345°41.74	50.22	105°39.49	11.40	Arcturus Rigil Kent.	145 46.80 139°38.63	19°2.76 -60°56.97
11	$134^{\circ}47.11$	302°35.93	37°32			50.08	120°42.04	11.36	Kochab	137°20.10	74°2.99
12	149°49.58	317°36.39 S07°3					135°44.60	N03°11.31	Zuben'ubi	136°54.60	-16°9.17
13	164°52.04		32.84 67°34				150°47.16	11.26	Alphecca	126°2.61	26° 37.69
14	179°54.50		33.99 82°34				165°49.71	11.21	Antares	$112^{\circ}14.10$	-26°29.51
15 16	194° 56.97 209° 59.43	2°37.79 · · · 3 17°38.26	35.14 97°35 36.29 112°36				180°52.27 195°54.83	· · 11.16 11.11	Atria	$107^{\circ}6.92$	-69°4.74
17	225°1.90		37.44 127°36				210°57.39	11.11	Sabik	102°1.11	-15°45.45
18	240°4.36	47°39.20 S07°3					225°59.95	N03°11.01	Shaula	96°8.35	-37°7.45
19	255°6.82		39.74 157°38				241°2.50	10.96	Rasalhague	95°57.14	12°32.59 51°29.35
20	270°9.29		172°38				256°5.06	10.91	Eltanin Kaus Aust.	90°41.27 83°30.47	-34°22.33
21	$285^{\circ}11.75$	92°40.62 · · ·	2.04 187°39	0.68 •• 38.55			271°7.62	• • 10.86	Vega	80°32.03	38° 48.71
22	$300^{\circ}14.22$		3.19 202°40				286°10.18	10.81	Nunki	75°45.82	-26° 15.78
23	315° 16.68	122°41.57	4.34 217°41	07 38.45	181°6.68	48.34	301°12.74	10.76	Altair	61°58.36	8°56.48
Mer.	pass. 02:02	$\nu$ 0.5' d1.2' m-4	$49 {\nu 0.7'}$	d-0.0′ m1.27	$\nu 1.9' d-0$	0.1′ m-1.79	$\nu^{2.6'} d^{-6}$	0.0′ m0.53	Peacock	53°3.06	-56°38.93
									Deneb	49°24.45	45°22.68
٠.	CIIA	CIIA D	CIII		CIIA	ъ.	CIIA	Б	Enif	33°37.15	9°59.99
Sat 0	<b>GHA</b> 330° 19.15	<b>GHA De</b> 137° 42.04 <b>S</b> 07° 4		<b>N Dec</b> 77 N23°38.40	<b>GHA</b> ) 196°8.59	<b>Dec</b> N17°48.19	<b>GHA</b> 316°15.30	<b>Dec</b> N03°10.71	Al Na'ir	27°30.76	-46° 49.75
1	345°21.61		16.64 247°42				331°17.86	10.66	Fomalhaut	15°12.68	-29°28.66
2	0°24.07		7.78 262°43				346°20.41	10.61	Scheat	13°43.55	28°13.74
3	15° 26.54		8.93 277°43				1°22.97	. 10.56	Markab	13°28.24	15°21.05
4	30°29.00		50.08 292°44				16°25.53	10.51	Aug 20 Thu	SHA	Mer.pass
5	45°31.47	212°44.43	51.22 307°45				31°28.09	10.46	Venus	$168^{\circ}59.22$	14:50
6	60°33.93	227°44.91 S07°!	52.37 322°45	5.94 N23°38.10			46°30.65	N03° 10.41		263°47.74	08:31
7	75° 36.39		33.52 337°46				61°33.21	10.36		226°15.72	11:00
8	90°38.86		54.66 352°47				76°35.77	10.31	Saturn	345°51.77	03:03
9	105°41.32		55.81 7°48				91°38.33	10.26	Aug 21 Fri	SHA	Mer.pass
10 11	120° 43.79 135° 46.25		56.95 22°48 58.10 37°49				106°40.89 121°43.45	10.21 10.16		$168^{\circ}10.84$	14:49
12	150° 48.72	317°47.81 S07°!					121 43.45 136°46.01	N03° 10.10	Mars	263°5.13	08:30
13	165°51.18		0.38 67°50				151°48.57	10.05	Jupiter	226°2.57	10:57
14	180° 53.64	347°48.78	1.53 82°51				166°51.14	10.00	Saturn	345°53.92	02:59
15	$195^{\circ}56.11$		2.67 97°52	2.22 •• 37.63	61°37.38	• • 46.01	181°53.70	• • 9.95	Aug 22 Sat	SHA	Mer.pass
16	210° 58.57	17° 49.75	3.81 112°52				196°56.26	9.90	Venus	$167^{\circ}22.90$	14:49
17	226°1.04	32°50.24	4.95 127°53				211°58.82	9.85		262°22.62	08:29
18	241°3.50		6.10 142°54				227°1.38	N03°9.80		225°49.45	10:54
19 20	256°5.96 271°8.43	62°51.22 77°51.71	7.24 157°55 8.38 172°55				242°3.94 257°6.50	9.75 9.70	Saturn	345°56.15	02:54
21	271 6.43 286° 10.89		9.52 187°56				272°9.07	• • 9.65	Horizo	ntal parallax	·
22	301°13.36		.0.66 202°57				287°11.63	9.59		Venus:	0.2
23	$316^{\circ}15.82$		.1.80 217°57				302°14.19	9.54		Mars:	0.1
Mar	pass. 01:58	ν0.5′ d1.1′ m-4		d-0.0′ m1.27		0.1′ m-1.79		0.1′ m0.53			
IVICI.	puss. UI.JU	νο.5 α1.1 III-2	νυ.1	u-0.0 III1.21	ν1.5 U-	0.1 111-1.19	ν 2.0 U-0	7.1 1110.33			

h	Su	n	Moon					
Thu	GHA	Dec	GHA	ν	Dec	d	HP	
0	179°7.06	N12°30.30	$96^{\circ}18.57$	11.6'	S24°18.31	7.5'	54.6'	
1	194°7.21	29.48	110°49.12	11.5'	24°25.83	7.4'	54.6'	
2	209°7.36 224°7.51	28.66 •• 27.83	125°19.63 139°50.10	11.5' 11.4'	24°33.22 24°40.50	7.3' 7.2'	54.5' 54.5'	
4	239°7.66	27.03	154°20.52	11.4'	24°47.66	7.0'	54.5'	
5	254°7.81	26.19	$168^{\circ}50.90$	11.3'	$24^{\circ}54.71$	6.9'	54.5'	
6	269°7.96	N12°25.36	183°21.24	11.3'	\$25°1.64	6.8'	54.5'	
7 8	284°8.10 299°8.25	24.54 23.71	197°51.53 212°21.78	11.3' 11.2'	25°8.44 25°15.13	6.7' 6.6'	54.5' 54.5'	
9	314°8.40	22.89	226°51.99	11.2'	25°21.70	6.4	54.4'	
10	329°8.55	22.06	241°22.16	11.1'	25°28.15	6.3'	54.4'	
11	344°8.70	21.24	255°52.28	11.1'	25°34.47	6.2'	54.4'	
12 13	359°8.85 14°9.01	N12°20.41 19.58	270°22.36 284°52.41	11.0' 11.0'	\$25°40.68 25°46.76	6.1' 6.0'	54.4' 54.4'	
14	29°9.16	18.76	299°22.41	11.0'	25°52.72	5.8'	54.4'	
15	44°9.31	• • 17.93	313°52.37	10.9'	$25^{\circ}58.56$	5.7'	54.4'	
16	59°9.46	17.10	328°22.30	10.9'	26°4.27	5.6'	54.4'	
17 18	74°9.61 89°9.76	16.27 N12°15.45	342°52.18 357°22.03	10.8' 10.8'	26°9.86 \$26°15.32	5.5' 5.3'	54.3' 54.3'	
19	104°9.91	14.62	11°51.84	10.8'	26°20.66	5.2'	54.3'	
20	$119^{\circ}10.07$	13.79	$26^{\circ}21.61$	10.7'	$26^{\circ}25.88$	5.1'	54.3'	
21	134° 10.22	• • 12.96	40°51.34	10.7'	26°30.97	5.0'	54.3'	
22 23	149° 10.37 164° 10.52	12.13 11.30	55°21.04 69°50.70	10.7' 10.6'	26°35.93 26°40.76	4.8' 4.7'	54.3' 54.3'	
23			09 30.10			7.1	J <del>-</del> .J	
	SD = 15.8'	d = -0.8'		SL	0 = 14.9'			
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	179° 10.68	N12°10.47	84°20.33	10.6'	S26°45.47	4.6'	54.3'	
1	194° 10.83 209° 10.98	9.64 8.81	98°49.92 113°19.48	10.6' 10.5'	26°50.05 26°54.50	4.5' 4.3'	54.3' 54.2'	
2	209 10.98 224°11.14	· · 7.98	113 19.48 127°49.01	10.5	26°58.83	4.3 4.2'	54.2'	
4	239° 11.29	7.14	142°18.50	10.5'	27°3.02	4.1'	54.2'	
5	254° 11.44	6.31	156°47.96	10.4'	27°7.09	3.9'	54.2'	
6 7	269°11.60 284°11.75	N12° 5.48 4.65	171°17.39 185°46.79	10.4' 10.4'	\$27°11.02 27°14.83	3.8' 3.7'	54.2' 54.2'	
8	284 11.75 299°11.91	4.05 3.82	200°16.17	10.4	27 14.83 27°18.50	3.7 3.5'	54.2'	
9	314° 12.06	• • 2.98	214°45.51	10.3'	27°22.05	3.4'	54.2'	
10	329° 12.22	2.15	229°14.82	10.3'	27°25.46	3.3'	54.2'	
11	344° 12.37 359° 12.53	1.31 N12° 0.48	243°44.11 258°13.37	10.3' 10.2'	27°28.74 \$27°31.89	3.2' 3.0'	54.2' 54.2'	
12 13	359 12.53 14°12.68	11° 59.65	258 13.37 272°42.61	10.2'	27°34.91	3.0 2.9'	54.2'	
14	29° 12.84	58.81	287°11.82	10.2'	27°37.80	2.8'	54.2'	
15	44°12.99	• • 57.98	301°41.01	10.2'	27°40.55	2.6'	54.2'	
16 17	59° 13.15 74° 13.31	57.14 56.30	316°10.17 330°39.32	10.1' 10.1'	27°43.17 27°45.66	2.5' 2.4'	54.2' 54.2'	
18	89° 13.46	N11°55.47	345°8.44	10.1	\$27°48.01	2.2'	54.1'	
19	104° 13.62	54.63	359°37.54	10.1'	$27^{\circ}50.23$	2.1'	54.1'	
20	119° 13.78	53.80	14°6.62		27°52.31	2.0'	54.1'	
21 22	134°13.93 149°14.09	· · 52.96 52.12	28°35.69 43°4.74	10.0' 10.0'	27°54.27 27°56.08	1.8' 1.7'	54.1' 54.1'	
23	164° 14.25	51.28	57°33.77	10.0'	27°57.77	1.5'	54.1	
	SD = 15.8'	d = -0.8'		SF	0 = 14.8'			
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0 1	179° 14.41 194° 14.57	N11°50.45 49.61	72°2.78 86°31.79	10.0' 10.0'	\$27°59.31 28°0.73	1.4' 1.3'	54.1' 54.1'	
2	209° 14.72	49.01	101°0.77	10.0'	28° 2.00	1.1'	54.1'	
3	224° 14.88	• • 47.93	115°29.75	10.0'	$28^{\circ}3.15$	1.0'	54.1'	
4	239° 15.04	47.09	129°58.71	10.0'	28° 4.15	0.9'	54.1'	
5 6	254° 15.20 269° 15.36	46.25 N11°45.41	144°27.67 158°56.61	9.9' 9.9'	28° 5.02 \$28° 5.76	0.7' 0.6'	54.1' 54.1'	
7	284° 15.52	44.57	173°25.55	9.9'	28° 6.36	0.5	54.1	
8	299° 15.68	43.73	187°54.48	9.9'	28° 6.82	0.3'	54.1'	
9	314° 15.84	• • 42.89	202°23.40	9.9'	28°7.15	0.2'	54.1'	
10 11	329°16.00 344°16.16	42.05 41.21	216°52.32 231°21.23	9.9' 9.9'	28°7.34 28°7.40	0.1' -0.1'	54.1' 54.1'	
12	359° 16.32	N11°40.36	245°50.15	9.9'	\$28°7.32	-0.1	54.1	
13	14° 16.48	39.52	260°19.06	9.9'	28°7.10	-0.4'	54.1'	
14	29° 16.64	38.68	274°47.96	9.9'	28° 6.75 28° 6.26	-0.5'	54.1'	
15 16	44° 16.80 59° 16.96	· · 37.84 36.99	289°16.87 303°45.78	9.9' 9.9'	28° 6.26 28° 5.64	-0.6' -0.8'	54.1' 54.1'	
17	74°17.12	36.15	318° 14.69	9.9'	28° 4.87	-0.8 -0.9'	54.1	
18	89° 17.28	N11°35.31	332°43.61	9.9'	\$28°3.98	-1.0'	54.1'	
19	104° 17.45 119° 17.61	34.46	347°12.53 1°41.45	9.9'	28° 2.94 28° 1.77	-1.2'	54.1'	
20 21	119°17.61 134°17.77	33.62 · · 32.77	1°41.45 16°10.38	9.9' 9.9'	28°1.77 28°0.47	-1.3' -1.4'	54.1' 54.1'	
22	149° 17.93	31.93	30°39.32	9.9'	27°59.03	-1.6'	54.1	
23	164°18.09	31.08	45°8.27	10.0'	27°57.45	-1.7'	54.1'	
	SD = 15.8'	d = -0.8'	-	SD	0 = 14.8'			

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	////	////	03:02	20:59	23:32	////
<b>N</b> 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
$N 58^{\circ}$	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	05:51	06:39	07:23	16:44	17:28	18:17
Lat	Moonrise				Moonset	 :

Lat.		Moonris	e		Moonset	:
Lat.	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° 50°	14:39 14:26	15:45 15:30	16:40 16:25	21:38 21:51	22:16 22:31	23:08 23:23
45°	13:59	15:30	10:25 15:54	22:18	22:31	23:23
				-		23:55
N 40° 35°	13:38 13:21	14:37 14:18	15:31 15:12	22:40 22:58	23:24 23:43	
35°	13:21	14:18 14:02	15:12 14:55	22:58	23:43	00:00
20°	12:41	13:35	14:55	23:13		00:00
N 10°	12:41	13:11	14:03	23.39	00:02	00:52
0°	11:59	12:49	13:41		00:23	01:14
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	08:13	08:27	09:02	03:11	04:40	05:52

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

h	Aries	Ver	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	331° 18.29	137°53.68	S08°12.94	232°58.50	N23°37.13	196°54.65	N17°44.70	317°16.75	N03° 9.49			
1	346°20.75	152°54.18	14.08	247°59.20	37.07	211°56.57	44.56	332°19.31	9.44	Alpheratz	357°33.06	29°14.33
2	1°23.21	$167^{\circ}54.67$	15.22	262°59.90	37.02	226°58.49	44.41	347°21.88	9.39	Ankaa Schedar	353°5.46 349°29.05	-42°9.38 56°40.96
3	16°25.68	182°55.17	• • 16.36	278° 0.60	• • 36.96	242°0.41	• • 44.26	2°24.44	• • 9.34	Diphda	348° 45.68	-17°50.18
4	31°28.14	197°55.66	17.49	293°1.30	36.90	257°2.33	44.12	17°27.00	9.29	Achernar	335° 18.84	-57° 5.73
5 6	46°30.61 61°33.07	212°56.16 227°56.66	18.63 \$08°19.77	308°2.00 323°2.70	36.84 N23°36.78	272°4.25 287°6.17	43.97 N17°43.83	32°29.57 47°32.13	9.23 N03° 9.18	Hamal	327°49.50	$23^{\circ}35.35$
7	76°35.53	242°57.16	20.91	338° 3.41	36.72	302°8.09	43.68	62°34.69	9.13	Polaris	313° 13.55	89°22.27
8	91°38.00	257°57.66	22.04	353° 4.11	36.67	317°10.01	43.54	77°37.25	9.08	Acamar	315° 10.63	-40°11.51
9	106°40.46	272°58.16	• • 23.18	8°4.81	• • 36.61	332°11.93	• • 43.39	92°39.82	• • 9.03	Menkar Mirfak	314°4.65 308°26.23	4°11.80 49°57.20
10	121°42.93	287°58.66	24.31	23°5.51	36.55	347°13.86	43.25	107°42.38	8.98	Aldebaran	290°38.12	49 37.20 16°33.81
11	136° 45.39	302°59.17	25.45	38° 6.21	36.49	2°15.78	43.10	122°44.95	8.92	Rigel	281°2.67	-8°10.07
12 13	151° 47.86 166° 50.32	317°59.67 333°0.17	\$08°26.58 27.72	53° 6.91 68° 7.61	N23°36.43 36.36	17°17.70 32°19.62	N17° 42.95 42.81	137°47.51 152°50.07	N03°8.87 8.82	Capella	280°20.04	$46^{\circ}1.34$
14	100 50.32 181°52.78	348°0.68	28.85	83°8.32	36.30	47°21.54	42.66	167°52.64	8.77	Bellatrix	278°21.54	$6^{\circ}22.53$
15	196° 55.25	3°1.19	29.99	98° 9.02	• • 36.24	62°23.46	42.52	182°55.20	• • 8.72	Elnath	278°0.29	28°37.75
16	211°57.71	18°1.69	31.12	113°9.72	36.18	77°25.38	42.37	197°57.77	8.66	Alnilam Betelgeuse	275°36.49 270°50.78	-1°10.96 7°24.81
17	227°0.18	33°2.20	32.25	128°10.42	36.12	92°27.30	42.23	213°0.33	8.61	Canopus	263°52.11	-52°42.27
18	242°2.64		S08°33.39	143°11.13	N23°36.06	107°29.22	N17°42.08	228°2.90	N03°8.56	Sirius	258° 25.26	-16°44.97
19	257°5.10 272°7.57	63°3.22 78°3.73	34.52 35.65	158°11.83 173°12.53	35.99 35.93	122°31.14 137°33.06	41.94	243°5.46 258°8.03	8.51	Adhara	255°5.06	-29°0.27
20 21	272 7.57 287°10.03	78 3.73 93°4.24	36.78	173 12.53 188°13.23	35.93	152°34.99	41.79 •• 41.64	258 8.03 273°10.59	8.45 •• 8.40	Procyon	244°49.68	$5^{\circ}9.48$
22	302° 12.50	108°4.75	37.91	203°13.94	35.80	167°36.91	41.50	288°13.16	8.35	Pollux	243° 15.95	27°57.69
23	317° 14.96	123°5.26	39.05	218°14.64	35.74	182°38.83	41.35	303°15.72	8.30	Avior	234° 14.77	-59°35.51
Mori	pass. 01:54	$\nu$ 0.5' d1.	1' m 4 51	υ0 7′ d 0	0.1' m1.27	11 0' d 0	.1′ m-1.79	ν2.6′ d-0	1/ m0 52	Suhail Miaplacidus	222°45.75 221°38.92	-43°32.29 -69°49.49
ivier.	pass. U1.34	νυ.5 U1.	111-4.31	νο.ι u-0	.1111.41	ν1.9 U-0	.1 11-1.19	ν Δ.Ο U-U	.1110.32	Alphard	221 36.92 217°46.75	-8°46.36
	CIIA	CILA	Б.	6115	Г.	CUA	Б	CI14	Б	Regulus	207° 33.33	11°50.29
Mon 0	<b>GHA</b> 332° 17.43	<b>GHA</b> 138°5.78	<b>Dec</b> \$08°40.18	<b>GHA</b> 233°15.35	<b>Dec</b> N23°35.68	<b>GHA</b> 197°40.75	<b>Dec</b> N17°41.21	<b>GHA</b> 318°18.29	<b>Dec</b> N03° 8.25	Dubhe	193° 39.99	61°36.51
1	347° 19.89	150° 5.76 153° 6.29	41.31	233 15.35 248°16.05	35.61	212° 42.67	41.06	333°20.85	8.19	Denebola	182°23.86	14°25.48
2	2°22.35	168°6.80	42.44	263°16.75	35.55	227°44.59	40.92	348°23.42	8.14	Gienah Acrux	175° 42.46 172° 59.14	-17°41.40 -63°14.99
3	$17^{\circ}24.82$	183°7.32	• • 43.56	278°17.46	• • 35.48	242°46.52	• • 40.77	3°25.99	• • 8.09	Gacrux	172 59.14 171°50.59	-03 14.99 -57°15.91
4	32°27.28	198°7.84	44.69	293°18.16	35.42	257°48.44	40.62	18°28.55	8.03	Alioth	166° 12.18	55°49.09
5	47°29.75	213°8.35	45.82 \$08°46.95	308°18.87	35.35	272°50.36	40.48	33°31.12	7.98	Spica	$158^{\circ}21.07$	-11°18.02
6 7	62°32.21 77°34.67	228°8.87 243°9.39	48.08	323°19.57 338°20.28	N23°35.29 35.22	287°52.28 302°54.20	N17° 40.33 40.19	48°33.68 63°36.25	N03°7.93 7.88	Alkaid	152° 51.19	49°11.02
8	92°37.14	258°9.91	49.21	353°20.98	35.15	317°56.12	40.04	78°38.82	7.82	Hadar	148°34.37	-60°30.32
9	107°39.60	273°10.43	• • 50.33	8°21.69	• • 35.09	332°58.05	• • 39.90	93°41.38	• • 7.77	Menkent Arcturus	147°56.19 145°46.81	-36°30.18 19°2.76
10	$122^{\circ}42.07$	$288^{\circ}10.95$	51.46	23°22.39	35.02	347°59.97	39.75	108°43.95	7.72	Rigil Kent.	139° 38.65	-60°56.96
11	137° 44.53	303°11.48	52.58	38°23.10	34.95	3°1.89	39.60	123°46.52	7.66	Kochab	137°20.15	74°2.98
12	152° 47.00	318°12.00	S08°53.71	53°23.81	N23°34.88	18° 3.81	N17°39.46	138°49.09	N03°7.61	Zuben'ubi	$136^{\circ}54.60$	$-16^{\circ}9.17$
13 14	167° 49.46 182° 51.92	333° 12.52 348° 13.05	54.84 55.96	68°24.51 83°25.22	34.81 34.75	33°5.74 48°7.66	39.31 39.17	153°51.65 168°54.22	7.56 7.50	Alphecca	126°2.62	26°37.69
15	197°54.39	3°13.57	• • 57.09	98°25.93	• • 34.68	63° 9.58	39.02	183°56.79	• • 7.45	Antares	112°14.11	-26°29.51
16	212°56.85	18° 14.10	58.21	113°26.63	34.61	78°11.50	38.88	198°59.36	7.40	Atria Sabik	107°6.94 102°1.12	-69°4.74 -15°45.45
17	227°59.32	33°14.63	08°59.33	128°27.34	34.54	93°13.43	38.73	214°1.92	7.34	Shaula	96°8.35	-37°7.45
18	243°1.78	48° 15.16	S09°0.46	143°28.05	N23°34.47	108°15.35	N17°38.58	229°4.49	N03°7.29	Rasalhague	95°57.15	12°32.59
19 20	258°4.24 273°6.71	63° 15.68 78° 16.21	1.58 2.70	158°28.75 173°29.46	34.40 34.33	123°17.27 138°19.20	38.44 38.29	244°7.06 259°9.63	7.24 7.18	Eltanin	90°41.29	51°29.36
21	288°9.17	93°16.75	• • 3.82	188°30.17	• • 34.26	153°21.12	38.15	274°12.20	7.13	Kaus Aust.	83°30.48	-34°22.33
22	303°11.64	108° 17.28	4.95	203°30.88	34.19	168°23.04	38.00	289°14.77	7.08	Vega	80°32.04 75°45.82	38°48.72 -26°15.78
23	$318^{\circ}14.10$	$123^{\circ}17.81$	6.07	218°31.59	34.12	183°24.96	37.85	304°17.33	7.02	Nunki Altair	61°58.36	8°56.48
Mer.i	pass. 01:51	$\nu 0.5' \ d1.$	1′ m-4.52	$\nu 0.7' d-0$	0.1' m1.26	$\nu 1.9' \ d-0$	.1′ m-1.79	$\nu$ 2.6' d-0	.1′ m0.52	Peacock	53°3.06	-56°38.93
	02.01									Deneb	49° 24.45	45°22.69
T	CHA	CHA	Dee	CHA	Doo	CHA	Dee	CHA	Dag	Enif	33°37.14	9°59.99
Tue 0	<b>GHA</b> 333° 16.56	<b>GHA</b> 138° 18.34	<b>Dec</b> \$09°7.19	<b>GHA</b> 233°32.29	<b>Dec</b> N23°34.04	<b>GHA</b> 198°26.89	<b>Dec</b> N17°37.71	<b>GHA</b> 319°19.90	<b>Dec</b> N03° 6.97	Al Na'ir	27°30.75	-46°49.76
1	348° 19.03	153° 18.88	8.31	248°33.00	33.97	213°28.81	37.56	334°22.47	6.91	Fomalhaut Scheat	15° 12.67 13° 43.54	-29°28.66 28°13.76
2	3°21.49	168° 19.41	9.43	263°33.71	33.90	228°30.73	37.42	349°25.04	6.86	Markab	13° 28.23	15°21.06
3	18°23.96	183° 19.95	• • 10.55	278°34.42	• • 33.83	243°32.66	• • 37.27	4°27.61	• • 6.81			
4	33°26.42	198°20.48	11.67	293°35.13	33.76	258°34.58	37.13	19°30.18	6.75	Aug 23 Sun	SHA 166° 25 40	Mer.pass
5 6	48° 28.89 63° 31.35	213°21.02 228°21.56	12.79 \$09°13.90	308°35.84 323°36.55	33.68 N23°33.61	273°36.50 288°38.43	36.98 N17°36.83	34°32.75 49°35.32	6.70 N03°6.64	Venus Mars	166° 35.40 261° 40.22	14:48 08:28
7	78° 33.81	243°22.10	15.02	338°37.26	33.53	303°40.35	36.69	64°37.89	6.59	Jupiter	225°36.37	10:51
8	93°36.28	258° 22.64	16.14	353° 37.97	33.46	318°42.28	36.54	79°40.46	6.54	Saturn	345°58.47	02:50
9	108°38.74	273°23.18	• • 17.26	8°38.68	• • 33.39	333°44.20	• • 36.40	94°43.03	• • 6.48	Aug 24 Man	CHV	Mor pace
10	123°41.21	288°23.72	18.37	23°39.39	33.31	348°46.12	36.25	109°45.60	6.43	Aug 24 Mon Venus	<b>SHA</b> 165° 48.35	Mer.pass 14:47
11	138° 43.67	303°24.26	19.49	38°40.10	33.24 Naa°aa 16	3°48.05	36.10	124°48.17	6.37	Mars	260°57.92	08:27
12 13	153° 46.13 168° 48.60	318°24.81 333°25.35	509°20.61 21.72	53°40.81 68°41.52	N23°33.16 33.09	18°49.97 33°51.89	N17°35.96 35.81	139°50.74 154°53.31	N03° 6.32 6.26	Jupiter	$225^{\circ}23.33$	10:48
14	183°51.06	348° 25.90	22.84	83°42.23	33.09	48°53.82	35.67	169°55.88	6.21	Saturn	346°0.86	02:46
15	198° 53.53	3°26.44	• • 23.95	98°42.94	• • 32.93	63°55.74	• • 35.52	184°58.45	• • 6.15	Aug 25 Tue	SHA	Mer.pass
16	213°55.99	18°26.99	25.06	113°43.65	32.86	78°57.67	35.38	200°1.02	6.10	Venus	$165^{\circ}1.78$	14:46
17	228° 58.46	33°27.54	26.18	128°44.37	32.78	93°59.59	35.23	215°3.60	6.05	Mars	260°15.73	08:25
18 19	244°0.92 259°3.38	48°28.09 63°28.64	\$09°27.29 28.40	143°45.08 158°45.79	N23°32.70 32.63	109°1.52 124°3.44	N17°35.08 34.94	230°6.17 245°8.74	N03° 5.99 5.94	Jupiter	225°10.32	10:45
20	274°5.85	78° 29.19	29.52	173°46.50	32.55	139° 5.37	34.79	260°11.31	5.88	Saturn	346°3.34	02:42
21	289°8.31	93°29.74	• • 30.63	188°47.21	• • 32.47	154°7.29	• • 34.65	275°13.88	• • 5.83	Horizoi	ntal parallax	
22	304° 10.78	108°30.29	31.74	203°47.93	32.39	$169^{\circ}9.22$	34.50	290°16.45	5.77		Venus:	0.2
23	319° 13.24	123°30.84	32.85	218°48.64	32.31	184°11.14	34.35	305°19.03	5.72		Mars:	0.1
Mer.	pass. 01:47	$\nu$ 0.5′ d1.	1′ m-4.53	$\nu 0.7' d-0$	0.1′ m1.26	$\nu 1.9' \ d$ -0	.1′ m-1.80	$\nu$ 2.6′ d-0	.1′ m0.51			

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°18.26	N11°30.24	59° 37.23	10.0'	\$27°55.74	-1.8'	54.2'
1	194°18.42	29.39	74°6.19	10.0'	27°53.89	-2.0'	54.2'
2	209°18.58 224°18.75	28.54 •• 27.70	88°35.17 103°4.16	10.0' 10.0'	27°51.91 27°49.79	-2.1' -2.3'	54.2' 54.2'
4	239°18.91	26.85	117° 33.17	10.0'	27° 47.53	-2.4	54.2'
5	254°19.07	26.00	132°2.19	10.0'	27°45.15	-2.5'	54.2'
6	269°19.24	$N11^{\circ}25.16$	146°31.23	10.1'	S27°42.62	-2.7'	54.2'
7	284°19.40	24.31	161°0.28 175°29.35	10.1' 10.1'	27°39.96	-2.8'	54.2'
8 9	299°19.57 314°19.73	23.46 •• 22.61	175° 29.35 189° 58.44	10.1	27°37.17 27°34.25	-2.9' -3.1'	54.2' 54.2'
10	329°19.89	21.76	204° 27.55	10.1	27°31.19	-3.1	54.2'
11	344°20.06	20.91	$218^{\circ}56.68$	10.2'	$27^{\circ}27.99$	-3.3'	54.2'
12	359°20.22	N11°20.06	233° 25.83	10.2'	S27°24.67	-3.5'	54.2'
13 14	14°20.39 29°20.56	19.21 18.36	247°55.00 262°24.20	10.2' 10.2'	27°21.21 27°17.61	-3.6' -3.7'	54.2' 54.2'
14 15	29 20.56 44°20.72	18.30	202 24.20 276°53.42	10.2'	27 17.01 27°13.89	-3.1 -3.9'	54.2'
16	59°20.89	16.66	291°22.67	10.3	27° 10.03	-4.0'	54.3'
17	74°21.05	15.81	$305^{\circ}51.94$	10.3'	$27^{\circ}6.04$	-4.1'	54.3'
18	89°21.22	N11°14.96	320°21.24	10.3'	\$27°1.92	-4.3'	54.3'
19 20	104°21.39 119°21.55	14.11 13.26	334°50.56 349°19.92	10.4' 10.4'	26° 57.67 26° 53.29	-4.4' -4.5'	54.3' 54.3'
21	134°21.72	• • 12.40	3°49.31	10.4	26°48.78	-4.6'	54.3'
22	149°21.89	11.55	18° 18.72	10.4	26°44.13	-4.8'	54.3'
23	164°22.05	10.70	$32^{\circ}48.17$	10.5'	26°39.36	-4.9'	54.3'
	SD = 15.8'	d = -0.8'		SI	D = 14.8'		
Mon 0	<b>GHA</b> 179°22.22	<b>Dec</b> N11°9.85	<b>GHA</b> 47° 17.65	u 10.5'	<b>Dec</b> \$26° 34.46	<i>d</i> −5.0'	<b>HP</b> 54.3'
1	194°22.39	8.99	61°47.16	10.5	26° 29.43	-5.2'	54.3'
2	209°22.56	8.14	76° 16.71	10.6'	26°24.27	-5.3'	54.3'
3	224°22.72	· · 7.29	90°46.29	10.6'	26°18.99	-5.4'	54.4'
4 5	239°22.89 254°23.06	6.43 5.58	105° 15.90 119° 45.55	10.7' 10.7'	26°13.57 26°8.03	-5.5' -5.7'	54.4' 54.4'
6	269°23.23	N11°4.72	119 45.55 134° 15.24	10.7	526°2.36	-5.8'	54.4
7	284°23.40	3.87	148° 44.96	10.8'	25°56.57	-5.9'	54.4'
8	299°23.57	3.01	163° 14.72	10.8'	25°50.65	-6.0'	54.4'
9	314°23.73	• • 2.16	177°44.52	10.8'	25°44.61	-6.2'	54.4'
10 11	329°23.90 344°24.07	1.30 11°0.44	192°14.36 206°44.24	10.9' 10.9'	25°38.44 25°32.15	-6.3' -6.4'	54.4' 54.4'
12	359°24.24	N10°59.59	221°14.16	11.0'	\$25°25.73	-6.5	54.5'
13	14°24.41	58.73	$235^{\circ}44.12$	11.0'	$25^{\circ}19.20$	-6.7'	54.5'
14	29°24.58	57.87	250° 14.12	11.0'	25° 12.54	-6.8'	54.5'
15 16	44°24.75 59°24.92	· · 57.01 56.16	264°44.16 279°14.24	11.1' 11.1'	25°5.75 24°58.85	-6.9' -7.0'	54.5' 54.5'
17	74°25.09	55.30	293°44.37	11.1	24°51.83	-7.0 -7.1'	54.5'
18	89°25.26	N10°54.44	308° 14.54	11.2'	S24°44.68	-7.3	54.5'
19	104°25.44	53.58	322°44.75	11.3'	24°37.42	-7.4'	54.6'
20	119°25.61	52.72	337° 15.01 351° 45.31		24°30.04		54.6'
21 22	134°25.78 149°25.95	•• 51.86 51.00	351 45.31 6° 15.65	11.3' 11.4'	24°22.54 24°14.92	-7.6' -7.7'	54.6' 54.6'
23	164°26.12	50.14	20°46.04	11.4'	24°7.19	-7.7 -7.9	54.6'
	SD = 15.8'	d = -0.9'		SI	D = 14.8'		
_							
Tue 0	<b>GHA</b> 179°26.29	<b>Dec</b> N10°49.28	<b>GHA</b> 35° 16.48	u 11.5'	<b>Dec</b> \$23° 59.34	d -8.0'	<b>HP</b> 54.6'
1	194°26.46	48.42	49°46.96	11.5'	23°51.37	-8.1'	54.6'
2	209°26.64	47.56	64° 17.49	11.6'	23°43.29	-8.2'	54.7'
3	224°26.81	• • 46.70	78° 48.06	11.6'	23° 35.09	-8.3'	54.7'
4 5	239°26.98 254°27.15	45.84 44.98	93° 18.68 107° 49.35	11.7' 11.7'	23°26.78 23°18.36	-8.4' -8.5'	54.7' 54.7'
6	269°27.33	N10°44.11	107 49.35 122° 20.07	11.7	\$23°9.83	-8.6'	54.7'
7	284°27.50	43.25	$136^{\circ}50.83$	11.8'	23°1.18	-8.8'	54.7'
8	299°27.67	42.39	151°21.64	11.9'	22°52.43	-8.9'	54.7'
9	314°27.85 329°28.02	· · 41.53	165°52.49 180°23.40	11.9' 12.0'	22°43.56 22°34.59	-9.0' -9.1'	54.8' 54.8'
10 11	329°28.02 344°28.19	40.66 39.80	180°23.40 194°54.35	12.0'	22° 34.59 22° 25.50	-9.1' -9.2'	54.8'
12	359°28.37	N10°38.94	209°25.35	12.0'	\$22°16.31	-9.3	54.8'
13	14°28.54	38.07	223°56.39	12.1'	22°7.01	-9.4'	54.8'
14	29°28.72	37.21	238° 27.49	12.1'	21°57.61	-9.5'	54.8'
15 16	44°28.89 59°29.07	· · 36.34 35.48	252°58.63 267°29.82	12.2' 12.2'	21°48.09 21°38.48	-9.6' -9.7'	54.9' 54.9'
17	59 29.07 74°29.24	35.48 34.61	282°1.06	12.2	21 38.48 21°28.76	-9.7 -9.8'	54.9'
18	89°29.42	N10° 33.75	296°32.35	12.3'	S21°18.93	-9.9'	54.9'
19	104°29.59	32.88	311°3.68	12.4'	21°9.01	-10.0'	54.9'
20	119°29.77 134°29.94	32.02	325°35.06 340°6.49	12.4' 12.5'	20°58.98 20°48.85	-10.1'	54.9'
21 22	134°29.94 149°30.12	· · 31.15 30.28	340°6.49 354°37.97	12.5' 12.5'	20°48.85 20°38.62	-10.2' -10.3'	55.0' 55.0'
23	164°30.29	29.42	9°9.49	12.6'	20° 28.29	-10.3	55.0'
	SD = 15.8'	d = -0.9'		SI	D = 14.9'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	05:43	06:31	07:14	16:51	17:34	18:23

Lat.		Moonris	e		Moonset	į.
Lat.	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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	10:06	11:33	13:07	06:35	06:53	07:01

h	Aries	Venus		M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	334° 15.70		9°33.96	233°49.35	N23°32.24	199°13.06	N17°34.21	320°21.60	N03°5.66			
1	349° 18.17	153°31.95	35.07	248°50.07	32.16	214°14.99	34.06	335°24.17	5.61	Alpheratz	357°33.05	29°14.35
2	4°20.63	168°32.51	36.18	263°50.78	32.08	229°16.91	33.92	350°26.74	5.55	Ankaa	353°5.44	-42°9.39
3	19°23.10		37.29	278°51.49	• • 32.00	244°18.84	• • 33.77	5°29.31	• • 5.50	Schedar	349°29.03	56°40.98
4	34°25.56	198°33.62	38.40	293°52.21	31.92	259°20.76	33.62	20°31.89	5.44	Diphda	348°45.67	-17°50.18
5	49°28.02	213°34.18	39.51	308°52.92	31.84	274°22.69	33.48	35°34.46	5.39	Achernar	335°18.80	-57°5.74 23°35.36
6	64°30.49	228°34.74 <b>S</b> 09	9°40.62	323°53.63	N23°31.76	289°24.62	N17°33.33	50°37.03	N03°5.33	Hamal Polaris	327°49.48 313°12.05	23 35.30 89°22.28
7	79°32.95	243°35.30	41.73	338°54.35	31.67	304°26.54	33.19	65°39.61	5.27	Acamar	315°10.61	-40°11.51
8	94°35.42	258°35.86	42.83	353°55.06	31.59	319°28.47	33.04	80°42.18	5.22	Menkar	314°4.63	4°11.80
9	109°37.88		43.94	8°55.78	• • 31.51	334°30.39	• • 32.89	95°44.75	• • 5.16	Mirfak	308°26.20	49°57.21
10	124°40.34	288°36.99	45.05	23°56.49	31.43	349°32.32	32.75	110°47.33	5.11	Aldebaran	290°38.09	16°33.82
11	139° 42.81	303°37.55	46.15	38°57.21	31.35	4°34.24	32.60	125°49.90	5.05	Rigel	281°2.65	-8°10.06
12	154° 45.27		9°47.26	53°57.92	N23°31.27	19°36.17	N17°32.46	140°52.47	N03°5.00	Capella	280°20.00	46°1.34
13 14	169° 47.74 184° 50.20	333°38.68 348°39.25	48.36 49.47	68°58.64 83°59.35	31.18 31.10	34°38.09 49°40.02	32.31 32.16	155°55.05 170°57.62	4.94 4.89	Bellatrix	278°21.52	6°22.53
15	199°52.67		50.57	99°0.07	• • 31.02	64°41.95	32.02	186°0.20	• • 4.83	Elnath	278°0.26	28° 37.75
16	214°55.13	18°40.38	51.67	114°0.79	30.93	79°43.87	31.87	201°2.77	4.77	Alnilam	275°36.46	-1°10.95
17	229° 57.59	33°40.95	52.78	129° 1.50	30.85	94°45.80	31.73	216°5.34	4.72	Betelgeuse	270°50.75	7°24.81
18	245°0.06		9°53.88	144°2.22	N23°30.76	109°47.73	N17°31.58	231°7.92	N03°4.66	Canopus	263°52.08	-52°42.26
19	260°2.52	63°42.09	54.98	159° 2.94	30.68	124°49.65	31.43	246°10.49	4.61	Sirius	258°25.24	-16°44.96 -29°0.26
20	275°4.99	78°42.67	56.09	174°3.65	30.59	139°51.58	31.29	261°13.07	4.55	Adhara	255°5.04 244°49.66	-29°0.26 5°9.48
21	290°7.45	93°43.24 · ·	57.19	189°4.37	• • 30.51	154°53.50	• • 31.14	276°15.64	• • 4.49	Procyon Pollux	244 49.00 243°15.93	27°57.69
22	$305^{\circ}9.91$	108°43.81	58.29	204°5.09	30.42	169°55.43	31.00	291°18.22	4.44	Avior	234° 14.76	-59°35.49
23	320° 12.38	123°44.39	59.39	219°5.80	30.34	184°57.36	30.85	306°20.79	4.38	Suhail	222°45.74	-43°32.28
Mer	pass. 01:43	$ u 0.6' \ d1.1' \ {\sf m} $	1-4.55	ν0 7′ d-0	0.1' m1.26	ν1 9' d-0	.1' m-1.80	ν2.6′ d-0	.1′ m0 51	Miaplacidus	221°38.91	-43 32.28 -69°49.48
	Da33. 01.43					ν1.5 d 0	1.00	- V2.0 U 0		Alphard	217°46.74	-8°46.36
										Regulus	207°33.32	11°50.28
Thu	GHA		Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.99	61°36.50
0	335°14.84		10°0.49	234°6.52	N23°30.25	199°59.28	N17°30.70	321°23.37	N03°4.33	Denebola	182°23.85	14°25.47
1	350° 17.31	153° 45.54	1.59	249°7.24	30.16	215° 1.21	30.56	336°25.94	4.27	Gienah	175°42.47	$-17^{\circ}41.39$
2	5°19.77	168° 46.12	2.69	264°7.96	30.08	230°3.14	30.41	351°28.52	4.21	Acrux	172°59.16	-63°14.98
3 4	20°22.23 35°24.70	183°46.69 • 198°47.27	· 3.79 4.88	279°8.68 294°9.39	· · 29.99 29.90	245° 5.06 260° 6.99	· · 30.27 30.12	6°31.10 21°33.67	· · 4.16 4.10	Gacrux	171°50.61	-57°15.90
5	50°27.16	213° 47.85	4.00 5.98	294 9.39 309°10.11	29.90	275° 8.92	29.97	36°36.25	4.10	Alioth	166°12.19	55°49.08
6	65°29.63		5.98 10°7.08	324°10.83	N23°29.73	290°10.85	N17° 29.83	51°38.82	N03°3.99	Spica	158°21.07	-11°18.02
7	80°32.09	243°49.02	8.18	339°11.55	29.64	305°12.77	29.68	66°41.40	3.93	Alkaid	152°51.20	49°11.01
8	95°34.55	258° 49.60	9.27	354°12.27	29.55	320°14.70	29.54	81°43.98	3.87	Hadar	148°34.39	-60°30.31
9	110°37.02		10.37	9°12.99	• • 29.46	335°16.63	29.39	96°46.55	• • 3.82	Menkent	147°56.20	-36°30.18
10	125°39.48	288°50.77	11.47	24°13.71	29.37	350°18.55	29.24	111°49.13	3.76	Arcturus	145°46.82	19°2.76 -60°56.96
11	140°41.95	303°51.35	12.56	39°14.43	29.28	5°20.48	29.10	126°51.71	3.70	Rigil Kent. Kochab	139°38.68 137°20.21	-60 56.96 74°2.97
12	155° 44.41	318°51.94 <b>S</b> 10	0°13.66	54°15.15	N23°29.19	20°22.41	N17°28.95	141°54.28	N03°3.65	Zuben'ubi	136°54.61	-16°9.16
13	170°46.88	333°52.53	14.75	$69^{\circ}15.87$	29.10	35°24.34	28.80	156°56.86	3.59	Alphecca	126°2.63	26° 37.69
14	185°49.34	348°53.12	15.84	84°16.59	29.01	50°26.26	28.66	171°59.44	3.53	Antares	112° 14.12	-26°29.51
15	200°51.80		16.94	99°17.31	• • 28.92	65°28.19	• • 28.51	187°2.02	• • 3.48	Atria	107°6.98	-69°4.75
16	215°54.27	18°54.30	18.03	114°18.03	28.83	80°30.12	28.37	202°4.59	3.42	Sabik	102°1.12	-15°45.45
17	230° 56.73	33°54.89	19.12	129°18.75	28.74	95°32.05	28.22	217°7.17	3.36	Shaula	96°8.36	-37°7.45
18	245°59.20		0°20.21	144°19.47	N23°28.65	110°33.98	N17°28.07	232°9.75	N03°3.30	Rasalhague	95°57.16	12°32.59
19	261°1.66	63°56.07	21.31	159°20.19	28.56	125°35.90	27.93	247°12.33	3.25	Eltanin	90°41.31	51°29.36
20	276°4.12 291°6.59	78°56.67 93°57.26	22.40 23.49	174°20.92 189°21.64	28.46 •• 28.37	140°37.83 155°39.76	27.78 •• 27.64	262°14.90 277°17.48	3.19 · · 3.13	Kaus Aust.	83°30.48	-34°22.34
21 22	306°9.05	108°57.86	24.58	204°22.36	28.28	170°41.69	27.49	277 17.46 292°20.06	3.08	Vega	80°32.05	38°48.72
23	321°11.52	123°58.45	25.67	219°23.08	28.19	185°43.62	27.34	307°22.64	3.02	Nunki	75°45.83	-26°15.78
		-								Altair	61°58.36	8°56.49
Mer. <sub>I</sub>	pass. 01:39	$ u 0.6' \; d1.1' \; {\sf m}$	า-4.56	$\nu$ 0.7′ $d$ -0	$0.1' \; {\sf m1.26}$	$\nu 1.9' \ d$ -0	.1′ m-1.80	$\nu$ 2.6′ d-0	.1' m $0.50$	Peacock	53°3.06	-56° 38.95
										Deneb	49°24.46 33°37.14	45°22.70 10°0.00
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	27°30.74	-46°49.77
0	336° 13.98	138°59.05 <b>S</b> 10		234°23.80	N23°28.09	200°45.55	N17°27.20	322°25.22	N03°2.96	Al Na'ir Fomalhaut	27 30.74 15°12.65	-46 49.77 -29°28.66
1	351°16.44	153°59.65	27.84	249°24.53	28.00	215°47.47	27.05	337°27.80	2.90	Scheat	13°43.53	28° 13.77
2	$6^{\circ}18.91$	169°0.25	28.93	264°25.25	27.91	230°49.40	26.90	352°30.37	2.85	Markab	13°28.22	15°21.07
3	21°21.37		30.02	279°25.97	• • 27.81	245°51.33	• • 26.76	7°32.95	• • 2.79			
4	36°23.84	199°1.45	31.11	294°26.70	27.72	260°53.26	26.61	22°35.53	2.73	Aug 26 Wed	SHA	Mer.pass
5	51°26.30	214°2.06	32.19	309°27.42	27.62	275°55.19	26.47	37°38.11	2.67		164°15.69	14:45
6	66°28.76		0°33.28	324°28.14	N23°27.53	290°57.12	N17°26.32	52°40.69	N03° 2.62	Mars		08:24
7	81°31.23	244°3.26	34.37	339°28.87	27.43	305°59.05	26.17	67°43.27	2.56	Jupiter Saturn	224°57.36 346°5.89	10:42 02:38
8 9	96°33.69 111°36.16	259°3.87 274°4.48 · ·	35.45 36.54	354°29.59 9°30.31	27.34 •• 27.24	321°0.98 336°2.90	26.03 •• 25.88	82°45.85 97°48.43	2.50 · · 2.44	Saturn	340 3.09	02:38
10	111 30.10 126°38.62	274 4.48 · · · 289° 5.08	37.62	9 30.31 24°31.04	27.14	351°4.83	25.74	97 48.43 112°51.01	2.38	Aug 27 Thu	SHA	Mer.pass
11	141°41.08	304°5.69	38.70	39°31.76	27.14	6° 6.76	25.74	112 51.01 127°53.59	2.33		163°30.12	14:44
12	156° 43.55		0°39.79	54°32.49	N23°26.95	21°8.69	N17°25.44	142°56.17	N03°2.27	Mars	258°51.68	08:23
13	171°46.01	334°6.91	40.87	69°33.21	26.85	36°10.62	25.30	157°58.75	2.21	Jupiter	224°44.44	10:39
14	186°48.48	349°7.52	41.95	84°33.94	26.75	51°12.55	25.15	173°1.33	2.15	Saturn	346°8.53	02:34
15	201°50.94	4°8.13 · ·	43.03	99°34.66	• • 26.66	$66^{\circ}14.48$	• • 25.00	188°3.91	• • 2.09	Aug 28 Fri	SHA	Mer.pass
16	$216^{\circ}53.40$	19°8.75	44.12	114°35.39	26.56	81°16.41	24.86	203°6.49	2.04	Venus		14:43
17	231°55.87	34°9.36	45.20	129°36.12	26.46	96°18.34	24.71	218°9.07	1.98	Mars	$258^{\circ}9.82$	08:22
18	246°58.33		0°46.28	144°36.84	N23°26.36	111°20.27	N17° 24.57	233°11.65	N03°1.92	Jupiter	224°31.57	10:36
19	262°0.80	64° 10.59	47.36	159°37.57	26.26	126°22.20	24.42	248°14.23	1.86	Saturn	346°11.24	02:30
20	277°3.26	79°11.21	48.44	174°38.29	26.16	141°24.13	24.27	263°16.81	1.80	Horizo	ntal parallax	
21	292°5.73		49.52	189°39.02	• • 26.06	156°26.06	• • 24.13	278°19.40	1.74	Honzoi	Venus:	0.3
22 23	307°8.19 322°10.65	109° 12.45 124° 13.07	50.59 51.67	204°39.75 219°40.47	25.96 25.86	171°27.99	23.98 23.83	293°21.98	1.69 1.63		Mars:	0.3
					25.86	186°29.92		308°24.56				-/-
Mer.	pass. 01:35	$ u$ 0.6 $^{\prime}$ $d$ 1.1 $^{\prime}$ m	า-4.57	$\nu$ 0.7′ d-0	0.1′ m1.25	$\nu$ 1.9′ d-0	.1′ m-1.80	$\nu$ 2.6′ d-0	$.1^\prime$ m0.50			

L	C	+0.1120 sec		-011 -		. 555	
h	Su	n			Moon		
Wed 0	<b>GHA</b> 179°30.47	<b>Dec</b> N10°28.55	<b>GHA</b> 23°41.06	u 12.6'	Dec \$20°17.87	<i>d</i> -10.5'	<b>HP</b> 55.0'
1	179 30.47 194°30.65	27.68	23 41.06 38°12.68	12.7'	20°7.34	-10.5 -10.6'	55.0'
2	209°30.82	26.81	52°44.35	12.7'	19°56.72	-10.7'	55.1'
3	224°31.00	• • 25.95	67°16.06	12.8'	19°46.00	-10.8'	55.1'
4	239°31.18	25.08	81°47.82	12.8'	$19^{\circ}35.19$	-10.9'	55.1'
5	254°31.35	24.21	96°19.62	12.9'	19°24.28	-11.0'	55.1'
6	269°31.53	N10°23.34	110°51.48	12.9'	\$19°13.28	-11.1'	55.1'
7 8	284°31.71 299°31.89	22.47 21.60	125°23.37 139°55.31	12.9' 13.0'	19°2.18 18°51.00	-11.2' -11.3'	55.2' 55.2'
9	314°32.06	20.73	154°27.30	13.0'	18°39.72	-11.3 -11.4'	55.2'
10	329°32.24	19.86	168°59.33	13.1'	18°28.35	-11.5'	55.2'
11	344°32.42	18.99	183°31.41	13.1'	$18^{\circ}16.89$	-11.5'	55.2'
12	359°32.60	N10°18.12	198°3.53	13.2'	S18°5.35	-11.6'	55.2'
13	14°32.78	17.25	212°35.69	13.2'	17°53.71	-11.7'	55.3'
14 15	29°32.95 44°33.13	16.38 •• 15.51	227°7.90 241°40.15	13.3' 13.3'	17°41.99 17°30.19	-11.8' -11.9'	55.3' 55.3'
16	59°33.31	14.63	241 40.15 256°12.44	13.3'	17° 18.30	-11.9	55.3'
17	74°33.49	13.76	270°44.78	13.4'	17°6.32	-12.1'	55.3'
18	89°33.67	N10°12.89	285°17.15	13.4'	S16°54.26	-12.1'	55.4'
19	104°33.85	12.02	299°49.57	13.5'	$16^{\circ}42.12$	-12.2'	55.4'
20	119°34.03	11.15	314°22.03	13.5'	16°29.89	-12.3'	55.4'
21	134°34.21	• • 10.27	328°54.53	13.5'	16°17.59	-12.4'	55.4'
22 23	149°34.39 164°34.57	9.40 8.52	343°27.07 357°59.64	13.6' 13.6'	16°5.21 15°52.74	-12.5' -12.5'	55.5' 55.5'
23						-12.3	55.5
	SD = 15.8'	d = -0.9'		SI	O = 15.0'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°34.75	N10°7.65	12°32.26	13.7'	\$15°40.20	-12.6'	55.5'
1 2	194°34.93 209°35.11	6.78 5.90	27°4.91 41°37.60	13.7' 13.7'	15°27.59 15°14.89	-12.7' -12.8'	55.5' 55.5'
3	209 35.11 224°35.29	• • 5.03	56°10.33	13.8'	15 14.09 15°2.12	-12.8'	55.6'
4	239°35.47	4.15	70°43.09	13.8'	14°49.28	-12.9'	55.6'
5	254°35.65	3.28	85°15.89	13.8'	$14^{\circ}36.36$	-13.0'	55.6'
6	269°35.83	N10°2.40	99°48.72	13.9'	\$14°23.37	-13.1'	55.6'
7	284°36.02	1.53	114°21.59	13.9'	14°10.31	-13.1'	55.6'
8 9	299°36.20 314°36.38	10°0.65 09°59.77	128°54.50 143°27.43	13.9' 14.0'	13°57.18 13°43.98	-13.2' -13.3'	55.7' 55.7'
10	329°36.56	58.90	158° 0.40	14.0'	13°30.70	-13.3'	55.7'
11	344°36.74	58.02	172°33.40	14.0'	13°17.37	-13.4'	55.7'
12	359°36.92	N09°57.14	187°6.43	14.1'	S13°3.96	-13.5'	55.7'
13	14°37.11	56.26	201°39.49	14.1'	12°50.49	-13.5'	55.8'
14	29°37.29	55.39	216°12.58	14.1'	12°36.95	-13.6'	55.8'
15 16	44°37.47 59°37.66	· · 54.51 53.63	230°45.69 245°18.84	14.1' 14.2'	12°23.35 12°9.69	-13.7' -13.7'	55.8' 55.8'
17	74°37.84	52.75	259°52.02	14.2'	11°55.96	-13.8'	55.9'
18	89°38.02	N09°51.87	274°25.22	14.2'	S11°42.18	-13.8'	55.9'
19	104°38.21	50.99	288°58.44	14.3'	11°28.33	-13.9'	55.9'
20	119°38.39	50.11	303°31.69	14.3'	11°14.42	-14.0'	55.9'
21	134°38.57 149°38.76	• • 49.23	318°4.97	14.3'	11°0.46 10°46.44	-14.0'	55.9'
22 23	149 38.76 164°38.94	48.35 47.47	332°38.27 347°11.59	14.3' 14.3'	10 46.44 10°32.36	-14.1' -14.1'	56.0' 56.0'
2.5	SD = 15.8'	d = -0.9'			D = 15.1'	11.1	
	<u>JD = 13.0</u>	<u>u = -0.9</u>		JI	J = 13.1		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°39.12	N09°46.59	1°44.93 16°18.29	14.4'	\$10°18.22	-14.2'	56.0'
1 2	194°39.31 209°39.49	45.71 44.83	16°18.29 30°51.68	14.4' 14.4'	10°4.04 09°49.79	-14.2' -14.3'	56.0' 56.0'
3	209 39.49 224°39.68	· · 43.95	45°25.08	14.4	09 49.79 09°35.50	-14.3'	56.1
4	239°39.86	43.07	59°58.50	14.4'	09°21.16	-14.4'	56.1
5	254°40.05	42.19	74°31.94	14.5'	09°6.76	-14.4'	56.1'
6	269°40.23	N09°41.30	89°5.40	14.5'	S08°52.31	-14.5'	56.1'
7	284°40.42	40.42	103°38.87	14.5'	08°37.82	-14.5'	56.2'
8 9	299°40.60 314°40.79	39.54 •• 38.66	118°12.35 132°45.85	14.5' 14.5'	08°23.28 08°8.69	-14.6' -14.6'	56.2' 56.2'
10	329°40.98	37.77	132 45.85 147°19.36	14.5'	07°54.06	-14.0	56.2
11	344°41.16	36.89	161°52.89	14.5'	07°39.38	-14.7'	56.2'
12	359°41.35	N09°36.01	176°26.42	14.5'	S07°24.66	-14.8'	56.3'
13	14°41.53	35.12	190°59.97	14.6'	07°9.90	-14.8'	56.3'
14 15	29°41.72 44°41.91	34.24 •• 33.35	205°33.52 220°7.09	14.6' 14.6'	06°55.09 06°40.25	-14.8' -14.9'	56.3' 56.3'
15 16	44°41.91 59°42.09	32.47	220° 7.09 234° 40.66	14.6'	06°40.25 06°25.36	-14.9' -14.9'	56.4
17	74°42.28	31.58	249°14.23	14.6'	06°25.30	-14.9 -15.0'	56.4
18	89°42.47	N09°30.70	263°47.82	14.6'	S05°55.48	-15.0'	56.4'
19	104°42.65	29.81	278°21.40	14.6'	05°40.49	-15.0'	56.4'
20	119°42.84	28.93	292°54.99	14.6'	05°25.46	-15.1'	56.4'
21 22	134°43.03 149°43.22	· · 28.04 27.15	307°28.58 322°2.18	14.6' 14.6'	05°10.39 04°55.29	-15.1' -15.1'	56.5' 56.5'
22	149°43.22 164°43.40	27.15 26.27	322°2.18 336°35.77	14.6'	04°55.29 04°40.16	-15.1 -15.2'	56.5'
	SD = 15.8'	d = -0.9'			D = 15.3'		
				JL			

Naut.         Civil         Sunset         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	Lat.	Twi	light	Sunrise	Sunset	Tw	ilight
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	Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
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         04:59         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           30°         04:41         05:10	N 72°	////	01:49	03:36	20:23	22:06	////
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	N 70°	////	02:29	03:53	20:07	21:28	////
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           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         05:43         18:20         18:42         19:08           N 10°         05:05         05:30	68°	////	02:56	04:07	19:53	21:03	23:29
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           52°         03:43         04:21         04:59         19:03         19:41         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         19:02           20°         04:54         05:21         05:34         18:20         18:42         19:08           N 10°         05:05         05:30	66°	01:34	03:16	04:19	19:42	20:43	22:22
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		02:10	03:32	04:28	19:33		21:48
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         05:23         18:39         19:07         19:41           35°         04:32         05:03         05:23         18:39         19:07         19:41           35°         04:32         05:03         05:23         18:39         19:07         19:41           35°         04:31         05:10         05:34         18:28         18:53         19:02           20°         04:54         05:21				04:36			
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	60°	02:54	03:56	04:43	19:19	20:05	21:06
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         05:43         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           5 10°         05:19         05:44         06:05         17:58         18:19         18:44           20°         05:25         05:51	N 58°	03:09	04:06	04:49	19:13	19:56	20:51
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         05:43         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           45°         05:31         06:00	56°	03:22	04:14	04:54	19:07	19:48	20:39
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           45°         05:31         06:00	54°	03:33	04:21	04:59	19:03	19:41	20:28
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	52°	03:43	04:27	05:04	18:58	19:34	20:19
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         17:52         18:00         18:31           45°         05:34         06:08	50°	03:51	04:33	05:07	18:55	19:29	20:11
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°         05:29         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	45°	04:08	04:45	05:16	18:46	19:17	19:54
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           5 50°         05:35         06:12         06:45         17:19         17:52         18:29           52°         05:35         06:14	N 40°	04:21	04:55	05:23	18:39	19:07	19:41
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           56°         05:35         06:16	35°	04:32	05:03	05:29	18:34	19:00	19:31
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         17:46         18:29           56°         05:35         06:18	30°	04:41	05:10	05:34	18:28	18:53	19:22
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           54°         05:35         06:14         06:48         17:16         17:50         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		04:54	05:21	05:43	18:20	18:42	19:08
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           5 0°         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           56°         05:35         06:16         06:52         17:12         17:48         18:29           58°         05:35         06:21         07:01         17:03         17:44         18:29		05:05	05:30	05:51	18:12	18:33	18:58
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           54°         05:35         06:14         06:48         17:16         17:50         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	0°	05:13	05:37	05:58	18:05	18:26	18:50
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           \$ 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           56°         05:35         06:16         06:52         17:12         17:48         18:29           58°         05:35         06:21         07:01         17:03         17:44         18:29	<b>S</b> 10°	05:19	05:44	06:05	17:58	18:19	18:44
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           \$ 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	20°	05:25	05:51	06:13	17:51	18:13	18:39
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		05:29	05:57	06:21	17:42	18:07	18:34
45°         05:34         06:08         06:38         17:26         17:56         18:30           \$ 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		05:31	06:00	06:26	17:38	18:03	18:33
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			06:04		17:32		
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	45°	05:34	06:08	06:38	17:26	17:56	18:30
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							
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							
58° 05:35 06:21 07:01 17:03 17:44 18:29							
<b>S</b> 60°   05:35 06:23 07:06   16:58 17:41 18:29							
	<b>S</b> 60°	05:35	06:23	07:06	16:58	17:41	18:29

Lat.		Moonris	e		Moonse	t
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°	21:22	20:18	19:38		01:18	03:56
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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° <b>S</b> 60°	14:53 14:41	16:20 16:13	17:47 17:43	06:52 07:04	06:57 07:05	07:01 07:05
3 00	14.41	10.13	11.43	07.04	07.03	01.05

		Sun		Moon			
Day	Eqn.of Time		n.of Time Mer.		Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	14-16	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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		

h	Aries	Venus	Mars	Jupiter	Saturn	
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	
0	337° 13.12	139°13.69 \$10°52.75	234°41.20 N23°25.76	201°31.85 N17°23.69	323°27.14 N03°1.57	
1	352° 15.58	154°14.31 53.83	249°41.93 25.66	216°33.78 23.54	338°29.72 1.51	
2	7° 18.05	169°14.93 54.90	264°42.66 25.56	231°35.71 23.40	353°32.30 1.45	
3	22°20.51	184°15.56 · · 55.98	279°43.38 · · 25.46	246°37.64 · · 23.25	8°34.89 · · 1.39	
4	37°22.97	199°16.18 57.06	294°44.11 25.36	261°39.57 23.10	23°37.47 1.33	
5	52°25.44	214°16.81 58.13	309°44.84 25.26	276°41.50 22.96	38°40.05 1.27	
6	67°27.90	229°17.43 \$10°59.20	324°45.57 N23°25.15	291°43.43 N17°22.81	53°42.63 N03°1.22	
7	82°30.37	244°18.06 11°0.28	339°46.30 25.05	306°45.37 22.66	68°45.21 1.16	
8	97°32.83	259°18.69 1.35	354°47.03 24.95	321°47.30 22.52	83°47.80 1.10	
9	112°35.29	274° 19.32 · · 2.43	9°47.76 · · 24.85	336°49.23 · · 22.37	98°50.38 · · 1.04	
10	127°37.76	289° 19.95 3.50	24°48.48 24.74	351°51.16 22.23	113°52.96 0.98	
11	142°40.22	304°20.58 4.57	39°49.21 24.64	6°53.09 22.08	128°55.55 0.92	
12	157° 42.69	319°21.22 \$11°5.64	54°49.94 N23°24.53	21°55.02 N17°21.93	143°58.13 N03°0.86	
13	172°45.15	334°21.85 6.71	69°50.67 24.43	36°56.95 21.79	159°0.71 0.80	
14	187° 47.61	349°22.49 7.78	84°51.40 24.32	51°58.88 21.64	174°3.30 0.74	
15	202°50.08	4°23.12 · · 8.85	99°52.13 · · 24.22	67° 0.81 · · 21.49	189°5.88 ⋅⋅ 0.68	
16	217°52.54	19°23.76 9.92	114°52.86 24.11	82° 2.75 21.35	204°8.46 0.63	
17	232°55.01	34°24.40 10.99	129°53.60 24.01	97°4.68 21.20	219°11.05 0.57	
18	247°57.47	49°25.04 \$11°12.06	144°54.33 N23°23.90	112°6.61 N17°21.06	234°13.63 N03°0.51	
19	262°59.93	64°25.68 13.13	159°55.06 23.80	127° 8.54 20.91	249°16.21 0.45	
20	278°2.40	79° 26.32 14.20	174°55.79 23.69	142°10.47 20.76	264°18.80 0.39	
21	293°4.86	94°26.96 · · 15.26	189°56.52 · · 23.58	157°12.40 · · 20.62	279°21.38 · · 0.33	
22	308°7.33	109°27.60 16.33	204°57.25 23.48	172°14.34 20.47	294°23.97 0.27	
23	323°9.79	124°28.24 17.40	219°57.98 23.37	187°16.27 20.32	309°26.55 0.21	
			-			١.
Mer.p	bass. 01:31	ν0.6' d1.1' m-4.58	ν0.7' d-0.1' m1.25	$\nu$ 1.9′ <i>d</i> -0.1′ m-1.80	ν2.6' d-0.1' m0.49	l N
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	
0	338° 12.25	139°28.89 <b>S</b> 11°18.46	234°58.72 N23°23.26	202°18.20 N17°20.18	324°29.14 N03°0.15	
1	353° 14.72	154°29.54 19.53	249°59.45 23.15	217°20.13 20.03	339°31.72 0.09	
2	8° 17.18	169°30.18 20.59	265°0.18 23.05	232°22.07 19.88	354°34.31 0.03	
3	23° 19.65	184°30.83 · · 21.66	280°0.91 · · 22.94	247°24.00 · · 19.74	9°36.89 02°59.97	
4	38° 22.11	199°31.48 22.72	295°1.65 22.83	262°25.93 19.59	24°39.48 02°59.91	
5	53° 24.57	214°32.13 23.78	310°2.38 22.72	277°27.86 19.45	39°42.06 59.85	
6	68° 27.04	229°32.78 \$11°24.84	325°3.11 N23°22.61	292°29.80 N17°19.30	54°44.65 N02°59.79	
7	83°29.50	244° 33.43 25.91	340° 3.85 22.50	307°31.73 19.15	69°47.23 59.73	
8	98°31.97	259°34.09 26.97	355° 4.58 22.39	322°33.66 19.01	84°49.82 59.67	
9	113°34.43	274°34.74 · · 28.03	10°5.31 · · 22.28	337°35.59 · · 18.86	99°52.40 · · 59.61	
10	128° 36.89	289°35.40 29.09	25°6.05 22.17	352°37.53 18.71	114°54.99 59.55	
11	143°39.36	304°36.05 30.15	40°6.78 22.06	7°39.46 18.57	129°57.58 59.49	'
12	158°41.82	319°36.71 \$11°31.21	55°7.52 N23°21.95	22°41.39 N17°18.42	145°0.16 N02°59.43	
13	173°44.29	334°37.37 32.27	70°8.25 21.84	37°43.33 18.28	160°2.75 59.37	
14	188°46.75	349°38.03 33.32	85°8.99 21.73	52°45.26 18.13	175°5.33 59.31	
15	203°49.21	4°38.69 · · 34.38	100°9.72 · · 21.61	67°47.19 · · 17.98	190°7.92 · · 59.25	
16	218°51.68	19°39.35 35.44	115°10.46 21.50	82°49.13 17.84	205°10.51 59.19	
17	233°54.14	34°40.01 36.50	130°11.19 21.39	97°51.06 17.69	220°13.09 59.13	
18	248°56.61	49°40.68 \$11°37.55	145°11.93 N23°21.28	112°52.99 N17°17.54	235°15.68 N02°59.07	F
19	263°59.07	64°41.34 38.61	160°12.67 21.16	127°54.93 17.40	250°18.27 59.01	'
20	279°1.53	79° 42.01 39.66	175°13.40 21.05	142°56.86 17.25	265°20.86 58.95	
21	294°4.00	94°42.67 · · 40.72	190°14.14 · · 20.94	157°58.79 · · 17.10	280°23.44 · · 58.88	'
22	309°6.46	109°43.34 41.77	205°14.87 20.82	173° 0.73 16.96	295°26.03 58.82	
23	324°8.93	124°44.01 42.83	220°15.61 20.71	188°2.66 16.81	310°28.62 58.76	
N/au -	pass. 01:27	ν0.6' d1.1' m-4.59	ν0.7' d-0.1' m1.25	ν1.9' d-0.1' m-1.80	$\nu 2.6' \ d$ -0.1' m0.49	
ivier.p	Dass. 01:27	νο.ο α1.1 m-4.59	νο.τ α-υ.1 m1.25	ν1.9 α-0.1 m-1.60	ν2.0 <i>a</i> -0.1 m0.49	
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	
0	$339^{\circ}11.39$	139°44.68 <b>S</b> 11°43.88	235°16.35 N23°20.59	203°4.60 N17°16.67	325°31.21 N02°58.70	
1	$354^{\circ}13.85$	154°45.35 44.93	250°17.09 20.48	218° 6.53 16.52	340°33.79 58.64	
2	9°16.32	169°46.02 45.98	265°17.82 20.36	233° 8.47 16.37	355°36.38 58.58	
3	24°18.78	184°46.70 · · 47.03	280°18.56 · · 20.25	248°10.40 · · 16.23	10°38.97 · · 58.52	<u> </u>
4	$39^{\circ}21.25$	199°47.37 48.09	295°19.30 20.13	263°12.33 16.08	25°41.56 58.46	A
5	54°23.71	214°48.05 49.14	310°20.04 20.02	278°14.27 15.93	40°44.15 58.40	
6	69°26.17	229°48.72 \$11°50.19	325°20.78 N23°19.90	293°16.20 N17°15.79	55°46.73 N02°58.34	
7	84° 28.64	244°49.40 51.23	340°21.51 19.78	308°18.14 15.64	70°49.32 58.28	
8	99°31.10	259°50.08 52.28	355°22.25 19.67	323°20.07 15.49	85°51.91 58.21	
9	114° 33.57	274°50.76 · · 53.33	10°22.99 · · 19.55	338°22.01 · · 15.35	100°54.50 · · 58.15	Α
10	129°36.03	289°51.44 54.38	25°23.73 19.43	353°23.94 15.20	115°57.09 58.09	"
11	144°38.50	304°52.12 55.43	40°24.47 19.31	8°25.88 15.06	130°59.68 58.03	
12	159° 40.96	319°52.80 \$11°56.47	55°25.21 N23°19.20	23°27.81 N17°14.91	146°2.27 N02°57.97	
13	174° 43.42	334°53.49 57.52	70°25.95 19.08	38°29.75 14.76	161°4.86 57.91	
14	189° 45.89	349°54.17 58.56	85°26.69 18.96	53°31.68 14.62	176°7.45 57.85	<u> </u>
15	204° 48.35	4°54.86 11°59.61	100°27.43 · · 18.84	68°33.62 · · 14.47	191°10.03 · · 57.79	Au
16	219°50.82	19°55.55 12°0.65	115°28.17 18.72	83°35.55 14.32	206°12.62 57.72	
17	234°53.28	34°56.23 1.70	130°28.91 18.60	98°37.49 14.18	221°15.21 57.66	
18	249°55.74	49°56.92 \$12°2.74	145°29.65 N23°18.48	113°39.42 N17°14.03	236°17.80 N02°57.60	
19	264°58.21	64°57.61 3.78	160°30.39 18.36	128°41.36 13.88	251°20.39 57.54	
20	280°0.67	79°58.31 4.83	175°31.14 18.24	143°43.30 13.74	266°22.98 57.48	$\vdash$
21	295°3.14	94°59.00 · · 5.87	190°31.88 · · 18.12	158°45.23 · · 13.59	281°25.57 · · 57.42	
22	310°5.60	109°59.69 6.91	205°32.62 18.00	173°47.17 13.44	296°28.16 57.35	
23	325°8.06	125°0.39 7.95	220°33.36 17.88	188°49.10 13.30	311°30.76 57.29	
Mer r	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	

	o tui o	
	SHA	Dec
Alpheratz	357°33.04	29°14.36
Ankaa	353°5.43	-42°9.39
Schedar	349°29.01	56°40.99
Diphda	348°45.65	-17°50.18
Achernar	335°18.78	-57°5.74
Hamal Polaris	327°49.46 313°10.68	23°35.37 89°22.29
Polaris Acamar	313°10.68 315°10.58	-40° 11.51
Menkar	314°4.61	4° 11.81
Mirfak	308°26.17	49° 57.22
Aldebaran	290°38.07	16°33.82
Rigel	281°2.63	-8°10.05
Capella	$280^{\circ}19.98$	46°1.34
Bellatrix	278°21.50	$6^{\circ}22.54$
Elnath	278°0.24	28°37.75
Alnilam	275°36.45	-1°10.94
Betelgeuse	270°50.74	7°24.81
Canopus	263°52.06	-52° 42.25
Sirius	258°25.23 255°5.03	-16°44.96 -29°0.25
Adhara Procyon	255 5.03 244°49.65	-29 0.25 5°9.48
Pollux	244 49.03 243°15.92	27° 57.69
Avior	234° 14.74	-59° 35.48
Suhail	222°45.73	-43°32.27
Miaplacidus	221°38.90	-69°49.46
Alphard	217°46.73	-8°46.35
Regulus	$207^{\circ}33.31$	11°50.28
Dubhe	193°39.99	61°36.48
Denebola	182°23.86	14°25.47
Gienah	175°42.47	-17°41.39
Acrux	172°59.18	-63°14.96
Gacrux	171°50.62	-57° 15.88
Alioth	166°12.20 158°21.08	55°49.07 -11°18.01
Spica Alkaid	158 21.08 152°51.22	49°11.00
Hadar	132 31.22 148°34.42	-60°30.30
Menkent	140° 54.42	-36° 30.17
Arcturus	145°46.83	19°2.76
Rigil Kent.	139°38.71	-60° 56.95
Kochab	137°20.26	74°2.96
Zuben'ubi	$136^{\circ}54.63$	-16°9.16
Alphecca	$126^{\circ}2.65$	26° 37.68
Antares	112°14.14	-26°29.51
Atria	107°7.02	-69°4.75
Sabik	102°1.14	-15°45.45 -37°7.46
Shaula Rasalhague	96°8.38 95°57.18	-37°7.46 12°32.60
Eltanin	90°41.34	51° 29.37
Kaus Aust.	83°30.50	-34°22.34
Vega	80°32.07	38°48.73
Nunki	75°45.84	-26° 15.79
Altair	61°58.37	8°56.49
Peacock	53°3.07	-56° 38.96
Deneb	49°24.47	45°22.72
Enif	33°37.14	10°0.01
Al Na'ir	27°30.73	-46°49.78
Fomalhaut	15°12.65	-29°28.67
Scheat	13°43.53	28°13.78 15°21.08
Markab	13°28.22	15 21.08
Aug 29 Sat	SHA	Mer.pass
Venus	162°0.57	14:42
Mars	257°28.08	08:21
Jupiter	224°18.73	10:33
Saturn	346°14.02	02:26
Aug 30 Sun	SHA	Mer.pass
Venus	$161^{\circ}16.64$	14:41
Mars	256°46.46	08:20
Jupiter	224°5.95	10:29
Saturn	346°16.88	02:22
Aug 31 Mon	SHA	Mer.pass
Venus	160°33.29	14:40
	256°4.96	08:19
Mars	223°53.21	10:26
Jupiter		
	346°19.81	02:18
Jupiter Saturn	346°19.81	02:18
Jupiter Saturn	346°19.81 ntal parallax	
Jupiter Saturn	346°19.81	02:18 0.3 0.1

Stars

h	Su	n	Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°43.59	N09°25.38	$351^{\circ}9.36$	14.6'	<b>S</b> 04°25.00	-15.2'	56.5'
1	194°43.78	24.49	5° 42.95	14.6'	04°9.81	-15.2'	56.5'
2	209°43.97 224°44.16	23.61 •• 22.72	20° 16.54 34° 50.13	14.6' 14.6'	03°54.59 03°39.35	-15.2' -15.3'	56.6' 56.6'
4	239°44.35	21.83	49°23.71	14.6'	03°24.07	-15.3'	56.6'
5	254°44.53	20.94	63°57.28	14.6'	03°8.77	-15.3'	56.6'
6	269°44.72	N09°20.05	78° 30.85	14.6'	S02°53.45	-15.3'	56.7'
7	284°44.91 299°45.10	19.16 18.28	93°4.41 107°37.96	14.5' 14.5'	02°38.10 02°22.74	-15.4'	56.7' 56.7'
8 9	299 45.10 314°45.29	18.28	107 37.96 122°11.50	14.5'	02 22.74 02°7.35	-15.4' -15.4'	56.7'
10	329°45.48	16.50	136° 45.02	14.5'	01°51.94	-15.4'	56.7'
11	344°45.67	15.61	151° 18.54	14.5'	$01^{\circ}36.51$	-15.4'	56.8'
12	359°45.86	N09° 14.72	165°52.04	14.5'	S01°21.06	-15.5'	56.8'
13 14	14°46.05 29°46.24	13.83 12.94	180°25.53 194°59.00	14.5' 14.5'	01°5.60 00°50.12	-15.5' -15.5'	56.8' 56.8'
15	44°46.43	12.94	209° 32.46	14.5	00°34.62	-15.5'	56.8'
16	59°46.62	11.15	224°5.90	14.4'	00°19.12	-15.5'	56.9'
17	74°46.81	10.26	238°39.32	14.4'	S00°3.60	-15.5'	56.9'
18	89°47.00 104°47.19	N09°9.37	253° 12.72	14.4'	N00°11.93	15.5'	56.9'
19 20	104 47.19 119°47.38	8.48 7.59	267° 46.10 282° 19.45	14.4' 14.3'	00°27.47 00°43.02	15.5' 15.6'	56.9' 57.0'
21	134°47.57	6.70	296° 52.78	14.3'	00° 58.58	15.6'	57.0'
22	149°47.76	5.80	311°26.09	14.3'	$01^{\circ}14.14$	15.6'	57.0'
23	164°47.96	4.91	325°59.37	14.3'	01°29.71	15.6'	57.0'
	SD = 15.8'	d = -0.9'		SI	O = 15.4'		
<b>c</b>	CUA	D	CUA		D	J	UP
Sun 0	<b>GHA</b> 179°48.15	<b>Dec</b> N09°4.02	<b>GHA</b> 340°32.63	u 14.2'	<b>Dec</b> N01° 45.28	d 15.6'	<b>HP</b> 57.0'
1	194°48.34	3.12	355°5.86	14.2'	02°0.86	15.6'	57.1
2	209°48.53	2.23	9°39.06	14.2'	02°16.43	15.6'	57.1'
3	224°48.72	• • 1.34	24° 12.23	14.1'	02°32.01	15.6'	57.1'
4 5	239°48.91 254°49.11	09°0.44 08°59.55	38° 45.36 53° 18.47	14.1' 14.1'	02°47.59 03°3.16	15.6' 15.6'	57.1' 57.1'
6	269°49.30	N08° 58.65	67°51.54	14.0'	N03° 18.73	15.6'	57.1
7	284°49.49	57.76	82°24.57	14.0'	03°34.30	15.6'	57.2'
8	299°49.68	56.86	96° 57.57	14.0'	03°49.86	15.6'	57.2'
9	314°49.88	• • 55.97	111°30.54 126°3.46	13.9'	04°5.42	15.5'	57.2'
10 11	329°50.07 344°50.26	55.07 54.18	120 3.40 140°36.35	13.9' 13.8'	04°20.96 04°36.50	15.5' 15.5'	57.2' 57.3'
12	359°50.46	N08°53.28	155°9.19	13.8'	N04°52.03	15.5'	57.3'
13	14°50.65	52.38	$169^{\circ}41.99$	13.8'	$05^{\circ}7.55$	15.5'	57.3'
14	29°50.84	51.49	184° 14.75	13.7'	05°23.05	15.5'	57.3'
15 16	44°51.04 59°51.23	· · 50.59 49.69	198° 47.47 213° 20.14	13.7' 13.6'	05°38.54 05°54.01	15.5' 15.5'	57.3' 57.4'
17	74°51.42	48.80	227° 52.76	13.6'	06°9.47	15.4	57.4
18	89°51.62	N08°47.90	242°25.34	13.5'	N06°24.91	15.4'	57.4'
19	104°51.81	47.00	256° 57.86	13.5'	06°40.32	15.4'	57.4'
20 21	119°52.01 134°52.20	46.10 •• 45.20	271°30.34 286°2.77	13.4' 13.4'	06°55.72 07°11.10	15.4' 15.4'	57.4' 57.5'
22	149°52.39	44.31	300°35.14	13.4	07 11.10 07°26.45	15.4	57.5'
23	164°52.59	43.41	315°7.46	13.3'	07°41.78	15.3'	57.5'
	SD = 15.8'	d = -0.9'		SI	O = 15.6'		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°52.78	N08° 42.51	329°39.72	13.2'	N07°57.08	15.3'	57.5'
1	194°52.98	41.61	344°11.93	13.2'	08°12.36	15.2'	57.5'
2	209°53.17 224°53.37	40.71 · · 39.81	358° 44.08 13° 16.18	13.1'	08° 27.61 08° 42.82	15.2'	57.6'
3 4	224°53.37 239°53.56	· · 39.81 38.91	13° 16.18 27° 48.21	13.0' 13.0'	08° 42.82 08° 58.01	15.2' 15.2'	57.6' 57.6'
5	254°53.76	38.01	42°20.19	12.9'	09°13.16	15.1	57.6'
6	269°53.95	N08° 37.11	56°52.10	12.8'	N09°28.28	15.1'	57.6'
7	284°54.15	36.21	71°23.95	12.8'	09°43.37	15.0'	57.7'
8 9	299°54.35 314°54.54	35.31 •• 34.41	85°55.73 100°27.45	12.7' 12.7'	09°58.42 10°13.42	15.0' 15.0'	57.7' 57.7'
10	329°54.74	33.50	114°59.11	12.6'	10° 13.42 10° 28.39	14.9'	57.7'
11	344°54.93	32.60	129°30.69	12.5'	10°43.32	14.9'	57.7'
12	359°55.13	N08°31.70	144°2.21	12.4'	N10°58.21	14.8'	57.8'
13 14	14°55.33 29°55.52	30.80 29.90	158°33.66 173°5.04	12.4' 12.3'	11°13.05 11°27.85	14.8' 14.8'	57.8' 57.8'
15	44°55.72	. 28.99	173 5.04 187°36.35	12.3	11°42.60	14.6	57.8'
16	59°55.92	28.09	202°7.58	12.2'	$11^{\circ}57.30$	14.7'	57.8'
17	74°56.11	27.19	216°38.74	12.1'	12°11.96	14.6'	57.8'
18	89°56.31 104°56.51	N08° 26.28 25.38	231°9.82 245°40.83	12.0' 11.9'	N12°26.56 12°41.11	14.6' 14.5'	57.9' 57.9'
19 20	104°56.51 119°56.71	25.38 24.48	245° 40.83 260° 11.76	11.9'	12°41.11 12°55.61	14.5° 14.4'	57.9'
21	134°56.90	23.57	274°42.61	11.8'	13° 10.05	14.4'	57.9'
22	149°57.10	22.67	289° 13.38	11.7'	13°24.43	14.3'	57.9'
23	164°57.30	21.76	303°44.08	11.6'	13°38.76	14.3'	58.0'
	SD = 15.8'	d = -0.9'		SI	O = 15.7'		

N 72°         ////         02:16         03:51           N 70°         ////         02:48         04:06	Sunset	Twilight		
<b>N</b> 70° //// 02:48 04:06	Juliset	Civil	Naut.	
	20:06	21:39	////	
	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	
<b>N</b> 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	
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60° 05:27 06:15 06:57	17:05	17:48	18:36	

Lat.		Moonris	e		Moonset	:
Lat.	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	19:14	20:47	22:23	07:05	07:05	07:04

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	17-19	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	99-91%	
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	Ver	nus	M	ars	Jup	oiter	Sat	turn		Stars
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA
	340° 10.53		\$12°8.99	235°34.10	N23°17.76		N17° 13.15	326°33.35	N02° 57.23		
0		140°1.08				203°51.04				Alpheratz	357°33.03
1	355° 12.99	155°1.78	10.03	250°34.84	17.63	218°52.98	13.01	341°35.94	57.17	Ankaa	353° 5.42
2	10° 15.46	170°2.48	11.07	265°35.59	17.51	233°54.91	12.86	356°38.53	57.11	Schedar	349°28.99
3	25° 17.92	185°3.18	• • 12.11	280°36.33	• • 17.39	248°56.85	• • 12.71	11°41.12	• • 57.04	Diphda	348°45.64
4	40°20.38	200°3.88	13.14	295°37.07	17.27	263°58.78	12.57	26°43.71	56.98	Achernar	335°18.76
5	55°22.85	215°4.58	14.18	310°37.82	17.14	279°0.72	12.42	41°46.30	56.92	Hamal	
6	70°25.31	230°5.28	\$12°15.22	325°38.56	N23°17.02	294°2.66	N17° 12.27	56°48.89	N02°56.86	Polaris	313°9.11
7	85°27.78	245°5.99	16.25	340°39.30	16.90	309°4.59	12.13	71°51.48	56.80	Acamar	315°10.56
8	100°30.24	260°6.69	17.29	355°40.05	16.77	324°6.53	11.98	86°54.07	56.73	Menkar	314°4.59
9	115°32.70	275°7.40	• • 18.32	10°40.79	• • 16.65	339°8.47	• • 11.83	101°56.67	• • 56.67	Mirfak	308°26.14
10	130°35.17	290°8.10	19.36	25°41.54	16.53	354°10.40	11.69	116°59.26	56.61	Aldebaran	290°38.05
11	145°37.63	305°8.81	20.39	40°42.28	16.40	9°12.34	11.54	132°1.85	56.55	Rigel	281°2.61
12	160°40.10	320°9.52	\$12°21.43	55°43.03	N23°16.28	24°14.28	N17°11.40	147°4.44	N02°56.48	Capella	280°19.95
13	175°42.56	335°10.23	22.46	70°43.77	16.15	39°16.22	11.25	162°7.03	56.42	Bellatrix	278°21.48
14	190°45.02	350°10.94	23.49	85°44.52	16.03	54°18.15	11.10	177°9.63	56.36	Elnath	278° 0.22
15	205°47.49	5°11.66	• • 24.52	100°45.26	• • 15.90	69°20.09	• • 10.96	192°12.22	• • 56.30	Alnilam	275°36.43
16	220°49.95	20°12.37	25.55	115°46.01	15.77	84°22.03	10.81	207°14.81	56.23	Betelgeuse	270°50.72
17	235°52.42	35°13.08	26.58	130°46.75	15.65	99°23.97	10.66	222°17.40	56.17		263°52.03
18	250° 54.88	50° 13.80	S12°27.61	145°47.50	N23°15.52	114°25.90	N17° 10.52	237°20.00	N02°56.11		258°25.21
19	265° 57.35	65° 14.52	28.64	160°48.24	15.39	129°27.84	10.37	252°22.59	56.05	Adhara	255°5.01
20	280° 59.81	80° 15.24	29.67	175°48.99	15.27	144°29.78	10.22	267°25.18	55.98	Procyon	244°49.63
21	296°2.27	95° 15.96	• • 30.70	190°49.74	• • 15.14	159°31.72	• • 10.08	282°27.78	• • 55.92	Pollux	
22	311°4.74	110° 16.68	31.73	205°50.48	15.01	174°33.65	9.93	297°30.37	55.86	Avior	234°14.72
23	326°7.20	125°17.40	32.76	220°51.23	14.88	189°35.59	9.78	312°32.96	55.80	Suhail	
Merr	pass. 01:19	$\nu 0.7' \ d1.0$	7' m-4 62	ν0.7' d-0	0.1' m1.24	v1 9' d-0	.1′ m-1.80	v2 6′ d-0	0.1' m0.48	Miaplacidus	221°38.88
	Jass. 01.15	- VO.1 GI.	J III 4.02	- VO.1 U O	,.I IIII.Z-T	ν1.5 d 0	.1 111 1.00	ν 2.0 d 0	7.1 1110.40	Alphard	217°46.72
										Regulus	207°33.31
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.99
0	$341^{\circ}9.67$	140°18.12	S12°33.78	235°51.98	N23°14.76	204°37.53	N17°9.64	327°35.56	N02°55.73	Denebola	182°23.86
1	$356^{\circ}12.13$	155° 18.84	34.81	250°52.73	14.63	219°39.47	9.49	342°38.15	55.67	Gienah	175°42.48
2	$11^{\circ}14.59$	$170^{\circ}19.57$	35.83	265°53.47	14.50	234°41.41	9.35	357°40.74	55.61	1	173° 42.40 172° 59.20
3	$26^{\circ}17.06$	185°20.30	• • 36.86	280°54.22	• • 14.37	249°43.34	• • 9.20	12°43.34	• • 55.54		172 59.20 171°50.64
4	$41^{\circ}19.52$	200°21.02	37.88	295°54.97	14.24	264°45.28	9.05	27°45.93	55.48	Alioth	
5	56°21.99	215°21.75	38.91	310°55.72	14.11	279°47.22	8.91	42°48.53	55.42	Spica	158°21.09
6	71°24.45	230°22.48	S12°39.93	325°56.47	N23°13.98	294°49.16	N17°8.76	57°51.12	N02°55.35		150 21.09 152°51.24
7	$86^{\circ}26.91$	245°23.21	40.95	340°57.22	13.85	309°51.10	8.61	72°53.71	55.29	Alkaid Hadar	152 51.24 148°34.45
8	101°29.38	260°23.95	41.97	355°57.97	13.72	324°53.04	8.47	87°56.31	55.23	I	146 34.45 147°56.24
9	116°31.84	275°24.68	• • 43.00	10°58.71	• • 13.59	339°54.98	• • 8.32	102°58.90	• • 55.16		147 50.24 145°46.85
10	131°34.31	290°25.41	44.02	25°59.46	13.46	354°56.92	8.17	118°1.50	55.10	1	
11	146°36.77	305°26.15	45.04	41°0.21	13.32	9°58.85	8.03	133°4.09	55.04	Rigil Kent.	139°38.74 137°20.32
12	161°39.24	320° 26.89	S12°46.06	56°0.96	N23°13.19	25°0.79	N17°7.88	148°6.69	N02°54.97	Kochab	137 20.32 136°54.64
13	176°41.70	335°27.62	47.07	$71^{\circ}1.71$	13.06	40° 2.73	7.73	163°9.28	54.91	Zuben'ubi	
14	191°44.16	350°28.36	48.09	86°2.46	12.93	55° 4.67	7.59	178°11.88	54.85	Alphecca	126°2.67
15	206° 46.63	5°29.10	• • 49.11	101°3.22	• • 12.80	70°6.61	• • 7.44	193°14.47	• • 54.78	Antares	112°14.16
16	221°49.09	20° 29.85	50.13	116°3.97	12.66	85° 8.55	7.30	208°17.07	54.72	Atria	107°7.07
17	236°51.56	35°30.59	51.14	131°4.72	12.53	100°10.49	7.15	223°19.66	54.66	Sabik	102°1.16
18	251° 54.02	50°31.33	S12°52.16	146° 5.47	N23°12.40	115°12.43	N17°7.00	238°22.26	N02° 54.59	Shaula	96°8.40
19	266° 56.48	65°32.08	53.18	161°6.22	12.26	130°14.37	6.86	253°24.85	54.53	Rasalhague	95°57.19
20	281°58.95	80°32.82	54.19	176° 6.97	12.13	145°16.31	6.71	268°27.45	54.47	Eltanin	90°41.36
21	297°1.41	95° 33.57	• • 55.21	191°7.72	• • 12.00	160°18.25	• • 6.56	283°30.05	• • 54.40	Kaus Aust.	83°30.52
22	312°3.88	110°34.32	56.22	206°8.48	11.86	175°20.19	6.42	298°32.64	54.34	Vega	80°32.09
23	327°6.34	125°35.07	57.23	221° 9.23	11.73	190°22.13	6.27	313°35.24	54.27	Nunki	75°45.86
										Altair	61°58.38
Mer.p	oass. 01:15	$\nu$ 0.7′ $d$ 1.0	0′ m-4.63	$\nu$ 0.7′ d-0	0.1′ m1.24	$\nu 1.9' \ d-0$	$.1^\prime$ m-1.81	$\nu 2.6' d-0$	$0.1' \; { m m0.47}$	Peacock	53°3.08
										Deneb	49°24.48
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.14
0	342°8.80	140°35.82		236° 9.98	N23°11.59	205°24.07	N17°6.12	328°37.84	N02°54.21	Al Na'ir	27°30.74
1	357° 11.27	155° 36.57	12°59.26	251°10.73	11.46	220°26.01	5.98	343°40.43	54.15	Fomalhaut	15°12.65
2	12° 13.73	170°37.33	13°0.27	266°11.49	11.32	235°27.95	5.83	358°43.03	54.08	Scheat	13°43.52
3	27° 16.20	185°38.08	. 1.28	281°12.24	. 11.18	250°29.89	• • 5.69	13°45.62	• • 54.02	Markab	13°28.21
4	42° 18.66	200°38.84	2.29	296°12.99	11.05	265°31.83	5.54	28°48.22	53.96	Sep 01 Tue	SHA
5	57°21.13	215°39.59	3.30	311°13.75	10.91	280°33.77	5.39	43°50.82	53.89		159°50.55
6	72°23.59	230° 40.35	S13°4.31	326°14.50	N23°10.77	295°35.71	N17°5.25		N02°53.83	Mars	255°23.57
7	87°26.05	245°41.11	5.32	341°15.26	10.64	310°37.65	5.10	73°56.01	53.76	Jupiter	223°40.51
8	102°28.52	260°41.87	6.32	356°16.01	10.50	325°39.59	4.95	88°58.61	53.70		346°22.82
9	117°30.98	275°42.63	7.33	11°16.76	. 10.36	340°41.53	• • 4.81	104°1.21	• • 53.63		
10	132°33.45	290°43.40	8.34	26°17.52	10.22	355°43.48	4.66	119°3.80	53.57	Sep 02 Wed	
11	147°35.91	305°44.16	9.34	41°18.27	10.09	10°45.42	4.51	134°6.40	53.51		159°8.45
12	162°38.37	320°44.93		56°19.03	N23°9.95	25°47.36	N17°4.37				254°42.31
13	177° 40.84	335°45.69	11.35	71°19.78	9.81	40°49.30	4.22	164°11.60	53.38		223°27.86
14	192°43.30	350°46.46	12.36	86°20.54	9.67	55°51.24	4.07	179°14.20	53.31	Saturn	346°25.89
15	207°45.77	5°47.23	. 13.36	101°21.30	• • 9.53	70°53.18	• • 3.93	194°16.79	• • 53.25	Sep 03 Thu	SHA
16	222°48.23	20°48.00	14.36	116°22.05	9.39	85°55.12	3.78	209°19.39	53.18		158° 27.02
17	237°50.70	35°48.77	15.37	131°22.81	9.25	100°57.07	3.64	224°21.99	53.12	Mars	254° 1.18
18	252°53.16		\$13°16.37	146°23.57	N23°9.11	115°59.01	N17°3.49	239°24.59			223°15.26
19	267°55.62	65°50.32	17.37	161°24.32	8.97	131° 0.95	3.34	254°27.19	52.99		346°29.03
20	282°58.09	80°51.10	18.37	176°25.08	8.83	146°2.89	3.20	269°29.79	52.92	Jatuill	2.0 25.05
21	298°0.55	95°51.87	• • 19.37	191°25.84	8.69	161°4.83	• • 3.05	284°32.38	• • 52.86	Horizor	ıtal parallax
22	313°3.02	110°52.65	20.37	206°26.59	8.55	176° 6.77	2.90	299°34.98	52.80		Venus:
23	328°5.48	125°53.43	21.37	221°27.35	8.41	191°8.72	2.76	314°37.58	52.73		Mars:
Mer.p	pass. 01:11	$\nu$ 0.8′ d1.0	J m-4.64	νυ.8′ <b>d</b> -0	0.1′ m1.24	$\nu$ 1.9' d-0	.1′ m-1.81	$\nu$ 2.6′ $d$ -0	).1′ m0.47		

Dec

 $29^{\circ}14.37$   $-42^{\circ}9.40$ 

56°41.00 -17°50.18

 $\text{-}57^{\circ}5.75$ 

23°35.38 89°22.29

-40°11.52

4°11.81

49°57.22 16°33.82

-8°10.05

46°1.34 6°22.54

28°37.75 -1°10.94

7°24.81 -52°42.24

-16°44.95

-29°0.25

 $27^{\circ}57.68$ 

-59°35.47

-43°32.26 -69°49.44

-8°46.35

11°50.28

 $61^{\circ}36.47$ 

14°25.47

-17°41.38 -63°14.95 -57°15.87

55°49.06 -11°18.01

49°11.00 -60°30.29

-36°30.16

19°2.75 -60°56.94

-16°9.16

26°37.69 -26°29.51

-69°4.75

-15°45.45 -37°7.46

 $12^{\circ}32.60$ 

51°29.37

-34°22.34 38°48.74

-26°15.79 8°56.50

-56°38.97

 $45^{\circ}22.73$ 

 $10^{\circ}0.01$ 

-46°49.79 -29°28.67

28°13.79 15°21.09

Mer.pass

14:39

08:17

10:23

02:13 Mer.pass

14:38

08:16

10:20

02:09 Mer.pass

14:37

08:15

10:17

02:05

0.3

0.1

 $5^{\circ}9.48$ 

h	Su	n	Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°57.50	N08°20.86	$318^{\circ}14.69$	11.5'	$N13^{\circ}53.03$	14.2'	58.0'
1	194°57.70	19.95	332°45.21	11.4'	14°7.23	14.1'	58.0'
2	209°57.89 224°58.09	19.05 •• 18.14	347°15.66 1°46.02	11.4' 11.3'	14°21.37 14°35.45	14.1' 14.0'	58.0' 58.0'
4	239°58.29	17.24	16°16.29	11.2'	14°49.46	13.9'	58.0'
5	254°58.49	16.33	$30^{\circ}46.48$	11.1'	$15^{\circ}3.41$	13.9'	58.1'
6	269°58.69	N08°15.43	45°16.58	11.0'	N15°17.28	13.8'	58.1'
7 8	284°58.89 299°59.09	14.52 13.61	59°46.60 74°16.52	10.9' 10.8'	15°31.09 15°44.82	13.7' 13.7'	58.1' 58.1'
9	314°59.28	. 12.71	88°46.35	10.7	15°58.48	13.6'	58.1'
10	329°59.48	11.80	$103^{\circ}16.10$	10.7'	$16^{\circ}12.06$	13.5'	58.1'
11	344°59.68	10.89	117°45.75 132°15.31	10.6'	16°25.57	13.4'	58.2'
12 13	359°59.88 15°0.08	N08°9.98 9.08	132°15.31 146°44.77	10.5' 10.4'	N16°39.00 16°52.35	13.3' 13.3'	58.2' 58.2'
14	30° 0.28	8.17	161°14.14	10.3'	17°5.62	13.2'	58.2'
15	45°0.48	• • 7.26	175°43.42	10.2'	17°18.80	13.1'	58.2'
16	60° 0.68 75° 0.88	6.35	190°12.60 204°41.68	10.1' 10.0'	17°31.90 17°44.91	13.0' 12.9'	58.2'
17 18	90°1.08	5.44 N08°4.53	204 41.08 219°10.66	9.9'	N17°57.84	12.9	58.3' 58.3'
19	105° 1.28	3.62	233°39.55	9.8'	18°10.67	12.7'	58.3'
20	120° 1.48	2.71	248°8.34	9.7'	18°23.42	12.7'	58.3'
21	135°1.68	• • 1.80	262°37.03	9.6'	18°36.07	12.6'	58.3'
22 23	150° 1.88 165° 2.08	0.89 59.98	277°5.62 291°34.11	9.5' 9.4'	18°48.63 19°1.09	12.5' 12.4'	58.3' 58.4'
	SD = 15.8'	d = -0.9'			0 = 15.8'		
	JD — 13.0°	u — -0.9		)L	- 13.0		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°2.28	N07°59.07	306°2.50	9.3'	N19°13.45	12.3'	58.4'
1 2	195°2.48 210°2.69	58.16 57.25	320°30.78 334°58.97	9.2' 9.1'	19°25.71 19°37.87	12.2' 12.1'	58.4' 58.4'
3	225° 2.89	56.34	349°27.05	9.0'	19°49.93	12.1	58.4
4	240°3.09	55.43	$3^{\circ}55.03$	8.9'	$20^{\circ}1.89$	11.8'	58.4'
5	255° 3.29	54.52	18°22.90	8.8'	20°13.74	11.7'	58.5'
6 7	270°3.49 285°3.69	N07°53.61 52.70	32°50.67 47°18.34	8.7' 8.6'	N20°25.48 20°37.11	11.6' 11.5'	58.5' 58.5'
8	300° 3.89	51.78	61°45.90	8.5'	20°48.63	11.4	58.5'
9	315°4.10	• • 50.87	$76^{\circ}13.36$	8.4'	21°0.04	11.3'	58.5'
10	330° 4.30	49.96	90°40.71	8.2'	21°11.33 21°22.51	11.2'	58.5'
11 12	345° 4.50 0° 4.70	49.05 N07°48.13	105°7.96 119°35.10	8.1' 8.0'	N21°33.57	11.1' 10.9'	58.5' 58.6'
13	15° 4.91	47.22	134°2.14	7.9'	21°44.51	10.8'	58.6'
14	30°5.11	46.31	$148^{\circ}29.07$	7.8'	$21^{\circ}55.33$	10.7'	58.6'
15	45° 5.31 60° 5.51	· · 45.39 44.48	162°55.90 177°22.62	7.7'	22°6.02 22°16.60	10.6'	58.6'
16 17	75° 5.72	44.48 43.56	177 22.02 191°49.23	7.6' 7.5'	22 10.00 22°27.04	10.4' 10.3'	58.6' 58.6'
18	90° 5.92	N07°42.65	206°15.74	7.4'	N22°37.36	10.2'	58.7'
19	105°6.12	41.73	220°42.15	7.3'	22°47.55	10.1'	58.7'
20 21	120° 6.32 135° 6.53	40.82 •• 39.91	235°8.44 249°34.64	7.2' 7.1'	22°57.60 23°7.53	9.9' 9.8'	58.7' 58.7'
22	150°6.73	38.99	264° 0.73	7.1 7.0'	23°17.32	9.6 9.7'	58.7'
23	165° 6.93	38.07	278°26.71	6.9'	23°26.97	9.5'	58.7'
	SD = 15.8'	d = -0.9'		SE	0 = 15.9'		
Thu	<b>GHA</b> 180° 7.14	<b>Dec</b> N07°37.16	<b>GHA</b> 292°52.59	ν 6.8'	<b>Dec</b> N23°36.49	<i>d</i> 9.4'	<b>HP</b> 58.7'
0 1	180° 7.14 195° 7.34	36.24	292°52.59 307°18.37	6.7	23°45.87	9.4° 9.2°	58.7' 58.7'
2	210°7.55	35.33	321°44.04	6.6'	23°55.10	9.1'	58.8'
3	225°7.75	• • 34.41	336°9.61	6.5'	24°4.20	8.9'	58.8'
4 5	240°7.95 255°8.16	33.49 32.58	350°35.08 5°0.44	6.4' 6.3'	24°13.15 24°21.95	8.8' 8.7'	58.8' 58.8'
6	270°8.36	N07°31.66	19°25.71	6.2'	N24°30.61	8.5'	58.8'
7	285°8.57	30.74	33°50.87	6.1'	24°39.12	8.4'	58.8'
8	300°8.77 315°8.97	29.83	48°15.94	6.0'	24°47.48	8.2'	58.8'
9 10	315°8.97 330°9.18	· · 28.91 27.99	62°40.91 77°5.78	5.9' 5.8'	24°55.68 25°3.73	8.1' 7.9'	58.9' 58.9'
11	345° 9.38	27.07	91°30.55	5.7'	25°11.63	7.7'	58.9'
12	0°9.59	N07°26.15	105°55.22	5.6'	N25°19.37	7.6'	58.9'
13	15°9.79	25.23	120°19.81 134°44.29	5.5'	25°26.96	7.4'	58.9'
14 15	30°10.00 45°10.20	24.32 •• 23.40	134°44.29 149°8.69	5.4' 5.3'	25°34.38 25°41.64	7.3' 7.1'	58.9' 58.9'
16	60°10.41	22.48	163°32.99	5.2'	25°48.74	6.9'	58.9'
17	75°10.61	21.56	177°57.20	5.1'	25°55.68	6.8'	59.0'
18	90°10.82	N07°20.64	192°21.32	5.0'	N26°2.45	6.6'	59.0'
19 20	105°11.02 120°11.23	19.72 18.80	206°45.36 221°9.31	4.9' 4.9'	26°9.06 26°15.50	6.4' 6.3'	59.0' 59.0'
21	135°11.44	17.88	235°33.17	4.8'	26°21.76	6.1	59.0'
22	150°11.64	16.96	249°56.95	4.7'	26°27.86	5.9'	59.0'
23	165°11.85	16.04	264°20.65	4.6'	26°33.79	5.8'	59.0'
	SD = 15.8'	d = -0.9'		SE	D = 16.0'		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	////	02:38	04:06	19:50	21:16	////
<b>N</b> 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
<b>N</b> 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
45°	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
35°	04:37	05:08	05:33	18:25	18:51	19:22
30°	04:45	05:13	05:38	18:21	18:46	19:14
20° N 10°	04:56 05:05	05:22 05:30	05:45 05:51	18:14 18:08	18:37 18:30	19:03 18:54
0°	05:05	05:36	05:56	18:03	18:24	18:48
<b>S</b> 10°						
20°	05:16 05:20	05:41 05:46	06:02 06:08	17:58 17:52	18:19 18:14	18:43 18:40
30°	05:20	05:50	06:08	17:52	18:10	18:37
35°	05:22	05:53	06:14	17:40	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
<b>S</b> 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
<b>S</b> 60°	05:18	06:06	06:48	17:12	17:54	18:42

Lat.		Moonris	e		Moonset	
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°	16:18			13:53		
<b>N</b> 70°	17:17			12:55		
68°	17:53			12:22		
66°	18:18	17:42		11:58	14:24	
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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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	80:80
56°	23:40		01:16	07:23	07:34	07:52
58°	23:52		01:34	07:14	07:21	07:34
<b>S</b> 60°		00:06	01:55	07:05	07:07	07:12

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
Duy	00 <sup>h</sup>	12 <sup>h</sup>	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	Stars
Fri -	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	343°7.94	140°54.21 \$13°22.37	236°28.11 N23°8.27	206°10.66 N17°2.61	329°40.18 N02°52.67	
1	358° 10.41	155°54.99 23.36	251°28.87 8.12	221°12.60 2.46	344°42.78 52.60	Alpheratz 357°33.01 29°14.38 Ankaa 353°5.40 -42°9.41
2	13° 12.87	170°55.77 24.36	266°29.63 7.98	236°14.54 2.32	359°45.38 52.54	Ankaa 353°5.40 -42°9.41 Schedar 349°28.97 56°41.02
3	28° 15.34	185°56.56 · · 25.36	281°30.39 · · 7.84	251°16.49 · · 2.17	14°47.98 · · 52.47	Diphda 348°45.63 -17°50.18
4	43° 17.80	200°57.34 26.35	296°31.14 7.70	266°18.43 2.03	29°50.58 52.41	Achernar 335°18.73 -57°5.76
5 6	58° 20.27 73° 22.73	215°58.13 27.35 230°58.92 \$13°28.34	311°31.90 7.55 326°32.66 N23°7.41	281°20.37 1.88 296°22.31 N17°1.73	44°53.18 52.34 59°55.78 N02°52.28	Hamal 327°49.42 23°35.38
7	88°25.19	245°59.71 29.33	341°33.42 7.27	311°24.26 1.59	74°58.38 52.21	Polaris 313°7.31 89°22.30
8	103°27.66	261°0.50 30.33	356°34.18 7.12	326°26.20 1.44	90°0.98 52.15	Acamar 315°10.54 -40°11.52
9	118°30.12	276°1.29 · · 31.32	11°34.94 · · 6.98	341°28.14 · · 1.29	105°3.58 · · 52.08	Menkar 314°4.57 4°11.82 Mirfak 308°26.11 49°57.23
10	133°32.59	291°2.08 32.31	26°35.70 6.83	356°30.09 1.15	120°6.18 52.01	Aldebaran 290°38.02 16°33.83
11	148°35.05	306°2.88 33.30	41°36.46 6.69	11°32.03 1.00	135°8.78 51.95	Rigel 281°2.58 -8°10.05
12	163°37.51	321°3.67 \$13°34.29	56°37.22 N23°6.54	26°33.97 N17°0.86	150°11.38 N02°51.88	Capella 280°19.91 46°1.34
13 14	178° 39.98 193° 42.44	336°4.47 35.28 351°5.27 36.27	71°37.98 6.40 86°38.75 6.25	41°35.92 0.71 56°37.86 0.56	165°13.98 51.82 180°16.58 51.75	Bellatrix 278°21.46 6°22.54
15	208° 44.91	6°6.07 · · 37.26	101°39.51 · · 6.11	71°39.80 · · 0.42	195°19.18 · · 51.69	Elnath 278° 0.19 28° 37.75
16	223° 47.37	21°6.87 38.25	116°40.27 5.96	86°41.75 0.27	210°21.78 51.62	Alnilam 275°36.40 -1°10.94
17	238° 49.84	36°7.67 39.24	131°41.03 5.81	101°43.69 0.12	225°24.38 51.56	Betelgeuse 270°50.69 7°24.81 Canopus 263°52.00 -52°42.24
18	253° 52.30	51°8.47 <b>S</b> 13°40.22	146°41.79 N23°5.67	116°45.64 N16°59.98	240°26.98 N02°51.49	Sirius 258°25.19 -16°44.95
19	268° 54.76	66°9.28 41.21	161°42.55 5.52	131°47.58 16°59.83	255°29.59 51.43	Adhara 255°4.98 -29°0.24
20	283° 57.23	81°10.08 42.19	176°43.32 5.37	146°49.52 59.68	270°32.19 51.36	Procyon 244°49.61 5°9.48
21 22	298°59.69 314°2.16	96°10.89 · · 43.18 111°11.70 44.16	191°44.08 · · 5.23 206°44.84 5.08	161°51.47 · · 59.54 176°53.41 59.39	285°34.79 · · 51.29 300°37.39 51.23	Pollux 243°15.88 27°57.68
23	329°4.62	126°12.51 45.15	221°45.61 4.93	191°55.36 59.25	315°39.99 51.16	Avior 234°14.70 -59°35.46
						Suhail 222°45.70 -43°32.25
Mer.	pass. 01:07	ν0.8′ d1.0′ m-4.65	ν0.8′ d-0.1′ m1.23	$\nu 1.9' \ d$ -0.1' m-1.81	$\nu 2.6' \ d$ -0.1' m0.46	Miaplacidus 221°38.85 -69°49.43 Alphard 217°46.71 -8°46.35
						Alphard 217°46.71 -8°46.35 Regulus 207°33.30 11°50.27
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.99 61°36.45
0	344°7.09	141°13.32 \$13°46.13	236°46.37 N23°4.78	206°57.30 N16°59.10	330°42.59 N02°51.10	Denebola 182°23.86 14°25.46
1	359°9.55	156°14.13 47.11	251°47.13 4.63	221°59.24 58.95	345°45.20 51.03	Gienah 175°42.48 -17°41.38
2	14° 12.01 29° 14.48	171°14.94 48.09 186°15.76 • 49.08	266°47.90 4.48 281°48.66 • 4.34	237°1.19 58.81 252°3.13 · · 58.66	0°47.80 50.97 15°50.40 · · 50.90	Acrux 172°59.20 -63°14.94
4	44° 16.94	201°16.57 50.06	296°49.43 4.19	267° 5.08 58.51	30°53.00 50.83	Gacrux 171°50.64 -57°15.86
5	59° 19.41	216° 17.39 51.04	311°50.19 4.04	282°7.02 58.37	45°55.60 50.77	Alioth 166°12.23 55°49.04
6	74°21.87	231°18.21 \$13°52.01	326°50.95 N23°3.89	297°8.97 N16°58.22	60°58.21 N02°50.70	Spica 158°21.09 -11°18.00 Alkaid 152°51.25 49°10.99
7	89°24.33	246°19.03 52.99	341°51.72 3.74	312°10.91 58.08	76°0.81 50.64	Hadar 148°34.46 -60°30.28
8	104°26.80	261°19.85 53.97	356°52.49 3.59	327°12.86 57.93	91°3.41 50.57	Menkent 147°56.24 -36°30.16
9	119°29.26	276°20.67 · · 54.95	11°53.25 · · 3.44	342°14.80 · · 57.78	106°6.02 · · 50.50	Arcturus 145°46.85 19°2.75
10 11	134°31.73 149°34.19	291°21.50 55.92 306°22.32 56.90	26°54.02 3.28 41°54.78 3.13	357°16.75 57.64 12°18.69 57.49	121°8.62 50.44 136°11.22 50.37	Rigil Kent. 139°38.75 -60°56.94
12	164° 36.66	321°23.15 \$13°57.88	56°55.55 N23°2.98	27°20.64 N16°57.34	151°13.82 N02°50.30	Kochab 137°20.37 74°2.95
13	179°39.12	336°23.98 58.85	71°56.32 2.83	42°22.59 57.20	166°16.43 50.24	Zuben'ubi 136°54.65 -16°9.15
14	194°41.58	351°24.81 13°59.82	86°57.08 2.68	57°24.53 57.05	181°19.03 50.17	Alphecca 126°2.68 26°37.68 Antares 112°14.17 -26°29.51
15	209°44.05	$6^{\circ}25.64$ $14^{\circ}0.80$	101°57.85 · · 2.53	72°26.48 · · 56.91	196°21.63 · · 50.11	Afria 107°7.10 -69°4.75
16	224° 46.51	21°26.47 1.77	116°58.62 2.37	87°28.42 56.76	211°24.24 50.04	Sabik 102°1.16 -15°45.44
17	239° 48.98	36°27.30 2.74	131°59.38 2.22	102°30.37 56.61	226°26.84 49.97 241°29.45 N02°49.91	Shaula 96°8.41 -37°7.46
18 19	254° 51.44 269° 53.90	51°28.14	147°0.15 N23°2.07 162°0.92 1.91	117°32.32 N16°56.47 132°34.26 56.32	241°29.45 N02°49.91 256°32.05 49.84	Rasalhague 95°57.20 12°32.61
20	284°56.37	81°29.81 5.65	177°1.69 1.76	147°36.21 56.17	271°34.65 49.77	Eltanin 90°41.38 51°29.38
21	299° 58.83	96°30.65 · · 6.62	192°2.46 · · 1.61	162°38.15 · · 56.03	286°37.26 · · 49.71	Kaus Aust. 83°30.52 -34°22.34 Vega 80°32.10 38°48.75
22	$315^{\circ}1.30$	111°31.49 7.59	207° 3.22 1.45	177°40.10 55.88	301°39.86 49.64	Nunki 75°45.86 -26°15.79
23	330°3.76	126°32.33 8.56	222°3.99 1.30	192°42.05 55.74	316°42.47 49.57	Altair 61°58.39 8°56.50
Mer.ı	pass. 01:03	ν0.8' d1.0' m-4.66	ν0.8' d-0.1' m1.23	$\nu$ 1.9' d-0.1' m-1.81	$\nu 2.6' \ d$ -0.1' m0.46	Peacock 53°3.09 -56°38.97
						Deneb 49°24.48 45°22.75
S	CHV	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°37.14 10°0.02
Sun 0	<b>GHA</b> 345°6.23	<b>GHA Dec</b> 141°33.17 <b>S</b> 14°9.53	<b>GHA Dec</b> 237° 4.76 N23° 1.14	<b>GHA Dec</b> 207°43.99 N16°55.59	<b>GHA Dec</b> 331°45.07 N02°49.51	Al Na'ir 27°30.73 -46°49.80
1	0°8.69	156°34.02 10.49	252°5.53 0.99	222°45.94 55.44	346°47.68 49.44	Fomalhaut 15°12.64 -29°28.67 Scheat 13°43.51 28°13.81
2	$15^{\circ}11.15$	171°34.86 11.46	267°6.30 0.83	237°47.89 55.30	1°50.28 49.37	Markab 13°28.20 15°21.10
3	30° 13.62	186°35.71 · · 12.42	282°7.07 · · 0.68	252°49.83 · · 55.15	16°52.88 · · 49.31	
4	45° 16.08	201°36.56 13.39	297° 7.84 0.52	267°51.78 55.01	31°55.49 49.24	Sep 04 Fri SHA Mer.pass
5	60° 18.55	216°37.41 14.35	312°8.61 0.37 327°9.38 N23°0.21	282°53.73 54.86	46°58.09 49.17	Venus 157°46.26 14:36 Mars 253°20.17 08:14
6 7	75°21.01 90°23.48	231°38.26 \$14°15.32 246°39.11 16.28	327°9.38 N23°0.21 342°10.15 23°0.05	297°55.68 N16°54.71 312°57.62 54.57	62°0.70 N02°49.11 77°3.30 49.04	Jupiter 223°2.71 10:14
8	105°25.94	261°39.96 17.24	357°10.92 22°59.90	327°59.57 54.42	92°5.91 48.97	Saturn 346°32.24 02:01
9	120°28.40	276°40.82 · · 18.20	12°11.69 · · 59.74	343°1.52 · · 54.27	107°8.52 · · 48.90	
10	135° 30.87	291°41.68 19.16	27°12.47 59.58	358° 3.47 54.13	122°11.12 48.84	Sep 05 Sat         SHA         Mer.pass           Venus         157°6.23         14:34
11	150°33.33	306°42.53 20.12	42°13.24 59.42	13° 5.41 53.98	137°13.73 48.77	Mars 252°39.28 08:12
12 13	165° 35.80 180° 38.26	321°43.39	57°14.01 N22°59.27 72°14.78 59.11	28°7.36 N16°53.84 43°9.31 53.69	152°16.33 N02°48.70 167°18.94 48.64	Jupiter 222°50.22 10:11
13 14	180° 38.26 195° 40.72	351°45.12 23.00	72°14.78 59.11 87°15.55 58.95	58°11.26 53.54	182°21.54 48.57	Saturn 346°35.51 01:57
15	210° 43.19	6°45.98 · · 23.95	102°16.33 · · 58.79	73°13.20 · · 53.40	197°24.15 · · 48.50	Sep 06 Sun SHA Mer.pass
16	225° 45.65	21°46.84 24.91	117°17.10 58.63	88°15.15 53.25	212°26.76 48.43	Venus 156°26.95 14:33
17	240°48.12	36°47.71 25.87	132°17.87 58.47	103°17.10 53.11	227°29.36 48.37	Mars 251°58.54 08:11
18	255° 50.58	51°48.58 \$14°26.82	147°18.64 N22°58.31	118°19.05 N16°52.96	242°31.97 N02°48.30	Jupiter 222° 37.77 10:08
19	270°53.05	66°49.45 27.78	162°19.42 58.15	133°21.00 52.81	257°34.58 48.23	Saturn 346°38.84 01:53
20 21	285°55.51 300°57.97	81°50.32 28.73 96°51.19 · · 29.68	177°20.19 57.99 192°20.97 · · 57.83	148°22.95 52.67 163°24.90 •• 52.52	272°37.18 48.16 287°39.79 • 48.10	Horizontal parallax
22	316°0.44	111°52.06 30.64	207°21.74 57.67	178°26.84 52.38	302°42.40 48.03	Venus: 0.3
23	331°2.90	126°52.94 31.59	222°22.52 57.51	193°28.79 52.23	317°45.00 47.96	Mars: 0.1
Mer	pass. 00:59	ν0.8' d1.0' m-4.68	ν0.8' d-0.2' m1.23	ν1.9' d-0.1' m-1.81	ν2.6' d-0.1' m0.45	
IVICI.	pass. 00.38	νο.ο α1.ο III-4.00	ν σ.σ u-σ.2 III1.23	ν 1.5 α-0.1 III-1.01	ν Δ.υ - υ.1 III∪.4J	

h	Su	n	Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	$180^{\circ}12.05$	$N07^{\circ}15.12$	278°44.26	4.5'	$N26^{\circ}39.54$	5.6'	59.0'
1	195°12.26	14.20	293°7.80	4.5'	26°45.12	5.4'	59.0'
2	210° 12.47 225° 12.67	13.27 •• 12.35	307°31.26 321°54.65	4.4' 4.3'	26°50.52 26°55.75	5.2' 5.0'	59.1' 59.1'
4	240° 12.88	11.43	336°17.96	4.2'	20° 55.75	4.9'	59.1'
5	255° 13.09	10.51	350°41.20	4.2'	27°5.67	4.7'	59.1'
6	270°13.29	N07° 9.59	5°4.37	4.1'	$N27^{\circ}10.36$	4.5'	59.1'
7	285°13.50	8.67	19°27.47	4.0'	27°14.87	4.3'	59.1'
8 9	300° 13.71 315° 13.91	7.74 • • 6.82	33°50.51 48°13.48	4.0' 3.9'	27°19.20 27°23.34	4.1' 4.0'	59.1' 59.1'
10	330°14.12	5.90	62°36.39	3.8'	27°27.30	4.0 3.8'	59.1'
11	345° 14.33	4.97	76°59.24	3.8'	27°31.07	3.6'	59.2'
12	0°14.53	N07°4.05	91°22.03	3.7'	N27°34.66	3.4'	59.2'
13	15° 14.74	3.13	105°44.76	3.7'	27°38.06	3.2'	59.2'
14 15	30° 14.95 45° 15.16	2.20 •• 1.28	120°7.44 134°30.08	3.6' 3.6'	27°41.27 27°44.30	3.0' 2.8'	59.2' 59.2'
16	60° 15.36	07° 0.36	148°52.66	3.5'	27°47.13	2.6'	59.2'
17	75° 15.57	$06^{\circ}59.43$	163°15.19	3.5'	27°49.78	2.5'	59.2'
18	90° 15.78	N06°58.51	177°37.68	3.4'	N27°52.23	2.3'	59.2'
19	105° 15.99	57.58 56.66	192°0.13	3.4'	27°54.50	2.1'	59.2'
20 21	120°16.20 135°16.40	56.66 •• 55.73	206°22.54 220°44.92	3.4' 3.3'	27°56.57 27°58.44	1.9' 1.7'	59.2' 59.3'
22	150° 16.61	54.81	235° 7.25	3.3'	28°0.13	1.5'	59.3'
23	165° 16.82	53.88	249°29.56	3.3'	28°1.62	1.3'	59.3'
	SD = 15.9'	d = -0.9'		SI	D = 16.1'		
_							
Sat	<b>GHA</b> 180° 17.03	<b>Dec</b> N06°52.96	<b>GHA</b> 263°51.84	ν 3.2'	<b>Dec</b> N28° 2.92	d 1.1'	<b>HP</b> 59.3'
0 1	180 17.03 195°17.24	52.03	203 51.84 278°14.09	3.2'	28° 4.02	0.9'	59.3'
2	210° 17.45	51.10	292°36.31	3.2'	28°4.92	0.7'	59.3'
3	225° 17.65	• • 50.18	306°58.51	3.2'	28°5.64	0.5'	59.3'
4	240° 17.86	49.25	321°20.70	3.2'	28°6.15	0.3'	59.3'
5 6	255° 18.07 270° 18.28	48.32 N06°47.40	335°42.86 350°5.02	3.2' 3.1'	28°6.47 N28°6.59	0.1' -0.1'	59.3' 59.3'
7	285° 18.49	46.47	4°27.16	3.1	28° 6.52	-0.1	59.3'
8	300° 18.70	45.54	18°49.29	3.1'	28°6.25	-0.5	59.3'
9	315° 18.91	• • 44.61	33°11.41	3.1'	28°5.78	-0.7'	59.3'
10	330°19.12	43.69	47°33.54	3.1'	28°5.12	-0.9'	59.4
11 12	345°19.33 0°19.54	42.76 N06°41.83	61°55.66 76°17.78	3.1' 3.1'	28°4.26 N28°3.20	-1.1' -1.3'	59.4' 59.4'
13	15° 19.74	40.90	90°39.91	3.1'	28°1.95	-1.5'	59.4'
14	30° 19.95	39.97	$105^{\circ}2.04$	3.1'	$28^{\circ}0.50$	-1.6'	59.4'
15	45°20.16	• • 39.05	119°24.19	3.2'	27°58.85	-1.8'	59.4'
16 17	60° 20.37 75° 20.58	38.12 37.19	133°46.34 148°8.51	3.2' 3.2'	27°57.01 27°54.97	-2.0' -2.2'	59.4' 59.4'
18	90° 20.79	N06°36.26	162°30.70	3.2'	N27°52.73	-2.4	59.4
19	105°21.00	35.33	$176^{\circ}52.91$	3.2'	$27^{\circ}50.30$	-2.6'	59.4'
20	120°21.21	34.40	191°15.14	3.3'	27°47.68	-2.8'	59.4'
21 22	135°21.42 150°21.63	· · 33.47 32.54	205°37.39 219°59.67	3.3' 3.3'	27°44.86 27°41.84	-3.0' -3.2'	59.4' 59.4'
23	165°21.85	32.54	219 59.07 234°21.98	3.3'	27 41.84 27°38.64	-3.2 -3.4'	59.4 59.4'
	SD = 15.9'	d = -0.9'		SI	D = 16.2'		
_							
Sun 0	<b>GHA</b> 180° 22.06	<b>Dec</b> N06°30.68	<b>GHA</b> 248° 44.33	ν 3.4'	<b>Dec</b> N27°35.23	d -3.6'	<b>HP</b> 59.4'
1	180°22.06 195°22.27	29.75	248 44.33 263 6.71	3.4' 3.4'	N27°35.23 27°31.64	-3.6° -3.8°	59.4' 59.4'
2	210° 22.48	28.82	277°29.12	3.5'	27°27.85	-4.0'	59.4'
3	225°22.69	• • 27.89	291°51.58	3.5'	27°23.88	-4.2'	59.4'
4	240°22.90 255°23.11	26.96 26.02	306°14.08 320°36.62	3.5' 3.6'	27°19.71 27°15.35	-4.4' -4.5'	59.4' 59.4'
5 6	255°23.11 270°23.32	26.02 N06°25.09	320°36.62 334°59.21	3.6'	27°15.35 N27°10.80	-4.5' -4.7'	59.4° 59.5'
7	285° 23.53	24.16	349°21.85	3.7'	27°6.07	-4.9	59.5'
8	300°23.74	23.23	3°44.54	3.7'	27°1.14	-5.1'	59.5'
9	315°23.95	• • 22.30	18°7.28	3.8'	26°56.03	-5.3'	59.5'
10 11	330°24.17 345°24.38	21.36 20.43	32°30.08 46°52.93	3.9' 3.9'	26°50.74 26°45.26	-5.5' -5.7'	59.5' 59.5'
12	0°24.59	N06°19.50	61°15.85	4.0'	N26°39.59	-5.8'	59.5'
13	15°24.80	18.57	75°38.82	4.0'	26°33.75	-6.0'	59.5'
14	30°25.01	17.63	90°1.86	4.1'	26°27.72	-6.2'	59.5'
15 16	45°25.22 60°25.43	· · 16.70 15.77	104°24.96 118°48.14	4.2' 4.2'	26°21.51 26°15.12	-6.4' -6.6'	59.5' 59.5'
17	75° 25.65	14.83	133°11.38	4.2	26°8.55	-6.7'	59.5'
18	90°25.86	N06°13.90	147°34.69	4.4'	N26°1.80	-6.9'	59.5'
19	105°26.07	12.97	161°58.07	4.5'	25°54.88	-7.1'	59.5'
20 21	120° 26.28 135° 26.50	12.03 •• 11.10	176°21.53 190°45.07	4.5' 4.6'	25°47.79 25°40.52	-7.3'	59.5' 59.5'
21	135°26.50 150°26.71	· · 11.10 10.16	190°45.07 205°8.68	4.6° 4.7'	25°40.52 25°33.08	-7.4' -7.6'	59.5' 59.5'
23	165° 26.92	9.23	219°32.37	4.8'	25°25.46	-7.8'	59.5'
	SD = 15.9'	d = -0.9'		SI	D = 16.2'		

Lat.	Twilight		Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	////	02:58	04:21	19:33	20:54	////
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 60°	05:10	05:58	06:39	17:19	18:01	18:49

Lat.		Moonris	e		Moonset	:
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°						
<b>N</b> 70°						
68°						
66°						
64°			21:05			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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	03:45	05:12	05:54	07:27	08:11	09:41

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
_ Zu,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	23-25	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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	Stars	
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA	
0	346°5.37	141°53.81 \$14°32.		208°30.74 N16°52.08	332°47.61 N02°47.89		,
1	1°7.83	156°54.69 33.	49 252°24.06 57.19	223°32.69 51.94	347°50.22 47.83	Alpheratz 357°32.99 Ankaa 353°5.38	•
2	16° 10.29	171°55.57 34.		238°34.64 51.79	2°52.82 47.76	Schedar 349°28.94	
3	31°12.76	186°56.45 · · 35.		253°36.59 · · 51.65	17°55.43 · · 47.69	Diphda 348°45.61	-:
4 5	46° 15.22 61° 17.69	201°57.33 36. 216°58.21 37.		268°38.54 51.50 283°40.49 51.35	32°58.04 47.62 48°0.65 47.56	Achernar 335°18.70	
6	76°20.15	231°59.10 \$14°38.		298°42.44 N16°51.21	63°3.25 N02°47.49	Hamal 327°49.40	2
7	91°22.62	246°59.99 39.		313°44.39 51.06	78°5.86 47.42	Polaris 313°5.70	8
8	106°25.08	262°0.87 40.		328°46.34 50.92	93°8.47 47.35	Acamar 315°10.51 Menkar 314°4.54	-4
9	121°27.54	277°1.76 · · 41.		343°48.29 · · 50.77	108°11.08 · · 47.28	Mirfak 308°26.07	
10	136°30.01	292°2.65 42.		358°50.24 50.62	123°13.69 47.22	Aldebaran 290°37.99	
11 12	151°32.47 166°34.94	307°3.54 42. 322°4.44 \$14°43.		13°52.19 50.48 28°54.14 N16°50.33	138°16.29 47.15 153°18.90 N02°47.08	Rigel 281°2.56	
13	181° 37.40	337°5.33 44.		43°56.09 50.19	168°21.51 47.01	Capella 280°19.87	
14	196°39.86	352°6.23 45.		58°58.04 50.04	183°24.12 46.94	Bellatrix 278°21.43	,
15	211°42.33	7°7.13 · · 46.		73°59.99 · · 49.89	198°26.73 · · 46.88	Elnath 278° 0.16 Alnilam 275° 36.37	•
16	226° 44.79	22°8.03 47.		89°1.94 49.75	213°29.34 46.81	Betelgeuse 270°50.66	
17	241° 47.26	37°8.93 48. 52°9.83 \$14°49.		104°3.89 49.60 119°5.84 N16°49.46	228°31.95 46.74	Canopus 263°51.97	-!
18 19	256° 49.72 271° 52.19	52°9.83 \$14°49. 67°10.73 50.	_	119°5.84 N16°49.46 134°7.79 49.31	243°34.55 N02°46.67 258°37.16 46.60	Sirius 258°25.16	-:
20	286° 54.65	82°11.64 51.		149° 9.74 49.17	273°39.77 46.53	Adhara 255°4.96	
21	301°57.11	97°12.54 · · 52.		164°11.69 · · 49.02	288°42.38 · · 46.47	Procyon 244°49.59	,
22	$316^{\circ}59.58$	112°13.45 53.	28 207°40.40 53.74	179°13.64 48.87	303°44.99 46.40	Pollux 243°15.85 Avior 234°14.67	
23	332°2.04	127°14.36 54.	22 222°41.18 53.57	194°15.59 48.73	318°47.60 46.33	Suhail 222°45.69	
Mer.p	pass. 00:55	ν0.9' d1.0' m-4.6	$\nu 0.8' \ d$ -0.2' m1.22	$\nu 1.9' \ d$ -0.1' m-1.81	$\nu$ 2.6′ d-0.1′ m0.45	Miaplacidus 221°38.83	-(
						Alphard 217°46.69	
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.28	
0	347°4.51	142°15.27 \$14°55.		209°17.55 N16°48.58	333°50.21 N02°46.26	Dubhe 193°39.97 Denebola 182°23.85	
1	2°6.97	157°16.18 56.	09 252°42.74 53.24	224°19.50 48.44	348°52.82 46.19	Gienah 175°42.47	_ :
2	17°9.43	172° 17.10 57.		239°21.45 48.29	3°55.43 46.12	Acrux 172°59.20	-(
3	32°11.90	187°18.01 · · 57.		254°23.40 · · 48.14	18°58.04 · · 46.05	Gacrux 171°50.64	-!
4 5	47° 14.36 62° 16.83	202°18.93 58. 217°19.85 14°59.		269°25.35 48.00 284°27.30 47.85	34°0.65 45.99 49°3.26 45.92	Alioth 166°12.23	ļ
6	77° 19.29	232°20.77 \$15°0.		299°29.25 N16°47.71	64°5.87 N02°45.85	Spica 158°21.09	-:
7	92°21.76	247°21.69 1.		314°31.21 47.56	79°8.48 45.78	Alkaid 152°51.26	4
8	$107^{\circ}24.22$	262°22.61 2.	_	329°33.16 47.42	94°11.09 45.71	Hadar 148°34.47 Menkent 147°56.24	-1
9	122°26.68	277°23.54 · · 3.		344°35.11 · · 47.27	109°13.70 · · 45.64	Arcturus 145°46.86	_,
10	137°29.15	292°24.46 4.		359°37.06 47.12	124°16.31 45.57	Rigil Kent. 139°38.77	-(
11 12	152°31.61 167°34.08	307°25.39 5. 322°26.32 \$15°6.		14°39.02 46.98 29°40.97 N16°46.83	139°18.92 45.50 154°21.53 N02°45.44	Kochab 137°20.42	
13	182°36.54	337°27.25 7.		44°42.92 46.69	169°24.14 45.37	Zuben'ubi 136°54.65	
14	197°39.00	352°28.18 8.		59°44.87 46.54	184°26.76 45.30	Alphecca 126°2.69	:
15	212°41.47	7°29.11 · · 9.		74°46.83 · · 46.39	199°29.37 · · 45.23	Antares 112°14.17 Atria 107°7.12	-2
16	227° 43.93	22°30.05 10.		89°48.78 46.25	214°31.98 45.16	Sabik 102°1.17	-:
17	242°46.40	37°30.99 10.		104°50.73 46.10	229°34.59 45.09	Shaula 96°8.42	
18 19	257° 48.86 272° 51.32	52°31.92 \$15°11. 67°32.86 12.	_	119°52.69 N16°45.96 134°54.64 45.81	244°37.20 N02°45.02 259°39.81 44.95	Rasalhague 95°57.21	
20	287° 53.79	82°33.81 13.		149°56.59 45.67	274°42.42 44.88	Eltanin 90°41.41	!
21	302°56.25	97°34.75 · · 14.		164°58.55 · · 45.52	289°45.03 · · 44.81	Kaus Aust. 83°30.53 Vega 80°32.12	-3
22	$317^{\circ}58.72$	112°35.69 15.	52 207°59.19 49.66	180° 0.50 45.38	304°47.65 44.74	Vega 80°32.12 Nunki 75°45.87	_,
23	333°1.18	127°36.64 16.	44 222°59.98 49.49	195°2.45 45.23	319°50.26 44.67	Altair 61°58.39	_
Mer.p	pass. 00:52	ν0.9' d0.9' m-4.7	$\nu 0.8' \ d$ -0.2' m1.22	$\nu 2.0' \ d$ -0.1' m-1.82	ν2.6' d-0.1' m0.45	Peacock 53°3.09	-!
						Deneb 49°24.49	4
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°37.13	
0	348°3.64	142°37.59 \$15°17.		210°4.41 N16°45.08	334°52.87 N02°44.61	Al Na'ir 27°30.72 Fomalhaut 15°12.62	-4 -2
1	$3^{\circ}6.11$	157°38.53 18.		225° 6.36 44.94	349°55.48 44.54	Scheat 13°43.50	-
2	18°8.57	172°39.49 19.		240°8.31 44.79	4°58.09 44.47	Markab 13°28.19	
3	33°11.04	187°40.44 · · 20.		255°10.27 · · 44.65	20°0.71 · · 44.40	Son O7 Mon SHA	=
4 5	48° 13.50 63° 15.97	202°41.39 21. 217°42.35 21.		270°12.22 44.50 285°14.18 44.36	35°3.32 44.33 50°5.93 44.26	<b>Sep 07 Mon SHA</b> Venus 155°48.45	
6	78° 18.43	232°43.30 S15°22.		300°16.13 N16°44.21	65°8.54 N02°44.19	Mars 251°17.92	
7	93°20.89	247°44.26 23.		315°18.08 44.06	80°11.16 44.12	Jupiter 222°25.38	
8	108°23.36	262°45.22 24.		330°20.04 43.92	95°13.77 44.05	Saturn 346°42.24	
9	123°25.82	277°46.18 · · 25.		345°21.99 · · 43.77	110°16.38 · · 43.98	Sep 08 Tue SHA	
10 11	138°28.29 153°30.75	292°47.15 26. 307°48.11 27.		0°23.95 43.63 15°25.90 43.48	125°19.00 43.91 140°21.61 43.84	Venus 155°10.77	
12	168° 33.21	307 48.11 27. 322°49.08 \$15°28.		30°27.86 N16°43.34	155°24.22 N02°43.77	Mars 250° 37.45	
13	183°35.68	337°50.04 29.		45°29.81 43.19	170°26.84 43.70	Jupiter 222°13.04	
14	198°38.14	352°51.01 30.	11 88°11.80 46.86	60°31.77 43.05	185°29.45 43.63	Saturn 346°45.70	_
15	213° 40.61	7°51.98 · · 31.		75°33.72 · · 42.90	200°32.06 · · 43.56	Sep 09 Wed SHA	1
16	228° 43.07	22°52.96 31.		90°35.68 42.75	215°34.68 43.49	Venus 154°33.94	
17 18	243° 45.53 258° 48.00	37°53.93 32. 52°54.91 \$15°33.		105°37.63 42.61 120°39.59 N16°42.46	230°37.29 43.42 245°39.90 N02°43.35	Mars 249°57.12	
19	273° 50.46	67°55.89 34.	_	135°41.55 42.32	260°42.52 43.28	Jupiter 222°0.76 Saturn 346°49.23	
20	288° 52.93	82°56.86 35.		150°43.50 42.17	275°45.13 43.21		_
21	303°55.39	97°57.85 · · 36.	43 193°17.34 · · 45.61	165°45.46 · · 42.03	290°47.75 · · 43.14	Horizontal parallax	
22	318° 57.85	112°58.83 37.		180°47.41 41.88	305°50.36 43.07	Venus: Mars:	
23	334°0.32	127°59.81 38.		195°49.37 41.74	320°52.97 43.00	iviars:	
Mer.p	pass. 00:48	ν0.9′ d0.9′ m-4.7	1 $\nu 0.8' \ d$ -0.2' m1.22	ν2.0′ d-0.1′ m-1.82	ν2.6′ d-0.1′ m0.44		

	353°5.38	29 14.40
Ankaa Schedar	353 5.38 349°28.94	-42°9.41 56°41.04
Diphda	348°45.61	-17° 50.18
Achernar	335°18.70	-57°5.76
Hamal	327°49.40	23°35.40
Polaris	313°5.70	89°22.31
Acamar	315°10.51	-40° 11.52
Menkar	314°4.54	4°11.82
Mirfak	308°26.07	49°57.24
Aldebaran	290°37.99	16°33.83
Rigel	281°2.56	-8°10.05
Capella	$280^{\circ}19.87$	46°1.34
Bellatrix	278°21.43	6°22.54
Elnath	278°0.16	28°37.75
Alnilam	275°36.37	$-1^{\circ}10.94$
Betelgeuse	270°50.66	$7^{\circ}24.82$
Canopus	263°51.97	-52°42.23
Sirius	258°25.16	-16°44.95
Adhara	255°4.96	-29°0.24
Procyon	244°49.59	5°9.48
Pollux	243°15.85	27°57.67
Avior	234°14.67	-59° 35.45
Suhail	222°45.69	-43°32.24
Miaplacidus	221°38.83	-69°49.42
Alphard	217°46.69	-8°46.35
Regulus	207°33.28	11°50.27
Dubhe	193°39.97	61°36.43
Denebola	182°23.85	14°25.46
Gienah	175°42.47	-17°41.38
Acrux	172°59.20	-63°14.93
Gacrux	171°50.64	-57° 15.85
Alioth	166°12.23	55°49.03
Spica	158°21.09	-11°18.00 49°10.97
Alkaid	152°51.26 148°34.47	-60° 30.28
Hadar Menkent	148 34.47 147°56.24	-00 30.28 -36°30.15
Arcturus	147 50.24 145°46.86	-30 30.15 19°2.74
Rigil Kent.	139°38.77	-60° 56.93
Kochab	137°20.42	74°2.93
Zuben'ubi	136°54.65	-16°9.15
Alphecca	126° 2.69	26° 37.68
	112° 14.17	-26° 29.51
Antares		
Antares Atria		
Atria	$107^{\circ}7.12$	-69°4.75
!		-69°4.75 -15°45.44
Atria Sabik	107°7.12 102°1.17	-69°4.75
Atria Sabik Shaula Rasalhague	107°7.12 102°1.17 96°8.42	-69°4.75 -15°45.44 -37°7.46
Atria Sabik Shaula	107°7.12 102°1.17 96°8.42 95°57.21	-69° 4.75 -15° 45.44 -37° 7.46 12° 32.61
Atria Sabik Shaula Rasalhague Eltanin	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41	-69°4.75 -15°45.44 -37°7.46 12°32.61 51°29.38
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust.	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53	-69°4.75 -15°45.44 -37°7.46 12°32.61 51°29.38 -34°22.35
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39	-69°4.75 -15°45.44 -37°7.46 12°32.61 51°29.38 -34°22.35 38°48.75
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09	-69°4.75 -15°45.44 -37°7.46 12°32.61 51°29.38 -34°22.35 38°48.75 -26°15.79 8°56.51 -56°38.98
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49	-69°4.75 -15°45.44 -37°7.46 12°32.61 51°29.38 -34°22.35 38°48.75 -26°15.79 8°56.51 -56°38.98 45°22.76
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13	-69°4.75 -15°45.44 -37°7.46 12°32.61 51°29.38 -34°22.35 38°48.75 -26°15.79 8°56.51 -56°38.98 45°22.76 10°0.03
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72	-69°4.75 -15°45.44 -37°7.46 12°32.61 51°29.38 -34°22.35 38°48.75 -26°15.79 8°56.51 -56°38.98 45°22.76 10°0.03 -46°49.80
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62	-69°4.75 -15° 45.44 -37° 7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 33°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50	-69°4.75 -15° 45.44 -37° 7.46 12° 32.61 51° 29.38 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62	-69°4.75 -15° 45.44 -37° 7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19	-69°4.75 -15°45.44 -37°7.46 12°32.61 51°29.38 -34°22.35 -26°15.79 8°56.51 -56°38.98 45°22.76 10°0.03 -46°49.80 -29°28.68 28°13.82 15°21.11
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19	-69°4.75 -15° 45.44 -37°7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19	-69°4.75 -15° 45.44 -37° 7.46 12° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11 Mer.pass 14:32
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19	-69°4.75 -15° 45.44 -37°7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92	-69°4.75 -15° 45.44 -37° 7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11 Mer.pass 14:32 08:10
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars Jupiter Saturn	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92 222°25.38 346°42.24	-69°4.75 -15° 45.44 -37°7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11 Mer.pass 14:32 08:10 10:05 01:49
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars Jupiter Saturn  Sep 08 Tue	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92 222°25.38 346°42.24	-69°4.75 -15° 45.44 -37° 7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11  Mer.pass 14:32 08:10 10:05 01:49  Mer.pass
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars Jupiter Saturn  Sep 08 Tue Venus	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92 222°25.38 346°42.24	-69°4.75 -15° 45.44 -37° 7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11  Mer.pass 14:32 08:10 10:05 01:49  Mer.pass 14:30
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars Jupiter Saturn  Sep 08 Tue Venus Mars	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92 222°25.38 346°42.24 SHA 155°10.77 250°37.45	-69°4.75 -15° 45.44 -37° 7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11  Mer.pass 14:32 08:10 10:05 01:49  Mer.pass 14:30 08:09
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars Jupiter Saturn  Sep 08 Tue Venus Mars Jupiter	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92 222°25.38 346°42.24 SHA 155°10.77 250°37.45 222°13.04	-69°4.75 -15° 45.44 -37° 7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11  Mer.pass 14:32 08:10 10:05 01:49  Mer.pass 14:30 08:09 10:02
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars Jupiter Saturn  Sep 08 Tue Venus Mars Jupiter Saturn	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92 222°25.38 346°42.24 SHA 155°10.77 250°37.45 222°13.04 346°45.70	-69°4.75 -15° 45.44 -37° 7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11  Mer.pass 14:32 08:10 10:05 01:49  Mer.pass 14:30 08:09 10:02 01:44
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars Jupiter Saturn  Sep 08 Tue Venus Mars Jupiter Saturn  Sep 09 Wed	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92 222°25.38 346°42.24 SHA 155°10.77 250°37.45 222°13.04 346°45.70	-69°4.75 -15° 45.44 -37° 7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11  Mer.pass 14:32 08:10 10:05 01:49  Mer.pass 14:30 08:09 10:02 01:44  Mer.pass
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars Jupiter Saturn  Sep 08 Tue Venus Mars Jupiter Saturn  Sep 09 Wed Venus	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92 222°25.38 346°42.24 SHA 155°10.77 250°37.45 222°13.04 346°45.70 SHA 154°33.94	-69°4.75 -15° 45.44 -37° 7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11  Mer.pass 14:32 08:10 10:05 01:49  Mer.pass 14:30 08:09 10:02 01:44  Mer.pass 14:29
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars Jupiter Saturn  Sep 08 Tue Venus Mars Jupiter Saturn  Sep 09 Wed Venus Mars Jupiter Saturn	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92 222°25.38 346°42.24 SHA 155°10.77 250°37.45 222°13.04 346°45.70 SHA 154°33.94 249°57.12	-69°4.75 -15° 45.44 -37°7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11  Mer.pass 14:32 08:10 10:05 01:49  Mer.pass 14:30 08:09 10:02 01:44  Mer.pass
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars Jupiter Saturn  Sep 08 Tue Venus Mars Jupiter Saturn  Sep 09 Wed Venus Mars Jupiter Saturn	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92 222°25.38 346°42.24 SHA 155°10.77 250°37.45 222°13.04 346°45.70 SHA 154°33.94 249°57.12 222°0.76	-69°4.75 -15° 45.44 -37° 7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11  Mer.pass 14:32 08:10 10:05 01:49  Mer.pass 14:30 08:09 10:02 01:44  Mer.pass 14:29 08:08 09:58
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars Jupiter Saturn  Sep 08 Tue Venus Mars Jupiter Saturn  Sep 09 Wed Venus Mars Jupiter Saturn	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92 222°25.38 346°42.24 SHA 155°10.77 250°37.45 222°13.04 346°45.70 SHA 154°33.94 249°57.12	-69°4.75 -15° 45.44 -37°7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11  Mer.pass 14:32 08:10 10:05 01:49  Mer.pass 14:30 08:09 10:02 01:44  Mer.pass
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars Jupiter Saturn  Sep 08 Tue Venus Mars Jupiter Saturn  Sep 09 Wed Venus Mars Jupiter Saturn	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92 222°25.38 346°42.24 SHA 155°10.77 250°37.45 222°13.04 346°45.70 SHA 154°33.94 249°57.12 222°0.76	-69°4.75 -15° 45.44 -37° 7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11  Mer.pass 14:32 08:10 10:05 01:49  Mer.pass 14:30 08:09 10:02 01:44  Mer.pass 14:29 08:08 09:58
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars Jupiter Saturn  Sep 08 Tue Venus Mars Jupiter Saturn  Sep 09 Wed Venus Mars Jupiter Saturn	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92 222°25.38 346°42.24 SHA 155°10.77 250°37.45 222°13.04 346°45.70 SHA 154°33.94 249°57.12 222°0.76 346°49.23	-69°4.75 -15° 45.44 -37° 7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11  Mer.pass 14:32 08:10 10:05 01:49  Mer.pass 14:30 08:09 10:02 01:44  Mer.pass 14:29 08:08 09:58
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars Jupiter Saturn  Sep 08 Tue Venus Mars Jupiter Saturn  Sep 09 Wed Venus Mars Jupiter Saturn	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 53°3.09 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92 222°25.38 346°42.24 SHA 155°10.77 250°37.45 222°13.04 346°45.70 SHA 154°33.94 249°57.12 222°0.76 346°49.23	-69°4.75 -15° 45.44 -37° 7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11  Mer.pass 14:32 08:10 10:05 01:49  Mer.pass 14:30 08:09 10:02 01:44  Mer.pass 14:29 08:08 09:58 01:40
Atria Sabik Shaula Rasalhague Eltanin Kaus Aust. Vega Nunki Altair Peacock Deneb Enif Al Na'ir Fomalhaut Scheat Markab  Sep 07 Mon Venus Mars Jupiter Saturn  Sep 08 Tue Venus Mars Jupiter Saturn  Sep 09 Wed Venus Mars Jupiter Saturn	107°7.12 102°1.17 96°8.42 95°57.21 90°41.41 83°30.53 80°32.12 75°45.87 61°58.39 49°24.49 33°37.13 27°30.72 15°12.62 13°43.50 13°28.19 SHA 155°48.45 251°17.92 222°25.38 346°42.24 SHA 155°10.77 250°37.45 222°13.04 346°45.70 SHA 154°33.94 249°57.12 222°0.76 346°49.23 atal parallax Venus:	-69°4.75 -15° 45.44 -37°7.46 12° 32.61 51° 29.38 -34° 22.35 38° 48.75 -26° 15.79 8° 56.51 -56° 38.98 45° 22.76 10° 0.03 -46° 49.80 -29° 28.68 28° 13.82 15° 21.11  Mer.pass 14:32 08:10 10:05 01:49  Mer.pass 14:30 08:09 10:02 01:44  Mer.pass 14:30 08:09 10:02 01:44

 $29^{\circ}\,14.40$ 

h	Sun		Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°27.13	N06°8.29	233°56.14	4.9'	N25° 17.68	-8.0'	59.5'
1	195°27.34 210°27.56	7.36	248° 20.00 262° 43.93	4.9' 5.0'	25°9.73 25°1.61	-8.1'	59.5' 59.5'
2	210 27.50 225°27.77	6.42 • • 5.49	202 43.93 277°7.95	5.0 5.1'	25 1.01 24°53.33	-8.3' -8.4'	59.5' 59.5'
4	240°27.98	4.55	291°32.06	5.2'	24°44.89	-8.6'	59.5'
5	255°28.20	3.62	305°56.26	5.3'	24°36.28	-8.8'	59.5'
6	270°28.41 285°28.62	N06°2.68 1.74	320°20.54 334°44.91	5.4' 5.5'	N24°27.51 24°18.58	-8.9' -9.1'	59.5' 59.5'
7 8	300°28.83	1.74 06°0.81	344 44.91 349°9.37	5.6'	24 18.58 24°9.49	-9.1 -9.2'	59.5'
9	315°29.05	05° 59.87	3°33.93	5.6'	24°0.25	-9.4	59.5'
10	330°29.26	58.94	17° 58.57	5.7'	23°50.85	-9.6'	59.5'
11	345°29.47 0°29.69	58.00 N05°57.06	32°23.31 46°48.14	5.8' 5.9'	23°41.30 N23°31.60	-9.7'	59.4'
12 13	0 29.69 15°29.90	56.12	40 48.14 61°13.07	5.9 6.0'	23°21.75	-9.9' -10.0'	59.4' 59.4'
14	30°30.11	55.19	75°38.10	6.1'	23°11.75	-10.1	59.4'
15	45°30.33	• • 54.25	$90^{\circ}3.22$	6.2'	$23^{\circ}1.60$	-10.3'	59.4'
16	60°30.54	53.31	104°28.43	6.3'	22°51.31	-10.4	59.4'
17 18	75°30.76 90°30.97	52.37 N05°51.44	118° 53.75 133° 19.16	6.4' 6.5'	22°40.88 N22°30.30	-10.6' -10.7'	59.4' 59.4'
19	105°31.18	50.50	147° 44.67	6.6'	22° 19.59	-10.7 -10.9'	59.4'
20	120°31.40	49.56	162° 10.28	6.7'	22°8.73	-11.0'	59.4'
21	135°31.61	• • 48.62	176°36.00	6.8'	21°57.74	-11.1'	59.4'
22	150°31.83	47.68	191°1.81	6.9'	21°46.62	-11.3'	59.4'
23	165°32.04	46.74	205°27.72	7.0'	21°35.36	-11.4'	59.4'
	SD = 15.9'	d = -0.9'		SI	D = 16.2'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°32.25	N05°45.80	219°53.73	7.1'	N21°23.97	-11.5'	59.4'
1	195°32.47	44.87	234° 19.84	7.2'	21° 12.46	-11.6'	59.4'
2	210°32.68 225°32.90	43.93 •• 42.99	248° 46.05 263° 12.36	7.3' 7.4'	21°0.81 20°49.04	-11.8' -11.9'	59.4' 59.4'
3 4	240°33.11	42.99	203 12.30 277°38.77	7.4 7.5'	20° 49.04 20° 37.15	-11.9 -12.0'	59.4 59.4'
5	255°33.33	41.11	292°5.29	7.6'	20°25.14	-12.1'	59.3'
6	270°33.54	N05°40.17	$306^{\circ}31.90$	7.7'	N20° 13.00	-12.3'	59.3'
7	285°33.76	39.23	320°58.62	7.8'	20°0.75	-12.4'	59.3'
8 9	300°33.97 315°34.19	38.29 •• 37.35	335°25.44 349°52.36	7.9' 8.0'	19°48.38 19°35.89	-12.5' -12.6'	59.3' 59.3'
10	330°34.40	36.41	4° 19.38	8.1'	19 35.69 19°23.30	-12.0	59.3'
11	345°34.62	35.46	18° 46.49	8.2'	19° 10.59	-12.8'	59.3'
12	0°34.83	N05°34.52	33° 13.71	8.3'	N18° 57.77	-12.9'	59.3'
13	15°35.05 30°35.26	33.58	47°41.03 62°8.45	8.4'	18° 44.85 18° 31.82	-13.0'	59.3' 59.3'
14 15	30°35.26 45°35.48	32.64 •• 31.70	76°35.97	8.5' 8.6'	18° 31.82 18° 18.68	-13.1' -13.2'	59.3' 59.3'
16	60°35.69	30.76	91°3.58	8.7'	18°5.45	-13.3'	59.2'
17	75°35.91	29.82	$105^{\circ}31.30$	8.8'	$17^{\circ}52.11$	-13.4'	59.2'
18	90°36.12	N05°28.87	119°59.11	8.9'	N17°38.68	-13.5'	59.2'
19 20	105°36.34 120°36.55	27.93 26.99	134° 27.02 148° 55.03	9.0' 9.1'	17°25.15 17°11.53	-13.6'	59.2' 59.2'
21	135°36.77	26.05	163°23.13	9.2'	16°57.81	-13.8'	59.2'
22	150°36.99	25.10	$177^{\circ}51.33$	9.3'	$16^{\circ}44.00$	-13.9'	59.2'
23	165°37.20	24.16	192°19.62	9.4'	16°30.11	-14.0'	59.2'
	SD = 15.9'	d = -0.9'		SI	D = 16.2'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°37.42 195°37.63	N05°23.22	206°48.01	9.5'	N16°16.13 16°2.06	-14.1'	59.1'
1 2	195°37.63 210°37.85	22.28 21.33	221°16.49 235°45.07	9.6' 9.7'	16° 2.06 15° 47.91	-14.2' -14.2'	59.1' 59.1'
3	225°38.07	. 20.39	$250^{\circ}13.74$	9.8'	15°33.68	-14.3	59.1'
4	240°38.28	19.45	264° 42.50	9.9'	15° 19.36	-14.4'	59.1'
5 6	255°38.50 270°38.71	18.50 N05° 17.56	279°11.35 293°40.29	9.9' 10.0'	15°4.97 N14°50.51	-14.5' -14.5'	59.1' 59.1'
7	270°38.71 285°38.93	16.61	308° 9.32	10.0	14° 35.97	-14.5' -14.6'	59.1° 59.0'
8	300°39.15	15.67	322°38.44	10.2'	14°21.36	-14.7'	59.0'
9	315°39.36	• • 14.73	337°7.65	10.3'	14°6.67	-14.8'	59.0'
10	330°39.58	13.78	351°36.95	10.4'	13°51.92	-14.8'	59.0'
11 12	345°39.80 0°40.01	12.84 N05°11.89	6°6.33 20°35.80	10.5' 10.6'	13°37.10 N13°22.22	-14.9' -14.9'	59.0' 59.0'
13	15°40.23	10.95	35°5.35	10.6'	13°7.27	-14.9 -15.0'	59.0'
14	30°40.45	10.00	49°34.98	10.7'	12°52.26	-15.1'	58.9'
15	45°40.66	• • 9.06	64°4.70	10.8'	12°37.19	-15.1'	58.9'
16 17	60°40.88 75°41.10	8.11 7.17	78°34.50 93°4.38	10.9' 11.0'	12°22.07 12°6.88	-15.2' -15.2'	58.9' 58.9'
17	75°41.10 90°41.31	7.17 N05°6.22	93°4.38 107°34.33	11.0'	N11°51.64	-15.2' -15.3'	58.9'
19	105°41.53	5.27	122°4.37	11.1'	11°36.35	-15.3'	58.8'
20	120°41.75	4.33	136°34.49	11.2'	11°21.01	-15.4'	58.8'
21	135°41.97	• • 3.38	151°4.68	11.3'	11°5.61	-15.4'	58.8'
22 23	150°42.18 165°42.40	2.44 1.49	165°34.95 180°5.29	11.3' 11.4'	10°50.17 10°34.69	-15.5' -15.5'	58.8' 58.8'
23	SD = 15.9'	d = -0.9'			D = 16.1'	10.0	33.0

Naut.         Civil         Januar           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           62°         03:21         04:21         05:03         18:51         19:41         20:46           60°         03:31         04:21         05:07         18:46         19:33         20:32           60°         03:33         04:28         05:11         18:39         19:20         20:10           56°         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°         04:06         04:44         05:23         18:31         19:06         19:47           50°         04:12         04:52         05:25         18:29         19:02         19:42	Lat.	Twi	light	Sunrise	Sunset	Twi	light
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         18:29         19:02         19:42           45°         04:25         05:00         05:30         18:24         18:54         19:30           N 40°         04:34         05:07	Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
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°         04:43         05:07	N 72°	00:36	03:16	04:35	19:17	20:35	22:58
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         05:17	<b>N</b> 70°	01:48	03:36	04:44	19:09	20:16	22:00
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         19:47           50°         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°         04:58         05:24	68°	02:23	03:50	04:51	19:02	20:02	21:27
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         19:47           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           N 10°         05:05         05:29         05:50         18:05         18:26         18:51           0°         05:10         05:34	66°	02:47	04:02	04:58	18:56	19:50	21:04
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           50°         04:10         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	64°	03:06	04:12	05:03	18:51	19:41	20:46
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         05:17         05:34         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           5 10°         05:13         05:37		03:21	04:21	05:07	18:46	19:33	20:32
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         05:17         05:34         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	60°	03:33	04:28	05:11	18:43	19:26	20:20
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         19:07           20°         04:58         05:24         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	<b>N</b> 58°	03:43	04:34	05:15	18:39	19:20	20:10
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         05:29         05:50         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         05:44		03:52	04:39	05:18	18:36	19:15	20:02
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         05:41         18:14         18:38         19:07           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         05:43		04:00	04:44	05:21	18:34	19:10	19:54
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           O°         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	_	04:06	04:48	05:23	18:31	19:06	19:47
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         05:44         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         05:47		04:12	04:52	05:25	18:29	19:02	19:42
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         05:47         06:20         17:37         18:09         18:46           52°         05:09         05:48	45°	04:25	05:00	05:30	18:24	18:54	19:30
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         05:44         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		04:34	05:07	05:34	18:20	18:48	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		04:42	05:12	05:38	18:17	18:43	
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         17:49         18:13         18:40           40°         05:14         05:45         06:12         17:43         18:11         18:42           45°         05:13         05:46         06:12         17:43         18:11         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         18:51           56°         05:06         05:49					18:14		
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         18:49           56°         05:06         05:48         06:23         17:31         18:08         18:51           58°         05:03         05:49         06:28         17:29         18:08         18:53							
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         18:49           56°         05:07         05:48         06:23         17:31         18:08         18:51           58°         05:03         05:49         06:28         17:29         18:08         18:53							
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		05:10	05:34	05:54	18:01	18:22	18:46
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           \$ 50°         05:10         05:47         06:20         17:37         18:09         18:46           52°         05:09         05:48         06:21         17:35         18:09         18:49           56°         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		05:13	05:37	05:58		18:18	18:43
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           \$ 50°         05:10         05:47         06:20         17:37         18:09         18:46           52°         05:09         05:48         06:21         17:35         18:09         18:49           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		05:15	05:40	06:02	17:53	18:15	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         06:23         17:31         18:08         18:51           58°         05:03         05:49         06:28         17:29         18:08         18:53		05:15	05:43		17:49	18:13	
45°         05:13         05:46         06:16         17:40         18:10         18:44           \$ 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 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		l					
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		05:13	05:46	06:16	17:40	18:10	18:44
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		05:10					
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							
58° 05:03 05:49 06:28 17:29 18:08 18:53		l					
<b>S</b> 60°   05:01 05:49 06:31   17:26 18:08 18:56							
	<b>S</b> 60°	05:01	05:49	06:31	17:26	18:08	18:56

Lat.		Moonris	e		Moonset	
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°			00:02		20:42	19:25
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:09	06:14	06:16	11:33	13:25	15:12

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
Day	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	26-28	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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.)

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	349°2.78	143°0.80 \$15°39.13		210°51.33 N16°41.59	335°55.59 N02°42.93	
1	4°5.25	158°1.78 40.02		225°53.28 41.45	350°58.20 42.86	Alpheratz 357°32.99 29°14.41
2	19°7.71	173°2.77 40.92		240°55.24 41.30	6°0.82 42.79	Ankaa 353°5.37 -42°9.42
3	$34^{\circ}10.17$	188°3.76 · · 41.82	2 283°22.10 · · 44.53	255°57.19 · · 41.15	21°3.43 · · 42.72	Schedar 349°28.93 56°41.06
4	$49^{\circ}12.64$	203°4.76 42.73	298°22.89 44.35	270°59.15 41.01	36°6.05 42.65	Diphda 348°45.60 -17°50.18 Achernar 335°18.67 -57°5.77
5	$64^{\circ}15.10$	218°5.75 43.63	313°23.68 44.17	286° 1.11 40.86	51°8.66 42.58	Hamal 327°49.38 23°35.40
6	79° 17.57	233°6.75 \$15°44.50		301°3.06 N16°40.72	66°11.28 N02°42.51	Polaris 313°4.41 89°22.33
7	94° 20.03	248°7.74 45.39		316° 5.02 40.57	81°13.89 42.44	Acamar 315°10.49 -40°11.52
8	109°22.50	263°8.74 46.29		331°6.98 40.43	96°16.51 42.37	Menkar 314°4.52 4°11.83
9	124° 24.96	278°9.74 · · 47.18		346°8.94 · · 40.28	111°19.12 · · 42.30	Mirfak 308°26.04 49°57.25
10	139° 27.42	293°10.74 48.07		1°10.89 40.14	126°21.74 42.23	Aldebaran 290°37.97 16°33.84
11 12	154° 29.89 169° 32.35	308°11.75 48.96 323°12.75 \$15°49.89		16°12.85 39.99 31°14.81 N16°39.85	141°24.35 42.16 156°26.97 N02°42.09	Rigel 281°2.54 -8°10.04
13	184° 34.82	338°13.76 50.73		46°16.77 39.70	171°29.58 42.02	Capella 280°19.84 46°1.34
14	199° 37.28	353°14.77 51.62		61°18.72 39.56	186°32.20 41.95	Bellatrix 278°21.41 6°22.55
15	214°39.74	8°15.78 · · 52.5		76°20.68 · · 39.41	201°34.81 · · 41.87	Elnath 278°0.13 28°37.76
16	229°42.21	23°16.79 53.39		91°22.64 39.27	216°37.43 41.80	Alnilam 275°36.35 -1°10.93
17	244°44.67	38°17.80 54.28	3 133°33.23 41.98	106°24.60 39.12	231°40.05 41.73	Betelgeuse 270°50.64 7°24.82
18	259°47.14	53°18.82 \$15°55.16	5 148°34.03 N22°41.80	121°26.55 N16°38.98	246°42.66 N02°41.66	Canopus 263°51.94 -52°42.22 Sirius 258°25.14 -16°44.94
19	274°49.60	68° 19.84 56.09	5 163°34.83 41.61	136°28.51 38.83	261°45.28 41.59	Adhara 255°4.94 -29°0.23
20	289°52.06	83°20.86 56.93		151°30.47 38.68	276°47.90 41.52	Procyon 244°49.57 5°9.48
21	304° 54.53	98°21.88 · · 57.83		166°32.43 · · 38.54	291°50.51 · · 41.45	Pollux 243°15.83 27°57.67
22	319°56.99	113°22.90 58.69		181°34.39 38.39	306°53.13 41.38	Avior 234°14.65 -59°35.43
23	334° 59.46	128°23.92 59.5	7 223°38.02 40.87	196°36.35 38.25	321°55.74 41.31	Suhail 222°45.67 -43°32.23
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	Miaplacidus 221°38.81 -69°49.40
	-					Alphard 217°46.68 -8°46.34
E.J	CHA	CUA D-	CHA D	CUA D	CHA D	Regulus 207°33.27 11°50.27
Fri 0	<b>GHA</b> 350°1.92	<b>GHA Dec</b> 143°24.95 <b>S</b> 16°0.49	GHA Dec 5 238°38.82 N22°40.69	<b>GHA Dec</b> 211°38.31 N16°38.10	<b>GHA Dec</b> 336°58.36 N02°41.24	Dubhe 193°39.96 61°36.42
1	5°4.38	158° 25.98 1.33		211 38.31 N16 38.10 226°40.26 37.96	352°0.98 41.17	Denebola 182°23.85 14°25.45
2	20°6.85	173° 27.01 2.2		241°42.22 37.81	7°3.59 41.10	Gienah 175°42.47 -17°41.37
3	35°9.31	188°28.04 · · 3.08		256°44.18 · · 37.67	22°6.21 · · 41.02	Acrux 172°59.22 -63°14.91
4	50° 11.78	203°29.07 3.96		271°46.14 37.52	37°8.83 40.95	Gacrux 171°50.65 -57°15.84
5	65° 14.24	218° 30.10 4.84		286°48.10 37.38	52°11.45 40.88	Alioth 166°12.24 55°49.01 Spica 158°21.10 -11°18.00
6	$80^{\circ}16.70$	233°31.14 <b>S</b> 16°5.73	328°43.62 N22°39.57	301°50.06 N16°37.23	67°14.06 N02°40.81	Spica 158°21.10 -11°18.00 Alkaid 152°51.27 49°10.96
7	$95^{\circ}19.17$	248°32.18 6.58	3 343°44.42 39.38	316°52.02 37.09	82°16.68 40.74	Hadar 148°34.49 -60°30.27
8	$110^{\circ}21.63$	263°33.22 7.46		331°53.98 36.94	97°19.30 40.67	Menkent 147°56.26 -36°30.15
9	125°24.10	278°34.26 · · 8.33		346°55.94 · · 36.80	112°21.91 · · 40.60	Arcturus 145°46.87 19°2.74
10	140°26.56	293°35.30 9.20		1°57.90 36.65	127°24.53 40.53	Rigil Kent. 139°38.79 -60°56.92
11 12	155° 29.02 170° 31.49	308°36.35 10.07 323°37.39 \$16°10.94		16°59.86 36.51 32°1.82 N16°36.36	142°27.15 40.46 157°29.77 N02°40.38	Kochab 137°20.47 74°2.92
13	185° 33.95	338°38.44 11.83		47° 3.78 36.22	172°32.39 40.31	Zuben'ubi 136°54.66 -16°9.15
14	200°36.42	353°39.49 12.68	_	62°5.74 36.07	187°35.00 40.24	Alphecca 126°2.70 26°37.67
15	215°38.88	8° 40.54 · · 13.54		77°7.70 · · 35.93	202°37.62 · · 40.17	Antares 112°14.19 -26°29.51
16	230°41.34	23°41.60 14.43		92° 9.66 35.78	217°40.24 40.10	Atria 107°7.17 -69°4.75 Sabik 102°1.18 -15°45.44
17	$245^{\circ}43.81$	38°42.65 15.28	3 133°52.44 37.49	107°11.62 35.64	232°42.86 40.03	Shaula 96°8.43 -37°7.46
18	260°46.27	53°43.71 S16°16.14		122°13.58 N16°35.49	247°45.48 N02°39.96	Rasalhague 95°57.22 12°32.60
19	275° 48.74	68° 44.77 17.00		137°15.54 35.35	262°48.09 39.88	Eltanin 90°41.43 51°29.38
20	290°51.20	83°45.83 17.8°		152°17.50 35.20	277°50.71 39.81	Kaus Aust. 83°30.55 -34°22.35
21 22	305°53.66 320°56.13	98°46.89 · · 18.73 113°47.95 19.59		167°19.46 · · 35.06 182°21.42 34.91	292°53.33 · · 39.74 307°55.95 39.67	Vega 80°32.14 38°48.76
23	335° 58.59	113 47.95 19.55 128°49.02 20.45	_	197°23.39 34.77	322°58.57 39.60	Nunki 75°45.88 -26°15.79
						Altair 61°58.40 8°56.51
Mer.	pass. 00:40	$\nu 1.0' \ d0.9' \ \text{m-4.73}$	$ u 0.8' \ d$ -0.2' m1.21	$\nu 2.0' \ d$ -0.1' m-1.82	$\nu 2.6' \ d$ -0.1' m0.43	Peacock 53°3.10 -56°38.99
						Deneb 49°24.51 45°22.77 Enif 33°37.14 10°0.03
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°37.14 10°0.03 Al Na'ir 27°30.72 -46°49.81
0	351°1.06	143°50.09 \$16°21.3		212°25.35 N16°34.62	338°1.19 N02°39.53	Fomalhaut 15°12.62 -29°28.68
1	6°3.52	158°51.16 22.17		227°27.31 34.48	353°3.81 39.45	Scheat 13°43.50 28°13.83
2	21°5.98	173°52.23 23.03		242°29.27 34.33	8°6.43 39.38	Markab 13°28.19 15°21.12
3	36°8.45	188°53.30 · · 23.88		257°31.23 · · 34.19	23°9.04 · · 39.31	
4	51° 10.91	203°54.38 24.74		272°33.19 34.04	38°11.66 39.24	Sep 10 Thu SHA Mer.pass
5	66° 13.38	218°55.45 25.60		287°35.15 33.90	53°14.28 39.17	Venus 153°58.01 14:27 Mars 249°16.94 08:06
6 7	81° 15.84 96° 18.30	233°56.53 \$16°26.49 248°57.61 27.30		302°37.12 N16°33.75 317°39.08 33.61	68°16.90 N02°39.10 83°19.52 39.02	Mars 249°16.94 08:06 Jupiter 221°48.54 09:55
	96 18.30 111°20.77	248°57.61 27.30 263°58.69 28.10			98°22.14 38.95	Saturn 346°52.81 01:36
8 9	111 20.77 126°23.23	278°59.78 · · 29.0		332°41.04 33.46 347°43.00 · · 33.32	113°24.76 · · 38.88	
10	141°25.70	294°0.86 29.86		2°44.97 33.17	128°27.38 38.81	Sep 11 Fri SHA Mer.pass
11	156° 28.16	309°1.95 30.7		17°46.93 33.03	143°30.00 38.74	Venus 153°23.03 14:25
12	171°30.62	324°3.04 \$16°31.56		32°48.89 N16°32.88	158°32.62 N02°38.66	Mars 248°36.90 08:05
13	186° 33.09	339°4.13 32.43	74°8.55 33.65	47°50.85 32.74	173°35.24 38.59	Jupiter 221°36.39 09:52 Saturn 346°56.44 01:32
14	201°35.55	354°5.23 33.20		62°52.82 32.60	188°37.86 38.52	
15	216°38.02	9°6.32 · · 34.10		77°54.78 · · 32.45	203°40.48 · · 38.45	Sep 12 Sat SHA Mer.pass
16	231° 40.48	24°7.42 34.99		92°56.74 32.31	218°43.10 38.38	Venus 152°49.03 14:24
17	246° 42.94	39°8.52 35.80		107°58.71 32.16	233°45.72 38.30	Mars 247°57.01 08:04
18 19	261° 45.41 276° 47.87	54°9.62 \$16°36.64 69°10.72 37.48		123°0.67 N16°32.02 138°2.63 31.87	248°48.34 N02°38.23 263°50.96 38.16	Jupiter 221°24.29 09:49
20	276 47.87 291°50.34	69°10.72 37.48 84°11.82 38.33		138°2.63 31.87 153°4.60 31.73	263°50.96 38.16 278°53.58 38.09	Saturn 347°0.13 01:28
21	306° 52.80	99°12.93 · · 39.1		168° 6.56 · · 31.58	293°56.20 · · 38.01	Horizontal parallax
22	321°55.26	114°14.04 40.03		183° 8.52 31.44	308°58.82 37.94	Venus: 0.3
23	336° 57.73	129°15.15 40.8		198°10.49 31.29	324°1.45 37.87	Mars: 0.1
Mer	pass. 00:36	ν1.1′ d0.9′ m-4.74		ν2.0' d-0.1' m-1.82	ν2.6' d-0.1' m0.43	
IVICI.	Pa33. 00.30	VI.I 00.9 III-4.74				

h	Su	n			Moon	oon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP	
0	180°42.62	N05°0.54	194°35.70	11.5'	N10°19.16	-15.6'	58.8'	
1	195°42.84	04°59.60	209°6.19	11.6'	10°3.58	-15.6'	58.7'	
2	210°43.05	58.65	223°36.75	11.6'	09°47.97	-15.7'	58.7'	
3	225°43.27	• • 57.70	238°7.38	11.7'	09°32.31	-15.7'	58.7'	
4	240°43.49	56.75	252°38.08	11.8'	09°16.62	-15.7'	58.7'	
5	255°43.71	55.81	267°8.85	11.8'	09°0.89	-15.8'	58.7'	
6	270°43.92	N04°54.86	281°39.68	11.9'	N08°45.13	-15.8'	58.6'	
7	285°44.14	53.91	296°10.58	12.0'	08°29.33	-15.8'	58.6'	
8	300°44.36	52.96	310°41.55	12.0'	08°13.51	-15.9'	58.6'	
9	315°44.58	• • 52.02	325°12.57	12.1'	07°57.65	-15.9'	58.6'	
10	330°44.79	51.07	339°43.66	12.2'	07°41.76	-15.9'	58.6'	
11	345°45.01	50.12	354°14.82	12.2'	07°25.85	-15.9'	58.5'	
12	0°45.23	N04°49.17	8°46.03	12.3'	N07°9.92	-16.0'	58.5'	
13	15°45.45 30°45.67	48.22 47.27	23°17.30 37°48.63	12.3' 12.4'	06°53.96 06°37.98	-16.0'	58.5' 58.5'	
14 15	45°45.89	• • 46.33	52°20.02	12.4	06°21.97	-16.0' -16.0'	58.4'	
16	60°46.10	45.38	66°51.46	12.5'	06°5.95	-16.0'	58.4'	
17	75°46.32	44.43	81°22.96	12.6'	05°49.92	-16.1	58.4	
18	90°46.54	N04°43.48	95°54.51	12.6'	N05°33.86	-16.1	58.4	
19	105°46.76	42.53	110°26.11	12.7'	05°17.80	-16.1	58.3'	
20	120°46.98	41.58	124°57.76	12.7	05°1.72	-16.1	58.3	
21	135°47.20	• • 40.63	139°29.47	12.8'	04°45.63	-16.1'	58.3'	
22	150°47.41	39.68	154°1.22	12.8'	04°29.53	-16.1	58.3'	
23	165°47.63	38.73	168°33.02	12.8'	04°13.42	-16.1'	58.3'	
	SD = 15.9'	d = -0.9'			D = 16.0'			
	שט = 15.9′	$a = -0.9^{\circ}$		51	D = 10.0			
Fri	GHA	Dec	GHA	ν	Dec	d	HP	
0	180°47.85	N04°37.78	183°4.87	12.9'	N03°57.30	-16.1'	58.2'	
1	195°48.07	36.83	197°36.76	12.9'	$03^{\circ}41.18$	-16.1'	58.2'	
2	210°48.29	35.88	212°8.69	13.0'	03°25.06	-16.1'	58.2'	
3	225°48.51	• • 34.93	226°40.67	13.0'	03°8.93	-16.1'	58.2'	
4	240°48.73	33.98	241°12.69	13.1'	02°52.81	-16.1'	58.1'	
5	255°48.95	33.03	255°44.75	13.1'	02°36.68	-16.1'	58.1'	
6	270°49.17	N04°32.08	270°16.85	13.1'	N02°20.55	-16.1'	58.1'	
7	285°49.38	31.13	284°48.99	13.2'	02°4.43	-16.1'	58.1'	
8	300°49.60	30.17	299°21.17	13.2'	01°48.32	-16.1'	58.0'	
9	315°49.82	• • 29.22	313°53.38	13.2'	01°32.21	-16.1'	58.0'	
10	330°50.04 345°50.26	28.27	328°25.63 342°57.91	13.3'	01°16.10 01°0.01	-16.1'	58.0'	
11	0°50.48	27.32 N04°26.37	342 57.91 357°30.22	13.3' 13.3'	N00°43.93	-16.1'	57.9' 57.9'	
12 13	15°50.70	25.42	12°2.56	13.4	00°27.86	-16.1' -16.1'	57.9'	
14	30°50.92	24.46	26°34.94	13.4	N00°11.80	-16.1 -16.0'	57.9'	
15	45°51.14	• • 23.51	41°7.34	13.4	S00°4.25	16.0'	57.8'	
16	60°51.36	22.56	55°39.77	13.5'	00°20.28	16.0'	57.8'	
17	75°51.58	21.61	70°12.23	13.5'	00°36.29	16.0'	57.8'	
18	90°51.80	N04°20.66	84°44.71	13.5'	S00°52.28	16.0'	57.8'	
19	105°52.02	19.70	99°17.22	13.5'	01°8.26	16.0'	57.7'	
20	120°52.24	18.75	113°49.75	13.6'	$01^{\circ}24.21$	15.9'	57.7'	
21	135°52.46	• • 17.80	128°22.31	13.6'	01°40.14	15.9'	57.7'	
22	150°52.68	16.84	142°54.88	13.6'	01°56.05	15.9'	57.7'	
23	165°52.90	15.89	157°27.48	13.6'	02°11.94	15.9'	57.6'	
	SD = 15.9'	d = -1.0'		SI	D = 15.9'			
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	180°53.12	N04°14.94	172°0.09	13.6'	S02°27.79	15.8'	57.6'	
1	195°53.34	13.98	186°32.72	13.6'	02°43.62	15.8'	57.6'	
2	210°53.56 225°53.78	13.03	201°5.37	13.7'	02°59.43 03°15.20	15.8'	57.5'	
3 4	225°53.78 240°54.00	· · 12.08 11.12	215°38.04 230°10.72	13.7' 13.7'	03°15.20 03°30.94	15.7' 15.7'	57.5' 57.5'	
4 5	240°54.00 255°54.22	11.12	230° 10.72 244° 43.41	13.7'	03°46.65	15.7' 15.7'	57.5° 57.5'	
6	255 54.22 270°54.44	N04°9.22	244 43.41 259°16.11	13.7	504°2.33	15.6'	57.5 57.4'	
7	285°54.66	8.26	273°48.83	13.7'	04° 17.97	15.6'	57.4'	
8	300°54.88	7.31	288°21.56	13.7'	04°17.57	15.6'	57.4	
9	315°55.10	. 6.35	302°54.29	13.7'	04°49.15	15.5'	57.3'	
10	330°55.32	5.40	317°27.03	13.8'	05°4.68	15.5'	57.3'	
11	345°55.54	4.44	331°59.79	13.8'	$05^{\circ}20.18$	15.5'	57.3'	
12	0°55.76	N04°3.49	346°32.54	13.8'	S05°35.63	15.4'	57.3'	
13	15°55.98	2.53	1°5.30	13.8'	$05^{\circ}51.04$	15.4'	57.2'	
14	30°56.20	1.58	15°38.07	13.8'	06°6.42	15.3'	57.2'	
15	45°56.42	04°0.62	30°10.84	13.8'	06°21.74	15.3'	57.2'	
16	60°56.64	03°59.67	44°43.61	13.8'	06°37.02	15.2'	57.1'	
17	75°56.86	58.71	59°16.38	13.8'	06°52.26	15.2'	57.1'	
18	90°57.08	N03°57.76	73°49.16	13.8'	\$07°7.45	15.1'	57.1'	
19	105°57.30 120°57.52	56.80	88°21.93	13.8'	07°22.59	15.1'	57.1'	
20 21	120°57.52 135°57.74	55.85 •• 54.89	102°54.70 117°27.46	13.8' 13.8'	07°37.68 07°52.73	15.0' 15.0'	57.0' 57.0'	
21	135°57.74 150°57.96	53.93	117°27.46 132°0.22	13.8'	07°52.73 08°7.72	15.0° 14.9'	57.0° 57.0'	
23	165°58.19	53.93 52.98	132 0.22 146°32.98	13.8'	08°22.66	14.9'	56.9'	
23						17.3	50.5	
	SD = 15.9'	d = -1.0'		SI	D = 15.7'			

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	04:52	05:40	06:22	17:33	18:14	19:03

Lat.		Moonris	е		Moonset	
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°	03:06	05:29	07:44	18:43	18:08	17:33
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:16	06:16	06:16	16:52	18:28	20:01

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	29-1
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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	Ven	nus	М	ars	Jup	oiter	Sat	urn	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	
0	352°0.19		S16°41.69	239°17.46	N22°31.49	213°12.45	N16°31.15	339°4.07	N02°37.80	
1	7°2.66	159° 17.37	42.53	254°18.28	31.29	228°14.42	31.00	354°6.69	37.73	
2	22°5.12	174° 18.49	43.36	269°19.09	31.09	243°16.38	30.86	9°9.31	37.65	
3 4	37°7.58 52°10.05	189°19.61 204°20.73	44.20 45.04	284°19.90 299°20.71	· · 30.90 30.70	258°18.34 273°20.31	· · 30.71 30.57	24°11.93 39°14.55	· · 37.58 37.51	
5	67° 12.51	219° 21.85	45.04 45.87	314°21.53	30.70	273 20.31 288°22.27	30.43	59 14.55 54°17.17	37.51	
6	82° 14.98	234° 22.97	\$16°46.70	329°22.34	N22°30.30	303°24.24	N16°30.28	69°19.79	N02°37.36	
7	97° 17.44	249°24.09	47.54	344°23.15	30.10	318°26.20	30.14	84°22.41	37.29	
8	112° 19.91	264°25.22	48.37	359°23.97	29.90	333°28.17	29.99	99°25.04	37.22	
9	$127^{\circ}22.37$	279°26.35	• • 49.20	14°24.78	• • 29.70	348°30.13	• • 29.85	114°27.66	• • 37.15	
10	$142^{\circ}24.83$	294°27.48	50.03	29°25.59	29.50	3°32.10	29.70	129°30.28	37.07	
11	157°27.30	309°28.61	50.86	44°26.41	29.30	18°34.06	29.56	144°32.90	37.00	
12	172°29.76	324°29.75	S16°51.69	59°27.22	N22°29.10	33°36.03	N16°29.41	159°35.52	N02°36.93	
13	187°32.23	339° 30.89	52.52	74°28.04	28.90	48°37.99	29.27	174°38.15	36.86	
14 15	202°34.69 217°37.15	354°32.02 9°33.16	53.34 •• 54.17	89°28.85 104°29.67	28.70 •• 28.50	63°39.96 78°41.92	29.13 •• 28.98	189°40.77 204°43.39	36.78 •• 36.71	
16	232°39.62	24°34.31	54.99	119°30.48	28.30	93°43.89	28.84	219°46.01	36.64	
17	247°42.08	39° 35.45	55.82	134°31.30	28.10	108°45.86	28.69	234°48.63	36.56	
18	262°44.55	54°36.60	S16°56.64	149°32.11	N22°27.90	123°47.82	N16°28.55	249°51.26	N02°36.49	
19	277°47.01	69°37.75	57.46	164°32.93	27.70	138°49.79	28.40	264°53.88	36.42	
20	292°49.47	84°38.90	58.28	179°33.75	27.50	153°51.75	28.26	279°56.50	36.35	
21	307°51.94	99°40.05	• • 59.10	194°34.56	• • 27.29	168°53.72	• • 28.11	294°59.13	• • 36.27	
22	322°54.40	114°41.20	$16^{\circ}59.92$	209°35.38	27.09	183°55.69	27.97	$310^{\circ}1.75$	36.20	
23	337°56.87	129°42.36	17°0.74	224°36.20	26.89	198°57.65	27.83	325°4.37	36.13	
Mer.	pass. 00:32	$\nu 1.1' \ d0.8$	3′ m-4.75	$\nu$ 0.8′ d-0	).2′ m1.20	$\nu$ 2.0′ d-0	.1′ m-1.83	$\nu$ 2.6′ d-0	.1′ m0.42	N
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	
0	352°59.33	144°43.52	S17°1.56	239°37.02	N22°26.68	213°59.62	$N16^{\circ}27.68$	340°6.99	N02°36.05	
1	8°1.79	159°44.68	2.38	254°37.84	26.48	$229^{\circ}1.59$	27.54	$355^{\circ}9.62$	35.98	
2	23°4.26	174°45.84	3.19	269°38.65	26.28	244° 3.55	27.39	10°12.24	35.91	
3	38°6.72	189°47.00	• • 4.01	284°39.47	• • 26.07	259° 5.52	• • 27.25	25°14.86	• • 35.84	
4	53°9.19	204°48.17	4.82	299°40.29	25.87	274°7.49	27.10	40°17.49	35.76	
5	68° 11.65	219°49.34	5.64	314°41.11	25.67	289° 9.46	26.96	55°20.11	35.69	
6	83° 14.11	234°50.51	S17°6.45	329°41.93	N22°25.46	304°11.42	N16°26.82	70°22.73	N02°35.62	
7	98° 16.58	249°51.68	7.26	344°42.75	25.26	319°13.39	26.67	85°25.36	35.54	
8	113° 19.04	264° 52.85	8.07	359°43.57	25.05	334°15.36	26.53	100°27.98	35.47	
9	128°21.51	279°54.03	• • 8.88	14°44.39	• • 24.85	349°17.33	• • 26.38	115°30.60	• • 35.40	
10 11	143° 23.97 158° 26.43	294°55.21 309°56.39	9.69 10.50	29°45.21 44°46.03	24.64 24.44	4°19.29 19°21.26	26.24 26.09	130°33.23 145°35.85	35.32 35.25	
12	173° 28.90	324° 57.57	S17°11.30	59°46.85	N22°24.23	34°23.23	N16°25.95	160°38.48	N02°35.18	
13	188°31.36	339° 58.75	12.11	74°47.67	24.03	49°25.20	25.81	175°41.10	35.10	
14	203°33.83	354°59.94	12.11	89°48.49	23.82	64°27.17	25.66	190°43.72	35.03	
15	218° 36.29	10°1.13	. 13.72	104°49.32	23.61	79°29.13	25.52	205°46.35	34.96	
16	233°38.75	25°2.32	14.52	119°50.14	23.41	94°31.10	25.37	220°48.97	34.88	
17	248°41.22	40°3.51	15.32	134°50.96	23.20	109°33.07	25.23	235°51.60	34.81	
18	263°43.68	55°4.70	S17°16.12	149°51.78	N22°22.99	124°35.04	N16°25.09	250°54.22	N02°34.74	
19	$278^{\circ}46.15$	70°5.90	16.92	164°52.61	22.78	139°37.01	24.94	265°56.85	34.66	.   '
20	293°48.61	85°7.10	17.72	179°53.43	22.58	154°38.98	24.80	280°59.47	34.59	
21	308°51.08	100°8.30	• • 18.52	194°54.25	• • 22.37	169°40.95	• • 24.65	296°2.09	• • 34.52	
22	323°53.54	115°9.50	19.32	209°55.08	22.16	184°42.92	24.51	311°4.72	34.44	
23	338°56.00	130° 10.71	20.12	224°55.90	21.95	199°44.89	24.37	326°7.34	34.37	
Mer.p	bass. 00:28	$\nu 1.2' \ d0.8$	3′ m-4.76	$\nu$ 0.8′ d-0	).2′ m1.20	$\nu 2.0' \ d-0$	.1′ m-1.83	$\nu 2.6' d-0$	0.1′ m0.42	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	
0	353°58.47		\$17°20.91	239°56.72	N22°21.74	214°46.86	N16°24.22	341°9.97	N02°34.30	
1	9°0.93 24°3.40	160°13.12 175°14.33	21.71	254°57.55 269°58.37	21.54	229°48.82	24.08	356°12.59 11°15.22	34.22	
2 3	24°3.40 39°5.86	175°14.33 190°15.54	22.50 · · 23.29	269°58.37 284°59.20	21.33 · · 21.12	244°50.79 259°52.76	23.93 •• 23.79	26°17.84	34.15 •• 34.08	
3 4	59° 5.60 54° 8.32	205° 16.76	24.08	300° 0.02	20.91	274°54.73	23.65	41°20.47	34.00	s
5	69° 10.79	220° 17.98	24.87	315° 0.85	20.70	289°56.70	23.50	56°23.09	33.93	
6	84° 13.25	235° 19.20	S17°25.66	330°1.68	N22°20.49	304°58.67	N16°23.36	71°25.72	N02°33.85	
7	99° 15.72	250° 20.42	26.45	345°2.50	20.28	320° 0.64	23.21	86°28.35	33.78	
8	114° 18.18	265°21.64	27.24	0°3.33	20.07	335°2.62	23.07	101°30.97	33.71	
9	129°20.64	280°22.86	• • 28.03	15°4.15	• • 19.86	350°4.59	• • 22.93	116°33.60	• • 33.63	
10	144°23.11	295°24.09	28.81	30°4.98	19.65	5°6.56	22.78	131°36.22	33.56	Se
11	159° 25.57	310°25.32	29.60	45°5.81	19.44	20°8.53	22.64	146°38.85	33.49	
12	174°28.04	325°26.55	S17°30.38	60°6.64	N22°19.22	35°10.50	N16°22.50	161°41.47	N02°33.41	
13	189°30.50	340°27.79	31.17	75°7.46	19.01	50°12.47	22.35	176°44.10	33.34	
14	204°32.96	355° 29.02	31.95	90°8.29	18.80	65°14.44	22.21	191°46.73	33.26	
15 16	219°35.43	10°30.26	• • 32.73	105°9.12	18.59	80°16.41	• • 22.06	206°49.35	33.19	s
16	234° 37.89	25°31.50	33.51	120° 9.95	18.38	95°18.38	21.92	221°51.98	33.12	
17	249° 40.36 264° 42.82	40°32.74	34.29 \$17°35.07	135°10.78	18.16 N22°17.05	110°20.35	21.78 N16° 21.63	236°54.60 251°57.23	33.04 N02°32.07	
18 19	264° 42.82 279° 45.29	55°33.99 70°35.23	\$17°35.07 35.84	150°11.61 165°12.44	N22°17.95 17.74	125°22.33 140°24.30	N16°21.63 21.49	251°57.23 266°59.86	N02°32.97 32.89	
20	279 45.29 294°47.75	85° 36.48	36.62	180°13.27	17.74	140 24.30 155°26.27	21.49	200 59.00 282°2.48	32.82	느
21	309°50.21	100°37.73	• • 37.40	195°14.10	17.31	170°28.24	21.20	202 2.40 297°5.11	• • 32.75	
22	324°52.68	115°38.99	38.17	210°14.93	17.10	185°30.21	21.06	312°7.74	32.67	
23	339°55.14	130°40.24	38.94	225°15.76	16.89	200°32.19	20.92	327°10.36	32.60	L
	pass. 00:24	$\nu 1.2' \ d0.8$			).2′ m1.19		.1′ m-1.83		0.1' m0.42	

	Stars	
	SHA	Dec
Alpheratz	357°32.98	29° 14.42
Ankaa	353°5.36	-42°9.43
Schedar Diphda	349°28.92 348°45.59	56°41.07 -17°50.18
Achernar	335°18.66	-57°5.78
Hamal	$327^{\circ}49.37$	$23^{\circ}35.41$
Polaris	313°3.04 315°10.47	89°22.33 -40°11.52
Acamar Menkar	315 10.47 314°4.51	4° 11.83
Mirfak	308°26.02	49°57.26
Aldebaran	290°37.95	16°33.84
Rigel Capella	281°2.52 280°19.82	-8° 10.04 46° 1.34
Bellatrix	278°21.39	6°22.55
Elnath	278°0.11	$28^{\circ}37.76$
Alnilam	275°36.34	-1°10.93
Betelgeuse Canopus	270°50.62 263°51.92	7°24.82 -52°42.22
Sirius	258°25.12	-16°44.94
Adhara	$255^{\circ}4.92$	-29°0.22
Procyon	244°49.55	5°9.48
Pollux Avior	243°15.82 234°14.62	27°57.67 -59°35.42
Suhail	222°45.66	-43°32.21
Miaplacidus	221°38.79	-69°49.39
Alphard	217°46.67	-8°46.34 11°50.26
Regulus Dubhe	207°33.27 193°39.96	61°36.40
Denebola	182°23.85	14° 25.45
Gienah	175°42.48	-17°41.36
Acrux	172°59.23 171°50.66	-63°14.90 -57°15.82
Gacrux Alioth	166° 12.25	55°49.00
Spica	$158^{\circ}21.11$	-11° 18.00
Alkaid	152°51.29	49° 10.95
Hadar Menkent	148°34.52 147°56.27	-60°30.25 -36°30.14
Arcturus	145°46.88	19°2.73
Rigil Kent.	139°38.82	-60°56.91
Kochab	137°20.52 136°54.68	74°2.91 -16°9.15
Zuben'ubi Alphecca	130 54.06 126°2.72	-10 9.15 26°37.67
Antares	$112^{\circ}14.21$	$-26^{\circ}29.50$
Atria	107°7.21 102°1.20	-69°4.75 -15°45.44
Sabik Shaula	96°8.46	-15 45.44 -37°7.46
Rasalhague	95°57.24	$12^{\circ}32.61$
Eltanin	90°41.46	51°29.39
Kaus Aust. Vega	83°30.57 80°32.16	-34°22.35 38°48.76
Nunki	75°45.90	-26° 15.79
Altair	61°58.41	$8^{\circ}56.51$
Peacock	53°3.13	-56°39.00
Deneb Enif	49°24.52 33°37.14	45°22.78 10°0.04
Al Na'ir	27°30.73	-46°49.83
Fomalhaut	15°12.62	-29°28.69
Scheat	13°43.50 13°28.19	28° 13.84 15° 21.12
Markab		15 21.12
Sep 13 Sun	SHA 152°16.07	Mer.pass
Venus Mars	152°16.07 247°17.27	14:22 08:02
Jupiter	221°12.26	09:46
Saturn	347°3.87	01:23
Sep 14 Mon	SHA	Mer.pass
Venus	151°44.19	14:20
Mars Jupiter	246°37.69 221°0.29	08:01 09:43
Saturn	347°7.66	01:19
Sep 15 Tue	SHA	Mer.pass
Venus	151°13.44	14:18
Mars	$245^{\circ}58.26$	08:00
Jupiter Saturn	220°48.39	09:40
	347°11.50	01:15
Horizor	ntal parallax	0.3
	Venus: Mars:	0.3 0.1
	********	

CHA	h	Su	n	Moon				
195°88 83	Sun	GHA	Dec	GHA	ν	Dec	d	HP
2						• • • • • • • • • • • • • • • • • • • •		
225°5907								
240°59.29								
The color of the	5							
8   301°0.18   44.37   277°27.43   13.7"   10°34.58   14.4"   56.7"     9   316°0.40   43.41   290°2.00   13.6"   10°48.94   14.3"   56.6"     10   331°0.62   42.45   306°32.73   13.6"   11°3.24   14.2"   56.6"     11   346°0.84   44.150   321°5.56   13.6"   11°1.747   14.2"   56.6"     12   1°1.06   N03°40.54   335°3.79   71.36"   511°31.63   14.1"   50.6"     13   16°1.28   39.58   350°10.56   13.6"   11°45.73   14.0"   50.5"     14   31°1.50   38.62   4°4.31.4   13.6"   11°45.73   14.0"   50.5"     15   46°1.72   37.66   19°15.70   13.5"   12°13.73   13.9"   50.5"     16   61°1.95   36.71   33.48.23   13.5"   12°21.63   13.8"   56.4"     17   76°2.17   35.75   48°20.75   13.5"   12°41.44   13.8"   56.4"     18   19°2.39   N03°34.79   62°53.24   13.5"   512°53.20   13.7"   54.4"     19   106°2.61   33.83   77°25.72   13.5"   13°8.88   13.6"   56.4"     21   136°3.05   31.91   106°30.00   13.4"   13°40.48   13.4"   56.3"     22   151°3.28   30.96   121°3.00   13.4"   13°49.48   13.4"   56.3"     22   151°3.28   30.96   121°3.00   13.4"   13°49.48   13.4"   56.3"     23   166°3.50   30.00   135°35.38   13.4"   14°2.86   13.3"   56.2"      Mon								
10   331°0.62   42.45   306°32.73   13.6°   10°48.94   14.3°   56.6°     11   336°0.84   41.50   321°5.36   13.6°   11°3.24   14.2°   56.6°     12   1°1.06   N03°40.54   338°37.97   13.6°   511°31.63   14.1°   56.6°     13   16°1.28   39.58   350°1.056   13.6°   11°45.74   14.2°   56.6°     14   31°1.50   38.62   4°43.14   13.6°   11°59.76   14.0°   56.5°     15   46°1.72   37.66   19°1.570   13.5°   12°13.73   13.9°   55.5°     16   61°1.95   36.71   33°48.23   13.5°   12°31.73   13.9°   55.6°     17   76°2.17   33°5.75   48°20.75   13.5°   12°41.44   13.8°   56.4°     18   91°2.39   N03°34.79   62°53.24   13.5°   512°55.20   13.7°   56.4°     19   106°2.61   33.83   77°5.72   13.8°   356.02     20   121°2.83   32.87   91°58.17   13.4°   13°22.48   13.5°   56.3°     22   151°3.28   30.96   121°3.00   13.4°   13°49.48   13.5°   56.3°     23   166°3.50   30.00   155°35.38   13.4°   14°2.86   13.3°   56.2°     25   25   48.3   2.26   6   133°44.02   13.2°   56.2°     2   211°4.16   27.12   179°12.35   13.3°   14°42.56   13.3°   56.2°     2   211°4.16   27.12   179°12.35   13.3°   14°42.56   13.3°   56.2°     3   26°4.38   2.26   6   133°44.02   13.2°   15°8.60   13.6°   56.1°     4   241°4.61   25.20   206°1.666   13.2°   15°8.56   13.0°   56.1°     5   256°4.83   24.24   222°49.08   13.2°   15°8.56   13.0°   56.1°     6   271°5.05   N03°23.28   237°21.26   13.2°   15°8.50   12.9°   56.1°     6   271°5.05   N03°23.28   237°21.26   13.2°   515°9.40   12.7°   56.0°     9   316°5.72   20.40   206°57.63   13.1°   16°2.41   12.4°   55.0°     9   316°5.72   20.40   206°57.63   13.1°   16°1.21   12.8°   56.1°     12   16°6.83   15.60   353°37.59   12°   17°1.76   12.8°   55.0°     13   46°6.16   16.84   310°1.71   13.0°   16°2.48   12.4°   55.0°     14   31°6.83   15.60   353°37.59   12°   17°1.76   12.7°   55.6°     25   256°1.01   1.18   21°2.90.70   12.6°   18°3.63   11.1°   55.7°     15   46°7.95   41.44   40°5.25   40°4.44   41°2.35   41°4.50   41°4.50     15   46°7.95   41.44   41°2.25   41°4.50   41°4.50   41°4								
11   346°0.84   41.50   321°5.36   13.6°   11°17.47   14.2°   56.6°   12   1°1.06   N03°4.054   335°37.97   13.6°   511°31.63   14.1°   56.5°   13.6°   11°45.73   14.0°   56.5°   14.4°   31°1.50   38.62   4°43.14   13.6°   11°95.76   14.0°   56.5°   15.6°   16°1.95   36.71   33°48.23   13.5°   12°13.73   13.9°   55.5°   16°   61°1.95   36.71   33°48.23   13.5°   12°27.62   13.8°   56.4°   17°   76°21.7   35.75   48°20.75   13.5°   12°41.41   18.8°   56.4°   18   91°2.39   N03°34.79   62°83.24   13.5°   512°41.44   13.8°   56.4°   19°   106°2.61   33.83   77°5.72   13.5°   13°8.88   13.6°   56.4°   22°   136°3.05   33.91   106°30.60   13.4°   13°40.62   13.5°   56.3°   221   136°3.05   30.90   136°3.53   13.4°   14°2.86   13.3°   56.2°   22°   15°3.28   30.96   12°3.00   13.4°   13°40.62   13.4°   56.2°   22°   12° 41.6   27.12   79°1.235   13.3°   14°42.54   13.4°   56.2°   22°   12° 41.6   27.12   179°1.235   13.3°   14°42.54   13.4°   56.2°   22°   12° 41.6   27.12   179°1.235   13.3°   14°42.54   13.1°   56.2°   22°   12° 41.6   27.12   179°1.235   13.3°   14°42.54   13.1°   56.2°   22°   12° 41.6   27.12   179°1.235   13.3°   14°42.54   13.1°   56.2°   22°   12° 41.6   27.12   179°1.235   13.3°   14°42.54   13.1°   56.2°   22°   12° 41.6   27.12   17° 1.235   13° 1.15° 1.128   56.1°   23°   2								
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Mon         GHA         Dec         GHA         ν         Dec         d         HP           0         181°3.72         N03°29.04         150°7.73         13.3'         S14°16.16         13.2'         56.2'           1         196°3.94         28.08         164°40.05         13.3'         14°29.39         13.1'         56.2'           2         211°4.16         27.12         179°12.35         13.3'         14°42.54         13.1'         56.2'           3         226°4.38         ×26.16         193°44.62         13.2'         15°5.61         13.0'         56.1'           6         271°5.05         N03°23.28         237°21.26         13.2'         15°8.60         12.9'         56.1'           7         286°5.27         22.32         251°53.41         13.1'         15°47.08         12.7'         56.0'           9         316°5.72         ×2.040         280°57.63         13.1'         15°47.08         12.5'         56.0'           10         331°5.94         19.44         295°29.69         13.0'         16°24.81         12.4'         55.9'           11         346°6.16         18.48         310°11.13.0'         16°24.81         12.4'         55.9'								
181°3.72   N03°29.04   150°7.73   13.3   S14°16.16   13.2   56.2     1   196°3.94   28.08   164°40.05   13.3   14°29.39   13.1   56.2     2   211°4.16   27.12   179°12.35   13.3   14°29.39   13.1   56.2     3   226°4.38   ·· 26.16   193°44.62   13.2   14°55.61   13.0   56.1     4   241°4.61   25.20   208°16.86   13.2   15°8.60   12.9   56.1     5   256°4.83   24.24   222°49.08   13.2   15°8.60   12.9   56.1     6   271°5.05   N03°23.28   237°21.26   13.2   S15°34.34   12.7   56.0     7   286°5.27   22.32   251°53.41   13.1   15°45.78   12.7   56.0     8   301°5.49   21.36   266°25.54   13.1   15°45.78   12.7   56.0     9   316°5.72   ·· 20.40   280°5.63   13.1   15°45.74   12.6   56.0     10   331°5.94   19.44   295°29.69   13.0   16°24.81   12.4   55.9     11   346°6.16   18.48   310°1.71   13.0   16°37.21   12.3   55.9     12   1°6.38   N03°17.52   324°33.71   13.0   16°49.53   12.2   55.9     13   16°6.60   16.56   339°5.67   12.9   17°1.76   12.1   55.8     14   31°6.83   15.60   333°3.759   12.9   17°1.390   12.0   55.8     15   46°7.05   ·· 14.64   88°9.48   12.9   17°25.95   12.0   55.8     16   61°7.27   13.68   22°41.34   12.8   17°49.77   11.8   55.7     18   91°7.72   N03°11.76   51°44.94   12.7   518°1.55   11.7   55.7     19   106°7.94   10.80   66°16.69   12.7   18°36.32   11.4   55.6     20   121°8.16   9.84   80°48.40   12.7   18°24.82   11.5   55.7     20   121°8.16   9.84   80°48.40   12.7   18°4.72   11.3   55.6      SD = 15.9'   d = -1.0'   SD = 15.3'      Tue   GHA   Dec   Dec   GHA   Dec   Dec   GHA   Dec   Dec   GHA   Dec   Dec   GHA   Dec   Dec   GHA   Dec   Dec   GHA   Dec		JD — 13.9	u — -1.0	-	)L	/ — 13.3°		
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5         256°10.16         1.18         211°32.07         12.3'         20°4.78         10.6'         55.4'           6         271°10.38         N03°0.22         226°3.39         12.3'         S20°15.39         10.5'         55.4'           7         286°10.61         02°59.26         240°34.67         12.2'         20°25.90         10.4'         55.4'           8         301°10.83         58.30         255°5.91         12.2'         20°36.31         10.3'         55.4'           9         316°11.05         · 57.34         269°37.11         12.2'         20°46.61         10.2'         55.3'           10         331°11.27         56.37         284°8.26         12.1'         20°56.80         10.1'         55.3'           11         346°11.50         55.41         298°39.38         12.1'         21°6.90         10.0'         55.3'           12         1°11.72         N02°54.45         313°10.45         12.0'         S21°16.88         9.9'         55.3'           13         16°11.94         53.49         327°41.49         12.0'         S21°16.88         9.9'         55.2'           14         31°12.17         52.52         342°12.48         11.9'         21°26.								
6 271°10.38 N03°0.22 226°3.39 12.3' \$20°15.39 10.5' \$5.4'   7 286°10.61 02°59.26 240°34.67 12.2' 20°25.90 10.4' 55.4'   8 301°10.83 58.30 255°5.91 12.2' 20°36.31 10.3' 55.4'   9 316°11.05 · 57.34 269°37.11 12.2' 20°46.61 10.2' 55.3'   10 331°11.27 56.37 284°8.26 12.1' 20°56.80 10.1' 55.3'   11 346°11.50 55.41 298°39.38 12.1' 21°6.90 10.0' 55.3'   12 1°11.72 N02°54.45 313°10.45 12.0' \$21°16.88 9.9' 55.3'   13 16°11.94 53.49 327°41.49 12.0' 21°26.76 9.8' 55.2'   14 31°12.17 52.52 342°12.48 11.9' 21°36.54 9.7' 55.2'   15 46°12.39 · 51.56 356°43.43 11.9' 21°46.20 9.6' 55.2'   16 61°12.61 50.60 11°14.34 11.9' 21°36.54 9.7' 55.2'   17 76°12.83 49.63 25°45.20 11.8' 22°52.1 9.3' 55.1'   18 91°13.06 N02°48.67 40°16.03 11.8' \$22°14.54 9.2' 55.1'   20 121°13.50 46.74 69°17.55 11.7' 22°32.89 9.0' 55.1'   21 136°13.72 · 45.78 83°48.25 11.7' 22°31.89 8.9' 55.1'   22 151°13.95 44.82 98°18.90 11.6' 22°5.079 8.8' 55.0'   23 166°14.17 43.85 112°49.52 11.6' 22°59.56 8.7' 55.0'								
7 286°10.61 02°59.26 240°34.67 12.2' 20°25.90 10.4' 55.4' 8 301°10.83 58.30 255°5.91 12.2' 20°36.31 10.3' 55.4' 9 316°11.05 · · 57.34 269°37.11 12.2' 20°46.61 10.2' 55.3' 10 331°11.27 56.37 284°8.26 12.1' 20°56.80 10.1' 55.3' 11 346°11.50 55.41 298°39.38 12.1' 21°6.90 10.0' 55.3' 12 1°11.72 N02°54.45 313°10.45 12.0' 521°16.88 9.9' 55.3' 13 16°11.94 53.49 327°41.49 12.0' 21°26.76 9.8' 55.2' 14 31°12.17 52.52 342°12.48 11.9' 21°36.54 9.7' 55.2' 15 46°12.39 · · 51.56 356°43.43 11.9' 21°46.20 9.6' 55.2' 16 61°12.61 50.60 11°14.34 11.9' 21°36.54 9.4' 55.2' 17 76°12.83 49.63 25°45.20 11.8' 22°5.21 9.3' 55.1' 18 91°13.06 N02°48.67 40°16.03 11.8' 522°14.54 9.2' 55.1' 19 106°13.28 47.71 54°46.81 11.7' 22°32.89 9.0' 55.1' 20 121°13.50 46.74 69°17.55 11.7' 22°32.89 9.0' 55.1' 21 136°13.72 · · 45.78 83°48.25 11.7' 22°41.89 8.9' 55.1' 22 151°13.95 44.82 98°18.90 11.6' 22°5.07 8.8' 55.0' 23 166°14.17 43.85 112°49.52 11.6' 22°59.56 8.7' 55.0'			N03°0.22		12.3'			
9       316°11.05       · · · 57.34       269°37.11       12.2'       20°46.61       10.2'       55.3'         10       331°11.27       56.37       284°8.26       12.1'       20°56.80       10.1'       55.3'         11       346°11.50       55.41       298°39.38       12.1'       21°6.90       10.0'       55.3'         12       1°11.72       N02°54.45       313°10.45       12.0'       S21°16.88       9.9'       55.3'         13       16°11.94       53.49       327°41.49       12.0'       21°26.76       9.8'       55.2'         14       31°12.17       52.52       342°12.48       11.9'       21°36.54       9.7'       55.2'         15       46°12.39       · · 51.56       356°43.43       11.9'       21°46.20       9.6'       55.2'         16       61°12.61       50.60       11°14.34       11.9'       21°55.76       9.4'       55.2'         17       76°12.83       49.63       25°45.20       11.8'       22°5.21       9.3'       55.1'         18       91°13.06       N02°48.67       40°16.03       11.8'       522°14.54       9.2'       55.1'         20       121°13.50       46.74       69°	7							
10         331°11.27         56.37         284°8.26         12.1'         20°56.80         10.1'         55.3'           11         346°11.50         55.41         298°39.38         12.1'         21°6.90         10.0'         55.3'           12         1°11.72         N02°54.45         313°10.45         12.0'         S21°16.88         9.9'         55.3'           13         16°11.94         53.49         327°41.49         12.0'         21°26.76         9.8'         55.2'           14         31°12.17         52.52         342°12.48         11.9'         21°36.54         9.7'         55.2'           15         46°12.39         • 51.56         356°43.43         11.9'         21°36.54         9.7'         55.2'           16         61°12.61         50.60         11°14.34         11.9'         21°55.76         9.4'         55.2'           17         76°12.83         49.63         25°45.20         11.8'         22°5.21         9.3'         55.1'           18         91°13.06         N02°48.67         40°16.03         11.8'         S22°14.54         9.2'         55.1'           20         121°13.50         46.74         69°17.55         11.7'         22°32.89								
11       346°11.50       55.41       298°39.38       12.1'       21°6.90       10.0'       55.3'         12       1°11.72       N02°54.45       313°10.45       12.0'       S21°16.88       9.9'       55.3'         13       16°11.94       53.49       327°41.49       12.0'       21°26.76       9.8'       55.2'         14       31°12.17       52.52       342°12.48       11.9'       21°36.54       9.7'       55.2'         15       46°12.39       • 51.56       356°43.43       11.9'       21°55.76       9.6'       55.2'         16       61°12.61       50.60       11°14.34       11.9'       21°55.76       9.4'       55.2'         17       76°12.83       49.63       25°45.20       11.8'       22°5.21       9.3'       55.1'         18       91°13.06       N02°48.67       40°16.03       11.8'       522°14.54       9.2'       55.1'         19       106°13.28       47.71       54°46.81       11.7'       22°23.77       9.1'       55.1'         20       121°13.50       46.74       69°17.55       11.7'       22°32.89       9.0'       55.1'         21       136°13.72       · 45.78       83°48.25 <th></th> <th></th> <th>01.01</th> <th></th> <th></th> <th></th> <th></th> <th></th>			01.01					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			55.41					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		1°11.72						
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
18         91°13.06         N02°48.67         40°16.03         11.8'         \$22°14.54         9.2'         55.1'           19         106°13.28         47.71         54°46.81         11.7'         22°23.77         9.1'         55.1'           20         121°13.50         46.74         69°17.55         11.7'         22°32.89         9.0'         55.1'           21         136°13.72         · · 45.78         83°48.25         11.7'         22°41.89         8.9'         55.1'           22         151°13.95         44.82         98°18.90         11.6'         22°50.79         8.8'         55.0'           23         166°14.17         43.85         112°49.52         11.6'         22°59.56         8.7'         55.0'		61°12.61	50.60	11°14.34	11.9'	$21^{\circ}55.76$	9.4'	55.2'
19     106°13.28     47.71     54°46.81     11.7'     22°23.77     9.1'     55.1'       20     121°13.50     46.74     69°17.55     11.7'     22°32.89     9.0'     55.1'       21     136°13.72     · 45.78     83°48.25     11.7'     22°41.89     8.9'     55.1'       22     151°13.95     44.82     98°18.90     11.6'     22°50.79     8.8'     55.0'       23     166°14.17     43.85     112°49.52     11.6'     22°59.56     8.7'     55.0'								
20     121°13.50     46.74     69°17.55     11.7'     22°32.89     9.0'     55.1'       21     136°13.72     · 45.78     83°48.25     11.7'     22°41.89     8.9'     55.1'       22     151°13.95     44.82     98°18.90     11.6'     22°50.79     8.8'     55.0'       23     166°14.17     43.85     112°49.52     11.6'     22°59.56     8.7'     55.0'								
21       136°13.72       · · 45.78       83°48.25       11.7'       22°41.89       8.9'       55.1'         22       151°13.95       44.82       98°18.90       11.6'       22°50.79       8.8'       55.0'         23       166°14.17       43.85       112°49.52       11.6'       22°59.56       8.7'       55.0'								
23 166°14.17 43.85 112°49.52 11.6' 22°59.56 8.7' 55.0'		136°13.72		83°48.25		22°41.89		
SD = 15.9'  d = -1.0' $SD = 15.2'$	23			112°49.52			8.7'	55.0'
		SD = 15.9'	d = -1.0'		SE	0 = 15.2'		

Lat.	Twi	light	Sunrise	Sunset	Twilight		
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.	
N 72°	01:59	03:50	05:02	18:46	19:58	21:45	
<b>N</b> 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	
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	04:43	05:31	06:12	17:40	18:21	19:10	

Lat.	Moonrise			Moonset		
Lat.	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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	
<b>S</b> 60°	06:16	06:16	06:18	21:34	23:08	•• ••

		Sun			Moon		
Day	Eqn.	Eqn.of Time		Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	2-4	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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	Stars
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	$354^{\circ}57.61$	145°41.50 \$17°39.72	240°16.59 N22°16.67	215°34.16 N16°20.77	342°12.99 N02°32.52	Alpheratz 357°32.97 29°14.43
1	10°0.07	160°42.76 40.49	255°17.42 16.46	230°36.13 20.63	357°15.62 32.45	Ankaa 353°5.35 -42°9.44
2	25°2.53 40°5.00	175°44.02 41.26 190°45.29 • 42.03	270°18.25 16.24 285°19.08 • 16.03	245°38.10 20.48 260°40.07 · · 20.34	12°18.24 32.38 27°20.87 · · 32.30	Schedar 349°28.90 56°41.09
3 4	55°7.46	205°46.55 42.80	300°19.91 15.81	275°42.05 20.20	42°23.50 32.23	Diphda 348°45.58 -17°50.19
5	70°9.93	220°47.82 43.56	315°20.75 15.60	290°44.02 20.05	57°26.12 32.15	Achernar 335°18.64 -57°5.79 Hamal 327°49.35 23°35.42
6	85° 12.39	235°49.09 S17°44.33	330°21.58 N22°15.38	305°45.99 N16°19.91	72°28.75 N02°32.08	Hamal 327°49.35 23°35.42 Polaris 313°1.48 89°22.35
7	100° 14.85	250°50.36 45.10	345°22.41 15.17	320°47.97 19.77	87°31.38 32.01	Acamar 315°10.45 -40°11.53
8 9	115° 17.32 130° 19.78	265°51.64 45.86 280°52.91 • 46.62	0°23.24 14.95 15°24.08 · · 14.74	335°49.94 19.62 350°51.91 •• 19.48	102°34.01 31.93 117°36.63 · · 31.86	Menkar 314°4.49 4°11.83
10	145° 22.25	295°54.19 47.39	30°24.91 14.52	5°53.89 19.34	132°39.26 31.78	Mirfak 308°25.98 49°57.26
11	160°24.71	310°55.48 48.15	45°25.74 14.30	20°55.86 19.19	147°41.89 31.71	Aldebaran 290°37.93 16°33.84
12	175°27.18	325°56.76 \$17°48.91	60°26.58 N22°14.09	35°57.83 N16°19.05	162°44.52 N02°31.63	Rigel 281°2.50 -8°10.04 Capella 280°19.79 46°1.34
13	190°29.64	340°58.04 49.67	75°27.41 13.87	50°59.81 18.91	177° 47.14 31.56	Bellatrix 278°21.37 6°22.54
14 15	205°32.10 220°34.57	355°59.33 50.43 11°0.62 · · 51.18	90°28.25 13.65 105°29.08 · · 13.44	66° 1.78 18.76 81° 3.76 · · 18.62	192°49.77 31.48 207°52.40 · · 31.41	Elnath 278° 0.09 28° 37.76
16	235°37.03	26°1.92 51.94	120°29.92 13.22	96° 5.73 18.48	222°55.03 31.34	Alnilam 275°36.31 -1°10.93
17	250°39.50	41°3.21 52.70	135°30.75 13.00	111°7.70 18.33	237°57.66 31.26	Betelgeuse 270°50.60 7°24.82 Canopus 263°51.88 -52°42.22
18	265°41.96	56°4.51 <b>S</b> 17°53.45	150°31.59 N22°12.78	126°9.68 N16°18.19	253°0.28 N02°31.19	Sirius 258°25.10 -16°44.94
19 20	280° 44.42	71°5.81 54.20 86°7.11 54.96	165°32.42 12.56 180°33.26 12.35	141°11.65 18.05 156°13.63 17.90	268°2.91 31.11 283°5.54 31.04	Adhara 255°4.90 -29°0.22
21	295° 46.89 310° 49.35	86°7.11 54.96 101°8.41 · · 55.71	180°33.26 12.35 195°34.10 · · 12.13	156°13.63 17.90 171°15.60 · 17.76	283°5.54 31.04 298°8.17 · · 30.96	Procyon 244°49.53 5°9.48
22	325°51.82	116° 9.72 56.46	210°34.93 11.91	186°17.58 17.62	313°10.80 30.89	Pollux 243°15.79 27°57.66
23	340°54.28	131°11.03 57.21	225°35.77 11.69	201°19.55 17.47	328°13.43 30.81	Avior 234°14.59 -59°35.42 Suhail 222°45.64 -43°32.21
Mer.r	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	Miaplacidus 221°38.75 -69°49.38
						Alphard 217°46.66 -8°46.34
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.26 11°50.26
0	355° 56.74	146°12.34 \$17°57.95	240°36.61 N22°11.47	216°21.53 N16°17.33	343°16.05 N02°30.74	Dubhe 193°39.95 61°36.39
1	10°59.21	161°13.65 58.70	255°37.45 11.25	231°23.50 17.19	358°18.68 30.67	Denebola 182°23.85 14°25.44 Gienah 175°42.48 -17°41.36
2	26°1.67	176°14.97 17°59.45	270°38.28 11.03	246°25.48 17.04	13°21.31 30.59	Acrux 172°59.23 -63°14.88
3	41°4.14	191°16.28 18°0.19	285°39.12 · · 10.81	261°27.45 · · 16.90	28°23.94 · · 30.52	Gacrux 171°50.66 -57°15.81
4 5	56°6.60 71°9.07	206°17.60 0.94 221°18.92 1.68	300°39.96 10.59 315°40.80 10.37	276°29.43 16.76 291°31.41 16.62	43°26.57 30.44 58°29.20 30.37	Alioth 166°12.26 55°48.99
6	86°11.53	236°20.25 \$18°2.42	330°41.64 N22°10.15	306°33.38 N16°16.47	73°31.83 N02°30.29	Spica 158°21.11 -11°18.00
7	101° 13.99	251°21.58 3.16	345°42.48 9.93	321°35.36 16.33	88°34.46 30.22	Alkaid 152°51.30 49°10.94 Hadar 148°34.53 -60°30.24
8	116° 16.46	266°22.90 3.90	0°43.32 9.71	336°37.33 16.19	103°37.08 30.14	Menkent 147°56.28 -36°30.13
9	131° 18.92	281°24.24 · · 4.64	15°44.16 · · 9.49	351°39.31 · · 16.04	118°39.71 · · 30.07	Arcturus 145°46.89 19°2.73
10 11	146°21.39 161°23.85	296°25.57 5.38 311°26.90 6.12	30°45.00 9.26 45°45.84 9.04	6°41.29 15.90 21°43.26 15.76	133°42.34 29.99 148°44.97 29.92	Rigil Kent. 139°38.84 -60°56.90
12	176° 26.31	326°28.24 \$18°6.85	60°46.68 N22°8.82	36°45.24 N16°15.61	163°47.60 N02°29.84	Kochab 137°20.57 74°2.90
13	191°28.78	341°29.58 7.59	75°47.52 8.60	51°47.22 15.47	178°50.23 29.77	Zuben'ubi 136°54.68 -16°9.14 Alphecca 126°2.73 26°37.67
14	206°31.24	356° 30.93 8.32	90°48.36 8.38	66°49.19 15.33	193°52.86 29.69	Antares 112°14.22 -26°29.50
15	221°33.71	11°32.27 · · 9.06	105°49.20 · · 8.15	81°51.17 · · 15.19	208°55.49 · · 29.62	Atria 107°7.25 -69°4.74
16 17	236°36.17 251°38.64	26°33.62 9.79 41°34.97 10.52	120°50.04 7.93 135°50.89 7.71	96°53.15 15.04 111°55.12 14.90	223°58.12 29.54 239°0.75 29.47	Sabik 102°1.21 -15°45.44
18	266° 41.10	56°36.32 \$18°11.25	150°51.73 N22°7.48	126°57.10 N16°14.76	254°3.38 N02°29.39	Shaula 96°8.47 -37°7.46
19	281°43.56	71°37.67 11.98	165°52.57 7.26	141°59.08 14.61	$269^{\circ}6.01$ $29.32$	Rasalhague 95°57.25 12°32.61 Eltanin 90°41.49 51°29.39
20	296° 46.03	86°39.03 12.70	180°53.41 7.04	157° 1.06 14.47	284°8.64 29.24	Kaus Aust. 83°30.58 -34°22.35
21	311°48.49 326°50.96	101°40.39 · · 13.43 116°41.75 14.15	195°54.26 · · 6.81 210°55.10 6.59	172°3.03 · · 14.33 187°5.01 14.19	299°11.27 · · 29.17 314°13.90 29.09	Vega 80°32.17 38°48.77
22 23	341°53.42	116°41.75 14.15 131°43.12 14.88	210°55.10 6.59 225°55.94 6.36	187° 5.01 14.19 202° 6.99 14.04	314°13.90 29.09 329°16.53 29.02	Nunki 75°45.91 -26°15.79
						Altair 61°58.42 8°56.52
Mer.p	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	Peacock 53°3.14 -56°39.01 Deneb 49°24.53 45°22.79
						Enif 33°37.15 10°0.05
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°30.74 -46°49.83
0 1	356° 55.88 11° 58.35	146°44.48 \$18°15.60 161°45.85 16.32	240°56.79 N22°6.14 255°57.63 5.91	217°8.97 N16°13.90 232°10.95 13.76	344°19.16 N02°28.94 359°21.79 28.87	Fomalhaut 15°12.62 -29°28.70
2	27°0.81	176° 47.22 17.05	270°58.48 5.69	247°12.92 13.61	14°24.42 28.79	Scheat 13°43.50 28°13.85   Markab 13°28.19 15°21.13
3	42°3.28	191°48.60 · · 17.77	285°59.32 · · 5.46	262°14.90 · · 13.47	29°27.05 · · 28.72	
4	57°5.74	206°49.97 18.48	301°0.17 5.24	277°16.88 13.33	44°29.68 28.64	Sep 16 Wed SHA Mer.pass
5	72°8.21	221°51.35 19.20	316°1.01 5.01	292°18.86 13.19	59°32.31 28.57	Venus 150°43.89 14:16 Mars 245°18.98 07:58
6 7	87° 10.67 102° 13.13	236°52.73 \$18°19.92 251°54.11 20.64	331°1.86 N22°4.79 346°2.70 4.56	307°20.84 N16°13.04 322°22.82 12.90	74°34.94 N02°28.49 89°37.57 28.42	Jupiter 220°36.55 09:36
8	117° 15.60	266°55.50 21.35	1°3.55 4.33	337°24.80 12.76	104°40.20 28.34	Saturn 347°15.38 01:11
9	$132^{\circ}18.06$	281°56.89 · · 22.06	16°4.40 · · 4.11	352°26.78 · · 12.62	119°42.83 · · 28.27	Sep 17 Thu SHA Mer.pass
10	147° 20.53	296°58.28 22.78	31°5.24 3.88	7°28.76 12.47	134°45.46 28.19	Venus 150°15.59 14:14
11 12	162°22.99 177°25.45	311°59.67 23.49 327°1.06 \$18°24.20	46°6.09 3.65 61°6.94 N22°3.43	22°30.73 12.33 37°32.71 N16°12.19	149°48.10 28.12 164°50.73 N02°28.04	Mars 244°39.86 07:57
13	177 25.45 192° 27.92	342°2.46 24.91	76°7.79 3.20	52°34.69 12.05	179°53.36 27.97	Jupiter 220°24.78 09:33
14	207° 30.38	357°3.86 25.61	91°8.63 2.97	67°36.67 11.90	194°55.99 27.89	Saturn 347°19.31 01:07
15	222° 32.85	12°5.26 · · 26.32	106°9.48 · · 2.74	82°38.65 · · 11.76	209°58.62 · · 27.82	Sep 18 Fri SHA Mer.pass
16	237°35.31	27°6.67 27.03	121°10.33 2.52	97°40.63 11.62	225°1.25 27.74	Venus 149°48.60 14:12
17 18	252° 37.77 267° 40.24	42°8.08 27.73 57°9.49 \$18°28.44	136°11.18 2.29 151°12.03 N22°2.06	112°42.61 11.48 127°44.59 N16°11.33	240°3.88 27.66 255°6.51 N02°27.59	Mars 244°0.90 07:56
19	282° 42.70	72°10.90 29.14	166°12.88 1.83	142°46.57 11.19	270°9.14 27.51	Jupiter 220°13.08 09:30 Saturn 347°23.27 01:03
20	297°45.17	87°12.31 29.84	181°13.73 1.60	157°48.56 11.05	285°11.78 27.44	
21	312° 47.63	102°13.73 · · 30.54	196°14.58 · · 1.37	172°50.54 · · 10.91	300°14.41 · · 27.36	Horizontal parallax
22 23	327°50.10 342°52.56	117° 15.15 31.24 132° 16.57 31.94	211°15.43 1.14 226°16.28 0.91	187°52.52 10.77 202°54.50 10.62	315°17.04 27.29 330°19.67 27.21	Venus: 0.3 Mars: 0.1
Mer.p	pass. 00:12	ν1.4' d0.7' m-4.79	$\nu 0.8' \ d$ -0.2' m1.18	ν2.0′ d-0.1′ m-1.84	ν2.6' d-0.1' m0.40	

h	Sun		Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	181°14.39	N02°42.89	$127^{\circ}20.09$	11.5'	\$23°8.23	8.6'	55.0'
1	196° 14.62	41.93	141°50.62	11.5'	23°16.78	8.4'	55.0'
2	211° 14.84 226° 15.06	40.96 •• 40.00	156°21.11 170°51.56	11.4' 11.4'	23°25.22 23°33.54	8.3' 8.2'	55.0' 54.9'
4	241° 15.28	39.04	185°21.97	11.4'	23°41.74	8.1'	54.9'
5	$256^{\circ}15.51$	38.07	199°52.33	11.3'	23°49.83	8.0'	54.9'
6	271°15.73	N02°37.11	214°22.66	11.3'	\$23°57.80	7.9'	54.9'
7 8	286° 15.95 301° 16.18	36.14 35.18	228°52.94 243°23.19	11.2' 11.2'	24°5.65 24°13.39	7.7' 7.6'	54.9' 54.8'
9	316° 16.40	34.21	257°53.39	11.2'	24°21.00	7.5	54.8'
10	331°16.62	33.25	272°23.55	11.1'	24°28.50	7.4'	54.8'
11	346° 16.85	32.29	286° 53.68	11.1'	24°35.87	7.3'	54.8'
12 13	1°17.07 16°17.29	N02°31.32 30.36	301°23.76 315°53.81	11.0' 11.0'	\$24°43.13 24°50.26	7.1' 7.0'	54.8' 54.7'
14	31° 17.51	29.39	330°23.82	11.0'	24°57.27	6.9	54.7'
15	46°17.74	• • 28.43	344°53.79	10.9'	$25^{\circ}4.16$	6.8'	54.7'
16	61°17.96	27.46	359°23.72	10.9'	25°10.92	6.6'	54.7'
17 18	76°18.18 91°18.41	26.50 N02°25.53	13°53.61 28°23.47	10.9' 10.8'	25°17.57 \$25°24.08	6.5' 6.4'	54.7' 54.7'
19	106° 18.63	24.57	42° 53.47	10.8	25°30.48	6.3	54.6'
20	121° 18.85	23.60	57°23.08	10.7'	25°36.75	6.1'	54.6'
21	136° 19.08	• • 22.64	71°52.83	10.7'	25°42.89	6.0'	54.6'
22	151° 19.30	21.67	86°22.54	10.7'	25°48.91	5.9'	54.6'
23	166° 19.52	20.70	100°52.22	10.6'	25°54.80	5.8'	54.6'
	SD = 15.9'	d = -1.0'		SD	0 = 15.0'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181° 19.75	$N02^{\circ}19.74$	115°21.87	10.6'	S26° 0.57	5.6'	54.6'
1	196° 19.97	18.77	129°51.48	10.6'	26° 6.21 26° 11.72	5.5'	54.5'
2	211°20.19 226°20.42	17.81 •• 16.84	144°21.06 158°50.61	10.5' 10.5'	26°11.72 26°17.10	5.4' 5.3'	54.5' 54.5'
4	241°20.64	15.88	173° 20.13	10.5	26°22.35	5.1'	54.5'
5	256° 20.86	14.91	187°49.62	10.5'	26°27.48	5.0'	54.5'
6	271°21.09	N02°13.94	202° 19.07	10.4'	S26°32.48	4.9'	54.5'
7	286°21.31	12.98	216°48.50	10.4	26°37.34	4.7'	54.5'
8 9	301°21.53 316°21.75	12.01 •• 11.04	231°17.89 245°47.26	10.4' 10.3'	26°42.08 26°46.69	4.6' 4.5'	54.5' 54.4'
10	331° 21.98	10.08	260° 16.60	10.3	26°51.16	4.3'	54.4'
11	346°22.20	9.11	274°45.92	10.3'	26°55.51	4.2'	54.4'
12	1°22.42	N02°8.15	289° 15.21	10.3'	S26°59.72	4.1'	54.4'
13 14	16°22.65 31°22.87	7.18 6.21	303° 44.47 318° 13.71	10.2' 10.2'	27°3.81 27°7.76	4.0' 3.8'	54.4' 54.4'
15	46°23.09	. 5.25	332°42.93	10.2'	27°11.58	3.7'	54.4
16	61°23.32	4.28	347° 12.12	10.2'	27°15.26	3.6'	54.4'
17	76°23.54	3.31	1°41.29	10.1'	27°18.81	3.4'	54.3'
18	91°23.76 106°23.99	N02°2.34 1.38	16° 10.44 30° 39.57	10.1'	\$27°22.23 27°25.52	3.3' 3.2'	54.3'
19 20	106 23.99 121°24 21	02°0.41	30 39.57 45°8.68	10.1' 10.1'	27 25.52 27°28.67	3.2 3.0'	54.3' 54.3'
21	136° 24.43	01°59.44	59°37.77	10.1	27°31.69	2.9'	54.3'
22	151°24.66	58.48	74°6.84	10.1'	$27^{\circ}34.58$	2.8'	54.3'
23	166°24.88	57.51	88°35.90	10.0'	27°37.33	2.6'	54.3'
	SD = 15.9'	d = -1.0'		SD	0 = 14.9'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°25.10 196°25.33	N01°56.54	103°4.94	10.0'	\$27°39.95 27°42.43	2.5'	54.3'
1 2	196°25.33 211°25.55	55.57 54.61	117°33.97 132°2.98	10.0' 10.0'	27°42.43 27°44.78	2.3' 2.2'	54.3' 54.3'
3	211 25.55 226° 25.77	• • 53.64	132 2.98 146°31.98	10.0'	27°46.99	2.1	54.3
4	241°26.00	52.67	161°0.96	10.0'	27°49.07	1.9'	54.3'
5	256° 26.22	51.70	175°29.94	10.0'	27°51.01	1.8'	54.2'
6 7	271°26.44 286°26.67	N01°50.74 49.77	189°58.90 204°27.86	10.0' 9.9'	\$27°52.82 27°54.49	1.7' 1.5'	54.2' 54.2'
8	301°26.89	48.80	218° 56.80	9.9' 9.9'	27°56.03	1.4'	54.2'
9	316° 27.11	• • 47.83	233°25.74	9.9'	27°57.43	1.3'	54.2'
10	331°27.34	46.86	247°54.67	9.9'	27°58.69	1.1'	54.2'
11 12	346°27.56 1°27.78	45.90 N01°44.93	262°23.60 276°52.52	9.9' 9.9'	27°59.82 \$28°0.82	1.0' 0.9'	54.2' 54.2'
13	1°27.78 16°28.00	43.96	276°52.52 291°21.44	9.9 9.9'	28° 1.67	0.9	54.2' 54.2'
14	31°28.23	42.99	305° 50.36	9.9'	28°2.40	0.6	54.2
15	46°28.45	• • 42.02	320° 19.27	9.9'	28°2.98	0.4'	54.2'
16	61°28.67	41.06	334°48.18	9.9'	28°3.43	0.3'	54.2'
17 18	76°28.90 91°29.12	40.09 N01°39.12	349°17.10 3°46.01	9.9' 9.9'	28°3.74 \$28°3.92	0.2'	54.2' 54.2'
19	106° 29.34	38.15	3 46.01 18°14.93	9.9 9.9'	28° 3.96	-0.1	54.2'
20	121° 29.57	37.18	32°43.85	9.9'	28°3.87	-0.2'	54.2'
21	136° 29.79	• • 36.21	47° 12.78	9.9'	28°3.64	-0.4'	54.2'
22	151°30.01 166°30.24	35.24	61°41.71 76°10.65	9.9' 9.9'	28°3.27 28°2.77	-0.5' -0.6'	54.2' 54.2'
23	$\frac{166^{\circ}30.24}{\text{SD} = 15.9'}$	$\frac{34.27}{d-1.0'}$	10 10.05			-0.0	54.2
	JU = 15.9′	d = -1.0'		50	0 = 14.8'		

Lat.	Twi	light	Sunrise	Sunset	Twilight	
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	02:24	04:05	05:16	18:30	19:40	21:19
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	04:33	05:22	06:03	17:47	18:28	19:18

Lat.		Moonris	е		Moonset	
Ldl.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	06:23	06:33	06:58	00:43	02:16	03:37

	Sun			Moon		
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	5-7
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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	Stars
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA
0	357°55.02	147°18.00 \$18°32.64	241°17.13 N22°0.68	217°56.48 N16°10.48	345°22.30 N02°27.14	
1	12°57.49	162°19.42 33.33	256°17.98 0.45	232°58.46 10.34	0°24.93 27.06	Alpheratz 357°32.96
2	27° 59.95	177°20.85 34.03	271°18.83 0.22	248° 0.44 10.20	15°27.57 26.99	Ankaa 353°5.34
3	43°2.42	192°22.28 · · 34.72	286°19.68 21°59.99	263°2.42 · · 10.05	30°30.20 · · 26.91	Schedar 349°28.88
4	58°4.88	207°23.72 35.41	301°20.54 21°59.76	278° 4.40 9.91	45°32.83 26.83	Diphda 348°45.57
5	73°7.34	222°25.15 36.10	316°21.39 59.53	293°6.39 9.77	60°35.46 26.76	Achernar 335°18.62
6	$88^{\circ}9.81$	237°26.59 \$18°36.79	331°22.24 N21°59.30	308°8.37 N16°9.63	75°38.09 N02°26.68	Hamal 327°49.33 Polaris 312°59.96
7	103° 12.27	252°28.04 37.48	346°23.09 59.07	323°10.35 9.49	90°40.73 26.61	Acamar 315°10.42
8	118° 14.74	267°29.48 38.17	1°23.95 58.84	338°12.33 9.34	105°43.36 26.53	Menkar 314°4.47
9	133° 17.20	282°30.93 · · 38.86	16°24.80 · · 58.61	353°14.31 · · 9.20	120°45.99 · · 26.46	Mirfak 308°25.95
10	148° 19.67	297°32.38 39.54	31°25.65 58.38	8°16.30 9.06	135°48.62 26.38	Aldebaran 290°37.90
11	163°22.13	312°33.83 40.23	46°26.51 58.14	23°18.28 8.92	150°51.26 26.31	Rigel 281°2.47
12	178°24.59	327°35.28 \$18°40.91	61°27.36 N21°57.91	38°20.26 N16°8.78	165°53.89 N02°26.23	Capella 280°19.75
13	193°27.06	342°36.74 41.60	76°28.21 57.68	53°22.24 8.63	180°56.52 26.15	Bellatrix 278°21.34
14 15	208° 29.52 223° 31.99	357°38.20 42.28	91°29.07 57.45 106°29.92 · · 57.21	68°24.23 8.49	$195^{\circ}59.15$ $26.08$ $211^{\circ}1.79$ · · $26.00$	Elnath 278° 0.06
16	223 31.99 238°34.45	12°39.66 · · 42.96 27°41.13 43.64	106°29.92 · · 57.21 121°30.78 56.98	83°26.21 · · 8.35 98°28.19 8.21	211°1.79 · · 26.00 226°4.42       25.93	Alnilam 275°36.29
17	253°36.91	42°42.59 44.31	136°31.63 56.75	113°30.18 8.07	241°7.05 25.85	Betelgeuse 270°50.58
18	268° 39.38	57°44.06 \$18°44.99	151°32.49 N21°56.51	128°32.16 N16°7.92	256°9.69 N02°25.77	Canopus 263°51.85
19	283°41.84	72°45.54 45.67	166°33.35 56.28	143°34.14 7.78	271°12.32 25.70	Sirius 258°25.08
20	298°44.31	87° 47.01 46.34	181°34.20 56.05	158°36.13 7.64	286°14.95 25.62	Adhara 255°4.87
21	313°46.77	102°48.49 · · 47.01	196°35.06 · · 55.81	173°38.11 · · 7.50	301°17.58 · · 25.55	Procyon 244°49.51
22	328° 49.24	117°49.97 47.69	211°35.92 55.58	188°40.09 7.36	316°20.22 25.47	Pollux 243°15.77
23	343°51.70	132°51.45 48.36	226°36.77 55.34	203°42.08 7.21	331°22.85 25.40	Avior 234°14.56
- N 4	00.00	1 4/ 10 7/ 4 00				Suhail 222°45.62
Mer.p	pass. 00:08	$\nu 1.4' \ d0.7' \ \text{m-4.80}$	ν0.9' d-0.2' m1.17	ν2.0′ d-0.1′ m-1.84	ν2.6' d-0.1' m0.40	Miaplacidus 221°38.72
						Alphard 217°46.64 Regulus 207°33.24
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.94
0	$358^{\circ}54.16$	147°52.94 \$18°49.03	241°37.63 N21°55.11	218°44.06 N16°7.07	346°25.48 N02°25.32	Denebola 182°23.84
1	13°56.63	162°54.42 49.70	256°38.49 54.87	233°46.05 6.93	1°28.12 25.24	Gienah 175°42.47
2	$28^{\circ}59.09$	177°55.92 50.36	271°39.35 54.64	248°48.03 6.79	16°30.75 25.17	Acrux 172°59.22
3	$44^{\circ}1.56$	192°57.41 • • 51.03	286°40.21 · · 54.40	263°50.02 · · 6.65	31°33.38 · · 25.09	Gacrux 171°50.66
4	59°4.02	207°58.90 51.69	301°41.06 54.17	278°52.00 6.51	46°36.02 25.02	Alioth 166°12.27
5	74°6.48	223°0.40 52.36	316°41.92 53.93	293°53.98 6.36	61°38.65 24.94	Spica 158°21.11
6	89°8.95	238°1.90 \$18°53.02	331°42.78 N21°53.69	308°55.97 N16°6.22	76°41.28 N02°24.86	Alkaid 152°51.31
7	104°11.41	253°3.41 53.68	346°43.64 53.46	323°57.95 6.08	91°43.92 24.79	Hadar 148°34.54
8	119° 13.88	268°4.91 54.34	1°44.50 53.22	338°59.94 5.94	106°46.55 24.71	Menkent 147°56.28
9	134° 16.34 149° 18.81	283°6.42 · · 55.00 298°7.93 55.66	16°45.36 · · 52.99 31°46.22 52.75	354°1.92 · · 5.80 9°3.91 5.66	121°49.19 · · 24.64 136°51.82 24.56	Arcturus 145°46.89
10 11	149 18.81 164°21.27	298°7.93 55.66 313°9.45 56.32	31°46.22 52.75 46°47.08 52.51	9° 3.91 5.66 24° 5.90 5.52	136°51.82 24.56 151°54.45 24.48	Rigil Kent. 139°38.85
12	179°23.73	328°10.96 \$18°56.97	61°47.94 N21°52.27	39°7.88 N16°5.37	166°57.09 N02°24.41	Kochab 137°20.62
13	194°26.20	343°12.48 57.63	76°48.80 52.04	54°9.87 5.23	181°59.72 24.33	Zuben'ubi 136°54.69
14	209°28.66	358°14.00 58.28	91°49.67 51.80	69°11.85 5.09	197°2.36 24.26	Alphecca 126°2.74
15	224°31.13	13°15.53 · · 58.93	106°50.53 · · 51.56	84°13.84 · · 4.95	212°4.99 · · 24.18	Antares 112°14.23
16	239°33.59	28°17.06 18°59.59	121°51.39 51.32	99°15.82 4.81	227°7.62 24.10	Atria 107°7.28 Sabik 102°1.22
17	254°36.05	43°18.59 19°0.23	136°52.25 51.08	114°17.81 4.67	242°10.26 24.03	Sabik 102°1.22 Shaula 96°8.48
18	269°38.52	58°20.12 <b>S</b> 19°0.88	151°53.12 N21°50.85	129°19.80 N16°4.53	257°12.89 N02°23.95	Rasalhague 95°57.26
19	284°40.98	73°21.65 1.53	166°53.98 50.61	144°21.78 4.38	272°15.53 23.87	Eltanin 90°41.51
20	299°43.45	88°23.19 2.18	181°54.84 50.37	159°23.77 4.24	287°18.16 23.80	Kaus Aust. 83°30.59
21	314°45.91	103°24.73 · · 2.82	196°55.70 · · 50.13	174°25.76 · · 4.10	302°20.80 · · 23.72	Vega 80°32.19
22	329°48.37	118°26.28 3.47	211°56.57 49.89	189°27.74 3.96	317°23.43 23.65	Nunki 75°45.92
23	344°50.84	133°27.82 4.11	226°57.43 49.65	204°29.73 3.82	332°26.07 23.57	Altair 61°58.43
Mer.	pass. 00:04	$\nu 1.5' \ d0.7' \ \text{m-4.80}$	$\nu$ 0.9' d-0.2' m1.17	$\nu$ 2.0' d-0.1' m-1.84	ν2.6' d-0.1' m0.40	Peacock 53°3.16
						Deneb 49°24.55
						Enif 33°37.15
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°30.74
0 1	359° 53.30 14° 55.77	148°29.37	241°58.30 N21°49.41 256°59.16 49.17	219°31.72 N16°3.68 234°33.71 3.54	347°28.70 N02°23.49 2°31.33 23.42	Fomalhaut 15°12.62
2	14 55.77 29°58.23	178° 32.48 6.03	272° 0.03 48.93	249°35.69 3.40	2 31.33 23.42 17°33.97 23.34	Scheat 13°43.49
3	45°0.70	176 32.46 0.03 193°34.03 · · 6.67	287°0.89 · · 48.69	264° 37.68 · · 3.25	32°36.60 · · 23.26	Markab 13°28.18
4	60°3.16	208°35.59 7.30	302°1.76 48.45	279°39.67 3.11	47°39.24 23.19	Sep 19 Sat SHA
5	75°5.62	223°37.15 7.94	317°2.62 48.21	294°41.66 2.97	62°41.87 23.11	Venus 149°22.97
6	90°8.09	238°38.72 \$19°8.57	332°3.49 N21°47.97	309°43.64 N16°2.83	77°44.51 N02°23.04	Mars 243°22.11
7	105° 10.55	253°40.29 9.21	347° 4.35 47.73	324°45.63 2.69	92°47.14 22.96	Jupiter 220°1.45
8	120° 13.02	268°41.86 9.84	2°5.22 47.49	339°47.62 2.55	107°49.78 22.88	Saturn 347°27.28
9	$135^{\circ}15.48$	283°43.43 · · 10.47	17°6.09 · · 47.24	354°49.61 · · 2.41	122°52.41 · · 22.81	Sep 20 Sun SHA
10	150° 17.94	298° 45.01 11.10	32°6.96 47.00	9°51.60 2.27	137°55.05 22.73	<b>Sep 20 Sun SHA</b> Venus 148° 58.77
11	165°20.41	313°46.58 11.73	47°7.82 46.76	24°53.59 2.13	152°57.69 22.65	Mars 242°43.47
12	180°22.87	328°48.17 \$19°12.35	62°8.69 N21°46.52	39°55.57 N16°1.98	168°0.32 N02°22.58	Jupiter 219°49.90
13	195°25.34	343°49.75 12.98	77°9.56 46.28	54°57.56 1.84	183°2.96 22.50	Saturn 347°31.32
14	210°27.80	358°51.34 13.60	92°10.43 46.03	69°59.55 1.70	198°5.59 22.42	
15	225°30.26	13°52.93 · · 14.23	107°11.30 · · 45.79	85°1.54 · · 1.56	213°8.23 · · 22.35	Sep 21 Mon SHA
16	240°32.73	28°54.52 14.85	122°12.16 45.55	100° 3.53 1.42	228°10.86 22.27	Venus 148°36.07
17	255° 35.19	43°56.11 15.47	137°13.03 45.30	115° 5.52 1.28 130° 7.51 N16° 1.14	243°13.50 22.19	Mars 242°4.99
18 19	270° 37.66 285° 40.12	58°57.71 <b>S</b> 19°16.09 73°59.31 16.71	152°13.90 N21°45.06 167°14.77 44.82	130°7.51 N16°1.14 145°9.50 1.00	258°16.13 N02°22.12 273°18.77 22.04	Jupiter 219°38.42
20	285 40.12 300°42.59	89°0.92 17.32	182°15.64 44.57	145 9.50 1.00 160°11.49 0.86	288°21.40 21.97	Saturn 347°35.40
21	315°45.05	104°2.52 · · 17.94	197°16.51 · · 44.33	175°13.48 · · 0.72	303°24.04 · · 21.89	Horizontal parallax
22	330°47.51	119° 4.13 18.55	212°17.38 44.09	190°15.47 0.58	318°26.68 21.81	Venus:
23	345°49.98	134°5.74 19.17	227°18.25 43.84	205°17.46 0.44	333°29.31 21.74	Mars:
			-			
ivier.	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	

	Stars	
	SHA	Dec
Alpheratz	357°32.96	29°14.44
Ankaa Schedar	353°5.34 349°28.88	-42°9.45 56°41.11
Diphda	348°45.57	-17°50.19
Achernar	$335^{\circ}18.62$	-57°5.80
Hamal	327°49.33 312°59.96	23°35.43 89°22.36
Polaris Acamar	312 59.96 315°10.42	-40°11.54
Menkar	$314^{\circ}4.47$	4°11.83
Mirfak Aldebaran	308°25.95 290°37.90	49°57.27 16°33.84
Rigel	290 37.90 281°2.47	-8°10.04
Capella	280°19.75	46°1.35
Bellatrix	278°21.34 278°0.06	6°22.55 28°37.76
Elnath Alnilam	278 0.06 275°36.29	-1°10.93
Betelgeuse	270°50.58	7°24.82
Canopus	263°51.85	-52°42.21
Sirius Adhara	258°25.08 255°4.87	-16°44.94 -29°0.22
Procyon	244°49.51	5°9.48
Pollux	243°15.77	27°57.65
Avior Suhail	234°14.56 222°45.62	-59°35.41 -43°32.20
Miaplacidus	221°38.72	-69°49.37
Alphard	217°46.64	-8°46.34
Regulus Dubhe	207°33.24 193°39.94	11°50.25 61°36.37
Denebola	182°23.84	14° 25.44
Gienah	$175^{\circ}42.47$	-17°41.36
Acrux	172°59.22 171°50.66	-63°14.87 -57°15.80
Gacrux Alioth	171 50.00 166°12.27	-57 15.80 55°48.97
Spica	$158^{\circ}21.11$	-11°18.00
Alkaid	152°51.31	49° 10.93
Hadar Menkent	148°34.54 147°56.28	-60°30.23 -36°30.13
Arcturus	$145^{\circ}46.89$	19°2.72
Rigil Kent.	139°38.85	-60°56.89
Kochab Zuben'ubi	137°20.62 136°54.69	74°2.89 -16°9.14
Alphecca	126°2.74	26° 37.66
Antares	112°14.23	-26°29.50
Atria Sabik	107°7.28 102°1.22	-69°4.74 -15°45.44
Shaula	96°8.48	-37°7.46
Rasalhague	95°57.26	12°32.61
Eltanin Kaus Aust.	90°41.51 83°30.59	51°29.39 -34°22.35
Vega	80°32.19	38° 48.77
Nunki	75°45.92	-26° 15.79
Altair Peacock	61°58.43 53°3.16	8°56.52 -56°39.02
Deneb	49°24.55	45°22.81
Enif	$33^{\circ}37.15$	$10^{\circ}0.05$
Al Na'ir Fomalhaut	27°30.74 15°12.62	-46°49.84 -29°28.70
Scheat	15 12.02 13°43.49	-29 28.70 28°13.86
Markab	13°28.18	15°21.14
Sep 19 Sat	SHA	Mer.pass
Venus	149°22.97	14:09
Mars Jupiter	243°22.11 220°1.45	07:54 09:27
Saturn	347°27.28	00:58
Sep 20 Sun	SHA	Mer.pass
Venus	148°58.77	14:07
Mars Jupiter	242°43.47 219°49.90	07:53 09:24
Saturn	347°31.32	00:54
Sep 21 Mon	SHA	Mer.pass
Venus	148°36.07	14:05
Mars Jupiter	242°4.99 219°38.42	07:52 09:21
Sup.tel	247025.40	00.50

00:50

0.4 0.1

h	Su	n	Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	181°30.46	N01°33.31	90°39.59	10.0'	S28°2.14	-0.8'	54.2'
1	196°30.68	32.34	105°8.54	10.0'	$28^{\circ}1.36$	-0.9'	54.2'
2	211°30.91	31.37	119°37.50	10.0'	28°0.45	-1.0'	54.2'
3	226°31.13	• • 30.40	134°6.48	10.0'	27°59.41	-1.2'	54.2'
4 5	241°31.35 256°31.57	29.43 28.46	148°35.46 163°4.46	10.0' 10.0'	27°58.23 27°56.92	-1.3' -1.4'	54.2' 54.2'
6	271°31.80	N01°27.49	177°33.46	10.0'	S27°55.47	-1.6'	54.2'
7	286°32.02	26.52	192°2.49	10.0'	27°53.89	-1.7'	54.2'
8	301°32.24	25.55	206°31.53	10.1'	$27^{\circ}52.17$	-1.9'	54.2'
9	316°32.47	• • 24.58	221°0.58	10.1'	$27^{\circ}50.32$	-2.0'	54.2'
10	331°32.69	23.61	235°29.65	10.1'	27°48.33	-2.1'	54.2'
11 12	346°32.91 1°33.14	22.64 N01°21.68	249°58.74 264°27.85	10.1' 10.1'	27°46.21 \$27°43.96	-2.3' -2.4'	54.2' 54.2'
13	16°33.36	20.71	278° 56.97	10.1	27°41.57	-2.4 -2.5'	54.2'
14	31°33.58	19.74	293°26.12	10.2'	27°39.05	-2.7'	54.2'
15	46°33.80	• • 18.77	307°55.29	10.2'	27°36.40	-2.8'	54.2'
16	61°34.03	17.80	322°24.48	10.2'	$27^{\circ}33.61$	-2.9'	54.2'
17	76°34.25	16.83	336°53.69	10.2'	27°30.69	-3.1'	54.2'
18	91°34.47 106°34.70	N01°15.86	351°22.93 5°52.19	10.3'	\$27°27.64 27°24.46	-3.2'	54.2'
19 20	106 34.70 121°34.92	14.89 13.92	5°52.19 20°21.48	10.3' 10.3'	27°24.46 27°21.14	-3.3' -3.4'	54.2' 54.2'
21	136° 35.14	• • 12.95	34°50.80	10.3	27°17.70	-3.6'	54.2'
22	151°35.36	11.98	49°20.14	10.4	27°14.12	-3.7'	54.2'
23	166°35.59	11.01	63°49.51	10.4'	$27^{\circ}10.41$	-3.8'	54.2'
	SD = 15.9'	d = -1.0'		SD	0 = 14.8'		
c	GHA	Daa	GHA		Dec	اد	μг
Sun 0	GHA 181°35.81	<b>Dec</b> N01°10.04	<b>GНА</b> 78°18.91	u 10.4'	<b>Dec</b> <b>S</b> 27°6.58	d -4.0'	<b>HP</b> 54.2'
1	196° 36.03	9.07	92°48.34	10.5'	27°2.61	-4.1'	54.2'
2	211°36.26	8.10	107°17.80	10.5'	$26^{\circ}58.51$	-4.2'	54.3'
3	226° 36.48	• • 7.13	121°47.29	10.5'	26°54.29	-4.4'	54.3'
4	241°36.70	6.16	136°16.81	10.6'	26°49.93	-4.5'	54.3'
5 6	256° 36.92 271° 37.15	5.19 N01°4.21	150°46.36 165°15.95	10.6' 10.6'	26°45.45 \$26°40.84	-4.6' -4.7'	54.3' 54.3'
7	286° 37.37	3.24	179°45.57	10.0	26°36.10	-4.7 -4.9'	54.3
8	301°37.59	2.27	194°15.22	10.7'	26°31.23	-5.0'	54.3'
9	316°37.81	• • 1.30	208°44.91	10.7'	$26^{\circ}26.24$	-5.1'	54.3'
10	331°38.04	01°0.33	223°14.64	10.8'	26°21.12	-5.2'	54.3'
11	346°38.26	00°59.36	237°44.40	10.8'	26°15.88	-5.4'	54.3'
12 13	1°38.48 16°38.70	N00°58.39 57.42	252°14.20 266°44.03	10.8' 10.9'	\$26° 10.51 26° 5.01	-5.5' -5.6'	54.3' 54.3'
14	31° 38.93	56.45	281°13.91	10.9	25°59.39	-5.7'	54.4'
15	46°39.15	• • 55.48	295°43.82	11.0'	25°53.65	-5.9'	54.4'
16	61°39.37	54.51	310°13.77	11.0'	$25^{\circ}47.78$	-6.0'	54.4'
17	76°39.59	53.54	324°43.76	11.0'	25°41.79	-6.1'	54.4'
18 19	91°39.82 106°40.04	N00°52.57 51.60	339°13.79 353°43.86	11.1' 11.1'	\$25°35.68 25°29.45	-6.2' -6.4'	54.4' 54.4'
20	100 40.04 121°40.26	50.62	8°13.97	11.1	25°23.09	-0.4 -6.5'	54.4'
21	136°40.48	• • 49.65	22°44.13	11.2'	25°16.62	-6.6'	54.4'
22	151°40.71	48.68	37°14.32	11.2'	$25^{\circ}10.02$	-6.7'	54.4'
23	166°40.93	47.71	51°44.56	11.3'	25°3.30	-6.8'	54.5'
	SD = 15.9'	d = -1.0'		SD	0 = 14.8'		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	181°41.15	N00°46.74	66°14.83	11.3'	S24°56.47	-7.0'	54.5'
1	196°41.37	45.77	80°45.15	11.4'	24°49.51	-7.1'	54.5'
2	211°41.59 226°41.82	44.80 •• 43.83	95°15.52 109°45.92	11.4'	24°42.44 24°35.25	-7.2' -7.3'	54.5'
3 4	226°41.82 241°42.04	· · 43.83 42.85	109°45.92 124°16.37	11.5' 11.5'	24°35.25 24°27.94	-7.3' -7.4'	54.5' 54.5'
5	256° 42.26	42.65	138°46.87	11.5'	24°20.52	-7.4 -7.5'	54.5'
6	271°42.48	N00°40.91	153°17.41	11.6'	S24°12.98	-7.7'	54.6'
7	286° 42.70	39.94	167°47.99	11.6'	24°5.32	-7.8'	54.6'
8	301°42.93	38.97	182°18.61	11.7'	23°57.55	-7.9'	54.6'
9	316°43.15 331°43.37	· · 38.00	196°49.28 211°20.00	11.7' 11.8'	23°49.67 23°41.67	-8.0'	54.6'
10 11	331°43.37 346°43.59	37.03 36.05	211°20.00 225°50.76	11.8' 11.8'	23°41.67 23°33.56	-8.1' -8.2'	54.6' 54.6'
12	1°43.81	N00°35.08	240°21.56	11.8'	\$23°25.34	-8.3	54.6
13	16° 44.04	34.11	254°52.41	11.9'	23°17.01	-8.4'	54.7'
14	31°44.26	33.14	269°23.31	11.9'	23°8.57	-8.6'	54.7'
15	46° 44.48	• • 32.17	283°54.25	12.0'	23°0.01	-8.7'	54.7'
16 17	61°44.70 76°44.92	31.20 30.22	298°25.24 312°56.27	12.0' 12.1'	22°51.35 22°42.57	-8.8' -8.9'	54.7' 54.7'
18	91°45.14	30.22 N00°29.25	312°56.27 327°27.34	12.1'	522°33.69	-8.9 -9.0'	54.7'
19	106° 45.37	28.28	341°58.46	12.1	22°24.70	-9.0 -9.1'	54.8'
20	121°45.59	27.31	356°29.63	12.2'	$22^{\circ}15.61$	-9.2'	54.8'
21	136° 45.81	• • 26.34	11°0.84	12.3'	22°6.40	-9.3'	54.8'
22	151° 46.03	25.36	25°32.10 40°3.40	12.3'	21°57.09	-9.4'	54.8'
23	166°46.25	24.39	40-3.40	12.3'	21°47.68	-9.5'	54.8'
	SD = 15.9'	d = -1.0'		SD	0 = 14.9'		

N 72° 02:45	04:20 04:30	Sunrise 05:29	Sunset 18:15	Civil	Naut.
		05:29	10.15		
N 70°   03.00	04:30		10.13	19:24	20:57
N /U   U3:06		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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60° 04:24	05:13	05:54	17:54	18:35	19:25

Lat.		Moonris	e	Moonset			
Lat.	Sat	Sun	Mon	Sat	Sun	Mon	
N 72°							
<b>N</b> 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° N 10°	13:09 12:45	13:56 13:34	14:40 14:21		00:03 00:27	00:58 01:18	
0°	12:45	13:34	14:21		00:27	01:16	
, ,	-			00.10			
<b>S</b> 10° 20°	12:01	12:53	13:45	00:19	01:09	01:57	
30°	11:38 11:10	12:31 12:06	13:26 13:04	00:43 01:11	01:32 01:59	02:18 02:41	
35°	10:54	11:51	12:51	01:11	02:14	02:41	
40°	10:34	11:33	12:35	01:46	02:14	02:33	
45°	10:12	11:12	12:17	02:10	02:54	03:30	
<b>S</b> 50°	09:42	10:45	11:55	02:39	03:21	03:53	
52°	09:42	10:43	11:44	02:54	03:35	03:35	
54°	09:11	10:32	11:32	03:11	03:50	04:03	
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	
<b>S</b> 60°	07:50	09:09	10:40	04:32	04:59	05:10	

		Sun			Moon	
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	8-10
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	0°52.44	149°7.36 \$19°19.78	242°19.13 N21°43.60	220°19.45 N16°0.30	348°31.95 N02°21.66
1	15°54.91	164°8.98 20.39	257°20.00 43.35	235°21.44 0.15	3°34.58 21.58
2	30°57.37	179°10.60 21.00	272°20.87 43.11	250°23.43 16°0.01	18°37.22 21.51
3	45°59.83	194°12.22 · · 21.61	287°21.74 · · 42.86	265°25.42 15°59.87	33°39.86 · · 21.43
4	61°2.30	209°13.85 22.21	302°22.61 42.62	280°27.41 59.73	48°42.49 21.35
5	76°4.76	224°15.47 22.82	317°23.49 42.37	295°29.40 59.59	63°45.13 21.28
6	91°7.23	239°17.11 <b>S</b> 19°23.42	332°24.36 N21°42.13	310°31.39 N15°59.45	78°47.77 N02°21.20
7	$106^{\circ}9.69$	254°18.74 24.02	347°25.23 41.88	325°33.39 59.31	93°50.40 21.12
8	121°12.15	269°20.38 24.63	2°26.11 41.63	340°35.38 59.17	108°53.04 21.05
9	$136^{\circ}14.62$	284°22.02 · · 25.23	17°26.98 · · 41.39	355°37.37 · · 59.03	123°55.67 · · 20.97
10	$151^{\circ}17.08$	299°23.66 25.83	32°27.85 41.14	10°39.36 58.89	138°58.31 20.89
11	166° 19.55	314°25.31 26.42	47°28.73 40.89	25°41.35 58.75	154°0.95 20.82
12	181°22.01	329°26.96 \$19°27.02	62°29.60 N21°40.65	40°43.34 N15°58.61	169°3.58 N02°20.74
13	196° 24.48	344°28.61 27.62	77°30.48 40.40	55°45.34 58.47	184°6.22 20.66
14	211°26.94	359°30.26 28.21	92°31.35 40.15	70°47.33 58.33	199°8.86 20.59
15	226°29.40	14°31.92 · · 28.80	107°32.23 · · 39.90	85°49.32 · · 58.19	214°11.49 · · 20.51
16	241°31.87	29°33.58 29.39	122°33.10 39.66	100°51.31 58.05	229°14.13 20.43
17	256°34.33	44°35.24 29.98 59°36.91 \$19°30.57	137°33.98 39.41 152°34.86 N21°39.16	115°53.31 57.91 130°55.30 N15°57.77	244°16.77 20.36 259°19.40 N02°20.28
18 19	271°36.80 286°39.26	74°38.58 31.16	152°34.86 N21°39.16 167°35.73 38.91	145°57.29 57.63	259°19.40 N02°20.28 274°22.04 20.20
20	301°41.72	89°40.25 31.75	182°36.61 38.66	160°59.28 57.49	289°24.68 20.12
21	316° 44.19	104°41.92 · · 32.33	197°37.49 · · 38.41	176°1.28 · · 57.35	304°27.32 · · · 20.05
22	331° 46.65	119° 43.60 32.91	212°38.36 38.17	191° 3.27 57.21	319°29.95 19.97
23	346°49.12	134°45.28 33.50	227°39.24 37.92	206° 5.26 57.07	334°32.59 19.89
Mer.p	pass. 23:53	$ u 1.6' \ d0.6' \ \text{m-4.81}$	$ u 0.9' \ d  0.2' \ \text{m} 1.16$	$\nu 2.0' \ d$ -0.1' m-1.85	ν2.6' d-0.1' m0.39
	_				
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	1°51.58	149°46.96 \$19°34.08	242°40.12 N21°37.67	221°7.26 N15°56.93	349°35.23 N02°19.82
1	$16^{\circ}54.04$	164°48.65 34.66	257°41.00 37.42	236° 9.25 56.79	4°37.86 19.74
2	$31^{\circ}56.51$	179°50.34 35.24	272°41.88 37.17	251°11.24 56.65	19°40.50 19.66
3	46°58.97	194°52.03 · · 35.81	287°42.76 · · 36.92	266°13.24 · · 56.51	34°43.14 · · 19.59
4	62°1.44	209°53.73 36.39	302°43.64 36.67	281°15.23 56.37	49°45.78 19.51
5	77°3.90	224°55.43 36.96	317°44.51 36.42	296°17.23 56.23	64°48.41 19.43
6	92°6.36	239°57.13 <b>S</b> 19°37.54	332°45.39 N21°36.17	311°19.22 N15°56.09	79°51.05 N02°19.36
7	107°8.83	254°58.83 38.11	347°46.27 35.92	326°21.22 55.95	94°53.69 19.28
8	122°11.29	270°0.54 38.68	2°47.16 35.67	341°23.21 55.81	109° 56.33 19.20
9	137° 13.76	285°2.25 · · 39.25	17°48.04 · · 35.41	356°25.20 · · 55.67	124°58.96 · · 19.12
10	152° 16.22 167° 18.69	300°3.96 39.82 315°5.68 40.38	32°48.92 35.16 47°49.80 34.91	11°27.20 55.53 26°29.19 55.39	140°1.60 19.05 155°4.24 18.97
11 12	182°21.15	315 5.08 40.38 330°7.40 \$19°40.95	62°50.68 N21°34.66	41°31.19 N15°55.25	155°4.24 18.97 170°6.88 N02°18.89
13	197°23.61	345°9.12 41.51	77°51.56 34.41	56°33.19 N15 55.25	185°9.52 18.82
14	212° 26.08	0°10.84 42.07	92°52.44 34.16	71°35.18 54.97	200°12.15 18.74
15	227° 28.54	15°12.57 · · 42.63	107°53.33 · · 33.90	86°37.18 · · 54.83	215°14.79 · · 18.66
16	242°31.01	30°14.30 43.19	122°54.21 33.65	101°39.17 54.69	230°17.43 18.59
17	257° 33.47	45°16.03 43.75	137°55.09 33.40	116°41.17 54.55	245°20.07 18.51
18	272°35.93	60°17.77 <b>S</b> 19°44.31	152°55.97 N21°33.15	131°43.16 N15°54.41	260°22.71 N02°18.43
19	287°38.40	75°19.51 44.86	167°56.86 32.89	146°45.16 54.27	275°25.34 18.35
20	302°40.86	90°21.25 45.42	182°57.74 32.64	161°47.16 54.13	290°27.98 18.28
21	317°43.33	105°23.00 · · 45.97	197°58.63 · · 32.39	176°49.15 · · 53.99	305°30.62 · · 18.20
22	332°45.79	120°24.75 46.52	212°59.51 32.13	191°51.15 53.85	320°33.26 18.12
23	347°48.25	135°26.50 47.07	228°0.40 31.88	206°53.15 53.71	335°35.90 18.05
Mer r	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
	6114	6114	6114	6114	G.1.4 B
Thu	GHA 2° 50, 72	GHA Dec	<b>GHA Dec</b> 243°1.28 N21°31.63	GHA Dec	GHA Dec 350°38.53 N02°17.97
0 1	2°50.72 17°53.18	150°28.25 \$19°47.62 165°30.01 48.17	243°1.28 N21°31.63 258°2.17 31.37	221°55.14 N15°53.57 236°57.14 53.43	350°38.53 N02°17.97 5°41.17 17.89
2	32°55.65	180°31.77 48.71	273°3.05 31.12	251°59.14 53.29	20°43.81 17.81
3	47°58.11	195°33.54 · · 49.26	288°3.94 · · 30.86	267°1.13 · · 53.15	35°46.45 · · 17.74
4	63°0.57	210°35.30 49.80	303°4.82 30.61	282° 3.13 53.01	50°49.09 17.66
5	78°3.04	225°37.07 50.34	318° 5.71 30.35	297° 5.13 52.88	65°51.73 17.58
6	93°5.50	240°38.85 \$19°50.89	333°6.60 N21°30.10	312°7.13 N15°52.74	80°54.37 N02°17.51
7	108°7.97	255°40.62 51.42	348°7.48 29.84	327° 9.12 52.60	95°57.00 17.43
8	123°10.43	270°42.40 51.96	3°8.37 29.59	342°11.12 52.46	110°59.64 17.35
9	138° 12.89	285°44.18 · · 52.50	18°9.26 · · 29.33	357°13.12 · · 52.32	126°2.28 · · 17.27
10	153° 15.36	300°45.97 53.03	33°10.15 29.08	12°15.12 52.18	141°4.92 17.20 S
11	168° 17.82	315°47.76 53.57	48°11.03 28.82	27°17.11 52.04	156°7.56 17.12
12	183°20.29	330°49.55 \$19°54.10	63°11.92 N21°28.56	42°19.11 N15°51.90	171°10.20 N02°17.04
13	198°22.75	345°51.34 54.63	78°12.81 28.31	57°21.11 51.76	186°12.84 16.96
14	213°25.21	0°53.14 55.16	93°13.70 28.05	72°23.11 51.62	201°15.48 16.89
15	228°27.68	15°54.94 · · 55.69	108°14.59 · · 27.79	87°25.11 · · 51.48	216°18.11 · · 16.81
16	243°30.14	30°56.75 56.21	123°15.48 27.54	102°27.11 51.34	231°20.75 16.73
17	258° 32.61 273° 35.07	45°58.55 56.74 61°0.36 \$19°57.26	138°16.37 27.28 153°17.26 N21°27.02	117°29.11 51.21 132°31.11 N15°51.07	246°23.39 16.66 261°26.03 N02°16.58
18 19	273° 35.07 288° 37.54	76°2.18 57.78	168°18.15 26.76	132°31.11 N15°51.07 147°33.11 50.93	261°26.03 N02°16.58 276°28.67 16.50
20	303°40.00	91°3.99 58.31	183°19.04 26.51	162°35.11 50.95	291°31.31 16.42
21	318° 42.46	106°5.81 · · 58.82	198°19.93 · · 26.25	177°37.11 · · 50.65	306°33.95 · · 16.35
22	333°44.93	121°7.63 59.34	213°20.82 25.99	192°39.10 50.51	321°36.59 16.27
23	348° 47.39	136°9.46 59.86	228°21.72 25.73	207°41.10 50.37	336°39.23 16.19
			ν0.9' d-0.3' m1.15		$\nu$ 2.6' d-0.1' m0.38
ivier.p	pass. 23:45	ν1.8′ d0.5′ m-4.81	νυ. <del>9</del> α-υ.5 m1.15	ν2.0′ d-0.1′ m-1.85	ν2.0 α-0.1 m0.38

	Stars	
	SHA	Dec
Alpheratz	357°32.96	29°14.45
Ankaa	353°5.33	-42°9.45
Schedar Diphda	349°28.87 348°45.56	56°41.12 -17°50.19
Achernar	335°18.60	-57°5.81
Hamal	327°49.31	23°35.44
Polaris Acamar	312°58.68 315°10.40	89°22.37 -40°11.54
Menkar	314°4.45	4°11.84
Mirfak	308°25.92	49°57.29
Aldebaran Rigel	290°37.88 281°2.45	16°33.85 -8°10.04
Capella	280°19.72	46°1.35
Bellatrix	278°21.32	6°22.55
Elnath Alnilam	278°0.03 275°36.26	28°37.76 -1°10.93
Betelgeuse	270°50.55	7°24.82
Canopus	263°51.82	-52°42.21
Sirius Adhara	258°25.05 255°4.85	-16°44.94 -29°0.22
Procyon	244°49.49	5°9.48
Pollux	243°15.74	27°57.65
Avior Suhail	234°14.54 222°45.60	-59°35.40 -43°32.19
Miaplacidus	222 45.60 221°38.69	-43 32.19 -69°49.36
Alphard	217°46.62	-8°46.34
Regulus	207°33.23 193°39.92	11°50.25 61°36.35
Dubhe Denebola	193 39.92 182°23.83	01 30.35 14°25.43
Gienah	$175^{\circ}42.47$	-17°41.36
Acrux	172°59.23	-63°14.86 -57°15.79
Gacrux Alioth	171°50.66 166°12.27	-57° 15.79 55° 48.95
Spica	158°21.11	-11°18.00
Alkaid	152°51.31	49°10.91
Hadar Menkent	148°34.55 147°56.29	-60°30.22 -36°30.12
Arcturus	145°46.90	19°2.72
Rigil Kent.	139°38.86	-60°56.88
Kochab Zuben'ubi	137°20.66 136°54.69	74°2.87 -16°9.14
Alphecca	126° 2.75	26°37.66
Antares	112°14.24 107°7.31	-26°29.50
Atria Sabik	107° 7.31 102° 1.23	-69°4.74 -15°45.44
Shaula	96°8.50	-37°7.46
Rasalhague	95°57.28	12°32.61
Eltanin Kaus Aust.	90°41.54 83°30.60	51°29.39 -34°22.35
Vega	80°32.21	38°48.77
Nunki	75°45.93	-26°15.80
Altair Peacock	61°58.44 53°3.17	8°56.52 -56°39.02
Deneb	49°24.56	45°22.81
Enif	33°37.15	10°0.06
Al Na'ir Fomalhaut	27°30.74 15°12.61	-46°49.85 -29°28.71
Scheat	13°43.49	28°13.88
Markab	13°28.18	15°21.15
Sep 22 Tue	SHA	Mer.pass
Venus	148°14.92	14:02
Mars Jupiter	241°26.68 219°27.01	07:50 09:17
Saturn	347°39.51	00:46
Sep 23 Wed	SHA	Mer.pass
Venus	147°55.38	13:59
Mars	$240^{\circ}48.54$	07:49
Jupiter Saturn	219°15.68 347°43.65	09:14 00:42
Sep 24 Thu Venus	<b>SHA</b> 147°37.54	Mer.pass 13:56
Mars	$240^{\circ}10.56$	07:47
Jupiter	219° 4.42	09:11
Saturn	347°47.82	00:37
Horizor	ntal parallax	0.4
	Venus: Mars:	0.4 0.1

h	Su	n	Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	181°46.47	N00°23.42	54°34.74	12.4'	S21°38.16	-9.6'	54.9'
1	196°46.69	22.45	69°6.13	12.4'	21°28.54	-9.7'	54.9'
2	211°46.92	21.48	83°37.57	12.5'	21°18.82	-9.8'	54.9'
3	226°47.14 241°47.36	· · 20.50	98°9.05 112°40.57	12.5'	21°8.99	-9.9'	54.9'
4 5	241 47.36 256° 47.58	19.53 18.56	112°40.57 127°12.14	12.6' 12.6'	20°59.06 20°49.03	-10.0' -10.1'	54.9' 55.0'
6	271°47.80	N00°17.59	141°43.75	12.7'	520°38.90	-10.1	55.0'
7	286°48.02	16.62	156°15.41	12.7'	20°28.68	-10.3'	55.0'
8	301°48.24	15.64	$170^{\circ}47.11$	12.7'	$20^{\circ}18.35$	-10.4'	55.0'
9	316°48.46	• • 14.67	185°18.85	12.8'	20°7.92	-10.5'	55.0'
10	331°48.69	13.70	199°50.63	12.8'	19°57.40	-10.6'	55.1'
11 12	346°48.91 1°49.13	12.73 N00°11.75	214°22.46 228°54.33	12.9' 12.9'	19°46.78 \$19°36.07	-10.7' -10.8'	55.1' 55.1'
13	16°49.35	10.78	243°26.24	13.0'	19°25.26	-10.6	55.1'
14	31°49.57	9.81	257°58.19	13.0'	19°14.35	-11.0'	55.1'
15	46°49.79	• • 8.84	272°30.19	13.0'	19°3.36	-11.1'	55.2'
16	61°50.01	7.86	287°2.22	13.1'	$18^{\circ}52.26$	-11.2'	55.2'
17	76°50.23	6.89	301°34.30	13.1'	18°41.08	-11.3'	55.2'
18	91°50.45	N00°5.92	316°6.41	13.2'	\$18°29.81	-11.4'	55.2'
19	106°50.67	4.95 3.97	330°38.57	13.2' 13.2'	18°18.44 18°6.99	-11.5'	55.3'
20 21	121°50.89 136°51.11	3.97	345°10.76 359°42.99	13.2	18° 5.99	-11.5' -11.6'	55.3' 55.3'
22	151°51.33	2.03	14°15.26	13.3'	17°43.82	-11.7'	55.3'
23	166°51.56	1.06	28°47.57	13.3'	17°32.10	-11.7	55.3'
	SD = 15.9'	d = -1.0'			O = 15.0'		
	JD — 15.9°	u = -1.0		اد	J — 13.0°		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°51.78	N00°0.08	43°19.91	13.4'	<b>S</b> 17°20.29	-11.9'	55.4'
1	196°52.00	S00°0.89	57°52.29	13.4'	17°8.40	-12.0'	55.4'
2	211°52.22	1.86	72°24.71	13.5'	16°56.42	-12.1'	55.4'
3 4	226°52.44 241°52.66	· · 2.83 3.81	86°57.16 101°29.65	13.5' 13.5'	16°44.36 16°32.22	-12.1' -12.2'	55.4' 55.5'
4 5	241 52.00 256°52.88	3.81 4.78	101 29.05 116°2.17	13.6'	16° 32.22	-12.2 -12.3'	55.5'
6	271°53.10	500°5.75	130°34.73	13.6'	S16°7.68	-12.4'	55.5'
7	286°53.32	6.72	145°7.32	13.6'	15°55.29	-12.5'	55.5'
8	301°53.54	7.70	159°39.94	13.7'	15°42.82	-12.5'	55.6'
9	316°53.76	• • 8.67	174°12.60	13.7'	15°30.27	-12.6'	55.6'
10	331°53.98	9.64	188°45.28	13.7'	15°17.65	-12.7'	55.6'
11	346°54.20	10.62	203°18.00	13.7'	15°4.94	-12.8'	55.6'
12 13	1°54.42 16°54.64	S00°11.59 12.56	217°50.74 232°23.52	13.8' 13.8'	\$14°52.16 14°39.30	-12.9' -12.9'	55.7' 55.7'
14	31°54.86	13.53	246°56.32	13.8'	14°26.36	-12.9 -13.0'	55.7'
15	46°55.08	. 14.51	261°29.16	13.9'	14°13.36	-13.1'	55.7'
16	61°55.30	15.48	276°2.02	13.9'	14°0.27	-13.2'	55.8'
17	$76^{\circ}55.52$	16.45	290°34.90	13.9'	$13^{\circ}47.12$	-13.2'	55.8'
18	91°55.74	S00°17.43	305°7.82	13.9'	\$13°33.89	-13.3'	55.8'
19	106°55.95	18.40	319°40.75	14.0'	13°20.59	-13.4'	55.8'
20 21	121°56.17 136°56.39	19.37 •• 20.34	334°13.72 348°46.70	14.0' 14.0'	13°7.23 12°53.79	-13.4° -13.5'	55.9' 55.9'
22	150°56.61	21.32	3°19.71	14.0'	12° 40.28	-13.5'	55.9'
23	166°56.83	22.29	17°52.74	14.1'	12°26.71	-13.6'	55.9'
	SD = 15.9'	d = -1.0'		SI	O = 15.1'		
	<u> </u>	<u>u = 1.0</u>					
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°57.05	S00°23.26	32°25.79	14.1'	\$12°13.07	-13.7'	56.0'
1 2	196°57.27 211°57.49	24.24 25.21	46°58.87 61°31.96	14.1' 14.1'	11°59.36 11°45.59	-13.8' -13.8'	56.0' 56.0'
3	211 57.49 226°57.71	26.18	76°5.07	14.1'	11 45.59 11°31.76	-13.8 -13.9'	56.1'
4	241°57.93	27.15	90°38.20	14.1'	11°17.86	-14.0'	56.1'
5	256°58.15	28.13	$105^{\circ}11.35$	14.2'	11°3.90	-14.0'	56.1'
6	271°58.37	S00°29.10	119°44.51	14.2'	<b>S</b> 10°49.88	-14.1'	56.1'
7	286°58.58	30.07	134°17.69	14.2	10°35.80	-14.1'	56.2'
8 9	301°58.80 316°59.02	31.05 · · 32.02	148°50.88 163°24.09	14.2' 14.2'	10°21.66 10°7.46	-14.2' -14.3'	56.2' 56.2'
9 10	316°59.02 331°59.24	32.02	163°24.09 177°57.31	14.2'	10°7.46 09°53.20	-14.3' -14.3'	56.2'
11	346°59.46	33.97	177 57.51 192°30.54	14.2	09°38.88	-14.5 -14.4'	56.3'
12	1°59.68	S00°34.94	207°3.79	14.3	S09°24.52	-14.4'	56.3'
13	16°59.90	35.91	221°37.04	14.3'	$09^{\circ}10.09$	-14.5'	56.3'
14	32°0.11	36.89	236°10.30	14.3'	08°55.61	-14.5'	56.4'
15	47° 0.33	• • 37.86	250°43.57	14.3'	08°41.08	-14.6'	56.4
16	62°0.55	38.83	265°16.85	14.3'	08°26.50	-14.6'	56.4'
17 18	77° 0.77 92° 0.99	39.80 \$00°40.78	279°50.14 294°23.43	14.3' 14.3'	08°11.87 <b>S</b> 07°57.18	-14.7' -14.7'	56.4' 56.5'
18 19	92°0.99 107°1.20	41.75	294°23.43 308°56.73	14.3'	07°42.45	-14.7' -14.8'	56.5
20	122° 1.42	42.72	323°30.03	14.3'	07°27.67	-14.8'	56.5
21	137° 1.64	• • 43.70	338°3.33	14.3'	07°12.85	-14.9'	56.5'
22	152°1.86	44.67	$352^{\circ}36.63$	14.3'	$06^{\circ}57.97$	-14.9'	56.6'
23	167°2.08	45.64	7°9.94	14.3'	06°43.06	-15.0'	56.6'
	SD = 15.9'	d = 1.0'		SI	D = 15.3'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Junioce	Civil	Naut.
N 72°	03:04	04:34	05:43	17:59	19:07	20:36
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	04:14	05:04	05:45	18:01	18:43	19:33
	1					

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		80:00	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	12:14	13:46	15:18	05:15	05:17	05:17

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	11-13
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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	Ver	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	3°49.86	151°11.29	\$20°0.37	243°22.61	N21°25.47	222°43.10	N15°50.23	351°41.87	N02° 16.11			
1	$18^{\circ}52.32$	$166^{\circ}13.12$	0.89	258°23.50	25.21	237°45.10	50.09	6°44.51	16.04	Alpheratz	357°32.95	29°14.46 -42°9.47
2	33° 54.78	181°14.96	1.40	273°24.39	24.96	252°47.11	49.96	21°47.15	15.96	Ankaa Schedar	353°5.32 349°28.87	-42 9.47 56°41.14
3	48° 57.25	196° 16.79	•• 1.91	288°25.29	• • 24.70	267°49.11	• • 49.82	36°49.79	•• 15.88	Diphda	348° 45.55	-17° 50.20
4	63°59.71	211°18.63	2.42	303°26.18	24.44	282°51.11	49.68	51°52.43	15.80	Achernar	335° 18.58	-57°5.83
5	79°2.18	226°20.48	2.93	318°27.07	24.18	297°53.11	49.54	66°55.07	15.73	Hamal	327°49.30	23°35.44
6 7	94°4.64 109°7.10	241°22.33 256°24.18	\$20° 3.44 3.94	333°27.97 348°28.86	N21°23.92	312°55.11	N15° 49.40	81°57.70 97°0.34	N02° 15.65	Polaris	312°57.60	89°22.39
8	109 7.10 124° 9.57	271°26.03	3.94 4.44	3°29.75	23.66 23.40	327°57.11 342°59.11	49.26 49.12	97 0.34 112°2.98	15.57 15.49	Acamar	$315^{\circ}10.38$	-40°11.55
9	139° 12.03	286° 27.89	• 4.95	18°30.65	23.14	358° 1.11	• • 48.98	127°5.62	15.49	Menkar	314°4.44	4°11.84
10	154° 14.50	301°29.75	5.45	33°31.54	22.88	13° 3.11	48.85	142°8.26	15.34	Mirfak	308°25.90	49°57.30
11	169° 16.96	316°31.61	5.95	48°32.44	22.62	28° 5.11	48.71	157°10.90	15.26	Aldebaran	290°37.86	16°33.85
12	184° 19.42	331°33.48	S20°6.44	63°33.33	N21°22.36	43°7.12	N15°48.57	172°13.54	N02°15.19	Rigel	281°2.43	-8°10.04
13	$199^{\circ}21.89$	346°35.35	6.94	78°34.23	22.10	58° 9.12	48.43	$187^{\circ}16.18$	15.11	Capella Bellatrix	280°19.69 278°21.30	46°1.35 6°22.55
14	214°24.35	1°37.22	7.44	93°35.13	21.83	73°11.12	48.29	202°18.82	15.03	Elnath	278°0.01	28° 37.76
15	229°26.82	16°39.10	• • 7.93	108°36.02	• • 21.57	88°13.12	• • 48.15	217°21.46	• • 14.95	Alnilam	275°36.25	-1°10.93
16	244°29.28	31°40.98	8.42	123°36.92	21.31	103°15.12	48.02	232°24.10	14.88	Betelgeuse	270°50.53	7°24.82
17	259°31.74	46° 42.86	8.91	138°37.82	21.05	118°17.13	47.88	247°26.74	14.80	Canopus	263°51.79	$-52^{\circ}42.21$
18 19	274° 34.21 289° 36.67	61°44.75 76°46.64	\$20° 9.40 9.89	153°38.71 168°39.61	N21°20.79 20.53	133°19.13 148°21.13	N15° 47.74 47.60	262°29.38 277°32.02	N02° 14.72 14.64	Sirius	258°25.03	$-16^{\circ}44.94$
20	304°39.14	91°48.53	10.37	183°40.51	20.33	163°23.13	47.46	292°34.66	14.57	Adhara	255°4.83	-29°0.21
21	319°41.60	106° 50.42	. 10.86	198°41.41	. 20.00	178°25.14	• • 47.32	307°37.30	• • 14.49	Procyon	244°49.47	5°9.48
22	334°44.06	121°52.32	11.34	213°42.31	19.74	193°27.14	47.19	322°39.94	14.41	Pollux	243°15.72	27°57.65
23	349° 46.53	136°54.22	11.82	228°43.20	19.48	208°29.14	47.05	337°42.58	14.33	Avior	234°14.51	-59°35.39
- N 4	02.41		7 4.00		2/ 114			2.6/ 1.0	0.1' m0.38	Suhail	222°45.58	-43°32.18
ivier.	pass. 23:41	$\nu 1.8' \ d0.5$	o m-4.82	$\nu$ 0.9° $a$ -0	0.3′ m1.14	$\nu$ 2.0° $a$ -0	.1′ m-1.86	$\nu$ 2.6° $a$ -0	0.1° m0.38	Miaplacidus Alphard	221°38.65 217°46.61	-69°49.35 -8°46.34
										Regulus	207°33.22	11°50.24
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.90	61°36.33
0	4°48.99	151°56.13	\$20°12.30	243°44.10	N21°19.21	223°31.15	N15°46.91	352°45.22	N02°14.26	Denebola	182°23.83	14°25.42
1	19°51.46	166°58.04	12.78	258°45.00	18.95	238°33.15	46.77	7°47.87	14.18	Gienah	175°42.47	-17°41.35
2	34°53.92	181°59.95	13.26	273°45.90	18.69	253°35.15	46.63	22°50.51	14.10	Acrux	172°59.23	-63° 14.84
3 4	49° 56.38 64° 58.85	197°1.87 212°3.78	· · 13.74 14.21	288°46.80 303°47.70	· · 18.42 18.16	268°37.16 283°39.16	· · 46.49 46.36	37°53.15 52°55.79	· · 14.02 13.94	Gacrux	171°50.66	-57° 15.77
5	80°1.31	212 3.76 227°5.71	14.21	318°48.60	17.90	203 39.10 298°41.17	46.22	67°58.43	13.94	Alioth	166° 12.27	55° 48.94
6	95°3.78		\$20°15.15	333°49.50	N21°17.63	313°43.17	N15°46.08	83°1.07	N02° 13.79	Spica	158°21.12	-11°17.99
7	110°6.24	257°9.56	15.62	348°50.41	17.37	328°45.17	45.94	98°3.71	13.71	Alkaid	152°51.32	49° 10.90
8	125°8.70	272°11.49	16.09	3°51.31	17.10	343°47.18	45.80	113°6.35	13.63	Hadar Menkent	148°34.57 147°56.30	-60°30.21 -36°30.11
9	$140^{\circ}11.17$	287°13.42	• • 16.56	18°52.21	• • 16.84	358°49.18	• • 45.67	128°8.99	• • 13.56	Arcturus	147 50.30 145°46.90	-30 30.11 19°2.71
10	$155^{\circ}13.63$	$302^{\circ}15.36$	17.02	33°53.11	16.57	13°51.19	45.53	143°11.63	13.48	Rigil Kent.	139° 38.89	-60° 56.87
11	$170^{\circ}16.10$	317° 17.30	17.49	48°54.01	16.31	28°53.19	45.39	158°14.27	13.40	Kochab	137°20.70	74°2.86
12	185° 18.56	332° 19.25	S20°17.95	63°54.92	N21°16.04	43°55.20	N15°45.25	173°16.91	N02°13.32	Zuben'ubi	136°54.70	-16°9.14
13	200°21.02	347°21.20	18.41	78°55.82	15.78	58°57.20	45.12	188°19.55	13.25	Alphecca	126°2.77	26°37.65
14	215°23.49	2°23.15	18.87	93°56.72	15.51	73°59.21	44.98	203°22.19	13.17	Antares	112° 14.25	-26°29.49
15	230°25.95	17°25.10	• • 19.33	108°57.62	• • 15.25	89° 1.21	• • 44.84	218°24.83	• • 13.09	Atria	107°7.36	-69°4.73
16 17	245°28.42 260°30.88	32°27.06 47°29.02	19.78 20.24	123°58.53 138°59.43	14.98 14.71	104°3.22	44.70 44.56	233°27.48 248°30.12	13.01 12.94	Sabik	102°1.25	$-15^{\circ}45.44$
18	275° 33.34	62°30.98	\$20°20.69	150 59.45 154°0.34	N21°14.45	119°5.23 134°7.23	N15° 44.43	263°32.76	N02° 12.86	Shaula	96°8.52	-37°7.46
19	290°35.81	77°32.95	21.14	169° 1.24	14.18	149° 9.24	44.29	278°35.40	12.78	Rasalhague	95° 57.29	12° 32.61
20	305°38.27	92°34.92	21.59	184° 2.15	13.91	164°11.24	44.15	293°38.04	12.70	Eltanin	90°41.56	51°29.39
21	320° 40.74	107°36.90	• • 22.04	199°3.05	• • 13.65	179°13.25	• • 44.01	308°40.68	12.63	Kaus Aust.		-34°22.36
22	335°43.20	122°38.87	22.49	214°3.96	13.38	194°15.26	43.88	323°43.32	12.55	Vega Nunki	80°32.23	38° 48.77 -26° 15.80
23	350° 45.66	137°40.86	22.93	229°4.86	13.11	209°17.26	43.74	338°45.96	12.47	Altair	61°58.46	8° 56.52
Mer	pass. 23:37	$\nu 1.9' d0.5$	5′ m_/ 81	υ0 0' d-0	0.3' m1.14	1/2 0/ d-0	.1′ m-1.86	υ2 6′ d-0	0.1' m0.37	Peacock		-56° 39.03
- IVICI .	pass. 25.51	ν1.9 d0.5			7.5 1111.14	ν2.0 u-0	.1 111-1.00		1110.57	Deneb	49°24.58	45°22.82
										Enif	33°37.16	10°0.06
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.75	-46°49.86
0	5°48.13	152° 42.84		244°5.77	N21°12.85	224°19.27	N15°43.60	353°48.60	N02°12.39	Fomalhaut	$15^{\circ}12.62$	$-29^{\circ}28.72$
1	20°50.59	167°44.83	23.82	259°6.68	12.58	239°21.28	43.46	8°51.25	12.31	Scheat	13°43.50	28° 13.88
2	35° 53.06 50° 55.52	182°46.82 197°48.81	24.26 •• 24.70	274°7.58 289°8.49	12.31 •• 12.04	254°23.28 269°25.29	43.33 •• 43.19	23°53.89 38°56.53	12.24 •• 12.16	Markab	13°28.18	15°21.15
4	65° 57.98	212°50.81	25.13	304° 9.40	11.78	284°27.30	43.19	50.55 53°59.17	12.10	Sep 25 Fri	SHA	Mer.pass
5	81°0.45	212 50.81 227°52.81	25.13	319°10.30	11.76	299°29.31	42.91	69°1.81	12.00		147°21.43	13:54
6	96°2.91	242°54.82			N21°11.24		N15° 42.78	84°4.45	N02°11.93	I	239°32.75	07:46
7	111°5.38	257° 56.82	26.44	349°12.12	10.97	329°33.32	42.64	99°7.09	11.85		218°53.25	09:08
8	126°7.84	272°58.84	26.87	4°13.03	10.70	344°35.33	42.50	114°9.73	11.77	Saturn	$347^{\circ}52.01$	00:33
9	141°10.30	288°0.85	• • 27.30	19°13.94	• • 10.43	359°37.34	• • 42.36	129°12.38	• • 11.69	Sep 26 Sat	SHA	Mar rass
10	156° 12.77	303°2.87	27.72	34°14.85	10.16	14°39.35	42.23	144°15.02	11.62	Venus	3HA 147°7.14	Mer.pass 13:50
11	171° 15.23	318°4.89	28.15	49°15.76	9.89	29°41.35	42.09	159°17.66	11.54		238°55.11	07:45
12	186° 17.70		\$20°28.58	64°16.67	N21°9.62	44°43.36	N15°41.95	174°20.30	N02°11.46	!	218° 42.16	09:05
13	201°20.16	348°8.94	29.00	79°17.58	9.35	59°45.37	41.82	189°22.94	11.38		347°56.23	00:29
14 15	216° 22.62 231° 25.09	3°10.97 18°13.01	29.42	94°18.49	9.08	74°47.38	41.68	204°25.58	11.30			
15 16	231°25.09 246°27.55	33° 15.05	· · 29.84 30.26	109°19.40 124°20.31	· · 8.81 8.54	89°49.39 104°51.40	· · 41.54 41.40	219°28.23 234°30.87	· · 11.23 11.15	Sep 27 Sun	SHA 146° 54.71	Mer.pass
10 17	240 27.55 261°30.02	48° 17.09	30.26	124 20.31 139°21.22	8.54 8.27	104 51.40 119°53.41	41.40	234 30.87 249°33.51	11.15		146°54.71 238°17.64	13:47
18	276° 32.48		\$20°31.09	154°22.13	N21°8.00	134°55.42	N15°41.13	264°36.15	N02° 10.99	I	238° 17.64 218° 31.14	07:43 09:02
19	291°34.95	78°21.18	31.51	169°23.04	7.73	149°57.43	40.99	279°38.79	10.92	Saturn	348° 0.48	09:02
20	306°37.41	93°23.23	31.92	184°23.95	7.46	164°59.44	40.86	294°41.43	10.84			00.23
21	321°39.87	108°25.29	• • 32.33	199°24.87	• • 7.19	180° 1.45	• • 40.72	309°44.08	• 10.76	Horizor	ntal parallax	
22	336° 42.34	123°27.35	32.74	214°25.78	6.92	195° 3.46	40.58	324°46.72	10.68		Venus:	0.4
23	351° 44.80	138°29.41	33.14	229°26.69	6.65	210° 5.47	40.45	339°49.36	10.60		Mars:	0.1
Mer.	pass. 23:33	$\nu 2.0' d0.4$	4′ m-4.81	$\nu 0.9' \ d-0$	0.3′ m1.13	$\nu 2.0' d-0$	.1′ m-1.86	$\nu$ 2.6′ d-0	0.1′ m0.37			
	·											

h	Su	n	Moon						
Fri	GHA	Dec	GHA	ν	Dec	d	HP		
0	182°2.29	500°46.62	21°43.24	14.3'	S06°28.09	-15.0'	56.6'		
1	197°2.51	47.59	$36^{\circ}16.55$	14.3'	06°13.09	-15.0'	56.7'		
2	212°2.73	48.56	50°49.85	14.3'	05°58.04	-15.1'	56.7'		
3	227°2.95	• • 49.54	65°23.14	14.3'	05°42.96	-15.1'	56.7'		
4 5	242°3.16 257°3.38	50.51 51.48	79°56.44 94°29.73	14.3' 14.3'	05°27.83 05°12.66	-15.2' -15.2'	56.7' 56.8'		
6	272°3.60	51.46 S00°52.45	94 29.73 109° 3.01	14.3'	504°57.46	-15.2'	56.8		
7	287°3.82	53.43	123°36.28	14.3'	04°42.22	-15.3'	56.8'		
8	302°4.03	54.40	138° 9.55	14.3'	04°26.95	-15.3'	56.8'		
9	317°4.25	• • 55.37	152°42.81	14.2'	04°11.64	-15.3'	56.9'		
10	332°4.47	56.35	167°16.06	14.2'	03°56.29	-15.4'	56.9'		
11	347°4.68 2°4.90	57.32	181°49.29	14.2'	03°40.92	-15.4'	56.9'		
12 13	17°5.12	\$00°58.29 00°59.27	196°22.51 210°55.72	14.2' 14.2'	\$03°25.51 03°10.08	-15.4' -15.5'	57.0' 57.0'		
14	32°5.34	00 59.27 01°0.24	225°28.92	14.2'	03°10.08	-15.5'	57.0'		
15	47°5.55	. 1.21	240°2.10	14.2'	02°39.12	-15.5'	57.0'		
16	62°5.77	2.19	254°35.26	14.1'	02°23.60	-15.5'	57.1'		
17	77°5.98	3.16	269°8.40	14.1'	02°8.06	-15.6'	57.1'		
18	92°6.20	S01°4.13	283°41.53	14.1'	S01°52.49	-15.6'	57.1'		
19	107°6.42 122°6.63	5.10	298°14.63 312°47.72	14.1'	01°36.89 01°21.28	-15.6'	57.1'		
20 21	122°6.63 137°6.85	6.08 •• 7.05	312°47.72 327°20.78	14.1' 14.0'	01°21.28 01°5.65	-15.6' -15.7'	57.2' 57.2'		
22	152°7.07	8.02	321 20.18 341°53.82	14.0'	01 5.05 00°49.99	-15.7'	57.2'		
23	167°7.28	9.00	356°26.83	14.0'	00°34.32	-15.7'	57.3'		
	SD = 15.9'	d = 1.0'			D = 15.4'				
		u — 1.0		اد					
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP		
0 1	182°7.50 197°7.71	S01°9.97 10.94	10°59.82 25°32.78	14.0' 13.9'	\$00°18.63 \$00°2.92	-15.7' -15.7'	57.3' 57.3'		
2	197°7.71 212°7.93	10.94 11.92	40° 5.72	13.9'	N00°12.80	-15.7' 15.7'	57.3'		
3	227°8.15	12.89	54°38.62	13.9'	00°28.54	15.7'	57.4'		
4	242°8.36	13.86	$69^{\circ}11.50$	13.8'	00°44.28	15.8'	57.4'		
5	257°8.58	14.84	83°44.34	13.8'	01°0.04	15.8'	57.4'		
6	272°8.79	S01°15.81	98°17.15	13.8'	N01°15.81	15.8'	57.4'		
7 8	287°9.01 302°9.22	16.78 17.75	112°49.93 127°22.67	13.7' 13.7'	01°31.59 01°47.37	15.8' 15.8'	57.5' 57.5'		
9	317°9.44	. 18.73	141°55.38	13.7'	01 47.37 02°3.17	15.8'	57.5'		
10	332°9.65	19.70	156°28.05	13.6'	02°18.96	15.8'	57.5'		
11	347°9.87	20.67	171°0.68	13.6'	02°34.76	15.8'	57.6'		
12	2° 10.08	S01°21.65	185°33.27	13.6'	N02°50.56	15.8'	57.6'		
13	17° 10.30 32° 10.51	22.62 23.59	200°5.83 214°38.34	13.5' 13.5'	03°6.36 03°22.17	15.8' 15.8'	57.6' 57.6'		
14 15	47° 10.73	. 24.56	214 36.34 229°10.81	13.4	03°22.17 03°37.97	15.8'	57.0 57.7'		
16	62° 10.94	25.54	243°43.23	13.4'	03°53.76	15.8'	57.7'		
17	$77^{\circ}11.16$	26.51	$258^{\circ}15.61$	13.3'	$04^{\circ}9.56$	15.8'	57.7'		
18	92°11.37	S01°27.48	272°47.95	13.3'	N04°25.34	15.8'	57.7'		
19	107° 11.59	28.46	287°20.23	13.2'	04°41.12	15.8'	57.8'		
20 21	122°11.80 137°12.02	29.43 · · 30.40	301°52.47 316°24.66	13.2' 13.1'	04°56.90 05°12.66	15.8' 15.8'	57.8' 57.8'		
22	152° 12.23	31.37	330°56.80	13.1'	05°28.41	15.7	57.8'		
23	167° 12.44	32.35	345°28.88	13.0'	05°44.15	15.7'	57.9'		
	SD = 15.9'	d = 1.0'		SI	D = 15.6'				
•									
Sun 0	<b>GHA</b> 182° 12.66	Dec 501°33.32	<b>GHA</b> 0°0.92	ν 13.0'	<b>Dec</b> N05°59.87	d 15.7'	<b>HP</b> 57.9'		
1	197° 12.87	34.29	14°32.90	12.9'	06°15.58	15.7'	57.9'		
2	212° 13.09	35.27	29°4.82	12.9'	$06^{\circ}31.27$	15.7'	57.9'		
3	227° 13.30	• • 36.24	43°36.69	12.8'	06°46.94	15.7'	58.0'		
4	242° 13.51	37.21	58°8.50	12.8'	07°2.59	15.6'	58.0'		
5 6	257° 13.73 272° 13.94	38.18 <b>S</b> 01°39.16	72°40.25 87°11.94	12.7' 12.6'	07°18.23 N07°33.83	15.6' 15.6'	58.0' 58.0'		
7	287° 14.15	40.13	101°43.57	12.6'	07°49.42	15.6'	58.1		
8	302° 14.37	41.10	116° 15.14	12.5'	08°4.98	15.5'	58.1		
9	317° 14.58	• • 42.07	130°46.65	12.4'	$08^{\circ}20.51$	15.5'	58.1'		
10	332° 14.79	43.05	145°18.09	12.4'	08°36.01	15.5'	58.1'		
11	347° 15.01	44.02	159°49.47	12.3'	08°51.48	15.4'	58.1'		
12 13	2° 15.22 17° 15.43	S01°44.99 45.96	174°20.77 188°52.02	12.2' 12.2'	N09°6.92 09°22.33	15.4' 15.4'	58.2' 58.2'		
14	32° 15.65	45.90 46.94	203°23.19	12.1'	09°22.33	15.4	58.2'		
15	47° 15.86	• • 47.91	217°54.29	12.0'	09°53.04	15.3'	58.2'		
16	62° 16.07	48.88	232°25.33	12.0'	10°8.34	15.3'	58.3'		
17	77°16.28	49.85	246°56.29	11.9'	10°23.60	15.2'	58.3'		
18 19	92° 16.50 107° 16.71	S01°50.83 51.80	261°27.18 275°57.99	11.8' 11.7'	N10°38.81 10°53.99	15.2' 15.1'	58.3' 58.3'		
20	107° 16.71 122° 16.92	51.80 52.77	275°57.99 290°28.73	11.7' 11.7'	10°53.99 11°9.12	15.1' 15.1'	58.3'		
21	137° 17.13	• • 53.74	304°59.39	11.6'	11°24.20	15.0'	58.4		
22	152° 17.34	54.72	319°29.98	11.5'	11°39.24	15.0'	58.4'		
23	167° 17.56	55.69	334°0.48	11.4'	11°54.23	14.9'	58.4'		
	SD = 15.9'	d = 1.0'		SI	D = 15.8'				

Lat.	Twi	light	Sunrise	Sunset	Tw	ilight
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	03:22	04:48	05:56	17:44	18:51	20:17
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	04:04	04:54	05:36	18:08	18:50	19:41

Lat.		Moonris	е		Moonse	t
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°	17:31	16:57	16:18	03:27	05:39	07:56
<b>N</b> 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° 45°	17:15	17:28 17:31	17:43 17:52	04:14	05:31	06:49 06:43
	17:13			04:18	05:30	
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° 20°	17:09 17:07	17:39 17:43	18:10 18:20	04:28 04:33	05:28 05:27	06:29 06:23
N 10°	17:07	17:43	18:28	04:33	05:27	06:23
0°	17:04	17:49	18:36	04:37	05:25	06:11
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	16:49	18:22	19:59	05:17	05:17	05:17

		Sun		Moon			
Day	Eqn.of	f Time	Mer.	Mer.	Age		
Duy	00 <sup>h</sup>	12 <sup>h</sup>	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	Stars
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA
0	6°47.27	153°31.48 <b>S</b> 20°33.55	244°27.60 N21°6.38	225°7.48 N15°40.31	354°52.00 N02°10.53	Alpheratz 357°32.95
1	21°49.73	168°33.54 33.95	259°28.52 6.11	240° 9.49 40.17	9°54.64 10.45	Ankaa 353°5.32
2	36°52.19	183°35.62 34.36	274°29.43 5.83	255°11.50 40.04	24°57.29 10.37	Schedar 349°28.86
3 4	51°54.66 66°57.12	198°37.69 · · 34.76 213°39.77 35.16	289°30.35 · · 5.56 304°31.26 5.29	270°13.51 ··· 39.90 285°15.52      39.76	39°59.93 ·· 10.29 55°2.57 10.22	Diphda 348°45.55
5	81°59.59	228°41.86 35.55	319°32.17 5.02	300°17.53 39.63	70°5.21 10.14	Achernar 335°18.57
6	97°2.05	243°43.94 \$20°35.95	334°33.09 N21°4.74	315°19.54 N15°39.49	85°7.85 N02°10.06	Hamal 327°49.29
7	112°4.51	258°46.03 36.34	349°34.00 4.47	330°21.55 39.35	100°10.50 9.98	Polaris 312°56.37 Acamar 315°10.37
8	127°6.98	273°48.12 36.74	4°34.92 4.20	345°23.56 39.22	115°13.14 9.91	Menkar 314°4.42
9	142°9.44	288°50.22 · · 37.13	19°35.84 · · 3.92	0°25.57 · · 39.08	130°15.78 · · 9.83	Mirfak 308°25.88
10 11	157° 11.91 172° 14.37	303°52.32 37.52 318°54.42 37.90	34°36.75 3.65 49°37.67 3.38	15°27.59 38.94 30°29.60 38.81	145°18.42 9.75 160°21.07 9.67	Aldebaran 290°37.84
12	172 14.37 187°16.83	333°56.53 \$20°38.29	49°37.67 3.38 64°38.59 N21°3.10	30°29.60 38.81 45°31.61 N15°38.67	160°21.07 9.67 175°23.71 N02°9.59	Rigel 281°2.41
13	202° 19.30	348°58.64 38.67	79°39.50 2.83	60°33.62 38.53	190°26.35 9.52	Capella 280°19.66
14	217°21.76	4°0.76 39.06	94°40.42 2.56	75°35.63 38.40	205°28.99 9.44	Bellatrix 278°21.28
15	232°24.23	19°2.87 · · 39.44	109°41.34 · · 2.28	90°37.65 · · 38.26	220°31.64 •• 9.36	Elnath 277° 59.99 Alnilam 275° 36.23
16	247°26.69	34°5.00 39.82	124°42.26 2.01	105°39.66 38.12	235°34.28 9.28	Betelgeuse 270°50.51
17	262°29.15	49°7.12 40.19	139°43.17 1.73 154°44.09 N21°1.46	120°41.67 37.99	250°36.92 9.21	Canopus 263°51.76
18 19	277°31.62 292°34.08	64°9.25 \$20°40.57 79°11.38 40.94	154°44.09 N21°1.46 169°45.01 1.18	135°43.68 N15°37.85 150°45.70 37.71	265°39.56 N02°9.13 280°42.21 9.05	Sirius 258°25.02
20	307°36.55	94°13.51 41.32	184° 45.93 0.91	165°47.71 37.58	295°44.85 8.97	Adhara 255°4.81
21	322°39.01	109°15.65 · · 41.69	199°46.85 · · 0.63	180°49.72 · · 37.44	310°47.49 · · 8.89	Procyon 244°49.45
22	337°41.47	124°17.80 42.06	214°47.77 0.36	195°51.74 37.31	325°50.13 8.82	Pollux 243°15.70 Avior 234°14.48
23	$352^{\circ}43.94$	139°19.94 42.43	229°48.69 0.08	210°53.75 37.17	340°52.78 8.74	Avior 234°14.48 Suhail 222°45.56
Mer r	pass. 23:29	ν2.1' d0.4' m-4.81	$\nu$ 0.9' d-0.3' m1.13	ν2.0' d-0.1' m-1.86	ν2.6' d-0.1' m0.36	Miaplacidus 221°38.61
						Alphard 217°46.60
т	CIIA	CHA De-	CHA D	GHA Dec	GHA Dec	Regulus 207°33.21
Tue 0	<b>GHA</b> 7° 46.40	<b>GHA Dec</b> 154°22.09 \$20°42.79	<b>GHA Dec</b> 244°49.61 N20°59.81	<b>GHA Dec</b> 225°55.77 N15°37.03	<b>GHA Dec</b> 355°55.42 <b>N</b> 02°8.66	Dubhe 193°39.90
1	22°48.87	169°24.24 43.16	259°50.53 59.53	240°57.78 36.90	10°58.06 8.58	Denebola 182°23.83
2	37°51.33	184°26.40 43.52	274°51.45 59.25	255°59.79 36.76	26°0.70 8.50	Gienah 175° 42.46 Acrux 172° 59.23
3	52°53.80	199°28.56 · · 43.88	289°52.37 · · 58.98	271°1.81 · · 36.63	41°3.35 · · 8.43	Gacrux 171°50.66
4	67°56.26	214°30.72 44.24	304°53.30 58.70	286° 3.82 36.49	56°5.99 8.35	Alioth 166°12.28
5	82°58.72	229°32.89 44.60	319°54.22 58.43	301°5.84 36.35	71°8.63 8.27	Spica 158°21.12
6 7	98°1.19 113°3.65	244°35.06 S20°44.95 259°37.23 45.31	334°55.14 N20°58.15 349°56.06 57.87	316°7.85 N15°36.22 331°9.87 36.08	86°11.28 N02°8.19 101°13.92 8.12	Alkaid 152°51.33
8	113 3.05 128°6.12	259°37.23 45.31 274°39.41 45.66	349°56.06 57.87 4°56.98 57.59	331°9.87 36.08 346°11.88 35.95	101°13.92 8.12 116°16.56 8.04	Hadar 148°34.58
9	143°8.58	289°41.59 · · 46.01	19°57.91 · · 57.32	1°13.90 · · 35.81	131°19.20 · · 7.96	Menkent 147°56.30
10	158° 11.04	304°43.78 46.36	34°58.83 57.04	16°15.91 35.67	146°21.85 7.88	Arcturus 145°46.91 Rigil Kent. 139°38.91
11	$173^{\circ}13.51$	319°45.96 46.70	49°59.75 56.76	31°17.93 35.54	161°24.49 7.80	Kochab 137°20.74
12	188° 15.97	334°48.16 \$20°47.05	65°0.68 N20°56.48	46°19.94 N15°35.40	176°27.13 N02°7.73	Zuben'ubi 136°54.72
13	203°18.44	349°50.35 47.39	80°1.60 56.21	61°21.96 35.27	191°29.78 7.65	Alphecca 126°2.78
14 15	218°20.90 233°23.36	4°52.55 47.74 19°54.75 • 48.08	95°2.53 55.93 110°3.45 · · 55.65	76°23.97 35.13 91°25.99 · · 35.00	206°32.42 7.57 221°35.06 •• 7.49	Antares 112°14.27
16	248° 25.83	34°56.96 48.41	125° 4.38 55.37	106°28.00 34.86	236°37.70 7.42	Atria 107°7.40
17	263°28.29	49°59.17 48.75	140°5.30 55.09	121°30.02 34.72	251°40.35 7.34	Sabik 102°1.27 Shaula 96°8.54
18	278°30.76	65°1.38 <b>S</b> 20°49.09	155°6.23 N20°54.81	136°32.04 N15°34.59	266°42.99 N02°7.26	Shaula 96°8.54 Rasalhague 95°57.31
19	293°33.22	80°3.60 49.42	170° 7.16 54.54	151°34.05 34.45	281°45.63 7.18	Eltanin 90°41.59
20	308° 35.68	95°5.82 49.75	185° 8.08 54.26	166°36.07 34.32	296°48.28 7.10	Kaus Aust. 83°30.64
21 22	323°38.15 338°40.61	110°8.04 · · 50.08 125°10.27 50.41	200° 9.01 · · 53.98 215° 9.94 53.70	181°38.09 · · 34.18 196°40.10 34.05	311°50.92 · · 7.03 326°53.56 6.95	Vega 80°32.25
23	353° 43.08	125°10.27 50.41 140°12.50 50.74	230°10.86 53.42	196°40.10 34.05 211°42.12 33.91	326°53.56 6.95 341°56.21 6.87	Nunki 75°45.96
					-	Altair 61°58.47
Mer.p	pass. 23:25	ν2.2′ d0.4′ m-4.80	$\nu$ 0.9' d-0.3' m1.12	ν2.0' d-0.1' m-1.87	ν2.6' d-0.1' m0.36	Peacock 53°3.22 Deneb 49°24.60
						Enif 33°37.17
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°30.76
0	8° 45.54	155°14.74 \$20°51.06	245°11.79 N20°53.14	226°44.14 N15°33.78	356°58.85 N02°6.79	Fomalhaut 15°12.63
1 2	23°48.01 38°50.47	170°16.97 51.38 185°19.22 51.71	260°12.72 52.86 275°13.65 52.58	241°46.16 33.64 256°48.17 33.51	12°1.49 6.72 27°4.14 6.64	Scheat 13°43.50
3	58° 50.47 53° 52.93	200°21.46 · · 52.02	275 13.05 52.58 290°14.57 · · 52.30	271°50.19 · · 33.37	42°6.78 · · 6.56	Markab 13°28.19
4	68° 55.40	215°23.71 52.34	305°15.50 52.02	286°52.21 33.23	57°9.42 6.48	Sep 28 Mon SHA
5	83°57.86	230°25.96 52.66	320°16.43 51.74	301°54.23 33.10	72°12.07 6.40	Venus 146°44.21
6	99°0.33	245°28.22 <b>S</b> 20°52.97	335°17.36 N20°51.46	316°56.25 N15°32.96	87°14.71 N02°6.33	Mars 237°40.34
7	114°2.79	260°30.48 53.28	350°18.29 51.17	331°58.26 32.83	102°17.35 6.25	Jupiter 218°20.21
8 9	129°5.25 144°7.72	275°32.74 53.60 290°35.01 • 53.90	5°19.22 50.89 20°20.15 · · 50.61	347°0.28 32.69 2°2.30 · · 32.56	117°20.00 6.17 132°22.64 • 6.09	Saturn 348° 4.74
10	144 7.72 159°10.18	305°37.28 54.21	20°20.15 · · 50.61 35°21.08 50.33	2°2.30 ·· 32.56 17°4.32 32.42	132°22.64 · · 6.09 147°25.28 6.02	Sep 29 Tue SHA
11	174° 12.65	320°39.56 54.52	50°22.01 50.05	32°6.34 32.29	162°27.93 5.94	Venus 146°35.69
12	189° 15.11	335°41.83 <b>S</b> 20°54.82	65°22.95 N20°49.77	47°8.36 N15°32.15	177°30.57 N02°5.86	Mars 237°3.21 Jupiter 218°9.36
13	204° 17.58	350°44.12 55.12	80°23.88 49.49	62°10.38 32.02	192°33.21 5.78	Jupiter 218°9.36 Saturn 348°9.02
14	219°20.04	5°46.40 55.42	95°24.81 49.20	77°12.40 31.88	207°35.86 5.70	
15 16	234°22.50 249°24.97	20°48.69 · · 55.72 35°50.98 56.02	110°25.74 · · 48.92 125°26.67 48.64	92°14.42 · · 31.75 107°16.43 31.61	222°38.50 · · 5.63 237°41.15 5.55	Sep 30 Wed SHA
17	249 24.97 264°27.43	50°53.28 56.31	125 20.67 48.04 140°27.61 48.36	107 10.43 31.61 122°18.45 31.48	252°43.79 5.47	Venus 146°29.19 Mars 236°26.25
18	279°29.90	65°55.58 \$20°56.60	155°28.54 N20°48.07	137°20.47 N15°31.34	267°46.43 N02°5.39	Jupiter 217°58.60
19	294°32.36	80°57.88 56.89	170°29.47 47.79	152°22.49 31.21	282°49.08 5.32	Saturn 348°13.31
20	309°34.82	96°0.19 57.18	185°30.41 47.51	167°24.52 31.08	297°51.72 5.24	
21	324°37.29	111°2.50 · · 57.47	200°31.34 · · 47.22	182°26.54 · · 30.94	312°54.36 · · 5.16	Horizontal parallax Venus:
22 23	339°39.75 354°42.22	126°4.82 57.75 141°7.14 58.04	215°32.27 46.94 230°33.21 46.66	197°28.56 30.81 212°30.58 30.67	327°57.01 5.08 342°59.65 5.00	Mars:
Mer.p	pass. 23:21	ν2.2′ d0.3′ m-4.79	$\nu 0.9' \ d$ -0.3' m1.12	ν2.0′ d-0.1′ m-1.87	ν2.6' d-0.1' m0.35	

Dec

29°14.47

-42°9.48

56°41 15

-17°50.20

 $-57^{\circ}5.84$ 

 $23^{\circ}35.45$ 

89°22.40

-40°11.56

49°57.30

16°33.85

-8°10.04

 $46^{\circ}1.35$ 

 $6^{\circ}22.55$ 

28°37.76

 $-1^{\circ}10.93$ 

 $7^{\circ}24.82$ 

-52°42.21

-16°44.94

-29°0.22

 $27^{\circ}57.64$ 

-59°35.38

-43°32.18

-69°49.34

-8°46.34

11°50.24

 $61^{\circ}36.32$ 

 $14^{\circ}25.42$ 

 $-17^{\circ}41.35$ 

 $-63^{\circ}14.83$ 

 $-57^{\circ}\,15.76$ 

55°48.92 -11°17.99

49°10.89 -60°30.20

 $-36^{\circ}30.10$ 

 $19^{\circ}2.70$ 

-60°56.86

-16°9.14

26°37.65

-26°29.49

-69°4.73

-15°45.44

 $-37^{\circ}7.45$ 

12°32.61

51°29.39

-34°22.35

38°48.77

-26°15.80

8°56.53

-56°39.04

45°22.83

-46°49.87

-29°28.72

28°13.89

15°21.16

Mer.pass

13:44

07:42

08:58 00:20

13:41

07:40

08:55

00:16

07:39

08:52

00:12

0.4

0.1

Mer.pass 13:37

Mer.pass

 $10^{\circ}0.06$ 

 $5^{\circ}9.47$ 

4°11.84

h	Su	n	Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	182°17.77	S01°56.66	$348^{\circ}30.91$	11.3'	$N12^{\circ}9.16$	14.9'	58.4'
1	197°17.98	57.63	3°1.26	11.3'	12°24.05	14.8'	58.4'
2	212°18.19 227°18.40	58.60 01°59.58	17° 31.53 32° 1.71	11.2' 11.1'	12° 38.88 12° 53.65	14.8' 14.7'	58.5' 58.5'
4	242°18.61	01 39.50 02°0.55	46°31.81	11.0'	12 33.03 13°8.37	14.7'	58.5'
5	257°18.83	1.52	61°1.83	10.9'	13°23.02	14.6'	58.5'
6	272°19.04	502°2.49	75°31.76	10.8'	N13° 37.62	14.5'	58.5'
7	287°19.25 302°19.46	3.47	90°1.61	10.8'	13°52.16	14.5'	58.5'
8 9	302°19.46 317°19.67	4.44 •• 5.41	104°31.37 119°1.04	10.7' 10.6'	14°6.63 14°21.03	14.4' 14.3'	58.6' 58.6'
10	332°19.88	6.38	133° 30.63	10.5	14° 35.37	14.3'	58.6'
11	347°20.09	7.35	148°0.12	10.4'	14°49.63	14.2'	58.6'
12	2°20.30	S02°8.33	162°29.53	10.3'	N15°3.83	14.1'	58.6'
13 14	17°20.51 32°20.72	9.30 10.27	176° 58.84 191° 28.07	10.2' 10.1'	15° 17.95 15° 32.00	14.0' 14.0'	58.7' 58.7'
14 15	47°20.93	10.27	205° 57.20	10.1	15 32.00 15°45.97	14.0 13.9'	58.7'
16	62°21.14	12.21	220°26.23	9.9'	15°59.87	13.8'	58.7'
17	77°21.35	13.18	$234^{\circ}55.17$	9.8'	$16^{\circ}13.68$	13.7'	58.7'
18	92°21.56	S02°14.16	249°24.02	9.8'	N16° 27.42	13.6'	58.7'
19 20	107°21.77 122°21.98	15.13 16.10	263°52.77 278°21.43	9.7' 9.6'	16°41.07 16°54.63	13.6' 13.5'	58.7' 58.8'
21	137°22.19	10.10	270 21.43 292°49.99	9.5'	10 34.03 17°8.11	13.4	58.8'
22	152°22.40	18.04	307° 18.45	9.4'	17°21.50	13.3'	58.8'
23	$167^{\circ}22.61$	19.01	321°46.82	9.3'	$17^{\circ}34.80$	13.2'	58.8'
	SD = 16.0'	d = 1.0'		SE	0 = 15.9'		
_						,	
Tue 0	<b>GHA</b> 182°22.82	Dec 502° 19.99	<b>GHA</b> 336° 15.09	$\nu$ 9.2'	<b>Dec</b> N17° 48.00	d 13.1'	<b>HP</b> 58.8'
1	197°23.03	20.96	350° 43.25	9.2 9.1'	18° 1.12	13.1	58.8'
2	212°23.24	21.93	5°11.32	9.0'	$18^{\circ}14.13$	12.9'	58.9'
3	227°23.45	• • 22.90	19°39.29	8.9'	18° 27.05	12.8'	58.9'
4	242°23.66 257°23.87	23.87 24.84	34°7.16 48°34.93	8.8' 8.7'	18° 39.87 18° 52.59	12.7'	58.9'
5 6	257 23.87 272°24.07	24.84 S02°25.81	48 34.93 63°2.60	8.6'	N19°5.21	12.6' 12.5'	58.9' 58.9'
7	287°24.28	26.79	77°30.16	8.5'	19° 17.72	12.4'	58.9'
8	302°24.49	27.76	91°57.63	8.4'	19°30.13	12.3'	58.9'
9	317°24.70	• • 28.73	106°24.99	8.3'	19°42.42	12.2'	58.9'
10 11	332°24.91 347°25.12	29.70 30.67	120° 52.25 135° 19.41	8.2' 8.1'	19°54.61 20°6.69	12.1' 12.0'	59.0' 59.0'
12	2°25.32	S02°31.64	149° 46.46	8.0'	N20° 18.65	11.8'	59.0'
13	17°25.53	32.61	$164^{\circ}13.42$	7.9'	$20^{\circ}30.49$	11.7'	59.0'
14	32°25.74	33.58	178°40.27	7.7'	20° 42.22	11.6'	59.0'
15 16	47°25.95 62°26.15	· · 34.56 35.53	193°7.02 207°33.66	7.6' 7.5'	20°53.83 21°5.32	11.5' 11.4'	59.0' 59.0'
17	77°26.36	36.50	207 33.00 222°0.21	7.4'	21°16.69	11.2'	59.0'
18	92°26.57	S02°37.47	236°26.65	7.3'	N21°27.93	11.1'	59.0'
19	107°26.78	38.44	250° 52.98	7.2'	21°39.05	11.0'	59.1'
20	122°26.98 137°27.19	39.41 •• 40.38	265° 19.22 279° 45.36	7.1' 7.0'	21°50.04 22°0.90	10.9' 10.7'	59.1' 59.1'
21 22	157 27.19 152°27.40	41.35	279 45.30 294°11.39	6.9'	22° 11.62	10.7	59.1'
23	167°27.60	42.32	308° 37.32	6.8'	22°22.22	10.5'	59.1'
	SD = 16.0'	d = 1.0'		SE	0 = 16.0'		
Wed	GHA	Dec	GHA	ν	Dec	d	НР
0	182°27.81	502°43.29	323°3.15	6.7'	N22° 32.68	10.3'	59.1'
1	197°28.02	44.26	$337^{\circ}28.88$	6.6'	22°43.00	10.2'	59.1'
2	212°28.22	45.23	351°54.51	6.5'	22°53.19	10.0'	59.1'
3 4	227°28.43 242°28.64	· · 46.20 47.17	6° 20.04 20° 45.47	6.4' 6.3'	23°3.23 23°13.14	9.9' 9.8'	59.1' 59.1'
4 5	242 28.04 257°28.84	47.17 48.14	20 45.47 35°10.80	6.2'	23 13.14 23°22.90	9.8 9.6'	59.1'
6	272°29.05	S02°49.12	49°36.04	6.1'	N23°32.52	9.5'	59.2'
7	287°29.25	50.09	64°1.17	6.0'	23°41.99	9.3'	59.2'
8 9	302°29.46 317°29.66	51.06 •• 52.03	78° 26.21 92° 51.16	5.9' 5.9'	23°51.31 24°0.48	9.2' 9.0'	59.2' 59.2'
10	317 29.66 332°29.87	53.00	92°51.16 107°16.01	5.9° 5.8'	24°0.48 24°9.50	9.0 8.9'	59.2' 59.2'
11	347°30.08	53.97	121° 40.77	5.7'	24° 18.37	8.7'	59.2'
12	2°30.28	S02°54.94	136°5.43	5.6'	N24°27.08	8.6'	59.2'
13	17°30.49	55.91	150°30.00	5.5'	24° 35.64	8.4'	59.2'
14 15	32°30.69 47°30.90	56.88 •• 57.85	164°54.48 179°18.88	5.4' 5.3'	24° 44.04 24° 52.28	8.2' 8.1'	59.2' 59.2'
16	62°31.10	58.82	179 18.88 193°43.18	5.2'	25°0.36	7.9'	59.2'
17	77°31.30	02°59.79	208°7.39	5.1'	25°8.28	7.8'	59.2'
18	92°31.51	S03°0.76	222°31.52	5.0'	N25°16.04	7.6'	59.2'
19 20	107°31.71 122°31.92	1.73 2.70	236° 55.57 251° 19.53	5.0' 4.9'	25°23.63 25°31.05	7.4' 7.3'	59.2' 59.2'
20	122°31.92 137°32.12	. 3.66	251° 19.53 265° 43.41	4.9° 4.8'	25°31.05 25°38.31	7.3	59.2' 59.2'
22	152°32.32	4.63	280°7.21	4.7'	25° 45.40	6.9	59.3'
23	167°32.53	5.60	294°30.93	4.6'	25°52.31	6.7'	59.3'
	SD = 16.0'	d = 1.0'		SE	0 = 16.1'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	03:38	05:02	06:10	17:29	18:36	19:58
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 60°	03:53	04:45	05:27	18:15	18:57	19:49

Lat.		Moonris	е		Moonset	:
Lut.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°	15:18			10:41		
N 70°	15:53			10:07		
68°	16:19	15:27		09:43	12:25	
66°	16:39	16:12		09:24	11:41	
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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	21:42	23:31		05:17	05:19	05:23

		Sun			Moon	
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	17-19
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	98-87%
28	09:11	09:21	11:51	00:48	13:13	
29	09:31	09:41	11:50	01:38	14:06	
30	09:51	10:01	11:50	02:34	15:03	

## October 01, 02, 03 UT (Thu., Fri., Sat.)

h	Aries	<b>V</b> e	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	9°44.68	156°9.46	S20°58.32	245°34.14	N20°46.37	227°32.60	N15°30.54	358°2.29	N02°4.93			
1	$24^{\circ}47.15$	171°11.78	58.60	260°35.08	46.09	242°34.62	30.40	13°4.94	4.85	Alpheratz Ankaa	357°32.94 353°5.32	29°14.48 -42°9.49
2	39°49.61	186°14.11	58.88	275°36.01	45.81	257°36.64	30.27	28°7.58	4.77	Schedar	349° 28.84	56°41.17
3	54° 52.07	201°16.45	• • 59.15	290°36.95	• • 45.52	272°38.66	30.13	43°10.23	• • 4.69	Diphda	348° 45.54	-17°50.20
4 5	69° 54.54 84° 57.00	216° 18.78 231° 21.12	59.43 20°59.70	305°37.89 320°38.82	45.24 44.95	287°40.68 302°42.70	30.00 29.86	58°12.87 73°15.51	4.62 4.54	Achernar	$335^{\circ}18.56$	-57° 5.85
6	99°59.47	246° 23.47	\$20°59.70	335°39.76	N20°44.67	317°44.73	N15°29.73	88° 18.16	N02°4.46	Hamal	327°49.27	23°35.45
7	115°1.93	261°25.82	0.24	350°40.70	44.38	332°46.75	29.60	103°20.80	4.38	Polaris	312°54.91	89°22.41
8	130°4.39	276°28.17	0.51	5°41.63	44.10	347°48.77	29.46	118°23.45	4.31	Acamar Menkar	315°10.35 314°4.40	-40°11.57 4°11.84
9	145°6.86	291°30.52	• • 0.77	20°42.57	• • 43.81	2°50.79	• • 29.33	133°26.09	• • 4.23	Mirfak	308°25.84	49°57.31
10	160°9.32	306°32.88	1.04	35°43.51	43.53	17°52.81	29.19	148°28.73	4.15	Aldebaran	290°37.82	16°33.85
11 12	175° 11.79 190° 14.25	321°35.24 336°37.61	1.30 \$21°1.56	50°44.45 65°45.39	43.24 N20°42.96	32°54.84 47°56.86	29.06 N15°28.92	163°31.38 178°34.02	4.07 N02°3.99	Rigel	281°2.39	-8°10.04
13	205° 16.72	351°39.98	1.81	80°46.33	42.67	62°58.88	28.79	176 34.02 193°36.67	3.92	Capella	280° 19.63	46°1.36
14	220° 19.18	6°42.35	2.07	95°47.26	42.39	78° 0.91	28.66	208°39.31	3.84	Bellatrix	278°21.25	6°22.55
15	235°21.64	21°44.73	• • 2.32	110°48.20	• • 42.10	93°2.93	• • 28.52	223°41.95	• • 3.76	Elnath	277°59.96	28°37.76 -1°10.94
16	$250^{\circ}24.11$	$36^{\circ}47.11$	2.58	125°49.14	41.81	108° 4.95	28.39	238°44.60	3.68	Alnilam Betelgeuse	275°36.20 270°50.49	7°24.82
17	265° 26.57	51°49.50	2.83	140°50.08	41.53	123°6.98	28.25	253°47.24	3.61	Canopus	263°51.73	-52°42.21
18	280°29.04	66°51.89	\$21°3.08	155°51.02	N20°41.24	138° 9.00	N15°28.12	268°49.89	N02°3.53	Sirius	258°24.99	-16°44.94
19 20	295°31.50 310°33.96	81°54.28 96°56.68	3.32 3.57	170°51.97 185°52.91	40.95 40.67	153°11.02 168°13.05	27.99 27.85	283°52.53 298°55.17	3.45 3.37	Adhara	255°4.78	-29°0.22
21	325° 36.43	111°59.08	• • 3.81	200°53.85	• • 40.38	183°15.07	• • 27.72	313°57.82	• • 3.30	Procyon	244°49.43	5°9.47
22	340°38.89	127°1.48	4.05	215°54.79	40.09	198°17.10	27.58	329°0.46	3.22	Pollux	243°15.68	27°57.63
23	355°41.36	142°3.89	4.29	230°55.73	39.81	213°19.12	27.45	344°3.11	3.14	Avior Suhail	234°14.44 222°45.54	-59°35.38 -43°32.17
Meri	pass. 23:17	v2 3' d0	3′ m-4.78	ν0 9' d-0	0.3' m1.11	ν2 0' d-0	.1' m-1.87	$\nu$ 2.6' d-0	1′ m0 35	Miaplacidus	221°38.57	-43 32.17 -69°49.33
	pass. 25.11	ν2.3 do.				ν2.0 d 0		- V Z.O U O	1110.55	Alphard	217°46.58	-8°46.34
	CIIA	CIIA	Б.	CIIA		CIIA	Б	CIIA	Б	Regulus	207°33.19	11°50.23
Fri 0	<b>GHA</b> 10° 43.82	<b>GHA</b> 157°6.30	<b>Dec</b> \$21° 4.53	<b>GHA</b> 245°56.67	<b>Dec</b> N20°39.52	<b>GHA</b> 228°21.14	<b>Dec</b> N15° 27.32	<b>GHA</b> 359°5.75	<b>Dec</b> N02°3.06	Dubhe	193°39.88	61°36.30
1	25° 46.29	172°8.71	4.76	260°57.62	39.23	243°23.17	27.18	14°8.39	2.98	Denebola	182°23.82	14°25.41
2	40°48.75	187°11.13	4.99	275°58.56	38.94	258°25.19	27.05	29°11.04	2.91	Gienah	175°42.46 172°59.21	-17°41.35
3	55°51.21	$202^{\circ}13.55$	• • 5.23	290°59.50	• • 38.65	273°27.22	• • 26.92	44°13.68	• • 2.83	Acrux Gacrux	172 59.21 171°50.65	-63°14.82 -57°15.75
4	70°53.68	$217^{\circ}15.98$	5.45	306°0.45	38.37	288°29.24	26.78	59°16.33	2.75	Alioth	166° 12.28	55°48.91
5	85°56.14	232°18.41	5.68	321°1.39	38.08	303°31.27	26.65	74°18.97	2.67	Spica	158°21.12	-11°17.99
6 7	100°58.61 116°1.07	247°20.84 262°23.28	\$21°5.91 6.13	336°2.33 351°3.28	N20°37.79 37.50	318°33.29 333°35.32	N15° 26.52 26.38	89°21.62 104°24.26	N02°2.60 2.52	Alkaid	$152^{\circ}51.34$	$49^{\circ}10.87$
8	131°3.53	202 25.26 277°25.72	6.35	6° 4.22	37.50	348° 37.35	26.25	104 24.20 119°26.90	2.52	Hadar	148°34.58	-60°30.19
9	146°6.00	292°28.16	• • 6.57	21°5.17	36.92	3°39.37	26.11	134°29.55	. 2.36	Menkent	147°56.30	-36°30.10
10	161°8.46	307°30.61	6.79	$36^{\circ}6.11$	36.64	18°41.40	25.98	149°32.19	2.29	Arcturus Rigil Kent.	145°46.92 139°38.91	19°2.70 -60°56.85
11	$176^{\circ}10.93$	322°33.07	7.01	51°7.06	36.35	33°43.42	25.85	164°34.84	2.21	Kochab	137°20.79	74°2.83
12	191°13.39	337°35.52	S21°7.22	66°8.01	N20°36.06	48°45.45	N15°25.71	179°37.48	N02°2.13	Zuben'ubi	136°54.72	-16°9.13
13 14	206° 15.86 221° 18.32	352°37.98 7°40.45	7.43 7.64	81°8.95 96°9.90	35.77 35.48	63°47.48 78°49.50	25.58 25.45	194°40.13 209°42.77	2.05 1.98	Alphecca	126°2.79	26°37.64
15	236° 20.78	22°42.91	· · 7.85	111°10.84	35.19	93°51.53	25.32	209 42.77 224°45.41	• • 1.90	Antares	112°14.28	-26°29.49
16	251°23.25	37°45.38	8.06	126°11.79	34.90	108°53.56	25.18	239°48.06	1.82	Atria	107°7.43	-69°4.72
17	$266^{\circ}25.71$	52°47.86	8.26	141°12.74	34.61	123°55.59	25.05	254°50.70	1.74	Sabik Shaula	102°1.27 96°8.55	-15°45.44 -37°7.45
18	281°28.18	67°50.34	S21°8.46	156°13.69	N20°34.32	138°57.61		269°53.35	N02°1.66	Rasalhague	95°57.32	12°32.61
19	296°30.64	82°52.82	8.66	171°14.64	34.03	153°59.64	24.78	284°55.99	1.59	Eltanin	90°41.61	51°29.39
20 21	311°33.11 326°35.57	97°55.31 112°57.80	8.86 •• 9.06	186°15.58 201°16.53	33.74 •• 33.45	169° 1.67 184° 3.70	24.65 •• 24.52	299°58.64 315°1.28	1.51 •• 1.43	Kaus Aust.	83°30.65	-34°22.35
22	341°38.03	128°0.29	9.25	216°17.48	33.16	199°5.72	24.38	330°3.93	1.45	Vega	80°32.27	38°48.78
23	356° 40.50	143°2.79	9.45	231°18.43	32.86	214°7.75	24.25	345°6.57	1.28	Nunki	75°45.97	-26°15.80 8°56.53
	pass. 23:13		2′ m-4.77		0.3' m1.10		.1' m-1.88	$\nu 2.6' d-0$		Altair Peacock	61°58.48 53°3.24	-56°39.04
IVICI.	puss. 23.13	ν2. <del>4</del> α0.		νσ.σ u-0	1111.10	ν2.0 u-0		ν2.0 u-0	1110.54	Deneb	49°24.61	45°22.84
_	C114	<b></b>		e	-	<b></b>		6115	ь.	Enif	$33^{\circ}37.17$	$10^{\circ}0.07$
Sat 0	<b>GHA</b> 11° 42.96	<b>GHA</b> 158°5.29	<b>Dec</b> \$21° 9.64	<b>GHA</b> 246°19.38	<b>Dec</b> N20°32.57	<b>GHA</b> 229° 9.78	<b>Dec</b> N15°24.12	<b>GHA</b> 0°9.21	<b>Dec</b> N02°1.20	Al Na'ir	27°30.77	-46°49.88
1	26° 45.43	173° 7.79	9.83	240 19.36 261°20.33	32.28	244°11.81	23.98	15°11.86	1.12	Fomalhaut	15°12.63	-29°28.73
2	41°47.89	188° 10.30	10.01	276°21.28	31.99	259°13.84	23.85	30°14.50	1.04	Scheat Markab	13°43.50 13°28.18	28°13.90 15°21.16
3	$56^{\circ}50.35$	203°12.81	• • 10.20	291°22.23	• • 31.70	$274^{\circ}15.87$	• • 23.72	$45^{\circ}17.15$	• • 0.97			
4	71°52.82	218° 15.33	10.38	306°23.18	31.41	289°17.89	23.59	60°19.79	0.89	Oct 01 Thu	SHA	Mer.pass
5	86°55.28	233°17.85	10.56	321°24.13	31.12	304°19.92	23.45	75°22.44	0.81	Venus Mars	146°24.78 235°49.46	13:33
6 7	101° 57.75 117° 0.21	248°20.38 263°22.90	\$21°10.74 10.92	336°25.09 351°26.04	N20°30.82 30.53	319°21.95 334°23.98	N15°23.32 23.19	90°25.08 105°27.73	N02°0.73 0.66		235 49.46 217°47.92	07:37 08:49
8	117 0.21 132°2.68	203 22.90 278° 25.43	11.09	6°26.99	30.53	349°26.01	23.19	105 27.73 120°30.37	0.00	Saturn	348° 17.61	00:49
9	147°5.14	293°27.97	• • 11.26	21°27.94	• • 29.95	4°28.04	• • 22.92	135°33.02	• • 0.50	0 . 00 5 :		
10	162°7.60	308°30.51	11.43	36°28.90	29.65	19°30.07	22.79	150°35.66	0.42	Oct 02 Fri	<b>SHA</b> 146°22.48	Mer.pass 13:29
11	177° 10.07	323°33.05	11.60	51°29.85	29.36	34°32.10	22.66	165°38.30	0.35		235° 12.85	07:36
12 13	192° 12.53 207° 15.00	338°35.60 353°38.15	\$21°11.77 11.93	66°30.80 81°31.76	N20°29.07 28.78	49°34.13 64°36.16	N15°22.53	180°40.95 195°43.59	N02°0.27	Jupiter		08:45
13 14	207° 15.00 222° 17.46	353°38.15 8°40.70	11.93	96°32.71	28.78 28.48	79°38.19	22.39 22.26	195°43.59 210°46.24	0.19 0.11	Saturn	348°21.93	00:04
15	237° 19.92	23°43.26	12.26	111°33.67	28.19	94°40.22	22.13	225°48.88	• • 0.04	Oct 03 Sat	SHA	Mer.pass
16	252°22.39	38°45.82	12.42	126°34.62	27.90	109°42.25	22.00	240°51.53	01°59.96		146°22.33	13:25
17	267°24.85	53°48.39	12.57	141°35.58	27.60	124°44.28	21.86	255°54.17	01°59.88	Mars	234°36.42	07:34
18	282°27.32	68°50.96	\$21°12.73	156°36.53	N20°27.31	139°46.32		270°56.82	N01°59.80	Jupiter		08:42
19 20	297° 29.78 312° 32.25	83°53.53 98°56.11	12.88 13.03	171°37.49 186°38.44	27.01 26.72	154°48.35 169°50.38	21.60 21.47	285°59.46 301°2.11	59.73 59.65	Saturn	348°26.25	23:55
21	312 32.25 327°34.71	98 56.11 113°58.69	13.03	201°39.40	26.43	184°52.41	21.47	301 2.11 316°4.75	59.65 •• 59.57	Horizoi	ıtal parallax	
22	342° 37.17	129°1.28	13.33	216°40.36	26.13	199°54.44	21.20	331°7.40	59.49		Venus:	0.4
23	357° 39.64	144°3.87	13.47	231°41.31	25.84	214°56.47	21.07	346°10.04	59.42		Mars:	0.1
Mer.ı	pass. 23:09	$\nu 2.5' d0.$	2′ m-4.76	$\nu 1.0' \ d-0$	0.3′ m1.10	$\nu$ 2.0′ d-0	0.1′ m-1.88	$\nu$ 2.6′ d-0	.1′ m0.33			
						_		_				

h	Su	n	Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	182°32.73	S03°6.57	308°54.57	4.6'	N25°59.06	6.6'	59.3'
1 2	197°32.94 212°33.14	7.54 8.51	323°18.13 337°41.62	4.5' 4.4'	26°5.64 26°12.03	6.4' 6.2'	59.3' 59.3'
3	212 33.14 227°33.34	• • 9.48	352° 5.04	4.3'	26°18.26	6.0'	59.3'
4	242°33.55	10.45	$6^{\circ}28.39$	4.3'	$26^{\circ}24.31$	5.9'	59.3'
5	257°33.75	11.42	20°51.67	4.2'	26°30.18	5.7'	59.3'
6 7	272°33.95 287°34.15	S03°12.39 13.36	35°14.88 49°38.03	4.1' 4.1'	N26°35.87 26°41.38	5.5' 5.3'	59.3' 59.3'
8	302°34.36	14.33	64°1.12	4.0'	26°46.71	5.1'	59.3'
9	317°34.56	• • 15.30	$78^{\circ}24.14$	4.0'	$26^{\circ}51.86$	5.0'	59.3'
10	332°34.76 347°34.96	16.27 17.23	92°47.10 107°10.01	3.9' 3.9'	26°56.83 27°1.61	4.8' 4.6'	59.3'
11 12	2°35.17	503°18.20	107 10.01 121°32.86	3.8'	N27°6.21	4.4	59.3' 59.3'
13	17°35.37	19.17	135°55.66	3.7'	27°10.63	4.2'	59.3'
14	32°35.57	20.14	150°18.40	3.7'	27°14.85	4.0'	59.3'
15 16	47°35.77 62°35.97	· · 21.11 22.08	164°41.10 179°3.76	3.7' 3.6'	27°18.89 27°22.74	3.9' 3.7'	59.3' 59.3'
17	77°36.17	23.05	193°26.36	3.6'	27°26.41	3.5'	59.3'
18	92°36.37	S03°24.01	207°48.93	3.5'	N27°29.88	3.3'	59.3'
19 20	107°36.58 122°36.78	24.98 25.95	222°11.46 236°33.95	3.5' 3.5'	27°33.16 27°36.26	3.1' 2.9'	59.3' 59.3'
21	122 36.78 137°36.98	25.95 •• 26.92	250°56.41	3.5 3.4'	27°39.16	2.9 2.7'	59.3'
22	152°37.18	27.89	265°18.83	3.4'	27°41.87	2.5'	59.3'
23	167°37.38	28.86	279°41.22	3.4'	27°44.38	2.3'	59.3'
	SD = 16.0'	d = 1.0'		SI	O = 16.2'		
Fri	GHA	Dec	GHA	ν	Dec	d	НР
0	182°37.58	S03°29.82	294°3.59	3.3'	$N27^{\circ}46.71$	2.1'	59.3'
1 2	197°37.78 212°37.98	30.79 31.76	308°25.93 322°48.25	3.3' 3.3'	27°48.84 27°50.78	1.9' 1.7'	59.3' 59.3'
3	212°37.98 227°38.18	32.73	322°48.25 337°10.55	3.3'	27°50.78 27°52.52	1.7	59.3'
4	242°38.38	33.70	351°32.84	3.3'	27°54.07	1.4'	59.3
5	257° 38.58	34.66	5°55.11	3.3'	27°55.43	1.2'	59.3'
6 7	272°38.78 287°38.98	S03°35.63 36.60	20°17.36 34°39.61	3.2' 3.2'	N27°56.59 27°57.55	1.0' 0.8'	59.3' 59.3'
8	302°39.18	37.57	49°1.85	3.2'	27°58.32	0.6	59.3'
9	317°39.38	• • 38.53	63°24.09	3.2'	27°58.90	0.4'	59.3'
10	332°39.58	39.50	77°46.32	3.2'	27°59.28	0.2'	59.3'
11 12	347°39.77 2°39.97	40.47 \$03°41.44	92°8.56 106°30.80	3.2' 3.2'	27°59.46 N27°59.45	-0.0' -0.2'	59.3' 59.3'
13	17° 40.17	42.40	120°53.04	3.3'	27°59.25	-0.4	59.3'
14	32° 40.37	43.37	135°15.30	3.3'	27°58.84	-0.6'	59.3'
15 16	47°40.57 62°40.77	· · 44.34 45.31	149°37.56 163°59.84	3.3' 3.3'	27°58.25 27°57.46	-0.8' -1.0'	59.3' 59.3'
17	77°40.96	46.27	178°22.14	3.3'	27°56.47	-1.2	59.3
18	92°41.16	S03°47.24	192°44.45	3.3'	N27°55.30	-1.4'	59.3'
19	107°41.36	48.21	207°6.79 221°29.15	3.4' 3.4'	27°53.92 27°52.36	-1.6'	59.3'
20 21	122°41.56 137°41.75	49.17 •• 50.14	221°29.15 235°51.53	3.4' 3.4'	27°52.36 27°50.60	-1.8' -2.0'	59.3' 59.3'
22	152°41.95	51.11	250°13.95	3.4'	27°48.65	-2.1'	59.2'
23	167° 42.15	52.07	264°36.39	3.5'	27°46.51	-2.3'	59.2'
	SD = 16.0'	d = 1.0'		SI	O = 16.2'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182° 42.35	S03°53.04	278°58.88	3.5'	N27°44.17	-2.5'	59.2'
1 2	197° 42.54 212° 42.74	54.01 54.97	293°21.39 307°43.95	3.6' 3.6'	27°41.64 27°38.93	-2.7' -2.9'	59.2' 59.2'
3	212°42.74 227°42.94	54.97 •• 55.94	307°43.95 322°6.54	3.6'	27°38.93 27°36.02	-2.9 -3.1'	59.2' 59.2'
4	242°43.13	56.90	$336^{\circ}29.18$	3.7'	27°32.93	-3.3'	59.2'
5	257° 43.33	57.87	350°51.87	3.7'	27°29.64	-3.5'	59.2'
6 7	272°43.52 287°43.72	\$03°58.84 03°59.80	5°14.60 19°37.39	3.8' 3.8'	N27°26.17 27°22.51	-3.7' -3.8'	59.2' 59.2'
8	302°43.92	04° 0.77	34°0.22	3.9'	27°18.67	-4.0'	59.2
9	317°44.11	. 1.73	48°23.11	3.9'	27°14.64	-4.2'	59.2'
10 11	332°44.31 347°44.50	2.70 3.66	62°46.06 77°9.06	4.0' 4.1'	27°10.42 27°6.03	-4.4' -4.6'	59.2' 59.2'
12	2°44.70	504° 4.63	91°32.13	4.1'	N27°1.45	-4.6 -4.8'	59.2'
13	17° 44.89	5.60	$105^{\circ}55.25$	4.2'	26°56.68	-4.9'	59.2'
14	32°45.09	6.56	120°18.45	4.3'	26°51.74 26°46.62	-5.1'	59.2'
15 16	47° 45.28 62° 45.48	· · 7.53 8.49	134°41.70 149°5.03	4.3' 4.4'	26°46.62 26°41.32	-5.3' -5.5'	59.2' 59.2'
17	77° 45.67	9.46	163°28.43	4.5	26°35.84	-5.7'	59.1
18	92°45.86	S04°10.42	177°51.90	4.5'	N26°30.19	-5.8'	59.1'
19 20	107°46.06 122°46.25	11.39 12.35	192°15.44 206°39.06	4.6' 4.7'	26°24.36 26°18.36	-6.0' -6.2'	59.1' 59.1'
21	122 46.25 137°46.45	• • 13.32	200 39.00 221°2.75	4.7 4.8'	26°12.18	-6.3'	59.1'
22	152° 46.64	14.28	235°26.52	4.9'	26°5.84	-6.5'	59.1'
23	167°46.83	15.25	249°50.37	4.9'	25°59.32	-6.7'	59.1'
	SD = 16.0'	d = 1.0'		SI	D = 16.2'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	03:43	04:35	05:18	18:22	19:05	19:58

Lat.		Moonris	е		Moonset	
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
<b>N</b> 70°						
68°						
66°						
64°						
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° N 10°	21:34 21:58	22:37 23:01	23:42	10:32	11:37	12:37 12:14
0°	21:58	23:01		10:09 09:48	11:13 10:50	12:14
				ł		
<b>S</b> 10°	22:42	23:45		09:26	10:28	11:31
20° 30°	23:06 23:34	••••	00:09	09:03	10:04	11:08
35°	23:54		00:37 00:53	08:37 08:21	09:36 09:19	10:41 10:25
40°	25:51	00:10	01:13	08:03	08:59	10:25
45°		00:10	01:36	07:41	08:36	09:43
<b>S</b> 50° 52°	00:00	01:04 01:19	02:05 02:20	07:13 07:00	08:06 07:51	09:14 09:00
54°	00:00	01:19	02:20	06:44	07:51	09:00
56°	00:13	01:57	02:57	06:26	07:33	08:24
58°	00:55	02:23	03:22	06:04	06:46	07:59
<b>S</b> 60°	01:23	03:00	03:56	05:35	06:09	07:25

		Sun		Moon			
Day	Eqn.o	Eqn.of Time		Mer.Pass.		Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	20-22	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	78-57%	
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	Stars
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA
0	12° 42.10	159°6.46 \$21°13.61	246°42.27 N20°25.54	229°58.51 N15°20.94	1°12.69 N01°59.34	
1	27° 44.57	174°9.05 13.75	261°43.23 25.25	245° 0.54 20.81	16°15.33 59.26	Alpheratz 357°32.94
2	42° 47.03	189°11.65 13.89	276°44.19 24.95	260°2.57 20.68	31°17.98 59.19	Ankaa 353°5.31
3	57° 49.49	204°14.26 · · 14.03	291°45.14 · · 24.66	275° 4.60 · · 20.54	46°20.62 · · 59.11	Schedar 349° 28.83
4	72°51.96	219° 16.87 14.16	306°46.10 24.36	290°6.64 20.41	61°23.26 59.03	Diphda 348°45.53
5	87°54.42	234°19.48 14.29	321°47.06 24.07	305°8.67 20.28	76°25.91 58.95	Achernar 335° 18.54
6	102°56.89	249°22.09 S21°14.42	336°48.02 N20°23.77	320°10.70 N15°20.15	91°28.55 N01°58.88	Hamal 327° 49.25
7	117°59.35	264°24.71 14.55	351°48.98 23.48	335°12.73 20.02	106°31.20 58.80	Polaris 312°53.63
8	133°1.82	279°27.34 14.68	6°49.94 23.18	350°14.77 19.89	121°33.84 58.72	Acamar 315°10.33
9	148°4.28	294°29.96 · · 14.80	21°50.90 · · 22.88	5°16.80 · · 19.75	136°36.49 · · 58.64	Menkar 314°4.38
10	163°6.74	309°32.59 14.92	36°51.86 22.59	20°18.84 19.62	151°39.13 58.57	Mirfak 308°25.81 Aldebaran 290°37.79
11	$178^{\circ}9.21$	324°35.23 15.04	51°52.82 22.29	35°20.87 19.49	166°41.78 58.49	Rigel 281°2.36
12	193°11.67	339°37.87 <b>S</b> 21°15.16	66°53.78 N20°22.00	50°22.90 N15°19.36	181°44.42 N01°58.41	Capella 280° 19.59
13	208°14.14	354°40.51 15.28	81°54.74 21.70	65°24.94 19.23	196°47.07 58.33	Bellatrix 278°21.23
14	223° 16.60	9°43.16 15.39	96°55.71 21.40	80°26.97 19.10	211°49.71 58.26	Elnath 277°59.93
15	238° 19.06	24°45.81 · · 15.50	111°56.67 · · 21.11	95°29.01 · · 18.96	226°52.36 · · 58.18	Alnilam 275°36.17
16	253°21.53	39°48.46 15.61	126°57.63 20.81	110°31.04 18.83	241°55.00 58.10	Betelgeuse 270°50.46
17	268°23.99	54°51.12 15.72	141°58.59 20.51	125°33.08 18.70	256°57.65 58.03	Canopus 263°51.70
18	283°26.46	69°53.78 S21°15.82	156°59.56 N20°20.21	140°35.11 N15°18.57	272°0.29 N01°57.95	Sirius 258°24.96
19	298°28.92	84°56.44 15.92	172°0.52 19.92	155°37.15 18.44	287°2.94 57.87	Adhara 255° 4.75
20 21	313°31.39 328°33.85	99°59.11 16.02 115°1.79 · · 16.12	187°1.48 19.62 202°2.45 · · 19.32	170°39.18 18.31 185°41.22 · · 18.18	302°5.58 57.79 317°8.23 • 57.72	Procyon 244°49.40
22	343°36.31	130°4.46 16.22	202 2.45 · · 19.32 217° 3.41	200°43.25 18.05	317 8.23 7 57.72 332°10.87 57.64	Pollux 243°15.64
23	358° 38.78	145°7.14 16.31	232°4.38 18.73	215°45.29 17.92	347°13.52 57.56	Avior 234°14.41
	330 30.70					Suhail 222° 45.51
Mer.p	bass. 23:05	$ u 2.6' \ d0.1' \ \text{m-4.74}$	$ u 1.0' \ d$ -0.3' m $1.09$	$ u 2.0' \ d$ -0.1' m-1.88	$\nu 2.6' \ d$ -0.1' m0.33	Miaplacidus 221°38.53
						Alphard 217° 46.55
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.17
0	13°41.24	160°9.83 <b>S</b> 21°16.41	247°5.34 N20°18.43	230°47.32 N15°17.78	2°16.16 N01°57.48	Dubhe 193°39.85
1	28° 43.71	175° 12.52 16.50	262°6.31 18.13	245°49.36 17.65	17°18.81 57.41	Denebola 182°23.81
2	43°46.17	190°15.21 16.59	277°7.27 17.83	260°51.40 17.52	32°21.45 57.33	Gienah 175° 42.44
3	58° 48.63	205°17.90 · · 16.67	292°8.24 · · 17.53	275°53.43 · · 17.39	47°24.09 · · 57.25	Acrux 172°59.20
4	73°51.10	220°20.60 16.76	307° 9.20 17.23	290°55.47 17.26	62°26.74 57.18	Gacrux 171°50.64 Alioth 166°12.27
5	88°53.56	235°23.31 16.84	322°10.17 16.94	305°57.51 17.13	77°29.38 57.10	Alioth 166°12.27 Spica 158°21.11
6	103°56.03	250°26.02 S21°16.92	337°11.14 N20°16.64	320°59.54 N15°17.00	92°32.03 N01°57.02	Alkaid 152°51.34
7	118°58.49	265°28.73 16.99	352°12.10 16.34	336°1.58 16.87	107°34.67 56.94	Hadar 148°34.58
8	134°0.96	280°31.44 17.07	7°13.07 16.04	351°3.62 16.74	122°37.32 56.87	Menkent 147° 56.30
9	149°3.42	295°34.16 · · 17.14	22°14.04 · · 15.74	6°5.66 · · 16.61	137°39.96 · · 56.79	Arcturus 145°46.91
10	164°5.88	310°36.88 17.21	37°15.01 15.44	21°7.69 16.48	152°42.61 56.71	Rigil Kent. 139°38.91
11	179°8.35	325°39.61 17.28	52°15.98 15.14	36° 9.73 16.35	167°45.25 56.64	Kochab 137°20.82
12	194° 10.81	340°42.34 <b>S</b> 21°17.35	67°16.95 N20°14.84	51°11.77 N15°16.21	182°47.90 N01°56.56	Zuben'ubi 136° 54.72
13	209° 13.28	355°45.08 17.41	82°17.91 14.54	66°13.81 16.08	197°50.54 56.48	Alphecca 126°2.80
14	224° 15.74	10°47.81 17.48	97°18.88 14.24	81°15.84 15.95	212°53.19 56.40	Antares 112° 14.28
15	239° 18.20	25°50.56 · · 17.54	112°19.85 · · 13.94	96°17.88 · · 15.82	227°55.83 · · 56.33	Atria 107°7.45
16 17	254°20.67 269°23.13	40°53.30 17.59	127°20.82 13.64 142°21.79 13.34	111°19.92 15.69	242°58.48 56.25 258°1.12 56.17	Sabik 102°1.28
18	284°25.60	55°56.05 17.65 70°58.81 \$21°17.70	142°21.79 13.34 157°22.76 N20°13.04	126°21.96 15.56 141°24.00 N15°15.43	258°1.12 56.17 273°3.77 N01°56.10	Shaula 96°8.55
19	299°28.06	86°1.56 17.75	172°23.74 12.74	156°26.04 15.30	288°6.41 56.02	Rasalhague 95°57.33
20	314°30.52	101°4.32 17.80	187°24.71 12.44	171°28.08 15.17	303°9.06 55.94	Eltanin 90°41.64
21	329° 32.99	116°7.09 · · 17.85	202°25.68 · · 12.14	186°30.12 · · 15.04	318°11.70 · · 55.87	Kaus Aust. 83°30.66
22	344° 35.45	131°9.86 17.90	217°26.65 11.84	201°32.16 14.91	333°14.35 55.79	Vega 80°32.28
23	359°37.92	146° 12.63 17.94	232°27.62 11.54	216°34.20 14.78	348°16.99 55.71	Nunki 75°45.98
						Altair 61°58.49
Mer.p	bass. 23:01	$\nu 2.7' \ d0.1' \ \text{m-4.72}$	$\nu 1.0' \ d$ -0.3' m1.08	ν2.0′ d-0.1′ m-1.89	$\nu 2.6' \ d$ -0.1' m0.33	Peacock 53°3.25 Deneb 49°24.63
						Deneb 49°24.63 Enif 33°37.17
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°30.77
0	14°40.38	161°15.41 <b>S</b> 21°17.98	247°28.60 N20°11.23	231°36.24 N15°14.65	3°19.64 N01°55.63	Fomalhaut 15°12.62
1	$29^{\circ}42.85$	176° 18.19 18.02	262°29.57 10.93	246°38.28 14.52	18°22.28 55.56	Scheat 13°43.50
2	44° 45.31	191°20.97 18.05	277°30.54 10.63	261°40.32 14.39	33°24.93 55.48	Markab 13°28.18
3	59° 47.77	206°23.76 · · 18.09	292°31.52 · · 10.33	276°42.36 · · 14.26	48°27.57 •• 55.40	
4	74°50.24	221°26.55 18.12	307°32.49 10.03	291°44.40 14.13	63°30.22 55.33	Oct 04 Sun SHA
5	89°52.70	236°29.35 18.15	322°33.46 9.73	306°46.44 14.00	78°32.86 55.25	Venus 146°24.36
6	104°55.17	251°32.15 S21°18.18	337°34.44 N20°9.42	321°48.48 N15°13.87	93°35.51 N01°55.17	Mars 234°0.17 Jupiter 217°16.40
7	119°57.63	266°34.95 18.20	352°35.41 9.12	336°50.52 13.74	108°38.15 55.10	
8 9	135°0.09 150°2.56	281°37.76 18.22 296°40.57 •• 18.25	7°36.39 8.82 22°37.37 · · 8.52	351°52.56 13.61 6°54.60 •• 13.48	123°40.80 55.02 138°43.44 • 54.94	Saturn 348°30.58
10	150 2.56 165°5.02	311°43.39 18.26	37°38.34 8.21	21°56.64 13.35	153°46.09 54.86	Oct 05 Mon SHA
11	180°7.49	326°46.21 18.28	52°39.32 7.91	36°58.69 13.22	168°48.73 54.79	Venus 146°28.59
12	195°9.95	341°49.03 S21°18.29	67°40.29 N20°7.61	52°0.73 N15°13.09	183°51.38 N01°54.71	Mars 233°24.10
13	210° 12.41	356°51.85 18.31	82°41.27 7.31	67°2.77 12.96	198°54.02 54.63	Jupiter 217°6.08
14	225° 14.88	11°54.69 18.32	97°42.25 7.00	82° 4.81 12.84	213°56.66 54.56	Saturn 348°34.92
15	240° 17.34	26°57.52 · · 18.32	112°43.23 · · 6.70	97° 6.85 · · 12.71	228°59.31 · · 54.48	Oct 06 Tue SHA
16	255° 19.81	42°0.36 18.33	127°44.20 6.40	112°8.90 12.58	244°1.95 54.40	Venus 146°35.03
17	270°22.27	57°3.20 18.33	142°45.18 6.09	127°10.94 12.45	259°4.60 54.33	Mars 232° 48.21
18	285°24.73	72°6.05 <b>S</b> 21°18.33	157°46.16 N20°5.79	142°12.98 N15°12.32	274°7.24 N01°54.25	Jupiter 216° 55.86
19	300°27.20	87°8.90 18.33	172°47.14 5.48	157°15.03 12.19	289°9.89 54.17	Saturn 348°39.26
20	315°29.66	102°11.75 18.33	187°48.12 5.18	172°17.07 12.06	304°12.53 54.10	
21	330°32.13	117°14.61 · · 18.32	202°49.10 · · 4.88	187°19.11 · · 11.93	319°15.18 · · 54.02	Horizontal parallax
22	345° 34.59	132°17.47 18.31	217°50.08 4.57	202°21.16 11.80	334°17.82 53.94	Venus:
23	0°37.06	147°20.33 18.30	232°51.06 4.27	217°23.20 11.67	349°20.47 53.87	Mars:
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	

Dec 29°14.49

-42°9.50

56°41 19

-17°50.21

 $-57^{\circ}5.86$ 

 $23^{\circ}35.46$ 

 $89^{\circ}22.43$ 

-40°11.57

4°11.84

49°57.32

16°33.85

-8°10.05

 $46^{\circ}1.36$ 

 $6^{\circ}22.55$ 

28°37.77

 $-1^{\circ}10.94$ 

 $7^{\circ}24.82$ 

-52°42.22

-16°44.94

-29°0.22

 $27^{\circ}57.63$ 

-59°35.38

-43°32.17

-69°49.32

-8°46.34

11°50.22

61°36.28

 $14^{\circ}25.40$ 

-17°41.35

-63°14.81

-57°15.74

55°48.89

-11°17.99

49°10.85 -60°30.18

-36°30.09

 $19^{\circ}2.69$ 

-60°56.84

 $74^{\circ}2.81$ 

-16°9.13

26°37.63

-26°29.49

-69°4.71

-15°45.44

 $-37^{\circ}7.45$ 

12°32.60

51°29.39

-34°22.35

38°48.78

-26°15.80

8°56.53

-56°39.05

45°22.85

 $10^{\circ}0.07$ 

-46°49.89

-29°28.73

28°13.91

15°21.17

Mer.pass

13:21

07:33

08:39

23:51

13:17

07:31

08:36

23:47

13:13

07:30

08:32

23:43

0.5

0.1

Mer.pass

Mer.pass

 $5^{\circ}9.46$ 

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	182°47.03	S04°16.21	$264^{\circ}14.31$	5.0'	$N25^{\circ}52.63$	-6.9'	59.1'
1	197°47.22	17.18	278°38.32	5.1'	25° 45.78	-7.0'	59.1'
2	212°47.41 227°47.61	18.14 •• 19.10	293°2.42 307°26.61	5.2' 5.3'	25°38.76 25°31.58	-7.2' -7.3'	59.1' 59.1'
4	242°47.80	20.07	321°50.88	5.4'	25°24.23	-7.5'	59.1'
5	257°47.99	21.03	$336^{\circ}15.24$	5.4'	$25^{\circ}16.72$	-7.7'	59.1'
6	272°48.18	S04°22.00	350°39.68	5.5'	N25°9.05	-7.8'	59.1'
7 8	287°48.38 302°48.57	22.96 23.92	5°4.22 19°28.85	5.6' 5.7'	25°1.22 24°53.23	-8.0' -8.1'	59.0' 59.0'
9	317°48.76	24.89	33°53.57	5.8'	24° 45.08	-8.3	59.0'
10	332°48.95	25.85	48°18.39	5.9'	$24^{\circ}36.78$	-8.5'	59.0'
11	347°49.14 2°49.33	26.82 <b>S</b> 04°27.78	62°43.29 77°8.30	6.0'	24°28.33 N24°19.73	-8.6'	59.0'
12 13	17°49.33	28.74	91°33.39	6.1' 6.2'	N24° 19.73 24° 10.97	-8.8' -8.9'	59.0' 59.0'
14	32°49.72	29.71	105°58.59	6.3	24°2.07	-9.1'	59.0'
15	47°49.91	• • 30.67	120° 23.88	6.4'	23°53.02	-9.2'	59.0'
16	62°50.10 77°50.29	31.63	134° 49.27 149° 14.75	6.5'	23°43.82 23°34.48	-9.3'	59.0'
17 18	92°50.48	32.59 <b>S</b> 04°33.56	149° 14.75 163° 40.34	6.6' 6.7'	N23° 24.99	-9.5' -9.6'	59.0' 58.9'
19	107°50.67	34.52	178°6.02	6.8'	23°15.37	-9.8'	58.9'
20	122°50.86	35.48	192°31.81	6.9'	$23^{\circ}5.60$	-9.9'	58.9'
21	137°51.05	• • 36.45	206°57.69	7.0'	22°55.70	-10.0'	58.9'
22 23	152°51.24 167°51.43	37.41 38.37	221°23.68 235°49.76	7.1' 7.2'	22°45.66 22°35.49	-10.2' -10.3'	58.9' 58.9'
23			255 75.10		D = 16.1'	10.5	33.3
	SD = 16.0'	d = 1.0'		51	D = 10.1		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°51.62	S04°39.33	250° 15.95	7.3'	N22°25.18	-10.4'	58.9'
1	197°51.81 212°52.00	40.30 41.26	264°42.24 279°8.62	7.4' 7.5'	22°14.74 22°4.17	-10.6' -10.7'	58.9' 58.9'
2	212°52.00 227°52.18	41.26 •• 42.22	279°8.62 293°35.11	7.5° 7.6'	22°4.17 21°53.48	-10.7 -10.8'	58.9' 58.9'
4	242°52.37	43.18	308°1.71	7.7'	21°42.65	-10.9'	58.8'
5	257°52.56	44.14	322°28.40	7.8'	21°31.71	-11.1'	58.8'
6	272°52.75 287°52.94	S04°45.11	336°55.19 351°22.09	7.9'	N21°20.64 21°9.45	-11.2'	58.8'
7 8	302°53.13	46.07 47.03	5°49.09	8.0' 8.1'	21°9.45 20°58.13	-11.3' -11.4'	58.8' 58.8'
9	317°53.31	• • 47.99	20° 16.19	8.2'	20°46.70	-11.5'	58.8'
10	332°53.50	48.95	34°43.39	8.3'	$20^{\circ}35.16$	-11.7'	58.8'
11	347°53.69 2°53.88	49.91	49° 10.69 63° 38.09	8.4'	20°23.50 N20°11.72	-11.8'	58.8'
12 13	2°53.88 17°54.06	\$04°50.88 51.84	78°5.59	8.5' 8.6'	19°59.84	-11.9' -12.0'	58.8' 58.7'
14	32°54.25	52.80	92°33.19	8.7'	19° 47.84	-12.1'	58.7'
15	47°54.44	• • 53.76	107°0.89	8.8'	19°35.74	-12.2'	58.7'
16	62°54.62 77°54.81	54.72	121°28.69 135°56.59	8.9'	19°23.53 19°11.22	-12.3'	58.7'
17 18	92°55.00	55.68 \$04°56.64	135 56.59 150°24.59	9.0' 9.1'	N18°58.80	-12.4' -12.5'	58.7' 58.7'
19	107°55.18	57.60	164° 52.69	9.2	18° 46.28	-12.6'	58.7'
20	122°55.37	58.56	179° 20.88	9.3'	18° 33.66		58.7'
21	137°55.56	04°59.52 05°0.48	193°49.17	9.4'	18°20.95 18°8.14	-12.8' -12.9'	58.6'
22 23	152°55.74 167°55.93	05°0.48 1.44	208° 17.56 222° 46.04	9.5' 9.6'	18° 8.14 17° 55.23	-12.9 -13.0'	58.6' 58.6'
20	SD = 16.0'	d = 1.0'			D = 16.1'	15.0	30.0
	3D = 10.0	a = 1.0		31	D = 10.1		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°56.11	S05°2.40	237°14.62	9.7'	N17°42.23	-13.1'	58.6'
1 2	197°56.30 212°56.48	3.36 4.32	251°43.30 266°12.06	9.8' 9.9'	17°29.14 17°15.95	-13.2' -13.3'	58.6' 58.6'
3	212 50.46 227°56.67	• 5.28	280° 40.92	10.0'	17° 2.68	-13.4'	58.6'
4	242°56.85	6.24	295°9.88	10.0'	16°49.33	-13.4'	58.6'
5	257°57.04	7.20 \$05°8.16	309°38.92	10.1'	16°35.89 N16°22.36	-13.5'	58.5'
6 7	272°57.22 287°57.40	\$05°8.16 9.12	324°8.06 338°37.28	10.2' 10.3'	N16°22.36 16°8.76	-13.6' -13.7'	58.5' 58.5'
8	302°57.59	10.08	353°6.60	10.4	15°55.07	-13.8'	58.5'
9	317°57.77	• • 11.04	7°36.00	10.5'	15°41.31	-13.8'	58.5'
10	332°57.96 347°58.14	12.00	22°5.49	10.6'	15°27.46 15°13.55	-13.9'	58.5'
11 12	347°58.14 2°58.32	12.95 \$05°13.91	36°35.07 51°4.74	10.7' 10.8'	15° 13.55 N14° 59.56	-14.0' -14.1'	58.5' 58.4'
13	17°58.51	14.87	65°34.49	10.8	14° 45.50	-14.1'	58.4'
14	32°58.69	15.83	80°4.32	10.9'	14°31.36	-14.2'	58.4'
15	47°58.87	· · 16.79	94°34.24	11.0'	14°17.16	-14.3'	58.4'
16 17	62°59.05 77°59.24	17.75 18.70	109°4.24 123°34.32	11.1' 11.2'	14°2.89 13°48.56	-14.3' -14.4'	58.4' 58.4'
18	92°59.42	S05°19.66	138°4.48	11.2'	N13°34.16	-14.5'	58.4'
19	107°59.60	20.62	152° 34.72	11.3'	13° 19.70	-14.5'	58.3'
20	122°59.78	21.58	167°5.04	11.4'	13°5.18	-14.6'	58.3'
21 22	137°59.96 153°0.14	· · 22.54 23.49	181°35.44 196°5.91	11.5' 11.5'	12°50.60 12°35.96	-14.6' -14.7'	58.3' 58.3'
23	168°0.33	24.45	210°36.46	11.6'	12° 21.27	-14.7	58.3
	SD = 16.0'	d = 1.0'		SI	D = 16.0'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	04:09	05:29	06:37	16:58	18:05	19:25
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	03:32	04:26	05:09	18:30	19:13	20:07

Lat.		Moonris	e	Moonset			
Lat.	Sun	Mon	Tue	Sun	Mon	Tue	
N 72°						17:57	
<b>N</b> 70°		21:53			18:34	17:32	
68°		22:37			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	
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	04:16	04:24	04:27	09:11	11:01	12:47	

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	23-25	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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	Ver	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	
0	15°39.52	162°23.20	S21°18.29	247°52.04	N20°3.96	232°25.24	N15°11.54	4°23.11	N01°53.79			
1	30°41.98	177°26.07	18.27	262°53.02	3.66	247°27.29	11.41	19°25.76	53.71	Alpheratz	357°32.94	
2	45° 44.45	192°28.95	18.26	277°54.00	3.35	262°29.33	11.28	34°28.40	53.64	Ankaa	353°5.30	
3	60°46.91	207°31.83	• • 18.24	292°54.98	• • 3.05	277°31.38	• • 11.16	49°31.05	• • 53.56	Schedar	349°28.83	
4	75°49.38	222°34.71	18.21	307°55.96	2.74	292°33.42	11.03	64°33.69	53.48	Diphda	348°45.53	
5	$90^{\circ}51.84$	237°37.60	18.19	322°56.95	2.44	307°35.47	10.90	79°36.34	53.41	Achernar	335°18.53 327°49.24	
6	105°54.30	252°40.49	S21°18.16	337°57.93	N20°2.13	322°37.51	N15° 10.77	94°38.98	N01°53.33	Hamal Polaris	312°52.70	
7	120°56.77	267°43.39	18.13	352°58.91	1.83	337°39.56	10.64	109°41.63	53.25	Acamar	315°10.31	
8	135°59.23	282°46.29	18.10	7°59.90	1.52	352°41.60	10.51	124°44.27	53.18	Menkar	314° 4.37	
9	151°1.70	297°49.19	• • 18.07	23°0.88	• • 1.22	7°43.65	• • 10.38	139°46.92	• • 53.10	Mirfak	308°25.79	
10	166°4.16	312°52.10	18.03	38°1.86	0.91	22°45.69	10.25	154°49.56	53.02	Aldebaran	290°37.77	
11	181°6.62	327°55.01	18.00	53°2.85	0.61	37°47.74	10.13	169°52.20	52.95	Rigel	281°2.34	
12	196°9.09 211°11.55	342°57.92 358°0.84	\$21°17.96	68° 3.83 83° 4.82	N20°0.30 19°59.99	52°49.78 67°51.83	N15° 10.00	184°54.85 199°57.49	N01°52.87 52.79	Capella	$280^{\circ}19.56$	
13 14	211 11.55 226°14.02	13°3.76	17.91 17.87	98° 5.80	19°59.99 19°59.69	82°53.88	9.87 9.74	215°0.14	52.79	Bellatrix	$278^{\circ}21.21$	
15	241°16.48	28°6.69	• • 17.82	113° 6.79	• • 59.38	97°55.92	9.61	230°2.78	• • 52.64	Elnath	277°59.90	
16	256° 18.94	43°9.62	17.77	128°7.77	59.07	112°57.97	9.48	245°5.43	52.56	Alnilam	275°36.15	
17	271°21.41	58° 12.55	17.72	143°8.76	58.77	128° 0.02	9.36	260°8.07	52.49	Betelgeuse	270°50.44	
18	286°23.87	73°15.49	S21°17.67	158° 9.75	N19°58.46	143°2.06	N15°9.23	275°10.72	N01°52.41	Canopus	263°51.67	
19	301°26.34	88° 18.43	17.61	173°10.73	58.15	$158^{\circ}4.11$	9.10	290°13.36	52.33	Sirius	258°24.94 255°4.73	
20	$316^{\circ}28.80$	103°21.38	17.55	188°11.72	57.85	173°6.16	8.97	$305^{\circ}16.01$	52.26	Adhara Procyon	255 4.73 244°49.38	
21	331°31.26	118°24.32	• • 17.49	203°12.71	•• 57.54	188°8.21	• • 8.84	$320^{\circ}18.65$	• • 52.18	Pollux	243°15.62	
22	346°33.73	133°27.28	17.43	218°13.69	57.23	203°10.25	8.71	335°21.30	52.10	Avior	234°14.37	
23	1°36.19	148°30.23	17.36	233°14.68	56.93	218°12.30	8.59	350°23.94	52.03	Suhail	222°45.49	
Mer.p	pass. 22:54	$\nu 2.9' \ d-0.$	0′ m-4.67	$\nu 1.0' \ d-0$	0.3' m1.07	$\nu 2.0' \ d-0$	.1′ m-1.89	$\nu$ 2.6′ d-0	0.1' m0.34	Miaplacidus	221°38.49	
		-								Alphard	217°46.54	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.15	
0	16°38.66	163°33.19	S21°17.29	248°15.67	N19°56.62	233°14.35	N15°8.46	5°26.59	N01°51.95	Dubhe	193°39.83	
1	31°41.12	178°36.16	17.22	263°16.66	56.31	248°16.40	8.33	20°29.23	51.88	Denebola	182°23.80	
2	46° 43.58	193°39.13	17.15	278°17.65	56.00	263°18.45	8.20	35°31.87	51.80	Gienah	175°42.44	
3	61°46.05	208°42.10	• • 17.07	293°18.64	55.70	278°20.49	• • 8.07	50°34.52	51.72		172°59.20	
4	$76^{\circ}48.51$	223°45.07	17.00	308°19.63	55.39	293°22.54	7.95	65°37.16	51.65	Gacrux Alioth	171°50.63 166°12.27	
5	91°50.98	238°48.05	16.92	323°20.62	55.08	308°24.59	7.82	80°39.81	51.57	Spica	158°21.11	
6	106°53.44	253°51.03	521°16.84	338°21.61	N19°54.77	323°26.64	N15°7.69	95°42.45	N01°51.49	Alkaid	152°51.34	
7	121°55.90	268°54.02	16.75	353°22.60	54.46	338°28.69	7.56	110°45.10	51.42	Hadar	148°34.59	
8	136° 58.37	283°57.01	16.66	8°23.59	54.15	353°30.74	7.44	125°47.74	51.34	Menkent	147°56.30	
9	152°0.83	299°0.00	· · 16.58	23°24.58	• • 53.85	8°32.79	• • 7.31	140°50.39	• • 51.26	Arcturus	$145^{\circ}46.92$	
10	167°3.30 182°5.76	314°3.00	16.48	38°25.57	53.54	23°34.84 38°36.89	7.18	155°53.03	51.19	Rigil Kent.	$139^{\circ}38.93$	
11 12	182 5.76 197°8.22	329°6.00 344°9.01	16.39 \$21°16.29	53°26.57 68°27.56	53.23 N19°52.92	58 30.89 53°38.94	7.05 N15°6.93	170°55.67 185°58.32	51.11 N01°51.04	Kochab	137°20.85	
13	212° 10.69	359°12.02	16.20	83°28.55	52.61	68°40.99	6.80	201°0.96	50.96	Zuben'ubi	136°54.72	
14	227° 13.15	14° 15.03	16.10	98°29.55	52.30	83°43.04	6.67	216°3.61	50.88	Alphecca	126°2.80	
15	242° 15.62	29° 18.05	. 15.99	113°30.54	51.99	98°45.09	• • 6.54	231°6.25	• • 50.81	Antares	112°14.29 107°7.49	
16	257° 18.08	44°21.07	15.89	128°31.53	51.68	113°47.14	6.42	246°8.90	50.73	Atria Sabik	107 7.49 102°1.29	
17	272°20.54	59°24.09	15.78	143°32.53	51.37	128°49.19	6.29	$261^{\circ}11.54$	50.65	Shaula	96° 8.57	
18	287°23.01		S21°15.67	158°33.52	N19°51.06	143°51.24	N15°6.16	$276^{\circ}14.19$	N01°50.58	Rasalhague	95°57.34	
19	302°25.47	89°30.15	15.56	173°34.52	50.75	158°53.30	6.03	291°16.83	50.50	Eltanin	90°41.66	
20	317°27.94	104°33.19	15.44	188°35.51	50.44	173°55.35	5.91	306°19.47	50.43	Kaus Aust.	83°30.68	
21	332°30.40	119°36.23	• • 15.32	203°36.51	• • 50.13	188°57.40	• • 5.78	321°22.12	• • 50.35	Vega	80°32.30	
22 23	347°32.86 2°35.33	134°39.27	15.20	218°37.50 233°38.50	49.82 49.51	203°59.45 219°1.50	5.65	336°24.76 351°27.41	50.27	Nunki	75°46.00	
		149°42.32	15.08			_	5.53		50.20	Altair	61°58.50	
Mer.p	pass. 22:50	$\nu$ 3.0′ <i>d</i> -0.	1′ m-4.64	$\nu 1.0' \ d$ -0	.3′ m1.06	$\nu 2.0' \ d-0$	.1' m-1.90	$\nu$ 2.6′ d-0	$0.1' \; \text{m}0.34$	Peacock	53°3.27	
										Deneb Enif	49°24.65 33°37.18	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.78	
0	17°37.79	$164^{\circ}45.37$	S21°14.96	248°39.50	$N19^{\circ}49.20$	234° 3.55	$N15^{\circ}5.40$	6°30.05	$N01^{\circ}50.12$	Fomalhaut	15°12.63	
1	32°40.26	179°48.42	14.83	263°40.49	48.89	$249^{\circ}5.61$	5.27	21°32.70	50.05	Scheat	13°43.50	
2	47° 42.72	194°51.48	14.70	278°41.49	48.58	264°7.66	5.15	36°35.34	49.97	Markab	13°28.19	
3	62°45.19	209°54.54	• • 14.57	293°42.49	• • 48.27	279°9.71	• • 5.02	51°37.98	• • 49.89	0 . 07 111 1	6114	=
4	77° 47.65	224°57.60	14.43	308°43.49	47.96	294°11.76	4.89	66°40.63	49.82	Oct 07 Wed	SHA	
5	92°50.11	240°0.67	14.30	323°44.48	47.65	309°13.82	4.77	81°43.27	49.74		146°43.68 232°12.52	
6	107°52.58	255°3.75 270°6.82	\$21°14.16	338°45.48		324°15.87 339°17.92	N15°4.64	96°45.92	N01°49.67	1	232 12.52 216°45.73	
7 8	122° 55.04 137° 57.51	270 0.82 285°9.90	14.02 13.87	353°46.48 8°47.48	47.03 46.71	354°19.98	4.51 4.39	111°48.56 126°51.21	49.59 49.51	Saturn	348°43.59	
9	157° 57.51 152° 59.97	300°12.99	• • 13.73	23°48.48	• • 46.40	9°22.03	• • 4.26	141°53.85	• • 49.44			=
10	168°2.43	315°16.07	13.73	38°49.48	46.09	24°24.09	4.13	156°56.49	49.36	Oct 08 Thu	SHA	
11	183°4.90	330°19.16	13.43	53°50.48	45.78	39°26.14	4.01	171°59.14	49.29	l l	146°54.54	
12	198°7.36		S21°13.27	68°51.48	N19°45.47	54°28.19	N15°3.88	187°1.78	N01°49.21		231°37.02	
13	$213^{\circ}9.83$	$0^{\circ}25.36$	13.12	83°52.48	45.16	69°30.25	3.75	202°4.43	49.13	Jupiter Saturn	216°35.69 348°47.93	
14	228° 12.29	15°28.46	12.96	98°53.48	44.84	84°32.30	3.63	217°7.07	49.06	Saturn		=
15	243°14.75	30°31.56	• • 12.80	113°54.48	• • 44.53	99°34.36	• • 3.50	232°9.71	• 48.98	Oct 09 Fri	SHA	
16	258° 17.22	45°34.67	12.64	128°55.49	44.22	114°36.41	3.37	247°12.36	48.91	Venus	147°7.57	
17	273°19.68	60°37.79	12.47	143°56.49	43.91	129°38.47	3.25 N15°2.12	262°15.00	48.83	Mars	231°1.70	
18 19	288°22.15 303°24.61	75°40.90 90°44.02	\$21°12.30 12.13	158°57.49 173°58.49	N19°43.60 43.28	144°40.52 159°42.58	N15°3.12 3.00	277°17.65 292°20.29	N01°48.76 48.68		216°25.76	
20	318° 27.07	90 44.02 105°47.15	12.13	173 56.49 188°59.50	43.26 42.97	159 42.56 174°44.64	2.87	307°22.93	48.60	Saturn	348°52.26	_
21	333°29.54	105 47.15 120°50.28	•• 11.78	204° 0.50	• • 42.66	189°46.69	2.74	322°25.58	• • 48.53	Horizon	ıtal parallax	
22	348°32.00	135°53.41	11.61	219° 1.50	42.34	204°48.75	2.62	337°28.22	48.45		Venus:	
23	3°34.47	150°56.54	11.43	234°2.51	42.03	219°50.80	2.49	352°30.87	48.38		Mars:	
Merr	pass. 22:46	$\nu$ 3.1' d-0.	1′ m-4 60	ν1 0' d 0	0.3′ m1.06	ν2 1 <sup>/</sup> d-Ω	.1′ m-1.90	v2 6' d 0	0.1' m0.35			
14101.		∠ J.1 U-U.		₽ 1.0 U-0		ν Z.1 U-U		- 2.0 u-0	1110.55			

Dec 29°14.50 -42°9.51 56°41.20 -17°50.21  $\text{-}57^{\circ}5.88$  $23^{\circ}35.47$ 89°22.45 -40°11.58 4°11.85 49°57.34 16°33.86 -8°10.05  $46^{\circ}1.37$  $6^{\circ}22.55$ 28°37.77 -1°10.94 7°24.82 -52°42.22 -16°44.95 -29°0.22  $5^{\circ}9.46$  $27^{\circ}57.63$ -59°35.37 -43°32.17 -69°49.31 -8°46.34 11°50.22 61°36.26 14°25.39 -17°41.34 -63°14.79 -57°15.73 55°48.87 -11°17.99 49°10.84 -60°30.17 -36°30.09 19°2.68 -60°56.83 74°2.79 -16°9.13 26°37.62 -26°29.48 -69°4.71 -15°45.44  $\text{-}37^{\circ}7.45$  $12^{\circ}32.60$ 51°29.38 -34°22.35 38°48.77 -26°15.80 8°56.53 -56°39.06 45°22.85  $10^{\circ}0.07$ -46°49.90 -29°28.74 28°13.92 15°21.18 Mer.pass 13:08 07:28 08:29 23:38 Mer.pass 13:03 07:26 08:26 23:34

Mer.pass 12:58 07:25 08:23 23:30

> 0.5 0.1

	011-010 =	+0.1190 sec		-011 -		500	
h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν 11.7'	Dec	d	HP
0 1	183°0.51 198°0.69	S05°25.41 26.37	225°7.09 239°37.78	11.7' 11.8'	N12°6.52 11°51.71	-14.8' -14.9'	58.3' 58.2'
2	213°0.87	27.32	254°8.55	11.8'	11°36.86	-14.9'	58.2'
3	228°1.05	• • 28.28	268°39.39	11.9'	11°21.95	-15.0'	58.2'
4	243°1.23	29.24	283°10.30	12.0'	11°7.00	-15.0'	58.2'
5	258°1.41	30.19	297°41.28	12.0'	10°52.00	-15.0'	58.2'
6	273°1.59	S05°31.15	312°12.33	12.1'	N10°36.95	-15.1'	58.2'
7	288°1.77	32.11	326°43.44	12.2'	10°21.86	-15.1'	58.1'
8 9	303°1.95 318°2.13	33.06 •• 34.02	341°14.62 355°45.86	12.2' 12.3'	10°6.72 09°51.55	-15.2' -15.2'	58.1' 58.1'
10	333°2.31	34.97	10°17.17	12.4'	09°36.33	-15.2 -15.3'	58.1
11	348°2.49	35.93	24°48.54	12.4'	09°21.08	-15.3'	58.1'
12	3°2.67	S05°36.89	39°19.97	12.5'	N09° 5.79	-15.3'	58.1'
13	18°2.84	37.84	53°51.46	12.5'	08°50.46	-15.4'	58.0'
14	33°3.02	38.80	68°23.01	12.6'	08°35.10	-15.4'	58.0'
15	48°3.20	• • 39.75	82°54.62	12.7'	08°19.71	-15.4'	58.0'
16 17	63°3.38 78°3.56	40.71 41.66	97°26.28 111°58.00	12.7' 12.8'	08°4.28 07°48.83	-15.5' -15.5'	58.0' 58.0'
18	93°3.74	\$05°42.62	111 56.00 126°29.77	12.8'	N07°33.35	-15.5'	58.0'
19	108°3.91	43.57	141°1.60	12.9'	07°17.84	-15.5'	57.9'
20	123°4.09	44.53	155°33.48	12.9'	07°2.30	-15.6'	57.9'
21	138°4.27	• • 45.48	$170^{\circ}5.41$	13.0'	06°46.74	-15.6'	57.9'
22	153°4.44	46.44	184°37.38	13.0'	06°31.16	-15.6'	57.9'
23	168°4.62	47.39	199° 9.41	13.1'	06°15.55	-15.6'	57.9'
	SD = 16.0'	d = 1.0'		SI	O = 15.9'		
Thu	<b>GHA</b> 183°4.80	Dec	<b>GHA</b> 213°41.49	$\nu$	Dec	d 15.6'	HP
0 1	183°4.80 198°4.97	\$05°48.35 49.30	213°41.49 228°13.61	13.1' 13.2'	N05°59.93 05°44.29	-15.6' -15.7'	57.9' 57.8'
2	213°5.15	50.26	242°45.77	13.2'	05°28.62	-15.7'	57.8'
3	228°5.33	• • 51.21	257°17.98	13.3'	05°12.95	-15.7'	57.8'
4	243°5.50	52.16	271°50.23	13.3'	04°57.26	-15.7'	57.8'
5	258°5.68	53.12	286°22.52	13.3'	04°41.55	-15.7'	57.8'
6	273°5.85	S05°54.07	300°54.86	13.4'	N04°25.83	-15.7'	57.7'
7	288°6.03	55.02	315°27.23	13.4'	04°10.11	-15.7'	57.7'
8 9	303°6.20 318°6.38	55.98 •• 56.93	329°59.64 344°32.08	13.4' 13.5'	03°54.37 03°38.62	-15.7' -15.8'	57.7' 57.7'
10	333°6.55	57.88	359° 4.57	13.5'	03°22.87	-15.8'	57.7'
11	348°6.73	58.84	13°37.08	13.5'	03°7.11	-15.8'	57.6'
12	3°6.90	S05°59.79	28° 9.63	13.6'	N02°51.35	-15.8'	57.6'
13	18°7.08	$06^{\circ}0.74$	42°42.21	13.6'	02°35.59	-15.8'	57.6'
14	33°7.25	1.69	57°14.83	13.6'	02°19.82	-15.8'	57.6'
15	48°7.42 63°7.60	• • 2.65	71°47.47	13.7'	02°4.06	-15.8'	57.6'
16 17	78°7.77	3.60 4.55	86°20.14 100°52.84	13.7' 13.7'	01°48.29 01°32.53	-15.8' -15.8'	57.5' 57.5'
18	93°7.95	\$06° 5.50	115°25.56	13.7'	N01°16.77	-15.8'	57.5
19	108°8.12	6.45	129°58.31		01° 1.01		57.5'
20	123°8.29	7.41	144°31.09	13.8'	00°45.26	-15.7'	57.5'
21	138°8.46	• • 8.36	159° 3.88	13.8'	00°29.52	-15.7'	57.4'
22	153°8.64	9.31	173°36.70	13.8'	N00°13.79	-15.7'	57.4'
23	168°8.81	10.26	188° 9.54	13.9'	S00°1.94	15.7'	57.4'
	SD = 16.0'	d = 1.0'		SI	O = 15.8'		
Fri	GHA	Dec	GHA	ν	Dec	d	НР
0	183°8.98	S06°11.21	202°42.40	13.9'	500°17.65	15.7'	57.4'
1	198° 9.15	12.16	217°15.27	13.9'	00°33.35	15.7'	57.4
2	213°9.32	13.11	$231^{\circ}48.17$	13.9'	$00^{\circ}49.04$	15.7'	57.3'
3	228° 9.50	• • 14.06	246°21.08	13.9'	01°4.71	15.7'	57.3'
4	243°9.67 258°9.84	15.01	260°54.00 275°26.94	13.9'	01°20.37 01°36.01	15.6'	57.3' 57.3'
5 6	258 9.84 273° 10.01	15.96 S06°16.91	275°26.94 289°59.89	14.0' 14.0'	501°51.63	15.6' 15.6'	57.3'
7	288° 10.18	17.86	304°32.86	14.0'	02°7.23	15.6'	57.3'
8	303° 10.35	18.81	319°5.83	14.0'	02°22.82	15.6'	57.2'
9	318° 10.52	• • 19.76	333°38.82	14.0'	02°38.38	15.5'	57.2'
10	333° 10.69	20.71	348°11.81	14.0'	02°53.91	15.5'	57.2'
11	348° 10.86	21.66	2°44.81	14.0'	03°9.43	15.5'	57.1'
12	3° 11.03 18° 11.20	S06°22.61 23.56	17°17.81 31°50.83	14.0'	\$03°24.91 03°40.37	15.5'	57.1'
13 14	18° 11.20 33° 11.37	23.56 24.51	31°50.83 46°23.84	14.0' 14.0'	03°40.37 03°55.81	15.4' 15.4'	57.1' 57.1'
15	48° 11.54	. 25.46	60°56.86	14.0'	03 55.61 04°11.21	15.4	57.1'
16	63°11.71	26.41	75°29.88	14.0'	04°26.59	15.3'	57.0'
17	78° 11.88	27.36	90°2.91	14.0'	04°41.93	15.3'	57.0'
18	93°12.04	S06°28.31	104°35.93	14.0'	S04°57.24	15.3'	57.0'
19	108° 12.21	29.25	119°8.95	14.0'	05°12.52	15.2'	57.0'
20	123° 12.38	30.20	133°41.97	14.0'	05°27.76	15.2'	56.9'
21 22	138° 12.55 153° 12.72	· · 31.15 32.10	148°14.99 162°48.00	14.0' 14.0'	05°42.97 05°58.14	15.2' 15.1'	56.9' 56.9'
23	168° 12.88	32.10	162 48.00 177°21.01	14.0'	05 58.14 06°13.27	15.1	56.9'
	SD = 16.0'	d = 1.0'			D = 15.6'		20.5
	<u> </u>	<u>u = 1.0</u>		اد			

Lat.	Twi	light	Sunrise	Sunset	Twi	light
	Naut.	Civil	Jamise	Janset	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	03:21	04:16	05:00	18:37	19:21	20:16
	1			1		

Lat.		Moonris	e		Moonset	
Lat.	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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	04:28	04:28	04:28	14:26	16:01	17:34

	Sun			Moon		
Day	Eqn.of	Eqn.of Time		Mer.	Pass.	Age
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	26-28
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	15-3%
07	12:02	12:11	11:48	09:18	21:41	
08	12:19	12:28	11:48	10:04	22:26	
09	12:36	12:44	11:47	10:49	23:11	

#### 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° 36.93	165°59.68 S21°11.24	249°3.51 N19°41.72	234°52.86 N15°2.37	7°33.51 N01°48.30	
1	33°39.39	181°2.82 11.06	264°4.52 41.40	249°54.92 2.24	22°36.15 48.23	Alpheratz
2	48°41.86	196°5.97 10.87	279°5.52 41.09	264°56.97 2.12	37°38.80 48.15	Ankaa
3	63°44.32	211°9.12 · · 10.68	294°6.53 · · 40.78	279°59.03 · · 1.99	52°41.44 · · 48.08	Schedar
4	78°46.79	226°12.27 10.49	309°7.54 40.46	295°1.09 1.86	67°44.09 48.00	Diphda Achernar
5	93°49.25	241°15.43 10.29	324°8.54 40.15	310°3.14 1.74	82°46.73 47.92	Hamal
6	$108^{\circ}51.71$	256°18.59 <b>S</b> 21°10.10	339°9.55 N19°39.84	325°5.20 N15°1.61	97°49.37 N01°47.85	Polaris
7	123°54.18	271°21.75 9.90	354°10.56 39.52	340°7.26 1.49	112°52.02 47.77	Acamar
8	138° 56.64	286°24.92 9.69	9°11.56 39.21	355° 9.32 1.36	127°54.66 47.70	Menkar
9	153°59.11	301°28.09 · · 9.49	24°12.57 · · 38.89	10°11.38 · · 1.24	142°57.30 · · 47.62	Mirfak
10	169°1.57	316°31.27 9.28	39°13.58 38.58	25°13.43 1.11	157°59.95 47.55	Aldebaran
11	184°4.03	331°34.44 9.07	54°14.59 38.27	40°15.49 0.99	173°2.59 47.47	Rigel
12	199°6.50	346°37.63 \$21°8.86	69°15.60 N19°37.95	55°17.55 N15°0.86	188°5.24 N01°47.40	Capella
13	214°8.96 229°11.43	1°40.81 8.65 16°44.00 8.43	84°16.60 37.64 99°17.61 37.32	70°19.61 0.74 85°21.67 0.61	203°7.88 47.32 218°10.52 47.24	Bellatrix
14 15	244° 13.89	31°47.19 · · 8.21	114°18.62 · · 37.01	100°23.73 · · 0.48	233°13.17 · · 47.17	Elnath
16	259° 16.35	46°50.39 7.99	129°19.63 36.69	115°25.79 0.36	248°15.81 47.09	Alnilam
17	274° 18.82	61°53.59 7.76	144°20.64 36.38	130°27.85 0.23	263°18.45 47.02	Betelgeuse
18	289°21.28	76°56.79 S21°7.54	159°21.65 N19°36.06	145°29.91 N15°0.11	278°21.10 N01°46.94	Canopus
19	304°23.75	92°0.00 7.31	174°22.67 35.75	160°31.97 14°59.98	293°23.74 46.87	Sirius
20	$319^{\circ}26.21$	107°3.21 7.08	189°23.68 35.43	175°34.03 14°59.86	308°26.38 46.79	Adhara
21	334°28.67	122°6.42 · · 6.84	204°24.69 · · 35.12	190°36.09 · · 59.73	323°29.03 · · 46.72	Procyon Pollux
22	$349^{\circ}31.14$	137°9.64 6.61	219°25.70 34.80	205°38.15 59.61	338°31.67 46.64	Avior
23	4°33.60	152°12.86 6.37	234°26.71 34.48	220°40.21 59.49	353°34.31 46.57	Suhail
Mer	pass. 22:42	ν3.1' d-0.2' m-4.57	$\nu 1.0' \ d$ -0.3' m1.05	ν2.1' d-0.1' m-1.90	ν2.6' d-0.1' m0.36	Miaplacidus
- IVICI.	Pa33. 22.42	V 3.1 U 0.2 III 4.31				Alphard
_						Regulus
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe
0	19°36.07	167°16.09 \$21°6.12	249°27.73 N19°34.17	235°42.27 N14°59.36	8°36.96 N01°46.49	Denebola
1	34°38.53	182°19.31 5.88	264°28.74 33.85	250°44.33 59.24	23°39.60 46.42	Gienah
2	49° 40.99 64° 43.46	197°22.55 5.63 212°25.78 · · 5.38	279°29.75 33.54 294°30.77 · · · 33.22	265°46.39 59.11 280°48.45 · · 58.99	38°42.24 46.34 53°44.89 • 46.27	Acrux
3 4	79° 45.92	212 25.76 · · · 5.36 227°29.02 5.13	309°31.78 32.90	295°50.51 58.86	68°47.53 46.19	Gacrux
5	94° 48.39	242°32.26 4.88	324°32.80 32.59	310°52.57 58.74	83°50.17 46.12	Alioth
6	109° 50.85	257°35.51 \$21°4.62	339°33.81 N19°32.27	325°54.64 N14°58.61	98°52.82 N01°46.04	Spica
7	124° 53.32	272°38.76 4.36	354°34.83 31.95	340°56.70 58.49	113°55.46 45.97	Alkaid
8	139°55.78	287°42.01 4.10	9°35.84 31.64	355°58.76 58.36	128°58.10 45.89	Hadar
9	154° 58.24	302°45.26 · · 3.84	24°36.86 · · 31.32	11°0.82 · · 58.24	144°0.75 · · 45.82	Menkent
10	170°0.71	317°48.52 3.57	39°37.87 31.00	26°2.89 58.12	159°3.39 45.74	Arcturus Rigil Kent.
11	185°3.17	332°51.79 3.30	54°38.89 30.69	41° 4.95 57.99	174°6.03 45.67	Kochab
12	200°5.64	347°55.05 \$21°3.03	69°39.91 N19°30.37	56°7.01 N14°57.87	189°8.68 N01°45.59	Zuben'ubi
13	215°8.10	2°58.32 2.76	84°40.92 30.05	71°9.07 57.74	204°11.32 45.52	Alphecca
14	230° 10.56	18°1.60 2.48	99°41.94 29.74	86°11.14 57.62	219°13.96 45.44	Antares
15	245° 13.03	33°4.87 · · 2.20	114°42.96 · · 29.42	101°13.20 · · 57.50	234°16.61 · · 45.37	Atria
16	260° 15.49	48°8.15 1.92	129°43.98 29.10	116°15.26 57.37	249°19.25 45.29	Sabik
17	275° 17.96	63°11.44 1.63	144°45.00 28.78	131°17.33 57.25	264°21.89 45.22	Shaula
18 19	290°20.42 305°22.88	78°14.72 <b>S</b> 21°1.35 93°18.01 1.06	159°46.02 N19°28.47 174°47.03 28.15	146°19.39 N14°57.12 161°21.46 57.00	279°24.54 N01°45.14 294°27.18 45.07	Rasalhague
20	320° 25.35	93°18.01 1.06 108°21.31 0.77	174°47.03 28.15 189°48.05 27.83	161°21.46 57.00 176°23.52 56.88	294°27.18 45.07 309°29.82 44.99	Eltanin
21	335°27.81	123°24.60 · · 0.47	204°49.07 · · 27.51	191°25.59 · · 56.75	324°32.46 · · 44.92	Kaus Aust.
22	350° 30.28	138°27.90 21°0.18	219°50.09 27.19	206°27.65 56.63	339°35.11 44.84	Vega
23	5°32.74	153°31.21 20°59.88	234°51.12 26.88	221°29.72 56.51	354°37.75 44.77	Nunki
						Altair
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	$\nu 2.6' \ d$ -0.1' m0.36	Peacock Deneb
						Enif
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir
0	20°35.20	168°34.52 <b>S</b> 20°59.58	249°52.14 N19°26.56	236°31.78 N14°56.38	9°40.39 N01°44.69	Fomalhaut
1	35° 37.67	183°37.83 59.27	264°53.16 26.24	251°33.85 56.26	24°43.04 44.62	Scheat
2	50°40.13	198°41.14 58.96	279°54.18 25.92	266°35.91 56.13	39°45.68 44.55	Markab
3	65° 42.60	213° 44.46 · · 58.66	294°55.20 · · 25.60	281°37.98 · · 56.01	54°48.32 · · 44.47	
4	80°45.06	228° 47.78 58.34	309°56.22 25.28	296°40.04 55.89	69°50.96 44.40	Oct 10 Sat
5	95°47.52	243°51.10 58.03	324°57.25 24.96	311°42.11 55.76	84°53.61 44.32	Venus Mars
6	110° 49.99 125° 52.45	258°54.43 \$20°57.71 273°57.76 57.39	339°58.27 N19°24.65	326°44.17 N14°55.64 341°46.24 55.52	99°56.25 N01°44.25	Jupiter
7 8	125 52.45 140° 54.92	273°57.76 57.39 289°1.09 57.07	354°59.29 24.33 10°0.32 24.01	341°46.24 55.52 356°48.31 55.40	114°58.89 44.17 130°1.53 44.10	Saturn
9	155° 57.38	304°4.43 · · 56.75	25°1.34 · · 23.69	11°50.37 · · 55.27	145°4.18 · · 44.02	
10	170° 59.85	319°7.77 56.42	40°2.37 23.37	26°52.44 55.15	160°6.82 43.95	Oct 11 Sun
11	186°2.31	334°11.12 56.09	55°3.39 23.05	41°54.51 55.03	175° 9.46 43.88	Venus
12	201°4.77	349°14.46 \$20°55.76	70°4.42 N19°22.73	56°56.58 N14°54.90	190°12.10 N01°43.80	Mars
13	216°7.24	4°17.81 55.42	85°5.44 22.41	71°58.64 54.78	205°14.75 43.73	Jupiter
14	231°9.70	19°21.17 55.09	100°6.47 22.09	87° 0.71 54.66	220°17.39 43.65	Saturn
15	246° 12.17	34°24.52 · · 54.75	115°7.49 · · 21.77	102°2.78 · · 54.53	235°20.03 · · 43.58	Oct 12 Mon
16	261° 14.63	49°27.88 54.41	130° 8.52 21.45	117° 4.85 54.41	250°22.67 43.50	Venus
17	276°17.09	64°31.25 54.06	145°9.55 21.13	132°6.92 54.29	265°25.32 43.43	Mars
18	291° 19.56	79°34.62 \$20°53.71	160°10.57 N19°20.81	147°8.98 N14°54.17	280°27.96 N01°43.35	Jupiter
19	306°22.02	94°37.99 53.37	175°11.60 20.49	162°11.05 54.04	295°30.60 43.28	Saturn
20	321°24.49	109°41.36 53.01 124°44.74 • 52.66	190°12.63 20.17 205°13.66 · · 19.85	177°13.12 53.92 192°15.19 · · 53.80	310°33.24 43.21	Horizon
21 22	336° 26.95 351° 29.41	124°44.74 · · 52.66 139°48.11 52.30	205°13.66 · · 19.85 220°14.69 19.53	192°15.19 · · 53.80 207°17.26 53.68	325°35.88 · · 43.13 340°38.53 43.06	1.0.12.011
23	6°31.88	154°51.50 51.94	235°15.72 19.21	207 17.20 53.06 222°19.33 53.55	355°41.17 42.98	
						L
Mer.	pass. 22:34	ν3.3′ d-0.3′ m-4.48	$\nu 1.0' \ d$ -0.3' m1.03	ν2.1' d-0.1' m-1.91	ν2.6' d-0.1' m0.37	

Stars SHA

357°32.94

353°5.31

349°28 83

348°45.53

 $335^{\circ}18.53$ 

 $327^{\circ}49.24$ 

 $312^{\circ}51.76$ 

315°10.30

 $290^{\circ}37.76$ 

281°2.32

 $280^{\circ}19.54$ 

 $278^{\circ}21.19$ 

277°59.88

275°36.14

270°50.42

263°51.64

258°24.92

255°4.71

 $244^{\circ}49.36$ 

 $243^{\circ}15.60$ 

234°14.34

222°45.47

221°38.45

217°46.52 207°33.14

193°39.81

182°23.79

 $175^{\circ}42.43$ 

 $172^{\circ}59.19$ 

 $171^{\circ}50.63$ 

166°12.27

158°21.11

152°51.35

148°34.59  $147^{\circ}56.31$ 

145°46.92

139°38.94

 $137^{\circ}20.88$ 

136°54.73

112°14 31

107°7.53

 $102^{\circ}1.31$ 

 $96^{\circ}8.59$ 

 $95^{\circ}57.36$ 

90°41.69

83°30.70

80°32.33

 $75^{\circ}46.01$ 

61°58.52

49°24.67

33°37.20

 $27^{\circ}30.80$ 

15°12.64

13°43.51

13°28.19

SHA

147°22.75

230°26.58

 $216^{\circ}15.93$ 

 $348^{\circ}56.58$ 

SHA

147°40.02

229°51.66

216°6.20

349°0.89

SHA

147°59.31

 $229^{\circ}16.93$ 

 $215^{\circ}56.58$ 

Horizontal parallax

 $349^{\circ}5.19$ 

Venus: Mars

 $53^{\circ}3.30$ 

126°2.82

 $314^{\circ}4.36$ 308°25.77

Dec 29°14.51

-42°9.52

56°41 22 -17°50.22

 $-57^{\circ}5.89$ 

23°35.48

 $89^{\circ}22.46$ 

40°11.59

4°11.84

49°57.35

16°33.86

-8°10.05

 $46^{\circ}1.37$ 

6°22.54

28°37.77

 $-1^{\circ}10.94$ 

 $7^{\circ}24.82$ -52°42.22

-16°44.95

-29°0.22

 $27^{\circ}57.62$ 

-59°35.37

-43°32.16

-69°49.31

-8°46.34

11°50.21

61°36.25

 $14^{\circ}25.39$ 

-17°41.34

-63°14.78

-57°15.71

55°48.85 -11°17.99

49°10.82 -60°30.15

-36°30.08

 $19^{\circ}2.67$ 

74°2.78

-16°9.13

26°37.61

-26°29.48

-69°4.70

 $-37^{\circ}7.45$ 

12°32.60

51°29.38

-34°22.35

38°48.77

-26°15.80

8°56.53

-56°39.06

45°22.86

 $10^{\circ}0.07$ 

-46°49.91

-29°28.75

28°13.93

15°21.18

Mer.pass

12:53

07:23

08:19

23:26

12:48

07:22

08:16

23:21

12:43

07:20

08:13

23:17

0.5

0.1

Mer.pass

Mer.pass

-15°45.44

60°56.82

 $5^{\circ}9.46$ 

h	Su	n	Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	183°13.05	S06°33.99	$191^{\circ}54.01$	14.0'	<b>S</b> 06°28.37	15.1'	56.9'
1	198°13.22	34.94	206°27.01	14.0'	06°43.42	15.0'	56.8'
2	213°13.38 228°13.55	35.89 •• 36.84	220°59.99 235°32.97	14.0' 14.0'	06°58.43 07°13.40	15.0' 14.9'	56.8' 56.8'
4	243°13.72	37.78	250°5.94	14.0'	07°28.33	14.9'	56.8'
5	258°13.88	38.73	264°38.90	13.9'	$07^{\circ}43.21$	14.8'	56.7'
6	273°14.05 288°14.22	S06°39.68	279°11.85	13.9'	S07°58.05	14.8'	56.7'
7 8	288°14.22 303°14.38	40.62 41.57	293°44.78 308°17.70	13.9' 13.9'	08° 12.83 08° 27.58	14.7' 14.7'	56.7' 56.7'
9	318°14.55	42.52	322°50.61	13.9'	08°42.27	14.6'	56.7'
10	333°14.71	43.46	$337^{\circ}23.50$	13.9'	$08^{\circ}56.91$	14.6'	56.6'
11	348°14.88 3°15.04	44.41	351°56.38 6°29.24	13.9'	09°11.50	14.5'	56.6'
12 13	18°15.04	S06° 45.35 46.30	6° 29.24 21° 2.08	13.8' 13.8'	\$09°26.04 09°40.52	14.5' 14.4'	56.6' 56.6'
14	33°15.37	47.24	35°34.90	13.8'	09°54.96	14.4	56.5'
15	48°15.54	• • 48.19	50°7.70	13.8'	10°9.33	14.3'	56.5'
16	63°15.70 78°15.86	49.13	64°40.49 79°13.25	13.8' 13.7'	10°23.65 10°37.91	14.3' 14.2'	56.5'
17 18	93°16.03	50.08 \$06° 51.02	93°45.99	13.7'	510°52.12	14.1'	56.5' 56.4'
19	108°16.19	51.97	108° 18.71	13.7'	11°6.26	14.1'	56.4'
20	123°16.35	52.91	122°51.40	13.7'	11°20.34	14.0'	56.4'
21	138°16.52	• • 53.86	137°24.07	13.6'	11°34.36	14.0'	56.4
22 23	153°16.68 168°16.84	54.80 55.75	151°56.71 166°29.33	13.6' 13.6'	11°48.32 12°2.22	13.9' 13.8'	56.4' 56.3'
	SD = 16.0'	d = 0.9'			0 = 15.5'		
	JU = 10.0′	u = 0.9°	-	)L	v — 13.5°		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°17.00	S06° 56.69	181°1.92	13.6'	\$12° 16.05	13.8'	56.3'
1 2	198°17.17 213°17.33	57.63 58.58	195°34.49 210°7.02	13.5' 13.5'	12°29.81 12°43.51	13.7' 13.6'	56.3' 56.3'
3	213 17.33 228°17.49	06°59.52	224°39.53	13.5'	12° 57.14	13.6'	56.2
4	243°17.65	$07^{\circ}0.46$	$239^{\circ}12.01$	13.4'	$13^{\circ}10.70$	13.5'	56.2'
5	258°17.81	1.41	253°44.45	13.4'	13°24.19	13.4'	56.2'
6 7	273°17.97 288°18.13	S07°2.35 3.29	268° 16.87 282° 49.26	13.4' 13.4'	\$13°37.61 13°50.96	13.3' 13.3'	56.2' 56.1'
8	303°18.30	4.23	297°21.61	13.3'	14°4.23	13.2'	56.1'
9	318°18.46	• • 5.18	$311^{\circ}53.93$	13.3'	$14^{\circ}17.43$	13.1'	56.1'
10	333°18.62 348°18.78	6.12	326°26.22	13.3' 13.2'	14°30.56 14°43.61	13.1'	56.1'
11 12	348 18.78 3°18.94	7.06 \$07°8.00	340°58.47 355°30.69	13.2'	S14°56.58	13.0' 12.9'	56.1' 56.0'
13	18°19.10	8.94	10°2.87	13.1'	15°9.48	12.8'	56.0'
14	33°19.25	9.89	24°35.02	13.1'	15°22.30	12.7'	56.0'
15 16	48°19.41 63°19.57	· · 10.83 11.77	39°7.13 53°39.21	13.1' 13.0'	15° 35.04 15° 47.69	12.7' 12.6'	56.0' 55.9'
17	78°19.73	12.71	68°11.25	13.0'	16°0.27	12.5'	55.9'
18	93°19.89	S07° 13.65	82°43.25	13.0'	<b>S</b> 16°12.76	12.4'	55.9'
19	108°20.05	14.59	97° 15.21	12.9'	16°25.17	12.3'	55.9'
20 21	123°20.21 138°20.36	15.53 •• 16.47	111°47.13 126°19.01	12.9′ 12.8′	16°37.50 16°49.74	12.2' 12.2'	55.8' 55.8'
22	153°20.52	17.41	140°50.86	12.8'	17°1.89	12.1'	55.8'
23	168°20.68	18.35	$155^{\circ}22.66$	12.8'	$17^{\circ}13.96$	12.0'	55.8'
	SD = 16.0'	d = 0.9'		SE	0 = 15.4'		
Mon 0	<b>GHA</b> 183°20.84	Dec 507° 19.29	<b>GHA</b> 169° 54.43	u 12.7'	<b>Dec</b> \$17° 25.94	<i>d</i> 11.9'	<b>HP</b> 55.8'
1	198°20.99	20.23	184°26.15	12.7'	17° 37.83	11.8'	55.7'
2	213°21.15	21.17	198°57.83	12.6'	17°49.63	11.7'	55.7'
3	228°21.31 243°21.46	· · 22.11 23.05	213°29.47 228°1.07	12.6' 12.6'	18°1.33 18°12.95	11.6' 11.5'	55.7'
4 5	243°21.46 258°21.62	23.05	242°32.63	12.5'	18° 12.95 18° 24.48	11.5 11.4'	55.7' 55.6'
6	273°21.78	S07°24.93	257°4.14	12.5'	S18°35.91	11.3'	55.6'
7	288°21.93	25.87	271°35.61	12.4'	18° 47.24	11.2'	55.6'
8 9	303°22.09 318°22.24	26.80 •• 27.74	286°7.04 300°38.42	12.4' 12.3'	18°58.49 19°9.63	11.1' 11.0'	55.6' 55.6'
10	318 22.24 333°22.40	28.68	300 38.42 315°9.76	12.3'	19 9.63 19°20.68	11.0'	55.5'
11	348°22.55	29.62	329°41.06	12.3'	$19^{\circ}31.63$	10.9'	55.5'
12	3°22.71	S07° 30.56	344° 12.31	12.2'	\$19°42.48	10.8'	55.5'
13 14	18°22.86 33°23.02	31.49 32.43	358° 43.52 13° 14.69	12.2' 12.1'	19°53.23 20°3.89	10.7' 10.6'	55.5' 55.4'
15	48°23.17	33.37	27°45.81	12.1'	20° 3.69 20° 14.44	10.4	55.4'
16	63°23.32	34.30	42°16.88	12.0'	$20^{\circ}24.89$	10.3'	55.4'
17	78°23.48	35.24	56°47.92	12.0'	20° 35.23	10.2'	55.4'
18 19	93°23.63 108°23.78	\$07°36.18 37.11	71°18.90 85°49.85	11.9' 11.9'	\$20°45.47 20°55.61	10.1' 10.0'	55.4' 55.3'
20	123°23.94	38.05	100°20.74	11.9'	21°5.64	9.9'	55.3'
21	138°24.09	• • 38.99	114°51.60	11.8'	$21^{\circ}15.57$	9.8'	55.3'
22 23	153°24.24 168°24.39	39.92	129°22.40 143°53.17	11.8' 11.7'	21°25.39 21°35.10	9.7' 9.6'	55.3' 55.3'
23		40.86	143 53.17			9.0	55.3
	SD = 16.0'	d = 0.9'		SE	0 = 15.2'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	04:37	05:56	07:05	16:27	17:35	18:53
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	03:10	04:07	04:51	18:44	19:29	20:26

Lat.		Moonris	e	Moonset		
Lat.	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	04:28	04:29	04:30	19:06	20:39	22:13

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	0-2
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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	

#### October 13, 14, 15 UT (Tue., Wed., Thu.)

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA
0	21°34.34	169°54.88 \$20°51.58	250°16.75 N19°18.89	237°21.40 N14°53.43	10°43.81 N01°42.91	
1	36°36.81	184°58.27 51.21	265°17.77 18.57	252°23.47 53.31	25°46.45 42.84	Alpheratz 357°32.94
2	51°39.27	200°1.67 50.85	280°18.80 18.25	267°25.54 53.19	40°49.09 42.76	Ankaa 353°5.31
3	66°41.73	215°5.06 · · 50.48	295°19.84 · · 17.92	282°27.61 · · 53.06	55°51.74 · · 42.69	Schedar 349°28.83
4	81°44.20	230°8.46 50.11	310°20.87 17.60	297°29.68 52.94	70°54.38 42.61	Diphda 348°45.53 Achernar 335°18.53
5	96°46.66	245°11.86 49.73	325°21.90 17.28	312°31.75 52.82	85°57.02 42.54	Achernar 335°18.53 Hamal 327°49.22
6	111°49.13	260°15.27 <b>S</b> 20°49.35	340°22.93 N19°16.96	327°33.82 N14°52.70	100°59.66 N01°42.47	Polaris 312°50.64
7	126°51.59	275° 18.68 48.97	355°23.96 16.64	342°35.89 52.58	116°2.30 42.39	Acamar 315°10.29
8	141°54.06	290°22.09 48.59	10°24.99 16.32	357°37.96 52.45	131°4.95 42.32	Menkar 314° 4.35
9	156° 56.52	305°25.50 · · 48.21	25°26.03 · · 16.00	12°40.03 · · 52.33	146°7.59 · · 42.24	Mirfak 308°25.75
10	171°58.98	320°28.92 47.82	40°27.06 15.67	27°42.10 52.21	161°10.23 42.17	Aldebaran 290°37.74
11	187°1.45 202°3.91	335°32.34 47.43 350°35.76 \$20°47.03	55°28.09 15.35 70°29.12 N19°15.03	42°44.18 52.09 57°46.25 N14°51.97	176°12.87 42.10 191°15.51 N01°42.02	Rigel 281°2.30
12 13	202 3.91 217°6.38	5°39.19 46.64	85°30.16 14.71	72°48.32 51.85	206°18.16 41.95	Capella 280°19.51
14	232°8.84	20°42.62 46.24	100°31.19 14.39	87°50.39 51.72	200 18.10 41.95 221°20.80 41.88	Bellatrix 278°21.17
15	247°11.30	35°46.05 · · 45.84	115°32.23 ·· 14.06	102°52.46 · · 51.60	236°23.44 · · 41.80	Elnath 277°59.86
16	262°13.77	50°49.49 45.44	130°33.26 13.74	117°54.54 51.48	251°26.08 41.73	Alnilam 275°36.12
17	277° 16.23	65°52.93 45.03	145°34.30 13.42	132°56.61 51.36	266°28.72 41.65	Betelgeuse 270°50.40
18	292° 18.70	80°56.37 <b>S</b> 20°44.63	160°35.33 N19°13.10	147°58.68 N14°51.24	281°31.36 N01°41.58	Canopus 263°51.61
19	307°21.16	95°59.82 44.22	175°36.37 12.78	163° 0.75 51.12	296°34.00 41.51	Sirius 258°24.90
20	322°23.62	111°3.26 43.80	190°37.41 12.45	178°2.83 51.00	311°36.65 41.43	Adhara 255° 4.69 Procyon 244° 49.34
21	337°26.09	126°6.72 · · 43.39	205°38.44 · · 12.13	193°4.90 · · 50.87	326°39.29 · · 41.36	Pollux 243°15.58
22	352°28.55	141°10.17 42.97	220°39.48 11.81	208° 6.98 50.75	341°41.93 41.29	Avior 234°14.30
23	7°31.02	156° 13.63 42.55	235°40.52 11.48	223° 9.05 50.63	356°44.57 41.21	Suhail 222°45.44
Mer r	pass. 22:30	ν3.4' d-0.4' m-4.43	ν1.0' d-0.3' m1.03	$\nu 2.1' \ d$ -0.1' m-1.92	$\nu 2.6' \ d$ -0.1' m0.37	Miaplacidus 221°38.39
						Alphard 217°46.50
						Regulus 207°33.12
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.79
0	22°33.48	171°17.09 \$20°42.13	250°41.55 N19°11.16	238°11.12 N14°50.51	11°47.21 N01°41.14	Denebola 182°23.78
1	37°35.95	186°20.55 41.70	265°42.59 10.84	253°13.20 50.39	26°49.85 41.07	Gienah 175°42.42
2 3	52°38.41 67°40.87	201°24.02 41.27 216°27.49 • 40.84	280°43.63 10.51 295°44.67 · · 10.19	268°15.27 50.27 283°17.35 • 50.15	41°52.49 40.99 56°55.13 • 40.92	Acrux 172°59.17
3 4	82° 43.34	231°30.96 40.41	310°45.71 9.87	298°19.42 50.03	71°57.78 40.85	Gacrux 171°50.61
5	97° 45.80	246°34.43 39.97	325°46.75 9.54	313°21.50 49.91	87°0.42 40.77	Alioth 166°12.26
6	112° 48.27	261°37.91 S20°39.53	340°47.79 N19°9.22	328°23.57 N14°49.78	102°3.06 N01°40.70	Spica 158°21.11
7	127°50.73	276°41.39 39.09	355°48.83 8.90	343°25.65 49.66	117°5.70 40.63	Alkaid 152°51.35
8	142°53.19	291°44.88 38.65	10°49.87 8.57	358°27.72 49.54	132°8.34 40.55	Hadar 148°34.59
9	157° 55.66	306°48.36 · · 38.20	25°50.91 • • 8.25	13°29.80 · · 49.42	147°10.98 · · 40.48	Menkent 147°56.31 Arcturus 145°46.93
10	$172^{\circ}58.12$	321°51.85 37.76	40°51.95 7.93	28°31.87 49.30	162°13.62 40.41	Rigil Kent. 139°38.94
11	188°0.59	336°55.35 37.31	55°52.99 7.60	43°33.95 49.18	177°16.26 40.33	Kochab 137°20.92
12	203°3.05	351°58.84 <b>S</b> 20°36.85	70°54.03 N19°7.28	58°36.03 N14°49.06	192°18.90 N01°40.26	Zuben'ubi 136°54.73
13	$218^{\circ}5.52$	7°2.34 36.40	85°55.08 6.95	73°38.10 48.94	207°21.54 40.19	Alphecca 126°2.83
14	233°7.98	22°5.84 35.94	100°56.12 6.63	88°40.18 48.82	222°24.19 40.11	Antares 112°14.32
15	248° 10.44	37°9.34 · · 35.48	115°57.16 · · 6.31	103°42.26 · · 48.70	237°26.83 · · 40.04	Atria 107° 7.55
16	263°12.91	52°12.85 35.01	130°58.21 5.98	118°44.33 48.58	252°29.47 39.97	Sabik 102°1.32
17 18	278° 15.37 293° 17.84	67°16.36 34.55 82°19.87 \$20°34.08	145°59.25 5.66 161°0.29 N19°5.33	133°46.41 48.46 148°48.49 N14°48.34	267°32.11 39.89 282°34.75 N01°39.82	Shaula 96°8.60
19	308° 20.30	97°23.39 33.61	161°0.29 N19°5.33 176°1.34 5.01	163°50.57 48.22	297°37.39 39.75	Rasalhague 95°57.37
20	323°22.76	112°26.91 33.13	191°2.38 4.68	178°52.64 48.10	312°40.03 39.68	Eltanin 90°41.72
21	338°25.23	127°30.43 · · 32.66	206°3.43 · · 4.36	193°54.72 · · 47.98	327°42.67 · · 39.60	Kaus Aust. 83°30.71
22	353°27.69	142°33.95 32.18	221° 4.47 4.03	208°56.80 47.86	342°45.31 39.53	Vega 80°32.35
23	8°30.16	157°37.48 31.70	236° 5.52 3.71	223°58.88 47.74	357°47.95 39.46	Nunki 75°46.03 Altair 61°58.53
Mer.p	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	Peacock 53°3.33 Deneb 49°24.69
						Enif 33°37.21
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°30.81
0	23°32.62	172°41.01 \$20°31.21	251°6.56 N19°3.38	239°0.96 N14°47.62	12°50.59 N01°39.38	Fomalhaut 15°12.65
1	38°35.08	187°44.54 30.73	266°7.61 3.06	254° 3.04 47.50	27°53.23 39.31	Scheat 13°43.52
2	53° 37.55	202°48.07 30.24	281°8.66 2.73	269° 5.12 47.38	42°55.87 39.24	Markab 13°28.20
3	68° 40.01	217°51.61 · · 29.75	296°9.71 · · 2.41	284°7.19 · · 47.26	57°58.51 · · 39.17	Oct 12 Too CIIA
4	83° 42.48	232°55.15 29.25	311°10.75 2.08	299° 9.27 47.14	73°1.15 39.09	Oct 13 Tue SHA Venus 148° 20.54
5	98°44.94 113°47.41	247°58.69 28.76 263°2.24 \$20°28.26	326°11.80 1.76 341°12.85 N19°1.43	314°11.35 47.02 329°13.43 N14°46.90	88°3.79 39.02 103°6.43 N01°38.95	Mars 228°42.40
6 7	113 47.41 128°49.87	278°5.79 27.76	356°13.90 1.10	344°15.51 46.78	103°6.43 N01°38.95 118°9.07 38.87	Jupiter 215°47.06
8	143°52.33	293°9.34 27.25	11°14.95 0.78	359°17.59 46.66	133°11.71 38.80	Saturn 349° 9.47
9	158° 54.80	308°12.89 · · 26.75	26°16.00 · · 0.45	14°19.67 · · 46.54	148°14.35 · · 38.73	
10	173°57.26	323°16.45 26.24	41°17.05 19°0.13	29°21.75 46.42	163°16.99 38.66	Oct 14 Wed SHA
11	188°59.73	338°20.00 25.73	56°18.10 18°59.80	44°23.83 46.31	178°19.63 38.58	Venus 148°43.61
12	204°2.19	353°23.57 \$20°25.21	71°19.15 N18°59.47	59°25.92 N14°46.19	193°22.27 N01°38.51	Mars 228° 8.07
13	$219^{\circ}4.65$	8°27.13 24.70	86°20.20 59.15	74°28.00 46.07	208°24.91 38.44	Jupiter 215°37.64 Saturn 349°13.73
14	234°7.12	23°30.70 24.18	101°21.25 58.82	89°30.08 45.95	223°27.55 38.37	
15	249°9.58	38°34.26 · · 23.66	116°22.30 · · 58.50	104°32.16 · · 45.83	238°30.19 · · 38.29	Oct 15 Thu SHA
16	264° 12.05	53°37.84 23.13	131°23.35 58.17	119°34.24 45.71	253°32.83 38.22	Venus 149°8.39
17	279° 14.51	68°41.41 22.61	146°24.40 57.84	134°36.32 45.59	268°35.47 38.15	Mars 227°33.94
18	294°16.98	83°44.99 \$20°22.08	161°25.46 N18°57.52	149°38.41 N14°45.47	283°38.11 N01°38.08	Jupiter 215°28.34
19 20	309° 19.44 324° 21.90	98° 48.57 21.55 113° 52.15 21.01	176°26.51 57.19 191°27.56 56.86	164°40.49 45.35 179°42.57 45.23	298°40.75 38.01 313°43.39 37.93	Saturn 349°17.97
20	324 21.90 339°24.37	113 52.15 21.01 128°55.73 · · 20.48	206°28.61 · · 56.54	179 42.57 45.23 194°44.65 · · 45.12	313 43.39 37.93 328°46.03 · · 37.86	Horizontal parallax
22	354°26.83	143°59.32 19.94	200 28.01 50.54 221°29.67 56.21	209°46.74 45.00	343°48.67 37.79	Venus:
23	9°29.30	159°2.91 19.40	236°30.72 55.88	224°48.82 44.88	358°51.31 37.72	Mars:
ivier.p	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	

**Dec** 29°14.52 -42°9.53

56°41.23 -17°50.22

-57°5.91

 $23^{\circ}35.48$ 

89°22.47 -40°11.61

4°11.84

49°57.35 16°33.85

-8°10.06

46°1.37 6°22.54

28°37.77 -1°10.94

 $7^{\circ}24.81$ 

-52°42.23

-16°44.96 -29°0.23

-59°35.37

-43°32.16

-69°49.30

-8°46.35 11°50.20

61°36.23 14°25.38

-17°41.34 -63°14.77 -57°15.70

55°48.84 -11°17.99

49°10.81 -60°30.14

-36°30.07

19°2.66 -60°56.80

74°2.76

-16°9.13

26°37.61 -26°29.48

-69°4.69

 $-15^{\circ}45.43$  $-37^{\circ}7.44$ 

 $12^{\circ}32.60$ 

51°29.37

-34°22.35 38°48.77

-26°15.80 8°56.53

-56°39.07

45°22.87

-46°49.92 -29°28.76

28°13.93 15°21.18

Mer.pass

12:37 07:18

08:09 23:13 **Mer.pass** 

12:32

07:17

08:06 23:09 **Mer.pass** 

12:26

07:15

08:03

23:05

0.5

0.1

 $10^{\circ}0.08$ 

5°9.45 27°57.61

h	Su	n		1	Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	183°24.55	S07°41.79	158°23.89	11.7'	S21°44.71	9.5'	55.2'
1	198°24.70	42.73	172°54.56	11.6'	21°54.20	9.4'	55.2'
2	213°24.85	43.66	187°25.19	11.6'	22°3.59	9.3'	55.2'
3	228°25.00	• • 44.60	201°55.78	11.5'	22°12.86	9.2'	55.2'
4 5	243°25.15 258°25.30	45.53 46.47	216°26.32 230°56.81	11.5' 11.5'	22°22.02 22°31.07	9.1' 8.9'	55.1' 55.1'
6	273°25.45	\$07°47.40	245°27.27	11.5	S22°40.01	8.8'	55.1
7	288°25.60	48.34	259°57.68	11.4'	22°48.84	8.7'	55.1'
8	303°25.76	49.27	274°28.04	11.3'	22°57.55	8.6'	55.1'
9	318°25.91	• • 50.20	288°58.36	11.3'	23°6.14	8.5'	55.1'
10	333°26.05 348°26.20	51.14	303°28.64	11.2'	23°14.62 23°22.99	8.4'	55.0'
11 12	348 26.20 3°26.35	52.07 \$07° 53.00	317°58.88 332°29.07	11.2' 11.2'	523°31.23	8.2' 8.1'	55.0' 55.0'
13	18° 26.50	53.94	346°59.23	11.1'	23°39.36	8.0'	55.0'
14	33°26.65	54.87	1°29.34	11.1'	23°47.37	7.9'	55.0'
15	48°26.80	• • 55.80	$15^{\circ}59.41$	11.0'	$23^{\circ}55.26$	7.8'	54.9'
16	63°26.95	56.73	30°29.43	11.0'	24°3.04	7.7'	54.9'
17	78°27.10	57.67	44°59.42 59°29.37	10.9'	24°10.69	7.5'	54.9'
18 19	93°27.25 108°27.39	\$07° 58.60 07° 59.53	59°29.37 73°59.28	10.9' 10.9'	\$24°18.22 24°25.63	7.4' 7.3'	54.9' 54.9'
20	108 27.59 123°27.54	07 59.55 08°0.46	88°29.14	10.9	24° 32.92	7.3 7.2'	54.9'
21	138°27.69	. 1.39	102°58.97	10.8'	24°40.08	7.0'	54.8'
22	153°27.84	2.33	117°28.76	10.8'	$24^{\circ}47.13$	6.9'	54.8'
23	168°27.98	3.26	131°58.52	10.7'	24°54.04	6.8'	54.8'
	SD = 16.0'	d = 0.9'		SD	= 15.1'		
Wed 0	<b>GHA</b> 183°28.13	<b>Dec</b> \$08°4.19	<b>GHA</b> 146°28.23	u 10.7'	Dec \$25°0.84	d 6.7'	<b>HP</b> 54.8'
1	183 28.13 198°28.27	5.12	140 28.23 160°57.91	10.7	25°7.51	6.5'	54.8'
2	213°28.42	6.05	175°27.55	10.6'	25°14.05	6.4'	54.7'
3	228°28.57	• • 6.98	189°57.16	10.6'	25°20.47	6.3'	54.7'
4	243°28.71	7.91	204°26.73	10.5'	25°26.76	6.2'	54.7'
5	258°28.86	8.84 \$08° 9.77	218°56.27	10.5'	25°32.93	6.0'	54.7'
6 7	273°29.00 288°29.15	10.70	233°25.78 247°55.25	10.5' 10.4'	\$25°38.97 25°44.88	5.9' 5.8'	54.7' 54.7'
8	303°29.29	11.63	262°24.69	10.4	25°50.66	5.7'	54.7°
9	318°29.44	• • 12.56	276°54.10	10.4'	25°56.32	5.5'	54.6'
10	333°29.58	13.49	291°23.47	10.3'	$26^{\circ}1.84$	5.4'	54.6'
11	348°29.73	14.41	305°52.82	10.3'	26°7.24	5.3'	54.6'
12 13	3°29.87 18°30.01	S08° 15.34 16.27	320°22.14 334°51.43	10.3' 10.3'	\$26° 12.50 26° 17.64	5.1' 5.0'	54.6' 54.6'
14	33°30.16	17.20	349°20.69	10.3	26°22.64	5.0 4.9'	54.6'
15	48°30.30	• 18.13	3°49.93	10.2'	26°27.52	4.7'	54.5'
16	63°30.44	19.05	18°19.14	10.2'	26°32.26	4.6'	54.5'
17	78°30.59	19.98	32°48.32	10.2'	26°36.87	4.5'	54.5'
18	93°30.73	508°20.91	47°17.48	10.1'	\$26°41.35	4.3'	54.5'
19 20	108°30.87 123°31.01	21.84 22.76	61°46.62 76°15.73	10.1' 10.1'	26° 45.69 26° 49.90	4.2' 4.1'	54.5' 54.5'
21	138°31.15	23.69	90°44.82	10.1	26°53.98	4.1 3.9'	54.5'
22	153°31.30	24.62	105°13.89	10.1'	26°57.93	3.8'	54.4'
23	168°31.44	25.54	119°42.94	10.0'	$27^{\circ}1.74$	3.7'	54.4'
	SD = 16.0'	d = 0.9'		SD	= 14.9'		
					_		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0 1	183°31.58 198°31.72	\$08° 26.47 27.39	134°11.98 148°40.99	10.0' 10.0'	\$27°5.42 27°8.97	3.5' 3.4'	54.4' 54.4'
2	213°31.86	28.32	163°9.99	10.0'	27°12.38	3.3'	54.4'
3	228°32.00	• • 29.24	177°38.97	10.0'	$27^{\circ}15.66$	3.1'	54.4'
4	243°32.14	30.17	192°7.94	10.0'	27°18.80	3.0'	54.4'
5	258°32.28 273°32.42	31.10 \$08° 32.02	206°36.89 221°5.83	9.9' 9.9'	27°21.81 <b>S</b> 27°24.68	2.9' 2.7'	54.4' 54.3'
6 7	273°32.42 288°32.56	32.94	221°5.83 235°34.76	9.9'	27°24.68 27°27.41	2.6'	54.3'
8	303°32.70	33.87	250°3.67	9.9'	27°30.01	2.5'	54.3'
9	318°32.84	• • 34.79	264°32.58	9.9'	27°32.48	2.3'	54.3'
10	333°32.98	35.72	279°1.48	9.9'	27°34.81	2.2'	54.3'
11	348°33.11	36.64	293°30.37	9.9'	27°37.00	2.1'	54.3'
12 13	3°33.25 18°33.39	\$08°37.56 38.49	307°59.25 322°28.12	9.9' 9.9'	\$27°39.06 27°40.98	1.9' 1.8'	54.3' 54.3'
13 14	33°33.53	39.41	322 28.12 336°57.00	9.9 9.9'	27 40.98 27°42.77	1.8	54.3'
15	48°33.67	• • 40.33	351°25.86	9.9'	27°44.42	1.5'	54.3'
16	63°33.80	41.26	5°54.73	9.9'	$27^{\circ}45.93$	1.4'	54.3'
17	78°33.94	42.18	20°23.59	9.9'	27°47.31	1.2'	54.2'
18	93°34.08 108°34.21	\$08° 43.10 44.02	34°52.46 49°21.32	9.9' 9.9'	\$27°48.55 27°49.66	1.1' 1.0'	54.2' 54.2'
19 20	108°34.21 123°34.35	44.02 44.94	49°21.32 63°50.19	9.9'	27° 49.66 27° 50.63	0.8	54.2'
21	138°34.49	• • 45.87	78°19.05	9.9'	27°51.46	0.7	54.2'
22	153°34.62	46.79	92°47.92	9.9'	$27^{\circ}52.16$	0.6'	54.2'
23	168°34.76	47.71	107°16.80	9.9'	27°52.72	0.4'	54.2'
	SD = 16.0'	d = 0.9'		SD	= 14.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Julisce	Civil	Naut.
N 72°	04:51	06:09	07:19	16:11	17:21	18:39
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	02:59	03:57	04:42	18:52	19:37	20:36

Lat.		Moonris	e		Moonset	
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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	
<b>S</b> 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
<b>S</b> 60°	04:34	04:42	05:01	23:48		01:15

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.	Mer.Pass.	
Duy	00 <sup>h</sup>	12 <sup>h</sup>	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.)

Fig.   Color	h	Aries	Venus	Mars	Jupiter	Saturn	Stars
1	Fri -	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
1 99°94.2 2 199°1100 11631 209°1281 50.22 34°1200 129°130 4.400 209°1200 129°130 4.400 209°1200 129°130 4.400 209°1200 129°130 4.400 209°1200 129°130 4.400 209°1200 129°130 4.400 209°1200 129°130 4.400 209°1200 129°130 4.400 209°1200 129°130 4.400 209°1200 129°130 4.400 209°1200 129°130 4.400 209°1200 129°130 4.400 209°1200 129°130 4.400 209°1200 129°130 4.400 209°1200 129°130 4.400 209°1200 129°130 4.400 209°1200 129°130 4.400 209							
1							
3 9919.15 23917.29 0.172.0 26919.00 0.54.5 26919.00 0.54.5 26919.00 0.54.6 2690.00 44.00 5911.30 0.5011.30 240.00							
1	3	69°39.15	219°17.29 · · 17.21	296°34.94 · · 54.57	284°57.15 • • 44.40	59°1.87 · · 37.43	
1.	4	84°41.62	234°20.89 16.66	311°36.00 54.24	299°59.24 44.29	74°4.50 37.36	·
1 1971-1960	5						
1447-9147   1947-9152   1447-9147   1947-9152   1447-9147   1947-9156   1447-9147   1947-9156   1447-9147   1947-9156   1447-9147   1447							
1							
10   187   564   1924   255   1.36   447   234   2.28   2.28   1971   197   1985   1987   1							
19   190							Mirfak 308°25.72 49°57.36
19							
230°370   230°370   230°341   11 50   200°456   50.07   070°100   43.22   200°42   50   36.64   50.07   11 14 20°50   36.64   50.07   11 15 20°50   36.64   50.07   36.64   36.07   36.64							
14   238   6.0   248   7.0   10.90   10.90   10.90   26.90							
Amalian   279   290   191   291	14	235°6.26					
12 2001 11.6	15	250°8.72	40°0.67 · · 10.40	116°47.64 · · 50.64	105°22.17 · · 42.99	239°33.53 · · 36.57	
1.5   1.5	16						
19							
Add							
21 360°2551 19°2248							
22 355"25.97   16"05"26.12   6.27   22"155.07   48.34   210"3.678   24.217   3.44"52.00   3.64							Procyon 244°49.31 5°9.45
10							
Morposis   22:18   V3.6' d-0.5' m-4.25   V1.1' d-0.3' m1.00   V2.1' d-0.1' m-1.93   V2.6' d-0.1' m0.39   Majabedist   221'38.38   99'8.93   V3.6' d-0.5' m-1.25   V3.8' m1.0' m-1.0' m							
Say   CHA   CHA   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA							
Sept	Mer. <sub>l</sub>	pass. 22:18	ν3.6′ d-0.5′ m-4.25	$\nu 1.1' \ d$ -0.3' m1.00	ν2.1' d-0.1' m-1.93	$\nu$ 2.6′ <i>d</i> -0.1′ m0.39	
Sat GHA  CHA  CHA  CHA  CHA  CHA  CHA  CHA							
29°30.00 100°37.00 4.46 20°69.26 4.47 20°0.00 118°47.68 20°40.99 N14°41.93 14°57.28 N01°35.92 16°60.00 182°23.77 14°25.72 17°41.74 17°41.74 17°41.75 18°40.00 182°23.77 14°25.75 18°40.00 18°20.	Sat				GHA Dec		
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8 165°5061 296°2.67 20°0.16 12°5.71 45.04 0°5.767 41.00 135°18.38 35.35 26 100 175°55.54 326°10.00 83.91 42°7.85 44.71 15°9.76 40.08 150°2.166 35.28 100°17.55 519°3.00 341°1.06 85.28 20°2.07 41.10 190°5.04 30.00 341°1.06 85.28 20°2.07 41.10 190°5.04 31.10 190°5	7	$130^{\circ}48.15$		357° 4.65 45.37		120°15.75 35.42	
9 100°53.08 311°6.34 19°59.54 27°6.78 · 44.71 15°59.76 · 40.88 150°21.02 · 35.28   Arcturus 145°46.92 10°2.65   11 10°58.01 31°13.68 43.0 15°12.06 35.14   Arcturus 145°46.92 10°2.65   11 10°58.01 31°13.68 43.0 10°6.03 114°40.33 19°2.93 10°3.507   Kochab 13°2.03 30°1.14   Arcturus 145°46.92 10°2.65   Arcturus 145°46.92 10°2.65   11 10°58.01 31°12.07   350°1.735 510°57.65   72°9.98 10°43.73   61°6.03 114°40.33 19°2.93 10°3.500   Arcturus 145°46.92 10°2.05   72°9.93   10°2.01 10°3.00   10°2.01 10°3.00   10°2.01 10°3.00   10°2.01 10°3.00   10°2.01 10°3.00   10°2.01 10°3.00   10°2.01 10°3.00   10°2.01 10°3.00   10°2.01 10°3.00   10°2.01 10°3.00   10°2.01 10°3.00   10°2.01 10°3.00   10°2.01 10°3.00   10							
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15   251°7.66   41°28.38   55.74   11°13.19   42.73   106°12.30   40.18   240°3.86   34.85							
16 266°10.33 56°32.06 55.10 132°14.25 42.40 121°14.39 40.07 255°34.8 34.78   17 281°12.79 77°35.74 54.46 147°15.32 42.07 136°16.48 39.95 270°42.12 34.71   18 296°15.26 86°39.43 519°53.81 16°216.39 N18°41.74 151°18.57 N14°39.83 285°44.76 N01°34.64   19 311°17.72 101°43.11 53.17 177°1.746 41.41 166°20.67 39.72 39.00 34.57   20 326°20.18 116°46.80 52.52 192°18.53 41.08 181°22.76 39.60 315′50.03 34.50   12 341°22.65 131°50.49 51.66 207°19.60 · 40.75 196°24.85 · 39.48 30°52.67 · 34.43   12 31°27.58 161°57.88 50.55 237°21.75 40.09 26°29.03 39.25 0°57.94 34.29   18 40°40.75 11°27.58 161°57.88 50.55 237°21.75 40.09 26°29.03 39.25 0°57.94 34.29   18 40°32.50 192°5.77 49.23 20°723.89 39.43 39.43   18 40°32.50 192°5.77 49.23 20°723.89 39.43 39.43   18 40°32.50 192°5.77 49.23 20°723.89 39.43 39.43   18 40°32.50 192°5.77 49.23 20°723.89 39.43 30°39.50 50°5.94 34.29   18 40°32.50 192°5.77 49.23 20°723.89 39.43 30°39.50 38.67 0   18 40°32.50 192°5.77 49.23 20°723.89 39.43 30°39.50 38.67 0   18 40°34.74 32.20 192°5.77 49.23 20°723.89 39.43 30°39.50 38.67 0   18 40°39.90 237°16.37 47.23 312°27.11 38.44 30°39.50 38.67 0   18 40°39.90 237°16.37 47.23 312°27.11 38.44 30°39.50 38.67 0   18 10°42.36 252°20.08 46.56 327°28.18 38.11 316°41.59 38.56 91°13.7 38.66   11°44.83 267°23.78 519°45.89 322°29.6 N18°37.77 33°43.69 N14°38.44 106°16.40 N01°33.79   18 140°49.75 297°31.20 44.53 12°31.40 37.11 4°47.88 38.21 136°42.22 N18°33.75   19 16°52.22 312°34.91 43.85 27°32.48 36.78 16°49.97 38.10 136°22.23 13.34   11 191°57.15 342°2.34 14.08 38.2 7°32.48 36.78 16°49.97 38.10 136°32.22 N10°33.31   11 191°57.15 342°2.34 14.08 38.2 7°32.48 36.78 16°40.97 38.10 136°32.22 N10°33.31   11 191°57.15 342°4.34 42.44 57°34.63 36.12 46°46.46 37.29 37.52 226°37.50 33.34   11 191°57.15 342°4.34 42.44 57°34.63 36.12 46°46.46 37.29 36°48.40 N01°33.79   11 282°11.91 73°4.67 38.32 147°4.10 87°4.88 38.51 316°20.59 33.34   11 191°57.15 342°2.34 14.08 38.2 7°32.48 34.59 38.50 37.52 226°37.50 33.34   12 20°74.54 97 70.54 97 70.55 90.00 34.67 97 70.55 90.00 34.67 97	15	251°7.86	41°28.38 · · 55.74				
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21 341°22.65 131°50.49 · · · · · · · · · · · · · · · · · · ·							
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Mer.pass   161°57.88   50.55   237°21.75   40.09   226°29.03   39.25   0°57.94   34.29							
Mer.pass. 22:14         ν 3.6' d-0.6' m-4.18         ν 1.1' d-0.3' m1.00         ν 2.1' d-0.1' m-1.93         ν 2.6' d-0.1' m0.39         Peacock Dene b         53° 3.34         -56° 30.07         Composition of the peacock	23	11°27.58	161°57.88 50.55	237°21.75 40.09	226°29.03 39.25	0°57.94 34.29	
Sun   GHA   CHA   Dec   GHA	Meri	pass 22·14	$\nu$ 3.6' d-0.6' m-4.18	ν1 1' d-0 3' m1 00	$\nu$ 2 1' d-0 1' m-1 93	$\nu$ 2 6' d-0.1' m0.39	
Sun   GHA   CHA   Dec   CHA		Pacci ==::					
0 26°30.04 177°1.57 519°49.89 252°2.282 N18°39.76 241°31.13 N14°39.14 16°0.58 N01°34.22 1		CIIA	CIIA D	CIIA	CIIA D	CIIA D	
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2 56°34.97 207°8.97 48.56 282°24.96 39.10 271°35.31 38.91 46°5.86 34.07 34.00 37.11 37.37 43 222°12.6747.90 297°26.0338.77 286°37.4138.79 61°8.4934.00 486°39.90 237°16.37 47.23 312°27.11 38.44 301°39.50 38.67 76°11.13 33.93 3.95 5 101°42.36 252°20.08 46.56 327°28.18 38.11 316°41.59 38.56 91°13.77 33.86 116°44.83 267°23.78 519°45.88 342°29.26 N18°37.77 331°43.69 N14°38.44 106°16.40 N01°33.79 Marks 227°0.02 07:13 7131°47.29 282°27.49 45.21 357°30.33 37.44 346°45.78 38.33 121°19.04 33.72 Jupiter 215°1.09 44.53 12°31.40 37.11 1°47.88 38.21 136°21.68 33.65 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5							
3 71°37.43 222°12.67 · 47.90 297°26.03 · 38.77 286°37.41 · 38.79 61°8.49 · 34.00 4 86°39.90 237°16.37 47.23 312°27.11 38.44 301°39.50 38.67 76°11.13 33.93 5   5 101°42.36 252°20.08 46.56 327°28.18 38.11 316°41.59 38.56 91°13.77 33.86   6 116°44.83 267°23.78 519°45.88 342°29.26 N18°37.77 331°43.69 N14°38.44 106°16.40 N01°33.79   7 131°47.29 282°27.49 45.21 357°30.33 37.44 346°45.78 38.33 121°19.04 33.72   8 146°49.75 297°31.20 44.53 12°31.40 37.11 1°47.88 38.21 136°21.68 33.65   9 161°52.22 312°34.91 · 43.85 27°32.48 · 36.78 16°49.97 · 38.10 151°24.31 · 33.58   10 176°54.68 327°38.63 43.17 42°33.55 36.45 31°52.07 37.98 166°26.95 33.51   11 191°57.15 342°42.34 42.48 57°34.63 36.12 46°54.16 37.87 181°29.99 33.44   12 206°59.61 357°46.06 519°41.79 72°35.71 N18°35.79 61°56.26 N14°37.75 196°32.22 N01°33.37   13 222°2.07 12°49.78 41.10 87°36.78 35.45 76°58.35 37.64 211°34.86 33.30   14 237°4.54 27°53.50 40.41 102°37.86 35.12 92°0.45 37.52 226°37.50 33.23   15 252°7.00 42°57.22 · 39.72 117°38.94 · 34.79 107°2.54 · 37.41 241°40.13 · 33.16   16 267°9.47 58°0.94 39.02 132°40.01 34.46 122°4.64 37.29 256°42.77 33.09   17 282°11.93 73°4.67 38.32 147°41.09 34.13 137°6.73 37.18 271°45.40 33.02   18 297°14.39 88°8.39 519°37.62 162°42.17 N18°33.79 152°8.83 N14°37.06 286°48.04 N01°32.95   19 312°16.86 103°12.12 36.92 177°43.25 33.46 167°10.93 36.95 301°50.68 32.88   20 327°19.32 118°15.85 36.21 120°44.33 33.13 182°13.02 36.83 316°53.31 32.81   340°21.79 133°19.58 · 35.50 207°45.41 · 32.80 197°15.12 · 36.72 331°55.95 · 32.74   22 357°24.25 148°23.32 34.79 222°46.49 32.47 212°17.22 36.60 346°58.58 32.67   23 12°26.72 163°27.05 34.08 237°47.57 32.13 227°19.31 36.49 2°12.22 32.60    10 418°2012 32001 34.08 310°2012 320.01   34.08 3202 327°19.32 188°13.70   38.65 310°37.40 34.90 34.90 34.90   34.08 3202 327°19.32 188°13.02 36.83 316°53.31 32.81   34.90 34.90 34.90 34.90 34.90 34.90   34.90 34.90 34.90 34.90 34.90 34.90   34.90 34.90 34.90 34.90 34.90 34.90 34.90 34.90   34.90 34.90 34.90 34.90 34.90 34.90 34.90   34.90 34.90 34.90 34.							
5 101°42.36 252°20.08 46.56 327°28.18 38.11 316°41.59 38.56 91°13.77 33.86 6 116°44.83 267°23.78 \$19°45.88 342°29.26 N18°37.77 331°43.69 N14°38.44 106°16.40 N01°33.79			222°12.67 · · 47.90	297°26.03 · · 38.77	286°37.41 · · 38.79	61°8.49 · · 34.00	
6 116°44.83 267°23.78 \$19°45.88 342°29.26 N18°37.77 331°43.69 N14°38.44 106°16.40 N01°33.79 7 131°47.29 282°27.49 45.21 357°30.33 37.44 346°45.78 38.33 121°19.04 33.72 34.65							•
7 131°47.29 282°27.49 45.21 357°30.33 37.44 346°45.78 38.33 121°19.04 33.72 8 146°49.75 297°31.20 44.53 12°31.40 37.11 1°47.88 38.21 136°21.68 33.65 9 161°52.22 312°34.91 · · · 43.85 27°32.48 · · · 36.78 16°49.97 · · · 38.10 151°24.31 · · · 33.58 10 176°54.68 327°38.63 43.17 42°33.55 36.45 31°52.07 37.98 166°26.95 33.51 11 191°57.15 342°42.34 42.48 57°34.63 36.12 46°54.16 37.87 181°29.59 33.44 12 206°59.61 357°46.06 \$19°41.79 72°35.71 \$N18°35.79 61°56.26 \$N14°37.75 196°32.22 \$N01°33.37 13 222°2.07 12°49.78 41.10 87°36.78 35.45 76°58.35 37.64 211°34.86 33.30 14 237°4.54 27°53.50 40.41 102°37.86 35.12 92°0.45 37.52 226°37.50 33.23 15 252°7.00 42°57.22 · · · 39.72 117°38.94 · · · · · · · · · · · · · · · · · · ·							
8 146°49.75 297°31.20 44.53 12°31.40 37.11 1°47.88 38.21 136°21.68 33.65 9 161°52.22 312°34.91 · · · 43.85 27°32.48 · · 36.78 16°49.97 · · · 38.10 151°24.31 · · · 33.58 10 176°54.68 327°38.63 43.17 42°33.55 36.45 31°52.07 37.98 166°26.95 33.51 11 191°57.15 342°42.34 42.48 57°34.63 36.12 46°54.16 37.87 181°29.59 33.44 12 206°59.61 357°46.06 519°41.79 72°35.71 N18°35.79 61°56.26 N14°37.75 196°32.22 N01°33.37 13 222°2.07 12°49.78 41.10 87°36.78 35.45 76°58.35 37.64 211°34.86 33.30 14 237°4.54 27°53.50 40.41 102°37.86 35.12 92°0.45 37.52 226°37.50 33.23 15 252°7.00 42°57.22 · · 39.72 117°38.94 · · 34.79 107°2.54 · · · 37.41 241°40.13 · · · 33.16 16 267°9.47 58°0.94 39.02 132°40.01 34.46 122°4.64 37.29 256°42.77 33.09 17 282°11.93 73°4.67 38.32 147°41.09 34.13 137°6.73 37.18 271°45.40 33.02 18 297°14.39 88°8.39 519°37.62 162°42.17 N18°33.79 152°8.83 N14°37.06 286°48.04 N01°32.95 19 312°16.86 103°12.12 36.92 177°43.25 33.46 167°10.93 36.95 301°50.68 32.88 20 327°19.32 118°15.85 36.21 192°44.33 33.13 182°13.02 36.83 316°53.31 32.81 21 342°21.79 133°19.58 · · · 35.50 207°45.41 · · · 32.80 197°15.12 · · · 36.72 331°55.95 · · · 32.74 22 357°24.25 148°23.32 34.79 222°46.49 32.47 212°17.22 36.60 346°58.58 32.67 23 12°26.72 163°27.05 34.08 237°47.57 32.13 227°19.31 36.49 2°1.22 32.60  Saturn 349°22.19 23:00  Oct 17 Sat Venus 34.59°22.19 12:15 Oct 17 Sat Venus 150°2.51 12:15 Mars 226°26.29 07:12 Jupiter 215°10.06 07:56 Saturn 349°22.19 23:00  Oct 17 Sat Venus 150°2.51 12:15 Mars 226°26.29 07:12 Jupiter 215°10.06 07:56 Saturn 349°3.05 12:15 Oct 17 Sat Venus 150°2.51 12:15 Mars 226°26.29 07:12 Jupiter 215°10.06 07:56 Saturn 349°30.35 12:15  Oct 18 Sun Mars 225°55.1 12:15 Mars 226°26.29 07:12 Jupiter 215°10.06 07:56 Saturn 349°30.35 12:15  Oct 18 Sun SHA Mer.pass 150°3.15 12:15 Mars 226°26.29 07:12 Jupiter 215°10.06 07:56 Saturn 349°30.35 12:15  Oct 18 Sun SHA Mer.pass 150°3.15 12:15 Mars 226°26.29 07:12 Jupiter 215°10.06 07:56 Saturn 349°30.35 12:15  Oct 18 Sun Statrn 349°30.30 12:15  Nars 226°26.29 07:12 Saturn 349°30.36 12:1							
9 161°52.22 312°34.91 · · 43.85 27°32.48 · · 36.78 16°49.97 · · 38.10 151°24.31 · · · 33.58 10 176°54.68 327°38.63 43.17 42°33.55 36.45 31°52.07 37.98 166°26.95 33.51 11 191°57.15 342°42.34 42.48 57°34.63 36.12 46°54.16 37.87 181°29.59 33.44 12 206°59.61 357°46.06 \$19°41.79 72°35.71 \$N18°35.79 61°56.26 \$N14°37.75 196°32.22 \$N01°33.37 13 222°2.07 12°49.78 41.10 87°36.78 63 35.12 92°0.45 37.52 226°37.50 33.23 15 252°7.00 42°57.22 · · 39.72 117°38.94 · · · 34.79 107°2.54 · · · 37.41 241°40.13 · · · 33.16 26°26.39							
10 176°54.68 327°38.63 43.17 42°33.55 36.45 31°52.07 37.98 166°26.95 33.51 11 191°57.15 342°42.34 42.48 57°34.63 36.12 46°54.16 37.87 181°29.59 33.44 12 206°59.61 357°46.06 \$19°41.79 72°35.71 \$\text{N18}\circ{35}{27}\$ 10 12°49.78 41.10 87°36.78 35.45 76°58.35 37.64 211°34.86 33.30 14 237°4.54 27°53.50 40.41 102°37.86 35.12 92°0.45 37.52 226°37.50 33.23 15 252°7.00 42°57.22 · 39.72 117°38.94 · 34.79 107°2.54 · 37.41 241°40.13 · 33.16 16 267°9.47 58°0.94 39.02 132°40.01 34.46 122°4.64 37.29 256°42.77 33.09 17 282°11.93 73°4.67 38.32 147°41.09 34.13 137°6.73 37.18 271°45.40 33.02 18 297°14.39 88°8.39 \$19°37.62 162°42.17 \$\text{N18}\circ{33.79}{33.94}\$ 162°42.17 \$\text{N18}\circ{33.79}{33.94}\$ 152°8.83 \$\text{N14}\circ{37.06}{36.83}\$ 286°48.04 \$\text{N01}\circ{32.95}{32.95}\$ \text{Saturn} \$\text{349}\circ{30.92}{32.95}\$ 118°15.85 36.21 192°44.33 33.13 182°13.02 36.83 316°53.31 32.81 21 342°21.79 133°19.58 · 35.50 207°45.41 · 32.80 197°15.12 · 36.72 331°55.95 · 32.74 22 357°24.25 148°23.32 34.79 222°46.49 32.47 212°17.22 36.60 346°58.58 32.67 23 12°26.72 163°27.05 34.08 237°47.57 32.13 227°19.31 36.49 2°1.22 32.60 \$\text{Mars}: 0.1\$							
11 191°57.15 342°42.34 42.48 57°34.03 30.12 46°54.16 37.87 181°29.99 33.44  12 206°59.61 357°46.06 \$19°41.79 72°35.71 N18°35.79 61°56.26 N14°37.75 196°32.22 N01°33.37  13 222°2.07 12°49.78 41.10 87°36.78 35.45 76°58.35 37.64 211°34.86 33.30  14 237°4.54 27°53.50 40.41 102°37.86 35.12 92°0.45 37.52 226°37.50 33.23  15 252°7.00 42°57.22 ·· 39.72 117°38.94 ·· 34.79 107°2.54 ·· 37.41 241°40.13 ·· 33.16  267°9.47 58°0.94 39.02 132°40.01 34.46 122°4.64 37.29 256°42.77 33.09  17 282°11.93 73°4.67 38.32 147°41.09 34.13 137°6.73 37.18 271°45.40 33.02  18 297°14.39 88°8.39 \$19°37.62 162°42.17 N18°33.79 152°8.83 N14°37.06 286°48.04 N01°32.95  19 312°16.86 103°12.12 36.92 177°43.25 33.46 167°10.93 36.95 301°50.68 32.88  20 327°19.32 118°15.85 36.21 192°44.33 33.13 182°13.02 36.83 316°53.31 32.81  21 342°21.79 133°19.58 ·· 35.50 207°45.41 ·· 32.80 197°15.12 ·· 36.72 331°55.95 ·· 32.74  22 357°24.25 148°23.32 34.79 222°46.49 32.47 212°17.22 36.60 346°58.58 32.67  23 12°26.72 163°27.05 34.08 237°47.57 32.13 227°19.31 36.49 2°1.22 32.60  Mars 226°26.29 07:12  Jupiter 215°10.06 52turn 349°26.38 22:56  Saturn 349°26.38 22:56  Oct 18 Sun SHA Mer.pass Venus 150°31.53 12:09  Mars 225°52.78 07:10  Jupiter 215°10.06 53turn 349°26.38 22:56  Saturn 349°30.54 22:52  Horizontal parallax Venus: 0.5  Mars: 0.1							
12 206 99.01 35 7 40.06 \$19 41.79							
14 237° 4.54 27° 53.50 40.41 102° 37.86 35.12 92° 0.45 37.52 226° 37.50 33.23							
15							
16       267° 9.47       58° 0.94       39.02       132° 40.01       34.46       122° 4.64       37.29       256° 42.77       33.09       Venus       150° 31.53       12:09         17       282° 11.93       73° 4.67       38.32       147° 41.09       34.13       137° 6.73       37.18       271° 45.40       33.02       Mars       225° 52.78       07:10         18       297° 14.39       88° 8.39       \$19° 37.62       162° 42.17       \$18° 33.79       152° 8.83       \$14° 37.06       286° 48.04       \$101° 32.95       Jupiter       215° 1.09       07:53         19       312° 16.86       103° 12.12       36.92       177° 43.25       33.46       167° 10.93       36.95       301° 50.68       32.88       \$3.11       34.91       34.93       30.92       301° 50.68       32.88       \$3.11       32.81       \$3.12° 21.09       32.81       \$3.12° 21.09       32.81       \$3.12° 21.09       32.81       \$3.12° 21.09       32.81       \$3.12° 21.09       32.81       \$3.12° 21.09       32.81       \$3.12° 21.09       32.81       \$3.12° 21.09       32.81       \$3.12° 31.09       \$3.12° 31.09       \$3.12° 31.09       \$3.12° 31.09       \$3.12° 31.09       \$3.12° 31.09       \$3.12° 31.09       \$3.12° 31.09       \$3.12° 31.09 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>							
17 282°11.93 73°4.67 38.32 147°41.09 34.13 137°6.73 37.18 271°45.40 33.02 Mars 225°52.78 07:10 18 297°14.39 88°8.39 \$19°37.62 162°42.17 \$N18°33.79 152°8.83 \$N14°37.06 286°48.04 \$N01°32.95\$ 19 312°16.86 103°12.12 36.92 177°43.25 33.46 167°10.93 36.95 301°50.68 32.88 20 327°19.32 118°15.85 36.21 192°44.33 33.13 182°13.02 36.83 316°53.31 32.81 21 342°21.79 133°19.58 · 35.50 207°45.41 · 32.80 197°15.12 · 36.72 331°55.95 · 32.74 22 357°24.25 148°23.32 34.79 222°46.49 32.47 212°17.22 36.60 346°58.58 32.67 23 12°26.72 163°27.05 34.08 237°47.57 32.13 227°19.31 36.49 2°1.22 32.60 Mars: 0.1							
18 297°14.39 88°8.39 \$19°37.62 162°42.17 N18°33.79 152°8.83 N14°37.06 286°48.04 N01°32.95 19 312°16.86 103°12.12 36.92 177°43.25 33.46 167°10.93 36.95 301°50.68 32.88 20 327°19.32 118°15.85 36.21 192°44.33 33.13 182°13.02 36.83 316°53.31 32.81 21 342°21.79 133°19.58 · 35.50 207°45.41 · 32.80 197°15.12 · 36.72 331°55.95 · 32.74 22 357°24.25 148°23.32 34.79 222°46.49 32.47 212°17.22 36.60 346°58.58 32.67 23 12°26.72 163°27.05 34.08 237°47.57 32.13 227°19.31 36.49 2°1.22 32.60							
19 312°16.86 103°12.12 36.92 177°43.25 33.46 167°10.93 36.95 301°50.68 32.88 20 327°19.32 118°15.85 36.21 192°44.33 33.13 182°13.02 36.83 316°53.31 32.81 21 342°21.79 133°19.58 · 35.50 207°45.41 · 32.80 197°15.12 · 36.72 331°55.95 · 32.74 22 357°24.25 148°23.32 34.79 222°46.49 32.47 212°17.22 36.60 346°58.58 32.67 23 12°26.72 163°27.05 34.08 237°47.57 32.13 227°19.31 36.49 2°1.22 32.60 Mars: 0.1							
20 327°19.32 118°15.85 36.21 192°44.33 33.13 182°13.02 36.83 316°53.31 32.81 21 342°21.79 133°19.58 · 35.50 207°45.41 · 32.80 197°15.12 · 36.72 331°55.95 · 32.74 22 357°24.25 148°23.32 34.79 222°46.49 32.47 212°17.22 36.60 346°58.58 32.67 23 12°26.72 163°27.05 34.08 237°47.57 32.13 227°19.31 36.49 2°1.22 32.60 Horizontal parallax  Venus: 0.5  Mars: 0.1					167°10.93 36.95		
22 357°24.25 148°23.32 34.79 222°46.49 32.47 212°17.22 36.60 346°58.58 32.67 Venus: 0.5 23 12°26.72 163°27.05 34.08 237°47.57 32.13 227°19.31 36.49 2°1.22 32.60 Mars: 0.1							
23 12°26.72 163°27.05 34.08 237°47.57 32.13 227°19.31 36.49 2°1.22 32.60 Mars: 0.1							-
25 12 20.12 100 21.00 51.00 251 11.51 52.10 52.10							
	ivier.	pass. 22:10	ν3.1' α-U.1' m-4.11	ν1.1 <i>a</i> -0.3 m0.99	ν2.1' <i>a</i> -0.1' m-1.94	ν2.0° <i>a</i> -0.1′ m0.40	

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	183°34.89	S08°48.63	121°45.68	9.9'	S27°53.15	0.3'	54.2'
1	198°35.03	49.55	136°14.57	9.9'	27°53.44	0.2'	54.2'
2	213°35.16 228°35.30	50.47 •• 51.39	150°43.47 165°12.37	9.9' 9.9'	27°53.59 27°53.61	0.0' -0.1'	54.2' 54.2'
4	243°35.43	52.31	179°41.29	9.9'	27°53.49	-0.1	54.2'
5	258° 35.57	53.23	194°10.21	9.9'	27°53.24	-0.4	54.2'
6	273°35.70	S08°54.15	208°39.15	10.0'	S27°52.85	-0.5'	54.2'
7	288°35.83	55.07	223°8.10	10.0'	27°52.32	-0.7'	54.2'
8 9	303°35.97 318°36.10	55.99 •• 56.91	237°37.07 252°6.05	10.0' 10.0'	27°51.66 27°50.87	-0.8' -0.9'	54.1' 54.1'
10	333° 36.23	57.83	266°35.04	10.0'	27°49.94	-0.9	54.1
11	348°36.37	58.74	281°4.06	10.0'	27°48.88	-1.2'	54.1'
12	3°36.50	S08°59.66	295°33.09	10.1'	S27°47.68	-1.3'	54.1'
13	18° 36.63 33° 36.76	09°0.58	310°2.14 324°31.21	10.1' 10.1'	27°46.35 27°44.89	-1.5'	54.1'
14 15	48°36.89	1.50 · · 2.41	324°31.21 339°0.30	10.1	27°44.89 27°43.29	-1.6' -1.7'	54.1' 54.1'
16	63°37.03	3.33	353°29.41	10.1	27°41.56	-1.9'	54.1'
17	78°37.16	4.25	7°58.55	10.2'	$27^{\circ}39.70$	-2.0'	54.1'
18	93°37.29	S09°5.17	22°27.71	10.2'	S27°37.70	-2.1'	54.1'
19 20	108° 37.42 123° 37.55	6.08 7.00	36°56.89 51°26.10	10.2' 10.2'	27°35.57 27°33.31	-2.3' -2.4'	54.1' 54.1'
21	125 37.55 138°37.68	7.00 • • 7.92	65°55.34	10.2	27°30.92	-2.4 -2.5'	54.1'
22	153°37.81	8.83	80°24.60	10.3	27°28.39	-2.7'	54.1'
23	168°37.94	9.75	94°53.89	10.3'	27°25.74	-2.8'	54.1'
	SD = 16.0'	d = 0.9'		SD	0 = 14.8'		
٠.							
Sat 0	<b>GHA</b> 183°38.07	<b>Dec</b> \$09°10.66	<b>GHA</b> 109°23.22	u 10.4'	<b>Dec</b> \$27°22.95	d -2.9'	<b>HP</b> 54.1'
1	198° 38.20	11.58	123°52.57	10.4'	27°20.03	-3.0'	54.1'
2	213°38.33	12.49	138°21.95	10.4'	27°16.99	-3.2'	54.1'
3	228° 38.45	• • 13.41	152°51.36	10.4'	27°13.81	-3.3'	54.1'
4 5	243°38.58 258°38.71	14.32 15.24	167°20.81 181°50.28	10.5' 10.5'	27°10.50 27°7.07	-3.4' -3.6'	54.1' 54.1'
6	273° 38.84	S09°16.15	196°19.80	10.5'	\$27°3.51	-3.7	54.1'
7	288°38.97	17.06	210°49.34	10.6'	$26^{\circ}59.82$	-3.8'	54.1'
8	303°39.09	17.98	225°18.92	10.6'	26°56.00	-3.9'	54.1'
9 10	318° 39.22 333° 39.35	18.89	239°48.54 254°18.20	10.7' 10.7'	26°52.05 26°47.98	-4.1' -4.2'	54.1' 54.1'
10	333° 39.35 348° 39.48	19.80 20.72	254° 18.20 268° 47.89	10.7'	26°47.98 26°43.78	-4.2 -4.3'	54.1'
12	3°39.60	S09°21.63	283°17.62	10.8'	S26°39.46	-4.4'	54.1'
13	18° 39.73	22.54	297°47.39	10.8'	$26^{\circ}35.01$	-4.6'	54.1'
14	33°39.85	23.45	312°17.19	10.8'	26°30.43 26°25.73	-4.7'	54.2'
15 16	48°39.98 63°40.10	· · 24.37 25.28	326°47.04 341°16.93	10.9' 10.9'	26°25.73 26°20.91	-4.8' -4.9'	54.2' 54.2'
17	78° 40.23	26.19	355°46.86	11.0'	26°15.96	-5.1'	54.2'
18	93°40.35	S09°27.10	$10^{\circ}16.82$	11.0'	S26°10.89	-5.2'	54.2'
19	108° 40.48	28.01	24°46.84	11.1'	26°5.70	-5.3'	54.2'
20 21	123°40.60 138°40.73	28.92 •• 29.83	39°16.89 53°46.99	11.1' 11.1'	26°0.39 25°54.95	-5.4' -5.6'	54.2' 54.2'
22	153° 40.75	30.74	68°17.13	11.1	25°49.40	-5.7'	54.2'
23	168°40.98	31.65	82°47.31	11.2'	25°43.72	-5.8'	54.2'
	SD = 16.0'	d = 0.9'		SD	0 = 14.8'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	183°41.10	S09°32.56	97°17.54	11.3'	\$25°37.92	-5.9'	54.2'
1	198°41.22	33.47	$111^{\circ}47.81$	11.3'	$25^{\circ}32.01$	-6.0'	54.2'
2	213°41.34	34.38	126°18.13	11.4'	25°25.97	-6.2'	54.2'
3 4	228°41.47 243°41.59	· · 35.29 36.20	140°48.49 155°18.90	11.4' 11.5'	25°19.82 25°13.55	-6.3' -6.4'	54.2' 54.2'
5	258° 41.71	37.11	169°49.35	11.5'	25°7.16	-6.5'	54.3
6	273°41.83	S09°38.02	184°19.85	11.5'	S25°0.66	-6.6'	54.3'
7	288°41.96	38.92	198°50.39	11.6'	24°54.04	-6.7'	54.3'
8 9	303°42.08 318°42.20	39.83 •• 40.74	213°20.99 227°51.63	11.6' 11.7'	24°47.31 24°40.46	-6.8' -7.0'	54.3' 54.3'
10	333° 42.32	41.65	242°22.31	11.7'	24 40.40 24°33.49	-7.0 -7.1'	54.3'
11	348° 42.44	42.55	256°53.05	11.8'	24°26.42	-7.2'	54.3'
12	3°42.56	S09°43.46	271°23.83	11.8'	S24°19.23	-7.3'	54.3'
13 14	18° 42.68 33° 42.80	44.37 45.27	285°54.66 300°25.53	11.9' 11.9'	24°11.92 24°4.51	-7.4' -7.5'	54.3' 54.3'
14 15	48° 42.92	45.27 • • 46.18	300 25.53 314°56.46	11.9 12.0'	24 4.51 23°56.98	-7.5 -7.6'	54.3 54.4'
16	63°43.04	47.09	329°27.43	12.0'	23°49.35	-7.7'	54.4'
17	78°43.16	47.99	343°58.45	12.1'	23°41.60	-7.9'	54.4'
18 19	93°43.28 108°43.39	\$09°48.90 49.80	358°29.52 13°0.63	12.1' 12.2'	\$23°33.75 23°25.78	-8.0' -8.1'	54.4' 54.4'
19 20	108° 43.39 123° 43.51	49.80 50.71	13°0.63 27°31.80	12.2'	23°25.78 23°17.71	-8.1° -8.2'	54.4'
21	138° 43.63	• • 51.61	42° 3.01	12.3'	23°9.53	-8.3	54.4'
22	153° 43.75	52.52	56°34.27	12.3'	23°1.24	-8.4'	54.4'
23	168°43.87	53.42	71°5.58	12.4'	22°52.85	-8.5'	54.5'
	SD = 16.0'	d = 0.9'		SD	0 = 14.8'		

	Twilight				Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	05:04	06:22	07:34	15:55	17:06	18:24
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	02:47	03:47	04:33	19:00	19:46	20:47
Lat.		Moonris	e		Moonset	:
	l			ı	Sat	

Lat.		Moonris	е	Moonset			
Lat.	Fri	Sat	Sun	Fri	Sat	Sun	
N 72°							
<b>N</b> 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	
<b>N</b> 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	•• ••	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	05:41	06:50	08:16	02:22	02:59	03:16	

#### October 19, 20, 21 UT (Mon., Tue., Wed.)

h	Aries	Venus	Mars	Jupiter	Saturn		Stars
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec		SHA
0	27°29.18	178°30.79 \$19°33.37	252°48.65 N18°31.80	242°21.41 N14°36.38	17°3.86 N01°32.53		
1	42°31.64	193°34.52 32.65	267°49.73 31.47	257°23.51 36.26	32°6.49 32.46	Alpheratz	357°32.94
2	57°34.11	208°38.26 31.93	282°50.81 31.14	272°25.61 36.15	47°9.13 32.39	Ankaa	353°5.31
3	72°36.57	223°42.00 · · 31.21	297°51.89 · · 30.80	287°27.71 · · 36.03	62°11.76 · · 32.32	Schedar	349°28.82
4	87°39.04	238°45.74 30.49	312°52.97 30.47	302°29.80 35.92	77°14.40 32.25	Diphda	348°45.52
5	102°41.50	253°49.49 29.76	327°54.05 30.14	317°31.90 35.81	92°17.03 32.18	Achernar	335° 18.51
6	117° 43.96	268°53.23 \$19°29.03	342°55.14 N18°29.81	332°34.00 N14°35.69	107°19.67 N01°32.11	Hamal	327°49.20
7	132° 46.43	283°56.98 28.30	357°56.22 29.47	347°36.10 35.58	122°22.30 32.04	Polaris	312°48.72
8	147° 48.89	299°0.72 27.57	12°57.30 29.14	2°38.20 35.46	137°24.94 31.97	Acamar	315° 10.26
9	162°51.36	314°4.47 · · 26.84	27°58.39 · · 28.81	17°40.30 · · 35.35	152°27.57 · · 31.90	Menkar	314°4.31
10	177°53.82	329°8.22 26.10	42°59.47 28.47	32°42.40 35.24	167°30.21 31.83	Mirfak	308°25.70
11	192°56.28	344°11.97 25.36	58° 0.55 28.14	47°44.50 35.12	182°32.85 31.76	Aldebaran	290°37.69
12	207°58.75	359°15.73 <b>S</b> 19°24.62	73°1.64 N18°27.81	62°46.60 N14°35.01	197°35.48 N01°31.69	Rigel	281°2.26
13	223°1.21	14°19.48 23.87	88°2.72 27.47	77°48.70 34.89	212°38.12 31.62	Capella	280° 19.44 278° 21.12
14	238°3.68	29°23.23 23.13	103°3.81 27.14	92°50.80 34.78	227°40.75 31.55	Bellatrix Elnath	277° 59.80
15	253°6.14	44°26.99 · · 22.38	118°4.90 · · 26.81	107°52.90 · · 34.67	242°43.38 · · 31.48	Alnilam	277 39.80 275°36.07
16	268°8.61	59°30.75 21.63	133°5.98 26.47	122°55.00 34.55	257°46.02 31.42	Betelgeuse	270°50.35
17	283°11.07	74°34.51 20.88	148°7.07 26.14	137°57.10 34.44	272°48.65 31.35	Canopus	263°51.54
18	298° 13.53	89°38.27 \$19°20.13	163°8.15 N18°25.81	152°59.20 N14°34.33	287°51.29 N01°31.28	Sirius	258°24.85
19	313°16.00	104°42.03 19.37	178° 9.24 25.47	168°1.30 34.21	302°53.92 31.21	Adhara	255°4.63
20	328° 18.46	119°45.79 18.61	193°10.33 25.14	183° 3.40 34.10	317°56.56 31.14	Procyon	244°49.29
21	343°20.93	134°49.55 · · 17.85	208°11.42 · · 24.81	198° 5.51 · · 33.99	332°59.19 · · 31.07	Pollux	243°15.52
22	358°23.39	149°53.32 17.09	223°12.51 24.47	213°7.61 33.88	348°1.83 31.00	Avior	234°14.23
23	13°25.85	164°57.09 16.32	238°13.59 24.14	228° 9.71 33.76	3°4.46 30.93	Suhail	222°45.39
Mer.p	pass. 22:06	$\nu 3.7' \ d$ -0.7' m-4.14	$ u 1.1' \ d$ -0.3 $' \ {\sf m0.98}$	$ u 2.1' \ d$ -0.1' m-1.94	$\nu 2.6' \ d$ -0.1' m0.40	Miaplacidus	221°38.30
						Alphard	
т	CHA	CHA Doo	CHA Doo	CHA Doo	CHA Dos	Regulus	207°33.08
Tue	<b>GHA</b> 28°28.32	<b>GHA Dec</b> 180° 0.85 <b>S</b> 19° 15.56	<b>GHA Dec</b> 253°14.68 N18°23.80	GHA Dec	<b>GHA Dec</b> 18°7.10 N01°30.86	Dubhe	193°39.73
0 1	28 28.32 43°30.78			243°11.81 N14°33.65 258°13.92 33.54	_	Denebola	182°23.75
2	45°33.25	195° 4.62 14.79 210° 8.39 14.02	268°15.77 23.47 283°16.86 23.14	258°13.92 33.54 273°16.02 33.42	33°9.73 30.79 48°12.37 30.72	Gienah	175°42.40
3	73°35.71	225°12.16 · · 13.24	298°17.95 · · 22.80	288°18.12 · · 33.31	63°15.00 · · 30.65		172°59.13
4	88°38.17	240°15.93 12.47	313°19.04 22.47	303°20.22 33.20	78°17.63 30.59		171°50.58
5	103° 40.64	255°19.70 11.69	328°20.13 22.13	318°22.33 33.09	93°20.27 30.52	Alioth	166°12.24
6	118° 43.10	270°23.48 \$19°10.91	343°21.23 N18°21.80	333°24.43 N14°32.97	108°22.90 N01°30.45	Spica	158°21.09
7	133° 45.57	285°27.25 10.13	358°22.32 21.46	348°26.54 32.86	123°25.54 30.38	Alkaid	152°51.35
8	148° 48.03	300°31.03 9.35	13°23.41 21.13	3°28.64 32.75	138°28.17 30.31	Hadar	148°34.58
9	163°50.50	315°34.80 · · 8.56	28°24.50 · · 20.80	18°30.74 · · 32.64	153°30.80 · · 30.24	Menkent	
10	178°52.96	330°38.58 7.77	43°25.59 20.46	33°32.85 32.52	168°33.44 30.17	1	145°46.92 139°38.94
11	193°55.42	345°42.36 6.98	58°26.69 20.13	48°34.95 32.41	183°36.07 30.10	Rigil Kent. Kochab	139 36.94 137°20.97
12	208° 57.89	0°46.14 \$19°6.19	73°27.78 N18°19.79	63°37.06 N14°32.30	198°38.70 N01°30.04	Zuben'ubi	136°54.73
13	224°0.35	15°49.92 5.40	88°28.87 19.46	78°39.16 32.19	213°41.34 29.97	Alphecca	126°2.83
14	239°2.82	30°53.70 4.60	103°29.97 19.12	93°41.27 32.07	228°43.97 29.90	Antares	112° 14.33
15	254°5.28	45°57.48 · · 3.81	118°31.06 · · 18.79	108°43.37 · · 31.96	243°46.60 · · 29.83	Atria	107°7.60
16	269°7.74	61°1.27 3.01	133°32.16 18.45	123°45.48 31.85	258°49.24 29.76	Sabik	102°1.33
17	284° 10.21	76°5.05 2.20	148°33.25 18.12	138°47.58 31.74	273°51.87 29.69	Shaula	96°8.62
18	299° 12.67	91°8.83 <b>S</b> 19°1.40	163°34.35 N18°17.78	153°49.69 N14°31.63	288°54.50 N01°29.62	Rasalhague	95°57.39
19	314° 15.14	106°12.62 19°0.59	178°35.44 17.45	168°51.80 31.52	303°57.14 29.56	Eltanin	90°41.76
20	329° 17.60	121°16.40 18°59.79	193°36.54 17.11	183°53.90 31.40	318°59.77 29.49	Kaus Aust.	83°30.73
21	344°20.06	136°20.19 · · 58.98	208°37.64 · · 16.78	198°56.01 · · 31.29	334°2.40 · · 29.42	Vega	80°32.38
22	359°22.53	151°23.98 58.16	223°38.73 16.44	213°58.12 31.18	349°5.04 29.35	Nunki	75°46.05
23	14°24.99	166°27.77 57.35	238°39.83 16.11	229°0.22 31.07	4°7.67 29.28	Altair	$61^{\circ}58.55$
Mer.p	pass. 22:02	$\nu$ 3.8′ <i>d</i> -0.8′ m-4.23	$ u 1.1' \ d$ -0.3 $' \ { m m0.97}$	$ u 2.1' \ d$ -0.1' m-1.95	$\nu 2.6' \ d$ -0.1' m0.41	Peacock	53°3.36
						Deneb	49°24.72
\Mad	CHA	CHA Doo	CHA Doo	CHA Doo	CHA Dos	Enif	33° 37.22
Wed 0	<b>GHA</b> 29°27.46	<b>GHA Dec</b> 181° 31.56 <b>S</b> 18° 56.54	<b>GHA Dec</b> 253°40.93 N18°15.77	<b>GHA Dec</b> 244° 2.33 N14° 30.96	<b>GHA Dec</b> 19°10.30 N01°29.21	Al Na'ir	27°30.83
1	44°29.92	196°35.35 55.72	268°42.03 15.44	259° 4.44 30.85	34°12.94 29.15	Fomalhaut	15° 12.65
2	59°32.38	211°39.14 54.90	283°43.13 15.10	274° 6.55 30.73	49°15.57 29.08	Scheat	13°43.52
3	74°34.85	226°42.93 · · 54.08	298°44.23 · · 14.76	289° 8.65 · · · 30.62	64°18.20 · · 29.01	Markab	13°28.20
4	89°37.31	241°46.72 53.25	313°45.32 14.43	304°10.76 30.51	79°20.83 28.94	Oct 19 Mon	SHA
5	104°39.78	256° 50.51 52.43	328°46.42 14.09	319°12.87 30.40	94°23.47 28.87	Venus	151°1.61
6	119° 42.24	271°54.31 \$18°51.60	343°47.52 N18°13.76	334°14.98 N14°30.29	109°26.10 N01°28.81	Mars	$225^{\circ}19.47$
7	$134^{\circ}44.71$	286°58.10 50.77	358°48.62 13.42	349°17.09 30.18	124°28.73 28.74	Jupiter	$214^{\circ}52.23$
8	$149^{\circ}47.17$	302°1.90 49.94	13°49.72 13.09	4°19.20 30.07	139°31.36 28.67	Saturn	349°34.68
9	$164^{\circ}49.63$	317°5.69 · · 49.11	28°50.83 ·· 12.75	19°21.31 · · 29.96	154°34.00 · · 28.60	Oct 20 Tes	SHA
10	$179^{\circ}52.10$	332°9.49 48.27	43°51.93 12.41	34°23.42 29.85	169°36.63 28.53	Oct 20 Tue	3HA 151°32.53
11	194°54.56	347°13.28 47.44	58°53.03 12.08	49°25.53 29.74	184°39.26 28.47		224° 46.37
12	209°57.03	2°17.08 \$18°46.60	73°54.13 N18°11.74	64°27.64 N14°29.62	199°41.89 N01°28.40	Jupiter	
13	224°59.49	17°20.88 45.76	88°55.23 11.41	79°29.75 29.51	214°44.52 28.33	Saturn	
14	240°1.95	32°24.68 44.91	103°56.34 11.07	94°31.86 29.40	229°47.16 28.26		
15	255°4.42	47°28.47 · · 44.07	118°57.44 · · 10.73	109°33.97 · · 29.29	244°49.79 · · 28.20	Oct 21 Wed	SHA
16	270°6.88	62°32.27 43.22	133°58.54 10.40	124°36.08 29.18	259°52.42 28.13	Venus	152°4.10
17	285°9.35	77°36.07 42.38	148°59.65 10.06	139°38.19 29.07	274°55.05 28.06	Mars	
18	300°11.81	92°39.87 \$18°41.53	164° 0.75 N18° 9.73	154°40.30 N14°28.96	289°57.68 N01°27.99	Jupiter	
19	315° 14.27 330° 16.74	107° 43.67 40.67 122° 47.47 39.82	179°1.86 9.39 194°2.96 9.05	169°42.41 28.85	305°0.32 27.92	Saturn	349°42.85
20 21	330° 16.74 345° 19.20	122°47.47 39.82 137°51.27 · · 38.97	194° 2.96 9.05 209° 4.07 • 8.72	184°44.52 28.74 199°46.63 •• 28.63	320°2.95 27.86 335°5.58 · · 27.79	Horizon	tal parallax
22	0°21.67	152°55.07 38.11	209 4.07 · · 8.72 224°5.17 8.38	214°48.74 28.52	350°8.21 27.72		Venus:
23	15°24.13	167° 58.88 37.25	239° 6.28 8.04	214 46.74 26.52 229°50.86 28.41	5°10.84 27.66		Mars:
Mer.p	bass. 21:59	$\nu$ 3.8′ <i>d</i> -0.8′ m-4.26	$ u 1.1' \ d$ -0.3' m0.96	$ u 2.1' \ d$ -0.1' m-1.95	$ u 2.6' \ d$ -0.1' m0.41		

Dec 29°14.53

-42°9.55

56°41.26

-17°50.23

 $-57^{\circ}5.93$ 

 $23^{\circ}35.49$ 

 $89^{\circ}22.51$ 

40°11.63

4°11.84

49°57.38

16°33.86

-8°10.06

 $46^{\circ}1.38$ 

 $6^{\circ}22.54$ 

28°37.77

 $-1^{\circ}10.95$ 

 $7^{\circ}24.81$ 

-52°42.24

 $-16^{\circ}44.97$ 

-29°0.24

 $27^{\circ}57.60$ 

-59°35.37

-43°32.16

-69°49.30

-8°46.36

11°50.19

 $61^{\circ}36.20$ 

 $14^{\circ}25.36$ 

-17°41.34

-63°14.75

-57°15.68

55°48.80 -11°18.00

49°10.77 -60°30.12

-36°30.06

 $19^{\circ}2.64$ 

-60°56.78

 $74^{\circ}2.73$ 

-16°9.13

26°37.58

-26°29.47

-69°4.67

-15°45.43

 $-37^{\circ}7.43$ 

12°32.59

51°29.36

-34°22.35

38°48.76

-26°15.80

8°56.53

-56°39.07

45°22.87

 $10^{\circ}0.08$ 

-46°49.93

-29°28.77

28°13.95

15°21.19

Mer.pass

12:03

07:08

07:49

22:48

11:57

07:07

07:46

22:44

11:51

07:05

07:43

22:39

0.5

0.1

Mer.pass

Mer.pass

 $5^{\circ}9.44$ 

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	183°43.98	S09°54.32	85°36.93	12.4'	S22°44.35	-8.6'	54.5'
1	198°44.10	55.23	100°8.34	12.5'	22°35.75	-8.7'	54.5'
2 3	213°44.22 228°44.33	56.13 •• 57.03	114°39.79 129°11.28	12.5' 12.5'	22°27.04 22°18.23	-8.8' -8.9'	54.5' 54.5'
4	243°44.45	57.94	143°42.83	12.6'	22°9.32	-9.0'	54.5'
5	258°44.56	58.84	$158^{\circ}14.42$	12.6'	$22^{\circ}0.30$	-9.1'	54.6'
6	273°44.68	S09°59.74	172°46.06	12.7'	\$21°51.19	-9.2'	54.6'
7 8	288°44.80 303°44.91	10°0.64 1.55	187°17.75 201°49.48	12.7' 12.8'	21°41.97 21°32.65	-9.3' -9.4'	54.6' 54.6'
9	318°45.02	2.45	216°21.26	12.8'	21°23.23	-9.5'	54.6'
10	333°45.14	3.35	230°53.08	12.9'	$21^{\circ}13.71$	-9.6'	54.6'
11	348°45.25	4.25	245°24.95	12.9'	21°4.10 \$20°54.38	-9.7'	54.7'
12 13	3°45.37 18°45.48	\$10°5.15 6.05	259°56.87 274°28.83	13.0' 13.0'	20°44.57	-9.8' -9.9'	54.7' 54.7'
14	33°45.59	6.95	289°0.83	13.0'	20°34.66	-10.0'	54.7'
15	48°45.71	• • 7.85	303°32.88	13.1'	20°24.66	-10.1'	54.7'
16	63°45.82	8.75	318°4.98	13.1'	20°14.56 20°4.37	-10.2'	54.7'
17 18	78°45.93 93°46.05	9.65 \$10°10.55	332°37.11 347°9.29	13.2' 13.2'	20°4.37 \$19°54.08	-10.3' -10.4'	54.8' 54.8'
19	108°46.16	11.45	1°41.52	13.3'	19°43.71	-10.5'	54.8'
20	123°46.27	12.35	$16^{\circ}13.78$	13.3'	19°33.23	-10.6'	54.8'
21	138°46.38	• • 13.24	30°46.09	13.3'	19°22.67	-10.7'	54.8'
22 23	153°46.49 168°46.60	14.14 15.04	45°18.44 59°50.83	13.4' 13.4'	19°12.02 19°1.27	-10.7' -10.8'	54.9' 54.9'
23		d = 0.9'	- 59 50.05		0 = 14.9'	10.0	J T. J
	SD = 16.0'	a = 0.9'		51	J = 14.9'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°46.71	S10°15.94	74°23.26	13.5'	S18°50.44	-10.9'	54.9'
1 2	198°46.82 213°46.94	16.84 17.73	88°55.73 103°28.24	13.5' 13.5'	18°39.51 18°28.50	-11.0' -11.1'	54.9' 55.0'
3	213°46.94 228°47.05	17.73	103° 28.24 118° 0.78	13.6'	18° 28.50 18° 17.40	-11.1 -11.2'	55.0' 55.0'
4	243°47.15	19.53	132°33.37	13.6'	18°6.22	-11.3'	55.0'
5	258°47.26	20.42	147°5.99	13.7'	17°54.94	-11.4'	55.0'
6	273°47.37 288°47.48	\$10°21.32 22.21	161°38.66 176°11.35	13.7'	\$17°43.58 17°32.14	-11.4'	55.0'
7 8	288°47.48 303°47.59	22.21	176°11.35 190°44.09	13.7' 13.8'	17°32.14 17°20.61	-11.5' -11.6'	55.1' 55.1'
9	318°47.70	24.00	205°16.86	13.8'	17°9.00	-11.7'	55.1'
10	333°47.81	24.90	219°49.66	13.8'	16°57.31	-11.8'	55.1'
11	348°47.91 3°48.02	25.79 \$10°26.69	234°22.50 248°55.37	13.9'	16°45.53 \$16°33.68	-11.9'	55.2'
12 13	18°48.02	27.58	248°55.37 263°28.27	13.9' 13.9'	16°21.74	-11.9' -12.0'	55.2' 55.2'
14	33°48.24	28.48	278°1.21	14.0'	16°9.72	-12.1'	55.2'
15	48°48.34	• • 29.37	292°34.18	14.0'	15°57.62	-12.2'	55.3'
16	63°48.45 78°48.56	30.26 31.16	307°7.18 321°40.21	14.0' 14.1'	15°45.45 15°33.20	-12.3'	55.3'
17 18	93°48.66	\$1.10 \$10°32.05	321 40.21 336°13.26	14.1	\$15°20.86	-12.3' -12.4'	55.3' 55.3'
19	108°48.77	32.94	350°46.35	14.1'	15°8.46	-12.5'	55.4'
20	123°48.87	33.83	5°19.46		14°55.98		
21 22	138°48.98 153°49.08	· · 34.73 35.62	19°52.60 34°25.77	14.2' 14.2'	14°43.42 14°30.79	-12.6' -12.7'	55.4' 55.4'
23	168°49.19	36.51	48°58.96	14.2'	14 30.79 14°18.08	-12.7 -12.8'	55.5'
	SD = 16.1'	d = 0.9'			D = 15.0'		
	<u> </u>	<u>u — 0.9</u>		ال			
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°49.29	\$10°37.40	63°32.18	14.2'	\$14°5.30 13°52.45	-12.9'	55.5'
1 2	198°49.39 213°49.50	38.29 39.18	78°5.42 92°38.68	14.3' 14.3'	13°52.45 13°39.53	-12.9' -13.0'	55.5' 55.6'
3	228°49.60	• • 40.07	107°11.97	14.3'	13°26.54	-13.1	55.6'
4	243°49.70	40.96	121°45.27	14.3'	13°13.48	-13.1'	55.6'
5 6	258°49.81 273°49.91	41.85 \$10°42.74	136°18.60 150°51.95	14.3' 14.4'	13°0.34 \$12°47.14	-13.2' -13.3'	55.6' 55.7'
7	273°49.91 288°50.01	43.63	165°25.31	14.4' 14.4'	12°33.88	-13.3'	55.7' 55.7'
8	303°50.11	44.52	179°58.69	14.4'	12°20.54	-13.4	55.7'
9	318°50.22	• • 45.41	194°32.09	14.4'	12°7.14	-13.5'	55.8'
10 11	333°50.32 348°50.42	46.30 47.18	209°5.51 223°38.94	14.4' 14.4'	11°53.68 11°40.15	-13.5' -13.6'	55.8' 55.8'
11	348 50.42 3°50.52	47.18 \$10°48.07	223° 38.94 238° 12.39	14.4	\$11°40.15 \$11°26.55	-13.6	55.8'
13	18°50.62	48.96	252°45.84	14.5'	11°12.90	-13.7'	55.9'
14	33°50.72	49.85	267°19.32	14.5'	10°59.18	-13.8'	55.9'
15 16	48°50.82 63°50.92	· · 50.73 51.62	281°52.80 296°26.29	14.5' 14.5'	10°45.40 10°31.56	-13.8' -13.9'	55.9' 56.0'
16 17	78°51.02	51.62 52.51	296° 26.29 310° 59.79	14.5'	10° 31.56 10° 17.66	-13.9 -14.0'	56.0'
18	93°51.12	\$10°53.39	325°33.30	14.5'	\$10°3.70	-14.0'	56.0'
19	108°51.22	54.28	340°6.82	14.5'	09°49.68	-14.1'	56.1'
20 21	123°51.32 138°51.41	55.16 •• 56.05	354°40.34 9°13.87	14.5' 14.5'	09°35.60 09°21.47	-14.1' -14.2'	56.1' 56.1'
21	138°51.41 153°51.51	56.93	9°13.87 23°47.41	14.5' 14.5'	09°21.47 09°7.28	-14.2' -14.2'	56.1'
23	168°51.61	57.82	38°20.95	14.5	08°53.04	-14.3'	56.2'
	SD = 16.1'	d = 0.9'		SI	D = 15.1'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	05:17	06:35	07:49	15:39	16:52	18:10
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	02:35	03:37	04:24	19:07	19:54	20:58
				I		

Lat.		Moonris	е	Moonset			
Lat.	Mon	Tue	Wed	Mon	Tue	Wed	
N 72°		17:30	16:34		22:10		
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	09:48	11:19	12:49	03:23	03:27	03:28	

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	9-11	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	53-72%	
19	14:56	15:01	11:45	18:53	06:30		
20	15:07	15:12	11:45	19:38	07:16		
21	15:17	15:22	11:45	20:22	08:00		

## October 22, 23, 24 UT (Thu., Fri., Sat.)

h	Aries	Venus	5	M	ars	Jup	oiter	Sat	urn		Stars	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	30°26.59		.8°36.39	254°7.39	N18°7.71	244°52.97	N14°28.30	20°13.47	N01°27.59			
1	45°29.06	198°6.48	35.53	269°8.49	7.37	259°55.08	28.19	35°16.10	27.52	Alpheratz	357°32.94	29°14.54
2	60°31.52	213° 10.28	34.66	284° 9.60	7.03	274°57.19	28.08	50°18.74	27.45	Ankaa	353°5.31	-42°9.56
3	75°33.99	228°14.09 ·	• 33.80	299°10.71	• • 6.70	289°59.31	• • 27.97	65°21.37	• • 27.39	Schedar	349°28.83	56°41.28
4	90°36.45	243° 17.89	32.93	$314^{\circ}11.82$	6.36	$305^{\circ}1.42$	27.86	80°24.00	27.32	Diphda Achernar	348°45.52 335°18.51	-17°50.24 -57°5.95
5	105°38.91	258°21.69	32.06	$329^{\circ}12.92$	6.02	320° 3.53	27.75	95°26.63	27.25	Hamal	327°49.19	-57 5.95 23°35.50
6	120°41.38		.8°31.19	344°14.03	N18°5.69	335° 5.65	N14°27.64	110°29.26	N01°27.18	Polaris	312°48.12	89°22.53
7	135° 43.84	288° 29.30	30.32	359°15.14	5.35	350°7.76	27.53	125°31.89	27.12	Acamar	315° 10.25	-40°11.64
8	150° 46.31	303°33.10	29.44	14°16.25	5.01	5°9.88	27.42	140°34.52	27.05	Menkar	314°4.31	4°11.84
9	165° 48.77 180° 51.23		• 28.56	29°17.36	• • 4.67	20°11.99	•• 27.31	155°37.15 170°39.78	• • 26.98	Mirfak	308°25.68	49°57.39
10 11	195° 53.70	333°40.71 348°44.52	27.69 26.81	44°18.47 59°19.58	4.34 4.00	35°14.10 50°16.22	27.21 27.10	170 39.76 185°42.41	26.92 26.85	Aldebaran	290°37.67	16°33.86
12	210°56.16		.8°25.93	74°20.69	N18°3.66	65°18.33	N14°26.99	200°45.04	N01°26.78	Rigel	281°2.24	-8°10.07
13	225°58.63	18°52.13	25.04	89°21.80	3.33	80°20.45	26.88	215°47.67	26.72	Capella	280°19.42	46°1.39
14	241°1.09	33°55.93	24.16	104°22.92	2.99	95°22.56	26.77	230°50.30	26.65	Bellatrix	278°21.10	6°22.54
15	256°3.56	48°59.74 •	· 23.27	$119^{\circ}24.03$	• • 2.65	110°24.68	• • 26.66	245°52.93	• • 26.58	Elnath	277°59.79	28°37.77 -1°10.95
16	271°6.02	64°3.54	22.38	134°25.14	2.31	125°26.79	26.55	260°55.56	26.52	Alnilam Betelgeuse	275°36.05 270°50.33	7°24.81
17	286°8.48	79°7.35	21.49	$149^{\circ}26.25$	1.98	140°28.91	26.44	275°58.19	26.45	Canopus	263°51.52	-52°42.25
18	301°10.95		.8°20.60	164°27.37	N18°1.64	155°31.03	N14°26.33	291°0.82	N01°26.38	Sirius	258°24.83	-16°44.97
19	316° 13.41	109°14.96	19.71	179°28.48	1.30	170°33.14	26.22	306°3.45	26.32	Adhara	255°4.61	-29°0.24
20	331°15.88	124° 18.76	18.81	194°29.59	0.96	185°35.26	26.12	321°6.08	26.25	Procyon	244°49.27	5°9.44
21	346° 18.34 1° 20.80		17.92	209°30.71	0.63	200°37.38 215°39.49	• • 26.01	336°8.71	• • 26.18	Pollux	243°15.49	27°57.60
22 23	1 20.60 16°23.27	154°26.37 169°30.18	17.02 16.12	224°31.82 239°32.94	18°0.29 17°59.95	215 39.49 230°41.61	25.90 25.79	351°11.34 6°13.97	26.12 26.05	Avior	234°14.19	-59°35.37
	10 23.27		_							Suhail	222°45.36	-43°32.16
_Mer.¡	pass. 21:55	$\nu$ 3.8′ d-0.9′	m-4.25	$\nu^{1.1'} d-0$	.3′ m0.95	$\nu^{2.1'} d-0$	.1′ m-1.95	$\nu^{2.6'} d^{-0}$	.1′ m0.41	Miaplacidus	221°38.25	-69°49.29
										Alphard	217°46.44	-8°46.36
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	207°33.06 193°39.70	11°50.18 61°36.18
0	31°25.73		.8°15.22	254°34.05	N17°59.61	245°43.73	N14°25.68	21°16.60	N01°25.98	Denebola	182°23.74	14°25.35
1	46°28.20	199°37.79	14.32	269°35.17	59.27	260°45.85	25.57	36°19.23	25.92	Gienah	175°42.39	-17°41.34
2	61°30.66	214°41.59	13.41	284°36.28	58.94	275°47.96	25.47	51°21.86	25.85	Acrux	172°59.12	$-63^{\circ}14.73$
3 4	76°33.12 91°35.59	229° 45.40 · 244° 49.20	· 12.51 11.60	299°37.40 314°38.52	•• 58.60 58.26	290°50.08 305°52.20	· · 25.36 25.25	66°24.49 81°27.12	· · 25.78 25.72	Gacrux	171°50.56	-57°15.67
5	106° 38.05	259°53.01	10.69	329°39.64	57.92	320°54.32	25.14	96°29.75	25.65	Alioth	166°12.23	55°48.78
6	121° 40.52		18° 9.78	344°40.75	N17°57.58	335°56.44	N14°25.03	111°32.38	N01°25.59	Spica	158°21.09	-11°18.00
7	136° 42.98	290°0.61	8.87	359°41.87	57.25	350°58.56	24.92	126°35.01	25.52	Alkaid Hadar	152°51.34 148°34.58	49°10.76 -60°30.10
8	151° 45.44	305°4.42	7.95	14°42.99	56.91	6°0.67	24.82	141°37.64	25.45	Menkent	146 54.56 147°56.29	-36°30.05
9	166° 47.91		• • 7.04	29°44.11	• • 56.57	21°2.79	• • 24.71	156°40.27	• • 25.39	Arcturus	145°46.92	19°2.63
10	181°50.37	335° 12.03	6.12	44°45.23	56.23	36° 4.91	24.60	171°42.90	25.32	Rigil Kent.	139°38.94	-60°56.77
11	196°52.84	350°15.83	5.20	59°46.35	55.89	51°7.03	24.49	186°45.53	25.26	Kochab	$137^{\circ}20.98$	$74^{\circ}2.71$
12 13	211°55.30 226°57.76	5°19.63 S 20°23.43	3.36	74°47.47 89°48.59	N17°55.55 55.22	66° 9.15 81° 11.27	N14°24.39 24.28	201°48.15 216°50.78	N01°25.19 25.12	Zuben'ubi	136°54.73	$-16^{\circ}9.13$
14	242°0.23	35° 27.24	2.44	104°49.71	54.88	96°13.39	24.27	231°53.41	25.12	Alphecca	126°2.84	26°37.57
15	257°2.69		. 1.52	119°50.83	• • 54.54	111°15.51	24.06	246°56.04	• • 24.99	Antares	112°14.34	-26°29.47
16	272°5.16		18°0.59	134°51.95	54.20	126°17.63	23.96	261°58.67	24.93	Atria Sabik	107°7.63 102°1.34	-69°4.66 -15°45.44
17	287°7.62	80°38.64 1	.7°59.66	149°53.07	53.86	141°19.76	23.85	277°1.30	24.86	Shaula	96°8.64	-37° 7.43
18	302°10.08		.7°58.74	164°54.19	N17°53.52	156°21.88	N14°23.74	292°3.93	N01°24.79	Rasalhague	95°57.40	12°32.58
19	317° 12.55	110°46.24	57.81	179°55.32	53.18	171°24.00	23.63	307°6.55	24.73	Eltanin	90°41.78	51°29.35
20	332° 15.01 347° 17.48	125°50.04	56.87	194°56.44	52.85	186°26.12 201°28.24	23.53 •• 23.42	322°9.18 337°11.81	24.66	Kaus Aust.		-34°22.35
21 22	2°19.94	140°53.84 • 155°57.64	55.94 55.01	209°57.56 224°58.68	· · 52.51 52.17	201 26.24 216°30.36	23.42	352°14.44	· · 24.60 24.53	Vega	80°32.40	38°48.76
23	17°22.40	171°1.44	54.07	239°59.81	51.83	231°32.49	23.21	7°17.07	24.47	Nunki		-26°15.80
										Altair	61°58.56	8°56.53
Mer.	pass. 21:51	$\nu$ 3.8′ <i>d</i> -0.9′	m-4.23	$\nu 1.1' d-0$	.3′ m0.94	$\nu 2.1' \ d-0$	.1′ m-1.96	$\nu$ 2.6′ $d$ -0	.1′ m0.42	Peacock Deneb	53° 3.39 49° 24.75	-56°39.08 45°22.88
										Enif	33° 37.23	10° 0.08
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir		-46°49.94
0	32°24.87	186°5.24 <b>S</b> 1			N17°51.49	246°34.61	N14°23.10	22°19.69	N01°24.40	Fomalhaut	15°12.66	-29°28.78
1	47°27.33	201°9.04	52.20	270°2.06	51.15	261°36.73	22.99	37°22.32	24.34	Scheat	13°43.53	28°13.95
2	62°29.80	216°12.83	51.26	285°3.18	50.81	276°38.85	22.89	52°24.95	24.27	Markab	13°28.21	15°21.19
3	77°32.26 92°34.72	231°16.63 • 246°20.43	• 50.32	300°4.31	50.47	291°40.98 306°43.10	•• 22.78	67°27.58 82°30.20	24.21	Oct 22 Thu	SHA	Mer.pass
4 5	92°34.72 107°37.19	246° 20.43 261° 24.22	49.38 48.43	315° 5.43 330° 6.56	50.13 49.80	306°43.10 321°45.22	22.67 22.57	97°32.83	24.14 24.07		152° 36.08	11:45
6	122°39.65	276°28.02 <b>S</b> 1			N17°49.46		N14°22.46	112°35.46	N01°24.01	I	223°40.79	07:03
7	137° 42.12	291°31.81	46.54	0°8.81	49.12	351°49.47	22.35	112 33.40 127°38.09	23.94	Jupiter	214°26.38	07:39
8	152° 44.58	306°35.61	45.59	15° 9.94	48.78	6°51.60	22.25	142°40.71	23.88	Saturn	349°46.88	22:35
9	167°47.04	321°39.40 ·	• 44.64	$30^{\circ}11.07$	• • 48.44	21°53.72	• • 22.14	157°43.34	• • 23.81	O-+ 22 Fri	CLIA	M
10	182° 49.51	336°43.19	43.69	45°12.20	48.10	36°55.85	22.03	172°45.97	23.75	Oct 23 Fri Venus	<b>SHA</b> 153°8.25	Mer.pass 11:39
11	197°51.97	351°46.98	42.74	60°13.32	47.76	51°57.97	21.93	187°48.60	23.68	Mars	223°8.32	07:01
12	212°54.44	6°50.77 S1			N17°47.42	67°0.10	N14°21.82	202°51.22	N01°23.62		214° 18.00	07:36
13 14	227° 56.90 242° 59.36	21°54.57 36°58.36	40.84 39.88	90°15.58 105°16.71	47.08 46.74	82°2.22 97°4.35	21.72 21.61	217°53.85 232°56.48	23.55 23.49	Saturn	349°50.87	22:31
15	242 59.30 258°1.83		· 38.93	105 10.71 120°17.84	• • 46.40	97 4.35 112° 6.47	21.50	232 50.46 247°59.10	23.49	Oct 24 Sat	SHA	Mer.pass
16	273°4.29	67°5.93	37.97	135°18.97	46.06	127°8.60	21.40	263°1.73	23.36		3HA 153°40.37	11:33
17	288°6.76	82°9.72	37.01	150°20.10	45.72	142°10.72	21.29	278°4.36	23.30		222°36.06	06:59
18	303°9.22	97° 13.51 S1			N17°45.38	157°12.85	$N14^{\circ}21.19$	293°6.98	N01°23.23	Jupiter	214°9.74	07:33
19	318° 11.69	112°17.29	35.09	180°22.36	45.04	172°14.98	21.08	308°9.61	23.17	Saturn	349°54.83	22:27
20	333° 14.15	127°21.08	34.13	195°23.50	44.70	187°17.10	20.98	323°12.24	23.10	Horizo	ntal parallax	
21 22	348° 16.61 3° 19.08	142°24.86 • 157°28.65	· 33.16 32.20	210°24.63 225°25.76	•• 44.36 44.02	202°19.23 217°21.36	· · 20.87 20.76	338°14.86 353°17.49	· · 23.04 22.97	11011201	Venus:	0.5
23	18°21.54	172°32.43	31.23	240°26.89	43.68	232°23.49	20.66	8°20.12	22.91		Mars:	0.1
		$\nu$ 3.8' d-0.9'			.3′ m0.93		.1′ m-1.96		.1′ m0.42			
ivier.	pass. 21:47	ν 3.0 U-U.9'	III- <del>4</del> .∠U	$\nu$ 1.1 $a$ -0	.5 1110.95	ν2.1 α-U	.1 111-1.90	ν2.0° α-0	.1 1110.42			

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	183°51.71	S10°58.70	52°54.49	14.5'	<b>S</b> 08°38.74	-14.4'	56.2'
1	198°51.80	10°59.59	67°28.03	14.5'	08°24.39	-14.4'	56.3'
2	213°51.90 228°52.00	11°0.47 · · 1.35	82°1.57 96°35.11	14.5' 14.5'	08°9.99 07°55.53	-14.5' -14.5'	56.3' 56.3'
4	243°52.09	2.24	111°8.65	14.5'	07°41.03	-14.6'	56.3'
5	258°52.19	3.12	$125^{\circ}42.19$	14.5'	$07^{\circ}26.47$	-14.6'	56.4'
6	273°52.29	<b>S</b> 11°4.00	140°15.72	14.5'	S07°11.87	-14.7'	56.4'
7 8	288°52.38 303°52.48	4.89 5.77	154°49.25 169°22.77	14.5' 14.5'	06°57.21 06°42.51	-14.7' -14.7'	56.4' 56.5'
9	318°52.57	• • 6.65	183°56.29	14.5	06°27.77	-14.7 -14.8'	56.5'
10	333°52.67	7.53	198°29.80	14.5'	06°12.98	-14.8'	56.5'
11	348°52.76	8.41	213°3.30	14.5'	$05^{\circ}58.14$	-14.9'	56.6'
12	3°52.85	S11°9.29	227°36.78	14.5'	S05°43.26	-14.9'	56.6'
13 14	18°52.95 33°53.04	10.17 11.05	242°10.26 256°43.73	14.5' 14.5'	05°28.34 05°13.37	-15.0' -15.0'	56.6' 56.7'
15	48°53.13	. 11.93	271°17.18	14.4'	05 13.37 04°58.37	-15.0'	56.7'
16	63°53.23	12.81	285°50.61	14.4'	04°43.32	-15.1'	56.7'
17	78°53.32	13.69	300°24.03	14.4'	04°28.24	-15.1'	56.8'
18	93°53.41 108°53.50	S11°14.57	314°57.44 329°30.82	14.4'	\$04°13.12 03°57.96	-15.2'	56.8'
19 20	108°53.50 123°53.60	15.45 16.33	329°30.82 344°4.19	14.4' 14.3'	03°57.96 03°42.77	-15.2' -15.2'	56.8' 56.9'
21	138°53.69	17.21	358°37.53	14.3'	03°27.54	-15.3'	56.9'
22	153°53.78	18.09	13°10.86	14.3'	03°12.27	-15.3'	56.9'
23	168°53.87	18.96	27°44.16	14.3'	02°56.98	-15.3'	57.0'
	SD = 16.1'	d = 0.9'		SI	D = 15.3'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	183°53.96	S11°19.84	42°17.44	14.3'	S02°41.65	-15.4'	57.0'
1	198°54.05	20.72	56°50.69	14.2'	$02^{\circ}26.29$	-15.4'	57.0'
2	213°54.14	21.60	71°23.91	14.2'	02°10.90	-15.4'	57.1'
3 4	228°54.23 243°54.32	· · 22.47 23.35	85°57.11 100°30.28	14.2' 14.1'	01°55.48 01°40.03	-15.4' -15.5'	57.1' 57.2'
5	243 54.32 258°54.41	23.33	115°3.42	14.1	01°24.56	-15.5'	57.2'
6	273°54.50	S11°25.10	129°36.53	14.1'	S01°9.06	-15.5'	57.2'
7	288°54.59	25.97	144°9.61	14.0'	00°53.54	-15.5'	57.3'
8	303°54.67	26.85	158°42.65	14.0'	00°37.99	-15.6'	57.3'
9 10	318°54.76 333°54.85	· · 27.72 28.60	173°15.66 187°48.63	14.0' 13.9'	00°22.43 \$00°6.84	-15.6' -15.6'	57.3' 57.4'
11	348°54.94	29.47	202°21.57	13.9'	N00°8.77	15.6'	57.4'
12	3°55.02	S11°30.35	216°54.47	13.9'	N00°24.40	15.6'	57.4'
13	18°55.11	31.22	231°27.32	13.8'	00°40.05	15.7'	57.5'
14 15	33°55.20 48°55.28	32.09 •• 32.97	246°0.14 260°32.92	13.8' 13.7'	00°55.71 01°11.39	15.7' 15.7'	57.5' 57.5'
16	63°55.37	33.84	275° 5.65	13.7'	01 11.39 01°27.08	15.7'	57.5' 57.6'
17	78°55.45	34.71	289°38.34	13.6'	01°42.78	15.7'	57.6'
18	93°55.54	S11°35.58	304°10.98	13.6'	N01°58.50	15.7'	57.6'
19	108°55.62 123°55.71	36.45	318°43.57 333°16.12	13.5'	02°14.23 02°29.96	15.7'	57.7'
20 21	123°55.71 138°55.79	37.33 · · 38.20	333°16.12 347°48.62	13.5' 13.4'	02°29.96 02°45.71	15.7' 15.8'	57.7' 57.7'
22	153°55.88	39.07	2°21.06	13.4'	03°1.46	15.8'	57.8'
23	168°55.96	39.94	16°53.46	13.3'	03°17.21	15.8'	57.8'
	SD = 16.1'	d = 0.9'		SI	D = 15.5'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0	183°56.04	S11°40.81	31°25.80	13.3'	N03°32.97	15.8'	57.8'
1	198°56.13	41.68	45°58.09	13.2'	03°48.74	15.8'	57.9'
2	213°56.21	42.55	60°30.32	13.2'	04°4.50	15.8'	57.9'
3 4	228°56.29 243°56.38	· · 43.42 44.28	75°2.49 89°34.61	13.1' 13.1'	04°20.26 04°36.03	15.8' 15.8'	57.9' 58.0'
5	258° 56.46	45.15	104° 6.67	13.1	04°51.79	15.8'	58.0'
6	273°56.54	S11°46.02	118°38.66	12.9'	N05°7.54	15.8'	58.0'
7	288°56.62	46.89	133°10.60	12.9'	05°23.29	15.7'	58.1'
8 9	303°56.70 318°56.78	47.76 •• 48.62	147°42.47 162°14.28	12.8' 12.7'	05°39.04 05°54.77	15.7' 15.7'	58.1' 58.1'
10	333°56.86	49.49	102 14.28 176°46.02	12.7'	05 54.77 06°10.50	15.7'	58.2
11	348°56.94	50.36	191°17.70	12.6'	$06^{\circ}26.21$	15.7'	58.2'
12	3°57.02	S11°51.22	205°49.30	12.5'	N06°41.91	15.7'	58.2'
13 14	18°57.10 33°57.18	52.09 52.96	220°20.84 234°52.31	12.5' 12.4'	06°57.60 07°13.27	15.7' 15.7'	58.3' 58.3'
15	48°57.26	• 53.82	249°23.70	12.4	07 13.27 07°28.92	15.6'	58.3'
16	63°57.34	54.69	263°55.03	12.2'	07°44.56	15.6'	58.4'
17	78°57.42	55.55	278°26.28	12.2'	08°0.18	15.6'	58.4'
18 19	93°57.49 108°57.57	\$11°56.42 57.28	292°57.45 307°28.55	12.1' 12.0'	N08°15.77 08°31.34	15.6' 15.5'	58.4' 58.5'
20	108 57.57 123°57.65	57.28 58.14	307 28.55 321°59.56	12.0 11.9'	08 31.34 08°46.88	15.5'	58.5'
21	138°57.73	• • 59.01	336°30.50	11.9'	09°2.40	15.5'	58.5'
22	153°57.80	11°59.87	351°1.36	11.8'	09°17.89	15.5'	58.5'
23	168°57.88	12°0.73	5°32.14	11.7'	09°33.35	15.4'	58.6'
	SD = 16.1'	d = 0.9'		SI	D = 15.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Ldl.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	05:29	06:49	08:05	15:22	16:38	17:57
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	02:22	03:28	04:15	19:15	20:03	21:10

Lat.		Moonris	e	Moonset			
Lat.	Thu	Fri	Sat	Thu	Fri	Sat	
N 72°	15:57	15:24	14:49	00:38	02:50	05:03	
<b>N</b> 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	
<b>N</b> 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	
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	14:19	15:50	17:25	03:29	03:29	03:29	

Day		Sun		Moon			
	Eqn.of Time		Mer.	Mer.Pass.		Age	
	00 <sup>h</sup> 12 <sup>h</sup>		Pass	Upper Lower		12-14	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	80-94%	
22	15:27	15:31	11:44	21:06	08:44		
23	15:36	15:40	11:44	21:50	09:28		
24	15:44	15:48	11:44	22:37	10:13		

### October 25, 26, 27 UT (Sun., Mon., Tue.)

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA
0	33°24.01	187°36.21 \$17°30.26	255°28.03 N17°43.34	247°25.61 N14°20.55	23°22.74 N01°22.84	
1	48°26.47	202°39.99 29.30	270°29.16 43.01	262°27.74 20.45	38°25.37 22.78	Alpheratz 357° 32.95
2	63°28.93	217° 43.77 28.33	285°30.29 42.67	277°29.87 20.34	53°27.99 22.71	Ankaa 353°5.32
3	78°31.40	232°47.55 · · 27.36	300°31.43 · · 42.33	292°32.00 · · 20.24	68°30.62 · · 22.65	Schedar 349° 28.83
4	93°33.86	247°51.33 26.38	315°32.56 41.99	307°34.13 20.13	83°33.24 22.59	Diphda 348°45.52
5	108°36.33	262°55.11 25.41	330°33.70 41.65	322°36.26 20.03	98°35.87 22.52	Achernar 335° 18.51
6	123°38.79	277°58.88 \$17°24.44	345°34.83 N17°41.31	337°38.38 N14°19.92	113°38.50 N01°22.46	Hamal 327°49.19
7	138°41.25	293°2.66 23.46	0°35.97 40.96	352°40.51 19.82	128°41.12 22.39	Polaris 312°47.45 Acamar 315°10.25
8	153°43.72	308°6.43 22.49	15°37.10 40.62	7°42.64 19.71	143°43.75 22.33	Acamar 315° 10.25 Menkar 314° 4.30
9	168°46.18	323°10.21 · · 21.51	30°38.24 · · 40.28	22°44.77 · · 19.61	158°46.37 · · 22.27	Mirfak 308°25.67
10	183°48.65	338°13.98 20.53	45°39.38 39.94	37°46.90 19.50	173°49.00 22.20	Aldebaran 290° 37.66
11	198°51.11	353°17.75 19.55	60°40.52 39.60	52°49.03 19.40	188°51.62 22.14	Rigel 281°2.23
12	213°53.57	8°21.52 \$17°18.57	75°41.65 N17°39.26	67°51.16 N14°19.30	203°54.25 N01°22.07	Capella 280° 19.39
13	228° 56.04	23°25.29 17.59	90°42.79 38.92	82°53.29 19.19	218°56.87 22.01	Bellatrix 278°21.09
14	243°58.50	38°29.06 16.61	105°43.93 38.58	97°55.42 19.09	233°59.50 21.95	Elnath 277°59.77
15	259°0.97 274°3.43	53°32.82 · · 15.63 68°36.59 14.64	120°45.07 · · 38.24	112°57.55 · · 18.98	249°2.12 · · 21.88	Alnilam 275°36.04
16 17	274 3.43 289°5.89	68°36.59 14.64 83°40.35 13.66	135°46.21 37.90 150°47.35 37.56	127°59.69 18.88 143°1.82 18.77	264°4.75 21.82 279°7.37 21.75	Betelgeuse 270°50.31
18	304°8.36	98°44.11 S17°12.67	165°48.49 N17°37.22	158° 3.95 N14° 18.67	294°10.00 N01°21.69	Canopus 263°51.49
19	319° 10.82	113°47.88 11.68	180°49.63 36.88	173° 6.08 18.57	309°12.62 21.63	Sirius 258°24.81
20	334° 13.29	128°51.64 10.70	195°50.77 36.54	188° 8.21 18.46	324°15.25 21.56	Adhara 255°4.59
21	349° 15.75	143°55.40 · · 9.71	210°51.91 · · 36.20	203°10.34 · · 18.36	339°17.87 · · 21.50	Procyon 244° 49.25
22	4° 18.21	158°59.16 8.72	225°53.05 35.86	218°12.48 18.25	354°20.49 21.44	Pollux 243°15.47
23	19°20.68	174°2.91 7.73	240°54.19 35.52	233°14.61 18.15	9°23.12 21.37	Avior 234°14.16
	21.42					Suhail 222°45.34
Mer.p	pass. 21:43	ν3.8′ d-1.0′ m-4.20	$\nu 1.1' \ d$ -0.3' m0.93	ν2.1' d-0.1' m-1.97	ν2.6' d-0.1' m0.43	Miaplacidus 221°38.20
						Alphard 217°46.42 Regulus 207°33.04
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.68
0	34°23.14	189°6.67 <b>S</b> 17°6.73	255°55.33 N17°35.18	248°16.74 N14°18.05	24°25.74 N01°21.31	Denebola 182°23.73
1	49°25.61	204° 10.42 5.74	270°56.48 34.84	263°18.88 17.94	39°28.37 21.25	Gienah 175° 42.38
2	64°28.07	219° 14.18 4.75	285°57.62 34.50	278°21.01 17.84	54°30.99 21.18	Acrux 172°59.10
3	79°30.54	234°17.93 · · 3.75	300°58.76 · · 34.16	293°23.14 · · 17.74	69°33.62 · · 21.12	Gacrux 171°50.55
4	94°33.00	249°21.68 2.76	315°59.91 33.81	308°25.28 17.63	84°36.24 21.06	Alioth 166° 12.23
5	109°35.46	264°25.43 1.76	331°1.05 33.47	323°27.41 17.53	99°38.86 20.99	Spica 158°21.08
6	124°37.93	279°29.18 \$17°0.76	346°2.19 N17°33.13	338°29.55 N14°17.43	114°41.49 N01°20.93	Alkaid 152° 51.34
7	139° 40.39	294°32.92 16°59.77	1°3.34 32.79	353°31.68 17.32	129°44.11 20.87	Hadar 148°34.58
8	154° 42.86	309°36.67 58.77	16° 4.48 32.45	8°33.81 17.22	144°46.73 20.80	Menkent 147°56.29
9	169° 45.32 184° 47.78	324°40.41 · · 57.77 339°44.15 56.77	31°5.63 · · 32.11 46°6.78 31.77	23°35.95 · · 17.12 38°38.08 17.01	159°49.36 · · 20.74 174°51.98 20.68	Arcturus 145°46.92
10 11	184 47.78 199°50.25	339°44.15 56.77 354°47.89 55.77	46° 6.78 31.77 61° 7.92 31.43	53°40.22 16.91	174°51.98 20.68 189°54.60 20.62	Rigil Kent. 139°38.95
12	214° 52.71	9°51.63 \$16°54.76	76°9.07 N17°31.09	68°42.36 N14°16.81	204°57.23 N01°20.55	Kochab 137°21.00
13	229°55.18	24°55.37 53.76	91°10.22 30.75	83°44.49 16.70	219°59.85 20.49	Zuben'ubi 136°54.73
14	244° 57.64	39°59.11 52.76	106°11.36 30.41	98°46.63 16.60	235°2.47 20.43	Alphecca 126°2.85
15	260°0.10	55°2.84 · · 51.75	121°12.51 · · 30.06	113°48.76 · · 16.50	250°5.10 · · 20.36	Antares 112°14.35
16	275°2.57	70°6.58 50.75	136°13.66 29.72	128°50.90 16.40	265°7.72 20.30	Atria 107°7.65 Sabik 102°1.35
17	290°5.03	85°10.31 49.74	151°14.81 29.38	143°53.04 16.29	280°10.34 20.24	Sabik 102°1.35 Shaula 96°8.65
18	305°7.50	100°14.04 <b>S</b> 16°48.74	166°15.96 N17°29.04	158°55.17 N14°16.19	295°12.96 N01°20.18	Rasalhague 95°57.41
19	320°9.96	115° 17.77 47.73	181°17.11 28.70	173°57.31 16.09	310°15.59 20.11	Eltanin 90°41.81
20	335° 12.43	130°21.49 46.72	196°18.26 28.36	188°59.45 15.99	325°18.21 20.05	Kaus Aust. 83°30.77
21	350° 14.89	145°25.22 · · 45.71	211°19.41 · · 28.02	204° 1.59 · · 15.88	340°20.83 · · 19.99	Vega 80° 32.42
22	5° 17.35	160°28.94 44.70	226°20.56 27.68	219° 3.72 15.78	355°23.45 19.93	Nunki 75°46.08
23	20° 19.82	175°32.66 43.69	241°21.71 27.33	234° 5.86 15.68	$10^{\circ}26.08$ 19.86	Altair 61° 58.58
Mer.p	pass. 21:39	ν3.8' d-1.0' m-4.22	$\nu 1.1' \ d$ -0.3' m0.92	$\nu 2.1' \ d$ -0.1' m-1.97	$\nu 2.6' \ d$ -0.1' m0.43	Peacock 53°3.42
						Deneb 49°24.77
_	6114	GUA D	6114	SUA B	6114	Enif 33°37.25
Tue	GHA	GHA Dec	<b>GHA Dec</b> 256°22.86 N17°26.99	GHA Dec	GHA Dec	Al Na'ir 27° 30.87
0 1	35°22.28 50°24.75	190°36.38 \$16°42.68 205°40.10 41.67	256°22.86 N17°26.99 271°24.01 26.65	249°8.00 N14°15.58 264°10.14 15.48	25°28.70 N01°19.80 40°31.32 19.74	Fomalhaut 15°12.68
2	65°27.21	220° 43.82 40.66	286°25.16 26.31	279°12.28 15.37	55°33.94 19.68	Scheat 13°43.55
3	80°29.67	235°47.54 · · 39.65	301°26.31 · · 25.97	294°14.42 · · 15.27	70°36.56 · · 19.62	Markab 13°28.22
4	95°32.14	250°51.25 38.64	316°27.47 25.63	309°16.55 15.17	85°39.19 19.55	Oct 25 Sun SHA
5	110°34.60	265°54.96 37.62	331°28.62 25.29	324°18.69 15.07	100°41.81 19.49	Venus 154°12.21
6	125°37.07	280°58.67 <b>S</b> 16°36.61	346°29.77 N17°24.94	339°20.83 N14°14.97	115°44.43 N01°19.43	Mars 222°4.02
7	140°39.53	296°2.38 35.59	1°30.93 24.60	354°22.97 14.87	130°47.05 19.37	Jupiter 214°1.61
8	155°41.99	311°6.09 34.58	16°32.08 24.26	9°25.11 14.76	145°49.67 19.31	Saturn 349° 58.74
9	170°44.46	326°9.79 · · 33.56	31°33.24 · · 23.92	24°27.25 · · 14.66	160°52.29 · · 19.24	Oct 26 Mon SHA
10	185°46.92	341°13.50 32.54	46°34.39 23.58	39°29.39 14.56	175°54.92 19.18	Venus 154°43.53
11	200°49.39	356°17.20 31.53	61°35.55 23.24	54°31.53 14.46	190°57.54 19.12	Mars 221°32.19
12	215°51.85	11°20.90 \$16°30.51	76°36.70 N17°22.89	69°33.68 N14°14.36	206°0.16 N01°19.06	Jupiter 213°53.60
13	230°54.32	26°24.59 29.49	91°37.86 22.55	84°35.82 14.26	221°2.78 19.00	Saturn 350°2.60
14	245°56.78	41°28.29 28.47	106°39.02 22.21	99°37.96 14.16	236° 5.40 18.93	
15 16	260° 59.24 276° 1.71	56°31.98 · · 27.45 71°35.68 26.43	121°40.17 · · 21.87 136°41.33	114°40.10 · · 14.06 129°42.24 13.95	251°8.02 · · 18.87 266°10.64 18.81	Oct 27 Tue SHA
17	276 1.71 291°4.17	86°39.37 25.41	150 41.33 21.53 151°42.49 21.19	129 42.24 13.95 144°44.38 13.85	281°13.26 18.75	Venus 155°14.10
18	306°6.64	101°43.06 \$16°24.39	166°43.65 N17°20.84	159°46.53 N14°13.75	296°15.88 N01°18.69	Mars 221°0.58 Jupiter 213°45.72
19	321°9.10	116° 46.74 23.37	181°44.80 20.50	174°48.67 13.65	311°18.50 18.63	Saturn 350°6.42
20	336°11.56	131°50.43 22.35	196°45.96 20.16	189°50.81 13.55	326°21.12 18.57	Jatum 330 0.42
21	351°14.03	146°54.11 · · 21.33	211°47.12 · · 19.82	204°52.95 · · 13.45	341°23.74 · · 18.50	Horizontal parallax
22	6°16.49	161°57.79 20.31	226°48.28 19.48	219°55.10 13.35	356°26.37 18.44	Venus:
23	21° 18.96	177°1.47 19.28	241°49.44 19.13	234°57.24 13.25	11°28.99 18.38	Mars:
Merr	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	

Dec

 $29^{\circ}14.55$   $-42^{\circ}9.58$ 

56°41.29 -17°50.25

-57°5.97

23°35.50 89°22.54

-40°11.65 4°11.84

49°57.40 16°33.86

-8°10.07

46°1.39 6°22.53

28°37.77 -1°10.96

7°24.80 -52°42.26

-16°44.98 -29°0.25

-59°35.37

-43°32.16 -69°49.29

-8°46.36

11°50.17

 $61^{\circ}36.17$ 

14°25.34

-17°41.34 -63°14.72 -57°15.66

55°48.76 -11°18.00

49°10.74 -60°30.09

-36°30.04

-60°56.76

 $19^{\circ}2.62$ 

74°2.69 -16°9.13

26°37.56 -26°29.47

-69°4.65

 $\textbf{-37}^{\circ}7.43$ 

 $12^{\circ}32.58$ 

51°29.35 -34°22.35

38°48.75

-26°15.80 8°56.53

 $-56^{\circ}39.08$ 

 $45^{\circ}22.88$ 

 $10^{\circ}0.08$ 

-46°49.95 -29°28.78

28°13.96 15°21.19

Mer.pass

11:27

06:58

07:29

22:23 Mer.pass

11:21

06:56

07:26

22:18 Mer.pass

11:15

06:54

07:22

22:14

0.5

0.1

-15°45.43

5°9.43 27°57.60

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	183°57.96	S12°1.60	20°2.84	11.6'	N09°48.78	15.4'	58.6'
1	198°58.03	2.46	$34^{\circ}33.45$	11.5'	$10^{\circ}4.17$	15.4'	58.6'
2	213°58.11	3.32	49°3.98	11.4'	10° 19.53	15.3'	58.7'
3	228°58.18	• • 4.18	63°34.42	11.4'	10°34.86	15.3'	58.7'
4	243°58.26	5.04	78°4.77	11.3'	10°50.14	15.2'	58.7'
5 6	258°58.33 273°58.41	5.90 \$12°6.77	92°35.04 107°5.21	11.2' 11.1'	11°5.38 N11°20.59	15.2' 15.2'	58.8' 58.8'
7	273 58.41 288°58.48	7.63	107 5.21 121°35.30	11.1 11.0'	11°35.75	15.2 15.1'	58.8'
8	303°58.55	8.49	136°5.29	10.9'	11°50.86	15.1'	58.8'
9	318°58.63	9.35	150°35.20	10.8'	12°5.93	15.0'	58.9'
10	333°58.70	10.20	165°5.00	10.7'	12°20.95	15.0'	58.9'
11	348°58.77	11.06	179°34.72	10.6'	12°35.92	14.9'	58.9'
12	3°58.85	S12°11.92	194°4.33	10.5'	N12°50.83	14.9'	59.0'
13	18°58.92	12.78	208°33.86	10.4'	13°5.69	14.8'	59.0'
14 15	33°58.99 48°59.06	13.64 •• 14.50	223°3.28 237°32.60	10.3' 10.2'	13°20.50 13°35.24	14.7' 14.7'	59.0' 59.0'
16	63°59.13	15.35	257 52.00 252°1.83	10.2	13° 49.93	14.7	59.0 59.1'
17	78°59.20	16.21	266° 30.95	10.0'	14°4.55	14.6'	59.1'
18	93°59.27	S12°17.07	280°59.98	9.9'	N14° 19.12	14.5'	59.1'
19	108°59.34	17.92	295°28.90	9.8'	14°33.61	14.4'	59.1'
20	123°59.41	18.78	309°57.71	9.7'	14°48.04	14.4'	59.2'
21	138°59.48	•• 19.64	324°26.43	9.6'	15°2.40	14.3'	59.2'
22	153°59.55	20.49	338° 55.03	9.5'	15° 16.69	14.2'	59.2'
23	168°59.62	21.35	353°23.54	9.4'	15°30.90	14.1'	59.2'
	SD = 16.1'	d = 0.9'		SE	O = 16.0'		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	183°59.69	S12°22.20	7°51.93	9.3'	N15° 45.04	14.1'	59.3'
1	198°59.76	23.06	22°20.22	9.2'	15°59.10	14.0'	59.3'
2	213°59.83	23.91	36°48.40	9.1'	16° 13.08	13.9'	59.3'
3	228°59.90	• • 24.76	51°16.47	9.0'	16°26.98	13.8'	59.3'
4	243°59.96	25.62	65°44.44	8.9'	16°40.80	13.7'	59.4'
5	259°0.03 274°0.10	26.47 \$12°27.32	80° 12.29 94° 40.03	8.7'	16°54.53 N17°8.18	13.6'	59.4'
6 7	274°0.10 289°0.16	28.18	94°40.03 109°7.66	8.6' 8.5'	17°21.74	13.6' 13.5'	59.4' 59.4'
8	304°0.23	29.03	123° 35.18	8.4'	17° 35.20	13.4	59.4 59.5'
9	319°0.29	. 29.88	138°2.59	8.3	17° 48.57	13.3'	59.5'
10	334°0.36	30.73	152°29.88	8.2'	18°1.85	13.2'	59.5'
11	349°0.43	31.58	166° 57.06	8.1'	18° 15.03	13.1'	59.5'
12	4°0.49	S12°32.43	181°24.13	8.0'	N18°28.11	13.0'	59.5'
13	19°0.56	33.28	195°51.09	7.8'	18°41.09	12.9'	59.6'
14	34°0.62	34.13	210° 17.93	7.7'	18°53.96	12.8'	59.6'
15	49°0.68 64°0.75	• • 34.98	224° 44.65	7.6'	19°6.73 19°19.39	12.7'	59.6'
16 17	79°0.81	35.83 36.68	239° 11.26 253° 37.76	7.5' 7.4'	19° 19.39 19° 31.94	12.6' 12.4'	59.6' 59.6'
18	94°0.87	S12°37.53	268°4.14	7.3'	N19° 44.38	12.3'	59.7'
19	109°0.94	38.38	282°30.41	7.2'	19°56.71	12.2'	59.7'
20	124°1.00	39.23	296° 56.56	7.0'	20°8.92	12.1'	59.7'
21	139°1.06	• • 40.08	$311^{\circ}22.59$	6.9'	20°21.01	12.0'	59.7'
22	154°1.12	40.92	325°48.52	6.8'	20°32.98	11.9'	59.7'
23	169°1.18	41.77	340°14.32	6.7'	20°44.83	11.7'	59.7'
	SD = 16.1'	d = 0.9'		SE	O = 16.2'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	184°1.24	<b>S</b> 12°42.62	354° 40.01	6.6'	N20°56.56	11.6'	59.8'
1	199°1.30	43.46	9°5.59	6.5'	21°8.16	11.5'	59.8'
2	214°1.37 229°1.43	44.31	23°31.05 37°56.40	6.3' 6.2'	21°19.63 21°30.97	11.3'	59.8'
3 4	229°1.43 244°1.49	· · 45.16 46.00	37°56.40 52°21.64	6.2	21°30.97 21°42.18	11.2' 11.1'	59.8' 59.8'
5	259°1.54	46.85	66° 46.76	6.0'	21°53.25	10.9'	59.8'
6	274°1.60	\$12°47.69	81°11.77	5.9'	N22°4.19	10.8	59.8'
7	289°1.66	48.54	95° 36.66	5.8'	22° 14.99	10.7'	59.9'
8	304°1.72	49.38	110°1.45	5.7'	22°25.65	10.5'	59.9'
9	319°1.78	• • 50.22	124° 26.12	5.6'	22° 36.17	10.4'	59.9'
10	334°1.84	51.07	138° 50.68	5.5'	22°46.55	10.2'	59.9'
11	349°1.89	51.91	153° 15.14	5.3'	22°56.77	10.1'	59.9'
12 13	4°1.95 19°2.01	\$12°52.75 53.59	167°39.48 182°3.72	5.2' 5.1'	N23°6.85 23°16.78	9.9' 9.8'	59.9' 59.9'
13 14	19°2.01 34°2.06	53.59 54.44	182°3.72 196°27.84	5.1° 5.0'	23° 16.78 23° 26.56	9.8'	59.9' 59.9'
15	49°2.12	55.28	210° 51.87	5.0 4.9'	23° 36.18	9.0 9.5'	60.0'
16	64°2.18	56.12	225° 15.79	4.8'	23°45.65	9.3'	60.0'
17	79°2.23	56.96	239° 39.60	4.7'	23°54.96	9.2'	60.0'
18	94°2.29	<b>S</b> 12°57.80	254°3.31	4.6'	N24°4.11	9.0'	60.0'
19	109°2.34	58.64	268°26.92	4.5'	24° 13.10	8.8'	60.0'
20	124°2.40	12°59.48	282°50.43	4.4'	24°21.93	8.7'	60.0'
21	139°2.45	13°0.32	297° 13.84	4.3'	24°30.59	8.5'	60.0'
22 23	154°2.50 169°2.56	1.16 2.00	311°37.15 326°0.37	4.2' 4.1'	24°39.09 24°47.41	8.3' 8.2'	60.0' 60.0'
23	$\frac{169 \ 2.56}{\text{SD} = 16.1'}$	d = 0.8'	320 0.37		0 = 16.3'	0.2	00.0
	JD — 10.1	<u>u — 0.0</u>	-	3L	7 — 10.3		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	05:42	07:02	08:21	15:05	16:24	17:44
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	02:09	03:18	04:07	19:23	20:12	21:23

Lat.		Moonris	е		Moonset	:
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°	14:03			07:31		
<b>N</b> 70°	14:27	13:26		07:10	10:00	
68°	14:45	14:10		06:53	09:17	
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
<b>S</b> 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
<b>S</b> 60°	19:07	20:56	22:50	03:29	03:30	03:34

Day		Sun		Moon			
	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	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		

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA
0 0	36°21.42	192°5.14 \$16°18.26	256°50.60 N17°18.79	249°59.38 N14°13.15	26°31.61 N01°18.32	
1	51°23.89	207°8.82 17.24	271°51.76 18.45	265°1.53 13.05	41°34.23 18.26	Alpheratz 357°32.95
2	66°26.35	222°12.49 16.21	286°52.92 18.11	280°3.67 12.95	56°36.85 18.20	Ankaa 353° 5.33
3	81°28.81	237°16.16 · · 15.19	301°54.08 · · 17.77	295° 5.82 · · 12.85	71°39.47 · · 18.14	Schedar 349°28.83
4	96°31.28	252°19.83 14.16	316°55.25 17.42	310°7.96 12.75	86°42.08 18.08	Diphda 348°45.52 Achernar 335°18.52
5	111°33.74	267°23.50 13.14	331°56.41 17.08	325°10.10 12.65	101°44.70 18.02	Hamal 327°49.18
6	126°36.21	282°27.16 \$16°12.11	346°57.57 N17°16.74	340°12.25 N14°12.55	116°47.32 N01°17.95	Polaris 312°46.52
7	141°38.67	297°30.82 11.09	1°58.73 16.40	355°14.39 12.45	131°49.94 17.89	Acamar 315°10.24
8 9	156°41.13 171°43.60	312°34.48 10.06 327°38.14 • 9.03	16°59.90 16.06 32°1.06 · · 15.71	10°16.54 12.35 25°18.69 · · 12.25	146°52.56 17.83 161°55.18 · · 17.77	Menkar 314° 4.29
10	171 45.00 186° 46.06	342°41.79 8.01	32°1.06 ·· 15.71 47°2.23 15.37	25°18.69 · · 12.25 40°20.83 12.15	161°55.18 · · 17.77 176°57.80 17.71	Mirfak 308°25.64
11	201°48.53	357°45.45 6.98	62°3.39 15.03	55°22.98 12.05	192°0.42 17.65	Aldebaran 290°37.64
12	216°50.99	12°49.10 \$16°5.95	77°4.55 N17°14.69	70°25.12 N14°11.95	207°3.04 N01°17.59	Rigel 281°2.21
13	231°53.46	27°52.75 4.92	92°5.72 14.35	85°27.27 11.85	222°5.66 17.53	Capella 280°19.36 Bellatrix 278°21.07
14	246°55.92	42°56.40 3.90	107°6.89 14.00	100°29.42 11.75	237°8.28 17.47	Bellatrix 278°21.07 Elnath 277°59.74
15	261°58.38	58°0.04 · · 2.87	122°8.05 · · 13.66	115°31.56 · · 11.65	252°10.90 · · 17.41	Alnilam 275°36.01
16	277°0.85	73°3.68 1.84	137° 9.22 13.32	130°33.71 11.55	267°13.52 17.35	Betelgeuse 270°50.29
17	292°3.31	88°7.32 16°0.81	152°10.39 12.98	145°35.86 11.45	282°16.13 17.29	Canopus 263°51.46
18 19	307°5.78 322°8.24	103°10.96 \$15°59.78 118°14.60 58.75	167°11.55 N17°12.63 182°12.72 12.29	160°38.01 N14°11.35 175°40.15 11.26	297°18.75 N01°17.23 312°21.37 17.17	Sirius 258°24.79
20	337° 10.71	133°18.23 57.72	197°13.89 11.95	190°42.30 11.16	327°23.99 17.11	Adhara 255° 4.57
21	352° 13.17	148°21.86 · · 56.69	212°15.06 · · 11.61	205°44.45 · · 11.06	342°26.61 · · 17.05	Procyon 244°49.22
22	7° 15.63	163°25.49 55.66	227°16.23 11.26	220°46.60 10.96	357°29.23 16.99	Pollux 243°15.44
23	22°18.10	178°29.12 54.63	242°17.39 10.92	235°48.75 10.86	12°31.84 16.93	Avior 234°14.12
Morr	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	$\nu$ 2.6' d-0.1' m0.44	Suhail 222°45.30 Miaplacidus 221°38.14
IVICI.	Dass. 21.31	νσ.τ α-1.0 III-4.21	V1.2 U-0.3 III0.90	V2.1 U-0.1 III-1.90	V2.0 U-0.1 III0.44	Alphard 217°46.40
						Regulus 207°33.02
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.65
0	37°20.56	193°32.74 \$15°53.60	257°18.56 N17°10.58	250°50.90 N14°10.76	27°34.46 N01°16.87	Denebola 182°23.71
1 2	52°23.03 67°25.49	208° 36.36 52.57 223° 39.98 51.54	272°19.73 10.24 287°20.90 9.90	265°53.05 10.66 280°55.20 10.56	42°37.08 16.81 57°39.70 16.75	Gienah 175°42.36
3	82° 27.95	238°43.60 · · 50.51	302°22.07 · · 9.55	295°57.35 · · 10.47	72°42.31 · · 16.69	Acrux 172°59.06
4	97°30.42	253°47.21 49.48	317°23.25 9.21	310°59.49 10.37	87°44.93 16.63	Gacrux 171°50.52
5	112°32.88	268°50.82 48.45	332°24.42 8.87	326°1.65 10.27	102°47.55 16.57	Alioth 166°12.21 Spica 158°21.07
6	127°35.35	283°54.43 <b>S</b> 15°47.42	347°25.59 N17°8.53	341°3.80 N14°10.17	117°50.17 N01°16.51	Alkaid 152°51.34
7	142°37.81	298°58.04 46.39	2°26.76 8.18	356° 5.95 10.07	132°52.78 16.45	Hadar 148°34.56
8	157° 40.28	314°1.65 45.36	17°27.93 7.84	11°8.10 9.97	147°55.40 16.39	Menkent 147°56.28
9	172° 42.74	329°5.25 · · 44.33	32°29.11 · · 7.50	26°10.25 · · 9.88	162°58.02 · · 16.33	Arcturus 145°46.91
10	187° 45.20 202° 47.67	344°8.85 43.30	47°30.28 7.16	41°12.40 9.78	178°0.64 16.27	Rigil Kent. 139°38.93
11 12	202 47.67 217°50.13	359°12.45 42.27 14°16.04 \$15°41.24	62°31.45 6.81 77°32.63 N17°6.47	56°14.55 9.68 71°16.70 N14°9.58	193°3.25 16.21 208°5.87 N01°16.15	Kochab 137°21.02
13	232° 52.60	29°19.63 40.20	92°33.80 6.13	86°18.85 9.49	223°8.49 16.09	Zuben'ubi 136°54.72
14	247°55.06	44°23.22 39.17	107°34.98 5.79	101°21.01 9.39	238°11.10 16.03	Alphecca 126° 2.85
15	262°57.53	59°26.81 · · 38.14	122°36.15 · · 5.44	116°23.16 · · 9.29	253°13.72 · · 15.97	Antares 112°14.35
16	277°59.99	74°30.40 37.11	137°37.33 5.10	131°25.31 9.19	268°16.34 15.91	Atria 107° 7.67 Sabik 102° 1.36
17	293°2.45	89°33.98 36.08	152°38.51 4.76	146°27.46 9.10	283°18.95 15.85	Shaula 96°8.66
18	308°4.92	104°37.56 \$15°35.05	167°39.68 N17°4.42	161°29.62 N14°9.00	298°21.57 N01°15.79	Rasalhague 95°57.42
19	323°7.38	119°41.14 34.02	182°40.86 4.07	176°31.77 8.90	313°24.19 15.74	Eltanin 90°41.83
20	338°9.85 353°12.31	134°44.71 32.99 149°48.28 · · 31.96	197°42.04 3.73 212°43.21 · · 3.39	191°33.92 8.80 206°36.08 • 8.71	328°26.80 15.68 343°29.42 · · 15.62	Kaus Aust. 83°30.77
21 22	8° 14.77	164°51.85 30.92	212 43.21 · · · 3.39 227°44.39 3.04	200 30.06 · · · 6.71 221°38.23 8.61	358°32.03 15.56	Vega 80°32.43
23	23° 17.24	179°55.42 29.89	242°45.57 2.70	236°40.39 8.51	13°34.65 15.50	Nunki 75°46.09
						Altair 61°58.59
Mer.p	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	Peacock 53° 3.44 Deneb 49° 24.78
						Enif 33°37.25
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°30.89
0	38° 19.70	194°58.98 \$15°28.86	257°46.75 N17°2.36	251°42.54 N14°8.42	28°37.26 N01°15.44	Fomalhaut 15°12.68
1	53°22.17	210°2.55 27.83	272°47.93 2.02	266°44.70 8.32	43°39.88 15.38	Scheat 13°43.55
2 3	68°24.63 83°27.10	225°6.10 26.80 240°9.66 •• 25.77	287°49.11 1.67 302°50.29 · · 1.33	281°46.85 8.22 296°49.01 • 8.13	58°42.50 15.32 73°45.11 · · 15.26	Markab 13°28.23
4	98° 29.56	255°13.21 24.74	317°51.47 0.99	311°51.16 8.03	88°47.73 15.21	Oct 28 Wed SHA
5	113°32.02	270°16.76 23.71	332°52.65 0.65	326°53.32 7.93	103°50.34 15.15	Venus 155°43.72
6	128° 34.49	285°20.31 S15°22.68	347°53.83 N17°0.30	341°55.47 N14°7.84	118°52.96 N01°15.09	Mars 220°29.18
7	143°36.95	300°23.86 21.65	2°55.01 16°59.96	356°57.63 7.74	133°55.57 15.03	Jupiter 213°37.96
8	158°39.42	315°27.40 20.62	17°56.19 16°59.62	11°59.79 7.64	148°58.19 14.97	Saturn 350°10.18
9	173°41.88	330°30.94 · · 19.59	32°57.38 · · 59.28	27° 1.94 · · 7.55	164°0.80 · · 14.91	Oct 29 Thu SHA
10	188° 44.35	345°34.48 18.56	47°58.56 58.93	42°4.10 7.45	179°3.42 14.85	Venus 156°12.18
11	203° 46.81	0°38.01 17.53	62°59.74 58.59	57° 6.26 7.35	194°6.03 14.80	Mars 219°58.00
12 13	218° 49.27 233° 51.74	15°41.54 \$15°16.51 30°45.07 15.48	78°0.93 N16°58.25 93°2.11 57.90	72°8.41 N14°7.26 87°10.57 7.16	209°8.65 N01°14.74 224°11.26 14.68	Jupiter 213°30.33
14	233 51.74 248° 54.20	45°48.60 14.45	108° 3.29 57.56	102°12.73 7.07	239°13.87 14.62	Saturn 350°13.90
15	263°56.67	60°52.12 · · 13.42	123° 4.48 · · 57.22	117°14.89 · · 6.97	254°16.49 · · 14.56	Oct 30 Fri SHA
16	278° 59.13	75°55.64 12.39	138° 5.66 56.88	132°17.05 6.87	269°19.10 14.51	Venus 156°39.28
17	294°1.59	90°59.16 11.37	153°6.85 56.53	147°19.20 6.78	284°21.72 14.45	Mars 219°27.05
18	309°4.06	106°2.67 <b>S</b> 15°10.34	168°8.04 N16°56.19	162°21.36 N14°6.68	299°24.33 N01°14.39	Jupiter 213°22.84
19	324°6.52	121°6.19 9.31	183°9.22 55.85	177°23.52 6.59	314°26.95 14.33	Saturn 350°17.56
20	339°8.99	136°9.69 8.28	198°10.41 55.51	192°25.68 6.49	329°29.56 14.27	Horizontal parallax
21	354°11.45 9°13.92	151°13.20 · · 7.26 166°16.70 6.23	213°11.60 · · 55.16 228°12.78 54.82	207°27.84 · · 6.40 222°30.00 6.30	344°32.17 · · 14.22 359°34.79 14.16	Venus:
22 23	9° 13.92 24° 16.38	166° 16.70 6.23 181° 20.20 5.21	228°12.78 54.82 243°13.97 54.48	222°30.00 6.30 237°32.16 6.21	359°34.79 14.16 14°37.40 14.10	Mars:
				-		
Mer.p	pass. 21:23	u3.6′ <i>d</i> -1.0′ m-4.20	$\nu 1.2' \ d$ -0.3' m0.88	$\nu 2.2' \ d$ -0.1' m-1.99	$ u 2.6' \ d$ -0.1' m0.45	

Dec 29°14.55 -42°9.59 56°41.30 -17°50.25 -57°5.98  $23^{\circ}35.51$ 89°22.56 -40°11.67 4°11.84 49°57.41 16°33.86 -8°10.08 46°1.39  $6^{\circ}22.53$ 28°37.77 -1°10.97 7°24.79 -52°42.27 -16°44.99 -29°0.26  $5^{\circ}9.42$  $27^{\circ}57.59$ -59°35.38 -43°32.16 -69°49.29 -8°46.37 11°50.16 61°36.15 14°25.33  $-17^{\circ}41.34$ -63°14.71 -57°15.65 55°48.75 -11°18.00

49°10.72 -60°30.08 -36°30.04 19°2.61 -60°56.74 74°2.67 -16°9.13 26°37.55 -26°29.46 -69°4.64 -15°45.43  $-37^{\circ}7.42$  $12^{\circ}32.57$ 51°29.34 -34°22.34 38°48.75 -26°15.80 8°56.53 -56°39.08 45°22.88  $10^{\circ}0.08$ -46°49.95 -29°28.79 28°13.97 15°21.20 Mer.pass 11:09 06:52 07:19 22:10 Mer.pass 11:03 06:50 07:16 22:06 Mer.pass 10:57 06:48 07:12 22:02

> 0.5 0.1

h	Su	n	Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	184° 2.61	S13°2.84	340°23.49	4.0'	N24°55.57	8.0'	60.0'
1 2	199°2.66 214°2.72	3.68 4.51	354°46.52 9°9.46	3.9' 3.8'	25°3.56 25°11.37	7.8' 7.6'	60.0' 60.1'
3	229° 2.77	• • 5.35	23°32.31	3.8'	25°19.01	7.5'	60.1
4	244° 2.82	6.19	37°55.07	3.7'	25°26.47	7.3'	60.1'
5	259°2.87 274°2.92	7.03	52°17.74 66°40.33	3.6' 3.5'	25°33.76 N25°40.86	7.1'	60.1'
6 7	274 2.92 289° 2.97	\$13°7.86 8.70	81°2.84	3.5°	N25 40.86 25°47.79	6.9' 6.7'	60.1' 60.1'
8	304° 3.03	9.53	95°25.27	3.4'	25°54.53	6.6'	60.1
9	319° 3.08	• • 10.37	109°47.62	3.3'	26°1.09	6.4'	60.1'
10 11	334°3.13 349°3.18	11.20 12.04	124°9.90 138°32.10	3.2' 3.1'	26°7.46 26°13.65	6.2' 6.0'	60.1' 60.1'
12	4° 3.22	\$13°12.87	150° 54.23	3.1'	N26°19.65	5.8'	60.1
13	19°3.27	13.71	$167^{\circ}16.29$	3.0'	$26^{\circ}25.46$	5.6'	60.1'
14	34° 3.32	14.54	181°38.28 196°0.21	2.9'	26°31.08	5.4'	60.1
15 16	49°3.37 64°3.42	· · 15.37 16.21	210°22.08	2.9' 2.8'	26°36.52 26°41.75	5.2' 5.0'	60.1' 60.1'
17	79° 3.47	17.04	224°43.89	2.8'	26°46.80	4.9'	60.1
18	94°3.51	\$13° 17.87	239°5.64	2.7'	N26°51.65	4.7'	60.1'
19 20	109°3.56 124°3.61	18.70 19.53	253°27.34 267°48.98	2.6' 2.6'	26°56.31 27°0.76	4.5' 4.3'	60.1' 60.1'
21	139° 3.65	20.37	282°10.58	2.5'	27°5.03	4.1	60.1
22	154°3.70	21.20	296°32.13	2.5'	$27^{\circ}9.09$	3.9'	60.1'
23	169°3.74	22.03	310°53.63	2.5'	27°12.96	3.7'	60.1'
	SD = 16.1'	d = 0.8'		SI	O = 16.4'		
Thu	GHA	Dec	GHA	ν	Dec	d	НР
0	184°3.79	\$13°22.86	$325^{\circ}15.10$	2.4'	N27°16.62	3.5'	60.1'
1	199°3.83	23.69	339°36.52	2.4'	27°20.09	3.3'	60.1
2	214°3.88 229°3.92	24.52 •• 25.34	353°57.92 8°19.28	2.4' 2.3'	27°23.35 27°26.42	3.1' 2.9'	60.1' 60.1'
4	244° 3.97	26.17	22°40.60	2.3'	27°29.28	2.7'	60.1
5	259° 4.01	27.00	37°1.91	2.3'	27°31.94	2.5'	60.1'
6	274°4.05 289°4.10	\$13°27.83 28.66	51°23.19 65°44.45	2.3' 2.2'	N27°34.39 27°36.65	2.3' 2.0'	60.1' 60.1'
7 8	289 4.10 304° 4.14	28.00 29.48	80°5.69	2.2'	27°38.69	2.0 1.8'	60.1
9	319°4.18	30.31	94°26.91	2.2'	27°40.54	1.6'	60.1
10	334° 4.22	31.14	108°48.13	2.2'	27°42.18	1.4'	60.1'
11 12	349° 4.26 4° 4.30	31.96 \$13°32.79	123°9.34 137°30.54	2.2'	27°43.62 N27°44.85	1.2' 1.0'	60.0' 60.0'
13	19° 4.35	33.61	151°51.73	2.2'	27°45.87	0.8'	60.0
14	34°4.39	34.44	166°12.93	2.2'	27°46.70	0.6'	60.0'
15 16	49° 4.43 64° 4.47	· · 35.26 36.09	180°34.13 194°55.34	2.2' 2.2'	27°47.31 27°47.73	0.4' 0.2'	60.0' 60.0'
17	79° 4.51	36.91	209°16.56	2.2'	27°47.73	0.2	60.0
18	94° 4.54	S13°37.73	223°37.79	2.2'	N27°47.94	-0.2'	60.0'
19 20	109° 4.58 124° 4.62	38.56 39.38	237°59.04 252°20.30	2.3' 2.3'	27°47.74 27°47.33	-0.4' -0.6'	60.0' 60.0'
21	139° 4.66	. 40.20	266°41.58	2.3'	27°46.72	-0.8'	60.0
22	154°4.70	41.02	281°2.89	2.3'	$27^{\circ}45.91$	-1.0'	60.0'
23	169°4.73	41.85	295°24.23	2.4'	27°44.90	-1.2'	60.0'
	SD = 16.1'	d = 0.8'		SI	D = 16.4'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	184° 4.77	S13°42.67	309°45.60	2.4'	N27°43.68	-1.4'	59.9'
1 2	199° 4.81 214° 4.85	43.49 44.31	324°7.00 338°28.43	2.4' 2.5'	27°42.26 27°40.64	-1.6' -1.8'	59.9' 59.9'
3	214 4.65 229°4.88	45.13	352°49.91	2.5'	27° 40.04 27° 38.82	-1.6 -2.0'	59.9'
4	244° 4.92	45.95	7°11.43	2.6'	27°36.80	-2.2'	59.9'
5 6	259° 4.95 274° 4.99	46.77 \$13°47.59	21°32.99 35°54.60	2.6' 2.7'	27°34.58 N27°32.16	-2.4' -2.6'	59.9' 59.9'
7	274 4.99 289° 5.02	48.40	50°16.25	2.7' 2.7'	27°29.54	-2.8'	59.9'
8	304°5.06	49.22	64°37.97	2.8'	27°26.73	-3.0'	59.9'
9	319°5.09	• • 50.04	78°59.73	2.8'	27°23.72	-3.2'	59.8'
10 11	334°5.12 349°5.16	50.86 51.68	93°21.55 107°43.44	2.9' 2.9'	27°20.51 27°17.11	-3.4' -3.6'	59.8' 59.8'
12	4°5.19	S13°52.49	122°5.39	3.0'	N27°13.52	-3.8'	59.8'
13	19° 5.22	53.31	136°27.40	3.1'	27°9.73	-4.0'	59.8'
14 15	34° 5.25 49° 5.29	54.12 •• 54.94	150°49.48 165°11.63	3.1' 3.2'	27°5.76 27°1.59	-4.2' -4.4'	59.8' 59.8'
16	64°5.32	55.76	179°33.85	3.3'	26°57.23	-4.5	59.8'
17	79°5.35	56.57	193°56.14	3.4'	26°52.69	-4.7'	59.7'
18 19	94°5.38 109°5.41	\$13°57.38 58.20	208°18.52 222°40.97	3.5' 3.5'	N26°47.96 26°43.04	-4.9' -5.1'	59.7' 59.7'
20	109 5.41 124° 5.44	59.01	237°3.50	3.6'	26°37.94	-5.1 -5.3'	59.7'
21	139° 5.47	13°59.83	251°26.12	3.7'	26°32.66	-5.5'	59.7'
22 23	154° 5.50 169° 5.53	14°0.64 1.45	265°48.82 280°11.60	3.8' 3.9'	26°27.20 26°21.55	-5.6' -5.8'	59.7' 59.6'
23	SD = 16.1'	d = 0.8'	200 11.00		D = 16.3'	-3.8	59.0
	אר = 10.1,	$u = 0.8^{\circ}$		51	J = 10.3		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>S</b> 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
<b>S</b> 60°	01:55	03:08	03:58	19:31	20:22	21:36

Lat.		Moonris	е		Moonset	
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°						
N 70°						
68°						
66°						
64°						
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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°		00:38	01:50	03:44	04:09	05:12

		Sun		Moon			
Day	Eqn.of	f Time	Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup> 12 <sup>h</sup> Pass Upper Lower		Lower	18-20			
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	95-81%	
28	16:10	16:13	11:44	01:22	13:53		
29	16:15	16:17	11:44	02:25	14:58		
30	16:19	16:21	11:44	03:30	16:02		

# October 31, 01, 02 UT (Sat., Sun., Mon.)

h	Aries	Ver	nus	M	ars	Jup	iter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	39° 18.84	196°23.70	S15° 4.18	258°15.16	N16°54.13	252°34.32	N14°6.11		N01°14.04			
1	54°21.31	211°27.20	3.15	273°16.35	53.79	267°36.48	6.02	44°42.63	13.99	Alpheratz	357°32.94	29°14.56
2	69°23.77	226°30.69	2.13	288°17.54	53.45	282°38.64	5.92	59°45.24	13.93	Ankaa Schedar	353°5.33 349°28.83	-42°9.60 56°41.32
3	84°26.24	$241^{\circ}34.18$	• • 1.11	303°18.73	•• 53.11	297°40.80	• • 5.83	74° 47.85	• • 13.87	Diphda	349 20.03 348° 45.52	-17°50.26
4	99°28.70	256° 37.66	15°0.08	318°19.92	52.76	312°42.96	5.73	89°50.47	13.81	Achernar	335° 18.51	-57°5.99
5	114°31.17	271°41.14	14°59.06	333°21.11	52.42	327°45.12	5.64	104°53.08	13.76	Hamal	327°49.17	23°35.52
6 7	129°33.63 144°36.09	286°44.62 301°48.10	\$14°58.03	348°22.30 3°23.49	N16°52.08	342°47.28	N14°5.54	119°55.69 134°58.30	N01°13.70	Polaris	312°45.76	89°22.58
8	159° 38.56	316° 51.57	57.01 55.99	3 23.49 18°24.68	51.74 51.39	357°49.45 12°51.61	5.45 5.35	154 56.50 150°0.92	13.64 13.58	Acamar	$315^{\circ}10.22$	-40°11.68
9	174° 41.02	331°55.05	• • 54.97	33°25.87	• • 51.05	27°53.77	. 5.26	165°3.53	• • 13.53	Menkar	314°4.27	4°11.84
10	189°43.49	346°58.51	53.95	48°27.07	50.71	42°55.93	5.17	180°6.14	13.47	Mirfak	308°25.62	49°57.42
11	204°45.95	2°1.98	52.92	63°28.26	50.36	57°58.10	5.07	195°8.75	13.41	Aldebaran	290°37.62	16°33.86
12	219°48.41	17°5.44	S14°51.90	78°29.45	N16°50.02	73°0.26	N14°4.98	210°11.37	N01°13.35	Rigel	281°2.18	-8°10.09
13	234°50.88	32°8.90	50.88	93°30.64	49.68	88° 2.42	4.88	$225^{\circ}13.98$	13.30	Capella Bellatrix	280° 19.33 278° 21.04	46°1.40 6°22.52
14	249°53.34	47° 12.35	49.86	108°31.84	49.34	103° 4.59	4.79	240°16.59	13.24	Elnath	277° 59.71	28°37.78
15	264°55.81	62°15.81	• • 48.84	123°33.03	• • 48.99	118° 6.75	• • 4.69	255° 19.20	• • 13.18	Alnilam	275°35.99	-1°10.97
16	279°58.27	77°19.25	47.82	138°34.23	48.65	133°8.91	4.60	270°21.81	13.13	Betelgeuse	270°50.26	$7^{\circ}24.79$
17	295°0.74	92°22.70 107°26.14	46.81 \$14°45.79	153°35.42	48.31 N16°47.97	148°11.08	4.51	285°24.43 300°27.04	13.07 N01°13.01	Canopus	263°51.43	-52°42.28
18 19	310°3.20 325°5.66	107 20.14 122°29.58	44.77	168°36.62 183°37.81	47.62	163°13.24 178°15.41	N14° 4.41 4.32	315°29.65	12.96	Sirius	258° 24.76	-16°45.00
20	340°8.13	137°33.02	43.75	198°39.01	47.28	193°17.57	4.23	330°32.26	12.90	Adhara	255°4.54	-29° 0.27
21	355° 10.59	152°36.46	• • 42.74	213°40.21	46.94	208°19.74	4.13	345°34.87	. 12.84	Procyon	244°49.19	5°9.42
22	10° 13.06	167°39.89	41.72	228°41.40	46.59	223°21.90	4.04	0°37.48	12.79	Pollux	243° 15.41	27°57.58
23	$25^{\circ}15.52$	182°43.31	40.71	243°42.60	46.25	238°24.07	3.95	15°40.10	12.73	Avior Suhail	234° 14.08 222° 45.27	-59°35.38 -43°32.17
Morr	pass. 21:19	1/3 E <sup>1</sup> d 1	.0′ m-4.09	11 2' d C	0.3′ m0.87	1/2 2 <sup>1</sup> d 0	1' m-2.00	12 6' d C	0.1' m0.46	Miaplacidus	222 45.27 221°38.09	-43 32.17 -69°49.29
- Ivier.p	Dass. 21.19	ν <sub>3.5</sub> α-1.	.0 111-4.09	ν1.2 <b>u</b> -0	7.5 1110.67	ν2.2 <b>u</b> -0.	1 111-2.00	ν2.0 <b>u</b> -0	7.1 1110.40	Alphard	217°46.37	-8°46.38
										Regulus	207°32.99	11°50.15
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.61	61°36.13
0	40° 17.98	197°46.74	S14°39.69	258°43.80	N16°45.91	253°26.23	N14° 3.85	30° 42.71	N01°12.67	Denebola	182°23.69	14°25.32
1	55° 20.45	212°50.16	38.68	273°45.00	45.57	268°28.40	3.76	45°45.32	12.62	Gienah	175°42.34	$-17^{\circ}41.35$
2	70°22.91 85°25.38	227°53.58 242°56.99	37.66 •• 36.65	288°46.20 303°47.40	45.22 •• 44.88	283°30.56 298°32.73	3.67 · · 3.57	60° 47.93 75° 50.54	12.56 •• 12.50	Acrux	172°59.03	-63°14.71
3 4	05 25.36 100° 27.84	242 50.99 258°0.40	35.64	318°48.59	44.54	313°34.90	3.48	90°53.15	12.45	Gacrux	171°50.49	-57° 15.65
5	115° 30.31	273°3.81	34.63	333°49.79	44.20	328°37.06	3.39	105°55.76	12.39	Alioth	166°12.19	55°48.72
6	130°32.77		\$14°33.62	348°50.99	N16°43.85	343°39.23	N14°3.29	120° 58.37	N01°12.34	Spica	158°21.05	-11°18.01
7	145°35.23	303° 10.62	32.60	3°52.20	43.51	358°41.40	3.20	136°0.98	12.28	Alkaid	152°51.33 148°34.54	49°10.70 -60°30.07
8	160°37.70	$318^{\circ}14.02$	31.60	18°53.40	43.17	13°43.57	3.11	151°3.59	12.22	Hadar Menkent	146 34.34 147°56.26	-36°30.04
9	$175^{\circ}40.16$	333°17.42	• • 30.59	33°54.60	• • 42.83	28°45.73	• • 3.02	166°6.20	• • 12.17	Arcturus	147 30.20 145° 46.90	19° 2.59
10	190°42.63	348°20.81	29.58	48°55.80	42.48	43°47.90	2.92	181°8.81	12.11	Rigil Kent.	139°38.92	-60°56.73
11	205° 45.09	3°24.20	28.57	63°57.00	42.14	58°50.07	2.83	196°11.42	12.06	Kochab	137°21.03	74° 2.65
12	220° 47.55	18° 27.58	S14°27.56	78°58.21	N16°41.80	73°52.24	N14°2.74	211°14.03	N01°12.00	Zuben'ubi	136°54.71	$-16^{\circ}9.13$
13 14	235° 50.02 250° 52.48	33°30.97 48°34.35	26.56 25.55	93°59.41 109°0.61	41.45 41.11	88°54.41 103°56.58	2.65 2.56	226° 16.64 241° 19.25	11.94 11.89	Alphecca	126°2.84	26°37.54
15	265° 54.95	63° 37.72	• • 24.54	109 0.01 124°1.82	• • 40.77	118°58.75	• • 2.46	256°21.86	• • 11.83	Antares	112° 14.34	-26°29.46
16	280° 57.41	78°41.09	23.54	139°3.02	40.43	134° 0.92	2.37	271°24.47	11.78	Atria	107°7.67	-69°4.63
17	295°59.88	93°44.46	22.54	154°4.22	40.08	149° 3.09	2.28	286° 27.08	11.72	Sabik	102°1.35	-15°45.43
18	311°2.34	108°47.83	S14°21.53	169° 5.43	N16°39.74	164° 5.26	N14°2.19	301°29.69	N01°11.67	Shaula Rasalhague	96°8.66 95°57.42	-37°7.42 12°32.57
19	326°4.80	123°51.19	20.53	184°6.64	39.40	179°7.43	2.10	$316^{\circ}32.30$	11.61	Eltanin	90°41.84	51°29.33
20	341°7.27	138°54.55	19.53	199°7.84	39.06	194° 9.60	2.00	331°34.91	11.56	Kaus Aust.		
21	356°9.73	153°57.91	• • 18.53	214° 9.05	• • 38.71	209°11.77	• • 1.91	346° 37.51	• • 11.50	Vega	80°32.44	38°48.74
22	11° 12.20	169°1.26	17.53	229°10.25	38.37	224°13.94	1.82	1°40.12	11.44	Nunki		$-26^{\circ}15.80$
23	26°14.66	184°4.61	16.53	244°11.46	38.03	239°16.11	1.73	16°42.73	11.39	Altair	61°58.59	8°56.53
Mer.p	bass. 21:15	$\nu$ 3.4′ d-1.	.0′ m-4.17	$\nu$ 1.2 $^{\prime}$ d-0	0.3′ m0.86	$\nu$ 2.2′ d-0.	1' m-2.00	$\nu$ 2.6′ d-0	$0.1'  \mathrm{m}0.46$	Peacock	53°3.45	-56°39.07
										Deneb	49° 24.80	45°22.88
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.26	10°0.08
0	41° 17.12		S14°15.53	259°12.67	N16°37.69	254°18.28	N14°1.64	31°45.34	N01°11.33	Al Na'ir Fomalhaut	27°30.89 15°12.69	-46°49.95 -29°28.79
1	56° 19.59	214°11.30	14.53	274°13.88	37.34	269°20.45	1.55	46°47.95	11.28	Scheat	13° 43.55	-29 28.79 28°13.97
2	71°22.05	229° 14.64	13.53	289°15.09	37.00	284°22.62	1.46	61°50.56	11.22	Markab	13° 28.23	15°21.20
3	86°24.52	244°17.98	• • 12.54	304°16.29	• • 36.66	299°24.80	• • 1.36	76°53.17	• • 11.17			
4	101°26.98	259°21.31	11.54	319°17.50	36.32	314°26.97	1.27	91°55.77	11.11	Oct 31 Sat	SHA	Mer.pass
5	116°29.45	274°24.64	10.55	334°18.71	35.97	329°29.14	1.18	106°58.38	11.06	Venus	157°4.86	10:52
6	131°31.91 146°34.37	289°27.96	\$14° 9.55		N16°35.63	344°31.32	N14° 1.09	122°0.99 137°3.60	N01°11.00		218° 56.32 213° 15.47	06:46 07:09
7 8	146° 34.37 161° 36.84	304°31.29 319°34.61	8.56 7.57	4°21.13 19°22.35	35.29 34.95	359°33.49 14°35.66	1.00 0.91	137° 3.60 152° 6.20	10.95 10.89	Saturn	350° 21.17	21:58
9	176° 39.30	334° 37.92	• • 6.58	34°23.56	• • 34.60	29°37.84	• • 0.82	167°8.81	• 10.84			
10	191°41.77	349°41.23	5.59	49°24.77	34.26	44°40.01	0.73	182° 11.42	10.79	Nov 01 Sun	SHA	Mer.pass
11	206° 44.23	4° 44.54	4.60	64°25.98	33.92	59°42.18	0.64	197° 14.03	10.73		157°28.75	10:46
12	221°46.69	19°47.85	S14°3.61	79°27.19	N16°33.58	74°44.36	N14°0.55	212° 16.63			218°25.81	06:45
13	236° 49.16	34°51.15	2.62	94°28.41	33.24	89°46.53	0.46	227° 19.24	10.62	Jupiter Saturn	213°8.25 350°24.72	07:05 21:53
14	251°51.62	49°54.45	1.64	109°29.62	32.89	104°48.71	0.37	242°21.85	10.57			21.33
15	266° 54.09	64°57.74	14°0.65	124°30.83	• • 32.55	119°50.88	• • 0.28	257° 24.46	• • 10.51	Nov 02 Mon	SHA	Mer.pass
16	281°56.55	80°1.04	13°59.66	139°32.05	32.21	134°53.06	0.19	272°27.06	10.46		157° 50.83	10:41
17 18	296°59.01 312°1.48	95°4.32	58.68 \$13°57.70	154°33.26 169°34.48	31.87 N16°31.52	149°55.23 164°57.41	0.10 N14° 0.01	287°29.67 302°32.28	10.40 N01°10.35		217°55.54	06:43
18	312 1.48 327°3.94	110 7.61 125° 10.89	56.71	169 34.48 184°35.69	31.18	104 57.41 179°59.59	13°59.92	302 32.28 317°34.88	10.35	Jupiter	213°1.16	07:02 21:49
20	342°6.41	140° 14.17	55.73	199°36.91	30.84	195°1.76	59.83	332°37.49	10.30	Saturn	350°28.22	∠1:49
21	357°8.87	155° 17.44	• • 54.75	214°38.12	30.50	210° 3.94	• • 59.74	347°40.10	. 10.19	Horizo	ntal parallax	
22	12°11.34	170°20.71	53.77	229°39.34	30.15	225°6.12	59.65	2°42.70	10.13		Venus:	0.5
23	$27^{\circ}13.80$	185°23.98	52.79	244°40.56	29.81	240°8.29	59.56	$17^{\circ}45.31$	10.08		Mars:	0.1
Merr	pass. 21:11	ν3.3′ d-1.	.0′ m-4 25	ν1 2' d-0	0.3′ m0.85	ν2 2' d-Ω	1′ m-2.01	ν2 6' d-0	0.1′ m0.47			
			1.20									

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	184°5.56	<b>S</b> 14°2.26	294°34.48	4.0'	$\textrm{N}26^{\circ}15.73$	-6.0'	59.6'
1	199°5.59	3.07	308° 57.44	4.1'	26°9.73	-6.2'	59.6'
2	214°5.61 229°5.64	3.89 •• 4.70	323°20.50 337°43.65	4.2' 4.2'	26°3.55 25°57.20	-6.3' -6.5'	59.6' 59.6'
4	244°5.67	5.51	352°6.90	4.3'	25°50.68	-6.7'	59.6'
5	259°5.70	6.32	6°30.24	4.4'	25°43.99	-6.9'	59.6'
6	274°5.72	\$14°7.13	20°53.69	4.5'	N25°37.12	-7.0'	59.5'
7 8	289°5.75 304°5.77	7.94 8.75	35°17.23 49°40.87	4.6' 4.7'	25°30.09 25°22.89	-7.2' -7.4'	59.5' 59.5'
9	319°5.80	• • 9.55	64°4.62	4.8'	25° 15.53	-7. <del>5</del>	59.5'
10	334°5.83	10.36	78°28.47	5.0'	25°8.00	-7.7'	59.5'
11	349°5.85	11.17	92°52.42 107°16.48	5.1'	25°0.32	-7.8'	59.4'
12 13	4°5.87 19°5.90	\$14°11.98 12.79	107° 16.48 121° 40.65	5.2' 5.3'	N24°52.47 24°44.46	-8.0' -8.2'	59.4' 59.4'
14	34°5.92	13.59	136°4.92	5.4'	24° 36.30	-8.3	59.4'
15	49°5.95	• • 14.40	$150^{\circ}29.31$	5.5'	$24^{\circ}27.98$	-8.5'	59.4'
16	64°5.97	15.20	164°53.80	5.6'	24° 19.51	-8.6'	59.4'
17 18	79°5.99 94°6.01	16.01 \$14°16.81	179° 18.41 193° 43.12	5.7' 5.8'	24°10.89 N24°2.12	-8.8' -8.9'	59.3' 59.3'
19	109°6.04	17.62	208°7.95	5.9'	23°53 20	-0.9 -9.1'	59.3'
20	124°6.06	18.42	222°32.89	6.1	23°44.13	-9.2	59.3'
21	139°6.08	• • 19.23	236° 57.94	6.2'	23°34.92	-9.4'	59.3'
22	154°6.10	20.03	251°23.11	6.3'	23°25.57	-9.5'	59.2'
23	169°6.12	20.83	265°48.39	6.4'	23°16.08	-9.6'	59.2'
	SD = 16.1'	d = 0.8'		S	D = 16.3'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	184°6.14	S14°21.64	280° 13.79	6.5'	N23°6.45	-9.8'	59.2'
1	199°6.16	22.44	294°39.30	6.6'	22°56.68	-9.9'	59.2'
2	214°6.18 229°6.20	23.24	309°4.92 323°30.66	6.7' 6.9'	22°46.77 22°36.73	-10.0' -10.2'	59.2' 59.1'
4	244°6.22	24.84	337° 56.52	7.0'	22° 26.56	-10.2	59.1'
5	259°6.24	25.64	352°22.49	7.1'	22° 16.26	-10.4	59.1'
6	274°6.26	<b>S</b> 14°26.45	6°48.58	7.2'	N22°5.84	-10.6'	59.1'
7	289°6.27	27.25	21°14.79	7.3'	21°55.28	-10.7'	59.1'
8 9	304°6.29 319°6.31	28.04 •• 28.84	35°41.11 50°7.54	7.4' 7.6'	21°44.60 21°33.80	-10.8' -10.9'	59.0' 59.0'
10	334°6.33	29.64	64° 34.09	7.7'	21°22.88	-10.9	59.0'
11	349°6.34	30.44	79°0.76	7.8'	21°11.84	-11.2	59.0'
12	4°6.36	<b>S</b> 14°31.24	93° 27.54	7.9'	N21°0.68	-11.3'	59.0'
13 14	19°6.37 34°6.39	32.04 32.83	107°54.44 122°21.45	8.0' 8.1'	20°49.40 20°38.02	-11.4' -11.5'	58.9'
14 15	49°6.40	. 33.63	122 21.45 136°48.58	8.1 8.2'	20° 38.02 20° 26.52	-11.5 -11.6'	58.9' 58.9'
16	64°6.42	34.43	151° 15.82	8.4	20°14.91	-11.7'	58.9'
17	79°6.43	35.22	$165^{\circ}43.17$	8.5'	$20^{\circ}3.19$	-11.8'	58.9'
18	94°6.45	S14°36.02	180° 10.64	8.6'	N19°51.36	-11.9'	58.8'
19 20	109°6.46 124°6.47	36.81 37.61	194°38.22 209°5.91	8.7' 8.8'	19°39.43 19°27.40	-12.0'	58.8' 58.8'
21	124 6.47 139°6.49	38.40	209 5.91 223°33.72	8.9'	19 27.40 19°15.27	-12.1 -12.2'	58.8'
22	154°6.50	39.20	238°1.63	9.0'	19°3.03	-12.3	58.7'
23	169°6.51	39.99	252°29.66	9.1'	$18^{\circ}50.70$	-12.4'	58.7'
	SD = 16.1'	d = 0.8'		S	D = 16.1'		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	184°6.52	<b>S</b> 14°40.78	266° 57.79	9.2'	N18° 38.27	-12.5'	58.7'
1	199°6.53	41.58	281°26.04	9.4'	18° 25.75	-12.6'	58.7'
2	214°6.54 229°6.56	42.37 •• 43.16	295°54.39 310°22.85	9.5' 9.6'	18° 13.14 18° 0.43	-12.7' -12.8'	58.7' 58.6'
4	244°6.57	43.10	324°51.42	9.7'	17° 47.64	-12.9	58.6'
5	259°6.58	44.74	$339^{\circ}20.10$	9.8'	$17^{\circ}34.76$	-13.0'	58.6'
6	274°6.59	S14°45.53	353°48.87	9.9'	N17°21.79	-13.1'	58.6'
7	289°6.59 304°6.60	46.32 47.11	8°17.76 22°46.75	10.0' 10.1'	17°8.74 16°55.61	-13.1' -13.2'	58.5' 58.5'
8 9	304 6.60 319 6.61	47.11 •• 47.90	22°46.75 37°15.84	10.1	16° 55.61 16° 42.39	-13.2' -13.3'	58.5'
10	334°6.62	48.69	51°45.03	10.3	16°29.10	-13.4	58.5
11	349°6.63	49.48	66° 14.32	10.4'	16° 15.73	-13.4'	58.5'
12	4°6.64	\$14°50.27	80°43.71	10.5'	N16°2.28	-13.5'	58.4'
13 14	19°6.64 34°6.65	51.06 51.84	95°13.20 109°42.79	10.6' 10.7'	15° 48.76 15° 35.17	-13.6' -13.7'	58.4' 58.4'
15	49°6.66	• • 52.63	124° 12.48	10.7	15°21.50	-13.7'	58.4
16	64°6.66	53.42	138°42.26	10.9'	15°7.77	-13.8'	58.3'
17	79°6.67	54.20	153°12.14	11.0'	14°53.97	-13.9'	58.3'
18 19	94°6.67 109°6.68	\$14°54.99 55.77	167° 42.11 182° 12.17	11.1' 11.2'	N14°40.10 14°26.17	-13.9' -14.0'	58.3' 58.3'
20	109°6.68 124°6.68	55.77 56.56	182° 12.17 196° 42.33	11.2'	14° 26.17 14° 12.17	-14.0 -14.1'	58.3'
21	139°6.69	• • 57.34	211° 12.57	11.3'	13°58.12	-14.1'	58.2'
22	154°6.69	58.13	225°42.90	11.4'	13°44.00	-14.2'	58.2'
23	169°6.69	58.91	240°13.33	11.5'	13°29.82	-14.2'	58.2'
	SD = 16.1'	d = 0.8'		S	D = 16.0'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	01:40	02:58	03:50	19:39	20:31	21:51

Lat.		Moonris	e		Moonset	t
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°			21:43			16:26
<b>N</b> 70°		18:53	22:12		17:26	15:55
68°		20:03	22:33		16:14	15:32
66°		20:40	22:49		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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 10°	23:00	23:59		11:07	12:01	12:50
0°	23:18		00:13	10:47	11:45	12:38
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	02:21	02:32	02:37	06:53	08:44	10:30

		Sun			Moon	
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	21-23
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	71-48%
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
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	42° 16.26	200°27.24 \$13°51.82	259°41.77 N16°29.47	255°10.47 N13°59.47	32°47.91 N01°10.03
1	57° 18.73	215°30.50 50.84	274°42.99 29.13	270°12.65 59.38	47°50.52 9.97
2	72°21.19	230°33.76 49.86	289°44.21 28.79	285°14.82 59.29	62°53.13 9.92
3	87°23.66	245°37.01 · · 48.89	304°45.43 · · 28.44	300°17.00 · · 59.20	77°55.73 · · 9.86
4	102°26.12	260°40.26 47.92	319°46.65 28.10	315°19.18 59.11	92°58.34 9.81
5	117°28.58	275°43.51 46.94	334°47.87 27.76	330°21.36 59.02	108°0.94 9.76
6	132°31.05	290°46.75 \$13°45.97	349°49.09 N16°27.42	345°23.54 N13°58.93	123°3.55 N01°9.70
7	147°33.51	305°49.99 45.00	4°50.31 27.08	0°25.72 58.84	138°6.15 9.65
8	162°35.98	320°53.23 44.03	19°51.53 26.73	15°27.90 58.76	153°8.76 9.60
9	177°38.44	335°56.46 · · 43.06	34°52.75 · · 26.39	30°30.08 · · 58.67	168°11.36 · · 9.54
10	192°40.90	350°59.68 42.10	49°53.97 26.05	45°32.26 58.58	183°13.97 9.49
11	207°43.37	6°2.91 41.13	64°55.19 25.71	60°34.44 58.49	198°16.57 9.44
12	222°45.83	21°6.13 \$13°40.17	79°56.42 N16°25.37	75°36.62 N13°58.40	213°19.18 N01°9.38
13	237°48.30	36°9.35 39.20	94°57.64 25.02	90°38.80 58.31	228°21.78 9.33
14	252°50.76	51°12.56 38.24	109°58.86 24.68	105°40.98 58.22	243°24.39 9.28
15	267°53.22	66° 15.77 · · · 37.28	125°0.09 · · 24.34	120°43.16 · · 58.14	258°26.99 · · 9.22
16	282°55.69	81°18.98 36.32	140° 1.31 24.00	135°45.34 58.05	273°29.60 9.17
17	297°58.15	96°22.18 35.36	155° 2.54 23.66	150°47.52 57.96	288°32.20 9.12
18	313°0.62	111°25.38 \$13°34.40	170°3.76 N16°23.31	165°49.70 N13°57.87	303°34.80 N01°9.06
19	328°3.08	126°28.57 33.44	185° 4.99 22.97	180°51.88 57.78	318°37.41 9.01
20	343°5.54	141°31.77 32.48	200°6.21 22.63	195°54.07 57.70	333°40.01 8.96
21	358°8.01	156°34.95 · · 31.53	215°7.44 · · 22.29	210°56.25 · · 57.61	348°42.61 · · 8.91
22	13° 10.47	171°38.14 30.57	230°8.66 21.95	225°58.43 57.52	3°45.22 8.85
23	28° 12.94	186°41.32 29.62	245°9.89 21.61	241°0.62 57.43	18°47.82 8.80
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
vved 0	<b>GHA</b> 43°15.40	201°44.50 S13°28.67	260°11.12 N16°21.26	256° 2.80 N13° 57.35	33°50.43 N01°8.75
1	43° 15.40 58° 17.87	201°44.50 \$13°28.67 216°47.67 27.72	275°12.35 20.92	250° 2.80 N13° 57.35 271° 4.98 57.26	48°53.03 8.69
2	73°20.33	231°50.84 26.77	275 12.55 20.92 290°13.57 20.58	271 4.96 57.20 286° 7.17 57.17	63°55.63 8.64
3	73 20.33 88°22.79	246°54.01 · · 25.82	305°14.80 · · 20.24	301°9.35 · · 57.08	78°58.23 · · 8.59
4	103°25.26	261°57.17 24.87	320°16.03 19.90	316°11.53 57.00	94°0.84 8.54
5	118° 27.72	277°0.33 23.93	335°17.26 19.56	331°13.72 56.91	109°3.44 8.48
6	133°30.19	292°3.48 \$13°22.98	350°18.49 N16°19.21	346°15.90 N13°56.82	124°6.04 N01°8.43
7	148° 32.65	307°6.63 22.04	5°19.72 18.87	1°18.09 56.74	139°8.65 8.38
8	163°35.11	322°9.78 21.10	20°20.95 18.53	16°20.27 56.65	154°11.25 8.33
9	178° 37.58	337°12.93 · · 20.15	35°22.18 · · 18.19	31°22.46 · · 56.56	169°13.85 · · 8.28
10	193°40.04	352°16.07 19.21	50°23.42 17.85	46°24.64 56.48	184°16.45 8.22
11	208° 42.51	7° 19.20 18.28	65°24.65 17.51	61°26.83 56.39	199°19.06 8.17
12	223° 44.97	22°22.34 \$13°17.34	80°25.88 N16°17.17	76°29.02 N13°56.30	214°21.66 N01°8.12
13	238° 47.43	37°25.47 16.40	95°27.11 16.82	91°31.20 56.22	229°24.26 8.07
14	253°49.90	52°28.59 15.47	110°28.35 16.48	106°33.39 56.13	244°26.86 8.02
15	268° 52.36	67°31.71 · · 14.53	125°29.58 · · 16.14	121°35.58 · · 56.04	259°29.46 · · 7.96
16	283°54.83	82°34.83 13.60	140°30.81 15.80	136°37.76 55.96	274°32.06 7.91
17	298°57.29	97°37.94 12.67	155°32.05 15.46	151°39.95 55.87	289°34.67 7.86
18	313°59.75	112°41.06 \$13°11.74	170°33.28 N16°15.12	166°42.14 N13°55.78	304°37.27 N01°7.81
19	329°2.22	127°44.16 10.81	185°34.52 14.78	181°44.33 55.70	319°39.87 7.76
20	344°4.68	142°47.27 9.88	200°35.76 14.44	196°46.51 55.61	334°42.47 7.71
21	359°7.15	157°50.36 · · 8.96	215°36.99 · · 14.10	211°48.70 · · 55.53	349°45.07 · · 7.65
22	$14^{\circ}9.61$	172°53.46 8.03	230°38.23 13.75	226°50.89 55.44	4°47.67 7.60
23	29° 12.07	187° 56.55 7.11	245°39.47 13.41	241°53.08 55.36	19°50.27 7.55
Mer.p	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
0	44° 14.54	202°59.64 \$13°6.19	260°40.70 N16°13.07	256°55.27 N13°55.27	34°52.87 N01°7.50
1	59° 17.00	218°2.72 5.27	275°41.94 12.73	271°57.46 55.18	49°55.47 7.45
2	74° 19.47	233°5.80 4.35	290°43.18 12.39	286°59.65 55.10	64°58.07 7.40
3	89°21.93	248°8.88 · · 3.43	305°44.42 · · 12.05	302°1.84 · · 55.01	80°0.67 · · · 7.35
4	104°24.39	263°11.95 2.51	320°45.66 11.71	317° 4.03 54.93	95°3.27 7.30
5	119°26.86	278°15.02 1.60	335°46.90 11.37	332°6.22 54.84	110°5.87 7.25
6	134°29.32	293°18.09 \$13°0.68	350°48.14 N16°11.03	347°8.41 N13°54.76	125°8.47 N01°7.19
7	149°31.79	308°21.15 12°59.77	5°49.38 10.69	2°10.60 54.67	140°11.07 7.14
8	164°34.25	323°24.21 58.86	20°50.62 10.34	17°12.79 54.59	155°13.67 7.09
9	179°36.71	338° 27.26 · · 57.95	35°51.86 · · 10.00	32°14.98 · · 54.50	170°16.27 · · · 7.04
10 11	194°39.18 209°41.64	353°30.31 57.04 8°33.36 56.13	50°53.10 9.66 65°54.34 9.32	47°17.18 54.42 62°19.37 54.34	185°18.87 6.99 200°21.47 6.94
11	209°41.64 224°44.11	23°36.40 S12°55.23	80°55.59 N16°8.98	77°21.56 N13°54.25	215°24.07 N01°6.89
13	224 44.11 239° 46.57	38°39.44 54.32	95°56.83 8.64	92°23.75 54.17	230°26.67 Not 6.89
14	254° 49.04	53°42.47 53.42	110°58.07 8.30	107°25.94 54.08	245°29.27 6.79
15	269°51.50	68° 45.50 · · 52.52	125°59.32 · · 7.96	122°28.14 · · 54.00	
16	284°53.96	83°48.53 51.62	141°0.56 7.62	137°30.33 53.91	260°31.87 · · 6.74   <b>r</b> 275°34.47 6.69
17	299° 56.43	98°51.55 50.72	156°1.81 7.28	152°32.52 53.83	290°37.07 6.64
18	314°58.89	113°54.57 \$12°49.82	171°3.05 N16°6.94	167°34.72 N13°53.75	305°39.66 N01°6.59
19	330°1.36	128° 57.59 48.93	186° 4.30 6.60	182°36.91 53.66	320°42.26 6.54
20	345°3.82	144°0.60 48.03	201°5.54 6.26	197°39.11 53.58	335°44.86 6.49
21	0°6.28	159°3.61 · · 47.14	216°6.79 · · 5.92	212°41.30 · · 53.49	350° 47.46 · · 6.44
22	15°8.75	174°6.61 46.25	231°8.04 5.58	227°43.50 53.41	5°50.06 6.39
23	30°11.21	189°9.61 45.36	246° 9.29 5.24	242°45.69 53.33	20°52.66 6.34
More	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
ivier.p	Jass. ∠1:UU	νσ.1 α-υ.9 m-4.44	ν1.∠ u-υ.5 mυ.81	ν∠.∠ α-υ.1 m-∠.υ3	ν z.υ α-υ.1 mυ.4δ

Alpheratz	353°5.33 349°28.84 348°45.52 335°18.51 327°49.16 312°45.39 315°10.21 314°4.26 308°25.60 290°37.60 281°2.16 280°19.30 277°59.69 275°35.97 270°50.24 263°51.40 255°4.51 244°49.17 243°15.38 234°14.04 222°45.24 21°38.04 217°46.34 207°32.97 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17	-42°9.61 56°41.33 -17°50.26 -57°6.01 23°35.52 89°22.60 -40°11.69 4°11.84 49°57.43 16°33.86 -8°10.09 46°1.41 6°22.52 28°37.78 -1°10.97 7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Ankaa 353°5.33	353°5.33 349°28.84 348°45.52 335°18.51 327°49.16 312°45.39 315°10.21 314°4.26 308°25.60 290°37.60 281°2.16 280°19.30 277°59.69 275°35.97 270°50.24 263°51.40 255°4.51 244°49.17 243°15.38 234°14.04 222°45.24 21°38.04 217°46.34 207°32.97 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17	-42°9.61 56°41.33 -17°50.26 -57°6.01 23°35.52 89°22.60 -40°11.69 4°11.84 49°57.43 16°33.86 -8°10.09 46°1.41 6°22.52 28°37.78 -1°10.97 7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Diphda   348° 45.52	348° 45.52 335° 18.51 327° 49.16 312° 45.39 315° 10.21 314° 4.26 308° 25.60 290° 37.60 281° 2.16 280° 19.30 277° 59.69 277° 59.69 270° 50.24 263° 51.40 258° 24.74 255° 4.51 244° 49.17 243° 15.38 234° 14.04 212° 45.24 221° 38.04 217° 46.34 207° 32.97 193° 39.57 182° 23.67 175° 42.32 172° 59.01 171° 50.47 166° 12.17	-17°50.26 -57°6.01 23°35.52 89°22.60 -40°11.69 4°11.84 49°57.43 16°33.86 -8°10.09 46°1.41 6°22.52 28°37.78 -1°10.97 7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Achernar Hamal Jayro 49.16 Jayro 49.16 Acamar Acamar Mirfak Mirfak Mirfak Mirfak Aldebaran Rigel Capella Bellatrix Z78° 21.02 Elnath Bellatrix 278° 21.02 Elnath Z78° 21.02 Elnath Z78° 21.02 Elnath Bellatrix 278° 21.02 Elnath Z78° 59.69 Eleguse Z70° 50.24 Fo 24.79 Eleguse S28° 24.74 Fo 45.38 Avior Z34° 14.04 Eleguse Savina Alphard Alphard Alphard Alphard Regulus Z21° 38.04 Eleguse Z21° 38.04 Eleguse Z21° 38.04 Eleguse Z21° 38.04 Eleguse Z21° 38.04 Eleguse Z21° 38.04 Eleguse Z21° 38.04 Eleguse Z21° 38.04 Eleguse Z21° 38.04 Eleguse Z21° 38.04 Eleguse Z21° 38.04 Eleguse Z21° 38.04 Eleguse Z21° 38.04 Eleguse Z21° 38.04 Eleguse Z21° 38.04 Eleguse Z21° 38.04 Eleguse Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 38.04 Elegus Z21° 46.34	335°18.51 327°49.16 312°45.39 315°10.21 314°4.26 308°25.60 290°37.60 281°2.16 280°19.30 277°59.69 275°35.97 270°50.24 263°51.40 258°24.74 255°4.51 244°49.17 243°15.38 234°14.04 217°46.34 207°32.97 193°39.57 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17	-57°6.01 23°35.52 89°22.60 -40°11.69 4°11.84 49°57.43 16°33.86 -8°10.09 46°1.41 6°22.52 28°37.78 -1°10.97 7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Hamal   327° 49.16   23° 35.52   Polaris   312° 45.39   89° 22.60   Acamar   315° 10.21   -40° 11.69   Menkar   314° 4.26   4° 11.84   Mirfak   308° 25.60   49° 57.43   Aldebaran   280° 19.30   46° 1.41   Bellatrix   278° 21.02   6° 22.52   Elnath   277° 59.69   28° 37.78   Alnilam   275° 35.97   -1° 10.97   Betelgeuse   270° 50.24   7° 24.79   Canopus   258° 24.74   -16° 45.00   Adhara   255° 4.51   -29° 0.27   Procyon   244° 49.17   5° 9.41   Pollux   243° 15.38   27° 57.58   Avior   234° 14.04   -59° 35.39   Suhail   222° 45.24   -43° 32.17   Miaplacidus   211° 46.34   -8° 46.39   Acrux   172° 59.01   -60° 49.29   Alphard   217° 46.34   -8° 46.39   Acrux   172° 59.01   -63° 14.70   Alkaid   152° 51.31   49° 25.30   Arcturus   145° 46.89   19° 2.58   Alphard   147° 56.26   -36° 30.06   Arcturus   145° 46.89   19° 2.58   Alpharca   147° 56.26   -36° 30.06   Arcturus   145° 46.89   19° 2.58   Alpharca   147° 56.26   -36° 30.06   Arcturus   145° 46.89   19° 2.58   Alpharca   147° 56.26   -36° 30.06   Arcturus   145° 46.89   19° 2.58   Alpharca   126° 2.84   26° 37.53   Alpharca   126	327° 49.16 312° 45.39 315° 10.21 314° 4.26 308° 25.60 290° 37.60 281° 2.16 280° 19.30 277° 59.69 275° 35.97 270° 50.24 263° 51.40 258° 24.74 255° 4.51 244° 49.17 243° 15.38 234° 14.04 212° 45.24 221° 38.04 217° 46.34 207° 32.97 193° 39.57 182° 23.67 75° 42.32 172° 59.01 171° 50.47 166° 12.17	23°35.52 89°22.60 -40°11.69 4°11.84 49°57.43 16°33.86 -8°10.09 46°1.41 6°22.52 28°37.78 -1°10.97 7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Polaris   312° 45.39   89° 22.60     Acamar   315° 10.21   -40° 11.69     Menkar   314° 4.26   4° 11.84     Mirfak   308° 25.60   49° 57.43     Aldebaran   290° 37.60   16° 33.86     Rigel   281° 2.16   -8° 10.09     Capella   280° 19.30   46° 1.41     Bellatrix   277° 59.69   28° 37.78     Alnilam   275° 35.97   -1° 10.97     Betelgeuse   270° 50.24   7° 24.79     Canopus   253° 51.40   -52° 42.29     Sirius   258° 24.74   -16° 45.00     Adhara   255° 4.51   -29° 0.27     Procyon   244° 49.17   5° 9.41     Polltux   243° 15.38   27° 57.58     Avior   234° 14.04   -59° 35.39     Suhail   222° 45.24   -43° 32.17     Miaplacidus   221° 38.04   -69° 49.29     Alphard   217° 46.34   -8° 46.39     Regulus   207° 32.97   11° 50.15     Dubhe   193° 39.57   61° 36.12     Dubhe   193° 39.57   61° 36.12     Denebola   182° 23.67   14° 25.30     Gienah   175° 42.32   -17° 41.35     Acrux   171° 50.47   -57° 15.64     Alioth   166° 12.17   55° 48.71     Spica   158° 21.04   -11° 18.01     Alkaid   Hadar   148° 34.53   -60° 30.06     Menkent   147° 56.26   -36° 30.03     Menkent   147° 56.26   -36° 30.03     Arcturus   145° 46.89   19° 2.58     Rigil Kent   139° 38.91   -60° 56.72     Kochab   Zuben'ubi   136° 54.71   -16° 9.13     Alphecca   126° 2.84   26° 37.53     Antares   112° 14.34   -26° 29.46     Atria   107° 7.68   -69° 4.62     Sabik   102° 1.36   -15° 45.44     Shaula   96° 8.66   -37° 7.42     Rasalhague   95° 57.43   12° 32.56     Eltanin   90° 41.86   51° 29.32     Kaus Aust   83° 30.79   -34° 22.34     Vega   80° 32.46   38° 48.73     Nunki   75° 46.10   -26° 15.80     Al Na'ir   27° 30.91   -46° 49.96     Fomalhaut   15° 12.69   -29° 28.80     Scheat   13° 43.56   28° 13.98     Markab   13° 28.23   15° 21.20     Nov 03 Tue   SHA   Mer.pass     Venus   158° 29.10   10:31     Mars   216° 55.72   06:58     Saturn   350° 38.33   21:37      Nunki   75° 46.10   -06:55     Saturn   350° 38.33   21:37      Nunki   75° 46.10   -06:55     Saturn   350° 38.33   21:37      Nov 05 Thu   SHA   Mer.pass     Nov 05 Thu	312° 45.39 315° 10.21 314° 4.26 308° 25.60 290° 37.60 281° 2.16 280° 19.30 278° 21.02 277° 59.69 275° 35.97 270° 50.24 263° 51.40 258° 24.74 255° 4.51 244° 49.17 243° 15.38 234° 14.04 222° 45.24 221° 38.04 217° 46.34 207° 32.97 193° 39.57 182° 23.67 175° 42.32 172° 59.01 171° 50.47 166° 12.17	89°22.60 -40°11.69 4°11.84 49°57.43 16°33.86 -8°10.09 46°1.41 6°22.52 28°37.78 -1°10.97 7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Acamar   315°10.21	315°10.21 314°4.26 308°25.60 290°37.60 281°2.16 280°19.30 277°59.69 275°35.97 270°50.24 263°51.40 258°24.74 255°4.51 244°49.17 243°15.38 234°14.04 222°45.24 21°38.04 217°38.04 217°46.34 207°32.97 182°23.67 75°42.32 172°59.01 171°50.47 166°12.17	-40°11.69 4°11.84 49°57.43 16°33.86 -8°10.09 46°1.41 6°22.52 28°37.78 -1°10.97 7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Menkar Mirfak Mirfak Mirfak Aldebaran Aldebaran 290°37.60         49°57.43           Aldebaran 290°37.60         16°33.86           Rigel Capella 280°19.30         46°1.41           Bellatrix 278°21.02         6°22.52           Elnath 277°59.69         28°37.78           Alnilam 275°35.97         -1°10.97           Betelgeuse Sirius 258°24.74         -16°45.00           Adhara 255°4.51         -29°0.27           Procyon 244°49.17         5°9.41           Pollux 243°15.38         27°57.58           Avior 234°14.04         -59°35.39           Suhail 222°45.24         -43°32.17           Miaplacidus 210°38.04         -69°49.29           Alphard 217°46.34         -8°46.39           Regulus 207°32.97         11°50.15           Dubhe 193°39.57         61°36.12           Dubhe 193°39.57         61°36.12           Gacrux 171°50.47         -57°15.64           Alioth 166°12.17         55°48.71           Agarux 171°50.47         -57°15.64           Alkaid 152°51.31         49°10.68           Hadar 148°34.53         -60°30.06           Menkent 176°46.89         19°2.58           Rigil Kent. 136°54.71         -16°9.13           Albaria 197°1.68         -60°40.29	314° 4.26 308° 25.60 290° 37.60 281° 2.16 280° 19.30 277° 59.69 277° 59.69 275° 35.97 270° 50.24 263° 51.40 258° 24.74 255° 4.51 244° 49.17 243° 15.38 234° 14.04 222° 45.24 221° 38.04 217° 46.34 207° 32.97 193° 39.57 182° 23.67 175° 42.32 172° 59.01 171° 50.47 166° 12.17	4°11.84 49°57.43 16°33.86 -8°10.09 46°1.41 6°22.52 28°37.78 -1°10.97 7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Mirfak         308°25.60         49°57.43           Aldebaran         290°37.60         16°33.86           Rigel         281°2.16         -8°10.09           Capella         280°19.30         46°1.41           Bellatrix         278°21.02         6°22.52           Elnath         277°59.69         28°37.78           Alnilam         275°35.97         -1°10.97           Betelgeuse         270°50.24         7°24.79           Canopus         263°51.40         -52°42.29           Sirius         258°24.74         -16°45.00           Adhara         255°4.51         -29°0.27           Procyon         244°49.17         5°9.41           Pollux         243°15.38         27°57.58           Avior         234°14.04         -59°35.39           Suhail         222°45.24         -43°32.17           Miaplacidus         221°3.67         46°39.12           Alphard         217°46.34         -8°46.39           Regulus         2207°32.97         11°50.15           Dubhe         193°39.57         61°36.12           Denebola         182°23.67         14°25.30           Gienah         172°50.1         -63°14.70	308° 25.60 290° 37.60 281° 21.62 280° 19.30 277° 59.69 275° 35.97 270° 50.24 263° 51.40 258° 24.74 255° 4.51 244° 49.17 243° 15.38 234° 14.04 222° 45.24 221° 38.04 217° 46.34 207° 32.97 193° 39.57 182° 23.67 175° 42.32 172° 59.01 171° 50.47 166° 12.17	49°57.43 16°33.86 -8°10.09 46°1.41 6°22.52 28°37.78 -1°10.97 7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Aldebaran   290° 37.60   16° 33.86   Rigel   281° 2.16   -8° 10.09   280° 19.30   46° 1.41   278° 21.02   6° 22.52   Elnath   277° 55.69   28° 37.78   Alnilam   275° 35.97   -1° 10.97   276° 24.79   263° 51.40   -52° 42.29   258° 24.74   -16° 45.00   Adhara   255° 4.51   -29° 0.27   244° 49.17   5° 9.41   Pollux   243° 15.38   27° 57.58   Avior   234° 14.04   -59° 35.39   Suhail   222° 45.24   -43° 32.17   Miaplacidus   221° 38.04   -69° 49.29   Alphard   217° 46.34   -8° 46.39   Regulus   207° 32.97   11° 50.15   Dubhe   193° 39.57   61° 36.12   Denebola   182° 23.67   14° 25.30   Acrux   171° 50.47   -57° 15.64   Alioth   166° 12.17   55° 48.71   Spica   148° 34.53   -60° 30.06   Arcturus   148° 34.53   -60° 30.06   Arcturus   148° 34.53   -60° 30.03   Arcturus   148° 34.53   -60° 30.03   Arcturus   145° 46.89   19° 2.58   Rigil Kent.   139° 38.91   -60° 56.72   Kochab   130° 32.10   Alphecca   126° 2.84   26° 37.53   Alphecca   126° 2.84   26	290°37.60 281°2.16 280°19.30 277°59.69 277°59.69 270°50.24 263°51.40 258°24.74 255°4.51 244°49.17 243°15.38 234°14.04 221°38.04 217°46.34 207°32.97 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17	16°33.86 -8°10.09 46°1.41 6°22.52 28°37.78 -1°10.97 7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Rigel Capella         281° 2.16         -8° 10.09           Capella Bellatrix         278° 21.02         6° 22.52           Elnath Bellatrix         277° 59.69         28° 37.78           Alnilam Path Stand         275° 35.97         -1° 10.97           Betelgeuse         270° 50.24         7° 24.79           Canopus Sirius         258° 24.74         -16° 45.00           Adhara         255° 4.51         -29° 0.27           Procyon Portory         244° 49.17         5° 9.41           Pollux Path Stand         243° 15.38         27° 57.58           Avior Avior Avior 234° 14.04         -59° 35.39           Suhail Sulpari 222° 45.24         -43° 32.17           Miaplacidus Alphard 21° 46.34         -8° 46.39           Regulus 207° 32.97         11° 50.15           Dubhe 193° 39.57         61° 36.12           Dubhe 193° 39.57         61° 36.12           Denebola 182° 23.67         14° 25.30           Gienah 175° 42.32         -17° 41.35           Acrux 172° 59.01         -63° 14.70           Gacrux 171° 50.47         -57° 15.64           Alloth 166° 12.17         55° 48.71           Spica 18         180° 10° 30° 30° 30° 30° 30° 30° 30° 30° 30° 3	281°2.16 280°19.30 278°21.02 277°59.69 270°50.24 263°51.40 258°24.74 255°4.51 244°49.17 243°15.38 234°14.04 217°46.34 207°32.97 193°39.57 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17	-8°10.09 46°1.41 6°22.52 28°37.78 -1°10.97 7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Capella         280° 19.30         46° 1.41           Bellatrix         278° 21.02         6° 22.52           Elnath         277° 59.69         28° 37.78           Alnilam         275° 59.24         7° 24.79           Betelgeuse         270° 50.24         7° 24.79           Canopus         263° 51.40         -52° 42.29           Sirius         288° 24.74         -16° 45.00           Adhara         255° 4.51         -29° 0.27           Procyon         244° 49.17         5° 9.41           Pollux         243° 13.38         27° 57.58           Avior         234° 14.04         -59° 35.39           Suhail         222° 45.24         -43° 32.17           Miaplacidus         221° 38.04         -69° 49.29           Alphard         217° 46.34         -8° 46.39           Regulus         207° 32.97         11° 50.15           Dubhe         193° 39.57         61° 36.12           Denebola         182° 23.67         14° 25.30           Gienah         175° 42.32         -17° 41.35           Acrux         172° 59.01         -63° 14.70           Gacrux         171° 50.47         -57° 15.64           Alloith         166° 12.17	280° 19.30 278° 21.02 277° 59.69 275° 35.97 270° 50.24 263° 51.40 258° 24.74 255° 4.51 244° 49.17 243° 15.38 234° 14.04 222° 45.24 221° 38.04 217° 46.34 207° 32.97 193° 39.57 182° 23.67 75° 42.32 172° 59.01 171° 50.47 166° 12.17	46°1.41 6°22.52 28°37.78 -1°10.97 7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Bellatrix         278°21.02         6°22.52           Elnath         277°59.69         28°37.78           Alnilam         275°55.97         -1°10.97           Betelgeuse         270°50.24         7°24.79           Canopus         263°51.40         -52°42.29           Sirius         258°24.74         -16°45.00           Adhara         255°4.51         -29°0.27           Procyon         244°49.17         5°9.41           Pollux         233°14.04         -59°35.39           Suhail         222°45.24         -43°32.17           Miaplacidus         221°38.04         -69°49.29           Alphard         217°46.34         -8°46.39           Regulus         207°32.97         11°50.15           Dubhe         193°39.57         61°36.12           Denebola         182°23.67         14°25.30           Gienah         175°42.32         -17°41.35           Acrux         172°59.01         -63°14.70           Gacrux         171°50.47         -57°15.64           Alloth         166°12.17         55°48.71           Spica         118°21.4         49°10.68           Hadar         147°56.26         -36°30.03	278°21.02 277°59.69 275°35.97 270°50.24 263°51.40 258°24.74 255°4.51 244°49.17 243°15.38 234°14.04 222°45.24 211°38.04 217°46.34 207°32.97 193°39.57 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17	6°22.52 28°37.78 -1°10.97 7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Elnath	277° 59.69 275° 35.97 270° 50.24 263° 51.40 258° 24.74 255° 4.51 244° 49.17 243° 15.38 234° 14.04 222° 45.24 221° 38.04 217° 46.34 207° 32.97 193° 39.57 182° 23.67 175° 42.32 172° 59.01 171° 50.47 166° 12.17	28°37.78 -1°10.97 7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Alnilam   275°35.97   -1°10.97   Betelgeuse   270°50.24   7°24.79   263°51.40   -52°42.29   258°24.74   -16°45.00   Adhara   255°4.51   -29°0.27   Procyon   244°49.17   5°9.41   Pollux   243°15.38   27°57.58   Avior   234°14.04   -59°35.39   Suhail   222°45.24   -43°32.17   Miaplacidus   221°36.04   -69°49.29   Alphard   211°46.34   -8°46.39   Regulus   207°32.97   11°50.15   Dubhe   193°39.57   61°36.15   Denebola   182°23.67   14°25.30   Gienah   175°42.32   -17°41.35   Acrux   171°50.47   -57°15.64   Alioth   166°12.17   55°48.71   Spica   158°21.04   -111°18.01   Alkaid   152°51.31   49°10.68   Hadar   148°34.53   -60°30.06   Arcturus   145°46.89   19°2.58   Rigil Kent.   Kochab   137°21.04   74°2.63   2408°4.62   Sabik   102°1.36   -15°45.44   Atria   107°7.68   -69°4.62   Sabik   102°1.36   -15°45.44   Shaula   96°8.66   -37°7.42   Rasalhague   95°57.43   12°32.56   Eltanin   90°41.86   51°29.32   Kaus Aust.   83°30.79   -34°22.34   Vega   80°32.46   38°48.73   Nunki   75°46.10   -26°15.80   Altair   61°58.61   8°56.52   Peacock   53°3.48   -56°39.08   Enif   33°37.27   10°0.08   Al Na'ir   27°30.91   -46°49.96   Fomalhaut   15°12.69   -29°28.80   Scheat   13°43.56   28°13.98   Markab   13°28.23   15°21.20     Nov 03 Tue	275° 35.97 270° 50.24 263° 51.40 258° 24.74 255° 4.51 244° 49.17 243° 15.38 234° 14.04 222° 45.24 221° 38.04 217° 46.34 207° 32.97 193° 39.57 182° 23.67 175° 42.32 172° 59.01 171° 50.47 166° 12.17	-1°10.97 7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Betelgeuse         270°50.24         7°24.79           Canopus         263°51.40         -52°42.29           Sirius         258°24.74         -16°45.00           Adhara         255°42.17         -29°0.27           Procyon         244°49.17         5°9.41           Pollux         243°15.38         27°57.58           Avior         234°14.04         -59°35.39           Suhail         222°45.24         -43°32.17           Miaplacidus         221°38.04         -69°49.29           Alphard         210°45.44         -69°49.29           Alphard         210°32.97         11°50.15           Dubhe         193°39.57         61°36.12           Denebola         182°23.67         14°25.30           Gienah         175°42.32         -17°41.35           Acrux         172°50.01         -63°14.70           Gacrux         171°50.47         -57°15.64           Alioth         166°12.17         55°48.71           Spica         158°21.04         -11°18.01           Alkaid         152°51.31         49°10.68           Hadar         148°34.53         -60°30.03           Arcturus         140°56.26         -36°30.03 <tr< td=""><td>270°50.24 263°51.40 258°24.74 255°4.51 244°49.17 243°15.38 234°14.04 222°45.24 221°38.04 217°46.34 207°32.97 193°39.57 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17</td><td>7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35</td></tr<>	270°50.24 263°51.40 258°24.74 255°4.51 244°49.17 243°15.38 234°14.04 222°45.24 221°38.04 217°46.34 207°32.97 193°39.57 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17	7°24.79 -52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Canopus         263° 51.40         -52° 42.29           Sirius         258° 24.74         -16° 45.00           Adhara         255° 4.51         -29° 0.27           Procyon         244° 49.17         5° 9.41           Pollux         243° 15.38         27° 57.58           Avior         234° 14.04         -59° 35.39           Suhail         222° 45.24         -43° 32.17           Miaplacidus         221° 38.04         -69° 49.29           Alphard         210° 46.34         -8° 46.39           Regulus         207° 32.97         11° 50.15           Dubhe         193° 39.57         61° 36.12           Denebola         182° 23.67         14° 25.30           Gienah         175° 42.32         -17° 41.35           Acrux         172° 59.01         -63° 14.70           Gacrux         171° 50.47         -57° 15.64           Alloth         166° 12.17         55° 48.71           Spica         158° 21.04         -11° 18.01           Alkaid         152° 51.31         49° 10.68           Hadar         148° 34.53         -60° 30.06           Menkent         147° 56.26         -36° 30.03           Arcturus         130° 38.91	263° 51.40 258° 24.74 255° 4.51 244° 49.17 243° 15.38 234° 14.04 222° 45.24 221° 38.04 217° 46.34 207° 32.97 193° 39.57 182° 23.67 175° 42.32 172° 59.01 171° 50.47 166° 12.17	-52°42.29 -16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Sirius         258° 24.74         -16° 45.00           Adhara         255° 4.51         -29° 0.27           Procyon         244° 49.17         5° 9.41           Pollux         243° 15.38         27° 57.58           Avior         234° 14.04         -59° 35.39           Suhail         222° 45.24         -43° 32.17           Miaplacidus         221° 38.04         -69° 49.29           Alphard         217° 46.34         -8° 46.39           Regulus         207° 32.97         11° 50.15           Dubhe         193° 39.57         61° 36.12           Denebola         182° 23.67         14° 25.30           Gienah         175° 42.32         -17° 41.35           Acrux         172° 59.01         -63° 14.70           Gacrux         171° 50.47         -57° 15.64           Alloth         166° 12.17         55° 48.71           Spica         158° 21.04         -11° 18.01           Alkaid         152° 51.31         49° 10.68           Hadar         148° 34.53         -60° 30.03           Arcturus         145° 46.89         19° 2.58           Rigil Kent.         139° 38.91         -60° 56.72           Kochab         137° 21.04	258°24.74 255°4.51 244°49.17 243°15.38 234°14.04 222°45.24 221°38.04 217°46.34 207°32.97 193°39.57 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17	-16°45.00 -29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Adhara         255° 4.51         -29° 0.27           Procyon         244° 49.17         5° 9.41           Pollux         243° 15.38         27° 57.58           Avior         234° 14.04         -59° 35.39           Suhail         222° 45.24         -43° 32.17           Miaplacidus         221° 38.04         -69° 49.29           Alphard         217° 46.34         -8° 46.39           Regulus         207° 32.97         11° 50.15           Dubhe         193° 39.57         61° 36.12           Gienah         175° 42.32         -17° 41.35           Acrux         172° 59.01         -63° 14.70           Gacrux         171° 50.47         -57° 15.64           Alioth         166° 12.17         55° 48.71           Spica         158° 21.04         -11° 18.01           Alkaid         152° 51.31         49° 10.68           Hadar         148° 34.53         -60° 30.03           Menkent         147° 56.26         -36° 30.03           Menkent         147° 56.26         -36° 30.03           Alphecca         130° 38.91         -60° 56.72           Kochab         130° 21.04         74° 2.63           Zuben'ubi         136° 54.71	255° 4.51 244° 49.17 243° 15.38 234° 14.04 222° 45.24 221° 38.04 217° 46.34 207° 32.97 193° 39.57 182° 23.67 175° 42.32 172° 59.01 171° 50.47 166° 12.17	-29°0.27 5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Procyon 244° 49.17 5° 9.41 Pollux 243° 15.38 27° 57.58 Avior 234° 14.04 -59° 35.39 Suhail 222° 45.24 -43° 32.17 Miaplacidus 221° 38.04 -69° 49.29 Alphard 217° 46.34 -8° 46.39 Regulus 207° 32.97 11° 50.15 Dubhe 193° 39.57 61° 36.12 Denebola 182° 23.67 14° 25.30 Gienah 175° 42.32 -17° 41.35 Acrux 172° 59.01 -63° 14.70 Gacrux 171° 50.47 -57° 15.64 Alioth 166° 12.17 55° 48.71 Spica 158° 21.04 -11° 18.01 Alkaid 152° 51.31 49° 10.68 Hadar 148° 34.53 -60° 30.03 Arcturus 145° 46.89 19° 2.58 Rigil Kent. 139° 38.91 -60° 56.72 Kochab 137° 21.04 74° 2.63 Zuben'ubi 136° 54.71 -16° 9.13 Alphecca 126° 2.84 26° 37.53 Antares 112° 14.34 -26° 29.46 Atria 107° 7.68 -69° 4.62 Sabik 102° 1.36 -15° 45.44 Shaula 96° 8.66 -37° 7.42 Rasalhague 95° 57.43 12° 32.56 Eltanin 90° 41.86 51° 29.32 Kaus Aust. 83° 30.79 -34° 22.34 Vega 80° 32.46 38° 48.73 Nunki 75° 46.10 -26° 15.80 Altair 61° 58.61 8° 56.52 Peacock 53° 3.48 -56° 39.08 Deneb 49° 24.82 45° 22.88 Enif 33° 37.27 10° 0.08 Al Na'ir 27° 30.91 -46° 49.96 Fomalhaut 15° 12.69 -29° 28.80 Scheat 13° 43.56 28° 13.98 Markab 13° 28.23 15° 21.20  Nov 03 Tue SHA Mer.pass Venus 158° 10.98 10.36 Mars 216° 55.72 06.39 Jupiter 212° 54.21 06:58 Saturn 350° 31.65 21:45  Nov 05 Thu SHA Mer.pass Venus 158° 29.10 10.31 Mars 216° 55.72 06:39 Jupiter 212° 54.21 06:55 Saturn 350° 35.02 21:41  Nov 05 Thu SHA Mer.pass Venus 158° 29.10 10.31 Jupiter 212° 54.21 06:55 Saturn 350° 33.33 21:37	244° 49.17 243° 15.38 234° 14.04 222° 45.24 221° 38.04 217° 46.34 207° 32.97 193° 39.57 182° 23.67 175° 42.32 172° 59.01 171° 50.47 166° 12.17	5°9.41 27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Pollux	243°15.38 234°14.04 222°45.24 221°38.04 217°46.34 207°32.97 193°39.57 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17	27°57.58 -59°35.39 -43°32.17 -69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Avior Suhail         234° 14.04         -59° 35.39           Suhail         222° 45.24         -43° 32.17           Miaplacidus Alphard         210° 38.04         -69° 49.29           Alphard         210° 32.97         11° 50.15           Dubhe         193° 39.57         61° 36.12           Denebola         182° 23.67         14° 25.30           Gienah         175° 42.32         -17° 41.35           Acrux         172° 59.01         -63° 14.70           Gacrux         171° 50.47         -57° 15.64           Alioth         166° 12.17         55° 48.71           Spica         158° 21.04         -11° 18.01           Alkaid         152° 51.31         49° 10.68           Hadar         148° 34.53         -60° 30.06           Menkent         147° 56.26         -36° 30.03           Arcturus         139° 38.91         -60° 56.72           Kochab         137° 21.04         74° 2.63           Zuben'ubi         136° 54.71         -16° 91.3           Alphecca         126° 2.84         26° 37.53           Antares         112° 14.34         -26° 29.46           Atria         107° 7.68         -69° 4.62           Sabik         102° 1	234°14.04 222°45.24 221°38.04 217°46.34 207°32.97 193°39.57 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17	-59° 35.39 -43° 32.17 -69° 49.29 -8° 46.39 11° 50.15 61° 36.12 14° 25.30 -17° 41.35
Suhail         222° 45.24         -43° 32.17           Miaplacidus         221° 38.04         -69° 49.29           Alphard         217° 46.34         -8° 46.39           Regulus         207° 32.97         11° 50.15           Dubhe         193° 39.57         61° 36.12           Denebola         182° 23.67         14° 25.30           Gienah         175° 42.32         -17° 41.35           Acrux         171° 50.47         -57° 15.64           Alloth         166° 12.17         55° 48.71           Spica         158° 21.04         -11° 18.01           Alkaid         152° 51.31         49° 10.68           Hadar         148° 34.53         -60° 30.06           Menkent         147° 56.26         -36° 30.03           Arcturus         145° 46.89         19° 2.58           Rigil Kent.         139° 38.91         -60° 56.72           Kochab         137° 21.04         74° 2.63           Zuben'ubi         136° 54.71         -16° 9.13           Alphecca         126° 2.84         26° 37.53           Antares         112° 14.34         -26° 29.46           Atria         107° 7.68         -69° 4.62           Sabik         102° 1.36	222° 45.24 221° 38.04 217° 46.34 207° 32.97 193° 39.57 182° 23.67 175° 42.32 172° 59.01 171° 50.47 166° 12.17	-43° 32.17 -69° 49.29 -8° 46.39 11° 50.15 61° 36.12 14° 25.30 -17° 41.35
Miaplacidus         221°38.04         -69°49.29           Alphard         217°46.34         -8°46.39           Regulus         207°32.97         11°50.15           Dubhe         193°35.77         61°36.12           Denebola         182°23.67         14°25.30           Gienah         175°42.32         -17°41.35           Acrux         172°59.01         -63°14.70           Gacrux         171°50.47         -57°15.64           Alloth         166°12.17         55°48.71           Spica         158°21.04         -11°18.01           Alkaid         152°51.31         49°10.68           Hadar         148°34.53         -60°30.06           Menkent         147°56.26         -36°30.03           Arcturus         145°46.89         19°2.58           Rigil Kent.         139°38.91         -60°56.72           Kochab         137°21.04         74°2.63           Zuben'ubi         136°54.71         -16°9.13           Alphecca         126°2.84         26°37.53           Antares         112°14.34         -26°9.46           Sabik         102°1.36         -15°45.44           Shaula         96°8.66         -37°7.42 <tr< td=""><td>221°38.04 217°46.34 207°32.97 193°39.57 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17</td><td>-69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35</td></tr<>	221°38.04 217°46.34 207°32.97 193°39.57 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17	-69°49.29 -8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Alphard Regulus Regulus 207°32.97 Dubhe 193°39.57 61°36.12 Denebola 175°42.32 17°41.35 Acrux 172°59.01 Alioth Alioth 166°12.17 Spica 158°21.04 Alkiaid 152°51.31 Agraturus 147°56.26 Agraturus 147°56.26 Alioth 147°56.26 Alioth 147°56.26 Alioth 147°56.26 Alioth 147°56.26 Alioth 147°56.26 Alioth 147°56.26 Alioth 139°38.91 Arcturus 145°46.89 Rigil Kent. 139°38.91 Alphecca Antares 112°14.34 Alphecca Antares 112°14.34 Alcaid 107°7.68 Alioth Altaid 107°7.68 Alioth Altaid 107°7.68 Alioth Altaid Alfiel Atria 107°7.68 Alioth Altain 107°7.68 Alioth Altain 107°7.68 Alioth Altain 107°7.68 Alioth Altain Altain 107°7.68 Alioth Altain 107°7.68 Alioth Altain 107°7.68 Alioth Altain Altain Altain 107°7.68 Alioth Altain	217°46.34 207°32.97 193°39.57 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17	-8°46.39 11°50.15 61°36.12 14°25.30 -17°41.35
Regulus         207° 32.97         11° 50.15           Dubhe         193° 39.57         61° 36.12           Denebola         182° 23.67         14° 25.30           Gienah         175° 42.32         -17° 41.35           Acrux         171° 50.47         -57° 15.64           Alloth         166° 12.17         55° 48.71           Spica         158° 21.04         -11° 18.01           Alkaid         152° 51.31         49° 10.68           Hadar         148° 34.53         -60° 30.06           Menkent         147° 52.62         -36° 30.03           Arcturus         145° 46.89         19° 2.58           Rigil Kent.         139° 38.91         -60° 56.72           Kochab         137° 21.04         74° 2.63           Zuben'ubi         136° 54.71         -16° 9.13           Alphecca         126° 2.84         26° 37.53           Antares         112° 14.34         -26° 29.46           Atria         102° 1.36         -15° 45.44           Shaula         96° 8.66         -37° 7.42           Rasalhague         95° 57.43         12° 32.56           Eltanin         90° 41.86         51° 29.32           Kaus Aust.         83° 30.79	207°32.97 193°39.57 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17	11°50.15 61°36.12 14°25.30 -17°41.35
Dubhe   193° 39.57   61° 36.12     Denebola   182° 23.67   14° 25.30     Gienah   175° 42.32   -17° 41.35     Acrux   172° 59.01   -63° 14.70     Gacrux   171° 50.47   -57° 15.64     Alioth   166° 12.17   55° 48.71     Spica   158° 21.04   -111° 18.01     Alkaid   152° 51.31   49° 10.68     Hadar   148° 34.53   -60° 30.06     Menkent   147° 56.26   -36° 30.03     Arcturus   145° 46.89   19° 2.58     Rigil Kent.   139° 38.91   -60° 56.72     Kochab   137° 21.04   74° 2.63     Zuben'ubi   136° 54.71   -16° 9.13     Alphecca   126° 2.84   26° 37.53     Antares   112° 14.34   -26° 29.46     Atria   107° 7.68   -69° 4.62     Sabik   102° 1.36   -15° 45.44     Shaula   96° 8.66   -37° 7.42     Rasalhague   95° 57.43   12° 32.56     Eltanin   90° 41.86   51° 29.32     Kaus Aust.   83° 30.79   -34° 22.34     Vega   80° 32.46   38° 48.73     Nunki   75° 46.10   -26° 15.80     Altair   61° 58.61   8° 56.52     Peacock   53° 3.48   -56° 39.08     Altair   61° 58.61   8° 56.52     Peacock   53° 3.48   -56° 39.08     Altair   27° 30.91   -46° 49.96     Fomalhaut   15° 12.69   -29° 28.80     Scheat   13° 43.56   28° 13.98     Markab   13° 28.23   15° 21.20     Nov 03 Tue   SHA   Mer.pass     Nerus   158° 10.98   10.36     Mars   216° 55.72   06:39     Jupiter   212° 54.21   06:58     Saturn   350° 31.65   21:45     Nov 05 Thu   SHA   Mer.pass     Venus   158° 29.10   10:31     Mars   216° 55.72   06:39     Jupiter   212° 40.73   06:51     Saturn   350° 33.33   21:37     Horizontal parallax   Venus   0.55     Saturn   350° 38.33   21:37	193°39.57 182°23.67 175°42.32 172°59.01 171°50.47 166°12.17	61°36.12 14°25.30 -17°41.35
Denebola Gienah Gienah Gienah Acrux         175° 42.32 17° 41.35 17° 41.35 17° 59.01 6-63° 14.70 63° 14.70 17° 55° 15.64 17° 55° 48.71 55° 48.71 55° 48.71 55° 48.71 16° 12.17 55° 48.71 49° 10.68 148° 34.53 60° 30.06 140° 56.26 36° 30.03 145° 46.89 19° 2.58 130° 38.91 60° 56.72 14.34 12° 12.04 74° 2.63 12° 12.04 74° 2.04 12° 12° 12° 12° 12° 12° 12° 12° 12° 12°	182°23.67 175°42.32 172°59.01 171°50.47 166°12.17	14°25.30 -17°41.35
Gienah         175° 42.32         -17° 41.35           Acrux         172° 59.01         -63° 14.70           Gacrux         171° 50.47         -57° 15.64           Alioth         166° 12.17         55° 48.71           Spica         158° 21.04         -11° 18.01           Alkaid         152° 51.31         49° 10.68           Hadar         148° 34.53         -60° 30.06           Menkent         147° 56.26         -36° 30.03           Arcturus         145° 46.89         19° 2.58           Rigil Kent.         139° 38.91         -60° 56.72           Kochab         137° 21.04         74° 2.63           Zuben'ubi         136° 54.71         -16° 9.13           Alphecca         126° 2.84         26° 37.53           Antares         112° 14.34         -26° 29.46           Atria         107° 7.68         -69° 4.62           Sabik         102° 1.36         -15° 45.44           Shaula         96° 57.43         12° 32.56           Eltanin         90° 41.86         51° 29.32           Kaus Aust.         83° 30.79         -34° 22.34           Vega         80° 32.46         38° 48.73           Nunki         75° 46.10 <td< td=""><td>175°42.32 172°59.01 171°50.47 166°12.17</td><td>-17°41.35</td></td<>	175°42.32 172°59.01 171°50.47 166°12.17	-17°41.35
Acrux         172° 59.01         -63° 14.70           Gacrux         171° 50.47         -57° 15.64           Alioth         166° 12.17         55° 48.71           Spica         158° 21.04         -11° 18.01           Alkaid         152° 51.31         49° 10.68           Hadar         148° 34.53         -60° 30.03           Menkent         147° 56.26         -36° 30.03           Arcturus         145° 46.89         19° 2.58           Rigil Kent.         139° 38.91         -60° 56.72           Kochab         137° 21.04         74° 2.63           Zuben'ubi         136° 54.71         -16° 9.13           Alphecca         126° 2.84         26° 37.53           Antares         112° 14.34         -26° 29.46           Atria         107° 7.68         -69° 4.62           Sabik         102° 1.36         -15° 45.44           Shaula         96° 8.66         -37° 7.42           Rasalhague         95° 57.43         12° 32.56           Eltanin         90° 41.86         51° 29.32           Kaus Aust.         83° 30.79         -34° 22.34           Vega         80° 32.46         38° 48.73           Nunki         75° 46.10 <td< td=""><td>172°59.01 171°50.47 166°12.17</td><td></td></td<>	172°59.01 171°50.47 166°12.17	
Gacrux         171° 50.47         -57° 15.64           Alioth         166° 12.17         55° 48.71           Spica         158° 21.04         -11° 18.01           Alkaid         152° 51.31         49° 10.68           Hadar         148° 34.53         -60° 30.06           Menkent         147° 56.26         -36° 30.03           Arcturus         145° 46.89         19° 2.58           Rigil Kent.         139° 38.91         -60° 56.72           Kochab         137° 21.04         74° 2.63           Zuben'ubi         136° 54.71         -16° 9.13           Alphecca         126° 2.84         26° 37.53           Antares         112° 14.34         -26° 29.46           Atria         107° 7.68         -69° 4.62           Sabik         102° 1.36         -15° 45.44           Shaula         96° 8.66         -37° 7.42           Rasalhague         95° 57.43         12° 32.56           Eltanin         90° 41.86         51° 29.32           Kaus Aust.         83° 30.79         -34° 22.34           Kaus Aust.         83° 37.97         10° 20.8           Letanin         90° 41.86         51° 29.32           Kaus Aust.         83° 37.97	171°50.47 166°12.17	-63°14.70
Alioth 166°12.17 55°48.71 Spica 158°21.04 -11°18.01 Alkaid 152°51.31 49°10.68 Hadar 148°34.53 -60°30.00 Menkent 147°56.26 -36°30.03 Arcturus 145°46.89 19°2.58 Rigil Kent. 139°38.91 -60°56.72 Kochab 137°21.04 74°2.63 Zuben'ubi 136°54.71 -16°9.13 Alphecca 126°2.84 26°37.53 Antares 112°1.34 -26°29.46 Atria 107°7.68 -69°4.62 Sabik 102°1.36 -15°45.44 Shaula 96°8.66 -37°7.42 Rasalhague 95°57.43 12°32.56 Eltanin 90°41.86 51°29.32 Kaus Aust. 83°30.79 -34°22.34 Vega 80°32.46 38°48.73 Nunki 75°46.10 -26°15.80 Altair 61°58.61 8°56.52 Peacock 53°3.48 -56°39.08 Deneb 49°24.82 45°22.88 Enif 33°37.27 10°0.08 Al Na'ir 27°30.91 -46°49.96 Fomalhaut 15°12.69 -29°28.80 Scheat 13°43.56 28°13.98 Markab 13°28.23 15°21.20  Nov 03 Tue SHA Mer.pass Venus 158°10.98 10.36 Mars 217°25.51 06.41 Jupiter 212°54.21 06.58 Saturn 350°31.65 21:45  Nov 04 Wed SHA Mer.pass Venus 158°29.10 10:31 Mars 216°55.72 06:39 Jupiter 212°47.40 06:55 Saturn 350°35.02 21:41  Nov 05 Thu SHA Mer.pass Venus 158°29.10 Nov 05 Thu SHA Mer.pass Venus 158°45.10 10:26 Mars 216°26.16 06:37 Jupiter 212°40.73 06:51 Saturn 350°38.33 21:37	$166^{\circ}12.17$	
Spica         158°21.04         -11°18.01           Alkaid         152°51.31         49°10.68           Hadar         148°34.53         -60°30.06           Menkent         147°56.26         -36°30.03           Arcturus         145°46.89         19°2.58           Rigil Kent.         139°38.91         -60°56.72           Kochab         137°21.04         74°2.63           Zuben'ubi         136°54.71         -16°9.13           Alphecca         126°2.84         26°37.53           Antares         112°14.34         -26°29.46           Atria         107°7.68         -69°4.62           Sabik         102°1.36         -15°45.4           Shaula         96°8.66         -37°7.42           Rasalhague         95°57.43         12°32.56           Eltanin         90°41.86         51°29.32           Kaus Aust.         83°30.79         -34°22.34           Vega         80°32.46         38°48.73           Nunki         61°58.61         8°56.52           Peacock         53°3.48         -56°39.08           Al Na'ir         27°30.91         -46°49.96           Fomalhaut         15°12.69         -29°28.80		
Alkaid 152°51.31 49°10.68 Hadar 148°34.53 -60°30.06 Menkent 147°56.26 -36°30.03 Arcturus 145°64.89 19°2.58 Rigil Kent. 139°38.91 -60°56.72 Kochab 137°21.04 74°2.63 Zuben'ubi 136°54.71 -16°9.13 Alphecca 126°2.84 26°37.53 Antares 112°14.34 -26°29.46 Atria 107°7.68 -69°4.62 Sabik 102°1.36 -15°45.44 Shaula 96°8.66 -37°7.42 Rasalhague 95°57.43 12°32.56 Eltanin 90°41.86 51°29.32 Kaus Aust. 83°30.79 -34°22.34 Vega 80°32.46 38°48.73 Nunki 75°46.10 -26°15.80 Altair 61°58.61 8°56.52 Peacock 53°3.48 -56°39.08 Deneb 49°24.82 45°22.88 Enif 33°37.27 10°0.08 Al Na'ir 27°30.91 -46°49.96 Fomalhaut 15°12.69 -29°28.80 Scheat 13°43.56 28°13.98 Markab 13°28.23 15°21.20  Nov 03 Tue SHA Mer.pass Venus 158°10.98 10.36 Mars 217°25.51 06:41 Jupiter 212°54.21 06:58 Saturn 350°31.65 21:45  Nov 04 Wed Venus 158°29.10 10:31 Mars 216°55.72 06:39 Jupiter 212°47.40 06:55 Saturn 350°35.02 21:41  Nov 05 Thu SHA Mer.pass Venus 158°29.10 10:31 Mars 216°55.72 06:39 Jupiter 212°47.40 06:55 Saturn 350°35.02 21:41  Nov 05 Thu SHA Mer.pass Venus 158°45.10 10:26 Mars 216°56.16 06:37 Jupiter 212°40.73 06:51 Saturn 350°38.33 21:37	158°21 04	
Hadar		
Menkent         147°56.26         -36°30.03           Arcturus         145°46.89         19°2.58           Rigil Kent.         139°38.91         -60°56.72           Kochab         137°21.04         74°2.63           Zuben'ubi         136°54.71         -16°9.13           Alphecca         126°2.84         26°37.53           Antares         112°14.34         -26°2.94           Atria         107°7.68         -69°4.62           Sabik         102°1.36         -15°45.44           Shaula         96°8.66         -37°7.42           Rasalhague         95°57.43         12°32.56           Eltanin         90°41.86         51°29.32           Kaus Aust.         83°30.79         -34°22.34           Vega         80°32.46         38°48.73           Nunki         75°46.10         -26°15.80           Altair         61°58.61         8°56.52           Peacock         53°3.48         -56°39.08           Deneb         49°24.82         45°22.88           Enif         33°37.27         10°0.08           Al Na'ir         27°30.91         -46°49.96           Fomalhaut         15°12.69         -29°28.80 <td< td=""><td></td><td></td></td<>		
Arcturus         145° 46.89         19° 2.58           Rigil Kent.         139° 38.91         -60° 56.72           Kochab         137° 21.04         74° 2.63           Zuben'ubi         136° 54.71         -16° 9.13           Alphecca         126° 2.84         26° 37.53           Antares         112° 14.34         -26° 29.46           Abria         107° 7.68         -69° 4.62           Sabik         102° 1.36         -15° 45.44           Shaula         96° 8.66         -37° 7.42           Rasalhague         95° 57.43         12° 32.56           Eltanin         90° 41.86         51° 29.32           Kaus Aust.         83° 30.79         -34° 22.34           Vega         80° 32.46         38° 48.73           Nunki         75° 46.10         -26° 15.80           Altair         61° 58.61         8° 56.52           Peacock         53° 3.48         -56° 39.08           Deneb         49° 24.82         45° 22.88           Enif         33° 37.27         10° 0.08           Al Na'ir         27° 30.91         -46° 49.96           Fomalhaut         15° 12.69         -29° 28.80           Scheat         13° 43.56         28° 1		
Rigil Kent.         139°38.91         -60°56.72           Kochab         137°21.04         74°2.63           Zuben'ubi         136°54.71         -16°9.13           Alphecca         126°2.84         26°37.53           Antares         112°1.34         -26°29.46           Atria         107°7.68         -69°4.62           Sabik         102°1.36         -15°45.44           Shaula         96°8.66         -37°7.42           Rasalhague         95°57.43         12°32.56           Eltanin         90°41.86         51°29.32           Kaus Aust.         83°30.79         -34°22.34           Vega         80°32.46         38°48.73           Nunki         75°46.10         -26°15.80           Altair         61°58.61         8°56.52           Peacock         53°3.48         -56°39.08           Deneb         49°24.82         45°22.88           Enif         33°37.27         10°0.08           Al Na'ir         27°30.91         -46°49.96           Fomalhaut         15°21.69         -29°28.80           Scheat         13°43.56         28°13.98           Markab         13°28.23         15°21.20           Nov		
Kochab         137°21.04         74°2.63           Zuben'ubi         136°54.71         -16°9.13           Alphecca         126°2.84         26°37.53           Antares         112°14.34         -26°29.46           Atria         107°7.68         -69°4.62           Sabik         102°1.36         -15°45.44           Shaula         96°8.66         -37°7.42           Rasalhague         95°57.43         12°32.56           Eltanin         90°41.86         51°29.32           Kaus Aust.         83°30.79         -34°22.34           Vega         80°32.46         38°48.73           Nunki         75°46.10         -26°15.80           Altair         61°58.61         8°56.52           Peacock         53°3.48         -56°39.08           Altair         61°58.61         8°56.52           Peacock         53°3.48         -56°39.08           Enif         33°37.27         10°0.08           Al Na'ir         27°30.91         -46°49.96           Fomalhaut         15°12.69         -29°28.80           Scheat         13°43.56         28°13.98           Markab         13°28.23         15°21.20           Nov 03 Tu		
Zuben'ubi         136° 54.71         -16° 9.13           Alphecca         126° 2.84         26° 37.53           Antares         112° 14.34         -26° 29.46           Atria         107° 7.68         -69° 4.62           Sabik         102° 1.36         -15° 45.44           Shaula         96° 8.66         -37° 7.42           Rasalhague         95° 57.43         12° 32.56           Eltanin         90° 41.86         51° 29.32           Kaus Aust.         83° 30.79         -34° 22.34           Vega         80° 32.46         38° 48.73           Nunki         75° 46.10         -26° 15.80           Altair         61° 58.61         8° 56.52           Peacock         53° 3.48         -56° 39.08           Deneb         49° 24.82         45° 22.88           Enif         33° 37.27         10° 0.08           Al Na'ir         27° 30.91         -46° 49.96           Fomalhaut         15° 12.69         -29° 28.80           Scheat         13° 43.56         28° 13.98           Markab         13° 28.23         15° 21.20           Nov 03 Tue         SHA         Mer.pass           Venus         158° 10.98         10:36 </td <td></td> <td></td>		
Alphecca		
Antares 112°14.34 -26°29.46 Atria 107°7.68 -69°4.62 Sabik 102°1.36 -15°45.44 Shaula 96°8.66 -37°7.42 Rasalhague 95°57.43 12°32.56 Eltanin 90°41.86 51°29.32 Kaus Aust. 83°30.79 -34°22.34 Vega 80°32.46 38°48.73 Nunki 75°46.10 -26°15.80 Altair 61°5.61 8°56.52 Peacock 53°3.48 -56°39.08 Deneb 49°24.82 45°22.88 Enif 33°37.27 10°0.08 Al Na'ir 27°30.91 -46°49.96 Fomalhaut 15°12.69 -29°28.80 Scheat 13°43.56 28°13.98 Markab 13°28.23 15°21.20  Nov 03 Tue SHA Mer.pass Venus 158°10.98 10.36 Mars 217°25.51 06:51 Saturn 350°31.65 21:45  Nov 04 Wed SHA Mer.pass Uniter 212°54.21 06:58 Saturn 350°31.65 21:45  Nov 05 Thu SHA Mer.pass Venus 158°29.10 10:31 Mars 216°55.72 06:39 Jupiter 212°54.21 06:55 Saturn 350°35.02 21:41  Nov 05 Thu SHA Mer.pass Venus 158°29.10 10:31 Mars 216°55.72 06:39 Jupiter 212°47.40 06:55 Saturn 350°35.02 21:41  Nov 05 Thu SHA Mer.pass Venus 158°45.10 10:26 Mars 216°26.16 06:37 Jupiter 212°40.73 06:51 Saturn 350°38.33 21:37		
Atria		
Sabik         102°1.36         -15°45.44           Shaula         96°8.66         -37°7.42           Rasalhague         95°57.43         12°32.56           Eltanin         90°41.86         51°29.32           Kaus Aust.         83°30.79         -34°22.34           Vega         80°32.46         38°48.73           Nunki         75°46.10         -26°15.80           Altair         61°58.61         8°56.52           Peacock         53°3.48         -56°39.08           Deneb         49°24.82         45°22.88           Enif         33°37.27         10°0.08           Al Na'ir         27°30.91         -46°49.96           Fomalhaut         15°12.69         -29°28.80           Scheat         13°43.56         28°13.98           Scheat         13°43.56         28°13.98           Markab         13°28.23         15°21.20           Nov 03 Tue         SHA         Mer.pass           Venus         158°10.98         10:36           Mars         217°25.51         06:41           Jupiter         212°54.21         06:58           Saturn         350°31.65         21:45           Nov 04 Wed		
Shaula Rasalhague         96°8.66         -37°7.42           Rasalhague         95°57.43         12°32.56           Eltanin         90°41.86         51°29.32           Kaus Aust.         83°30.79         -34°22.34           Vega         80°32.46         38°48.73           Nunki         75°46.10         -26°15.80           Altair         61°58.61         8°56.52           Peacock         53°3.48         -56°39.08           Deneb         49°24.82         45°22.88           Enif         33°37.27         10°0.08           Al Na'ir         27°30.91         -46°49.96           Fomalhaut         15°12.69         -29°28.80           Scheat         13°43.56         28°13.98           Markab         13°28.23         15°21.20           Nov 03 Tue         SHA         Mer.pass           Venus         158°10.98         10.36           Mars         217°25.51         06:41           Jupiter         212°54.21         06:58           Saturn         350°31.65         21:45           Nov 04 Wed         SHA         Mer.pass           Venus         158°29.10         10:31           Mars		
Rasalhague         95° 57.43         12° 32.56           Eltanin         90° 41.86         51° 29.32           Kaus Aust.         83° 30.79         -34° 22.34           Vega         80° 32.46         38° 48.73           Nunki         75° 46.10         -26° 15.80           Altair         61° 58.61         8° 56.52           Peacock         53° 3.48         -56° 39.08           Deneb         49° 24.82         45° 22.88           Enif         33° 37.27         10° 0.08           Al Na'ir         27° 30.91         -46° 49.96           Fomalhaut         15° 12.69         -29° 28.80           Scheat         13° 43.56         28° 13.98           Markab         13° 28.23         15° 21.20           Nov 03 Tue         SHA         Mer.pass           Venus         158° 10.98         10.36           Mars         217° 25.51         06:41           Jupiter         212° 54.21         06:58           Saturn         158° 29.10         10:31           Mars         216° 55.72         06:39           Jupiter         212° 47.40         06:55           Saturn         350° 35.02         21:41           No		
Eltanin         90° 41.86         51° 29.32           Kaus Aust.         83° 30.79         -34° 22.34           Vega         80° 32.46         38° 48.73           Nunki         75° 46.10         -26° 15.80           Altair         61° 58.61         8° 56.52           Peacock         53° 3.48         -56° 39.08           Deneb         49° 24.82         45° 22.88           Enif         33° 37.27         10° 0.08           Al Na'ir         27° 30.91         -46° 49.96           Fomalhaut         15° 12.69         -29° 28.80           Scheat         13° 43.56         28° 13.98           Markab         13° 28.23         15° 21.20           Nov 03 Tue         SHA         Mer.pass           Venus         158° 10.98         10:36           Mars         217° 25.51         06:41           Jupiter         212° 54.21         06:58           Saturn         350° 31.65         21:45           Nov 04 Wed         SHA         Mer.pass           Venus         158° 29.10         10:31           Mars         216° 55.72         06:39           Jupiter         212° 47.40         06:55 <t< th=""><th></th><th></th></t<>		
Kaus Aust.         83°30.79         -34°22.34           Vega         80°32.46         38°48.73           Nunki         75°46.10         -26°15.80           Altair         61°58.61         8°56.52           Peacock         53°3.48         -56°39.08           Deneb         49°24.82         45°22.88           Enif         33°37.27         10°0.08           Al Na'ir         27°30.91         -46°49.96           Fomalhaut         15°12.69         -29°28.80           Scheat         13°43.56         28°13.98           Markab         13°28.23         15°21.20           Nov 03 Tue         SHA         Mer.pass           Venus         158°10.98         10:36           Mars         217°25.51         06:41           Jupiter         212°54.21         06:58           Saturn         350°31.65         21:45           Nov 04 Wed         SHA         Mer.pass           Venus         158°29.10         10:31           Mars         216°55.72         06:39           Jupiter         212°47.40         06:55           Saturn         350°35.02         21:41           Nov 05 Thu         SHA		
Vega         80° 32.46         38° 48.73           Nunki         75° 46.10         -26° 15.80           Altair         61° 58.61         8° 56.52           Peacock         53° 3.48         -56° 39.08           Deneb         49° 24.82         45° 22.88           Enif         33° 37.27         10° 0.08           Al Na'ir         27° 30.91         -46° 49.96           Fomalhaut         15° 12.69         -29° 28.80           Scheat         13° 43.56         28° 13.98           Markab         13° 28.23         15° 21.20           Nov 03 Tue         SHA         Mer.pass           Venus         158° 10.98         10:36           Mars         217° 25.51         06:41           Jupiter         212° 54.21         06:58           Saturn         350° 31.65         21:45           Nov 04 Wed         SHA         Mer.pass           Venus         158° 29.10         10:31           Mars         212° 47.40         06:55           Saturn         350° 35.02         21:41           Nov 05 Thu         SHA         Mer.pass           Venus         158° 45.10         10:26           Mars         21		
Nunki         75° 46.10         -26° 15.80           Altair         61° 58.61         8° 56.52           Peacock         53° 3.48         -56° 39.08           Deneb         49° 24.82         45° 22.88           Enif         33° 37.27         10° 0.08           Al Na'ir         27° 30.91         -46° 49.96           Fomalhaut         15° 12.69         -29° 28.80           Scheat         13° 43.56         28° 13.98           Markab         13° 28.23         15° 21.20           Nov 03 Tue         SHA         Mer.pass           Venus         158° 10.98         10:36           Mars         217° 25.51         06:41           Jupiter         212° 54.21         06:58           Saturn         350° 31.65         21:45           Nov 04 Wed         SHA         Mer.pass           Venus         158° 29.10         10:31           Mars         216° 55.72         06:39           Jupiter         212° 47.40         06:55           Saturn         350° 35.02         21:41           Nov 05 Thu         SHA         Mer.pass           Venus         158° 45.10         10:26           Mars         21		
Altair		
Peacock Denoble         53°3.48         -56°39.08           Deneb         49°24.82         45°22.88           Enif         33°37.27         10°0.08           Al Na'ir         27°30.91         -46°49.96           Fomalhaut         15°12.69         -29°28.80           Scheat         13°43.56         28°13.98           Markab         13°28.23         15°21.20           Nov 03 Tue         SHA         Mer.pass           Venus         158°10.98         10.36           Mars         217°25.51         06:41           Jupiter         212°54.21         06:58           Saturn         350°31.65         21:45           Nov 04 Wed         SHA         Mer.pass           Venus         158°29.10         10:31           Mars         216°55.72         06:39           Jupiter         212°47.40         06:55           Saturn         350°35.02         21:41           Nov 05 Thu         SHA         Mer.pass           Venus         158°45.10         10:26           Mars         216°26.16         06:37           Jupiter         212°40.73         06:51           Saturn         350°38.33 </td <td></td> <td></td>		
Deneb		
Roy 04 Wed Venus   158° 29.10   10°31   10°40.8   15° 12.69   29° 28.80   13° 43.56   28° 13.98   13° 28.23   15° 21.20   15° 21.20   15° 25.51   15		
Al Na'ir 27°30.91 -46°49.96 Fomalhaut 15°12.69 -29°28.80 Scheat 13°43.56 28°13.98 Markab 13°28.23 15°21.20  Nov 03 Tue SHA Mer.pass Venus 158°10.98 10:36 Mars 217°25.51 06:41 Jupiter 212°54.21 06:58 Saturn 350°31.65 21:45  Nov 04 Wed SHA Mer.pass Venus 158°29.10 10:31 Mars 216°55.72 06:39 Jupiter 212°47.40 06:55 Saturn 350°35.02 21:41  Nov 05 Thu SHA Mer.pass Venus 158°45.10 10:26 Mars 216°26.16 06:37 Jupiter 212°40.73 06:51 Saturn 350°38.33 21:37  Horizontal parallax Venus: 0.5		
Fomalhaut   15°12.69   -29°28.80   32°43.56   28°13.98   13°28.23   15°21.20     Nov 03 Tue		
Scheat Markab         13°43.56         28°13.98           Markab         13°28.23         15°21.20           Nov 03 Tue Venus Venus Mars         5HA 217°25.51         Mer.pass           158°10.98         10:36         41           Jupiter 212°5.51         06:41         06:58           Saturn         350°31.65         21:45           Nov 04 Wed Venus 158°29.10         10:31           Mars 216°55.72         06:39           Jupiter 212°47.40         06:55           Saturn         350°35.02         21:41           Nov 05 Thu Venus 158°45.10         10:26           Mars 216°26.16         06:37           Jupiter 212°40.73         06:51           Saturn         350°38.33         21:37           Horizontal parallax Venus: 0.5		
Markab         13°28.23         15°21.20           Nov 03 Tue         SHA         Mer.pass           Venus         158°10.98         10:36           Mars         217°25.51         06:41           Jupiter         212°54.21         06:58           Saturn         350°31.65         21:45           Nov 04 Wed         SHA         Mer.pass           Venus         158°29.10         10:31           Mars         216°55.72         06:39           Jupiter         212°47.40         06:55           Saturn         350°35.02         21:41           Nov 05 Thu         SHA         Mer.pass           Venus         158°45.10         10:26           Mars         216°26.16         06:37           Jupiter         212°40.73         06:51           Saturn         350°38.33         21:37           Horizontal parallax           Venus:         0.5		
Nov 03 Tue         SHA Mer.pass 10.36 Mars 217°25.51 066:41 Jupiter 212°54.21 06:58 Saturn 350°31.65 21:45           Nov 04 Wed Venus 158°29.10 Mars 216°55.72 06:39 Jupiter 212°47.40 06:55 Saturn 350°35.02 21:41           Nov 05 Thu Venus 158°45.10 Mars 216°26.16 Mars 216°26.16 06:37 Jupiter 212°40.73 06:51 Saturn 350°38.33 21:37         Mer.pass Mer.pass Mer.pass 216°26.16 06:37 06:51 350°38.33 21:37           Horizontal parallax Venus: 0.5		
Venus         158° 10.98         10:36           Mars         217° 25.51         06:41           Jupiter         212° 54.21         06:58           Saturn         350° 31.65         21:45           Nov 04 Wed         SHA         Mer.pass           Venus         158° 29.10         10:31           Mars         216° 55.72         06:39           Jupiter         212° 47.40         06:55           Saturn         350° 35.02         21:41           Nov 05 Thu         SHA         Mer.pass           Venus         158° 45.10         10:26           Mars         216° 26.16         06:37           Jupiter         212° 40.73         06:51           Saturn         350° 38.33         21:37           Horizontal parallax           Venus:         0.5	15-28.23	15 21.20
Venus         158°10.98         10:36           Mars         217°25.51         06:41           Jupiter         212°54.21         06:58           Saturn         350°31.65         21:45           Nov 04 Wed         SHA         Mer.pass           Venus         158°29.10         10:31           Mars         216°55.72         06:39           Jupiter         212°47.40         06:55           Saturn         350°35.02         21:41           Nov 05 Thu         SHA         Mer.pass           Venus         158°45.10         10:26           Mars         216°26.16         06:37           Jupiter         212°40.73         06:51           Saturn         350°38.33         21:37           Horizontal parallax           Venus:         0.5	SHA	Mer.pass
Mars Jupiter Saturn         217°25.51         06:41           Jupiter Saturn         212°54.21         06:58           Nov 04 Wed Venus         SHA IS8°29.10         Mer.pass           Jupiter Jupiter Saturn         216°55.72         06:39           Jupiter Jupiter Saturn         212°47.40         06:55           Saturn         350°35.02         21:41           Nov 05 Thu Venus         SHA Mer.pass         Mer.pass           Jupiter Jupiter Saturn         216°26.16         06:37           Jupiter Saturn         212°40.73         06:51           Saturn         350°38.33         21:37           Horizontal parallax           Venus:         0.5		
Nov 04 Wed   SHA   Mer.pass		
Nov 04 Wed         SHA (158° 29.10)         Mer.pass 10:31           Venus         158° 29.10         10:31           Mars         216° 55.72         06:39           Jupiter         212° 47.40         06:55           Saturn         350° 35.02         21:41           Nov 05 Thu Venus         SHA (Mer.pass)           Venus         158° 45.10         10:26           Mars         216° 26.16         06:37           Jupiter         212° 40.73         06:51           Saturn         350° 38.33         21:37           Horizontal parallax           Venus:         0.5	212°54.21	06:58
Nov 04 Wed         SHA (158° 29.10)         Mer.pass 10:31           Venus         158° 29.10         10:31           Mars         216° 55.72         06:39           Jupiter         212° 47.40         06:55           Saturn         350° 35.02         21:41           Nov 05 Thu Venus         SHA (Mer.pass)           Venus         158° 45.10         10:26           Mars         216° 26.16         06:37           Jupiter         212° 40.73         06:51           Saturn         350° 38.33         21:37           Horizontal parallax           Venus:         0.5	350°31.65	21:45
Venus         158° 29.10         10:31           Mars         216° 55.72         06:39           Jupiter         212° 47.40         06:55           Saturn         350° 35.02         21:41           Nov 05 Thu         SHA         Mer.pass           Venus         158° 45.10         10:26           Mars         216° 26.16         06:37           Jupiter         212° 40.73         06:51           Saturn         350° 38.33         21:37           Horizontal parallax           Venus:         0.5		
Mars Jupiter Saturn         216° 55.72 212° 47.40 26:55 254urn         06:55 254urn           Nov 05 Thu Venus 158° 45.10 34upiter Saturn         SHA 216° 26.16 216° 26.16 212° 40.73 212°		
Jupiter Saturn         212° 47.40 255° 35.02         06:55 21:41           Nov 05 Thu Venus         SHA 158° 45.10 10:26         Mer.pass 10:26           Mars 216° 26.16 216° 26.16 212° 40.73 212° 40.73         06:51 212° 40.73         06:51 212° 40.73           Saturn 350° 38.33 21:37         350° 38.33         21:37           Horizontal parallax Venus: 0.5		
Saturn         350° 35.02         21:41           Nov 05 Thu         SHA         Mer.pass           Venus         158° 45.10         10:26           Mars         216° 26.16         06:37           Jupiter         212° 40.73         06:51           Saturn         350° 38.33         21:37           Horizontal parallax           Venus:         0.5		
Nov 05 Thu         SHA         Mer.pass           Venus         158° 45.10         10:26           Mars         216° 26.16         06:37           Jupiter         212° 40.73         06:51           Saturn         350° 38.33         21:37           Horizontal parallax           Venus:         0.5		
Venus         158° 45.10         10:26           Mars         216° 26.16         06:37           Jupiter         212° 40.73         06:51           Saturn         350° 38.33         21:37           Horizontal parallax           Venus:         0.5	JOU JO.U2	∠1:41
Venus         158° 45.10         10:26           Mars         216° 26.16         06:37           Jupiter         212° 40.73         06:51           Saturn         350° 38.33         21:37           Horizontal parallax           Venus:         0.5	SHA	Mer.pass
Mars 216°26.16 06:37 Jupiter 212°40.73 06:51 Saturn 350°38.33 21:37  Horizontal parallax Venus: 0.5		•
Jupiter         212° 40.73         06:51           Saturn         350° 38.33         21:37           Horizontal parallax           Venus:         0.5		
Saturn 350°38.33 21:37  Horizontal parallax Venus: 0.5		
Horizontal parallax Venus: 0.5		
Venus: 0.5		
		0.5
iviars: U.1		
	iviars:	0.1
		107°7.68 102°1.36 96°8.66 95°57.43 90°41.86 83°30.79 80°32.46 75°46.10 61°58.61 53°3.48 49°24.82 33°37.27 27°30.91 15°12.69 13°43.56 13°28.23 SHA 158°10.98 217°25.51 212°54.21 350°31.65 SHA 158°29.10 216°55.72 212°47.40 350°35.02 SHA 158°45.10 216°26.16 212°40.73 350°38.33 al parallax Venus:

Stars SHA

Dec

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	184°6.70	\$14°59.69	254°43.84	11.6'	N13°15.59	-14.3'	58.2'
1 2	199° 6.70 214° 6.70	15°0.48 1.26	269°14.43 283°45.11	11.7' 11.8'	13°1.30 12°46.96	-14.3' -14.4'	58.1' 58.1'
3	229° 6.70	. 2.04	298°15.87	11.8'	12°32.57	-14.4'	58.1'
4	244°6.71	2.82	312°46.72	11.9'	12°18.12	-14.5'	58.1'
5 6	259° 6.71 274° 6.71	3.60 \$15°4.38	327°17.64 341°48.65	12.0' 12.1'	12°3.62 N11°49.08	-14.5' -14.6'	58.1' 58.0'
7	274 6.71 289°6.71	515 4.38	341 48.05 356°19.74	12.1	11°34.49	-14.6'	58.0'
8	304°6.71	5.94	10°50.90	12.2'	11°19.85	-14.7'	58.0'
9	319°6.71	• • 6.72	25°22.14	12.3'	11°5.17	-14.7'	58.0'
10 11	334° 6.71 349° 6.71	7.50 8.28	39°53.45 54°24.84	12.4' 12.5'	10°50.45 10°35.69	-14.8' -14.8'	57.9' 57.9'
12	4° 6.71	\$15°9.06	68°56.29	12.5'	N10°20.88	-14.8'	57.9'
13	19°6.70	9.83	83°27.82	12.6'	10°6.04	-14.9'	57.9'
14 15	34° 6.70 49° 6.70	10.61 •• 11.39	97°59.42 112°31.09	12.7' 12.7'	09°51.16 09°36.25	-14.9' -14.9'	57.9' 57.8'
16	64° 6.70	12.16	127°2.83	12.8'	09°21.30	-15.0'	57.8'
17	79°6.69	12.94	141°34.63	12.9'	09°6.31	-15.0'	57.8'
18 19	94° 6.69 109° 6.69	\$15°13.72 14.49	156°6.50 170°38.43	12.9' 13.0'	N08°51.30	-15.0' -15.1'	57.8' 57.7'
20	109 6.69 124° 6.68	14.49	170 38.43 185°10.42	13.1'	08°21.18	-15.1'	57.7'
21	139° 6.68	• • 16.04	199°42.47	13.1'	08°6.08	-15.1'	57.7'
22	154° 6.67	16.81	214°14.59	13.2'	07°50.95	-15.2'	57.7'
23	169°6.67	17.59	228°46.76	13.2'	07°35.80	-15.2'	57.7'
	SD = 16.1'	d = 0.8'		SI	D = 15.9'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	184°6.66	S15°18.36	243°18.99	13.3'	N07°20.62	-15.2'	57.6'
1 2	199° 6.66 214° 6.65	19.13 19.90	257°51.27 272°23.61	13.3' 13.4'	07°5.42 06°50.20	-15.2' -15.2'	57.6' 57.6'
3	214 0.05 229°6.64	•• 20.68	286°56.00	13.4'	06°34.96	-15.2 -15.3'	57.6'
4	244° 6.64	21.45	301°28.45	13.5'	06°19.70	-15.3'	57.5'
5 6	259° 6.63 274° 6.62	22.22 \$15°22.99	316°0.94 330°33.48	13.5' 13.6'	06°4.43 N05°49.13	-15.3' -15.3'	57.5' 57.5'
7	289° 6.61	23.76	345°6.08	13.6'	05°33.82	-15.3'	57.5'
8	304°6.60	24.53	359°38.71	13.7'	05°18.50	-15.3'	57.5'
9	319°6.60	• • 25.30	14°11.40	13.7'	05°3.16	-15.3'	57.4
10 11	334° 6.59 349° 6.58	26.06 26.83	28°44.13 43°16.90	13.8' 13.8'	04°47.81 04°32.46	-15.4' -15.4'	57.4' 57.4'
12	4°6.57	S15°27.60	57°49.71	13.9'	N04°17.09	-15.4'	57.4'
13	19° 6.56 34° 6.55	28.37 29.13	72°22.56 86°55.46	13.9' 13.9'	04°1.71 03°46.33	-15.4'	57.3'
14 15	34 6.55 49°6.53	29.13	101°28.39	13.9 14.0'	03 46.33 03°30.94	-15.4' -15.4'	57.3' 57.3'
16	64° 6.52	30.67	116°1.35	14.0'	03°15.55	-15.4'	57.3'
17	79°6.51	31.43	130°34.36	14.0'	03°0.15	-15.4'	57.3'
18 19	94° 6.50 109° 6.49	\$15°32.20 32.96	145°7.39 159°40.46	14.1' 14.1'	N02°44.75 02°29.35	-15.4' -15.4'	57.2' 57.2'
20	124° 6.47	33.72	174°13.56	14.1'	02°13.95		57.2'
21	139° 6.46	• • 34.49	188°46.69	14.2'	01°58.55	-15.4'	57.2'
22 23	154° 6.45 169° 6.43	35.25 36.01	203°19.85 217°53.04	14.2' 14.2'	01°43.16 01°27.76	-15.4' -15.4'	57.1' 57.1'
23	SD = 16.1'	d = 0.8'	217 33.04		D = 15.7'	-13.4	37.1
		<u>u = 0.0</u>					
Thu	<b>GHA</b> 184° 6.42	<b>Dec</b> \$15°36.78	<b>GHA</b> 232° 26.25	u 14.2'	<b>Dec</b> N01°12.37	d -15.4'	<b>HP</b> 57.1'
0 1	184 6.42 199 6.40	37.54	232°26.25 246°59.49	14.2 14.3'	00°56.99	-15.4' -15.4'	57.1'
2	214°6.39	38.30	261°32.76	14.3'	00°41.61	-15.4'	57.1'
3 4	229° 6.37 244° 6.36	· · 39.06 39.82	276°6.04 290°39.35	14.3' 14.3'	00°26.25 N00°10.89	-15.4' -15.4'	57.0' 57.0'
4 5	244 6.36 259 6.34	39.82 40.58	305°12.68	14.3'	S00°4.47	-15.4 15.3'	57.0° 57.0°
6	274°6.32	S15°41.34	319°46.03	14.4'	S00°19.80	15.3'	57.0'
7	289° 6.31 304° 6.29	42.10	334°19.39 348°52.77	14.4' 14.4'	00°35.13 00°50.45	15.3' 15.3'	56.9'
8 9	304°6.29 319°6.27	42.86 •• 43.62	348°52.77 3°26.17	14.4'	00°50.45 01°5.75	15.3'	56.9' 56.9'
10	334°6.25	44.38	17°59.59	14.4'	$01^{\circ}21.03$	15.3'	56.9'
11	349° 6.24	45.13	32°33.01	14.4'	01°36.30	15.3'	56.9'
12 13	4° 6.22 19° 6.20	\$15°45.89 46.65	47°6.45 61°39.90	14.4' 14.5'	\$01°51.55 02°6.78	15.2' 15.2'	56.8' 56.8'
14	34°6.18	47.40	76°13.36	14.5'	02°22.00	15.2'	56.8'
15	49°6.16	• 48.16	90°46.83	14.5'	02°37.19	15.2'	56.8'
16 17	64° 6.14 79° 6.12	48.91 49.67	105°20.30 119°53.78	14.5' 14.5'	02°52.36 03°7.51	15.1' 15.1'	56.8' 56.7'
18	94° 6.10	\$15°50.42	134°27.27	14.5	503°22.63	15.1	56.7'
19	109°6.08	51.18	149°0.76	14.5'	03°37.73	15.1'	56.7'
20 21	124° 6.05 139° 6.03	51.93 •• 52.68	163°34.25 178°7.75	14.5' 14.5'	03°52.81 04°7.85	15.0' 15.0'	56.7' 56.6'
22	154° 6.01	53.43	178 7.75 192°41.25	14.5'	04 7.85 04°22.87	15.0'	56.6'
23	169°5.99	54.19	207°14.74	14.5'	04°37.86	15.0'	56.6'
	SD = 16.1'	d = 0.8'		-	D = 15.6'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Junioce	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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	01:24	02:48	03:42	19:47	20:41	22:08

Lat.		Moonris	e		Moonset	į.
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°		00:17	02:29	15:32	14:56	14:24
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	02:39	02:39	02:40	12:10	13:44	15:15

		Sun			Moon				
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age			
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	24-26			
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	37-18%			
03	16:27	16:27	11:44	07:15	19:39				
04	16:27	16:26	11:44	08:01	20:24				
05	16:26	16:25	11:44	08:46	21:08				

## November 06, 07, 08 UT (Fri., Sat., Sun.)

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Fri -	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	45° 13.68	204°12.61 \$12°44.47	261°10.53 N16°4.90	257°47.89 N13°53.24	35°55.25 N01°6.29	
1	60°16.14	219°15.60 43.58	276°11.78 4.56	272°50.08 53.16	50°57.85 6.24	Alpheratz 357°32.96 29°14.57
2	75° 18.60	234° 18.59 42.70	291°13.03 4.22	287°52.28 53.08	66°0.45 6.19	Ankaa 353°5.34 -42°9.62
3	90°21.07	249°21.57 · · 41.81	306°14.28 · · 3.88	302°54.47 · · 52.99	81°3.05 · · 6.14	Schedar 349°28.85 56°41.34
4	105°23.53	264°24.55 40.93	321°15.53 3.54	317°56.67 52.91	96°5.64 6.09	Diphda 348°45.53 -17°50.27 Achernar 335°18.52 -57°6.02
5	120°26.00	279°27.53 40.05	336°16.78 3.20	332°58.87 52.83	111°8.24 6.04	Achernar 335°18.52 -57°6.02 Hamal 327°49.16 23°35.52
6	135°28.46	294°30.50 \$12°39.17	351°18.03 N16°2.86	348°1.06 N13°52.74	126°10.84 N01°5.99	Polaris 312°45.07 89°22.62
7	150° 30.92	309°33.47 38.29	6°19.28 2.52	3°3.26 52.66	141°13.44 5.94	Acamar 315°10.21 -40°11.70
8	165°33.39	324°36.44 37.42	21°20.53 2.18	18° 5.46 52.58	156°16.03 5.89	Menkar 314°4.26 4°11.83
9 10	180° 35.85 195° 38.32	339°39.40 · · 36.54 354°42.36 35.67	36°21.78 · · 1.84 51°23.04 1.50	33°7.65 · · 52.49 48°9.85 52.41	171°18.63 · · 5.84 186°21.23 5.79	Mirfak 308°25.59 49°57.44
11	210° 40.78	9°45.31 34.80	66°24.29 1.16	48° 9.85 52.41 63° 12.05 52.33	186°21.23 5.79 201°23.82 5.74	Aldebaran 290°37.59 16°33.86
12	225° 43.24	24°48.26 \$12°33.92	81°25.54 N16°0.82	78°14.25 N13°52.25	216°26.42 N01°5.69	Rigel 281°2.15 -8°10.10
13	240° 45.71	39°51.21 33.06	96°26.79 0.48	93°16.45 52.16	231°29.02 5.64	Capella 280°19.28 46°1.41
14	255°48.17	54°54.15 32.19	111°28.05 16°0.14	108°18.65 52.08	246°31.61 5.60	Bellatrix 278°21.01 6°22.52
15	270°50.64	69°57.09 · · 31.32	126°29.30 15°59.80	123°20.84 · · 52.00	261°34.21 · · 5.55	Elnath 277°59.67 28°37.78 Alnilam 275°35.96 -1°10.98
16	285°53.10	85°0.02 30.46	141°30.56 59.46	138°23.04 51.92	276°36.80 5.50	Alnilam 275°35.96 -1°10.98 Betelgeuse 270°50.23 7°24.78
17	300°55.56	100°2.95 29.59	156°31.81 59.12	153°25.24 51.84	291°39.40 5.45	Canopus 263°51.38 -52°42.30
18	315°58.03	115°5.88 \$12°28.73	171°33.07 N15°58.78	168°27.44 N13°51.75	306°42.00 N01°5.40	Sirius 258°24.72 -16°45.01
19	331°0.49	130°8.80 27.87	186°34.32 58.44	183°29.64 51.67	321°44.59 5.35	Adhara 255°4.49 -29°0.28
20	346°2.96	145°11.72 27.02	201°35.58 58.10	198°31.84 51.59	336°47.19 5.30	Procyon 244°49.15 5°9.41
21 22	1°5.42 16°7.88	160°14.63 · · 26.16 175°17.55 25.30	216°36.84 · · 57.76 231°38.10 57.42	213°34.04 · · 51.51 228°36.24 51.43	351°49.78 · · 5.25 6°52.38 5.20	Pollux 243°15.36 27°57.58
23	31° 10.35	175 17.55 25.50 190°20.45 24.45	231°38.10 57.42 246°39.35 57.08	228°36.24 51.43 243°38.45 51.34	6°52.38 5.20 21°54.97 5.16	Avior 234°14.00 -59°35.39
			· -			Suhail 222°45.22 -43°32.17
Mer.	pass. 20:56	$\nu 3.0' \ d$ -0.9' m-4.50	$\nu 1.2' \ d$ -0.3' m0.80	$\nu 2.2' \ d$ -0.1' m-2.03	$\nu 2.6' \ d$ -0.0' m0.48	Miaplacidus 221°37.99 -69°49.29
						Alphard 217°46.33 -8°46.39 Regulus 207°32.95 11°50.14
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.54 61°36.11
0	46° 12.81	205°23.36 \$12°23.60	261°40.61 N15°56.74	258°40.65 N13°51.26	36°57.57 N01°5.11	Denebola 182°23.65 14°25.30
1	61° 15.28	220°26.25 22.75	276°41.87 56.40	273°42.85 51.18	52°0.16 5.06	Gienah 175°42.31 -17°41.35
2	76° 17.74	235°29.15 21.90	291°43.13 56.06	288°45.05 51.10	67°2.76 5.01	Acrux 172°58.98 -63°14.69
3 4	91°20.21 106°22.67	250°32.04 · · 21.05 265°34.93 · · 20.21	306°44.39 · · 55.72 321°45.65 55.39	303°47.25 · · 51.02 318°49.46 50.94	82°5.35 · · 4.96 97°7.95 4.91	Gacrux 171°50.45 -57°15.63
5	121°25.13	280°37.81 19.36	336°46.91 55.05	333°51.66 50.86	112°10.54 4.87	Alioth 166°12.16 55°48.69
6	136° 27.60	295°40.69 \$12°18.52	351°48.17 N15°54.71	348°53.86 N13°50.78	127°13.13 N01°4.82	Spica 158°21.03 -11°18.01
7	151° 30.06	310°43.57 17.68	6°49.43 54.37	3°56.06 50.70	142°15.73 4.77	Alkaid 152°51.31 49°10.67 Hadar 148°34.52 -60°30.05
8	$166^{\circ}32.53$	325°46.44 16.84	21°50.69 54.03	18°58.27 50.61	157°18.32 4.72	Menkent 147°56.25 -36°30.03
9	181°34.99	340°49.31 · · 16.01	36°51.96 · · 53.69	34°0.47 · · 50.53	172°20.92 · · 4.67	Arcturus 145°46.89 19°2.57
10	196°37.45	355°52.17 15.17	51°53.22 53.35	49° 2.68 50.45	187°23.51 4.63	Rigil Kent. 139°38.91 -60°56.71
11 12	211°39.92 226°42.38	10°55.03 14.34 25°57.89 \$12°13.50	66°54.48 53.01 81°55.74 N15°52.67	64°4.88 50.37 79°7.08 N13°50.29	202°26.10 4.58 217°28.70 N01°4.53	Kochab 137°21.04 74°2.61
13	241°44.85	41°0.74 12.67	96°57.01 52.34	94° 9.29 50.21	232°31.29 4.48	Zuben'ubi 136°54.70 -16°9.13
14	256° 47.31	56°3.59 11.84	111°58.27 52.00	109°11.49 50.13	247°33.88 4.44	Alphecca 126°2.85 26°37.51
15	271°49.77	71°6.43 · · 11.02	126°59.54 · · 51.66	124°13.70 · · 50.05	262°36.48 · · 4.39	Antares 112°14.35 -26°29.46 Atria 107°7.71 -69°4.60
16	286°52.24	86°9.27 10.19	142°0.80 51.32	139°15.90 49.97	277°39.07 4.34	Sabik 102°1.37 -15°45.44
17	301°54.70	101°12.11 9.37	157°2.07 50.98	154°18.11 49.89	292°41.66 4.29	Shaula 96°8.68 -37°7.41
18	316°57.17	116°14.94 S12°8.55	172°3.33 N15°50.64	169°20.32 N13°49.81	307°44.26 N01°4.25	Rasalhague 95°57.44 12°32.55
19	331°59.63	131°17.77 7.72	187° 4.60 50.30	184°22.52 49.73	322°46.85 4.20	Eltanin 90°41.88 51°29.31
20 21	347°2.09 2°4.56	146°20.59 6.91 161°23.42 · · 6.09	202°5.87 49.97 217°7.14 • 49.63	199°24.73 49.65 214°26.94 • 49.57	$337^{\circ}49.44$ 4.15 $352^{\circ}52.03$ · · 4.10	Kaus Aust. 83°30.80 -34°22.34
22	17°7.02	176°26.23 5.27	232°8.40 49.29	229°29.14 49.49	7°54.63 4.06	Vega 80°32.48 38°48.73
23	32°9.49	191°29.04 4.46	247° 9.67 48.95	244°31.35 49.41	22°57.22 4.01	Nunki 75°46.12 -26°15.80 Altair 61°58.62 8°56.52
Man	20.E2	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	Peacock 53°3.51 -56°39.08
ivier.	pass. 20:52	V2.9 U-0.9 III-4.55	ν1.3 α-0.3 III0.79	ν2.2 α-0.1 III-2.04	ν2.0 α-0.0 III0.49	Deneb 49°24.84 45°22.88
						Enif 33°37.28 10°0.08
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°30.93 -46°49.97
0	47° 11.95	206°31.85 \$12°3.65	262°10.94 N15°48.61	259°33.56 N13°49.33	37°59.81 N01°3.96	Fomalhaut 15°12.71 -29°28.81
1 2	62° 14.42 77° 16.88	221°34.66 2.84 236°37.46 2.03	277°12.21 48.27 292°13.48 47.94	274°35.77 49.25 289°37.97 49.17	53°2.40 3.92 68°4.99 3.87	Scheat 13°43.58 28°13.98
3	92°19.34	251°40.26 · · 1.22	307°14.75 · · 47.60	304°40.18 · · 49.10	83°7.59 · · 3.82	Markab 13°28.25 15°21.20
4	107°21.81	266°43.05 12°0.42	322°16.02 47.26	319°42.39 49.02	98°10.18 3.78	Nov 06 Fri SHA Mer.pass
5	122°24.27	281°45.84 11°59.61	337°17.29 46.92	334°44.60 48.94	113°12.77 3.73	Venus 158°58.93 10:21
6	137°26.74	296°48.62 \$11°58.81	352°18.56 N15°46.58	349°46.81 N13°48.86	128°15.36 N01°3.68	Mars 215°56.86 06:35
7	$152^{\circ}29.20$	311°51.41 58.01	7°19.83 46.25	4°49.02 48.78	143°17.95 3.64	Jupiter 212°34.21 06:48
8	167°31.66	326°54.18 57.21	22°21.11 45.91	19°51.23 48.70	158°20.54 3.59	Saturn 350°41.58 21:33
9	182°34.13	341°56.96 · · 56.41	37°22.38 · · 45.57	34°53.44 · · 48.62	173°23.13 · · 3.54	Nov 07 Sat SHA Mer.pass
10 11	197° 36.59 212° 39.06	356°59.73 55.62 12°2.49 54.83	52°23.65 45.23 67°24.93 44.90	49°55.65 48.54 64°57.86 48.47	188°25.72 3.50 203°28.32 3.45	Venus 159°10.54 10:16
12	212 39.00 227°41.52	27°5.25 \$11°54.04	82°26.20 N15°44.56	80°0.07 N13°48.39	218°30.91 N01°3.40	Mars 215°27.80 06:33
13	242° 43.98	42°8.01 53.25	97°27.47 44.22	95°2.28 48.31	233°33.50 3.36	Jupiter 212°27.83 06:44
14	257° 46.45	57°10.76 52.46	112°28.75 43.88	110°4.49 48.23	248°36.09 3.31	Saturn 350°44.75 21:28
15	272°48.91	72°13.51 · · 51.67	127°30.03 · · 43.55	125°6.70 · · 48.15	263°38.68 · · 3.26	Nov 08 Sun SHA Mer.pass
16	287°51.38	87°16.26 50.89	142°31.30 43.21	140°8.91 48.07	278°41.27 3.22	Venus 159°19.90 10:12
17	302°53.84	102°19.00 50.10	157°32.58 42.87	155°11.13 48.00	293°43.86 3.17	Mars 214°58.99 06:31
18 19	317°56.30 332°58.77	117°21.74	172°33.85 N15°42.53 187°35.13 42.20	170°13.34 N13°47.92 185°15.55 47.84	308°46.45 N01°3.13 323°49.04 3.08	Jupiter 212°21.61 06:41
20	348°1.23	147°27.20 47.77	202°36.41 41.86	200°17.76 47.76	338°51.63 3.04	Saturn 350°47.86 21:24
21	3°3.70	162°29.93 · · 46.99	217°37.69 · · 41.52	215°19.98 · · 47.69	353°54.22 · · 2.99	Horizontal parallax
22	$18^{\circ}6.16$	177°32.65 46.22	232°38.97 41.18	230°22.19 47.61	8°56.80 2.94	Venus: 0.5
23	33°8.63	192°35.37 45.45	247°40.24 40.85	245°24.40 47.53	23°59.39 2.90	Mars: 0.1
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	
	-					

h	Su	n	Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	184°5.96	S15°54.94	221°48.24	14.5'	S04°52.82	14.9'	56.6'
1 2	199°5.94 214°5.92	55.69 56.44	236°21.73 250°55.22	14.5' 14.5'	05°7.75 05°22.65	14.9' 14.9'	56.6' 56.5'
3	229°5.89	57.19	265°28.70	14.5'	05°37.52	14.8'	56.5
4	244°5.87	57.94	280° 2.18	14.5'	05°52.35	14.8'	56.5'
5	259°5.84	58.69	294°35.65	14.5'	06°7.14 \$06°21.90	14.8'	56.5'
6 7	274°5.82 289°5.79	\$15°59.44 16°0.18	309° 9.11 323° 42.57	14.5' 14.4'	06°36.63	14.7' 14.7'	56.5' 56.4'
8	304°5.77	0.93	338° 16.01	14.4'	06°51.31	14.6'	56.4
9	319°5.74	• • 1.68	352°49.45	14.4'	07°5.96	14.6'	56.4'
10 11	334°5.71 349°5.69	2.43 3.17	7°22.87 21°56.28	14.4' 14.4'	07°20.56 07°35.13	14.6' 14.5'	56.4' 56.4'
12	4°5.66	\$16° 3.92	36°29.67	14.4	507°49.65	14.5	56.3
13	19°5.63	4.66	51°3.05	14.4'	$08^{\circ}4.13$	14.4'	56.3'
14	34°5.60	5.41	65°36.42	14.3'	08°18.57	14.4'	56.3'
15 16	49°5.57 64°5.54	· · 6.15 6.90	80° 9.77 94° 43.10	14.3' 14.3'	08°32.96 08°47.30	14.3' 14.3'	56.3' 56.3'
17	79°5.51	7.64	109°16.41	14.3'	09°1.60	14.2'	56.2'
18	94°5.48	<b>S</b> 16°8.38	123°49.70	14.3'	S09°15.85	14.2'	56.2'
19 20	109°5.45 124°5.42	9.13 9.87	138°22.97 152°56.22	14.2' 14.2'	09°30.05 09°44.20	14.2' 14.1'	56.2' 56.2'
21	139°5.39	10.61	167°29.45	14.2'	09°58.30	14.1	56.2
22	154°5.36	11.35	182°2.65	14.2'	10°12.35	14.0'	56.1'
23	169°5.33	12.09	196°35.83	14.2'	10°26.34	13.9'	56.1'
	SD = 16.1'	d = 0.8'		SE	0 = 15.4'		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	184°5.30	S16°12.83	211°8.99	14.1'	S10°40.28	13.9'	56.1'
1	199°5.27	13.57	225°42.11	14.1'	10°54.17	13.8'	56.1'
2	214°5.23 229°5.20	14.31 •• 15.05	240°15.22 254°48.29	14.1' 14.0'	11°8.00 11°21.77	13.8' 13.7'	56.0' 56.0'
3 4	244°5.17	15.79	269°21.34	14.0'	11 21.77 11°35.49	13.7	56.0'
5	259°5.13	16.53	283°54.35	14.0'	$11^{\circ}49.15$	13.6'	56.0'
6	274°5.10	\$16°17.27	298°27.34	14.0'	\$12°2.74	13.5'	56.0'
7 8	289°5.06 304°5.03	18.00 18.74	313°0.30 327°33.22	13.9' 13.9'	12°16.28 12°29.75	13.5' 13.4'	55.9' 55.9'
9	319°4.99	19.47	342° 6.12	13.9'	12°43.16	13.3'	55.9'
10	334°4.96	20.21	356° 38.97	13.8'	12°56.51	13.3'	55.9'
11 12	349°4.92 4°4.89	20.95 \$16°21.68	11°11.80 25°44.59	13.8' 13.8'	13°9.80 \$13°23.01	13.2' 13.2'	55.9' 55.9'
13	19°4.85	22.41	40° 17.35	13.7	13°36.16	13.1	55.8'
14	34°4.81	23.15	54°50.07	13.7'	$13^{\circ}49.25$	13.0'	55.8'
15	49°4.77 64°4.74	• • 23.88	69°22.75 83°55.40	13.6' 13.6'	14°2.26 14°15.21	12.9'	55.8' 55.8'
16 17	79°4.70	24.61 25.35	98°28.01	13.6'	14 15.21 14°28.08	12.9' 12.8'	55.8'
18	94°4.66	S16°26.08	113°0.57	13.5'	S14°40.88	12.7'	55.7'
19	109°4.62	26.81	127°33.11	13.5'	14°53.61	12.7'	55.7'
20 21	124°4.58 139°4.54	27.54 •• 28.27	142°5.60 156°38.05	13.5' 13.4'	15°6.27 15°18.85	12.6' 12.5'	55.7' 55.7'
22	154° 4.50	29.00	171°10.46	13.4'	15°31.36	12.4	55.7'
23	169°4.46	29.73	185°42.82	13.3'	15°43.79	12.4'	55.6'
	SD = 16.1'	d = 0.7'		SE	0 = 15.3'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	184°4.42	<b>S</b> 16°30.46	200°15.15	13.3'	S15°56.15	12.3'	55.6'
1	199°4.38	31.19	214°47.43	13.2'	16°8.42	12.2'	55.6'
2	214°4.34 229°4.30	31.91 •• 32.64	229°19.67 243°51.87	13.2' 13.2'	16°20.62 16°32.74	12.1' 12.0'	55.6' 55.6'
4	244°4.25	33.37	258°24.02	13.1'	16°44.77	12.0'	55.5'
5	259°4.21	34.10	272°56.13	13.1'	16°56.73	11.9'	55.5'
6 7	274°4.17 289°4.12	\$16°34.82 35.55	287°28.19 302°0.21	13.0' 13.0'	\$17°8.60 17°20.38	11.8' 11.7'	55.5' 55.5'
8	304°4.08	36.27	316°32.18	12.9'	17°32.09	11.6'	55.5'
9	319°4.04	• • 37.00	331°4.11	12.9'	17°43.70	11.5'	55.4'
10 11	334°3.99 349°3.95	37.72 38.44	345°35.99 0°7.82	12.8' 12.8'	17°55.23 18°6.67	11.4' 11.4'	55.4' 55.4'
12	4°3.90	S16°39.17	14°39.61	12.7	\$18°18.03	11.4	55.4
13	19°3.86	39.89	29°11.35	12.7'	18°29.29	11.2'	55.4'
14 15	34°3.81 49°3.76	40.61 •• 41.33	43°43.04 58°14.68	12.6' 12.6'	18°40.47 18°51.55	11.1' 11.0'	55.4' 55.3'
15 16	49°3.76 64°3.72	42.05	58°14.68 72°46.27	12.5'	18°51.55 19°2.54	10.9	55.3'
17	79°3.67	42.78	87°17.82	12.5'	19°13.44	10.8	55.3'
18	94°3.62	S16°43.50	101°49.31	12.4'	\$19°24.25	10.7'	55.3'
19 20	109°3.57 124°3.53	44.22 44.93	116°20.76 130°52.16	12.4' 12.3'	19°34.96 19°45.57	10.6' 10.5'	55.3' 55.2'
21	139°3.48	• • 45.65	130 52.10 145°23.51	12.3'	19 45.57 19°56.09	10.5	55.2'
22	154°3.43	46.37	159°54.81	12.3'	20°6.51	10.3'	55.2'
23	169°3.38	47.09	174°26.06	12.2'	20°16.83	10.2'	55.2'
	SD = 16.1'	d = 0.7'		SE	0 = 15.2'		

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           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°         05:30         06:07	Lat.	Twi	light	Sunrise	Sunset	Twi	light
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         17:38           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	Lut.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
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°         05:30         06:07         06:36         16:51         17:20         17:57           30°         05:25         05:54	N 72°	06:30	07:57	09:38	13:48	15:29	16:56
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         17:35           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	N 70°	06:23	07:40	09:02	14:24	15:46	17:03
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         17:35           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°         05:35         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         05:34         06:18         17:00         17:27         17:57           30°         05:25         05:54         06:18         17:00         17:27         17:52           35°         05:15         05:41	68°	06:17	07:26	08:36	14:50	16:00	17:09
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           52°         05:49         06:29         07:06         16:21         16:53         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         17:57         18:22           0°         04:54         05:19	66°	06:12	07:15	08:17	15:09	16:11	17:14
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           50°         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							
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         17:40           N 40°         05:35         06:07         06:36         16:51         17:20         17:52           35°         05:30         06:07         06:36         16:51         17:20         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							
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         17:57           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°         04:55         04:52	60°	06:00	06:51	07:37	15:49	16:36	17:26
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         17:57           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           35°         03:52         04:25		05:57	06:45	07:28	15:59	16:42	17:29
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         04:55         05:16         18:12         18:35         19:03           35°         03:52         04:25	56°	05:54	06:39	07:20	16:07	16:48	
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         17:57         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         19:33           40°         03:36         04:13         04:42         18:46         19:16         19:52           45°         03:17         03:58							
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					_		
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							
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         18:53         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           \$50°         02:51         03:39	45°	05:40	06:15	06:47	16:40	17:11	17:46
$\begin{array}{cccccccccccccccccccccccccccccccccccc$						17:20	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$							
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$\begin{array}{cccccccccccccccccccccccccccccccccccc$							
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         19:34         20:21         21:27           58°         01:40         02:55         03:45         19:44         20:35         21:52							
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	1	04:54	05:19	05:40	17:47	18:09	18:34
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           \$ 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							
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           \$ 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					_		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$							
45°         03:17         03:58         04:31         18:58         19:31         20:12           \$ 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 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							
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							
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							
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							
58° 01:40 02:55 03:45 19:44 20:35 21:52							
<b>5</b> 00°   01:05 02:39 03:34   19:55 20:51 22:28							
	<b>5</b> 60°	01:05	02:39	03:34	19:55	20:51	22:28

Lat.		Moonris	e		Moonset	
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°	04:38	06:58		13:49	13:04	
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 60°	02:40	02:40	02:42	16:45	18:16	19:49

	Sun			Moon		
Day	Eqn.o	f Time	Mer.	Mer.	Pass.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	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° 11.09	207°38.08 \$11°44.68	262°41.52 N15°40.51	260°26.62 N13°47.45	39°1.98 N01°2.85	
1	63° 13.55	222°40.79 43.91	277°42.80 40.17	275°28.83 47.38	54°4.57 2.81	/
2	78° 16.02	237°43.50 43.14	292°44.08 39.84	290°31.05 47.30	69°7.16 2.76	
3	93° 18.48	252°46.20 · · 42.38	307°45.37 · · 39.50	305°33.26 · · 47.22	84°9.75 · · 2.72	
4	108° 20.95	267°48.90 41.61	322°46.65 39.16	320°35.47 47.15	99°12.34 2.67	
5	100° 20.93 123° 23.41	282°51.60 40.85	337°47.93 38.83	335°37.69 47.07	114°14.93 2.63	
6	138° 25.87	297°54.29 \$11°40.09	352°49.21 N15°38.49	350°39.91 N13°46.99	129°17.51 N01°2.58	
7	153° 28.34	312°56.97 39.33	7°50.49 38.15	5°42.12 46.92	144°20.10 2.54	
8	168° 30.80	327°59.66 38.58	22°51.78 37.82	20°44.34 46.84	159°22.69 2.49	
9	183°33.27	343°2.33 · · 37.83	37°53.06 · · 37.48	35°46.55 · · 46.76	174°25.28 · · 2.45	
10	198°35.73	358°5.01 37.07	52°54.34 37.14	50°48.77 46.69	189°27.87 2.40	
11	213°38.20	13°7.68 36.32	67°55.63 36.81	65°50.99 46.61	204°30.45 2.36	A
12	228° 40.66	28°10.35 S11°35.57	82°56.91 N15°36.47	80°53.20 N13°46.53	219°33.04 N01°2.31	
13	243°43.12	43°13.01 34.83	97°58.20 36.14	95°55.42 46.46	234°35.63 2.27	
14	258° 45.59	58° 15.67 34.08	112°59.48 35.80	110°57.64 46.38	249°38.22 2.22	
15	273°48.05	73°18.32 · · 33.34	128° 0.77 · · 35.46	125°59.86 · · 46.30	264°40.80 · · 2.18	
16	288° 50.52	88°20.97 32.60	143°2.06 35.13	141°2.07 46.23	279°43.39 2.13	
17	303°52.98	103°23.62 31.86	158° 3.34 34.79	156° 4.29 46.15	294°45.98 2.09	В
18	318°55.44	118°26.26 \$11°31.12	173°4.63 N15°34.46	171°6.51 N13°46.08	309°48.56 N01°2.04	
19	333°57.91	133°28.90 30.39	188° 5.92 34.12	186° 8.73 46.00	324°51.15 2.00	
20	349°0.37	148°31.54 29.65	203°7.21 33.78	201°10.95 45.93	339°53.74 1.96	
21	4°2.84	163°34.17 · · 28.92	218°8.50 · · 33.45	216°13.17 · · 45.85	354°56.32 · · 1.91	
22	19°5.30	178° 36.80 28.19	233° 9.79 33.11	231°15.39 45.78	9°58.91 1.87	
23	34°7.76	193°39.42 27.46	248°11.08 32.78	246°17.61 45.70	25°1.50 1.82	
		<u> </u>				
Mer.p	pass. 20:44	ν2.7' d-0.8' m-4.64	ν1.3′ d-0.3′ m0.77	ν2.2′ d-0.1′ m-2.05	ν2.6' d-0.0' m0.50	Mi
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	
0	49° 10.23	208°42.04 \$11°26.74	263°12.37 N15°32.44	261°19.83 N13°45.63	40°4.08 N01°1.78	
1	64° 12.69	223°44.66 26.01	278°13.66 32.11	276°22.05 45.55	55°6.67 1.73	
2	$79^{\circ}15.16$	238° 47.27 25.29	293°14.95 31.77	291°24.27 45.48	70°9.25 1.69	
3	94° 17.62	253°49.88 · · 24.57	308°16.24 · · 31.43	306°26.49 · · 45.40	85°11.84 · · 1.65	
4	109°20.09	268°52.48 23.85	323°17.53 31.10	321°28.71 45.33	100°14.42 1.60	
5	124°22.55	283°55.08 23.13	338°18.82 30.76	336°30.93 45.25	115°17.01 1.56	
6	139°25.01	298°57.68 \$11°22.42	353°20.12 N15°30.43	351°33.15 N13°45.18	130°19.59 N01°1.52	
7	$154^{\circ}27.48$	314°0.27 21.71	8°21.41 30.09	6°35.38 45.10	145°22.18 1.47	
8	169°29.94	329°2.86 21.00	23°22.70 29.76	21°37.60 45.03	160°24.76 1.43	
9	184°32.41	344°5.44 · · 20.29	38°24.00 · · 29.42	36°39.82 · · 44.95	175°27.35 · · 1.39	
10	199°34.87	359°8.02 19.58	53°25.29 29.09	51°42.04 44.88	190°29.93 1.34	R
11	214°37.33	14°10.60 18.87	68°26.59 28.75	66°44.27 44.80	205°32.52 1.30	'`
12	229°39.80	29°13.17 <b>S</b> 11°18.17	83°27.88 N15°28.42	81°46.49 N13°44.73	220°35.10 N01°1.26	7
13	244°42.26	44°15.74 17.47	98°29.18 28.08	96°48.71 44.66	235°37.69 1.21	-
14	259°44.73	59°18.30 16.77	113°30.48 27.75	111°50.94 44.58	250°40.27 1.17	
15	$274^{\circ}47.19$	74°20.86 · · 16.07	128°31.77 · · 27.42	126°53.16 · · 44.51	265°42.86 · · 1.13	
16	289°49.66	89°23.42 15.37	143°33.07 27.08	141°55.39 44.43	280°45.44 1.08	
17	304°52.12	104°25.97 14.68	158°34.37 26.75	156°57.61 44.36	295°48.02 1.04	
18	319°54.58	119°28.52 <b>S</b> 11°13.99	173°35.67 N15°26.41	171°59.84 N13°44.29	310°50.61 N01°1.00	Ra
19	334° 57.05	134°31.06 13.30	188°36.97 26.08	187° 2.06 44.21	325°53.19 0.95	
20	349°59.51	149°33.61 12.61	203°38.27 25.74	202°4.29 44.14	340°55.77 0.91	K
21	5°1.98	164°36.14 · · 11.92	218°39.57 · · 25.41	217° 6.51 · · 44.07	355°58.36 · · 0.87	
22	20°4.44	179°38.68 11.24	233°40.87 25.07	232° 8.74 43.99	11°0.94 0.83	
23	35°6.90	194°41.21 10.56	248°42.17 24.74	247°10.96 43.92	26°3.52 0.78	
Mer.p	pass. 20:40	$\nu 2.6' \ d$ -0.7' m-4.68	ν1.3' d-0.3' m0.75	ν2.2' d-0.1' m-2.06	ν2.6' d-0.0' m0.50	
\A/I	CIIA	CHA De-	CHA De-	CHA De-	CHA De-	
Wed	<b>GHA</b> 50°9.37	<b>GHA Dec</b> 209° 43.73 <b>S</b> 11° 9.87	<b>GHA Dec</b> 263°43.47 N15°24.41	<b>GHA Dec</b> 262°13.19 N13°43.85	<b>GHA Dec</b> 41°6.11 N01°0.74	
0 1	65° 11.83	209 43.73 511 9.87 224°46.25 9.20	278° 44.77 24.07	202 13.19 N13 43.85 277°15.42 43.78	56°8.69 0.70	F
2	80° 14.30	224 40.25 9.20 239°48.77 8.52	278 44.77 24.07 293°46.07 23.74	277 15.42 43.78 292°17.64 43.70	71°11.27 0.66	
3	95° 16.76	254°51.28 · · 7.84	308°47.37 · · 23.41	307°19.87 · · 43.63	86°13.85 · · 0.61	
3 4	110° 19.23	269°53.79 7.17	323°48.68 23.07	322°22.10 43.56	101°16.44 0.57	Nov
5	110 19.23 125°21.69	284°56.30 6.50	338°49.98 22.74	337°24.33 43.48	116°19.02 0.53	1400
6	140°24.15	299°58.80 S11°5.83	353°51.28 N15°22.40	352°26.56 N13°43.41	131°21.60 N01°0.49	
7	140 24.15 155°26.62	315°1.30 5.16	8°52.59 22.40	7°28.78 43.34	146°24.18 0.45	
8	170°29.08	330°3.79 4.50	23°53.89 21.74	22°31.01 43.27	161°26.76 0.40	
9	170 29.00 185°31.55	345°6.28 · · 3.84	38°55.20 · · 21.40	37°33.24 · · 43.20	176°29.34 · · 0.36	$\vdash$
10	200°34.01	0°8.77 3.17	53°56.51 21.07	52°35.47 43.12	191°31.93 0.32	No
11	200°34.01 215°36.47	15°11.25 2.51	68°57.81 20.74	67°37.70 43.05	206°34.51 0.28	
12	230°38.94	30°13.73 S11°1.86	83°59.12 N15°20.40	82°39.93 N13°42.98	221°37.09 N01°0.24	
13	245°41.40	45°16.20 1.20	99°0.43 20.07	97°42.16 42.91	236°39.67 0.20	
14	260°43.87	60°18.68 11°0.55	114°1.73 19.74	112°44.39 42.84	251°42.25 0.15	
15	275°46.33	75°21.14 10°59.90	129°3.04 · · 19.40	127°46.62 · · 42.76	266°44.83 · · 0.11	Nov
16	290°48.80	90°23.61 59.25	144° 4.35 19.07	142°48.85 42.69	281°47.41 0.07	NOV
17	305°51.26	105°26.06 58.60	159° 5.66 18.74	157°51.08 42.62	296°49.99 0.03	
18	320°53.72	120°28.52 \$10°57.95	174°6.97 N15°18.41	172°53.31 N13°42.55	311°52.57 N00°59.99	
19	335°56.19	135°30.97 57.31	189° 8.28 18.07	187°55.55 42.48	326°55.15 00°59.95	
20	350°58.65	150°33.42 56.67	204° 9.59 17.74	202°57.78 42.41	341°57.73 59.91	
21	6°1.12	165°35.86 · · 56.03	219°10.90 · · 17.41	218° 0.01 · · 42.34	357°0.31 · · 59.86	
22	21°3.58	180°38.30 55.39	234°12.21 17.08	233° 2.24 42.27	12°2.89 59.82	
23	36°6.04	195°40.74 54.75	249°13.52 16.74	248° 4.48 42.20	27°5.47 59.78	L
		ν2.5' d-0.7' m-4.71	ν1.3' d-0.3' m0.74	ν2.2' d-0.1' m-2.06	ν2.6' d-0.0' m0.51	
ivier.p	pass. 20:36	ν2.5' d-U.1' m-4./1	ν1.3 α-U.3 mU./4	ν2.2 α-0.1 m-2.06	ν2.0 α-U.U mU.51	

	Stars	
	SHA	Dec
Alpheratz	357°32.97	29° 14.57
Ankaa	353°5.36 349°28.85	-42°9.63
Schedar Diphda	349°28.85 348°45.53	56° 41.35 -17° 50.28
Achernar	335°18.53	-57°6.04
Hamal	$327^{\circ}49.16$	23°35.53
Polaris	312°44.58	89°22.63
Acamar Menkar	315°10.21 314°4.25	-40°11.72 4°11.83
Mirfak	308°25.58	49°57.45
Aldebaran	290°37.57	16°33.85
Rigel	281°2.14	-8°10.11
Capella Bellatrix	280°19.26 278°20.99	46°1.41 6°22.51
Elnath	277°59.66	28° 37.78
Alnilam	275°35.94	-1°10.99
Betelgeuse	270°50.21	7°24.78
Canopus Sirius	263°51.35 258°24.70	-52° 42.32 -16° 45.02
Adhara	255°4.47	-10 45.02 -29°0.30
Procyon	244°49.13	5°9.40
Pollux	243°15.34	27°57.57
Avior Suhail	234°13.97 222°45.19	-59°35.40 -43°32.18
Miaplacidus	222°45.19 221°37.93	-43°32.18 -69°49.30
Alphard	217°46.30	-8°46.40
Regulus	207°32.93	11°50.13
Dubhe	193°39.51	61°36.09
Denebola Gienah	182°23.64 175°42.29	14°25.29 -17°41.35
Acrux	173°58.95	-63°14.68
Gacrux	$171^{\circ}50.42$	-57°15.62
Alioth	166°12.15	55° 48.67
Spica Alkaid	158°21.02 152°51.30	-11° 18.01 49° 10.65
Hadar	148°34.50	-60° 30.04
Menkent	147°56.24	-36°30.02
Arcturus	145°46.88	19°2.56
Rigil Kent. Kochab	139°38.89 137°21.05	-60°56.70 74°2.60
Zuben'ubi	137 21.05 136°54.70	-16°9.13
Alphecca	126°2.85	26° 37.50
Antares	112°14.35	-26°29.45
Atria Sabik	107°7.72 102°1.37	-69°4.59 -15°45.43
Shaula	96°8.68	-15 45.45 -37°7.40
Rasalhague	95°57.44	12°32.55
Eltanin	90°41.90	51°29.30
Kaus Aust.	83°30.81	-34°22.33 38°48.72
Vega Nunki	80°32.49 75°46.13	-26°15.80
Altair	61°58.63	8° 56.52
Peacock	53°3.53	-56°39.07
Deneb	49°24.86	45°22.88
Enif Al Na'ir	33°37.29 27°30.95	10°0.08 -46°49.97
Fomalhaut	15°12.72	-40 49.97 -29°28.81
Scheat	$13^{\circ}43.58$	28°13.98
Markab	13°28.26	15°21.20
Nov 09 Mon	SHA	Mer.pass
Venus	159°26.99	10:08
Mars	214°30.43	06:29
Jupiter Saturn	212°15.53 350°50.89	06:37 21:20
Nov 10 Tue Venus	<b>SHA</b> 159°31.81	Mer.pass 10:03
Mars	214°2.14	06:27
Jupiter	$212^{\circ}9.60$	06:34
Saturn	350°53.85	21:16
Nov 11 Wed	SHA	Mer.pass
Venus	159°34.36	09:59
Mars	213°34.10 212°3.82	06:25
Jupiter Saturn	212°3.82 350°56.74	06:30 21:12
		21.12
Horizon	ntal parallax Venus:	0.5
	Mars:	0.5
		-

h	Su	n	Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	184°3.33	<b>S</b> 16°47.81	188°57.26	12.2'	S20°27.05	10.1'	55.2'
1 2	199°3.28 214°3.23	48.52 49.24	203°28.41 217°59.51	12.1' 12.1'	20°37.17 20°47.20	10.0' 9.9'	55.2' 55.1'
3	214 3.23 229°3.18	• • 49.95	217 59.51 232°30.56	12.1	20°57.12	9.9 9.8'	55.1'
4	244°3.13	50.67	247°1.56	12.0'	21°6.93	9.7'	55.1'
5	259°3.08	51.38	261°32.51	11.9'	21°16.65	9.6'	55.1'
6 7	274°3.02 289°2.97	\$16°52.10 52.81	276°3.42 290°34.27	11.9' 11.8'	\$21°26.26 21°35.76	9.5' 9.4'	55.1' 55.1'
8	304°2.92	53.53	305°5.07	11.8	21°45.16	9.4	55.0'
9	319°2.87	• • 54.24	319°35.83	11.7'	21°54.45	9.2'	55.0'
10	334°2.81	54.95	334°6.53	11.7'	22°3.64	9.1'	55.0'
11 12	349°2.76 4°2.70	55.66 \$16°56.37	348°37.19 3°7.79	11.6' 11.6'	22°12.71 522°21.68	9.0' 8.9'	55.0' 55.0'
13	19°2.65	57.08	17°38.35	11.5'	22°30.54	8.7'	55.0'
14	34°2.60	57.79	32°8.86	11.5'	22°39.28	8.6'	54.9'
15	49°2.54 64°2.48	· · 58.50 59.21	46°39.32 61°9.73	11.4' 11.4'	22°47.92 22°56.44	8.5' 8.4'	54.9' 54.9'
16 17	79°2.43	16°59.92	75°40.10	11.4	22 50.44 23°4.85	8.3'	54.9'
18	94°2.37	<b>S</b> 17° 0.63	90°10.42	11.3'	S23°13.15	8.2'	54.9'
19	109°2.32	1.34	104°40.69	11.2'	23°21.33	8.1'	54.9'
20 21	124°2.26 139°2.20	2.05 •• 2.75	119°10.91 133°41.09	11.2' 11.1'	23°29.39 23°37.34	8.0' 7.8'	54.8' 54.8'
22	154°2.14	3.46	148° 11.22	11.1'	23°45.18	7.7'	54.8'
23	169°2.09	4.16	162°41.31	11.0'	23°52.89	7.6'	54.8'
	SD = 16.1'	d = 0.7'		SE	) = 15.0′		
<b>T</b>	CUA	D	CUA		D	.1	LIP
Tue 0	<b>GHA</b> 184°2.03	<b>Dec</b> <b>S</b> 17° 4.87	<b>GHA</b> 177°11.35	u  11.0'	Dec 524° 0.49	d 7.5'	<b>HP</b> 54.8'
1	199°1.97	5.57	191°41.35	11.0'	24°7.97	7.4	54.8'
2	214°1.91	6.28	206°11.31	10.9'	24°15.33	7.2'	54.8'
3 4	229°1.85 244°1.79	· · 6.98 7.68	220°41.22 235°11.08	10.9' 10.8'	24°22.57 24°29.69	7.1' 7.0'	54.7' 54.7'
5	259°1.73	8.39	249°40.91	10.8	24°29.09	6.9'	54.7'
6	274°1.67	S17° 9.09	264°10.69	10.7'	S24°43.57	6.8'	54.7'
7	289°1.61	9.79	278°40.44	10.7'	24°50.32	6.6'	54.7'
8 9	304°1.55 319°1.48	10.49 •• 11.19	293°10.14 307°39.80	10.7' 10.6'	24°56.95 25°3.46	6.5' 6.4'	54.7' 54.6'
10	334°1.42	11.89	322°9.42	10.6'	25° 9.84	6.3'	54.6'
11	349°1.36	12.59	336°39.01	10.5'	25°16.10	6.1'	54.6'
12 13	4°1.30 19°1.23	\$17°13.29 13.99	351°8.56 5°38.07	10.5' 10.5'	\$25°22.23 25°28.24	6.0' 5.9'	54.6' 54.6'
14	34°1.17	13.99	20°7.54	10.5	25 26.24 25°34.12	5.8'	54.6'
15	49°1.11	• • 15.39	34°36.98	10.4'	$25^{\circ}39.87$	5.6'	54.6'
16	64°1.04	16.08	49°6.39 63°35.76	10.4'	25°45.50	5.5'	54.5'
17 18	79°0.98 94°0.91	16.78 \$17°17.48	63°35.76 78°5.09	10.3' 10.3'	25°51.00 \$25°56.36	5.4' 5.2'	54.5' 54.5'
19	109°0.85	18.17	92°34.40	10.3'	26° 1.60	5.1'	54.5'
20	124°0.78	18.87		10.2'	26°6.71	5.0'	54.5'
21 22	139°0.71 154°0.65	· · 19.56 20.25	121°32.92 136°2.14	10.2' 10.2'	26°11.69 26°16.55	4.9' 4.7'	54.5' 54.5'
23	169°0.58	20.25	150° 2.14 150° 31.32	10.2'	26°21.26	4.7 4.6'	54.5'
	SD = 16.1'	d = 0.7'		SE	0 = 14.9'		
Wed	<b>GHA</b> 184°0.51	<b>Dec</b> \$17°21.64	<b>GHA</b> 165°0.48	u  10.1'	<b>Dec</b> \$26°25.85	d 4.5'	<b>HP</b> 54.4'
0 1	184 ° 0.51 199° 0.45	22.33	165°0.48 179°29.62	10.1'	26°30.31	4.5	54.4° 54.4°
2	214°0.38	23.02	193°58.73	10.1'	$26^{\circ}34.63$	4.2'	54.4'
3	229°0.31 244°0.24	• • 23.72	208°27.81	10.1'	26°38.83	4.1'	54.4'
4 5	244°0.24 259°0.17	24.41 25.10	222°56.87 237°25.91	10.0' 10.0'	26°42.89 26°46.82	3.9' 3.8'	54.4' 54.4'
6	274°0.10	\$17°25.79	251°54.92	10.0'	S26°50.61	3.7'	54.4
7	289°0.03	26.48	266°23.92	10.0'	26°54.27	3.5'	54.4'
8 9	303°59.96 318°59.89	27.16 •• 27.85	280°52.90 295°21.86	10.0' 9.9'	26°57.80 27°1.19	3.4' 3.3'	54.3' 54.3'
10	318 59.89 333°59.82	28.54	295 21.80 309°50.80	9.9 9.9'	27 1.19 27°4.45	3.3 3.1'	54.3'
11	348°59.75	29.23	324°19.73	9.9'	27°7.57	3.0'	54.3'
12	3°59.68	\$17°29.91	338°48.64	9.9'	\$27°10.56	2.9'	54.3'
13 14	18°59.60 33°59.53	30.60 31.29	353°17.53 7°46.42	9.9' 9.9'	27°13.42 27°16.14	2.7' 2.6'	54.3' 54.3'
15	48°59.46	31.97	22°15.29	9.9'	27°18.72	2.4	54.3'
16	63°59.39	32.66	36°44.16	9.9'	27°21.17	2.3'	54.3'
17	78°59.31 93°59.24	33.34 \$17°34.02	51°13.01	9.8'	27°23.48	2.2'	54.2'
18 19	93°59.24 108°59.16	\$17°34.02 34.71	65°41.86 80°10.70	9.8' 9.8'	\$27°25.66 27°27.70	2.0' 1.9'	54.2' 54.2'
20	123°59.09	35.39	94°39.53	9.8'	$27^{\circ}29.61$	1.8'	54.2'
21	138°59.02	• • 36.07	109°8.36	9.8'	27°31.38	1.6'	54.2'
22 23	153°58.94 168°58.86	36.75 37.43	123°37.19 138°6.01	9.8' 9.8'	27°33.01 27°34.51	1.5' 1.4'	54.2' 54.2'
23	SD = 16.1'	d = 0.7'	130 0.01		0 = 14.8'	1.4	J T. Z
	JD — 10.1	u = 0.1	-	3L	/ — 14.0		

	Twilight		Sunrise	Sunset	Twilight		
Lat.	Naut.	Civil	Sumsc	Juliset	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	
<b>S</b> 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	
<b>S</b> 60°	00:43	02:29	03:27	20:03	21:02	22:54	

Lat.		Moonris	e		Moonset	
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	02:45	02:52	03:06	21:22	22:52	•• ••

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	0-2
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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	Stars
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	51°8.51	210°43.17	264°14.83 N15°16.41	263°6.71 N13°42.12	42°8.05 N00°59.74	
1	$66^{\circ}10.97$	225°45.60 53.49	279°16.15 16.08	278°8.94 42.05	57°10.63 59.70	Alpheratz 357°32.97 29°14.58 Ankaa 353°5.36 -42°9.64
2	81°13.44	240°48.02 52.86	294°17.46 15.75	293°11.18 41.98	72°13.21 59.66	Schedar 349°28.86 56°41.37
3	96° 15.90	255°50.44 · · 52.23	309°18.77 · · 15.42	308°13.41 · · 41.91	87°15.79 · · 59.62	Diphda 348°45.53 -17°50.29
4	111°18.37	270°52.86 51.60	324°20.09 15.08	323°15.64 41.84	102°18.37 59.58	Achernar 335°18.54 -57°6.05
5 6	126°20.83 141°23.29	285°55.27 50.98 300°57.68 \$10°50.36	339°21.40 14.75 354°22.72 N15°14.42	338°17.88 41.77 353°20.11 N13°41.70	117°20.95 59.54 132°23.53 N00°59.50	Hamal 327°49.15 23°35.53
7	156°25.76	316°0.08 49.74	9°24.03 14.09	8°22.35 41.63	147°26.11 59.46	Polaris 312°44.11 89°22.65
8	171°28.22	331°2.49 49.12	24°25.35 13.76	23°24.58 41.56	162°28.68 59.42	Acamar 315°10.20 -40°11.73
9	186°30.69	346°4.88 · · 48.50	39°26.67 · · 13.42	38°26.82 · · 41.49	177°31.26 · · 59.38	Menkar 314°4.24 4°11.82 Mirfak 308°25.56 49°57.46
10	201°33.15	1°7.28 47.89	54°27.98 13.09	53°29.05 41.42	192°33.84 59.34	Aldebaran 290°37.55 16°33.85
11	216°35.62	16°9.67 47.28	69°29.30 12.76	68°31.29 41.35	207°36.42 59.30	Rigel 281°2.12 -8°10.12
12	231°38.08	31°12.05 \$10°46.67	84°30.62 N15°12.43	83°33.53 N13°41.28	222°39.00 N00°59.26	Capella 280°19.23 46°1.42
13 14	246° 40.54 261° 43.01	46°14.43 46.06 61°16.81 45.45	99°31.94 12.10 114°33.25 11.77	98°35.76 41.21 113°38.00 41.14	237°41.58 59.22 252°44.15 59.18	Bellatrix 278°20.97 6°22.50
15	276° 45.47	76°19.19 · · 44.85	129°34.57 · · 11.44	128°40.24 · · 41.07	267°46.73 · · 59.14	Elnath 277°59.63 28°37.78
16	291° 47.94	91°21.56 44.25	144°35.89 11.11	143°42.47 41.01	282°49.31 59.10	Alnilam 275°35.92 -1°11.00
17	$306^{\circ}50.40$	106°23.92 43.65	159°37.21 10.77	158°44.71 40.94	297°51.89 59.06	Betelgeuse 270°50.19 7°24.77
18	321°52.86	121°26.28 \$10°43.05	174°38.53 N15°10.44	173°46.95 N13°40.87	312°54.46 N00°59.02	Canopus 263°51.32 -52°42.33 Sirius 258°24.68 -16°45.03
19	336° 55.33	136°28.64 42.45	189°39.85 10.11	188°49.19 40.80	327°57.04 58.98	Adhara 255°4.45 -29°0.31
20	351°57.79	151°31.00 41.86	204°41.18 9.78	203°51.43 40.73	342°59.62 58.94	Procyon 244°49.10 5°9.39
21 22	7°0.26 22°2.72	166°33.35 · · 41.27 181°35.70 40.68	219°42.50 · · 9.45 234°43.82 9.12	218°53.66 · · 40.66 233°55.90 40.59	358°2.19 · · 58.90 13°4.77 58.86	Pollux 243°15.31 27°57.56
23	37°5.19	196°38.04 40.09	249°45.14 8.79	248°58.14 40.52	28°7.35 58.82	Avior 234°13.93 -59°35.41
		-				Suhail 222°45.16 -43°32.19
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	Miaplacidus 221°37.87 -69°49.30
						Alphard 217°46.27 -8°46.41 Regulus 207°32.90 11°50.12
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.47 61°36.08
0	52°7.65	211°40.38 \$10°39.50	264°46.47 N15°8.46	264°0.38 N13°40.45	43°9.92 N00°58.78	Denebola 182°23.61 14°25.27
1	67° 10.11	226° 42.72 38.92	279°47.79 8.13	279° 2.62 40.39	58°12.50 58.74	Gienah 175°42.27 -17°41.36
2	82° 12.58 97° 15.04	241°45.05 38.33 256°47.38 · · 37.75	294°49.12 7.80 309°50.44 · · 7.47	294°4.86 40.32 309°7.10 • 40.25	73°15.07 58.70 88°17.65 • 58.66	Acrux 172°58.91 -63°14.67
4	112° 17.51	271°49.70 37.18	324°51.77 7.14	324° 9.34 40.18	103°20.23 58.62	Gacrux 171°50.39 -57°15.62
5	127° 19.97	286°52.02 36.60	339°53.09 6.81	339°11.58 40.11	118°22.80 58.58	Alioth 166°12.12 55°48.65
6	142°22.43	301°54.34 \$10°36.02	354°54.42 N15°6.48	354°13.83 N13°40.05	133°25.38 N00°58.54	Spica 158°21.00 -11°18.02 Alkaid 152°51.29 49°10.63
7	$157^{\circ}24.90$	316°56.65 35.45	9°55.74 6.15	$9^{\circ}16.07$ 39.98	148°27.95 58.50	Hadar 148°34.47 -60°30.03
8	172°27.36	331°58.96 34.88	24°57.07 5.82	24°18.31 39.91	163°30.53 58.47	Menkent 147°56.22 -36°30.02
9	187°29.83	347°1.27 · · 34.31	39°58.40 · · 5.49	39°20.55 · · 39.84	178°33.10 · · 58.43	Arcturus 145°46.87 19°2.55
10 11	202°32.29 217°34.76	2°3.57 33.75 17°5.86 33.18	54°59.73 5.16 70°1.06 4.83	54°22.79 39.77 69°25.04 39.71	193°35.68 58.39 208°38.25 58.35	Rigil Kent. 139°38.87 -60°56.69
12	232°37.22	32°8.16 \$10°32.62	85°2.38 N15°4.50	84°27.28 N13°39.64	223°40.83 N00°58.31	Kochab 137°21.05 74°2.58
13	247°39.68	47°10.45 32.06	100°3.71 4.17	99°29.52 39.57	238°43.40 58.27	Zuben'ubi 136°54.69 -16°9.13
14	262° 42.15	62°12.74 31.50	115°5.04 3.84	114°31.77 39.51	253°45.98 58.23	Alphecca 126°2.84 26°37.49 Antares 112°14.34 -26°29.45
15	277°44.61	77°15.02 · · 30.95	130°6.37 · · 3.51	129°34.01 · · 39.44	268°48.55 · · 58.20	Atria 107°7.71 -69°4.58
16	292°47.08	92°17.30 30.39	145°7.71 3.18	144°36.25 39.37	283°51.12 58.16	Sabik 102°1.37 -15°45.43
17	307° 49.54	107°19.57 29.84	160°9.04 2.85	159°38.50 39.30	298°53.70 58.12	Shaula 96°8.68 -37°7.40
18 19	322°52.00 337°54.47	122°21.84 \$10°29.29 137°24.11 28.74	175°10.37 N15°2.53 190°11.70 2.20	174°40.74 N13°39.24 189°42.99 39.17	313°56.27 N00°58.08 328°58.85 58.04	Rasalhague 95°57.45 12°32.54
20	352° 56.93	152°26.38 28.19	205°13.03 1.87	204°45.23 39.10	344°1.42 58.01	Eltanin 90°41.91 51°29.29
21	7°59.40	167°28.64 · · 27.65	220°14.37 · · 1.54	219°47.48 · · 39.04	359°3.99 · · 57.97	Kaus Aust. 83°30.81 -34°22.33
22	23°1.86	182°30.89 27.11	235°15.70 1.21	234°49.72 38.97	14°6.57 57.93	Vega 80°32.50 38°48.71 Nunki 75°46.13 -26°15.79
23	38°4.33	197°33.14 26.57	250°17.04 0.88	249°51.97 38.90	29°9.14 57.89	Altair 61°58.64 8°56.51
Meri	pass. 20:28	ν2.3' d-0.6' m-4.77	ν1.3' d-0.3' m0.72	ν2.2' d-0.1' m-2.07	$\nu 2.6' \ d$ -0.0' m0.52	Peacock 53°3.55 -56°39.07
	Puss. 20.20					Deneb 49°24.88 45°22.88
٠.	CILA	CUA	CIIA	CUA D	CIIA D	Enif 33°37.30 10°0.08
Sat 0	<b>GHA</b> 53°6.79	<b>GHA Dec</b> 212°35.39 \$10°26.03	<b>GHA Dec</b> 265°18.37 <b>N</b> 15°0.55	<b>GHA Dec</b> 264°54.21 N13°38.84	<b>GHA Dec</b> 44°11.71 N00°57.85	Al Na'ir 27°30.97 -46°49.97
1	68° 9.25	212 33.39 310 20.03 227°37.64 25.49	280°19.71 15°0.23	279°56.46 38.77	59°14.29 57.82	Fomalhaut 15°12.73 -29°28.82
2	83° 11.72	242°39.88 24.96	295°21.04 14°59.90	294°58.71 38.71	74°16.86 57.78	Scheat 13°43.59 28°13.98   Markab 13°28.26 15°21.21
3	$98^{\circ}14.18$	257°42.12 · · 24.43	310°22.38 · · 59.57	310°0.95 · · 38.64	89°19.43 · · 57.74	
4	113° 16.65	272°44.35 23.90	325°23.71 59.24	325° 3.20 38.57	104°22.00 57.70	Nov 12 Thu SHA Mer.pass
5	128° 19.11	287°46.58 23.37	340°25.05 58.91	340°5.45 38.51	119°24.58 57.67	Venus 159°34.66 09:56
6 7	143°21.58 158°24.04	302°48.81 \$10°22.84 317°51.03 22.32	355°26.39 N14°58.59 10°27.73 58.26	355°7.70 N13°38.44 10°9.94 38.38	134°27.15 N00°57.63 149°29.72 57.59	Mars 213°6.32 06:22 Jupiter 211°58.20 06:27
8	158 24.04 173°26.50	317 51.03 22.32 332°53.25 21.80	25°29.06 57.93	25°12.19 38.31	164°32.29 57.55	Saturn 350°59.54 21:08
9	188° 28.97	347°55.46 · · 21.28	40°30.40 · · 57.60	40°14.44 · · 38.25	179°34.86 · · 57.52	
10	203°31.43	2°57.68 20.76	55°31.74 57.27	55°16.69 38.18	194°37.43 57.48	Nov 13 Fri SHA Mer.pass
11	218° 33.90	17°59.88 20.24	70°33.08 56.95	70°18.94 38.12	209°40.01 57.44	Venus 159°32.73 09:52 Mars 212°38.82 06:20
12	233°36.36	33°2.09 \$10°19.73	85°34.42 N14°56.62	85°21.19 N13°38.05	224°42.58 N00°57.41	Jupiter 211°52.73 06:23
13	248°38.82	48°4.29 19.22	100°35.76 56.29	100°23.44 37.99	239°45.15 57.37	Saturn 351°2.27 21:04
14 15	263° 41.29 278° 43.75	63°6.48 18.71 78°8.68 •• 18.20	115°37.11 55.97 130°38.45 • 55.64	115°25.69 37.92 130°27.94 · · 37.86	254°47.72 57.33 269°50.29 · 57.30	
16	276 43.75 293°46.22	93°10.87 17.69	145°39.79 55.31	145°30.19 37.79	284°52.86 57.26	Nov 14 Sat SHA Mer.pass Venus 159°28.60 09:48
17	308° 48.68	108°13.05 17.19	160°41.13 54.98	160°32.44 37.73	299°55.43 57.22	Mars 212°11.58 06:18
18	323°51.15	123°15.23 \$10°16.69	175°42.48 N14°54.66	175°34.69 N13°37.66	314°58.00 N00°57.19	Jupiter 211°47.42 06:19
19	338° 53.61	138° 17.41 16.19	190°43.82 54.33	190°36.94 37.60	330°0.57 57.15	Saturn 351°4.92 21:00
20	353°56.07	153°19.59 15.69	205°45.16 54.00	205°39.19 37.53	345°3.14 57.11	Harizontal paralle:
21	8°58.54	168°21.76 · · 15.19	220°46.51 · · 53.68	220°41.45 · · 37.47	0°5.71 · · 57.08	Horizontal parallax Venus: 0.4
22 23	24°1.00 39°3.47	183°23.92 14.70 198°26.09 14.21	235°47.85 53.35 250°49.20 53.02	235°43.70 37.41 250°45.95 37.34	15°8.28 57.04 30°10.85 57.00	Mars: 0.1
Mer.	pass. 20:24	ν2.2' d-0.5' m-4.80	ν1.3' d-0.3' m0.71	ν2.2' d-0.1' m-2.08	ν2.6' d-0.0' m0.52	

	011-010 =	+0.1210 Sec		-011	_ +09.0022	- 500	
h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	183°58.79	S17°38.11	$152^{\circ}34.84$	9.8'	\$27°35.87	1.2'	54.2'
1	198°58.71	38.79	167°3.66	9.8'	27°37.10	1.1'	54.2'
2	213°58.63 228°58.56	39.47 •• 40.15	181°32.49 196°1.31	9.8' 9.8'	27°38.19 27°39.14	1.0' 0.8'	54.2' 54.2'
3 4	243°58.48	40.13	210°30.15	9.8'	27°39.14	0.6	54.2 54.1'
5	258° 58.40	41.51	224°58.98	9.8'	27°40.64	0.5	54.1'
6	273°58.32	S17°42.18	239°27.83	9.9'	S27°41.19	0.4'	54.1'
7	288° 58.25	42.86	253°56.68	9.9'	27°41.60	0.3'	54.1'
8 9	303°58.17 318°58.09	43.54 •• 44.21	268°25.54 282°54.41	9.9' 9.9'	27°41.87 27°42.01	0.1' 0.0'	54.1' 54.1'
10	318 58.09 333°58.01	44.89	282 54.41 297°23 29	9.9 9.9'	27 42.01 27°42.01	-0.1	54.1'
11	348° 57.93	45.56	311°52.18	9.9'	27°41.88	-0.3	54.1'
12	3°57.85	S17°46.24	326°21.09	9.9'	S27°41.61	-0.4'	54.1'
13	18°57.77	46.91	340°50.01	9.9'	27°41.21	-0.5'	54.1'
14 15	33°57.68 48°57.60	47.58 •• 48.25	355°18.94 9°47.90	10.0' 10.0'	27°40.68 27°40.00	-0.7' -0.8'	54.1' 54.1'
16	63°57.52	48.93	24°16.87	10.0'	27°39.20	-0.9	54.1
17	78° 57.44	49.60	38°45.86	10.0'	27°38.26	-1.1'	54.1'
18	93° 57.36	S17°50.27	53°14.87	10.0'	<b>S</b> 27°37.18	-1.2'	54.1'
19	108°57.27	50.94	67°43.90	10.1'	27°35.97	-1.3'	54.0'
20 21	123°57.19 138°57.11	51.61 •• 52.28	82°12.95 96°42.03	10.1' 10.1'	27°34.63 27°33.16	-1.5' -1.6'	54.0' 54.0'
22	153° 57.11	52.28	90 42.03 111°11.13	10.1	27°31.55	-1.7'	54.0'
23	168° 56.94	53.61	125°40.26	10.2	27°29.81	-1.9'	54.0'
	SD = 16.1'	d = 0.7'			) = 14.8′		
	JD — 10.1	u = 0.7		JL.	/ — 14.0°		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°56.85	S17°54.28	140°9.41	10.2'	\$27°27.94	-2.0'	54.0'
1	198°56.77	54.95	154°38.59	10.2	27°25.93	-2.1'	54.0'
2	213°56.68 228°56.60	55.61 •• 56.28	169°7.80 183°37.04	10.2' 10.3'	27°23.80 27°21.53	-2.3' -2.4'	54.0' 54.0'
3 4	243°56.51	56.94	183 37.04 198°6.31	10.3	27 21.53 27°19.14	-2.4 -2.5'	54.0'
5	258° 56.42	57.61	212°35.61	10.3	27°16.61	-2.7'	54.0'
6	273°56.34	S17°58.27	227° 4.95	10.4'	S27°13.95	-2.8'	54.0'
7	288°56.25	58.94	241°34.32	10.4'	27°11.16	-2.9'	54.0'
8 9	303°56.16 318°56.07	17°59.60 18°0.26	256° 3.72 270° 33.16	10.4' 10.5'	27° 8.25 27° 5.20	-3.0' -3.2'	54.0' 54.0'
10	333°55.98	0.92	285°2.63	10.5	27° 2.03	-3.2 -3.3'	54.0'
11	348°55.90	1.59	299°32.14	10.5	26°58.72	-3.4	54.0'
12	3°55.81	\$18°2.25	314°1.69	10.6'	\$26°55.30	-3.6'	54.0'
13	18°55.72	2.91	328°31.28	10.6'	26°51.74	-3.7'	54.0'
14 15	33°55.63 48°55.54	3.57 •• 4.23	343°0.90 357°30.57	10.7' 10.7'	26°48.06 26°44.25	-3.8' -3.9'	54.0' 54.0'
16	63°55.45	4.89	12°0.28	10.7	26°40.32	-3.9 -4.1'	54.0'
17	78°55.35	5.54	26°30.03	10.8'	26°36.26	-4.2'	54.0'
18	93°55.26	<b>S</b> 18°6.20	40°59.82	10.8'	S26°32.07	-4.3'	54.0'
19	108°55.17	6.86	55°29.66		26°27.77 26°23.34		54.0'
20 21	123°55.08 138°54.99	7.51 •• 8.17	69°59.53 84°29.46	10.9' 11.0'	26° 23.34 26° 18.79	-4.6' -4.7'	54.0' 54.0'
22	153°54.89	8.83	98°59.43	11.0'	26°14.11	-4.8	54.0'
23	168°54.80	9.48	113°29.44	11.1'	$26^{\circ}9.31$	-4.9'	54.0'
	SD = 16.2'	d = 0.7'		SE	0 = 14.7'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°54.71	\$18°10.14	127°59.51	11.1'	\$26° 4.40	-5.0'	54.0'
1 2	198°54.61 213°54.52	10.79 11.44	142°29.61 156°59.77	11.2' 11.2'	25°59.36 25°54.20	-5.2' -5.3'	54.0' 54.0'
3	213 54.52 228°54.42	. 12.10	171°29.97	11.3'	25°48.92	-5.4'	54.0'
4	243°54.33	12.75	186°0.23	11.3'	25°43.52	-5.5'	54.0'
5	258° 54.23	13.40	200°30.53	11.4'	25°38.01	-5.6'	54.0'
6	273°54.14	\$18°14.05	215°0.88 229°31.28	11.4'	\$25°32.38	-5.7'	54.0'
7 8	288° 54.04 303° 53.95	14.70 15.35	229°31.28 244°1.73	11.5' 11.5'	25°26.63 25°20.76	-5.9' -6.0'	54.0' 54.0'
9	318° 53.85	16.00	258°32.24	11.6'	25°14.78	-6.1'	54.0'
10	333°53.75	16.65	$273^{\circ}2.79$	11.6'	$25^{\circ}8.69$	-6.2'	54.0'
11	348°53.65	17.30	287°33.40	11.7'	25°2.48	-6.3	54.0'
12 13	3°53.56 18°53.46	\$18°17.94 18.59	302°4.05 316°34.76	11.7' 11.8'	\$24°56.15 24°49.71	-6.4'	54.0'
13 14	18°53.46 33°53.36	18.59 19.24	316°34.76 331°5.53	11.8'	24°49.71 24°43.16	-6.5' -6.7'	54.0' 54.0'
15	48°53.26	• • 19.88	345°36.34	11.9'	24°36.50	-6.8	54.0'
16	63°53.16	20.53	0°7.21	11.9'	24°29.73	-6.9'	54.0'
17	78° 53.06	21.17	14°38.13	12.0'	24°22.85	-7.0'	54.1'
18	93°52.96 108°52.86	\$18°21.82	29° 9.10 43° 40.13	12.0' 12.1'	\$24°15.85 24°8.75	-7.1'	54.1'
19 20	108° 52.86 123° 52.76	22.46 23.11	43°40.13 58°11.21	12.1'	24°8.75 24°1.54	-7.2' -7.3'	54.1' 54.1'
21	138° 52.66	23.75	72°42.35	12.1	24°1.54°23°54.22	-7.4'	54.1
22	153°52.56	24.39	87°13.53	12.2'	23°46.80	-7.5	54.1'
23	168° 52.46	25.03	101°44.78	12.3'	23°39.26	-7.6'	54.1'
	SD = 16.2'	d = 0.7'		SE	0 = 14.7'		
		<u> </u>	-		·		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	00:03	02:19	03:19	20:11	21:12	////

Lat.	Moonrise			Moonset		
Lat.	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° 52°	11:19	12:02	12:32 12:19	17:20	18:22	19:34
52 50°	11:02 10:48	11:47 11:33	12:19	17:37 17:52	18:38 18:51	19:47 19:58
45°	10:48	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°	09:35	10:43	11:23	19:03	19:40	20:40
30°	09:30	10:23	10:53	19:03	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
<b>S</b> 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
<b>S</b> 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° <b>S</b> 60°	04:12	05:09	06:23	00.00	00:24	00:54
<b>5</b> 60°	03:38	04:37	05:58	80:00	00:56	01:19

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	3-5
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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.)

1 69°8.39 3.40 1.1222 280°51.89 52.37 280°30.06 37.21 60°1.99 50.03 41 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1	h	Aries	Venus	Mars	Jupiter	Saturn	
0 9*8*99 218*282 5 510*13.72 265*90.50 N1*27.20 00*548.20 N18*37.82 4*19.42 N00*549.77 5 5.00 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	
2 041108 20210.00 13.23 200751.00 230751.00 20							
2 mil 10.60 243*12.255 12.75 265*53.24 52.05 267*52.71 37.15 75*18.56 55.00 24 11*15.79 275*36.85 11.76 33.5*55.64 11.76 13.5*55.64 25.5*57.25*25*25*25*25*25*25*25*25*25*25*25*25*2							Α
3 09°13.32 285°34.70 · 12.26 310°44.90 · 51.72 310°54.96 · 37.00 106°22.13 · 56.86 4 11.6°10.75 283°34.00 · 51.76 31.76 325°57.22 310°56.72 370 · 56.87 5 11.6°10.10 28 30°56.00 · 51.00 · 30°57.28 11.0°7 30°56 1.0°26.27 · 56.70 11.0°26.20 11.0°26.27 · 56.70 11.0°26.20 11.0°26.20 11.0°26.27 · 56.70 11.0°26.20 1							
5 129"18.27 303"41.3 50"10.02 35"668.3 N18"05.7 3 35"6.7 3.1 113"0.0 10.3"2.02"2.7 55.79 10.02 35.70 10.02 35"668.3 N18"05.7 35"6.7 113"3.0 10.02 35"6.7 16"5.3 35"6.7 3.1 113"0.0 10.02 35"6.7 3.0 35"1.7 113"3.0 10.02 35"6.7 16"5.3 37"1.6 5.7 3.0 10.02 35.7 16"5.3 37"1.6 5.7 3.0 10.02 35.7 16"5.3 37"1.6 5.7 3.0 10.02 35.7 16"5.3 37"1.6 5.7 3.0 10.02 35.7 16"5.3 37"1.6 5.7 3.0 10.02 35.7 16"5.3 37"1.6 5.0 10.02 35"1.0 10.02 35"1.0 10.02 35"1.0 10.02 35.0 10.02 35.0 1.0 10.02 35.0 1.0 10.02 35.0 1.0 10.02 35.0 10.02 35.0 10.02 35.0 10.02 35.0 1.0 10.02 35.0 1.0 10.02 35.0 1.0 10.02 35.0 1		99° 13.32	258°34.70 · · 12.26				
6   144"20.72   503"41.13   510"10.82   355"8.63   114"5.074   356"1.73   113"9.90   135"28.81   100"56.75   7   150"21.61   318"43.63   0.977   26"1.33   50.09   26"2.4   35.77   165"33.97   56.66   11   201"31.01   318"31.76   8.47   71"5.33   41"3.07   35.00   26"2.4   35.77   165"33.97   56.66   11   201"31.01   318"31.76   8.47   71"5.33   49.12   71"11.00   35.53   310"41.65   56.57   12   201"31.01   318"31.76   8.47   71"5.33   49.12   71"11.00   35.53   310"41.65   56.57   13   201"31.01   318"31.76   8.47   71"5.33   49.12   71"11.00   35.53   310"41.65   56.57   13   201"31.01   318"31.76   8.47   101"8.00   48.47   101"15.2   36.46   201"48.8   56.57   13   201"41.35   30"358.16   6.16   146"1.2   146"4.52   131"2.00   36.33   20"3"1.65   56.55   15   201"41.35   30"42.30   6.16   146"1.2   15   47.66   101"2.00   36.33   20"3"1.65   56.55   16   201"41.35   30"42.30   6.16   146"1.2   15   47.66   101"2.00   36.33   20"3"1.65   30"5"5.5   18   332"50.28   31"44.88   3.46   230"20.28   45.54   220"37.8   35.00   314"4.78   56.26   19   335"52.51   154"10.67   4.35   200"17.67   4.61   200"33.3   36.00   314"4.78   56.26   10   55"5.07   214"18.98   3.40   230"20.28   45.54   220"37.8   35.00   10"9.02   56.10   10   55"5.07   244"31.8   3.40   230"20.3   45.54   220"37.8   35.00   10"9.02   56.10   10   55"5.07   244"31.13   10.13   30"25.7   260"20.3   114"4.50   20"3"3.0   35.77   20"2"3.55   30"3"3.3   30"2"3.1   30"2"3.1   30"2"3.1   30"2"3.1   30"2"3.1   30"3"3.1   30"2"3.1   30"3"3.1   30"2"3.1   30"3"3.1   30"2"3.1   30"3"3.1   30"2"3.1   30"3"3.1   30"2"3.1   30"3"3.1							
6   14-8" 2072   336" 41.3   510" 10.82   356" 86.3   148" 50.74   356" 173   113" 35.0   358" 43.0   56.68   138" 43.2   56.6							/
7 199"23.18 318"43.26 10.35 10"59.98 50.42 11"5.98 36.83 150"31.41 56.72 10.88 170"25.8 133"65.9 9.87 26"1.33 50.09 26"6.24 30.67 16"5.33"5.09 26"6.24 30.77 16"3.33"7 56.66 10.33"6.39 130"36.45 25.66 10.33"6.39 26"6.24 30.77 16"3.33"7 56.66 10.33"6.39 10"30.54 5.56 6.40 10.32"6.24 30.77 16"3.53 30.33 15"5.34 10.32"6.24 30.77 16"3.54 30.57 10"30.55 10.30"5.54 5.56 6.40 11.20"22.33"5.50 3.35"6.25 10.35"5.88 510"8.00 86.67 14 11"48.79 86"5.56 11.13"36.53 225"44.25 100"56.54 11.32 249"35.00 375.38 510"8.00 86.67 14 11"48.79 36.50 11.13"36.52 225"44.25 100"56.54 11.32 249"37.06 48"55.99 7.75 11.00 1.47 4.25 11.32 249"3.00 30.33 20"51.05 56.47 11.32 249"3.00 30.00 38"51.32 30.00 38"51.33 30.00		144° 20.72		355°58.63 N14°50.74			
9 189"2811 1 180"3854	7	$159^{\circ}23.18$			11° 3.98 36.83	150°31.41 56.72	
10 204°39.57 3°49.64 8.93 95°4.03 49.44 50°10.75 36.64 195°39.11 56.61 12 224°35.00 36.58 210°14.88 56.74 12 224°35.00 36.58 210°14.88 56.50 12 224°35.00 36.58 210°14.88 56.50 12 224°35.00 36.58 210°14.88 56.50 12 224°35.00 36.58 210°14.88 56.50 12 224°35.00 36.58 210°16.00 86°6.74 141°46.79 36°15.26 113°15.22 225°44.25 100°5.54 141°34.79 36 44°5.50 150.10 7.08 116°0.44 46.14 116°10.77 36.39 255°40.30 56.47 141°14.70 141°14.70 141°14.70 36.39 255°40.30 56.47 141°14.70 141	8	174°25.64	333°45.39 9.87	26°1.33 50.09	26°6.24 36.77	165°33.97 56.68	
11 210*3304 18*51.76 8.47 71*5.39 49.12 71*13.00 36.58 210*41.88 05.567 12 236*355.0 33*5.83 810*300 86*674 Na*4.87 86*15.26 Na*3*5.62 23*4.25 Noo*5.64 71 13.20*4.25 Noo*5.64 240*3.66*1.56*0.00*5.64*1.10*1.00*1.00*1.10*1.752 36.46 240*6.68*1.56*0.00*5.64*1.10*1.00*1.10*1.00*1.10*1.752 36.46 240*6.68*1.56*0.00*1.10*1.10*1.00*1.10*1.752 36.46 240*6.68*1.56*0.00*1.10*1.10*1.10*1.10*1.10*1.10*1.1	9	$189^{\circ}28.11$	348°47.52 · · 9.40	41°2.68 · · 49.77	41°8.49 · · 36.71	180°36.54 · · 56.64	
13 294 335	10	204°30.57				195°39.11 56.61	
13 249°37 66 48°59.99 7.54 101°8.09 48.47 101°17.52 36.46 220°66.31 56.50 14 260°60.31 65°8.04 7.08 11.6°9.44 48.14 110°19.77 36.39 25°6.93 8.56.47 15 270°42.89 79°0.20 6.62 131°10.80 47.82 131°22.03 .56.33 270°51.95 .56.43 16 20°45.55 94°2.30 6.16 140°12.15 47.49 146°24.99 36.27 265°45.25 5.08 6.31 16 20°45.55 94°2.30 6.16 140°12.15 47.49 146°24.99 36.27 265°45.25 5.08 6.31 17 300°47.82 131°40.80 47.17 161°25.54 36.21 300°57.08 56.35 18 328°40.23 11.8°66.81 550°5.25 11.9°6.18 510°5.	11						^
14   264	12						
15   279°429   79°1020   -6.62   131°1080   -4782   131°2203   -30.33   270°51.95   -56.43   16   294°45.36   94°230   -6.16   146°12.15   47.79   146°52.49   -36.27   305°45.25   55.63   17 309°47.82   124°6.49   510°5.25   176°14.60   184°6.40   176°288   0.13°3.614   315°9.65   000°5.05   176°14.60   184°6.40   176°288   0.13°3.614   315°9.65   000°5.05   176°4.60   184°6.40   176°28.80   0.13°3.614   315°9.65   000°5.05   176°4.60   184°6.40   176°28.80   0.13°3.614   315°9.65   000°5.62   176°4.60   184°6.40   176°28.80   183°3.614   315°9.65   000°5.62   176°4.60   184°6.60   186°4.60   186							
15   204"45.36   204"23.0   0.16   146"21.15   47.49   146"24.29   30.27   285"64.52   56.40   18   234"50.28   194"640   5.70   161"13.50   47.17   161"25.54   30.21"3.00157.08   56.36   18   234"50.28   134"64.08   146"62.19   193"30.1013.0014.01   30.0557.08   56.36   18   234"50.28   325"2.75   139"83.8   4.80   194"16.21   4.65.22   191"30.1013.0014.01   30.0557.08   56.29   191"30.1013.0014.01   30.0557.08   56.29   191"30.1013.0014.01   30.0557.08   56.29   191"30.1013.0014.01   30.0557.08   30.02   346"4.78   56.29   191"30.1013.0014.01   30.0557.08   30.02   346"4.78   56.29   191"30.1013.0014.01   30.0557.08   30.0577.57   46.10   206"33.32   23.05.02   346"4.78   56.29   191"30.1013.0014.01   30.0557.08   30.0577.08   30.05							
18   324°90.28   124°649   510°5.25   170°1.486   N146°6.44   170°1.265   30.21   300°5.70.8   56.36     19   339°5.27   139°1.58   4.80   191°1.62   4.652   191°31.06   30.08   331°2.22   56.29     20   339°5.27   139°1.05   4.33   500°1.757   4.652   191°31.06   30.08   331°2.22   56.29     21   9°57.68   109°12.75   3.39   221°18.93   4.537   221°35.88   3.596   17°.35   56.22     22   25°10.14   124°14.83   3.40   226°20.28   4.543   226°37.84   35.90   16°0.22   56.19     23   40°2.61   124°14.89   510°5.77   566°23.00   N14°44.90   226°42.35   N13°35.77   46°15.05   N00°56.12     32   32   32°3.28   322°3.29   321°3.31   30°3.31   31°2.70   4.03   31°2.70     40   55°5.67   228°2.17   1.26   31°2.07   4.03   31°2.07   4.03   31°2.07   4.03   31°2.07   4.03   4.							
18 328°3-27.5 139°4-58.0 1516°2.5 1171.15.0 147.45.4 101°5-38.0 N.3°3-6.1 331°5-58 N.00°8-3.3 18 18 18 328°3-27.5 139°4-58.1 18 18 18 18 18 18 18 18 18 18 18 18 18							Ве
19 339°52.75 139°8.58 4.80 191°10.21 46.52 101°31.06 36.08 331°2.22 56.29 20 334°5.275 139°10.07 4.35 300 221°19.33 · 45.67 22°35.83 2 36.02 346°4.78 56.26 12 9°57.68 19°12.75 3.00 221°19.35 · 45.67 22°35.85 15.96 12°33.5 36°6.26 12°22 25°0.14 184°14.8 3.46 25°20.28 4.55 4 236°37.84 35.90 15°9.92 56.19 23 40°2.61 199°16.91 3.01 251°21.64 45.22 251°40.10 35.83 31°12.48 56.15 16°9.92 40°2.61 199°16.91 3.01 251°21.64 45.22 251°40.10 35.83 31°12.48 56.15 16°9.92 40°2.61 199°16.91 3.01 251°21.64 45.22 251°40.10 35.83 31°12.48 56.15 16°9.92 1							
20   334°55.21   134°10.67   4.35   206°17.57   4.61.9   206°33.32   36.02   346°47.8   56.26   22   22°50.14   348°14.83   3.46   236°20.28   45.47   22°13.55.8   35.90   16°9.92   56.19   23   40°26.1   199°16.91   3.01   22°12.16.9   4.54.57   22°13°21.01   35.83   31°12.48   56.15   48°14.83   3.16°1.28   48°14.83   3.16°1.28   48°14.83   3.16°1.28   48°14.83   3.16°1.28   48°14.83   3.16°1.28   48°14.83   3.16°1.28   48°14.83   3.16°1.28   48°14.83   3.16°1.28   48°14.83   3.16°1.28   48°14.83   3.16°1.28   48°14.83   3.16°1.28   48°14.83   3.16°1.28   48°14.83   3.16°1.28   3.16°							
22   9°57.68   169°12.75   3,00   221°18.93   45.67   221°35.86   15°3.96   15°9.92   56.19   22   22°50.14   184°14.85   3.40   236°0.28   4.55.44   236°37.84   33.90   16°9.92   56.19   23   40°2.61   189°16.91   3.01   251°21.64   45.22   221°4.01   33.83   31°12.48   56.15   Mer.pass. 20:20   \( \buildrel{\substacless} \) \( \substacles							
22   25°0.14   184°14.83   3.46   236°20.28   45.54   236°37.84   35.90   16°9.92   56.19							
Mor.pass. 20:20   \( \bullet 22' \) d-0.5' m-4.82   \( \bullet 1.3' \) d-0.3' m0.69   \( \bullet 2.3' \) d-0.1' m-2.09   \( \bullet 2.6' \) d-0.0' m0.53   Mile (high property)   \( \bullet 2.2' \) d-0.1' m-2.09   \( \bullet 2.6' \) d-0.0' m0.53   Mile (high property)   \( \bullet 2.2' \) d-0.1' m-2.09   \( \bullet 2.6' \) d-0.0' m0.53   Mile (high property)   \( \bullet 2.6' \) d-0.1' m-2.09   \( \bullet 2.6' \) d-0.0' m0.53   Mile (high property)   \( \bullet 2.6' \) d-0.1' m-2.09   \( \bullet 2.6' \) d-0.0' m0.53   Mile (high property)   \( \bullet 2.5' \) d-0.1' m-2.09   \( \bullet 2.6' \) d-0.0' m0.53   Mile (high property)   \( \bullet 2.5' \) d-0.1' m-2.09   \( \bullet 2.6' \) d-0.0' m0.53   Mile (high property)   \( \bullet 2.3' \) d-0.1' m-2.09   \( \bullet 2.6' \) d-0.0' m0.53   Mile (high property)   \( \bullet 2.3' \) d-0.1' m-2.09   \( \bullet 2.6' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   Mile (high property)   \( \bullet 2.3' \) d-0.1' m-2.09   \( \bullet 2.6' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.55   \( \bullet 2.5' \) d-0.0' m0.55   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.53   \( \bullet 2.5' \) d-0.0' m0.55   \( \bullet 2.5' \) d-0.0' m0.55   \( \bullet 2.5' \) d-0.0' m0.55   \( \bullet 2.5' \) d-0.0' m0.55   \( \bullet 2.5' \) d-0.0' m0.55   \( \bullet 2.5' \) d-0.0' m0.55   \( \bullet 2.5' \) d-0.0' m0.55   \( \bullet 2.5' \) d-0.0' m0.55   \( \bullet 2.5' \) d-0.0' m0.55   \( \bullet 2.5' \) d-0.0' m0.55   \( \bullet 2.5' \) d-0.0' m0.55   \( \bullet 2.5' \) d-0.0' m0.55   \( \bul							
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0 55°5,07 214°18,98 510°2,57 266°23.00 N14°44,90 266°42,35 N13°35,77 46°15,05 N00°56,12 1 70°75,3 226°2,105 2.13 281°24,36 44,57 281°44,61 3.57.1 61°17,22 55,08 8 68°10,00 246°23,17 1.12 296°25,72 44,25 296°46,87 3.56.5 76°50,18 5.56.5 1 10°12,46 256°25,17 1.12 6 311°27,07 -33.93 11°40,14 3.59 91°22,75 .56.05 1 10°12,46 256°25,17 1.12 6 311°27,07 -33.93 11°40,14 3.59 91°22,75 .56.05 1 13°17,39 266°29,29 0.40 31°29,79 4.32 8 31°15,140 3.55 3 106°55,31 55.98 1 13°17,39 266°29,29 0.40 31°29,79 4.32 8 31°15,61 0.35,34 151°27,88 5.59 6 1 45°18,85 304°31,34 500°59,97 336°31,16 N14°22,55 356°55,92 N13°35,41 136°30,44 N00°55,91 1 76°22,23 310°33,34 00°59,97 336°31,16 N14°22,55 356°55,92 N13°35,41 136°30,44 N00°55,91 1 10°22,25 340°37,47 .58,69 41°35,24 -41.99 42°2,70 3.52 2 181°38,14 5.58,10 10°26°20,71 4°39,59 5.92 7 56°36,60 41,65 57°4,97 35,16 106°35,57 55,78 11 20°33,18 14 55,57 56,78 37,18 12 20°34,18 14 34°45,59 57,02 101°40,69 40,69 102°11,75 34,98 21°40,40 13°40,59 55,61 15 200°42,03 70°49,63 5.51,91 11°42,06 40,37 11°141,02 87°44,59 34,80 21°15,55 6 15 205°44,50 94°51,65 55,78 11°40,47 93,97 11°41,40 2 34,80 221°15,35 2 2 181°3,50 25,61 16°42,61 93,73 16°47,51 10°40,69 40,69 102°11,75 34,98 221°15,55 6 1 16°20°44,50 94°51,65 55,79 11°44,50 94°3,50 55,34 16°44,79 39,73 17°11,18 5 34,80 221°15,35 2 55,61 16°20°44,50 94°51,65 55,79 191°48,89 33,70 12°17,20 71,30 46,91 10°33,66 55,38 161°46,15 39,30 10°22,31 34,40 34,30 156,65 55,54 11°22,55 11°20°42,03 13°15,04 10°33,66 55,38 161°46,15 39,30 10°22,31 34,40 34,30 156,65 55,54 11°22,20 10°56,55 50,55 316°20°55,73 11°64,75 20°10,75 30°40,75 3	Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	
1 70°7.53 220°21.05 2.13 281°24.36 44.57 281°44.61 35.71 61°17.62 55.08 281°10.00 244°23.211 1.70 296°25.72 44.25 296°46.87 35.65 70°20.18 55.05 3 100°12.46 259°25.17 1.26 311°27.07 1.43.93 311°49.14 35.59 91°22.75 5.56.02 4115°14.93 274°27.23 0.83 256°28.43 43.60 326°51.40 35.53 100°25.51 55.98 5 110°17.39 280°29.29 0.40 341°29.79 43.28 341°53.66 35.47 121°27.88 5.95 16 145°19.85 304°31.34 500°59.91 386°31.61 114°42.09 36°55.92 113°33.33 00°59.54 11°32.52 42.63 11°58.18 35.34 151°33.01 55.88 175°24.78 334°35.43 59.11 26°33.88 42.31 27°0.44 55.28 166°55.97 55.88 19 100°27.25 349°37.47 158.69 41°35.24 141.99 42°2.70 153.22 181°38.14 158.1							.
3 100°1246 259°25.17 · 1.26 311°27.07 · 43.93 311°49.14 · 35.59 91°22.75 · 56.02 1 15.59   4 115°149.3 24°42′23 0.83 326°28.43 43.60 326°51.40 35.53 16°25.51 55.98   5 130°17.39 289°29.29 0.40 31°29.79 43.28 341°53.66 35.37 121°27.88 55.95   7 160°22.32 310°33.38 09°90.54 11°32.59 42.63 11°81.81 33.34 151°33.01 55.81   8 175°24.78 334°3.83 43 59.11 26°33.88 42.31 27°0.44 35.28 166°35.57 55.85   9 190°27.25 340°37.47 83.69 41°35.24 1.19 42°2.29 35.22 181°38.14 55.81   10 205°29.71 4°39.50 58.27 56°36.00 41.66 57°4.97 35.16 196°40.70 55.78   11 220°32.18 19°41.54 57.65 71°37.97 41.34 72°2.72 35.10 196°40.70 55.78   12 255°34.64 34°43.57 509°57.43 86°39.33 N14°41.02 87°9.49 N13°35.04 226°45.83 N0°55.71   12 255°34.64 34°45.59 57.02 101°30.09 40.09 102°11.75 34.98 241°48.40 55.66   14 265°39.57 10 49°45.59 57.02 101°30.09 40.09 102°11.75 34.98 241°48.40 55.66   15 280°42.03 79°40.63 5.61 151°42.05 40.37 117°14.02 34.92 256°50.96 55.64   16 295°44.50 94°51.65 55.79 146°44.79 39.73 147°18.55 34.80 266°56.09 55.54   17 310°40.96 100°53.66 55.38 161°46.15 39.40 12°20.81 34.74 31°22.70 05°55.11   18 325°39.42 124°55.67 509°54.97 176°47.52 N14°39.08 177°23.07 N13°34.68 31°1°12.2 N00°55.51   18 325°49.42 124°55.67 509°54.97 176°47.52 N14°39.08 177°23.07 N13°34.68 31°1°12.2 N00°55.51   19 340°51.89 139°57.67 54.57 191°48.89 38.76 12°22.54 34.44 17°11.47 55.38   20 355°84.35 154°59.67 59.65 52.99 26°55.73 N14°37.15 22°22°9.87 34.50 22°29.0 55.41   22 25°59.28 185°3.66 53.37 236°59.29 26°55.73 N14°37.15 26°3.66 7 N13°3.42 47°16.59 N00°55.51   7 161°21.46 320°21.58 51.42 311°9.98 37.79 237°3.21 4 34.44 17°11.47 55.38   22 26°59.28 185°3.66 53.37 236°55.90 26°55.73 N14°37.15 26°5.67 N33°3.37 34.77 75.90 55.51   22 36°59.28 30°17.52 50.66 53.37 328°45.74 34.00 312°22.24 35.50 55.24   23 41°1.14 200°5.65 52.99 26°55.73 N14°37.15 26°3.66 7 N13°3.33 34.77 75.21 75.55 51.8   25 311°16.50 30°17.52 50.66 53.37 328°45.74 34.00 310°28.84 55.18   10°191926.39 300°19.59 50.60 50.34 22°29 38.40 33.40 312°23.55 55.24   24 86°9.14 245°1.60		70°7.53		281°24.36 44.57			'
4 115°1493 274°27.23 0.83 326°28.43 4.360 326°51.40 35.53 106°25.31 55.98 5 130°17.39 286°29.90 4.0 341°29.79 43.28 341°53.66 35.47 1272.88 5.59 5 6 145°19.55 304°31.34 S09°59.79 43.28 341°53.66 35.47 1272.88 5.59 5 7 160°27.22 319°38.33 09°59.54 11°32.52 42.63 11°38.61 35.44 115°3.04 N00°55.91 11°3.00°25.97	2	$85^{\circ}10.00$	244°23.11 1.70	296°25.72 44.25	296°46.87 35.65	76°20.18 56.05	
5 130°17.39 289°29.29 0.40 34°29.79 43.28 34'8.36 35.66 35.47 121°27.88 55.95 1 6 145°19.55 304°31.34 509°59.79 356°31.16 N14°2.29 356°55.92 13°33.83 4. 15°33.04 N00°55.91 7 160°22.22 319°33.83 09°59.54 11°32.52 42.63 11°6.81 33.34 151°33.01 55.88 8 175°24.78 343°35.43 9.91 1. 26°33.88 42.31 27°0.44 35.28 166°33.57 55.85 9 190°27.25 349°37.47 · \$8.69 47*55.24 · 41.99 42°2.70 · 35.22 181°38.14 · 55.81 10 205°29.71 4°39.50 8.82 75°56.60 41.66 57°4.97 35.16 106°40.70 55.76 11 220°22.18 19°41.54 57.85 71°37.97 41.34 72°7.23 35.10 211°43.27 55.74 12 225°34.64 34°43.57 500°57.43 86°39.33 N14°41.02 87°9.49 N13°35.04 226°45.83 N00°55.71 12 225°34.64 34°43.57 500°57.43 86°39.33 N14°41.02 87°9.49 N13°35.04 226°45.83 N00°55.71 12 205°37.10 49°45.59 57.02 101°34.09 40.69 102°11.75 34.98 22*46.40 55.66 14 265°39.57 64°47.61 56.61 116°42.06 40.37 117°14.02 34.92 256°50.96 55.64 15 280°42.03 79°49.63 56.19 131°34.24 · 40.05 132°16.28 34.86 277°55.52 55.61 16 295°44.50 94°51.65 55.79 140°44.79 39.73 147°18.55 34.80 266°55.05 55.54 18 325°49.42 124°55.67 509°54.97 170°47.52 N14°99.08 177°23.07 N13°34.68 317°12.22 N00°55.51 19 340°51.89 139°57.67 54.57 191°48.99 38 177°23.07 N13°34.68 317°12.22 N00°55.51 19 340°51.89 139°57.67 54.57 191°48.99 38 177°23.07 N13°34.68 317°12.22 N00°55.51 19 340°51.89 139°57.67 54.57 191°48.99 38 177°23.07 N13°34.64 33 32°12.22 N34°3.22 25°59.28 185°3.66 53.37 236°52.99 37.79 237°32.14 34.44 17°11.47 55.38 48 22 25°59.88 185°3.66 53.37 236°52.99 37.79 237°32.14 34.44 17°11.47 55.38 48 22 25°59.28 185°3.66 53.37 236°52.99 37.79 237°32.14 34.41 17°11.47 55.38 5.24 14.95 11.00 260°13.88 12.25 14.03 55.34 14.95 11.00 260°13.88 12.25 14.03 55.34 14.95 11.00 260°13.88 12.25 14.03 55.34 14.95 11.00 260°13.88 12.25 14.03 55.34 14.95 11.00 260°13.88 12.25 14.03 55.34 14.95 11.00 260°13.88 12.25 12.25 14.33 11.00 260°13.88 12.25 12.25 14.33 11.00 260°13.88 12.25 12.25 14.33 11.00 260°13.88 12.25 12.25 14.33 11.00 10.00 260°13.88 12.25 12.25 14.33 11.00 11.00 260°13.88 12.25 12.25 14.33 11.00 11.00 260°13.88 1	3	$100^{\circ}12.46$	259°25.17 · · 1.26	311°27.07 · · 43.93	311°49.14 · · 35.59	91°22.75 · · 56.02	
6 145°19.85 304°31.34 \$00°59.97 356°31.16 NI4e²42.95 36°55.92 NI3e³35.41 136°30.44 N00°55.91 7 160°22.23 2310°33.38 00°59.96 111°25.25 42.63 11°58.18 35.34 11°33.01 55.88 8 178°24.78 334°35.43 59.11 26°33.88 42.31 27°0.44 35.28 166°35.57 55.88 9 190°27.25 349°37.47 58.69 44°35.24 41.99 42°2.70 35.22 181°38.14 55.81 10 205°29.71 4°39.50 58.27 56°36.60 41.66 57°4.97 35.16 196°40.70 55.78 75.78 11°22.03°23.18 19°41.54 57.85 71°37.97 41.34 72°7.23 35.10 211°43.27 55.78 12°22.34 40 34°43.57 509°57.43 86°93.33 N14°41.02 87°9.49 N13°55.04 245°45.83 N00°55.71 13°250°37.10 49°45.59 57.02 101°40.69 40.69 102°11.75 34.98 244°84.40 55.68 11 280°42.03 79°49.63 5.61 116°42.06 40.37 117°14.02 34.92 245°8.09 55.64 15 280°42.03 79°49.63 5.61 116°42.06 40.37 117°14.02 34.92 25°50.96 55.64 15 280°42.03 79°49.63 5.61 116°42.06 40.37 117°14.02 34.92 26°65.09 55.65 16 126°94.50 99°53.66 55.58 18 325°94.2 124°94.50 99°53.66 55.38 161°46.15 39.40 162°20.81 34.74 301°58.66 55.54 18 325°94.2 124°59.67 50°94.70 176°47.52 N14°39.90 177°23.07 N13°34.68 322°3.78 55.44 21 10°56.82 170°16.7 5.53.77 221°51.62 38.12 222°59.38 155°5.65 52.98 251°54.36 37.47 252°34.40 34.38 32°14.03 55.34 N6r.pass. 20:16 \(\begin{array}{cccccccccccccccccccccccccccccccccccc	4	$115^{\circ}14.93$	274°27.23 0.83	326°28.43 43.60	326°51.40 35.53	106°25.31 55.98	
7 160°22.32 319°33.38 00°99.54 11°32.52 42.63 11°98.18 35.34 151°33.01 55.88 9 190°27.25 349°37.47 \( \tau \) 5.86 60 41°35.24 \( \tau \) 41.93 42°2.70 \( \tau \) 53.22 181°38.14 \( \tau \) 55.88 9 190°27.25 349°37.47 \( \tau \) 5.86 60 41°35.24 \( \tau \) 41.99 42°2.70 \( \tau \) 53.22 181°38.14 \( \tau \) 55.88 10 205°29.71 4°39.50 58.27 56°36.60 41.66 57°4.97 35.16 19°6.07.07 55.78 11 220°32.18 19°41.54 57.85 71°37.97 41.34 72°7.23 35.10 211°43.27 55.74 12 235°34.64 34°43.57 500°57.43 86°39.33 NI4°41.02 87°9.49 NI3°35.04 226°43.83 N00°55.71 12 235°34.64 34°45.59 5.70 2101°40.09 40.69 102°11.75 34.99 225°63.83 N00°55.71 12 253°34.64 34°45.59 5.70 2101°40.09 40.69 102°11.75 34.99 225°63.93 N00°55.71 12 205°45.59 57.00 101°40.09 40.69 102°11.75 34.99 225°650.96 55.64 14 265°39.57 64°47.61 56.61 116°42.06 40.37 117°14.02 34.92 256°50.96 55.64 15 280°42.03 79°49.63 5.61 19 131°43.42 40.00 132°16.20 34.86 286°56.09 55.56 16 295°44.50 94°51.65 55.79 146°44.79 39.73 147°18.55 34.80 286°56.09 55.56 18 325°49.42 124°55.07 500°54.97 176°47.52 N14°39.08 177°23.07 N13°34.68 317°1.22 N00°55.51 139 340°51.89 139°57.67 54.57 191°48.89 38.76 192°25.34 34.62 323°37.87 55.48 20 355°54.35 154°59.67 54.17 206°50.26 38.44 20°27.60 34.56 34.76 34 55.44 21 10°656.22 170°1.67 5.37.77 221°51.62 38.12 222°29.87 34.50 2°8.90 5.54 12 222°29.87 34.50 2°8.90 5.54 12 21°57.64 500°52.59 265°55.73 N14°37.15 222°51.04 31°59.94 34.00 34.38 22°14.03 55.34 22°14.03 55.34 11°11.60 260°13.58 51.42 311°59.94 36.10 312°43.47 34.15 92°24.28 55.21 11°11.60 52.28 41°1.00 51.81 296°48.47 36.51 297°41.20 34.21 7°72.17 55.52 43 110°11.60 260°13.58 51.02 32°12.15 33.67 327°45.74 33.89 112°29.24 55.90 55.05 342°2.59 35.55 342°48.00 34.03 312°3.97 110°55.15 51.03 32°12.13 320°12.13 320°12.13 320°12.13 320°12.15 33.34 300°19.79 33.35 31.17 10°3.35 34.90 110°2.21.54 39.79 110°2.21.55 50.05 342°2.59 35.55 342°48.00 34.03 31.22°2.94 05.51 11 21°13.13 10°2.02 68.85 5°2.73 24 48.76 5°3.99 50.57 34.24 48.00 34.03 31.22°3.94 55.50 21 122°3.31 126°3.33 33°3.21 49.51	5	$130^{\circ}17.39$			341°53.66 35.47	121°27.88 55.95	
8   175°24.78   334°35.43   59.11   26°33.88   42.31   27°0.44   35.28   166°35.57   55.85   9   190°27.25   349°37.47   5.86   60   41°35.24   5.11°0   40°2.70   53.22   118°38.14   55.81   10   205°29.71   4°39.50   58.27   56°36.60   41.66   57°4.97   35.16   196°40.70   55.78   77.12   77.23   35.10   211°43.27   55.78   77.12   77.23   35.10   211°43.27   55.78   77.12   235°34.46   34°43.37   509°57.43   86°39.33   N14°41.02   87°9.49   N13°35.04   226°45.83   N00°55.71   33   250°37.10   49°45.59   57.02   101°40.69   40.69   102°11.75   34.98   241°48.40   55.68   15   280°42.03   79°49.63   5.61   116°42.06   40.37   117°14.02   34.92   241°48.40   55.66   15   228°44.50   49°51.65   5.75   146°44.70   39.73   117°14.02   34.92   241°48.40   55.66   16   296°44.50   49°51.65   5.75   146°44.70   39.73   147°18.55   34.80   271°53.52   55.61   18   325°49.42   124°55.67   509°54.97   176°47.25   N14°39.08   177°23.07   N13°34.68   317°1.22   N00°55.51   19   340°51.89   139°57.67   54.57   191°48.89   38.76   192°25.34   34.62   332°3.78   55.48   22   25°59.28   185°3.66   53.37   236°52.99   37.79   237°32.14   34.44   17°11.47   55.38   23   41°14.50   205°56.50   25.99   25.19   281°57.10   36.83   282°38.93   34.27   222°39.91   35.53   3214.03   55.34   Mer.pass. 20:16   \$22.1′ d-0.4′ m-4.84   \$21.4′ d-0.3′ m0.68   \$22.3′ d-0.1′ m-2.09   \$22.6′ d-0.0′ m0.53   \$28.6° s.99   55.64   311°51.65   320°17.55   55.24   311°51.65   320°17.55   55.24   311°51.65   320°17.55   55.24   311°51.65   320°21.55   57.99   35.55   34.99   12°29.40   55.18   55.18   55.14   311°59.84   36.99   312°29.40   55.18   55.14   311°59.84   36.99   312°29.40   55.18   55.14   311°59.84   36.99   312°29.40   35.18   320°37.99   335°25.36   49.14   49.99   12°5.33   34.90   12°25.44   33.99   12°29.40   55.15   55.24   311°11.60   206°38.85   57.73   48.79   57.93   55.55   34.48   30.99   300°57.55   54.89   320°29.20   335°3.30   335°2.34   49.55   220°3.37   49.50°3.30   31.29   330°3.55   54.89   320°3.37   333°3.30	6	$145^{\circ}19.85$	304°31.34 <b>S</b> 09°59.97	356°31.16 N14°42.95	356°55.92 N13°35.41	136°30.44 N00°55.91	
9 190°27/25 349°37.47 · 58.69 41°35.24 · 41.99 42°2.70 · 35.22 181°38.14 · 55.81 10 205°927.11 4°39.50 56.27 56°36.00 41.66 57°49.7 35.16 106°40.70 55.78 11 220°32.18 10°41.54 57.85 71°37.97 41.34 72°7.23 35.10 211°43.27 55.74 12°2.35°34.64 34°45.57 \$09°57.43 86°39.33 N140°41.02 87°9.49 N13°35.01 221°43.27 55.74 13 250°37.10 49°45.59 57.02 101°40.69 102°11.75 34.98 241°48.40 55.68 14 266°39.57 64°47.61 56.61 116°42.06 40.37 117°14.02 34.92 256°50.96 55.64 15 280°44.03 79°46.63 56.19 131°43.42 40.05 132°16.26 34.86 271°55.52 · 55.61 16 295°44.50 94°51.65 55.79 146°44.79 39.73 147°18.55 34.80 266°56.09 55.58 17 310°46.96 109°53.66 55.38 161°46.15 39.40 162°20.81 34.74 301°58.65 55.54 18 325°49.42 124°55.67 \$509°54.97 176°47.52 N14°39.08 177°23.07 N13°34.68 317°1.22 N00°55.51 19 340°51.89 139°57.67 54.57 191°48.89 38.76 192°25.34 34.62 332°3.78 55.48 20 355°54.35 154°59.67 54.17 206°50.26 38.44 207°27.60 34.56 347°6.34 55.44 21 10°56.82 170°1.67 5.377 221°51.62 38.12 222°39.87 34.50 2°8.90 · 55.41 22 25°59.28 188°3.66 53.37 236°52.99 37.99 237°32.14 34.44 17°11.47 55.38 23 41°1.74 200°5.65 52.98 251°54.36 37.47 252°34.40 34.38 32°47.85 55.34 11°16.67 230°9.62 52.19 281°57.10 36.83 282°38.93 34.27 62°19.16 55.28 11°16.07 230°9.62 52.19 281°57.10 36.83 282°38.93 34.27 62°19.16 55.28 11°16.07 250°14.25 250°14.25 25°15.55 51.0 332°12.13 35.87 327°41.20 34.21 77°21.72 55.24 116°14.07 275°15.55 51.03 332°12.13 35.87 327°41.20 34.21 77°21.72 55.24 116°14.07 275°15.55 51.03 332°12.13 35.87 327°41.20 34.21 77°21.72 55.24 116°14.07 275°15.55 51.03 332°12.13 35.87 327°41.20 34.21 77°21.72 55.24 116°14.07 275°15.55 51.03 332°12.13 35.87 327°41.20 34.21 72°21.27 55.24 116°14.07 275°15.55 51.03 332°12.13 35.87 327°41.20 34.21 72°21.27 55.24 54.81 31°16.53 290°17.52 50.65 342°2.59 35.55 342°4.80 34.03 122°34.57 5.50 55.10 120°33.13 10°31.60 33.55 35.10 330°3.14 54.55 55.10 120°33.13 10°31.60 35.55 340°4.20 335°3.24 40.40 35.55 33.40 12°23.45 5.55 21 N14°33.30 88°3.88 N13°33.52 227°47.33 N00°54.92 13.25°4.53 35°4.94 500°4.25 35.5	7						
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16   295°44.50   94°51.65   55.79   146°44.79   39.73   147°18.55   34.80   286°56.09   55.58   17   310°46.96   109°53.66   55.38   161°46.15   39.40   162°20.81   34.74   301°58.65   55.54   18   325°49.42   124°55.67   S09°54.97   176°47.52   N14°39.08   177°23.07   N13°34.68   317°1.22   N00°55.51   19   340°51.89   139°57.67   54.57   191°48.89   38.76   192°25.34   34.62   332°3.78   55.48   20   355°54.35   154°95.67   54.17   206°50.26   38.44   207°27.60   34.56   347°6.34   55.44   21   10°56.62   170°1.67   53.77   221°51.62   38.12   222°29.97   34.50   2°8.90   55.41   22   25°59.28   185°3.66   53.37   226°52.99   37.79   237°32.14   34.44   17°11.47   55.38   32°41.03   55.34   32°41.03   55.34   32°41.03   55.34   32°41.03   35.34   32°41.03   35.34   32°41.03   35.34   32°41.03   35.34   32°41.03   35.34   32°41.03   35.34   32°41.03   35.34   32°41.03   35.34   32°41.03   35.34   32°41.03   35.34   32°41.03   35.34   32°41.03   36.33   32°41.03   34.27   36°41.03   36.33   32°41.03   34.27   36°41.03   34.27							
17   310°46.96   100°53.66   55.38   161°46.15   39.40   162°20.81   34.74   301°88.65   55.54     18   325°49.42   124°55.67   S09°54.97   176°47.52   N14°39.08   177°23.07   N13°34.68   337°1.22   N00°55.51     340°51.89   139°57.67   54.57   191°48.89   38.76   192°25.34   34.62   332°3.78   55.48     20   355°54.35   154°59.67   54.17   206°50.26   38.44   207°27.60   34.50   28.90   55.41     21   10°56.82   170°1.67   53.77   222°51.62   38.44   207°27.60   34.50   28.90   55.41     22   25°59.28   185°3.66   53.37   236°52.99   37.79   237°32.14   34.44   17°11.47   55.38     23   41°1.74   200°5.65   52.98   251°54.36   37.47   252°34.40   34.38   32°14.03   55.34     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   0.56°4.21   215°7.64   S09°52.59   266°55.73   N14°37.15   267°36.67   N13°34.32   47°16.59   N00°55.31     1   71°6.67   230°9.62   52.19   281°57.10   36.83   282°38.93   34.27   62°19.16   55.28     2   86°9.14   245°11.60   51.81   296°58.47   36.51   297°41.20   34.21   77°21.72   55.24     3   101°11.60   260°13.58   51.42   311°99.84   36.19   312°43.47   34.15   92°24.28   55.18     4   116°18.99   305°19.49   S09°50.27   357°3.96   N14°35.52   357°50.27   N13°33.97   137°31.97   N00°55.11     7   161°21.46   320°21.45   49.89   12°5.33   34.90   12°52.54   33.81   12°9.34   55.08     8   176°29.92   335°23.41   49.51   27°6.70   34.58   27°50.27   N13°33.97   137°31.97   N00°55.11     7   161°21.46   320°21.45   49.89   12°5.33   34.90   12°52.54   33.81   12°9.39.65   55.02     10   206°28.85   5°27.32   48.76   57°9.04   33.30   88°3.88   N13°3.62   227°47.33   N00°55.19     10   221°31.31   20°29.26   48.39   72°10.83   33.94   57°50.53   33.74   197°42.21   54.99     11   221°31.31   20°29.26   48.69   14°29.08   33.90   12°52.54   33.30   22°47.73   N00°54.92     13   231°36.24   50°33.15   47.66   102°13.58   32.99   103°6.15   33.56   227°47.33   N00°5.91     13   21°41							
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4       116°14.07       275°15.55       51.03       327°1.21       35.87       327°45.74       34.09       107°26.84       55.18       Not         5       131°16.53       290°17.52       50.65       342°2.59       35.55       342°48.00       34.03       122°29.40       55.15         6       146°18.99       305°19.49       S09°50.27       357°3.96       N14°35.22       357°50.27       N13°33.97       N00°55.11         7       161°21.46       320°21.45       49.89       12°5.33       34.90       12°52.54       33.91       152°34.53       55.08         8       176°23.92       335°23.41       49.51       27°6.70       34.58       27°54.81       33.85       167°37.09       55.05         9       191°26.39       350°25.36       49.14       42°8.08       34.26       42°57.08       33.80       182°39.65       55.02         10       206°28.85       5°27.32       48.76       57°9.45       33.94       57°59.35       33.74       197°42.21       54.99         11       221°31.31       20°29.26       48.39       72°10.83       33.62       73°1.62       33.68       212°44.77       54.95         12       236°33.78       35°31.21       <							
5       131°16.53       290°17.52       50.65       342°2.59       35.55       342°48.00       34.03       122°29.40       55.15         6       146°18.99       305°19.49       S09°50.27       357°3.96       N14°35.22       357°50.27       N13°33.97       137°31.97       N00°55.11         7       161°21.46       320°21.45       49.89       12°5.33       34.90       12°52.54       33.91       152°34.53       55.08         8       176°23.92       335°23.41       49.51       27°6.70       34.58       27°54.81       33.85       167°37.09       55.02         9       191°26.39       350°25.36       49.14       42°8.08       34.26       42°57.08       33.80       182°39.65       55.02         10       206°28.85       5°27.32       48.76       57°9.45       33.94       57°59.35       33.74       197°42.21       54.99         11       221°31.31       20°29.26       48.39       72°10.83       33.62       73°1.62       33.68       212°44.77       54.95         12       236°33.78       35°31.21       500°48.02       87°12.20       N14°33.30       88°3.88       N13°33.62       227°47.33       N00°54.92         13       251°36.24       5							
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8       176°23.92       335°23.41       49.51       27°6.70       34.58       27°54.81       33.85       167°37.09       55.05         9       191°26.39       350°25.36       · 49.14       42°8.08       · 34.26       42°57.08       · 33.80       182°39.65       · 55.02         10       206°28.85       5°27.32       48.76       57°9.45       33.94       57°59.35       33.74       197°42.21       54.99         11       221°31.31       20°29.26       48.39       72°10.83       33.62       73°1.62       33.68       212°44.77       54.95         12       236°33.78       35°31.21       509°48.02       87°12.20       N14°33.30       88°3.88       N13°33.62       227°47.33       N00°54.92         13       251°36.24       50°33.15       47.66       102°13.58       32.98       103°6.15       33.56       242°49.89       54.89         14       266°38.71       65°35.09       47.29       117°14.95       32.66       118°8.42       33.51       257°52.45       54.86         15       281°41.17       80°37.02       · 46.93       132°16.33       · 32.34       133°10.70       · 33.45       272°55.02       · 54.83         16       296°43.63 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>							
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13       251°36.24       50°33.15       47.66       102°13.58       32.98       103°6.15       33.56       242°49.89       54.89         14       266°38.71       65°35.09       47.29       117°14.95       32.66       118°8.42       33.51       257°52.45       54.86         15       281°41.17       80°37.02       · 46.93       132°16.33       · 32.34       133°10.70       · 33.45       272°55.02       · 54.83         16       296°43.63       95°38.95       46.57       147°17.71       32.02       148°12.97       33.39       287°57.58       54.79         17       311°46.10       110°40.88       46.21       162°19.09       31.70       163°15.24       33.33       303°0.14       54.76         18       326°48.56       125°42.81       S09°45.85       177°20.46       N14°31.38       178°17.51       N13°33.28       318°2.70       N00°54.73         19       341°51.03       140°44.73       45.50       192°21.84       31.06       193°19.78       33.22       333°5.26       54.70         20       356°53.49       155°46.64       45.14       207°23.22       30.74       208°22.05       33.16       348°7.82       54.67         21       11°55.96							
14       266° 38.71       65° 35.09       47.29       117° 14.95       32.66       118° 8.42       33.51       257° 52.45       54.86         15       281° 41.17       80° 37.02       · 46.93       132° 16.33       · 32.34       133° 10.70       · 33.45       272° 55.02       · 54.83         16       296° 43.63       95° 38.95       46.57       147° 17.71       32.02       148° 12.97       33.39       287° 57.58       54.79         17       311° 46.10       110° 40.88       46.21       162° 19.09       31.70       163° 15.24       33.33       303° 0.14       54.76         18       326° 48.56       125° 42.81       S09° 45.85       177° 20.46       N14° 31.38       178° 17.51       N13° 33.28       318° 2.70       N00° 54.73         19       341° 51.03       140° 44.73       45.50       192° 21.84       31.06       193° 19.78       33.22       333° 5.26       54.70         20       356° 53.49       155° 46.64       45.14       207° 23.22       30.74       208° 22.05       33.16       348° 7.82       54.67         21       11° 55.96       170° 48.56       · 44.79       222° 24.60       · 30.42       223° 24.32       · 33.10       3° 10.37       · 54.64							
15       281° 41.17       80° 37.02       · · 46.93       132° 16.33       · · 32.34       133° 10.70       · · 33.45       272° 55.02       · · 54.83       Non         16       296° 43.63       95° 38.95       46.57       147° 17.71       32.02       148° 12.97       33.39       287° 57.58       54.79       54.79         17       311° 46.10       110° 40.88       46.21       162° 19.09       31.70       163° 15.24       33.33       303° 0.14       54.76       54.67							L
16       296° 43.63       95° 38.95       46.57       147° 17.71       32.02       148° 12.97       33.39       287° 57.58       54.79         17       311° 46.10       110° 40.88       46.21       162° 19.09       31.70       163° 15.24       33.33       303° 0.14       54.76         18       326° 48.56       125° 42.81       S09° 45.85       177° 20.46       N14° 31.38       178° 17.51       N13° 33.28       318° 2.70       N00° 54.73         19       341° 51.03       140° 44.73       45.50       192° 21.84       31.06       193° 19.78       33.22       333° 5.26       54.70         20       356° 53.49       155° 46.64       45.14       207° 23.22       30.74       208° 22.05       33.16       348° 7.82       54.67         21       11° 55.96       170° 48.56       44.79       222° 24.60       30.42       223° 24.32       33.10       3° 10.37       54.64         22       26° 58.42       185° 50.47       44.44       237° 25.98       30.10       238° 26.60       33.05       18° 12.93       54.60         23       42° 0.88       200° 52.37       44.10       252° 27.36       29.79       253° 28.87       32.99       33° 15.49       54.57							NI.
17       311° 46.10       110° 40.88       46.21       162°19.09       31.70       163°15.24       33.33       303°0.14       54.76         18       326° 48.56       125° 42.81       S09° 45.85       177°20.46       N14°31.38       178°17.51       N13°33.28       318°2.70       N00°54.73         19       341°51.03       140°44.73       45.50       192°21.84       31.06       193°19.78       33.22       333°5.26       54.70         20       356°53.49       155°46.64       45.14       207°23.22       30.74       208°22.05       33.16       348°7.82       54.67         21       11°55.96       170°48.56       · 44.79       222°24.60       · 30.42       223°24.32       · 33.10       3°10.37       · 54.64         22       26°58.42       185°50.47       44.44       237°25.98       30.10       238°26.60       33.05       18°12.93       54.60         23       42°0.88       200°52.37       44.10       252°27.36       29.79       253°28.87       32.99       33°15.49       54.57							1401
18       326° 48.56       125° 42.81       S09° 45.85       177° 20.46       N14° 31.38       178° 17.51       N13° 33.28       318° 2.70       N00° 54.73         19       341° 51.03       140° 44.73       45.50       192° 21.84       31.06       193° 19.78       33.22       333° 5.26       54.70         20       356° 53.49       155° 46.64       45.14       207° 23.22       30.74       208° 22.05       33.16       348° 7.82       54.67         21       11° 55.96       170° 48.56       · · 44.79       222° 24.60       · · 30.42       223° 24.32       · · 33.10       3° 10.37       · · 54.64         22       26° 58.42       185° 50.47       44.44       237° 25.98       30.10       238° 26.60       33.05       18° 12.93       54.60         23       42° 0.88       200° 52.37       44.10       252° 27.36       29.79       253° 28.87       32.99       33° 15.49       54.57							
19       341°51.03       140°44.73       45.50       192°21.84       31.06       193°19.78       33.22       333°5.26       54.70         20       356°53.49       155°46.64       45.14       207°23.22       30.74       208°22.05       33.16       348°7.82       54.67         21       11°55.96       170°48.56       · 44.79       222°24.60       · 30.42       223°24.32       · 33.10       3°10.37       · 54.64         22       26°58.42       185°50.47       44.44       237°25.98       30.10       238°26.60       33.05       18°12.93       54.60         23       42°0.88       200°52.37       44.10       252°27.36       29.79       253°28.87       32.99       33°15.49       54.57							
20       356°53.49       155°46.64       45.14       207°23.22       30.74       208°22.05       33.16       348°7.82       54.67         21       11°55.96       170°48.56       · · 44.79       222°24.60       · · 30.42       223°24.32       · · 33.10       3°10.37       · · 54.64         22       26°58.42       185°50.47       44.44       237°25.98       30.10       238°26.60       33.05       18°12.93       54.60         23       42°0.88       200°52.37       44.10       252°27.36       29.79       253°28.87       32.99       33°15.49       54.57							
21       11°55.96       170°48.56       · · 44.79       222°24.60       · · 30.42       223°24.32       · · 33.10       3°10.37       · · 54.64         22       26°58.42       185°50.47       44.44       237°25.98       30.10       238°26.60       33.05       18°12.93       54.60         23       42°0.88       200°52.37       44.10       252°27.36       29.79       253°28.87       32.99       33°15.49       54.57							
22       26°58.42       185°50.47       44.44       237°25.98       30.10       238°26.60       33.05       18°12.93       54.60         23       42°0.88       200°52.37       44.10       252°27.36       29.79       253°28.87       32.99       33°15.49       54.57							
23 42°0.88 200°52.37 44.10 252°27.36 29.79 253°28.87 32.99 33°15.49 54.57							
Mer.pass. 20:12 $\nu 2.0' \ d$ -0.4' m-4.85 $\nu 1.4' \ d$ -0.3' m0.67 $\nu 2.3' \ d$ -0.1' m-2.10 $\nu 2.6' \ d$ -0.0' m0.54							
	Mer	nass 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	$\nu$ 2 6' d-0.0' m0.54	
		Puss. 20.12	ν 2.0 u-0.τ III-4.03	ν 1.¬ u-0.5 III0.07	ν 2.5 d-0.1 III-2.10	ν 2.0 u-0.0 III0.J4	

	Stars	
	SHA	Dec
Alpheratz	357°32.97	29°14.59
Ankaa Schedar	353°5.37 349°28.87	-42°9.65 56°41.38
Diphda	348°45.53	-17°50.29
Achernar	335°18.55	-57°6.06
Hamal	327°49.15 312°43.90	23°35.53 89°22.67
Polaris Acamar	312°43.90 315°10.20	-40° 11.75
Menkar	314°4.23	4°11.82
Mirfak	308°25.55	49°57.47
Aldebaran	290°37.54 281°2.10	16°33.85 -8°10.13
Rigel Capella	280°19.20	-6 10.13 46°1.43
Bellatrix	278°20.95	6°22.50
Elnath	277°59.61	28° 37.78
Alnilam	275°35.90 270°50.16	-1°11.00 7°24.77
Betelgeuse Canopus	263°51.30	-52°42.34
Sirius	258°24.66	-16°45.04
Adhara	255°4.42	-29°0.32
Procyon	244°49.08	5°9.38 27°57.56
Pollux Avior	243°15.28 234°13.89	-59°35.42
Suhail	222°45.13	-43°32.20
Miaplacidus	221°37.82	-69°49.31
Alphard	217°46.25 207°32.87	-8°46.42 11°50.11
Regulus Dubhe	207°32.87 193°39.43	11°50.11 61°36.07
Denebola	182°23.59	14°25.26
Gienah	175°42.24	-17°41.37
Acrux	172°58.87 171°50.35	-63°14.67 -57°15.62
Gacrux Alioth	171°50.35 166°12.10	-57° 15.62 55° 48.64
Spica	158°20.98	-11° 18.03
Alkaid	$152^{\circ}51.27$	49° 10.61
Hadar	148°34.45	-60°30.02
Menkent Arcturus	147°56.20 145°46.86	-36°30.02 19°2.53
Rigil Kent.	139°38.85	-60°56.68
Kochab	137°21.04	74°2.56
Zuben'ubi	136°54.68 126°2.84	-16°9.14 26°37.47
Alphecca Antares	120 2.04 112°14.34	-26°29.45
Atria	107°7.71	-69°4.57
Sabik	102°1.37	-15°45.44
Shaula	96°8.68 95°57.45	-37°7.40 12°32.53
Rasalhague Eltanin	95 57.45 90°41.93	51° 29.27
Kaus Aust.	83°30.82	-34°22.32
Vega	80°32.51	38°48.70
Nunki Altair	75°46.14	-26°15.79
Peacock	61°58.64 53°3.56	8°56.51 -56°39.07
Deneb	49°24.90	45° 22.88
Enif	33°37.31	10°0.08
Al Na'ir Fomalhaut	27°30.98 15°12.74	-46°49.98 -29°28.82
Scheat	15 12.74 13°43.60	-29 28.82 28°13.99
Markab	13°28.27	15°21.21
Nov 15 Sun	SHA	Mer.pass
Venus	159°22.32	09:45
Mars	211°44.62	06:16
Jupiter Saturn	211°42.27 351°7.49	06:16 20:56
Nov 16 Mon	SHA	Mer.pass
Venus	159°13.91	09:41
Mars	211°17.93	06:14
Jupiter	211°37.29	06:12
Saturn	351°9.98	20:51
Nov 17 Tue	SHA 150°3 //3	Mer.pass
Venus Mars	159°3.43 210°51.52	09:38 06:12
Jupiter	211°32.46	06:09
Saturn	351°12.38	20:47
Horizon	ıtal parallax	
	Venus:	0.4

Venus: Mars: 0.4 0.1

h	Sun		Moon				
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	183°52.35	S18°25.67	$116^{\circ}16.07$	12.4'	<b>S</b> 23°31.62	-7.7'	54.1'
1	198°52.25	26.31	130°47.42	12.4'	23°23.88	-7.8'	54.1'
2	213°52.15 228°52.05	26.95 •• 27.59	145°18.83 159°50.29	12.5' 12.5'	23°16.03 23°8.08	-8.0' -8.1'	54.1' 54.1'
4	243°51.94	28.23	174°21.80	12.6'	23°0.03	-8.2'	54.1'
5	258°51.84	28.87	$188^{\circ}53.37$	12.6'	$22^{\circ}51.87$	-8.3'	54.1'
6	273°51.73	\$18°29.51	203°24.99	12.7'	\$22°43.61	-8.4'	54.2'
7 8	288°51.63 303°51.52	30.14 30.78	217°56.66 232°28.39	12.7' 12.8'	22°35.25 22°26.79	-8.5' -8.6'	54.2' 54.2'
9	318°51.42	31.41	247°0.17	12.8'	22°18.23	-8.7'	54.2'
10	333°51.31	32.05	261°32.00	12.9'	$22^{\circ}9.58$	-8.8'	54.2'
11	348°51.21	32.68 \$18°33.32	276°3.89 290°35.83	12.9'	22°0.82 \$21°51.96	-8.9'	54.2'
12 13	3°51.10 18°50.99	33.95	290°35.83 305°7.82	13.0' 13.0'	21°43.01	-9.0' -9.0'	54.2' 54.2'
14	33°50.89	34.59	319°39.87	13.1'	21°33.97	-9.1'	54.2'
15	48°50.78	•• 35.22	334°11.97	13.1'	21°24.82	-9.2'	54.3'
16	63°50.67 78°50.56	35.85	348°44.12 3°16.32	13.2'	21°15.59 21°6.26	-9.3'	54.3'
17 18	93°50.45	36.48 \$18°37.11	3°16.32 17°48.57	13.3' 13.3'	\$20°56.83	-9.4' -9.5'	54.3' 54.3'
19	108°50.34	37.74	32°20.87	13.4	20°47.31	-9.6'	54.3'
20	123°50.23	38.37	$46^{\circ}53.23$	13.4'	$20^{\circ}37.71$	-9.7'	54.3'
21	138°50.12	• • 39.00	61°25.63	13.5'	20°28.00	-9.8'	54.3'
22 23	153°50.01 168°49.90	39.63 40.26	75°58.09 90°30.59	13.5' 13.6'	20°18.21 20°8.33	-9.9' -10.0'	54.3' 54.4'
23	SD = 16.2'		- 50 50.59			10.0	J r. <del>-1</del>
	$3\nu = 10.2'$	d = 0.6'		51	D = 14.8'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°49.79	S18°40.88	105°3.14	13.6'	S19°58.36	-10.1'	54.4'
1 2	198°49.68 213°49.57	41.51 42.14	119°35.75 134°8.40	13.6' 13.7'	19°48.30 19°38.16	-10.1' -10.2'	54.4' 54.4'
3	213°49.57 228°49.46	42.14 · · 42.76	134°8.40 148°41.09	13.7'	19°38.16 19°27.93	-10.2 -10.3	54.4'
4	243°49.35	43.39	163°13.84	13.8'	19°17.61	-10.4	54.4'
5	258°49.23	44.01	177°46.63	13.8'	19°7.20	-10.5'	54.5'
6	273°49.12	\$18°44.63	192°19.47 206°52.35	13.9'	\$18°56.71 18°46.14	-10.6'	54.5'
7 8	288°49.01 303°48.89	45.26 45.88	206°52.35 221°25.28	13.9' 14.0'	18° 46.14 18° 35.48	-10.7' -10.7'	54.5' 54.5'
9	318°48.78	• • 46.50	235°58.25	14.0'	18°24.74	-10.8'	54.5'
10	333°48.67	47.12	250°31.27	14.1'	$18^{\circ}13.91$	-10.9'	54.5'
11	348°48.55 3°48.44	47.74 \$18°48.37	265°4.33 279°37.43	14.1'	18°3.01 \$17°52.02	-11.0'	54.6'
12 13	18°48.44	48.98	279°37.43 294°10.58	14.1' 14.2'	17°40.96	-11.1' -11.1'	54.6' 54.6'
14	33°48.20	49.60	308°43.76	14.2'	17°29.81	-11.2	54.6'
15	48°48.09	•• 50.22	323°16.99	14.3'	17°18.59	-11.3'	54.6'
16	63°47.97 78°47.86	50.84 51.46	337°50.26 352°23.56	14.3' 14.3'	17°7.28 16°55.90	-11.4' -11.5'	54.6' 54.7'
17 18	93°47.74	\$1.40 \$18°52.07	6°56.91	14.4	516°44.45	-11.5'	54.7'
19	108°47.62	52.69	21°30.29	14.4'	16°32.91	-11.6'	54.7'
20	123°47.50	53.31	36°3.71		16°21.30		54.7'
21 22	138°47.38 153°47.27	· · 53.92 54.54	50°37.17 65°10.66	14.5' 14.5'	16°9.62 15°57.86	-11.8' -11.8'	54.7' 54.8'
23	168°47.15	55.15	79°44.19	14.6'	15°46.03	-11.6 -11.9'	54.8'
	SD = 16.2'	d = 0.6'			D = 14.8'		
	3D = 10.2	<u>u = 0.0</u>		- 31	J = 14.0		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	183°47.03 198°46.91	\$18°55.76 56.38	94°17.75 108°51.35	14.6' 14.6'	\$15°34.13 15°22.15	-12.0' -12.0'	54.8' 54.8'
2	198°46.91 213°46.79	56.38 56.99	108°51.35 123°24.98	14.6 14.7'	15° 22.15 15° 10.11	-12.0 -12.1'	54.8° 54.9°
3	228°46.67	• • 57.60	137°58.64	14.7'	14°57.99	-12.2'	54.9'
4	243°46.55	58.21	152°32.33	14.7'	14°45.80	-12.3'	54.9'
5 6	258°46.42 273°46.30	58.82 \$18°59.43	167°6.05 181°39.81	14.8' 14.8'	14°33.54 \$14°21.22	-12.3' -12.4'	54.9' 54.9'
7	273 46.30 288°46.18	19°0.04	181 39.81 196°13.59	14.8'	14°8.83	-12.4 -12.5'	54.9 55.0'
8	303°46.06	0.65	210°47.39	14.8'	13°56.36	-12.5'	55.0'
9	318°45.94	• • 1.26	225°21.23	14.9'	13°43.84	-12.6'	55.0'
10 11	333°45.81 348°45.69	1.86 2.47	239°55.09 254°28.97	14.9' 14.9'	13°31.24 13°18.58	-12.7' -12.7'	55.0' 55.1'
11	348 45.69 3°45.57	2.47 \$19°3.08	254° 28.97 269° 2.88	14.9'	\$13° 18.58 \$13° 5.86	-12.7' -12.8'	55.1'
13	18°45.44	3.68	283°36.82	15.0'	12°53.07	-12.9'	55.1'
14	33°45.32	4.29	298°10.77	15.0'	12°40.22	-12.9'	55.1'
15 16	48°45.19 63°45.07	• • 4.89 5.50	312°44.75 327°18.74	15.0' 15.0'	12°27.31 12°14.33	-13.0' -13.0'	55.2' 55.2'
16 17	63°45.07 78°44.94	5.50 6.10	327° 18.74 341° 52.76	15.0' 15.0'	12°14.33 12°1.30	-13.0 -13.1'	55.2' 55.2'
18	93°44.82	S19°6.70	356°26.80	15.1'	S11°48.20	-13.2'	55.2'
19	108°44.69	7.30	11°0.85	15.1'	11°35.04	-13.2'	55.3'
20 21	123°44.57 138°44.44	7.90 •• 8.51	25°34.92 40°9.00	15.1' 15.1'	11°21.83 11°8.55	-13.3' -13.3'	55.3' 55.3'
21	138°44.44 153°44.31	9.11	40°9.00 54°43.10	15.1'	11°8.55 10°55.22	-13.3' -13.4'	55.4'
23	168°44.18	9.71	69°17.21	15.1	10°41.83	-13.4	55.4'
	SD = 16.2'	d = 0.6'		SI	O = 14.9'		

Lat.	Twilight		Sunrise	Sunset	Twilight		
Lat.	Naut.	Civil	Juliuse	Sunset	Civil	Naut.	
N 72°	07:03	08:39	11:31	11:57	14:49	16:25	
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 60°	////	02:09	03:12	20:19	21:23	////	
				1			

Lat.		Moonris	е		Moonset	:
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
<b>N</b> 72°		16:17	15:02		19:07	21:53
<b>N</b> 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	
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	07:26	08:56	10:24	01:30	01:35	01:37

## 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°3.35	215°54.28	267°28.75 N14°29.47	268°31.14 N13°32.93	48°18.05 N00°54.54	
1	72°5.81	230°56.18 43.41	282°30.13 29.15	283°33.42 32.88	63°20.61 54.51	Al
2	87°8.28	245°58.07 43.07	297°31.51 28.83	298°35.69 32.82	78°23.17 54.48	
3	102° 10.74	260°59.97 · · 42.73	312°32.89 · · 28.51	313°37.96 · · 32.76	93°25.73 · · 54.45	
4	117° 13.20	276°1.86 42.39	327°34.28 28.19	328°40.24 32.71	108°28.29 54.42	
5	132° 15.67	291°3.74 42.05	342°35.66 27.87	343°42.51 32.65	123°30.85 54.39	A
6	147° 18.13	306°5.63 S09°41.72	357°37.04 N14°27.56	358°44.79 N13°32.59	138°33.40 N00°54.36	
7	162°20.60	321°7.51 41.39	12°38.43 27.24	13°47.06 32.54	153°35.96 54.32	
8	177°23.06	336°9.38 41.06	27°39.81 26.92	28°49.34 32.48	168°38.52 54.29	
9	192°25.52	351°11.25 · · 40.73	42°41.20 · · 26.60	43°51.61 · · 32.43	183°41.08 · · 54.26	
10	207°27.99	6°13.12 40.41	57°42.59 26.28	58°53.89 32.37	198°43.64 54.23	
11	222°30.45	21°14.99 40.08	72°43.97 25.97	73°56.17 32.31	213°46.19 54.20	Al
12	237°32.92	36°16.85 S09°39.76	87°45.36 N14°25.65	88°58.44 N13°32.26	228°48.75 N00°54.17	
13	252°35.38	51°18.71 39.44	102°46.75 25.33	104° 0.72 32.20	243°51.31 54.14	.
14	267°37.84	66°20.57 39.13	117° 48.14 25.01	119° 3.00 32.15	258°53.86 54.11	"
15	282°40.31	81°22.42 · · 38.81	132°49.52 · · 24.70	134°5.27 · · 32.09	273°56.42 · · 54.08	
16	297° 42.77	96°24.27 38.50	147°50.91 24.38	149°7.55 32.04	288°58.98 54.05	D.
17	312°45.24	111°26.11 38.18	162°52.30 24.06	164° 9.83 31.98	304°1.53 54.02	Bet
18	327°47.70	126°27.96 <b>S</b> 09°37.87	177°53.69 N14°23.74	179°12.11 N13°31.93	319°4.09 N00°53.99	
19	$342^{\circ}50.16$	141°29.80 37.57	192°55.08 23.43	194°14.39 31.87	334°6.65 53.96	
20	357°52.63	156°31.63 37.26	207°56.48 23.11	209°16.66 31.82	349°9.20 53.93	,
21	12°55.09	171°33.46 · · 36.96	222°57.87 · · 22.79	224°18.94 · · 31.76	4°11.76 · · 53.90	'
22	27°57.56	186°35.29 36.66	237°59.26 22.48	239°21.22 31.71	19°14.31 53.87	
23	43°0.02	201°37.12 36.36	253°0.65 22.16	254°23.50 31.65	34°16.87 53.84	
Merr	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	$\nu$ 2.6' d-0.0' m0.54	Mia
10101.	20.00	ν1.9 u-0.5 III-4.07		V2.5 G-0.1 III-2.10	V2.0 U-0.0 1110.54	IVIIIa
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	
0	58°2.49	216°38.94 <b>S</b> 09°36.06	268°2.05 N14°21.85	269°25.78 N13°31.60	49°19.43 N00°53.81	D
1	73°4.95	231°40.76 35.76	283°3.44 21.53	284°28.06 31.55	64°21.98 53.78	
2	88°7.41	246° 42.57 35.47	298°4.83 21.21	299°30.34 31.49	79°24.54 53.75	
3	103°9.88	261°44.39 · · 35.18	313°6.23 · · 20.90	314°32.62 · · 31.44	94°27.09 · · 53.72	
4	118° 12.34	276°46.20 34.89	328°7.62 20.58	329°34.91 31.38	109°29.65 53.69	
5	133° 14.81	291°48.00 34.60	343°9.02 20.27	344°37.19 31.33	124°32.20 53.66	
6	148° 17.27	306°49.80 <b>S</b> 09°34.31	358°10.42 N14°19.95	359°39.47 N13°31.28	139°34.76 N00°53.64	
7	163° 19.73	321°51.60 34.03	13°11.81 19.64	14°41.75 31.22	154°37.31 53.61	
8	178°22.20	336°53.40 33.74	28°13.21 19.32	29°44.03 31.17	169°39.86 53.58	_ N
9	193°24.66	351°55.19 · · 33.46	43°14.61 · · 19.00	44°46.32 · · 31.11	184°42.42 · · 53.55	_ A
10	208°27.13	6°56.98 33.18	58°16.01 18.69	59°48.60 31.06	199°44.97 53.52	Rig
11	223°29.59	21°58.77 32.91	73°17.41 18.37	74°50.88 31.01	214°47.53 53.49	
12	238°32.05	37°0.55 S09°32.63	88°18.80 N14°18.06	89°53.17 N13°30.95	229°50.08 N00°53.46	Zu
13	253°34.52	52°2.33 32.36	103°20.20 17.75	104°55.45 30.90	244°52.63 53.43	A
14	268°36.98	67°4.10 32.09	118°21.60 17.43	119°57.73 30.85	259°55.19 53.40	
15	283° 39.45	82°5.88 · · 31.82	133°23.01 · · 17.12	135°0.02 · · 30.80	274°57.74 · · 53.38	İ
16	298°41.91	97°7.65 31.55	148°24.41 16.80	150°2.30 30.74	290°0.29 53.35	
17	313°44.37	112°9.41 31.29	163°25.81 16.49	165° 4.59 30.69	305°2.85 53.32	İ
18	328° 46.84	127°11.17	178°27.21 N14°16.17	180° 6.87 N13° 30.64 195° 9.16 30.58	320°5.40 N00°53.29	Ras
19	343° 49.30 358° 51.77	142°12.93 30.77 157°14.69 30.51	193°28.61 15.86 208°30.02 15.55		335°7.95 53.26 350°10.50 53.23	
20 21	13° 54.23	157°14.69 30.51 172°16.44 · · 30.25	208°30.02 15.55 223°31.42 · · 15.23	210°11.44 30.53 225°13.73 · · 30.48	350°10.50 53.23 5°13.06 · · 53.21	Kaı
22	28° 56.69	187°18.19 29.99	238°32.83 14.92	240°16.02 30.43	20°15.61 53.18	
23	43°59.16	202°19.94 29.74	253°34.23 14.61	255°18.30 30.38	35°18.16 53.15	
_						
Mer.p	pass. 20:05	$\nu 1.8' \ d$ -0.3' m-4.88	$\nu 1.4' \ d$ -0.3' m0.64	$\nu 2.3' \ d\text{-}0.1' \ \text{m-}2.11$	$ u 2.6' \ d$ -0.0' m0.55	F
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	
6 0	<b>GПА</b> 59°1.62	<b>GHA Dec</b> 217°21.68 <b>S</b> 09°29.49	268°35.64 N14°14.29	270°20.59 N13°30.32	50°20.71 N00°53.12	
1	74°4.09	232°23.42 29.24	283°37.04 114.29	285°22.88 30.27	65°23.26 53.09	For
2	89°6.55	247°25.16 28.99	298°38.45 13.67	300°25.16 30.22	80°25.82 53.07	
3	104°9.02	262°26.89 · · 28.75	313°39.86 · · 13.35	315°27.45 · · 30.17	95°28.37 · · 53.04	
4	119° 11.48	277°28.62 28.50	328°41.26 13.04	330°29.74 30.12	110°30.92 53.01	Nov
5	134° 13.94	292°30.35 28.26	343°42.67 12.73	345°32.03 30.07	125°33.47 52.98	
6	149° 16.41	307°32.07 S09°28.02	358°44.08 N14°12.41	0°34.32 N13°30.01	140°36.02 N00°52.96	
7	164° 18.87	322°33.80 27.78	13°45.49 12.10	15°36.61 29.96	155°38.57 52.93	
8	179°21.34	337°35.51 27.55	28°46.90 11.79	30°38.89 29.91	170°41.12 52.90	
9	194°23.80	352°37.23 · · 27.31	43°48.31 · · 11.48	45°41.18 · · 29.86	185°43.67 · · 52.87	-
10	209°26.26	7°38.94 27.08	58°49.72 11.16	60°43.47 29.81	200°46.22 52.85	Nov
11	224°28.73	22°40.65 26.85	73°51.13 10.85	75°45.76 29.76	215°48.77 52.82	
12	239°31.19	37°42.35 S09°26.62	88°52.54 N14°10.54	90°48.05 N13°29.71	230°51.32 N00°52.79	
13	254° 33.66	52°44.05 26.39	103°53.95 10.23	105°50.35 29.66	245°53.87 52.77	
14	269° 36.12	67°45.75 26.17	118°55.36 9.92	120°52.64 29.61	260°56.42 52.74	L
15	284°38.58	82°47.45 · · 25.95	133°56.78 · · 9.61	135°54.93 · · 29.56	275°58.97 · · 52.71	No
16	299°41.05	97°49.14 25.73	148°58.19 9.29	150°57.22 29.51	291°1.52 52.69	'**
17	314°43.51	112°50.83 25.51	163°59.61 8.98	165°59.51 29.46	306°4.07 52.66	
18	329°45.98	127°52.51 \$09°25.29	179°1.02 N14°8.67	181°1.80 N13°29.40	321°6.62 N00°52.63	
19	344°48.44	142°54.19 25.07	194°2.44 8.36	196° 4.10 29.35	336°9.17 52.61	
20	359°50.90	157°55.87 24.86	209° 3.85 8.05	211°6.39 29.30	351°11.72 52.58	
21	14°53.37	172°57.55 · · 24.65	224°5.27 · · 7.74	226° 8.68 · · 29.26	6°14.27 · · 52.55	
22	29°55.83	187°59.22 24.44	239°6.68 7.43	241°10.97 29.21	21°16.82 52.53	
23	44°58.30	203°0.89 24.23	254°8.10 7.12	256°13.27 29.16	36°19.36 52.50	
More	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	
ivier.	Jass. 20:01	ν 1.1 u-υ.∠ III-4.09	ν1.4 u-0.3 III0.03	ν Δ.Ο U-U.1 III-Δ.1Δ	ν Δ.υ	

	Stars	
	SHA	Dec
Alpheratz	357°32.98	29°14.59
Ankaa Schedar	353°5.38 349°28.88	-42°9.66 56°41.39
Diphda	349 20.00 348°45.54	-17°50.30
Achernar	335°18.56	-57°6.08
Hamal	327°49.15	23°35.54
Polaris	312°43.96 315°10.20	89°22.69 -40°11.76
Acamar Menkar	315 10.20 314°4.23	4°11.82
Mirfak	308°25.54	49°57.48
Aldebaran	290°37.53	16°33.85
Rigel	281°2.09 280°19.19	-8°10.13 46°1.44
Capella Bellatrix	280 19.19 278°20.94	6°22.50
Elnath	277°59.59	28°37.78
Alnilam	275°35.88	-1°11.01
Betelgeuse	270°50.15	7°24.77 -52°42.36
Canopus Sirius	263°51.28 258°24.64	-52 42.30 -16°45.05
Adhara	255°4.40	-29°0.33
Procyon	244°49.06	5°9.38
Pollux	243°15.25 234°13.86	27°57.56
Avior Suhail	234°13.86 222°45.10	-59°35.43 -43°32.20
Miaplacidus	221°37.78	-69°49.31
Alphard	$217^{\circ}46.23$	-8°46.43
Regulus	207°32.85	11°50.10
Dubhe Denebola	193°39.39 182°23.57	61°36.06 14°25.25
Gienah	175°42.22	-17°41.37
Acrux	$172^{\circ}58.84$	$-63^{\circ}14.66$
Gacrux	171°50.33	-57°15.61
Alioth Spica	166°12.07 158°20.97	55°48.62 -11°18.03
Alkaid	150° 51.25	49°10.60
Hadar	$148^{\circ}34.43$	$-60^{\circ}30.01$
Menkent	147°56.19	-36°30.01
Arcturus Rigil Kent.	145°46.85 139°38.83	19°2.52 -60°56.67
Kochab	137°21.03	74°2.54
Zuben'ubi	$136^{\circ}54.67$	$-16^{\circ}9.14$
Alphecca	126°2.83	26°37.46 -26°29.45
Antares Atria	112°14.34 107°7.72	-26°29.45 -69°4.55
Sabik	102°1.37	-15°45.44
Shaula	96°8.68	-37°7.39
Rasalhague	95°57.45	12°32.52 51°29.26
Eltanin Kaus Aust.	90°41.94 83°30.82	-34°22.32
Vega	80°32.52	38°48.69
Nunki	$75^{\circ}46.14$	$-26^{\circ}15.80$
Altair	61°58.66	8°56.50
Peacock Deneb	53°3.58 49°24.92	-56°39.07 45°22.87
Enif	33°37.32	10°0.07
Al Na'ir	$27^{\circ}30.99$	-46°49.98
Fomalhaut	15°12.75	-29°28.83
Scheat Markab	13°43.61 13°28.28	28°13.99 15°21.20
Nov 18 Wed	SHA	
Venus	5HA 158°50.93	Mer.pass 09:35
Mars	210°25.40	06:10
Jupiter	211°27.80	06:05
Saturn	351°14.71	20:43
Nov 19 Thu Venus	<b>SHA</b> 158°36.46	Mer.pass 09:32
Venus Mars	209°59.56	09:32
Jupiter	211°23.30	06:01
Saturn	351°16.94	20:39
Nov 20 Fri	SHA	Mer.pass
Venus	158°20.06	09:29
Mars Jupiter	209°34.01 211°18.97	06:05 05:58
Saturn	351°19.09	20:35
Horizon	ıtal parallax	
1 1011201	Venus:	0.4
	Mars:	0.1

, i i —	011-010 =	+0.1225 sec	<u> </u>	-011	_ \05.0017	300	
h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	183°44.06	\$19°10.30	83°51.34	15.1'	\$10°28.38	-13.5'	55.4'
1	198°43.93	10.90	98°25.48	15.1'	10°14.88	-13.6'	55.4'
2	213°43.80	11.50	112°59.62	15.2'	10°1.33	-13.6'	55.5'
3	228°43.67	• • 12.10	127°33.78	15.2'	09°47.72	-13.7'	55.5'
4	243°43.54	12.69	$142^{\circ}7.94$	15.2'	09°34.05	-13.7'	55.5'
5	258°43.41	13.29	156°42.12	15.2'	09°20.33	-13.8'	55.6'
6	273°43.28	S19°13.89	171°16.30	15.2'	S09°6.56	-13.8'	55.6'
7	288°43.15	14.48	185°50.48	15.2'	08°52.74	-13.9'	55.6'
8	303°43.02	15.08	200°24.67	15.2'	08°38.87	-13.9'	55.6'
9 10	318°42.89 333°42.76	· · 15.67 16.26	214°58.86 229°33.05	15.2' 15.2'	08°24.95 08°10.98	-14.0' -14.0'	55.7' 55.7'
11	348°42.63	16.85	244°7.24	15.2'	07°56.96	-14.1'	55.7'
12	3°42.49	\$19°17.45	258°41.44	15.2'	507°42.89	-14.1'	55.8'
13	18°42.36	18.04	273°15.63	15.2'	07°28.77	-14.2'	55.8'
14	33°42.23	18.63	287°49.82	15.2'	07°14.61	-14.2'	55.8'
15	48°42.10	• • 19.22	$302^{\circ}24.00$	15.2'	07°0.40	-14.3'	55.9'
16	63°41.96	19.81	$316^{\circ}58.18$	15.2'	06°46.15	-14.3'	55.9'
17	78°41.83	20.40	331°32.36	15.2'	06°31.85	-14.3'	55.9'
18	93°41.69	S19°20.98	346°6.53	15.2'	S06°17.51	-14.4'	56.0'
19	108°41.56	21.57	0°40.69	15.1'	06°3.13	-14.4'	56.0'
20	123°41.43	22.16	15°14.84	15.1'	05°48.70	-14.5'	56.0'
21 22	138°41.29 153°41.15	· · 22.75 23.33	29°48.97 44°23.10	15.1' 15.1'	05°34.24 05°19.73	-14.5' -14.5'	56.1' 56.1'
23	168°41.15	23.33	58°57.22	15.1' 15.1'	05°19.73 05°5.19	-14.5' -14.6'	56.1
23			- 33 31.22			17.0	50.1
	SD = 16.2'	d = 0.6'		SI	D = 15.1'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
1 nu 0	БПА 183°40.88	S19°24.50	73°31.32	u 15.1'	S04°50.60	a -14.6'	56.2'
1	198°40.75	25.09	88°5.40	15.1'	04°35.98	-14.7'	56.2'
2	213°40.61	25.67	102°39.47	15.0'	04°21.32	-14.7'	56.2'
3	228°40.47	• • 26.25	$117^{\circ}13.52$	15.0'	04°6.62	-14.7'	56.3'
4	243°40.33	26.83	131°47.55	15.0'	03°51.89	-14.8'	56.3'
5	258°40.20	27.42	146°21.56	15.0'	03°37.12	-14.8'	56.3'
6	273°40.06	S19°28.00	160°55.55	15.0'	503°22.32	-14.8'	56.4'
7	288°39.92	28.58	175°29.51	14.9'	03°7.49	-14.9'	56.4
8	303°39.78	29.16	190°3.46	14.9'	02°52.62	-14.9'	56.4'
9	318°39.64 333°39.50	• • 29.74	204°37.37 219°11.26	14.9' 14.9'	02°37.73 02°22.80	-14.9'	56.5' 56.5'
10 11	333 39.50 348°39.36	30.31 30.89	219 11.20 233°45.12	14.9 14.8'	02 22.80 02°7.84	-15.0' -15.0'	56.6'
12	3°39.22	\$19°31.47	248°18.96	14.8'	S01°52.85	-15.0'	56.6
13	18°39.08	32.05	262°52.76	14.8'	01°37.84	-15.0'	56.6'
14	33°38.94	32.62	277°26.53	14.7'	01°22.80	-15.1'	56.7'
15	48°38.80	• • 33.20	292°0.27	14.7'	01°7.73	-15.1'	56.7'
16	63°38.65	33.77	306°33.97	14.7'	00°52.64	-15.1'	56.7'
17	78°38.51	34.35	321°7.64	14.6'	00°37.52	-15.1'	56.8'
18	93°38.37	S19°34.92	335°41.27	14.6'	500°22.39	-15.2'	56.8'
19	108°38.23	35.49 36.06	350°14.86 4°48.42	14.6'	\$00°7.22 N00°7.96	-0	56.8'
20 21	123°38.08 138°37.94	36.06	4°48.42 19°21.93	14.5' 14.5'	00°23.16	15.2' 15.2'	56.9' 56.9'
22	150 37.94 153°37.80	37.21	33°55.40	14.5 14.4'	00°23.10	15.2'	50.9 57.0'
23	168°37.65	37.78	48°28.83	14.4	00°53.63	15.3'	57.0'
			.5 20.05		D = 15.3'	_0.0	-15
	SD = 16.2'	d = 0.6'		SI	$\nu = 15.3'$		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	183°37.51	S19°38.35	63°2.21	ν 14.3'	N01°8.89	15.3'	57.0'
1	198°37.36	38.92	77°35.55	14.3'	01°24.16	15.3'	57.1
2	213°37.22	39.49	92°8.83	14.2'	01°39.45	15.3'	57.1'
3	228°37.07	• • 40.05	106°42.07	14.2'	$01^{\circ}54.75$	15.3'	57.1'
4	243°36.93	40.62	121°15.26	14.1'	$02^{\circ}10.07$	15.3'	57.2'
5	258°36.78	41.19	135°48.40	14.1'	02°25.40	15.3'	57.2'
6	273°36.63	S19°41.75	150°21.48	14.0'	N02°40.74	15.4'	57.3'
7	288°36.49	42.32	164°54.51	14.0'	02°56.09	15.4'	57.3'
8 9	303°36.34 318°36.19	42.88 •• 43.45	179°27.49 194°0.41	13.9' 13.9'	03°11.45 03°26.82	15.4' 15.4'	57.3' 57.4'
9 10	318°36.19 333°36.04	44.01	194°0.41 208°33.27	13.9'	03°26.82 03°42.19	15.4' 15.4'	57.4° 57.4'
10	333 36.04 348°35.89	44.01 44.58	208 33.27 223°6.07	13.8	03 42.19 03°57.57	15.4' 15.4'	57.4° 57.5'
12	3°35.75	\$19°45.14	237°38.80	13.7'	N04°12.95	15.4	57.5
13	18°35.60	45.70	252°11.48	13.6'	04°28.34	15.4	57.5'
14	33°35.45	46.26	266°44.09	13.5'	04°43.73	15.4'	57.6'
15	48°35.30	• • 46.82	281°16.64	13.5'	$04^{\circ}59.11$	15.4'	57.6'
16	63°35.15	47.38	295°49.12	13.4'	05°14.50	15.4'	57.7'
17	78°35.00	47.94	310°21.53	13.3'	05°29.89	15.4'	57.7'
18	93°34.85	S19°48.50	324°53.87	13.3'	N05°45.27	15.4'	57.7'
19	108°34.69	49.06	339°26.14	13.2'	06°0.65	15.4'	57.8'
20	123°34.54	49.62	353°58.34	13.1'	06°16.02	15.4'	57.8'
21 22	138°34.39 153°34.24	· · 50.17 50.73	8°30.47 23°2.52	13.1' 13.0'	06°31.38 06°46.74	15.4' 15.3'	57.9' 57.9'
23	153°34.24 168°34.09	50.73 51.28	23°2.52 37°34.49	13.0 12.9'	06°46.74 07°2.09	15.3'	57.9' 57.9'
23			- 31 34.49			13.3	31.3
	SD = 16.2'	d = 0.6'		SI	D = 15.6'		

Lat.	Twilight		Sunrise	Sunset	Twilight	
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	07:13	08:53			14:37	16:16
<b>N</b> 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	80:80	15:22	16:13	17:05
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	////	02:00	03:06	20:27	21:34	////

Lat.		Moonris	e	Moonset		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°	14:22	13:49	13:17		00:04	02:11
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	11:51	13:19	14:50	01:38	01:39	01:39

	Sun			Moon		
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	9-11
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	55-74%
18	14:56	14:50	11:45	18:57	06:36	
19	14:44	14:37	11:45	19:40	07:19	
20	14:30	14:23	11:46	20:25		

## November 21, 22, 23 UT (Sat., Sun., Mon.)

h	Aries	Venus	Mars	Jupiter	Saturn
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	60°0.76	218°2.56 <b>S</b> 09°24.03	269° 9.52 N14° 6.81	271°15.56 N13°29.11	51°21.91 N00°52.47
1	75°3.22	233°4.22 23.82	284°10.94 6.50	286°17.86 29.06	66°24.46 52.45
2	90°5.69	248°5.88 23.62	299°12.36 6.19	301°20.15 29.01	81°27.01 52.42
3	105°8.15	263°7.54 · · 23.42 278°9.19	314°13.77 · · 5.88	316°22.45 · · 28.96 331°24.74 28.91	96°29.56 · · 52.40
4 5	120° 10.62 135° 13.08	278°9.19 23.22 293°10.84 23.03	329°15.19 5.57 344°16.61 5.26	331°24.74 28.91 346°27.04 28.86	111°32.10 52.37 126°34.65 52.34
6	150° 15.54	308°12.49 S09°22.83	359°18.04 N14°4.95	1°29.33 N13°28.81	141°37.20 N00°52.32
7	165° 18.01	323°14.14 22.64	14°19.46 4.64	16°31.63 28.76	156°39.75 52.29
8	180° 20.47	338° 15.78 22.45	29°20.88 4.33	31°33.92 28.71	171°42.29 52.27
9	195°22.94	353°17.42 · · 22.26	44°22.30 · · 4.02	46°36.22 · · 28.66	186°44.84 · · 52.24
10	210°25.40	8°19.05 22.07	59°23.72 3.71	61°38.52 28.62	201°47.39 52.22
11	225°27.87	23°20.68 21.89	74°25.15 3.40	76°40.81 28.57	216°49.93 52.19
12	240°30.33	38°22.31 <b>S</b> 09°21.70	89°26.57 N14°3.09	91°43.11 N13°28.52	231°52.48 N00°52.16
13	255° 32.79	53°23.94 21.52	104°28.00 2.79	106°45.41 28.47	246°55.02 52.14
14	270°35.26	68°25.56 21.34	119°29.42 2.48	121°47.71 28.42	261°57.57 52.11
15	285°37.72	83°27.18 · · 21.16	134°30.85 · · 2.17	136°50.01 · · 28.37	277°0.12 · · 52.09
16	300° 40.19	98°28.80 20.99	149°32.27 1.86	151°52.30 28.33	292°2.66 52.06
17	315° 42.65 330° 45.11	113°30.41 20.81 128°32.02 \$09°20.64	164°33.70 1.55 179°35.12 N14°1.24	166°54.60 28.28 181°56.90 N13°28.23	307°5.21 52.04 322°7.75 N00°52.01
18	330°45.11 345°47.58		179°35.12 N14°1.24 194°36.55 0.94		
19 20	345°47.58 0°50.04	143°33.63 20.47 158°35.23 20.30	194°36.55 0.94 209°37.98 0.63	196°59.20 28.18 212°1.50 28.14	337°10.30 51.99 352°12.84 51.96
21	0 50.04 15°52.51	173°36.83 · · 20.14	209 37.98 0.03 224°39.41 · · 0.32	212 1.50 28.14 227°3.80 · · 28.09	7°15.39 · · 51.94
22	30°54.97	188°38.43 19.97	239°40.84 14°0.01	242°6.10 28.04	22°17.93 51.91
23	45° 57.43	203°40.03 19.81	254°42.27 13°59.71	257°8.40 27.99	37°20.48 51.89
	pass. 19:57	$\frac{203 \cdot 40.03}{\nu 1.7' \cdot d - 0.2' \cdot m - 4.89}$	$\frac{234 \ 42.27 \ 13 \ 39.71}{\nu 1.4' \ d-0.3' \ m0.61}$	$\frac{237 \text{ d.40}}{\nu 2.3' \text{ d-0.0' m-2.12}}$	$\frac{37\ 20.46}{\nu 2.5'\ d-0.0'\ m0.56}$
ivier.p	pa55. 19:51	ν1.1 α-υ.∠ m-4.ŏ9	ν1.4 α-0.5 MU.01	ν2.3 α-0.0 m-2.12	ν∠.υ α-υ.υ mu.συ
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	60°59.90	218°41.62 \$09°19.65	269°43.70 N13°59.40	272°10.70 N13°27.95	52°23.02 N00°51.87
1	76°2.36	233°43.21 19.49	284°45.13 59.09	287°13.00 27.90	67°25.57 51.84
2	91°4.83	248°44.80 19.33	299°46.56 58.78	302°15.31 27.85	82°28.11 51.82
3	106°7.29	263°46.38 · · 19.18	314°47.99 · · 58.48	317°17.61 · · 27.81	97°30.66 · · 51.79
4	121°9.75	278°47.96 19.02	329°49.42 58.17	332°19.91 27.76	112°33.20 51.77
5	$136^{\circ}12.22$	293°49.53 18.87	344°50.86 57.86	347°22.21 27.71	127°35.74 51.74
6	151° 14.68	308°51.11 S09°18.72	359°52.29 N13°57.56	2°24.51 N13°27.67	142°38.29 N00°51.72
7	$166^{\circ}17.15$	323°52.68 18.57	14°53.72 57.25	17°26.82 27.62	157°40.83 51.70
8	181° 19.61	338° 54.25 18.42	29°55.16 56.95	32°29.12 27.57	172° 43.37 51.67
9	196°22.08	353°55.81 · · 18.28	44°56.59 · · 56.64	47°31.42 · · 27.53	187°45.92 · · 51.65
10	211°24.54	8°57.37 18.14	59°58.03 56.33	62°33.73 27.48	202°48.46 51.62
11	226° 27.00	23°58.93 18.00	74°59.46 56.03	77°36.03 27.44	217°51.00 51.60
12	241°29.47	39°0.49 \$09°17.86	90°0.90 N13°55.72	92°38.34 N13°27.39	232°53.54 N00°51.58
13	256° 31.93	54°2.04 17.72 69°3.59 17.58	105°2.34 55.42 120°3.77 55.11	107°40.64 27.34 122°42.95 27.30	247°56.09 51.55
14 15	271°34.40 286°36.86	69°3.59 17.58 84°5.14 · · 17.45	120°3.77 55.11 135°5.21 · · 54.81	122°42.95 27.30 137°45.25 •• 27.25	262°58.63 51.53 278°1.17 · · 51.51
16	301°39.32	99°6.68 17.32	150°6.65 54.50	152°47.56 27.21	293°3.71 51.48
17	316° 41.79	114°8.22 17.19	165° 8.09 54.20	167°49.86 27.16	308° 6.26 51.46
18	331° 44.25	129°9.76 S09°17.06	180° 9.53 N13° 53.89	182°52.17 N13°27.12	323°8.80 N00°51.44
19	346° 46.72	144°11.29 16.93	195°10.97 53.59	197°54.48 27.07	338°11.34 51.41
20	1°49.18	159°12.83 16.81	210°12.41 53.28	212°56.78 27.03	353°13.88 51.39
21	16°51.64	174°14.35 · · 16.69	225°13.85 · · 52.98	227°59.09 · · 26.98	8°16.42 · · 51.37
22	31°54.11	189°15.88 16.57	240°15.29 52.67	243°1.40 26.94	23°18.96 51.34
23	46°56.57	204°17.40 16.45	255°16.73 52.37	258° 3.71 26.89	38°21.50 51.32
Mer.p	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°59.04	219°18.92 <b>S</b> 09°16.33	270°18.18 N13°52.07	273°6.01 N13°26.85	53°24.04 N00°51.30
1	77°1.50	234°20.44 16.21	285°19.62 51.76	288° 8.32 26.80	68°26.58 51.28
2	92°3.97	249°21.95 16.10	300°21.06 51.46	303°10.63 26.76	83°29.12 51.25
3	107°6.43	264°23.46 · · 15.99	315°22.51 · · 51.16	318°12.94 · · 26.71	98°31.67 · · 51.23
4	122°8.89	279°24.97 15.88	330°23.95 50.85	333°15.25 26.67	113°34.21 51.21
5	137°11.36	294°26.48 15.77	345°25.40 50.55	348°17.56 26.63	128°36.75 51.19
6	152°13.82	309°27.98 S09°15.66	0°26.84 N13°50.25	3°19.87 N13°26.58	143°39.29 N00°51.16
7	167°16.29	324°29.48 15.56	15°28.29 49.94	18°22.18 26.54	158°41.82 51.14
8 9	182° 18.75 197° 21.21	339°30.98 15.45 354°32.47 •• 15.35	30°29.74 49.64 45°31.18 • 49.34	33°24.49 26.49 48°26.80 • 26.45	173°44.36 51.12 188°46.90 •• 51.10
10	212°23.68	9°33.96 15.25	45 31.18 · · 49.34 60°32.63 49.03	63°29.11 26.41	203°49.44 51.08
11	212 23.08 227°26.14	9 33.90 15.25 24°35.45 15.15	75°34.08 48.73	78°31.42 26.36	203 49.44 51.08 218°51.98 51.05
12	242° 28.61	39°36.93 S09°15.06	90°35.53 N13°48.43	93°33.73 N13°26.32	233°54.52 N00°51.03
13	257°31.07	54°38.41 14.96	105°36.98 48.13	108°36.04 26.28	248°57.06 51.01
14	272°33.54	69°39.89 14.87	120°38.43 47.83	123°38.36 26.23	263°59.60 50.99
15	287°36.00	84°41.37 · · 14.78	135°39.88 · · 47.52	138°40.67 · · 26.19	279°2.14 · · 50.97
16	302°38.46	99°42.84 14.69	150°41.33 47.22	153°42.98 26.15	294°4.67 50.95
17	$317^{\circ}40.93$	114°44.31 14.60	165°42.78 46.92	168°45.29 26.10	309°7.21 50.92
18	332°43.39	129°45.78 <b>S</b> 09°14.52	180°44.23 N13°46.62	183°47.61 N13°26.06	324°9.75 N00°50.90
19	347° 45.86	144°47.24 14.43	195°45.69 46.32	198°49.92 26.02	339°12.29 50.88
20	2°48.32	159°48.70 14.35	210°47.14 46.02	213°52.24 25.98	354°14.83 50.86
21	17°50.78	174°50.16 · · 14.27	225°48.59 · · 45.72	228°54.55 · · 25.93	9°17.36 · · 50.84
22	32°53.25	189°51.62 14.19	240°50.05 45.42	243°56.86 25.89	24°19.90 50.82
23	47°55.71	204°53.07 14.12	255°51.50 45.12	258°59.18 25.85	39°22.44 50.80
Mer.p	bass. 19:49	$\nu 1.5' \ d$ -0.1' m-4.90	ν1.4' d-0.3' m0.58	ν2.3' d-0.0' m-2.14	ν2.5′ <i>d</i> -0.0′ m0.57

	Stars	
	SHA	Dec
Alpheratz	357°32.99	29° 14.59
Ankaa Schedar	353°5.40 349°28.90	-42°9.67 56°41.40
Diphda	$348^{\circ}45.55$	-17°50.31
Achernar	335°18.57	-57°6.09 23°35.54
Hamal Polaris	327°49.15 312°44.00	23 35.54 89°22.71
Acamar	315°10.20	-40°11.77
Menkar	314°4.23 308°25.54	4°11.82
Mirfak Aldebaran	308°25.54 290°37.52	49°57.49 16°33.85
Rigel	281°2.08	-8°10.14
Capella	280°19.17	46°1.44
Bellatrix Elnath	278°20.93 277°59.58	6°22.49 28°37.79
Alnilam	275°35.87	-1°11.02
Betelgeuse	270°50.14	7°24.76
Canopus Sirius	263°51.26 258°24.62	-52°42.37 -16°45.06
Adhara	255°4.39	-10 45.00 -29°0.34
Procyon	244°49.04	5°9.37
Pollux	243°15.23	27°57.55
Avior Suhail	234°13.82 222°45.07	-59°35.44 -43°32.21
Miaplacidus	221°37.72	-69°49.32
Alphard	217°46.21	-8°46.43
Regulus Dubhe	207°32.83 193°39.35	11°50.09 61°36.05
Dubne Denebola	193 39.35 182°23.55	14°25.24
Gienah	175°42.21	-17°41.37
Acrux	172°58.80	-63°14.66
Gacrux Alioth	171°50.30 166°12.05	-57°15.61 55°48.60
Spica	158°20.96	-11°18.04
Alkaid	152°51.24	49° 10.58
Hadar Menkent	148°34.41 147°56.17	-60°30.00 -36°30.01
Arcturus	147 50.17 145°46.84	19°2.51
Rigil Kent.	139°38.82	-60°56.66
Kochab	137°21.02	74°2.52
Zuben'ubi Alphecca	136°54.66 126°2.83	-16°9.14 26°37.45
Antares	112° 14.34	-26°29.45
Atria	107°7.72	-69°4.54
Sabik Shaula	102°1.37 96°8.69	-15°45.44 -37°7.39
Rasalhague	95°57.46	12° 32.51
Eltanin	90°41.95	51°29.24
Kaus Aust.	83°30.83	-34°22.32
Vega Nunki	80°32.54 75°46.15	38° 48.68 -26° 15.79
Altair	61°58.67	8° 56.50
Peacock	53°3.61	-56°39.06
Deneb Enif	49°24.94 33°37.34	45°22.86 10°0.07
Al Na'ir	27°31.02	-46° 49.98
Fomalhaut	$15^{\circ}12.76$	-29°28.83
Scheat	13°43.63	28°13.99
Markab	13°28.29	15°21.20
Nov 21 Sat	<b>SHA</b> 158°1.80	Mer.pass
Venus Mars	209°8.76	09:27 06:03
Jupiter	211°14.80	05:54
Saturn	351°21.15	20:31
Nov 22 Sun	SHA	Mer.pass
Venus Mars	157°41.72 208°43.80	09:24 06:01
Jupiter	208 43.80 211°10.80	05:50
Saturn	351°23.12	20:27
Nov 23 Mon	SHA	Mer.pass
Venus	157°19.89	09:22
Mars Jupiter	208°19.14 211°6.98	05:58 05:47
Saturn	351°25.01	20:23
	atal paralles	

Horizontal parallax

Venus: Mars: 0.4 0.1

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	183°33.93	S19°51.84	52°6.39	12.8'	N07° 17.42	15.3'	58.0'
1	198°33.78	52.39	66°38.20	12.7'	07°32.75	15.3'	58.0'
2	213°33.63	52.95	81°9.94	12.7'	07°48.06	15.3'	58.1'
3	228°33.47	• • 53.50	95°41.59	12.6'	08°3.35	15.3'	58.1'
4 5	243°33.32 258°33.16	54.05 54.60	110°13.16 124°44.65	12.5' 12.4'	08° 18.63 08° 33.89	15.3' 15.2'	58.1' 58.2'
6	273°33.01	\$19°55.15	139° 16.05	12.4	N08° 49.13	15.2'	58.2'
7	288°32.85	55.71	153° 47.36	12.2'	09°4.35	15.2'	58.2'
8	303°32.70	56.26	168° 18.59	12.1'	09° 19.54	15.2'	58.3'
9	318°32.54	• • 56.80	$182^{\circ}49.72$	12.0'	09°34.71	15.1'	58.3'
10	333°32.39	57.35	197°20.76	11.9'	09°49.86	15.1'	58.4'
11 12	348°32.23 3°32.07	57.90 \$19°58.45	211°51.71 226°22.57	11.9' 11.8'	10°4.98 N10°20.07	15.1' 15.1'	58.4' 58.4'
13	3 32.07 18°31.91	58.99	240° 53.33	11.8	10°35.13	15.1 15.0'	58.5'
14	33°31.76	19° 59.54	255° 23.99	11.6'	10° 50.15	15.0'	58.5'
15	48°31.60	20°0.09	269° 54.56	11.5'	11°5.15	15.0'	58.6'
16	63°31.44	0.63	$284^{\circ}25.02$	11.4'	$11^{\circ}20.11$	14.9'	58.6'
17	78°31.28	1.18	298°55.39	11.3'	11°35.03	14.9'	58.6'
18	93°31.12	\$20°1.72	313°25.65	11.2'	N11°49.91	14.8'	58.7'
19 20	108°30.96 123°30.80	2.26 2.80	327°55.81 342°25.87	11.1' 10.9'	12°4.75 12°19.55	14.8' 14.8'	58.7'
20	123°30.80 138°30.64	2.80 · · 3.35	342°25.87 356°55.81	10.9	12° 19.55 12° 34.31	14.8	58.8' 58.8'
22	153°30.48	3.89	11°25.66	10.7	12°49.02	14.7'	58.8'
23	168°30.32	4.43	25° 55.39	10.6'	13°3.68	14.6'	58.9'
	SD = 16.2'	d = 0.6'	-	SI	0 = 15.8'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	183°30.16 198°30.00	\$20°4.97 5.51	40°25.02 54°54.53	10.5' 10.4'	N13° 18.29 13° 32.85	14.6' 14.5'	58.9' 58.9'
2	213°29.84	6.04	69° 23.93	10.4	13°47.36	14.5	56.9 59.0'
3	228°29.68	• • 6.58	83°53.22	10.2'	14°1.82	14.4'	59.0'
4	243°29.51	7.12	98°22.40	10.1'	$14^{\circ}16.21$	14.3'	59.1'
5	258°29.35	7.66	112°51.46	9.9'	14° 30.55	14.3'	59.1'
6	273°29.19 288°29.02	\$20°8.19 8.73	127°20.40 141°49.23	9.8' 9.7'	N14° 44.83 14° 59.05	14.2' 14.2'	59.1' 59.2'
7 8	303°28.86	9.26	156° 17.94	9.7 9.6'	14 59.05 15°13.20	14.1	59.2'
9	318°28.70	• • 9.80	170°46.53	9.5'	15°27.28	14.0'	59.2'
10	333°28.53	10.33	185° 15.00	9.3'	15°41.30	13.9'	59.3'
11	348°28.37	10.86	199°43.34	9.2'	15°55.24	13.9'	59.3'
12	3°28.20	S20°11.39	214° 11.57	9.1'	N16°9.12	13.8'	59.3'
13 14	18°28.04 33°27.87	11.92 12.46	228°39.67 243°7.65	9.0' 8.9'	16°22.92 16°36.64	13.7' 13.6'	59.4' 59.4'
15	48°27.71	. 12.40	257° 35.50	8.7'	16° 50.04	13.6'	59.4'
16	63°27.54	13.52	272°3.23	8.6'	17°3.84	13.5'	59.5'
17	78°27.37	14.04	$286^{\circ}30.83$	8.5'	$17^{\circ}17.33$	13.4'	59.5'
18	93°27.20	S20°14.57	300°58.31	8.3'	N17° 30.72	13.3'	59.6'
19	108°27.04	15.10	315°25.66	8.2'	17°44.03 17°57.25	13.2'	59.6'
20 21	123°26.87 138°26.70	15.63 •• 16.15	329°52.87 344°19.96	8.1' 8.0'	17 57.25 18° 10.38	13.1' 13.0'	59.6' 59.7'
22	153°26.53	16.68	358° 46.92	7.8'	18° 23.41	12.9'	59.7'
23	168°26.36	17.20	13° 13.75	7.7'	18°36.35	12.8'	59.7'
	SD = 16.2'	d = 0.5'		SE	D = 16.1'		
Mon 0	<b>GHA</b> 183°26.19	Dec \$20° 17.73	<b>GHA</b> 27° 40.45	u 7.6'	<b>Dec</b> N18° 49.19	d 12.7'	<b>HP</b> 59.7'
1	183 26.19 198°26.03	18.25	42°7.02	7.0 7.4'	19°1.93	12.7	59.7 59.8'
2	213°25.86	18.77	56° 33.45	7.3'	19° 14.57	12.5'	59.8'
3	228°25.69	• • 19.30	70°59.75	7.2'	$19^{\circ}27.10$	12.4'	59.8'
4	243°25.51	19.82	85°25.92	7.0'	19°39.53	12.3'	59.9'
5	258°25.34 273°25.17	20.34 \$20°20.86	99°51.96 114°17.87	6.9'	19°51.85 N20°4.05	12.2'	59.9'
6 7	273°25.17 288°25.00	21.38	114°17.87 128°43.64	6.8' 6.6'	N20°4.05 20°16.15	12.1' 12.0'	59.9' 60.0'
8	303°24.83	21.30	143°9.28	6.5	20° 10.13	11.9'	60.0'
9	318°24.66	• • 22.42	157° 34.78	6.4'	20°39.98	11.7'	60.0'
10	333°24.48	22.93	172°0.15	6.2'	20°51.72	11.6'	60.1'
11	348°24.31	23.45	186°25.39	6.1'	21°3.34	11.5'	60.1'
12	3°24.14 18°23.96	\$20°23.97	200°50.50 215°15.47	6.0'	N21°14.83 21°26.20	11.4'	60.1'
13 14	18°23.96 33°23.79	24.48 25.00	215°15.47 229°40.31	5.8' 5.7'	21°26.20 21°37.43	11.2' 11.1'	60.1' 60.2'
15	48°23.62	25.51	244°5.02	5.6'	21°48.54	11.0'	60.2'
16	63°23.44	26.03	258°29.60	5.4'	21°59.51	10.8'	60.2'
17	78°23.27	26.54	272°54.04	5.3'	22° 10.34	10.7'	60.2'
18	93°23.09	\$20°27.05	287° 18.35	5.2'	N22°21.04	10.6'	60.3'
19 20	108°22.92 123°22.74	27.57 28.08	301°42.53 316°6.59	5.1' 4.9'	22°31.59 22°42.00	10.4' 10.3'	60.3' 60.3'
21	123 22.74 138°22.56	28.08	310 0.59 330°30.51	4.9 4.8'	22 42.00 22°52.27	10.3	60.3
22	153°22.39	29.10	344° 54.30	4.7'	23°2.39	10.0'	60.4
23	$168^{\circ}22.21$	29.61	$359^{\circ}17.97$	4.5'	23°12.36	9.8'	60.4'
	SD = 16.2'	d = 0.5'		SE	0 = 16.3'		

	Twilight				Twilight	
Lat.		•	Sunrise	Sunset		•
	Naut.	Civil			Civil	Naut.
N 72°	07:24	09:08			14:24	16:08
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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	////
<b>S</b> 60°	////	01:50	02:59	20:35	21:45	////

Lat		Moonris	е	Moonset		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°	12:39	11:37		04:26	07:13	
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	16:27	18:11	20:04	01:39	01:40	01:43

	Sun			Moon		
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	12-14
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	83-96%
21	14:16	14:08	11:46	21:13	08:48	
22	14:01	13:53	11:46	22:05	09:38	
23	13:45	13:37	11:46	23:03	10:33	

## November 24, 25, 26 UT (Tue., Wed., Thu.)

h	Aries	Venus	Mars	Jupiter	Saturn
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	62°58.18	219°54.52 <b>S</b> 09°14.04	270°52.96 N13°44.81	274°1.49 N13°25.81	54°24.97 N00°50.77
1	78°0.64	234°55.97 13.97	285°54.42 44.51	289° 3.81 25.77	69°27.51 50.75
2	93°3.11	249°57.41 13.90	300°55.87 44.21	304° 6.13 25.72	84°30.05 50.73
3	108°5.57	264°58.85 · · 13.83	315°57.33 · · 43.91	319°8.44 · · 25.68	99°32.58 · · 50.71
4	123°8.03	280°0.29 13.76	330°58.79 43.61	334°10.76 25.64	114°35.12 50.69
5 6	138° 10.50 153° 12.96	295°1.73 13.69 310°3.16 \$09°13.63	346°0.24 43.31 1°1.70 N13°43.01	349°13.07 25.60 4°15.39 N13°25.56	129°37.66 50.67 144°40.19 N00°50.65
7	153 12.96 168° 15.43	310 3.16 <b>3</b> 09 13.63 325°4.59 13.57	1°1.70 N13°43.01 16°3.16 42.72	4°15.39 N13°25.56 19°17.71 25.52	159°42.73 50.63
8	183° 17.89	340°6.02 13.51	31° 4.62 42.42	34°20.03 25.47	174°45.26 50.61
9	198° 20.35	355°7.44 · · 13.45	46°6.08 · · 42.12	49°22.34 · · 25.43	189°47.80 · · 50.59
10	213°22.82	10°8.86 13.39	61°7.54 41.82	64°24.66 25.39	204°50.34 50.57
11	228°25.28	25°10.28 13.33	76° 9.00 41.52	79°26.98 25.35	219°52.87 50.55
12	243°27.75	40°11.70 <b>S</b> 09°13.28	91°10.47 N13°41.22	94°29.30 N13°25.31	234°55.41 N00°50.53
13	258° 30.21	55° 13.11 13.23	106°11.93 40.92	109°31.62 25.27	249°57.94 50.51
14	273°32.68	70°14.52 13.18	121°13.39 40.62	124°33.94 25.23	265°0.48 50.49
15	288° 35.14	85°15.93 ·· 13.13 100°17.33 13.08	136°14.85 · · 40.33 151°16.32 40.03	139°36.26 · · 25.19 154°38.58 25.15	280°3.01 · · 50.47 295°5.54 50.45
16 17	303°37.60 318°40.07	100°17.33 13.08 115°18.73 13.03	151°16.32 40.03 166°17.78 39.73	154°38.58 25.15 169°40.90 25.11	295°5.54 50.45 310°8.08 50.43
18	333° 42.53	130°20.13 S09°12.99	181°19.25 N13°39.43	184°43.22 N13°25.07	325°10.61 N00°50.41
19	348° 45.00	145°21.53 12.95	196°20.71 39.13	199°45.54 25.03	340°13.15 50.39
20	3°47.46	160°22.92 12.91	211°22.18 38.84	214°47.86 24.99	355°15.68 50.37
21	18°49.93	175°24.31 · · 12.87	226°23.65 · · 38.54	229°50.18 · · 24.95	10°18.21 · · 50.35
22	33°52.39	190°25.70 12.83	241°25.11 38.24	244°52.50 24.91	25°20.75 50.33
23	48°54.85	205°27.08 12.80	256°26.58 37.94	259°54.82 24.87	40°23.28 50.31
Mer.p	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
	6		- CUA -	- CIIIA -	- CUA
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0 1	63°57.32 78°59.78	220°28.47	271°28.05 N13°37.65 286°29.52 37.35	274°57.15 N13°24.83 289°59.47 24.79	55°25.81 N00°50.29 70°28.35 50.27
2	78°59.78 94°2.25	235°29.84 12.73 250°31.22 12.70	286°29.52 37.35 301°30.99 37.05	289°59.47 24.79 305°1.79 24.75	70°28.35 50.27 85°30.88 50.25
3	94 2.25 109°4.71	265°32.60 · · 12.67	316°32.46 · · 36.76	320°4.12 · · 24.71	100°33.41 · · 50.24
4	124°7.18	280°33.97 12.64	331°33.93 36.46	335° 6.44 24.67	115°35.95 50.22
5	139°9.64	295°35.33 12.62	346°35.40 36.17	350° 8.76 24.63	130°38.48 50.20
6	154° 12.10	310°36.70 <b>S</b> 09°12.60	1°36.87 N13°35.87	5°11.09 N13°24.59	145°41.01 N00°50.18
7	$169^{\circ}14.57$	325°38.06 12.57	16°38.34 35.57	20°13.41 24.55	160°43.54 50.16
8	184° 17.03	340°39.42 12.55	31°39.82 35.28	35°15.74 24.51	175°46.07 50.14
9	199° 19.50	355°40.78 · · 12.54	46°41.29 · · 34.98	50°18.06 · · 24.48	190°48.61 · · 50.12
10	214°21.96	10° 42.13 12.52	61°42.76 34.69	65°20.39 24.44	205°51.14 50.10
11	229° 24.42 244° 26.89	25°43.49 12.50 40°44.84 \$09°12.49	76°44.24 34.39 91°45.71 N13°34.10	80°22.71 24.40 95°25.04 N13°24.36	220°53.67 50.09 235°56.20 N00°50.07
12 13	244° 26.89 259° 29.35	55°46.18 12.48	91°45.71 N13°34.10 106°47.19 33.80	95°25.04 N13°24.36 110°27.36 24.32	250°58.73 50.05
14	259 29.35 274°31.82	70°47.52 12.47	100 47.19 33.60 121°48.66 33.51	110 27.30 24.32 125°29.69 24.28	266°1.26 50.03
15	289° 34.28	85°48.87 · · 12.46	136°50.14 · · 33.21	140°32.02 · · 24.25	281°3.79 · · 50.01
16	304° 36.75	100°50.20 12.45	151°51.62 32.92	155°34.34 24.21	296°6.32 49.99
17	319°39.21	115°51.54 12.45	166°53.10 32.63	170°36.67 24.17	311°8.85 49.98
18	334°41.67	130°52.87 <b>S</b> 09°12.44	181°54.57 N13°32.33	185°39.00 N13°24.13	326°11.38 N00°49.96
19	349°44.14	145°54.20 12.44	196°56.05 32.04	200°41.33 24.10	341°13.91 49.94
20	4°46.60	160°55.53 12.44	211°57.53 31.74	215°43.66 24.06	356°16.44 49.92
21	19°49.07	175°56.85 · · 12.44	226°59.01 · · 31.45	230°45.98 · · 24.02	11°18.97 · · 49.91
22	34°51.53	190°58.18 12.45	242°0.49 31.16	245°48.31 23.98	26°21.50 49.89
23	49°54.00	205°59.49 12.45	257°1.97 30.86	260°50.64 23.95	41°24.03 49.87
Mer.p	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
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	64° 56.46	221°0.81 S09°12.46	272°3.45 N13°30.57	275°52.97 N13°23.91	56°26.56 N00°49.85
1	79°58.92	236°2.13 12.46	287°4.94 30.28	290°55.30 23.87	71°29.09 49.84
2	95°1.39	251°3.44 12.47	302°6.42 29.98	305°57.63 23.84	86°31.62 49.82
3	$110^{\circ}3.85$	266°4.74 · · 12.49	317°7.90 · · 29.69	320°59.96 · · 23.80	101°34.15 · · 49.80
4	125°6.32	281°6.05 12.50	332°9.39 29.40	336° 2.29 23.76	116°36.68 49.78
5	140°8.78	296°7.35 12.51	347°10.87 29.11	351° 4.62 23.73	131°39.21 49.77
6	155°11.25	311°8.65 S09°12.53	2°12.35 N13°28.82	6°6.96 N13°23.69	146°41.73 N00°49.75
7	170°13.71	326°9.95 12.55	17°13.84 28.52	21°9.29 23.65	161°44.26 49.73
8 9	185° 16.17 200° 18.64	341°11.25 12.57 356°12.54 · · 12.59	32°15.33 28.23 47°16.81 · · 27.94	36°11.62 23.62 51°13.95 · · 23.58	176°46.79 49.72 191°49.32 • 49.70
10	200° 18.64 215° 21.10	11° 13.83 12.61	62°18.30 27.65	66°16.28 23.54	191°49.32 · · 49.70 206°51.85 49.68
11	230° 23.57	26°15.12 12.63	77°19.79 27.36	81°18.62 23.51	200 51.65 49.66 221°54.37 49.67
12	245°26.03	41°16.40 S09°12.66	92°21.28 N13°27.07	96°20.95 N13°23.47	236°56.90 N00°49.65
13	260° 28.50	56°17.68 12.69	107°22.76 26.78	111°23.28 23.44	251°59.43 49.63
14	275°30.96	71°18.96 12.72	122°24.25 26.48	126°25.62 23.40	267°1.96 49.62
15	$290^{\circ}33.42$	86°20.24 · · 12.75	137°25.74 · · 26.19	141°27.95 · · 23.37	282°4.48 · · 49.60
16	$305^{\circ}35.89$	101°21.51 12.78	152°27.23 25.90	156°30.29 23.33	297°7.01 49.58
17	320°38.35	116°22.78 12.81	167°28.72 25.61	171°32.62 23.30	312°9.54 49.57
18	335°40.82	131°24.05 S09°12.85	182°30.22 N13°25.32	186°34.96 N13°23.26	327°12.06 N00°49.55
19	350°43.28	146°25.32 12.89	197°31.71 25.03	201°37.29 23.23	342°14.59 49.53
20 21	5° 45.75 20° 48.21	161°26.58 12.92 176°27.84 · · 12.96	212°33.20 24.74 227°34.69 •• 24.45	216°39.63 23.19 231°41.96 · · 23.16	357°17.11 49.52 12°19.64 • 49.50
22	20°48.21 35°50.67	176°27.84 · · 12.96 191°29.10 13.01	242°36.19	246°44.30 23.12	27°22.17 49.49
23	50°53.14	206°30.36 13.05	257°37.68 23.88	261°46.63 23.09	42°24.69 49.47
	pass. 19:37	$\frac{13.05}{\nu 1.3' \ d0.0' \ \text{m-4.91}}$	$\frac{251.51.60}{\nu 1.5' \ d - 0.3' \ m0.54}$	$\frac{201 \text{ fo.ids}}{\nu 2.3' \text{ d-0.0' m-2.16}}$	$\nu 2.5' \ d$ -0.0' m0.58
		ν 1.0 αυ.υ III-τ.31	ν 1.5 α 0.5 III0.5τ	ν 2.0 d 0.0 HI-2.10	~ 2.0 G 0.0 III0.00

	Stars	
	SHA	Dec
Alpheratz	357°33.00	29°14.59
Ankaa Schedar	353°5.41 349°28.90	-42°9.68 56°41.41
Diphda	348°45.56	-17°50.31
Achernar	$335^{\circ}18.59$	$-57^{\circ}6.10$
Hamal	327°49.15	23°35.54
Polaris Acamar	312°43.78 315°10.20	89°22.72 -40°11.79
Menkar	314°4.22	4°11.81
Mirfak	308°25.53	49°57.50
Aldebaran Rigel	290°37.51 281°2.06	16°33.85 -8°10.15
Capella	280°19.15	-6 10.15 46°1.45
Bellatrix	$278^{\circ}20.91$	6°22.48
Elnath	277°59.56	28°37.78
Alnilam Betelgeuse	275°35.86 270°50.12	-1°11.03 7°24.75
Canopus	263°51.24	-52°42.39
Sirius	258°24.60	-16°45.08
Adhara	255°4.37 244°49.02	-29°0.36 5°9.36
Procyon Pollux	244 49.02 243°15.21	5 9.36 27°57.55
Avior	234°13.78	-59°35.45
Suhail	222°45.04	-43°32.23
Miaplacidus	221°37.66 217°46.18	-69°49.33 -8°46.45
Alphard Regulus	217°46.18 207°32.81	-8°46.45 11°50.08
Dubhe	193°39.31	61°36.03
Denebola	182°23.53	14°25.23
Gienah Acrux	175°42.18 172°58.76	-17°41.38 -63°14.66
Gacrux	172 58.76 171°50.26	-03 14.00 -57°15.61
Alioth	166°12.03	55°48.59
Spica	158°20.93	-11°18.04
Alkaid Hadar	152°51.22 148°34.37	49°10.56 -60°29.99
Menkent	146 34.37 147°56.15	-00 29.99 -36°30.01
Arcturus	$145^{\circ}46.82$	$19^{\circ}2.49$
Rigil Kent.	139°38.78	-60°56.65
Kochab Zuben'ubi	137°21.01 136°54.64	74°2.50 -16°9.14
Alphecca	126° 2.82	26°37.43
Antares	$112^{\circ}14.33$	-26°29.44
Atria Sabik	107°7.71 102°1.36	-69°4.52 -15°45.44
Shaula	96°8.69	-15 45.44 -37°7.38
Rasalhague	95°57.45	12°32.51
Eltanin	90°41.96	51°29.23
Kaus Aust. Vega	83°30.83 80°32.54	-34°22.31 38°48.67
Nunki	75°46.16	-26°15.79
Altair	$61^{\circ}58.67$	8°56.49
Peacock	53°3.63	-56°39.05
Deneb Enif	49°24.95 33°37.34	45°22.86 10°0.07
Al Na'ir	27°31.03	-46°49.98
Fomalhaut	15°12.78	-29°28.84
Scheat Markab	13°43.63 13°28.30	28°13.99 15°21.20
Nov 24 Tue Venus	<b>SHA</b> 156°56.34	Mer.pass 09:19
Mars	207°54.78	05:56
Jupiter	211°3.32	05:43
Saturn	351°26.80	20:19
Nov 25 Wed	SHA	Mer.pass
Venus Mars	156°31.15 207°30.73	09:17 05:54
Jupiter	210°59.83	05:39
Saturn	351°28.50	20:15
Nov 26 Thu	SHA	Mer.pass
Venus	156° 4.35	09:15
Mars Jupiter	207°6.99 210°56.51	05:51 05:36
Saturn	351°30.10	20:11
	ıtal parallax	
1 1011201	Venus:	0.4
	Mars:	0.1

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	183°22.03	S20°30.12	13°41.51	4.4'	N23°22.18	9.7'	60.4
1 2	198°21.86 213°21.68	30.62 31.13	28°4.92 42°28.21	4.3' 4.2'	23°31.85 23°41.36	9.5' 9.4'	60.4' 60.5'
3	228°21.50	31.64	56°51.38	4.0'	23°50.71	9.2'	60.5
4	243°21.32	32.14	71°14.42	3.9'	23°59.90	9.0'	60.5'
5 6	258°21.14 273°20.96	32.65 \$20°33.15	85°37.34 100°0.14	3.8' 3.7'	24°8.93 N24°17.79	8.9' 8.7'	60.5' 60.5'
7	288° 20.78	33.66	114°22.82	3.6'	24°26.49	8.5'	60.6
8	303°20.60	34.16	128°45.39	3.4'	24°35.01	8.4'	60.6'
9	318°20.42 333°20.24	• • 34.66	143°7.84 157°30.17	3.3'	24°43.37 24°51.56	8.2'	60.6'
10 11	333 20.24 348°20.06	35.17 35.67	157 30.17 171°52.39	3.2' 3.1'	24 51.50 24°59.57	8.0' 7.8'	60.6' 60.6'
12	3°19.88	S20°36.17	186°14.51	3.0'	N25°7.40	7.7'	60.7'
13	18°19.70	36.67	200°36.51	2.9'	25°15.05	7.5'	60.7'
14 15	33°19.52 48°19.34	37.17 · · · 37.67	214°58.41 229°20.20	2.8' 2.7'	25°22.53 25°29.82	7.3' 7.1'	60.7' 60.7'
16	63°19.15	38.16	243°41.89	2.6'	25°36.93	6.9'	60.7'
17	78° 18.97	38.66	258°3.48	2.5'	25°43.85	6.7'	60.7'
18 19	93°18.79 108°18.60	\$20°39.16	272°24.98 286°46.37	2.4' 2.3'	N25°50.58 25°57.13	6.5' 6.4'	60.7' 60.8'
20	123°18.42	40.15	301°7.67	2.2'	26°3.48	6.2	60.8
21	138°18.24	• • 40.65	$315^{\circ}28.89$	2.1'	$26^{\circ}9.64$	6.0'	60.8'
22	153°18.05 168°17.87	41.14	329°50.01 344°11.05	2.0'	26°15.61	5.8'	60.8'
23		41.63	344 11.05	2.0'	26°21.38	5.6'	60.8'
	SD = 16.2'	d = 0.5'		SI	D = 16.5'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°17.68 198°17.50	\$20°42.13 42.62	358°32.00	1.9'	N26°26.95 26°32.33	5.4'	60.8'
1 2	198°17.50 213°17.31	42.62 43.11	12°52.87 27°13.67	1.8' 1.7'	26°32.33 26°37.50	5.2' 5.0'	60.8' 60.8'
3	228°17.12	• • 43.60	41°34.39	1.6'	26°42.48	4.8'	60.9
4	243°16.94	44.09	55°55.04	1.6'	26°47.25	4.6'	60.9'
5 6	258°16.75 273°16.56	44.58 \$20°45.07	70°15.62 84°36.13	1.5' 1.5'	26°51.81 N26°56.17	4.4' 4.2'	60.9' 60.9'
7	288°16.38	45.56	98°56.58	1.4'	27° 0.33	3.9'	60.9
8	303°16.19	46.04	113°16.97	1.3'	27° 4.27	3.7'	60.9'
9 10	318°16.00 333°15.81	· · 46.53 47.02	127°37.31 141°57.59	1.3' 1.2'	27°8.01 27°11.54	3.5' 3.3'	60.9'
10	348° 15.62	47.02 47.50	141 57.59 156°17.82	1.2'	27 11.54 27°14.86	3.3 3.1'	60.9' 60.9'
12	3°15.43	S20°47.99	170°38.00	1.1'	N27°17.96	2.9'	60.9'
13 14	18°15.24 33°15.05	48.47 48.95	184°58.14 199°18.24	1.1' 1.1'	27°20.86 27°23.54	2.7' 2.5'	60.9' 60.9'
15	48° 14.86	. 49.44	213°38.31	1.0'	27°26.00	2.3'	60.9
16	63°14.67	49.92	227°58.34	1.0'	27°28.26	2.0'	60.9'
17	78°14.48	50.40	242°18.34 256°38.31	1.0'	27°30.30	1.8'	60.9'
18 19	93°14.29 108°14.10	\$20°50.88 51.36	256° 38.31 270° 58.26	1.0' 0.9'	N27°32.12 27°33.72	1.6' 1.4'	60.9' 60.9'
20	123°13.91	51.84	285°18.20		27°35.12	1.2'	60.9'
21	138°13.72	• • 52.32	299°38.11	0.9'	27°36.29	1.0'	60.9'
22 23	153°13.52 168°13.33	52.80 53.28	313°58.02 328°17.91	0.9' 0.9'	27°37.25 27°37.99	0.7' 0.5'	60.9' 60.9'
	SD = 16.2'	d = 0.5'	020 11.01		D = 16.6'		
Thu 0	<b>GHA</b> 183°13.14	<b>Dec</b> \$20°53.75	<b>GHA</b> 342°37.81	u 0.9'	<b>Dec</b> N27°38.51	<i>d</i> 0.3'	<b>HP</b> 60.9'
1	198°12.94	54.23	$356^{\circ}57.69$	0.9'	27°38.82	0.1	60.9'
2	213°12.75	54.70	11°17.59	0.9'	27°38.91	-0.1'	60.9'
3 4	228°12.56 243°12.36	• • 55.18 55.65	25°37.49 39°57.39	0.9' 0.9'	27°38.78 27°38.43	-0.3' -0.6'	60.9' 60.9'
5	258°12.17	56.13	54°17.31	0.9'	27°37.87	-0.8	60.9
6	273°11.97	S20°56.60	68°37.25	1.0'	N27°37.09	-1.0'	60.9'
7 8	288°11.78 303°11.58	57.07 57.54	82°57.21 97°17.19	1.0' 1.0'	27°36.10 27°34.89	-1.2' -1.4'	60.9' 60.9'
9	318°11.39	. 58.01	111°37.20	1.0'	27°33.46	-1.4 -1.6'	60.9
10	333°11.19	58.48	125°57.24	1.1'	27°31.82	-1.9'	60.9'
11 12	348°10.99 3°10.80	58.95 \$20°59.42	140°17.31 154°37.42	1.1' 1.2'	27°29.96 N27°27.90	-2.1' -2.3'	60.9' 60.9'
13	18°10.60	20° 59.42 20° 59.89	154 37.42 168°57.57	1.2'	27°25.61	-2.5'	60.9'
14	33°10.40	$21^{\circ}0.36$	$183^{\circ}17.77$	1.2'	$27^{\circ}23.12$	-2.7'	60.9'
15 16	48°10.20 63°10.01	· · 0.82 1.29	197°38.01 211°58.31	1.3' 1.3'	27°20.41 27°17.50	-2.9' -3.1'	60.9' 60.9'
16 17	63°10.01 78°9.81	1.29 1.75	211°58.31 226°18.66	1.4'	27°17.50 27°14.37	-3.1° -3.3'	60.8
18	93°9.61	S21°2.22	240°39.06	1.5'	N27°11.03	-3.5'	60.8'
19 20	108° 9.41 123° 9.21	2.68 3.14	254°59.53 269°20.06	1.5' 1.6'	27°7.49 27°3.74	-3.7' -4.0'	60.8' 60.8'
20	123° 9.21 138° 9.01	3.14 · · 3.61	269°20.06 283°40.66	1.6	26°59.79	-4.0' -4.2'	60.8
22	153°8.81	4.07	298°1.32	1.7'	$26^{\circ}55.63$	-4.4'	60.8'
23	168°8.61	4.53	312°22.06	1.8'	26°51.26	-4.6'	60.8'
	SD = 16.2'	d = 0.5'		SI	O = 16.6'		

Lat.	Twi	light	Sunrise	Sunset	Twi	Twilight	
Lat.	Naut.	Civil	Junise	Juliset	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	80:80	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	80:80	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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	////	
<b>S</b> 60°	////	01:41	02:53	20:42	21:56	////	

Lat.		Moonris	е		Moonset	i
Lat.	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	80:80	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
<b>S</b> 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
<b>S</b> 60°	21:58	23:32	•• ••	01:50	02:07	02:53

# November 27, 28, 29 UT (Fri., Sat., Sun.)

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	65°55.60	221°31.61 S09°13.10	272°39.18 N13°23.59	276°48.97 N13°23.05	57°27.22 N00°49.46	
1	80° 58.07	236°32.86 13.14	287°40.67 23.30	291°51.31 23.02	72°29.74 49.44	Alpheratz 357°33.00 29°14.60
2	96°0.53	251°34.11 13.19	302°42.17 23.01	306°53.65 22.98	87°32.27 49.42	Ankaa 353°5.41 -42°9.68
3	111°3.00	266°35.35 · · 13.24	317°43.66 · · 22.72	321°55.98 · · 22.95	102°34.79 · · 49.41	Schedar 349°28.91 56°41.42
4	126°5.46	281°36.60 13.29	332°45.16 22.43	336°58.32 22.92	117°37.32 49.39	Diphda 348°45.55 -17°50.32 Achernar 335°18.60 -57°6.11
5	141°7.92	296°37.84 13.34	347°46.66 22.14	352°0.66 22.88	132°39.84 49.38	Hamal 327°49.14 23°35.55
6	156° 10.39	311°39.07 S09°13.40	2°48.16 N13°21.86	7°3.00 N13°22.85	147°42.37 N00°49.36	Polaris 312°43.66 89°22.74
7	171°12.85	326°40.31 13.45	17°49.66 21.57	22°5.34 22.81	162°44.89 49.35	Acamar 315°10.20 -40°11.80
8 9	186° 15.32 201° 17.78	341°41.54 13.51 356°42.77 · · 13.57	32°51.16 21.28 47°52.66 · · 20.99	37°7.68 22.78 52°10.02 · · 22.75	177°47.41 49.33 192°49.94 • 49.32	Menkar 314°4.21 4°11.81
10	216°20.24	11°44.00 13.63	62°54.16 20.71	67°12.36 22.71	207°52.46 49.30	Mirfak 308°25.51 49°57.51
11	231°22.71	26° 45.22 13.69	77°55.66 20.42	82°14.70 22.68	222°54.99 49.29	Aldebaran 290°37.49 16°33.85
12	246°25.17	41°46.45 \$09°13.76	92°57.16 N13°20.13	97°17.04 N13°22.65	237°57.51 N00°49.27	Rigel 281°2.04 -8°10.16 Capella 280°19.12 46°1.45
13	261°27.64	56°47.67 13.82	107°58.66 19.84	112°19.38 22.62	253°0.03 49.26	Capella 280°19.12 46°1.45 Bellatrix 278°20.89 6°22.48
14	276°30.10	71°48.88 13.89	123°0.16 19.56	127°21.72 22.58	268°2.56 49.24	Elnath 277°59.53 28°37.79
15	291°32.57	86°50.10 · · 13.96	138°1.67 · · 19.27	142°24.06 · · 22.55	283°5.08 · · 49.23	Alnilam 275°35.83 -1°11.03
16 17	306° 35.03 321° 37.49	101°51.31 14.03 116°52.52 14.10	153°3.17 18.98 168°4.68 18.70	157°26.40 22.52 172°28.74 22.48	298°7.60 49.21 313°10.12 49.20	Betelgeuse 270°50.09 7°24.75
18	336°39.96	131°53.73 S09°14.17	183°6.18 N13°18.41	187°31.09 N13°22.45	328°12.65 N00°49.18	Canopus 263°51.22 -52°42.41
19	351° 42.42	146°54.93 14.25	198° 7.69 18.13	202°33.43 22.42	343°15.17 49.17	Sirius 258°24.58 -16°45.09
20	6°44.89	161°56.13 14.32	213°9.19 17.84	217°35.77 22.39	358°17.69 49.16	Adhara 255°4.34 -29°0.37
21	21°47.35	176°57.33 · · 14.40	228°10.70 · · 17.56	232°38.12 · · 22.36	13°20.21 · · 49.14	Procyon 244°48.99 5°9.35 Pollux 243°15.17 27°57.54
22	36°49.82	191°58.53 14.48	243°12.21 17.27	247°40.46 22.32	28°22.74 49.13	Avior 234°13.75 -59°35.47
23	51°52.28	206°59.72 14.56	258°13.71 16.99	262°42.80 22.29	43°25.26 49.11	Suhail 222°45.01 -43°32.24
Mer.ı	pass. 19:33	$\nu 1.3' \ d0.0' \ \text{m-4.90}$	$\nu 1.5' \ d$ -0.3' m0.52	$\nu 2.3' \ d$ -0.0' m-2.16	$\nu 2.5' \ d$ -0.0' m0.59	Miaplacidus 221°37.61 -69°49.34
						Alphard 217°46.15 -8°46.46
C-4	CIIA	CUA D	CHA De-	CHA De-	CHA D	Regulus 207°32.77 11°50.07
Sat 0	<b>GHA</b> 66° 54.74	<b>GHA Dec</b> 222°0.92 <b>S</b> 09°14.64	<b>GHA Dec</b> 273°15.22 N13°16.70	<b>GHA Dec</b> 277°45.15 N13°22.26	<b>GHA Dec</b> 58°27.78 N00°49.10	Dubhe 193°39.26 61°36.02
1	81°57.21	237°2.10 14.73	288°16.73 16.42	292°47.49 22.23	73°30.30 49.09	Denebola 182°23.50 14°25.21
2	96°59.67	252°3.29 14.81	303°18.24 16.13	307°49.84 22.20	88°32.82 49.07	Gienah 175° 42.15 -17° 41.39
3	112°2.14	267°4.48 · · 14.90	318°19.75 · · 15.85	322°52.18 · · 22.16	103°35.34 · · 49.06	Acrux 172°58.71 -63°14.66 Gacrux 171°50.21 -57°15.61
4	$127^{\circ}4.60$	282°5.66 14.99	333°21.26 15.56	337°54.53 22.13	118°37.86 49.04	Gacrux 171°50.21 -57°15.61 Alioth 166°11.99 55°48.57
5	$142^{\circ}7.06$	297°6.84 15.08	348°22.77 15.28	352°56.87 22.10	133°40.38 49.03	Spica 158°20.91 -11°18.05
6	157°9.53	312°8.01 S09°15.17	3°24.29 N13°15.00	7°59.22 N13°22.07	148°42.90 N00°49.02	Alkaid 152°51.20 49°10.54
7	172°11.99	327°9.19 15.26	18°25.80 14.71	23°1.57 22.04	163°45.43 49.00	Hadar 148°34.33 -60°29.99
8	187° 14.46 202° 16.92	342°10.36 15.36	33°27.31 14.43	38° 3.91 22.01	178°47.95 48.99	Menkent 147°56.12 -36°30.01
9 10	202 16.92 217°19.39	357°11.53 · · 15.45 12°12.70 15.55	48°28.82 · · 14.15 63°30.34	53°6.26 · · 21.98 68°8.61 21.95	193°50.47 · · 48.98 208°52.99 48.96	Arcturus 145°46.80 19°2.48
11	232°21.85	27°13.86 15.65	78°31.85 13.58	83°10.95 21.92	208 52.99 48.95 223°55.51 48.95	Rigil Kent. 139°38.75 -60°56.64
12	247°24.31	42°15.02 S09°15.75	93°33.37 N13°13.30	98°13.30 N13°21.89	238°58.02 N00°48.94	Kochab 137°20.99 74°2.48
13	262°26.78	57°16.18 15.85	108°34.88 13.01	113°15.65 21.86	254°0.54 48.93	Zuben'ubi 136°54.62 -16°9.15 Alphecca 126°2.80 26°37.42
14	277°29.24	72°17.34 15.95	123°36.40 12.73	128°18.00 21.83	269°3.06 48.91	Antares 112° 14.31 -26° 29.44
15	292°31.71	87° 18.50 · · 16.06	138°37.92 · · 12.45	143°20.35 · · 21.80	284°5.58 · · 48.90	Atria 107°7.69 -69°4.51
16	307°34.17	102°19.65 16.17	153°39.44 12.17	158°22.70 21.77	299°8.10 48.89	Sabik 102°1.35 -15°45.44
17	322°36.64 337°39.10	117°20.80 16.27	168°40.95 11.89 183°42.47 N13°11.60	173°25.05 21.74	314°10.62 48.87	Shaula 96°8.67 -37°7.37
18 19	352°41.56	132°21.94 S09°16.38 147°23.09 16.49	183°42.47 N13°11.60 198°43.99 11.32	188°27.40 N13°21.71 203°29.75 21.68	329°13.14 N00°48.86 344°15.66 48.85	Rasalhague 95°57.45 12°32.50
20	7°44.03	162°24.23 16.61	213°45.51 11.04	218°32.10 21.65	359°18.18 48.84	Eltanin 90°41.97 51°29.22
21	22°46.49	177°25.37 · · 16.72	228°47.03 · · 10.76	233°34.45 · · 21.62	14°20.69 · · 48.82	Kaus Aust. 83°30.82 -34°22.31 Vega 80°32.55 38°48.66
22	37°48.96	192°26.51 16.83	243°48.55 10.48	248°36.80 21.59	29°23.21 48.81	Vega 80°32.55 38°48.66 Nunki 75°46.15 -26°15.79
23	$52^{\circ}51.42$	207°27.65 16.95	258°50.08 10.20	263°39.15 21.56	44°25.73 48.80	Altair 61°58.67 8°56.49
Mer.ı	pass. 19:29	ν1.2' d0.1' m-4.90	$\nu$ 1.5' d-0.3' m0.51	ν2.3' d-0.0' m-2.17	$\nu$ 2.5' d-0.0' m0.59	Peacock 53°3.63 -56°39.05
						Deneb 49°24.96 45°22.86
c	CIIA	CUA D	CHA D	CHA De-	CUA D	Enif 33°37.34 10°0.07
Sun 0	<b>GHA</b> 67°53.88	<b>GHA Dec</b> 222°28.78 <b>S</b> 09°17.07	<b>GHA Dec</b> 273°51.60 N13°9.92	<b>GHA Dec</b> 278°41.50 N13°21.53	<b>GHA Dec</b> 59°28.25 N00°48.79	Al Na'ir 27°31.04 -46°49.98
1	82° 56.35	237°29.91 17.19	288°53.12 9.64	293°43.85 21.50	74°30.76 48.77	Fomalhaut 15°12.78 -29°28.84
2	97°58.81	252°31.04 17.31	303°54.65 9.36	308°46.20 21.47	89°33.28 48.76	Scheat 13°43.64 28°13.99 Markab 13°28.30 15°21.20
3	113°1.28	267°32.16 · · 17.43	318°56.17 · · 9.08	323°48.56 · · 21.44	104°35.80 · · 48.75	Warkab 13 20.30 13 21.20
4	128°3.74	282°33.28 17.56	333°57.69 8.80	338°50.91 21.41	119°38.32 48.74	Nov 27 Fri SHA Mer.pass
5	143°6.21	297°34.41 17.68	348°59.22 8.52	353°53.26 21.39	134°40.83 48.73	Venus 155°36.01 09:13
6	158°8.67	312°35.52 <b>S</b> 09°17.81	4°0.75 N13°8.24	8°55.62 N13°21.36	149°43.35 N00°48.72	Mars 206° 43.57 05:49
7	173°11.13	327°36.64 17.94	19°2.27 7.96	23°57.97 21.33	164°45.87 48.70	Jupiter 210°53.37 05:32 Saturn 351°31.62 20:07
8 9	188° 13.60 203° 16.06	342°37.75 18.07 357°38.86 · · 18.20	34°3.80 7.68 49°5.33 · · 7.40	39° 0.32 21.30 54° 2.68 · · 21.27	179°48.38 48.69 194°50.90 •• 48.68	
10	218° 18.53	12°39.97 18.33	64°6.85 7.12	69° 5.03 21.24	209°53.41 48.67	Nov 28 Sat SHA Mer.pass
11	233°20.99	27°41.08 18.46	79° 8.38 6.85	84°7.39 21.22	224°55.93 48.66	Venus 155°6.17 09:11
12	248°23.45	42°42.18 <b>S</b> 09°18.60	94°9.91 N13°6.57	99°9.74 N13°21.19	239°58.45 N00°48.65	Mars 206°20.48 05:46 Jupiter 210°50.40 05:28
13	263°25.92	57°43.29 18.74	109°11.44 6.29	114°12.10 21.16	255°0.96 48.64	Jupiter 210°50.40 05:28 Saturn 351°33.04 20:03
14	278° 28.38	72°44.39 18.88	124°12.97 6.01	129°14.46 21.13	270°3.48 48.62	
15 16	293°30.85	87°45.48 · · 19.02	139°14.50 · · 5.73	144°16.81 · · 21.11	285°5.99 · · 48.61	Nov 29 Sun SHA Mer.pass
16 17	308° 33.31 323° 35.78	102°46.58 19.16 117°47.67 19.30	154°16.04 5.46 169°17.57 5.18	159°19.17 21.08 174°21.52 21.05	300°8.51 48.60 315°11.02 48.59	Venus 154°34.89 09:09
18	323 35.78 338°38.24	132°48.76 S09°19.44	184°19.10 N13°4.90	189°23.88 N13°21.02	330°13.54 N00°48.58	Mars 205°57.71 05:44 Jupiter 210°47.62 05:24
19	353° 40.70	147°49.85 19.59	199°20.64 4.62	204°26.24 21.00	345°16.05 48.57	Saturn 351°34.36 19:59
20	8°43.17	162°50.93 19.74	214°22.17 4.35	219°28.60 20.97	0°18.56 48.56	
21	23°45.63	177°52.01 · · 19.88	229°23.70 · · 4.07	234°30.96 · · 20.94	15°21.08 · · 48.55	Horizontal parallax
22	38° 48.10	192°53.09 20.03	244°25.24 3.80	249°33.31 20.92	30°23.59 48.54	Venus: 0.4
23	53°50.56	207°54.17 20.18	259°26.78 3.52	264°35.67 20.89	45°26.11 48.53	Mars: 0.1
Mer. <sub>ا</sub>	pass. 19:25	$ u 1.1' \ d 0.1' \ \text{m-4.90}$	$ u 1.5' \ d  0.3' \ \text{m} 0.49$	$\nu 2.4' \ d\text{-}0.0' \ \text{m-}2.18$	$\nu 2.5' \ d$ -0.0' m0.60	

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	183°8.41	S21°4.99	326°42.88	1.9'	N26°46.70	-4.8'	60.8'
1	198°8.21	5.45	341°3.77	2.0'	26°41.93	-5.0'	60.7'
2	213°8.01	5.91	355°24.74	2.1'	26°36.97	-5.2'	60.7'
3	228°7.80	• • 6.37	9°45.80	2.1'	26°31.80	-5.4'	60.7'
4	243°7.60	6.82	24°6.94	2.2'	26°26.45	-5.6'	60.7'
5	258°7.40 273°7.20	7.28 <b>S</b> 21°7.74	38°28.18 52°49.50	2.3' 2.4'	26°20.89 N26°15.14	-5.7'	60.7'
6 7	273 7.20 288°6.99	8.19	52 49.50 67°10.91	2.4	26° 9.20	-5.9' -6.1'	60.7' 60.7'
8	303°6.79	8.65	81°32.43	2.6'	26°3.08	-6.3'	60.6'
9	318°6.59	9.10	95°54.04	2.7'	25°56.76	-6.5	60.6'
10	333°6.38	9.56	110°15.75	2.8'	25°50.25	-6.7'	60.6'
11	348°6.18	10.01	124°37.56	2.9'	25°43.56	-6.9'	60.6'
12	3°5.97	S21°10.46	138°59.48	3.0'	N25°36.69	-7.1'	60.6'
13	18°5.77	10.91	153°21.50	3.1'	25°29.64	-7.2'	60.6'
14	33°5.56	11.36	167°43.63 182°5.87	3.2'	25°22.40 25°14.99	-7.4'	60.5' 60.5'
15 16	48°5.36 63°5.15	· · 11.81 12.26	182°5.87 196°28.23	3.4' 3.5'	25° 14.99 25° 7.40	-7.6' -7.8'	60.5
17	78° 4.95	12.71	210°50.69	3.6'	24°59.64	-7.8 -7.9'	60.5
18	93°4.74	S21°13.16	225°13.28	3.7'	N24°51.71	-8.1'	60.5'
19	108°4.53	13.61	239°35.97	3.8'	24°43.60	-8.3'	60.4'
20	123°4.33	14.05	253°58.79	3.9'	24°35.33	-8.4'	60.4'
21	138°4.12	• • 14.50	$268^{\circ}21.72$	4.1'	24°26.89	-8.6'	60.4'
22	153°3.91	14.95	282°44.78	4.2'	24°18.29	-8.8'	60.4'
23	168°3.70	15.39	297°7.96	4.3'	24°9.52	-8.9'	60.3'
	SD = 16.2'	d = 0.5'		SI	D = 16.6'		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	183°3.49	\$21°15.83	311°31.26	4.4'	N24° 0.60	-9.1'	60.3'
1	198°3.28	16.28	325°54.68	4.5'	23°51.51	-9.2'	60.3'
2	213°3.08	16.72	340°18.23	4.7'	23°42.27	-9.4'	60.3'
3	228°2.87	• • 17.16	354°41.90	4.8'	23°32.88	-9.5'	60.3'
4	243°2.66	17.60	9°5.70	4.9'	23°23.33	-9.7'	60.2'
5	258°2.45 273°2.24	18.04 <b>S</b> 21°18.48	23°29.63 37°53.69	5.1'	23°13.64 N23°3.79	-9.8'	60.2'
6 7	273°2.24 288°2.03	18.48	52°17.87	5.2' 5.3'	N23° 3.79 22° 53.80	-10.0' -10.1'	60.2' 60.2'
8	200 2.03 303°1.81	19.36	66°42.18	5.4'	22°43.67	-10.1 -10.3'	60.1
9	318°1.60	. 19.80	81°6.63	5.6'	22°33.40	-10.4	60.1
10	333°1.39	20.23	95°31.20	5.7'	22°22.98	-10.6'	60.1
11	348°1.18	20.67	109°55.90	5.8'	22°12.43	-10.7'	60.1'
12	3°0.97	S21°21.11	124°20.74	6.0'	N22° 1.75	-10.8'	60.0'
13	18°0.75	21.54	138°45.70	6.1'	21°50.93	-10.9'	60.0'
14	33°0.54	21.98	153°10.80	6.2'	21°39.98	-11.1'	60.0'
15	48°0.33 63°0.12	• • 22.41	167°36.02 182°1.38	6.4'	21°28.91 21°17.70	-11.2' -11.3'	59.9'
16 17	77° 59.90	22.84 23.27	182 1.38 196°26.87	6.5' 6.6'	21 17.70 21°6.37	-11.3 -11.4'	59.9' 59.9'
18	92° 59.69	521°23.70	210°52.49	6.8'	N20°54.93	-11.4	59.9'
19	107°59.47	24.14	225°18.24	6.9'	20°43.36	-11.7'	59.8'
20	122°59.26	24.57	239°44.12	7.0'	20°31.67	-11.8'	59.8'
21	137°59.04	• • 24.99	254°10.13	7.1'	20°19.87	-11.9'	59.8'
22	152° 58.83	25.42	268°36.27	7.3'	20°7.95	-12.0'	59.8'
23	167°58.61	25.85	283°2.54	7.4'	19°55.92	-12.1'	59.7'
	SD = 16.2'	d = 0.4'		SI	D = 16.5'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	182°58.40	S21°26.28	297°28.95	7.5'	N19°43.78	-12.2'	59.7'
1	197°58.18	26.70	311°55.48	7.7'	19°31.54	-12.4'	59.7'
2	212°57.96	27.13	326°22.13	7.8'	19°19.19	-12.5'	59.6'
3	227°57.75	•• 27.56	340°48.92	7.9'	19°6.73	-12.6'	59.6'
4 5	242°57.53 257°57.31	27.98 28.40	355°15.84 9°42.88	8.0' 8.2'	18°54.18 18°41.52	-12.7' -12.8'	59.6' 59.5'
6	257°57.31 272°57.09	28.40 \$21°28.83	9°42.88 24°10.04	8.2'	18°41.52 N18°28.77	-12.8'	59.5'
7	287° 56.88	29.25	38°37.34	8.4'	18°15.93	-12.6 -12.9'	59.5'
8	302°56.66	29.67	53°4.76	8.5'	18°2.99	-13.0'	59.5'
9	317° 56.44	• • 30.09	67°32.30	8.7'	17°49.96	-13.1'	59.4'
10	332°56.22	30.51	81°59.96	8.8'	$17^{\circ}36.84$	-13.2'	59.4'
11	347°56.00	30.93	96°27.75	8.9'	17°23.63	-13.3'	59.4'
12	2°55.78	S21°31.35	110°55.66	9.0'	N17°10.34	-13.4'	59.3'
13	17°55.56 32°55.34	31.77	125°23.69 139°51.84	9.1' 9.3'	16°56.97 16°43.51	-13.5'	59.3'
14 15	32°55.34 47°55.12	32.18 · · 32.60	139°51.84 154°20.11	9.3'	16°43.51 16°29.98	-13.5' -13.6'	59.3' 59.2'
16	62° 54.90	33.02	168°48.49	9.4 9.5'	16° 29.96	-13.0	59.2'
17	77° 54.68	33.43	183°17.00	9.6'	16° 2.68	-13.7	59.2'
18	92°54.46	S21°33.85	197°45.61	9.7'	N15°48.92	-13.8'	59.1'
19	107°54.24	34.26	$212^{\circ}14.35$	9.8'	15°35.08	-13.9'	59.1'
20	122°54.01	34.67	226°43.19	10.0'	15°21.18	-14.0'	59.1'
21	137°53.79	• • 35.08	241°12.15	10.1'	15°7.21	-14.0'	59.1'
22 23	152°53.57 167°53.35	35.50 35.91	255°41.22 270°10.40	10.2' 10.3'	14°53.17 14°39.07	-14.1' -14.2'	59.0' 59.0'
23			210 10.40			-14.2	59.0
	SD = 16.2'	d = 0.4'		SI	D = 16.3'		

Lat.	Twilight		Supriso	Sunrise Sunset	Twilight		
Lat.	Naut.	Civil	Juliuse	Juliset	Civil	Naut.	
N 72°	07:42	09:36			13:59	15:53	
<b>N</b> 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	
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	////	
<b>S</b> 60°	////	01:32	02:48	20:49	22:07	////	

Lat.	Moonrise			Moonset		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
<b>N</b> 72°			18:58			15:01
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	00:20	00:38	00:46	04:24	06:18	08:09

#### 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°53.02	222°55.25 \$09°20.34		279°38.03 N13°20.86	60°28.62 N00°48.52
1 2	83°55.49 98°57.95	237° 56.32 20.49 252° 57.39 20.69		294°40.39 20.84 309°42.75 20.81	75°31.13 48.51 90°33.65 48.50
3	114°0.42	267°58.46 · · 20.80		324°45.11 · · 20.78	105°36.16 · · 48.49
4	129°2.88	282°59.53 20.96	334°34.46 2.14	339°47.47 20.76	120°38.67 48.48
5	144°5.34	298°0.59 21.12		354°49.83 20.73	135°41.19 48.47
6	159°7.81	313°1.66		9°52.19 N13°20.71	150°43.70 N00°48.46
7 8	174° 10.27 189° 12.74	328°2.71 21.4 <sup>2</sup> 343°3.77 21.61		24°54.55 20.68 39°56.92 20.66	165°46.21 48.45 180°48.72 48.44
9	204° 15.20	358°4.83 · · 21.77		54°59.28 · · 20.63	195°51.23 · · 48.43
10	219° 17.67	13°5.88 21.94		70°1.64 20.61	210°53.75 48.42
11	234°20.13	28°6.93 22.11		85°4.00 20.58	225°56.26 48.41
12	249°22.59	43°7.98 \$09°22.28		100°6.36 N13°20.55	240°58.77 N00°48.40
13 14	264°25.06 279°27.52	58°9.02 22.45 73°10.07 22.62		115° 8.73 20.53 130° 11.09 20.50	256°1.28 48.39 271°3.79 48.38
15	294°29.99	88°11.11 · · 22.79		145°13.46 · · 20.48	286°6.30 · · 48.37
16	$309^{\circ}32.45$	103°12.15 22.97		160°15.82 20.46	301°8.82 48.36
17	324°34.91	118°13.18 23.14		175°18.18 20.43	316°11.33 48.35
18 19	339°37.38 354°39.84	133°14.22		190°20.55 N13°20.41 205°22.91 20.38	331°13.84 N00°48.34 346°16.35 48.33
20	9°42.31	163°16.28 23.68		20° 25.28 20.36	1°18.86 48.32
21	24° 44.77	178°17.31 · · 23.86		235°27.64 · · 20.33	16°21.37 · · 48.31
22	39°47.23	193°18.33 24.04		250°30.01 20.31	31°23.88 48.31
23	54° 49.70	208°19.36 24.23	260°3.82 56.95	265°32.38 20.29	46°26.39 48.30
Mer.p	bass. 19:21	$\nu 1.1' \ d0.2' \ \text{m-4.89}$	$\nu 1.5' \ d ext{-}0.3' \ \text{m}0.48$	$\nu$ 2.4′ <i>d</i> -0.0′ m-2.19	$\nu 2.5' \ d$ -0.0' m0.60
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0 1	69°52.16 84°54.63	223°20.38		280°34.74 N13°20.26 295°37.11 20.24	61°28.90 N00°48.29 76°31.41 48.28
2	99°57.09	253°22.41 24.79		310°39.48 20.22	91°33.92 48.27
3	114° 59.56	268°23.43 · · 24.98		325°41.84 · · 20.19	106°36.42 · · 48.26
4	$130^{\circ}2.02$	283°24.44 25.17		340°44.21 20.17	121°38.93 48.25
5	145°4.48	298°25.45 25.36		355°46.58 20.15	136°41.44 48.25
6 7	160°6.95 175°9.41	313°26.46		10°48.95 N13°20.12 25°51.32 20.10	151°43.95 N00°48.24 166°46.46 48.23
8	175 9.41 190°11.88	343°28.47 25.94		40°53.69 20.08	181°48.97 48.22
9	205°14.34	358°29.47 · · 26.14		55°56.06 · · 20.05	196°51.48 · · 48.21
10	220° 16.80	13°30.46 26.34		70°58.43 20.03	211°53.98 48.21
11 12	235° 19.27 250° 21.73	28°31.46 26.54 43°32.46 \$09°26.74		86°0.80 20.01 101°3.17 N13°19.99	226°56.49 48.20 241°59.00 N00°48.19
13	265°24.20	58° 33.45 26.94		116° 5.54 19.96	257°1.51 48.18
14	280° 26.66	73°34.44 27.15		131°7.91 19.94	272°4.01 48.17
15	$295^{\circ}29.12$	88°35.43 · · 27.35		146°10.28 · · 19.92	287°6.52 · · 48.17
16	310°31.59	103°36.41 27.56		161°12.65 19.90	302°9.03 48.16
17 18	325°34.05 340°36.52	118°37.39 27.77 133°38.37 \$09°27.98		176°15.02 19.88 191°17.40 N13°19.85	317°11.53 48.15 332°14.04 N00°48.15
19	355°38.98	148°39.35 28.19		206°19.77 19.83	347°16.55 48.14
20	10°41.44	163°40.33 28.40		221°22.14 19.81	2°19.05 48.13
21	25° 43.91	178°41.30 · · 28.61		236°24.51 · · 19.79	17°21.56 · · 48.12
22	40°46.37	193° 42.28 28.83		251°26.89 19.77	32°24.07 48.12
23	55° 48.84	208°43.25 29.04		266°29.26 19.75	47°26.57 48.11
Mer.p	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
oved 0	70°51.30	223°44.22 \$09°29.26		281°31.64 N13°19.73	62°29.08 N00°48.10
1	85°53.77	238°45.18 29.48		296°34.01 19.70	77°31.58 48.10
2	100°56.23	253°46.15 29.70		311°36.39 19.68	92°34.09 48.09
3	115°58.69	268°47.11 · · 29.92		326°38.76 · · 19.66	107°36.59 · · 48.08
4 5	131°1.16 146°3.62	283°48.07 30.1 <sup>2</sup> 298°49.02 30.36		341°41.14 19.64 356°43.51 19.62	122°39.10 48.08 <b>N</b> 137°41.60 48.07
6	161°6.09	313°49.98 S09°30.59		11°45.89 N13°19.60	152°44.11 N00°48.06
7	176°8.55	328°50.93 30.81	20°53.75 48.38	26°48.26 19.58	167°46.61 48.06
8	191°11.01	343°51.88 31.04		41°50.64 19.56	182°49.12 48.05
9	206°13.48	358°52.83 · · 31.27		56°53.02 · · 19.54	197°51.62 · · 48.04
10 11	221°15.94 236°18.41	13°53.78 31.50 28°54.72 31.73		71°55.40 19.52 86°57.77 19.50	212°54.12 48.04 227°56.63 48.03
12	251°20.87	43°55.66 \$09°31.96		102°0.15 N13°19.48	242°59.13 N00°48.03
13	266°23.33	58°56.60 32.19	111°3.19 46.79	117° 2.53 19.46	258°1.64 48.02
14	281°25.80	73°57.54 32.43		132°4.91 19.44	273°4.14 48.02
15 16	296°28.26 311°30.73	88°58.48 · · 32.67 103°59.41 32.90		147°7.29 · · 19.42 162°9.67 19.40	288°6.64 · · · 48.01 D
16 17	311°30.73 326°33.19	103°59.41 32.90 119°0.34 33.14		162° 9.67 19.40 177° 12.05 19.39	303°9.14 48.00 318°11.65 48.00
18	341°35.65	134°1.27 S09°33.38		192°14.43 N13°19.37	333°14.15 N00°47.99
19	$356^{\circ}38.12$	149°2.20 33.62	201°12.64 45.22	207°16.81 19.35	348°16.65 47.99
20	11° 40.58	164°3.13 33.86		222°19.19 19.33	3°19.15 47.98
21 22	26° 43.05 41° 45.51	179°4.05 · · 34.11 194°4.97 34.35		237°21.57 · · 19.31 252°23.95 19.29	18°21.66 · · 47.98 33°24.16 47.97
23	41°45.51 56°47.97	194°4.97 34.35 209°5.89 34.60		267°26.33 19.27	48° 26.66 47.97
	pass. 19:13	$\frac{269 \text{ s.69}}{\nu 1.0' \text{ d0.2' m-4.88}}$	$-\frac{201 \text{ 16.56}}{\nu 1.6' \text{ d-0.3' m0.44}}$	$\frac{207 \ 20.033}{\nu 2.4' \ d-0.0' \ m-2.20}$	$\frac{18 \text{ 20.00}}{\nu 2.5'  d\text{-0.0' m0.61}}$
14101.1		ν 1.0 α 0.2 III-4.00		ν 2.1 α 0.0 HI-2.20	ν 2.0 G 0.0 III0.01

	SHA	Dec
Alpheratz	357°33.01	29°14.60
Ankaa	353°5.42	-42°9.69
Schedar Diphda	349°28.93 348°45.56	56°41.43 -17°50.32
Achernar	335°18.61	-17 50.32 -57°6.12
Hamal	327°49.14	23°35.55
Polaris	$312^{\circ}43.98$	89°22.76
Acamar	315°10.20	-40°11.81 4°11.81
Menkar Mirfak	314°4.21 308°25.50	4°11.81 49°57.53
Aldebaran	290°37.47	16°33.85
Rigel	$281^{\circ}2.03$	-8°10.17
Capella	280°19.10	46°1.46
Bellatrix Elnath	278°20.87 277°59.52	6°22.48 28°37.79
Alnilam	275°35.82	-1°11.04
Betelgeuse	$270^{\circ}50.08$	$7^{\circ}24.74$
Canopus	263°51.20	-52°42.42
Sirius	258°24.56 255°4.32	-16°45.10 -29°0.38
Adhara Procyon	255 4.32 244°48.96	-29 0.38 5°9.34
Pollux	243°15.15	27°57.54
Avior	234°13.72	-59° 35.48
Suhail	222°44.98	-43°32.25
Miaplacidus Alphard	221°37.57 217°46.12	-69°49.35 -8°46.47
Regulus	217 40.12 207°32.75	-6 40.47 11°50.06
Dubhe	193°39.21	61°36.01
Denebola	182°23.47	14°25.20
Gienah	175°42.13 172°58.67	-17°41.40 -63°14.66
Acrux Gacrux	172°58.67 171°50.18	-63° 14.66 -57° 15.61
Alioth	166°11.96	55° 48.55
Spica	$158^{\circ}20.89$	-11° 18.06
Alkaid	152°51.17	49° 10.52
Hadar Menkent	148°34.30 147°56.10	-60°29.98 -36°30.01
Arcturus	147 50.10 145°46.78	-30 30.01 19°2.46
Rigil Kent.	139°38.72	-60° 56.64
Kochab	137°20.97	74°2.46
Zuben'ubi	136°54.60 126°2.79	-16°9.16 26°37.40
Alphecca Antares	120 2.79 112°14.30	-26°29.44
Atria	107°7.68	-69°4.50
Sabik	102°1.35	-15°45.45
Shaula	96°8.67 95°57.44	-37°7.37 12°32.49
Rasalhague Eltanin	95 57.44 90°41.98	12 32.49 51°29.20
Kaus Aust.	83°30.82	-34°22.31
Vega	80°32.55	38°48.64
Nunki	75°46.15	-26°15.79
Altair Peacock	61°58.68 53°3.64	8°56.48 -56°39.04
Deneb	49°24.98	45°22.85
Enif	33°37.35	10°0.06
Al Na'ir	27°31.05	-46°49.98
Fomalhaut Scheat	15°12.79 13°43.65	-29°28.84 28°13.99
Markab	13° 43.65 13° 28.31	28° 13.99 15° 21.20
Nov 30 Mon Venus	<b>SHA</b> 154°2.22	Mer.pass 09:08
Mars	205°35.29	05:42
Jupiter	$210^{\circ}45.01$	05:21
Saturn	351°35.60	19:55
Dec 01 Tue	SHA	Mer.pass
Venus	153°28.22	09:06
Mars	205°13.21 210°42.58	05:39 05:17
Jupiter Saturn	351°36.73	19:51
Dec 02 Wed Venus	<b>SHA</b> 152°52.91	Mer.pass 09:04
Mars	204°51.47	05:37
Jupiter	210°40.34	05:13
Saturn	351°37.78	19:47
Horizon	ıtal parallax	<u> </u>
	Venus:	0.3
	Mars:	0.1

Stars

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	182°53.12	S21°36.32	284°39.69	10.4'	$N14^{\circ}24.91$	-14.2'	59.0'
1	197°52.90	36.73	299°9.09	10.5'	14°10.68	-14.3'	58.9'
2	212°52.68 227°52.45	37.14 •• 37.54	313°38.60 328°8.21	10.6' 10.7'	13°56.40 13°42.05	-14.3' -14.4'	58.9' 58.9'
4	242°52.23	37.95	342°37.92	10.8'	13°27.65	-14.5'	58.8'
5	257°52.00	38.36	357°7.74	10.9'	$13^{\circ}13.20$	-14.5'	58.8'
6	272°51.78	S21°38.76	11°37.65	11.0'	N12°58.70	-14.6'	58.8'
7 8	287°51.55 302°51.33	39.17 39.57	26°7.67 40°37.79	11.1' 11.2'	12° 44.14 12° 29.54	-14.6' -14.7'	58.7' 58.7'
9	317°51.10	39.98	55°8.01	11.3'	12°14.88	-14.7'	58.7'
10	332°50.87	40.38	69°38.32	11.4'	$12^{\circ}0.19$	-14.7'	58.6'
11	347°50.65 2°50.42	40.78 <b>S</b> 21°41.18	84°8.72	11.5' 11.6'	11°45.44	-14.8'	58.6'
12 13	17°50.42	41.58	98°39.23 113°9.82	11.6	N11°30.66 11°15.83	-14.8' -14.9'	58.6' 58.5'
14	32°49.97	41.98	127° 40.50	11.8'	11°0.96	-14.9'	58.5'
15	47°49.74	• • 42.38	142° 11.28	11.9'	10°46.06	-14.9'	58.5'
16	62°49.51	42.78	156° 42.14 171° 13.09	11.9'	10°31.12 10°16.14	-15.0'	58.4'
17 18	77°49.28 92°49.05	43.18 <b>S</b> 21°43.58	171°13.09 185°44.12	12.0' 12.1'	N10° 1.13	-15.0' -15.0'	58.4' 58.4'
19	107°48.82	43.97	200° 15.24	12.2'	09°46.09	-15.1'	58.3'
20	122°48.59	44.37	214°46.44	12.3'	$09^{\circ}31.02$	-15.1'	58.3'
21	137°48.37	• • 44.76	229° 17.72	12.4'	09°15.92	-15.1'	58.3'
22 23	152°48.14 167°47.91	45.16 45.55	243°49.08 258°20.53	12.4' 12.5'	09°0.79 08°45.64	-15.2' -15.2'	58.2' 58.2'
23						15.4	30.2
	SD = 16.2'	d = 0.4'		SI	D = 16.1'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°47.68	S21°45.95	272°52.04	12.6'	N08° 30.46	-15.2'	58.2'
1 2	197°47.44 212°47.21	46.34 46.73	287°23.64 301°55.30	12.7' 12.7'	08° 15.25 08° 0.02	-15.2' -15.2'	58.1' 58.1'
3	212 47.21 227°46.98	40.73 •• 47.12	301 55.30 316°27.05	12.7	08 0.02 07°44.78	-15.2 -15.3'	58.1'
4	242°46.75	47.51	330°58.86	12.9'	07°29.51	-15.3	58.0'
5	257°46.52	47.90	345°30.74	13.0'	07° 14.23	-15.3'	58.0'
6	272°46.29 287°46.05	S21°48.29	0°2.69 14°34.71	13.0'	N06°58.92 06°43.61	-15.3'	58.0'
7 8	302°45.82	48.68 49.06	14°34.71 29°6.79	13.1' 13.1'	06° 43.61 06° 28.28	-15.3' -15.3'	57.9' 57.9'
9	317°45.59	• • 49.45	43°38.94	13.2'	06°12.93	-15.4	57.9'
10	332°45.36	49.84	58°11.15	13.3'	$05^{\circ}57.57$	-15.4'	57.9'
11	347°45.12 2°44.89	50.22 <b>S</b> 21°50.60	72°43.42 87°15.75	13.3'	05° 42.21 N05° 26.83	-15.4'	57.8'
12 13	17°44.89	50.99	87°15.75 101°48.14	13.4' 13.4'	05° 11.45	-15.4' -15.4'	57.8' 57.8'
14	32°44.42	51.37	116° 20.59	13.5'	04°56.06	-15.4	57.7'
15	47°44.18	• • 51.75	130° 53.09	13.6'	04°40.66	-15.4'	57.7'
16	62°43.95 77°43.71	52.13 52.52	145°25.65 159°58.26	13.6' 13.7'	04°25.26 04°9.85	-15.4'	57.7'
17 18	92°43.48	52.52 <b>S</b> 21°52.89	159 58.20 174°30.92	13.7'	N03°54.45	-15.4' -15.4'	57.6' 57.6'
19	107°43.24	53.27	189°3.64	13.8'	03°39.04	-15.4'	57.6'
20	122°43.01	53.65	203°36.40		03°23.63		57.5'
21 22	137°42.77 152°42.53	•• 54.03 54.41	218°9.21 232°42.06	13.9' 13.9'	03°8.22 02°52.82	-15.4' -15.4'	57.5' 57.5'
23	167°42.30	54.41 54.78	232 42.00 247°14.96	13.9'	02 52.62 02°37.42	-15.4'	57.5 57.4'
	SD = 16.2'	d = 0.4'			D = 15.9'		
	3D = 10.2	<u>u = 0.4</u>			D = 13.9		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°42.06 197°41.82	\$21°55.16	261°47.90 276°20.88	14.0'	N02°22.03	-15.4'	57.4'
1 2	197°41.82 212°41.58	55.53 55.91	276°20.88 290°53.91	14.0' 14.1'	02°6.64 01°51.25	-15.4' -15.4'	57.4' 57.4'
3	227°41.35	• • 56.28	305° 26.97	14.1'	01°35.88	-15.4	57.3'
4	242°41.11	56.65	320°0.07	14.1'	01°20.51	-15.4'	57.3'
5 6	257°40.87 272°40.63	57.03 \$21°57.40	334°33.21 349°6.38	14.2' 14.2'	01°5.16 N00°49.81	-15.3' -15.3'	57.3' 57.2'
7	272°40.63 287°40.39	57.77	349°6.38 3°39.59	14.2'	00° 34.48	-15.3' -15.3'	57.2'
8	302°40.15	58.14	18° 12.83	14.3	$00^{\circ}19.16$	-15.3'	57.2'
9	317°39.91	• • 58.51	32°46.10	14.3'	N00°3.85	-15.3'	57.1'
10 11	332°39.67 347°39.43	58.87 59.24	47°19.40 61°52.72	14.3' 14.4'	\$00°11.44 00°26.71	15.3' 15.3'	57.1' 57.1'
11	2°39.19	59.24 \$21°59.61	76° 26.08	14.4	500° 41.97	15.3'	57.1'
13	17°38.95	21°59.97	90°59.46	14.4'	$00^{\circ}57.21$	15.2'	57.0'
14	32°38.71	0.34	105°32.86	14.4	01°12.43	15.2'	57.0'
15 16	47°38.47 62°38.22	· · 0.70 1.07	120°6.29 134°39.74	14.4' 14.5'	01°27.63 01°42.80	15.2' 15.2'	57.0' 56.9'
16 17	62°38.22 77°37.98	1.07	134° 39.74 149° 13.21	14.5'	01°42.80 01°57.96	15.2 15.1'	56.9'
18	92°37.74	\$22°1.79	163°46.70	14.5	S02°13.09	15.1	56.9'
19	107°37.50	2.15	178°20.20	14.5'	02°28.20	15.1'	56.8'
20 21	122°37.25 137°37.01	2.52 •• 2.88	192°53.73 207°27.26	14.5' 14.6'	02°43.28 02°58.34	15.1' 15.0'	56.8' 56.8'
21	137°37.01 152°36.77	3.24	207°27.26 222°0.82	14.6'	02°58.34 03°13.37	15.0° 15.0°	56.8'
23	167°36.52	3.59	236°34.38	14.6'	03°28.37	15.0'	56.7'
	SD = 16.2'	d = 0.4'		SI	D = 15.7'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junioc	Juliset	Civil	Naut.
N 72°	07:51	09:50			13:47	15:46
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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	////
<b>S</b> 60°	////	01:23	02:44	20:56	22:18	////

Lat.		Moonris	e		Moonset	
Lat.	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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 10°	23:42		00:33	11:32	12:15	12:55
0°	23:49		00:34	11:24	12:11	12:55
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	00:49	00:50	00:50	09:53	11:30	13:02
		_				

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	21-23	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	64-42%	
30	11:32	11:22	11:49	05:12	17:36		
01	11:11	11:00	11:49	06:00	18:23		
02	10:48	10:37	11:49	06:45	19:07		

#### December 03, 04, 05 UT (Thu., Fri., Sat.)

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	71°50.44	224°6.81 <b>S</b> 09°34.84	276°20.54 N12°43.91	282°28.71 N13°19.25	63°29.16 N00°47.96	
1	86°52.90	239°7.72 35.09	291°22.12 43.65	297°31.09 19.24	78°31.66 47.96	Alpheratz 357°33.02 29°14.60 Ankaa 353°5.44 -42°9.70
2	101°55.37	254°8.63 35.34	306°23.70 43.39	312°33.48 19.22	93°34.16 47.95	Schedar 349°28.95 56°41.43
3	116° 57.83	269°9.55 · · 35.59	321°25.29 · · 43.13	327°35.86 · · 19.20	108°36.67 · · 47.95	Diphda 348°45.57 -17°50.33
4	132°0.30	284°10.45 35.84	336°26.87 42.87	342°38.24 19.18	123°39.17 47.94	Achernar 335°18.63 -57°6.14
5 6	147°2.76 162°5.22	299°11.36 36.10 314°12.27 \$09°36.35	351°28.45 42.61 6°30.04 N12°42.35	357°40.63 19.16 12°43.01 N13°19.15	138°41.67 47.94 153°44.17 N00°47.93	Hamal 327°49.15 23°35.55
7	177°7.69	329°13.17 36.61	21°31.62 42.09	27°45.39 19.13	168°46.67 47.93	Polaris 312°44.38 89°22.78
8	192° 10.15	344°14.07 36.86	36°33.21 41.83	42°47.78 19.11	183°49.17 47.92	Acamar 315°10.20 -40°11.83
9	$207^{\circ}12.62$	359°14.97 · · 37.12	51°34.80 · · 41.57	57°50.16 · · 19.09	198°51.67 · · 47.92	Menkar 314°4.21 4°11.80 Mirfak 308°25.50 49°57.53
10	222° 15.08	14°15.86 37.38	66°36.38 41.31	72°52.55 19.08	213°54.17 47.92	Aldebaran 290°37.47 16°33.85
11	237° 17.54	29°16.76 37.64	81°37.97 41.05	87°54.93 19.06	228°56.67 47.91	Rigel 281°2.03 -8°10.18
12	252°20.01 267°22.47	44°17.65 S09°37.90 59°18.54 38.17	96°39.56 N12°40.80 111°41.15 40.54	102°57.32 N13°19.04 117°59.70 19.03	243°59.17 N00°47.91 259°1.67 47.90	Capella 280°19.09 46°1.47
13 14	282°24.94	59°18.54 38.17 74°19.43 38.43	111°41.15 40.54 126°42.74 40.28	117°59.70 19.03 133°2.09 19.01	259°1.67 47.90 274°4.17 47.90	Bellatrix 278°20.87 6°22.47
15	297°27.40	89°20.31 · · 38.69	141°44.33 ·· 40.02	148° 4.48 · · 18.99	289°6.66 · · 47.89	Elnath 277°59.51 28°37.79
16	$312^{\circ}29.86$	104°21.20 38.96	156°45.92 39.76	163°6.86 18.98	304°9.16 47.89	Alnilam 275°35.81 -1°11.04
17	327°32.33	119°22.08 39.23	171°47.51 39.51	178° 9.25 18.96	319°11.66 47.89	Betelgeuse 270°50.07 7°24.74 Canopus 263°51.18 -52°42.44
18	342°34.79	134°22.96 <b>S</b> 09°39.50	186°49.10 N12°39.25	193°11.64 N13°18.94	334°14.16 N00°47.88	Sirius 258°24.55 -16°45.11
19	357° 37.26	149°23.84 39.77	201°50.70 38.99	208°14.03 18.93	349°16.66 47.88	Adhara 255°4.31 -29°0.40
20 21	12°39.72 27°42.18	164°24.71 40.04 179°25.59 • 40.31	216°52.29 38.74 231°53.88 · · 38.48	223°16.42 18.91 238°18.80 · · 18.90	4°19.16 47.88 19°21.65 • 47.87	Procyon 244°48.95 5°9.34
22	42° 44.65	194°26.46 40.58	246°55.48 38.22	253°21.19 18.88	34°24.15 47.87	Pollux 243°15.13 27°57.54
23	57° 47.11	209°27.33 40.86	261°57.07 37.97	268°23.58 18.86	49°26.65 47.87	Avior 234°13.69 -59°35.49
						Suhail 222°44.95 -43°32.26
ivier.	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	$\nu 2.5' \ d$ -0.0' m0.62	Miaplacidus 221°37.52 -69°49.36 Alphard 217°46.10 -8°46.48
						Regulus 207°32.72 11°50.05
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.18 61°36.00
0	72°49.58	224°28.20 S09°41.13	276°58.67 N12°37.71	283°25.97 N13°18.85	64°29.15 N00°47.86	Denebola 182°23.45 14°25.19
1 2	87°52.04	239°29.06 41.41 254°29.93 41.69	292°0.27 37.46 307°1.86 37.20	298°28.36 18.83 313°30.75 18.82	79°31.64 47.86 94°34.14 47.86	Gienah 175°42.11 -17°41.40
3	102°54.50 117°56.97	254°29.93 41.69 269°30.79 • 41.97	307°1.86 37.20 322°3.46 · · 36.95	313°30.75 18.82 328°33.14 · · 18.80	94°34.14 47.86 109°36.64 • 47.85	Acrux 172°58.63 -63°14.65
4	132°59.43	284°31.65 42.25	337°5.06 36.69	343°35.53 18.79	124°39.14 47.85	Gacrux 171°50.15 -57°15.61
5	148°1.90	299°32.51 42.53	352°6.66 36.44	358°37.92 18.77	139°41.63 47.85	Alioth 166°11.93 55°48.54 Spica 158°20.87 -11°18.07
6	163°4.36	314°33.36 <b>S</b> 09°42.81	7°8.26 N12°36.18	13°40.32 N13°18.76	154°44.13 N00°47.85	Alkaid 152°51.15 49°10.51
7	178°6.83	329°34.22 43.09	22°9.86 35.93	28°42.71 18.74	169°46.63 47.84	Hadar 148°34.27 -60°29.98
8	193°9.29	344°35.07 43.38	37°11.46 35.67	43°45.10 18.73	184°49.12 47.84	Menkent 147°56.08 -36°30.01
9	208°11.75	359°35.92 · · 43.67	52°13.06 · · 35.42	58°47.49 · · 18.71	199°51.62 · · 47.84	Arcturus 145°46.77 19°2.45
10 11	223° 14.22 238° 16.68	14° 36.77 43.95 29° 37.61 44.24	67°14.67 35.17 82°16.27 34.91	73°49.88 18.70 88°52.28 18.68	214°54.11 47.84 229°56.61 47.83	Rigil Kent. 139°38.70 -60°56.63
12	253° 19.15	44°38.46 S09°44.53	97°17.87 N12°34.66	103°54.67 N13°18.67	244°59.10 N00°47.83	Kochab 137°20.94 74°2.44
13	268°21.61	59°39.30 44.82	112°19.48 34.41	118°57.06 18.66	260°1.60 47.83	Zuben'ubi 136°54.59 -16°9.16 Alphecca 126°2.79 26°37.39
14	283°24.07	74°40.14 45.11	127°21.08 34.16	133°59.46 18.64	275°4.09 47.83	Alphecca 126°2.79 26°37.39 Antares 112°14.30 -26°29.44
15	298° 26.54	89°40.98 · · 45.41	142°22.69 · · 33.90	149°1.85 · · 18.63	290°6.59 · · 47.82	Atria 107°7.67 -69°4.49
16	313°29.00	104°41.81 45.70	157°24.30 33.65	164° 4.25 18.61	305°9.08 47.82	Sabik 102°1.34 -15°45.45
17 18	328°31.47 343°33.93	119° 42.65 45.99 134° 43.48 \$09° 46.29	172°25.90 33.40 187°27.51 N12°33.15	179°6.64 18.60 194°9.04 N13°18.59	320°11.58 47.82 335°14.07 N00°47.82	Shaula 96°8.67 -37°7.37
19	358° 36.39	134°43.48 S09°46.29 149°44.31 46.59	202°29.12 32.90	209°11.43 18.57	350°16.57 47.82	Rasalhague 95°57.45 12°32.48
20	13°38.86	164°45.14 46.89	217°30.73 32.65	224°13.83 18.56	5°19.06 47.81	Eltanin 90°41.98 51°29.18
21	28°41.32	179°45.97 · · 47.19	232°32.34 · · 32.40	239°16.23 · · 18.55	20°21.55 · · 47.81	Kaus Aust. 83°30.83 -34°22.30 Vega 80°32.56 38°48.63
22	43°43.79	194°46.79 47.49	247°33.95 32.14	254°18.62 18.53	35°24.05 47.81	Vega 80° 32.56 38° 48.63 Nunki 75° 46.16 -26° 15.79
23	58° 46.25	209°47.61 47.79	262°35.56 31.89	269°21.02 18.52	50°26.54 47.81	Altair 61°58.69 8°56.48
Mer.	pass. 19:06	$\nu$ 0.9' d0.3' m-4.87	$\nu$ 1.6' d-0.3' m0.41	ν2.4' d-0.0' m-2.21	$\nu 2.5' \ d$ -0.0' m0.62	Peacock 53°3.67 -56°39.04
						Deneb 49°25.00 45°22.84
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°37.37 10°0.06
0 0	73°48.72	224°48.43 \$09°48.09	277°37.17 N12°31.64	284°23.42 N13°18.51	65°29.04 N00°47.81	Al Na'ir 27°31.07 -46°49.98
1	88°51.18	239°49.25 48.40	292°38.78 31.39	299°25.81 18.50	80°31.53 47.81	Fomalhaut 15°12.80 -29°28.85   Scheat 13°43.66 28°13.99
2	103°53.64	254°50.07 48.70	307°40.40 31.14	314°28.21 18.48	95°34.02 47.81	Markab 13°28.32 15°21.20
3	118°56.11	269°50.88 · · 49.01	322°42.01 · · 30.90	329°30.61 · · 18.47	110°36.51 · · 47.81	
4	133°58.57	284°51.70 49.31	337°43.63 30.65	344°33.01 18.46	125°39.01 47.80	Dec 03 Thu SHA Mer.pass
5 6	149°1.04 164°3.50	299°52.51 49.62 314°53.32 \$09°49.93	352°45.24 30.40 7°46.86 N12°30.15	359°35.41 18.45 14°37.81 N13°18.43	140°41.50 47.80 155°43.99 N00°47.80	Venus 152°16.37 09:03 Mars 204°30.10 05:34
7	104 5.50 179°5.96	329°54.12 50.24	22°48.47 29.90	29°40.21 18.42	170°46.48 47.80	Jupiter 210°38.27 05:09
8	194°8.43	344°54.93 50.55	37°50.09 29.65	44°42.61 18.41	185°48.98 47.80	Saturn 351°38.72 19:43
9	209° 10.89	359°55.73 · · 50.87	52°51.71 · · 29.40	59°45.01 · · 18.40	200°51.47 · · 47.80	
10	224° 13.36	14°56.53 51.18	67°53.33 29.16	74°47.41 18.39	215°53.96 47.80	Dec 04 Fri SHA Mer.pass Venus 151° 38.62 09:02
11	239° 15.82	29° 57.33 51.50	82°54.94 28.91	89°49.81 18.37	230°56.45 47.80	Mars 204°9.09 05:32
12 13	254° 18.28 269° 20.75	44°58.13 S09°51.81 59°58.93 52.13	97°56.56 N12°28.66 112°58.18 28.41	104°52.21 N13°18.36 119°54.61 18.35	245°58.94 N00°47.80 261°1.43 47.80	Jupiter 210°36.40 05:05
13 14	269 20.75 284°23.21	74°59.72 52.45	112 58.18 28.41 127°59.81 28.17	134°57.01 18.34	276°3.92 47.80	Saturn 351°39.57 19:39
15	299°25.68	90°0.51 · · 52.77	143°1.43 · · 27.92	149°59.41 · · 18.33	291°6.42 · · 47.80	Dec 05 Sat SHA Mer.pass
16	314° 28.14	105°1.30 53.09	158° 3.05 27.67	165°1.82 18.32	306°8.91 47.80	Venus 150°59.72 09:00
17	329°30.61	120°2.09 53.41	173°4.67 27.43	180°4.22 18.31	321°11.40 47.80	Mars 203°48.46 05:29
18	344°33.07	135°2.88	188°6.30 N12°27.18	195° 6.62 N13° 18.30	336°13.89 N00°47.80	Jupiter 210°34.70 05:02
19	359°35.53	150°3.66 54.05	203°7.92 26.94	210° 9.03 18.29	351°16.38 47.80	Saturn 351°40.32 19:35
20 21	14°38.00 29°40.46	165°4.44 54.38 180°5.22 · · 54.70	218° 9.55 26.69 233° 11.17 · · · 26.45	225°11.43 18.28 240°13.83 •• 18.27	6°18.87 47.80 21°21.36 • 47.80	Horizontal parallax
22	44° 42.93	195°6.00 55.03	248°12.80 26.20	255°16.24 18.26	36°23.85 47.80	Venus: 0.3
23	59° 45.39	210°6.78 55.36	263°14.42 25.96	270°18.64 18.24	51°26.34 47.80	Mars: 0.1
Mor	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	
IVICI.	Juss. 15.UZ	νο.υ αυ.υ III-4.00	ν 1.0 U-0.2 III0.40	ν Δ. τ u=0.0 III=Δ.ΔΔ	ν Δ.Ο - U.U IIIU.UJ	

L	C	-0.1254 360		-011			
h	Su				Moon		
Thu 0	<b>GHA</b> 182° 36.28	<b>Dec</b> \$22° 3.95	<b>GHA</b> 251°7.96	u 14.6'	<b>Dec</b> 503°43.35	<i>d</i> 14.9'	HP
1	182 36.28 197°36.04	\$22 3.95 4.31	265°41.55	14.6'	03°58.29	14.9'	56.7' 56.7'
2	212°35.79	4.67	280°15.15	14.6'	04°13.20	14.9'	56.6'
3	227° 35.55	5.02	294°48.75	14.6'	04°28.09	14.8'	56.6'
4	242°35.30	5.38	309°22.36	14.6'	04°42.93	14.8'	56.6'
5	257° 35.06	5.73	323°55.98	14.6'	04°57.75	14.8'	56.6'
6	272°34.81	S22°6.08	338°29.60	14.6'	S05°12.53	14.7'	56.5'
7	287°34.57	6.44	353°3.23 7°36.85	14.6'	05°27.28 05°41.99	14.7'	56.5'
8 9	302°34.32 317°34.07	6.79 •• 7.14	7°36.85 22°10.48	14.6' 14.6'	05°41.99 05°56.66	14.7' 14.6'	56.5' 56.5'
10	332° 33.83	7.49	36°44.11	14.6'	06°11.29	14.6'	56.4'
11	347°33.58	7.84	51°17.74	14.6'	06°25.89	14.6'	56.4'
12	2°33.33	\$22°8.19	65°51.36	14.6'	S06°40.44	14.5'	56.4'
13	17° 33.08	8.54	80°24.98	14.6'	06°54.96	14.5'	56.4'
14	32°32.84	8.88	94°58.60	14.6'	07°9.43	14.4'	56.3'
15	47°32.59 62°32.34	• • 9.23	109°32.20 124°5.81	14.6'	07°23.86 07°38.25	14.4' 14.3'	56.3' 56.3'
16 17	77°32.09	9.58 9.92	124 5.81 138°39.40	14.6' 14.6'	07 38.25 07°52.59	14.3'	56.2'
18	92°31.84	522°10.27	153° 12.99	14.6'	S08° 6.89	14.3'	56.2'
19	107°31.59	10.61	167°46.56	14.6'	08°21.14	14.2'	56.2'
20	122°31.34	10.95	182°20.12	14.6'	08°35.35	14.2'	56.2'
21	137°31.09	• • 11.30	196°53.67	14.5'	$08^{\circ}49.51$	14.1'	56.1'
22	152° 30.85	11.64	211°27.21	14.5'	09°3.62	14.1'	56.1'
23	167°30.59	11.98	226°0.74	14.5'	09°17.68	14.0'	56.1'
	SD = 16.2'	d = 0.4'		SE	0 = 15.5'		
Fri 0	<b>GHA</b> 182°30.34	Dec 522°12.32	<b>GHA</b> 240°34.24	u 14.5'	<b>Dec</b> <b>S</b> 09°31.68	<i>d</i> 14.0'	HP 56.1'
1	197° 30.09	12.66	255°7.73	14.5'	09°45.64	13.9'	56.0'
2	212° 29.84	13.00	269°41.21	14.5'	09°59.55	13.9'	56.0'
3	227°29.59	• • 13.34	284°14.66	14.4'	$10^{\circ}13.40$	13.8'	56.0'
4	242°29.34	13.67	298°48.10	14.4'	$10^{\circ}27.20$	13.7'	56.0'
5	257°29.09	14.01	313°21.51	14.4'	10°40.95	13.7'	56.0'
6	272°28.84	\$22°14.34	327°54.90	14.4'	\$10°54.63	13.6'	55.9'
7 8	287°28.58 302°28.33	14.68 15.01	342°28.28 357°1.62	14.3' 14.3'	11°8.27 11°21.84	13.6' 13.5'	55.9' 55.9'
9	317°28.08	• • 15.35	11°34.95	14.3'	11°35.36	13.5'	55.9'
10	332°27.83	15.68	26°8.24	14.3'	11°48.82	13.4'	55.8'
11	347°27.57	16.01	40°41.52	14.2'	$12^{\circ}2.21$	13.3'	55.8'
12	2°27.32	S22°16.34	55°14.76	14.2'	S12°15.55	13.3'	55.8'
13	17°27.07	16.67	69°47.98	14.2'	12°28.83	13.2'	55.8'
14	32°26.81 47°26.56	17.00	84°21.17 98°54.33	14.2'	12°42.04 12°55.19	13.1'	55.7'
15 16	62°26.30	· · 17.33 17.66	98°54.33 113°27.45	14.1' 14.1'	12°55.19 13°8.28	13.1' 13.0'	55.7' 55.7'
17	77° 26.05	17.99	128° 0.55	14.1'	13°21.30	13.0'	55.7'
18	92°25.79	S22°18.31	142°33.62	14.0'	S13°34.25	12.9'	55.7'
19	107°25.54	18.64	$157^{\circ}6.65$	14.0'	$13^{\circ}47.14$	12.8'	55.6'
20	122°25.28	18.96	171°39.65	14.0'	13°59.96	12.8'	55.6'
21	137°25.03	• • 19.29	186°12.61	13.9'	14°12.71	12.7'	55.6'
22	152°24.77	19.61	200°45.54 215°18.43	13.9'	14°25.39	12.6'	55.6'
23	167°24.51	19.94	215 18.43	13.9'	14°38.01	12.5'	55.5'
	SD = 16.2'	d = 0.3'		SE	0 = 15.3'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°24.26	S22°20.26	229°51.29	13.8'	S14°50.55	12.5'	55.5'
1	197°24.00	20.58	244°24.11	13.8'	15° 3.02	12.4'	55.5'
2	212°23.74	20.90	258°56.89	13.7'	15°15.41	12.3'	55.5'
3	227°23.49 242°23.23	•• 21.22	273°29.63 288°2.33	13.7' 13.7'	15°27.74 15°39.99	12.2' 12.2'	55.5'
4 5	242°23.23 257°22.97	21.54 21.86	288° 2.33 302° 35.00	13.6'	15° 52.16	12.1'	55.4' 55.4'
6	272°22.71	\$22°22.17	317°7.62	13.6'	\$16°4.26	12.1	55.4
7	287° 22.46	22.49	331°40.20	13.5'	16°16.28	11.9'	55.4'
8	302°22.20	22.81	$346^{\circ}12.74$	13.5'	$16^{\circ}28.22$	11.9'	55.4'
9	317°21.94	• • 23.12	0°45.23	13.5'	16°40.08	11.8'	55.3'
10	332°21.68 347°21.42	23.44	15°17.69 29°50.10	13.4'	16°51.87 17°3.57	11.7'	55.3'
11 12	347°21.42 2°21.16	23.75 \$22°24.06	29°50.10 44°22.46	13.4' 13.3'	517° 15.19	11.6' 11.5'	55.3' 55.3'
13	17° 20.90	24.38	58°54.78	13.3'	17°26.73	11.5'	55.3'
14	32°20.64	24.69	73°27.06	13.2'	17°38.19	11.4'	55.2'
15	47°20.38	• • 25.00	87°59.29	13.2'	$17^{\circ}49.56$	11.3'	55.2'
16	62°20.12	25.31	102°31.47	13.1'	18°0.85	11.2'	55.2'
17	77° 19.86	25.62	117°3.61	13.1'	18°12.05	11.1'	55.2'
18 19	92°19.60 107°19.34	\$22°25.93 26.23	131°35.70 146°7.74	13.0' 13.0'	\$18°23.17 18°34.19	11.0' 10.9'	55.2' 55.1'
20	107 19.34 122° 19.08	26.23 26.54	146 7.74 160°39.74	13.0	18 34.19 18°45.14	10.9	55.1'
21	137° 18.81	. 26.85	175°11.68	12.9'	18°55.99	10.8	55.1
22	152° 18.55	27.15	189°43.58	12.8'	19°6.75	10.7'	55.1'
23	$167^{\circ}18.29$	27.46	204°15.43	12.8'	19°17.42	10.6'	55.1'
	SD = 16.2'	d = 0.3'		SE	0 = 15.1'		
			-				

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Juliuse	Juliset	Civil	Naut.
N 72°	07:59	10:04			13:36	15:41
<b>N</b> 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
45°	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
<b>S</b> 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	////
<b>S</b> 60°	////	01:14	02:39	21:02	22:29	////

Lat.		Moonris	e		Moonset	:
Lat.	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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	00:51	00:51	00:52	14:31	16:01	17:31

		Sun		Moon			
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age	
	00 <sup>h</sup>	12 <sup>h</sup>	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	Venu	ıs	M	ars	Jup	oiter	Sat	urn	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	
0	74° 47.85		09°55.69	278°16.05	N12°25.71	285°21.05	N13° 18.23	66°28.82	N00° 47.80	
1	89° 50.32	240°8.33	56.02	293°17.68	25.47	300°23.45	18.22	81°31.31	47.80	Alpheratz
2	104°52.78	255°9.10	56.35	308°19.31	25.47	315°25.86	18.22	96°33.80	47.80 47.80	Ankaa
3	119° 55.25		56.68	323°20.94	24.98	330°28.26	18.21	111°36.29	• • 47.80	Schedar
3 4	119 55.25 134°57.71	285°10.63	57.01	323 20.94 338°22.57	24.74	345°30.67	18.20	111 30.29 126°38.78	47.80	Diphda
5	150°0.17	300°11.40	57.35	353°24.20	24.74	0°33.08	18.19	141°41.27	47.80	Achernar
6	165°2.64		57.55 509°57.68	8°25.83	N12°24.25	15°35.48	N13° 18.18	156°43.76	N00° 47.80	Hamal
7	180°5.10	330°12.93	58.02	0 25.03 23°27.47	24.25	30°37.89	18.17	171°46.24	47.80	Polaris
	100 5.10 195°7.57	345° 13.69	58.35	38°29.10	23.77	45°40.30				Acamar
8	210° 10.03			58° 29.10 53° 30.73		45 40.30 60°42.71	18.16	186°48.73 201°51.22	47.81	Menkar
9			58.69		• • 23.52	75°45.11	18.15		• • 47.81	Mirfak
10	225° 12.50	15°15.20	59.03	68°32.37	23.28	75 45.11 90°47.52	18.14	216°53.71	47.81	Aldebaran
11	240° 14.96	30°15.96	59.37	83°34.00	23.04		18.13 N13°18.12	231°56.19	47.81	Rigel
12	255° 17.42		09°59.71	98°35.64	N12°22.80	105°49.93		246°58.68	N00° 47.81	Capella
13	270° 19.89	60° 17.46 75° 18.21	10°0.05	113°37.27 128°38.91	22.56	120°52.34 135°54.75	18.11	262°1.17 277°3.66	47.81	Bellatrix
14	285°22.35		0.40		22.32		18.11		47.81	Elnath
15	300°24.82	90°18.95	• • 0.74	143°40.55	• • 22.08	150°57.16	• • 18.10	292°6.14	• • 47.82	Alnilam
16	315°27.28	105° 19.70	1.09	158°42.19	21.83	165°59.57	18.09	307°8.63	47.82	Betelgeuse
17	330°29.74	120°20.44	1.43	173°43.83	21.59	181°1.98	18.08	322°11.12	47.82	Canopus
18	345°32.21		S10°1.78	188°45.47	N12°21.35	196° 4.39	N13° 18.07	337°13.60	N00°47.82	Sirius
19	0°34.67	150°21.93	2.13	203°47.11	21.11	211°6.80	18.07	352°16.09	47.82	Adhara
20	15°37.14	165°22.66	2.48	218°48.75	20.88	226° 9.21	18.06	7°18.57	47.82	Procyon
21	30°39.60	180°23.40	• • 2.83	233°50.39	• • 20.64	241°11.63	• • 18.05	22°21.06	• • 47.83	Pollux
22	45° 42.07	195°24.13	3.18	248°52.03	20.40	256°14.04	18.04	37°23.54	47.83	Avior
23	60°44.53	210°24.87	3.53	263°53.68	20.16	271°16.45	18.04	52°26.03	47.83	Suhail
Mer.	pass. 18:58	$\nu$ 0.8′ d0.3′	m-4.86	$\nu 1.6' \ d-0$	0.2′ m0.38	$\nu$ 2.4′ d-0	.0′ m-2.23	$\nu 2.5' \ d0$	.0′ m0.63	Miaplacidus
										Alphard
			_		_		_		_	Regulus
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe
0	75° 46.99	225°25.60	<b>S</b> 10° 3.88	278°55.32	N12°19.92	286°18.86	N13° 18.03	67°28.51	N00°47.83	Denebola
1	90°49.46	240°26.33	4.24	293°56.96	19.68	301°21.28	18.02	82°31.00	47.84	Gienah
2	105°51.92	255°27.05	4.59	308°58.61	19.44	316°23.69	18.01	97°33.48	47.84	Acrux
3	120°54.39	270°27.78	• • 4.95	324°0.26	• • 19.21	331°26.10	• • 18.01	112°35.97	• • 47.84	Gacrux
4	135°56.85	285°28.50	5.31	339°1.90	18.97	346°28.52	18.00	127°38.45	47.84	Alioth
5	150°59.31	300°29.23	5.67	354° 3.55	18.73	1°30.93	17.99	142°40.94	47.85	Spica
6	166°1.78		S10°6.03	9°5.20	N12°18.49	16°33.35	N13° 17.99	157°43.42	N00°47.85	Alkaid
7	181°4.24	330°30.66	6.39	$24^{\circ}6.85$	18.26	31°35.76	17.98	172°45.91	47.85	Hadar
8	$196^{\circ}6.71$	345°31.38	6.75	39°8.50	18.02	46°38.18	17.97	187°48.39	47.85	Menkent
9	211°9.17	0°32.10	• • 7.11	54°10.15	•• 17.79	61°40.59	• • 17.97	202°50.87	• • 47.86	Arcturus
10	$226^{\circ}11.64$	15°32.81	7.47	69°11.80	17.55	76°43.01	17.96	217°53.36	47.86	Rigil Kent.
11	241°14.10	30°33.52	7.84	84°13.45	17.31	91°45.43	17.96	232°55.84	47.86	Kochab
12	256° 16.56		<b>S</b> 10°8.20	99°15.10	$N12^{\circ}17.08$	106°47.84	N13° 17.95	247°58.32	N00°47.87	Zuben'ubi
13	$271^{\circ}19.03$	60°34.94	8.57	114°16.75	16.84	121°50.26	17.94	263°0.80	47.87	Alphecca
14	$286^{\circ}21.49$	75°35.64	8.93	129°18.41	16.61	136°52.68	17.94	278°3.29	47.87	Antares
15	301°23.96	90°36.35	• • 9.30	144°20.06	• • 16.37	151°55.09	• • 17.93	293°5.77	• • 47.88	Atria
16	316°26.42	105°37.05	9.67	159°21.72	16.14	166°57.51	17.93	308°8.25	47.88	Sabik
17	331°28.88	120°37.75	10.04	174°23.37	15.90	181°59.93	17.92	323°10.73	47.88	Shaula
18	346°31.35	135°38.45 S	10°10.41	189°25.03	N12°15.67	197° 2.35	N13° 17.92	338°13.22	N00°47.89	Rasalhague
19	1°33.81	150°39.15	10.78	204°26.68	15.44	212° 4.77	17.91	353°15.70	47.89	Eltanin
20	16°36.28	165°39.84	11.16	219°28.34	15.20	227°7.19	17.91	8°18.18	47.90	Kaus Aust.
21	31°38.74	180°40.53	• • 11.53	234°30.00	• • 14.97	$242^{\circ}9.61$	• • 17.90	23°20.66	• • 47.90	Vega
22	46°41.21	195°41.23	11.90	249°31.66	14.74	257°12.03	17.90	38°23.14	47.90	Nunki
23	61°43.67	210°41.92	12.28	264°33.32	14.51	272°14.45	17.89	53°25.62	47.91	Altair
N/a# #	10.F4	$\nu 0.7' \ d0.4'$	1 OF	1 6/ .1 0	0.2' m0.36	1/	.0′ m-2.23	5/ 40	.0′ m0.63	Peacock
ivier.	pass. 18:54	νο.τ αυ.4	111-4.05	$\nu_{1.0}$ $a_{-0}$	J.2 MU.30	ν2.4 α-0	.0 111-2.23	ν2.5 d0	.0 1110.03	Deneb
										Enif
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir
0	76°46.13		10°12.66	279°34.98	N12°14.27	287°16.87	N13°17.89	68°28.10	N00°47.91	Fomalhaut
1	91°48.60	240°43.29	13.03	294°36.64	14.04	302°19.29	17.88	83°30.59	47.92	Scheat
2	106°51.06	255°43.98	13.41	309°38.30	13.81	$317^{\circ}21.71$	17.88	98°33.07	47.92	Markab
3	121°53.53	270°44.66	• • 13.79	324°39.97	• • 13.58	332°24.13	• • 17.87	113°35.55	• • 47.93	IvidiNaD
4	136°55.99	285°45.34	14.17	339°41.63	13.35	347°26.55	17.87	128°38.03	47.93	Dec 06 Sun
5	151°58.46	300°46.02	14.55	354°43.29	13.12	2°28.98	17.87	143°40.51	47.93	Venus
6	167°0.92	315°46.70 S	10°14.93	9°44.96	N12°12.88	17°31.40	N13° 17.86	158°42.99	N00°47.94	Mars
7	182°3.38	330°47.37	15.32	24°46.62	12.65	32°33.82	17.86	173°45.47	47.94	Jupiter
8	197°5.85	345°48.05	15.70	39°48.29	12.42	47°36.24	17.86	188°47.95	47.95	Saturn
9	212°8.31		• • 16.09	54°49.95	•• 12.19	62°38.67	• • 17.85	203°50.43	• • 47.95	D- 07.11
10	227° 10.78	15°49.39	16.47	69°51.62	11.96	77°41.09	17.85	218°52.90	47.96	Dec 07 Mon
11	242°13.24	30°50.06	16.86	84°53.29	11.73	92°43.52	17.85	233°55.38	47.96	Venus
12	257° 15.70		10°17.25	99°54.96	N12°11.51	107°45.94	N13°17.84	248°57.86	N00°47.97	Mars
13	272° 18.17	60°51.40	17.63	114°56.63	11.28	122°48.37	17.84	264°0.34	47.97	Jupiter
14	287° 20.63	75°52.06	18.02	129°58.30	11.05	137°50.79	17.84	279°2.82	47.98	Saturn
15	302°23.10		• • 18.41	144°59.97	• • 10.82	152°53.22	• • 17.83	294°5.30	• • 47.98	Dec 08 Tue
16	317° 25.56	105°53.38	18.80	160°1.64	10.59	167°55.64	17.83	309°7.78	47.99	Venus
17	332°28.03	120°54.04	19.20	175°3.31	10.36	182°58.07	17.83	324°10.25	47.99	Mars
18	347°30.49		10°19.59	190°4.99	N12°10.14	198° 0.49	N13° 17.83	339°12.73	N00°48.00	Jupiter
19	2°32.95	150°55.36	19.98	205° 6.66	9.91	213°2.92	17.82	354°15.21	48.01	Saturn
20	17°35.42	165°56.01	20.38	220°8.34	9.68	228° 5.35	17.82	9°17.69	48.01	
21	32°37.88	180°56.66	• • 20.77	235°10.01	• • 9.45	243°7.78	• • 17.82	24°20.16	• • 48.02	Horizon
22	47°40.35	195°57.31	21.17	250°11.69	9.23	258°10.20	17.82	39°22.64	48.02	
23	62°42.81	210°57.96	21.57	265°13.36	9.00	273°12.63	17.82	54°25.12	48.03	
N/1-11	nacc 10.F0	ν0.7′ d0.4′	m / 0/	,,1 7/ -/ 0	0.2′ m0.34	1/2 // 4 0	.0′ m-2.24	1.0 E/ JO	.0′ m0.64	
ivier.	pass. 18:50	νο.ι αυ.4	111-4.04	ν1.1 α-0	7.4 1110.34	ν2.4 U-U	.0 111-2.24	ν2.5 d0	.0 1110.04	

Stars SHA

357°33.03

353°5.46

349° 28 96

348°45.58

 $335^{\circ}18.65$ 

 $327^{\circ}49.15$ 

312°44.63

315°10.21

 $314^{\circ}4.21$ 

308°25.50

290°37.46

281°2.02

 $280^{\circ}19.08$ 

 $278^{\circ}20.86$ 

277°59.50

275°35.80

270°50.05

263°51.17

258°24.53

244°48.93

 $243^{\circ}\,15.11$ 

234°13.65

222°44.93

221°37.47

217°46.08 207°32.70

193°39.14

182°23.43

175°42.08

 $172^{\circ}58.58$ 

 $171^{\circ}50.11$ 

166°11.90

158° 20.85

152°51.13

148°34.24

 $147^{\circ}56.06$ 

 $145^{\circ}46.75$ 

139°38.67

137°20.92

136°54.58

126°2.77

112°14 29

107°7.66  $102^{\circ}1.34$ 

 $96^{\circ}8.66$ 

95°57.44

90°41.99

83°30.83

80°32.57

 $75^{\circ}46.16$ 

61°58.69

53°3.68

49°25.01

 $33^{\circ}37.38$ 

 $27^{\circ}31.09$ 

15°12.82

13°43.67

13°28.33

SHA

150°19.70

203°28.20

 $210^{\circ}33.19$ 

 $351^{\circ}40.97$ 

SHA

149°38.60

203°8.33

210°31.87

351°41.52

SHA

148°56.47

202°48.85

 $210^{\circ}30.73$ 

351°41.97

Venus: Mars:

Horizontal parallax

255°4.29

Dec 29°14.60

-42°9.70

56°41 44 -17°50.34

 $\textbf{-57}^{\circ}6.15$ 

 $23^{\circ}35.55$ 

89°22.80

40°11.84 4°11.80

49°57.54

16°33.85

 $-8^{\circ}10.19$ 

46°1.47

6°22.46

28°37.79

 $-1^{\circ}11.05$ 

 $7^{\circ}24.73$ -52°42.46

-16°45.13

-29°0.41

 $27^{\circ}57.54$ 

-59°35.51

-43°32.27

-69°49.37

-8°46.49

11°50.04

61°36.00

 $14^{\circ}25.18$ 

-17°41.41

-63°14.65

-57°15.61

55°48.53

-11°18.07

49°10.49

-60°29.97

-36°30.01

 $19^{\circ}2.44$ 

60°56.62

74°2.43

-16°9.16

26°37.37

-26°29.44

-69°4.47

-15°45.45

-37°7.36

 $12^{\circ}32.47$ 

51°29.17

-34°22.30 38°48.62

-26°15.78

8°56.47

-56°39.03

45°22.83

 $10^{\circ}0.05$ 

-46°49.98

-29°28.85

28°13.99

15°21.19

Mer.pass

08:59

05:26

04:58

19:31

08:58

05:24

04:54

19:27

05:21

04:50

19:23

0.3

0.1

Mer.pass 08:57

Mer.pass

 $5^{\circ}9.33$ 

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	НР
0	182°18.03	S22°27.76	218°47.23	12.8'	S19°28.00	10.5'	55.1'
1	197°17.77	28.06	233° 18.98	12.7'	19°38.49	10.4'	55.0'
2	212°17.50 227°17.24	28.37	247°50.68 262°22.33	12.7' 12.6'	19°48.88 19°59.18	10.3' 10.2'	55.0' 55.0'
3 4	242°16.98	· · 28.67 28.97	202 22.33 276°53.93	12.6'	20°9.39	10.2	55.0'
5	257°16.71	29.27	291°25.48	12.5'	20° 19.50	10.0'	55.0'
6	272°16.45	S22°29.57	305°56.98	12.4'	S20°29.51	9.9'	55.0'
7	287°16.19	29.87	320°28.43	12.4'	20°39.43	9.8'	54.9'
8	302°15.92	30.17	334°59.83	12.3'	20°49.24	9.7'	54.9'
9 10	317°15.66 332°15.39	· · 30.46 30.76	349°31.18 4°2.48	12.3' 12.2'	20°58.96 21°8.58	9.6' 9.5'	54.9' 54.9'
11	347°15.13	31.06	18°33.72	12.2'	21°18.10	9.4'	54.9'
12	2°14.86	S22°31.35	33°4.92	12.1'	S21°27.52	9.3'	54.9'
13	17°14.60	31.64	47°36.06	12.1'	21°36.83	9.2'	54.8'
14 15	32°14.33 47°14.07	31.94 · · 32.23	62°7.15 76°38.19	12.0' 12.0'	21°46.04 21°55.15	9.1' 9.0'	54.8' 54.8'
16	62°13.80	32.52	91°9.18	11.9'	21 55.15 22°4.16	9.0 8.9'	54.8'
17	77°13.53	32.81	105°40.12	11.9'	22° 13.05	8.8'	54.8'
18	92°13.27	S22°33.10	120°11.01	11.8'	S22°21.85	8.7'	54.8'
19	107°13.00	33.39	134°41.84	11.8'	22°30.53	8.6'	54.7'
20 21	122°12.73 137°12.47	33.68 •• 33.97	149°12.63 163°43.36	11.7' 11.7'	22°39.11 22°47.58	8.5' 8.4'	54.7' 54.7'
22	157 12.47 152°12.20	34.26	178° 14.05	11.6'	22°55.94	8.3'	54.7'
23	167°11.93	34.54	192°44.68	11.6'	23°4.19	8.1'	54.7'
	SD = 16.2'	d = 0.3'		SF	0 = 15.0'		
Mon 0	<b>GHA</b> 182°11.66	<b>Dec</b> \$22°34.83	<b>GHA</b> 207° 15.27	u 11.5'	Dec 523° 12.33	<i>d</i> 8.0'	<b>HP</b> 54.7'
1	182 11.00 197°11.39	35.11	207 15.27 221°45.81	11.5'	23° 20.36	8.0 7.9'	54.7'
2	212°11.13	35.40	236°16.29	11.4'	23°28.28	7.8'	54.6'
3	227°10.86	•• 35.68	250°46.73	11.4'	23°36.08	7.7'	54.6'
4	242°10.59 257°10.32	35.96	265°17.12 279°47.46	11.3'	23°43.77 23°51.34	7.6'	54.6'
5 6	272°10.05	36.24 \$22°36.53	279 47.46 294°17.75	11.3' 11.2'	23 51.34 \$23°58.80	7.5' 7.3'	54.6' 54.6'
7	287° 9.78	36.81	308°47.99	11.2'	24°6.15	7.2'	54.6'
8	302°9.51	37.09	323°18.19	11.2'	$24^{\circ}13.38$	7.1'	54.6'
9	317°9.24	• • 37.36	337°48.34	11.1'	24°20.49	7.0'	54.5'
10 11	332°8.97 347°8.70	37.64 37.92	352°18.45 6°48.51	11.1' 11.0'	24°27.48 24°34.36	6.9' 6.8'	54.5' 54.5'
12	2°8.43	\$22°38.20	21°18.52	11.0'	\$24°41.12	6.6	54.5
13	17°8.16	38.47	35°48.49	10.9'	24° 47.75	6.5	54.5'
14	32°7.89	38.75	$50^{\circ}18.42$	10.9'	$24^{\circ}54.27$	6.4'	54.5'
15	47°7.62	• • 39.02	64°48.30	10.8'	25°0.66 25°6.94	6.3'	54.5'
16 17	62°7.35 77°7.07	39.29 39.57	79°18.14 93°47.94	10.8' 10.8'	25° 13.09	6.2' 6.0'	54.5' 54.4'
18	92°6.80	S22°39.84	108° 17.70	10.7'	S25°19.12	5.9'	54.4'
19	107°6.53	40.11	$122^{\circ}47.41$	10.7'	$25^{\circ}25.03$	5.8'	54.4'
20	122°6.26	40.38	137°17.09	10.6'	25°30.81	5.7'	54.4'
21 22	137°5.99 152°5.71	· · 40.65 40.92	151°46.73 166°16.32	10.6' 10.6'	25°36.47 25°42.00	5.5' 5.4'	54.4' 54.4'
23	167° 5.44	41.19	180° 45.88	10.5	25°47.41	5.4	54.4
	SD = 16.2'	d = 0.3'		SE	0 = 14.9'		
_	GHA	Б.	GHA				HP
Tue 0	182°5.17	Dec \$22° 41.45	195° 15.41	u 10.5'	Dec \$25° 52.69	<i>d</i> 5.2'	пР 54.4'
1	197°4.89	41.72	209°44.90	10.5	25° 57.84	5.0'	54.3'
2	212°4.62	41.99	224°14.35	10.4'	26°2.87	4.9'	54.3'
3	227° 4.35 242° 4.07	· · 42.25	238° 43.77 253° 13.15	10.4	26°7.77	4.8'	54.3'
4 5	242°4.07 257°3.80	42.51 42.78	253° 13.15 267° 42.51	10.4' 10.3'	26° 12.54 26° 17.19	4.6' 4.5'	54.3' 54.3'
6	272°3.52	\$22°43.04	282°11.83	10.3'	\$26°21.70	4.4'	54.3'
7	287°3.25	43.30	296°41.12	10.3'	26°26.09	4.3'	54.3'
8	302°2.97	43.56	311°10.38	10.2'	26°30.34	4.1'	54.3'
9 10	317°2.70 332°2.42	· · 43.82 44.08	325°39.61 340°8.82	10.2' 10.2'	26°34.47 26°38.47	4.0' 3.9'	54.3' 54.3'
10	332 2.42 347°2.15	44.08 44.34	340 8.82 354°38.00	10.2'	26° 42.33	3.9	54.3' 54.2'
12	2°1.87	S22°44.60	9°7.15	10.1'	S26°46.06	3.6'	54.2'
13	17°1.60	44.86	23°36.28	10.1'	26°49.67	3.5'	54.2'
14	32°1.32	45.11	38°5.38	10.1'	26°53.14	3.3'	54.2'
15 16	47°1.05 62°0.77	•• 45.37 45.62	52°34.47 67°3.53	10.1' 10.0'	26°56.47 26°59.68	3.2' 3.1'	54.2' 54.2'
17	77°0.49	45.88	81°32.57	10.0'	20 59.06 27°2.75	2.9'	54.2'
18	92°0.22	S22°46.13	96°1.59	10.0'	\$27°5.69	2.8'	54.2'
19	106°59.94	46.38	110°30.60	10.0'	27°8.49	2.7'	54.2'
20	121°59.66 136°59.38	46.63	124°59.59 139°28.56	10.0'	27°11.17 27°13.71	2.5'	54.2'
21 22	136°59.38 151°59.11	· · 46.88 47.13	139°28.56 153°57.52	10.0' 9.9'	27°13.71 27°16.11	2.4' 2.3'	54.1' 54.1'
23	166°58.83	47.13	168° 26.46	9.9'	27°18.38	2.1'	54.1'
	SD = 16.2'	d = 0.3'		SE	0 = 14.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	08:06	10:17			13:25	15:37
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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	////
<b>S</b> 60°	////	01:06	02:36	21:08	22:39	////

Lat.		Moonris	е		Moonset	:
Lat.	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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	00:55	01:01	01:13	19:04	20:34	21:55

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	27-29
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	9-1%
06	09:12	08:59	11:51	09:43	22:07	
07	08:47	08:34	11:51	10:32	22:57	
08	08:21	08:07	11:52	11:22	23:48	

## December 09, 10, 11 UT (Wed., Thu., Fri.)

h	Aries	Venus	Mars	Jupiter	Saturn
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
	<b>GПА</b> 77°45.27		280°15.04 N12°8.78		l l
0		225°58.61 \$10°21.97		288°15.06 N13°17.81	69°27.59 N00°48.04
1	92°47.74	240°59.25 22.37	295°16.72 8.55	303°17.49 17.81	84°30.07 48.04
2	107°50.20	255°59.90 22.77	310°18.40 8.32	318°19.92 17.81	99°32.55 48.05
3	122°52.67	271°0.54 · · 23.17	325°20.08 · · 8.10	333°22.35 · · 17.81	114°35.02 · · 48.05
4	137°55.13	286°1.18 23.57	340°21.76 7.87	348°24.78 17.81	129°37.50 48.06
5	152°57.60	301°1.82 23.97	355°23.44 7.65	3°27.21 17.81	144°39.98 48.07
6	$168^{\circ}0.06$	316°2.46 \$10°24.37	10°25.12 N12°7.42	18°29.64 N13°17.81	159°42.45 N00°48.07
7	183°2.52	331°3.09 24.78	25°26.80 7.20	33°32.07 17.81	174°44.93 48.08
8	198°4.99	346°3.73 25.18	40°28.48 6.98	48°34.50 17.81	189°47.40 48.09
9	213°7.45	1°4.36 · · 25.59	55°30.17 · · 6.75	63°36.93 · · 17.81	204°49.88 • • 48.09
10	228°9.92	16°4.99 26.00	70°31.85 6.53	78°39.36 17.80	219°52.35 48.10
11	243°12.38	31°5.62 26.41	85°33.54 6.31	93°41.80 17.80	234°54.83 48.11
12	258° 14.85	46°6.25 \$10°26.81	100°35.22 N12°6.08	108°44.23 N13°17.80	249°57.30 N00°48.11
13	273° 17.31	61°6.87 27.22	115°36.91 5.86	123°46.66 17.80	264°59.78 48.12
14	288° 19.77	76°7.50 27.63	130°38.60 5.64	138°49.09 17.80	280°2.25 48.13
15	303°22.24	91°8.12 · · 28.05	145°40.29 · · 5.42	153°51.53 · · 17.80	295°4.72 · · 48.13
16	318°24.70	106°8.74 28.46	160°41.97 5.20	168°53.96 17.80	310°7.20 48.14
17	333°27.17	121°9.36 28.87	175°43.66 4.97	183°56.39 17.80	325°9.67 48.15
18	348°29.63	136°9.97 \$10°29.29	190°45.35 N12°4.75	198°58.83 N13°17.80	340°12.15 N00°48.16
19	3°32.09	151°10.59 29.70	205°47.04 4.53	214°1.26 17.81	355°14.62 48.16
20	18° 34.56	166°11.20 30.12	200° 48.74 4.31	229° 3.70 17.81	10°17.09 48.17
21	33°37.02	181°11.82 · · 30.53		244°6.13 · · 17.81	25°19.57 · · 48.18
22	48°39.49	196°12.43 30.95	250°52.12 3.87	259°8.57 17.81	40°22.04 48.19
23	63°41.95	211°13.04 31.37	265°53.82 3.65	274°11.01 17.81	55°24.51 48.20
Mer	pass. 18:46	ν0.6' d0.4' m-4.83	ν1.7' d-0.2' m0.33	$\nu$ 2.4' d-0.0' m-2.25	ν2.5' d0.0' m0.64
	7433. 10.40				- V2.5 d0.0 m0.04
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	78°44.42	226°13.64 \$10°31.79	280°55.51 N12°3.43	289°13.44 N13°17.81	70°26.98 N00°48.20
1	93°46.88	241°14.25 32.21	295°57.20 3.21	304°15.88 17.81	85°29.46 48.21
2	108°49.34	256°14.85 32.63	310°58.90 2.99	319°18.32 17.81	100°31.93 48.22
3	123°51.81	271°15.46 · · 33.05	326°0.60 · · 2.77	334°20.75 · · 17.81	115°34.40 · · 48.23
4	138°54.27	286°16.06 33.47	341°2.29 2.56	349°23.19 17.82	130°36.87 48.24
5	153° 56.74	301°16.66 33.89	356° 3.99 2.34	4°25.63 17.82	145°39.34 48.24
6	168° 59.20	316°17.26 \$10°34.32	11°5.69 N12°2.12	19°28.07 N13°17.82	160°41.82 N00°48.25
	184°1.67	331°17.85 34.74	26°7.39 1.90	34°30.51 17.82	175°44.29 48.26
7					
8	199°4.13	346°18.45 35.17	41°9.09 1.69	49°32.94 17.82	190°46.76 48.27
9	214°6.59	1°19.04 · · 35.59	56°10.79 · · 1.47	64°35.38 · · 17.83	205°49.23 · · 48.28
10	229°9.06	16° 19.63 36.02	71°12.49 1.25	79°37.82 17.83	220°51.70 48.29
11	244° 11.52	31°20.22 36.45	86°14.20 1.04	94°40.26 17.83	235°54.17 48.29
12	259° 13.99	46°20.81 \$10°36.88	101°15.90 N12°0.82	109°42.70 N13°17.83	250°56.64 N00°48.30
13	274° 16.45	61°21.40 37.31	116°17.60 0.60	124°45.14 17.84	265°59.11 48.31
14	289° 18.91	76°21.98 37.74	131°19.31 0.39	139°47.58 17.84	281°1.58 48.32
15	304°21.38	91°22.56 · · 38.17	146°21.01 · · 0.17	154°50.03 · · 17.84	296°4.05 · · 48.33
16	319°23.84	106°23.15 38.60	161°22.72 11°59.96	169°52.47 17.84	311°6.52 48.34
17	334°26.31	121°23.73 39.03	176°24.43 11°59.74	184°54.91 17.85	326°8.99 48.35
18	349°28.77	136°24.30 \$10°39.47	191°26.13 N11°59.53	199°57.35 N13°17.85	341°11.46 N00°48.36
19	4°31.24	151°24.88 39.90	206°27.84 59.31	214°59.79 17.85	356°13.93 48.37
20	19°33.70	166°25.46 40.34	221°29.55 59.10	230° 2.24 17.86	11°16.40 48.38
21	34°36.16	181°26.03 · · 40.77	236°31.26 · · 58.89	245° 4.68 · · 17.86	26°18.87 · · 48.39
22	49°38.63	196°26.60 41.21	251°32.97 58.67	260°7.12 17.86	41°21.34 48.40
23	64°41.09	211°27.17 41.65	266°34.68 58.46	275°9.57 17.87	56°23.80 48.40
Mer.p	pass. 18:42	$ u 0.6' \ d0.4' \ \text{m-4.82}$	$\nu 1.7' \; d\text{-}0.2' \; \text{m}0.31$	$\nu$ 2.4′ $d$ 0.0′ $m$ -2.26	ν2.5′ d0.0′ m0.65
Ev!	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
Fri 0	<b>GHA</b> 79°43.56	226° 27.74 \$10° 42.09	281°36.39 N11°58.25	290°12.01 N13°17.87	71°26.27 N00°48.41
1	79 43.50 94°46.02	241°28.31 42.52	281 30.39 N11 58.25 296°38.11 58.03	305°14.46 17.88	86°28.74 48.42
	94 46.02 109°48.49				I
2				320°16.90 17.88	101°31.21 48.43
3	124°50.95		326°41.53 · · 57.61	335°19.35 · · 17.88	116°33.68 · · 48.44
4	139°53.41	286°30.00 43.85	341°43.25 57.40	350°21.79 17.89	131°36.14 48.45 D
5	154° 55.88	301°30.56 44.29	356°44.97 57.19	5°24.24 17.89	146°38.61 48.46
6	169°58.34	316°31.12 S10°44.73	11°46.68 N11°56.98	20°26.68 N13°17.90	161°41.08 N00°48.47
7	185°0.81	331°31.68 45.18	26°48.40 56.77	35°29.13 17.90	176°43.55 48.48
8	200°3.27	346°32.24 45.62	41°50.12 56.55	50°31.58 17.91	191°46.01 48.49
9	215°5.73	1°32.79 · · 46.06	56°51.83 · · 56.34	65°34.02 · · 17.91	206°48.48 · · 48.51
10	230°8.20	16°33.35 46.51	71°53.55 56.13	80°36.47 17.92	221°50.95 48.52
11	$245^{\circ}10.66$	31°33.90 46.96	86°55.27 55.93	95°38.92 17.92	236°53.41 48.53
12	260°13.13	46°34.45 \$10°47.41	101°57.00 N11°55.72	110°41.37 N13°17.93	251°55.88 N00°48.54
13	$275^{\circ}15.59$	61°35.00 47.85	116°58.72 55.51	125°43.82 17.93	266°58.35 48.55
14	290°18.06	76°35.55 48.30	132°0.44 55.30	140°46.27 17.94	282°0.81 48.56
15	305°20.52	91°36.09 · · 48.75	147°2.16 · · 55.09	155°48.71 · · 17.95	297°3.28 · · 48.57
16	320°22.98	106° 36.64 49.20	162°3.89 54.88	170°51.16 17.95	312°5.74 48.58
17	335°25.45	121°37.18 49.65	177° 5.61 54.67	185°53.61 17.96	327°8.21 48.59
18	350°27.91	136°37.72 \$10°50.11	192°7.34 N11°54.47	200°56.06 N13°17.96	342°10.67 N00°48.60
19	5°30.38	150 37.72 310 50.11 151°38.26 50.56	207° 9.06 54.26	215°58.51 17.97	357°13.14 48.61
20	20°32.84	166°38.80 51.01	222°10.79 54.05 237°12.52 · · 53.84	231°0.97 17.98	12°15.60 48.62
21	35°35.31	181°39.33 · · 51.47		246° 3.42 · · 17.98	27°18.07 · · 48.64
22	50°37.77	196°39.87 51.92	252°14.24 53.64	261°5.87 17.99	42°20.53 48.65
23	65°40.23	211°40.40 52.38	267°15.97 53.43	276° 8.32 18.00	57°23.00 48.66
Mer	pass. 18:38	ν0.6' d0.4' m-4.81	ν1.7' d-0.2' m0.29	ν2.4' d0.0' m-2.26	ν2.5' d0.0' m0.65

	эпа	Dec
Alpheratz	357°33.04	29°14.60
Ankaa	353° 5.47	-42°9.71
Schedar	349°28.97	56°41.44
Diphda	348°45.59	-17°50.34
Achernar	335°18.67 327°49.15	-57°6.16
Hamal	327°49.15 312°44.88	23°35.55 89°22.81
Polaris Acamar	312 44.88 315°10.21	-40°11.85
Menkar	314°4.21	4°11.79
Mirfak	308°25.49	49°57.55
Aldebaran	290°37.45	16°33.84
Rigel	281°2.00	-8°10.20
Capella	280°19.06	46°1.48
Bellatrix	278°20.84	6°22.46
Elnath	277°59.48	28°37.79
Alnilam	275°35.79	-1°11.06
Betelgeuse	270°50.04	7°24.72
Canopus	263°51.15	-52°42.48
Sirius	258°24.52	-16°45.14
Adhara	255°4.27	-29°0.43
Procyon	244°48.91 243°15.08	5°9.32 27°57.53
Pollux Avior	243°15.08 234°13.62	-59°35.52
Avior Suhail	234°13.62 222°44.90	-59°35.52 -43°32.29
Miaplacidus	222 44.90 221°37.42	-43 32.29 -69°49.39
Alphard	217°46.05	-8°46.50
Regulus	207°32.67	11°50.03
Dubhe	193°39.09	61°35.99
Denebola	182°23.40	14°25.17
Gienah	$175^{\circ}42.05$	-17°41.42
Acrux	172°58.53	-63°14.65
Gacrux	171°50.06	-57°15.61
Alioth	166°11.87	55°48.51
Spica Alkaid	158°20.82 152°51.10	-11°18.08 49°10.48
Alkaid Hadar	152°51.10 148°34.20	-60°29.97
Menkent	146 34.20 147°56.03	-36°30.01
Arcturus	147 30.03 145°46.73	19°2.42
Rigil Kent.	139°38.63	-60°56.61
Kochab	137°20.89	74°2.41
Zuben'ubi	136°54.55	-16°9.17
Alphecca	$126^{\circ}2.76$	26°37.36
Antares	112°14.27	-26°29.44
Atria	107°7.63	-69°4.46
Sabik	102° 1.33 96° 8.65	-15°45.45 -37°7.35
Shaula Rasalhague	96°8.65 95°57.44	-37°7.35 12°32.46
Rasalhague Eltanin	95°57.44 90°41 99	51°29.15
Kaus Aust.	83°30.82	-34°22.29
Vega	80°32.57	38°48.61
Nunki	75°46.15	-26°15.78
Altair	61°58.69	8°56.47
Peacock	53°3.69	-56°39.02
Deneb	49°25.02	45°22.83
Enif	33°37.38	10°0.05
Al Na'ir	27°31.10	-46°49.98
Fomalhaut	15°12.82	-29°28.85
Scheat Markab	13°43.68 13°28.34	28°13.98 15°21.19
iviarkab	13 20.34	10 21.19
Dec 09 Wed	SHA	Mer.pass
Venus	148°13.33	08:56
Mars	202°29.77	05:18
Jupiter	210°29.79	04:46
Saturn	351°42.32	19:19
Dec 10 Thu	SHA	Mer.pass
Venus	147°29.23	08:55
Mars	202°11.09	05:16
Jupiter	210°29.03	04:42
Saturn	351°42.57	19:15
Dec 11 Fri	SHA	Mer.pass
Venus	146°44.19	08:54
Mars	201°52.84	05:13
Jupiter	210°28.46	04:38
Saturn	351°42.72	19:11
Horizor	ıtal parallax	
	Venus:	0.3
	Mars:	0.1

Stars SHA

Dec

		+0.1230 sec		-011 -	. 4	. 500	
h	Su	<u> </u>			Moon		
Wed	GHA	<b>Dec</b> \$22°47.63	GHA	$\nu$	Dec	d 2.0'	HP
0 1	181°58.55 196°58.27	47.88	182°55.40 197°24.32	9.9' 9.9'	\$27°20.52 27°22.52	2.0' 1.9'	54.1' 54.1'
2	211°57.99	48.13	211°53.23	9.9'	27°24.38	1.7'	54.1'
3	226°57.72	• • 48.37	$226^{\circ}22.14$	9.9'	$27^{\circ}26.11$	1.6'	54.1'
4	241°57.44	48.62	240°51.04	9.9'	27°27.71	1.5'	54.1'
5	256°57.16	48.86	255°19.93	9.9'	27°29.17	1.3'	54.1'
6 7	271°56.88 286°56.60	\$22°49.11 49.35	269°48.82 284°17.70	9.9' 9.9'	\$27°30.50 27°31.69	1.2' 1.1'	54.1' 54.1'
8	301°56.32	49.59	298°46.58	9.9'	27°32.75	0.9'	54.1'
9	316°56.04	• • 49.83	313°15.46	9.9'	27°33.67	0.8'	54.1'
10	331°55.76	50.08	327°44.35	9.9'	27°34.45	0.7'	54.0'
11	346°55.48	50.32	342°13.23 356°42.12	9.9'	27°35.11	0.5'	54.0'
12 13	1°55.20 16°54.92	\$22°50.55 50.79	356° 42.12 11° 11.01	9.9' 9.9'	\$27°35.62 27°36.00	0.4' 0.2'	54.0' 54.0'
14	31°54.64	51.03	25°39.91	9.9'	27°36.25	0.1	54.0'
15	46°54.36	• • 51.27	40°8.81	9.9'	27°36.36	-0.0'	54.0'
16	61°54.08	51.50	54°37.72	9.9'	27°36.33	-0.2'	54.0'
17	76°53.80 91°53.51	51.74 \$22°51.97	69°6.64 83°35.57	9.9' 9.9'	27°36.17 \$27°35.88	-0.3'	54.0' 54.0'
18 19	91°53.51 106°53.23	52.21	83°35.57 98°4.51	9.9	27° 35.88	-0.4' -0.6'	54.0'
20	100 53.25 121°52.95	52.44	112°33.47	10.0'	27°34.88	-0.7	54.0'
21	136°52.67	• • 52.67	127°2.44	10.0'	27°34.19	-0.8'	54.0'
22	151°52.39	52.90	141°31.42	10.0'	27°33.35	-1.0'	54.0'
23	166°52.10	53.13	156°0.43	10.0'	27°32.39	-1.1'	54.0'
	$SD = 16.2^{\prime}$	d = 0.2'		SD	0 = 14.8'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0 0	181°51.82	\$22°53.36	170°29.45	ν 10.0'	\$27°31.29	-1.2'	54.0'
1	196°51.54	53.59	184°58.49	10.1'	27°30.06	-1.4'	54.0'
2	211°51.26	53.82	199°27.54	10.1'	27°28.69	-1.5'	54.0'
3	226°50.97	• • 54.05	213°56.63	10.1'	27°27.19	-1.6'	53.9'
4 5	241°50.69 256°50.41	54.28 54.50	228°25.73 242°54.86	10.1' 10.2'	27°25.56 27°23.80	-1.8' -1.9'	53.9' 53.9'
6	271°50.12	\$22° 54.73	257°24.01	10.2'	\$27°21.90	-2.0'	53.9'
7	286°49.84	54.95	271°53.19	10.2'	27° 19.87	-2.2'	53.9'
8	301°49.55	55.17	286°22.39	10.2'	$27^{\circ}17.71$	-2.3'	53.9'
9	316°49.27	• • 55.40	300°51.62	10.3'	27°15.42	-2.4'	53.9'
10 11	331°48.99 346°48.70	55.62 55.84	315°20.89 329°50.18	10.3' 10.3'	27°13.00 27°10.45	-2.6' -2.7'	53.9' 53.9'
12	1°48.42	\$22° 56.06	344°19.50	10.4	\$27°7.77	-2.8'	53.9
13	16°48.13	56.28	358°48.86	10.4'	27°4.96	-2.9'	53.9'
14	31°47.85	56.50	13°18.25	10.4'	27°2.02	-3.1'	53.9'
15	46°47.56 61°47.28	• • 56.72	27°47.68	10.5'	26°58.95	-3.2'	53.9'
16 17	76°46.99	56.93 57.15	42°17.14 56°46.64	10.5' 10.5'	26°55.75 26°52.43	-3.3' -3.5'	53.9' 53.9'
18	91°46.71	\$22°57.37	71°16.17	10.6'	\$26°48.98	-3.6'	53.9'
19	106°46.42	57.58	85°45.75	10.6'	$26^{\circ}45.40$	-3.7'	53.9'
20	121°46.13	57.80	100°15.36	10.7'	26°41.70	-3.8'	53.9'
21	136°45.85	58.01	114°45.02 129°14.71	10.7'	26°37.87 26°33.91	-4.0'	53.9'
22 23	151°45.56 166°45.27	58.22 58.43	129 14.71 143°44.45	10.7' 10.8'	26° 29.83	-4.1' -4.2'	53.9' 53.9'
2.5	SD = 16.2'	d = 0.2'	113 11.13		0 = 14.7'	1.2	33.3
	$5D = 16.2^{\circ}$	$a = 0.2^{\circ}$		- SL	0 = 14.7		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°44.99	S22°58.64	158°14.23	10.8'	S26°25.62	-4.3'	53.9'
1 2	196°44.70 211°44.41	58.85 59.06	172°44.05 187°13.92	10.9' 10.9'	26°21.30 26°16.85	-4.5' -4.6'	53.9' 53.9'
3	211 44.41 226°44.13	59.00	201°43.84	10.9	26 10.85 26°12.27	-4.0 -4.7'	53.9'
4	241°43.84	59.48	216°13.80	11.0'	26°7.58	-4.8'	53.9'
5	256°43.55	59.69	230°43.81	11.1'	26°2.76	-4.9'	53.9'
6	271°43.26	\$22°59.89	245°13.86	11.1'	\$25°57.82	-5.1'	53.9'
7 8	286°42.98 301°42.69	23°0.10 0.30	259°43.96 274°14.12	11.2' 11.2'	25°52.76 25°47.59	-5.2' -5.3'	53.9' 53.9'
9	316°42.40	0.51	274 14.12 288°44.32	11.2	25 47.59 25°42.29	-5.3 -5.4'	53.9'
10	331°42.11	0.71	303°14.57	11.3'	25°36.88	-5.5'	53.9'
11	346°41.82	0.91	317°44.87	11.4'	25°31.35	-5.6'	53.9'
12	1°41.53	\$23°1.11	332°15.23	11.4'	\$25°25.70	-5.8'	53.9'
13 14	16°41.24 31°40.96	1.31 1.51	346°45.64 1°16.10	11.5' 11.5'	25°19.93 25°14.05	-5.9' -6.0'	53.9' 53.9'
15	46°40.67	. 1.71	15°46.61	11.6'	25 14.05 25°8.06	-6.1'	53.9'
16	61°40.38	1.91	30°17.17	11.6'	25°1.95	-6.2	53.9'
17	76°40.09	2.11	44°47.79	11.7'	24°55.72	-6.3'	53.9'
18	91°39.80	\$23°2.30	59°18.47	11.7'	\$24°49.39	-6.4'	53.9'
19 20	106°39.51 121°39.22	2.50 2.70	73°49.20 88°19.98	11.8' 11.8'	24°42.94 24°36.38	-6.6' -6.7'	53.9' 53.9'
21	121 39.22 136°38.93	2.89	88 19.98 102°50.82	11.8	24 30.38 24°29.71	-6.8'	53.9'
22	151°38.64	3.08	117°21.72	12.0'	24° 22.93	-6.9	53.9'
23	166°38.35	3.28	131°52.67	12.0'	24°16.04	-7.0'	53.9'
	SD = 16.2'	d = 0.2'		SD	0 = 14.7'		
			-				

Lat.	Twi	light	Sunrise	Sunset	Twilight		
Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut.	
N 72°	08:12	10:29			13:16	15:33	
<b>N</b> 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	
<b>N</b> 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	80:80	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	
<b>N</b> 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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	////	
<b>S</b> 60°	////	00:59	02:34	21:13	22:49	////	

Lat.		Moonris	е	Moonset		
Ldl.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
						-
	-					
				1		-
						-
35° 40° 45° <b>S</b> 50° 52° 54° 56° 58° <b>S</b> 60°	04:33 04:14 03:52 03:23 03:09 02:53 02:34 02:10 01:38	05:25 05:06 04:44 04:15 04:01 03:44 03:25 03:01 02:28	06:21 06:03 05:42 05:16 05:03 04:48 04:31 04:10 03:43	19:55 20:14 20:36 21:05 21:19 21:36 21:55 22:20 22:52	20:42 21:00 21:21 21:48 22:01 22:16 22:34 22:55 23:23	21:23 21:39 21:58 22:21 22:32 22:45 22:59 23:16 23:37

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
,	00 <sup>h</sup>	12 <sup>h</sup>	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	

# December 12, 13, 14 UT (Sat., Sun., Mon.)

h	Aries	Venus	Mars	Jupiter	Saturn
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	80° 42.70	226°40.93 \$10°52.83	282°17.70 N11°53.23	291°10.77 N13°18.00	72°25.46 N00°48.67
1	95°45.16	241°41.46 53.29	297°19.43 53.02	306°13.22 18.01	87°27.93 48.68
2	110°47.63	256°41.99 53.75	312°21.16 52.81	321°15.68 18.02	102°30.39 48.69
3	125°50.09	271°42.52 · · 54.21	327°22.90 · · 52.61	336°18.13 · · 18.02	117°32.85 · · 48.71
4	140°52.55	286°43.05 54.67	342°24.63 52.40	351°20.58 18.03	132°35.32 48.72
5	155°55.02	301°43.57 55.13	357°26.36 52.20	6°23.04 18.04	147°37.78 48.73
6	170° 57.48	316°44.09 \$10°55.59	12°28.10 N11°52.00	21°25.49 N13°18.05	162°40.24 N00°48.74
7	185° 59.95	331°44.61 56.05	27°29.83 51.79	36°27.95 18.05	177°42.71 48.75
8	201°2.41	346°45.13 56.51	42°31.57 51.59	51°30.40 18.06	192°45.17 48.77
9	216°4.88	1°45.65 · · 56.97	57°33.30 · · 51.39	66°32.86 · · 18.07	207°47.63 · · 48.78
10	231°7.34	16°46.17 57.44	72°35.04 51.18	81°35.31 18.08	222°50.09 48.79
11	246°9.80	31°46.68 57.90	87°36.78 50.98	96°37.77 18.09	237°52.56 48.80
12	261°12.27	46°47.20 \$10°58.37	102°38.52 N11°50.78	111°40.22 N13°18.09	252°55.02 N00°48.81
13	$276^{\circ}14.73$	61°47.71 58.83	117°40.26 50.58	126°42.68 18.10	267°57.48 48.83
14	291°17.20	76°48.22 59.30	132°42.00 50.37	141°45.14 18.11	282°59.94 48.84
15	$306^{\circ}19.66$	91°48.73 10°59.77	147°43.74 · · 50.17	156°47.59 · · 18.12	298°2.40 · · 48.85
16	321°22.12	106°49.24 11°0.24	162°45.48 49.97	171°50.05 18.13	313°4.86 48.87
17	336° 24.59	121°49.74 0.70	177°47.22 49.77	186°52.51 18.14	328°7.33 48.88
18	351°27.05	136°50.25 \$11°1.17	192°48.97 N11°49.57	201°54.97 N13°18.15	343°9.79 N00°48.89
19	6°29.52	151°50.75 1.64	207°50.71 49.37	216°57.42 18.15	358°12.25 48.90
20	21°31.98	166°51.25 2.11	222°52.45 49.17	231°59.88 18.16	13°14.71 48.92
21	36° 34.45	181°51.75 · · 2.59	237°54.20 · · 48.97	247°2.34 · · 18.17	28°17.17 · · 48.93
22	51°36.91	196° 52.25 3.06	252°55.95 48.77	262°4.80 18.18	43°19.63 48.94
23	66°39.37	211°52.75 3.53	267°57.69 48.57	277°7.26 18.19	58°22.09 48.96
Mer.	pass. 18:34	ν0.5' d0.5' m-4.80	$\nu$ 1.7′ d-0.2′ m0.27	$\nu 2.5' \ d0.0' \ \text{m-}2.27$	ν2.5' d0.0' m0.66
_					-
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	81°41.84	226°53.25 \$11°4.00	282°59.44 N11°48.37	292° 9.72 N13° 18.20	73°24.55 N00°48.97
1	96°44.30	241°53.74 4.48	298°1.19 48.17	307°12.18 18.21	88°27.01 48.98
2	111°46.77	256°54.23 4.95	313°2.94 47.98	322°14.64 18.22	103°29.47 49.00
3	126°49.23	271°54.72 · · 5.43	328°4.69 · · 47.78	337°17.10 · · 18.23	118°31.93 · · 49.01
4	141°51.69	286°55.21 5.90	343°6.44 47.58	352°19.56 18.24	133°34.39 49.02
5	156° 54.16	301°55.70 6.38	358°8.19 47.38	7°22.03 18.25	148°36.85 49.04
6	171°56.62	316°56.19 S11°6.86	13°9.94 N11°47.19	22°24.49 N13°18.26	163°39.30 N00°49.05
7	186°59.09	331°56.67 7.34	28°11.70 46.99	37°26.95 18.27	178°41.76 49.07
8	202°1.55	346°57.16 7.82	43°13.45 46.79	52°29.41 18.28	193°44.22 49.08
9	217°4.02	1°57.64 · · 8.29	58°15.21 · · 46.60	67°31.88 · · 18.29	208°46.68 · · 49.09
10	232°6.48 247°8.94	16° 58.12 8.78 31° 58.60 9.26	73°16.96 46.40	82°34.34 18.30	223°49.14 49.11
11	247 8.94 262°11.41	31°58.60 9.26 46°59.08 \$11°9.74	88°18.72 46.20 103°20.47 N11°46.01	97°36.80 18.31 112°39.27 N13°18.33	238°51.60 49.12 253°54.05 N00°49.14
12 13	202 11.41 277°13.87	61°59.56 10.22	118°22.23 45.81	112 39.27 N13 18.33 127°41.73 18.34	268°56.51 49.15
14	277 13.67 292°16.34	77°0.03 10.70	133°23.99 45.62	142°44.20 18.35	283°58.97 49.16
15	307° 18.80	92°0.51 · · 11.19	148°25.75 · · 45.43	157°46.66 · · 18.36	299°1.43 · · 49.18
16	322°21.26	107°0.98 11.67	163°27.51 45.23	172°49.13 18.37	314°3.88 49.19
17	337°23.73	107 0.96 11.07 122°1.45 12.15	178°29.27 45.04	187°51.59 18.38	329°6.34 49.21
18	352°26.19	137°1.92 S11°12.64	193°31.03 N11°44.84	202°54.06 N13°18.39	344°8.80 N00°49.22
19	7°28.66	152°2.39 13.13	208°32.79 44.65	217°56.52 18.41	359°11.25 49.24
20	22°31.12	167°2.85 13.61	223°34.56 44.46	232°58.99 18.42	14°13.71 49.25
21	37°33.59	182°3.32 · · 14.10	238°36.32 · · 44.27	248°1.46 · · 18.43	29°16.17 · · 49.27
22	52°36.05	197°3.78 14.59	253°38.09 44.07	263°3.92 18.44	44°18.62 49.28
23	67°38.51	212°4.24 15.08	268°39.85 43.88	278°6.39 18.46	59°21.08 49.30
Mer.	pass. 18:30	$\nu$ 0.5′ $d$ 0.5′ 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°40.98	227°4.70 \$11°15.57	283°41.62 N11°43.69	293°8.86 N13°18.47	74°23.54 N00°49.31
1	97°43.44	242°5.16 16.06	298°43.38 43.50	308°11.33 18.48	89°25.99 49.33
2	$112^{\circ}45.91$	257°5.62 16.55	313°45.15 43.31	323°13.80 18.49	104°28.45 49.34
3	127°48.37	272°6.08 · · 17.04	328°46.92 · · 43.12	338°16.27 · · 18.51	119°30.90 ⋅ ⋅ 49.36
4	$142^{\circ}50.83$	287°6.53 17.53	343°48.69 42.93	353°18.74 18.52	134°33.36 49.37
5	$157^{\circ}53.30$	302°6.99 18.02	358°50.46 42.74	8°21.21 18.53	149°35.81 49.39
6	172°55.76	317°7.44 <b>S</b> 11°18.51	13°52.23 N11°42.55	23°23.67 N13°18.54	164°38.27 N00°49.41
7	$187^{\circ}58.23$	332°7.89 19.01	28°54.00 42.36	38°26.15 18.56	179°40.72 49.42
8	203°0.69	347°8.34 19.50	43°55.78 42.17	53°28.62 18.57	194°43.17 49.44
9	218°3.15	2°8.79 · · 20.00	58°57.55 · · 41.98	68°31.09 · · 18.58	209°45.63 · · 49.45
10	233°5.62	17°9.23 20.49	73°59.32 41.79	83°33.56 18.60	224°48.08 49.47
11	248°8.08	32°9.68 20.99	89°1.10 41.60	98°36.03 18.61	239°50.54 49.49
12	263° 10.55	47°10.12 \$11°21.49	104°2.87 N11°41.42	113°38.50 N13°18.63	254°52.99 N00°49.50
13	278° 13.01	62°10.56 21.98	119° 4.65 41.23	128°40.97 18.64	269°55.44 49.52
14	293° 15.48	77°11.00 22.48	134°6.43 41.04	143°43.45 18.65	284°57.90 49.53 <u></u>
15	308° 17.94	92°11.44 · · 22.98	149°8.20 · · 40.85	158°45.92 · · 18.67	300°0.35 · · 49.55
16	323°20.40	107°11.88 23.48	164°9.98 40.67	173°48.39 18.68	315°2.80 49.57
17	338°22.87	122°12.32 23.98	179°11.76 40.48	188°50.87 18.70	330°5.26 49.58
18	353°25.33	137°12.75 \$11°24.48	194°13.54 N11°40.29	203°53.34 N13°18.71	345°7.71 N00°49.60
19	8°27.80	152°13.19 24.98	209°15.32 40.11	218°55.81 18.73	0°10.16 49.62
20	23°30.26	167°13.62 25.48	224°17.11 39.92	233°58.29 18.74	15°12.61 49.63
21	38° 32.72	182°14.05 · · 25.98	239°18.89 · · 39.74	249° 0.76 · · 18.76	30°15.07 · · 49.65
22	53°35.19	197°14.48 26.49	254°20.67 39.55	264° 3.24 18.77	45°17.52 49.67
23	68° 37.65	212°14.91 26.99	269°22.46 39.37	279° 5.71 18.79	60°19.97 49.68
Mer.	pass. 18:26	$\nu 0.5' \ d0.5' \ \text{m-4.78}$	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°33.04	29°14.60
Ankaa Schedar	353°5.48 349°28.99	-42°9.71 56°41.45
Diphda	$348^{\circ}45.59$	-17°50.34
Achernar Hamal	335°18.69 327°49.15	-57°6.16 23°35.55
Polaris	327 49.15 312°45.38	23 35.55 89°22.83
Acamar	$315^{\circ}10.22$	-40°11.86
Menkar Mirfak	314°4.20 308°25.49	4°11.79 49°57.56
Aldebaran	290°37.44	16°33.84
Rigel	281°1.99	-8°10.21
Capella Bellatrix	280°19.04 278°20.83	46°1.49 6°22.45
Elnath	277°59.46	28°37.79
Alnilam	$275^{\circ}35.77$	-1°11.07
Betelgeuse	270°50.02 263°51.14	7°24.72 -52°42.49
Canopus Sirius	263°51.14 258°24.50	-52°42.49 -16°45.15
Adhara	255°4.26	-29°0.44
Procyon	244°48.89	5°9.31
Pollux Avior	243°15.06 234°13.59	27°57.53 -59°35.54
Suhail	222°44.87	-43°32.30
Miaplacidus	221°37.37	-69°49.40
Alphard Regulus	217°46.03 207°32.64	-8°46.51 11°50.02
Dubhe	207 32.64 193° 39.04	61°35.98
Denebola	$182^{\circ}23.37$	14°25.16
Gienah	175°42.02	-17°41.43
Acrux Gacrux	172°58.48 171°50.02	-63°14.66 -57°15.61
Alioth	$166^{\circ}11.83$	55°48.50
Spica	158°20.80	-11°18.09
Alkaid Hadar	152°51.08 148°34.16	49°10.46 -60°29.96
Hadar Menkent	148°34.16 147°56.00	-60°29.96 -36°30.01
Arcturus	$145^{\circ}46.71$	19°2.41
Rigil Kent.	139°38.59 137°20.86	-60°56.61 74°2.39
Kochab Zuben'ubi	137°20.86 136°54.53	74°2.39 -16°9.17
Alphecca	$126^{\circ}2.74$	26°37.34
Antares	112° 14.25	-26°29.44
Atria Sabik	107°7.60 102°1.31	-69°4.45 -15°45.45
Shaula	96°8.64	-37°7.35
Rasalhague	95°57.43	12°32.45
Eltanin Kaus Aust.	90°41.99 83°30.81	51°29.13 -34°22.29
Kaus Aust. Vega	83° 30.81 80° 32.57	-34 · 22.29 38 ° 48.59
Nunki	$75^{\circ}46.15$	-26°15.78
Altair	61°58.69 53°3.69	8°56.46
Peacock Deneb	53°3.69 49°25.03	-56°39.01 45°22.82
Enif	$33^{\circ}37.38$	10°0.05
Al Na'ir	27°31.11	-46°49.98
Fomalhaut Scheat	15°12.83 13°43.69	-29°28.85 28°13.98
Markab	13°28.34	15°21.19
Dec 12 Sat	SHA	Mer.pass
Venus Mars	145°58.24 201°35.00	08:53 05:10
Jupiter	210°28.07	05:10
Saturn	351°42.76	19:07
Dec 13 Sun	SHA	Mer.pass
Venus Mars	145°11.41 201°17.60	08:52 05:07
Jupiter	$210^{\circ}27.88$	04:31
Saturn	351°42.71	19:03
Dec 14 Mon	SHA	Mer.pass
Venus Mars	144°23.73 201°0.64	08:51 05:05
Jupiter	201 0.64 210°27.88	05:05
Saturn	351°42.56	18:59
Horizon	ntal parallax	- 3
	Venus: Mars:	0.3 0.1
	IVIGIS.	0.1

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	181°38.06	\$23°3.47	146°23.68	12.1'	S24°9.04	-7.1'	53.9'
1	196° 37.77	3.66	160°54.74	12.1'	24°1.93	-7.2'	53.9'
2	211°37.47	3.85	175°25.87	12.2'	23°54.72	-7.3'	53.9'
3 4	226° 37.18 241° 36.89	· · 4.04 4.23	189°57.05 204°28.29	12.2' 12.3'	23°47.40 23°39.97	-7.4' -7.5'	53.9' 53.9'
5	256° 36.60	4.42	218°59.58	12.4	23°32.44	-7.6'	53.9'
6	271°36.31	S23°4.60	233°30.93	12.4'	S23°24.81	-7.7'	53.9'
7	286°36.02	4.79	248°2.34	12.5'	$23^{\circ}17.07$	-7.8'	53.9'
8	301°35.73	4.98	262°33.81	12.5'	23°9.23	-7.9'	53.9'
9 10	316° 35.43 331° 35.14	· · 5.16 5.34	277°5.34 291°36.93	12.6'	23°1.29 22°53.24	-8.0'	53.9'
10	331 35.14 346°34.85	5.54 5.53	291 36.93 306°8.57	12.6' 12.7'	22 53.24 22°45.10	-8.1' -8.2'	54.0' 54.0'
12	1°34.56	\$23°5.71	320°40.27	12.8'	S22°36.86	-8.3	54.0'
13	16°34.26	5.89	$335^{\circ}12.03$	12.8'	22°28.51	-8.4'	54.0'
14	31°33.97	6.07	349°43.85	12.9'	22°20.07	-8.5'	54.0'
15	46° 33.68	. 6.25	4°15.73	12.9'	22°11.54	-8.6'	54.0'
16 17	61°33.39 76°33.09	6.43 6.61	18°47.66 33°19.65	13.0' 13.1'	22°2.90 21°54.17	-8.7' -8.8'	54.0' 54.0'
18	91° 32.80	523°6.79	47°51.71	13.1	\$21°45.35	-8.9'	54.0'
19	106°32.51	6.96	62°23.81	13.2'	21°36.43	-9.0'	54.0'
20	121°32.21	7.14	76°55.98	13.2'	$21^{\circ}27.42$	-9.1'	54.0'
21	136°31.92	7.31	91°28.20	13.3'	21°18.31	-9.2'	54.0'
22	151° 31.63 166° 31.33	7.49 7.66	106° 0.48	13.3'	21°9.11	-9.3'	54.0' 54.0'
23		7.66	120°32.82	13.4'	20°59.82	-9.4'	54.0
	SD = 16.2'	d = 0.2'		SI	O = 14.7'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	181°31.04	\$23°7.84	135° 5.22	13.5'	S20°50.45	-9.5'	54.0'
1	196°30.74	8.01	149°37.67	13.5'	$20^{\circ}40.98$	-9.6'	54.1'
2	211°30.45	8.18	164°10.17	13.6'	20°31.42	-9.6'	54.1'
3	226° 30.15	• • 8.35	178°42.74	13.6'	20°21.78	-9.7'	54.1'
4 5	241°29.86 256°29.57	8.52 8.69	193°15.35 207°48.03	13.7' 13.7'	20°12.04 20°2.22	-9.8' -9.9'	54.1' 54.1'
6	271° 29.27	\$23°8.86	222°20.76	13.8'	\$19°52.32	-10.0'	54.1
7	286°28.98	9.02	236°53.54	13.8'	19°42.33	-10.1'	54.1'
8	301°28.68	9.19	251°26.38	13.9'	19°32.26	-10.2'	54.1'
9	316°28.38	• • 9.36	265°59.27	13.9'	19°22.10	-10.2'	54.1'
10 11	331°28.09 346°27.79	9.52 9.68	280°32.21 295°5.21	14.0' 14.0'	19°11.86 19°1.54	-10.3' -10.4'	54.1' 54.1'
11	1°27.50	9.08 \$23° 9.85	295 5.21 309°38.26	14.1	19 1.54 \$18°51.14	-10.4	54.1
13	16°27.20	10.01	324°11.36	14.2'	18°40.65	-10.6'	54.2'
14	31°26.91	10.17	338°44.51	14.2'	18°30.09	-10.6'	54.2'
15	46°26.61	• • 10.33	353°17.72	14.3'	18°19.45	-10.7'	54.2'
16	61°26.31	10.49	7°50.97	14.3'	18° 8.73	-10.8'	54.2'
17 18	76°26.02 91°25.72	10.65 \$23°10.81	22°24.28 36°57.63	14.4' 14.4'	17°57.93 \$17°47.06	-10.9' -10.9'	54.2' 54.2'
19	106° 25.42	10.97	51°31.03	14.5	17°36.11	-10.9	54.2'
20	121°25.13	11.12	66°4.48		17°25.09		54.3'
21	136°24.83	• • 11.28	80°37.98	14.5'	$17^{\circ}13.99$	-11.2'	54.3'
22	151°24.53	11.44	95°11.52	14.6'	17°2.82	-11.2'	54.3'
23	166°24.24	11.59	109°45.11	14.6'	16°51.57	-11.3'	54.3'
	SD = 16.2'	d = 0.2'		SI	O = 14.7'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°23.94	\$23°11.74	124°18.75	14.7'	S16°40.25	-11.4'	54.3'
1	196°23.64	11.90	138°52.43	14.7'	16°28.87	-11.5'	54.3'
2	211°23.34 226°23.05	12.05 •• 12.20	153°26.16 167°59.93	14.8'	16°17.41 16°5.88	-11.5'	54.3' 54.3'
3 4	226°23.05 241°22.75	12.35	167°59.93 182°33.74	14.8' 14.9'	16°5.88 15°54.28	-11.6' -11.7'	54.3' 54.4'
5	256° 22.45	12.50	197° 7.59	14.9	15° 42.61	-11.7'	54.4'
6	271°22.15	S23°12.65	211°41.49	14.9'	S15°30.88	-11.8'	54.4'
7	286°21.86	12.80	226°15.43	15.0'	15°19.08	-11.9'	54.4'
8	301°21.56 316°21.26	12.94	240°49.40 255°23.42	15.0'	15°7.21 14°55.28	-11.9'	54.4'
9 10	316°21.26 331°20.96	· · 13.09 13.24	255°23.42 269°57.47	15.1' 15.1'	14°55.28 14°43.28	-12.0' -12.1'	54.4' 54.5'
11	346° 20.66	13.24	284°31.56	15.1	14° 43.26 14° 31.22	-12.1'	54.5'
12	1°20.36	S23°13.52	299°5.69	15.2'	<b>S</b> 14°19.10	-12.2'	54.5'
13	16°20.06	13.67	313°39.86	15.2'	14°6.91	-12.2'	54.5'
14	31° 19.77	13.81	328°14.06	15.2'	13°54.66	-12.3'	54.5'
15 16	46° 19.47 61° 19.17	· · 13.95 14.09	342°48.29 357°22.56	15.3' 15.3'	13°42.35 13°29.98	-12.4' -12.4'	54.5' 54.6'
17	76° 18.87	14.09	357 22.50 11°56.86	15.3'	13 29.98 13°17.55	-12.4 -12.5'	54.6'
18	91° 18.57	S23°14.37	26°31.19	15.4'	\$13°5.06	-12.5'	54.6'
19	106° 18.27	14.51	41°5.55	15.4'	$12^{\circ}52.51$	-12.6'	54.6'
20	121° 17.97	14.65	55°39.95	15.4'	12°39.90	-12.7'	54.6'
21	136° 17.67	• • 14.78	70°14.37	15.5'	12°27.24	-12.7'	54.7'
22 23	151° 17.37 166° 17.07	14.92 15.05	84°48.82 99°23.29	15.5' 15.5'	12°14.52 12°1.75	-12.8' -12.8'	54.7' 54.7'
23						-12.0	J-1.1
	SD = 16.2'	d = 0.2'		SI	D = 14.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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	////
<b>S</b> 60°	////	00:53	02:32	21:17	22:58	////

Lat.		Moonris	e		Moonset	:
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°			13:29			19:17
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	05:10	06:39	08:06	23:44	23:47	23:48

			Sun		Moon			
Day	Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
	,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	3-5	
L		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	8-21%	
	12	06:32	06:18	11:54	14:42	02:19		
l	13	06:04	05:50	11:54	15:28	03:05		
L	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
0	83°40.12	227°15.33 \$11°27.49	284°24.24 N11°39.18	294°8.19 N13°18.80	75°22.42 N00°49.70
1	98°42.58	242°15.76 28.00	299°26.03 39.00	309°10.67 18.82	90°24.87 49.72
2	113°45.04	257°16.18 28.50	314°27.81 38.82	324°13.14 18.83	105°27.32 49.73
3	113 45.04 128° 47.51	272°16.61 · · 29.01	329°29.60 · · 38.63	339°15.62 · · 18.85	120°29.77 · · 49.75
3 4	143°49.97	287°17.03 29.51	344°31.39 38.45	354°18.10 18.86	135°32.22 49.77
5	158° 52.44	302°17.45 30.02 317°17.87 \$11°30.53	359°33.18 38.27 14°34.97 N11°38.09		
6	173°54.90				
7	188° 57.37	332°18.28 31.04	29°36.76 37.90	39°25.53 18.91	180°39.58 49.82
8	203°59.83	347°18.70 31.55	44°38.55 37.72	54°28.01 18.93	195° 42.03 49.84
9	219°2.29	2°19.11 · · 32.05	59°40.34 · · 37.54	69°30.49 · · 18.94	210°44.48 · · 49.86
10	234°4.76	17°19.52 32.56	74°42.13 37.36	84°32.97 18.96	225°46.93 49.87
11	249°7.22 264°9.69	32°19.94 33.07 47°20.35 \$11°33.59	89°43.93 37.18 104°45.72 N11°37.00	99°35.45 18.98 114°37.93 N13°18.99	240°49.38 49.89 255°51.83 N00°49.91
12	204 9.09 279° 12.15				
13	279° 12.15 294° 14.61	62°20.75 34.10 77°21.16 34.61	119°47.52 36.82 134°49.31 36.64	129°40.41 19.01 144°42.89 19.03	270°54.27 49.93 285°56.72 49.95
14					I
15	309°17.08	92°21.57 · · 35.12	149°51.11 · · 36.46	159°45.37 · · 19.04	300°59.17 · · 49.96
16	324° 19.54	107°21.97 35.63	164°52.91 36.28	174°47.85 19.06	316°1.62 49.98 331°4.07 50.00
17	339°22.01	122°22.38 36.15	179°54.71 36.10	189°50.33 19.08	
18	354°24.47	137°22.78 \$11°36.66	194°56.50 N11°35.92	204°52.81 N13°19.10	346°6.52 N00°50.02
19	9°26.93	152°23.18 37.18	209°58.30 35.75	219°55.29 19.11	1°8.97 50.04
20	24°29.40	167°23.58 37.69	225° 0.11 35.57	234°57.78 19.13	16°11.41 50.06
21	39°31.86	182°23.97 · · 38.21	240°1.91 · · 35.39	250° 0.26 · · 19.15 265° 2.74 19.17	31°13.86 · · 50.07
22	54°34.33	197°24.37 38.72	255° 3.71 35.21		46°16.31 50.09
23	69°36.79	212°24.77 39.24	270°5.51 35.04	280° 5.23 19.19	61°18.76 50.11
Mer.p	pass. 18:22	ν0.4' d0.5' m-4.77	ν1.8' d-0.2' m0.21	ν2.5′ d0.0′ m-2.29	$\nu 2.5' \ d0.0' \ m0.67$
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	84°39.26	227°25.16 \$11°39.76	285°7.32 N11°34.86	295°7.71 N13°19.20	76°21.20 N00°50.13
1	99°41.72	242°25.55 40.28	300°9.12 34.68	310°10.19 19.22	91°23.65 50.15
2	114°44.18	257°25.94 40.80	315°10.93 34.51	325°12.68 19.24	106°26.10 50.17
3	129°46.65	272°26.33 · · 41.31	330°12.73 · · 34.33	340°15.16 · · 19.26	121°28.55 · · 50.19
4	144°49.11	287° 26.72 41.83	345°14.54 34.16	355°17.65 19.28	136°30.99 50.21
5	159°51.58	302°27.11 42.35	0°16.35 33.98	10°20.13 19.30	151°33.44 50.23
6	174°54.04	317°27.49 \$11°42.87	15°18.16 N11°33.81	25°22.62 N13°19.31	166°35.89 N00°50.24
7	189°56.50	332°27.88 43.40	30°19.97 33.63	40°25.10 19.33	181°38.33 50.26
8	204°58.97	347°28.26 43.92	45°21.78 33.46	55°27.59 19.35	196°40.78 50.28
9	220°1.43	2°28.64 · · 44.44	60°23.59 · · 33.29	70°30.08 · · 19.37	211°43.22 · · 50.30
10	235°3.90	17°29.02 44.96	75°25.40 33.11	85°32.56 19.39	226045.67 50.22
11	250°6.36	32°29.40 45.49	90°27.21 32.94	100°35.05 19.41	241°48.11 50.34
12	265°8.82	47°29.78 S11°46.01	105°29.03 N11°32.77	115°37.54 N13°19.43	256°50.56 N00°50.36
13	280° 11.29	62°30.15 46.53	120°30.84 32.59	130°40.03 19.45	271°53.00 50.38
14	295° 13.75	77°30.53 47.06	135°32.66 32.42	145°42.52 19.47	286°55.45 50.40
15	310° 16.22	92°30.90 · · 47.58	150°34.47 · · 32.25	160°45.00 · · 19.49	301°57.89 · · 50.42
16	325° 18.68	107°31.27 48.11	165°36.29 32.08	175°47.49 19.51	317°0.34 50.44
17	340°21.14	122°31.64 48.64	180°38.11 31.91	190°49.98 19.53	332°2.78 50.46
18	355°23.61	137°32.01 S11°49.16	195°39.93 N11°31.74	205°52.47 N13°19.55	247°E 22 NO0°E0 40
19	10° 26.07	152°32.38 49.69	210°41.75 31.57	220°54.96 19.57	2°7.67 50.50
20	25°28.54	167°32.75 50.22	225°43.57 31.40	235°57.45 19.59	1701011 5050
21	40°31.00	182°33.11 · · 50.75	240°45.39 · · 31.23	250°59.94 · · 19.61	32°12.56 · · 50.54
22	55° 33.47	197°33.48 51.28	255°47.21 31.06	266° 2.43 19.63	47°15.00 50.56
23	70°35.93	212°33.84 51.81	270°49.03 30.89	281° 4.93 19.65	62°17.45 50.58
	pass. 18:18	$\frac{212 \text{ 35.6} ^{\circ} ^{\circ} ^{\circ} ^{\circ} ^{\circ} ^{\circ} ^{\circ}}{\nu 0.4' ^{\prime} ^{\prime} ^{\circ} ^$	$\frac{210^{\circ} 13.03^{\circ} 90.03^{\circ}}{\nu 1.8' \ d - 0.2' \ m0.20}$	$\frac{20193}{\nu 2.5' \ d0.0' \ \text{m-}2.30}$	$\frac{02.11.13}{\nu 2.4' \ d0.0' \ m0.67}$
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	85°38.39	227°34.20 \$11°52.34	285°50.85 N11°30.72	296°7.42 N13°19.67	77°19.89 N00°50.60
1	100°40.86	242°34.56 52.87	300°52.68 30.55	311° 9.91 19.69	92°22.33 50.62
2	115°43.32	257°34.92 53.40	315°54.50 30.38	326°12.40 19.71	107°24.77 50.65
3	130°45.79	272°35.28 · · 53.93	330°56.33 · · 30.22	341°14.89 · · 19.74	122°27.22 · · 50.67
4	145°48.25	287°35.63 54.46	345°58.16 30.05	356°17.39 19.76	137°29.66 50.69 <b>C</b>
5	160°50.71	302°35.99 54.99	0°59.98 29.88	11°19.88 19.78	152°32.10 50.71
6	175°53.18	317°36.34 <b>S</b> 11°55.53	16°1.81 N11°29.72	26°22.37 N13°19.80	167°34.54 N00°50.73
7	190°55.64	332°36.69 56.06	31°3.64 29.55	41°24.87 19.82	182°36.99 50.75
8	205°58.11	347°37.04 56.59	46° 5.47 29.38	56°27.36 19.84	197°39.43 50.77
9	221°0.57	2°37.39 · · 57.13	61°7.30 · · 29.22	71°29.86 · · 19.87	212°41.87 · · 50.79
10	236°3.03	17° 37.74 57.66	$76^{\circ}9.13$ 29.05	86°32.35 19.89	227°44.31 50.81
11	251°5.50	32°38.09 58.20	91°10.97 28.89	101°34.85 19.91	242°46.75 50.84
12	266°7.96	47°38.43 \$11°58.73	106°12.80 N11°28.72	116°37.34 N13°19.93	257°49.19 N00°50.86
13	$281^{\circ}10.43$	62°38.78 59.27	121°14.63 28.56	131°39.84 19.95	272°51.63 50.88
14	$296^{\circ}12.89$	$77^{\circ}39.12  11^{\circ}59.81$	136°16.47 28.39	146°42.34 19.98	287°54.07 50.90
15	311° 15.35	92°39.46 12°0.34	151°18.30 · · 28.23	161°44.83 · · 20.00	302°56.51 · · 50.92 D
16	$326^{\circ}17.82$	107°39.80 0.88	166°20.14 28.07	176°47.33 20.02	317°58.95 50.94
17	$341^{\circ}20.28$	122°40.14 1.42	181°21.98 27.90	191°49.83 20.05	333°1.39 50.97
18	356°22.75	137°40.48	196°23.82 N11°27.74	206°52.32 N13°20.07	348°3.83 N00°50.99
19	11°25.21	152°40.81 2.50	211°25.65 27.58	221°54.82 20.09	3°6.27 51.01
20	26°27.67	167°41.15 3.04	226°27.49 27.42	236°57.32 20.11	18°8.71 51.03
21	41°30.14	182°41.48 · · 3.58	241°29.34 · · 27.25	251°59.82 · · 20.14	33°11.15 · · 51.05
22	56° 32.60	197°41.82 4.12	256°31.18 27.09	267°2.32 20.16	48°13.59 51.08
23	71°35.07	212°42.15 4.66	271°33.02 26.93	282°4.82 20.18	63°16.03 51.10
Mer.p	pass. 18:14	ν0.4' d0.5' m-4.75	ν1.8′ <i>d</i> -0.2′ m0.18	ν2.5′ d0.0′ m-2.31	ν2.4' d0.0' m0.68

	Stars	
	SHA	Dec
Alpheratz	357°33.06	29°14.60
Ankaa	$353^{\circ}5.49$	-42°9.72
Schedar	349°29.01	56°41.45
Diphda	348°45.60	-17°50.35
Achernar	335°18.70	-57°6.17
Hamal Polaris	327°49.16 312°46.15	23°35.55 89°22.85
Acamar	312 40.15 315°10.22	-40°11.88
Menkar	314° 4.21	4°11.79
Mirfak	308°25.50	49°57.57
Aldebaran	290°37.44	16°33.84
Rigel	281°1.99	-8°10.22
Capella	$280^{\circ}19.03$	$46^{\circ}1.50$
Bellatrix	278°20.82	6°22.45
Elnath	277°59.46	28°37.80
Alnilam	275°35.77	-1°11.08
Betelgeuse	270°50.01	7°24.72
Canopus	263°51.13	-52°42.51 -16°45.16
Sirius	258°24.49 255°4.24	-10 45.16 -29 0.46
Adhara Procyon	255 4.24 244°48.87	-29 0.46 5°9.30
Pollux	243°15.04	27°57.53
Avior	234°13.57	-59°35.55
Suhail	222°44.84	-43°32.32
Miaplacidus	221°37.34	-69°49.41
Alphard	217°46.00	-8°46.52
Regulus	207°32.62	11°50.01
Dubhe	193°38.99	61°35.97
Denebola	182°23.35	14°25.15
Gienah	$175^{\circ}42.00$	-17°41.44
Acrux	172°58.44	-63°14.66
Gacrux	171°49.99	-57°15.62
Alioth	166°11.80	55°48.48
Spica	158°20.78	-11°18.10
Alkaid	152°51.05	49°10.45 -60°29.96
Hadar Menkent	148°34.12 147°55.98	-60°29.96 -36°30.02
Arcturus	147 55.96 145°46.69	19°2.39
Rigil Kent.	139°38.56	-60°56.61
Kochab	137°20.81	74°2.37
Zuben'ubi	136°54.51	-16°9.18
Alphecca	126°2.73	26°37.33
Antares	$112^{\circ}14.24$	-26°29.44
Atria	107°7.58	-69°4.44
Sabik	102°1.30	-15°45.46
Shaula	96°8.63	-37°7.35
Rasalhague	95°57.42	12°32.43
Eltanin	90°41.99	51°29.12
Kaus Aust.	83°30.81	-34°22.29
Vega Nunki	80°32.57 75°46.15	38°48.57 -26°15.78
Altair	61°58.70	-20 15.76 8°56.45
Peacock	53° 3.70	-56°39.01
Deneb	49°25.05	45°22.81
Enif	33°37.39	10°0.04
Al Na'ir	27°31.12	-46°49.98
Fomalhaut	15°12.84	-29°28.85
Scheat	13°43.70	28°13.98
Markab	13°28.35	15°21.19
Dec 15 Tue	SHA	Mer.pass
Venus	143°35.22	08:51
Mars	200°44.12	05:02
Jupiter	210°28.07	04:23
Saturn	$351^{\circ}42.30$	18:55
Dec 16 Wed	SHA	Mer.pass
Venus	142°45.90	08:50
Mars	200°28.06	04:59
Jupiter	210°28.45	04:19
Saturn	351°41.95	18:52
Dec 17 Thu	SHA	Mer.pass
Venus	141°55.81	08:50
	200°12.46	04:56
Mars	210°29.02	04:15
Mars Jupiter		
	351°41.49	18:48
Jupiter Saturn		18:48
Jupiter Saturn	351°41.49 Ital parallax Venus:	0.3

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h	Su	n	Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	181°16.77	\$23°15.19	113°57.80	15.5'	<b>S</b> 11°48.92	-12.9'	54.7'
1	196°16.47	15.32	128°32.33	15.6'	11°36.03	-12.9'	54.7'
2	211°16.17 226°15.87	15.45 •• 15.59	143°6.88 157°41.46	15.6' 15.6'	11°23.10 11°10.11	-13.0' -13.0'	54.8' 54.8'
4	241°15.57	15.72	172°16.06	15.6'	10°57.06	-13.1'	54.8'
5	256°15.27	15.85	186°50.68	15.6'	$10^{\circ}43.97$	-13.1'	54.8'
6	271°14.97	\$23°15.98	201°25.32	15.7'	\$10°30.83	-13.2'	54.8'
7 8	286°14.67 301°14.37	16.11 16.23	215°59.98 230°34.66	15.7' 15.7'	10°17.63 10°4.39	-13.2' -13.3'	54.9' 54.9'
9	316°14.07	. 16.36	245°9.36	15.7'	09°51.10	-13.3'	54.9'
10	331°13.76	16.49	259°44.08	15.7'	09°37.76	-13.4'	54.9'
11	346°13.46	16.61	274°18.81	15.7'	09°24.37	-13.4'	54.9'
12 13	1°13.16 16°12.86	\$23°16.74 16.86	288°53.55 303°28.31	15.8' 15.8'	\$09°10.94 08°57.46	-13.5' -13.5'	55.0' 55.0'
14	31°12.56	16.98	318°3.08	15.8'	08°43.93	-13.6'	55.0'
15	46°12.26	•• 17.11	332° 37.86	15.8'	08°30.36	-13.6'	55.0'
16	61°11.96 76°11.65	17.23	347°12.65 1°47.45	15.8'	08°16.75 08°3.10	-13.7'	55.1'
17 18	91°11.35	17.35 \$23°17.47	1°47.45 16°22.26	15.8' 15.8'	507°49.40	-13.7' -13.7'	55.1' 55.1'
19	106°11.05	17.59	30°57.08	15.8'	07°35.66	-13.8'	55.1'
20	121°10.75	17.71	45°31.90	15.8'	$07^{\circ}21.88$	-13.8'	55.2'
21	136°10.45	• • 17.82	60°6.73	15.8'	07°8.06	-13.9'	55.2'
22 23	151°10.14 166°9.84	17.94 18.06	74°41.56 89°16.39	15.8' 15.8'	06°54.19 06°40.30	-13.9' -13.9'	55.2' 55.2'
23			- 55 10.59			13.3	33.2
	SD = 16.2'	d = 0.1'		51	O = 14.9'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181° 9.54	S23°18.17	103°51.23	15.8'	<b>S</b> 06°26.36	-14.0'	55.3'
1 2	196° 9.24 211° 8.93	18.28 18.40	118°26.06 133°0.90	15.8' 15.8'	06°12.38 05°58.37	-14.0' -14.0'	55.3' 55.3'
3	211°8.93 226°8.63	18.40	133°0.90 147°35.73	15.8'	05°58.37 05°44.32	-14.0 -14.1'	55.3'
4	241°8.33	18.62	162°10.56	15.8'	05°30.24	-14.1'	55.4'
5	256°8.02	18.73	176°45.39	15.8'	05°16.12	-14.2'	55.4'
6	271°7.72	\$23°18.84	191°20.21 205°55.02	15.8'	\$05°1.97 04°47.78	-14.2'	55.4'
7 8	286°7.42 301°7.12	18.95 19.06	205°55.02 220°29.82	15.8' 15.8'	04°47.78 04°33.57	-14.2' -14.2'	55.5' 55.5'
9	316° 6.81	19.17	235°4.62	15.8'	04°19.32	-14.3'	55.5'
10	331°6.51	19.28	$249^{\circ}39.41$	15.8'	$04^{\circ}5.04$	-14.3'	55.5'
11	346° 6.21 1° 5.90	19.38 <b>S</b> 23°19.49	264°14.18 278°48.94	15.8'	03°50.73 \$03°36.38	-14.3'	55.6' 55.6'
12 13	1°5.90 16°5.60	19.59	278°48.94 293°23.69	15.7' 15.7'	03°22.02	-14.4' -14.4'	55.6'
14	31°5.29	19.69	307°58.43	15.7'	03°7.62	-14.4'	55.7'
15	46° 4.99	•• 19.80	322°33.14	15.7'	02°53.19	-14.5'	55.7'
16	61° 4.69 76° 4.38	19.90	337°7.84 351°42.52	15.7'	02°38.74 02°24.27	-14.5'	55.7'
17 18	76 4.38 91°4.08	20.00 \$23°20.10	6°17.18	15.7' 15.6'	02 24.27 \$02°9.76	-14.5' -14.5'	55.7' 55.8'
19	106° 3.78	20.20	20°51.82	15.6'	01°55.24	-14.5'	55.8'
20	121° 3.47	20.30	35°26.44		01°40.69		55.8'
21 22	136° 3.17 151° 2.86	· · 20.40 20.49	50°1.03 64°35.60	15.6' 15.5'	01°26.12 01°11.52	-14.6' -14.6'	55.9' 55.9'
23	166° 2.56	20.49	79°10.14	15.5'	01 11.52 00°56.91	-14.6'	55.9'
	SD = 16.2'	d = 0.1'			D = 15.1'		
	JD — 10.2	u — 0.1		اد	J — 1J.1		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°2.25 196°1.95	\$23°20.69	93°44.66	15.5'	\$00°42.27 00°27.62	-14.7'	56.0'
1 2	196°1.95 211°1.64	20.78 20.87	108°19.14 122°53.60	15.5' 15.4'	500°12.94	-14.7' -14.7'	56.0' 56.0'
3	226° 1.34	• • 20.97	137°28.02	15.4'	N00°1.75	14.7'	56.1
4	241°1.03	21.06	152°2.41	15.4'	00°16.46	14.7'	56.1'
5 6	256° 0.73 271° 0.42	21.15 <b>S</b> 23°21.24	166°36.76 181°11.08	15.3' 15.3'	00°31.19 N00°45.93	14.7' 14.8'	56.1' 56.2'
о 7	271°0.42 286°0.12	21.33	181°11.08 195°45.37	15.3' 15.2'	01°0.68	14.8'	56.2'
8	300°59.81	21.42	$210^{\circ}19.61$	15.2'	01°15.45	14.8'	56.2'
9	315°59.51	• • 21.51	224°53.82	15.2'	01°30.23	14.8'	56.3'
10 11	330°59.20 345°58.90	21.60 21.68	239°27.98 254°2.10	15.1' 15.1'	01°45.03 01°59.83	14.8' 14.8'	56.3' 56.3'
11	0°58.59	\$23°21.77	254°2.10 268°36.18	15.1	N02°14.64	14.8'	56.4
13	15°58.29	21.85	283°10.22	15.0'	$02^{\circ}29.47$	14.8'	56.4'
14	30°57.98	21.94	297°44.20	14.9'	02°44.30	14.8'	56.4'
15 16	45°57.68 60°57.37	· · 22.02 22.10	312°18.14 326°52.03	14.9' 14.8'	02°59.14 03°13.99	14.8' 14.9'	56.5' 56.5'
16 17	75°57.07	22.10	326°52.03 341°25.87	14.8'	03°13.99 03°28.84	14.9' 14.9'	56.5'
18	90°56.76	\$23°22.27	355°59.66	14.7'	N03°43.70	14.9'	56.6'
19	105°56.45	22.35	10°33.40	14.7'	03°58.56	14.9'	56.6'
20 21	120°56.15 135°55.84	22.43 •• 22.50	25°7.08 39°40.70	14.6' 14.6'	04°13.42 04°28.28	14.9' 14.9'	56.7' 56.7'
21	135°55.84 150°55.54	22.58	39°40.70 54°14.27	14.6° 14.5'	04°28.28 04°43.15	14.9' 14.9'	56.7' 56.7'
23	165°55.23	22.66	68°47.78	14.4'	04°58.01	14.9'	56.8'
	SD = 16.2'	d = 0.1'		SI	D = 15.3'		

	Naut. 08:21	Civil	Sunrise	Sunset	Twilight		
	00.21			Junioce	Civil	Naut.	
N 72°	00.21	10:49			13:02	15:30	
<b>N</b> 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	
	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	
	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	
	05:36	06:04	06:28	17:23	17:47	18:15	
	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	
	03:34	04:11	04:41	19:11	19:40	20:17	
	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	
	01:56	03:01	03:45	20:06	20:51	21:56	
	01:28	02:46	03:34	20:17	21:06	22:24	
	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	////	
<b>S</b> 60°	////	00:48	02:31	21:20	23:05	////	

Lat.		Moonris	e		Moonset	į.
Lat.	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	
<b>N</b> 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	
<b>N</b> 10°	10:50	11:27	12:05	22:58	23:44	
0°	10:43	11:24	12:06	23:03	23:44	
<b>S</b> 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	
<b>S</b> 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
<b>S</b> 60°	09:32	10:57	12:23	23:49	23:49	23:49

	Sun			Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	6-8	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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	Venu	•	•	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	86° 37.53	227°42.48	S12°5.20	286°34.86	N11°26.77		N13°20.21	78°18.47	N00°51.12			
1	101° 40.00	242°42.80	5.74	301°36.71	26.61	312° 9.82	20.23	93°20.91	51.14	Alpheratz	357°33.07	29°14.59
2	116° 42.46	257°43.13	6.28	316°38.55	26.45	327°12.32	20.26	108°23.35	51.17	Ankaa	353°5.51	-42° 9.72
3	131° 44.92	272°43.46	• • 6.83	331°40.40	. 26.29	342°14.82	20.28	123°25.79	51.19	Schedar	349°29.04	56°41.45
4	146° 47.39	287°43.78	7.37	346°42.24	26.13	357°17.32	20.30	138°28.22	51.21	Diphda	348°45.61	-17°50.36
5	161° 49.85	302°44.11	7.91	1°44.09	25.97	12°19.82	20.33	153°30.66	51.23	Achernar	335° 18.73	-57° 6.18
6	176°52.32	317°44.43	S12°8.46	16°45.94	N11°25.81	27°22.32	N13°20.35	168°33.10	N00°51.26	Hamal	327°49.17	23°35.55
7	191°54.78	332°44.75	9.00	31°47.79	25.65	42°24.82	20.38	183°35.54	51.28	Polaris	312°46.95	89°22.86
8	206° 57.24	347°45.07	9.55	46°49.64	25.50	57°27.32	20.40	198°37.98	51.30	Acamar	315°10.24	-40°11.89
9	221°59.71	2°45.39	• • 10.09	61°51.49	• • 25.34	72°29.83	• • 20.43	213°40.41	• • 51.33	Menkar	314°4.21	4°11.78
10	237°2.17	17°45.70	10.64	76°53.34	25.18	87°32.33	20.45	228°42.85	51.35	Mirfak	308°25.50	49°57.58
11	252°4.64	32°46.02	11.18	91°55.19	25.02	102°34.83	20.48	243°45.29	51.37	Aldebaran	290°37.44 281°1.99	16°33.84 -8°10.23
12	267°7.10	47°46.33	512°11.73	106°57.04	N11°24.87	117°37.34	N13°20.50	258°47.72	N00°51.40	Rigel Capella	280° 19.03	-6 10.23 46°1.50
13	$282^{\circ}9.56$	62°46.65	12.28	121°58.90	24.71	132°39.84	20.53	273°50.16	51.42	Bellatrix	278° 20.82	6°22.45
14	297°12.03	77°46.96	12.83	$137^{\circ}0.75$	24.55	147°42.34	20.55	288°52.60	51.44	Elnath	277° 59.45	28°37.80
15	312° 14.49		• • 13.37	152°2.61	• • 24.40	162°44.85	• • 20.58	303°55.03	• • 51.47	Alnilam	275°35.76	-1°11.08
16	327° 16.96	107°47.58	13.92	167°4.47	24.24	177°47.35	20.60	318°57.47	51.49	Betelgeuse	270°50.01	7°24.71
17	342° 19.42	122°47.89	14.47	182°6.32	24.09	192°49.86	20.63	333°59.91	51.51	Canopus	263°51.12	-52°42.53
18	357°21.88		512°15.02	197°8.18	N11°23.93	207°52.36	N13°20.65	349°2.34	N00°51.54	Sirius	258° 24.48	-16°45.18
19	12°24.35	152°48.50	15.57	212°10.04	23.78	222°54.87	20.68	4°4.78	51.56	Adhara	255°4.23	-29°0.47
20	27°26.81	167°48.80	16.12	227°11.90	23.63	237°57.38	20.71	19°7.21	51.58	Procyon	244°48.86	5°9.30
21	42°29.28		• • 16.67	242°13.76	• • 23.47	252°59.88	• • 20.73	34°9.65	• • 51.61	Pollux	243°15.02	27°57.53
22	57°31.74	197°49.41	17.22	257°15.62	23.32	268°2.39	20.76	49°12.08	51.63	Avior	234°13.54	-59°35.57
23	72°34.21	212°49.71	17.77	272°17.48	23.17	283°4.90	20.78	64°14.52	51.66	Suhail	222°44.82	-43°32.33
Mer.	pass. 18:11	$\nu$ 0.3' d0.5'	m-4.74	$\nu$ 1.8' $d$ -0	0.2′ m0.16	$\nu 2.5' \ d0.$	.0′ m-2.31	$\nu 2.4' \ d0$	.0′ m0.68	Miaplacidus	221°37.30	-69°49.43
	<u>-</u>									Alphard	217°45.99	-8°46.53
٠.	CIIA	CIIA		CIIA	Б.	CIIA	Б	CIIA	Б	Regulus	207°32.60	11°50.00
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°38.96	61°35.97
0	87°36.67		512°18.33	287°19.35	N11°23.01	298°7.40	N13°20.81	79°16.95	N00°51.68	Denebola	182°23.33	14°25.14
1	102°39.13	242°50.31	18.88	302°21.21	22.86	313°9.91	20.84	94°19.39	51.71	Gienah	175°41.98	-17°41.45
2	117° 41.60 132° 44.06	257°50.60	19.43	317°23.08 332°24.94	22.71	328°12.42 343°14.93	20.86 •• 20.89	109°21.82 124°24.26	51.73 •• 51.75	Acrux	172°58.40	-63°14.66
3 4	147° 46.53	272°50.90 287°51.19	· · 19.98 20.54	347°26.81	· · 22.56 22.41	358° 17.44	· · 20.89 20.92	139°26.69	•• 51.75 51.78	Gacrux	171°49.95	-57°15.62
5	147 40.55 162°48.99	302°51.48	21.09	2°28.68	22.41	13°19.95	20.92	159 20.09 154°29.12	51.76	Alioth	166°11.77	55°48.47
6	102 46.99 177°51.45		512°21.64	17°30.54	N11°22.10	28°22.45	N13°20.97	169°31.56	N00°51.83	Spica	158° 20.76	-11°18.11
7	192°53.92	332°52.07	22.20	32°32.41	21.95	43°24.96	21.00	184°33.99	51.85	Alkaid	152°51.02	49°10.43
8	207°56.38	347°52.36	22.75	47°34.28	21.80	58° 27.47	21.00	199°36.42	51.88	Hadar	148° 34.09	-60°29.96
9	222°58.85		• • 23.31	62°36.15	. 21.65	73°29.99	21.05	214°38.86	• • 51.90	Menkent	147° 55.96	-36°30.02
10	238°1.31	17°52.93	23.87	77°38.03	21.50	88°32.50	21.08	229°41.29	51.93	Arcturus	145° 46.67	19°2.38
11	253°3.77	32°53.22	24.42	92°39.90	21.36	103°35.01	21.11	244°43.72	51.95	Rigil Kent.	139°38.53	-60°56.60
12	268°6.24		512°24.98	107°41.77	N11°21.21	118°37.52	N13°21.14	259°46.16	N00°51.98	Kochab	137°20.77	74°2.36
13	283°8.70	62°53.78	25.53	122°43.65	21.06	133°40.03	21.16	274°48.59	52.00	Zuben'ubi	136°54.50	-16°9.19
14	298° 11.17	77°54.06	26.09	137°45.52	20.91	148°42.54	21.19	289°51.02	52.03	Alphecca	126°2.71	26°37.31
15	313° 13.63		• • 26.65	152°47.40	20.76	163°45.05	• • 21.22	304°53.45	• • 52.05	Antares	112°14.23	-26°29.44
16	328° 16.10	107°54.62	27.21	167°49.27	20.62	178°47.57	21.25	319°55.89	52.08	Atria	107°7.56	-69° 4.43
17	343° 18.56	122°54.90	27.77	182°51.15	20.47	193°50.08	21.28	334°58.32	52.10	Sabik	102°1.30 96°8.62	-15°45.46 -37°7.34
18	358°21.02	137°55.18	512°28.33	197°53.03	N11°20.32	208°52.59	N13°21.31	350°0.75	N00°52.13	Shaula Rasalhague	90 0.02 95°57.42	-37 7.34 12°32.42
19	13°23.49	152°55.45	28.88	212°54.91	20.18	223°55.11	21.33	5°3.18	52.16		90°41.99	51°29.10
20	28°25.95	167°55.73	29.44	227°56.79	20.03	238°57.62	21.36	$20^{\circ}5.61$	52.18	Eltanin Kaus Aust.	83°30.81	-34°22.28
21	43°28.42	182°56.00	• • 30.00	242°58.67	• • 19.89	254°0.13	• • 21.39	35°8.04	• • 52.21	Vega	80°32.57	38°48.56
22	58° 30.88	197°56.27	30.57	258° 0.55	19.74	269°2.65	21.42	50°10.47	52.23	Nunki	75°46.15	-26°15.78
23	73°33.34	212°56.54	31.13	273°2.43	19.60	284°5.16	21.45	65°12.90	52.26	Altair	61°58.70	8°56.44
Mar	pass. 18:07	$\nu$ 0.3' d0.6'	m 1 72	1 0/ d C	0.2' m0.14		.0′ m-2.32	1/2 1/ 40	.0′ m0.69	Peacock	53°3.72	-56°39.00
ivier.	pass. 10.07	νο.3 αο.ο ———————————————————————————————————		ν1.9 u-0	7.2 1110.14	ν2.5 do.	.0 111-2.32	ν2.4 d0	.0 1110.09	Deneb	49°25.06	45°22.79
										Enif	33°37.40	10°0.03
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.14	-46°49.97
0	88° 35.81		512°31.69	288°4.32	N11°19.45	299°7.68	N13°21.48	80°15.33	N00°52.28	Fomalhaut	15° 12.86	-29°28.86
1	103°38.27	242°57.08	32.25	303°6.20	19.31	314°10.20	21.51	95°17.77	52.31	Scheat	13°43.72	28°13.97
2	118° 40.74	257° 57.35	32.81	318°8.09	19.16	329°12.71	21.54	110°20.20	52.34	Markab	$13^{\circ}28.37$	15°21.18
3	133° 43.20		• • 33.37	333°9.97	• • 19.02	344°15.23	• • 21.57	125°22.63	• • 52.36			
4	148° 45.66	287° 57.88	33.94	348°11.86	18.88	359°17.74	21.60	140°25.06	52.39	Dec 18 Fri	SHA	Mer.pass
5	163°48.13	302°58.14	34.50	3°13.75	18.74	14°20.26	21.63	155°27.49	52.42	Venus	141°4.95	08:49
6	178° 50.59		512°35.06	18°15.64	N11°18.59	29°22.78	N13°21.66	170°29.91	N00°52.44	Mars	199°57.33	04:53
7	193°53.06	332°58.66	35.63	33°17.53	18.45	44°25.30	21.69	185°32.34	52.47	Jupiter	210°29.78	04:11
8	208° 55.52	347°58.92	36.19	48°19.42	18.31	59°27.81	21.72	200°34.77	52.49	Saturn	351°40.94	18:44
9	223°57.99		36.75	63°21.31	18.17	74°30.33	•• 21.75	215°37.20	52.52	Dec 19 Sat	SHA	Mer.pass
10	239°0.45	17°59.43	37.32	78°23.20	18.03	89°32.85	21.78	230°39.63	52.55 52.59		140°13.34	08:48
11	254°2.91	32°59.69	37.88	93°25.09	17.89	104°35.37	21.81	245°42.06	52.58		199°42.68	04:50
12 13	269°5.38 284°7.84	47°59.94 63°0.20	39.02	108°26.99 123°28.88	N11°17.75	119°37.89 134°40.41	N13°21.84	260°44.49 275°46.92	N00° 52.60	Jupiter	$210^{\circ}30.73$	04:07
13 14	284 7.84 299°10.31	78° 0.45	39.02 39.58	123 28.88 138°30.78	17.61 17.47	134 40.41 149°42.93	21.87 21.90	275 46.92 290°49.34	52.63 52.66	Saturn	351°40.28	18:40
15	314° 12.77		• 40.15	150° 30.76	17.33	164° 45.45	21.93	305°51.77	• • 52.68	Dec 20 5	CUA	Mornos
16	329° 15.23	108°0.95	40.15	168°34.57	17.33	104 45.45 179°47.97	21.96	320°54.20	52.71	Dec 20 Sun	SHA 130° 21.00	Mer.pass
17	344° 17.70	108 0.95 123°1.20	41.28	183°36.47	17.19	179 47.97 194°50.49	21.90	335°56.63	52.71		139°21.00 199°28.51	08:48
18	359°20.16		512°41.85	198°38.37	N11°16.91	209°53.01	N13°22.02	350°59.06	N00°52.76		210° 31.87	04:47 04:03
19	14°22.63	153°1.69	42.42	213°40.27	16.78	224°55.53	22.06	6°1.48	52.79	Saturn		18:36
20	29°25.09	168°1.94	42.99	228°42.17	16.64	239°58.05	22.09	21°3.91	52.82			10.30
21	44°27.56		• • 43.55	243°44.07	16.50	255° 0.58	22.12	36°6.34	• • 52.85	Horizor	ntal parallax	
22	59°30.02	198°2.42	44.12	258°45.98	16.37	270°3.10	22.15	51°8.76	52.88		Venus:	0.3
23	74°32.48	213°2.66	44.69	273°47.88	16.23	285° 5.62	22.18	66°11.19	52.90		Mars:	0.1
										-		
ivier.	pass. 18:03	$\nu$ 0.3' $d$ 0.6'	m-4./1	$\nu$ 1.9' $d$ -0	0.1' m0.12	$\nu$ 2.5′ $d0$ .	.0′ m-2.33	ν2.4′ d0	.0′ m0.69			

h	Su	n	Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°54.92	\$23°22.73	83°21.22	14.4'	$N05^{\circ}12.88$	14.9'	56.8'
1	195°54.62	22.81	97°54.61	14.3'	05°27.74	14.9'	56.8'
2	210°54.31 225°54.00	22.88 •• 22.96	112°27.93 127°1.19	14.3' 14.2'	05°42.59 05°57.45	14.9' 14.8'	56.9' 56.9'
4	240°53.70	23.03	141°34.38	14.1'	06°12.29	14.8'	56.9'
5	255°53.39	23.10	156°7.50	14.1'	06°27.13	14.8'	57.0'
6	270°53.08	S23°23.17	170°40.56	14.0'	N06°41.97	14.8'	57.0'
7	285°52.78	23.24	185°13.54 199°46.46	13.9'	06°56.79	14.8' 14.8'	57.1'
8 9	300°52.47 315°52.16	23.31	214°19.30	13.8' 13.8'	07°11.61 07°26.41	14.8	57.1' 57.1'
10	330°51.86	23.45	228°52.06	13.7'	07°41.20	14.8'	57.2'
11	345°51.55	23.52	243°24.75	13.6'	$07^{\circ}55.97$	14.8'	57.2'
12	0°51.24	S23°23.58	257°57.36	13.5'	N08°10.74	14.7'	57.3'
13 14	15°50.94 30°50.63	23.65 23.71	272°29.90 287°2.35	13.5' 13.4'	08°25.48 08°40.21	14.7' 14.7'	57.3' 57.3'
14 15	45°50.32	23.71	287 2.35 301°34.72	13.4	08°54.92	14.7'	57.4'
16	60°50.02	23.84	316°7.01	13.2'	09°9.61	14.7'	57.4'
17	75°49.71	23.90	330°39.21	13.1'	$09^{\circ}24.28$	14.6'	57.5'
18	90°49.40	S23°23.96	345°11.33	13.0'	N09°38.93	14.6'	57.5'
19 20	105°49.09 120°48.79	24.02 24.08	359°43.35 14°15.29	12.9' 12.8'	09°53.55 10°8.15	14.6' 14.6'	57.5' 57.6'
21	120 46.79 135°48.48	. 24.06	28°47.14	12.8'	10° 0.13	14.5	57.6'
22	150°48.17	24.20	43°18.90	12.7'	10°37.27	14.5'	57.7'
23	165°47.86	24.26	57°50.56	12.6'	$10^{\circ}51.79$	14.5'	57.7'
	SD = 16.2'	d = 0.1'		SE	D = 15.5'		
<b>.</b> .	CIIA		CUL			,	
Sat 0	<b>GHA</b> 180°47.56	Dec \$23°24.32	<b>GHA</b> 72°22.13	u 12.5'	<b>Dec</b> N11°6.27	d 14.5'	<b>HP</b> 57.7'
1	195°47.25	24.37	86°53.61	12.4'	11°20.73	14.4	57.8'
2	210°46.94	24.43	101°24.98	12.3'	$11^{\circ}35.15$	14.4'	57.8'
3	225°46.63	• • 24.48	115°56.26	12.2'	11°49.54	14.4'	57.9'
4	240°46.33 255°46.02	24.53	130°27.43 144°58.51	12.1'	12°3.89 12°18.20	14.3'	57.9'
5 6	255 46.02 270°45.71	24.59 \$23°24.64	159°29.48	12.0' 11.9'	N12°32.47	14.3' 14.2'	57.9' 58.0'
7	285°45.40	24.69	174°0.34	11.8'	12°46.71	14.2'	58.0'
8	300°45.09	24.74	188°31.10	11.7'	$13^{\circ}0.90$	14.1'	58.1'
9	315°44.79	• • 24.79	203°1.76	11.5'	13°15.05	14.1'	58.1'
10 11	330°44.48 345°44.17	24.84 24.88	217°32.30 232°2.74	11.4' 11.3'	13°29.15 13°43.20	14.1' 14.0'	58.1' 58.2'
12	0°43.86	\$23°24.93	246°33.06	11.2'	N13°57.21	14.0'	58.2
13	15°43.55	24.98	261°3.27	11.1'	14°11.17	13.9'	58.3'
14	30°43.24	25.02	275°33.37	11.0'	$14^{\circ}25.07$	13.9'	58.3'
15	45°42.94	• • 25.06	290°3.35	10.9'	14°38.92 14°52.72	13.8'	58.3'
16 17	60°42.63 75°42.32	25.11 25.15	304°33.21 319°2.96	10.7' 10.6'	14 52.72 15°6.46	13.7' 13.7'	58.4' 58.4'
18	90°42.01	\$23°25.19	333°32.59	10.5'	N15°20.14	13.6'	58.5'
19	105°41.70	25.23	$348^{\circ}2.10$	10.4'	$15^{\circ}33.76$	13.6'	58.5'
20	120°41.39	25.27	2°31.48	10.3'	15°47.32		58.6'
21 22	135°41.09 150°40.78	· · 25.31 25.35	17°0.75 31°29.89	10.1' 10.0'	16°0.82 16°14.24	13.4' 13.4'	58.6' 58.6'
23	165°40.47	25.39	45°58.90	9.9'	16° 27.61	13.4	58.7'
	SD = 16.2'	d=0.1'			O = 15.7'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d 12.2'	HP
0 1	180°40.16 195°39.85	\$23°25.43 25.46	60°27.79 74°56.56	9.8' 9.6'	N16°40.90 16°54.12	13.2' 13.1'	58.7' 58.8'
2	210°39.54	25.50	89°25.19	9.5'	10° 54.12 17° 7.26	13.1	58.8'
3	225°39.23	• • 25.53	103°53.70	9.4'	$17^{\circ}20.34$	13.0'	58.8'
4	240°38.93	25.57	118°22.07	9.2'	17°33.33	12.9'	58.9'
5 6	255°38.62 270°38.31	25.60 \$23°25.63	132°50.31 147°18.43	9.1' 9.0'	17°46.25 N17°59.08	12.8' 12.8'	58.9' 59.0'
7	285°38.00	25.66	161°46.41	8.8'	18°11.83	12.7'	59.0'
8	300°37.69	25.69	176°14.25	8.7'	18°24.50	12.6'	59.0'
9	315°37.38	• • 25.72	190°41.96	8.6'	18°37.08	12.5'	59.1'
10 11	330°37.07 345°36.76	25.75 25.78	205°9.54 219°36.98	8.4' 8.3'	18°49.57 19°1.97	12.4' 12.3'	59.1' 59.2'
11	0°36.45	25.78 \$23°25.81	219°36.98 234°4.28	8.3'	N19°14.28	12.3'	59.2' 59.2'
13	15°36.15	25.83	248°31.44	8.0'	19°26.49	12.1'	59.2'
14	30°35.84	25.86	262°58.47	7.9'	19°38.61	12.0'	59.3'
15	45°35.53	• • 25.88	277°25.35	7.7'	19°50.62	11.9'	59.3'
16 17	60°35.22 75°34.91	25.91 25.93	291°52.10 306°18.71	7.6' 7.5'	20°2.54 20°14.35	11.8' 11.7'	59.4' 59.4'
18	90°34.60	25.93 \$23°25.95	300 18.71 320°45.17	7.5 7.3'	20 14.35 N20°26.05	11.6'	59.4 59.4'
19	105°34.29	25.97	335°11.50	7.2'	20°37.65	11.5'	59.5'
20	120°33.98	25.99	349°37.68	7.0'	20°49.13	11.4'	59.5'
21	135°33.67 150°33.36	· · 26.01 26.03	4°3.72 18°29.63	6.9'	21°0.51 21°11.77	11.3'	59.6'
22 23	150°33.36 165°33.05	26.03	18° 29.63 32° 55.38	6.8' 6.6'	21°11.77 21°22.91	11.1' 11.0'	59.6' 59.6'
	SD = 16.2'	d = 0.0'			0 = 16.0'		
	<u> </u>	<u>u — 0.0</u>		JL	_ 10.0		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	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
<b>N</b> 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
<b>S</b> 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	////
<b>S</b> 60°	////	00:46	02:31	21:23	23:09	////

Lat.		Moonris	e		Moonset	<u> </u>
Lat.	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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 60°	13:54	15:31	17:16	23:50	23:52	23:56

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
Day	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	9-11	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	58-78%	
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
0	89°34.95	228°2.90 \$12°45.26	288°49.78 N11°16.09	300°8.14 N13°22.21	81°13.62 N00°52.93
1	104°37.41	243°3.14 45.83	303°51.69 15.96	315°10.67 22.25	96°16.04 52.96
2	119° 39.88 134° 42.34	258°3.38 46.40 273°3.61 • 46.97	318°53.59 15.82 333°55.50 • 15.69	330°13.19 22.28 345°15.72 · · 22.31	111°18.47 52.99 126°20.90 · · 53.01
3 4	134 42.34 149°44.80	288°3.85 47.54	333°55.50 · · 15.69 348°57.41 15.55	345°15.72 · · 22.31 0°18.24 22.34	126°20.90 · · 53.01 141°23.32 53.04
5	164° 47.27	303°4.08 48.11	3°59.32 15.42	15°20.76 22.37	156°25.75 53.07
6	179°49.73	318°4.32 S12°48.69	19°1.23 N11°15.29	30°23.29 N13°22.41	171°28.17 N00°53.10
7	194°52.20	333°4.55 49.26	34°3.14 15.15	45°25.81 22.44	186°30.60 53.13
8	209°54.66	348°4.78 49.83	49°5.05 15.02	60°28.34 22.47	201°33.02 53.16
9	224°57.13	3°5.01 · · 50.40	64°6.96 · · 14.89	75°30.87 · · 22.51	216°35.45 · · 53.18
10	239°59.59	18°5.23 50.98	79°8.87 14.75	90°33.39 22.54	231°37.87 53.21
11 12	255°2.05 270°4.52	33°5.46 51.55 48°5.69 \$12°52.12	94°10.79 14.62 109°12.70 N11°14.49	105°35.92 22.57 120°38.45 N13°22.61	246°40.30 53.24 261°42.72 N00°53.27
13	270 4.52 285°6.98	63°5.91 52.70	124°14.62 14.36	135°40.97 22.64	276°45.14 53.30
14	300°9.45	78°6.13 53.27	139°16.54 14.23	150°43.50 22.67	291°47.57 53.33
15	315°11.91	93°6.35 · · 53.84	154°18.45 · · 14.10	165°46.03 · · 22.71	306°49.99 · · 53.36
16	$330^{\circ}14.37$	108°6.58 54.42	169°20.37 13.97	180°48.56 22.74	321°52.42 53.39
17	345° 16.84	123°6.79 54.99	184°22.29 13.84	195°51.09 22.77	336°54.84 53.41
18	0°19.30	138°7.01 \$12°55.57	199°24.21 N11°13.71	210°53.62 N13°22.81	351°57.26 N00°53.44
19 20	15°21.77 30°24.23	153°7.23 56.14 168°7.45 56.72	214°26.13 13.58 229°28.05 13.45	225°56.14 22.84 240°58.67 22.88	6°59.69 53.47 22°2.11 53.50
21	30 24.23 45°26.70	183°7.66 · · 57.30	244°29.98 · · 13.32	256°1.20 · · 22.91	37°4.53 · · 53.53
22	60°29.16	198°7.87 57.87	259°31.90 13.19	271°3.73 22.94	52°6.95 53.56
23	75°31.62	213°8.09 58.45	274°33.83 13.07	286° 6.27 22.98	67°9.38 53.59
Marr	pass. 17:59	ν0.2' d0.6' m-4.70	$\nu$ 1.9' d-0.1' m0.10	ν2.5' d0.0' m-2.34	ν2.4' d0.0' m0.69
ivier.p	Dass. 17:59	00.2 do.6 m-4.70	ν1.9 α-0.1 mo.10	ν2.5 αυ.υ m-2.34	
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	90°34.09 105°36.55	228°8.30 \$12°59.03 243°8.51 12°59.60	289°35.75 N11°12.94 304°37.68 12.81	301°8.80 N13°23.01 316°11.33 23.05	82°11.80 N00°53.62 97°14.22 53.65
1 2	105 36.55 120°39.02	243°8.51 12°59.60 258°8.72 13°0.18	304°37.68 12.81 319°39.60 12.69	316°11.33 23.05 331°13.86 23.08	97°14.22 53.65 112°16.64 53.68
3	135°41.48	273°8.92 · · 0.76	334°41.53 · · 12.56	346°16.39 · · 23.12	127°19.06 · · 53.71
4	150° 43.95	288°9.13 1.34	349°43.46 12.43	1°18.92 23.15	142°21.49 53.74
5	$165^{\circ}46.41$	303°9.33 1.92	4°45.39 12.31	16°21.46 23.19	157°23.91 53.77
6	180°48.87	318°9.54 <b>S</b> 13°2.49	19°47.32 N11°12.18	31°23.99 N13°23.22	172°26.33 N00°53.80
7	195°51.34	333°9.74 3.07	34°49.25 12.06	46°26.52 23.26	187°28.75 53.83
8	210°53.80	348°9.94 3.65	49°51.19 11.94	61°29.05 23.29	202°31.17 53.86
9 10	225° 56.27 240° 58.73	3°10.14 · · 4.23 18°10.34 4.81	64°53.12 · · 11.81 79°55.05 11.69	76°31.59 · · 23.33 91°34.12 23.37	217°33.59 · · 53.89 232°36.01 53.92
11	256°1.20	33°10.54 5.39	94°56.99 11.56	106°36.66 23.40	247°38.43 53.95
12	271°3.66	48°10.74 \$13°5.97	109°58.93 N11°11.44	121°39.19 N13°23.44	262°40.85 N00°53.98
13	286°6.12	63°10.93 6.55	125°0.86 11.32	136°41.73 23.47	277°43.27 54.01
14	301°8.59	78°11.13 7.13	140°2.80 11.20	151°44.26 23.51	292°45.69 54.04
15	316° 11.05	93°11.32 · · 7.71	155°4.74 · · 11.08	166°46.80 · · 23.55	307°48.11 · · 54.07
16	331°13.52	108°11.51 8.30	170°6.68 10.95	181°49.33 23.58	322°50.53 54.10
17 18	346° 15.98 1° 18.45	123°11.70 8.88 138°11.89 \$13°9.46	185°8.62 10.83 200°10.56 N11°10.71	196°51.87 23.62 211°54.41 N13°23.66	337°52.95 54.13 352°55.37 N00°54.16
19	16°20.91	153°12.08 10.04	215°12.50 10.59	226°56.94 23.69	7°57.79 54.20
20	31°23.37	168°12.27 10.62	230°14.45 10.47	241°59.48 23.73	23°0.21 54.23
21	46°25.84	183°12.46 · · 11.21	245°16.39 · · 10.35	257° 2.02 · · 23.77	38°2.63 · · 54.26
22	61°28.30	198° 12.64 11.79	260°18.34 10.23	272°4.56 23.80	53°5.05 54.29
23	76°30.77	213°12.82 12.37	275°20.28 10.12	287°7.10 23.84	68°7.46 54.32
Mer.p	pass. 17:55	ν0.2' d0.6' m-4.69	ν1.9' d-0.1' m0.08	$\nu 2.5' \ d0.0' \ \text{m-}2.34$	ν2.4' d0.0' m0.70
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec
0	91°33.23	228°13.01 \$13°12.96	290°22.23 N11°10.00	302°9.63 N13°23.88	83°9.88 N00°54.35
1	$106^{\circ}35.69$	243°13.19 13.54	305°24.18 9.88	317°12.17 23.92	98°12.30 54.38
2	121°38.16	258°13.37 14.12	320°26.13 9.76	332°14.71 23.95	113°14.72 54.41
3	136° 40.62	273°13.55 · · 14.71	335°28.08 · · 9.64	347°17.25 · · 23.99	128°17.14 · · · 54.45
4 5	151° 43.09 166° 45.55	288°13.73 15.29 303°13.90 15.88	350°30.03 9.53 5°31.98 9.41	2°19.79 24.03 17°22.33 24.07	143°19.55 54.48 D 158°21.97 54.51
6	100 45.55 181°48.02	318°14.08 S13°16.46	20°33.93 N11°9.30	32°24.87 N13°24.10	173°24.39 N00°54.54
7	196° 50.48	333°14.25 17.05	35°35.88 9.18	47°27.41 24.14	188°26.80 54.57
8	211°52.94	348°14.43 17.63	50°37.84 9.06	62°29.96 24.18	203°29.22 54.61
9	$226^{\circ}55.41$	3°14.60 · · 18.22	65°39.79 · · 8.95	77°32.50 · · 24.22	218°31.64 · · 54.64
10	241°57.87	18° 14.77 18.80	80°41.75 8.83	92°35.04 24.26	233°34.05 54.67
11	257°0.34	33°14.94 19.39	95°43.71 8.72	107°37.58 24.30	248°36.47 54.70
12 13	272°2.80 287°5.27	48°15.11 \$13°19.98 63°15.28 20.56	110°45.66 N11°8.61 125°47.62 8.49	122°40.12 N13°24.33 137°42.67 24.37	263°38.89 N00°54.73 278°41.30 54.77
13 14	302°7.73	78°15.44 21.15	140°49.58 8.38	152°45.21 24.41	278 41.30 54.77 293°43.72 54.80
15	317° 10.19	93°15.61 · · 21.74	155°51.54 · · 8.27	167°47.75 · · 24.45	308°46.13 · · 54.83
16	332° 12.66	108° 15.77 22.32	170°53.51 8.16	182°50.30 24.49	323°48.55 54.86
17	347° 15.12	123°15.94 22.91	185°55.47 8.04	197°52.84 24.53	338°50.96 54.90
18	2°17.59	138°16.10 \$13°23.50	200°57.43 N11°7.93	212°55.39 N13°24.57	353°53.38 N00°54.93
19	17°20.05	153°16.26 24.09	215°59.40 7.82	227°57.93 24.61	8°55.79 54.96
20 21	32°22.52 47°24.98	168°16.42 24.68 183°16.58 •• 25.26	231°1.36 7.71 246°3.33 · · 7.60	243° 0.48 24.65 258° 3.02 · · 24.69	23°58.21 54.99 39°0.62 · · 55.03
22	47 24.98 62°27.44	198°16.74 25.85	240 3.33 · · 7.60 261°5.29 7.49	273°5.57 24.73	54°3.04 55.06
23	77°29.91	213°16.89 26.44	276°7.26 7.38	288°8.11 24.77	69° 5.45 55.09
	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
- ivier.	vass. 11:31	νυ.∠ αυ.υ m-4.00	ν1.9 U-U.1 IIIU.U3	ν2.3 d0.0 III-2.33	ν Δ.Ψ

	Stars	
	SHA	Dec
Alpheratz	357°33.08	29°14.59
Ankaa Schedar	353°5.52 349°29.05	-42°9.73 56°41.46
Diphda	$348^{\circ}45.62$	-17°50.36
Achernar	335° 18.75	-57°6.19
Hamal Polaris	327°49.17 312°47.50	23°35.55 89°22.87
Acamar	312 47.50 315° 10.25	-40°11.90
Menkar	314°4.21	4°11.78
Mirfak	308°25.50	49°57.58
Aldebaran Rigel	290°37.43 281°1.98	16°33.84 -8°10.24
Capella	$280^{\circ}19.02$	46°1.51
Bellatrix	278° 20.81	6°22.44
Elnath Alnilam	277°59.44 275°35.75	28°37.80 -1°11.09
Betelgeuse	$270^{\circ}50.00$	7°24.70
Canopus	263°51.11	-52°42.55
Sirius Adhara	258°24.47 255°4.22	-16°45.19 -29°0.49
Adhara Procyon	255°4.22 244°48.84	-29°0.49 5°9.29
Pollux	243°15.00	27°57.52
Avior	234° 13.52	-59°35.59
Suhail Miaplacidus	222°44.80 221°37.25	-43°32.35 -69°49.45
Alphard	$217^{\circ}45.96$	-8°46.55
Regulus	207°32.58	11°49.99
Dubhe	193°38.92 182°23.30	61°35.97 14°25.13
Denebola Gienah	182°23.30 175°41.95	14°25.13 -17°41.46
Acrux	172°58.35	-63°14.67
Gacrux	$171^{\circ}49.91$	-57°15.62
Alioth Spica	166°11.73 158°20.73	55°48.46 -11°18.12
Alkaid	152°51.00	49°10.42
Hadar	148°34.04	-60°29.95
Menkent	147°55.93	-36°30.02 19°2.37
Arcturus Rigil Kent.	145°46.65 139°38.48	19°2.37 -60°56.60
Kochab	$137^{\circ}20.74$	74°2.34
Zuben'ubi	136°54.47	-16°9.19
Alphecca Antares	126°2.70 112°14.21	26°37.30 -26°29.44
Antares	$107^{\circ}7.53$	-69°4.41
Sabik	$102^{\circ}1.28$	-15°45.46
Shaula Rasalhague	96°8.61 95°57.41	-37°7.34 12°32.42
Rasalhague Eltanin	95°57.41 90°41.99	12°32.42 51°29.08
Kaus Aust.	83°30.80	-34°22.28
Vega	80° 32.57	38°48.55
Nunki Altair	75°46.14 61°58.70	-26°15.77 8°56.44
Peacock	53°3.73	-56°38.99
Deneb	$49^{\circ}25.07$	45°22.78
Enif Al Na'ir	33°37.41 27°31.16	10°0.03 -46°49.97
Fomalhaut	27 31.16 15°12.87	-46 49.97 -29°28.86
Scheat	$13^{\circ}43.73$	28°13.97
Markab	13°28.37	15°21.18
Dec 21 Mon	SHA	Mer.pass
Venus Mars	138° 27.95 199° 14.84	08:48 04:44
Jupiter	210° 33.20	04:44
Saturn	351°38.67	18:32
Dec 22 Tue	SHA	Mer.pass
Venus	137°34.21	08:47
Mars Jupiter	199°1.66 210°34.71	04:41 03:55
Saturn	351°37.71	18:28
Dec 23 Wed	SHA	Mer.pass
Venus	$136^{\circ}39.78$	08:47
Mars	198°49.00	04:38
Jupiter Saturn	210°36.40 351°36.65	03:51 18:24
		10.2 .
Horizoi	ntal parallax Venus:	0.3
	Mars:	0.3
l .		

h	Su	n	Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°32.74	\$23°26.07	$47^{\circ}21.00$	6.5'	N21°33.93	10.9'	59.7'
1	195°32.44	26.08	61°46.47	6.3'	21°44.83	10.8'	59.7'
2	210°32.13 225°31.82	26.10 •• 26.12	76°11.80 90°36.99	6.2' 6.0'	21°55.61 22°6.27	10.7' 10.5'	59.7' 59.8'
4	240°31.51	26.13	105°2.04	5.9'	22°16.79	10.4	59.8'
5	255°31.20	26.14	$119^{\circ}26.94$	5.8'	$22^{\circ}27.19$	10.3'	59.9'
6	270°30.89	\$23°26.16	133°51.70	5.6'	N22° 37.45	10.1'	59.9'
7 8	285°30.58 300°30.27	26.17 26.18	148°16.32 162°40.80	5.5' 5.3'	22° 47.58 22° 57.57	10.0' 9.9'	59.9' 60.0'
9	315°29.96	26.19	177°5.14	5.2'	23°7.42	9.7'	60.0'
10	330°29.65	26.20	191°29.33	5.1'	23°17.13	9.6'	60.0'
11 12	345°29.34 0°29.03	26.21 \$23°26.21	205°53.39 220°17.31	4.9' 4.8'	23°26.70 N23°36.12	9.4' 9.3'	60.1' 60.1'
13	15°28.72	26.22	234°41.08	4.6'	23°45.40	9.3 9.1'	60.1
14	30°28.41	26.23	249°4.72	4.5'	23°54.52	9.0'	60.2'
15	45°28.10	• • 26.23	263°28.23	4.4'	24°3.49	8.8'	60.2'
16 17	60°27.79 75°27.48	26.24 26.24	277°51.59 292°14.82	4.2' 4.1'	24°12.31 24°20.96	8.7' 8.5'	60.2' 60.3'
18	90°27.17	523°26.24	306°37.92	4.0'	N24°29.46	8.3'	60.3
19	105°26.86	26.24	321°0.88	3.8'	24°37.80	8.2'	60.3'
20	120°26.55	26.24	335°23.71	3.7'	24°45.98	8.0'	60.4
21 22	135°26.24 150°25.94	· · 26.24 26.24	349°46.41 4°8.99	3.6' 3.4'	24°53.99 25°1.83	7.8' 7.7'	60.4' 60.4'
23	165°25.63	26.24	18°31.43	3.3'	25° 9.50	7.7 7.5'	60.5
	SD = 16.3'	d = 0.0'			D = 16.3'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	180°25.32 195°25.01	\$23°26.24 26.24	32°53.75 47°15.94	3.2' 3.1'	N25°17.00 25°24.33	7.3' 7.1'	60.5' 60.5'
2	210°24.70	26.23	61°38.01	3.1 2.9'	25°24.33	7.1	60.5
3	225°24.39	26.23	75°59.96	2.8'	25°38.45	6.8'	60.6
4	240°24.08	26.22	90°21.79	2.7'	25°45.24	6.6'	60.6'
5 6	255°23.77 270°23.46	26.22 \$23°26.21	104°43.50 119°5.09	2.6' 2.5'	25°51.85 N25°58.27	6.4' 6.2'	60.6' 60.7'
7	285°23.15	26.20	133°26.58	2.4'	26°4.51	6.1	60.7
8	300°22.84	26.19	147°47.95	2.3'	26° 10.56	5.9'	60.7'
9	315°22.53	• • 26.18	162°9.21	2.2'	26°16.42	5.7'	60.7'
10 11	330°22.22 345°21.91	26.17 26.16	176°30.37 190°51.42	2.1' 2.0'	26°22.09 26°27.57	5.5' 5.3'	60.8' 60.8'
12	0°21.60	523°26.15	205°12.37	1.9'	N26° 32.85	5.1'	60.8
13	15°21.29	26.14	219°33.22	1.8'	26° 37.93	4.9'	60.8'
14	30°20.98	26.12	233°53.98	1.7'	26°42.82	4.7'	60.9'
15 16	45°20.67 60°20.36	· · 26.11 26.09	248°14.64 262°35.21	1.6' 1.5'	26° 47.51 26° 51.99	4.5' 4.3'	60.9' 60.9'
17	75°20.05	26.08	276°55.69	1.4'	26°56.27	4.1'	60.9
18	90°19.74	\$23°26.06	291°16.09	1.3'	N27°0.35	3.9'	61.0'
19	105°19.43	26.04	305°36.40	1.2'	27°4.22	3.7'	61.0'
20 21	120°19.12 135°18.81	26.03 •• 26.01	319°56.64 334°16.80	1.2' 1.1'	27°7.89 27°11.34	3.5' 3.2'	61.0' 61.0'
22	150°18.50	25.99	348°36.89	1.0'	27°14.59	3.0'	61.0'
23	165°18.19	25.97	$2^{\circ}56.91$	1.0'	$27^{\circ}17.62$	2.8'	61.1'
	SD = 16.3'	d = -0.0'		S	D = 16.5'		
\A/ad	СПУ	Daa	CHA		Doo	۔	шп
Wed 0	<b>GHA</b> 180° 17.88	Dec \$23°25.94	<b>GHA</b> 17°16.86	u 0.9'	<b>Dec</b> N27° 20.44	d 2.6'	HP 61.1'
1	195°17.57	25.92	31°36.75	0.8'	27°23.05	2.4'	61.1'
2	210°17.26	25.90	45°56.58	0.8'	27° 25.45	2.2'	61.1'
3 4	225°16.95 240°16.64	· · 25.87 25.85	60°16.35 74°36.07	0.7' 0.7'	27°27.62 27°29.59	2.0' 1.7'	61.1' 61.2'
5	255°16.33	25.82	88°55.75	0.6'	27° 31.33	1.5'	61.2
6	270°16.02	S23°25.80	103°15.37	0.6'	N27°32.86	1.3'	61.2'
7	285°15.71 300°15.40	25.77	117°34.96 131°54.51	0.5' 0.5'	27°34.17 27°35.26	1.1' 0.9'	61.2' 61.2'
8 9	300°15.40 315°15.09	25.74 •• 25.71	131°54.51 146°14.02	0.5'	27°35.26 27°36.13	0.9'	61.2'
10	330°14.78	25.68	160°33.50	0.5'	27°36.78	0.4	61.2'
11	345°14.48	25.65	174°52.96	0.4'	27°37.20	0.2'	61.3'
12 13	0°14.17 15°13.86	\$23°25.62 25.59	189°12.39 203°31.80	0.4' 0.4'	N27°37.41 27°37.40	-0.0' -0.2'	61.3' 61.3'
13 14	30°13.55	25.59 25.55	203°31.80 217°51.20	0.4	27°37.40 27°37.16	-0.2 -0.5	61.3
15	45°13.24	• • 25.52	$232^{\circ}10.59$	0.4'	$27^{\circ}36.70$	-0.7'	61.3'
16	60°12.93	25.48	246°29.96	0.4'	27°36.02	-0.9'	61.3'
17 18	75°12.62 90°12.31	25.45 \$23°25.41	260°49.34 275°8.71	0.4'	27°35.11 N27°33.99	-1.1' -1.3'	61.3' 61.3'
18 19	90°12.31 105°12.00	523°25.41 25.38	275°8.71 289°28.08	0.4'	N27° 33.99 27° 32.64	-1.3' -1.6'	61.3'
20	120°11.69	25.34	303°47.47	0.4'	$27^{\circ}31.07$	-1.8'	61.4'
21	135°11.38	• • 25.30	318°6.86	0.4'	27°29.27	-2.0'	61.4
22 23	150°11.07 165°10.76	25.26 25.22	332°26.27 346°45.70	0.4' 0.4'	27°27.26 27°25.02	-2.2' -2.5'	61.4' 61.4'
23	SD = 16.3'	d = -0.0'			D = 16.7'	2.3	U1.7
	JU — 10.3	u — -0.0		3	U — 10.1		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
<b>S</b> 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	////
<b>S</b> 60°	////	00:46	02:32	21:25	23:11	////

Lat.		Moonris	e		Moonset	
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	19:09	20:58	22:11		00:06	00:34

		Sun		Moon				
Day	Eqn.of	Time	Mer.	Mer.	Age			
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	12-14		
	mm:ss mm:ss		hh:mm	hh:mm	hh:mm 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.)

CHA	h	Aries	Venus		Ma	ars	Jup	oiter	Sat	urn		Stars	
1   107/24.07   2071/10   3172/20   2071/20	Thu	GHA	GHA D	ec	GHA	Dec	GHΔ	Dec	GHA	Dec		SHA	Dec
1 1071438 2481720 2762 391140 7.16 1887121 2.28 289 1970.03 55.06 1970.05 55.06 1970.05 1970.													
1   177   177   177   178													
3 177-917 3781171													
1. 1974-06.0	3	137°39.77	273°17.51 · ·	28.80	336°15.14	• • 6.94	348° 18.30	• • 24.93		• • 55.23			
	4	152° 42.23	288° 17.66	29.39	351°17.12	6.84	3°20.85	24.97	$144^{\circ}17.52$	55.26			
8 2127-269 337-180 1-20-236	5	167°44.69				6.73	18°23.40	25.01		55.29			
227   209   349   122   31.75   31.7											1		
1													
10 247-5702 111-18-18 33-03 81 117-297 0.0 93-76-18 25-21 248-72-00 5.5-66   Mortal 371-18-69 371-28-69 1.0 247-12-18 117-29-59 1.0 2-21-29-18-18-18-18-18-18-18-18-18-18-18-18-18-											Menkar		
11 277594 331268 3352 997305 0 9087305 0 287360 247514 15549 247505 2510 277504 2510 2510 2510 2510 2510 2510 2510 2510											Mirfak	308°25.50	49°57.59
12 2771-194											Aldebaran		16°33.84
138 288°4 41													
14 300°687 78°19.10 35.30 141°3698 5.50 162°46.80 2.53 22°44.464 55.60 1681.077°59.40 22°32.40 24°11.10 161°10.77 3.44 171°40.66 5.57 187°51.45 2.54 2.50 20°44.06 55.60 1681.077°59.40 22°32.70 171°10.10 161°10.77 3.44 171°40.66 5.57 187°51.45 2.54 2.50 20°42.47 55.67 31°42.10 161°10.77 3.44 171°40.66 5.57 187°51.45 2.54 2.50 20°42.47 55.67 31°42.10 161°10.77 3.44 171°40.66 5.57 187°51.45 2.54 2.50 20°42.47 55.67 31°42.10 161°10.77 3.45 2.57 2.50 2.50 2.50 2.50 30°42.66 187°10.70 3.86 2.10 2.10 2.10 2.10 2.10 2.10 2.10 2.10													
18   18   18   18   18   18   18   18													
18	15	$318^{\circ}9.34$	93°19.24 · ·	35.89	156°38.88	• • 5.68	168°48.89	• • 25.42	309°44.06	• • 55.63	1		
11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	16	333°11.80	108° 19.37	36.48	171°40.86	5.57		25.46		55.67			
18	17	348° 14.27	123° 19.51	37.07	186°42.84	5.47	198°54.00	25.51	339°48.88	55.70			
1													
22 6(17)-65 1987(2)17 40,09 40,007 40,07 4											1		
22 878209   2187203   4004   20182.78   4.96   274876   25.76   273.34   55.97													
Mer. pass. 17-47											Pollux	243°14.98	27°57.52
Fr   GHA											Avior	234°13.49	
CHA			-								1		
Fig.   GHA	Mer. <sub>I</sub>	pass. 17:47	$ u 0.2' \ d0.6' \ \text{m}$	4.67	$\nu$ 2.0′ d-0.	.1′ m0.03	$\nu 2.5' \ d0.$	.0′ m-2.36	$\nu$ 2.4′ d0	.0′ m0.70			
Fig. 6HA 6HA 0 Dec 6HA 0 D													
0 93 31.52 223 0.043 513 41.22 221 50.76 111 476 304 11.87 11.37 1	Fri	GHA	GHA D	ec	GHA	Dec	GHA	Dec	GHA	Dec	1		
1 106° 3398   42° 2056   41.62   306° 5876   4.66   339° 1106° 310   55.98   100° 31.0   55.98   34° 210° 31.0   33° 210° 31.0	0	93°31.52	228°20.43 \$13°	41.22	291°56.76	N11°4.76	304°11.87	N13°25.80	85°5.75	N00°55.94			
2 123°36.44 288°20.68 4.241 322°0.75 4.56 324°1.69 2.89 115°1.0.77 5.50.11   3 188°3891 273°20.81 4.30.0 327°2.74 4.47 349°19.53 2.29.39 115°1.0.77 5.50.11   5 183°4.63 0 318°21.07 \$13°4.79 22°8.73 111°4.71 34°2.72 0 112°8.0.10 2.59 115°1.0.78 3.0 5.00.05   6 183°4.63 0 318°21.17 \$13°4.79 22°8.73 117°4.71 34°7.72 0 112°8.0.10 2.59 115°1.0.78 3.0 5.00.05 5.15   7 188°4.63 7 333°1.29 4 45.38 37°1.0.73 4.07 49°2.97 5 2.11 190°2.0 100°5.5.15   8 213°5.12 346°21.41 4.59 8 37°1.0.73 4.07 49°2.97 5 2.11 190°2.0 100°5.5.15   9 228°53.69 32°1.53 4.66 7 67°3.47 3 .3.88 79°3.48 7 2.01 9 220°27.43 5.50 6   112°2.86°5.66 18°1.65 47.17 82°1.67 3.00 6.67 67°3.47 3 .3.88 79°3.48 7 2.01 9 220°2.74 3 5.50 6   112°2.86°5.66 18°1.65 47.17 82°1.67 3.00 6.67 67°3.47 3 .00 6.67 67°3.47 3 .00 6.67 67°3.47 3 .00 6.67 67°3.47 3 .00 6.67 67°3.47 3 .00 6.67 67°3.47 3 .00 6.67 67°3.47 3 .00 6.67 67°3.47 3 .00 67°3.90 6.00 6.00 6.00 6.00 6.00 6.00 6.00 6													
4 153°41,37 288°20.93 43.00 302°4.74 4.37 4°22.00 2.597 145°15.39 56.08 56.12 168°43.48 303°21.07 54.49 7°6.73 4.27 19°24.65 26.02 175°20.1 N00°56.15 169°2.26 50.1 169°2.26 10 243°56.16 182′2.65 4.717 82°16.73 3.379 94°3.74.3 20.1 20.20°2.74.3 16.2 16.2 16.2 16.2 16.2 16.2 16.2 16.2													
5											Gacrux	171°49.86	-57°15.63
8 183*46.30 318°21.17 S13*44.79 2°8.73 N11°4.17 34°27.20 N13°26.06 175°20.21 N00°56.15 Spired 183*5.07.4 17.5 189*46.77 333°21.29 4.53 37°10.73 4.07 4.9°29.76 2.61 1.90°22.6 25.02 5.6.29 18.4 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0											Alioth		
8 213*61.23 348*21.41 4 549.9 \$2*21.273 3.98 64*23.31 26.15 205*25.62 56.19													
8 213°51.23 348°21.41 45.98 52°1.273 3.98 64°32.31 26.15 205°25.02 56.26 Merkent 147°549.0 230°2.03 10 243°56.16 18°21.65 471.7 82°16.73 3.89 79°43.743 26.24 235°2.94 56.26 Merkent 147°549.0 230°2.03 11 285°56.26 233°2.17 64 4776 92°16.73 3.99 94°37.43 26.24 235°2.94 56.29 22.05 11 225°4.00 46°21.88 513°48.36 112°20.73 N11°3.59 124°42.54 N13°6.32 265°34.66 N00°56.37 Kecthal 137°30.43 66°56.00 12°20.73 N11°3.59 124°42.54 N13°6.32 265°34.66 N00°56.37 Kecthal 137°30.43 66°30.10 76°22.10 49.55 142°24.74 3.41 154°47.66 26.41 295°39.47 56.44 16°334°10.94 49.95 142°24.74 3.41 154°47.66 26.41 295°39.47 56.47 112°28.75 3.32 184°52.78 26.50 325°44.29 56.11 330°40.41 122°22.31 51.34 187°30.76 3.12 199°55.34 26.56 325°44.29 56.11 530°43.34 103°2.24 513°51.93 202°32.77 N11°3.03 214°57.90 N13°26.59 355°49.10 N00°56.58 5halk 102°1.26 15°45.66 21.49°2.52 6183°2.26 183°2.26 6 535.72 22°47°38.00 27.6°20.55 26.26 35°40.10 N00°56.58 22.6 63.52 26 65.35.72 22°47°38.00 22°47°38.00 27.6°20.55 26.26 30°42.57 31 98°2.26 6 535.72 267°30.07 26.56 27°58.14 26.77 55°8.87.3 56.75 40°45.05 22°40.95 25.53 31 223°30.79 2.55 245°3.02 26.68 25°5.87 30 56.69 124°25.73 198°2.29 6 54.32 262°40.81 2.66 275°8.14 26.77 55°8.87.3 56.75 40°45.29 10.15°2.5													
228*53.61 18 23*21.51 40.57 67*14.73 **.388 79*34.87 **.26.19 220*27.43 **.56.26   110 235*56.61 18*21.55 47.17 82*16.73 3.79 99*37.43 2.62 42 235*28 45.62 96.33   12 276*1.09 48*21.88 \$13*48.35 \$12*92.73 \$11*25.59 12.62*2.62 5.63 22.55 5.63 2.55 6.03   12 276*1.09 48*21.88 \$13*48.35 \$11*2*02.73 \$11*25.59 12.62*2.74 3.50 139*45.10 26.53 2.55*3.04 6.000*56.37   14 304*6.10 78*22.10 49.55 12*2*2.74 3.51 15*65.60 12.63*2.73 \$10*25.27 \$1.00*2.70 15.31*2.09*3.70 5.64   15 334*1.09 41 108*22.23 50.74 11*2*22.75 3.22 18.6*2.75 5.65 325*4.25*2.59 5.65 1   16 334*1.09 41 108*22.23 50.74 11*2*22.75 3.22 18.6*2.75 \$2.65 1.35*4.25*2.75 \$2.50 1.35*2.75*2.75 \$1.21*2.19*2.15*2.19*2.10*2.15*2.15*2.15*2.15*2.15*2.15*2.15*2.15													
10 243*56.6 2 33*21.76 47.76 82*16.73 3.79 94*37.43 26.24 255*29.84 56.29 12 243*56.6 2 33*21.76 47.76 82*16.73 3.69 109*9.99 9.62.8 250*22.5 56.39 (Kochab 13*72.06 7*42.21 12 276*1.09 48*21.88 513*68.35 112*20.73 N11*2.59 124*42.54 N13*2.63 2.65*34.66 N00*56.37 13 289*3.55 68*21.99 48.95 127*22.74 3.50 139*45.10 2.65*3.7 260*37.46 N00*56.37 14.50*3.7 11	9	228°53.69	3°21.53 · ·	46.57	67°14.73	• • 3.88	79°34.87	• • 26.19	220°27.43	• • 56.26			
11 226°58.62 33°21.76 47	10	243°56.16	18°21.65	47.17	82°16.73	3.79	94°37.43	26.24		56.29			
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7 199°47.91 333°23.85 13°59.70 37°58.96 1.86 50°31.21 27.18 191°20.37 57.06 8 214°50.37 348°23.94 14°0.29 53°0.99 1.77 65°33.77 27.23 206°22.78 57.09 9 29°52.83 3°24.03 · · 0.89 66°3.01 · 1.69 80°36.34 · · 27.28 221°25.18 · · 57.13 10 244°55.30 18°24.12 1.49 83°5.03 1.60 95°38.90 27.32 236°27.59 57.17 11 259°57.76 33°24.21 2.09 98°7.06 1.51 110°41.47 27.37 251°29.99 57.21 12 275°0.23 48°24.30 \$14°2.69 113°9.08 N11°1.43 125°44.03 N13°27.42 266°32.40 N00°57.24 13 290°2.69 63°24.38 3.29 128°11.11 1.34 140°46.60 27.46 281°34.80 57.28 14 305°5.16 78°24.47 3.88 143°13.14 1.26 155°49.17 27.51 296°37.20 57.32 15 320°7.62 93°24.56 · · · 4.48 158°15.17 · · · 1.17 170°51.73 · · · 27.56 311°39.61 · · 57.36 16 335°10.08 108°24.64 5.08 173°17.20 1.09 188°54.30 27.60 326°42.01 57.39 17 350°12.55 123°24.72 5.68 188°19.23 1.01 200°56.87 27.65 341°44.41 57.43 181°52.15 130°24.88 6.88 173°17.20 1.09 188°54.30 27.60 326°42.01 57.39 18 5°1.01 138°24.80 514°6.28 203°21.26 N11°0.92 215°59.43 N13°27.70 356°46.81 N00°57.47 19 20°17.48 153°24.88 6.88 218°23.29 0.84 231°2.00 27.75 11°49.22 57.51 25°2.40 183°25.04 · · · 8.08 248°27.36 · · · 0.68 261°7.14 · · · 27.84 41°54.02 · · 57.58 21 50°22.40 183°25.04 · · · 8.08 248°27.36 · · · 0.68 261°7.14 · · · 27.84 41°54.02 · · 57.58 21 50°22.40 183°25.04 · · · · 8.08 248°27.36 · · · · 0.68 261°7.14 · · · 27.84 41°54.02 · · 57.58 21 50°22.40 183°25.04 · · · · · · · · · · · · · · · · · · ·													
8 214°50.37 348°23.94 14°0.29 53°0.99 1.77 65°33.77 27.23 206°22.78 57.09 9 229°52.83 3°24.03 · · 0.89 68°3.01 · · 1.69 80°36.34 · · 27.28 221°25.18 · · 57.13 10 244°55.30 18°24.12 1.49 83°5.03 1.60 95°38.90 27.32 236°27.59 57.17 11 259°57.76 33°24.21 2.09 98°7.06 1.51 110°41.47 27.37 251°29.99 57.21 12 275°0.23 48°24.30 514°2.69 113°9.08 N11°1.43 125°44.03 N13°27.42 266°32.40 N00°57.24 13 290°2.69 63°24.38 3.29 128°11.11 1.34 140°46.60 27.46 281°34.80 57.28 14 305°5.16 78°24.47 3.88 143°13.14 1.26 155°49.17 27.51 296°37.20 57.32 15 320°7.62 93°24.56 · · · 4.48 158°15.17 · · · 1.17 170°51.73 · · · 27.56 311°39.61 · · 57.36 16 335°10.08 108°24.64 5.08 173°17.20 1.09 185°54.30 27.60 326°42.01 57.39 18 21 210°40.35 351°34.24 18:17 19 20°17.48 153°24.88 6.88 218°23.29 0.84 231°2.00 27.75 11°49.22 57.51 20°17.48 153°24.88 6.88 218°23.29 0.84 231°2.00 27.75 11°49.22 57.51 20°17.48 153°24.88 6.88 218°23.29 0.84 231°2.00 27.75 11°49.22 57.55 11°49.22 57.55 11°49.22 65°24.87 198°25.12 8.68 263°29.39 0.60 276°9.71 27.89 56°56.42 57.62 57.52 10.2 40.2 57.58 11°49.22 57.55 11°49.25 57.52 11°49.25 57.52 11°49.25 57.55 11°49.25 57.55 11°49.25 57.62 11°40.25 57.55 11°40.25 57.62 11°40.25 57.55 11°40.25											1		
9 229°52.83 3°24.03 ·· 0.89 68°3.01 ·· 1.69 80°36.34 ·· 27.28 221°25.18 ·· 57.13 10 244°55.30 18°24.12 1.49 83°5.03 1.60 95°38.90 27.32 236°27.59 57.17 11 259°57.76 33°24.21 2.09 98°7.06 1.51 110°41.47 27.37 251°29.99 57.21 12 275°0.23 48°24.30 \$14°2.69 113°9.08 N11°1.43 125°44.03 N13°27.42 266°32.40 N00°57.24 13 290°2.69 63°24.38 3.29 128°11.11 1.34 140°46.60 27.46 281°34.80 57.28 14 305°5.16 78°24.47 3.88 143°13.14 1.26 155°49.17 27.51 296°37.20 57.32 15 320°7.62 93°24.56 ·· 4.48 158°15.17 ·· 1.17 170°51.73 ·· 27.56 311°39.61 ·· 57.36 16 335°10.08 108°24.64 5.08 173°17.20 1.09 185°54.30 27.60 326°42.01 57.39 17 350°12.55 123°24.72 5.68 188°19.23 1.01 200°56.87 27.65 341°44.41 57.43 18 5°15.01 138°24.80 \$14°6.28 203°21.26 N11°0.92 215°59.43 N13°27.70 356°46.81 N00°57.47 19 20°17.48 153°24.88 6.88 218°23.29 0.84 231°2.00 27.75 11°49.22 57.51 20 35°19.94 168°24.96 7.48 233°25.32 0.76 246°4.57 27.79 26°51.62 57.55 21 50°22.40 183°25.04 ·· 8.08 248°27.36 ·· 0.68 261°7.14 ·· 27.84 41°54.02 ·· 57.58 21 50°22.40 183°25.02 9.28 278°31.43 0.51 291°12.28 27.94 71°58.83 57.66   Dec 25 Fri Venus 134°48.91 084.49.10 Venus 134°48.91 08.47													
10											Saturn	331 33.49	10.21
11 259°57.76 33°24.21 2.09 98°7.06 1.51 110°41.47 27.37 251°29.99 57.21 12 275°0.23 48°24.30 \$14°2.69 113°9.08 \$N11°1.43 125°44.03 \$N13°27.42 266°32.40 \$N00°57.24 \$13 290°2.69 63°24.38 3.29 128°11.11 1.34 140°46.60 27.46 281°34.80 57.28 \$14°34.81 57.28 14 305°5.16 78°24.47 3.88 143°13.14 1.26 155°49.17 27.51 296°37.20 57.32 15 320°7.62 93°24.56 · 4.48 158°15.17 · 1.17 170°51.73 · 27.56 311°39.61 · 57.36 16 335°10.08 108°24.64 5.08 173°17.20 1.09 185°54.30 27.60 326°42.01 57.39 18 5°15.01 138°24.80 \$14°6.28 203°21.26 \$N11°0.92 215°59.43 \$N13°27.70 356°46.81 \$N00°57.47 19 20°17.48 153°24.88 6.88 218°23.29 0.84 231°2.00 27.75 11°49.22 57.51 21°20.42.61 03:38 20.35°19.94 168°24.96 7.48 233°25.32 0.76 246°4.57 27.79 26°51.62 57.55 21 50°22.40 183°25.04 · 8.08 248°27.36 · 0.68 261°7.14 · 27.84 41°54.02 · 57.58 21 50°22.40 183°25.20 9.28 278°31.43 0.51 291°12.28 27.94 71°58.83 57.66											l l		
12 275 0.23 48 24.30 \$14 2.69 113 9.08 \$N11 1.43 125 44.03 \$N13 27.42 266 32.40 \$N00 57.24 \$  13 290 2.69 63 24.38 3.29 128 11.11 1.34 140 46.60 27.46 281 34.80 57.28 \$  14 305 5.16 78 24.47 3.88 143 13.14 1.26 155 49.17 27.51 296 37.20 57.32 \$  15 320 7.62 93 24.56													
13 290 2.69 63 24.38 3.29 128 11.11 1.34 140 40.00 27.40 281 34.80 57.28 14.80								N13°27.42		N00°57.24			
14 305 3.16													
16 335°10.08 108°24.64 5.08 173°17.20 1.09 185°54.30 27.60 326°42.01 57.39 Venus 133°52.51 08:46 17 350°12.55 123°24.72 5.68 188°19.23 1.01 200°56.87 27.65 341°44.41 57.43 Mars 198°14.18 04:28 18 5°15.01 138°24.80 \$14°6.28 203°21.26 N11°0.92 215°59.43 N13°27.70 356°46.81 N00°57.47 19 20°17.48 153°24.88 6.88 218°23.29 0.84 231°2.00 27.75 11°49.22 57.51 Saturn 351°32.88 18:13 20 35°19.94 168°24.96 7.48 233°25.32 0.76 246°4.57 27.79 26°51.62 57.55 21 50°22.40 183°25.04 · 8.08 248°27.36 · 0.68 261°7.14 · 27.84 41°54.02 · 57.58 26 For St. Saturn 351°32.88 18:13 26°24.87 198°25.12 8.68 263°29.39 0.60 276°9.71 27.89 56°56.42 57.62 Nars: 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2													
17 350°12.55 123°24.72 5.68 188°19.23 1.01 200°56.87 27.65 341°44.41 57.43 18 5°15.01 138°24.80 \$14°6.28 203°21.26 \$N11°0.92 215°59.43 \$N13°27.70 356°46.81 \$N00°57.47 \$ 19 20°17.48 153°24.88 6.88 218°23.29 0.84 231°2.00 27.75 11°49.22 57.51 \$ 20 35°19.94 168°24.96 7.48 233°25.32 0.76 246°4.57 27.79 26°51.62 57.55 \$ 21 50°22.40 183°25.04 · 8.08 248°27.36 · 0.68 261°7.14 · 27.84 41°54.02 · 57.58 \$ 22 65°24.87 198°25.12 8.68 263°29.39 0.60 276°9.71 27.89 56°56.42 57.62 \$ 23 80°27.33 213°25.20 9.28 278°31.43 0.51 291°12.28 27.94 71°58.83 57.66 \$  Mars 198°14.18 04:28 \$  Jupiter 210°42.61 03:38 \$  Saturn 351°32.88 18:13 \$  Horizontal parallax \$ Venus: 0.2 \$ Mars: 0.2													
18 5°15.01 138°24.80 \$14°6.28 203°21.26 N11°0.92 215°59.43 N13°27.70 356°46.81 N00°57.47 19 20°17.48 153°24.88 6.88 218°23.29 0.84 231°2.00 27.75 11°49.22 57.51 20 35°19.94 168°24.96 7.48 233°25.32 0.76 246°4.57 27.79 26°51.62 57.55 21 50°22.40 183°25.04 · 8.08 248°27.36 · 0.68 261°7.14 · 27.84 41°54.02 · 57.58 22 65°24.87 198°25.12 8.68 263°29.39 0.60 276°9.71 27.89 56°56.42 57.62 23 80°27.33 213°25.20 9.28 278°31.43 0.51 291°12.28 27.94 71°58.83 57.66  356°46.81 N00°57.47  Jupiter 210°42.61 03:38  Saturn 351°32.88 18:13  Horizontal parallax  Venus: 0.2  Mars: 0.2													
19  20°17.48  153°24.88  6.88  218°23.29  0.84  231°2.00  27.75  11°49.22  57.51													
20 35°19.94 168°24.96 7.48 233°25.32 0.76 246°4.57 27.79 26°51.62 57.55 21 50°22.40 183°25.04 · 8.08 248°27.36 · 0.68 261°7.14 · 27.84 41°54.02 · 57.58 22 65°24.87 198°25.12 8.68 263°29.39 0.60 276°9.71 27.89 56°56.42 57.62 23 80°27.33 213°25.20 9.28 278°31.43 0.51 291°12.28 27.94 71°58.83 57.66 Mars: 0.2													
22       65°24.87       198°25.12       8.68       263°29.39       0.60       276°9.71       27.89       56°56.42       57.62       Venus: 0.2         23       80°27.33       213°25.20       9.28       278°31.43       0.51       291°12.28       27.94       71°58.83       57.66       Mars: 0.2													
23 80°27.33 213°25.20 9.28 278°31.43 0.51 291°12.28 27.94 71°58.83 57.66 Mars: 0.2											Horizoi	-	0.0
25 60 21.35 215 25.20 5.20 21.00 51.00													
Mer.pass. 17:39 $\nu 0.1' \ d0.6' \ m-4.65$ $\nu 2.0' \ d-0.1' \ m-0.01$ $\nu 2.6' \ d0.0' \ m-2.37$ $\nu 2.4' \ d0.0' \ m0.71$	23	80-27.33	-									iviais.	٧.٧
	Mer. <sub>I</sub>	pass. 17:39	ν0.1′ d0.6′ m-	4.65	$\nu$ 2.0′ <i>d</i> -0.	1′ m-0.01	$\nu$ 2.6′ d0.	.0′ m-2.37	$\nu$ 2.4′ d0	.0′ m0.71			

h	Su	n	Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°10.45	\$23°25.18	1°5.15	0.5'	N27°22.57	-2.7'	61.4'
1 2	195°10.14 210°9.83	25.13 25.09	15°24.62 29°44.13	0.5' 0.5'	27°19.89 27°16.99	-2.9' -3.1'	61.4' 61.4'
3	225°9.52	• • 25.05	44°3.67	0.6'	27°13.87	-3.3'	61.4
4	240°9.21	25.00	58°23.24	0.6'	27°10.54	-3.6'	61.4'
5	255°8.90 270°8.59	24.96 <b>S</b> 23°24.91	72°42.86 87°2.52	0.7'	27°6.99 N27°3.22	-3.8'	61.4'
6 7	270 8.59 285°8.28	24.91	87 2.52 101°22.22	0.7' 0.8'	N27 3.22 26°59.23	-4.0' -4.2'	61.4' 61.4'
8	300°7.97	24.82	115°41.98	0.8'	26°55.03	-4.4'	61.4'
9	315°7.67	• • 24.77	130°1.79	0.9'	26°50.61	-4.6'	61.4'
10 11	330°7.36 345°7.05	24.72 24.67	144°21.66 158°41.59	0.9' 1.0'	26°45.98 26°41.14	-4.8' -5.1'	61.4' 61.4'
12	0°6.74	\$23°24.62	173°1.59	1.1'	N26°36.09	-5.1 -5.3'	61.4
13	15°6.43	24.57	$187^{\circ}21.65$	1.1'	$26^{\circ}30.83$	-5.5'	61.4'
14	30°6.12	24.51	201°41.78 216°1.99	1.2'	26°25.36	-5.7'	61.4'
15 16	45°5.81 60°5.50	· · 24.46 24.41	216°1.99 230°22.27	1.3' 1.4'	26°19.68 26°13.80	-5.9' -6.1'	61.4' 61.4'
17	75°5.19	24.35	244° 42.64	1.4'	26°7.71	-6.3	61.4
18	90°4.88	S23°24.29	259°3.08	1.5'	N26° 1.42	-6.5'	61.4'
19 20	105°4.57 120°4.26	24.24 24.18	273°23.61 287°44.23	1.6' 1.7'	25°54.93 25°48.24	-6.7' -6.9'	61.4' 61.4'
21	120 4.20 135°3.96	24.12	302°4.94	1.8'	25°41.35	-0.9 -7.1'	61.4
22	150°3.65	24.06	316°25.74	1.9'	25°34.27	-7.3'	61.3'
23	165°3.34	24.00	330°46.63	2.0'	25°26.99	-7.5'	61.3'
	SD = 16.3'	d = -0.0'		S	D = 16.7'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°3.03	\$23°23.94	$345^{\circ}7.63$	2.1'	N25°19.52	-7.7'	61.3'
1	195°2.72	23.88	359°28.72	2.2'	25°11.86	-7.9'	61.3'
2	210°2.41 225°2.10	23.82 •• 23.75	13° 49.92 28° 11.22	2.3' 2.4'	25°4.01 24°55.97	-8.0' -8.2'	61.3' 61.3'
4	240°1.79	23.69	42°32.63	2.5'	24°47.75	-8.4	61.3
5	255°1.48	23.62	56°54.15	2.6'	24°39.34	-8.6'	61.3'
6 7	270°1.17 285°0.87	\$23°23.56 23.49	71°15.78 85°37.52	2.7' 2.9'	N24°30.75 24°21.99	-8.8' -8.9'	61.3' 61.3'
8	300°0.56	23.49	99° 59.37	3.0'	24°21.99	-0.9 -9.1'	61.2
9	315°0.25	• • 23.36	$114^{\circ}21.34$	3.1'	24°3.93	-9.3'	61.2'
10 11	329°59.94 344°59.63	23.29 23.22	128°43.43 143°5.64	3.2' 3.3'	23°54.64 23°45.18	-9.5' -9.6'	61.2' 61.2'
12	359°59.32	523°23.15	143 5.04 157°27.96	3.4'	N23°35.55	-9.0 -9.8'	61.2
13	14°59.01	23.08	171°50.41	3.6'	23°25.75	-10.0'	61.2'
14	29°58.71	23.00	186°12.99 200°35.68	3.7'	23°15.79	-10.1'	61.1' 61.1'
15 16	44°58.40 59°58.09	· · 22.93 22.86	200° 35.68 214° 58.51	3.8' 3.9'	23°5.67 22°55.39	-10.3' -10.4'	61.1
17	74°57.78	22.78	229°21.46	4.1'	22°44.95	-10.6'	61.1'
18	89°57.47	\$23°22.71	243°44.53	4.2'	N22°34.36 22°23.62	-10.7'	61.1'
19 20	104°57.16 119°56.85	22.63 22.55	258°7.74 272°31.07	4.3' 4.5'	22°23.62 22°12.72	-10.9' -11.0'	61.1' 61.0'
21	134°56.55	• • 22.47	286°54.54	4.6'	22°1.68	-11.2'	61.0'
22	149°56.24	22.40	301°18.13	4.7'	21°50.49	-11.3'	61.0'
23	164°55.93	22.32	315°41.86	4.9'	21°39.16	-11.5'	61.0'
	SD = 16.3'	d = -0.1'		S	D = 16.7'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°55.62	\$23°22.24	330°5.72 344°29.71	5.0'	N21°27.69 21°16.08	-11.6'	61.0'
1 2	194°55.31 209°55.01	22.15 22.07	344 29.71 358° 53.83	5.1' 5.3'	21°16.08 21°4.33	-11.7' -11.9'	60.9' 60.9'
3	224°54.70	• • 21.99	13° 18.09	5.4'	20°52.45	-12.0'	60.9'
4	239°54.39 254°54.08	21.91 21.82	27°42.47 42°7.00	5.5' 5.7'	20°40.44 20°28.30	-12.1' -12.3'	60.9' 60.8'
5 6	254 54.08 269°53.77	21.82 \$23°21.74	42°7.00 56°31.65	5.8'	N20°16.04	-12.3 -12.4'	60.8
7	284°53.47	21.65	$70^{\circ}56.44$	5.9'	$20^{\circ}3.65$	-12.5'	60.8'
8	299°53.16	21.56	85°21.36	6.1'	19°51.13	-12.6'	60.8
9 10	314°52.85 329°52.54	· · 21.48 21.39	99°46.42 114°11.61	6.2' 6.3'	19°38.50 19°25.75	-12.7' -12.9'	60.7' 60.7'
11	344°52.24	21.39	128° 36.93	6.5	19° 12.89	-13.0'	60.7'
12	359°51.93	\$23°21.21	143°2.39	6.6'	N18°59.92	-13.1'	60.7'
13 14	14°51.62 29°51.31	21.12 21.03	157°27.97 171°53.69	6.7' 6.9'	18°46.83 18°33.64	-13.2' -13.3'	60.6' 60.6'
15	29 51.31 44°51.00	20.93	171 53.69 186° 19.55	6.9 7.0'	18° 33.04 18° 20.34	-13.3 -13.4'	60.6
16	59°50.70	20.84	200°45.53	7.1'	$18^{\circ}6.95$	-13.5'	60.5'
17	74°50.39	20.74 \$23°20.65	215°11.64	7.2'	17°53.45	-13.6'	60.5'
18 19	89°50.08 104°49.78	\$23°20.65 20.55	229°37.89 244°4.26	7.4' 7.5'	N17°39.85 17°26.15	-13.7' -13.8'	60.5' 60.5'
20	$119^{\circ}49.47$	20.46	258°30.77	7.6'	$17^{\circ}12.37$	-13.9'	60.4
21	134°49.16	• • 20.36	272°57.40	7.8'	16°58.49	-14.0'	60.4
22 23	149°48.85 164°48.55	20.26 20.16	287°24.16 301°51.04	7.9' 8.0'	16°44.52 16°30.47	-14.1' -14.1'	60.4' 60.3'
23	SD = 16.3'	d = -0.1'			D = 16.6'	-14.1	00.3
	5D = 16.3'	a = -0.1		5	ח = 10.0,		

Lat.	Twi	light	Sunrise	Sunset	Tw	ilight
Lat.	Naut.	Civil	Junisc	Juliset	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
<b>S</b> 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	////
<b>S</b> 60°	////	00:49	02:34	21:25	23:10	////

Lat.		Moonris	е		Moonse	t
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	22:41	22:53	22:58	01:43	03:33	05:31

		Sun		Moon				
Day	Eqn.of	Time	Mer.	Mer.	Age			
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	15-17		
	mm:ss mm:ss		hh:mm	hh:mm	hh:mm	100-94%		
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			

#### December 27, 28, 29 UT (Sun., Mon., Tue.)

h	Aries	Vei	nus	M	ars	Jup	oiter	Sat	urn		Stars
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA
0	95°29.80	228° 25.27	\$14°9.88	293°33.47	N11°0.43	306°14.85	N13°27.99	87°1.23	N00° 57.70		
1	110°32.26	243°25.35	10.48	308°35.51	0.35	321°17.42	28.03	102°3.63	57.74	Alpheratz	357°33.09
2	125°34.73	258° 25.42	11.08	323°37.54	0.33	336°19.99	28.08	102 5.03 117°6.03	57.77	Ankaa	353°5.54
3	140°37.19	273° 25.49	• • 11.68	338°39.59	. 0.19	351°22.56	28.13	132°8.43	• • 57.81	Schedar	349°29.09
4	155°39.65	288°25.56	12.28	353°41.63	0.11	6°25.13	28.18	147°10.83	57.85	Diphda	348°45.63
5	170° 42.12	303°25.63	12.88	8°43.67	0.04	21°27.70	28.23	162°13.23	57.89	Achernar	335° 18.79
6	185° 44.58	318°25.70	S14°13.48	23°45.71	N10°59.96	36°30.27	N13°28.28	177°15.63	N00° 57.93	Hamal	327°49.17
7	200° 47.05	333°25.77	14.08	38°47.76	10°59.88	51°32.84	28.33	192°18.03	57.97	Polaris	312°49.02
8	215°49.51	348° 25.83	14.68	53°49.80	59.80	66°35.41	28.38	207°20.44	58.01	Acamar	315°10.26
9	230°51.97	3°25.90	• • 15.28	68°51.85	• • 59.73	81°37.99	• • 28.42	222°22.84	• • 58.04	Menkar	314°4.21
10	245°54.44	18° 25.96	15.88	83°53.90	59.65	96°40.56	28.47	237°25.24	58.08	Mirfak	308°25.50
11	260°56.90	33°26.03	16.48	98°55.94	59.57	111°43.13	28.52	252°27.64	58.12	Aldebaran	290°37.42 281°1.96
12	275°59.37	48°26.09	<b>S</b> 14°17.08	113°57.99	N10°59.50	126°45.71	N13°28.57	267°30.04	N00°58.16	Rigel Capella	281 1.96 280°18.99
13	291°1.83	$63^{\circ}26.15$	17.68	129°0.04	59.42	141°48.28	28.62	282°32.43	58.20	Bellatrix	278°20.79
14	306°4.30	78°26.21	18.28	144°2.09	59.35	156°50.85	28.67	297°34.83	58.24	Elnath	277° 59.42
15	321°6.76	93°26.27	• • 18.88	159°4.15	• • 59.27	171°53.43	• • 28.72	312°37.23	• • 58.28	Alnilam	275°35.73
16	336°9.22	108°26.33	19.48	174°6.20	59.20	186°56.00	28.77	327°39.63	58.32	Betelgeuse	270°49.97
17	351°11.69	123°26.39	20.08	189°8.25	59.12	201°58.58	28.82	342°42.03	58.36	Canopus	263°51.10
18	6°14.15	138°26.44	\$14°20.69	204°10.31	N10°59.05	217° 1.15	N13°28.87	357°44.43	N00°58.40	Sirius	258° 24.44
19	21°16.62	153°26.50	21.29	219°12.37	58.98	232° 3.73	28.92	12°46.83	58.44	Adhara	255°4.19
20	36°19.08	168° 26.55	21.89	234°14.42	58.91	247° 6.30	28.97	27°49.23	58.48	Procyon	244°48.80
21	51°21.54	183°26.60	• • 22.49	249°16.48	• • 58.83	262°8.88	• • 29.02	42°51.63	58.52	Pollux	243°14.95
22 23	66°24.01 81°26.47	198°26.65 213°26.71	23.09	264°18.54 279°20.60	58.76 58.69	277°11.46 292°14.03	29.07	57°54.02 72°56.42	58.56	Avior	$234^{\circ}13.47$
23	01 20.47	213 20.71	23.69		_	_	29.12	12 50.42	58.60	Suhail	222°44.75
Mer.p	bass. 17:35	$\nu 0.1' \ d0.$	6′ m-4.64	$\nu 2.0' \ d-0$	.1' m-0.03	$\nu 2.6' \ d0.$	.0′ m-2.38	$\nu 2.4' \ d0$	.0'  m $0.71$	Miaplacidus	221°37.18
										Alphard	$217^{\circ}45.91$
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°32.52
0	96°28.94	228° 26.76	\$14°24.29	294°22.66	N10°58.62	307°16.61	N13°29.17	87°58.82	N00° 58.64	Dubhe	193°38.81
1	111°31.40	243°26.80	24.89	309°24.72	58.55	322°19.19	29.23	103°1.22	58.68	Denebola	182°23.24
2	126° 33.86	258° 26.85	25.50	324°26.79	58.48	337°21.77	29.28	118°3.61	58.72	Gienah	175°41.89
3	141°36.33	273°26.90	26.10	339°28.85	58.41	352°24.34	29.33	133°6.01	58.76		172°58.25
4	156° 38.79	288° 26.94	26.70	354°30.92	58.34	7°26.92	29.38	148°8.41	58.80		171°49.82
5	171°41.26	303°26.99	27.30	9°32.98	58.27	22°29.50	29.43	163°10.80	58.84	Alioth	166°11.65
6	186° 43.72	318° 27.03	S14°27.90	24°35.05	N10°58.20	37°32.08	N13°29.48	178°13.20	N00°58.88	Spica	158°20.67
7	201°46.19	333°27.07	28.50	39°37.12	58.14	52°34.66	29.53	193°15.60	58.92	Alkaid	152°50.93 148°33.95
8	216° 48.65	348°27.11	29.11	54°39.19	58.07	67°37.24	29.58	208°17.99	58.96	Hadar Menkent	148 33.95 147°55.86
9	231°51.11	3°27.15	• • 29.71	69°41.26	• • 58.00	82°39.82	• • 29.64	223°20.39	• • 59.00	Arcturus	147 55.80 145°46.59
10	246°53.58	18°27.19	30.31	84°43.33	57.94	97°42.40	29.69	238°22.79	59.04	Rigil Kent.	139°38.39
11	261°56.04	33°27.23	30.91	99°45.40	57.87	112°44.98	29.74	253°25.18	59.08	Kochab	137°20.64
12	276°58.51	48°27.27	<b>S</b> 14°31.51	114°47.47	N10°57.80	127°47.56	N13°29.79	268°27.58	N00°59.12	Zuben'ubi	136°54.42
13	292°0.97	63°27.30	32.11	129°49.55	57.74	142°50.14	29.84	283°29.97	59.16	Alphecca	126°2.65
14	307°3.43	78°27.34	32.72	144°51.62	57.67	157°52.72	29.90	298°32.37	59.20	Antares	112° 14.16
15	322°5.90	93°27.37	• • 33.32	159°53.70	• • 57.61	172°55.31	• • 29.95	313°34.76	• • 59.24	Atria	107°7.44
16	337°8.36	108°27.41	33.92	174°55.78	57.55	187°57.89	30.00	328°37.16	59.28	Sabik	102°1.24
17	352° 10.83	123°27.44	34.52	189°57.86	57.48	203°0.47	30.05	343°39.55	59.33	Shaula	96°8.57
18	7° 13.29		\$14°35.12	204°59.93	N10°57.42	218° 3.05	N13°30.11	358°41.95	N00° 59.37	Rasalhague	95°57.38
19	22°15.75	153°27.50	35.73	220°2.02	57.36	233° 5.64	30.16	13°44.34	59.41	Eltanin	90°41.97
20	37° 18.22 52° 20.68	168° 27.53 183° 27.55	36.33 •• 36.93	235°4.10 250°6.18	57.29 •• 57.23	248°8.22 263°10.80	30.21 · · 30.27	28°46.74 43°49.13	59.45 •• 59.49	Kaus Aust.	83°30.76
21 22	67°23.15	103 27.55 198° 27.58	37.53	265° 8.26	57.23	203 10.80 278°13.39	30.32	43 49.13 58°51.53	59.49	Vega	80°32.55
23	82°25.61	213° 27.61	38.13	280°10.35	57.11	276 13.39 293°15.97	30.32	73°53.92	59.55	Nunki	75°46.12
										Altair	61°58.69
Mer.p	pass. 17:31	$\nu 0.0' \ d0.$	6′ m-4.63	$\nu 2.1' \ d-0$	$.1^\prime$ m-0.05	$\nu 2.6' \ d0.$	1'  m-2.38	$\nu 2.4' \ d0$	.0′ m0.72	Peacock	53°3.71
										Deneb	49°25.08
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.41
0	97°28.07	228°27.63	S14°38.74	295°12.43	N10°57.05	308°18.56	N13°30.43		N00°59.62	Al Na'ir	27°31.16
1	112°30.54	243°27.65	39.34	310°14.52	56.99	323°21.14	30.48	103°58.71	59.66	Fomalhaut Scheat	15° 12.87 13° 43.74
2	127°33.00	258° 27.68	39.94	325°16.61	56.93	338°23.73	30.53	119°1.10	59.70	Markab	13°28.38
3	142°35.47	273°27.70	• • 40.54	340°18.69	• • 56.87	353°26.31	• • 30.59	134°3.49	• • 59.74		
4	157°37.93	288°27.72	41.15	355°20.78	56.81	8°28.90	30.64	149°5.89	59.78	Dec 27 Sun	SHA
5	$172^{\circ}40.40$	303°27.74	41.75	10°22.88	56.75	23°31.49	30.69	164°8.28	59.82		132°55.47
6	187° 42.86	318°27.76	<b>S</b> 14°42.35	25°24.97	N10°56.69	38°34.07	N13°30.75	179°10.67	N00°59.87	Mars	198°3.67
7	202°45.32	333°27.77	42.95	40°27.06	56.64	53°36.66	30.80	194°13.06	$00^{\circ}59.91$		210°45.05
8	217° 47.79	348°27.79	43.55	55°29.15	56.58	68°39.25	30.86	209°15.46	00°59.95	Saturn	351°31.43
9	232°50.25	3°27.80	• • 44.16	70°31.25	• • 56.52	83°41.83	• • 30.91	224°17.85	• • 59.99	Dec 28 Mon	SHA
10	247°52.72	18° 27.82	44.76	85°33.34	56.47	98°44.42	30.97	239°20.24	0.04		131°57.82
11	262°55.18	33°27.83	45.36	100°35.44	56.41	113°47.01	31.02	254°22.63	0.08		197°53.72
12	277°57.64	48°27.84	\$14°45.96	115°37.54	N10°56.36	128°49.60	N13°31.07	269°25.02	N01°0.12		210°47.67
13	293°0.11	63°27.86	46.57	130°39.64	56.30	143°52.19	31.13	284°27.41	0.16		351°29.88
14 15	308°2.57	78° 27.87	47.17	145°41.74	56.25	158°54.78	31.18	299°29.81	0.21		
15 16	323°5.04 338°7.50	93°27.87 108°27.88	· · 47.77	160°43.84 175°45.94	· · 56.19 56.14	173°57.37 188°59.96	31.24	314°32.20 329°34.59	· · 0.25 0.29	Dec 29 Tue	SHA
16 17	353° 7.50 353° 9.96	108° 27.88 123° 27.89	48.37 48.97	175°45.94 190°48.04	56.14 56.08	204°2.55	31.29 31.35	329°34.59 344°36.98	0.29		130°59.56
18	8°12.43		\$14°49.58	205°50.15	N10°56.03	204 2.55 219° 5.14	N13°31.40	359°39.37	0.33 N01°0.38		197°44.36 210°50.48
19	23°14.89	153° 27.90	50.18	220° 52.25	55.98	219 5.14 234°7.73	31.46	14°41.76	0.42		351° 28.24
20	38° 17.36	168° 27.90	50.78	235°54.36	55.93	249°10.32	31.52	29°44.15	0.46	Jaturn	JJ1 20.24
21	53° 19.82	183°27.91	• • 51.38	250°56.47	• • 55.88	264°12.91	31.57	44°46.54	0.51	Horizor	ntal parallax
22	68° 22.28	198°27.91	51.98	265°58.57	55.82	279°15.50	31.63	59°48.93	0.55		Venus:
23	83°24.75	213°27.91	52.59	281°0.68	55.77	294°18.09	31.68	74°51.32	0.59		Mars:
			6′ m-4.61		.1′ m-0.07		.1′ m-2.39		.0′ m0.72		
ivier.p	pass. 17:27	νυ.υ αυ.	U III-4.01	ν2.1° α-0	.111-0.07	ν2.0° α0.	.⊥ 111-∠.39	ν2.4° d0	.0 1110.72		

Dec 29°14.59

-42°9.73

56°41 46

-17°50.36

 $-57^{\circ}6.20$ 

 $23^{\circ}35.56$ 

89°22.91

-40°11.92

4°11.77

49°57.60

16°33.84

-8°10.25

 $46^{\circ}1.53$ 

6°22.43

28°37.81

 $-1^{\circ}11.11$ 

 $7^{\circ}24.69$ 

-52°42.58

-16°45.22

-29°0.52

 $27^{\circ}57.52$ 

-59°35.63

-43°32.38

-69°49.48

-8°46.57

11°49.97

61°35.96

 $14^{\circ}25.10$ 

 $-17^{\circ}41.49$ 

-63°14.68

-57°15.64

55°48.44

-11°18.14

49°10.39

-60°29.96

 $-36^{\circ}30.03$ 

 $19^{\circ}2.34$ 

-60°56.60

 $74^{\circ}2.31$ 

-16°9.21

26°37.27

-26°29.44

-69°4.39

-37°7.33

 $12^{\circ}32.39$ 

51°29.05

-34°22.27

38°48.51

-26°15.77

8°56.42

-56°38.97

45°22.76

 $10^{\circ}0.02$ 

-46°49.96

-29°28.85

28°13.96

15°21.17

Mer.pass

08:46

04:25

03:34

18:09

08:46

04:22

03:30

18:05

08:46

04:19

03:26

18:01

0.2

0.2

Mer.pass

Mer.pass

-15°45.47

 $5^{\circ}9.27$ 

h	Su	n	Moon				
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°48.24	S23°20.06	$316^{\circ}18.06$	8.1'	$N16^{\circ}16.33$	-14.2'	60.3'
1	194°47.93	19.96	330° 45.19	8.3'	16°2.11	-14.3'	60.3'
2	209°47.63 224°47.32	19.86 •• 19.76	345°12.46 359°39.84	8.4' 8.5'	15° 47.81 15° 33.43	-14.4' -14.5'	60.2' 60.2'
4	239°47.01	19.65	14°7.35	8.6'	15° 18.98	-14.5'	60.2'
5	254°46.71	19.55	28°34.98	8.8'	15°4.45	-14.6'	60.1'
6	269°46.40	S23° 19.45	43°2.73	8.9'	N14°49.85	-14.7'	60.1'
7	284°46.09 299°45.79	19.34 19.23	57°30.60 71°58.59	9.0' 9.1'	14°35.18 14°20.45	-14.7'	60.1' 60.0'
8 9	299 45.79 314°45.48	19.23	71 58.59 86°26.70	9.1 9.2'	14 20.45 14°5.65	-14.8' -14.9'	60.0'
10	329°45.17	19.02	100°54.92	9.3'	13°50.78	-14.9'	60.0'
11	344°44.87	18.91	115°23.26	9.5'	$13^{\circ}35.86$	-15.0'	59.9'
12	359°44.56	\$23°18.80	129°51.72	9.6'	N13°20.88	-15.0'	59.9'
13 14	14°44.25 29°43.95	18.69 18.58	144°20.28 158°48.96	9.7' 9.8'	13°5.84 12°50.75	-15.1' -15.1'	59.9' 59.8'
15	44°43.64	. 18.47	173° 17.75	9.0 9.9'	12°35.60	-15.1 -15.2'	59.8'
16	59°43.33	18.35	187° 46.65	10.0'	12°20.40	-15.2'	59.8'
17	74°43.03	18.24	202° 15.65	10.1'	12°5.16	-15.3'	59.7'
18	89°42.72	\$23° 18.12 18.01	216° 44.76	10.2'	N11° 49.86	-15.3'	59.7'
19 20	104°42.42 119°42.11	18.01 17.89	231°13.98 245°43.30	10.3' 10.4'	11° 34.52 11° 19.14	-15.4' -15.4'	59.6' 59.6'
21	134°41.80	17.89	245 43.30 260°12.73	10.4	11 19.14 11°3.72	-15.4 -15.5'	59.6'
22	149°41.50	17.66	274° 42.26	10.6'	10°48.26	-15.5'	59.5'
23	164°41.19	17.54	289°11.88	10.7'	10°32.76	-15.5'	59.5'
	SD = 16.3'	d = -0.1'		SI	D = 16.4'		
B 4 -	CUA	D	CUA		D-:	.1	LID
Mon 0	<b>GHA</b> 179°40.89	Dec \$23° 17.42	<b>GHA</b> 303°41.61	u 10.8'	<b>Dec</b> N10° 17.22	d -15.6'	<b>HP</b> 59.5'
1	194°40.58	17.30	318° 11.43	10.0	10°1.65	-15.6'	59.4'
2	209°40.28	17.18	$332^{\circ}41.35$	11.0'	$09^{\circ}46.05$	-15.6'	59.4'
3	224°39.97	• • 17.06	347°11.36	11.1'	09°30.42	-15.7'	59.3'
4 5	239°39.67 254°39.36	16.93 16.81	1°41.47 16°11.67	11.2' 11.3'	09°14.76 08°59.07	-15.7' -15.7'	59.3' 59.3'
6	269°39.06	523° 16.69	30°41.96	11.4	N08° 43.36	-15.7'	59.2'
7	284°38.75	16.56	45° 12.34	11.5'	08° 27.62	-15.8'	59.2'
8	299°38.45	16.44	59° 42.80	11.6'	08°11.86	-15.8'	59.2'
9	314°38.14	16.31	74° 13.36	11.6'	07°56.08	-15.8'	59.1'
10 11	329°37.84 344°37.53	16.18 16.05	88°43.99 103°14.71	11.7' 11.8'	07°40.28 07°24.47	-15.8' -15.8'	59.1' 59.0'
12	359°37.23	S23° 15.92	117° 45.52	11.9'	N07°8.64	-15.8'	59.0'
13	14°36.92	15.79	132° 16.40	12.0'	06°52.79	-15.9'	59.0'
14	29°36.62	15.66	146° 47.36	12.0'	06°36.93	-15.9'	58.9'
15 16	44°36.31 59°36.01	· · 15.53 15.40	161° 18.40 175° 49.52	12.1' 12.2'	06°21.06 06°5.18	-15.9' -15.9'	58.9' 58.8'
17	74°35.70	15.40	175 49.52 190° 20.71	12.3'	05°49.30	-15.9'	58.8'
18	89°35.40	\$23°15.13	204°51.97	12.3'	N05°33.40	-15.9'	58.8'
19	104°35.09	15.00	219°23.30	12.4'	05° 17.51	-15.9'	58.7'
20	119°34.79 134°34.49	14.86 •• 14.73	233°54.71 248°26.18	12.5' 12.5'	05°1.60 04°45.70		
21 22	134 34.49 149°34.18	14.73	248 20.18 262°57.72	12.5	04 45.70 04°29.79	-15.9' -15.9'	58.6' 58.6'
23	164°33.88	14.45	277° 29.33	12.7'	04° 13.89	-15.9'	58.6'
	SD = 16.3'	d = -0.1'		SI	D = 16.2'		
Tue	GHA	Dec	GHA	ν	Dec	d	НР
0	179°33.57	\$23° 14.31	292°1.00	12.7'	N03°57.99	-15.9'	58.5'
1	194°33.27	14.17	306° 32.74	12.8'	03°42.09	-15.9'	58.5'
2	209°32.97	14.03	321°4.53	12.9'	03°26.19	-15.9'	58.4'
3 4	224°32.66 239°32.36	· · 13.89 13.75	335°36.39 350°8.30	12.9' 13.0'	03°10.30 02°54.42	-15.9' -15.9'	58.4' 58.4'
5	254°32.06	13.60	4° 40.27	13.0'	02°38.55	-15.9'	58.3'
6	269°31.75	S23° 13.46	19° 12.30	13.1'	N02°22.68	-15.9'	58.3'
7	284°31.45	13.32	33°44.38	13.1'	02°6.83	-15.8'	58.3'
8 9	299°31.15 314°30.84	13.17 •• 13.02	48° 16.52 62° 48.70	13.2' 13.2'	01°50.99 01°35.16	-15.8' -15.8'	58.2' 58.2'
10	329°30.54	12.88	77° 20.94	13.2	01° 19.35	-15.8'	58.1'
11	344°30.24	12.73	91°53.22	13.3'	01°3.55	-15.8'	58.1'
12	359°29.93	\$23° 12.58	106° 25.55	13.4'	N00°47.77	-15.8'	58.1'
13 14	14°29.63 29°29.33	12.43 12.28	120° 57.93 135° 30.35	13.4' 13.5'	00°32.01 00°16.27	-15.7' -15.7'	58.0' 58.0'
14 15	29°29.33 44°29.03	12.28	135° 30.35 150° 2.82	13.5'	N00° 0.54	-15.7' -15.7'	58.0° 57.9'
16	59°28.72	11.98	164° 35.32	13.5'	S00° 15.16	15.7'	57.9'
17	74°28.42	11.83	179°7.87	13.6'	00°30.83	15.7'	57.9'
18	89°28.12	\$23°11.67	193° 40.45	13.6'	500°46.49	15.6'	57.8'
19 20	104°27.82 119°27.51	11.52 11.36	208° 13.08 222° 45.73	13.7' 13.7'	01°2.12 01°17.72	15.6' 15.6'	57.8' 57.7'
21	134°27.21	• 11.21	237° 18.43	13.7'	01°17.72	15.5'	57.7'
22	149°26.91	11.05	251°51.15	13.8'	01°48.84	15.5'	57.7'
23	164°26.61	10.89	266°23.91	13.8'	02°4.36	15.5'	57.6'
	SD = 16.3'	d = -0.1'		SI	D = 16.0'		

Lat.	Twi	light	Sunrise	Sunset	Twilight		
Lat.	Naut.	Civil	Sunnse	Sunset	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	80:80	15:55	16:36	17:20	
50° 45°	06:38	07:20	07:58	16:05	16:43	17:25	
	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° 20°	05:58 05:42	06:28 06:10	06:55 06:34	17:08 17:30	17:35 17:54	18:05 18:21	
N 10°	05:42	05:52	06:34	17:30	17:54	18:21	
0°	05:09	05:35	05:58	18:05	18:28	18:54	
<b>S</b> 10°	04:50	05:33	05:40	18:23	18:46	19:13	
20°	04:30	04:57	05:40	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	
<b>S</b> 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	////	
<b>S</b> 60°	////	00:55	02:37	21:25	23:07	////	

Lat.		Moonris	e	Moonset			
Lat.	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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	
<b>S</b> 60°	23:00	23:01	23:01	07:23	09:06	10:43	

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup> 12 <sup>h</sup>		Pass	Upper Lower		18-20	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	88-69%	
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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	98°27.21		S14°53.19	296°2.79	N10°55.72	309°20.69	N13°31.74	89°53.71	N01°0.64			
1	113°29.68	243°27.91	53.79	311° 4.90	55.67	324°23.28	31.80	104°56.10	0.68	Alpheratz	357°33.11	29° 14.59
2	128°32.14	$258^{\circ}27.91$	54.39	326°7.02	55.62	339°25.87	31.85	119°58.49	0.72	Ankaa	353°5.56	-42°9.73
3	143°34.61	273°27.90	• • 54.99	341°9.13	• • 55.58	354°28.46	• • 31.91	135°0.88	• • 0.77	Schedar	349°29.11	56°41.46
4	158°37.07	288°27.90	55.60	356°11.24	55.53	9°31.06	31.96	150°3.27	0.81	Diphda Achernar	348°45.64 335°18.81	-17°50.37 -57°6.20
5	173°39.53	303°27.89	56.20	11°13.36	55.48	24°33.65	32.02	165°5.65	0.85	Hamal	327°49.18	-57 0.20 23°35.55
6	188° 42.00	318°27.89	S14°56.80	26°15.48	N10°55.43	39°36.25	N13°32.08	180°8.04	N01°0.90	Polaris	312°50.13	89°22.92
7	203°44.46	333° 27.88	57.40	41°17.59	55.38	54°38.84	32.13	195°10.43	0.94	Acamar	315°10.27	-40° 11.93
8	218° 46.93	348°27.87	58.00	56°19.71	55.34	69°41.44	32.19	210°12.82	0.98	Menkar	314°4.22	4°11.77
9 10	233° 49.39 248° 51.85	3°27.86 18°27.85	58.60	71°21.83 86°23.95	· · 55.29 55.25	84°44.03 99°46.63	· · 32.25 32.30	225°15.21 240°17.60	. 1.03	Mirfak	308°25.51	49°57.61
11	240 51.05 263°54.32	33° 27.84	59.21 14°59.81	101°26.08	55.20	99 40.03 114°49.22	32.36	255°19.98	1.07 1.12	Aldebaran	290°37.42	16°33.84
12	278° 56.78	48° 27.83	\$15°0.41	116° 28.20	N10°55.15	129°51.82	N13°32.42	270°22.37	N01° 1.16	Rigel	281°1.96	-8° 10.26
13	293°59.25	63°27.82	1.01	131°30.32	55.11	144°54.41	32.48	285°24.76	1.21	Capella	280°18.99	46°1.53
14	309°1.71	78°27.80	1.61	146°32.45	55.07	159°57.01	32.53	300°27.15	1.25	Bellatrix	278°20.79	6°22.43
15	324°4.17	93°27.79	• • 2.21	161°34.57	• • 55.02	174°59.61	• • 32.59	315°29.53	· · 1.29	Elnath	277°59.42	28°37.81
16	339°6.64	$108^{\circ}27.77$	2.82	176°36.70	54.98	190° 2.21	32.65	330°31.92	1.34	Alnilam Betelgeuse	275°35.73 270°49.97	-1°11.11 7°24.69
17	354°9.10	123°27.75	3.42	191°38.83	54.94	205°4.80	32.71	345°34.31	1.38	Canopus	263°51.10	-52°42.60
18	9° 11.57	138°27.74	S15°4.02	206°40.96	N10°54.89	220°7.40	N13°32.76	0°36.69	N01°1.43	Sirius	258°24.44	-16°45.23
19	24° 14.03	153°27.72	4.62	221°43.09	54.85	235°10.00	32.82	15°39.08	1.47	Adhara	255°4.19	-29°0.53
20	39° 16.49	168°27.70	5.22	236°45.22	54.81	250°12.60	32.88	30°41.47	1.52	Procyon	244°48.79	5°9.26
21 22	54° 18.96 69° 21.42	183°27.68 198°27.65	• • 5.82	251°47.35 266°49.48	• • 54.77 54.73	265°15.20 280°17.80	· · 32.94 33.00	45°43.85 60°46.24	. 1.56	Pollux	243°14.94	27°57.52
23	84°23.89	213° 27.63	6.42 7.02	281°51.62	54.73 54.69	295°20.40	33.06	75°48.62	1.61 1.65	Avior	234°13.46	-59°35.64
										Suhail	222°44.73	-43°32.40
Mer.	pass. 17:23	$\nu$ -0.0′ d0	.6′ m-4.60	$\nu 2.1' d-0$	.0′ m-0.10	$\nu 2.6' d0$	.1′ m-2.40	$\nu$ 2.4′ d0.	0′ m0.72	Miaplacidus	221°37.15	-69°49.50
										Alphard Regulus	217°45.90 207°32.50	-8°46.58 11°49.96
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°38.78	61°35.96
0	99° 26.35	$228^{\circ}27.61$	<b>S</b> 15°7.63	296°53.75	N10°54.65	310°23.00	N13°33.11	90°51.01	$N01^{\circ}1.70$	Denebola	182°23.22	14°25.09
1	114°28.82	243°27.58	8.23	311°55.89	54.61	325°25.60	33.17	105°53.39	1.74	Gienah	175°41.87	-17°41.49
2	129°31.28	258° 27.55	8.83	326°58.03	54.57	340°28.20	33.23	120°55.78	1.79	Acrux	172°58.21	-63°14.69
3 4	144°33.74 159°36.21	273°27.53 288°27.50	· · 9.43 10.03	342°0.17 357°2.31	•• 54.53 54.49	355°30.80 10°33.40	· · 33.29 33.35	135°58.17 151°0.55	· · 1.83 1.88	Gacrux	171°49.78	-57° 15.65
5	174° 38.67	303° 27.47	10.63	12° 4.45	54.46	25°36.00	33.41	166°2.93	1.92	Alioth	166°11.62	55°48.43
6	189°41.14	318°27.44	S15°11.23	27° 6.59	N10°54.42	40°38.60	N13° 33.47	181°5.32	N01°1.97	Spica	158°20.65	-11°18.15
7	204°43.60	333°27.41	11.83	42°8.73	54.38	55°41.20	33.53	196°7.70	2.01	Alkaid Hadar	152°50.90 148°33.91	49°10.38 -60°29.96
8	219°46.06	348°27.38	12.43	57°10.88	54.35	70°43.81	33.59	211°10.09	2.06	Menkent	146 55.91 147°55.84	-36°30.04
9	234°48.53	3°27.34	• • 13.03	72°13.02	• • 54.31	85°46.41	• • 33.65	226°12.47	• • 2.10	Arcturus	145°46.57	19°2.33
10	249°50.99	18°27.31	13.63	87°15.17	54.28	100°49.01	33.70	241°14.86	2.15	Rigil Kent.	139°38.36	-60°56.60
11	264° 53.46	33°27.27	14.23	102°17.32	54.24	115°51.61	33.76	256°17.24	2.20	Kochab	137°20.59	74°2.29
12 13	279°55.92 294°58.38	48°27.24 63°27.20	\$15°14.83 15.43	117°19.46 132°21.61	N10°54.21 54.17	130°54.22 145°56.82	N13°33.82 33.88	271°19.62 286°22.01	N01°2.24 2.29	Zuben'ubi	136°54.40	$-16^{\circ}9.21$
14	310°0.85	78° 27.16	16.03	147°23.76	54.17	160°59.43	33.94	301°24.39	2.29	Alphecca	126°2.63	26°37.25
15	325°3.31	93°27.12	. 16.63	162°25.92	54.11	176° 2.03	• • 34.00	316°26.77	• • 2.38	Antares	112°14.15	-26°29.45
16	340°5.78	108°27.08	17.23	177°28.07	54.07	191°4.64	34.06	331°29.16	2.43	Atria Sabik	107°7.41 102°1.23	-69°4.38 -15°45.47
17	355°8.24	123°27.04	17.83	192°30.22	54.04	206°7.24	34.12	346°31.54	2.47	Shaula	96°8.56	-37°7.33
18	10° 10.70	138°27.00	S15°18.43	207°32.38	N10°54.01	221° 9.85	N13°34.19	1°33.92	N01°2.52	Rasalhague	95°57.37	12°32.38
19	25°13.17	153°26.96	19.03	222°34.53	53.98	236°12.45	34.25	16°36.30	2.56	Eltanin	90°41.96	51°29.03
20	40° 15.63	168°26.91	19.63	237°36.69	53.95	251°15.06	34.31	31°38.69	2.61	Kaus Aust.	83°30.76	$-34^{\circ}22.27$
21 22	55° 18.10 70° 20.56	183°26.87 198°26.82	· · 20.23 20.83	252°38.85 267°41.01	· · 53.92 53.89	266°17.66 281°20.27	· · 34.37 34.43	46°41.07 61°43.45	• • 2.66	Vega	80°32.55	38°48.50
23	85°23.03	213°26.78	21.43	282°43.17	53.86	296°22.88	34.43	76°45.83	2.70 2.75	Nunki		-26° 15.77
										Altair	61°58.69	8°56.41
Mer.	pass. 17:19	$\nu$ -0.0′ d0	.6′ m-4.59	$\nu 2.1' d-0$	.0′ m-0.12	$\nu 2.6' d0$	.1′ m-2.40	$\nu^{2.4'} d0.$	0′ m0.73	Peacock		-56°38.96
										Deneb Enif	49°25.09 33°37.42	45°22.75 10°0.01
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir		-46°49.95
0	$100^{\circ}25.49$		<b>S</b> 15°22.03	297°45.33	N10°53.83	311°25.48	N13°34.55	91°48.21	$N01^{\circ}2.80$	Fomalhaut	15°12.88	-40° 49.93 -29° 28.85
1	115°27.95	243°26.68	22.63	312°47.49	53.80	326°28.09	34.61	106°50.59	2.84	Scheat	13°43.75	28° 13.96
2	130°30.42	258° 26.63	23.22	327°49.65	53.77	341°30.70	34.67	121°52.98	2.89	Markab	13°28.39	15°21.16
3	145°32.88	273°26.58	• • 23.82	342°51.82	• • 53.75	356°33.31	• • 34.73	136°55.36	• • 2.94	De- 20 M	CIIA	
4	160°35.35	288°26.53	24.42	357°53.99	53.72	11°35.92	34.79	151°57.74	2.98	Dec 30 Wed	SHA 120°0 70	Mer.pass
5 6	175°37.81 190°40.27	303°26.48	25.02 \$15°25.62	12°56.15 27°58.32	53.69 N10°53.67	26°38.53 41°41.13	34.86 N13°34.92	167°0.12 182°2.50	3.03 N01°3.08	Venus Mars	130°0.70 197°35.58	08:46 04:15
7	205° 42.74	333° 26.37	26.22	43° 0.49	53.64	56°43.74	34.98	197°4.88	3.13	Jupiter	210°53.47	03:22
8	220° 45.20	348°26.31	26.82	58° 2.66	53.62	71°46.35	35.04	212°7.26	3.17	Saturn	351°26.50	17:58
9	235° 47.67	3° 26.26	• • 27.41	73° 4.83	• • 53.59	86°48.96	• • 35.10	227°9.64	• • 3.22			
10	250°50.13	18°26.20	28.01	88°7.00	53.57	101°51.57	35.17	242°12.02	3.27	Dec 31 Thu	<b>SHA</b> 129°1.25	Mer.pass 08:46
11	265°52.59	33°26.14	28.61	103°9.18	53.54	116°54.18	35.23	257°14.40	3.31	Venus Mars	129 1.25 197°27.40	04:12
12	280°55.06	48°26.08	\$15°29.21	118°11.35	N10°53.52	131°56.80	N13°35.29	272°16.78	N01°3.36		210°56.64	03:18
13 14	295°57.52 310°59.99	63°26.02 78°25.96	29.81 30.40	133°13.53 148°15.70	53.50 53.47	146°59.41 162°2.02	35.35 35.41	287°19.16 302°21.54	3.41 3.46	Saturn	351°24.66	17:54
14 15	310 59.99 326°2.45	78 25.90 93°25.90	31.00	148 15.70 163°17.88	53.47	162 2.02 177° 4.63	35.41	302 21.54 317°23.92	3.40 · · 3.51	Jan 01 Fri	SHA	Mor pass
16	341°4.92	108° 25.83	31.60	178°20.06	53.43	192°7.24	35.54	332°26.30	3.55	Venus	128°1.24	Mer.pass 08:46
17	356°7.38	123°25.77	32.20	193°22.24	53.41	207° 9.86	35.60	347°28.67	3.60		197°19.84	04:08
18	11°9.84	138°25.70	<b>S</b> 15°32.79	208°24.42	N10°53.39	222°12.47	N13°35.67	2°31.05	$N01^{\circ}3.65$	Jupiter	211°0.00	03:14
19	26° 12.31	153°25.64	33.39	223°26.60	53.37	237°15.08	35.73	17°33.43	3.70	Saturn	351°22.72	17:50
20	41°14.77	168°25.57	33.99	238°28.78	53.35	252°17.69	35.79	32°35.81	3.74	Horizon	ntal parallax	
21 22	56° 17.24 71° 19.70	183°25.50 198°25.43	· · 34.58 35.18	253°30.97 268°33.15	· · 53.33 53.31	267°20.31 282°22.92	· · 35.86 35.92	47°38.19 62°40.57	· · 3.79 3.84	11011201	Venus:	0.2
22	71 19.70 86°22.16	213° 25.43	35.18	283°35.34	53.31	282 22.92 297°25.54	35.92 35.98	77°42.94	3.84		Mars:	0.2
							.1′ m-2.41					
ivier.p	bass. 17:15	ν-υ.υ αυ	.6′ m-4.58	ν2.2 a-0	.0′ m-0.14	ν2.0° α0	.1 111-2.41	$\nu$ 2.4′ d0.	U 111U./3			

h	Su	n	Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°26.31	<b>S</b> 23°10.73	280°56.70	13.8'	S02°19.85	15.5'	57.6'
1	194°26.01	10.58	295°29.52	13.8'	02°35.31	15.4	57.6'
2	209°25.70 224°25.40	10.42 •• 10.26	310°2.36 324°35.23	13.9' 13.9'	02°50.73 03°6.13	15.4' 15.4'	57.5' 57.5'
4	239°25.10	10.09	339°8.13	13.9'	03°21.48	15.3'	57.4'
5	254°24.80	9.93	353°41.05	13.9'	03°36.81	15.3'	57.4'
6	269°24.50	<b>S</b> 23°9.77	8°14.00	14.0'	S03°52.09	15.2'	57.4'
7 8	284°24.20 299°23.90	9.60 9.44	22°46.96 37°19.95	14.0' 14.0'	04°7.34 04°22.55	15.2' 15.2'	57.3' 57.3'
9	314°23.60	• • 9.27	51°52.95	14.0'	04°22.55	15.2 15.1'	57.3'
10	329°23.29	9.11	66°25.97	14.0'	04°52.85	15.1'	57.2'
11	344°22.99	8.94	80°59.01	14.1'	$05^{\circ}7.94$	15.0'	57.2'
12	359°22.69	S23°8.77	95°32.06	14.1'	S05°22.99	15.0'	57.1'
13 14	14°22.39 29°22.09	8.60 8.43	110°5.13 124°38.21	14.1' 14.1'	05°38.00 05°52.96	15.0' 14.9'	57.1' 57.1'
15	44°21.79	• • 8.26	139°11.30	14.1	05°52.90	14.9	57.1°
16	59°21.49	8.09	153°44.40	14.1'	$06^{\circ}22.75$	14.8'	57.0'
17	74°21.19	7.92	168°17.50	14.1'	06°37.58	14.8'	57.0'
18 19	89°20.89 104°20.59	\$23°7.75 7.57	182°50.62 197°23.74	14.1' 14.1'	\$06°52.35 07°7.08	14.7' 14.7'	56.9' 56.9'
20	104 20.59 119°20.29	7.57 7.40	197°23.74 211°56.87	14.1' 14.1'	07°7.08	14.7 14.6'	56.9'
21	134°19.99	7.22	226°30.00	14.1'	07°36.39	14.6'	56.8'
22	149°19.69	7.05	241°3.14	14.1'	$07^{\circ}50.97$	14.5'	56.8'
23	164°19.39	6.87	255°36.27	14.1'	08°5.50	14.5'	56.8'
	SD = 16.3'	d = -0.2'		SE	0 = 15.7'		
Thu	GHA	Dec	GHA	ν	Dec	d	НР
0	179°19.09	\$23°6.69	270°9.41	ν 14.1'	508° 19.98	14.4'	56.7'
1	194°18.79	6.52	284°42.55	14.1'	08°34.40	14.4'	56.7'
2	209°18.50	6.34	299°15.68	14.1'	08°48.77	14.3'	56.6'
3 4	224°18.20 239°17.90	· · 6.16 5.98	313°48.81 328°21.94	14.1' 14.1'	09°3.08 09°17.34	14.3' 14.2'	56.6' 56.6'
5	254°17.60	5.90 5.79	342°55.06	14.1'	09 17.54 09°31.54	14.1	56.5
6	269°17.30	S23°5.61	357°28.18	14.1'	S09°45.68	14.1'	56.5'
7	284°17.00	5.43	12°1.29	14.1'	09°59.77	14.0'	56.5'
8	299°16.70	5.24	26°34.39	14.1'	10°13.79	14.0'	56.4
9 10	314°16.40 329°16.11	· · 5.06 4.87	41°7.48 55°40.56	14.1' 14.1'	10°27.76 10°41.66	13.9' 13.8'	56.4' 56.4'
11	344°15.81	4.69	70°13.63	14.1'	10°55.50	13.8'	56.3'
12	359°15.51	S23°4.50	84°46.69	14.0'	S11°9.28	13.7'	56.3'
13	14°15.21	4.31	99°19.73	14.0'	11°23.00	13.7'	56.3'
14 15	29°14.91 44°14.62	4.12 · · 3.93	113°52.76 128°25.78	14.0' 14.0'	11°36.65 11°50.24	13.6' 13.5'	56.3' 56.2'
16	59°14.32	3.74	142°58.78	14.0'	12°3.77	13.5'	56.2'
17	$74^{\circ}14.02$	3.55	$157^{\circ}31.76$	14.0'	$12^{\circ}17.22$	13.4'	56.2'
18	89°13.72	\$23°3.36	172°4.72	13.9'	\$12°30.61	13.3'	56.1'
19 20	104°13.43 119°13.13	3.17 2.97	186°37.66 201°10.58	13.9' 13.9'	12°43.93 12°57.18	13.3' 13.2'	56.1' 56.1'
21	134°12.83	2.78	201 10.56 215°43.48	13.9'	12 57.16 13° 10.37	13.1	56.0'
22	149°12.54	2.58	230°16.36	13.9'	13° 23.48	13.0'	56.0'
23	164°12.24	2.39	244°49.22	13.8'	13°36.52	13.0'	56.0'
	SD = 16.3'	d = -0.2'		SE	0 = 15.5'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°11.94	\$23°2.19	259°22.05	13.8'	\$13°49.49	12.9'	55.9'
1	194°11.65 209°11.35	1.99 1.79	273°54.86 288°27.64	13.8' 13.8'	14°2.39 14°15.21	12.8' 12.7'	55.9' 55.9'
2	209°11.35 224°11.05	1.79	303°0.40	13.8	14° 15.21 14° 27.96	12.7'	55.9' 55.9'
4	239°10.76	1.39	317°33.13	13.7'	14° 40.64	12.6'	55.8'
5	254°10.46	1.19	332°5.83	13.7'	14°53.24	12.5'	55.8'
6	269°10.17 284°9.87	\$23°0.99	346°38.50 1°11.14	13.6'	\$15°5.76 15°18.21	12.4'	55.8'
7 8	284°9.87 299°9.57	0.79 0.59	1°11.14 15°43.75	13.6' 13.6'	15° 18.21 15° 30.57	12.4' 12.3'	55.7' 55.7'
9	314°9.28	0.38	30°16.33	13.5'	15° 42.86	12.2'	55.7'
10	329°8.98	0.18	44°48.88	13.5'	15°55.07	12.1'	55.7'
11	344°8.69	22°59.97	59°21.40	13.5'	16°7.20	12.0'	55.6'
12 13	359°8.39 14°8.10	\$22°59.76 59.56	73°53.88 88°26.33	13.4' 13.4'	\$16° 19.25 16° 31.22	12.0' 11.9'	55.6' 55.6'
14	29°7.80	59.35	102°58.75	13.4'	16°43.10	11.8'	55.5'
15	44°7.51	• • 59.14	117°31.13	13.3'	$16^{\circ}54.90$	11.7'	55.5'
16	59°7.21	58.93	132°3.47	13.3'	17°6.62	11.6'	55.5'
17 18	74°6.92 89°6.62	58.72 \$22°58.51	146°35.78 161°8.05	13.3' 13.2'	17° 18.25 \$17° 29.80	11.5' 11.5'	55.5' 55.4'
19	104°6.33	58.30	101 0.05 175°40.28	13.2'	17° 41.26	11.5	55.4'
20	119°6.04	58.08	190°12.47	13.2'	17°52.64	11.3'	55.4'
21	134°5.74	• • 57.87	204°44.63	13.1'	18°3.92	11.2'	55.4'
22 23	149°5.45 164°5.16	57.66 57.44	219°16.74 233°48.82	13.1' 13.0'	18° 15.12 18° 26.23	11.1' 11.0'	55.3' 55.3'
23	SD = 16.3'	d = -0.2'	200 70.02		0 = 15.3'	11.0	33.3
	<u> </u>	u — -0.2	-	)L	, — 15.5		

Lat.	Twilight		Sunrise	Sunset	Twilight		
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.	
N 72°	08:25	10:46			13:20	15:41	
<b>N</b> 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	80:80	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	
<b>N</b> 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	
<b>S</b> 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	
<b>S</b> 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	////	
<b>S</b> 60°	////	01:02	02:41	21:24	23:01	////	

Lat.		Moonris	е		Moonset			
Lat.	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		
<b>N</b> 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		
<b>N</b> 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		
<b>N</b> 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		
<b>S</b> 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		
<b>S</b> 60°	23:02	23:03	23:05	12:15	13:46	15:17		

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	21-23	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	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		