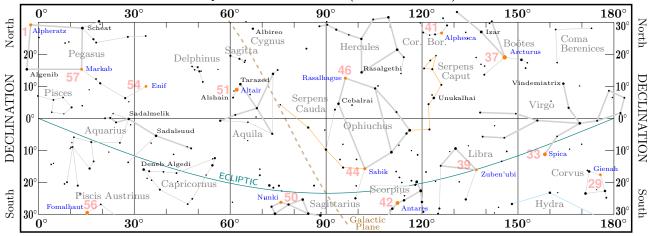
#### GENERATED USING SKYFIELD

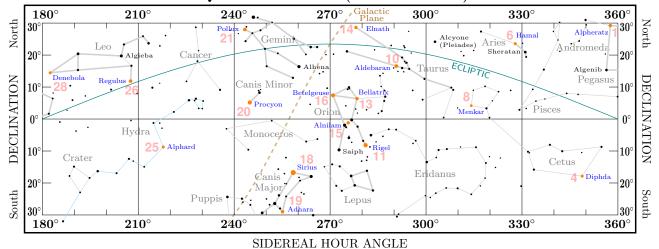
http://rhodesmill.org/skyfield/

#### 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 20, 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	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Thu -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	100°39.7	180°36.3	\$23°37.3	176°47.0	\$23°43.2	347°32.3	N21°58.7	103° 16.9	S03°35.8			
1	115°42.2	195°35.4	37.2	191°47.3	43.0	2°35.1	58.8	118° 19.2	35.7	Alpheratz	357°34.0	29°14.2
2	130°44.7	210°34.4	37.1	206°47.7	42.9	17°37.9	58.9	133°21.5	35.7	Ankaa	353°06.4	-42°10.1
3	145°47.1	225°33.4	• • 37.0	221°48.1	• • 42.7	32°40.7	• • 58.9	148°23.9	35.6	Schedar	349°30.1	56°41.1
4	160°49.6	240°32.5	36.8	236°48.5	42.5	47°43.5	59.0	163°26.2	35.5	Diphda	348°46.5	-17°50.7
5	175°52.1	255°31.5	36.7	251°48.9	42.4	62°46.3	59.0	178°28.5	35.5	Achernar	335°19.4	-57°06.5
6	190°54.5	270°30.5	\$23°36.6	266°49.2	S23°42.2	77°49.1	N21°59.1	193°30.9	S03°35.4	Hamal Polaris	327°50.1 313°17.9	23°35.3 89°22.7
7	205°57.0	285°29.6	36.4	281°49.6	42.0	92°52.0	59.1	208°33.2	35.3	Acamar	315°10.9	-40°12.2
8	220°59.4	300°28.6	36.3	296°50.0	41.8	107°54.8	59.2	223°35.5	35.3	Menkar	314°05.1	4°11.5
9	236°01.9	315°27.6	• • 36.2	311°50.4	• • 41.7	122°57.6	• • 59.3	238°37.9	• • 35.2	Mirfak	308°26.7	49°57.4
10	251°04.4	330°26.7	36.0	326°50.8	41.5	138°00.4	59.3	253°40.2	35.1	Aldebaran	290°38.4	16°33.7
11	266°06.8	345°25.7	35.9	341°51.1	41.3	153°03.2	59.4	268° 42.5	35.1	Rigel	281°02.8	-8°10.3
12	281°09.3	0°24.7	\$23°35.7	356°51.5	S23°41.2	168°06.0	N21°59.4	283°44.9	S03°35.0	Capella	280°20.2	46°01.5
13	296°11.8	15°23.8	35.6	11°51.9	41.0	183°08.8	59.5	298° 47.2	34.9	Bellatrix	278°21.7	6°22.4
14 15	311°14.2 326°16.7	30°22.8 45°21.8	35.5 •• 35.3	26°52.3 41°52.7	40.8 •• 40.6	198°11.6 213°14.4	59.5 •• 59.6	313°49.5 328°51.9	34.9 •• 34.8	Elnath	278°00.5	28°37.8
16	341°19.2	60° 20.9	35.2	56°53.0	40.5	228°17.3	59.7	343°54.2	34.7	Alnilam	275°36.6	$-1^{\circ}11.1$
17	356°21.6	75° 19.9	35.0	71°53.4	40.3	243°20.1	59.7	358° 56.5	34.7	Betelgeuse	270°50.9	7°24.7
18	11°24.1	90° 18.9	S23°34.9	86°53.8	S23°40.1	258°22.9	N21°59.8	13°58.9	S03°34.6	Canopus	263°51.5	-52°42.6
19	26°26.6	105° 18.0	34.7	101°54.2	39.9	273°25.7	59.8	29°01.2	34.5	Sirius	258°25.2	-16°45.1
20	41°29.0	120° 17.0	34.6	116°54.6	39.8	288°28.5	59.9	44°03.5	34.5	Adhara	255°04.8	-29°00.4
21	56°31.5	135°16.0	• • 34.4	131°54.9	• • 39.6	303°31.3	21°59.9	59°05.8	• • 34.4	Procyon	244°49.6	5°09.5
22	71°33.9	150° 15.1	34.3	146°55.3	39.4	318°34.1	22°00.0	74°08.2	34.3	Pollux	243°15.9	27°57.7
23	86°36.4	165°14.1	34.1	161°55.7	39.2	333°37.0	00.1	89°10.5	34.3	Avior Suhail	234°13.8 222°45.3	-59°35.4 -43°32.1
Maria	pass. 17:15	1 0/ 4 0	0.1' m-3.90	··0 4′ d 0	.2′ m1.12	9/ 40	1′ m-2.67		.1′ m1.01	Miaplacidus	222 45.3 221°37.3	-43 32.1 -69°49.2
ivier.p	Dass. 17:15	ν-1.0 a-0	7.1 m-3.90	νο.4 α-υ	.2 m1.12	ν2.ο do.	1 m-2.07	ν2.5 α-0	.1 m1.01	Alphard	221 37.3 217°46.7	-8°46.3
										Regulus	207°33.4	11°50.3
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.7	61°36.3
0	101°38.9	180°13.2	\$23°34.0	176°56.1	\$23°39.1	348°39.8	N22°00.1	104° 12.8	S03°34.2	Denebola	182°24.0	14°25.5
1	116°41.3	195° 12.2	33.8	191°56.5	38.9	3°42.6	00.2	119° 15.2	34.1	Gienah	175°42.7	-17°41.1
2	131°43.8	210°11.2	33.7	206°56.8	38.7	18°45.4	00.2	134° 17.5	34.1		172°59.1	-63°14.3
3	146°46.3	225° 10.3	• • 33.5	221°57.2	• • 38.5	33°48.2	• • 00.3	149°19.8	• • 34.0	Gacrux	171°50.7	-57°15.3
4	161°48.7	240°09.3	33.3	236°57.6	38.3	48°51.0	00.3	164°22.2	33.9	Alioth	$166^{\circ}12.3$	55°48.8
5	176°51.2	255°08.3	33.2	251°58.0	38.2	63°53.8	00.4	179°24.5	33.9	Spica	158°21.5	-11°17.8
6 7	191°53.7 206°56.1	270°07.4 285°06.4	\$23°33.0 32.8	266°58.4 281°58.7	\$23°38.0	78°56.6 93°59.5	N22°00.5 00.5	194°26.8 209°29.1	S03°33.8	Alkaid	152°51.5	49°10.7
8	200 50.1 221°58.6	300°05.4	32.0 32.7	296°59.1	37.8 37.6	93 59.5 109°02.3	00.5	209 29.1 224°31.5	33.7 33.7	Hadar	148°35.1	-60°29.7
9	237°01.1	315° 04.5	• • 32.5	311°59.5	• • 37.4	109 02.3 124°05.1	•• 00.6	239°33.8	• • 33.6		147°56.8	-36°29.7
10	252°03.5	330°03.5	32.3	326°59.9	37.4	139°07.9	00.7	254°36.1	33.5	Arcturus	145°47.3	19°02.6
11	267°06.0	345°02.5	32.2	342°00.3	37.1	154°10.7	00.7	269°38.5	33.5	Rigil Kent.	139°39.5	-60°56.3
12	282°08.4	0°01.6	S23°32.0	357°00.6	S23°36.9	169°13.5	N22°00.8	284°40.8	503°33.4	Kochab	137°20.5	74°02.5
13	297°10.9	15°00.6	31.8	12°01.0	36.7	184°16.3	00.9	299°43.1	33.3	Zuben'ubi	136°55.3	-16°09.0
14	312°13.4	29°59.7	31.7	27°01.4	36.5	199°19.2	00.9	314°45.4	33.3	Alphecca	126°03.3 112°15.2	26°37.4
15	327°15.8	44°58.7	• • 31.5	42°01.8	• • 36.3	214°22.0	• • 01.0	329°47.8	• • 33.2	Antares Atria	112°15.2 107°09.2	-26°29.3 -69°04.3
16	342°18.3	59°57.7	31.3	57°02.2	36.1	229°24.8	01.0	$344^{\circ}50.1$	33.1	Sabik	107 09.2 102°02.2	-09 04.3 -15°45.4
17	357°20.8	74°56.8	31.1	72°02.5	36.0	244°27.6	01.1	359°52.4	33.0	Shaula	96°09.7	-37°07.3
18	12°23.2	89°55.8	S23°31.0	87°02.9	S23°35.8	259°30.4	N22°01.1	14°54.8	S03°33.0	Rasalhague	95°58.1	12°32.4
19	27°25.7	104°54.8	30.8	102°03.3	35.6	274°33.2	01.2	29°57.1	32.9	Eltanin	90°42.3	51°29.0
20	42°28.2	119°53.9	30.6	117°03.7	35.4	289°36.0	01.3	44°59.4	32.8	Kaus Aust.	83°31.8	-34°22.3
21	57°30.6	134°52.9	• • 30.4	132°04.1	• • 35.2	304°38.9	01.3	60°01.7	• • 32.8	Vega	80°33.1	38°48.4
22	72°33.1	149°52.0	30.2	147°04.4	35.0	319°41.7	01.4	75°04.1	32.7	Nunki	75°47.1	-26°15.9
23	87°35.6	164°51.0	30.1	162°04.8	34.8	334°44.5	01.4	90°06.4	32.6	Altair	61°59.5	8°56.2
Mer.p	oass. 17:11	$\nu$ -1.0' d-0	).2′ m-3.90	$\nu$ 0.4′ d-0	.2′ m1.12	$\nu$ 2.8′ d0.	1′ m-2.67	$\nu 2.3' \ d-0$	.1' m $1.01$	Peacock	53°05.0	-56°39.2
										Deneb	49°25.7	45°22.5
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.2	9°59.7
0 0	102°38.0	179° 50.0	\$23°29.9	177°05.2	\$23°34.6	349°47.3	N22°01.5	105°08.7	S03°32.6	Al Na'ir	27°32.2	-46°50.3
1	117°40.5	194°49.1	29.7	192°05.6	34.4	4°50.1	01.5	120°11.0	32.5	Fomalhaut	15°13.8	-29°29.2
2	132°42.9	209°48.1	29.5	207°06.0	34.3	19°52.9	01.6	135° 13.4	32.4	Scheat Markab	13°44.6 13°29.2	28°13.6 15°20.8
3	147°45.4	224°47.2	29.3	222°06.3	• • 34.1	34°55.8	01.7	150° 15.7	• • 32.4	iviarkab	13 29.2	10 ∠0.8
4	162°47.9	239°46.2	29.1	237°06.7	33.9	49°58.6	01.7	165°18.0	32.3	Jan 01 Thu	SHA	Mer.pass
5	177°50.3	254°45.2	28.9	$252^{\circ}07.1$	33.7	65°01.4	01.8	180°20.3	32.2	Venus	79°56.6	11:58
6	192°52.8	269°44.3	<b>S</b> 23°28.7	267°07.5	S23°33.5	80°04.2	$N22^{\circ}01.8$	195°22.7	S03°32.2	Mars	76°07.2	12:13
7	207°55.3	284°43.3	28.5	282°07.9	33.3	95°07.0	01.9	$210^{\circ}25.0$	32.1	Jupiter		00:50
8	222°57.7	299°42.4	28.3	297°08.2	33.1	110°09.8	01.9	225°27.3	32.0	Saturn	2°37.1	17:04
9	238°00.2	314°41.4	• • 28.1	312°08.6	• • 32.9	125°12.7	• • 02.0	240°29.6	• • 32.0	Jan 02 Fri	SHA	Mer.pass
10	253°02.7	329°40.4	27.9	327°09.0	32.7	140°15.5	02.1	255°32.0	31.9	Venus	78°34.3	12:00
11	268°05.1	344°39.5	27.7	342°09.4	32.5	155°18.3	02.1	270°34.3	31.8	Mars	75°17.2	12:12
12	283°07.6	359°38.5	\$23°27.5	357°09.8	\$23°32.3	170°21.1	N22°02.2	285°36.6	\$03°31.7	Jupiter		00:45
13 14	298°10.1 313°12.5	14°37.6 29°36.6	27.3 27.1	12°10.2 27°10.5	32.1 31.9	185°23.9 200°26.7	02.2 02.3	300°38.9 315°41.3	31.7 31.6	Saturn	2°34.0	17:01
14 15	313 12.5 328°15.0	29 36.6 44°35.6	. 26.9	42°10.9	31.7	200 26.7 215°29.6	02.3	315 41.3 330°43.6	31.5	I 02 C :	CIIA	Ma:: :::
16	328 15.0 343°17.4	44 35.6 59°34.7	26.7	42 10.9 57°11.3	31.5	215 29.6 230°32.4	02.4	345°45.9	31.5	Jan 03 Sat	<b>SHA</b> 77°12.0	Mer.pass
17	358°19.9	74° 33.7	26.7	72°11.7	31.4	245°35.2	02.4	0°48.2	31.4	Venus Mars	77°12.0 74°27.2	12:01
18	13°22.4	89° 32.8	\$23°26.3	87°12.1	\$23°31.2	260°38.0	N22°02.5	15° 50.6	S03°31.3		247°09.3	12:11 00:41
19	28°24.8	104°31.8	26.1	102°12.4	31.0	275°40.8	02.6	30°52.9	31.3	Saturn	2°30.7	16:57
20	43°27.3	119°30.9	25.9	117°12.8	30.8	290°43.6	02.6	45°55.2	31.2	Jatuill	2 30.1	10.31
21	58°29.8	134°29.9	• • 25.7	132°13.2	• • 30.6	305°46.5	• • 02.7	60°57.5	• • 31.1	Horizont	al parallax	
22	73°32.2	$149^{\circ}28.9$	25.5	$147^{\circ}13.6$	30.4	320°49.3	02.7	$75^{\circ}59.9$	31.1		Venus:	0.1
23	88°34.7	164°28.0	25.3	$162^{\circ}14.0$	30.2	$335^{\circ}52.1$	02.8	91°02.2	31.0		Mars:	0.1
Merr	pass. 17:07	$\nu$ -1 0' d-0	0.2' m-3.90	ν0 4' d-0	.2′ m1.11	ν2 8' dΩ	1′ m-2.67	ν2 3' d-Ω	.1′ m1.01			
		- 1.0 u-0	5.50	- 5.1 4.0		- 2.0 00.						

h	Su			Moon			
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°10.1	523°01.0	36°44.5	2.4'	N26°24.2	6.7'	60.7'
1	194°09.8	8.00	$51^{\circ}06.0$	2.3'	26°30.9	6.5'	60.7'
2	209°09.5	00.6	65°27.3	2.3'	26°37.4	6.3'	60.7'
3 4	224°09.2 239°08.9	· · 00.4 00.2	79°48.6 94°09.7	2.2' 2.1'	26°43.7 26°49.8	6.1' 5.9'	60.7' 60.7'
5	254°08.6	23°00.0	108° 30.8	2.1	26°55.7	5.9' 5.7'	60.7
6	269°08.3	S22°59.8	122°51.8	1.9'	N27°01.5	5.5'	60.7'
7	284°08.0	59.6	$137^{\circ}12.7$	1.8'	27°07.0	5.3'	60.7'
8	299°07.7	59.4	151°33.5	1.8'	27° 12.3	5.1'	60.7'
9	314°07.4 329°07.1	• • 59.2	165° 54.3 180° 14.9	1.7'	27°17.4 27°22.3	4.9' 4.7'	60.7'
10 11	329 07.1 344°06.8	59.0 58.8	180 14.9 194°35.6	1.6' 1.5'	27°27.0	4.7 4.5'	60.7' 60.7'
12	359°06.5	S22°58.6	208°56.1	1.5'	N27°31.4	4.3'	60.7'
13	14°06.2	58.3	$223^{\circ}16.6$	1.4'	27°35.7	4.1'	60.8'
14	29°05.9	58.1	237°37.0	1.4'	27°39.8	3.9'	60.8'
15 16	44°05.6 59°05.4	· · 57.9 57.7	251° 57.3 266° 17.6	1.3' 1.2'	27°43.6 27°47.3	3.6' 3.4'	60.8' 60.8'
17	74°05.1	57.5	280° 37.9	1.2'	27°50.7	3.4	60.8
18	89°04.8	\$22°57.3	294°58.1	1.2'	N27°53.9	3.0'	60.8
19	104°04.5	57.1	309°18.2	1.1'	27°56.9	2.8'	60.8'
20	119°04.2	56.8	323°38.3	1.1'	27°59.7	2.6'	60.8'
21 22	134°03.9 149°03.6	· · 56.6 56.4	337° 58.4 352° 18.5	1.0' 1.0'	28°02.2 28°04.6	2.3' 2.1'	60.8' 60.8'
23	164°03.3	56.2	6°38.5	1.0'	28°06.7	2.1 1.9'	60.8
	SD = 16.3'	d = -0.2'			D = 16.5'		
	JD = 10.3	<i>u</i> = -0.2		- 31	J = 10.5		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°03.0	\$22°56.0	20°58.4	1.0'	N28°08.6	1.7'	60.8'
1	194°02.7 209°02.4	55.7 55.5	35° 18.4 49° 38.3	0.9'	28°10.3 28°11.8	1.5' 1.3'	60.8'
2 3	209 02.4 224°02.2	55.3	49 38.3 63°58.2	0.9' 0.9'	28°13.0	1.0'	60.8' 60.8'
4	239°01.9	55.1	78° 18.2	0.9'	28°14.1	0.8'	60.8'
5	254°01.6	54.8	92°38.0	0.9'	28°14.9	0.6'	60.8'
6	269°01.3	\$22°54.6	106°57.9	0.9'	N28° 15.5	0.4'	60.8'
7 8	284°01.0 299°00.7	54.4 54.2	121°17.8 135°37.7	0.9' 0.9'	28° 15.8 28° 16.0	0.1' -0.1'	60.8' 60.7'
9	314°00.4	• • 53.9	149° 57.6	0.9	28° 15.9	-0.1	60.7
10	329°00.1	53.7	164° 17.5	0.9'	28° 15.6	-0.5	60.7'
11	343°59.8	53.5	178°37.4	0.9'	28° 15.1	-0.7'	60.7'
12	358°59.5	\$22°53.3	192°57.3	0.9'	N28°14.4	-0.9'	60.7'
13 14	13°59.3 28°59.0	53.0 52.8	207°17.3 221°37.3	1.0' 1.0'	28°13.4 28°12.3	-1.2' -1.4'	60.7' 60.7'
15	43°58.7	• • 52.6	235°57.3	1.0'	28° 10.9	-1.6'	60.7
16	58°58.4	52.3	$250^{\circ}17.3$	1.1'	28°09.3	-1.8'	60.7'
17	73°58.1	52.1	264° 37.4	1.1'	28°07.4	-2.0'	60.7'
18 19	88°57.8 103°57.5	\$22°51.9 51.6	278° 57.5 293° 17.6	1.1' 1.2'	N28°05.4 28°03.1	-2.3' -2.5'	60.7' 60.7'
20	118°57.2	51.6	293 17.0 307°37.8	1.2'	28°00.7	-2.5' -2.7'	60.6
21	133°56.9	51.1	321°58.0	1.3'	27°58.0	-2.9'	60.6'
22	148°56.7	50.9	$336^{\circ}18.3$	1.3'	$27^{\circ}55.1$	-3.1'	60.6'
23	163°56.4	50.7	350°38.7	1.4'	27°52.0	-3.3'	60.6'
	SD = 16.3'	d = -0.2'		SI	O = 16.6'		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°56.1	S22°50.4	$4^{\circ}59.1$	1.5'	N27°48.6	-3.5'	60.6'
1	193°55.8	50.2	19° 19.5	1.5'	27°45.1	-3.7'	60.6'
2	208°55.5 223°55.2	49.9 •• 49.7	33°40.1 48°00.7	1.6' 1.7'	27°41.4 27°37.4	-4.0' -4.2'	60.6' 60.6'
4	238°54.9	49.5	62°21.3	1.7'	27°33.2	-4.4'	60.5
5	253°54.6	49.2	$76^{\circ}42.1$	1.8'	27°28.9	-4.6'	60.5'
6	268°54.4	\$22°49.0	91°02.9	1.9'	N27°24.3	-4.8'	60.5
7	283°54.1 298°53.8	48.7 48.5	105°23.8 119°44.8	2.0' 2.1'	27° 19.5 27° 14.5	-5.0' -5.2'	60.5' 60.5'
8 9	298 53.8 313°53.5	48.5 · · 48.2	119 44.8 134°05.9	2.1	27 14.5 27°09.3	-5.∠ -5.4'	60.5
10	328°53.2	48.0	148° 27.0	2.3'	27°04.0	-5.6'	60.4
11	343°52.9	47.7	$162^{\circ}48.3$	2.3'	26°58.4	-5.8'	60.4'
12	358°52.6	\$22°47.5	177°09.6	2.4'	N26°52.6	-6.0'	60.4
13 14	13°52.4 28°52.1	47.2 47.0	191°31.1 205°52.6	2.5' 2.6'	26°46.6 26°40.5	-6.2' -6.4'	60.4' 60.4'
15	43°51.8	• • 46.7	200° 14.3	2.8'	26°34.1	-6.5'	60.3
16	58°51.5	46.5	234°36.0	2.9'	26°27.6	-6.7'	60.3'
17	73°51.2	46.2	248°57.9	3.0'	26°20.8	-6.9'	60.3'
18 19	88°50.9 103°50.7	\$22°46.0 45.7	263°19.8 277°41.9	3.1' 3.2'	N26°13.9 26°06.8	-7.1' -7.3'	60.3' 60.3'
20	103°50.7 118°50.4	45.7 45.5	277°41.9 292°04.1	3.2	25°59.5	-7.5'	60.2
21	133°50.1	• • 45.2	306°26.4	3.4'	25°52.1	-7.6'	60.2
22	148°49.8	45.0	320°48.8	3.5'	25°44.4	-7.8'	60.2'
23	163°49.5	44.7	335°11.4	3.7'	25°36.6	-8.0'	60.2'
	SD = 16.3'	d = -0.2'		SI	O = 16.5'		

Lat.	Twi	light	Sunrise	Sunset	Tw	ilight
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	08:23	10:39			13:29	15:46
<b>N</b> 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
$30^{\circ}$	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	////
	ı					

Lat.		Moonris	e		Moonse	t
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
<b>N</b> 70°						
68°						
66°						
64°						
62°	10:58		13:35	08:53		10:56
60°	11:50	12:40	14:19	08:02	09:32	10:12
N 58°	12:21	13:18	14:48	07:31	08:55	09:43
56°	12:45	13:44	15:10	07:07	08:28	09:20
54°	13:05	14:05	15:28	06:48	08:07	09:02
52°	13:21	14:23	15:44	06:32	07:49	08:46
50°	13:36	14:38	15:57	06:18	07:34	08:32
45°	14:05	15:08	16:25	05:49	07:04	08:04
<b>N</b> 40°	14:27	15:32	16:46	05:27	06:40	07:42
35°	14:46	15:51	17:04	05:09	06:20	07:23
30°	15:03	16:08	17:19	04:53	06:04	07:07
20°	15:30	16:36	17:45	04:26	05:35	06:40
N 10°	15:54	17:01	18:08	04:03	05:11	06:17
0°	16:16	17:23	18:29	03:42	04:48	05:55
<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°	20:23	21:28	22:01	00:00	00:39	01:54
<b>S</b> 60°	21:01	22:05	22:26	•• ••	00:00	01:17

			Sun			Moon	
L	Day	Eqn.of	Time	Time 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	91-100%
	01	03:20	03:34	12:04	22:32	09:59	
	02	03:48	04:02	12:04	23:39 11:06 -:- 12:12		
	03	04:16	04:29	12:04			

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	103°37.2	179°27.0	\$23°25.0	177°14.3	\$23°30.0	350°54.9	N22°02.9	106°04.5	S03°30.9			
1	118°39.6	194°26.1	24.8	192°14.7	29.8	5°57.7	02.9	121°06.8	30.8	Alpheratz	357°34.0	29°14.2
2	133°42.1	209°25.1	24.6	207°15.1	29.6	21°00.5	03.0	136°09.2	30.8	Ankaa	353°06.4	-42°10.1
3	148°44.6	224°24.2	24.4	222°15.5	29.4	36°03.4	03.0	151°11.5	30.7	Schedar	349°30.1	56°41.1
4	163°47.0	239°23.2	24.2	237°15.9	29.2	51°06.2	03.1	166°13.8	30.6	Diphda	348°46.5	-17°50.7
5	178°49.5	254°22.3	23.9	252°16.3	29.0	66°09.0	03.1	181°16.1	30.6	Achernar	335°19.4	-57°06.5
6	193°51.9	269°21.3	S23°23.7	267°16.6	S23°28.7	81°11.8	N22°03.2	196°18.4	S03°30.5	Hamal	327°50.1 313°18.8	23°35.3 89°22.7
7	208°54.4	284°20.3	23.5	282°17.0	28.5	96°14.6	03.3	211°20.8	30.4	Polaris Acamar	315°10.9	-40°12.2
8	223°56.9	299°19.4	23.3	297°17.4	28.3	111°17.4	03.3	226°23.1	30.4	Menkar	314°05.1	4°11.5
9	238°59.3	314°18.4	• • 23.0	312°17.8	• • 28.1	126°20.3	• • 03.4	241°25.4	• • 30.3	Mirfak	308°26.7	49°57.4
10	254°01.8	329°17.5	22.8	327°18.2	27.9	141°23.1	03.4	256°27.7	30.2	Aldebaran	290°38.4	16°33.7
11	269°04.3	344°16.5	22.6	342°18.5	27.7	156°25.9	03.5	271°30.1	30.1	Rigel	281°02.8	-8°10.3
12	284°06.7	359°15.6	\$23°22.3	357°18.9	\$23°27.5	171°28.7	N22°03.5	286°32.4	\$03°30.1	Capella	280°20.2	46°01.5
13 14	299°09.2 314°11.7	14°14.6 29°13.7	22.1 21.9	12°19.3 27°19.7	27.3 27.1	186°31.5 201°34.4	03.6 03.6	301°34.7 316°37.0	30.0 29.9	Bellatrix	278°21.7	6°22.4
15	329°14.1	44°12.7	• • 21.6	42°20.1	26.9	201 34.4 216°37.2	• • 03.7	331°39.3	29.9	Elnath	278°00.4	28°37.8
16	344°16.6	59°11.8	21.4	57°20.5	26.7	231°40.0	03.8	346°41.7	29.8	Alnilam	275°36.6	-1°11.1
17	359°19.1	74°10.8	21.2	72°20.8	26.5	246°42.8	03.8	1°44.0	29.7	Betelgeuse	270°50.8	7°24.7
18	14°21.5	89°09.8	S23°20.9	87°21.2	\$23°26.3	261°45.6	N22°03.9	16°46.3	S03°29.6	Canopus	263°51.5	-52°42.6
19	29°24.0	104°08.9	20.7	102°21.6	26.1	276°48.4	03.9	31°48.6	29.6	Sirius	258°25.1	-16°45.1
20	44°26.4	119°07.9	20.5	117°22.0	25.9	291°51.3	04.0	46°50.9	29.5	Adhara	255°04.8	-29°00.4
21	59°28.9	134°07.0	• • 20.2	$132^{\circ}22.4$	• • 25.6	$306^{\circ}54.1$	• • 04.0	$61^{\circ}53.3$	• • 29.4	Procyon Pollux	244°49.6 243°15.9	5°09.4 27°57.7
22	74°31.4	149°06.0	20.0	$147^{\circ}22.7$	25.4	321°56.9	04.1	76°55.6	29.4	Avior	243 15.9 234°13.8	-59°35.4
23	89°33.8	164°05.1	19.7	$162^{\circ}23.1$	25.2	336°59.7	04.2	91°57.9	29.3	Suhail	234 13.6 222°45.3	-39 35.4 -43°32.1
Mer n	ass. 17:03	$\nu$ -1.0' d-0	0.2' m-3.90	ν0.4' d-0	.2′ m1.11	$\nu^{2.8'} d0$	1′ m-2.68	$\nu 2.3' d-0$	.1′ m1.01	Miaplacidus	221°37.3	-69°49.2
р		- 1.0 0-0	5.50	- 3.1 4.0		-2.5 40.		- 2.5 4-0		Alphard	217°46.7	-8°46.3
			_		_		_		_	Regulus	207°33.3	11°50.3
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.7	61°36.3
0	104°36.3	179°04.1	S23° 19.5	177°23.5	\$23°25.0	352°02.5	N22°04.2	107°00.2	S03°29.2	Denebola	182°24.0	14°25.4
1	119°38.8	194°03.2	19.2	192°23.9	24.8	7°05.4	04.3	122°02.5	29.2	Gienah	175°42.7	-17°41.2
2	134°41.2 149°43.7	209°02.2 224°01.3	19.0 •• 18.7	207°24.3 222°24.7	24.6 •• 24.4	22°08.2 37°11.0	04.3 •• 04.4	137°04.9 152°07.2	29.1 •• 29.0		172°59.1	-63°14.3
3 4	149 45.7 164°46.2	239°00.3	18.5	237°25.0	24.4	52°13.8	04.4	167°09.5	28.9	1	171°50.7	-57°15.3
5	179°48.6	253°59.4	18.2	252°25.4	24.2	67°16.6	04.4	182°11.8	28.9	Alioth	166°12.2	55°48.8
6	194°51.1	268°58.4	S23°18.0	267°25.8	\$23°23.7	82°19.5	N22°04.6	197°14.1	S03°28.8	Spica	158°21.5	-11°17.8
7	209°53.6	283°57.5	17.7	282°26.2	23.5	97°22.3	04.6	212°16.5	28.7	Alkaid	152°51.5	49°10.7
8	224°56.0	298°56.5	17.5	297°26.6	23.3	112°25.1	04.7	227°18.8	28.6	Hadar	148°35.0	-60°29.7
9	239°58.5	313°55.6	• • 17.2	312°26.9	• • 23.1	127°27.9	• • 04.7	242°21.1	28.6		147°56.8	-36°29.7
10	255°00.9	328°54.6	17.0	327°27.3	22.9	142°30.7	04.8	257°23.4	28.5	Arcturus Rigil Kent.	145°47.3 139°39.4	19°02.6 -60°56.3
11	270°03.4	343°53.7	16.7	342°27.7	22.7	157°33.6	04.8	272°25.7	28.4	Kochab	139° 39.4 137° 20.4	74°02.5
12	285°05.9	358°52.7	S23°16.4	357°28.1	S23°22.4	172°36.4	N22°04.9	287°28.0	S03°28.4	Zuben'ubi	136°55.3	-16°09.0
13	$300^{\circ}08.3$	13°51.8	16.2	12°28.5	22.2	187°39.2	05.0	302°30.4	28.3	Alphecca	126°03.3	26°37.4
14	315°10.8	28°50.8	15.9	27°28.9	22.0	202°42.0	05.0	317°32.7	28.2	Antares	112° 15.1	-26°29.3
15	330°13.3	43°49.9	• • 15.6	42°29.2	• • 21.8	217°44.8	•• 05.1	332°35.0	• • 28.1	Atria	107°09.1	-69°04.3
16	345°15.7	58°48.9	15.4	57°29.6	21.6	232°47.7	05.1	347°37.3	28.1	Sabik	102°02.1	-15°45.4
17	0°18.2	73°48.0	15.1	72°30.0	21.4	247°50.5	05.2	2°39.6	28.0	Shaula	96°09.6	-37°07.3
18	15°20.7	88°47.0	\$23°14.8	87°30.4	\$23°21.1	262°53.3	N22°05.2	17°41.9	\$03°27.9	Rasalhague	$95^{\circ}58.1$	12°32.4
19	30°23.1 45°25.6	103°46.1 118°45.1	14.6	102°30.8 117°31.2	20.9	277°56.1 292°58.9	05.3	32°44.3 47°46.6	27.9	Eltanin	90°42.3	51°29.0
20 21	45°28.0	133°44.2	14.3 •• 14.0	132°31.5	20.7	308°01.8	05.4 •• 05.4	62°48.9	27.8 •• 27.7	Kaus Aust.	83°31.8	-34°22.3
22	75°30.5	148°43.3	13.8	147°31.9	20.3	323°04.6	05.5	77°51.2	27.6	Vega	80°33.1	38°48.4
23	90°33.0	163°42.3	13.5	162°32.3	20.0	338°07.4	05.5	92°53.5	27.6	Nunki	75°47.1	-26°15.9
										Altair	61°59.5	8°56.2
Mer.p	ass. 16:59	$\nu$ -1.0′ d-0	0.2′ m-3.90	$\nu$ 0.4′ d-0	.2′ m1.10	$\nu 2.8' d0.$	1′ m-2.68	$\nu 2.3' \ d-0$	.1′ m1.01	Peacock Deneb	53°05.0	-56°39.2
									·	Enif	49°25.7 33°38.2	45°22.5 9°59.7
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.3
0	$105^{\circ}35.4$	178°41.4	S23°13.2	$177^{\circ}32.7$	S23°19.8	353°10.2	$N22^{\circ}05.6$	$107^{\circ}55.8$	S03°27.5	Fomalhaut	15°13.8	-40°30.3 -29°29.2
1	120°37.9	193°40.4	12.9	192°33.1	19.6	8°13.0	05.6	122°58.2	27.4	Scheat	13°44.6	28°13.6
2	135°40.4	208°39.5	12.7	207°33.5	19.4	23°15.9	05.7	138°00.5	27.4	Markab	13°29.2	15°20.8
3	150°42.8	223°38.5	• • 12.4	222°33.8	• • 19.1	38°18.7	• • 05.8	153°02.8	• • 27.3			
4	165°45.3	238°37.6	12.1	237°34.2	18.9	53°21.5	05.8	168°05.1	27.2	Jan 04 Sun	SHA 75°40.0	Mer.pass
5	180°47.8	253°36.6	11.8	252°34.6	18.7	68°24.3	05.9	183°07.4	27.1	Venus Mars	75°49.9 73°37.2	12:03 12:11
6 7	195°50.2	268°35.7	\$23°11.5	267°35.0 282°35.4	\$23°18.5 18.2	83°27.1 98°30.0	N22°05.9	198°09.7 213°12.1	\$03°27.1	Jupiter		00:36
7 8	210°52.7 225°55.2	283°34.7 298°33.8	11.2 11.0	282°35.4 297°35.8	18.2 18.0	98°30.0 113°32.8	06.0 06.0	213°12.1 228°14.4	27.0 26.9	Saturn	2 <sup>4</sup> 7 17.7 2°27.3	16:53
9	240°57.6	313°32.9	•• 10.7	312°36.1	• • 17.8	113 32.6 128°35.6	06.1	243°16.7	. 26.8			
10	256°00.1	328°31.9	10.4	327°36.5	17.6	143°38.4	06.1	258°19.0	26.8	Jan 05 Mon	SHA	Mer.pass
11	271°02.5	343°31.0	10.1	342°36.9	17.3	158°41.2	06.2	273°21.3	26.7	Venus	74°27.8	12:04
12	286°05.0	358°30.0	\$23°09.8	357°37.3	S23°17.1	173°44.1	N22°06.3	288°23.6	S03°26.6	Mars	72°47.2	12:10
13	$301^{\circ}07.5$	13°29.1	09.5	$12^{\circ}37.7$	16.9	188°46.9	06.3	303°25.9	26.5	Jupiter Saturn	247°26.2 2°23.9	00:32 16:49
14	316°09.9	28°28.1	09.2	27°38.1	16.7	203°49.7	06.4	318°28.3	26.5	Jatuill	2 23.9	10.49
15	331°12.4	43°27.2	• • 08.9	42°38.4	• • 16.4	218°52.5	• • 06.4	333°30.6	• • 26.4	Jan 06 Tue	SHA	Mer.pass
16	346°14.9	58°26.3	08.6	57°38.8	16.2	233°55.4	06.5	348°32.9	26.3	Venus	73°05.9	12:06
17	1°17.3	73°25.3	08.3	72°39.2	16.0	248°58.2	06.5	3°35.2	26.3	Mars	71°57.2	12:10
18	16°19.8	88°24.4	\$23°08.0	87°39.6	\$23°15.7	264°01.0	N22°06.6	18°37.5	\$03°26.2		247°34.8	00:27
19 20	31°22.3 46°24.7	103°23.4 118°22.5	07.7 07.4	102°40.0 117°40.4	15.5 15.3	279°03.8 294°06.6	06.7 06.7	33°39.8 48°42.1	26.1 26.0	Saturn	2°20.4	16:46
20	46 24.7 61°27.2	118 22.5 133°21.5	07.4	117 40.4 132°40.7	15.3	309°09.5	06.8	48 42.1 63°44.5	26.0	Horizont	al parallax	
22	76°29.7	148°20.6	06.8	147°41.1	14.8	309 09.3 324°12.3	06.8	78°46.8	25.9		Venus:	0.1
23	91°32.1	163°19.7	06.5	162°41.5	14.6	339°15.1	06.9	93°49.1	25.8		Mars:	0.1
					.2′ m1.10		1′ m-2.68					
ivier.p	ass. 16:55	$\nu$ -0.9' d-0	).3′ m-3.90	$\nu$ 0.4' $d$ -0	.∠ m1.10	ν2.8′ d0.	1. m-5.08	$\nu$ 2.3′ $d$ -0	.1′ m1.01			

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°49.2	S22°44.4	349°34.0	3.8'	N25°28.6	-8.2'	60.2'
1	193°49.0	44.2	$3^{\circ}56.8$	3.9'	$25^{\circ}20.5$	-8.3'	60.1'
2	208°48.7	43.9	18°19.7	4.0'	25°12.1	-8.5'	60.1'
3	223°48.4	• • 43.7	32°42.7	4.2'	25°03.6	-8.7'	60.1'
4 5	238°48.1 253°47.8	43.4 43.1	47°05.9 61°29.2	4.3' 4.4'	24°55.0 24°46.1	-8.8' -9.0'	60.1' 60.0'
6	268°47.5	522°42.9	75°52.6	4.4	N24°37.1	-9.0 -9.2'	60.0
7	283°47.3	42.6	90°16.1	4.7'	24°28.0	-9.3	60.0'
8	298°47.0	42.4	104°39.8	4.8'	24°18.7	-9.5'	59.9'
9	313°46.7	• • 42.1	$119^{\circ}03.6$	4.9'	24°09.2	-9.6'	59.9'
10	328°46.4	41.8	133°27.5	5.1'	23°59.6	-9.8'	59.9'
11	343°46.1	41.6	147°51.6	5.2'	23°49.8	-9.9'	59.9'
12 13	358°45.8 13°45.6	\$22°41.3 41.0	162°15.8 176°40.2	5.3' 5.5'	N23°39.9 23°29.8	-10.1' -10.2'	59.8' 59.8'
14	28°45.3	40.7	170 40.2 191°04.6	5.6'	23°19.6	-10.2 -10.4'	59.8'
15	43°45.0	• • 40.5	205°29.2	5.8'	23°09.3	-10.5	59.7'
16	58°44.7	40.2	$219^{\circ}54.0$	5.9'	22°58.8	-10.6'	59.7'
17	73°44.4	39.9	$234^{\circ}18.9$	6.0'	22°48.2	-10.8'	59.7'
18	88°44.2	S22°39.7	248°43.9	6.2'	N22°37.4	-10.9'	59.7'
19	103°43.9 118°43.6	39.4	263°09.1 277°34.4	6.3'	22°26.5 22°15.5	-11.0'	59.6'
20 21	118°43.6 133°43.3	39.1 •• 38.8	277°34.4 291°59.8	6.4' 6.6'	22°15.5 22°04.3	-11.2' -11.3'	59.6' 59.6'
22	148°43.0	38.6	306°25.4	6.7'	21°53.0	-11.4'	59.5'
23	163°42.8	38.3	320°51.1	6.9'	21°41.6	-11.5'	59.5'
	SD = 16.3'	d = -0.3'			O = 16.4'		
	JD — 10.3	u — -0.3		31	J — 10.4°		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°42.5 193°42.2	\$22°38.0 37.7	335°17.0 349°43.0	7.0' 7.1'	N21°30.1 21°18.5	-11.6' -11.8'	59.5' 59.4'
2	193°42.2 208°41.9	37.7 37.5	4°09.1	7.1	21°18.5 21°06.7	-11.8 -11.9'	59.4' 59.4'
3	223°41.6	37.2	18°35.4	7.4'	20°54.8	-12.0'	59.4'
4	238°41.4	36.9	$33^{\circ}01.8$	7.6'	20°42.8	-12.1'	59.3'
5	253°41.1	36.6	47°28.3	7.7'	20°30.7	-12.2'	59.3'
6	268°40.8	S22°36.3	61°55.0	7.8'	N20°18.5	-12.3'	59.3'
7 8	283°40.5 298°40.3	36.1 35.8	76°21.9 90°48.8	8.0' 8.1'	20°06.2 19°53.8	-12.4' -12.5'	59.2' 59.2'
9	313°40.0	• • 35.5	105°15.9	8.2'	19°41.2	-12.6'	59.2'
10	328°39.7	35.2	119°43.2	8.4	19°28.6	-12.7'	59.1'
11	343°39.4	34.9	$134^{\circ}10.5$	8.5'	19°15.9	-12.8'	59.1'
12	358°39.2	S22°34.6	148°38.0	8.6'	N19°03.1	-12.9'	59.1'
13	13°38.9 28°38.6	34.3	163°05.7 177°33.5	8.8'	18°50.2 18°37.2	-13.0' -13.1'	59.0'
14 15	43°38.3	34.1 •• 33.8	177 33.5 192°01 4	8.9' 9.0'	18°24.1	-13.1 -13.2'	59.0' 59.0'
16	58°38.0	33.5	206°29.4	9.2'	18° 10.9	-13.3'	58.9'
17	73°37.8	33.2	220°57.6	9.3'	17°57.6	-13.3'	58.9'
18	88°37.5	S22°32.9	235°25.9	9.4'	N17°44.3	-13.4'	58.8'
19	103°37.2	32.6	249°54.3	9.6'	17°30.9	-13.5'	58.8'
20	118°36.9 133°36.7	32.3	264°22.9 278°51.6	9.7' 9.8'	17°17.4 17°03.8	-13.6' -13.7'	58.8' 58.7'
21 22	148°36.4	· · 32.0 31.7	276 51.0 293°20.4	9.6 9.9'	16°50.1	-13.7'	58.7'
23	163°36.1	31.4	307°49.3	10.1'	16°36.4	-13.8'	58.7'
	SD = 16.3'	d = -0.3'		SI	0 = 16.2'		
_							
Tue 0	<b>GHA</b> 178°35.8	Dec \$22°31.1	<b>GHA</b> 322°18.4	u 10.2'	Dec N16°22.6	d -13.9'	<b>HP</b> 58.6'
1	178 35.8 193°35.6	30.8	322 18.4 336°47.6	10.2	16°08.7	-13.9' -13.9'	58.6'
2	208°35.3	30.5	351°16.9	10.4	15°54.8	-14.0'	58.6'
3	223°35.0	• • 30.2	5°46.3	10.6'	15°40.8	-14.1'	58.5'
4	238°34.7	29.9	20°15.9	10.7'	15°26.7	-14.1'	58.5'
5	253°34.5	29.6	34°45.5 49°15.3	10.8'	15°12.6	-14.2'	58.4'
6 7	268°34.2 283°33.9	\$22°29.3 29.0	49°15.3 63°45.2	10.9' 11.0'	N14°58.4 14°44.1	-14.2' -14.3'	58.4' 58.4'
8	298°33.7	28.7	78°15.3	11.1'	14° 44.1	-14.3 -14.4'	58.3'
9	313°33.4	• • 28.4	92°45.4	11.3'	14°15.5	-14.4'	58.3'
10	328°33.1	28.1	$107^{\circ}15.7$	11.4'	$14^{\circ}01.1$	-14.5'	58.2'
11	343°32.8	27.8	121°46.0	11.5'	13°46.6	-14.5'	58.2'
12 13	358°32.6 13°32.3	\$22°27.5 27.2	136°16.5 150°47.1	11.6' 11.7'	N13°32.1 13°17.5	-14.6' -14.6'	58.2' 58.1'
13 14	13°32.3 28°32.0	27.2 26.9	165°17.8	11.7	13°17.5 13°02.9	-14.6'	58.1
15	43°31.7	26.6	179°48.6	11.9'	12°48.3	-14.7'	58.1
16	58°31.5	26.3	$194^{\circ}19.5$	12.0'	12°33.6	-14.7'	58.0'
17	73°31.2	26.0	208°50.5	12.1'	12°18.9	-14.8'	58.0'
18	88°30.9	\$22°25.7	223°21.6	12.2'	N12°04.1	-14.8'	57.9'
19 20	103°30.7 118°30.4	25.4 25.1	237°52.9 252°24.2	12.3' 12.4'	11°49.3 11°34.5	-14.8' -14.9'	57.9' 57.9'
21	133°30.1	• • 24.7	266°55.6	12.5'	11°19.6	-14.9'	57.8'
22	148°29.9	24.4	281°27.1	12.6'	11°04.7	-14.9'	57.8'
23	163°29.6	24.1	295°58.7	12.7'	10°49.7	-15.0'	57.7'
	SD = 16.3'	d = -0.3'	-	SI	O = 16.0'		
	3D = 10.5						

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

Lat.		Moonris	е		Moonset	;
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°			18:27			12:03
<b>N</b> 70°		16:00	18:49		12:42	11:39
68°		16:44	19:06		11:57	11:20
66°	14:23	17:13	19:19	12:20	11:27	11:05
64°	15:18	17:34	19:30	11:24	11:04	10:52
62°	15:50	17:51	19:40	10:51	10:46	10:41
60°	16:14	18:06	19:48	10:26	10:31	10:32
N 58°	16:33	18:18	19:55	10:06	10:18	10:24
56°	16:49	18:28	20:01	09:50	10:06	10:17
54°	17:03	18:37	20:06	09:35	09:56	10:10
52°	17:15	18:45	20:11	09:23	09:47	10:05
50°	17:25	18:53	20:16	09:12	09:39	09:59
45°	17:47	19:08	20:25	08:49	09:22	09:48
<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
S 10°	19:46	20:37	21:22	06:39	07:41	08:37
20°	20:05	20:51	21:30	06:18	07:24	08:26
30°	20:26	21:06	21:40	05:54	07:05	08:12
35°	20:38	21:15	21:46	05:40	06:54	08:05
40°	20:52	21:26	21:53	05:23	06:41	07:56
45°	21:09	21:38	22:00	05:03	06:26	07:45
<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 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	Vei	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	106°34.6	178° 18.7	\$23°06.2	177°41.9	\$23°14.3	354°17.9	N22°06.9	108°51.4	S03°25.7			
1	121°37.0	193° 17.8	05.9	192°42.3	14.1	9°20.7	07.0	123°53.7	25.7	Alpheratz	357°34.0	29°14.2
2	136°39.5	208° 16.8	05.6	207°42.7	13.9	24°23.6	07.1	138° 56.0	25.6	Ankaa	353°06.4	-42°10.1
3	151°42.0	223° 15.9	• • 05.3	222°43.0	. 13.6	39°26.4	07.1	153° 58.3	25.5	Schedar	349°30.2	56°41.1
4	166°44.4	238° 15.0	05.0	237°43.4	13.4	54°29.2	07.2	169°00.6	25.4	Diphda	348°46.5	-17°50.7
5	181°46.9	253°14.0	04.7	252°43.8	13.2	69°32.0	07.2	184°03.0	25.4	Achernar	335°19.5	-57°06.5
6	196°49.4	268° 13.1	\$23°04.4	267°44.2	S23°12.9	84°34.9	N22°07.3	199°05.3	S03°25.3	Hamal	327°50.1	23°35.3
7	211°51.8	283°12.2	04.0	282°44.6	12.7	99°37.7	07.3	214° 07.6	25.2	Polaris	313°20.1	89°22.7
8	226°54.3	298°11.2	03.7	297°45.0	12.5	114°40.5	07.4	229°09.9	25.1	Acamar	315°10.9	-40°12.2
9	241°56.8	313° 10.3	• • 03.4	312°45.4	. 12.2	129°43.3	07.4	244° 12.2	25.1	Menkar	314°05.1	4°11.5
10	256°59.2	328°09.3	03.1	327°45.7	12.0	144°46.1	07.5	259° 14.5	25.0	Mirfak	308°26.7	49°57.4
11	272°01.7	343°08.4	02.8	342°46.1	11.7	159°49.0	07.6	274° 16.8	24.9	Aldebaran	290°38.4	16°33.7
12	287°04.1	358° 07.5	S23°02.5	357°46.5	S23°11.5	174°51.8	N22°07.6	$289^{\circ}19.1$	S03°24.8	Rigel	281°02.8	-8°10.3
13	302°06.6	13°06.5	02.1	12°46.9	11.3	189°54.6	07.7	304°21.4	24.8	Capella	280°20.2 278°21.7	46°01.5 6°22.4
14	$317^{\circ}09.1$	28°05.6	01.8	27°47.3	11.0	204°57.4	07.7	319°23.8	24.7	Bellatrix Elnath	278°00.4	28°37.8
15	$332^{\circ}11.5$	43°04.7	•• 01.5	42°47.7	• • 10.8	220°00.3	• • 07.8	334°26.1	• • 24.6	Alnilam	275°36.6	-1°11.1
16	$347^{\circ}14.0$	58°03.7	01.2	57°48.0	10.5	235°03.1	07.8	349°28.4	24.5	Betelgeuse	270°50.8	7°24.7
17	$2^{\circ}16.5$	73°02.8	8.00	72°48.4	10.3	250°05.9	07.9	4°30.7	24.5	Canopus	263°51.5	-52°42.6
18	17°18.9	88°01.9	S23°00.5	87°48.8	S23°10.1	265°08.7	N22°08.0	19°33.0	S03°24.4	Sirius	258°25.1	-16°45.1
19	32°21.4	103°00.9	23°00.2	102°49.2	09.8	280°11.5	0.80	34°35.3	24.3	Adhara	255°04.8	-29°00.5
20	47°23.9	118°00.0	22°59.8	117°49.6	09.6	295°14.4	08.1	49°37.6	24.2	Procyon	244°49.6	5°09.4
21	62°26.3	132°59.0	• • 59.5	132°50.0	• • 09.3	310°17.2	• • 08.1	64°39.9	• • 24.2	Pollux	243°15.9	27°57.7
22	77°28.8	147°58.1	59.2	147°50.4	09.1	325°20.0	08.2	79°42.2	24.1	Avior	234°13.8	-59°35.5
23	92°31.3	162°57.2	58.8	162°50.7	08.8	340°22.8	08.2	94°44.5	24.0	Suhail	222°45.3	-43°32.2
Mer n	ass. 16:51	ν-0.9' d-0	.3′ m-3.90	ν0.4′ d-0	.2′ m1.09	ν2.8′ dΩ	1′ m-2.68	ν2.3' d-0	.1′ m1.01	Miaplacidus	221°37.3	-69°49.3
										Alphard	217°46.7	-8°46.3
										Regulus	207°33.3	11°50.3
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.6	61°36.3
0	107°33.7	177°56.2	\$22°58.5	177°51.1	S23°08.6	355°25.7	N22°08.3	109°46.9	S03°23.9	Denebola	182°24.0	14°25.4
1	122°36.2	192°55.3	58.2	192°51.5	08.4	10°28.5	08.3	124°49.2	23.9	Gienah	175°42.7	-17°41.2
2	137°38.6	207°54.4	57.8	207°51.9	08.1	25°31.3	08.4	139°51.5	23.8		172°59.1	-63°14.4
3	152°41.1	222°53.4	• • 57.5	222°52.3	• • 07.9	40°34.1	• • 08.5	154° 53.8	• • 23.7	Gacrux	171°50.6	-57°15.3
4	167°43.6	237°52.5	57.2	237°52.7	07.6	55°36.9	08.5	169°56.1	23.6	Alioth	166°12.2	55°48.8
5	182°46.0	252°51.6	56.8	252°53.1	07.4	70°39.8	08.6	184° 58.4	23.6	Spica	158°21.4	-11°17.8
6	197°48.5	267°50.7	\$22°56.5	267°53.4	\$23°07.1	85°42.6	N22°08.6	200°00.7	\$03°23.5	Alkaid	152°51.4	49°10.7
7	212°51.0	282°49.7	56.1	282°53.8	06.9	100°45.4	08.7	215°03.0	23.4	Hadar	148°35.0	-60°29.7
8	227°53.4 242°55.9	297°48.8	55.8	297°54.2	06.6	115°48.2	08.7	230°05.3	23.3	Menkent	147°56.7	-36°29.7
9		312°47.9	• • 55.4	312°54.6	06.4	130°51.1	08.8	245°07.6	• • 23.3	Arcturus	145°47.3	19°02.6
10 11	257°58.4 273°00.8	327°46.9 342°46.0	55.1	327°55.0 342°55.4	06.1 05.9	145°53.9	08.9 08.9	260°09.9 275°12.3	23.2	Rigil Kent.	139°39.4	-60°56.3
11	273 00.8 288°03.3	342 46.0 357°45.1	54.7 \$22°54.4	342 55.4 357°55.8	523°05.6	160°56.7 175°59.5	N22°09.0	275 12.3 290°14.6	23.1 \$03°23.0	Kochab	137°20.4	74°02.5
13	303°05.8	12°44.1	54.0	12°56.1	05.4	175 59.5 191°02.4	09.0	305°16.9	23.0	Zuben'ubi	136°55.2	-16°09.0
14	318°08.2	27°43.2	53.7	27°56.5	05.4	206°05.2	09.0	320° 19.2	23.0	Alphecca	126°03.3	26°37.4
15	333°10.7	42° 42.3	• • 53.3	42°56.9	• • 04.9	200 03.2 221°08.0	09.1	335°21.5	• • 22.8	Antares	$112^{\circ}15.1$	-26°29.3
16	348°13.1	42 42.3 57°41.4	53.0	57°57.3	04.6	236°10.8	09.1	350°23.8	22.7	Atria	107°09.1	-69°04.3
17	3°15.6	72°40.4	52.6	72°57.7	04.4	251°13.6	09.2	5°26.1	22.7	Sabik	102°02.1	-15°45.4
18	18°18.1	87°39.5	S22°52.3	87°58.1	\$23°04.1	266°16.5	N22°09.3	20°28.4	S03°22.6	Shaula	96°09.6	-37°07.3
19	33°20.5	102°38.6	51.9	102°58.5	03.9	281°19.3	09.4	35°30.7	22.5	Rasalhague	95°58.1	12°32.4
20	48°23.0	117° 37.6	51.5	117°58.8	03.6	296°22.1	09.4	50°33.0	22.4	Eltanin	90°42.3	51°29.0
21	63°25.5	132°36.7	51.2	132°59.2	03.4	311°24.9	• • 09.5	65°35.3	22.4	Kaus Aust.	83°31.8	-34°22.3
22	78°27.9	147°35.8	50.8	147°59.6	03.1	326°27.8	09.5	80°37.6	22.3	Vega	80°33.1	38°48.4
23	93°30.4	162°34.9	50.5	163°00.0	02.9	341°30.6	09.6	95°39.9	22.2	Nunki	75°47.1	-26°15.9
										Altair	61°59.5	8°56.2
Mer.p	ass. 16:47	$\nu$ -0.9' d-0	.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 Deneb	53°05.0	-56°39.2
										Enif	49°25.7 33°38.2	45°22.5 9°59.7
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.3
0	108°32.9	177°33.9	S22°50.1	178°00.4	S23°02.6	356°33.4	N22°09.6	110°42.2	S03°22.1	Fomalhaut	15°13.8	-40° 30.3 -29° 29.2
1	123°35.3	192°33.0	49.7	193°00.8	02.4	11°36.2	09.7	125° 44.5	22.0	Scheat	13°44.6	28°13.6
2	138°37.8	$207^{\circ}32.1$	49.4	208°01.2	02.1	26°39.1	09.7	140°46.9	22.0	Markab	13°29.2	15°20.8
3	153°40.2	222°31.2	• • 49.0	223°01.6	• • 01.8	41°41.9	• • 09.8	155° 49.2	• • 21.9	manas	10 23.2	10 20.0
4	168°42.7	237°30.2	48.6	238°01.9	01.6	56°44.7	09.9	170°51.5	21.8	Jan 07 Wed	SHA	Mer.pass
5	183°45.2	252°29.3	48.3	253°02.3	01.3	71°47.5	09.9	185°53.8	21.7	Venus	71°44.1	12:08
6	198°47.6	267°28.4	S22°47.9	268°02.7	S23°01.1	86°50.3	N22°10.0	200°56.1	S03°21.7	Mars	71°07.3	12:09
7	213°50.1	282°27.5	47.5	283°03.1	8.00	101°53.2	10.0	215°58.4	21.6	Jupiter		00:23
8	228°52.6	297°26.5	47.1	298°03.5	00.6	116°56.0	10.1	231°00.7	21.5	Saturn	2°16.8	16:42
9	243°55.0	312°25.6	• • 46.8	313°03.9	00.3	131°58.8	• • 10.1	246°03.0	• • 21.4	Jan 08 Thu	SHA	Mer.pass
10	258°57.5	327°24.7	46.4	328°04.3	23°00.0	147°01.6	10.2	261°05.3	21.4	Venus	70°22.5	12:09
11	274°00.0	342°23.8	46.0	343°04.7	22°59.8	162°04.5	10.3	276°07.6	21.3	Mars	70°17.4	12:08
12	289°02.4	357°22.8	\$22°45.6	358°05.0	\$22°59.5	177°07.3	N22°10.3	291°09.9	S03°21.2	Jupiter		00:18
13	304°04.9	12°21.9	45.2	13°05.4	59.3	192°10.1	10.4	306°12.2	21.1	Saturn	2°13.1	16:38
14	319°07.4	27°21.0	44.9	28°05.8	59.0	207°12.9	10.4	321°14.5	21.0			
15	334°09.8	42°20.1	• • 44.5	43°06.2	58.7	222°15.8	• • 10.5	336°16.8	• • 21.0	Jan 09 Fri	SHA	Mer.pass
16 17	349°12.3	57° 19.2	44.1	58°06.6	58.5	237°18.6	10.5	351°19.1	20.9	Venus	69°01.1	12:10
17 18	4°14.7 19°17.2	72°18.2 87°17.3	43.7 \$22°43.3	73°07.0 88°07.4	58.2 \$22°57.9	252°21.4 267°24.2	10.6 N22°10.6	6°21.4 21°23.7	20.8 \$03°20.7	Mars	69°27.5	12:08
19	19 17.2 34°19.7	87 17.3 102°16.4	\$22 43.3 42.9	103°07.8	522 57.9 57.7	282°27.1	10.7	21 23.7 36°26.0	20.7		248°00.6	00:14
20	49°22.1	102 10.4 117° 15.5	42.9 42.6	103 07.8 118°08.1	57.7 57.4	202 27.1 297°29.9	10.7	50°28.3	20.7	Saturn	2°09.4	16:35
21	64°24.6	132° 14.6	• • 42.2	133°08.5	57.4	312°32.7	• • 10.8	66° 30.6	. 20.5	Horizont	al parallax	
22	79°27.1	147° 13.6	41.8	148°08.9	56.9	327°35.5	10.0	81°32.9	20.4		Venus:	0.1
23	94°29.5	162° 12.7	41.4	163°09.3	56.6	342°38.3	10.9	96°35.2	20.3		Mars:	0.1
Mer.p	ass. 16:43	$\nu$ -0.9′ d-0	.4′ m-3.90	$\nu$ 0.4′ $d$ -0	.3′ m1.09	$\nu$ 2.8′ $d$ 0.	1′ m-2.68	ν2.3′ <b>d</b> -0	.1'  m1.02			

h	Sun				Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°29.3	S22°23.8	310°30.4	12.8'	N10°34.8	-15.0'	57.7'
1 2	193°29.0 208°28.8	23.5 23.2	325°02.2 339°34.1	12.9' 13.0'	10°19.8 10°04.7	-15.0' -15.1'	57.7' 57.6'
3	206 26.6 223°28.5	22.9	354°06.1	13.1'	10 04.7 09°49.7	-15.1'	57.6'
4	238°28.2	22.5	8°38.2	13.2'	09°34.6	-15.1'	57.6'
5	253°28.0	22.2	23°10.4	13.3'	09°19.5	-15.1'	57.5'
6 7	268°27.7 283°27.4	\$22°21.9 21.6	37°42.6 52°15.0	13.3' 13.4'	N09°04.4 08°49.3	-15.1' -15.2'	57.5' 57.4'
8	203 27.4 298°27.2	21.0	66° 47.4	13.5'	06 49.3 08°34.1	-15.2'	57.4'
9	313°26.9	• • 20.9	81°19.9	13.6'	08°18.9	-15.2'	57.4'
10	328°26.6	20.6	95°52.5	13.7'	08°03.7	-15.2'	57.3'
11 12	343°26.4 358°26.1	20.3 \$22°20.0	110°25.1 124°57.9	13.7' 13.8'	07°48.5 N07°33.3	-15.2' -15.2'	57.3' 57.2'
13	13°25.8	19.7	139° 30.7	13.9'	07°18.1	-15.2'	57.2'
14	28°25.6	19.3	154°03.6	14.0'	07°02.8	-15.3'	57.2'
15	43°25.3	• • 19.0	168° 36.6	14.0'	06°47.6	-15.3'	57.1'
16 17	58°25.0 73°24.8	18.7 18.4	183°09.6 197°42.7	14.1' 14.2'	06°32.3 06°17.1	-15.3' -15.3'	57.1' 57.1'
18	88°24.5	S22°18.0	212° 15.9	14.3'	N06°01.8	-15.3'	57.0'
19	103°24.2	17.7	$226^{\circ}49.2$	14.3'	05°46.5	-15.3'	57.0'
20	118°24.0 133°23.7	17.4	241°22.5	14.4'	05°31.2	-15.3'	56.9'
21 22	133°23.7 148°23.4	· · 17.0 16.7	255°55.9 270°29.3	14.4' 14.5'	05°15.9 05°00.7	-15.3' -15.3'	56.9' 56.9'
23	163°23.2	16.4	285°02.8	14.6'	04°45.4	-15.3'	56.8'
	SD = 16.3'	d = -0.3'		SI	D = 15.7'		
Thu	GHA	Dec	GHA	ν 14.6'	Dec	d 15.2'	HP
0 1	178°22.9 193°22.6	\$22°16.0 15.7	299°36.4 314°10.0	14.6' 14.7'	N04°30.1 04°14.8	-15.3' -15.3'	56.8' 56.8'
2	208°22.4	15.4	328° 43.7	14.7'	03°59.5	-15.3'	56.7'
3	223°22.1	•• 15.0	343° 17.5	14.8'	03°44.2	-15.3'	56.7'
4	238°21.8 253°21.6	14.7	357°51.3 12°25.1	14.9'	03°29.0 03°13.7	-15.3'	56.6'
5 6	253°21.6 268°21.3	14.4 \$22°14.0	26°59.0	14.9' 15.0'	03°13.7 N02°58.4	-15.3' -15.3'	56.6' 56.6'
7	283°21.0	13.7	41°33.0	15.0'	02°43.2	-15.2'	56.5
8	298°20.8	13.4	56°07.0	15.1'	02°27.9	-15.2'	56.5'
9	313°20.5	· · 13.0	70°41.1	15.1'	02°12.7 01°57.5	-15.2'	56.5'
10 11	328°20.3 343°20.0	12.7 12.3	85° 15.2 99° 49.3	15.2' 15.2'	01°57.5 01°42.3	-15.2' -15.2'	56.4' 56.4'
12	358°19.7	S22°12.0	114°23.5	15.2'	N01°27.1	-15.2'	56.4'
13	13°19.5	11.7	128°57.8	15.3'	01°11.9	-15.2'	56.3'
14 15	28°19.2 43°18.9	11.3 · · 11.0	143°32.0 158°06.4	15.3' 15.4'	00°56.7 00°41.6	-15.2' -15.1'	56.3' 56.3'
16	58°18.7	10.6	172° 40.7	15.4'	00°26.5	-15.1'	56.2
17	73°18.4	10.3	$187^{\circ}15.1$	15.4'	$N00^{\circ}11.3$	-15.1'	56.2'
18	88°18.2 103°17.9	\$22°09.9	201°49.6 216°24.0	15.5'	\$00°03.8 00°18.8	15.1'	56.2'
19 20	103 17.9 118°17.6	09.6 09.2	210 24.0 230°58.6	15.5' 15.5'	00 18.8 00°33.9	15.1' 15.0'	56.1' 56.1'
21	133°17.4	08.9	245°33.1	15.6'	00°48.9	15.0'	56.1
22	148°17.1	08.5	260°07.7	15.6'	01°04.0	15.0'	56.0'
23	163°16.9	08.2	274°42.3	15.6'	01°19.0	15.0'	56.0'
	SD = 16.3'	d = -0.3'		SI	D = 15.5'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°16.6	\$22°07.8	289°16.9	15.7'	S01°33.9	14.9'	56.0'
1	193°16.3	07.5	303°51.6	15.7'	01°48.9	14.9'	55.9'
2	208°16.1 223°15.8	07.1 •• 06.8	318°26.2 333°00.9	15.7' 15.7'	02°03.8 02°18.7	14.9' 14.9'	55.9' 55.9'
4	238°15.6	06.4	347°35.7	15.8'	02°13.6	14.8	55.8'
5	253°15.3	06.1	2°10.4	15.8'	02°48.4	14.8'	55.8'
6 7	268°15.0 283°14.8	\$22°05.7 05.4	16°45.2 31°20.0	15.8' 15.8'	\$03°03.2 03°18.0	14.8' 14.8'	55.8' 55.7'
7 8	283°14.8 298°14.5	05.4 05.0	45°54.8	15.8'	03°18.0 03°32.8	14.8	55.7' 55.7'
9	313°14.3	• • 04.6	60°29.6	15.8'	03°47.5	14.7'	55.7'
10	328°14.0	04.3	75°04.5	15.9'	04°02.2	14.7'	55.6'
11 12	343°13.8 358°13.5	03.9 \$22°03.6	89°39.3 104°14.2	15.9' 15.9'	04°16.8 \$04°31.5	14.6' 14.6'	55.6' 55.6'
13	13°13.2	03.2	104 14.2 118°49.1	15.9'	04°46.1	14.6	55.6'
14	28°13.0	02.9	133°24.0	15.9'	05°00.6	14.5'	55.5'
15	43°12.7	• • 02.5	147°58.9	15.9'	05°15.2	14.5'	55.5'
16 17	58°12.5 73°12.2	02.1 01.8	162°33.8 177°08.7	15.9' 15.9'	05°29.6 05°44.1	14.5' 14.4'	55.5' 55.4'
18	88°12.0	\$22°01.4	177 08.7 191°43.7	15.9'	\$05°58.5	14.4	55.4
19	103°11.7	01.0	206° 18.6	15.9'	06°12.9	14.3'	55.4'
20	118°11.5	00.7	220°53.5	15.9'	06°27.2	14.3'	55.4'
21 22	133°11.2 148°10.9	22°00.3 21°59.9	235°28.5 250°03.4	15.9' 15.9'	06°41.5 06°55.8	14.3' 14.2'	55.3' 55.3'
23	163°10.7	59.6	264°38.4	15.9'	07°10.0	14.2'	55.3'
	SD = 16.3'	d = -0.4'		SI	D = 15.3'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Juliuse	Juliset	Civil	Naut.
N 72°	08:15	10:19			13:55	15:59
N 70°	07:58	09:36			14:38	16:16
68°	07:44	09:07	11:09	13:05	15:06	16:30
66°	07:32	08:46	10:13	14:01	15:28	16:42
64°	07:23	08:28	09:40	14:34	15:45	16:51
62°	07:14	08:14	09:16	14:58	16:00	17:00
60°	07:07	08:02	08:57	15:17	16:12	17:07
N 58°	07:00	07:51	08:41	15:33	16:23	17:14
56°	06:54	07:42	08:28	15:46	16:32	17:20
54°	06:48	07:34	08:16	15:58	16:40	17:26
52°	06:43	07:26	08:06	16:08	16:48	17:31
50°	06:38	07:19	07:57	16:17	16:55	17:35
45°	06:28	07:04	07:38	16:36	17:09	17:46
N 40°	06:18	06:52	07:22	16:52	17:22	17:56
35°	06:09	06:41	07:09	17:05	17:33	18:04
30°	06:01	06:31	06:57	17:17	17:43	18:12
20°	05:46	06:13	06:37	17:37	18:00	18:28
N 10°	05:31	05:57	06:19	17:54	18:17	18:43
0°	05:15	05:41	06:03	18:10	18:33	18:59
<b>S</b> 10°	04:57	05:24	05:46	18:27	18:50	19:17
20°	04:35	05:04	05:28	18:45	19:09	19:38
30°	04:08	04:41	05:08	19:05	19:33	20:05
35°	03:50	04:26	04:55	19:18	19:47	20:23
40°	03:28	04:09	04:41	19:32	20:04	20:44
45°	03:00	03:48	04:24	19:49	20:25	21:13
<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	е	Moonset			
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	
N 10°	21:55	22:42	23:28	09:41	10:20	10:58	
0°	21:58	22:41	23:22	09:35	10:19	11:01	
<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.of 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	Ve	nus	Ma	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	109°32.0	177°11.8	\$22°41.0	178°09.7	\$22°56.4	357°41.2	N22°11.0	111°37.5	S03°20.3			
1	124°34.5	192°10.9	40.6	193°10.1	56.1	12°44.0	11.0	126°39.8	20.2	Alpheratz	357°34.0	29°14.2
2	139°36.9	207°10.0	40.2	208°10.5	55.8	27°46.8	11.1	141°42.2	20.1	Ankaa	353°06.4	-42°10.1
3	154°39.4	222°09.1	39.8	223°10.9	55.6	42°49.6	. 11.1	156°44.5	20.0	Schedar	349°30.2	56°41.1
4	169°41.9	237°08.1	39.4	238°11.2	55.3	57°52.5	11.2	171°46.8	20.0	Diphda	348°46.5	-17°50.7
5	184°44.3	252°07.2	39.0	253°11.6	55.0	72°55.3	11.3	186°49.1	19.9	Achernar	335°19.5	-57°06.5
6	199°46.8	267°06.3	S22°38.6	268°12.0	S22°54.7	87°58.1	N22°11.3	201°51.4	S03°19.8	Hamal	327°50.2	23°35.3 89°22.7
7	214°49.2	282°05.4	38.2	283°12.4	54.5	103°00.9	11.4	216°53.7	19.7	Polaris Acamar	313°21.4 315°10.9	-40°12.2
8	229°51.7	297°04.5	37.8	298°12.8	54.2	118°03.8	11.4	231°56.0	19.6	Menkar	314°05.1	4°11.5
9	244°54.2	312°03.6	• • 37.4	313°13.2	• • 53.9	133°06.6	• • 11.5	246°58.3	• • 19.6	Mirfak	308°26.8	49°57.4
10	259°56.6	327°02.6	37.0	328°13.6	53.7	148°09.4	11.5	262°00.6	19.5	Aldebaran	290°38.4	16°33.7
11	274°59.1	342°01.7	36.6	343°14.0	53.4	163°12.2	11.6	277°02.9	19.4	Rigel	281°02.8	-8°10.3
12	290°01.6	357°00.8	\$22°36.2	358°14.4	\$22°53.1	178°15.1	N22°11.6	292°05.2	S03°19.3	Capella	280°20.2	46°01.5
13	305°04.0	11°59.9	35.8	13°14.7	52.9	193°17.9	11.7	307°07.5	19.2	Bellatrix	278°21.7	6°22.4
14 15	320°06.5 335°09.0	26°59.0 41°58.1	35.3 •• 34.9	28°15.1 43°15.5	52.6 •• 52.3	208°20.7 223°23.5	11.8 •• 11.8	322°09.8 337°12.1	19.2 •• 19.1	Elnath	278°00.5	28°37.8
16	350°11.4	56°57.2	34.5	58°15.9	52.0	238°26.3	11.9	352°14.4	19.0	Alnilam	275°36.6	-1°11.2
17	5°13.9	71°56.2	34.1	73°16.3	51.8	253°29.2	11.9	7°16.7	18.9	Betelgeuse	270°50.8	7°24.7
18	20°16.3	86°55.3	\$22°33.7	88°16.7	\$22°51.5	268°32.0	N22°12.0	22°19.0	S03°18.9	Canopus	263°51.5	-52°42.6
19	35°18.8	101°54.4	33.3	103°17.1	51.2	283°34.8	12.0	37°21.3	18.8	Sirius	258°25.1	-16°45.2
20	50°21.3	116°53.5	32.9	118°17.5	50.9	298°37.6	12.1	52°23.6	18.7	Adhara	255°04.8	-29°00.5
21	65°23.7	131°52.6	• • 32.4	133°17.9	• • 50.7	313°40.5	• • 12.1	67°25.9	• • 18.6	Procyon	244°49.6	5°09.4
22	80°26.2	146°51.7	32.0	148°18.3	50.4	328°43.3	12.2	82°28.2	18.5	Pollux Avior	243°15.9 234°13.8	27°57.7 -59°35.5
23	95°28.7	161°50.8	31.6	163°18.6	50.1	343°46.1	12.2	97°30.5	18.5	Suhail	234 13.6 222°45.3	-39 33.3 -43°32.2
Mern	ass. 16:39	ν-0 9' d-0	.4' m-3.90	ν0.4' d-0	3' m1 na	v2 8' d0	1′ m-2.68	v2 3' d-0	.1′ m1.02	Miaplacidus	222 45.3 221°37.3	-43 32.2 -69°49.3
- IVIEL.P	ass. 10.39	ν-0.9 u-0	7.4 111-3.90	νο.4 u-0	.5 1111.09	ν2.0 do.	1 111-2.00	ν2.3 u-0	.1 1111.02	Alphard	217°46.6	-8°46.3
										Regulus	207°33.3	11°50.3
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.6	61°36.3
0	110°31.1	176°49.9	S22°31.2	178°19.0	522°49.8	358°48.9	N22°12.3	112°32.8	S03°18.4	Denebola	182°24.0	14°25.4
1	125°33.6	191°49.0	30.8	193°19.4	49.6	13°51.8	12.4	127°35.1	18.3	Gienah	175°42.6	-17°41.2
2	140°36.1	206°48.0	30.3	208°19.8	49.3	28°54.6	12.4	142°37.4	18.2	Acrux	$172^{\circ}59.0$	-63°14.4
3 4	155°38.5	221°47.1	•• 29.9	223°20.2 238°20.6	· · 49.0 48.7	43°57.4	• • 12.5	157°39.7 172°42.0	• • 18.1	Gacrux	171°50.6	-57°15.3
5	170°41.0 185°43.5	236°46.2 251°45.3	29.5 29.0	250°20.0° 253°21.0°	48.4	59°00.2 74°03.1	12.5 12.6	172 42.0 187°44.3	18.1 18.0	Alioth	$166^{\circ}12.2$	55°48.8
6	200°45.9	266°44.4	\$22° 28.6	268°21.4	\$22°48.2	89°05.9	N22°12.6	202°46.6	503°17.9	Spica	158°21.4	-11°17.9
7	215°48.4	281°43.5	28.2	283°21.8	47.9	104°08.7	12.7	217°48.9	17.8	Alkaid	152°51.4	49°10.7
8	230°50.8	296°42.6	27.8	298°22.2	47.6	119°11.5	12.7	232°51.2	17.7	Hadar	148°35.0	-60°29.7
9	245°53.3	311°41.7	27.3	313°22.5	• • 47.3	134°14.4	• • 12.8	247°53.5	• • 17.7	Menkent	147°56.7	-36°29.8
10	260°55.8	326°40.8	26.9	328°22.9	47.0	149°17.2	12.9	262°55.8	17.6	Arcturus	145°47.2 139°39.4	19°02.6 -60°56.3
11	275°58.2	341°39.9	26.5	343°23.3	46.8	164°20.0	12.9	277°58.1	17.5	Rigil Kent. Kochab	139 39.4 137°20.3	74°02.5
12	291°00.7	356°39.0	S22°26.0	358°23.7	S22°46.5	179°22.8	N22°13.0	293°00.4	S03°17.4	Zuben'ubi	136°55.2	-16°09.0
13	$306^{\circ}03.2$	11°38.1	25.6	13°24.1	46.2	194°25.6	13.0	308°02.7	17.3	Alphecca	126°03.2	26°37.4
14	321°05.6	26°37.2	25.1	28°24.5	45.9	209°28.5	13.1	323°05.0	17.3	Antares	112° 15.1	-26°29.3
15	336°08.1	41°36.3	• • 24.7	43°24.9	• • 45.6	224°31.3	• • 13.1	338°07.2	• • 17.2	Atria	107°09.0	-69°04.3
16	351°10.6	56°35.4	24.3	58°25.3	45.3	239°34.1	13.2	353°09.5	17.1	Sabik	102°02.1	-15°45.4
17	6°13.0	71°34.5	23.8	73°25.7	45.1	254°36.9	13.2	8°11.8	17.0	Shaula	96°09.6	-37°07.3
18	21°15.5	86°33.5	\$22°23.4	88°26.1	\$22°44.8	269°39.8	N22°13.3	23°14.1	\$03°16.9	Rasalhague	$95^{\circ}58.1$	12°32.4
19 20	36°18.0 51°20.4	101°32.6 116°31.7	22.9 22.5	103°26.4 118°26.8	44.5 44.2	284°42.6 299°45.4	13.4 13.4	38°16.4 53°18.7	16.9 16.8	Eltanin	90°42.3	51°28.9
21	66°22.9	131°30.8	• • 22.0	133°27.2	• • 43.9	314°48.2	• • 13.5	68°21.0	• • 16.7	Kaus Aust.	83°31.8	-34°22.3
22	81°25.3	146°29.9	21.6	148°27.6	43.6	329°51.1	13.5	83°23.3	16.6	Vega	80°33.1	38°48.4
23	96°27.8	161°29.0	21.1	163°28.0	43.3	344°53.9	13.6	98°25.6	16.5	Nunki	75°47.1	-26°15.9
		0.0/ 1.0			2/ 1.00	2.0/_10				Altair	61°59.5	8°56.2 -56°39.2
Mer.p	ass. 16:35	$\nu$ -0.9' d-0	0.4′ m-3.90	$\nu$ 0.4′ $d$ -0	.3′ m1.09	$\nu$ 2.8′ d0.	1′ m-2.68	$\nu$ 2.3′ d-0	.1′ m1.02	Peacock Deneb	53°05.0 49°25.7	-50 39.2 45°22.4
										Enif	33°38.2	9°59.7
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.3
0	111°30.3	176°28.1	522°20.7	178°28.4	S22°43.1	359°56.7	N22°13.6	113°27.9	S03°16.5	Fomalhaut	15°13.8	-29°29.2
1	126°32.7	191°27.2	20.2	193°28.8	42.8	14°59.5	13.7	128°30.2	16.4	Scheat	13°44.6	28°13.6
2	141°35.2	206°26.3	19.8	208°29.2	42.5	30°02.4	13.7	143°32.5	16.3	Markab	$13^{\circ}29.2$	15°20.8
3	156°37.7	221°25.4	19.3	223°29.6	• • 42.2	45°05.2	• • 13.8	158°34.8	• • 16.2	Jan 10 Sat	SHA	Mon no
4 5	171°40.1 186°42.6	236°24.5 251°23.6	18.9 18.4	238°30.0 253°30.4	41.9 41.6	60°08.0 75°10.8	13.8	173°37.1 188°39.4	16.1	Venus	5HA 67°39.8	Mer.pass 12:12
6	201°45.1		522° 18.0		\$22°41.3		13.9 N22°14.0	203°41.7	16.1	Mars	68°37.7	12:12
7	201 45.1 216°47.5	266°22.7 281°21.8	17.5	268°30.8 283°31.1	41.0	90°13.6 105°16.5	14.0	203 41.7 218°44.0	\$03°16.0 15.9	Jupiter	248°09.2	00:09
8	231°50.0	296°20.9	17.0	298°31.5	40.7	100°10.3	14.1	233°46.3	15.8	Saturn	2°05.6	16:31
9	246°52.4	311°20.0	16.6	313°31.9	• • 40.4	135°22.1	. 14.1	248°48.6	• • 15.7			
10	261°54.9	326°19.1	16.1	328°32.3	40.2	150°24.9	14.2	263°50.9	15.6	Jan 11 Sun	SHA	Mer.pass
11	276°57.4	341°18.2	15.6	343°32.7	39.9	165°27.8	14.2	278°53.2	15.6	Venus	66°18.7	12:13
12	291°59.8	356°17.3	S22°15.2	358°33.1	S22°39.6	180°30.6	N22°14.3	293°55.5	<b>S</b> 03°15.5	Mars Jupiter	67°47.9 248°17.8	12:06 00:05
13	307°02.3	11°16.5	14.7	13°33.5	39.3	195°33.4	14.3	308°57.8	15.4	Saturn	248 17.8 2°01.6	16:27
14	322°04.8	26°15.6	14.2	28°33.9	39.0	210°36.2	14.4	324°00.1	15.3			
15	337°07.2	41°14.7	• • 13.8	43°34.3	• • 38.7	225°39.1	• • 14.4	339°02.3	• • 15.2	Jan 12 Mon	SHA	Mer.pass
16	352°09.7	56°13.8	13.3	58°34.7	38.4	240°41.9	14.5	354°04.6	15.2	Venus	64°57.9	12:15
17	7°12.2	71°12.9	12.8	73°35.1	38.1	255°44.7	14.6	9°06.9	15.1	Mars	66°58.1	12:06
18 19	22°14.6 37°17.1	86°12.0 101°11.1	\$22°12.4 11.9	88°35.5 103°35.9	\$22°37.8 37.5	270°47.5 285°50.3	N22°14.6 14.7	24°09.2 39°11.5	\$03°15.0 14.9	Jupiter		00:00
20	52°19.6	101 11.1 116°10.2	11.9	103 35.9 118°36.3	37.5 37.2	285 50.3 300°53.2	14.7 14.7	59 11.5 54°13.8	14.9 14.8	Saturn	1°57.7	16:24
21	67°22.0	131°09.3	• 10.9	133°36.6	36.9	315°56.0	• • 14.8	69°16.1	• • 14.7	Horizont	al parallax	
22	82°24.5	146°08.4	10.5	148°37.0	36.6	330°58.8	14.8	84°18.4	14.7		Venus:	0.1
23	97°26.9	161°07.5	10.0	163°37.4	36.3	346°01.6	14.9	99°20.7	14.6		Mars:	0.1
Mar	ass. 16:31		.5′ m-3.90		.3′ m1.09		1′ m-2.68		.1′ m1.02			
ivier.p	ass. 10.31	ν-υ.9 α-υ	111-3.90	νυ.4 α-0	.5 1111.09	ν2.0 dU.	111-2.00	ν2.3 <b>u</b> -0	.1111.02			

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°10.4	S21°59.2	279°13.3	15.9'	S07°24.2	14.1'	55.2'
1 2	193°10.2 208°09.9	58.8 58.5	293°48.2 308°23.2	15.9' 15.9'	07°38.3 07°52.4	14.1' 14.0'	55.2' 55.2'
3	223°09.7	58.1	322°58.1	15.9'	08°06.5	14.0'	55.2'
4	238°09.4	57.7	337°33.0	15.9'	$08^{\circ}20.5$	14.0'	55.1'
5	253°09.2	57.3	352°07.9	15.9'	08°34.4	13.9'	55.1'
6 7	268°08.9 283°08.7	\$21°57.0 56.6	6°42.8 21°17.7	15.9' 15.9'	\$08°48.3 09°02.2	13.9' 13.8'	55.1' 55.1'
8	298°08.4	56.2	35°52.6	15.9'	09°16.0	13.8'	55.0'
9	313°08.2	• • 55.8	50°27.5	15.9'	09°29.8	13.7'	55.0'
10	328°07.9 343°07.7	55.5	65°02.4 79°37.2	15.9'	09°43.5 09°57.2	13.7'	55.0'
11 12	343 07.7 358°07.4	55.1 \$21°54.7	79 37.2 94°12.1	15.8' 15.8'	09 57.2 \$10°10.8	13.6' 13.6'	55.0' 54.9'
13	13°07.2	54.3	108°46.9	15.8'	10°24.4	13.5'	54.9'
14	28°06.9	54.0	123°21.7	15.8'	10°37.9	13.5'	54.9'
15 16	43°06.7 58°06.4	· · 53.6 53.2	137°56.5 152°31.2	15.8' 15.7'	10°51.4 11°04.8	13.4' 13.4'	54.9' 54.9'
17	73°06.2	52.8	167°06.0	15.7'	11°18.2	13.3'	54.8'
18	88°05.9	S21°52.4	181°40.7	15.7'	S11°31.5	13.3'	54.8'
19	103°05.7	52.1	196°15.4	15.7'	11°44.8	13.2'	54.8'
20 21	118°05.4 133°05.2	51.7 •• 51.3	210°50.1 225°24.8	15.7' 15.6'	11°58.0 12°11.1	13.2' 13.1'	54.8' 54.7'
22	148°04.9	50.9	239°59.4	15.6'	12°24.2	13.0'	54.7'
23	163°04.7	50.5	254°34.0	15.6'	12°37.3	13.0'	54.7'
	SD = 16.3'	d = -0.4'		SE	D = 15.1'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
o O	<b>GПА</b> 178°04.4	S21°50.1	269°08.6	u 15.6'	\$12°50.3	<i>a</i> 12.9'	<b>пР</b> 54.7'
1	193°04.2	49.7	283°43.1	15.5'	13°03.2	12.9'	54.7'
2	208°03.9 223°03.7	49.4	298°17.7 312°52.2	15.5'	13°16.0 13°28.9	12.8'	54.6'
3 4	223°03.7 238°03.4	· · 49.0 48.6	312°52.2 327°26.6	15.5' 15.4'	13°28.9 13°41.6	12.7' 12.7'	54.6' 54.6'
5	253°03.2	48.2	342°01.1	15.4'	13°54.3	12.6'	54.6'
6	268°02.9	S21°47.8	356°35.5	15.4'	\$14°06.9	12.6'	54.6'
7 8	283°02.7 298°02.4	47.4 47.0	11°09.8 25°44.1	15.3' 15.3'	14°19.5 14°32.0	12.5' 12.4'	54.6' 54.5'
9	313°02.2	• • 46.6	40°18.4	15.3'	14° 32.0	12.4	54.5
10	328°01.9	46.2	54°52.7	15.2'	$14^{\circ}56.8$	12.3'	54.5'
11	343°01.7	45.8	69°26.9	15.2'	15°09.1	12.2'	54.5'
12 13	358°01.4 13°01.2	\$21°45.4 45.0	84°01.1 98°35.2	15.1' 15.1'	\$15°21.3 15°33.5	12.2' 12.1'	54.5' 54.5'
14	28°01.0	44.6	113°09.3	15.1'	15°45.6	12.0'	54.4'
15	43°00.7	• • 44.2	127°43.4	15.0'	15°57.6	12.0'	54.4'
16 17	58°00.5 73°00.2	43.8 43.4	142°17.4 156°51.4	15.0' 14.9'	16°09.6 16°21.5	11.9' 11.8'	54.4' 54.4'
18	88°00.0	\$21°43.0	171°25.3	14.9'	\$16°33.3	11.8'	54.4
19	102°59.7	42.6	$185^{\circ}59.2$	14.8'	$16^{\circ}45.0$	11.7'	54.4'
20	117°59.5 132°59.3	42.2	200°33.1		16°56.7		54.4'
21 22	132°59.3 147°59.0	· · 41.8 41.4	215°06.9 229°40.6	14.8' 14.7'	17°08.3 17°19.9	11.5' 11.5'	54.3' 54.3'
23	162°58.8	41.0	244°14.3	14.7'	17°31.3	11.4	54.3
	SD = 16.3'	d = -0.4'		SE	0 = 14.9'		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	177°58.5	\$21°40.6	258°48.0	ν 14.6'	\$17°42.7	11.3'	54.3'
1	192°58.3	40.2	273°21.6	14.6'	$17^{\circ}54.1$	11.2'	54.3'
2	207°58.0 222°57.8	39.8	287°55.2 302°28.7	14.5'	18°05.3	11.2'	54.3'
3 4	222°57.8 237°57.6	· · 39.4 39.0	302°28.7 317°02.1	14.5' 14.4'	18°16.5 18°27.6	11.1' 11.0'	54.3' 54.2'
5	252°57.3	38.6	331°35.5	14.4'	18°38.6	10.9'	54.2'
6	267°57.1	S21°38.2	346°08.9	14.3'	\$18°49.5	10.9'	54.2'
7 8	282°56.8 297°56.6	37.8 37.4	0°42.2 15°15.4	14.2' 14.2'	19°00.3 19°11.1	10.8' 10.7'	54.2' 54.2'
9	312°56.4	37.0	29°48.6	14.1'	19°21.8	10.6	54.2'
10	327°56.1	36.6	44°21.8	14.1'	19°32.4	10.5	54.2'
11 12	342°55.9 357°55.6	36.1 \$21°35.7	58°54.8 73°27.9	14.0' 14.0'	19°42.9 \$19°53.4	10.4' 10.4'	54.2' 54.2'
13	12°55.4	35.3	88°00.8	13.9'	20°03.8	10.4	54.2'
14	27°55.2	34.9	102°33.8	13.9'	20°14.0	10.2'	54.1'
15	42°54.9	• • 34.5	117°06.6	13.8'	20°24.2	10.1'	54.1'
16 17	57°54.7 72°54.4	34.1 33.7	131°39.4 146°12.2	13.7' 13.7'	20°34.3 20°44.3	10.0' 9.9'	54.1' 54.1'
18	87°54.2	S21°33.2	160°44.8	13.6'	S20°54.3	9.8'	54.1'
19	102°54.0	32.8	175°17.5	13.6'	21°04.1	9.8'	54.1'
20 21	117°53.7 132°53.5	32.4 •• 32.0	189°50.0 204°22.5	13.5' 13.4'	21°13.9 21°23.5	9.7' 9.6'	54.1' 54.1'
22	132 53.5 147°53.3	31.6	204 22.5 218°55.0	13.4'	21°23.5 21°33.1	9.5	54.1'
23	162°53.0	31.1	233°27.3	13.3'	21°42.6	9.4'	54.1'
	SD = 16.3'	d = -0.4'		SE	0 = 14.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
	Naut.	Civil	Jamise	Janset	Civil	Naut.
N 72°	08:09	10:07			14:09	16:07
N 70°	07:53	09:29			14:48	16:23
68°	07:40	09:02	10:53	13:24	15:15	16:36
66°	07:29	08:41	10:05	14:12	15:35	16:47
64°	07:20	08:25	09:34	14:42	15:52	16:57
62°	07:12	08:11	09:11	15:05	16:05	17:05
60°	07:04	07:59	08:53	15:23	16:17	17:12
N 58°	06:58	07:49	08:38	15:38	16:27	17:18
56°	06:52	07:40	08:25	15:51	16:36	17:24
54°	06:47	07:32	08:14	16:02	16:44	17:29
52°	06:42	07:25	08:04	16:12	16:52	17:34
50°	06:37	07:18	07:55	16:21	16:58	17:39
45°	06:27	07:04	07:37	16:40	17:13	17:49
N 40°	06:18	06:51	07:21	16:55	17:25	17:58
35°	06:09	06:41	07:08	17:08	17:35	18:07
30°	06:01	06:31	06:57	17:19	17:45	18:15
20°	05:47	06:14	06:37	17:38	18:02	18:29
N 10°	05:32	05:58	06:20	17:56	18:18	18:44
0°	05:16	05:42	06:04	18:12	18:34	19:00
S 10°	04:58	05:25	05:48	18:28	18:51	19:17
20°	04:37	05:06	05:30	18:45	19:09	19:38
30°	04:11	04:43	05:10	19:05	19:32	20:05
35°	03:53	04:29	04:58	19:17	19:46	20:22
40°	03:32	04:12	04:44	19:31	20:03	20:43
45°	03:05	03:52	04:28	19:47	20:23	21:10
<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	////
				1		

Lat.		Moonris	e		Moonset	
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
N 40°		00:50	01:52	11:07	11:30	11:55
35°		00:42	01:41	11:13	11:39	12:07
30°		00:35	01:31	11:18	11:47	12:18
20°		00:24	01:14	11:27	12:01	12:36
N 10°		00:13	01:00	11:35	12:13	12:53
0°		00:04	00:47	11:42	12:24	13:08
<b>S</b> 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	f 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	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	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	112°29.4	176° 06.6	\$22°09.5	178°37.8	S22°36.0	1°04.5	N22°14.9	114°23.0	S03°14.5			
1	127°31.9	191°05.7	09.0	193°38.2	35.7	16°07.3	15.0	129°25.3	14.4	Alpheratz		29°14.2
2	142°34.3	206° 04.8	08.5	208°38.6	35.4	31°10.1	15.0	144°27.6	14.3	Ankaa	353°06.4	-42°10.1
3	157°36.8	221°03.9	08.1	223°39.0	35.1	46°12.9	• • 15.1	159°29.9	• • 14.3	Schedar	349°30.2	56°41.1
4	172°39.3	236°03.1	07.6	238°39.4	34.8	61°15.8	15.2	174° 32.2	14.2	Diphda	348°46.5	-17°50.7
5	187°41.7	251°02.2	07.1	253°39.8	34.5	76°18.6	15.2	189°34.5	14.1	Achernar	335°19.5	-57°06.5
6	202°44.2	266°01.3	S22°06.6	268°40.2	S22°34.2	91°21.4	N22°15.3	204° 36.7	S03°14.0	Hamal	327°50.2	23°35.2
7	217°46.7	281°00.4	06.1	283°40.6	33.9	106°24.2	15.3	219°39.0	13.9	Polaris	313°22.5	89°22.7
8	232°49.1	295°59.5	05.6	298°41.0	33.6	121°27.0	15.4	234°41.3	13.8	Acamar	315°10.9	-40°12.2
9	247°51.6	310°58.6	• • 05.1	313°41.4	• • 33.3	136°29.9	• • 15.4	249°43.6	• • 13.8	Menkar	314°05.1	4°11.5
10	262°54.1	325° 57.7	04.7	328°41.8	33.0	151°32.7	15.5	264° 45.9	13.7	Mirfak	308°26.8	49°57.4
11	277°56.5	340°56.8	04.2	343°42.2	32.7	166°35.5	15.5	279°48.2	13.6	Aldebaran	290°38.4 281°02.8	16°33.7
12	292°59.0	355°55.9	S22°03.7	358°42.6	S22°32.4	181°38.3	N22°15.6	294°50.5	S03°13.5	Rigel		-8°10.3
13	308°01.4	10°55.1	03.2	13°42.9	32.1	196°41.2	15.6	309°52.8	13.4	Capella	280°20.2 278°21.7	46°01.5 6°22.4
14	323°03.9	25° 54.2	02.7	28°43.3	31.8	211°44.0	15.7	324°55.1	13.3	Bellatrix Elnath	278°00.5	28°37.8
15	338°06.4	40°53.3	•• 02.2	43°43.7	• • 31.5	226°46.8	• • 15.7	339° 57.4	• • 13.3	Alnilam	275°36.6	-1°11.2
16	353°08.8	55° 52.4	01.7	58°44.1	31.2	241°49.6	15.8	354° 59.7	13.2	Betelgeuse	270°50.8	7°24.7
17	8°11.3	70°51.5	01.2	73°44.5	30.9	256°52.5	15.9	10°02.0	13.1	Canopus	263°51.5	-52°42.6
18	23°13.8	85°50.6	\$22°00.7	88°44.9	S22°30.6	271°55.3	N22°15.9	25°04.2	S03°13.0	Sirius	258°25.1	-16°45.2
19	$38^{\circ}16.2$	100°49.7	22°00.2	103°45.3	30.3	286°58.1	16.0	40°06.5	12.9	Adhara	255°04.8	-29°00.5
20	53°18.7	115°48.9	21°59.7	118°45.7	30.0	302°00.9	16.0	55°08.8	12.9	Procyon	244°49.6	5°09.4
21	68°21.2	130°48.0	• • 59.2	133°46.1	• • 29.7	317°03.7	• • 16.1	70°11.1	• • 12.8	Pollux	243°15.9	27°57.7
22	83°23.6	145° 47.1	58.7	148°46.5	29.3	332°06.6	16.1	85° 13.4	12.7	Avior	234°13.8	-59°35.5
23	98°26.1	160°46.2	58.2	163°46.9	29.0	347°09.4	16.2	100°15.7	12.6	Suhail	222°45.3	-43°32.2
Mer.n	ass. 16:27	$\nu$ -0.9' d-0	0.5′ m-3.90	ν0.4' d-0	.3′ m1.09	$\nu 2.8' d0$	1′ m-2.68	$\nu 2.3' \ d-0$	.1′ m1.02	Miaplacidus	221°37.2	-69°49.3
							. =.00			Alphard	217°46.6	-8°46.3
			_		_		_		_	Regulus	207°33.3	11°50.3
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.5	61°36.3
0	113°28.5	175° 45.3	S21°57.7	178°47.3	S22°28.7	2°12.2	N22°16.2	115° 18.0	S03°12.5	Denebola	182°23.9	14°25.4
1	128°31.0	190°44.4	57.2	193°47.7	28.4	17°15.0	16.3	130°20.3	12.4	Gienah	175°42.6	-17°41.2
2	143°33.5	205° 43.6	56.6	208°48.1	28.1	32°17.9	16.3	145°22.6	12.4	Acrux	$172^{\circ}59.0$	-63°14.4
3	158°35.9	220° 42.7	• • 56.1	223°48.5	• • 27.8	47°20.7	16.4	160°24.9	• • 12.3	Gacrux	171°50.6	-57°15.3
4	173°38.4	235°41.8	55.6	238°48.9	27.5	62°23.5	16.4	175°27.1	12.2	Alioth	$166^{\circ}12.1$	55°48.8
5	188°40.9	250° 40.9	55.1	253°49.3	27.2	77°26.3	16.5	190°29.4	12.1	Spica	158°21.4	-11°17.9
6	203°43.3	265°40.0	S21°54.6	268°49.7	S22°26.9	92°29.1 107°32.0	N22°16.6	205°31.7	\$03°12.0	Alkaid	152°51.4	49°10.6
7 8	218°45.8 233°48.3	280°39.2	54.1	283°50.1 298°50.5	26.6	107 32.0 122°34.8	16.6	220°34.0	11.9	Hadar	148°34.9	-60°29.7
9	233 46.3 248°50.7	295°38.3 310°37.4	53.6 •• 53.0	313°50.9	26.2 •• 25.9	122 34.6 137°37.6	16.7 •• 16.7	235°36.3 250°38.6	11.9 •• 11.8	Menkent	147°56.7	-36°29.8
10	263°53.2	325°36.5	52.5	328°51.3	25.6	157° 37.0	16.8	265° 40.9	11.7	Arcturus	145°47.2	19°02.6
11	203 55.2 278°55.7	340°35.6	52.0	343°51.6	25.3	167°43.2	16.8	280° 43.2	11.6	Rigil Kent.	139°39.3	-60°56.3
12	293°58.1	355° 34.8	S21°51.5	358°52.0	\$22°25.0	182°46.1	N22°16.9	295° 45.5	S03°11.5	Kochab	137°20.2	74°02.5
13	309°00.6	10°33.9	51.0	13°52.4	24.7	197°48.9	16.9	310° 47.7	11.4	Zuben'ubi	136°55.2	-16°09.0
14	324°03.0	25°33.0	50.4	28°52.8	24.4	212°51.7	17.0	325°50.0	11.3	Alphecca	126°03.2	26°37.4
15	339°05.5	40°32.1	• • 49.9	43°53.2	• • 24.0	227°54.5	•• 17.0	340°52.3	. 11.3	Antares	112°15.1	-26°29.3
16	354°08.0	55°31.3	49.4	58°53.6	23.7	242°57.4	17.1	355° 54.6	11.2	Atria	107°09.0	-69°04.3
17	9°10.4	70°30.4	48.9	73°54.0	23.4	258°00.2	17.1	10° 56.9	11.1	Sabik	102°02.1	-15°45.4
18	24°12.9	85°29.5	S21°48.3	88°54.4	S22°23.1	273°03.0	N22°17.2	25°59.2	S03°11.0	Shaula	96°09.6	-37°07.3
19	39°15.4	100°28.6	47.8	103°54.8	22.8	288°05.8	17.3	41°01.5	10.9	Rasalhague	95°58.1	12°32.3
20	54°17.8	115°27.8	47.3	118°55.2	22.5	303°08.6	17.3	56°03.8	10.8	Eltanin	90°42.3	51°28.9
21	69°20.3	130°26.9	• • 46.8	133°55.6	22.1	318°11.5	17.4	71°06.0	. 10.8	Kaus Aust.	83°31.8	-34°22.3
22	84°22.8	145°26.0	46.2	148°56.0	21.8	333°14.3	17.4	86°08.3	10.7	Vega	80°33.1	38°48.3
23	99°25.2	160°25.1	45.7	163°56.4	21.5	348°17.1	17.5	101° 10.6	10.6	Nunki	75°47.1	-26°15.9
						2.0/_/0				Altair	61°59.5 53°05.0	8°56.2 -56°39.1
ivier.p	ass. 16:23	$\nu$ -0.9° $a$ -0	0.5′ m-3.90	$\nu_{0.4}$ a-0	.3′ m1.09	ν2.8° α0.	1′ m-2.68	$\nu$ 2.3 d-0	.1′ m1.02	Peacock Deneb	49°25.7	-50 39.1 45°22.4
										Enif	33°38.2	9°59.7
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.3
0	$114^{\circ}27.7$	175°24.3	S21°45.2	$178^{\circ}56.8$	S22°21.2	$3^{\circ}19.9$	$N22^{\circ}17.5$	$116^{\circ}12.9$	S03°10.5	Fomalhaut	15°13.8	-40° 30.3 -29° 29.2
1	129°30.2	190°23.4	44.6	193°57.2	20.9	18°22.8	17.6	131° 15.2	10.4	Scheat	13°44.6	28°13.6
2	144°32.6	$205^{\circ}22.5$	44.1	208°57.6	20.5	33°25.6	17.6	146° 17.5	10.3	Markab	13°29.3	15°20.8
3	159°35.1	220°21.7	• • 43.5	223°58.0	• • 20.2	48°28.4	•• 17.7	161° 19.8	• • 10.3			
4	174°37.5	235°20.8	43.0	238°58.4	19.9	63°31.2	17.7	176°22.1	10.2	Jan 13 Tue	SHA	Mer.pass
5	189°40.0	250° 19.9	42.5	253°58.8	19.6	78°34.0	17.8	191°24.3	10.1	Venus	63°37.2	12:16
6	204°42.5	265° 19.0	S21°41.9	268°59.2	S22°19.3	93°36.9	N22°17.8	206°26.6	S03°10.0	Mars	66°08.4	12:05
7	219°44.9	280° 18.2	41.4	283°59.6	18.9	108°39.7	17.9	221°28.9	09.9	Jupiter		23:51
8	234°47.4	295° 17.3	40.8	299°00.0	18.6	123°42.5	17.9	236°31.2	09.8	Saturn	1°53.6	16:20
9	249°49.9	310°16.4	• • 40.3	314°00.4	• • 18.3	138°45.3	· · 18.0	251°33.5	• • 09.7	Jan 14 Wed	SHA	Mer.pass
10	264°52.3	325°15.6	39.7	329°00.8	18.0	153°48.1	18.1	266°35.8	09.7	Venus	62°16.8	12:18
11	279°54.8	340°14.7	39.2	344°01.2	17.6	168°51.0	18.1	281°38.1	09.6	Mars	65°18.7	12:05
12	294°57.3	355°13.8	\$21°38.6	359°01.6	\$22°17.3	183°53.8	N22°18.2	296°40.3	\$03°09.5	Jupiter		23:47
13	309°59.7	10°13.0	38.1	14°02.0	17.0 16.7	198°56.6	18.2	311°42.6	09.4	Saturn	1°49.4	16:16
14 15	325°02.2	25°12.1 40°11.2	37.5	29°02.4 44°02.8	16.7 •• 16.3	213°59.4	18.3	326°44.9 341°47.2	09.3	1 15	CIIC	
15 16	340°04.7 355°07.1	40°11.2 55°10.4	· · 37.0	44°02.8 59°03.2	16.0	229°02.2 244°05.1	· · 18.3 18.4	341°47.2 356°49.5	09.2	Jan 15 Thu	SHA 60°E6 6	Mer.pass
16 17	355°07.1 10°09.6		36.4 35.9	74°03.6		244 ° 05.1 259° 07.9		356 49.5 11°51.8	09.1	Venus	60°56.6	12:19
17 18	25°12.0	70°09.5 85°08.6	35.9 \$21°35.3	74°03.6 89°04.0	15.7 \$22°15.4	259°07.9 274°10.7	18.4 N22°18.5	26° 54.0	09.1 \$03°09.0	Mars	64°29.1	12:04
18	25 12.0 40°14.5	100°07.8	34.8	89 04.0 104°04.4	15.0	274 10.7 289°13.5	N22 18.5 18.5	20 54.0 41°56.3	08.9		248°52.2	23:42
20	55°17.0	115° 06.9	34.0	119°04.8	14.7	304°16.3	18.6	56° 58.6	08.9	Saturn	1°45.2	16:13
20	70°19.4	130°06.1	• • 33.7	119 04.6 134°05.2	• • 14.4	319°19.2	18.6	72°00.9	08.7	Horizont	al parallax	
22	85°21.9	145°05.2	33.1	149°05.6	14.0	334°22.0	18.7	87°03.2	08.6		Venus:	0.1
23	100°24.4	160°04.3	32.5	164°06.0	13.7	349°24.8	18.7	102°05.5	08.5		Mars:	0.1
Mer.p	ass. 16:19	$\nu$ -0.9' d-0	0.5′ m-3.90	$\nu$ 0.4′ d-0	.3′ m1.09	$\nu 2.8' \ d0.$	1′ m-2.67	$\nu 2.3' \ d-0$	.1′ m1.02			

h	Su	n		1	Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	177°52.8	S21°30.7	247°59.7	13.3'	S21°52.0	9.3'	54.1'
1	192°52.5	30.3	262°31.9	13.2'	22°01.3	9.2'	54.1'
2	207°52.3 222°52.1	29.9 •• 29.4	277°04.1 291°36.2	13.1' 13.1'	22°10.5 22°19.6	9.1' 9.0'	54.1' 54.1'
4	237°51.8	29.0	306°08.3	13.0'	22°28.6	8.9'	54.1'
5	252°51.6	28.6	320°40.3	12.9'	22°37.5	8.8'	54.1'
6	267°51.4	<b>S</b> 21°28.2	335°12.3	12.9'	S22°46.3	8.7'	54.0'
7	282°51.1	27.7	349°44.1 4°16.0	12.8'	22°55.1	8.6'	54.0'
8 9	297°50.9 312°50.7	27.3 •• 26.9	4°16.0 18°47.7	12.8' 12.7'	23°03.7 23°12.2	8.5' 8.4'	54.0' 54.0'
10	327° 50.4	26.5	33°19.4	12.6'	23°20.6	8.3'	54.0'
11	342°50.2	26.0	47°51.0	12.6'	23°29.0	8.2'	54.0'
12	357°50.0	S21°25.6	62°22.6	12.5'	S23°37.2	8.1'	54.0'
13 14	12° 49.7 27° 49.5	25.2 24.7	76°54.1 91°25.5	12.4' 12.4'	23°45.3 23°53.3	8.0' 7.9'	54.0' 54.0'
14 15	42° 49.3	. 24.7	91 25.5 105°56.9	12.4	23 53.3 24°01.2	7.9 7.8'	54.0'
16	57°49.0	23.9	120°28.2	12.2'	24°09.0	7.7'	54.0'
17	72°48.8	23.4	134°59.4	12.2'	$24^{\circ}16.7$	7.6'	54.0'
18	87°48.6	S21°23.0	149°30.6	12.1'	\$24°24.3	7.5'	54.0'
19 20	102°48.3 117°48.1	22.6 22.1	164°01.7 178°32.8	12.0' 12.0'	24°31.8 24°39.2	7.4' 7.3'	54.0' 54.0'
21	132° 47.9	. 21.7	170 32.0 193°03.7	11.9'	24° 39.2 24° 46.5	7.3 7.2'	54.0'
22	147° 47.7	21.3	207°34.7	11.9'	24°53.6	7.1'	54.0'
23	$162^{\circ}47.4$	20.8	222°05.5	11.8'	25°00.7	6.9'	54.0'
	SD = 16.3'	d = -0.4'		SD	= 14.7′		
\A/c -l	CUV	Das	GHA		Das	d	μп
Wed 0	<b>GHA</b> 177° 47.2	Dec 521°20.4	GHA 236°36.3	u 11.7'	Dec \$25°07.6	<i>d</i> 6.8'	<b>HP</b> 54.0'
1	192°47.0	19.9	251°07.0	11.7'	25°14.5	6.7'	54.0'
2	207°46.7	19.5	265°37.7	11.6'	25°21.2	6.6'	54.0'
3	222°46.5	• • 19.1	280°08.3	11.5'	25°27.8	6.5'	54.0'
4 5	237° 46.3 252° 46.1	18.6 18.2	294°38.8 309°09.3	11.5' 11.4'	25°34.3 25°40.6	6.4' 6.3'	54.0' 54.0'
6	267° 45.8	S21°17.7	323°39.7	11.4	\$25°46.9	6.1	54.0'
7	282°45.6	17.3	338°10.1	11.3'	25°53.0	6.0'	54.0'
8	297° 45.4	16.8	352°40.4	11.2'	25°59.1	5.9'	54.0'
9	312°45.1	• • 16.4	7°10.6	11.2'	26°05.0	5.8'	54.0'
10 11	327° 44.9 342° 44.7	16.0 15.5	21°40.8 36°10.9	11.1' 11.1'	26°10.8 26°16.4	5.7' 5.5'	54.0' 54.0'
12	357° 44.5	S21°15.1	50°40.9	11.0'	S26°22.0	5.4'	54.0'
13	12°44.2	14.6	65°10.9	10.9'	26°27.4	5.3'	54.1'
14	27°44.0	14.2	79°40.9	10.9'	26°32.7	5.2'	54.1'
15 16	42° 43.8 57° 43.6	· · 13.7 13.3	94°10.7 108°40.5	10.8' 10.8'	26°37.9 26°43.0	5.1' 4.9'	54.1' 54.1'
17	72°43.3	12.8	106 40.5 123°10.3	10.6	26°47.9	4.8'	54.1'
18	87°43.1	S21°12.4	137°40.0	10.6'	S26°52.7	4.7'	54.1'
19	102°42.9	11.9	152°09.7	10.6'	26°57.4	4.6'	54.1'
20	117° 42.7	11.5	166°39.3	10.5'	27°02.0		54.1' 54.1'
21 22	132° 42.4 147° 42.2	· · 11.0 10.5	181°08.8 195°38.3	10.5' 10.4'	27°06.4 27°10.7	4.3' 4.2'	54.1'
23	162°42.0	10.1	210°07.7	10.4'	27°14.9	4.1'	54.1'
	SD = 16.3'	d = -0.4'		SD	= 14.7′		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	177°41.8	<b>S</b> 21°09.6	224°37.1	10.3'	\$27°19.0	3.9'	54.1'
1	192°41.5	09.2	239°06.4	10.3'	27°22.9	3.8'	54.1'
2	207°41.3 222°41.1	08.7 •• 08.3	253°35.7 268°05.0	10.2' 10.2'	27°26.7 27°30.3	3.7' 3.5'	54.1' 54.1'
3 4	237° 40.9	07.8	282°34.1	10.2	27°33.9	3.4'	54.1'
5	252°40.7	07.3	297°03.3	10.1'	27°37.3	3.3'	54.1'
6	267°40.4	S21°06.9	311°32.4	10.0'	S27°40.6	3.1'	54.2'
7	282°40.2	06.4	326°01.4	10.0'	27°43.7	3.0'	54.2'
8 9	297° 40.0 312° 39.8	06.0 •• 05.5	340°30.4 354°59.4	10.0' 9.9'	27°46.7 27°49.6	2.9' 2.7'	54.2' 54.2'
10	327°39.6	05.0	9°28.3	9.9'	27°52.3	2.6'	54.2'
11	342°39.3	04.6	23°57.2	9.8'	27°54.9	2.5'	54.2'
12	357°39.1	S21°04.1	38°26.0	9.8'	\$27°57.4	2.3'	54.2'
13 14	12°38.9 27°38.7	03.6 03.2	52°54.8 67°23.6	9.8' 9.7'	27°59.7 28°01.9	2.2' 2.1'	54.2' 54.2'
15	42° 38.5	•• 02.7	81°52.3	9.7' 9.7'	28°04.0	2.1 1.9'	54.2'
16	57° 38.2	02.2	96°21.0	9.7'	$28^{\circ}05.9$	1.8'	54.2'
17	72°38.0	01.8	110°49.6	9.6'	28°07.7	1.6'	54.3'
18	87°37.8 102°37.6	\$21°01.3	125°18.2 139°46.8	9.6'	\$28°09.3 28°10.8	1.5' 1.4'	54.3'
19 20	102°37.6 117°37.4	00.8 21°00.4	139°46.8 154°15.4	9.6' 9.5'	28°10.8 28°12.2	1.4'	54.3' 54.3'
21	132°37.1	20°59.9	168°43.9	9.5'	28°13.4	1.1'	54.3'
22	147° 36.9	59.4	183°12.4	9.5'	28°14.5	1.0'	54.3'
23	162°36.7	59.0	197°40.9	9.4'	28°15.5	0.8'	54.3'
	SD = 16.3'	d = -0.5'		SD	= 14.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Suririse	Sunset	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
<b>N</b> 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
N 10°	05:33	05:59	06:21	17:57	18:20	18:46
0°	05:17	05:43	06:05	18:13	18:35	19:01
<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	////
Lat.		Moonris	ie .		Moonset	:
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
<b>N</b> 70°						
68°						_
66°	06:27	_	_	08:45		

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

	Sun			Moon	
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	29-13%
08:29	08:40	12:09	07:42	20:06	
08:51	09:02	12:09	08:30	20:55	
09:13	09:24	12:09	09:21	21:47	
	00 <sup>h</sup> mm:ss 08:29 08:51	Eqn.of Time 00 <sup>h</sup> 12 <sup>h</sup> mm:ss mm:ss 08:29 08:40 08:51 09:02	Eqn. of Time 00h         Mer.           12h         Pass hh:mm           08:29         08:40         12:09           08:51         09:02         12:09	Eqn. of Time 00h         Mer.         Mer.         Mer.           00h         12h         Pass hh:mm         Upper hh:mm           08:29         08:40         12:09         07:42           08:51         09:02         12:09         08:30	Eqn. of Time 00h         Mer. Pass.           00h         12h         Pass Upper Lower hh:mm           mm:ss         mm:ss         hh:mm           08:29         08:40         12:09         07:42         20:06           08:51         09:02         12:09         08:30         20:55

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	115° 26.8	175°03.5	\$21°32.0	179°06.4	\$22°13.4	4°27.6	N22° 18.8	117°07.8	S03°08.5			
1	130°29.3	190°02.6	31.4	194°06.8	13.1	19°30.4	18.8	132°10.0	08.4	Alpheratz	357°34.0	29°14.2
2	145°31.8	205°01.7	30.9	209°07.2	12.7	34°33.3	18.9	147°12.3	08.3	Ankaa	353°06.4	-42°10.1
3	160°34.2	220°00.9	30.3	224°07.6	. 12.4	49°36.1	• • 19.0	162°14.6	08.2	Schedar	349°30.2	56°41.1
4	175°36.7	235°00.0	29.7	239°08.0	12.1	64°38.9	19.0	177°16.9	08.1	Diphda	348°46.5	-17°50.7
5	190°39.2	249°59.2	29.2	254°08.4	11.7	79°41.7	19.1	192°19.2	08.0	Achernar	335°19.5	-57°06.5
6	205°41.6	264°58.3	S21°28.6	269°08.8	S22°11.4	94°44.5	N22°19.1	207°21.5	503°07.9	Hamal	327°50.2	23°35.2 89°22.7
7	220°44.1	279°57.4	28.0	284°09.2	11.1	109°47.4	19.2	222°23.7	07.9	Polaris Acamar	313°23.6 315°11.0	-40°12.2
8	235°46.5	294°56.6	27.5	299°09.6	10.7	124°50.2	19.2	237°26.0	07.8	Menkar	314°05.1	4°11.5
9	250°49.0	309°55.7	• • 26.9	314°10.0	• • 10.4	139°53.0	• • 19.3	252°28.3	• • 07.7	Mirfak	308° 26.8	49°57.4
10	265°51.5	324°54.9	26.3	329° 10.4	10.1	154° 55.8	19.3	267°30.6	07.6	Aldebaran	290°38.4	16°33.7
11	280°53.9	339°54.0	25.7	344°10.8	09.7	169°58.6	19.4	282°32.9	07.5	Rigel	281°02.8	-8°10.4
12	295°56.4	354°53.2	S21°25.2	359°11.2	S22°09.4	185°01.5	N22°19.4	297°35.1	S03°07.4	Capella	280°20.2	46°01.5
13	310°58.9	9°52.3	24.6	14°11.6	09.1	200°04.3	19.5	312°37.4	07.3	Bellatrix	278°21.7	6°22.4
14 15	326°01.3 341°03.8	24°51.5 39°50.6	24.0 •• 23.4	29°12.0 44°12.4	08.7 •• 08.4	215°07.1 230°09.9	19.5 •• 19.6	327°39.7 342°42.0	07.3 •• 07.2	Elnath	$278^{\circ}00.5$	28°37.8
16	356°06.3	54°49.7	22.8	59°12.8	08.1	245° 12.7	19.6	357°44.3	07.2	Alnilam	275°36.6	-1°11.2
17	11°08.7	69°48.9	22.3	74°13.2	07.7	260° 15.6	19.7	12°46.6	07.1	Betelgeuse	270°50.8	7°24.7
18	26°11.2	84°48.0	S21°21.7	89° 13.6	S22°07.4	275° 18.4	N22°19.7	27°48.8	S03°06.9	Canopus	263°51.5	-52°42.6
19	41°13.7	99°47.2	21.1	104° 14.0	07.0	290°21.2	19.8	42°51.1	06.8	Sirius	258°25.1	-16°45.2
20	56° 16.1	114°46.3	20.5	119°14.4	06.7	305°24.0	19.8	57°53.4	06.7	Adhara	255°04.8	-29°00.5
21	71°18.6	129°45.5	• • 19.9	134°14.8	• • 06.4	320°26.8	• • 19.9	72°55.7	• • 06.6	Procyon	244°49.6	5°09.4
22	86°21.0	144°44.6	19.3	149°15.2	06.0	335°29.6	20.0	87°58.0	06.6	Pollux	243°15.9	27°57.7 -59°35.5
23	101°23.5	159°43.8	18.8	$164^{\circ}15.6$	05.7	$350^{\circ}32.5$	20.0	103°00.2	06.5	Avior Suhail	234° 13.7 222° 45.3	-59°35.5 -43°32.2
Morn	pass. 16:16	ν-0 α' d α	0.6' m-3.90	νΩ Λ' Α Ω	.3′ m1.09	1/2 8/ 40	1′ m-2.67	1/3 3/ 4 0	.1′ m1.02	Miaplacidus	222°45.3 221°37.2	-43°32.2 -69°49.3
ivier.p	Jass. 10.10	ν-0.9 u-0	7.0 111-3.90	νο.4 α-υ	.5 1111.09	ν2.6 d0.	1 111-2.07	ν2.3 u-0	.1 1111.02	Alphard	217°46.6	-8°46.3
										Regulus	207°33.3	11°50.3
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.5	61°36.3
0	116°26.0	174°42.9	S21°18.2	179°16.0	S22°05.3	5°35.3	N22°20.1	118°02.5	S03°06.4	Denebola	182°23.9	14°25.4
1	131°28.4	189°42.1	17.6	194°16.4	05.0	20°38.1	20.1	133°04.8	06.3	Gienah	175°42.6	-17°41.2
2	146°30.9	204°41.2	17.0	209°16.8	04.7	35°40.9	20.2	148°07.1	06.2	Acrux	172°58.9	-63°14.4
3	161°33.4	219°40.4	• • 16.4	224°17.2	• • 04.3	50°43.7	· · 20.2	163°09.4	06.1	Gacrux	$171^{\circ}50.5$	-57°15.3
4	176°35.8	234°39.5	15.8	239°17.6	04.0	65°46.6	20.3	178°11.6	06.0	Alioth	$166^{\circ}12.1$	55°48.7
5 6	191°38.3 206°40.8	249°38.7 264°37.8	15.2 \$21°14.6	254°18.0 269°18.4	03.6 \$22°03.3	80°49.4 95°52.2	20.3 N22°20.4	193°13.9 208°16.2	06.0 \$03°05.9	Spica	158°21.4	-11°17.9
7	200 40.8 221°43.2	279°37.0	14.0	284°18.8	02.9	110°55.0	20.4	200° 10.2 223° 18.5	05.8	Alkaid	152°51.3	49°10.6
8	236° 45.7	294°36.1	13.4	299°19.2	02.6	125° 57.8	20.4	238°20.8	05.7	Hadar	148°34.9	-60°29.7
9	251°48.1	309°35.3	. 12.8	314°19.6	• • 02.3	141°00.6	20.5	253°23.0	• • 05.6		147°56.7	-36°29.8
10	266°50.6	324°34.4	12.2	329°20.0	01.9	156°03.5	20.6	268°25.3	05.5	Arcturus	145°47.2	19°02.6
11	281°53.1	339°33.6	11.6	344°20.4	01.6	171°06.3	20.6	283°27.6	05.4	Rigil Kent. Kochab	139°39.3 137°20.2	-60°56.3 74°02.5
12	296°55.5	354°32.7	S21°11.0	359°20.8	S22°01.2	$186^{\circ}09.1$	N22°20.7	298°29.9	503°05.3	Zuben'ubi	137 20.2 136°55.2	-16°09.0
13	311°58.0	9°31.9	10.4	14°21.2	00.9	201°11.9	20.7	313°32.2	05.3	Alphecca	130° 55.2 126° 03.2	26°37.4
14	327°00.5	24°31.1	09.8	29°21.7	00.5	$216^{\circ}14.7$	20.8	328°34.4	05.2	Antares	112° 15.0	-26°29.3
15	342°02.9	39°30.2	•• 09.2	44°22.1	22°00.2	231°17.5	• • 20.8	343°36.7	•• 05.1	Atria	107°08.9	-69°04.2
16	357°05.4	54°29.4	08.6	59°22.5	21°59.8	246°20.4	20.9	358°39.0	05.0	Sabik	102°02.1	-15°45.4
17	12°07.9	69°28.5	0.80	74°22.9	59.5	261°23.2	20.9	13°41.3	04.9	Shaula	96°09.6	-37°07.3
18	27° 10.3	84°27.7	S21°07.4	89°23.3	S21°59.1	276°26.0	N22°21.0	28°43.6	S03°04.8	Rasalhague	95°58.0	12°32.3
19	42°12.8	99°26.8	06.8	104°23.7	58.8	291°28.8	21.0	43°45.8	04.7	Eltanin	90°42.3	51°28.9
20 21	57° 15.3 72° 17.7	114°26.0 129°25.2	06.2 •• 05.6	119°24.1 134°24.5	58.4 •• 58.1	306°31.6 321°34.5	21.1 • • 21.1	58°48.1 73°50.4	04.6 •• 04.5	Kaus Aust.	83°31.8	-34°22.3
22	87°20.2	144°24.3	05.0	149°24.9	57.7	336° 37.3	21.1	88°52.7	04.5	Vega	80°33.1	38°48.3
23	102°22.6	159°23.5	04.3	164°25.3	57.4	351°40.1	21.3	103°54.9	04.4	Nunki	75°47.1	-26°15.9
								-		Altair	61°59.5	8°56.2
Mer.p	pass. 16:12	$\nu$ -0.9′ d-0	0.6′ m-3.90	$\nu$ 0.4′ d-0	.3′ m1.09	$\nu$ 2.8′ d0.	1' m-2.67	$\nu 2.3' \ d-0$	.1′ m1.03	Peacock	53°05.0	-56°39.1
										Deneb Enif	49°25.7 33°38.2	45°22.4 9°59.7
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27° 32.2	-46°50.2
0	$117^{\circ}25.1$	174°22.6	S21°03.7	$179^{\circ}25.7$	<b>S</b> 21°57.0	6°42.9	$N22^{\circ}21.3$	$118^{\circ}57.2$	S03°04.3	Fomalhaut	15° 13.8	-40° 30.2 -29° 29.2
1	132°27.6	189°21.8	03.1	194°26.1	56.7	21°45.7	21.4	133°59.5	04.2	Scheat	13°44.6	28°13.6
2	147°30.0	204°21.0	02.5	209°26.5	56.3	36°48.5	21.4	149°01.8	04.1	Markab	13° 29.3	15°20.8
3	162°32.5	219°20.1	• • 01.9	224°26.9	• • 56.0	51°51.3	· · 21.5	164°04.1	• • 04.0	1 16 5	2114	
4	177°35.0	234°19.3	01.3	239°27.3	55.6	66°54.2	21.5	179°06.3	03.9	Jan 16 Fri	SHA	Mer.pass
5 6	192°37.4 207°39.9	249°18.4	00.6	254°27.7 269°28.1	55.3	81°57.0	21.6 N22°21.6	194°08.6 209°10.9	03.8	Venus Mars	59° 36.6 63° 39.5	12:20 12:03
		264°17.6	\$21°00.0		S21°54.9	96° 59.8			\$03°03.8	Jupiter		23:38
7 8	222°42.4 237°44.8	279°16.8 294°15.9	20°59.4 58.8	284°28.5 299°28.9	54.6 54.2	112°02.6 127°05.4	21.7 21.7	224°13.2 239°15.4	03.7 03.6	Saturn	1°40.9	16:09
9	252° 47.3	309°15.1	58.1	314°29.3	• • 53.9	142°08.2	21.8	254°17.7	• • 03.5	Suturn	1 10.5	10.05
10	267°49.8	324°14.3	57.5	329°29.8	53.5	157°11.1	21.8	269°20.0	03.4	Jan 17 Sat	SHA	Mer.pass
11	282°52.2	339°13.4	56.9	344°30.2	53.2	172° 13.9	21.9	284°22.3	03.3	Venus	58° 16.9	12:22
12	297° 54.7	354°12.6	\$20°56.3	359°30.6	S21°52.8	187° 16.7	N22°21.9	299°24.5	S03°03.2	Mars	62°50.0	12:03
13	312°57.1	9°11.8	55.6	14°31.0	52.4	$202^{\circ}19.5$	22.0	314°26.8	03.1	Jupiter		23:33
14	327°59.6	24°10.9	55.0	29°31.4	52.1	$217^{\circ}22.3$	22.0	$329^{\circ}29.1$	03.0	Saturn	1°36.6	16:05
15	343°02.1	39°10.1	•• 54.4	44°31.8	•• 51.7	232°25.1	•• 22.1	344°31.4	•• 03.0	Jan 18 Sun	SHA	Mer.pass
16	358° 04.5	54°09.3	53.7	59°32.2	51.4	247°28.0	22.1	359°33.7	02.9	Venus	$56^{\circ}57.5$	12:23
17	13°07.0	69°08.4	53.1	74°32.6	51.0	262°30.8	22.2	14°35.9	02.8	Mars	62°00.6	12:02
18	28°09.5	84°07.6	S20°52.5	89°33.0	S21°50.7	277°33.6	N22°22.2	29°38.2	S03°02.7		249°17.8	23:29
19	43°11.9	99°06.8	51.8 51.2	104°33.4	50.3	292°36.4	22.3	44°40.5	02.6	Saturn	1°32.1	16:02
20 21	58° 14.4 73° 16.9	114°05.9 129°05.1	51.2 •• 50.6	119°33.8 134°34.2	49.9 •• 49.6	307°39.2 322°42.0	22.3 · · 22.4	59°42.8 74°45.0	02.5 · · 02.4	Horizont	al parallax	
22	73 16.9 88° 19.3	129 05.1 144°04.3	49.9	134 34.2 149°34.6	49.0	322 42.0 337°44.8	22.4	74 45.0 89°47.3	02.4		Venus:	0.1
23	103°21.8	159°03.5	49.3	164°35.0	48.9	352°47.7	22.4	104°49.6	02.3		Mars:	0.1
Mer.p	pass. 16:08	$\nu$ -0.8′ $d$ -0	).6′ 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′ m1.03			

Fri	h	Su	n			Moon		
1   177°36.5   \$20°88.5   212°09.3   9.4   \$28°16.5   0.7   \$4.3'   2   207°36.1   \$5.5   246°36.1   9.4   28°17.0   0.5   \$6.3'   3   222°35.9   \$5.5   \$25°34.5   9.4   28°17.0   0.5   \$6.4'   4   237°35.6   \$56.6   270°02.8   9.3   28°18.1   0.1   \$6.4'   5   252°35.4   \$56.1   284°31.2   9.3   28°18.1   0.0   \$54.4'   6   267°35.2   \$20°56.5   298°59.5   9.3   \$28°18.2   0.0   \$54.4'   7   282°35.0   \$55.2   313°27.8   9.3   28°18.0   0.0   \$54.4'   9   312°34.6   \$5.4   327°56.1   9.3   28°17.7   0.05   \$54.4'   10   327°34.4   \$53.7   356°56.6   9.2   28°15.0   0.0   \$54.4'   11   342°34.1   \$53.2   \$11°20.8   9.2   28°15.0   0.0   \$54.5'   12   357°33.9   \$20°28.   25°49.1   9.2   \$28°15.0   0.0   \$54.5'   13   12°33.7   \$52.3   40°17.3   9.2   28°14.0   -1.2   \$54.5'   14   27°33.5   \$51.8   \$54°45.5   9.2   286°15.0   -1.0   \$54.5'   15   42°33.3   \$51.8   \$54°45.5   9.2   286°15.0   -1.0   \$54.5'   15   42°33.3   \$51.8   \$54°45.5   9.2   286°10.0   -1.6   \$54.5'   16   57°33.1   \$50.8   83°41.9   9.2   286°10.1   -1.7   \$54.5'   17   72°32.9   \$50.3   98°10.1   9.2   28°00.4   -1.7   \$54.5'   18   86°32.7   \$20°49.9   112°38.3   9.2   28°00.4   -1.7   \$54.5'   19   102°32.4   49.4   127°00.5   9.2   28°00.6   -2.3   \$54.6'   20   117°32.2   48.9   141°34.7   9.2   28°00.6   -2.3   \$54.6'   21   132°31.6   47.4   184°59.3   9.2   27°50.2   2.2   \$54.6'   22   147°31.8   47.9   170°31.1   9.2   28°00.6   -2.3   \$54.6'   23   162°31.6   44.4   186°50.3   9.2   28°00.6   -2.3   \$54.6'   24   237°30.6   45.0   257°20.5   9.2   28°04.0   -2.5   \$54.6'   25   25°30.4   44.5   50°0.9   9.2   28°00.6   -2.3   \$54.6'   26   267°30.2   20°44.0   286°17.1   9.3   27°30.3   35°47   27   282°9.9   43.5   300°45.4   9.2   28°00.6   -2.3   \$54.6'   28   297°27.7   43.0   315°13.7   9.3   27°30.3   35°47   29   312°29.5   44.5   57°50.5   9.5   26°50.1   -3.6   54.7   31   12°28.7   40.5   28°30.9   9.5   26°50.1   -3.6   54.7   31   12°28.7   40.5   28°30.9   9.6   26°31.3   -3.6   54.7   31   12°28.7   40.5   28°3	Fri	GHA	Dec	GHA	ν	Dec	d	HP
2   207°361   57.5   241°061   94'   281°175   04'   54.3'   3   222°359   57.1   255°345   94'   281°179   02'   54.4'   5   252°354   56.6   270°028   93'   281°180   0.0'   54.4'   6   267°35.2   500′55.6   298°95.5   93'   528°182   0.0'   54.4'   7   282°35.0   55.2   313°27.8   93'   281°180   0.03'   54.4'   9   312°34.6   5.54.2   342°24.3   93'   281°17.7   0.05'   54.4'   10   327°34.4   53.7   356°56.6   9.2'   281°15.0   0.0'   54.5'   11   342°34.1   53.2   11°20.8   92'   281°15.0   0.0'   54.5'   12   357°339   502°8.2   25°49.1   9.2'   528°15.0   0.0'   54.5'   13   12°337   52.3   40°17.3   92'   281°15.0   0.0'   54.5'   14   27°333   55.8   54°45.5   9.2'   281°15.0   0.0'   54.5'   15   42°333   51.8   54°45.5   9.2'   281°15.0   1.0'   54.5'   15   42°333   51.8   54°45.5   9.2'   281°15.0   1.0'   54.5'   15   42°333   51.8   54°45.5   9.2'   281°15.0   1.0'   54.5'   15   42°333   51.8   54°45.5   9.2'   281°10.0   1.6'   54.5'   15   42°333   51.8   69°13.7   9.2'   281°10.1   1.0'   54.5'   16   57°331   50.8   83°41.9   9.2'   281°10.0   1.6'   54.5'   17   72°32.9   50.3   98°10.1   9.2'   281°00.1   1.6'   54.5'   18   87°32.7   520°49.9   112°38.3   9.2'   27°56.2   2.0'   54.6'   19   102°32.4   49.4   127°06.5   9.2'   281°04.   1.0'   54.5'   19   102°32.4   49.4   127°06.5   9.2'   281°04.   2.0'   54.6'   21   132°32.0   0.44   156°0.9   9.2'   280°06.   2.3'   54.6'   22   147°31.8   47.9   110°31.1   9.2'   27°56.2   2.5'   54.6'   23   162°31.6   47.4   184°59.3   9.2'   27°56.2   2.5'   54.6'   24   237°30.6   45.9   228°24.0   9.2'   287°04.   2.9'   54.6'   25   220°31.0   45.9   228°24.0   9.2'   287°04.   2.9'   54.6'   26   267°30.2   520°44.0   286°17.1   9.3'   527°25.3   3.3'   27°10.3   3.5'   27   282°29.1   41.5   30°40.4   9.3'   27°10.3   4.5'   54.6'   28   297°29.7   43.0   316°13.7   9.3'   27°27.2   3.9'   54.6'   29   312°29.5   44.6   271°48.8   9.3'   27°45.3   3.0'   54.7'   21   34°22.1   41.5   33°1.3   33°1.3   33°1.3   33°1.3	0				9.4'		0.7'	54.3'
3								
5								
8 297°3418 547 327°561 03' 28°177 0.5' 54.4' 9 312°346 · 542 342°243 9.3' 28°173 0.6' 54.4' 10 327°344 55.7 36°526 9.2' 28°166 -0.7' 54.4' 11 342°341 55.2 11°20.8 9.2' 28°166 -0.7' 54.4' 11 342°341 55.2 11°20.8 9.2' 28°166 -0.7' 54.4' 11 342°341 55.2 11°20.8 9.2' 28°166 -0.7' 54.4' 11 342°341 55.2 11°20.8 9.2' 28°16.6 -0.7' 54.4' 11 2°337 52.3 40°17.3 9.2' 28°16.1 0.1.0' 54.5' 13 12°33.7 52.3 40°17.3 9.2' 28°14.0 1.2' 54.5' 15 42°33.5 51.8 54°45.5 9.2' 28°12.8 1.3' 54.5' 15 42°33.3 · 51.3 69°13.7 9.2' 28°10.1 0.1.6' 54.5' 16 57°33.1 50.8 83°41.9 9.2' 28°10.4 1.7' 54.5' 18 87°32.7 \$20°49.9 112°38.3 9.2' \$28°06.4 1.7' 54.5' 18 87°32.7 \$20°49.9 112°38.3 9.2' \$28°06.7 1.9' 54.6' 20 117°32.2 49.9 112°38.3 9.2' \$28°06.7 1.9' 54.6' 21 132°32.0 · 48.4 156°0.9 9.2' 28°06.6 2.0' 54.6' 22 142°32.0 · 48.4 156°0.9 9.2' 28°06.6 2.3' 54.6' 23 162°31.6 47.4 184°59.3 9.2' 27°55.8 2.6' 54.6' 24 20°31.0 45.9 228°40.9 2.2' 27°55.8 2.6' 54.6' 25 20°31.0 45.9 228°40.9 2.2' 27°55.8 2.6' 54.6' 26 20°31.0 45.9 228°40.9 2.2' 27°55.8 2.6' 54.6' 27 20°31.0 46.9 228°24.0 9.2' 27°55.4 2.9' 54.6' 28 22°30.8 · 45.5 242°52.3 9.3' 27°44.5 3.2' 54.6' 29 312°29.7 43.0 315°13.7 9.3' 27°47.5 3.3' 54.7' 282°29.9 43.5 300°45.4 9.3' 27°30.9 3.7' 54.7' 282°29.9 43.5 300°45.4 9.3' 27°30.9 3.7' 54.7' 282°29.9 43.5 300°45.4 9.3' 27°30.9 3.7' 54.7' 282°29.9 43.5 300°45.4 9.3' 27°30.9 3.7' 54.7' 282°29.9 43.5 300°45.4 9.3' 27°30.9 3.7' 54.7' 282°29.9 43.5 300°45.4 9.3' 27°30.9 3.7' 54.7' 282°29.9 43.5 300°45.4 9.3' 27°30.9 3.7' 54.7' 38 29°29.7 43.0 315°13.7 9.4' 27°10.2 4.2' 54.8' 11 342°21.1 41.5 388°38.7 9.4' 27°10.3 4.6' 54.8' 11 342°21.1 41.5 388°38.7 9.4' 27°10.2 4.2' 54.8' 11 342°21.3 31.5 30.5 16°52.5 9.5' \$26°47.0 5.5' 55.1' 11 342°22.7 3.3 30.5 56°32.5 9.5' \$26°47.0 5.6' 55.1' 11 32°27.1 3.5 51.8 54.6' 50.9 9.8' \$26°02.1 6.2' 56.8' 20 117°27.3 37.0 128°55.2 9.7' \$26°00.0 5.8' 55.0'  5D = 16.3' d = 0.5'   5D = 16.3' d = 0.5'  5D = 16.3' d = 0.5'  5D = 16.3' d = 0.5'  5D = 16.3' d = 0.5'  11 32°27.7 3.3 10 28°47.4 9.9 9.9 28°55.9 6.6' 55.5' 51 324 4								
19   312°34.6   54.2   342°24.3   9.3'   28°17.3   0.6'   54.4'     10   327°34.4   53.7   356°52.6   9.2'   28°15.9   -0.9'   54.5'     12   357°33.9   \$20°52.8   25°49.1   9.2'   \$28°15.9   -0.9'   54.5'     13   12°33.7   55.3   40°17.3   9.2'   28°14.0   -1.0'   54.5'     14   27°33.5   51.8   54°45.5   9.2'   28°14.0   -1.2'   54.5'     15   42°33.3   51.8   54°45.5   9.2'   28°11.5   -1.5'   54.5'     16   57°33.1   50.8   83°41.9   9.2'   28°01.0   -1.6'   54.5'     17   72°32.9   50.3   98°10.1   9.2'   28°00.1   -1.5'   54.5'     18   87°32.7   \$20°49.9   112°38.3   9.2'   \$28°06.7   -1.9'   54.6'     19   102°32.4   49.4   127°06.5   9.2'   28°00.6   -2.3'   54.6'     20   117°32.2   49.9   112°38.3   9.2'   \$28°02.7   -2.2'   54.6'     21   132°32.0   -48.4   156°02.9   9.2'   28°00.6   -2.3'   54.6'     22   147°31.8   47.9   170°31.1   9.2'   27°55.8   -2.6'   54.6'     25   2   207°31.0   45.9   228°24.0   9.2'   27°55.8   -2.6'   54.6'     26   207°30.2   54.5   54.5'   54.5'   54.5'     3   22°20.8   45.5   228°24.0   9.2'   27°50.4   -2.3'   54.7'     3   22°30.6   45.0   257°20.5   9.3'   27°41.3   3.3'   54.7'     3   22°30.6   44.5   271°48.8   9.3'   27°34.5   3.3'   54.7'     4   237°30.6   45.0   257°20.5   9.3'   27°41.3   3.3'   54.7'     5   252°30.4   44.5   271°48.8   9.3'   27°30.3   4.0'   54.8'     6   267°30.2   \$20°44.0   286°17.1   9.3'   \$27°34.5   3.6'   54.7'     9   312°29.5   42.5   329°42.0   9.4'   27°91.3   4.0'     1   342°29.1   41.5   358°38.7   9.4'   27°15.1   4.3'   54.8'     10   327°29.3   34.5   20°38.8   9.5'   26°67.0   4.9'   54.8'     11   342°29.1   41.5   358°38.7   9.4'   27°15.1   4.3'   54.8'     12   357°24.5   3.3'   35°73.4   5.6'   55.0'     12   35°26.9   5.35   56°32.5   9.5'   26°52.0   5.6'   55.0'     13   12°28.7   40.5   27°35.6   9.4'   27°05.3   4.6'   54.8'     14   27°28.5   40.0   42°4.0   9.5'   27°01.7   4.7'   54.9'     15   42°28.3   34.5   20°18.8   98.8'   26°02.1   6.2'   55.0'     16   57°22.1   39.0   30°1.1   94'   27°01	7		55.2				-0.3'	54.4'
10   327°34.4   53.7   356°52.6   9.2'   28°15.6   0.17'   54.5'     11   342°34.1   53.2   11°20.8   9.2'   28°15.0   0.10'   54.5'     12   357°33.9   S20°52.8   25°49.1   9.2'   S28°15.0   0.10'   54.5'     13   12°33.7   52.3   40°17.3   9.2'   28°11.4   0.1.2'   54.5'     14   27°33.5   51.8   546°45.9   9.2'   28°12.8   1.3'   54.5'     15   42°33.3   51.3   69°13.7   9.2'   28°11.5   1.5'   54.5'     15   42°33.3   51.3   69°13.7   9.2'   28°10.1   5.15'   54.5'     15   42°33.3   51.3   69°13.7   9.2'   28°10.1   5.15'   54.5'     16   57°33.1   50.8   83°14.9   9.2'   28°00.6   -1.9'   54.6'     18   87°32.7   S20°49.9   112°38.3   9.2'   28°04.8   -2.0'   54.6'     19   102°32.4   49.4   127°06.5   9.2'   28°04.8   -2.0'   54.6'     20   117°32.2   49.9   141°34.7   9.2'   28°00.6   -2.3'   54.6'     21   132°32.0   0.48   156°02.9   9.2'   28°00.6   -2.3'   54.6'     22   147°31.8   47.9   170°31.1   9.2'   27°58.2   2.5'   54.6'     22   147°31.8   47.9   170°31.1   9.2'   27°58.2   2.5'   54.6'     22   207°31.0   46.4   213°55.8   9.2'   27°55.2   2.6'   54.6'     22   207°31.0   45.9   228°24.0   9.2'   27°47.5   -3.0'   54.7'     3   222°30.8   0.45.5   242°52.3   9.3'   27°44.5   -3.2'   54.6'     4   237°30.6   45.0   27°20.5   9.3'   27°41.5   -3.3'   54.7'     5   252°30.4   44.5   27°48.8   9.3'   27°30.0   3.5'   54.7'     7   282°29.9   43.5   300°45.4   9.3'   27°30.0   3.5'   54.7'     7   282°29.9   43.5   300°45.4   9.3'   27°30.0   3.5'   54.7'     10   327°29.3   42.0   344°10.4   94'   27°19.2   4.2'   54.8'     11   342°21.1   41.5   588°3.7   94'   27°10.3   4.6'   54.5'     12   357°28.9   \$20°41.0   26°11.1   93'   22°33.0   3.5'   54.7'     13   12°28.7   40.5   27°35.6   94'   27°35.3   4.0'   54.8'     14   27°28.5   40.0   40°40.0   40°40.0   40°40.0   40°40.0   40°40.0   40°40.0   56°50.0   40°40.0   56°50.0   56°50.0   56°50.0   56°50.0   56°50.0   56°50.0   56°50.0   56°50.0   56°50.0   56°50.0   56°50.0   56°50.0   56°50.0   56°50.0   56°50.0   56°50.0   56°50.0   56°								
11   342°34.1   53.2   11°20.8   9.2°   28°15.0   0.0°   54.5°     12   357°33.9   \$20°52.8   25°49.1   9.2°   \$28°15.0   -1.0°   54.5°     13   12°33.7   52.3   40°17.3   9.2°   28°14.0   -1.2°   54.5°     14   27°33.5   51.8   54°45.5   9.2°   28°14.0   -1.2°   54.5°     15   42°33.3   51.8   54°45.5   9.2°   28°11.5   -1.5°   54.5°     16   57°33.1   50.8   83°41.9   9.2°   28°10.0   -1.6°   54.5°     17   72°32.9   50.3   98°10.1   9.2°   28°00.4   -1.7°   54.6°     19   102°32.4   49.4   127°06.5   9.2°   28°06.7   -1.9°   54.6°     19   102°32.4   49.4   127°06.5   9.2°   28°02.7   -2.2°   54.6°     20   117°32.2   49.9   114°34.7   9.2°   28°00.6   -2.3°   54.6°     21   132°32.0   -48.9   144°34.7   9.2°   28°00.6   -2.3°   54.6°     22   147°31.8   47.9   170°31.1   9.2°   27°58.2   2.5°   54.6°     22   147°31.8   47.9   170°31.1   9.2°   27°58.2   2.5°   54.6°     23   162°31.6   47.4   184°59.3   9.2°   27°50.4   2.9°   54.7°     1 192°31.2   46.4   213°58.8   9.2°   27°50.4   2.9°   54.7°     2 200°31.0   45.9   199°27.6   9.2°   227°55.8   2.2°   54.6°     2 200°31.0   45.9   228°24.0   9.2°   27°44.5   3.0°   54.7°     3 222°30.8   +45.5   242°52.3   9.3°   22°44.5   3.3°   54.7°     4 237°30.6   45.0   257°20.5   9.3°   22°41.3   3.3°   54.7°     5 252°30.4   44.5   271°48.8   9.3°   27°30.9   3.7°   54.7°     8 29°29.9   43.5   300°45.4   9.3°   27°30.9   3.7°   54.7°     9 312°29.5   +42.5   329°42.0   9.4°   27°23.3   4.0°   54.8°     10 32°29.5   +42.5   329°42.0   9.4°   22°23.3   4.0°   54.8°     10 32°29.3   40.0   40°0.0   9.5°   27°0.1   4.7°   54.9°     10 32°29.3   40.0   40°0.0   9.5°   22°0.1   50°   54.8°     11 342°29.1   41.5   358°38.7   9.4°   27°15.1   4.3°   54.8°     10 32°29.3   40.0   40°0.0   9.5°   22°0.1   50°   54.8°     11 342°29.1   41.5   358°38.7   9.4°   27°15.1   4.3°   54.8°     10 32°29.3   30.0   30°0.1   30°0.1   30°0.1   30°0.1     12 357°28.9   50°14.0   38°50.9   9.6°   52°64.0   55.1°     14 27°28.5   40.0   42°0.0   9.5°   22°0.0   5.6°     1 192°2.5				0.2 20				
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Sat         GHA         Dec         GHA         ν         Dec         d         HP           0         177°31.4         \$20°46.9         199°27.6         9.2'         \$27°55.2         -2.8'         \$4.6'           1         192°31.2         46.4         213°55.8         9.2'         27°50.4         -2.9'         54.7'           2         207°31.0         45.9         228°24.0         9.2'         27°55.4         -2.9'         54.7'           4         237°30.6         45.0         257°20.5         9.3'         27°44.5         -3.2'         54.7'           5         252°30.4         44.5         221°48.8         9.3'         27°34.5         -3.6'         54.7'           7         282°29.9         43.5         300°45.4         9.3'         22°34.5         -3.6'         54.7'           8         297°29.7         43.0         315°13.7         9.3'         22°27.2         -3.9'         54.8'           10         327°29.3         42.0         344°10.4         9.4'         27°19.2         -4.2'         54.8'           11         342°29.1         41.5         388°38.7         9.4'         27°15.1         -4.5'         54.8'								
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5         252°30.4         44.5         271°48.8         9.3'         27°38.0         -3.5'         54.7'           6         267°30.2         S20°44.0         286°17.1         9.3'         22°30.9         -3.7'         54.7'           7         282°29.9         43.0         315°13.7         9.3'         27°27.2         -3.9'         54.8'           9         312°29.5         · 42.5         329°42.0         9.4'         27°27.2         -3.9'         54.8'           10         327°29.3         42.0         344°10.4         9.4'         27°15.1         -4.2'         54.8'           11         342°29.1         41.5         358°38.7         9.4'         27°16.1         -4.2'         54.8'           12         357°28.9         520°41.0         13°07.1         9.4'         27°06.3         -4.6'         54.8'           13         12°28.7         40.5         27°35.6         9.4'         27°06.3         -4.6'         54.8'           13         12°28.7         40.5         27°35.6         9.4'         27°06.3         -4.6'         54.8'           14         27°27.9         38.5         85°99.5         9.5'         26°37.1         -5.1'         54.9'								
6         267°30.2         S20°44.0         286°17.1         9.3'         S27°34.5         -3.6'         54.7'           7         282°29.9         43.5         300°45.4         9.3'         27°30.9         -3.7'         54.7'           8         297°29.7         43.0         315°13.7'         9.3'         27°27.2         -3.9'         54.8'           10         327°29.3         42.0         344°10.4         9.4'         27°19.2         -4.2'         54.8'           11         342°29.1         41.5         358°38.7         9.4'         27°15.1         -4.3'         54.8'           12         357°28.9         520°41.0         13°07.1         9.4'         27°06.3         -4.6'         54.8'           13         12°28.7         40.5         27°35.6         9.4'         27°06.3         -4.6'         54.8'           14         27°28.5         40.0         42°04.0         9.5'         27°01.7         -4.7'         54.9'           15         42°28.3         39.5         56°32.5         9.5'         26°52.1         -5.0'         54.9'           16         57°28.5         33.5         156°32.5         9.5'         26°52.1         -5.0'         54.9'<								
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18         87°27.7         S20°38.0         99°58.0         9.6'         S26°42.0         -5.3'         54.9'           19         102°27.5         37.5         114°26.6         9.6'         26°36.7         -5.4'         54.9'           20         117°27.3         37.0         128°55.2         9.6'         26°36.7         -5.4'         55.0'           21         132°27.1         · 36.5         143°23.9         9.7'         26°25.7         -5.7'         55.0'           22         147°26.9         36.0         157°52.5         9.7'         26°20.0         -5.8'         55.0'           23         162°26.7         35.5         172°21.2         9.7'         26°14.2         -6.0'         55.0'           SD = 16.3'         d = -0.5'         SD = 14.9'         SD = 14.9'         SD = 14.9'           Sun         GHA         Dec         GHA         ν         Dec         d HP           1         192°26.3         34.5         201°18.8         9.8'         26°08.2         -6.1'         55.0'           2         207°26.1         34.0         215°47.6         9.9'         25°45.5         -6.5'         55.1'           3         222°25.9         · 3								
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Sun         GHA         Dec         GHA         ν         Dec         d         HP           0         177°26.5         \$20°35.0         186°50.0         9.8'         \$26°08.2         -6.1'         55.0'           1         192°26.3         34.5         201°18.8         9.8'         26°02.1         -6.2'         55.0'           2         207°26.1         34.0         215°47.6         9.9'         25°55.9         -6.4'         55.1'           3         222°25.9         · 33.5         230°16.4         9.9'         25°49.5         -6.5'         55.1'           4         237°25.7         32.9         244°45.3         9.9'         25°43.0         -6.6'         55.1'           5         252°25.5         32.4         259°14.3         10.0'         25°36.4         -6.8'         55.1'           6         267°25.3         \$20°31.9         273°43.2         10.0'         \$25°22.7         -7.0'         55.1'           7         282°25.1         31.4         288°12.2         10.1'         25°08.5         -7.3'         55.2'           9         312°24.7         · 30.4         317°10.4         10.1'         25°08.5         -7.3'         55.2' <td>23</td> <td></td> <td></td> <td>172°21.2</td> <td></td> <td></td> <td>-6.0</td> <td>55.0</td>	23			172°21.2			-6.0	55.0
0         177°26.5         \$20°35.0         186°50.0         9.8'         \$26°08.2         -6.1'         55.0'           1         192°26.3         34.5         201°18.8         9.8'         26°02.1         -6.2'         55.0'           2         207°26.1         34.0         215°47.6         9.9'         25°55.9         -6.4'         55.1'           3         222°25.9         · · 33.5         230°16.4         9.9'         25°43.0         -6.5'         55.1'           4         237°25.7         32.9         244°45.3         9.9'         25°43.0         -6.6'         55.1'           5         252°25.5         32.4         259°14.3         10.0'         25°36.4         -6.8'         55.1'           6         267°25.3         \$20°31.9         273°43.2         10.0'         \$25°22.7         -7.0'         55.1'           7         282°25.1         31.4         288°12.2         10.1'         25°15.7         -7.2'         55.2'           9         312°24.7         · 30.4         317°10.4         10.1'         25°08.5         -7.3'         55.2'           10         327°4.5         29.9         311°0.4'         10.1'         25°08.5         -7.3'		SD = 16.3'	d = -0.5'		SL	0 = 14.9'		
1       192°26.3       34.5       201°18.8       9.8'       26°02.1       -6.2'       55.0'         2       207°26.1       34.0       215°47.6       9.9'       25°55.9       -6.4'       55.1'         3       222°25.9       · 33.5       230°16.4       9.9'       25°49.5       -6.5'       55.1'         4       237°25.7       32.9       244°45.3       9.9'       25°43.0       -6.6'       55.1'         5       252°25.5       32.4       259°14.3       10.0'       25°36.4       -6.8'       55.1'         6       267°25.3       \$20°31.9       273°43.2       10.0'       \$25°29.6       -6.9'       55.1'         7       282°25.1       31.4       288°12.2       10.1'       25°22.7       -7.0'       55.1'         8       297°24.9       30.9       302°41.3       10.1'       25°15.7       -7.2'       55.2'         9       312°24.7       · 30.4       317°10.4       10.1'       25°08.5       -7.3'       55.2'         10       327°24.5       29.9       331°39.5       10.2'       25°01.2       -7.4'       55.2'         11       342°24.3       29.4       346°08.7       10.2'       24								
2       207°26.1       34.0       215°47.6       9.9'       25°55.9       -6.4'       55.1'         3       222°25.9       · 33.5       230°16.4       9.9'       25°49.5       -6.5'       55.1'         4       237°25.7       32.9       244°45.3       9.9'       25°43.0       -6.6'       55.1'         5       252°25.5       32.4       259°14.3       10.0'       25°36.4       -6.8'       55.1'         6       267°25.3       S20°31.9       273°43.2       10.0'       S25°29.6       -6.9'       55.1'         7       282°25.1       31.4       288°12.2       10.1'       25°22.7       -7.0'       55.1'         8       297°24.9       30.9       302°41.3       10.1'       25°08.5       -7.3'       55.2'         9       312°24.7       · 30.4       317°10.4       10.1'       25°08.5       -7.3'       55.2'         10       327°24.5       29.9       331°39.5       10.2'       25°01.2       -7.4'       55.2'         11       342°24.3       29.4       346°08.7       10.2'       24°53.8       -7.5'       55.2'         12       357°24.1       S20°28.9       0°38.0       10.3' <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
3       222°25.9       · · · 33.5       230°16.4       9.9'       25°49.5       -6.5'       55.1'         4       237°25.7       32.9       244°45.3       9.9'       25°43.0       -6.6'       55.1'         5       252°25.5       32.4       259°14.3       10.0'       25°36.4       -6.8'       55.1'         6       267°25.3       S20°31.9       273°43.2       10.0'       S25°29.6       -6.9'       55.1'         7       282°25.1       31.4       288°12.2       10.1'       25°22.7       -7.0'       55.1'         8       297°24.9       30.9       302°41.3       10.1'       25°08.5       -7.3'       55.2'         9       312°24.7       · · 30.4       317°10.4       10.1'       25°08.5       -7.3'       55.2'         10       327°24.5       29.9       331°39.5       10.2'       25°01.2       -7.4'       55.2'         11       342°24.3       29.4       346°08.7       10.2'       24°53.8       -7.5'       55.2'         12       357°24.1       S20°28.9       0°38.0       10.3'       S24°46.2       -7.7'       55.2'         13       12°23.9       28.3       15°07.2       10.3'								
4       237°25.7       32.9       244°45.3       9.9'       25°43.0       -6.6'       55.1'         5       252°25.5       32.4       259°14.3       10.0'       25°36.4       -6.6'       55.1'         6       267°25.3       S20°31.9       273°43.2       10.0'       S25°29.6       -6.9'       55.1'         7       282°25.1       31.4       288°12.2       10.1'       25°22.7       -7.0'       55.1'         8       297°24.9       30.9       302°41.3       10.1'       25°15.7       -7.2'       55.2'         9       312°24.7       · 30.4       317°10.4       10.1'       25°08.5       -7.3'       55.2'         10       327°24.5       29.9       331°39.5       10.2'       25°01.2       -7.4'       55.2'         11       342°24.3       29.4       346°08.7       10.2'       24°53.8       -7.5'       55.2'         12       357°24.1       S20°28.9       0°38.0       10.3'       S24°46.2       -7.7'       55.2'         13       12°23.9       28.3       15°07.2       10.3'       24°38.6       -7.8'       55.3'         14       27°23.7       27.8       29°36.6       10.4' <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>								
6         267°25.3         \$20°31.9         273°43.2         10.0'         \$25°29.6         -6.9'         55.1'           7         282°25.1         31.4         288°12.2         10.1'         25°22.7         -7.0'         55.1'           8         297°24.9         30.9         302°41.3         10.1'         25°15.7         -7.2'         55.2'           9         312°24.7         · · · 30.4         317°10.4         10.1'         25°08.5         -7.3'         55.2'           10         327°24.5         29.9         331°39.5         10.2'         25°01.2         -7.4'         55.2'           11         342°24.3         29.4         346°08.7         10.2'         24°53.8         -7.5'         55.2'           12         357°24.1         S20°28.9         0°38.0         10.3'         524°46.2         -7.7'         55.2'           13         12°23.9         28.3         15°07.2         10.3'         24°38.6         -7.8'         55.3'           14         27°23.7         27.8         29°36.6         10.4'         24°30.8         -7.9'         55.3'           15         42°23.5         · · 27.3         44°05.9         10.4'         24°22.8         -8.1'		237°25.7	32.9	244°45.3		25°43.0		
7       282°25.1       31.4       288°12.2       10.1'       25°22.7       -7.0'       55.1'         8       297°24.9       30.9       302°41.3       10.1'       25°15.7       -7.2'       55.2'         9       312°24.7       · · · 30.4       317°10.4       10.1'       25°08.5       -7.3'       55.2'         10       327°24.5       29.9       331°39.5       10.2'       25°01.2       -7.4'       55.2'         11       342°24.3       29.4       346°08.7       10.2'       24°53.8       -7.5'       55.2'         12       357°24.1       S20°28.9       0°38.0       10.3'       S24°46.2       -7.7'       55.2'         13       12°23.9       28.3       15°07.2       10.3'       24°38.6       -7.8'       55.3'         14       27°23.7       27.8       29°36.6       10.4'       24°30.8       -7.9'       55.3'         15       42°23.5       · · 27.3       44°05.9       10.4'       24°22.8       -8.1'       55.3'         16       57°23.3       26.8       58°35.3       10.5'       24°14.8       -8.2'       55.3'         17       72°23.1       26.3       73°04.8       10.5' <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
8       297°24.9       30.9       302°41.3       10.1'       25°15.7       -7.2'       55.2'         9       312°24.7       · · 30.4       317°10.4       10.1'       25°08.5       -7.3'       55.2'         10       327°24.5       29.9       331°39.5       10.2'       25°01.2       -7.4'       55.2'         11       342°24.3       29.4       346°08.7       10.2'       24°53.8       -7.5'       55.2'         12       357°24.1       S20°28.9       0°38.0       10.3'       S24°46.2       -7.7'       55.2'         13       12°23.9       28.3       15°07.2       10.3'       24°38.6       -7.8'       55.3'         14       27°23.7       27.8       29°36.6       10.4'       24°30.8       -7.9'       55.3'         15       42°23.5       · · 27.3       44°05.9       10.4'       24°22.8       -8.1'       55.3'         16       57°23.3       26.8       58°35.3       10.5'       24°14.8       -8.2'       55.3'         17       72°23.1       26.3       73°04.8       10.5'       24°06.6       -8.3'       55.3'         18       87°22.9       S20°25.8       87°34.3       10.6'       <								
9         312°24.7         · · 30.4         317°10.4         10.1'         25°08.5         -7.3'         55.2'           10         327°24.5         29.9         331°39.5         10.2'         25°01.2         -7.4'         55.2'           11         342°24.3         29.4         346°08.7         10.2'         24°53.8         -7.5'         55.2'           12         357°24.1         S20°28.9         0°38.0         10.3'         524°46.2         -7.7'         55.2'           13         12°23.9         28.3         15°07.2         10.3'         24°38.6         -7.8'         55.3'           14         27°23.7         27.8         29°36.6         10.4'         24°38.6         -7.9'         55.3'           15         42°23.5         · · 27.3         44°05.9         10.4'         24°32.8         -8.1'         55.3'           16         57°23.3         26.8         58°35.3         10.5'         24°14.8         -8.2'         55.3'           17         72°23.1         26.3         73°04.8         10.5'         24°14.8         -8.2'         55.3'           18         87°22.9         \$20°25.8         87°34.3         10.6'         \$23°49.9         -8.5'								
10         327°24.5         29.9         331°39.5         10.2'         25°01.2         -7.4'         55.2'           11         342°24.3         29.4         346°08.7         10.2'         24°53.8         -7.5'         55.2'           12         357°24.1         S20°28.9         0°38.0         10.3'         S24°46.2         -7.7'         55.2'           13         12°23.9         28.3         15°07.2         10.3'         24°38.6         -7.8'         55.3'           14         27°23.7         27.8         29°36.6         10.4'         24°30.8         -7.9'         55.3'           15         42°23.5         · 27.3         44°05.9         10.4'         24°22.8         -8.1'         55.3'           16         57°23.3         26.8         58°35.3         10.5'         24°14.8         -8.2'         55.3'           17         72°23.1         26.3         73°04.8         10.5'         24°14.8         -8.2'         55.3'           18         87°22.9         S20°25.8         87°34.3         10.6'         S23°58.3         -8.4'         55.3'           19         102°22.7         25.2         102°03.9         10.6'         23°49.9         -8.5'         <								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	10		29.9					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$				44°05.9		24°22.8		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			26.8					
19     102°22.7     25.2     102°03.9     10.6'     23°49.9     -8.5'     55.4'       20     117°22.5     24.7     116°33.5     10.7'     23°41.3     -8.7'     55.4'       21     132°22.3     · · 24.2     131°03.1     10.7'     23°32.7     -8.8'     55.4'       22     147°22.1     23.7     145°32.9     10.8'     23°23.9     -8.9'     55.4'       23     162°21.9     23.2     160°02.6     10.8'     23°15.0     -9.0'     55.4'								
20     117°22.5     24.7     116°33.5     10.7'     23°41.3     -8.7'     55.4'       21     132°22.3     · · 24.2     131°03.1     10.7'     23°32.7     -8.8'     55.4'       22     147°22.1     23.7     145°32.9     10.8'     23°23.9     -8.9'     55.4'       23     162°21.9     23.2     160°02.6     10.8'     23°15.0     -9.0'     55.4'								
21     132°22.3     · · · 24.2     131°03.1     10.7'     23°32.7     -8.8'     55.4'       22     147°22.1     23.7     145°32.9     10.8'     23°23.9     -8.9'     55.4'       23     162°21.9     23.2     160°02.6     10.8'     23°15.0     -9.0'     55.4'								
23 162°21.9 23.2 160°02.6 10.8' 23°15.0 -9.0' 55.4'								
SD = 16.2'  d = -0.5' $SD = 15.0'$	23			160°02.6	10.8'	23°15.0	-9.0'	55.4'
		SD = 16.2'	d = -0.5'		SE	0 = 15.0'		

	Twi	light			Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	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
$60^{\circ}$	06:59	07:52	08:44	15:36	16:28	17:22
N 58°	06:53	07:43	08:31	15:50	16:38	17:28
56°	06:48	07:35	08:19	16:02	16:46	17:33
54°	06:43	07:27	08:08	16:12	16:53	17:38
52°	06:38	07:21	07:59	16:21	17:00	17:42
50°	06:34	07:14	07:51	16:30	17:06	17:46
45°	06:25	07:01	07:34	16:47	17:20	17:56
<b>N</b> 40°	06:16	06:50	07:19	17:01	17:31	18:04
35°	06:09	06:40	07:07	17:13	17:41	18:12
30°	06:01	06:31	06:56	17:24	17:50	18:19
20°	05:47	06:14	06:38	17:42	18:06	18:33
$N 10^{\circ}$	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°	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	////
Lat.		Moonris	ie .		Moonset	
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°		_			_	

Lat.		Moonris	e		Moonset	:
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°						
N 70°						
68°						
66°						
64°			10:48			13:18
62°		10:12	10:01		12:04	14:04
60°	08:47	09:19	09:31	11:39	12:58	14:34
N 58°	08:08	08:46	09:07	12:19	13:30	14:56
56°	07:41	08:22	08:49	12:46	13:54	15:14
54°	07:19	08:03	08:33	13:07	14:13	15:30
52°	07:01	07:46	08:19	13:25	14:29	15:43
50°	06:46	07:32	08:07	13:40	14:43	15:55
45°	06:16	07:03	07:42	14:11	15:11	16:19
<b>N</b> 40°	05:52	06:41	07:22	14:35	15:34	16:38
35°	05:32	06:22	07:06	14:54	15:52	16:54
30°	05:15	06:06	06:51	15:11	16:08	17:08
20°	04:47	05:38	06:26	15:39	16:34	17:31
<b>N</b> 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.of	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	M	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	118°24.3	174°02.6	\$20°48.6	179°35.4	S21°48.5	опа 7°50.5	N22°22.5	119°51.9	503°02.2			Dec
1	133°26.7	174 02.0 189°01.8		179 35.4 194°35.9	48.1	22°53.3	22.6	119 51.9 134°54.1	02.1	Alpheratz	357°34.0	29°14.2
			48.0							Ankaa	353°06.4	-42°10.1
2	148°29.2	204°01.0	47.4	209°36.3	47.8	37°56.1	22.6	149°56.4	02.0	Schedar	349°30.2	56°41.1
3	163°31.6	219°00.2	• • 46.7	224°36.7	• • 47.4	52°58.9	• • 22.7	164°58.7	• • 01.9	Diphda	348°46.5	-17°50.7
4	178°34.1	233°59.3	46.1	239°37.1	47.1	68°01.7	22.7	180°00.9	01.8	Achernar	$335^{\circ}19.6$	-57°06.5
5	193°36.6	248°58.5	45.4	254°37.5	46.7	83°04.5	22.8	195°03.2	01.7	Hamal	327°50.2	23°35.2
6	208°39.0 223°41.5	263°57.7	\$20°44.8	269°37.9 284°38.3	\$21°46.3	98°07.4	N22°22.8	210°05.5	\$03°01.6	Polaris	313°25.0	89°22.8
7		278°56.8	44.1		46.0	113°10.2	22.9	225°07.8	01.5	Acamar	$315^{\circ}11.0$	-40°12.2
8	238°44.0 253°46.4	293°56.0	43.5	299°38.7	45.6	128°13.0	22.9	240°10.0	01.4	Menkar	$314^{\circ}05.1$	4°11.5
9	268°48.9	308°55.2	• • 42.8	314°39.1	• • 45.2	143°15.8	• • 23.0	255°12.3 270°14.6	01.3	Mirfak	308°26.8	49°57.4
10		323°54.4	42.2	329°39.5 344°39.9	44.9 44.5	158°18.6	23.0		01.3	Aldebaran	290°38.4	16°33.7
11	283°51.4 298°53.8	338°53.6 353°52.7	41.5 \$20°40.9	359°40.3	521°44.1	173°21.4 188°24.2	23.1 N22°23.1	285°16.9 300°19.1	01.2 \$03°01.1	Rigel	281°02.8	-8°10.4
12 13	290 55.6 313°56.3	8°51.9		14°40.8		203°27.0		315°21.4		Capella	280°20.2	46°01.5
	328°58.8	23°51.1	40.2 39.6	29°41.2	43.8 43.4	203 27.0 218°29.9	23.2 23.2	330°23.7	01.0 00.9	Bellatrix	278°21.7	6°22.4
14 15	344°01.2	23 51.1 38°50.3	38.9	44°41.6	• • 43.0	216 29.9 233°32.7	23.2	345°26.0	00.8	Elnath	278°00.5	28°37.8
16	359°03.7	53°49.5	38.3	59°42.0	42.7	248°35.5	23.3	0°28.2	00.7	Alnilam	275°36.6	-1°11.2
17	14°06.1	68°48.6	37.6	74°42.4	42.7	246 35.5 263°38.3	23.3	15°30.5	00.7	Betelgeuse	270°50.8	7°24.7
					\$21°41.9		N22°23.4			Canopus	263°51.5	-52°42.7
18	29°08.6 44°11.1	83°47.8 98°47.0	\$20°36.9	89°42.8 104°43.2		278°41.1 293°43.9		30°32.8 45°35.0	\$03°00.5 00.4	Sirius	258°25.1	-16°45.2
19 20	59°13.5	96 47.0 113°46.2	36.3 35.6	104 43.2 119°43.6	41.6	293 43.9 308°46.7	23.5 23.5	45° 35.0 60° 37.3		Adhara	255°04.8	-29°00.5
21	74°16.0	113 40.2 128°45.4	34.9	119 45.0 134°44.0	41.2 •• 40.8	306 40.7 323°49.5		75°39.6	00.4	Procyon	244°49.6	5°09.4
22	89°18.5	143°44.5	34.3	134 44.0 149°44.4	40.5	338°52.4	· · 23.6 23.6	90°41.9	00.2	Pollux	243°15.9	27°57.7
										Avior	234°13.7	-59°35.5
23	104°20.9	158°43.7	33.6	164°44.9	40.1	353°55.2	23.7	105°44.1	00.1	Suhail	222°45.2	-43°32.2
Mer.pa	ass. 16:04	$\nu$ -0.8′ d-0	.6′ 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 $1.03$	Miaplacidus	221°37.2	-69°49.3
										Alphard	217°46.6	-8°46.4
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.2	11°50.3
0	119°23.4	173°42.9	S20° 33.0	179°45.3	S21°39.7	8°58.0	N22°23.8	120°46.4	\$03°00.0	Dubhe	193°39.5	61°36.3
1	134°25.9	188°42.1	32.3	194°45.7	39.3	24°00.8	23.8	135°48.7	02°59.9	Denebola	182°23.9	14°25.4
2	149°28.3	203°41.3	31.6	209°46.1	39.0	39°03.6	23.9	150°51.0	59.8	Gienah	175°42.6	-17°41.2
3	164°30.8	218°40.5	30.9	224°46.5	• • 38.6	54°06.4	23.9	165°53.2	• • 59.7		172°58.9	-63°14.4
4	179°33.2	233°39.6	30.3	239°46.9	38.2	69°09.2	24.0	180°55.5	59.6	Gacrux		-57°15.4
5	194°35.7	248°38.8	29.6	254°47.3	37.9	84°12.0	24.0	195°57.8	59.5	Alioth	166°12.0	55°48.7
6	209°38.2	263°38.0	\$20°28.9	269°47.7	S21°37.5	99°14.9	N22°24.1	211°00.0	S02°59.4	Spica	158°21.3	-11°17.9
7	224°40.6	278°37.2	28.3	284°48.1	37.1	114°17.7	24.1	226°02.3	59.4	Alkaid	152°51.3	49°10.6
8	239°43.1	293°36.4	27.6	299°48.6	36.7	129°20.5	24.2	241°04.6	59.3	Hadar	148°34.8	-60°29.7
9	254°45.6	308°35.6	26.9	314°49.0	36.4	144°23.3	• • 24.2	256°06.9	59.2	Menkent	147°56.6	-36°29.8
10	269°48.0	323°34.8	26.2	329°49.4	36.0	159°26.1	24.3	271°09.1	59.1	Arcturus	145°47.1	19°02.6
11	284°50.5	338°34.0	25.6	344°49.8	35.6	174°28.9	24.3	286°11.4	59.0	Rigil Kent.	139°39.2	-60°56.4
12	299°53.0	353°33.2	S20°24.9	359°50.2	S21°35.2	189°31.7	N22°24.4	301°13.7	S02°58.9	Kochab	137°20.1	74°02.5
13	314°55.4	8°32.3	24.2	14°50.6	34.9	204°34.5	24.4	316°15.9	58.8	Zuben'ubi	136°55.1	-16°09.0 26°37.4
14	329°57.9	23°31.5	23.5	29°51.0	34.5	219°37.3	24.5	331°18.2	58.7	Alphecca	126°03.2 112°15.0	-26°29.3
15	345°00.4	38°30.7	• • 22.8	44°51.4	• • 34.1	234°40.1	• • 24.5	346°20.5	• • 58.6	Antares Atria	112 15.0 107°08.9	-20 29.3 -69°04.2
16	0°02.8	53°29.9	22.2	59°51.8	33.7	249°43.0	24.6	1°22.7	58.5	Sabik	107 08.9 102°02.0	-09 04.2 -15°45.4
17	15°05.3	68°29.1	21.5	74°52.3	33.3	264°45.8	24.6	16°25.0	58.4	Shaula	96°09.5	-37°07.3
18	30°07.7	83°28.3	S20°20.8	89°52.7	S21°33.0	279°48.6	N22°24.7	31°27.3	S02°58.4	Rasalhague	95°58.0	12°32.3
19	45°10.2	98°27.5	20.1	104°53.1	32.6	294°51.4	24.7	46°29.6	58.3	Eltanin	90°42.3	51°28.9
20	60°12.7	113°26.7	19.4	119°53.5	32.2	309°54.2	24.8	61°31.8	58.2	Kaus Aust.	83°31.7	-34°22.3
21	$75^{\circ}15.1$	128°25.9	• • 18.7	134°53.9	• • 31.8	324°57.0	• • 24.8	76°34.1	•• 58.1	Vega	80°33.0	38°48.3
22	90°17.6	143°25.1	18.0	149°54.3	31.4	339°59.8	24.9	91°36.4	58.0	Nunki	75°47.0	-26°15.9
23	$105^{\circ}20.1$	158°24.3	17.3	164°54.7	31.1	355°02.6	24.9	106°38.6	57.9	Altair	61°59.4	8°56.2
Mern	ass. 16:00	ν-0.8' d-0	.7′ m-3.90	ν0 Δ' d-0	.4′ m1.09	1/2 8' d0	1' m-2.67	1/2 3 <sup>1</sup> d-0	.1′ m1.03	Peacock	53°05.0	-56°39.1
- IVICI.P	a33. 10.00	ν-0.0 u-0	.7 111-3.90	νο. <del>-</del> α-ο	.4 1111.09	ν2.0 do.	111-2.07	ν2.5 u-0		Deneb	49°25.7	45°22.4
										Enif	33°38.2	9°59.7
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.2
0	120°22.5	173°23.5	S20°16.7	179°55.2	S21°30.7	10°05.4	N22°24.9	121°40.9	S02°57.8	Fomalhaut	15°13.8	-29°29.2
1	135°25.0	$188^{\circ}22.7$	16.0	194°55.6	30.3	25°08.2	25.0	136°43.2	57.7	Scheat	13°44.6	28°13.5
2	150°27.5	203°21.9	15.3	209°56.0	29.9	$40^{\circ}11.1$	25.0	151°45.4	57.6	Markab	13°29.3	15°20.8
3	165°29.9	218°21.1	• • 14.6	224°56.4	• • 29.5	55°13.9	• • 25.1	166°47.7	• • 57.5			
4	180°32.4	233°20.3	13.9	239°56.8	29.2	70°16.7	25.1	181°50.0	57.4	Jan 19 Mon	SHA	Mer.pass
5	195°34.9	248°19.5	13.2	254°57.2	28.8	85°19.5	25.2	196°52.2	57.3	Venus	55°38.4	12:25
6	210°37.3	263°18.7	\$20°12.5	269°57.6	S21°28.4	100°22.3	N22°25.2	211°54.5	S02°57.3	Mars	61°11.2	12:01
7	225°39.8	278°17.9	11.8	284°58.1	28.0	115°25.1	25.3	226°56.8	57.2	Jupiter	249°26.2	23:24
8	240°42.2	293°17.1	11.1	299°58.5	27.6	130°27.9	25.3	241°59.0	57.1	Saturn	1°27.6	15:58
9	255°44.7	308°16.3	• • 10.4	314°58.9	• • 27.2	145°30.7	• • 25.4	257°01.3	• • 57.0	Jan 20 Tue	SHA	Mer.pass
10	270°47.2	323°15.5	09.7	329°59.3	26.9	160°33.5	25.4	272°03.6	56.9	Venus	54°19.5	12:26
11	285°49.6	338°14.7	09.0	344°59.7	26.5	175°36.3	25.5	287°05.8	56.8	Mars	60°21.9	12:01
12	300°52.1	353°13.9	\$20°08.3	0°00.1	\$21°26.1	190°39.1	N22°25.5	302°08.1	\$02°56.7	Jupiter	249°34.6	23:20
13	315°54.6	8°13.1	07.6	15°00.5	25.7	205°41.9	25.6	317°10.4	56.6	Saturn	1°23.0	15:54
14 15	330°57.0	23°12.3	06.9	30°01.0	25.3	220°44.8	25.6	332°12.7	56.5	1 01		
15 16	345°59.5 1°02.0	38°11.5 53°10.7	· · 06.2	45°01.4 60°01.8	· · 24.9	235°47.6 250°50.4	· · 25.7	347°14.9 2°17.2	· · 56.4	Jan 21 Wed	SHA F3°00 0	Mer.pass
16 17	1°02.0 16°04.4	53°10.7 68°09.9	05.5 04.7	75°02.2	24.5 24.1	250°50.4 265°53.2	25.7 25.8	17°19.5	56.3 56.2	Venus	53°00.9	12:27
17 18	31°06.9	83°09.1	04.7 \$20°04.0	90°02.6	24.1 \$21°23.8	265°53.2 280°56.0	25.8 N22°25.8	32°21.7	50.2 S02°56.1	Mars	59°32.6	12:00
19	46°09.3	98°08.3	03.3	105°03.0	23.4	295°58.8	25.9	47°24.0	56.1	Jupiter		23:15
20	40 09.3 61°11.8	96 06.5 113°07.5	03.3	105 03.0 120°03.4	23.4	311°01.6	25.9 25.9	62°26.3	56.0	Saturn	1°18.4	15:51
21	76°14.3	113 07.5 128°06.7	•• 01.9	135°03.4	• • 22.6	326°04.4	26.0	77°28.5	• • 55.9	Horizont	al parallax	
22	91°16.7	143°05.9	01.2	150°04.3	22.2	341°07.2	26.0	92°30.8	55.8		Venus:	0.1
23	106°19.2	158°05.1	00.5	165°04.7	21.8	356°10.0	26.1	107°33.1	55.7		Mars:	0.1
			.7′ m-3.90		.4′ m1.09		0′ m-2.66		.1′ m1.03			
ivier.pa	ass. 15:56	$\nu$ -0.0 $a$ -0	., 111-3.90	$\nu$ 0.4 $u$ -0	.+ 1111.09	ν2.0 a0.	∪ 111-∠.00	ν2.3 U-U	.1111.03			

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	177°21.7	\$20°22.6	174°32.4	10.9'	S23°05.9	-9.1'	55.5'
1 2	192°21.5 207°21.3	22.1 21.6	189°02.3 203°32.2	10.9'	22°56.8 22°47.5	-9.3'	55.5'
3	207 21.3 222°21.1	21.1	203 32.2 218°02.2	11.0' 11.0'	22 47.5 22°38.1	-9.4' -9.5'	55.5' 55.5'
4	237°21.0	20.5	232°32.2	11.1'	22°28.6	-9.6'	55.5'
5	252°20.8	20.0	247°02.3	11.1'	22°19.0	-9.7'	55.6'
6	267°20.6 282°20.4	\$20° 19.5 19.0	261°32.4 276°02.6	11.2' 11.2'	\$22°09.3 21°59.5	-9.8' -10.0'	55.6' 55.6'
7 8	297°20.2	18.4	270 02.0 290°32.8	11.2	21 59.5 21°49.5	-10.0	55.6'
9	312°20.0	• • 17.9	305°03.1	11.3'	21°39.4	-10.2'	55.6'
10	327°19.8	17.4	319°33.4	11.4'	21°29.3	-10.3'	55.7'
11 12	342°19.6 357°19.4	16.9 \$20°16.3	334°03.8 348°34.3	11.4' 11.5'	21°19.0 521°08.6	-10.4' -10.5'	55.7' 55.7'
13	12°19.2	15.8	3°04.8	11.6'	20°58.1	-10.6'	55.7'
14	27°19.0	15.3	$17^{\circ}35.3$	11.6'	$20^{\circ}47.5$	-10.7'	55.7'
15	42°18.9	• • 14.7	32°05.9	11.7'	20°36.8	-10.8'	55.8'
16 17	57°18.7 72°18.5	14.2 13.7	46°36.6 61°07.3	11.7' 11.8'	20°26.0 20°15.1	-10.9' -11.0'	55.8' 55.8'
18	87°18.3	\$20°13.1	75°38.1	11.8'	\$20°04.0	-11.1'	55.8'
19	102°18.1	12.6	90°08.9	11.9'	19°52.9	-11.2'	55.8'
20	117°17.9	12.1	104°39.8	11.9'	19°41.7	-11.3'	55.9'
21 22	132°17.7 147°17.5	· · 11.5 11.0	119°10.7 133°41.7	12.0' 12.0'	19°30.4 19°18.9	-11.4' -11.5'	55.9' 55.9'
23	162°17.4	10.5	148°12.7	12.1'	19°07.4	-11.6'	55.9'
	SD = 16.2'	d = -0.5'			D = 15.1'		
Tue	<b>GHA</b> 177°17.2	<b>Dec</b> \$20°09.9	<b>GHA</b> 162°43.8	u  12.1'	<b>Dec</b> \$18°55.8	d -11.7'	<b>HP</b> 55.9'
0 1	177°17.2 192°17.0	\$20°09.9 09.4	162°43.8 177°14.9	12.1	518°55.8 18°44.1	-11.7' -11.8'	55.9'
2	207°16.8	08.8	191°46.1	12.2'	18°32.3	-11.9'	56.0'
3	222°16.6	• • 08.3	206°17.4	12.3'	18°20.4	-12.0'	56.0'
4	237°16.4 252°16.2	07.8	220°48.6 235°20.0	12.3'	18°08.4 17°56.3	-12.1'	56.0'
5 6	252°16.2 267°16.1	07.2 \$20°06.7	235° 20.0 249° 51.4	12.4' 12.4'	517°44.1	-12.2' -12.3'	56.0' 56.0'
7	282°15.9	06.1	264°22.8	12.5'	17°31.9	-12.4'	56.1'
8	297°15.7	05.6	278°54.3	12.5'	$17^{\circ}19.5$	-12.4'	56.1'
9	312°15.5	• • 05.0	293°25.8	12.6'	17°07.1	-12.5'	56.1'
10 11	327°15.3 342°15.1	04.5 04.0	307°57.4 322°29.1	12.6' 12.7'	16°54.5 16°41.9	-12.6' -12.7'	56.1' 56.1'
12	357°15.0	S20°03.4	337°00.8	12.7'	S16°29.2	-12.8'	56.2'
13	12°14.8	02.9	351°32.5	12.8'	16°16.4	-12.9'	56.2'
14 15	27°14.6 42°14.4	02.3 •• 01.8	6°04.3 20°36.1	12.8' 12.9'	16°03.6 15°50.6	-12.9' -13.0'	56.2' 56.2'
15 16	42 14.4 57°14.2	01.8	20 30.1 35°08.0	12.9' 12.9'	15 50.6 15°37.6	-13.0 -13.1'	56.2'
17	72°14.0	00.7	49°39.9	13.0'	15°24.5	-13.2'	56.3'
18	87°13.9	\$20°00.1	64°11.8	13.0'	\$15°11.3	-13.3'	56.3'
19 20	102°13.7 117°13.5	19° 59.6 59.0	78°43.8 93°15.9	13.0'	14°58.0 14°44.7	-13.3'	56.3' 56.3'
21	132°13.3	59.0 •• 58.5	93 15.9 107°48.0	13.1	14 44.7 14°31.3	-13.4 -13.5'	56.3'
22	147°13.1	57.9	122°20.1	13.2'	14°17.8	-13.6'	56.4'
23	162°13.0	57.4	136°52.3	13.2'	14°04.2	-13.6'	56.4'
	SD = 16.2'	d = -0.5'		SI	O = 15.3'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	177°12.8	S19°56.8	151°24.5	13.3'	S13°50.6	-13.7'	56.4'
1	192°12.6 207°12.4	56.3	165°56.7 180°29.0	13.3' 13.3'	13°36.9 13°23.1	-13.8' -13.8'	56.4'
2 3	207°12.4 222°12.3	55.7 •• 55.1	180°29.0 195°01.4	13.3	13°23.1 13°09.3	-13.8° -13.9'	56.5' 56.5'
4	237°12.1	54.6	209°33.7	13.4'	12°55.4	-14.0'	56.5
5	252°11.9	54.0	224°06.1	13.4'	12°41.4	-14.0'	56.5'
6 7	267°11.7 282°11.5	\$19°53.5 52.9	238°38.6 253°11.1	13.5' 13.5'	\$12°27.3 12°13.2	-14.1' -14.2'	56.5' 56.6'
8	282°11.5 297°11.4	52.9 52.4	267°43.6	13.5'	12°13.2 11°59.0	-14.2' -14.2'	56.6
9	312°11.2	• • 51.8	$282^{\circ}16.1$	13.6'	11°44.8	-14.3'	56.6'
10	327°11.0	51.2	296°48.7	13.6'	11°30.5	-14.4'	56.6'
11 12	342°10.8 357°10.7	50.7 \$19°50.1	311°21.3 325°53.9	13.6' 13.7'	11°16.2 \$11°01.7	-14.4' -14.5'	56.6' 56.7'
13	12°10.5	49.6	340°26.6	13.7'	10°47.3	-14.5'	56.7
14	27°10.3	49.0	354°59.3	13.7'	10°32.7	-14.6'	56.7'
15	42°10.1	• • 48.4	9°32.0	13.8'	10°18.2	-14.6'	56.7'
16 17	57°10.0 72°09.8	47.9 47.3	24°04.8 38°37.5	13.8' 13.8'	10°03.5 09°48.8	-14.7' -14.7'	56.7' 56.8'
18	87°09.6	\$19°46.7	53°10.3	13.8'	S09°34.1	-14.7	56.8
19	102°09.5	46.2	67°43.2	13.8'	09°19.3	-14.8'	56.8'
20	117°09.3	45.6	82°16.0	13.9'	09°04.4	-14.9'	56.8'
21 22	132°09.1 147°08.9	· · 45.0 44.5	96°48.9 111°21.8	13.9' 13.9'	08°49.5 08°34.6	-14.9' -15.0'	56.8' 56.9'
23	162°08.8	43.9	111 21.0 125°54.7	13.9'	08°19.6	-15.0'	56.9
	SD = 16.2'	d = -0.6'			D = 15.4'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	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
N 10°	05:34	06:00	06:22	18:00	18:22	18:48
0°	05:20	05:45	06:07	18:15	18:37	19:02
<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
N 58°	09:19	09:26	09:30	16:28	17:59	19:29
56°	09:05	09:16	09:24	16:41	18:08	19:34
54°	08:53	09:08	09:18	16:52	18:15	19:38
52°	08:43	09:00	09:14	17:02	18:22	19:42
50°	08:33	08:53	09:09	17:11	18:28	19:46
45°	08:13	08:38	09:00	17:30	18:41	19:53
<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

ı			Sun			Moon		ı
	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	0-5%	
	19	10:33	10:42	12:11	12:47	00:23		
	20	10:51	11:00	12:11	13:35	01:11		l
	21	11:09	11:17	12:11	14:21	01:58		

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

h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	121°21.7	173°04.3	\$19°59.8	180°05.1	S21°21.4	11°12.8	N22°26.1	122°35.3	S02°55.6	Alpheratz	357°34.1	29°14.2
1	136°24.1	188°03.5	59.0	195°05.5	21.0	26°15.6	26.2	137°37.6	55.5	Ankaa	353°06.5	-42°10.1
2	151°26.6	203°02.7	58.3	210°05.9	20.6	41°18.4	26.2	152°39.8	55.4	Schedar	349°30.3	56°41.1
3	$166^{\circ}29.1$	218°02.0	• • 57.6	225°06.4	• • 20.2	56°21.2	• • 26.3	167°42.1	• • 55.3	Diphda	349° 30.5	-17°50.7
4	181°31.5	233°01.2	56.9	240°06.8	19.8	71°24.0	26.3	182°44.4	55.2			
5	196°34.0	248°00.4	56.2	255°07.2	19.5	86°26.8	26.4	197°46.6	55.1	Achernar	335°19.6	-57°06.5
6	211°36.5	262°59.6	S19°55.4	270°07.6	S21°19.1	101°29.7	N22°26.4	212°48.9	S02°55.0	Hamal	327°50.2	23°35.2
7	226°38.9	277°58.8	54.7	285°08.0	18.7	116°32.5	26.5	227°51.2	54.9	Polaris	313°26.6	89°22.8
8	241°41.4	292°58.0	54.0	300°08.5	18.3	131°35.3	26.5	242°53.4	54.8	Acamar	315°11.0	-40°12.2
9	256°43.8	307° 57.2	• • 53.3	315°08.9	• • 17.9	146°38.1	• • 26.6	257°55.7	• • 54.8	Menkar	314°05.1	4°11.5
10	271°46.3	322°56.4	52.5	330°09.3	17.5	161°40.9	26.6	272°58.0	54.7	Mirfak	308°26.8	49°57.4
11	286°48.8	337°55.7	51.8	345°09.7	17.1	176°43.7	26.7	288°00.2	54.6	Aldebaran	290°38.4	16°33.7
12	301°51.2	352° 54.9	S19°51.1	0°10.1	S21°16.7	191°46.5	N22°26.7	303°02.5	S02°54.5	Rigel	281°02.8	-8°10.4
13	316°53.7	7°54.1	50.4	15°10.5	16.3	206°49.3	26.8	318°04.8	54.4	Capella	280°20.2	46°01.5
14	331°56.2	22°53.3	49.6	30°11.0	15.9	221°52.1	26.8	333°07.0	54.3	Bellatrix	278°21.7	6°22.4
15	346°58.6	37°52.5	• • 48.9	45°11.4	• • 15.5	236°54.9	• • 26.9	348°09.3	• • 54.2	Elnath	278°00.5	28°37.8
16	2°01.1	52°51.7	48.2	60°11.8	15.1	251°57.7	26.9	3°11.6	54.1	Alnilam	275°36.6	-1°11.2
17	17°03.6	67°51.0	47.4	75°12.2	14.7	267°00.5	27.0	18° 13.8	54.0	Betelgeuse	270°50.8	7°24.7
18	32°06.0	82°50.2	S19°46.7	90°12.6	S21°14.3	282°03.3	N22°27.0	33° 16.1	S02°53.9	Canopus	263°51.5	-52°42.7
19	47°08.5	97°49.4	46.0	105°13.1	13.9	297°06.1	27.1	48° 18.4	53.8	Sirius	258°25.1	-16°45.2
20	62°11.0	112°48.6	45.2	120°13.5	13.5	312°08.9	27.1	63°20.6	53.7	Adhara	255°04.8	-29°00.5
21	77°13.4	127° 47.8	• • 44.5	135°13.9	· · 13.1	327°11.7	27.2	78°22.9	• • 53.6	Procyon	244°49.6	5°09.4
22	92°15.9	127 47.0 142° 47.0	43.8	150°14.3	12.7	342°14.5	27.2	93°25.1	53.5	Pollux	243°15.9	27°57.7
										Avior	234°13.7	-59°35.6
23	107°18.3	157°46.3	43.0	165°14.7	12.3	357°17.3	27.2	108°27.4	53.4	Suhail	222°45.2	-43°32.3
Mer.p	ass. 15:52	$\nu$ -0.8′ d-0	).7′ m-3.90	$\nu$ 0.4' d-0	).4′ m1.10	$\nu$ 2.8′ d0.	0′ m-2.66	$\nu 2.3' \ d-0$	.1′ m1.03	Miaplacidus	221°37.2	-69°49.4
										Alphard	217°46.6	-8°46.4
			_		_		_		_	Regulus	207°33.2	11°50.2
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.4	61°36.3
0	122°20.8	172°45.5	S19°42.3	180°15.1	S21°11.9	12°20.1	N22°27.3	123°29.7	S02°53.4	Denebola	182°23.9	14°25.4
1	137°23.3	187°44.7	41.5	195°15.6	11.5	27°22.9	27.3	138°31.9	53.3	I	175°42.5	-17°41.2
2	152°25.7	202°43.9	40.8	210°16.0	11.1	42°25.7	27.4	153°34.2	53.2		172°58.8	-63°14.4
3	167°28.2	217°43.2	• • 40.1	225°16.4	• • 10.7	57°28.5	• • 27.4	168°36.5	•• 53.1		171°50.4	-57°15.4
4	182°30.7	232°42.4	39.3	240°16.8	10.3	72°31.3	27.5	183°38.7	53.0	I	166°12.0	55°48.7
5	197°33.1	247°41.6	38.6	255°17.3	09.9	87°34.1	27.5	198°41.0	52.9		158°21.3	-11°17.9
6	212°35.6	262°40.8	<b>S</b> 19°37.8	270°17.7	S21°09.5	102°36.9	N22°27.6	213°43.2	S02°52.8	Alkaid	150° 51.3	49°10.6
7	227°38.1	277°40.0	37.1	$285^{\circ}18.1$	09.1	$117^{\circ}39.7$	27.6	228°45.5	52.7	Hadar	148°34.8	-60°29.7
8	242°40.5	292°39.3	36.3	300°18.5	08.7	132°42.5	27.7	243°47.8	52.6	Menkent	140°56.6	-36°29.8
9	257°43.0	307°38.5	• • 35.6	315°18.9	• • 08.3	147°45.3	• • 27.7	258°50.0	• • 52.5	Arcturus	147 30.0 145°47.1	19°02.6
10	272°45.4	322°37.7	34.8	330°19.4	07.9	162°48.1	27.8	273°52.3	52.4	Rigil Kent.	139°39.2	-60°56.4
11	287°47.9	337°37.0	34.1	345°19.8	07.5	177°51.0	27.8	288°54.6	52.3	"	139 39.2 137°20.0	74°02.5
12	302°50.4	352°36.2	S19°33.3	0°20.2	S21°07.1	192°53.8	N22°27.9	303°56.8	S02°52.2	Kochab		
13	317°52.8	7°35.4	32.6	15°20.6	06.7	207°56.6	27.9	318°59.1	52.1	Zuben'ubi	136°55.1	-16°09.0
14	332°55.3	22°34.6	31.8	30°21.0	06.2	222°59.4	28.0	334°01.3	52.0	Alphecca	126°03.1	26°37.4
15	347°57.8	37°33.9	• • 31.1	45°21.5	• • 05.8	238°02.2	• • 28.0	349°03.6	• • 51.9	Antares	112°15.0	-26°29.3
16	3°00.2	52°33.1	30.3	60°21.9	05.4	253°05.0	28.1	4°05.9	51.8	Atria	107°08.8	-69°04.2
17	18°02.7	67°32.3	29.5	75°22.3	05.0	268°07.8	28.1	19°08.1	51.7	Sabik	102°02.0	-15°45.5
18	33°05.2	82°31.6	S19°28.8	90°22.7	S21°04.6	283°10.6	N22°28.2	34° 10.4	S02°51.7	Shaula	96°09.5	-37°07.3
19	48°07.6	97°30.8	28.0	105°23.2	04.2	298°13.4	28.2	49° 12.7	51.6	Rasalhague	95°58.0	12°32.3
20	63°10.1	112°30.0	27.3	120°23.6	03.8	313°16.2	28.3	64°14.9	51.5	Eltanin	90°42.2	51°28.9
21	78°12.6	127°29.3	26.5	135°24.0	03.4	328°19.0	28.3	79° 17.2	• • 51.4	Kaus Aust.	83°31.7	-34°22.3
22	93°15.0	142°28.5	25.8	150°24.4	03.0	343°21.8	28.3	94° 19.4	51.3	Vega	80°33.0	38°48.3
23	108°17.5	157° 27.7	25.0	165°24.8	02.6	358°24.6	28.4	109°21.7	51.2	Nunki	75°47.0	-26°15.9
23	100 17.5	131 21.1				330 24.0	20.4			Altair	61°59.4	8°56.2
Mer.p	ass. 15:48	$\nu$ -0.8' d-0	).7′ m-3.90	$\nu$ 0.4 $'$ d-0	$0.4' \; { m m} 1.10$	$\nu 2.8' \ d0.$	0′ m-2.66	$\nu 2.3' \ d-0$	.1'  m1.03	Peacock	53°04.9	-56°39.1
										Deneb	49°25.7	45°22.4
٠.	CIIA	CIIA	Б.	CILA	Б	CIIA	Б	CIIA	Б	Enif	33°38.2	9°59.6
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.2
0	123°19.9	172°27.0	\$19°24.2	180°25.3	\$21°02.2	13°27.4	N22°28.4	124°24.0	\$02°51.1	Fomalhaut	15°13.8	-29°29.2
1	138°22.4	187°26.2	23.5	195°25.7	01.7	28°30.2	28.5	139°26.2	51.0	Scheat	13°44.6	28°13.5
2	153°24.9	202°25.4	22.7	210°26.1	01.3	43°33.0	28.5	154°28.5	50.9	Markab	13°29.3	15°20.8
3	168°27.3	217°24.7	• • 21.9	225°26.5	• • 00.9	58°35.8	• • 28.6	169°30.7	• • 50.8	I- 00 T	CIIA	N4.
4	183°29.8	232°23.9	21.2	240°27.0	00.5	73°38.6	28.6	184°33.0	50.7	Jan 22 Thu	SHA	Mer.pass
5	198°32.3	247°23.1	20.4	255°27.4	21°00.1	88°41.4	28.7	199°35.3	50.6	Venus	51°42.7	12:28
6	213°34.7	262°22.4	S19°19.6	270°27.8	\$20°59.7	103°44.1	N22°28.7	214°37.5	S02°50.5	Mars	58°43.4	11:59
7	228°37.2	277°21.6	18.9	285°28.2	59.3	118°46.9	28.8	229°39.8	50.4	Jupiter	249°51.1	23:11
8	243°39.7	292°20.8	18.1	300°28.7	58.9	133°49.7	28.8	244°42.0	50.3	Saturn	1°13.6	15:47
9	258°42.1	307°20.1	• • 17.3	315°29.1	• • 58.4	148°52.5	• • 28.9	259°44.3	• • 50.2	Jan 23 Fri	SHA	Mer.pass
10	273°44.6	322°19.3	16.5	330°29.5	58.0	163°55.3	28.9	274°46.6	50.1	Venus	50°24.7	12:30
11	288°47.1	337° 18.6	15.8	345°29.9	57.6	178°58.1	29.0	289°48.8	50.0	Mars	57°54.3	11:59
12	303°49.5	352° 17.8	S19°15.0	0°30.4	\$20°57.2	194°00.9	N22°29.0	304°51.1	S02°49.9	Jupiter	249°59.3	23:06
	318°52.0	$7^{\circ}17.0$	14.2	15°30.8	56.8	209°03.7	29.1	$319^{\circ}53.3$	49.8	Saturn	1°08.9	15:44
13		$22^{\circ}16.3$	13.4	30°31.2	56.4	224°06.5	29.1	334°55.6	49.8	Jaturn	1 00.9	10:44
	333°54.4		• • 12.7	45°31.6	• • 55.9	239°09.3	• • 29.1	349°57.9	• • 49.7	Jan 24 Sat	SHA	Mer.pass
13	333°54.4 348°56.9	$37^{\circ}15.5$			55.5	254°12.1	29.2	5°00.1	49.6	Venus	49°07.0	12:31
13 14		37° 15.5 52° 14.8	11.9	60°32.1			29.2					
13 14 15 16	348°56.9		11.9 11.1	75°32.5	55.1	269°14.9	29.2	20°02.4	49.5	Mare	57°05 ३	11.58
13 14 15 16 17	348°56.9 3°59.4 19°01.8	52° 14.8 67° 14.0	11.1	$75^{\circ}32.5$						Mars	57°05.3 250°07.4	11:58 23:02
13 14 15 16 17 18	348°56.9 3°59.4 19°01.8 34°04.3	52°14.8 67°14.0 82°13.3	11.1 \$19°10.3	75°32.5 90°32.9	S20°54.7	284°17.7	N22°29.3	35°04.6	S02°49.4	Jupiter	250°07.4	23:02
13 14 15 16 17 18 19	348°56.9 3°59.4 19°01.8 34°04.3 49°06.8	52°14.8 67°14.0 82°13.3 97°12.5	11.1 \$19°10.3 09.5	75°32.5 90°32.9 105°33.3	\$20°54.7 54.3	284°17.7 299°20.5	N22°29.3 29.3	35°04.6 50°06.9	\$02°49.4 49.3			
13 14 15 16 17 18 19 20	348° 56.9 3° 59.4 19° 01.8 34° 04.3 49° 06.8 64° 09.2	52°14.8 67°14.0 82°13.3 97°12.5 112°11.7	11.1 \$19°10.3 09.5 08.8	75°32.5 90°32.9 105°33.3 120°33.8	\$20°54.7 54.3 53.9	284°17.7 299°20.5 314°23.3	N22°29.3 29.3 29.4	35°04.6 50°06.9 65°09.1	\$02°49.4 49.3 49.2	Jupiter Saturn	250°07.4 1°04.0	23:02
13 14 15 16 17 18 19 20 21	348°56.9 3°59.4 19°01.8 34°04.3 49°06.8 64°09.2 79°11.7	52°14.8 67°14.0 82°13.3 97°12.5 112°11.7 127°11.0	11.1 \$19°10.3 09.5 08.8 •• 08.0	75°32.5 90°32.9 105°33.3 120°33.8 135°34.2	\$20°54.7 54.3 53.9 •• 53.4	284°17.7 299°20.5 314°23.3 329°26.1	N22°29.3 29.3 29.4 · · 29.4	35°04.6 50°06.9 65°09.1 80°11.4	\$02°49.4 49.3 49.2 •• 49.1	Jupiter Saturn	250°07.4 1°04.0	23:02 15:40
13 14 15 16 17 18 19 20 21 22	348°56.9 3°59.4 19°01.8 34°04.3 49°06.8 64°09.2 79°11.7 94°14.2	52°14.8 67°14.0 82°13.3 97°12.5 112°11.7 127°11.0 142°10.2	11.1 \$19°10.3 09.5 08.8 • 08.0 07.2	75°32.5 90°32.9 105°33.3 120°33.8 135°34.2 150°34.6	\$20° 54.7 54.3 53.9 •• 53.4 53.0	284°17.7 299°20.5 314°23.3 329°26.1 344°28.9	N22°29.3 29.3 29.4 •• 29.4 29.5	35°04.6 50°06.9 65°09.1 80°11.4 95°13.7	\$02° 49.4 49.3 49.2 •• 49.1 49.0	Jupiter Saturn	250°07.4 1°04.0	23:02
13 14 15 16 17 18 19 20 21	348°56.9 3°59.4 19°01.8 34°04.3 49°06.8 64°09.2 79°11.7	52°14.8 67°14.0 82°13.3 97°12.5 112°11.7 127°11.0	11.1 \$19°10.3 09.5 08.8 •• 08.0	75°32.5 90°32.9 105°33.3 120°33.8 135°34.2 150°34.6 165°35.0	\$20°54.7 54.3 53.9 •• 53.4	284°17.7 299°20.5 314°23.3 329°26.1	N22°29.3 29.3 29.4 · · 29.4	35°04.6 50°06.9 65°09.1 80°11.4	\$02°49.4 49.3 49.2 •• 49.1	Jupiter Saturn	250°07.4 1°04.0 al parallax Venus:	23:02 15:40 0.1

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	177°08.6	\$19°43.3	140°27.6	13.9'	S08°04.6	-15.1'	56.9'
1 2	192°08.4 207°08.3	42.8 42.2	155°00.6 169°33.5	14.0' 14.0'	07°49.5 07°34.3	-15.1' -15.2'	56.9' 56.9'
3	222°08.1	• • 41.6	184°06.5	14.0'	07°19.2	-15.2'	57.0'
4	237°07.9	41.1	198°39.5	14.0'	07°04.0	-15.3'	57.0'
5	252°07.8 267°07.6	40.5 \$19°39.9	213°12.5 227°45.6	14.0' 14.0'	06°48.7 506°33.4	-15.3' -15.3'	57.0' 57.0'
6 7	267 07.6 282°07.4	39.3	227 45.6 242°18.6	14.0'	06°18.1	-15.3' -15.4'	57.0' 57.0'
8	297°07.3	38.8	256°51.6	14.1'	06°02.7	-15.4'	57.1'
9	312°07.1	• • 38.2	271°24.7	14.1'	05°47.3	-15.4'	57.1'
10 11	327°06.9 342°06.8	37.6 37.0	285°57.8 300°30.8	14.1' 14.1'	05°31.9 05°16.4	-15.5' -15.5'	57.1' 57.1'
12	357°06.6	S19°36.5	315°03.9	14.1'	S05°00.9	-15.5'	57.1
13	12°06.4	35.9	329° 37.0	14.1'	04°45.3	-15.6'	57.2'
14 15	27°06.3 42°06.1	35.3 •• 34.7	344°10.1 358°43.2	14.1' 14.1'	04°29.8 04°14.2	-15.6' -15.6'	57.2' 57.2'
16	57°05.9	34.1	13° 16.3	14.1	04 14.2 03°58.5	-15.0 -15.7'	57.2'
17	72°05.8	33.6	$27^{\circ}49.3$	14.1'	03°42.9	-15.7'	57.2'
18	87°05.6 102°05.4	S19°33.0	42°22.4	14.1'	\$03°27.2	-15.7'	57.3'
19 20	102°05.4 117°05.3	32.4 31.8	56°55.5 71°28.6	14.1' 14.1'	03°11.5 02°55.8	-15.7' -15.8'	57.3' 57.3'
21	132°05.1	31.2	86°01.7	14.1'	02°40.0	-15.8'	57.3'
22	147°04.9	30.7	100°34.8	14.1'	02°24.2	-15.8'	57.3'
23	162°04.8	30.1	115°07.8	14.1'	02°08.4	-15.8'	57.4'
	SD = 16.2'	d = -0.6'		SI	O = 15.5'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177°04.6	S19°29.5	129°40.9	14.1'	S01°52.6	-15.8'	57.4'
1 2	192°04.5 207°04.3	28.9 28.3	144°13.9 158°47.0	14.0' 14.0'	01°36.8 01°20.9	-15.9' -15.9'	57.4' 57.4'
3	207 04.3 222°04.1	· · 27.7	173° 20.0	14.0'	01°20.9	-15.9'	57.4'
4	237°04.0	27.1	187°53.0	14.0'	00°49.2	-15.9'	57.5'
5	252°03.8	26.6	202°26.0	14.0'	00°33.3	-15.9'	57.5
6 7	267°03.6 282°03.5	S19°26.0 25.4	216°59.0 231°32.0	14.0' 13.9'	\$00°17.4 \$00°01.5	-15.9' -15.9'	57.5' 57.5'
8	297°03.3	24.8	246°04.9	13.9'	N00°14.5	15.9'	57.5
9	312°03.2	• • 24.2	260°37.9	13.9'	00°30.4	15.9'	57.6'
10 11	327°03.0 342°02.9	23.6 23.0	275°10.8 289°43.7	13.9' 13.9'	00°46.3 01°02.3	16.0' 16.0'	57.6' 57.6'
12	357°02.7	\$19°22.4	304° 16.5	13.8'	N01°18.3	16.0'	57.6'
13	12°02.5	21.8	318°49.4	13.8'	01°34.2	16.0'	57.6'
14 15	27°02.4 42°02.2	21.2 · · 20.7	333°22.2 347°55.0	13.8' 13.8'	01°50.2 02°06.1	16.0' 16.0'	57.7' 57.7'
16	57°02.1	20.7	2°27.7	13.7'	02 00.1 02°22.1	16.0'	57.7'
17	72°01.9	19.5	$17^{\circ}00.4$	13.7'	$02^{\circ}38.1$	16.0'	57.7'
18	87°01.8 102°01.6	\$19° 18.9	31°33.1 46°05.8	13.7'	N02°54.1 03°10.0	16.0' 16.0'	57.7'
19 20	102 01.6 117°01.4	18.3 17.7	40 05.8 60°38.4	13.6' 13.6'	03°10.0	16.0'	57.8' 57.8'
21	132°01.3	• • 17.1	75°11.0	13.6'	03°41.9	15.9'	57.8'
22	147°01.1	16.5	89°43.6	13.5'	03°57.9	15.9'	57.8'
23	162°01.0	15.9	104°16.1	13.5'	04°13.8	15.9'	57.8'
	SD = 16.2'	d = -0.6'		SL	O = 15.6'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177°00.8 192°00.7	\$19° 15.3 14.7	118°48.6	13.4' 13.4'	N04°29.7 04°45.7	15.9' 15.9'	57.9'
1 2	192 00.7 207°00.5	14.7 14.1	133°21.0 147°53.4	13.4 13.4'	04 45.7 05°01.6	15.9' 15.9'	57.9' 57.9'
3	222°00.4	• • 13.5	$162^{\circ}25.8$	13.3'	$05^{\circ}17.5$	15.9'	57.9'
4	237°00.2 252°00.1	12.9	176°58.1	13.3'	05°33.3 05°49.2	15.9'	57.9'
5 6	252°00.1 266°59.9	12.3 \$19°11.7	191°30.4 206°02.6	13.2' 13.2'	05°49.2 N06°05.1	15.8' 15.8'	58.0' 58.0'
7	281°59.8	11.1	$220^{\circ}34.7$	13.1'	06°20.9	15.8'	58.0'
8	296°59.6	10.5	235°06.9	13.1'	06°36.7	15.8'	58.0'
9 10	311°59.5 326°59.3	· · 09.9 09.3	249°38.9 264°10.9	13.0' 13.0'	06°52.5 07°08.3	15.8' 15.7'	58.0' 58.1'
11	341°59.2	08.7	278°42.9	12.9'	07°24.0	15.7'	58.1
12	356°59.0	\$19°08.1	293° 14.8	12.8'	N07°39.7	15.7'	58.1'
13 14	11°58.9 26°58.7	07.4 06.8	307°46.7 322°18.4	12.8' 12.7'	07°55.4 08°11.1	15.7' 15.6'	58.1' 58.1'
15	41°58.6	06.2	336° 50.2	12.7'	08°26.7	15.6'	58.2'
16	56°58.4	05.6	$351^{\circ}21.8$	12.6'	08°42.3	15.6'	58.2'
17 18	71°58.3 86°58.1	05.0 \$19°04.4	5°53.5 20°25.0	12.5' 12.5'	08°57.9 N09°13.5	15.5' 15.5'	58.2' 58.2'
19	101°58.0	03.8	20 25.0 34°56.5	12.5 12.4'	09°29.0	15.5'	58.2'
20	116°57.8	03.2	49°27.9	12.3'	09°44.4	15.4'	58.3'
21 22	131°57.7 146°57.5	· · 02.6 02.0	63°59.2 78°30.5	12.3' 12.2'	09°59.9 10°15.3	15.4' 15.4'	58.3' 58.3'
23	140 57.5 161°57.4	02.0	78 30.5 93°01.7	12.2	10°15.3	15.4 15.3'	58.3'
	SD = 16.2'	d = -0.6'			D = 15.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	07:39	09:18			15:07	16:46
N 70°	07:27	08:52	10:41	13:44	15:33	16:57
68°	07:18	08:33	09:56	14:28	15:52	17:07
66°	07:10	08:17	09:27	14:57	16:08	17:15
64°	07:03	08:04	09:05	15:19	16:21	17:22
62°	06:56	07:53	08:48	15:36	16:32	17:28
60°	06:51	07:43	08:33	15:51	16:41	17:34
N 58°	06:46	07:35	08:21	16:03	16:49	17:38
56°	06:41	07:28	08:10	16:14	16:57	17:43
54°	06:37	07:21	08:01	16:23	17:03	17:47
52°	06:33	07:15	07:53	16:32	17:09	17:51
50°	06:30	07:09	07:45	16:39	17:15	17:55
45°	06:21	06:57	07:29	16:55	17:27	18:03
<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	////

Lat.		Moonris	е		Moonset	:
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°	10:07	09:32	08:56	20:40	22:53	
N 70°	09:59	09:33	09:06	20:44	22:47	
68°	09:53	09:33	09:13	20:47	22:42	
66°	09:48	09:34	09:20	20:50	22:38	
64°	09:43	09:34	09:25	20:52	22:35	
62°	09:39	09:35	09:30	20:54	22:32	
60°	09:36	09:35	09:34	20:56	22:29	
N 58°	09:33	09:35	09:38	20:58	22:27	
56°	09:30	09:36	09:41	20:59	22:25	23:54
54°	09:27	09:36	09:44	21:00	22:23	23:49
52°	09:25	09:36	09:47	21:01	22:22	23:44
50°	09:23	09:36	09:50	21:02	22:20	23:40
45°	09:19	09:37	09:55	21:05	22:17	23:31
<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
N 10°	08:59	09:39	10:19	21:14	22:03	22:55
0°	08:55	09:39	10:25	21:16	22:01	22:47
<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		Eqn.of Time 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		

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	124°19.1	172°08.7	\$19°05.6	180°35.5	\$20°52.2	14°34.5	N22°29.6	125°18.2	S02°48.8			
1	139°21.5	187°08.0	04.8	195°35.9	51.8	29°37.3	29.6	140°20.4	48.7	Alpheratz	357°34.1	29°14.2
2	154°24.0	202°07.2	04.0	210°36.3	51.3	44°40.1	29.7	155°22.7	48.6	Ankaa	353°06.5	-42°10.1
3	169°26.5	217°06.5	03.2	225°36.7	50.9	59°42.9	29.7	170°25.0	• • 48.5	Schedar	349°30.3	56°41.1
4	184°28.9	232°05.7	02.5	240°37.2	50.5	74°45.7	29.7	185°27.2	48.4	Diphda	348°46.5	-17°50.7
5	199°31.4	247°05.0	01.7	255°37.6	50.1	89°48.5	29.8	200°29.5	48.3	Achernar	335°19.6	-57°06.5
6	214°33.9	262°04.2	S19°00.9	270°38.0	S20°49.6	104°51.3	N22°29.8	215°31.7	S02°48.2	Hamal	327°50.2	23°35.2
7	229°36.3	277°03.5	19°00.1	285°38.4	49.2	$119^{\circ}54.1$	29.9	230°34.0	48.1	Polaris	313°28.0 315°11.0	89°22.8 -40°12.2
8	244°38.8	292°02.7	18°59.3	300°38.9	48.8	134°56.9	29.9	245°36.2	48.0	Acamar Menkar	314°05.2	4°11.5
9	259°41.3	307°02.0	• • 58.5	315°39.3	• • 48.4	149°59.7	• • 30.0	260°38.5	• • 47.9	Mirfak	308°26.8	49°57.4
10	274°43.7	322°01.2	57.7	330°39.7	47.9	165°02.4	30.0	275°40.8	47.8	Aldebaran	290°38.4	16°33.7
11	289°46.2	337°00.5	56.9	345°40.2	47.5	180°05.2	30.1	290°43.0	47.7	Rigel	281°02.8	-8°10.4
12	304°48.7	351°59.7	\$18°56.1	0°40.6	S20°47.1	195°08.0	N22°30.1	305°45.3	502°47.6	Capella	280°20.2	46°01.6
13	319°51.1	6°59.0	55.3	15°41.0	46.7	210°10.8	30.2	320°47.5	47.5	Bellatrix	278°21.7	6°22.4
14 15	334°53.6 349°56.0	21°58.2 36°57.5	54.5 •• 53.7	30°41.4 45°41.9	46.2 •• 45.8	225°13.6 240°16.4	30.2 · · 30.3	335°49.8 350°52.0	47.4 •• 47.3	Elnath	278°00.5	28°37.8
16	4°58.5	51°56.7	52.9	60°42.3	45.4	255°19.2	30.3	5°54.3	47.2	Alnilam	275°36.6	-1°11.2
17	20°01.0	66°56.0	52.1	75°42.7	45.0	270°22.0	30.3	20°56.5	47.2	Betelgeuse	270°50.9	7°24.7
18	35°03.4	81°55.3	S18°51.3	90°43.2	S20°44.5	285°24.8	N22°30.4	35°58.8	S02°47.1	Canopus	263°51.5	-52°42.7
19	50°05.9	96°54.5	50.5	105°43.6	44.1	300°27.6	30.4	51°01.1	47.0	Sirius	258°25.1	-16°45.2
20	65°08.4	111°53.8	49.7	120°44.0	43.7	315°30.4	30.5	66°03.3	46.9	Adhara	255°04.8	-29°00.5
21	80°10.8	126°53.0	• • 48.9	135°44.4	• • 43.3	330°33.2	• • 30.5	81°05.6	• • 46.8	Procyon	244°49.6	5°09.4
22	95°13.3	141°52.3	48.1	150°44.9	42.8	345°36.0	30.6	96°07.8	46.7	Pollux Avior	243°15.9 234°13.7	27°57.7 -59°35.6
23	$110^{\circ}15.8$	156°51.5	47.3	$165^{\circ}45.3$	42.4	0°38.8	30.6	$111^{\circ}10.1$	46.6	Suhail	234°13.7 222°45.2	-59°35.6 -43°32.3
Mern	ass. 15:40	ν-0 8' d-0	0.8' m-3.90	ν0 4' d-0	.4′ m1.10	1/2 8' d0	0′ m-2.65	v2 31 d-0	.1′ m1.03	Miaplacidus	222 45.2 221°37.2	-43 32.3 -69°49.4
ivier.p	,u33. 1J.4U	ν-0.0 u-0	7.0 111-3.90	νυ. <del>4</del> α-0	1111.10	ν Δ.Ο	U 111-2.00	ν2.5 U-U	.1111.03	Alphard	221 37.2 217°46.6	-8°46.4
										Regulus	207°33.2	11°50.2
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.4	61°36.3
0	125°18.2	171°50.8	S18°46.4	180°45.7	S20°42.0	15°41.5	N22°30.7	126°12.3	S02°46.5	Denebola	182°23.8	14°25.4
1	140°20.7	186°50.1	45.6	195°46.2	41.5	30°44.3	30.7	141°14.6	46.4	Gienah	175°42.5	-17°41.2
2 3	155°23.1 170°25.6	201°49.3 216°48.6	44.8 •• 44.0	210°46.6 225°47.0	41.1 • • 40.7	45°47.1 60°49.9	30.8 · · 30.8	156°16.8 171°19.1	46.3 •• 46.2	Acrux	172°58.8	-63°14.4
4	170 25.0 185°28.1	210 46.0 231°47.9	43.2	240°47.5	40.7	75°52.7	30.8	171 19.1 186°21.4	46.1	Gacrux		-57°15.4
5	200°30.5	246°47.1	42.4	255°47.9	39.8	90°55.5	30.0	201°23.6	46.0	Alioth	166°12.0	55°48.7
6	215°33.0	261°46.4	\$18°41.6	270°48.3	S20°39.4	105°58.3	N22°30.9	216°25.9	\$02°45.9	Spica	158°21.3	-11°17.9
7	230°35.5	276°45.6	40.8	285°48.8	38.9	121°01.1	31.0	231°28.1	45.8	Alkaid	152°51.2	49°10.6
8	245°37.9	291°44.9	39.9	300°49.2	38.5	136°03.9	31.0	246°30.4	45.7	Hadar	148°34.7	-60°29.7
9	260°40.4	306°44.2	• • 39.1	315°49.6	• • 38.1	151°06.7	31.1	261°32.6	• • 45.6		147°56.6	-36°29.8
10	275°42.9	321°43.4	38.3	330°50.0	37.6	166°09.5	31.1	276°34.9	45.5	Arcturus Rigil Kent.	145°47.1 139°39.1	19°02.6 -60°56.4
11	290°45.3	336°42.7	37.5	345°50.5	37.2	181°12.2	31.2	291°37.1	45.4	Kochab	139° 39.1 137° 20.0	74°02.5
12	305°47.8	351°42.0	S18°36.7	0°50.9	S20°36.8	$196^{\circ}15.0$	N22°31.2	306°39.4	S02°45.3	Zuben'ubi	136°55.1	-16°09.0
13	320°50.3	6°41.2	35.8	15°51.3	36.3	211°17.8	31.3	321°41.6	45.2	Alphecca	126°03.1	26°37.3
14	335°52.7	21°40.5	35.0	30°51.8	35.9	226°20.6	31.3	336°43.9	45.1	Antares	112° 15.0	-26°29.3
15	350°55.2	36°39.8	• • 34.2	45°52.2	• • 35.5	241°23.4	• • 31.3	351°46.2	• • 45.0	Atria	107°08.8	-69°04.2
16	5°57.6	51°39.0	33.4	60°52.6	35.0	256°26.2	31.4	6°48.4	44.9	Sabik	102°02.0	-15°45.5
17	21°00.1	66°38.3	32.5	75°53.1	34.6	271°29.0	31.4	21°50.7	44.8	Shaula	96°09.5	-37°07.3
18	36°02.6	81°37.6	\$18°31.7	90°53.5	\$20°34.2	286°31.8	N22°31.5	36°52.9	S02°44.7	Rasalhague	95°58.0	12°32.3
19	51°05.0 66°07.5	96°36.8 111°36.1	30.9	105°53.9 120°54.4	33.7	301°34.6 316°37.3	31.5	51°55.2 66°57.4	44.6	Eltanin	90°42.2	51°28.9
20 21	81°10.0	111 30.1 126°35.4	30.1 •• 29.2	120 54.4 135°54.8	33.3 · · 32.8	331°40.1	31.6 · · 31.6	81°59.7	44.5 •• 44.4	Kaus Aust.	83°31.7	-34°22.3
22	96°12.4	141°34.7	28.4	150°55.2	32.4	346°42.9	31.7	97°01.9	44.3	Vega	80°33.0	38°48.3
23	111°14.9	156°33.9	27.6	165°55.7	32.0	1°45.7	31.7	112°04.2	44.2	Nunki	75°47.0	-26°15.9
										Altair	61°59.4	8°56.1
Mer.p	ass. 15:36	$\nu$ -0.7 d-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′ m1.03	Peacock Deneb	53°04.9 49°25.7	-56°39.1 45°22.4
										Enif	33°38.2	9°59.6
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.2
0	126° 17.4	171°33.2	S18°26.7	180°56.1	S20°31.5	16°48.5	$N22^{\circ}31.8$	127°06.4	502°44.1	Fomalhaut	15°13.8	-29°29.2
1	141°19.8	186°32.5	25.9	195°56.5	31.1	31°51.3	31.8	142°08.7	44.0	Scheat	13°44.6	28°13.5
2	156°22.3	201°31.8	25.1	210°57.0	30.6	46°54.1	31.8	157°10.9	43.9	Markab	13°29.3	15°20.8
3	171°24.8	216°31.0	• • 24.2	225°57.4	30.2	61°56.9	31.9	172°13.2	• • 43.8	lam DE C.:	CHA	Ma:: ::
4	186°27.2	231°30.3	23.4	240°57.8	29.8	76°59.6	31.9	187°15.4	43.7	Jan 25 Sun Venus	<b>SHA</b> 47°49.6	Mer.pass 12:32
5 6	201°29.7 216°32.1	246°29.6 261°28.9	22.6 \$18°21.7	255°58.3 270°58.7	29.3 \$20°28.9	92°02.4 107°05.2	32.0 N22°32.0	202°17.7 217°19.9	43.6 S02°43.5	Mars	47 49.6 56°16.4	12:32
7	210 32.1 231°34.6	201 28.9 276°28.1	20.9	270 56.7 285°59.1	28.4	107 05.2 122°08.0	32.1	217 19.9 232°22.2	43.4	Jupiter		22:57
8	246°37.1	270 28.1 291°27.4	20.9	300°59.6	28.0	137°10.8	32.1	232 22.2 247°24.4	43.4	Saturn	0°59.1	15:36
9	261°39.5	306°26.7	. 19.2	316°00.0	• • 27.5	152°13.6	32.2	262°26.7	• • 43.2			
10	276°42.0	321°26.0	18.4	331°00.4	27.1	167°16.4	32.2	277°29.0	43.1	Jan 26 Mon	SHA	Mer.pass
11	291°44.5	336°25.2	17.5	346°00.9	26.7	182°19.1	32.2	292°31.2	43.1	Venus	46°32.6	12:33
12	306°46.9	351°24.5	S18°16.7	1°01.3	S20°26.2	197°21.9	N22°32.3	307°33.5	S02°43.0	Mars	55°27.5 250°23.3	11:57 22:53
13	321°49.4	6°23.8	15.8	16°01.8	25.8	212°24.7	32.3	322°35.7	42.9	Jupiter	250°23.3 0°54.1	15:33
14	336°51.9	21°23.1	15.0	31°02.2	25.3	227°27.5	32.4	337°38.0	42.8	Jatuill	U J4.1	15.55
15	351°54.3	36°22.4	• • 14.2	46°02.6	• • 24.9	242°30.3	• • 32.4	352°40.2	• • 42.7	Jan 27 Tue	SHA	Mer.pass
16	6°56.8	51°21.7	13.3	61°03.1	24.4	257°33.1	32.5	7°42.5	42.6	Venus	45°15.8	12:34
17	21°59.3	66°20.9	12.5	76°03.5	24.0	272°35.9	32.5	22°44.7	42.5	Mars	54°38.7	11:56
18	37°01.7	81°20.2	\$18° 11.6	91°03.9	\$20°23.5	287°38.6	N22°32.5	37°47.0 52°49.2	\$02°42.4		250°31.1	22:49
19 20	52°04.2 67°06.6	96°19.5 111°18.8	10.8 09.9	106°04.4 121°04.8	23.1 22.6	302°41.4 317°44.2	32.6 32.6	52°49.2 67°51.5	42.3 42.2	Saturn	0°49.1	15:29
20	82°09.1	111 18.8 126°18.1	•• 09.9	121 04.8 136°05.2	22.2	317 44.2 332°47.0	32.0	82°53.7	• 42.2	Horizont	al parallax	
22	97°11.6	141°17.4	08.2	150 05.2 151°05.7	21.8	347°49.8	32.7	97°56.0	42.1		Venus:	0.1
23	112°14.0	156°16.6	07.4	166°06.1	21.3	2°52.6	32.8	112°58.2	41.9		Mars:	0.1
			0.8′ m-3.90		.4′ m1.10							
ivier.p	ass. 15:32	$\nu$ -0.1' $a$ -0	7.0° IN-3.90	νυ.4 α-0	.4 m1.10	ν2.σ΄ <b>α</b> 0.	0′ m-2.64	$\nu 2.3^{\circ} a = 0$	.1′ m1.03			

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	176°57.2	S19°00.7	107°32.9	12.1'	N10°46.0	15.3'	58.3'
1	191°57.1 206°56.9	19°00.1 18°59.5	122°03.9	12.0'	11°01.2 11°16.5	15.2'	58.4'
2	200 56.9 221°56.8	18 59.5	136°34.9 151°05.8	11.9' 11.8'	11 10.5 11°31.6	15.2' 15.1'	58.4' 58.4'
4	236°56.7	58.3	165°36.7	11.8'	11°46.8	15.1'	58.4'
5	251°56.5	57.7	180°07.4	11.7'	12°01.9	15.0'	58.4'
6	266°56.4 281°56.2	\$18°57.0 56.4	194°38.1 209°08.7	11.6' 11.5'	N12°16.9 12°31.9	15.0' 14.9'	58.5' 58.5'
7 8	296°56.1	55.8	209 06.7 223°39.2	11.5	12 31.9 12°46.8	14.9	58.5'
9	311°55.9	• • 55.2	238°09.6	11.4'	13°01.7	14.8'	58.5'
10	326°55.8	54.6	252°40.0	11.3'	13°16.5	14.8'	58.5'
11 12	341°55.7 356°55.5	53.9 \$18°53.3	267°10.3 281°40.4	11.2' 11.1'	13°31.3 N13°46.0	14.7' 14.6'	58.6' 58.6'
13	11°55.4	52.7	296°10.5	11.1	14°00.6	14.6'	58.6
14	26°55.2	52.1	310°40.5	10.9'	14°15.2	14.5'	58.6'
15	41°55.1	• • 51.5	325°10.4	10.8'	14°29.7	14.5'	58.6'
16 17	56°55.0 71°54.8	50.8 50.2	339°40.3 354°10.0	10.7' 10.6'	14°44.2 14°58.6	14.4' 14.3'	58.6' 58.7'
18	86°54.7	S18° 49.6	8°39.6	10.5'	N15°12.9	14.2'	58.7'
19	101°54.5	49.0	23°09.2	10.4'	15°27.1	14.2'	58.7'
20	116°54.4	48.3	37°38.6	10.3'	15°41.3	14.1'	58.7'
21 22	131°54.3 146°54.1	· · 47.7 47.1	52°08.0 66°37.2	10.2' 10.2'	15°55.4 16°09.4	14.0' 13.9'	58.7' 58.8'
23	161°54.0	46.5	81°06.4	10.2	16°23.4	13.9'	58.8'
	SD = 16.2'	d = -0.6'		SI	0 = 15.9'		
Mon	<b>GHA</b> 176°53.8	<b>Dec</b> \$18°45.8	<b>GHA</b> 95°35.4	u  9.9'	<b>Dec</b> N16°37.2	d 13.8'	<b>HP</b> 58.8'
0 1	176°53.8 191°53.7	\$18°45.8 45.2	95°35.4 110°04.4	9.9'	16°51.0	13.8	58.8'
2	206°53.6	44.6	124°33.2	9.7'	17°04.7	13.6'	58.8'
3	221°53.4	• • 43.9	139°02.0	9.6'	17°18.3	13.5'	58.9'
4	236°53.3 251°53.2	43.3	153°30.6 167°59.1	9.5'	17°31.9 17°45.3	13.4'	58.9'
5 6	251°53.2 266°53.0	42.7 \$18° 42.0	167°59.1 182°27.6	9.4' 9.3'	17°45.3 N17°58.7	13.4' 13.3'	58.9' 58.9'
7	281°52.9	41.4	196°55.9	9.2'	18°11.9	13.2'	58.9'
8	296°52.8	40.8	$211^{\circ}24.1$	9.1'	18°25.1	13.1'	58.9'
9	311°52.6	• • 40.2	225°52.2	9.0'	18°38.2	13.0'	59.0'
10 11	326°52.5 341°52.4	39.5 38.9	240°20.2 254°48.1	8.9' 8.8'	18°51.1 19°04.0	12.9' 12.8'	59.0' 59.0'
12	356°52.2	\$18°38.2	269°15.9	8.7'	N19°16.8	12.7'	59.0'
13	11°52.1	37.6	283°43.6	8.6'	19°29.5	12.6'	59.0'
14	26°52.0 41°51.8	37.0	298°11.1 312°38.6	8.4'	19°42.1 19°54.5	12.5'	59.0'
15 16	41 51.8 56°51.7	· · 36.3 35.7	312 38.0 327°05.9	8.3' 8.2'	19 54.5 20°06.9	12.4' 12.3'	59.1' 59.1'
17	71°51.6	35.1	341°33.1	8.1'	20°19.1	12.1'	59.1'
18	86°51.4	\$18°34.4	356°00.2	8.0'	N20°31.3	12.0'	59.1'
19 20	101°51.3 116°51.2	33.8 33.1	10°27.2 24°54.1	7.9' 7.8'	20°43.3 20°55.2	11.9'	59.1' 59.1'
21	131°51.2	32.5	24 54.1 39°20.9	7.8 7.7'	20 55.2 21°07.0	11.8	59.1 59.2'
22	146°50.9	31.9	53°47.5	7.5'	21°18.7	11.6'	59.2'
23	161°50.8	31.2	68°14.0	7.4'	21°30.3	11.4'	59.2'
	SD = 16.2'	d = -0.6'		SE	0 = 16.0'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	176°50.7	\$18°30.6	82°40.5	7.3'	N21°41.7	11.3'	59.2'
1	191°50.5	29.9	97°06.8	7.2'	21°53.0	11.2'	59.2'
2	206°50.4 221°50.3	29.3 · · 28.7	111°33.0 125°59.0	7.1' 7.0'	22°04.2 22°15.3	11.1' 10.9'	59.2' 59.3'
3 4	221 50.3 236°50.2	28.7	125 59.0 140°25.0	7.0 6.8'	22°15.3 22°26.2	10.9	59.3'
5	251°50.0	27.4	154°50.8	6.7'	22°37.0	10.7'	59.3'
6	266°49.9	\$18°26.7	169°16.6	6.6'	N22°47.7	10.5'	59.3'
7 8	281°49.8 296°49.6	26.1 25.4	183°42.2 198°07.7	6.5' 6.4'	22°58.2 23°08.6	10.4' 10.3'	59.3' 59.3'
9	311°49.5	• • 24.8	212°33.0	6.3'	23°18.9	10.3	59.3'
10	326°49.4	24.1	$226^{\circ}58.3$	6.2'	23°29.0	10.0'	59.4'
11	341°49.3	23.5	241°23.5	6.0'	23°39.0	9.8'	59.4'
12 13	356°49.1 11°49.0	\$18°22.8 22.2	255°48.5 270°13.4	5.9' 5.8'	N23°48.8 23°58.5	9.7' 9.5'	59.4' 59.4'
14	26°48.9	21.5	284°38.2	5.7'	24°08.0	9.4	59.4'
15	41°48.8	•• 20.9	299°02.9	5.6'	24°17.4	9.2'	59.4'
16	56°48.7	20.2	313°27.5	5.5'	24°26.6	9.1'	59.4'
17 18	71°48.5 86°48.4	19.6 \$18° 18.9	327°52.0 342°16.3	5.4' 5.3'	24°35.7 N24°44.6	8.9' 8.8'	59.5' 59.5'
19	101°48.3	18.3	356°40.6	5.1'	24°53.4	8.6'	59.5'
20	116°48.2	17.6	11°04.7	5.0'	25°02.0	8.5'	59.5'
21 22	131°48.0 146°47.9	· · 17.0 16.3	25°28.8 39°52.7	4.9'	25°10.5 25°18.8	8.3' 8.1'	59.5' 59.5'
22	146°47.9 161°47.8	16.3 15.7	39°52.7 54°16.5	4.8' 4.7'	25°18.8 25°26.9	8.1'	59.5' 59.5'
	SD = 16.2'	d = -0.6'			0 = 16.1'	2.0	
	JD — 10.2	<u>a — -0.0</u>		JL	_ 10.1		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
N 58°	06:42	07:30	08:16	16:10	16:55	17:44
56°	06:38	07:23	08:06	16:20	17:02	17:48
54°	06:34	07:17	07:57	16:29	17:09	17:52
52°	06:30	07:11	07:49	16:37	17:14	17:56
50°	06:27	07:06	07:42	16:44	17:20	17:59
45°	06:19	06:54	07:26	16:59	17:31	18:07
<b>N</b> 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	е		Moonset	:
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°	08:10	06:17		01:19	04:58	
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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		Mer.	Mer.	Mer.Pass.		
Day	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	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
vvea 0	127°16.5	ла 171° 15.9	S18°06.5	181°06.6	S20°20.9	17°55.3	N22°32.8	128° 00.5	S02°41.8			
1	142°19.0	171 15.9 186° 15.2	05.7	196°07.0	20.4	32°58.1	32.9	143°02.7	41.7	Alpheratz	$357^{\circ}34.1$	29°14.2
2	142 19.0 157°21.4	201° 14.5	04.8	211°07.4	20.4	48°00.9	32.9	158° 05.0	41.6	Ankaa	353°06.5	-42°10.1
3	172°23.9	216° 13.8	03.9	211 07.4 226°07.9	. 19.5	63°03.7	32.9	173° 07.2	• • 41.5	Schedar	349°30.3	56°41.1
4	187°26.4	231° 13.1	03.9	241°08.3	19.1	78°06.5	33.0	188° 09.5	41.4	Diphda	348°46.5	-17°50.7
5	202°28.8	246° 12.4	02.2	256°08.7	18.6	93°09.2	33.0	203°11.7	41.3	Achernar	335°19.6	-57°06.5
6	217°31.3	261°11.7	S18°01.4	271°09.2	S20°18.2	108°12.0	N22°33.1	218° 14.0	\$02°41.2	Hamal	327°50.2	23°35.2
7	232°33.8	276° 10.9	18°00.5	286°09.6	17.7	123°14.8	33.1	233°16.2	41.1	Polaris	313°29.2	89°22.8
8	247°36.2	291°10.2	17°59.6	301°10.1	17.2	138°17.6	33.2	248° 18.5	41.0	Acamar	315°11.0	-40°12.2
9	262°38.7	306° 09.5	• • 58.8	316°10.5	. 16.8	153°20.4	33.2	263°20.7	40.9	Menkar	314°05.2	4°11.5
10	277°41.1	321°08.8	57.9	331°10.9	16.3	168°23.2	33.2	278°23.0	40.8	Mirfak	308°26.8	49°57.4
11	292°43.6	336°08.1	57.1	346°11.4	15.9	183°25.9	33.3	293°25.2	40.7	Aldebaran	290°38.4	16°33.7
12	307°46.1	351°07.4	S17°56.2	1°11.8	S20°15.4	198°28.7	N22°33.3	308° 27.5	S02°40.6	Rigel	281°02.8	-8°10.4
13	322°48.5	6°06.7	55.3	16°12.3	15.0	213°31.5	33.4	323°29.7	40.5	Capella	280°20.2	46°01.6
14	$337^{\circ}51.0$	21°06.0	54.5	31°12.7	14.5	228°34.3	33.4	338°32.0	40.4	Bellatrix	278°21.7	6°22.4
15	352°53.5	36°05.3	• • 53.6	46°13.1	• • 14.1	243°37.1	• • 33.5	353°34.2	• • 40.3	Elnath	278°00.5	28°37.8
16	7°55.9	51°04.6	52.7	61°13.6	13.6	258°39.8	33.5	8°36.5	40.2	Alnilam	275°36.6	-1°11.2
17	22°58.4	66°03.9	51.9	76°14.0	13.2	273°42.6	33.6	23°38.7	40.1	Betelgeuse	270°50.9	7°24.7
18	38°00.9	81°03.2	S17°51.0	91°14.4	S20°12.7	288°45.4	N22°33.6	38° 40.9	S02°40.0	Canopus Sirius	263°51.5 258°25.1	-52°42.7 -16°45.2
19	53°03.3	96°02.5	50.1	106°14.9	12.2	303°48.2	33.6	53°43.2	39.9	Adhara	255°04.8	-10 45.2 -29°00.6
20	68°05.8	111°01.8	49.3	121°15.3	11.8	318°51.0	33.7	68°45.4	39.8		244°49.6	5°09.4
21	83°08.2	$126^{\circ}01.1$	• • 48.4	$136^{\circ}15.8$	• • 11.3	333°53.7	• • 33.7	83°47.7	• • 39.7	Procyon Pollux	244 49.6 243°15.8	5 09.4 27°57.7
22	98°10.7	141°00.4	47.5	151°16.2	10.9	348°56.5	33.8	98°49.9	39.6	Avior	234°13.7	-59°35.6
23	113°13.2	155° 59.7	46.6	$166^{\circ}16.7$	10.4	3°59.3	33.8	113°52.2	39.5	Suhail	222°45.2	-43°32.3
Merr	pass. 15:28	ν-0.7' d-0	.9' m-3.90	ν0 4' d-0	.4′ m1.10	ν2 8' dΩ	0′ m-2.64	ν2 3' d-0	.1′ m1.03	Miaplacidus	221°37.2	-43° 32.3 -69° 49.4
14101.		- U.I U-U	3.30	ν σ.π u-0		- 2.0 u0.	- 111 2.07	- 2.5 u-0		Alphard	217°46.6	-8°46.4
										Regulus	207°33.2	11°50.2
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.4	61°36.3
0	128°15.6	170°59.0	S17°45.8	181°17.1	S20°10.0	19°02.1	N22°33.9	128°54.4	S02°39.4	Denebola	182°23.8	14°25.4
1	143°18.1	185°58.3	44.9	196°17.5	09.5	34°04.8	33.9	143°56.7	39.3	Gienah	175°42.5	-17°41.2
2	158°20.6	200°57.6	44.0	211°18.0	09.0	49°07.6	33.9	158° 58.9	39.2	Acrux		-63°14.4
3	173°23.0	215°56.9	• • 43.1	226°18.4	• • 08.6	64°10.4	• • 34.0	174°01.2	• • 39.1		171°50.4	-57°15.4
4	188°25.5	230°56.2	42.3	241°18.9	08.1	79°13.2	34.0	189°03.4	39.0	Alioth	$166^{\circ}11.9$	55°48.7
5	203°28.0	245°55.5	41.4	256°19.3	07.7	94°16.0	34.1	204°05.7	38.9	Spica	158°21.3	-11°17.9
6	218°30.4	260°54.8	\$17°40.5	271°19.7	S20°07.2	109°18.7	N22°34.1	219°07.9	502°38.8	Alkaid	152°51.2	49°10.6
7	233°32.9	275°54.1	39.6	286°20.2	06.7	124°21.5	34.2	234°10.2	38.7	Hadar	148°34.7	-60°29.7
8	248°35.4	290°53.4	38.7	301°20.6	06.3	139°24.3	34.2	249°12.4	38.6	Menkent	$147^{\circ}56.5$	-36°29.8
9	263°37.8	305°52.7	• • 37.9	316°21.1	• • 05.8	154°27.1	34.2	264°14.7	· · 38.5	Arcturus	$145^{\circ}47.1$	19°02.6
10	278°40.3	320°52.0	37.0	331°21.5	05.4	169°29.8	34.3	279°16.9	38.4	Rigil Kent.	$139^{\circ}39.1$	-60°56.4
11	293°42.7	335°51.3	36.1	346°22.0	04.9	184°32.6	34.3	294°19.2	38.3	Kochab	$137^{\circ}19.9$	74°02.5
12	308°45.2	350°50.6	\$17°35.2	1°22.4	\$20°04.4	199°35.4	N22°34.4	309°21.4	S02°38.2	Zuben'ubi	136°55.1	-16°09.0
13	323°47.7 338°50.1	5°49.9	34.3	16°22.8 31°23.3	04.0	214°38.2	34.4	324°23.6	38.1	Alphecca	126°03.1	26°37.3
14		20°49.2	33.4		03.5	229°40.9 244°43.7	34.5	339°25.9	38.0	Antares	112°14.9	-26°29.4
15	353°52.6 8°55.1	35° 48.5 50° 47.8	· · 32.5 31.7	46°23.7 61°24.2	· · 03.0 02.6	244 43.7 259°46.5	• • 34.5	354°28.1 9°30.4	· · 37.9 37.8	Atria	107°08.7	-69°04.2
16 17	23°57.5	65° 47.0	30.8	76°24.6	02.0	274°49.3	34.5 34.6	9 30.4 24°32.6	37.6 37.7	Sabik	102°02.0	-15°45.5
18	39°00.0	80°46.4	S17°29.9	91°25.1	S20°01.6	289°52.0	N22°34.6	39°34.9	S02° 37.6	Shaula	96°09.5	-37°07.3
19	54°02.5	95°45.8	29.0	106°25.5	01.0	304°54.8	04 -	54°37.1	07.5	Rasalhague	95°58.0	12°32.3
20	69°04.9	95°45.6 110°45.1	28.1	100 25.5 121°25.9	01.2 00.7	319°57.6	34.7 34.7	69°39.4	37.5 37.4	Eltanin	90°42.2	51°28.9
21	84°07.4	110 43.1 125°44.4	•• 27.2	136°26.4	20°00.2	335°00.4	• • 34.7	84°41.6	• • 37.3	Kaus Aust.	83°31.7	-34°22.3
22	99°09.9	140°43.7	26.3	151°26.8	19°59.8	350°03.1	34.8	99°43.9	37.3	Vega	80°33.0	38°48.3
23	114°12.3	155° 43.0	25.4	166°27.3	59.3	5°05.9	34.8	114° 46.1	37.2	Nunki	75°47.0	-26°15.9
										Altair	61°59.4	8°56.1
Mer.p	oass. 15:24	$\nu$ -0.7′ d-0	.9′ m-3.90	$\nu$ 0.4′ $d$ -0	.5'  m1.10	$\nu$ 2.8′ d0.	0′ m-2.64	$\nu$ 2.2′ d-0	.1' m $1.03$	Peacock	53°04.9	-56°39.1
										Deneb	49°25.7	45°22.4
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.2	9°59.6
0	129°14.8	170°42.3	S17°24.5	181°27.7	S19°58.8	20°08.7	N22°34.9	129° 48.4	S02°37.0	Al Na'ir	27°32.2	-46°50.2
1	144°17.2	185°41.6	23.6	196°28.2	58.4	35°11.5	34.9	144° 50.6	36.9	Fomalhaut Scheat	15°13.8 13°44.6	-29°29.2 28°13.5
2	159°19.7	200°40.9	22.7	211°28.6	57.9	50°14.2	35.0	159° 52.8	36.8	Markab	13° 44.6 13° 29.3	28 13.5 15°20.7
3	174°22.2	215°40.3	• • 21.8	226°29.1	• • 57.4	65°17.0	• • 35.0	174° 55.1	36.7	iviarkab	13 29.3	13 20.1
4	189°24.6	230°39.6	20.9	241°29.5	57.0	80°19.8	35.0	189° 57.3	36.6	Jan 28 Wed	SHA	Mer.pass
5	204°27.1	245°38.9	20.0	256°29.9	56.5	95°22.6	35.1	204°59.6	36.5	Venus	43°59.4	12:36
6	219°29.6	260°38.2	S17°19.1	271°30.4	S19°56.0	110°25.3	N22°35.1	220°01.8	S02°36.4	Mars	$53^{\circ}50.1$	11:55
7	234°32.0	275°37.5	18.2	286°30.8	55.6	$125^{\circ}28.1$	35.2	$235^{\circ}04.1$	36.3	Jupiter	250°38.8	22:44
8	249°34.5	290° 36.8	17.3	301°31.3	55.1	140°30.9	35.2	250°06.3	36.2	Saturn	0°44.0	15:26
9	264°37.0	305°36.2	• • 16.4	316°31.7	• • 54.6	155°33.6	• • 35.2	265°08.6	• • 36.0	Jan 29 Thu	SHA	Mer.pass
10	279°39.4	320° 35.5	15.5	331°32.2	54.2	170°36.4	35.3	280° 10.8	35.9	Venus	42°43.3	12:37
11	294°41.9	335°34.8	14.6	346°32.6	53.7	185°39.2	35.3	295° 13.0	35.8	Mars	42 43.3 53°01.5	11:55
12	309°44.4	350°34.1	\$17°13.7	1°33.1	S19°53.2	200°42.0	N22°35.4	310° 15.3	S02°35.7	Jupiter	250°46.4	22:40
13	324°46.8	5°33.4	12.8	16°33.5	52.7	215°44.7	35.4	325° 17.5	35.6	Saturn	0°38.8	15:22
14	339°49.3	20°32.7	11.9	31°34.0	52.3	230°47.5	35.5	340° 19.8	35.5			19.22
15	354°51.7	35°32.1	• • 11.0	46°34.4	• • 51.8	245°50.3	• • 35.5	355°22.0	35.4	Jan 30 Fri	SHA	Mer.pass
16	9°54.2	50°31.4	10.1	61°34.9	51.3	260°53.0	35.5	10°24.3	35.3	Venus	41°27.5	12:38
17	24°56.7	65°30.7	09.2	76°35.3	50.8	275°55.8	35.6	25°26.5	35.2	Mars	52°12.9	11:54
18	39°59.1	80°30.0	\$17°08.3	91°35.8	S19°50.4	290°58.6	N22°35.6	40°28.7	\$02°35.1	Jupiter		22:35
19	55°01.6	95°29.4	07.3	106°36.2	49.9	306°01.3	35.7	55°31.0	35.0	Saturn	0°33.6	15:18
20	70°04.1	110°28.7	06.4	121°36.6	49.4	321°04.1	35.7	70°33.2	34.9	Horizont	al parallax	
21	85°06.5	125°28.0	• • 05.5	136°37.1	· · 48.9	336°06.9	• • 35.7	85°35.5	• • 34.8	1101120110	Venus:	0.1
22	100°09.0	140°27.3	04.6	151°37.5	48.5 48.0	351°09.7	35.8 35.8	100°37.7	34.7		Mars:	0.1
	115011 5											
23	115°11.5 pass. 15:20	155°26.7	03.7 0.9' m-3.90	166°38.0	.5' m1.11	6°12.4	0′ m-2.63	115°40.0	34.6 .1' m1.03		iviais.	0.1

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	176° 47.7	S18°15.0	68°40.3	4.6'	N25°34.9	7.8'	59.6'
1	191°47.6	14.4	83°03.9	4.5'	25°42.7	7.6'	59.6'
2	206° 47.4	13.7	97°27.4	4.4'	25°50.3	7.5'	59.6'
3	221°47.3	• • 13.0	111°50.8	4.3'	25°57.7	7.3'	59.6'
4	236° 47.2	12.4	126°14.1	4.2'	26°05.0	7.1'	59.6'
5	251° 47.1	11.7	140°37.4	4.1'	26°12.1	6.9'	59.6'
6 7	266° 47.0 281° 46.9	\$18°11.1 10.4	155°00.5 169°23.5	4.0' 3.9'	N26°19.1 26°25.8	6.8' 6.6'	59.6' 59.6'
8	296° 46.7	09.7	183°46.4	3.8'	26°32.4	6.4	59.6'
9	311°46.6	09.1	198°09.3	3.8'	26°38.8	6.2	59.7'
10	326°46.5	08.4	212°32.0	3.7'	26°45.0	6.0'	59.7'
11	341°46.4	07.8	226°54.7	3.6'	$26^{\circ}51.1$	5.9'	59.7'
12	356°46.3	S18°07.1	241°17.3	3.5'	N26°56.9	5.7'	59.7'
13	11°46.2	06.4	255°39.8	3.4'	27°02.6	5.5'	59.7'
14	26°46.0	05.8	270°02.2	3.3'	27°08.1	5.3'	59.7'
15 16	41° 45.9 56° 45.8	· · 05.1 04.4	284°24.6 298°46.8	3.3' 3.2'	27°13.4 27°18.5	5.1' 4.9'	59.7' 59.7'
17	71°45.7	03.8	313°09.0	3.1'	27°10.5	4.9 4.7'	59.7'
18	86° 45.6	S18°03.1	327°31.1	3.0'	N27°28.1	4.5'	59.7
19	101°45.5	02.4	341°53.2	3.0'	27°32.7	4.3'	59.7'
20	116°45.4	01.8	356°15.2	2.9'	27°37.0	4.1'	59.8'
21	131°45.3	•• 01.1	10°37.1	2.8'	$27^{\circ}41.1$	3.9'	59.8'
22	$146^{\circ}45.1$	18°00.4	24°58.9	2.8'	27°45.1	3.7'	59.8'
23	161°45.0	17°59.8	39°20.7	2.7'	27°48.8	3.6'	59.8'
	SD = 16.2'	d = -0.7'		SI	D = 16.2'		
Thu	GHA	Dec	GHA	ν	Dec	d	НР
0	176°44.9	\$17°59.1	53°42.4	ν 2.7'	N27°52.4	3.4'	59.8'
1	191° 44.8	58.4	68°04.1	2.6'	27°55.7	3.2'	59.8'
2	206°44.7	57.8	82°25.7	2.6'	27°58.9	3.0'	59.8'
3	221°44.6	•• 57.1	96°47.3	2.5'	28°01.8	2.8'	59.8'
4	236°44.5	56.4	111°08.8	2.5'	28°04.6	2.5'	59.8'
5	251° 44.4	55.7	125°30.3	2.4'	28°07.1	2.3'	59.8'
6	266° 44.3	\$17°55.1	139°51.8	2.4'	N28°09.5 28°11.6	2.1'	59.8'
7 8	281° 44.2 296° 44.0	54.4 53.7	154°13.2 168°34.5	2.4' 2.3'	28°11.6 28°13.6	1.9' 1.7'	59.8' 59.8'
9	311° 43.9	• • 53.1	100 54.5 182°55.9	2.3'	28°15.3	1.7	59.8'
10	326° 43.8	52.4	102 33.9 197°17.2	2.3'	28°16.8	1.3'	59.8'
11	341°43.7	51.7	211°38.4	2.3'	28°18.2	1.1'	59.8'
12	356° 43.6	S17°51.0	225°59.7	2.2'	N28°19.3	0.9'	59.8'
13	11°43.5	50.4	240°20.9	2.2'	28°20.2	0.7'	59.8'
14	26°43.4	49.7	254°42.1	2.2'	28°20.9	0.5'	59.8'
15	41°43.3	• • 49.0	269°03.3	2.2'	28°21.4	0.3'	59.8'
16	56° 43.2 71° 43.1	48.3 47.6	283°24.5 297°45.7	2.2' 2.2'	28°21.7 28°21.8	0.1'	59.8' 59.8'
17 18	71 43.1 86°43.0	\$17°47.0	312°06.9	2.2'	28 21.8 N28°21.6	-0.1' -0.3'	59.8 59.9'
19	101°42.9	46.3	326°28.1	2.2'	28°21.3	-0.5'	59.9'
20	116° 42.8	45.6	340°49.3	2.2'	28°20.8	-0.7'	59.9'
21	131°42.7	• • 44.9	355°10.4	2.2'	28°20.0	-1.0'	59.9'
22	146°42.6	44.2	9°31.6	2.2'	28°19.1	-1.2'	59.9'
23	161°42.5	43.6	23°52.8	2.2'	28°17.9	-1.4'	59.9'
	SD = 16.2'	d = -0.7'		SI	D = 16.3'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°42.4	S17°42.9	38°14.0	2.2'	$N28^{\circ}16.5$	-1.6'	59.9'
1	191°42.3	42.2	52°35.3	2.3'	28°14.9	-1.8'	59.9'
2	206° 42.2	41.5	66°56.5	2.3'	28°13.2	-2.0'	59.8'
3	221° 42.1 236° 42.0	• • 40.8	81°17.8 95°39.1	2.3' 2.3'	28°11.2 28°09.0	-2.2'	59.8'
4 5	236° 42.0 251° 41.9	40.1 39.5	95°39.1 110°00.4	2.4'	28°09.0 28°06.6	-2.4' -2.6'	59.8' 59.8'
6	266° 41.8	39.5 \$17°38.8	110 00.4 124°21.8	2.4'	28 00.0 N28°04.0	-2.8'	59.8'
7	281°41.7	38.1	138°43.2	2.4'	28°01.2	-3.0'	59.8'
8	296°41.6	37.4	153°04.6	2.5'	27°58.2	-3.2'	59.8'
9	311°41.5	• • 36.7	$167^{\circ}26.1$	2.5'	27°55.0	-3.4'	59.8'
10	326°41.4	36.0	181°47.6	2.6'	27°51.5	-3.6'	59.8'
11	341°41.3	35.3	196°09.2	2.6'	27°47.9	-3.8'	59.8'
12	356°41.2 11°41.1	\$17°34.6	210°30.8 224°52.5	2.7'	N27°44.1 27°40.1	-4.0'	59.8'
13 14	11°41.1 26°41.0	34.0 33.3	224°52.5 239°14.2	2.7' 2.8'	27°40.1 27°35.9	-4.2' -4.4'	59.8' 59.8'
15	41°40.9	• • 32.6	259 14.2 253°36.0	2.8'	27°31.5	-4.4 -4.6'	59.8'
16	56° 40.8	31.9	267°57.8	2.9'	27°26.9	-4.8'	59.8'
17	71° 40.7	31.2	282°19.8	3.0'	27°22.1	-5.0'	59.8'
18	86°40.6	S17°30.5	296°41.7	3.0'	$N27^{\circ}17.1$	-5.2'	59.8'
19	101°40.5	29.8	311°03.8	3.1'	27°11.9	-5.4'	59.8'
20	116° 40.4	29.1	325°25.9	3.2'	27°06.5	-5.6'	59.8'
21	131° 40.3	• • 28.4	339°48.1	3.3'	27°00.9	-5.8'	59.8'
22 23	146° 40.2 161° 40.1	27.7 27.0	354°10.3 8°32.7	3.3' 3.4'	26°55.1 26°49.2	-6.0' -6.1'	59.8' 59.7'
23	SD = 16.2'	d = -0.7'	0 32.7		D = 16.3'	-0.1	59.7
	3D = 10.2°	u = -0.7		- 51	J — 10.3		

	Twilight			_	Twilight		
Lat.	Naut.	Civil	Sunrise	Sunset	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	
<b>N</b> 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°	13:16	14:17	15:24	02:10	03:18	04:22
N 10°	13:39	14:42	15:47	01:49	02:53	03:58
0°	14:01	15:05	16:09	01:28	02:31	03:36
<b>S</b> 10°	14:22	15:28	16:31	01:08	02:08	03:13
20°	14:46	15:52	16:55	00:46	01:44	02:49
30°	15:13	16:21	17:22	00:21	01:16	02:20
35°	15:29	16:38	17:38	00:06	01:00	02:03
40°	15:48	16:58	17:57		00:40	01:43
45°	16:11	17:22	18:19		00:17	01:19
<b>S</b> 50°	16:40	17:53	18:48	23:47		00:48
52°	16:55	18:08	19:02	23:32		00:33
54°	17:12	18:26	19:18	23:15	•• ••	00:15
56°	17:32	18:48	19:37	22:55	23:53	
58°	17:57	19:16	20:01	22:29	23:25	
<b>S</b> 60°	18:32	19:57	20:32	21:54	22:44	

		Sun		Moon			
Day	Eqn.of	Eqn.of Time		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	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		

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

h	Aries	Ve	` nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
	130° 13.9	170°26.0	\$17°02.8	181°38.4	\$19°47.5	21°15.2	N22°35.9	130°42.2	502°34.5		SHA	Dec
0										Alpheratz	$357^{\circ}34.1$	29°14.2
1	145° 16.4	185°25.3	01.9	196°38.9	47.0	36°18.0	35.9	145°44.4	34.4	Ankaa	353°06.5	-42°10.1
2	160° 18.9	200°24.6	00.9	211°39.3	46.6	51°20.7	36.0	160°46.7	34.3	Schedar	349°30.3	56°41.1
3	175°21.3	215°24.0	17°00.0	226°39.8	• • 46.1	66°23.5	36.0	175°48.9	• • 34.2	Diphda	348°46.6	-17°50.7
4	190°23.8	230°23.3	16°59.1	241°40.2	45.6	81°26.3	36.0	190°51.2	34.1	Achernar	$335^{\circ}19.7$	-57°06.5
5 6	205°26.2 220°28.7	245°22.6 260°21.9	58.2 \$16°57.3	256°40.7 271°41.1	45.1 \$19°44.6	96°29.0 111°31.8	36.1 N22°36.1	205°53.4 220°55.7	34.0 \$02°33.9	Hamal	327°50.2	23°35.2
7	235°31.2	275°21.3	56.4	286°41.6	44.0	111 31.6 126°34.6	36.2	235°57.9	33.8	Polaris	313°30.4	89°22.8
8	250° 33.6	290°20.6	55.4	301°42.0	43.7	141°37.3	36.2	251°00.1	33.7	Acamar	$315^{\circ}11.0$	-40°12.2
9	265°36.1	305°19.9	• • 54.5	316°42.5	• • 43.2	156° 40.1	36.2	266°02.4	• • 33.6	Menkar	314°05.2	4°11.5
10	280°38.6	320°19.3	53.6	331°42.9	42.7	171°42.9	36.3	281°04.6	33.5	Mirfak	308°26.8	49°57.4
11	295°41.0	335°18.6	52.7	346°43.4	42.2	186° 45.6	36.3	296°06.9	33.4	Aldebaran	290°38.4	16°33.7
12	310°43.5	350°17.9	S16°51.7	1°43.8	S19°41.8	201°48.4	N22°36.4	311°09.1	S02°33.3	Rigel	281°02.8	-8°10.4
13	325°46.0	5°17.3	50.8	16°44.3	41.3	216°51.2	36.4	326°11.4	33.2	Capella	280°20.2	46°01.6
14	340°48.4	20°16.6	49.9	31°44.7	40.8	231°53.9	36.4	341°13.6	33.1	Bellatrix	278°21.7	6°22.4
15	355°50.9	35°15.9	• • 49.0	46°45.2	• • 40.3	246°56.7	• • 36.5	356°15.8	• • 33.0	Elnath	278°00.5	28°37.8
16	10°53.4	50°15.3	48.0	61°45.6	39.8	261°59.5	36.5	11°18.1	32.9	Alnilam	275°36.6	-1°11.2
17	25°55.8	65°14.6	47.1	$76^{\circ}46.1$	39.4	277°02.2	36.6	26°20.3	32.8	Betelgeuse	270°50.9	7°24.7
18	40°58.3	80°13.9	S16°46.2	91°46.5	S19°38.9	292°05.0	N22°36.6	41°22.6	S02°32.7	Canopus Sirius	263°51.5 258°25.1	-52°42.7 -16°45.2
19	$56^{\circ}00.7$	95°13.3	45.2	106°47.0	38.4	307°07.7	36.6	56°24.8	32.6	Adhara	255° 04.8	-10 45.2 -29°00.6
20	71°03.2	110°12.6	44.3	121°47.4	37.9	322°10.5	36.7	71°27.0	32.5	Procyon	244°49.6	5°09.4
21	86°05.7	125°11.9	• • 43.4	136°47.9	• • 37.4	337°13.3	• • 36.7	86°29.3	• • 32.4	Pollux	244 49.0 243°15.8	27°57.7
22	$101^{\circ}08.1$	140°11.3	42.4	151°48.4	36.9	352°16.0	36.8	101°31.5	32.3	Avior	234° 13.7	-59°35.6
23	$116^{\circ}10.6$	155°10.6	41.5	166°48.8	36.4	7° 18.8	36.8	116°33.8	32.2	Suhail	222°45.2	-43°32.3
Mern	ass. 15:17	v-0.7′ d-0	.9' m-3.90	ν0 4' d-0	.5′ m1.11	v2 8' d0	0′ m-2.63	v2 2' d-0	.1′ m1.03	Miaplacidus	221°37.2	-69°49.4
- IVICI.P	ass. 15.11	ν-0.7 α-0	.9 111-5.90	νο. <del>-</del> α-ο	.5 1111.11	ν2.0 do.	0 111-2.03	ν2.2 u-0	.1 1111.05	Alphard	217°46.5	-8°46.4
										Regulus	207°33.2	11°50.2
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.3	61°36.4
0	131° 13.1	170°10.0	S16°40.6	181°49.3	<b>S</b> 19°36.0	22°21.6	N22°36.8	131°36.0	S02°32.1	Denebola	182°23.8	14°25.4
1	146° 15.5	185°09.3	39.6	196°49.7	35.5	37°24.3	36.9	146°38.2	32.0	Gienah	175°42.5	-17°41.3
2	161°18.0	200°08.6	38.7	211°50.2	35.0	52°27.1	36.9	161°40.5	31.9		172°58.7	-63°14.5
3	176° 20.5	215°08.0	• • 37.8	226°50.6	• • 34.5	67°29.9	• • 37.0	176°42.7	• • 31.8	Gacrux	171°50.3	-57°15.4
4	191°22.9	230°07.3	36.8	241°51.1	34.0	82°32.6	37.0	191°45.0	31.7	Alioth	166°11.9	55°48.7
5	206°25.4	245°06.7	35.9	256°51.5	33.5	97°35.4	37.0	206°47.2	31.6	Spica	158°21.2	-11°17.9
6	221°27.9	260°06.0	S16°34.9	271°52.0	S19°33.0	112°38.1	N22°37.1	221°49.4	S02°31.4	Alkaid	152°51.2	49°10.6
7	236°30.3	275°05.4	34.0	286°52.4	32.6	127°40.9	37.1	236°51.7	31.3	Hadar	148°34.6	-60°29.7
8	251°32.8	290°04.7	33.1	301°52.9	32.1	142°43.7	37.2	251°53.9	31.2	Menkent	$147^{\circ}56.5$	-36°29.8
9	266° 35.2	305°04.0	• • 32.1	316°53.3	· · 31.6	157° 46.4	• • 37.2	266°56.2	• • 31.1	Arcturus	$145^{\circ}47.0$	19°02.5
10	281°37.7 296°40.2	320°03.4	31.2	331°53.8 346°54.2	31.1	172°49.2	37.2	281°58.4	31.0	Rigil Kent.	139°39.0	-60°56.4
11 12	296 40.2 311°42.6	335°02.7 350°02.1	30.2 \$16°29.3	1°54.7	30.6 \$19°30.1	187°51.9 202°54.7	37.3 N22°37.3	297°00.6 312°02.9	30.9 \$02°30.8	Kochab	$137^{\circ}19.9$	74°02.5
13	326° 45.1	5°01.4	28.3	16°55.2	29.6	202 54.7 217°57.5	37.4	312 02.9 327°05.1	30.7	Zuben'ubi	136°55.0	-16°09.0
14	341°47.6	20°00.8	26.3 27.4	31°55.6	29.0	233°00.2	37.4 37.4	342°07.4	30.7	Alphecca	126°03.1	26°37.3
15	356° 50.0	35°00.1	. 26.4	46°56.1	. 28.6	248°03.0	•• 37.4	357°09.6	30.5	Antares	$112^{\circ}14.9$	-26°29.4
16	11°52.5	49°59.5	25.5	61°56.5	28.1	263°05.7	37.4	12°11.8	30.4	Atria	107°08.6	-69°04.2
17	26°55.0	64°58.8	24.6	76°57.0	27.7	278° 08.5	37.5	27°14.1	30.4	Sabik	102°02.0	-15°45.5
18	41°57.4	79°58.2	\$16°23.6	91°57.4	S19°27.2	293°11.3	N22°37.6	42°16.3	S02°30.2	Shaula	96°09.4	-37°07.3
19	56°59.9	94°57.5	22.7	106°57.9	26.7	308°14.0	37.6	57°18.6	30.1	Rasalhague	95°57.9	12°32.3
20	72°02.3	109°56.9	21.7	121°58.3	26.2	323°16.8	37.6	72°20.8	30.0	Eltanin	90°42.2	51°28.8
21	87°04.8	124°56.2	20.8	136°58.8	• • 25.7	338° 19.5	• • 37.7	87°23.0	• • 29.9	Kaus Aust.	83°31.6	-34°22.3
22	102°07.3	139°55.6	19.8	151°59.2	25.2	353°22.3	37.7	102°25.3	29.8	Vega	80°33.0	38°48.3
23	117°09.7	154°54.9	18.8	166°59.7	24.7	8°25.0	37.8	117°27.5	29.7	Nunki	75°47.0	-26°15.9
										Altair	61°59.4	8°56.1
Mer.p	ass. 15:13	$\nu$ -0.7 d-0	.9' m-3.91	$\nu$ 0.5′ d-0	.5′ m1.11	$\nu$ 2.8' d0.	0′ m-2.62	$\nu$ 2.2′ d-0	.1′ m1.03	Peacock Deneb	53°04.9 49°25.7	-56°39.1 45°22.3
										Enif	33° 38.2	9°59.6
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.2
0	$132^{\circ}12.2$	169°54.3	S16°17.9	182°00.2	<b>S</b> 19°24.2	23°27.8	N22°37.8	132°29.7	S02°29.6	Fomalhaut	15° 13.8	-40° 30.2 -29° 29.2
1	$147^{\circ}14.7$	184°53.6	16.9	$197^{\circ}00.6$	23.7	38°30.6	37.8	147°32.0	29.5	Scheat	13°44.6	28°13.5
2	$162^{\circ}17.1$	199°53.0	16.0	212°01.1	23.2	53°33.3	37.9	162°34.2	29.4	Markab	13°29.3	15°20.7
3	177° 19.6	214°52.3	• • 15.0	227°01.5	• • 22.7	68°36.1	• • 37.9	177°36.5	• • 29.3			
4	192°22.1	229°51.7	14.1	242°02.0	22.2	83°38.8	38.0	192°38.7	29.2	Jan 31 Sat	SHA	Mer.pass
5	207°24.5	244°51.0	13.1	257°02.4	21.7	98°41.6	38.0	207°40.9	29.1	Venus	40°12.1	12:39
6	222°27.0	259°50.4	S16°12.1	272°02.9	S19°21.2	113°44.3	N22°38.0	222°43.2	S02°29.0	Mars	51°24.5	11:53
7	237°29.5	274°49.7	11.2	287°03.4	20.7	128°47.1	38.1	237°45.4	28.9	Jupiter	251°01.3	22:31
8	252° 31.9	289°49.1	10.2	302°03.8	20.2	143°49.9	38.1	252°47.6	28.8	Saturn	0°28.3	15:15
9	267°34.4	304°48.5	• • 09.3	317°04.3	• • 19.7	158°52.6	• • 38.2	267°49.9	• • 28.7	Feb 01 Sun	SHA	Mer.pass
10	282° 36.8	319°47.8	08.3	332°04.7	19.2	173°55.4	38.2	282°52.1	28.5	Venus	38°56.9	12:40
11	297°39.3	334°47.2	07.3	347°05.2	18.7	188°58.1	38.2	297°54.4	28.4	Mars	50°36.2	11:52
12	312°41.8	349°46.5	S16°06.4	2°05.6	S19°18.2	204°00.9	N22°38.3	312°56.6	S02°28.3	Jupiter		22:26
13	327°44.2	4°45.9	05.4	17°06.1	17.7	219°03.6	38.3	327°58.8	28.2	Saturn	0°22.9	15:11
14	342°46.7	19°45.2	04.5	32°06.6	17.2	234°06.4	38.3	343°01.1	28.1			
15	357°49.2	34°44.6	• • 03.5	47°07.0	· · 16.7	249°09.1	38.4	358°03.3	• • 28.0	Feb 02 Mon	SHA	Mer.pass
16	12°51.6	49°44.0	02.5	62°07.5	16.2	264°11.9	38.4	13°05.5	27.9	Venus	37°42.1	12:41
17	27°54.1	64°43.3 79°42.7	01.6	77°07.9 92°08.4	15.7 \$10°15.2	279°14.6	38.5 N22°38.5	28°07.8 43°10.0	27.8 S02°27.7	Mars	49°48.0	11:52
18 19	42°56.6 57°59.0	79°42.7 94°42.1	\$16°00.6 15°59.6	92°08.4 107°08.9	\$19°15.2 14.7	294°17.4 309°20.2	N22°38.5 38.5	43°10.0 58°12.3	27.6	Jupiter		22:22
20	57°59.0 73°01.5	94°42.1 109°41.4	15 59.6 58.6	107°08.9 122°09.3	14.7 14.2	309°20.2 324°22.9	38.5 38.6	58°12.3 73°14.5	27.6 27.5	Saturn	0°17.5	15:08
20	73 01.5 88°04.0	109 41.4 124°40.8	58.0 •• 57.7	122 09.3 137°09.8	14.2	324 22.9 339°25.7	38.6	73 14.5 88°16.7	27.4	Horizont	al parallax	
22	103°06.4	139°40.1	56.7	157 09.8 152°10.2	13.7	354°28.4	38.7	103°19.0	27.3		Venus:	0.1
23	118°08.9	154°39.5	55.7	167°10.7	12.7	9°31.2	38.7	118°21.2	27.3		Mars:	0.1
Mer.p	ass. 15:09	$\nu$ -0.6′ d-1	.0′ m-3.91	$\nu$ 0.5′ $d$ -0	.5′ m1.11	$\nu$ 2.8′ d0.	0′ m-2.62	$\nu$ 2.2′ d-0	.1' m $1.03$			

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	176° 40.0	S17°26.3	22°55.1	3.5'	N26°43.0	-6.3	59.7'
1	191°39.9	25.6	37°17.6	3.6'	26°36.7	-6.5'	59.7'
2	206°39.8	24.9	51°40.2	3.7'	26°30.2	-6.7'	59.7'
3	221°39.7	• • 24.3	66°02.9	3.8'	26°23.5	-6.9'	59.7'
4	236°39.6 251°39.5	23.6 22.9	80°25.6 94°48.5	3.9'	26°16.6 26°09.6	-7.1' -7.2'	59.7'
5 6	251 39.5 266°39.4	\$17°22.2	94 48.5 109°11.4	3.9' 4.0'	N26° 02.4	-7.4'	59.7' 59.7'
7	281°39.4	21.5	123°34.5	4.1	25°54.9	-7.4 -7.6'	59.7'
8	296°39.3	20.8	137°57.6	4.2'	25°47.4	-7.8'	59.7'
9	311°39.2	• • 20.1	152°20.9	4.3'	25°39.6	-7.9'	59.6'
10	326°39.1	19.4	166°44.2	4.4'	25°31.7	-8.1'	59.6'
11	341°39.0	18.7	181°07.6	4.5'	25°23.6	-8.3'	59.6'
12	356°38.9 11°38.8	\$17°18.0 17.3	195°31.2 209°54.8	4.6' 4.8'	N25°15.3 25°06.9	-8.4'	59.6'
13 14	26°38.7	17.3	209 54.8 224°18.6	4.8 4.9'	25 00.9 24°58.3	-8.6' -8.8'	59.6' 59.6'
15	41° 38.6	. 15.8	238°42.4	5.0'	24° 49.5	-8.9'	59.6'
16	56°38.5	15.1	253°06.4	5.1'	24°40.6	-9.1'	59.6'
17	71°38.5	14.4	267°30.5	5.2'	24°31.5	-9.2'	59.5'
18	86°38.4	S17°13.7	281°54.7	5.3'	N24°22.3	-9.4'	59.5'
19	101°38.3	13.0	296°19.0	5.4'	24°12.9	-9.5'	59.5'
20	116°38.2	12.3 •• 11.6	310°43.4	5.5'	24°03.3	-9.7'	59.5'
21 22	131°38.1 146°38.0	10.9	325°07.9 339°32.6	5.6' 5.8'	23°53.6 23°43.8	-9.8' -10.0'	59.5' 59.5'
23	161° 37.9	10.9	353°57.3	5.0 5.9'	23°33.8	-10.0	59.5'
23						10.1	33.1
	SD = 16.2'	d = -0.7'		SI	D = 16.3'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0 1	176°37.9 191°37.8	\$17°09.5 08.8	8°22.2 22°47.2	6.0' 6.1'	N23°23.6 23°13.3	-10.3' -10.4'	59.4' 59.4'
2	206° 37.7	08.1	37°12.3	6.2'	23°02.9	-10.4	59.4'
3	221°37.6	07.4	51°37.5	6.3	22°52.4	-10.7	59.4'
4	236° 37.5	06.7	66°02.9	6.5'	22°41.6	-10.8'	59.4'
5	251°37.4	05.9	80°28.3	6.6'	22°30.8	-11.0'	59.3'
6	266°37.4	S17°05.2	94°53.9	6.7'	N22°19.8	-11.1'	59.3'
7	281°37.3	04.5	109°19.6	6.8'	22°08.7	-11.2'	59.3'
8 9	296°37.2 311°37.1	03.8	123°45.4 138°11.4	6.9' 7.1'	21°57.5 21°46.1	-11.4' -11.5'	59.3' 59.3'
10	311 37.1 326° 37.0	02.4	150° 11.4	7.1	21°34.6	-11.6'	59.3'
11	341°36.9	01.7	167°03.6	7.3	21°23.0	-11.7'	59.2'
12	356°36.9	S17°01.0	181°30.0	7.4'	N21°11.3	-11.9'	59.2'
13	11°36.8	17°00.2	195°56.4	7.6'	20°59.4	-12.0'	59.2'
14	26°36.7	16°59.5	210°22.9	7.7'	20°47.4	-12.1'	59.2'
15 16	41°36.6 56°36.5	· · 58.8 58.1	224°49.6 239°16.4	7.8' 7.9'	20°35.3 20°23.1	-12.2' -12.3'	59.1' 59.1'
10 17	50 30.5 71°36.5	58.1 57.4	259 10.4 253°43.3	7.9 8.0'	20°23.1	-12.3 -12.4'	59.1'
18	86°36.4	\$16°56.7	268°10.4	8.2'	N19°58.4	-12.5	59.1'
19	101°36.3	55.9	282°37.5	8.3'	19°45.9	-12.6'	59.0'
20	116°36.2	55.2	297°04.8	8.4'	19°33.2	-12.7'	59.0'
21	131°36.1	• • 54.5	311°32.2	8.5'	19°20.5	-12.8'	59.0'
22	146°36.1 161°36.0	53.8	325°59.7	8.6' 8.8'	19°07.6 18°54.7	-12.9'	59.0'
23		53.1	340°27.3			-13.0'	58.9'
	SD = 16.2'	d = -0.7'		SI	O = 16.2'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°35.9	\$16°52.3	354°55.1	8.9'	N18°41.6	-13.1'	58.9'
1	191°35.8	51.6	9°23.0 23°51.0	9.0'	18°28.5	-13.2'	58.9'
2	206°35.8 221°35.7	50.9 •• 50.2	23°51.0 38°19.1	9.1' 9.2'	18°15.3 18°02.0	-13.3' -13.4'	58.9' 58.8'
3 4	221 35.7 236° 35.6	49.5	52°47.3	9.2 9.3'	18 02.0 17°48.5	-13.4 -13.5'	58.8'
5	251° 35.5	48.7	67°15.6	9.5'	17°35.1	-13.6'	58.8'
6	266° 35.5	S16°48.0	81°44.1	9.6'	N17°21.5	-13.7'	58.8'
7	281°35.4	47.3	96°12.6	9.7'	17°07.8	-13.7'	58.7'
8	296°35.3	46.6	110°41.3	9.8'	16°54.1	-13.8'	58.7'
9	311°35.2 326°35.2	· · 45.8	125°10.1 139°39.0	9.9'	16°40.2	-13.9'	58.7'
10 11	326°35.2 341°35.1	45.1 44.4	139°39.0 154°08.1	10.0' 10.1'	16°26.3 16°12.3	-14.0' -14.1'	58.7' 58.6'
12	356° 35.0	\$16°43.7	168°37.2	10.1	N15°58.3	-14.1	58.6
13	11°34.9	42.9	183°06.4	10.4	15°44.2	-14.2'	58.6'
14	26° 34.9	42.2	197°35.8	10.5'	15°30.0	-14.3'	58.6'
15	41°34.8	• • 41.5	212°05.2	10.6'	15°15.7	-14.3'	58.5'
16 17	56°34.7 71°34.7	40.8 40.0	226°34.8 241°04.5	10.7' 10.8'	15°01.4 14°47.0	-14.4' -14.5'	58.5' 58.5'
18	71°34.7 86°34.6	40.0 \$16°39.3	241°04.5 255°34.3	10.8	N14° 32.5	-14.5'	58.4
19	101°34.5	38.6	270°04.1	11.0'	14° 18.0	-14.6'	58.4
20	116°34.4	37.8	284°34.1	11.1'	14°03.4	-14.6'	58.4'
21	131° 34.4	•• 37.1	299°04.2	11.2'	13°48.8	-14.7'	58.4'
22	146°34.3	36.4	313°34.4	11.3'	13°34.1	-14.7'	58.3'
23	161°34.2	35.6	328°04.7	11.4'	13°19.3	-14.8'	58.3'
	SD = 16.2'	d = -0.7'		SI	O = 16.1'		

Lat.	Twi	light	Sunrise	Sunset	Tw	light
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	e		Moonse	t
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°			15:08			10:54
N 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
N 58°	13:51	15:37	17:18	08:09	08:24	08:32
56°	14:10	15:50	17:26	07:49	08:10	08:23
54°	14:26	16:01	17:34	07:33	07:58	08:15
52°	14:40	16:11	17:40	07:19	07:48	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
N 40°	15:37	16:54	18:09	06:20	07:02	07:35
35°	15:53	17:07	18:17	06:02	06:48	07:25
30°	16:07	17:18	18:25	05:47	06:36	07:16
20°	16:31	17:37	18:38	05:22	06:15	07:00
N 10°	16:52	17:53	18:50	05:00	05:56	06:47
0°	17:11	18:08	19:00	04:39	05:39	06:34
<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	Eqn.of Time		Eqn.of Time Mer. Mer.Pass.		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	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	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	133°11.3	169°38.9	\$15°54.8	182°11.2	\$19°12.2	24°33.9	N22°38.7	133°23.4	S02°27.1			
1	148°13.8	184°38.2	53.8	197°11.6	11.7	39°36.7	38.8	148°25.7	27.0	Alpheratz	357°34.1	29°14.2
2	163°16.3	199°37.6	52.8	212°12.1	11.2	54°39.4	38.8	163°27.9	26.9	Ankaa	353°06.5	-42°10.0
3	178°18.7	214°37.0	• • 51.8	227°12.5	• • 10.7	69°42.2	• • 38.8	178°30.1	26.8	Schedar	349°30.3	56°41.1
4	193°21.2	229°36.3	50.9	242°13.0	10.2	84°44.9	38.9	193°32.4	26.7	Diphda	348°46.6	-17°50.7
5	208°23.7	244°35.7	49.9	257°13.5	09.7	99°47.7	38.9	208°34.6	26.6	Achernar	335°19.7	-57°06.5
6	223°26.1	259°35.1	S15°48.9	272°13.9	S19°09.2	114°50.4	N22°39.0	223°36.8	S02°26.5	Hamal	327°50.2 313°32.1	23°35.2 89°22.8
7	238°28.6	274°34.4	47.9	287°14.4	08.7	129°53.2	39.0	238°39.1	26.4	Acamar	315° 11.1	-40°12.2
8	253°31.1	289°33.8	47.0	302°14.8	08.2	144°55.9	39.0	253°41.3	26.2	Menkar	314°05.2	4°11.5
9	268°33.5	304°33.2	• • 46.0	317°15.3	• • 07.7	159°58.7	• • 39.1	268°43.6	• • 26.1	Mirfak	308°26.9	49°57.4
10	283°36.0	319°32.5	45.0	332°15.8	07.2	175°01.4	39.1	283°45.8	26.0	Aldebaran	290°38.4	16°33.7
11	298°38.4	334°31.9	44.0	347°16.2	06.7	190°04.2	39.2	298°48.0	25.9	Rigel	281°02.8	-8°10.4
12	313°40.9 328°43.4	349°31.3 4°30.7	\$15°43.0	2°16.7 17°17.2	\$19°06.2	205°06.9 220°09.7	N22°39.2	313°50.3 328°52.5	\$02°25.8	Capella	280°20.3	46°01.6
13 14	343°45.8	4 30.7 19°30.0	42.0 41.1	32°17.6	05.7 05.1	235°12.4	39.2 39.3	343°54.7	25.7 25.6	Bellatrix	$278^{\circ}21.7$	6°22.4
15	358°48.3	34° 29.4	• • 40.1	47°18.1	• • 04.6	250°15.2	39.3	358° 57.0	25.5	Elnath	278°00.5	28°37.8
16	13°50.8	49°28.8	39.1	62°18.5	04.1	265°17.9	39.3	13°59.2	25.4	Alnilam	275°36.6	-1°11.2
17	28°53.2	64°28.2	38.1	77°19.0	03.6	280°20.7	39.4	29°01.4	25.3	Betelgeuse	270°50.9	7°24.7
18	43°55.7	79°27.5	S15°37.1	92°19.5	S19°03.1	295°23.4	N22°39.4	44°03.7	S02°25.2	Canopus	263°51.6	-52°42.7
19	58°58.2	94°26.9	36.1	107°19.9	02.6	$310^{\circ}26.2$	39.5	59°05.9	25.1	Sirius	258°25.1	-16°45.2 -29°00.6
20	74°00.6	109°26.3	35.2	122°20.4	02.1	325°28.9	39.5	74°08.1	25.0	Adhara	255°04.8 244°49.6	-29 00.6 5°09.4
21	89°03.1	124° 25.7	• • 34.2	137°20.9	•• 01.6	340°31.7	•• 39.5	89° 10.4	• • 24.9	Procyon Pollux	244 49.6 243°15.8	5 09.4 27°57.7
22	104°05.6	139°25.0	33.2	152°21.3	01.1	355°34.4	39.6	104° 12.6	24.8	Avior	234° 13.7	-59°35.6
23	119°08.0	154°24.4	32.2	167°21.8	00.6	10°37.1	39.6	119°14.8	24.7	Suhail	222°45.2	-43°32.3
Mer.n	ass. 15:05	$\nu$ -0.6' d-1	0′ m-3.91	$\nu$ 0.5′ d-0	.5′ m1.11	$\nu 2.8' \ d0$	0′ m-2.61	$\nu 2.2' \ d-0$	.1′ m1.03	Miaplacidus	221°37.2	-69°49.4
										Alphard	217°46.5	-8°46.4
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.2	11°50.2
0 0	134° 10.5	169°23.8	\$15°31.2	182°22.3	\$19°00.0	25°39.9	N22°39.6	134° 17.1	S02°24.6	Dubhe	193°39.3	61°36.4
1	149°12.9	184°23.2	30.2	197°22.7	18°59.5	40°42.6	39.7	149°19.3	24.5	Denebola	182°23.8	14°25.4
2	164°15.4	199°22.5	29.2	212°23.2	59.0	55°45.4	39.7	164°21.5	24.4	Gienah	175°42.4	-17°41.3
3	179°17.9	214°21.9	28.2	227°23.7	• • 58.5	70°48.1	39.8	179°23.8	24.3		172°58.7	-63°14.5
4	194°20.3	229°21.3	27.2	242°24.1	58.0	85°50.9	39.8	194°26.0	24.1		171°50.3	-57°15.4
5	209°22.8	244°20.7	26.2	257°24.6	57.5	100°53.6	39.8	209°28.2	24.0	Alioth Spica	166°11.9 158°21.2	55°48.7 -11°17.9
6	224°25.3	259°20.1	S15°25.2	272°25.0	S18°57.0	115°56.4	N22°39.9	224°30.5	S02°23.9	Alkaid	150° 21.2 152° 51.1	49°10.6
7	239°27.7	$274^{\circ}19.4$	24.2	287°25.5	56.4	$130^{\circ}59.1$	39.9	239°32.7	23.8	Hadar	148° 34.6	-60°29.7
8	254°30.2	$289^{\circ}18.8$	23.2	302°26.0	55.9	146°01.8	39.9	254°34.9	23.7		147°56.5	-36°29.8
9	269°32.7	304° 18.2	• • 22.2	317°26.4	• • 55.4	161°04.6	• • 40.0	269°37.2	• • 23.6	Arcturus	145°47.0	19°02.5
10	284°35.1	319° 17.6	21.2	332°26.9	54.9	176°07.3	40.0	284°39.4	23.5	Rigil Kent.	139°39.0	-60°56.4
11	299°37.6	334°17.0	20.2	347°27.4	54.4	191°10.1	40.0	299°41.6	23.4	Kochab	$137^{\circ}19.8$	74°02.4
12 13	314°40.1 329°42.5	349°16.4 4°15.7	\$15° 19.2 18.2	2°27.8 17°28.3	\$18°53.9 53.4	206°12.8 221°15.6	N22°40.1 40.1	314°43.9 329°46.1	S02°23.3 23.2	Zuben'ubi	136°55.0	-16°09.1
14	344°45.0	19° 15.1	17.2	32°28.8	52.8	236°18.3	40.1	344°48.3	23.2	Alphecca	126°03.0	26°37.3
15	359°47.4	34° 14.5	16.2	47°29.2	• • 52.3	251°21.1	• • 40.2	359° 50.6	23.0	Antares	112°14.9	-26°29.4
16	14°49.9	49° 13.9	15.2	62°29.7	51.8	266°23.8	40.2	14°52.8	22.9	Atria	107°08.6	-69°04.2
17	29°52.4	64°13.3	14.2	77°30.2	51.3	281°26.5	40.3	29°55.0	22.8	Sabik	102°01.9	-15°45.5
18	44°54.8	79°12.7	S15°13.2	92°30.6	S18°50.8	296°29.3	N22°40.3	44°57.3	S02°22.7	Shaula	96°09.4 95°57.9	-37°07.3 12°32.3
19	59°57.3	94°12.1	12.2	107°31.1	50.2	311°32.0	40.3	59°59.5	22.6	Rasalhague	95° 57.9 90° 42.1	51°28.8
20	74°59.8	109°11.5	11.2	122°31.6	49.7	326°34.8	40.4	75°01.7	22.5	Eltanin Kaus Aust.	83°31.6	-34°22.3
21	90°02.2	124° 10.8	• • 10.2	137°32.0	• • 49.2	341°37.5	• • 40.4	90°03.9	• • 22.3	Vega	80°33.0	38°48.2
22	105°04.7	139° 10.2	09.2	152°32.5	48.7	356°40.2	40.5	105°06.2	22.2	Nunki	75°47.0	-26°15.9
23	120°07.2	154°09.6	08.2	167°33.0	48.2	11°43.0	40.5	120°08.4	22.1	Altair	61°59.4	8°56.1
Mer.p	ass. 15:01	$\nu$ -0.6' d-1	0′ m-3.91	$\nu$ 0.5′ d-0	.5′ m1.11	$\nu 2.7' \ d0.$	0′ m-2.61	$\nu 2.2' \ d-0$	.1′ m1.03	Peacock	53°04.9	-56°39.1
						-				Deneb	49°25.7	45°22.3
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.2	9°59.6
0	135°09.6	169°09.0	\$15°07.2	182°33.4	\$18°47.7	26°45.7	N22°40.5	135° 10.6	S02°22.0	Al Na'ir	27°32.2	-46°50.2
1	150°12.1	184°08.4	06.2	197°33.9	47.1	41°48.5	40.6	150°12.9	21.9	Fomalhaut	15° 13.8	-29°29.2
2	165°14.5	199°07.8	05.2	212°34.4	46.6	56°51.2	40.6	165°15.1	21.8	Scheat	13°44.6 13°29.3	28°13.5
3	180°17.0	214°07.2	• • 04.2	227°34.9	• • 46.1	71°53.9	40.6	180° 17.3	• • 21.7	Markab	13 29.3	15°20.7
4	$195^{\circ}19.5$	229°06.6	03.2	$242^{\circ}35.3$	45.6	$86^{\circ}56.7$	40.7	$195^{\circ}19.6$	21.6	Feb 03 Tue	SHA	Mer.pass
5	$210^{\circ}21.9$	244°06.0	02.1	257°35.8	45.0	101°59.4	40.7	$210^{\circ}21.8$	21.5	Venus	36°27.5	12:42
6	225°24.4	259°05.4	S15°01.1	272°36.3	<b>S</b> 18°44.5	117°02.2	N22°40.7	225°24.0	S02°21.4	Mars	48°59.8	11:51
7	240°26.9	274°04.8	15°00.1	287°36.7	44.0	132°04.9	40.8	240°26.3	21.3	Jupiter		22:18
8	255°29.3	289°04.2	14°59.1	302°37.2	43.5	147°07.6	40.8	255°28.5	21.2	Saturn	0°12.1	15:04
9	270°31.8	304°03.5	· · 58.1	317°37.7	• • 43.0	162°10.4	· · 40.8	270°30.7	• • 21.1	Feb 04 Wed	SHA	Mer.pass
10 11	285°34.3 300°36.7	319°02.9 334°02.3	57.1 56.1	332°38.1 347°38.6	42.4 41.9	177°13.1 192°15.8	40.9 40.9	285°33.0 300°35.2	21.0 20.9	Venus	$35^{\circ}13.3$	12:43
12	300 36.7 315°39.2	334 02.3 349°01.7	50.1 \$14°55.0	2°39.1	\$18°41.4	192 15.8 207°18.6	40.9 N22°41.0	300 35.2 315°37.4	20.9 S02°20.7	Mars	48°11.8	11:50
13	330°41.7	4°01.1	54.0	17°39.6	40.9	207 18.0 222°21.3	41.0	330°39.6	20.6		251°29.4	22:13
14	345°44.1	19°00.5	53.0	32°40.0	40.3	237°24.1	41.0	345°41.9	20.5	Saturn	0°06.6	15:01
15	0°46.6	33°59.9	• • 52.0	47°40.5	• • 39.8	252°26.8	41.1	0°44.1	20.4	Feb 05 Thu	SHA	Mer.pass
16	15°49.0	48°59.3	51.0	62°41.0	39.3	267°29.5	41.1	15°46.3	20.3	Venus	33°59.4	12:44
17	$30^{\circ}51.5$	63°58.7	49.9	77°41.4	38.8	282°32.3	41.1	30°48.6	20.2	Mars	47°23.8	11:49
18	45°54.0	78°58.1	<b>S</b> 14°48.9	92°41.9	S18°38.2	297°35.0	N22°41.2	45°50.8	502°20.1	Jupiter	$251^{\circ}36.1$	22:09
19	60°56.4	93°57.5	47.9	107°42.4	37.7	312°37.7	41.2	60°53.0	20.0	Saturn	0°01.0	14:57
20	75°58.9	108° 56.9	46.9	122°42.8	37.2	327°40.5	41.2	75°55.3	19.9	Usul-s	al parallas	
21	91°01.4	123°56.3	• • 45.9	137°43.3	• • 36.6	342°43.2	• • 41.3	90°57.5	19.8	Horizon	al parallax Venus:	0.1
22 23	106°03.8 121°06.3	138°55.7 153°55.1	44.8 43.8	152°43.8 167°44.3	36.1 35.6	357°45.9 12°48.7	41.3 41.3	105°59.7 121°01.9	19.7 19.6		Mars:	0.1
												-
Mer.p	ass. 14:57	$\nu$ -0.6′ d-1	0′ m-3.91	$\nu$ 0.5′ d-0	.5′ m1.11	$\nu 2.7' \ d0.$	0′ m-2.60	$\nu 2.2' \ d-0$	.1′ m1.03			

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	176°34.2	S16°34.9	342°35.1	11.5'	N13°04.5	-14.8'	58.3'
1	191°34.1	34.2	357°05.6	11.6'	$12^{\circ}49.7$	-14.9'	58.2'
2	206°34.0	33.4	11°36.1	11.7'	12°34.8	-14.9'	58.2'
3	221°34.0	• • 32.7	26°06.8	11.8'	12°19.9	-15.0'	58.2'
4 5	236°33.9 251°33.8	32.0 31.2	40°37.6 55°08.5	11.9' 12.0'	12°04.9 11°49.8	-15.0' -15.1'	58.1' 58.1'
6	251 33.8 266°33.8	\$1.2 \$16°30.5	69°39.4	12.1'	N11°34.8	-15.1'	58.1
7	281°33.7	29.8	84° 10.5	12.1	11°19.7	-15.1 -15.2'	58.1
8	296°33.6	29.0	98°41.6	12.2'	11°04.5	-15.2'	58.0'
9	311°33.6	• • 28.3	113° 12.8	12.3'	10°49.3	-15.2'	58.0'
10	326°33.5	27.6	127° 44.2	12.4'	$10^{\circ}34.1$	-15.3'	58.0'
11	341°33.4	26.8	142° 15.6	12.5'	10°18.8	-15.3'	57.9'
12	356°33.4 11°33.3	\$16°26.1	156° 47.1 171° 18.6	12.6'	N10°03.5 09°48.2	-15.3'	57.9'
13 14	26°33.3	25.3 24.6	171° 18.6 185° 50.3	12.7' 12.7'	09°48.2	-15.3' -15.4'	57.9' 57.8'
15	41°33.2	23.9	200°22.0	12.7	09° 32.9	-15.4'	57.8'
16	56°33.1	23.1	214°53.9	12.9'	09°02.1	-15.4'	57.8'
17	71°33.1	22.4	229°25.8	13.0'	08°46.7	-15.5'	57.7'
18	86°33.0	S16°21.6	243°57.7	13.1'	N08°31.2	-15.5'	57.7'
19	101°32.9	20.9	258° 29.8	13.1'	08°15.7	-15.5'	57.7'
20	116°32.9	20.1	273°01.9	13.2'	08°00.3	-15.5'	57.6'
21 22	131°32.8 146°32.8	· · 19.4 18.7	287°34.1 302°06.4	13.3' 13.3'	07°44.7 07°29.2	-15.5'	57.6'
22	146°32.8 161°32.7	18.7 17.9	302°06.4 316°38.7	13.4'	07°29.2 07°13.7	-15.5' -15.6'	57.6' 57.6'
23			310 30.7			-13.0	51.0
	SD = 16.2'	d = -0.7'		SI	O = 15.9'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°32.6	S16°17.2	331°11.2	13.5'	N06°58.1	-15.6'	57.5
1	191°32.6	16.4	$345^{\circ}43.6$	13.6'	$06^{\circ}42.5$	-15.6'	57.5'
2	206°32.5	15.7	0°16.2	13.6'	06°27.0	-15.6'	57.5
3	221°32.5	• • 14.9	14°48.8	13.7'	06°11.4	-15.6'	57.4'
4	236°32.4	14.2	29°21.5 43°54.3	13.8'	05°55.8 05°40.1	-15.6'	57.4
5 6	251°32.3 266°32.3	13.4 \$16°12.7	43°54.3 58°27.1	13.8' 13.9'	05°40.1 N05°24.5	-15.6' -15.6'	57.4' 57.3'
7	281°32.2	12.0	72°59.9	13.9'	05°08.9	-15.6'	57.3'
8	296°32.2	11.2	87°32.9	14.0'	04°53.3	-15.6'	57.3'
9	311°32.1	• • 10.5	102°05.9	14.1'	04°37.6	-15.6'	57.2'
10	326°32.1	09.7	116°38.9	14.1'	04°22.0	-15.6'	57.2'
11	341°32.0	09.0	131°12.0	14.2'	04°06.4	-15.6'	57.2'
12	356°31.9	S16°08.2	145°45.2	14.2'	N03°50.8	-15.6'	57.1'
13	11°31.9 26°31.8	07.5	160° 18.4 174° 51.7	14.3'	03°35.1 03°19.5	-15.6'	57.1'
14 15	20 31.8 41°31.8	06.7 •• 05.9	174 51.7 189°25.0	14.3' 14.4'	03 19.5 03°03.9	-15.6' -15.6'	57.1' 57.0'
16	56°31.7	05.2	203°58.4	14.4'	03°48.3	-15.6'	57.0'
17	71°31.7	04.4	218°31.8	14.5'	02°32.7	-15.6'	57.0'
18	86°31.6	S16°03.7	233°05.3	14.5'	N02°17.1	-15.6'	56.9'
19	101°31.6	02.9	247°38.8	14.6'	$02^{\circ}01.5$	-15.6'	56.9'
20	116°31.5	02.2	262°12.3	14.6'	01°45.9	-15.6'	56.9'
21	131°31.5	01.4	276°45.9	14.6'	01°30.3 01°14.8	-15.6'	56.8'
22 23	146°31.4 161°31.4	16°00.7 15°59.9	291°19.6 305°53.3	14.7' 14.7'	01°14.8 00°59.2	-15.5' -15.5'	56.8' 56.8'
25	SD = 16.2'	d = -0.7'	303 33.3		O = 15.7'	-13.3	30.0
	3D = 10.2	u = -0.7		31	J = 15.7		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°31.3	S15°59.2	320°27.0	14.8'	N00°43.7	-15.5'	56.7'
1	191°31.2	58.4	335°00.7	14.8'	00°28.2	-15.5'	56.7'
2	206°31.2 221°31.1	57.6 •• 56.9	349°34.5 4°08.4	14.8' 14.9'	N00°12.7 S00°02.8	-15.5' 15.5'	56.7' 56.6'
3 4	221°31.1 236°31.1	56.1	18° 42.3	14.9'	00°18.2	15.5	56.6
5	251°31.0	55.4	33°16.2	14.9'	00°33.7	15.4	56.6
6	266°31.0	S15°54.6	47°50.1	15.0'	S00°49.1	15.4'	56.5
7	281°30.9	53.9	$62^{\circ}24.1$	15.0'	$01^{\circ}04.5$	15.4'	56.5'
8	296°30.9	53.1	76°58.1	15.0'	01°19.8	15.3'	56.5
9	311°30.8	• • 52.3	91°32.1	15.1'	01°35.2	15.3'	56.4
10 11	326°30.8 341°30.8	51.6 50.8	106°06.1 120°40.2	15.1' 15.1'	01°50.5 02°05.8	15.3' 15.3'	56.4' 56.4'
11	341°30.8 356°30.7	50.8 \$15°50.1	120° 40.2 135° 14.3	15.1'	02°05.8 S02°21.1	15.3	56.4
13	11°30.7	49.3	149° 48.5	15.2'	02°36.3	15.2'	56.3
14	26°30.6	48.5	164°22.6	15.2'	02°51.5	15.2'	56.3
15	41°30.6	• • 47.8	178°56.8	15.2'	$03^{\circ}06.7$	15.2'	56.3'
16	56°30.5	47.0	193°31.0	15.2'	03°21.9	15.1'	56.2'
17	71°30.5	46.2	208°05.2	15.2'	03°37.0	15.1'	56.2
18 19	86°30.4 101°30.4	\$15° 45.5 44.7	222°39.4 237°13.7	15.2' 15.3'	\$03°52.1 04°07.1	15.1' 15.0'	56.2' 56.1'
20	101°30.4 116°30.3	44. <i>1</i> 43.9	251° 47.9	15.3'	04°07.1 04°22.1	15.0° 15.0°	56.1
21	131°30.3	• • 43.2	266°22.2	15.3'	04°22.1	14.9	56.1
22	146°30.2	42.4	280° 56.5	15.3'	04°52.1	14.9'	56.0'
23	161°30.2	41.6	295°30.8	15.3'	05°07.0	14.9'	56.0'
	SD = 16.2'	d = -0.8'		SI	D = 15.5'		

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

Lat.		Moonris	e		Moonset	:
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
N 40°	19:20	20:27	21:32	08:02	08:26	08:48
35°	19:24	20:28	21:29	07:56	08:23	08:49
30°	19:29	20:29	21:27	07:50	08:21	08:49
20°	19:36	20:30	21:23	07:40	08:17	08:51
N 10°	19:42	20:31	21:19	07:32	08:13	08:52
0°	19:48	20:33	21:15	07:23	08:10	08:53
<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	
Duy	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	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Fri –	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	136°08.8	168°54.5	S14°42.8	182°44.7	S18°35.1	27°51.4	N22°41.4	136°04.2	S02°19.5			
1	151°11.2	183°53.9	41.8	197°45.2	34.5	42°54.1	41.4	151°06.4	19.4	Alpheratz	357°34.1	29°14.1
2	166° 13.7	198°53.3	40.7	212°45.7	34.0	57° 56.9	41.5	166°08.6	19.3	Ankaa	353°06.5	-42°10.0
3	181°16.1	213°52.7	• • 39.7	227°46.2	• • 33.5	72°59.6	. 41.5	181°10.9	. 19.1	Schedar	349°30.4	56°41.0
4	196° 18.6	228°52.1	38.7	242°46.6	32.9	88°02.3	41.5	196°13.1	19.0	Diphda	348°46.6	-17°50.7
5	211°21.1	243°51.6	37.6	257°47.1	32.4	103°05.1	41.6	211°15.3	18.9	Achernar	335° 19.7	-57°06.5
6	226°23.5	258°51.0	S14°36.6	272°47.6	S18°31.9	118° 07.8	N22°41.6	226°17.5	S02°18.8	Hamal	327°50.3	23°35.2
7	241°26.0	273°50.4	35.6	287°48.0	31.3	133° 10.5	41.6	241°19.8	18.7	Polaris	313°33.7	89°22.8
8	256° 28.5	288°49.8	34.6	302°48.5	30.8	148° 13.3	41.7	256°22.0	18.6	Acamar	315°11.1	-40°12.2
9	271°30.9	303°49.2	• • 33.5	317°49.0	30.3	163° 16.0	• • 41.7	271°24.2	• • 18.5	Menkar	314°05.2	4°11.5
10	286° 33.4	318°48.6	32.5	332°49.5	29.7	178° 18.7	41.7	286°26.5	18.4	Mirfak	308°26.9	49°57.4
11	301°35.9	333°48.0	31.5	347°49.9	29.2	193°21.5	41.8	301°28.7	18.3	Aldebaran	290°38.4	16°33.7
12	316°38.3	348°47.4	\$14°30.4	2°50.4	S18°28.7	208° 24.2	N22°41.8	316°30.9	502°18.2	Rigel	281°02.8	-8°10.4
13	331° 40.8	3°46.8	29.4	17°50.9	28.2	223°26.9	41.8	331°33.1	18.1	Capella	280°20.3	46°01.6
14	346°43.3	18°46.2	28.4	32°51.4	27.6	238°29.6	41.9	346°35.4	18.0	Bellatrix	278°21.7	6°22.4
15	1°45.7	33°45.6	• • 27.3	47°51.8	27.1	253°32.4	41.9	1°37.6	• • 17.9	Elnath	278°00.5	28°37.8
16	16°48.2	48°45.0	26.3	62°52.3	26.5	268°35.1	41.9	16°39.8	17.7	Alnilam	275°36.6	-1°11.2
17	31°50.6	63°44.5	25.2	77°52.8	26.0	283°37.8	42.0	31°42.1	17.6	Betelgeuse	270°50.9	7°24.7
18	46°53.1	78°43.9	S14°24.2	92°53.3	\$18°25.5	298°40.6	N22°42.0	46°44.3	S02°17.5	Canopus	263°51.6	-52°42.7
19	61°55.6	93°43.3	23.2	107°53.7	24.9	313°43.3	42.0	61°46.5	17.4	Sirius	258° 25.2	-16°45.2
20	76°58.0	108°42.7	22.1	122°54.2	24.4	328°46.0	42.1	76°48.7	17.3	Adhara	255°04.8	-29°00.6
21	92°00.5	123°42.1	•• 21.1	137°54.7	23.9	343°48.7	• • 42.1	91°51.0	. 17.2	Procyon	244°49.6	5°09.4
22	107°03.0	138°41.5	20.1	157°55.2	23.3	358° 51.5	42.1	106°53.2	17.1	Pollux	243° 15.8	27°57.7
23	107 05.0 122°05.4	153°40.9	19.0	167°55.6	22.8	13° 54.2	42.2	100 55.2 121°55.4	17.1	Avior	234° 13.7	-59°35.7
		_	-							Suhail	222°45.2	-43°32.3
Mer.p	ass. 14:53	$\nu$ -0.6′ d-1	.0′ m-3.91	$\nu$ 0.5′ d-0	0.5'  m 1.11	$\nu 2.7' \ d0.$	0′ m-2.60	$\nu$ 2.2′ d-0	.1'  m1.02	Miaplacidus	221°37.2	-69°49.5
										Alphard	217°46.5	-8°46.4
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.2	11°50.2
0	137° 07.9	168° 40.4	\$14°18.0	182°56.1	S18°22.3	28° 56.9	N22° 42.2	136°57.6	\$02°16.9	Dubhe	193°39.3	61°36.4
1	152° 10.4	183°39.8	16.9	197°56.6	21.7	43°59.7	42.3	151°59.9	16.8	Denebola	182°23.8	14°25.4
2	167° 12.8	198°39.2	15.9	212°57.1	21.2	59°02.4	42.3	167°02.1	16.7	Gienah	175°42.4	-17°41.3
3	182° 15.3	213°38.6	• • 14.8	227°57.6	20.6	74°05.1	42.3	182°04.3	. 16.6	Acrux	172°58.7	-63°14.5
4	197° 17.8	228°38.0	13.8	242°58.0	20.1	89°07.8	42.4	197°06.6	16.5		171°50.3	-57°15.4
5	212°20.2	243°37.4	12.7	257°58.5	19.6	104° 10.6	42.4	212°08.8	16.3	Alioth	166°11.8	55°48.7
6	227°22.7	258°36.9	S14°11.7	272°59.0	S18°19.0	119° 13.3	N22°42.4	227°11.0	S02°16.2	Spica	158°21.2	-11°17.9
7	242°25.1	273°36.3	10.7	287°59.5	18.5	134° 16.0	42.5	242°13.2	16.1	Alkaid	152°51.1	49°10.6
8	257° 27.6	288°35.7	09.6	302°59.9	18.0	149° 18.7	42.5	257°15.5	16.0	Hadar	148°34.6	-60°29.7
9	272°30.1	303°35.1	• • 08.6	318°00.4	•• 17.4	164°21.5	• • 42.5	272°17.7	• • 15.9	1	147°56.5	-36°29.8
10	287° 32.5	318°34.5	07.5	333°00.9	16.9	179°24.2	42.6	287°19.9	15.8	Arcturus	145°47.0	19°02.5
11	302°35.0	333°33.9	06.5	348°01.4	16.3	194°26.9	42.6	302°22.1	15.7	Rigil Kent.	139°39.0	-60°56.4
12	317°37.5	348°33.4	S14°05.4	3°01.9	\$18°15.8	209°29.6	N22°42.6	317°24.4	S02°15.6	Kochab	137° 19.7	74°02.4
13	332°39.9	3°32.8	04.4	18°02.3	15.2	224°32.4	42.7	332°26.6	15.5	Zuben'ubi	136°55.0	-16°09.1
14	347°42.4	18°32.2	03.3	33°02.8	14.7	239°35.1	42.7	347°28.8	15.4	Alphecca	126°03.0	26°37.3
15	2°44.9	33°31.6	02.3	48°03.3	. 14.2	254°37.8	• • 42.7	2°31.0	. 15.3	Antares	112° 14.9	-26°29.4
16	17°47.3	48°31.1	01.2	63°03.8	13.6	269°40.5	42.8	17°33.3	15.2	Atria	107°08.5	-69°04.2
17	32°49.8	63°30.5	14°00.2	78°04.2	13.1	284°43.3	42.8	32°35.5	15.0	Sabik	102°01.9	-15°45.5
18	47°52.2	78°29.9	\$13°59.1	93°04.7	S18°12.5	299°46.0	N22°42.8	47°37.7	S02°14.9	Shaula	96°09.4	-37°07.3
19	62°54.7	93°29.3	58.0	108°05.2	12.0	314°48.7	42.9	62°39.9	14.8	Rasalhague	95°57.9	12°32.3
20	77°57.2	108°28.8	57.0	123°05.7	11.4	329°51.4	42.9	77°42.2	14.7	Eltanin	90°42.1	51°28.8
21	92°59.6	123°28.2	• • 55.9	138°06.2	. 10.9	344°54.1	• • 42.9	92°44.4	• • 14.6	Kaus Aust.	83°31.6	-34°22.3
22	108°02.1	138°27.6	54.9	153°06.6	10.4	359°56.9	43.0	107°46.6	14.5	Vega	80°32.9	38°48.2
23	123°04.6	153°27.0	53.8	168°07.1	09.8	14°59.6	43.0	122°48.8	14.4	Nunki	75°46.9	-26°15.9
										Altair	61°59.4	8°56.1
Mer.p	ass. 14:49	$\nu$ -0.6′ d-1	.0′ m-3.91	$\nu$ 0.5′ $d$ -0	.5′ m1.12	$\nu$ 2.7′ d0.	0′ m-2.59	$\nu 2.2' \ d-0$	.1′ m1.02	Peacock	53°04.9	-56°39.0
										Deneb	49°25.7	45°22.3
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.2	9°59.6
0	138° 07.0	168°26.5	S13°52.8	183°07.6	S18°09.3	30°02.3	N22°43.0	137°51.1	S02°14.3	Al Na'ir	27°32.2	-46°50.2
1	153°09.5	183°25.9	51.7	198°08.1	08.7	45°05.0	43.1	152°53.3	14.2	Fomalhaut	15°13.8	-29°29.2
2	168° 12.0	198°25.3	50.6	213°08.6	08.2	60°07.7	43.1	167°55.5	14.1	Scheat	13°44.6	28°13.5
3	183° 14.4	213°24.7	• • 49.6	228°09.0	07.6	75° 10.5	• • 43.1	182°57.7	• • 14.0	Markab	13°29.3	15°20.7
4	198° 16.9	228°24.2	48.5	243°09.5	07.1	90°13.2	43.2	198°00.0	13.9	Feb 06 Fri	SHA	Mer.pass
5	213° 19.4	243°23.6	47.5	258° 10.0	06.5	105° 15.9	43.2	213°02.2	13.7	Venus	32°45.8	12:45
6	228°21.8	258°23.0	S13°46.4	273° 10.5	S18°06.0	120° 18.6	N22°43.2	228°04.4	S02°13.6	Mars	46°36.0	11:49
7	243°24.3	273°22.5	45.3	288°11.0	05.4	135°21.3	43.3	243°06.6	13.5	Jupiter		22:05
8	258° 26.7	288°21.9	44.3	303°11.5	04.9	150°24.1	43.3	258°08.9	13.4	Saturn	359°55.4	14:54
9	273°29.2	303°21.3	• • 43.2	318°11.9	04.3	165°26.8	• • 43.3	273°11.1	· · 13.3			
10	288°31.7	318°20.8	42.2	333°12.4	03.8	180° 29.5	43.4	288°13.3	13.2	Feb 07 Sat	SHA	Mer.pass
11	303°34.1	333°20.2	41.1	348°12.9	03.2	195°32.2	43.4	303°15.5	13.1	Venus	31°32.5	12:46
12	318° 36.6	348°19.6	S13°40.0	3°13.4	S18°02.7	210°34.9	N22°43.4	318°17.8	S02°13.0	Mars	45°48.2	11:48
13	333°39.1	3°19.1	39.0	18° 13.9	02.1	225°37.7	43.5	333°20.0	12.9	Jupiter		22:00
14	348°41.5	$18^{\circ}18.5$	37.9	33°14.3	01.6	240°40.4	43.5	348°22.2	12.8	Saturn	359°49.8	14:50
15	3°44.0	33°17.9	• • 36.8	48°14.8	•• 01.0	255°43.1	• • 43.5	3°24.4	• • 12.7	Feb 08 Sun	SHA	Mer.pass
16	18° 46.5	48°17.4	35.8	63° 15.3	18°00.5	270°45.8	43.6	18°26.7	12.5	Venus	30° 19.4	12:47
17	33°48.9	63°16.8	34.7	78° 15.8	17°59.9	285°48.5	43.6	33°28.9	12.4	Mars	45°00.6	11:47
18	48°51.4	78°16.2	<b>S</b> 13°33.6	93°16.3	S17°59.4	300°51.2	N22°43.6	48°31.1	S02°12.3	Jupiter		21:56
19	63°53.9	93°15.7	32.5	108°16.8	58.8	315°53.9	43.7	63°33.3	12.2	Saturn	359°44.0	14:46
20	78° 56.3	$108^{\circ}15.1$	31.5	123° 17.3	58.3	330°56.7	43.7	78°35.6	12.1			
21	93°58.8	123°14.5	• • 30.4	138° 17.7	• • 57.7	345°59.4	• • 43.7	93°37.8	• • 12.0	Horizont	al parallax	
22	109°01.2	138°14.0	29.3	153° 18.2	57.2	1°02.1	43.8	108°40.0	11.9		Venus:	0.1
23	124°03.7	153°13.4	28.3	$168^{\circ}18.7$	56.6	$16^{\circ}04.8$	43.8	123°42.2	11.8		Mars:	0.1
Mers	ass. 14:45	ν-0 6/ d 1	.1′ m-3.91	νΩ 5/ d Ω	.5′ m1.12	1/2 7/ 40	0′ m-2.59	1/2 2/ 4 0	.1′ m1.02			
ivier.p	vass. 14.45	ν-0.0 <i>a</i> -1	.11-3.91	$\nu$ 0.5 $a$ -0	1111.12	ν2.1 a0.	∪ 111-∠.39	ν2.2 U-U	.1 1111.02			

Fri	h	Sun				Moon		
1 191°30.1 44.1 324°39.4 15.3 05°36.7 14.8 56.0′ 2 206°30.1 330 330°31.8 15.3 05°51.5 14.8 56.0′ 3 221°30.0 · 33.6 358°48.1 15.3 06°06.3 14.7 55.9′ 4 236°30.0 57.8 8°22.5 15.4 06°21.0 14.7 55.9′ 5 221°29.9 37.0 22°56.8 15.4 06°25.1 14.6 55.8° 6 266°29.9 \$15°36.3 37°31.2 15.4 506°50.3 14.6 55.8° 8 296°29.8 34.7 66°39.9 15.4 07°19.4 14.5 55.7′ 8 291°29.8 33.9 81°14.2 15.4 07°19.4 14.5 55.7′ 10 326°29.7 33.2 95°48.6 15.4 07°48.4 14.4 55.7 11.3 11°29.6 30.9 130°31.5 15.4 07°48.4 14.4 55.7 11.3 11°29.6 30.9 130°31.5 15.4 07°48.4 14.4 55.7 11.3 11°29.6 30.9 130°31.7 15.3 08°45.7 14.2 55.6 15.4 07°48.4 14.4 55.7 11.3 11°29.6 30.9 130°31.7 15.3 08°45.7 14.2 55.6 15.4 07°48.4 14.4 55.7 11.3 11°29.6 30.9 130°31.7 15.3 08°45.7 14.1 14.3 55.6 15.4 12°40.6 15.3 08°45.7 14.2 55.6 15.4 12°40.6 15.3 08°45.7 14.2 55.6 15.4 12°40.6 15.3 08°45.7 14.2 55.6 15.4 12°40.6 15.3 08°45.7 14.1 15.5 55.7 15.3 10°40.1 15.3 08°45.7 14.1 15.5 55.7 15.3 10°40.1 15.3 08°45.7 14.1 15.5 55.7 15.3 10°40.1 15.3 10°40.1 15.3 08°45.7 14.1 15.5 55.6 15.4 10°40.1 15.3 08°45.7 14.1 15.5 55.7 15.3 10°40.1 15.3 10°40.1 15.3 10°40.1 15.3 10°40.1 15.3 10°40.1 15.3 10°40.1 15.3 10°40.1 15.3 10°40.1 15.3 10°40.1 15.3 10°40.1 15.3 10°40.1 15.3 10°40.1 15.3 10°40.1 15.3 10°40.1 15.3 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.1 10°40.1 15.5 15.3 10°40.1 15.5 15.1 10°40.1 15.5 15.3	Fri	GHA	Dec	GHA	ν	Dec	d	HP
2								
3         221°30.0         ··· 38.6         353°48.1         15.3'         06°20.0         14.7'         55.9'           5         251°29.9         37.0         22°56.8         15.4'         06°35.7         14.6'         55.8'           6         266°29.9         S15°36.3         37°31.2         15.4'         06°35.7         14.6'         55.8'           7         281°29.9         33.5'         52°05.5         15.4'         07°19.4         14.5'         55.8'           8         296°29.8         34.7'         66°39.9         15.5'         70°33.9         15.5'         55.7'           10         326°29.7         31.2'         110°23.0         15.4'         60°02.8         14.4'         55.7'           11         341°29.6         0.30.1         15.6'         36°21.1         14.3'         55.6'           14         26°29.6         30.1         15.4'°         60°0.0         13.3'         08°3.1         14.3'         55.5'           15         41°29.6         20.3         166°40.4         15.3'         08°41.1         14.1'         55.5'           16         56°29.5         28.5         183°4.7'         15.3'         09°14.1         14.1' <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
4         236°30.0         37.8         8°22.5         15.4         06°35.7         14.6°         55.8°           6         266°29.9         S15°36.3         37°31.2         15.4°         06°85.7         14.6°         55.8°           7         281°29.9         315.5         52°65.8         15.4°         00°19.4         14.5°         55.7°           9         311°29.8         33.9         31°14.2         15.4°         00°19.4         14.5°         55.7°           10         326°29.7         S15°31.6         126°37.3         15.4°         08°02.8         14.4°         55.7°           13         11°29.6         0.93.1         13°31.7         15.3°         08°11.1         13.3°         56°17.1         3.3°         56°14.1         14.4°         55.7°           15         41°29.6         0.93.1         13°31.7         15.3°         08°41.1         14.3°         56.6°           16         56°29.5         28.5         183°14.7         15.3°         08°45.7         12.2°         56.7°           16         56°29.5         28.5         183°14.7         15.3°         08°42.7         15.5°           16         66°29.5         51.5°         13°3.7         <								
The color of th								
Sect								
9   311°29.8   · · · · · · · · · · · · · · · · · ·								
11   341°29.7   32.4   110°23.0   15.4'   08°02.8   14.4'   55.7'     12   356°29.7   \$515°31.6   124°57.3   15.4'   \$08°17.1   14.3'   \$55.6'     13   11°29.6   30.9   139°31.7   15.3'   08°31.4   14.3'   \$55.6'     15   41°29.6   30.1   154°06.0   15.3'   08°31.4   14.3'   \$55.6'     15   41°29.6   30.1   154°06.0   15.3'   08°31.4   14.3'   \$55.6'     16   56°29.5   28.5   183°14.7   15.3'   08°45.7   14.2   \$55.6'     16   56°29.5   28.5   183°14.7   15.3'   09°42.2   14.0'   \$55.5'     18   86°29.4   \$515°27.0   212°23.4   15.3'   \$09°42.2   14.0'   \$55.5'     19   101°29.4   26.2   226°57.7   15.3'   09°56.3   14.0'   \$55.4'     20   116°29.4   25.4   241°32.0   15.3'   10°10.2   13.9'   55.4'     21   131°29.3   ···································				81°14.2				
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Sat         GHA         Dec         GHA         ν         Dec         d         HP           0         176°29.2         S15°22.3         299°49.0         15.2'         S11°05.5         13.7'         55.3'           1         191°29.2         206°29.2         20.8         328°57.5         15.2'         11°19.1         13.6'         55.3'           3         221°29.1         19.2         358°05.8         15.2'         11°46.3         13.5'         55.2'           5         251°29.0         18.4         12°40.0         15.1'         12°13.2         13.4'         55.2'           6         266°29.0         S15°17.6         27°14.1         15.1'         12°39.9         13.3'         55.2'           7         281°29.0         16.8         41°48.2         15.1'         12°39.9         13.3'         55.1'           8         296°29.0         16.1         56°22.3         15.1'         12°39.9         13.7'         55.1'           9         311°28.9         13.7         100°04.4         15.0'         13°04.5         13.1'         55.1'           10         326°28.9         14.5         88°30.4         15.0'         13°04.5         13.1'         <								
Sat         GHA         Dec         GHA         ν         Dec         d         HP           0         176°29.2         S15°22.3         299°49.0         15.2'         S11°05.5         13.7'         55.3'           1         191°29.2         206°29.2         20.8         328°57.5         15.2'         11°19.1         13.6'         55.3'           3         221°29.1         19.2         358°05.8         15.2'         11°46.3         13.5'         55.2'           5         251°29.0         18.4         12°40.0         15.1'         12°13.2         13.4'         55.2'           6         266°29.0         S15°17.6         27°14.1         15.1'         12°39.9         13.3'         55.2'           7         281°29.0         16.8         41°48.2         15.1'         12°39.9         13.3'         55.1'           8         296°29.0         16.1         56°22.3         15.1'         12°39.9         13.7'         55.1'           9         311°28.9         13.7         100°04.4         15.0'         13°04.5         13.1'         55.1'           10         326°28.9         14.5         88°30.4         15.0'         13°04.5         13.1'         <		SD = 16.2'	d = -0.8'		SE	0 = 15.3'		
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Sun         GHA         Dec         GHA         ν         Dec         d         HP           0         176°28.5         \$15°03.5         289°23.9         14.6'         \$16°16.1         12.1'         54.8'           1         191°28.4         02.7         303°57.5         14.5'         16°28.2         12.0'         54.8'           2         206°28.4         01.9         318°31.0         14.5'         16°40.2         11.9'         54.7'           3         221°28.4         · 01.1         333°04.5         14.4'         16°52.1         11.9'         54.7'           4         236°28.4         15°00.3         347°37.9         14.4'         17°04.0         11.8'         54.7'           5         251°28.3         14°59.5         2°11.3         14.4'         17°15.8         11.7'         54.7'           6         266°28.3         514°58.7         16°44.7         14.3'         17°39.1         11.5'         54.6'           8         296°28.3         57.2         45°51.3         14.2'         17°50.6         11.5'         54.6'           9         311°28.2         *56.4         60°24.5         14.2'         18°02.1         11.4'         54.6'	23			274°50.3	14.6'	16°04.0	12.2'	54.8'
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0       176°28.5       S15°03.5       289°23.9       14.6'       S16°16.1       12.1'       54.8'         1       191°28.4       02.7       303°57.5       14.5'       16°28.2       12.0'       54.8'         2       206°28.4       01.9       318°31.0       14.5'       16°40.2       11.9'       54.7'         3       221°28.4       · · · 01.1       333°04.5       14.4'       16°52.1       11.9'       54.7'         4       236°28.4       15°00.3       347°37.9       14.4'       17°04.0       11.8'       54.7'         5       251°28.3       14°59.5       2°11.3       14.4'       17°04.0       11.8'       54.7'         6       266°28.3       514°58.7       16°44.7       14.3'       517°27.5       11.6'       54.7'         7       281°28.3       58.0       31°18.0       14.3'       17°39.1       11.5'       54.6'         8       296°28.3       57.2       45°51.3       14.2'       17°50.6       11.5'       54.6'         9       311°28.2       · 56.4       60°24.5       14.2'       18°02.1       11.4'       54.6'         10       326°28.2       55.6       74°57.7       14.1'	Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
2       206°28.4       01.9       318°31.0       14.5'       16°40.2       11.9'       54.7'         3       221°28.4       · · · 01.1       333°04.5       14.4'       16°52.1       11.9'       54.7'         4       236°28.4       15°00.3       347°37.9       14.4'       17°04.0       11.8'       54.7'         5       251°28.3       14°59.5       2°11.3       14.4'       17°15.8       11.7'       54.7'         6       266°28.3       514°58.7       16°44.7       14.3'       517°27.5       11.6'       54.7'         7       281°28.3       58.0       31°18.0       14.3'       17°39.1       11.5'       54.6'         8       296°28.3       57.2       45°51.3       14.2'       17°50.6       11.5'       54.6'         9       311°28.2       · · 56.4       60°24.5       14.2'       18°02.1       11.4'       54.6'         10       326°28.2       55.6       74°57.7       14.1'       18°13.5       11.3'       54.6'         11       341°28.2       54.8       89°30.9       14.1'       18°41.3       11.1'       54.6'         12       356°28.2       514°54.0       104°04.0       14.1'	0	176°28.5	S15°03.5	289°23.9	14.6'	<b>S</b> 16°16.1	12.1'	54.8'
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5         251°28.3         14°59.5         2°11.3         14.4'         17°15.8         11.7'         54.7'           6         266°28.3         S14°58.7         16°44.7         14.3'         S17°27.5         11.6'         54.7'           7         281°28.3         58.0         31°18.0         14.3'         17°39.1         11.5'         54.6'           8         296°28.3         57.2         45°51.3         14.2'         17°50.6         11.5'         54.6'           9         311°28.2         · · · 56.4         60°24.5         14.2'         18°02.1         11.4'         54.6'           10         326°28.2         55.6         74°57.7         14.1'         18°13.5         11.3'         54.6'           11         341°28.2         54.8         89°30.9         14.1'         18°24.8         11.2'         54.6'           12         356°28.2         S14°54.0         104°04.0         14.1'         S18°36.0         11.1'         54.6'           13         11°28.2         53.2         118°37.0         14.0'         18°47.1         11.1'         54.6'           14         26°28.1         52.4         133°10.1         14.0'         18°58.2         11.0'								
7       281°28.3       58.0       31°18.0       14.3'       17°39.1       11.5'       54.6'         8       296°28.3       57.2       45°51.3       14.2'       17°50.6       11.5'       54.6'         9       311°28.2       · · · · 56.4       60°24.5       14.2'       18°02.1       11.4'       54.6'         10       326°28.2       55.6       74°57.7       14.1'       18°13.5       11.3'       54.6'         11       341°28.2       54.8       89°30.9       14.1'       18°24.8       11.2'       54.6'         12       356°28.2       S14°54.0       104°04.0       14.1'       518°36.0       11.1'       54.6'         13       11°28.2       53.2       118°37.0       14.0'       18°47.1       11.1'       54.5'         14       26°28.1       52.4       133°10.1       14.0'       18°58.2       11.0'       54.5'         15       41°28.1       · · 51.6       147°43.0       13.9'       19°09.1       10.9'       54.5'         16       56°28.1       50.8       162°15.9       13.9'       19°20.0       10.8'       54.5'         17       71°28.1       50.0       176°48.8       13.8'	5	251°28.3	14°59.5	2°11.3	14.4'	$17^{\circ}15.8$	11.7'	54.7'
8       296°28.3       57.2       45°51.3       14.2'       17°50.6       11.5'       54.6'         9       311°28.2       · · · 56.4       60°24.5       14.2'       18°02.1       11.4'       54.6'         10       326°28.2       55.6       74°57.7       14.1'       18°13.5       11.3'       54.6'         11       341°28.2       54.8       89°30.9       14.1'       18°24.8       11.2'       54.6'         12       356°28.2       S14°54.0       104°04.0       14.1'       S18°36.0       11.1'       54.6'         13       11°28.2       53.2       118°37.0       14.0'       18°47.1       11.1'       54.5'         14       26°28.1       52.4       133°10.1       14.0'       18°58.2       11.0'       54.5'         15       41°28.1       · · · 51.6       147°43.0       13.9'       19°09.1       10.9'       54.5'         16       56°28.1       50.8       162°15.9       13.9'       19°09.1       10.9'       54.5'         17       71°28.1       50.0       176°48.8       13.8'       19°30.8       10.7'       54.5'         18       86°28.0       S14°49.2       191°21.6       13.8'								
9 311°28.2 ··· 56.4 60°24.5 14.2' 18°02.1 11.4' 54.6' 10 326°28.2 55.6 74°57.7 14.1' 18°13.5 11.3' 54.6' 11 341°28.2 54.8 89°30.9 14.1' 18°24.8 11.2' 54.6' 12 356°28.2 \$14°54.0 104°04.0 14.1' \$18°36.0 11.1' 54.6' 13 11°28.2 53.2 118°37.0 14.0' 18°47.1 11.1' 54.5' 14 26°28.1 52.4 133°10.1 14.0' 18°58.2 11.0' 54.5' 15 41°28.1 ··· 51.6 147°43.0 13.9' 19°09.1 10.9' 54.5' 16 56°28.1 50.8 162°15.9 13.9' 19°20.0 10.8' 54.5' 17 71°28.1 50.0 176°48.8 13.8' 19°30.8 10.7' 54.5' 18 86°28.0 \$14°49.2 191°21.6 13.8' \$19°41.5 10.6' 54.5' 19 101°28.0 48.4 205°54.4 13.7' 19°52.2 10.5' 54.5' 20 116°28.0 47.6 220°27.1 13.7' 20°02.7 10.4' 54.4' 21 131°28.0 ··· 46.8 234°59.8 13.6' 20°13.1 10.4' 54.4' 22 146°28.0 46.0 249°32.4 13.6' 20°23.5 10.3' 54.4' 23 161°27.9 45.2 264°05.0 13.5' 20°33.8 10.2' 54.4'								
11       341°28.2       54.8       89°30.9       14.1'       18°24.8       11.2'       54.6'         12       356°28.2       S14°54.0       104°04.0       14.1'       S18°36.0       11.1'       54.6'         13       11°28.2       53.2       118°37.0       14.0'       18°47.1       11.1'       54.5'         14       26°28.1       52.4       133°10.1       14.0'       18°58.2       11.0'       54.5'         15       41°28.1       · 51.6       147°43.0       13.9'       19°09.1       10.9'       54.5'         16       56°28.1       50.8       162°15.9       13.9'       19°20.0       10.8'       54.5'         17       71°28.1       50.0       176°48.8       13.8'       19°30.8       10.7'       54.5'         18       86°28.0       514°49.2       191°21.6       13.8'       S19°41.5       10.6'       54.5'         19       101°28.0       48.4       205°54.4       13.7'       19°52.2       10.5'       54.5'         20       116°28.0       47.6       220°27.1       13.7'       20°02.7       10.4'       54.4'         21       131°28.0       · 46.8       234°59.8       13.6'		311°28.2						
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
13         11°28.2         53.2         118°37.0         14.0'         18°47.1         11.1'         54.5'           14         26°28.1         52.4         133°10.1         14.0'         18°58.2         11.0'         54.5'           15         41°28.1         · · · 51.6         147°43.0         13.9'         19°09.1         10.9'         54.5'           16         56°28.1         50.8         162°15.9         13.9'         19°20.0         10.8'         54.5'           17         71°28.1         50.0         176°48.8         13.8'         19°30.8         10.7'         54.5'           18         86°28.0         514°49.2         191°21.6         13.8'         519°41.5         10.6'         54.5'           19         101°28.0         48.4         205°54.4         13.7'         19°52.2         10.5'         54.5'           20         116°28.0         47.6         220°27.1         13.7'         20°02.7         10.4'         54.4'           21         131°28.0         · · 46.8         234°59.8         13.6'         20°13.1         10.4'         54.4'           22         146°28.0         46.0         249°32.4         13.6'         20°23.5         10.3' <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	14	26°28.1	52.4	$133^{\circ}10.1$	14.0'	18°58.2	11.0'	54.5'
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
18       86°28.0       \$14°49.2       191°21.6       13.8'       \$19°41.5       10.6'       54.5'         19       101°28.0       48.4       205°54.4       13.7'       19°52.2       10.5'       54.5'         20       116°28.0       47.6       220°27.1       13.7'       20°02.7       10.4'       54.4'         21       131°28.0       · · 46.8       234°59.8       13.6'       20°13.1       10.4'       54.4'         22       146°28.0       46.0       249°32.4       13.6'       20°23.5       10.3'       54.4'         23       161°27.9       45.2       264°05.0       13.5'       20°33.8       10.2'       54.4'								
19     101°28.0     48.4     205°54.4     13.7'     19°52.2     10.5'     54.5'       20     116°28.0     47.6     220°27.1     13.7'     20°02.7     10.4'     54.4'       21     131°28.0     46.8     234°59.8     13.6'     20°13.1     10.4'     54.4'       22     146°28.0     46.0     249°32.4     13.6'     20°23.5     10.3'     54.4'       23     161°27.9     45.2     264°05.0     13.5'     20°33.8     10.2'     54.4'								
21 131°28.0 ·· 46.8 234°59.8 13.6' 20°13.1 10.4' 54.4' 22 146°28.0 46.0 249°32.4 13.6' 20°23.5 10.3' 54.4' 23 161°27.9 45.2 264°05.0 13.5' 20°33.8 10.2' 54.4'	19	101°28.0	48.4	205°54.4	13.7'	$19^{\circ}52.2$	10.5'	54.5'
22       146°28.0       46.0       249°32.4       13.6'       20°23.5       10.3'       54.4'         23       161°27.9       45.2       264°05.0       13.5'       20°33.8       10.2'       54.4'								
23 161°27.9 45.2 264°05.0 13.5' 20°33.8 10.2' 54.4'								
SD = 16.2'  d = -0.8' $SD = 14.9'$								
		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
N 70°	06:42	07:57	09:13	15:16	16:33	17:48
68°	06:37	07:45	08:52	15:38	16:44	17:52
66°	06:33	07:35	08:35	15:55	16:54	17:56
64°	06:30	07:27	08:21	16:08	17:02	18:00
62°	06:27	07:20	08:09	16:20	17:09	18:03
60°	06:24	07:14	07:59	16:30	17:16	18:05
N 58°	06:21	07:08	07:51	16:38	17:21	18:08
56°	06:19	07:03	07:43	16:46	17:26	18:10
54°	06:16	06:58	07:36	16:53	17:31	18:13
52°	06:14	06:54	07:30	16:59	17:35	18:15
50°	06:12	06:50	07:24	17:04	17:39	18:17
45°	06:07	06:42	07:12	17:16	17:47	18:22
<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
<b>N</b> 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	
N 40°	22:36	23:39		09:09	09:31	09:55	
35°	22:29	23:29		09:13	09:39	10:06	
30°	22:24	23:20		09:17	09:46	10:16	
20°	22:14	23:05	23:58	09:24	09:58	10:33	
N 10°	22:05	22:52	23:41	09:30	10:08	10:48	
0°	21:58	22:40	23:25	09:36	10:18	11:02	
<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	f 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	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	M	ars	Jup	oiter	Sat	urn		Stars	
Mon -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	139°06.2	168°12.9	\$13°27.2	183°19.2	S17°56.1	31°07.5	N22°43.8	138°44.4	S02°11.7			
1	154° 08.6	183°12.3	26.1	198°19.7	55.5	46° 10.2	43.9	153°46.7	11.6	Alpheratz	357°34.1	29°14.1
2	169°11.1	198°11.7	25.0	213°20.2	55.0	61°12.9	43.9	168°48.9	11.5	Ankaa	353°06.5	-42°10.0
3	184° 13.6	213°11.2	• • 24.0	228°20.6	• • 54.4	$76^{\circ}15.7$	• • 43.9	183°51.1	• • 11.3	Schedar	349°30.4	56°41.0
4	$199^{\circ}16.0$	228°10.6	22.9	243°21.1	53.9	91°18.4	44.0	198°53.3	11.2	Diphda Achernar	348°46.6 335°19.7	-17°50.7 -57°06.5
5	214° 18.5	243°10.1	21.8	258°21.6	53.3	$106^{\circ}21.1$	44.0	213°55.6	11.1	Hamal	327°50.3	23°35.2
6	229°21.0	258°09.5	\$13°20.7	273°22.1	S17°52.7	121°23.8	N22°44.0	228°57.8	S02°11.0	Polaris	313°35.0	89°22.8
7	244°23.4	273°08.9	19.7	288°22.6	52.2	136°26.5	44.0	244°00.0	10.9	Acamar	315°11.1	-40°12.2
8 9	259°25.9 274°28.3	288°08.4 303°07.8	18.6 • • 17.5	303°23.1 318°23.6	51.6 •• 51.1	151°29.2 166°31.9	44.1 •• 44.1	259°02.2 274°04.4	10.8 · · 10.7	Menkar	$314^{\circ}05.2$	4°11.5
10	289°30.8	318°07.3	16.4	333°24.0	50.5	181°34.6	44.1	289°06.7	10.6	Mirfak	308°26.9	49°57.4
11	304°33.3	333°06.7	15.3	348°24.5	50.0	196°37.4	44.2	304°08.9	10.5	Aldebaran	290°38.4	16°33.7
12	319°35.7	348°06.2	S13°14.3	3°25.0	S17°49.4	211°40.1	N22°44.2	319°11.1	S02°10.4	Rigel Capella	281°02.8 280°20.3	-8°10.4 46°01.6
13	334°38.2	3°05.6	13.2	18°25.5	48.9	226°42.8	44.2	334°13.3	10.2	Bellatrix	278° 21.7	6°22.3
14	349°40.7	18°05.1	12.1	33°26.0	48.3	241°45.5	44.3	349°15.6	10.1	Elnath	278°00.5	28°37.8
15	4° 43.1 19° 45.6	33°04.5 48°03.9	• • 11.0	48°26.5 63°27.0	• • 47.7	256° 48.2 271° 50.9	• • 44.3	4°17.8 19°20.0	• • 10.0	Alnilam	275°36.6	-1°11.2
16 17	34° 48.1	63°03.4	09.9 08.8	78°27.5	47.2 46.6	271 50.9 286°53.6	44.3 44.4	34°22.2	09.9 09.8	Betelgeuse	270°50.9	7°24.7
18	49° 50.5	78°02.8	S13°07.8	93°27.9	\$17°46.1	301°56.3	N22°44.4	49°24.4	S02°09.7	Canopus	263°51.6	-52°42.8
19	64°53.0	93°02.3	06.7	108°28.4	45.5	316°59.0	44.4	64°26.7	09.6	Sirius	258°25.2	-16°45.3
20	79°55.5	108°01.7	05.6	123°28.9	44.9	$332^{\circ}01.7$	44.5	79°28.9	09.5	Adhara	255°04.8 244°49.6	-29°00.6 5°09.4
21	94° 57.9	123°01.2	• • 04.5	138°29.4	• • 44.4	347°04.4	• • 44.5	94°31.1	• • 09.4	Procyon Pollux	244 49.0 243°15.8	27°57.7
22	110°00.4	138°00.6	03.4	153°29.9	43.8	2°07.2	44.5	109°33.3	09.3	Avior	234°13.8	-59°35.7
23	125°02.8	153°00.1	02.3	168°30.4	43.3	17°09.9	44.6	124°35.6	09.1	Suhail	222°45.2	-43°32.4
Mer.p	ass. 14:41	$\nu$ -0.6' d-1	1' m-3.91	$\nu$ 0.5′ d-0	.6′ m1.12	$\nu$ 2.7′ d0.	0′ m-2.58	$\nu$ 2.2′ d-0	.1′ m1.02	Miaplacidus	221°37.2	-69°49.5
										Alphard	217°46.5	-8°46.4
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.1	11°50.2
0	140°05.3	167°59.5	S13°01.2	183°30.9	S17°42.7	32°12.6	N22°44.6	139°37.8	S02°09.0	Dubhe	193°39.3	61°36.4
1	155°07.8	182°59.0	13°00.1	198°31.4	42.1	$47^{\circ}15.3$	44.6	154°40.0	08.9	Denebola Gienah	182°23.7 175°42.4	14°25.4 -17°41.3
2	170° 10.2	197°58.4	$12^{\circ}59.1$	213°31.8	41.6	$62^{\circ}18.0$	44.6	169°42.2	8.80		173° 42.4	-63°14.5
3	185° 12.7	212°57.9	• • 58.0	228°32.3	• • 41.0	77°20.7	• • 44.7	184°44.4	• • 08.7	Gacrux	171°50.3	-57°15.5
4	200° 15.2	227°57.3	56.9	243°32.8	40.4	92°23.4	44.7	199°46.7	08.6	Alioth	166°11.8	55°48.7
5 6	215°17.6 230°20.1	242°56.8 257°56.2	55.8 \$12°54.7	258°33.3 273°33.8	39.9 \$17°39.3	107°26.1 122°28.8	44.7 N22°44.8	214°48.9 229°51.1	08.5 \$02°08.4	Spica	158°21.2	-11°18.0
7	245°22.6	257 50.2 272°55.7	53.6	273 33.6 288°34.3	38.8	122 20.0 137°31.5	44.8	244°53.3	08.3	Alkaid	152°51.1	49°10.6
8	260°25.0	287°55.2	52.5	303°34.8	38.2	157° 31.3	44.8	259°55.5	08.2	Hadar	148°34.5	-60°29.7
9	275°27.5	302°54.6	51.4	318°35.3	37.6	167°36.9	• • 44.9	274°57.8	• • 08.0	Menkent	147°56.4 145°47.0	-36°29.8
10	290°30.0	$317^{\circ}54.1$	50.3	333°35.8	37.1	182°39.6	44.9	290°00.0	07.9	Arcturus Rigil Kent.	145 47.0 139°38.9	19°02.5 -60°56.4
11	305°32.4	332°53.5	49.2	348°36.3	36.5	197°42.3	44.9	305°02.2	07.8	Kochab	137° 19.7	74°02.4
12	320°34.9	347°53.0	S12°48.1	3°36.7	S17°35.9	212°45.0	N22°45.0	320°04.4	S02°07.7	Zuben'ubi	136°55.0	-16°09.1
13	335°37.3	2°52.4	47.0	18°37.2	35.4	227°47.7	45.0	335°06.6	07.6	Alphecca	$126^{\circ}03.0$	26°37.3
14 15	350°39.8 5°42.3	17°51.9 32°51.3	45.9 •• 44.8	33°37.7 48°38.2	34.8 •• 34.2	242°50.4 257°53.1	45.0 •• 45.1	350°08.9 5°11.1	07.5 •• 07.4	Antares	112°14.8	-26°29.4
16	20°44.7	47°50.8	43.7	63°38.7	33.7	272°55.8	45.1	20°13.3	07.4	Atria	107°08.5	-69°04.2
17	35° 47.2	62°50.3	42.6	78°39.2	33.1	287° 58.5	45.1	35°15.5	07.2	Sabik	102°01.9	-15°45.5
18	50°49.7	77°49.7	S12°41.5	93°39.7	S17°32.5	303°01.2	N22°45.1	50°17.7	S02°07.0	Shaula Rasalhague	96°09.4 95°57.9	-37°07.3 12°32.3
19	65°52.1	92°49.2	40.4	108°40.2	32.0	318°04.0	45.2	65°20.0	06.9	Eltanin	90°42.1	51°28.8
20	80°54.6	107°48.6	39.3	123°40.7	31.4	333°06.7	45.2	80°22.2	06.8	Kaus Aust.	83°31.6	-34°22.3
21	95°57.1	122°48.1	• • 38.2	138°41.2	30.8	348°09.4	• • 45.2	95°24.4	• • 06.7	Vega	80°32.9	38°48.2
22 23	110°59.5 126°02.0	137°47.6 152°47.0	37.1 36.0	153°41.7 168°42.2	30.3 29.7	3°12.1 18°14.8	45.3 45.3	110°26.6 125°28.8	06.6 06.5	Nunki	75°46.9	-26°15.9
										Altair	61°59.4	8°56.1
Mer.p	ass. 14:37	$\nu$ -0.5' d-1	1′ m-3.91	$\nu$ 0.5′ d-0	.6′ m1.12	$\nu 2.7' \ d0.$	0′ m-2.57	$\nu 2.2' \ d-0$	.1′ m1.02	Peacock	53°04.9	-56°39.0
										Deneb Enif	49°25.6 33°38.2	45°22.3 9°59.6
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.2
0	141°04.4	167°46.5	S12°34.9	183°42.7	S17°29.1	33° 17.5	N22°45.3	140°31.1	S02°06.4	Fomalhaut	15°13.8	-29°29.2
1	156°06.9	182°45.9	33.8	198°43.1	28.6	48°20.2	45.4	155°33.3	06.3	Scheat	$13^{\circ}44.6$	28°13.5
2	171°09.4 186°11.8	197°45.4 212°44.9	32.7 · · 31.6	213°43.6 228°44.1	28.0 •• 27.4	63°22.9 78°25.6	45.4 •• 45.4	170°35.5 185°37.7	06.2 •• 06.0	Markab	13°29.3	15°20.7
4	201°14.3	212 44.9 227°44.3	30.5	243°44.6	26.8	93°28.3	45.4	200°39.9	05.9	Feb 09 Mon	SHA	Mer.pass
5	216° 16.8	242°43.8	29.4	258°45.1	26.3	108°30.9	45.5	215°42.1	05.8	Venus	29°06.7	12:48
6	231° 19.2	257°43.3	S12°28.3	273°45.6	S17°25.7	123°33.6	N22°45.5	230°44.4	S02°05.7	Mars	44°13.0	11:46
7	246°21.7	272°42.7	27.2	288°46.1	25.1	$138^{\circ}36.3$	45.5	245°46.6	05.6	Jupiter	252°01.4	21:52
8	261°24.2	287°42.2	26.1	303°46.6	24.6	153°39.0	45.6	260°48.8	05.5	Saturn	359°38.3	14:43
9	276°26.6	302°41.7	• • 25.0	318°47.1	• • 24.0	168°41.7	• • 45.6	275°51.0	• • 05.4	Feb 10 Tue	SHA	Mer.pass
10	291°29.1 306°31.6	317°41.1	23.9	333°47.6	23.4	183°44.4	45.6 45.7	290°53.2	05.3	Venus	27°54.2	12:48
11 12	300 31.0 321°34.0	332°40.6 347°40.1	22.8 \$12°21.7	348°48.1 3°48.6	22.8 \$17°22.3	198° 47.1 213° 49.8	45.7 N22 <sup>o</sup> 45.7	305°55.5 320°57.7	05.2 \$02°05.0	Mars	43° 25.6	11:46
13	336°36.5	2°39.5	20.6	18°49.1	21.7	213° 49.0° 228° 52.5	45.7	335°59.9	04.9	Jupiter		21:47
14	351°38.9	17°39.0	19.4	33°49.6	21.1	243°55.2	45.7	351°02.1	04.8	Saturn	359°32.5	14:39
15	$6^{\circ}41.4$	32°38.5	• • 18.3	48°50.1	• • 20.5	258° 57.9	• • 45.8	$6^{\circ}04.3$	• • 04.7	Feb 11 Wed	SHA	Mer.pass
16	21°43.9	47°37.9	17.2	63°50.6	20.0	274°00.6	45.8	21°06.5	04.6	Venus	26°42.0	12:49
17	36°46.3	62°37.4	16.1	78°51.1	19.4	289°03.3	45.8	36°08.8	04.5	Mars	42°38.2	11:45
18	51°48.8	77°36.9	\$12°15.0	93°51.6	\$17°18.8	304°06.0	N22°45.9	51°11.0 66°13.2	\$02°04.4		252°13.0	21:43
19 20	66°51.3 81°53.7	92°36.3 107°35.8	13.9 12.8	108°52.0 123°52.5	18.2 17.7	319°08.7 334°11.4	45.9 45.9	81°15.4	04.3 04.2	Saturn	359°26.6	14:36
21	96°56.2	107 35.6 122°35.3	12.0	123 52.5 138°53.0	17.1	349°14.1	• • 46.0	96°17.6	• • 04.0	Horizont	al parallax	
22	111°58.7	137°34.8	10.5	153°53.5	16.5	4°16.8	46.0	111°19.8	03.9		Venus:	0.1
23	$127^{\circ}01.1$	152°34.2	09.4	$168^{\circ}54.0$	15.9	$19^{\circ}19.5$	46.0	$126^{\circ}22.1$	03.8		Mars:	0.1
Mern	ass. 14:33	$\nu$ -0.5' d-1	1′ m-3.91	$\nu 0.5' d_{-}0$	.6′ m1.12	ν2 7' dΩ	0′ m-2.57	ν2 2' d-Ω	.1′ m1.02			
		- 0.0 4 1	0.51	- 3.5 4 0	, <u>-</u>							

h	Su	n			Moon			
			CHA			٠	HP	
Mon 0	<b>GHA</b> 176°27.9	Dec \$14°44.4	<b>GHA</b> 278°37.5	u 13.5'	Dec \$20°43.9	d 10.1'	пР 54.4'	
1	191°27.9	43.6	293°09.9	13.4	20°54.0	10.0'	54.4'	
2	206°27.9	42.8	307°42.4	13.4	21°04.0	9.9'	54.4'	
3	221°27.9	42.0	322°14.7	13.3'	21°13.9	9.8'	54.4'	
4	236°27.8	41.2	336°47.0	13.2'	21°23.7	9.7'	54.3'	
5	251°27.8	40.4	351°19.3	13.2'	21°33.4	9.6'	54.3'	
6	266°27.8	S14°39.6	5°51.5	13.1'	S21°43.0	9.5'	54.3'	
7	281°27.8	38.8	20°23.6	13.1'	21°52.6	9.4'	54.3'	
8	296°27.8	38.0	34°55.7	13.0'	22°02.0	9.3'	54.3'	
9	311°27.8	• • 37.2	49°27.7	13.0'	22°11.3	9.2'	54.3'	
10	326°27.7	36.4	63°59.7	12.9'	22°20.5	9.1'	54.3'	
11	341°27.7	35.6	78°31.6	12.9'	22°29.7	9.0'	54.3'	
12	356°27.7	\$14°34.8	93°03.4	12.8'	522°38.7	8.9'	54.3'	
13	11°27.7	34.0	107°35.2	12.7'	22°47.6	8.8'	54.3'	
14	26°27.7	33.2	122°07.0	12.7'	22°56.5	8.7'	54.2'	
15 16	41°27.7 56°27.7	· · 32.4 31.6	136°38.7 151°10.3	12.6' 12.6'	23°05.2 23°13.8	8.6' 8.5'	54.2' 54.2'	
17	71°27.6	30.7	165°41.9	12.5'	23 13.6 23°22.4	6.5 8.4'	54.2'	
18	86°27.6	S14° 29.9	180°13.4	12.5'	523°30.8	8.3	54.2'	
19	101°27.6	29.1	194°44.9	12.4	23°39.1	8.2'	54.2'	
20	116° 27.6	28.3	209°16.3	12.4	23°47.3	8.1	54.2'	
21	131°27.6	• • 27.5	223°47.6	12.3'	23°55.4	8.0'	54.2	
22	146°27.6	26.7	238°18.9	12.2'	24°03.4	7.9'	54.2'	
23	161°27.6	25.9	252°50.1	12.2'	24°11.3	7.8'	54.2'	
	SD = 16.2'	d = -0.8'		SE	0 = 14.8'			
Tue	GHA	Dec	GHA	ν	Dec	d	HP	
0	176°27.6	S14°25.1	267°21.3	12.1'	S24°19.1	7.7'	54.2'	
1	191°27.6	24.3	281°52.4	12.1'	24°26.8	7.6'	54.2'	
2	206°27.5	23.5	296°23.4	12.0'	24°34.3	7.5'	54.2'	
3	221°27.5	• • 22.6	310°54.4	11.9'	24°41.8	7.3'	54.2'	
4	236°27.5	21.8	325°25.4	11.9'	24°49.2	7.2'	54.2'	
5	251°27.5 266°27.5	21.0 \$14° 20.2	339°56.2 354°27.0	11.8' 11.8'	24°56.4 \$25°03.5	7.1' 7.0'	54.2' 54.2'	
6 7	281°27.5	19.4	354 27.0 8°57.8	11.7	25°10.5	6.9'	54.2'	
8	296°27.5	18.6	23°28.5	11.6'	25°17.4	6.8	54.1'	
9	311°27.5	17.8	37°59.2	11.6'	25°24.2	6.7'	54.1'	
10	326°27.5	17.0	52°29.7	11.5'	25°30.9	6.6'	54.1'	
11	341°27.5	16.1	67°00.3	11.5'	25°37.4	6.4'	54.1'	
12	356°27.5	\$14°15.3	81°30.7	11.4'	S25°43.9	6.3'	54.1'	
13	11°27.4	14.5	96°01.2	11.4'	25°50.2	6.2'	54.1'	
14	26°27.4	13.7	110°31.5	11.3'	25°56.4	6.1'	54.1'	
15 16	41°27.4 56°27.4	· · 12.9 12.1	125°01.8 139°32.1	11.2' 11.2'	26°02.5 26°08.5	6.0' 5.8'	54.1' 54.1'	
17	71°27.4	11.2	159 52.1 154°02.3	11.1'	26°14.3	5.7	54.1	
18	86°27.4	\$14° 10.4	168°32.4	11.1'	526°20.0	5.6'	54.1'	
19	101°27.4	09.6	183°02.5	11.0'	26°25.6	5.5'	54.1'	
20	116°27.4	08.8	197°32.5	11.0'	26°31.1	5.4'	54.1'	
21	131°27.4	08.0	212°02.5	10.9'	26°36.5	5.2'	54.1'	
22	146°27.4	07.2	226°32.4	10.9'	26°41.7	5.1'	54.1'	
23	161°27.4	06.3	241°02.3	10.8'	26°46.8	5.0'	54.1'	
	SD = 16.2'	d = -0.8'		SE	0 = 14.8'			
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	176°27.4	S14°05.5	$255^{\circ}32.1$	10.8'	S26°51.8	4.9'	54.1'	
1	191°27.4	04.7	270°01.9	10.7'	26°56.7	4.7'	54.1'	
2	206°27.4	03.9	284°31.6	10.7'	27°01.4	4.6'	54.1'	
3	221°27.4	• • 03.0	299°01.3	10.6'	27°06.1	4.5'	54.2'	
4	236°27.4	02.2	313°30.9	10.6'	27°10.6	4.4'	54.2'	
5	251°27.4 266°27.4	01.4 \$14°00.6	328°00.4 342°30.0	10.5' 10.5'	27°14.9 <b>S</b> 27°19.2	4.2' 4.1'	54.2' 54.2'	
6 7	266°27.4 281°27.4	13°59.8	342°30.0 356°59.4	10.5	27°23.3	4.1 4.0'	54.2'	
8	296°27.4	58.9	11°28.8	10.4	27°27.2	3.9'	54.2'	
9	311°27.4	• • 58.1	25°58.2	10.3'	27°31.1	3.7'	54.2'	
10	326°27.4	57.3	40°27.5	10.3'	27°34.8	3.6'	54.2'	
11	341°27.4	56.5	54°56.8	10.2'	27°38.4	3.5'	54.2'	
12	356°27.4	S13°55.6	69°26.1	10.2'	S27°41.9	3.3'	54.2'	
13	11°27.4	54.8	83°55.3	10.2'	27°45.2	3.2'	54.2'	
14	26°27.4	54.0	98°24.4	10.1'	27°48.4	3.1'	54.2'	
15	41°27.4	• • 53.2	112°53.5	10.1'	27°51.4	2.9'	54.2'	
16 17	56°27.4 71°27.4	52.3 51.5	127°22.6 141°51.6	10.0' 10.0'	27°54.4 27°57.2	2.8' 2.7'	54.2' 54.2'	
18	86°27.4	51.5 \$13°50.7	141 51.6 156°20.6	10.0'	\$27°59.8	2.7	54.2'	
19	101°27.4	49.9	170°49.6	9.9'	28°02.4	2.4	54.2'	
20	116°27.4	49.0	185° 18.5	9.9'	28°04.8	2.3'	54.2'	
21	131°27.4	• • 48.2	199°47.4	9.8'	28°07.0	2.1'	54.3'	
22	146°27.4	47.4	214°16.2	9.8'	28°09.1	2.0'	54.3'	
23	161°27.4	46.5	228°45.0	9.8'	28°11.1	1.8'	54.3'	
	SD = 16.2'	d = -0.8' SD = 14.8'						

		0.	26 Febr	,		
Lat.	Twi	light	Sunrise	Sunset	Twi	light
Ldt.	Naut.	Civil	Surrise	Sunset	Civil	Naut.
N 72°	06:35	07:58	09:24	15:06	16:32	17:55
<b>N</b> 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
$N 10^{\circ}$	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
<b>S</b> $10^{\circ}$	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
$30^{\circ}$	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
	. Moonris				Moonset	:
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°						
<b>N</b> 70°						
68°	04:50			06:07		
66°	03:40			07:18		
64°	03:04	05:15		07:54	07:22	
62°	02:30	04.23	06.21	08:21	08.13	07.50

N 72°         Image: color of the col	Lat.		Moonris	е		Moonset	:
N 70°       68°       04:50       66°       03:40       77:18       77:54       77:22       77:54       77:22       77:54       77:59       77:54       77:22       77:54       77:22       77:54       77:59       77:50       77:59       77:50       77:59       77:50       77:59       77:50       77:50       77:59       77:50       77	Lat.	Mon	Tue	Wed	Mon	Tue	Wed
68° 04:50	N 72°						
66° 03:40	N 70°						
64° 03:04 05:15	68°	04:50			06:07		
62° 02:39 04:23 06:21 08:21 08:13 07:59 60° 02:19 03:52 05:24 08:41 08:45 08:56    N 58° 02:02 03:29 04:51 08:58 09:09 09:29 56° 01:49 03:10 04:27 09:13 09:28 09:54 54° 01:37 02:54 04:07 09:25 09:45 10:14 52° 01:26 02:40 03:51 09:36 09:59 10:30 50° 01:17 02:29 03:37 09:46 10:11 10:45 45° 00:58 02:04 03:08 10:06 10:36 11:14    N 40° 00:42 01:45 02:46 10:23 10:56 11:36 35° 00:29 01:28 02:27 10:37 11:13 11:55 30° 00:17 01:14 02:11 10:50 11:28 12:12 20° ⋯ 00:51 01:45 11:11 11:53 12:39    N 10° ⋯ 00:11 01:00 11:47 12:35 13:25    S 10° 23:52 ⋯ 00:39 12:04 12:55 13:47 20° 23:32 ⋯ 00:11 01:00 11:47 12:35 13:25    S 10° 23:52 ⋯ 00:39 12:04 12:55 13:47 20° 23:30 23:09 23:50 ⋯ 12:45 13:12 14:14 13:03 35° 22:26 23:35 ⋯ 12:57 13:57 14:55 40° 22:40 23:17 ⋯ 13:12 14:14 15:14 45° 22:22 22:55 23:37 13:30 14:35 15:37    S 50° 21:59 22:28 23:07 13:52 15:02 16:06 52° 21:21 21:42 22:15 14:28 15:47 16:59 58° 21:05 21:20 21:48 14:44 16:08 17:25 16:59 58° 21:05 21:20 21:48 14:44 16:08 17:25 11:47 16:59 58° 21:05 21:20 21:48 14:44 16:08 17:25	66°	03:40			07:18		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	64°	03:04	05:15		07:54	07:22	
$\begin{array}{c} \textbf{N} \ 58^{\circ} \\ 56^{\circ} \ 01:49 \\ 03:10 \ 04:27 \ 09:13 \ 09:28 \ 09:54 \\ 54^{\circ} \ 01:37 \ 02:54 \ 04:07 \ 09:25 \ 09:45 \ 10:14 \\ 52^{\circ} \ 01:26 \ 02:40 \ 03:51 \ 09:36 \ 09:59 \ 10:30 \\ 50^{\circ} \ 01:17 \ 02:29 \ 03:37 \ 09:46 \ 10:11 \ 10:45 \\ 45^{\circ} \ 00:58 \ 02:04 \ 03:08 \ 10:06 \ 10:36 \ 11:14 \\ \textbf{N} \ 40^{\circ} \ 00:42 \ 01:45 \ 02:46 \ 10:23 \ 10:56 \ 11:36 \\ 35^{\circ} \ 00:29 \ 01:28 \ 02:27 \ 10:37 \ 11:13 \ 11:55 \\ 30^{\circ} \ 00:17 \ 01:14 \ 02:11 \ 10:50 \ 11:28 \ 12:12 \\ 20^{\circ} \ \cdots \ 00:51 \ 01:45 \ 11:11 \ 11:53 \ 12:39 \\ \textbf{N} \ 10^{\circ} \ \cdots \ 00:30 \ 01:22 \ 11:30 \ 12:14 \ 13:03 \\ 0^{\circ} \ \cdots \ 00:11 \ 01:00 \ 11:47 \ 12:35 \ 13:25 \\ \textbf{S} \ 10^{\circ} \ 23:52 \ \cdots \ 00:39 \ 12:04 \ 12:55 \ 13:47 \\ 20^{\circ} \ 23:32 \ \cdots \ 00:16 \ 12:23 \ 13:17 \ 14:11 \\ 30^{\circ} \ 23:09 \ 23:50 \ \cdots \ 12:45 \ 13:42 \ 14:38 \\ 35^{\circ} \ 22:56 \ 23:35 \ \cdots \ 12:57 \ 13:57 \ 14:55 \\ 40^{\circ} \ 22:40 \ 23:17 \ \cdots \ 13:12 \ 14:14 \ 15:14 \\ 45^{\circ} \ 22:22 \ 22:55 \ 23:37 \ 13:30 \ 14:35 \ 15:37 \\ \textbf{S} \ 50^{\circ} \ 21:59 \ 22:28 \ 23:07 \ 13:52 \ 15:02 \ 16:06 \\ 52^{\circ} \ 21:48 \ 22:15 \ 22:55 \ 14:42 \ 15:47 \ 16:59 \\ 58^{\circ} \ 21:05 \ 21:20 \ 21:48 \ 14:44 \ 16:08 \ 17:25 \\ \hline \end{tabular}$		02:39	04:23		08:21	08:13	07:59
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	60°	02:19	03:52	05:24	08:41	08:45	08:56
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	N 58°	02:02	03:29	04:51	08:58	09:09	09:29
52°         01:26         02:40         03:51         09:36         09:59         10:30           50°         01:17         02:29         03:37         09:46         10:11         10:45           45°         00:58         02:04         03:08         10:06         10:36         11:14           N 40°         00:42         01:45         02:46         10:23         10:56         11:36           35°         00:29         01:28         02:27         10:37         11:13         11:55           30°         00:17         01:14         02:11         10:50         11:28         12:12           20°          00:51         01:45         11:11         11:53         12:39           N 10°          00:30         01:22         11:30         12:14         13:03           0°          00:11         01:00         11:47         12:35         13:25           S 10°         23:52          00:39         12:04         12:55         13:47           20°         23:32          00:16         12:23         13:17         14:11           30°         23:99         23:50	56°	01:49	03:10	04:27	09:13	09:28	09:54
50°         01:17         02:29         03:37         09:46         10:11         10:45           45°         00:58         02:04         03:08         10:06         10:36         11:14           N 40°         00:42         01:45         02:46         10:23         10:56         11:36           35°         00:29         01:28         02:27         10:37         11:13         11:55           30°         00:17         01:14         02:11         10:50         11:28         12:12           20°          00:51         01:45         11:11         11:53         12:39           N 10°          00:30         01:22         11:30         12:14         13:03           0°          00:11         01:00         11:47         12:35         13:25           S 10°         23:52          00:39         12:04         12:55         13:47           20°         23:32          00:16         12:23         13:17         14:11           30°         23:99         23:50          12:45         13:42         14:38           35°         22:56         23:35 </th <th></th> <th>01:37</th> <th>02:54</th> <th>04:07</th> <th>09:25</th> <th>09:45</th> <th>10:14</th>		01:37	02:54	04:07	09:25	09:45	10:14
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		01:26	02:40	03:51	09:36		10:30
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		1					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	45°	00:58	02:04	03:08	10:06	10:36	11:14
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	N 40°	00:42	01:45	02:46	10:23	10:56	11:36
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	35°	00:29	01:28	02:27	10:37	11:13	11:55
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		00:17	01:14	02:11	10:50	11:28	12:12
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			00:51	01:45	11:11	11:53	12:39
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	-		00:11	01:00	11:47	12:35	13:25
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		23:52		00:39	12:04	12:55	13:47
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		23:32		00:16	12:23	13:17	14:11
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					12:45		14:38
45°         22:22         22:55         23:37         13:30         14:35         15:37           \$ 50°         21:59         22:28         23:07         13:52         15:02         16:06           52°         21:48         22:15         22:52         14:02         15:15         16:21           54°         21:36         22:00         22:35         14:14         15:29         16:38           56°         21:21         21:42         22:15         14:28         15:47         16:59           58°         21:05         21:20         21:48         14:44         16:08         17:25							
S 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							
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		22:22	22:55	23:37	13:30	14:35	15:37
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		21:59		23:07	13:52	15:02	16:06
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		1					
58° 21:05 21:20 21:48 14:44 16:08 17:25	_						
		I					
<b>S</b> 60°   20·45   20·53   21·12   15·03   16·35   18·01							
2 00   20.13   20.33   21.12   13.03   10.03   10.01	<b>S</b> 60°	20:45	20:53	21:12	15:03	16:35	18:01

		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	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.)

	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	142°03.6	167°33.7	S12°08.3	183°54.5	S17°15.4	34°22.2	N22°46.0	141°24.3	S02°03.7	Alpheratz	357°34.1	29°14.1
1	$157^{\circ}06.1$	182°33.2	07.2	198°55.0	14.8	49°24.9	46.1	$156^{\circ}26.5$	03.6			
2	172°08.5	197°32.7	06.1	213°55.5	14.2	64°27.5	46.1	171°28.7	03.5	Ankaa	353°06.5	-42°10.0
3	187°11.0	212°32.1	• • 05.0	228°56.0	• • 13.6	79°30.2	46.1	186°30.9	• • 03.4	Schedar	349°30.4	56°41.0
4	202°13.4	227°31.6	03.8	243°56.5	13.1	94°32.9	46.2	201°33.2	03.4	Diphda	348°46.6	-17°50.7
										Achernar	335°19.7	-57°06.5
5	217°15.9	242°31.1	02.7	258°57.0	12.5	109°35.6	46.2	216°35.4	03.1	Hamal	327°50.3	23°35.2
6	232°18.4	257° 30.6	S12°01.6	273°57.5	S17°11.9	124°38.3	N22°46.2	231° 37.6	S02°03.0	Polaris	313°36.3	89°22.8
7	247°20.8	272°30.0	12°00.5	288°58.0	11.3	139°41.0	46.2	246°39.8	02.9	Acamar	315°11.1	-40°12.2
8	262°23.3	287° 29.5	11°59.4	303°58.5	10.7	154°43.7	46.3	261°42.0	02.8			
9	277°25.8	302°29.0	• • 58.2	318°59.0	• • 10.2	169°46.4	• • 46.3	276°44.2	• • 02.7	Menkar	314°05.2	4°11.5
10	292°28.2	317°28.5	57.1	333°59.5	09.6	184°49.1	46.3	291°46.5	02.6	Mirfak	308°26.9	49°57.4
11	307°30.7	332°27.9	56.0	349°00.0	09.0	199°51.8	46.4	306°48.7	02.5	Aldebaran	290°38.5	16°33.7
										Rigel	281°02.8	-8°10.4
12	322°33.2	347°27.4	S11°54.9	4°00.5	S17°08.4	214°54.5	N22°46.4	321°50.9	502°02.4	Capella	280°20.3	46°01.6
13	337°35.6	2°26.9	53.7	19°01.0	07.8	229°57.1	46.4	336°53.1	02.3	Bellatrix	278°21.7	6°22.3
14	352°38.1	$17^{\circ}26.4$	52.6	$34^{\circ}01.5$	07.3	244°59.8	46.5	351°55.3	02.1		278°00.5	28°37.8
15	7°40.6	32°25.9	· · 51.5	49°02.0	· · 06.7	260°02.5	• • 46.5	6° 57.5	• • 02.0	Elnath		
16	22°43.0	47° 25.3	50.4	64°02.5	06.1	275°05.2	46.5	21°59.7	01.9	Alnilam	275°36.6	-1°11.2
17	37°45.5	62°24.8	49.2	79°03.0	05.5	290°07.9	46.5	37°02.0	01.8	Betelgeuse	270°50.9	7°24.7
	52°47.9	77°24.3		94°03.5	S17°04.9	305°10.6	N22°46.6	52°04.2	S02°01.7	Canopus	263°51.6	-52°42.8
18			S11°48.1							Sirius	258°25.2	-16°45.3
19	67°50.4	92°23.8	47.0	109°04.0	04.3	320°13.3	46.6	67°06.4	01.6	Adhara	255°04.8	-29°00.6
20	82°52.9	107°23.3	45.9	124°04.5	03.8	335°16.0	46.6	82°08.6	01.5	Procyon	244°49.6	5°09.4
21	97°55.3	122°22.7	• • 44.7	139°05.0	• • 03.2	$350^{\circ}18.6$	• • 46.7	97° 10.8	• • 01.4	Pollux	243°15.8	27°57.7
22	112°57.8	137°22.2	43.6	154°05.5	02.6	5°21.3	46.7	112°13.0	01.2			
23	128°00.3	152°21.7	42.5	169°06.0	02.0	20°24.0	46.7	127° 15.3	01.1	Avior	234°13.8	-59°35.7
										Suhail	222°45.2	-43°32.4
Mer.pa	ass. 14:29	$\nu$ -0.5' d-1	1′ m-3.91	$\nu 0.5' \ d-0$	).6′ m1.12	$\nu 2.7' \ d0.$	0′ m-2.56	$\nu 2.2' \ d-0$	.1′ m1.02	Miaplacidus	221°37.2	-69°49.5
- 1										Alphard	217°46.5	-8°46.4
										Regulus	207°33.1	11°50.2
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	_		
0	143°02.7	167°21.2	S11°41.4	184°06.5	S17°01.4	35°26.7	N22°46.7	142° 17.5	S02°01.0	Dubhe	193°39.2	61°36.4
1	158°05.2	182°20.7	40.2	199°07.0	00.8	50°29.4	46.8	157° 19.7	00.9	Denebola	182°23.7	14°25.4
										Gienah	175°42.4	-17°41.3
2	173°07.7	197°20.2	39.1	214°07.5	17°00.3	65°32.1	46.8	172°21.9	8.00	Acrux	172°58.6	-63°14.5
3	$188^{\circ}10.1$	212° 19.6	• • 38.0	229°08.0	16°59.7	80°34.8	• • 46.8	187°24.1	• • 00.7		171°50.2	-57°15.5
4	203°12.6	227° 19.1	36.8	244°08.5	59.1	95°37.4	46.9	202°26.3	00.6	Alioth	166°11.8	55°48.8
5	218°15.1	242°18.6	35.7	259°09.0	58.5	110°40.1	46.9	$217^{\circ}28.5$	00.5			
6	233°17.5	257° 18.1	<b>S</b> 11°34.6	274°09.5	S16°57.9	125°42.8	N22°46.9	232°30.8	S02°00.3	Spica	158°21.2	-11°18.0
7	248°20.0	272° 17.6	33.4	289°10.0	57.3	140°45.5	46.9	247°33.0	00.2	Alkaid	152°51.1	49°10.6
										Hadar	148°34.5	-60°29.8
8	263°22.4	287° 17.1	32.3	304°10.5	56.7	155°48.2	47.0	262°35.2	00.1	Menkent	147°56.4	-36°29.9
9	278°24.9	302°16.6	• • 31.2	319°11.0	• • 56.1	170°50.9	• • 47.0	277° 37.4	02°00.0	Arcturus	145°47.0	19°02.5
10	293°27.4	$317^{\circ}16.1$	30.0	334°11.5	55.6	185°53.5	47.0	292°39.6	$01^{\circ}59.9$	Rigil Kent.	139°38.9	-60°56.4
11	308°29.8	332° 15.5	28.9	349°12.0	55.0	200°56.2	47.0	307°41.8	59.8			
12	323°32.3	347° 15.0	S11°27.8	4°12.5	S16°54.4	215°58.9	N22°47.1	322°44.0	S01°59.7	Kochab	137°19.6	74°02.4
13	338°34.8	2°14.5	26.6	19°13.0	53.8	231°01.6	47.1	337°46.3	59.6	Zuben'ubi	136°54.9	-16°09.1
										Alphecca	126°03.0	26°37.3
14	353°37.2	17° 14.0	25.5	34°13.6	53.2	246°04.3	47.1	352°48.5	59.4	Antares	112°14.8	-26°29.4
15	8°39.7	32°13.5	• • 24.3	49°14.1	• • 52.6	261°06.9	• • 47.2	7°50.7	• • 59.3	Atria	107°08.4	-69°04.2
16	23°42.2	47° 13.0	23.2	64°14.6	52.0	276°09.6	47.2	22°52.9	59.2	Sabik	102°01.9	-15°45.5
17	38°44.6	62°12.5	22.1	79°15.1	51.4	291°12.3	47.2	37°55.1	59.1		96°09.3	-37°07.3
18	53°47.1	77° 12.0	S11°20.9	94°15.6	S16°50.8	306°15.0	N22°47.2	52°57.3	S01°59.0	Shaula		
19	68°49.5	92°11.5	19.8	109°16.1	50.3	321°17.7	47.3	67° 59.5	58.9	Rasalhague	95°57.9	12°32.3
	83°52.0	107° 11.0		124°16.6		336°20.3		83°01.8		Eltanin	90°42.1	51°28.8
20			18.6		49.7		47.3		58.8	Kaus Aust.	83°31.6	-34°22.3
21	98°54.5	122° 10.5	• • 17.5	139°17.1	• • 49.1	351°23.0	• • 47.3	98°04.0	• • 58.7	Vega	80°32.9	38°48.2
22	113°56.9	137°09.9	16.4	154°17.6	48.5	6°25.7	47.4	113°06.2	58.5	Nunki	75°46.9	-26°15.9
23	128°59.4	152°09.4	15.2	$169^{\circ}18.1$	47.9	21°28.4	47.4	128°08.4	58.4	Altair	61°59.4	8°56.1
							-1		-1			
Mer.pa	ass. 14:25	$\nu$ -0.5′ d-1	$1^\prime$ m-3.91	$\nu$ 0.5′ $d$ -0	$0.6' \; { m m} 1.12$	$\nu$ 2.7′ d0.	0′ m-2.56	$\nu 2.2' \ d-0$	.1' m $1.02$	Peacock	53°04.8	-56°39.0
										Deneb	49°25.6	45°22.3
٠.	6114		_	C114	_	6114	_	6114	_	Enif	33°38.2	9°59.6
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.1
0	144°01.9	167°08.9	S11°14.1	184°18.6	<b>S</b> 16°47.3	36°31.1	N22°47.4	143°10.6	S01°58.3	Fomalhaut	15°13.8	-29°29.1
1	159°04.3	182°08.4	12.9	199°19.1	46.7	51°33.7	47.4	158° 12.8	58.2	Scheat	13°44.6	28°13.5
2	174°06.8	197°07.9	11.8	214°19.6	46.1	66°36.4	47.5	173°15.0	58.1	Markab	13°29.3	15°20.7
3	189°09.3	212°07.4	. 10.7	229°20.1	• • 45.5	81°39.1	• • 47.5	188° 17.3	• • 58.0	iviarkab	13 29.3	10 20.7
4	204°11.7	227°06.9	09.5	244°20.6	44.9	96°41.8	47.5	203° 19.5	57.9	Feb 12 Thu	SHA	Mer.pass
											25°30.1	
	219°14.2	242°06.4	08.4	259°21.1	44.3	111°44.4	47.5	218°21.7	57.7	Venus		12:50
5		257°05.9	S11°07.2	274°21.6	S16°43.7	126°47.1	N22°47.6	233°23.9	<b>S</b> 01°57.6	Mars	41°50.9	11:44
6	234°16.7		06.1	289°22.1	43.1	141°49.8	47.6	248°26.1	57.5	Jupiter	252°18.6	21:39
	234 16.7 249°19.1	272°05.4	00.1		42.6	156°52.5	47.6	263°28.3	57.4	Saturn	359°20.7	14:32
6			04.9	304°22.7	42.0	100 02.0						
6 7 8	249°19.1 264°21.6	272°05.4 287°04.9	04.9				· · 47 7		• • 57.3			
6 7 8 9	249°19.1 264°21.6 279°24.0	272°05.4 287°04.9 302°04.4	04.9 · · 03.8	$319^{\circ}23.2$	• • 42.0	171°55.1	· · 47.7	278°30.5	· · 57.3	Feb 13 Fri	SHA	Mer.pass
6 7 8 9 10	249°19.1 264°21.6 279°24.0 294°26.5	272°05.4 287°04.9 302°04.4 317°03.9	04.9 · · 03.8 02.6	319°23.2 334°23.7	· · 42.0 41.4	171°55.1 186°57.8	47.7	278°30.5 293°32.7	57.2	Feb 13 Fri Venus	<b>SHA</b> 24°18.5	-
6 7 8 9 10 11	249°19.1 264°21.6 279°24.0 294°26.5 309°29.0	272°05.4 287°04.9 302°04.4 317°03.9 332°03.4	04.9 •• 03.8 02.6 01.5	319°23.2 334°23.7 349°24.2	· · 42.0 41.4 40.8	171°55.1 186°57.8 202°00.5	47.7 47.7	278°30.5 293°32.7 308°35.0	57.2 57.1	Venus	$24^{\circ}18.5$	12:51
6 7 8 9 10 11	249°19.1 264°21.6 279°24.0 294°26.5 309°29.0 324°31.4	272°05.4 287°04.9 302°04.4 317°03.9 332°03.4 347°02.9	04.9 · · 03.8 02.6 01.5 S11°00.3	319°23.2 334°23.7 349°24.2 4°24.7	· · 42.0 41.4 40.8 \$16°40.2	171°55.1 186°57.8 202°00.5 217°03.2	47.7 47.7 N22°47.7	278°30.5 293°32.7 308°35.0 323°37.2	57.2 57.1 \$01°57.0	Venus Mars	24°18.5 41°03.8	12:51 11:43
6 7 8 9 10 11	249°19.1 264°21.6 279°24.0 294°26.5 309°29.0	272°05.4 287°04.9 302°04.4 317°03.9 332°03.4 347°02.9 2°02.4	04.9 •• 03.8 02.6 01.5	319°23.2 334°23.7 349°24.2 4°24.7 19°25.2	· · 42.0 41.4 40.8	171°55.1 186°57.8 202°00.5	47.7 47.7	278°30.5 293°32.7 308°35.0	57.2 57.1	Venus Mars Jupiter	24°18.5 41°03.8 252°24.0	12:51 11:43 21:34
6 7 8 9 10 11	249°19.1 264°21.6 279°24.0 294°26.5 309°29.0 324°31.4	272°05.4 287°04.9 302°04.4 317°03.9 332°03.4 347°02.9	04.9 · · 03.8 02.6 01.5 S11°00.3	319°23.2 334°23.7 349°24.2 4°24.7	· · 42.0 41.4 40.8 \$16°40.2	171°55.1 186°57.8 202°00.5 217°03.2	47.7 47.7 N22°47.7	278°30.5 293°32.7 308°35.0 323°37.2	57.2 57.1 \$01°57.0	Venus Mars	24°18.5 41°03.8	12:51 11:43 21:34
6 7 8 9 10 11 12 13 14	249°19.1 264°21.6 279°24.0 294°26.5 309°29.0 324°31.4 339°33.9 354°36.4	272° 05.4 287° 04.9 302° 04.4 317° 03.9 332° 03.4 347° 02.9 2° 02.4 17° 01.9	04.9 · · 03.8 02.6 01.5 S11°00.3 10°59.2 58.0	319°23.2 334°23.7 349°24.2 4°24.7 19°25.2 34°25.7	42.0 41.4 40.8 \$16°40.2 39.6 39.0	171°55.1 186°57.8 202°00.5 217°03.2 232°05.8 247°08.5	47.7 47.7 N22°47.7 47.8 47.8	278° 30.5 293° 32.7 308° 35.0 323° 37.2 338° 39.4 353° 41.6	57.2 57.1 S01°57.0 56.8 56.7	Venus Mars Jupiter Saturn	24°18.5 41°03.8 252°24.0 359°14.7	12:51 11:43 21:34 14:29
6 7 8 9 10 11 12 13 14 15	249°19.1 264°21.6 279°24.0 294°26.5 309°29.0 324°31.4 339°33.9 354°36.4 9°38.8	272° 05.4 287° 04.9 302° 04.4 317° 03.9 332° 03.4 347° 02.9 2° 02.4 17° 01.9 32° 01.4	04.9 · 03.8 02.6 01.5 \$11°00.3 10°59.2 58.0 · 56.9	319°23.2 334°23.7 349°24.2 4°24.7 19°25.2 34°25.7 49°26.2	·· 42.0 41.4 40.8 \$16°40.2 39.6 39.0 ·· 38.4	171°55.1 186°57.8 202°00.5 217°03.2 232°05.8 247°08.5 262°11.2	47.7 47.7 N22°47.7 47.8 47.8	278° 30.5 293° 32.7 308° 35.0 323° 37.2 338° 39.4 353° 41.6 8° 43.8	57.2 57.1 \$01° 57.0 56.8 56.7 56.6	Venus Mars Jupiter Saturn	24°18.5 41°03.8 252°24.0 359°14.7	12:51 11:43 21:34 14:29 Mer.pass
6 7 8 9 10 11 12 13 14 15 16	249°19.1 264°21.6 279°24.0 294°26.5 309°29.0 324°31.4 339°33.9 354°36.4 9°38.8 24°41.3	272° 05.4 287° 04.9 302° 04.4 317° 03.9 332° 03.4 347° 02.9 2° 02.4 17° 01.9 32° 01.4 47° 00.9	04.9 · 03.8 02.6 01.5 \$11°00.3 10°59.2 58.0 · 56.9 55.7	319°23.2 334°23.7 349°24.2 4°24.7 19°25.2 34°25.7 49°26.2 64°26.7	42.0 41.4 40.8 \$16° 40.2 39.6 39.0 38.4 37.8	171°55.1 186°57.8 202°00.5 217°03.2 232°05.8 247°08.5 262°11.2 277°13.9	47.7 47.7 N22°47.7 47.8 47.8 • • 47.8 47.8	278° 30.5 293° 32.7 308° 35.0 323° 37.2 338° 39.4 353° 41.6 8° 43.8 23° 46.0	57.2 57.1 \$01° 57.0 56.8 56.7 •• 56.6 56.5	Venus Mars Jupiter Saturn Feb 14 Sat Venus	24°18.5 41°03.8 252°24.0 359°14.7 SHA 23°07.1	12:51 11:43 21:34 14:29 <b>Mer.pass</b> 12:52
6 7 8 9 10 11 12 13 14 15 16 17	249°19.1 264°21.6 279°24.0 294°26.5 309°29.0 324°31.4 339°33.9 354°36.4 9°38.8 24°41.3 39°43.8	272° 05.4 287° 04.9 302° 04.4 317° 03.9 332° 03.4 347° 02.9 2° 02.4 17° 01.9 32° 01.4 47° 00.9 62° 00.4	04.9 03.8 02.6 01.5 \$11°00.3 10°59.2 58.0 56.9 55.7 54.6	319°23.2 334°23.7 349°24.2 4°24.7 19°25.2 34°25.7 49°26.2 64°26.7 79°27.2	** 42.0 41.4 40.8 \$16° 40.2 39.6 39.0 ** 38.4 37.8 37.2	171°55.1 186°57.8 202°00.5 217°03.2 232°05.8 247°08.5 262°11.2 277°13.9 292°16.5	47.7 47.7 N22° 47.7 47.8 47.8 ••• 47.8 47.8 47.9	278° 30.5 293° 32.7 308° 35.0 323° 37.2 338° 39.4 353° 41.6 8° 43.8 23° 46.0 38° 48.2	57.2 57.1 \$01° 57.0 56.8 56.7 •• 56.6 56.5 56.4	Venus Mars Jupiter Saturn  Feb 14 Sat Venus Mars	24°18.5 41°03.8 252°24.0 359°14.7 SHA 23°07.1 40°16.7	12:51 11:43 21:34 14:29 <b>Mer.pass</b> 12:52 11:42
6 7 8 9 10 11 12 13 14 15 16 17 18	249°19.1 264°21.6 279°24.0 294°26.5 309°29.0 324°31.4 339°33.9 9°38.8 24°41.3 39°43.8 54°46.2	272° 05.4 287° 04.9 302° 04.4 317° 03.9 332° 03.4 347° 02.9 2° 02.4 17° 01.9 32° 01.4 47° 00.9 62° 00.4 76° 59.9	04.9 · 03.8 02.6 01.5 \$11°00.3 10°59.2 58.0 · 56.9 55.7	319°23.2 334°23.7 349°24.2 4°24.7 19°25.2 34°25.7 49°26.2 64°26.7 79°27.2 94°27.7	42.0 41.4 40.8 \$16° 40.2 39.6 39.0 38.4 37.8	171°55.1 186°57.8 202°00.5 217°03.2 232°05.8 247°08.5 262°11.2 277°13.9 292°16.5 307°19.2	47.7 47.7 N22°47.7 47.8 47.8 ••• 47.8 47.8 47.9 N22°47.9	278° 30.5 293° 32.7 308° 35.0 323° 37.2 338° 39.4 353° 41.6 8° 43.8 23° 46.0 38° 48.2 53° 50.4	57.2 57.1 \$01° 57.0 56.8 56.7 •• 56.6 56.5	Venus Mars Jupiter Saturn Feb 14 Sat Venus	24°18.5 41°03.8 252°24.0 359°14.7 SHA 23°07.1	12:51 11:43 21:34 14:29 <b>Mer.pass</b> 12:52 11:42
6 7 8 9 10 11 12 13 14 15 16 17	249°19.1 264°21.6 279°24.0 294°26.5 309°29.0 324°31.4 339°33.9 354°36.4 9°38.8 24°41.3 39°43.8	272° 05.4 287° 04.9 302° 04.4 317° 03.9 332° 03.4 347° 02.9 2° 02.4 17° 01.9 32° 01.4 47° 00.9 62° 00.4	04.9 03.8 02.6 01.5 \$11°00.3 10°59.2 58.0 56.9 55.7 54.6	319°23.2 334°23.7 349°24.2 4°24.7 19°25.2 34°25.7 49°26.2 64°26.7 79°27.2	** 42.0 41.4 40.8 \$16° 40.2 39.6 39.0 ** 38.4 37.8 37.2	171°55.1 186°57.8 202°00.5 217°03.2 232°05.8 247°08.5 262°11.2 277°13.9 292°16.5	47.7 47.7 N22° 47.7 47.8 47.8 ••• 47.8 47.8 47.9	278° 30.5 293° 32.7 308° 35.0 323° 37.2 338° 39.4 353° 41.6 8° 43.8 23° 46.0 38° 48.2	57.2 57.1 \$01° 57.0 56.8 56.7 •• 56.6 56.5 56.4	Venus Mars Jupiter Saturn  Feb 14 Sat Venus Mars Jupiter	24°18.5 41°03.8 252°24.0 359°14.7 <b>SHA</b> 23°07.1 40°16.7 252°29.2	12:51 11:43 21:34 14:29 Mer.pass 12:52 11:42 21:30
6 7 8 9 10 11 12 13 14 15 16 17 18	249°19.1 264°21.6 279°24.0 294°26.5 309°29.0 324°31.4 339°33.9 354°36.4 9°38.8 24°41.3 39°43.8 54°46.2 69°48.7	272° 05.4 287° 04.9 302° 04.4 317° 03.9 332° 03.4 347° 02.9 2° 02.4 17° 01.9 32° 01.4 47° 00.9 62° 00.4 76° 59.9 91° 59.4	04.9     · 03.8     02.6     01.5     S11° 00.3     10° 59.2     58.0     · 56.9     55.7     54.6     S10° 53.4     52.3	319°23.2 334°23.7 349°24.2 4°24.7 19°25.2 34°25.7 49°26.2 64°26.7 79°27.2 94°27.7 109°28.2	··· 42.0 41.4 40.8 S16° 40.2 39.6 39.0 ·· 38.4 37.8 37.2 S16° 36.6 36.0	171°55.1 186°57.8 202°00.5 217°03.2 232°05.8 247°08.5 262°11.2 277°13.9 292°16.5 307°19.2 322°21.9	47.7 47.7 N22° 47.7 47.8 47.8 • • 47.8 47.9 N22° 47.9	278° 30.5 293° 32.7 308° 35.0 323° 37.2 338° 39.4 353° 41.6 8° 43.8 23° 46.0 38° 48.2 53° 50.4 68° 52.7	57.2 57.1 S01° 57.0 56.8 56.7 · 56.6 56.5 56.4 S01° 56.3 56.2	Venus Mars Jupiter Saturn  Feb 14 Sat Venus Mars Jupiter Saturn	24°18.5 41°03.8 252°24.0 359°14.7 SHA 23°07.1 40°16.7 252°29.2 359°08.7	12:51 11:43 21:34 14:29 Mer.pass 12:52 11:42 21:30
6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	249°19.1 264°21.6 279°24.0 294°26.5 309°29.0 324°31.4 339°33.9 354°36.4 9°38.8 24°41.3 39°43.8 54°46.2 69°48.7 84°51.2	272° 05.4 287° 04.9 302° 04.4 317° 03.9 332° 03.4 347° 02.9 2° 02.4 17° 01.9 32° 01.4 47° 00.9 62° 00.4 76° 59.9 91° 59.4 106° 58.9	04.9     · 03.8     02.6     01.5  \$11° 00.3     10° 59.2     58.0     · 56.9     55.7     54.6  \$10° 53.4     52.3     51.1	319°23.2 334°23.7 349°24.2 4°24.7 19°25.2 34°25.7 49°26.2 64°26.7 79°27.2 94°27.7 109°28.2 124°28.7	42.0 41.4 40.8 \$16° 40.2 39.6 39.0 38.4 37.8 37.2 \$16° 36.6 36.0 35.4	171°55.1 186°57.8 202°00.5 217°03.2 232°05.8 247°08.5 262°11.2 277°13.9 292°16.5 307°19.2 322°21.9 337°24.5	47.7 47.7 N22° 47.7 47.8 47.8 47.8 47.8 47.9 N22° 47.9 47.9	278° 30.5 293° 32.7 308° 35.0 323° 37.2 338° 39.4 353° 41.6 8° 43.8 23° 46.0 38° 48.2 53° 50.4 68° 52.7 83° 54.9	57.2 57.1 \$01° 57.0 56.8 56.7 · · 56.6 56.5 56.4 \$01° 56.3 56.2 56.0	Venus Mars Jupiter Saturn  Feb 14 Sat Venus Mars Jupiter Saturn	24°18.5 41°03.8 252°24.0 359°14.7 <b>SHA</b> 23°07.1 40°16.7 252°29.2	12:51 11:43 21:34 14:29 Mer.pass 12:52 11:42 21:30
6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	249°19.1 264°21.6 279°24.0 294°26.5 309°29.0 324°31.4 339°33.9 354°36.4 9°38.8 24°41.3 39°43.8 54°46.2 69°48.7 84°51.2 99°53.6	272° 05.4 287° 04.9 302° 04.4 317° 03.9 332° 03.4 347° 02.9 2° 02.4 17° 01.9 32° 01.4 47° 00.9 62° 00.4 76° 59.9 91° 59.4 106° 58.9 121° 58.4	04.9     · 03.8     02.6     01.5     \$11°00.3     10°59.2     58.0     · 56.9     55.7     54.6     \$10°53.4     52.3     51.1     · 50.0	319°23.2 334°23.7 349°24.2 4°24.7 19°25.2 34°25.7 49°26.2 64°26.7 79°27.2 94°27.7 109°28.2 124°28.7 139°29.3	42.0 41.4 40.8 \$16° 40.2 39.6 39.0 38.4 37.8 37.2 \$16° 36.6 36.0 35.4	171°55.1 186°57.8 202°00.5 217°03.2 232°05.8 247°08.5 262°11.2 277°13.9 292°16.5 307°19.2 322°21.9 337°24.5 352°27.2	47.7 47.7 N22° 47.7 47.8 47.8 • 47.8 47.9 N22° 47.9 47.9 • 48.0	278° 30.5 293° 32.7 308° 35.0 323° 37.2 338° 39.4 353° 41.6 8° 43.8 23° 46.0 38° 48.2 53° 50.4 68° 52.7 83° 54.9 98° 57.1	57.2 57.1 \$01° 57.0 56.8 56.7 · · 56.6 56.5 56.4 \$01° 56.3 56.2 56.0 · · 55.9	Venus Mars Jupiter Saturn  Feb 14 Sat Venus Mars Jupiter Saturn	24°18.5 41°03.8 252°24.0 359°14.7 <b>SHA</b> 23°07.1 40°16.7 252°29.2 359°08.7	Mer.pass 12:51 11:43 21:34 14:29  Mer.pass 12:52 11:42 21:30 14:25
6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	249°19.1 264°21.6 279°24.0 294°26.5 309°29.0 324°31.4 339°33.9 354°36.4 9°38.8 24°41.3 39°43.8 54°46.2 69°48.7 84°51.2 99°53.6 114°56.1	272° 05.4 287° 04.9 302° 04.4 317° 03.9 332° 03.4 347° 02.9 2° 02.4 17° 01.9 32° 01.4 47° 00.9 62° 00.4 76° 59.9 91° 59.4 106° 58.9 121° 58.4 136° 57.9	04.9     · 03.8     02.6     01.5     S11° 00.3     10° 59.2     58.0     · 56.9     55.7     54.6     S10° 53.4     52.3     51.1     · 50.0     48.8	319°23.2 334°23.7 349°24.2 4°24.7 19°25.2 34°25.7 49°26.2 64°26.7 79°27.2 94°27.7 109°28.2 124°28.7 139°29.3 154°29.8	42.0 41.4 40.8 \$16° 40.2 39.6 39.0 38.4 37.8 37.2 \$16° 36.6 36.0 35.4 34.8	171°55.1 186°57.8 202°00.5 217°03.2 232°05.8 247°08.5 262°11.2 277°13.9 292°16.5 307°19.2 322°21.9 337°24.5 352°27.2 7°29.9	47.7 47.7 N22° 47.7 47.8 47.8 • 47.8 47.9 N22° 47.9 47.9 47.9 • 48.0 48.0	278° 30.5 293° 32.7 308° 35.0 323° 37.2 338° 39.4 353° 41.6 8° 43.8 23° 46.0 38° 48.2 53° 50.4 68° 52.7 83° 54.9 98° 57.1 113° 59.3	57.2 57.1 \$01° 57.0 56.8 56.7 · · 56.6 56.5 56.4 \$01° 56.3 56.2 56.0 · · 55.9 55.8	Venus Mars Jupiter Saturn  Feb 14 Sat Venus Mars Jupiter Saturn	24°18.5 41°03.8 252°24.0 359°14.7 <b>SHA</b> 23°07.1 40°16.7 252°29.2 359°08.7 tal parallax Venus:	12:51 11:43 21:34 14:29 Mer.pass 12:52 11:42 21:30 14:25
6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	249°19.1 264°21.6 279°24.0 294°26.5 309°29.0 324°31.4 339°33.9 354°36.4 9°38.8 24°41.3 39°43.8 54°46.2 69°48.7 84°51.2 99°53.6	272° 05.4 287° 04.9 302° 04.4 317° 03.9 332° 03.4 347° 02.9 2° 02.4 17° 01.9 32° 01.4 47° 00.9 62° 00.4 76° 59.9 91° 59.4 106° 58.9 121° 58.4	04.9     · 03.8     02.6     01.5     \$11°00.3     10°59.2     58.0     · 56.9     55.7     54.6     \$10°53.4     52.3     51.1     · 50.0	319°23.2 334°23.7 349°24.2 4°24.7 19°25.2 34°25.7 49°26.2 64°26.7 79°27.2 94°27.7 109°28.2 124°28.7 139°29.3	42.0 41.4 40.8 \$16° 40.2 39.6 39.0 38.4 37.8 37.2 \$16° 36.6 36.0 35.4	171°55.1 186°57.8 202°00.5 217°03.2 232°05.8 247°08.5 262°11.2 277°13.9 292°16.5 307°19.2 322°21.9 337°24.5 352°27.2	47.7 47.7 N22° 47.7 47.8 47.8 • 47.8 47.9 N22° 47.9 47.9 • 48.0	278° 30.5 293° 32.7 308° 35.0 323° 37.2 338° 39.4 353° 41.6 8° 43.8 23° 46.0 38° 48.2 53° 50.4 68° 52.7 83° 54.9 98° 57.1	57.2 57.1 \$01° 57.0 56.8 56.7 · · 56.6 56.5 56.4 \$01° 56.3 56.2 56.0 · · 55.9	Venus Mars Jupiter Saturn  Feb 14 Sat Venus Mars Jupiter Saturn	24°18.5 41°03.8 252°24.0 359°14.7 <b>SHA</b> 23°07.1 40°16.7 252°29.2 359°08.7	12:51 11:43 21:34 14:29 Mer.pass 12:52 11:42 21:30 14:25

h	Sun				Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	НР
0	176°27.4	<b>S</b> 13°45.7	$243^{\circ}13.8$	9.7'	S28°13.0	1.7'	54.3'
1	191°27.4	44.9	257° 42.6	9.7'	28°14.7	1.6'	54.3'
2	206°27.4 221°27.4	44.0 •• 43.2	272°11.3 286°40.0	9.7' 9.7'	28°16.3 28°17.7	1.4' 1.3'	54.3' 54.3'
4	236°27.4	42.4	301°08.6	9.6'	28°19.0	1.2'	54.3'
5	251°27.4	41.5	315° 37.2	9.6'	28°20.2	1.0'	54.3'
6	266°27.4 281°27.4	\$13°40.7 39.9	330°05.8 344°34.4	9.6' 9.5'	\$28°21.2 28°22.1	0.9' 0.7'	54.3' 54.3'
7 8	201 27.4 296°27.5	39.9 39.1	359°03.0	9.5' 9.5'	28°22.8	0.7	54.4'
9	311°27.5	• • 38.2	13°31.5	9.5'	28°23.4	0.5'	54.4'
10	326°27.5	37.4	28°00.0	9.5'	28°23.9	0.3'	54.4
11 12	341°27.5 356°27.5	36.6 \$13°35.7	42°28.5 56°56.9	9.5' 9.4'	28°24.2 528°24.4	0.2' 0.0'	54.4' 54.4'
13	11°27.5	34.9	71°25.4	9.4'	28°24.4	-0.1	54.4'
14	26°27.5	34.0	85° 53.8	9.4'	28°24.3	-0.2'	54.4'
15	41°27.5 56°27.5	· · 33.2	100°22.2 114°50.6	9.4'	28°24.1 28°23.7	-0.4'	54.4'
16 17	50 27.5 71°27.5	32.4 31.5	114 50.6 129°18.9	9.4' 9.4'	28°23.7	-0.5' -0.7'	54.5' 54.5'
18	86°27.5	\$13°30.7	143° 47.3	9.4'	S28°22.5	-0.8'	54.5'
19	101°27.6	29.9	158° 15.7	9.3'	28°21.7	-0.9'	54.5'
20 21	116°27.6 131°27.6	29.0 •• 28.2	172° 44.0 187° 12.3	9.3' 9.3'	28°20.8 28°19.7	-1.1' -1.2'	54.5' 54.5'
22	146°27.6	27.3	201°40.7	9.3'	28°18.4	-1.2 -1.4'	54.5
23	161°27.6	26.5	216°09.0	9.3'	28°17.1	-1.5'	54.6'
	SD = 16.2'	d = -0.8'		SD	0 = 14.8'		
F. *	CUA	D	CUA		D-:	.1	LIP
Fri 0	<b>GHA</b> 176°27.6	Dec \$13°25.7	<b>GHA</b> 230° 37.3	$\nu$ 9.3'	Dec 528° 15.5	d -1.7'	<b>HP</b> 54.6'
1	191°27.6	24.8	245°05.6	9.3'	28°13.9	-1.8'	54.6'
2	206°27.6	24.0	259°33.9	9.3'	28°12.1	-1.9'	54.6'
3 4	221°27.7 236°27.7	· · 23.2 22.3	274°02.2 288°30.5	9.3' 9.3'	28°10.1 28°08.0	-2.1' -2.2'	54.6' 54.6'
5	250° 27.7	21.5	302°58.8	9.3'	28°05.8	-2.2 -2.4'	54.6
6	266°27.7	S13°20.6	317°27.1	9.3'	S28°03.4	-2.5'	54.7'
7	281°27.7	19.8	331°55.4	9.3'	28°00.9	-2.7'	54.7'
8 9	296°27.7 311°27.7	18.9 •• 18.1	346°23.7 0°52.0	9.3' 9.3'	27°58.3 27°55.4	-2.8' -2.9'	54.7' 54.7'
10	326°27.8	17.3	15°20.3	9.3'	27°52.5	-3.1'	54.7'
11	341°27.8	16.4	29°48.6	9.3'	27°49.4	-3.2'	54.7'
12 13	356°27.8 11°27.8	\$13° 15.6 14.7	44°17.0 58°45.3	9.3' 9.4'	\$27°46.2 27°42.8	-3.4' -3.5'	54.8' 54.8'
13 14	26°27.8	14.7	58 45.3 73°13.7	9.4 9.4'	27 42.8 27°39.3	-3.5 -3.7'	54.8'
15	41°27.8	• • 13.0	87°42.0	9.4'	27°35.6	-3.8'	54.8'
16	56°27.9	12.2	102° 10.4	9.4'	27°31.8	-3.9'	54.8'
17 18	71°27.9 86°27.9	11.3 \$13° 10.5	116°38.8 131°07.2	9.4' 9.4'	27°27.9 527°23.8	-4.1' -4.2'	54.9' 54.9'
19	101°27.9	09.7	145°35.6	9.4'	27°19.6	-4.4	54.9'
20	116°27.9	08.8	160°04.1	9.5'	27°15.2		54.9'
21 22	131°27.9 146°28.0	· · 08.0 07.1	174°32.5 189°01.0	9.5' 9.5'	27°10.7 27°06.1	-4.6' -4.8'	54.9' 54.9'
23	161°28.0	06.3	203°29.5	9.5'	27°01.3	-4.0 -4.9'	55.0'
-	SD = 16.2'	d = -0.8'			0 = 14.9'	-	
Sat	GHA	Dec	GHA	ν	Dec	d - 1,	HP
0 1	176°28.0 191°28.0	\$13°05.4 04.6	217°58.0 232°26.6	9.5' 9.6'	\$26°56.4 26°51.3	-5.1' -5.2'	55.0' 55.0'
2	206°28.0	03.7	246°55.1	9.6'	$26^{\circ}46.1$	-5.3'	55.0'
3	221°28.1	•• 02.9	261°23.7	9.6'	26°40.8	-5.5'	55.0'
4 5	236°28.1 251°28.1	02.0 01.2	275°52.3 290°21.0	9.6' 9.7'	26°35.3 26°29.7	-5.6' -5.8'	55.1' 55.1'
6	266°28.1	S13°00.3	304°49.7	9.7'	S26°23.9	-5.9'	55.1
7	281°28.1	12°59.5	319° 18.4	9.7'	26°18.0	-6.0'	55.1'
8 9	296°28.2 311°28.2	58.6 •• 57.8	333° 47.1 348° 15.8	9.8' 9.8'	26°12.0 26°05.8	-6.2' -6.3'	55.1' 55.2'
10	311 28.2 326°28.2	56.9	2°44.6	9.8 9.8'	26 05.8 25°59.5	-6.4'	55.2'
11	341°28.2	56.1	17° 13.5	9.9'	25°53.1	-6.6'	55.2'
12	356°28.3	\$12°55.2	31°42.3	9.9'	\$25°46.5	-6.7'	55.2'
13 14	11°28.3 26°28.3	54.4 53.5	46°11.2 60°40.1	9.9' 10.0'	25°39.8 25°33.0	-6.8' -7.0'	55.3' 55.3'
15	41°28.3	• • 52.6	75°09.1	10.0'	25°26.0	-7.1'	55.3
16	56°28.4	51.8	89°38.1	10.0'	25°18.9	-7.2'	55.3'
17 18	71°28.4 86°28.4	50.9 \$12°50.1	104°07.1 118°36.2	10.1' 10.1'	25°11.7 <b>S</b> 25°04.3	-7.4' -7.5'	55.3' 55.4'
18 19	86°28.4 101°28.4	49.2	118° 36.2 133° 05.3	10.1'	24°56.8	-7.5°	55.4' 55.4'
20	116°28.5	48.4	147°34.4	10.2'	24°49.2	-7.8'	55.4'
21	131°28.5	• • 47.5	162°03.6	10.2'	24°41.4	-7.9'	55.4'
22 23	146°28.5 161°28.5	46.7 45.8	176°32.8 191°02.1	10.3' 10.3'	24°33.5 24°25.5	-8.0' -8.1'	55.5' 55.5'
23	SD = 16.2'	d = -0.8'			0 = 15.0'	5.1	33.3
	JD — 10.2	u — -0.0		JL.	, — 13.0		

Lat	Twi	light	Cumica	Cumant	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	06:23	07:44	09:05	15:25	16:46	18:07
<b>N</b> 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
<b>N</b> 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° 45°	06:03 05:59	06:41 06:34	07:14 07:04	17:15 17:25	17:48 17:55	18:26 18:30
N 40° 35°	05:56 05:52	06:28 06:22	06:55 06:48	17:33 17:41	18:01 18:07	18:33 18:36
30°	05:52	06:22	06:48	17:41	18:12	18:40
20°	05:49	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° <b>S</b> 60°	02:48 02:26	03:51 03:39	04:38 04:29	19:49 19:57	20:35 20:47	21:38 21:59
3 00	02:20	03:39	04:29	19:57	20:47	21:59
Lat.		Moonris	e		Moonset	:
	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
<b>N</b> 70°						
68°						
66°						
64°			00.10			11.07
62° 60°	06:40	07:24	08:18 07:40	09:27	10:33	11:27 12:05
N 58° 56°	06:00	06:47	07:13	10:07	11:09	12:31
56° 54°	05:32 05:11	06:21 06:00	06:52 06:35	10:35 10:57	11:35 11:56	12:52 13:09
54° 52°	05:11	05:43	06:35 06:20	10:57	11:56	13:09
50°	04:33	05:43	06:20	11:14	12:13	13:24
45°	04:07	03:28	05:40	12:01	12:57	14:02
N 40°	03:43	04:34	05:19	12:24	13:21	14:23
35°	03:43	04:34	05:19	12:24	13:21	14:23
30°	03:07	03:58	04:46	13:01	13:56	14:55

		Sun	_		Moon	
<b>S</b> 60°	22:00	23:21		19:02	19:30	19:41
58°	22:38	23:51		18:23	18:59	19:19
56°	23:05		00:14	17:56	18:36	19:01
54°	23:26		00:33	17:35	18:17	18:46
52°	23:44		00:49	17:17	18:01	18:32
<b>S</b> 50°	23:59		01:03	17:02	17:47	18:21
45°		00:29	01:31	16:32	17:18	17:56
40°	00:01	00:53	01:52	16:08	16:56	17:37
35°	00:20	01:12	02:11	15:49	16:38	17:20
30°	00:37	01:29	02:26	15:32	16:22	17:06
20°	01:05	01:57	02:52	15:04	15:54	16:42
S 10°	01:29	02:21	03:15	14:39	15:31	16:21
0°	01:51	02:44	03:36	14:17	15:09	16:01
N 10°	02:14	03:06	03:57	13:54	14:47	15:41
20°	02:38	03:30	04:20	13:29	14:23	15:20
30°	03:07	03:58	04:46	13:01	13:56	14:55
35°	03:23	04:15	05:01	12:44	13:40	14:40
N 40°	03:43	04:34	05:19	12:24	13:21	14:23
45°	04:07	04:58	05:40	12:01	12:57	14:02
50°	04:37	05:28	06:07	11:30	12:28	13:36
52°	04:53	05:43	06:20	11:14	12:13	13:24
54°	05:11	06:00	06:35	10:57	11:56	13:09

ı			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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	145°01.0	166°56.9	S10°46.5	184°30.8	S16°33.0	37°35.2	N22°48.1	144°03.7	S01°55.6			
1	160°03.5	181°56.4	45.4	199°31.3	32.4	52°37.9	48.1	159°05.9	55.5	Alpheratz	357°34.1	29°14.1
2	175°05.9	196°55.9	44.2	214°31.8	31.8	67°40.6	48.1	174°08.1	55.4	Ankaa	353°06.5	-42°10.0
3	190°08.4	211°55.4	• • 43.0	229°32.3	• • 31.2	82°43.2	• • 48.1	189°10.3	• • 55.3	Schedar	349°30.4	56°41.0
4	205° 10.9	226°54.9	41.9	244°32.8	30.6	97°45.9	48.2	204°12.6	55.1	Diphda	348°46.6	-17°50.7
5	220° 13.3	241°54.4	40.7	259°33.3	30.0	112°48.6	48.2	219°14.8	55.0	Achernar	335°19.8	-57°06.5
6	235° 15.8	256°54.0	S10°39.6	274°33.9	S16°29.4	127°51.2	N22°48.2	234°17.0	S01°54.9	Hamal	327°50.3	23°35.2
7	250° 18.3	271°53.5	38.4	289°34.4	28.8	142°53.9	48.2	249°19.2	54.8	Polaris	313°37.8	89°22.8
8	265°20.7	286°53.0	37.3	304°34.9	28.2	157° 56.6	48.3	264°21.4	54.7	Acamar	315°11.1	-40°12.2
9	280°23.2	301°52.5	• • 36.1	319°35.4	• • 27.6	172°59.2	• • 48.3	279°23.6	• • 54.6	Menkar	314°05.2	4°11.5
10	295°25.7	316°52.0	34.9	334°35.9	27.0	188°01.9	48.3	294°25.8	54.5	Mirfak	308°26.9	49°57.4
11	$310^{\circ}28.1$	331°51.5	33.8	349°36.4	26.4	203°04.6	48.3	309°28.0	54.3	Aldebaran	290°38.5	16°33.7
12	325°30.6	346°51.0	S10°32.6	4°36.9	S16°25.8	218°07.2	N22°48.4	324°30.2	S01°54.2	Rigel	281°02.8	-8°10.4
13	340°33.0	1°50.5	31.5	19°37.4	25.2	233°09.9	48.4	339°32.5	54.1	Capella	280°20.3	46°01.6
14	355°35.5	16°50.0	30.3	34°37.9	24.6	248°12.6	48.4	354°34.7	54.0	Bellatrix	278°21.7	6°22.3
15	10°38.0	31°49.5	• • 29.1	49°38.5	• • 24.0	263°15.2	• • 48.4	9°36.9	• • 53.9	Elnath	278°00.5	28°37.8
16	25°40.4	46°49.0	28.0	64°39.0	23.4	278°17.9	48.5	24°39.1	53.8	Alnilam	275°36.6	-1°11.2
17	40°42.9	61°48.6	26.8	79°39.5	22.8	293°20.6	48.5	39°41.3	53.7	Betelgeuse	270°50.9	7°24.7
18	55°45.4	76°48.1	S10°25.6	94°40.0	S16°22.2	308°23.2	N22°48.5	54°43.5	S01°53.5	Canopus	263°51.6	-52°42.8 -16°45.3
19	70°47.8	91°47.6	24.5	109°40.5	21.6	323°25.9	48.5	69°45.7	53.4	Sirius	258°25.2	-10 45.3 -29°00.6
20	85°50.3	106°47.1	23.3	124°41.0	21.0	338°28.6	48.6	84°47.9	53.3	Adhara	255°04.8	
21	$100^{\circ}52.8$	121°46.6	• • 22.2	139°41.5	• • 20.4	353°31.2	• • 48.6	99°50.1	• • 53.2	Procyon	244° 49.6 243° 15.8	5°09.4
22	$115^{\circ}55.2$	136°46.1	21.0	$154^{\circ}42.1$	19.7	8°33.9	48.6	114°52.4	53.1	Pollux		27°57.7
23	$130^{\circ}57.7$	151°45.6	19.8	169°42.6	19.1	23°36.6	48.6	129°54.6	53.0	Avior	234°13.8	-59°35.7 -43°32.4
N/a===	255 14.10	1, O E/ J 1	2′ m-3.91	"U E/ ¬ C	0.6′ m1.13	1/2 7/ 40	.0′ m-2.54	,,,, ,, , , ,	.1′ m1.02	Suhail Miaplacidus	222°45.2 221°37.2	-43°32.4 -69°49.5
ivier.p	ass. 14:18	$\nu$ -0.5 a-1	∠ in-3.91	$\nu$ 0.5° $a$ -0	υ.υ m1.13	ν2.Γ α0.	U II1-∠.54	$\nu$ 2.2 $a$ -0	.ı mı.U2	Miaplacidus	221°37.2 217°46.5	-69°49.5 -8°46.4
										Regulus	217 40.5 207°33.1	-8 46.4 11°50.2
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	207 33.1 193°39.2	61°36.4
0	$146^{\circ}00.1$	166°45.2	S10°18.7	184°43.1	<b>S</b> 16°18.5	38°39.2	N22°48.7	144°56.8	S01°52.9	Dubne	193° 39.2 182° 23.7	14°25.4
1	$161^{\circ}02.6$	181°44.7	17.5	199°43.6	17.9	53°41.9	48.7	159°59.0	52.7	Gienah	182 23.7 175°42.4	-17°41.3
2	176°05.1	196°44.2	16.3	214°44.1	17.3	68°44.5	48.7	175°01.2	52.6	Acrux	175 42.4 172°58.6	-17 41.3 -63°14.5
3	191°07.5	211°43.7	• • 15.2	229°44.6	• • 16.7	83°47.2	• • 48.7	190°03.4	• • 52.5	Gacrux	172 50.0 171°50.2	-03 14.5 -57°15.5
4	$206^{\circ}10.0$	226°43.2	14.0	244°45.1	16.1	98°49.9	48.8	205°05.6	52.4	Alioth	166° 11.7	-57 15.5 55°48.8
5	221°12.5	241°42.7	12.8	259°45.7	15.5	113°52.5	48.8	220°07.8	52.3	Spica	158°21.1	-11°18.0
6	236°14.9	256°42.2	S10°11.7	274°46.2	S16°14.9	128°55.2	N22°48.8	235°10.0	S01°52.2	Alkaid	150° 21.1 152° 51.0	49°10.6
7	251° 17.4	271°41.8	10.5	289°46.7	14.3	143°57.8	48.8	$250^{\circ}12.2$	52.1	Hadar	148°34.4	-60°29.8
8	$266^{\circ}19.9$	286°41.3	09.3	304°47.2	13.7	159°00.5	48.9	265°14.4	51.9	Menkent	140° 54.4	-36°29.9
9	281°22.3	301°40.8	•• 08.1	319°47.7	•• 13.1	174°03.2	• • 48.9	280°16.7	• • 51.8	Arcturus	145°46.9	19°02.5
10	296°24.8	316°40.3	07.0	334°48.2	12.5	189°05.8	48.9	295°18.9	51.7	Rigil Kent.	139°38.8	-60°56.4
11	311°27.3	331°39.8	05.8	349°48.7	11.8	204°08.5	48.9	310°21.1	51.6	Kochab	137° 19.5	74°02.4
12	326° 29.7	346°39.4	S10°04.6	4°49.3	<b>S</b> 16°11.2	$219^{\circ}11.1$	N22°49.0	325°23.3	S01°51.5	Zuben'ubi	136°54.9	-16°09.1
13	341°32.2	1°38.9	03.5	19°49.8	10.6	234°13.8	49.0	340°25.5	51.4	Alphecca	126°02.9	26°37.3
14	356° 34.6	16°38.4	02.3	34°50.3	10.0	249° 16.5	49.0	355°27.7	51.3	Antares	112° 14.8	-26°29.4
15	11°37.1	31°37.9	10°01.1	49°50.8	• • 09.4	264°19.1	• • 49.0	10°29.9	• • 51.1	Atria	107°08.3	-69°04.2
16	26°39.6	46°37.4	09°59.9	64°51.3	8.80	279°21.8	49.1	25°32.1	51.0	Sabik	102°01.8	-15°45.5
17	41°42.0	61°37.0	58.8	79°51.8	08.2	294°24.4	49.1	40°34.3	50.9	Shaula	96°09.3	-37°07.3
18	56° 44.5	76°36.5	S09°57.6	94°52.4	<b>S</b> 16°07.6	309°27.1	N22°49.1	55°36.5	S01°50.8	Rasalhague	95°57.8	12°32.3
19	71°47.0	91°36.0	56.4	109°52.9	07.0	324°29.7	49.1	70°38.7	50.7	Eltanin	90°42.0	51°28.8
20	86°49.4	106°35.5	55.2	124°53.4	06.3	339°32.4	49.2	85°41.0	50.6	Kaus Aust.	83°31.5	-34°22.3
21	101°51.9	121°35.0	• • 54.1	139°53.9	• • 05.7	354°35.1	• • 49.2	100°43.2	• • 50.5	Vega	80°32.9	38°48.2
22	116°54.4	136°34.6	52.9	154°54.4	05.1	9°37.7	49.2	115°45.4	50.3	Nunki	75°46.9	-26°15.9
23	131°56.8	151°34.1	51.7	169°55.0	04.5	24°40.4	49.2	130°47.6	50.2	Altair	61°59.3	8°56.1
Mern	ass. 14:14	u_0.5′ d_1	2′ m-3.91	ν0.5' d-0	0.6' m1.13	1/2 7' d0	.0′ m-2.54	1/2 2' d-0	.1′ m1.01	Peacock	53°04.8	-56°39.0
- IVICI.P	ass. 17.17	ν-0.5 α-1		νο.5 u-c	1111.15	ν2.1 do.	10 111-2.54	ν2.2 u-0		Deneb	49°25.6	45°22.3
										Enif	33°38.2	9°59.6
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.1
0	146° 59.3	166°33.6	S09°50.5	184°55.5	S16°03.9	39° 43.0	N22°49.3	145°49.8	S01°50.1	Fomalhaut	15°13.8	-29°29.1
1	$162^{\circ}01.8$	181°33.1	49.4	199°56.0	03.3	54° 45.7	49.3	160°52.0	50.0	Scheat	13°44.6	28°13.5
2	177°04.2	196°32.7	48.2	214°56.5	02.7	69° 48.3	49.3	175°54.2	49.9	Markab	13°29.3	15°20.7
3	192°06.7	211°32.2	• • 47.0	229°57.0	•• 02.1	84°51.0	• • 49.3	190°56.4	• • 49.8			
4	207°09.1	226°31.7	45.8	244°57.5	01.4	99°53.6	49.4	205°58.6	49.6	Feb 15 Sun	SHA	Mer.pass
5	222° 11.6	241°31.2	44.6	259°58.1	8.00	114° 56.3	49.4	221°00.8	49.5	Venus	21°55.9	12:53
6	$237^{\circ}14.1$	256°30.8	S09°43.5	274°58.6	S16°00.2	129°58.9	N22°49.4	236°03.0	S01°49.4	Mars	39°29.8	11:42
7	252° 16.5	271°30.3	42.3	289°59.1	15°59.6	145°01.6	49.4	251°05.2	49.3	Jupiter	252°34.2	21:26
8	267° 19.0	286°29.8	41.1	304°59.6	59.0	160°04.2	49.5	266°07.5	49.2	Saturn	359°02.7	14:22
9	282°21.5	301°29.3	• • 39.9	320°00.1	• • 58.4	175°06.9	• • 49.5	281°09.7	• • 49.1	Feb 16 Mon	SHA	Mer.pass
10	297°23.9	316°28.9	38.7	335°00.7	57.7	190°09.5	49.5	296°11.9	49.0	Venus	20°45.0	12:53
11	312°26.4	331°28.4	37.6	350°01.2	57.1	205°12.2	49.5	311°14.1	48.8	Mars	38° 42.9	11:41
12	327°28.9	346°27.9	S09°36.4	5°01.7	S15°56.5	220°14.8	N22°49.6	326°16.3	S01°48.7	Jupiter	252°39.1	21:22
13	342°31.3	1°27.5	35.2	20°02.2	55.9	235° 17.5	49.6	341°18.5	48.6	Saturn	358° 56.6	14:18
14	357° 33.8	16°27.0	34.0	35°02.8	55.3	250°20.1	49.6	356°20.7	48.5	Jatuili	330 30.0	
15	12°36.2	31°26.5	• • 32.8	50°03.3	•• 54.7	265°22.8	• • 49.6	11°22.9	• • 48.4	Feb 17 Tue	SHA	Mer.pass
16	27°38.7	46°26.1	31.6	65°03.8	54.0	280°25.4	49.7	26°25.1	48.3	Venus	19°34.3	12:54
17	42°41.2	61°25.6	30.5	80°04.3	53.4	295°28.1	49.7	41°27.3	48.2	Mars	$37^{\circ}56.2$	11:40
18	57°43.6	76°25.1	S09°29.3	95°04.8	S15°52.8	310°30.7	N22°49.7	56°29.5	S01°48.0	Jupiter	252°43.7	21:17
19	72°46.1	91°24.6	28.1	110°05.4	52.2	325°33.4	49.7	71°31.7	47.9	Saturn	358°50.5	14:15
20	87°48.6	106°24.2	26.9	125°05.9	51.6	340°36.0	49.7	86°33.9	47.8	ш!	al navalla	
21	102°51.0	121°23.7	• • 25.7	140°06.4	• • 50.9	355°38.7	• • 49.8	101°36.1	• • 47.7	Horizont	al parallax	0.1
22	117°53.5	136°23.2	24.5	155°06.9	50.3	10°41.3	49.8	116°38.4	47.6		Venus:	0.1
23	132°56.0	151°22.8	23.3	170°07.4	49.7	25°44.0	49.8	131°40.6	47.5		Mars:	0.1
Mern	ass. 14:10	$\nu$ -0.5' d-1	2′ m-3.91	$\nu 0.5' d-0$	0.6' m1.13	$\nu^2$ 7' $d\Omega$	.0′ m-2.53	ν2 2' d-Ω	.1′ m1.01			
р								0				

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	176°28.6	<b>S</b> 12°44.9	205°31.4	10.3'	S24°17.4	-8.3'	55.5'
1	191°28.6	44.1	220°00.8	10.4	24°09.1	-8.4'	55.5'
2	206°28.6 221°28.7	43.2 •• 42.4	234°30.2 248°59.6	10.4' 10.5'	24°00.7 23°52.2	-8.5' -8.7'	55.5' 55.6'
4	236°28.7	41.5	263°29.1	10.5'	23°43.5	-8.8'	55.6'
5	251°28.7	40.7	277°58.6	10.6'	23°34.7	-8.9'	55.6'
6	266°28.7	\$12°39.8	292°28.1	10.6'	\$23°25.8	-9.0'	55.6'
7 8	281°28.8 296°28.8	38.9 38.1	306°57.7 321°27.4	10.7' 10.7'	23°16.8 23°07.7	-9.1' -9.3'	55.7' 55.7'
9	311°28.8	37.2	335°57.1	10.7'	22°58.4	-9.4'	55.7'
10	326°28.9	36.4	$350^{\circ}26.8$	10.8'	$22^{\circ}49.0$	-9.5'	55.7'
11	341°28.9 356°28.9	35.5	4°56.6 19°26.5	10.8'	22°39.5 522°29.9	-9.6'	55.8'
12 13	356°28.9 11°29.0	\$12°34.6 33.8	19°26.5 33°56.3	10.9' 10.9'	22°20.1	-9.7' -9.9'	55.8' 55.8'
14	26°29.0	32.9	48°26.3	11.0'	22°10.3	-10.0'	55.8'
15	41°29.0	• • 32.0	62°56.2	11.0'	22°00.3	-10.1'	55.9'
16	56°29.0 71°29.1	31.2	77°26.2 91°56.3	11.1'	21°50.2 21°40.0	-10.2'	55.9'
17 18	71°29.1 86°29.1	30.3 \$12°29.5	91°56.3 106°26.4	11.1' 11.2'	\$21°40.0 \$21°29.7	-10.3' -10.4'	55.9' 55.9'
19	101°29.1	28.6	120°56.6	11.2'	21°19.2	-10.6'	56.0'
20	116°29.2	27.7	$135^{\circ}26.8$	11.3'	$21^{\circ}08.7$	-10.7'	56.0'
21	131°29.2	• • 26.9	149°57.0	11.3'	20°58.0	-10.8'	56.0'
22 23	146°29.2 161°29.3	26.0 25.1	164°27.3 178°57.7	11.3' 11.4'	20°47.2 20°36.4	-10.9' -11.0'	56.0' 56.0'
23	SD = 16.2'				0 = 15.1'	11.0	30.0
	3D = 10.2'	d = -0.9'		51	ν = 15.1′		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°29.3	\$12°24.3	193°28.1	11.4'	\$20°25.4	-11.1'	56.1
1 2	191°29.4 206°29.4	23.4 22.5	207°58.5 222°29.0	11.5' 11.5'	20°14.3 20°03.1	-11.2' -11.3'	56.1' 56.1'
3	200 29.4 221°29.4	21.7	222 29.0 236°59.5	11.6'	20 03.1 19°51.8	-11.3 -11.4'	56.1
4	236°29.5	20.8	251°30.1	11.6'	19°40.3	-11.5'	56.2'
5	251°29.5	19.9	266°00.7	11.7'	19°28.8	-11.6'	56.2'
6	266°29.5 281°29.6	\$12° 19.1 18.2	280°31.4 295°02.1	11.7' 11.8'	\$19°17.2 19°05.5	-11.7' -11.8'	56.2' 56.2'
7 8	281 29.6 296°29.6	17.3	295 02.1 309°32.9	11.8	19 05.5 18°53.6	-11.8 -11.9'	56.2 56.3
9	311°29.6	• • 16.5	324°03.7	11.9'	18°41.7	-12.0'	56.3'
10	326°29.7	15.6	338°34.5	11.9'	18°29.7	-12.1'	56.3'
11 12	341°29.7 356°29.8	14.7 \$12°13.9	353°05.4 7°36.4	11.9' 12.0'	18°17.5 \$18°05.3	-12.2' -12.3'	56.3' 56.4'
13	11°29.8	13.0	7 30.4 22°07.4	12.0'	17°53.0	-12.3 -12.4'	56.4'
14	26°29.8	12.1	36°38.4	12.1'	17°40.6	-12.5'	56.4'
15	41°29.9	• • 11.2	51°09.5	12.1'	17°28.1	-12.6'	56.4'
16 17	56°29.9 71°30.0	10.4 09.5	65°40.6 80°11.8	12.2' 12.2'	17°15.5 17°02.8	-12.7' -12.8'	56.5' 56.5'
18	86°30.0	\$12°08.6	94°43.0	12.2'	\$16°50.0	-12.9'	56.5
19	101°30.0	07.8	109°14.2	12.3'	16°37.1	-13.0'	56.5'
20	116°30.1	06.9	123°45.5		16°24.1		56.6'
21 22	131°30.1 146°30.2	· · 06.0 05.1	138°16.8 152°48.2	12.4' 12.4'	16°11.1 15°57.9	-13.1' -13.2'	56.6' 56.6'
23	161°30.2	04.3	167°19.6	12.5'	15°44.7	-13.2	56.6
	SD = 16.2'	d = -0.9'		SI	D = 15.3'		
	35 = 10.2	<u>u = 0.5</u>					
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	176°30.2 191°30.3	\$12°03.4 02.5	181°51.1 196°22.6	12.5' 12.5'	\$15°31.4 15°18.0	-13.4' -13.5'	56.7' 56.7'
2	206°30.3	02.5 01.6	210°54.1	12.5 12.6'	15 18.0 15°04.5	-13.5 -13.6'	56.7'
3	221°30.4	12°00.8	225°25.7	12.6'	$14^{\circ}50.9$	-13.6'	56.7'
4	236°30.4	11°59.9	239°57.3	12.6'	14°37.3	-13.7'	56.8'
5 6	251°30.5 266°30.5	59.0 \$11°58.1	254°28.9 269°00.6	12.7' 12.7'	14°23.5 \$14°09.7	-13.8' -13.9'	56.8' 56.8'
7	281°30.5	57.3	283°32.3	12.7	13°55.9	-13.9	56.8
8	296°30.6	56.4	298°04.1	12.8'	13°41.9	-14.0'	56.9'
9	311°30.6	• • 55.5	312°35.9	12.8'	13°27.9	-14.1'	56.9'
10 11	326°30.7 341°30.7	54.6 53.8	327°07.7 341°39.6	12.9' 12.9'	13°13.8 12°59.6	-14.2' -14.3'	56.9' 56.9'
12	356°30.8	\$11°52.9	356°11.5	12.9'	\$12°45.3	-14.3'	57.0'
13	11°30.8	52.0	10°43.4	13.0'	12°31.0	-14.4'	57.0'
14	26°30.9	51.1	25°15.3	13.0'	12°16.6	-14.5'	57.0'
15 16	41°30.9 56°31.0	· · 50.2 49.4	39°47.3 54°19.3	13.0' 13.0'	12°02.2 11°47.6	-14.5' -14.6'	57.0' 57.1'
17	71°31.0	48.5	68°51.4	13.1'	11°33.0	-14.7	57.1
18	86°31.0	<b>S</b> 11°47.6	83°23.4	13.1'	S11°18.4	-14.7'	57.1'
19	101°31.1	46.7	97°55.5	13.1'	11°03.7	-14.8'	57.1'
20 21	116°31.1 131°31.2	45.8 •• 45.0	112°27.6 126°59.8	13.1' 13.2'	10°48.9 10°34.0	-14.8' -14.9'	57.1' 57.2'
22	146°31.2	44.1	141°32.0	13.2'	10° 34.0 10° 19.1	-14.9	57.2'
23	161°31.3	43.2	$156^{\circ}04.1$	13.2'	10°04.2	-15.0'	57.2'
	SD = 16.2'	d = -0.9'	-	SI	O = 15.5'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Junioci	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
<b>N</b> 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

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
<b>N</b> 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

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

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	147°58.4	166°22.3	509°22.1	185°08.0	S15°49.1	40°46.6	N22°49.8	146° 42.8	S01°47.3			
1	163°00.9	181°21.8	21.0	200°08.5	48.5	55°49.3	49.9	161°45.0	47.2	Alpheratz	357°34.1	29°14.1
2	178°03.4	196°21.4	19.8	215°09.0	47.8	70°51.9	49.9	176°47.2	47.1	Ankaa	353°06.5	-42°10.0
3	193°05.8	211°20.9	• • 18.6	230°09.5	• • 47.2	85°54.6	49.9	191°49.4	• • 47.0	Schedar	349°30.4	56°41.0
4	208°08.3	226° 20.4	17.4	245°10.1	46.6	100°57.2	49.9	206°51.6	46.9	Diphda	348°46.6	-17°50.7
5	223°10.7	241°20.0	16.2	260°10.6	46.0	115°59.9	50.0	221°53.8	46.8	Achernar	335°19.8	-57°06.5
6	238°13.2	256° 19.5	S09°15.0	275°11.1	S15°45.4	131°02.5	N22°50.0	236°56.0	S01°46.7	Hamal	327°50.3	23°35.2
7	253°15.7	271°19.1	13.8	290°11.6	44.7	146°05.1	50.0	251°58.2	46.5	Polaris	313°39.5	89°22.8
8	268°18.1	286° 18.6	12.6	305°12.2	44.1	161°07.8	50.0	267°00.4	46.4	Acamar	315°11.1	-40°12.2
9	283°20.6	301°18.1	• • 11.4	320°12.7	• • 43.5	176°10.4	• • 50.0	282°02.6	• • 46.3	Menkar	314°05.2	4°11.5
10	298°23.1	$316^{\circ}17.7$	10.2	335°13.2	42.9	191°13.1	50.1	297°04.8	46.2	Mirfak Aldebaran	308°27.0	49°57.4 16°33.7
11	313°25.5	331°17.2	09.1	350°13.7	42.2	206°15.7	50.1	312°07.0	46.1	Rigel	290°38.5 281°02.8	-8°10.4
12	328°28.0	346° 16.7	<b>S</b> 09°07.9	5°14.3	S15°41.6	221°18.4	N22°50.1	327°09.2	S01°46.0	Capella	280° 20.3	-6 10.4 46°01.6
13	343°30.5	1°16.3	06.7	20°14.8	41.0	236°21.0	50.1	$342^{\circ}11.4$	45.8	Bellatrix	278°21.7	6°22.3
14	358°32.9	$16^{\circ}15.8$	05.5	35°15.3	40.4	251°23.6	50.2	357°13.6	45.7	Elnath	278°00.5	28°37.8
15	13°35.4	31° 15.4	• • 04.3	50°15.8	• • 39.8	266°26.3	• • 50.2	12° 15.9	• • 45.6	Alnilam	275°36.6	-1°11.2
16	28°37.9	46°14.9	03.1	65°16.4	39.1	281°28.9	50.2	27°18.1	45.5	Betelgeuse	270°50.9	7°24.7
17	43°40.3	61°14.4	01.9	80°16.9	38.5	296°31.6	50.2	42°20.3	45.4	Canopus	263°51.7	-52°42.8
18	58°42.8	76°14.0	S09°00.7	95°17.4	S15°37.9	311°34.2	N22°50.3	57°22.5	S01°45.3	Sirius	258°25.2	-16°45.3
19	73°45.2	91°13.5	08°59.5	110°17.9	37.3	326°36.8	50.3	72°24.7	45.1 45.0	Adhara	255°04.9	-29°00.6
20	88°47.7	106°13.1	58.3	125°18.5	36.6	341°39.5	50.3	87°26.9	45.0	Procyon	244°49.6	5°09.4
21 22	103°50.2 118°52.6	121°12.6 136°12.1	· · 57.1 55.9	140°19.0 155°19.5	· · 36.0 35.4	356°42.1 11°44.8	· · 50.3 50.3	102°29.1 117°31.3	44.9	Pollux	243°15.8	27°57.7
22	118°52.6 133°55.1	136° 12.1 151° 11.7	55.9 54.7	155° 19.5 170° 20.0		26°47.4	50.3 50.4	117°31.3 132°33.5	44.8 44.7	Avior	$234^{\circ}13.8$	-59°35.7
_					34.7				44.7	Suhail	222°45.2	-43°32.4
Mer.p	ass. 14:06	$\nu$ -0.5' d-1	2′ m-3.91	$\nu$ 0.5′ d-0	.6′ m1.13	$\nu$ 2.6′ d0.	0′ m-2.52	$\nu$ 2.2′ d-0	.1' m $1.01$	Miaplacidus	221°37.2	-69°49.5
										Alphard	217°46.5	-8°46.5
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.1	11°50.2
0	148°57.6	166°11.2	\$08°53.5	185°20.6	S15°34.1	41°50.0	N22°50.4	147°35.7	S01°44.6	Dubhe	193°39.2	61°36.4
1	164°00.0	181° 10.8	52.3	200°21.1	33.5	56°52.7	50.4	162°37.9	44.5	Denebola	182°23.7	14°25.4
2	179°02.5	196° 10.3	51.1	215°21.6	32.9	71°55.3	50.4	177°40.1	44.3	Gienah		-17°41.3
3	194°05.0	211°09.8	• • 49.9	230°22.2	32.2	86°58.0	• • 50.5	192°42.3	• • 44.2		172°58.5	-63°14.6
4	209°07.4	226° 09.4	48.7	245°22.7	31.6	102°00.6	50.5	207°44.5	44.1	1	171°50.2	-57°15.5
5	224°09.9	241°08.9	47.5	260°23.2	31.0	117°03.2	50.5	222°46.7	44.0	Alioth	166°11.7	55°48.8
6	239°12.3	256°08.5	S08°46.3	275°23.7	S15°30.4	132°05.9	N22°50.5	237°48.9	S01°43.9	Spica	158°21.1	-11°18.0
7	254°14.8	271°08.0	45.1	290°24.3	29.7	147°08.5	50.5	252°51.1	43.8	Alkaid Hadar	152°51.0 148°34.4	49°10.6
8	269°17.3	286°07.6	43.9	305°24.8	29.1	$162^{\circ}11.1$	50.6	267°53.3	43.6		148 34.4 147°56.3	-60°29.8 -36°29.9
9	284°19.7	301°07.1	• • 42.7	320°25.3	• • 28.5	177°13.8	• • 50.6	282°55.5	• • 43.5	Arcturus	147 50.5 145°46.9	-30° 29.9 19° 02.5
10	299°22.2	$316^{\circ}06.7$	41.5	335°25.9	27.8	192°16.4	50.6	297°57.7	43.4	Rigil Kent.	139°38.8	-60°56.4
11	314°24.7	331°06.2	40.3	350°26.4	27.2	$207^{\circ}19.0$	50.6	$313^{\circ}00.0$	43.3	Kochab	137°19.5	74°02.4
12	$329^{\circ}27.1$	346°05.8	508°39.1	5°26.9	S15°26.6	222°21.7	N22°50.6	328°02.2	S01°43.2	Zuben'ubi	136°54.9	-16°09.1
13	344°29.6	1°05.3	37.9	20°27.4	25.9	237°24.3	50.7	343°04.4	43.1	Alphecca	126°02.9	26°37.3
14	359°32.1	16°04.8	36.7	35°28.0	25.3	252°26.9	50.7	358°06.6	42.9	Antares	112° 14.7	-26°29.4
15	14°34.5	31°04.4	• • 35.5	50°28.5	• • 24.7	267°29.6	• • 50.7	13°08.8	• • 42.8	Atria	107°08.3	-69°04.2
16	29°37.0	46°03.9	34.3	65°29.0	24.0	282°32.2	50.7	28°11.0	42.7	Sabik	102°01.8	-15°45.5
17	44°39.5	61°03.5	33.1	80°29.6	23.4	297°34.8	50.8	43°13.2	42.6	Shaula	96°09.3	-37°07.3
18	59°41.9	76°03.0	S08°31.9	95°30.1	S15°22.8	312°37.5	N22°50.8	58° 15.4	S01°42.5	Rasalhague	95°57.8	12°32.2
19	74°44.4	91°02.6	30.7	110°30.6	22.2	327°40.1	50.8	73°17.6	42.4	Eltanin	90°42.0	51°28.8
20	89°46.8	106°02.1	29.5	125°31.2	21.5	342°42.7	50.8	88° 19.8	42.2	Kaus Aust.	83°31.5	-34°22.3
21	104°49.3	121°01.7	• • 28.3	140°31.7	• • 20.9	357°45.4	50.8	103°22.0	• • 42.1	Vega	80°32.9	38°48.2
22	119°51.8	136°01.2	27.1	155°32.2	20.3	12°48.0	50.9	118°24.2	42.0	Nunki	75°46.9	-26°15.9
23	134°54.2	151°00.8	25.9	170°32.7	19.6	27°50.6	50.9	133°26.4	41.9	Altair	$61^{\circ}59.3$	8°56.1
Mer.p	ass. 14:02	$\nu$ -0.5' d-1	2′ m-3.91	$\nu$ 0.5′ $d$ -0	.6′ m1.13	$\nu$ 2.6′ d0.	0′ m-2.51	$\nu$ 2.2′ d-0	.1' m $1.01$	Peacock	53°04.8	-56°39.0
										Deneb	49°25.6	45°22.3
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.2	9°59.6
0 0	149°56.7	166°00.3	S08°24.6	185°33.3	S15°19.0	42°53.3	N22°50.9	148°28.6	S01°41.8	Al Na'ir	27°32.2	-46°50.1
1	164°59.2	180° 59.9	23.4	200°33.8	18.4	57°55.9	50.9	163°30.8	41.7	Fomalhaut	15°13.8	-29°29.1
2	180°01.6	195° 59.4	22.2	215°34.3	17.7	72°58.5	50.9	178°33.0	41.7	Scheat	13°44.6	28°13.5
3	195°04.1	210°59.0	• • 21.0	230°34.9	• • 17.1	88°01.2	51.0	193°35.2	• • 41.4	Markab	13°29.3	15°20.7
4	210°06.6	225°58.5	19.8	245°35.4	16.5	103°03.8	51.0	208°37.4	41.3	Feb 18 Wed	SHA	Mer.pass
5	225°09.0	240°58.1	18.6	260°35.9	15.8	118°06.4	51.0	223°39.6	41.2	Venus	$18^{\circ}23.9$	12:55
6	240°11.5	255° 57.7	S08°17.4	275°36.5	S15°15.2	133°09.0	N22°51.0	238°41.8	S01°41.1	Mars	$37^{\circ}09.5$	11:39
7	$255^{\circ}13.9$	270°57.2	16.2	290°37.0	14.5	$148^{\circ}11.7$	51.1	253°44.0	41.0	Jupiter	252°48.2	21:13
8	270°16.4	285°56.8	15.0	305°37.5	13.9	163°14.3	51.1	268°46.2	40.8	Saturn	358°44.3	14:11
9	285°18.9	$300^{\circ}56.3$	• • 13.8	$320^{\circ}38.1$	•• 13.3	178°16.9	•• 51.1	283°48.4	• • 40.7	Feb 19 Thu	SHA	Mer.pass
10	300°21.3	315°55.9	12.6	335°38.6	12.6	193° 19.5	51.1	298° 50.6	40.6	Venus	<b>эна</b> 17°13.7	12:56
11	315°23.8	330°55.4	11.3	350°39.1	12.0	208°22.2	51.1	313°52.8	40.5	Mars	36°23.0	11:38
12	330°26.3	345°55.0	S08°10.1	5°39.7	S15°11.4	223°24.8	N22°51.2	328° 55.0	S01°40.4	Jupiter		21:09
13	345°28.7	0°54.5	08.9	20°40.2	10.7	238°27.4	51.2	343°57.2	40.3	Saturn	358° 38.1	14:08
14	0°31.2	15°54.1	07.7	35°40.7	10.1	253°30.0	51.2	358°59.4	40.1			
15	15°33.7	30°53.6	• • 06.5	50°41.3	• • 09.5	268°32.7	• • 51.2	14°01.6	• • 40.0	Feb 20 Fri	SHA	Mer.pass
16	30°36.1	45°53.2	05.3	65°41.8	08.8	283°35.3	51.2	29°03.8	39.9	Venus	16°03.6	12:56
17	45°38.6	60°52.8	04.1	80°42.3	08.2	298°37.9	51.3	44°06.0	39.8	Mars	35°36.6	11:37
18	60°41.1	75°52.3	\$08°02.9	95°42.9	\$15°07.5	313°40.5	N22°51.3	59°08.3	S01°39.7	Jupiter		21:05
19	75°43.5	90°51.9	01.6	110°43.4	06.9	328°43.2	51.3	74°10.5	39.6	Saturn	358°31.9	14:04
20	90°46.0	105°51.4	08°00.4	125°43.9	06.3	343°45.8	51.3	89°12.7	39.4 •• 39.3	Horizont	al parallax	
21 22	105°48.4 120°50.9	120°51.0 135°50.5	07°59.2 58.0	140°44.5 155°45.0	· · 05.6 05.0	358°48.4 13°51.0	· · 51.3 51.4	104° 14.9 119° 17.1	39.3	1.5/125/10	Venus:	0.1
23	120°50.9 135°53.4	150°50.5	56.8	170°45.6	04.3	28°53.7	51.4	134° 19.3	39.2		Mars:	0.1
Mer.p	ass. 13:58	$\nu$ -0.4' d-1	2′ m-3.91	$\nu$ 0.5′ d-0	.6′ m1.13	$\nu$ 2.6′ d0.	0′ m-2.51	$\nu$ 2.2′ d-0	.1' m $1.01$			

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	176°31.3	S11°42.3	170°36.4	13.2'	S09°49.1	-15.1'	57.2'
1 2	191°31.4 206°31.4	41.4 40.6	185°08.6 199°40.9	13.3' 13.3'	09°34.1 09°18.9	-15.1' -15.2'	57.3' 57.3'
3	200 31.4 221°31.5	39.7	214°13.1	13.3'	09 16.9 09°03.7	-15.2'	57.3'
4	236°31.5	38.8	228°45.4	13.3'	08°48.5	-15.3'	57.3'
5	251°31.6	37.9	243°17.8	13.3'	08°33.2	-15.3'	57.4'
6 7	266°31.6 281°31.7	\$11°37.0 36.1	257°50.1 272°22.5	13.4' 13.4'	\$08°17.9 08°02.5	-15.4' -15.4'	57.4' 57.4'
8	296°31.7	35.3	272 22.5 286°54.8	13.4	06 02.5 07°47.0	-15.4 -15.5'	57.4'
9	311°31.8	• • 34.4	301°27.2	13.4'	07°31.5	-15.5'	57.4'
10	326°31.8	33.5	315°59.6	13.4'	07°16.0	-15.6'	57.5'
11 12	341°31.9 356°32.0	32.6 \$11°31.7	330°32.0 345°04.4	13.4' 13.4'	07°00.4 506°44.8	-15.6' -15.7'	57.5' 57.5'
13	11° 32.0	30.8	359°36.9	13.4'	06°29.1	-15.7'	57.5'
14	26°32.1	29.9	14°09.3	13.4'	06°13.4	-15.7'	57.6'
15	41°32.1	• • 29.1	28°41.8	13.5'	05°57.7 05°41.9	-15.8'	57.6'
16 17	56°32.2 71°32.2	28.2 27.3	43°14.2 57°46.7	13.5' 13.5'	05 41.9 05°26.1	-15.8' -15.9'	57.6' 57.6'
18	86° 32.3	S11°26.4	72°19.1	13.5'	S05°10.2	-15.9'	57.6'
19	101°32.3	25.5	86°51.6	13.5'	04°54.4	-15.9'	57.7'
20 21	116°32.4 131°32.4	24.6 •• 23.7	101°24.1 115°56.6	13.5' 13.5'	04°38.4 04°22.5	-16.0' -16.0'	57.7' 57.7'
22	131 32.4 146°32.5	22.8	115 50.0 130°29.1	13.5'	04 22.5 04°06.5	-16.0'	57.7'
23	161°32.6	22.0	145°01.5	13.5'	03°50.5	-16.0'	57.7'
	SD = 16.2'	d = -0.9'		SI	D = 15.6'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	176°32.6 191°32.7	\$11°21.1 20.2	159°34.0 174°06.5	13.5' 13.5'	\$03°34.4 03°18.4	-16.1' -16.1'	57.8' 57.8'
2	206° 32.7	19.3	188°39.0	13.5'	03°02.3	-16.1	57.8'
3	221°32.8	• • 18.4	203°11.4	13.5'	$02^{\circ}46.1$	-16.1'	57.8'
4	236° 32.8	17.5	217°43.9	13.5'	02°30.0	-16.2'	57.8'
5 6	251°32.9 266°33.0	16.6 \$11°15.7	232°16.4 246°48.8	13.5' 13.4'	02°13.8 \$01°57.7	-16.2' -16.2'	57.9' 57.9'
7	281°33.0	14.8	261°21.3	13.4'	01°41.5	-16.2'	57.9'
8	296°33.1	13.9	$275^{\circ}53.7$	13.4'	01°25.2	-16.2'	57.9'
9	311°33.1	· · 13.1	290°26.1	13.4'	01°09.0	-16.3'	57.9'
10 11	326°33.2 341°33.3	12.2 11.3	304°58.5 319°30.9	13.4' 13.4'	00°52.7 00°36.5	-16.3' -16.3'	58.0' 58.0'
12	356°33.3	S11°10.4	334°03.3	13.4'	500°20.2	-16.3'	58.0'
13	11°33.4	09.5	348°35.7	13.3'	500°03.9	-16.3	58.0'
14 15	26°33.4 41°33.5	08.6 •• 07.7	3°08.0 17°40.3	13.3' 13.3'	N00°12.4 00°28.7	16.3' 16.3'	58.0' 58.0'
16	56° 33.6	06.8	32°12.6	13.3'	00° 45.0	16.3'	58.1
17	71°33.6	05.9	46°44.9	13.3'	$01^{\circ}01.3$	16.3'	58.1'
18 19	86°33.7 101°33.7	\$11°05.0 04.1	61°17.2 75°49.4	13.2' 13.2'	N01°17.7 01°34.0	16.3' 16.3'	58.1' 58.1'
20	116° 33.8	03.2	90°21.7		01°50.3		58.1
21	131°33.9	02.3	104°53.9	13.2'	02°06.7	16.3'	58.2'
22	146°33.9	01.4	119°26.0	13.1'	02°23.0	16.3'	58.2'
23	161°34.0	00.5	133°58.2	13.1'	02°39.3	16.3'	58.2'
	SD = 16.2'	d = -0.9'		SI	D = 15.8'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°34.1	<b>S</b> 10°59.6	148°30.3	13.1'	N02°55.6	16.3'	58.2'
1	191°34.1 206°34.2	58.7	163°02.4	13.1'	03°11.9	16.3'	58.2'
2	206°34.2 221°34.2	57.8 •• 56.9	177°34.4 192°06.4	13.0' 13.0'	03°28.3 03°44.6	16.3' 16.3'	58.2' 58.3'
4	236° 34.3	56.0	206°38.4	12.9'	04°00.8	16.3	58.3'
5	251°34.4	55.1	221°10.4	12.9'	04°17.1	16.3'	58.3'
6 7	266°34.4 281°34.5	\$10°54.3 53.4	235°42.3 250°14.2	12.9' 12.8'	N04°33.4 04°49.7	16.3' 16.2'	58.3' 58.3'
8	281 34.5 296°34.6	53.4 52.5	250 14.2 264°46.0	12.8'	04 49.7 05°05.9	16.2	58.3'
9	311°34.6	• • 51.6	279°17.8	12.8'	$05^{\circ}22.1$	16.2'	58.3'
10	326°34.7 341°34.8	50.7	293°49.6 308°21.3	12.7'	05°38.3	16.2'	58.4'
11 12	341°34.8 356°34.8	49.8 \$10°48.9	308°21.3 322°52.9	12.7' 12.6'	05°54.5 N06°10.7	16.2' 16.1'	58.4' 58.4'
13	11°34.9	48.0	337°24.6	12.6'	06°26.8	16.1	58.4
14	26°35.0	47.1	351°56.1	12.5'	06°42.9	16.1'	58.4'
15 16	41°35.0 56°35.1	· · 46.2 45.3	6°27.7 20°59.2	12.5'	06°59.0 07°15.1	16.1'	58.4'
16 17	56° 35.1 71° 35.2	45.3 44.4	20°59.2 35°30.6	12.4' 12.4'	07°15.1 07°31.1	16.0' 16.0'	58.5' 58.5'
18	86°35.2	S10°43.4	50°02.0	12.3'	N07°47.1	16.0'	58.5'
19	101°35.3	42.5	64°33.3	12.3'	08°03.1	15.9'	58.5'
20 21	116°35.4 131°35.5	41.6 •• 40.7	79°04.6 93°35.8	12.2' 12.2'	08° 19.1 08° 35.0	15.9' 15.9'	58.5' 58.5'
22	131 35.5 146°35.5	39.8	93 35.8 108°07.0	12.1'	08°50.8	15.9 15.8'	58.5'
23	161°35.6	38.9	122°38.1	12.1'	09°06.7	15.8'	58.5'
	SD = 16.2'	d = -0.9'	-	SI	D = 15.9'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
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
N 40°	05:49	06:20	06:48	17:40	18:08	18:40
35°	05:46	06:16	06:42	17:46	18:12	18:42
30°	05:44	06:12	06:36	17:52	18:16	18:44
20°	05:39	06:04	06:27	18:01	18:23	18:49
N 10°	05:32	05:57	06:18	18:09	18:31	18:55
0°	05:25	05:49	06:10	18:17	18:38	19:03
<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°	04:49	05:19	05:43	18:44	19:08	19:38
35°	04:40	05:11	05:38	18:49	19:16	19:47
40°	04:28	05:02	05:31	18:56	19:24	19:58
45°	04:14	04:52	05:23	19:04	19:35	20:12
<b>S</b> 50°	03:55	04:39	05:13	19:13	19:48	20:31
52°	03:46	04:32	05:09	19:17	19:54	20:39
54°	03:36	04:25	05:04	19:22	20:01	20:50
56°	03:24	04:17	04:59	19:27	20:08	21:01
58°	03:10	04:08	04:53	19:33	20:17	21:15
<b>S</b> 60°	02:52	03:58	04:46	19:40	20:28	21:32

Lat.		Moonris	e		Moonset	:
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°	08:33	07:56	07:20	18:05	20:21	22:44
N 70°	08:22	07:54	07:27	18:13	20:19	22:30
68°	08:13	07:52	07:32	18:19	20:17	22:18
66°	08:05	07:51	07:36	18:24	20:15	22:09
64°	07:59	07:49	07:40	18:29	20:13	22:01
62°	07:53	07:48	07:44	18:32	20:12	21:54
60°	07:48	07:47	07:47	18:36	20:11	21:48
N 58°	07:44	07:47	07:49	18:39	20:10	21:43
56°	07:40	07:46	07:52	18:41	20:09	21:39
54°	07:36	07:45	07:54	18:44	20:08	21:35
52°	07:33	07:44	07:56	18:46	20:07	21:31
50°	07:30	07:44	07:57	18:48	20:07	21:28
45°	07:24	07:43	08:01	18:52	20:05	21:21
N 40°	07:19	07:42	08:05	18:55	20:04	21:15
35°	07:14	07:41	08:07	18:58	20:03	21:10
30°	07:10	07:40	08:10	19:01	20:02	21:05
20°	07:03	07:39	08:14	19:05	20:01	20:57
N 10°	06:57	07:37	08:18	19:09	19:59	20:51
0°	06:51	07:36	08:22	19:12	19:58	20:45
S 10°	06:45	07:35	08:26	19:16	19:57	20:38
20°	06:38	07:34	08:30	19:20	19:55	20:32
30°	06:31	07:33	08:35	19:24	19:54	20:24
35°	06:27	07:32	08:38	19:26	19:53	20:20
40°	06:22	07:31	08:41	19:29	19:52	20:15
45°	06:17	07:30	08:44	19:32	19:50	20:09
<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	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	150° 55.8	165°49.7	\$07°55.6	185°46.1	\$15°03.7	43°56.3	N22°51.4	149°21.5	S01°39.0			
1	165° 58.3	180°49.2	54.3	200°46.6	03.1	58° 58.9	51.4	164°23.7	38.9	Alpheratz	357°34.1	29°14.1
2	181°00.8	195°48.8	53.1	215°47.2	02.4	74°01.5	51.4	179°25.9	38.7	Ankaa	353°06.6	-42°10.0
3	196°03.2	210°48.3	• • 51.9	230°47.7	• • 01.8	89°04.1	• • 51.5	194°28.1	• • 38.6	Schedar	349°30.4	56°41.0
4	$211^{\circ}05.7$	225°47.9	50.7	245°48.2	01.1	$104^{\circ}06.8$	51.5	209°30.3	38.5	Diphda Achernar	348°46.6 335°19.8	-17°50.7 -57°06.5
5	226°08.2	240°47.5	49.5	260°48.8	15°00.5	$119^{\circ}09.4$	51.5	224°32.5	38.4	Hamal	327°50.3	23°35.2
6	241°10.6	255°47.0	S07°48.3	275°49.3	S14°59.9	134°12.0	N22°51.5	239°34.7	S01°38.3	Polaris	313°41.0	89°22.8
7	256° 13.1	270°46.6	47.0	290°49.8	59.2	149°14.6	51.5	254°36.9	38.2	Acamar	315°11.2	-40°12.2
8	271° 15.5 286° 18.0	285°46.1 300°45.7	45.8 •• 44.6	305°50.4 320°50.9	58.6 •• 57.9	164° 17.2 179° 19.9	51.6 •• 51.6	269°39.1 284°41.3	38.0 · · 37.9	Menkar	$314^{\circ}05.2$	4°11.5
10	301°20.5	315°45.3	43.4	335°51.5	57.3	194°22.5	51.6	299°43.5	37.8	Mirfak	308°27.0	49°57.4
11	316°22.9	330°44.8	42.2	350°52.0	56.6	209°25.1	51.6	314°45.7	37.7	Aldebaran	290°38.5	16°33.7
12	331°25.4	345°44.4	S07°40.9	5°52.5	S14°56.0	224°27.7	N22°51.6	329°47.9	S01°37.6	Rigel	281°02.9	-8°10.4 46°01.6
13	$346^{\circ}27.9$	0°44.0	39.7	20°53.1	55.4	239°30.3	51.7	$344^{\circ}50.1$	37.5	Capella Bellatrix	280°20.4 278°21.8	6°22.3
14	1°30.3	15°43.5	38.5	35°53.6	54.7	254°33.0	51.7	359°52.3	37.3	Elnath	278°00.5	28°37.8
15	16°32.8	30°43.1	• • 37.3	50°54.1	• • 54.1	269°35.6	• • 51.7	14°54.5	• • 37.2	Alnilam	275°36.6	-1°11.2
16 17	31°35.3 46°37.7	45°42.7 60°42.2	36.1 34.8	65°54.7 80°55.2	53.4 52.8	284°38.2 299°40.8	51.7 51.7	29°56.7 44°58.9	37.1 37.0	Betelgeuse	270°50.9	7°24.7
18	61°40.2	75°41.8	S07°33.6	95°55.8	\$14°52.1	314°43.4	N22°51.8	60°01.1	S01°36.9	Canopus	263°51.7	-52°42.8
19	76° 42.7	90°41.4	32.4	110°56.3	51.5	329°46.0	51.8	75°03.3	36.7	Sirius	258°25.2	-16°45.3
20	91°45.1	105°40.9	31.2	125°56.8	50.8	344°48.6	51.8	90°05.5	36.6	Adhara	255°04.9	-29°00.6
21	$106^{\circ}47.6$	120°40.5	• • 29.9	140°57.4	• • 50.2	359°51.3	• • 51.8	105°07.7	• • 36.5	Procyon Pollux	244° 49.6 243° 15.9	5°09.4 27°57.7
22	121°50.0	135°40.0	28.7	155°57.9	49.6	14°53.9	51.8	120°09.9	36.4	Avior	245 15.9 234° 13.8	-59°35.7
23	136°52.5	150°39.6	27.5	170°58.5	48.9	29°56.5	51.9	135°12.1	36.3	Suhail	222°45.2	-43°32.4
Mer.p	ass. 13:54	$\nu$ -0.4' d-1	2′ m-3.91	$\nu 0.5' \ d-0$	.6′ m1.13	$\nu 2.6' d0.$	0′ m-2.50	$\nu 2.2' \ d-0$	0.1' m1.01	Miaplacidus	221°37.2	-69°49.5
										Alphard	217°46.5	-8°46.5
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	$207^{\circ}33.1$	11°50.2
0 0	151°55.0	165°39.2	S07°26.3	185°59.0	\$14°48.3	44°59.1	N22°51.9	150°14.3	S01°36.2	Dubhe	193°39.2	61°36.4
1	166° 57.4	180°38.7	25.0	200°59.5	47.6	60°01.7	51.9	165°16.5	36.0	Denebola	182°23.7	14°25.4
2	181°59.9	195°38.3	23.8	216°00.1	47.0	75°04.3	51.9	180°18.7	35.9	Gienah	175°42.3	-17°41.3 -63°14.6
3	197°02.4	210°37.9	• • 22.6	231°00.6	• • 46.3	90°06.9	• • 51.9	195°20.9	• • 35.8	Gacrux	172°58.5 171°50.2	-63°14.6 -57°15.5
4	$212^{\circ}04.8$	225°37.5	21.4	$246^{\circ}01.2$	45.7	$105^{\circ}09.6$	51.9	$210^{\circ}23.1$	35.7	Alioth	166° 11.7	55°48.8
5	227°07.3	240°37.0	20.1	261°01.7	45.0	120° 12.2	52.0	225°25.3	35.6	Spica	158°21.1	-11°18.0
6	242°09.8	255°36.6	507°18.9	276°02.2	S14°44.4	135°14.8	N22°52.0	240°27.5	S01°35.5	Alkaid	152°51.0	49°10.6
7	257°12.2	270°36.2	17.7	291°02.8	43.7	150° 17.4	52.0	255°29.7	35.3	Hadar	148°34.4	-60°29.8
8	272° 14.7 287° 17.2	285°35.7 300°35.3	16.5 •• 15.2	306°03.3 321°03.9	43.1 •• 42.4	165°20.0 180°22.6	52.0 • • 52.0	270°31.9 285°34.1	35.2 · · 35.1	Menkent	147°56.3	-36°29.9
10	302° 19.6	315°34.9	14.0	336°04.4	41.8	195°25.2	52.0	300°36.3	35.0	Arcturus	145°46.9	19°02.5
11	317°22.1	330°34.4	12.8	351°05.0	41.1	210°27.8	52.1	315°38.5	34.9	Rigil Kent.	139°38.8	-60°56.4
12	332°24.5	345°34.0	S07°11.5	6°05.5	S14°40.5	225°30.4	N22°52.1	330°40.7	S01°34.8	Kochab	137°19.4	74°02.5
13	$347^{\circ}27.0$	0°33.6	10.3	21°06.0	39.8	240°33.0	52.1	345°42.9	34.6	Zuben'ubi Alphecca	136°54.9 126°02.9	-16°09.1 26°37.3
14	$2^{\circ}29.5$	15°33.2	09.1	36°06.6	39.2	255°35.7	52.1	0°45.1	34.5	Antares	112° 14.7	-26°29.4
15	17°31.9	30°32.7	• • 07.9	51°07.1	• • 38.5	270°38.3	• • 52.2	15°47.3	• • 34.4	Atria	107°08.2	-69°04.2
16	32°34.4	45°32.3	06.6	66°07.7	37.9	285°40.9	52.2	30°49.5	34.3	Sabik	102°01.8	-15°45.5
17	47° 36.9 62° 39.3	60°31.9 75°31.4	05.4	81°08.2 96°08.8	37.2	300°43.5 315°46.1	52.2	45°51.7	34.2	Shaula	$96^{\circ}09.2$	-37°07.3
18 19	02 39.3 77°41.8	75 31.4 90°31.0	\$07°04.2 02.9	90 08.8 111°09.3	\$14°36.6 35.9	315 46.1 330°48.7	N22°52.2 52.2	60°53.9 75°56.1	\$01°34.0 33.9	Rasalhague	95°57.8	12°32.2
20	92°44.3	105°30.6	01.7	126°09.8	35.3	345°51.3	52.2	90°58.3	33.8	Eltanin	90°42.0	51°28.8
21	107°46.7	120°30.2	07°00.5	141°10.4	• • 34.6	0°53.9	52.3	106°00.5	33.7	Kaus Aust.	83°31.5	-34°22.3 38°48.2
22	$122^{\circ}49.2$	135°29.7	06°59.2	156°10.9	34.0	$15^{\circ}56.5$	52.3	121°02.7	33.6	Vega Nunki	80°32.8 75°46.8	-26°15.9
23	$137^{\circ}51.6$	150°29.3	58.0	171°11.5	33.3	$30^{\circ}59.1$	52.3	136°04.9	33.5	Altair	61°59.3	8°56.1
Mer.p	ass. 13:50	$\nu$ -0.4' d-1	2′ m-3.91	$\nu 0.5' \ d-0$	.6′ m1.13	$\nu^{2.6'} d0.$	0′ m-2.49	$\nu 2.2' \text{ d-0}$	0.1' m1.00	Peacock	53°04.8	-56°39.0
			0.31							Deneb	49°25.6	45°22.2
N4	CIIA	CHA	D	CIIA	D	CHA	D	CHA	D	Enif	33°38.2	9°59.6
Mon 0	<b>GHA</b> 152° 54.1	<b>GHA</b> 165°28.9	<b>Dec</b> <b>S</b> 06°56.8	<b>GHA</b> 186°12.0	Dec \$14°32.7	<b>GHA</b> 46°01.7	<b>Dec</b> N22° 52.3	<b>GHA</b> 151°07.1	Dec \$01°33.3	Al Na'ir	27°32.2	-46°50.1
1	167° 56.6	180°28.5	55.6	201°12.6	32.0	61°04.3	52.3	166°09.3	33.2	Fomalhaut Scheat	15° 13.8 13° 44.7	-29°29.1 28°13.4
2	182°59.0	195°28.0	54.3	216°13.1	31.4	76°06.9	52.4	181°11.5	33.1	Markab	13° 29.3	15°20.7
3	$198^{\circ}01.5$	210°27.6	• • 53.1	231°13.7	• • 30.7	$91^{\circ}09.5$	• • 52.4	$196^{\circ}13.7$	• • 33.0			
4	213°04.0	225°27.2	51.9	246°14.2	30.1	106° 12.1	52.4	211°15.9	32.9	Feb 21 Sat	SHA	Mer.pass
5	228°06.4	240°26.8	50.6	261°14.7	29.4	121°14.7	52.4	226°18.1	32.7	Venus	14°53.8	12:57
6	243°08.9	255°26.3	506°49.4	276°15.3	S14°28.8	136°17.3	N22°52.4	241°20.3		Mars Jupiter	34°50.3 253°00.4	11:37 21:01
7 8	258° 11.4 273° 13.8	270°25.9 285°25.5	48.1 46.9	291°15.8 306°16.4	28.1 27.4	151° 19.9 166° 22.5	52.4 52.5	256°22.5 271°24.7	32.5 32.4	Saturn	358° 25.6	14:01
9	288° 16.3	300°25.1	• • 45.7	300 10.4 321°16.9	. 26.8	181°25.1	• • 52.5	286°26.9	32.4			
10	303° 18.8	315°24.6	44.4	336°17.5	26.1	196°27.8	52.5	301°29.1	32.2	Feb 22 Sun	SHA	Mer.pass
11	318°21.2	330°24.2	43.2	351°18.0	25.5	211°30.4	52.5	316°31.3	32.0	Venus	13°44.2	12:58
12	333°23.7	345°23.8	S06°42.0	6°18.6	S14°24.8	226°33.0	N22° 52.5	331°33.5	S01°31.9	Mars Jupiter	34°04.0 253°04.1	11:36 20:56
13	348°26.1	0°23.4	40.7	21°19.1	24.2	241°35.6	52.6	346°35.7	31.8	Saturn	358° 19.3	13:57
14	3°28.6	15°23.0	39.5	36°19.7	23.5	256°38.2	52.6	1°37.9	31.7			
15 16	18° 31.1	30°22.5	· · 38.3	51°20.2	• • 22.9	271°40.8	· · 52.6	16°40.1	· · 31.6	Feb 23 Mon	SHA	Mer.pass
16 17	33° 33.5 48° 36.0	45°22.1 60°21.7	37.0 35.8	66°20.8 81°21.3	22.2 21.5	286°43.4 301°46.0	52.6 52.6	31°42.3 46°44.5	31.4 31.3	Venus	12°34.8	12:58
17 18	48 30.0 63°38.5	75°21.3	506°34.5	96°21.9	\$14°20.9	301 46.0 316°48.5	52.6 N22°52.6	40 44.5 61°46.7	501°31.2	Mars	33°17.9 253°07.6	11:35 20:52
19	78° 40.9	90°20.9	33.3	111°22.4	20.2	331°51.1	52.7	76°48.9	31.1		253 07.6 358°13.0	13:53
20	93°43.4	105°20.4	32.1	126°23.0	19.6	346°53.7	52.7	91°51.1	31.0			15.55
21	108°45.9	120°20.0	• • 30.8	141°23.5	• • 18.9	1°56.3	• • 52.7	$106^{\circ}53.3$	• • 30.9	Horizont	al parallax	
22	123°48.3	135°19.6	29.6	156°24.1	18.3	16°58.9	52.7	121°55.5	30.7		Venus:	0.1
23	138° 50.8	150°19.2	28.4	171°24.6	17.6	32°01.5	52.7	136°57.7	30.6		Mars:	0.1
Mer.p	ass. 13:46	$\nu$ -0.4 $d$ -1	2′ m-3.91	$\nu$ 0.5' d-0	.7′ m1.14	$\nu 2.6' \ d0.$	0′ m-2.49	$\nu 2.2' \ d-0$	0.1′ m1.00			

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	176°35.7	S10°38.0	137°09.2	12.0'	N09°22.5	15.8'	58.6'
1	191°35.7	37.1	$151^{\circ}40.1$	11.9'	09°38.2	15.7'	58.6'
2	206°35.8	36.2	166°11.1	11.9'	09°53.9	15.7'	58.6'
3	221°35.9	• • 35.3	180°42.0	11.8'	10°09.6	15.6'	58.6'
4 5	236°36.0 251°36.0	34.4 33.5	195°12.8 209°43.5	11.7' 11.7'	10°25.2 10°40.8	15.6' 15.5'	58.6' 58.6'
6	266°36.1	510° 32.6	209 43.5 224°14.2	11.6'	N10°56.3	15.5'	58.6'
7	281°36.2	31.7	238°44.8	11.5'	11°11.8	15.4	58.7'
8	296°36.2	30.8	253°15.4	11.5'	11°27.3	15.4'	58.7'
9	311°36.3	• • 29.9	267°45.8	11.4'	11°42.6	15.3'	58.7'
10	326°36.4	29.0	282°16.2	11.3'	11°58.0	15.3'	58.7'
11	341°36.5	28.1	296°46.6	11.3'	12°13.2 N12°28.4	15.2'	58.7'
12 13	356°36.5 11°36.6	\$10°27.2 26.3	311°16.9 325°47.0	11.2' 11.1'	12°43.6	15.2' 15.1'	58.7' 58.7'
14	26°36.7	25.4	340°17.2	11.1	12°58.7	15.1	58.7'
15	41°36.8	• • 24.4	354°47.2	11.0'	13°13.7	15.0'	58.7'
16	56°36.8	23.5	9°17.2	10.9'	13°28.7	14.9'	58.8'
17	71°36.9	22.6	$23^{\circ}47.1$	10.8'	13°43.6	14.8'	58.8'
18	86°37.0	S10°21.7	38°16.9	10.7'	N13°58.4	14.8'	58.8'
19	101°37.1	20.8	52°46.6	10.7'	14°13.2 14°27.9	14.7'	58.8'
20 21	116°37.1 131°37.2	19.9 •• 19.0	67°16.3 81°45.9	10.6' 10.5'	14°27.9 14°42.5	14.6' 14.5'	58.8' 58.8'
21	131 37.2 146°37.3	18.1	96°15.3	10.5	14 42.5 14°57.0	14.5'	58.8'
23	161°37.4	17.2	110°44.8	10.4	15°11.5	14.4	58.8'
	SD = 16.2'	d = -0.9'		SE	0 = 16.0'		
•							
Sun	<b>GHA</b> 176°37.4	<b>Dec</b> \$10°16.3	<b>GHA</b> 125°14.1	u  10.2'	Dec N15°25.9	d 14.3'	<b>HP</b> 58.8'
0 1	176°37.4 191°37.5	15.4	125°14.1 139°43.3	10.2'	15°40.2	14.3	58.8'
2	206°37.6	14.4	154°12.5	10.1	15°54.5	14.2'	58.9'
3	221°37.7	• • 13.5	168°41.6	10.0'	16°08.6	14.1'	58.9'
4	236°37.8	12.6	183°10.5	9.9'	16°22.7	14.0'	58.9'
5	251°37.8	11.7	197°39.4	9.8'	16°36.7	13.9'	58.9'
6 7	266°37.9 281°38.0	\$10° 10.8 09.9	212°08.2 226°36.9	9.7' 9.6'	N16°50.6 17°04.4	13.8' 13.7'	58.9' 58.9'
8	296°38.1	09.0	241°05.6	9.5'	17°18.1	13.6'	58.9'
9	311°38.1	• • 08.1	255°34.1	9.4'	17°31.7	13.5'	58.9'
10	326°38.2	07.2	270°02.5	9.3'	17°45.3	13.4'	58.9'
11	341°38.3	06.2	284°30.9	9.3'	17°58.7	13.3'	58.9'
12	356°38.4 11°38.5	\$10°05.3 04.4	298°59.1 313°27.3	9.2'	N18°12.0 18°25.3	13.2'	58.9'
13 14	26°38.6	03.5	313 27.3 327°55.4	9.1' 9.0'	16 25.5 18°38.4	13.1' 13.0'	58.9' 59.0'
15	41°38.6	02.6	342°23.3	8.9'	18°51.5	12.9'	59.0'
16	56°38.7	01.7	$356^{\circ}51.2$	8.8'	19°04.4	12.8'	59.0'
17	71°38.8	10°00.8	11°19.0	8.7'	19°17.2	12.7'	59.0'
18	86°38.9 101°39.0	S09°59.8	25°46.7 40°14.3	8.6'	N19°30.0 19°42.6	12.6'	59.0'
19 20	101 39.0 116°39.0	58.9 58.0	40 14.3 54°41.7	8.5' 8.4'	19 42.6 19°55.1	12.5' 12.4'	59.0' 59.0'
21	131°39.1	•• 57.1	69°09.1	8.3'	20°07.5	12.3'	59.0'
22	146°39.2	56.2	83°36.4	8.2'	20°19.8	12.2'	59.0'
23	161°39.3	55.3	98°03.6	8.1'	20°31.9	12.0'	59.0'
	SD = 16.2'	d = -0.9'		SE	O = 16.0'		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	176°39.4	S09°54.3	112°30.7	8.0'	N20°44.0	11.9'	59.0'
1	191°39.5	53.4	126°57.7	7.9'	20°55.9	11.8'	59.0'
2	206°39.5	52.5	141°24.6	7.8'	21°07.7	11.7'	59.0'
3 4	221°39.6 236°39.7	· · 51.6 50.7	155°51.4 170°18.1	7.7' 7.6'	21°19.4 21°31.0	11.6' 11.4'	59.0' 59.0'
4 5	230°39.7 251°39.8	50.7 49.8	170°18.1 184°44.7	7.6° 7.5'	21°31.0 21°42.4	11.4	59.0' 59.0'
6	266°39.9	509°48.8	199°11.2	7.4'	N21°53.7	11.2'	59.1'
7	281°40.0	47.9	213°37.6	7.3'	22°04.9	11.0'	59.1'
8	296°40.1	47.0	228°03.9	7.2'	22°16.0	10.9'	59.1'
9	311°40.1	• • 46.1	242°30.1	7.1'	22°26.9	10.8'	59.1'
10 11	326°40.2 341°40.3	45.2 44.2	256°56.2 271°22.2	7.0' 6.9'	22°37.7 22°48.3	10.6' 10.5'	59.1' 59.1'
12	356°40.4	509°43.3	271 22.2 285°48.1	6.8	22 48.3 N22°58.8	10.5	59.1'
13	11°40.5	42.4	300°13.9	6.7'	23°09.2	10.2	59.1'
14	26°40.6	41.5	314°39.6	6.6'	23°19.4	10.1'	59.1'
15	41°40.7	• • 40.6	329°05.2	6.5'	23°29.5	9.9'	59.1'
16 17	56°40.8 71°40.8	39.6 38.7	343°30.7 357°56.1	6.4' 6.3'	23°39.4 23°49.2	9.8' 9.7'	59.1' 59.1'
18	71 40.8 86°40.9	38.7 S09°37.8	12°21.4	6.2'	23 49.2 N23°58.9	9.7	59.1'
19	101°41.0	36.9	26°46.7	6.1	24°08.4	9.4	59.1
20	116°41.1	36.0	41°11.8	6.0'	24°17.8	9.2'	59.1'
21	131°41.2	• • 35.0	55°36.8	5.9'	24°27.0	9.0'	59.1'
22 23	146°41.3 161°41.4	34.1 33.2	70°01.7 84°26.6	5.8' 5.7'	24°36.0 24°44.9	8.9' 8.7'	59.1' 59.1'
23		d = -0.9'	04 20.0			0.1	J9.1
	SD = 16.2'		SE	D = 16.1'			

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
N 72°	05:43	07:02	08:14	16:14	17:27	18:46
<b>N</b> 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
<b>N</b> 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	е		Moonset	:
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°	06:38	05:25			01:42	
<b>N</b> 70°	06:55	06:09			01:00	
68°	07:09	06:39	05:26		00:32	03:37
66°	07:21	07:01	06:28		00:11	02:36
64°	07:30	07:19	07:03	23:55	•• ••	02:02
62°	07:39	07:34	07:29	23:41	•• ••	01:37
60°	07:46	07:46	07:49	23:30		01:18
N 58°	07:52	07:57	08:06	23:20		01:02
56°	07:58	08:07	08:20	23:12		00:48
54°	08:03	08:15	08:32	23:04		00:37
52°	08:08	08:23	08:43	22:57		00:26
50°	08:12	08:30	08:53	22:51		00:17
45°	08:21	08:45	09:14	22:38	23:58	
<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	
N 10°	09:01	09:47	10:37	21:45	22:42	23:42
0°	09:10	10:00	10:55	21:33	22:26	23:22
<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	f Time	Mer.	Mer.	Pass.	Age		
_ Duy	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	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	153°53.3	165°18.8	S06°27.1	186°25.1	\$14°16.9	47°04.1	N22°52.7	151°59.8	S01°30.5			Dec
1	168°55.7	180° 18.3	25.9	201°25.7	16.3	62°06.7	52.8	167°02.0	30.4	Alpheratz	$357^{\circ}34.1$	29°14.1
2	183°58.2	195° 17.9	24.6	216°26.2	15.6	77°09.3	52.8	182°04.2	30.4	Ankaa	353°06.6	-42°10.0
3	199°00.6	210° 17.5	• • 23.4	231°26.8	• • 15.0	92°11.9	• • 52.8	197°06.4	30.1	Schedar	349°30.4	56°41.0
4	214°03.1	225° 17.1	22.2	246°27.3	14.3	107°14.5	52.8	212°08.6	30.0	Diphda	348°46.6	-17°50.7
5	229°05.6	240°16.7	20.9	261°27.9	13.6	122°17.1	52.8	227°10.8	29.9	Achernar	335°19.8	-57°06.5
6	244°08.0	255° 16.3	S06°19.7	276°28.4	S14°13.0	$137^{\circ}19.7$	N22°52.8	242°13.0	S01°29.8	Hamal Polaris	327°50.3 313°42.2	23°35.2 89°22.8
7	259°10.5	270°15.8	18.4	291°29.0	12.3	152°22.3	52.9	$257^{\circ}15.2$	29.7	Acamar	315° 11.2	-40°12.2
8	274°13.0	285° 15.4	17.2	306°29.5	11.7	167°24.9	52.9	272°17.4	29.6	Menkar	314°05.3	4°11.5
9	289°15.4	300°15.0	• • 15.9	321°30.1	• • 11.0	182°27.5	• • 52.9	287° 19.6	• • 29.4	Mirfak	308° 27.0	49°57.4
10	304°17.9	315°14.6	14.7	336°30.6	10.3	197°30.1	52.9	302°21.8	29.3	Aldebaran	290°38.5	16°33.7
11	319°20.4	330°14.2	13.5	351°31.2	09.7	212°32.7	52.9	317°24.0	29.2	Rigel	281°02.9	-8°10.4
12	334°22.8 349°25.3	345°13.8 0°13.4	S06°12.2	6°31.7 21°32.3	\$14°09.0	227°35.3 242°37.9	N22°52.9	332°26.2 347°28.4	S01°29.1	Capella	280°20.4	46°01.6
13 14	349 25.3 4°27.8	15°12.9	11.0 09.7	36°32.9	08.4 07.7	242 37.9 257°40.4	53.0 53.0	2°30.6	29.0 28.8	Bellatrix	278°21.8	6°22.3
15	19°30.2	30° 12.5	• • 08.5	51°33.4	• • 07.0	272°43.0	• • 53.0	17°32.8	28.7	Elnath	278°00.6	28°37.8
16	34°32.7	45° 12.1	07.2	66°34.0	06.4	287°45.6	53.0	32°35.0	28.6	Alnilam	275°36.7	-1°11.2
17	49°35.1	60°11.7	06.0	81°34.5	05.7	302°48.2	53.0	47°37.2	28.5	Betelgeuse	270°50.9	7°24.6
18	64°37.6	75°11.3	S06°04.8	96°35.1	S14°05.0	317°50.8	N22°53.0	62°39.4	S01°28.4	Canopus	263°51.7	-52°42.8
19	79°40.1	90°10.9	03.5	111°35.6	04.4	332°53.4	53.1	77°41.6	28.2	Sirius	258°25.2	-16°45.3 -29°00.6
20	94°42.5	105° 10.5	02.3	126°36.2	03.7	347°56.0	53.1	92°43.8	28.1	Adhara Procyon	255°04.9 244°49.6	-29 00.6 5°09.4
21	109°45.0	120° 10.0	$06^{\circ}01.0$	141°36.7	•• 03.1	2°58.6	• • 53.1	107°46.0	• • 28.0	Pollux	244 49.0 243°15.9	27°57.7
22	124°47.5	135°09.6	05°59.8	156°37.3	02.4	18°01.2	53.1	122°48.2	27.9	Avior	234° 13.8	-59°35.8
23	139°49.9	150°09.2	58.5	171°37.8	01.7	33°03.8	53.1	137°50.4	27.8	Suhail	222°45.2	-43°32.4
Mer.n	ass. 13:42	$\nu$ -0.4' d-1	2′ m-3.91	$\nu$ 0.5′ d-0	.7′ m1.14	$\nu 2.6' \ d0$	0′ m-2.48	$\nu 2.2' \ d-0$	.1′ m1.00	Miaplacidus	221°37.2	-69°49.6
										Alphard	217°46.5	-8°46.5
\A/I	CIIA	CHA	D	CIIA	D	CIIA	D	CHA	D	Regulus	$207^{\circ}33.1$	11°50.2
Wed 0	<b>GHA</b> 154°52.4	<b>GHA</b> 165°08.8	<b>Dec</b> \$05°57.3	<b>GHA</b> 186°38.4	Dec \$14°01.1	<b>GHA</b> 48°06.3	<b>Dec</b> N22°53.1	<b>GHA</b> 152° 52.6	<b>Dec</b> \$01°27.7	Dubhe	193°39.2	61°36.4
1	169°54.9	180°08.4	56.0	201°38.9	14°00.4	63°08.9	53.2	167°54.8	27.5	Denebola	182°23.7	14°25.4
2	184°57.3	195°08.0	54.8	216°39.5	13°59.7	78°11.5	53.2	182°57.0	27.4	Gienah	175°42.3	-17°41.3
3	199°59.8	210°07.6	• • 53.5	231°40.0	• • 59.1	93°14.1	53.2	197°59.2	27.3		172°58.5	-63°14.6
4	215°02.2	225°07.2	52.3	246°40.6	58.4	108°16.7	53.2	213°01.4	27.2	Gacrux		-57°15.5
5	230°04.7	240°06.8	51.0	261°41.1	57.7	123°19.3	53.2	228°03.6	27.1	Alioth	166°11.7 158°21.1	55°48.8 -11°18.0
6	245°07.2	255°06.3	S05°49.8	276°41.7	S13°57.1	138°21.9	N22°53.2	243°05.8	S01°26.9	Spica Alkaid	150 21.1 152°50.9	-11 16.0 49°10.6
7	$260^{\circ}09.6$	270°05.9	48.5	291°42.3	56.4	153°24.4	53.3	258°08.0	26.8	Hadar	152 50.9 148°34.3	-60°29.8
8	$275^{\circ}12.1$	285°05.5	47.3	306°42.8	55.7	168°27.0	53.3	$273^{\circ}10.1$	26.7	Menkent	147°56.3	-36°29.9
9	290°14.6	300°05.1	• • 46.0	321°43.4	• • 55.1	183°29.6	• • 53.3	288°12.3	• • 26.6	Arcturus	145°46.9	19°02.5
10	305°17.0	315°04.7	44.8	336°43.9	54.4	198°32.2	53.3	303°14.5	26.5	Rigil Kent.	139°38.7	-60°56.4
11	320°19.5	330°04.3	43.5	351°44.5	53.7	213°34.8	53.3	318°16.7	26.3	Kochab	$137^{\circ}19.4$	74°02.5
12 13	335°22.0 350°24.4	345°03.9 0°03.5	\$05°42.3 41.0	6°45.0 21°45.6	\$13°53.1 52.4	228°37.4 243°39.9	N22°53.3 53.3	333°18.9 348°21.1	S01°26.2	Zuben'ubi	136°54.8	-16°09.1
14	5°26.9	15°03.1	39.8	36°46.1	52.4	243 39.9 258°42.5	53.4	3°23.3	26.1 26.0	Alphecca	126°02.9	26°37.3
15	20°29.4	30°02.7	• • 38.5	51°46.7	• • 51.1	273°45.1	• • 53.4	18° 25.5	. 25.9	Antares	112°14.7	-26°29.4
16	35°31.8	45°02.3	37.3	66°47.3	50.4	288°47.7	53.4	33°27.7	25.7	Atria	107°08.2	-69°04.2
17	50°34.3	60°01.9	36.0	81°47.8	49.7	303°50.3	53.4	48°29.9	25.6	Sabik	102°01.8	-15°45.5
18	65°36.7	75°01.4	S05°34.8	96°48.4	S13°49.1	318°52.9	N22°53.4	63°32.1	S01°25.5	Shaula	96°09.2 95°57.8	-37°07.3 12°32.2
19	80°39.2	90°01.0	33.5	111°48.9	48.4	333°55.4	53.4	78°34.3	25.4	Rasalhague	90°42.0	51°28.8
20	95°41.7	105°00.6	32.3	126°49.5	47.7	348°58.0	53.5	93°36.5	25.3	Eltanin Kaus Aust.	83°31.5	-34°22.3
21	$110^{\circ}44.1$	120°00.2	• • 31.0	141°50.0	• • 47.1	4°00.6	• • 53.5	108°38.7	• • 25.2	Vega	80°32.8	38°48.2
22	125°46.6	134°59.8	29.8	156°50.6	46.4	19°03.2	53.5	123°40.9	25.0	Nunki	75°46.8	-26°15.8
23	140°49.1	149°59.4	28.5	171°51.1	45.7	34°05.8	53.5	138°43.1	24.9	Altair	61°59.3	8°56.1
Mer.p	ass. 13:38	$\nu$ -0.4 $'$ d-1	2′ m-3.91	$\nu$ 0.6′ d-0	.7′ m1.14	$\nu 2.6' \ d0.$	0′ m-2.47	$\nu$ 2.2′ d-0	.1′ m1.00	Peacock	53°04.7	-56°39.0
										Deneb	49°25.6	45°22.2
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.2	9°59.6
0	155°51.5	164°59.0	\$05°27.3	186°51.7	\$13°45.0	49°08.3	N22°53.5	153° 45.3	501°24.8	Al Na'ir	27°32.2	-46°50.1
1	170°54.0	179°58.6	26.0	201°52.3	44.4	64°10.9	53.5	168° 47.5	24.7	Fomalhaut Scheat	15° 13.8 13° 44.6	-29°29.1
2	185°56.5	194°58.2	24.8	216°52.8	43.7	79°13.5	53.5	183°49.7	24.6	Scheat	13° 44.6 13° 29.3	28°13.4 15°20.7
3	200°58.9	209°57.8	• • 23.5	231°53.4	• • 43.0	94°16.1	• • 53.6	$198^{\circ}51.9$	• • 24.4	IVIAIKAD	13 49.3	13 20.1
4	$216^{\circ}01.4$	224°57.4	22.3	$246^{\circ}53.9$	42.4	$109^{\circ}18.7$	53.6	$213^{\circ}54.1$	24.3	Feb 24 Tue	SHA	Mer.pass
5	231°03.9	239° 57.0	21.0	261°54.5	41.7	124°21.2	53.6	228°56.3	24.2	Venus	11°25.5	12:59
6	246°06.3	254° 56.6	S05°19.8	276°55.1	S13°41.0	139°23.8	N22°53.6	243°58.4	S01°24.1	Mars	32°31.9	11:34
7	261°08.8	269°56.2	18.5	291°55.6	40.3	154°26.4	53.6	259°00.6	24.0	Jupiter	253°10.9	20:48
8	276°11.2	284°55.8	17.3	306°56.2	39.7	169°29.0	53.6	274°02.8	23.8	Saturn	358°06.6	13:50
9 10	291°13.7 306°16.2	299°55.4 314°55.0	· · 16.0 14.7	321°56.7 336°57.3	· · 39.0 38.3	184°31.5 199°34.1	· · 53.6 53.7	289°05.0 304°07.2	· · 23.7 23.6	Feb 25 Wed	SHA	Mer.pass
11	300 16.2 321°18.6	314 55.0 329°54.6	14.7	350 57.3 351°57.8	38.3 37.7	199 34.1 214°36.7	53.7 53.7	304 07.2 319°09.4	23.5	Venus	$10^{\circ}16.4$	13:00
12	336°21.1	344° 54.2	S05°12.2	6°58.4	\$13°37.0	214 30.7 229°39.3	N22°53.7	334°11.6	501°23.4	Mars	31°46.0	11:33
13	351°23.6	359°53.8	11.0	21°59.0	36.3	244°41.8	53.7	349°13.8	23.2	Jupiter		20:44
14	6°26.0	14°53.4	09.7	36°59.5	35.6	259°44.4	53.7	4°16.0	23.1	Saturn	358°00.2	13:46
15	21°28.5	29°53.0	• • 08.5	$52^{\circ}00.1$	• • 35.0	274°47.0	• • 53.7	$19^{\circ}18.2$	• • 23.0	Feb 26 Thu	SHA	Mer.pass
16	$36^{\circ}31.0$	44°52.6	07.2	67°00.6	34.3	289°49.6	53.7	$34^{\circ}20.4$	22.9	Venus	9°07.5	13:00
17	51°33.4	59°52.2	05.9	82°01.2	33.6	304°52.1	53.8	49°22.6	22.8	Mars	31°00.2	11:32
18	66°35.9	74°51.8	S05°04.7	97°01.8	S13°32.9	319°54.7	N22°53.8	64°24.8	S01°22.6		$253^{\circ}16.8$	20:40
19	81°38.4	89°51.4	03.4	112°02.3	32.3	334°57.3	53.8	79°27.0	22.5	Saturn	357°53.7	13:43
20	96°40.8	104°51.0	02.2	127°02.9	31.6	349°59.8	53.8	94°29.2	22.4	Horizont	al parallax	
21 22	111°43.3 126°45.7	119°50.6 134°50.2	05°00.9 04°59.7	142°03.5 157°04.0	· · 30.9 30.2	5°02.4 20°05.0	· · 53.8 53.8	109°31.4 124°33.6	· · 22.3 22.2	1101120111	Venus:	0.1
23	141°48.2	134 50.2 149°49.8	58.4	172°04.6	29.6	20 05.0 35°07.6	53.8	139°35.8	22.2		Mars:	0.1
ivler.p	ass. 13:34	$\nu$ -0.4′ $d$ -1	3′ m-3.91	νυ.b′ d-0	.7′ m1.14	$\nu$ 2.0′ $d0$ .	0′ m-2.46	$\nu$ 2.2' d-0	.1′ m1.00			

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	176°41.5	S09°32.3	98°51.3	5.7'	N24°53.6	8.6'	59.1'
1	191°41.6	31.4	113°16.0	5.6'	25°02.2	8.4'	59.1'
2 3	206°41.7 221°41.7	30.4 •• 29.5	127°40.6 142°05.0	5.5' 5.4'	25°10.6 25°18.9	8.3' 8.1'	59.1' 59.1'
4	236°41.8	28.6	156°29.4	5.3'	25°27.0	7.9'	59.1
5	251°41.9	27.7	170°53.7	5.2'	25°34.9	7.8'	59.1'
6	266° 42.0	S09°26.7	$185^{\circ}18.0$	5.1'	$N25^{\circ}42.7$	7.6'	59.1'
7	281°42.1	25.8	199°42.1	5.0'	25°50.3	7.4'	59.1'
8 9	296° 42.2 311° 42.3	24.9 •• 24.0	214°06.1 228°30.1	5.0' 4.9'	25°57.8 26°05.0	7.3' 7.1'	59.1' 59.1'
10	326° 42.4	23.0	242°54.0	4.9 4.8'	26°12.1	6.9	59.1'
11	341°42.5	22.1	257°17.8	4.7'	26°19.1	6.8	59.2'
12	356° 42.6	S09°21.2	271°41.5	4.6'	N26°25.8	6.6'	59.2'
13	11°42.7	20.3	286°05.2	4.6'	26°32.4	6.4'	59.2'
14 15	26° 42.8 41° 42.9	19.3 •• 18.4	300°28.7 314°52.2	4.5' 4.4'	26°38.8 26°45.0	6.2' 6.1'	59.2' 59.2'
16	56° 43.0	17.5	329°15.7	4.4'	26°51.1	5.9'	59.2'
17	71°43.0	16.6	343°39.0	4.3'	$26^{\circ}56.9$	5.7'	59.2'
18	86°43.1	S09°15.6	358°02.3	4.2'	N27°02.6	5.5'	59.2'
19 20	101°43.2 116°43.3	14.7 13.8	12°25.5 26°48.7	4.2' 4.1'	27°08.1 27°13.5	5.3' 5.1'	59.2' 59.2'
21	110 43.3 131°43.4	13.8	20 48.7 41°11.8	4.1 4.0'	27 13.5 27°18.6	5.1 5.0'	59.2'
22	146° 43.5	11.9	55°34.8	4.0'	27°23.6	4.8'	59.2'
23	161°43.6	11.0	69°57.8	3.9'	27°28.4	4.6'	59.2'
	SD = 16.2'	d = -0.9'		SI	D = 16.1'		
Wed 0	<b>GHA</b> 176° 43.7	<b>Dec</b> <b>S</b> 09°10.1	<b>GHA</b> 84°20.7	$\nu$ 3.9'	<b>Dec</b> N27°33.0	d 4.4'	<b>HP</b> 59.2'
1	170 43.7 191°43.8	09.1	98°43.6	3.8'	27°37.4	4.4	59.2'
2	206°43.9	08.2	$113^{\circ}06.4$	3.8'	$27^{\circ}41.6$	4.0'	59.2'
3	221°44.0	• • 07.3	127°29.2	3.7'	27°45.6	3.8'	59.2'
4	236° 44.1 251° 44.2	06.3	141°51.9 156°14.6	3.7' 3.6'	27°49.4 27°53.1	3.7' 3.5'	59.2' 59.2'
5 6	251 44.2 266° 44.3	05.4 \$09°04.5	150 14.0 170°37.2	3.6'	N27°56.6	3.3'	59.2'
7	281°44.4	03.6	184°59.8	3.5'	27°59.8	3.1'	59.2'
8	296° 44.5	02.6	199°22.3	3.5'	28°02.9	2.9'	59.2'
9	311° 44.6	• • 01.7	213°44.8	3.5'	28°05.8	2.7'	59.2'
10 11	326° 44.7 341° 44.8	09°00.8 08°59.8	228°07.3 242°29.8	3.4' 3.4'	28°08.5 28°11.0	2.5' 2.3'	59.2' 59.2'
12	356° 44.9	508°58.9	256°52.2	3.4	N28°13.3	2.1'	59.2'
13	11°45.0	58.0	271°14.6	3.4'	28°15.4	1.9'	59.1'
14	26° 45.1	57.0	285°36.9	3.3'	28°17.3	1.7'	59.1'
15	41° 45.2 56° 45.3	56.1	299°59.3 314°21.6	3.3'	28°19.0 28°20.5	1.5'	59.1' 59.1'
16 17	50°45.3 71°45.4	55.2 54.2	314°21.6 328°43.9	3.3' 3.3'	28°21.9	1.3' 1.1'	59.1' 59.1'
18	86° 45.5	S08°53.3	343°06.2	3.3'	N28°23.0	0.9'	59.1'
19	101°45.6	52.4	357°28.5	3.3'	28°23.9	0.7'	59.1'
20	116°45.7	51.4	11°50.8		28°24.7	0.5'	59.1'
21 22	131° 45.8 146° 45.9	· · 50.5 49.6	26°13.0 40°35.3	3.3' 3.3'	28°25.2 28°25.5	0.3' 0.1'	59.1' 59.1'
23	161°46.0	48.6	54° 57.6	3.3'	28°25.7	-0.1	59.1
	SD = 16.2'	d = -0.9'	-	SI	D = 16.1'		
					10.1		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	176° 46.1 191° 46.2	S08°47.7 46.8	69°19.8 83°42.1	3.3' 3.3'	N28°25.6 28°25.4	-0.2' -0.4'	59.1' 59.1'
2	206° 46.3	40.8 45.8	98°04.4	3.3'	28°24.9	-0.4 -0.6'	59.1'
3	221°46.4	• • 44.9	$112^{\circ}26.7$	3.3'	28°24.3	-0.8'	59.1'
4	236°46.5	44.0	126°49.0	3.3'	28°23.5	-1.0'	59.1'
5 6	251°46.6 266°46.7	43.0 \$08°42.1	141°11.3 155°33.6	3.3' 3.4'	28°22.4 N28°21.2	-1.2' -1.4'	59.1' 59.1'
7	281°46.8	41.2	155 33.0 169°56.0	3.4'	28°19.8	-1.4 -1.6'	59.1'
8	296°46.9	40.2	184°18.3	3.4'	28°18.2	-1.8'	59.1'
9	311°47.1	• • 39.3	198°40.7	3.4'	28°16.4	-2.0'	59.1'
10 11	326° 47.2 341° 47.3	38.4 37.4	213°03.2 227°25.6	3.5' 3.5'	28°14.3 28°12.1	-2.2' -2.4'	59.1' 59.1'
11	341°47.3 356°47.4	37.4 \$08°36.5	227°25.6 241°48.1	3.5'	28°12.1 N28°09.7	-2.4' -2.6'	59.1'
13	11° 47.5	35.6	$256^{\circ}10.7$	3.6'	28°07.2	-2.8'	59.1
14	26° 47.6	34.6	270°33.2	3.6'	28°04.4	-3.0'	59.1'
15	41°47.7	• • 33.7	284°55.8	3.7'	28°01.4	-3.2'	59.1'
16 17	56° 47.8 71° 47.9	32.7 31.8	299°18.5 313°41.2	3.7' 3.7'	27°58.2 27°54.9	-3.4' -3.5'	59.0' 59.0'
18	86°48.0	508°30.9	328°03.9	3.8'	N27°51.3	-3.7'	59.0'
19	101°48.1	29.9	342°26.7	3.8'	27°47.6	-3.9'	59.0'
20	116°48.2	29.0	356°49.6	3.9'	27°43.7	-4.1'	59.0'
21 22	131° 48.3 146° 48.4	· · 28.1 27.1	11°12.5 25°35.4	4.0' 4.0'	27°39.6 27°35.3	-4.3' -4.5'	59.0' 59.0'
23	140 48.4 161°48.6	26.2	25 35.4 39°58.4	4.0 4.1'	27°35.3	-4.5 -4.7'	59.0'
	SD = 16.1'	d = -0.9'			D = 16.1'		

Lat.		light	Sunrise	Sunset		light
	Naut.	Civil			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
	ı					

Lat.		Moonris	e		Moonset	i i
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
N 70°						
68°						
66°						
64°	06:22			04:43		
62°	07:22	07:06	00.15	03:44	06:08	06.11
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° 52°	08:58	09:39	10:41	02:10	03:36	04:45
52°	09:12 09:25	09:56 10:11	10:58 11:13	01:56 01:43	03:19 03:04	04:27 04:12
45°	09.23	10:11	11:44	01:43	02:35	03:42
N 40°	10:12	11:04	12:07	00:58	02:33	03:18
35°	10:12	11:04	12:07	00:58	02:12	03:18
30°	10:30	11:40	12:44	00:42	01:36	02:38
20°	11:10	12:09	13:12	00:03	01:09	02:41
N 10°	11:33	12:33	13:36		00:45	01:48
0°	11:54	12:56	13:58		00:23	01:26
<b>S</b> 10°	12:15	13:18	14:21		00:01	01:03
20°	12:37	13:43	14:45	23:37		00:38
30°	13:04	14:11	15:13	23:10		00:09
35°	13:19	14:28	15:30	22:54	23:52	
40°	13:38	14:48	15:49	22:35	23:32	
45°	14:00	15:12	16:13	22:12	23:08	
<b>S</b> 50°	14:28	15:43	16:43	21:43	22:37	23:48
52°	14:42	15:59	16:57	21:29	22:22	23:33
54°	14:58	16:17	17:15	21:13	22:03	23:16
56°	15:17	16:39	17:35	20:53	21:41	22:56
58°	15:40	17:07	18:01	20:29	21:13	22:30
<b>S</b> 60°	16:12	17:48	18:37	19:58	20:32	21:55

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
y	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	Ve:	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	156° 50.7	164°49.4	S04°57.1	187°05.1	S13°28.9	50° 10.1	N22°53.9	154°37.9	S01°21.9			
1	171°53.1	179°49.0	55.9	202°05.7	28.2	65°12.7	53.9	169°40.1	21.8	Alpheratz	357°34.1	29°14.1
2	186°55.6	194°48.6	54.6	217°06.3	27.5	80° 15.3	53.9	184°42.3	21.7	Ankaa	353°06.6	-42°10.0
3	201°58.1	209°48.2	• • 53.4	232°06.8	26.9	95° 17.8	• • 53.9	199°44.5	• • 21.6	Schedar	349°30.4	56°41.0
4	217°00.5	224°47.8	52.1	247°07.4	26.2	110°20.4	53.9	214°46.7	21.4	Diphda	348°46.6	-17°50.7
5	232°03.0	239°47.4	50.9	262°07.9	25.5	125°23.0	53.9	229°48.9	21.3	Achernar	335° 19.8	-57°06.4
6	247°05.5	254°47.0	S04°49.6	277°08.5	\$13°24.8	140°25.5	N22°53.9	244°51.1	S01°21.2	Hamal	327°50.3	23°35.2
7	262°07.9	269°46.6	48.3	292°09.1	24.2	155°28.1	54.0	259°53.3	21.1	Polaris	313°43.4	89°22.8
8	277° 10.4	284°46.2	47.1	307°09.6	23.5	170°30.7	54.0	274°55.5	21.0	Acamar	315°11.2	-40°12.2
9	292°12.9	299°45.8	• • 45.8	322°10.2	22.8	185° 33.3	• • 54.0	289°57.7	20.8	Menkar	314°05.3	4°11.5
10	307°15.3	314°45.4	44.5	337°10.8	22.1	200°35.8	54.0	304°59.9	20.7	Mirfak	308°27.0	49°57.4
11	322° 17.8	329°45.0	43.3	352°11.3	21.4	215°38.4	54.0	320°02.1	20.6	Aldebaran	290°38.5	16°33.7
12	337°20.2	344°44.6	S04°42.0	7°11.9	\$13°20.8	230°41.0	N22°54.0	335°04.3	S01°20.5	Rigel	281°02.9	-8°10.4
13	352°22.7	359°44.2	40.8	22°12.5	20.1	245°43.5	54.0	350°06.5	20.4	Capella	280° 20.4	46°01.6
14	7°25.2	14°43.8	39.5	37°13.0	19.4	260°46.1	54.1	5°08.7	20.4	Bellatrix	278°21.8	6°22.3
15	22°27.6	29°43.4	• • 38.2	52°13.6	• • 18.7	275°48.6	• • 54.1	20°10.9	. 20.1	Elnath	278°00.6	28°37.8
16	37°30.1	44°43.0	37.0	67°14.1	18.1	290°51.2	54.1	35°13.0	20.0	Alnilam	275°36.7	-1°11.2
17	52°32.6	59°42.6	35.7	82°14.7	17.4	305°53.8	54.1	50°15.2	19.9	Betelgeuse	270°50.9	7°24.6
18	67°35.0	74°42.2	S04°34.5	97°15.3	\$13°16.7	320° 56.3	N22°54.1	65°17.4	S01°19.8	Canopus	263°51.7	-52°42.8
19	82°37.5	89°41.8	33.2	112° 15.8	16.0	335°58.9	54.1	80°19.6	19.6	Sirius	258°25.2	-16°45.3
20	97°40.0	104°41.4	31.9	127° 16.4	15.3	351°01.5	54.1	95°21.8	19.5	Adhara	255°04.9	-29°00.7
21	112°42.4	119°41.0	• • 30.7	142° 17.0	• • 14.7	6°04.0	• • 54.2	110°24.0	• • 19.4	Procyon	244°49.6	5°09.4
22	127° 44.9	134°40.6	29.4	157° 17.5	14.0	21°06.6	54.2	125°26.2	19.3	Pollux	243°15.9	27°57.7
23	142°47.4	149°40.2	28.1	172° 18.1	13.3	36°09.2	54.2	140°28.4	19.2	Avior	234°13.8	-59°35.8
								-		Suhail	222°45.2	-43°32.5
Mer.p	ass. 13:30	$\nu$ -0.4' d-1	3′ m-3.91	$\nu$ 0.6′ d-0	).7′ m1.14	$\nu 2.6' \ d0.$	0′ m-2.46	$\nu$ 2.2′ d-0	.1'  m0.99	Miaplacidus	221°37.3	-69°49.6
										Alphard	217°46.5	-8°46.5
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.1	11°50.2
0	157° 49.8	164°39.8	S04°26.9	187° 18.7	\$13°12.6	51°11.7	N22°54.2	155°30.6	S01°19.0	Dubhe	193°39.1	61°36.4
1	172°52.3	179°39.5	25.6	202°19.2	11.9	66°14.3	54.2	170°32.8	18.9	Denebola	182°23.7	14°25.4
2	187° 54.7	194°39.1	24.4	217° 19.8	11.2	81°16.8	54.2	185°35.0	18.8		175°42.3	-17°41.4
3	202°57.2	209°38.7	23.1	232°20.4	. 10.6	96° 19.4	• • 54.2	200°37.2	• • 18.7		172°58.4	-63°14.6
4	217°59.7	224°38.3	21.8	247°20.9	09.9	111°22.0	54.2	215°39.4	18.6	I	171°50.1	-57°15.6
5	233°02.1	239°37.9	20.6	262°21.5	09.2	126°24.5	54.3	230°41.6	18.4	Alioth	166°11.6	55°48.8
6	248° 04.6	254°37.5	S04°19.3	277°22.1	\$13°08.5	141°27.1	N22°54.3	245°43.7	S01°18.3	Spica	158°21.1	-11°18.0
7	263°07.1	269°37.1	18.0	292°22.6	07.8	156° 29.6	54.3	260°45.9	18.2	Alkaid	152°50.9	49°10.6
8	278°09.5	284°36.7	16.8	307°23.2	07.2	171°32.2	54.3	275°48.1	18.1	Hadar	148°34.3	-60°29.8
9	293°12.0	299°36.3	• • 15.5	322°23.8	06.5	186°34.8	54.3	290°50.3	• • 18.0	I	147°56.3	-36°29.9
10	308° 14.5	314°35.9	14.2	337°24.3	05.8	201°37.3	54.3	305°52.5	17.8	I	145°46.8	19°02.5
11	323° 16.9	329°35.5	13.0	352°24.9	05.0	216°39.9	54.3	320°54.7	17.7	Rigil Kent.		-60°56.5
12	338° 19.4	344°35.1	\$04°11.7	7°25.5	\$13°04.4	231°42.4	N22°54.3	335°56.9	S01°17.6	Kochab	137°19.3	74°02.5
13	353°21.8	359°34.7	10.4	22°26.0	03.7	246°45.0	54.4	350°59.1	17.5	Zuben'ubi	136°54.8	-16°09.1
14	8°24.3	14°34.4	09.2	37°26.6	03.1	261°47.5	54.4	6°01.3	17.4	Alphecca	126°02.8	26°37.3
15	23°26.8	29°34.0	07.9	52°27.2	02.4	276°50.1	• • 54.4	21°03.5	• • 17.2	Antares	112°14.7	-26°29.4
16	38°29.2	44°33.6	06.6	67°27.7	01.7	291°52.7	54.4	36°05.7	17.1	Atria	107°08.1	-69°04.2
17	53°31.7	59°33.2	05.4	82°28.3	01.0	306°55.2	54.4	51°07.9	17.0	Sabik	102°01.7	-15°45.5
18	68°34.2	74°32.8	S04°04.1	97°28.9	S13°00.3	321°57.8	N22°54.4	66°10.1	S01°16.9	Shaula	96°09.2	-37°07.3
19	83°36.6	89°32.4	02.8	112°29.5	12°59.6	337°00.3	54.4	81°12.2	16.8	Rasalhague	95°57.7	12°32.2
20	98°39.1	104°32.0	01.6	127°30.0	58.9	352°02.9	54.4	96°14.4	16.6	Eltanin	90°41.9	51°28.7
21	113°41.6	119°31.6	04°00.3	142°30.6	• • 58.3	7°05.4	• • 54.5	111°16.6	• • 16.5	Kaus Aust.	83°31.4	-34°22.3
22	128° 44.0	134°31.2	03°59.0	157°31.2	57.6	22°08.0	54.5	126°18.8	16.4	Vega	80°32.8	38°48.2
23	143°46.5	149°30.9	57.8	172°31.7	56.9	37° 10.5	54.5	141°21.0	16.3	Nunki	75°46.8	-26°15.8
										Altair	61°59.3	8°56.1
Mer.p	ass. 13:26	$\nu$ -0.4′ d-1	3′ m-3.91	$\nu$ 0.6′ $d$ -0	).7′ m1.14	$\nu$ 2.6′ d0.	0′ m-2.45	$\nu 2.2' \ d-0$	.1' m $0.99$	Peacock	53°04.7	-56°39.0
										Deneb	49°25.6	45°22.2
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.2	9°59.6
0	158° 49.0	164°30.5	S03°56.5	187°32.3	S12°56.2		N22°54.5	156°23.2	S01°16.2	Al Na'ir	27°32.2	-46°50.1
1	173°51.4	179°30.1	55.2	202°32.9	55.5	67° 15.6	54.5	171°25.4	16.0	Fomalhaut	15° 13.8	-29°29.1
2	188°53.9	194°29.7	54.0	217°33.4	54.8	82° 18.2	54.5	186°27.6	15.9	Scheat	13°44.6	28°13.4
3	203°56.3	209°29.3	• • 52.7	232°34.0	• • 54.1	97°20.8	• • 54.5	201°29.8	• • 15.8	Markab	13°29.3	15°20.7
4	218°58.8	224°28.9	51.4	247°34.6	53.4	112°23.3	54.5	216°32.0	15.7	Feb 27 Fri	SHA	Mer.pass
5	234°01.3	239°28.5	50.1	262°35.2	52.8	127°25.9	54.6	231°34.2	15.6	Venus	7°58.7	13:01
6	249°03.7	254°28.1	S03°48.9	277°35.7	S12°52.1	142°28.4	N22°54.6	246°36.4	S01°15.4	Mars	30°14.5	11:31
7	264°06.2	269°27.7	47.6	292°36.3	51.4	157°31.0	54.6	261°38.5	15.3	Jupiter	253°19.5	20:36
8	279°08.7	284°27.4	46.3	307°36.9	50.7	172°33.5	54.6	276°40.7	15.2	Saturn	357°47.3	13:39
9	294° 11.1	299°27.0	• • 45.1	322°37.4	• • 50.0	187°36.1	• • 54.6	291°42.9	• • 15.1			
10	$309^{\circ}13.6$	314°26.6	43.8	337°38.0	49.3	202°38.6	54.6	306°45.1	15.0	Feb 28 Sat	SHA	Mer.pass
11	$324^{\circ}16.1$	329°26.2	42.5	352°38.6	48.6	217°41.2	54.6	321°47.3	14.8	Venus	6°50.0	13:02
12	339° 18.5	344°25.8	503°41.3	7°39.2	<b>S</b> 12°47.9	232°43.7	N22°54.6	336°49.5	S01°14.7	Mars	29°28.9	11:30
13	354°21.0	359°25.4	40.0	22°39.7	47.3	247°46.3	54.6	351°51.7	14.6	Jupiter	253°21.9	20:32
14	9°23.5	14°25.0	38.7	37°40.3	46.6	262°48.8	54.7	6°53.9	14.5	Saturn	357°40.8	13:36
15	24° 25.9	29°24.7	• • 37.4	52°40.9	• • 45.9	277°51.3	• • 54.7	21°56.1	• • 14.4	Mar 01 Sun	SHA	Mer.pass
16	39°28.4	44°24.3	36.2	67°41.4	45.2	292°53.9	54.7	36°58.3	14.2	Venus	5°41.5	13:02
17	54°30.8	59°23.9	34.9	82°42.0	44.5	307°56.4	54.7	52°00.5	14.1	Mars	28°43.3	11:29
18	69°33.3	74°23.5	503°33.6	97° 42.6	S12°43.8	322°59.0	N22°54.7	67°02.6	S01°14.0	Jupiter		20:28
19	84° 35.8	89°23.1	32.4	112°43.2	43.1	338°01.5	54.7	82°04.8	13.9	Saturn	357°34.2	13:32
20	99°38.2	104°22.7	31.1	127°43.7	42.4	353°04.1	54.7	97°07.0	13.8			
21	114° 40.7	119°22.3	• • 29.8	142°44.3	• • 41.7	8°06.6	• • 54.7	112°09.2	• • 13.6	Horizont	al parallax	
22	129°43.2	134°22.0	28.5	157° 44.9	41.0	23°09.2	54.8	127°11.4	13.5		Venus:	0.1
23	144°45.6	149°21.6	27.3	$172^{\circ}45.5$	40.4	38°11.7	54.8	142°13.6	13.4		Mars:	0.1
Mar	ass. 13:23	1/_O A/ A 1	3′ m-3.91	10 6/ 4 C	0.7′ m1.14	1/2 6/ 40	0′ m-2.44	1/2 2/ 4 0	.1′ m0.99			
ivier.p	vass. 13.23	ν-0.4 U-1	111-3.91	νυ.υ α-U	1111.14	ν2.0° α0.	∪ III-∠.44	ν Δ.Δ U-U	.1 1110.99			

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	176°48.7	S08°25.2	54°21.5	4.1'	$N27^{\circ}26.1$	-4.8'	59.0'
1	191°48.8	24.3	68°44.7	4.2'	27°21.3	-5.0'	59.0'
2	206°48.9 221°49.0	23.4	83°07.9 97°31.1	4.3' 4.3'	27°16.3 27°11.1	-5.2' -5.4'	59.0' 59.0'
3 4	221 49.0 236°49.1	21.5	97 31.1 111°54.5	4.3 4.4'	27 11.1 27°05.7	-5.4 -5.6'	59.0'
5	251°49.2	20.5	111 54.5 126°17.9	4.5'	27°00.1	-5.7'	59.0'
6	266°49.3	S08°19.6	140°41.4	4.6'	N26°54.3	-5.9'	58.9'
7	281°49.4	18.7	155°05.0	4.6'	26°48.4	-6.1'	58.9'
8	296°49.5	17.7	169°28.6	4.7'	26°42.3	-6.3	58.9'
9 10	311°49.6 326°49.8	· · 16.8 15.8	183°52.3 198°16.1	4.8' 4.9'	26°36.0 26°29.6	-6.4' -6.6'	58.9' 58.9'
11	320 49.0 341°49.9	14.9	212°40.0	4.9 5.0'	26°23.0	-6.8'	58.9'
12	356°50.0	S08°14.0	227°04.0	5.0'	N26°16.2	-7.0'	58.9'
13	11°50.1	13.0	241°28.0	5.1'	26°09.2	-7.1'	58.9'
14	26°50.2	12.1	255°52.1	5.2'	26°02.1	-7.3'	58.9'
15 16	41°50.3 56°50.4	· · 11.1 10.2	270°16.4 284°40.7	5.3' 5.4'	25°54.8 25°47.3	-7.5' -7.6'	58.9' 58.9'
17	71°50.5	09.2	204 40.7 299°05.1	5.4 5.5'	25 47.3 25°39.7	-7.8'	58.8'
18	86°50.7	S08°08.3	313°29.6	5.6'	N25°31.9	-7.9'	58.8'
19	101°50.8	07.4	327°54.2	5.7'	25°24.0	-8.1'	58.8'
20	116°50.9	06.4	342°18.8	5.8'	25°15.9	-8.3'	58.8'
21	131°51.0	• • 05.5	356°43.6 11°08.5	5.9'	25°07.6 24°59.2	-8.4'	58.8'
22 23	146°51.1 161°51.2	04.5 03.6	25°33.5	6.0' 6.1'	24°59.2 24°50.6	-8.6' -8.7'	58.8' 58.8'
23						-0.7	30.0
	SD = 16.1'	d = -0.9'		SI	D = 16.1'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°51.3 191°51.5	508°02.6	39°58.5 54°23.7	6.2' 6.3'	N24°41.9 24°33.0	-8.9'	58.8'
1 2	191°51.5 206°51.6	01.7 08°00.8	68°49.0	6.4	24°33.0 24°24.0	-9.0' -9.2'	58.8' 58.8'
3	200 51.0 221°51.7	07°59.8	83°14.4	6.5	24°24.0	-9.2 -9.3	58.7'
4	236°51.8	58.9	97°39.8	6.6'	24°05.5	-9.5'	58.7'
5	251°51.9	57.9	112°05.4	6.7'	$23^{\circ}56.1$	-9.6'	58.7'
6	266°52.0	S07°57.0	126°31.1	6.8'	N23°46.4	-9.7'	58.7'
7	281°52.2 296°52.3	56.0	140°56.9 155°22.7	6.9'	23°36.7 23°26.8	-9.9'	58.7'
8 9	296 52.3 311°52.4	55.1 •• 54.1	155°22.7 169°48.7	7.0' 7.1'	23°26.8 23°16.8	-10.0' -10.2'	58.7' 58.7'
10	326°52.5	53.2	184°14.8	7.2'	23°06.6	-10.3	58.7'
11	341°52.6	52.2	198°41.0	7.3'	22°56.3	-10.4'	58.6'
12	356°52.7	S07°51.3	213°07.3	7.4'	N22°45.9	-10.6'	58.6'
13	11°52.9 26°53.0	50.4	227°33.8 242°00.3	7.5'	22°35.3 22°24.6	-10.7'	58.6'
14 15	20 53.0 41°53.1	49.4 •• 48.5	242 00.3 256°26.9	7.6' 7.7'	22 24.0 22°13.8	-10.8' -10.9'	58.6' 58.6'
16	56°53.2	47.5	270°53.6	7.8'	22°02.9	-11.1'	58.6'
17	71°53.3	46.6	$285^{\circ}20.5$	7.9'	$21^{\circ}51.8$	-11.2'	58.6'
18	86°53.4	S07°45.6	299°47.4	8.1'	N21°40.6	-11.3'	58.5'
19	101°53.6 116°53.7	44.7	314°14.5 328°41.7	8.2'	21°29.3 21°17.8	-11.4'	58.5'
20 21	131°53.8	43.7 •• 42.8	328 41.7 343°08.9	8.3' 8.4'	21 17.8 21°06.3	-11.6' -11.7'	58.5' 58.5'
22	146°53.9	41.8	357°36.3	8.5'	20°54.6	-11.8'	58.5'
23	161°54.0	40.9	12°03.8	8.6'	20°42.9	-11.9'	58.5'
	SD = 16.1'	d = -0.9'		SI	O = 16.0'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
Sun 0	<b>GHA</b> 176°54.2	S07°39.9	26°31.4	ν 8.7'	N20°31.0	-12.0'	пР 58.5'
1	191°54.3	39.0	40°59.1	8.8'	20°19.0	-12.1'	58.4'
2	206°54.4	38.0	55°26.9	8.9'	20°06.9	-12.2'	58.4'
3	221°54.5	•• 37.1	69°54.8	9.0'	19°54.6 19°42.3	-12.3'	58.4'
4 5	236°54.6 251°54.8	36.1 35.2	84°22.8 98°51.0	9.1' 9.2'	19°42.3 19°29.9	-12.4' -12.5'	58.4' 58.4'
6	266°54.9	507°34.2	96 51.0 113°19.2	9.2	N19°17.4	-12.6'	58.4
7	281°55.0	33.3	$127^{\circ}47.5$	9.4'	19°04.7	-12.7'	58.3'
8	296°55.1	32.3	142°16.0	9.5'	18°52.0	-12.8'	58.3'
9	311°55.3	• • 31.4	156°44.5	9.6'	18°39.2	-12.9'	58.3'
10 11	326°55.4 341°55.5	30.4 29.5	171°13.1 185°41.9	9.7' 9.9'	18°26.3 18°13.3	-13.0' -13.1'	58.3' 58.3'
12	356°55.6	507°28.5	200°10.7	10.0'	N18°00.2	-13.1	58.3
13	11°55.7	27.6	214°39.7	10.1'	17°47.0	-13.3'	58.2'
14	26°55.9	26.6	229°08.8	10.2'	17°33.7	-13.4'	58.2'
15	41°56.0	• • 25.7	243°37.9	10.3'	17°20.4	-13.4'	58.2'
16 17	56°56.1 71°56.2	24.7 23.8	258°07.2 272°36.5	10.4' 10.5'	17°06.9 16°53.4	-13.5' -13.6'	58.2' 58.2'
18	71 56.2 86°56.4	23.8 S07°22.8	272 30.5 287°06.0	10.5	N16°39.8	-13.0	58.1'
19	101°56.5	21.9	301°35.5	10.6'	16°26.1	-13.8'	58.1'
20	116°56.6	20.9	316°05.2	10.7'	$16^{\circ}12.3$	-13.8'	58.1'
21	131°56.7	• • 20.0	330°34.9	10.8'	15°58.5	-13.9'	58.1'
22 23	146°56.9 161°57.0	19.0 18.1	345°04.7 359°34.7	10.9' 11.0'	15°44.6 15°30.6	-14.0' -14.1'	58.1' 58.0'
23			339 34.7			-14.1	J0.U
	SD = 16.1'	d = -0.9'		SI	O = 15.9'		

Lat.		Twilight		Sunset	Twilight		
	Naut.	Civil	Sunrise	Juliset	Civil	Naut.	
N 72°	05:15	06:33	07:42	16:45	17:54	19:13	
N 70°	05:19	06:30	07:32	16:55	17:57	19:08	
68°	05:23	06:27	07:24	17:03	18:00	19:04	
66°	05:26	06:25	07:17	17:10	18:02	19:01	
64°	05:28	06:23	07:11	17:15	18:04	18:59	
62°	05:30	06:21	07:06	17:20	18:05	18:56	
60°	05:32	06:20	07:02	17:25	18:07	18:55	
N 58°	05:33	06:18	06:58	17:28	18:08	18:53	
56°	05:34	06:17	06:54	17:32	18:09	18:52	
54°	05:35	06:15	06:51	17:35	18:11	18:52	
52°	05:35	06:14	06:48	17:38	18:12	18:51	
50°	05:36	06:13	06:46	17:40	18:13	18:50	
45°	05:36	06:10	06:40	17:46	18:15	18:49	
N 40°	05:36	06:08	06:35	17:51	18:18	18:49	
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	
N 10°	05:29	05:54	06:15	18:10	18:31	18:56	
0°	05:24	05:48	06:09	18:16	18:37	19:01	
S 10°	05:18	05:42	06:03	18:21	18:43	19:07	
20°	05:09	05:35	05:57	18:27	18:50	19:16	
30°	04:57	05:26	05:50	18:34	18:59	19:27	
35°	04:50	05:20	05:46	18:38	19:04	19:35	
40°	04:40	05:13	05:41	18:43	19:11	19:44	
45°	04:29	05:05	05:36	18:49	19:19	19:55	
<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°						
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 10°	14:39	15:40	16:37	02:50	03:46	04:38
0°	15:00	15:57	16:50	02:28	03:27	04:23
S 10°	15:20	16:14	17:03	02:06	03:09	04:08
20°	15:42	16:32	17:16	01:43	02:48	03:52
30°	16:07	16:53	17:31	01:15	02:24	03:33
35°	16:22	17:05	17:40	00:59	02:10	03:22
40°	16:39	17:19	17:50	00:40	01:54	03:09
45°	17:00	17:35	18:02	00:17	01:34	02:54
<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	f 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	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	159°48.1	164°21.2	\$03°26.0	187°46.0	\$12°39.7	53°14.3	N22°54.8	157° 15.8	S01°13.3			
1	174°50.6	179°20.8	24.7	202°46.6	39.0	68°16.8	54.8	172° 18.0	13.2	Alpheratz	357°34.1	29°14.1
2	189°53.0	194°20.4	23.5	217°47.2	38.3	83°19.3	54.8	187°20.2	13.0	Ankaa	353°06.6	-42°10.0
3	204°55.5	209°20.0	22.2	232°47.8	• • 37.6	98°21.9	• • 54.8	202°22.4	12.9	Schedar	349°30.5	56°41.0
4	219°57.9	224° 19.7	20.9	247°48.3	36.9	113°24.4	54.8	217°24.6	12.8	Diphda	348°46.6	-17°50.7
5	235°00.4	239° 19.3	19.6	262°48.9	36.2	128°27.0	54.8	232°26.7	12.7	Achernar	335°19.9	-57°06.4
6	250°02.9	254° 18.9	S03°18.4	277°49.5	S12°35.5	143°29.5	N22°54.8	247°28.9	S01°12.5	Hamal	327°50.3	23°35.2
7	265°05.3	269° 18.5	17.1	292°50.1	34.8	158°32.1	54.8	262°31.1	12.4	Polaris	313°44.9	89°22.8
8	280°07.8	284°18.1	15.8	307°50.6	34.1	173°34.6	54.9	277°33.3	12.3	Acamar	315°11.2	-40°12.2
9	295°10.3	299° 17.7	• • 14.5	322°51.2	• • 33.4	188°37.1	• • 54.9	292°35.5	• • 12.2	Menkar	314°05.3	4°11.5
10	310°12.7	314° 17.4	13.3	337°51.8	32.7	203°39.7	54.9	307°37.7	12.1	Mirfak	308°27.0	49°57.4
11	325°15.2	329° 17.0	12.0	352°52.4	32.0	218°42.2	54.9	322°39.9	11.9	Aldebaran	290°38.5	16°33.7
12	340°17.7	344°16.6	S03°10.7	7°52.9	S12°31.3	233°44.8	N22°54.9	337°42.1	S01°11.8	Rigel	281°02.9	-8°10.4
13	355°20.1	359° 16.2	09.4	22°53.5	30.6	248°47.3	54.9	352°44.3	11.7	Capella	280°20.4	46°01.6
14	10°22.6	14° 15.8	08.2	37°54.1	30.0	263°49.8	54.9	7°46.5	11.6	Bellatrix	278°21.8	6°22.3
15	25°25.1	29° 15.5	• • 06.9	52°54.7	29.3	278°52.4	• • 54.9	22°48.6	• • 11.5	Elnath	278°00.6	28°37.8
16	40°27.5	44° 15.1	05.6	67°55.2	28.6	293°54.9	54.9	37°50.8	11.3	Alnilam	275°36.7	-1°11.2
17	55°30.0	59°14.7	04.3	82°55.8	27.9	308°57.5	55.0	52°53.0	11.2	Betelgeuse	270°50.9	7°24.6
18	70°32.4	74°14.3	S03°03.1	97°56.4	S12°27.2	324°00.0	N22°55.0	67°55.2	S01°11.1	Canopus	263°51.7	-52°42.8
19	85°34.9	89°13.9	01.8	112°57.0	26.5	339°02.5	55.0	82°57.4	11.0	Sirius	258°25.2	-16°45.3
20	100°37.4	104° 13.5	03°00.5	127°57.5	25.8	354°05.1	55.0	97° 59.6	10.9	Adhara	255°04.9	-29°00.7
21	115°39.8	119° 13.2	02°59.2	142°58.1	25.1	9°07.6	• • 55.0	113°01.8	. 10.7	Procyon	244°49.6	5°09.4
22	130°42.3	134°12.8	58.0	157°58.7	24.4	24°10.1	55.0	128°04.0	10.6	Pollux	243°15.9	27°57.8
23	145°44.8	149°12.4	56.7	172°59.3	23.7	39°12.7	55.0	143°06.2	10.5	Avior	234°13.9	-59°35.8
										Suhail	222°45.2	-43°32.5
Mer.p	ass. 13:19	$\nu$ -0.4' d-1	3′ m-3.92	$\nu$ 0.6′ d-0	.7′ m1.14	$\nu 2.5' \ d0.$	0′ m-2.43	$\nu$ 2.2′ d-0	.1' m $0.99$	Miaplacidus	221°37.3	-69°49.6
										Alphard	217°46.5	-8°46.5
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.1	11°50.2
0	160°47.2	164° 12.0	S02°55.4	187°59.9	S12°23.0	54°15.2	N22°55.0	158°08.4	S01°10.4	Dubhe	193°39.1	61°36.5
1	175°49.7	179°11.6	54.1	203°00.4	22.3	69°17.8	55.0	173° 10.5	10.3	Denebola	182°23.6	14°25.4
2	190°52.2	194°11.3	52.9	218°01.0	21.6	84°20.3	55.0	188° 12.7	10.1	Gienah	175°42.3	-17°41.4
3	205°54.6	209° 10.9	51.6	233°01.6	. 20.9	99°22.8	55.1	203° 14.9	• • 10.0		172°58.4	-63°14.6
4	205°57.1	209 10.9 224°10.5	50.3	248°02.2	20.9	114°25.4	55.1	203 14.9 218° 17.1	09.9	Gacrux	171°50.1	-57°15.6
5	235°59.6	239°10.1	49.0	263°02.7	19.5	114 25.4 129°27.9	55.1	233° 19.3	09.9	Alioth	$166^{\circ}11.6$	55°48.8
6	255 59.0 251°02.0	254°09.7	502°47.8	278°03.3	\$12°18.8	144°30.4	N22°55.1	233 19.3 248°21.5	S01°09.6	Spica	158°21.0	-11°18.0
7	266°04.5	269°09.4		278 03.3 293°03.9	18.1	159°33.0	55.1	263°23.7	09.5	Alkaid	152°50.9	49°10.6
8	200 04.5 281°06.9	284°09.0	46.5 45.2	308°04.5	17.4	174°35.5	55.1	203 23.7 278°25.9		Hadar	148°34.3	-60°29.8
9	296°09.4	299°08.6	· · 43.9	306 04.5 323°05.1	. 16.7	174 35.5 189°38.0	. 55.1	276 25.9 293°28.1	09.4 •• 09.3	Menkent	147°56.2	-36°29.9
						204°40.6				Arcturus	145°46.8	$19^{\circ}02.5$
10	311°11.9	314°08.2	42.6	338°05.6	16.0		55.1	308°30.2 323°32.4	09.2	Rigil Kent.	139°38.6	-60°56.5
11	326°14.3 341°16.8	329°07.9	41.4	353°06.2	15.3	219°43.1	55.1 N22°55.1	323 32.4 338°34.6	09.0	Kochab	$137^{\circ}19.2$	74°02.5
12		344°07.5	502°40.1	8°06.8	\$12°14.6	234°45.6			S01°08.9	Zuben'ubi	136°54.8	$-16^{\circ}09.1$
13	356°19.3	359°07.1	38.8	23°07.4	13.9	249°48.1	55.2	353°36.8	08.8	Alphecca	$126^{\circ}02.8$	26°37.3
14	11°21.7	14°06.7	37.5	38°08.0	13.2	264°50.7	55.2	8°39.0	08.7	Antares	$112^{\circ}14.6$	-26°29.4
15	26°24.2	29°06.3	• • 36.3	53°08.5	• • 12.5	279°53.2	• • 55.2	23°41.2	08.6	Atria	$107^{\circ}08.0$	-69°04.2
16	41°26.7	44°06.0	35.0	68°09.1	11.8	294°55.7	55.2	38° 43.4	08.4	Sabik	$102^{\circ}01.7$	-15°45.5
17	56°29.1	59°05.6	33.7	83°09.7	11.1	309°58.3	55.2	53°45.6	08.3	Shaula	$96^{\circ}09.1$	-37°07.3
18	71°31.6	74°05.2	S02°32.4	98°10.3	\$12°10.4	325°00.8	N22°55.2	68° 47.8	S01°08.2	Rasalhague	95°57.7	12°32.2
19	86°34.0	89°04.8	31.1	113°10.9	09.7	340°03.3	55.2	83°49.9	08.1	Eltanin	90°41.9	51°28.7
20	101°36.5	104°04.5	29.9	128°11.5	09.0	355°05.9	55.2	98°52.1	08.0	Kaus Aust.	83°31.4	-34°22.3
21	116°39.0	119°04.1	• • 28.6	143°12.0	•• 08.3	10°08.4	• • 55.2	113°54.3	• • 07.8	Vega	80°32.8	38°48.1
22	131°41.4	134°03.7	27.3	158°12.6	07.6	25°10.9	55.2	128° 56.5	07.7	Nunki	75°46.8	-26°15.8
23	146°43.9	149°03.3	26.0	173°13.2	06.9	40°13.4	55.3	143°58.7	07.6	Altair	61°59.3	8°56.1
Mer.p	ass. 13:15	$\nu$ -0.4' d-1	3′ m-3.92	$\nu$ 0.6′ d-0	.7′ m1.14	$\nu 2.5' \ d0.$	0′ m-2.43	$\nu 2.2' \ d-0$	.1'  m0.99	Peacock	53°04.7	-56°38.9
										Deneb	49°25.6	45°22.2
										Enif	33°38.2	9°59.6
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	$27^{\circ}32.1$	$-46^{\circ}50.1$
0	161°46.4	164°03.0	S02°24.7	188°13.8	S12°06.2	55°16.0	N22°55.3	159°00.9	S01°07.5	Fomalhaut	15°13.8	-29°29.1
1	176°48.8	179°02.6	23.5	203°14.4	05.5	70°18.5	55.3	174°03.1	07.3	Scheat	13°44.6	28°13.4
2	191°51.3	194°02.2	22.2	218°14.9	04.8	85°21.0	55.3	189°05.3	07.2	Markab	13°29.3	15°20.7
3	206°53.8	209°01.8	• • 20.9	233°15.5	• • 04.1	100°23.5	• • 55.3	204° 07.5	•• 07.1	NA- 00 14	CIIA	N4.
4	221°56.2	224°01.5	19.6	248°16.1	03.4	115°26.1	55.3	219°09.6	07.0	Mar 02 Mon	SHA 4°22 1	Mer.pass
5	236°58.7	239°01.1	18.3	263°16.7	02.7	130°28.6	55.3	234°11.8	06.9	Venus	4°33.1	13:03
6	252°01.2	254°00.7	\$02°17.1	278°17.3	\$12°02.0	145°31.1	N22°55.3	249°14.0	S01°06.7	Mars	27°57.9	11:28
7	267°03.6	269°00.3	15.8	293°17.9	01.3	160°33.6	55.3	264°16.2	06.6	Jupiter	253°26.2	20:24
8	282°06.1	283°59.9	14.5	308°18.4	12°00.6	175°36.2	55.3	279°18.4	06.5	Saturn	357°27.7	13:29
9	297°08.5	298° 59.6	• • 13.2	323°19.0	11°59.9	190°38.7	• • 55.3	294°20.6	• • 06.4	Mar 03 Tue	SHA	Mer.pass
10	312°11.0	313°59.2	11.9	338°19.6	59.2	205°41.2	55.3	309°22.8	06.3	Venus	3°24.8	13:04
11	327°13.5	328° 58.8	10.7	353°20.2	58.5	220°43.7	55.4	324°25.0	06.1	Mars	27°12.6	11:28
12	342°15.9	343°58.5	S02°09.4	8°20.8	S11°57.8	235°46.3	N22°55.4	339°27.2	S01°06.0	Jupiter	253°28.0	20:20
13	357°18.4	358°58.1	08.1	23°21.4	57.1	250°48.8	55.4	354°29.3	05.9	Saturn	357°21.1	13:25
14	12°20.9	13°57.7	06.8	38°21.9	56.4	265°51.3	55.4	9°31.5	05.8			
15	27°23.3	28° 57.3	• • 05.5	53°22.5	• • 55.7	280°53.8	• • 55.4	24°33.7	• • 05.6	Mar 04 Wed	SHA	Mer.pass
16	42°25.8	43°57.0	04.3	68°23.1	55.0	295°56.3	55.4	39°35.9	05.5	Venus	2°16.6	13:04
17	57°28.3	58° 56.6	03.0	83°23.7	54.3	310°58.9	55.4	54°38.1	05.4	Mars	26°27.4	11:27
18	72°30.7	73°56.2	S02°01.7	98°24.3	S11°53.6	326°01.4	N22°55.4	69°40.3	S01°05.3	Jupiter		20:16
19	87°33.2	88°55.8	02°00.4	113°24.9	52.8	341°03.9	55.4	84°42.5	05.2	Saturn	357°14.5	13:22
20	102°35.6	103°55.5	01°59.1	128°25.5	52.1	356°06.4	55.4	99°44.7	05.0	Ц!	ol novelle:	
21	117°38.1	118°55.1	• • 57.9	143°26.0	• • 51.4	11°08.9	• • 55.4	114°46.8	• • 04.9	norizoni	al parallax	0.1
22	132°40.6	133°54.7	56.6	158°26.6	50.7	26°11.5	55.5	129°49.0	04.8		Venus:	0.1
23	147°43.0	148°54.3	55.3	173°27.2	50.0	41°14.0	55.5	144°51.2	04.7		Mars:	0.1
Mern	ass. 13:11	$\nu$ -0.4' d <sub>c</sub> 1	.3′ m-3.92	$\nu 0.6' d_{-0}$	.7′ m1.15	ν2 5' dΩ	0′ m-2.42	ν2 2' d-Ω	.1′ m0.98			
			0.52									

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	176° 57.1	<b>S</b> 07°17.1	14°04.7	11.1'	N15° 16.6	-14.1'	58.0'
1	191°57.2	16.2	28°34.8	11.2'	15°02.4	-14.2'	58.0'
2	206°57.4 221°57.5	15.2 •• 14.2	43°05.0 57°35.4	11.3' 11.4'	14°48.2 14°34.0	-14.3' -14.3'	58.0' 58.0'
4	236° 57.6	13.3	72°05.7	11.5'	14° 19.7	-14.4'	57.9'
5	251° 57.7	12.3	86°36.2	11.6'	14°05.3	-14.4'	57.9'
6	266° 57.9	S07°11.4	101°06.8	11.7'	N13°50.9	-14.5'	57.9'
7	281°58.0 296°58.1	10.4	115°37.5	11.7'	13°36.4	-14.6'	57.9'
8 9	296 58.1 311° 58.2	09.5 •• 08.5	130°08.2 144°39.0	11.8' 11.9'	13°21.8 13°07.2	-14.6' -14.7'	57.9' 57.8'
10	326° 58.4	07.6	159°10.0	12.0'	12°52.5	-14.7'	57.8'
11	341°58.5	06.6	173°41.0	12.1'	12°37.8	-14.8'	57.8'
12	356° 58.6	S07°05.7	188°12.0	12.2'	N12°23.0	-14.8'	57.8'
13 14	11°58.8 26°58.9	04.7 03.7	202°43.2 217°14.5	12.2' 12.3'	12°08.2 11°53.4	-14.9' -14.9'	57.8' 57.7'
14 15	20 58.9 41°59.0	02.8	217 14.5 231°45.8	12.3 12.4'	11 53.4 11°38.5	-14.9 -15.0'	57.7'
16	56° 59.1	01.8	246°17.2	12.5'	11°23.5	-15.0'	57.7'
17	71°59.3	07°00.9	260°48.7	12.6'	11°08.5	-15.0'	57.7'
18	86°59.4	S06°59.9	275°20.2	12.6'	N10°53.5	-15.1'	57.6'
19 20	101°59.5 116°59.7	59.0 58.0	289°51.8 304°23.6	12.7' 12.8'	10°38.4 10°23.3	-15.1' -15.2'	57.6' 57.6'
21	131° 59.8	57.1	318°55.3	12.0	10°23.3	-15.2'	57.6'
22	146° 59.9	56.1	333°27.2	12.9'	09°52.9	-15.2'	57.6'
23	162°00.1	55.1	$347^{\circ}59.1$	13.0'	09°37.7	-15.3'	57.5'
	SD = 16.1'	d = -1.0'		SI	D = 15.8'		
-	CUA				Г.	,	
Tue 0	<b>GHA</b> 177°00.2	<b>Dec</b> <b>S</b> 06°54.2	<b>GHA</b> 2°31.1	u  13.1'	Dec N09° 22.4	d -15.3'	<b>HP</b> 57.5'
1	192°00.3	53.2	17°03.2	13.1	09°07.1	-15.3'	57.5'
2	207°00.4	52.3	31°35.3	13.2'	08°51.8	-15.3'	57.5'
3	222°00.6	• • 51.3	46°07.5	13.3'	08°36.5	-15.4'	57.4
4	237°00.7 252°00.8	50.4 49.4	60°39.7 75°12.1	13.3' 13.4'	08°21.1 08°05.7	-15.4' -15.4'	57.4' 57.4'
5 6	267°01.0	506°48.4	89°44.5	13.4	N07°50.3	-15.4'	57.4
7	282°01.1	47.5	104°16.9	13.5'	07°34.8	-15.5'	57.3'
8	297°01.2	46.5	118°49.4	13.6'	07°19.3	-15.5'	57.3'
9	312°01.4	• • 45.6	133°22.0	13.6'	07°03.9	-15.5'	57.3'
10 11	327°01.5 342°01.6	44.6 43.6	147°54.6 162°27.3	13.7' 13.7'	06°48.3 06°32.8	-15.5' -15.5'	57.3' 57.3'
12	357°01.8	S06°42.7	177°00.0	13.8'	N06°17.3	-15.6'	57.2'
13	12°01.9	41.7	191°32.8	13.8'	$06^{\circ}01.7$	-15.6'	57.2'
14	27°02.0	40.8	206°05.7	13.9'	05°46.2	-15.6'	57.2'
15 16	42°02.2 57°02.3	· · 39.8 38.8	220°38.6 235°11.5	14.0' 14.0'	05°30.6 05°15.0	-15.6' -15.6'	57.2' 57.1'
17	72°02.4	37.9	249°44.5	14.1'	03°13.0	-15.6'	57.1
18	87°02.6	S06°36.9	264°17.6	14.1'	N04°43.8	-15.6'	57.1'
19	102°02.7	36.0	278°50.7	14.1'	04°28.2	-15.6'	57.1'
20	117°02.8 132°03.0	35.0 •• 34.0	293°23.8 307°57.0	14.2' 14.2'	04°12.5 03°56.9	-15.6' -15.6'	57.0' 57.0'
21 22	147°03.1	33.1	307 57.0 322°30.3	14.2	03°41.3	-15.6'	57.0'
23	162°03.2	32.1	337°03.5	14.3'	03°25.6	-15.6'	57.0'
	SD = 16.1'	d = -1.0'		SI	D = 15.7'		
Wed	GHA	Dec	GHA	ν	Dec	d	НР
0	177° 03.4	506°31.2	351°36.9	ν 14.4'	N03° 10.0	-15.6'	56.9'
1	192°03.5	30.2	6°10.2	14.4'	02°54.4	-15.6'	56.9'
2	207°03.6	29.2	20°43.6	14.4'	02°38.8	-15.6'	56.9'
3 4	222°03.8 237°03.9	· · 28.3 27.3	35°17.1 49°50.6	14.5' 14.5'	02°23.1 02°07.5	-15.6' -15.6'	56.9' 56.8'
4 5	252°04.1	27.3 26.4	49 50.6 64°24.1	14.5 14.6'	02 07.5 01°51.9	-15.6'	56.8'
6	267° 04.2	S06°25.4	78°57.6	14.6'	N01°36.3	-15.6'	56.8'
7	282°04.3	24.4	93°31.2	14.6'	01°20.7	-15.6'	56.8'
8	297°04.5 312°04.6	23.5	108°04.8 122°38.5	14.7'	01°05.1 00°49.5	-15.6'	56.7'
9 10	312°04.6 327°04.7	· · 22.5 21.5	122°38.5 137°12.2	14.7' 14.7'	00°49.5 00°33.9	-15.6' -15.6'	56.7' 56.7'
11	342°04.9	20.6	151°45.9	14.7'	00° 18.4	-15.5'	56.7
12	357°05.0	<b>S</b> 06°19.6	166°19.6	14.8'	N00°02.8	-15.5'	56.6'
13	12°05.2	18.7	180°53.4	14.8'	500°12.7	15.5'	56.6'
14 15	27°05.3 42°05.4	17.7 •• 16.7	195°27.2 210°01.0	14.8' 14.8'	00°28.2 00°43.7	15.5' 15.5'	56.6' 56.5'
16	57° 05.6	15.8	224°34.8	14.9	00° 43.7	15.5'	56.5
17	72°05.7	14.8	239°08.7	14.9'	01°14.7	15.4'	56.5'
18	87°05.8	S06°13.8	253°42.6	14.9'	S01°30.1	15.4'	56.5'
19 20	102°06.0 117°06.1	12.9 11.9	268°16.5 282°50.4	14.9' 14.9'	01°45.5 02°00.9	15.4' 15.4'	56.4' 56.4'
20	117°06.1 132°06.3	11.9	282°50.4 297°24.4	14.9 15.0'	02°16.3	15.4' 15.4'	56.4'
22	147°06.4	10.0	311°58.3	15.0'	02°31.7	15.3'	56.4
23	162°06.5	09.0	326°32.3	15.0'	02°47.0	15.3'	56.3'
	SD = 16.1'	d = -1.0'		SI	O = 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
<b>N</b> 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
<b>N</b> 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
	ı			1		1

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
<b>N</b> 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	Eqn.of Time		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		

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Thu -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	162°45.5	163°54.0	S01°54.0	188°27.8	\$11°49.3	56°16.5	N22°55.5	159°53.4	501°04.6		JIIA	Dec
	102 45.5 177°48.0									Alpheratz	$357^{\circ}34.1$	29°14.1
1		178°53.6	52.7	203°28.4	48.6	71°19.0	55.5	174°55.6	04.4	Ankaa	353°06.6	-42°10.0
2	192°50.4	193°53.2	51.4	218°29.0	47.9	86°21.5	55.5	189°57.8	04.3	Schedar	349°30.5	56°40.9
3	207°52.9	208°52.8	• • 50.2	233°29.6	• • 47.2	101°24.1	• • 55.5	205°00.0	• • 04.2	Diphda	348°46.6	-17°50.7
4	222°55.4	223°52.5	48.9	248°30.1	46.5	116°26.6	55.5	220°02.2	04.1	Achernar	335°19.9	-57°06.4
5	237°57.8	238°52.1	47.6	263°30.7	45.8	131°29.1	55.5	235°04.3	03.9	Hamal	327°50.3	23°35.2
6	253°00.3	253°51.7	S01°46.3	278°31.3	S11°45.1	146°31.6	N22°55.5	250°06.5	S01°03.8	Polaris	313°46.3	89°22.8
7	268°02.8	268°51.4	45.0	293°31.9	44.4	161°34.1	55.5	265°08.7	03.7	Acamar	$315^{\circ}11.2$	-40°12.2
8	283°05.2	283°51.0	43.8	308°32.5	43.7	176°36.6	55.5	280°10.9	03.6	Menkar	314°05.3	4°11.5
9	298°07.7	298°50.6	• • 42.5	323°33.1	• • 43.0	191°39.1	• • 55.5	295°13.1	• • 03.5	Mirfak	308°27.1	49°57.4
10	313°10.1	313°50.2	41.2	338°33.7	42.2	206°41.7	55.5	310°15.3	03.3	Aldebaran	290°38.5	16°33.7
11	328°12.6	328°49.9	39.9	353°34.2	41.5	221°44.2	55.6	325°17.5	03.2	Rigel	281°02.9	-8°10.4
12	343°15.1	343°49.5	S01°38.6	8°34.8	S11°40.8	236°46.7	N22°55.6	340°19.7	S01°03.1	Capella	280°20.4	46°01.6
13	358°17.5	358°49.1	37.3	23°35.4	40.1	251°49.2	55.6	355°21.8	03.0	Bellatrix	278°21.8	6°22.3
14	13°20.0	13°48.8	36.1	38°36.0	39.4	266°51.7	55.6	10°24.0	02.9	Elnath	278°00.6	28°37.8
15	28°22.5	28°48.4	• • 34.8	53°36.6	• • 38.7	281°54.2	• • 55.6	25°26.2	• • 02.7	Alnilam	275°36.7	-1°11.2
16	43°24.9	43°48.0	33.5	68°37.2	38.0	296°56.7	55.6	40°28.4	02.6	Betelgeuse	270°51.0	7°24.6
17	58°27.4	58°47.6	32.2	83°37.8	37.3	311°59.3	55.6	55°30.6	02.5	Canopus	263°51.8	-52°42.8
18	73°29.9	73°47.3	S01°30.9	98°38.4	S11°36.6	327°01.8	N22°55.6	70°32.8	S01°02.4	Sirius	258°25.2	-16°45.3
19	88°32.3	88°46.9	29.6	113°39.0 128°39.5	35.9	342°04.3	55.6	85°35.0	02.2	Adhara	255°04.9	-29°00.7
20	103°34.8	103°46.5	28.4		35.1	357°06.8	55.6	100°37.1	02.1	Procyon	244°49.6	5°09.4
21	118°37.2	118°46.2	•• 27.1	143°40.1	• • 34.4	12°09.3	• • 55.6	115°39.3	02.0	Pollux	243°15.9	27°57.8
22	133°39.7	133°45.8	25.8	158°40.7	33.7	27°11.8	55.6	130°41.5	01.9	Avior	234°13.9	-59°35.8
23	148°42.2	148°45.4	24.5	173°41.3	33.0	42°14.3	55.6	145°43.7	01.8	Suhail	222°45.2	-43°32.5
Mer.p	pass. 13:07	$\nu$ -0.4′ d-1	l.3′ m-3.92	$\nu$ 0.6′ d-0	.7′ m1.15	$\nu 2.5' \ d0.$	0′ m-2.41	$\nu$ 2.2′ d-0	.1' m $0.98$	Miaplacidus	221°37.3	-69°49.6
										Alphard	$217^{\circ}46.5$	-8°46.5
Ev:	CHV	CHV	Dec	CHA	Doc	C L A	Dec	CHA	Doc	Regulus	207°33.1	11°50.2
Fri	<b>GHA</b> 163°44.6	<b>GHA</b> 163°45.1		<b>GHA</b> 188° 41.9	Dec \$11° 32.3	GHA 57°16 °		<b>GHA</b> 160°45.9	Dec 501°01.6	Dubhe	193°39.1	61°36.5
0 1	163°44.6 178°47.1		S01°23.2	188°41.9 203°42.5		57°16.8 72°19.3	N22°55.7		S01°01.6	Denebola	182°23.6	14°25.4
2	178°47.1 193°49.6	178°44.7 193°44.3	21.9 20.6	203°42.5 218°43.1	31.6 30.9	72°19.3 87°21.8	55.7 55.7	175°48.1 190°50.3	01.5 01.4	Gienah	175°42.3	-17°41.4
3	193 49.6 208°52.0									Acrux	172°58.4	-63°14.6
	208 52.0 223°54.5	208°43.9	• • 19.4	233° 43.7 248° 44.3	· · 30.2 29.5	102°24.4 117°26.9	• • 55.7 55.7	205°52.5	01.3	Gacrux	$171^{\circ}50.1$	-57° 15.6
4	223 54.5 238°57.0	223°43.6	18.1			117 20.9 132°29.4		220°54.6	01.1	Alioth	$166^{\circ}11.6$	55°48.8
5 6	253°59.4	238°43.2 253°42.8	16.8 S01°15.5	263° 44.9 278° 45.4	28.7 \$11°28.0	132 29.4 147°31.9	55.7 N22°55.7	235°56.8 250°59.0	01.0 S01°00.9	Spica	158°21.0	-11°18.0
	269°01.9	268°42.5		276 45.4 293°46.0		162°34.4				Alkaid	152°50.9	49°10.6
7 8	209 01.9 284°04.4	206 42.5 283°42.1	14.2 12.9	308°46.6	27.3 26.6	102 34.4 177°36.9	55.7 55.7	266°01.2 281°03.4	00.8 00.7	Hadar	148°34.2	-60°29.8
9	299°06.8	298°41.7	• • 11.7	323°47.2	• • 25.9	177 30.9 192°39.4	• • 55.7	296°05.6	00.7	Menkent	147°56.2	-36°29.9
10	314°09.3	313°41.4	10.4	338°47.8	25.2	207°41.9	55.7	311°07.8	00.4	Arcturus	145°46.8	19°02.5
11	329°11.7	328°41.0	09.1	353°48.4	24.5	207 41.9 222°44.4	55.7 55.7	326°09.9	00.4	Rigil Kent.	139°38.6	-60°56.5
12	344°14.2	343°40.6	S01°07.8	8°49.0	\$11°23.8	237°46.9	N22°55.7	341°12.1	S01°00.2	Kochab	137°19.2	74°02.5
13	359°16.7	358°40.2	06.5	23°49.6	23.0	252°49.4	55.7	356°14.3	01°00.1	Zuben'ubi	136°54.8	-16°09.1
14	14°19.1	13°39.9	05.2	38° 50.2	22.3	267°51.9	55.7 55.7	11°16.5	01 00.1 00°59.9	Alphecca	126°02.8	26°37.3
15	29°21.6	28°39.5	03.9	53° 50.2	21.6	282°54.4	• • 55.8	26°18.7	• • 59.8	Antares	112°14.6	-26°29.4
16	44°24.1	43°39.1	02.7	68°51.4	20.9	297°56.9	55.8	41°20.9	59.7	Atria	107°08.0	-69°04.2
17	59°26.5	58°38.8	01.4	83°52.0	20.9	312°59.4	55.8	56°23.1	59.7 59.6	Sabik	102°01.7	-15°45.5
18	74°29.0	73°38.4	S01°00.1	98°52.5	S11°19.5	328°01.9	N22°55.8	71°25.3	S00°59.4	Shaula	96°09.1	-37°07.3
19	89°31.5	88°38.0	00°58.8	113°53.1	18.8	343°04.4	55.8	86°27.4	59.3	Rasalhague	95°57.7	12°32.2
20	104°33.9	103°37.7	57.5	113 53.1 128°53.7	18.0	358°06.9	55.8	101°29.6	59.2	Eltanin	90°41.9	51°28.7
21	119°36.4	118°37.3	56.2	143°54.3	• • 17.3	13°09.4	• • 55.8	116°31.8	• • 59.1	Kaus Aust.	83°31.4	-34°22.3
22	134°38.8	133°36.9	54.9	158° 54.9	16.6	28°11.9	55.8	131°34.0	59.0	Vega	80°32.7	38°48.1
23	149°41.3	148°36.6	53.7	173° 55.5	15.9	43°14.4	55.8	146°36.2	58.8	Nunki	75°46.7	-26°15.8
										Altair	61°59.2	8°56.1
Mer.p	pass. 13:03	$\nu$ -0.4' d-1	l.3′ m-3.92	$\nu$ 0.6′ d-0	.7′ m1.15	$\nu 2.5' \ d0.$	0′ m-2.40	$\nu$ 2.2′ d-0	.1' m $0.98$	Peacock	53°04.7	-56°38.9
										Deneb	49°25.5	45°22.2
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.2	9°59.6
0	164°43.8	163°36.2	S00°52.4	188° 56.1	\$11°15.2	58°16.9	N22°55.8	161°38.4	S00°58.7	Al Na'ir	27°32.1	-46°50.1
1	179°46.2	178°35.8	51.1	203°56.7	14.5	73°19.4	55.8	176°40.6	58.6	Fomalhaut	15°13.8	-29°29.1
2	194°48.7	193°35.5	49.8	218° 57.3	13.8	88°21.9	55.8	170 40.0 191°42.7	58.5	Scheat	13°44.6	28°13.4
3	209°51.2	208°35.1	• • 48.5	233°57.9	• • 13.0	103°24.4	• • 55.8	206°44.9	58.3	Markab	13°29.3	15°20.7
4	224°53.6	200°33.1° 223°34.7	47.2	248° 58.5	12.3	118°26.9	55.8	200°44.9 221°47.1	58.2	Mar 05 Thu	SHA	Mer.pass
5	239°56.1	238°34.4	45.9	263°59.1	11.6	133°29.4	55.8	236°49.3	58.1	Venus	1°08.5	13:05
6	254°58.6	253°34.0	S00°44.7	278° 59.7	S11°10.9	148°31.9	N22°55.9	251°51.5	S00°58.0	Mars	25°42.3	11:26
7	270°01.0	268°33.6	43.4	294°00.3	10.2	163°34.4	55.9	266°53.7	57.9	Jupiter		20:12
8	285°03.5	283°33.3	42.1	309°00.9	09.5	178°36.9	55.9	281°55.9	57.7	Saturn	357°07.9	13:18
9	300°06.0	298°32.9	• • 40.8	324°01.5	• • 08.7	193°39.4	• • 55.9	296°58.0	• • 57.6			
10	315°08.4	313°32.5	39.5	339°02.0	08.0	208°41.9	55.9	312°00.2	57.5	Mar 06 Fri	SHA	Mer.pass
11	330°10.9	328°32.2	38.2	354°02.6	07.3	223°44.4	55.9	327°02.4	57.4	Venus	0°00.4	13:05
12	345°13.3	343°31.8	S00°36.9	9°03.2	S11°06.6	238°46.9	N22°55.9	342°04.6	S00°57.2	Mars	24°57.3	11:25
13	0°15.8	358°31.4	35.7	24°03.8	05.9	253°49.4	55.9	357°06.8	57.1		253°32.2	20:08
14	15°18.3	13°31.1	34.4	39°04.4	05.1	268°51.9	55.9	12°09.0	57.0	Saturn	357°01.3	13:15
15	30°20.7	28°30.7	• • 33.1	54°05.0	• • 04.4	283°54.4	• • 55.9	27°11.1	• • 56.9	Mar 07 Sat	SHA	Mer.pass
16	45°23.2	43°30.3	31.8	69°05.6	03.7	298°56.9	55.9	42°13.3	56.8		358°52.4	13:06
17	60°25.7	58°30.0	30.5	84°06.2	03.0	313°59.4	55.9	57°15.5	56.6	Mars	24°12.3	11:24
18	75°28.1	73°29.6	S00°29.2	99°06.8	S11°02.3	329°01.9	N22°55.9	72°17.7	S00°56.5		253°33.2	20:04
19	90°30.6	88°29.2	27.9	$114^{\circ}07.4$	01.6	344°04.4	55.9	$87^{\circ}19.9$	56.4	Saturn	356°54.6	13:12
20	105°33.1	103°28.9	26.6	$129^{\circ}08.0$	8.00	359°06.9	55.9	$102^{\circ}22.1$	56.3			
21	120°35.5	$118^{\circ}28.5$	• • 25.4	144°08.6	$11^{\circ}00.1$	14°09.4	• • 55.9	117°24.3	•• 56.1	Horizont	al parallax	
22	135°38.0	133°28.1	24.1	159°09.2	10°59.4	29°11.9	55.9	132°26.4	56.0		Venus:	0.1
23	150°40.5	148°27.8	22.8	174°09.8	58.7	44°14.4	55.9	147°28.6	55.9		Mars:	0.1
Mern	pass. 12:59	$\nu$ -0 4' d-1	l.3′ m-3.92	ν0 6' d-0	.7′ m1.15	$\nu$ 2.5′ d0	0′ m-2.39	ν2 2' d-Ω	.1′ m0.98			
							. =:00					

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	177°06.7	S06°08.1	$341^{\circ}06.3$	15.0'	S03°02.3	15.3'	56.3'
1	192°06.8	07.1	355°40.3	15.0'	03°17.6	15.2'	56.3'
2	207°07.0 222°07.1	06.1 •• 05.2	10° 14.3 24° 48.3	15.0' 15.0'	03°32.8 03°48.1	15.2' 15.2'	56.3' 56.2'
4	237°07.2	04.2	39° 22.4	15.1'	04°03.2	15.2'	56.2'
5	252°07.4	03.2	53°56.4	15.1'	04°18.4	15.1'	56.2'
6	267°07.5	S06°02.3	68° 30.5	15.1'	S04°33.5	15.1'	56.2'
7	282°07.7	01.3	83°04.6	15.1'	04°48.6	15.1'	56.1'
8	297°07.8 312°08.0	06°00.3 05°59.4	97°38.6 112°12.7	15.1' 15.1'	05°03.7 05°18.7	15.0' 15.0'	56.1' 56.1'
9 10	312 08.0 327°08.1	05 59.4 58.4	112 12.7 126°46.8	15.1'	05 18.7 05°33.7	15.0 14.9'	56.1
11	342°08.2	57.4	141°20.9	15.1'	05°48.6	14.9'	56.0'
12	357°08.4	S05°56.5	155°55.0	15.1'	<b>S</b> 06°03.5	14.9'	56.0'
13	12°08.5	55.5	170°29.1	15.1'	06°18.4	14.8'	56.0'
14 15	27°08.7 42°08.8	54.5 •• 53.6	185°03.2 199°37.2	15.1' 15.1'	06°33.2 06°48.0	14.8' 14.7'	56.0' 55.9'
16	57°08.9	52.6	214° 11.3	15.1'	00°48.0	14.7	55.9'
17	72°09.1	51.6	228° 45.4	15.1'	07°17.5	14.7'	55.9'
18	87°09.2	S05°50.7	243°19.5	15.1'	S07°32.1	14.6'	55.9'
19	102°09.4	49.7	257°53.6	15.1'	07°46.7	14.6'	55.8'
20	117°09.5	48.7	272°27.7	15.1'	08°01.3	14.5'	55.8'
21 22	132°09.7 147°09.8	· · 47.8 46.8	287°01.7 301°35.8	15.1' 15.0'	08°15.8 08°30.3	14.5' 14.4'	55.8' 55.8'
23	162°10.0	45.8	316° 09.8	15.0'	08°44.7	14.4'	55.7'
	SD = 16.1'	d = -1.0'			0 = 15.4'		
	JD — 10.1°	u — -1.0		)L	/ — 13.4°		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	177°10.1 192°10.2	S05°44.9 43.9	330°43.9 345°17.9	15.0' 15.0'	\$08°59.1 09°13.5	14.3' 14.3'	55.7' 55.7'
2	192 10.2 207°10.4	43.9 42.9	345 17.9 359°51.9	15.0'	09 13.5 09°27.7	14.3 14.2'	55.7'
3	222°10.5	• • 41.9	14° 25.9	15.0'	09°42.0	14.2'	55.6'
4	237°10.7	41.0	28°59.9	15.0'	09°56.1	14.1'	55.6'
5	252°10.8	40.0	43°33.9	15.0'	10°10.3	14.1'	55.6'
6	267°11.0	S05°39.0	58°07.8	14.9'	\$10°24.3	14.0'	55.6'
7 8	282°11.1 297°11.3	38.1 37.1	72°41.8 87°15.7	14.9' 14.9'	10°38.3 10°52.3	14.0' 13.9'	55.5' 55.5'
9	312°11.4	36.1	101°49.6	14.9'	10° 52.3 11° 06.2	13.8'	55.5'
10	327°11.5	35.2	116°23.5	14.9'	11°20.0	13.8'	55.5'
11	342°11.7	34.2	130°57.4	14.9'	11°33.8	13.7'	55.5'
12	357°11.8	S05°33.2	145°31.3	14.8'	S11°47.5	13.7'	55.4'
13 14	12°12.0 27°12.1	32.3 31.3	160°05.1 174°38.9	14.8' 14.8'	12°01.2 12°14.8	13.6' 13.5'	55.4' 55.4'
15	42°12.3	30.3	174 30.9 189°12.7	14.8	12 14.0 12°28.4	13.5'	55.4'
16	57°12.4	29.3	203°46.4	14.7'	12°41.8	13.4	55.3'
17	72°12.6	28.4	$218^{\circ}20.2$	14.7'	$12^{\circ}55.2$	13.3'	55.3'
18	87°12.7	S05°27.4	232°53.9	14.7'	\$13°08.6	13.3'	55.3'
19 20	102°12.9 117°13.0	26.4 25.5	247°27.6 262°01.2	14.7' 14.6'	13°21.9 13°35.1	13.2'	55.3' 55.2'
21	117 13.0 132°13.2	25.5 •• 24.5	202 01.2 276°34.9	14.6'	13°48.2	13.1	55.2'
22	147°13.3	23.5	291°08.5	14.6'	14°01.3	13.0'	55.2'
23	162°13.5	22.5	$305^{\circ}42.0$	14.5'	$14^{\circ}14.3$	12.9'	55.2'
	SD = 16.1'	d = -1.0'		SE	0 = 15.2'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0 0	177°13.6	S05°21.6	320° 15.6	ν 14.5'	\$14°27.3	12.9'	55.2'
1	192°13.8	20.6	$334^{\circ}49.1$	14.5'	14°40.2	12.8'	55.1'
2	207°13.9	19.6	349°22.6	14.4'	14°53.0	12.7'	55.1'
3 4	222°14.1 237°14.2	· · 18.7 17.7	3°56.0 18°29.4	14.4' 14.4'	15°05.7 15°18.4	12.7' 12.6'	55.1' 55.1'
4 5	252°14.4	16.7	18 29.4 33°02.8	14.4	15 18.4 15°31.0	12.5'	55.1'
6	267°14.5	S05°15.7	47°36.1	14.3'	\$15°43.5	12.4	55.0'
7	282°14.7	14.8	62°09.4	14.3'	15°55.9	12.4'	55.0'
8	297°14.8	13.8	76°42.7	14.2'	16°08.3	12.3'	55.0'
9 10	312°15.0 327°15.1	· · 12.8 11.9	91°15.9 105°49.1	14.2' 14.2'	16°20.6 16°32.8	12.2' 12.1'	55.0' 55.0'
11	342°15.3	10.9	105 49.1 120°22.3	14.1'	16°44.9	12.1'	54.9'
12	357°15.4	S05°09.9	134°55.4	14.1'	S16°57.0	12.0'	54.9'
13	12°15.6	08.9	149°28.5	14.0'	17°08.9	11.9'	54.9'
14	27°15.7	08.0	164°01.5 178°34.5	14.0'	17°20.8	11.8'	54.9'
15 16	42°15.9 57°16.0	· · 07.0 06.0	178°34.5 193°07.5	14.0' 13.9'	17°32.6 17°44.4	11.7' 11.6'	54.9' 54.8'
17	72°16.2	05.0	207° 40.4	13.9'	17° 56.0	11.6'	54.8'
18	87°16.3	S05°04.1	222°13.3	13.8'	S18°07.6	11.5'	54.8'
19	102°16.5	03.1	236° 46.1	13.8'	18°19.1	11.4'	54.8'
20	117°16.6	02.1	251° 18.9	13.7'	18°30.5	11.3'	54.8'
21 22	132°16.8 147°16.9	·· 01.1 05°00.2	265°51.6 280°24.3	13.7' 13.7'	18°41.8 18°53.0	11.2' 11.1'	54.8' 54.7'
23	162°17.1	05 00.2 04°59.2	294° 57.0	13.6'	19°04.1	11.1	54.7'
	SD = 16.1'	d = -1.0'			0 = 15.0'		
		-			-		

	Twi	light			Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	04:44	06:03	07:11	17:14	18:22	19:41
<b>N</b> 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
<b>N</b> 40°	05:28	05:59	06:26	17:57	18:24	18:56
35°	05:28	05:58	06:23	18:00	18:25	18:55
30°	05:29	05:57	06:20	18:02	18:26	18:54
20°	05:28	05:54	06:16	18:07	18:29	18:54
N 10°	05:26	05:51	06:12	18:11	18:32	18:56
0°	05:23	05:47	06:08	18:14	18:35	18:59
<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°	19:23	19:45	20:10	07:45	08:50	09:54
45°	19:18	19:36	19:57	07:49	08:57	10:05
<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°	18:59	19:02	19:06	08:01	09:27	10:52
<b>S</b> 60°	18:55	18:54	18:54	08:04	09:33	11:03

		Sun		Moon				
Day	Eqn.o	Time	Mer.	Mer.	Age			
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	16-18		
	mm:ss mm:s		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	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	165°42.9	163° 27.4	S00°21.5	189°10.4	\$10°58.0	59°16.8	N22°56.0	162°30.8	S00°55.8			
1	180°45.4	178° 27.0	20.2	204°11.0	57.2	74°19.3	56.0	177°33.0	55.7	Alpheratz	357°34.1	29°14.1
2	195°47.8	193°26.7	18.9	219°11.6	56.5	89°21.8	56.0	192°35.2	55.5	Ankaa	353°06.6	-42°09.9
3	210°50.3	208° 26.3	17.6	234°12.2	55.8	104°24.3	56.0	207°37.4	55.4	Schedar	349°30.5	56°40.9
4	225°52.8	223°25.9	16.4	249°12.8	55.1	119°26.8	56.0	222°39.6	55.3	Diphda	348°46.6	-17°50.7
5	240°55.2	238°25.6	15.1	264°13.4	54.4	134°29.3	56.0	237°41.7	55.2	Achernar	335°19.9 327°50.3	-57°06.4 23°35.2
6	255°57.7	253°25.2	S00°13.8	279°14.0	S10°53.6	149°31.8	N22°56.0	252°43.9	\$00°55.0	Hamal Polaris	327 50.5 313°47.5	89°22.7
7	271°00.2	268°24.8	12.5	294°14.6	52.9	164°34.3	56.0	$267^{\circ}46.1$	54.9	Acamar	315°11.2	-40°12.2
8	286°02.6	283°24.5	11.2	309°15.2	52.2	179°36.8	56.0	282°48.3	54.8	Menkar	314°05.3	4°11.5
9	301°05.1	298°24.1	• • 09.9	324°15.8	• • 51.5	194°39.3	• • 56.0	297°50.5	• • 54.7	Mirfak	308°27.1	49°57.4
10	316°07.6	313°23.7	08.6	339°16.4	50.7	209°41.7	56.0	312°52.7	54.6	Aldebaran	290°38.6	16°33.7
11	331°10.0	328°23.4	07.3	354°17.0	50.0	224°44.2	56.0	327°54.8	54.4	Rigel	281°02.9	-8°10.4
12	346°12.5 1°14.9	343°23.0	\$00°06.1	9°17.6	\$10°49.3	239°46.7 254°49.2	N22°56.0	342°57.0	\$00°54.3	Capella	280°20.4	46°01.6
13 14	1 14.9 16°17.4	358°22.6 13°22.3	04.8 03.5	24°18.2 39°18.8	48.6 47.9	254 49.2 269°51.7	56.0 56.0	357°59.2 13°01.4	54.2 54.1	Bellatrix	$278^{\circ}21.8$	6°22.3
15	31°19.9	28° 21.9	02.2	54°19.4	• • 47.1	284°54.2	56.0	28°03.6	53.9	Elnath	278°00.6	28°37.8
16	46°22.3	43°21.5	S00°00.9	69°20.0	46.4	299°56.7	56.0	43°05.8	53.8	Alnilam	275°36.7	-1°11.2
17	61°24.8	58°21.2	N00°00.4	84°20.6	45.7	314°59.1	56.0	58°08.0	53.7	Betelgeuse	270°51.0	7°24.6
18	76°27.3	73°20.8	N00°01.7	99°21.2	S10°45.0	330°01.6	N22°56.0	73° 10.1	S00°53.6	Canopus	263°51.8	-52°42.8
19	91°29.7	88°20.4	03.0	114°21.8	44.2	345°04.1	56.0	88° 12.3	53.5	Sirius	258°25.3	-16°45.3 -29°00.7
20	$106^{\circ}32.2$	103°20.1	04.2	129°22.4	43.5	0°06.6	56.0	$103^{\circ}14.5$	53.3	Adhara	255°04.9 244°49.6	-29°00.7 5°09.4
21	121°34.7	$118^{\circ}19.7$	•• 05.5	144°23.0	• • 42.8	$15^{\circ}09.1$	• • 56.1	$118^{\circ}16.7$	• • 53.2	Procyon Pollux	244 49.0 243°15.9	27°57.8
22	136°37.1	133° 19.4	06.8	159°23.6	42.1	30°11.6	56.1	133° 18.9	53.1	Avior	234° 13.9	-59°35.8
23	151°39.6	148°19.0	08.1	174°24.2	41.3	$45^{\circ}14.1$	56.1	148°21.1	53.0	Suhail	222° 45.2	-43°32.5
Mer n	ass. 12:55	$\nu$ -0 4' d-1	3′ m-3.92	$\nu 0.6' d-0$	.7′ m1.15	$\nu^2 5' d0$	0′ m-2.39	$\nu^2 2' d-0$	0.1' m0.97	Miaplacidus	221°37.3	-69°49.6
										Alphard	217°46.5	-8°46.5
	G114	6114	-	6114	_	6114	-	6114	-	Regulus	207°33.1	11°50.2
Mon 0	<b>GHA</b> 166°42.1	<b>GHA</b> 163° 18.6	<b>Dec</b> N00°09.4	<b>GHA</b> 189°24.8	Dec \$10°40.6	<b>GHA</b> 60°16.5	<b>Dec</b> N22°56.1	<b>GHA</b> 163°23.2	<b>Dec</b> \$00° 52.8	Dubhe	193°39.1	61°36.5
1	181°44.5	163 18.6 178° 18.3	10.7	189 24.8 204°25.4	39.9	75°19.0	56.1	103 23.2 178°25.4	52.7	Denebola	182°23.6	14°25.4
2	196°47.0	178 18.3 193° 17.9	12.0	219°26.0	39.9	90°21.5	56.1	176 25.4 193°27.6	52.7	Gienah	175°42.3	-17°41.4
3	211°49.4	208° 17.5	. 13.3	234°26.6	38.4	105°24.0	56.1	208° 29.8	52.5	Acrux	172°58.4	-63°14.7
4	226°51.9	223° 17.2	14.5	249°27.2	37.7	120°26.5	56.1	223°32.0	52.4	Gacrux	171°50.1	-57°15.6
5	241°54.4	238° 16.8	15.8	264°27.8	37.0	135°28.9	56.1	238°34.2	52.2	Alioth	166°11.6	55°48.8
6	256°56.8	253°16.4	N00° 17.1	279°28.4	S10°36.3	150°31.4	N22°56.1	253°36.3	S00°52.1	Spica	158°21.0	-11°18.0
7	271°59.3	$268^{\circ}16.1$	18.4	294°29.0	35.5	165°33.9	56.1	268°38.5	52.0	Alkaid	152°50.9 148°34.2	49°10.6 -60°29.9
8	287°01.8	283° 15.7	19.7	309°29.6	34.8	180°36.4	56.1	283°40.7	51.9	Hadar Menkent	148 34.2 147°56.2	-80° 29.9 -36° 29.9
9	$302^{\circ}04.2$	298°15.3	• • 21.0	324°30.2	• • 34.1	195°38.9	• • 56.1	298°42.9	• • 51.7	Arcturus	147 30.2 145°46.8	19°02.5
10	$317^{\circ}06.7$	$313^{\circ}15.0$	22.3	339°30.8	33.4	210°41.3	56.1	$313^{\circ}45.1$	51.6	Rigil Kent.	139°38.6	-60°56.5
11	332°09.2	328°14.6	23.6	354°31.4	32.6	225°43.8	56.1	328°47.3	51.5	Kochab	137° 19.1	74°02.5
12	347°11.6	343°14.3	N00°24.9	9°32.0	S10°31.9	240°46.3	N22°56.1	343°49.5	S00°51.4	Zuben'ubi	136°54.8	-16°09.1
13	2°14.1	358° 13.9	26.1	24°32.6	31.2	255°48.8	56.1	358°51.6	51.3	Alphecca	126°02.8	26°37.3
14	17°16.6	13° 13.5	27.4	39°33.2	30.5	270°51.3	56.1	13°53.8	51.1	Antares	112°14.6	-26°29.4
15	32°19.0	28° 13.2	• • 28.7	54°33.8	• • 29.7	285°53.7	56.1	28°56.0	• • 51.0	Atria	$107^{\circ}07.9$	-69°04.2
16 17	47°21.5 62°23.9	43°12.8	30.0 31.3	69°34.4 84°35.0	29.0 28.3	300°56.2 315°58.7	56.1 56.1	43°58.2 59°00.4	50.9 50.8	Sabik	$102^{\circ}01.7$	-15°45.5
18	77°26.4	58° 12.4 73° 12.1	N00°32.6	99°35.6	20.3 \$10°27.6	331°01.2	N22°56.1	74°02.6	50.6 S00°50.6	Shaula	$96^{\circ}09.1$	-37°07.3
19	92°28.9	88° 11.7	33.9	114°36.2	26.8	346°03.6	56.1	89°04.7	50.5	Rasalhague	95°57.7	12°32.2
20	107°31.3	103°11.3	35.2	129°36.8	26.1	1°06.1	56.1	104°06.9	50.4	Eltanin	90°41.8	51°28.7
21	122°33.8	118° 11.0	36.4	144°37.4	• • 25.4	16°08.6	56.1	119°09.1	50.3	Kaus Aust.	83°31.4	-34°22.3
22	137°36.3	133° 10.6	37.7	159°38.0	24.6	31°11.1	56.2	134°11.3	50.1	Vega	80°32.7	38°48.1 -26°15.8
23	152°38.7	148°10.3	39.0	174°38.6	23.9	46°13.5	56.2	149°13.5	50.0	Nunki Altair	75°46.7 61°59.2	8°56.1
Morn	ass. 12:51	1, 0 1' d1	.3′ m-3.92	10 6' d 0	.7′ m1.15	1/2 E/ d0	0′ m-2.38	12 2' d C	0.1' m0.97	Peacock	53°04.6	-56°38.9
- Ivier.p	ass. 12.J1	ν-0.4 d1	.5 111-5.92	νο.σ α-σ	.7 1111.13	ν2.3 do.	0 111-2.30	ν2.2 <b>u</b> -0	7.1 1110.97	Deneb	49° 25.5	45°22.2
										Enif	33°38.1	9°59.6
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.1	-46°50.0
0	167°41.2	163°09.9	N00°40.3	189°39.2	\$10°23.2	61°16.0	N22°56.2	164° 15.7	S00°49.9	Fomalhaut	15°13.8	-29°29.1
1	182°43.7	178°09.5	41.6	204°39.8	22.5	76°18.5	56.2	179°17.8	49.8 49.7	Scheat	13°44.6	28°13.4
2	197°46.1 212°48.6	193°09.2 208°08.8	42.9 •• 44.2	219°40.4 234°41.0	21.7 · · 21.0	91°21.0 106°23.4	56.2 •• 56.2	194°20.0 209°22.2	49.7 •• 49.5	Markab	13°29.3	15°20.7
3 4	212 46.0 227°51.0	208 08.8 223°08.4	45.5	249°41.7	20.3	100 25.4 121°25.9	56.2	209 22.2 224°24.4	49.4	Mar 08 Sun	SHA	Mer.pass
5	242°53.5	238°08.1	46.7	264°42.3	19.5	136°28.4	56.2	239° 26.6	49.3		357°44.5	13:06
6	257°56.0	253°07.7	N00°48.0	279°42.9	S10°18.8	151°30.9	N22°56.2	254°28.8	S00°49.2	Mars	23°27.5	11:23
7	272°58.4	268°07.3	49.3	294°43.5	18.1	166°33.3	56.2	269°30.9	49.0	Jupiter		20:00
8	288°00.9	283°07.0	50.6	309°44.1	17.4	181°35.8	56.2	284°33.1	48.9	Saturn	356° 47.9	13:08
9	303°03.4	298°06.6	•• 51.9	324°44.7	• • 16.6	196°38.3	• • 56.2	299°35.3	• • 48.8	Mar 09 Mon	SHA	Mer pass
10	318°05.8	313°06.3	53.2	339°45.3	15.9	211°40.7	56.2	314° 37.5	48.7		356° 36.6	Mer.pass 13:07
11	333°08.3	328°05.9	54.5	354°45.9	15.2	226°43.2	56.2	329°39.7	48.6	Mars	22°42.7	11:22
12	348°10.8	343°05.5	N00°55.8	9°46.5	\$10°14.4	241°45.7	N22°56.2	344°41.9	S00°48.4		253°34.5	19:56
13	3°13.2	358°05.2	57.0	24°47.1	13.7	256°48.1	56.2	359°44.0	48.3	Saturn	356°41.2	13:05
14 15	18°15.7 33°18.2	13°04.8	58.3	39°47.7 54°48.3	13.0	271°50.6	56.2	14°46.2	48.2	10.7		
15 16	48°20.6	28°04.4 43°04.1	00°59.6 01°00.9	54 48.3 69°48.9	· · 12.2 11.5	286°53.1 301°55.6	· · 56.2 56.2	29° 48.4 44° 50.6	· · 48.1 47.9	Mar 10 Tue	SHA 255° 20 7	Mer.pass
17	63°23.1	43 04.1 58°03.7	01 00.9	84°49.5	10.8	316°58.0	56.2	59° 52.8	47.9 47.8	Venus Mars	355°28.7 21°58.0	13:08
18	78°25.5	73°03.7	N01°03.5	99°50.1	\$10°10.1	332°00.5	N22°56.2	74° 55.0	\$00°47.7		21°58.0 253°34.8	11:21 19:52
19	93°28.0	88°03.0	04.8	114°50.7	09.3	347°03.0	56.2	89°57.1	47.6	Saturn	356° 34.5	13:01
20	108°30.5	103°02.6	06.1	129°51.3	08.6	2°05.4	56.2	104°59.3	47.4			15.01
21	123°32.9	118°02.3	• • 07.3	144°52.0	• • 07.9	17°07.9	• • 56.2	120°01.5	• • 47.3	Horizont	al parallax	
22	$138^{\circ}35.4$	133°01.9	08.6	$159^{\circ}52.6$	07.1	$32^{\circ}10.4$	56.2	$135^{\circ}03.7$	47.2		Venus:	0.1
23	153°37.9	148°01.5	09.9	174°53.2	06.4	47°12.8	56.2	150°05.9	47.1		Mars:	0.1
Mer.p	ass. 12:47	$\nu$ -0.4' d1	.3′ m-3.92	$\nu 0.6' \ d-0$	.7′ m1.15	$\nu 2.5' d0.$	0′ m-2.37	$\nu 2.2' d-0$	0.1′ m0.97			

h	Su	n	Moon					
Sun	GHA	Dec	GHA	ν	Dec	d	HP	
0	177°17.2	S04°58.2	309°29.6	13.6'	S19°15.2	11.0'	54.7'	
1	192°17.4	57.3	324°02.2	13.5'	19°26.1	10.9'	54.7'	
2	207°17.5 222°17.7	56.3 •• 55.3	338°34.7 353°07.2	13.5' 13.4'	19°37.0 19°47.8	10.8' 10.7'	54.7' 54.7'	
4	237°17.8	54.3	7°39.6	13.4'	19°58.5	10.6'	54.6'	
5	252°18.0	53.4	22°12.0	13.3'	20°09.1	10.5'	54.6'	
6	267°18.1	S04°52.4	36°44.3	13.3'	S20°19.6	10.4'	54.6'	
7	282°18.3	51.4	51°16.6	13.2'	20°30.0	10.3'	54.6'	
8 9	297°18.4 312°18.6	50.4 •• 49.5	65°48.8 80°21.0	13.2' 13.1'	20°40.3 20°50.6	10.2' 10.1'	54.6' 54.6'	
10	312 18.0 327°18.8	48.5	94°53.1	13.1	20° 30.0 21° 00.7	10.1	54.5	
11	342°18.9	47.5	109°25.2	13.0'	21°10.7	9.9'	54.5'	
12	357°19.1	S04°46.5	123°57.2	13.0'	S21°20.7	9.8'	54.5'	
13	12°19.2	45.5	138°29.2	12.9'	21°30.5	9.7'	54.5'	
14 15	27°19.4 42°19.5	44.6 •• 43.6	153°01.1 167°33.0	12.9' 12.8'	21°40.3 21°49.9	9.6' 9.5'	54.5' 54.5'	
16	57°19.7	42.6	107 33.0 182°04.8	12.8'	21 49.9 21°59.4	9.5 9.4'	54.5'	
17	72°19.8	41.6	196°36.6	12.7'	22°08.9	9.3'	54.5'	
18	87°20.0	S04°40.7	211°08.3	12.7'	S22°18.2	9.2'	54.4'	
19	102°20.1	39.7	225°40.0	12.6'	22°27.5	9.1'	54.4'	
20	117°20.3	38.7	240°11.6	12.6'	22°36.6	9.0'	54.4	
21 22	132°20.5 147°20.6	· · 37.7	254°43.2 269°14.7	12.5' 12.5'	22°45.6 22°54.6	8.9' 8.8'	54.4' 54.4'	
23	162°20.8	35.8	283°46.1	12.5	22°54.0 23°03.4	8.7'	54.4'	
	SD = 16.1'	d = -1.0'			0 = 14.9'			
	3D — 10.1°	u — -1.0		)L	· — 14.9			
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	177°20.9 192°21.1	\$04°34.8	298°17.5 312°48.9	12.4' 12.3'	\$23°12.1 23°20.7	8.6'	54.4'	
1 2	192°21.1 207°21.2	33.8 32.9	312°48.9 327°20.2	12.3'	23°20.7 23°29.3	8.5' 8.4'	54.4' 54.3'	
3	207 21.2 222°21.4	31.9	341°51.5	12.3	23°37.7	8.3'	54.3'	
4	237°21.6	30.9	356°22.7	12.1'	23°46.0	8.2'	54.3'	
5	252°21.7	29.9	$10^{\circ}53.8$	12.1'	23°54.1	8.1'	54.3'	
6	267°21.9	S04°28.9	25°24.9	12.0'	\$24°02.2	8.0'	54.3'	
7 8	282°22.0 297°22.2	28.0 27.0	39°55.9 54°26.9	12.0' 11.9'	24°10.2 24°18.0	7.9' 7.7'	54.3' 54.3'	
9	312°22.3	26.0	54 20.9 68°57.9	11.9'	24 18.0 24°25.8	7.7 7.6'	54.3'	
10	327°22.5	25.0	83°28.7	11.8'	24°33.4	7.5'	54.3'	
11	342°22.7	24.1	$97^{\circ}59.6$	11.8'	24°40.9	7.4'	54.3'	
12	357°22.8	S04°23.1	112°30.4	11.7'	S24°48.3	7.3'	54.3'	
13 14	12°23.0 27°23.1	22.1 21.1	127°01.1 141°31.8	11.7' 11.6'	24°55.6 25°02.8	7.2' 7.1'	54.3' 54.2'	
15	42°23.3	20.1	141 31.6 156°02.4	11.6'	25 02.8 25°09.9	6.9	54.2'	
16	57°23.4	19.2	170°33.0	11.5'	25°16.8	6.8'	54.2'	
17	72°23.6	18.2	$185^{\circ}03.5$	11.5'	$25^{\circ}23.7$	6.7'	54.2'	
18	87°23.8	S04°17.2	199°33.9	11.4'	\$25°30.4	6.6'	54.2'	
19 20	102°23.9 117°24.1	16.2 15.2	214°04.4 228°34.7	11.4' 11.3'	25°37.0 25°43.5	6.5' 6.4'	54.2' 54.2'	
21	132°24.2	14.3	243°05.1	11.3'	25 43.5 25°49.8	6.2	54.2'	
22	147°24.4	13.3	257°35.3	11.2'	25°56.1	6.1	54.2'	
23	162°24.6	12.3	272°05.5	11.2'	$26^{\circ}02.2$	6.0'	54.2'	
	SD = 16.1'	d = -1.0'		SE	0 = 14.8'			
_	CUA		CIIA		Б.	,		
Tue 0	<b>GHA</b> 177°24.7	<b>Dec</b> \$04°11.3	<b>GHA</b> 286°35.7	u  11.1'	<b>Dec</b> 526°08.2	<i>d</i> 5.9'	<b>HP</b> 54.2'	
1	192°24.9	10.3	301°05.8	11.1'	26°14.0	5.8'	54.2'	
2	207°25.0	09.4	315°35.9	11.0'	26°19.8	5.6'	54.2'	
3	222°25.2	• • 08.4	330°05.9	11.0'	26°25.4	5.5'	54.2'	
4 5	237°25.4 252°25.5	07.4 06.4	344°35.9 359°05.9	10.9' 10.9'	26°30.9 26°36.3	5.4' 5.3'	54.2' 54.2'	
6	252 25.5 267°25.7	504°05.4	13°35.8	10.9	20 30.3 S26°41.6	5.1'	54.2'	
7	282°25.8	04.5	28°05.6	10.8'	26°46.7	5.0'	54.2'	
8	297°26.0	03.5	42°35.4	10.8'	26°51.7	4.9'	54.2'	
9	312°26.2	• • 02.5	57°05.1	10.7'	26°56.6	4.8'	54.2'	
10 11	327°26.3 342°26.5	01.5 04°00.5	71°34.9 86°04.5	10.7' 10.6'	27°01.4 27°06.0	4.6' 4.5'	54.2' 54.2'	
12	357°26.6	S03°59.6	100°34.1	10.6'	\$27°10.5	4.4	54.2'	
13	12°26.8	58.6	115°03.7	10.5'	27°14.9	4.2'	54.2'	
14	27°27.0	57.6	129°33.3	10.5'	27°19.2	4.1'	54.2'	
15	42°27.1	56.6	144°02.8	10.5'	27°23.3	4.0'	54.2'	
16 17	57°27.3 72°27.5	55.6 54.7	158°32.2 173°01.7	10.4' 10.4'	27°27.3 27°31.1	3.9' 3.7'	54.2' 54.2'	
18	87°27.6	\$03°53.7	187°31.0	10.4	\$27°34.9	3.6'	54.2'	
19	102°27.8	52.7	202°00.4	10.3'	27°38.5	3.5'	54.2'	
20	117°27.9	51.7	216°29.7	10.3'	27°41.9	3.3'	54.2'	
21 22	132°28.1 147°28.3	· · 50.7 49.8	230°59.0 245°28.2	10.2' 10.2'	27°45.3 27°48.5	3.2' 3.1'	54.2' 54.2'	
23	147°28.3 162°28.4	49.8 48.8	245°28.2 259°57.4	10.2'	27°48.5 27°51.6	3.1° 2.9'	54.2' 54.2'	
25	SD = 16.1'	d = -1.0'			0 = 14.8'	2.3	J 1.2	
	JD — 10.1	u — -1.0		JL	_ 17.0			

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	04:28	05:48	06:55	17:28	18:35	19:56
N 70°	04:38	05:50	06:50	17:33	18:34	19:46
68°	04:46	05:51	06:46	17:37	18:32	19:38
66°	04:52	05:52	06:43	17:40	18:31	19:31
64°	04:57	05:53	06:40	17:43	18:30	19:26
62°	05:02	05:53	06:37	17:45	18:29	19:21
60°	05:05	05:54	06:35	17:47	18:29	19:17
N 58°	05:08	05:54	06:33	17:49	18:28	19:14
56°	05:11	05:54	06:31	17:51	18:28	19:11
54°	05:13	05:54	06:30	17:52	18:28	19:09
52°	05:15	05:55	06:28	17:54	18:27	19:07
50°	05:17	05:55	06:27	17:55	18:27	19:05
45°	05:21	05:55	06:24	17:58	18:27	19:01
<b>N</b> 40°	05:23	05:54	06:21	18:00	18:27	18:59
35°	05:25	05:54	06:19	18:02	18:28	18:57
30°	05:25	05:53	06:17	18:04	18:28	18:56
$20^{\circ}$	05:26	05:52	06:14	18:08	18:30	18:55
N 10°	05:25	05:49	06:10	18:11	18:32	18:56
0°	05:22	05:46	06:07	18:14	18:34	18:59
<b>S</b> 10°	05:18	05:43	06:04	18:17	18:38	19:02
20°	05:13	05:38	06:00	18:20	18:42	19:08
30°	05:04	05:32	05:56	18:24	18:48	19:16
$35^{\circ}$	04:58	05:28	05:54	18:27	18:52	19:22
40°	04:51	05:24	05:51	18:29	18:56	19:29
45°	04:43	05:18	05:48	18:32	19:02	19:37
<b>S</b> 50°	04:32	05:11	05:44	18:36	19:09	19:48
52°	04:26	05:08	05:42	18:38	19:12	19:53
54°	04:20	05:04	05:40	18:40	19:16	19:59
56°	04:13	05:00	05:38	18:42	19:20	20:06
58°	04:05	04:55	05:35	18:44	19:24	20:14
<b>S</b> 60°	03:56	04:50	05:33	18:47	19:30	20:23
Lat.		Moonris	e		Moonset	:
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°						
N 70°	03:04		_	03:34		_

Lat.		Moonris	е		Moonset	
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°	80:00	01:51	03:42	06:35	06:29	06:19
60°		01:25	02:59	06:52	06:55	07:02
N 58°		01:05	02:30	07:07	07:16	07:31
56°		00:48	02:08	07:20	07:33	07:54
54°		00:34	01:50	07:31	07:47	08:12
52°		00:22	01:34	07:40	08:00	08:28
50°		00:11	01:21	07:49	08:11	08:41
45°	23:48		00:54	08:08	08:35	09:09
N 40°	23:30		00:33	08:23	08:54	09:31
35°	23:15		00:15	08:36	09:10	09:49
30°	23:02		00:00	08:47	09:23	10:05
20°	22:40	23:34		09:06	09:47	10:31
N 10°	22:21	23:12		09:23	10:07	10:54
0°	22:04	22:52	23:42	09:39	10:27	11:16
<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	f Time	Mer.	Mer.	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			

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	168°40.3	163°01.2	N01°11.2	189°53.8	S10°05.7	62°15.3	N22°56.2	165°08.0	500°47.0		357°34.1	29°14.1
1	183°42.8	178°00.8	12.5	204°54.4	04.9	77° 17.8	56.2	$180^{\circ}10.2$	46.8	Alpheratz	357 34.1 353°06.6	-42°09.9
2	198°45.3	193°00.4	13.8	219°55.0	04.2	92°20.2	56.2	195°12.4	46.7	Ankaa	353 00.0 349°30.5	
3	213°47.7	208°00.1	• • 15.1	234°55.6	• • 03.5	$107^{\circ}22.7$	• • 56.2	$210^{\circ}14.6$	• • 46.6	Schedar Diphda	349 30.5 348°46.6	56°40.9 -17°50.7
4	228°50.2	222°59.7	16.4	249°56.2	02.7	122°25.1	56.2	$225^{\circ}16.8$	46.5	Achernar	335°19.9	-17 50.7 -57°06.4
5	243°52.7	237°59.4	17.6	264°56.8	02.0	137°27.6	56.2	240°19.0	46.3	Hamal	327°50.4	23°35.2
6	258°55.1	252°59.0	N01°18.9	279°57.4	<b>S</b> 10°01.3	152°30.1	N22°56.2	$255^{\circ}21.1$	S00°46.2	Polaris	313°48.6	89°22.7
7	273°57.6	267°58.6	20.2	294°58.0	$10^{\circ}00.5$	167°32.5	56.2	270°23.3	46.1	Acamar	315°11.3	-40°12.2
8	289°00.0	282°58.3	21.5	309°58.6	09°59.8	182°35.0	56.2	285°25.5	46.0	Menkar	314°05.3	4° 11.5
9	304°02.5	297°57.9	• • 22.8	324°59.3	•• 59.1	197°37.5	• • 56.2	300°27.7	• • 45.9	Mirfak	308°27.1	49°57.4
10	319°05.0	312°57.5	24.1	339°59.9	58.3	212°39.9	56.2	315°29.9	45.7	Aldebaran	290°38.6	16°33.7
11	334°07.4	327°57.2	25.4	355°00.5	57.6	227°42.4	56.3	330°32.1	45.6	Rigel	281°02.9	-8° 10.4
12	349°09.9	342°56.8	N01°26.7	10°01.1	S09°56.9	242°44.8	N22°56.3	345° 34.2	S00°45.5	Capella	280°20.5	46°01.6
13	4°12.4	357°56.4	27.9	25°01.7	56.1	257°47.3	56.3	0°36.4	45.4	Bellatrix	278°21.8	6°22.3
14	19°14.8	12°56.1	29.2	40°02.3	55.4	272°49.8	56.3	15°38.6	45.2	Elnath	278°00.6	28°37.8
15	34°17.3	27°55.7	• • 30.5	55°02.9	• • 54.7	287°52.2	• • 56.3	30°40.8	• • 45.1	Alnilam	275°36.7	-1°11.2
16	49°19.8	42°55.4	31.8	70°03.5	53.9	302°54.7	56.3	45°43.0	45.0	Betelgeuse	270°51.0	7°24.6
17	64°22.2	57°55.0	33.1	85°04.1	53.2	317°57.1	56.3	60°45.2	44.9	Canopus	263°51.8	-52°42.8
18	79°24.7	72°54.6	N01°34.4	100°04.7	S09°52.5	332°59.6	N22°56.3	75°47.3	S00°44.7	Sirius	258°25.3	-16°45.3
19	94°27.2	87°54.3	35.7	115°05.4	51.7	348°02.1	56.3	90°49.5	44.6	Adhara	255°05.0	-29°00.7
20	109°29.6	102°53.9	37.0	130°06.0	51.0	3°04.5	56.3	105°51.7	44.5	Procyon	244°49.6	5°09.4
21	124°32.1	117°53.5	• • 38.2	145°06.6	• • 50.2	18° 07.0	56.3	120°53.9	• • 44.4	Pollux	243°15.9	27°57.8
22	139°34.5	132°53.2	39.5	160°07.2	49.5	33°09.4	56.3	135°56.1	44.3	Avior	234°13.9	-59°35.8
23	154°37.0	147°52.8	40.8	175°07.8	48.8	48°11.9	56.3	150°58.2	44.1	Suhail	222°45.2	-43°32.5
Mer.p	ass. 12:43	$ u$ -0.4 $^{\prime}$ d1	.3′ m-3.92	$\nu$ 0.6′ d-0	.7′ m1.15	$\nu 2.5' \ d0.$	.0′ m-2.36	$\nu$ 2.2′ d-0	.1′ m0.96	Miaplacidus	221°37.3	-69°49.7
· ·										Alphard	217°46.5	-8°46.5
	6114	6114	_	6114	_	6114	_	G.1.4	_	Regulus	207°33.1	11°50.2
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.1	61°36.5
0	169°39.5	162°52.5	N01°42.1	190°08.4	S09°48.0	63°14.3	N22°56.3	166°00.4	\$00°44.0	Denebola	182°23.6	14°25.4
1	184°41.9	177°52.1	43.4	205°09.0	47.3	78°16.8	56.3	181°02.6	43.9	Gienah	175°42.3	-17°41.4
2	199°44.4	192°51.7	44.7	220°09.6	46.6	93°19.3	56.3	196°04.8	43.8	Acrux	172°58.4	-63°14.7
3	214°46.9	207°51.4	• • 46.0	235°10.2	• • 45.8	108°21.7	56.3	211°07.0	• • 43.6	Gacrux	$171^{\circ}50.0$	-57° 15.6
4	229°49.3	222°51.0	47.2	250°10.9	45.1	123°24.2 138°26.6	56.3	226°09.2 241°11.3	43.5	Alioth	$166^{\circ}11.6$	55°48.8
5	244°51.8	237°50.6	48.5 N01°49.8	265°11.5	44.4		56.3		43.4	Spica	158°21.0	-11° 18.0
6	259°54.3	252°50.3		280°12.1	S09°43.6	153°29.1	N22°56.3	256° 13.5	S00°43.3	Alkaid	152°50.8	49°10.7
7	274°56.7	267°49.9	51.1	295°12.7	42.9	168°31.5	56.3	271°15.7	43.1	Hadar	148°34.2	-60°29.9
8 9	289°59.2 305°01.6	282°49.5 297°49.2	52.4 •• 53.7	310°13.3 325°13.9	42.1 •• 41.4	183°34.0 198°36.4	56.3 •• 56.3	286°17.9 301°20.1	43.0 •• 42.9	Menkent	147°56.2	-36°30.0
	320°04.1	312°48.8		340°14.5				316° 22.2		Arcturus	145°46.8	19°02.5
10	320 04.1 335°06.6	312 48.8 327°48.5	55.0 56.2	340 14.5 355°15.1	40.7	213°38.9 228°41.3	56.3	310 22.2 331°24.4	42.8	Rigil Kent.	139°38.5	-60°56.5
11 12	350°09.0	342°48.1	56.2 N01°57.5	10°15.8	39.9 \$09°39.2	243°43.8	56.3	331 24.4 346°26.6	42.7	Kochab	$137^{\circ}19.1$	74°02.5
	5° 11.5	357°47.7	01°58.8	25°16.4	38.5	258°46.2	N22°56.3	1°28.8	\$00°42.5	Zuben'ubi	136°54.7	$-16^{\circ}09.1$
13 14	5 11.5 20°14.0	357 47.7 12°47.4	01 58.8 02°00.1	25 16.4 40°17.0	38.5 37.7	258 46.2 273°48.7	56.3 56.3	1 28.8 16°31.0	42.4 42.3	Alphecca	126°02.8	26°37.3
15	35°16.4	27°47.0	•• 01.4	55°17.6	• • 37.0	288°51.2	56.3	31°33.2	• • 42.2	Antares	112°14.6	-26°29.4
16	50°18.9	42°46.6	02.7	70°18.2	36.2	303°53.6	56.3	46°35.3	42.2	Atria	107°07.9	-69°04.2
17	65°21.4	57°46.3	04.0	85°18.8	35.5	318° 56.1	56.3	61°37.5	41.9	Sabik	102°01.6	-15°45.5
18	80°23.8	72°45.9	N02°05.2	100°19.4	S09°34.8	333°58.5	N22°56.3	76°39.7	S00°41.8	Shaula	96°09.1	-37°07.3
19	95°26.3	87°45.6	06.5	115°20.1	34.0	349°01.0	56.3	91°41.9	41.7	Rasalhague	95°57.7	12°32.2
20	110°28.8	102°45.2	00.3	130°20.7	33.3	4°03.4	56.3	106°44.1	41.7	Eltanin	90°41.8	51°28.7
21	125°31.2	102 43.2 117°44.8	•• 09.1	145°21.3	• • 32.5	19°05.8	56.3	121°46.2	• • 41.4	Kaus Aust.	83°31.3	-34°22.3
22	140°33.7	132°44.5	10.4	160°21.9	31.8	34°08.3	56.3	136°48.4	41.3	Vega	80°32.7	38°48.1
23	155°36.1	147°44.1	11.7	175°22.5	31.1	49° 10.7	56.3	151°50.6	41.2	Nunki	75°46.7	-26° 15.8
23	133 30.1									Altair	61°59.2	8°56.1
Mer.p	ass. 12:39	$ u$ -0.4 $^{\prime}$ $d1$	.3′ m-3.92	$\nu$ 0.6′ d-0	$0.7'  \mathrm{m}1.16$	$\nu 2.5' \ d0.$	.0′ m-2.36	$\nu 2.2' \ d-0$	.1' m $0.96$	Peacock	53°04.6	-56°38.9
										Deneb	49°25.5	45°22.2
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.1	9°59.6
0	170°38.6	162°43.7	N02°13.0	190°23.1	S09°30.3	64°13.2	N22°56.3	166° 52.8	S00°41.1	Al Na'ir	27°32.1	-46°50.0
1	185°41.1	177°43.4	14.2	205°23.7	29.6	79°15.6	56.3	181°55.0	40.9	Fomalhaut	15°13.8	-29°29.1
2	200°43.5	192°43.0	15.5	200°24.4	28.8	94°18.1	56.3	196° 57.1	40.9	Scheat	13°44.6	28°13.4
3	215°46.0	207°42.6	. 16.8	235°25.0	28.1	109°20.5	. 56.3	211°59.3	• • 40.7	Markab	13°29.3	15°20.7
4	230°48.5	222°42.3	18.1	250°25.6	27.4	109°20.3	56.3	211 39.3 227°01.5	40.6	Mar 11 Wed	SHA	Mer.pass
5	245°50.9	237°41.9	19.4	265°26.2	26.6	139°25.4	56.3	242°03.7	40.4	Venus	354°20.8	13:08
6	260°53.4	252°41.6	N02°20.7	280°26.8	S09°25.9	154°27.9	N22°56.3	257°05.9	S00°40.3	Mars	21°13.4	11:20
7	275°55.9	267°41.2	22.0	295°27.4	25.1	169°30.3	56.3	272°08.1	40.2	Jupiter	253°35.0	19:48
8	290°58.3	282°40.8	23.2	310°28.1	24.4	184°32.8	56.3	287° 10.2	40.1	Saturn	356°27.7	12:58
9	306°00.8	297°40.5	• • 24.5	325°28.7	• • 23.7	199°35.2	56.3	302°12.4	39.9			
10	321°03.3	312°40.1	25.8	340°29.3	22.9	214°37.7	56.3	317°14.6	39.8	Mar 12 Thu	SHA	Mer.pass
11	336°05.7	327°39.7	27.1	355°29.9	22.2	229°40.1	56.3	332°16.8	39.7	Venus	353°13.0	13:09
12	351°08.2	342°39.4	N02°28.4	10°30.5	S09°21.4	244°42.5	N22°56.3	347°19.0	S00°39.6	Mars	20°28.9	11:19
13	6°10.6	357°39.0	29.7	25°31.1	20.7	259°45.0	56.3	2°21.1	39.5	Jupiter	253°34.9	19:44
14	21°13.1	12°38.6	30.9	40°31.7	20.0	274°47.4	56.3	17°23.3	39.3	Saturn	356°21.0	12:54
15	36°15.6	27°38.3	• • 32.2	55°32.4	19.2	289°49.9	• • 56.3	32°25.5	39.2	Mar 13 Fri	SHA	Mer.pass
16	51°18.0	42°37.9	33.5	70°33.0	18.5	304°52.3	56.3	47° 27.7	39.1	Venus	352°05.1	13:09
17	66°20.5	57°37.5	34.8	85°33.6	17.7	319°54.7	56.3	62°29.9	39.0	Mars	19°44.5	11:18
18	81°23.0	72°37.2	N02°36.1	100°34.2	S09°17.0	334°57.2	N22°56.3	77°32.0	S00°38.8	Jupiter	253°34.6	19:40
19	96°25.4	87°36.8	37.4	115°34.8	16.2	349°59.6	56.3	92°34.2	38.7	Saturn	356°14.2	12:51
20	111°27.9	102°36.5	38.7	130°35.5	15.5	5°02.1	56.3	107°36.4	38.6	Jatuill	JJJ 17.2	16.91
21	126°30.4	117°36.1	39.9	145°36.1	14.8	20°04.5	56.3	122°38.6	38.5	Horizont	al parallax	
22	141°32.8	132°35.7	41.2	160°36.7	14.0	35°07.0	56.3	137°40.8	38.3		Venus:	0.1
23	156°35.3	147°35.4	42.5	175°37.3	13.3	50°09.4	56.3	152°43.0	38.2		Mars:	0.1
ivier.p	ass. 12:35	$\nu$ -0.4 dl	.3′ m-3.92	$\nu$ 0.0 $a$ -0	).7′ m1.16	ν2.4 aU.	.0′ m-2.35	$\nu 2.2^{\circ} a-0$	.1' m $0.96$			

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	177°28.6	S03°47.8	274°26.6	10.1'	\$27°54.5	2.8'	54.2'
1	192°28.8	46.8	288°55.7	10.1'	27°57.3	2.7'	54.2'
2	207°28.9 222°29.1	45.8 •• 44.8	303°24.8 317°53.9	10.1' 10.0'	28°00.0 28°02.5	2.5' 2.4'	54.2' 54.2'
4	237° 29.2	43.9	332°22.9	10.0	28°04.9	2.3'	54.2'
5	252° 29.4	42.9	346°51.9	10.0'	28°07.2	2.1'	54.2'
6	267° 29.6	S03°41.9	1°20.9	10.0'	S28°09.3	2.0'	54.2'
7	282°29.7 297°29.9	40.9	15°49.9	9.9'	28°11.3	1.9'	54.2'
8 9	297°29.9 312°30.1	39.9 •• 39.0	30°18.8 44°47.7	9.9' 9.9'	28°13.2 28°14.9	1.7' 1.6'	54.2' 54.2'
10	327° 30.2	38.0	59°16.6	9.9'	28°16.5	1.5'	54.2'
11	342°30.4	37.0	73°45.4	9.8'	28°18.0	1.3'	54.2'
12	357°30.6	S03°36.0	88°14.3	9.8'	\$28°19.3	1.2'	54.2'
13 14	12°30.7 27°30.9	35.0 34.0	102°43.1 117°11.9	9.8' 9.8'	28°20.5 28°21.5	1.0' 0.9'	54.2' 54.3'
14 15	42°31.0	33.1	117 11.9 131°40.6	9.8 9.8'	28°22.4	0.9	54.3'
16	57° 31.2	32.1	146°09.4	9.7'	28°23.2	0.6'	54.3'
17	72°31.4	31.1	160°38.1	9.7'	28°23.8	0.5'	54.3'
18	87°31.5	S03°30.1	175°06.9	9.7'	\$28°24.3	0.4'	54.3'
19 20	102°31.7 117°31.9	29.1 28.1	189°35.6 204°04.2	9.7' 9.7'	28°24.7 28°24.9	0.2' 0.1'	54.3' 54.3'
21	132° 32.0	27.2	218°32.9	9.7' 9.7'	28°25.0	-0.1	54.3'
22	147°32.2	26.2	233°01.6	9.7'	28°24.9	-0.2'	54.3'
23	162°32.4	25.2	247°30.2	9.6'	28°24.7	-0.3'	54.3'
	SD = 16.1'	d = -1.0'		SD	0 = 14.8'		
Thu	GHA	Dec	GHA	ν	Dec	d	НР
0	177°32.5	503°24.2	261°58.9	ν 9.6'	\$28°24.4	-0.5'	54.3'
1	192°32.7	23.2	276°27.5	9.6'	$28^{\circ}23.9$	-0.6'	54.4'
2	207° 32.9	22.2	290°56.1	9.6'	28°23.3	-0.8'	54.4'
3	222°33.0	• • 21.3	305°24.7	9.6'	28°22.5	-0.9'	54.4'
4 5	237°33.2 252°33.4	20.3 19.3	319°53.3 334°22.0	9.6' 9.6'	28°21.6 28°20.6	-1.0' -1.2'	54.4' 54.4'
6	267° 33.5	S03°18.3	348°50.6	9.6'	\$28°19.4	-1.3'	54.4'
7	282°33.7	17.3	3°19.1	9.6'	28°18.1	-1.5'	54.4'
8	297° 33.9	16.3	17°47.7	9.6'	28°16.6	-1.6'	54.4'
9	312°34.0 327°34.2	• • 15.4	32°16.3 46°44.9	9.6' 9.6'	28°15.0 28°13.3	-1.7'	54.4' 54.5'
10 11	342° 34.4	14.4 13.4	46 44.9 61°13.5	9.6' 9.6'	28 13.3 28°11.4	-1.9' -2.0'	54.5'
12	357° 34.5	S03°12.4	75°42.1	9.6'	S28°09.4	-2.2'	54.5'
13	12°34.7	11.4	90°10.7	9.6'	28°07.2	-2.3'	54.5'
14	27°34.9	10.4	104°39.3	9.6'	28°04.9	-2.4'	54.5'
15 16	42°35.0 57°35.2	· · 09.5 08.5	119°08.0 133°36.6	9.6' 9.6'	28°02.5 27°59.9	-2.6' -2.7'	54.5' 54.5'
17	72° 35.4	07.5	148°05.2	9.6'	27°57.2	-2.9'	54.6'
18	87° 35.5	S03°06.5	162°33.8	9.6'	S27°54.3	-3.0'	54.6'
19	102°35.7	05.5	177°02.5	9.7'	27°51.3	-3.1'	54.6'
20	117°35.9 132°36.0	04.5	191°31.1 205°59.8	9.7'	27°48.2 27°44.9		54.6'
21 22	132 36.0 147°36.2	· · 03.5 02.6	205 59.8 220°28.5	9.7' 9.7'	27 44.9 27°41.5	-3.4' -3.6'	54.6' 54.6'
23	162°36.4	01.6	234°57.2	9.7'	27°37.9	-3.7'	54.7'
	SD = 16.1'	d = -1.0'		SD	0 = 14.8'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	177° 36.6	S03°00.6	249°25.9	9.7'	S27°34.2	-3.8'	54.7'
1	192°36.7	$02^{\circ}59.6$	263°54.6	9.7'	27°30.4	-4.0'	54.7'
2	207°36.9	58.6	278°23.3	9.8'	27°26.4	-4.1'	54.7'
3 4	222°37.1 237°37.2	· · 57.6 56.6	292°52.1 307°20.9	9.8' 9.8'	27°22.3 27°18.1	-4.2' -4.4'	54.7' 54.7'
5	252° 37.4	55.7	301° 20.9 321° 49.7	9.8'	27°13.7	-4.5'	54.8'
6	267° 37.6	S02°54.7	336°18.5	9.8'	S27°09.2	-4.7'	54.8'
7	282°37.7	53.7	350°47.3	9.9'	27°04.5	-4.8'	54.8'
8 9	297°37.9 312°38.1	52.7 •• 51.7	5°16.2 19°45.0	9.9' 9.9'	26°59.7 26°54.8	-4.9' -5.1'	54.8' 54.8'
10	312 36.1 327°38.2	50.7	34°13.9	9.9 9.9'	26°49.7	-5.1 -5.2'	54.6 54.9'
11	342°38.4	49.7	48°42.9	10.0'	26°44.5	-5.3	54.9'
12	357° 38.6	S02°48.8	63°11.8	10.0'	S26°39.2	-5.5'	54.9'
13 14	12°38.8 27°38.9	47.8 46.8	77°40.8 92°09.8	10.0' 10.0'	26°33.7 26°28.1	-5.6' -5.7'	54.9' 54.9'
14 15	42° 39.1	46.8 •• 45.8	92°09.8 106°38.8	10.0	26°22.4	-5.7' -5.9'	54.9 55.0'
16	57° 39.3	44.8	121°07.9	10.1'	26°16.5	-6.0'	55.0'
17	72°39.4	43.8	135°37.0	10.1'	26°10.5	-6.1'	55.0'
18	87°39.6	S02°42.8	150°06.1	10.1'	\$26°04.3	-6.3'	55.0'
19 20	102°39.8 117°39.9	41.9 40.9	164°35.2 179°04.4	10.2' 10.2'	25°58.1 25°51.7	-6.4' -6.5'	55.1' 55.1'
21	132° 40.1	• • 39.9	179 04.4 193°33.6	10.2'	25°45.1	-6.7'	55.1
22	147°40.3	38.9	208°02.9	10.3'	25°38.4	-6.8'	55.1'
23	162°40.5	37.9	222°32.1	10.3'	25°31.6	-6.9'	55.1'
	SD = 16.1'	d = -1.0'		SD	0 = 14.9'		

	Twi	light			Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	04:11	05:33	06:40	17:42	18:49	20:12
<b>N</b> 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
<b>N</b> 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
N $10^{\circ}$	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> $10^{\circ}$	05:19	05:43	06:04	18:15	18:36	19:01
$20^{\circ}$	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
Las		Moonrise			Moonset	;
Lat.	Wed	Thu	Fri	Wed	Thu	Fri

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
<b>N</b> 40°	01:32	02:26	03:13	10:15	11:08	12:07
35°	01:13	02:06	02:54	10:35	11:27	12:25
30°	00:56	01:49	02:38	10:52	11:44	12:41
20°	00:28	01:21	02:11	11:20	12:12	13:07
N 10°	00:04	00:56	01:47	11:44	12:36	13:30
0°		00:34	01:26	12:07	12:59	13:51
<b>S</b> 10°		00:11	01:04	12:29	13:21	14:11
20°	23:47		00:40	12:54	13:45	14:34
30°	23:18		00:13	13:22	14:13	14:59
35°	23:02	23:57		13:39	14:30	15:15
40°	22:42	23:38		13:58	14:49	15:32
45°	22:18	23:15		14:22	15:12	15:53
<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.	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	09:34	09:26	12:09	07:38	20:04			

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

h	Aries	Ve	nus	M	ars	Jup	iter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	171°37.8	162°35.0	N02°43.8	190°37.9	S09°12.5	65°11.8	N22°56.3	167° 45.1	S00°38.1			
1	186°40.2	177°34.6	45.1	205°38.5	11.8	80° 14.3	56.3	182° 47.3	38.0	Alpheratz	357°34.1	29°14.1
2	201°42.7	192°34.3	46.4	220° 39.2	11.0	95° 16.7	56.3	197°49.5	37.9	Ankaa	353°06.6	-42°09.9
3	216°45.1	207°33.9	47.6	235°39.8	. 10.3	110° 19.1	56.3	212°51.7	37.7	Schedar	349°30.5	56°40.9
4	231°47.6	222°33.5	48.9	250°40.4	09.6	$125^{\circ}21.6$	56.3	227°53.9	37.6	Diphda	348°46.6	-17°50.7
5	$246^{\circ}50.1$	237°33.2	50.2	265°41.0	8.80	$140^{\circ}24.0$	56.3	242°56.0	37.5	Achernar	335°19.9	-57°06.4 23°35.2
6	261°52.5	252°32.8	N02°51.5	280°41.6	S09°08.1	155° 26.5	N22°56.3	257° 58.2	S00°37.4	Hamal Polaris	327°50.4 313°49.7	23 35.2 89°22.7
7	276°55.0	267°32.4	52.8	295°42.3	07.3	170°28.9	56.3	273°00.4	37.2	Acamar	315° 11.3	-40°12.2
8	291°57.5	282°32.1	54.1	310°42.9	06.6	185°31.3	56.3	288°02.6	37.1	Menkar	314°05.3	4°11.5
9	306°59.9	297°31.7	• • 55.3	325°43.5	• • 05.8	200° 33.8	• • 56.3	303°04.8	• • 37.0	Mirfak	308° 27.1	49°57.4
10	322°02.4	312°31.4	56.6	340°44.1	05.1	215°36.2	56.3	318°06.9	36.9	Aldebaran	290°38.6	16°33.7
11	337°04.9	327°31.0	57.9	355°44.7	04.3	230°38.6	56.3	333°09.1	36.7	Rigel	281°02.9	-8°10.4
12	352°07.3 7°09.8	342°30.6 357°30.3	N02°59.2 03°00.5	10°45.4 25°46.0	S09°03.6	245° 41.1 260° 43.5	N22°56.3	348° 11.3 3° 13.5	\$00°36.6	Capella	280°20.5	46°01.6
13 14	7 09.8 22°12.2	12°29.9	03 00.5	40°46.6	02.9 02.1	200 45.5 275°45.9	56.3 56.3	3 13.5 18° 15.7	36.5 36.4	Bellatrix	$278^{\circ}21.8$	6°22.3
15	37°14.7	27°29.5	03.0	55°47.2	01.4	290°48.4	56.3	33° 17.8	• • 36.3	Elnath	278°00.6	28°37.8
16	52°17.2	42°29.2	04.3	70°47.8	09°00.6	305°50.8	56.3	48° 20.0	36.1	Alnilam	275°36.7	-1°11.2
17	67°19.6	57°28.8	05.6	85°48.5	08°59.9	320°53.2	56.3	63°22.2	36.0	Betelgeuse	270°51.0	7°24.6
18	82°22.1	72°28.4	N03°06.9	100°49.1	S08°59.1	335°55.7	N22°56.3	78°24.4	S00°35.9	Canopus	263°51.8	-52°42.8
19	97°24.6	87°28.1	08.2	$115^{\circ}49.7$	58.4	350°58.1	56.3	93°26.6	35.8	Sirius	258° 25.3 255° 05.0	-16°45.3 -29°00.7
20	$112^{\circ}27.0$	102°27.7	09.4	130°50.3	57.6	6°00.5	56.3	108°28.7	35.6	Adhara Procyon	255 05.0 244°49.6	5°09.4
21	127°29.5	$117^{\circ}27.3$	• • 10.7	145°50.9	• • 56.9	21°03.0	• • 56.3	123°30.9	• • 35.5	Pollux	243°15.9	27°57.8
22	142°32.0	132°27.0	12.0	160°51.6	56.1	36°05.4	56.3	138°33.1	35.4	Avior	234°13.9	-59°35.8
23	157°34.4	147°26.6	13.3	175°52.2	55.4	51°07.8	56.3	153°35.3	35.3	Suhail	222°45.3	-43°32.5
Mer.p	ass. 12:31	$\nu$ -0.4' d1	.3′ m-3.92	$\nu$ 0.6′ d-0	.7′ m1.16	$\nu 2.4' \ d-0$	.0′ m-2.34	$\nu 2.2' \ d-0$	.1′ m0.95	Miaplacidus	221°37.4	-69°49.7
<u>.</u>									-	Alphard	$217^{\circ}46.5$	-8°46.5
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.1	11°50.2
0	172°36.9	162°26.2	N03°14.6	190°52.8	S08°54.6	66° 10.3	N22°56.3	168° 37.5	S00°35.1	Dubhe	193°39.1	61°36.5
1	187°39.4	177°25.9	15.8	205°53.4	53.9	81° 12.7	56.3	183°39.6	35.0	Denebola	182°23.6	14°25.4
2	202°41.8	192°25.5	17.1	220°54.0	53.2	96° 15.1	56.3	198°41.8	34.9	Gienah	175°42.3	-17°41.4
3	217°44.3	207°25.1	. 18.4	235°54.7	52.4	111° 17.5	56.3	213° 44.0	• • 34.8	Acrux	172°58.4	-63°14.7
4	232°46.7	222°24.8	19.7	250°55.3	51.7	126°20.0	56.3	228°46.2	34.7	Gacrux Alioth	171°50.0 166°11.6	-57°15.6 55°48.8
5	247°49.2	237°24.4	21.0	265°55.9	50.9	141°22.4	56.3	243°48.4	34.5	Spica	158° 21.0	-11°18.0
6	262°51.7	252°24.0	N03°22.2	280°56.5	S08°50.2	156° 24.8	N22°56.3	258° 50.5	500°34.4	Alkaid	150° 21.0° 152° 50.8	49°10.7
7	$277^{\circ}54.1$	$267^{\circ}23.7$	23.5	295°57.2	49.4	171°27.3	56.3	273°52.7	34.3	Hadar	148° 34.1	-60°29.9
8	292°56.6	282°23.3	24.8	310°57.8	48.7	186° 29.7	56.3	288° 54.9	34.2	Menkent	147°56.2	-36°30.0
9	307°59.1	297°22.9	26.1	325°58.4	• • 47.9	201°32.1	• • 56.3	303°57.1	• • 34.0	Arcturus	145°46.8	19°02.5
10	323°01.5	312°22.6	27.4	340°59.0	47.2	216°34.5	56.3	318°59.3	33.9	Rigil Kent.	139°38.5	-60°56.5
11	338°04.0	327°22.2	28.6 N03°29.9	355°59.6	46.4 \$08°45.7	231°37.0	56.3	334°01.4 349°03.6	33.8	Kochab	$137^{\circ}19.0$	74°02.5
12 13	353°06.5 8°08.9	342°21.8 357°21.5	31.2	11°00.3 26°00.9	44.9	246°39.4 261°41.8	N22°56.3 56.3	4° 05.8	\$00°33.7 33.5	Zuben'ubi	136°54.7	-16°09.1
14	23°11.4	12°21.1	32.5	41°01.5	44.2	276°44.2	56.3	19°08.0	33.4	Alphecca	126°02.7	26°37.3
15	38°13.9	27°20.7	33.8	56°02.1	• • 43.4	291°46.7	56.3	34° 10.2	• • 33.3	Antares	112°14.5	-26°29.4
16	53°16.3	42°20.4	35.0	71°02.8	42.7	306°49.1	56.3	49° 12.3	33.2	Atria	107°07.8	-69°04.2
17	68°18.8	57°20.0	36.3	86°03.4	41.9	321°51.5	56.3	64° 14.5	33.1	Sabik Shaula	102°01.6 96°09.0	-15°45.5 -37°07.3
18	83°21.2	72° 19.6	N03°37.6	101°04.0	S08°41.2	336°53.9	N22°56.2	79° 16.7	S00°32.9	Rasalhague	95° 57.6	12°32.2
19	98°23.7	$87^{\circ}19.3$	38.9	116°04.6	40.4	351°56.4	56.2	94°18.9	32.8	Eltanin	90°41.8	51°28.7
20	113°26.2	102° 18.9	40.2	131°05.3	39.7	6°58.8	56.2	109°21.1	32.7	Kaus Aust.	83°31.3	-34°22.3
21	128°28.6	117° 18.5	• • 41.4	146°05.9	• • 38.9	22°01.2	56.2	124°23.2	• • 32.6	Vega	80°32.7	38°48.1
22	143°31.1	132°18.2	42.7	161°06.5	38.2	37°03.6	56.2	139°25.4	32.4	Nunki	75°46.7	-26°15.8
23	158°33.6	147°17.8	44.0	176°07.1	37.4	52°06.1	56.2	154°27.6	32.3	Altair	61°59.2	8°56.1
Mer.p	ass. 12:27	$\nu$ -0.4 $^{\prime}$ d1.	.3′ m-3.92	$\nu$ 0.6′ d-0	.7'  m $1.16$	$\nu$ 2.4′ d-0	.0′ m-2.33	$\nu$ 2.2′ d-0	.1' m $0.95$	Peacock	53°04.6	-56°38.9
										Deneb	49°25.5	45°22.2
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.1	9°59.6
0	173°36.0	162°17.4	N03°45.3	191°07.8	S08°36.7	67°08.5	N22°56.2	169°29.8	500°32.2	Al Na'ir Fomalhaut	27°32.1 15°13.8	-46°50.0 -29°29.1
1	188°38.5	$177^{\circ}17.1$	46.5	$206^{\circ}08.4$	35.9	$82^{\circ}10.9$	56.2	184°32.0	32.1	Scheat	13°44.6	28°13.4
2	203°41.0	$192^{\circ}16.7$	47.8	221°09.0	35.2	$97^{\circ}13.3$	56.2	$199^{\circ}34.1$	31.9	Markab	13° 29.2	15°20.7
3	218°43.4	207°16.3	• • 49.1	236°09.6	• • 34.4	112° 15.7	• • 56.2	214°36.3	• • 31.8			
4	233°45.9	222°16.0	50.4	251°10.3	33.7	127° 18.2	56.2	229°38.5	31.7	Mar 14 Sat	SHA	Mer.pass
5	248°48.3	237°15.6	51.7	266°10.9	32.9	142°20.6	56.2	244°40.7	31.6	Venus		13:10
6	263°50.8	252°15.2	N03°52.9	281°11.5	508°32.2	157°23.0	N22°56.2	259°42.9	S00°31.4	Mars	19°00.2	11:17
7 8	278°53.3 293°55.7	267°14.9 282°14.5	54.2	296°12.1 311°12.8	31.4 30.7	172°25.4 187°27.8	56.2 56.2	274° 45.0 289° 47.2	31.3 31.2	Jupiter Saturn	253°34.1 356°07.4	19:36 12:47
9	293 55.7 308°58.2	282 14.5 297°14.1	55.5 •• 56.8	311 12.8 326°13.4	29.9	202°30.3	56.2	289 47.2 304°49.4	31.2			
10	306 56.2 324°00.7	312° 13.8	58.0	341°14.0	29.9	202 30.3 217°32.7	56.2	319°51.6	31.1	Mar 15 Sun	SHA	Mer.pass
11	339°03.1	327°13.4	03°59.3	356°14.6	28.4	232°35.1	56.2	334°53.8	30.8		349°49.4	13:11
12	354°05.6	342°13.0	N04°00.6	11°15.3	S08°27.7	247° 37.5	N22°56.2	349°55.9	S00°30.7	Mars	18° 15.9	11:16
13	9°08.1	$357^{\circ}12.7$	01.9	$26^{\circ}15.9$	26.9	262°39.9	56.2	4°58.1	30.6		253°33.4	19:32
14	$24^{\circ}10.5$	$12^{\circ}12.3$	03.1	$41^{\circ}16.5$	26.2	$277^{\circ}42.3$	56.2	$20^{\circ}00.3$	30.5	Saturn	356°00.6	12:44
15	39°13.0	27°11.9	• • 04.4	56° 17.1	• • 25.4	292°44.8	• • 56.2	35°02.5	• • 30.3	Mar 16 Mon	SHA	Mer.pass
16	54° 15.5	42°11.6	05.7	71°17.8	24.7	307°47.2	56.2	50°04.7	30.2	1	348°41.4	13:11
17	69°17.9	57°11.2	07.0	86°18.4	23.9	322°49.6	56.2	65°06.8	30.1	Mars	17°31.7	11:15
18	84°20.4	72°10.8	N04°08.2	101°19.0	508°23.2	337°52.0	N22°56.2	80°09.0	S00°30.0		253°32.4	19:28
19	99°22.8	87°10.5	09.5 10.8	116° 19.6	22.4	352°54.4	56.2	95°11.2	29.8	Saturn	355°53.8	12:40
20 21	114°25.3 129°27.8	102°10.1 117°09.7	10.8 •• 12.1	131°20.3 146°20.9	21.7 •• 20.9	7°56.8 22°59.2	56.2 •• 56.2	110° 13.4 125° 15.6	29.7 •• 29.6	Horizont	al parallax	
22	144°30.2	117 09.7 132°09.3	13.3	140 20.9 161°21.5	20.9	38°01.7	56.2	140° 17.7	29.5		Venus:	0.1
23	159°32.7	147°09.0	14.6	176°22.2	19.4	53°04.1	56.2	155° 19.9	29.4		Mars:	0.1
			.3′ m-3.92		.8′ m1.16		.0′ m-2.32		.1′ m0.95	_		
ivier.p	ass. 12:24	ν-0.4 α1	.5 111-5.92	$\nu$ 0.0 $a$ -0	.0 111.10	ν2.4 a-U	.0 111-2.32	$\nu z.z = a-0$	.1 1110.95			

h	Su	Moon						
Sat	GHA	Dec	GHA	ν	Dec	d	HP	
0	177°40.6	S02°36.9	$237^{\circ}01.4$	10.3'	\$25°24.7	-7.1'	55.2'	
1	192°40.8	35.9	251°30.8	10.4	25°17.6	-7.2'	55.2'	
2	207°41.0 222°41.1	35.0 •• 34.0	266°00.1 280°29.5	10.4' 10.4'	25°10.4 25°03.1	-7.3' -7.5'	55.2' 55.2'	
4	237°41.3	33.0	294°59.0	10.5	24°55.7	-7.6'	55.3'	
5	252°41.5	32.0	$309^{\circ}28.5$	10.5'	$24^{\circ}48.1$	-7.7'	55.3'	
6	267°41.7	<b>S</b> 02°31.0	323°58.0	10.5'	S24°40.4	-7.8'	55.3'	
7 8	282°41.8 297°42.0	30.0 29.0	338°27.5 352°57.1	10.6' 10.6'	24°32.5 24°24.6	-8.0' -8.1'	55.3' 55.4'	
9	312°42.2	28.1	7°26.7	10.0	24°24.0	-8.2'	55.4'	
10	327°42.4	27.1	21°56.4	10.7'	24°08.3	-8.3	55.4'	
11	342°42.5	26.1	$36^{\circ}26.1$	10.7'	23°59.9	-8.5'	55.4'	
12	357°42.7	S02°25.1	50°55.8	10.8'	\$23°51.5	-8.6'	55.5'	
13 14	12°42.9 27°43.0	24.1 23.1	65°25.6 79°55.4	10.8' 10.9'	23°42.9 23°34.2	-8.7' -8.8'	55.5' 55.5'	
15	42°43.2	22.1	94° 25.3	10.9	23°25.3	-0.0' -9.0'	55.5'	
16	57°43.4	21.1	108°55.2	10.9'	$23^{\circ}16.4$	-9.1'	55.6'	
17	72°43.6	20.2	123°25.1	11.0'	23°07.3	-9.2'	55.6'	
18 19	87°43.7 102°43.9	\$02°19.2 18.2	137°55.1 152°25.1	11.0' 11.1'	\$22°58.1 22°48.8	-9.3' -9.4'	55.6' 55.6'	
20	102 43.9 117°44.1	18.2 17.2	152 25.1 166°55.1	11.1	22 48.8 22°39.4	-9.4 -9.6'	55.7'	
21	132°44.3	. 16.2	181°25.2	11.1'	22°29.8	-9.7'	55.7'	
22	147°44.4	15.2	195°55.4	11.2'	22°20.1	-9.8'	55.7'	
23	162°44.6	14.2	210°25.5	11.2'	22°10.4	-9.9'	55.8'	
	SD = 16.1'	d = -1.0'		SE	0 = 15.0'			
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	177°44.8	S02°13.2	224°55.7	11.3'	S22°00.5	-10.0'	55.8'	
1	192°45.0	12.3	239° 26.0	11.3'	21°50.4	-10.1'	55.8'	
2	207°45.1 222°45.3	11.3 · · 10.3	253°56.3 268°26.6	11.3' 11.4'	21°40.3 21°30.0	-10.3' -10.4'	55.8' 55.9'	
4	237°45.5	09.3	282°57.0	11.4'	21°19.7	-10.4	55.9'	
5	252°45.6	08.3	297°27.4	11.5'	21°09.2	-10.6'	55.9'	
6	267°45.8	<b>S</b> 02°07.3	311°57.9	11.5'	S20°58.6	-10.7'	56.0'	
7	282°46.0	06.3	326° 28.4	11.5'	20°47.9	-10.8'	56.0'	
8 9	297°46.2 312°46.3	05.3 •• 04.4	340°58.9 355°29.5	11.6' 11.6'	20°37.1 20°26.2	-10.9' -11.0'	56.0' 56.0'	
10	327°46.5	03.4	10°00.1	11.7'	20° 15.2	-11.1'	56.1'	
11	342°46.7	02.4	24°30.7	11.7'	20°04.0	-11.2'	56.1'	
12	357°46.9	S02°01.4	39°01.4	11.7'	\$19°52.8	-11.4'	56.1'	
13 14	12°47.0 27°47.2	02°00.4 01°59.4	53°32.2 68°02.9	11.8' 11.8'	19°41.4 19°30.0	-11.5' -11.6'	56.2' 56.2'	
15	42°47.4	• 58.4	82° 33.7	11.8'	19°18.4	-11.7'	56.2'	
16	57°47.6	57.4	97°04.6	11.9'	$19^{\circ}06.7$	-11.8'	56.3'	
17	72°47.7	56.4	111°35.5	11.9'	18°55.0	-11.9'	56.3'	
18 19	87°47.9 102°48.1	S01°55.5 54.5	126°06.4 140°37.4	12.0' 12.0'	\$18°43.1 18°31.1	-12.0' -12.1'	56.3' 56.3'	
20	102 48.1 117°48.3	53.5	155° 08.4		18°19.0		56.4	
21	132°48.5	• • 52.5	169°39.4	12.1'	18°06.9	-12.3'	56.4'	
22	147°48.6	51.5	184° 10.5	12.1'	17°54.6	-12.4'	56.4'	
23	162°48.8	50.5	198°41.6	12.1'	17°42.2	-12.5'	56.5'	
	SD = 16.1'	d = -1.0'		SL	0 = 15.2'			
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0 1	177°49.0 192°49.2	S01°49.5 48.5	213° 12.7 227° 43.9	12.2' 12.2'	\$17°29.7 17°17.2	-12.6' -12.7'	56.5' 56.5'	
2	207°49.3	46.5 47.6	242° 15.1	12.2'	17°17.2	-12.7 -12.8'	56.6'	
3	222°49.5	• • 46.6	256°46.3	12.3'	$16^{\circ}51.8$	-12.8'	56.6'	
4	237°49.7	45.6	271°17.6	12.3'	16°38.9	-12.9'	56.6'	
5 6	252°49.9 267°50.0	44.6 501°43.6	285°48.9 300°20.3	12.3' 12.4'	16°26.0 \$16°12.9	-13.0' -13.1'	56.7' 56.7'	
7	282°50.2	42.6	300 20.3 314°51.7	12.4 12.4'	15°59.8	-13.1 -13.2'	56.7'	
8	297°50.4	41.6	329°23.1	12.4'	15°46.6	-13.3'	56.7'	
9	312°50.6	• • 40.6	343°54.5	12.5'	15°33.3	-13.4'	56.8'	
10 11	327°50.7 342°50.9	39.6 38.7	358°26.0 12°57.5	12.5' 12.5'	15°19.9 15°06.4	-13.5' -13.6'	56.8' 56.8'	
12	342°50.9 357°51.1	38.7 \$01°37.7	12°57.5 27°29.0	12.6'	514°52.9	-13.6'	56.9	
13	12°51.3	36.7	42°00.6	12.6'	$14^{\circ}39.2$	-13.7'	56.9	
14	27°51.5	35.7	56°32.2	12.6'	14°25.5	-13.8'	56.9'	
15 16	42°51.6 57°51.8	· · 34.7 33.7	71°03.8 85°35.4	12.6' 12.7'	14°11.7 13°57.8	-13.9'	57.0'	
16 17	57°51.8 72°52.0	33.7 32.7	85°35.4 100°07.1	12.7' 12.7'	13°57.8 13°43.8	-14.0' -14.1'	57.0' 57.0'	
18	87°52.2	S01°31.7	114° 38.8	12.7'	\$13°29.7	-14.1'	57.1	
19	102°52.3	30.7	129° 10.5	12.7'	13°15.6	-14.2'	57.1'	
20	117°52.5 132°52.7	29.8	143°42.2	12.8' 12.8'	13°01.4 12°47.1	-14.3'	57.1'	
21 22	132°52.7 147°52.9	· · 28.8 27.8	158° 14.0 172° 45.8	12.8' 12.8'	12°47.1 12°32.7	-14.4' -14.4'	57.2' 57.2'	
23	162°53.1	26.8	187° 17.6	12.8'	12°18.3	-14.5'	57.2	
	SD = 16.1'	d = -1.0'		SE	0 = 15.4'			

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	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
N 58°	04:51	05:37	06:16	18:03	18:42	19:28
56°	04:55	05:39	06:16	18:03	18:40	19:24
54°	04:59	05:40	06:15	18:04	18:39	19:21
52°	05:02	05:41	06:14	18:04	18:38	19:17
50°	05:04	05:42	06:14	18:05	18:37	19:15
45°	05:09	05:44	06:13	18:06	18:35	19:09
N 40°	05:13	05:45	06:12	18:07	18:34	19:05
35°	05:16	05:46	06:11	18:07	18:33	19:02
30°	05:18	05:46	06:10	18:08	18:32	19:00
20°	05:21	05:47	06:08	18:10	18:32	18:57
N 10°	05:22	05:46	06:07	18:11	18:32	18:56
0°	05:21	05:45	06:06	18:12	18:33	18:57
S 10°	05:19	05:43	06:04	18:14	18:35	18:59
20°	05:15	05:40	06:02	18:15	18:37	19:03
30°	05:08	05:36	06:00	18:17	18:41	19:09
35°	05:04	05:34	05:59	18:18	18:44	19:13
40°	04:58	05:30	05:57	18:20	18:47	19:18
45°	04:52	05:26	05:56	18:21	18:51	19:25
<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
	ı			ı	NA	

Lat.		Moonris	e		Moonset	<u> </u>
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
N 58°	05:34	05:45	05:51	11:33	13:05	14:38
56°	05:16	05:31	05:42	11:51	13:18	14:46
54°	05:01	05:20	05:34	12:06	13:28	14:53
52°	04:48	05:10	05:27	12:18	13:38	14:59
50°	04:36	05:01	05:20	12:30	13:46	15:05
45°	04:12	04:42	05:06	12:53	14:04	15:17
<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	Ve	nus	,	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	174°35.2	162°08.6	N04°15.9	191°22.8	S08° 18.7	68°06.5	N22°56.2	170°22.1	S00°29.2			
1	189°37.6	177°08.2	17.2	206°23.4	17.9	83°08.9	56.2	185°24.3	29.1	Alpheratz	357°34.1	29°14.0
2	204°40.1	192°07.9	18.4	221°24.0	17.1	98°11.3	56.2	200°26.5	29.0	Ankaa	353°06.6	-42°09.9
3	219°42.6	207°07.5	• • 19.7	236°24.7	. 16.4	113°13.7	56.2	215°28.6	28.9	Schedar	349°30.5	56°40.9
4	234°45.0	222°07.1	21.0	251°25.3	15.6	128°16.1	56.2	230°30.8	28.7	Diphda	348°46.6	-17°50.7
5	249° 47.5	237°06.8	22.3	266°25.9	14.9	143°18.5	56.2	245°33.0	28.6	Achernar	335°19.9	-57°06.4
6	264°50.0	252°06.4	N04°23.5	281°26.6	S08°14.1	158°20.9	N22°56.1	260°35.2	S00°28.5	Hamal	327°50.4	23°35.2
7	279°52.4	267°06.0	24.8	296° 27.2	13.4	173°23.4	56.1	275°37.3	28.4	Polaris Acamar	313°51.1	89°22.7
8	294°54.9	282°05.6	26.1	311°27.8	12.6	188°25.8	56.1	290°39.5	28.2		315°11.3 314°05.3	-40°12.2 4°11.5
9	309°57.3	297°05.3	• • 27.4	326°28.4	• • 11.9	203°28.2	• • 56.1	305°41.7	• • 28.1	Menkar Mirfak	308° 27.1	4 11.5 49°57.4
10	324°59.8	312°04.9	28.6	341°29.1	11.1	218°30.6	56.1	320°43.9	28.0	Aldebaran	290°38.6	16°33.7
11	340°02.3	327°04.5	29.9	356°29.7	10.4	233°33.0	56.1	335°46.1	27.9	Rigel	281°03.0	-8°10.4
12	355°04.7	342°04.2	N04°31.2	11°30.3	S08°09.6	248°35.4	N22°56.1	350°48.2	S00°27.7	Capella	280° 20.5	46°01.6
13	10°07.2	357°03.8	32.5	26°31.0	08.9	263°37.8	56.1	5°50.4	27.6	Bellatrix	278°21.8	6°22.3
14	25°09.7	12°03.4	33.7	41°31.6	08.1	278°40.2	56.1	20°52.6	27.5	Elnath	278°00.6	28°37.8
15	40° 12.1	27°03.0	• • 35.0	56°32.2	• • 07.3	293°42.6	• • 56.1	35°54.8	• • 27.4	Alnilam	275°36.7	-1°11.2
16	55° 14.6	42°02.7	36.3	71°32.9	06.6	308°45.0	56.1	50°57.0	27.3	Betelgeuse	270°51.0	7°24.6
17	70°17.1	57°02.3	37.5	86°33.5	05.8	323°47.4	56.1	65°59.1	27.1	Canopus	263°51.9	-52°42.8
18	85° 19.5	72°01.9	N04°38.8	101°34.1	S08°05.1	338°49.8	N22°56.1	81°01.3	S00°27.0	Sirius	258° 25.3	-16°45.3
19	100°22.0	87°01.6	40.1	116°34.7	04.3	353°52.3	56.1	96°03.5	26.9	Adhara	255°05.0	-29°00.7
20	115°24.4	102°01.2	41.4	131°35.4	03.6	8°54.7	56.1	111°05.7	26.8	Procyon	244°49.7	5°09.4
21	130°26.9	117°00.8	• • 42.6	146°36.0	• • 02.8	23°57.1	• • 56.1	126°07.9	• • 26.6	Pollux	243°15.9	27°57.8
22	145°29.4	132°00.4	43.9	161°36.6	02.1	38°59.5	56.1	141°10.0	26.5	Avior	234°14.0	-59°35.8
23	160°31.8	147°00.1	45.2	176°37.3	01.3	54°01.9	56.1	156°12.2	26.4	Suhail	222°45.3	-43°32.5
Mer.p	ass. 12:20	$\nu$ -0.4 $^{\prime}$ d1	.3′ m-3.92	$\nu$ 0.6′ d-0	.8′ m1.16	$\nu$ 2.4′ d-0	.0′ m-2.32	$\nu$ 2.2′ d-0	.1' m $0.94$	Miaplacidus	221°37.4	-69°49.7
										Alphard	217°46.5	-8°46.5
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.1	11°50.2
oved 0	<b>GПА</b> 175°34.3	161°59.7	Dec N04°46.4	191°37.9	S08°00.5	69°04.3	N22° 56.1	ла 171°14.4	S00°26.3	Dubhe	193°39.1	61°36.5
1	190°36.8	176°59.3	47.7	206°38.5	07°59.8	84°06.7	56.1	186°16.6	26.1	Denebola	182°23.6	14°25.4
2	205° 39.2	170 59.5 191°59.0	47.7	200 36.5 221°39.2	59.0	99°09.1	56.1	201°18.8	26.1	Gienah	175°42.3	-17°41.4
3	220°41.7	206°58.6	• • 50.3	236°39.8	• • 58.3	114°11.5	. 56.1	216°20.9	25.9	Acrux	172°58.4	-63°14.7
4	235°44.2	221°58.2	51.5	251° 40.4	57.5	129°13.9	56.1	231°23.1	25.8	Gacrux	171°50.0	-57°15.7
5	250°46.6	236°57.8	52.8	266°41.1	56.8	144°16.3	56.1	246°25.3	25.7	Alioth	166°11.5	55°48.8
6	265°49.1	251°57.5	N04°54.1	281°41.7	S07°56.0	159°18.7	N22°56.1	261°27.5	S00°25.5	Spica	158°21.0	-11°18.0
7	280°51.6	266°57.1	55.3	296°42.3	55.2	174°21.1	56.1	276°29.6	25.4	Alkaid	152°50.8	49°10.7
8	295°54.0	281°56.7	56.6	311°42.9	54.5	189°23.5	56.0	291°31.8	25.3	Hadar	148°34.1	-60°29.9
9	310°56.5	296°56.4	• • 57.9	326°43.6	• • 53.7	204°25.9	• • 56.0	306°34.0	25.2	Menkent	147°56.1	-36°30.0
10	325°58.9	311°56.0	04°59.1	341°44.2	53.0	219°28.3	56.0	321°36.2	25.0	Arcturus	145°46.7	19°02.5
11	341°01.4	326°55.6	05°00.4	356° 44.8	52.2	234°30.7	56.0	336°38.4	24.9	Rigil Kent.	139°38.5 137°19.0	-60°56.5 74°02.5
12	356°03.9	341°55.2	N05°01.7	11° 45.5	S07°51.5	249°33.1	N22°56.0	351°40.5	S00°24.8	Kochab Zuben'ubi		
13	11°06.3	356°54.9	02.9	26°46.1	50.7	264°35.5	56.0	6°42.7	24.7		136°54.7 126°02.7	-16°09.2 26°37.3
14	26°08.8	$11^{\circ}54.5$	04.2	41°46.7	49.9	279°37.9	56.0	21°44.9	24.5	Alphecca	120 02.7 112° 14.5	-26°29.4
15	41°11.3	26°54.1	• • 05.5	56°47.4	• • 49.2	294°40.3	• • 56.0	36°47.1	• • 24.4	Antares Atria	112 14.5 107°07.8	-20 29.4 -69°04.2
16	56° 13.7	41°53.7	06.7	71°48.0	48.4	309°42.7	56.0	51°49.3	24.3	Sabik	107 07.8 102°01.6	-09 04.2 -15°45.5
17	$71^{\circ}16.2$	56°53.4	08.0	86°48.6	47.7	324°45.1	56.0	66°51.4	24.2	Shaula	96°09.0	-13° 43.3 -37° 07.3
18	86°18.7	71°53.0	N05°09.3	101°49.3	S07°46.9	339°47.5	N22°56.0	81°53.6	S00°24.1	Rasalhague	95°57.6	12°32.2
19	$101^{\circ}21.1$	86°52.6	10.5	116°49.9	46.2	354°49.9	56.0	96°55.8	23.9	Eltanin	90°41.7	51°28.7
20	116°23.6	101°52.2	11.8	131°50.5	45.4	9°52.3	56.0	111°58.0	23.8	Kaus Aust.	83°31.3	-34°22.3
21	131°26.0	116°51.9	• • 13.1	146°51.2	• • 44.6	24°54.7	• • 56.0	127°00.1	• • 23.7	Vega	80°32.6	38°48.1
22	146°28.5	131°51.5	14.3	161°51.8	43.9	39°57.1	56.0	142°02.3	23.6	Nunki	75°46.6	-26°15.8
23	161°31.0	146°51.1	15.6	176°52.4	43.1	54°59.5	56.0	157°04.5	23.4	Altair	61°59.2	8°56.1
Mer.p	ass. 12:16	$\nu$ -0.4' d1	.3′ m-3.92	$\nu 0.6' d-0$	.8′ m1.16	$\nu^{2.4'} d-0$	.0′ m-2.31	$\nu 2.2' \ d-0$	.1′ m0.94	Peacock	53°04.5	-56°38.9
										Deneb	49°25.5	45°22.2
			_		_		_		_	Enif	$33^{\circ}38.1$	9°59.6
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	$27^{\circ}32.1$	-46°50.0
0	176°33.4	161°50.7	N05°16.9	191°53.1	S07°42.4	70°01.9	N22°56.0	172°06.7	\$00°23.3	Fomalhaut	15°13.8	-29°29.1
1	191°35.9	176°50.4	18.1	206°53.7	41.6	85°04.3	56.0	187°08.9	23.2	Scheat	13°44.6	28°13.4
2	206°38.4 221°40.8	191°50.0 206°49.6	19.4	221°54.3 236°55.0	40.8 •• 40.1	100°06.7 115°09.1	56.0	202°11.0 217°13.2	23.1	Markab	13°29.2	15°20.7
3 4	221°40.8 236°43.3	206°49.6 221°49.2	· · 20.7 21.9	251°55.6	39.3	115°09.1 130°11.4	· · 56.0 55.9	217°13.2 232°15.4	22.8	Mar 17 Tue	SHA	Mer.pass
5	250 45.5 251°45.8	221 49.2 236°48.9	23.2	266° 56.2	39.5 38.6	130 11.4 145°13.8	55.9 55.9	232 15.4 247°17.6	22.6	Venus		13:12
6	266° 48.2	251°48.5	N05°24.5	281°56.9	507° 37.8	160°16.2	N22°55.9	262°19.8	S00°22.6	Mars	16°47.6	11:14
7	200 46.2 281°50.7	266°48.1	25.7	296° 57.5	37.1	175°18.6	55.9	202 19.8 277°21.9	22.4	Jupiter	253°31.3	19:24
8	201°53.7 296°53.2	281°47.7	27.0	311°58.2	36.3	190°21.0	55.9	292°24.1	22.3	Saturn	355°46.9	12:37
9	311°55.6	296°47.4	. 28.3	326°58.8	• • 35.5	205°23.4	• • 55.9	307°26.3	22.2			
10	326°58.1	311°47.0	29.5	341°59.4	34.8	220°25.8	55.9	322°28.5	22.1	Mar 18 Wed	SHA	Mer.pass
11	342°00.5	326°46.6	30.8	357°00.1	34.0	235°28.2	55.9	337°30.6	22.0	Venus	346°25.4	13:12
12	357°03.0	341°46.2	N05°32.1	12°00.7	S07°33.3	250°30.6	N22°55.9	352°32.8	S00°21.8	Mars	16°03.6	11:13
13	12°05.5	356°45.9	33.3	27°01.3	32.5	265°33.0	55.9	7°35.0	21.7	Jupiter	253°30.0	19:21
14	27°07.9	11°45.5	34.6	42°02.0	31.7	280°35.4	55.9	22°37.2	21.6	Saturn	355°40.1	12:33
15	$42^{\circ}10.4$	26°45.1	• • 35.9	57°02.6	• • 31.0	295°37.8	• • 55.9	37°39.4	• • 21.5	Mar 19 Thu	SHA	Mer.pass
16	$57^{\circ}12.9$	41°44.7	37.1	72°03.2	30.2	310°40.1	55.9	52°41.5	21.3	Venus	345°17.3	13:13
17	$72^{\circ}15.3$	56°44.3	38.4	87°03.9	29.5	325°42.5	55.9	67°43.7	21.2	Mars	15°19.6	11:12
18	87° 17.8	71°44.0	N05°39.6	102°04.5	S07°28.7	340°44.9	N22°55.9	82°45.9	S00°21.1	Jupiter		19:17
19	$102^{\circ}20.3$	86°43.6	40.9	$117^{\circ}05.1$	27.9	355°47.3	55.9	97°48.1	21.0	Saturn	355°33.2	12:30
20	117° 22.7	101°43.2	42.2	132°05.8	27.2	10°49.7	55.9	112°50.2	20.8			
21	132°25.2	116°42.8	• • 43.4	147°06.4	• • 26.4	25°52.1	• • 55.9	127°52.4	• • 20.7	Horizont	al parallax	0.1
22	147°27.6	131°42.5	44.7	162°07.1	25.6	40°54.5	55.8	142°54.6	20.6		Venus:	0.1
23	162°30.1	146°42.1	45.9	177°07.7	24.9	55°56.9	55.8	157°56.8	20.5		Mars:	0.1
Mer n	ass. 12:12	$\nu$ -0.4' d1	.3′ m-3.92	$\nu^{0.6'} d^{-0}$	.8′ m1.17	ν2.4' d-0	.0′ m-2.30	$\nu 2.2' d-0$	.1′ m0.93			
р				0	· · · · · · · · · · · · ·	0		0				

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	177°53.2	S01°25.8	201°49.4	12.8'	S12°03.8	-14.6'	57.2'
1 2	192°53.4 207°53.6	24.8 23.8	216°21.3 230°53.1	12.9' 12.9'	11°49.2 11°34.5	-14.7' -14.7'	57.3' 57.3'
3	222° 53.8	• • 22.8	245°25.0	12.9'	11° 19.8	-14.8'	57.3
4	237°53.9	21.8	$259^{\circ}56.9$	12.9'	$11^{\circ}05.0$	-14.9'	57.4'
5	252°54.1	20.9	274°28.8 289°00.8	12.9'	10°50.1	-14.9'	57.4
6 7	267° 54.3 282° 54.5	S01°19.9 18.9	289°00.8 303°32.7	12.9' 13.0'	\$10°35.2 10°20.2	-15.0' -15.1'	57.4' 57.5'
8	297° 54.7	17.9	318°04.7	13.0'	10°05.1	-15.1'	57.5'
9	312° 54.8	• • 16.9	332°36.6	13.0'	09°50.0	-15.2'	57.5'
10 11	327°55.0 342°55.2	15.9 14.9	347°08.6 1°40.6	13.0' 13.0'	09°34.8 09°19.6	-15.3' -15.3'	57.6' 57.6'
12	357°55.4	S01°13.9	16°12.6	13.0'	509°04.3	-15.4	57.6'
13	12°55.6	12.9	30°44.7	13.0'	08°48.9	-15.4'	57.6'
14	27°55.7	12.0	45°16.7 59°48.7	13.0'	08°33.5 08°18.0	-15.5'	57.7'
15 16	42°55.9 57°56.1	· · 11.0 10.0	59 48.7 74°20.8	13.0' 13.0'	08 18.0 08°02.4	-15.5' -15.6'	57.7' 57.7'
17	72° 56.3	09.0	88°52.8	13.1'	07°46.8	-15.6'	57.8'
18	87°56.4	S01°08.0	103°24.9	13.1'	S07°31.2	-15.7'	57.8'
19 20	102°56.6 117°56.8	07.0 06.0	117°56.9 132°29.0	13.1' 13.1'	07°15.5 06°59.7	-15.7' -15.8'	57.8' 57.9'
21	132° 57.0	• • 05.0	132 29.0 147°01.0	13.1	06°43.9	-15.8'	57.9'
22	147°57.2	04.0	161°33.1	13.1'	$06^{\circ}28.1$	-15.9'	57.9'
23	162°57.3	03.1	176°05.2	13.1'	06°12.2	-15.9'	57.9'
	SD = 16.1'	d = -1.0'		SI	O = 15.6'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177°57.5	501°02.1	190°37.2	13.1'	S05°56.3	-16.0'	58.0'
1	192°57.7 207°57.9	01.1	205°09.3	13.1'	05°40.3	-16.0'	58.0'
2	207°57.9 222°58.1	01°00.1 00°59.1	219°41.3 234°13.4	13.0' 13.0'	05°24.3 05°08.2	-16.1' -16.1'	58.0' 58.1'
4	237°58.2	58.1	248°45.4	13.0'	04°52.1	-16.1	58.1
5	252°58.4	57.1	263°17.5	13.0'	04°35.9	-16.2'	58.1'
6	267° 58.6 282° 58.8	\$00°56.1 55.1	277°49.5 292°21.5	13.0' 13.0'	\$04°19.7 04°03.5	-16.2' -16.3'	58.1' 58.2'
7 8	282 58.8 297°59.0	55.1 54.2	292 21.5 306°53.5	13.0'	04 03.5 03°47.3	-16.3'	58.2'
9	312°59.2	• • 53.2	321°25.5	13.0'	03°31.0	-16.3'	58.2'
10	327°59.3	52.2	335°57.5	13.0'	03°14.7	-16.4	58.3'
11 12	342°59.5 357°59.7	51.2 \$00°50.2	350°29.5 5°01.4	13.0' 12.9'	02°58.3 \$02°41.9	-16.4' -16.4'	58.3' 58.3'
13	12°59.9	49.2	19°33.4	12.9'	02°25.5	-16.4	58.3
14	28°00.1	48.2	34°05.3	12.9'	02°09.1	-16.5'	58.4'
15 16	43°00.2 58°00.4	· · 47.2 46.2	48°37.2 63°09.1	12.9' 12.9'	01°52.6 01°36.1	-16.5' -16.5'	58.4' 58.4'
17	73°00.6	45.3	77°41.0	12.8'	01° 19.6	-16.5'	58.4'
18	88°00.8	<b>S</b> 00°44.3	92°12.8	12.8'	S01°03.1	-16.6'	58.5'
19	103°01.0 118°01.1	43.3	106°44.7 121°16.5	12.8'	00°46.5 00°30.0	-16.6'	58.5' 58.5'
20 21	133°01.3	42.3 •• 41.3	121 10.5 135°48.2	12.8'	500°13.4	-16.6'	58.6'
22	148°01.5	40.3	150°20.0	12.7'	N00°03.2	16.6'	58.6'
23	163°01.7	39.3	164°51.7	12.7'	00° 19.9	16.6'	58.6'
	SD = 16.1'	d = -1.0'		SI	D = 15.8'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°01.9	S00°38.3	179°23.4	12.7'	N00°36.5	16.6'	58.6'
1 2	193°02.1 208°02.2	37.3 36.4	193°55.1 208°26.7	12.6' 12.6'	00°53.1 01°09.8	16.6' 16.7'	58.7' 58.7'
3	223°02.4	• • 35.4	222°58.3	12.6'	01°26.4	16.7	58.7'
4	238°02.6	34.4	237°29.9	12.5'	01°43.1	16.7'	58.7'
5 6	253°02.8 268°03.0	33.4 \$00°32.4	252°01.4 266°32.9	12.5' 12.5'	01°59.8 N02°16.4	16.7' 16.7'	58.7' 58.8'
7	283°03.1	31.4	200 32.9 281°04.4	12.4'	02°33.1	16.7	58.8'
8	298°03.3	30.4	295°35.8	12.4'	02°49.8	16.7'	58.8'
9 10	313°03.5 328°03.7	· · 29.4 28.4	310°07.2 324°38.6	12.4' 12.3'	03°06.5 03°23.1	16.7' 16.7'	58.8' 58.9'
10	328 03.7 343°03.9	28.4 27.4	324 38.6 339°09.9	12.3'	03 23.1 03°39.8	16.7'	58.9'
12	358°04.1	\$00°26.5	353°41.2	12.2'	N03°56.4	16.7'	58.9'
13	13°04.2	25.5	8°12.4	12.2'	04°13.1	16.6'	58.9'
14 15	28° 04.4 43° 04.6	24.5 •• 23.5	22°43.6 37°14.7	12.1' 12.1'	04°29.7 04°46.4	16.6' 16.6'	58.9' 59.0'
16	58°04.8	22.5	51°45.8	12.0'	05°03.0	16.6'	59.0'
17	73°05.0	21.5	66°16.8	12.0'	05° 19.6	16.6'	59.0'
18 19	88°05.2 103°05.3	\$00°20.5 19.5	80°47.8 95°18.7	11.9' 11.9'	N05°36.2 05°52.8	16.6' 16.6'	59.0' 59.1'
20	103 05.3 118°05.5	19.5 18.5	95 18.7 109°49.6	11.8'	05°52.8	16.5	59.1'
21	133°05.7	• • 17.6	124°20.5	11.8'	06°25.9	16.5'	59.1'
22 23	148°05.9 163°06.1	16.6 15.6	138°51.2 153°22.0	11.7' 11.7'	06° 42.4 06° 58.9	16.5' 16.5'	59.1' 59.1'
23	SD = 16.1'	d = -1.0'	133 22.0		O = 16.0'	10.5	59.1
	J∪ = 10.1	u = -1.0		31	J — 10.0°		

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

١			Sun		Moon			
	Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
	,	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	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	177° 32.6	161°41.7	N05°47.2	192°08.3	507°24.1	70°59.3	N22°55.8	172°59.0	500°20.4			
1	192°35.0	176°41.3	48.5	207°09.0	23.4	86°01.6	55.8	188°01.1	20.2	Alpheratz	357°34.1	29°14.0
2	207° 37.5	191°40.9	49.7	222°09.6	22.6	101°04.0	55.8	203°03.3	20.1	Ankaa	353°06.6	-42°09.9
3	222°40.0	206°40.6	51.0	237°10.2	21.8	116°06.4	• • 55.8	218°05.5	20.0	Schedar	349°30.5	56°40.9
4	237°42.4	221°40.2	52.3	252°10.9	21.1	131°08.8	55.8	233°07.7	19.9	Diphda	348°46.6	-17°50.7
5	252°44.9	236°39.8	53.5	$267^{\circ}11.5$	20.3	$146^{\circ}11.2$	55.8	248°09.9	19.7	Achernar Hamal	335° 19.9 327° 50.4	-57°06.3 23°35.2
6	267°47.4	251°39.4	N05°54.8	282°12.2	S07°19.6	161°13.6	N22°55.8	263°12.0	S00°19.6	Polaris	313°52.2	89°22.7
7	282°49.8	266°39.0	56.0	297°12.8	18.8	176°16.0	55.8	278°14.2	19.5	Acamar	315°11.3	-40°12.2
8	297°52.3	281°38.7	57.3	312°13.4	18.0	191°18.3	55.8	293°16.4	19.4	Menkar	314°05.3	4°11.5
9	312°54.8	296°38.3	• • 58.5	327°14.1	• • 17.3	206°20.7	• • 55.8	308°18.6	• • 19.2	Mirfak	308°27.1	49°57.4
10 11	327°57.2 342°59.7	311°37.9 326°37.5	05° 59.8 06° 01.1	342°14.7 357°15.3	16.5 15.7	221°23.1 236°25.5	55.8 55.8	323°20.7 338°22.9	19.1 19.0	Aldebaran	290°38.6	16°33.7
12	358° 02.1	341°37.1	N06°02.3	12°16.0	507°15.0	250°25.5 251°27.9	N22° 55.8	353°25.1	500°18.9	Rigel	281°03.0	-8°10.4
13	13°04.6	356°36.8	03.6	27°16.6	14.2	266°30.3	55.8	8°27.3	18.7	Capella	280°20.5	46°01.6
14	28°07.1	11°36.4	04.8	42°17.3	13.5	281°32.6	55.7	23°29.5	18.6	Bellatrix	278°21.9	6°22.3
15	43°09.5	26°36.0	• • 06.1	57°17.9	• • 12.7	296°35.0	• • 55.7	38°31.6	• • 18.5	Elnath	278°00.7	28°37.8
16	58°12.0	41°35.6	07.4	72°18.5	11.9	311°37.4	55.7	53°33.8	18.4	Alnilam	275°36.8 270°51.0	-1°11.2 7°24.6
17	$73^{\circ}14.5$	56°35.2	08.6	87°19.2	11.2	326°39.8	55.7	68°36.0	18.3	Betelgeuse Canopus	263°51.9	-52°42.8
18	$88^{\circ}16.9$	71°34.9	N06°09.9	102°19.8	S07°10.4	341°42.2	N22°55.7	83°38.2	S00°18.1	Sirius	258° 25.3	-16°45.3
19	103° 19.4	86°34.5	11.1	117°20.5	09.6	356°44.5	55.7	98°40.3	18.0	Adhara	255°05.0	-29°00.7
20	118°21.9	101°34.1	12.4	132°21.1	08.9	11°46.9	55.7	113°42.5	17.9	Procyon	244°49.7	5°09.4
21	133°24.3	116°33.7	13.6	147°21.7	• • 08.1	26°49.3	• • 55.7	128°44.7	• • 17.8	Pollux	243°15.9	27°57.8
22 23	148° 26.8 163° 29.2	131°33.3 146°33.0	14.9 16.2	162°22.4 177°23.0	07.4 06.6	41°51.7 56°54.1	55.7 55.7	143°46.9 158°49.1	17.6	Avior	$234^{\circ}14.0$	-59°35.9
_							55.7		17.5	Suhail	222°45.3	-43°32.5
_Mer.p	ass. 12:08	$\nu$ -0.4' d1.	.3′ m-3.92	$\nu$ 0.6′ d-0	.8′ m1.17	$\nu$ 2.4′ d-0	.0′ m-2.29	$\nu$ 2.2′ d-0	.1′ m0.93	Miaplacidus	221°37.4	-69°49.7
										Alphard Regulus	217°46.5 207°33.1	-8°46.5 11°50.2
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.1	61°36.5
0	$178^{\circ}31.7$	161°32.6	N06° 17.4	192°23.7	S07°05.8	71°56.4	N22°55.7	173°51.2	\$00°17.4	Denebola	182°23.6	14°25.4
1	193°34.2	176°32.2	18.7	207°24.3	05.1	86°58.8	55.7	188°53.4	17.3	Gienah	175°42.3	-17°41.4
2	208°36.6	191°31.8	19.9	222°24.9	04.3	102°01.2	55.7	203°55.6	17.1	Acrux	172°58.3	-63°14.7
3 4	223°39.1 238°41.6	206°31.4	• • 21.2	237°25.6 252°26.2	• • 03.5	117°03.6	• • 55.7 55.6	218°57.8	•• 17.0	Gacrux	$171^{\circ}50.0$	-57°15.7
5	250 41.0 253°44.0	221°31.0 236°30.7	22.4 23.7	267°26.9	02.8 02.0	132°05.9 147°08.3	55.6	233°59.9 249°02.1	16.9 16.8	Alioth	166° 11.5	55°48.9
6	268° 46.5	251°30.3	N06°24.9	282°27.5	S07°01.2	162°10.7	N22°55.6	264°04.3	S00°16.7	Spica	158°21.0	-11°18.0
7	283°49.0	266°29.9	26.2	297°28.1	07°00.5	177°13.1	55.6	279°06.5	16.5	Alkaid	152°50.8	49°10.7
8	298°51.4	281°29.5	27.4	312°28.8	06°59.7	192°15.4	55.6	294°08.7	16.4	Hadar Menkent	148°34.1 147°56.1	-60°29.9 -36°30.0
9	313°53.9	296°29.1	• • 28.7	327°29.4	• • 58.9	207°17.8	• • 55.6	309°10.8	• • 16.3	Arcturus	147 30.1 145°46.7	19°02.5
10	328° 56.4	311°28.7	30.0	342°30.1	58.2	222°20.2	55.6	324°13.0	16.2	Rigil Kent.	139°38.5	-60°56.5
11	343°58.8	326°28.4	31.2	357°30.7	57.4	237°22.6	55.6	339°15.2	16.0	Kochab	137° 18.9	74°02.5
12	359°01.3	341°28.0	N06° 32.5	12°31.4	S06°56.7	252°24.9	N22°55.6	354°17.4	S00°15.9	Zuben'ubi	$136^{\circ}54.7$	-16°09.2
13	14°03.7 29°06.2	356°27.6	33.7	27°32.0 42°32.6	55.9 55.1	267°27.3 282°29.7	55.6	9°19.5 24°21.7	15.8	Alphecca	$126^{\circ}02.7$	26°37.3
14 15	44° 08.7	11°27.2 26°26.8	35.0 •• 36.2	57°33.3	54.4	202 29.7 297°32.1	55.6 •• 55.6	39°23.9	15.7 •• 15.5	Antares	112° 14.5	-26°29.4
16	59°11.1	41°26.4	37.5	72°33.9	53.6	312°34.4	55.6	54°26.1	15.4	Atria	107°07.7	-69°04.2
17	74° 13.6	56°26.1	38.7	87°34.6	52.8	327°36.8	55.5	69°28.3	15.3	Sabik	102°01.6 96°09.0	-15°45.5
18	$89^{\circ}16.1$	71°25.7	N06°40.0	102°35.2	S06°52.1	342°39.2	N22°55.5	84°30.4	S00°15.2	Shaula Rasalhague	95°57.6	-37°07.3 12°32.2
19	$104^{\circ}18.5$	86°25.3	41.2	117°35.8	51.3	357°41.6	55.5	99°32.6	15.1	Eltanin	90°41.7	51°28.7
20	119°21.0	101°24.9	42.5	132°36.5	50.5	12°43.9	55.5	114°34.8	14.9	Kaus Aust.	83°31.2	-34°22.3
21	134°23.5	116°24.5	• • 43.7	147°37.1	• • 49.8	27°46.3	• • 55.5	129°37.0	• • 14.8	Vega	80°32.6	38°48.1
22 23	149°25.9 164°28.4	131°24.1 146°23.7	45.0 46.2	162°37.8 177°38.4	49.0 48.2	42°48.7 57°51.0	55.5 55.5	144°39.1 159°41.3	14.7	Nunki	75°46.6	-26°15.8
									14.6	Altair	61°59.1	8°56.1
Mer.p	ass. 12:04	$\nu$ -0.4′ $d1$	.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°04.5	-56°38.9
										Deneb Enif	49°25.4 33°38.1	45°22.2 9°59.6
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.1	-46°50.0
0	$179^{\circ}30.9$	$161^{\circ}23.3$	N06°47.5	$192^{\circ}39.1$	S06°47.5	72°53.4	$N22^{\circ}55.5$	174°43.5	S00°14.4	Fomalhaut	15° 13.8	-40° 30.0° -29° 29.0
1	194°33.3	176°23.0	48.7	207°39.7	46.7	87°55.8	55.5	189°45.7	14.3	Scheat	13°44.6	28°13.4
2	209°35.8	191°22.6	50.0	222°40.3	45.9	102°58.1	55.5	204°47.9	14.2	Markab	13°29.2	15°20.7
3	224° 38.2	206°22.2	• • 51.2	237°41.0	• • 45.2	118°00.5	• • 55.5	219°50.0	• • 14.1	N4 00 F :	CIIA	
4	239°40.7	221°21.8	52.5	252°41.6	44.4	133°02.9	55.5	234°52.2	13.9	Mar 20 Fri Venus	<b>SHA</b> 344°09.1	Mer.pass 13:14
5 6	254° 43.2 269° 45.6	236°21.4 251°21.0	53.7 N06°55.0	267°42.3 282°42.9	43.6 \$06°42.9	148°05.2 163°07.6	55.5 N22°55.4	249°54.4 264°56.6	13.8 S00°13.7	Mars	14°35.8	13:14
7	284° 48.1	266°20.6	56.2	297°43.6	42.1	178°10.0	55.4	279°58.7	13.6	Jupiter		19:13
8	299° 50.6	281°20.3	57.5	312°44.2	41.3	170°10.0	55.4	295°00.9	13.5	Saturn	355°26.4	12:26
9	314° 53.0	296°19.9	06°58.7	327°44.9	• • 40.6	208°14.7	• • 55.4	310°03.1	• • 13.3			
10	$329^{\circ}55.5$	311°19.5	$07^{\circ}00.0$	342°45.5	39.8	$223^{\circ}17.1$	55.4	$325^{\circ}05.3$	13.2	Mar 21 Sat	<b>SHA</b> 343°00.9	Mer.pass 13:14
11	344°58.0	326°19.1	01.2	357°46.1	39.0	238°19.4	55.4	340°07.5	13.1	Mars	13°51.9	11:10
12	0°00.4	341°18.7	N07°02.4	12°46.8	S06°38.3	253°21.8	N22°55.4	355°09.6	500°13.0		253°24.7	19:09
13 14	15°02.9 30°05.3	356°18.3 11°17.9	03.7 04.9	27°47.4 42°48.1	37.5 36.7	268°24.2 283°26.5	55.4 55.4	10°11.8 25°14.0	12.8	Saturn		12:23
14 15	30 05.3 45°07.8	26°17.5	06.2	42 48.1 57°48.7	36.0	283 26.5 298°28.9	55.4 •• 55.4	40°16.2	12.7 •• 12.6	Mar 22 Sun	SHA	Mor pass
16	60° 10.3	41°17.1	07.4	72°49.4	35.2	313°31.3	55.4	55°18.3	12.5		341°52.5	Mer.pass 13:15
17	75° 12.7	56°16.8	08.7	87°50.0	34.4	328°33.6	55.4	70°20.5	12.3	Mars	13°08.2	11:09
18	90°15.2	71°16.4	N07°09.9	102°50.7	<b>S</b> 06°33.7	343°36.0	N22°55.3	85°22.7	S00°12.2		253°22.6	19:05
19	105° 17.7	86°16.0	11.2	117°51.3	32.9	358°38.4	55.3	100°24.9	12.1	Saturn		12:19
20	120° 20.1	101°15.6	12.4	132°51.9	32.1	13°40.7	55.3	115°27.1	12.0	Horizont	al parallax	
21 22	135°22.6 150°25.1	116°15.2 131°14.8	· · 13.7 14.9	147°52.6 162°53.2	· · 31.4 30.6	28°43.1 43°45.5	• • 55.3 55.3	130°29.2 145°31.4	· · 11.9 11.7	TIOTIZONI	Venus:	0.1
22	165° 27.5	131 14.8 146°14.4	14.9 16.1	102 53.2 177°53.9	30.6 29.8	43 45.5 58°47.8	55.3 55.3	145 31.4 160°33.6	11.7		Mars:	0.1
ivier.p	ass. 12:00	$\nu$ -0.4′ $d1$	.2′ m-3.92	$\nu$ 0.0' $d$ -0	.8′ m1.17	$\nu$ 2.4' $d$ -0	.0′ m-2.28	$\nu$ 2.2' $d$ -0	.1′ m0.92			

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°06.3	S00°14.6	167°52.6	11.6'	N07°15.3	16.4'	59.1'
1 2	193°06.4 208°06.6	13.6 12.6	182°23.2 196°53.8	11.6' 11.5'	07°31.8 07°48.2	16.4' 16.4'	59.2' 59.2'
3	208 00.0 223°06.8	. 11.6	211°24.3	11.4	07 46.2 08°04.5	16.3	59.2'
4	238°07.0	10.6	225°54.7	11.4'	08°20.9	16.3'	59.2'
5	253°07.2	09.6	240°25.1	11.3'	08°37.2	16.3'	59.2'
6 7	268°07.4 283°07.5	\$00°08.7 07.7	254°55.4 269°25.6	11.2' 11.2'	N08°53.5 09°09.7	16.2' 16.2'	59.3' 59.3'
8	298° 07.7	06.7	283°55.8	11.1'	09°09.7	16.2	59.3'
9	313°07.9	• • 05.7	298°25.9	11.0'	09°42.0	16.1'	59.3'
10	328°08.1	04.7	312°56.0	11.0'	09°58.2	16.1'	59.3'
11 12	343°08.3 358°08.5	03.7 <b>S</b> 00°02.7	327°25.9 341°55.8	10.9' 10.8'	10°14.2 N10°30.2	16.0' 16.0'	59.3' 59.3'
13	13°08.6	01.7	356°25.7	10.8'	10°46.2	15.9'	59.4'
14	28°08.8	500°00.8	10°55.4	10.7'	11°02.1	15.9'	59.4'
15 16	43°09.0 58°09.2	N00°00.2 01.2	25°25.1 39°54.7	10.6' 10.5'	11°18.0 11°33.8	15.8' 15.8'	59.4' 59.4'
17	73°09.4	02.2	54°24.2	10.5'	11°49.6	15.7'	59.4'
18	88°09.6	N00°03.2	68°53.7	10.4'	N12°05.3	15.6'	59.4'
19	103°09.7	04.2	83°23.1	10.3'	12°20.9	15.6'	59.4'
20 21	118°09.9 133°10.1	05.2 •• 06.2	97°52.4 112°21.6	10.2' 10.1'	12°36.5 12°52.0	15.5' 15.5'	59.5' 59.5'
22	148° 10.3	07.2	126°50.8	10.1	13°07.5	15.4	59.5'
23	163°10.5	08.1	$141^{\circ}19.8$	10.0'	13°22.9	15.3'	59.5'
	SD = 16.1'	d = -1.0'		SE	0 = 16.1'		
C +		Das	CUA		Das	۔	НР
Sat 0	<b>GHA</b> 178°10.7	<b>Dec</b> N00°09.1	<b>GHA</b> 155°48.8	u 9.9'	<b>Dec</b> N13°38.2	d 15.2'	<b>нР</b> 59.5'
1	193°10.8	10.1	$170^{\circ}17.7$	9.8'	13°53.4	15.2'	59.5'
2	208°11.0	11.1	184°46.5	9.7'	14°08.6	15.1'	59.5'
3 4	223°11.2 238°11.4	· · 12.1 13.1	199°15.2 213°43.9	9.6' 9.6'	14°23.7 14°38.7	15.0' 14.9'	59.5' 59.5'
5	253°11.4	14.1	213 43.9 228°12.4	9.5'	14°53.7	14.9	59.6'
6	268°11.8	N00°15.1	242°40.9	9.4'	N15°08.6	14.8'	59.6'
7	283°12.0	16.0	257°09.3	9.3'	15°23.3	14.7'	59.6'
8 9	298°12.1 313°12.3	17.0 •• 18.0	271°37.6 286°05.8	9.2' 9.1'	15°38.0 15°52.7	14.6' 14.5'	59.6' 59.6'
10	328°12.5	19.0	300°33.9	9.0'	16°07.2	14.4	59.6'
11	343°12.7	20.0	315°02.0	8.9'	16°21.6	14.4'	59.6'
12	358°12.9 13°13.1	N00°21.0	329°29.9 343°57.7	8.8'	N16°36.0 16°50.3	14.3'	59.6'
13 14	28°13.1	22.0 23.0	343°57.7 358°25.5	8.8' 8.7'	16°50.3 17°04.4	14.2' 14.1'	59.6' 59.6'
15	43°13.4	• • 24.0	12°53.1	8.6'	17°18.5	14.0'	59.6'
16	58°13.6	24.9	27°20.7	8.5'	17°32.5	13.9'	59.6'
17 18	73°13.8 88°14.0	25.9 N00°26.9	41°48.2 56°15.5	8.4' 8.3'	17°46.3 N18°00.1	13.8' 13.7'	59.6' 59.6'
19	103°14.2	27.9	70°42.8	8.2'	18°13.8	13.6'	59.7'
20	118°14.4	28.9	85°10.0	8.1'	18°27.3		59.7'
21	133°14.6	• • 29.9	99°37.1	8.0'	18°40.8	13.3'	59.7'
22 23	148°14.7 163°14.9	30.9 31.9	114°04.1 128°31.0	7.9' 7.8'	18°54.1 19°07.3	13.2' 13.1'	59.7' 59.7'
	SD = 16.1'	d = 1.0'			0 = 16.2'	10.1	
		<u>u = 1.0</u>		- 51	7 — 10.2		
Sun	GHA 170°15 1	<b>Dec</b> N00°32.8	<b>GHA</b> 142°57.8	ν 77'	<b>Dec</b> N19°20.4	d 12.0'	HP
0 1	178°15.1 193°15.3	N00° 32.8 33.8	142°57.8 157°24.5	7.7' 7.6'	19°20.4 19°33.4	13.0' 12.9'	59.7' 59.7'
2	208°15.5	34.8	171°51.1	7.5'	19°46.3	12.8'	59.7'
3	223°15.7	• • 35.8	186°17.6	7.4'	19°59.1	12.6'	59.7'
4 5	238°15.9 253°16.0	36.8 37.8	200°44.0 215°10.4	7.3' 7.2'	20°11.7 20°24.2	12.5' 12.4'	59.7' 59.7'
6	268°16.2	N00°38.8	219°36.6	7.1'	N20°36.6	12.4	59.7'
7	283°16.4	39.8	244°02.7	7.0'	20°48.9	12.1'	59.7'
8 9	298°16.6 313°16.8	40.7 •• 41.7	258°28.7 272°54.6	6.9' 6.8'	21°01.0 21°13.0	12.0' 11.9'	59.7' 59.7'
10	313 16.8 328°17.0	42.7	272 54.6 287°20.5	6.8 6.7'	21 13.0 21°24.9	11.9	59.7' 59.7'
11	343°17.2	43.7	$301^{\circ}46.2$	6.6'	21°36.6	11.6'	59.7'
12	358°17.3	N00° 44.7	316°11.8	6.5'	N21°48.3	11.5'	59.7'
13 14	13°17.5 28°17.7	45.7 46.7	330°37.4 345°02.8	6.4' 6.3'	21°59.7 22°11.0	11.3' 11.2'	59.7' 59.7'
15	43°17.9	• • 47.6	359°28.2	6.3	22°22.2	11.0'	59.7'
16	58°18.1	48.6	13°53.4	6.2'	22°33.3	10.9'	59.7'
17 18	73°18.3 88°18.5	49.6 N00° 50.6	28°18.6 42°43.7	6.1' 6.0'	22°44.2 N22°54.9	10.8' 10.6'	59.7' 59.7'
18 19	88° 18.5 103° 18.6	51.6	42°43.7 57°08.6	5.9'	23°05.5	10.5	59.7' 59.7'
20	118°18.8	52.6	71°33.5	5.8'	23°16.0	10.3'	59.7'
21	133°19.0	• • 53.6	85°58.3	5.7'	23°26.3	10.2'	59.7'
22 23	148°19.2 163°19.4	54.6 55.5	100°23.0 114°47.6	5.6' 5.5'	23°36.5 23°46.5	10.0' 9.8'	59.7' 59.7'
23	$\frac{103 \text{ 19.4}}{\text{SD} = 16.0'}$	$\frac{33.5}{d=1.0'}$			0 = 16.3'	9.0	33.1
	JD — 10.0	u — 1.0		JL	_ 10.5		

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	180°30.0	161°14.0	N07°17.4	192°54.5	S06°29.0	73°50.2	N22°55.3	175°35.8	\$00°11.5			
1	195°32.5	176° 13.6	18.6	207°55.2	28.3	88°52.5	55.3	190°37.9	11.4	Alpheratz	357°34.1	29°14.0
2	210°34.9	191°13.2	19.9	222°55.8	27.5	103°54.9	55.3	$205^{\circ}40.1$	11.2	Ankaa	353°06.6	-42°09.9
3	225°37.4	206°12.9	• • 21.1	237°56.5	• • 26.7	118°57.3	• • 55.3	220°42.3	• • 11.1	Schedar	349°30.5	56°40.9
4	240°39.8	221°12.5	22.4	252°57.1	26.0	133°59.6	55.3	235°44.5	11.0	Diphda	348°46.6	-17°50.7
5	255°42.3	236°12.1	23.6	267°57.8	25.2	149°02.0	55.2	250°46.7	10.9	Achernar Hamal	335°20.0 327°50.4	-57°06.3 23°35.2
6	270°44.8	251° 11.7	N07°24.8	282°58.4	506°24.4	164°04.3	N22°55.2	265°48.8	S00° 10.7	Polaris	313°53.0	89°22.7
7	285°47.2	266°11.3	26.1	$297^{\circ}59.1$	23.7	179°06.7	55.2	280°51.0	10.6	Acamar	315° 11.3	-40°12.1
8	300°49.7	281°10.9	27.3	312°59.7	22.9	194°09.1	55.2	295°53.2	10.5	Menkar	314°05.3	4°11.5
9	315°52.2	296° 10.5	• • 28.6	328°00.3	• • 22.1	209°11.4	• • 55.2	310°55.4	• • 10.4	Mirfak	308° 27.2	49°57.4
10	330°54.6	311°10.1	29.8	343°01.0	21.4	224°13.8	55.2	325° 57.5	10.3	Aldebaran	290°38.6	16°33.7
11	345°57.1	326°09.7	31.0	358°01.6	20.6	239° 16.1	55.2	340°59.7	10.1	Rigel	281°03.0	-8°10.4
12	0°59.6	341°09.3	N07°32.3	13°02.3	S06°19.8	254° 18.5	N22°55.2	356°01.9	S00°10.0	Capella	280° 20.5	46°01.6
13	16°02.0	356° 08.9	33.5	28°02.9	19.1	269° 20.8	55.2	11°04.1	09.9	Bellatrix	278°21.9	6°22.3
14	31°04.5	11°08.5	34.8	43°03.6	18.3	284°23.2	55.2	26°06.3	09.8	Elnath	278°00.7	28°37.8
15	46°07.0	26°08.1	• • 36.0	58°04.2	• • 17.5	299°25.6	• • 55.2	41°08.4	• • 09.6	Alnilam	275°36.8	-1°11.2
16	61°09.4	41°07.7	37.2	73°04.9	16.7	314°27.9	55.1	56° 10.6	09.5	Betelgeuse	270°51.0	$7^{\circ}24.6$
17	76°11.9	56°07.3	38.5	88°05.5	16.0	329°30.3	55.1	71°12.8	09.4	Canopus	263°51.9	-52°42.8
18	91°14.3	71°07.0	N07°39.7	103°06.2	S06°15.2	344° 32.6	N22°55.1	86° 15.0	500°09.3	Sirius	258°25.3	-16°45.3
19	106°16.8	86°06.6	40.9	118°06.8	14.4	359°35.0	55.1	101°17.1	09.1	Adhara	255°05.0	-29°00.7
20	121°19.3	101°06.2	42.2	133°07.5	13.7	14°37.3	55.1	116° 19.3	09.0	Procyon	244°49.7	5°09.4
21	136°21.7 151°24.2	116°05.8	• • 43.4	148°08.1	• • 12.9	29°39.7	55.1	131°21.5	• • 08.9	Pollux	243°16.0	27°57.8
22		131°05.4	44.7	163°08.8	12.1	44°42.0	55.1	146°23.7	08.8	Avior	$234^{\circ}14.0$	-59°35.9
23	166°26.7	146°05.0	45.9	178°09.4	11.4	59°44.4	55.1	161°25.8	08.7	Suhail	222°45.3	-43°32.5
Mer.p	ass. 11:56	$ u$ -0.4 $^{\prime}$ d1	2′ m-3.92	$\nu$ 0.6′ d-0	.8′ m1.17	$\nu$ 2.4′ d-0	.0′ m-2.27	$\nu$ 2.2′ d-0	.1' m $0.91$	Miaplacidus	221°37.5	-69°49.7
		-						-		Alphard	$217^{\circ}46.5$	-8°46.5
<b>T</b>	CIIA	CIIA	D	CIIA	D	CIIA	D	CHA	D	Regulus	$207^{\circ}33.1$	11°50.2
Tue	GHA 191° 20 1	GHA	Dec	<b>GHA</b> 193° 10.1	Dec S06°10.6	GHA 74° 46. 7	Dec	<b>GHA</b> 176°28.0	Dec	Dubhe	$193^{\circ}39.1$	$61^{\circ}36.6$
0 1	181°29.1 196°31.6	161°04.6 176°04.2	N07°47.1 48.4	193° 10.1 208° 10.7	\$06° 10.6 09.8	74° 46.7 89° 49.1	N22°55.1 55.1	176°28.0 191°30.2	\$00°08.5 08.4	Denebola	$182^{\circ}23.6$	$14^{\circ}25.4$
2	211°34.1	170 04.2 191°03.8		208 10.7 223°11.4		104°51.4		206° 32.4		Gienah	175°42.2	-17°41.4
3	211 34.1 226°36.5	206° 03.4	49.6 •• 50.8	238°12.0	09.0 •• 08.3	104 51.4 119°53.8	55.0 • • 55.0	200 32.4 221°34.6	08.3 •• 08.2	Acrux	172°58.3	-63°14.7
4	241°39.0	200 03.4 221°03.0	52.1	250° 12.0° 253° 12.7°	07.5	119 55.6 134° 56.1	55.0	236°36.7		Gacrux	171°50.0	-57°15.7
5	241 39.0 256°41.5	236°02.6	53.3	268° 13.3	07.5	134 50.1 149°58.5	55.0 55.0	250 30.7 251°38.9	08.0 07.9	Alioth	$166^{\circ}11.5$	55°48.9
6	271°43.9	251°02.2	N07°54.5	283°14.0	S06°06.0	165°00.9	N22°55.0	266°41.1	500°07.8	Spica	158°21.0	-11°18.1
7	286°46.4	266°01.8	55.8	298°14.6	05.2	180°03.2	55.0	281°43.3	07.7	Alkaid	152°50.8	49°10.7
8	301°48.8	281°01.4	55.6 57.0	313°15.3	04.4	195° 05.2	55.0	201 45.3 296°45.4	07.7	Hadar	148°34.1	-60°29.9
9	316°51.3	296°01.0	• • 58.2	328° 15.9	•• 03.6	210°07.9	• • 55.0	311°47.6	•• 07.4	l l	147°56.1	-36°30.0
10	331°53.8	311°00.6	07°59.5	343°16.6	02.9	210°07.9 225°10.3	55.0	326°49.8	07.4	Arcturus	145°46.7	19°02.5
11	346°56.2	326°00.2	08°00.7	358° 17.2	02.9	240°12.6	55.0	341°52.0	07.3	Rigil Kent.	139°38.4	-60°56.6
12	1°58.7	340°59.8	N08°01.9	13° 17.9	S06°01.3	255° 14.9	N22°54.9	356° 54.2	S00°07.1	Kochab	137°18.9	74°02.5
13	17°01.2	355°59.4	03.2	28°18.5	06°00.6	270° 17.3	54.9	11°56.3	06.9	Zuben'ubi	136°54.7	-16°09.2
14	32°03.6	10°59.0	04.4	43° 19.2	05°59.8	285° 19.6	54.9	26°58.5	06.8	Alphecca	126°02.7	26°37.3
15	47°06.1	25° 58.6	05.6	58° 19.8	• • 59.0	300°22.0	54.9	42°00.7	06.7	Antares	112°14.5	-26°29.4
16	62°08.6	40°58.2	06.9	73°20.5	58.2	315°24.3	54.9	57° 02.9	06.6	Atria	107°07.6	-69°04.2
17	77°11.0	55° 57.8	08.1	88°21.1	57.5	330° 26.7	54.9	72°05.0	06.4	Sabik	102°01.6	-15°45.5
18	92°13.5	70°57.4	N08°09.3	103°21.8	S05°56.7	345°29.0	N22°54.9	87°07.2	S00°06.3	Shaula	96°09.0	-37°07.3
19	107°15.9	85° 57.0	10.6	118°22.4	55.9	0°31.4	54.9	102°09.4	06.2	Rasalhague	95°57.6	12°32.2
20	122°18.4	100°56.6	11.8	133°23.1	55.2	15°33.7	54.9	117° 11.6	06.1	Eltanin	90°41.7	51°28.7
21	137°20.9	115°56.2	· · 13.0	148°23.7	• • 54.4	30°36.1	• • 54.8	132° 13.8	• • 05.9	Kaus Aust.	83°31.2	-34°22.3
22	152°23.3	130°55.8	14.2	163°24.4	53.6	45°38.4	54.8	147° 15.9	05.8	Vega	80°32.6	38°48.1
23	167°25.8	145°55.4	15.5	178°25.0	52.8	60°40.8	54.8	162° 18.1	05.7	Nunki	75°46.6	-26°15.8
										Altair	61°59.1	8°56.1 -56°38.9
Mer.p	ass. 11:52	$\nu$ -0.4' d1	2′ m-3.92	$\nu$ 0.6′ $d$ -0	0.8′ m1.17	$\nu$ 2.4′ d-0	.0′ m-2.26	$\nu$ 2.2′ d-0	.1′ m0.91	Peacock	53°04.5	
										Deneb	49°25.4	45°22.1
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir	33°38.1 27°32.0	9°59.6 -46°50.0
0	182°28.3	160°55.0	N08°16.7	193°25.7	S05°52.1	75° 43.1	N22°54.8	177°20.3	500°05.6	Fomalhaut	27 32.0 15°13.8	-46 50.0 -29°29.0
1	197°30.7	175°54.6	17.9	208°26.3	51.3	90°45.5	54.8	192°22.5	05.5	Scheat	13°44.6	-29°29.0° 28°13.4
2	212°33.2	190°54.2	19.2	223°27.0	50.5	105°47.8	54.8	207°24.6	05.3	Markab	13° 29.2	15°20.7
3	227°35.7	205°53.8	20.4	238°27.6	• • 49.8	120°50.1	• • 54.8	222°26.8	• • 05.2			
4	242°38.1	220°53.4	21.6	253°28.3	49.0	135°52.5	54.8	237°29.0	05.1	Mar 23 Mon	SHA	Mer.pass
5	257°40.6	235°53.0	22.8	268°28.9	48.2	150°54.8	54.8	252°31.2	05.0	Venus	340°44.0	13:15
6	272°43.1	250°52.6	N08°24.1	283°29.6	S05°47.4	165°57.2	N22°54.7	267°33.3	S00°04.8	Mars	$12^{\circ}24.5$	11:08
7	287°45.5	265°52.2	25.3	298°30.2	46.7	180°59.5	54.7	282°35.5	04.7	Jupiter	253°20.2	19:02
8	302°48.0	280°51.8	26.5	313°30.9	45.9	196°01.9	54.7	297°37.7	04.6	Saturn	355°05.8	12:16
9	$317^{\circ}50.4$	295°51.4	• • 27.7	328°31.5	•• 45.1	211°04.2	• • 54.7	$312^{\circ}39.9$	• • 04.5	Mar 24 Tu-	Ç LI A	Mor noor
10	332°52.9	310°51.0	29.0	343°32.2	44.3	226°06.5	54.7	$327^{\circ}42.1$	04.3	Mar 24 Tue	<b>SHA</b> 339° 35.5	Mer.pass 13:16
11	$347^{\circ}55.4$	325°50.6	30.2	358°32.8	43.6	241°08.9	54.7	$342^{\circ}44.2$	04.2	Venus	339° 35.5 11° 40.9	
12	2°57.8	340°50.2	N08°31.4	13°33.5	S05°42.8	256°11.2	N22°54.7	357° 46.4	S00°04.1	Mars Jupiter		11:07 18:58
13	18°00.3	355°49.8	32.6	$28^{\circ}34.1$	42.0	271° 13.6	54.7	12°48.6	04.0	Saturn	253 17.0 354°58.9	12:12
14	33°02.8	10°49.4	33.9	43°34.8	41.3	286° 15.9	54.7	27°50.8	03.9	Saturn	JJ4 J0.9	12.12
15	48°05.2	25°49.0	• • 35.1	58°35.5	• • 40.5	301°18.2	• • 54.6	42°52.9	• • 03.7	Mar 25 Wed	SHA	Mer.pass
16	63°07.7	40°48.6	36.3	73°36.1	39.7	$316^{\circ}20.6$	54.6	57°55.1	03.6	Venus	338°26.8	13:17
17	78°10.2	55°48.2	37.5	88°36.8	38.9	331°22.9	54.6	72° 57.3	03.5	Mars	$10^{\circ}57.4$	11:06
18	93°12.6	70°47.8	N08°38.8	103°37.4	S05°38.2	346° 25.3	N22°54.6	87° 59.5	S00°03.4	Jupiter	253°14.8	18:54
19	108°15.1	85° 47.4	40.0	118°38.1	37.4	1°27.6	54.6	103°01.7	03.2	Saturn	$354^{\circ}52.0$	12:09
20	123°17.6	100°47.0	41.2	133°38.7	36.6	16°29.9	54.6	118°03.8	03.1		-1 "	
21	138°20.0	115°46.5	• • 42.4	148°39.4	• • 35.8	31°32.3	• • 54.6	133°06.0	• • 03.0	Horizont	al parallax	0.1
22	153°22.5	130°46.1	43.6	163°40.0	35.1	46°34.6	54.6	148°08.2	02.9		Venus:	0.1
23	168°24.9	145°45.7	44.9	178°40.7	34.3	61°36.9	54.6	163° 10.4	02.8		Mars:	0.1
Mern	ass. 11:48	$\nu$ -0 4' d1	2′ m-3.92	$\nu 0.7' d-0$	0.8′ m1.17	$\nu^{2.3'} d^{-0}$	.0′ m-2.25	$\nu^{2.2'} d^{-0}$	.1′ m0.91			

h	Sui	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°19.6	N00°56.5	129°12.1	5.4'	N23°56.3	9.7'	59.7'
1 2	193°19.8 208°20.0	57.5 58.5	143°36.5 158°00.9	5.3' 5.3'	24°06.0 24°15.5	9.5' 9.4'	59.7' 59.7'
3	223°20.1	00°59.5	172°25.1	5.2'	24°24.9	9.2'	59.7'
4	238°20.3	$01^{\circ}00.5$	$186^{\circ}49.3$	5.1'	$24^{\circ}34.1$	9.0'	59.7'
5	253°20.5	01.5	201°13.4	5.0'	24°43.1	8.9'	59.6'
6 7	268°20.7 283°20.9	N01°02.4 03.4	215°37.4 230°01.3	4.9' 4.8'	N24°52.0 25°00.7	8.7' 8.5'	59.6' 59.6'
8	298°21.1	04.4	244°25.1	4.8'	25°09.2	8.4	59.6'
9	313°21.3	• • 05.4	258°48.9	4.7'	25°17.6	8.2'	59.6'
10 11	328°21.5 343°21.6	06.4 07.4	273°12.6 287°36.2	4.6' 4.5'	25°25.8 25°33.8	8.0' 7.9'	59.6' 59.6'
12	358°21.8	N01°08.4	301°59.7	4.4	N25°41.7	7.7'	59.6'
13	13°22.0	09.3	$316^{\circ}23.1$	4.4'	25°49.4	7.5'	59.6'
14	28°22.2 43°22.4	10.3 •• 11.3	330°46.5 345°09.8	4.3' 4.2'	25°56.9 26°04.2	7.3' 7.1'	59.6' 59.6'
15 16	58°22.6	12.3	359°33.1	4.2'	26°11.3	7.1 7.0'	59.6'
17	73°22.8	13.3	$13^{\circ}56.2$	4.1'	$26^{\circ}18.3$	6.8'	59.6'
18	88°23.0	N01°14.3	28°19.3	4.0'	N26°25.1 26°31.7	6.6'	59.6'
19 20	103°23.1 118°23.3	15.3 16.2	42°42.4 57°05.3	4.0' 3.9'	26°31.7 26°38.1	6.4' 6.2'	59.6' 59.6'
21	133°23.5	17.2	71°28.3	3.9'	26°44.3	6.1	59.5'
22	148°23.7	18.2	85°51.1	3.8'	26°50.4	5.9'	59.5'
23	163°23.9	19.2	100°13.9	3.8'	26°56.3	5.7'	59.5'
	SD = 16.0'	d = 1.0'		SI	D = 16.3'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°24.1	N01°20.2	$114^{\circ}36.7$	3.7'	$N27^{\circ}01.9$	5.5'	59.5'
1	193°24.3 208°24.5	21.2 22.2	128°59.4 143°22.0	3.6' 3.6'	27°07.4 27°12.7	5.3' 5.1'	59.5' 59.5'
2	208 24.5 223°24.6	23.1	143 22.0 157°44.6	3.6'	27 12.7 27°17.8	5.1 4.9'	59.5'
4	238°24.8	24.1	172°07.2	3.5'	27°22.7	4.7'	59.5'
5	253°25.0	25.1	186°29.7	3.5'	27°27.5	4.5'	59.5'
6 7	268°25.2 283°25.4	N01°26.1 27.1	200°52.2 215°14.6	3.4' 3.4'	N27°32.0 27°36.4	4.3' 4.2'	59.5' 59.5'
8	298°25.6	28.1	229°37.0	3.4'	27°40.5	4.0'	59.4
9	313°25.8	• • 29.0	243°59.4	3.3'	27°44.5	3.8'	59.4'
10 11	328°26.0 343°26.1	30.0 31.0	258°21.7 272°44.0	3.3' 3.3'	27°48.2 27°51.8	3.6' 3.4'	59.4' 59.4'
12	358°26.3	N01°32.0	287°06.3	3.3'	N27°55.2	3.2	59.4
13	13°26.5	33.0	301°28.5	3.2'	27°58.3	3.0'	59.4'
14 15	28°26.7 43°26.9	34.0 •• 34.9	315°50.8 330°13.0	3.2' 3.2'	28°01.3 28°04.1	2.8' 2.6'	59.4' 59.4'
16	58°27.1	35.9	344°35.2	3.2'	28°06.7	2.4	59.4'
17	73°27.3	36.9	$358^{\circ}57.4$	3.2'	$28^{\circ}09.1$	2.2'	59.3'
18 19	88°27.5 103°27.6	N01°37.9 38.9	13°19.5 27°41.7	3.2' 3.2'	N28°11.3 28°13.3	2.0' 1.8'	59.3' 59.3'
20	103 27.0 118°27.8	39.9	42°03.9	3.2'	28°15.1	1.6'	59.3'
21	133°28.0	• • 40.9	56°26.0	3.2'	$28^{\circ}16.7$	1.4'	59.3'
22 23	148°28.2 163°28.4	41.8 42.8	70°48.2 85°10.3	3.2' 3.2'	28°18.1 28°19.3	1.2' 1.0'	59.3' 59.3'
23	SD = 16.0'	d = 1.0'	05 10.5		D = 16.2'	1.0	39.3
	3D = 10.0	u = 1.0		31	D = 10.2		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°28.6 193°28.8	N01°43.8 44.8	99°32.5 113°54.7	3.2' 3.2'	N28°20.3 28°21.1	0.8' 0.6'	59.3' 59.2'
2	208°29.0	45.8	128°16.8	3.2'	28°21.7	0.4	59.2'
3	223°29.2	• • 46.8	142°39.0	3.2'	28°22.1	0.2'	59.2'
4 5	238°29.3 253°29.5	47.7 48.7	157°01.2 171°23.4	3.2' 3.2'	28°22.3 28°22.3	0.0' -0.2'	59.2' 59.2'
6	268°29.7	N01°49.7	185°45.7	3.3'	N28°22.1	-0.4	59.2
7	283°29.9	50.7	200°08.0	3.3'	28°21.8	-0.6'	59.2'
8 9	298°30.1 313°30.3	51.7 •• 52.7	214°30.2 228°52.6	3.3' 3.4'	28°21.2 28°20.4	-0.8' -1.0'	59.1' 59.1'
10	328°30.5	53.6	243°14.9	3.4'	28°19.5	-1.2	59.1'
11	343°30.7	54.6	257°37.3	3.4'	28°18.3	-1.4'	59.1'
12 13	358°30.9 13°31.0	N01°55.6 56.6	271°59.7 286°22.2	3.5' 3.5'	N28°16.9 28°15.4	-1.5' -1.7'	59.1' 59.1'
13 14	28°31.2	56.6 57.6	286°22.2 300°44.7	3.5'	28° 15.4 28° 13.7	-1.7' -1.9'	59.1' 59.1'
15	43°31.4	• • 58.5	$315^{\circ}07.2$	3.6'	$28^{\circ}11.7$	-2.1'	59.0'
16	58°31.6 73°31.8	01°59.5 02°00.5	329°29.8 343°52.4	3.6' 3.7'	28°09.6 28°07.3	-2.3'	59.0'
17 18	73°31.8 88°32.0	02°00.5 N02°01.5	343°52.4 358°15.1	3.7'	28°07.3 N28°04.8	-2.5' -2.7'	59.0' 59.0'
19	103°32.2	02.5	12°37.9	3.8'	28°02.1	-2.9'	59.0'
20	118°32.4	03.5	27°00.6	3.8'	27°59.2	-3.1'	59.0'
21 22	133°32.5 148°32.7	· · 04.4 05.4	41°23.5 55°46.4	3.9' 4.0'	27°56.1 27°52.9	-3.3' -3.4'	59.0' 58.9'
23	163°32.9	06.4	70°09.4	4.0'	27°49.4	-3.6'	58.9
	SD = 16.0'	d = 1.0'		SI	D = 16.2'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	02:53	04:29	05:38	18:37	19:47	21:25
N 70°	03:17	04:39	05:41	18:34	19:37	21:00
68°	03:34	04:47	05:43	18:31	19:28	20:42
66°	03:48	04:53	05:45	18:29	19:21	20:27
64°	04:00	04:59	05:47	18:27	19:15	20:15
62°	04:09	05:04	05:48	18:26	19:10	20:06
60°	04:17	05:08	05:50	18:24	19:06	19:57
N 58°	04:24	05:12	05:51	18:23	19:02	19:50
56°	04:30	05:15	05:52	18:22	18:59	19:44
54°	04:35	05:17	05:53	18:21	18:56	19:39
52°	04:40	05:20	05:54	18:20	18:54	19:34
50°	04:44	05:22	05:54	18:19	18:52	19:30
45°	04:52	05:27	05:56	18:17	18:47	19:22
N 40°	04:58	05:30	05:57	18:16	18:43	19:15
35°	05:03	05:33	05:58	18:15	18:40	19:10
30°	05:07	05:35	05:59	18:14	18:38	19:06
20°	05:13	05:39	06:01	18:12	18:34	19:00
N 10°	05:17	05:41	06:02	18:11	18:32	18:56
0°	05:18	05:42	06:03	18:09	18:30	18:54
S 10°	05:19	05:43	06:04	18:08	18:29	18:54
20°	05:17	05:43	06:05	18:07	18:29	18:55
30°	05:14	05:42	06:06	18:06	18:30	18:58
35°	05:12	05:41	06:06	18:06	18:31	19:00
40°	05:08	05:40	06:07	18:05	18:32	19:03
45°	05:04	05:38	06:07	18:04	18:34	19:08
<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.		Moonris	e		Moonset	:
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°						
<b>N</b> 70°						
68°						
66°						
64°	04:57			01:53		
62°	05:38	05:29		01:13	03:30	
60°	06:06	06:22	07:07	00:45	02:38	04:06
N 58°	06:28	06:54	07:45	00:24	02:06	03:27
56°	06:46	07:18	08:12	00:07	01:42	03:00
54°	07:02	07:38	08:33		01:23	02:39
52°	07:15	07:54	08:51		01:07	02:21
50°	07:27	80:80	09:06		00:53	02:06
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	11:12	12:15	21:55	22:57	
20°	10:29	11:36	12:40	21:32	22:32	23:36
30°	10:54	12:04	13:08	21:06	22:04	23:08
35°	11:09	12:21	13:25	20:50	21:47	22:51
40°	11:27	12:40	13:44	20:32	21:27	22:32
45°	11:48	13:04	14:08	20:10	21:03	22:08
<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	21:23
54°	12:42	14:07	15:12	19:14	19:59	21:06
56°	13:00	14:28	15:33	18:56	19:38	20:44
58°	13:21	14:56	16:00	18:34	19:10	20:17
<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			

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	183°27.4	160°45.3	N08°46.1	193°41.3	S05°33.5	76°39.3	N22°54.5	178°12.5	S00°02.6			
1	198°29.9	175°44.9	47.3	208°42.0	32.7	91°41.6	54.5	193°14.7	02.5	Alpheratz	357°34.1	29°14.0
2	213°32.3	190°44.5	48.5	223°42.6	32.0	106°43.9	54.5	208°16.9	02.4	Ankaa	353°06.6	-42°09.9
3	228°34.8	205°44.1	• • 49.7	238°43.3	• • 31.2	121°46.3	• • 54.5	223°19.1	• • 02.3	Schedar	349°30.5	56°40.9
4	243°37.3	220°43.7	51.0	253°44.0	30.4	136°48.6	54.5	238°21.3	02.1	Diphda	348°46.6	-17°50.6
5	258°39.7	235°43.3	52.2	268°44.6	29.6	151°51.0	54.5	253°23.4	02.0	Achernar	335°20.0	-57°06.3
6	273°42.2	250°42.9	N08°53.4	283°45.3	S05°28.9	166°53.3	N22°54.5	268°25.6	S00°01.9	Hamal	327°50.4	23°35.2
7	288°44.7	265°42.5	54.6	298°45.9	28.1	181°55.6	54.5	283°27.8	01.8	Polaris	313°53.7	89°22.7
8	303°47.1	280°42.1	55.8	313°46.6	27.3	196°58.0	54.4	298°30.0	01.6	Acamar	315°11.3	-40°12.1
9	318°49.6	295°41.7	• • 57.0	328°47.2	• • 26.5	212°00.3	• • 54.4	313°32.1	• • 01.5	Menkar	314°05.3	4°11.5
10	333°52.1	310°41.3	58.3	343°47.9	25.8	227°02.6	54.4	328°34.3	01.4	Mirfak	308°27.2	49°57.4
11	348°54.5	325°40.8	08°59.5	358°48.5	25.0	242°05.0	54.4	343°36.5	01.3	Aldebaran	290°38.6	16°33.7
12	3°57.0	340°40.4	N09°00.7	13°49.2	S05°24.2	257°07.3	N22°54.4	358°38.7	S00°01.2	Rigel	281°03.0	-8°10.4
13	18°59.4	355°40.0	01.9	28°49.8	23.4	272°09.6	54.4	13°40.8	01.0	Capella	280°20.5	46°01.6
14	34°01.9	10°39.6	03.1	43°50.5	22.7	$287^{\circ}11.9$	54.4	28°43.0	00.9	Bellatrix		6°22.3
15	49°04.4	25°39.2	• • 04.3	58°51.2	• • 21.9	$302^{\circ}14.3$	• • 54.4	43°45.2	• • 00.8	Elnath	278°00.7	28°37.8
16	64°06.8	40°38.8	05.6	73°51.8	21.1	$317^{\circ}16.6$	54.3	58°47.4	00.7	Alnilam	275°36.8	-1°11.2
17	79°09.3	55°38.4	06.8	88°52.5	20.3	$332^{\circ}18.9$	54.3	73°49.6	00.5	Betelgeuse	270°51.0	7°24.6
18	94°11.8	70°38.0	N09°08.0	103°53.1	S05°19.6	347°21.3	N22°54.3	88°51.7	S00°00.4	Canopus	263°52.0	-52°42.8
19	109°14.2	85°37.6	09.2	118°53.8	18.8	2°23.6	54.3	103°53.9	00.3	Sirius	258°25.3	-16°45.3
20	124°16.7	100°37.1	10.4	133°54.4	18.0	17°25.9	54.3	118°56.1	00.2	Adhara	255°05.0	-29°00.7
21	139°19.2	115°36.7	• • 11.6	148°55.1	• • 17.2	32°28.3	• • 54.3	133°58.3	S00°00.1	Procyon	244°49.7	5°09.4 27°57.8
22	154°21.6	130°36.3	12.8	163°55.8	16.5	47°30.6	54.3	149°00.4	N00°00.1	Pollux Avior	243°16.0 234°14.1	-59°35.9
23	169°24.1	145°35.9	14.1	178°56.4	15.7	62°32.9	54.3	164°02.6	00.2	Avior Suhail	234°14.1 222°45.3	-59°35.9 -43°32.6
N /	page 11.44	,, O A/ J1	.2′ m-3.92	107/ d o	.8′ m1.17	1/2 2/ 4 0	.0′ m-2.25	1,2 2/ 4 0	.1′ m0.91		222°45.3 221°37.5	-43°32.6 -69°49.7
ivier.	pass. 11:44	$\nu$ -0.4 d1	.∠ in-3.92	$\nu$ 0.1° $a$ -0	.o m1.1/	$\nu 2.3^{\circ} a-0$	.u m-2.25	$\nu$ 2.2 $a$ -0	.1 INU.91	Miaplacidus Alphard	221°37.5 217°46.5	-69°49.7 -8°46.5
											217 40.5 207°33.1	-6 40.5 11°50.2
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	207 33.1 193°39.1	61°36.6
0	184°26.6	160°35.5	N09°15.3	193°57.1	S05°14.9	77°35.2	N22°54.2	179°04.8	N00°00.3	Dubne	193°39.1 182°23.6	14°25.4
1	199°29.0	175°35.1	16.5	208°57.7	14.1	92°37.6	54.2	194°07.0	00.4	Gienah	182 23.6 175°42.2	-17°41.4
2	214°31.5	190°34.7	17.7	223°58.4	13.4	$107^{\circ}39.9$	54.2	209°09.2	00.6		175° 42.2 172° 58.3	-63°14.8
3	229°33.9	205°34.3	• • 18.9	238°59.0	• • 12.6	122°42.2	• • 54.2	224°11.3	• • 00.7		172 50.5 171°50.0	-03 14.8 -57°15.7
4	244°36.4	220°33.8	20.1	253°59.7	11.8	$137^{\circ}44.6$	54.2	239°13.5	8.00	Alioth	166°11.5	55°48.9
5	259°38.9	235°33.4	21.3	269°00.4	11.0	152°46.9	54.2	254°15.7	00.9	Spica	158°20.9	-11°18.1
6	274°41.3	250°33.0	N09°22.5	284°01.0	S05°10.3	167°49.2	N22°54.2	269°17.9	N00°01.0	Alkaid	150° 20.9° 152° 50.7	49°10.7
7	289°43.8	265°32.6	23.7	299°01.7	09.5	$182^{\circ}51.5$	54.2	284°20.0	01.2	Hadar	148°34.0	-60°30.0
8	304°46.3	280°32.2	24.9	314°02.3	08.7	197°53.9	54.1	299°22.2	01.3		147°56.1	-36°30.0
9	319°48.7	295°31.8	• • 26.1	329°03.0	• • 07.9	212°56.2	•• 54.1	314°24.4	• • 01.4	Arcturus	145°46.7	19°02.5
10	334°51.2	310°31.4	27.4	344°03.6	07.2	227°58.5	54.1	329°26.6	01.5	Rigil Kent.	139°38.4	-60°56.6
11	349°53.7	325°30.9	28.6	359°04.3	06.4	243°00.8	54.1	344°28.7	01.7	Kochab	137°18.9	74°02.5
12	4°56.1	340°30.5	N09°29.8	14°05.0	S05°05.6	258°03.2	N22°54.1	359°30.9	N00°01.8	Zuben'ubi	136°54.6	-16°09.2
13	19°58.6	355°30.1	31.0	29°05.6	04.8	273°05.5	54.1	14°33.1	01.9	Alphecca	126°02.6	26°37.3
14	35°01.0	$10^{\circ}29.7$	32.2	44°06.3	04.1	288°07.8	54.1	29°35.3	02.0	Antares	112° 14.4	-26°29.4
15	50°03.5	25°29.3	• • 33.4	59°06.9	• • 03.3	$303^{\circ}10.1$	•• 54.1	44°37.5	• • 02.2	Atria	107°07.6	-69°04.2
16	65°06.0	40°28.9	34.6	74°07.6	02.5	318°12.4	54.0	59°39.6	02.3	Sabik	102°01.5	-15°45.5
17	80°08.4	55°28.4	35.8	89°08.2	01.7	333°14.8	54.0	74°41.8	02.4	Shaula	96°08.9	-37°07.3
18	95°10.9	70°28.0	N09°37.0	104°08.9	S05°00.9	348°17.1	N22°54.0	89°44.0	N00°02.5	Rasalhague	95°57.5	12°32.2
19	110°13.4	85°27.6	38.2	119°09.6	05°00.2	3°19.4	54.0	104°46.2	02.6	Eltanin	90°41.6	51°28.7
20	125°15.8	100°27.2	39.4	134°10.2	04°59.4	18°21.7	54.0	119°48.3	02.8	Kaus Aust.	83°31.2	-34°22.3
21	140°18.3	115°26.8	• • 40.6	149°10.9	• • 58.6	33°24.1	• • 54.0	134°50.5	• • 02.9	Vega	80°32.6	38°48.1
22	155°20.8	130°26.4	41.8	164°11.5	57.8	48°26.4	54.0	149°52.7	03.0	Nunki	75°46.6	-26°15.8
23	170°23.2	145°25.9	43.0	179°12.2	57.1	63°28.7	53.9	164°54.9	03.1	Altair	61°59.1	8°56.1
Mer	pass. 11:40	$\nu$ -0.4' d1	.2′ m-3.92	$\nu 0.7' d-0$	.8′ m1.18	v2 3' d-0	.0′ m-2.24	v2 2' d0	.1′ m0.91	Peacock	53°04.4	-56°38.9
	<del></del>									Deneb	49°25.4	45°22.1
										Enif	33°38.1	9°59.6
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.0	-46°50.0
0	185°25.7	160°25.5	N09°44.2	194°12.9	S04°56.3	78°31.0	N22°53.9	179°57.1	N00°03.3	Fomalhaut	15°13.7	-29°29.0
1	200°28.2	175°25.1	45.4	209°13.5	55.5	93°33.3	53.9	194°59.2	03.4	Scheat	13°44.6	28°13.4
2	215°30.6	190°24.7	46.6	224°14.2	54.7	108°35.7	53.9	210°01.4	03.5	Markab	13°29.2	15°20.7
3	230°33.1	205°24.3	• • 47.8	239°14.8	• • 54.0	123°38.0	• • 53.9	225°03.6	• • 03.6	NA 00 =:		
4	245°35.5	220°23.8	49.0	254°15.5	53.2	138°40.3	53.9	240°05.8	03.7	Mar 26 Thu	SHA	Mer.pass
5	260°38.0	235°23.4	50.2	269°16.2	52.4	153°42.6	53.9	255°07.9	03.9	Venus		13:17
6	275°40.5	250°23.0	N09°51.4	284°16.8	S04°51.6	168°44.9	N22°53.8	270°10.1	N00°04.0	Mars	10°13.9	11:05
7	290°42.9	265°22.6	52.6	299°17.5	50.8	183°47.2	53.8	285°12.3	04.1	Jupiter		18:50
8	305°45.4	280°22.2	53.8	314°18.1	50.1	198°49.6	53.8	300°14.5	04.2	Saturn	354°45.1	12:05
9	320°47.9	295°21.7	• • 55.0	329°18.8	• • 49.3	213°51.9	• • 53.8	315°16.7	• • 04.4	Mar 27 Fri	SHA	Mer.pass
10	335°50.3	310°21.3	56.2	344°19.5	48.5	228°54.2	53.8	330°18.8	04.5	Venus	336°08.9	13:18
11	350°52.8	325°20.9	57.4	359°20.1	47.7	243°56.5	53.8	345°21.0	04.6	Mars	9°30.5	11:04
12	5°55.3	340°20.5	N09°58.6	14°20.8	S04°47.0	258°58.8	N22°53.8	0°23.2	N00°04.7		253°08.7	18:47
13	20°57.7	355°20.0	09°59.8	29°21.4	46.2	274°01.1	53.8	15°25.4	04.8	Saturn	354°38.2	12:02
14	36°00.2	10°19.6	10°01.0	44°22.1	45.4	289°03.5	53.7	30°27.5	05.0			
15	51°02.7	25°19.2	• • 02.2	59°22.8	• • 44.6	304°05.8	• • 53.7	45°29.7	• • 05.1	Mar 28 Sat	SHA	Mer.pass
16	66°05.1	40°18.8	03.4	74°23.4	43.8	319°08.1	53.7	60°31.9	05.2	Venus		13:19
17	81°07.6	55°18.3	04.6	89°24.1	43.1	334°10.4	53.7	75°34.1	05.3	Mars	8°47.2	11:03
18	96°10.0	70°17.9	N10°05.8	104°24.7	S04°42.3	349°12.7	N22°53.7	90°36.2	N00°05.5	Jupiter		18:43
19	111°12.5 126°15.0	85°17.5	07.0	119°25.4	41.5	4°15.0	53.7	105°38.4	05.6	Saturn	354°31.4	11:58
	1/0 15 ()	$100^{\circ}17.1$	08.2	134°26.1	40.7 •• 40.0	19°17.4 34°19.7	53.7 • • 53.6	120°40.6 135°42.8	05.7 •• 05.8	Horizont	tal parallax	
20		1150167					•• 536		05.8	1101120111		,
20 21	141°17.4	115°16.7	· · 09.4	149°26.7							-	0.1
20 21 22	141°17.4 156°19.9	$130^{\circ}16.2$	10.6	$164^{\circ}27.4$	39.2	49°22.0	53.6	150°45.0	05.9		Venus:	0.1 0.1
20 21 22 23	141°17.4	130°16.2 145°15.8		164°27.4 179°28.0		49°22.0 64°24.3		150°45.0 165°47.1			-	0.1 0.1

h	Sui	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°33.1	$N02^{\circ}07.4$	84°32.4	4.1'	N27°45.8	-3.8'	58.9'
1	193°33.3	08.4	98°55.5	4.2'	27°42.0	-4.0'	58.9'
2	208°33.5 223°33.7	09.3 •• 10.3	113°18.7 127°41.9	4.2' 4.3'	27°38.0 27°33.8	-4.2' -4.4'	58.9' 58.9'
4	238°33.9	11.3	142°05.2	4.4'	27° 29.4	-4.5	58.8'
5	253°34.1	12.3	$156^{\circ}28.6$	4.5'	$27^{\circ}24.9$	-4.7'	58.8'
6	268°34.2	N02°13.3	170°52.0	4.5'	N27°20.2	-4.9'	58.8'
7 8	283°34.4 298°34.6	14.2 15.2	185°15.6 199°39.2	4.6' 4.7'	27°15.3 27°10.2	-5.1' -5.2'	58.8' 58.8'
9	313°34.8	. 16.2	214°02.9	4.8'	27° 05.0	-5.4'	58.8'
10	328°35.0	17.2	228°26.7	4.9'	26° 59.5	-5.6'	58.7'
11	343°35.2	18.2	242°50.5	4.9'	26°53.9	-5.8'	58.7'
12 13	358°35.4 13°35.6	N02°19.2 20.1	257°14.5 271°38.5	5.0' 5.1'	N26°48.2 26°42.2	-5.9' -6.1'	58.7' 58.7'
14	28°35.8	21.1	286°02.6	5.2'	26°36.1	-6.3'	58.7'
15	43°35.9	• • 22.1	300°26.8	5.3'	26°29.9	-6.4'	58.7'
16	58°36.1 73°36.3	23.1	314°51.1	5.4'	26°23.4	-6.6'	58.6'
17 18	73°36.3 88°36.5	24.1 N02°25.0	329°15.5 343°40.0	5.5' 5.6'	26°16.8 N26°10.0	-6.8' -6.9'	58.6' 58.6'
19	103°36.7	26.0	358°04.6	5.7'	26°03.1	-7.1'	58.6'
20	118°36.9	27.0	12°29.3	5.8'	25° 56.0	-7.2'	58.6'
21	133°37.1	• • 28.0	26°54.0	5.9'	25°48.8 25°41.4	-7.4'	58.6'
22 23	148°37.3 163°37.5	29.0 29.9	41°18.9 55°43.9	6.0' 6.1'	25°41.4 25°33.8	-7.6' -7.7'	58.5' 58.5'
20	SD = 16.0'	d = 1.0'			D = 16.1'		
	אר = דור?	$a = 1.0^{\circ}$		51	D = 10.1		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°37.6	N02°30.9	70°08.9	6.2'	N25°26.1	-7.9'	58.5'
1 2	193°37.8 208°38.0	31.9 32.9	84°34.1 98°59.4	6.3' 6.4'	25°18.2 25°10.2	-8.0' -8.2'	58.5' 58.5'
3	200 38.0 223°38.2	33.8	90° 59.4 113° 24.8	6.5	25°02.0	-8.3'	58.5'
4	238°38.4	34.8	127°50.3	6.6'	24°53.7	-8.5'	58.4'
5	253°38.6	35.8	142°15.9	6.7'	24°45.3	-8.6'	58.4'
6 7	268°38.8 283°39.0	N02°36.8 37.8	156°41.5 171°07.3	6.8' 6.9'	N24°36.6 24°27.9	-8.8' -8.9'	58.4' 58.4'
8	203 39.0 298°39.2	38.7	171 07.3 185°33.2	7.0'	24°27.9	-0.9 -9.0'	58.4'
9	313°39.3	• • 39.7	199°59.3	7.1'	24° 10.0	-9.2'	58.4'
10	328°39.5	40.7	214°25.4	7.2'	24°00.8	-9.3'	58.3'
11 12	343°39.7 358°39.9	41.7 N02°42.7	228°51.6 243°17.9	7.3' 7.4'	23°51.5 N23°42.0	-9.4' -9.6'	58.3' 58.3'
13	13°40.1	43.6	243 17.9 257°44.4	7. <del>4</del> 7.5'	23°32.4	-9.0 -9.7'	58.3'
14	28°40.3	44.6	272°10.9	7.7'	23°22.7	-9.8'	58.3'
15	43°40.5	• • 45.6	286°37.6	7.8'	23°12.9	-10.0'	58.2'
16 17	58°40.7 73°40.9	46.6 47.5	301°04.4 315°31.2	7.9' 8.0'	23°02.9 22°52.8	-10.1' -10.2'	58.2' 58.2'
18	88°41.0	N02°48.5	329°58.2	8.1'	N22°42.6	-10.2	58.2
19	103°41.2	49.5	344°25.3	8.2'	22°32.2	-10.5'	58.2'
20	118°41.4	50.5	358°52.5	8.3'	22°21.8		58.2'
21 22	133°41.6 148°41.8	· · 51.5 52.4	13°19.8 27°47.2	8.4' 8.5'	22°11.2 22°00.4	-10.7' -10.8'	58.1' 58.1'
23	163°42.0	53.4	42°14.8	8.6'	21°49.6	-10.0	58.1
	SD = 16.0'	d = 1.0'		SI	D = 16.0'		
	<u> </u>	<u>u = 1.0</u>			J = 10.0		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°42.2 193°42.4	N02°54.4 55.4	56°42.4 71°10.1	8.7' 8.9'	N21°38.7 21°27.6	-11.1' -11.2'	58.1' 58.1'
2	208°42.6	55.4 56.3	71 10.1 85°38.0	8.9 9.0'	21°16.4	-11.2 -11.3'	58.1°
3	223°42.8	• • 57.3	$100^{\circ}06.0$	9.1'	21°05.2	-11.4'	58.0'
4	238°42.9	58.3	114°34.0	9.2'	20°53.8	-11.5'	58.0'
5 6	253°43.1 268°43.3	02°59.3 N03°00.2	129°02.2 143°30.5	9.3' 9.4'	20°42.3 N20°30.7	-11.6' -11.7'	58.0' 58.0'
7	283°43.5	01.2	145 50.5 157°58.9	9.4 9.5'	20° 18.9	-11.7 -11.8'	56.0 57.9'
8	298°43.7	02.2	172°27.4	9.6'	$20^{\circ}07.1$	-11.9'	57.9'
9	313°43.9	• • 03.2	186°56.0	9.7'	19°55.2	-12.0'	57.9'
10 11	328°44.1 343°44.3	04.2 05.1	201°24.7 215°53.5	9.8' 9.9'	19°43.2 19°31.1	-12.1' -12.2'	57.9' 57.9'
12	358°44.5	N03°06.1	230°22.4	10.0'	N19°18.9	-12.3'	57.9'
13	13°44.6	07.1	244°51.4	10.1'	19°06.6	-12.4'	57.8'
14	28°44.8	08.1	259°20.5	10.2'	18° 54.2	-12.5'	57.8'
15 16	43°45.0 58°45.2	· · 09.0 10.0	273°49.7 288°19.1	10.3' 10.4'	18°41.7 18°29.1	-12.6' -12.7'	57.8' 57.8'
17	73°45.4	11.0	302°48.5	10.4	18° 16.5	-12.7 -12.8'	57.8'
18	88°45.6	N03°12.0	317°18.0	10.6'	N18°03.7	-12.8'	57.7'
19	103°45.8	12.9	331°47.6	10.7'	17°50.9	-12.9'	57.7'
20 21	118°46.0 133°46.2	13.9 •• 14.9	346°17.4 0°47.2	10.8' 10.9'	17°37.9 17°24.9	-13.0' -13.1'	57.7' 57.7'
22	148°46.3	15.9	15°17.1	11.0'	17°24.9	-13.1 -13.2'	57.7'
23	163°46.5	16.8	29°47.1	11.1'	16°58.7	-13.2'	57.6'
	SD = 16.0'	d = 1.0'		SI	D = 15.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Junset	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
$66^{\circ}$	03:34	04:41	05:34	18:39	19:32	20:40
64°	03:47	04:48	05:36	18:36	19:25	20:26
62°	03:58	04:54	05:39	18:34	19:19	20:15
60°	04:07	04:59	05:41	18:32	19:14	20:06
$N 58^{\circ}$	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
$35^{\circ}$	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
$20^{\circ}$	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> $10^{\circ}$	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	е		Moonset	:
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
<b>N</b> 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
N 10°	12:33	13:33	14:30	00:44	01:42	02:34
0°	12:54	13:52	14:45	00:22	01:22	02:17
<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	

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

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0 0	186°24.8	160°15.4 N10°13.0	194°28.7 <b>S</b> 04°37.6	79°26.6 N22°53.6	180°49.3 N00°06.2	SHA Dec
						Alpheratz 357°34.1 29°14.0
1	201°27.3		209°29.4 36.8 224°30.0 36.1	94°28.9 53.6	195°51.5 06.3	Ankaa 353°06.6 -42°09.8
2	216°29.8 231°32.2	190°14.5 15.4		109°31.2 53.6	210°53.7 06.4	Schedar 349°30.5 56°40.9
3		205°14.1 · · 16.5	239°30.7 · · 35.3	124°33.5 · · 53.5	225°55.8 · · 06.6	Diphda 348°46.6 -17°50.6
4	246°34.7	220°13.7 17.7	254°31.4 34.5	139°35.8 53.5	240°58.0 06.7	Achernar 335°20.0 -57°06.3
5	261°37.2	235°13.2 18.9 250°12.8 N10°20.1	269°32.0 33.7 284°32.7 \$04°32.9	154°38.2 53.5	256°00.2 06.8	Hamal 327°50.4 23°35.2
6 7	276°39.6 291°42.1			169°40.5 N22°53.5 184°42.8 53.5	271°02.4 N00°06.9 286°04.6 07.0	Polaris 313°54.7 89°22.7
						Acamar 315°11.3 -40°12.1
8 9	306°44.5 321°47.0	280°12.0 22.5	314°34.0 31.4 329°34.7 · · · 30.6	199°45.1 53.5 214°47.4 · · 53.5	301°06.7 07.2	Menkar 314°05.3 4°11.5
	336°49.5	295°11.5 · · 23.7			316°08.9 · · 07.3	Mirfak 308°27.2 49°57.4
10	350 49.5 351°51.9	310°11.1 24.9	344°35.3 29.8 359°36.0 29.1		331°11.1 07.4 346°13.3 07.5	Aldebaran 290°38.6 16°33.7
11 12	6°54.4	325°10.7 26.1 340°10.2 N10°27.2	359°36.0 29.1 14°36.6 \$04°28.3	244°52.0 53.4 259°54.3 N22°53.4	346°13.3 07.5 1°15.4 N00°07.7	Rigel 281°03.0 -8°10.4
	21°56.9					Capella 280°20.6 46°01.6
13 14	36°59.3	355°09.8 28.4 10°09.4 29.6	29°37.3 27.5 44°38.0 26.7	274°56.6 53.4 289°58.9 53.4	16°17.6 07.8 31°19.8 07.9	Bellatrix 278°21.9 6°22.3
15	50° 59.5 52° 01.8	25°09.0 · · 30.8	59°38.6 · · 25.9	305°01.2 · · 53.4	46°22.0 · · 08.0	Elnath 278°00.7 28°37.8
16	67°04.3	40°08.5 32.0	74°39.3 25.2	320°03.5 53.4	61°24.2 08.1	Alnilam 275°36.8 -1°11.2
17	82°06.7	55°08.1 33.2	89°40.0 24.4	335°05.9 53.3	76°26.3 08.3	Betelgeuse 270°51.1 7°24.6
	97°09.2					Canopus 263°52.0 -52°42.8
18 19	97 09.2 112°11.6	70°07.7 N10°34.4 85°07.2 35.6	104°40.6 S04°23.6 119°41.3 22.8	350°08.2 N22°53.3 5°10.5 53.3		Sirius 258°25.3 -16°45.3
20	112 11.0 127°14.1	85°07.2 35.6 100°06.8 36.7	134°42.0 22.0	5°10.5 53.3 20°12.8 53.3	106°30.7 08.5 121°32.9 08.6	Adhara 255°05.0 -29°00.7
21	142°16.6	115°06.4 · · 37.9	149°42.6 · · 21.3	35°15.1 · · 53.3	136°35.0 · · 08.8	Procyon 244°49.7 5°09.4
22	142 10.0 157°19.0					Pollux 243°16.0 27°57.8
22	157 19.0 172°21.5	130°05.9 39.1 145°05.5 40.3	164°43.3 20.5 179°43.9 19.7	50°17.4 53.3 65°19.7 53.2	151°37.2 08.9 166°39.4 09.0	Avior 234°14.1 -59°35.9
23	112 21.5				<del></del>	Suhail 222°45.3 -43°32.6
Mer.p	ass. 11:32	$\nu$ -0.4 $'$ $d1.2'$ m-3.92	$ u 0.7' \ d$ -0.8' m1.18	$\nu 2.3' \ d$ -0.0' m-2.22	$ u 2.2' \ d0.1' \ m0.91$	Miaplacidus 221°37.6 -69°49.7
						Alphard 217°46.6 -8°46.5
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.1 11°50.2
0	187°24.0	160°05.1 N10°41.5	194°44.6 \$04°18.9	80°22.0 N22°53.2	181°41.6 N00°09.1	Dubhe 193°39.1 61°36.6
1	202°26.4	175°04.6 42.6	209°45.3 18.1	95°24.3 53.2	196°43.8 09.2	Denebola 182°23.6 14°25.4
2	202 20.4 217°28.9	190°04.2 43.8	224°45.9 17.4	110°26.6 53.2	211°45.9 09.4	Gienah 175°42.2 -17°41.4
3	232°31.4	205°03.8 · · 45.0	239°46.6 · · 16.6	125°28.9 · · 53.2	226°48.1 · · 09.5	Acrux 172°58.3 -63°14.8
4	247°33.8	220°03.3 46.2	254°47.3 15.8	140°31.2 53.2	241°50.3 09.6	Gacrux 171°50.0 -57°15.7
5	262°36.3	235°02.9 47.4	269°47.9 15.0	155°33.5 53.2	256°52.5 09.7	Alioth 166°11.5 55°48.9
6	202 30.3 277°38.8	250°02.5 N10°48.6	284°48.6 \$04°14.2	170°35.8 N22°53.1	271°54.6 N00°09.8	Spica 158°20.9 -11°18.1
7	292°41.2	265°02.0 49.7	299°49.3 13.5	185°38.1 53.1	286°56.8 10.0	Alkaid 152°50.7 49°10.7
8	307°43.7	280°01.6 50.9	314°49.9 12.7	200°40.4 53.1	301°59.0 10.1	Hadar 148°34.0 -60°30.0
9	322°46.1	295°01.2 · · 52.1	329°50.6 · · 11.9	215°42.7 · · 53.1	317°01.2 · · 10.2	Menkent 147°56.1 -36°30.0
10	337°48.6	310°00.7 53.3	344°51.3 11.1	230°45.0 53.1	332°03.4 10.3	Arcturus 145°46.7 19°02.5
11	352°51.1	325°00.3 54.4	359°51.9 10.3	245°47.3 53.1	347°05.5 10.5	Rigil Kent. 139°38.4 -60°56.6
12	7°53.5	339°59.9 N10°55.6	14°52.6 \$04°09.6	260°49.6 N22°53.0	2°07.7 N00°10.6	Kochab 137°18.8 74°02.6
13	22°56.0	354°59.4 56.8	29°53.2 08.8	275°51.9 53.0	17°09.9 10.7	Zuben'ubi 136°54.6 -16°09.2
14	37°58.5	9°59.0 58.0	44°53.9 08.0	290°54.2 53.0	32°12.1 10.8	Alphecca 126°02.6 26°37.3
15	53°00.9	24°58.5 10°59.2	59°54.6 · · 07.2	305°56.5 · · 53.0	47°14.2 · · 10.9	Antares 112°14.4 -26°29.4
16	68°03.4	39°58.1 11°00.3	74°55.2 06.4	320°58.8 53.0	62°16.4 11.1	Atria 107°07.5 -69°04.3
17	83°05.9	54°57.7 01.5	89°55.9 05.7	336°01.1 53.0	77°18.6 11.2	Sabik 102°01.5 -15°45.5
18	98°08.3	69°57.2 N11°02.7	104°56.6 <b>S</b> 04°04.9	351°03.4 N22°52.9	92°20.8 N00°11.3	Shaula 96°08.9 -37°07.3
19	113°10.8	84°56.8 03.9	119°57.2 04.1	6°05.7 52.9	107°22.9 11.4	Rasalhague 95°57.5 12°32.2
20	128°13.2	99°56.3 05.0	134°57.9 03.3	21°08.0 52.9	122°25.1 11.6	Eltanin 90°41.6 51°28.7
21	143°15.7	114°55.9 · · 06.2	149°58.6 · · 02.5	36°10.3 · · 52.9	137°27.3 · · 11.7	Kaus Aust. 83°31.2 -34°22.3
22	158°18.2	129°55.5 07.4	164°59.2 01.8	51°12.6 52.9	152°29.5 11.8	Vega 80°32.5 38°48.1
23	173°20.6	144°55.0 08.5	179°59.9 01.0	66°14.9 52.9	167°31.7 11.9	Nunki 75°46.5 -26°15.8
		0.4/ 11.0/ 0.00				Altair 61°59.1 8°56.1
Mer.p	ass. 11:29	ν-0.4' d1.2' m-3.92	$\nu$ 0.7′ <i>d</i> -0.8′ m1.18	ν2.3' d-0.0' m-2.22	$\nu 2.2' \ d0.1' \ m0.92$	Peacock 53°04.4 -56°38.8 Deneb 49°25.4 45°22.1
						Enif 33°38.0 9°59.6
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°32.0 -46°50.0
0	188°23.1	159°54.6 N11°09.7	195°00.6 <b>S</b> 04°00.2	81°17.2 N22°52.8	182°33.8 N00°12.0	Fomalhaut 15°13.7 -29°29.0
1	203°25.6	174°54.1 10.9	210°01.2 03°59.4	96°19.5 52.8	197°36.0 12.2	Scheat 13°44.6 28°13.4
2	218°28.0	189°53.7 12.1	225°01.9 58.6	111°21.8 52.8	212°38.2 12.3	Markab 13°29.2 15°20.7
3	233°30.5	204°53.3 · · 13.2	240°02.6 · · 57.9	126°24.1 · · 52.8	227°40.4 · · 12.4	IVIAIKAU 13 29.2 15 20.7
4	248°33.0	219°52.8 14.4	255°03.2 57.1	141°26.4 52.8	242°42.5 12.5	Mar 29 Sun SHA Mer.pass
5	263°35.4	234°52.4 15.6	270°03.9 56.3	156°28.7 52.8	257°44.7 12.6	Venus 333°50.5 13:19
6	278°37.9	249°51.9 N11°16.7	285°04.6 <b>S</b> 03°55.5	171°31.0 N22°52.7	272°46.9 N00°12.8	Mars 8°03.9 11:02
7	293°40.4	264°51.5 17.9	300°05.2 54.7	186°33.3 52.7	287°49.1 12.9	Jupiter 253°01.8 18:39
8	308°42.8	279°51.1 19.1	315°05.9 53.9	201°35.5 52.7	302°51.3 13.0	Saturn 354°24.5 11:55
9	323°45.3	294°50.6 · · 20.2	330°06.6 · · 53.2	216°37.8 · · 52.7	317°53.4 · · 13.1	Mar 20 Man CHA Marin
10	338°47.7	309°50.2 21.4	345°07.2 52.4	231°40.1 52.7	332°55.6 13.3	Mar 30 Mon SHA Mer.pass
11	353°50.2	324°49.7 22.6	0°07.9 51.6	246°42.4 52.7	347°57.8 13.4	Venus 332°41.1 13:20   Mars 7°20.6 11:01
12	8°52.7	339°49.3 N11°23.7	15°08.6 <b>S</b> 03°50.8	261°44.7 N22°52.6	3°00.0 N00°13.5	Mars 7°20.6 11:01 Jupiter 252°58.0 18:36
13	23°55.1	354°48.8 24.9	30°09.2 50.0	276°47.0 52.6	18°02.1 13.6	Saturn 354°17.6 11:52
14	38°57.6	9°48.4 26.1	45°09.9 49.3	291°49.3 52.6	33°04.3 13.7	Jatum 334 17.0 11:32
15	54°00.1	24°47.9 · · 27.2	60°10.6 · · 48.5	306°51.6 · · 52.6	48°06.5 · · 13.9	Mar 31 Tue SHA Mer.pass
16	69°02.5	39°47.5 28.4	75°11.2 47.7	321°53.9 52.6	63°08.7 14.0	Venus 331°31.5 13:21
17	84°05.0	54°47.1 29.6	90°11.9 46.9	336°56.2 52.6	78°10.9 14.1	Mars 6°37.5 10:59
18	99°07.5	69°46.6 N11°30.7	105°12.6 \$03°46.1	351°58.5 N22°52.5	93°13.0 N00°14.2	Jupiter 252°54.1 18:32
19	114°09.9	84°46.2 31.9	120°13.2 45.4	7°00.8 52.5	108°15.2 14.4	Saturn 354°10.7 11:48
20	129°12.4	99°45.7 33.1	135°13.9 44.6	22°03.0 52.5	123°17.4 14.5	Horizontal parallax
21	144°14.8	114°45.3 · · 34.2	150°14.6 · · 43.8	37°05.3 · · 52.5	138°19.6 · · 14.6	Venus: 0.1
22	159°17.3	129°44.8 35.4	165°15.2 43.0	52°07.6 52.5	153°21.8 14.7	Mars: 0.1
23	174°19.8	144°44.4 36.5	180°15.9 42.2	67°09.9 52.5	168°23.9 14.8	iviai5. U.1
Mer.p	ass. 11:25	$\nu$ -0.4 $'$ $d1.2'$ m-3.92	$ u 0.7' \ d \text{-} 0.8' \ \text{m} 1.18$	$\nu 2.3' \ d$ -0.0' m-2.21	$ u 2.2' \ d0.1' \ m0.92$	

h	Sui	า			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°46.7	N03°17.8	44°17.2	11.2'	N16°45.5	-13.3'	57.6'
1 2	193°46.9 208°47.1	18.8 19.8	58°47.4 73°17.7	11.3' 11.4'	16°32.1 16°18.8	-13.4' -13.5'	57.6' 57.6'
3	223°47.3	20.7	87°48.1	11.5'	16°05.3	-13.5'	57.6'
4	238°47.5	21.7	102°18.6	11.6'	$15^{\circ}51.8$	-13.6'	57.5'
5	253°47.7	22.7	116°49.1	11.7'	15°38.2	-13.7'	57.5'
6 7	268°47.8 283°48.0	N03°23.6 24.6	131°19.8 145°50.5	11.7' 11.8'	N15°24.5 15°10.8	-13.7' -13.8'	57.5' 57.5'
8	298°48.2	25.6	160°21.4	11.9'	14° 56.9	-13.9'	57.5
9	313°48.4	• • 26.6	174°52.3	12.0'	14°43.1	-13.9'	57.4'
10 11	328°48.6 343°48.8	27.5 28.5	189°23.3 203°54.4	12.1' 12.2'	14°29.2 14°15.2	-14.0' -14.0'	57.4' 57.4'
12	358°49.0	20.5 N03°29.5	203 34.4 218°25.6	12.2	N14°01.1	-14.1'	57.4
13	13°49.2	30.5	232°56.8	12.3'	13°47.0	-14.2'	57.4'
14	28°49.4	31.4	247°28.2	12.4'	13°32.8	-14.2'	57.4'
15 16	43°49.5 58°49.7	· · 32.4 33.4	261°59.6 276°31.1	12.5' 12.6'	13°18.6 13°04.4	-14.3' -14.3'	57.3' 57.3'
17	73°49.9	34.4	291°02.7	12.7'	12°50.0	-14.4'	57.3'
18	88°50.1	N03°35.3	305°34.3	12.7'	N12°35.7	-14.4'	57.3'
19 20	103°50.3 118°50.5	36.3 37.3	320°06.1 334°37.9	12.8' 12.9'	12°21.2 12°06.8	-14.5' -14.5'	57.3' 57.2'
21	118 50.5 133°50.7	38.2	334 37.9 349°09.8	13.0'	12 00.8 11°52.2	-14.5 -14.6'	57.2'
22	148°50.9	39.2	3°41.7	13.0'	11°37.7	-14.6'	57.2'
23	163°51.1	40.2	18°13.8	13.1'	11°23.1	-14.7'	57.2'
	SD = 16.0'	d = 1.0'		SI	O = 15.7'		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	178°51.2	N03°41.2	32°45.9	13.2'	N11°08.4	-14.7'	57.2'
1	193°51.4	42.1	47°18.0	13.2'	10°53.7	-14.7'	57.1'
2	208°51.6 223°51.8	43.1 •• 44.1	61°50.3 76°22.6	13.3' 13.4'	10°39.0 10°24.2	-14.8' -14.8'	57.1' 57.1'
3 4	238°52.0	45.0	90°55.0	13.4'	10° 24.2	-14.8'	57.1'
5	253°52.2	46.0	105°27.4	13.5'	09°54.5	-14.9'	57.1'
6	268°52.4	N03°47.0	119°59.9	13.6'	N09°39.7	-14.9'	57.0'
7 8	283°52.6 298°52.7	48.0 48.9	134°32.5 149°05.1	13.6' 13.7'	09°24.8 09°09.8	-14.9' -15.0'	57.0' 57.0'
9	313°52.9	49.9	163°37.8	13.7'	08°54.8	-15.0'	57.0'
10	328°53.1	50.9	178° 10.5	13.8'	08°39.8	-15.0'	56.9'
11 12	343°53.3 358°53.5	51.8 N03°52.8	192°43.3 207°16.2	13.9' 13.9'	08°24.8 N08°09.7	-15.1' -15.1'	56.9' 56.9'
13	13°53.7	53.8	207 10.2 221°49.1	14.0'	07°54.6	-15.1'	56.9'
14	28°53.9	54.7	236°22.1	14.0'	07°39.5	-15.1'	56.9'
15	43°54.1	• • 55.7	250°55.1	14.1'	07°24.4	-15.2'	56.8'
16 17	58°54.3 73°54.4	56.7 57.7	265°28.2 280°01.3	14.1' 14.2'	07°09.2 06°54.0	-15.2' -15.2'	56.8' 56.8'
18	88°54.6	N03°58.6	294°34.5	14.2'	N06°38.8	-15.2'	56.8'
19	103°54.8	03°59.6	309°07.8	14.3'	06°23.6	-15.2'	56.8'
20 21	118°55.0 133°55.2	04°00.6 •• 01.5	323°41.0 338°14.4	14.3' 14.4'	06°08.4 05°53.1	-15.3' -15.3'	56.7' 56.7'
22	133 55.2 148°55.4	02.5	352°47.7	14.4'	05°37.9	-15.3'	56.7'
23	163°55.6	03.5	7°21.2	14.5'	05°22.6	-15.3'	56.7'
	SD = 16.0'	d = 1.0'		SI	D = 15.6'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°55.8	N04°04.4	21°54.6	14.5'	N05°07.3	-15.3'	56.7'
1	193°55.9	05.4	36°28.1	14.5'	04°52.0	-15.3'	56.6'
2	208°56.1 223°56.3	06.4 •• 07.3	51°01.7 65°35.3	14.6' 14.6'	04°36.7 04°21.4	-15.3' -15.3'	56.6' 56.6'
4	238°56.5	08.3	80°08.9	14.7'	04°21.4 04°06.0	-15.3'	56.6'
5	253°56.7	09.3	94°42.5	14.7'	03°50.7	-15.3'	56.6'
6 7	268°56.9 283°57.1	N04°10.2 11.2	109°16.2 123°50.0	14.7' 14.8'	N03°35.4 03°20.0	-15.3' -15.4'	56.5' 56.5'
8	203 57.1 298°57.3	12.2	138°23.7	14.8	03° 04.7	-15.4'	56.5'
9	313°57.4	• • 13.1	152°57.5	14.8'	02°49.3	-15.4'	56.5'
10	328°57.6	14.1	167°31.4	14.9'	02°33.9	-15.4'	56.5'
11 12	343°57.8 358°58.0	15.1 N04°16.0	182°05.2 196°39.1	14.9' 14.9'	02°18.6 N02°03.2	-15.4' -15.4'	56.4' 56.4'
13	13°58.2	17.0	211°13.1	14.9'	01°47.9	-15.3	56.4
14	28°58.4	18.0	225°47.0	15.0'	01°32.5	-15.3'	56.4
15 16	43°58.6 58°58.8	· · 18.9 19.9	240°21.0 254°55.0	15.0' 15.0'	01°17.2 01°01.9	-15.3' -15.3'	56.4' 56.3'
17	73°58.9	20.9	254 55.0 269°29.0	15.0'	01 01.9 00°46.5	-15.3'	56.3'
18	88°59.1	N04°21.8	284°03.1	15.1'	N00°31.2	-15.3'	56.3'
19	103°59.3 118°59.5	22.8 23.8	298°37.1 313°11.2	15.1' 15.1'	00°15.9 N00°00.6	-15.3' -15.3'	56.3' 56.3'
20 21	118°59.5 133°59.7	23.8	313°11.2 327°45.3	15.1' 15.1'	S00°14.7	-15.3'	56.2
22	148°59.9	25.7	342°19.4	15.1'	00°30.0	15.3'	56.2'
23	164°00.1	26.7	356°53.6	15.2'	00°45.3	15.3'	56.2'
	SD = 16.0'	d = 1.0'		SI	O = 15.5'		

Naut.         Civil         Stinise         Civil         Naut.           N 72°         02:01         03:54         05:07         19:05         20:19         22:17           N 70°         02:37         04:08         05:13         18:59         20:04         21:38           68°         03:01         04:20         05:18         18:53         19:52         21:12           66°         03:20         04:29         05:22         18:49         19:42         20:53           64°         03:34         04:37         05:26         18:45         19:34         20:37           62°         03:46         04:43         05:29         18:42         19:27         20:25           60°         03:56         04:49         05:32         18:39         19:22         20:15           N 58°         04:05         04:54         05:34         18:36         19:16         20:06           56°         04:12         04:58         05:36         18:34         19:12         19:58           54°         04:19         05:02         05:38         18:32         19:08         19:52           20°         04:25         05:06         05:40         18:30	Lat.	Twi	light	Sunrise	Sunset	Twi	light
N 70°         02:37         04:08         05:13         18:59         20:04         21:38           68°         03:01         04:20         05:18         18:53         19:52         21:12           66°         03:20         04:29         05:22         18:49         19:42         20:53           64°         03:34         04:37         05:26         18:45         19:34         20:37           62°         03:46         04:43         05:29         18:42         19:27         20:25           60°         03:56         04:49         05:32         18:39         19:22         20:15           N 58°         04:05         04:49         05:32         18:39         19:22         20:15           N 58°         04:05         04:49         05:32         18:39         19:22         20:15           N 58°         04:05         04:49         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	Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
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         04:58         05:36         18:34         19:12         19:58           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         18:49         19:22           35°         04:55         05:20	N 72°	02:01	03:54	05:07	19:05	20:19	22:17
66°         03:20         04:29         05:22         18:49         19:42         20:53           64°         03:34         04:37         05:26         18:45         19:34         20:37           62°         03:46         04:43         05:29         18:42         19:27         20:25           60°         03:56         04:49         05:32         18:39         19:22         20:15           N 58°         04:05         04:54         05:34         18:36         19:16         20:06           56°         04:12         04:58         05:36         18:34         19:12         19:58           54°         04:19         05:02         05:38         18:32         19:08         19:52           52°         04:25         05:06         05:40         18:30         19:05         19:46           50°         04:30         05:09         05:41         18:29         19:01         19:41           45°         04:40         05:15         05:45         18:25         18:55         19:30           N 40°         04:48         05:20         05:47         18:22         18:49         19:12           20°         05:08         05:33	<b>N</b> 70°	02:37	04:08	05:13	18:59	20:04	21:38
64°         03:34         04:37         05:26         18:45         19:34         20:37           62°         03:46         04:43         05:29         18:42         19:27         20:25           60°         03:56         04:49         05:32         18:39         19:22         20:15           N 58°         04:05         04:54         05:34         18:36         19:16         20:06           56°         04:12         04:58         05:36         18:34         19:12         19:58           54°         04:19         05:02         05:38         18:32         19:08         19:52           52°         04:25         05:06         05:40         18:30         19:05         19:46           50°         04:30         05:09         05:41         18:29         19:01         19:41           45°         04:40         05:15         05:45         18:25         18:55         19:30           N 40°         04:48         05:20         05:47         18:22         18:49         19:12           35°         04:55         05:24         05:50         18:20         18:45         19:15           30°         05:08         05:33	68°	03:01	04:20	05:18	18:53	19:52	21:12
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           52°         04:25         05:06         05:40         18:30         19:05         19:46           50°         04:30         05:09         05:41         18:29         19:01         19:41           45°         04:40         05:15         05:45         18:25         18:55         19:30           N 40°         04:48         05:20         05:47         18:22         18:49         19:22           35°         04:55         05:24         05:50         18:20         18:45         19:15           30°         05:00         05:28         05:52         18:17         18:41         19:10           20°         05:08         05:33         05:55         18:14         18:36         19:02           N 10°         05:13         05:37		03:20	04:29	05:22	18:49	19:42	20:53
60°         03:56         04:49         05:32         18:39         19:22         20:15           N 58°         04:05         04:54         05:34         18:36         19:16         20:06           56°         04:12         04:58         05:36         18:34         19:12         19:58           54°         04:19         05:02         05:38         18:32         19:08         19:52           52°         04:25         05:06         05:40         18:30         19:05         19:46           50°         04:30         05:09         05:41         18:29         19:01         19:41           45°         04:40         05:15         05:45         18:25         18:55         19:30           N 40°         04:48         05:20         05:47         18:22         18:49         19:22           35°         04:55         05:24         05:50         18:20         18:45         19:15           30°         05:00         05:28         05:52         18:17         18:41         19:10           20°         05:08         05:33         05:55         18:14         18:36         19:02           N 10°         05:13         05:37		03:34	04:37	05:26	18:45	19:34	20:37
N 58°         04:05         04:54         05:34         18:36         19:16         20:06           56°         04:12         04:58         05:36         18:34         19:12         19:58           54°         04:19         05:02         05:38         18:32         19:08         19:52           52°         04:25         05:06         05:40         18:30         19:05         19:46           50°         04:30         05:09         05:41         18:29         19:01         19:41           45°         04:40         05:15         05:45         18:25         18:55         19:30           N 40°         04:48         05:20         05:47         18:22         18:49         19:22           35°         04:55         05:24         05:50         18:20         18:45         19:15           30°         05:00         05:28         05:52         18:17         18:41         19:10           20°         05:08         05:33         05:55         18:14         18:36         19:02           N 10°         05:13         05:37         05:58         18:11         18:32         18:56           0°         05:16         05:40		03:46	04:43		18:42	19:27	
56°         04:12         04:58         05:36         18:34         19:12         19:58           54°         04:19         05:02         05:38         18:32         19:08         19:52           52°         04:25         05:06         05:40         18:30         19:05         19:46           50°         04:30         05:09         05:41         18:29         19:01         19:41           45°         04:40         05:15         05:45         18:25         18:55         19:30           N 40°         04:48         05:20         05:47         18:22         18:49         19:22           35°         04:55         05:24         05:50         18:20         18:45         19:15           30°         05:00         05:28         05:52         18:17         18:41         19:10           20°         05:08         05:33         05:55         18:14         18:36         19:02           N 10°         05:13         05:37         05:58         18:11         18:32         18:56           0°         05:16         05:40         06:01         18:08         18:28         18:52           5 10°         05:18         05:43	60°	03:56	04:49	05:32	18:39	19:22	20:15
54°         04:19         05:02         05:38         18:32         19:08         19:52           52°         04:25         05:06         05:40         18:30         19:05         19:46           50°         04:30         05:09         05:41         18:29         19:01         19:41           45°         04:40         05:15         05:45         18:25         18:55         19:30           N 40°         04:48         05:20         05:47         18:22         18:49         19:22           35°         04:55         05:24         05:50         18:20         18:45         19:15           30°         05:00         05:28         05:52         18:17         18:41         19:10           20°         05:08         05:33         05:55         18:14         18:36         19:02           N 10°         05:13         05:37         05:58         18:11         18:32         18:56           0°         05:16         05:40         06:01         18:08         18:28         18:52           5 10°         05:18         05:43         06:04         18:05         18:24         18:50           30°         05:18         05:44	<b>N</b> 58°	04:05	04:54	05:34	18:36	19:16	20:06
52°         04:25         05:06         05:40         18:30         19:05         19:46           50°         04:30         05:09         05:41         18:29         19:01         19:41           45°         04:40         05:15         05:45         18:25         18:55         19:30           N 40°         04:48         05:20         05:47         18:22         18:49         19:22           35°         04:55         05:24         05:50         18:20         18:45         19:15           30°         05:00         05:38         05:52         18:17         18:41         19:10           20°         05:08         05:33         05:55         18:14         18:36         19:02           N 10°         05:13         05:37         05:58         18:11         18:32         18:56           0°         05:16         05:40         06:01         18:08         18:28         18:52           5 10°         05:18         05:43         06:04         18:05         18:26         18:50           20°         05:19         05:44         06:06         18:02         18:24         18:51           35°         05:16         05:46	56°	04:12	04:58	05:36	18:34	19:12	19:58
50°         04:30         05:09         05:41         18:29         19:01         19:41           45°         04:40         05:15         05:45         18:25         18:55         19:30           N 40°         04:48         05:20         05:47         18:22         18:49         19:22           35°         04:55         05:24         05:50         18:20         18:45         19:15           30°         05:00         05:28         05:52         18:17         18:41         19:10           20°         05:08         05:33         05:55         18:14         18:36         19:02           N 10°         05:13         05:37         05:58         18:11         18:32         18:56           0°         05:16         05:40         06:01         18:08         18:28         18:52           5 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         06:01         17:59         18:23         18:51           35°         05:16         05:46	54°	04:19	05:02	05:38	18:32	19:08	19:52
45°         04:40         05:15         05:45         18:25         18:55         19:30           N 40°         04:48         05:20         05:47         18:22         18:49         19:22           35°         04:55         05:24         05:50         18:20         18:45         19:15           30°         05:00         05:28         05:52         18:17         18:41         19:10           20°         05:08         05:33         05:55         18:14         18:36         19:02           N 10°         05:13         05:37         05:58         18:11         18:32         18:50           0°         05:16         05:40         06:01         18:08         18:28         18:52           S 10°         05:18         05:43         06:04         18:05         18:26         18:50           20°         05:19         05:44         06:06         18:02         18:24         18:50           30°         05:18         05:46         06:09         17:59         18:23         18:51           35°         05:16         05:46         06:11         17:57         18:23         18:52           40°         05:14         05:46		04:25	05:06	05:40	18:30	19:05	19:46
N 40°         04:48         05:20         05:47         18:22         18:49         19:22           35°         04:55         05:24         05:50         18:20         18:45         19:15           30°         05:00         05:28         05:52         18:17         18:41         19:10           20°         05:08         05:33         05:55         18:14         18:36         19:02           N 10°         05:13         05:37         05:58         18:11         18:32         18:56           0°         05:16         05:40         06:01         18:08         18:28         18:52           5 10°         05:18         05:43         06:04         18:05         18:26         18:50           20°         05:18         05:44         06:06         18:02         18:24         18:50           30°         05:18         05:46         06:06         17:59         18:23         18:51           35°         05:16         05:46         06:11         17:57         18:23         18:52           40°         05:14         05:46         06:13         17:55         18:22         18:54           45°         05:08         05:45	50°	04:30	05:09	05:41	18:29	19:01	19:41
35°         04:55         05:24         05:50         18:20         18:45         19:15           30°         05:00         05:28         05:52         18:17         18:41         19:10           20°         05:08         05:33         05:55         18:14         18:36         19:02           N 10°         05:13         05:37         05:58         18:11         18:32         18:56           0°         05:16         05:40         06:01         18:08         18:28         18:52           5 10°         05:18         05:43         06:04         18:05         18:26         18:50           20°         05:18         05:44         06:06         18:02         18:24         18:50           30°         05:18         05:46         06:09         17:59         18:23         18:51           35°         05:16         05:46         06:11         17:57         18:23         18:52           40°         05:14         05:46         06:13         17:55         18:22         18:54           45°         05:08         05:45         06:15         17:53         18:22         18:56           5 0°         05:08         05:45	45°	04:40	05:15	05:45	18:25	18:55	19:30
30°         05:00         05:28         05:52         18:17         18:41         19:10           20°         05:08         05:33         05:55         18:14         18:36         19:02           N 10°         05:13         05:37         05:58         18:11         18:32         18:56           0°         05:16         05:40         06:01         18:08         18:28         18:52           5 10°         05:18         05:43         06:04         18:05         18:26         18:50           20°         05:19         05:44         06:06         18:02         18:24         18:50           30°         05:18         05:46         06:09         17:59         18:23         18:51           35°         05:16         05:46         06:11         17:57         18:23         18:52           40°         05:14         05:46         06:13         17:55         18:22         18:54           45°         05:12         05:46         06:15         17:53         18:22         18:56           5 50°         05:08         05:45         06:17         17:51         18:23         19:00           52°         05:06         05:45		04:48	05:20	05:47	18:22	18:49	19:22
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		04:55	05:24	05:50	18:20	18:45	19:15
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		05:00	05:28	05:52	18:17	18:41	19:10
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		05:08	05:33	05:55	18:14	18:36	19:02
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			05:37		18:11	18:32	18:56
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0°	05:16	05:40	06:01	18:08	18:28	18:52
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		05:18	05:43	06:04	18:05	18:26	18:50
35°         05:16         05:46         06:11         17:57         18:23         18:52           40°         05:14         05:46         06:13         17:55         18:22         18:54           45°         05:12         05:46         06:15         17:53         18:22         18:56           \$ 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		05:19	05:44	06:06	18:02	18:24	18:50
40°         05:14         05:46         06:13         17:55         18:22         18:54           45°         05:12         05:46         06:15         17:53         18:22         18:56           S 50°         05:08         05:45         06:17         17:51         18:23         19:00           52°         05:06         05:45         06:19         17:49         18:23         19:02           54°         05:03         05:44         06:20         17:48         18:23         19:04           56°         05:01         05:44         06:21         17:47         18:24         19:07           58°         04:58         05:43         06:23         17:45         18:24         19:10		05:18	05:46	06:09		18:23	18:51
45°         05:12         05:46         06:15         17:53         18:22         18:56           \$ 50°         05:08         05:45         06:17         17:51         18:23         19:00           52°         05:06         05:45         06:19         17:49         18:23         19:02           54°         05:03         05:44         06:20         17:48         18:23         19:04           56°         05:01         05:44         06:21         17:47         18:24         19:07           58°         04:58         05:43         06:23         17:45         18:24         19:10							
S 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							
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	45°	05:12	05:46	06:15	17:53	18:22	18:56
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> 50°	05:08	05:45	06:17	17:51	18:23	19:00
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		05:06	05:45	06:19	17:49	18:23	19:02
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							
	<b>S</b> 60°	04:54	05:43	06:24	17:43	18:25	19:13

Lat.		Moonris	e		Moonset	t
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° 45°	16:20	16:44	17:05	02:10	03:19	04:26 04:23
	16:29	16:48	17:06	01:58	03:12	
<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.	Mer.Pass.			
,	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	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	$189^{\circ}22.2$	159°43.9	N11°37.7	195°16.6	S03°41.4	82°12.2	N22°52.4	183°26.1	N00°15.0	Alpheratz	357°34.1	29°14.0
1	204°24.7	174°43.5	38.9	210°17.2	40.7	97°14.5	52.4	198°28.3	15.1	Ankaa	353°06.6	-42°09.8
2	219°27.2	189°43.0	40.0	225°17.9	39.9	112°16.8	52.4	213°30.5	15.2	Schedar	349°30.5	56°40.8
3	234°29.6	204°42.6	• • 41.2	240°18.6	• • 39.1	127°19.1	• • 52.4	228°32.6	• • 15.3	Diphda	348°46.6	-17°50.6
4	249°32.1	219°42.1	42.3	255°19.2	38.3	142°21.4	52.4	243°34.8	15.4	Achernar	335°20.0	-57°06.3
5	264°34.6	234°41.7	43.5	270°19.9	37.5	157°23.6	52.4	258°37.0	15.6	Hamal	327°50.4	23°35.2
6 7	279°37.0 294°39.5	249°41.2 264°40.8	N11°44.7	285°20.6	S03°36.8	172°25.9 187°28.2	N22°52.3	273°39.2 288°41.4	N00° 15.7	Polaris	313°55.6	89°22.7
8	294 39.5 309°42.0	204 40.8 279°40.3	45.8	300°21.3 315°21.9	36.0 35.2	202°30.5	52.3 52.3	200 41.4 303°43.5	15.8	Acamar	315°11.3	-40°12.1
9	309 42.0 324°44.4	279 40.3 294°39.9	47.0 •• 48.1	330°22.6	34.4	202 30.5 217°32.8	• • 52.3	318° 45.7	15.9 •• 16.1	Menkar	314°05.4	$4^{\circ}11.5$
10	339°46.9	309°39.4	49.3	345°23.3	33.6	232°35.1	52.3	333°47.9	16.1	Mirfak	308°27.2	49°57.3
11	354°49.3	324°39.0	50.4	0°23.9	32.8	247°37.4	52.2	348°50.1	16.3	Aldebaran	290°38.6	16°33.7
12	9°51.8	339°38.5	N11°51.6	15°24.6	S03°32.1	262°39.6	N22° 52.2	3°52.2	N00° 16.4	Rigel	281°03.0	-8°10.4
13	24°54.3	354°38.1	52.7	30°25.3	31.3	277°41.9	52.2	18°54.4	16.5	Capella	280°20.6	46°01.6
14	39°56.7	9°37.6	53.9	45°25.9	30.5	292°44.2	52.2	33°56.6	16.7	Bellatrix	278°21.9	6°22.3
15	54°59.2	24°37.2	•• 55.1	60°26.6	• • 29.7	307°46.5	• • 52.2	48°58.8	• • 16.8	Elnath Alnilam	278°00.7 275°36.8	28° 37.8 -1° 11.2
16	$70^{\circ}01.7$	39°36.7	56.2	75°27.3	28.9	322°48.8	52.2	64°01.0	16.9	Betelgeuse	270°51.1	7°24.6
17	85°04.1	54°36.3	57.4	90°27.9	28.1	337°51.1	52.1	79°03.1	17.0	Canopus	263°52.0	-52° 42.8
18	100°06.6	69°35.8	N11°58.5	105°28.6	S03°27.4	352°53.3	N22°52.1	94°05.3	N00°17.1	Sirius	258°25.4	-16° 45.3
19	115°09.1	84°35.3	11°59.7	120°29.3	26.6	7°55.6	52.1	109°07.5	17.3	Adhara	255°05.1	-29°00.7
20	130°11.5	99°34.9	12°00.8	135°30.0	25.8	22°57.9	52.1	124°09.7	17.4	Procyon	244°49.7	5°09.4
21	145°14.0	114°34.4	• • 02.0	150°30.6	• • 25.0	38°00.2	• • 52.1	139°11.8	• • 17.5	Pollux	243°16.0	27°57.8
22	160°16.4	129°34.0	03.1	165°31.3	24.2	53°02.5	52.0	154°14.0	17.6	Avior	234°14.1	-59°35.9
23	175° 18.9	144°33.5	04.3	180°32.0	23.5	68°04.8	52.0	169°16.2	17.7	Suhail	222°45.3	-43°32.6
Mer.p	ass. 11:21	$\nu$ -0.4' d1	.2′ m-3.92	$\nu$ 0.7′ d-0	.8′ m1.18	$\nu$ 2.3′ d-0	.0′ m-2.20	$\nu$ 2.2 $^{\prime}$ d0	.1′ m0.92	Miaplacidus	221°37.6	-69°49.7
										Alphard	217°46.6	-8°46.5
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	$207^{\circ}33.1$	11°50.2
I nu O	<b>GHA</b> 190°21.4	бна 159°33.1	<b>Dec</b> N12°05.4	БНА 195°32.6	S03°22.7	<b>GHA</b> 83°07.0	<b>Dec</b> N22°52.0	184°18.4	Dec N00°17.9	Dubhe	193°39.2	61°36.6
1	205°23.8	174°32.6	06.6	210°33.3	21.9	98°09.3	52.0	199°20.6	18.0	Denebola	182°23.6	14°25.4
2	220°26.3	189°32.2	07.7	225°34.0	21.1	113°11.6	52.0	214°22.7	18.1	Gienah	175°42.2	-17°41.4
3	235°28.8	204°31.7	08.9	240°34.6	. 20.3	128°13.9	• • 52.0	229°24.9	. 18.2		172°58.3	-63°14.8
4	250°31.2	219°31.2	10.0	255°35.3	19.5	143°16.2	51.9	244°27.1	18.4		171°50.0	-57° 15.7
5	265°33.7	234°30.8	11.2	270°36.0	18.8	158°18.4	51.9	259°29.3	18.5	Alioth	166°11.5	55° 48.9 -11° 18.1
6	280°36.2	249°30.3	N12°12.3	285°36.7	S03°18.0	173°20.7	N22°51.9	274°31.4	N00°18.6	Spica	158°20.9 152°50.7	-11 18.1 49°10.7
7	295°38.6	264°29.9	13.4	300°37.3	17.2	188°23.0	51.9	289°33.6	18.7	Alkaid Hadar	152 50.7 148°34.0	-60°30.0
8	$310^{\circ}41.1$	279°29.4	14.6	315°38.0	16.4	203°25.3	51.9	304°35.8	18.8	Menkent	147°56.1	-36° 30.0
9	325°43.6	294°28.9	•• 15.7	330°38.7	•• 15.6	218°27.5	• • 51.8	319°38.0	• • 19.0	Arcturus	145°46.7	19°02.5
10	340°46.0	309°28.5	16.9	345°39.3	14.8	233°29.8	51.8	334°40.2	19.1	Rigil Kent.	139°38.3	-60° 56.6
11	355°48.5	324°28.0	18.0	0°40.0	14.1	248°32.1	51.8	349°42.3	19.2	Kochab	137°18.8	74°02.6
12	10°50.9	339°27.6	N12° 19.2	15°40.7	S03°13.3	263°34.4	N22°51.8	4°44.5	N00°19.3	Zuben'ubi	136°54.6	-16°09.2
13	25°53.4	354°27.1	20.3	30°41.3	12.5	278°36.7	51.8	19°46.7	19.4	Alphecca	$126^{\circ}02.6$	26°37.3
14	40°55.9	9°26.6	21.4	45°42.0	11.7	293°38.9	51.8	34°48.9	19.6	Antares	$112^{\circ}14.4$	-26°29.4
15 16	55°58.3 71°00.8	24°26.2 39°25.7	· · 22.6 23.7	60°42.7 75°43.4	· · 10.9 10.1	308°41.2 323°43.5	· · 51.7 51.7	49°51.1 64°53.2	· · 19.7 19.8	Atria	107°07.5	-69°04.3
17	86°03.3	54°25.3	24.9	90°44.0	09.4	338°45.8	51.7	79°55.4	19.0	Sabik	102°01.5	-15°45.5
18	101°05.7	69°24.8	N12°26.0	105°44.7	S03°08.6	353°48.0	N22°51.7	94°57.6	N00°20.0	Shaula	96°08.9	-37°07.3
19	116°08.2	84°24.3	27.1	120°45.4	07.8	8°50.3	51.7	109°59.8	20.2	Rasalhague	95°57.5	12°32.2
20	131° 10.7	99°23.9	28.3	135°46.0	07.0	23°52.6	51.6	125°01.9	20.3	Eltanin	90°41.6	51°28.7 -34°22.3
21	$146^{\circ}13.1$	114°23.4	• • 29.4	150°46.7	• • 06.2	38°54.9	• • 51.6	140°04.1	• • 20.4	Kaus Aust.	83°31.1 80°32.5	-34 22.3 38°48.1
22	161°15.6	129°22.9	30.6	165°47.4	05.4	53°57.1	51.6	155°06.3	20.5	Vega Nunki	75°46.5	-26°15.8
23	$176^{\circ}18.1$	144°22.5	31.7	180°48.1	04.7	68°59.4	51.6	170°08.5	20.7	Altair	61°59.1	8°56.1
Mern	ass. 11:17	u_0.5′ d1	.1′ m-3.92	u∩ 7′ d-0	.8′ m1.18	1/2 3' d-0	.0′ m-2.20	1/2 2' d0	.1′ m0.92	Peacock	53°04.4	-56°38.8
iviei.p	ass. 11.11	ν-0.5 α1	.1 111-3.92	νο.τ α-ο	.0 1111.10	ν2.3 u-0	.0 111-2.20	ν2.2 do	.1 1110.92	Deneb	49°25.3	45°22.1
										Enif	33°38.0	9°59.6
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.0	-46°49.9
0	191°20.5	159°22.0	N12°32.8	195°48.7	S03°03.9	84°01.7	N22°51.6	185°10.7	N00°20.8	Fomalhaut	15°13.7	-29°29.0
1	206°23.0	174°21.6	34.0	210°49.4	03.1	99°03.9	51.5	200°12.8	20.9	Scheat	13°44.6	28°13.4
2	221°25.4 236°27.9	189°21.1 204°20.6	35.1 · · 36.2	225°50.1 240°50.8	02.3 · · 01.5	114°06.2 129°08.5	51.5 •• 51.5	215°15.0 230°17.2	21.0 · · 21.1	Markab	13°29.2	15°20.7
4	250° 27.9 251° 30.4	204 20.0 219°20.2	37.4	255°51.4	00.7	144°10.8	51.5	245°19.4	21.3	Apr 01 Wed	SHA	Mer.pass
4 5	266° 32.8	219 20.2 234°19.7	37.4 38.5	255 51.4 270°52.1	00.7 03°00.0	144 10.8 159°13.0	51.5 51.5	245 19.4 260°21.6	21.3	Venus	330°21.7	13:21
6	200 32.6 281°35.3	249°19.2	N12°39.6	285°52.8	502°59.2	174°15.3	N22°51.4	275°23.7	N00°21.5	Mars	5°54.3	10:58
7	296°37.8	264°18.8	40.8	300°53.4	58.4	189°17.6	51.4	290°25.9	21.6	Jupiter	252°50.0	18:28
8	311°40.2	279°18.3	41.9	315°54.1	57.6	204°19.8	51.4	305°28.1	21.7	Saturn	354°03.9	11:45
9	326°42.7	294°17.8	43.0	330°54.8	• • 56.8	219°22.1	51.4	320°30.3	21.9			
10	341°45.2	309°17.4	44.2	345°55.5	56.0	234°24.4	51.4	335°32.4	22.0	Apr 02 Thu	SHA	Mer.pass
11	$356^{\circ}47.6$	$324^{\circ}16.9$	45.3	$0^{\circ}56.1$	55.3	249°26.7	51.3	350°34.6	22.1	Venus	329°11.7	13:22
12	11°50.1	$339^{\circ}16.4$	N12°46.4	15°56.8	S02°54.5	264°28.9	N22°51.3	5°36.8	N00°22.2	Mars Jupiter	5°11.3 252°45.7	10:57 18:25
13	26° 52.5	354°15.9	47.6	30°57.5	53.7	279°31.2	51.3	20°39.0	22.3	Saturn	252 45.7 353°57.0	18:25
14	41°55.0	9°15.5	48.7	45°58.2	52.9	294°33.5	51.3	35°41.2	22.5	Jatuill	333 31.0	11.41
15	56° 57.5	24°15.0	• • 49.8	60°58.8	• • 52.1	309°35.7	• • 51.3	50°43.3	• • 22.6	Apr 03 Fri	SHA	Mer.pass
16	71°59.9	39°14.5	51.0	75°59.5	51.3	324°38.0	51.2	65°45.5	22.7	Venus	328°01.5	13:23
17	87°02.4	54°14.1	52.1	91°00.2	50.6	339°40.3	51.2	80°47.7	22.8	Mars	4°28.2	10:56
18	102°04.9	69°13.6	N12°53.2	106°00.8	S02°49.8	354°42.5	N22°51.2	95°49.9	N00°22.9	Jupiter		18:21
19	117°07.3	84°13.1	54.3	121°01.5	49.0	9°44.8	51.2	110°52.1	23.1	Saturn	353°50.1	11:38
20	132°09.8 147°12.3	99°12.6 114°12.2	55.5 • • 56.6	136°02.2	48.2 •• 47.4	24°47.1	51.2	125°54.2 140°56.4	23.2	Horizont	al parallax	
21 22	147°12.3 162°14.7	114°12.2 129°11.7	· · 56.6 57.7	151°02.9 166°03.5	46.6	39°49.3 54°51.6	· · 51.1 51.1	140°56.4 155°58.6	· · 23.3 23.4	1.01120111	Venus:	0.1
23	102 14.7 177° 17.2	144°11.2	58.8	181°04.2	45.9	69°53.9	51.1	171°00.8	23.4		Mars:	0.1
										L		
Mer.p	ass. 11:13	$\nu$ -0.5' d1	.1' m-3.92	$\nu$ 0.7′ d-0	.8′ m1.19	$\nu 2.3' \text{ d-0}$	.0′ m-2.19	$\nu 2.2'  d0$	$.1' \; {\sf m0.92}$			

h	Sui	1			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°00.2	N04°27.6	11°27.8	15.2'	S01°00.5	15.2'	56.2'
1	194°00.4	28.6	26°01.9	15.2'	01°15.8	15.2'	56.2'
2	209°00.6	29.6	40°36.1	15.2'	01°31.0	15.2'	56.1'
3	224°00.8	• • 30.5	55°10.3	15.2'	$01^{\circ}46.2$	15.2'	56.1'
4	239°01.0	31.5	69°44.5	15.2'	$02^{\circ}01.4$	15.2'	56.1'
5	254°01.2	32.5	84°18.8	15.2'	$02^{\circ}16.6$	15.2'	56.1'
6	269°01.4	N04°33.4	98°53.0	15.2'	S02°31.7	15.1'	56.0'
7	284°01.6	34.4	113°27.2	15.3'	02°46.8	15.1'	56.0'
8	299°01.7	35.4	128°01.5	15.3'	03°01.9	15.1'	56.0'
9	314°01.9	• • 36.3	142°35.8	15.3'	03°17.0	15.1'	56.0'
10	329°02.1	37.3	157° 10.0	15.3'	03°32.1	15.0'	56.0'
11	344°02.3	38.2	171°44.3	15.3'	03°47.1	15.0'	55.9'
12	359°02.5	N04°39.2	186°18.6	15.3'	\$04°02.1 04°17.1	15.0'	55.9'
13 14	14°02.7 29°02.9	40.2 41.1	200°52.8 215°27.1	15.3' 15.3'	04°17.1 04°32.1	15.0' 14.9'	55.9' 55.9'
14 15	29 02.9 44°03.0	42.1	215 27.1 230°01.4	15.3'	04 32.1 04°47.0	14.9'	55.9'
16	59°03.2	43.1	244°35.7	15.3'	04 47.0 05°01.9	14.9'	55.8'
17	74°03.4	44.0	259°09.9	15.3'	05°16.8	14.8'	55.8'
18	89°03.6	N04° 45.0	273°44.2	15.3'	505°31.6	14.8'	55.8'
19	104° 03.8	46.0	288° 18.5	15.3'	05°46.4	14.8'	55.8'
20	119°04.0	46.9	302°52.7	15.3'	06°01.2	14.7	55.8'
21	134°04.2	. 47.9	317°27.0	15.3'	06°15.9	14.7	55.7'
22	149° 04.3	48.8	332°01.3	15.2'	06°30.6	14.7'	55.7'
23	164° 04.5	49.8	346°35.5	15.2'	06°45.2	14.6'	55.7'
	SD = 16.0'	d = 1.0'		SL	0 = 15.3'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°04.7	N04°50.8	1°09.7	15.2'	S06°59.9	14.6'	55.7'
1	194°04.9	51.7	15°44.0	15.2'	07°14.4	14.5'	55.7'
2	209°05.1	52.7	30°18.2	15.2'	07°29.0	14.5	55.6'
3	224°05.3	• • 53.6	44°52.4	15.2'	07°43.5	14.5'	55.6'
4	239°05.5	54.6	59°26.6	15.2'	07°57.9	14.4'	55.6'
5	254°05.6	55.6	74°00.8	15.2'	08°12.4	14.4'	55.6'
6	269°05.8 284°06.0	N04° 56.5 57.5	88°34.9 103°09.1	15.2' 15.1'	\$08°26.7 08°41.1	14.3'	55.6'
7 8	284°06.0 299°06.2	57.5 58.5	103°09.1 117°43.2	15.1' 15.1'	08°41.1 08°55.3	14.3' 14.2'	55.5' 55.5'
8 9	299°06.2 314°06.4	58.5 04°59.4	117° 43.2 132° 17.3	15.1' 15.1'	08°55.3 09°09.6	14.2'	55.5'
10	329°06.6	04 59.4 05°00.4	132 17.3 146°51.4	15.1'	09 09.0 09°23.8	14.1	55.5'
11	344°06.7	05 00.4	161°25.5	15.1'	09°23.8	14.1	55.5'
12	359°06.9	N05°02.3	101 25.5 175°59.6	15.0'	S09°52.0	14.0'	55.4
13	14°07.1	03.3	190°33.6	15.0'	10°06.0	14.0'	55.4'
14	29°07.3	04.2	205°07.7	15.0'	10°20.0	13.9'	55.4'
15	44°07.5	05.2	219°41.7	15.0'	10°34.0	13.9'	55.4'
16	59°07.7	06.1	234°15.6	15.0'	10°47.9	13.8'	55.4'
17	74°07.9	07.1	248°49.6	14.9'	$11^{\circ}01.7$	13.8'	55.4'
18	89°08.0	N05°08.1	263°23.5	14.9'	<b>S</b> 11°15.5	13.7'	55.3'
19	104°08.2	09.0	277° 57.4	14.9'	11°29.2	13.7'	55.3'
20	119°08.4	10.0	292°31.3	14.9'	11°42.9	13.6'	55.3'
21	134°08.6	• • 10.9	$307^{\circ}05.1$	14.8'	$11^{\circ}56.5$	13.6'	55.3'
22	149°08.8	11.9	321°39.0	14.8'	12°10.0	13.5'	55.3'
23	164°09.0	12.8	336°12.8	14.8'	12°23.5	13.4'	55.2'
	SD = 16.0'	d=1.0'		SE	0 = 15.2'		
E.:	CHA	Daa			Dee		шп
Fri 0	<b>GHA</b> 179°09.1	<b>Dec</b> N05° 13.8	<b>GHA</b> 350° 46.5	u 14.7'	<b>Dec</b> \$12°37.0	d 13.4'	<b>HP</b> 55.2'
1	179 09.1 194°09.3	14.8	5°20.3	14.7	12°50.3	13.4	55.2'
2	209° 09.5	15.7	19°54.0	14.7'	12°03.7	13.2	55.2'
3	224°09.7	. 16.7	34°27.6	14.6'	13°16.9	13.2'	55.2'
4	239°09.9	17.6	49°01.3	14.6'	13°30.1	13.1	55.1'
5	254°10.1	18.6	63°34.9	14.6'	13°43.2	13.1'	55.1'
6	269°10.3	N05° 19.5	78°08.5	14.5'	S13°56.3	13.0'	55.1'
7	284°10.4	20.5	92°42.0	14.5'	14°09.3	12.9'	55.1'
8	299°10.6	21.5	$107^{\circ}15.5$	14.5'	14°22.2	12.9'	55.1'
9	314° 10.8	• • 22.4	121°49.0	14.4'	14°35.0	12.8'	55.1'
10	329°11.0	23.4	136°22.4	14.4'	14°47.8	12.7'	55.0'
11	344°11.2	24.3	150°55.8	14.4'	15°00.5	12.6'	55.0'
12	359°11.4	N05°25.3	165°29.2	14.3'	\$15°13.2	12.6'	55.0'
13	14°11.5	26.2	180°02.5	14.3'	15°25.8	12.5'	55.0'
14	29°11.7	27.2	194°35.8	14.2'	15°38.3	12.4'	55.0'
15	44°11.9	· · 28.2	209°09.0	14.2'	15°50.7	12.4'	55.0'
16	59°12.1	29.1	223°42.2	14.2'	16°03.1	12.3'	54.9'
17	74° 12.3 89° 12.5	30.1 N05°31.0	238° 15.4 252° 48.5	14.1'	16°15.3	12.2'	54.9'
18 19	89°12.5 104°12.6	N05°31.0 32.0	252°48.5 267°21.5	14.1' 14.0'	\$16°27.5 16°39.7	12.1' 12.1'	54.9' 54.9'
20	104°12.6 119°12.8	32.0 32.9	267°21.5 281°54.6	14.0'	16° 39.7 16° 51.7	12.1	54.9' 54.9'
21	134°13.0	33.9	201 54.0 296°27.6	13.9'	10 51.7 17°03.7	11.9'	54.9'
22	149° 13.2	34.8	311°00.5	13.9'	17°15.6	11.8'	54.8'
23	164° 13.4	35.8	325°33.4	13.9'	17°27.4	11.7'	54.8'
	SD = 16.0'	d = 1.0'			0 = 15.1'		
	JD — 10.0	u — 1.0		JL	_ 13.1		

Lat.	Twi	light	Sunrise	Sunset	Twi	light	
Lat.	Naut.	Civil	Junisc	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	
N 40°	04:43	05:15	05:43	18:25	18:53	19:25	
35°	04:50	05:20	05:46	18:22	18:48	19:18	
30°	04:56	05:24	05:48	18:19	18:43	19:12	
20°	05:05	05:31	05:53	18:15	18:37	19:03	
N 10°	05:11	05:36	05:57	18:10	18:32	18:56	
0°	05:15	05:40	06:00	18:07	18:28	18:52	
S 10°	05:18	05:43	06:04	18:03	18:24	18:49	
20°	05:20	05:45	06:07	18:00	18:22	18:47	
30°	05:20	05:47	06:11	17:55	18:19	18:47	
35°	05:19	05:48	06:13	17:53	18:18	18:48	
40°	05:17	05:49	06:16	17:51	18:18	18:49	
45°	05:15	05:49	06:19	17:48	18:17	18:51	
<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	
		Moonric		Moonsot			

Lat.		Moonris	е		Moonset	:
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°	19:01	21:17		04:53	04:18	03:32
<b>N</b> 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
<b>N</b> 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
N 10°	17:49	18:36	19:24	05:21	05:59	06:38
0°	17:45	18:28	19:11	05:23	06:05	06:48
<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.	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	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	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	192° 19.7	159°10.8	N13°00.0	196°04.9	S02°45.1	84°56.1	N22°51.1	186°02.9	N00°23.7			
1	207°22.1	174°10.3	01.1	211°05.6	44.3	99°58.4	51.1	201°05.1	23.8	Alpheratz	357°34.1	29°14.0
2	222°24.6	189°09.8	02.2	226°06.2	43.5	115°00.7	51.0	216°07.3	23.9	Ankaa	353°06.5	-42°09.8
3	237°27.0	204°09.3	03.3	241°06.9	• • 42.7	130°02.9	51.0	231°09.5	• • 24.0	Schedar	349°30.5	56° 40.8
4	252°29.5	219°08.9	04.5	256° 07.6	41.9	145°05.2	51.0	246°11.7	24.2	Diphda	348°46.6	-17°50.6
5	267°32.0	234°08.4	05.6	271°08.3	41.1	160°07.5	51.0	261°13.8	24.3	Achernar	335°20.0	-57°06.3
6	282°34.4	249°07.9	N13°06.7	286°08.9	S02°40.4	175°09.7	N22°51.0	276°16.0	N00°24.4	Hamal	327°50.4	23°35.1
7	297°36.9	264°07.4	07.8	301°09.6	39.6	190°12.0	50.9	291°18.2	24.5	Polaris	313°56.3	89°22.6
8	312°39.4	279°07.0	08.9	316° 10.3	38.8	205°14.2	50.9	306°20.4	24.6	Acamar	315°11.4	-40°12.1
9	327°41.8	294°06.5	· · 10.1	331°11.0	• • 38.0	220°16.5	• • 50.9	321°22.6	• • 24.8	Menkar	314°05.4	4°11.5
10	342°44.3	309°06.0	11.2	346°11.6	37.2	235°18.8	50.9	336°24.7	24.9	Mirfak	308°27.2	49°57.3
11	357°46.8	324°05.5	12.3	1°12.3	36.4	250°21.0	50.9	351°26.9	25.0	Aldebaran	290°38.7	16°33.7
12	12°49.2	339°05.0	N13°13.4	16°13.0	S02°35.7	265°23.3	N22°50.8	6°29.1	N00°25.1	Rigel	281°03.0	-8°10.4
13	27°51.7	354°04.6	14.5	31°13.6	34.9	280°25.6	50.8	21°31.3	25.2	Capella	280°20.6	46°01.6
14	42°54.1	9°04.1	15.6	46°14.3	34.1	295°27.8	50.8	36°33.4	25.4	Bellatrix	278°21.9 278°00.7	6°22.3 28°37.8
15	57° 56.6	24°03.6	• • 16.8	$61^{\circ}15.0$	• • 33.3	$310^{\circ}30.1$	• • 50.8	51°35.6	• • 25.5	Elnath Alnilam	275°36.8	-1°11.2
16	72°59.1	39°03.1	17.9	76° 15.7	32.5	325°32.3	50.8	66°37.8	25.6	Betelgeuse	275 30.8 270°51.1	7° 24.6
17	88°01.5	54°02.6	19.0	91°16.3	31.7	340°34.6	50.7	81°40.0	25.7	Canopus	263°52.0	-52°42.8
18	103°04.0	69°02.2	N13°20.1	106° 17.0	S02°31.0	355°36.9	N22°50.7	96°42.2	N00°25.8	Sirius	258°25.4	-32 42.8 -16°45.3
19	118°06.5	84°01.7	21.2	121°17.7	30.2	$10^{\circ}39.1$	50.7	111°44.3	26.0	Adhara	255°05.1	-10°45.5
20	133°08.9	99°01.2	22.3	136° 18.4	29.4	25°41.4	50.7	126°46.5	26.1		244°49.7	5°09.4
21	$148^{\circ}11.4$	114°00.7	• • 23.4	$151^{\circ}19.0$	• • 28.6	40°43.6	• • 50.7	141°48.7	• • 26.2	Procyon Pollux	244 49.7 243°16.0	5 09.4 27°57.8
22	$163^{\circ}13.9$	129°00.2	24.6	$166^{\circ}19.7$	27.8	55°45.9	50.6	156°50.9	26.3	Avior	245 10.0 234°14.1	-59°35.9
23	$178^{\circ}16.3$	143°59.8	25.7	$181^{\circ}20.4$	27.0	70°48.2	50.6	171°53.1	26.4	Suhail	234 14.1 222°45.4	-59 35.9 -43°32.6
Mers	ass. 11:09	v-0 5′ d1	.1′ m-3.92	v0 7' 4 0	.8′ m1.19	1/2 3/ 40	.0′ m-2.18	1/2 2/ An	.1′ m0.93	Miaplacidus	222 45.4 221°37.6	-43 32.0 -69°49.8
ivier.p	ass. 11.09	ν-υ.5 α1	.1 111-3.94	νυ.ι α-υ	.0 1111.19	ν2.3 U-U	.0 111-2.10	ν Δ.Δ dU	.1110.93	Alphard	221 37.6 217°46.6	-8°46.5
										Regulus	207°33.1	11°50.2
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.2	61°36.6
0	193° 18.8	158°59.3	N13°26.8	$196^{\circ}21.1$	502°26.2	85°50.4	N22°50.6	186°55.2	$N00^{\circ}26.6$	Denebola	182°23.6	14° 25.4
1	208°21.3	173°58.8	27.9	$211^{\circ}21.8$	25.5	$100^{\circ}52.7$	50.6	201°57.4	26.7	Gienah	175°42.2	-17°41.4
2	223°23.7	188°58.3	29.0	226°22.4	24.7	115°54.9	50.5	$216^{\circ}59.6$	26.8		173° 42.2	-63°14.8
3	238° 26.2	203°57.8	• • 30.1	241°23.1	• • 23.9	130°57.2	• • 50.5	232°01.8	• • 26.9		171°50.0	-57° 15.8
4	253°28.6	218°57.3	31.2	256°23.8	23.1	145°59.4	50.5	247°04.0	27.0	Alioth	166°11.5	55°48.9
5	268°31.1	233°56.9	32.3	271°24.5	22.3	161°01.7	50.5	$262^{\circ}06.1$	27.2	Spica	158°20.9	-11° 18.1
6	283°33.6	248°56.4	N13°33.4	286°25.1	S02°21.5	176°04.0	N22°50.5	277°08.3	$N00^{\circ}27.3$	Alkaid	152°50.7	49° 10.7
7	298°36.0	263°55.9	34.5	301°25.8	20.8	191°06.2	50.4	$292^{\circ}10.5$	27.4	Hadar	148°34.0	-60° 30.0
8	313°38.5	278°55.4	35.6	316°26.5	20.0	206°08.5	50.4	$307^{\circ}12.7$	27.5	<b>I</b>	147°56.1	-36° 30.0
9	328°41.0	293°54.9	• • 36.7	331°27.2	• • 19.2	221°10.7	• • 50.4	322°14.9	• • 27.6	Arcturus	145°46.7	19°02.5
10	343°43.4	308°54.4	37.8	346°27.8	18.4	236°13.0	50.4	337°17.0	27.8	Rigil Kent.		-60° 56.6
11	358°45.9	323°53.9	39.0	1°28.5	17.6	251°15.2	50.4	352°19.2	27.9	Kochab	137°18.8	74°02.6
12	13°48.4	338°53.5	N13°40.1	16°29.2	S02°16.8	$266^{\circ}17.5$	N22°50.3	7°21.4	N00°28.0	Zuben'ubi	136°54.6	-16°09.2
13	28°50.8	353°53.0	41.2	31°29.9	16.0	$281^{\circ}19.7$	50.3	22°23.6	28.1	Alphecca	126°02.6	26° 37.3
14	43°53.3	8°52.5	42.3	46°30.5	15.3	296°22.0	50.3	37°25.7	28.2	Antares	112°14.4	-26°29.4
15	58°55.8	23°52.0	• • 43.4	61°31.2	• • 14.5	311°24.2	• • 50.3	52°27.9	• • 28.4	Atria	107°07.4	-69°04.3
16	73°58.2	38°51.5	44.5	76°31.9	13.7	326°26.5	50.2	67°30.1	28.5	Sabik	102°01.5	-15° 45.5
17	89°00.7	53°51.0	45.6	91°32.6	12.9	341°28.8	50.2	82°32.3	28.6	Shaula	96°08.8	-37°07.3
18	104°03.1	68°50.5	N13°46.7	106°33.2	S02°12.1	356°31.0	N22°50.2	97°34.5	N00°28.7	Rasalhague	95°57.5	12°32.2
19	119°05.6	83°50.0	47.8	121°33.9	11.3	11°33.3	50.2	112°36.6	28.8	Eltanin	90°41.6	51°28.7
20	134°08.1	98°49.5	48.9	136°34.6	10.6	26°35.5	50.2	127°38.8	29.0	Kaus Aust.	83°31.1	-34°22.3
21	149° 10.5	113°49.1	• • 50.0	151°35.3	• • 09.8	41°37.8	50.1	142°41.0	• • 29.1	Vega	80°32.5	38°48.1
22	164° 13.0	128°48.6	51.1	166°36.0	09.0	56°40.0	50.1	157°43.2	29.2	Nunki	75°46.5	-26° 15.8
23	179° 15.5	143°48.1	52.2	181°36.6	08.2	71°42.3	50.1	172°45.4	29.3	Altair	61°59.0	8°56.1
Mer.p	ass. 11:05	$\nu$ -0.5' d1	.1′ m-3.92	$\nu 0.7' d-0$	.8′ m1.19	$\nu 2.3' \ d-0$	.0′ m-2.17	$\nu 2.2' d0$	.1′ m0.93	Peacock	53°04.3	-56° 38.8
										Deneb	49°25.3	$45^{\circ}22.1$
										Enif	33°38.0	9°59.6
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.0	-46°49.9
0	194°17.9	158°47.6	N13°53.3	196° 37.3	\$02°07.4	86°44.5	N22°50.1		N00°29.4	Fomalhaut	$15^{\circ}13.7$	-29°29.0
1	209°20.4	173°47.1	54.4	211°38.0	06.6	101°46.8	50.0	202°49.7	29.6	Scheat	13°44.5	28° 13.4
2	224°22.9	188°46.6	55.5	226°38.7	05.8	116°49.0	50.0	217°51.9	29.7	Markab	13°29.2	15°20.7
3	239°25.3	203°46.1	• • 56.5	241°39.3	05.1	131°51.3	• • 50.0	232°54.1	• • 29.8	A 04 C :	CIIA	
4	254°27.8	218°45.6	57.6	256°40.0	04.3	146°53.5	50.0	247°56.3	29.9	Apr 04 Sat	SHA 226° 5.1.1	Mer.pass
5	269°30.2	233°45.1	58.7	271°40.7	03.5	161°55.8	50.0	262°58.4	30.0	Venus	326°51.1	13:24
6	284°32.7	248°44.6	N13°59.8	286°41.4	\$02°02.7	176°58.0	N22°49.9	278°00.6	N00°30.2	Mars	3°45.2	10:55
7	299°35.2	263°44.1	14°00.9	301°42.0	01.9	192°00.3	49.9	293°02.8	30.3		252°36.5	18:17
8	314°37.6	278°43.6	02.0	316°42.7	01.1	207°02.5	49.9	308°05.0	30.4	Saturn	353°43.3	11:34
9	329°40.1	293°43.1	03.1	331°43.4	02°00.4	222°04.8	49.9	323°07.2	• • 30.5	Apr 05 Sun	SHA	Mer.pass
10	344°42.6 359°45.0	308°42.6	04.2	346°44.1 1°44.8	01°59.6	237°07.0	49.8	338°09.3 353°11.5	30.6	Venus	325°40.5	13:24
11	359°45.0 14°47.5	323°42.1 338°41.6	05.3 N14°06.4	1°44.8 16°45.4	58.8 \$01°58.0	252°09.2 267°11.5	49.8 N22°49.8	353°11.5 8°13.7	30.8 N00°30.9	Mars	3°02.3	10:54
12 13	14°47.5 29°50.0	353°41.6 353°41.2	N14°06.4 07.5	31°46.1	57.2	267°11.5 282°13.7	N22 49.8 49.8	8°13.7 23°15.9	31.0	Jupiter	252°31.6	18:14
13 14	29 50.0 44° 52.4	353 41.2 8°40.7	07.5 08.6	31 46.1 46°46.8	57.2 56.4	282 13.7 297°16.0	49.8 49.8	23 15.9 38°18.1	31.0	Saturn	353°36.4	11:31
	44 52.4 59°54.9	8 40.7 23°40.2	09.6	40 40.8 61°47.5	. 55.6	312°18.2	49.8 •• 49.7	58 18.1 53°20.2		A OC 14	CIIA	
15 16	59°54.9 74°57.4	23°40.2 38°39.7	10.7	76°48.1	54.9	312°18.2 327°20.5	• • 49.7 49.7	68°22.4	· · 31.2 31.4	Apr 06 Mon	SHA	Mer.pass
16 17	74 57.4 89°59.8	58° 39.7	10.7	76 48.1 91°48.8	54.9 54.1	327 20.5 342°22.7	49.7 49.7	83°24.6	31.4	Venus	324°29.7	13:25
17 18	105°02.3	68°38.7	N14° 12.9	91 48.8 106°49.5	54.1 S01°53.3	342 22.7 357°25.0	49.7 N22°49.7	98°26.8	N00°31.6	Mars	2°19.4	10:53
19	105 02.3 120°04.7	83°38.2	14.0	100 49.5 121°50.2	52.5	12°27.2	49.6	96 20.6 113°29.0	31.7	Jupiter		18:10
20	120 04.7 135°07.2	98°37.7	15.1	121 50.2 136° 50.9	52.5 51.7	27°29.5	49.6 49.6	113 29.0 128°31.1	31.8	Saturn	353°29.6	11:27
21	150°09.7	96 37.7 113°37.2	16.2	150°50.9	50.9	42°31.7	• • 49.6	143°33.3	32.0	Horizont	al parallax	
22	165° 12.1	113 37.2 128°36.7	17.2	166°52.2	50.1	57°33.9	49.6	143°35.5	32.0		Venus:	0.1
23	180° 14.6	143°36.2	18.3	181°52.9	49.4	72°36.2	49.5	173°37.7	32.2		Mars:	0.1
Mer.p	ass. 11:01	$\nu$ -0.5' $d1$	.1′ m-3.92	$\nu$ 0.7′ $d$ -0	.8′ m1.19	$\nu$ 2.3′ d-0	.0′ m-2.17	$\nu$ 2.2′ d0	.1'  m0.93			

h	Sui	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°13.5	N05°36.7	340°06.3	13.8'	<b>S</b> 17°39.1	11.7'	54.8'
1	194°13.7	37.7	354°39.1	13.8'	17°50.8	11.6'	54.8'
2 3	209°13.9 224°14.1	38.7 •• 39.6	9°11.9 23°44.6	13.7' 13.7'	18°02.4 18°13.8	11.5' 11.4'	54.8' 54.8'
4	239°14.3	40.6	38°17.3	13.6'	18° 25.2	11.3'	54.7'
5	254°14.5	41.5	52°49.9	13.6'	$18^{\circ}36.6$	11.2'	54.7'
6	269°14.6	N05°42.5	67°22.5	13.5'	\$18°47.8	11.1'	54.7'
7 8	284°14.8 299°15.0	43.4 44.4	81°55.0 96°27.5	13.5' 13.4'	18° 58.9 19° 10.0	11.1' 11.0'	54.7' 54.7'
9	314°15.2	• • 45.3	110°59.9	13.4'	19°21.0	10.9'	54.7'
10	329°15.4	46.3	125°32.3	13.3'	19°31.8	10.8'	54.7'
11	344°15.6 359°15.7	47.2 N05°48.2	140°04.6 154°36.9	13.3'	19°42.6 \$19°53.3	10.7'	54.6'
12 13	359°15.7 14°15.9	N05 48.2 49.1	154° 36.9 169° 09.2	13.2' 13.2'	20°03.9	10.6' 10.5'	54.6' 54.6'
14	29°16.1	50.1	183°41.4	13.1'	20° 14.5	10.4	54.6'
15	44°16.3	•• 51.0	198°13.5	13.1'	20°24.9	10.3'	54.6'
16	59°16.5 74°16.6	52.0 52.9	212°45.6 227°17.6	13.0' 13.0'	20°35.2 20°45.4	10.2' 10.1'	54.6'
17 18	89°16.8	52.9 N05°53.9	241°49.6	12.9'	20 45.4 \$20°55.6	10.1	54.6' 54.5'
19	104°17.0	54.8	256°21.5	12.9'	21°05.6	9.9'	54.5'
20	119°17.2	55.8	270°53.4	12.8'	21°15.6	9.8'	54.5'
21	134°17.4 149°17.5	• • 56.7	285°25.3 299°57.0	12.8'	21°25.4	9.7'	54.5'
22 23	149°17.5 164°17.7	57.7 58.6	299°57.0 314°28.8	12.7' 12.7'	21°35.2 21°44.8	9.6' 9.5'	54.5' 54.5'
	SD = 16.0'	d = 1.0'			0 = 14.9'	3.3	
	3D - 10.0°	u — 1.0		)L	J — 14.9°		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°17.9	N05°59.6 06°00.5	329°00.5	12.6' 12.6'	\$21°54.4	9.4'	54.5'
1 2	194°18.1 209°18.3	06°00.5 01.5	343°32.1 358°03.7	12.6′ 12.5′	22°03.8 22°13.2	9.3' 9.2'	54.4' 54.4'
3	224°18.4	02.4	12°35.2	12.5'	22°22.4	9.1	54.4'
4	239°18.6	03.4	$27^{\circ}06.7$	12.4'	$22^{\circ}31.5$	9.0'	54.4'
5	254°18.8	04.3	41°38.1	12.4'	22°40.6	8.9'	54.4'
6 7	269°19.0 284°19.2	N06°05.3 06.2	56°09.4 70°40.7	12.3' 12.3'	\$22°49.5 22°58.3	8.8' 8.7'	54.4' 54.4'
8	299°19.3	07.2	85°12.0	12.2'	23°07.1	8.6'	54.4'
9	314°19.5	•• 08.1	99°43.2	12.2'	$23^{\circ}15.7$	8.5'	54.4'
10	329°19.7	09.1	114°14.4 128°45.5	12.1'	23°24.2	8.4'	54.3'
11 12	344°19.9 359°20.1	10.0 N06°11.0	128 45.5 143°16.5	12.1' 12.0'	23°32.6 \$23°40.9	8.3' 8.2'	54.3' 54.3'
13	14°20.2	11.9	157°47.5	12.0'	23°49.0	8.1'	54.3'
14	29°20.4	12.9	$172^{\circ}18.5$	11.9'	23°57.1	8.0'	54.3'
15	44°20.6 59°20.8	• • 13.8	186°49.4 201°20.2	11.9'	24°05.1 24°12.9	7.8'	54.3' 54.3'
16 17	74°21.0	14.8 15.7	201 20.2 215°51.0	11.8' 11.7'	24 12.9 24°20.7	7.7' 7.6'	54.3'
18	89°21.1	N06°16.7	230°21.8	11.7'	S24°28.3	7.5'	54.3'
19	104°21.3	17.6	244°52.5	11.6'	24°35.8	7.4'	54.3'
20 21	119°21.5 134°21.7	18.6 •• 19.5	259°23.1 273°53.7	11.6' 11.6'	24°43.2 24°50.4	7.3' 7.2'	54.2' 54.2'
22	134 21.7 149°21.9	20.5	273 55.7 288°24.3	11.5'	24 50.4 24°57.6	7.2 7.0'	54.2'
23	164°22.0	21.4	302°54.8	11.5'	25°04.6	6.9'	54.2'
	SD = 16.0'	d = 0.9'		SE	0 = 14.9'		
Mon 0	<b>GHA</b> 179°22.2	<b>Dec</b> N06°22.3	<b>GHA</b> 317°25.2	u 11.4'	<b>Dec</b> \$25° 11.6	<i>d</i> 6.8'	<b>HP</b> 54.2'
1	179 22.2 194°22.4	23.3	317 25.2 331°55.7	11.4'	25° 18.4	6.7	54.2'
2	209°22.6	24.2	346°26.0	11.3'	$25^{\circ}25.1$	6.6'	54.2'
3	224°22.8	• • 25.2	0°56.3	11.3'	25°31.6	6.5'	54.2'
4 5	239°22.9 254°23.1	26.1 27.1	15°26.6 29°56.8	11.2' 11.2'	25° 38.1 25° 44.4	6.3' 6.2'	54.2' 54.2'
6	269°23.3	N06°28.0	44°27.0	11.1'	S25°50.6	6.1	54.2
7	284°23.5	29.0	58°57.1	11.1'	25°56.7	6.0'	54.2'
8 9	299°23.6 314°23.8	29.9 •• 30.8	73°27.2 87°57.2	11.0' 11.0'	26°02.7 26°08.5	5.8' 5.7'	54.2' 54.2'
10	314 23.8 329°24.0	31.8	87°57.2 102°27.2	10.9'	26° 14.3	5.7° 5.6'	54.2° 54.1°
11	344°24.2	32.7	116°57.1	10.9'	$26^{\circ}19.9$	5.5'	54.1'
12	359°24.4	N06°33.7	131°27.1	10.9'	\$26°25.3	5.3'	54.1'
13 14	14°24.5 29°24.7	34.6 35.6	145°56.9 160°26.7	10.8' 10.8'	26° 30.7 26° 35.9	5.2' 5.1'	54.1' 54.1'
14 15	29 24.7 44°24.9	36.5	160 26.7 174°56.5	10.8	26° 35.9	5.1 5.0'	54.1'
16	59°25.1	37.5	$189^{\circ}26.3$	10.7'	$26^{\circ}46.0$	4.8'	54.1'
17	74°25.2	38.4	203°56.0	10.7'	26°50.8	4.7'	54.1'
18 19	89°25.4 104°25.6	N06°39.3 40.3	218°25.6 232°55.3	10.6' 10.6'	\$26°55.5 27°00.1	4.6' 4.5'	54.1' 54.1'
20	119°25.8	41.2	232 33.3 247°24.8	10.6'	27°04.6	4.3'	54.1'
21	134°25.9	• • 42.2	261°54.4	10.5'	27°08.9	4.2'	54.1'
22	149°26.1	43.1	276°23.9	10.5'	27°13.1	4.1'	54.1'
23	164°26.3	44.0	290°53.4	10.4'	27°17.2	3.9'	54.1'
	SD = 16.0'	d = 0.9'		SE	0 = 14.8'		

			2026	April 04	to Ap	r. 06
1-4	Twi	light	Ci	C	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	00:09	03:16	04:35	19:34	20:54	////
<b>N</b> 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
	ł					
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
		Moonris	20		Moonset	
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
NI 70°		Jun	IVION		Jun	ivion
N 72°	01:07			01:16		
N 70°				03:03		
68°				03:43		
66°	••••	00:27		04:11	03:35	
64°	23:47		02:07	04:33	04:17	03:36
62°	23:19		01:06	04:50	04:45	04:38
60°	22:58		00:32	05:05	05:07	05:12
N $58^{\circ}$	22:41		00:07	05:17	05:25	05:37

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

ı			Sun			Moon	
	Day	Eqn.of Time		Mer.	Mer.	Age	
	,	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	`	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	195° 17.1	158°35.7	N14° 19.4	196°53.6	S01°48.6	87°38.4	N22°49.5	188°39.9	N00°32.3			
1	210° 19.5	173°35.2	20.5	211°54.3	47.8	102°40.7	49.5	203°42.0	32.4	Alpheratz	357°34.1	29° 14.0
	210 19.5 225°22.0							203 42.0 218°44.2		Ankaa	353°06.5	-42°09.8
2		188°34.7	21.6	226°54.9	47.0	117°42.9	49.5		32.6	Schedar	349°30.5	56°40.8
3	240°24.5	203°34.2	• • 22.7	241°55.6	• • 46.2	132°45.2	• • 49.5	233°46.4	• • 32.7	Diphda	348°46.6	-17°50.6
4	255°26.9	218°33.6	23.7	256°56.3	45.4	147°47.4	49.4	248°48.6	32.8	Achernar	335°20.0	-57°06.2
5	270°29.4	233°33.1	24.8	271°57.0	44.7	162°49.6	49.4	263°50.8	32.9	Hamal	327°50.4	23°35.1
6	285°31.9	248°32.6	N14°25.9	286°57.6	S01°43.9	$177^{\circ}51.9$	N22°49.4	278°52.9	N00°33.0	Polaris	313°56.7	89°22.6
7	300°34.3	263°32.1	27.0	301°58.3	43.1	192°54.1	49.4	293°55.1	33.2			
8	315°36.8	278°31.6	28.1	316°59.0	42.3	207°56.4	49.3	308°57.3	33.3	Acamar	315°11.4	-40°12.1
9	330°39.2	293°31.1	• • 29.1	331°59.7	• • 41.5	222°58.6	• • 49.3	323°59.5	• • 33.4	Menkar	314°05.4	4° 11.5
10	345°41.7	308°30.6	30.2	347°00.4	40.7	238°00.8	49.3	339°01.7	33.5	Mirfak	308°27.2	49°57.3
11	0°44.2	323°30.1	31.3	2°01.0	39.9	253°03.1	49.3	354°03.8	33.6	Aldebaran	290°38.7	16°33.7
12	15°46.6	338°29.6	N14°32.4	17°01.7	S01°39.2	268°05.3	N22°49.2	9°06.0	N00°33.8	Rigel	281°03.0	-8°10.4
										Capella	280°20.6	46°01.6
13	30°49.1	353°29.1	33.4	32°02.4	38.4	283°07.6	49.2	24°08.2	33.9	Bellatrix	278°21.9	6°22.3
14	45°51.6	8°28.6	34.5	47°03.1	37.6	298°09.8	49.2	39°10.4	34.0	Elnath	278°00.7	28°37.8
15	60°54.0	23°28.1	• • 35.6	62°03.8	• • 36.8	313°12.0	• • 49.2	54°12.6	• • 34.1	Alnilam	275°36.8	-1°11.2
16	75°56.5	38°27.6	36.7	77°04.4	36.0	328°14.3	49.1	69°14.7	34.2	Betelgeuse	270°51.1	7°24.6
17	90°59.0	53°27.1	37.7	92°05.1	35.2	343°16.5	49.1	84°16.9	34.4	Canopus	263°52.1	-52°42.8
18	$106^{\circ}01.4$	68°26.6	N14°38.8	107°05.8	S01°34.4	358°18.8	N22°49.1	99°19.1	N00°34.5			
19	121°03.9	83°26.1	39.9	122°06.5	33.7	13°21.0	49.1	114°21.3	34.6	Sirius	258°25.4	-16°45.3
20	136°06.4	98°25.5	40.9	137°07.2	32.9	28°23.2	49.1	129°23.5	34.7	Adhara	255°05.1	-29°00.7
21	151°08.8	113°25.0	42.0	152°07.8	32.1	43°25.5	• • 49.0	144°25.6	• • 34.8	Procyon	244°49.7	5°09.4
22	166°11.3	113 25.0 128°24.5	43.1	167°08.5	31.3	58°27.7	49.0	159°27.8	34.9	Pollux	243°16.0	27°57.8
	100 11.3 181°13.7									Avior	234°14.2	-59°35.9
23	101 13./	143°24.0	44.1	182°09.2	30.5	73°29.9	49.0	174°30.0	35.1	Suhail	222°45.4	-43°32.6
Mer.p	ass. 10:57	$\nu$ -0.5' d1	.1′ m-3.92	$\nu$ 0.7′ d-0	.8′ m1.19	$\nu 2.2' \ d-0$	.0′ m-2.16	$\nu 2.2' \ d0$	.1′ m0.93	Miaplacidus	221°37.7	-69°49.8
										Alphard	217°46.6	-8°46.5
										Regulus	207°33.1	11°50.2
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.2	61°36.6
0	$196^{\circ}16.2$	158°23.5	N14°45.2	197°09.9	S01°29.7	88°32.2	N22°49.0	189°32.2	$N00^{\circ}35.2$	Denebola	182°23.6	14°25.4
1	$211^{\circ}18.7$	173°23.0	46.3	212°10.6	29.0	103°34.4	48.9	204°34.4	35.3	Gienah	175°42.2	-17°41.5
2	$226^{\circ}21.1$	188°22.5	47.4	$227^{\circ}11.2$	28.2	118°36.6	48.9	219°36.5	35.4	Acrux		-63°14.8
3	241°23.6	203°22.0	• • 48.4	242°11.9	• • 27.4	133°38.9	• • 48.9	234°38.7	• • 35.5	Gacrux		-57° 15.8
4	256°26.1	218°21.4	49.5	257°12.6	26.6	148°41.1	48.9	249°40.9	35.7			
5	271°28.5	233°20.9	50.5	272°13.3	25.8	163°43.4	48.8	264°43.1	35.8	Alioth	166°11.5	55°48.9
6	286°31.0	248°20.4	N14°51.6	287°14.0	S01°25.0	178°45.6	N22°48.8	279°45.3	N00°35.9	Spica	158°20.9	-11°18.1
7	301°33.5	263°19.9	52.7	302°14.6	24.2	193°47.8	48.8	294°47.4	36.0	Alkaid	152°50.7	49° 10.8
8	316°35.9	278°19.4	53.7	317°15.3	23.5	208°50.1	48.8	309°49.6	36.1	Hadar	148°33.9	-60°30.0
9	331°38.4	293°18.9	• • 54.8	332°16.0	22.7	223°52.3	• • 48.7	324°51.8	36.3		147°56.0	-36°30.0
10	346°40.8	308°18.4	55.9	347°16.7	21.9	238°54.5	48.7	339°54.0	36.4	Arcturus	145°46.7	19°02.5
11	1°43.3	323°17.8	56.9	2°17.4	21.1	253°56.8	48.7	354°56.2	36.5	Rigil Kent.	139°38.3	-60°56.6
	1 45.5 16°45.8		N14° 58.0	17°18.0			46.7 N22°48.7	9°58.3		Kochab	$137^{\circ}18.7$	74°02.6
12		338°17.3			S01°20.3	268°59.0			N00°36.6	Zuben'ubi	136°54.6	$-16^{\circ}09.2$
13	31°48.2	353°16.8	14°59.0	32°18.7	19.5	284°01.2	48.6	25°00.5	36.7	Alphecca	126°02.6	26°37.3
14	46°50.7	8°16.3	15°00.1	47°19.4	18.7	299°03.4	48.6	40°02.7	36.9	Antares	112°14.4	-26°29.4
15	61°53.2	23°15.8	01.2	62°20.1	• • 18.0	314°05.7	• • 48.6	55°04.9	• • 37.0	Atria	107°07.4	-69°04.3
16	76°55.6	38°15.3	02.2	77°20.8	17.2	329°07.9	48.6	70°07.1	37.1	Sabik	102°01.4	$-15^{\circ}45.5$
17	91°58.1	53°14.7	03.3	92°21.4	16.4	344°10.1	48.5	85°09.2	37.2	Shaula	96°08.8	-37°07.3
18	107°00.6	68°14.2	N15°04.3	107°22.1	S01°15.6	359°12.4	N22°48.5	100°11.4	N00°37.3	Rasalhague	95°57.5	12°32.2
19	122°03.0	83°13.7	05.4	122°22.8	14.8	14°14.6	48.5	115°13.6	37.4	Eltanin	90°41.5	51°28.7
20	137°05.5	98°13.2	06.4	137°23.5	14.0	29°16.8	48.5	130°15.8	37.6	Kaus Aust.	83°31.1	-34°22.2
21	152°08.0	113°12.7	• • 07.5	152°24.2	• • 13.3	$44^{\circ}19.1$	• • 48.4	145°18.0	• • 37.7	Vega	80°32.5	38°48.1
22	$167^{\circ}10.4$	128°12.1	08.6	167°24.9	12.5	59°21.3	48.4	160°20.2	37.8	Nunki	75°46.5	-26° 15.8
23	182° 12.9	143°11.6	09.6	182°25.5	11.7	74°23.5	48.4	175°22.3	37.9	Altair	61°59.0	8°56.1
N 4	200 10.52		.1′ m-3.92		.8′ m1.19		0/ = 2.15	1,2 2/ -/2	.1′ m0.93	Peacock	53°04.3	-56°38.8
ivier.p	ass. 10:53	$\nu$ -0.5 d1	.1 m-3.92	$\nu$ 0.1 $a$ -0	.o m1.19	ν2.2 α-0	.0′ m-2.15	ν2.2 d0	.1 INU.93	Deneb	49°25.3	-50 38.8 45°22.1
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.0	9°59.6
0	197° 15.3	158°11.1	N15° 10.7	197°26.2	S01°10.9	89°25.7	N22° 48.4	190°24.5	N00°38.0	Al Na'ir	27°31.9	-46°49.9
1	212° 17.8	173°10.6	11.7	212°26.9	10.1	104°28.0	48.3	205°26.7	38.2	Fomalhaut	15°13.7	-29°29.0
2	212 17.8 227°20.3	173 10.0 188°10.1	12.8	212 20.9 227°27.6	09.3	119°30.2	48.3	200°28.9	38.3	Scheat	13°44.5	28°13.4
										Markab	13°29.2	15°20.7
3	242°22.7	203°09.5	• • 13.8	242°28.3	• • 08.5	134°32.4	• • 48.3	235°31.1	38.4	A 07 T	CIIA	Ma:: :-
4	257°25.2	218°09.0	14.9	257°28.9	07.8	149°34.7	48.3	250°33.2	38.5	Apr 07 Tue	SHA	Mer.pass
5	272°27.7	233°08.5	15.9	272°29.6	07.0	164°36.9	48.2	265°35.4	38.6	Venus		13:26
6	287°30.1	248°08.0	N15° 17.0	287°30.3	S01°06.2	179°39.1	N22°48.2	280°37.6	N00°38.8	Mars	1°36.5	10:52
7	302°32.6	263°07.4	18.0	302°31.0	05.4	194°41.3	48.2	295°39.8	38.9	Jupiter		18:07
8	317°35.1	278°06.9	19.1	317°31.7	04.6	209°43.6	48.2	310°42.0	39.0	Saturn	353°22.8	11:24
9	332° 37.5	293°06.4	· · 20.1	332°32.4	• • 03.8	224°45.8	• • 48.1	325°44.1	• • 39.1	Apr 08 Wed	SHA	Mer.pass
10	347°40.0	308°05.9	21.2	347°33.0	03.0	239°48.0	48.1	340°46.3	39.2	Venus	322°07.3	13:27
11	2°42.5	323°05.3	22.2	2°33.7	02.3	254°50.2	48.1	355°48.5	39.4	Mars	0°53.7	10:51
12	17°44.9	338°04.8	N15°23.2	17°34.4	S01°01.5	269°52.5	N22°48.1	10°50.7	N00°39.5		252°16.0	18:03
13	32°47.4	353°04.3	24.3	32°35.1	01°00.7	284°54.7	48.0	25°52.9	39.6	Saturn	353°16.0	11:20
14	47°49.8	8°03.8	25.3	47°35.8	00°59.9	299°56.9	48.0	40°55.1	39.7	Jatuill	555 10.0	11.40
15	$62^{\circ}52.3$	23°03.2	• • 26.4	62°36.4	•• 59.1	314°59.1	• • 48.0	55°57.2	• • 39.8	Apr 09 Thu	SHA	Mer.pass
16	77° 54.8	38°02.7	27.4	77°37.1	58.3	330°01.4	48.0	70°59.4	39.9	Venus	320°55.8	13:28
17	92°57.2	53°02.2	28.5	92°37.8	57.6	345°03.6	47.9	86°01.6	40.1	Mars	0°10.9	10:50
18	107°59.7	68°01.6	N15°29.5	107°38.5	S00°56.8	0°05.8	N22°47.9	101°03.8	N00°40.2	Jupiter		18:00
19	$123^{\circ}02.2$	83°01.1	30.5	122°39.2	56.0	15°08.0	47.9	116°06.0	40.3	Saturn	353°09.2	11:17
20	138°04.6	98°00.6	31.6	137°39.9	55.2	30°10.3	47.9	131°08.1	40.4			=.
21	153°07.1	113°00.1	• • 32.6	152°40.5	• • 54.4	45°12.5	• • 47.8	146°10.3	• • 40.5	Horizon	al parallax	
22	168°09.6	127°59.5	33.7	167°41.2	53.6	60°14.7	47.8	161°12.5	40.7		Venus:	0.1
23	$183^{\circ}12.0$	142°59.0	34.7	182°41.9	52.8	75°16.9	47.8	$176^{\circ}14.7$	40.8		Mars:	0.1
ivier.p	ass. 10:49	$\nu$ -0.5′ $d1$	.1′ m-3.92	$\nu$ 0.1' $d$ -0	.8′ m1.19	$\nu$ 2.2° d-0	.0′ m-2.15	$\nu$ 2.2′ $d0$	.1'  m0.93			

h	Sui	า			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179° 26.5	N06°45.0	305°22.9	10.4'	527°21.1	3.8'	54.1'
1	194°26.7	45.9	$319^{\circ}52.3$	10.4'	27°25.0	3.7'	54.1'
2	209°26.8	46.9	334°21.6	10.4'	27°28.6	3.6'	54.1'
3	224°27.0	• • 47.8	348°51.0	10.3'	27°32.2	3.4'	54.1'
4 5	239°27.2 254°27.4	48.7 49.7	3°20.3 17°49.6	10.3' 10.3'	27°35.6 27°38.9	3.3' 3.2'	54.1' 54.1'
6	269° 27.5	N06° 50.6	32°18.9	10.3	S27°42.1	3.0'	54.1
7	284°27.7	51.6	46°48.1	10.2	27°45.1	2.9'	54.1'
8	299°27.9	52.5	61°17.3	10.2'	27°48.0	2.8'	54.1'
9	314°28.1	• • 53.4	75°46.5	10.2'	27°50.7	2.6'	54.1'
10	329°28.2	54.4	90° 15.7	10.1'	27°53.4	2.5'	54.1'
11	344°28.4	55.3	104°44.8	10.1'	27°55.8	2.4'	54.1'
12 13	359°28.6 14°28.8	N06°56.3 57.2	119°13.9 133°43.0	10.1' 10.1'	\$27°58.2 28°00.4	2.2' 2.1'	54.1' 54.1'
14	29°28.9	58.1	133 43.0 148°12.1	10.1	28°02.5	2.1	54.1
15	44°29.1	06°59.1	162°41.1	10.0'	28°04.5	1.8'	54.1'
16	59°29.3	07°00.0	$177^{\circ}10.1$	10.0'	28°06.3	1.7'	54.1'
17	74°29.5	01.0	$191^{\circ}39.1$	10.0'	28°08.0	1.5'	54.1'
18	89°29.6	N07°01.9	206°08.1	10.0'	\$28°09.5	1.4'	54.1'
19	104°29.8 119°30.0	02.8	220°37.1 235°06.1	10.0'	28°10.9 28°12.2	1.3'	54.1'
20 21	119°30.0 134°30.2	03.8	235°06.1 249°35.0	9.9' 9.9'	28°12.2 28°13.3	1.1' 1.0'	54.1' 54.1'
22	149° 30.3	05.6	264° 03.9	9.9'	28°14.3	0.9'	54.1
23	164°30.5	06.6	278°32.9	9.9'	28°15.2	0.7	54.1'
	SD = 16.0'	d = 0.9'			0 = 14.8'		
	JD — 10.0°	<u>u = 0.9</u>		JL.	, — 14.0°		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°30.7 194°30.9	N07°07.5 08.4	293°01.8 307°30.7	9.9'	\$28°15.9 28°16.5	0.6'	54.1' 54.1'
1 2	194°30.9 209°31.0	08.4 09.4	307° 30.7 321° 59.6	9.9' 9.9'	28° 16.5 28° 17.0	0.5' 0.3'	54.1' 54.1'
3	224°31.2	. 10.3	336°28.4	9.9'	28°17.3	0.3	54.1'
4	239°31.4	11.3	350°57.3	9.9'	28°17.5	0.0'	54.1'
5	254°31.5	12.2	5°26.2	9.9'	28°17.5	-0.1'	54.1'
6	269°31.7	N07° 13.1	19°55.0	9.9'	\$28°17.4	-0.2'	54.1'
7 8	284°31.9 299°32.1	14.1 15.0	34°23.9 48°52.8	9.9' 9.9'	28°17.2 28°16.8	-0.4' -0.5'	54.2' 54.2'
9	314°32.2	. 15.9	63°21.6	9.9'	28°16.3	-0.6	54.2'
10	329°32.4	16.9	77° 50.5	9.9'	28°15.7	-0.8'	54.2'
11	344°32.6	17.8	$92^{\circ}19.3$	9.9'	28°14.9	-0.9'	54.2'
12	359° 32.8	N07°18.7	106°48.2	9.9'	\$28°14.0	-1.1'	54.2'
13 14	14°32.9 29°33.1	19.7 20.6	121°17.1 135°45.9	9.9' 9.9'	28°12.9 28°11.8	-1.2' -1.3'	54.2' 54.2'
15	44° 33.3	. 21.5	150°14.8	9.9'	28°10.4	-1.5'	54.2'
16	59°33.4	22.5	164°43.7	9.9'	28°09.0	-1.6'	54.2'
17	74°33.6	23.4	$179^{\circ}12.6$	9.9'	28°07.4	-1.7'	54.2'
18	89°33.8	N07°24.3	193°41.5	9.9'	\$28°05.6	-1.9'	54.2'
19	104°34.0	25.3	208° 10.4	9.9'	28°03.8 28°01.7	-2.0'	54.2'
20 21	119°34.1 134°34.3	26.2 •• 27.1	222°39.3 237°08.2	9.9' 9.9'	28°01.7 27°59.6	-2.1' -2.3'	54.3' 54.3'
22	149°34.5	28.1	251°37.1	9.9'	27°57.3	-2.4'	54.3
23	164°34.6	29.0	266°06.1	10.0'	27°54.9	-2.6'	54.3'
	SD = 16.0'	d = 0.9'		SD	0 = 14.8'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°34.8	N07° 29.9	280°35.0	10.0'	\$27°52.3	-2.7'	54.3'
1	194°35.0	30.8	295°04.0	10.0'	27°49.6	-2.8'	54.3'
2	209°35.2	31.8	309°33.0	10.0'	27°46.8	-3.0'	54.3'
3	224°35.3	• • 32.7	324°02.0	10.0'	27°43.8	-3.1'	54.3'
4 5	239°35.5 254°35.7	33.6 34.6	338°31.0 353°00.0	10.0' 10.1'	27°40.7 27°37.5	-3.2' -3.4'	54.3' 54.4'
6	254° 35.7 269° 35.8	34.6 N07°35.5	7°29.1	10.1'	527°34.1	-3.4	54.4
7	284°36.0	36.4	21°58.2	10.1	27°30.6	-3.6'	54.4
8	299°36.2	37.4	36°27.3	10.1'	27°27.0	-3.8'	54.4'
9	314° 36.4	• • 38.3	50° 56.4	10.1'	27°23.2	-3.9'	54.4'
10	329°36.5	39.2	65°25.6	10.2'	27°19.3	-4.0'	54.4'
11 12	344°36.7 359°36.9	40.1 N07°41.1	79°54.7 94°23.9	10.2' 10.2'	27°15.3 \$27°11.1	-4.2' -4.3'	54.4' 54.5'
13	359°36.9 14°37.0	N07 41.1 42.0	94°23.9 108°53.1	10.2'	27°06.8	-4.3° -4.4'	54.5'
14	29° 37.2	42.9	123°22.4	10.2	27°02.4	-4.6'	54.5'
15	44°37.4	• • 43.9	$137^{\circ}51.7$	10.3'	26°57.8	-4.7'	54.5'
16	59°37.5	44.8	152°20.9	10.3'	26°53.1	-4.8'	54.5'
17 18	74°37.7 89°37.9	45.7 N07°46.6	166°50.3 181°19.6	10.4' 10.4'	26°48.2 <b>S</b> 26°43.3	-5.0' -5.1'	54.5' 54.5'
18 19	104°38.0	NU7 46.6 47.6	181°19.6 195°49.0	10.4	26°38.2	-5.1 -5.2'	54.6'
20	119° 38.2	48.5	210° 18.4	10.4	26°32.9	-5.4'	54.6'
21	134°38.4	• • 49.4	224°47.9	10.5'	26°27.6	-5.5'	54.6'
22	149°38.6	50.3	239° 17.3	10.5'	26°22.1	-5.6'	54.6'
23	164°38.7	51.3	253°46.9	10.5'	26°16.5	-5.7'	54.6'
	SD = 16.0'	d = 0.9'		SE	0 = 14.8'		

	Twi	light			Twi	light
Lat.	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
$60^{\circ}$	03:24	04:20	05:04	19:01	19:45	20:43
<b>N</b> 58°	03:35	04:27	05:09	18:56	19:38	20:31
56°	03:45	04:34	05:13	18:52	19:31	20:20
54°	03:54	04:39	05:16	18:49	19:26	20:11
52°	04:01	04:44	05:19	18:46	19:21	20:04
50°	04:08	04:49	05:22	18:43	19:16	19:57
45°	04:22	04:58	05:28	18:36	19:07	19:43
N 40°	04:33	05:06	05:33	18:31	18:59	19:32
35°	04:41	05:12	05:37	18:27	18:53	19:23
30°	04:48	05:17	05:41	18:23	18:47	19:16
20°	04:59	05:26	05:48	18:16	18:38	19:05
$N 10^{\circ}$	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°	05:23	05:51	06:15	17:48	18:12	18:40
35°	05:23	05:53	06:18	17:45	18:10	18:40
40°	05:23	05:55	06:22	17:41	18:08	18:40
45°	05:23	05:57	06:26	17:37	18:06	18:40
<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
		Moonris	ie		Moonset	
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						

Lat.		Moonris	e		Moonset	t
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
N 70°						
68°						
66°						
64°						
62°	03:04		04:53	04:24		06:10
60°	02:02	03:12	03:49	05:27	06:03	07:13
N 58°	01:28	02:32	03:15	06:01	06:42	07:47
56°	01:03	02:05	02:50	06:26	07:10	08:12
54°	00:43	01:44	02:29	06:46	07:31	08:32
52°	00:26	01:26	02:13	07:03	07:49	08:49
50°	00:12	01:11	01:58	07:17	08:04	09:03
45°		00:40	01:29	07:47	08:35	09:32
N 40°		00:16	01:06	08:10	08:59	09:55
35°	23:57		00:47	08:29	09:18	10:13
30° 20°	23:40		00:30	08:45	09:35 10:03	10:29 10:57
N 10°	23:12 22:48	23:39	00:03	09:13 09:36	10:03	11:20
0°	22:46	23:17		09.50	10:50	11:41
1						
<b>S</b> 10° 20°	22:03 21:38	22:54 22:31	23:47 23:25	10:21 10:45	11:12 11:37	12:03 12:26
30°	21:30	22:03	22:59	11:12	12:05	12:52
35°	20:54	21:46	22:44	11:29	12:21	13:08
40°	20:34	21:27	22:26	11:48	12:41	13:26
45°	20:11	21:04	22:05	12:11	13:04	13:48
S 50°	19:41	20:34	21:38	12:41	13:34	14:16
52°	19:26	20:19	21:25	12:56	13:49	14:29
54°	19:09	20:02	21:09	13:13	14:06	14:45
56°	18:48	19:41	20:51	13:34	14:27	15:03
58°	18:22	19:15	20:29	14:00	14:53	15:26
<b>S</b> 60°	17:45	18:39	20:01	14:36	15:30	15:54

		Sun		Moon			
Day	Eqn.of	Eqn.of Time		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		

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

h	Aries	Ve	nus	M	ars	Jup	iter	Sat	urn		Stars	
Fri –	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	198°14.5	157°58.5	N15°35.7	197°42.6	S00°52.1	90°19.1	N22°47.8	191°16.9	N00°40.9			
1	213°17.0	172°57.9	36.8	212°43.3	51.3	105°21.4	47.7	206°19.0	41.0	Alpheratz	$357^{\circ}34.1$	$29^{\circ}14.0$
2	213 17.0 228°19.4	172 57.9 187°57.4		212 43.3 227°44.0	50.5	105°21.4		200 19.0 221°21.2		Ankaa	353°06.5	-42°09.8
			37.8				47.7		41.1	Schedar	349°30.4	56°40.8
3	243°21.9	202°56.9	• • 38.8	242°44.6	• • 49.7	135°25.8	• • 47.7	236°23.4	• • 41.2	Diphda	348°46.6	$-17^{\circ}50.6$
4	258°24.3	217°56.3	39.9	257°45.3	48.9	150°28.0	47.7	251°25.6	41.4	Achernar	335°20.0	-57°06.2
5	273°26.8	232°55.8	40.9	272°46.0	48.1	165°30.3	47.6	266°27.8	41.5	Hamal	327°50.4	23°35.1
6	288°29.3	247°55.3	N15°41.9	287°46.7	S00°47.3	180°32.5	N22°47.6	281°30.0	N00°41.6	Polaris	313°57.3	89°22.6
7	303°31.7	262°54.7	43.0	302°47.4	46.6	195°34.7	47.6	296°32.1	41.7		315°11.4	-40°12.1
8	318°34.2	277°54.2	44.0	317°48.0	45.8	210°36.9	47.5	311°34.3	41.8	Acamar		
9	333°36.7	292°53.7	• • 45.0	332°48.7	• • 45.0	225°39.1	• • 47.5	326°36.5	• • 42.0	Menkar	314°05.4	4°11.5
10	348°39.1	307°53.1	46.1	347°49.4	44.2	240°41.3	47.5	341°38.7	42.1	Mirfak	308°27.2	49°57.3
11	3°41.6	322°52.6	47.1	2°50.1	43.4	255°43.6	47.5	356°40.9	42.2	Aldebaran	290°38.7	16°33.7
12	18°44.1	337°52.0	N15°48.1	17°50.8	S00°42.6	270°45.8	N22°47.4	11°43.0	N00°42.3	Rigel	281°03.1	-8°10.4
13	33°46.5	352°51.5	49.1	32°51.5	41.9	285°48.0	47.4	26°45.2	42.4	Capella	280°20.6	$46^{\circ}01.6$
	48°49.0	7°51.0		47°52.1		300°50.2		41°47.4		Bellatrix	278°21.9	6°22.3
14			50.2		41.1		47.4		42.5	Elnath	278°00.7	28°37.8
15	63°51.4	22°50.4	• • 51.2	62°52.8	• • 40.3	315°52.4	• • 47.4	56°49.6	• • 42.7	Alnilam	275°36.8	$-1^{\circ}11.2$
16	78°53.9	37°49.9	52.2	77°53.5	39.5	330°54.7	47.3	71°51.8	42.8	Betelgeuse	$270^{\circ}51.1$	$7^{\circ}24.6$
17	93°56.4	52°49.4	53.3	92°54.2	38.7	345°56.9	47.3	86°54.0	42.9	Canopus	263°52.1	-52°42.8
18	108°58.8	67°48.8	N15°54.3	107°54.9	S00°37.9	$0^{\circ}59.1$	N22°47.3	$101^{\circ}56.1$	N00°43.0	Sirius	258° 25.4	-16°45.3
19	124°01.3	82°48.3	55.3	122°55.6	37.1	$16^{\circ}01.3$	47.3	116°58.3	43.1	Adhara	255°05.1	-29°00.7
20	139°03.8	97°47.7	56.3	137°56.3	36.4	31°03.5	47.2	132°00.5	43.3		244°49.8	5°09.4
21	154°06.2	112°47.2	• • 57.3	152°56.9	• • 35.6	46°05.7	• • 47.2	147°02.7	• • 43.4	Procyon		5°09.4 27°57.8
22	169°08.7	127°46.6	58.4	167°57.6	34.8	61°07.9	47.2	162°04.9	43.5	Pollux	243°16.0	
23	184°11.2	142°46.1	59.4	182°58.3	34.0	76°10.2	47.2	177°07.0	43.6	Avior	234°14.2	-59°35.9
										Suhail	222°45.4	-43°32.6
Mer.p	ass. 10:45	$ u$ -0.5 $^{\prime}$ d1	.0′ m-3.92	$\nu$ 0.7′ d-0	.8′ m1.20	$\nu$ 2.2′ d-0	.0′ m-2.14	$\nu$ 2.2′ d0	$.1^\prime$ m $0.93$	Miaplacidus	221°37.7	-69°49.8
										Alphard	217°46.6	-8°46.5
C	CIIA	CILA	D	CIIA	D	CIIA	D	CHA	D	Regulus	$207^{\circ}33.1$	11°50.2
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.2	61°36.6
0	199°13.6	157°45.6	N16°00.4	197°59.0	S00°33.2	91°12.4	N22°47.1	192°09.2	N00°43.7	Denebola	182°23.6	14°25.4
1	214°16.1	172°45.0	01.4	212°59.7	32.4	106°14.6	47.1	207°11.4	43.8	Gienah	175°42.2	-17°41.5
2	229°18.6	$187^{\circ}44.5$	02.5	228°00.4	31.7	121°16.8	47.1	222°13.6	44.0	Acrux	172°58.3	-63°14.9
3	244°21.0	202°43.9	• • 03.5	243°01.0	• • 30.9	$136^{\circ}19.0$	• • 47.0	237°15.8	• • 44.1		171°50.0	-57°15.8
4	259°23.5	217°43.4	04.5	258°01.7	30.1	151°21.2	47.0	252°18.0	44.2	Alioth	166° 11.5	55°48.9
5	274°25.9	232°42.8	05.5	273°02.4	29.3	166°23.4	47.0	267°20.1	44.3			
6	289°28.4	247°42.3	N16°06.5	288°03.1	S00°28.5	181°25.7	N22°47.0	282°22.3	N00°44.4	Spica	158°20.9	-11°18.1
7	304°30.9	262°41.8	07.5	303°03.8	27.7	196°27.9	46.9	297°24.5	44.6	Alkaid	152°50.7	49°10.8
8	319°33.3	277°41.2	08.6	318°04.5	26.9	211°30.1	46.9	312°26.7	44.7	Hadar	148°33.9	-60°30.0
9	334°35.8	292°40.7	•• 09.6	333°05.1	. 26.2	226°32.3	• • 46.9	327°28.9	• • 44.8	Menkent	147°56.0	-36°30.1
						241°34.5				Arcturus	145°46.6	$19^{\circ}02.5$
10	349°38.3	307°40.1	10.6	348°05.8	25.4		46.9	342°31.0	44.9	Rigil Kent.	139°38.3	-60°56.6
11	4°40.7	322°39.6	11.6	3°06.5	24.6	256°36.7	46.8	357°33.2	45.0	Kochab	$137^{\circ}18.7$	74°02.6
12	19°43.2	337°39.0	N16° 12.6	18°07.2	S00°23.8	271°38.9	N22°46.8	12°35.4	N00°45.1	Zuben'ubi	136°54.6	$-16^{\circ}09.2$
13	34°45.7	352°38.5	13.6	33°07.9	23.0	286°41.1	46.8	27°37.6	45.3	Alphecca	126°02.6	26°37.3
14	49°48.1	7°37.9	14.6	48°08.6	22.2	301°43.3	46.7	42°39.8	45.4	Antares	112°14.3	-26°29.4
15	64°50.6	22°37.4	•• 15.6	63°09.2	• • 21.5	316°45.6	• • 46.7	57°42.0	• • 45.5	Atria	107°07.3	-69°04.3
16	79°53.1	37°36.8	16.6	78°09.9	20.7	331°47.8	46.7	72°44.1	45.6	Sabik	107°07.3	-15°45.5
17	94°55.5	52°36.3	17.7	93°10.6	19.9	346°50.0	46.7	87°46.3	45.7	l.		-13°43.3
18	109°58.0	67°35.7	N16° 18.7	108°11.3	500°19.1	1°52.2	N22°46.6	102°48.5	N00°45.9	Shaula	96°08.8	
19	125°00.4	82°35.2	19.7	123°12.0	18.3	16°54.4	46.6	117°50.7	46.0	Rasalhague	95°57.4	12°32.2
20	140°02.9	97°34.6	20.7	138°12.7	17.5	31°56.6	46.6	132°52.9	46.1	Eltanin	90°41.5	51°28.8
21	155°05.4	112°34.1	• • 21.7	153°13.4	. 16.8	46°58.8	• • 46.6	147°55.1	46.2	Kaus Aust.	83°31.0	-34°22.2
22	170°07.8	127°33.5	22.7	168°14.0	16.0	62°01.0		162°57.2		Vega	80°32.4	38°48.1
							46.5		46.3	Nunki	75°46.4	$-26^{\circ}15.8$
23	185°10.3	142°33.0	23.7	183°14.7	15.2	77°03.2	46.5	177°59.4	46.4	Altair	$61^{\circ}59.0$	$8^{\circ}56.1$
Mern	pass. 10:41	$\nu$ -0.5' d1	.0′ m-3.92	$\nu 0.7' d_{-0}$	.8′ m1.20	$\nu 2.2' d-0$	.0′ m-2.13	$\nu^{2.2'} d\Omega$	.1′ m0.93	Peacock	53°04.2	-56°38.8
										Deneb	49°25.3	45°22.1
										Enif	33°38.0	9°59.6
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.9	-46°49.9
0	200°12.8	157°32.4	N16°24.7	198°15.4	S00°14.4	92°05.4	N22°46.5	193°01.6	N00°46.6	Fomalhaut	15° 13.7	-29°29.0
1	215°15.2	172°31.9	25.7	213°16.1	13.6	107°07.6	46.4	208°03.8	46.7	Scheat	13°44.5	28°13.4
2	230°17.7	187°31.3	26.7	228°16.8	12.8	122°09.9	46.4	223°06.0	46.8	l.	13° 29.1	26 13.4 15°20.7
3	245°20.2	202°30.8	27.7	243°17.5	. 12.0	137°12.1	• • 46.4	238°08.2	• • 46.9	Markab	13 29.1	10 20.7
4	260°22.6	217°30.2	28.7	258°18.2	11.3	152°14.3	46.4	253°10.3	47.0	Apr 10 Fri	SHA	Mer.pass
5	275°25.1	232°29.6	29.7	273°18.8	10.5	167°16.5	46.3	268°12.5	47.1		319°44.0	13:29
6	275 25.1 290°27.6	232 29.0 247°29.1	N16° 30.7	288°19.5	500°09.7	182°18.7	N22°46.3	283°14.7	N00°47.3	Mars		10:49
										l l		17:56
7	305°30.0	262°28.5	31.7	303°20.2	08.9	197°20.9	46.3	298°16.9	47.4		252°04.7	
8	320°32.5	277°28.0	32.7	318°20.9	08.1	212°23.1	46.2	313°19.1	47.5	Saturn	353°02.4	11:13
9	335°34.9	292°27.4	• • 33.7	333°21.6	• • 07.3	227°25.3	• • 46.2	328°21.2	• • 47.6	Apr 11 Sat	SHA	Mer.pass
10	350°37.4	307°26.9	34.7	348°22.3	06.6	242°27.5	46.2	343°23.4	47.7		318°31.9	13:29
11	5°39.9	322°26.3	35.7	3°23.0	05.8	257°29.7	46.2	358°25.6	47.9		358° 45.4	10:48
12	20°42.3	337°25.7	N16°36.7	18°23.6	S00°05.0	272°31.9	N22°46.1	13°27.8	N00°48.0			
13	35°44.8	352°25.2	37.7	33°24.3	04.2	$287^{\circ}34.1$	46.1	28°30.0	48.1		251°58.7	17:53
14	50°47.3	7°24.6	38.7	48°25.0	03.4	302°36.3	46.1	43°32.2	48.2	Saturn	352°55.6	11:10
15	65°49.7	22°24.1	39.7	63°25.7	02.6	317°38.5	• • 46.0	58°34.3	• • 48.3	Apr 12 Sun	SHA	Mer.pass
16	80°52.2	37°23.5	40.7	78°26.4	01.9	332°40.7	46.0	73°36.5	48.4		317° 19.7	
17	95°54.7	52°23.0	41.7	93°27.1	01.9	347°42.9	46.0	88°38.7	48.6			13:30
	95 54.7 110°57.1	67°22.4	N16° 42.6	93°27.1	S00°00.3	2°45.1	N22°46.0	103°40.9	N00°48.7		358°02.6	10:46
18											251°52.7	17:49
19	125°59.6	82°21.8	43.6	123°28.4	N00°00.5	17°47.3	45.9	118°43.1	48.8	Saturn	352°48.8	11:06
20	141°02.0	97°21.3	44.6	138°29.1	01.3	32°49.5	45.9	133°45.3	48.9	Horizont	al navallas	
21	156°04.5	112°20.7	• • 45.6	153°29.8	• • 02.1	47°51.7	• • 45.9	148°47.4	• • 49.0	norizont	al parallax	0.1
22	171°07.0	127°20.1	46.6	168°30.5	02.8	62°53.9	45.8	163°49.6	49.1		Venus:	0.1
23	186°09.4	142°19.6	47.6	183°31.2	03.6	77°56.1	45.8	178°51.8	49.3		Mars:	0.1
N 4 e ··	10:27	1, 0.6/ -/1	.0′ m-3.92	107/-10	.8′ m1.20		.0′ m-2.13	,,2 2/ -/2	.1′ m0.93			
ivier.p	bass. 10:37	$\nu$ -0.0 $a_1$	.0 111-3.92	$\nu$ 0.1 $u$ -0	.0 1111.20	ν∠.∠ <b>u</b> -0	.∪ 111-∠.13	ν2.2 dU	.1 1110.93			

h	Sui	า	Moon					
Fri	GHA	Dec	GHA	ν	Dec	d	HP	
0	179°38.9	$N07^{\circ}52.2$	$268^{\circ}16.4$	10.6'	\$26°10.7	-5.9'	54.7'	
1	194°39.1 209°39.2	53.1 54.1	282°46.0 297°15.6	10.6'	26°04.9 25°58.9	-6.0' -6.1'	54.7'	
2	209 39.2 224°39.4	55.0	297 15.0 311°45.2	10.6' 10.7'	25 58.9 25°52.7	-6.1 -6.3	54.7' 54.7'	
4	239°39.6	55.9	326°14.9	10.7'	25°46.5	-6.4	54.7'	
5	254°39.7	56.8	340°44.6	10.7'	25°40.1	-6.5'	54.7'	
6	269°39.9	N07°57.8	355°14.3 9°44.1	10.8'	\$25°33.6 25°26.9	-6.6'	54.8'	
7 8	284°40.1 299°40.2	58.7 07°59.6	9°44.1 24°13.9	10.8' 10.9'	25°20.9 25°20.2	-6.8' -6.9'	54.8' 54.8'	
9	314°40.4	08°00.5	38°43.8	10.9'	25°13.3	-7.0'	54.8'	
10	329°40.6	01.4	53°13.7	10.9'	25°06.3	-7.1'	54.8'	
11	344°40.7 359°40.9	02.4	67°43.6	11.0'	24°59.1 \$24°51.9	-7.3'	54.9'	
12 13	359°40.9 14°41.1	N08°03.3 04.2	82°13.6 96°43.6	11.0' 11.0'	24°44.5	-7.4' -7.5'	54.9' 54.9'	
14	29°41.2	05.1	111°13.6	11.1'	24°37.0	-7.6'	54.9'	
15	44°41.4	•• 06.1	125°43.7	11.1'	24°29.4	-7.7'	55.0'	
16	59°41.6	07.0	140°13.8	11.2'	24°21.6	-7.9'	55.0'	
17 18	74°41.7 89°41.9	07.9 N08°08.8	154°44.0 169°14.2	11.2' 11.2'	24°13.7 <b>S</b> 24°05.8	-8.0' -8.1'	55.0' 55.0'	
19	104°42.1	09.7	183°44.4	11.3'	23°57.7	-8.2	55.0'	
20	119°42.2	10.7	$198^{\circ}14.7$	11.3'	23°49.4	-8.3'	55.1'	
21	134°42.4	• • 11.6	212°45.0	11.4'	23°41.1	-8.5'	55.1'	
22 23	149°42.6 164°42.7	12.5 13.4	227°15.4 241°45.8	11.4' 11.4'	23°32.6 23°24.0	-8.6' -8.7'	55.1' 55.1'	
23						-0.1	55.1	
	SD = 16.0'	d = 0.9'		SI	O = 14.9'			
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	179°42.9	N08°14.4	256°16.2	11.5'	\$23°15.3	-8.8'	55.2'	
1 2	194°43.1 209°43.2	15.3 16.2	270°46.7 285°17.2	11.5' 11.6'	23°06.5 22°57.6	-8.9' -9.0'	55.2' 55.2'	
3	209 43.2 224°43.4	17.1	285 17.2 299°47.8	11.6'	22°48.5	-9.0 -9.2'	55.2'	
4	239°43.6	18.0	314°18.4	11.6'	22°39.4	-9.3'	55.3'	
5	254°43.7	19.0	328°49.0	11.7'	22°30.1	-9.4'	55.3'	
6	269°43.9 284°44.0	N08°19.9 20.8	343°19.7 357°50.4	11.7' 11.8'	\$22°20.7 22°11.2	-9.5'	55.3'	
7 8	284 44.0 299°44.2	20.8 21.7	357°50.4 12°21.2	11.8'	22°11.2 22°01.6	-9.6' -9.7'	55.4' 55.4'	
9	314°44.4	22.6	26°52.0	11.8'	21°51.9	-9.8'	55.4'	
10	329°44.5	23.5	41°22.8	11.9'	21°42.1	-9.9'	55.4'	
11	344°44.7 359°44.9	24.5 N08°25.4	55°53.7 70°24.6	11.9' 12.0'	21°32.1 <b>S</b> 21°22.1	-10.1' -10.2'	55.5' 55.5'	
12 13	359 44.9 14°45.0	26.3	70 24.6 84°55.6	12.0'	21°11.9	-10.2 -10.3'	55.5'	
14	29°45.2	27.2	99°26.6	12.0'	21°01.6	-10.4	55.5'	
15	44°45.4	• • 28.1	113°57.6	12.1'	20°51.3	-10.5'	55.6'	
16 17	59°45.5 74°45.7	29.0 30.0	128°28.7 142°59.8	12.1' 12.2'	20°40.8 20°30.2	-10.6' -10.7'	55.6' 55.6'	
18	89°45.8	N08°30.9	142 59.6 157°31.0	12.2'	520°19.5	-10.7	55.7'	
19	104°46.0	31.8	172°02.2	12.2'	20°08.7	-10.9'	55.7'	
20	119°46.2	32.7	186°33.4		19°57.8			
21 22	134°46.3 149°46.5	· · 33.6 34.5	201°04.7 215°36.0	12.3' 12.3'	19°46.8 19°35.7	-11.1' -11.2'	55.8' 55.8'	
23	164°46.7	35.5	230°07.3	12.4	19 35.7 19°24.5	-11.2	55.8'	
	SD = 16.0'	d = 0.9'			O = 15.0'		- 3.3	
	<u> </u>	u — 0.9		اد				
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	179°46.8	N08°36.4	244°38.7 259°10.1	12.4'	\$19°13.2	-11.4'	55.8'	
1 2	194°47.0 209°47.1	37.3 38.2	259°10.1 273°41.6	12.4' 12.5'	19°01.8 18°50.3	-11.5' -11.6'	55.9' 55.9'	
3	224°47.3	39.1	288°13.0	12.5'	18°38.6	-11.7	55.9'	
4	239°47.5	40.0	302°44.6	12.5'	18°26.9	-11.8'	56.0'	
5	254°47.6 269°47.8	40.9 N08°41.9	317°16.1 331°47.7	12.6' 12.6'	18°15.1 \$18°03.2	-11.9' -12.0'	56.0'	
6 7	269°47.8 284°47.9	N08°41.9 42.8	331°47.7 346°19.3	12.6'	17°51.2	-12.0° -12.1'	56.0' 56.1'	
8	299°48.1	43.7	0°50.9	12.7'	17°39.1	-12.2'	56.1	
9	314°48.3	• • 44.6	15°22.6	12.7'	17°27.0	-12.3'	56.1'	
10 11	329°48.4 344°48.6	45.5 46.4	29°54.3 44°26.1	12.7' 12.8'	17°14.7 17°02.3	-12.4' -12.5'	56.2' 56.2'	
12	344 48.6 359°48.8	46.4 N08°47.3	44°26.1 58°57.8	12.8'	516°49.8	-12.5' -12.6'	56.2'	
13	14°48.9	48.2	73°29.6	12.8'	16°37.3	-12.6'	56.3	
14	29°49.1	49.1	88°01.5	12.9'	16°24.6	-12.7'	56.3'	
15 16	44°49.2 59°49.4	· · 50.1 51.0	102°33.3 117°05.2	12.9' 12.9'	16°11.9 15°59.1	-12.8' -12.9'	56.3' 56.4'	
16 17	59°49.4 74°49.6	51.0 51.9	117°05.2 131°37.1	12.9' 12.9'	15°59.1 15°46.2	-12.9° -13.0'	56.4'	
18	89°49.7	N08°52.8	$146^{\circ}09.1$	13.0'	S15°33.2	-13.1'	56.4	
19	104°49.9	53.7	160°41.0	13.0'	15°20.1	-13.2'	56.5'	
20 21	119°50.0 134°50.2	54.6 •• 55.5	175°13.0 189°45.0	13.0'	15°06.9 14°53.7	-13.3'	56.5'	
21 22	134°50.2 149°50.3	· · 55.5 56.4	189°45.0 204°17.1	13.0' 13.1'	14°53.7 14°40.3	-13.3' -13.4'	56.5' 56.6'	
23	164°50.5	57.3	218°49.1	13.1'	14°26.9	-13.5'	56.6'	
	SD = 16.0'	d = 0.9'		SI	D = 15.2'			
				J.	19.2			

			2026	April 1(	) to Ap	r. 12
Lat.	Twi	Twilight Sunrise Sunset Twi		Twi	light	
Lat.	Naut.	Civil	Juillise	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	05:01	05:33	18:29	18:55	19:26
30°	04:45	05:00	05:38	18:25	18:49	19:18
20°	04:43	05:23	05:45	18:17	18:39	19:16
N 10°	05:06	05:31	05:52	18:10	18:32	18:56
0°	05:00	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°	05:16	05:42	06:04	17:50	18:14	18:40
30°	05:25	05:53	06:10	17:45	18:09	18:37
35°	05:26	05:55	06:21	17:43	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° 54°	05:26	06:05	06:39	17:22	17:56	18:35
56°	05:25 05:25	06:06	06:42	17:19	17:55	18:36
58°	05:25	06:08 06:09	06:45 06:49	17:16 17:12	17:53 17:52	18:36 18:37
<b>S</b> 60°	05:24	06:11	06:53	17:12	17:52	18:38
3 00	03.23			17.00	17.50	10.50
Lat.		Moonris			Moonset	
	Fri	Sat	Sun	Fri	Sat	Sun
N 72°			07:27			08:48
<b>N</b> 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
FC0	00.10	00.00	00.40	00.00	40.50	

Lat.		Moonris	e	Moonset				
Lat.	Fri	Sat	Sun	Fri	Sat	Sun		
N 72°			07:27			08:48		
<b>N</b> 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		
N 58°	03:38	03:51	03:59	09:09	10:37	12:08		
56°	03:18	03:36	03:48	09:28	10:52	12:18		
54°	03:02	03:23	03:39	09:45	11:04	12:26		
52°	02:47	03:12	03:31	09:59	11:15	12:34		
50°	02:35	03:02	03:23	10:11	11:25	12:41		
45°	02:09	02:41	03:07	10:36	11:45	12:56		
<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°	80:00	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° 40°	23:45 23:30		00:47	13:49	14:25	14:56		
40 45°	23:30		00:36 00:22	14:05 14:24	14:38 14:53	15:06 15:17		
_	-							
<b>S</b> 50°	22:49		00:04	14:48	15:12	15:30		
52° 54°	22:38	23:56	•• ••	14:59	15:20	15:37		
54°	22:26	23:47		15:12	15:30	15:44		
56°	22:12 21:55	23:37 23:25		15:26 15:43	15:41 15:54	15:51 16:00		
<b>S</b> 60°	21:55	23:25		16:04	15:54 16:08	16:00		
3 00	21:35	23:11		10:04	10:00	10.10		

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
Duy	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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
-												_
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	201°11.9	157° 19.0	N16°48.6	198°31.9	N00°04.4	92°58.3	N22°45.8	193°54.0	N00°49.4	Alpheratz	357°34.0	29° 14.0
1	216° 14.4	172°18.4	49.6	213°32.6	05.2	108°00.5	45.8	208° 56.2	49.5	Ankaa	353°06.5	-42°09.8
2	231°16.8	187°17.9	50.5	228°33.2	06.0	123°02.7	45.7	223°58.4	49.6	Schedar	349°30.4	56°40.8
3	246° 19.3	202°17.3	• • 51.5	243°33.9	• • 06.8	138°04.9	• • 45.7	239°00.5	• • 49.7	Diphda	348°46.6	-17°50.6
4	261°21.8	$217^{\circ}16.8$	52.5	258°34.6	07.5	153°07.1	45.7	254°02.7	49.8	Achernar	335°20.0	-57°06.2
5	276°24.2	232°16.2	53.5	273°35.3	08.3	168°09.3	45.6	269°04.9	50.0	Hamal	327°50.4	23°35.1
6	291°26.7	247°15.6	N16°54.5	288°36.0	N00°09.1	183°11.5	N22°45.6	284°07.1	N00°50.1	Polaris	313°57.9	89°22.6
7	306°29.2	262°15.1	55.5	303°36.7	09.9	198°13.7	45.6	299°09.3	50.2	Acamar	315°11.4	-40° 12.1
8	321°31.6	$277^{\circ}14.5$	56.4	318°37.4	10.7	213°15.9	45.6	314°11.5	50.3	Menkar	314°05.4	4°11.5
9	336°34.1	292°13.9	• • 57.4	333°38.0	• • 11.5	228°18.1	• • 45.5	329°13.6	• • 50.4		308°27.2	49°57.3
10	351°36.5	$307^{\circ}13.4$	58.4	348°38.7	12.2	243°20.3	45.5	344°15.8	50.5	Mirfak		
11	6°39.0	322°12.8	16°59.4	3°39.4	13.0	258°22.5	45.5	359°18.0	50.7	Aldebaran	290°38.7	16°33.7
12	21°41.5	337°12.2	N17°00.4	18°40.1	N00° 13.8	273°24.7	N22°45.4	14°20.2	N00°50.8	Rigel	281°03.1	-8° 10.4
13	36°43.9	352°11.6	01.3	33°40.8	14.6	288°26.9	45.4	29°22.4	50.9	Capella	280°20.6	46°01.6
14	51°46.4	$7^{\circ}11.1$	02.3	48°41.5	15.4	303°29.1	45.4	44°24.6	51.0	Bellatrix	278°21.9	6°22.3
15	66°48.9	$22^{\circ}10.5$	• • 03.3	63°42.2	· · 16.2	318°31.3	• • 45.3	59°26.7	• • 51.1	Elnath	278°00.8	28°37.8
16	81°51.3	37°09.9	04.3	78°42.8	16.9	333°33.5	45.3	74°28.9	51.2	Alnilam	275°36.8	-1°11.2
17	96°53.8	52°09.4	05.2	93°43.5	17.7	348°35.7	45.3	89°31.1	51.4	Betelgeuse	270°51.1	7°24.6
18	111°56.3	67°08.8	N17°06.2	108°44.2	N00° 18.5	3°37.9	N22°45.3	104°33.3	N00°51.5	Canopus	263°52.1	-52°42.8
19	126°58.7	82°08.2	07.2	123°44.9	19.3	18°40.1	45.2	119°35.5	51.6	Sirius	258°25.4	-16°45.3
20	142°01.2	97°07.6	08.1	138°45.6	20.1	33°42.3	45.2	134°37.7	51.7	Adhara	255°05.1	-29°00.7
21	157°03.6	112°07.1	•• 09.1	153°46.3	. 20.9	48°44.5	• • 45.2	149°39.9	51.8	Procyon	244°49.8	5°09.4
22	172°06.1	112 07.1 127°06.5	10.1	168°47.0	21.6	63°46.7	45.2	164° 42.0	51.0	Pollux	243°16.0	27° 57.8
23	172 00.1 187°08.6	142°05.9	11.1	183°47.7	22.4	78°48.9	45.1	179°44.2	52.1	Avior	234°14.2	-59° 35.9
-										Suhail	222°45.4	-43°32.6
Mer.p	ass. 10:33	$\nu$ -0.6' $d1$	.0′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.8′ m1.20	$\nu$ 2.2′ d-0.	.0′ m-2.12	$\nu$ 2.2 $^{\prime}$ d0	.1'  m $0.93$	Miaplacidus	221°37.8	-69°49.8
										Alphard	$217^{\circ}46.6$	-8°46.5
т	CUA	CILA	D	CILA	D	CILA	D	CUA	D	Regulus	$207^{\circ}33.1$	11°50.2
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.2	61°36.6
0	202°11.0	157°05.3	N17°12.0	198°48.3	N00°23.2	93°51.1	N22°45.1	194°46.4	N00°52.2	Denebola	$182^{\circ}23.6$	14°25.4
1	217° 13.5	172°04.8	13.0	213°49.0	24.0	108°53.2	45.1	209°48.6	52.3	Gienah		-17°41.5
2	232°16.0	187°04.2	14.0	228°49.7	24.8	123°55.4	45.0	224°50.8	52.4	Acrux	172°58.3	-63° 14.9
3	247° 18.4	202°03.6	• • 14.9	243°50.4	• • 25.5	138°57.6	• • 45.0	239°53.0	• • 52.5		171°50.0	-57° 15.8
4	262°20.9	217°03.0	15.9	258°51.1	26.3	153°59.8	45.0	254°55.1	52.6	Alioth	166°11.5	55°49.0
5	277°23.4	232°02.5	16.9	273°51.8	27.1	169°02.0	44.9	269°57.3	52.8	Spica	158°20.9	-11° 18.1
6	292°25.8	247°01.9	N17°17.8	288°52.5	N00°27.9	184°04.2	N22°44.9	284°59.5	N00°52.9	Alkaid	152°50.7	49° 10.8
7	$307^{\circ}28.3$	262°01.3	18.8	303°53.2	28.7	199°06.4	44.9	$300^{\circ}01.7$	53.0	Hadar	148°33.9	-60° 30.0
8	322°30.8	277°00.7	19.7	318°53.8	29.5	$214^{\circ}08.6$	44.8	315°03.9	53.1		147°56.0	-36°30.1
9	337°33.2	292°00.2	• • 20.7	333°54.5	• • 30.2	229°10.8	• • 44.8	$330^{\circ}06.1$	• • 53.2	Arcturus	145°46.6	19°02.5
10	352°35.7	306°59.6	21.7	348°55.2	31.0	244°13.0	44.8	345°08.2	53.3	Rigil Kent.	139°38.3	-60° 56.7
11	7°38.1	321°59.0	22.6	3°55.9	31.8	259°15.2	44.8	0°10.4	53.5	Kochab	139° 38.3	74°02.6
12	22°40.6	336°58.4	N17°23.6	18°56.6	N00°32.6	274°17.4	N22°44.7	15° 12.6	N00°53.6			
13	37°43.1	351°57.8	24.5	33°57.3	33.4	289°19.5	44.7	30°14.8	53.7	Zuben'ubi	136°54.6	-16°09.2
14	52°45.5	6°57.3	25.5	48°58.0	34.2	304°21.7	44.7	45°17.0	53.8	Alphecca	126°02.5	26°37.3
15	67°48.0	21°56.7	26.5	63°58.7	• • 34.9	319°23.9	• • 44.6	60° 19.2	• • 53.9	Antares	112°14.3	-26°29.4
16	82°50.5	36°56.1	27.4	78°59.3	35.7	334°26.1	44.6	75°21.4	54.0	Atria	107°07.3	-69°04.3
17	97°52.9	51°55.5	28.4	94°00.0	36.5	349°28.3	44.6	90°23.5	54.2	Sabik	102°01.4	-15°45.5
18	112°55.4	66°54.9	N17°29.3		N00°37.3	4°30.5	N22°44.5	105°25.7	N00°54.3	Shaula	96°08.8	-37°07.3
19	127°57.9	81°54.3	30.3	124°01.4	38.1	19°32.7	44.5	120°27.9	54.4	Rasalhague	95°57.4	12° 32.2
20	143°00.3	96°53.8	31.2	139°02.1	38.8	34°34.9	44.5	135°30.1	54.5	Eltanin	90°41.5	51°28.8
21	158°02.8	111°53.2	• • 32.2	154°02.1	• • 39.6	49°37.1	• • 44.4	150°32.3	• • 54.6	Kaus Aust.	83°31.0	-34°22.2
22	173° 05.3	111 55.2 126°52.6	33.1	169°03.5	40.4	64°39.2	44.4	165°34.5	54.7	Vega	80°32.4	38°48.1
				184°04.2						Nunki	75°46.4	-26° 15.8
23	188°07.7	141°52.0	34.1	184 04.2	41.2	79°41.4	44.4	180°36.6	54.9	Altair	$61^{\circ}59.0$	8°56.1
Mer.p	ass. 10:30	$\nu$ -0.6' d1.	.0′ m-3.92	$\nu$ 0.7′ d0	.8′ m1.20	$\nu$ 2.2′ d-0.	.0′ m-2.11	$\nu$ 2.2′ d0	.1'  m0.93	Peacock	53°04.2	-56°38.8
<u>.</u>										Deneb	49°25.2	45°22.1
		<b></b> -	_		_	<b></b>	_	<b></b> -	-	Enif	33°38.0	9°59.6
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	$27^{\circ}31.9$	-46° 49.9
0	203°10.2	156°51.4	N17°35.0	199°04.8	N00° 42.0	94°43.6	N22°44.4	195°38.8	N00°55.0	Fomalhaut	$15^{\circ}13.6$	-29°29.0
1	218° 12.6	171°50.8	36.0	214°05.5	42.8	109°45.8	44.3	210°41.0	55.1	Scheat	13°44.5	28° 13.3
2	233°15.1	186°50.2	36.9	229°06.2	43.5	124°48.0	44.3	225°43.2	55.2	Markab	$13^{\circ}29.1$	15°20.7
3	248°17.6	201°49.7	• • 37.9	244°06.9	• • 44.3	139°50.2	• • 44.3	240°45.4	• • 55.3			
4	263°20.0	216°49.1	38.8	259°07.6	45.1	154°52.4	44.2	255° 47.6	55.4	Apr 13 Mon	SHA	Mer.pass
5	278°22.5	231°48.5	39.8	274°08.3	45.9	169°54.6	44.2	270°49.8	55.6		316°07.1	13:31
6	293°25.0	246°47.9	N17°40.7	289°09.0	N00°46.7	184°56.7	N22°44.2	285°51.9	N00°55.7	Mars		10:45
7	308°27.4	261°47.3	41.7	304°09.7	47.4	199°58.9	44.1	300°54.1	55.8	Jupiter		17:46
8	323°29.9	276°46.7	42.6	319°10.3	48.2	215°01.1	44.1	315°56.3	55.9	Saturn	352°42.1	11:03
9	338°32.4	291°46.1	• • 43.6	334°11.0	• • 49.0	230°03.3	• • 44.1	330°58.5	• • 56.0	Apr 14 Tue	SHA	Mer.pass
10	353°34.8	306°45.5	44.5	349°11.7	49.8	245°05.5	44.0	346°00.7	56.1		314°54.3	13:32
11	8°37.3	321°44.9	45.4	4°12.4	50.6	260°07.7	44.0	1°02.9	56.2		314 54.3 356°37.3	10:44
12	23°39.7	336°44.4	N17°46.4	19°13.1	N00°51.4	275°09.8	N22°44.0		N00°56.4	Jupiter		10:44
13	$38^{\circ}42.2$	351°43.8	47.3	34°13.8	52.1	$290^{\circ}12.0$	44.0	31°07.2	56.5			
14	53°44.7	6°43.2	48.3	49°14.5	52.9	$305^{\circ}14.2$	43.9	46°09.4	56.6	Saturn	352°35.4	10:59
15	68°47.1	21°42.6	• • 49.2	64°15.2	• • 53.7	$320^{\circ}16.4$	• • 43.9	$61^{\circ}11.6$	• • 56.7	Apr 15 Wed	SHA	Mer.pass
16	83°49.6	36°42.0	50.1	79°15.9	54.5	335°18.6	43.9	76° 13.8	56.8		313°41.2	13:33
17	98°52.1	51°41.4	51.1	94°16.5	55.3	350°20.8	43.8	91°16.0	56.9		355°54.7	10:43
18	113°54.5	66°40.8	N17°52.0		N00° 56.0	5°22.9	N22°43.8	106° 18.2		Jupiter		17:39
19	128°57.0	81°40.2	52.9	124°17.9	56.8	20°25.1	43.8	121°20.3	57.2	Saturn	352°28.7	10:56
20	143°59.5	96°39.6	53.9	139°18.6	57.6	35°27.3	43.7	136°22.5	57.3	Jatuill	332 20.1	10.50
21	159°01.9	111°39.0	• • 54.8	154°19.3	• • 58.4	50°29.5	• • 43.7	151°24.7	57.4	Horizont	al parallax	
22	174°04.4	126°38.4	55.7	169°20.0	59.2	65°31.7	43.7	166°26.9	57.5		Venus:	0.1
23	189°06.9	141°37.8	56.7	184°20.7	59.9	80°33.8	43.6	181°29.1	57.6		Mars:	0.1
Mer.p	ass. 10:26	$\nu$ -0.6' d0.	.9′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.8′ m1.20	$\nu$ 2.2′ d-0.	.0′ m-2.11	$\nu$ 2.2′ d0	.1' m $0.93$			

h	Sui	า	Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°50.7	N08°58.2	233°21.2	13.1'	S14°13.4	-13.6'	56.6'
1	194°50.8	$08^{\circ}59.2$	247°53.3	13.1'	13°59.8	-13.7'	56.7'
2	209°51.0	09°00.1	262°25.4	13.1'	13°46.1	-13.7'	56.7'
3 4	224°51.1 239°51.3	· · 01.0 01.9	276°57.5 291°29.7	13.2' 13.2'	13°32.4 13°18.5	-13.8' -13.9'	56.7' 56.8'
5	259 51.5 254°51.5	01.9	291 29.7 306°01.9	13.2'	13 16.5 13°04.6	-13.9 -14.0'	56.8'
6	269°51.6	N09°03.7	320°34.1	13.2'	\$12°50.7	-14.1'	56.8'
7	284°51.8	04.6	335°06.3	13.2'	12°36.6	-14.1'	56.9'
8	299°51.9	05.5	349°38.5	13.2'	12°22.5	-14.2'	56.9'
9	314°52.1	• • 06.4	4°10.7 18°43.0	13.2' 13.3'	12°08.2	-14.3'	57.0'
10 11	329°52.2 344°52.4	07.3 08.2	18°43.0 33°15.2	13.3'	11°54.0 11°39.6	-14.4' -14.4'	57.0' 57.0'
12	359°52.6	N09°09.1	47°47.5	13.3'	S11°25.2	-14.5	57.1'
13	14°52.7	10.0	62°19.8	13.3'	11° 10.7	-14.6'	57.1'
14	29°52.9	10.9	76°52.1	13.3'	10°56.1	-14.6'	57.1'
15	44°53.0 59°53.2	• • 11.8	91°24.4 105°56.7	13.3'	10°41.5 10°26.8	-14.7'	57.2'
16 17	59 53.2 74°53.3	12.7 13.6	105 56.7 120°29.0	13.3' 13.3'	10 26.8 10°12.0	-14.8' -14.8'	57.2' 57.2'
18	89°53.5	N09°14.6	135°01.3	13.3'	S09°57.2	-14.9'	57.3'
19	104°53.7	15.5	149°33.7	13.3'	09°42.3	-15.0'	57.3'
20	119°53.8	16.4	164°06.0	13.3'	09°27.3	-15.0'	57.4'
21	134°54.0	• • 17.3	178°38.3	13.3'	09°12.3	-15.1'	57.4
22 23	149°54.1 164°54.3	18.2 19.1	193°10.7 207°43.0	13.3' 13.3'	08°57.2 08°42.0	-15.2' -15.2'	57.4' 57.5'
23			201 43.0			-13.2	51.3
	SD = 15.9'	d = 0.9'		SI	D = 15.4'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	179°54.4 194°54.6	N09°20.0 20.9	222°15.3 236°47.7	13.3' 13.3'	\$08°26.8 08°11.5	-15.3' -15.3'	57.5' 57.5'
2	209°54.7	20.9	250 47.7 251°20.0	13.3'	06 11.5 07°56.2	-15.3 -15.4'	57.6'
3	224°54.9	22.7	265°52.3	13.3'	07°40.8	-15.4'	57.6'
4	239°55.0	23.6	280°24.6	13.3'	$07^{\circ}25.4$	-15.5'	57.7'
5	254°55.2	24.5	294°56.9	13.3'	07°09.9	-15.6'	57.7'
6 7	269°55.4 284°55.5	N09°25.4 26.3	309°29.3 324°01.6	13.3' 13.3'	\$06° 54.3 06° 38.7	-15.6' -15.7'	57.7' 57.8'
8	204 55.5 299°55.7	20.3	338°33.8	13.3'	06°23.1	-15.7' -15.7'	57.8'
9	314°55.8	28.1	353°06.1	13.3'	06°07.4	-15.8'	57.8'
10	329°56.0	29.0	7°38.4	13.3'	$05^{\circ}51.6$	-15.8'	57.9'
11	344°56.1	29.9	22°10.7	13.2'	05°35.8	-15.8'	57.9'
12	359°56.3 14°56.4	N09°30.8 31.7	36°42.9 51°15.1	13.2'	\$05°20.0 05°04.1	-15.9'	57.9'
13 14	29°56.6	31.7 32.6	51 15.1 65°47.3	13.2' 13.2'	05 04.1 04°48.1	-15.9' -16.0'	58.0' 58.0'
15	44°56.7	• • 33.5	80°19.5	13.2'	04°32.1	-16.0'	58.1'
16	59°56.9	34.4	94°51.7	13.2'	$04^{\circ}16.1$	-16.1'	58.1'
17	74°57.0	35.3	109°23.9	13.1'	04°00.0	-16.1'	58.1'
18 19	89°57.2 104°57.3	N09°36.2 37.1	123°56.0 138°28.1	13.1' 13.1'	\$03°43.9 03°27.8	-16.1' -16.2'	58.2' 58.2'
20	119°57.5	38.0	153° 00.2	13.1'	03°11.6	-16.2'	58.2'
21	134°57.7	• • 38.9	167°32.3	13.0'	02°55.4	-16.3	58.3
22	149°57.8	39.7	182°04.3	13.0'	$02^{\circ}39.1$	-16.3'	58.3'
23	164°58.0	40.6	196°36.3	13.0'	02°22.9	-16.3'	58.3'
	SD = 15.9'	d = 0.9'		SI	O = 15.7'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°58.1	N09°41.5	211°08.3	13.0'	S02°06.5	-16.3'	58.4'
1	194°58.3	42.4	225°40.3	12.9'	01°50.2	-16.4'	58.4'
2	209°58.4	43.3	240°12.2	12.9'	01°33.8	-16.4'	58.5'
3 4	224°58.6 239°58.7	· · 44.2 45.1	254°44.1 269°16.0	12.9' 12.8'	01°17.4 01°01.0	-16.4' -16.5'	58.5' 58.5'
5	254°58.9	46.0	283°47.8	12.8'	01 01.0 00°44.5	-10.5'	58.6'
6	269°59.0	N09°46.9	298°19.6	12.8'	500°28.0	-16.5	58.6'
7	284°59.2	47.8	312°51.3	12.7'	S00°11.5	-16.5'	58.6'
8	299°59.3	48.7	327°23.1	12.7'	N00°05.0	16.5'	58.7'
9 10	314°59.5 329°59.6	· · 49.6 50.5	341°54.7 356°26.4	12.6' 12.6'	00°21.6 00°38.1	16.6' 16.6'	58.7' 58.7'
10	329 59.6 344°59.8	50.5 51.4	350 26.4 10°58.0	12.6'	00 38.1 00°54.7	16.6'	58.7° 58.8'
12	359°59.9	N09°52.3	25°29.5	12.5'	N01°11.3	16.6	58.8'
13	15°00.1	53.2	40°01.0	12.5'	01°27.9	16.6'	58.8'
14	30°00.2	54.1	54°32.5	12.4'	01°44.6	16.6'	58.9'
15 16	45°00.4 60°00.5	• • 54.9 55.8	69°03.9 83°35.3	12.4' 12.3'	02°01.2 02°17.8	16.6' 16.7'	58.9' 58.9'
16 17	75°00.7	55.8 56.7	83°35.3 98°06.6	12.3'	02°17.8 02°34.5	16.7'	58.9° 59.0'
18	90°00.8	N09°57.6	112°37.9	12.2'	N02°51.2	16.7'	59.0'
19	105°01.0	58.5	127°09.1	12.2'	03°07.8	16.7'	59.0'
20	120°01.1	09°59.4	141°40.3	12.1'	03°24.5	16.7'	59.1'
21 22	135°01.2 150°01.4	10°00.3 01.2	156°11.4 170°42.4	12.1' 12.0'	03°41.2 03°57.9	16.7' 16.7'	59.1' 59.1'
23	165°01.5	01.2	170 42.4 185°13.4	11.9'	03 57.9 04°14.5	16.7'	59.1 59.2'
	SD = 15.9'	d = 0.9'			D = 15.9'		

Lat.	Twilight		Sunrise	Sunset	Twilight		
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.	
N 72°	////	02:07	03:45	20:19	22:01	////	
<b>N</b> 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°	05:04	05:29	05:50	18:10	18:32	18:57	
0°	05:12	05:36	05:57	18:04	18:25	18:49	
<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°	05:26	05:54	06:18	17:42	18:06	18:34	
35°	05:28	05:57	06:23	17:37	18:03	18:32	
40°	05:29	06:01	06:28	17:32	17:59	18:31	
45°	05:30	06:04	06:34	17:26	17:56	18:30	
<b>S</b> 50°	05:30	06:08	06:41	17:19	17:52	18:29	
52°	05:30	06:10	06:44	17:16	17:50	18:29	
54°	05:30	06:11	06:47	17:12	17:48	18:29	
56°	05:30	06:13	06:51	17:08	17:46	18:29	
58°	05:30	06:15	06:55	17:04	17:44	18:29	
<b>S</b> 60°	05:29	06:18	07:00	16:59	17:42	18:30	

Lat.		Moonris	е	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	
<b>N</b> 40°	03:20	03:44	04:07	14:15	15:24	16:34	
35°	03:12	03:40	04:07	14:22	15:26	16:33	
30°	03:05	03:36	04:06	14:27	15:29	16:32	
20°	02:53	03:29	04:05	14:37	15:33	16:29	
N 10°	02:42	03:23	04:04	14:46	15:36	16:28	
0°	02:32	03:18	04:04	14:54	15:39	16:26	
S 10°	02:22	03:12	04:03	15:02	15:43	16:24	
20°	02:11	03:06	04:02	15:10	15:46	16:22	
30°	01:58	02:59	04:01	15:19	15:50	16:20	
35°	01:51	02:55	04:01	15:25	15:52	16:19	
40°	01:43	02:51	04:00	15:31	15:54	16:17	
45°	01:33	02:46	04:00	15:38	15:57	16:16	
<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	f 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	00:08	00:00	12:00	10:15	22:38		

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

The   GIA   GIA   Dec   Dec   GIA   Dec   Dec   GIA   Dec   Dec   GIA   Dec   GIA   Dec   Dec   Dec   GIA   Dec	h	Aries	`	nus	M	ars	Jup	oiter	Sat	urn		Stars	
201   201	Thu -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
1 20°118   171°50   985   24°22   0.15   10°82   24°35   576   30°30   30°30   40°30   50°40													
2 2371-32 1097-90 179-90 279-70 0.33 127-70 0.35 1257-00 4.45 2071-70 0.51 10 10 10 10 10 10 10 10 10 10 10 10 10											Alpheratz		
3 A90*167 201545 1900.4 24*2.4 * 23.1 * 100*26. * 41.4 * 20*70. * 50.2											Ankaa		
A get   19.2   216   48   0.13   296   241   0.15   156   44.7   45.5   256   40.0   92.2   14.6   14.8													
Section   Property													
6													
8   1967   1													
8 a   24   20   27   27   27   28   28   28   28   28													
9 38° 13.5 29° 13.8 0.00 33° 12.6 0.00 38° 12.6 0.00 38° 12.6 0.00 39° 1													
18									331°50.9				
13 30°13 30°10 119°05 19°00 100°10 10	10	354°34.0		06.9	349°28.3	08.5	245°57.8	43.3	346°53.1	58.9			
23   196   196   197	11	9°36.4	321°30.6	07.8	4°28.9	09.3	261°00.0	43.3	1°55.3	59.0			
13 9-9-13 39-0-14 39-0	12	24°38.9	336°30.0	N18°08.7	19°29.6	N01°10.1	276°02.2	N22°43.2	16°57.5	N00°59.1			
18   18   18   18   18   18   18   18	13	39°41.3	351°29.4	09.6	34°30.3	10.9	291°04.3	43.2	$31^{\circ}59.7$	59.3			
19	14	54°43.8	6°28.8	10.6	49°31.0	11.7	306°06.5	43.2		59.4			
Betelgans	15	69°46.3	$21^{\circ}28.2$	• • 11.5	64°31.7	• • 12.4	321°08.7	• • 43.1	62°04.1	• • 59.5			
19   19   19   19   19   19   19   19													
18   18   18   18   18   18   18   18													
1447985													
147-1960   147-1960													
100													
23   100   100   14   123   180   187   180   187													
Mar.													
Fri GHA  GHA  GHA  Dec  Denbela 1823 392 61 36-6  Denbela 1823 392	23	190~06.0										222°45.4	-43°32.6
Fri GHA  OBM  OBM  OBM  OBM  OBM  OBM  OBM  OB	Mer.p	ass. 10:22	$\nu$ -0.6 $^{\prime}$ d0	.9′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.8′ m1.20	$\nu$ 2.2′ d-0	.0′ m-2.10	$\nu$ 2.2 $^{\prime}$ d0	.1'  m0.93			-69°49.8
Fri GHA  CHA  CHA  CHA  CHA  CHA  CHA  CHA		-											
0 205°08.5   166°22.8   N18°19.7   199°37.9   N01°19.5   96°28.3   N22°04.8   197°23.7   N01°00.5   Dendelscol.   120°10.0   171°22.2   206   21.4°38.6   202   111°30.4   42.8   221°25.9   0.06   22.2°25.1   41.8°28.2   220°31.3   21.0°29.3   21.0°29.3   21.0°29.3   21.0°29.3   22	Ev:	CHV	CUA	Doc	CUA	Doc	CUA	Doc	CUA	Doc	_		
2 229°19.9   171°22.2   206   214°38.6   20.2   111°30.4   42.8   212°25.9   00.6   222°35.3   00.6   201°20.9   224   244°30.0   221.8   141°34.8   427°   242°33.3   00.9   426°51.8   201°20.9   224   244°30.0   221.8   141°34.8   427°   242°33.3   00.9   426°32.3   234°42.0   221°31.0   427°   227°32.5   01.0   66°11.5   58°20.5   620°32.3   231°19.7   243°   274°31.4   234°   171°39.1   427°   272°34.7   01.1   596°2.2   245°2.2													
2 235°13.4 186°21.5 201°20.9 · 22.4 24°40.0 · .21.8 141°34.8 · .42.7 24°30.3 · .00.9 4													
250°15.8   201°20.9													
286°18.3 216°20.3 234 229°40.7 2.6 156°37.0 42.7 227°33.7 01.0 5 280°30.0 231°17.1 243 27°41.4 23.4 171°39.1 42.7 27°34.7 01.1 5 35°40.0 6 295°33.2 246°19.1 N18°25.2 289°42.0 N01°24.1 186°41.3 N2°42.6 287°36.9 N01°01.2 Albert 1.0°21.5 26°10.3 320°32.0 01.3 48 325°28.2 276°17.9 2.70 310°43.4 25.7 216°45.6 4.26 317°41.2 01.4 4													
6 296°20.8 231°19.7 24.3 274°14. 23.4 171°39.1 42.7 272°34.7 01.1 5. 5piza 188°20.9 3.13°18.7 187°3.1 187°3.2 26.1 306°4.7 24.9 201°4.3 5 42.6 302°3.0 01.0 1.2 41.41 186°4.1 3. N22°4.6 302°3.0 01.0 1.2 41.41 186°3.1 3. N22°4.6 302°3.0 01.0 1.2 41.41 185°3.0 4.0 1.4 187°3.0 1.4 187°													
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9 340°30.6 291°17.3 . · · · · · · · · · · · · · · · · · ·													
10   355°331   306°16.7   28.8   349°44.8   27.2   246°80.0   42.5   347°45.6   0.17     11   10°35.6   321°16.0   29.7   4°45.5   28.0   261°82.2   42.5   22°47.6   0.18     13   40°40.5   331°14.8   31.5   34°46.9   0.10°28.8   276°54.3   N22°42.4   17°50.0   N01°0.19     14   55°42.9   6°14.2   32.4   40°47.6   30.4   306°88.7   42.4   42°84.4   0.21     15   70°45.4   221°13.6   33.3   43.3   31.1   32°20.0   43.3   25°65.2   0.22     16   85°47.9   36°13.0   34.2   70°48.9   31.9   337°03.0   43.3   39°50.0   0.25     18   115°52.8   66°11.7   N18°36.0   109°50.3   N01°32.5   0.37°11.7   42.2   123°05.3   0.27     12   130°55.3   81°11.1   38.9   124°51.0   34.3   22°05.5   42.2   128°05.3   0.27     12   10°00.2   11°09.9   38.7   154°52.4   35.8   52°13.8   42.1   153°08.7   0.29     12   10°00.2   11°09.9   3.99.0   109°33.1   306°37.1   74   42.2   188°11.9   30.3     Numki   75°46.4   221°13.0   34.3   22°05.8   42.2   188°07.5   0.28     12   10°00.2   11°09.9   38.7   154°52.4   35.8   52°13.8   42.1   153°14.0   0.32     12   10°00.2   11°09.9   3.99.0   109°33.1   306°37.1   30.6   67°16.0   42.1   168°11.9   0.30     Merpass   10.18   \$\sigma \frac{\text{CMM}}{\text{Doc}}  Adapta \text{Adapta \text													
11 10°36.6 321°16.0 29.7 4°45.5 28.0 261°52.2 42.5 2°47.8 01.8 18 Kochab 13°16.7 47°0.26 12 25°33.0 336°15.4 N18°30.6 19°46.2 801°28.8 267°64.3 N22°24.2 17°50.0 N01°0.19 13°16.7 47°0.26 13°40°40.5 351°14.8 31.5 34°46.9 29.6 291°66.5 42.4 32°52.2 02.0 44.5 47°40.26 11.5 18°54.9 6°42.3 31°4.8 31.5 34°46.9 29.6 291°66.5 42.4 32°52.2 02.0 44.5 47°40.26 11.5 18°54.9 6°42.3 31°4.9 31.0 34°46.9 29.6 291°66.5 42.4 32°52.2 02.0 44.5 47°40.26 11.5 18°54.9 49.4 49°4.6 32.7 31°30.8 4.2.3 40°49.6 2.2 42°4.2 40°47.6 30.4 306°8.8 7 42.4 49°47.6 30.4 306°8.8 7 42.4 49°47.6 30.4 306°8.8 7 42.4 49°47.8 7 40°40.2 41.5 18°45.5 18.0 18°49.5 31.0 34°32.2 42.2 108°0.3 10°0.2 5 18°49.3 19.3 10°5.3 81°11.1 30°9.0 124°51.0 34.3 22°0.5 42.3 93°0.9 0.5 5 18.0 18.0 18°5.3 81°11.1 30°9.1 11°0.9 13.7 154°52.4 35.8 52°13.8 42.1 155°0.7 02.8 18.2 11°0.2 11°0.9 13.7 154°52.4 35.8 52°13.8 42.1 155°0.7 02.8 18.2 11°0.2 11°0.9 13.7 154°52.4 35.8 52°13.8 42.1 155°0.7 02.8 18.2 11°0.2 11°0.9 13.7 154°52.4 35.8 52°13.8 42.1 155°0.7 02.8 18.2 11°0.2 11°0.2 11°0.9 13.7 154°52.4 35.8 52°13.8 42.1 155°0.7 02.8 18.2 18.2 18.2 18.2 18.2 18.2 18.2 1													
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18	17	$100^{\circ}50.3$	51°12.4	35.1	94°49.6	32.7	352°05.2	42.3	93°00.9	02.5			
19 130°85.3 81°11.1 36.9 124°81.0 34.3 22°09.5 4.22 123°05.3 02.7   20 148°87.7 96°10.5 37.8 139°10.7 35.0 37°11.7 42.2 138°07.5 02.8   21 161°00.2 111°09.9 ·· 38.7 154°85.4 ·· 35.8 52°13.8 ·· 42.1 153°09.7 ·· 02.9   22 176°02.7 126°09.3 39.6 169°65.1 36.6 67°16.0 42.1 183°14.0 03.2   23 191°05.1 141°08.7 40.5 184°53.8 37.4 82°18.2 42.1 183°14.0 03.2    Mer.pass. 10:18    \(\nu=0.06'\) d0.9' m-3.92   \(\nu=0.07'\) d0.8' m1.21   \(\nu=0.06'\) d0.9' m-3.92   \(\nu=0.07'\) d0.8' m1.23   \(\nu=0.06'\) d0.9' m-3.92   \(\nu=0.06'\) d0.9' m-3.92   \(\nu=0.07'\) d0.8' m1.23   \(\nu=0.06'\) d0.9' m-3.92   \(\nu=0.06'\) d0.8' m1.21	18	115°52.8	66°11.7	N18°36.0	109°50.3	N01°33.5	7°07.3	N22°42.2	108°03.1	N01°02.6			
20 146°57.7 96°10.5 37.8 139°51.7 35.0 37°11.7 42.2 138°07.5 02.8 (as Aust. 183°31.0 3.4°22.2 21 160°0.2 111°09.9 38.7 154°52.4 3.5.8 52°13.8 4.2.1 168°11.9 03.0 180°23.1 141°08.7 40.5 184°52.8 43.8 37.4 82°18.2 42.1 188°14.0 03.2 Nuniki 75°46.4 -26°15.8 Altair 61°58.9 8°56.1 141°09.7 141°08.7 40.5 184°52.4 0.00 122′ d-0.0′ m-2.09 v2.2′ d-0.1′ m0.93 Deneb 49°25.2 45°22.1 186°06.8 181°4.1 199°54.5 N01°38.2 97°20.3 N22°42.0 198°16.2 N01°03.3 Deneb 49°25.2 45°22.1 198°16.2 Nuniki 75°46.4 -26°15.8 Altair 61°58.9 8°56.1 221°10.1 171°07.4 42.2 214°55.2 38.9 112°22.5 42.0 198°16.2 N01°03.3 Schemar 15°40.8 13°337.9 9°59.6 Al Na'ir 27°31.9 46°49.9 12°21°10.1 171°07.4 42.2 214°55.2 38.9 112°22.5 42.0 218°18.4 03.4 Schemar 15°13.6 -29°28.9 326°12.5 186°06.8 43.1 229°58.6 39.7 127°24.7 42.0 228°20.6 03.5 3.5 325°12.5 186°06.8 43.1 229°55.8 39.7 127°24.7 42.0 228°20.6 03.5 52819.9 231°04.9 44.5 259°57.2 41.3 157°29.0 41.9 258°25.0 03.7 436°38.1 13°42.5 28°13.3 Markab 13°29.1 15°20.7 311°24.8 261°03.7 47.6 304°59.3 43.6 202°35.5 41.8 308°33.5 04.1 312°27.3 312°4.0 4.9 48.3 228°48.5 41.8 303°31.5 04.1 Jupiter 251°26.7 17.35 Saturn 352°22.0 10.52 10.35°03.2 36°32.2 306°01.8 50.2 350°01.4 44.5 224°42.0 41.7 33°35.9 0.4.3 11°34.7 321°01.2 51.1 5°02.1 46.7 262°44.2 41.7 340°3.3 40.3 04.5 11°34.7 321°01.2 51.1 5°02.1 46.7 262°44.2 41.7 346°3.3 340.3 04.5 04.5 04.5 04.5 04.5 04.5 04.5 04.5	19	130°55.3	$81^{\circ}11.1$	36.9	124°51.0	34.3	22°09.5	42.2	123°05.3	02.7			
21 161°00.2 111°09.9 · · · · · · · · · · · · · · · · · ·	20			37.8		35.0				02.8			
23 191°05.1 141°08.7 40.5 184°53.8 37.4 8°218.2 42.1 183°14.4 03.2  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  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  Mer.pass. 10:18 ν-0.6′ d0.9′ m-3.92 ν0.7′ d0.8′ m1.21 ν2.2′ d-0.0′ m-2.09 ν2.2′ d0.1′ m0.93  Sat GHA GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec 121° 16.7 16.7 16.7 16.7 16.7 16.7 16.7 16.7										• • 02.9			
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Mer.pass. 10:18   V-0.6' d0.9' m-3.92   V0.7' d0.8' m1.21   V2.2' d-0.0' m-2.09   V2.2' d0.1' m0.93   Peacok   53°04.2   56°8.8   Enif   33°37.9   9°59.6   Sat   GHA   Dec	23	191°05.1	141°08.7	40.5	184°53.8	37.4	82°18.2	42.1	183°14.0	03.2	I		
Sat         GHA         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         Mol <sup>o</sup> 50.6         Mol <sup>o</sup> 30.3         33° 37.9         9° 59.6         Al Nair         27° 31.9         46° 49.9         9° 59.6         Al Nair         22° 28° 38.9         112° 22.5         42.0         213° 84.0         03.4         Scheat         13° 29.1         15° 13.6         -29° 28° 31.3         3         28° 1° 15.0         201° 06.2         44.0         244° 56.5         + 40.5         142° 26.8         + 41.9         28° 25.0         03.7         Alrakab         13° 29.1         15° 20.7         Alrakab         3° 29.1         45° 20.0         Alrakab         3° 29.1         45° 20.0         Alrakab         3° 29.1         45° 20.0         45° 20.0         45° 20.0         45° 20.0         45° 20.0         45° 20.0         45° 20.0         45° 20.0         45° 20.0	Mer n	ass 10·18	$\nu$ -0.6' d0	9′ m-3 92	$\nu 0.7' d0$	8′ m1 21	$\nu^2 2' d-0$	0′ m-2 09	$\nu^2 2' d0$	1′ m0 93			
Sat         GHA         GHA         Dec         Al Na'ir         27°319         -46°49.9           0         206°07.6         156°08.0         N18°41.4         199°54.5         N01°38.2         97°20.3         N22°42.0         213°18.4         03.4         Case         Case         03.5         03.7         03.7         04.1         24°56.5         0.40.5         142°26.8         0.41.9         243°22.8         03.6         03.5         03.7         03.7         04.1         0.42.2         03.8         04.1         0.42.2         03.8         03.2         03.5         04.			- 0.0 40										
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15       71°44.6       20°58.7       · · 54.6       65°04.8       · · 49.8       322°52.8       · · 41.5       63°49.0       · · 05.0       Apr 18 Sat       SHA       Mer.pass         16       86°47.0       35°58.1       55.5       80°05.5       50.6       337°55.0       41.5       78°51.2       05.1       Venus       310°00.4       13:36         17       101°49.5       50°57.4       56.4       95°06.2       51.4       352°57.1       41.4       93°53.4       05.2       Mars       353°46.9       10:40         18       116°51.9       65°56.8       N18°57.3       110°06.9       N01°52.2       7°59.3       N22°41.4       108°55.6       N01°05.3       Jupiter       251°12.8       17:28         20       146°56.9       95°55.6       59.0       140°08.3       53.7       38°03.6       41.3       139°00.0       05.6         21       161°59.3       110°54.9       18°59.9       155°09.0       · · 54.5       53°05.8       · · 41.3       154°02.2       · · 05.7         22       177°01.8       125°54.3       19°00.8       170°09.7       55.3       68°08.0       41.3       169°04.4       05.8       Horizontal parallax         23       192											Saturn	352-15.3	10:49
16       86°47.0       35°58.1       55.5       80°05.5       50.6       337°55.0       41.5       78°51.2       05.1       Venus       310°00.4       13:36         17       101°49.5       50°57.4       56.4       95°06.2       51.4       352°57.1       41.4       93°53.4       05.2       Mars       353°46.9       10:40         18       116°51.9       65°56.8       N18°57.3       110°06.9       N01°52.2       7°59.3       N22°41.4       108°55.6       N01°05.3       Jupiter       251°12.8       17:28         19       131°54.4       80°56.2       58.1       125°07.6       52.9       23°01.5       41.4       123°57.8       05.4         20       146°56.9       95°55.6       59.0       140°08.3       53.7       38°03.6       41.3       139°00.0       05.6         21       161°59.3       110°54.9       18°59.9       155°09.0       · 54.5       53°05.8       · 41.3       154°02.2       · 05.7         22       177°01.8       125°54.3       19°00.8       170°09.7       55.3       68°08.0       41.3       169°04.4       05.8       Venus       0.1         23       192°04.3       140°53.7       01.6       185°10.4		71°44.6	20°58.7	• • 54.6	65°04.8	• • 49.8		• • 41.5	63°49.0		Apr 18 Sat	SHA	Mer.pass
17       101°49.5       50°57.4       56.4       95°66.2       51.4       352°57.1       41.4       93°53.4       05.2       Mars       353°46.9       10:40         18       116°51.9       65°56.8       N18°57.3       110°60.9       N01°52.2       7°59.3       N22°41.4       108°55.6       N01°05.3       Jupiter       251°12.8       17:28         19       131°54.4       80°56.2       58.1       125°07.6       52.9       23°01.5       41.4       123°57.8       05.4       Saturn       352°08.6       10:45         20       146°56.9       95°55.6       59.0       140°08.3       53.7       38°03.6       41.3       139°00.0       05.6       65°09.7       40°09.7       55.3       68°08.8       41.3       154°02.2       05.7       40°09.7       40°09.7       40°09.7       55.3       68°08.0       41.3       169°04.4       05.8       40°09.8       40°09.8       40°09.7 <td< td=""><td>16</td><td></td><td><math>35^{\circ}58.1</math></td><td>55.5</td><td>80°05.5</td><td>50.6</td><td><math display="block">337^{\circ}55.0</math></td><td>41.5</td><td></td><td>05.1</td><td></td><td></td><td></td></td<>	16		$35^{\circ}58.1$	55.5	80°05.5	50.6	$337^{\circ}55.0$	41.5		05.1			
18       116°51.9       65°56.8       N18°57.3       110°06.9       N01°52.2       7°59.3       N22°41.4       108°55.6       N01°05.3       Jupiter       251°12.8       17:28         19       131°54.4       80°56.2       58.1       125°07.6       52.9       23°01.5       41.4       123°57.8       05.4       05.4       521°12.8       10.45 <td></td>													
20 146°56.9 95°55.6 59.0 140°08.3 53.7 38°03.6 41.3 139°00.0 05.6 21 161°59.3 110°54.9 18°59.9 155°09.0 · 54.5 53°05.8 · 41.3 154°02.2 · 05.7 22 177°01.8 125°54.3 19°00.8 170°09.7 55.3 68°08.0 41.3 169°04.4 05.8 23 192°04.3 140°53.7 01.6 185°10.4 56.0 83°10.1 41.2 184°06.5 05.9  Horizontal parallax Venus: 0.1 Mars: 0.1											I		17:28
21       161°59.3       110°54.9       18°59.9       155°09.0       · · 54.5       53°05.8       · · 41.3       154°02.2       · · 05.7       Horizontal parallax         22       177°01.8       125°54.3       19°00.8       170°09.7       55.3       68°08.0       41.3       169°04.4       05.8       Venus:       0.1         23       192°04.3       140°53.7       01.6       185°10.4       56.0       83°10.1       41.2       184°06.5       05.9       Mars:       0.1											Saturn	352°08.6	10:45
22 177°01.8 125°54.3 19°00.8 170°09.7 55.3 68°08.0 41.3 169°04.4 05.8 Venus: 0.1 23 192°04.3 140°53.7 01.6 185°10.4 56.0 83°10.1 41.2 184°06.5 05.9 Mars: 0.1											ш!	al navalle:	
23 192°04.3 140°53.7 01.6 185°10.4 56.0 83°10.1 41.2 184°06.5 05.9 Mars: 0.1											Horizont	-	0.1
25 152 01.5 170 35.7 02.5 165 16.7 35.6 05 16.1 17.2 157 05.5													
Mer.pass. 10:14 $\nu$ -0.6′ $d$ 0.9′ m-3.92 $\nu$ 0.7′ $d$ 0.8′ m1.21 $\nu$ 2.2′ $d$ -0.0′ m-2.09 $\nu$ 2.2′ $d$ 0.1′ m0.93	23	192~04.3	140~53.7	01.6	185~10.4	56.0	83~10.1	41.2	184~06.5	05.9		iviars:	0.1
	Mer.p	ass. 10:14	$\nu$ -0.6′ d0	.9′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.8′ m1.21	$\nu$ 2.2′ d-0	.0′ m-2.09	$\nu$ 2.2′ d0	.1′ m0.93			

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

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

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
											эпа	Dec
0	207°06.7	155°53.0	N19°02.5	200°11.0	N01°56.8	98°12.3	N22°41.2	199°08.7	N01°06.0	Alpheratz	357°34.0	$29^{\circ}14.0$
1	222°09.2	170°52.4	03.4	215°11.7	57.6	113°14.4	41.2	214° 10.9	06.1	Ankaa	353°06.5	-42°09.7
2	237°11.7	185°51.8	04.2	230°12.4	58.4	$128^{\circ}16.6$	41.1	229°13.1	06.2	Schedar	349°30.4	56° 40.8
3	$252^{\circ}14.1$	200°51.1	•• 05.1	245°13.1	• • 59.1	143°18.8	• • 41.1	244°15.3	• • 06.4		348°46.6	-17° 50.6
4	$267^{\circ}16.6$	215°50.5	06.0	260°13.8	$01^{\circ}59.9$	158°20.9	41.1	259° 17.5	06.5	Diphda		
5	282°19.0	230°49.9	06.9	275°14.5	02°00.7	173°23.1	41.0	274°19.7	06.6	Achernar	335°20.0	-57°06.2
6	297°21.5	245°49.2	N19°07.7	290°15.2	N02°01.5	188°25.2	N22°41.0	289°21.9	N01°06.7	Hamal	327°50.4	23°35.1
7	312°24.0	260°48.6	08.6	305°15.9	02.3	203°27.4	41.0	304°24.1	06.8	Polaris	313°58.5	89°22.6
										Acamar	315°11.4	-40°12.0
8	327°26.4	275°48.0	09.5	320°16.6	03.0	218°29.6	40.9	319°26.2	06.9	Menkar	314°05.4	$4^{\circ}11.5$
9	342°28.9	290°47.3	• • 10.3	335°17.3	• • 03.8	233°31.7	• • 40.9	334°28.4	• • 07.0	Mirfak	308°27.2	49°57.3
10	357°31.4	305°46.7	11.2	350°18.0	04.6	248°33.9	40.9	349°30.6	07.2	Aldebaran	290°38.7	16°33.7
11	12°33.8	320°46.1	12.0	5°18.6	05.4	263°36.0	40.8	4°32.8	07.3	l l	281°03.1	-8° 10.4
12	27°36.3	335°45.4	N19° 12.9	20°19.3	N02°06.1	278°38.2	N22°40.8	19°35.0	N01°07.4	Rigel		
13	42°38.8	350°44.8	13.8	35°20.0	06.9	293°40.3	40.7	34°37.2	07.5	Capella	280°20.7	46°01.5
14	57°41.2	5°44.2	14.6	50°20.7	07.7	308°42.5	40.7	49°39.4	07.6	Bellatrix	278°22.0	6°22.3
15	72°43.7	20°43.5	15.5	65°21.4	• • 08.5	323°44.7	40.7	64°41.6	• • 07.7	Elnath	278°00.8	28° 37.8
16	87°46.2	35°42.9	16.3	80°22.1	09.2	338°46.8	40.6	79°43.8	07.8	Alnilam	275°36.9	$-1^{\circ}11.2$
	102°48.6			95°22.8				94°45.9		Betelgeuse	$270^{\circ}51.1$	7°24.6
17		50°42.3	17.2		10.0	353°49.0	40.6		07.9	Canopus	263°52.2	-52°42.8
18	117°51.1	65°41.6	N19° 18.0	110°23.5	N02° 10.8	8°51.1	N22°40.6	109°48.1	N01°08.1	Sirius	258°25.4	$-16^{\circ}45.3$
19	132°53.5	80°41.0	18.9	125°24.2	11.6	23°53.3	40.5	124°50.3	08.2	Adhara	255°05.2	-29°00.7
20	147°56.0	95°40.3	19.8	140°24.9	12.3	38°55.4	40.5	139°52.5	08.3	Procyon	244°49.8	5°09.4
21	162°58.5	110°39.7	• • 20.6	155°25.6	•• 13.1	53°57.6	• • 40.5	154° 54.7	•• 08.4		244 49.6 243°16.1	5 09.4 27°57.8
22	178°00.9	125°39.1	21.5	170°26.3	13.9	68°59.7	40.4	169°56.9	08.5	Pollux		
23	193°03.4	140°38.4	22.3	185°26.9	14.7	84°01.9	40.4	184°59.1	08.6	Avior	234°14.3	-59°35.9
										Suhail	222°45.4	-43°32.6
Mer.p	ass. 10:10	$\nu$ -0.6' d0.	.9′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.8′ m1.21	$\nu$ 2.2′ d-0	.0′ m-2.08	$\nu$ 2.2 $^{\prime}$ d0	.1' m $0.93$	Miaplacidus	221°37.8	-69°49.8
										Alphard	217°46.6	-8°46.5
			_		_		_		_	Regulus	207°33.2	11°50.2
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.3	61°36.7
0	208°05.9	155°37.8	N19°23.2	200°27.6	N02°15.4	99°04.1	N22°40.4	200°01.3	N01°08.7	Denebola	182°23.6	14° 25.4
1	223°08.3	170°37.1	24.0	215°28.3	16.2	$114^{\circ}06.2$	40.3	215°03.5	08.9	Gienah	175°42.2	-17°41.5
2	238°10.8	185°36.5	24.9	230°29.0	17.0	129°08.4	40.3	230°05.6	09.0	Acrux	173° 42.2	-63° 14.9
3	253° 13.3	200°35.9	• • 25.7	245°29.7	• • 17.8	144°10.5	• • 40.2	245°07.8	•• 09.1			
4	268° 15.7	215°35.2	26.6	260°30.4	18.5	159°12.7	40.2	260°10.0	09.2	Gacrux	171°50.0	-57° 15.8
5	283° 18.2	230°34.6	27.4	275°31.1	19.3	174°14.8	40.2	275° 12.2	09.3	Alioth	166°11.5	55° 49.0
						189°17.0		290°14.4		Spica	158°20.9	-11°18.1
6	298° 20.7	245°33.9	N19°28.3	290°31.8	N02°20.1		N22°40.1		N01°09.4	Alkaid	152°50.7	49°10.8
7	313°23.1	260°33.3	29.1	305°32.5	20.9	204°19.1	40.1	305°16.6	09.5	Hadar	148°33.9	$-60^{\circ}30.1$
8	328° 25.6	275°32.6	29.9	320°33.2	21.6	219°21.3	40.1	320° 18.8	09.6	Menkent	147°56.0	$-36^{\circ}30.1$
9	343°28.0	290°32.0	• • 30.8	335°33.9	• • 22.4	234°23.4	• • 40.0	335°21.0	• • 09.8	Arcturus	145°46.6	19°02.6
10	358° 30.5	305°31.3	31.6	350°34.6	23.2	249°25.6	40.0	350°23.2	09.9	Rigil Kent.	139°38.2	-60°56.7
11	13°33.0	320°30.7	32.5	5°35.2	24.0	264°27.7	40.0	5°25.4	10.0	Kochab	137°18.7	74°02.7
12	28° 35.4	335°30.0	N19°33.3	20°35.9	N02°24.7	279°29.9	N22°39.9	20°27.5	N01°10.1			
13	43°37.9	350°29.4	34.1	35°36.6	25.5	294°32.0	39.9	35°29.7	10.2	Zuben'ubi	136°54.5	-16°09.2
14	58° 40.4	5°28.8	35.0	50°37.3	26.3	309°34.2	39.8	50°31.9	10.3	Alphecca	126°02.5	26°37.4
										Antares	112°14.3	-26°29.5
15	73°42.8	20°28.1	• • 35.8	65°38.0	• • 27.1	324°36.3	• • 39.8	65°34.1	• • 10.4	Atria	107°07.2	-69°04.3
16	88°45.3	35°27.5	36.7	80°38.7	27.8	339°38.5	39.8	80°36.3	10.6	Sabik	102°01.4	$-15^{\circ}45.5$
17	103°47.8	50°26.8	37.5	95°39.4	28.6	354°40.6	39.7	95°38.5	10.7	Shaula	96°08.7	-37°07.3
18	118°50.2	65°26.2	N19°38.3	110°40.1	N02°29.4	9°42.8	N22°39.7	110°40.7	N01°10.8	Rasalhague	95°57.4	12°32.3
19	133°52.7	80°25.5	39.2	125°40.8	30.2	24°44.9	39.7	125°42.9	10.9	Eltanin	90°41.4	51°28.8
20	148°55.2	95°24.9	40.0	140°41.5	30.9	39°47.1	39.6	140°45.1	11.0	Kaus Aust.	83°31.0	-34°22.2
21	163°57.6	110°24.2	• • 40.8	155°42.2	• • 31.7	54°49.2	• • 39.6	155°47.3	• • 11.1	Vega	80°32.4	38° 48.2
22	179°00.1	125°23.6	41.7	170°42.9	32.5	69°51.4	39.6	170°49.4	11.2	_		
23	194°02.5	140°22.9	42.5	185°43.5	33.3	84°53.5	39.5	185°51.6	11.3	Nunki	75°46.4	-26°15.8
										Altair	61°58.9	8°56.1
Mer.p	ass. 10:06	$\nu$ -0.6' d0.	.8′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.8′ m1.21	$\nu$ 2.2′ d-0	.0′ m-2.08	$\nu$ 2.2 $^{\prime}$ d0	.1' m $0.93$	Peacock	53°04.1	-56°38.8
										Deneb	49°25.2	45°22.1
_		<u> </u>	_		_	<b></b>	_	<b></b>	_	Enif	33°37.9	$9^{\circ}59.6$
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	$27^{\circ}31.8$	-46°49.9
0	209°05.0	155°22.3	N19°43.3	200°44.2	N02°34.0	99°55.7	N22°39.5	200°53.8	N01°11.5	Fomalhaut	15°13.6	-29°28.9
1	224°07.5	170°21.6	44.1	215°44.9	34.8	114°57.8	39.4	215°56.0	11.6	Scheat	13°44.5	28° 13.3
2	239°09.9	185°20.9	45.0	230°45.6	35.6	130°00.0	39.4	230°58.2	11.7	Markab	13°29.1	15° 20.7
3	254°12.4	200°20.3	• • 45.8	245°46.3	• • 36.4	$145^{\circ}02.1$	• • 39.4	246°00.4	• • 11.8			
4	269°14.9	$215^{\circ}19.6$	46.6	260°47.0	37.1	160°04.3	39.3	261°02.6	11.9	Apr 19 Sun	SHA	Mer.pass
5	284°17.3	230°19.0	47.4	275°47.7	37.9	175°06.4	39.3	276°04.8	12.0	Venus	308°46.3	13:37
6	299° 19.8	245°18.3	N19°48.3	290°48.4	N02°38.7	190°08.6	N22°39.3	291°07.0	N01°12.1	Mars	353°04.3	10:39
7	314° 22.3	260°17.7	49.1	305°49.1	39.5	205°10.7	39.2	306°09.2	12.2	Jupiter	251°05.5	17:25
						205 10.7 220°12.9		300 09.2 321°11.4		Saturn	352°02.0	10:42
8	329°24.7	275°17.0	49.9	320°49.8	40.2		39.2		12.4	Saturn	JJ2 U2.U	10.42
9	344°27.2	290°16.4	• • 50.7	335°50.5	• • 41.0	235°15.0	39.1	336°13.5	• • 12.5	Apr 20 Mon	SHA	Mer.pass
10	359°29.7	305°15.7	51.6	350°51.2	41.8	250°17.1	39.1	351°15.7	12.6	Venus	307°31.9	13:38
11	14°32.1	320°15.0	52.4	5°51.9	42.5	265°19.3	39.1	6° 17.9	12.7	Mars	352°21.8	10:38
12	29°34.6	335°14.4	N19°53.2	20°52.5	N02°43.3	280°21.4	N22°39.0	$21^{\circ}20.1$			250°58.2	
13	44°37.0	$350^{\circ}13.7$	54.0	35°53.2	44.1	295°23.6	39.0	$36^{\circ}22.3$	12.9	Jupiter		17:21
14	59°39.5	5°13.1	54.8	50°53.9	44.9	$310^{\circ}25.7$	39.0	51°24.5	13.0	Saturn	351°55.4	10:38
15	74°42.0	20°12.4	• • 55.6	65°54.6	• • 45.6	325°27.9	38.9	66° 26.7	· · 13.1	Apr 21 Tue	SHA	Mer.pass
16	89°44.4	35°11.8	56.5	80°55.3	46.4	340°30.0	38.9	81°28.9	13.3		306°17.2	13:39
	104° 46.9	50°11.1	57.3	95°56.0	47.2	355°32.2	38.8	96°31.1	13.4	l l		
17		65°10.4	N19°58.1		47.2 N02°48.0	10°34.3	38.8 N22°38.8	96 31.1 111°33.3	N01°13.5	Mars	351°39.2	10:37
18	119°49.4			110°56.7						Jupiter	250°50.7	17:18
19	134°51.8	80°09.8	58.9	125°57.4	48.7	25°36.4	38.8	126°35.5	13.6	Saturn	351°48.8	10:35
20	149°54.3	95°09.1	19°59.7	140°58.1	49.5	40°38.6	38.7	141°37.6	13.7		al ac:::-!!	
21	164°56.8	110°08.5	20°00.5	155°58.8	• • 50.3	55°40.7	• • 38.7	156° 39.8	• • 13.8	Horizont	al parallax	
22	$179^{\circ}59.2$	125°07.8	01.3	170°59.5	51.0	70°42.9	38.7	171°42.0	13.9		Venus:	0.1
23	195°01.7	140°07.1	02.1	186°00.2	51.8	85°45.0	38.6	186°44.2	14.0		Mars:	0.1
										<u> </u>		
Mer.p	ass. 10:02	$\nu$ -0.7' $d0$	.8′ m-3.92	$ u$ 0. $\ell'$ $d0$	.8′ m1.21	$\nu$ 2.1′ $d$ -0	.0′ m-2.07	$\nu$ 2.2′ d0	.1' m $0.93$			

h	Sui	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°11.9	N11°06.2	161°07.0	5.0'	N22°22.4	11.2'	60.5'
1 2	195°12.0 210°12.2	07.0 07.9	175°31.1 189°55.0	4.9' 4.8'	22°33.6 22°44.7	11.1' 10.9'	60.5' 60.6'
3	225°12.3	•• 08.8	204°18.8	4.7'	22°55.6	10.8	60.6
4	240°12.4	09.6	218°42.6	4.6'	23°06.3	10.6'	60.6'
5	255°12.6	10.5	233°06.2 247°29.7	4.5'	23°16.9 N23°27.4	10.4'	60.6'
6 7	270°12.7 285°12.8	N11°11.4 12.2	247°29.7 261°53.1	4.4' 4.3'	N23°27.4 23°37.7	10.3' 10.1'	60.6' 60.6'
8	300°13.0	13.1	276°16.5	4.2'	23°47.8	10.0'	60.6
9	315°13.1	•• 14.0	290°39.7	4.1'	23°57.7	9.8'	60.6'
10 11	330°13.2 345°13.4	14.8 15.7	305°02.8 319°25.8	4.0' 3.9'	24°07.5 24°17.1	9.6' 9.4'	60.6' 60.6'
12	0°13.5	N11°16.5	333°48.8	3.8'	N24°26.6	9.4	60.5
13	15°13.6	17.4	$348^{\circ}11.6$	3.8'	24°35.8	9.1'	60.5'
14	30°13.8	18.3	2°34.4	3.7'	24°44.9	8.9'	60.5
15 16	45°13.9 60°14.0	· · 19.1 20.0	16°57.0 31°19.6	3.6' 3.5'	24°53.8 25°02.6	8.7' 8.6'	60.5' 60.5'
17	75°14.2	20.9	45°42.1	3.4'	25°11.1	8.4'	60.5'
18	90°14.3	N11°21.7	60°04.5	3.3'	N25°19.5	8.2'	60.5'
19 20	105°14.4 120°14.6	22.6 23.4	74°26.8 88°49.1	3.2' 3.2'	25°27.7 25°35.7	8.0' 7.8'	60.5' 60.5'
21	135°14.7	24.3	103°11.2	3.1'	25°43.6	7.6'	60.5
22	150°14.8	25.2	117°33.3	3.0'	25°51.2	7.4'	60.5'
23	165°15.0	26.0	131°55.3	2.9'	25°58.6	7.3'	60.5'
	SD = 15.9'	d = 0.9'		SI	D = 16.5'		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°15.1	N11°26.9	146°17.3	2.9'	N26°05.9	7.1'	60.5
1	195°15.2	27.7	160°39.1	2.8'	26°13.0	6.9'	60.5'
2	210°15.3 225°15.5	28.6 •• 29.5	175°00.9 189°22.7	2.7' 2.7'	26°19.8 26°26.5	6.7' 6.5'	60.5' 60.5'
3 4	240°15.6	30.3	203°44.3	2.6'	26°33.0	6.3	60.5
5	255°15.7	31.2	218°06.0	2.6'	26°39.3	6.1'	60.4'
6	270°15.9	N11°32.0	232°27.5	2.5'	N26°45.4	5.9'	60.4
7 8	285°16.0 300°16.1	32.9 33.7	246°49.0 261°10.5	2.4' 2.4'	26°51.3 26°57.0	5.7' 5.5'	60.4' 60.4'
9	315°16.3	• • 34.6	275°31.8	2.3'	27°02.4	5.3'	60.4
10	330°16.4	35.5	289°53.2	2.3'	27°07.7	5.1'	60.4'
11 12	345°16.5 0°16.6	36.3 N11°37.2	304°14.5 318°35.8	2.3'	27°12.8 N27°17.7	4.9' 4.7'	60.4' 60.4'
13	15°16.8	38.0	332°57.0	2.2'	27°22.4	4.7 4.5'	60.4
14	30°16.9	38.9	$347^{\circ}18.2$	2.1'	27°26.9	4.3'	60.3'
15	45°17.0 60°17.2	• • 39.7	1°39.3 16°00.4	2.1' 2.1'	27°31.1 27°35.2	4.1' 3.9'	60.3'
16 17	75°17.3	40.6 41.4	30°21.5	2.1'	27°35.2 27°39.1	3.9 3.6'	60.3' 60.3'
18	90°17.4	N11°42.3	44°42.6	2.0'	N27°42.7	3.4'	60.3'
19	105°17.5	43.1	59°03.6 73°24.6	2.0'	27°46.1	3.2' 3.0'	60.3'
20 21	120°17.7 135°17.8	44.0 •• 44.8	73°24.6 87°45.6	2.0' 2.0'	27°49.4 27°52.4	3.0° 2.8'	60.3' 60.2'
22	150°17.9	45.7	102°06.6	2.0'	27°55.2	2.6'	60.2'
23	165°18.1	46.5	116°27.6	2.0'	27°57.8	2.4'	60.2'
	SD = 15.9'	d = 0.9'		S	D = 16.5'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°18.2	N11°47.4	130°48.6	2.0'	N28°00.2	2.2'	60.2'
1 2	195°18.3 210°18.4	48.3 49.1	145°09.6 159°30.5	2.0' 2.0'	28°02.4 28°04.4	2.0' 1.8'	60.2' 60.2'
3	210 18.4 225°18.6	• • 50.0	159 30.5 173°51.5	2.0'	28°06.2	1.6'	60.2
4	240°18.7	50.8	$188^{\circ}12.5$	2.0'	28°07.7	1.4'	60.1'
5	255°18.8 270°18.9	51.7	202°33.5 216°54.5	2.0'	28°09.1 N28°10.2	1.1'	60.1'
6 7	270°18.9 285°19.1	N11°52.5 53.3	210°54.5 231°15.5	2.0' 2.0'	28°11.2	0.9' 0.7'	60.1' 60.1'
8	300°19.2	54.2	245°36.5	2.1'	28°11.9	0.5'	60.1'
9	315°19.3	• • 55.0	259°57.6	2.1'	28°12.4	0.3'	60.0'
10 11	330°19.4 345°19.6	55.9 56.7	274°18.6 288°39.7	2.1' 2.1'	28°12.7 28°12.8	0.1' -0.1'	60.0' 60.0'
12	0°19.7	N11°57.6	303°00.9	2.2'	N28°12.7	-0.1	60.0
13	15°19.8	58.4	317°22.0	2.2'	28°12.4	-0.5'	60.0'
14 15	30°19.9 45°20.1	11°59.3 12°00.1	331°43.2 346°04.5	2.2' 2.3'	28°11.9 28°11.1	-0.7' -0.9'	59.9' 59.9'
16	60°20.2	01.0	0°25.8	2.3'	28°10.2	-1.1'	59.9'
17	75°20.3	01.8	14°47.1	2.4'	28°09.1	-1.3'	59.9'
18 19	90°20.4 105°20.6	N12°02.7 03.5	29°08.5 43°29.9	2.4' 2.5'	N28°07.7 28°06.2	-1.5' -1.7'	59.9' 59.8'
20	105°20.6 120°20.7	03.5 04.4	43°29.9 57°51.4	2.5' 2.5'	28°06.2 28°04.5	-1.7 -1.9'	59.8'
21	135°20.8	• • 05.2	72°12.9	2.6'	28°02.5	-2.1'	59.8'
22	150°20.9 165°21.0	06.0	86°34.5 100°56.1	2.7' 2.7'	28°00.4 27°58.0	-2.3'	59.8' 59.7'
23		06.9	1.00 56.1			-2.5'	59.7
	SD = 15.9'	d = 0.9'		5	D = 16.4'		

N 72°         ////         00:56         03:10         20:53         23:22           N 70°         ////         01:57         03:31         20:30         22:07           68°         ////         02:31         03:47         20:13         21:31           66°         00:48         02:55         04:01         20:00         21:06         2           64°         01:42         03:14         04:12         19:48         20:47         2           62°         02:13         03:29         04:21         19:39         20:32         2           60°         02:35         03:41         04:29         19:30         20:19         2           N 58°         02:53         03:52         04:36         19:23         20:08         2           56°         03:07         04:01         04:42         19:17         19:58         2           54°         03:20         04:09         04:48         19:11         19:50         2           50°         03:39         04:22         04:57         19:02         19:37         2           45°         03:58         04:36         05:07         18:52         19:23         2	Twilight		
N 70°	laut.		
68°         ////         02:31         03:47         20:13         21:31           66°         00:48         02:55         04:01         20:00         21:06         2           64°         01:42         03:14         04:12         19:48         20:47         2           62°         02:13         03:29         04:21         19:39         20:32         2           60°         02:35         03:41         04:29         19:30         20:19         2           N 58°         02:53         03:52         04:36         19:23         20:08         2           56°         03:07         04:01         04:42         19:17         19:58         2           54°         03:20         04:09         04:48         19:11         19:50         2           52°         03:30         04:16         04:53         19:06         19:43         2           50°         03:39         04:22         04:57         19:02         19:37         2           45°         03:58         04:36         05:07         18:52         19:23         2           N 40°         04:13         04:47         05:15         18:43         19:12	////		
66°         00:48         02:55         04:01         20:00         21:06         2           64°         01:42         03:14         04:12         19:48         20:47         2           62°         02:13         03:29         04:21         19:39         20:32         2           60°         02:35         03:41         04:29         19:30         20:19         2           N 58°         02:53         03:52         04:36         19:23         20:08         2           56°         03:07         04:01         04:42         19:17         19:58         2           54°         03:20         04:09         04:48         19:11         19:50         2           52°         03:30         04:16         04:53         19:06         19:43         2           50°         03:39         04:22         04:57         19:02         19:37         2           45°         03:58         04:36         05:07         18:52         19:23         2           N 40°         04:13         04:47         05:15         18:43         19:12         1           35°         04:24         04:56         05:22         18:36	////		
64°         01:42         03:14         04:12         19:48         20:47         2           62°         02:13         03:29         04:21         19:39         20:32         2           60°         02:35         03:41         04:29         19:30         20:19         2           N 58°         02:53         03:52         04:36         19:23         20:08         2           56°         03:07         04:01         04:42         19:17         19:58         2           54°         03:20         04:09         04:48         19:11         19:50         2           52°         03:30         04:16         04:53         19:06         19:43         2           50°         03:39         04:22         04:57         19:02         19:37         2           45°         03:58         04:36         05:07         18:52         19:23         2           N 40°         04:13         04:47         05:15         18:43         19:12         1           35°         04:24         04:56         05:22         18:36         19:03         1	////		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	3:27		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	2:22		
N 58°         02:53         03:52         04:36         19:23         20:08         2           56°         03:07         04:01         04:42         19:17         19:58         2           54°         03:20         04:09         04:48         19:11         19:50         2           52°         03:30         04:16         04:53         19:06         19:43         2           50°         03:39         04:22         04:57         19:02         19:37         2           45°         03:58         04:36         05:07         18:52         19:23         2           N 40°         04:13         04:47         05:15         18:43         19:12         1           35°         04:24         04:56         05:22         18:36         19:03         1	1:49		
56°         03:07         04:01         04:42         19:17         19:58         2           54°         03:20         04:09         04:48         19:11         19:50         2           52°         03:30         04:16         04:53         19:06         19:43         2           50°         03:39         04:22         04:57         19:02         19:37         2           45°         03:58         04:36         05:07         18:52         19:23         2           N 40°         04:13         04:47         05:15         18:43         19:12         1           35°         04:24         04:56         05:22         18:36         19:03         1	1:26		
54°         03:20         04:09         04:48         19:11         19:50         2           52°         03:30         04:16         04:53         19:06         19:43         2           50°         03:39         04:22         04:57         19:02         19:37         2           45°         03:58         04:36         05:07         18:52         19:23         2           N 40°         04:13         04:47         05:15         18:43         19:12         1           35°         04:24         04:56         05:22         18:36         19:03         1	1:08		
52°         03:30         04:16         04:53         19:06         19:43         2           50°         03:39         04:22         04:57         19:02         19:37         2           45°         03:58         04:36         05:07         18:52         19:23         2           N 40°         04:13         04:47         05:15         18:43         19:12         1           35°         04:24         04:56         05:22         18:36         19:03         1	0:53		
50°         03:39         04:22         04:57         19:02         19:37         2           45°         03:58         04:36         05:07         18:52         19:23         2           N 40°         04:13         04:47         05:15         18:43         19:12         1           35°         04:24         04:56         05:22         18:36         19:03         1	0:40		
45°         03:58         04:36         05:07         18:52         19:23         2           N 40°         04:13         04:47         05:15         18:43         19:12         1           35°         04:24         04:56         05:22         18:36         19:03         1	0:29		
N 40°     04:13     04:47     05:15     18:43     19:12     1       35°     04:24     04:56     05:22     18:36     19:03     1	0:20		
35° 04:24 04:56 05:22 18:36 19:03 1	0:01		
	9:46		
30° 04:34 05:03 05:28 18:30 18:55 1	9:34		
	9:24		
	9:09		
	8:57		
0° 05:10 05:34 05:56 18:02 18:23 1	8:48		
	8:40		
	8:33		
	8:28		
	8:25		
	8:23		
45° 05:37 06:11 06:41 17:16 17:46 1	8:20		
	8:18		
	8:17		
	8:16		
	8:15		
	8:15		
<b>S</b> 60° 05:43 06:31 07:15 16:42 17:25 1	8:14		

Lat.		Moonris	e		Moonset	
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°						
N 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°	04:35	04:56	05:38	23:38		01:11
56°	04:51	05:18	06:04	23:16		00:45
54°	05:04	05:35	06:25	22:59		00:24
52°	05:16	05:51	06:43	22:44		00:07
50°	05:26	06:04	06:58	22:31	23:52	•• ••
45°	05:48	06:31	07:28	22:05	23:22	•• ••
<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

Γ			Sun			Moon	
	Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age
	,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	2-4
L		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	

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
				201°00.9	N02°52.6				N01°14.2		ЗПА	Dec
0	210°04.2	155°06.5	N20°02.9			100°47.2	N22°38.6	201°46.4		Alpheratz	357°34.0	29° 14.0
1	225°06.6	170°05.8	03.8	216°01.6	53.4	115°49.3	38.5	216°48.6	14.3	Ankaa	353°06.5	-42°09.7
2	240°09.1	185°05.1	04.6	231°02.2	54.1	130°51.4	38.5	231°50.8	14.4	Schedar	349°30.4	56° 40.8
3	255°11.5	200°04.5	• • 05.4	246°02.9	• • 54.9	145°53.6	• • 38.5	246°53.0	• • 14.5	Diphda	348°46.5	-17°50.6
4	270°14.0	215°03.8	06.2	261°03.6	55.7	160°55.7	38.4	261°55.2	14.6	Achernar	335°20.0	-57°06.2
5	285°16.5	230°03.1	07.0	276°04.3	56.4	175°57.9	38.4	276°57.4	14.7		327°50.4	23°35.1
6	300°18.9	245°02.5	N20°07.8	291°05.0	N02°57.2	191°00.0	N22°38.4	291°59.6	N01°14.8	Hamal		
7	315°21.4	260°01.8	08.6	306°05.7	58.0	206°02.1	38.3	307°01.7	14.9	Polaris	313°58.5	89°22.6
8	330°23.9	275°01.1	09.4	321°06.4	58.8	221°04.3	38.3	322°03.9	15.1	Acamar	315°11.4	-40° 12.0
9	345°26.3	290°00.5	· · 10.2	336°07.1	02°59.5	236°06.4	38.2	337°06.1	. 15.2	Menkar	314°05.4	4° 11.5
10	0°28.8	304°59.8	11.0	351°07.8	03°00.3	251°08.6	38.2	352°08.3	15.3	Mirfak	308°27.2	49°57.3
11	15°31.3	319°59.1	11.8	6°08.5	01.1	266°10.7	38.2	7°10.5	15.4	Aldebaran	290°38.7	16°33.7
12	30°33.7	334°58.5	N20° 12.6	21°09.2	N03°01.8	281°12.8	N22°38.1	22°12.7	N01° 15.5	Rigel	281°03.1	-8° 10.4
										Capella	280°20.7	46°01.5
13	45°36.2	349°57.8	13.4	36°09.9	02.6	296°15.0	38.1	37°14.9	15.6	Bellatrix	278°22.0	6°22.3
14	60°38.7	4°57.1	14.2	51°10.6	03.4	311°17.1	38.0	52°17.1	15.7	Elnath	278°00.8	28° 37.8
15	75°41.1	19°56.5	• • 14.9	66°11.3	• • 04.2	326°19.2	• • 38.0	67°19.3	• • 15.8	Alnilam	275°36.9	-1°11.2
16	90°43.6	34°55.8	15.7	81°11.9	04.9	341°21.4	38.0	82°21.5	15.9	Betelgeuse	270°51.1	7°24.6
17	105°46.0	49°55.1	16.5	96°12.6	05.7	356°23.5	37.9	97°23.7	16.1	Canopus	263°52.2	-52°42.8
18	120°48.5	64°54.5	N20° 17.3	111°13.3	N03°06.5	11°25.7	N22°37.9	112°25.9	N01°16.2			-32 42.8 -16°45.3
19	135°51.0	79°53.8	18.1	126°14.0	07.2	26°27.8	37.9	127°28.1	16.3	Sirius	258°25.5	
20	150°53.4	94°53.1	18.9	141°14.7	0.80	41°29.9	37.8	142°30.2	16.4	Adhara	255°05.2	-29°00.7
21	165°55.9	109°52.4	19.7	156°15.4	. 08.8	56°32.1	37.8	157°32.4	. 16.5	Procyon	244°49.8	5°09.4
22	180°58.4	124°51.8	20.5	171°16.1	09.5	71°34.2	37.7	172°34.6	16.6	Pollux	243°16.1	27°57.8
23	196°00.8	139°51.1	21.3	186°16.8	10.3	86°36.3	37.7	187°36.8	16.7	Avior	234°14.3	-59°35.9
										Suhail	222°45.5	-43°32.6
Mer.p	ass. 09:58	$\nu$ -0.7' d0	.8′ m-3.92	$\nu$ 0.7 $'$ d0	.8′ m1.21	$\nu 2.1' \ d$ -0	.0′ m-2.06	$\nu$ 2.2 $^{\prime}$ d0	$.1^\prime$ m $0.93$	Miaplacidus	221°37.9	-69°49.8
										Alphard	217°46.6	-8°46.5
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.2	11°50.2
	211°03.3									Dubhe	193°39.3	61°36.7
0		154°50.4 169°49.7	N20°22.0	201°17.5	N03°11.1	101°38.5	N22°37.7	202°39.0 217°41.2	N01°16.8	Denebola	182°23.6	14°25.4
1	226°05.8		22.8	216°18.2	11.9	116°40.6	37.6		16.9	Gienah	175°42.2	-17°41.5
2	241°08.2	184°49.1	23.6	231°18.9	12.6	131°42.8	37.6	232°43.4	17.1	Acrux	172°58.3	-63° 14.9
3	256°10.7	199°48.4	• • 24.4	246°19.6	• • 13.4	146°44.9	• • 37.5	247°45.6	• • 17.2	Gacrux	171°50.0	-57° 15.9
4	271°13.1	214°47.7	25.2	261°20.3	14.2	161°47.0	37.5	262°47.8	17.3	Alioth	$166^{\circ}11.5$	55°49.0
5	286°15.6	229°47.0	26.0	276°21.0	14.9	176°49.2	37.5	277°50.0	17.4	Spica	158°20.9	-11° 18.1
6	301°18.1	244°46.4	N20°26.7	291°21.6	N03° 15.7	191°51.3	N22°37.4	292°52.2	N01°17.5	Alkaid	152°50.7	49° 10.8
7	316°20.5	259°45.7	27.5	306°22.3	16.5	206°53.4	37.4	307°54.4	17.6	Hadar	148°33.9	-60°30.1
8	331°23.0	274°45.0	28.3	321°23.0	17.2	221°55.6	37.3	322°56.6	17.7	Menkent	147°56.0	-36°30.1
9	346°25.5	289°44.3	• • 29.1	336°23.7	• • 18.0	236°57.7	• • 37.3	337°58.8	• • 17.8	Arcturus	145°46.6	19°02.6
10	1°27.9	304°43.7	29.8	351°24.4	18.8	251°59.8	37.3	353°00.9	18.0	Rigil Kent.	139°38.2	-60° 56.7
11	16°30.4	319°43.0	30.6	6°25.1	19.6	267°02.0	37.2	8°03.1	18.1	Kochab	137°18.6	74°02.7
12	31°32.9	334°42.3	N20°31.4	21°25.8	N03°20.3	282°04.1	N22°37.2	23°05.3	N01°18.2	Zuben'ubi	136°54.5	-16°09.2
13	46°35.3	349°41.6	32.2	36°26.5	21.1	297°06.2	37.2	38°07.5	18.3	Alphecca	126°02.5	26°37.4
14	61°37.8	4°40.9	32.9	51°27.2	21.9	312°08.4	37.1	53°09.7	18.4	Antares	112° 14.2	-26°29.5
15	76°40.3	19°40.3	• • 33.7	66°27.9	• • 22.6	$327^{\circ}10.5$	•• 37.1	68°11.9	•• 18.5	Atria	107°07.1	-69°04.3
16	$91^{\circ}42.7$	34°39.6	34.5	81°28.6	23.4	$342^{\circ}12.6$	37.0	83°14.1	18.6	Sabik	102°01.3	-15° 45.5
17	106°45.2	49°38.9	35.3	96°29.3	24.2	$357^{\circ}14.8$	37.0	98°16.3	18.7	Shaula	96°08.7	-37°07.3
18	121°47.6	64°38.2	N20°36.0	111°30.0	N03°24.9	$12^{\circ}16.9$	N22°37.0	113°18.5	N01°18.8	Rasalhague	95°57.4	12°32.3
19	136°50.1	79°37.5	36.8	126°30.7	25.7	$27^{\circ}19.0$	36.9	128°20.7	19.0	Eltanin	90°41.4	51°28.8
20	151°52.6	94°36.9	37.6	141°31.4	26.5	42°21.1	36.9	143°22.9	19.1	Kaus Aust.	83°30.9	-34°22.2
21	166°55.0	109°36.2	• • 38.3	156°32.0	• • 27.2	57°23.3	• • 36.8	158°25.1	• • 19.2	Vega	80°32.3	38°48.2
22	181°57.5	124°35.5	39.1	171°32.7	28.0	72°25.4	36.8	173°27.3	19.3	Nunki	75°46.3	-26° 15.8
23	197°00.0	139°34.8	39.8	186°33.4	28.8	87°27.5	36.8	188°29.5	19.4	Altair	61°58.9	8°56.1
	00.54	0.7/ 10	0/ 2.00	0.7/ 10	0/ 1.01	0.1/ / 0	0/ 0.00	2.0/_/0	1/ 0.02			-56°38.8
ivier.p	ass. 09:54	$\nu$ -0.7 d0	.8′ m-3.92	$\nu$ 0.1' d0	.8′ m1.21	$\nu$ 2.1 $a$ -0	.0′ m-2.06	ν2.2 a0	.1′ m0.93	Peacock Deneb	53°04.1 49°25.1	-50 38.8 45°22.1
										Enif	33°37.9	9°59.6
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		27°31.8	-46°49.8
0	212°02.4	154°34.1	N20° 40.6	201°34.1		102°29.7	N22°36.7		N01° 19.5	Al Na'ir		-46° 49.8 -29° 28.9
1	227°04.9	169°33.4	41.4	216°34.8	30.3	117°31.8	36.7	218°33.8	19.6	Fomalhaut	15°13.6	
2	242°07.4	184°32.8	42.1	231°35.5	31.1	132°33.9	36.6	233°36.0	19.7	Scheat	13°44.4	28° 13.3
3	257°09.8	199°32.1	42.9	246°36.2	31.8	147°36.1	• • 36.6	248°38.2	. 19.8	Markab	13°29.1	15°20.7
4	272°12.3	214°31.4	43.6	261°36.9	32.6	162°38.2	36.6	263°40.4	19.9	Apr 22 Wed	SHA	Mer.pass
5	287°14.8	214 31.4 229°30.7	44.4	276°37.6	33.4	177°40.3	36.5	278°42.6	20.1	Venus		13:40
6	302°17.2	244°30.0	N20°45.2	291°38.3	N03°34.2	192°42.4	N22°36.5	293°44.8	N01°20.2	Mars		10:35
7	302 17.2 317°19.7	259°29.3	45.9	306°39.0	34.9	207°44.6	36.4	308°47.0	20.3	Jupiter		17:14
8	332°22.1	259 29.5 274°28.6	45.9 46.7	300 39.0 321°39.7	34.9 35.7	207 44.0 222°46.7	36.4	323°49.2	20.3	Saturn	351°42.3	10:31
9	347°24.6	274 28.0 289°27.9	• • 47.4	336°40.4	36.5	222 40.7 237°48.8	. 36.4	338°51.4	. 20.4	Saturii	JUL 12.J	10.51
10	2°27.1	304°27.3	48.2	351°41.1	37.2	252°50.9	36.3	353°53.6	20.6	Apr 23 Thu	SHA	Mer.pass
11	17°29.5	319°26.6	48.2	6°41.8	38.0	267°53.1	36.3	8°55.8	20.0	Venus	303°47.1	13:41
12	32°32.0	334°25.9	N20° 49.7	21°42.4	N03°38.8	282°55.2	N22° 36.2	23°58.0	N01°20.8	Mars		10:34
13	32 32.0 47°34.5	334 25.9 349°25.2	N20 49.7 50.4	36°43.1	39.5	282 55.2 297°57.3	36.2	23 58.0 39°00.2	20.9	Jupiter	250°35.2	17:11
14	62°36.9	4°24.5	51.2	50 43.1 51°43.8	40.3	312°59.5	36.2	54°02.4	20.9	Saturn	351°35.7	10:28
	77°39.4	4 24.5 19°23.8		66°44.5	41.1	312 59.5 328°01.6		69°04.6		A 01.5	CIIA	N4-
15 16	77°39.4 92°41.9	19°23.8 34°23.1	· · 51.9 52.7	81°45.2		328°01.6 343°03.7	· · 36.1	84°06.8	•• 21.2	Apr 24 Fri	SHA	Mer.pass
16 17					41.8		36.1		21.3	Venus		13:42
17	107°44.3	49°22.4	53.4 N20° 54.2	96°45.9	42.6	358°05.8	36.0	99°09.0	21.4 No1°21 5	Mars		10:33
18	122°46.8	64°21.7	N20°54.2	111°46.6	N03°43.4	13°08.0	N22°36.0		N01°21.5	Jupiter		17:08
19	137°49.3	79°21.0	54.9	126°47.3	44.1	28°10.1	36.0	129°13.3	21.6	Saturn	351°29.2	10:24
20	152°51.7	94°20.3	55.7	141°48.0	44.9	43°12.2	35.9	144°15.5	21.7	Horizont	al parallax	
21	167°54.2	109°19.7	• • 56.4	156°48.7	• • 45.7	58°14.3	• • 35.9	159°17.7	• • 21.8	1101120110	Venus:	0.1
22	182°56.6	124°19.0	57.1 57.0	171°49.4	46.4	73°16.5	35.8	174°19.9	21.9		Mars:	0.1
23	197°59.1	139°18.3	57.9	186°50.1	47.2	88°18.6	35.8	189°22.1	22.0		141013.	0.1
Mer.p	ass. 09:50	$\nu$ -0.7 $'$ d0	.8′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.8′ m1.22	$\nu 2.1' \ d-0$	.0′ m-2.05	$\nu$ 2.2′ d0	.1′ m0.93			

h	Sun				Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°21.2	N12°07.7	115° 17.8	2.8'	N27°55.5	-2.7'	59.7'
1 2	195°21.3 210°21.4	08.6 09.4	129°39.6 144°01.5	2.9' 2.9'	27°52.7 27°49.8	-2.9' -3.1'	59.7' 59.7'
3	225° 21.5	10.3	158°23.4	3.0'	27°46.7	-3.1 -3.3'	59.7'
4	240°21.7	11.1	$172^{\circ}45.4$	3.1'	27°43.3	-3.5'	59.6'
5	255°21.8	11.9	187°07.5	3.2'	27°39.8	-3.7'	59.6'
6 7	270°21.9 285°22.0	N12° 12.8 13.6	201°29.6 215°51.9	3.2' 3.3'	N27°36.1 27°32.2	-3.9' -4.1'	59.6' 59.6'
8	300° 22.1	14.5	230°14.2	3.4'	27°28.1	-4.1 -4.3'	59.5
9	315°22.3	• • 15.3	244°36.6	3.5'	27°23.8	-4.5'	59.5'
10	330°22.4	16.1	258°59.1	3.6'	27°19.4 27°14.7	-4.7'	59.5'
11 12	345°22.5 0°22.6	17.0 N12° 17.8	273°21.7 287°44.4	3.7' 3.8'	27°14.7 N27°09.9	-4.8' -5.0'	59.5' 59.4'
13	15°22.7	18.7	302°07.1	3.9'	27°04.8	-5.2'	59.4'
14	30°22.9	19.5	316°30.0	4.0'	26°59.7	-5.4'	59.4'
15	45°23.0 60°23.1	· · 20.3 21.2	330°52.9 345°16.0	4.1' 4.2'	26°54.3 26°48.7	-5.6' -5.7'	59.4' 59.3'
16 17	75°23.2	22.0	359°39.2	4.2	26°43.0	-5.1' -5.9'	59.3'
18	90°23.3	N12° 22.8	14°02.4	4.4'	N26°37.1	-6.1	59.3'
19	105°23.5	23.7	28°25.8	4.5'	26°31.0	-6.3	59.3'
20 21	120°23.6 135°23.7	24.5 · · 25.3	42°49.3 57°12.9	4.6' 4.7'	26°24.7 26°18.3	-6.4' -6.6'	59.2' 59.2'
22	150°23.8	26.2	71°36.6	4.7	26°11.7	-6.8'	59.2'
23	165°23.9	27.0	86°00.4	4.9'	26°05.0	-6.9	59.2'
	SD = 15.9'	d = 0.8'		SI	O = 16.3'		
<b>-</b> .							
Thu 0	<b>GHA</b> 180° 24.1	<b>Dec</b> N12°27.8	<b>GHA</b> 100°24.3	u 5.0'	Dec N25°58.0	d -7.1'	<b>HP</b> 59.1'
1	195° 24.2	28.7	$114^{\circ}48.3$	5.1'	25°51.0	-7.1 -7.2'	59.1
2	210°24.3	29.5	129° 12.4	5.3'	25°43.7	-7.4'	59.1'
3	225°24.4 240°24.5	· · 30.4 31.2	143°36.7 158°01.0	5.4'	25°36.3 25°28.7	-7.6'	59.0'
4 5	240 24.5 255°24.6	31.2	158 01.0 172°25.5	5.5' 5.6'	25 28.7 25°21.0	-7.7' -7.9'	59.0' 59.0'
6	270° 24.8	N12° 32.8	186°50.1	5.7'	N25°13.1	-8.0'	59.0'
7	285° 24.9	33.7	201°14.8	5.8'	25°05.1	-8.2'	58.9'
8 9	300°25.0 315°25.1	34.5 •• 35.3	215°39.7 230°04.6	6.0' 6.1'	24°56.9 24°48.6	-8.3' -8.5'	58.9' 58.9'
10	330°25.2	36.2	244°29.7	6.2'	24°40.1	-o.5 -8.6'	58.9'
11	345° 25.3	37.0	258°54.9	6.3'	24°31.5	-8.8'	58.8'
12	0°25.5	N12°37.8	273°20.2	6.4'	N24°22.7	-8.9'	58.8'
13 14	15°25.6 30°25.7	38.7 39.5	287°45.7 302°11.2	6.6' 6.7'	24°13.8 24°04.8	-9.0' -9.2'	58.8' 58.7'
15	45° 25.8	40.3	316°36.9	6.8'	23°55.6	-9.2'	58.7'
16	60°25.9	41.2	331°02.7	6.9'	23°46.3	-9.5'	58.7'
17	75°26.0 90°26.1	42.0 N12°42.8	345°28.7 359°54.7	7.1'	23°36.8 N23°27.2	-9.6' -9.7'	58.7'
18 19	90 26.1 105°26.3	43.6	359 54.7 14°20.9	7.2' 7.3'	23°17.5	-9.7 -9.9'	58.6' 58.6'
20	120°26.4	44.5	28°47.2	7.4'	23°07.7		58.6'
21	135°26.5	• • 45.3	43°13.6	7.6'	22°57.7	-10.1'	58.6'
22 23	150°26.6 165°26.7	46.1 46.9	57°40.2 72°06.9	7.7' 7.8'	22°47.6 22°37.3	-10.2' -10.3'	58.5' 58.5'
23	SD = 15.9'	d = 0.8'	12 00.9		D = 16.1'	-10.5	
	<u>JD = 13.9</u>	<u>u = 0.0</u>		JI	J = 10.1		
Fri	GHA	Dec	GHA	$\nu$	Dec	d 10.5'	HP
0 1	180° 26.8 195° 26.9	N12°47.8 48.6	86°33.7 101°00.6	7.9' 8.0'	N22°27.0 22°16.5	-10.5' -10.6'	58.5' 58.4'
2	210° 27.1	49.4	$115^{\circ}27.6$	8.2'	22°05.9	-10.0	58.4
3	225° 27.2	• • 50.2	129°54.8	8.3'	21°55.2	-10.8'	58.4'
4	240°27.3 255°27.4	51.1	144°22.1 158°49.5	8.4'	21°44.4 21°33.5	-10.9'	58.4'
5 6	255°27.4 270°27.5	51.9 N12°52.7	158° 49.5 173° 17.0	8.5' 8.7'	N21°22.4	-11.0' -11.2'	58.3' 58.3'
7	285°27.6	53.5	$187^{\circ}44.7$	8.8'	21°11.3	-11.3'	58.3'
8	300°27.7	54.4	202°12.5	8.9'	21°00.0	-11.4'	58.2'
9 10	315°27.8 330°28.0	· · 55.2 56.0	216°40.4 231°08.4	9.0' 9.1'	20°48.7 20°37.2	-11.5' -11.6'	58.2' 58.2'
11	345°28.1	56.8	245°36.5	9.3'	20°25.6	-11.7	58.2'
12	0°28.2	N12°57.6	260°04.8	9.4'	N20°13.9	-11.8'	58.1'
13	15°28.3	58.5 12° 59.3	274°33.1	9.5'	20°02.2 19°50.3	-11.9'	58.1'
14 15	30° 28.4 45° 28.5	12°59.3 13°00.1	289°01.6 303°30.2	9.6' 9.7'	19°50.3 19°38.3	-12.0' -12.1'	58.1' 58.0'
16	60°28.6	00.9	317° 59.0	9.8'	19°26.3	-12.2'	58.0'
17	75°28.7	01.7	332°27.8	10.0'	19°14.1	-12.2'	58.0'
18 19	90°28.8 105°28.9	N13°02.6 03.4	346°56.8 1°25.8	10.1' 10.2'	N19°01.9 18°49.6	-12.3' -12.4'	58.0' 57.9'
20	105 28.9 120°29.1	04.2	15°55.0	10.2	18°37.1	-12.4 -12.5'	57.9'
21	135°29.2	• • 05.0	$30^{\circ}24.3$	10.4'	18°24.6	-12.6'	57.9'
22	150°29.3	05.8	44°53.7	10.5'	18°12.0	-12.7'	57.9'
23	165°29.4	06.7	59°23.2	10.6'	17°59.4	-12.7'	57.8'
	SD = 15.9'	d = 0.8'		SI	O = 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
<b>N</b> 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	е		Moonset	
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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	00.40
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		

Second	h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
1	Sat	CHA	CHA	Doc	CHV	Doc	CHV	Doc	CHV	Doc		SHA	Doc
1 929°96   1997'0   2999'4   2975   489   1897'25   5357   2997'05   223   3697'05   5275   2997'05   224   4777'11   4747'13													Dec
2 24700.5 184*10.2 21*031 23*152.2 49.8 183*15.0 5.7 244*28.7 22.4 6.4 2.2 2.4 1 2.5 2.5 2.4 1 2.5 2.5 2.4 1 2.5 2.5 2.4 1 2.5 2.5 2.5 2.4 1 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5											Alpheratz	357°34.0	$29^{\circ}14.0$
3 250 00.0 399 11.5 0 00.0 00.0 200 200 200 00.0 00.0 00.											Ankaa	353°06.5	-42°09.7
1											Schedar	349°30.4	56°40.8
Section   Sect											Diphda	348°46.5	$-17^{\circ}50.6$
86 303*16.4 294*11.4 021*03.0 294*16.9 003*15.2 193*13.4 192*36.5 294*37.5 003*2.9 Herm 27.7 310*2.8 297*11.7 03.6 23.5 297*12.0 04.5 3115.0 3 51.1 223*37.7 35.4 324*14.9 23.0 Merica 31.0 3*0.2 297*12.0 04.5 3115.0 3 51.1 223*37.7 35.4 324*14.9 23.0 Merica 31.0 3*0.2 297*12.0 04.5 3115.0 3 51.1 223*37.7 35.4 324*14.9 23.0 Merica 31.0 04.0 297*12.0 04.5 31.0 04.5 31.0 04.0 20.2 04.0 1.0 34.0 04.0 20.0 34.0 1.0 04.0 20.0 04.0 20.0 04.0 20.0 04.0 04											Achernar	335°20.0	$-57^{\circ}06.1$
17 1911 88 289 127 088 300 556 533 200 150 535 300 397 7 229 6											Hamal	327°50.4	23°35.1
8 83973 3 294110													
19   19   19   19   19   19   19   19													
13 1 127 3 137 137 137 137 137 137 137 137 137													
19 1 37-92 1 301-90													
18-261   38-200   12-77   37-80   10-77   37-80   30-77   30-78   30	10					55.6							
14   637   63   63   63   63   63   63   6													
13   18   18   19   19   19   19   19   19				N21°07.4									
15	13			08.1		57.9		35.2		23.6			
19	14		4°07.8	08.9	52°00.5	58.7	313°50.4		54°55.0	23.7			
Bestegene	15			• • 09.6				• • 35.1		• • 23.8			
19   187	16	93°41.0	34°06.4	10.3		04°00.2	343°54.7		84°59.4	23.9			
18   18   18   18   18   18   18   18	17	108°43.5	49°05.7	11.0		01.0	358°56.8	35.0	$100^{\circ}01.6$	24.0	_		
Mathematics	18	123°45.9	64°05.0	N21°11.8	112°03.3	N04°01.7	13°58.9	N22°35.0	115°03.8	N01°24.1			
Decoration	19	138°48.4	79°04.3	12.5	127°04.0	02.5	29°01.0	35.0	130°06.0	24.2			
22 185*53.8 126*022 146 127*050.0 048 59*05-3 **34.0 180*1014 **24.5 46**  23 186*53.8 126*022 146 127*050.0 048 59*05-3 **34.0 180*114.0 **24.5 46**  23 186*53.8 126*022 146 127*050.0 048 59*05.3 **34.0 180*114.0 **24.5 46**  34 187 187 187 187 187 187 187 187 187 187	20	153°50.9	94°03.6	13.2	142°04.6	03.2	44°03.1	34.9	145°08.2	24.4			
22   188*558   124*02.2   14.6   172*06.0   04.8   74*07.4   34.8   175*12.6   24.6   5.0   24.6   34.8   100*14.8   24.7   34.8   100*14.8   24.7   34.8   100*14.8   24.7   34.8   24.6   34.8   100*14.8   24.7   34.8   24.6   34.8   24.8   34.8   24.8   34.8   24.8   34.8   24.8   34.8   24.8   34.8	21	168°53.3	109°02.9	• • 13.9	157°05.3	• • 04.0	59°05.3	• • 34.9	160° 10.4	• • 24.5			
Mer. pass. 09.46		183°55.8							175°12.6				
Mor. pass. 0946													
Sun GHA													
Sun   GHA   CHA   Dec   GHA   Dec   CHA   Dec   CHA   Dec   Dubbh   2014   2	Mer.p	ass. 09:46	$\nu$ -0.7′ d0	. <i>(</i> ′ m-3.92	$\nu^{0.7'} d0$	.ʊ′ m1.22	$\nu^{2.1'} d-0$	.u′ m-2.05	$\nu^{2.2'} d0$	.1′ m0.93			
Sum   GHA													
224*00.7 15*00.8 N21*16.1 202*07.4 N04*06.3 104*11.6 N22*94.8 205*17.0 N01*24.8   Decembed 122*07.2 104*09.5 104*24.7   Decembed 122*07.2 104*24.7   Decembed 122	Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	_		
2 244°05.6 183°59.4 17.5 223°08.8 07.8 134°15.8 34.7 220°19.2 249 0 3 299°08.1 189°58.7 18.2 247°09.5 0.86 149°18.0 3.46 250°23.6 0.51. 4 274°10.6 213°57.9 18.9 262°10.2 0.94 166°20.1 34.6 250°23.6 0.51. 5 289°13.0 286°57.2 19.6 277°10.9 10.1 170°22.2 34.5 280°28.0 25.3 5.1 4.1 4.1 4.1 4.1 4.1 4.1 4.1 4.1 4.1 4													
2 244°05.6   189°54   71.5   232°08.8   07.8   134°15.8   34.7   225°21.4   25.0   3 25°08.1   189°54   71.5   232°08.8   07.8   134°15.8   34.7   225°21.4   25.0   4 274°10.6   231°57.9   18.0   262°10.2   09.4   164°20.1   34.6   265°25.8   25.2   5 289°13.0   228°57.2   19.6   202°10.2   09.4   164°20.1   34.6   265°25.8   25.2   5 289°13.0   228°57.2   19.6   202°10.2   09.4   164°20.1   37.6   265°25.8   25.2   5 289°13.0   228°57.2   19.6   202°10.0   10.1   179°22.2   34.5   226°28.0   25.3   6 304°15.5   237°55.1   21.7   322°13.0   12.4   224°28.5   34.4   325°34.6   25.7   8 334°20.4   273°55.1   21.7   322°13.0   12.4   224°28.5   34.4   325°34.6   25.7   8 334°20.4   333°53.7   32.3   352°14.4   13.9   255°32.8   34.3   355°39.0   25.8   8 10 4°22.9   288°54.4   22.5   332°13.7   13.2   239°30.7   34.4   340°35.8   25.8   8 10 4°22.8   331°53.0   23.0   37°13.7   13.2   239°30.1   223°43.0   224°35.5   11 19°27.8   318°53.0   23.0   37°13.7   13.2   239°30.1   223°43.0   10°41.2   20.6   12 19°37.7   38°50.2   235°5.1   227°35.5   227°35.5   227°35.5   13 19 19 30°47.5   78°30.0   25.9   25°17.1   17.7   330°43.4   34.1   70°50.0   26.4   14 64°32.7   338°40.0   237°45.5   237°45.5   238°45.0   238°45													
299°08.1 bg* 980°7. 18.2 247°09.5 · 08.6 149°18.0 · 34.6 220°23.6 · 25.1 4 247°19.5 · 08.6 149°18.0 · 34.6 220°23.6 · 25.1 4 27.6 cacus 171°80.0 · 57°80.0 55°80.0 1 34°80.0 · 238°57.2   18.0 20°10.2 · 09.4 166°20.1 34.6 · 220°28.0 · 25.3   Alich 160°11.5 5°80.0   55°80.0 1 30°15.5   248°57.5   19.0 cacus 171°80.0   19.0 cacus 17													
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See   138   130   228   137   106   277   109   10.1   179   179   22.2   34.5   280   28.0   25.3   Allert   187   197   179   17											Gacrux		
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8 334°0.4   273°55.1   21.7   322°13.0   12.4   224°28.5   34.4   340°36.8   25.8   Menkent   147°56.0   38°50.1   10   4°25.4   303°53.7   23.2   332°14.4   13.9   254°32.8   34.3   355°39.0   25.9   Menkent   147°56.0   38°50.1   11   19°22.6   11   19°22.6   318°35.3   233°21.4   13.9   254°32.8   34.3   355°39.0   25.9   Menkent   147°56.0   38°50.1   10   10   10   10   10   10   10											Alkaid	152°50.7	49° 10.8
9 349°229 288°544, 225 337°13.7 · 13.2 239°30.7 · 34.4 340°36.8 · 25.8 Members 147°30.9 30.30.30.30.30.1 10°41.2 ° 26.0 11°10°42.8 318°53.0 23.9 ° 151.1 · 147 · 269°34.9 34.3 355°34.3 N01°26.1 236°30.3 333°52.3 N21°24.6 · 22°15.8 N04°15.5 248°37.0 N22°34.2 25°43.4 N01°26.1 240°45.6 ° 26.2 11°36°32.3 ° 36°50.9 ° 26.0 ° 52°17.1 · 17.0 ° 314°41.2 ° 34.2 ° 26°43.4 ° 34°1.1 ° 36°51.2 ° 26°5.3 ° 37°16.4 ° 16.2 ° 299°39.1 ° 34.2 ° 40°45.6 ° 26.2 ° 240°45.6 ° 26.2 ° 245°40.1 ° 33°49.4 ° 27.4 ° 82°18.5 ° 15.5 ° 344°45.5 ° 34.1 ° 80°52.2 ° 26.5 ° 26.7 ° 67°17.8 ° 17.7 ° 329°43.4 ° 34.1 ° 80°52.2 ° 26.5 ° 340°40.1 ° 33°49.4 ° 27.4 ° 82°18.5 ° 15.5 ° 344°45.5 ° 34.1 ° 80°52.2 ° 26.5 ° 340°40.1 ° 33°49.4 ° 27.4 ° 82°18.5 ° 344°45.5 ° 34.1 ° 80°52.2 ° 26.5 ° 340°40.1 ° 33°40.4 ° 27.4 ° 34°45.5 ° 34.1 ° 80°52.2 ° 26.5 ° 340°40.1 ° 33°45.5 ° 16°40.2 ° 20°5.1 ° 20°40.2 ° 20°5.1 ° 20°5.2 ° 37°47.5 ° 34°4.3 ° 20°5.2 ° 12°20.6 ° 20.8 ° 29°51.8 ° 34.0 ° 130°58.7 ° 26.8 ° 340°40.2 ° 22°18.8 ° 34.0 ° 130°58.7 ° 26.9 ° 27.0 ° 24.2 ° 23°1.5 ° 24.2 ° 24.5											Hadar	148°33.9	-60°30.1
10											Menkent	147°56.0	$-36^{\circ}30.1$
11 19°27.8 318°53.0 23.9 7°15.1 14.7 260°34.9 34.3 10°41.2 260 Kochab 12°15.1 13°34.3 10°41.2 260 Kochab 13°18.6 77°102.7 13 49°32.7 348°51.6 253 37°16.4 16.2 299°39.1 34.2 40°45.6 26.2 Alphecca 126°0.2 52°17.1 17.0 31°41.2 34.2 55°47.8 26.3 Alphecca 126°0.2 52°17.1 17.0 31°41.2 34.2 55°47.8 26.3 Alphecca 126°0.2 52°17.1 17.0 31°41.2 34.2 55°47.8 26.3 Alphecca 126°0.2 52°37.4 Alphecca 126°0.2 52°47.4 Alphecca 126°0.2											Arcturus	145°46.6	19°02.6
12 34°30.3 333°\$2.3 N21°24.6											Rigil Kent.	139°38.2	-60°56.7
13											Kochab	137°18.6	74°02.7
Alpheca   18   18   18   18   18   18   18   1											Zuben'ubi	136°54.5	-16°09.2
14 64*35.2 3*90.9 26.0 67*7.8 17.0 314*41.2 34.2 55*47.8 26.3 15*7.77.7 18*90.2 **2.67 67*7.8 17.7 329*43.4 **34.1 70*70.50 **.26.4 16 94*40.1 33*94.9 4 27.4 82*18.5 18.5 344*45.5 34.1 85*52.2 26.5 18.1 124*45.1 33*94.4 27.4 82*18.5 18.5 344*45.5 34.1 85*52.2 26.5 18.1 124*45.1 63*48.0 N21*28.8 112*19.9 N04*20.0 14*49.7 N22*34.0 115*56.5 N012*6.8 18.1 124*45.1 63*48.0 N21*28.8 112*19.9 N04*20.0 14*49.7 N22*34.0 115*56.5 N012*6.8 18.1 124*3.1 12*19.9 N04*20.0 14*49.7 N22*34.0 115*56.5 N012*6.8 18.1 124*3.1 12*19.9 N04*20.0 14*49.7 N22*34.0 115*56.5 N012*6.8 18.1 124*2.1 12*19.9 N04*20.0 14*49.7 N22*34.0 115*56.5 N012*6.8 18.1 12*19.5 N04*20.0 14*49.7 N22*34.0 115*56.5 N012*6.8 18.1 12*19.5 N04*20.0 14*49.7 N22*34.0 115*56.5 N012*6.8 18.1 12*19.5 N04*20.0 14*49.7 N22*34.0 115*56.5 N012*6.8 15*34.7 N21*2*2.7 23.1 74*58.1 33.8 176*05.3 27.2 N02*3.3 199*57.4 138*34.4 32.2 187*23.4 23.8 90*00.3 33.8 191*07.5 27.3 N14*1.7 N14*2*1.2 N2.2 N02*34.2 N02*													
15 79°37.7 18°80.2 · · · · · · · · · · · · · · · · · · ·													
16   94*40.1   33*49.4   27.4   82*18.5   344*45.5   34.1   86*52.2   26.5   34.0   100*64.3   26.6   34.0   100*64.3   26.6   34.0   100*64.3   26.6   34.0   100*64.3   26.6   34.0   100*64.3   26.6   34.0   100*64.3   26.6   34.0   100*64.3   26.6   34.0   100*64.3   26.6   34.0   100*68.7   26.0				• • 26.7									
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20 154°50.0 93°46.6 30.2 142°21.3 21.6 44°53.9 33.9 146°00.9 27.0 161°03.1 · 27.1 Vega 161°05.2 184°54.9 123°45.2 31.5 172°22.7 23.1 74°58.1 33.8 176°05.3 27.2 Numit 75°46.3 · 26°15.8 Numit 75°46.3 · 26°15.8 Numit 75°40.0 · 26°15.8 Numit 75°40.0 · 26°15.8 Numit 75°40.3	19	139°47.5	78°47.3	29.5		20.8	29°51.8	34.0	130°58.7	26.9	_		
21 169°525 108°459 · 30.9 · 157°22.0 · 22.3 · 59°56.0 · 33.9 · 161°03.1 · 27.1 · 22.2 · 28.4 · 23.8 · 39°00.3 · 33.8 · 176°05.3 · 27.2 · 27.3 · 28.8 · 23.3 · 39°3.2 · 27.2 · 27.3 · 28.8 · 23.3 · 199°57.4 · 138°44.4 · 32.2 · 187°23.4 · 23.8 · 90°00.3 · 33.8 · 191°07.5 · 27.3	20	154°50.0	93°46.6	30.2	142°21.3		44°53.9		146°00.9				
23 196°57.4 138°44.4 33.2 187°23.4 23.8 9°00.3 33.8 191°07.5 27.3   Mer.pass. 09:42 ν-0.7' d0.7' m-3.92 ν0.7' d0.8' m1.22 ν2.1' d-0.0' m-2.04 ν2.2' d0.1' m0.93   Mon GHA GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec 1 230°02.3 166°43.0 33.6 217°24.8 25.4 120°04.5 33.7 221°11.9 27.5   245°04.8 183°42.3 34.3 232°25.5 26.1 135°06.6 33.7 236°14.1 27.6   256°09.7 213°40.9 35.7 262°26.9 27.6 165°10.8 33.6 251°16.3 2.27.7   276°09.7 213°40.9 35.7 262°26.9 27.6 165°10.8 33.6 251°16.3 2.27.7   277°37.5 28.4 180°12.9 33.5 281°20.7 27.9   288°33.9 350°22.0 288°37.3 3.9 31. 322°29.6 30.7 225°19.3 33.4 310°25.1 28.2   350°14.6 243°39.4 N21°37.1 292°28.2 N04°29.2 195°15.0 N22°33.5 296°22.9 N01°28.1   38°36°14.6 243°39.4 N21°37.1 292°28.2 N04°29.2 195°15.0 N22°33.5 296°22.9 N01°28.1   35°24.5 303°36.6 39.8 352°31.0 32.2 255°33.5 33.3 365°31.7 28.5   35°24.6 308°36.8 18°33.0 38.4 322°29.6 30.7 225°19.3 33.4 310°25.1 28.2   35°29.4 333°35.1 N21°41.1 22°32.4 N04°33.7 285°27.7 N22°33.2 26°36.1 N01°28.7   35°31.9 346°34.4 41.8 37°33.1 34.5 300°29.8 33.2 41°38.3 28.8   35°31.9 33°32.2 43.9 82°35.2 36.8 345°36.1 33.0 86°44.9 29.1   35°39.9 33°32.2 43.9 82°35.2 36.8 345°36.1 33.0 86°44.9 29.1   31°10°41.7 48°31.5 44.5 9°735.9 9°35.9 37.5 0°38.3 33.0 101°47.1 29.2   31°10°41.7 48°31.5 44.5 9°735.9 9°35.9 37.5 0°38.3 33.0 101°47.1 29.2   31°10°41.7 48°31.5 44.5 9°735.9 9°35.6 N33.3 15°40.4 N22°33.0 110°49.3 N010°29.4   31°10°41.7 48°31.5 44.5 9°735.9 9°35.9 37.5 0°38.3 33.0 101°47.1 29.2   31°10°41.7 48°31.5 44.5 9°735.9 9°35.9 37.5 0°38.3 33.0 101°47.1 29.2   31°10°41.7 48°31.5 44.5 9°735.9 975.9 0°38.3 33.0 101°47.1 29.2   31°10°41.7 48°31.5 44.5 9°735.9 9735.9 0°38.3 33.0 101°47.1 29.2   31°10°41.7 48°31.5 44.5 9°737.3 39.0 30°42.5 32.9 131°51.5 29.5   31°10°41.7 48°31.5 44.5 9°735.9 9°35.9 37.5 0°38.3 33.0 101°47.1 29.2   31°10°41.7 48°31.5 44.5 9°735.9 9°35.9 37.5 0°38.3 33.0 101°47.1 29.2   31°10°41.7 48°31.5 44.5 9°35.9 9°35.9 37.5 0°38.3 33.0 101°47.1 29.2   31°10°41.7 48°31.5 44.5 9°35.9 9°35.9 37.5 0°38.3 33.0 101°47.1 29.	21	$169^{\circ}52.5$	108°45.9	• • 30.9	157°22.0	• • 22.3	59°56.0	• • 33.9		•• 27.1			
Mer.pass. 09:42   \( \nu \) -0.7' \( \nu \) 0.7' \( \nu \) 0.8' \( \mathrm{m} \) 1.8" \( \nu \) 4.4 \( \nu \) 3.22 \( \nu \) 18" \( \nu \) 1.8" \( \nu \) 2.1' \( \nu \) 0.0' \( \nu \) -2.2' \( \nu \) 0.1' \( \mu \) 0.8 \( \nu \) 50 \( \nu \) 2.1' \( \nu \) 0.0' \( \nu \) -2.2' \( \nu \) 0.1' \( \mu \) 0.8 \( \nu \) 50 \( \nu \) 1.8 \( \nu \) 2.1' \( \nu \) 0.0' \( \nu \) -2.2' \( \nu \) 0.1' \( \mu \) 0.8 \( \nu \) 50 \( \nu \) 1 \( \nu \) 2.1' \( \nu \) 0.0' \( \nu \) -2.2' \( \nu \) 0.1' \( \nu \) 0.0 \( \nu \) 50 \( \nu \) 1 \( \nu \) 2.1' \( \nu \) 0.0' \( \nu \) 2.2' \( \nu \) 0.1' \( \nu \) 0.0 \( \nu \) 50 \( \nu \) 1 \( \nu \) 2.2' \( \nu \) 0.1' \( \nu \) 0.0 \( \nu \) 2.2' \( \nu \) 0.1' \( \nu	22	184°54.9	123°45.2	31.5	172°22.7	23.1	$74^{\circ}58.1$	33.8	176°05.3	27.2	_		
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16 95°39.3 33°32.2 43.9 82°35.2 36.8 345°36.1 33.0 86°44.9 29.1 Venus 298°43.9 13:46 17 110°41.7 48°31.5 44.5 97°35.9 37.5 0°38.3 33.0 101°47.1 29.2 18 125°44.2 63°30.8 N21°45.2 112°36.6 N04°38.3 15°40.4 N22°33.0 116°49.3 N01°29.4 19 140°46.7 78°30.1 45.9 127°37.3 39.0 30°42.5 32.9 131°51.5 29.5 20 155°49.1 93°29.4 46.5 142°38.0 39.8 45°44.6 32.9 146°53.7 29.6 21 170°51.6 108°28.6 · 47.2 157°38.6 · 40.6 60°46.7 · 32.8 161°55.9 · 29.7 22 185°54.1 123°27.9 47.9 172°39.3 41.3 75°48.8 32.8 176°58.1 29.8 23 200°56.5 138°27.2 48.5 187°40.0 42.1 90°50.9 32.7 192°00.3 29.9    Venus 298°43.9 13:46											Apr 27 Man	CHV	Mer pass
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18													
19 140° 46.7 78° 30.1 45.9 127° 37.3 39.0 30° 42.5 32.9 131° 51.5 29.5 20 155° 49.1 93° 29.4 46.5 142° 38.0 39.8 45° 44.6 32.9 146° 53.7 29.6 21 170° 51.6 108° 28.6 · 47.2 157° 38.6 · 40.6 60° 46.7 · 32.8 161° 55.9 · 29.7 22 185° 54.1 123° 27.9 47.9 172° 39.3 41.3 75° 48.8 32.8 176° 58.1 29.8 23 200° 56.5 138° 27.2 48.5 187° 40.0 42.1 90° 50.9 32.7 192° 00.3 29.9 Mars: 0.1													
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21       170°51.6       108°28.6       · · 47.2       157°38.6       · · 40.6       60°46.7       · · 32.8       161°55.9       · · 29.7       Horizontal parallax         22       185°54.1       123°27.9       47.9       172°39.3       41.3       75°48.8       32.8       176°58.1       29.8       Venus: 0.1         23       200°56.5       138°27.2       48.5       187°40.0       42.1       90°50.9       32.7       192°00.3       29.9       Mars: 0.1											Saturn	331 09.9	10:14
22 185°54.1 123°27.9 47.9 172°39.3 41.3 75°48.8 32.8 176°58.1 29.8 Venus: 0.1 23 200°56.5 138°27.2 48.5 187°40.0 42.1 90°50.9 32.7 192°00.3 29.9 Mars: 0.1											Horizont	al parallax	-
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25 200 50.5 25.2 10.5 201 10.5 20.5 52.1 252 50.5													
Mer.pass. 09:38 $\nu$ -0.7 $'$ d0.7 $'$ m-3.92 $\nu$ 0.7 $'$ d0.8 $'$ m1.22 $\nu$ 2.1 $'$ d-0.0 $'$ m-2.03 $\nu$ 2.2 $'$ d0.1 $'$ m0.93	23	200 30.5											
	Mer.pa	ass. 09:38	$\nu$ -0.7′ d0	.7′ m-3.92	u0.7′ d0	.8′ m1.22	$\nu$ 2.1′ <i>d</i> -0	.0′ m-2.03	$\nu$ 2.2′ d0	.1'  m $0.93$			

h	Sui	า			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°29.5	N13°07.5	73°52.8	10.7'	N17°46.6	-12.8'	57.8'
1	195°29.6	08.3	88°22.6	10.8'	17°33.8	-12.9'	57.8'
2	210°29.7	09.1	102°52.4	10.9'	17°20.9	-13.0'	57.7'
3 4	225°29.8 240°29.9	· · 09.9 10.7	117°22.4 131°52.4	11.1' 11.2'	17°07.9 16°54.9	-13.1' -13.1'	57.7' 57.7'
5	255°30.0	10.7	131 32.4 146°22.6	11.3'	16° 41.7	-13.1	57.7'
6	270°30.1	N13°12.4	160°52.8	11.4'	N16°28.5	-13.3'	57.6'
7	285°30.2	13.2	175°23.2	11.5'	$16^{\circ}15.3$	-13.3'	57.6'
8	300°30.4	14.0	189°53.6	11.6'	16°01.9	-13.4'	57.6'
9	315°30.5	• • 14.8	204°24.2	11.7' 11.8'	15°48.5	-13.5'	57.6'
10 11	330°30.6 345°30.7	15.6 16.4	218°54.9 233°25.6	11.8	15°35.0 15°21.5	-13.5' -13.6'	57.5' 57.5'
12	0°30.8	N13°17.2	247°56.5	12.0'	N15°07.9	-13.7	57.5'
13	15°30.9	18.1	262°27.4	12.0'	14°54.3	-13.7'	57.4'
14	30°31.0	18.9	276°58.5	12.1'	14°40.5	-13.8'	57.4'
15	45°31.1 60°31.2	• • 19.7	291°29.6 306°00.9	12.2' 12.3'	14° 26.8 14° 12.9	-13.8'	57.4'
16 17	75°31.3	20.5 21.3	300 00.9 320°32.2	12.3 12.4'	14 12.9 13°59.0	-13.9' -13.9'	57.4' 57.3'
18	90°31.4	N13°22.1	335°03.6	12.5'	N13°45.1	-14.0'	57.3
19	105°31.5	22.9	349°35.1	12.6'	13°31.1	-14.0'	57.3'
20	120°31.6	23.7	4°06.7	12.7'	13° 17.1	-14.1'	57.3'
21	135°31.7	• • 24.5	18°38.4	12.8'	13°03.0	-14.1'	57.2'
22 23	150°31.8 165°31.9	25.3 26.1	33°10.1 47°42.0	12.8' 12.9'	12°48.8 12°34.7	-14.2' -14.2'	57.2' 57.2'
23			<del>+1 +2.0</del>			-14.2	J1.4
	SD = 15.9'	d = 0.8'		51	D = 15.8'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0 1	180°32.0 195°32.1	N13°27.0 27.8	62°13.9 76°45.9	13.0' 13.1'	N12°20.4 12°06.2	-14.3' -14.3'	57.2' 57.1'
2	210°32.2	28.6	91°18.0	13.1	12 00.2 11°51.8	-14.3 -14.4'	57.1'
3	225°32.3	• • 29.4	105°50.2	13.2'	11°37.5	-14.4'	57.1'
4	240°32.4	30.2	120°22.4	13.3'	$11^{\circ}23.1$	-14.4'	57.0'
5	255°32.6	31.0	134°54.8	13.4'	11°08.6	-14.5'	57.0'
6 7	270°32.7 285°32.8	N13°31.8 32.6	149°27.2 163°59.6	13.5' 13.5'	N10°54.2 10°39.6	-14.5' -14.5'	57.0' 57.0'
8	300°32.9	33.4	103 59.0 178°32.2	13.6'	10° 39.0	-14.5 -14.6'	56.9'
9	315°33.0	• • 34.2	193°04.8	13.7'	10° 10.5	-14.6'	56.9'
10	330°33.1	35.0	207°37.5	13.8'	09°55.9	-14.6'	56.9'
11	345°33.2	35.8	222°10.2	13.8'	09°41.3	-14.7'	56.9'
12 13	0°33.3 15°33.4	N13°36.6 37.4	236°43.1 251°15.9	13.9' 14.0'	N09°26.6 09°11.9	-14.7' -14.7'	56.8' 56.8'
14	30°33.5	38.2	265°48.9	14.0'	09 11.9 08°57.1	-14.7 -14.8'	56.8'
15	45°33.6	• • 39.0	280°21.9	14.1'	08°42.4	-14.8'	56.8'
16	60°33.7	39.8	294°55.0	14.1'	08°27.6	-14.8'	56.7'
17	75°33.8 90°33.9	40.6	309°28.1	14.2'	08°12.8 N07°57.9	-14.8'	56.7'
18 19	90°33.9 105°34.0	N13°41.4 42.2	324°01.3 338°34.6	14.3' 14.3'	07°43.1	-14.9' -14.9'	56.7' 56.7'
20	120°34.1	43.0	353°07.9	14.4'	07°28.2	-14.9'	56.6'
21	135°34.2	• • 43.8	7°41.3	14.4'	07°13.3	-14.9'	56.6'
22	150°34.3	44.6	22°14.7	14.5'	06°58.4	-14.9'	56.6'
23	165°34.4	45.4	36°48.2	14.5'	06°43.5	-15.0'	56.6'
	SD = 15.9'	d = 0.8'		SI	O = 15.6'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°34.5	N13°46.2	51°21.7	14.6'	N06°28.5	-15.0'	56.6'
1	195°34.6	47.0	65°55.3	14.6'	06°13.5	-15.0'	56.5'
2 3	210°34.7 225°34.8	47.8 • • 48.6	80°28.9 95°02.6	14.7' 14.7'	05°58.6 05°43.6	-15.0' -15.0'	56.5' 56.5'
3 4	225°34.8 240°34.9	49.4	95°02.6 109°36.3	14.7	05°43.6 05°28.6	-15.0' -15.0'	56.5'
5	255°35.0	50.2	124°10.1	14.8'	05°13.5	-15.0'	56.4
6	270°35.1	N13°51.0	138°43.9	14.9'	N04°58.5	-15.0'	56.4'
7	285°35.1	51.8	153°17.8	14.9'	04°43.5	-15.0'	56.4
8 9	300°35.2 315°35.3	52.6 •• 53.4	167°51.7 182°25.6	14.9' 15.0'	04°28.4 04°13.4	-15.1' -15.1'	56.4' 56.3'
10	315 35.3 330°35.4	54.2	182 25.6 196°59.6	15.0'	04 13.4 03°58.3	-15.1'	56.3'
11	345°35.5	55.0	211°33.6	15.1'	03°43.3	-15.1	56.3
12	0°35.6	N13°55.8	226°07.7	15.1'	N03°28.2	-15.1'	56.3'
13	15°35.7	56.6	240°41.8	15.1'	03°13.1	-15.1'	56.2'
14 15	30°35.8 45°35.9	57.4 •• 58.1	255°15.9 269°50.1	15.2' 15.2'	02°58.1 02°43.0	-15.1' -15.1'	56.2' 56.2'
16	45 35.9 60°36.0	58.9	284°24.3	15.2'	02 43.0 02°27.9	-15.1'	56.2'
17	75°36.1	13°59.7	298°58.5	15.3'	02°12.9	-15.1	56.2'
18	90°36.2	N14°00.5	313°32.7	15.3'	N01°57.8	-15.1'	56.1'
19	105°36.3	01.3	328°07.0	15.3'	01°42.7	-15.1'	56.1'
20 21	120°36.4 135°36.5	02.1 · · 02.9	342°41.3 357°15.7	15.3' 15.4'	01°27.7 01°12.6	-15.1' -15.1'	56.1' 56.1'
22	150°36.6	03.7	11°50.0	15.4	01 12.6 00°57.6	-15.1 -15.0'	56.0'
23	165°36.7	04.5	26°24.4	15.4'	00°42.5	-15.0'	56.0'
	SD = 15.9'	d = 0.8'		SI	O = 15.4'		

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

The Control	h	Aries	•	nus	•	ars	Jug	oiter	Sat	curn		Stars	
19   19   19   19   19   19   19   19	-												_
1 2 10:14 189:157 690 9. 10:14.14 4.18 19:15.17 19:15												SHA	Dec
1.											Alpheratz	357°34.0	29°14.0
2 20 00 1 125 0 10 1 125 0 10 1 125 0 10 1 125 0 10 125 0 12													
2													
. 4. 1949   2. 2019   2. 2													
1													
9 901-143	5	291°11.3	228°22.8	52.5	277°44.2	46.6	181°03.5	32.5	282°13.5	30.5			
1				N21°53.2		N04°47.4		N22°32.4		N01°30.6			
9 95 19 19 19 19 19 19 19 19 19 19 19 19 19	7	321°16.2	258°21.4	53.9	307°45.6	48.1	211°07.7	32.4	312°17.9	30.8			
19	8	336°18.7	273°20.6	54.5	322°46.3	48.9	226°09.9	32.3	327°20.1	30.9			
19 1 2 27-03	9	351°21.2	$288^{\circ}19.9$	• • 55.2		• • 49.7	241°12.0	• • 32.3	342°22.3	• • 31.0			
1.	10	6°23.6	303°19.2	55.8	352°47.7	50.4	256°14.1	32.3	357°24.5	31.1			
\$ 97.00   \$3	11	21°26.1	$318^{\circ}18.5$		7°48.4	51.2	271°16.2	32.2	12°26.7	31.2			
14 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	12	36°28.6	333°17.7	N21°57.1	22°49.1	N04°51.9	286°18.3	N22°32.2	27°28.9	N01°31.3	_		
19 0.73	13	51°31.0	348°17.0	57.8	37°49.8	52.7	301°20.4	32.1	42°31.1	31.4			
19	14	66°33.5	3°16.3	58.4	52°50.4	53.4	316°22.5	32.1	57°33.3	31.5			
Betchgrow   Section   Se	15	81°35.9	$18^{\circ}15.5$	• • 59.1	$67^{\circ}51.1$	• • 54.2	331°24.6	• • 32.0	72°35.5	• • 31.6			
17   111   11   11   13   13   13   13	16	96°38.4	33°14.8	$21^{\circ}59.7$	82°51.8	55.0	346°26.7	32.0	87°37.7	31.7			
18   126'433   678'133   N22'010   112'532   N04'565   16'809   N22'819   117'421   N01'819   23.     20   156'483   971'19   0.23   142'546   850   46'851   318   147'465   3.22     21   171'507   18'111   0.23   142'546   850   46'851   318   102'487   23.3     22   171'507   18'111   0.23   142'546   850   46'851   318   102'487   23.3     23   201'557   136'107   0.43   187'587   05'002   91'41.4   31.7   192'531   32.5     32   201'557   136'107   0.43   187'587   05'002   91'41.4   31.7   192'531   32.5     4   271'508   271'508   271'508   271'508   271'508   271'508   271'508     4   271'508   186'007   0.68   271'508   0.68   0.78   0.	17	111°40.9	$48^{\circ}14.1$	22°00.4	97°52.5	55.7	1°28.8	31.9	102°39.9		_		
19	18	126°43.3		N22°01.0	112°53.2	N04° 56.5			117°42.1	N01°31.9			
20													
11 117°807 108°1111 1 03.0 157°58.3 18.7 61°39′2 31.8 102°48.7 2.33   Froches 21.39°10.4 30.6 127°50.0 45°50.5 70°50.3 31.7 177°50.9 32.4   Froches 21.39°10.4 30.6 127°50.7 05°00.2 91°41.4 31.7 17°50.9 32.4   Froches 21.39°10.7 32.2   Froches 21.39°10.2   Froches 21.39°10.7 32.2   Froches 21.39°10.7 32											I I		
128   186°83 2   123°10.4   0.8													
Mer_pass   09.34   W-0.7 d 0.7 d 0.7 d 0.9   19.1													
More													
May   Chan   C													
Very	Mer.p	ass. 09:34	$\nu$ -0.7' d0	.7′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.8′ m1.22	$\nu$ 2.1′ <i>d</i> -0	.0′ m-2.03	$\nu$ 2.2 $^{\prime}$ d0	.1' m $0.93$			
CHA													
216*98.1   153*08.9   N22*04.9   202*07.4   N05*01.0   106*43.5   N22*31.6   207*59.5   207*10.6   168*08.2   65.6   217*98.1   01.8   121*45.6   31.6   227*57.5   32.7   32.2   427*03.0   188*07.5   60.6   223*28.8   02.5   136*47.7   31.5   237*59.7   32.8   427*03.0   321*06.0   07.5   268*00.2   04.0   166*19.9   31.4   268*06.1   33.0   31.6   327*21.9   32.	\A/ad	CHA	CHA	Doo	CHA	Doo	CHA	Dee	CHA	Dee	Regulus	207°33.2	
1 222°00.6 166°08.2 05.6 217°8.1 01.8 121°45.6 31.6 222°57.5 32.7 data. 17°42.5 3.0 130°0.7 1.0 120°0.0 130°0											Dubhe		
2 47°03.0   183°07.5   06.2   232°58.8   02.5   186°47.7   31.5   237°59.7   32.8   3 262°05.5   188°06.7   ~ 0.6.8   247°59.5   ~ 0.3   151°48.8   ~ 31.5   238°01.9   ~ 2.9   4 277°08.0   230°06.0   ~ 0.75   268°00.2   04.0   166°51.9   31.4   268°04.1   33.0   5 202°10.4   228°05.3   08.1   278°00.9   04.8   181°54.0   31.4   268°04.1   33.0   6 307°12.9   243°04.5   N22°08.7   293°01.5   N05°05.5   166°56.1   N22°31.4   298°08.5   N01°33.2   8 33°17.8   228°303.1   10.0   323°02.9   07.0   227°00.3   31.3   318°10.7   33.3   8 33°17.8   273°031.1   10.0   323°02.9   07.0   227°03.3   31.3   328°12.9   33.4   9 332°20.3   228°02.3   10.16   383°03.6   07.8   242°02.4   31.2   343°15.1   33.3   10 7°22.8   338°01.6   11.3   385°03.6   07.8   242°02.6   31.1   31°19.5   33.4   11 22°25.2   318°03.6   11.9   86°05.0   00.5   272°06.6   31.1   31°19.5   33.6   12 37°27.7   333°01.1   N22°12.5   23°05.7   N05°101.1   383°05.7   N22°31.1   32°21.1   N01°33.9   14 87°33.6   34°30.1   N22°12.5   23°05.7   N05°101.1   383°10.7   N22°31.5   33°05.7   N22°31.1   32°21.1   N01°33.9   15 82°35.1   178°79.5   14.4   86°078.8   12.3   328°15.0   30.0   73°23.3   34.4   16 97°35.7   32°75.7   32°75.7   15.0   83°05.5   15.0   32°23.4   17 112°40.7   47°54.9   10.9   128°09.1   10.1   10.7   13.0   128°30.1   13.0   12											Denebola	182°23.6	$14^{\circ}25.4$
22°205.5 198°06.7 · 0.06. 247°59.5 · 0.03. 151°49.8 · 0.15. 253°01.9 · 0.29. 4 277°06.0 213°06.0 0.75. 95°00.2 · 0.04 166°19.9 · 0.14. 283°06.3 · 0.31.   5 202°10.4 · 0.22°08.7 · 0.22°08.7 · 0.23°01.5 · 0.05°5.5 · 1.06°5.1 · 0.22°31.4 · 0.28°0.6 · 0.03°3.2 · 0.06 · 0.07.   7 322°15.4 · 258°0.3 · 0.04 · 0.08°0.2 · 0.06 · 0.08°1.0											Gienah	175°42.2	$-17^{\circ}41.5$
4 277°08.0 213°06.0 075. 263°00.2 040 166°519 31.4 268°04.1 33.0 Althorh 166°11.5 55°30.0 165 202°10.4 288°05.3 081.2 787°00.9 048 1818°40 31.4 268°06.3 33.1 Spice 185°20.9 1719.1 166°31.5 25°30.0											Acrux	172°58.3	-63°14.9
5 292"10.4   228"05.3   08.1   278"00.9   04.8   181"94.0   31.4   283"05.3   33.1   All   Al											Gacrux	171°50.0	$-57^{\circ}15.9$
307°129 343°045 N22°087 293°015 N05°055 196°561 N22°314 298°085 N01°332 SHL 132°507 49108 8 337°178 237°031 100 333°029 070 227°003 313 338°129 334 Hadar 147°863 9.0°501 9 352°203 288°023 1006 338°036 078 242°024 3112 388°173 33. 11 22°252 318°008 11.9 8°050 093 272°066 311.1 3315°13 338°136 07102 112°22°52 318°008 11.9 8°050 093 272°066 311.1 13°195 33.8 Figure 147°86 9.0°50 112 32°57 313°001 N22°125 23°057 N05°101 287°087 N22°311 28°217 N01°339 34 Activate 147°86 9.0°50 112 33°57 33°001 N22°125 23°057 N05°101 287°087 N22°311 28°217 N01°339 34 Activate 147°86 9.0°50 113 85°507 116 83°125 115 82°351 17°579 144 68°078 123 332°150 130°105 830.5 343 116 67°335 32°572 150 83805 131 347°171 30.9 88°305 343 516 127°425 116 127°426 116 113°105 348 116 113°105 348 118 118 118 118 118 118 118 118 118 1											Alioth	$166^{\circ}11.5$	55°49.0
6 307**129											I I		
7   322-154   237-031   100   308-022   06.3   211-582   31.3   313-107   33.4     8   337-178   237-031   100   323-029   07.0   227-030   31.3   333-1107   33.4     9   352-1203   328-023   308-033   31.0   338-129   338-129   338-129   338-129     10   72-28   303-06   11.3   338-030   306   257-045   31.2   368-171   337-7     11   227-25   2318-008   11.9   8°050   09.3   227-066   31.1   13°105   338     12   37-27   333-001   322-125   230-57   No.101   237-066   31.1   13°105   338     13   67-302   37-594   13.2   38°064   10.8   302-10.8   31.0   43°2.39   34.0     14   67°3.26   27°5.6   13.8   53°07.1   11.6   317'12.9   31.0   43°2.39   34.0     15   82-35.1   77'5.9   14.4   68°07.8   12.3   332'15.0   30.9   73°2.8   3.3   3.4     16   97°3.7   32°57.2   15.0   33'06.5   13.1   347'11.1   30.9   30.5   34.3     17   112'40.0   47°56.4   15.7   98°09.2   13.8   2719.2   30.9   103°3.7   34.4     18   127*42.5   62°55.7   N22*61.1   313'09.9   N05*61.6   17-21.3   N22*80.8   138'37.1   34.6     19   142'44.9   77'54.9   16.9   128'10.6   15.3   32'23.4   30.8   133'37.1   34.6     19   142'44.9   77'54.9   16.9   128'10.6   15.3   32'23.8   30.6   138'45.5   30.0     19   142'44.9   77'54.9   16.9   128'10.6   15.3   32'23.8   30.6   193'45.9   30.0     Mer.pass. 09.31   12-32.3   122'52.7   18.8   133'12.6   17.6   77'29.7   30.6   138'45.9   30.0      Mer.pass. 09.31   12-32.3   122'52.7   18.8   133'12.6   17.6   77'29.7   30.6   138'45.9   30.0      Mer.pass. 09.31   12-32.2   122'23.3   123'23.3   13.4   422'40.9   30.2   43.4   43.8      18   18   18   18   18   18   18													
8 337°178. 3 237°183. 1 10.0 323°02.9 07.0 227°00.3 31.3 388°11.9 33.5 Menkent 147°56.0 36°30.1 7°22.8 303°01.6 11.3 38°03.6 07.8 242°02.4 31.2 343°15.1 33.5 386°17.3 33.6 01.6 11.3 35°04.3 08.6 257°04.5 31.2 385°17.3 33.6 Kerturus 146°6.6 19°02.6 11.2 22°25.2 318°00.8 11.9 8°05.0 09.3 22°06.6 31.1 13°19.5 33.8 Kerturus 146°6.6 19°02.6 12.3 35°07.7 12°21.5 23°05.7 No5°10.1 267°06.7 No2°31.1 28°21.7 N01°33.9 34.0 45°23.9 34.0 45°23.9 34.0 45°23.9 34.0 45°23.9 34.0 45°23.9 34.0 45°23.9 34.0 45°23.9 34.0 45°23.9 34.0 45°23.9 34.0 45°23.9 34.0 45°23.9 34.0 45°23.9 34.0 45°23.9 34.0 45°23.9 34.0 45°23.9 34.0 45°23.9 34.0 45°23.9 34.0 45°24.9 34.0 45°25.1 17°57.9 1.44 468°07.8 12.3 332°15.0 3.0 90 73°28.3 34.2 45°19.1 16.0 45°25.1 17°57.9 1.44 468°07.8 12.3 332°15.0 3.0 90 73°28.3 34.2 45°19.1 16.0 45°25.1 15°0.0 32°06.5 13.1 34°17.1 10.2 30.9 88°30.5 34.3 58.0 45°25.1 34.1 10.2 45°25.2 45°25.1 10.0 47°66.4 15.7 98°09.2 13.8 2°19.2 30.9 103°32.7 34.4 58.0 45°25.1 15°0.0 45													
9 352°20.3 88°02.3 10.6 133°30.6 0.78 242°02.4 · 31.2 343°15.1 · 33.5													
10	9		288°02.3	• • 10.6		• • 07.8	242°02.4	• • 31.2		• • 33.5			
12 37°7.7 333°00.1 N22°12.5 23°05.7 N05°10.1 22°705.0 "31.1 13°19.5 "3.8 Kochab 13°18.6 74°02.7 N01°33.9 13°01.0 N22°12.5 23°05.7 N05°10.1 22°705.0 "31.1 12°32.9 "34.0 N35°35.1 N05°35.1 N05°10.1 N22°12.5 N05°35.1 N05°10.1 N05°10	10			11.3		08.6		31.2		33.7	I I		
12   37°27.7   33°300.1   34°59.4   13.2   23°06.7   N05°10.1   28°08.7   N22°31.1   28°21.7   N01°33.9   34.0   47°32.0   25°8.6   13.8   53°07.1   11.6   31°12.9   31.0   43°28.3   34.2   Antares   126°0.2   26°37.4   Antares   26°0.2   26°37.4   Antares   26°0.2   26°37.4   Antares   26°0.2   26°37.4   Antares   26°0.2   26°37.4   26°0.2   26°0.3   26°0.2   26°0.3   26°0.2   26°0.3   26°0.2   26°0.3   26°0.2   26°0.3   26°0.2   26°0.3   26°0.2   26°0.3   26°0.2   26°0.3   26°0.2   26°0.3   26°0.2   26°0.3   26°0.3   26°0.3   26°0.3   2	11	22°25.2	318°00.8	11.9	8°05.0	09.3	272°06.6		13°19.5		_		
13 52°302 347°594 13.2 38°06.4 10.8 302′10.8 31.0 43°23.9 34.0 Alpheca 126°02.5 26°37.4 Altares	12	37°27.7	333°00.1	$N22^{\circ}12.5$	23°05.7	$N05^{\circ}10.1$	287°08.7	N22°31.1		N01°33.9			
14 67°3.6 2'58.6 13.8 6'30°7.1 11.6 317°12.9 31.0 58°26.1 34.1 16 97°37.5 11.7 57.9 14.4 68°07.8 1.12.3 332°15.0 30.9 173°28.3 3.42   16 97°37.5 12°57.9 14.4 68°07.8 1.12.3 332°15.0 30.9 173°28.3 3.34.2   17 112°40.0 47°56.4 15.7 98°09.2 13.8 2°19.2 30.9 103°32.7 34.4   18 127°42.5 62°55.7 N22°16.3 113°09.9 N05°4.6 17°21.3 N22°30.8 118°34.9 N01°34.5   18 127°42.5 62°55.7 N22°16.3 113°09.9 N05°4.6 17°21.3 N22°30.8 118°34.9 N01°34.5   18 127°42.5 162°55.7 N22°16.3 113°09.9 N05°4.6 17°21.3 N22°30.8 118°34.9 N01°34.5   18 20°157°47.4 02°54.2 17.5 143°11.3 16.1 47°25.5 30.7 148°30.3 34.7   18 21 172°49.9 107°53.4 18.1 158°12.0 16.9 6°2°27.6 30.7 163°41.5 34.8   18 22°22 187°52.3 122°52.7 18.8 173°12.6 17.6 77°29.7 30.6 178°43.7 34.9   18 22°202°54.8 137°52.0 19.4 188°13.3 18.4 92°31.8 30.6 193°45.9 35.0   18 21°252.7 18.8 173°12.6 17.6 77°29.7 30.6 178°43.7 34.9   18 21°252.7 18.8 173°12.6 17.6 77°29.7 30.6 178°43.7 34.9   18 21°252.1 172°40.1 17°25.0 19.4 188°13.3 18.4 92°31.8 30.6 193°45.9 35.0   18 21°252.7 18.8 173°12.6 17.6 6   18 21°252.7 18.8 173°12.6 17.6 6   18 21°252.7 18.8 173°12.6 17.6 6   18 21°252.7 18.8 173°12.6 17.6 6   18 21°252.7 18.8 173°12.6 17.6 6   18 21°252.7 18.8 173°12.6 17.6 6   18 21°252.7 18.8 173°12.6 17.6 6   18 21°252.7 18.8 173°12.6 17.6 6   18 21°252.7 18.8 173°12.6 17.6 6   18 21°252.7 18.8 173°12.6 17.6 6   18 21°252.7 18.8 173°12.6 17.6 6   18 21°253.7 18.8 173°12.6 17.6 6   18 21°253.7 18.8 173°12.6 17.6 6   18 21°254.2 18.2 18.2 18.2 18.2 18.2 18.2 18.2 18	13	52°30.2	347°59.4	13.2	38°06.4	10.8	302°10.8	31.0	43°23.9	34.0			
15 82°35.1 17'579.2 150 83°08.5 131.3 332'150 30.9 73'28.3 34.2   16 97°375 32'577.2 150 83°08.5 131.3 332'150 30.9 88°30.5 34.3   17 112°40.0 47'56.4 15.7 98'09.2 13.8 2'19.2 30.9 103°32.7 34.4   18 127'24.5 62°55.7 N22'16.3 113°09.9 N05°14.6 15.7 12°21.3 N22°08.8 118°34.9 N01°34.5   18 127'24.5 62°55.7 N22'16.3 113°09.9 N05°14.6 17'21.3 N22°08.8 118°34.9 N01°34.5   19 142°44.9 77°54.9 16.9 128°10.6 15.3 32°23.4 30.8 133°37.1 34.6   19 142°44.9 77°54.9 16.9 128°10.6 15.3 32°23.4 30.8 133°37.1 34.6   19 142°44.9 17°53.4 18.1 158°12.0 16.9 62°27.6 30.7 163°41.5 34.8   10 157°47.4 92°42.2 12°52.7 18.8 173°12.6 17.6 77'29.7 30.6 178°43.7 34.9   10 17°43.1 12°45.2 19.4 188°13.3 18.4 92°31.8 30.6 193°45.9 35.0   10 187°43.7 34.9 Nunki 75°46.3 26°11.8   10 187°43.7 34.9 Nunki 75°46.3 26°11.8   10 217°57.3 152°51.2 N22°20.0 203°14.0 N05°19.1 107°33.9 N22°30.5 208°48.1 N01°35.1   1 232°59.7 107'50.5 20.6 218°14.7 19.9 122°30.0 30.5 223°50.3 35.3   2 248°0.2 182°49.7 21.2 233°15.4 20.6 137'38.1 30.4 238°52.5 35.4   2 248°0.2 182°49.7 21.2 233°15.4 20.6 137'38.1 30.4 238°52.5 35.4   2 248°0.2 182°49.7 21.2 233°15.4 20.6 137'38.1 30.4 238°52.5 35.4   2 27°40.1 197'40.0 21.8 248°16.1 21.4 152°40.2 30.4 258°54.7 35.5   1 233°14.5 257°46.0 24.3 308°18.9 24.4 212°48.5 30.2 318°0.9 35°0.7 36.0   10 8°21.9 302°43.8 26.1 353°21.0 26.6 257'54.8 30.1 359°10.1 36.2   10 8°21.9 302°43.8 22°7.3 23°22.4 N05°23.6 127°56.9 N22°0.0 29°14.5 N01°36.4   11 23°44.4 317°43.0 26.7 8°21.7 27.4 227°50.9 N22°30.7 99°18.9 36.6   11 23°44.4 317°43.0 26.7 8°21.7 27.4 227°50.9 N22°30.7 99°18.9 36.6   11 23°44.4 317°43.0 26.7 8°21.7 27.4 227°50.9 N22°30.7 99°18.9 36.6   11 23°44.4 317°43.0 26.7 8°21.7 27.4 227°50.9 N22°30.7 99°18.9 36.6   11 23°44.4 317°43.0 26.7 8°21.7 27.4 227°50.9 N22°30.7 99°18.9 36.6   11 23°44.4 317°40.0 22.9 168°25.7 33.4 33°13.7 29.9 59°18.9 36.6   11 23°44.4 317°43.0 26.7 8°21.7 27.4 227°50.9 N22°30.7 99°18.9 36.6   11 23°44.6 60°37.8 N22°30.9 118°25.5 N05°22.7 18°11.0 N22°3.7 18°29	14	67°32.6	2°58.6	13.8	53°07.1	11.6	$317^{\circ}12.9$	31.0	58°26.1	34.1			
Sample   S	15	82°35.1	17°57.9	• • 14.4	68°07.8	• • 12.3	332°15.0	• • 30.9	73°28.3	• • 34.2			
18 127 40.0 47 56.4 15.7 98 99.9 13.8 2 19.2 30.9 103 32.7 34.4 Shaula 96 96.6 37 907.3 19 142 45. 62 55.7 N22 16.3 113 90.9 N05 14.6 17 21.3 N22 30.8 118 34.9 N01 34.5 Eltanin 12 14 14 14 14 14 15 14 15 14 14 15 14 15 14 15 14 14 15 15 14	16	97°37.5	32°57.2	15.0	83°08.5	13.1	$347^{\circ}17.1$	30.9	88°30.5	34.3			
18   127" 42.5   62" 55.7   N22" 16.3   113" 09.9   N05" 14.6   17" 21.3   N22" 30.8   118" 34.9   N01" 34.5     19   142" 44.9   7" 54.9   16.9   128" 113" 10.6   15.3   32" 23.4   30.8   313" 37.1   34.6     20   157" 47.4   92" 54.2   17.5   143" 11.3   16.1   47" 25.5   30.7   148" 39.3   34.7     21   172" 49.9   107" 55.4   18.1   158" 11.3   16.1   47" 25.5   30.7   148" 39.3   34.7     22   187" 52.3   122" 52.7   18.8   173" 12.6   17.6   77" 29.7   30.6   178" 43.7   34.9     Mer.pass. 09:31   \( \nu_{-0.7}\' d0.6" \) -3.92   \( \nu_{-0.7}\' d0.8" \) m1.22   \( \nu_{-0.7}\' d	17	112°40.0	47°56.4	15.7	98°09.2	13.8	2°19.2	30.9	103°32.7	34.4			
142*44.9	18	127°42.5	62°55.7	N22°16.3	113°09.9	N05° 14.6	17°21.3	N22°30.8	118°34.9	N01°34.5			
20	19	142°44.9	77°54.9	16.9	128°10.6	15.3	32°23.4	30.8	133°37.1	34.6	_		
172°499   107°534   18.1   158°12.0   16.9   62°27.6   30.7   163°41.5   34.8   Vega 23   202°54.8   137°52.0   19.4   188°13.3   18.4   92°31.8   30.6   193°45.9   35.0   Nunki 75°46.3   26°15.8   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15.8   26°15.3   26°15	20	157°47.4	92°54.2	17.5	143°11.3	16.1			148°39.3	34.7			
22   187*52.3   122*52.7   18.8   173*12.6   17.6   77*29.7   30.6   178*43.7   34.9   34.9     Mer.pass. 09:31   ν-0.7 / d0.6 / m-3.92   ν0.7 / d0.8 / m1.22   ν2.1 / d-0.0 / m-2.02   ν2.2 / d0.1 / m0.93     Mer.pass. 09:31   ν-0.7 / d0.6 / m-3.92   ν0.7 / d0.8 / m1.22   ν2.1 / d-0.0 / m-2.02   ν2.2 / d0.1 / m0.93     Mer.pass. 09:31   ν-0.7 / d0.6 / m-3.92   ν0.7 / d0.8 / m1.22   ν2.1 / d-0.0 / m-2.02   ν2.2 / d0.1 / m0.93     Mer.pass. 09:31   ν-0.7 / d0.6 / m-3.92   ν0.7 / d0.8 / m1.22   ν2.1 / d-0.0 / m-2.02   ν2.2 / d0.1 / m0.93     Mer.pass. 09:31   ν-0.7 / d0.6 / m-3.92   ν0.7 / d0.8 / m1.22   ν2.1 / d-0.0 / m-2.02   ν2.2 / d0.1 / m0.93     Mer.pass. 09:31   ν-0.7 / d0.6 / m-3.92   ν0.7 / d0.8 / m1.22   ν2.1 / d-0.0 / m-2.02   ν2.2 / d0.1 / m0.93     Mer.pass. 09:31   ν-0.7 / d0.6 / m-3.92   ν0.7 / d0.8 / m1.22   ν2.1 / d-0.0 / m-2.02   ν2.2 / d0.1 / m0.93     Mer.pass. 09:31   ν-0.7 / d0.6 / m-3.92   ν0.7 / d0.8 / m1.22   ν2.1 / d-0.0 / m-2.02   ν2.2 / d0.1 / m0.93     Mer.pass. 09:31   ν-0.7 / d0.6 / m-3.92   ν0.7 / d0.8 / m1.22   ν2.1 / d-0.0 / m-2.02   ν2.2 / d0.1 / m0.93     Mer.pass. 09:31   ν-0.7 / d0.6 / m-3.92   ν0.7 / d0.8 / m1.22   ν2.1 / d-0.0 / m-2.02   ν2.2 / d0.1 / m0.93     Mer.pass. 09:31   ν-0.7 / d0.6 / m-3.92   ν0.7 / d0.8 / m1.22   ν2.1 / d-0.0 / m-2.02   ν2.2 / d0.1 / m0.93     Very d0.1   ν-0.7 / d0.6 / m-3.92   ν0.7 / d0.8 / m1.22	21	172°49.9	107°53.4	• • 18.1	158°12.0	• • 16.9	62°27.6	• • 30.7	163°41.5	• • 34.8			
23   202°54.8   137°52.0   19.4   188°13.3   18.4   92°31.8   30.6   193°45.9   35.0   Althir   61°8.8   8°561.1     Mer.pass. 09:31   ν-0.7' d0.6' m-3.92   ν0.7' d0.8' m1.22   ν2.1' d-0.0' m-2.02   ν2.2' d0.1' m0.93     Final GHA   GHA   Dec		187°52.3	122°52.7			17.6			178°43.7	34.9	_		
Mer.pass. 09:31			137°52.0										
Thu GHA GHA CHA CHA CHA CHA CHA CHAIL CHA													
Thu         GHA         CHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         Al Nair         33° 37.8         9°9.6         46′49.8         1         232° 59.7         16° 50.5         20.6         218° 14.7         19.9         122° 36.0         30.5         223° 59.3         35.3         Scheat         15° 13.2         29° 29.8         22° 28.8         248° 02.2         182° 49.7         21.2         233° 15.4         20.6         137° 38.1         30.4         258° 55.3         35.3         Scheat         13° 44.4         28° 13.3         263° 04.7         19° 49.0         · 21.8         248° 16.1         · 21.4         15° 40.2         · 30.3         268° 56.9         35.6         5         293° 09.6         227° 47.5         23.1         278° 17.5         22.9         182° 44.3         30.3         268° 56.9         35.6         36.0         22.1         16° 42.3         30.3         268° 56.9         35.6         40° 28° 29° 29° 29° 27° 47.5         23.1         278° 17.5         22.9         182° 44.3         30.3         268° 56.9         35.6         40° 29° 29° 37.3         40° 29° 29° 37.3         40° 29° 29° 37.3         40° 29° 29° 37.3         40° 29° 29° 30° 30° 30° 30° 30° 30° 30° 30° 30° 30	Mer.p	ass. 09:31	$\nu$ -0. $\ell'$ $d0$	.o′ m-3.92	$\nu$ 0.1' d0	.ơ m1.22	$\nu^{2.1'} d-0$	.u′ m-2.02	$\nu^{2.2'} d0$	.1′ m0.93	I .		
Thu         GHA         GHA         Dec         GHA         Power of the pasts         Promable of the pasts         All Na'ir         2° 31.7         4° 6° 9.8         All Na'ir         2° 31.7         4° 6° 9.8         All Na'ir         2° 31.7         4° 6° 92.8         All Na'ir         2° 31.7         4° 6° 92.8         All Na'ir													
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11 23°24.4 317°43.0 26.7 8°21.7 27.4 272°56.9 30.0 14°12.3 36.3   12 38°26.8 332°42.3 N22°27.3 23°22.4 N05°28.1 287°59.0 N22°30.0 29°14.5 N01°36.4   13 53°29.3 347°41.5 27.9 38°23.0 28.9 303°01.1 29.9 44°16.7 36.5   14 68°31.8 2°40.8 28.5 53°23.7 29.6 318°03.2 29.9 59°18.9 36.6   15 83°34.2 17°40.0 · · 29.1 68°24.4 · · · 30.4 333°05.3 · · 29.8 74°21.1 · · · 36.7   16 98°36.7 32°39.3 29.7 83°25.1 31.2 348°07.4 29.8 89°23.3 36.8   17 113°39.1 47°38.5 30.3 98°25.8 31.9 3°09.5 29.7 104°25.5 37.0   18 128°41.6 62°37.8 N22°30.9 113°26.5 N05°32.7 18°11.6 N22°29.7 119°27.7 N01°37.1   19 143°44.1 77°37.0 31.5 128°27.2 33.4 33°13.7 29.7 134°29.9 37.2   20 158°46.5 92°36.3 32.1 143°27.9 34.2 48°15.7 29.6 149°32.1 37.3   21 173°49.0 107°35.5 · · 32.7 158°28.6 · · 34.9 63°17.8 · · · 29.6 164°34.3 · · 37.4   22 188°51.5 122°34.8 33.3 173°29.3 35.7 78°19.9 29.5 179°36.5 37.5   23 203°53.9 137°34.0 33.9 188°30.0 36.4 93°22.0 29.5 194°38.7 37.6    Nars 345°59.3 10:28   Mars 345°59.3 10:28   Mars 345°59.3 10:28   Nars 34°40.4 10:51   Na											•		-
12 38°26.8 332°42.3 N22°27.3 23°22.4 N05°28.1 287°59.0 N22°30.0 29°14.5 N01°36.4 13 53°29.3 347°41.5 27.9 38°23.0 28.9 303°01.1 29.9 44°16.7 36.5 14 68°31.8 2°40.8 28.5 53°23.7 29.6 318°03.2 29.9 59°18.9 36.6 15 83°34.2 17°40.0 ·· 29.1 68°24.4 ·· 30.4 333°05.3 ·· 29.8 74°21.1 ·· 36.7 16 98°36.7 32°39.3 29.7 83°25.1 31.2 348°07.4 29.8 89°23.3 36.8 17 113°39.1 47°38.5 30.3 98°25.8 31.9 3°09.5 29.7 104°25.5 37.0 18 128°41.6 62°37.8 N22°30.9 113°26.5 N05°32.7 18°11.6 N22°29.7 119°27.7 N01°37.1 19 143°44.1 77°37.0 31.5 128°27.2 33.4 33°13.7 29.7 134°29.9 37.2 20 158°46.5 92°36.3 32.1 143°27.9 34.2 48°15.7 29.6 149°32.1 37.3 21 173°49.0 107°35.5 ·· 32.7 158°28.6 ·· 34.9 63°17.8 ·· 29.6 164°34.3 ·· 37.4 21 173°49.0 107°35.5 ·· 32.7 158°28.6 ·· 34.9 63°17.8 ·· 29.6 164°34.3 ·· 37.4 22 188°51.5 122°34.8 33.3 173°29.3 35.7 78°19.9 29.5 179°36.5 37.5 29.5 Mars: 0.1 188°30.0 36.4 93°22.0 29.5 194°38.7 37.6 Mars: 0.1													
13 53°29.3 347°41.5 27.9 38°23.0 28.9 303°01.1 29.9 44°16.7 36.5 36.5 14 68°31.8 2°40.8 28.5 53°23.7 29.6 318°03.2 29.9 59°18.9 36.6 15 83°34.2 17°40.0 · · · 29.1 68°24.4 · · · 30.4 333°05.3 · · · 29.8 74°21.1 · · · 36.7 36.7 16 98°36.7 32°39.3 29.7 83°25.1 31.2 348°07.4 29.8 89°23.3 36.8 17 113°39.1 47°38.5 30.3 98°25.8 31.9 3°09.5 29.7 104°25.5 37.0 18 128°41.6 62°37.8 N22°30.9 113°26.5 N05°32.7 18°11.6 N22°29.7 119°27.7 N01°37.1 19 143°44.1 77°37.0 31.5 128°27.2 33.4 33°13.7 29.7 134°29.9 37.2 20 158°46.5 92°36.3 32.1 143°27.9 34.2 48°15.7 29.6 149°32.1 37.3 21 173°49.0 107°35.5 · · · 32.7 158°28.6 · · · 34.9 63°17.8 · · · 29.6 164°34.3 · · · 37.4 21 173°49.0 107°35.5 · · · 32.7 158°28.6 · · · 34.9 63°17.8 · · · 29.6 164°34.3 · · · 37.4 22 188°51.5 122°34.8 33.3 173°29.3 35.7 78°19.9 29.5 179°36.5 37.5 29.5 194°38.7 37.6 1.0 14 14 14 14 14 14 14 14 14 14 14 14 14											I .		10:28
14 68°31.8 2°40.8 28.5 53°23.7 29.6 318°03.2 29.9 59°18.9 36.6 15 83°34.2 17°40.0 · · · 29.1 68°24.4 · · · 30.4 333°05.3 · · · 29.8 74°21.1 · · · 36.7 16 98°36.7 32°39.3 29.7 83°25.1 31.2 348°07.4 29.8 89°23.3 36.8 17 113°39.1 47°38.5 30.3 98°25.8 31.9 3°09.5 29.7 104°25.5 37.0 18 128°41.6 62°37.8 N22°30.9 113°26.5 N05°32.7 18°11.6 N22°29.7 119°27.7 N01°37.1 19 143°44.1 77°37.0 31.5 128°27.2 33.4 33°13.7 29.7 134°29.9 37.2 20 158°46.5 92°36.3 32.1 143°27.9 34.2 48°15.7 29.6 149°32.1 37.3 21 173°49.0 107°35.5 · · · 32.7 158°28.6 · · · 34.9 63°17.8 · · · 29.6 164°34.3 · · · 37.4 21 173°49.0 107°35.5 · · · 32.7 158°28.6 · · · 34.9 63°17.8 · · · 29.6 164°34.3 · · · 37.4 21 188°51.5 122°34.8 33.3 173°29.3 35.7 78°19.9 29.5 179°36.5 37.5 21.0 143°21.1 2°34.0 33.9 188°30.0 36.4 93°22.0 29.5 194°38.7 37.6   Mars: 0.1 10:07											Jupiter		16:51
15 83°34.2 17°40.0 · · · 29.1 68°24.4 · · · 30.4 333°05.3 · · · 29.8 74°21.1 · · · 36.7 98°36.7 32°39.3 29.7 83°25.1 31.2 348°07.4 29.8 89°23.3 36.8 173°39.1 47°38.5 30.3 98°25.8 31.9 3°09.5 29.7 104°25.5 37.0 18 128°41.6 62°37.8 N22°30.9 113°26.5 N05°32.7 18°11.6 N22°29.7 119°27.7 N01°37.1 19 143°44.1 77°37.0 31.5 128°27.2 33.4 33°13.7 29.7 134°29.9 37.2 158°46.5 92°36.3 32.1 143°27.9 34.2 48°15.7 29.6 149°32.1 37.3 173°49.0 107°35.5 · · · 32.7 158°28.6 · · · 34.9 63°17.8 · · · 29.6 164°34.3 · · · 37.4 188°51.5 122°34.8 33.3 173°29.3 35.7 78°19.9 29.5 179°36.5 37.5 122°34.8 33.3 173°29.3 35.7 78°19.9 29.5 179°36.5 37.5 128°37.0 131°38.2 10.1 143°32.1											Saturn	$350^{\circ}57.1$	10:07
16       98°36.7       32°39.3       29.7       83°25.1       31.2       348°07.4       29.8       89°23.3       36.8       Venus       294°54.0       13:49         17       113°39.1       47°38.5       30.3       98°25.8       31.9       3°09.5       29.7       104°25.5       37.0       Mars       345°16.8       10:27         18       128°41.6       62°37.8       N22°30.9       113°26.5       N05°32.7       18°11.6       N22°29.7       119°27.7       N01°37.1       Jupiter       249°36.6       16:47         19       143°44.1       77°37.0       31.5       128°27.2       33.4       33°13.7       29.7       134°29.9       37.2       Saturn       350°50.8       10:03         20       158°46.5       92°36.3       32.1       143°27.9       34.2       48°15.7       29.6       149°32.1       37.3       37.4       Saturn       350°50.8       10:03         21       173°49.0       107°35.5       · 32.7       158°28.6       · 34.9       63°17.8       · 29.6       164°34.3       · 37.4       Horizontal parallax         22       188°51.5       122°34.8       33.3       173°29.3       35.7       78°19.9       29.5       179°36.5 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>A. 20 T</td><td>CIII</td><td>N4 -</td></td<>											A. 20 T	CIII	N4 -
17 113°39.1 47°38.5 30.3 98°25.8 31.9 3°09.5 29.7 104°25.5 37.0 18 128°41.6 62°37.8 N22°30.9 113°26.5 N05°32.7 18°11.6 N22°29.7 119°27.7 N01°37.1 19 143°44.1 77°37.0 31.5 128°27.2 33.4 33°13.7 29.7 134°29.9 37.2 20 158°46.5 92°36.3 32.1 143°27.9 34.2 48°15.7 29.6 149°32.1 37.3 21 173°49.0 107°35.5 · 32.7 158°28.6 · 34.9 63°17.8 · 29.6 164°34.3 · 37.4 22 188°51.5 122°34.8 33.3 173°29.3 35.7 78°19.9 29.5 179°36.5 37.5 23 203°53.9 137°34.0 33.9 188°30.0 36.4 93°22.0 29.5 194°38.7 37.6  Mars 345°16.8 10:27  Saturn 350°50.8 10:03  Horizontal parallax  Venus: 0.1  Mars: 0.1													-
18 128°41.6 62°37.8 N22°30.9 113°26.5 N05°32.7 18°11.6 N22°29.7 119°27.7 N01°37.1 19°143°44.1 77°37.0 31.5 128°27.2 33.4 33°13.7 29.7 134°29.9 37.2 20 158°46.5 92°36.3 32.1 143°27.9 34.2 48°15.7 29.6 149°32.1 37.3 21 173°49.0 107°35.5 · 32.7 158°28.6 · 34.9 63°17.8 · 29.6 164°34.3 · 37.4 22 188°51.5 122°34.8 33.3 173°29.3 35.7 78°19.9 29.5 179°36.5 37.5 23 203°53.9 137°34.0 33.9 188°30.0 36.4 93°22.0 29.5 194°38.7 37.6													
19 143°44.1 77°37.0 31.5 128°27.2 33.4 33°13.7 29.7 134°29.9 37.2 20 158°46.5 92°36.3 32.1 143°27.9 34.2 48°15.7 29.6 149°32.1 37.3 21 173°49.0 107°35.5 · 32.7 158°28.6 · 34.9 63°17.8 · 29.6 164°34.3 · 37.4 22 188°51.5 122°34.8 33.3 173°29.3 35.7 78°19.9 29.5 179°36.5 37.5 23 203°53.9 137°34.0 33.9 188°30.0 36.4 93°22.0 29.5 194°38.7 37.6 Mars: 0.1													
20 158°46.5 92°36.3 32.1 143°27.9 34.2 48°15.7 29.6 149°32.1 37.3 21 173°49.0 107°35.5 · · 32.7 158°28.6 · · 34.9 63°17.8 · · 29.6 164°34.3 · · 37.4 22 188°51.5 122°34.8 33.3 173°29.3 35.7 78°19.9 29.5 179°36.5 37.5 23 203°53.9 137°34.0 33.9 188°30.0 36.4 93°22.0 29.5 194°38.7 37.6  Horizontal parallax Venus: 0.1 Mars: 0.1													
21 173°49.0 107°35.5 · · 32.7 158°28.6 · · 34.9 63°17.8 · · · 29.6 164°34.3 · · · 37.4 22 188°51.5 122°34.8 33.3 173°29.3 35.7 78°19.9 29.5 179°36.5 37.5 23 203°53.9 137°34.0 33.9 188°30.0 36.4 93°22.0 29.5 194°38.7 37.6  Horizontal parallax Venus: 0.1 Mars: 0.1											Saturn	350°50.8	10:03
22 188°51.5 122°34.8 33.3 173°29.3 35.7 78°19.9 29.5 179°36.5 37.5 Venus: 0.1 23 203°53.9 137°34.0 33.9 188°30.0 36.4 93°22.0 29.5 194°38.7 37.6 Mars: 0.1											Horizont	al narallav	
23 203°53.9 137°34.0 33.9 188°30.0 36.4 93°22.0 29.5 194°38.7 37.6 Mars: 0.1											1101120111	•	Λ1
25 260 56.5 251 51.0 56.7 55 25.6 25.7 57.0													
Mer.pass. 09:27 $\nu$ -0.7′ $d$ 0.6′ m-3.92 $\nu$ 0.7′ $d$ 0.8′ m1.22 $\nu$ 2.1′ $d$ -0.0′ m-2.02 $\nu$ 2.2′ $d$ 0.1′ m0.93	23	203~53.9	137~34.0	33.9	188,30.0	36.4	93~22.0	29.5	194~38.7	37.6		ividi5:	0.1
	Mer.p	ass. 09:27	$\nu$ -0.7′ d0	.6′ m-3.92	$\nu 0.7' \ d0$	.8′ m1.22	$\nu 2.1' \ d-0$	.0′ m-2.02	$\nu 2.2' \ d0$	.1′ m0.93			

h	Sui	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180° 36.8	$N14^{\circ}05.3$	40°58.8	15.4'	N00°27.5	-15.0'	56.0'
1	195°36.9 210°37.0	06.0	55°33.2 70°07.7	15.4'	N00°12.4 S00°02.6	-15.0'	56.0'
2	210 37.0 225°37.0	06.8 •• 07.6	70 07.7 84°42.2	15.5' 15.5'	00°17.6	15.0' 15.0'	56.0' 55.9'
4	240°37.1	08.4	99° 16.6	15.5'	00°32.6	15.0'	55.9'
5	255°37.2	09.2	$113^{\circ}51.1$	15.5'	00°47.6	15.0'	55.9'
6	270°37.3 285°37.4	N14°10.0	128°25.7 143°00.2	15.5'	\$01°02.5 01°17.5	15.0'	55.9'
7 8	285°37.4 300°37.5	10.8 11.5	143°00.2 157°34.7	15.5' 15.6'	01°17.5 01°32.4	14.9' 14.9'	55.9' 55.8'
9	315° 37.6	. 12.3	172°09.3	15.6'	01°47.3	14.9'	55.8'
10	330°37.7	13.1	$186^{\circ}43.9$	15.6'	$02^{\circ}02.2$	14.9'	55.8'
11	345°37.8	13.9	201°18.4	15.6'	02°17.1 502°32.0	14.9'	55.8'
12 13	0°37.9 15°38.0	N14° 14.7 15.5	215°53.0 230°27.6	15.6' 15.6'	02°46.8	14.8' 14.8'	55.8' 55.7'
14	30°38.1	16.2	245°02.2	15.6'	03°01.7	14.8'	55.7'
15	45°38.1	• • 17.0	259°36.8	15.6'	$03^{\circ}16.5$	14.8'	55.7'
16	60°38.2	17.8	274°11.4	15.6'	03°31.3	14.8'	55.7'
17 18	75°38.3 90°38.4	18.6 N14°19.4	288°46.0 303°20.6	15.6' 15.6'	03°46.0 504°00.7	14.7' 14.7'	55.7' 55.6'
19	90 36.4 105°38 5	20.2	317°55.3	15.6'	04°15.5	14.7	55.6'
20	120° 38.6	20.9	332°29.9	15.6'	04°30.1	14.7'	55.6'
21	135°38.7	• • 21.7	347°04.5	15.6'	04°44.8	14.6'	55.6'
22	150°38.8	22.5	1°39.1	15.6'	04°59.4	14.6'	55.6'
23	165°38.9	23.3	16°13.7	15.6'	05°14.0	14.6'	55.5'
	SD = 15.9'	d = 0.8'		SI	D = 15.3'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°39.0	N14°24.1	30°48.3	15.6'	S05°28.6	14.5'	55.5'
1	195°39.0 210°39.1	24.8 25.6	45°22.9 59°57.5	15.6' 15.6'	05°43.1 05°57.6	14.5' 14.5'	55.5' 55.5'
2	210°39.1 225°39.2	25.6	59°57.5 74°32.1	15.6'	05°57.6 06°12.1	14.5 14.4'	55.5'
4	240°39.3	27.2	89°06.6	15.6'	06°26.5	14.4'	55.4'
5	255°39.4	27.9	$103^{\circ}41.2$	15.6'	06°40.9	14.4'	55.4'
6	270°39.5	N14°28.7	118° 15.8	15.5'	S06°55.3	14.3'	55.4'
7 8	285°39.6 300°39.6	29.5 30.3	132°50.3 147°24.8	15.5' 15.5'	07°09.6 07°23.9	14.3' 14.3'	55.4' 55.4'
9	315°39.7	31.0	161°59.4	15.5'	07°23.9	14.2	55.3'
10	330°39.8	31.8	176°33.9	15.5'	07°52.4	14.2'	55.3'
11	345°39.9	32.6	191°08.3	15.5'	08°06.6	14.1'	55.3'
12	0°40.0	N14°33.4	205°42.8	15.5'	\$08°20.7 08°34.8	14.1'	55.3'
13 14	15° 40.1 30° 40.2	34.1 34.9	220°17.3 234°51.7	15.4' 15.4'	08° 48.9	14.1' 14.0'	55.3' 55.3'
15	45° 40.2	• • 35.7	249°26.1	15.4	09°02.9	14.0'	55.2'
16	60°40.3	36.5	$264^{\circ}00.5$	15.4'	$09^{\circ}16.9$	13.9'	55.2'
17	75°40.4	37.2	278°34.9	15.4'	09°30.8	13.9'	55.2'
18 19	90° 40.5 105° 40.6	N14°38.0 38.8	293°09.2 307°43.6	15.3' 15.3'	\$09°44.7 09°58.5	13.8' 13.8'	55.2' 55.2'
20	120° 40.7	39.5	322°17.9		10°12.3	13.7'	55.1'
21	135°40.8	• • 40.3	336°52.2	15.3'	10°26.0	13.7'	55.1'
22	150° 40.8	41.1	351°26.4	15.2'	10°39.7	13.6'	55.1'
23	165°40.9	41.8	6°00.6	15.2'	10°53.3	13.6'	55.1'
	SD = 15.9'	d = 0.8'		S	D = 15.1'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°41.0	N14°42.6	20°34.8	15.2'	S11°06.9	13.5'	55.1'
1 2	195°41.1 210°41.2	43.4 44.2	35°09.0 49°43.2	15.1' 15.1'	11°20.5 11°33.9	13.5' 13.4'	55.1' 55.0'
3	210 41.2 225°41.3	• 44.2	49 43.2 64°17.3	15.1'	11 33.9 11°47.4	13.4	55.0'
4	240°41.3	45.7	78°51.4	15.1'	12°00.7	13.3'	55.0'
5	255°41.4	46.5	93°25.4	15.0'	12°14.1	13.3'	55.0'
6	270°41.5 285°41.6	N14°47.2 48.0	107°59.4 122°33.4	15.0' 15.0'	\$12°27.3 12°40.5	13.2' 13.1'	55.0' 55.0'
7 8	285°41.6 300°41.7	48.0 48.8	122° 33.4 137° 07.4	15.0 14.9'	12°40.5 12°53.7	13.1'	55.0° 54.9'
9	315°41.7	• • 49.5	151°41.3	14.9'	13°06.7	13.0'	54.9'
10	330°41.8	50.3	166° 15.2	14.8'	13°19.8	13.0'	54.9'
11	345°41.9	51.0 N14°51.8	180°49.0	14.8'	13°32.7	12.9'	54.9'
12 13	0°42.0 15°42.1	N14°51.8 52.6	195°22.8 209°56.6	14.8' 14.7'	\$13°45.6 13°58.5	12.8' 12.8'	54.9' 54.9'
14	30°42.1	53.3	209°30.0 224°30.3	14.7	14°11.3	12.7	54.9'
15	45° 42.2	•• 54.1	239°04.0	14.7'	$14^{\circ}24.0$	12.6'	54.8'
16	60°42.3	54.9	253°37.7	14.6	14°36.6	12.6'	54.8'
17 18	75° 42.4 90° 42.5	55.6 N14°56.4	268°11.3 282°44.9	14.6' 14.5'	14°49.2 \$15°01.7	12.5' 12.4'	54.8' 54.8'
19	90° 42.5 105° 42.5	57.1	202 44.9 297°18.4	14.5'	15°14.2	12.4'	54.8'
20	120°42.6	57.9	$311^{\circ}51.9$	14.4'	$15^{\circ}26.5$	12.3'	54.8'
21	135° 42.7	• • 58.7	326°25.3	14.4	15°38.9	12.2'	54.8'
22 23	150° 42.8 165° 42.9	14°59.4 15°00.2	340°58.7 355°32.1	14.4' 14.3'	15°51.1 16°03.3	12.2' 12.1'	54.7' 54.7'
23	$\frac{103^{\circ} 42.9}{\text{SD} = 15.9'}$	d = 0.8'	- 333 32.1		D = 15.0'	14.1	J <del>1</del> .1
	الا — 15.9 — 15.9	u — 0.0		3	D — 13.0		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	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.		Moonris	е		Moonset	
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°	16:31	18:40	21:17	03:16	02:43	02:03
<b>N</b> 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
<b>N</b> 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		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
<b>N</b> 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
<b>S</b> 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

		Sun		Moon				
Day	Eqn.of Time		Eqn.of Time   Mer.   Me		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			

0 215-96-4 152-953 1 227-91-5 005-74 1 71-9 127-96 2 294-4 207-94 9 107-97.  2 347-91-3 1827-18 8.57 227-91-5 127-91-1 207-96 2 294-9 127-91-9 127-	h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
1 227/80   1677912   331.   201114   370   127782   204   224"&11   37.8	Fri	GHA	GHA		GHA				GHA	Dec		SHA	Dec
1	0			N22°34.5				N22°29.4	209°40.9	N01°37.7	Alpheratz	357°34 N	29°14.0
1													-42°09.7
1													56°40.7
1													-17°50.5
2													-57°06.1
9 39 14.5													23°35.1
9 39916.1 2727.27 39.2 3927.80 43.2 208140.5 20.0 3087.80 88.5 Meltrak 307.27.2 19.0 38418.6 207.26 20.0 387.80 88.5 Meltrak 307.27.2 19.0 10.0 91.10 3027.27 40.3 3837.6 44.7 2587.81 20.0 38.4 31.0 41.2 20.0 10.0 3027.27 40.3 3837.6 44.7 2587.81 20.0 38.4 31.0 31.0 31.0 20.0 38.7 38.9 38.9 38.9 38.9 38.9 38.9 38.9 38.9											1		89°22.5
9 98 98 18 6 287 26 5 9 97 388 26 9 4 99 248 29 29 0 29 38 5000 3 86 6 Method 20 27 27 10 10 9°10 30 331 37 55 0 00 3 331 37 55 0 00 3 331 37 55 0 00 3 331 37 55 0 00 3 331 37 55 0 00 3 331 37 55 0 00 3 331 37 55 0 00 3 331 37 55 0 00 3 331 37 37 37 37 37 37 37 37 37 37 37 37 37													-40°12.0
191 99 91.0 302*257 403 382*37.6 44.7 258*45.0 229 9°0°30 38.7 4 200°30 39.8 4 200°30 39.7 4 200°30													4°11.5
11 2 2°2.3.5 317°2.50											Mirfak	308°27.2	49°57.3
123 967%60 3327424 N22*41.5 23730.0 NG5*46.2 288*60.2 N22*28.8 30*074. NG5*39.0 1 NG5*46.2 288*60.2 NG*29.6 NG											Aldebaran	290°38.7	16°33.7
131 5 6 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2											Rigel	281°03.1	-8°10.4
14											Capella	280°20.7	46°01.5
15   64   33   17   21   0   -4   42   68   21   1   -4   44   33   35   54   -28   7   75   14   0   -39   3   4   17   14   17   33   3   47   20   4   44   44   69   42   54   69   37   59   28   10   12   13   48   39   3   12   13   13   13   13   13   13											Bellatrix		6°22.3
105 99°35.8 32°21.2 43.8 83°41.6 401 346°57.5 287.9 90°16.2 39.4 1 17.1 114°33.8 32°22.8 43.9 37°59.6 28.6 105°18.4 39.5 1 18.1 18.1 18.1 18.1 18.1 18.1 18.1													28°37.8
17 114*38.3 47*20.4 44.4 99*42.5 49.9 3*59.6 105*18.4 39.5 106*20.6 107*20.6 109*20.6 109*20.5 109*20.													-1°11.2
18   129"   108   129"   108   129"   108   129"   108"   129"											_		7°24.7
19													-52°42.8
20 19*45.7 92*18.1 46.1 143*44.5 52.1 49*05.9 28.5 19*25.0 39.8 14.6 120*16.6 47.2 173*45.9 21.2 19*36.6 122*16.6 47.2 173*45.9 36.6 19*36.0 122*16.6 47.2 173*45.9 36.6 54.4 9*12.1 23.3 19*31.6 40.1 19*36.0 122*16.6 47.2 173*45.9 18*46.6 54.4 9*12.1 23.3 19*31.6 40.1 19*36.0 122*16.6 47.2 173*45.9 18*46.6 54.4 9*12.1 23.3 19*31.6 40.1 19*36.0 122*16.6 47.2 173*45.9 18*46.6 54.4 9*12.1 23.3 19*31.6 40.1 19*36.0 18*36.0													-16°45.3
22   147461   1077174   - 666   158745   2   52.9   647080   - 284   105724   - 309   10742   - 309													
22 189*50.6 122*16.6 47.2 173*45.9 33.6 79*10.0 28.4 180*29.4 40.0 Follow 57.3 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1													5°09.4
Webstack	22										1		27°57.8
Mer.pass. 09-23	23												-59°35.9
Sate GHA  GHA  GHA  Dec  GHA  GHA  GHA  GHA  GHA  GHA  GHA  GH													-43°32.6
Section   Color	Mer.p	ass. 09:23	$\nu$ -0.8′ d0	.b′ m-3.92	$\nu 0.7' d0$	.გ. m1.23	$\nu^{2.1'} d^{-0}$	.0′ m-2.01	$\nu^{2.2'} d0$	.1′ m0.93			-69°49.8
Charle   C													
0 219°555 152°151 N22°48 3 203°473 N05°551 100°142 N22°83 210°338 N01°402 205°050 167°143 48.9 218°48 0 550 124°163 28.2 225°36.0 40.4 40.5 40.5 40.5 40.5 40.5 40.5 40	Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	1		11°50.2
12 234°580 167°14.3 48.9 218°48.0 55.9 124°16.3 28.2 225°36.0 40.3   2 25°07.9 182°13.6 49.5 233°48.7 56.6 139°18.4 28.2 240°38.2 40.4   280°67.5 122°12.1 50.6 248°49.4 · 57.4 156°20.5 · 28.1 25°40.4 · 40.5   5 295°07.9 21°13.5 51.1 276°50.8 58.9 184°24.6 28.1 29°74.2   6 310°10.3 242°10.5 N22°51.7 29°51.5 N05°9.6 199°26.7 N22°28.0 300°47.1 N01°40.8   7 325°12.8 237°08.9 5.2 3 306°52.2 06°00.4 214°28.8 27.9 315°49.3   40.9 359°11.7 28°708.2 · 53.9 355°42. 20.6 ° 00.4 214°28.8 27.9 315°49.3   10 10°20.2 302°07.5 5.39 355°42. 20.6 ° 20.4 24°31.2 27.7 15°58.1 41.4   70°30.2 302°07.5 5.39 355°42. 20.6 ° 25°41.3 27.8 05°55.9 1 41.4   70°30.2 302°07.5 5.39 355°42. 20.6 ° 25°41.3 27.8 05°55.9 14.1   11 25°22.6 317°06.7 54.5 68°54.9 0.33 27°47.1 27.7 15°58.1 41.4   70°30.0 2°04.5 56.1 55°57.0 55.6 38°56.3 04.8 304°41.3 27.6 61°04.7 41.6   741.7 70°30.2 ° 25.6 36°56.3 04.8 304°41.3 27.6 64°02.5 41.6   741.7 70°30.0 ° 2°04.5 56.1 55°7.0 55.6 38°56.3 04.8 304°41.3 27.6 64°02.5 41.6   741.8 70°30.9 ° 2°04.5 56.1 55°7.0 05.0 318°43.4 27.6 61°04.7 41.7   741.8 70°30.9 ° 2°04.8 56.1 55°7.0 05.0 318°43.4 27.6 61°04.7 41.8   741.8 70°30.9 ° 2°04.8 58.8 4 07.1 349°47.6 27.5 919.1 41.9   741.1 10°32.9 ° 2°07.1 40°0.1 10°0.2 10	0												
2 2 200 00.5 182 13.6 49.5 233 48.7 50.6 139 18.4 28.2 240 38.2 40.4 40.5 43 265 265 27.9 1971 12.8 50.0 249.4 5.7 4.1 154 20.5 28.1 257 40.4 4.05 4.05 4.05 4.05 4.05 4.05 4.05	1			48.9	218°48.0								
3 286 029 197128 5.0.0 287 4914 5.74 154°205 281 255°404 40.5 40.6 Allow 166°115 5.75 4 14 280°167 227 11.3 5.01 278°508 5.9 198°226 281 255°404 40.5 Allow 166°115 5.75 4 155°205 270°126 281 270°126 40.6 Allow 166°115 5.75 4 155°205 270°126 281 280°107 277°128 277°108 5.25 11 278°508 5.9 184°246 280 285°448 40.7 5.0 40.6 Allow 166°115 5.75 4 12.7 4 1	2	250°00.5	182°13.6	49.5	233°48.7	56.6	139°18.4	28.2	240°38.2	40.4	1		
40 280°054 9 127°12.1 50.6 263°50.1 58.1 166°22.6 28.1 270°42.6 40.6 Alloth 166°11.5 55°42.6 20°07.9 127°11.3 51.1 278°50.8 58.9 184°4.6 28.0 285°4.4 8 40.7 Spice 188°20.9 11°18.6 310°10.3 227°10.5 N22°51.7 287°50.8 58.9 184°4.6 28.0 285°4.4 8 40.7 Spice 188°20.9 11°18.6 310°10.3 227°10.5 N22°51.7 287°50.8 58.9 184°4.6 28.0 300°47.1 N01°40.8 Alkaid 152°50.7 49°11.0 10°10.2 25°10.5 10°10.0 10°20.2 30°07.5 53.8 335°52.9 0.11 229°30.9 27.9 330°51.5 41.1 Alkaid 152°50.7 49°11.0 10°20.2 30°07.5 53.9 335°51.2 0.0 244°33.0 ~7.8 345°53.7 41.2 Arctum 145°46.6 19°0.7 11°10.1 10°20.2 30°07.5 545.8 8549.9 33.2 274°27.1 27.8 0°55.9 41.3 Keyler 11.2 25°2.6 317°06.7 545.8 8549.9 33.2 274°27.7 277.7 15°56.1 41.4 Kochab 137°18.6 19°0.1 12.2 40°25.1 337°05.9 N22°55.0 23°55.6 N06°04.1 289°39.2 N22°27.7 31°03. N01°41.5 Luben'ubi 136°54.5 16°03.1 13.5 5°27.6 347°05.2 55.6 38°56.3 0.8 304°41.3 7.6 61°04.7 41.7 Allot 137°18.2 16°05.1 135°57.0 0.6 319°43.4 5°7.6 16°04.7 41.7 Allot 15.8 5°22.5 17°03.7 50.7 6.6 57.7 0.0 3. 334°45.5 ~7.5 61°06.9 41.8 Allot 100°35.0 32°0.9 5°7.2 83°56.4 07.1 349°47.6 27.5 91°09.1 41.9 Sabit 100°35.0 35°57.7 0.0 56.0 319°43.4 5°7.0 11°40.1 11°37.4 47°02.1 57.8 98°59.1 07.8 449.6 27.5 91°09.1 41.9 Sabit 100°35.0 35°59.0 50°57.7 0.0 3 344°45.5 ~7.5 91°09.1 41.9 Sabit 100°35.0 35°59.0 50°59.0 345°53.8 27.4 121°13.5 N01°42.1 11°37.4 47°02.1 57.8 98°59.1 07.8 449.6 27.5 91°09.1 41.9 Sabit 100°40.4 8 19°40.0 58.9	3	265°02.9	197°12.8	• • 50.0	248°49.4	• • 57.4	154°20.5	• • 28.1	255°40.4	• • 40.5			
5 299 077 9 227113 5.1. 278 508 58.9 184°24.6 28.0 285 44.8 40.7   5 295 077 9 227109 3 242°105 N22°51.7 N22°51.6 N22°52.0 N22°52.0 N22°52.7 N22°52.0 N22°52	4	280°05.4		50.6	263°50.1	58.1	169°22.6	28.1	270°42.6	40.6			
3 10°10.3 10°20.2 32°10.5 N2°51.7 293°15.5 N05°50.6 199°26.7 N2°228.0 300°47.1 N01°40.8 Alkaid 152°50.7 49°11.7 10°10.2 10°10.2 10°20.2 300°52.2 00°50.5 10°10.2 10°20.2 300°50.5 10°10.2 10°20.2 300°10.5 10°10.2 10°20.2 300°10.5 10°10.2 10°20.2 300°10.5 10°10.2 10°20.2 300°10.5 10°10.2 10°20.2 300°10.5 10°10.2 10°10.2 10°20.2 300°10.5 10°10.2 10°10.2 10°10.2 10°10.2 10°10.2 10°10.2 10°20.2 30°10.5 10°10.2 10°10	5	295°07.9	$227^{\circ}11.3$	51.1	278°50.8	58.9	184°24.6	28.0	285°44.8	40.7			
78 325°12.8 227°09.8 52.3 308°52.2 06°00.4 214°28.8 27.9 315°49.3 40.9 48°33.9 40.9 48°40.1 40.9 40.9 40.9 40.9 40.9 40.9 40.9 40.9	6	310°10.3	242°10.5	N22°51.7	293°51.5	N05°59.6	199°26.7	N22°28.0	300°47.1	N01°40.8			
8 340°15.2 2°2°09.0 52.8 323°52.9 0.1.1 229°30.9 27.9 330°51.5 41.1 10°10°20.2 30°207.5 53.9 338°53.5 0.19 244°33.0 0.7.8 345°53.7 ·41.2 4.1 4.1 4.1 4.1 4.1 4.1 4.1 4.1 4.1 4.1	7	325°12.8		52.3	308°52.2	$06^{\circ}00.4$	214°28.8	27.9	315°49.3	40.9			
9	8	340°15.2		52.8	323°52.9	01.1	229°30.9	27.9		41.1			
10 10°202 30°207.5 53.9 353°84.2 02.6 259°35.1 27.8 0°55.9 41.3 41.4 128°37.1 27.7 15°58.9 41.3 41.4 14.2 12°52.6 317°06.7 54.5 8°54.9 03.3 274°37.1 27.7 15°58.1 41.4 14.2 12°52.6 317°06.7 54.5 8°54.9 0.82°52.6 16.0 33°56.3 04.8 304°41.3 27.6 61°04.7 41.7 41.7 41.6 14.2 11.5 85°22.5 17°03.7 · 56.7 6.3 33°45.5 · 27.5 76°60.9 · 41.8 41.6 15.8 5°22.5 17°03.7 · 56.7 6.8 °57.7 · 06.3 33°45.5 · 27.5 76°60.9 · 41.8 41.6 15.8 5°22.5 17°03.7 · 56.7 68°57.7 · 06.3 33°45.5 · 27.5 76°60.9 · 41.8 41.6 15.8 5°22.5 17°03.7 · 56.7 68°57.7 · 06.3 33°45.5 · 27.5 76°60.9 · 41.8 41.6 15.8 5°22.5 17°03.7 · 56.7 68°57.7 · 06.3 33°45.5 · 27.5 76°60.9 · 41.8 41.6 15.8 5°22.5 15°03.7 · 56.7 68°57.7 · 06.3 33°45.5 · 27.5 76°60.9 · 41.8 41.6 15.8 5°22.5 15°03.7 · 56.7 68°57.7 · 06.3 33°45.5 · 27.5 76°60.9 · 41.8 41.6 15.8 5°22.5 15°03.7 · 56.7 68°57.7 · 06.3 33°45.5 · 27.5 76°60.9 · 41.8 41.6 15.8 5°22.5 15°03.7 · 56.7 68°57.7 · 06.3 33°45.5 · 27.5 76°60.9 · 41.8 41.6 15.8 5°22.5 15°37.4 47°02.1 · 57.8 5°59.8 · 41.6 15.8 5°59.1 · 07.8 4°49.6 27.4 136°15.7 42.2 15.8 5°59.8 · 59.4 144°01.2 · 101. 49°55.9 · 27.3 166°20.1 · 42.4 Vega 80°32.3 33°44.2 · 22.2 156°57.5 · 010. 189°03.2 · 12.3 95°02.1 · 27.2 156°45.4 · 42.6 Vega 80°32.3 38°44.2 · 40°22.2 136°57.5 · 010. 189°03.2 · 12.3 95°02.1 · 27.2 156°45.4 · 42.6 Vega 80°32.3 38°44.2 · 40°32.2 15°45.2 · 40°40.3 9 N06°13.0 110°04.2 N22°7.1 · 21°26.7 N01°42.7 Vega 80°32.3 38°44.2 · 40°40.5 · 40°40.3 9 N06°13.0 110°04.2 N22°7.1 · 21°26.7 N01°42.7 Vega 80°32.3 38°44.2 · 40°40.3 9 N06°13.0 110°04.2 N22°7.1 · 21°26.9 · 42.8 Vega 80°32.3 38°44.2 · 40°40.3 9 N06°13.0 110°04.2 N22°7.1 · 21°26.7 N01°42.7 Vega 80°32.3 38°44.2 · 40°40.3 9 N06°13.0 110°04.2 N22°7.1 · 21°26.7 N01°42.7 Vega 80°32.3 × 38°45.5 · 40°40.5 · 40°40.3 9 N06°13.0 110°04.2 N22°7.1 · 21°26.7 N01°42.7 Vega 80°32.3 × 38°45.5 · 40°40.5 · 40°40.3 9 N06°13.0 110°04.2 N22°29.1 Vega 80°32.3 × 38°45.5 · 40°40.5 · 40°40.5 · 40°40.5 · 40°40.5 · 40°40.5 · 40°40.5 · 40°40.5 · 40°40.5 · 40°40.5 · 40°40.5 · 40°40.5 · 40°40.5 · 40°40.5 · 40°40.5 · 40	9	355°17.7	287°08.2	• • 53.4	338°53.5	•• 01.9		• • 27.8	345°53.7	• • 41.2			19°02.6
11 25°226 1 332°059 N22°550 23°556 N6°641 289°39.2 N22°77 31°053 N01°41.5 146	10			53.9		02.6		27.8		41.3			-60°56.7
12	11										"		74°02.7
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GHA         GHA         Dec         Al Na'ir         27°31.7         -46°44         Permanant         Permanant         Formalmant         15°13.5         -29°2E         20°5°59.6         181°55.2         02.6         234°05.3         14.5         140°08.4         27.0         241°31.2         42.9         42.9         42.8         256°02.1         196°54.4         -03.2         249°06.0         -15.3         155°10.4         27.0         241°31.2         42.9         42.9         42.8         42.9         43.1         42.9         42.8         42.9         43.1         42.9         43.1         42.9         43.1         42.9         43.1         43.0         43.2         43.1         43.0         43.2         43.1         43.0         43.2         43.1         43.0         43.2         43.2         43.1         44°25.1         43.1         43.2         43.2         43.2         43.2         43.2         43.2         43.2         43.2         43.2         43.2											l .		45°22.1
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3 266°02.1 196°54.4 · · · 03.2 249°06.0 · · 15.3 155°10.4 · · · 27.0 256°33.4 · · · 43.0 281°04.5 211°53.7 03.7 264°06.7 16.0 170°12.5 26.9 271°35.6 43.1 May 01 Fri SHA Mer.pa 298°07.0 226°52.9 04.2 279°07.4 16.8 185°14.6 26.9 286°37.8 43.2 Venus 293°36.9 13.3 11°09.5 241°52.1 N23°04.8 294°08.1 N06°17.5 200°16.7 N22°26.8 301°40.0 N01°43.3 Mars 344°34.3 10.3 326°11.9 256°51.4 05.3 309°08.8 18.2 215°18.8 26.8 316°42.2 43.5 340°14.4 471°50.6 05.8 324°09.5 19.0 230°20.8 26.7 331°44.4 43.6 Saturn 350°44.5 10.1 1°19.3 301°49.0 06.9 354°10.9 20.5 260°25.0 26.6 1°48.8 43.8 11 26°21.8 316°48.3 07.4 9°11.6 21.2 275°27.1 26.6 16°51.0 43.9 Venus 292°19.6 13: 41°24.2 331°44.4 10.0 84°15.0 24.9 350°31.2 265.5 46°55.4 44.1 71°29.2 1°45.9 09.0 54°13.6 23.4 320°33.3 26.4 61°57.6 44.2 116°36.6 46°43.6 10.6 99°15.7 25.7 5°39.5 26.3 107°04.3 44.5 Mars 343°03.3 10.9 116°34.1 31°44.4 10.0 84°15.0 24.9 350°37.5 26.3 107°04.3 44.5 Mars 343°03.3 10.9 116°34.1 31°44.4 10.0 84°15.0 24.9 350°37.5 26.3 107°04.3 44.5 Mars 343°03.3 10.9 116°34.1 31°44.4 10.0 84°15.0 24.9 350°37.5 26.3 107°04.3 44.5 Mars 343°03.3 10.9 116°34.1 31°44.4 10.0 84°15.0 24.9 350°37.5 26.3 107°04.3 44.5 Mars 343°03.3 10.9 116°34.1 31°44.4 10.0 84°15.0 24.9 350°37.5 26.3 107°04.3 44.5 Mars 343°09.3 10.0 116°40.5 76°42.1 11.6 129°17.1 27.2 35°43.7 26.2 137°08.7 44.7 116°36.6 46°43.6 10.6 99°15.7 25.7 5°39.5 26.3 107°04.3 44.5 Mars 343°09.3 10.9 10.9 10°44.0 116°40.5 76°42.1 11.6 129°17.1 27.2 35°43.7 26.2 137°08.7 44.7 116°36.6 46°43.6 10.6 99°15.7 25.7 5°39.5 26.3 107°04.3 44.5 Mars 343°09.3 10.9 10.9 10°44.0 116°40.5 76°42.1 11.6 129°17.1 27.2 35°43.7 26.2 137°08.7 44.7 116°44.0 91°41.3 12.1 144°17.8 27.9 50°45.8 26.1 150°10.9 44.8 11.0 110°41.3 12.1 144°17.8 27.9 50°45.8 26.1 150°10.9 44.8 11.0 110°41.3 12.1 144°17.8 27.9 50°45.8 26.1 150°10.9 44.8 11.0 110°41.5 12.1 144°17.8 27.9 50°45.8 26.1 150°10.9 44.8 11.0 110°41.1 110°41.1 110°41.1 110°41.1 110°41.1 110°41.1 110°41.1 110°41.1 110°41.1 110°41.1 110°41.1 110°41.1 110°41.1 110°41.1 110°41.1 110°41.1 110°41.1 11													28°13.3
4 281°04.5 211°53.7 03.7 264°06.7 16.0 170°12.5 26.9 271°35.6 43.1 296°07.0 226°52.9 04.2 279°07.4 16.8 185°14.6 26.9 286°37.8 43.2 43.2 43.5 43.1 294°08.1 N06°17.5 200°16.7 N22°26.8 301°40.0 N01°43.3 44.3 43.3 10: 215°18.8 341°14.4 271°50.6 05.8 324°09.5 19.0 230°20.8 26.7 331°44.4 43.6 34.8 43.8 43.8 43.8 43.8 43.8 43.8 43.8											Markab	13°29.0	15°20.7
5 296°07.0 226°52.9 04.2 279°07.4 16.8 185°14.6 26.9 286°37.8 43.2   6 311°09.5 241°52.1 N23°04.8 294°08.1 N06°17.5 200°16.7 N22°26.8 301°40.0 N01°43.3   7 326°11.9 256°51.4 05.3 309°08.8 18.2 215°18.8 26.8 316°42.2 43.5   8 341°14.4 271°50.6 05.8 324°09.5 19.0 230°20.8 26.7 331°44.4 43.6   9 356°16.9 286°49.8 · · · 06.4 339°10.2 · · 19.7 245°22.9 · · 26.7 346°46.6 · · 43.7   10 11°19.3 301°49.0 06.9 354°10.9 20.5 260°25.0 26.6 1°48.8 43.8   11 26°21.8 316°48.3 07.4 9°11.6 21.2 275°27.1 26.6 16°51.0 43.9   12 41°24.2 331°47.5 N23°07.9 24°12.2 N06°22.0 290°29.1 N22°26.5 31°53.2 N01°44.0   13 56°26.7 346°46.7 08.5 39°12.9 22.7 305°31.2 26.5 46°55.4 44.1   14 71°29.2 1°45.9 09.0 54°13.6 23.4 320°33.3 26.4 61°57.6 44.2   15 86°31.6 16°45.2 · · · 09.5 69°14.3 · · · 24.9 350°37.5 26.3 92°02.0 44.4   17 116°36.6 46°43.6 10.6 99°15.7 25.7 5°39.5 26.3 107°04.3 44.5   18 131°39.0 61°42.8 N23°11.1 114°16.4 N06°26.4 20°41.6 N22°26.2 122°06.5 N01°44.6   19 146°44.0 91°41.3 12.1 144°17.8 27.9 50°45.8 26.1 152°10.9 44.8   21 176°46.4 106°40.5 · · 12.6 159°18.5 · · 28.6 66°47.8 · · · 26.1 167°13.1 · · · 44.9   22 191°48.9 121°39.7 13.1 174°19.2 29.4 80°49.9 26.0 182°15.3 45.0   13 136°39.0 13.6 189°19.9 30.1 95°52.0 26.0 197°17.5 45.1    15 Wenus 293°36.9 13:   Mars 343°3.9 13:   Mars 344°34.3 10:   Mars 344°34.3 10:   Mars 344°34.3 10:   Mars 344°34.3 10:   43.6   43.6   43.6   43.6   44.4   43.6   43.6   44.8   43.8   44.2   44.4   43.6   44.4   43.6   44.4   43.6   44.4   43.6   44.4   43.6   44.8   43.8   44.9   44.9   44.9   44.9   44.0   44											May 01 Fri	SHA	Mer.pass
6 311°09.5 241°52.1 N23°04.8 294°08.1 N06°17.5 200°16.7 N22°26.8 301°40.0 N01°43.3   Mars 344°34.3 10: 326°11.9 256°51.4 05.3 309°08.8 18.2 215°18.8 26.8 316°42.2 43.5   Mars 344°34.5   Mars 350°44.5 10: 341°14.4 271°50.6 05.8 324°09.5 19.0 230°20.8 26.7 331°44.4 43.6   Saturn 350°44.5 10: 341°14.4 271°50.6 05.8 324°09.5 19.0 230°20.8 26.7 331°44.4 43.6   Saturn 350°44.5 10: 341°14.4 271°50.6 05.8 324°09.5 19.0 230°20.8 26.7 331°44.4 43.6   Saturn 350°44.5 10: 341°14.9   Mars 344°34.3 10: 341°14.4 43.6   Mars 346°46.7 06.9 354°10.9 20.5 260°25.0 26.6 1°48.8 43.8   Mars 350°44.5 10: 341°24.2 331°47.5 N23°07.9 24°12.2 N06°22.0 290°29.1 N22°26.5 31°53.2 N01°44.0   Mars 343°51.8 10: 341°4.4 71°29.2 1°45.9 09.0 54°13.6 23.4 320°33.3 26.4 61°57.6 44.2   Mars 343°51.8 10: 341°4.4 10.0 84°15.0 24.9 350°37.5 26.3 92°02.0 44.4   Mars 350°38.3 09: 350°37.5 26.3 92°02.0 44.4   Mars 343°09.3 10: 341°39.0 61°42.8 N23°11.1 114°16.4 N06°26.4 20°41.6 N22°26.2 122°06.5 N01°44.6   Mars 343°09.3 10: 341°39.0 61°42.8 N23°11.1 114°16.4 N06°26.4 20°41.6 N22°26.2 122°06.5 N01°44.6   Mars 343°09.3 10: 341°39.0 61°44.0 91°41.3 12.1 144°17.8 27.9 50°45.8 26.1 152°10.9 44.8   Mars 343°03.1 10: 350°32.1 09: 341°39.7 13.1 174°19.2 29.4 80°49.9 26.0 182°15.3 45.0   Mars: 0.1													13:50
7 326°11.9 256°51.4 05.3 309°08.8 18.2 215°18.8 26.8 316°42.2 43.5 8 341°14.4 271°50.6 05.8 324°09.5 19.0 230°20.8 26.7 331°44.4 43.6 9 356°16.9 286°49.8 · · · · · · · · · · · · · · · · · · ·													10:25
8 341°14.4 271°50.6 05.8 324°09.5 19.0 230°20.8 26.7 331°44.4 43.6 9 356°16.9 286°49.8 · · · 06.4 339°10.2 · · 19.7 245°22.9 · · · 26.7 346°46.6 · · 43.7 10 11°19.3 301°49.0 06.9 354°10.9 20.5 260°25.0 26.6 1°48.8 43.8 11 26°21.8 316°48.3 07.4 9°11.6 21.2 275°27.1 26.6 16°51.0 43.9 12 41°24.2 331°47.5 N23°07.9 24°12.2 N06°22.0 290°29.1 N22°26.5 31°53.2 N01°44.0 13 56°26.7 346°46.7 08.5 39°12.9 22.7 305°31.2 26.5 46°55.4 44.1 14 71°29.2 1°45.9 09.0 54°13.6 23.4 320°33.3 26.4 61°57.6 44.2 15 86°31.6 16°45.2 · · · 09.5 69°14.3 · · · 24.2 335°35.4 · · · · 26.4 76°59.8 · · · 44.3 16 101°34.1 31°44.4 10.0 84°15.0 24.9 350°37.5 26.3 92°02.0 44.4 17 116°36.6 46°43.6 10.6 99°15.7 25.7 5°39.5 26.3 107°04.3 44.5 15 10 10°34.5 76°42.1 11.6 129°17.1 27.2 35°43.7 26.2 137°08.7 44.7 16°46.4 106°40.5 · · · 12.6 159°18.5 · · · 28.6 65°47.8 · · · 26.1 152°10.9 44.8 11 176°46.4 106°40.5 · · · 12.6 159°18.5 · · · 28.6 65°47.8 · · · 26.1 167°13.1 · · · 44.9 110°41.3 121°14°41.9 2 29.4 80°49.9 26.0 182°15.3 45.0 110°17.5 45.1 10°19.1 136°35.1 136°39.0 13.6 189°19.9 30.1 95°52.0 26.0 197°17.5 45.1 10°31.1 140°15.1 110°1.1 1													16:44
9 356°16.9 286°49.8 · · · 06.4 339°10.2 · · · 19.7 245°22.9 · · · 26.7 346°46.6 · · · 43.7 10 11°19.3 301°49.0 06.9 354°10.9 20.5 260°25.0 26.6 1°48.8 43.8 11 26°21.8 316°48.3 07.4 9°11.6 21.2 275°27.1 26.6 16°51.0 43.9 12 41°24.2 331°47.5 N23°07.9 24°12.2 N06°22.0 290°29.1 N22°26.5 31°53.2 N01°44.0 13 56°26.7 346°46.7 08.5 39°12.9 22.7 305°31.2 26.5 46°55.4 44.1 14 71°29.2 1°45.9 09.0 54°13.6 23.4 320°33.3 26.4 61°57.6 44.2 15 86°31.6 16°45.2 · · 09.5 69°14.3 · · 24.2 335°35.4 · · · 26.4 76°59.8 · · · 44.3 16 101°34.1 31°44.4 10.0 84°15.0 24.9 350°37.5 26.3 92°02.0 44.4 17 116°36.6 46°43.6 10.6 99°15.7 25.7 5°39.5 26.3 107°04.3 44.5 18 131°39.0 61°42.8 N23°11.1 114°16.4 N06°26.4 20°41.6 N22°26.2 122°06.5 N01°44.6 19 146°41.5 76°42.1 11.6 129°17.1 27.2 35°43.7 26.2 137°08.7 44.7 20 161°44.0 91°41.3 12.1 144°17.8 27.9 50°45.8 26.1 152°10.9 44.8 21 176°46.4 106°40.5 · · 12.6 159°18.5 · · 28.6 65°47.8 · · 26.1 167°13.1 · · 44.9 14.9 12°39.7 13.1 174°19.2 29.4 80°49.9 26.0 182°15.3 45.0 19 19°17.5 45.1 Mars: 0.1 110°17.5 15.1													10:00
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12 41°24.2 331°47.5 N23°07.9 24°12.2 N06°22.0 290°29.1 N22°26.5 31°53.2 N01°44.0 13 56°26.7 346°46.7 08.5 39°12.9 22.7 305°31.2 26.5 46°55.4 44.1 14.1 14.1 14.1 14.1 14.1 14.1	11												13:52
13 56°26.7 346°46.7 08.5 39°12.9 22.7 305°31.2 26.5 46°55.4 44.1 41.1   14 71°29.2 1°45.9 09.0 54°13.6 23.4 320°33.3 26.4 61°57.6 44.2   15 86°31.6 16°45.2 · · · 09.5 69°14.3 · · · 24.2 335°35.4 · · · 26.4 76°59.8 · · · 44.3   16 101°34.1 31°44.4 10.0 84°15.0 24.9 350°37.5 26.3 92°02.0 44.4   17 116°36.6 46°43.6 10.6 99°15.7 25.7 5°39.5 26.3 107°04.3 44.5   18 131°39.0 61°42.8 N23°11.1 114°16.4 N06°26.4 20°41.6 N22°26.2 122°06.5 N01°44.6   19 146°41.5 76°42.1 11.6 129°17.1 27.2 35°43.7 26.2 137°08.7 44.7   20 161°44.0 91°41.3 12.1 144°17.8 27.9 50°45.8 26.1 152°10.9 44.8   21 176°46.4 106°40.5 · · 12.6 159°18.5 · · · 28.6 65°47.8 · · · 26.1 167°13.1 · · · 44.9   22 191°48.9 121°39.7 13.1 174°19.2 29.4 80°49.9 26.0 182°15.3 45.0   23 206°51.3 136°39.0 13.6 189°19.9 30.1 95°52.0 26.0 197°17.5 45.1      May 03 Sun SHA Mer.pa Venus 291°02.1 13:     Mars 343°09.3 10:     Mars 343°09.3 10:     Saturn 350°38.3 09:     Saturn 350°38.3 09:     May 03 Sun SHA Mer.pa Venus 291°02.1 13:     Mars 343°09.3 10:     Saturn 350°38.3 09:     Satu	12										!		10:24
14 71°29.2 1°45.9 09.0 54°13.6 23.4 320°33.3 26.4 61°57.6 44.2 15 86°31.6 16°45.2 ·· 09.5 69°14.3 ·· 24.2 335°35.4 ·· 26.4 76°59.8 ·· 44.3 16 101°34.1 31°44.4 10.0 84°15.0 24.9 350°37.5 26.3 92°02.0 44.4 17 116°36.6 46°43.6 10.6 99°15.7 25.7 5°39.5 26.3 107°04.3 44.5 18 131°39.0 61°42.8 N23°11.1 114°16.4 N06°26.4 20°41.6 N22°26.2 122°06.5 N01°44.6 19 146°41.5 76°42.1 11.6 129°17.1 27.2 35°43.7 26.2 137°08.7 44.7 20 161°44.0 91°41.3 12.1 144°17.8 27.9 50°45.8 26.1 152°10.9 44.8 21 176°46.4 106°40.5 ·· 12.6 159°18.5 ·· 28.6 65°47.8 ·· 26.1 167°13.1 ·· 44.9 22 191°48.9 121°39.7 13.1 174°19.2 29.4 80°49.9 26.0 182°15.3 45.0 23 206°51.3 136°39.0 13.6 189°19.9 30.1 95°52.0 26.0 197°17.5 45.1 Mars: 0.1	13												16:41
15 86°31.6 16°45.2 · · · 09.5 69°14.3 · · · 24.2 335°35.4 · · · 26.4 76°59.8 · · · 44.3 16 101°34.1 31°44.4 10.0 84°15.0 24.9 350°37.5 26.3 92°02.0 44.4 17 116°36.6 46°43.6 10.6 99°15.7 25.7 5°39.5 26.3 107°04.3 44.5 18 131°39.0 61°42.8 N23°11.1 114°16.4 N06°26.4 20°41.6 N22°26.2 122°06.5 N01°44.6 19 146°41.5 76°42.1 11.6 129°17.1 27.2 35°43.7 26.2 137°08.7 44.7 20 161°44.0 91°41.3 12.1 144°17.8 27.9 50°45.8 26.1 152°10.9 44.8 11 16°40.5 · · · 12.6 159°18.5 · · · 28.6 65°47.8 · · · 26.1 167°13.1 · · · 44.9 11°49.2 29.4 80°49.9 26.0 182°15.3 45.0 23 206°51.3 136°39.0 13.6 189°19.9 30.1 95°52.0 26.0 197°17.5 45.1 Mars: 0.1	14										Saturn	350°38.3	09:56
16       101°34.1       31°44.4       10.0       84°15.0       24.9       350°37.5       26.3       92°02.0       44.4       Venus       291°02.1       13:         17       116°36.6       46°43.6       10.6       99°15.7       25.7       5°39.5       26.3       107°04.3       44.5       Mars       343°09.3       10:         18       131°39.0       61°42.8       N23°11.1       114°16.4       N06°26.4       20°41.6       N22°26.2       122°06.5       N01°44.6       Jupiter       249°09.5       16:         19       146°41.5       76°42.1       11.6       129°17.1       27.2       35°43.7       26.2       137°08.7       44.7       Saturn       350°32.1       09:         20       161°44.0       91°41.3       12.1       144°17.8       27.9       50°45.8       26.1       152°10.9       44.8       5aturn       350°32.1       09:         21       176°46.4       106°40.5       12.6       159°18.5       28.6       65°47.8       26.1       167°13.1       44.9       44.9         22       191°48.9       121°39.7       13.1       174°19.2       29.4       80°49.9       26.0       182°15.3       45.0       45.1       Mars:	15										May 03 Sun	SHA	Mer.pass
17	16										-		13:53
18	17												10:23
19	18	131°39.0	61°42.8	N23°11.1	114°16.4	N06°26.4	20°41.6	N22°26.2	122°06.5	N01°44.6			16:37
20 161°44.0 91°41.3 12.1 144°17.8 27.9 50°45.8 26.1 152°10.9 44.8 21 176°46.4 106°40.5 · · 12.6 159°18.5 · · 28.6 65°47.8 · · 26.1 167°13.1 · · 44.9 22 191°48.9 121°39.7 13.1 174°19.2 29.4 80°49.9 26.0 182°15.3 45.0 23 206°51.3 136°39.0 13.6 189°19.9 30.1 95°52.0 26.0 197°17.5 45.1 Mars: 0.1	19	146°41.5	76°42.1			27.2	35°43.7		137°08.7				09:53
22 191°48.9 121°39.7 13.1 174°19.2 29.4 80°49.9 26.0 182°15.3 45.0 Venus: 0.1 23 206°51.3 136°39.0 13.6 189°19.9 30.1 95°52.0 26.0 197°17.5 45.1 Mars: 0.1	20	161°44.0	91°41.3	12.1	144°17.8	27.9	50°45.8	26.1	152°10.9				
23 206°51.3 136°39.0 13.6 189°19.9 30.1 95°52.0 26.0 197°17.5 45.1 Mars: 0.1	21			• • 12.6		• • 28.6				• • 44.9	Horizont	•	_
25 260 51.5 150 55.0 15.5 56.1 55.5 56.1	22												
Mer pass 10:15  v.0.8/ d0.5/ m.3.92  v.0.7/ d0.7/ m1.23  v.2.1/ d-0.0/ m-2.00  v.2.2/ d0.1/ m0.03	23	206°51.3	136°39.0	13.6	189°19.9	30.1	95°52.0	26.0	197°17.5	45.1		Mars:	0.1
	Mar	ΩSS 00.15	1/_N 8/ 40	5/ m 3 02	υΩ 7/ ຝΩ	7′ m1 22	,,2 1/ d 0	0' m 2 00	1/2 2/ 40	1/ m0 02			

h	Sui	า			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°42.9	$N15^{\circ}00.9$	10°05.4	14.3'	S16°15.4	12.0'	54.7'
1 2	195°43.0 210°43.1	01.7 02.5	24°38.7 39°11.9	14.2' 14.2'	16°27.4 16°39.3	12.0' 11.9'	54.7' 54.7'
3	210 43.1 225°43.2	03.2	59 11.9 53°45.1	14.1'	16°51.2	11.8'	54.7'
4	240°43.2	04.0	68°18.2	14.1'	17°03.0	11.7'	54.7'
5	255°43.3	04.7	82°51.3	14.0'	17°14.7	11.6'	54.6'
6 7	270°43.4 285°43.5	N15°05.5 06.2	97°24.3 111°57.3	14.0' 13.9'	\$17°26.4 17°37.9	11.6' 11.5'	54.6' 54.6'
8	300°43.5	07.0	111 37.3 126°30.3	13.9'	17°49.4	11.4	54.6'
9	315°43.6	• • 07.7	141°03.2	13.8'	18°00.8	11.3'	54.6'
10	330°43.7	08.5	155°36.0	13.8'	18°12.2	11.2'	54.6'
11 12	345°43.8 0°43.8	09.3 N15°10.0	170°08.8 184°41.5	13.7' 13.7'	18°23.4 \$18°34.6	11.2' 11.1'	54.6' 54.5'
13	15°43.9	10.8	199°14.2	13.6'	18°45.7	11.0'	54.5'
14	30°44.0	11.5	213°46.8	13.6'	18°56.7	10.9'	54.5'
15 16	45°44.1 60°44.1	· · 12.3 13.0	228°19.4 242°52.0	13.5' 13.5'	19°07.6 19°18.4	10.8' 10.7'	54.5' 54.5'
17	75°44.2	13.8	242 32.0 257°24.4	13.4'	19°10.4	10.7	54.5'
18	90°44.3	N15°14.5	271°56.9	13.4'	S19°39.8	10.6'	54.5'
19	105°44.4	15.3	286°29.2	13.3'	19°50.4	10.5'	54.5'
20 21	120°44.4 135°44.5	16.0 •• 16.8	301°01.6 315°33.8	13.3' 13.2'	20°00.8 20°11.2	10.4' 10.3'	54.4' 54.4'
22	150°44.6	17.5	330°06.0	13.2'	20°21.5	10.3	54.4'
23	165°44.6	18.3	344°38.2	13.1'	20°31.7	10.1'	54.4'
	SD = 15.9'	d = 0.8'		SE	0 = 14.9'		
_							
Sat 0	<b>GHA</b> 180°44.7	<b>Dec</b> N15°19.0	<b>GHA</b> 359°10.3	u  13.1'	Dec 520°41.8	<i>d</i> 10.0'	<b>HP</b> 54.4'
1	195°44.8	19.8	13°42.4	13.0'	20°51.8	9.9'	54.4'
2	210°44.9	20.5	28°14.4	12.9'	21°01.8	9.8'	54.4'
3 4	225°44.9 240°45.0	· · 21.3 22.0	42°46.3 57°18.2	12.9' 12.8'	21°11.6 21°21.3	9.7' 9.6'	54.4' 54.4'
5	255°45.1	22.0	71°50.0	12.8'	21°21.3	9.0 9.5'	54.4 54.3'
6	270°45.1	N15°23.5	86°21.8	12.7'	S21°40.5	9.4'	54.3'
7	285°45.2	24.2	100°53.5	12.7'	21°49.9	9.3'	54.3'
8 9	300°45.3 315°45.4	25.0 •• 25.7	115°25.2 129°56.8	12.6' 12.6'	21°59.2 22°08.5	9.2' 9.1'	54.3' 54.3'
10	330°45.4	26.5	144°28.4	12.5'	22°17.6	9.0'	54.3'
11	345°45.5	27.2	158°59.9	12.4'	22°26.7	8.9'	54.3'
12	0°45.6 15°45.6	N15°28.0 28.7	173°31.3 188°02.7	12.4' 12.3'	\$22°35.6 22°44.4	8.8'	54.3' 54.3'
13 14	30°45.7	28.7 29.4	202°34.0	12.3'	22 44.4 22°53.1	8.7' 8.6'	54.3'
15	45°45.8	30.2	217°05.3	12.2'	23°01.8	8.5'	54.2'
16	60°45.8	30.9	231°36.6	12.2'	23°10.3	8.4'	54.2'
17 18	75°45.9 90°46.0	31.7 N15°32.4	246°07.7 260°38.9	12.1' 12.1'	23°18.7 <b>S</b> 23°27.0	8.3' 8.2'	54.2' 54.2'
19	105°46.0	33.1	275°09.9	12.0'	23°35.2	8.1'	54.2'
20	120°46.1	33.9	289°40.9		23°43.3	8.0'	54.2'
21 22	135°46.2 150°46.2	· · 34.6 35.4	304°11.9 318°42.8	11.9' 11.9'	23°51.2 23°59.1	7.9' 7.8'	54.2' 54.2'
23	165°46.3	36.1	333°13.7	11.8'	24°06.8	7.6'	54.2'
	SD = 15.9'	d = 0.7'		SE	0 = 14.8'		
					_		
Sun 0	<b>GHA</b> 180°46.4	<b>Dec</b> N15°36.8	<b>GHA</b> 347°44.5	u 11.8'	Dec \$24°14.5	d 7.5'	<b>HP</b> 54.2'
1	195°46.4	37.6	2°15.2	11.7'	24°22.0	7.5 7.4'	54.2'
2	210°46.5	38.3	16°45.9	11.6'	24°29.4	7.3'	54.1'
3 4	225°46.6 240°46.6	· · 39.0 39.8	31°16.6 45°47.2	11.6' 11.5'	24°36.7 24°43.9	7.2' 7.1'	54.1' 54.1'
5	255°46.7	40.5	60°17.7	11.5'	24°51.0	7.1	54.1'
6	270°46.8	N15°41.2	74°48.2	11.4'	S24°58.0	6.8'	54.1'
7	285°46.8 300°46.9	42.0 42.7	89°18.7 103°49.0	11.4'	25°04.8	6.7'	54.1'
8 9	300°46.9 315°47.0	42.7 • • 43.4	103°49.0 118°19.4	11.3' 11.3'	25°11.5 25°18.1	6.6' 6.5'	54.1' 54.1'
10	330°47.0	44.2	132°49.7	11.3'	25°24.6	6.4	54.1'
11	345°47.1	44.9	147°19.9	11.2'	25°31.0	6.2'	54.1'
12 13	0°47.2 15°47.2	N15°45.6 46.4	161°50.2 176°20.3	11.2' 11.1'	\$25°37.2 25°43.4	6.1' 6.0'	54.1' 54.1'
14	30°47.3	40.4	170 20.3 190°50.4	11.1'	25°49.4	5.9'	54.1'
15	45°47.3	• • 47.8	$205^{\circ}20.5$	11.0'	25°55.3	5.8'	54.1'
16	60°47.4	48.6	219°50.5 234°20.5	11.0'	26°01.0 26°06.7	5.6'	54.1'
17 18	75°47.5 90°47.5	49.3 N15°50.0	234°20.5 248°50.4	10.9' 10.9'	26°06.7 \$26°12.2	5.5' 5.4'	54.0' 54.0'
19	105°47.6	50.8	263°20.3	10.9'	26°17.6	5.3'	54.0'
20	120°47.6	51.5	277°50.2	10.8'	26°22.8	5.1'	54.0'
21 22	135°47.7 150°47.8	· · 52.2 52.9	292°20.0 306°49.7	10.8' 10.7'	26°28.0 26°33.0	5.0' 4.9'	54.0' 54.0'
23	165°47.8	53.7	321°19.5	10.7'	26°37.9	4.8'	54.0'
	SD = 15.9'	d = 0.7'		SE	0 = 14.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
	Naut.	Civil			Civil	Naut.
N $72^{\circ}$	////	////	01:44	22:18	////	////
<b>N</b> 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
<b>N</b> 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
$20^{\circ}$	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
		Moonris	ie		Moonset	:
Lat.	Eri	Sat	Sun	Eri	Sat	Sun

Lat.		Moonris	e		Moonset	t
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°		_		00:57		
<b>N</b> 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
<b>S</b> 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

		Sun		Moon				
Day		f Time	Mer.	Mer.	Age			
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	14-16		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	99-98%		
01	02:52	02:55	11:57	-:-	11:41			
02	02:59	03:02	11:57	00:03	12:27			
03	03:05	03:09	11:57	00:51	13:15			

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
		151°38.2			N06°30.9	110°54.1	N22° 25.9		N01°45.2			Dec
0	221°53.8		N23°14.2	204°20.6				212°19.7		Alpheratz	357°33.9	29°14.0
1	236°56.3	166°37.4	14.7	219°21.2	31.6	125°56.1	25.9	227°21.9	45.3	Ankaa	353°06.4	-42°09.7
2	251°58.7	181°36.6	15.2	234°21.9	32.3	140°58.2	25.8	242°24.1	45.4	Schedar	349°30.3	56°40.7
3	267°01.2	196°35.9	• • 15.7	249°22.6	• • 33.1	156°00.3	• • 25.8	257°26.3	• • 45.5	Diphda	348° 46.5	-17°50.5
4	282°03.7	211°35.1	16.2	264°23.3	33.8	171°02.4	25.7	272°28.5	45.6	Achernar	335°19.9	-57°06.1
5	297°06.1	226°34.3	16.7	279°24.0	34.6	186°04.4	25.7	287°30.7	45.7	Hamal	327° 50.3	23°35.1
6	312°08.6	241°33.5	N23°17.2	294°24.7	N06°35.3	201°06.5	N22°25.6	302°32.9	N01°45.8			89°22.5
7	327°11.1	256°32.7	17.7	309°25.4	36.0	216°08.6	25.6	317°35.2	45.9	Polaris	313°58.6	
8	342°13.5	271°32.0	18.2	324°26.1	36.8	231°10.7	25.5	332°37.4	46.0	Acamar	315°11.4	-40°12.0
9	357°16.0	286°31.2	18.7	339°26.8	• • 37.5	246°12.7	• • 25.5	347°39.6	• • 46.1	Menkar	314°05.4	4°11.5
10	12°18.5	301°30.4	19.2	354°27.5	38.3	261°14.8	25.4	2°41.8	46.2	Mirfak	308°27.2	49°57.2
										Aldebaran	290°38.7	16°33.7
11	27°20.9	316°29.6	19.7	9°28.2	39.0	276°16.9	25.4	17°44.0	46.3	Rigel	281°03.1	-8°10.4
12	42°23.4	331°28.8	N23°20.2	24°28.9	N06°39.7	291°18.9	N22°25.3	32°46.2	N01°46.4	Capella	280°20.7	46°01.5
13	57°25.8	346°28.1	20.7	39°29.6	40.5	$306^{\circ}21.0$	25.3	47°48.4	46.6	Bellatrix	278°22.0	6°22.3
14	72°28.3	1°27.3	21.2	54°30.2	41.2	321°23.1	25.2	62°50.6	46.7	Elnath	278°00.8	28°37.8
15	87°30.8	$16^{\circ}26.5$	· · 21.7	69°30.9	· · 42.0	336°25.2	· · 25.2	77°52.8	• • 46.8	1		
16	102°33.2	31°25.7	22.2	84°31.6	42.7	351°27.2	25.1	92°55.0	46.9	Alnilam	275°36.9	-1°11.2
17	117°35.7	46°24.9	22.7	99°32.3	43.4	6°29.3	25.1	107°57.2	47.0	Betelgeuse	270°51.2	7°24.7
18	132°38.2	61°24.2	N23°23.2	114°33.0	N06°44.2	21°31.4	N22°25.0	122°59.4	N01°47.1	Canopus	263°52.3	-52°42.8
	147°40.6	76°23.4		114 33.0 129°33.7		36°33.4		138°01.7		Sirius	258°25.5	-16°45.3
19			23.7		44.9		25.0		47.2	Adhara	255°05.2	-29°00.7
20	162°43.1	91°22.6	24.2	144°34.4	45.7	51°35.5	24.9	153°03.9	47.3	Procyon	244°49.8	5°09.4
21	177°45.6	106°21.8	• • 24.6	159°35.1	• • 46.4	66°37.6	• • 24.8	168°06.1	• • 47.4	Pollux	243°16.1	27°57.8
22	192°48.0	121°21.0	25.1	174°35.8	47.1	81°39.7	24.8	183°08.3	47.5	Avior	234° 14.4	-59°35.9
23	207°50.5	136°20.2	25.6	189°36.5	47.9	96°41.7	24.7	$198^{\circ}10.5$	47.6			
	00.11		F/ 2.22		7/ 100		1/ 0.00			Suhail	222°45.5	-43°32.6
Mer.p	ass. 09:11	$\nu$ -0.8′ d0	.5′ m-3.92	$\nu$ 0.7' d0	.7′ m1.23	$\nu 2.1' d-0$	.1' m-2.00	$\nu$ 2.2′ d0	.1' m $0.93$	Miaplacidus	221°38.1	-69°49.8
										Alphard	217°46.7	-8°46.5
т	CHA	CHA	Daa	CHA	Dag	CHA	Doo	CHA	Doo	Regulus	207°33.2	11°50.2
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.4	61°36.7
0	222°53.0	151°19.5	N23°26.1	204°37.2	N06°48.6	111°43.8	N22°24.7	213°12.7	N01°47.7	Denebola	182°23.6	14°25.4
1	237°55.4	166°18.7	26.6	219°37.9	49.3	126°45.9	24.6	228°14.9	47.8	Gienah	175°42.2	-17°41.5
2	252°57.9	181°17.9	27.1	234°38.5	50.1	141°47.9	24.6	243°17.1	47.9		172°58.4	-63°15.0
3	268°00.3	$196^{\circ}17.1$	• • 27.6	249°39.2	• • 50.8	156°50.0	• • 24.5	258°19.3	• • 48.0		172 50.4 171°50.0	-57°15.9
4	283°02.8	211°16.3	28.0	264°39.9	51.6	171°52.1	24.5	273°21.5	48.1			
5	298°05.3	226°15.5	28.5	279°40.6	52.3	186°54.1	24.4	288°23.7	48.2	Alioth	166°11.5	55°49.1
6	313°07.7	241°14.7	N23°29.0	294°41.3	N06°53.0	201°56.2	N22°24.4	303°26.0	N01°48.3	Spica	158°20.9	-11°18.1
	328°10.2	256°14.0		309°42.0		216°58.3		318°28.2		Alkaid	152°50.7	49°10.9
7			29.5		53.8		24.3		48.4	Hadar	148°33.8	-60°30.1
8	343°12.7	271°13.2	29.9	324°42.7	54.5	232°00.4	24.3	333°30.4	48.5	Menkent	147°56.0	-36°30.1
9	358°15.1	286°12.4	• • 30.4	339°43.4	• • 55.2	247°02.4	• • 24.2	348°32.6	• • 48.6	Arcturus	145°46.6	19°02.6
10	13°17.6	301°11.6	30.9	354°44.1	56.0	262°04.5	24.2	3°34.8	48.7	Rigil Kent.	139°38.2	-60°56.8
11	28°20.1	$316^{\circ}10.8$	31.4	9°44.8	56.7	277°06.6	24.1	18°37.0	48.8	Kochab	137° 18.6	74°02.7
12	43°22.5	331°10.0	N23°31.8	24°45.5	N06°57.5	292°08.6	N22°24.1	33°39.2	N01°48.9			
13	58°25.0	346°09.2	32.3	39°46.1	58.2	307°10.7	24.0	48°41.4	49.0	Zuben'ubi	136°54.5	-16°09.2
14	73°27.5	1°08.4	32.8	54°46.8	58.9	322°12.8	24.0	63°43.6	49.1	Alphecca	126°02.5	26°37.4
15	88°29.9	16°07.7	• • 33.2	69°47.5	06°59.7	337°14.8	• • 23.9	78°45.8	• • 49.2	Antares	112°14.2	-26°29.5
										Atria	$107^{\circ}07.0$	-69°04.4
16	103°32.4	31°06.9	33.7	84°48.2	07°00.4	352°16.9	23.9	93°48.0	49.3	Sabik	$102^{\circ}01.3$	-15°45.5
17	118°34.8	46°06.1	34.2	99°48.9	01.1	7°19.0	23.8	108°50.3	49.4	Shaula	96°08.6	-37°07.3
18	133°37.3	61°05.3	N23°34.6	114°49.6	N07°01.9	22°21.0	N22°23.8	123°52.5	N01°49.5	Rasalhague	95°57.3	12°32.3
19	148°39.8	76°04.5	35.1	129°50.3	02.6	37°23.1	23.7	138°54.7	49.6	Eltanin	90°41.3	51°28.8
20	163°42.2	91°03.7	35.6	144°51.0	03.3	52°25.2	23.7	153°56.9	49.7	Kaus Aust.	83°30.8	-34°22.2
21	178°44.7	106°02.9	• • 36.0	159°51.7	• • 04.1	67°27.2	• • 23.6	168°59.1	• • 49.8			
22	193°47.2	121°02.1	36.5	174°52.4	04.8	82°29.3	23.6	184°01.3	49.9	Vega	80°32.2	38°48.2
23	208°49.6	136°01.3	36.9	189°53.1	05.5	97°31.4	23.5	199°03.5	50.0	Nunki	75°46.2	-26°15.8
23	200 49.0			109 33.1	05.5	97 31.4	25.5	199 03.3	30.0	Altair	61°58.8	8°56.1
Mer.p	ass. 09:07	$\nu$ -0.8' d0	.5′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.7′ m1.23	$\nu 2.1' \ d-0$	.1' m-1.99	$\nu$ 2.2′ d0	.1'  m0.92	Peacock	53°03.9	-56°38.8
										Deneb	49°25.0	45°22.2
										Enif	33°37.8	9°59.6
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.7	-46°49.8
0	223°52.1	151°00.5	N23°37.4	204°53.7	$N07^{\circ}06.3$	112°33.4	N22°23.5	214°05.7	N01°50.1	Fomalhaut	15°13.5	-29°28.9
1	238°54.6	165°59.7	37.9	219°54.4	07.0	127°35.5	23.4	229°07.9	50.2	Scheat	13°44.3	28°13.4
2	253°57.0	180°59.0	38.3	234°55.1	07.7	142°37.6	23.3	244°10.1	50.3	Markab	13° 29.0	15°20.7
3	268°59.5	195°58.2	38.8	249°55.8	• • 08.5	157°39.6	23.3	259°12.4	• • 50.4	iviarkab	13 29.0	13 20.1
4	284°02.0	210°57.4	39.2	264°56.5	09.2	172°41.7	23.2	274°14.6	50.5	May 04 Mon	SHA	Mer.pass
5	299°04.4	225°56.6	39.7	279°57.2	09.9	187°43.7	23.2	289°16.8	50.6	Venus		13:54
										Mars		10:22
6	314°06.9	240°55.8	N23°40.1	294°57.9	N07°10.7	202°45.8	N22°23.1	304°19.0	N01°50.7			
7	329°09.3	255°55.0	40.6	309°58.6	11.4	217°47.9	23.1	319°21.2	50.8	Jupiter	249°00.2	16:34
8	344°11.8	270°54.2	41.0	324°59.3	12.1	232°49.9	23.0	334°23.4	50.9	Saturn	350°25.9	09:49
9	359°14.3	285°53.4	• • 41.5	340°00.0	• • 12.9	247°52.0	• • 23.0	349°25.6	• • 51.0	May 05 Tue	SHA	Mer.pass
10	$14^{\circ}16.7$	300°52.6	41.9	355°00.7	13.6	262°54.1	22.9	4°27.8	51.1			•
11	29°19.2	315°51.8	42.4	10°01.3	14.3	277°56.1	22.9	19°30.0	51.2	Venus		13:55
12	44°21.7	330°51.0	N23°42.8	25°02.0	N07°15.1	292°58.2	N22°22.8	34°32.3	N01°51.3	Mars		10:21
13	59°24.1	345°50.2	43.2	40°02.7	15.8	308°00.3	22.8	49°34.5	51.4	Jupiter		16:31
14	74°26.6	0°49.4	43.7	55°03.4	16.5	323°02.3	22.7	64°36.7	51.5	Saturn	350°19.7	09:46
	89°29.1	15°48.6		70°04.1	17.3	338°04.4		79°38.9		NA OC 184	CLIA	N4
15			• • 44.1				• • 22.7		51.6	May 06 Wed	SHA	Mer.pass
16	104°31.5	30°47.8	44.6	85°04.8	18.0	353°06.4	22.6	94°41.1	51.8		287°08.4	13:57
17	119°34.0	45°47.0	45.0	100°05.5	18.7	8°08.5	22.6	109°43.3	51.9	Mars		10:20
18	134°36.4	60°46.2	N23°45.4	115°06.2	$N07^{\circ}19.5$	23°10.6	N22°22.5	124°45.5	N01°52.0	Jupiter	248°41.3	16:28
19	149°38.9	75°45.5	45.9	130°06.9	20.2	38°12.6	22.5	139°47.7	52.1	Saturn	350°13.6	09:42
20	164°41.4	90°44.7	46.3	145°07.6	20.9	53°14.7	22.4	154°50.0	52.2			=
21	179°43.8	105°43.9	46.7	160°08.2	21.7	68°16.7	22.3	169°52.2	52.3	Horizont	al parallax	
22	194°46.3	120°43.1	47.2	175°08.9	22.4	83°18.8	22.3	184°54.4	52.4		Venus:	0.1
	209°48.8					98°20.9	22.3	199°56.6			Mars:	0.1
23	209 48.8	135°42.3	47.6	190°09.6	23.1	90 20.9	22.2	199 50.0	52.5			V.±
Mern	ass. 09:03	$\nu$ -0.8' d0	.5′ m-3.92	$\nu$ 0 7' d0	.7′ m1.23	ν2 1' d-Ω	.1′ m-1.99	ν2 2' d0	.1′ m0.92			

h	Sui	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°47.9	N15°54.4	335°49.2	10.7'	S26°42.7	4.6'	54.0'
1	195°48.0	55.1	$350^{\circ}18.8$	10.6'	26°47.3	4.5'	54.0'
2	210°48.0	55.8	4°48.4	10.6'	26°51.8	4.4'	54.0'
3	225°48.1	• • 56.6	19°18.0	10.5'	26°56.2	4.3'	54.0'
4 5	240°48.1 255°48.2	57.3 58.0	33°47.6 48°17.1	10.5' 10.5'	27°00.4 27°04.6	4.1' 4.0'	54.0' 54.0'
6	270°48.2	N15°58.7	62°46.5	10.5	\$27°08.6	3.9'	54.0'
7	285°48.3	15°59.5	77°16.0	10.4	27° 12.4	3.7'	54.0'
8	300°48.4	16°00.2	91°45.4	10.4	27° 16.2	3.6'	54.0'
9	315°48.4	• • 00.9	$106^{\circ}14.8$	10.4'	$27^{\circ}19.8$	3.5'	54.0'
10	330°48.5	01.6	120°44.1	10.3'	27°23.3	3.3'	54.0'
11	345°48.5 0°48.6	02.4	135°13.5	10.3'	27°26.6	3.2'	54.0'
12 13	15°48.6	N16°03.1 03.8	149°42.8 164°12.0	10.3' 10.2'	\$27°29.8 27°32.9	3.1' 2.9'	54.0' 54.0'
14	30°48.7	03.8	178°41.3	10.2'	27°35.8	2.8'	54.0'
15	45°48.8	05.2	193°10.5	10.2	27°38.7	2.7'	54.0'
16	60°48.8	06.0	207°39.7	10.2'	27°41.3	2.5'	54.0'
17	75°48.9	06.7	222°08.9	10.2'	27°43.9	2.4'	54.0'
18	90°48.9	N16°07.4	236°38.0	10.1'	\$27°46.3	2.3'	54.0'
19	105°49.0	08.1	251°07.2	10.1'	27°48.6	2.1'	54.0'
20 21	120°49.0 135°49.1	08.8 •• 09.5	265°36.3 280°05.4	10.1' 10.1'	27°50.7 27°52.7	2.0' 1.9'	54.0' 54.0'
22	150°49.1	10.3	294°34.4	10.1	27°54.6	1.7'	54.0'
23	165°49.2	11.0	309°03.5	10.0'	27°56.4	1.6'	54.0'
	SD = 15.9'	d = 0.7'			0 = 14.7'		
		<u>u = 0.1</u>		JL	. — 17.1		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0 1	180°49.3 195°49.3	N16°11.7 12.4	323°32.5 338°01.6	10.0' 10.0'	\$27°58.0 27°59.5	1.5' 1.3'	54.0' 54.0'
2	210°49.4	13.1	352°30.6	10.0'	21° 59.5 28° 00.8	1.2'	54.0'
3	225°49.4	• • 13.8	6°59.6	10.0'	28°02.0	1.1'	54.0'
4	240°49.5	14.5	21°28.6	10.0'	$28^{\circ}03.1$	0.9'	54.0'
5	255°49.5	15.3	35°57.6	10.0'	28°04.0	0.8'	54.0'
6	270°49.6 285°49.6	N16°16.0 16.7	50°26.6 64°55.6	10.0' 10.0'	\$28° 04.8 28° 05.5	0.7' 0.5'	54.0' 54.0'
7 8	300°49.7	10.7	79°24.5	10.0'	28°06.0	0.5	54.0'
9	315°49.7	18.1	93°53.5	10.0'	28°06.4	0.3'	54.0'
10	330°49.8	18.8	108°22.5	10.0'	28°06.6	0.1'	54.0'
11	345°49.9	19.5	122°51.4	10.0'	28°06.8	-0.0'	54.0'
12	0°49.9	N16°20.2	137°20.4	10.0'	\$28°06.7	-0.2'	54.0'
13 14	15°50.0 30°50.0	21.0 21.7	151°49.4 166°18.3	10.0' 10.0'	28°06.6 28°06.3	-0.3' -0.4'	54.0' 54.0'
15	45°50.1	22.4	180°47.3	10.0'	28° 05.9	-0.6'	54.0'
16	60°50.1	23.1	195°16.2	10.0'	28°05.3	-0.7'	54.0'
17	75°50.2	23.8	209°45.2	10.0'	28°04.6	-0.8'	54.0'
18	90°50.2	N16°24.5	224°14.2	10.0'	\$28°03.8	-1.0'	54.0'
19 20	105°50.3 120°50.3	25.2	238°43.2 253°12.2	10.0' 10.0'	28°02.8 28°01.7	-1.1'	54.0'
21	135°50.4	25.9 •• 26.6	267°41.2	10.0'	28° 00.5	-1.2' -1.4'	54.0' 54.0'
22	150°50.4	27.3	282°10.2	10.0'	27°59.1	-1.5'	54.0'
23	165°50.5	28.0	296°39.2	10.0'	27°57.6	-1.6'	54.0'
	SD = 15.9'	d = 0.7'		SD	0 = 14.7'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
oved 0	180°50.5	N16°28.7	311°08.3	ν 10.1'	\$27°55.9	-1.8'	54.0'
1	195°50.6	29.4	325°37.3	10.1'	27°54.1	-1.9'	54.0'
2	210°50.6	30.1	340°06.4	10.1'	$27^{\circ}52.2$	-2.1'	54.0'
3	225°50.6	• • 30.8	354°35.5	10.1'	27°50.2	-2.2'	54.1'
4	240°50.7	31.5	9°04.6	10.1'	27°48.0 27°45.7	-2.3' -2.5'	54.1' 54.1'
5 6	255°50.7 270°50.8	32.2 N16°32.9	23°33.7 38°02.8	10.1' 10.2'	27°45.7 <b>S</b> 27°43.2	-2.5' -2.6'	54.1' 54.1'
7	270 50.8 285°50.8	33.6	52°32.0	10.2'	27°40.6	-2.0 -2.7'	54.1'
8	300°50.9	34.3	67°01.1	10.2'	27°37.9	-2.9'	54.1
9	315°50.9	• • 35.0	81°30.3	10.2'	27°35.1	-3.0'	54.1'
10	330°51.0	35.7	95°59.6	10.2'	27°32.1	-3.1'	54.1'
11	345°51.0	36.4	110°28.8	10.3'	27°28.9	-3.3'	54.1'
12 13	0°51.1 15°51.1	N16°37.1 37.8	124°58.1 139°27.4	10.3' 10.3'	\$27°25.7 27°22.3	-3.4' -3.5'	54.1' 54.1'
14	30°51.2	37.o 38.5	159 27.4 153°56.7	10.3'	27° 18.8	-3.6'	54.1'
15	45°51.2	• • 39.2	168°26.0	10.4'	27° 15.2	-3.8'	54.1'
16	60°51.2	39.9	182°55.4	10.4'	27° 11.4	-3.9'	54.2'
17	75°51.3	40.6	197°24.8	10.4'	27°07.5	-4.0'	54.2'
18 19	90°51.3 105°51.4	N16°41.3 42.0	211°54.3 226°23.7	10.5' 10.5'	\$27°03.4 26°59.3	-4.2' -4.3'	54.2' 54.2'
20	105°51.4 120°51.4	42.0 42.7	240°53.2	10.5'	26°59.3 26°55.0	-4.3° -4.4°	54.2'
21	135°51.5	• • 43.4	255°22.8	10.6'	26°50.5	-4.6'	54.2'
22	150°51.5	44.1	269°52.3	10.6'	26°46.0	-4.7'	54.2'
23	165°51.6	44.8	284°21.9	10.6'	26°41.3	-4.8'	54.2'
	SD = 15.9'	d = 0.7'		SE	0 = 14.7'		

1	Twi	light	C	C	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut
N 72°	////	////	01:14	22:50	////	////
<b>N</b> 70°	////	////	02:07	21:52	////	////
68°	////	////	02:39	21:18	////	////
66°	////	01:29	03:02	20:54	22:31	////
64°	////	02:06	03:20	20:36	21:51	////
62°	////	02:32	03:35	20:20	21:24	////
60°	01:19	02:52	03:47	20:08	21:04	22:41
<b>N</b> 58°	01:53	03:08	03:58	19:57	20:47	22:04
56°	02:17	03:22	04:07	19:47	20:34	21:39
54°	02:36	03:33	04:16	19:39	20:22	21:20
52°	02:51	03:43	04:23	19:31	20:11	21:04
50°	03:04	03:52	04:30	19:25	20:02	20:51
45°	03:30	04:11	04:44	19:10	19:43	20:25
<b>N</b> 40°	03:49	04:26	04:55	18:59	19:28	20:05
35°	04:05	04:38	05:05	18:49	19:16	19:49
30°	04:18	04:48	05:14	18:40	19:06	19:36
20°	04:38	05:05	05:29	18:25	18:48	19:16
N $10^{\circ}$	04:54	05:19	05:41	18:12	18:34	19:00
0°	05:07	05:32	05:53	18:00	18:22	18:47
<b>S</b> 10°	05:18	05:43	06:05	17:48	18:10	18:35
20°	05:28	05:54	06:17	17:36	17:59	18:25
30°	05:38	06:07	06:31	17:22	17:47	18:15
$35^{\circ}$	05:43	06:13	06:40	17:13	17:40	18:10
40°	05:48	06:20	06:49	17:04	17:33	18:05
45°	05:53	06:28	06:59	16:53	17:24	17:59
<b>S</b> 50°	05:59	06:38	07:12	16:40	17:15	17:53
52°	06:02	06:42	07:18	16:34	17:11	17:51
54°	06:04	06:47	07:25	16:28	17:06	17:48
56°	06:07	06:52	07:33	16:20	17:01	17:45
58°	06:10	06:57	07:41	16:12	16:55	17:42
<b>S</b> 60°	06:13	07:04	07:50	16:02	16:49	17:39
Lat.		Moonris	ie		Moonset	:
	Mon	Tue	Wed	Mon	Tue	Wed
N 72°						
<b>N</b> 70°						
68°						
66°		_				

Lat.		Moonris	e		Moonset	Į.
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°						
N 70°						
68°						
66°						
64°						
62°	00:26		03:03	02:49		03:45
60°		00:58	01:47	03:35	04:03	05:01
N 58°		00:21	01:11	04:05	04:40	05:36
56°	23:54		00:45	04:28	05:06	06:02
54°	23:34		00:25	04:47	05:27	06:22
52°	23:16		00:07	05:03	05:45	06:39
50°	23:01	23:53		05:16	05:59	06:54
45°	22:31	23:23		05:44	06:30	07:24
<b>N</b> 40°	22:08	23:00	23:44	06:07	06:53	07:47
35°	21:49	22:41	23:26	06:25	07:12	08:06
30°	21:32	22:24	23:11	06:41	07:29	08:22
20°	21:05	21:56	22:45	07:08	07:57	08:49
N 10°	20:41	21:32	22:22	07:31	08:21	09:13
0°	20:19	21:10	22:01	07:52	08:43	09:35
<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°	16:47	17:34	18:38	11:20	12:20	13:02
58°	16:23	17:08	18:15	11:45	12:46	13:25
<b>S</b> 60°	15:50	16:32	17:44	12:18	13:22	13:56

		Sun		Moon				
Day	Eqn.of	f Time	Mer.	Mer. Mer.		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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	224°51.2	150°41.5	N23°48.0	$205^{\circ}10.3$	$N07^{\circ}23.9$	113°22.9	N22°22.2	214°58.8	N01°52.6	Alpheratz	357°33.9	29°14.0
1	239°53.7	165°40.7	48.5	220°11.0	24.6	128°25.0	22.1	230°01.0	52.7	Ankaa	353°06.4	-42°09.6
2	254°56.2	180°39.9	48.9	235°11.7	25.3	143°27.0	22.1	245°03.2	52.8	Schedar	349°30.3	56°40.7
3	269°58.6	$195^{\circ}39.1$	• • 49.3	250°12.4	• • 26.1	158°29.1	• • 22.0	260°05.4	• • 52.9	Diphda	348°46.5	-17°50.5
4	285°01.1	210°38.3	49.7	265°13.1	26.8	173°31.2	22.0	275°07.6	53.0	Achernar	335°19.9	-57°06.1
5	300°03.6	225°37.5	50.2	280°13.8	27.5	188°33.2	21.9	290°09.9	53.1	Hamal	327°50.3	23°35.1
6	315°06.0	240° 36.7	N23°50.6	295° 14.5	N07°28.2	203°35.3	N22°21.9	305°12.1	N01°53.2	Polaris	313°58.4	89°22.5
7	330°08.5	255° 35.9	51.0	310° 15.1	29.0	218° 37.3	21.8	320°14.3	53.3	Acamar	315°11.4	-40°11.9
8	345°10.9	270°35.1	51.4	325° 15.8	29.7	233°39.4	21.8	335°16.5	53.4	Menkar	314°05.3	4°11.5
9	0°13.4	285° 34.3	• • 51.9	340° 16.5	• • 30.4	248°41.5	• • 21.7	350°18.7	• • 53.5	Mirfak	308°27.2	49°57.2
10	15°15.9	300°33.5	52.3	355° 17.2	31.2	263°43.5	21.7	5°20.9	53.6	Aldebaran	290°38.7	16°33.7
11	30°18.3	315°32.7	52.7	10° 17.9	31.9	278° 45.6	21.6	20°23.1	53.7	Rigel	281°03.1	-8°10.4
12	45°20.8	330°31.9	N23°53.1	25° 18.6	N07°32.6	293°47.6	N22°21.5	35°25.3	N01°53.8	Capella	280°20.7	46°01.5
13	60°23.3	345°31.1	53.5	40°19.3	33.4	308°49.7	21.5	50°27.6	53.9	Bellatrix	278°22.0	6°22.4
14	75°25.7	0°30.3	53.9	55°20.0	34.1	323°51.7	21.4	65°29.8	54.0	Elnath	278°00.8	28°37.8
15	90°28.2	15°29.5	• • 54.3	70°20.7	• • 34.8	338°53.8	• • 21.4	80°32.0	• • 54.1	Alnilam	275°36.9	-1°11.2
16	105°30.7	30°28.7	54.8	85°21.4	35.5	353°55.9	21.3	95°34.2	54.2	Betelgeuse	270°51.2	7°24.7
17	120°33.1	45°27.9	55.2	100°22.0	36.3	8°57.9	21.3	110°36.4	54.3	Canopus	263°52.3	-52°42.8
18	135°35.6	60°27.1	N23°55.6	115°22.7	N07°37.0	24°00.0	N22°21.2	125°38.6	N01°54.4	Sirius	258°25.5	-16°45.3
19	150°38.1	75°26.3	56.0	130°23.4	37.7	39°02.0	21.2	140°40.8	54.5	Adhara	255°05.2	-29°00.7
20	165°40.5	90°25.5	56.4	145°24.1	38.5	54°04.1	21.1	155°43.1	54.6	Procyon	244°49.8	5°09.4
21	180°43.0	105°24.7	• • 56.8	160°24.8	39.2	69°06.1	• • 21.1	170°45.3	• • 54.7	Pollux	243°16.1	27°57.8
22	195°45.4	120°23.8	57.2	175°25.5	39.9	84°08.2	21.0	185°47.5	54.8	Avior	$234^{\circ}14.5$	-59°35.9
23	210°47.9	135°23.0	57.6	190°26.2	40.6	99°10.3	20.9	200°49.7	54.9	Suhail	222°45.5	-43°32.6
Mer.p	pass. 08:59	$\nu$ -0.8' d0	.4′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.7′ m1.23	$\nu 2.1' \ d-0$	.1′ m-1.98	$\nu$ 2.2′ d0	.1'  m0.92	Miaplacidus	221°38.1	-69°49.8
										Alphard	217°46.7	-8°46.5
٠.	CIIA	CIIA	Б	CILA	Б	CIIA	Б	CILA	Б	Regulus	207°33.2	11°50.2
Fri	GHA	<b>GHA</b> 150° 22.2	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.4	61°36.7
0	225°50.4		N23°58.0	205°26.9	N07°41.4	114°12.3	N22°20.9	215°51.9	N01°55.0	Denebola	182°23.6	14°25.4
1	240°52.8	165°21.4	58.4	220°27.6	42.1	129°14.4	20.8	230°54.1	55.1	Gienah	175°42.2	$-17^{\circ}41.5$
2	255°55.3	180° 20.6	58.8	235°28.3	42.8	144°16.4	20.8	245°56.3	55.2	Acrux	172°58.4	-63°15.0
3	270°57.8	195° 19.8	59.2	250°28.9	• • 43.5	159° 18.5	• • 20.7	260°58.6	• • 55.3	Gacrux	171°50.0	-57°15.9
4	286°00.2	210° 19.0	23°59.6	265°29.6	44.3	174°20.5	20.7	276°00.8	55.4	Alioth	$166^{\circ}11.5$	55°49.1
5	301°02.7	225° 18.2	24°00.0	280°30.3	45.0	189°22.6	20.6	291°03.0	55.5	Spica	158°20.9	-11°18.1
6	316°05.2	240°17.4	N24°00.4	295°31.0	N07°45.7	204°24.6	N22°20.6	306°05.2	N01°55.6	Alkaid	152°50.7	49°10.9
7	331°07.6	255° 16.6	00.8	310°31.7 325°32.4	46.5	219° 26.7 234° 28.7	20.5	321°07.4	55.7	Hadar	148°33.8	-60°30.2
8 9	346°10.1 1°12.6	270° 15.8 285° 15.0	01.2	325 32.4 340°33.1	47.2 •• 47.9	234 28.7 249°30.8	20.5	336°09.6 351°11.8	55.8 • • 55.9	Menkent	$147^{\circ}56.0$	-36°30.1
			•• 01.6	355° 33.8		249 30.6 264°32.9		6°14.1		Arcturus	145°46.6	19°02.6
10	16°15.0 31°17.5	300° 14.2 315° 13.4	02.0 02.3	10°34.5	48.6 49.4	204 32.9 279°34.9	20.3	21°16.3	56.0	Rigil Kent.	139°38.1	-60°56.8
11 12	46°19.9	330° 12.6	N24°02.7	25°35.1	N07°50.1	279 34.9 294°37.0	20.3 N22°20.2	36°18.5	56.1 N01°56.2	Kochab	$137^{\circ}18.6$	74°02.8
13	61°22.4	345°11.8	03.1	40°35.8	50.8	309°39.0	20.2	51°20.7	56.3	Zuben'ubi	136°54.5	$-16^{\circ}09.2$
14	76°24.9	0°11.0	03.1	55° 36.5	51.5	309 39.0 324°41.1	20.2	66°22.9	56.4	Alphecca	126°02.5	26°37.4
15	91°27.3	15° 10.2	03.9	70°37.2	52.3	339°43.1	. 20.1	81°25.1	56.5	Antares	112°14.2	$-26^{\circ}29.5$
16	106°29.8	30°09.3	04.3	85°37.9	53.0	354°45.1	20.1	96°27.3	56.6	Atria	$107^{\circ}06.9$	-69°04.4
17	121°32.3	45°08.5	04.7	100°38.6	53.7	9°47.2	20.0	111°29.6	56.7	Sabik	102°01.2	-15°45.5
18	136°34.7	60°07.7	N24°05.0	115° 39.3	N07°54.4	24°49.3	N22°19.9	126°31.8	N01°56.8	Shaula	96°08.6	-37°07.3
19	151°37.2	75°06.9	05.4	130°40.0	55.2	39°51.3	19.9	141°34.0	56.9	Rasalhague	95°57.3	12°32.3
20	166°39.7	90°06.1	05.8	145°40.7	55.9	54°53.4	19.8	156°36.2	57.0	Eltanin	90°41.3	51°28.8
21	181°42.1	105°05.3	• • 06.2	160°41.3	56.6	69°55.4	. 19.7	171°38.4	57.1	Kaus Aust.	83°30.8	-34°22.2
22	196°44.6	120°04.5	06.5	175° 42.0	57.3	84° 57.5	19.7	186°40.6	57.2	Vega	80°32.2	38°48.2
23	211°47.1	135°03.7	06.9	190°42.7	58.1	99°59.5	19.6	201°42.8	57.3	Nunki	75°46.2	-26°15.8
										Altair	61°58.8	8°56.1
Mer.p	pass. 08:55	$\nu$ -0.8′ d0	.4′ m-3.92	$ u 0.7' \ d0$	.7′ m1.24	$\nu 2.1' \ d-0$	$.1^\prime$ m-1 $.98$	$\nu$ 2.2′ d0	.1' m $0.92$	Peacock	53°03.9	-56°38.8
										Deneb	49°25.0	45°22.2
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.8	9°59.6
0	226°49.5	150°02.9	N24°07.3	205°43.4	N07°58.8	115°01.6	N22°19.6	216°45.1	N01°57.4	Al Na'ir	27°31.7	-46°49.8
1	241°52.0	165°02.1	07.7	220°44.1	07°59.5	130°03.6	19.5	231°47.3	57.4	Fomalhaut Scheat	15°13.5 13°44.3	-29°28.9 28°13.4
2	256°54.4	180°01.3	08.0	235°44.8	08°00.2	145°05.7	19.5	246°49.5	57.5	Markab	13° 44.3	28 13.4 15°20.7
3	271°56.9	195°00.4	• • 08.4	250° 45.5	• • 00.9	160°07.7	• • 19.4	261°51.7	• • 57.6	IVIAIKAD	15 29.0	15 20.7
4	286°59.4	209° 59.6	08.8	265°46.2	01.7	175°09.8	19.4	276°53.9	57.7	May 07 Thu	SHA	Mer.pass
5	302°01.8	224°58.8	09.1	280°46.8	02.4	190°11.8	19.3	291°56.1	57.8	Venus	285°50.2	13:58
6	317°04.3	239° 58.0	N24°09.5	295° 47.5	N08°03.1	205° 13.9	N22°19.2	306°58.4	N01°57.9	Mars		10:19
7	332°06.8	254° 57.2	09.9	310°48.2	03.8	220°15.9	19.2	322°00.6	58.0	Jupiter	248°31.7	16:24
8	347°09.2	269° 56.4	10.2	325°48.9	04.6	235°18.0	19.1	337°02.8	58.1	Saturn	350°07.6	09:39
9	2°11.7	284°55.6	• • 10.6	340°49.6	• • 05.3	250°20.0	• • 19.1	352°05.0	• • 58.2			
10	17°14.2	299° 54.8	11.0	355°50.3	06.0	265°22.1	19.0	7°07.2	58.3	May 08 Fri	SHA	Mer.pass
11	$32^{\circ}16.6$	314°54.0	11.3	$10^{\circ}51.0$	06.7	280°24.1	19.0	22°09.4	58.4	Venus		13:59
12	47°19.1	329°53.1	N24°11.7	25°51.7	N08°07.5	295° 26.2	N22°18.9	37°11.7		Mars	339°36.5	10:18
13	62°21.5	344° 52.3	12.0	40°52.4	08.2	310°28.2	18.9	52°13.9	58.6	Jupiter	248°21.9	16:21
14	77°24.0	359°51.5	12.4	55°53.0	08.9	325°30.3	18.8	67°16.1	58.7	Saturn	350°01.5	09:35
	92°26.5	14°50.7	• • 12.8	70°53.7	• • 09.6	340°32.3	• • 18.7	82°18.3	• • 58.8	May 09 Sat	SHA	Mer.pass
15	92 20.5	29°49.9	13.1	85°54.4	10.3	355°34.4	18.7	97°20.5	58.9	Venus		14:01
15 16	107°28.9		13.5	100°55.1	11.1	10°36.4	18.6	112°22.7	59.0	Mars		10:17
		$44^{\circ}49.1$	13.3	100 33.1							55.5	
16	107°28.9	44° 49.1 59° 48.3	N24°13.8	115°55.8	N08°11.8	25°38.5	N22°18.6	127°25.0	N01°59.1	1	248°12 1	16.18
16 17	107°28.9 122°31.4				N08°11.8 12.5	25°38.5 40°40.5	N22°18.6 18.5	127°25.0 142°27.2	N01°59.1 59.2	Jupiter		16:18 09:32
16 17 18	107°28.9 122°31.4 137°33.9	59°48.3	N24°13.8	115°55.8						Jupiter Saturn	349°55.5	16:18 09:32
16 17 18 19	107°28.9 122°31.4 137°33.9 152°36.3	59° 48.3 74° 47.5	N24°13.8 14.2	115°55.8 130°56.5	12.5	40°40.5	18.5	$142^{\circ}27.2$	59.2	Jupiter Saturn	349°55.5 cal parallax	09:32
16 17 18 19 20	107°28.9 122°31.4 137°33.9 152°36.3 167°38.8	59° 48.3 74° 47.5 89° 46.6	N24°13.8 14.2 14.5	115°55.8 130°56.5 145°57.2	12.5 13.2	40° 40.5 55° 42.6	18.5 18.5	142°27.2 157°29.4	59.2 59.3	Jupiter Saturn	349°55.5 cal parallax Venus:	09:32
16 17 18 19 20 21	107°28.9 122°31.4 137°33.9 152°36.3 167°38.8 182°41.3	59° 48.3 74° 47.5 89° 46.6 104° 45.8	N24°13.8 14.2 14.5 •• 14.9	115° 55.8 130° 56.5 145° 57.2 160° 57.9	12.5 13.2 · · 13.9	40° 40.5 55° 42.6 70° 44.6	18.5 18.5 •• 18.4	142°27.2 157°29.4 172°31.6	59.2 59.3 •• 59.4	Jupiter Saturn	349°55.5 cal parallax	09:32

h	Sur	า			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°51.6	N16°45.5	298°51.6	10.7'	S26°36.5	-4.9'	54.2'
1	195°51.6	46.2	313°21.2	10.7'	26°31.6	-5.1'	54.3'
2	210°51.7	46.9	327°50.9	10.7'	26°26.5	-5.2'	54.3'
3	225°51.7	• • 47.6	342°20.7	10.8'	26°21.3 26°16.0	-5.3'	54.3'
4 5	240°51.8 255°51.8	48.2 48.9	356°50.4 11°20.3	10.8' 10.9'	26°10.5	-5.4' -5.6'	54.3' 54.3'
6	270°51.8	N16°49.6	25°50.1	10.9	S26°05.0	-5.7'	54.3
7	285°51.9	50.3	40°20.0	10.9'	25°59.3	-5.8'	54.3'
8	300°51.9	51.0	54°49.9	11.0'	25°53.5	-5.9'	54.3'
9	315°52.0	•• 51.7	69°19.9	11.0'	25°47.5	-6.1'	54.4'
10	330°52.0	52.4	83°49.9	11.1'	25°41.5	-6.2'	54.4'
11	345°52.0	53.1	98°20.0	11.1'	25°35.3	-6.3'	54.4'
12 13	0°52.1 15°52.1	N16°53.8 54.4	112°50.1 127°20.2	11.1' 11.2'	\$25°29.0 25°22.5	-6.4' -6.5'	54.4' 54.4'
14	30°52.2	55.1	127 20.2 141°50.4	11.2'	25° 16.0	-0.5 -6.7'	54.4'
15	45°52.2	55.8	156°20.6	11.3'	25°09.3	-6.8'	54.4'
16	60°52.2	56.5	170°50.9	11.3'	25°02.5	-6.9'	54.5'
17	75°52.3	57.2	185°21.2	11.4'	24°55.6	-7.0'	54.5'
18	90°52.3	N16°57.9	199°51.5	11.4'	S24°48.6	-7.1'	54.5'
19	105°52.4	58.6	214°21.9	11.4'	24°41.4	-7.3'	54.5'
20	120°52.4	59.2	228°52.4	11.5'	24°34.2	-7.4'	54.5
21	135°52.4	16°59.9	243°22.9 257°53.4	11.5'	24°26.8 24°19.3	-7.5'	54.5'
22 23	150°52.5 165°52.5	17°00.6 01.3	257°53.4 272°24.0	11.6' 11.6'	24°19.3 24°11.7	-7.6' -7.7'	54.6' 54.6'
23			212 24.0			-1.1	J4.U
	SD = 15.8'	d = 0.7'		SI	O = 14.8'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°52.5	N17°02.0	286°54.6	11.7'	524°04.0	-7.8'	54.6'
1 2	195°52.6 210°52.6	02.6 03.3	301°25.2 315°56.0	11.7' 11.8'	23°56.1 23°48.2	-8.0' -8.1'	54.6' 54.6'
3	210 52.6 225°52.6	04.0	315 56.0 330°26.7	11.8	23°40.1	-8.1 -8.2'	54.6'
4	240°52.7	04.0	344°57.5	11.8	23°31.9	-8.3'	54.7'
5	255°52.7	05.4	359°28.4	11.9'	23°23.6	-8.4	54.7'
6	270°52.8	N17°06.0	13°59.3	11.9'	S23°15.2	-8.5'	54.7'
7	285°52.8	06.7	28°30.2	12.0'	23°06.7	-8.6'	54.7'
8	300°52.8	07.4	43°01.2	12.0'	22°58.1	-8.7'	54.7'
9	315°52.9	• • 08.1	57°32.2	12.1'	22°49.3	-8.8'	54.8'
10	330°52.9 345°52.9	08.7 09.4	72°03.3 86°34.4	12.1' 12.2'	22°40.5 22°31.5	-9.0' -9.1'	54.8'
11 12	0°53.0	09.4 N17°10.1	86°34.4 101°05.6	12.2'	522°22.5	-9.1' -9.2'	54.8' 54.8'
13	15°53.0	10.1	101 05.0 115°36.8	12.3'	22°13.3	-9.2 -9.3'	54.8'
14	30°53.0	11.4	130°08.1	12.3'	22°04.0	-9.4'	54.9'
15	45°53.1	• • 12.1	144°39.4	12.4'	21°54.7	-9.5'	54.9'
16	60°53.1	12.8	159°10.7	12.4'	21°45.2	-9.6'	54.9'
17	75°53.1	13.5	173°42.1	12.4'	21°35.6	-9.7'	54.9'
18	90°53.2 105°53.2	N17°14.1	188°13.6 202°45.0	12.5'	\$21°25.9	-9.8'	55.0'
19 20	105 53.2 120°53.2	14.8 15.5	202 45.0 217°16.6	12.5' 12.6'	21°16.1 21°06.2	-9.9' -10.0'	55.0' 55.0'
21	135°53.2	. 16.2	231°48.1	12.6'	20°56.2	-10.0	55.0'
22	150°53.3	16.8	246°19.8	12.7'	20°46.1	-10.2	55.1'
23	165°53.3	17.5	260°51.4	12.7'	20°35.9	-10.3'	55.1'
	SD = 15.8'	d = 0.7'		SI	O = 14.9'		
Sat	GHA	Dec	GHA		Dec	d	HP
Sat 0	<b>GHA</b> 180°53.3	Dec N17°18.2	275°23.1	u 12.7'	S20° 25.6	a -10.4'	нР 55.1'
1	195°53.4	18.8	289°54.9	12.7	20° 15.2	-10.4	55.1'
2	210°53.4	19.5	304°26.7	12.8'	20°04.7	-10.6'	55.2'
3	225°53.4	• • 20.2	318°58.5	12.9'	19°54.1	-10.7'	55.2'
4	240°53.5	20.8	333°30.4	12.9'	19°43.4	-10.8'	55.2'
5	255°53.5	21.5	348°02.3	13.0'	19°32.7	-10.9'	55.2'
6	270°53.5 285°53.5	N17°22.2 22.8	2°34.2 17°06.2	13.0' 13.0'	\$19°21.8 19°10.8	-11.0'	55.3'
7 8	285°53.5 300°53.6	22.8	17°06.2 31°38.2	13.0'	19° 10.8 18° 59.7	-11.1' -11.2'	55.3' 55.3'
9	315°53.6	24.2	46°10.3	13.1	18° 48.6	-11.2 -11.3'	55.3'
10	330°53.6	24.8	60°42.4	13.1	18° 37.3	-11.3'	55.4'
11	345°53.7	25.5	75°14.6	13.2'	18°26.0	-11.4'	55.4'
12	0°53.7	N17°26.2	89°46.8	13.2'	<b>S</b> 18° 14.5	-11.5'	55.4'
13	15°53.7	26.8	104°19.0	13.3'	18°03.0	-11.6'	55.4'
14	30°53.7	27.5	118°51.2	13.3'	17°51.4	-11.7'	55.5'
15 16	45°53.8 60°53.8	· · 28.1 28.8	133°23.5 147°55.9	13.3' 13.4'	17°39.7 17°27.9	-11.8' -11.9'	55.5' 55.5'
16 17	60°53.8 75°53.8	28.8	147°55.9 162°28.2	13.4'	17°27.9 17°16.0	-11.9° -12.0'	55.5' 55.6'
18	90°53.8	N17°30.1	102 20.2 177°00.6	13.4	\$17°04.0	-12.1'	55.6'
19	105°53.9	30.8	191°33.1	13.5'	16°52.0	-12.1'	55.6'
20	120°53.9	31.4	$206^{\circ}05.5$	13.5'	16°39.8	-12.2'	55.6'
21	135°53.9	•• 32.1	220°38.0	13.5'	16°27.6	-12.3'	55.7'
22	150°53.9	32.8	235°10.5	13.6'	16°15.3	-12.4'	55.7'
23	165°54.0	33.4	249°43.1	13.6'	16°02.9	-12.5'	55.7'
	SD = 15.8'	d = 0.7'		SI	D = 15.0'		

	Twi	light			Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	////	////	00:25	////	////	////
$N 70^{\circ}$	////	////	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 $58^{\circ}$	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 $10^{\circ}$	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
$35^{\circ}$	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
1 -4		Moonris	ie .		Moonset	:
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						

Lat.		Moonris	е		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°	01:01	01:26	01:44	07:31	08:47	10:06
52°	00:46	01:14	01:34	07:46	08:59	10:15
50°	00:33	01:03	01:26	07:58	09:09	10:23
45°	00:06	00:40	01:08	08:25	09:31	10:40
<b>N</b> 40°		00:21	00:53	08:46	09:49	10:53
35°		00:06	00:40	09:03	10:03	11:05
30°	23:52		00:29	09:18	10:16	11:15
20°	23:29		00:10	09:43	10:38	11:32
<b>N</b> 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°	19:55	21:16	22:40	13:29	13:46	13:58
58°	19:36	21:03	22:31	13:48	14:00	14:08
<b>S</b> 60°	19:14	20:47	22:20	14:11	14:17	14:19

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Mer.Pass.		
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	20-22	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	77-59%	
07	03:26	03:28	11:57	04:13	16:38		
80	03:30	03:32	11:56	05:02	17:26		
09	03:33	03:35	11:56	05:49	18:12		

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	227°48.7	149°43.4	N24°15.9	205°59.9	N08°16.1	115°50.7	N22°18.2	217°38.3	N01°59.7			
1	242°51.1	164°42.6	16.3	203 39.9 221°00.6	16.8	130°52.8	18.2	232°40.5	59.8	Alpheratz	357°33.9	29°14.0
2	242 51.1 257°53.6	179°41.8		236°01.3	17.5	130 52.6 145°54.8	18.1	232 40.5 247°42.7	01°59.9	Ankaa	353°06.4	-42°09.6
			16.6					262°44.9		Schedar	$349^{\circ}30.2$	56°40.7
3	272°56.0	194°40.9	• • 16.9	251°02.0	• • 18.3	160°56.9	• • 18.1		02°00.0	Diphda	348°46.5	-17°50.5
4	287°58.5	209°40.1	17.3	266°02.7	19.0	175°58.9	18.0	277°47.1	00.1	Achernar	335°19.9	-57°06.0
5	303°01.0	224°39.3	17.6	281°03.4	19.7	191°01.0	17.9	292°49.3	00.2	Hamal	327°50.3	23°35.1
6	318°03.4	239°38.5	N24°18.0	296°04.0	N08°20.4	206°03.0	N22°17.9	307°51.6	N02°00.3	Polaris	313°58.2	89°22.5
7	333°05.9	254°37.7	18.3	311°04.7	21.1	221°05.1	17.8	322°53.8	00.4	Acamar	315°11.4	-40°11.9
8	348°08.4	269°36.9	18.6	326°05.4	21.9	236°07.1	17.8	337°56.0	00.5	Menkar	314°05.3	4°11.5
9	3°10.8	284°36.0	• • 19.0	341°06.1	• • 22.6	251°09.2	• • 17.7	352°58.2	• • 00.6	Mirfak	308°27.2	49°57.2
10	18°13.3	299°35.2	19.3	356°06.8	23.3	266°11.2	17.7	8°00.4	00.7	Aldebaran	290°38.7	16°33.7
11	33°15.8	314°34.4	19.6	11°07.5	24.0	281°13.2	17.6	23°02.6	8.00	Rigel	281°03.1	-8°10.4
12	48°18.2	329°33.6	N24°20.0	26°08.2	N08°24.7	296°15.3	N22° 17.6	38°04.9	N02°00.9	Capella	280° 20.7	46°01.5
13	63°20.7	344°32.8	20.3	41°08.9	25.4	311°17.3	17.5	53°07.1	01.0	Bellatrix	278° 22.0	6°22.4
14	78°23.2	359°32.0	20.6	56°09.5	26.2	$326^{\circ}19.4$	17.4	68°09.3	01.1	Elnath	278°00.8	28°37.8
15	93°25.6	14°31.1	• • 21.0	71°10.2	· · 26.9	341°21.4	• • 17.4	83°11.5	•• 01.2			-1°11.2
16	108°28.1	29°30.3	21.3	86°10.9	27.6	356°23.5	17.3	98°13.7	01.3	Alnilam	275°36.9 270°51.2	7°24.7
17	123°30.5	44°29.5	21.6	101°11.6	28.3	$11^{\circ}25.5$	17.3	113°16.0	01.4	Betelgeuse		
18	138°33.0	59°28.7	N24°21.9	116°12.3	N08°29.0	26°27.5	N22° 17.2	128°18.2	N02°01.5	Canopus	263°52.3	-52°42.8
19	153°35.5	74°27.9	22.2	131°13.0	29.7	41°29.6	17.2	143°20.4	01.6	Sirius	258° 25.5	-16°45.3
20	168°37.9	89°27.0	22.6	146°13.7	30.5	56°31.6	17.1	158°22.6	01.7	Adhara	255°05.2	-29°00.7
21	183°40.4	104°26.2	22.9	161°14.3	31.2	71°33.7	17.0	173°24.8	• • 01.8	Procyon	244°49.9	5°09.4
22	198°42.9	119°25.4	23.2	176°15.0	31.9	86°35.7	17.0	188°27.1	01.9	Pollux	243°16.1	27°57.8
23	213°45.3	134°24.6	23.5	191°15.7	32.6	101°37.8	16.9	203°29.3	02.0	Avior	234° 14.5	-59°35.9
				-		-				Suhail	222°45.6	-43°32.6
Mer.p	ass. 08:47	$\nu$ -0.8' d0	.3′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.7′ m1.24	$\nu 2.0' \ d-0$	$.1^\prime$ m-1.97	$\nu$ 2.2′ d0	.1' m $0.92$	Miaplacidus	221°38.1	-69°49.8
										Alphard	217°46.7	-8°46.5
NA	CHA	CIIA	D	CIIA	D	CIIA	D	CIIA	D	Regulus	207°33.2	11°50.3
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.4	61°36.7
0	228°47.8	149°23.8	N24°23.8	206°16.4	N08°33.3	116°39.8	N22°16.9	218°31.5	N02°02.1	Denebola	$182^{\circ}23.6$	14°25.4
1	243°50.3	164°23.0	24.2	221°17.1	34.0	131°41.8	16.8	233°33.7	02.2	Gienah	175°42.2	-17°41.5
2	258°52.7	179°22.1	24.5	236°17.8	34.8	146°43.9	16.7	248°35.9	02.2	Acrux	172°58.4	-63°15.0
3	273°55.2	194°21.3	• • 24.8	251°18.5	• • 35.5	161°45.9	• • 16.7	263°38.1	• • 02.3	Gacrux		-57°15.9
4	288°57.6	209°20.5	25.1	266°19.2	36.2	176°48.0	16.6	278°40.4	02.4	Alioth	166°11.5	55°49.1
5	304°00.1	224°19.7	25.4	281°19.8	36.9	191°50.0	16.6	293°42.6	02.5	Spica	158° 20.9	-11°18.1
6	$319^{\circ}02.6$	239°18.9	N24°25.7	296°20.5	N08°37.6	206°52.0	N22° 16.5	308°44.8	$N02^{\circ}02.6$	Alkaid	152°50.7	49°10.9
7	334°05.0	254°18.0	26.0	311°21.2	38.3	221°54.1	16.5	323°47.0	02.7	Hadar	148°33.8	-60°30.2
8	349°07.5	269°17.2	26.3	326°21.9	39.0	$236^{\circ}56.1$	16.4	338°49.2	02.8	Menkent	140°55.0	-36°30.1
9	4°10.0	284°16.4	• • 26.6	341°22.6	• • 39.8	251°58.2	• • 16.3	353°51.5	• • 02.9	Arcturus	147° 30.0	19°02.6
10	19°12.4	299°15.6	26.9	356°23.3	40.5	267°00.2	16.3	8°53.7	03.0	1		
11	34°14.9	314°14.8	27.3	11°24.0	41.2	282°02.2	16.2	23°55.9	03.1	Rigil Kent.	139°38.1	-60°56.8
12	49°17.4	329°13.9	N24°27.6	26°24.6	N08°41.9	297°04.3	N22°16.2	38°58.1	N02°03.2	Kochab	137°18.6	74°02.8
13	64°19.8	344°13.1	27.9	41°25.3	42.6	312°06.3	16.1	54°00.3	03.3	Zuben'ubi	136°54.5	-16°09.2
14	79°22.3	359°12.3	28.2	56°26.0	43.3	327°08.4	16.1	69°02.6	03.4	Alphecca	126°02.4	26°37.4
15	94°24.8	14°11.5	28.5	71°26.7	• • 44.0	342°10.4	16.0	84°04.8	03.5	Antares	112°14.1	-26°29.5
16	109°27.2	29°10.6	28.7	86°27.4	44.8	357°12.4	15.9	99°07.0	03.6	Atria	107°06.9	-69°04.4
17	124°29.7	44°09.8	29.0	101°28.1	45.5	12°14.5	15.9	114°09.2	03.7	Sabik	102°01.2	-15°45.5
18	139°32.1	59°09.0	N24°29.3	116°28.8	N08°46.2	27°16.5	N22°15.8	129°11.4	N02° 03.8	Shaula	96°08.5	-37°07.3
19	154°34.6	74°08.2	29.6	131°29.4	46.9	42°18.6	15.8	144°13.7	03.9	Rasalhague	95°57.2	12°32.3
										Eltanin	90°41.3	51°28.9
20	169°37.1	89°07.4	29.9	146°30.1	47.6	57°20.6	15.7	159°15.9 174°18.1	04.0	Kaus Aust.	83°30.8	-34°22.2
21	184°39.5	104°06.5	• • 30.2	161°30.8	• 48.3	72°22.6	• • 15.6		• • 04.1	Vega	80°32.2	38°48.2
22	199°42.0	119°05.7	30.5	176°31.5	49.0	87°24.7	15.6	189°20.3	04.2	Nunki	75°46.2	-26°15.8
23	214°44.5	134°04.9	30.8	191°32.2	49.7	102°26.7	15.5	204°22.5	04.3	Altair	$61^{\circ}58.8$	8°56.1
Mer.p	ass. 08:43	$\nu$ -0.8' d0	.3′ m-3.92	$\nu$ 0.7′ d0	.7′ m1.24	$\nu 2.0' d-0$	.1′ m-1.96	$\nu 2.2' \ d0$	.1'  m0.92	Peacock	53°03.9	-56°38.8
										Deneb	49°25.0	45°22.2
										Enif	33°37.8	9°59.6
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.6	-46°49.8
0	229°46.9	149°04.1	N24°31.1	206°32.9	N08°50.5	117°28.7	N22° 15.5	219°24.8	N02°04.4	Fomalhaut	15° 13.5	-29°28.8
1	244°49.4	164°03.2	31.4	221°33.6	51.2	132°30.8	15.4	234°27.0	04.5	Scheat	13°44.3	28°13.4
2	259°51.9	179°02.4	31.7	236°34.2	51.9	147°32.8	15.4	249°29.2	04.6	Markab	13°29.0	15°20.7
3	$274^{\circ}54.3$	194°01.6	• • 31.9	251°34.9	• • 52.6	162°34.8	•• 15.3	264°31.4	• • 04.7			
4	289°56.8	209°00.8	32.2	266°35.6	53.3	177°36.9	15.2	279°33.7	04.8	May 10 Sun	SHA	Mer.pass
5	$304^{\circ}59.2$	223°59.9	32.5	281°36.3	54.0	192°38.9	15.2	294°35.9	04.9	Venus	$281^{\circ}54.7$	14:02
6	320°01.7	238°59.1	N24°32.8	296°37.0	N08°54.7	207°41.0	N22° 15.1	309°38.1	N02°04.9	Mars	$338^{\circ}11.3$	10:16
7	335°04.2	253°58.3	33.1	311°37.7	55.4	222°43.0	15.1	324°40.3	05.0	Jupiter	$248^{\circ}02.1$	16:14
8	350°06.6	268°57.5	33.3	326°38.4	56.1	237°45.0	15.0	339°42.5	05.1	Saturn		09:28
9	5°09.1	283°56.6	33.6	341°39.0	56.9	252°47.1	• • 14.9	354°44.8	05.2			
10	20°11.6	298°55.8	33.9	356°39.7	57.6	267°49.1	14.9	9°47.0	05.3	May 11 Mon	SHA	Mer.pass
11	35°14.0	313°55.0	34.2	11°40.4	58.3	282°51.1	14.8	24°49.2	05.4	<b>I</b>	280°36.0	14:03
12	50°16.5	328°54.2	N24°34.4	26°41.1	N08°59.0	297°53.2	N22°14.8	39°51.4	N02°05.5	1	337°28.6	10:14
13	65°19.0	343°53.4	34.7	41°41.8	08°59.7	312°55.2	14.7	54°53.6	05.6		247°52.0	16:11
14	80°21.4	358°52.5	35.0	56°42.5	09°00.4	327°57.2	14.6	69°55.9	05.7	Saturn	349°43.7	09:25
15	95°23.9	13°51.7	• • 35.3	71°43.2	• • 01.1	342°59.3	. 14.6	84°58.1	• • 05.8	May 12 To	CHA	Monare
16	95 25.9 110°26.4	28°50.9	35.5	86°43.8	01.8	358°01.3	14.5	100°00.3	05.9	May 12 Tue	SHA 270° 17 1	Mer.pass
											279°17.1	14:05
17	125°28.8	43°50.0	35.8	101°44.5	02.5	13°03.3	14.5	115°02.5	06.0		336°45.9	10:13
18	140°31.3	58°49.2	N24°36.1	116°45.2		28°05.4	N22°14.4		N02°06.1		247°41.8	16:08
19	155°33.7	73°48.4	36.3	131°45.9	03.9	43°07.4	14.3	145°07.0	06.2	Saturn	349°37.8	09:21
20	170°36.2	88°47.6	36.6	146°46.6	04.7	58°09.4	14.3	160°09.2	06.3	Horizont	al parallax	
21	185°38.7	103°46.7	• • 36.9	161°47.3	• • 05.4	73°11.5	• • 14.2	175°11.4	• • 06.4	TIOTIZOTI	Venus:	0.1
22	200°41.1	118°45.9	37.1	176°47.9	06.1	88°13.5	14.2	190°13.6	06.5		Mars:	0.1
23	215°43.6	133°45.1	37.4	191°48.6	06.8	103°15.5	14.1	205°15.9	06.6		ividIS.	0.1
Mern	ass. 08:39	$\nu$ -0.8' d0	.3′ m-3.92	$\nu^{0.7'} d0$	.7′ m1.24	$\nu 2.0' d-0$	.1′ m-1.96	$\nu^{2.2'} d\Omega$	.1′ m0.92			

h	Sui	n					
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°54.0	$N17^{\circ}34.1$	264°15.7	13.6'	\$15°50.4	-12.6'	55.8'
1 2	195°54.0 210°54.0	34.7 35.4	278°48.3 293°21.0	13.6' 13.7'	15° 37.9 15° 25.2	-12.6' -12.7'	55.8'
3	210 54.0 225°54.1	36.0	293 21.0 307°53.6	13.7'	15 25.2 15°12.5	-12.7 -12.8'	55.8' 55.9'
4	240°54.1	36.7	322°26.3	13.7'	14°59.7	-12.9'	55.9'
5	255°54.1	37.4	336°59.0	13.7'	14°46.8	-13.0'	55.9'
6	270°54.1	N17°38.0	351°31.8	13.8'	\$14°33.9 14°20.8	-13.0'	55.9'
7 8	285°54.2 300°54.2	38.7 39.3	6°04.6 20°37.4	13.8' 13.8'	14 20.8 14°07.7	-13.1' -13.2'	56.0' 56.0'
9	315°54.2	• • 40.0	35°10.2	13.8'	13°54.5	-13.3	56.0'
10	330°54.2	40.6	49°43.0	13.9'	13°41.3	-13.3'	56.1'
11 12	345°54.2 0°54.3	41.3 N17°41.9	64°15.9 78°48.8	13.9' 13.9'	13°27.9 \$13°14.5	-13.4' -13.5'	56.1' 56.1'
13	15°54.3	42.6	93°21.7	13.9'	13°01.0	-13.5'	56.2
14	30°54.3	43.2	107°54.6	13.9'	12°47.5	-13.6'	56.2'
15	45°54.3	• • 43.9	122°27.5	14.0'	12°33.9	-13.7'	56.2'
16 17	60°54.3 75°54.4	44.5 45.2	137°00.5 151°33.4	14.0' 14.0'	12°20.2 12°06.4	-13.8' -13.8'	56.3' 56.3'
18	90°54.4	N17°45.8	166°06.4	14.0'	S11°52.6	-13.9	56.3
19	105°54.4	46.5	180°39.4	14.0'	11°38.7	-14.0'	56.4'
20	120°54.4	47.1	195°12.4	14.0'	11°24.7	-14.0'	56.4'
21 22	135°54.4 150°54.5	· · 47.8 48.4	209°45.4 224°18.4	14.0' 14.0'	11° 10.6 10° 56.5	-14.1' -14.2'	56.5' 56.5'
23	165°54.5	40.4 49.0	238°51.5	14.0'	10° 50.5	-14.2'	56.5'
-	SD = 15.8'	d = 0.7'			0 = 15.2'	·-	
	JD — 13.0	<u>u = 0.1</u>		JL.	J — 1J.Z		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°54.5 195°54.5	N17°49.7 50.3	253°24.5 267°57.6	14.0' 14.1'	\$10°28.1 10°13.8	-14.3'	56.6'
1 2	195°54.5 210°54.5	50.3 51.0	267°57.6 282°30.6	14.1'	10°13.8 09°59.5	-14.4' -14.4'	56.6' 56.6'
3	225°54.6	51.6	297°03.7	14.1	09° 45.1	-14.5	56.7'
4	240°54.6	52.3	$311^{\circ}36.8$	14.1'	09°30.6	-14.5'	56.7'
5	255°54.6	52.9	326°09.8	14.1'	09°16.0	-14.6'	56.7'
6 7	270°54.6 285°54.6	N17°53.6 54.2	340°42.9 355°16.0	14.1' 14.1'	\$09°01.4 08°46.8	-14.7' -14.7'	56.8' 56.8'
8	300°54.6	54.8	9°49.0	14.1'	08°32.1	-14.8'	56.8'
9	315°54.7	• • 55.5	24°22.1	14.1'	$08^{\circ}17.3$	-14.8'	56.9'
10	330°54.7	56.1	38°55.2	14.1'	08°02.5	-14.9'	56.9'
11 12	345°54.7 0°54.7	56.8 N17°57.4	53°28.2 68°01.3	14.1' 14.0'	07°47.6 \$07°32.6	-14.9' -15.0'	57.0' 57.0'
13	15°54.7	58.0	82°34.3	14.0'	07° 17.6	-15.0'	57.0'
14	30°54.7	58.7	97°07.4	14.0'	07°02.6	-15.1'	57.1'
15	45°54.7 60°54.8	·· 59.3 17°59.9	111°40.4 126°13.4	14.0'	06° 47.5 06° 32.4	-15.1'	57.1'
16 17	75°54.8	17 59.9 18°00.6	140°46.4	14.0' 14.0'	06°17.2	-15.2' -15.2'	57.1' 57.2'
18	90°54.8	N18°01.2	155°19.4	14.0'	S06°01.9	-15.3'	57.2'
19	105°54.8	01.8	169°52.4	14.0'	05°46.6	-15.3'	57.3'
20 21	120°54.8 135°54.8	02.5 · · 03.1	184°25.4 198°58.3	14.0' 13.9'	05°31.3 05°15.9	-15.4' -15.4'	57.3' 57.3'
22	150°54.8	03.7	213°31.3	13.9'	05 15.9 05°00.5	-15.4 -15.5'	57.4'
23	165°54.8	04.4	228°04.2	13.9'	04°45.0	-15.5'	57.4'
	SD = 15.8'	d = 0.6'		SI	O = 15.4'		
_							
Tue	<b>GHA</b> 180°54.9	<b>Dec</b> N18°05.0	<b>GHA</b> 242°37.1	u 13.9'	<b>Dec</b> \$04° 29.5	d -15.6'	<b>HP</b> 57.5'
0 1	180°54.9 195°54.9	N18 05.0 05.6	242°37.1 257°10.0	13.9' 13.9'	04° 13.9	-15.6'	57.5'
2	210°54.9	06.3	271°42.8	13.8'	03°58.3	-15.6'	57.5'
3	225°54.9	• • 06.9	286°15.6	13.8'	03°42.7	-15.7'	57.6'
4 5	240°54.9 255°54.9	07.5 08.2	300°48.4 315°21.2	13.8' 13.8'	03°27.0 03°11.3	-15.7' -15.7'	57.6' 57.7'
6	270°54.9	N18°08.8	329°54.0	13.7'	\$02°55.6	-15.8'	57.7'
7	285°54.9	09.4	344°26.7	13.7'	02°39.8	-15.8'	57.7'
8	300°54.9	10.1	358°59.4	13.7'	02°24.0 02°08.1	-15.9'	57.8'
9 10	315°55.0 330°55.0	· · 10.7 11.3	13°32.1 28°04.7	13.6' 13.6'	02°08.1 01°52.2	-15.9' -15.9'	57.8' 57.9'
11	345°55.0	11.9	42°37.3	13.6'	$01^{\circ}36.3$	-15.9'	57.9'
12	0°55.0	N18°12.6	57°09.8	13.5'	501°20.4	-16.0'	57.9'
13 14	15°55.0 30°55.0	13.2 13.8	71°42.4 86°14.9	13.5' 13.4'	01°04.4 00°48.4	-16.0'	58.0' 58.0'
14 15	30°55.0 45°55.0	13.8	86°14.9 100°47.3	13.4'	00°48.4 00°32.4	-16.0' -16.1'	58.0° 58.1'
16	60°55.0	15.1	$115^{\circ}19.7$	13.4'	00°16.3	-16.1	58.1'
17	75°55.0	15.7	129°52.1	13.3'	S00°00.2	-16.1'	58.1'
18 19	90°55.0 105°55.0	N18°16.3 16.9	144°24.4 158°56.7	13.3' 13.2'	N00°15.9 00°32.0	16.1' 16.1'	58.2' 58.2'
20	105°55.0 120°55.0	16.9 17.5	158°56.7 173°28.9	13.2'	00° 32.0 00° 48.1	16.1	58.2' 58.2'
21	135°55.0	• • 18.2	$188^{\circ}01.1$	13.1'	01°04.3	16.2'	58.3'
22	150°55.1	18.8	202°33.2	13.1'	01°20.5	16.2	58.3'
23	165°55.1	19.4	217°05.3	13.0'	01°36.7	16.2'	58.4'
	SD = 15.8'	d = 0.6'		SI	O = 15.7'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
N 70°	////	////	01:23	22:37	////	////
68°	////	////	02:09	21:48	////	////
66°	////	00:25	02:38	21:18	////	////
64°	////	01:34	03:00	20:55	22:24	////
62°	////	02:08	03:18	20:37	21:48	////
60°	00:22	02:32	03:32	20:22	21:23	////
N 58°	01:24	02:51	03:44	20:10	21:04	22:33
56°	01:55	03:07	03:55	19:59	20:48	22:00
54°	02:18	03:20	04:04	19:50	20:34	21:37
52°	02:36	03:31	04:13	19:41	20:23	21:19
50°	02:51	03:42	04:20	19:34	20:12	21:03
45°	03:20	04:02	04:36	19:18	19:51	20:34
N 40°	03:41	04:19	04:49	19:05	19:35	20:12
35°	03:58	04:32	05:00	18:53	19:21	19:55
30°	04:12	04:43	05:09	18:44	19:10	19:41
20°	04:34	05:02	05:26	18:27	18:51	19:19
N 10°	04:52	05:18	05:40	18:13	18:35	19:01
0°	05:06	05:31	05:53	18:00	18:22	18:47
<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
<b>S</b> 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

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

h	Aries	Venus		Ma	ars	Jup	iter	Sat	urn		Stars	
Wed	GHA	GHA D	)ес	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0 0	230°46.1		1°37.6	206°49.3	N09°07.5	118°17.6	N22°14.0	220°18.1	N02°06.7			
1	245°48.5	163°43.4	37.9	200°49.3 221°50.0	08.2	133°19.6	14.0	235°20.3	06.8	Alpheratz	357°33.9	29°14.0
					08.9	133 19.0 148°21.6		250°22.5		Ankaa	353°06.4	-42°09.6
2	260°51.0 275°53.5	178° 42.6	38.1	236°50.7			13.9		06.9	Schedar	349°30.2	56°40.7
3			38.4	251°51.4	• • 09.6	163°23.7	• • 13.9	265°24.8	• • 07.0	Diphda	348°46.4	-17°50.5
4	290°55.9	208°41.0	38.7	266°52.1	10.3	178°25.7	13.8	280°27.0	07.0	Achernar	$335^{\circ}19.9$	-57°06.0
5	305°58.4	223°40.1	38.9 4°39.2	281°52.7	11.0 N09°11.7	193°27.7	13.7	295°29.2	07.1	Hamal	327°50.3	23°35.1
6 7	321°00.9 336°03.3			296°53.4		208°29.8 223°31.8	N22°13.7	310°31.4 325°33.7	N02°07.2	Polaris	313°58.0	89°22.4
	350 03.3 351°05.8	253° 38.5 268° 37.7	39.4	311°54.1	12.4		13.6		07.3	Acamar	$315^{\circ}11.4$	-40°11.9
8 9	6°08.2		39.7	326°54.8	13.1 • • 13.8	238°33.8 253°35.9	13.6	340°35.9 355°38.1	07.4	Menkar	314°05.3	4°11.5
			39.9	341°55.5			• • 13.5		• • 07.5	Mirfak	308°27.2	49°57.2
10	21°10.7 36°13.2	298°36.0	40.2	356°56.2	14.6	268°37.9	13.4	10°40.3 25°42.5	07.6	Aldebaran	290°38.7	16°33.7
11		313°35.2 328°34.3 N24	40.4	11°56.8	15.3 N09°16.0	283°39.9	13.4	40°44.8	07.7	Rigel	281°03.1	-8°10.3
12	51°15.6 66°18.1		4°40.6	26°57.5		298°41.9 313°44.0	N22°13.3	55°47.0	N02°07.8	Capella	280°20.7	46°01.5
13 14	81°20.6	343°33.5 358°32.7	40.9	41°58.2 56°58.9	16.7 17.4	313 44.0 328°46.0	13.3 13.2	70°49.2	07.9 08.0	Bellatrix	278°22.0	6°22.4
15	96°23.0		41.1 41.4	71°59.6	18.1	343°48.0	. 13.2	85°51.4	08.1	Elnath	278°00.8	28°37.8
	90° 25.0 111° 25.5	28°31.0		87°00.3	18.8	358°50.1	13.1	100°53.7		Alnilam	275°36.9	-1°11.2
16 17	111 25.5 126°28.0	43°30.2	41.6 41.8	102°01.0	19.5	13°52.1	13.1	100 55.7 115°55.9	08.2 08.3	Betelgeuse	$270^{\circ}51.2$	7°24.7
							N22°13.0			Canopus	263°52.3	-52°42.7
18 19	141°30.4 156°32.9	58° 29.4 N24 73° 28.5	4°42.1	117°01.6 132°02.3	N09°20.2 20.9	28°54.1 43°56.2	12.9	130°58.1 146°00.3	N02°08.4	Sirius	258° 25.5	-16°45.3
20	171°35.3	73 26.5 88°27.7	42.3 42.6	132 02.3 147°03.0	20.9	43 50.2 58°58.2	12.9	140 00.3 161°02.6	08.5 08.6	Adhara	255°05.3	-29°00.6
21	171 35.3 186°37.8		42.8	162°03.7	22.3	74°00.2	• • 12.8	176°04.8	•• 08.7	Procyon	244°49.9	5°09.4
	201°40.3			102 03.7 177°04.4		89°02.2		170 04.8 191°07.0		Pollux	243°16.2	27°57.8
22 23	201 40.3 216°42.7	118°26.1 133°25.2	43.0 43.3	177 04.4 192°05.1	23.0 23.7	89 02.2 104°04.3	12.7 12.7	206°09.2	08.8 08.8	Avior	$234^{\circ}14.5$	-59°35.9
23	210 42.7	-								Suhail	$222^{\circ}45.6$	-43°32.6
Mer.p	ass. 08:36	u-0.8 $'$ $d$ 0.3 $'$ m	1-3.92	$\nu$ 0.7′ d0.	7'  m1.24	$\nu$ 2.0′ d-0.	1' m-1.95	$\nu$ 2.2′ d0	$.1^\prime$ m $0.91$	Miaplacidus	221°38.2	-69°49.8
										Alphard	217°46.7	-8°46.5
Thu	GHA	GHA E	)ec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.2	11°50.3
0	231°45.2		4°43.5	207°05.7	N09°24.4	119°06.3	N22°12.6	221°11.5	N02°08.9	Dubhe	193°39.4	61°36.7
1	246°47.7	163°23.6	43.7	207 05.7 222°06.4	25.1	134°08.3	12.5	236°13.7	09.0	Denebola	182°23.7	14°25.4
2	261°50.1	178° 22.7	43.9	237°07.1	25.8	149°10.4	12.5	251°15.9	09.0	Gienah	175°42.2	-17°41.5
3	201 50.1 276°52.6		44.2	252°07.8	26.5	164°12.4	. 12.3	266°18.1	•• 09.1		172°58.4	-63°15.0
4	291°55.1	208°21.1	44.4	267°08.5	27.2	179°14.4	12.4	281°20.4	09.3	Gacrux	171°50.0	-57°15.9
5	306°57.5	223°20.2	44.6	282°09.2	27.9	179 14.4 194°16.4	12.4	296°22.6	09.3	Alioth	166°11.6	55°49.1
6	322°00.0		1°44.8	297°09.8	N09°28.6	209°18.5	N22°12.2	311°24.8	N02°09.5	Spica	158° 20.9	-11°18.1
7	337°02.5	253°18.6	45.1	312°10.5	29.3	224°20.5	12.2	326°27.0	09.6	Alkaid	152°50.7	49°10.9
8	352°04.9	268° 17.8	45.3	327°11.2	30.0	239°22.5	12.2	341°29.3	09.7	Hadar	148° 33.8	-60°30.2
9	7°07.4		45.5	342°11.9	• • 30.7	254°24.5	12.1	356°31.5	09.8	Menkent	147°56.0	-36°30.2
10	22°09.8	298°16.1	45.7	357°12.6	31.4	269°26.6	12.0	11°33.7	09.9	Arcturus	145°46.6	19°02.6
11	37°12.3	313° 15.3	45.9	12°13.3	32.1	284°28.6	11.9	26°35.9	10.0	Rigil Kent.	139°38.1	-60°56.8
12	52°14.8		4°46.1	27°13.9	N09°32.8	299°30.6	N22°11.9	41°38.2	N02°10.1	Kochab	137° 18.6	74°02.8
13	67°17.2	343°13.6	46.4	42°14.6	33.5	314°32.7	11.8	56°40.4	10.2	Zuben'ubi	136°54.5	-16°09.2
14	82°19.7	358° 12.8	46.6	57°15.3	34.2	329°34.7	11.7	71°42.6	10.3	Alphecca	126°02.4	26°37.4
15	97°22.2		46.8	72°16.0	• • 34.9	344°36.7	. 11.7	86°44.8	. 10.3	Antares	112°14.1	-26°29.5
16	112°24.6	28°11.1	47.0	87°16.7	35.6	359°38.7	11.6	101°47.1	10.4	Atria	107°06.8	-69°04.4
17	127°27.1	43°10.3	47.2	102°17.3	36.3	14°40.8	11.6	116°49.3	10.5	Sabik	102°01.2	-15°45.5
18	142°29.6		1°47.4	117°18.0	N09°37.0	29°42.8	N22°11.5	131°51.5	N02°10.6	Shaula	96°08.5	-37°07.3
19	157°32.0	73°08.6	47.6	132°18.7	37.7	44°44.8	11.4	146°53.7	10.7	Rasalhague	95°57.2	12°32.3
20	172°34.5	88°07.8	47.8	147°19.4	38.4	59°46.8	11.4	161°56.0	10.8	Eltanin	90°41.2	51°28.9
21	187°36.9		48.0	162°20.1	• • 39.1	74°48.9	. 11.3	176°58.2	. 10.9	Kaus Aust.	83°30.8	-34°22.2
22	202°39.4	118°06.1	48.2	177°20.8	39.8	89°50.9	11.3	192°00.4	11.0	Vega	80°32.2	38°48.2
23	217°41.9	133°05.3	48.4	192°21.4	40.5	104°52.9	11.2	207°02.7	11.1	Nunki	75°46.2	-26°15.8
				-		_				Altair	61°58.7	8°56.2
Mer.p	ass. 08:32	$\nu$ -0.8' $d$ 0.2' m	1-3.93	$\nu$ 0.7′ d0.	/′ m1.25	$\nu 2.0' d-0.$	1′ m-1.95	$\nu$ 2.2′ d0	.1′ m0.91	Peacock	53°03.8	-56°38.8
										Deneb	49°24.9	45°22.2
Fri	GHA	GHA D	)ec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.7	9°59.6
0	232°44.3		1°48.6	207°22.1	N09°41.2	119°54.9	N22°11.1	222°04.9	N02°11.2	Al Na'ir	27°31.6 15°13.4	-46°49.8
1	247°46.8	163°03.6	48.8	222°22.8	41.9	134°57.0	11.1	237°07.1	11.3	Fomalhaut		-29°28.8
2	262°49.3	178°02.8	49.0	237°23.5	42.6	149°59.0	11.0	252°09.3	11.4	Scheat	13°44.3	28°13.4
3	277°51.7		49.2	252°24.2	• • 43.3	165°01.0	. 10.9	267°11.6	. 11.5	Markab	13°28.9	15°20.7
4	292°54.2	208°01.1	49.4	267°24.9	44.0	180°03.0	10.9	282°13.8	11.6	May 13 Wed	SHA	Mer.pass
5	307°56.7	223°00.3	49.6	282°25.5	44.7	195°05.0	10.8	297°16.0	11.7		277°58.2	14:06
6	322°59.1		1°49.8	297°26.2		210°07.1	N22°10.8		N02°11.7		336°03.3	10:12
7	338°01.6	252°58.6	50.0	312°26.9	46.1	225°09.1	10.7	327°20.5	11.8	Jupiter		16:05
8	353°04.1	267°57.8	50.2	327°27.6	46.8	240°11.1	10.6	342°22.7	11.9	Saturn		09:17
9	8°06.5		50.4	342°28.3	• • 47.5	255°13.1	. 10.6	357°24.9	12.0			
10	23°09.0	297°56.2	50.6	357°28.9	48.2	270°15.2	10.5	12°27.2	12.1	May 14 Thu	SHA	Mer.pass
11	38°11.4	312°55.3	50.7	12°29.6	48.9	285°17.2	10.4	27°29.4	12.2		276°39.2	14:07
12	53°13.9		4°50.9	27°30.3	N09°49.6	300°19.2	N22°10.4	42°31.6	N02°12.3		335°20.5	10:11
13	68°16.4	342°53.7	51.1	42°31.0	50.3	315°21.2	10.3	57°33.8	12.4		247°21.1	16:01
14	83°18.8	357°52.8	51.3	57°31.7	51.0	330°23.2	10.3	72°36.1	12.5	Saturn	349°26.3	09:14
15	98°21.3	12°52.0	51.5	72°32.4	• • 51.7	345°25.3	10.2	87°38.3	• • 12.6	May 15 Fri	SHA	Mer.pass
16	$113^{\circ}23.8$	27°51.2	51.7	87°33.0	52.4	0°27.3	10.1	102°40.5	12.7		275°20.1	14:08
17	$128^{\circ}26.2$	42°50.3	51.8	102°33.7	53.1	15°29.3	10.1	117°42.7	12.8		334°37.8	10:10
18	143°28.7		4°52.0	117°34.4	N09°53.8	30°31.3	N22°10.0		N02°12.9		247°10.6	15:58
19	158°31.2	72°48.7	52.2	132°35.1	54.5	45°33.3	09.9	147°47.2	13.0		$349^{\circ}20.5$	09:10
20	173°33.6	87° 47.8	52.4	147°35.8	55.2	60°35.4	09.9	162°49.4	13.0			
21	188°36.1		52.5	162°36.4	• • 55.9	75°37.4	• • 09.8	177°51.7	· · 13.1	Horizont	al parallax	0.1
22	203°38.6	117°46.2	52.7	177°37.1	56.6	90°39.4	09.8	192°53.9	13.2		Venus:	0.1
23	218°41.0	132°45.3	52.9	192°37.8	57.3	105°41.4	09.7	207°56.1	13.3		Mars:	0.1
Mer.p	ass. 08:28	ν-0.8′ d0.2′ m	1-3.93	$\nu$ 0.7′ d0.	7′ m1.25	$\nu 2.0' d-0.$	1′ m-1.95	$\nu$ 2.2' d0	.1′ m0.91			

h	Sur	า	Moon						
Wed	GHA	Dec	GHA	ν	Dec	d	HP		
0	180°55.1	$N18^{\circ}20.0$	231°37.3	13.0'	$N01^{\circ}52.9$	16.2'	58.4'		
1	195°55.1	20.6	246°09.3	12.9'	02°09.1	16.2	58.4'		
2	210°55.1 225°55.1	21.3	260°41.2 275°13.1	12.9' 12.8'	02°25.4 02°41.6	16.3' 16.3'	58.5' 58.5'		
4	240° 55.1	22.5	289°44.9	12.7'	02°57.9	16.3'	58.6'		
5	255°55.1	23.1	304°16.6	12.7'	03°14.1	16.3'	58.6'		
6	270°55.1	N18°23.7	318°48.3	12.6'	N03°30.4	16.3'	58.6'		
7	285°55.1	24.4	333°20.0	12.6'	03°46.7	16.3	58.7'		
8 9	300°55.1 315°55.1	25.0 •• 25.6	347°51.5 2°23.0	12.5' 12.4'	04°03.0 04°19.3	16.3' 16.3'	58.7' 58.8'		
10	330° 55.1	26.2	16°54.5	12.4'	04°15.5	16.3	58.8'		
11	345°55.1	26.8	31°25.8	12.3'	04°51.9	16.3'	58.8'		
12	0°55.1	N18°27.4	45°57.1	12.2'	N05°08.2	16.3'	58.9'		
13 14	15°55.1 30°55.1	28.0 28.6	60°28.4 74°59.5	12.2' 12.1'	05°24.4 05°40.7	16.3' 16.3'	58.9' 59.0'		
15	45° 55.1	29.3	89°30.6	12.1	05 40.7 05°57.0	16.3	59.0'		
16	60°55.1	29.9	104°01.6	11.9'	06°13.3	16.3'	59.0'		
17	75°55.1	30.5	118°32.5	11.9'	06°29.5	16.3'	59.1'		
18	90°55.1	N18°31.1	133°03.4	11.8'	N06°45.8	16.2	59.1'		
19 20	105°55.1 120°55.1	31.7 32.3	147°34.2 162°04.9	11.7' 11.6'	07°02.0 07°18.3	16.2' 16.2'	59.1' 59.2'		
21	135° 55.1	32.9	176° 35.5	11.5'	07 16.5 07°34.5	16.2	59.2'		
22	150°55.1	33.5	191°06.0	11.4'	07°50.7	16.2'	59.3'		
23	165°55.1	34.1	205°36.5	11.4'	08°06.8	16.2'	59.3'		
	SD = 15.8′	d = 0.6'		SE	O = 15.9'				
TL	CUV	Das	CD 4		Dec	اد	ЫD		
Thu 0	<b>GHA</b> 180° 55.1	<b>Dec</b> N18°34.7	<b>GHA</b> 220°06.8	u 11.3'	<b>Dec</b> N08°23.0	<i>d</i> 16.1'	<b>HP</b> 59.3'		
1	195° 55.1	35.3	234°37.1	11.2'	08°39.1	16.1	59.4		
2	210°55.1	35.9	$249^{\circ}07.3$	11.1'	08°55.2	16.1'	59.4'		
3	225°55.1	• • 36.6	263°37.4	11.0'	09°11.3	16.1'	59.4'		
4 5	240°55.1 255°55.1	37.2 37.8	278°07.4 292°37.3	10.9' 10.8'	09°27.4 09°43.4	16.0' 16.0'	59.5' 59.5'		
6	255 55.1 270°55.1	N18° 38.4	292 37.3 307°07.1	10.8	N09°59.4	16.0'	59.5 59.6'		
7	285°55.1	39.0	321°36.9	10.6'	10°15.3	15.9'	59.6'		
8	300°55.1	39.6	336°06.5	10.5'	10°31.3	15.9'	59.6'		
9	315°55.1	• • 40.2	350°36.0	10.4'	10°47.1	15.8'	59.7'		
10 11	330°55.1 345°55.1	40.8 41.4	5°05.5 19°34.8	10.3' 10.2'	11°03.0 11°18.8	15.8' 15.8'	59.7' 59.7'		
12	0°55.1	N18° 42.0	34°04.0	10.1	N11°34.6	15.7'	59.8'		
13	15°55.1	42.6	48°33.1	10.0'	11°50.3	15.7'	59.8'		
14	30°55.1	43.2	63°02.2	9.9'	12°06.0	15.6'	59.8'		
15 16	45°55.1 60°55.1	· · 43.8 44.4	77°31.1 91°59.9	9.8' 9.7'	12°21.6 12°37.2	15.6' 15.5'	59.9' 59.9'		
17	75°55.1	45.0	106°28.6	9.6'	12°52.7	15.5'	59.9'		
18	90°55.1	N18° 45.6	120°57.2	9.5'	N13°08.1	15.4'	60.0'		
19	105°55.1	46.2	135°25.7	9.4'	13°23.5	15.4'	60.0'		
20	120°55.1	46.8	149°54.1 164°22.3	9.3'	13°38.9 13°54.2		60.0'		
21 22	135°55.1 150°55.1	· · 47.3 47.9	104 22.3 178°50.5	9.1' 9.0'	13 54.2 14°09.4	15.2' 15.2'	60.1' 60.1'		
23	165° 55.0	48.5	193° 18.5	8.9'	14°24.6	15.1'	60.1		
	SD = 15.8'	d = 0.6'		SE	D = 16.2'				
Fri	GHA	Dec	GHA	ν	Dec	d	HP		
0	180°55.0	N18°49.1	207°46.4	8.8'	N14°39.7	15.0'	60.2'		
1	195°55.0	49.7	222°14.2	8.7'	14°54.7	15.0'	60.2'		
2	210°55.0 225°55.0	50.3 •• 50.9	236°41.9 251°09.5	8.6' 8.4'	15°09.7 15°24.5	14.9' 14.8'	60.2' 60.2'		
3 4	225°55.0 240°55.0	51.5	265°36.9	8.4	15°24.5 15°39.3	14.8	60.2		
5	255°55.0	52.1	280°04.2	8.2'	15°54.1	14.6'	60.3'		
6	270°55.0	N18°52.7	294°31.4	8.1'	N16°08.7	14.6'	60.3'		
7	285°55.0 300°55.0	53.3	308°58.5	8.0'	16°23.3	14.5'	60.4'		
8 9	300°55.0 315°55.0	53.9 •• 54.4	323°25.5 337°52.3	7.8' 7.7'	16°37.7 16°52.1	14.4' 14.3'	60.4' 60.4'		
10	330°55.0	55.0	352° 19.0	7.6'	17°06.4	14.2'	60.4		
11	345°55.0	55.6	6°45.6	7.5'	17°20.6	14.1'	60.5'		
12	0°54.9	N18°56.2	21°12.1	7.3'	N17°34.7	14.0'	60.5'		
13 14	15°54.9 30°54.9	56.8 57.4	35°38.4 50°04.6	7.2' 7.1'	17°48.8 18°02.7	13.9' 13.8'	60.5' 60.5'		
15	45° 54.9	• • 58.0	64°30.7	7.1	18° 16.5	13.7'	60.6		
16	60°54.9	58.6	78°56.7	6.8'	18°30.2	13.6'	60.6'		
17	75°54.9	59.1	93°22.5	6.7'	18°43.8	13.5'	60.6'		
18 19	90°54.9 105°54.9	N18°59.7 19°00.3	107°48.2 122°13.8	6.6' 6.4'	N18°57.3 19°10.7	13.4' 13.3'	60.6' 60.7'		
20	105°54.9 120°54.9	00.9	122°13.8 136°39.2	6.3'	19° 10.7 19° 24.0	13.3	60.7'		
21	135° 54.9	01.5	151°04.5	6.2'	19°37.1	13.0'	60.7'		
22	150° 54.8	02.0	$165^{\circ}29.7$	6.1'	19°50.2	12.9'	60.7'		
23	165°54.8	02.6	179°54.8	5.9'	20°03.1	12.8'	60.7'		
	SD = 15.8'	d = 0.6'		SE	O = 16.4'				

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Ldt.	Naut.	Civil	Sunrise	Sunset	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
$20^{\circ}$	05:31	05:58	06:21	17:32	17:55	18:22
$30^{\circ}$	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> $50^{\circ}$	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
		Moonris	ie		Moonset	:
Lat.	\Mod	Thu	Eri	Wod	Thu	Eri

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	
N 58°	02:23	02:27	02:32	15:42	17:20	19:05	
56°	02:24	02:31	02:40	15:39	17:13	18:53	
54°	02:25	02:35	02:47	15:36	17:07	18:43	
52°	02:26	02:39	02:54	15:34	17:01	18:34	
50°	02:27	02:42	03:00	15:31	16:56	18:26	
45°	02:29	02:49	03:13	15:26	16:45	18:09	
N 40°	02:30	02:55	03:23	15:22	16:36	17:55	
35°	02:32	03:00	03:32	15:19	16:29	17:43	
30°	02:33	03:05	03:41	15:16	16:22	17:32	
20°	02:35	03:13	03:55	15:10	16:10	17:15	
N 10°	02:37	03:20	04:07	15:06	16:00	16:59	
0°	02:39	03:27	04:19	15:01	15:51	16:45	
S 10°	02:41	03:34	04:31	14:57	15:42	16:31	
20°	02:43	03:41	04:44	14:52	15:32	16:16	
30°	02:45	03:50	04:58	14:47	15:21	15:59	
35°	02:47	03:55	05:07	14:44	15:14	15:49	
40°	02:48	04:00	05:17	14:41	15:07	15:38	
45°	02:50	04:07	05:28	14:37	14:58	15:24	
<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		ı
Day	Eqn.of	Time	Mer.	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	20-5%	
13	03:40	03:40	11:56	08:50	21:14		
14	03:41	03:40	11:56	09:39	22:05		
15	03:40	03:40	11:56	10:32	23:00		

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Cat -	GHA	GHA	Dec	CHV	Dec	GHA	Doc	GHA	Doc		SHA	Doc
Sat				GHA			Dec		Dec		эна	Dec
0	233°43.5	147°44.5	N24°53.1	207°38.5	N09°57.9	120°43.5	N22°09.6	222°58.3	N02° 13.4	Alpheratz	357°33.8	29°14.0
1	248°45.9	162°43.7	53.2	222°39.2	58.6	135°45.5	09.6	238°00.6	13.5	Ankaa	353°06.3	-42°09.6
2	263°48.4	177°42.8	53.4	237°39.9	09°59.3	150°47.5	09.5	253°02.8	13.6	Schedar	349°30.2	56°40.7
3	278°50.9	192°42.0	• • 53.6	252°40.5	10°00.0	165°49.5	• • 09.4	268°05.0	• • 13.7	Diphda	348°46.4	-17°50.5
4	293°53.3	207°41.2	53.7	267°41.2	00.7	180°51.5	09.4	283°07.3	13.8		335°19.9	-17 30.3 -57°06.0
5	308°55.8	222°40.3	53.9	282°41.9	01.4	195°53.5	09.3	298°09.5	13.9	Achernar		
6	323°58.3	237°39.5	N24°54.1	297°42.6	N10°02.1	210°55.6	N22°09.2	313°11.7	N02° 14.0	Hamal	327°50.3	23°35.1
7	339°00.7	252°38.7	54.2	312°43.3	02.8	225°57.6	09.2	328°13.9	14.1	Polaris	313°57.4	89°22.4
8	354°03.2	267°37.8	54.4	327°43.9	03.5	240°59.6	09.1	343°16.2	14.1	Acamar	$315^{\circ}11.4$	-40°11.9
9	9°05.7	282°37.0	• • 54.5	342°44.6	04.2	256°01.6	09.1	358°18.4	. 14.2	Menkar	314°05.3	4°11.5
										Mirfak	308°27.2	49°57.2
10	24°08.1	297°36.2	54.7	357°45.3	04.9	271°03.6	09.0	13°20.6	14.3	Aldebaran	290°38.7	16°33.7
11	39°10.6	312°35.3	54.9	12°46.0	05.6	286°05.7	08.9	28°22.9	14.4	Rigel	281°03.1	-8°10.3
12	54°13.1	327°34.5	N24°55.0	27°46.7	N10°06.3	301°07.7	N22°08.9	43°25.1	N02°14.5	Capella	280°20.7	46°01.5
13	69°15.5	342°33.7	55.2	42°47.3	07.0	$316^{\circ}09.7$	8.80	58°27.3	14.6	Bellatrix	278°22.0	6°22.4
14	84°18.0	357°32.8	55.3	57°48.0	07.6	331°11.7	08.7	73°29.6	14.7	Elnath	278°00.8	28°37.8
15	99°20.4	12°32.0	• • 55.5	72°48.7	• • 08.3	$346^{\circ}13.7$	• • 08.7	88°31.8	• • 14.8	1		-1°11.2
16	114°22.9	27°31.2	55.6	87°49.4	09.0	1°15.7	08.6	103°34.0	14.9	Alnilam	275°36.9	
17	129°25.4	42°30.3	55.8	102°50.1	09.7	$16^{\circ}17.8$	08.5	118°36.2	15.0	Betelgeuse	270°51.2	7°24.7
18	144°27.8	57°29.5	N24°55.9	117°50.7	N10°10.4	31°19.8	N22°08.5	133°38.5	N02°15.1	Canopus	263°52.3	-52°42.7
	159°30.3	72°28.7		132°51.4		46°21.8		148°40.7		Sirius	258°25.5	-16°45.3
19	174°32.8	87°27.8	56.1	132 51.4 147°52.1	11.1	61°23.8	08.4	146 40.7 163°42.9	15.2	Adhara	$255^{\circ}05.3$	-29°00.6
20			56.2		11.8		08.4		15.2	Procyon	244°49.9	5°09.4
21	189°35.2	102°27.0	• • 56.4	162°52.8	• • 12.5	76°25.8	• • 08.3	178°45.2	• • 15.3	Pollux	243°16.2	27°57.8
22	204°37.7	117°26.2	56.5	177°53.5	13.2	91°27.8	08.2	193°47.4	15.4	Avior	234° 14.5	-59°35.9
23	219°40.2	132°25.3	56.7	192°54.1	13.9	106°29.9	08.2	208°49.6	15.5	Suhail	222°45.6	-43°32.6
N/a===	ass. 08:24	,, n o/ Jn	.2′ m-3.93	10 7/ 40	.7′ m1.25	1/2 N/ 4 A	.1′ m-1.94	,,2 2/ JO	.1′ m0.91	Miaplacidus	222 45.0 221°38.2	-43 32.0 -69°49.8
ivier.p	ass. U0.24	ν-0.6 α0	.2 111-3.93	νυ.ι αυ	., 1111.25	ν2.0 <b>u</b> -0	.1 111-1.94	ν ∠.∠ u0	.1110.91	Alphard	221 38.2 217°46.7	-8°46.5
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
0	234°42.6	147°24.5	N24°56.8	207°54.8	N10°14.6	121°31.9	N22°08.1	223°51.9	N02° 15.6	Dubhe	193°39.5	61°36.7
	249°45.1	162°23.7	56.9	222°55.5	15.2	136°33.9		238°54.1	15.7	Denebola	182°23.7	14°25.4
1							08.0			Gienah	175°42.3	-17°41.5
2	264°47.5	177°22.8	57.1	237°56.2	15.9	151°35.9	08.0	253°56.3	15.8	Acrux	172°58.4	-63°15.0
3	279°50.0	192°22.0	• • 57.2	252°56.9	• • 16.6	166°37.9	• • 07.9	268°58.6	• • 15.9	Gacrux		-57°15.9
4	294°52.5	$207^{\circ}21.2$	57.3	267°57.5	17.3	181°39.9	07.8	284°00.8	16.0	Alioth	166°11.6	55°49.1
5	309°54.9	222°20.3	57.5	282°58.2	18.0	196°42.0	07.8	299°03.0	16.1	II .	158° 20.9	-11°18.1
6	324°57.4	237°19.5	N24°57.6	297°58.9	N10°18.7	211°44.0	N22°07.7	314°05.2	$N02^{\circ}16.2$	Spica		
7	339°59.9	252°18.7	57.7	312°59.6	19.4	226°46.0	07.6	329°07.5	16.3	Alkaid	152°50.7	49°10.9
8	355°02.3	267°17.8	57.9	328°00.3	20.1	241°48.0	07.6	344°09.7	16.3	Hadar	148°33.8	-60°30.2
9	10°04.8	282°17.0				256°50.0				Menkent	147°56.0	-36°30.2
			• • 58.0	343°00.9	• • 20.8		• • 07.5	359°11.9	• • 16.4	Arcturus	145°46.6	19°02.6
10	25°07.3	297°16.2	58.1	358°01.6	21.4	271°52.0	07.5	14°14.2	16.5	Rigil Kent.	139°38.1	-60°56.8
11	40°09.7	312°15.3	58.3	13°02.3	22.1	286°54.0	07.4	29°16.4	16.6	Kochab	$137^{\circ}18.7$	74°02.8
12	55°12.2	$327^{\circ}14.5$	N24°58.4	28°03.0	$N10^{\circ}22.8$	301°56.0	N22°07.3	44°18.6	$N02^{\circ}16.7$	Zuben'ubi	136°54.5	-16°09.2
13	$70^{\circ}14.7$	$342^{\circ}13.7$	58.5	43°03.7	23.5	316°58.1	07.3	59°20.9	16.8	II		26°37.5
14	85°17.1	$357^{\circ}12.8$	58.6	58°04.3	24.2	332°00.1	07.2	74°23.1	16.9	Alphecca	126°02.4	
15	100°19.6	12°12.0	• • 58.8	73°05.0	24.9	347°02.1	07.1	89°25.3	17.0	Antares	112°14.1	-26°29.5
16	115°22.0	27°11.2	58.9	88°05.7	25.6	2°04.1	07.1	104°27.6	17.1	Atria	107°06.8	-69°04.4
		42°10.3								Sabik	$102^{\circ}01.2$	-15°45.5
17	130°24.5		59.0	103°06.4	26.2	17°06.1	07.0	119°29.8	17.2	Shaula	96°08.5	-37°07.3
18	145°27.0	57°09.5	N24°59.1		N10°26.9	32°08.1	N22°06.9	134°32.0	N02°17.2	Rasalhague	95°57.2	12°32.3
19	160°29.4	72°08.7	59.2	133°07.7	27.6	47°10.1	06.9	149°34.3	17.3	Eltanin	90°41.2	51°28.9
20	175°31.9	87°07.8	59.4	148°08.4	28.3	62°12.2	06.8	164°36.5	17.4	Kaus Aust.	83°30.7	-34°22.2
21	190°34.4	102°07.0	• • 59.5	163°09.1	• • 29.0	77°14.2	• • 06.7	179°38.7	• • 17.5	Vega	80°32.2	38°48.3
22	205°36.8	$117^{\circ}06.2$	59.6	178°09.8	29.7	92°16.2	06.7	194°41.0	17.6	Nunki	75°46.1	-26°15.8
23	220°39.3	132°05.3	59.7	193°10.5	30.4	$107^{\circ}18.2$	06.6	209°43.2	17.7	Altair	61°58.7	8°56.2
			1/ 0.00	0 =/ 10	=/					II		
Mer.p	ass. 08:20	$\nu$ -0.8′ d0	.1' m-3.93	$\nu$ 0.7 d0	.7′ m1.25	$\nu$ 2.0′ d-0	.1' m-1.94	$\nu$ 2.2' d0	$.1^\prime$ m $0.91$	Peacock	53°03.8	-56°38.8
										Deneb	49°24.9	45°22.2
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.7	9°59.6
0	235°41.8	147°04.5	N24°59.8		N10°31.0	122°20.2	N22°06.5	224°45.4	N02° 17.8	Al Na'ir	27°31.6	-46°49.8
				208 11.1 223°11.8						Fomalhaut	15° 13.4	-29°28.8
1	250°44.2	162°03.7	24°59.9		31.7	137°22.2	06.5	239°47.7	17.9	Scheat	13°44.3	28°13.4
2	265°46.7	177°02.8	25°00.0	238°12.5	32.4	152°24.2	06.4	254°49.9	18.0	Markab	$13^{\circ}28.9$	15°20.7
3	280°49.2	192°02.0	• • 00.1	253°13.2	• • 33.1	167°26.2	06.3	269°52.1	• • 18.1		c	
4	295°51.6	207°01.2	00.2	268°13.9	33.8	182°28.2	06.3	284°54.4	18.1	May 16 Sat	SHA	Mer.pass
5	$310^{\circ}54.1$	222°00.3	00.4	283°14.5	34.5	197°30.3	06.2	299°56.6	18.2		274°01.0	14:10
6	325°56.5	236°59.5	N25°00.5	298°15.2	N10°35.1	212°32.3	N22°06.2	314°58.8	N02° 18.3	II.	333°55.0	10:09
7	340°59.0	251°58.7	00.6	313°15.9	35.8	227°34.3	06.1	330°01.1	18.4	Jupiter	247°00.0	15:55
8	356°01.5	266°57.8	00.7	328°16.6	36.5	242°36.3	06.0	345°03.3	18.5	Saturn	$349^{\circ}14.9$	09:07
9	11°03.9	281°57.0	00.8	343°17.2	37.2	257°38.3	06.0	0°05.5	. 18.6			
10	26°06.4	296°56.2	00.9	358°17.9	37.9	272°40.3	05.9	15°07.8	18.7	May 17 Sun	SHA	Mer.pass
	41°08.9	311°55.3	01.0	13°18.6	38.6	287°42.3	05.9	30°10.0	18.8	Venus	$272^{\circ}41.9$	14:11
11										Mars	333°12.2	10:08
12	56°11.3	326°54.5	N25°01.1	28°19.3	N10°39.2	302°44.3	N22°05.8		N02° 18.9		246°49.3	15:52
13	71°13.8	341°53.7	01.2	43°20.0	39.9	317°46.3	05.7	60°14.5	19.0		349°09.2	09:03
14	86°16.3	356° 52.8	01.2	58°20.6	40.6	332°48.3	05.6	75°16.7	19.0		05.2	
15	$101^{\circ}18.7$	11°52.0	•• 01.3	73°21.3	• • 41.3	347°50.4	•• 05.6	90°18.9	• • 19.1	May 18 Mon	SHA	Mer.pass
16	$116^{\circ}21.2$	26°51.2	01.4	88°22.0	42.0	2°52.4	05.5	105°21.2	19.2		271°22.7	14:12
17	131°23.7	41°50.3	01.5	103°22.7	42.7	17°54.4	05.4	120°23.4	19.3		332°29.4	10:07
18	146°26.1	56°49.5	N25°01.6	118°23.4		32°56.4	N22°05.4		N02° 19.4		246°38.4	15:49
19	161°28.6	71°48.7	01.7	133°24.0	44.0	47°58.4	05.3	150°27.9	19.5			
										Saturn	349°03.7	09:00
20	176°31.0	86°47.8	01.8	148°24.7	44.7	63°00.4	05.2	165°30.1	19.6	Horizont	al parallax	
21	191°33.5	101°47.0	• • 01.9	163°25.4	• • 45.4	78°02.4	05.2	180°32.3	• • 19.7	Horizont	•	0.1
22	206°36.0	116°46.2	02.0	178°26.1	46.1	93°04.4	05.1	195°34.6	19.8		Venus:	0.1
23	221°38.4	131°45.3	02.0	193°26.7	46.7	108°06.4	05.0	210°36.8	19.9		Mars:	0.1
N/a===	255 00.16	,, n o/ Jn	.1′ m-3.93	10 7/ 40	.7′ m1.25	12 0/ 4 0	.1′ m-1.93	1/2 2/ 40	.1′ m0.91			
ivier.p	ass. 08:16	ν-0.6 α0	.111-3.93	νυ.ι αυ	., 1111.25	ν2.0 α-0	.1 111-1.93	ν2.2° α0	.1110.91			

h	Sui	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°54.8	N19°03.2	194°19.7	5.8'	N20°15.9	12.7'	60.8'
1	195°54.8	03.8	208°44.5	5.7'	20°28.5	12.5'	60.8'
2	210°54.8	04.4	223°09.2	5.5'	20°41.1	12.4'	60.8'
3	225°54.8 240°54.8	• • 04.9	237°33.7	5.4'	20°53.5	12.3' 12.1'	60.8'
4 5	240°54.8 255°54.7	05.5 06.1	251°58.1 266°22.4	5.3' 5.2'	21°05.8 21°17.9	12.1	60.8' 60.9'
6	270°54.7	N19°06.7	280°46.6	5.0'	N21°29.9	11.9'	60.9
7	285°54.7	07.3	295°10.6	4.9'	21°41.8	11.7'	60.9
8	300°54.7	07.8	309°34.5	4.8'	21°53.5	11.6'	60.9'
9	315°54.7	• • 08.4	323°58.3	4.6'	$22^{\circ}05.1$	11.4'	60.9'
10	330°54.7	09.0	338°21.9	4.5'	22°16.5	11.3'	60.9'
11	345°54.7 0°54.6	09.6 N19°10.1	352°45.4 7°08.8	4.4' 4.3'	22°27.8 N22°39.0	11.1' 11.0'	61.0'
12 13	0 54.6 15°54.6	N19 10.1 10.7	7 08.8 21°32.1	4.3 4.1'	N22 39.0 22°50.0	10.8	61.0' 61.0'
14	30°54.6	11.3	35°55.3	4.0'	23°00.8	10.7	61.0'
15	45°54.6	• • 11.8	50°18.3	3.9'	23°11.5	10.5'	61.0'
16	60°54.6	12.4	64°41.2	3.8'	23°22.0	10.3'	61.0'
17	75°54.6	13.0	79°04.0	3.7'	23°32.3	10.2'	61.0'
18	90°54.5	N19°13.6	93°26.6	3.6'	N23°42.5	10.0'	61.1'
19 20	105°54.5 120°54.5	14.1 14.7	107°49.2 122°11.6	3.4' 3.3'	23°52.5 24°02.4	9.8' 9.7'	61.1' 61.1'
21	120 54.5 135°54.5	15.3	136°34.0	3.2'	24 02.4 24°12.0	9.7 9.5'	61.1
22	150°54.5	15.8	150°56.2	3.1'	24°21.5	9.3'	61.1
23	165°54.5	16.4	165°18.3	3.0'	24°30.9	9.1'	61.1'
	SD = 15.8'	d = 0.6'		S	D = 16.6'		
Sun	<b>GHA</b> 180°54.4	Dec	GHA	$\nu$	Dec	d	HP
0 1	180°54.4 195°54.4	N19°17.0 17.5	179°40.2 194°02.1	2.9' 2.8'	N24°40.0 24°49.0	9.0' 8.8'	61.1' 61.1'
2	210°54.4	18.1	208°23.9	2.7'	24°57.8	8.6'	61.1
3	225°54.4	• • 18.7	222°45.6	2.6'	25°06.4	8.4'	61.1
4	240°54.4	19.2	$237^{\circ}07.1$	2.5'	$25^{\circ}14.8$	8.2'	61.1'
5	255°54.3	19.8	251°28.6	2.4'	25°23.0	8.0'	61.1'
6 7	270°54.3 285°54.3	N19°20.3 20.9	265°49.9 280°11.2	2.3' 2.2'	N25°31.1 25°38.9	7.9' 7.7'	61.1' 61.1'
8	300°54.3	21.5	294°32.4	2.1'	25°46.6	7.5'	61.1
9	315°54.3	• • 22.0	308°53.5	2.0'	25°54.0	7.3'	61.2'
10	330°54.2	22.6	323°14.5	1.9'	26°01.3	7.1'	61.2'
11	345°54.2 0°54.2	23.2 N19°23.7	337°35.4 351°56.2	1.8' 1.7'	26°08.4 N26°15.3	6.9' 6.7'	61.2' 61.2'
12 13	15°54.2	N19 23.7 24.3	6°16.9	1.7'	26°21.9	6.7 6.5'	61.2'
14	30°54.2	24.8	20°37.6	1.6'	26°28.4	6.3'	61.2'
15	45°54.1	• • 25.4	34°58.2	1.5'	26°34.7	6.1'	61.2'
16	60°54.1	25.9	49°18.7	1.4'	26°40.7	5.9'	61.2'
17 18	75°54.1 90°54.1	26.5 N19°27.1	63°39.1 77°59.5	1.4' 1.3'	26°46.6 N26°52.2	5.6' 5.4'	61.2' 61.2'
19	105°54.0	27.6	92°19.8	1.3'	26°57.7	5.4 5.2'	61.1
20	120°54.0	28.2	106°40.1	1.2'	27°02.9	5.0'	61.1'
21	135°54.0	• • 28.7	121°00.3	1.1'	27°07.9	4.8'	61.1'
22	150°54.0	29.3	135°20.4	1.1'	27°12.7	4.6'	61.1'
23	165°54.0	29.8	149°40.5	1.0'	27°17.3	4.4'	61.1'
	SD = 15.8'	d = 0.6'		S	D = 16.7'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°53.9	$N19^{\circ}30.4$	164°00.5	1.0'	N27°21.7	4.2'	61.1'
1	195°53.9	30.9	178°20.5	1.0'	27°25.8	3.9'	61.1'
2	210°53.9 225°53.9	31.5 · · 32.0	192°40.5 207°00.4	0.9' 0.9'	27°29.8 27°33.5	3.7' 3.5'	61.1' 61.1'
4	240°53.8	32.6	201° 00.4 221° 20.3	0.9	27°37.0	3.3'	61.1
5	255°53.8	33.1	235°40.1	0.8'	27°40.3	3.1'	61.1'
6	270°53.8	N19°33.7	249°59.9	0.8'	N27°43.4	2.9'	61.1'
7	285°53.8	34.2	264°19.7	0.8'	27°46.2	2.6'	61.1'
8	300°53.7 315°53.7	34.8 •• 35.3	278°39.5	0.8'	27°48.9	2.4'	61.1'
9 10	315°53.7 330°53.7	· · 35.3 35.9	292°59.3 307°19.0	0.7' 0.7'	27°51.3 27°53.5	2.2' 2.0'	61.1' 61.0'
11	345°53.6	36.4	307 19.0 321°38.7	0.7'	27°55.4	1.7'	61.0'
12	0°53.6	N19°37.0	335°58.5	0.7'	N27°57.2	1.5'	61.0'
13	15°53.6	37.5	350°18.2	0.7'	27°58.7	1.3'	61.0'
14	30°53.6	38.1	4°37.9	0.7'	28°00.0	1.1'	61.0'
15 16	45°53.5 60°53.5	· · 38.6 39.2	18°57.6 33°17.4	0.7' 0.7'	28°01.1 28°02.0	0.9' 0.6'	61.0' 61.0'
17	75°53.5	39.7	47°37.1	0.7	28°02.6	0.4	61.0'
18	90°53.5	N19°40.2	61°56.9	0.8'	N28°03.0	0.2'	60.9'
19	105°53.4	40.8	76°16.7	0.8'	28°03.2	-0.0'	60.9'
20	120°53.4	41.3	90°36.5	0.8'	28°03.2	-0.2'	60.9'
21 22	135°53.4 150°53.3	· · 41.9 42.4	104°56.3 119°16.2	0.9' 0.9'	28°03.0 28°02.5	-0.5' -0.7'	60.9' 60.9'
23	165°53.3	42.4	133°36.1	0.9'	28°01.8	-0.7	60.9
	SD = 15.8'	d = 0.6'	-	S	D = 16.7'		
					***		

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
<b>N</b> 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	
N 58°	02:41	02:57	03:29	20:55	22:40	23:59
56°	02:53	03:15	03:53	20:38	22:16	23:33
54°	03:04	03:31	04:13	20:23	21:57	23:13
52°	03:14	03:44	04:29	20:10	21:41	22:56
50°	03:23	03:56	04:44	19:58	21:26	22:41
45°	03:42	04:21	05:13	19:35	20:58	22:11
<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.	Mer.Pass.		
,		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	ŝ	03:39	03:39	11:56	11:30	-:-		
17	7	03:38	03:37	11:56	12:34	00:01		
18	3	03:36	03:34	11:56	13:41	01:07		

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
<b>T</b>	CIIA	CHA	D	CIIA	D	- CIIA	D	GHA	D		SHA	D
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec		Dec		SHA	Dec
0	236°40.9	146° 44.5	N25°02.1	208°27.4	N10°47.4	123°08.4	N22°05.0	225°39.0	N02°19.9	Alpheratz	357°33.8	29°14.0
1	251°43.4	161°43.7	02.2	223°28.1	48.1	138°10.4	04.9	240°41.3	20.0	Ankaa	353°06.3	-42°09.6
2	266°45.8	176° 42.8	02.3	238°28.8	48.8	153°12.4	04.8	255°43.5	20.1	Schedar	349°30.1	56°40.7
3	281°48.3	191°42.0	• • 02.4	253°29.5	• • 49.5	168°14.5	• • 04.8	270°45.7	• • 20.2	Diphda	348°46.4	-17°50.5
4	296°50.8	206°41.2	02.4	268°30.1	50.1	$183^{\circ}16.5$	04.7	285°48.0	20.3	Achernar	335°19.8	-57°06.0
5	311°53.2	221°40.3	02.5	283°30.8	50.8	$198^{\circ}18.5$	04.6	300°50.2	20.4	Hamal	327°50.3	23°35.1
6	326°55.7	236°39.5	N25°02.6	298°31.5	N10°51.5	213°20.5	N22°04.6	315°52.4	N02°20.5			89°22.4
7	341°58.2	251°38.7	02.7	313°32.2	52.2	228°22.5	04.5	330°54.7	20.6	Polaris	313°56.6	
8	357°00.6	266° 37.8	02.7	328°32.8	52.9	243°24.5	04.4	345°56.9	20.7	Acamar	315°11.3	-40°11.9
9	12°03.1	281°37.0	• • 02.8	343°33.5	• • 53.5	258°26.5	• • 04.4	0°59.2	• • 20.7	Menkar	314°05.3	4°11.5
10	27°05.5	296°36.2	02.9	358°34.2	54.2	273°28.5	04.3	16°01.4	20.8	Mirfak	308°27.2	49°57.2
11	42°08.0	311°35.3	02.9	13°34.9	54.9	288°30.5	04.2	31°03.6	20.9	Aldebaran	290°38.7	16°33.7
	57°10.5	326° 34.5	N25°03.0	28°35.5	N10°55.6	303°32.5	N22°04.2	46°05.9	N02°21.0	Rigel	281°03.1	-8°10.3
12										Capella	280°20.7	$46^{\circ}01.5$
13	72°12.9	341°33.7	03.1	43°36.2	56.2	318°34.5	04.1	61°08.1	21.1	Bellatrix	278°22.0	6°22.4
14	87°15.4	356° 32.8	03.1	58°36.9	56.9	333°36.5	04.0	76°10.3	21.2	Elnath	278°00.8	28°37.8
15	102°17.9	11°32.0	• • 03.2	73°37.6	• • 57.6	348°38.5	• • 04.0	91°12.6	• • 21.3	Alnilam	275°36.9	-1°11.2
16	117°20.3	26°31.2	03.3	88°38.3	58.3	3°40.5	03.9	106°14.8	21.4	Betelgeuse	270°51.2	7°24.7
17	132°22.8	41°30.3	03.3	103°38.9	58.9	18°42.5	03.8	121°17.0	21.4	Canopus	263°52.4	-52°42.7
18	147°25.3	56° 29.5	N25°03.4	118°39.6	N10°59.6	33°44.5	N22°03.8	136°19.3	N02°21.5			
19	162°27.7	71°28.7	03.4	133°40.3	11°00.3	48°46.5	03.7	151°21.5	21.6	Sirius	258°25.5	-16°45.3
20	177°30.2	86° 27.8	03.5	148°41.0	01.0	63°48.6	03.6	166°23.8	21.7	Adhara	255°05.3	-29°00.6
21	192°32.7	101°27.0	• • 03.6	163°41.6	• • 01.6	78°50.6	• • 03.6	181°26.0	• • 21.8	Procyon	244°49.9	5°09.4
22	207°35.1	116° 26.2	03.6	178°42.3	02.3	93°52.6	03.5	196°28.2	21.0	Pollux	243°16.2	27°57.8
23	207 33.1 222°37.6	131° 25.3	03.0	176 42.3 193°43.0	02.3	93°52.0 108°54.6	03.5	211°30.5	22.0	Avior	234°14.6	-59°35.9
23	222 31.0									Suhail	222°45.6	-43°32.6
Mer.p	ass. 08:12	$\nu$ -0.8′ d0	.1' m-3.93	$\nu$ 0.7 $^{\prime}$ d0	.7′ m1.25	$\nu$ 2.0′ d-0	.1′ m-1.93	$\nu$ 2.2' d0	.1' m $0.90$	Miaplacidus	221°38.3	-69°49.8
<u>.</u>										Alphard	217°46.7	-8°46.5
										Regulus	207°33.3	11°50.3
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.5	61°36.7
0	237°40.0	$146^{\circ}24.5$	N25°03.7	208°43.7	$N11^{\circ}03.7$	123°56.6	N22°03.4	226°32.7	N02°22.1	Denebola	182°23.7	14°25.4
1	252°42.5	161°23.7	03.8	223°44.3	04.3	138°58.6	03.3	241°34.9	22.2	Gienah	175° 42.3	-17°41.5
2	267°45.0	$176^{\circ}22.9$	03.8	238°45.0	05.0	154°00.6	03.2	256°37.2	22.2			
3	282°47.4	191°22.0	• • 03.9	253°45.7	• • 05.7	169°02.6	• • 03.2	271°39.4	22.3		172°58.4	-63°15.0
4	297°49.9	206°21.2	03.9	268°46.4	06.4	184°04.6	03.1	286°41.7	22.4		171°50.0	-57°16.0
5	312°52.4	221°20.4	04.0	283°47.1	07.0	199°06.6	03.0	301°43.9	22.5	Alioth	166°11.6	55°49.1
6	327°54.8	236° 19.5	N25°04.0	298°47.7	N11°07.7	214°08.6	N22°03.0	316°46.1	N02°22.6	Spica	158°20.9	-11°18.1
								331°48.4		Alkaid	152°50.7	49°10.9
7	342°57.3	251° 18.7	04.0	313°48.4	08.4	229°10.6	02.9	331 48.4	22.7	Hadar	148°33.8	-60°30.2
8	357°59.8	266° 17.9	04.1	328°49.1	09.1	244°12.6	02.8	346°50.6	22.8	Menkent	147°55.9	-36°30.2
9	13°02.2	281°17.0	• • 04.1	343°49.8	• • 09.7	259°14.6	• • 02.8	1°52.8	• • 22.9	Arcturus	145°46.6	19°02.6
10	28°04.7	296°16.2	04.2	358°50.4	10.4	274°16.6	02.7	$16^{\circ}55.1$	22.9	Rigil Kent.	139°38.1	-60°56.8
11	43°07.2	311° 15.4	04.2	13°51.1	11.1	289°18.6	02.6	31°57.3	23.0	Kochab	137° 18.7	74°02.8
12	58°09.6	326° 14.5	N25°04.2	28°51.8	N11°11.8	304°20.6	N22°02.5	46°59.6	N02°23.1	Zuben'ubi	136°54.5	-16°09.2
13	73°12.1	341°13.7	04.3	43°52.5	12.4	319°22.6	02.5	62°01.8	23.2			
14	88°14.5	$356^{\circ}12.9$	04.3	58°53.1	13.1	334°24.6	02.4	77°04.0	23.3	Alphecca	126°02.4	26°37.5
15	103°17.0	11°12.1	• • 04.4	73°53.8	• • 13.8	349°26.6	• • 02.3	92°06.3	• • 23.4	Antares	112°14.1	-26°29.5
16	118°19.5	26° 11.2	04.4	88°54.5	14.4	4°28.6	02.3	107°08.5	23.5	Atria	107°06.8	-69°04.4
17	133°21.9	41° 10.4	04.4	103°55.2	15.1	19°30.6	02.2	122°10.7	23.6	Sabik	102°01.2	-15°45.5
18	148°24.4	56°09.6	N25°04.4	118°55.8	N11°15.8	34°32.6	N22°02.1	137°13.0	N02°23.6	Shaula	96°08.5	-37°07.3
		71°08.7			46-		00.1			Rasalhague	95°57.2	12°32.3
19	163°26.9		04.5	133°56.5	16.5	49°34.6	02.1	152°15.2	23.7	Eltanin	90°41.2	51°28.9
20	178°29.3	86°07.9	04.5	148°57.2	17.1	64°36.6	02.0	167°17.5	23.8	Kaus Aust.	83°30.7	-34°22.2
21	193°31.8	101°07.1	• • 04.5	163°57.9	• • 17.8	79°38.6	• • 01.9	182°19.7	• • 23.9	Vega	80°32.1	38°48.3
22	208°34.3	116°06.2	04.6	178°58.5	18.5	94°40.6	01.9	197°21.9	24.0	Nunki	75°46.1	-26°15.8
23	223°36.7	131°05.4	04.6	193°59.2	19.1	109°42.6	01.8	212°24.2	24.1	Altair	61°58.7	8°56.2
N/au m	00.00	0 0/ 40	1/ 2.02	0 7/ 40	7/1 OF	2 0/ 4 0	1/ 1 00	2 2/ 40	1/0 00	Peacock	53°03.7	-56°38.7
ivier.p	ass. 08:08	ν-υ.ο αυ	.1′ m-3.93	νυ.ι αυ	.7′ m1.25	ν2.0 <b>a</b> -0	.1′ m-1.92	ν2.2 α0	.1′ m0.90	Deneb	49° 24.9	-50 36.7 45°22.2
										Enif		45 22.2 9°59.7
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	l .	33°37.7	
0	238°39.2	146°04.6	N25°04.6	208°59.9	N11°19.8	124°44.6	N22°01.7	227°26.4		Al Na'ir	27°31.5	-46°49.8
1	253°41.7	161°03.8	04.6	224°00.6	20.5	139°46.6	01.7	242°28.7	24.2	Fomalhaut	15°13.4	-29°28.8
2	268°44.1	101 03.8 176°02.9	04.6	239°01.2	20.5	159°40.0 154°48.6	01.7	242 20.7 257°30.9	24.2	Scheat	13°44.2	28°13.4
					. 21.1	154 48.6 169°50.6		257 30.9 272°33.1		Markab	13°28.9	15°20.7
3	283°46.6	191°02.1	• • 04.7	254°01.9			• • 01.5		• • 24.4	Ma 10 T	CIIA	N4a :: ::
4	298°49.0	206°01.3	04.7	269°02.6	22.5	184°52.6	01.5	287°35.4	24.5	May 19 Tue	SHA	Mer.pass
5	313°51.5	221°00.4	04.7	284°03.3	23.2	199°54.6	01.4	302°37.6	24.6		270°03.6	14:14
6	328°54.0	235° 59.6	N25°04.7	299°03.9	N11°23.8	214°56.6	N22°01.3	317°39.9	N02°24.7	Mars		10:06
7	343°56.4	250°58.8	04.7	314°04.6	24.5	229°58.6	01.3	332°42.1	24.8	Jupiter		15:45
8	358°58.9	265°58.0	04.7	329°05.3	25.2	245°00.6	01.2	347°44.3	24.9	Saturn	348°58.1	08:56
9	14°01.4	280°57.1	• • 04.7	$344^{\circ}06.0$	• • 25.8	260°02.6	•• 01.1	2°46.6	• • 24.9	May 20 M/- 1	CH A	Me:: ====
10	29°03.8	295°56.3	04.8	359°06.6	26.5	275°04.6	01.0	17°48.8	25.0	May 20 Wed	SHA	Mer.pass
11	44°06.3	310°55.5	04.8	14°07.3	27.2	290°06.6	01.0	32°51.1	25.1	Venus		14:15
12	59°08.8	325°54.6	N25°04.8	29°08.0	N11°27.8	305°08.6	N22°00.9	47°53.3	N02°25.2	Mars		10:05
13	74°11.2	340°53.8	04.8	44°08.7	28.5	320°10.6	00.8	62°55.5	25.3	Jupiter		15:42
14	89°13.7	355°53.0	04.8	59°09.3	29.2	335°12.6	00.8	77°57.8	25.4	Saturn	348°52.7	08:52
										NA. 01 T	CIII	N4-
15 16	104°16.2	10°52.2	•• 04.8	74°10.0	• • 29.8	350°14.6	•• 00.7	93°00.0	• • 25.5	May 21 Thu	SHA	Mer.pass
16	119°18.6	25°51.3	04.8	89°10.7	30.5	5°16.6	00.6	108°02.3	25.5	Venus		14:16
17	134°21.1	40°50.5	04.8	104°11.4	31.2	20°18.6	00.6	123°04.5	25.6	Mars		10:04
18	149°23.5	55° 49.7	N25°04.8	119°12.0	N11°31.8	35°20.6	N22°00.5		N02°25.7	Jupiter		15:39
19	164°26.0	70°48.8	04.8	134°12.7	32.5	50°22.6	00.4	153°09.0	25.8	Saturn	348°47.2	08:49
20	179°28.5	85°48.0	04.8	149°13.4	33.2	65°24.6	00.4	$168^{\circ}11.2$	25.9			
21	194°30.9	100°47.2	• • 04.8	$164^{\circ}14.1$	• • 33.8	80°26.6	• • 00.3	$183^{\circ}13.5$	• • 26.0	Horizont	al parallax	
22	209°33.4	115°46.4	04.8	$179^{\circ}14.7$	34.5	95°28.6	00.2	$198^{\circ}15.7$	26.1		Venus:	0.1
23	224°35.9	130°45.5	04.8	194°15.4	35.2	110°30.6	00.1	213°18.0	26.1		Mars:	0.1
										·		
Mer.p	ass. 08:04	$\nu$ -0.8′ d0	.0′ m-3.93	νυ.τ' d0	.7′ m1.26	$\nu$ 2.0′ d-0	.1′ m-1.92	$\nu^{2.2'} d0$	.1′ m0.90			

h	Sur	า			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°53.3	N19°43.5	$147^{\circ}56.0$	1.0'	N28°00.9	-1.1'	60.8'
1	195°53.3	44.0	162° 16.0	1.0'	27°59.8	-1.3'	60.8'
2	210°53.2	44.6	176°36.0	1.1' 1.1'	27°58.5 27°57.0	-1.5'	60.8'
3 4	225°53.2 240°53.2	• • 45.1 45.6	190°56.1 205°16.2	1.1	27°55.2	-1.8' -2.0'	60.8' 60.8'
5	255° 53.1	46.2	219° 36.3	1.2'	27°53.2	-2.0' -2.2'	60.7
6	270°53.1	N19°46.7	233° 56.6	1.3'	N27°51.0	-2.4	60.7'
7	$285^{\circ}53.1$	47.2	$248^{\circ}16.9$	1.4'	27°48.6	-2.6'	60.7'
8	300°53.0	47.8	262°37.2	1.4'	27°46.0	-2.8'	60.7'
9 10	315°53.0 330°53.0	· · 48.3 48.8	276°57.6 291°18.1	1.5' 1.6'	27°43.2 27°40.2	-3.0' -3.2'	60.7' 60.6'
11	345°52.9	40.0 49.4	305°38.7	1.6'	27° 40.2 27° 36.9	-3.4'	60.6
12	0°52.9	N19°49.9	319°59.3	1.7'	N27°33.5	-3.7'	60.6'
13	15°52.9	50.4	$334^{\circ}20.1$	1.8'	27°29.8	-3.9'	60.6'
14	30°52.8	51.0	348° 40.9	1.9'	27°26.0	-4.1'	60.5'
15	45° 52.8	51.5	3°01.8	2.0'	27°21.9	-4.3'	60.5'
16 17	60° 52.8 75° 52.7	52.0 52.6	17°22.7 31°43.8	2.1' 2.2'	27°17.6 27°13.2	-4.5' -4.7'	60.5' 60.5'
18	90°52.7	N19°53.1	46° 05.0	2.3'	N27°08.5	-4.9	60.4
19	105°52.7	53.6	60°26.2	2.4'	27°03.6	-5.1'	60.4
20	120°52.6	54.1	74°47.6	2.5'	$26^{\circ}58.6$	-5.2'	60.4'
21	135°52.6	• • 54.7	89°09.0	2.6'	26°53.3	-5.4'	60.4
22	150°52.6 165°52.5	55.2 55.7	103°30.6 117°52.3	2.7' 2.8'	26° 47.9 26° 42.3	-5.6'	60.3' 60.3'
23			111 52.3			-5.8'	00.3
	SD = 15.8'	d = 0.5'		S	D = 16.6'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°52.5	N19°56.2	132°14.0	2.9'	N26°36.5	-6.0'	60.3'
1 2	195°52.5 210°52.4	56.8 57.3	146°35.9 160°57.9	3.0' 3.1'	26°30.5 26°24.3	-6.2' -6.4'	60.3' 60.2'
3	210 52.4 225°52.4	57.8	175° 20.0	3.2'	26° 17.9	-0.4 -6.6'	60.2'
4	240°52.4	58.3	189°42.3	3.3'	26°11.3	-6.7	60.2
5	255°52.3	58.9	204°04.6	3.5'	26°04.6	-6.9'	60.1'
6	270°52.3	N19°59.4	218°27.1	3.6'	N25°57.7	-7.1'	60.1'
7	285°52.2	19°59.9	232°49.6 247°12.3	3.7'	25°50.6 25°43.3	-7.3'	60.1'
8 9	300°52.2 315°52.2	20°00.4 •• 00.9	247°12.3 261°35.2	3.8' 4.0'	25° 43.3 25° 35.9	-7.4' -7.6'	60.1' 60.0'
10	330°52.1	01.5	275° 58.1	4.1'	25°28.3	-7.8'	60.0'
11	345°52.1	02.0	290°21.2	4.2'	25°20.5	-7.9'	60.0'
12	0°52.1	N20°02.5	304°44.4	4.3'	N25°12.6	-8.1'	59.9'
13	15°52.0	03.0	319°07.7	4.5'	25°04.5	-8.3'	59.9'
14 15	30°52.0 45°51.9	03.5	333°31.2 347°54.8	4.6' 4.7'	24°56.2 24°47.8	-8.4' -8.6'	59.9' 59.8'
16	60°51.9	04.6	2° 18.5	4.9'	24° 39.2	-8.7'	59.8'
17	75°51.9	05.1	16°42.4	5.0'	24°30.5	-8.9'	59.8'
18	90°51.8	N20°05.6	31°06.4	5.1'	N24°21.6	-9.0'	59.8'
19	105°51.8	06.1	45°30.5	5.3'	24°12.6	-9.2'	59.7'
20 21	120°51.7 135°51.7	06.6 •• 07.1	59°54.8 74°19.2	5.4' 5.5'	24°03.4 23°54.0	-9.3' -9.5'	59.7' 59.7'
22	150°51.7	07.1	88° 43.7	5.7'	23°44.5	-9.5'	59.6'
23	165°51.6	08.1	103°08.4	5.8'	23°34.9	-9.8'	59.6'
	SD = 15.8'	d = 0.5'		S	D = 16.4'		
Thu 0	<b>GHA</b> 180°51.6	<b>Dec</b> N20°08.7	<b>GHA</b> 117°33.2	u 5.9'	Dec N23°25.2	d -9.9'	<b>HP</b> 59.6'
1	195° 51.5	09.2	117 55.2 131°58.2	5.9 6.1'	23° 15.3	-9.9 -10.0'	59.0 59.5'
2	210°51.5	09.7	$146^{\circ}23.3$	6.2'	23°05.2	-10.2	59.5'
3	225°51.5	• • 10.2	160°48.5	6.4'	22°55.0	-10.3'	59.5'
4	240°51.4	10.7	175°13.8	6.5'	22°44.7	-10.4'	59.4' 59.4'
5 6	255°51.4 270°51.3	11.2 N20°11.7	189°39.4 204°05.0	6.6' 6.8'	22°34.3 N22°23.7	-10.6' -10.7'	59.4' 59.4'
7	285°51.3	12.2	218° 30.8	6.9'	22°13.1	-10.7	59.4
8	300°51.2	12.7	232°56.7	7.1'	22°02.2	-10.9'	59.3'
9	315°51.2	• • 13.2	247°22.7	7.2'	21°51.3	-11.1'	59.3'
10	330°51.2	13.7	261°48.9	7.3'	21°40.3	-11.2'	59.2'
11 12	345°51.1 0°51.1	14.2 N20°14.7	276°15.3 290°41.7	7.5' 7.6'	21°29.1 N21°17.8	-11.3' -11.4'	59.2' 59.1'
13	15° 51.0	15.2	305°08.3	7.7'	21°06.4	-11.5'	59.1'
14	30°51.0	15.7	319°35.1	7.9'	20°54.9	-11.6'	59.1'
15	45°50.9	• • 16.2	334°02.0	8.0'	20°43.3	-11.7'	59.0'
16	60°50.9	16.7	348°29.0	8.1'	20°31.5	-11.8'	59.0'
17 18	75°50.9 90°50.8	17.2 N20°17.7	2°56.1 17°23.4	8.3' 8.4'	20°19.7 N20°07.8	-11.9' -12.0'	59.0' 58.9'
18	90 50.8 105°50.8	N20 17.7 18.2	31°50.8	8.5'	19°55.7	-12.0 -12.1'	58.9'
20	120° 50.7	18.7	46° 18.4	8.7'	19° 43.6	-12.2	58.9'
21	135°50.7	• • 19.2	60°46.0	8.8'	19°31.4	-12.3'	58.8'
22	150° 50.6	19.7	75° 13.8	8.9'	19°19.0	-12.4'	58.8'
23	165°50.6	20.2	89°41.8	9.1'	19°06.6	-12.5'	58.8'
	SD = 15.8'	d = 0.5'		S	D = 16.2'		

1 -4	Twi	light	C	C	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°						
<b>N</b> 70°						
68°	////	////	01:17	22:43	////	////
$66^{\circ}$	////	////	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	////
<b>N</b> 58°	00:12	02:27	03:26	20:28	21:28	////
56°	01:21	02:47	03:39	20:16	21:08	22:36
54°	01:52	03:02	03:49	20:05	20:52	22:04
52°	02:15	03:16	03:59	19:55	20:39	21:40
50°	02:33	03:27	04:08	19:46	20:27	21:22
45°	03:06	03:51	04:26	19:28	20:03	20:48
N 40°	03:31	04:10	04:41	19:13	19:44	20:23
35°	03:50	04:25	04:53	19:00	19:29	20:04
30°	04:06	04:37	05:04	18:50	19:16	19:48
20°	04:30	04:58	05:22	18:31	18:55	19:23
N 10°	04:49	05:16	05:38	18:15	18:37	19:04
0°	05:05	05:31	05:53	18:00	18:22	18:48
<b>S</b> 10°	05:20	05:45	06:08	17:45	18:08	18:33
$20^{\circ}$	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
$35^{\circ}$	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	ie .		Moonset	:
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
<b>N</b> 70°						
68°						

Lat.		Moonris	e		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	
N 40°	06:42	07:57	09:13	22:47	23:33	
35°	07:01	08:14	09:27	22:29	23:18	23:58
30°	07:18	08:29	09:40	22:13	23:05	23:48
20°	07:46	08:54	10:00	21:47	22:43	23:30
N 10°	08:09	09:16	10:18	21:24	22:23	23:15
0°	08:32	09:36	10:35	21:03	22:05	23:01
<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	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	239°38.3	145°44.7	N25°04.8	$209^{\circ}16.1$	$N11^{\circ}35.8$	125°32.6	N22°00.1	228°20.2	N02°26.2	Alpheratz	357°33.8	29°14.0
1	254°40.8	160°43.9	04.8	224°16.8	36.5	140°34.6	22°00.0	243°22.4	26.3	Ankaa	353°06.3	-42°09.6
2	269°43.3	175°43.1	04.8	239°17.4	37.1	155°36.6	21°59.9	258°24.7	26.4	Schedar	349°30.1	56°40.7
3	284°45.7	190°42.2	• • 04.7	254°18.1	• • 37.8	170°38.6	• • 59.9	273°26.9	• • 26.5	Diphda	348°46.4	-17°50.4
4	299°48.2	205°41.4	04.7	269°18.8	38.5	185°40.6	59.8	288°29.2	26.6	Achernar	335°19.8	-17 30.4 -57°06.0
5	314°50.6	220°40.6	04.7	284°19.5	39.1	200°42.5	59.7	303°31.4	26.7	Hamal	327°50.2	23°35.1
6	329°53.1	235°39.8	N25°04.7	299°20.1	$N11^{\circ}39.8$	215°44.5	N21°59.7	318°33.6	N02°26.7	Polaris	313°56.1	89°22.4
7	344°55.6	250°38.9	04.7	314°20.8	40.5	230°46.5	59.6	333°35.9	26.8	Acamar	315°11.3	-40°11.9
8	359°58.0	265°38.1	04.7	329°21.5	41.1	245°48.5	59.5	348°38.1	26.9	Menkar	314°05.3	4°11.6
9	15°00.5	280°37.3	• • 04.7	344°22.2	• • 41.8	260°50.5	• • 59.4	3°40.4	• • 27.0	Mirfak	308°27.1	49°57.2
10	30°03.0	295°36.5	04.6	359°22.8	42.5	275°52.5	59.4	18°42.6	27.1	Aldebaran	290°38.7	16°33.7
11	45°05.4	310°35.6	04.6	14°23.5	43.1	290°54.5	59.3	33°44.9	27.2	I	290 36.7 281°03.1	-8°10.3
12	60°07.9	325°34.8	N25°04.6	29°24.2	N11°43.8	305°56.5	N21°59.2	48°47.1	N02°27.3	Rigel		-6 10.3 46°01.5
13	75° 10.4	340°34.0	04.6	44°24.8	44.4	320°58.5	59.2	63°49.3	27.3	Capella Bellatrix	280° 20.7 278° 22.0	6°22.4
14	90°12.8	355°33.2	04.5	59°25.5	45.1	336°00.5	59.1	78°51.6	27.4	Elnath	278°22.0	28°37.8
15	105° 15.3	10°32.3	• • 04.5	74°26.2	• • 45.8	351°02.5	• • 59.0	93°53.8	• • 27.5	Alnilam	275°36.9	-1°11.2
16	120°17.8	25°31.5	04.5	89°26.9	46.4	6°04.5	59.0	108°56.1	27.6	Betelgeuse	270°51.2	7°24.7
17	135°20.2	40°30.7	04.5	104°27.5	47.1	21°06.5	58.9	123°58.3	27.7	_	263°52.4	-52°42.7
18	150°22.7	55°29.9	N25°04.4	119°28.2	N11°47.7	36°08.5	N21°58.8	139°00.6	N02°27.8	Canopus		-32 42.7 -16°45.2
19	165°25.1	70°29.0	04.4	134°28.9	48.4	51°10.5	58.7	154°02.8	27.9	Sirius	258°25.5	-10 45.2 -29°00.6
20	180°27.6	85°28.2	04.4	149°29.6	49.1	66°12.5	58.7	169°05.0	27.9	Adhara	255°05.3	
21	195°30.1	100°27.4	• • 04.3	164°30.2	• • 49.7	81°14.5	• • 58.6	184°07.3	• • 28.0	Procyon	244°49.9	5°09.4
22	210°32.5	115°26.6	04.3	179°30.9	50.4	96°16.5	58.5	199°09.5	28.1	Pollux	243°16.2	27°57.8
23	225°35.0	130°25.7	04.3	194°31.6	51.0	111°18.4	58.5	214°11.8	28.2	Avior	234°14.6	-59°35.9
										Suhail	222°45.6	-43°32.6
ivler.p	ass. 08:00	$\nu$ -0.8′ $d$ -0	0.0′ m-3.93	$\nu$ 0. $l'$ $d$ 0	.7′ m1.26	$\nu$ 2.0′ d-0	.1′ m-1.92	$\nu^{2.2'} d0$	.1′ m0.90	Miaplacidus	221°38.3	-69°49.8
										Alphard	217°46.7	-8°46.5
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
0	240°37.5	145°24.9	N25°04.2	209°32.2	N11°51.7	126°20.4	N21°58.4	229°14.0	N02°28.3	Dubhe	193°39.5	61°36.7
1	255°39.9	160°24.1	04.2	224°32.9	52.4	141°22.4	58.3	244°16.3	28.4	Denebola	182°23.7	14°25.4
2	270°42.4	175°23.3	04.2	239°33.6	53.0	156°24.4	58.3	259°18.5	28.4	Gienah	175°42.3	-17°41.5
3	285°44.9	190°22.4	04.1	254°34.3	53.7	171°26.4	• • 58.2	274°20.8	28.5	Acrux	172°58.4	-63°15.0
4	300°47.3	205°21.6	04.1	269°34.9	54.3	186°28.4	58.1	289°23.0	28.6		171°50.0	-57°16.0
5	315°49.8	220°20.8	04.0	284°35.6	55.0	201°30.4	58.0	304°25.2	28.7	Alioth	166°11.6	55°49.1
6	330°52.3	235°20.0	N25°04.0	299°36.3	N11°55.7	216°32.4	N21°58.0	319°27.5	N02°28.8	Spica	158° 20.9	-11°18.1
7	345°54.7	250°19.2	03.9	314°37.0	56.3	231°34.4	57.9	334°29.7	28.9	Alkaid	152°50.7	49°10.9
8	0°57.2	265°18.3	03.9	329°37.6	57.0	246°36.4	57.8	349°32.0	29.0	Hadar	148°33.8	-60°30.2
9	15°59.6	280°17.5	• • 03.8	344°38.3	• • 57.6	261°38.4	• • 57.8	4°34.2	29.0	Menkent	147°55.9	-36°30.2
10	31°02.1	295°16.7	03.8	359°39.0	58.3	276°40.4	57.7	19°36.5	29.1	Arcturus	145°46.6	19°02.6
11	46°04.6	310°15.9	03.7	14°39.6	58.9	291°42.4	57.6	34°38.7	29.2	Rigil Kent.	139°38.1	-60°56.8
12	61°07.0	325°15.0	N25°03.7	29°40.3	N11°59.6	306°44.3	N21°57.5	49°41.0	N02°29.3	Kochab	137° 18.7	74°02.8
13	76°09.5	340°14.2	03.6	44°41.0	12°00.3	321°46.3	57.5	64°43.2	29.4	Zuben'ubi	136°54.4	-16°09.2
14	91°12.0	355°13.4	03.6	59°41.7	00.9	336°48.3	57.4	79°45.5	29.5	Alphecca	126°02.4	26°37.5
15	106° 14.4	10°12.6	• • 03.5	74°42.3	01.6	351°50.3	• • 57.3	94°47.7	29.5	Antares	112° 14.1	-26°29.5
16	121° 16.9	25°11.8	03.5	89°43.0	02.2	6°52.3	57.3	109°49.9	29.6	Atria	107°06.7	-69°04.4
17	136° 19.4	40°10.9	03.4	104°43.7	02.2	21°54.3	57.2	124°52.2	29.7	Sabik	102°01.2	-15°45.5
18	151°21.8	55°10.1	N25°03.4	119°44.3	N12°03.5	36°56.3	N21°57.1	139°54.4	N02°29.8	Shaula	96°08.4	-37°07.3
19	166°24.3	70°09.3	03.3	134°45.0	04.2	51°58.3	57.0	154°56.7	29.9	Rasalhague	95°57.2	12°32.3
20	181° 26.7	85°08.5	03.2	149°45.7	04.8	67°00.3	57.0	169°58.9	30.0	Eltanin	90°41.2	51°28.9
21	196° 29.2	100°07.7	•• 03.2	164°46.4	• • 05.5	82°02.3	• • 56.9	185°01.2	• • 30.0	Kaus Aust.	83°30.7	-34°22.2
22	211°31.7	115°06.8	03.2	179°47.0	06.2	97°04.2	56.8	200°03.4	30.0	Vega	80°32.1	38°48.3
23	226°34.1	130°06.0	03.1	194°47.7	06.8	112°06.2	56.8	215°05.7	30.1	Nunki	75°46.1	-26°15.8
23	220 34.1	130 00.0				112 00.2				Altair	61°58.7	8°56.2
Mer.p	ass. 07:56	$\nu$ -0.8' d-0	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 $^{\prime}$ d0	.1' m $0.90$	Peacock	53°03.7	-56°38.7
										Deneb	49° 24.9	45°22.2
c	CHA	CHA	Dee	CHA	Dee	CHA	Doo	CHA	Doo	Enif	33° 37.7	9°59.7
Sun 0	<b>GHA</b> 241°36.6	<b>GHA</b> 145°05.2	<b>Dec</b> N25°03.0	<b>GHA</b> 209°48.4	<b>Dec</b> N12°07.5	<b>GHA</b> 127°08.2	<b>Dec</b> N21°56.7	<b>GHA</b> 230°07.9	<b>Dec</b> N02°30.3	Al Na'ir	27°31.5	-46°49.7
1	241 36.6 256°39.1	145 05.2 160°04.4	02.9	209 48.4 224°49.0	08.1	127 08.2 142°10.2	N21 56.7 56.6	245°10.2	30.4	Fomalhaut	15°13.4	-29°28.8
2	250 39.1 271°41.5	160 04.4 175°03.6	02.9	224 49.0 239°49.7	08.1	142 10.2 157°12.2		245 10.2 260°12.4		Scheat	13°44.2	28°13.4
3	271°41.5 286°44.0	175°03.6 190°02.8		239°49.7 254°50.4	09.4		56.5 •• 56.5	260°12.4 275°14.6	30.5	Markab	13°28.9	15°20.7
	301°46.5		· · 02.8			172°14.2		275 14.6 290°16.9	· · 30.5	May 22 Fri	SHA	Mer.pass
4		205°01.9	02.7	269°51.1 284°51.7	10.1	187°16.2	56.4		30.6	Venus	266°06.4	14:18
5	316°48.9	220°01.1 235°00.3	02.6		10.7	202°18.2	56.3	305°19.1	30.7	Mars	329°37.8	10:02
6 7		7.33 UU 3	N25°02.6	299°52.4	N12°11.4	217°20.2	N21°56.3	320°21.4	N02°30.8	Jupiter	329 37.8 245°54.2	15:36
1	331°51.4			314°53.1	12.0	232°22.1	56.2	335°23.6	30.9	Saturn	348°41.9	
	346°53.9	249°59.5	02.5		10.7	2/702/1						08:45
8	346°53.9 1°56.3	249°59.5 264°58.7	02.4	$329^{\circ}53.7$	12.7	247°24.1	56.1	350°25.9	31.0	Saturn	310 11.3	
8 9	346°53.9 1°56.3 16°58.8	249°59.5 264°58.7 279°57.8	02.4 •• 02.3	329°53.7 344°54.4	•• 13.3	$262^{\circ}26.1$	• • 56.0	5°28.1	• • 31.0	May 23 Sat	SHA	Mer.pass
8 9 10	346°53.9 1°56.3 16°58.8 32°01.2	249°59.5 264°58.7 279°57.8 294°57.0	02.4 · · 02.3 02.2	329°53.7 344°54.4 359°55.1	· · 13.3 14.0	262°26.1 277°28.1	· · 56.0 56.0	5°28.1 20°30.4	· · 31.0 31.1			Mer.pass 14:19
8 9 10 11	346° 53.9 1° 56.3 16° 58.8 32° 01.2 47° 03.7	249°59.5 264°58.7 279°57.8 294°57.0 309°56.2	02.4 •• 02.3 02.2 02.2	329°53.7 344°54.4 359°55.1 14°55.8	· · 13.3 14.0 14.6	262°26.1 277°28.1 292°30.1	56.0 56.0 55.9	5°28.1 20°30.4 35°32.6	· · 31.0 31.1 31.2	May 23 Sat	SHA	
8 9 10 11 12	346° 53.9 1° 56.3 16° 58.8 32° 01.2 47° 03.7 62° 06.2	249° 59.5 264° 58.7 279° 57.8 294° 57.0 309° 56.2 324° 55.4	02.4 · · 02.3 02.2 02.2 N25°02.1	329°53.7 344°54.4 359°55.1 14°55.8 29°56.4	· · 13.3 14.0 14.6 N12°15.3	262°26.1 277°28.1 292°30.1 307°32.1	•• 56.0 56.0 55.9 N21°55.8	5°28.1 20°30.4 35°32.6 50°34.9	·· 31.0 31.1 31.2 N02°31.3	May 23 Sat Venus	<b>SHA</b> 264° 47.4 328° 54.8 245° 43.0	14:19
8 9 10 11 12 13	346° 53.9 1° 56.3 16° 58.8 32° 01.2 47° 03.7 62° 06.2 77° 08.6	249° 59.5 264° 58.7 279° 57.8 294° 57.0 309° 56.2 324° 55.4 339° 54.6	02.4 · · 02.3 02.2 02.2 N25°02.1 02.0	329°53.7 344°54.4 359°55.1 14°55.8 29°56.4 44°57.1	· · 13.3 14.0 14.6 N12°15.3 15.9	262°26.1 277°28.1 292°30.1 307°32.1 322°34.1	56.0 56.0 55.9 N21°55.8 55.7	5°28.1 20°30.4 35°32.6 50°34.9 65°37.1	· · 31.0 31.1 31.2 N02°31.3 31.4	May 23 Sat Venus Mars	<b>SHA</b> 264° 47.4 328° 54.8	14:19 10:01
8 9 10 11 12 13 14	346° 53.9 1° 56.3 16° 58.8 32° 01.2 47° 03.7 62° 06.2 77° 08.6 92° 11.1	249°59.5 264°58.7 279°57.8 294°57.0 309°56.2 324°55.4 339°54.6 354°53.8	02.4 · · 02.3 02.2 02.2 N25°02.1 02.0 01.9	329°53.7 344°54.4 359°55.1 14°55.8 29°56.4 44°57.1 59°57.8	·· 13.3 14.0 14.6 N12°15.3 15.9 16.6	262°26.1 277°28.1 292°30.1 307°32.1 322°34.1 337°36.1	56.0 56.0 55.9 N21°55.8 55.7 55.7	5°28.1 20°30.4 35°32.6 50°34.9 65°37.1 80°39.4	·· 31.0 31.1 31.2 N02°31.3 31.4 31.5	May 23 Sat Venus Mars Jupiter Saturn	SHA 264° 47.4 328° 54.8 245° 43.0 348° 36.6	14:19 10:01 15:33 08:42
8 9 10 11 12 13 14 15	346° 53.9 1° 56.3 16° 58.8 32° 01.2 47° 03.7 62° 06.2 77° 08.6 92° 11.1 107° 13.6	249°59.5 264°58.7 279°57.8 294°57.0 309°56.2 324°55.4 339°54.6 354°53.8 9°52.9	02.4 · · 02.3 02.2 02.2 N25°02.1 02.0 01.9 · · 01.8	329°53.7 344°54.4 359°55.1 14°55.8 29°56.4 44°57.1 59°57.8 74°58.4	·· 13.3 14.0 14.6 N12°15.3 15.9 16.6 ·· 17.2	262°26.1 277°28.1 292°30.1 307°32.1 322°34.1 337°36.1 352°38.0	56.0 56.0 55.9 N21°55.8 55.7 55.7	5°28.1 20°30.4 35°32.6 50°34.9 65°37.1 80°39.4 95°41.6	·· 31.0 31.1 31.2 N02°31.3 31.4 31.5 ·· 31.5	May 23 Sat Venus Mars Jupiter Saturn May 24 Sun	SHA 264° 47.4 328° 54.8 245° 43.0 348° 36.6 SHA	14:19 10:01 15:33 08:42 <b>Mer.pass</b>
8 9 10 11 12 13 14 15 16	346° 53.9 1° 56.3 16° 58.8 32° 01.2 47° 03.7 62° 06.2 77° 08.6 92° 11.1 107° 13.6 122° 16.0	249°59.5 264°58.7 279°57.8 294°57.0 309°56.2 324°55.4 339°54.6 354°53.8 9°52.9 24°52.1	02.4 · 02.3 02.2 02.2 N25°02.1 02.0 01.9 · 01.8 01.7	329°53.7 344°54.4 359°55.1 14°55.8 29°56.4 44°57.1 59°57.8 74°58.4 89°59.1	·· 13.3 14.0 14.6 N12°15.3 15.9 16.6 ·· 17.2 17.9	262°26.1 277°28.1 292°30.1 307°32.1 322°34.1 337°36.1 352°38.0 7°40.0	56.0 56.0 55.9 N21°55.8 55.7 55.7 55.6 55.5	5°28.1 20°30.4 35°32.6 50°34.9 65°37.1 80°39.4 95°41.6 110°43.9	N02°31.3 31.4 31.5 31.5 31.6	May 23 Sat Venus Mars Jupiter Saturn  May 24 Sun Venus	SHA 264° 47.4 328° 54.8 245° 43.0 348° 36.6 SHA 263° 28.6	14:19 10:01 15:33 08:42 <b>Mer.pass</b> 14:20
8 9 10 11 12 13 14 15 16 17	346° 53.9 1° 56.3 16° 58.8 32° 01.2 47° 03.7 62° 06.2 77° 08.6 92° 11.1 107° 13.6 122° 16.0 137° 18.5	249°59.5 264°58.7 279°57.8 294°57.0 309°56.2 324°55.4 339°54.6 354°53.8 9°52.9 24°52.1 39°51.3	02.4 · 02.3 02.2 02.2 N25°02.1 02.0 01.9 · 01.8 01.7 01.7	329°53.7 344°54.4 359°55.1 14°55.8 29°56.4 44°57.1 59°57.8 74°58.4 89°59.1 104°59.8	·· 13.3 14.0 14.6 N12°15.3 15.9 16.6 ·· 17.2 17.9 18.5	262°26.1 277°28.1 292°30.1 307°32.1 322°34.1 337°36.1 352°38.0 7°40.0 22°42.0	56.0 56.0 55.9 N21°55.8 55.7 55.7 55.6 55.5 55.5	5°28.1 20°30.4 35°32.6 50°34.9 65°37.1 80°39.4 95°41.6 110°43.9 125°46.1	N02°31.3 31.4 31.5 · · 31.5 31.6 31.7	May 23 Sat Venus Mars Jupiter Saturn  May 24 Sun Venus Mars	SHA 264° 47.4 328° 54.8 245° 43.0 348° 36.6 SHA 263° 28.6 328° 11.8	14:19 10:01 15:33 08:42 <b>Mer.pass</b> 14:20 10:00
8 9 10 11 12 13 14 15 16 17	346° 53.9 1° 56.3 16° 58.8 32° 01.2 47° 03.7 62° 06.2 77° 08.6 92° 11.1 107° 13.6 122° 16.0 137° 18.5 152° 21.0	249°59.5 264°58.7 279°57.8 294°57.0 309°56.2 324°55.4 339°54.6 354°53.8 9°52.9 24°52.1 39°51.3 54°50.5	02.4 · 02.3 02.2 02.2 N25°02.1 02.0 01.9 · 01.8 01.7 01.7 N25°01.6	329°53.7 344°54.4 359°55.1 14°55.8 29°56.4 44°57.1 59°57.8 74°58.4 89°59.1 104°59.8 120°00.5	· · 13.3 14.0 14.6 N12°15.3 15.9 16.6 · · 17.2 17.9 18.5 N12°19.2	262°26.1 277°28.1 292°30.1 307°32.1 322°34.1 352°38.0 7°40.0 22°42.0 37°44.0	56.0 56.0 55.9 N21°55.8 55.7 55.6 55.5 55.5 N21°55.4	5°28.1 20°30.4 35°32.6 50°34.9 65°37.1 80°39.4 95°41.6 110°43.9 125°46.1 140°48.4	N02°31.3 31.4 31.2 N02°31.3 31.4 31.5 · · 31.5 31.6 31.7 N02°31.8	May 23 Sat Venus Mars Jupiter Saturn  May 24 Sun Venus Mars Jupiter	SHA 264° 47.4 328° 54.8 245° 43.0 348° 36.6 SHA 263° 28.6 328° 11.8 245° 31.6	14:19 10:01 15:33 08:42 <b>Mer.pass</b> 14:20 10:00 15:29
8 9 10 11 12 13 14 15 16 17 18 19	346° 53.9 1° 56.3 16° 58.8 32° 01.2 47° 03.7 62° 06.2 77° 08.6 92° 11.1 107° 13.6 122° 16.0 137° 18.5 152° 21.0 167° 23.4	249°59.5 264°58.7 279°57.8 294°57.0 309°56.2 324°55.4 339°54.6 354°53.8 9°52.9 24°52.1 39°51.3 54°50.5 69°49.7	02.4 · 02.3 02.2 02.2 N25° 02.1 02.0 01.9 · 01.8 01.7 01.7 N25° 01.6 01.5	329°53.7 344°54.4 359°55.1 14°55.8 29°56.4 44°57.1 59°57.8 74°58.4 89°59.1 104°59.8 120°00.5 135°01.1	· · 13.3 14.0 14.6 N12°15.3 15.9 16.6 · · 17.2 17.9 18.5 N12°19.2	262°26.1 277°28.1 292°30.1 307°32.1 322°34.1 352°38.0 7°40.0 22°42.0 37°44.0 52°46.0	56.0 56.0 55.9 N21°55.8 55.7 55.6 55.5 55.5 N21°55.4 55.3	5°28.1 20°30.4 35°32.6 50°34.9 65°37.1 80°39.4 95°41.6 110°43.9 125°46.1 140°48.4 155°50.6	··· 31.0 31.1 31.2 N02° 31.3 31.4 31.5 ··· 31.5 31.6 31.7 N02° 31.8 31.9	May 23 Sat Venus Mars Jupiter Saturn  May 24 Sun Venus Mars	SHA 264° 47.4 328° 54.8 245° 43.0 348° 36.6 SHA 263° 28.6 328° 11.8	14:19 10:01 15:33 08:42 <b>Mer.pass</b> 14:20 10:00
8 9 10 11 12 13 14 15 16 17 18 19 20	346° 53.9 1° 56.3 16° 58.8 32° 01.2 47° 03.7 62° 06.2 77° 08.6 92° 11.1 107° 13.6 122° 16.0 137° 18.5 152° 21.0 167° 23.4 182° 25.9	249°59.5 264°58.7 279°57.8 294°57.0 309°56.2 324°55.4 339°54.6 354°53.8 9°52.9 24°52.1 39°51.3 54°50.5 69°49.7 84°48.9	02.4 · 02.3 02.2 02.2 N25° 02.1 02.0 01.9 · 01.8 01.7 01.7 N25° 01.6 01.5 01.4	329°53.7 344°54.4 359°55.1 14°55.8 29°56.4 44°57.1 59°57.8 74°58.4 89°59.1 104°59.8 120°00.5 135°01.1 150°01.8	13.3 14.0 14.6 N12°15.3 15.9 16.6 17.2 17.9 18.5 N12°19.2 19.8 20.5	262°26.1 277°28.1 292°30.1 307°32.1 322°34.1 337°36.1 352°38.0 7°40.0 22°42.0 37°44.0 52°46.0 67°48.0	56.0 56.0 55.9 N21°55.8 55.7 55.6 55.5 55.5 N21°55.4 55.3 55.2	5°28.1 20°30.4 35°32.6 50°34.9 65°37.1 80°39.4 95°41.6 110°43.9 125°46.1 140°48.4 155°50.6 170°52.9	··· 31.0 31.1 31.2 N02°31.3 31.4 31.5 ··· 31.5 31.6 31.7 N02°31.8 31.9 32.0	May 23 Sat Venus Mars Jupiter Saturn  May 24 Sun Venus Mars Jupiter Saturn	SHA 264° 47.4 328° 54.8 245° 43.0 348° 36.6 SHA 263° 28.6 328° 11.8 245° 31.6 348° 31.3	14:19 10:01 15:33 08:42 <b>Mer.pass</b> 14:20 10:00 15:29
8 9 10 11 12 13 14 15 16 17 18 19 20 21	346° 53.9 1° 56.3 16° 58.8 32° 01.2 47° 03.7 62° 06.2 77° 08.6 92° 11.1 107° 13.6 122° 16.0 137° 18.5 152° 21.0 167° 23.4 182° 25.9 197° 28.4	249°59.5 264°58.7 279°57.8 294°57.0 309°56.2 324°55.4 339°54.6 354°53.8 9°52.9 24°52.1 39°51.3 54°50.5 69°49.7 84°48.9 99°48.1	02.4 · 02.3 02.2 02.2 N25°02.1 02.0 01.9 · 01.8 01.7 01.7 N25°01.6 01.5 01.4 · 01.3	329°53.7 344°54.4 359°55.1 14°55.8 29°56.4 44°57.1 59°57.8 74°58.4 89°59.1 104°59.8 120°00.5 135°01.1 150°01.8 165°02.5	13.3 14.0 14.6 N12°15.3 15.9 16.6 17.2 17.9 18.5 N12°19.2 19.8 20.5	262°26.1 277°28.1 292°30.1 307°32.1 322°34.1 352°38.0 7°40.0 22°42.0 37°44.0 52°46.0 67°48.0 82°50.0	56.0 56.0 55.9 N21°55.8 55.7 55.7 55.6 55.5 55.5 N21°55.4 55.3 55.2 55.2	5°28.1 20°30.4 35°32.6 50°34.9 65°37.1 80°39.4 95°41.6 110°43.9 125°46.1 140°48.4 155°50.6 170°52.9 185°55.1	*** 31.0 31.1 31.2 **N02° 31.3 31.4 31.5 *** 31.5 31.6 31.7 ***N02° 31.8 31.9 32.0 *** 32.0	May 23 Sat Venus Mars Jupiter Saturn  May 24 Sun Venus Mars Jupiter Saturn	SHA 264° 47.4 328° 54.8 245° 43.0 348° 36.6  SHA 263° 28.6 328° 11.8 245° 31.6 348° 31.3 al parallax	14:19 10:01 15:33 08:42 Mer.pass 14:20 10:00 15:29 08:38
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	346° 53.9 1° 56.3 16° 58.8 32° 01.2 47° 03.7 62° 06.2 77° 08.6 92° 11.1 107° 13.6 122° 16.0 137° 18.5 152° 21.0 167° 23.4 182° 25.9 197° 28.4 212° 30.8	249°59.5 264°58.7 279°57.8 294°57.0 309°56.2 324°55.4 339°54.6 354°53.8 9°52.9 24°52.1 39°51.3 54°50.5 69°49.7 84°48.9 99°48.1 114°47.2	02.4	329°53.7 344°54.4 359°55.1 14°55.8 29°56.4 44°57.1 59°57.8 74°58.4 89°59.1 104°59.8 120°00.5 135°01.1 150°01.8 165°02.5 180°03.1	13.3 14.0 14.6 N12°15.3 15.9 16.6 17.2 17.9 18.5 N12°19.2 19.8 20.5 21.1 21.8	262°26.1 277°28.1 292°30.1 307°32.1 322°34.1 337°36.1 352°38.0 7°40.0 22°42.0 37°44.0 52°46.0 67°48.0 82°50.0 97°52.0	56.0 56.0 55.9 N21°55.8 55.7 55.7 55.6 55.5 55.5 N21°55.4 55.3 55.2 55.2	5°28.1 20°30.4 35°32.6 50°34.9 65°37.1 80°39.4 95°41.6 110°43.9 125°46.1 140°48.4 155°50.6 170°52.9 185°55.1 200°57.4	31.0 31.1 31.2 N02°31.3 31.4 31.5 31.6 31.7 N02°31.8 31.9 32.0 32.0	May 23 Sat Venus Mars Jupiter Saturn  May 24 Sun Venus Mars Jupiter Saturn	SHA 264° 47.4 328° 54.8 245° 43.0 348° 36.6  SHA 263° 28.6 328° 11.8 245° 31.6 348° 31.3 al parallax Venus:	14:19 10:01 15:33 08:42 Mer.pass 14:20 10:00 15:29 08:38
8 9 10 11 12 13 14 15 16 17 18 19 20 21	346° 53.9 1° 56.3 16° 58.8 32° 01.2 47° 03.7 62° 06.2 77° 08.6 92° 11.1 107° 13.6 122° 16.0 137° 18.5 152° 21.0 167° 23.4 182° 25.9 197° 28.4	249°59.5 264°58.7 279°57.8 294°57.0 309°56.2 324°55.4 339°54.6 354°53.8 9°52.9 24°52.1 39°51.3 54°50.5 69°49.7 84°48.9 99°48.1	02.4 · 02.3 02.2 02.2 N25°02.1 02.0 01.9 · 01.8 01.7 01.7 N25°01.6 01.5 01.4 · 01.3	329°53.7 344°54.4 359°55.1 14°55.8 29°56.4 44°57.1 59°57.8 74°58.4 89°59.1 104°59.8 120°00.5 135°01.1 150°01.8 165°02.5	13.3 14.0 14.6 N12°15.3 15.9 16.6 17.2 17.9 18.5 N12°19.2 19.8 20.5	262°26.1 277°28.1 292°30.1 307°32.1 322°34.1 352°38.0 7°40.0 22°42.0 37°44.0 52°46.0 67°48.0 82°50.0	56.0 56.0 55.9 N21°55.8 55.7 55.7 55.6 55.5 55.5 N21°55.4 55.3 55.2 55.2	5°28.1 20°30.4 35°32.6 50°34.9 65°37.1 80°39.4 95°41.6 110°43.9 125°46.1 140°48.4 155°50.6 170°52.9 185°55.1	*** 31.0 31.1 31.2 **N02° 31.3 31.4 31.5 *** 31.5 31.6 31.7 ***N02° 31.8 31.9 32.0 *** 32.0	May 23 Sat Venus Mars Jupiter Saturn  May 24 Sun Venus Mars Jupiter Saturn	SHA 264° 47.4 328° 54.8 245° 43.0 348° 36.6  SHA 263° 28.6 328° 11.8 245° 31.6 348° 31.3 al parallax	14:19 10:01 15:33 08:42 Mer.pass 14:20 10:00 15:29 08:38

h	Sui	า			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°50.5	N20°20.7	$104^{\circ}09.9$	9.2'	${\color{red}N18^{\circ}54.1}$	-12.6'	58.7'
1	195°50.5 210°50.4	21.2 21.7	118°38.1 133°06.4	9.3' 9.5'	18° 41.5 18° 28.8	-12.7' -12.8'	58.7'
2	210 50.4 225°50.4	22.2	133 00.4 147°34.9	9.5 9.6'	18 28.8 18°16.0	-12.8 -12.9'	58.6' 58.6'
4	240°50.4	22.7	162°03.4	9.7'	18°03.2	-12.9'	58.6'
5	255°50.3	23.2	176°32.1	9.8'	17°50.3	-13.0'	58.5'
6	270°50.3 285°50.2	N20°23.7 24.2	191°01.0 205°29.9	10.0' 10.1'	N17°37.2 17°24.1	-13.1' -13.2'	58.5' 58.5'
7 8	300°50.2	24.2	205 29.9 219°59.0	10.1	17°24.1	-13.2'	58.4'
9	315°50.1	• • 25.2	234°28.2	10.3'	16°57.7	-13.3'	58.4'
10	330°50.1	25.6	248°57.5	10.4'	16°44.4	-13.4'	58.4'
11 12	345°50.0 0°50.0	26.1 N20°26.6	263°27.0 277°56.5	10.6' 10.7'	16°31.0 N16°17.5	-13.5' -13.5'	58.3' 58.3'
13	15°49.9	27.1	292°26.2	10.8'	16°04.0	-13.6'	58.3'
14	30°49.9	27.6	$306^{\circ}56.0$	10.9'	$15^{\circ}50.4$	-13.7'	58.2'
15	45°49.8 60°49.8	• • 28.1	321°25.9 335°55.9	11.0'	15°36.8 15°23.0	-13.7'	58.2'
16 17	75°49.7	28.6 29.1	350°26.1	11.1' 11.2'	15 23.0 15°09.2	-13.8' -13.8'	58.1' 58.1'
18	90°49.7	N20°29.5	4°56.3	11.4'	N14°55.4	-13.9'	58.1'
19	105°49.6	30.0	19°26.7	11.5'	14°41.5	-14.0'	58.0'
20 21	120°49.6 135°49.5	30.5 · · 31.0	33°57.1 48°27.7	11.6' 11.7'	14°27.5 14°13.5	-14.0' -14.1'	58.0' 58.0'
22	150°49.5	31.5	62°58.4	11.7	14 13.5 13°59.5	-14.1'	56.0 57.9'
23	165°49.4	32.0	77°29.1	11.9'	13°45.4	-14.2'	57.9'
	SD = 15.8'	d = 0.5'	-	SI	D = 16.0'		
Sat 0	<b>GHA</b> 180°49.4	<b>Dec</b> N20°32.4	<b>GHA</b> 92°00.0	u 12.0'	<b>Dec</b> N13°31.2	d -14.2'	<b>HP</b> 57.9'
1	195°49.3	32.9	106°31.0	12.1'	13° 17.0	-14.2	57.8'
2	210°49.3	33.4	121°02.1	12.2'	13°02.7	-14.3'	57.8'
3 4	225°49.2 240°49.2	· · 33.9 34.4	135°33.2 150°04.5	12.3' 12.4'	12°48.4 12°34.1	-14.3' -14.4'	57.8' 57.7'
5	255°49.1	34.4	164°35.9	12.4	12° 19.7	-14.4' -14.4'	57.7'
6	270°49.1	N20°35.3	179°07.4	12.6'	N12°05.2	-14.5'	57.7'
7	285°49.0	35.8	193°38.9	12.7'	11°50.8	-14.5'	57.6'
8 9	300°49.0 315°48.9	36.3 · · 36.7	208°10.6 222°42.3	12.7' 12.8'	11°36.3 11°21.7	-14.5' -14.6'	57.6' 57.5'
10	330°48.8	37.2	237°14.2	12.9'	11°07.1	-14.6'	57.5'
11	345°48.8	37.7	251°46.1	13.0'	10°52.5	-14.6'	57.5'
12	0°48.7	N20°38.2	266°18.1	13.1'	N10°37.9 10°23.2	-14.7'	57.4'
13 14	15°48.7 30°48.6	38.6 39.1	280°50.2 295°22.4	13.2' 13.3'	10° 23.2 10° 08.5	-14.7' -14.7'	57.4' 57.4'
15	45°48.6	• • 39.6	309°54.6	13.3'	09°53.8	-14.8'	57.3'
16	60°48.5	40.1	324°27.0	13.4'	09°39.0	-14.8'	57.3'
17 18	75°48.5 90°48.4	40.5 N20°41.0	338°59.4 353°31.9	13.5' 13.6'	09°24.2 N09°09.4	-14.8' -14.8'	57.3' 57.2'
19	105°48.4	41.5	8°04.4	13.6'	08°54.5	-14.9'	57.2'
20	120°48.3	41.9	22°37.1	13.7'	08°39.7	-14.9'	57.2'
21	135°48.2	• • 42.4	37°09.8	13.8'	08°24.8	-14.9'	57.1'
22 23	150°48.2 165°48.1	42.9 43.3	51°42.6 66°15.5	13.9' 13.9'	08°09.9 07°55.0	-14.9' -14.9'	57.1' 57.1'
23	SD = 15.8'	d=0.5'			D = 15.8'	11.5	J1.1
		<u>u = 0.5</u>			3 — 13.0		
Sun	GHA	Dec	GHA	ν	Dec	d 15.07	HP
0 1	180°48.1 195°48.0	N20°43.8 44.3	80°48.4 95°21.4	14.0' 14.1'	N07°40.0 07°25.1	-15.0' -15.0'	57.0' 57.0'
2	210°48.0	44.7	$109^{\circ}54.5$	14.1'	$07^{\circ}10.1$	-15.0'	57.0'
3	225°47.9	• • 45.2	124°27.6	14.2'	06°55.1	-15.0'	56.9'
4 5	240°47.8 255°47.8	45.7 46.1	139°00.8 153°34.1	14.3' 14.3'	06°40.1 06°25.1	-15.0' -15.0'	56.9' 56.9'
6	270°47.7	N20°46.6	168°07.4	14.4'	N06° 10.1	-15.0'	56.8'
7	285°47.7	47.1	182°40.8	14.4'	05°55.1	-15.0'	56.8'
8	300°47.6 315°47.6	47.5 • • 48.0	197°14.2 211°47.7	14.5' 14.5'	05°40.0 05°25.0	-15.0' -15.1'	56.8' 56.8'
9 10	315°47.6 330°47.5	48.4	211°47.7 226°21.2	14.6'	05° 25.0 05° 09.9	-15.1' -15.1'	56.7'
11	345°47.4	48.9	240°54.8	14.7'	04°54.9	-15.1'	56.7'
12	0°47.4	N20°49.4	255°28.5	14.7'	N04°39.8	-15.1'	56.7'
13 14	15°47.3 30°47.3	49.8 50.3	270°02.2 284°36.0	14.8' 14.8'	04°24.7 04°09.7	-15.1' -15.1'	56.6' 56.6'
15	45°47.2	• • 50.7	299°09.8	14.9'	04 09.7 03°54.6	-15.1'	56.6'
16	60°47.1	51.2	313°43.6	14.9'	03°39.5	-15.1'	56.5'
17	75°47.1	51.6	328°17.5	14.9'	03°24.4	-15.1'	56.5'
18 19	90°47.0 105°47.0	N20°52.1 52.5	342°51.5 357°25.5	15.0' 15.0'	N03°09.4 02°54.3	-15.1' -15.1'	56.5' 56.4'
20	120°46.9	53.0	11°59.5	15.1'	02°39.2	-15.1'	56.4
21	135°46.8	• • 53.5	26°33.5	15.1'	02°24.2	-15.1'	56.4
22 23	150°46.8 165°46.7	53.9 54.4	41°07.7 55°41.8	15.1' 15.2'	02°09.1 01°54.1	-15.0' -15.0'	56.4' 56.3'
23	SD = 15.8'	d = 0.5'	- 33 41.0		D = 15.6'	-13.0	30.3
	JD — 13.6	u = 0.5		31	J — 13.0°		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
N 70°						
68°	////	////	00:54	23:08	////	////
66°	////	////	01:50	22:07	////	////
64°	////	////	02:23	21:33	////	////
62°	////	01:15	02:46	21:09	22:44	////
60°	////	01:54	03:05	20:50	22:03	////
N 58°	////	02:20	03:21	20:34	21:35	////
56°	01:07	02:40	03:34	20:21	21:15	22:50
54°	01:43	02:57	03:45	20:09	20:58	22:13
52°	02:08	03:11	03:55	19:59	20:44	21:47
50°	02:27	03:23	04:04	19:50	20:31	21:28
45°	03:02	03:48	04:23	19:31	20:06	20:52
<b>N</b> 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
<b>N</b> 10°	04:49	05:15	05:38	18:16	18:38	19:05
0°	05:05	05:31	05:53	18:00	18:22	18:48
S 10°	05:20	05:46	06:08	17:45	18:08	18:33
20°	05:34	06:01	06:24	17:29	17:53	18:20
30°	05:48	06:17	06:43	17:11	17:36	18:06
35°	05:55	06:26	06:53	17:00	17:27	17:58
40°	06:03	06:36	07:05	16:48	17:17	17:51
45°	06:11	06:47	07:20	16:33	17:06	17:42
<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
				ı	N4	

Lat.		Moonris	е		Moonset	į
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°	06:17	09:43	12:02	04:36	02:53	02:09
N 70°	07:27	10:02	12:08	03:24	02:31	02:00
68°	08:03	10:18	12:14	02:46	02:14	01:52
66°	08:29	10:30	12:18	02:20	02:00	01:45
64°	08:48	10:40	12:22	01:59	01:48	01:39
62°	09:04	10:49	12:25	01:42	01:38	01:34
60°	09:17	10:56	12:28	01:28	01:29	01:30
N 58°	09:28	11:02	12:31	01:15	01:22	01:26
56°	09:38	11:08	12:33	01:05	01:15	01:22
54°	09:47	11:13	12:35	00:55	01:09	01:19
52°	09:54	11:18	12:37	00:47	01:03	01:16
50°	10:01	11:22	12:38	00:39	00:58	01:14
45°	10:16	11:31	12:42	00:23	00:48	01:08
N 40°	10:28	11:38	12:45	00:09	00:39	01:03
35°	10:38	11:45	12:48		00:31	00:59
30°	10:47	11:50	12:50		00:24	00:55
20°	11:02	12:00	12:54	••••	00:12	00:49
N 10°	11:15	12:08	12:57		00:01	00:43
0°	11:28	12:16	13:00	23:51		00:37
S 10°	11:40	12:24	13:04	23:41		00:32
20°	11:53	12:32	13:07	23:30		00:26
30°	12:08	12:41	13:11	23:18	•• ••	00:19
35°	12:17	12:47	13:13	23:10		00:15
40°	12:26	12:53	13:16	23:02		00:11
45°	12:38	13:00	13:18	22:52		00:05
<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	f 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	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	Vei	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	242°35.7	144° 45.6	N25°01.0	210°04.5	N12°23.1	127°55.9	N21°54.9	231°01.8	N02° 32.3			
1	257°38.2	159°44.8	00.9	225°05.1	23.7	142°57.9	54.9	246°04.1	32.4	Alpheratz	357°33.8	29°14.0
2	272°40.7	174°44.0	00.8	240°05.8	24.4	157°59.9	54.8	261°06.3	32.4	Ankaa	353°06.3	-42°09.6
3	287°43.1	189°43.2	00.7	255°06.5	25.0	173°01.9	54.7	276°08.6	32.5	Schedar	349°30.1	56°40.7
4	302°45.6	204°42.4	00.6	270°07.2	25.7	188°03.9	54.7	291°10.8	32.6	Diphda	348°46.4	-17°50.4
5	$317^{\circ}48.1$	219°41.5	00.5	285°07.8	26.3	203°05.9	54.6	$306^{\circ}13.1$	32.7	Achernar	335°19.8	-57°06.0
6	332°50.5	234°40.7	N25°00.4	300°08.5	N12°27.0	218°07.8	N21°54.5	321°15.3	N02°32.8	Hamal Polaris	327°50.2 313°55.6	23°35.1 89°22.4
7	347°53.0	249°39.9	00.3	315°09.2	27.6	233°09.8	54.4	336° 17.6	32.9	Acamar	315°11.3	-40°11.8
8	2°55.5	264°39.1	00.2	330°09.8	28.3	248°11.8	54.4	351°19.8	32.9	Menkar	314°05.3	4°11.6
9	17°57.9	279°38.3	00.1	345°10.5	• • 28.9	263°13.8	• • 54.3	6°22.1	• • 33.0	Mirfak	308°27.1	49°57.2
10	33°00.4	294°37.5	25°00.0	0°11.2	29.6	278°15.8	54.2	21°24.3	33.1	Aldebaran	290°38.7	16°33.7
11	48°02.8	309°36.7	24°59.9	15°11.8	30.2	293°17.8	54.1	36°26.6	33.2	Rigel	281°03.1	-8°10.3
12 13	63°05.3 78°07.8	324°35.9 339°35.1	N24°59.8 59.7	30°12.5 45°13.2	N12°30.8 31.5	308°19.7 323°21.7	N21°54.1 54.0	51°28.8 66°31.1	N02°33.3 33.3	Capella	$280^{\circ}20.7$	46°01.5
14	93°10.2	354° 34.2	59.7 59.5	60°13.8	32.1	338°23.7	53.9	81°33.3	33.4	Bellatrix	278°22.0	6°22.4
15	108°12.7	9°33.4	59.4	75°14.5	• • 32.8	353°25.7	53.8	96°35.6	• • 33.5	Elnath	278°00.8	28°37.8
16	123°15.2	24°32.6	59.3	90°15.2	33.4	8°27.7	53.8	111°37.8	33.6	Alnilam	275°36.9	-1°11.2
17	138°17.6	39°31.8	59.2	105°15.9	34.1	23°29.7	53.7	126°40.1	33.7	Betelgeuse	270°51.2	7°24.7
18	153°20.1	54°31.0	N24°59.1	120°16.5	N12°34.7	38°31.6	N21°53.6	141°42.3	N02°33.8	Canopus	263°52.4	-52°42.7
19	$168^{\circ}22.6$	69°30.2	59.0	135°17.2	35.4	53°33.6	53.6	156°44.6	33.8	Sirius Adhara	258°25.5 255°05.3	-16°45.2 -29°00.6
20	183°25.0	84°29.4	58.8	150°17.9	36.0	68°35.6	53.5	171°46.8	33.9	Procyon	244°49.9	5°09.4
21	198°27.5	99°28.6	• • 58.7	165°18.5	• • 36.6	83°37.6	• • 53.4	186°49.1	• • 34.0	Pollux	243°16.2	27°57.8
22	213°30.0	114°27.8	58.6	180°19.2	37.3	98°39.6	53.3	201°51.3	34.1	Avior	234° 14.6	-59°35.9
23	228°32.4	129°27.0	58.5	195°19.9	37.9	113°41.6	53.3	216°53.6	34.2	Suhail	222°45.6	-43°32.6
Mer.p	ass. 07:48	$\nu$ -0.8 $^{\prime}$ d-0	.1′ m-3.94	$\nu$ 0.7 $^{\prime}$ d0	.6′ m1.26	$\nu 2.0' d-0$	.1′ m-1.91	$\nu$ 2.2' d0	.1′ m0.89	Miaplacidus	221°38.4	-69°49.8
										Alphard	$217^{\circ}46.7$	-8°46.5
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
0	243°34.9	144° 26.1	N24° 58.3	210°20.5	N12°38.6	128°43.5	N21°53.2	231°55.8	N02°34.2	Dubhe	193°39.5	61°36.7
1	258°37.3	159°25.3	58.2	225°21.2	39.2	143°45.5	53.1	246°58.1	34.3	Denebola	182°23.7	14°25.5
2	273°39.8	174°24.5	58.1	240°21.9	39.9	158°47.5	53.0	262°00.3	34.4	Gienah	175°42.3	-17°41.5
3	288°42.3	189°23.7	• • 58.0	255°22.5	• • 40.5	173°49.5	• • 53.0	277°02.6	• • 34.5	Gacrux	172°58.5 171°50.1	-63°15.0 -57°16.0
4	303°44.7	204°22.9	57.8	270°23.2	41.1	188°51.5	52.9	292°04.9	34.6	Alioth	166°11.6	55°49.1
5	318°47.2	$219^{\circ}22.1$	57.7	285°23.9	41.8	203°53.5	52.8	$307^{\circ}07.1$	34.6	Spica	158° 20.9	-11°18.1
6	333°49.7	234°21.3	N24°57.6	300°24.5	N12°42.4	218°55.4	N21°52.7	322°09.4	N02°34.7	Alkaid	152°50.7	49°11.0
7	348°52.1	249°20.5	57.4	315°25.2	43.1	233°57.4	52.7	337°11.6	34.8	Hadar	148°33.8	-60°30.2
8	3°54.6	264° 19.7	57.3	330°25.9	43.7	248°59.4	52.6	352°13.9	34.9	Menkent	147°55.9	-36°30.2
9	18°57.1 33°59.5	279° 18.9 294° 18.1	• • 57.2	345°26.5 0°27.2	· · 44.3 45.0	264°01.4 279°03.4	• • 52.5	7° 16.1 22° 18.4	•• 35.0	Arcturus	145°46.6	19°02.7
10 11	33 39.3 49°02.0	309° 17.3	57.0 56.9	15°27.9	45.0 45.6	279 03.4 294°05.3	52.4 52.4	37°20.6	35.1 35.1	Rigil Kent.	139°38.1	-60°56.8
12	64°04.4	324° 16.5	N24° 56.8	30°28.6	N12°46.3	309°07.3	N21°52.3	52°22.9	N02°35.2	Kochab	137°18.7	74°02.8
13	79°06.9	339°15.7	56.6	45°29.2	46.9	324°09.3	52.2	67°25.1	35.3	Zuben'ubi	136°54.4	-16°09.2
14	94°09.4	354° 14.9	56.5	60°29.9	47.5	339°11.3	52.1	82°27.4	35.4	Alphecca	126°02.4	26°37.5
15	109°11.8	$9^{\circ}14.1$	• • 56.3	75°30.6	• • 48.2	354°13.3	• • 52.1	97°29.6	• • 35.5	Antares Atria	112°14.1 107°06.7	-26°29.5 -69°04.4
16	$124^{\circ}14.3$	24°13.3	56.2	90°31.2	48.8	9°15.2	52.0	112°31.9	35.5	Sabik	107 00.7 102°01.1	-09 04.4 -15°45.5
17	139°16.8	39°12.4	56.0	105°31.9	49.5	24°17.2	51.9	127°34.1	35.6	Shaula	96°08.4	-37°07.3
18	154°19.2	54°11.6	N24°55.9		N12°50.1	39°19.2	N21°51.8	142°36.4	N02°35.7	Rasalhague	95°57.2	12°32.3
19	169°21.7	69° 10.8	55.7	135°33.2	50.7	54°21.2	51.8	157°38.6	35.8	Eltanin	90°41.2	51°28.9
20	184°24.2	84° 10.0	55.6	150°33.9	51.4	69°23.2	51.7	172°40.9	35.9	Kaus Aust.	83°30.7	-34°22.3
21 22	199°26.6 214°29.1	99°09.2 114°08.4	• • 55.4 55.3	165°34.6 180°35.2	• • 52.0	84°25.1 99°27.1	• • 51.6	187°43.1 202°45.4	• • 35.9	Vega	80°32.1	38°48.3
23	214 29.1 229°31.6	114 08.4 129°07.6	55.3 55.1	100 35.2 195°35.9	52.7 53.3	114°29.1	51.5 51.5	202 45.4 217°47.6	36.0 36.1	Nunki	75°46.1	-26°15.8
										Altair	61°58.6	8°56.2
Mer.p	ass. 07:44	$\nu$ -0.8′ d-0	.1' m-3.94	u0.7′ $d$ 0	.6′ m1.26	$\nu 2.0' \ d-0$	.1′ m-1.90	$\nu$ 2.3′ d0	$.1^\prime$ m0.89	Peacock	53°03.7	-56°38.7
										Deneb	49°24.8 33°37.6	45°22.2 9°59.7
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir	33 37.0 27°31.5	9 59.7 -46°49.7
0	244°34.0	144°06.8	N24°55.0	210°36.6	N12°53.9	129°31.1	N21°51.4	232°49.9	N02°36.2	Fomalhaut	15° 13.3	-40 49.7 -29°28.8
1	$259^{\circ}36.5$	$159^{\circ}06.0$	54.8	225°37.2	54.6	144°33.1	51.3	$247^{\circ}52.2$	36.3	Scheat	13°44.2	28°13.4
2	274°38.9	174°05.2	54.7	240°37.9	55.2	159°35.0	51.2	262°54.4	36.3	Markab	13°28.8	15°20.7
3	289°41.4	189°04.4	• • 54.5	255°38.6	• • 55.8	174°37.0	• • 51.2	277°56.7	• • 36.4			
4	304°43.9	204°03.6	54.3	270°39.2	56.5	189°39.0	51.1	292°58.9	36.5	May 25 Mon	SHA	Mer.pass
5	319°46.3	219°02.8	54.2	285°39.9	57.1	204°41.0	51.0	308°01.2	36.6		262°09.9	14:22
6 7	334°48.8 349°51.3	234°02.0 249°01.2	N24°54.0	300°40.6 315°41.2	N12°57.7 58.4	219°43.0 234°44.9	N21°50.9 50.9	323°03.4 338°05.7	N02°36.7	Mars Jupiter	327°28.7 245°20.2	09:59 15:26
8	4°53.7	264° 00.4	53.9 53.7	330°41.9	59.0	234 44.9 249°46.9	50.9	353° 05.7	36.7 36.8	Saturn	348°26.1	08:35
9	19°56.2	278° 59.6	• • 53.5	345°42.6	12°59.7	264°48.9	• • 50.7	8°10.2	• • 36.9			
10	34°58.7	293°58.8	53.4	0°43.2	13°00.3	279°50.9	50.6	23°12.4	37.0	May 26 Tue	SHA	Mer.pass
11	50°01.1	308°58.0	53.2	15°43.9	00.9	294°52.8	50.6	38° 14.7	37.1		260°51.3	14:23
12	65°03.6	323°57.2	N24°53.0	30°44.6	N13°01.6	309°54.8	N21°50.5	53°17.0	N02°37.1		326°45.7 245°08.7	09:58
13	80°06.1	338° 56.4	52.9	45°45.2	02.2	324°56.8	50.4	68° 19.2	37.2	Saturn	348°21.0	15:23 08:31
14	95°08.5	353°55.6	52.7	60°45.9	02.8	339°58.8	50.3	83°21.5	37.3			
15	110°11.0	8°54.8	• • 52.5	75°46.6	• • 03.5	355°00.8	50.3	98°23.7	•• 37.4	May 27 Wed	SHA	Mer.pass
16	125°13.4	23°54.0	52.3	90°47.2	04.1	10°02.7	50.2	113°26.0	37.4		259°32.8	14:24
17 18	140°15.9 155°18.4	38°53.2 53°52.4	52.2 N24°52.0	105°47.9	04.7 N13°05.4	25°04.7 40°06.7	50.1 N21°50.0	128°28.2	37.5 N02°37.6		326°02.5	09:57
19	170°20.8	68° 51.6	51.8	135°49.2	06.0	55°08.7	50.0	143 30.3 158°32.7	37.7	Saturn	244°57.1 348°15.9	15:20 08:27
20	185°23.3	83° 50.8	51.6	150°49.9	06.6	70°10.6	49.9	173°35.0	37.8	Saturn	J+0 15.9	00:21
21	200°25.8	98° 50.0	• • 51.5	165°50.6	• • 07.3	85°12.6	• • 49.8	188°37.2	• • 37.8	Horizont	al parallax	
22	215°28.2	113°49.3	51.3	180°51.2	07.9	100°14.6	49.7	203°39.5	37.9		Venus:	0.1
23	230°30.7	128°48.5	51.1	195°51.9	08.5	115°16.6	49.7	218°41.8	38.0		Mars:	0.1
Mer.p	ass. 07:40	$\nu$ -0.8' d-0	.2′ m-3.94	$\nu$ 0.7' d0	.6′ m1.26	$\nu 2.0' d-0$	.1′ m-1.90	$\nu 2.3' d0$	.1′ m0.89			

h	Sui	า			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°46.7	N20°54.8	70°16.0	15.2'	N01°39.0	-15.0'	56.3'
1 2	195°46.6 210°46.5	55.3 55.7	84°50.2 99°24.4	15.2' 15.3'	01°24.0 01°09.0	-15.0' -15.0'	56.3' 56.2'
3	225°46.5	56.2	113°58.7	15.3'	01° 54.0	-15.0'	56.2'
4	240°46.4	56.6	128°33.0	15.3'	$00^{\circ}39.0$	-15.0'	56.2'
5	255°46.4	57.1	143°07.4	15.4'	00°24.0	-15.0'	56.2'
6 7	270°46.3 285°46.2	N20°57.5 58.0	157°41.8 172°16.1	15.4' 15.4'	N00°09.0 S00°05.9	-15.0' 14.9'	56.1' 56.1'
8	300°46.2	58.4	186°50.6	15.4'	00° 20.9	14.9'	56.1'
9	315°46.1	• • 58.8	201°25.0	15.5'	00°35.8	14.9'	56.0'
10	330°46.0 345°46.0	59.3 20°59.7	215°59.5 230°34.0	15.5' 15.5'	00°50.7 01°05.6	14.9'	56.0'
11 12	0°45.9	N21°00.2	245°08.5	15.5'	S01°20.5	14.9' 14.9'	56.0' 56.0'
13	15°45.8	00.6	259°43.0	15.6'	01°35.4	14.8'	55.9'
14	30°45.8	01.1	274°17.6	15.6'	01°50.2	14.8'	55.9'
15 16	45°45.7 60°45.7	· · 01.5 01.9	288°52.2 303°26.7	15.6' 15.6'	02°05.0 02°19.8	14.8' 14.8'	55.9' 55.9'
17	75°45.6	02.4	318°01.3	15.6'	02°34.6	14.8'	55.8'
18	90°45.5	$N21^{\circ}02.8$	332°36.0	15.6'	<b>S</b> 02°49.4	14.7'	55.8'
19 20	105°45.5 120°45.4	03.3 03.7	347°10.6 1°45.2	15.6' 15.6'	03°04.1 03°18.8	14.7' 14.7'	55.8' 55.8'
21	120 45.4 135°45.3	04.1	1 45.2 16°19.9	15.0 15.7'	03 18.8 03°33.5	14.7'	55.8 55.7'
22	150°45.3	04.6	30°54.5	15.7'	03°48.1	14.6'	55.7'
23	165°45.2	05.0	45°29.2	15.7'	04°02.8	14.6'	55.7'
	SD = 15.8′	d = 0.5'		SI	O = 15.4'		
Tue	GHA	Dec	GHA	ν	Dec	d	НР
0	180°45.1	N21°05.5	60°03.8	ν 15.7'	S04°17.4	14.6'	55.7'
1	195°45.1	05.9	74°38.5	15.7'	04°31.9	14.5'	55.6'
2	210°45.0 225°44.9	06.3	89°13.2 103°47.9	15.7'	04°46.5 05°01.0	14.5' 14.5'	55.6'
3 4	240°44.9	· · 06.8 07.2	103 47.9 118°22.5	15.7' 15.7'	05 01.0 05°15.5	14.5 14.4'	55.6' 55.6'
5	255°44.8	07.6	132°57.2	15.7'	05°29.9	14.4	55.5'
6	270°44.7	N21°08.1	147°31.9	15.7'	S05°44.3	14.4'	55.5'
7 8	285°44.7 300°44.6	08.5 08.9	162°06.6 176°41.3	15.7' 15.7'	05°58.7 06°13.0	14.3' 14.3'	55.5' 55.5'
9	315°44.5	•• 09.4	170 41.3 191°15.9	15.7'	06°27.4	14.3'	55.4'
10	330°44.5	09.8	205°50.6	15.7'	$06^{\circ}41.6$	14.2'	55.4'
11	345°44.4	10.2	220°25.3	15.7'	06°55.9	14.2'	55.4'
12 13	0°44.3 15°44.2	N21°10.6 11.1	234°59.9 249°34.6	15.6' 15.6'	\$07°10.1 07°24.2	14.2' 14.1'	55.4' 55.3'
14	30°44.2	11.5	264°09.2	15.6'	07°38.3	14.1'	55.3'
15	45°44.1	• • 11.9	278°43.8	15.6'	07°52.4	14.0'	55.3'
16 17	60°44.0 75°44.0	12.4 12.8	293°18.4 307°53.0	15.6' 15.6'	08°06.5 08°20.5	14.0' 14.0'	55.3' 55.3'
18	90°43.9	N21°13.2	322°27.6	15.6'	S08°34.4	13.9'	55.2'
19	105°43.8	13.6	337°02.2	15.6'	08°48.3	13.9'	55.2'
20 21	120°43.8 135°43.7	14.0 •• 14.5	351°36.7 6°11.3	15.5' 15.5'	09°02.2 09°16.0	13.8' 13.8'	55.2' 55.2'
22	150°43.6	14.9	20°45.8	15.5'	09°10.0	13.7	55.2'
23	165°43.5	15.3	35°20.3	15.5'	09°43.5	13.7'	55.1'
	SD = 15.8'	d = 0.4'		SI	O = 15.2'		
Wed	GHA	Dec	GHA	ν	Dec	d	НР
0	180°43.5	N21°15.7	49°54.8	15.5'	S09°57.2	13.6'	55.1'
1	195°43.4	16.2	64°29.2	15.4'	10° 10.8	13.6'	55.1'
2 3	210°43.3 225°43.3	16.6 •• 17.0	79°03.7 93°38.1	15.4' 15.4'	10°24.4 10°38.0	13.5' 13.5'	55.1' 55.1'
4	240°43.2	17.4	108°12.5	15.4'	10°51.4	13.4	55.0'
5	255°43.1	17.8	122°46.9	15.3'	11°04.9	13.4'	55.0'
6 7	270°43.0 285°43.0	N21°18.2 18.7	137°21.2 151°55.5	15.3' 15.3'	\$11° 18.3 11° 31.6	13.3' 13.3'	55.0' 55.0'
8	300°42.9	19.1	166°29.8	15.3'	11°44.9	13.2'	55.0'
9	315°42.8	• • 19.5	181°04.1	15.2'	$11^{\circ}58.1$	13.2'	54.9'
10	330°42.8 345°42.7	19.9	195°38.3 210°12.5	15.2'	12°11.3 12°24.4	13.1'	54.9'
11 12	345°42.7 0°42.6	20.3 N21°20.7	210°12.5 224°46.7	15.2' 15.1'	12°24.4 \$12°37.4	13.1' 13.0'	54.9' 54.9'
13	15°42.5	21.2	239°20.8	15.1'	12°50.4	12.9'	54.9'
14	30°42.5	21.6	253°54.9	15.1'	13°03.4	12.9'	54.8'
15 16	45°42.4 60°42.3	· · 22.0 22.4	268°29.0 283°03.0	15.0' 15.0'	13°16.2 13°29.1	12.8' 12.8'	54.8' 54.8'
17	75°42.2	22.4	203 03.0 297°37.0	15.0'	13°41.8	12.7	54.8'
18	90°42.2	N21°23.2	312°11.0	14.9'	\$13°54.5	12.6'	54.8'
19 20	105°42.1 120°42.0	23.6 24.0	326°44.9 341°18.8	14.9' 14.9'	14° 07.2 14° 19.7	12.6' 12.5'	54.8' 54.7'
20	120°42.0 135°41.9	24.4	341 18.8 355°52.7	14.9	14° 19.7 14° 32.2	12.5 12.4'	54.7' 54.7'
22	150°41.9	24.8	$10^{\circ}26.5$	14.8'	14°44.7	12.4'	54.7'
23	165°41.8	25.2	25°00.2	14.7'	14°57.1	12.3'	54.7'
	SD = 15.8'	d = 0.4'		SI	O = 15.0'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Juliuse	Juliset	Civil	Naut.
N 72°						
<b>N</b> 70°						
68°	////	////	00:17	////	////	////
66°	////	////	01:38	22:20	////	////
64°	////	////	02:14	21:43	////	////
62°	////	00:59	02:39	21:16	23:01	////
60°	////	01:44	02:59	20:56	22:13	////
N 58°	////	02:13	03:16	20:40	21:43	////
56°	00:53	02:35	03:29	20:26	21:21	23:06
54°	01:35	02:52	03:41	20:14	21:03	22:22
52°	02:02	03:07	03:52	20:03	20:48	21:54
50°	02:22	03:19	04:01	19:54	20:36	21:34
45°	02:59	03:45	04:21	19:34	20:10	20:56
N 40°	03:25	04:05	04:36	19:18	19:50	20:30
35°	03:46	04:21	04:50	19:05	19:34	20:09
30°	04:02	04:34	05:01	18:53	19:20	19:52
20°	04:28	04:57	05:21	18:33	18:58	19:26
<b>N</b> 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	е		Moonset	:
Ldl.	Mon	Tue	Wed	Mon	Tue	Wed
<b>N</b> 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
N 10°	13:44	14:30	15:17	01:22	01:59	02:37
0°	13:43	14:25	15:07	01:21	02:03	02:45
<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	f Time	Mer.	Mer.	Pass.	Age
5	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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Thu –	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
		143° 47.7	N24° 50.9		N13°09.2		N21°49.6	233° 44.0	N02°38.1		эпа	Dec
0	245°33.2			210°52.5		130°18.5				Alpheratz	357°33.8	29°14.0
1	260°35.6	158°46.9	50.7	225°53.2	09.8	145°20.5	49.5	248°46.3	38.2	Ankaa	353°06.2	-42°09.5
2	275°38.1	173°46.1	50.5	240°53.9	10.4	160°22.5	49.4	263°48.5	38.2	Schedar	349°30.1	56°40.7
3	290°40.5	188°45.3	• • 50.3	255°54.5	· · 11.0	175°24.5	• • 49.4	278° 50.8	• • 38.3	Diphda	348°46.3	-17°50.4
4	305°43.0	203°44.5	50.2	270°55.2	11.7	190°26.4	49.3	293°53.0	38.4	Achernar	335°19.8	-57°05.9
5	320°45.5	218°43.7	50.0	285°55.9	12.3	205°28.4	49.2	308°55.3	38.5	Hamal	327°50.2	23°35.1
6	335°47.9	233°42.9	N24°49.8	300°56.5	N13° 12.9	220°30.4	N21°49.1	323°57.6	N02°38.6	1		89°22.4
7	350°50.4	248°42.1	49.6	315°57.2	13.6	235°32.4	49.1	338° 59.8	38.6	Polaris	313°54.9 315°11.3	-40°11.8
8	5°52.9	263°41.3	49.4	330°57.9	14.2	250°34.4	49.0	354°02.1	38.7	Acamar		
9	20°55.3	278°40.5	• • 49.2	345°58.5	• • 14.8	265°36.3	• • 48.9	9°04.3	• • 38.8	Menkar	314°05.3	4°11.6
10	35°57.8	293°39.7	49.0	0°59.2	15.5	280°38.3	48.8	24°06.6	38.9	Mirfak	308°27.1	49°57.2
11	51°00.3	308°38.9	48.8	15°59.9	16.1	295°40.3	48.7	39°08.8	38.9	Aldebaran	290°38.7	16°33.7
12	66°02.7	323°38.1	N24°48.6	31°00.5	N13° 16.7	310°42.2	N21°48.7	54° 11.1	N02°39.0	Rigel	281°03.1	-8°10.3
13	81°05.2	338°37.4	48.4	46°01.2	17.3	325°44.2	48.6	69°13.4	39.1	Capella	280°20.7	46°01.5
14	96°07.7	353°36.6	48.2	61°01.9	18.0	340°46.2	48.5	84°15.6	39.2	Bellatrix	278°22.0	6°22.4
15	111°10.1	8°35.8	• • 48.0	76°02.5	• • 18.6	355°48.2	• • 48.4	99°17.9	39.3	Elnath	278°00.8	28°37.8
16	126°12.6	23°35.0	47.8	91°03.2	19.2	10°50.1	48.4	114°20.1	39.3	Alnilam	275°36.9	-1°11.1
17	141°15.0	38°34.2	47.6	106°03.9	19.2	25°52.1	48.3	129° 22.4	39.4	Betelgeuse	270°51.2	7°24.7
18	156° 17.5	53° 33.4	N24° 47.4	121°04.5	N13° 20.5	40°54.1	N21°48.2	144° 24.6	N02°39.5	Canopus	263°52.4	-52°42.7
										Sirius	258° 25.5	-16°45.2
19	171°20.0	68°32.6	47.2	136°05.2	21.1	55°56.1	48.1	159°26.9	39.6	Adhara	255°05.3	-29°00.6
20	186°22.4	83°31.8	47.0	151°05.8	21.7	70°58.0	48.1	174°29.2	39.6	Procyon	244°49.9	5°09.4
21	201°24.9	98°31.0	• • 46.8	166°06.5	• • 22.4	86°00.0	• • 48.0	189°31.4	• • 39.7	Pollux	243°16.2	27°57.8
22	216°27.4	113°30.2	46.6	181°07.2	23.0	101°02.0	47.9	204°33.7	39.8	Avior	234°14.6	-59°35.9
23	231°29.8	128°29.5	46.3	196°07.8	23.6	116°04.0	47.8	219°35.9	39.9	Suhail	222°45.7	-43°32.6
Mern	ass. 07:37	ν-0.8' d-0	0.2' m-3.94	ν0 7' d0	.6′ m1.26	ν2 0' d-0	.1′ m-1.89	v2 3' d0	.1′ m0.89	Miaplacidus	221°38.4	-69°49.8
- ivici.p		ν σ.σ α-σ	111 3.37	νσ.1 d0	1111.20	ν2.0 u-0.	.1 111 1.09	- Z.5 dO		Alphard	217°46.7	-8°46.5
										Regulus	207°33.3	11°50.3
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.5	61°36.7
0	246°32.3	143°28.7	N24°46.1	211°08.5	N13°24.2	131°05.9	N21°47.7	234°38.2	N02°40.0	Denebola	193 39.3 182°23.7	14°25.5
1	261°34.8	158°27.9	45.9	226°09.2	24.9	146°07.9	47.7	249°40.4	40.0			
2	276°37.2	173°27.1	45.7	241°09.8	25.5	161°09.9	47.6	264°42.7	40.1	Gienah	175°42.3	-17°41.5
3	291°39.7	188°26.3	• • 45.5	256°10.5	26.1	176°11.9	47.5	279°45.0	• • 40.2		172°58.5	-63°15.1
4	306°42.2	203°25.5	45.3	271°11.2	26.7	191°13.8	47.4	294°47.2	40.3	Gacrux	171°50.1	-57°16.0
5	321°44.6	218°24.7	45.1	286°11.8	27.4	206°15.8	47.4	309°49.5	40.3	Alioth	166°11.6	55°49.1
6	336°47.1	233°23.9	N24° 44.8	301°12.5	N13°28.0	221°17.8	N21°47.3	324°51.7	N02°40.4	Spica	158°20.9	-11°18.1
7	351°49.5	248° 23.2		316°13.1		236°19.7	47.2	339°54.0		Alkaid	152°50.7	49°11.0
			44.6		28.6				40.5	Hadar	148°33.9	-60°30.2
8	6°52.0	263°22.4	44.4	331°13.8	29.2	251°21.7	47.1	354°56.3	40.6	Menkent	147°55.9	-36°30.2
9	21°54.5	278°21.6	• • 44.2	346°14.5	• • 29.8	266°23.7	• • 47.0	9°58.5	• • 40.7	Arcturus	145°46.6	19°02.7
10	36°56.9	293°20.8	43.9	1°15.1	30.5	281°25.7	47.0	25°00.8	40.7	Rigil Kent.	139°38.1	-60°56.9
11	51°59.4	308°20.0	43.7	16°15.8	31.1	296°27.6	46.9	40°03.0	40.8	Kochab	$137^{\circ}18.7$	74°02.9
12	67°01.9	323°19.2	N24°43.5	31°16.5	N13°31.7	311°29.6	N21°46.8	55°05.3	N02°40.9	Zuben'ubi	136°54.4	-16°09.2
13	82°04.3	338° 18.5	43.3	46°17.1	32.3	326°31.6	46.7	70°07.6	41.0	Alphecca	126°02.4	26°37.5
14	97°06.8	353°17.7	43.0	61°17.8	33.0	341°33.5	46.7	85°09.8	41.0	Antares	112°14.1	-26°29.5
15	112°09.3	8°16.9	• • 42.8	$76^{\circ}18.5$	• • 33.6	356°35.5	• • 46.6	$100^{\circ}12.1$	• • 41.1	Atria	107°06.7	-69°04.5
16	$127^{\circ}11.7$	23°16.1	42.6	$91^{\circ}19.1$	34.2	11°37.5	46.5	$115^{\circ}14.3$	41.2	Sabik	102°01.1	-15°45.5
17	142°14.2	38°15.3	42.3	106°19.8	34.8	26°39.5	46.4	$130^{\circ}16.6$	41.3	Shaula	96°08.4	-37°07.3
18	157°16.6	53° 14.5	N24°42.1	121°20.4	N13°35.4	41°41.4	N21°46.3	145°18.9	N02°41.3	Rasalhague	95°57.2	12°32.4
19	$172^{\circ}19.1$	68° 13.8	41.9	136°21.1	36.1	56°43.4	46.3	$160^{\circ}21.1$	41.4	1	90°41.1	51°29.0
20	187°21.6	83°13.0	41.6	151°21.8	36.7	71°45.4	46.2	175°23.4	41.5	Eltanin Kaus Aust.	83°30.7	-34°22.3
21	202°24.0	98°12.2	• • 41.4	166°22.4	• • 37.3	86°47.3	• • 46.1	190°25.6	• • 41.6		80°32.1	38°48.3
22	217°26.5	113°11.4	41.2	181°23.1	37.9	101°49.3	46.0	205°27.9	41.7	Vega		
23	232°29.0	128°10.6	40.9	196°23.8	38.6	116°51.3	46.0	220°30.2	41.7	Nunki	75°46.1	-26°15.8
										Altair	61°58.6	8°56.2
Mer.p	ass. 07:33	$\nu$ -0.8′ d-0	).2′ m-3.94	$ u 0.7' \ d0$	.6′ m1.27	$\nu 2.0' d-0$	$.1^\prime$ m-1.89	$\nu$ 2.3′ d0	$.1^\prime$ m0.88	Peacock	53°03.6	-56°38.7
										Deneb	49°24.8	45°22.2
Sat	GHA	GHA	Dec	GHA	Doc	GHA	Doc	GHA	Doc	Enif	33°37.6	9°59.7
Sat 0	247°31.4	143°09.9	N24° 40.7	211°24.4	<b>Dec</b> N13°39.2	131°53.2	<b>Dec</b> N21°45.9	235°32.4	<b>Dec</b> N02°41.8	Al Na'ir	27°31.4	-46°49.7
1	262°33.9	145 09.9 158°09.1	40.7	211 24.4 226°25.1	39.8	131 55.2 146°55.2	45.8	250°34.7	41.9	Fomalhaut	15°13.3	-29°28.8
						140 55.2 161°57.2				Scheat	13°44.2	28°13.4
2	277°36.4	173°08.3	40.2	241°25.7	40.4		45.7	265°36.9	42.0	Markab	13°28.8	15°20.7
3	292°38.8	188°07.5	•• 39.9	256°26.4	• • 41.0	176°59.2	• • 45.6	280°39.2	• • 42.0	May 20 Th	CHA	Mo: ::
4	307°41.3	203°06.8	39.7	271°27.1	41.6	192°01.1	45.6	295°41.5	42.1	May 28 Thu	SHA	Mer.pass
5	322°43.8	218°06.0	39.5	286°27.7	42.3	207°03.1	45.5	310°43.7	42.2		258°14.5	14:26
6	337°46.2	233°05.2	N24°39.2		N13°42.9	222°05.1	N21°45.4	325°46.0		1	325°19.4	09:56
7	352°48.7	248°04.4	39.0	316°29.1	43.5	237°07.0	45.3	340°48.3	42.3	Jupiter		15:17
8	7°51.1	263°03.6	38.7	331°29.7	44.1	252°09.0	45.2	355°50.5	42.4	Saturn	348°10.9	08:24
9	22°53.6	278°02.9	• • 38.5	346°30.4	• • 44.7	267°11.0	• • 45.2	10°52.8	• • 42.5	May 29 Fri	SHA	Mer.pass
10	37°56.1	293°02.1	38.2	1°31.0	45.4	282°12.9	45.1	25°55.0	42.6	1 -	256° 56.4	14:27
11	52°58.5	308°01.3	37.9	16°31.7	46.0	297°14.9	45.0	40°57.3	42.6		324° 36.2	09:55
12	68°01.0	323°00.5	N24°37.7	31°32.4	N13°46.6	312°16.9	N21°44.9	55° 59.6	N02°42.7		324 30.2 244°33.6	
13	83°03.5	337°59.8	37.4	46°33.0	47.2	$327^{\circ}18.8$	44.9	71°01.8	42.8			15:14
14	98°05.9	352°59.0	37.2	61°33.7	47.8	342°20.8	44.8	86°04.1	42.9	Saturn	348°05.9	08:20
15	113°08.4	7°58.2	• • 36.9	76°34.3	• • 48.4	357°22.8	• • 44.7	101°06.4	• • 42.9	May 30 Sat	SHA	Mer.pass
16	$128^{\circ}10.9$	22°57.4	36.7	91°35.0	49.1	12°24.7	44.6	116°08.6	43.0		255°38.4	14:28
17	143°13.3	37°56.7	36.4	106°35.7	49.7	27°26.7	44.5	131°10.9	43.1		323°53.0	09:54
18	158°15.8	52°55.9	N24°36.1		N13°50.3	42°28.7	N21°44.5		N02°43.2		244°21.8	15:10
19	173°18.3	67°55.1	35.9	136°37.0	50.9	57°30.6	44.4	161°15.4	43.2		348°01.0	08:17
20	188°20.7	82°54.3	35.6	151°37.6	51.5	72°32.6	44.3	176° 17.7	43.3	Jatuill	5.5 01.0	00.11
21	203°23.2	97°53.6	• • 35.3	166°38.3	• 52.1	87°34.6	• • 44.2	191°19.9	• • 43.4	Horizont	al parallax	ļ
22	218°25.6	112°52.8	35.1	181°39.0	52.7	102°36.5	44.1	206°22.2	43.5		Venus:	0.1
23	233°28.1	127°52.0	34.8	196°39.6	53.4	117°38.5	44.1	221°24.5	43.5		Mars:	0.1
Mer.p	ass. 07:29	$\nu$ -0.8′ d-0	).2′ m-3.94	$ u 0.7' \ d0$	.6′ m1.27	$\nu 2.0' \ d-0$	.1' m- $1.89$	$\nu$ 2.3 $^{\prime}$ d0	.1' m $0.88$			

h	Sui	า			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°41.7	N21°25.6	39°34.0	14.7'	<b>S</b> 15°09.4	12.2'	54.7'
1	195°41.6	26.1	54°07.7	14.7'	15°21.6	12.2'	54.7'
2	210°41.6	26.5	68°41.3	14.6'	15°33.8	12.1'	54.6'
3 4	225°41.5 240°41.4	· · 26.9 27.3	83°14.9 97°48.5	14.6' 14.5'	15° 45.9 15° 57.9	12.0' 12.0'	54.6' 54.6'
5	255°41.3	27.3 27.7	97 46.5 112°22.0	14.5'	15° 57.9 16° 09.9	11.9'	54.6'
6	270°41.2	N21°28.1	126°55.5	14.4'	S16°21.8	11.8'	54.6'
7	285°41.2	28.5	141°28.9	14.4'	16°33.6	11.8'	54.6'
8	300°41.1	28.9	156°02.3	14.3'	$16^{\circ}45.4$	11.7'	54.6'
9	315°41.0	• • 29.3	170°35.6	14.3'	16°57.1	11.6'	54.5'
10	330°40.9	29.7	185°08.9 199°42.2	14.2'	17°08.7	11.5'	54.5'
11 12	345°40.9 0°40.8	30.1 N21°30.5	199 42.2 214°15.4	14.2' 14.1'	17°20.2 \$17°31.6	11.5' 11.4'	54.5' 54.5'
13	15°40.7	30.9	214 13.4 228°48.5	14.1'	17°43.0	11.3'	54.5'
14	30°40.6	31.3	243°21.6	14.0'	17°54.3	11.2'	54.5'
15	45°40.5	• • 31.7	257°54.7	14.0'	$18^{\circ}05.5$	11.1'	54.5'
16	60°40.5	32.1	272°27.7	13.9'	18° 16.7	11.1'	54.4'
17	75°40.4	32.4	287°00.6	13.9'	18°27.7	11.0'	54.4
18 19	90°40.3 105°40.2	N21°32.8 33.2	301°33.5 316°06.3	13.8' 13.8'	\$18°38.7 18°49.6	10.9' 10.8'	54.4' 54.4'
20	105 40.2 120°40.1	33.6	330°39.1	13.7'	19°00.4	10.7	54.4
21	135°40.1	• • 34.0	345°11.9	13.7'	19°11.1	10.6'	54.4'
22	150°40.0	34.4	359°44.6	13.6'	19°21.8	10.6'	54.4'
23	165°39.9	34.8	14°17.2	13.6'	19°32.3	10.5'	54.4'
	SD = 15.8'	d = 0.4'		SE	0 = 14.9'		
Fri	GHA	Dec	GHA	ν	Dec	d	НР
0	180°39.8	N21°35.2	28°49.8	13.5'	<b>S</b> 19°42.8	10.4'	54.3'
1	195°39.7	35.6	43°22.3	13.5'	19°53.2	10.3'	54.3'
2	210°39.7 225°39.6	36.0	57°54.8 72°27.2	13.4'	20°03.5 20°13.7	10.2'	54.3'
3 4	225°39.6 240°39.5	· · 36.4 36.7	72°27.2 86°59.5	13.4' 13.3'	20° 13.7 20° 23.8	10.1' 10.0'	54.3' 54.3'
5	255°39.4	37.1	101°31.8	13.2'	20° 33.8	9.9'	54.3'
6	270°39.3	N21°37.5	116°04.1	13.2'	520°43.8	9.8'	54.3'
7	285°39.3	37.9	$130^{\circ}36.3$	13.1'	$20^{\circ}53.6$	9.8'	54.3'
8	300°39.2	38.3	145°08.4	13.1'	21°03.4	9.7'	54.3'
9	315°39.1 330°39.0	· · 38.7 39.1	159°40.5 174°12.5	13.0' 13.0'	21°13.0 21°22.6	9.6' 9.5'	54.2' 54.2'
10 11	330 39.0 345°38.9	39.1 39.4	174 12.5 188°44.5	12.9'	21°22.0	9.5 9.4'	54.2'
12	0°38.8	N21°39.8	203°16.4	12.9'	S21°41.5	9.3'	54.2'
13	15°38.8	40.2	217°48.3	12.8'	21°50.7	9.2'	54.2'
14	30°38.7	40.6	232°20.1	12.7'	21°59.9	9.1'	54.2'
15	45°38.6 60°38.5	· · 41.0 41.3	246°51.8 261°23.5	12.7' 12.6'	22°09.0 22°18.0	9.0'	54.2' 54.2'
16 17	75°38.4	41.3 41.7	201 23.5 275°55.1	12.6'	22° 26.9	8.9' 8.8'	54.2'
18	90°38.3	N21°42.1	290°26.7	12.5'	\$22°35.7	8.7'	54.2'
19	105°38.3	42.5	304°58.2	12.5'	22°44.3	8.6'	54.1'
20	120°38.2	42.9	319°29.7	12.4'	22°52.9	8.5'	54.1'
21	135°38.1	• • 43.2	334°01.1	12.3'	23°01.4	8.4'	54.1'
22 23	150°38.0 165°37.9	43.6 44.0	348°32.4 3°03.7	12.3' 12.2'	23°09.8 23°18.0	8.3' 8.2'	54.1' 54.1'
23		d = 0.4'	3 03.7		0 = 14.8'	0.2	J4.1
	SD = 15.8'	$a = 0.4^{\circ}$		SL	$0 = 14.8^{\circ}$		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°37.8 195°37.8	N21°44.4	17°35.0 32°06.1	12.2'	\$23°26.2	8.1'	54.1' 54.1'
1 2	195°37.8 210°37.7	44.7 45.1	46°37.3	12.1' 12.1'	23°34.3 23°42.2	7.9' 7.8'	54.1'
3	225°37.6	• • 45.5	61°08.3	12.0'	23°50.0	7.7'	54.1
4	240°37.5	45.9	75°39.3	12.0'	23°57.8	7.6'	54.1'
5	255°37.4	46.2	90°10.3	11.9'	24°05.4	7.5'	54.1'
6	270°37.3	N21°46.6	104°41.2	11.8'	\$24°12.9	7.4'	54.1'
7 8	285°37.2 300°37.2	47.0 47.3	119°12.0 133°42.8	11.8' 11.7'	24°20.3 24°27.6	7.3' 7.2'	54.1' 54.0'
9	315°37.1	• • 47.7	148°13.6	11.7'	24° 34.8	7.1'	54.0'
10	330°37.0	48.1	$162^{\circ}44.3$	11.6'	$24^{\circ}41.9$	7.0'	54.0'
11	345°36.9	48.4	177°14.9	11.6'	24°48.8	6.8'	54.0'
12	0°36.8	N21°48.8	191°45.5	11.5'	\$24°55.6 25°02.4	6.7'	54.0'
13 14	15°36.7 30°36.6	49.2 49.5	206°16.0 220°46.5	11.5' 11.4'	25°02.4 25°09.0	6.6' 6.5'	54.0' 54.0'
15	45°36.5	• • 49.9	235°16.9	11.4'	25° 15.5	6.4	54.0'
16	60°36.5	50.3	249°47.3	11.3'	$25^{\circ}21.8$	6.3'	54.0'
17	75°36.4	50.6	264°17.6	11.3'	25°28.1	6.1'	54.0'
18	90°36.3	N21°51.0	278°47.9	11.2'	\$25°34.2	6.0'	54.0'
19 20	105°36.2 120°36.1	51.4 51.7	293°18.1 307°48.3	11.2' 11.1'	25°40.3 25°46.2	5.9' 5.8'	54.0' 54.0'
21	135°36.0	52.1	307 48.3 322°18.4	11.1'	25°51.9	5.7	54.0'
22	150°35.9	52.4	336°48.5	11.0'	25°57.6	5.5'	54.0'
23	165°35.8	52.8	351°18.5	11.0'	$26^{\circ}03.1$	5.4'	54.0'
	SD = 15.8'	d = 0.4'		SE	0 = 14.8'		

			2020	iviay 20	S to IVI	ау. ЗО
Lat.	Twil	<b>ight</b> Civil	Sunrise	Sunset	<b>Twi</b> Civil	light Naut.
N 72°	Italia					
N 70°						
68°						
66°						
	////	////	01:25	22:33	////	////
64°	////	////	02:06	21:51	////	////
62°	////	00:39	02:33	21:23	23:24	////
60°	////	01:35	02:54	21:02	22:22	////
N 58°	////	02:06	03:11	20:45	21:50	////
56°	00:35	02:29	03:26	20:30	21:27	23:27
54°	01:27	02:48	03:38	20:18	21:08	22:31
52°	01:56	03:03	03:49	20:07	20:53	22:01
50°	02:17	03:16	03:58	19:57	20:40	21:39
45°	02:56	03:42	04:18	19:37	20:13	21:00
N 40°	03:23	04:03	04:35	19:20	19:52	20:33
35°	03:44	04:19	04:48	19:07	19:36	20:11
$30^{\circ}$	04:01	04:33	05:00	18:55	19:22	19:54
$20^{\circ}$	04:27	04:56	05:20	18:35	18:59	19:28
N $10^{\circ}$	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	06:10	17:43	17:52	18:19
20°		06:03				
	05:51		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
3 00	00.55	01.40	00.41	13.13	10.07	17.01
Lat.	Thu	<b>Moonris</b> Fri	e Sat	Thu	Moonset Fri	: Sat
N 72°						
N 70°	20:54			00:07		
68°	19:53		_	22:50 00:31	_	
				23:53	00:28	
66°	19:18	21:43		00:50	23:40	
64°	18:54	20:47		01:05	00:54	00:36
62°	18:35	20:14	22:00	01:18	01:14	01:10
60°	18:19	19:50	21:22	01:29	01:30	01:34
N 58°	18:06	19:31	20:55	01:38	01:44	01:54
56°	17:54	19:15	20:34	01:47	01:56	02:10
54°	17:44	19:02	20:17	01:54	02:07	02:24
52°	17:36	18:50	20:02	02:01	02:16	02:37
50°	17:28	18:40	19:50	02:07	02:25	02:47
45°	17:11	18:18	19:23	02:20	02:43	03:10
<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
N 10°	16:04	16:53	17:44	03:03	03:56	04:40
0°	15:50	16:36	17:24	03:10	03:30	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> $50^{\circ}$	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	14:37	05:04	06:33	07:54
58°					06:33	
58 S 60°	13:43 13:31	13:50 13:34	14:03 13:40	05:21 05:32	07:02	08:12 08:34
3 00	13:31		13:40	05:52		00:34
		Sun			Moon	
Day	Eqn.of		Mer.	Mer.		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	03.43	11.57	22:01	00:30	

02:47

02:39 02:31

29 30 02:43

02:35 02:27 11:57

22:01

22:47 23:36 09:39

10:24 11:11

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
Sun O	248°30.6	ина 142°51.3	N24°34.5	211° 40.3	N13°54.0	132° 40.5	Dec N21°44.0	236°26.7	N02°43.6			
	263°33.0	157°50.5		211 40.3 226°41.0		132 40.3 147°42.4		251°29.0		Alpheratz	357°33.7	29°14.0
1 2	203 33.0 278°35.5	157 50.5 172°49.7	34.3 34.0	241°41.6	54.6	147 42.4 162°44.4	43.9 43.8	251 29.0 266°31.2	43.7	Ankaa	353°06.2	-42°09.5
3	278°35.5 293°38.0	172°49.7 187°49.0	· · 33.7	241°41.6 256°42.3	55.2 •• 55.8	162°44.4 177°46.4	43.8 •• 43.7	266°31.2 281°33.5	43.8 •• 43.8	Schedar	349°30.0	56°40.7
										Diphda	348°46.3	$-17^{\circ}50.4$
4	308°40.4	202°48.2	33.4	271°42.9	56.4	192°48.3	43.7	296°35.8	43.9	Achernar	335°19.8	-57°05.9
5	323°42.9	217°47.4	33.2	286°43.6	57.0	207°50.3	43.6	311°38.0	44.0	Hamal	327°50.2	23°35.1
6	338°45.4	232°46.6	N24°32.9	301°44.3	N13°57.6	222°52.3	N21°43.5	326°40.3	N02°44.1	Polaris	313°53.9	89°22.4
7	353°47.8	247°45.9	32.6	316°44.9	58.3	237°54.2	43.4	341°42.6	44.1	Acamar	315° 11.3	-40°11.8
8	8°50.3	262°45.1	32.3	331°45.6	58.9	252° 56.2	43.3	356°44.8	44.2	Menkar	314°05.3	4°11.6
9	23°52.8	277°44.3	• • 32.0	346°46.2	13°59.5	267°58.2	• • 43.3	11°47.1	• • 44.3			
10	38°55.2	292°43.6	31.8	1°46.9	14°00.1	283°00.1	43.2	26°49.4	44.4	Mirfak	308°27.1	49°57.2
11	53°57.7	307°42.8	31.5	16° 47.6	00.7	298°02.1	43.1	41°51.6	44.4	Aldebaran	290°38.7	16°33.7
12	69°00.1	322°42.0	N24°31.2	31°48.2	N14°01.3	313°04.1	N21°43.0	56° 53.9	N02°44.5	Rigel	281°03.1	-8°10.3
13	84°02.6	337°41.3	30.9	46° 48.9	01.9	328°06.0	42.9	71°56.2	44.6	Capella	280°20.7	46°01.4
14	99°05.1	352°40.5	30.6	61°49.5	02.5	343°08.0	42.9	86°58.4	44.7	Bellatrix	278°22.0	6°22.4
15	114°07.5	7°39.7	30.3	76°50.2	03.1	358° 10.0	• • 42.8	102°00.7	• • 44.7	Elnath	278°00.8	28°37.8
								102 00.7 117°03.0		Alnilam	275°36.9	$-1^{\circ}11.1$
16	129°10.0	22°39.0	30.1	91°50.9	03.7	13°11.9	42.7		44.8	Betelgeuse	$270^{\circ}51.2$	$7^{\circ}24.7$
17	144°12.5	37°38.2	29.8	106°51.5	04.4	28° 13.9	42.6	132°05.2	44.9	Canopus	263°52.4	-52°42.7
18	159°14.9	52°37.5	N24°29.5	121°52.2	N14°05.0	43° 15.9	N21°42.5	147°07.5	N02°45.0	Sirius	258° 25.5	-16°45.2
19	174°17.4	67°36.7	29.2	136°52.8	05.6	58° 17.8	42.5	162°09.7	45.0	Adhara	255°05.3	-29°00.6
20	189°19.9	82°35.9	28.9	151°53.5	06.2	73°19.8	42.4	$177^{\circ}12.0$	45.1	Procyon	244°49.9	5°09.4
21	204°22.3	97°35.2	• • 28.6	$166^{\circ}54.1$	• • 06.8	88°21.8	• • 42.3	192° 14.3	• • 45.2	Pollux	244 49.9 243°16.2	27°57.8
22	$219^{\circ}24.8$	112°34.4	28.3	181°54.8	07.4	103°23.7	42.2	$207^{\circ}16.5$	45.3			
23	234°27.3	127°33.6	28.0	196°55.5	0.80	118° 25.7	42.1	222° 18.8	45.3	Avior	234°14.7	-59°35.9
		-								Suhail	222°45.7	-43°32.6
Mer.p	ass. 07:25	$\nu$ -0.8′ d-0	.3′ m-3.95	u0.7′ d0	.6′ m1.27	$\nu$ 2.0′ d-0	.1' m-1.88	$\nu 2.3' \ d0$	.1' m $0.88$	Miaplacidus	221°38.4	-69°49.8
										Alphard	217°46.8	-8°46.5
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
		142°32.9						237°21.1		Dubhe	193°39.6	61°36.7
0	249°29.7		N24°27.7	211°56.1	N14°08.6	133°27.6	N21°42.1		N02°45.4	Denebola	182°23.7	14°25.5
1	264°32.2	157°32.1	27.4	226° 56.8	09.2	148°29.6	42.0	252°23.3	45.5	Gienah	175°42.3	$-17^{\circ}41.5$
2	279°34.6	172°31.4	27.1	241°57.4	09.8	163°31.6	41.9	267°25.6	45.6	Acrux	172°58.5	-63°15.1
3	294°37.1	187°30.6	• • 26.8	256°58.1	• • 10.4	178° 33.5	• • 41.8	282°27.9	• • 45.6		171°50.1	-57°16.0
4	309°39.6	202°29.8	26.5	271°58.8	11.0	193°35.5	41.7	297°30.1	45.7	Alioth	166°11.7	55°49.1
5	324°42.0	$217^{\circ}29.1$	26.2	286°59.4	11.7	208°37.5	41.7	312°32.4	45.8	Spica	158° 20.9	-11°18.1
6	339°44.5	232°28.3	N24°25.9	$302^{\circ}00.1$	N14°12.3	223°39.4	N21°41.6	327°34.7	N02°45.9	Alkaid	152° 50.7	49°11.0
7	354°47.0	247°27.6	25.6	$317^{\circ}00.7$	12.9	238°41.4	41.5	342°36.9	45.9	Hadar	148° 33.9	-60°30.3
8	9°49.4	262°26.8	25.3	332°01.4	13.5	253°43.4	41.4	357°39.2	46.0		140° 55.9	-36°30.2
9	24°51.9	277°26.0	• • 25.0	347°02.1	• • 14.1	268°45.3	• • 41.3	12°41.5	• • 46.1			
10	39°54.4	292°25.3	24.7	2°02.7	14.7	283°47.3	41.3	27°43.7	46.1	Arcturus	145°46.6	19°02.7
11	54°56.8	307°24.5	24.3	17°03.4	15.3	298° 49.2	41.2	42°46.0	46.2	Rigil Kent.	139°38.1	-60°56.9
12	69°59.3	322°23.8	N24°24.0	32°04.0	N14°15.9	313°51.2	N21°41.1	57°48.3	N02°46.3	Kochab	137° 18.8	74°02.9
13	85°01.7	337°23.0		47°04.7		328° 53.2		72°50.5		Zuben'ubi	136°54.4	-16°09.2
		352°22.3	23.7		16.5		41.0		46.4	Alphecca	126°02.4	26°37.5
14	100°04.2		23.4	62°05.3	17.1	343°55.1	40.9	87°52.8	46.4	Antares	$112^{\circ}14.1$	-26°29.5
15	115°06.7	7°21.5	· · 23.1	77°06.0	• • 17.7	358°57.1	• • 40.9	102°55.1	• • 46.5	Atria	$107^{\circ}06.7$	-69°04.5
16	130°09.1	22°20.8	22.8	92°06.7	18.3	13°59.1	40.8	117°57.3	46.6	Sabik	$102^{\circ}01.1$	-15°45.5
17	145°11.6	37°20.0	22.5	107°07.3	18.9	29°01.0	40.7	132°59.6	46.7	Shaula	96°08.4	-37°07.3
18	$160^{\circ}14.1$	52°19.2	N24°22.1	122°08.0	N14°19.5	44°03.0	N21°40.6	148°01.9	N02°46.7	Rasalhague	95°57.2	12°32.4
19	175°16.5	67°18.5	21.8	137°08.6	20.1	59°04.9	40.5	163°04.2	46.8	Eltanin	90°41.1	51°29.0
20	190°19.0	82°17.7	21.5	152°09.3	20.7	74°06.9	40.4	178°06.4	46.9	Kaus Aust.	83°30.6	-34°22.3
21	205°21.5	97°17.0	• • 21.2	$167^{\circ}09.9$	• • 21.3	89°08.9	• • 40.4	193°08.7	• • 47.0	Vega	80°32.1	38°48.3
22	220°23.9	112°16.2	20.8	182° 10.6	21.9	104° 10.8	40.3	208°11.0	47.0	_		
23	235°26.4	127°15.5	20.5	197°11.3	22.5	119° 12.8	40.2	223°13.2	47.1	Nunki	75°46.0	-26°15.8
										Altair	61°58.6	8°56.2
Mer.p	ass. 07:21	$\nu$ -0.8′ d-0	.3′ m-3.95	$ u 0.7' \ d0$	.6′ m1.27	$\nu$ 2.0′ d-0	$.1^\prime$ m-1.88	$\nu$ 2.3′ d0	.1' m $0.88$	Peacock	53°03.6	-56°38.7
										Deneb	49°24.8	45°22.2
-	C	<b></b>	Б	c	-	<b></b>	ь.	a	-	Enif	33°37.6	9°59.7
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.4	-46°49.7
0	250°28.9	142°14.7	N24°20.2	212°11.9		134° 14.7	N21°40.1	238° 15.5	N02°47.2	Fomalhaut	15°13.3	-29°28.8
1	265°31.3	157°14.0	19.9	227° 12.6	23.7	149° 16.7	40.0	253°17.8	47.2	Scheat	13°44.1	28°13.4
2	280°33.8	172°13.2	19.5	242°13.2	24.3	164° 18.7	40.0	268°20.0	47.3	Markab	13°28.8	15°20.8
3	295°36.2	187°12.5	· · 19.2	257° 13.9	• • 24.9	179°20.6	• • 39.9	283°22.3	• • 47.4			
4	$310^{\circ}38.7$	202°11.7	18.9	272° 14.6	25.5	194°22.6	39.8	298°24.6	47.5	May 31 Sun	SHA	Mer.pass
5	$325^{\circ}41.2$	$217^{\circ}11.0$	18.5	287°15.2	26.1	209°24.5	39.7	$313^{\circ}26.8$	47.5	Venus	254°20.7	14:29
6	340°43.6	232°10.2	N24°18.2	302° 15.9	N14°26.7	224° 26.5	N21°39.6	328°29.1	N02°47.6	Mars	323°09.7	09:53
7	355°46.1	247°09.5	17.9	317° 16.5	27.3	239° 28.5	39.5	343°31.4	47.7	Jupiter		15:07
8	10°48.6	262°08.7	17.5	332°17.2	27.9	254° 30.4	39.5	358°33.7	47.8	Saturn	347°56.1	08:13
9	25°51.0	277°08.0	17.2	347°17.8	. 28.5	269°32.4	39.4	13°35.9	• • 47.8			
	40°53.5	292°07.2	16.9	2°18.5	29.1	284° 34.4		28°38.2	47.9	Jun 01 Mon	SHA	Mer.pass
10							39.3			Venus	253°03.2	14:31
11	55°56.0	307°06.5	16.5	17° 19.1	29.7	299°36.3	39.2	43°40.5	48.0		322°26.4	09:52
12	70°58.4	322°05.7	N24°16.2	32°19.8	N14°30.3	314°38.3	N21°39.1	58°42.7	N02°48.0	Jupiter		15:04
13	86°00.9	337°05.0	15.8	47° 20.5	30.9	329° 40.2	39.1	73°45.0	48.1	Saturn	347°51.4	08:09
14	101°03.4	352°04.3	15.5	62°21.1	31.5	344° 42.2	39.0	88°47.3	48.2	Jatuill	J., J1.+	55.09
15	116°05.8	7°03.5	• • 15.2	77°21.8	• • 32.1	359°44.1	• • 38.9	103°49.5	• • 48.3	Jun 02 Tue	SHA	Mer.pass
16	131°08.3	22°02.8	14.8	92°22.4	32.7	14°46.1	38.8	$118^{\circ}51.8$	48.3	Venus	251°45.9	14:32
17	$146^{\circ}10.7$	37°02.0	14.5	$107^{\circ}23.1$	33.3	29°48.1	38.7	133°54.1	48.4	Mars		09:51
18	161°13.2	52°01.3	N24°14.1	122° 23.7	N14°33.9	44°50.0	N21°38.6	148°56.4	N02°48.5	Jupiter		15:01
19	176°15.7	67°00.5	13.8	137°24.4	34.5	59° 52.0	38.6	163°58.6	48.5	Saturn		08:06
20	191°18.1	81°59.8	13.4	152°25.1	35.1	74°53.9	38.5	179°00.9	48.6	Jatuill	J.1 70.0	00.00
21	206°20.6	96°59.0	13.1	167°25.7	• • 35.7	89°55.9	38.4	194°03.2	• • 48.7	Horizont	al parallax	
22	200°20.0° 221°23.1	111°58.3	12.7	182°26.4	36.3	104° 57.9	38.3	209°05.4	48.8		Venus:	0.1
											Mars:	0.1
23	236°25.5	126°57.6	12.4	197°27.0	36.9	119°59.8	38.2	224°07.7	48.8		.viui J.	V.1
Mern	ass. 07:17	$\nu$ -0.8' d-0	.3′ m-3.95	$\nu$ 0.7' d0	.6′ m1.27	$\nu 2.0' d_{-0}$	.1′ m-1.88	$\nu 2.3' d0$	.1′ m0.87			
								•				

h	Sui	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°35.7	$N21^{\circ}53.2$	5°48.5	10.9'	S26°08.5	5.3'	54.0'
1	195°35.7	53.5	20°18.5	10.9'	26°13.8	5.2'	54.0'
2 3	210°35.6 225°35.5	53.9 •• 54.2	34°48.4 49°18.2	10.9' 10.8'	26° 19.0 26° 24.0	5.0' 4.9'	53.9' 53.9'
4	240°35.4	54.6	63°48.0	10.8	26°29.0	4.8'	53.9'
5	255°35.3	54.9	$78^{\circ}17.8$	10.7'	$26^{\circ}33.8$	4.7'	53.9'
6	270°35.2	N21°55.3	92°47.5	10.7'	\$26°38.4	4.5'	53.9'
7 8	285°35.1 300°35.0	55.6 56.0	107°17.2 121°46.9	10.7' 10.6'	26°43.0 26°47.4	4.4' 4.3'	53.9' 53.9'
9	315°34.9	• • 56.3	136°16.5	10.6'	26°51.7	4.2'	53.9'
10	330°34.8	56.7	150°46.1	10.5'	$26^{\circ}55.8$	4.0'	53.9'
11	345°34.8 0°34.7	57.1 N21°57.4	165°15.6 179°45.1	10.5' 10.5'	26°59.9 <b>5</b> 27°03.8	3.9'	53.9'
12 13	15°34.7	N21 57.4 57.8	179°45.1 194°14.6	10.5	27°07.6	3.8' 3.6'	53.9' 53.9'
14	30°34.5	58.1	208°44.1	10.4	27°11.2	3.5'	53.9'
15	45°34.4	• • 58.5	223°13.5	10.4'	27° 14.7	3.4'	53.9'
16 17	60°34.3 75°34.2	58.8 59.1	237°42.8 252°12.2	10.3' 10.3'	27° 18.1 27° 21.4	3.3' 3.1'	53.9' 53.9'
18	90°34.1	N21°59.5	266°41.5	10.3	\$27°24.5	3.0'	53.9'
19	105°34.0	21°59.8	281°10.8	10.3'	27°27.5	2.9'	53.9'
20	120°33.9	22°00.2	295°40.0	10.2'	27°30.4	2.7'	53.9'
21	135°33.8 150°33.7	· · 00.5	310°09.3 324°38.5	10.2'	27° 33.1 27° 35.7	2.6'	53.9'
22 23	165°33.6	00.9	324 38.5 339°07.7	10.2' 10.2'	27°38.1	2.5' 2.3'	53.9' 53.9'
	SD = 15.8'	d = 0.4'			0 = 14.7'		
	3D = 15.6	<u>u = 0.4</u>		30	7 — 14.7		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°33.5	N22°01.6	353°36.8	10.1'	\$27°40.5 27°42.7	2.2'	53.9'
1 2	195°33.5 210°33.4	01.9 02.2	8°06.0 22°35.1	10.1' 10.1'	27°42.7 27°44.7	2.1' 1.9'	53.9' 53.9'
3	225°33.3	• • 02.6	37°04.2	10.1	27°46.7	1.8'	53.9
4	240°33.2	02.9	51°33.3	10.1'	$27^{\circ}48.5$	1.7'	53.9'
5	255°33.1	03.3 N22°03.6	66°02.4 80°31.4	10.1'	27°50.1 <b>S</b> 27°51.7	1.5'	53.9'
6 7	270°33.0 285°32.9	03.9	95°00.4	10.0' 10.0'	27°53.1	1.4' 1.3'	53.9' 53.9'
8	300°32.8	04.3	109°29.5	10.0'	27°54.3	1.1'	53.9'
9	315°32.7	•• 04.6	123°58.5	10.0'	$27^{\circ}55.4$	1.0'	53.9'
10	330°32.6 345°32.5	05.0	138°27.5 152°56.5	10.0'	27° 56.4 27° 57.3	0.9'	53.9'
11 12	0°32.4	05.3 N22°05.6	152 50.5 167°25.5	10.0' 10.0'	527°58.0	0.7' 0.6'	53.9' 53.9'
13	15°32.3	06.0	181°54.4	10.0'	27°58.6	0.4	53.9'
14	30°32.2	06.3	196°23.4	10.0'	27°59.0	0.3'	53.9'
15 16	45°32.1 60°32.0	· · 06.6 07.0	210°52.4 225°21.3	10.0' 10.0'	27° 59.3 27° 59.5	0.2' 0.0'	53.9' 53.9'
17	75°31.9	07.0	239°50.3	10.0'	27°59.5	-0.1	53.9'
18	90°31.8	N22°07.6	254°19.3	10.0'	S27°59.5	-0.2'	53.9'
19	105°31.7	07.9	268°48.2	10.0'	27°59.2	-0.4'	53.9'
20 21	120°31.6 135°31.5	08.3 •• 08.6	283°17.2 297°46.2	10.0' 10.0'	27°58.9 27°58.4	-0.5' -0.6'	53.9' 53.9'
22	150°31.4	08.9	312°15.1	10.0'	27°57.7	-0.8	53.9
23	165°31.3	09.3	$326^{\circ}44.1$	10.0'	27°57.0	-0.9'	53.9'
	SD = 15.8'	d = 0.3'		SD	0 = 14.7'		
_							
Tue 0	<b>GHA</b> 180°31.2	<b>Dec</b> N22°09.6	<b>GHA</b> 341°13.1	u  10.0'	<b>Dec S</b> 27° 56.0	d -1.0'	<b>HP</b> 53.9'
1	195°31.2	09.9	355°42.1	10.0'	27°55.0	-1.0 -1.2'	53.9'
2	210°31.1	10.2	10°11.1	10.0'	27°53.8	-1.3'	53.9'
3 4	225°31.0 240°30.9	· · 10.6 10.9	24°40.1 39°09.1	10.0' 10.0'	27°52.5 27°51.1	-1.5' -1.6'	53.9' 53.9'
4 5	240 30.9 255°30.8	10.9	59 09.1 53°38.1	10.0'	27° 49.5	-1.0 -1.7'	53.9'
6	270°30.7	N22°11.5	68°07.2	10.1'	S27°47.8	-1.9'	53.9'
7	285°30.6	11.9	82°36.2	10.1'	27°45.9	-2.0'	54.0'
8 9	300°30.5 315°30.4	12.2 •• 12.5	97°05.3 111°34.4	10.1' 10.1'	27°43.9 27°41.8	-2.1' -2.3'	54.0' 54.0'
10	330°30.3	12.8	126°03.5	10.1	27°39.5	-2.3 -2.4'	54.0'
11	345°30.2	13.1	140°32.7	10.2'	$27^{\circ}37.1$	-2.5'	54.0'
12	0°30.1	N22°13.5	155°01.8 169°31.0	10.2'	\$27°34.6	-2.7'	54.0'
13 14	15°30.0 30°29.9	13.8 14.1	169°31.0 184°00.2	10.2' 10.2'	27° 32.0 27° 29.2	-2.8' -2.9'	54.0' 54.0'
15	45°29.8	• • 14.4	198°29.4	10.2	27°26.2	-3.1'	54.0'
16	60°29.7	14.7	212°58.6	10.3'	27°23.2	-3.2'	54.0'
17	75°29.6	15.0	227°27.9	10.3'	27° 20.0 <b>S</b> 27° 16.7	-3.3'	54.0'
18 19	90°29.5 105°29.4	N22°15.4 15.7	241°57.2 256°26.6	10.3' 10.4'	\$27°16.7 27°13.2	-3.4' -3.6'	54.0' 54.0'
20	105°29.4 120°29.3	16.0	270°55.9	10.4	27°13.2 27°09.7	-3.7'	54.0'
21	135°29.2	• • 16.3	285°25.3	10.4'	27°06.0	-3.8'	54.0'
22 23	150°29.1 165°29.0	16.6 16.9	299°54.7 314°24.2	10.5' 10.5'	27°02.1 26°58.1	-4.0' -4.1'	54.0' 54.0'
23			314 24.2			-4.1	54.0
	SD = 15.8'	d = 0.3'		SD	0 = 14.7'		

Lat.	Twi	light	Sunrise	Sunset	Twi	ilight
	Naut.	Civil	Junisc	Junice	Civil	Naut.
N 72°						
N 70°						
68°						
66°	////	////	01:12	22:47	////	////
64° 62°	////	////	01:58	22:00	//// ////	////
60°	 	//// 01:26	02:27 02:49	21:30 21:08	22:32	//// ////
N 58°	i					
1N ⊃o 56°	 	02:00 02:25	03:07 03:22	20:50 20:34	21:57 21:32	//// ////
54°	01:19	02:23	03:22	20:34	21:32	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°	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° 35°	05:52	06:22	06:48	17:08	17:34	18:03
35 40°	06:00 06:09	06:31 06:42	06:59 07:12	16:56 16:43	17:24 17:13	17:55 17:47
45°	06:18	06:55	07:12	16:27	17:13	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°	06:57	07:52	08:46	15:09	16:04	16:59
Lak		Moonris	e	Moonset		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°						
<b>N</b> 70°						
68°						
66°						
64°						
62° 60°	23:52	22.42	01:14	01:05	00:58	01:23
	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° 54°	21:45 21:25	22:41 22:20	23:20 23:01	02:32 02:49	03:05 03:26	03:56 04:16
54 52°	21:25	22:20	23:01	02:49	03:20	04:16
50°	20:54	21:48	22:32	03:07	03:57	04:48
45°	20:24	21:19	22:04	03:44	04:27	05:18
<b>N</b> 40°	20:02	20:55	21:42	04:06	04:50	05:41
35°	19:43	20:36	21:24	04:23	05:09	06:00
30°	19:27	20:19	21:08	04:39	05:25	06:17
20°	18:59	19:52	20:41	05:05	05:53	06:44
N 10°	18:36	19:28	20:18	05:27	06:17	07:08
	1 40 4 4	10.05	19:57	05:48	06:39	07:30
0°	18:14	19:05	19.51	05.40	00.39	07.50
<b>S</b> 10°	17:52	18:43	19:35	06:09	07:01	07:52

<b>S</b> 60°	13:55	14:29	15:33	10:02	11:14	11:57	
		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
Juy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	15-17	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	100-97%	
31	02:23	02:19	11:58	-:-	12:01		
01	02:14	02:10	11:58	00:26	12:52		
02	02:05	02:00	11:58	01:18	13:43		

18:29

18:11

17:48

17:20

17:06

16:49

16:30

16:06

07:13

07:31

07:53

08:21

08:35

09:09

09:32

08:09

08:28

08:51

09:21

09:35

09:52

10:13

10:39

08:59

09:18

09:41

10:10

10:24

10:41

11:00

11:25

17:35

17:16

16:53

16:23

16:08

15:51

15:31

15:05

35°

40° 45°

**S** 50° 52° 54°

56°

16:46

16:28

16:06

15:37

15:24

15:08

14:49

14:26

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0 0	251°28.0	141° 56.8	N24° 12.0	212°27.7	N14° 37.5	135°01.8	N21°38.2	239° 10.0	N02°48.9		ЗПА	Dec
1	266°30.5	156° 56.1	11.7	212 27.7 227°28.3	38.1	150°03.7	38.1	254° 12.3	49.0	Alpheratz	357°33.7	29°14.0
2	281°32.9	171°55.3	11.7	242°29.0	38.7	165°05.7	38.0	269° 14.5	49.0	Ankaa	353°06.2	-42°09.5
3	296°35.4	186°54.6	· · 11.0	257°29.6	39.3	180°07.6	37.9	284°16.8	. 49.1	Schedar	349°30.0	56°40.7
4	311°37.9	201°53.9	10.6	272°30.3	39.9	195°09.6	37.8	299° 19.1	49.2	Diphda	348°46.3	-17°50.4
5	326°40.3	216°53.1	10.2	287°31.0	40.4	210°11.6	37.7	314°21.3	49.3	Achernar	335°19.7	-57°05.9
6	341°42.8	231°52.4	N24°09.9	302°31.6	N14°41.0	225°13.5	N21°37.7	329°23.6	N02°49.3	Hamal	327°50.2	23°35.1
7	356°45.2	246°51.6	09.5	317°32.3	41.6	240°15.5	37.6	344°25.9	49.4	Polaris	313°52.9	89°22.4
8	11°47.7	261°50.9	09.1	332°32.9	42.2	255°17.4	37.5	359°28.2	49.5	Acamar	315°11.3 314°05.2	-40°11.8
9	$26^{\circ}50.2$	276°50.2	• • 08.8	347°33.6	• • 42.8	270°19.4	• • 37.4	14°30.4	• • 49.5	Menkar Mirfak	314 05.2 308°27.1	4°11.6 49°57.2
10	41°52.6	291°49.4	08.4	2°34.2	43.4	285°21.4	37.3	29°32.7	49.6	Aldebaran	290°38.6	16°33.7
11	$56^{\circ}55.1$	306°48.7	08.1	17°34.9	44.0	300°23.3	37.2	44°35.0	49.7	Rigel	281°03.1	-8°10.3
12	71°57.6	321°48.0	N24°07.7	32°35.5	N14°44.6	315°25.3	N21°37.2	59°37.2	N02°49.8	Capella	280°20.7	46°01.4
13	87°00.0	336°47.2	07.3	47°36.2	45.2	330°27.2	37.1	74°39.5	49.8	Bellatrix	278°22.0	6°22.4
14	102°02.5	351°46.5	06.9	62°36.8	45.8	345°29.2	37.0	89°41.8	49.9	Elnath	278°00.8	28°37.8
15	117°05.0	6°45.8	• • 06.6	77°37.5	• • 46.4	0°31.1	• • 36.9	104°44.1	• • 50.0	Alnilam	275°36.9	-1°11.1
16	132°07.4	21°45.0	06.2	92°38.2	47.0	15°33.1	36.8	119°46.3 134°48.6	50.0	Betelgeuse	270°51.2	7°24.7
17 18	147°09.9 162°12.4	36°44.3 51°43.6	05.8 N24°05.5	107°38.8 122°39.5	47.6 N14°48.1	30°35.0 45°37.0	36.7 N21°36.7	134 48.0 149°50.9	50.1 N02°50.2	Canopus	263°52.4	-52°42.7
19	102 12.4 177°14.8	66°42.8	05.1	122 39.5 137°40.1	48.7	60°39.0	36.6	149 50.9 164°53.2	50.2	Sirius	$258^{\circ}25.5$	-16°45.2
20	177 14.8 192°17.3	81°42.1	03.1	157° 40.1	49.3	75°40.9	36.5	104 55.2 179°55.4	50.2	Adhara	$255^{\circ}05.3$	-29°00.6
21	207°19.7	96°41.4	04.3	167°41.4	. 49.9	90°42.9	36.4	194°57.7	50.4	Procyon	244°49.9	5°09.4
22	222°22.2	111°40.6	03.9	182°42.1	50.5	105°44.8	36.3	210°00.0	50.5	Pollux	243°16.2	27°57.8
23	237°24.7	126°39.9	03.6	197°42.7	51.1	120°46.8	36.2	225°02.3	50.5	Avior	234° 14.7	-59°35.9
				-						Suhail	222°45.7	-43°32.6
Mer.p	ass. 07:13	$\nu$ -0.7′ d-0	.4′ m-3.95	$\nu 0.7' d0$	.6′ m1.27	$\nu 2.0' d-0$	.1′ m-1.88	$\nu 2.3' d0$	.1′ m0.87	Miaplacidus	221°38.5	-69°49.8
										Alphard	217°46.8	-8°46.5
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
0	252°27.1	141°39.2	N24°03.2	212°43.4	N14°51.7	135°48.7	N21°36.2	240°04.5	N02°50.6	Dubhe Denebola	193°39.6 182°23.7	61°36.7 14°25.5
1	$267^{\circ}29.6$	156°38.4	02.8	227°44.0	52.3	150°50.7	36.1	255°06.8	50.7	Gienah	175°42.3	-17°41.5
2	$282^{\circ}32.1$	171°37.7	02.4	242°44.7	52.9	165°52.6	36.0	270°09.1	50.7		173° 42.3	-63°15.1
3	297°34.5	186°37.0	• • 02.0	257°45.4	• • 53.4	180°54.6	• • 35.9	285°11.4	• • 50.8	Gacrux	172 50.5 171°50.1	-57°16.0
4	312°37.0	201°36.3	01.6	272°46.0	54.0	195°56.6	35.8	300°13.6	50.9	Alioth	166°11.7	55°49.2
5	327°39.5	216°35.5	01.3	287°46.7	54.6	210°58.5	35.7	315° 15.9	51.0	Spica	158° 20.9	-11°18.1
6	342°41.9	231°34.8	N24°00.9	302°47.3	N14°55.2	226°00.5	N21°35.7	330° 18.2	N02°51.0	Alkaid	152°50.8	49°11.0
7	357°44.4	246°34.1	00.5	317°48.0	55.8	241°02.4	35.6	345°20.5	51.1	Hadar	148°33.9	-60°30.3
8	12°46.9	261°33.3	24°00.1	332°48.6	56.4	256°04.4	35.5	0°22.7	51.2	Menkent	147°55.9	-36°30.2
9	27°49.3	276°32.6	23°59.7	347°49.3	• • 57.0	271°06.3	• • 35.4	15°25.0	• • 51.2	Arcturus	$145^{\circ}46.6$	19°02.7
10	42°51.8	291°31.9	59.3	2°49.9	57.6	286°08.3	35.3	30°27.3	51.3	Rigil Kent.	$139^{\circ}38.1$	-60°56.9
11	57°54.2	306°31.2	58.9	17°50.6 32°51.2	58.1	301°10.2	35.2	45°29.6	51.4 N02°51.4	Kochab	$137^{\circ}18.8$	74°02.9
12 13	72°56.7 87°59.2	321°30.4 336°29.7	N23°58.5	47°51.9	N14°58.7	316°12.2 331°14.1	N21°35.1 35.1	60°31.8 75°34.1	51.5	Zuben'ubi	136°54.4	-16°09.2
14	103°01.6	350° 29.7 351° 29.0	58.1 57.7	62°52.5	59.3 14° 59.9	346°16.1	35.1	90°36.4	51.5	Alphecca	126°02.4	26°37.5
15	118°04.1	6°28.3	•• 57.3	77°53.2	15°00.5	1°18.1	• • 34.9	105°38.7	51.6	Antares	112° 14.0	-26°29.5
16	133°06.6	21°27.5	56.9	92°53.8	01.1	16°20.0	34.8	120° 40.9	51.7	Atria	107°06.7	-69°04.5
17	148°09.0	36°26.8	56.5	107°54.5	01.6	31°22.0	34.7	135° 43.2	51.8	Sabik	102°01.1	-15°45.5
18	163°11.5	51°26.1	N23°56.1		N15°02.2	46°23.9	N21°34.6	150°45.5	N02°51.9	Shaula	96°08.4	-37°07.4
19	178°14.0	66° 25.4	55.7	137°55.8	02.8	61°25.9	34.6	165°47.8	51.9	Rasalhague	95°57.1	12°32.4
20	193°16.4	81°24.7	55.3	152°56.5	03.4	76°27.8	34.5	180°50.0	52.0	Eltanin Kaus Aust.	90°41.1 83°30.6	51°29.0 -34°22.3
21	208°18.9	96°23.9	• • 54.9	167°57.1	• • 04.0	91°29.8	• • 34.4	195°52.3	•• 52.1	Vega	80°32.0	-34 22.3 38°48.3
22	223°21.3	111°23.2	54.5	182°57.8	04.6	106°31.7	34.3	210°54.6	52.1	Nunki	75°46.0	-26°15.8
23	238°23.8	126°22.5	54.1	197°58.4	05.1	121°33.7	34.2	225°56.9	52.2	Altair	61°58.6	8°56.2
Mern	ass. 07:09	v-0.7' d-0	.4′ m-3.95	ν0 7' d0	.6′ m1.27	v2 0′ d₌0	.1′ m-1.87	v2 3' d0	.1′ m0.87	Peacock	53°03.5	-56°38.7
- IVICI.P	ass. 01.09	ν-σ.τ α-σ	.+ 111-5.95	νο.τ do	.0 1111.27	ν2.0 u-0	.1 111-1.07	ν2.5 do	.1 1110.07	Deneb	49° 24.7	45°22.3
										Enif	33°37.6	9°59.7
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.4	-46°49.7
0	253°26.3	141°21.8	N23°53.7	212°59.1	N15°05.7	136°35.6	N21°34.1	240°59.1		Fomalhaut	$15^{\circ}13.2$	-29°28.8
1	268°28.7	156°21.1	53.3	227°59.7	06.3	151°37.6	34.0	256°01.4	52.3	Scheat	$13^{\circ}44.1$	28°13.4
2	283°31.2	171°20.4	52.9	243°00.4	06.9	166°39.5	34.0	271°03.7	52.4	Markab	13°28.8	15°20.8
3	298°33.7 313°36.1	186° 19.6 201° 18.9	· · 52.5 52.0	258°01.0 273°01.7	· · 07.5 08.1	181°41.5 196°43.4	· · 33.9 33.8	286°06.0 301°08.3	· · 52.5 52.5	Jun 03 Wed	SHA	Mer.pass
4 5	328°38.6	201 18.9 216° 18.2	51.6	288°02.3	08.6	211°45.4	33.7	316° 10.5	52.5	l l	250°28.8	14:33
6	343°41.1	231° 17.5	N23°51.2		N15°09.2	211 45.4 226°47.3	N21°33.6	331° 12.8			320°59.7	09:50
7	358°43.5	246°16.8	50.8	318°03.6	09.8	241°49.3	33.5	346°15.1	52.7	Jupiter		14:58
8	13°46.0	261°16.1	50.4	333°04.3	10.4	256°51.3	33.5	1°17.4	52.8	Saturn	347°42.0	08:02
9	28°48.5	276° 15.3	• • 50.0	348°04.9	• • 11.0	271°53.2	· · 33.4	16° 19.6	• • 52.9			
10	43°50.9	291°14.6	49.5	3°05.6	11.5	286°55.2	33.3	31°21.9	53.0	Jun 04 Thu	SHA	Mer.pass
11	58°53.4	306° 13.9	49.1	18°06.2	12.1	301°57.1	33.2	46°24.2	53.0		249°12.0	14:34
12	73°55.8	321°13.2	N23°48.7	33°06.9	N15° 12.7	316°59.1	N21°33.1	61°26.5	N02°53.1		320° 16.3 243° 21.6	09:49
13	88°58.3	$336^{\circ}12.5$	48.3	48°07.5	13.3	332°01.0	33.0	76°28.8	53.2		243°21.6 347°37.4	14:55 07:58
14	104°00.8	351°11.8	47.8	63°08.2	13.8	347°03.0	32.9	91°31.0	53.2	Saturn	JT1 J1.4	01.30
15	119°03.2	6°11.1	• • 47.4	78°08.8	• • 14.4	2°04.9	• • 32.9	106°33.3	• • 53.3	Jun 05 Fri	SHA	Mer.pass
16	134°05.7	21°10.4	47.0	93°09.5	15.0	17°06.9	32.8	121°35.6	53.4		247°55.5	14:35
17	149°08.2	36°09.6	46.6	108°10.1	15.6	32°08.8	32.7	136°37.9	53.4		319°32.8	09:48
18	164°10.6	51°08.9	N23°46.1		N15°16.2	47°10.8	N21°32.6		N02°53.5		243°09.4	14:52
19	179°13.1	66°08.2	45.7	138°11.4	16.7	62°12.7	32.5	166° 42.4	53.6	Saturn	347°32.9	07:55
20	194°15.6 209°18.0	81°07.5 96°06.8	45.3 •• 44.8	153°12.1 168°12.7	17.3 •• 17.9	77°14.7	32.4 · · 32.3	181°44.7 196°47.0	53.6 •• 53.7	Horizont	al parallax	
21 22	209°18.0 224°20.5	96°06.8 111°06.1	44.8	168° 12.7 183° 13.4	18.5	92°16.6 107°18.6	32.3	211°49.3	53.8		Venus:	0.1
23	239°23.0	111 00.1 126°05.4	44.4	103 13.4 198°14.0	19.0	107 18.6 122°20.5	32.3	211 49.3 226°51.5	53.8		Mars:	0.1
Mer.p	ass. 07:05	$\nu$ -0.7′ d-0	.4′ m-3.96	$ u$ 0.7 $^{\prime}$ d0	.6′ m1.28	$\nu 2.0' \ d-0$	$.1^\prime$ m-1.87	$\nu 2.3' \ d0$	.1' m $0.87$			

h	Sur			Moon			
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°28.9	$N22^{\circ}17.2$	328°53.7	10.5'	S26°54.0	-4.2'	54.1'
1	195°28.8	17.5	343°23.2	10.6'	26°49.8	-4.4'	54.1'
2	210°28.6	17.9	357°52.7	10.6'	26°45.5	-4.5'	54.1'
3 4	225°28.5 240°28.4	· · 18.2 18.5	12°22.3 26°51.9	10.6' 10.7'	26°41.0 26°36.4	-4.6' -4.7'	54.1' 54.1'
4 5	240 28.4 255° 28.3	18.8	20 51.9 41°21.6	10.7'	26°31.6	-4.7 -4.9'	54.1'
6	270° 28.2	N22° 19.1	55°51.3	10.7	526°26.8	-5.0'	54.1'
7	285°28.1	19.4	70°21.0	10.8'	26°21.8	-5.1'	54.1'
8	300°28.0	19.7	84°50.8	10.8'	$26^{\circ}16.7$	-5.2'	54.1'
9	315°27.9	• • 20.0	99°20.6	10.9'	26°11.4	-5.4'	54.1'
10	330°27.8	20.3	113°50.5	10.9'	26°06.0	-5.5'	54.1'
11 12	345°27.7 0°27.6	20.6 N22°20.9	128° 20.4 142° 50.3	10.9' 11.0'	26°00.6 \$25°54.9	-5.6' -5.7'	54.1' 54.2'
13	15° 27.5	21.2	142 50.3 157°20.3	11.0'	25°49.2	-5.1' -5.9'	54.2'
14	30°27.4	21.5	171°50.4	11.1'	25°43.4	-6.0'	54.2'
15	45°27.3	• • 21.8	186°20.4	11.1'	25°37.4	-6.1'	54.2'
16	60°27.2	22.1	200°50.6	11.2'	$25^{\circ}31.3$	-6.2'	54.2'
17	75°27.1	22.4	215°20.7	11.2'	25°25.1	-6.3'	54.2'
18	90°27.0	N22°22.7	229°50.9	11.3'	\$25°18.7	-6.5	54.2'
19	105°26.9	23.0	244°21.2 258°51.5	11.3'	25°12.3 25°05.7	-6.6'	54.2'
20 21	120°26.8 135°26.7	23.3	258°51.5 273°21.9	11.4' 11.4'	25°05.7 24°59.0	-6.7' -6.8'	54.2' 54.3'
22	150°26.6	23.9	273 21.9 287°52.3	11.4	24 59.0 24°52.2	-0.6 -6.9'	54.3'
23	165° 26.5	24.2	302°22.7	11.5'	24°45.2	-7.0'	54.3'
	SD = 15.8'	d = 0.3'			D = 14.7'		
	3D = 13.6	<u>u = 0.5</u>		31	J — 14.1		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°26.4	N22°24.5	316°53.2	11.5'	\$24°38.2	-7.2'	54.3'
1 2	195°26.3 210°26.2	24.8 25.1	331°23.7 345°54.3	11.6' 11.6'	24°31.0 24°23.8	-7.3' -7.4'	54.3' 54.3'
3	225° 26.0	25.1	0°25.0	11.7	24 23.6 24°16.4	-7.4 -7.5'	54.3'
4	240°25.9	25.7	14°55.7	11.7'	24°08.9	-7.6'	54.3'
5	255°25.8	25.9	29°26.4	11.8'	24°01.3	-7.7'	54.3'
6	270°25.7	N22°26.2	43°57.2	11.8'	S23°53.5	-7.8'	54.4'
7	285°25.6	26.5	58°28.1	11.9'	23°45.7	-7.9'	54.4'
8	300°25.5	26.8	72°59.0	11.9'	23°37.7	-8.1'	54.4'
9	315°25.4	• • 27.1	87°29.9	12.0'	23°29.7	-8.2'	54.4'
10 11	330°25.3 345°25.2	27.4 27.7	102°00.9 116°32.0	12.1' 12.1'	23°21.5 23°13.2	-8.3' -8.4'	54.4' 54.4'
12	0°25.1	N22°28.0	110 32.0 131°03.1	12.1	523°04.8	-0.4 -8.5'	54.4
13	15°25.0	28.3	145°34.2	12.2'	22°56.4	-8.6'	54.5'
14	30°24.9	28.5	160°05.4	12.3'	22°47.8	-8.7'	54.5'
15	45°24.8	• • 28.8	174°36.7	12.3'	$22^{\circ}39.1$	-8.8'	54.5'
16	60°24.7	29.1	189°08.0	12.4'	22°30.2	-8.9'	54.5'
17	75°24.5	29.4 N22°29.7	203°39.4	12.4'	22°21.3	-9.0'	54.5'
18 19	90°24.4 105°24.3	N22°29.7 30.0	218° 10.8 232° 42.2	12.5' 12.5'	\$22°12.3 22°03.2	-9.1' -9.2'	54.5' 54.6'
20	105 24.3 120° 24.2	30.0	247° 13.8	12.6'	22 03.2 21°54.0	-9.2 -9.3'	54.6'
21	135°24.1	• • 30.5	261°45.3	12.6'	21°44.6	-9.4'	54.6'
22	150°24.0	30.8	276°16.9	12.7'	21°35.2	-9.5'	54.6'
23	165°23.9	31.1	290°48.6	12.7'	21°25.7	-9.6'	54.6'
	SD = 15.8'	d = 0.3'		SI	O = 14.8'		
Fri	GHA	Dec	GHA	ν	Dec	d	НР
0	180° 23.8	N22°31.3	305°20.3	12.8'	\$21°16.1	-9.7'	54.6'
1	195° 23.7	31.6	319°52.1	12.8'	21°06.4	-9.8'	54.7'
2	210°23.6	31.9	$334^{\circ}23.9$	12.9'	$20^{\circ}56.5$	-9.9'	54.7'
3	225° 23.5	• • 32.2	348°55.8	12.9'	20°46.6	-10.0'	54.7'
4	240°23.3	32.5	3°27.7	13.0'	20°36.6 20°26.5	-10.1'	54.7'
5 6	255°23.2 270°23.1	32.7 N22°33.0	17°59.7 32°31.7	13.0' 13.1'	20°26.5 S20°16.3	-10.2' -10.3'	54.7' 54.7'
7	270 23.1 285°23.0	33.3	32 31.7 47°03.8	13.1'	20°06.0	-10.3 -10.4'	54. <i>1</i> 54.8'
8	300°22.9	33.5	61°35.9	13.2'	19°55.6	-10.5	54.8'
9	315° 22.8	• • 33.8	76°08.0	13.2'	19°45.1	-10.6'	54.8'
10	330°22.7	34.1	90°40.3	13.3'	19°34.6	-10.7'	54.8'
11	345°22.6	34.4	105°12.5	13.3'	19°23.9	-10.8'	54.8'
12	0°22.5	N22°34.6 34.9	119°44.8	13.4'	\$19°13.2 19°02.3	-10.8'	54.9'
13 14	15°22.4 30°22.2	34.9 35.2	134°17.2 148°49.6	13.4' 13.4'	19°02.3 18°51.4	-10.9' -11.0'	54.9' 54.9'
14 15	45° 22.1	35.4	148 49.6 163°22.0	13.4	18 51.4 18°40.4	-11.0 -11.1'	54.9'
16	60°22.0	35.7	177°54.5	13.5'	18°29.3	-11.2	54.9'
17	75° 21.9	36.0	192°27.0	13.6'	18° 18.1	-11.3	55.0'
18	90°21.8	N22°36.2	206°59.6	13.6'	S18°06.8	-11.4'	55.0'
19	105°21.7	36.5	221°32.3	13.7'	17°55.4	-11.4'	55.0'
20	120°21.6	36.8	236°04.9	13.7'	17°44.0	-11.5'	55.0'
21	135°21.5 150°21.3	· · 37.0 37.3	250°37.6 265°10.4	13.7' 13.8'	17°32.4 17°20.8	-11.6'	55.0'
22 23	165°21.3	37.3 37.6	265° 10.4 279° 43.2	13.8'	17°20.8 17°09.1	-11.7' -11.8'	55.1' 55.1'
23			219 43.2			-11.0	55.1
	SD = 15.8'	d = 0.3'		SL	0 = 14.9'		

N 70°							
N 72°	Lat.		-	Sunrise	Sunset		_
N 70°	N 72°						
66°							
66°							
64°							
60°							
60°         ////         01:18         02:45         21:12         22:42         ////           N 58°         ////         01:55         03:04         20:54         22:03         ////           56°         ////         02:20         03:19         20:38         21:37         ////           54°         01:11         02:40         03:32         20:25         21:17         22:48           50°         02:09         03:11         03:54         20:03         20:47         21:49           45°         02:51         03:39         04:15         19:42         20:19         21:07           N 40°         03:19         04:00         04:32         19:25         19:57         20:38           35°         03:41         04:07         04:49         18:58         19:25         19:58           20°         04:27         04:55         05:20         18:37         19:01         19:40           30°         05:06         05:32         05:53         18:58         19:25         19:58           20°         05:06         05:32         05:53         18:02         18:24         18:50           10°         06:48         05:15 <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>							
N 58°							
56°         ////         01:11         02:20         03:19         20:38         21:37         ////           54°         01:41         02:40         03:32         20:25         21:17         22:48           50°         02:09         03:11         03:54         20:03         20:47         21:49           45°         02:51         03:39         04:15         19:42         20:19         21:07           N 40°         03:19         04:00         04:32         19:25         19:57         20:38           35°         03:41         04:17         04:46         19:10         19:40         20:16           30°         03:59         04:32         04:59         18:58         19:25         19:58           20°         04:27         04:55         05:20         18:37         19:01         19:40           N 10°         04:48         05:15         05:38         18:19         18:42         19:09           0°         05:06         05:32         05:55         18:02         18:24         18:50           S 10°         05:22         05:49         06:11         17:45         18:88         18:34           20°         05:38							
54°         01:11         02:40         03:32         20:25         21:17         22:48           50°         02:09         03:11         03:54         20:03         20:47         21:49           45°         02:51         03:39         04:15         19:42         20:19         21:07           N 40°         03:19         04:00         04:32         19:25         19:57         20:38           35°         03:41         04:17         04:46         19:10         19:40         20:16           30°         03:59         04:32         04:59         18:58         19:25         19:58           20°         04:27         04:55         05:20         18:37         19:01         19:30           N 10°         04:48         05:15         05:38         18:19         18:42         19:09           0°         05:06         05:32         05:55         18:02         18:24         18:50           S 10°         05:22         05:49         06:11         17:45         18:88         18:34           20°         05:38         06:05         06:29         17:28         17:51         18:19           30°         05:53         06:23							
52° 01:45 02:57 03:44 20:13 21:01 22:13 50° 02:09 03:11 03:54 20:03 20:47 21:49 45° 02:51 03:39 04:15 19:42 20:19 21:07 N 40° 03:19 04:00 04:32 19:25 19:57 20:38 35° 03:41 04:17 04:46 19:10 19:40 20:16 30° 03:59 04:32 04:59 18:58 19:25 19:58 20° 04:27 04:55 05:20 18:37 19:01 19:30 N 10° 04:48 05:15 05:38 18:19 18:42 19:09 0° 05:06 05:32 05:55 18:02 18:24 18:50 S 10° 05:22 05:49 06:11 17:45 18:08 18:34 20° 05:53 06:23 06:49 17:28 17:51 18:19 30° 05:53 06:23 06:49 17:07 17:33 18:03 35° 06:02 06:33 07:01 16:56 17:23 17:55 40° 06:10 06:44 07:14 16:42 17:12 17:46 45° 06:20 06:57 07:30 16:26 16:59 17:36 S 50° 06:31 07:12 07:50 16:07 16:44 17:25 50° 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 58° 06:53 07:45 08:35 15:21 16:12 17:03 S 60° 07:00 07:56 08:51 15:05 16:01 16:56 17:24 17:15 18:08 S 60° 07:00 07:56 08:51 15:05 16:01 16:56 17:24 17:15 18:09 18:24 18:50 18:34 18:50 18:34					l		
50°         02:09         03:11         03:54         20:03         20:47         21:49           45°         02:51         03:39         04:15         19:42         20:19         21:07           N 40°         03:19         04:00         04:32         19:25         19:57         20:38           35°         03:41         04:17         04:46         19:10         19:40         20:16           30°         03:59         04:32         04:59         18:58         19:25         19:58           20°         04:27         04:55         05:20         18:37         19:01         19:30           N 10°         04:48         05:15         05:38         18:19         18:42         18:50           5 10°         05:22         05:49         06:11         17:45         18:08         18:34           20°         05:38         06:05         06:29         17:28         17:51         18:19           30°         05:53         06:23         06:49         17:07         17:38         17:51         18:19           30°         05:38         06:05         06:29         17:08         17:12         17:44           40°         06:10					l .		
N 40° 03:19 04:00 04:32 19:25 19:57 20:38 35° 03:41 04:17 04:46 19:10 19:40 19:40 30° 03:59 04:32 04:59 18:58 19:25 19:58 20° 04:27 04:55 05:20 18:37 19:01 19:30 N 10° 04:48 05:15 05:38 18:19 18:42 19:09 0° 05:06 05:32 05:55 18:02 18:24 18:50 S 10° 05:22 05:49 06:11 17:45 18:08 18:34 35° 06:02 06:33 07:01 16:56 17:23 17:55 40° 06:10 06:44 07:14 16:42 17:12 17:46 45° 06:20 06:57 07:30 16:26 16:59 17:36 S 50° 06:31 07:12 07:50 16:07 16:44 17:25 550° 06:41 07:27 08:10 15:47 16:30 17:15 S 60° 07:00 07:56 08:51 15:05 16:01 16:56  Lat.							
N 40° 03:19 04:00 04:32 19:25 19:57 20:38 35° 03:41 04:17 04:46 19:10 19:40 20:16 30° 03:59 04:32 04:59 18:58 19:25 19:58 20° 04:27 04:55 05:20 18:37 19:01 19:30 N 10° 04:48 05:15 05:38 18:19 18:42 19:09 0° 05:06 05:32 05:55 18:02 18:24 18:50 S 10° 05:22 05:49 06:11 17:45 18:08 18:34 20° 05:38 06:05 06:29 17:28 17:51 18:19 30° 05:53 06:23 06:24 17:07 17:33 18:39 30° 05:55 06:02 06:33 07:01 16:56 17:23 17:55 40° 06:10 06:44 07:14 16:42 17:12 17:46 45° 06:20 06:57 07:30 16:26 16:59 17:36 S 50° 06:31 07:12 07:50 16:07 16:44 17:25 52° 06:36 07:19 07:59 15:57 16:37 17:20 54° 06:41 07:27 08:10 15:47 16:30 17:15 56° 06:47 07:35 08:21 15:35 16:21 17:10 56° 07:00 07:56 08:51 15:05 16:01 16:56  Lat.							
35° 03:41 04:17 04:46 19:10 19:40 20:16 30° 03:59 04:32 04:59 18:58 19:25 19:58 20° 04:27 04:55 05:20 18:37 19:01 19:30 N 10° 04:48 05:15 05:38 18:19 18:42 19:09 0° 05:06 05:32 05:55 18:02 18:24 18:50 S 10° 05:22 05:49 06:11 17:45 18:08 18:34 20° 05:38 06:05 06:29 17:28 17:51 18:19 30° 05:53 06:23 06:49 17:07 17:33 18:03 35° 06:02 06:33 07:01 16:56 17:23 17:55 40° 06:10 06:44 07:14 16:42 17:12 17:46 45° 06:20 06:57 07:30 16:26 16:59 17:36 S 50° 06:31 07:12 07:50 16:07 16:44 17:25 52° 06:36 07:19 07:59 15:57 16:37 17:20 54° 06:41 07:27 08:10 15:47 16:30 17:15 56° 06:47 07:35 08:21 15:35 16:21 17:10 56° 07:00 07:56 08:51 15:05 16:01 16:56  Lat.							
30° 03:59 04:32 04:59 18:58 19:25 19:58 20° 04:27 04:55 05:20 18:37 19:01 19:30 N 10° 04:48 05:15 05:38 18:19 18:42 19:09 0° 05:06 05:32 05:55 18:02 18:24 18:50 510° 05:22 05:49 06:11 17:45 18:08 18:34 20° 05:38 06:05 06:29 17:28 17:51 18:19 30° 05:53 06:23 06:49 17:07 17:33 18:03 35° 06:02 06:33 07:01 16:56 17:23 17:55 40° 06:10 06:44 07:14 16:42 17:12 17:46 45° 06:20 06:57 07:30 16:26 16:59 17:36 55° 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 55° 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 58 06° 07:00 07:56 08:51 15:05 16:01 16:56 00:04 07:04 07:04 07:04 07:04 07:05 07:00 07:56 08:51 15:05 16:01 16:56 00:04 07:04 07:05 08:21 15:35 16:21 17:10 07:05 07:00 07:00 07:56 08:51 15:05 16:01 16:56 00:04 07:04 07:05 08:21 15:35 16:21 17:10 07:05 07:00 07:00 07:56 08:51 15:05 16:01 16:56 00:04 07:04 07:05 07:00 07:50 08:51 15:05 16:01 16:56 00:04 07							
N   10°   04:27   04:55   05:20   18:37   19:01   19:30							
N 10° 04:48 05:15 05:38 18:19 18:42 19:09 0° 05:06 05:32 05:55 18:02 18:24 18:50 S 10° 05:22 05:49 06:11 17:45 18:08 18:34 20° 05:38 06:05 06:29 17:28 17:51 18:19 30° 05:53 06:23 06:49 17:07 17:33 18:03 35° 06:02 06:33 07:01 16:56 17:23 17:55 40° 06:10 06:44 07:14 16:42 17:12 17:46 45° 06:20 06:57 07:30 16:26 16:59 17:36 S 50° 06:31 07:12 07:50 16:07 16:44 17:25 52° 06:36 07:19 07:59 15:57 16:37 17:20 54° 06:41 07:27 08:10 15:47 16:30 17:15 58° 06:53 07:45 08:35 15:21 16:12 17:03 S 60° 07:00 07:56 08:51 15:05 16:01 16:56					1		
0°         05:06         05:32         05:55         18:02         18:24         18:50           S 10°         05:22         05:49         06:11         17:45         18:08         18:34           20°         05:38         06:05         06:29         17:28         17:51         18:19           30°         05:53         06:02         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           5 50°         06:31         07:12         07:50         16:07         16:44         17:25           52°         06:36         07:19         07:59         15:57         16:30         17:15           56°         06:41         07:27         08:10         15:47         16:30         17:15           58°         06:53         07:45         08:35         15:21         16:12         17:00           58°         06:53         07:45         08:51         15:05         16:01         16:56           17.2         16:30							
\$ 10°   05:22   05:49   06:11   17:45   18:08   18:34   20°   05:38   06:05   06:29   17:28   17:51   18:19   30°   05:53   06:23   06:49   17:07   17:33   18:03   35°   06:02   06:33   07:01   16:56   17:23   17:55   40°   06:10   06:44   07:14   16:42   17:12   17:46   45°   06:20   06:57   07:30   16:26   16:59   17:36   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   58°   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   56°   07:00   07:56   08:51   15:05   16:01   16:56   16:59   17:36   16:26   16:59   17:36   16:26   16:59   17:36   16:26   16:59   17:36   16:37   17:20   16:44   17:25   16:37   17:20   17:30   17:15   16:30   17:15   156°   06:47   07:35   08:21   15:35   16:21   17:10   15:8°   06:53   07:45   08:35   15:21   16:12   17:03   16:56   17:30   17:15   16:56   17:30   17:15   16:56   17:30   17:15   16:56   17:30   17							
20° 05:38 06:05 06:29 17:28 17:51 18:19 30° 05:53 06:23 06:49 17:07 17:33 18:03 35° 06:02 06:33 07:01 16:56 17:23 17:55 40° 06:10 06:44 07:14 16:42 17:12 17:46 45° 06:20 06:57 07:30 16:26 16:59 17:36 S 50° 06:31 07:12 07:50 16:07 16:44 17:25 52° 06:36 07:19 07:59 15:57 16:37 17:20 54° 06:41 07:27 08:10 15:47 16:30 17:15 56° 06:47 07:35 08:21 15:35 16:21 17:10 S 60° 07:00 07:56 08:51 15:05 16:01 16:56  Lat.		05:06	05:32	05:55	18:02	18:24	
30° 05:53 06:23 06:49 17:07 17:33 18:03 35° 06:02 06:33 07:01 16:56 17:23 17:55 40° 06:10 06:44 07:14 16:42 17:12 17:46 45° 06:20 06:57 07:30 16:26 16:59 17:36 S 50° 06:31 07:12 07:50 16:07 16:44 17:25 52° 06:36 07:19 07:59 15:57 16:37 17:20 54° 06:41 07:27 08:10 15:47 16:30 17:15 56° 06:47 07:35 08:21 15:35 16:21 17:10 58° 06:53 07:45 08:35 15:21 16:12 17:03 S 60° 07:00 07:56 08:51 15:05 16:01 16:56  Lat.		05:22	05:49	06:11	17:45	18:08	18:34
35° 06:02 06:33 07:01 16:56 17:23 17:55 40° 06:10 06:44 07:14 16:42 17:12 17:46 45° 06:20 06:57 07:30 16:26 16:59 17:36    S 50° 06:31 07:12 07:50 16:07 16:44 17:25 52° 06:36 07:19 07:59 15:57 16:37 17:20 54° 06:41 07:27 08:10 15:47 16:30 17:15 56° 06:47 07:35 08:21 15:35 16:21 17:10 58° 06:53 07:45 08:35 15:21 16:12 17:03   S 60° 07:00 07:56 08:51 15:05 16:01 16:56    Lat.		05:38		06:29	17:28	17:51	18:19
40°   06:10   06:44   07:14   16:42   17:12   17:46   45°   06:20   06:57   07:30   16:26   16:59   17:36   S 50°   06:31   07:12   07:50   16:07   16:44   17:25   52°   06:36   07:19   07:59   15:57   16:37   17:20   54°   06:41   07:27   08:10   15:47   16:30   17:15   56°   06:47   07:35   08:21   15:35   16:21   17:10   58°   06:53   07:45   08:35   15:21   16:12   17:03   S 60°   07:00   07:56   08:51   15:05   16:01   16:56    Lat.		05:53	06:23	06:49	l	17:33	18:03
45°       06:20       06:57       07:30       16:26       16:59       17:36         S 50°       06:31       07:12       07:50       16:07       16:44       17:25         52°       06:36       07:19       07:59       15:57       16:37       17:20         54°       06:41       07:27       08:10       15:47       16:30       17:15         58°       06:53       07:45       08:35       15:21       16:12       17:03         S 60°       07:00       07:56       08:51       15:05       16:01       16:56         Moonrise         Wed       Thu       Fri       Wed       Thu       Fri         N 72°       Image: Colspan="6">Moonset         N 75°       Image: Colspan="6">Moonset         N 75°       <					l .		
\$ 50°   06:31							17:46
52° 06:36 07:19 07:59 15:57 16:37 17:20 54° 06:41 07:27 08:10 15:47 16:30 17:15 56° 06:47 07:35 08:21 15:35 16:21 17:10 58° 06:53 07:45 08:35 15:21 16:12 17:03 S 60° 07:00 07:56 08:51 15:05 16:01 16:56  Lat.	45°	06:20	06:57	07:30	16:26	16:59	17:36
56° 06:41 07:27 08:10 15:47 16:30 17:15 56° 06:47 07:35 08:21 15:35 16:21 17:10 58° 06:53 07:45 08:35 15:21 16:12 17:03 S 60° 07:00 07:56 08:51 15:05 16:01 16:56  Lat.		06:31	07:12	07:50	16:07	16:44	17:25
56°         06:47         07:35         08:21         15:35         16:21         17:10           58°         06:53         07:45         08:35         15:21         16:12         17:03           S 60°         07:00         07:56         08:51         15:05         16:01         16:56           Lat.         Moonrise         Wed         Thu         Fri         Wed         Thu         Fri           N 70°         Image: square squ	52°	06:36	07:19	07:59	15:57	16:37	17:20
S8° Oo°         06:53 O7:05 O7:56 O8:51         15:21 16:12 17:03         17:03 16:56           Moonrise         Moonset           Moonset           Moonset           Moonset           Moonset           Moonset           Moonset           Wed Thu Fri           N 70°           68°         ————————————————————————————————————	54°	06:41	07:27	08:10	15:47	16:30	17:15
S 60°         07:00         07:56         08:51         15:05         16:01         16:56           Moonset           Wed         Thu         Fri         Moonset           N 72°         Wed         Thu         Fri           N 70°         ———————————————————————————————————		06:47	07:35	08:21	15:35	16:21	17:10
Lat.         Moonrise         Wed         Thu         Fri         Wed         Thu         Fri           N 72°         Image: Control of the property		06:53	07:45	08:35	15:21	16:12	17:03
N 72° N 70°	<b>S</b> 60°	07:00	07:56	08:51	15:05	16:01	16:56
N 70° 68° 68° 60° 60° 60° 60° 60° 60° 60° 60° 60° 60	Lat.	)A/ I					
N 70° 68° 01:42 02:29	N 72°						
68°			=			_	
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N 58°         · · · ·         00:02         00:14         04:40         06:03         07:29           56°         23:45         · · · ·         00:01         05:03         06:20         07:42           54°         23:29         23:49         · · · ·         05:21         06:35         07:53           52°         23:16         23:39         23:56         05:37         06:48         08:02           50°         23:05         23:29         23:49         05:50         06:59         08:11           45°         22:41         23:10         23:34         06:17         07:22         08:29           N 40°         22:21         22:54         23:22         06:39         07:41         08:44           35°         22:05         22:41         23:12         06:57         07:56         08:57           30°         21:51         22:29         23:03         07:12         08:09         09:07           20°         21:27         22:09         22:47         07:38         08:32         09:07           N 10°         21:06         21:51         22:33         08:00         08:52         09:42           0°         20:47         21:34 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
56°         23:45         ···         00:01         05:03         06:20         07:42           54°         23:29         23:49         ···         05:21         06:35         07:53           52°         23:16         23:39         23:56         05:37         06:48         08:02           50°         23:05         23:29         23:49         05:50         06:59         08:11           45°         22:41         23:10         23:34         06:17         07:22         08:29           N 40°         22:21         22:54         23:22         06:39         07:41         08:44           35°         22:05         22:41         23:12         06:57         07:56         08:57           30°         21:51         22:29         23:03         07:12         08:09         09:07           20°         21:27         22:09         22:47         07:38         08:32         09:26           N 10°         21:06         21:51         22:33         08:00         08:52         09:42           0°         20:47         21:34         22:20         08:21         09:10         09:57           S 10°         20:27         21:18         <							
54°         23:29         23:49         ···         05:21         06:35         07:53           52°         23:16         23:39         23:56         05:37         06:48         08:02           50°         23:05         23:29         23:49         05:50         06:59         08:11           45°         22:41         23:10         23:34         06:17         07:22         08:29           N 40°         22:21         22:54         23:22         06:39         07:41         08:44           35°         22:05         22:41         23:12         06:57         07:56         08:57           30°         21:51         22:29         23:03         07:12         08:09         09:07           20°         21:27         22:09         22:47         07:38         08:32         09:20           N 10°         21:06         21:51         22:33         08:00         08:52         09:42           0°         20:47         21:34         22:20         08:21         09:10         09:57           S 10°         20:27         21:18         22:07         08:42         09:28         10:12           20°         20:06         21:00							
52°         23:16         23:39         23:56         05:37         06:48         08:02           50°         23:05         23:29         23:49         05:50         06:59         08:11           45°         22:41         23:10         23:34         06:17         07:22         08:29           N 40°         22:21         22:54         23:22         06:39         07:41         08:44           35°         22:05         22:41         23:12         06:57         07:56         08:57           30°         21:51         22:29         23:03         07:12         08:09         09:07           20°         21:27         22:09         22:47         07:38         08:32         09:26           N 10°         21:06         21:51         22:33         08:00         08:52         09:42           0°         20:47         21:34         22:20         08:21         09:10         09:57           S 10°         20:27         21:18         22:07         08:42         09:28         10:12           20°         20:06         21:00         21:53         09:04         09:47         10:27           35°         19:27         20:27							
50°         23:05         23:29         23:49         05:50         06:59         08:11           45°         22:41         23:10         23:34         06:17         07:22         08:29           N 40°         22:21         22:54         23:22         06:39         07:41         08:44           35°         22:05         22:41         23:12         06:57         07:56         08:57           30°         21:51         22:29         23:03         07:12         08:09         09:07           20°         21:27         22:09         22:47         07:38         08:32         09:26           N 10°         21:06         21:51         22:33         08:00         08:52         09:42           0°         20:47         21:34         22:20         08:21         09:10         09:57           S 10°         20:27         21:18         22:07         08:42         09:28         10:12           20°         20:06         21:00         21:53         09:04         09:47         10:27           30°         19:42         20:39         21:37         09:29         10:09         10:48           35°         19:27         20:27					1		
45°         22:41         23:10         23:34         06:17         07:22         08:29           N 40°         22:21         22:54         23:22         06:39         07:41         08:44           35°         22:05         22:41         23:12         06:57         07:56         08:57           30°         21:51         22:29         23:03         07:12         08:09         09:07           N 10°         21:27         22:09         22:47         07:38         08:32         09:26           N 10°         21:06         21:51         22:33         08:00         08:52         09:42           0°         20:47         21:34         22:20         08:21         09:10         09:57           S 10°         20:27         21:18         22:07         08:42         09:28         10:12           20°         20:06         21:00         21:53         09:04         09:47         10:27           30°         19:42         20:39         21:37         09:29         10:09         10:48           35°         19:27         20:27         21:28         09:44         10:22         10:56           40°         19:11         20:13	50°						
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45°     18:51     19:57     21:05     10:22     10:55     11:21       \$ 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							10:56
<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		_					11:07
52°   18:13	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
			40.00	00.40	11.00	11 07	
54°   17:59   19:15   20:34   11:15   11:38   11:55   15:6°   17:43   10:03   20:25   11:31   11:52   12:05				20:42			

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h	Aries	`	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	254°25.4	141°04.7	N23°43.5	213° 14.7	N15°19.6	137° 22.5	N21°32.1	241°53.8	N02°53.9			
1	269°27.9	156°04.0	43.1	228° 15.3	20.2	152° 24.4	32.0	256°56.1	54.0	Alpheratz	357°33.7	29°14.0
2	284°30.3	171°03.3	42.7	243°16.0	20.8	167° 26.4	31.9	271°58.4	54.0	Ankaa	353°06.2	-42°09.5
3	204° 30.3 299° 32.8	186°02.6	• • 42.2	258° 16.6	. 21.3	182°28.3	31.8	287°00.7	• • 54.1	Schedar	$349^{\circ}29.9$	56°40.7
4		201°01.9				102 20.3 197°30.3				Diphda	348°46.3	-17°50.4
	314°35.3		41.8	273°17.3	21.9		31.7	302°02.9	54.2	Achernar	$335^{\circ}19.7$	-57°05.9
5	329°37.7	216°01.2	41.3	288°17.9	22.5	212°32.2	31.7	317°05.2	54.2	Hamal	$327^{\circ}50.1$	23°35.2
6	344°40.2	231°00.5	N23°40.9	303°18.6	N15°23.1	227°34.2	N21°31.6	332°07.5	N02°54.3	Polaris	$313^{\circ}52.1$	89°22.3
7	359°42.7	245°59.8	40.5	318° 19.2	23.6	242°36.1	31.5	347°09.8	54.4	Acamar	315°11.3	-40°11.8
8	14°45.1	260°59.0	40.0	333° 19.9	24.2	257°38.1	31.4	2°12.1	54.4	Menkar	314°05.2	4°11.6
9	29°47.6	275°58.3	• • 39.6	348° 20.5	• • 24.8	272°40.0	• • 31.3	17° 14.3	• • 54.5	Mirfak	308°27.1	49°57.2
10	44°50.1	290°57.6	39.1	3°21.2	25.4	287°42.0	31.2	32°16.6	54.6	Aldebaran	290°38.6	16°33.7
11	59°52.5	305°56.9	38.7	18°21.8	25.9	302°43.9	31.1	47° 18.9	54.6			
12	74°55.0	320°56.2	N23°38.2	33°22.5	N15°26.5	317°45.9	N21°31.1	62°21.2	N02°54.7	Rigel	281°03.1	-8°10.3
13	89°57.5	335°55.5	37.8	48°23.1	27.1	332°47.8	31.0	77°23.5	54.8	Capella	280°20.7	46°01.4
14	104°59.9	350°54.8	37.3	63°23.8	27.7	347°49.8	30.9	92°25.8	54.8	Bellatrix	278°22.0	6°22.4
15	120°02.4	5°54.1	· · 36.9	78°24.4	• • 28.2	2°51.7	• • 30.8	107°28.0	• • 54.9	Elnath	278°00.8	28°37.8
16	135°04.8	20°53.4	36.4	93°25.1	28.8	17°53.7	30.7	122°30.3	55.0	Alnilam	275°36.9	-1°11.1
17	150°07.3	35°52.7	36.0	108° 25.7	29.4	32°55.6	30.6	137°32.6	55.0	Betelgeuse	270°51.2	7°24.7
	165°09.8				N15°29.9					Canopus	263°52.4	-52°42.6
18		50°52.0	N23°35.5	123°26.4		47°57.6	N21°30.5	152°34.9	N02°55.1	Sirius	258°25.5	-16°45.2
19	180°12.2	65°51.4	35.1	138°27.0	30.5	62°59.5	30.4	167°37.2	55.2	Adhara	255°05.3	-29°00.6
20	195°14.7	80°50.7	34.6	153°27.7	31.1	78°01.4	30.4	182°39.4	55.2	Procyon	244°49.9	5°09.4
21	210°17.2	95°50.0	• • 34.1	168°28.3	• • 31.6	93°03.4	• • 30.3	197°41.7	• • 55.3	Pollux	243°16.2	27°57.8
22	225°19.6	110°49.3	33.7	183°29.0	32.2	108°05.3	30.2	212°44.0	55.4	Avior	234° 14.7	-59°35.9
23	240°22.1	125°48.6	33.2	198°29.6	32.8	123°07.3	30.1	227°46.3	55.4	Suhail	234 14.7 222° 45.7	-39 33.9 -43°32.6
1/10%	255 07:01	1,07/40	1 1 m 2 06	,,O 7/ JO	.6′ m1.28	1,10/ 40	1/ m 1 07	1/2 2/ 40	1/ m0 96		222 45.7 221°38.5	-43 32.0 -69°49.8
ivier.p	ass. 07:01	$\nu$ -0.1 a-0	0.4′ m-3.96	$\nu$ 0.1 d0	.υ ιn1.28	ν1.9 α-0	.1′ m-1.87	ν2.3 d0	.1′ m0.86	Miaplacidus		
										Alphard	217°46.8	-8°46.5
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
0	255°24.6	140°47.9	N23°32.8	213°30.3	N15°33.4	138° 09.2	N21°30.0	242°48.6	N02°55.5	Dubhe	193°39.6	61°36.7
1	270°27.0	155°47.2	32.3	228° 30.9	33.9	153° 11.2	29.9	257°50.9	55.6	Denebola	182°23.7	14°25.5
		170°46.5								Gienah	175°42.3	-17°41.5
2	285°29.5		31.8	243°31.6	34.5	168° 13.1	29.8	272°53.1	55.6	Acrux	172°58.5	-63°15.1
3	300°31.9	185°45.8	• • 31.4	258°32.2	35.1	183°15.1	• • 29.8	287°55.4	• • 55.7	Gacrux	$171^{\circ}50.1$	-57°16.0
4	315°34.4	200°45.1	30.9	273°32.9	35.6	198° 17.0	29.7	302°57.7	55.8	Alioth	$166^{\circ}11.7$	55°49.2
5	330°36.9	215°44.4	30.4	288° 33.5	36.2	213°19.0	29.6	318°00.0	55.8	Spica	158° 20.9	-11°18.1
6	345°39.3	230°43.7	N23°30.0	303°34.2	N15°36.8	228° 20.9	N21°29.5	333°02.3	N02°55.9	Alkaid	152°50.8	49°11.0
7	0°41.8	245°43.0	29.5	318° 34.8	37.3	243°22.9	29.4	348°04.6	56.0	Hadar	148°33.9	-60°30.3
8	15°44.3	260°42.3	29.0	333°35.5	37.9	258° 24.8	29.3	3°06.8	56.0		147°55.9	-36°30.2
9	30°46.7	275°41.6	• • 28.5	348°36.1	• • 38.5	273°26.8	• • 29.2	18°09.1	• • 56.1		147 33.9 145°46.6	19°02.7
10	45°49.2	290°41.0	28.1	3°36.8	39.0	288°28.7	29.1	33°11.4	56.2	Arcturus		
11	60°51.7	305°40.3	27.6	18° 37.4	39.6	303°30.7	29.1	48° 13.7	56.2	Rigil Kent.	139°38.1	-60°56.9
12	75°54.1	320°39.6	N23°27.1	33°38.1	N15°40.2	318° 32.6	N21°29.0	63°16.0	N02°56.3	Kochab	137°18.8	74°02.9
13	90°56.6	335°38.9	26.6	48°38.7	40.7	333°34.5	28.9	78° 18.3	56.4	Zuben'ubi	136°54.4	-16°09.2
14	105°59.1	350°38.2	26.2	63°39.3	41.3	348°36.5	28.8	93°20.5	56.4	Alphecca	126°02.4	26°37.5
										Antares	$112^{\circ}14.0$	-26°29.5
15	121°01.5	5°37.5	• • 25.7	78°40.0	• • 41.9	3°38.4	• • 28.7	108°22.8	• • 56.5	Atria	$107^{\circ}06.6$	-69°04.5
16	136°04.0	20°36.8	25.2	93°40.6	42.4	18°40.4	28.6	123°25.1	56.6	Sabik	$102^{\circ}01.1$	-15°45.5
17	151°06.4	35°36.2	24.7	108°41.3	43.0	33°42.3	28.5	138°27.4	56.6	Shaula	96°08.4	-37°07.4
18	166°08.9	50°35.5	N23°24.3	123°41.9	N15°43.6	48° 44.3	N21°28.4	153° 29.7	N02°56.7	Rasalhague	95°57.1	12°32.4
19	181°11.4	65°34.8	23.8	138°42.6	44.1	63°46.2	28.4	168°32.0	56.8	Eltanin	90°41.1	51°29.0
20	196°13.8	80°34.1	23.3	153°43.2	44.7	78°48.2	28.3	183°34.2	56.8	Kaus Aust.	83°30.6	-34°22.3
21	211°16.3	95°33.4	• • 22.8	168°43.9	• • 45.2	93°50.1	• • 28.2	198°36.5	• • 56.9	Vega	80°32.0	38°48.4
22	226°18.8	110°32.7	22.3	183°44.5	45.8	108°52.1	28.1	213°38.8	57.0	Nunki	75°46.0	-26°15.8
23	241°21.2	125°32.0	21.8	198°45.2	46.4	123°54.0	28.0	228°41.1	57.0			
										Altair	61°58.6	8°56.2
Mer.p	ass. 06:57	$\nu$ -0.7′ $d$ -0	).5′ m-3.96	u0.6′ $d$ 0	.6′ m1.28	$\nu 1.9' \ d-0$	$.1^\prime$ m-1.86	$\nu$ 2.3′ d0	$.1^\prime$ m0.86	Peacock	53°03.5	-56°38.8
										Deneb	49°24.7	45°22.3
N4	CHA	CHA	Daa	CHA	Daa	CHA	Daa	GHA	Dos	Enif	33°37.5	9°59.7
Mon	GHA	GHA	Dec	GHA 212° 45 0	Dec	GHA	Dec		<b>Dec</b> N02°57.1	Al Na'ir	27°31.3	-46°49.7
0	256°23.7	140°31.4	N23°21.3	213° 45.8		138°55.9	N21°27.9	243°43.4		Fomalhaut	15°13.2	-29°28.7
1	271°26.2	155°30.7	20.8	228° 46.5	47.5	153°57.9	27.8	258° 45.7	57.1	Scheat	13°44.1	28°13.4
2	286°28.6	170°30.0	20.4	243° 47.1	48.1	168° 59.8	27.7	273°48.0	57.2	Markab	13°28.7	15°20.8
3	301°31.1	185°29.3	• • 19.9	258° 47.8	• • 48.6	184°01.8	• • 27.7	288°50.2	• • 57.3	1 000	C	
4	316°33.6	200°28.6	19.4	273°48.4	49.2	199°03.7	27.6	303°52.5	57.3	Jun 06 Sat	SHA	Mer.pass
5	331°36.0	215°28.0	18.9	288°49.1	49.7	214°05.7	27.5	318°54.8	57.4		246°39.3	14:36
6	346°38.5	230°27.3	N23°18.4	303°49.7	N15°50.3	229°07.6	N21°27.4	333°57.1	N02°57.5	Mars		09:47
7	1°40.9	245°26.6	17.9	318°50.3	50.9	244°09.6	27.3	348°59.4	57.5	Jupiter		14:49
8	16°43.4	260°25.9	17.4	333°51.0	51.4	259°11.5	27.2	4°01.7	57.6	Saturn	$347^{\circ}28.4$	07:51
9	31°45.9	275°25.3	· · 16.9	348°51.6	• • 52.0	274° 13.4	27.1	19°04.0	• • 57.7	T		
10	46°48.3	290°24.6	16.4	3°52.3	52.5	289° 15.4	27.0	34°06.2	57.7	Jun 07 Sun	SHA	Mer.pass
11	61°50.8	305°23.9	15.9	18°52.9	53.1	304° 17.3	26.9	49°08.5	57.8	Venus		14:37
12	76°53.3	320°23.2	N23°15.4	33° 53.6	N15°53.7	319° 19.3	N21°26.9	64° 10.8	N02°57.9		318°05.7	09:46
13	91°55.7	335°22.6	14.9	48° 54.2	54.2	334°21.2	26.8	79°13.1	57.9	Jupiter		14:45
										Saturn	$347^{\circ}24.0$	07:48
14	106°58.2	350°21.9	14.4	63°54.9	54.8	349°23.2	26.7	94°15.4	58.0			
15	122°00.7	5°21.2	• • 13.9	78°55.5	• • 55.3	4°25.1	• • 26.6	109° 17.7	• • 58.1	Jun 08 Mon	SHA	Mer.pass
16	137°03.1	20°20.5	13.4	93°56.2	55.9	19°27.1	26.5	124°20.0	58.1	Venus		14:39
17	152°05.6	35°19.9	12.9	108° 56.8	56.4	34°29.0	26.4	139°22.3	58.2	Mars	$317^{\circ}22.1$	09:45
18	167°08.0	50°19.2	N23°12.4	123°57.5	N15°57.0	49°30.9	N21°26.3	154°24.5	N02°58.2	Jupiter	242°32.3	14:42
19	$182^{\circ}10.5$	65°18.5	11.9	138°58.1	57.6	64°32.9	26.2	169° 26.8	58.3	Saturn		07:44
20	197°13.0	80°17.9	11.3	153° 58.7	58.1	79°34.8	26.1	184°29.1	58.4			
21	212°15.4	95°17.2	• • 10.8	168° 59.4	• • 58.7	94°36.8	26.1	199°31.4	• • 58.4	Horizont	al parallax	
22	227°17.9	$110^{\circ}16.5$	10.3	184°00.0	59.2	109°38.7	26.0	214°33.7	58.5		Venus:	0.1
23	242°20.4	125°15.8	09.8	199°00.7	59.8	124°40.7	25.9	229°36.0	58.6		Mars:	0.1
										·		
Mer.p	ass. 06:53	$\nu$ -0.7′ d-0	).5′ m-3.96	u0.6′ $d$ 0	.6′ m1.28	$\nu$ 1.9′ d-0	$.1^\prime$ m-1.86	$\nu$ 2.3′ d0	.1' m $0.86$			

h	Sur	า			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°21.1	$N22^{\circ}37.8$	294°16.0	13.9'	<b>S</b> 16°57.4	-11.9'	55.1'
1	195°21.0	38.1	308°48.9	13.9'	16°45.5	-11.9'	55.1'
2	210°20.9 225°20.8	38.3 •• 38.6	323°21.8 337°54.7	13.9' 14.0'	16°33.6 16°21.6	-12.0' -12.1'	55.2' 55.2'
3 4	240°20.7	38.9	352°27.7	14.0'	16°21.6	-12.1 -12.2'	55.2'
5	255°20.6	39.1	7°00.7	14.1'	15°57.3	-12.2'	55.2'
6	270°20.4	N22°39.4	21°33.8	14.1'	S15°45.1	-12.3'	55.3'
7	285°20.3	39.6	36°06.9	14.1'	15°32.7	-12.4'	55.3'
8	300°20.2	39.9	50°40.0	14.2'	15°20.3	-12.5'	55.3'
9 10	315°20.1 330°20.0	· · 40.1 40.4	65°13.2 79°46.4	14.2' 14.2'	15°07.9 14°55.3	-12.5' -12.6'	55.3' 55.4'
11	345°19.9	40.7	94°19.6	14.3'	14° 42.7	-12.7'	55.4'
12	0°19.8	N22°40.9	108°52.9	14.3'	<b>S</b> 14°30.0	-12.8'	55.4'
13	15°19.6	41.2	123°26.2	14.3'	14° 17.3	-12.8'	55.4'
14	30°19.5 45°19.4	41.4 •• 41.7	137°59.5 152°32.9	14.4' 14.4'	14°04.4 13°51.5	-12.9' -13.0'	55.5' 55.5'
15 16	45 19.4 60°19.3	41.7	152 32.9 167°06.2	14.4 14.4'	13° 38.6	-13.0'	55.5'
17	75°19.2	42.2	181°39.7	14.4'	13° 25.5	-13.1'	55.5'
18	90°19.1	N22°42.4	196°13.1	14.5'	<b>S</b> 13°12.4	-13.2'	55.6'
19	105°19.0	42.7	210°46.6	14.5'	12°59.3	-13.2'	55.6'
20	120°18.8 135°18.7	42.9 • • 43.2	225°20.0 239°53.6	14.5'	12°46.0 12°32.7	-13.3'	55.6' 55.6'
21 22	135 18.7 150°18.6	43.4	259 55.0 254°27.1	14.5' 14.6'	12 32.7 12°19.4	-13.4' -13.4'	55.7'
23	165° 18.5	43.6	269°00.6	14.6'	12°05.9	-13.5'	55.7'
	SD = 15.8'	d = 0.3'			D = 15.0'		
					15.0		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	180°18.4 195°18.3	N22°43.9 44.1	283°34.2 298°07.8	14.6' 14.6'	\$11°52.4 11°38.9	-13.6' -13.6'	55.7' 55.7'
2	195°18.3 210°18.1	44.1 44.4	298°07.8 312°41.4	14.6'	11° 38.9 11° 25.3	-13.6 -13.7'	55.7° 55.8'
3	225°18.0	• • 44.6	327°15.1	14.7'	11°11.6	-13.7'	55.8'
4	240°17.9	44.9	341°48.7	14.7'	$10^{\circ}57.9$	-13.8'	55.8'
5	255°17.8	45.1	356°22.4	14.7'	10°44.1	-13.9'	55.9'
6 7	270°17.7 285°17.6	N22°45.3 45.6	10°56.1 25°29.8	14.7' 14.7'	\$10°30.2 10°16.3	-13.9' -14.0'	55.9' 55.9'
8	300°17.4	45.0 45.8	25 29.6 40°03.5	14.7'	10 10.3 10°02.4	-14.0'	56.0'
9	315°17.3	• • 46.1	54°37.2	14.7'	09°48.3	-14.1'	56.0'
10	330°17.2	46.3	69°10.9	14.7'	09°34.3	-14.1'	56.0'
11	345°17.1	46.5	83°44.7	14.8'	09°20.1	-14.2'	56.0'
12 13	0°17.0 15°16.9	N22°46.8 47.0	98°18.4 112°52.2	14.8' 14.8'	\$09°06.0 08°51.7	-14.2' -14.3'	56.1' 56.1'
14	30°16.7	47.0	112 52.2 127°26.0	14.8'	08°37.4	-14.3'	56.1
15	45°16.6	• • 47.5	141°59.7	14.8'	$08^{\circ}23.1$	-14.4'	56.2'
16	60°16.5	47.7	156°33.5	14.8'	08°08.7	-14.4'	56.2'
17	75°16.4 90°16.3	48.0 N22°48.2	171°07.3 185°41.1	14.8'	07°54.3 507°39.8	-14.5'	56.2'
18 19	90 16.3 105°16.1	N22 48.2 48.4	200°14.8	14.8' 14.8'	07°25.3	-14.5' -14.6'	56.3' 56.3'
20	120°16.0	48.6	214°48.6	14.8'	07°10.7	-14.6'	56.3'
21	135°15.9	• • 48.9	229°22.4	14.8'	$06^{\circ}56.0$	-14.7'	56.4'
22	150°15.8	49.1	243°56.2	14.8'	06°41.4	-14.7'	56.4
23	165°15.7	49.3	258°29.9	14.8'	06°26.7	-14.8'	56.4'
	SD = 15.8'	d = 0.2'		SI	O = 15.2'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°15.5	N22°49.6	273°03.7	14.8'	<b>S</b> 06°11.9	-14.8'	56.5'
1	195°15.4	49.8	287°37.5	14.8'	05°57.1	-14.8'	56.5'
2	210°15.3 225°15.2	50.0 •• 50.2	302°11.2 316°45.0	14.7' 14.7'	05°42.3 05°27.4	-14.9' -14.9'	56.5' 56.6'
4	240°15.1	50.2	331° 18.7	14.7'	05° 12.4	-14.9 -15.0'	56.6'
5	255°14.9	50.7	$345^{\circ}52.4$	14.7'	04°57.5	-15.0'	56.6'
6	270°14.8	N22°50.9	0°26.1	14.7'	S04°42.5	-15.0'	56.7'
7	285°14.7 300°14.6	51.1	14°59.8 29°33.5	14.7'	04°27.4 04°12.4	-15.1'	56.7'
8 9	300°14.6 315°14.5	51.4 •• 51.6	29°33.5 44°07.2	14.7' 14.6'	04°12.4 03°57.2	-15.1' -15.1'	56.7' 56.8'
10	330°14.3	51.8	58°40.8	14.6'	03°42.1	-15.2'	56.8'
11	345°14.2	52.0	73°14.5	14.6'	03°26.9	-15.2'	56.8'
12	0°14.1	N22°52.3	87°48.1	14.6'	\$03°11.7	-15.2'	56.9'
13 14	15°14.0 30°13.9	52.5 52.7	102°21.7 116°55.2	14.6' 14.5'	02°56.4 02°41.2	-15.3' -15.3'	56.9' 56.9'
14 15	30 13.9 45°13.7	52.7	110 55.2 131°28.8	14.5'	02 41.2 02°25.9	-15.3'	50.9 57.0'
16	60°13.6	53.1	$146^{\circ}02.3$	14.5'	$02^{\circ}10.5$	-15.4	57.0'
17	75°13.5	53.3	160°35.8	14.5'	01°55.1	-15.4'	57.0'
18	90°13.4	N22°53.6	175°09.3	14.4'	S01°39.7	-15.4'	57.1'
19 20	105°13.3 120°13.1	53.8 54.0	189°42.7 204°16.1	14.4' 14.4'	01°24.3 01°08.9	-15.4' -15.5'	57.1' 57.1'
21	135°13.0	• • 54.2	218°49.5	14.4	01 08.9 00°53.4	-15.5'	57.1
22	150°12.9	54.4	233°22.8	14.3'	00°37.9	-15.5'	57.2'
23	165°12.8	54.6	247°56.1	14.3'	00°22.4	-15.5'	57.3'
	SD = 15.8'	d = 0.2'		SI	O = 15.4'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
<b>N</b> 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	////
$N 58^{\circ}$	////	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
		Moonris			Moonset	

Lat.		Moonris	е		Moonset	
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°	02:51	01:45	01:06	06:34	09:12	11:25
N 70°	02:07	01:26	00:58	07:16	09:29	11:30
68°	01:38	01:11	00:51	07:43	09:42	11:34
66°	01:16	00:59	00:45	08:04	09:53	11:37
64°	00:58	00:49	00:40	08:21	10:01	11:40
62°	00:44	00:40	00:36	08:34	10:09	11:43
60°	00:31	00:32	00:32	08:46	10:15	11:45
<b>N</b> 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	f 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		

CHA	h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
19	T	CHA	CHA	Dos	CHA	Das	CHA	Das		Das		CHA	Dos
277793.3 1867145 688 297020 000 1867445 73 296700 857 286700 357040 3570												эна	Dec
2 987728 170118 683 24700 010 107405 75 24763 848 586 54764 12 107405 12 107											Alpheratz	357°33.6	29°14.0
20											Ankaa	353°06.1	-42°09.5
## 117*127 200*12.5 07.2 27*05.9 0.24 309*5.4 5.94 300*47.4 5.99  **********************************											Schedar	349°29.9	56°40.7
Series 3. 20114 S. 0.07											Diphda	348°46.3	-17°50.4
\$\frac{1}{2} \frac{2}{2} \frac											Achernar	335°19.7	-57°05.9
7 2*00. 26*10.5 05.7 33*008.0 04.2 24*95.2 25.2 34*9*54.3 59.1 4.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1											Hamal	$327^{\circ}50.1$	23°35.2
17-42.5   2007 08   0.51   331-05.5   0.48   2007-83.1   25.1   4*56.6   59.1											Polaris	313°51.3	89°22.3
9 32°450											Acamar	$315^{\circ}11.3$	-40°11.8
11   07495   200   085   014   47078   059   200   024   035   12   933   Meller   12   10   10   10   10   10   10   10											Menkar	$314^{\circ}05.2$	4°11.6
11 62°469 306°079 03.6 19°084 66.8 36°640 24.8 50°03.5 59.3											Mirfak	308°27.0	49°57.2
13 07154 200702 N23*030 34*081 N85*070 200*085 N9*070 205 030*070											Aldebaran	290°38.6	16°33.7
92"94-9 38"960-5 02.5 49"097 07.5 38"078 24.6 80"08.0 99.4											Rigel	281°03.1	-8°10.3
107-873											Capella	280°20.7	46°01.4
15   1227508   75   75   75   75   75   75   75   7											Bellatrix	278°22.0	6°22.4
19 138 '023 '027 '027 '04											Elnath	278°00.8	28°37.8
18   16   16   70   25   70   25   70   25   70   25   70   25   70   25   70   25   70   25   25   25   25   25   25   25   2											Alnilam	275°36.9	-1°11.1
18   18   18   19   18   19   18   19   18   18											Betelgeuse	$270^{\circ}51.2$	7°24.7
19   183°096   69   593   139°136   10.8   65°195   241   10°21.8   598   598   139°136   10.8   65°195   241   10°21.8   598   598   139°136   221°21.8   221°21.1   23°21.8											Canopus	263°52.4	-52°42.6
198*12.1   80°01.9   58.8   156*14.2   11.4   80°21.4   24.0   185*24.1   99.9   64.0   25*9.9   22.1   231*4.6   96°01.3   58.2   100°19.9   11.9   95°23.4   23.9   200°40.6   02°59.9   00°10.0   231*14.7   232*221*17.0   110°0.6   57.7   106°15.7   130°15.5   110°5.5   23.1   23.9   23.7   23.9   200°10.0   231*14.7   25*3.2   231*12.5   231*20.9											Sirius	258° 25.5	-16°45.2
213714.6   97013.3   58.2   196714.9   11975.3   23.8   21576.6   03°0.00   1.0   22.2   22.2   23.7   23.8   21576.6   03°0.00   03.1   23.8   21572.2   23.7   230°3.09   00.1   23.8   23.											Adhara	255°05.3	-29°00.6
22 288°17.0   110°006   57.7   188°15.5   125   110°25.3   23.8   215°28.6   03°00.0											Procyon	244°49.9	5°09.4
Mer.pass. 06:49   \( Delta Policy of the policy of											Pollux	243°16.2	27°57.8
Mer. pass. 06.49											Avior	234°14.7	-59°35.9
Mod   GHA   GHA   Dec   GHA													I .
Wed         CHA         GHA         Dec         GHA         Dec         GHA         Dec         Dubhe         129/33.3         127/93.3 <td>Mer.p</td> <td>ass. 06:49</td> <td><math>\nu</math>-0.7′ d-0</td> <td>.5′ m-3.97</td> <td>u0.6′ d0</td> <td>.6′ m1.28</td> <td><math>\nu 1.9' \ d-0</math></td> <td><math>.1^\prime</math> m-1.86</td> <td><math>\nu 2.3' \ d0</math></td> <td><math>.1^\prime</math> m0.85</td> <td></td> <td></td> <td></td>	Mer.p	ass. 06:49	$\nu$ -0.7′ d-0	.5′ m-3.97	u0.6′ d0	.6′ m1.28	$\nu 1.9' \ d-0$	$.1^\prime$ m-1.86	$\nu 2.3' \ d0$	$.1^\prime$ m0.85			
Color   Col		-	-					_			· ·		
289°220   139°953   N22°956   214°168   N16°136   140°392   N21°236   249°332   N03°00.1   140°392   120°355   00.2   120°355   120°35	Wed	GHΔ	GHA	Dec	GHA	Dec	GHA	Dec	СН⊅	Dec	_		
2 280°64 9 169°80 6 55.1 229°17.4 14.1 155°31.1 235 260°35.5 00.2 260°35.5 00.2 260°35.5 00.2 260°35.5 00.2 260°35.5 00.5 00.5 00.5 00.5 00.5 00.5 00.5													
2 288°26 9 160°86 0 55.5 244°81 1 14.7 170°331 2.35 275°37.8 0.03 3 30°3°24 1 197°35 5.55 246°18.1 14.7 170°331 2.35 275°37.8 0.03 3 30°3°24 1 197°35 5.55 246°18.1 14.7 170°331 2.35 2.25 275°37.8 0.03 3 30°3°24 1 197°35 5.55 246°18.1 14.7 18.55 2.35 30°36.9 3.23 30°44.7 0.04 1.05°36 1 197°36 5.0 1.05°36 1 197°36 1 19													
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\$\frac{4}{5}\$\frac{318}{318}\$\frac{31}{318}\$\frac{199}{567}\$\frac{5}{5}\$\frac{274}{5}\frac{194}{5}\frac{1}{6}\$\frac{230}{5}\frac{6}{348}\frac{9}{368}\$\frac{2}{229}\frac{25}{5}\frac{1}{348}\frac{7}{5}\frac{2}{34}\frac{1}{348}\frac{7}{5}\frac{2}{348}\frac{7}{3}\frac{7}{32}\frac{2}{229}\frac{2}{24}\frac{7}{3}\frac{7}{3}\frac{7}{32}\frac{2}{24}\frac{7}{3}\frac{7}{3}\frac{7}{3}\frac{7}{32}\frac{7}{2}\frac{7}{3}\frac{7}{													
5 333°343 214°560 539 280°200 163 215°389 232 320°44.7 00.4 6 348°368 220°554 N22°534 30°206 N6169 230°306 N21°231 335°470 033°055 7 3°392 244°547 528 319°213 17.4 245°42.8 230 350°40.3 00.6 8 18°41.7 25°9541 523 334°219 18.0 260°447 22.9 5°51.6 00.6 9 33°44.1 776°354 51.7 349°22.6 18.5 275°46.6 22.8 20°53.9 00.7 10 48°46.6 280°52.8 51.2 4°23.2 191 220°48.6 22.7 35°56.1 00.8 11 63°49.1 304°52.1 50.6 19°23.9 19.6 305°90.5 22.6 50°58.4 00.8 12 78°51.5 310°51.5 N22°50.1 34°24.5 110°20.2 320°52.5 N21°22.6 50°58.4 00.8 13 93°34.0 334°50.8 49.5 49°25.1 20.7 335°84.4 22.5 81°03.0 00.9 14 108°56.5 340°50.2 49.0 64°25.8 21.2 350°65.3 22.4 96°05.3 01.0 15 123°58.9 44°95 48.4 79°26.4 21.8 5′58.3 22.3 111°07.6 01.1 16 139°01.4 10°48.9 47.8 94°27.1 22.3 21°00.2 22.2 126°09.9 01.1 18 160°63 40°47.6 N22°46.7 102′22.3 21°00.2 22.2 116°11.2 21.2 01.2 19 184°08.8 447.5 N22°46.1 42′22.8 N16°23.4 5′50°4.1 N21′22.0 11.2 19 184°08.6 447.6 N22°46.4 45.9 106°40.3 11.8 166°19.1 11.6 80°13. 18 160°63 40°47.6 N22°46.7 45.9 166°50.3 12.9 171°16.8 01.3 166°14.5 N30°12.2 12.2 12.2 12.2 12.2 12.2 12.2 12.2													
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13   93*64.0   336*95.0   336*95.1   207   330*954.5   225   81*03.0   0.09     14   108*56.5   349*50.2   49.5   49.5   49.5   49.5   49.5   49.5   49.5   49.5     15   123*88.9   49.5   48.4   79*26.4   21.8   5*98.3   22.3   1110*7.6   0.11     16   139*01.4   19*48.9   47.8   94*27.1   22.3   21*00.2   22.2   126*09.9   0.11     17   15*03.9   34*43.3   47.3   109*27.7   22.9   36*02.2   22.1   141*12.2   0.12     18   169*06.3   49*47.6   N22*46.7   124*28.4   N16*23.4   51*04.1   N21*22.0   156*14.5   N03*01.2     19   184*08.3   64*7.0   46.2   139*29.0   24.0   66*06.0   21.9   171*16.8   0.13     21   214*13.7   94*63.3   45.6   154*29.6   24.5   81*08.0   21.8   186*19.1   0.14     22   229*16.2   109*45.0   44.5   184*30.9   25.6   111*11.8   21.6   216*23.7   0.15     Mer.pass. 06:45   \$\nu_{\nu, 0.77} \tau_{\nu,	11	63°49.1	304°52.1	50.6	19°23.9	19.6	305°50.5	22.6	50°58.4	8.00			
14 108°66.5 349°50.2 49.0 64°25.8 21.2 30°56.3 22.4 96°06.3 00.0 9 1.1 1.1 11°07.6 0.1 1.1 11°07.7 0.1 11°07.8 0.1 11°	12	78°51.5	319°51.5	N22°50.1	34°24.5	N16°20.2	320°52.5	N21°22.6	66°00.7	N03°00.9	l.		
14 108°56.5 349°50.2 49.0 64°25.8 21.2 350°56.3 22.4 96°05.3 01.0 Artares 112°14.0 26°29.5 15 12758.9 4°94.5 48.4 79°26.4 21.8 5°58.3 22.3 110°70.6 0.01.1 Artare 112°14.0 26°29.5 16 139°01.4 19°48.9 47.8 94°27.1 22.3 21°00.2 22.2 126°09.9 01.1 Sabik 107°01.6 6.9 69°04.5 17 154°03.9 34°48.3 47.3 109°27.7 22.9 36°02.2 22.1 141°12.2 01.2 51.6 14.5 107°0.6 6.9 69°04.5 11 15°45.5 18 169°06.3 49°47.6 N22°46.7 124°28.4 N16°23.4 51°04.1 N21°22.0 156°14.5 N05°01.2 51.0 14.0 14.0 14.0 14.0 14.0 14.0 14.0 1	13	93°54.0	334°50.8	49.5	49°25.1	20.7	335°54.4	22.5	81°03.0	00.9			
15 123°88.9 4°49.5 · · · · · · · · · · · · · · · · · · ·	14	108°56.5	349°50.2	49.0	64°25.8	21.2	350°56.3	22.4	96°05.3	01.0	· ·		
16   139°01.4   19°48.9   47.8   94°27.1   22.3   21°00.2   22.2   126°09.9   01.1   15°45.5   17°45.9   17°45.9   18°40.3   14°12.2   01.2   14°12.2   01.2   14°12.2   01.2   15°14.5   18°40.3   14°12.2   01.2   15°14.5   18°40.3   14°12.2   01.2   15°14.5   18°40.3   14°12.2   01.2   15°14.5   18°30.1   18°50.1   18°50.3   18°50.1   18°50.3   18°50.1   18°50.3   18°50.1   18°50.3   18°50.3   18°50.3   18°50.1   18°50.3   18°50.3   18°50.1   18°50.3	15	123°58.9	4°49.5	• • 48.4	79°26.4	• • 21.8	5°58.3	• • 22.3	111°07.6	•• 01.1	l l		
18   169°06.3   34°48.3   47.3   109°27.7   22.9   36°02.2   22.1   141°12.2   01.2     18   186°06.3   49°47.6   N22°45.7   124°28.4   N16°23.4   51°04.1   N21°22.0   156°14.5   N03°01.2     19   184°08.8   64°47.0   46.2   139°29.0   24.0   66°06.0   21.9   171°16.8   01.3     21   214°13.7   94°6.3   45.6   154°20.6   24.5   81°08.0   21.8   816°19.1   01.4     22   229°16.2   109°45.0   44.5   184°30.9   25.6   111°11.8   21.6   216°23.7   01.5     23   244°18.6   124°44.4   43.9   199°31.6   26.1   126°13.8   21.5   231°26.0   01.5     Mer.pass. 06:45   \( \nu.07' \) d-0.5′ m-3.97   \( \nu.06' \) d0.5′ m1.28   \( \nu.07' \) d-0.5′ m-3.97   \( \nu.06' \) d0.5′ m1.28   \( \nu.07' \) d-0.5′ m-3.97   \( \nu.06' \) d0.5′ m1.28   \( \nu.07' \) d-0.5′ m-3.97   \( \nu.06' \) d0.5′ m1.28   \( \nu.07' \) d-0.5′ m-3.97   \( \nu.06' \) d0.5′ m1.28   \( \nu.07' \) d-0.5′ m-3.97   \( \nu.06' \) d0.5′ m1.28   \( \nu.07' \) d-0.5′ m-3.97   \( \nu.06' \) d0.5′ m1.28   \( \nu.07' \) d-0.5′ m-3.97   \( \nu.06' \) d0.5′ m1.28   \( \nu.07' \) d-0.5′ m-3.97   \( \nu.06' \) d0.5′ m1.28   \( \nu.07' \) d-0.5′ m-3.97   \( \nu.06' \) d0.5′ m1.28   \( \nu.07' \) d-0.5′ m-3.97   \( \nu.06' \nu.06' \) d0.5′ m1.28   \( \nu.07' \nu.05' \nu.07' \) d-0.5′ m-3.97   \( \nu.07' \nu.05' \nu.07' \nu.07' \nu.05' \nu.07' \nu.05' \nu.07' \nu.05' \nu.07' \nu.07' \nu.05' \nu.07' \nu.05' \nu.07' \nu.07' \nu.07' \nu.05' \nu.07' \nu.07' \nu.05' \nu.07' \nu.07' \nu.05' \nu.07'	16	139°01.4	19°48.9	47.8	94°27.1	22.3	$21^{\circ}00.2$	22.2	126°09.9	01.1			
19   184°08.8   64°47.0   46.2   139°29.0   24.0   66°06.0   21.9   171°16.8   01.3											l l		
19   184°08.8   64°47.0   46.2   139°29.0   24.0   66°06.0   21.9   171°16.8   01.3   186°19.1   01.4   14.5   186°29.6   24.5   81°08.0   21.8   186°19.1   01.4   14.5   186°29.6   24.5   81°08.0   21.8   186°19.1   01.4   14.5   186°29.6   24.5   81°08.0   21.8   186°19.1   01.4   14.5   186°29.6   24.5   81°08.0   21.8   186°19.1   01.4   14.5   186°29.6   24.5   81°08.0   21.8   186°19.1   01.4   14.5   186°29.6   24.5   81°08.0   21.8   186°19.1   01.4   14.5   186°19.1   01.4   14.5   186°19.1   01.4   14.5   186°19.1   01.4   14.5   186°19.1   01.5   18.5   01.5   18.5   01.5   18.5   01.5   18.5   01.5   18.5   01.5   18.													
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Thu GHA GHA OPE GHA Dec GHA DE	23	244°18.6	124°44.4	43.9	199°31.6	26.1	126°13.8	21.5	231°26.0	01.5	Altair	$61^{\circ}58.6$	8°56.2
Thu GHA GHA Dec GHA DE	Mer.p	ass. 06:45	$\nu$ -0.7' d-0	.5′ m-3.97	$\nu 0.6' d0$	.5′ m1.28	$\nu 1.9' d-0$	.1′ m-1.85	$\nu 2.3' d0$	.1′ m0.85	Peacock	53°03.5	-56°38.8
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9 34°43.3 274°88.0 · · · 38.2 349°38.0 · · · 31.5 276°33.2 · · · 20.6 21°48.9 · · · 02.2 10 49°45.7 289°37.4 37.6 4°38.6 32.1 291°35.1 20.5 36°51.2 02.2 11 64°48.2 304°36.8 37.1 19°39.3 32.6 306°37.0 20.5 51°53.5 02.3 12 79°50.7 319°36.1 N22°36.5 34°39.9 N16°33.1 321°39.0 N21°20.4 66°55.8 N03°02.3 13 94°53.1 334°35.5 35.9 49°40.5 33.7 336°40.9 20.3 81°58.1 02.4 14 109°55.6 349°34.9 35.3 64°41.2 34.2 351°42.8 20.2 97°00.4 02.5 15 124°58.1 4°34.2 · · · 34.8 79°41.8 · · · 34.8 6°44.8 · · · 20.1 112°02.7 · · · 02.5 16 140°00.5 19°33.6 34.2 94°42.5 35.3 21°46.7 20.0 127°05.0 02.6 17 155°03.0 34°33.0 33.6 109°43.1 35.8 36°48.7 19.9 142°07.3 02.6 18 170°05.5 49°32.3 N22°33.0 124°43.7 N16°36.4 51°50.6 N21°19.8 157°09.6 N03°02.7 19 185°07.9 64°31.7 32.4 139°44.4 36.9 66°52.5 19.7 172°11.9 02.8 20 200°10.4 79°31.1 31.8 154°45.0 37.4 81°54.5 19.6 187°14.2 02.8 21 215°12.9 94°30.4 · · · 31.2 169°45.7 · · · 38.0 96°56.4 · · · 19.5 202°16.5 · · · 02.9 22 230°15.3 109°29.8 30.7 184°46.3 38.5 111°58.3 19.4 217°18.8 02.9 22 230°15.3 109°29.8 30.7 184°46.3 38.5 111°58.3 19.4 217°18.8 02.9 23 245°17.8 124°29.2 30.1 199°46.9 39.0 127°00.3 19.3 232°21.1 03.0   34°43.3 274°38.0 · · · · · · · · · · · · · · · · · · ·													
10											Saturn	347 13.4	07.40
11 64°48.2 304°36.8 37.1 19°39.3 32.6 306°37.0 20.5 51°53.5 02.3 12 79°50.7 319°36.1 N22°36.5 34°39.9 N16°33.1 321°39.0 N21°20.4 66°55.8 N03°02.3 13 94°53.1 334°35.5 35.9 49°40.5 33.7 336°40.9 20.3 81°58.1 02.4 14 109°55.6 349°34.9 35.3 64°41.2 34.2 351°42.8 20.2 97°00.4 02.5 15 124°58.1 4°34.2 · 34.8 79°41.8 · 34.8 6°44.8 · 20.1 112°02.7 · 02.5 16 140°00.5 19°33.6 34.2 94°42.5 35.3 21°46.7 20.0 127°05.0 02.6 17 155°03.0 34°33.0 33.6 109°43.1 35.8 36°48.7 19.9 142°07.3 02.6 18 170°05.5 49°32.3 N22°33.0 124°43.7 N16°36.4 51°50.6 N21°19.8 157°09.6 N03°02.7 19 185°07.9 64°31.7 32.4 139°44.4 36.9 66°52.5 19.7 172°11.9 02.8 20 200°10.4 79°31.1 31.8 154°45.0 37.4 81°54.5 19.6 187°14.2 02.8 21 215°12.9 94°30.4 · 31.2 169°45.7 · 38.0 96°56.4 · 19.5 202°16.5 · 02.9 22 230°15.3 109°29.8 30.7 184°46.3 38.5 111°58.3 19.4 217°18.8 02.9 23 245°17.8 124°29.2 30.1 199°46.9 39.0 127°00.3 19.3 232°21.1 03.0     Venus 241°37.3 14:41  Mars 315°54.8 09:42  Jupiter 242°07.2 14:36  Saturn 347°11.3 07:37   Jun 11 Thu SHA Mer.pass  Venus 240°22.7 14:42  Mars 315°54.8 09:42  Jupiter 242°07.2 14:36  Saturn 347°11.1 09:41  Jupiter 241°57.3 16:411  O9:43  Mars 315°54.8 09:42  Jupiter 242°07.2 14:36  Saturn 347°11.1 09:41  Jupiter 241°37.3 16:411  O9:43  Mars 315°54.8 09:42  Jupiter 242°07.2 14:36  Saturn 347°11.1 09:41  Jupiter 241°37.3 16:411  O9:43  Mars 315°54.8 09:42  Jupiter 242°07.2 14:36  Saturn 347°11.1 09:41  Jupiter 241°37.3 16:411  O9:41  O7:37													Mer.pass
12													
13 94°53.1 334°35.5 35.9 49°40.5 33.7 336°40.9 20.3 81°58.1 02.4 109°55.6 349°34.9 35.3 64°41.2 34.2 351°42.8 20.2 97°00.4 02.5 15 124°58.1 4°34.2 ··· 34.8 79°41.8 ··· 34.8 6°44.8 ··· 20.1 112°02.7 ··· 02.5 16 140°00.5 19°33.6 34.2 94°42.5 35.3 21°46.7 20.0 127°05.0 02.6 17 155°03.0 34°33.0 33.6 109°43.1 35.8 36°48.7 19.9 142°07.3 02.6 18 170°05.5 49°32.3 N22°33.0 124°43.7 N16°36.4 51°50.6 N21°19.8 157°09.6 N03°02.7 19 185°07.9 64°31.7 32.4 139°44.4 36.9 66°52.5 19.7 172°11.9 02.8 20 200°10.4 79°31.1 31.8 154°45.0 37.4 81°54.5 19.6 187°14.2 02.8 21 215°12.9 94°30.4 ··· 31.2 169°45.7 ··· 38.0 96°56.4 ··· 19.5 202°16.5 ··· 02.9 22 230°15.3 109°29.8 30.7 184°46.3 38.5 111°58.3 19.4 217°18.8 02.9 22 230°15.3 124°29.2 30.1 199°46.9 39.0 127°00.3 19.3 232°21.1 03.0 14       34°58.1 02.4											l l		
14 109°55.6 349°34.9 35.3 64°41.2 34.2 351°42.8 20.2 97°00.4 02.5 15 124°58.1 4°34.2 ··· 34.8 79°41.8 ··· 34.8 6°44.8 ··· 20.1 112°02.7 ··· 02.5 16 140°00.5 19°33.6 34.2 94°42.5 35.3 21°46.7 20.0 127°05.0 02.6 17 155°03.0 34°33.0 33.6 109°43.1 35.8 36°48.7 19.9 142°07.3 02.6 18 170°05.5 49°32.3 N22°33.0 124°43.7 N16°36.4 51°50.6 N21°19.8 157°09.6 N03°02.7 19 185°07.9 64°31.7 32.4 139°44.4 36.9 66°52.5 19.7 172°11.9 02.8 20 200°10.4 79°31.1 31.8 154°45.0 37.4 81°54.5 19.6 187°14.2 02.8 21 215°12.9 94°30.4 ··· 31.2 169°45.7 ··· 38.0 96°56.4 ··· 19.5 202°16.5 ··· 02.9 22 230°15.3 109°29.8 30.7 184°46.3 38.5 111°58.3 19.4 217°18.8 02.9 23 245°17.8 124°29.2 30.1 199°46.9 39.0 127°00.3 19.3 232°21.1 03.0     Saturn 34/°11.3 07:37     Jun 11 Thu SHA Mer.pass     Venus 240°22.7 14:42     Mars 315°11.1 09:41     Jupiter 241°54.6 14:33     Saturn 347°07.1 07:33     Horizontal parallax     Venus 0.1     Mars: 0.1													
15											Saturn	347°11.3	07:37
16       140°00.5       19°33.6       34.2       94°42.5       35.3       21°46.7       20.0       127°05.0       02.6       Venus 240°22.7       14:42         17       155°03.0       34°33.0       33.6       109°43.1       35.8       36°48.7       19.9       142°07.3       02.6       Mars 315°11.1       09:41         18       170°05.5       49°32.3       N22°33.0       124°43.7       N16°36.4       51°50.6       N21°19.8       157°09.6       N03°02.7       Jupiter 241°54.6       14:33         19       185°07.9       64°31.7       32.4       139°44.4       36.9       66°52.5       19.7       172°11.9       02.8       Saturn 347°07.1       07:33         20       200°10.4       79°31.1       31.8       154°45.0       37.4       81°54.5       19.6       187°14.2       02.8         21       215°12.9       94°30.4       · 31.2       169°45.7       · 38.0       96°56.4       · 19.5       202°16.5       · 02.9       Horizontal parallax         22       230°15.3       109°29.8       30.7       184°46.3       38.5       111°58.3       19.4       217°18.8       02.9       Venus:       0.1         23       245°17.8       124°29.2       <											Jun 11 Thu	SHA	Mer.nass
17													
18       170°05.5       49°32.3       N22°33.0       124°43.7       N16°36.4       51°50.6       N21°19.8       157°09.6       N03°02.7       Jupiter 241°54.6       14:33         19       185°07.9       64°31.7       32.4       139°44.4       36.9       66°52.5       19.7       172°11.9       02.8       Saturn 347°07.1       07:33         20       200°10.4       79°31.1       31.8       154°45.0       37.4       81°54.5       19.6       187°14.2       02.8       187°14.2       02.8       187°15.3       19.6       187°14.2       02.8       187°15.3       19.6       187°14.2       02.8       187°15.3       19.6       187°14.2       02.8       187°14.2       02.8       187°15.3       19.6       187°14.2       02.8       187°15.3       19.6       187°14.2       02.8       187°15.3       19.6       187°14.2       02.8       187°15.3       187°15.3       19.6       187°14.2       02.8       187°15.3       19.6       187°14.2       02.8       187°15.3       19.8       187°15.3       19.9       187°15.3       19.4       217°18.8       02.9       187°15.3       19.3       187°15.3       19.3       187°15.3       19.3       187°15.3       19.3       187°15.3       19.3													
19 185°07.9 64°31.7 32.4 139°44.4 36.9 66°52.5 19.7 172°11.9 02.8 20 200°10.4 79°31.1 31.8 154°45.0 37.4 81°54.5 19.6 187°14.2 02.8 21 215°12.9 94°30.4 · 31.2 169°45.7 · 38.0 96°56.4 · 19.5 202°16.5 · 02.9 22 230°15.3 109°29.8 30.7 184°46.3 38.5 111°58.3 19.4 217°18.8 02.9 23 245°17.8 124°29.2 30.1 199°46.9 39.0 127°00.3 19.3 232°21.1 03.0 Mars: 0.1													
20 200°10.4 79°31.1 31.8 154°45.0 37.4 81°54.5 19.6 187°14.2 02.8 21 215°12.9 94°30.4 ·· 31.2 169°45.7 ·· 38.0 96°56.4 ·· 19.5 202°16.5 ·· 02.9 22 230°15.3 109°29.8 30.7 184°46.3 38.5 111°58.3 19.4 217°18.8 02.9 23 245°17.8 124°29.2 30.1 199°46.9 39.0 127°00.3 19.3 232°21.1 03.0 Mars: 0.1													
21 215°12.9 94°30.4 · · 31.2 169°45.7 · · 38.0 96°56.4 · · 19.5 202°16.5 · · · 02.9 22 230°15.3 109°29.8 30.7 184°46.3 38.5 111°58.3 19.4 217°18.8 02.9 Venus: 0.1 23 245°17.8 124°29.2 30.1 199°46.9 39.0 127°00.3 19.3 232°21.1 03.0 Mars: 0.1	20	$200^{\circ}10.4$	79°31.1	31.8	154°45.0	37.4		19.6		02.8			
23 245°17.8 124°29.2 30.1 199°46.9 39.0 127°00.3 19.3 232°21.1 03.0 Mars: 0.1											Horizont		
25 215 11.0 12.1 25.2 50.1 155 10.5 55.0 121 00.5 15.5 252 21.1 65.0													
Mer.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' m0.85	23	245°17.8	124°29.2	30.1	199°46.9	39.0	127°00.3	19.3	232°21.1	03.0		Mars:	0.1
	Mer.p	ass. 06:41	ν-0.6' d-0	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′ m0.85			

h	Sui	า			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180° 12.7	N22°54.8	262°29.4	14.2'	S00°06.8	-15.6'	57.3'
1 2	195° 12.5 210° 12.4	55.0 55.3	277°02.6 291°35.8	14.2' 14.1'	N00°08.7 00°24.3	15.6' 15.6'	57.3' 57.4'
3	225°12.3	• • 55.5	306°08.9	14.1'	00°24.3	15.6'	57.4
4	240°12.2	55.7	$320^{\circ}42.0$	14.1'	00°55.5	15.6'	57.4'
5	255°12.0	55.9	335° 15.1	14.0'	01°11.1	15.6'	57.5'
6 7	270°11.9 285°11.8	N22°56.1 56.3	349°48.1 4°21.1	14.0' 13.9'	N01°26.8 01°42.5	15.7' 15.7'	57.5' 57.6'
8	300°11.7	56.5	18°54.0	13.9'	01°58.1	15.7'	57.6'
9	315°11.5	• • 56.7	$33^{\circ}26.9$	13.8'	02°13.8	15.7'	57.6'
10	330°11.4 345°11.3	56.9	47°59.7 62°32.5	13.8'	02°29.5 02°45.2	15.7'	57.7'
11 12	0°11.2	57.1 N22°57.3	77°05.2	13.7' 13.7'	02 45.2 N03°01.0	15.7' 15.7'	57.7' 57.7'
13	15° 11.1	57.5	91°37.9	13.6'	03°16.7	15.7'	57.8'
14	30° 10.9	57.7	106° 10.5	13.6'	03°32.4	15.7'	57.8'
15 16	45° 10.8 60° 10.7	· · 57.9 58.1	120°43.1 135°15.6	13.5' 13.4'	03°48.2 04°03.9	15.7' 15.7'	57.9' 57.9'
17	75° 10.6	58.3	149° 48.0	13.4'	04° 03.9	15.7'	57.9'
18	90°10.4	N22°58.5	164°20.4	13.3'	N04°35.4	15.7'	58.0'
19	105°10.3	58.7	178°52.7	13.2'	04°51.1	15.7'	58.0'
20 21	120° 10.2 135° 10.1	58.9 •• 59.1	193°24.9 207°57.1	13.2' 13.1'	05°06.9 05°22.6	15.7' 15.7'	58.0' 58.1'
22	150°09.9	59.3	222°29.2	13.0'	05°38.4	15.7'	58.1
23	165°09.8	59.5	237°01.3	13.0'	05°54.1	15.7'	58.2'
	SD = 15.8'	d = 0.2'		SI	D = 15.6'		
\A/. I	GHA	D	CUA		D-:	_1	LIP
Wed 0	GHA 180°09.7	<b>Dec</b> N22°59.7	<b>GHA</b> 251°33.2	u 12.9'	<b>Dec</b> N06°09.8	d 15.7'	<b>HP</b> 58.2'
1	195°09.6	$22^{\circ}59.9$	$266^{\circ}05.1$	12.8'	06°25.6	15.7	58.2'
2	210°09.4	23°00.1	280°37.0	12.7'	06°41.3	15.7'	58.3'
3 4	225°09.3 240°09.2	· · 00.3 00.5	295°08.7 309°40.4	12.7' 12.6'	06°57.0 07°12.7	15.7' 15.7'	58.3' 58.4'
5	255°09.1	00.5	324°12.0	12.5'	07 12.7 07°28.4	15.7'	58.4
6	270°08.9	N23°00.9	338°43.5	12.4'	N07°44.0	15.6'	58.4'
7	285°08.8	01.1	353°14.9	12.4'	07°59.7	15.6'	58.5'
8 9	300°08.7 315°08.6	01.2 · · 01.4	7°46.3 22°17.5	12.3' 12.2'	08°15.3 08°30.9	15.6' 15.6'	58.5' 58.6'
10	330°08.4	01.4	36°48.7	12.1'	08°46.5	15.6'	58.6'
11	345°08.3	01.8	51°19.8	12.0'	$09^{\circ}02.1$	15.5'	58.6'
12	0°08.2	N23°02.0	65°50.8 80°21.7	11.9'	N09°17.6 09°33.1	15.5'	58.7'
13 14	15°08.1 30°07.9	02.2 02.4	94°52.6	11.8' 11.7'	09°33.1	15.5' 15.5'	58.7' 58.7'
15	45°07.8	02.5	109°23.3	11.6'	10°04.1	15.4'	58.8'
16	60°07.7	02.7	123°53.9	11.5'	10°19.5	15.4'	58.8'
17 18	75°07.5 90°07.4	02.9 N23°03.1	138°24.5 152°54.9	11.4' 11.3'	10°35.0 N10°50.3	15.4' 15.3'	58.9' 58.9'
19	105° 07.3	03.3	167°25.3	11.2'	11°05.7	15.3'	58.9'
20	120°07.2	03.5	$181^{\circ}55.5$		11°21.0	15.3'	59.0'
21	135°07.0	• • 03.6	196°25.7	11.0'	11°36.2	15.2'	59.0'
22 23	150°06.9 165°06.8	03.8 04.0	210°55.7 225°25.6	10.9' 10.8'	11°51.5 12°06.7	15.2' 15.1'	59.0' 59.1'
20	SD = 15.7'	d = 0.2'			D = 15.9'	10.1	
	<u>JD = 13.7</u>	<u>u = 0.2</u>			J = 13.9		
Thu	<b>GHA</b> 180° 06.7	<b>Dec</b> N23°04.2	<b>GHA</b> 239° 55.5	ν 10.7'	<b>Dec</b> N12°21.8	d 15.1'	<b>HP</b> 59.1'
0 1	180°06.7 195°06.5	N23°04.2 04.3	239°55.5 254°25.2	10.7' 10.6'	12°36.9	15.1' 15.1'	59.1° 59.2'
2	210°06.4	04.5	268° 54.8	10.5'	12°51.9	15.0'	59.2'
3	225°06.3	• • 04.7	283°24.3	10.4'	13°06.9	15.0'	59.2'
4 5	240°06.1 255°06.0	04.9 05.0	297°53.7 312°23.0	10.3' 10.2'	13°21.9 13°36.8	14.9' 14.8'	59.3' 59.3'
6	270°05.9	N23°05.2	326°52.2	10.1'	N13°51.6	14.8	59.3'
7	285°05.8	05.4	341°21.2	9.9'	14°06.4	14.7'	59.4'
8 9	300°05.6 315°05.5	05.6 •• 05.7	355°50.2 10°19.0	9.8' 9.7'	14°21.2 14°35.8	14.7' 14.6'	59.4' 59.5'
10	315 U5.5 330° 05.4	05.7	10 19.0 24°47.7	9. <i>1</i> 9.6'	14 35.8 14°50.4	14.6	59.5'
11	345°05.3	06.1	$39^{\circ}16.3$	9.5'	15°05.0	14.5'	59.5'
12	0°05.1	N23°06.3	53°44.7	9.3'	N15°19.5	14.4'	59.6'
13 14	15°05.0 30°04.9	06.4 06.6	68° 13.1 82° 41.3	9.2' 9.1'	15°33.9 15°48.2	14.3' 14.3'	59.6' 59.6'
15	45°04.7	06.8	97°09.4	9.0'	16°02.5	14.2	59.7'
16	60°04.6	06.9	111°37.4	8.8'	16°16.7	14.1'	59.7'
17 18	75°04.5 90°04.3	07.1 N23°07.3	126°05.2 140°32.9	8.7' 8.6'	16°30.8 N16°44.9	14.0' 14.0'	59.7' 59.8'
18 19	90°04.3 105°04.2	N23°07.3	140° 32.9 155° 00.5	8.5'	16°58.8	13.9	59.8'
20	120°04.1	07.6	$169^{\circ}27.9$	8.3'	$17^{\circ}12.7$	13.8'	59.8'
21	135°04.0	• • 07.7	183°55.3	8.2'	17°26.5	13.7'	59.9'
22 23	150°03.8 165°03.7	07.9 08.1	198°22.5 212°49.5	8.1' 7.9'	17°40.2 17°53.8	13.6' 13.5'	59.9' 60.0'
23	SD = 15.7'	d = 0.2'			D = 16.1'	10.0	55.5
	JD — 13.1	u — U.Z		اد	_ 10.1		

Lat.	Twil	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
<b>N</b> 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	1111
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
<b>N</b> 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

Lat.         Tue         Wed         Thu         Tue         Wed         Th           N 72°         00:32 23:58         23:15 21:45 13:35 15:58 19:           N 70°         00:32 23:35 23:44 13:31 15:41 18:           68°         00:32 00:13 23:51 23:19 13:27 15:27 17:	17
N 72°     23:58     23:15     21:45     13:35     15:58     19:       N 70°     00:32     00:06 23:35     22:44     13:31     15:41     18:       68°     00:32     00:13 23:51     23:19     13:27     15:27     17:	20
N 70°     00:32     23:35     22:44     13:31     15:41     18:       68°     00:32     00:13     23:19     13:27     15:27     17:	
68° 00:32 23:51 23:19 13:27 15:27 17:	46
$66^{\circ}$ 00:32 00:19 $\frac{00:04}{23:44}$ 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 13:16 14:52 16:	36
<b>N</b> 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
<b>N</b> 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:	
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:	- 1
<b>S</b> 60° 00:32 02:06 03:46 12:30 12:30 12:	30

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
- Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	260°20.2	139°28.6	N22°29.5	214° 47.6	N16°39.6	142°02.2	N21°19.3	247°23.3	N03°03.1			
1	275°22.7	154°27.9	28.9	229°48.2	40.1	157°04.1	19.2	262°25.6	03.1	Alpheratz	357°33.6	29°14.1
2	290°25.2	169°27.3	28.3	244° 48.9	40.7	172°06.1	19.1	277°27.9	03.2	Ankaa	$353^{\circ}06.1$	-42°09.5
3	305°27.6	184°26.7	• • 27.7	259° 49.5	• • 41.2	187°08.0	. 19.0	292°30.2	• • 03.2	Schedar	349°29.9	56°40.7
4	320°30.1	199°26.1	27.1	274° 50.1	41.7	202°09.9	18.9	307°32.5	03.2	Diphda	348°46.2	-17°50.4
5	335°32.6	214°25.4		289° 50.8	42.3	202 09.9 217°11.9		307 32.3 322°34.8		Achernar	$335^{\circ}19.7$	-57°05.9
6	350°35.0	214 25.4 229°24.8	26.5 N22°25.9			232°13.8	18.8	337°37.1	03.3 N03°03.4	Hamal	$327^{\circ}50.1$	23°35.2
				304°51.4	N16°42.8		N21°18.7			Polaris	$313^{\circ}50.1$	89°22.3
7	5°37.5	244°24.2	25.3	319°52.1	43.3	247°15.7	18.6	352°39.4	03.5	Acamar	$315^{\circ}11.2$	-40°11.8
8	20°40.0	259°23.6	24.7	334°52.7	43.9	262°17.7	18.5	7°41.7	03.5	Menkar	$314^{\circ}05.2$	4°11.6
9	35°42.4	274°22.9	• • 24.1	349°53.3	• • 44.4	277°19.6	• • 18.4	22°44.0	• • 03.6	Mirfak	308°27.0	49° 57.2
10	50°44.9	289°22.3	23.5	4°54.0	44.9	292°21.6	18.3	37°46.3	03.6	Aldebaran	290°38.6	16°33.7
11	65°47.4	304°21.7	22.9	19°54.6	45.4	307°23.5	18.2	52°48.6	03.7	Rigel	281°03.1	-8° 10.3
12	80°49.8	319°21.1	N22°22.3	34°55.3	N16°46.0	322°25.4	N21°18.1	67°50.9	N03°03.8	Capella	280°20.6	46°01.4
13	95°52.3	334°20.5	21.7	49°55.9	46.5	337°27.4	18.0	82°53.2	03.8	Bellatrix	278°22.0	6°22.4
14	110°54.7	349°19.9	21.1	64°56.5	47.0	352°29.3	18.0	97° 55.5	03.9	Elnath	278°00.8	28°37.7
15	125°57.2	4°19.2	• • 20.5	79°57.2	• • 47.6	7°31.2	• • 17.9	112°57.8	• • 03.9	Alnilam	275°36.9	-1°11.1
16	140°59.7	19°18.6	19.9	94°57.8	48.1	22°33.2	17.8	128°00.1	04.0	Betelgeuse	270°51.2	7°24.7
17	156°02.1	34°18.0	19.3	109°58.5	48.6	37°35.1	17.7	143°02.4	04.1	Canopus	263°52.4	-52°42.6
18	171°04.6	49°17.4	N22°18.7	124°59.1	N16°49.2	52°37.0	N21°17.6	158°04.7	N03°04.1	Sirius	258°25.5	-16°45.2
19	186°07.1	64°16.8	18.1	139° 59.7	49.7	67°39.0	17.5	173°07.0	04.2	Adhara	255°05.3	-10 43.2 -29°00.5
20	201°09.5	79°16.2	17.5	155°00.4	50.2	82°40.9	17.4	188°09.3	04.2		244°49.9	5°09.4
21	216°12.0	94°15.5	• • 16.9	170°01.0	• • 50.7	97°42.8	• • 17.3	203°11.6	• • 04.3	Procyon		
22	231°14.5	109°14.9	16.2	185°01.6	51.3	112°44.8	17.2	$218^{\circ}13.9$	04.3	Pollux	243°16.2 234°14.8	27°57.8
23	246°16.9	124°14.3	15.6	200°02.3	51.8	127°46.7	17.1	233°16.2	04.4	Avior		-59°35.8
_										Suhail	222°45.7	-43°32.6
ivler.p	pass. 06:38	$\nu$ -0.6′ $d$ -0	0.6′ m-3.98	$\nu$ 0.6′ $d$ 0	.5′ m1.28	$\nu$ 1.9° d-0	.1′ m-1.85	$\nu$ 2.3′ d0	.1′ m0.84	Miaplacidus	221°38.6	-69°49.8
										Alphard	217°46.8	-8°46.5
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
0	261°19.4	139°13.7	N22°15.0	215°02.9	N16°52.3	142°48.6	N21°17.0	248° 18.5	N03°04.5	Dubhe	193°39.7	61°36.7
1	276°21.9	154°13.1	14.4	230°03.6	52.9	157° 50.6	16.9	263°20.8	04.5	Denebola	182°23.7	14°25.5
2	291°24.3	169°12.5	13.8	245°04.2	53.4	172°52.5	16.8	278°23.1	04.6	Gienah	175°42.3	-17°41.5
3	306°26.8	184°11.9	•• 13.2	260°04.8	• • 53.9	172 52.5 187°54.4	16.7	293°25.4	• • 04.6	Acrux		-63°15.1
										Gacrux	171°50.2	-57°16.0
4	321°29.2	199°11.3	12.6	275°05.5	54.4	202°56.4	16.6	308°27.7	04.7	Alioth	$166^{\circ}11.7$	55°49.2
5	336°31.7	214°10.7	11.9	290°06.1	55.0	217°58.3	16.6	323°30.0	04.8	Spica	158°20.9	-11°18.1
6	351°34.2	229°10.0	N22°11.3	305°06.8	N16°55.5	233°00.2	N21°16.5	338° 32.3	N03°04.8	Alkaid	152°50.8	49°11.0
7	6°36.6	244°09.4	10.7	320°07.4	56.0	248°02.2	16.4	353°34.6	04.9	Hadar	148°33.9	-60°30.3
8	21°39.1	259°08.8	10.1	335°08.0	56.5	263°04.1	16.3	8°36.9	04.9	Menkent	147°56.0	-36°30.2
9	36°41.6	274°08.2	• • 09.4	350°08.7	• • 57.1	278°06.0	• • 16.2	23°39.2	• • 05.0	Arcturus	145°46.6	19°02.7
10	51°44.0	289°07.6	8.80	5°09.3	57.6	293°08.0	16.1	38°41.5	05.0	Rigil Kent.	139°38.2	-60° 56.9
11	66°46.5	304°07.0	08.2	20°09.9	58.1	308°09.9	16.0	53°43.8	05.1	Kochab	137°18.9	74°02.9
12	81°49.0	319°06.4	N22°07.6	35° 10.6	N16°58.6	323°11.8	N21°15.9	68°46.1	N03°05.2	Zuben'ubi	136°54.4	-16°09.2
13	96°51.4	334°05.8	06.9	$50^{\circ}11.2$	59.2	338° 13.8	15.8	83°48.4	05.2	Alphecca	126°02.4	26° 37.6
14	111°53.9	349°05.2	06.3	$65^{\circ}11.9$	$16^{\circ}59.7$	353° 15.7	15.7	98°50.7	05.3	Antares	112° 14.0	-26°29.5
15	126°56.4	4°04.6	• • 05.7	80°12.5	17°00.2	8° 17.6	• • 15.6	113°53.0	• • 05.3	Atria	107°06.6	-69°04.5
16	141°58.8	19°04.0	05.1	95° 13.1	00.7	23° 19.6	15.5	128°55.3	05.4	Sabik	107 00.0 102°01.1	-15° 45.5
17	157°01.3	34°03.4	04.4	110° 13.8	01.2	38°21.5	15.4	143°57.6	05.4	Shaula	96°08.4	-37°07.4
18	172°03.7	49°02.8	N22°03.8	125° 14.4	N17°01.8	53°23.4	N21°15.3	158°59.9	N03°05.5	Rasalhague	95°57.1	12°32.4
19	187°06.2	64°02.2	03.2	140°15.0	02.3	68°25.3	15.2	174°02.2	05.6			51°29.0
20	202°08.7	79°01.6	02.5	155° 15.7	02.8	83°27.3	15.1	189°04.6	05.6	Eltanin	90°41.1 83°30.6	-34°22.3
21	217°11.1	94°01.0	•• 01.9	170°16.3	• • 03.3	98°29.2	• • 15.0	204°06.9	• • 05.7	Kaus Aust.		
22	232°13.6	109°00.4	01.3	185° 16.9	03.9	113°31.1	15.0	219°09.2	05.7	Vega	80°32.0	38°48.4
23	247°16.1	123°59.8	00.6	200°17.6	04.4	128°33.1	14.9	234°11.5	05.8	Nunki	75°46.0	-26°15.8
										Altair	61°58.5	8°56.3
Mer.p	pass. 06:34	$\nu$ -0.6′ $d$ -0	0.6′ m-3.98	$\nu$ 0.6′ d0	.5′ m1.28	$\nu 1.9' \ d-0$	$.1^\prime$ m-1.85	$\nu 2.3' d0$	$.1^\prime$ m0.84	Peacock	53°03.5	-56°38.8
										Deneb	49°24.7	45°22.3
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.5	9°59.7
0	262°18.5	138°59.2	N22°00.0	215° 18.2		143°35.0	N21°14.8	249°13.8	N03°05.8	Al Na'ir	27°31.3	-46°49.7
1	277°21.0	153°58.6	21°59.3	230° 18.9	05.4	158° 36.9	14.7	264° 16.1	05.9	Fomalhaut	15°13.2	-29°28.7
2	292°23.5	168°58.0	58.7	245° 19.5	05.4	173° 38.9	14.6	279°18.4	06.0	Scheat	13°44.0	28°13.4
3	307°25.9	183°57.4	• • 58.1	260°20.1	06.5	173 30.9 188°40.8	•• 14.5	294°20.7	• • 06.0	Markab	13°28.7	15°20.8
4	307 23.9 322°28.4	198°56.8	57.4	275° 20.8	07.0	203° 42.7	14.4	309°23.0	06.1	Jun 12 Fri	SHA	Mer.pass
5	337°30.8	213°56.2	56.8	275 20.8 290°21.4	07.5	203 42.7 218°44.7	14.4	324°25.3	06.1		239°08.3	14:43
6	352°33.3	213 50.2 228°55.6	N21°56.1	305° 22.0	N17°08.0	233° 46.6	N21°14.2	339°27.6	N03°06.2		314°27.3	09:40
7	7°35.8	243°55.0	55.5	320° 22.7	08.5	248° 48.5	14.1	354°29.9	06.2	Jupiter		14:30
	7 35.8 22°38.2	243 55.0 258°54.5	55.5 54.8	320 22.7 335°23.3	09.0	248 48.5 263°50.4	14.1	9°32.2	06.2	Saturn	347°03.1	07:29
8					09.6			9°32.2 24°34.5		Jatuill	J-1 UJ.1	01.29
9	37°40.7	273°53.9	• • 54.2	350°23.9		278°52.4	• • 13.9		06.3	Jun 13 Sat	SHA	Mer.pass
10	52°43.2	288°53.3	53.5 53.0	5°24.6	10.1	293°54.3	13.8	39°36.8	06.4 06.5	Venus	237°54.3	14:44
11	67°45.6	303°52.7	52.9	20°25.2	10.6	308°56.2	13.7	54°39.1	06.5	Mars	313°43.5	09:39
12	82°48.1	318°52.1	N21°52.2	35°25.9	N17°11.1	323°58.2	N21°13.6	69°41.4	N03°06.5		241°29.2	14:27
13	97°50.6	333°51.5	51.6	50°26.5	11.6	339°00.1	13.5	84°43.7	06.6	Saturn	346°59.1	07:26
14	112°53.0	348°50.9	50.9	65°27.1	12.2	354°02.0	13.4	99°46.0	06.6			
15	127°55.5	3°50.3	• • 50.3	80°27.8	• • 12.7	9°04.0	• • 13.3	114°48.3	• • 06.7	Jun 14 Sun	SHA	Mer.pass
16	142°58.0	18°49.7	49.6	95°28.4	13.2	24°05.9	13.2	129°50.6	06.7		236°40.7	14:45
17	158°00.4	33°49.2	49.0	110°29.0	13.7	39°07.8	13.2	144°52.9	06.8		312°59.7	09:38
18	173°02.9	48°48.6	N21°48.3	125°29.7	N17°14.2	54°09.7	N21°13.1	159°55.2	N03°06.9	Jupiter		14:24
19	188°05.3	63°48.0	47.7	140°30.3	14.7	69°11.7	13.0	174° 57.6	06.9	Saturn	$346^{\circ}55.2$	07:22
20	203°07.8	78°47.4	47.0	155° 30.9	15.2	84°13.6	12.9	189°59.9	07.0		-1 "	
21	218°10.3	93°46.8	• • 46.4	170°31.6	• • 15.8	99° 15.5	• • 12.8	205°02.2	• • 07.0	Horizont	al parallax	
22	233°12.7	108°46.2	45.7	185°32.2	16.3	114° 17.5	12.7	220°04.5	07.1		Venus:	0.1
23	248°15.2	123°45.7	45.0	200°32.8	16.8	129° 19.4	12.6	235°06.8	07.1		Mars:	0.1
Mars	pass. 06:30	ν-0 6/ d 0	0.6' m-3.98	νη 6' dη	.5′ m1.29	1/1 Q/ d O	.1′ m-1.84	1/2 3/ 40	.1′ m0.84			
ινισι.μ		₽ 0.0 U-0	5.30	₽ U.U UU		ν 1.5 U-0	1.07	ν 2.5 u0	- 1110.UT			

h	Sui	า			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°03.6	N23°08.2	227°16.5	7.8'	N18°07.3	13.4'	60.0'
1	195°03.4	08.4	241°43.3	7.7'	18°20.8	13.3'	60.0'
2	210°03.3	08.5	256°09.9	7.5'	18°34.1	13.2'	60.1'
3	225°03.2	• • 08.7	270°36.4	7.4'	18°47.4	13.1'	60.1
4 5	240°03.1 255°02.9	08.9 09.0	285°02.8 299°29.1	7.3' 7.1'	19°00.5 19°13.5	13.0' 12.9'	60.1' 60.1'
6	270°02.8	N23°09.2	313°55.2	7.1	N19°26.5	12.8'	60.1
7	285°02.7	09.3	328°21.2	6.8'	19°39.3	12.7'	60.2
8	300°02.5	09.5	342°47.0	6.7'	19°52.0	12.6'	60.2'
9	315°02.4	• • 09.6	357°12.7	6.6'	20°04.6	12.5'	60.3'
10	330°02.3	09.8	11°38.3	6.4'	20°17.1	12.4'	60.3'
11	345°02.1 0°02.0	10.0 N23°10.1	26°03.7 40°29.0	6.3' 6.2'	20°29.5 N20°41.8	12.3' 12.1'	60.3' 60.4'
12 13	15°01.9	10.3	40 29.0 54°54.2	6.0'	20°53.9	12.1	60.4
14	30°01.7	10.4	69°19.2	5.9'	21°05.9	11.9'	60.4
15	45°01.6	• • 10.6	83°44.1	5.7'	21°17.8	11.8'	60.4'
16	60°01.5	10.7	98°08.8	5.6'	21°29.6	11.6'	60.5'
17	75°01.4	10.9	112°33.4	5.5'	21°41.2	11.5'	60.5'
18	90°01.2 105°01.1	N23°11.0	126°57.9 141°22.2	5.3'	N21°52.7 22°04.0	11.4' 11.2'	60.5'
19 20	105 01.1 120°01.0	11.2 11.3	141 22.2 155°46.3	5.2' 5.0'	22 04.0 22°15.3	11.1'	60.6' 60.6'
21	135°00.8	. 11.4	170°10.4	4.9'	22°26.3	10.9'	60.6
22	150°00.7	11.6	184°34.3	4.8'	22°37.3	10.8'	60.6
23	165°00.6	11.7	$198^{\circ}58.1$	4.6'	22°48.1	10.7'	60.7'
	SD = 15.7'	d = 0.2'		S	D = 16.4'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0 0	180°00.4	N23°11.9	213°21.7	υ 4.5'	N22°58.7	10.5'	60.7'
1	195°00.3	12.0	227°45.2	4.4'	23°09.2	10.3'	60.7'
2	210°00.2	12.2	242°08.5	4.2'	23°19.6	10.2'	60.7'
3 4	225°00.0 239°59.9	· · 12.3 12.4	256°31.8 270°54.9	4.1' 4.0'	23°29.8 23°39.8	10.0'	60.8'
4 5	254°59.8	12.4	270 54.9 285°17.8	4.0 3.8'	23 39.8 23°49.7	9.9' 9.7'	60.8' 60.8'
6	269°59.6	N23°12.7	299°40.6	3.7'	N23°59.4	9.6'	60.8
7	284°59.5	12.9	314°03.3	3.6'	24°09.0	9.4'	60.9'
8	299°59.4	13.0	328°25.9	3.4'	24°18.4	9.2'	60.9'
9	314°59.3	• • 13.1	342°48.3	3.3'	24°27.6	9.1'	60.9'
10 11	329°59.1 344°59.0	13.3 13.4	357°10.7 11°32.8	3.2' 3.1'	24°36.7 24°45.5	8.9' 8.7'	60.9' 60.9'
12	359°58.9	N23°13.5	25°54.9	2.9'	N24°54.2	8.5'	61.0'
13	14°58.7	13.7	40°16.8	2.8'	25°02.8	8.4'	61.0'
14	29°58.6	13.8	54°38.7	2.7'	25°11.1	8.2'	61.0'
15	44°58.5 59°58.3	· · 13.9	69°00.4 83°22.0	2.6'	25°19.3 25°27.3	8.0'	61.0'
16 17	59°58.3 74°58.2	14.1 14.2	97°43.4	2.5' 2.4'	25°27.3 25°35.1	7.8' 7.6'	61.0' 61.0'
18	89°58.1	N23°14.3	112°04.8	2.2'	N25°42.7	7.4	61.1
19	104°57.9	14.5	126°26.0	2.1'	$25^{\circ}50.1$	7.2'	61.1'
20	119°57.8	14.6	140°47.2	2.0'	25°57.4	7.0'	61.1'
21	134°57.7	• • 14.7	155°08.2	1.9'	26°04.4	6.9'	61.1'
22 23	149°57.5 164°57.4	14.9 15.0	169°29.1 183°50.0	1.8' 1.7'	26°11.3 26°17.9	6.7' 6.5'	61.1' 61.1'
23	SD = 15.7'	d = 0.1'	103 30.0		D = 16.6'		01.1
•	CUA				Б.	,	
Sun 0	<b>GHA</b> 179°57.3	<b>Dec</b> N23°15.1	<b>GHA</b> 198°10.7	u 1.6'	<b>Dec</b> N26°24.4	d 6.3'	<b>HP</b> 61.2'
1	194°57.1	15.2	212°31.3	1.5'	26°30.7	6.1	61.2'
2	209°57.0	15.4	$226^{\circ}51.8$	1.4'	26°36.7	5.9'	61.2'
3	224°56.9	• • 15.5	241°12.3	1.4'	26°42.6	5.6'	61.2'
4 5	239°56.7 254°56.6	15.6 15.7	255°32.7 269°52.9	1.3' 1.2'	26°48.2 26°53.7	5.4' 5.2'	61.2' 61.2'
6	254°56.6 269°56.5	15.7 N23°15.9	269°52.9 284°13.1	1.1'	26°53.7 N26°58.9	5.2'	61.2'
7	284°56.3	16.0	298°33.2	1.0'	27°03.9	4.8'	61.2'
8	299°56.2	16.1	$312^{\circ}53.3$	1.0'	27°08.7	4.6'	61.2'
9	314°56.1	· · 16.2	327°13.2	0.9'	27°13.4	4.4'	61.3'
10 11	329°55.9 344°55.8	16.3 16.5	341°33.1 355°52.9	0.8' 0.8'	27°17.7 27°21.9	4.2' 4.0'	61.3' 61.3'
12	359°55.7	N23°16.6	355 52.9 10°12.7	0.8	N27°25.9	3.7'	61.3
13	14°55.5	16.7	24°32.4	0.6'	27°29.6	3.5'	61.3
14	29°55.4	16.8	38°52.0	0.6'	27°33.2	3.3'	61.3'
15	44°55.3	• • 16.9	53°11.6	0.5'	27°36.5	3.1'	61.3'
16 17	59°55.1 74°55.0	17.0 17.2	67°31.2 81°50.7	0.5' 0.5'	27°39.5 27°42.4	2.9' 2.6'	61.3' 61.3'
18	89°54.8	N23°17.3	96°10.1	0.5	N27°45.1	2.4	61.3
19	104°54.7	17.4	110°29.5	0.4'	27°47.5	2.2'	61.3'
20	119°54.6	17.5	124°48.9	0.4'	27°49.7	2.0'	61.3'
21	134°54.4	•• 17.6	139°08.3	0.3'	27°51.7	1.8'	61.3'
22 23	149°54.3 164°54.2	17.7 17.8	153°27.6 167°46.9	0.3' 0.3'	27°53.4 27°55.0	1.5' 1.3'	61.3' 61.3'
23	SD = 15.7'	$\frac{17.8}{d=0.1'}$	101 40.9		D = 16.7'	1.5	01.5

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	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	////
<b>N</b> 58°	////	01:43	02:57	21:03	22:18	////
56°	////	02:12	03:14	20:47	21:49	////
54°	00:52	02:34	03:28	20:33	21:27	23:10
52°	01:35	02:51	03:40	20:21	21:09	22:26
50°	02:02	03:06	03:50	20:10	20:54	21:59
45°	02:46	03:36	04:13	19:48	20:25	21:14
N 40°	03:16	03:58	04:31	19:30	20:02	20:44
35°	03:39	04:16	04:45	19:15	19:44	20:21
30°	03:58	04:31	04:58	19:02	19:29	20:03
20°	04:27	04:56	05:20	18:40	19:05	19:34
N 10°	04:49	05:16	05:39	18:21	18:44	19:11
0°	05:08	05:34	05:56	18:04	18:26	18:52
S 10°	05:25	05:51	06:14	17:46	18:09	18:36
20°	05:41	06:08	06:32	17:28	17:52	18:20
30°	05:57	06:27	06:53	17:07	17:33	18:03
35°	06:06	06:37	07:05	16:55	17:23	17:55
40°	06:15	06:49	07:19	16:41	17:11	17:45
45°	06:25	07:02	07:36	16:24	16:58	17:35
<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			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
N 40°	01:51	02:28	03:17	16:46	18:06	19:23
35°	02:02	02:43	03:35	16:32	17:49	19:04
30°	02:12	02:57	03:51	16:20	17:34	18:47
20°	02:29	03:19	04:17	16:00	17:09	18:20
N 10°	02:44	03:39	04:40	15:42	16:47	17:56
0°	02:58	03:57	05:01	15:25	16:27	17:33
<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.o	f Time	Mer.	Mer.	Mer.Pass.			
	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	00:08	12:00	09:12	21:41			
13	00:02	00:05	12:00	10:12	22:44			
14	00:11	00:17	12:00	11:17	23:51			

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	263°17.7	138°45.1	N21°44.4	215° 33.5	N17°17.3	144°21.3	N21°12.5	250°09.1	N03°07.2			
1	278°20.1	153°44.5	43.7	230°34.1	17.8	159° 23.3	12.4	265°11.4	07.2	Alpheratz	357°33.6	29°14.1
2	293°22.6	168°43.9	43.0	245°34.8	18.3	174° 25.2	12.3	280°13.7	07.2	Ankaa	353°06.1	-42°09.5
3	308°25.1	183°43.3	• • 42.4	260°35.4	• • 18.8	189° 27.1	12.2	295°16.0	07.3	Schedar	349°29.8	56°40.7
4	323°27.5	198°42.8	41.7	275°36.0	19.3	204° 29.0	12.1	310°18.3	07.4	Diphda	348°46.2	-17°50.4
5	338°30.0	213°42.2	41.0	290°36.7	19.9	219°31.0	12.0	325°20.6	07.5	Achernar	335°19.6	-57°05.9
6	353°32.5	228°41.6	N21°40.4	305°37.3	N17°20.4	234°32.9	N21°11.9	340°22.9	N03°07.5	Hamal Polaris	327°50.1 313°48.7	23°35.2 89°22.3
7	8°34.9	243°41.0	39.7	320°37.9	20.9	249°34.8	11.8	355°25.2	07.6	Acamar	315° 11.2	-40°11.7
8	23°37.4	258°40.4	39.0	335°38.6	21.4	264°36.8	11.7	10°27.5	07.6	Menkar	314°05.2	4°11.6
9	38°39.8	273°39.9	• • 38.4	350° 39.2	• • 21.9	279°38.7	• • 11.6	25°29.8	•• 07.7	Mirfak	308° 27.0	49°57.2
10	53°42.3	288°39.3	37.7	5°39.8	22.4	294°40.6	11.5	40°32.2	07.7	Aldebaran	290°38.6	16°33.7
11	68°44.8	303°38.7	37.0	20°40.5	22.9	309° 42.5	11.4	55°34.5	07.8	Rigel	281°03.1	-8°10.3
12	83°47.2 98°49.7	318°38.1 333°37.6	N21°36.4	35°41.1 50°41.7	N17°23.4 23.9	324°44.5	N21°11.3	70°36.8 85°39.1	N03°07.8	Capella	280°20.6	46°01.4
13 14	96 49.7 113°52.2	348°37.0	35.7 35.0	65° 42.4	23.9	339°46.4 354°48.3	11.2 11.1	05 39.1 100°41.4	07.9 08.0	Bellatrix	278°21.9	6°22.4
15	128°54.6	3°36.4	• • 34.3	80°43.0	25.0	9°50.3	. 11.0	115°43.7	. 08.0	Elnath	278°00.8	28°37.7
16	143°57.1	18°35.9	33.6	95°43.6	25.5	24° 52.2	10.9	130°46.0	08.1	Alnilam	275°36.9	-1°11.1
17	158°59.6	33°35.3	33.0	110°44.3	26.0	39°54.1	10.9	145°48.3	08.1	Betelgeuse	270°51.1	7°24.7
18	174°02.0	48°34.7	N21°32.3	125°44.9	N17°26.5	54°56.0	N21°10.8	160°50.6	N03°08.2	Canopus Sirius	263°52.4 258°25.5	-52°42.6 -16°45.2
19	189°04.5	63°34.2	31.6	140°45.5	27.0	69°58.0	10.7	175°52.9	08.2	Adhara	255° 05.3	-10 45.2 -29°00.5
20	204°07.0	78°33.6	30.9	155°46.2	27.5	84°59.9	10.6	190°55.2	08.3	Procyon	244°49.9	5°09.4
21	219°09.4	93°33.0	• • 30.2	170°46.8	• • 28.0	100°01.8	• • 10.5	205°57.5	• • 08.3	Pollux	243°16.2	27°57.8
22	234°11.9	108°32.4	29.6	185° 47.4	28.5	115°03.7	10.4	220°59.9	08.4	Avior	234°14.8	-59°35.8
23	249°14.3	123°31.9	28.9	200°48.1	29.0	130°05.7	10.3	236°02.2	08.4	Suhail	222°45.7	-43°32.6
Mer.p	ass. 06:26	$\nu$ -0.6' d-0	).7′ m-3.98	u0.6′ d0	.5′ m1.29	$\nu$ 1.9′ d-0	.1' m-1.84	$\nu 2.3' \ d0$	.1'  m $0.83$	Miaplacidus	221°38.6	-69°49.8
										Alphard	217°46.8	-8°46.5
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
0	264°16.8	138°31.3	N21°28.2	215°48.7	N17°29.5	145°07.6	N21°10.2	251°04.5	N03°08.5	Dubhe	193°39.7	61°36.7
1	279°19.3	153°30.7	27.5	230°49.3	30.0	$160^{\circ}09.5$	10.1	266°06.8	08.5	Denebola Gienah	182°23.7 175°42.3	14°25.5 -17°41.5
2	294°21.7	168°30.2	26.8	245°50.0	30.5	$175^{\circ}11.5$	10.0	281°09.1	08.6		173° 42.5	-63°15.1
3	309°24.2	183°29.6	• • 26.1	260°50.6	• • 31.0	190°13.4	• • 09.9	296°11.4	•• 08.7	Gacrux		-57°16.0
4	324°26.7	198°29.1	25.4	275°51.2	31.5	205° 15.3	09.8	311°13.7	08.7	Alioth	166°11.7	55°49.2
5	339°29.1	213°28.5	24.8	290°51.9	32.0	220°17.2	09.7	326°16.0	8.80	Spica	$158^{\circ}20.9$	-11°18.1
6 7	354°31.6 9°34.1	228°27.9 243°27.4	N21°24.1 23.4	305°52.5 320°53.1	N17°32.5 33.0	235° 19.2 250° 21.1	N21°09.6 09.5	341°18.3 356°20.6	N03°08.8 08.9	Alkaid	152°50.8	49°11.0
8	24°36.5	258°26.8	22.7	335° 53.8	33.6	265°23.0	09.5	11°23.0	08.9	Hadar	148°33.9	-60°30.3
9	39°39.0	273°26.3	22.0	350°54.4	• • 34.1	280° 24.9	09.3	26°25.3	• • 09.0	Menkent	147°56.0	-36°30.2
10	54°41.5	288°25.7	21.3	5°55.0	34.6	295°26.9	09.2	41°27.6	09.0	Arcturus Rigil Kent.	145°46.6 139°38.2	19°02.7 -60°56.9
11	69°43.9	303°25.1	20.6	20°55.7	35.1	310°28.8	09.1	56° 29.9	09.1	Kochab	139° 38.2 137° 18.9	74°02.9
12	84°46.4	318°24.6	N21°19.9	35°56.3	N17°35.6	325°30.7	N21°09.0	71°32.2	N03°09.1	Zuben'ubi	136°54.4	-16°09.2
13	99°48.8	333°24.0	19.2	50°56.9	36.1	340°32.6	08.9	86°34.5	09.2	Alphecca	126°02.4	26°37.6
14	114°51.3	348°23.5	18.5	65°57.6	36.6	355°34.6	08.8	101°36.8	09.2	Antares	$112^{\circ}14.0$	-26°29.5
15 16	129°53.8 144°56.2	3°22.9 18°22.4	· · 17.8 17.1	80° 58.2 95° 58.8	· · 37.1 37.6	10°36.5 25°38.4	· · 08.7 08.6	116°39.1 131°41.5	· · 09.3 09.3	Atria	107°06.6	-69°04.5
17	159°58.7	33°21.8	16.4	110° 59.5	38.1	40°40.3	08.5	146°43.8	09.3	Sabik	102°01.1	-15°45.5
18	175°01.2	48°21.2	N21°15.7		N17°38.6	55° 42.3	N21°08.4	161°46.1	N03°09.5	Shaula	96°08.3	-37°07.4
19	190°03.6	63°20.7	15.0	141°00.7	39.1	70°44.2	08.3	176°48.4	09.5	Rasalhague	95°57.1 90°41.1	12°32.4 51°29.1
20	205°06.1	78°20.1	14.3	156°01.4	39.6	85°46.1	08.2	191°50.7	09.6	Eltanin Kaus Aust.	83°30.5	-34°22.3
21	220°08.6	93°19.6	• • 13.6	171°02.0	• • 40.1	$100^{\circ}48.1$	•• 08.1	206°53.0	•• 09.6	Vega	80°32.0	38°48.4
22	235°11.0	108°19.0	12.9	186°02.6	40.6	115°50.0	0.80	221°55.3	09.7	Nunki	75° 45.9	-26°15.8
23	250°13.5	123°18.5	12.2	201°03.3	41.1	130°51.9	07.9	236° 57.6	09.7	Altair	61°58.5	8°56.3
Mer.p	ass. 06:22	$\nu$ -0.6' d-0	0.7′ m-3.99	$\nu$ 0.6′ d0	.5′ m1.29	$\nu 1.9' \ d-0$	.1′ m-1.84	$\nu 2.3' \ d0$	.1′ m0.83	Peacock	53°03.4	-56°38.8
										Deneb	49°24.7	45°22.3
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.5	9°59.8
oved 0	265°16.0	138°17.9	N21°11.5	216°03.9	N17°41.6	145°53.8	N21°07.8	251°59.9	N03°09.8	Al Na'ir	27°31.2	-46°49.7
1	280°18.4	153°17.4	10.8	231°04.5	42.1	160°55.8	07.7	267°02.3	09.8	Fomalhaut	15°13.1	-29°28.7
2	295°20.9	168°16.8	10.1	246°05.2	42.6	175°57.7	07.6	282°04.6	09.9	Scheat Markab	13°44.0 13°28.7	28°13.5 15°20.8
3	310°23.3	183°16.3	• • 09.4	261°05.8	• • 43.1	190°59.6	• • 07.6	297°06.9	• • 09.9		13 20.1	13 20.0
4	325°25.8	198°15.7	08.6	276°06.4	43.6	206°01.5	07.5	$312^{\circ}09.2$	10.0	Jun 15 Mon	SHA	Mer.pass
5	340°28.3	213°15.2	07.9	$291^{\circ}07.1$	44.0	221°03.5	07.4	$327^{\circ}11.5$	10.0		235°27.4	14:46
6	355°30.7	228°14.6	N21°07.2		N17°44.5	236°05.4	N21°07.3	342°13.8		l l	312°15.8	09:37
7	10°33.2	243°14.1	06.5	321°08.3	45.0	251°07.3	07.2	357°16.1	10.1	Jupiter		14:21
8	25°35.7	258°13.6	05.8	336°09.0	45.5 •• 46.0	266°09.2	07.1	12°18.5	10.2	Saturn	346°51.4	07:18
9	40°38.1 55°40.6	273°13.0 288°12.5	· · 05.1 04.4	351°09.6 6°10.2		281°11.2 296°13.1	· · 07.0 06.9	27°20.8 42°23.1	· · 10.2 10.3	Jun 16 Tue	SHA	Mer.pass
10 11	55 40.6 70°43.1	288 12.5 303°11.9	04.4	21° 10.2	46.5 47.0	290 13.1 311°15.0	06.9	42 23.1 57°25.4	10.3		234°14.5	14:46
12	85°45.5	318°11.4	N21°02.9	36°11.5	N17°47.5	326° 16.9	N21°06.7	72°27.7	N03°10.4		311°31.9	09:36
13	100°48.0	333°10.8	02.2	51°12.1	48.0	341°18.8	06.6	87°30.0	10.4		240°50.8	14:18
14	$115^{\circ}50.5$	348°10.3	01.5	$66^{\circ}12.7$	48.5	$356^{\circ}20.8$	06.5	$102^{\circ}32.3$	10.5	Saturn	346°47.7	07:15
15	130°52.9	3°09.8	00.8	81° 13.4	• • 49.0	11°22.7	• • 06.4	117°34.7	•• 10.5	Jun 17 Wed	SHA	Mer.pass
16	145°55.4	18°09.2	21°00.0	96°14.0	49.5	26° 24.6	06.3	132°37.0	10.6		$233^{\circ}02.0$	14:47
17	160°57.8	33°08.7	20°59.3	111°14.6	50.0	41°26.5	06.2	147°39.3	10.6		310°47.9	09:35
18 19	176°00.3 191°02.8	48°08.1 63°07.6	N20°58.6 57.9	126° 15.3 141° 15.9	N17°50.5 51.0	56°28.5 71°30.4	N21°06.1 06.0	162°41.6 177°43.9	N03°10.7 10.7		240°37.9	14:15
20	191 02.8 206°05.2	78°07.1	57.9 57.1	141 15.9 156° 16.5	51.0 51.5	71 30.4 86°32.3	05.0	177 43.9 192°46.2	10.7	Saturn	346°44.0	07:11
21	200 03.2 221°07.7	93°06.5	• • 56.4	171° 17.2	52.0	101°34.2	•• 05.8	207°48.5	. 10.0	Horizont	al parallax	
22	236°10.2	108°06.0	55.7	186° 17.8	52.4	116°36.2	05.7	222°50.9	10.9		Venus:	0.1
23	$251^{\circ}12.6$	123°05.5	55.0	201° 18.4	52.9	$131^{\circ}38.1$	05.6	$237^{\circ}53.2$	11.0		Mars:	0.1
Mern	ass. 06:18	$\nu$ -0.5' d-0	).7′ m-3.99	ν0 6′ d0	.5′ m1.29	ν1 9' d-N	.1′ m-1.84	ν2 3' dΩ	.1′ m0.83			

h	Sui	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°54.0	N23°17.9	182°06.2	0.3'	N27°56.3	1.1'	61.3'
1	194°53.9	18.1	$196^{\circ}25.4$	0.3'	27°57.3	0.9'	61.3'
2	209°53.8	18.2	210°44.7	0.2'	27°58.2	0.6'	61.3'
3	224°53.6	• • 18.3	225°03.9	0.2'	27°58.8	0.4'	61.3'
4 5	239°53.5 254°53.4	18.4 18.5	239°23.2 253°42.4	0.2' 0.2'	27°59.2 27°59.4	0.2' -0.0'	61.3' 61.3'
6	269°53.2	N23°18.6	268°01.7	0.2	N27°59.4	-0.0	61.3
7	284°53.1	18.7	282°20.9	0.3	27°59.1	-0.5	61.3
8	299°53.0	18.8	296°40.2	0.3'	27°58.6	-0.7'	61.3'
9	314°52.8	• • 18.9	$310^{\circ}59.5$	0.3'	27°57.9	-0.9'	61.3'
10	329°52.7	19.0	325°18.8	0.3'	27°56.9	-1.2'	61.3'
11	344°52.6	19.1	339°38.1 353°57.5	0.4'	27°55.7	-1.4'	61.3'
12 13	359°52.4 14°52.3	N23°19.2 19.3	353°57.5 8°16.8	0.4' 0.4'	N27°54.3 27°52.7	-1.6' -1.8'	61.3' 61.3'
13	29°52.2	19.3	22°36.3	0.4	27°50.9	-1.6 -2.1'	61.2
15	44°52.0	. 19.5	36°55.7	0.5	27°48.8	-2.3	61.2'
16	59°51.9	19.6	51°15.2	0.5'	27°46.5	-2.5'	61.2'
17	74°51.7	19.7	65°34.8	0.6'	27°44.0	-2.7'	61.2'
18	89°51.6	N23°19.8	79°54.4	0.6'	N27°41.3	-2.9'	61.2'
19	104°51.5	19.9	94°14.0	0.7'	27°38.4	-3.2'	61.2'
20 21	119°51.3 134°51.2	20.0	108°33.7 122°53.5	0.8' 0.8'	27°35.2 27°31.8	-3.4' -3.6'	61.2' 61.2'
22	134 51.2 149°51.1	20.1	122 55.5 137°13.3	0.6	27°28.2	-3.8'	61.2
23	164°50.9	20.2	151°33.2	1.0'	27°24.4	-3.0 -4.0'	61.1'
_0	SD = 15.7'	d = 0.1'			D = 16.7'	•	
	3D = 15.1'	u = 0.1		3	יו 10.1′ ב		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°50.8	N23°20.4	165°53.1	1.0'	N27°20.4	-4.2'	61.1'
1 2	194°50.7 209°50.5	20.5 20.5	180°13.2 194°33.3	1.1' 1.2'	27°16.1 27°11.7	-4.4' -4.7'	61.1' 61.1'
3	209 50.5 224°50.4	. 20.5	208°53.5	1.3'	27 11.7 27°07.0	-4.1 -4.9	61.1
4	239°50.3	20.7	223°13.8	1.4'	27°02.2	-5.1'	61.1'
5	254°50.1	20.8	237°34.1	1.5'	26°57.1	-5.3	61.1'
6	269°50.0	N23°20.9	251°54.6	1.5'	$N26^{\circ}51.8$	-5.5'	61.0'
7	284°49.8	21.0	266°15.1	1.6'	26°46.3	-5.7'	61.0'
8	299°49.7	21.1	280°35.8	1.7'	26°40.6	-5.9'	61.0'
9	314°49.6	• • 21.2	294°56.5 309°17.3	1.8'	26°34.7 26°28.7	-6.1'	61.0'
10 11	329°49.4 344°49.3	21.2 21.3	309°17.3 323°38.3	1.9' 2.0'	26°28.7 26°22.4	-6.3' -6.5'	61.0' 60.9'
12	359°49.2	N23°21.4	337°59.3	2.2'	N26°15.9	-6.7'	60.9
13	14°49.0	21.5	352°20.5	2.3'	26°09.2	-6.9'	60.9
14	29°48.9	21.6	6°41.7	2.4'	26°02.4	-7.0'	60.9'
15	44°48.8	• • 21.7	21°03.1	2.5'	25°55.3	-7.2'	60.9'
16	59°48.6	21.7	35°24.6	2.6'	25°48.1	-7.4'	60.8'
17 18	74°48.5 89°48.3	21.8 N23°21.9	49°46.2 64°07.9	2.7'	25°40.7 N25°33.1	-7.6' -7.8'	60.8' 60.8'
19	104°48.2	22.0	78°29.8	2.0 3.0'	25°25.3	-7.6 -8.0'	60.8
20	119°48.1	22.1	92°51.7	3.1'	25°17.3	-8.1'	60.7'
21	134°47.9	• • 22.1	107°13.8	3.2'	25°09.2	-8.3'	60.7'
22	149°47.8	22.2	121°36.0	3.3'	25°00.8	-8.5'	60.7'
23	164°47.7	22.3	135°58.4	3.5'	24°52.4	-8.7'	60.7'
	SD = 15.7'	d = 0.1'		S	D = 16.7'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°47.5	N23°22.4	150°20.8	3.6'	N24°43.7	-8.8'	60.6'
1	194°47.4	22.4	164°43.4	3.7'	24°34.9	-9.0'	60.6'
2	209°47.3	22.5	179°06.2	3.9'	24°25.9	-9.2'	60.6'
3	224°47.1 239°47.0	· · 22.6 22.7	193°29.0 207°52.0	4.0' 4.1'	24°16.7 24°07.4	-9.3' -9.5'	60.6' 60.5'
4 5	239°47.0 254°46.8	22.7 22.7	207°52.0 222°15.2	4.1	24°07.4 23°57.9	-9.5° -9.6'	60.5
6	269°46.7	N23°22.8	236°38.4	4.4	N23°48.2	-9.8'	60.5
7	284°46.6	22.9	251°01.8	4.5'	23°38.4	-9.9'	60.5
8	299°46.4	22.9	265°25.4	4.7'	23°28.5	-10.1'	60.4'
9	314°46.3	• • 23.0	279°49.1	4.8'	23°18.4	-10.2'	60.4
10	329°46.2 344°46.0	23.1	294°12.9	5.0'	23°08.1 22°57.8	-10.4'	60.4'
11 12	344°46.0 359°45.9	23.1 N23°23.2	308°36.8 323°00.9	5.1' 5.2'	22°57.8 N22°47.2	-10.5' -10.7'	60.3' 60.3'
13	14°45.8	23.3	337°25.2	5.4'	22°36.5	-10.7	60.3
14	29°45.6	23.3	351°49.5	5.5'	22°25.7	-11.0'	60.2
15	44°45.5	• • 23.4	$6^{\circ}14.1$	5.7'	$22^{\circ}14.8$	-11.1'	60.2'
16	59°45.3	23.5	20°38.7	5.8'	22°03.7	-11.2'	60.2
17	74°45.2	23.5	35°03.5	5.9'	21°52.4	-11.4'	60.1'
18 19	89°45.1 104°44.9	N23°23.6 23.7	49°28.5 63°53.6	6.1' 6.2'	N21°41.1 21°29.6	-11.5' -11.6'	60.1' 60.1'
20	119°44.8	23.7	78°18.8	6.4'	21°29.0 21°18.0	-11.0	60.1
21	134°44.7	• • 23.8	92°44.2	6.5'	21°06.3	-11.8'	60.0'
22	149°44.5	23.8	$107^{\circ}09.7$	6.7'	20°54.4	-12.0'	60.0'
23	164°44.4	23.9	121°35.3	6.8'	20°42.5	-12.1'	60.0'
	SD = 15.7'	d = 0.1'		S	D = 16.5'		

			2026	June 15	5 to Ju	n. 17
Lat.	<b>Tw</b> i	ilight Civil	Sunrise	Sunset	<b>Tw</b> i Civil	i <b>light</b> Naut.
N 72°						
N 70°						
68°						
66°						
64°	////	////	01:32	22:30	////	////
62° 60°	////	//// 00:52	02:10 02:36	21:52 21:26	//// 23:11	//// ////
N 58°	////	01:41	02:56	21:05	22:21	////
56°	////	02:11	03:13	20:49	21:51	////
54°	00:48	02:33	03:27	20:35	21:29	23:15
52°	01:33	02:51	03:39	20:22	21:11	22:29
50°	02:00	03:06	03:50	20:11	20:56	22:01
45°	02:46	03:35	04:13	19:49	20:26	21:16
<b>N</b> 40°	03:16	03:58	04:31	19:31	20:04	20:45
$35^{\circ}$	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
$20^{\circ}$	04:27	04:56	05:21	18:41	19:05	19:35
N 10°	04:49	05:16	05:40	18:22	18:45	19:12
0°	05:08	05:35	05:57	18:04	18:27	18:53
<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		07:58			
52°		07:20 07:27		16:03	16:42	17:23 17:18
54°	06:43 06:49	07:27	08:08 08:19	15:53 15:42	16:34 16:26	17:10
56°	06:55	07:33	08:32	15:42	16:20	17:12
58°	07:02	07:54	08:46	15:15	16:07	17:00
<b>S</b> 60°	07:02	08:06	09:04	14:58	15:55	16:52
3 00	01.03			l		
Lat.	Mon	Moonris Tue	i <b>e</b> Wed	Mon	Moonset Tue	t Wed
N 72°						
			· · · · · · · · · · · · · · · · · · ·			-
N 70°						
68°						
66°						
64°	20.05		03:44	00.56	22.56	00:36
62°	00:25	02:08	04:24	23:56	23:56	23:53
60°	01:32	02:58	04:51	23:06	23:28	23:36
N 58°	02:07	03:29	05:12	22:35	23:06	23:21
56°	02:33	03:52	05:30	22:11	22:48	23:09
54°	02:53	04:11	05:44	21:52	22:33	22:58
52°	03:11	04:27	05:57	21:35	22:19	22:48
50°	03:25	04:41	06:08	21:21	22:08	22:39
45°	03:55	05:09	06:32	20:53	21:43	22:21
<b>N</b> 40°	04:19	05:31	06:50	20:30	21:24	22:05
35°	04:38	05:50	07:06	20:11	21:07	21:52
30°	04:54	06:06	07:19	19:55	20:53	21:41
20°	05:22	06:32	07:42	19:27	20:28	21:21
N 10°	05:47	06:55	08:02	19:04	20:07	21:04
0°	06:09	07:16	08:20	18:41	19:47	20:48
<b>S</b> 10°	06:32	07:38	08:38	18:19	19:27	20:32
20°	06:56	07:38	08:58	17:55	19:27 19:06	20:32
20°	07:24	08:01	09:20	17:55	18:40	19:54
30°	07:24	08:27	09:20		18:40	
35° 40°	07:41	08:43 ∩0:∩1	09:33	17:11 16:51	18:20 18:08	19:42

		Sun				
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age
Duy	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	
17	00:50	00:56	12:01	14:34	02:04	

10:06

10:27

10:38

10:50

11:03

11:18

09:01

09:22

09:50

10:03

10:18

10:36

10:58

40°

45°

**S** 50° 52°

56°

08:00

08:24

08:54

09:09

09:27

09:48

10:15

18:08

17:47

17:21

17:08

16:53

16:36

16:14

16:51

16:28

15:58

15:43

15:25

15:04

14:38

19:28

19:11

18:51

18:41

18:30

18:17

18:03 17:45

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Thu -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
											SHA	Dec
0	266° 15.1	138°04.9	N20°54.2	216° 19.1	N17°53.4	146°40.0	N21°05.5	252°55.5	N03°11.0	Alpheratz	357°33.6	29°14.1
1	281°17.6	153°04.4	53.5	231° 19.7	53.9	161°41.9	05.4	267°57.8	11.1	Ankaa	353°06.0	-42°09.5
2	296°20.0	168°03.9	52.8	246°20.3	54.4	176°43.9	05.3	283°00.1	11.1	Schedar	349°29.8	56° 40.7
3	311°22.5	183°03.3	• • 52.0	261°21.0	• • 54.9	191°45.8	• • 05.2	298°02.4	• • 11.2		348°46.2	-17°50.3
4	326°25.0	198°02.8	51.3	276°21.6	55.4	206°47.7	05.1	313°04.8	11.2	Diphda		
5	341°27.4	213°02.3	50.6	291°22.2	55.9	221°49.6	05.0	328°07.1	11.3	Achernar	335°19.6	-57°05.8
6	356°29.9	228°01.7	N20°49.8	306°22.8	N17°56.4	236°51.5	N21°04.9	343°09.4	N03°11.3	Hamal	327°50.0	23°35.2
7	11°32.3	243°01.2	49.1	321°23.5	56.9	251°53.5	04.8	358°11.7	11.4	Polaris	313°47.5	89°22.3
8	26°34.8	258°00.7		336°24.1		266°55.4	04.7	13°14.0		Acamar	$315^{\circ}11.2$	-40°11.7
			48.4		57.3				11.4	Menkar	$314^{\circ}05.1$	$4^{\circ}11.6$
9	41°37.3	273°00.2	• • 47.6	351°24.7	• • 57.8	281°57.3	• • 04.6	28°16.3	• • 11.5	Mirfak	308°26.9	49°57.2
10	56° 39.7	287°59.6	46.9	6°25.4	58.3	296° 59.2	04.5	43°18.7	11.5	Aldebaran	290°38.6	16°33.7
11	71°42.2	302°59.1	46.1	21°26.0	58.8	312°01.2	04.4	58°21.0	11.6	Rigel	281°03.1	-8°10.2
12	86° 44.7	$317^{\circ}58.6$	N20°45.4	36°26.6	$N17^{\circ}59.3$	$327^{\circ}03.1$	N21°04.3	73°23.3	N03°11.6	Capella	280°20.6	46°01.4
13	101°47.1	332°58.1	44.7	51°27.3	17°59.8	342°05.0	04.2	88°25.6	11.7			
14	116°49.6	347°57.5	43.9	66°27.9	18°00.3	357°06.9	04.1	103°27.9	11.7	Bellatrix	278°21.9	6°22.4
15	131°52.1	2°57.0	• • 43.2	81°28.5	00.8	12°08.9	• • 04.0	118°30.3	• • 11.8	Elnath	278°00.7	28°37.7
16	146°54.5	17°56.5	42.4	96°29.1	01.2	27°10.8	03.9	133°32.6	11.8	Alnilam	275°36.9	-1°11.1
17	161°57.0	32°56.0	41.7	111°29.8	01.7	42°12.7	03.8	148°34.9	11.9	Betelgeuse	$270^{\circ}51.1$	7°24.7
										Canopus	263°52.4	-52° 42.6
18	176° 59.5	47°55.4	N20°40.9	126°30.4	N18°02.2	57°14.6	N21°03.7	163°37.2	N03°11.9	Sirius	258°25.5	$-16^{\circ}45.2$
19	192°01.9	62°54.9	40.2	141°31.0	02.7	72°16.5	03.6	178°39.5	12.0	Adhara	255°05.3	-29°00.5
20	207°04.4	77°54.4	39.4	156°31.7	03.2	87° 18.5	03.5	193°41.8	12.0	Procyon	244°49.9	5°09.4
21	222°06.8	92°53.9	• • 38.7	171°32.3	• • 03.7	102°20.4	• • 03.4	208°44.2	• • 12.1	Pollux	244° 49.9 243° 16.2	27° 57.8
22	237°09.3	107°53.4	37.9	186°32.9	04.1	117°22.3	03.3	223°46.5	12.1	1	243 10.2 234°14.8	
23	252°11.8	122°52.8	37.2	201°33.6	04.6	132°24.2	03.2	238°48.8	12.2	Avior		-59°35.8
										Suhail	222°45.7	-43°32.6
Mer.p	bass. 06:14	$\nu$ -0.5′ $d$ -0	).7′ m-3.99	u0.6′ $d$ 0	.5′ m1.29	$\nu 1.9' \ d-0$	.1' m-1.83	$\nu$ 2.3′ d0	.1'  m0.82	Miaplacidus	221°38.7	-69°49.8
										Alphard	217°46.8	-8°46.5
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
										Dubhe	193°39.7	61°36.7
0	267°14.2	137°52.3	N20°36.4	216°34.2	N18°05.1	147°26.1	N21°03.1	253°51.1	N03°12.2	Denebola	182°23.7	14°25.5
1	282° 16.7	152°51.8	35.7	231°34.8	05.6	162°28.1	03.0	268°53.4	12.3	Gienah	175°42.3	-17°41.5
2	$297^{\circ}19.2$	167°51.3	34.9	246°35.4	06.1	177°30.0	02.9	283°55.8	12.3		172°58.6	-63° 15.1
3	312°21.6	182°50.8	• • 34.2	261°36.1	• • 06.6	192°31.9	• • 02.8	298°58.1	• • 12.4		171°50.2	-57° 16.0
4	327°24.1	197°50.3	33.4	276°36.7	07.0	207°33.8	02.7	314°00.4	12.4	Alioth	166°11.8	55°49.2
5	342°26.6	212°49.8	32.7	291°37.3	07.5	222°35.8	02.6	329°02.7	12.5			
6	357°29.0	227°49.2	N20°31.9	306°38.0	N18°08.0	237°37.7	N21°02.5	344°05.0	N03°12.5	Spica	158°20.9	-11°18.1
7	12°31.5	242°48.7	31.2	321°38.6	08.5	252°39.6	02.4	359°07.4	12.6	Alkaid	152°50.8	49°11.0
8	27°33.9	257°48.2	30.4	336°39.2	09.0	267°41.5	02.4	14°09.7	12.6	Hadar	148°33.9	-60°30.3
										Menkent	147°56.0	-36°30.2
9	42°36.4	272°47.7	• • 29.6	351°39.8	• • 09.4	282°43.4	• • 02.2	29°12.0	• • 12.6	Arcturus	145°46.6	19°02.7
10	57°38.9	287°47.2	28.9	6°40.5	09.9	297° 45.4	02.1	44°14.3	12.7	Rigil Kent.	139°38.2	-60°56.9
11	72°41.3	302°46.7	28.1	21°41.1	10.4	312°47.3	02.0	59°16.6	12.7	Kochab	137°19.0	74°02.9
12	87°43.8	317°46.2	$N20^{\circ}27.4$	36°41.7	N18°10.9	327°49.2	$N21^{\circ}01.9$	74°19.0	N03°12.8	Zuben'ubi		-16°09.2
13	102°46.3	332°45.7	26.6	51°42.4	11.4	342°51.1	01.8	89°21.3	12.8		126°02.4	26° 37.6
14	117°48.7	347°45.2	25.8	66°43.0	11.8	357°53.0	01.7	104°23.6	12.9	Alphecca		
15	132°51.2	2°44.7	• • 25.1	81°43.6	• • 12.3	12°55.0	• • 01.6	119°25.9	• • 12.9	Antares	112°14.0	-26°29.5
16	147°53.7	17°44.1	24.3	96°44.2	12.8	27° 56.9	01.5	134°28.3	13.0	Atria	107°06.6	-69°04.6
17	162° 56.1	32°43.6	23.5	111°44.9	13.3	42°58.8	01.3	149°30.6	13.0	Sabik	$102^{\circ}01.1$	-15°45.5
										Shaula	96°08.3	-37°07.4
18	177°58.6	47°43.1	N20°22.8	126° 45.5	N18°13.8	58°00.7	N21°01.3	164°32.9	N03°13.1	Rasalhague	95°57.1	12°32.4
19	193°01.1	62°42.6	22.0	141°46.1	14.2	73°02.6	01.2	179°35.2	13.1	Eltanin	90°41.1	51°29.1
20	208°03.5	77°42.1	21.2	156° 46.8	14.7	88° 04.6	01.1	194°37.5	13.2	Kaus Aust.	83°30.5	-34°22.3
21	223°06.0	92°41.6	• • 20.5	171°47.4	• • 15.2	103°06.5	• • 01.0	209°39.9	• • 13.2	Vega	80°32.0	38°48.4
22	238°08.4	$107^{\circ}41.1$	19.7	186°48.0	15.7	118°08.4	00.9	224°42.2	13.3	Nunki	75°45.9	-26° 15.8
23	253° 10.9	122°40.6	18.9	201°48.6	16.1	133°10.3	8.00	239°44.5	13.3	Altair	61°58.5	8° 56.3
		0.5/ 1.0		0.6/	=/ 1.00			2 0/ 10	2/ 2.22			
Mer.p	bass. 06:10	$\nu$ -0.5° $d$ -0	).8′ m-4.00	$\nu$ 0.6′ $d$ 0	.5'  m1.29	$\nu$ 1.9° d-0	.1' m-1.83	$\nu$ 2.3′ d0	.0'  m0.82	Peacock	53°03.4	-56°38.8
										Deneb	49°24.6	45°22.3
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.4	9°59.8
0 0	268° 13.4	137°40.1	N20°18.2	216°49.3		148°12.2	N21°00.7	254°46.8	N03°13.4	Al Na'ir	27°31.2	-46°49.7
	200 15.4 283°15.8	157 40.1 152°39.6	17.4	210 49.3 231°49.9	17.1	146 12.2 163°14.2	00.6	269°49.2	13.4	Fomalhaut	15°13.1	-29°28.7
1										Scheat	13°44.0	28°13.5
2	298° 18.3	167°39.1	16.6	246°50.5	17.6	178°16.1	00.5	284°51.5	13.5	Markab	13°28.6	15°20.8
3	313°20.8	182°38.6	• • 15.8	261°51.2	• • 18.0	193°18.0	• • 00.4	299°53.8	• • 13.5	1 45 =	<b>6</b> -	
4	328°23.2	197°38.1	15.1	276°51.8	18.5	208° 19.9	00.3	314°56.1	13.6	Jun 18 Thu	SHA	Mer.pass
5	343°25.7	212°37.6	14.3	291°52.4	19.0	223°21.8	00.2	329°58.4	13.6	Venus		14:48
6	358°28.2	227°37.1	N20°13.5	306°53.0	$N18^{\circ}19.5$	238°23.8	N21°00.1	345°00.8	N03°13.7	Mars	310°04.0	09:34
7	13°30.6	242°36.6	12.7	321°53.7	19.9	253°25.7	21°00.0	0°03.1	13.7	Jupiter	240°24.9	14:12
8	28°33.1	257°36.1	11.9	336° 54.3	20.4	268° 27.6	20°59.9	15°05.4	13.8	Saturn	346°40.4	07:07
9	43°35.6	272°35.6	. 11.2	351°54.9	20.9	283°29.5	59.8	30°07.7	• • 13.8			
10	58° 38.0	287°35.2	10.4	6°55.6	21.3	298°31.4	59.7	45°10.1	13.9	Jun 19 Fri	SHA	Mer.pass
	73° 40.5	302°34.7	09.6	21°56.2	21.3	313°33.4	59.7 59.6	60°12.4	13.9	Venus	230°38.1	14:49
11										Mars	309°19.9	09:33
12	88° 42.9	317°34.2	N20°08.8	36°56.8	N18°22.3	328°35.3	N20°59.5	75°14.7	N03°13.9	Jupiter	240°11.9	14:08
13	103°45.4	332°33.7	08.0	51°57.4	22.8	343°37.2	59.4	90°17.0	14.0	Saturn	346°36.9	07:04
14	118° 47.9	347°33.2	07.2	66°58.1	23.2	358°39.1	59.3	105°19.4	14.0			
15	133°50.3	2°32.7	• • 06.5	81°58.7	• • 23.7	13°41.0	• • 59.2	120°21.7	•• 14.1	Jun 20 Sat	SHA	Mer.pass
16	148°52.8	17°32.2	05.7	96°59.3	24.2	28°43.0	59.1	135°24.0	14.1	Venus		14:50
17	163°55.3	32°31.7	04.9	111°59.9	24.6	43°44.9	59.0	150°26.3	14.2	<b>I</b>	308°35.9	09:32
18	178° 57.7	47°31.2	N20°04.1	127°00.6	N18°25.1	58° 46.8	N20°58.9	165°28.7	N03°14.2	Jupiter		14:05
19	194°00.2	62°30.7	03.3	142°01.2	25.6	73°48.7	58.8	180°31.0	14.3	Saturn	346°33.5	07:00
20	209°02.7	77°30.3	02.5	157°01.8	26.1	88° 50.6	58.7	195°33.3	14.3	Jaturn	J+U JJ.J	07:00
	209 02.7 224°05.1	92°29.8	01.7	172°02.5	. 26.5	103°52.5	58.6	210°35.6	. 14.3	Horizont	al parallax	
21										1.01.2011	Venus:	0.1
22	239°07.6	107°29.3	00.9	187°03.1	27.0	118°54.5	58.5	225°38.0	14.4		Mars:	0.1
23	254° 10.0	122°28.8	00.2	202°03.7	27.5	133°56.4	58.4	240°40.3	14.5		iviars:	0.1
Mer.n	pass. 06:06	$\nu$ -0.5' d-0	0.8′ m-4.00	$\nu$ 0.6' d0	.5′ m1.29	$\nu 1.9' d-0$	.1′ m-1.83	$\nu 2.3' d0$	.0′ m0.82			

h	Sui	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°44.2	N23°24.0	136°01.1	6.9'	N20°30.4	-12.2'	59.9'
1 2	194°44.1 209°44.0	24.0 24.1	150°27.1 164°53.1	7.1' 7.2'	20°18.2 20°05.9	-12.3' -12.4'	59.9' 59.8'
3	209 44.0 224°43.8	24.1	179°19.4	7.4	19°53.5	-12.4 -12.5'	59.8'
4	239°43.7	24.2	193°45.7	7.5'	19°41.0	-12.6'	59.8'
5	254°43.6	24.2	208°12.2	7.6'	19°28.3	-12.7'	59.7'
6 7	269°43.4 284°43.3	N23°24.3 24.3	222°38.9 237°05.6	7.8' 7.9'	N19°15.6 19°02.8	-12.8' -12.9'	59.7' 59.7'
8	299°43.2	24.3	251°32.5	8.0'	19°02.8	-12.9 -13.0'	59.7 59.6'
9	314°43.0	• • 24.4	265°59.6	8.2'	18°36.9	-13.1'	59.6'
10	329°42.9	24.5	280°26.8	8.3'	18°23.7	-13.2'	59.6'
11 12	344°42.7 359°42.6	24.6 N23°24.6	294°54.1 309°21.6	8.5' 8.6'	18° 10.5 N17° 57.2	-13.3' -13.4'	59.5' 59.5'
13	14° 42.5	24.6	323°49.1	8.7'	17°43.9	-13.5'	59.5'
14	29°42.3	24.7	$338^{\circ}16.9$	8.9'	17°30.4	-13.5'	59.4'
15	44°42.2	• • 24.7	352°44.7	9.0'	17°16.8	-13.6'	59.4'
16 17	59°42.1 74°41.9	24.8 24.8	7°12.7 21°40.8	9.1' 9.2'	17°03.2 16°49.5	-13.7' -13.8'	59.3' 59.3'
18	89°41.8	N23°24.9	36°09.1	9.4	N16°35.7	-13.9'	59.3'
19	104°41.6	24.9	50°37.4	9.5'	$16^{\circ}21.9$	-13.9'	59.2'
20	119°41.5	25.0	65°05.9	9.6'	16°07.9	-14.0'	59.2'
21 22	134°41.4 149°41.2	· · 25.0 25.1	79°34.6 94°03.3	9.8' 9.9'	15°53.9 15°39.9	-14.1' -14.1'	59.1' 59.1'
23	164°41.1	25.1	108°32.2	10.0'	15°25.7	-14.1	59.1'
	SD = 15.7'	d = 0.1'			D = 16.3'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	179°41.0 194°40.8	N23°25.1 25.2	123°01.2 137°30.3	10.1' 10.2'	N15°11.5 14°57.3	-14.3' -14.3'	59.0' 59.0'
2	209°40.7	25.2	151°59.5	10.2	14° 43.0	-14.3 -14.4'	59.0'
3	224°40.5	• • 25.3	166°28.9	10.5'	14°28.6	-14.4'	58.9'
4	239°40.4	25.3	180°58.4	10.6'	14°14.1	-14.5'	58.9'
5 6	254°40.3 269°40.1	25.3 N23°25.4	195°28.0 209°57.7	10.7' 10.8'	13°59.6 N13°45.1	-14.5' -14.6'	58.8' 58.8'
7	284°40.1	N23 25.4 25.4	209 57.7 224°27.5	10.6	13°30.5	-14.6'	58.8'
8	299°39.9	25.4	238°57.4	11.0'	13°15.8	-14.7'	58.7'
9	314°39.7	• • 25.5	253°27.5	11.2'	13°01.1	-14.7'	58.7'
10	329°39.6 344°39.4	25.5 25.5	267°57.6 282°27.9	11.3' 11.4'	12°46.4 12°31.6	-14.8' -14.8'	58.6'
11 12	344 39.4 359°39.3	25.5 N23°25.6	282 27.9 296°58.2	11.4	N12°16.8	-14.8 -14.9'	58.6' 58.6'
13	14°39.2	25.6	311°28.7	11.6'	12°01.9	-14.9'	58.5'
14	29°39.0	25.6	325°59.3	11.7'	11°47.0	-15.0'	58.5'
15 16	44°38.9 59°38.8	· · 25.7 25.7	340°30.0 355°00.8	11.8' 11.9'	11°32.0 11°17.1	-15.0' -15.0'	58.4' 58.4'
17	74°38.6	25.7	9°31.6	12.0'	11°02.0	-15.1'	58.4'
18	89°38.5	N23°25.7	24°02.6	12.1'	N10°47.0	-15.1'	58.3'
19	104°38.4	25.8	38°33.7	12.2'	10°31.9	-15.1'	58.3'
20 21	119°38.2 134°38.1	25.8 • • 25.8	53°04.9 67°36.1	12.3' 12.4'	10° 16.8 10° 01.6	-15.1' -15.2'	58.2' 58.2'
22	149°37.9	25.9	82°07.5	12.5	09°46.5	-15.2'	58.2'
23	164°37.8	25.9	96°38.9	12.5'	09°31.3	-15.2'	58.1'
	SD = 15.7'	d = 0.0'		SI	D = 16.1'		
_							
Sat 0	<b>GHA</b> 179°37.7	<b>Dec</b> N23°25.9	<b>GHA</b> 111°10.5	u 12.6'	<b>Dec</b> N09° 16.0	d -15.2'	<b>HP</b> 58.1'
1	194°37.5	25.9	125°42.1	12.7	09°00.8	-15.3'	58.0'
2	209°37.4	25.9	140°13.8	12.8'	08°45.5	-15.3'	58.0'
3 4	224°37.3 239°37.1	· · 26.0 26.0	154°45.6 169°17.5	12.9' 13.0'	08°30.2 08°14.9	-15.3' -15.3'	58.0' 57.9'
4 5	254°37.0	26.0	109 17.5 183°49.5	13.0'	08 14.9 07°59.6	-15.3'	57.9' 57.9'
6	269°36.8	N23°26.0	198°21.5	13.1'	N07°44.3	-15.4'	57.9'
7	284°36.7	26.0	212°53.7	13.2'	07°28.9	-15.4'	57.8'
8 9	299°36.6 314°36.4	26.1 •• 26.1	227°25.9 241°58.2	13.3' 13.4'	07°13.6 06°58.2	-15.4' -15.4'	57.8' 57.7'
10	329°36.3	26.1	256°30.5	13.4	06°42.8	-15.4'	57.7'
11	344°36.2	26.1	271°03.0	13.5'	06°27.4	-15.4'	57.7'
12	359°36.0	N23°26.1	285°35.5	13.6'	N06°12.0	-15.4'	57.6'
13 14	14°35.9 29°35.7	26.1 26.2	300°08.0 314°40.7	13.6' 13.7'	05°56.6 05°41.2	-15.4' -15.4'	57.6' 57.5'
15	44°35.6	. 26.2	329°13.4	13.8'	05°25.8	-15.4'	57.5'
16	59°35.5	26.2	343°46.2	13.8'	05°10.3	-15.4'	57.5'
17	74°35.3 89°35.2	26.2	358°19.0	13.9'	04°54.9 N04°39.5	-15.4'	57.4'
18 19	89°35.2 104°35.1	N23°26.2 26.2	12°51.9 27°24.9	14.0' 14.0'	N04°39.5 04°24.1	-15.4' -15.4'	57.4' 57.3'
20	119°34.9	26.2	41°57.9	14.1'	04° 08.6	-15.4'	57.3'
21	134°34.8	• • 26.2	56°31.0	14.1'	03°53.2	-15.4'	57.3'
22	149°34.7 164°34.5	26.2	71°04.2 85°37.4	14.2'	03°37.8 03°22.4	-15.4'	57.2'
23		26.2	σ5 <sup>-</sup> 37.4	14.3'		-15.4'	57.2'
	SD = 15.7'	d = 0.0'		SI	D = 15.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Juliuse	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	////
N 58°	////	01:40	02:56	21:07	22:23	////
56°	////	02:10	03:13	20:50	21:53	////
54°	00:45	02:33	03:27	20:36	21:30	23:18
52°	01:32	02:51	03:39	20:23	21:12	22:31
50°	02:00	03:06	03:50	20:12	20:57	22:03
45°	02:46	03:35	04:13	19:50	20:27	21:17
N 40°	03:16	03:58	04:31	19:32	20:05	20:46
35°	03:40	04:16	04:46	19:17	19:46	20:23
30° 20°	03:58	04:32	04:59	19:04	19:31	20:05
N 10°	04:27 04:50	04:57 05:17	05:21 05:40	18:42 18:23	19:06 18:46	19:35 19:13
00	05:09	05:17	05:40	18:05	18:28	18:54
<b>S</b> 10°						
20°	05:26 05:42	05:52 06:10	06:15 06:34	17:48 17:29	18:10 17:53	18:37 18:21
30°	05:59	06:29	06:55	17:08	17:34	18:04
35°	05.59	06:39	07:07	16:55	17:34	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

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

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	269°12.5	137°28.3	N19°59.4	217°04.3	N18°27.9	148° 58.3	N20°58.3	255° 42.6	N03°14.5		JIIA	
	209 12.5 284°15.0			217 04.3 232°05.0				270°44.9		Alpheratz	357°33.5	29°14.1
1		152°27.8	58.6		28.4	164°00.2	58.2		14.6	Ankaa	353°06.0	-42°09.4
2	299°17.4	167°27.3	57.8	247°05.6	28.9	179°02.1	58.1	285°47.3	14.6	Schedar	349°29.8	56°40.7
3	314°19.9	182°26.9	• • 57.0	262°06.2	• • 29.3	194°04.1	• • 58.0	300°49.6	• • 14.6	Diphda	348°46.2	-17°50.3
4	329°22.4	197°26.4	56.2	277°06.8	29.8	209°06.0	57.9	315°51.9	14.7	Achernar	335°19.5	-57°05.8
5	344°24.8	212°25.9	55.4	292°07.5	30.3	224°07.9	57.8	330°54.2	14.7	Hamal	327°50.0	23°35.2
6	359°27.3	227°25.4	N19°54.6	307°08.1	N18°30.7	239°09.8	N20°57.7	345° 56.6	N03°14.8	Polaris	313°46.5	89°22.3
7	14°29.8	242°24.9	53.8	322°08.7	31.2	254° 11.7	57.6	0°58.9	14.8	Acamar	315°11.2	-40°11.7
8	29°32.2	257°24.5	53.0	337°09.3	31.7	269°13.6	57.5	$16^{\circ}01.2$	14.9	Menkar	314°05.1	4°11.6
9	44°34.7	272°24.0	•• 52.2	$352^{\circ}10.0$	• • 32.1	284°15.6	•• 57.4	31°03.6	• • 14.9	Mirfak	308° 26.9	49°57.2
10	59°37.2	287°23.5	51.4	$7^{\circ}10.6$	32.6	299° 17.5	57.2	46°05.9	15.0	Aldebaran	290°38.6	16°33.7
11	74°39.6	302°23.0	50.6	22°11.2	33.1	$314^{\circ}19.4$	57.1	61°08.2	15.0		290 38.0 281°03.0	-8°10.2
12	89°42.1	317°22.6	N19°49.8	$37^{\circ}11.9$	N18°33.5	329°21.3	N20°57.0	76° 10.5	N03°15.1	Rigel		
13	104°44.5	332°22.1	49.0	52°12.5	34.0	344°23.2	56.9	91°12.9	15.1	Capella	280°20.6	46°01.4
14	119°47.0	347°21.6	48.2	$67^{\circ}13.1$	34.4	359°25.1	56.8	$106^{\circ}15.2$	15.1	Bellatrix	278°21.9	6°22.4
15	134°49.5	$2^{\circ}21.1$	• • 47.4	82°13.7	• • 34.9	$14^{\circ}27.1$	• • 56.7	121°17.5	• • 15.2	Elnath	278°00.7	28°37.7
16	149°51.9	17°20.7	46.6	97° 14.4	35.4	29°29.0	56.6	136°19.8	15.2	Alnilam	275°36.8	-1°11.1
17	164°54.4	32°20.2	45.7	112° 15.0	35.8	44°30.9	56.5	151°22.2	15.3	Betelgeuse	270°51.1	7°24.7
18	179°56.9	47°19.7	N19°44.9	127° 15.6	N18°36.3	59° 32.8	N20°56.4	166°24.5	N03°15.3	Canopus	263°52.4	-52°42.6
19	194°59.3	62°19.3	44.1	142° 16.2	36.8	74° 34.7	56.3	181°26.8	15.4	Sirius	258° 25.5	-16°45.2
20	210°01.8	77°18.8	43.3	157° 16.9	37.2	89° 36.7	56.2	196°29.2	15.4	Adhara	255°05.3	-29°00.5
21	225°04.3	92°18.3	• • 42.5	172° 17.5	•• 37.7	104° 38.6	56.1	211°31.5	. 15.5	Procyon	244°49.9	5°09.4
22	240°06.7	92 16.3 107°17.8	41.7	187° 18.1	38.1	104 38.0 119°40.5	56.0	226°33.8	15.5	Pollux	243°16.2	27°57.8
23	255°09.2	107 17.8 122°17.4	40.9	202° 18.7	38.6	119 40.5 134° 42.4	55.9	241°36.1	15.5	Avior	234°14.8	-59°35.8
23	233 09.2						_			Suhail	222°45.8	-43°32.5
Mer.p	ass. 06:02	$\nu$ -0.5′ $d$ -0	0.8′ m-4.01	$\nu$ 0.6 $^{\prime}$ d0	.5′ m1.29	$\nu$ 1.9′ <i>d</i> -0	.1' m-1.83	$\nu 2.3' \ d0$	.0'  m0.81	Miaplacidus	221°38.7	-69°49.8
<u>.</u>						-		-		Alphard	$217^{\circ}46.8$	-8°46.5
	G114	6114	_	6114	_	G114	-	6114	_	Regulus	207°33.3	11°50.3
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.7	61°36.7
0	270°11.7	137°16.9	N19°40.1	217°19.4	N18°39.1	149°44.3	N20°55.8	256°38.5	N03°15.6	Denebola	182°23.7	14°25.5
1	285°14.1	152°16.4	39.3	232°20.0	39.5	164°46.2	55.7	271°40.8	15.6	Gienah	175°42.3	-17°41.5
2	300°16.6	$167^{\circ}16.0$	38.4	247°20.6	40.0	179°48.2	55.6	286°43.1	15.7	Acrux	172°58.7	-63°15.1
3	315°19.0	182°15.5	• • 37.6	262°21.2	• • 40.4	194°50.1	• • 55.5	301°45.5	• • 15.7		171°50.2	-57°16.0
4	330°21.5	197°15.1	36.8	$277^{\circ}21.9$	40.9	209°52.0	55.4	316°47.8	15.8	Alioth	166°11.8	55°49.2
5	345°24.0	212°14.6	36.0	292°22.5	41.4	224°53.9	55.3	331°50.1	15.8	Spica	158° 20.9	-11°18.1
6	0°26.4	$227^{\circ}14.1$	N19°35.2	307°23.1	N18°41.8	239°55.8	N20°55.2	346°52.5	N03°15.9	Alkaid	152° 50.8	49°11.0
7	15°28.9	242°13.7	34.4	322°23.7	42.3	254°57.7	55.1	1°54.8	15.9	Hadar	148° 33.9	-60°30.3
8	30°31.4	257°13.2	33.5	337°24.4	42.7	269°59.6	55.0	16°57.1	16.0		147°56.0	-36°30.2
9	45°33.8	272°12.7	• • 32.7	352°25.0	• • 43.2	285°01.6	• • 54.9	31°59.4	• • 16.0	Arcturus	147 30.0 145°46.6	19°02.7
10	60°36.3	287°12.3	31.9	7°25.6	43.6	300°03.5	54.8	47°01.8	16.0	Rigil Kent.	139°38.2	-60°56.9
11	75°38.8	302°11.8	31.1	22°26.2	44.1	315°05.4	54.7	62°04.1	16.1	Kochab	139 36.2 137°19.0	74°02.9
12	90°41.2	317°11.4	N19°30.2	37°26.9	N18°44.6	330°07.3	N20°54.6	77°06.4	N03°16.1			
13	105°43.7	332°10.9	29.4	52° 27.5	45.0	345°09.2	54.5	92°08.8	16.2	Zuben'ubi	136°54.4	-16°09.2
14	120°46.1	347°10.4	28.6	67°28.1	45.5	0°11.1	54.4	107°11.1	16.2	Alphecca	126°02.4	26°37.6
15	135°48.6	2°10.0	27.8	82°28.7	• • 45.9	15° 13.1	• • 54.3	122° 13.4	· · 16.3	Antares	112°14.0	-26°29.5
16	150°51.1	17°09.5	26.9	97°29.4	46.4	30° 15.0	54.2	137° 15.8	16.3	Atria	107°06.6	-69°04.6
17	165°53.5	32°09.1	26.1	112°30.0	46.8	45° 16.9	54.1	152° 18.1	16.4	Sabik	102°01.1	-15°45.5
18	180°56.0	47°08.6	N19°25.3	127°30.6	N18°47.3	60° 18.8	N20°54.0	167°20.4	N03°16.4	Shaula	96°08.3	-37°07.4
19	195°58.5	62°08.2	24.5	142°31.2	47.7	75° 20.7	53.9	182°22.8	16.4	Rasalhague	95°57.1	12°32.4
20	211°00.9	77°07.7	23.6	157°31.9	48.2	90°22.6	53.7	197°25.1	16.5	Eltanin	90°41.1	51°29.1
21	226°03.4	92°07.3	22.8	172°32.5	• 48.6	105°24.6	• • 53.6	212°27.4	16.5	Kaus Aust.	83°30.5	-34°22.3
22	241°05.9	107°06.8	22.0	172 32.3 187°33.1	49.1	105° 24.0° 120° 26.5	53.5	212 27.4 227°29.8	16.6	Vega	80°32.0	38°48.4
								242°32.1		Nunki	75°45.9	-26°15.8
23	256°08.3	122°06.4	21.1	202°33.7	49.5	135°28.4	53.4	242 32.1	16.6	Altair	$61^{\circ}58.5$	8°56.3
Mer.p	ass. 05:58	$\nu$ -0.5' d-0	0.8′ m-4.01	$\nu$ 0.6 $^{\prime}$ d0	.5′ m1.29	$\nu$ 1.9′ d-0	.1′ m-1.83	$\nu$ 2.3′ d0	.0′ m0.81	Peacock	53°03.3	-56°38.8
<u> </u>										Deneb	49°24.6	45°22.3
_		<b></b> -	-	<b></b>	_		_	<b></b> -	_	Enif	33°37.4	9°59.8
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.2	-46°49.7
0	271°10.8	137°05.9	N19°20.3	217°34.4		150°30.3	N20°53.3	257°34.4	N03°16.7	Fomalhaut	$15^{\circ}13.1$	-29°28.7
1	286°13.3	152°05.5	19.5	232°35.0	50.5	165°32.2	53.2	272°36.8	16.7	Scheat	13°43.9	28°13.5
2	301°15.7	167°05.0	18.6	247°35.6	50.9	180°34.1	53.1	287°39.1	16.7	Markab	13°28.6	15°20.8
3	316°18.2	182°04.6	• • 17.8	262°36.2	• • 51.4	195°36.0	• • 53.0	302°41.4	• • 16.8			
4	331°20.6	197°04.1	17.0	277°36.9	51.8	210°38.0	52.9	317°43.8	16.8	Jun 21 Sun	SHA	Mer.pass
5	346°23.1	212°03.7	16.1	292°37.5	52.3	225°39.9	52.8	332°46.1	16.9		228°15.8	14:51
6	1°25.6	227°03.2	N19°15.3	$307^{\circ}38.1$	N18°52.7	240°41.8	N20°52.7	347°48.4	N03°16.9	Mars		09:31
7	$16^{\circ}28.0$	242°02.8	14.4	322°38.7	53.2	255°43.7	52.6	2°50.8	17.0	Jupiter		14:02
8	$31^{\circ}30.5$	257°02.3	13.6	337°39.4	53.6	270°45.6	52.5	$17^{\circ}53.1$	17.0	Saturn	346°30.1	06:56
9	46°33.0	272°01.9	• • 12.8	352°40.0	•• 54.1	285°47.5	• • 52.4	32°55.4	• • 17.0	Jun 22 Mon	SHA	Ma:: ::
10	61°35.4	287°01.5	11.9	7°40.6	54.5	300°49.4	52.3	47°57.8	17.1	Venus		Mer.pass 14:51
11	76°37.9	$302^{\circ}01.0$	11.1	22°41.2	55.0	315°51.4	52.2	63°00.1	17.1		307°07.7	
12	91°40.4	317°00.6	N19°10.2	37°41.8	N18°55.4	330°53.3	N20°52.1	78°02.4	N03°17.2			09:30
13	$106^{\circ}42.8$	332°00.1	09.4	52°42.5	55.8	345°55.2	52.0	93°04.8	17.2	Jupiter		13:59
14	121°45.3	346°59.7	08.6	67°43.1	56.3	0°57.1	51.9	$108^{\circ}07.1$	17.3	Saturn	346°26.8	06:52
15	136°47.7	1°59.3	• • 07.7	82°43.7	• • 56.7	15°59.0	• • 51.8	123°09.4	• • 17.3	Jun 23 Tue	SHA	Mer.pass
16	151°50.2	16°58.8	06.9	97°44.3	57.2	31°00.9	51.7	138°11.8	17.3	Venus		14:52
17	166°52.7	31°58.4	06.0	112°45.0	57.6	46°02.8	51.6	153° 14.1	17.4	Mars		09:29
18	181°55.1	46°57.9	N19°05.2	127° 45.6	N18°58.1	61°04.8	N20°51.5	168° 16.4	N03°17.4	Jupiter		13:56
19	196°57.6	61°57.5	04.3	142°46.2	58.5	76°06.7	51.4	183° 18.8	17.5	Saturn		06:49
20	212°00.1	76°57.1	03.5	157°46.8	59.0	91°08.6	51.2	198°21.1	17.5	Jatuill	5.0 23.0	00.43
21	227°02.5	91°56.6	02.6	172°47.5	• • 59.4	106° 10.5	51.1	213°23.4	• • 17.6	Horizont	al parallax	
22	242°05.0	106°56.2	01.8	187°48.1	18°59.9	121° 12.4	51.0	228°25.8	17.6		Venus:	0.1
23	257°07.5	121°55.8	00.9	202°48.7	19°00.3	136°14.3	50.9	243°28.1	17.6		Mars:	0.1
Mer.p	ass. 05:54	$\nu$ -0.4′ $d$ -0	).8′ m-4.01	$\nu$ 0.6′ d0	.5′ m1.29	$\nu 1.9' \ d-0$	.1′ m-1.82	$\nu 2.3' \ d0$	.0'  m0.81			

CHA	h	Su	n			Moon		
1	Sun	GHA	Dec	GHA	ν	Dec	d	HP
2								
3								
5								
Fig.		239°33.8						
Record   R								
Section   Sect								
9   314°33.2   26.3   231°12.2   14.7   00°48.8   -15.3   56.8								
11   344°329   26.3   260°19.7   14.8°   00°18.2   -15.3°   56.8°     13   14°32.6   26.3   226°3.5   14.8°   N00°02.9   -15.2°   56.7°     14   29°32.5   26.3   304°01.2   14.9°   00°12.7   15.2°   56.6°     15   44°32.3   -26.3   318°35.1   14.9°   00°12.7   15.2°   56.6°     16   59°32.2   26.3   333°09.0   15.0°   00°57.9   15.1°   56.6°     17   74°32.1   26.2   347°43.0   15.0°   01°13.0   15.1°   56.5°     18   89°31.9   N23°26.2   2°17.0   15.0°   501°28.1   15.1°   56.5°     19   104°31.8   26.2   16°51.0   15.1°   01°43.8   15.1°   56.5°     20   119°31.7   26.2   31°25.1   15.1°   01°58.3   15.0°   56.4°     22   149°31.2   26.2   48°59.2   15.1°   02°28.4   15.0°   56.4°     23   164°31.2   26.2   75°07.4   15.2°   02°43.4   15.0°   56.4°     24   219°30.1   26.2   104°15.7   15.2°   30°31.3   14.9°   56.3°     25   20   20°30.8   26.2   118°4.9   15.2°   30°38.3   14.9°   56.3°     25   254°30.4   26.1   16°32.6   15.3°   304°12.7   14.8°   56.1°     26   260°30.3   N23°26.1   147°56.4   15.2°   03°38.3   14.9°   56.3°     26   260°30.3   N23°26.1   147°56.4   15.2°   03°38.3   14.9°   56.3°     27   284°30.2   26.1   147°56.4   15.2°   03°38.3   14.9°   56.3°     28   299°30.0   26.1   147°56.4   15.2°   03°38.3   14.9°   56.3°     28   299°30.0   26.1   147°56.4   15.2°   03°38.3   14.9°   56.3°     28   299°30.0   26.1   147°56.4   15.2°   03°38.1   14.8°   56.2°     26   260°30.3   N23°26.1   177°06.9   15.3°   504°27.5   14.7°   56.1°     340°29.9   26.0   235°24.0   15.3°   504°27.5   14.7°   56.1°     10   329°29.7   26.0   235°24.0   15.3°   504°12.7   14.8°   56.1°     10   329°29.7   26.0   235°24.0   15.3°   504°12.7   14.8°   56.2°     10   329°29.7   26.0   235°24.0   15.3°   506°13.6   14.6°   56.0°     10   329°29.7   26.0   235°24.0   15.3°   506°13.6   14.6°   56.0°     10   329°29.7   26.0   235°24.0   15.3°   506°13.6   14.6°   56.0°     10   329°29.7   26.0   235°24.0   15.3°   506°13.6   14.6°   56.0°     11   344°29.6   27.0°   27.0°   27.0°   27.0°   27.0°   27.0°   27.0°				231°12.2				
12   359°32.7   N23°26.3   224°53.5   14.8°   N00°02.9   -15.2°   56.7°     14   29°32.5   26.3   388°27.3   14.9°   00°27.5   15.2°   56.6°     15   44°32.3   -26.3   318°35.1   14.9°   00°42.7   15.2°   56.6°     16   59°32.2   26.3   338°30.9   15.0°   00°57.5   15.1°   56.6°     17   74°32.1   26.2   347°43.0   15.0°   01°13.0   15.1°   56.5°     18   88°31.9   N23°26.2   21°1.0   15.0°   501°28.1   15.1°   56.5°     19   104°31.8   26.2   31°25.1   15.1°   01°43.2   15.1°   56.5°     19   104°31.8   26.2   31°25.1   15.1°   01°43.2   15.1°   56.5°     20   119°31.7   26.2   31°25.1   15.1°   02°13.4   15.0°   56.4°     21   134°31.5   -26.2   45°59.2   15.1°   02°13.4   15.0°   56.4°     22   149°31.4   26.2   60°33.3   15.1°   02°28.4   15.0°   56.4°     22   149°31.4   26.2   26.2   75°07.4   15.2°   02°13.4   15.0°   56.4°     3   1   194°31.0   26.2   118°49.9   15.2°   03°33.1   40°   56.3°     1   194°31.0   26.2   118°49.9   15.2°   03°33.1   40°   56.3°     2   209°30.8   26.2   118°49.9   15.2°   03°33.1   40°   56.3°     3   224°30.7   -26.2   133°24.1   15.2°   03°43.1   14.8°   56.2°     4   239°30.6   26.1   147°58.4   15.2°   03°43.1   14.8°   56.2°     5   254°30.4   26.1   162°32.6   15.3°   504°27.5   14.8°   56.1°     7   284°30.2   26.1   162°32.6   15.3°   504°27.5   14.7°   56.1°     8   299°30.0   N23°26.1   179°0.9   15.3°   504°27.5   14.7°   56.1°     8   299°30.0   26.1   220°49.7   15.3°   50°47.15   14.7°   56.1°     10   329°29.7   26.0   235°24.0   15.3°   50°47.15   14.7°   56.1°     10   329°29.7   26.0   235°24.0   15.3°   50°47.15   14.7°   56.1°     11   344°29.6   26.0   246°36.3   15.3°   50°40.8   14.5°   56.0°     12   359°29.5   N23°26.0   266°35.3   15.3°   50°40.8   14.5°   56.0°     12   359°29.5   N23°26.0   266°50.3   15.3°   50°40.8   14.5°   56.0°     14   29°39.2   26.0   29°341.3   15.3°   50°40.8   14.5°   56.0°     15   44°29.1   25.9   337°24.3   15.3°   50°40.8   14.5°   55.6°     26   44°20.1   25.8   35°55.5   35°50.9   35°55.4   34.5°   55°50.9								
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5         254°27.2         25.6         152°15.9         15.2'         09°56.2         13.7'         55.4'           6         269°27.0         N23°25.5         166°50.2         15.2'         \$10°09.9         13.7'         55.4'           7         284°26.9         25.5         181°24.4         15.2'         10°23.6         13.6'         55.4'           8         299°26.8         25.5         195°58.6         15.2'         10°37.2         13.6'         55.4'           9         314°26.6         · · 25.4         210°32.8         15.2'         10°50.8         13.5'         55.3'           10         329°26.5         25.4         225°07.0         15.2'         11°04.3         13.5'         55.3'           11         344°26.4         25.4         239°41.2         15.1'         11°17.7         13.4'         55.3'           12         359°26.2         N23°25.3         254°15.3         15.1'         511°31.1         13.3'         55.3'           13         14°26.1         25.3         268°49.4         15.1'         11°44.5         13.3'         55.2'           14         29°26.0         25.2         283°3.5         15.1'         11°57.8         13.2'	3	224°27.4	• • 25.6	123°07.4	15.3'		13.8'	55.5'
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19     104°25.3     25.0     356°13.6     14.9'     13°03.3     12.9'     55.1'       20     119°25.2     25.0     10°47.6     14.9'     13°16.2     12.9'     55.1'       21     134°25.0     25.0'     25°21.5     14.9'     13°29.1     12.8'     55.0'       22     149°24.9     24.9     39°55.4     14.9'     13°41.9     12.7'     55.0'       23     164°24.7     24.9     54°29.3     14.8'     13°54.6     12.7'     55.0'	17	74°25.6	25.1	$327^{\circ}05.7$	15.0'	12°37.3	13.0'	55.1'
20     119°25.2     25.0     10°47.6     14.9'     13°16.2     12.9'     55.1'       21     134°25.0     • 25.0     25°21.5     14.9'     13°29.1     12.8'     55.0'       22     149°24.9     24.9     39°55.4     14.9'     13°41.9     12.7'     55.0'       23     164°24.7     24.9     54°29.3     14.8'     13°54.6     12.7'     55.0'								
21 134°25.0 ··· 25.0 25°21.5 14.9' 13°29.1 12.8' 55.0' 22 149°24.9 24.9 39°55.4 14.9' 13°41.9 12.7' 55.0' 23 164°24.7 24.9 54°29.3 14.8' 13°54.6 12.7' 55.0'								
23 164°24.7 24.9 54°29.3 14.8' 13°54.6 12.7' 55.0'								
SD = 15.7'  d = -0.0' $SD = 15.2'$	23			54°29.3			12.7'	55.0'
		SD = 15.7'	d = -0.0'		SI	D = 15.2'		

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

Lat.		Moonris	e		Moonset	
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
<b>N</b> 40°	11:40	12:44	13:47	23:51		00:12
35°	11:40	12:41	13:40	23:52		00:17
30°	11:40	12:38	13:34	23:54		00:22
20°	11:40	12:32	13:23	23:56		00:30
N 10°	11:40	12:27	13:14	23:59		00:37
0°	11:40	12:23	13:05		00:01	00:43
S 10°	11:40	12:19	12:57		00:03	00:50
20°	11:41	12:14	12:48		00:05	00:57
30°	11:41	12:09	12:37		80:00	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	

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
- \\/ad	CHA	CHA	Dos	GHA	Doo		Doc					Doo
Wed	GHA	GHA	Dec		Dec	GHA	Dec	GHA	<b>Dec</b> N03° 17.7		SHA	Dec
0	272°09.9	136°55.3	N19°00.1	217°49.3	N19°00.8	151°16.2	N20°50.8	258°30.4		Alpheratz	357°33.5	29°14.1
1	287°12.4	151°54.9	18°59.2	232°50.0	01.2	166°18.2	50.7	273°32.8	17.7	Ankaa	353°06.0	-42°09.4
2	302°14.9	166°54.5	58.4	247°50.6	01.6	181°20.1	50.6	288°35.1	17.8	Schedar	349°29.7	56°40.7
3	317°17.3	181°54.0	• • 57.5	262°51.2	• • 02.1	196°22.0	• • 50.5	303°37.5	• • 17.8	Diphda	348°46.1	-17°50.3
4	332°19.8	196°53.6	56.7	277°51.8	02.5	211°23.9	50.4	318° 39.8	17.9	Achernar	335° 19.5	-57°05.8
5	347°22.2	211°53.2	55.8	292°52.4	03.0	226°25.8	50.3	333°42.1	17.9	Hamal	327°50.0	23°35.2
6	2°24.7	226° 52.8	N18°54.9	307°53.1	N19°03.4	241°27.7	N20°50.2	348°44.5	N03°17.9	Polaris	313°45.2	89°22.3
7	17°27.2	241°52.3	54.1	322°53.7	03.9	256°29.6	50.1	3°46.8	18.0	Acamar	315° 11.2	-40°11.7
8	32°29.6	256°51.9	53.2	337°54.3	04.3	271°31.6	50.0	18°49.1	18.0	Menkar	314°05.1	4°11.6
9	47°32.1	271°51.5	• • 52.4	352°54.9	• • 04.7	286°33.5	• • 49.9	33°51.5	• • 18.1		308° 26.9	49°57.2
10	62°34.6	286°51.0	51.5	7°55.6	05.2	301°35.4	49.8	48°53.8	18.1	Mirfak		
11	77°37.0	301°50.6	50.6	22°56.2	05.6	316°37.3	49.7	63°56.2	18.1	Aldebaran	290°38.6	16°33.7
12	92°39.5	316°50.2	N18°49.8	37°56.8	N19°06.1	331°39.2	N20°49.6	78° 58.5	N03°18.2	Rigel	281°03.0	-8°10.2
13	107°42.0	331°49.8	48.9	52°57.4	06.5	346°41.1	49.5	94°00.8	18.2	Capella	280°20.6	46°01.4
14	122°44.4	346°49.4	48.1	67°58.0	06.9	1°43.0	49.4	109°03.2	18.3	Bellatrix	278°21.9	6°22.4
15	137°46.9	1°48.9	• • 47.2	82°58.7	• • 07.4	16°44.9	49.2	124°05.5	• • 18.3	Elnath	278°00.7	28°37.7
16	152°49.4	16°48.5	46.3	97°59.3	07.8	31°46.9	49.1	139°07.8	18.3	Alnilam	275°36.8	-1°11.1
17	167°51.8	31°48.1	45.5	112°59.9	08.3	46°48.8	49.0	154° 10.2	18.4	Betelgeuse	$270^{\circ}51.1$	7°24.7
18	182°54.3	46° 47.7	N18° 44.6	128°00.5	N19°08.7	61°50.7	N20°48.9	169° 12.5	N03° 18.4	Canopus	263°52.4	-52°42.6
19	102 54.5 197°56.7	61°47.3		143°01.2	09.1	76°52.6		109 12.5 184° 14.9		Sirius	258° 25.5	-16°45.1
			43.7			91°54.5	48.8	104 14.9 199°17.2	18.5	Adhara	255°05.3	-29°00.5
20	212°59.2	76°46.8	42.9	158°01.8	09.6		48.7		18.5	Procyon	244°49.9	5°09.4
21	228°01.7	91°46.4	• • 42.0	173°02.4	• • 10.0	106°56.4	• • 48.6	214° 19.5	• • 18.6	Pollux	243°16.2	27°57.8
22	243°04.1	106° 46.0	41.1	188°03.0	10.4	121°58.3	48.5	229°21.9	18.6	Avior	234°14.8	-59°35.8
23	258°06.6	121°45.6	40.3	203°03.6	10.9	137°00.2	48.4	244°24.2	18.6	Suhail	222°45.8	-43°32.5
Mern	ass. 05:50	$\nu$ -0.4' d-0	0.9' m-4.02	$\nu$ 0.6' d0	.4′ m1.30	$\nu^{1.9'} d_{-0}$	.1′ m-1.82	$\nu^{2.3'} d\Omega$	.0′ m0.80	Miaplacidus	221°38.7	-69°49.8
,.сг.р		. J. 1 u-0		- 0.0 00						Alphard	217°46.8	-8°46.5
										Regulus	207°33.3	11°50.3
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.8	61°36.7
0	273°09.1	136°45.2	N18°39.4	218°04.3	N19° 11.3	152°02.2	N20°48.3	259°26.6	N03°18.7	Denebola	193° 39.0 182° 23.8	14°25.5
1	$288^{\circ}11.5$	151°44.8	38.5	233°04.9	11.8	$167^{\circ}04.1$	48.2	274°28.9	18.7		175° 42.3	-17°41.5
2	303°14.0	166°44.3	37.6	248°05.5	12.2	182°06.0	48.1	289°31.2	18.8	Gienah		
3	318°16.5	181°43.9	• • 36.8	263°06.1	• • 12.6	197°07.9	• • 48.0	304°33.6	• • 18.8		172°58.7	-63°15.1
4	333°18.9	196°43.5	35.9	278°06.8	13.1	212°09.8	47.9	319°35.9	18.8			-57°16.0
5	348°21.4	211°43.1	35.0	293°07.4	13.5	227°11.7	47.8	334°38.3	18.9	Alioth	166°11.8	55°49.2
6	3°23.9	226° 42.7	N18°34.1	308°08.0	N19° 13.9	242°13.6	N20°47.7	349°40.6	N03° 18.9	Spica	158°20.9	-11°18.1
7	18°26.3	241°42.3	33.3	323°08.6	14.4	257°15.5	47.6	4°42.9	19.0	Alkaid	152°50.8	49°11.0
8	33°28.8	256° 41.9	32.4	338°09.2	14.4	272°17.5	47.4	19°45.3	19.0	Hadar	148°34.0	-60°30.3
9	48°31.2	271°41.5	31.5	353°09.2	. 15.2	272 17.5 287°19.4	• • 47.3	34° 47.6	• • 19.0	Menkent	147°56.0	-36°30.2
										Arcturus	145°46.6	19°02.7
10	63°33.7	286°41.1	30.6	8°10.5	15.7	302°21.3	47.2	49°50.0	19.1	Rigil Kent.	139°38.2	-60°56.9
11	78°36.2	301°40.6	29.7	23°11.1	16.1	317°23.2	47.1	64°52.3	19.1	Kochab	$137^{\circ}19.1$	74°03.0
12	93°38.6	316°40.2	N18°28.9	38°11.7	N19° 16.5	332°25.1	N20°47.0	79°54.6	N03°19.2	Zuben'ubi	136°54.5	-16°09.2
13	108°41.1	331°39.8	28.0	53°12.3	17.0	347°27.0	46.9	94°57.0	19.2	Alphecca	126°02.4	26°37.6
14	123°43.6	$346^{\circ}39.4$	27.1	68°13.0	17.4	2°28.9	46.8	109°59.3	19.2	Antares	112°14.0	-26°29.5
15	138°46.0	1°39.0	• • 26.2	83°13.6	• • 17.8	17°30.8	• • 46.7	125°01.7	• • 19.3	Atria	107°06.6	-69°04.6
16	153°48.5	16°38.6	25.3	98°14.2	18.3	32°32.7	46.6	140°04.0	19.3	Sabik	102°01.1	-15°45.5
17	168°51.0	31°38.2	24.5	113°14.8	18.7	47°34.7	46.5	155°06.3	19.4	Shaula	96°08.3	-37°07.4
18	183°53.4	46° 37.8	N18°23.6	128°15.5	N19° 19.1	62°36.6	N20°46.4	170°08.7	N03° 19.4	Rasalhague	95°57.1	12°32.5
19	198°55.9	61°37.4	22.7	143°16.1	19.5	77°38.5	46.3	185°11.0	19.4	_		51°29.1
20	213°58.3	76°37.0	21.8	158°16.7	20.0	92°40.4	46.2	200°13.4	19.5	Eltanin	90°41.1 83°30.5	-34°22.3
21	229°00.8	91°36.6	• • 20.9	173°17.3	• • 20.4	107°42.3	• • 46.1	$215^{\circ}15.7$	• • 19.5	Kaus Aust.	80°32.0	-34 22.3 38°48.5
22	244°03.3	106°36.2	20.0	188°17.9	20.8	122°44.2	46.0	$230^{\circ}18.1$	19.5	Vega		
23	259°05.7	121°35.8	19.1	203°18.6	21.3	137°46.1	45.9	245°20.4	19.6	Nunki	75°45.9	-26°15.8
										Altair	61°58.5	8°56.3
Mer.p	ass. 05:46	$\nu$ -0.4 $^{\prime}$ d-0	0.9′ m-4.02	u0.6′ $d$ 0	.4′ m1.30	$\nu 1.9' \ d-0$	.1′ m-1.82	$\nu 2.3' \ d0$	.0'  m0.80	Peacock	53°03.3	-56°38.8
										Deneb	49°24.6	45°22.4
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.4	9°59.8
0	274°08.2	136°35.4	N18° 18.2	218° 19.2	N19°21.7	152°48.0	N20° 45.7	260°22.7	N03° 19.6	Al Na'ir	27°31.2	-46°49.7
1	274 08.2 289°10.7	150 35.4 151°35.0	17.4	216 19.2 233°19.8	22.1	167°49.9	45.6	275°25.1	19.7	Fomalhaut	15°13.1	-29°28.7
2	304°13.1	166°34.6		233 19.6 248°20.4		182°51.9		275 25.1 290°27.4		Scheat	13°43.9	28°13.5
			16.5		22.6		45.5 • • 45.4		19.7	Markab	13°28.6	15°20.8
3	319°15.6	181°34.2	· · 15.6	263°21.0	• • 23.0	197°53.8	· · 45.4	305°29.8	19.7	Jun 24 Wed	SHA	Mor noon
4	334°18.1	196°33.8	14.7	278°21.7	23.4	212°55.7	45.3	320°32.1	19.8		224° 45.4	Mer.pass
5	349°20.5	211°33.4	13.8	293°22.3	23.8	227°57.6	45.2	335°34.5	19.8	Venus		14:53
6	4°23.0	226°33.0	N18° 12.9	308°22.9	N19°24.3	242°59.5	N20°45.1	350°36.8	N03° 19.9	Mars	305°39.4	09:28
7	19°25.5	241°32.6	12.0	323°23.5	24.7	258°01.4	45.0	5°39.2	19.9	Jupiter	239°06.3	13:53
8	34°27.9	256°32.3	11.1	338°24.1	25.1	273°03.3	44.9	20°41.5	19.9	Saturn	346°20.5	06:45
9	49°30.4	271°31.9	• • 10.2	353°24.8	• • 25.5	288°05.2	• • 44.8	35°43.8	• • 20.0	Jun 25 Thu	SHA	Mer.pass
10	64°32.8	286°31.5	09.3	8°25.4	26.0	303°07.1	44.7	50°46.2	20.0	Venus	223°36.1	14:53
11	79°35.3	301°31.1	08.4	23°26.0	26.4	318°09.0	44.6	65°48.5	20.0	Mars		09:27
12	94°37.8	316°30.7	N18°07.5	38°26.6	N19°26.8	333°11.0	N20°44.5	80°50.9	N03°20.1	Jupiter	238°53.1	13:50
13	109°40.2	331°30.3	06.6	53°27.2	27.2	348°12.9	44.4	95°53.2	20.1	Saturn	346° 17.5	06:41
14	124°42.7	$346^{\circ}29.9$	05.7	68°27.9	27.7	3°14.8	44.2	$110^{\circ}55.6$	20.2	Saturn	J-U 11.3	00.41
15	139°45.2	1°29.5	• • 04.8	83°28.5	• • 28.1	18°16.7	• • 44.1	125°57.9	• • 20.2	Jun 26 Fri	SHA	Mer.pass
16	154°47.6	$16^{\circ}29.1$	03.9	98°29.1	28.5	33°18.6	44.0	141°00.3	20.2	Venus	222°27.2	14:54
17	$169^{\circ}50.1$	31°28.8	03.0	113°29.7	28.9	48°20.5	43.9	$156^{\circ}02.6$	20.3	Mars		09:26
18	184°52.6	46°28.4	N18°02.1	128°30.3	N19°29.4	63°22.4	N20°43.8	171°04.9	N03°20.3	Jupiter		13:47
19	199°55.0	61°28.0	01.2	143°31.0	29.8	78°24.3	43.7	186°07.3	20.4	Saturn	346° 14.5	06:37
20	214°57.5	76°27.6	18°00.3	158°31.6	30.2	93°26.2	43.6	201°09.6	20.4			- 55.51
21	230°00.0	91°27.2	17°59.4	173°32.2	30.6	108°28.1	• • 43.5	216° 12.0	20.4	Horizont	al parallax	
22	245°02.4	106° 26.8	58.5	188°32.8	31.0	123°30.1	43.4	231°14.3	20.5		Venus:	0.1
23	260°04.9	121°26.5	57.6	203°33.4	31.5	138°32.0	43.3	246° 16.7	20.5		Mars:	0.1
Mer.p	ass. 05:43	$\nu$ -0.4' $d$ -0	0.9′ m-4.03	$\nu$ 0.6′ $d$ 0	.4′ m1.30	$\nu$ 1.9′ d-0	.1' m-1.82	$ u 2.3' \ d0$	.0′ m0.80			

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°24.6	N23°24.8	69°03.1	14.8'	\$14°07.3	12.6'	55.0'
1 2	194°24.5 209°24.3	24.8 24.7	83°36.9 98°10.7	14.8' 14.7'	14°19.9 14°32.4	12.5' 12.5'	54.9' 54.9'
3	224°24.2	24.7	112°44.4	14.7'	14° 44.9	12.4	54.9'
4	239°24.1	24.6	$127^{\circ}18.1$	14.7'	14°57.3	12.3'	54.9'
5	254°23.9	24.6	141°51.8	14.6'	15°09.6	12.3'	54.9'
6 7	269°23.8 284°23.7	N23°24.5 24.5	156°25.4 170°59.0	14.6' 14.6'	\$15°21.9 15°34.1	12.2' 12.1'	54.8' 54.8'
8	299° 23.5	24.4	170 39.0 185°32.5	14.5	15°46.2	12.1	54.8'
9	314°23.4	• • 24.4	200°06.0	14.5'	15°58.2	12.0'	54.8'
10	329°23.3	24.3	214°39.5	14.4'	16°10.2	11.9'	54.8'
11 12	344°23.1 359°23.0	24.3 N23°24.2	229°12.9 243°46.3	14.4' 14.4'	16°22.1 \$16°33.9	11.8' 11.8'	54.7' 54.7'
13	14° 22.9	24.2	258°19.7	14.3'	16°45.7	11.7'	54.7'
14	29°22.7	24.1	272°53.0	14.3'	$16^{\circ}57.4$	11.6'	54.7'
15	44°22.6	• • 24.1	287°26.3	14.2'	17°09.0	11.5'	54.7'
16 17	59°22.5 74°22.3	24.0 23.9	301°59.5 316°32.7	14.2' 14.1'	17°20.5 17°31.9	11.4' 11.4'	54.6' 54.6'
18	89° 22.2	N23°23.9	331°05.8	14.1'	\$17°43.3	11.3'	54.6'
19	104°22.1	23.8	345°38.9	14.0'	17°54.6	11.2'	54.6'
20	119°21.9	23.8	0°12.0	14.0'	18°05.8	11.1'	54.6'
21 22	134°21.8 149°21.7	· · 23.7 23.6	14°45.0 29°17.9	14.0' 13.9'	18°16.9 18°27.9	11.0' 11.0'	54.6' 54.5'
23	164° 21.5	23.6	43°50.8	13.9'	18°38.9	10.9'	54.5
	SD = 15.7'	d = -0.0'			0 = 15.0'	-	
				JL			
Thu	GHA	Dec	GHA	ν	Dec	d 10.0'	HP
0 1	179°21.4 194°21.3	N23°23.5 23.5	58°23.7 72°56.5	13.8' 13.8'	\$18°49.8 19°00.6	10.8' 10.7'	54.5' 54.5'
2	209°21.1	23.4	87°29.3	13.7'	19°00.0	10.7	54.5
3	224°21.0	• • 23.3	102°02.0	13.7'	$19^{\circ}21.9$	10.5'	54.5'
4	239°20.9	23.3	116°34.6	13.6'	19°32.4	10.5'	54.4'
5 6	254°20.7 269°20.6	23.2 N23°23.1	131°07.3 145°39.8	13.6' 13.5'	19°42.9 \$19°53.3	10.4' 10.3'	54.4' 54.4'
7	284° 20.5	23.1	160°12.3	13.5'	20°03.5	10.2	54.4'
8	299°20.3	23.0	174°44.8	13.4'	$20^{\circ}13.7$	10.1'	54.4'
9	314°20.2	• • 22.9	189°17.2	13.4'	20°23.8	10.0'	54.4'
10 11	329°20.1 344°19.9	22.9 22.8	203°49.6 218°21.9	13.3' 13.2'	20°33.8 20°43.7	9.9' 9.8'	54.4' 54.3'
12	359° 19.8	N23°22.7	232°54.1	13.2'	\$20°53.6	9.7'	54.3
13	14° 19.7	22.6	247°26.3	13.1'	21°03.3	9.6'	54.3'
14	29° 19.6 44° 19.4	22.6	261°58.4 276°30.5	13.1'	21°12.9 21°22.5	9.5'	54.3'
15 16	44 · 19.4 59 · 19.3	· · 22.5 22.4	276°30.5 291°02.6	13.0' 13.0'	21°22.5 21°31.9	9.4' 9.3'	54.3' 54.3'
17	74° 19.2	22.3	305°34.6	12.9'	21°41.3	9.3'	54.3'
18	89° 19.0	N23°22.3	320°06.5	12.9'	S21°50.5	9.2'	54.3'
19 20	104° 18.9 119° 18.8	22.2 22.1	334°38.4 349°10.2	12.8' 12.8'	21°59.7 22°08.7	9.1' 9.0'	54.2' 54.2'
21	134° 18.6	• • 22.0	3°41.9	12.7	22 06.7 22°17.7	9.0 8.9'	54.2'
22	149° 18.5	22.0	18°13.6	12.7'	22°26.5	8.8'	54.2'
23	164°18.4	21.9	32°45.3	12.6'	22°35.3	8.7'	54.2'
	SD = 15.7'	d = -0.1'		SE	0 = 14.9'		
Fri	GHA	Dec	GHA	ν	Dec	d	НР
0	179° 18.2	N23°21.8	47°16.9	12.5'	\$22°44.0	8.6'	54.2'
1	194°18.1	21.7	61°48.4	12.5'	22°52.5	8.5'	54.2'
2 3	209° 18.0 224° 17.8	21.6 · · 21.6	76°19.9 90°51.4	12.4' 12.4'	23°01.0 23°09.3	8.3' 8.2'	54.2' 54.2'
3 4	224°17.8 239°17.7	21.5	90°51.4 105°22.7	12.4	23°17.6	8.2 8.1'	54.2 54.1'
5	254°17.6	21.4	119°54.0	12.3'	23°25.7	8.0'	54.1'
6	269°17.4	N23°21.3	134°25.3	12.2'	\$23°33.7	7.9'	54.1'
7 8	284° 17.3 299° 17.2	21.2 21.1	148°56.5 163°27.7	12.2' 12.1'	23°41.7 23°49.5	7.8' 7.7'	54.1' 54.1'
9	299 17.2 314°17.1	21.1	103 27.7 177°58.8	12.1 12.0'	23°57.2	7.7 7.6'	54.1'
10	329° 16.9	21.0	$192^{\circ}29.8$	12.0'	24°04.8	7.5'	54.1'
11	344°16.8	20.9	207°00.8	11.9'	24°12.3	7.4'	54.1'
12 13	359° 16.7 14° 16.5	N23°20.8 20.7	221°31.8 236°02.6	11.9' 11.8'	\$24°19.7 24°27.0	7.3' 7.2'	54.1' 54.1'
14	29° 16.4	20.7	250° 33.5	11.8'	24°27.0	7.2 7.1'	54.1'
15	44°16.3	• • 20.5	265°04.3	11.7'	24°41.2	6.9'	54.1'
16	59°16.1	20.4	279°35.0	11.7'	24°48.1	6.8'	54.0'
17 18	74° 16.0 89° 15.9	20.3 N23°20.3	294°05.7 308°36.3	11.6' 11.6'	24°54.9 \$25°01.7	6.7' 6.6'	54.0' 54.0'
18 19	89° 15.9 104° 15.7	N23 20.3 20.2	308°36.3 323°06.8	11.5'	25°08.3	6.5	54.0° 54.0°
20	119° 15.6	20.1	337°37.4	11.5'	25°14.7	6.4'	54.0'
21	134° 15.5	• • 20.0	352°07.8	11.4'	25°21.1	6.2'	54.0'
22 23	149° 15.4 164° 15.2	19.9 19.8	6°38.2 21°08.6	11.4' 11.3'	25°27.4 25°33.5	6.1' 6.0'	54.0' 54.0'
23			ZI U8.0			0.0	54.0
	SD = 15.7'	d = -0.1'		SL	0 = 14.8'		

Lat.         Native Nation         Civil of Nation         Sunsite Civil Nation         Nation Nation         Nation	N   72°	N 72° N 70° 68° 66° 64° 60° N 58° 56° 54° 52° 50° 45° N 40° 35°	
N 72°	N 70°       □       □       □       □       □         68°       □        □       □       □       □       □       □       □       □       □       □       □ <td< th=""><th>N 70° 68° 66° 64° 62° 60° N 58° 56° 54° 52° 50° 45° N 40° 35°</th></td<>	N 70° 68° 66° 64° 62° 60° N 58° 56° 54° 52° 50° 45° N 40° 35°	
N 70°   □	N 70°       □       □       □       □       □         68°       □        □       □       □       □       □       □       □       □       □       □       □ <td< th=""><th>N 70° 68° 66° 64° 62° 60° N 58° 56° 54° 52° 50° 45° N 40° 35°</th></td<>	N 70° 68° 66° 64° 62° 60° N 58° 56° 54° 52° 50° 45° N 40° 35°	
666°	68°	68° 66° 64° 62° 60° <b>N</b> 58° 56° 54° 52° 50° 45° <b>N</b> 40° 35°	
666°	66°	66° 64° 62° 60° <b>N</b> 58° 56° 54° 52° 50° 45° <b>N</b> 40° 35°	
64°	64°	64° 62° 60° <b>N</b> 58° 56° 54° 52° 50° 45° <b>N</b> 40° 35°	
60°	62°       ////       00°       ////       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       23:1         52°       01:34       02:52       03:41       20:24       21:31       22:3         50°       02:02       03:07       03:52       20:13       20:58       22:0         45°       02:47       03:37       04:14       19:51       20:28       21:1         N 40°       03:18       04:00       04:32       19:33       20:06       20:4         35°       03:41       04:18       04:47       19:18       19:48       20:2         20°       04:29       04:58       05:22       18:43       19:07       19:3         N 10°       04:51       05:18       05:41       18:24       18:47       19:13         0°       05:10       05:36       05:59       18:06       18:29       18:5         5 10° <t< td=""><td>62° 60° <b>N</b> 58° 56° 54° 52° 50° 45° <b>N</b> 40° 35°</td></t<>	62° 60° <b>N</b> 58° 56° 54° 52° 50° 45° <b>N</b> 40° 35°	
N 58°	60°       ////       00:52       02:37       21:28       23:12       ///         N 58°       ////       01:42       02:58       21:07       22:23       ///         56°       ////       02:12       03:14       20:51       21:53       ///         54°       00:48       02:34       03:29       20:36       21:31       23:1         50°       02:02       03:07       03:52       20:13       20:58       22:0         45°       02:47       03:37       04:14       19:51       20:28       21:1         N 40°       03:18       04:00       04:32       19:33       20:06       20:4         35°       03:41       04:18       04:47       19:18       19:48       20:2         30°       04:00       04:33       05:00       19:05       19:32       20:0         00°       04:29       04:58       05:22       18:43       19:07       19:3         N 10°       04:51       05:18       05:41       18:24       18:47       19:1         0°       05:10       05:36       05:59       18:06       18:29       18:5         5 10°       05:27       05:54	60° N 58° 56° 54° 52° 50° 45° N 40° 35°	
N 58°	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         23:1           52°         01:34         02:52         03:41         20:24         21:13         22:3           50°         02:02         03:07         03:52         20:13         20:58         22:0           45°         02:47         03:37         04:14         19:51         20:28         21:1           N 40°         03:18         04:00         04:32         19:33         20:06         20:4           35°         03:41         04:18         04:47         19:18         19:48         20:2           30°         04:00         04:33         05:00         19:05         19:32         20:0           N 10°         04:51         05:18         05:21         18:43         19:07         19:3           20°         04:29         04:58         05:22         18:43         19:07         19:3           \$ 10°         05:10         05:36         05:5	N 58° 56° 54° 52° 50° 45° N 40° 35°	
Section	56°         ////         00:48         02:12         03:14         20:51         21:53         ///           54°         00:48         02:34         03:29         20:36         21:31         23:1           52°         01:34         02:52         03:41         20:24         21:13         22:3           50°         02:02         03:07         03:52         20:13         20:58         22:0           45°         02:47         03:37         04:14         19:51         20:05         22:1           N 40°         03:18         04:00         04:32         19:33         20:06         20:4           35°         03:41         04:18         04:47         19:18         19:48         20:2           30°         04:00         04:33         05:00         19:05         19:32         20:0           04:29         04:58         05:22         18:43         19:07         19:3           N 10°         04:51         05:18         05:41         18:24         18:47         19:1           0°         05:10         05:36         05:59         18:06         18:29         18:5           5 10°         05:27         05:54         06:1	56° 54° 52° 50° 45° <b>N</b> 40° 35°	
52°   00:48   02:52   03:41   20:24   21:13   22:31     52°   01:34   02:52   03:41   20:24   21:13   22:31     50°   02:02   03:07   03:52   20:13   20:58   22:03     45°   02:47   03:37   04:14   19:51   20:28   21:18     N 40°   03:18   04:00   04:32   19:33   20:06   20:47     35°   03:41   04:18   04:47   19:18   19:48   20:24     30°   04:00   04:33   05:00   19:05   19:32   20:06     20°   04:29   04:58   05:22   18:43   19:07   19:37     N 10°   04:51   05:18   05:41   18:24   18:47   19:14     0°   05:10   05:36   05:59   18:06   18:29   18:55     5 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   06:55   17:09   17:36   18:05     35°   06:09   06:40   07:09   16:57   17:25   17:57     45°   06:28   07:06   07:39   16:26   17:00   17:37     45°   06:28   07:06   07:39   16:26   17:00   17:37     5 50°   06:40   07:22   08:00   16:05   16:44   17:25     52°   06:45   07:29   08:10   15:55   16:36   17:20     54°   06:51   07:37   08:21   15:44   16:28   17:14     56°   06:57   07:46   08:34   15:32   16:19   17:08     5 60°   07:12   08:08   09:06   14:59   15:57   16:54      Lat.	54°       00:48       02:34       03:29       20:36       21:31       23:1         52°       01:34       02:52       03:41       20:24       21:13       22:3         50°       02:02       03:07       03:52       20:13       20:58       22:0         45°       02:47       03:37       04:14       19:51       20:28       21:1         N 40°       03:18       04:00       04:32       19:33       20:06       20:4         35°       03:41       04:18       04:47       19:18       19:48       20:2         30°       04:00       04:33       05:00       19:05       19:32       20:0         20°       04:29       04:58       05:22       18:43       19:07       19:3         N 10°       04:51       05:18       05:41       18:24       18:47       19:1         0°       05:10       05:36       05:59       18:06       18:29       18:5         5 10°       05:27       05:54       06:16       17:49       18:12       18:3         30°       06:00       06:30       06:56       17:09       17:36       18:0         35°       06:09       06:40	54° 52° 50° 45° <b>N</b> 40° 35°	
S2°   01:34   02:52   03:41   20:24   21:13   22:31	52°   01:34   02:52   03:41   20:24   21:13   22:350°   02:02   03:07   03:52   20:13   20:58   22:045°   02:47   03:37   04:14   19:51   20:28   21:1   19:48   20:24   23:0°   03:41   04:18   04:47   19:18   19:48   20:20°   04:29   04:58   05:22   18:43   19:07   19:32   20:06   20°   04:29   04:58   05:22   18:43   19:07   19:32   20:06   20°   04:29   04:58   05:22   18:43   19:07   19:35   18:06   18:29   18:5   10°   05:10   05:36   05:59   18:06   18:29   18:5   10°   05:43   06:11   06:35   17:30   17:54   18:2   20°   05:43   06:11   06:35   17:30   17:54   18:2   20°   05:43   06:11   06:35   17:30   17:54   18:2   30°   06:00   06:30   06:56   17:09   17:36   18:06   18:29   18:5   16:06   06:18   06:52   07:23   16:43   17:13   17:4   45°   06:28   07:06   07:39   16:26   17:00   17:3   17:4   45°   06:40   07:22   08:00   16:05   16:44   17:2   52°   06:45   07:29   08:10   15:55   16:36   17:25   58°   07:04   07:57   08:48   15:17   16:09   17:05   58°   07:04   07:57   08:48   15:17   16:09   17:05   58°   07:04   07:57   08:48   15:17   16:09   17:05   17:05   16:54   17:23   16:43   17:13   15:57   16:56   16:64   17:23   16:43   17:23   16:43   17:23   16:43   17:23   16:43   17:23   16:43   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   16:46   17:23   17:46   17:47   17:56   19:40   23:26   23:22   23:160°   16:04   17:35   19:07   23:41   23:44   23:54   23:54   23:44   23:54   23:54   23:44   23:	52° 50° 45° <b>N</b> 40° 35°	
S0°   02:02   03:07   03:52   20:13   20:58   22:03     N 40°   03:18   04:00   04:32   19:33   20:06   20:47     35°   03:41   04:18   04:47   19:18   19:48   20:24     30°   04:00   04:33   05:00   19:05   19:32   20:06     20°   04:29   04:58   05:22   18:43   19:07   19:37     N 10°   04:51   05:18   05:41   18:24   18:47   19:14     0°   05:10   05:36   05:59   18:06   18:29   18:55     S 10°   05:27   05:54   06:16   17:49   18:12   18:38     20°   05:43   06:11   06:35   17:30   17:54   18:22     30°   06:00   06:30   06:56   17:09   17:36   18:05     35°   06:09   06:40   07:09   16:57   17:25   17:57     40°   06:18   06:52   07:23   16:43   17:13   17:47     45°   06:28   07:06   07:39   16:26   17:00   17:37     55°   06:40   07:22   08:00   16:06   16:44   17:25     52°   06:45   07:29   08:10   15:55   16:36   17:20     55°   06:57   07:46   08:34   15:32   16:19   17:08     58°   07:04   07:57   08:48   15:17   16:09   17:01     5 60°   07:12   08:08   09:06   14:59   15:57   16:54    Lat.	50°         02:02         03:07         03:52         20:13         20:58         22:08         45°         02:47         03:37         04:14         19:51         20:28         21:1           N 40°         03:18         04:00         04:32         19:33         20:06         20:4           35°         03:41         04:18         04:47         19:18         19:48         20:2           20°         04:29         04:58         05:22         18:43         19:07         19:3           N 10°         04:51         05:18         05:41         18:24         18:47         19:1           0°         05:10         05:36         05:59         18:06         18:29         18:5           5 10°         05:27         05:54         06:16         17:49         18:12         18:3           20°         05:43         06:11         06:35         17:30         17:54         18:2           30°         06:00         06:30         06:56         17:09         17:36         18:0           40°         06:18         06:52         07:23         16:43         17:15         17:25           45°         06:40         07:02         08:00         <	50° 45° <b>N</b> 40° 35°	
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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         60°       16:04       17:35       19:07       23:41       23:44       23:51         N 58°       15:52       17:18       18:42       23:53       ···       00:01         56°       15:42       17:03       18:23       ···       00:04       00:17         54°       15:33       16:51       18:07       00:02       00:14       00:30         52°       15:25       16:40       17:53       00:08       00:22       00:41         50°       15:18       16:30       17:41       00:13       00:30       00:51         45°       15:03       16:10       17:16       00:25       00:47       01:13         N 40°       14:50       15:53       16:56       00:35       01:00       01:30         30°       14:41       15:28       16:25       00:51       01:22       01:57 <tr< th=""><th><math display="block">\begin{array}{c ccccccccccccccccccccccccccccccccccc</math></th><th>N 72°</th></tr<>	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	N 72°	
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66° (40°)         16:56         19:05         22:46         22:12           64° (40°)         16:35         18:24         20:38         23:08         22:53         22:19           62° (40°)         16:04         17:35         19:07         23:41         23:22         23:17           N 58° (40°)         15:52         17:18         18:42         23:53         ···         00:01           56° (55)         15:42         17:03         18:23         ···         00:04         00:17           54° (50°)         15:33         16:51         18:07         00:02         00:14         00:30           52° (7)         15:18         16:30         17:41         00:13         00:30         00:51           45° (7)         15:18         16:30         17:41         00:13         00:30         00:51           45° (7)         15:03         16:10         17:16         00:25         00:47         01:13           N 40° (14:31)         15:50         16:56         00:35         01:00         01:30           35° (14:40)         15:40         16:39         00:43         01:12         01:45           30° (14:31)         14:50         15:40         01:15	66°     16:56     19:05     22:46     22:12       64°     16:35     18:24     20:38     23:08     22:53     22:1       62°     16:18     17:56     19:40     23:26     23:22     23:1       60°     16:04     17:35     19:07     23:41     23:44     23:5		
Color	64°     16:35     18:24     20:38     23:08     22:53     22:1       62°     16:18     17:56     19:40     23:26     23:22     23:1       60°     16:04     17:35     19:07     23:41     23:44     23:44		
C2°   16:18   17:56   19:40   23:26   23:22   23:17	62°     16:18     17:56     19:40     23:26     23:22     23:1       60°     16:04     17:35     19:07     23:41     23:44     23:4		
60°         16:04         17:35         19:07         23:41         23:44         23:51           N 58°         15:52         17:18         18:42         23:53         ···         00:01           56°         15:42         17:03         18:23         ···         00:04         00:17           54°         15:33         16:51         18:07         00:02         00:14         00:30           52°         15:25         16:40         17:53         00:08         00:22         00:41           50°         15:18         16:30         17:41         00:13         00:30         00:51           45°         15:03         16:10         17:16         00:25         00:47         01:13           N 40°         14:50         15:53         16:56         00:35         01:00         01:30           35°         14:40         15:40         16:39         00:43         01:12         01:45           30°         14:15         15:07         16:01         01:04         01:40         02:21         01:57           20°         14:15         15:07         16:01         01:04         01:40         01:40         02:22         01:57	60°   16:04 17:35 19:07   23:41 23:44 23:5		
N 58°   15:52   17:18   18:42   23:53   · · · · · · · · · · · · · · · · · ·			
56°         15:42         17:03         18:23         · · · ·         00:04         00:17           54°         15:33         16:51         18:07         00:02         00:14         00:30           52°         15:25         16:40         17:53         00:08         00:22         00:41           50°         15:18         16:30         17:41         00:13         00:30         00:51           45°         15:03         16:10         17:16         00:25         00:47         01:13           N 40°         14:50         15:53         16:56         00:35         01:00         01:30           35°         14:40         15:40         16:39         00:43         01:12         01:45           30°         14:31         15:28         16:25         00:51         01:22         01:57           20°         14:15         15:07         16:01         01:04         01:40         02:19           N 10°         14:01         14:34         15:21         01:26         02:10         02:56           S 10°         13:36         14:17         15:02         01:37         02:25         03:14           20°         13:22         14:00			
54°         15:33         16:51         18:07         00:02         00:14         00:30           52°         15:25         16:40         17:53         00:08         00:22         00:41           50°         15:18         16:30         17:41         00:13         00:30         00:51           45°         15:03         16:10         17:16         00:25         00:47         01:13           N 40°         14:50         15:53         16:56         00:35         01:00         01:30           35°         14:40         15:40         06:39         00:43         01:12         01:47           20°         14:15         15:07         16:01         01:04         01:40         02:19           N 10°         14:01         14:50         15:40         01:15         01:55         02:38           0°         13:49         14:34         15:21         01:26         02:10         02:56           S 10°         13:36         14:17         15:02         01:37         02:25         03:14           20°         13:22         14:00         14:41         01:48         02:40         03:33           30°         13:07         13:40			
Table   Tab			
Text			
45°         15:03         16:10         17:16         00:25         00:47         01:13           N 40°         14:50         15:53         16:56         00:35         01:00         01:30           35°         14:40         15:40         16:39         00:43         01:12         01:45           30°         14:31         15:28         16:25         00:51         01:22         01:57           20°         14:15         15:07         16:01         01:04         01:40         02:19           N 10°         14:01         14:50         15:40         01:15         01:55         02:38           0°         13:49         14:34         15:21         01:26         02:10         02:56           S 10°         13:36         14:17         15:02         01:37         02:25         03:14           20°         13:36         14:17         15:02         01:37         02:25         03:14           20°         13:36         14:17         15:02         01:37         02:25         03:14           20°         13:29         14:04         02:09         03:09         04:09           40°         12:48         13:16         13:48			
N 40°         14:50         15:53         16:56         00:35         01:00         01:30           35°         14:40         15:40         16:39         00:43         01:12         01:45           30°         14:31         15:28         16:25         00:51         01:22         01:57           20°         14:15         15:07         16:01         01:04         01:40         02:19           N 10°         14:01         14:50         15:40         01:15         01:55         02:38           0°         13:49         14:34         15:21         01:26         02:10         02:56           S 10°         13:36         14:17         15:02         01:37         02:25         03:14           20°         13:22         14:00         14:41         01:48         02:40         03:33           30°         13:07         13:40         14:17         02:01         02:58         03:55           35°         12:58         13:29         14:04         02:09         03:09         04:09           40°         12:48         13:16         13:48         02:18         03:21         04:24           45°         12:23         12:41	0		
35°   14:40   15:40   16:39   00:43   01:12   01:45	45°   15:03   16:10   17:16   00:25   00:47   01:1	50°	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		50° 45°	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	35°   14:40 15:40 16:39   00:43 01:12 01:4	50° 45° <b>N</b> 40°	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		50° 45° <b>N</b> 40°	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		50° 45° N 40° 35° 30°	
S 10°         13:36         14:17         15:02         01:37         02:25         03:14           20°         13:22         14:00         14:41         01:48         02:40         03:33           30°         13:07         13:40         14:17         02:01         02:58         03:55           35°         12:58         13:29         14:04         02:09         03:09         04:09           40°         12:48         13:16         13:48         02:18         03:21         04:24           45°         12:37         13:00         13:29         02:28         03:35         04:42           \$ 50°         12:23         12:41         13:05         02:41         03:53         05:04           52°         12:16         12:33         12:54         02:46         04:01         05:15           54°         12:09         12:23         12:41         02:53         04:10         05:27           56°         12:01         12:11         12:27         03:00         04:21         05:42           58°         11:52         11:59         12:10         03:08         04:33         05:58           \$ 60°         11:42         11:44		50° 45° <b>N</b> 40° 35° 30° 20°	
S 10°         13:36         14:17         15:02         01:37         02:25         03:14           20°         13:22         14:00         14:41         01:48         02:40         03:33           30°         13:07         13:40         14:17         02:01         02:58         03:55           35°         12:58         13:29         14:04         02:09         03:09         04:09           40°         12:48         13:16         13:48         02:18         03:21         04:24           45°         12:37         13:00         13:29         02:28         03:35         04:42           \$ 50°         12:23         12:41         13:05         02:41         03:53         05:04           52°         12:16         12:33         12:54         02:46         04:01         05:15           54°         12:09         12:23         12:41         02:53         04:10         05:27           56°         12:01         12:11         12:27         03:00         04:21         05:42           58°         11:52         11:59         12:10         03:08         04:33         05:58           \$ 60°         11:42         11:44	0°   13:49	50° 45° N 40° 35° 30° 20° N 10°	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		50° 45° N 40° 35° 30° 20° N 10°	
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		50° 45° N 40° 35° 30° 20° N 10° 0° S 10°	
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12:37   13:00   13:29   02:28   03:35   04:42     S 50°   12:23   12:41   13:05   02:41   03:53   05:04     52°   12:16   12:33   12:54   02:46   04:01   05:15     54°   12:09   12:23   12:41   02:53   04:10   05:27     56°   12:01   12:11   12:27   03:00   04:21   05:42     58°   11:52   11:59   12:10   03:08   04:33   05:58     S 60°   11:42   11:44   11:49   03:18   04:47   06:18      Day		50° 45° N 40° 35° 30° 20° N 10° 0° S 10° 20° 30°	
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S 60°         11:42         11:44         11:49         03:18         04:47         06:18           Day         Eqn. of Time Mer.         Mer. Pass.         Lower Pass.         Age 9-11           00h         12h         Pass hh:mm         hh:mm         hh:mm         hh:mm         70-86%           24         02:22         02:28         12:02         19:59         07:37         07:37           25         02:34         02:41         12:03         20:45         08:22         08:22		50° 45° N 40° 35° 30° 20° N 10° 0° S 10° 20° 30° 35° 40° 45° S 50° 52° 54°	
Sun         Moon           Day         Eqn. of Time 00h 12h mm:ss mm:ss mm:ss mm:ss mm:ss hh:mm		50° 45° N 40° 35° 30° 20° N 10° 0° S 10° 20° 35° 40° 45° S 50° 52° 54° 56°	
Day         Eqn. of Time 00h 12h mm:ss         Mer. Pass Upper hh:mm         Lower hh:mm         9-11 y0-86%           24         02:22         02:28 12:02 19:59 07:37 25 02:34 02:41 12:03 20:45 08:22         08:22 08:24	C 60°   11.40   11.40   02.10 04.47 06.1	50° 45° N 40° 35° 30° 20° N 10° 0° S 10° 20° 30° 35° 40° 45° S 50° 52° 54° 56° 58°	
Odh mm:ss         12h mm:ss         Pass hh:mm         Upper hh:mm         Lower hh:mm         9-11 ro-86%           24         02:22         02:28         12:02         19:59 ro-37 ro-37         07:37 ro-36 ro-37 ro-37 ro-36 r	\$ 60°   11:42   11:44   11:49   03:18   04:47   06:1	50° 45° N 40° 35° 30° 20° N 10° 0° S 10° 20° 30° 35° 40° 45° S 50° 52° 54° 56° 58°	
00h mm:ss         12h mm:ss         Pass hh:mm         Upper hh:mm         Lower hh:mm         9-11 rol-86%           24         02:22         02:28 rol-22         12:02 rol-23         19:59 rol-37 rol-37         08:22 rol-36           25         02:34 rol-24         12:03 rol-26         20:45 rol-26         08:22 rol-26	Sun Moon	50° 45° N 40° 35° 30° 20° N 10° 0° S 10° 20° 30° 35° 40° 45° S 50° 52° 54° 56° 58°	
mm:ss         mm:ss         hh:mm         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	Sun         Moon           Dav         Eqn.of Time         Mer.         Mer.Pass.         Age	50° 45° N 40° 35° 30° N 10° 0° S 10° 20° 35° 40° 45° S 50° 52° 54° 56° S 60°	
25 02:34 02:41 12:03 20:45 08:22	Sun Moon  Day Eqn.of Time Mer. Mer.Pass. Age	50° 45° N 40° 35° 30° N 10° 0° S 10° 20° 35° 40° 45° S 50° 52° 54° 56° S 60°	
25 02:34 02:41 12:03 20:45 08:22	Day         Sun         Moon           Eqn.of Time         Mer.         Mer.Pass.         Agr           00 <sup>h</sup> 12 <sup>h</sup> Pass         Upper         Lower         9-1	50° 45° N 40° 35° 30° N 10° 0° S 10° 20° 35° 40° 45° S 50° 52° 54° 56° S 60°	
	Day         Sun         Moon           Eqn.of Time         Mer.         Mer.Pass.         Agr           00h         12h         Pass         Upper         Lower         9-1           mm:ss         mm:ss         hh:mm         hh:mm         hh:mm         70-86	50° 45° N 40° 35° 30° N 10° 0° S 10° 20° 30° 40° 45° S 50° 52° 54° 56° 58° S 60°	
	Day         Sun         Moon           Eqn.of Time 00 <sup>h</sup> 12 <sup>h</sup> Pass mm:ss mm:ss mm:ss hh:mm         Mer. Mer. Pass. Upper Lower hh:mm hh:mm hh:mm hh:mm 70-80           24         02:22         02:28         12:02         19:59         07:37	50° 45° N 40° 35° 30° 20° S 10° 20° 30° 45° 55° 55° 56° 58° S 60°  Day	

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	275°07.3	136°26.1	N17°56.7	218°34.1	N19°31.9	153° 33.9	N20°43.2	261°19.0	N03°20.5			
1	290°09.8	150° 25.7	55.8	233°34.7	32.3	168° 35.8	43.1	276°21.4	20.6	Alpheratz	357°33.5	29°14.1
2	305°12.3	166°25.3	54.9	248° 35.3	32.7	183°37.7	43.0	291°23.7	20.6	Ankaa	353°06.0	-42°09.4
3	320°14.7	181°24.9	• • 54.0	263°35.9	33.1	198° 39.6	• 42.8	306°26.1	20.7	Schedar	349° 29.7	56°40.7
4	335°17.2	196°24.6	53.0	278° 36.5	33.6	213°41.5	42.7	321°28.4	20.7	Diphda	348°46.1	-17°50.3
5	350°19.7	211°24.2	52.1	293° 37.2	34.0	228°43.4	42.6	336°30.8	20.7	Achernar	335° 19.5	-57°05.8
6	5°22.1	226°23.8	N17°51.2	308° 37.8	N19°34.4	243° 45.3	N20°42.5	351°33.1	N03°20.8	Hamal	327°50.0	23°35.2
7	20°24.6	241°23.4	50.3	323°38.4	34.8	258° 47.2	42.4	6°35.4	20.8	Polaris	313°43.7	89°22.3
8	35°27.1	256°23.1	49.4	338°39.0	35.2	273°49.2	42.3	21°37.8	20.8	Acamar	315°11.1	-40°11.7
9	50°29.5	271°22.7	• • 48.5	353°39.6	35.6	288°51.1	• • 42.2	36°40.1	20.9	Menkar	314°05.1	4°11.6
10	65°32.0	286°22.3	47.6	8°40.3	36.1	303°53.0	42.1	51°42.5	20.9	Mirfak	308°26.9	49°57.1
11	80°34.5	301°21.9	46.7	23°40.9	36.5	318° 54.9	42.0	66°44.8	20.9	Aldebaran	290°38.5	16°33.7
12	95°36.9	316°21.6	N17°45.7	38°41.5	N19°36.9	333°56.8	N20°41.9	81°47.2	N03°21.0	Rigel	281°03.0	-8°10.2
13	110°39.4	331°21.2	44.8	53°42.1	37.3	348° 58.7	41.8	96°49.5	21.0	Capella	280°20.6	46°01.4
14	125°41.8	346°20.8	43.9	68° 42.7	37.7	4°00.6	41.7	111°51.9	21.1	Bellatrix	278°21.9	6°22.4
15	140°44.3	1°20.5	• • 43.0	83°43.3	• • 38.1	19°02.5	• • 41.5	126° 54.2	• • 21.1	Elnath	278°00.7	28°37.7
16	155°46.8	16°20.1	42.1	98°44.0	38.6	34°04.4	41.4	141°56.6	21.1	Alnilam	275°36.8	-1°11.1
17	170°49.2	31°19.7	41.2	113°44.6	39.0	49°06.3	41.3	156°58.9	21.2	Betelgeuse	270°51.1	7°24.7
18	185°51.7	46°19.3	N17°40.2	128° 45.2	N19°39.4	64°08.2	N20°41.2	172°01.3	N03°21.2	Canopus	263°52.4	-52°42.5
19	200°54.2	61°19.0	39.3	143°45.8	39.8	79° 10.2	41.1	187°03.6	21.2	Sirius	258° 25.5	-16°45.1
20	215°56.6	76°18.6	38.4	158° 46.4	40.2	94°12.1	41.0	202°06.0	21.3	Adhara	255°05.3	-29°00.5
21	230°59.1	91°18.2	• • 37.5	173°47.1	• • 40.6	109°14.0	• • 40.9	217°08.3	21.3	Procyon	244°49.9	5°09.4
22	246°01.6	106°17.9	36.5	188° 47.7	41.0	124° 15.9	40.8	232° 10.7	21.3	Pollux	243°16.2	27°57.8
23	261°04.0	121°17.5	35.6	203°48.3	41.5	139° 17.8	40.7	247° 13.0	21.4	Avior	234°14.8	-59°35.8
							_			Suhail	222°45.8	-43°32.5
Mer.p	ass. 05:39	$\nu$ -0.4' d-0	0.9′ m-4.03	$\nu^{0.6'} d0$	.4′ m1.30	$\nu 1.9' d-0$	.1′ m-1.82	$\nu^{2.3'} d0$	.0′ m0.79	Miaplacidus	221°38.7	-69°49.8
										Alphard	217°46.8	-8°46.5
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
0	276°06.5	136°17.2	N17°34.7	218° 48.9	N19°41.9	154° 19.7	N20°40.6	262°15.4	N03°21.4	Dubhe	193°39.8	61°36.7
1	291°08.9	150°17.2	33.8	233°49.5	42.3	169°21.6	40.5	202 13.4 277°17.7	21.5	Denebola	182°23.8	14°25.5
2	306°11.4	166°16.4	32.8	248°50.2	42.7	184° 23.5	40.3	292°20.1	21.5	Gienah	175°42.3	-17°41.5
3	321°13.9	181°16.1	31.9	263°50.8	• • 43.1	199°25.4	40.2	307°22.4	21.5		172°58.7	-63°15.1
4	336°16.3	196°15.7	31.0	278°51.4	43.5	214° 27.3	40.1	322°24.8	21.6		171°50.3	-57°16.0
5	351°18.8	211°15.3	30.1	293°52.0	43.9	229°29.2	40.0	337°27.1	21.6	Alioth	166°11.8	55°49.2
6	6°21.3	226°15.0	N17°29.1	308°52.6	N19°44.3	244°31.1	N20°39.9	352°29.5	N03°21.6	Spica	158°20.9	-11°18.1
7	21°23.7	241°14.6	28.2	323°53.2	44.7	259°33.1	39.8	7°31.8	21.7	Alkaid	152°50.9	49°11.1
8	36°26.2	256°14.3	27.3	338°53.9	45.2	274° 35.0	39.7	22°34.2	21.7	Hadar	148°34.0	-60°30.3
9	51°28.7	271°13.9	26.3	353°54.5	45.6	289° 36.9	39.6	37° 36.5	21.7	l l	147°56.0	-36°30.2
10	66°31.1	286°13.6	25.4	8°55.1	46.0	304°38.8	39.5	52°38.9	21.8	Arcturus	145°46.6	19°02.7
11	81°33.6	301°13.2	24.5	23°55.7	46.4	319°40.7	39.4	67°41.2	21.8	Rigil Kent.	139°38.2	-60°56.9
12	96°36.1	316°12.9	N17°23.6	38° 56.3	N19°46.8	334° 42.6	N20°39.3	82°43.6	N03°21.8	Kochab	137°19.1	74°03.0
13	111°38.5	331°12.5	22.6	53°57.0	47.2	349°44.5	39.1	97°45.9	21.9	Zuben'ubi	136°54.5	-16°09.2
14	126°41.0	346°12.1	21.7	68° 57.6	47.6	4°46.4	39.0	112°48.3	21.9	Alphecca	126°02.4	26°37.6
15	141°43.4	1°11.8	• • 20.7	83°58.2	• • 48.0	19°48.3	• • 38.9	127°50.6	• • 21.9	Antares	112°14.0	-26°29.5
16	156°45.9	16°11.4	19.8	98° 58.8	48.4	34°50.2	38.8	142°53.0	22.0	Atria	107°06.6	-69°04.6
17	171°48.4	31°11.1	18.9	113°59.4	48.8	49°52.1	38.7	157°55.3	22.0	Sabik	102°01.0	-15°45.5
18	186°50.8	46°10.7	N17°17.9	129°00.0	N19°49.2	64°54.0	N20°38.6	172°57.7	N03°22.1	Shaula	96°08.3	-37°07.4
19	201°53.3	61°10.4	17.0	144°00.7	49.6	79°55.9	38.5	188°00.1	22.1	Rasalhague	95°57.1	12°32.5
20	216°55.8	76°10.0	16.1	159°01.3	50.0	94°57.9	38.4	203°02.4	22.1	Eltanin	90°41.1	51°29.1
21	231°58.2	91°09.7	• • 15.1	174°01.9	• • 50.5	109°59.8	• • 38.3	218°04.8	• • 22.2	Kaus Aust.	83°30.5	-34°22.3
22	247°00.7	106°09.3	14.2	189°02.5	50.9	125°01.7	38.2	233°07.1	22.2	Vega	80°32.0	38°48.5
23	262°03.2	121°09.0	13.2	204°03.1	51.3	140°03.6	38.1	248°09.5	22.2	Nunki	75°45.9	-26°15.8
	05.25	0.4/ 1.0			4/ 1.20	1.0/ 1.0	1/ 1.01	2.4/ 10	0/ 0.70	Altair	61°58.5	8°56.3 -56°38.8
Mer.p	ass. 05:35	$\nu$ -0.4′ $d$ -0	0.9′ m-4.04	$\nu$ 0.6° $d$ 0	.4′ m1.30	$\nu$ 1.9' d-0	.1′ m-1.81	$\nu^{2.4'} d0$	.0′ m0.79	Peacock Deneb	53°03.3 49°24.6	-50 38.8 45°22.4
											33°37.4	9°59.8
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir	33 37.4 27°31.1	-46°49.7
0	277°05.6	136°08.6	N17°12.3		N19°51.7	155°05.5	N20°37.9	263°11.8	N03°22.3	Fomalhaut	27°31.1 15°13.0	-46°49.7 -29°28.7
1	292°08.1	151°08.3	11.4	234°04.4	52.1	170°07.4	37.8	278°14.2	22.3	Scheat	15 13.0 13°43.9	-29 28.7 28°13.5
2	307°10.6	166°08.0	10.4	249°05.0	52.5	185°09.3	37.7	293°16.5	22.3	Markab	13° 28.6	28 13.5 15°20.8
3	322°13.0	181°07.6	09.5	264°05.6	52.9	200°11.2	37.6	308° 18.9	22.4	iviarkab	13 28.0	10 ∠0.8
4	337°15.5	196°07.3	08.5	279°06.2	53.3	215° 13.1	37.5	323°21.2	22.4	Jun 27 Sat	SHA	Mer.pass
5	352°17.9	211°06.9	07.6	294°06.8	53.7	230° 15.0	37.4	338°23.6	22.4		221°18.7	14:55
6	7°20.4	226°06.6	N17°06.6	309°07.5	N19°54.1	245° 16.9	N20°37.3	353°25.9	N03°22.5	Mars	303°26.7	09:25
7	22°22.9	241°06.2	05.7	324°08.1	54.5	260°18.8	37.2	8°28.3	22.5	Jupiter		13:44
8	37°25.3	256°05.9	04.8	339°08.7	54.9	275° 20.7	37.1	23°30.6	22.5	Saturn	$346^{\circ}11.7$	06:34
9	52°27.8	271°05.6	• • 03.8	354°09.3	• • 55.3	290°22.6	• • 37.0	38°33.0	• • 22.6	1 22 2		
10	67°30.3	286°05.2	02.9	9°09.9	55.7	305°24.5	36.8	53°35.4	22.6	Jun 28 Sun	SHA	Mer.pass
11	82°32.7	301°04.9	01.9	$24^{\circ}10.5$	56.1	320°26.5	36.7	68°37.7	22.6	Venus	220°10.7	14:55
12	97°35.2	316°04.6	N17°01.0	39°11.2		335°28.4	N20°36.6	83°40.1	N03°22.7	Mars		09:24
13	112°37.7	331°04.2	17°00.0	54°11.8	56.9	350° 30.3	36.5	98°42.4	22.7	Jupiter		13:41
14	127°40.1	346°03.9	$16^{\circ}59.1$	69°12.4	57.3	5°32.2	36.4	113°44.8	22.7	Saturn	346°08.9	06:30
15	142°42.6	1°03.5	• • 58.1	84°13.0	• • 57.7	20°34.1	• • 36.3	128°47.1	• • 22.8	Jun 29 Mon	SHA	Mer.pass
16	157°45.1	16°03.2	57.2	99°13.6	58.1	35°36.0	36.2	143°49.5	22.8	Venus		14:56
17	172°47.5	31°02.9	56.2	$114^{\circ}14.2$	58.5	50°37.9	36.1	158°51.8	22.8	Mars		09:23
18	187°50.0	46°02.5	N16°55.2	129° 14.9	N19°58.9	65°39.8	N20°36.0	173°54.2	N03°22.9	Jupiter		13:38
19	202°52.4	61°02.2	54.3	$144^{\circ}15.5$	59.3	80°41.7	35.8	$188^{\circ}56.6$	22.9	Saturn	346°06.2	06:26
20	217°54.9	$76^{\circ}01.9$	53.3	$159^{\circ}16.1$	$19^{\circ}59.7$	95°43.6	35.7	203°58.9	22.9			
21	232°57.4	91°01.5	• • 52.4	$174^{\circ}16.7$	$20^{\circ}00.1$	110°45.5	• • 35.6	219°01.3	• • 23.0	Horizont	al parallax	
22	247°59.8	$106^{\circ}01.2$	51.4	189° 17.3	00.5	125°47.4	35.5	234°03.6	23.0		Venus:	0.1
23	263°02.3	121°00.9	50.5	204° 17.9	00.9	140°49.3	35.4	249°06.0	23.0		Mars:	0.1
1/100	ναςς ΩΕ.21	1,02/40	0.9′ m-4.04	1/0 K/ J0	.4′ m1.30	1/1 0/ 4 0	.1′ m-1.81	1/2 4/ 40	.0′ m0.78			
ivier.p	ass. 05:31	$\nu$ -0.5 $a$ -0	v. 5 111-4.U4	νυ.υ αυ	.+ 1111.30	ν1.9 U-U	.1 111-1.01	ν2.4° α0	.0 1110.70			

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°15.1	N23° 19.7	35°38.9	11.3'	S25°39.5	5.9'	54.0'
1	194°15.0	19.6	50°09.2	11.2'	25°45.4	5.8'	54.0'
2	209°14.8	19.5	64°39.4	11.2'	25°51.2	5.7'	54.0'
3	224°14.7	• • 19.4	79°09.6	11.1'	25°56.8	5.5'	54.0'
4	239°14.6	19.3	93°39.7	11.1'	26°02.4	5.4'	54.0'
5	254°14.5 269°14.3	19.2 N23°19.1	108°09.8 122°39.8	11.0' 11.0'	26°07.8 <b>S</b> 26°13.1	5.3'	54.0'
6 7	269 14.3 284°14.2	19.0	122 39.8 137°09.8	10.9'	26°18.2	5.2' 5.0'	54.0' 54.0'
8	299°14.1	18.9	151°39.7	10.9'	26°23.3	4.9'	54.0'
9	314°13.9	. 18.8	166°09.6	10.8'	26°28.2	4.8'	53.9'
10	329°13.8	18.7	180°39.4	10.8'	26°33.0	4.7'	53.9'
11	344°13.7	18.6	195°09.2	10.8'	26°37.7	4.6'	53.9'
12	359°13.5	N23° 18.5	209°39.0	10.7'	S26°42.2	4.4'	53.9'
13	14°13.4	18.4	224°08.7	10.7'	26°46.7	4.3'	53.9'
14	29°13.3	18.3	238°38.4	10.6'	26°51.0	4.2'	53.9'
15 16	44°13.2 59°13.0	· · 18.1 18.0	253°08.1 267°37.7	10.6' 10.6'	26°55.1 26°59.2	4.0' 3.9'	53.9' 53.9'
17	74°12.9	17.9	282°07.2	10.5	20 59.2 27°03.1	3.8'	53.9'
18	89°12.8	N23° 17.8	296°36.8	10.5'	\$27°06.9	3.7'	53.9'
19	104°12.6	17.7	311°06.3	10.5'	27°10.5	3.5'	53.9'
20	119°12.5	17.6	325°35.7	10.4'	27°14.1	3.4'	53.9'
21	134°12.4	• • 17.5	340°05.1	10.4'	27°17.5	3.3'	53.9'
22	149°12.3	17.4	354°34.5	10.4'	27°20.8	3.1'	53.9'
23	164°12.1	17.3	9°03.9	10.3'	27°23.9	3.0'	53.9'
	SD = 15.7'	d = -0.1'		SE	0 = 14.7'		
C.,	GHA	Doc	GHA		Doc	d	НР
Sun 0	<b>GHA</b> 179°12.0	<b>Dec</b> N23°17.1	23°33.2	u 10.3'	Dec \$27°26.9	a 2.9'	<b>нР</b> 53.9'
1	194°11.9	17.0	38°02.5	10.3'	27°29.8	2.7'	53.9'
2	209°11.8	16.9	52°31.8	10.2'	27°32.5	2.6'	53.9'
3	224°11.6	• • 16.8	67°01.0	10.2'	27°35.2	2.5'	53.9'
4	239°11.5	16.7	81°30.3	10.2'	27°37.6	2.4'	53.9'
5	254°11.4	16.6	95°59.5	10.2'	27°40.0	2.2'	53.9'
6	269°11.2	N23° 16.5	110°28.6	10.1'	S27°42.2	2.1'	53.9'
7	284°11.1	16.3	124°57.8	10.1'	27°44.3	2.0'	53.9'
8	299°11.0 314°10.9	16.2	139°26.9 153°56.0	10.1'	27°46.2 27°48.1	1.8' 1.7'	53.9'
9 10	314 10.9 329°10.7	· · 16.1 16.0	153 50.0 168°25.1	10.1' 10.1'	27 48.1 27°49.8	1.6'	53.9' 53.9'
11	329 10.7 344°10.6	15.9	182°54.1	10.1	27 49.8 27°51.3	1.6	53.9'
12	359°10.5	N23° 15.7	102 34.1 197°23.2	10.0'	527°52.7	1.3'	53.9'
13	14°10.4	15.6	211°52.2	10.0'	27°54.0	1.1'	53.9'
14	29°10.2	15.5	226°21.2	10.0'	27°55.2	1.0'	53.9'
15	44°10.1	• • 15.4	240°50.2	10.0'	27°56.2	0.9'	53.9'
16	59°10.0	15.2	$255^{\circ}19.2$	10.0'	27°57.0	0.7'	53.9'
17	74°09.8	15.1	269°48.2	10.0'	27°57.8	0.6'	53.9'
18	89°09.7	N23° 15.0	284°17.1 298°46.1	10.0'	\$27°58.4	0.5'	53.9'
19 20	104°09.6 119°09.5	14.9 14.7	298 46.1 313°15.0	9.9' 9.9'	27°58.9 27°59.2	0.3' 0.2'	53.9'
21	134°09.3	. 14.6	327°44.0	9.9'	27°59.4	0.2	53.9' 53.9'
22	149°09.2	14.5	342°12.9	9.9'	27°59.5	-0.1	53.9'
23	164°09.1	14.3	356°41.8	9.9'	27°59.4	-0.2	53.9'
	SD = 15.7'	d = -0.1'		SE	0 = 14.7'		
					Б.		
Mon 0	<b>GHA</b> 179°09.0	<b>Dec</b> N23°14.2	<b>GHA</b> 11°10.7	u 9.9'	Dec \$27°59.2	d -0.3'	<b>HP</b> 53.9'
1	179 09.0 194°08.8	N23 14.2 14.1	25°39.7	9.9 9.9'	27°58.8	-0.3 -0.5'	53.9' 53.9'
2	209°08.7	13.9	40°08.6	9.9'	27°58.4	-0.6'	53.9'
3	224°08.6	• • 13.8	54°37.5	9.9'	27°57.7	-0.8'	53.9'
4	239°08.5	13.7	69°06.4	9.9'	27°57.0	-0.9'	53.9'
5	254°08.3	13.5	83°35.4	9.9'	27°56.1	-1.0'	53.9'
6	269°08.2	N23°13.4	98°04.3	9.9'	\$27°55.1	-1.2'	53.9'
7	284°08.1 299°08.0	13.3	112°33.2 127°02.2	9.9'	27°53.9	-1.3'	54.0'
8 9	299°08.0 314°07.8	13.1 •• 13.0	127°02.2 141°31.1	10.0' 10.0'	27°52.6 27°51.2	-1.4' -1.6'	54.0' 54.0'
10	314 07.8 329°07.7	12.9	141 31.1 156°00.1	10.0'	27°49.6	-1.0 -1.7'	54.0'
11	344°07.6	12.7	170°29.1	10.0'	27°47.9	-1.8'	54.0'
12	359°07.5	N23°12.6	184°58.1	10.0'	\$27°46.1	-2.0'	54.0'
13	14°07.3	12.4	$199^{\circ}27.1$	10.0'	$27^{\circ}44.1$	-2.1'	54.0'
14	29°07.2	12.3	213°56.1	10.0'	27°42.0	-2.2'	54.0'
15	44°07.1	· · 12.2	228°25.1	10.0'	27°39.8	-2.4'	54.0'
16	59°07.0	12.0	242°54.2	10.1'	27°37.4	-2.5'	54.0'
17 18	74°06.8 89°06.7	11.9 N23°11.7	257°23.2 271°52.3	10.1' 10.1'	27°34.9 <b>S</b> 27°32.2	-2.6' -2.8'	54.0' 54.0'
18 19	89°06.7 104°06.6	N23 11.7 11.6	271°52.3 286°21.4	10.1	27°29.5	-2.8' -2.9'	54.0°
20	119°06.5	11.0	300°50.6	10.1	27°26.6	-2.9 -3.0'	54.0'
21	134°06.3	· · 11.3	315°19.7	10.2'	27°23.5	-3.2'	54.0'
22	149°06.2	11.2	329°48.9	10.2'	27°20.3	-3.3'	54.0'
23	164°06.1	11.0	344°18.1	10.2'	27°17.0	-3.4'	54.0'
	SD = 15.7'	d = -0.1'		SE	0 = 14.7'		

	Twi	light			Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut
<b>N</b> 72°						
<b>N</b> 70°						
68°						
66°						
64°	////	////	01:37	22:29	////	////
62°	////	////	02:13	21:52	////	////
$60^{\circ}$	////	00:57	02:39	21:27	23:08	////
N 58°	////	01:45	03:00	21:07	22:21	////
56°	////	02:14	03:16	20:50	21:52	////
54°	00:52	02:36	03:30	20:36	21:30	23:13
52°	01:36	02:54	03:42	20:24	21:12	22:29
50°	02:04	03:09	03:53	20:13	20:58	22:02
45°	02:49	03:38	04:16	19:51	20:28	21:18
<b>N</b> 40°	03:19	04:01	04:34	19:33	20:06	20:47
35°	03:42	04:19	04:48	19:18	19:48	20:24
30°	04:01	04:34	05:01	19:05	19:33	20:06
20°	04:01	04:59	05:01	18:43	19:08	19:37
N 10°	04:52	05:19	05:42	18:24	18:47	19:15
0°	05:11	05:37	06:00	18:07	18:29	18:56
<b>S</b> 10°	05:28	05:54				18:39
20°	05:26	05:54	06:17 06:35	17:50 17:31	18:12 17:55	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	07:09	16:44	17:14	17:48
45°	06:29	07:06	07:23	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° <b>S</b> 60°	07:04 07:11	07:56 08:08	08:48 09:05	15:19 15:01	16:10 15:59	17:03 16:55
3 00	07.11	00.00	09.03	15.01	13.39	10.50
Lat.	Sat	Moonris Sun	e Mon	Sat	Moonset Sun	t Mon
N 72°	Sat	Sun	IVION	Sat	Sun	IVIOII
		_				
N 70°						
68°						
66°						
64°	24.00		20.10	20.11		
62°	21:29	21.41	23:10	23:11	20.00	00.4
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°	19:01	19:59	20:45	01:06	01:41	02:28
50°	18:47	19:44	20:31	01:19	01:55	02:43
45°	18:18	19:14	20:02	01:44	02:24	03:13
<b>N</b> 40°	17:56	18:51	19:40	02:05	02:47	03:36
35°	17:37	18:32	19:21	02:22	03:06	03:56
30°	17:21	18:15	19:05	02:37	03:22	04:12
20°	16:55	17:47	18:38	03:02	03:49	04:40
N $10^{\circ}$	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
<b>S</b> 10°	15:49	16:39	17:31	04:05	04:57	05:48
20°	15:26	16:15	17:07	04:05	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°	14:44	15:12	16:05	05:25	06:23	07:15
	14:05	14:49	15:42	05:46	06:46	07:38
					JU.7U	01.30
45°						
45° <b>S</b> 50°	13:37	14:19	15:13	06:13	07:15	08:08
45° <b>S</b> 50° 52°	13:37 13:24	14:19 14:05	15:13 14:59	06:13 06:26	07:15 07:30	08:08 08:22
45° <b>S</b> 50°	13:37	14:19	15:13	06:13	07:15	08:08

		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	92-99%
27	03:00	03:06	12:03	22:22	09:57	
28	03:12	03:18	12:03	23:14	10:48	
29	03:24	03:30	12:04	-:-	11:39	

13:23

07:20

08:32

09:24

09:58

58°

12:29

12:01

13:02

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0 0	278° 04.8	136°00.6	N16°49.5	219°18.6	N20°01.3	155°51.2	N20°35.3	264°08.3	N03°23.1		эпа	Dec
	278 04.8 293°07.2	150 00.0 151°00.2		219 16.0 234°19.2						Alpheratz	357°33.5	29°14.1
1			48.6		01.7	170°53.1	35.2	279°10.7	23.1	Ankaa	353°05.9	-42°09.4
2	308°09.7	165°59.9	47.6	249°19.8	02.1	185°55.0	35.1	294°13.1	23.1	Schedar	349°29.6	56°40.7
3	323°12.2	180°59.6	• • 46.6	264°20.4	• • 02.5	200°57.0 215°58.9	• • 35.0	309°15.4	• • 23.2	Diphda	348°46.1	-17°50.3
4 5	338° 14.6	195°59.2	45.7	279°21.0	02.9		34.9	324°17.8	23.2	Achernar	$335^{\circ}19.5$	-57°05.8
6	353°17.1 8°19.6	210°58.9 225°58.6	44.7 N16°43.8	294°21.6 309°22.3	03.2 N20°03.6	231°00.8 246°02.7	34.7 N20°34.6	339°20.1 354°22.5	23.2 N03°23.3	Hamal	327°50.0	23°35.2
7	23°22.0	240°58.3	42.8	324°22.9	04.0	240 02.7 261°04.6	34.5	9°24.8	23.3	Polaris	313°42.2	89°22.3
8	38° 24.5	255°58.0	41.8	339°23.5	04.0	276°06.5	34.4	24°27.2	23.3	Acamar	$315^{\circ}11.1$	-40°11.7
9	53° 26.9	270°57.6	• • 40.9	354°24.1	• • 04.8	291°08.4	• • 34.3	39°29.6	• • 23.4	Menkar	314°05.1	4°11.7
10	68°29.4	285°57.3	39.9	9°24.7	05.2	306°10.3	34.2	54°31.9	23.4	Mirfak		49°57.1
11	83°31.9	300°57.0	38.9	24°25.3	05.6	321°12.2	34.1	69°34.3	23.4	Aldebaran	290°38.5	16°33.7
12	98°34.3	315°56.7	N16°38.0	39°25.9	N20°06.0	336°14.1	N20°34.0	84°36.6	N03°23.5	Rigel	281°03.0	-8°10.2
13	113°36.8	330°56.3	37.0	54°26.6	06.4	351°16.0	33.9	99°39.0	23.5	Capella	280°20.5	46°01.4
14	128°39.3	345°56.0	36.0	69°27.2	06.8	6°17.9	33.7	114°41.4	23.5	Bellatrix	278°21.9	6°22.4
15	143°41.7	0°55.7	• • 35.1	84°27.8	• • 07.2	$21^{\circ}19.8$	• • 33.6	129°43.7	• • 23.5	Elnath	278°00.7	28°37.7
16	158°44.2	15°55.4	34.1	99°28.4	07.6	$36^{\circ}21.7$	33.5	144°46.1	23.6	Alnilam	275°36.8	-1°11.1
17	173°46.7	30°55.1	33.1	114°29.0	0.80	51°23.6	33.4	159°48.4	23.6	Betelgeuse	270°51.1	7°24.7
18	188°49.1	45°54.8	N16°32.2	129°29.6	N20°08.3	66°25.5	N20°33.3	174°50.8	N03°23.6	Canopus Sirius	263°52.4 258°25.5	-52°42.5 -16°45.1
19	203°51.6	60°54.4	31.2	144°30.3	08.7	81°27.4	33.2	189°53.2	23.7	Adhara	255°05.3	-10 45.1 -29°00.5
20	$218^{\circ}54.1$	75°54.1	30.2	159°30.9	09.1	96°29.3	33.1	204°55.5	23.7	Procyon	244°49.9	5°09.4
21	233°56.5	90°53.8	• • 29.3	174°31.5	• • 09.5	111°31.3	• • 33.0	219°57.9	• • 23.7	Pollux	244 49.9 243°16.2	27°57.8
22	248°59.0	105°53.5	28.3	189°32.1	09.9	126°33.2	32.8	235°00.2	23.8	Avior	234°14.8	-59°35.8
23	264°01.4	120°53.2	27.3	204°32.7	10.3	141°35.1	32.7	250°02.6	23.8	Suhail	222°45.8	-43°32.5
Mer n	ass. 05:27	v-0 3' d-1	.0′ m-4.05	ν0 6′ d0	.4′ m1.30	v1 9' d-0	.1' m-1.81	v2 4' d0	.0′ m0.78	Miaplacidus	221°38.8	-69°49.7
- IVIEL.P	a33. U3.21	ν-0.5 α-1	.0 111-4.03		.4 1111.50	ν1.9 u-0	.1 111-1.01	ν2. <del>4</del> αθ	.0 1110.70	Alphard	217°46.8	-8°46.5
										Regulus	207°33.3	11°50.3
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.8	61°36.7
0	279°03.9	135°52.9	N16°26.3	219°33.3	N20°10.7	156°37.0	N20°32.6	265°05.0	N03°23.8	Denebola	182°23.8	14°25.5
1	294°06.4	150°52.6	25.4	234°34.0	11.1	171°38.9	32.5	280°07.3	23.9	Gienah	175°42.3	-17°41.5
2	309°08.8	165°52.3	24.4	249°34.6	11.5	186°40.8	32.4	295°09.7	23.9		172°58.7	-63°15.1
3	324°11.3	180°52.0	• • 23.4	264°35.2	• • 11.8	201°42.7	• • 32.3	310°12.0	• • 23.9		171°50.3	-57°16.0
4	339°13.8	195°51.6	22.4	279°35.8	12.2	216°44.6	32.2	325°14.4	24.0	Alioth	166°11.8	55°49.2
5	354°16.2	210°51.3	21.5	294°36.4	12.6	231°46.5	32.1	340°16.8	24.0	Spica	158°20.9	-11°18.1
6	9° 18.7	225°51.0	N16°20.5	309°37.0	N20°13.0	246°48.4	N20°32.0	355°19.1	N03°24.0	Alkaid	152°50.9	49°11.1
7	24°21.2	240°50.7	19.5	324°37.6	13.4	261°50.3	31.8	10°21.5	24.0	Hadar	148°34.0	-60°30.3
8	39°23.6	255°50.4	18.5	339°38.3	13.8	276°52.2	31.7	25°23.8	24.1	Menkent	$147^{\circ}56.0$	-36°30.2
9	54°26.1	270°50.1	•• 17.6	354°38.9	• • 14.2	291°54.1	• • 31.6	40°26.2	• • 24.1	Arcturus	$145^{\circ}46.6$	19°02.7
10	69°28.5 84°31.0	285°49.8	16.6	9°39.5	14.5	306°56.0	31.5	55°28.6	24.1	Rigil Kent.	139°38.2	-60°57.0
11 12	99°33.5	300°49.5 315°49.2	15.6 N16°14.6	24°40.1 39°40.7	14.9 N20°15.3	321°57.9 336°59.8	31.4 N20°31.3	70°30.9 85°33.3	24.2 N03°24.2	Kochab	$137^{\circ}19.2$	74°03.0
13	99 33.3 114°35.9	330°48.9	13.6	54°41.3	15.7	352°01.7	31.2	100°35.7	24.2	Zuben'ubi	136°54.5	-16°09.2
14	114 35.9 129°38.4	345°48.6	12.7	69°41.9	16.1	7°03.6	31.2	100 35.7 115°38.0	24.2	Alphecca	126°02.4	26°37.6
15	144°40.9	0°48.3	•• 11.7	84°42.6	• • 16.5	22°05.5	• • 30.9	130°40.4	24.3	Antares	112°14.0	-26°29.5
16	159° 43.3	15°48.0	10.7	99°43.2	16.8	37°07.4	30.9	145°42.7	24.3	Atria	107°06.6	-69°04.6
17	174° 45.8	30°47.7	09.7	114°43.8	17.2	52°09.3	30.7	160°45.1	24.4	Sabik		-15°45.5
18	189°48.3	45°47.4	N16°08.7	129°44.4	N20°17.6	67°11.3	N20°30.6	175°47.5	N03°24.4	Shaula	96°08.3	-37°07.4
19	204° 50.7	60°47.1	07.7	144°45.0	18.0	82°13.2	30.5	190°49.8	24.4	Rasalhague	95°57.1	12°32.5
20	219°53.2	75°46.8	06.7	159°45.6	18.4	97°15.1	30.4	205°52.2	24.4	Eltanin	90°41.1	51°29.1
21	234°55.7	90°46.5	• • 05.8	174°46.3	• • 18.7	112°17.0	· · 30.3	220°54.6	• • 24.5	Kaus Aust.	83°30.5	-34°22.3
22	249°58.1	105°46.2	04.8	189°46.9	19.1	127°18.9	30.2	235°56.9	24.5	Vega	80°32.0	38°48.5 -26°15.8
23	265°00.6	120°45.9	03.8	204°47.5	19.5	142°20.8	30.0	250°59.3	24.5	Nunki Altair	75°45.9 61°58.4	8°56.3
N 4	OF.02	- 0 2/ -/ 1	0/ 4.05	- 0.6/ -10	.4′ m1.30	-10/-10	1/ 1 01	-2.4/ -10	0/ 0.70	Peacock	53°03.3	-56°38.8
ivier.pa	ass. 05:23	$\nu$ -0.3 a-1	.0′ m-4.05	$\nu$ 0.6 au	.4 m1.30	$\nu_{1.9} \ a_{-0}$	.1′ m-1.81	ν2.4 αυ	.0′ m0.78	Deneb	49°24.6	45°22.4
										Enif	33°37.4	9°59.8
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.1	-46°49.7
0	280°03.0	135°45.6	$N16^{\circ}02.8$	219°48.1	N20°19.9	157°22.7	N20°29.9	266°01.6	N03°24.6	Fomalhaut	15°13.0	-29°28.7
1	295°05.5	150°45.3	01.8	234°48.7	20.3	172°24.6	29.8	281°04.0	24.6	Scheat	13°43.9	28° 13.5
2	310°08.0	165°45.0	16°00.8	249°49.3	20.6	187°26.5	29.7	296°06.4	24.6	Markab	13°28.5	15°20.9
3	325°10.4	180°44.7	15°59.8	264°49.9	• • 21.0	202°28.4	• • 29.6	311°08.7	• • 24.7			
4	340°12.9	195°44.4	58.8	279°50.6	21.4	217°30.3	29.5	326°11.1	24.7	Jun 30 Tue	SHA	Mer.pass
5	355° 15.4	210°44.2	57.8	294°51.2	21.8	232°32.2	29.4	341°13.5	24.7		217°55.8	14:56
6	10° 17.8	225°43.9	N15°56.9	309°51.8	N20°22.2	247°34.1	N20°29.3	356°15.8	N03°24.7		301°13.8	09:22
7	25°20.3	240°43.6	55.9	324°52.4	22.5	262°36.0	29.1	11°18.2	24.8	Jupiter Saturn	237°46.5	13:35
8	40°22.8	255°43.3	54.9	339°53.0	22.9	277°37.9	29.0	26°20.6	24.8	Saturn	346°03.6	06:22
9	55°25.2	270°43.0	• • 53.9	354°53.6	• • 23.3	292°39.8	• • 28.9	41°22.9	• • 24.8	Jul 01 Wed	SHA	Mer.pass
10	70°27.7 85°30.2	285°42.7 300°42.4	52.9 51.0	9°54.2 24°54.9	23.7 24.0	307°41.7 322°43.6	28.8 28.7	56°25.3 71°27.7	24.9		$216^{\circ}49.0$	14:57
11	85° 30.2 100° 32.6	300°42.4 315°42.1	51.9 N15°50.9	39°55.5	24.0 N20°24.4	322°43.6 337°45.5	28.7 N20°28.6	86°30.0	24.9 N03°24.9	Mars	$300^{\circ}29.4$	09:21
12 13	100 32.6 115°35.1	315 42.1 330°41.9	N15 50.9 49.9	54°56.1	24.8	352°47.4	28.5	101°32.4	24.9		$237^{\circ}33.1$	13:32
14	130°37.5	345°41.6	49.9 48.9	69°56.7	25.2	7°49.3	28.4	101 32.4 116°34.8	25.0	Saturn	346°01.0	06:19
15	145° 40.0	0°41.3	• • 47.9	84°57.3	• • 25.5	22°51.2	• • 28.2	131°37.1	• • 25.0	Jul 02 Thu	SHA	Mor page
16	160° 42.5	15°41.0	46.9	99°57.9	25.9	37°53.1	28.1	146°39.5	25.0		215°42.6	Mer.pass 14:57
17	175° 44.9	30°40.7	45.9	114°58.5	26.3	52°55.0	28.0	161°41.9	25.0		215 42.0 299°45.0	09:20
18	190°47.4	45°40.4	N15°44.9	129°59.2	N20°26.7	67°56.9	N20°27.9	176°44.2	N03°25.1		299 45.0 237°19.6	13:29
19	205° 49.9	60°40.2	43.9	144°59.8	27.0	82°58.8	27.8	191°46.6	25.1		345°58.6	06:15
20	220°52.3	75°39.9	42.9	160°00.4	27.4	98°00.7	27.7	206°49.0	25.1			00.13
21	235°54.8	90°39.6	• • 41.9	175°01.0	• • 27.8	113°02.6	• • 27.6	221°51.3	• • 25.2	Horizont	al parallax	
22	250°57.3	105°39.3	40.9	$190^{\circ}01.6$	28.2	128°04.6	27.4	$236^{\circ}53.7$	25.2		Venus:	0.1
23	$265^{\circ}59.7$	120°39.0	39.9	205°02.2	28.5	143°06.5	27.3	$251^{\circ}56.1$	25.2		Mars:	0.1
Morn	ass. 05:19	v-0 3/ d 1	.0′ m-4.06	νη 6/ <b>Α</b> η	.4′ m1.30	1/1 Q' d Q	.1′ m-1.81	1/2 // 40	.0′ m0.77			
ivici.p	00.13	ν 0.5 u-1	.5 7.00	₽ J.U UU		ν 1.5 U-U	1.01	ν Δ.¬ UU				

h	Su	n			Moon	oon			
Tue	GHA	Dec	GHA	ν	Dec	d	HP		
0	179°06.0	N23°10.9	358°47.3	10.3'	S27°13.6	-3.6'	54.0'		
1	194°05.9	10.7	13°16.6	10.3'	$27^{\circ}10.0$	-3.7'	54.0'		
2	209°05.7	10.6	27°45.8	10.3'	27°06.3	-3.8'	54.1'		
3	224°05.6	• • 10.4	42°15.2	10.3'	27°02.5	-4.0'	54.1'		
4	239°05.5 254°05.4	10.3	56°44.5 71°13.9	10.4	26°58.5 26°54.4	-4.1' -4.2'	54.1'		
5 6	269°05.2	10.1 N23°10.0	71 13.9 85°43.3	10.4' 10.4'	20 54.4 S26°50.2	-4.2 -4.4'	54.1' 54.1'		
7	284°05.1	09.8	100°12.7	10.5	26°45.8	-4.5'	54.1'		
8	299°05.0	09.7	114°42.2	10.5'	26°41.3	-4.6'	54.1'		
9	314°04.9	• • 09.5	129°11.7	10.5'	26°36.7	-4.7'	54.1'		
10	329°04.7	09.3	143°41.2	10.6'	26°32.0	-4.9'	54.1'		
11	344°04.6	09.2	158°10.8	10.6'	26°27.1	-5.0'	54.1'		
12	359°04.5 14°04.4	N23°09.0	172°40.4 187°10.1	10.7' 10.7'	\$26°22.1 26°17.0	-5.1' -5.2'	54.1' 54.1'		
13 14	29°04.3	08.9 08.7	201°39.7	10.7'	26°17.0 26°11.7	-5.2' -5.4'	54.1'		
15	44°04.1	08.6	216°09.5	10.7	26°06.4	-5.5'	54.2'		
16	59°04.0	08.4	230°39.3	10.8'	26°00.9	-5.6'	54.2'		
17	74°03.9	08.2	245°09.1	10.9'	25°55.2	-5.7'	54.2'		
18	89°03.8	N23°08.1	259°38.9	10.9'	S25°49.5	-5.9'	54.2'		
19	104°03.7	07.9	274°08.8	10.9'	25°43.6	-6.0'	54.2'		
20	119°03.5	07.8	288°38.8	11.0'	25°37.6	-6.1'	54.2' 54.2'		
21 22	134°03.4 149°03.3	· · 07.6 07.4	303°08.8 317°38.8	11.0' 11.1'	25°31.5 25°25.3	-6.2' -6.4'	54.2'		
23	149 03.3 164°03.2	07.4 07.3	317 38.8 332°08.9	11.1'	25 25.3 25°18.9	-6.5'	54.2'		
23			- 552 50.9			0.5	J 1.2		
	SD = 15.7'	d = -0.1'		SL	O = 14.7'				
Wed	GHA	<b>Dec</b> N23°07.1	GHA	ν 11.2'	Dec	d	HP		
0 1	179°03.0 194°02.9	N23°07.1 06.9	346°39.0 1°09.2	11.2'	\$25°12.4 25°05.8	-6.6' -6.7'	54.2' 54.2'		
2	209°02.8	06.8	15°39.4	11.3'	24°59.1	-6.8	54.3		
3	224°02.7	• • 06.6	30°09.7	11.3'	24°52.3	-7.0'	54.3'		
4	239°02.6	06.4	44°40.0	11.4'	$24^{\circ}45.3$	-7.1'	54.3'		
5	254°02.4	06.3	59°10.4	11.4'	24°38.3	-7.2'	54.3'		
6 7	269°02.3 284°02.2	N23°06.1 05.9	73°40.8 88°11.2	11.5' 11.5'	\$24°31.1 24°23.8	-7.3' -7.4'	54.3' 54.3'		
8	299°02.1	05.9 05.8	00 11.2 102°41.8	11.6'	24 23.6 24°16.4	-7.4 -7.5'	54.3'		
9	314°02.0	05.6	117°12.3	11.6'	24°08.8	-7.6'	54.3'		
10	329°01.8	05.4	131°43.0	11.7'	24°01.2	-7.8'	54.3'		
11	344°01.7	05.3	146°13.6	11.7'	23°53.4	-7.9'	54.4'		
12	359°01.6 14°01.5	N23°05.1	160°44.4	11.8'	\$23°45.6 23°37.6	-8.0'	54.4'		
13 14	29°01.4	04.9 04.7	175°15.1 189°46.0	11.8' 11.9'	23 37.0 23°29.5	-8.1' -8.2'	54.4' 54.4'		
15	44°01.2	04.6	204°16.8	11.9'	23°21.3	-8.3	54.4'		
16	59°01.1	04.4	218°47.8	12.0'	23°13.0	-8.4'	54.4'		
17	74°01.0	04.2	233°18.8	12.0'	23°04.6	-8.5'	54.4'		
18	89°00.9 104°00.8	N23°04.0	247°49.8 262°20.9	12.1'	\$22°56.0 22°47.4	-8.6'	54.4'		
19 20	104 00.8 119°00.7	03.9 03.7	262 20.9 276°52.1	12.1' 12.2'	22 47.4 22°38.7	-8.7' -8.8'	54.5'		
21	134°00.5	• • 03.5	291°23.3	12.3'	22°29.8	-8.9'	54.5' 54.5'		
22	149°00.4	03.3	305°54.5	12.3'	22°20.9	-9.1'	54.5'		
23	164°00.3	03.1	320°25.8	12.4'	$22^{\circ}11.8$	-9.2'	54.5'		
	SD = 15.7'	d = -0.2'		SI	D = 14.8'				
Thu	GHA	Dec	GHA	••	Dec	d	НР		
I nu O	<b>GHA</b> 179°00.2	Dec N23°03.0	334°57.2	u 12.4'	<b>S</b> 22°02.7	a -9.3'	HP 54.5'		
1	194°00.1	02.8	349°28.6	12.5'	21°53.4	-9.4'	54.5'		
2	208°59.9	02.6	4°00.1	12.5'	$21^{\circ}44.1$	-9.5'	54.5'		
3	223°59.8	• • 02.4	18°31.6	12.6'	21°34.6	-9.6'	54.6'		
4	238°59.7	02.2	33°03.2	12.6'	21°25.0	-9.7'	54.6'		
5 6	253°59.6 268°59.5	02.0 N23°01.9	47°34.8 62°06.5	12.7' 12.7'	21°15.4 <b>S</b> 21°05.6	-9.8' -9.9'	54.6' 54.6'		
7	283°59.4	01.7	76°38.3	12.7	20°55.8	-9.9' -9.9'	54.6'		
8	298°59.2	01.5	91°10.1	12.8'	20°45.8	-10.0'	54.6'		
9	313°59.1	• • 01.3	105°41.9	12.9'	20°35.8	-10.1'	54.6'		
10	328°59.0	01.1	120°13.8	13.0'	20°25.7	-10.2'	54.7'		
11	343°58.9	00.9	134°45.8	13.0'	20°15.4	-10.3'	54.7'		
12 13	358°58.8 13°58.7	N23°00.7 00.5	149°17.8 163°49.8	13.1' 13.1'	\$20°05.1 19°54.7	-10.4' -10.5'	54.7' 54.7'		
13 14	28°58.5	00.5	103 49.8 178°21.9	13.1	19 54.7 19°44.2	-10.5 -10.6'	54.7' 54.7'		
15	43°58.4	00.2	192°54.1	13.2'	19°33.6	-10.7	54.7'		
16	58°58.3	23°00.0	207°26.3	13.3'	19°22.9	-10.8'	54.8'		
17	73°58.2	22°59.8	221°58.6	13.3'	19°12.1	-10.9'	54.8'		
18 19	88°58.1 103°58.0	N22°59.6 59.4	236°30.9 251°03.3	13.4' 13.4'	\$19°01.3 18°50.3	-11.0' -11.0'	54.8' 54.8'		
20	103°58.0 118°57.8	59.4 59.2	251°03.3 265°35.7	13.4	18° 39.3	-11.0 -11.1'	54.8'		
21	133°57.7	59.0	280°08.2	13.5'	18°28.1	-11.2	54.8'		
22	148°57.6	58.8	294°40.7	13.6'	18°16.9	-11.3'	54.8'		
23	163°57.5	58.6	309°13.2	13.6'	18°05.6	-11.4'	54.9'		
	SD = 15.7'	d = -0.2'		SI	0 = 14.9'				

Lat.	Twi	light	Sunrise	Sunset	Tw	ilight
Lat.	Naut.	Civil	Junise	Junser	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	////
<b>N</b> 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
$20^{\circ}$	04:31	05:00	05:24	18:44	19:08	19:37
<b>N</b> 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
$35^{\circ}$	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		Moonse	t

Lat.		Moonris	e		Moonse	t
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
N 70°						
68°			01:23		_	02:19
			23:59			02.13
66°			00:04			03:37
64°	00.56	00.07	23:33		00.00	04.12
62°	23:56	23:27	23:13 22:56	01.05	02:03	04:13
62°	23:05 22:33	23:00 22:39	22:56	01:05 01:57	02:55 03:26	04:39 04:59
N 58°	22:09	22:22	22:30	02:29	03:49	05:16
56°	21:49	22:08	22:20	02:53	04:08	05:30
54° 52°	21:33 21:19	21:55 21:44	22:10 22:02	03:12 03:28	04:24 04:38	05:42 05:52
52 50°	21:19	21:44	22:02	03:28	04:58	05:52
45°	20:42	21:13	21:39	03:42	05:14	06:21
N 40° 35°	20:21	20:56	21:26	04:33	05:34	06:37
35°	20:05 19:50	20:42 20:30	21:14 21:05	04:51 05:07	05:50 06:04	06:50 07:02
20°	19:50	20:30	20:48	05:07	06:04	07:02
N 10°	19:03	19:50	20:48	05:56	06:48	07:22
0°	18:43	19:32	20:33	05:30	07:07	07:55
S 10°	18:23	19:15	20:05	06:38	07:26	08:11
20°	18:01	18:56	19:49	00:36	07:26	08:11
30°	17:36	18:34	19:49	07:01	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
Lay	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	

19 21 022 135 368 015 330 120 120 120 120 120 120 120 120 120 12	h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
12 90°04.7 100°385 5 7.9 25°03.4 293 177°10.3 271 22°00.8 25.5 4													Dec
2 3 30°90.1 169°38.2 36.0 20°14.1 266 889°12.2 27.0 29°70.2 25.3 466.2 49°38.2 25.3 30°70.1 100°38.2 25.3 100°70.5 25.4 1.0 20°70.2 100°3.2 10											Alpheratz	357°33.4	29°14.1
3 326°96.0   180°377   350   200°47   300   200°141   269   312°05.5   25.3   360°40.4   340°40.4											Ankaa	353°05.9	-42°09.4
4 34112.0 1951577 34.9 2007053 30.4 22110.0 26.8 32707.9 25.6 4 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1											Schedar	$349^{\circ}29.6$	56°40.7
5 5 5 5 14.5 220 17.4 133 30 295 65 30 80 233 17.9 67 34.2 10.3 25.4 14.6 14.6 11.2 10.2 11.2 11.2 11.2 11.2 11.2 11.2												$348^{\circ}46.1$	-17°50.3
6   11   17   22   23   17   18   18   19   23   17   17   24   18   18   18   18   18   18   18   1											Achernar		-57°05.8
7 2 2*18.4 24*2*19.5 25*36.6 3.10 32*0*0*7.1 31.5 26*2*14.7 2*19.5 25.4 412*19.5 25.4											Hamal		23°35.2
8 4 4*21.9 295*96.6 30.8 340*07.7 31.9 278*23.6 20.3 27*17.4 25.5 [Acade 1970] 9 50*24.6 20*36.3 20.8 30.8 10*00.0 32.6 308*27.4 26.1 57*22.1 25.5 [Acade 1970] 9 50*24.6 30.2 28*36.0 28.8 10*00.0 32.6 308*27.4 26.1 57*22.1 25.5 [Acade 1970] 10 7*17.6 8 28*36.0 28.8 10*00.0 32.6 308*27.4 26.1 57*22.1 25.5 [Acade 1970] 12 10*17.8 8 28*36.0 26.8 10*10*20.0 32.6 308*27.4 26.1 57*22.1 25.5 [Acade 1970] 13 11*16*4.2 30*37.5 2 56.8 55*10.8 3.3 7. 35*33.1 25.7 102*20.2 25.6 [Acade 1970] 13 11*16*4.2 30*37.5 2 56.8 55*10.8 3.3 7. 35*33.1 25.7 102*20.2 25.6 [Acade 1970] 14 13*15.6 2 56*36 55*10.8 3.3 7. 35*33.1 25.7 102*20.2 25.6 [Acade 1970] 15 14*16*30.1 10*34.7 2.3 8 85*12.0 24.4 23*56.9 2.5 5.5 132*34.0 25.7 [Acade 1970] 15 14*16*30.1 10*34.7 2.3 8 85*12.0 24.4 23*56.9 2.5 5.5 132*34.0 25.7 [Acade 1970] 16 14*16*30.1 10*34.7 2.3 8 85*12.0 3.4 2.7 2.7 2.7 12.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.											Polaris		89°22.3
0. 6 6744 270°13-3 . 908 355′084 9.22 293°25.5 . 26.2 42°13 7 . 9.5.5 1													-40°11.6
10. 1 12 86 293 100 00 288 10 100 00 22.6 386 274 20.1 57 22.1 25.5 American Series 10 100 00 22.0 100 23.0 32.0 32.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5													4° 11.7
11. 8 of 29.3 300 29.8 8													49°57.1
121 10131.8 31575.5 N15726.8 4010.2 N00733.3 338731. N20725.9 8776.9 N03725.6 Callery 3272.19 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0											1		16°33.7
13													-8° 10.2
14   11   13   50.7   346   35.0   24   8   70   11.4   34.1   8   35.0   25.6   11   73.6   25.6   25.7													46°01.4
15. 146°39.1 0°34.7 0°32.8 85°12.0 °34.4 23°36.9 °25.5 12°34.0 °25.7 15°10.6 °26.1 10°14.1 10°34.1 10°34.2 °21.7 11°10.6 °34.8 °38.8 °22.4 14°36.3 °25.7 15°10.6 °34.1 10°34.1 10°34.2 °21.7 11°10.3 °35.2 °35°38.8 °24.7 °25.3 10°23.7 °25.7 15°10.3 °25.2 °25.1 10°34.1 10°34.2 °21.7 11°10.3 °25.7 15°10.3 °25.2 °25.2 °27.7 11°10.7 °25.7 °25.2 °27.7 11°10.3 °25.2 °25.2 °27.7 11°10.3 °25.2 °25.2 °27.7 11°10.3 °25.2 °25.2 °27.7 11°10.3 °25.2 °25.2 °27.7 11°10.3 °25.2 °25.2 °27.											1		6°22.4
161 101-94.16 15934.4 22.8 100*12.6 34.8 38*38.8 25.4 1479.63 25.7 1478.1 30*34.2 12.7 1578.1 33 35.2 35*40.7 25.3 162*38.7 25.7 158*31.8 109*46.5 46*33.9 N15*20.7 130*13.9 N20*25.5 68*42.6 N20*25.2 177*11.1 N03*25.7 168*25.5 16.9 20*0*49.0 0*0*33.6 10.7 145*14.5 35.9 38*34.5 25.1 102*34.4 25.8 AJAN 25*05.3 20*22*2.2 177*11.1 N03*25.7 168*25.5 16.9 20*0*49.0 0*0*33.6 10.7 145*14.5 35.9 38*44.5 25.1 102*34.4 25.8 AJAN 25*05.3 20*22*2.2 177*10.1 N03*25.7 168*25.5 16.9 38*45.5 25.1 102*34.5 25.8 25.8 25.8 25.8 25.8 25.8 25.8 25											1		28°37.7
12   176'441   397'842   21.7   157'133   35.2   53'407   25.3   102'837   25.7   102'837   25.8   102'837   25.8   103'845   25.8   103'845   25.8   103'845   25.8   103'845   25.8   103'845   25.8   25											1		-1°11.1
18		176°44.1	30°34.2								_		7°24.7
19. 266-490. 66733.6 19.7 145°14.5 35.9 83°4.5 25.1 192°43.4 25.8   Aller 20.2 21°51.5 75°33.4 18.7 160°15.2 8.1 18.7 18.2 18.2 18.2 18.2 18.2 18.2 18.2 18.2													-52°42.5
20											1		-16°45.1
12   286*53.9   90*33.1   1.17.   175*15.7   36.6   113*43.3   2.48   22*42.2   2.55*26.   2.59   Arrival 2.50*25.2   2.59*26.   105*22.6   15.7   205*16.9   37.3   143*52.1   2.4   2.25*25.9   2.59   Arrival 2.50*25.2   2.59*26.													-29°00.5
22 231*56.4 106*32.8 16.7 190*16.3 37.0 128*50.2 24.7 237*50.6 25.9 4.9 120*32.6 15.7 205*16.9 37.3 128*50.2 24.6 252*50.5 25.9 4.9 120*32.6 15.7 205*16.9 37.3 128*50.2 24.6 252*50.5 25.9 25.9 12.9 120*32.6 15.7 205*16.9 37.3 138*52.1 24.6 252*50.5 25.9 25.9 12.9 120*32.6 120*32.6 120*32.8													5°09.4
All								24.7					27°57.8
Act											1		-59°35.8
Alphane   Alph											1		-43°32.5
Section   Change	/ler.p	ass. 05:15	$\nu$ -0.3′ $d$ -1	0′ m-4.06	$\nu$ 0.6′ d0	.4′ m1.30	$\nu$ 1.9′ d-0	.1′ m-1.81	$\nu$ 2.4′ d0	.0′ m0.77			-69°49.7
the thing the thing of thing of the thing of thing of the thing of thing of the thing of the thing of thing of thing of the thing of the thing of the thing of th													-8°46.5
0 282°01.3 138°32.3 N15°146 200°176 N20°377, 188°54.0 N20°24.5 226°55.3 N03°25.9 Chulle 13.3°0.3 1.0°3.3 1.0°3.3 150°3.3 150°3.2 1.3°6.3 160°3.8 150°3.2 1.3°6.6 13.6°6.3 166°3.8 1.2°6.2 20°18.8 3.4 188°57.8 2.4 3.2°60.0 26.0 Acr. 172°58.4 1.7°4.4 342°1.1 1.0°4.2 1.0°4.3 1.0°4.5 1.1 1.0°4.0 1.0°4.5 1.1 1.0°4.0 1.0°4.0 1.0°4.5 1.0°4.0	Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	0		11°50.3
1 297°03.8   150°32.1   13.6   235°18.2   38.1   137°15.9   24.4   282°57.7   25.9   Glenbal   175°42.4   173°33   37°08.7   160°31.5   11.6   265°19.4   38.8   263°15.8   283.8   283°15.8   298°0.0   20.0   20.0   20.0   32.7   25.0   25.5													61°36.7
2 3 12°06.3 166°31.8 12.6 290°18.8 38.4 188°57.8 24.3 298°00.0 26.0 Acrus 17°50.5 -55 357°13.6 190°31.3 10.6 280°20.0 39.2 19°01.6 24.0 328°04.8 26.0 Acrus 17°50.5 -55 5357°13.6 210°31.0 09.5 260°20.6 39.5 234°03.5 23.9 343°07.2 26.0 Acrus 17°50.5 -55 5357°13.6 210°31.0 09.5 260°20.6 39.5 234°03.5 23.9 343°07.2 26.0 Acrus 17°50.5 -55 5357°13.6 210°31.0 09.5 260°20.6 39.5 234°05.6 N20°23.8 3858°09.5 N03°26.1 Acrus 17°50.5 -55 357°13.6 240°20.5 N15°08.5 310°21.2 N20°39.9 240°08.4 N20°23.8 3858°09.5 N03°26.1 Acrus 18°52.0 10.7 22°60.0 255°0.3 30°25.5 40.6 270°00.2 236 28°14.3 26.1 Acrus 18°52.0 10.7 22°60.0 255°0.3 30°25.2 40.0 256°00.1 23.3 58°10.0 26.1 Acrus 18°52.0 11.0 72°26.0 285°20.7 04.4 10°23.7 41.3 300°13.0 23.3 58°10.0 26.2 N20°10.1 18°82.0 11.1 88°23.8 N03°26.2 N15°02.4 40°24.9 N20°42.0 390°13.0 23.3 58°10.0 26.2 N20°13.1 117°33.3 300°20.0 01.4 85°25.5 44.3 34°14.7 324°14.9 232. 73°21.4 62.2 N20°23.1 88°23.8 N03°26.2 N20°13.1 117°33.3 10°21.2 N15°02.4 40°24.9 N20°42.0 390°16.8 N20°23.1 88°23.8 N03°26.2 N20°13.1 117°33.3 0°28.5 N20°13.1 117°33.3 0°28.5 N20°13.3 N03°26.1 122°25.0 N20°23.3 N20°46.3 N20°23.1 88°23.8 N03°26.2 N20°23.1 N20°26.1													14°25.5
3 327°08.7   180°31.5													-17°41.5
4 342°11.2   196°31.3   10.6   280°20.0   39.2   219°01.6   24.0   382°04.8   26.0   38.0   34.0													-63° 15.1
5 357°31.6 210°31.0 09.5 295°20.6 39.5 234°03.5 239 343°07.2 26.0 Spice 188°20.9 -11.  6 12°161.0 225°30.8 N15°08.5 310°21.2 N20°39.9 249°65.4 N20°23.8 358°09.5 N20°66.1 Spice 188°20.9 -11.  7 27°18.6 240°30.5 07.5 325°21.8 40.2 264°07.3 23.7 13°11.9 26.1 Alkaid 152°50.9 49.9 55°23.5 070°30.0 .0.55. 335°23.1 .41.0 294°11.1 .23.4 43°16.7 .26.1 Alkaid 182°50.9 49.9 55°23.5 070°30.0 .0.55. 335°23.1 .41.0 294°11.1 .23.4 43°16.7 .26.1 Alkaid 188°34.0 .60 Menkent 147°56.0 -36.1 11. 87°38.4 300°29.5 03.4 25°24.3 41.7 324°14.9 23.2 73°21.4 26.2 62. Alkaid 188°34.0 .60 Menkent 147°56.0 -36.1 11. 87°38.4 300°29.5 03.4 25°24.3 41.7 324°14.9 23.2 73°21.4 26.2 62. Alkaid 183°34.0 .40 25°24.3 41.7 324°14.9 23.2 73°21.4 26.2 62. Alkaid 132°35.8 345°28.7 15°00.3 70°25.1 42.3 95°26.1 8. N20°23.1 188°23.8 103°6.6 2. Alkaid 132°35.8 345°28.7 15°00.3 70°25.1 42.3 95°26.1 8. N20°23.1 188°23.8 103°6.6 2. Alkaid 132°35.8 345°28.7 15°00.3 70°25.1 42.3 95°26.1 8. N20°23.1 133°30.9 2.6.3 Alkaid 132°35.8 345°28.7 15°00.3 70°25.1 42.3 95°26.1 8. N20°23.1 133°30.9 2.6.3 Alkaid 132°35.8 345°28.7 15°00.3 70°25.1 42.3 95°26.1 8. N20°23.1 133°30.9 2.6.3 Alkaid 132°35.8 345°28.7 15°00.3 70°25.1 42.3 95°26.1 8. N20°23.1 120°20.0 130°28.6 N20°24.1 120°23.0 120°26.5 51.1 120°31.0 45.6 120°35.8 120°26.5 51.1 120°31.0 45.6 120°35.8 120°30.5 51.1 120°31.0 45.6 120°35.8 120°30.5 51.1 120°31.0 45.6 120°35.8 120°30.5 51.1 120°31.0 45.6 120°35.8 120°30.5 51.1 120°31.0 45.6 120°35.8 120°30.5 51.1 120°31.0 45.6 120°35.8 120°30.5 51.1 120°31.0 45.6 120°35.8 120°30.5 51.1 120°31.0 45.6 120°35.8 120°30.5 51.1 120°31.0 45.6 120°35.8 120°30.5 51.1 120°31.0 45.6 120°35.8 120°30.5 51.1 120°31.0 45.6 120°35.8 120°30.0 120°30.5 51.1 120°30.0 120°30.0 410°30.0 120°30.0 410°30.0 410°30.0 410°30.0 410°30.0 410°30.0 410°30.0 410°3											1		-57° 16.0
6   12°16.1   225°30.8   N15°06.5   310°2.1.2   N20°30.9   249°05.4   N20°23.8   358°09.5   N03°26.1   N36°05.5   N36°05.													55° 49.2
7 27°18.6 240°30.5 07.5 325°21.8 40.2 264°07.3 23.7 13°11.9 26.1 Marian 132°30.9 48 4 2°21.0 255°30.3 0.65 340°22.5 40.6 27°90.9 2 23.6 28°14.3 26.1 Merikent 147°50.0 3.6 9 5 7°23.5 270°30.0 0.55 355°33.1 1.41.0 294°11.1 0.23.4 43°16.7 26.1 Merikent 147°50.0 3.6 11 8 87°28.4 300°29.5 03.4 25°24.3 1.17 324°14.9 23.3 58°19.0 26.2 1.20°20.0 315°29.2 N15°02.4 40°24.9 N0°42.0 339°16.8 N20°21.3 88°23.8 N03°26.2 1.20°20.0 315°29.2 N15°02.4 40°24.9 N0°42.0 339°16.8 N20°21.3 88°23.8 N03°26.2 1.20°20.1 11°33.4 330°20.0 01.4 55°55.5 42.4 354°18.7 23.0 103°26.1 56.3 1.20°20.1 12°35.8 345°20.7 15°00.3 70°26.1 42.8 9°20.6 22.9 118°28.5 26.3 1.20°20.4 128.9 128.9 128.9 128.9 128.9 128.9 128.9 128.9 128.9 128.9 128.0 128.9 128													-11°18.1
8 42°21.0 25°530.3 06.5 340°22.5 40.6 279°09.2 23.6 28°14.3 26.1 Menkent 147°5.0 3-50 50°50.7 1.0 95°57.2 1.0 10 72°26.0 2865°29.7 04.4 10°23.7 41.0 290°13.0 23.3 68°19.0 26.2 11.0 187°2.5 11.0 187°2.5 12.0 10.0 72°2.5 12.0 10.0 72°2.5 12.0 10.0 72°2.5 12.0 10.0 72°2.5 12.0 10.0 72°2.5 12.0 10.0 72°3.5 12.0 72°3.5 12.0 10.0 72°3.5 12.0 72°3.5 12.0 10.0 72°3.5 12.0													49°11.1
9 57°23.5 270°30.0 · 0.5.5 355°23.1 · 41.0 294°11.1 · 23.4 43°16.7 ·													-60°30.3
10 72°26.0 288°29.7 0.4.4 10°23.7 41.3 309°13.0 23.3 58°19.0 26.2 11.8 87°24.4 300°9.9 5 03.4 25°24.3 41.7 32°21.4 26.2 12.0 10°23.9 315°9.9 2 01.4 40°24.9 N20°42.0 339°16.8 N20°3.1 88°23.8 N03°6.2 12.0 10°30.9 315°9.9 2 01.4 40°24.9 N20°42.0 339°16.8 N20°3.1 88°23.8 N03°6.2 24ben'ubi 130°545.5 1.4 14 132°38.8 348°38.7 15°00.3 70°26.1 42.8 9°20.6 22.9 118°28.5 26.3 Alpheca 126°02.4 26.1 14 132°38.8 348°38.7 15°00.3 70°26.1 42.8 9°20.6 22.9 118°28.5 26.3 Alpheca 126°02.4 26.1 161°16°40.8 15°28.2 58.3 100°27.4 43.5 39°24.4 22.5 163°35.6 26.3 Shalla 120°40.0 11.7 177°43.2 30°28.0 57.3 115°28.0 43.8 54°26.3 22.5 163°35.6 26.3 Shalla 100°20.7 44.5 18.1 29°34.4 22.2 22.6 148°38.0 N03°26.4 Alpheca 126°00.4 18.1 190°45.7 45°29.2 44.5 84°30.1 22.3 193°40.4 26.4 26.4 26.4 22.2 223°55.1 60°27.5 55.2 145°29.2 44.5 84°30.1 22.3 193°40.4 26.4 26.4 22.2 223°55.5 105°56.8 52.1 100°30.4 4.5 3.3 114°33.9 22.1 223°45.1 26.4 22.2 223°55.5 105°56.8 52.1 100°30.4 45.3 114°33.9 22.1 223°45.1 26.4 22.2 223°55.5 105°56.8 52.1 100°30.4 45.3 114°33.9 22.1 223°45.1 26.4 22.2 223°55.5 105°6.8 52.1 100°30.4 45.5 11.2 29°35.8 22.0 238°49.9 26.5 Alpheca 120°26.5 51.1 200°31.6 46.0 144°37.7 21.8 253°49.9 26.5 Alpheca 120°26.5 51.1 200°31.6 46.0 144°37.7 21.8 253°49.9 26.5 Alpheca 120°26.5 51.1 20°31.6 46.0 144°37.7 21.8 253°49.9 26.5 Alpheca 120°26.5 51.1 20°31.6 46.0 144°37.7 21.8 253°49.9 26.5 Alpheca 120°26.5 51.1 20°31.6 46.0 144°37.7 21.8 253°49.9 26.5 Alpheca 120°26.5 Shall 30°32.5 47.0 180°43.5 21.5 298°57.0 26.5 Alpheca 120°26.5 Shall 30°32.5 47.0 180°43.5 21.5 298°57.0 26.5 Alpheca 120°26.5 Shall 30°32.5 47.0 180°43.5 21.5 298°57.0 26.6 Bent 33°33.3 30°32.5 5.5 33°32.9 46.7 174°41.6 21.6 283°54.6 26.5 Shall 30°32.5 45.9 20°34.7 47.7 219°47.3 21.3 329°01.8 26.6 Dent 40°32.3 328°07.9 180°25.5 47.0 265°34.1 47.4 24.4 24.4 24.1 31°325.4 26.6 Shall 30°32.5 45.9 280°33.9 30°3.7 40°33.5 47.0 180°43.5 21.5 298°57.0 26.6 Shall 30°32.5 45.9 280°33.9 30°3.7 40°33.5 47.0 180°43.5 20°3.0 38°20.8 N03°26.6 Shall 30°33.5 47.0 180°43.5 48.9 290°30.5 N											1		-36°30.2
11 87°28.4 300°29.5 0.34 25°24.3 41.7 324°14.9 23.2 73°21.4 26.2 100°30.9 315°29.2 N15°02.4 40°24.9 N20°42.0 339°16.8 N20°32.1 88°28.8 N03°26.2 26.2 131°33.4 330°29.0 0.14 55°25.5 42.4 354°18.7 23.0 103°26.1 26.2 131°33.4 330°29.0 0.14 55°25.5 42.4 354°18.7 23.0 103°26.1 26.2 126°02.4 26.1 147°38.3 0°26.5 14°59.3 85°26.7 43.1 24°22.5 -22.8 133°30.9 26.3 Aphreca 112°14.0 26.1 161°62°40.8 15°28.2 38.3 100°27.4 43.5 39°24.4 22.6 148°33.3 26.3 53bik 102°01.0 15°1.0 15°24.2 30°28.0 57.3 115°28.0 43.8 85°26.7 22.2 163°33.6 26.3 Sabik 102°01.0 15°3.1 161°240.8 15°28.2 38.3 100°27.4 43.5 39°24.4 22.6 148°33.3 26.3 Sabik 102°01.0 15°3.1 18°19.2 97°41.1 51°4.2 22.5 163°32.2 25.1 63°33.6 26.3 Sabik 102°01.0 15°3.1 18°19.2 97°41.1 51°4.2 22.5 163°33.5 6.2 3 Sabik 102°01.0 15°40.8 140°40.1 40°40.4 26.4 160°27.5 55.2 130°28.6 N20°44.2 69°28.2 N20°22.4 178°38.0 N03°26.4 26.4 26.4 22.2 23°43.1 90°27.0 153.1 175°30.4 45.5 112°43.0 22.1 223°45.1 102°01.0 15°22.2 23°45.1 90°7.0 153.1 175°30.4 45.5 112°43.9 22.1 223°45.1 102°01.0 15°22.2 25°55.5 102°26.5 51.1 205°31.0 45.6 124°37.7 21.8 253°49.9 26.5 Nunki 79°45.9 26.2 22.2 208°42.8 26.5 Nunki 79°45.9 26.2 22.2 208°42.8 26.5 Nunki 79°45.9 26.5 Nunki 79°45.9 26.5 Nunki 79°45.9 26.5 Nunki 79°45.9 26.2 130°26.4 Nunki 79°45.9 26.5 Nunki 79													19°02.7
12   102'30,9   315'29,2   0   1.4   55'25,5   42.4   339'16,8   82'023,1   88'23,8   30'32'6,1   26.2     13   117'33,4   330'29,0   0   1.4   55'25,5   42.4   339'16,8   72.30   103'26,1   26.2     14   132'35,8   345'28,7   15'90,3   70'26,1   42.8   9°0,0   22.9   118'28,5   26.3     15   147'38,3   0°28,5   14'99,3   85'26,7   43.1   42'22,5   22.5   133'30,0   26.3     16   162'40,8   15'28,2   58.3   100'27,4   43.5   39'9,4   22.6   148'33,3   26.3     17   177'43,2   30'28,0   57.3   115'28,0   43.8   54'56,3   32'25,1   163'35,6   26.3     18   192'45,7   45'27,7   N14'56,2   130'28,6   N20'44,2   69'28,2   N20'22,4   178'38,0   N03'26,4     19   207'48,1   60'27,5   55.2   145'29,2   44.5   84'30,1   22.3   193'40,4   26.4     20   222'50,6   75'27,3   54.2   160'29,8   44.9   99'32,0   22.2   223'45,1   26.4     20   222'55,5   105'60,8   52.1   190'31,0   45.6   129'35,8   22.0   233'47,5   26.5     223   252'55,5   105'60,8   52.1   190'31,0   45.6   129'35,8   22.0   233'47,5   26.5     Mer.pass. 05:11   \$\bar{CHA}\$   \$			300°29.5										-60°57.0 74°03.0
131 1117*33.4 330°29.0 01.4   52°25.5   42.8 354°18.7   23.0   103°26.1   26.2   Alpheca   126°02.4   26.5   147°38.3   36°26.7   14°18.7   38.6   120°26.1   42.8   9°20.6   22.9   118°26.5   26.3   Antares   112°14.0   2.5   2.5   15   14°38.3   0°28.5   120°26.5   3.3   100°27.4   43.5   39°24.4   22.6   148°33.3   26.3   Sabik   102°01.0   1.5   102°01.0   1.5   102°01.0   1.5   102°02.0   177   177°42.2   30°28.0   57.3   110°28.0   43.8   54°6.6   22.2   168°35.6   26.3   Sabik   102°01.0   1.5   102°01.0   1.5   102°02.0   222°50.6   75°27.3   54.2   160°29.8   44.9   99°32.0   22.2   208°42.8   26.4   Kasa Aust.   83°30.5   22.2   225°55.5   120°26.5   51.1   190°31.0   45.6   129°35.8   22.0   222°3   45°58.0   120°26.5   51.1   205°31.6   46.0   144°37.7   21.8   233°49.9   26.5   Altrain   0°41.1   15°45.0   22.3   23°50.5   135°26.3   N14°50.0   220°32.3   N20°46.3   159°39.7   N20°21.7   268°52.3   N03°26.5   Altrain   15°33.0   22.9   233°30.5   135°26.3   N14°50.0   220°32.3   N20°46.3   159°39.7   N20°21.7   268°52.3   N03°26.5   Scheat   13°43.8   22.0   222°3.0   222°4.8   N14°33.3   103°35.9   N20°46.3   159°39.7   N20°21.7   268°52.3   N03°26.5   Scheat   13°43.8   22.0   222°3.3   24°40.0   223°3.3   24°40.0   223°3.3   24°40.0   223°3.3   24°40.0   223°3.3   24°40.0   223°3.3   24°40.0   223°3.3   24°40.0   223°3.3   24°40.0   223°3.3   24°40.0   223°3.3   24°40.0   223°3.3   24°40.0   223°3.3   24°40.0   223°3.3   24°40.0   24°40.	12	102°30.9	315°29.2	N15°02.4	40°24.9	N20°42.0	339° 16.8	N20°23.1	88°23.8	N03°26.2	1		-16°09.2
Aftares 112°14.0	13	117°33.4	330°29.0	01.4	55°25.5	42.4	354° 18.7	23.0	103°26.1	26.2			26° 37.6
15 147'38.3	14	132°35.8	345°28.7	15°00.3	70°26.1	42.8	9°20.6	22.9	118°28.5	26.3			-26°29.5
16 162*40.8 15*28.2 58.3 100*27.4 43.5 39*24.4 2.6 148*33.3 26.3 3.8 26.3 115*28.2 58.3 100*27.4 43.5 39*24.4 2.6 163*35.6 26.3 22.5 163*35.6 26.3 188*192*45.7 145*28.0 43.8 54*26.3 22.5 163*35.6 26.3 22.5 169*28.2 130*28.6 N20*42.2 69*28.2 N20*22.4 178*38.0 N03*26.4 26.4 21.2 23*65.1 190*31.0 45.6 129*35.8 22.0 20*8*42.8 26.4 21.2 23*65.5 105*26.8 52.1 190*31.0 45.6 129*35.8 22.0 20*8*42.8 26.4 21.2 23*65.5 105*26.8 52.1 190*31.0 45.6 129*35.8 22.0 23*8*47.5 26.5 24.5 24.5 24.5 24.5 24.5 24.5 24.5 24	15	147°38.3	0°28.5	14°59.3	85°26.7	• • 43.1	24°22.5	• • 22.8	133°30.9	• • 26.3			-20 29.5 -69°04.6
17 177'43.2 30'28.0 57.3 115'28.0 43.8 43'8.0 43.8 54'26.3 2.5 163'35.6 26.3 49.8 29.8 181 192'45.7 415'25.7 141'43.2 99'28.2 122'5 163'35.6 26.3 49.8 29.8 29.8 29.8 29.8 29.8 29.8 29.8 2	16	162°40.8	15°28.2	58.3	100°27.4	43.5	39°24.4	22.6	148°33.3	26.3			-15°45.5
181 192*45.7	17	177°43.2	30°28.0	57.3	115°28.0	43.8	54°26.3	22.5	163°35.6	26.3	1		-37°07.4
207 48.1 60°27.5 55.2 145°29.2 44.5 84°30.1 22.3 193°40.4 26.4 26.4 26.2 22°50.6 75°27.3 54.2 160°28. 44.9 99°32.0 22.2 22°28°42.8 26.4 21 23°63.1 90°27.0 · 53.1 175°30.4 · 45.3 114°33.9 · 22.1 23°45.1 · 26.4 21 23°65.1 · 26.4 22°25.5 105°26.8 52.1 190°31.0 45.6 129°35.8 22.0 238°47.5 26.5 26.5 28.6 22°25°55.5 105°26.8 52.1 190°31.0 45.6 129°35.8 22.0 238°47.5 26.5 28.6 22.0 23.8 22.0 238°47.5 26.5 28.6 22.0 23.8 22.0 238°47.5 26.5 28.6 22.0 23.8 22.0 238°47.5 26.5 28.6 22.0 23.8 22.0 23.0 23.0 23.0 23.0 23.0 23.0 23.0	18	192°45.7	45°27.7	N14°56.2	130°28.6	N20°44.2	69°28.2	N20°22.4	178°38.0	N03°26.4			12°32.5
222°55.5 1 9°27.0 53.1 17°30.4 v.45.3 114°33.9 v.22.1 23°45.1 v.26.4 Vega 80°32.0 38 Mer. pass. 05:11  v-0.3′ d-1.0′ m-4.07  v0.6′ d0.4′ m1.30  v1.9′ d-0.1′ m-1.81  v2.4′ d0.0′ m0.76  v3°32.0 38 Mer. pass. 05:11  v-0.3′ d-1.0′ m-4.07  v0.6′ d0.4′ m1.30  v1.9′ d-0.1′ m-1.81  v2.4′ d0.0′ m0.76  v3°32.3 26°58.0 136°26.8 138°26.3 N14°50.0 220°32.3 N20°46.3 159°39.7 N20°21.7 268°52.3 N03°25.5 26.5 Nunki 75°45.9 -26 Nunki 75°45.9 Nunki 75°45.9 -26 Nunki 75°45.9 Nunki 75°45.	19	207°48.1	60°27.5	55.2	145°29.2	44.5	84°30.1	22.3	193°40.4	26.4	_		51°29.1
222 252°55.5 105°26.8 52.1 190°31.0 45.6 129°25.8 22.0 238°47.5 26.5 46.6 223°25.5 105°26.8 52.1 190°31.0 45.6 129°25.8 22.0 238°47.5 26.5 46.6 23°25.5 105°26.8 52.1 190°31.0 45.6 129°25.8 22.0 238°47.5 26.5 46.6 23°25.8 46.7 120°26.5 51.1 205°31.6 46.0 144°37.7 21.8 253°49.9 26.5 46.6 46.6 46.0 144°37.7 21.8 253°49.9 26.5 46.6 46.0 144°37.7 21.8 253°49.9 26.5 46.6 46.0 144°37.7 21.8 253°49.9 26.5 46.6 144°37.7 21.8 253°49.9 26.5 46.6 144°37.7 21.8 253°49.9 26.5 46.6 144°37.7 21.8 253°49.9 26.5 46.6 144°37.7 21.8 253°49.9 26.5 46.6 144°37.7 21.8 253°49.9 26.5 46.6 13°52.6 3 144°50.0 220°32.3 120°46.3 159°39.7 120°21.7 266°52.3 103°26.5 46.6 26.5 26.5 26.9 26°02.9 150°26.0 49.0 235°32.9 46.7 174°41.6 21.6 283°54.6 26.5 26.6 26.5 270°24.1 4.0 256°34.1 4.7 4.7 4.0 204°45.4 21.4 313°59.4 2.6 4.6 26.6 26.6 26.5 270°24.1 4.4 295°35.3 48.1 234°49.2 21.1 344°04.1 26.6 27.8 28°17.7 240°24.6 42.8 325°36.5 48.8 264°53.0 20.9 14°08.9 26.7 24.0 40.7 40.7 355°37.8 49.9 309°58.7 20.6 59°16.0 26.8 49.0 235°3.9 10°38.4 49.9 309°58.7 20.6 59°16.0 26.8 49.0 237°0.2 255°4.3 41.8 340°37.1 49.1 279°54.9 20.8 29°11.3 26.7 54.1 188°27.6 300°23.6 38.7 25°39.0 50.2 325°00.6 20.4 74°18.4 26.8 40.2 213°31.0 11.8 8°27.6 300°23.6 38.7 25°39.0 50.2 325°00.6 20.4 74°18.4 26.8 40.2 213°31.0 11.8 8°27.6 300°23.6 38.7 25°39.0 50.2 325°00.6 340°02.5 100°23.1 285°23.9 39.7 10°38.4 49.9 309°58.7 20.6 59°16.0 26.8 40.1 11.8 8°27.6 300°23.6 38.7 25°39.0 50.2 325°00.6 340°02.5 10°32.2 26.8 340°32.2 26.8 340°32.2 32.4 115°42.7 52.3 55°12.0 19.8 164°32.7 26.9 46.7 340°52.1 22°25.8 44.9 11.9 30°47.3 10°06.3 20.1 119°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.9 14.1 11.9 10°25.5 26.	20	222°50.6	75°27.3	54.2	160°29.8	44.9	99°32.0	22.2	208°42.8	26.4			-34°22.3
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Mer.pass. 05:11	23	267°58.0	120°26.5	51.1	205°31.6	46.0	144°37.7	21.8	253°49.9	26.5			8°56.3
Company   Comp	1000	OF.11	0 3/ 4 1	0′ 4.07	0 6/ 40	4/ 1 20	1 0/ -/ 0	1/ 1 01	2 4/ 40	0′0 76	1		-56°38.8
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9 58°22.6 270°24.1 · · 40.7 355°37.8 · · 49.5 294°56.8 · · 20.7 44°13.6 · · 26.7 10 73°25.1 285°23.9 39.7 10°38.4 49.9 309°58.7 20.6 59°16.0 26.8 11 88°27.6 300°23.6 38.7 25°39.0 50.2 325°00.6 20.4 74°18.4 26.8 112 103°30.0 315°23.4 N14°37.6 40°39.6 N20°50.6 340°02.5 N20°20.3 89°20.8 N03°26.8 118°32.5 330°23.2 36.6 55°40.2 50.9 355°04.4 20.2 104°23.2 26.8 14 133°35.0 345°22.9 35.6 70°40.8 51.3 10°06.3 20.1 110°25.5 26.9 15 148°37.4 0°22.7 · · · 34.5 85°41.4 · · · 51.6 25°08.2 · · · 20.0 134°27.9 · · · 26.9 16 163°39.9 15°22.5 33.5 100°42.0 52.0 40°10.1 19.9 149°30.3 26.9 178°42.4 30°22.2 32.4 115°42.7 52.3 55°12.0 19.8 164°32.7 26.9 18 193°44.8 45°22.0 N14°31.4 130°43.3 N20°52.6 70°13.9 N20°19.6 179°35.0 N03°27.0 19 208°47.3 60°21.8 30.3 145°43.9 53.0 85°15.8 19.5 194°37.4 27.0 21 238°52.2 90°21.3 · · · 28.3 175°45.1 · · 53.7 115°19.6 · · 19.3 224°42.2 · · · · 27.0 21 238°52.2 90°21.3 · · · 28.3 175°45.1 · · 53.7 115°19.6 · · 19.3 224°42.2 · · · · · 27.0 21 238°52.2 253°54.7 105°21.1 27.2 190°45.7 54.0 130°21.5 19.2 239°44.6 27.1													13:20
10											Saturn	345°56.2	06:11
10 73 25.1 285 23.9 39.7 10 38.4 49.9 309 38.7 20.6 59 10.0 26.8 8 27.6 300°23.6 38.7 25°39.0 50.2 325°00.6 20.4 74°18.4 26.8 103°30.0 315°23.4 N14°37.6 40°39.6 N20°50.6 340°02.5 N20°20.3 89°20.8 N03°26.8 13 118°32.5 330°23.2 36.6 55°40.2 50.9 355°04.4 20.2 104°23.2 26.8 14 133°35.0 345°22.9 35.6 70°40.8 51.3 10°06.3 20.1 119°25.5 26.9 15 148°37.4 0°22.7 · · · 34.5 85°41.4 · · · 51.6 25°08.2 · · · 20.0 134°27.9 · · · 26.9 16 163°39.9 15°22.5 33.5 100°42.0 52.0 40°10.1 19.9 149°30.3 26.9 17 178°42.4 30°22.2 32.4 115°42.7 52.3 55°12.0 19.8 164°32.7 26.9 18 193°44.8 45°22.0 N14°31.4 130°43.3 N20°52.6 70°13.9 N20°19.6 179°35.0 N03°27.0 19 208°47.3 60°21.8 30.3 145°43.9 53.0 85°15.8 19.5 194°37.4 27.0 223°49.7 75°21.5 29.3 160°44.5 53.3 100°17.7 19.4 209°39.8 27.0 223°49.7 75°21.5 29.3 160°44.5 53.3 100°17.7 19.4 209°39.8 27.0 222 253°54.7 105°21.1 27.2 190°45.7 54.0 130°21.5 19.2 239°44.6 27.1 Venus: (190.5 Name of the companies of											Jul 0/1 Sa+	SHA	Mer.pas
11 88°27.0 300°23.6 38.7 25°39.0 50.2 325°00.6 20.4 74°18.4 26.8 122 103°30.0 315°23.4 N14°37.6 40°39.6 N20°50.6 340°02.5 N20°20.3 89°20.8 N03°26.8 13 118°32.5 330°23.2 36.6 55°40.2 50.9 355°04.4 20.2 104°23.2 26.8 14 133°35.0 345°22.9 35.6 70°40.8 51.3 10°06.3 20.1 119°25.5 26.9 15 148°37.4 0°22.7 · 34.5 85°41.4 · 51.6 25°08.2 · 20.0 134°27.9 · 26.9 16 163°39.9 15°22.5 33.5 100°42.0 52.0 40°10.1 19.9 149°30.3 26.9 178°42.4 30°22.2 32.4 115°42.7 52.3 55°12.0 19.8 164°32.7 26.9 18 193°44.8 45°22.0 N14°31.4 130°43.3 N20°52.6 70°13.9 N20°19.6 179°35.0 N03°27.0 19 208°47.3 60°21.8 30.3 145°43.9 53.0 85°15.8 19.5 194°37.4 27.0 223°49.7 75°21.5 29.3 160°44.5 53.3 100°17.7 19.4 209°39.8 27.0 223°49.7 75°21.5 29.3 160°44.5 53.3 100°17.7 19.4 209°39.8 27.0 223°554.7 105°21.1 27.2 190°45.7 54.0 130°21.5 19.2 239°44.6 27.1 Venus: (9 200°21.3 · 28.3 175°45.1 · 53.7 115°19.6 · 19.3 224°42.2 · 27.0 19.2 239°44.6 27.1													14:58
103 30.0 315 23.4 N14 37.6 40 39.6 N20 50.6 340 02.5 N20 20.3 89 20.8 N03 26.8   118 118 32.5 330°23.2 36.6 55°40.2 50.9 355°04.4 20.2 104°23.2 26.8   128 118°32.5 330°23.2 36.6 55°40.2 50.9 35.6 70°40.8 51.3 10°06.3 20.1 119°25.5 26.9   129 148°37.4 0°22.7 · 34.5 85°41.4 · 51.6 25°08.2 · 20.0 134°27.9 · 26.9   130°39.9 15°22.5 33.5 100°42.0 52.0 40°10.1 19.9 149°30.3 26.9   148°37.4 30°22.2 32.4 115°42.7 52.3 55°12.0 19.8 164°32.7 26.9   150 148°37.4 30°22.2 32.4 115°42.7 52.3 55°12.0 19.8 164°32.7 26.9   160 193°44.8 45°22.0 N14°31.4 130°43.3 N20°52.6 70°13.9 N20°19.6 179°35.0 N03°27.0   170 208°47.3 60°21.8 30.3 145°43.9 53.0 85°15.8 19.5 194°37.4 27.0   170 223°49.7 75°21.5 29.3 160°44.5 53.3 100°17.7 19.4 209°39.8 27.0   170 238°52.2 90°21.3 · 28.3 175°45.1 · 53.7 115°19.6 · 19.3 224°42.2 · 27.0   180 238°52.2 90°21.3 · 28.3 175°45.1 · 53.7 115°19.6 · 19.3 224°42.2 · 27.0   180 238°52.2 253°54.7 105°21.1 27.2 190°45.7 54.0 130°21.5 19.2 239°44.6 27.1   190 25.5 26.9   210 238°52.2 253°54.7 105°21.1 27.2 190°45.7 54.0 130°21.5 19.2 239°44.6 27.1   238°52.2 253°54.7 105°21.1 27.2 190°45.7 54.0 130°21.5 19.2 239°44.6 27.1   238°52.7 345°52.7 345°52.7 345°54.0   240 25°508.2 · 20.0 134°27.9 · 26.9   250 253°54.7 105°21.1 27.2 190°45.7 54.0 130°21.5 19.2 239°44.6 27.1													09:18
118 3.2.5 330 23.2 30.6 55 40.2 50.9 355 04.4 20.2 104 23.2 26.8 Saturn 345 54.0 114 133 3.5.0 345 22.9 35.6 70 40.8 51.3 10 06.3 20.1 119 25.5 26.9 128 37.4 0 22.7 34.5 85 41.4 51.6 25 08.2 20.0 134 27.9 26.9 16 163 39.9 15 22.5 33.5 100 42.0 52.0 40 10.1 19.9 149 30.3 26.9 178 42.4 30 22.2 32.4 115 42.7 52.3 55 12.0 19.8 164 32.7 26.9 18 193 44.8 45 22.0 N14 31.4 130 43.3 N20 52.6 70 13.9 N20 19.6 179 35.0 N03 27.0 19 208 47.3 60 21.8 30.3 145 43.9 53.0 85 15.8 19.5 194 37.4 27.0 20 223 49.7 75 21.5 29.3 160 44.5 53.3 100 17.7 19.4 209 39.8 27.0 21 238 52.2 90 21.3 28.3 175 45.1 53.7 115 19.6 19.6 19.3 224 42.2 27.0 19.8 Horizontal parallax 22 253 54.7 105 21.1 27.2 190 45.7 54.0 130 21.5 19.2 239 44.6 27.1													13:23
14 13 3 3 3 .0 345 22.9 3 3 .0 70 40 .8 5 1 .3 10 06 .3 20 .1 119 25 .5 26 .9 15 148° 37 .4 0° 22 .7 · · · 34 .5 85° 41 .4 · · · 51 .6 25° 08 .2 · · · 20 .0 134° 27 .9 · · · 26 .9 16 ° 39 .9 15° 22 .5 3 3 .5 100° 42 .0 52 .0 40° 10 .1 19 .9 149° 30 .3 26 .9 17 178° 42 .4 30° 22 .2 32 .4 115° 42 .7 52 .3 55° 12 .0 19 .8 164° 32 .7 26 .9 18 193° 44 .8 45° 22 .0 N14° 31 .4 130° 43 .3 N20° 52 .6 70° 13 .9 N20° 19 .6 179° 35 .0 N03° 27 .0 19 208° 47 .3 60° 21 .8 30 .3 145° 43 .9 53 .0 85° 15 .8 19 .5 194° 37 .4 27 .0 20 223° 49 .7 75° 21 .5 29 .3 160° 44 .5 53 .3 100° 17 .7 19 .4 209° 39 .8 27 .0 21 238° 52 .2 90° 21 .3 · · · 28 .3 175° 45 .1 · · · 53 .7 115° 19 .6 · · 19 .3 224° 42 .2 · · · 27 .0 22 253° 54 .7 105° 21 .1 27 .2 190° 45 .7 54 .0 130° 21 .5 19 .2 239° 44 .6 27 .1													06:07
16       163°39.9       15°22.5       33.5       100°42.0       52.0       40°10.1       19.9       149°30.3       26.9       Venus       212°25.8         17       178°42.4       30°22.2       32.4       115°42.7       52.3       55°12.0       19.8       164°32.7       26.9       Mars       297°31.8         18       193°44.8       45°22.0       N14°31.4       130°43.3       N20°52.6       70°13.9       N20°19.6       179°35.0       N03°27.0       Jupiter       236°39.2         19       208°47.3       60°21.8       30.3       145°43.9       53.0       85°15.8       19.5       194°37.4       27.0       Saturn       345°51.8         20       223°49.7       75°21.5       29.3       160°44.5       53.3       100°17.7       19.4       209°39.8       27.0         21       238°52.2       90°21.3       28.3       175°45.1       53.7       115°19.6       19.3       224°42.2       27.0       Horizontal parallax         22       253°54.7       105°21.1       27.2       190°45.7       54.0       130°21.5       19.2       239°44.6       27.1       40°2.1       Venus:       0											Jatuill		00.07
16 163°39.9 15°22.5 33.5 100°42.0 52.0 40°10.1 19.9 149°30.3 26.9 Venus 212°25.8 17 178°42.4 30°22.2 32.4 115°42.7 52.3 55°12.0 19.8 164°32.7 26.9 Mars 297°31.8 193°44.8 45°22.0 N14°31.4 130°43.3 N20°52.6 70°13.9 N20°19.6 179°35.0 N03°27.0 Venus 212°25.8 30.3 145°43.9 53.0 85°15.8 19.5 194°37.4 27.0 223°49.7 75°21.5 29.3 160°44.5 53.3 100°17.7 19.4 209°39.8 27.0 21 238°52.2 90°21.3 28.3 175°45.1 53.7 115°19.6 19.3 224°42.2 27.0 Venus 212°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 21.0 Venus 212°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 21.0 Venus 22°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 21.0 Venus 22°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 21.0 Venus 212°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 21.0 Venus 212°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 21.0 Venus 212°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 21.0 Venus 212°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 21.0 Venus 212°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 21.0 Venus 212°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 21.0 Venus 212°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 21.0 Venus 212°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 21.0 Venus 212°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 21.0 Venus 212°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 21.0 Venus 212°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 21.0 Venus 212°25.8 Mars 297°31.8 Jupiter 236°39.2 Saturn 345°51.8 Jupiter 236°39.2 Satu											Jul 05 Sun	SHA	Mer.pass
17 178°42.4 30°22.2 32.4 115°42.7 52.3 55°12.0 19.8 164°32.7 26.9 18 193°44.8 45°22.0 N14°31.4 130°43.3 N20°52.6 70°13.9 N20°19.6 179°35.0 N03°27.0 19 208°47.3 60°21.8 30.3 145°43.9 53.0 85°15.8 19.5 194°37.4 27.0 20 223°49.7 75°21.5 29.3 160°44.5 53.3 100°17.7 19.4 209°39.8 27.0 21 238°52.2 90°21.3 · · 28.3 175°45.1 · · 53.7 115°19.6 · · 19.3 224°42.2 · · · 27.0 22 253°54.7 105°21.1 27.2 190°45.7 54.0 130°21.5 19.2 239°44.6 27.1    Mars 297°31.8     Jupiter 236°39.2     Saturn 345°51.8     Horizontal parallax     Venus: (1)													14:58
19											Mars	297°31.8	09:17
19											Jupiter	$236^{\circ}39.2$	13:20
20 223°49.7 75°21.5 29.3 160°44.5 53.3 100°17.7 19.4 209°39.8 27.0 21 238°52.2 90°21.3 ··· 28.3 175°45.1 ··· 53.7 115°19.6 ··· 19.3 224°42.2 ··· 27.0 22 253°54.7 105°21.1 27.2 190°45.7 54.0 130°21.5 19.2 239°44.6 27.1 Venus: (							85° 15.8						06:04
22 253°54.7 105°21.1 27.2 190°45.7 54.0 130°21.5 19.2 239°44.6 27.1 Venus:													
100 0 111 100 1111 1110 1011 1010 101											Horizont	•	
23 268°57.1 120°20.9 26.2 205°46.3 54.4 145°23.4 19.1 254°46.9 27.1 Mars: (													0.1
	23	268°57.1	120°20.9	26.2	205°46.3	54.4	145°23.4	19.1	254°46.9	27.1		Mars:	0.1

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°57.4	N22°58.4	323°45.9	13.7'	S17°54.3	-11.5'	54.9'
1 2	193°57.3 208°57.1	58.2 58.0	338°18.5 352°51.2	13.7' 13.8'	17°42.8 17°31.3	-11.5' -11.6'	54.9' 54.9'
3	223°57.0	• • 57.8	7°24.0	13.8'	17°19.6	-11.7'	54.9'
4	238°56.9	57.6	21°56.8	13.8'	17°08.0	-11.8'	55.0'
5	253°56.8 268°56.7	57.4	36°29.6 51°02.5	13.9'	16°56.2 \$16°44.3	-11.9'	55.0'
6 7	268°56.7 283°56.6	N22°57.2 57.0	65°35.5	13.9' 14.0'	16°32.4	-11.9' -12.0'	55.0' 55.0'
8	298°56.5	56.8	80°08.5	14.0'	16°20.4	-12.1'	55.0'
9	313°56.3	• • 56.6	94°41.5	14.1'	16°08.3	-12.2'	55.0'
10 11	328°56.2 343°56.1	56.4 56.2	109°14.5 123°47.7	14.1' 14.2'	15°56.1 15°43.9	-12.2' -12.3'	55.1' 55.1'
12	358°56.0	N22° 56.0	138°20.8	14.2'	\$15°31.6	-12.4	55.1
13	13°55.9	55.8	$152^{\circ}54.0$	14.2'	$15^{\circ}19.2$	-12.4'	55.1'
14	28°55.8 43°55.7	55.6	167°27.2 182°00.5	14.3' 14.3'	15°06.8 14°54.2	-12.5'	55.1' 55.2'
15 16	43 55.7 58°55.5	· · 55.3 55.1	182 00.5 196°33.8	14.3 14.4'	14 54.2 14°41.7	-12.6' -12.7'	55.2'
17	73°55.4	54.9	211°07.2	14.4'	14°29.0	-12.7'	55.2'
18	88°55.3	N22°54.7	225°40.6	14.4'	S14°16.3	-12.8'	55.2'
19 20	103°55.2 118°55.1	54.5 54.3	240°14.0 254°47.5	14.5' 14.5'	14°03.5 13°50.6	-12.9' -12.9'	55.2' 55.3'
21	133°55.0	• • 54.1	269°21.0	14.5'	13°37.7	-12.9 -13.0'	55.3'
22	148°54.9	53.9	283°54.5	14.6'	$13^{\circ}24.7$	-13.1'	55.3'
23	163°54.8	53.7	298°28.0	14.6'	13°11.7	-13.1'	55.3'
	SD = 15.7'	d = -0.2'		SE	O = 15.0'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0	178°54.6	N22°53.4	$313^{\circ}01.6$	14.6'	S12°58.5	-13.2'	55.3'
1	193°54.5	53.2	327°35.3	14.7'	12°45.4	-13.2'	55.4'
2	208°54.4 223°54.3	53.0 •• 52.8	342°08.9 356°42.6	14.7' 14.7'	12°32.1 12°18.8	-13.3' -13.4'	55.4' 55.4'
4	238°54.2	52.6	11°16.3	14.7'	12°05.5	-13.4'	55.4'
5	253°54.1	52.4	25°50.1	14.8'	11°52.1	-13.5'	55.4'
6	268°54.0 283°53.9	N22°52.1 51.9	40°23.8 54°57.6	14.8' 14.8'	\$11°38.6 11°25.1	-13.5' -13.6'	55.5' 55.5'
7 8	283 53.9 298°53.8	51.9 51.7	69°31.5	14.8	11 25.1 11°11.5	-13.6'	55.5'
9	313°53.6	• 51.5	84°05.3	14.9'	10°57.8	-13.7'	55.5'
10	328°53.5	51.3	98°39.2	14.9'	10°44.1	-13.8'	55.5'
11 12	343°53.4 358°53.3	51.0 N22°50.8	113°13.1 127°47.0	14.9' 14.9'	10°30.4 \$10°16.6	-13.8' -13.9'	55.6' 55.6'
13	13°53.2	50.6	142°20.9	15.0'	10°02.7	-13.9'	55.6'
14	28°53.1	50.4	156°54.9	15.0'	09°48.8	-14.0'	55.6'
15 16	43°53.0 58°52.9	· · 50.1 49.9	171°28.9 186°02.9	15.0' 15.0'	09°34.9 09°20.9	-14.0' -14.1'	55.7' 55.7'
17	73°52.8	49.7	200°36.9	15.0'	09°26.8	-14.1'	55.7'
18	88°52.6	N22°49.5	215°10.9	15.0'	S08°52.7	-14.1'	55.7'
19 20	103°52.5 118°52.4	49.2 49.0	229°45.0 244°19.0	15.1'	08°38.6 08°24.4	-14.2' -14.2'	55.8' 55.8'
21	133°52.3	· · 48.8	258°53.1	15.1'	08°10.1	-14.2 -14.3'	55.8'
22	148°52.2	48.5	273°27.2	15.1'	07°55.8	-14.3'	55.8'
23	163°52.1	48.3	288°01.3	15.1'	07°41.5	-14.4'	55.9'
	SD = 15.7'	d = -0.2'		SE	O = 15.1'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°52.0	N22°48.1	302°35.4	15.1'	507°27.1	-14.4'	55.9'
1 2	193°51.9 208°51.8	47.8 47.6	317°09.5 331°43.6	15.1' 15.1'	07°12.7 06°58.3	-14.5' -14.5'	55.9' 55.9'
3	223°51.7	• • 47.4	$346^{\circ}17.7$	15.1'	06°43.8	-14.5'	56.0'
4	238°51.6	47.2	0°51.8	15.1'	06°29.3	-14.6'	56.0'
5 6	253°51.4 268°51.3	46.9 N22°46.7	15°26.0 30°00.1	15.1' 15.1'	06°14.7 506°00.1	-14.6' -14.6'	56.0' 56.0'
7	283°51.2	46.4	44°34.2	15.1	05°45.4	-14.7	56.1
8	298°51.1	46.2	59°08.4	15.1'	05°30.7	-14.7'	56.1'
9 10	313°51.0 328°50.9	· · 46.0 45.7	73°42.5 88°16.6	15.1' 15.1'	05°16.0 05°01.3	-14.7' -14.8'	56.1' 56.1'
10	328 50.9 343°50.8	45.7 45.5	88 16.6 102°50.8	15.1' 15.1'	05 01.3 04°46.5	-14.8' -14.8'	56.2
12	358°50.7	N22°45.3	117°24.9	15.1'	S04°31.7	-14.8'	56.2'
13	13°50.6	45.0	131°59.0	15.1'	04°16.8 04°02.0	-14.9'	56.2'
14 15	28°50.5 43°50.4	44.8 •• 44.5	146°33.1 161°07.3	15.1' 15.1'	04°02.0 03°47.1	-14.9' -14.9'	56.2' 56.3'
16	58°50.3	44.3	$175^{\circ}41.4$	15.1'	$03^{\circ}32.1$	-15.0'	56.3'
17	73°50.2	44.0	190°15.4	15.1'	03°17.2	-15.0'	56.3'
18 19	88°50.1 103°49.9	N22°43.8 43.6	204°49.5 219°23.6	15.1' 15.1'	\$03°02.2 02°47.1	-15.0' -15.0'	56.3' 56.4'
20	118°49.8	43.3	219 23.0 233°57.6	15.1	02°32.1	-15.1'	56.4
21	133°49.7	• • 43.1	248°31.7	15.0'	02°17.0	-15.1'	56.4'
22 23	148°49.6 163°49.5	42.8 42.6	263°05.7 277°39.7	15.0' 15.0'	02°01.9 01°46.8	-15.1' -15.1'	56.5' 56.5'
23	$\frac{103 \text{ 49.5}}{\text{SD} = 15.7'}$	d = -0.2'	211 39.1		$01 \ 40.8$ 0 = 15.2'	-13.1	50.5
	2D — 13.1	u — -0.2		ЭL	<i>J</i> — 13.∠		

Lat.	Twilight		Sunrise	Sunset	Twilight		
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.	
N 72°							
<b>N</b> 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	
<b>N</b> 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	

Lat.		Moonris	e		Moonset	:
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 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
N 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
N 40°	21:51	22:14	22:36	07:41	08:45	09:49
35°	21:43	22:09	22:34	07:51	08:52	09:52
30°	21:36	22:05	22:34	08:00	08:57	09:55
20°	21:24	21:58	22:32	08:15	09:07	09:59
N 10°	21:13	21:52	22:30	08:28	09:16	10:03
0°	21:03	21:46	22:29	08:40	09:24	10:07
<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

		Sun		Moon			
Day	Eqn.of 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	92-78%	
03	04:10	04:16	12:04	02:29	14:52		
04	04:21	04:27	12:04	03:14	15:35		
05	04:32	04:37	12:05	03:56	16:18		

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Mon -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Doc
Mon	283°59.6		N14°25.1				N20° 18.9		N03°27.1			Dec
0 1	283 59.0 299°02.1	135°20.6 150°20.4		220°46.9 235°47.5	N20°54.7 55.1	160°25.3 175°27.2		269°49.3 284°51.7		Alpheratz	357°33.4	29°14.1
2	299 02.1 314°04.5	165° 20.2	24.1 23.0	250°48.2	55.1 55.4	175 27.2 190°29.1	18.8 18.7	284 51.7 299°54.1	27.1 27.1	Ankaa	353°05.9	-42°09.4
3	314 04.5 329°07.0			265°48.8	. 55.8	205°31.0	18.6	299 54.1 314°56.4	27.1	Schedar	$349^{\circ}29.6$	56°40.8
3 4	344°09.5	180° 20.0 195° 19.7	· · 22.0 20.9	280°49.4	56.1	205 31.0 220°32.9	18.5	329°58.8	27.2	Diphda	348°46.0	-17°50.3
5	359°11.9	210° 19.5	19.9	295°50.0	56.5	235°34.8	18.4	345°01.2	27.2	Achernar	$335^{\circ}19.4$	-57°05.8
6	14°14.4	210 19.3 225° 19.3	N14°18.9	310°50.6	N20°56.8	250°36.7	N20° 18.2	0°03.6	N03°27.2	Hamal	327°49.9	23°35.2
7	29°16.9	240° 19.1	17.8	325°51.2	57.1	265°38.6	18.1	15°06.0	27.3	Polaris	313°39.7	89°22.3
8	44°19.3	255° 18.8	16.8	340°51.8	57.5	280°40.5	18.0	30°08.3	27.3	Acamar	$315^{\circ}11.1$	-40°11.6
9	59°21.8	270° 18.6	15.7	355°52.4	• • 57.8	295°42.4	17.9	45°10.7	27.3	Menkar	314°05.0	4°11.7
10	74°24.2	285° 18.4	14.7	10°53.0	58.2	310°44.3	17.8	60°13.1	27.3	Mirfak		49°57.1
11	89°26.7	300°18.2	13.6	25°53.7	58.5	325°46.2	17.7	75°15.5	27.4	Aldebaran	290°38.5	16°33.7
12	104°29.2	315° 18.0	N14°12.6	40°54.3	N20°58.9	340°48.1	N20° 17.5	90°17.9	N03°27.4	Rigel	281°03.0	-8°10.2
13	119°31.6	330° 17.7	11.5	55°54.9	59.2	355°50.0	17.4	105°20.2	27.4	Capella	280°20.5	46°01.4
14	134°34.1	345° 17.5	10.5	70°55.5	59.5	10°51.9	17.3	120°22.6	27.4	Bellatrix	278°21.9	6°22.4
15	149°36.6	0°17.3	09.4	85°56.1	20°59.9	25°53.8	17.2	135°25.0	27.4	Elnath	278°00.7	28°37.7
16	164°39.0	15° 17.1	08.3	100°56.7	21°00.2	40°55.7	17.1	150°27.4	27.5	Alnilam	275°36.8	-1°11.1
17	179°41.5	30° 16.9	07.3	115°57.3	00.6	55°57.6	17.0	165°29.8	27.5	Betelgeuse	270°51.1	7°24.7
18	194°44.0	45° 16.7	N14°06.2	130°57.9	N21°00.9	70°59.5	N20°16.8	180°32.2	N03°27.5	Canopus	263°52.4	-52°42.5
19	209°46.4	60° 16.5	05.2	145°58.5	01.2	86°01.4	16.7	195°34.5	27.5	Sirius	258°25.5	-16°45.1
20	224°48.9	75° 16.2	04.1	160°59.2	01.6	101°03.3	16.6	210°36.9	27.6	Adhara	255°05.3	-29°00.4
21	239°51.3	90°16.0	• • 03.1	175°59.8	• • 01.9	116°05.2	· · 16.5	225°39.3	27.6	Procyon	244°49.9	5°09.4
22	254°53.8	105° 15.8	02.0	191°00.4	02.3	131°07.1	16.4	240°41.7	27.6	Pollux	243°16.2	27°57.8
23	269°56.3	120° 15.6	01.0	206°01.0	02.6	146°09.0	16.3	255°44.1	27.6	Avior	234°14.9	-59°35.7
										Suhail	222°45.8	-43°32.5
Mer.p	ass. 05:03	$\nu$ -0.2′ d-1	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	Miaplacidus	221°38.8	-69°49.7
				•						Alphard	217°46.8	-8°46.4
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.4	11°50.3
0	284°58.7	135° 15.4	N13°59.9	221°01.6	N21°02.9	161°10.9	N20° 16.1	270°46.4	N03°27.6	Dubhe	193°39.8	61°36.7
1	300°01.2	150° 15.2	58.8	236°02.2	03.3	176°12.8	16.0	285°48.8	27.7	Denebola	182°23.8	14°25.5
2	315°03.7	165° 15.0	57.8	251°02.8	03.6	191°14.7	15.9	300°51.2	27.7	Gienah	175°42.4	-17°41.5
3	330°06.1	180° 14.8	56.7	266°03.4	04.0	206°16.6	. 15.8	315°53.6	• • 27.7		172°58.8	-63°15.1
4	345°08.6	195° 14.6	55.7	281°04.0	04.3	221°18.5	15.7	330°56.0	27.7		171°50.3	-57°16.0
5	0°11.1	210°14.4	54.6	296°04.7	04.6	236°20.4	15.5	345°58.4	27.7		166°11.9	55°49.2
6	15°13.5	225° 14.1	N13°53.5	311°05.3	N21°05.0	251°22.3	N20° 15.4	1°00.7	N03°27.8		158°20.9	-11°18.1
7	30°16.0	240° 13.9	52.5	326°05.9	05.3	266°24.2	15.3	16°03.1	27.8	Alkaid	152°50.9	49°11.1
8	45°18.5	255° 13.7	51.4	341°06.5	05.6	281°26.1	15.2	31°05.5	27.8	Hadar	148°34.0	-60°30.3
9	60°20.9	270° 13.5	50.4	356°07.1	06.0	296°28.0	. 15.1	46°07.9	27.8		147°56.0	-36°30.2
10	75°23.4	285° 13.3	49.3	11°07.7	06.3	311°29.9	15.0	61°10.3	27.9	Arcturus	145°46.7	19°02.7
11	90°25.8	300°13.1	48.2	26°08.3	06.6	326°31.8	14.8	76°12.7	27.9	Rigil Kent.		-60°57.0
12	105°28.3	315°12.9	N13°47.2	41°08.9	N21°07.0	341°33.7	N20° 14.7	91°15.0	N03°27.9	Kochab	137°19.2	74°03.0
13	120°30.8	330° 12.7	46.1	56°09.5	07.3	356°35.6	14.6	106°17.4	27.9	Zuben'ubi	136°54.5	-16°09.2
14	135°33.2	345° 12.5	45.0	71°10.2	07.6	11°37.5	14.5	121°19.8	27.9	Alphecca	126°02.4	26°37.6
15	150°35.7	0°12.3	• • 44.0	86°10.8	08.0	26°39.4	• • 14.4	136°22.2	28.0	Antares	112°14.0	-26°29.5
16	165°38.2	15° 12.1	42.9	101°11.4	08.3	41°41.2	14.3	151°24.6	28.0	Atria	107°06.6	-69°04.6
17	180°40.6	30°11.9	41.8	116°12.0	08.6	56°43.1	14.1	166°27.0	28.0	Sabik		-15°45.5
18	195°43.1	45° 11.7	N13°40.8	131°12.6	N21°09.0	71°45.0	N20°14.0	181°29.4	N03°28.0	Shaula	96°08.3	-37°07.4 12°32.5
19	210°45.6	$60^{\circ}11.5$	39.7	146°13.2	09.3	86°46.9	13.9	196°31.7	28.0	Rasalhague	95°57.1	
20	225°48.0	75°11.3	38.6	161°13.8	09.6	101°48.8	13.8	211°34.1	28.1	Eltanin	90°41.1	51°29.2 -34°22.3
21	240°50.5	90°11.1	• • 37.6	176°14.4	• • 10.0	116°50.7	• • 13.7	226°36.5	28.1	Kaus Aust. Vega	83°30.5 80°32.0	-34 22.3 38°48.5
22	255°53.0	105° 10.9	36.5	191°15.0	10.3	131°52.6	13.5	241°38.9	28.1	Nunki	75°45.8	-26°15.8
23	270°55.4	120° 10.7	35.4	206°15.6	10.6	146°54.5	13.4	256°41.3	28.1	Altair	61°58.4	8°56.3
N 4	04.50	0.0/ / 1	1/ 4.00	0.6/ 10	2/ 1.20	1.0/ 1.0	1/ 1.00	0.4/ 10	0/ 0.75	Peacock	53°03.2	-56°38.8
ivier.p	ass. 04:59	$\nu$ -0.2 a-1	1′ m-4.08	$\nu$ 0.6° $a$ 0	.3′ m1.30	$\nu_{1.9}$ a-0	.1′ m-1.80	$\nu$ 2.4 au	.0′ m0.75	Deneb	49°24.5	45°22.4
										Enif	33°37.3	9°59.8
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.0	-46°49.7
0	285°57.9	135° 10.5	N13°34.4	221°16.3	N21°10.9	161°56.4	N20° 13.3	271°43.7	N03°28.1	Fomalhaut	15°13.0	-40° 49.7 -29° 28.7
1	301°00.3	$150^{\circ}10.4$	33.3	$236^{\circ}16.9$	11.3	176°58.3	13.2	$286^{\circ}46.1$	28.2	Scheat	13°43.8	28°13.5
2	316°02.8	165° 10.2	32.2	251°17.5	11.6	192°00.2	13.1	301°48.4	28.2	Markab	13°28.5	15°20.9
3	331°05.3	$180^{\circ}10.0$	• • 31.2	$266^{\circ}18.1$	• • 11.9	207°02.1	• • 13.0	$316^{\circ}50.8$	• • 28.2	ividikab		15 20.5
4	346°07.7	$195^{\circ}09.8$	30.1	$281^{\circ}18.7$	12.3	222°04.0	12.8	$331^{\circ}53.2$	28.2	Jul 06 Mon	SHA	Mer.pass
5	1°10.2	$210^{\circ}09.6$	29.0	$296^{\circ}19.3$	12.6	237°05.9	12.7	$346^{\circ}55.6$	28.2		211°21.0	14:59
6	16°12.7	225°09.4	N13°27.9	311°19.9	N21°12.9	252°07.8	N20°12.6	1°58.0	N03°28.3		296°47.3	09:16
7	$31^{\circ}15.1$	240°09.2	26.9	$326^{\circ}20.5$	13.2	267°09.7	12.5	$17^{\circ}00.4$	28.3		236°25.7	13:17
8	46°17.6	255°09.0	25.8	$341^{\circ}21.1$	13.6	282°11.6	12.4	$32^{\circ}02.8$	28.3	Saturn	345°49.7	06:00
9	61°20.1	270°08.8	• • 24.7	$356^{\circ}21.7$	• • 13.9	297°13.5	•• 12.2	47°05.2	• • 28.3	Jul 07 Tue	SHA	Mor pass
10	76°22.5	285°08.6	23.6	11°22.4	14.2	312°15.4	12.1	$62^{\circ}07.5$	28.3		210°16.7	Mer.pass 14:59
11	91°25.0	300°08.5	22.6	26°23.0	14.5	327°17.3	12.0	77°09.9	28.4		210 10.7 296°02.9	09:16
12	106°27.4	315°08.3	N13°21.5	41°23.6	N21°14.9	342°19.2	N20°11.9	92°12.3	N03°28.4		236°12.1	13:14
13	121°29.9	330°08.1	20.4	56°24.2	15.2	357°21.1	11.8	107°14.7	28.4		345°47.7	05:56
14	136°32.4	345°07.9	19.3	71°24.8	15.5	12°23.0	11.6	122°17.1	28.4	Jatuill	J.J 71.1	03.30
15	151°34.8	0°07.7	• • 18.3	86°25.4	•• 15.8	27°24.9	• • 11.5	137° 19.5	• • 28.4	Jul 08 Wed	SHA	Mer.pass
16	166°37.3	15° 07.5	17.2	101°26.0	16.2	42°26.8	11.4	152°21.9	28.5		$209^{\circ}12.7$	14:59
17	181°39.8	30°07.4	16.1	116°26.6	16.5	57°28.7	11.3	167°24.3	28.5		$295^{\circ}18.4$	09:15
18	196°42.2	45°07.2	N13°15.0	131°27.2	N21°16.8	72°30.6	N20°11.2	182°26.6	N03°28.5	Jupiter	$235^{\circ}58.6$	13:11
19	211°44.7	60°07.0	13.9	146°27.9	17.1	87°32.5	11.1	197°29.0	28.5	Saturn	$345^{\circ}45.8$	05:52
20	226°47.2	75°06.8	12.9	161°28.5	17.5	102°34.4	10.9	212°31.4	28.5	11. 1	al me!!	
21	241°49.6	90°06.6	• • 11.8	176°29.1	• • 17.8	117°36.3	• • 10.8	227°33.8	• • 28.5	Horizont	al parallax	0.1
22	256°52.1	105°06.5	10.7	191°29.7	18.1	132°38.2	10.7	242°36.2	28.6		Venus:	0.1
23	271°54.6	120°06.3	09.6	206°30.3	18.4	147°40.1	10.6	257°38.6	28.6		Mars:	0.1
Mern	ass. 04:55	$\nu$ -0.2' d-1	.1′ m-4.09	$\nu_{0.6'} d0$	.3′ m1.30	ν1.9' d-0	.1′ m-1.80	$\nu$ 2.4' d0	0′ m0.75			
								2. 0				

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°49.4	N22°42.3	292°13.7	15.0'	S01°31.7	-15.2'	56.5'
1 2	193°49.3 208°49.2	42.1 41.8	306°47.6 321°21.6	14.9' 14.9'	01°16.5 01°01.4	-15.2' -15.2'	56.5' 56.6'
3	208 49.2 223°49.1	• • 41.6	321 21.0 335°55.5	14.9'	01 01.4 00°46.2	-15.2'	56.6'
4	238°49.0	41.3	350°29.4	14.9'	00°31.0	-15.2'	56.6'
5	253°48.9	41.1	5°03.3	14.8'	00°15.7	-15.2'	56.7'
6 7	268°48.8 283°48.7	N22°40.8 40.6	19°37.1 34°10.9	14.8' 14.8'	S00°00.5 N00°14.8	-15.3' 15.3'	56.7' 56.7'
8	298°48.6	40.0	48°44.7	14.8	00°30.0	15.3	56.7'
9	313°48.5	• • 40.1	63°18.5	14.7'	00°45.3	15.3'	56.8'
10	328°48.4	39.8	77°52.2	14.7'	01°00.6	15.3'	56.8'
11 12	343°48.3 358°48.2	39.6 N22°39.3	92°25.9 106°59.6	14.7' 14.6'	01°15.9 N01°31.2	15.3' 15.3'	56.8' 56.9'
13	13°48.1	39.0	100 33.0 121°33.2	14.6'	01°46.6	15.3'	56.9
14	28°48.0	38.8	$136^{\circ}06.8$	14.5'	$02^{\circ}01.9$	15.3'	56.9'
15	43°47.9	• • 38.5	150°40.3	14.5'	02°17.3	15.3'	56.9'
16 17	58°47.7 73°47.6	38.3 38.0	165°13.8 179°47.3	14.5' 14.4'	02°32.6 02°48.0	15.4' 15.4'	57.0' 57.0'
18	88°47.5	N22°37.8	194°20.7	14.4'	N03°03.3	15.4	57.0'
19	103°47.4	37.5	$208^{\circ}54.1$	14.3'	03°18.7	15.4'	57.1'
20	118°47.3 133°47.2	37.2	223°27.4	14.3'	03°34.0	15.4	57.1'
21 22	133°47.2 148°47.1	· · 37.0 36.7	238°00.7 252°33.9	14.2' 14.2'	03°49.4 04°04.8	15.4' 15.4'	57.1' 57.2'
23	163°47.0	36.4	267°07.1	14.1'	04°04.0	15.4'	57.2'
	SD = 15.7'	d = -0.2'		SI	D = 15.4'		
					10.4		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°46.9 193°46.8	N22°36.2 35.9	281°40.3 296°13.3	14.1' 14.0'	N04°35.5 04°50.8	15.4' 15.4'	57.2' 57.3'
2	208°46.7	35.6	310°46.4	14.0'	05°06.2	15.3'	57.3'
3	223°46.6	• • 35.4	$325^{\circ}19.4$	13.9'	$05^{\circ}21.5$	15.3'	57.3'
4	238°46.5	35.1	339°52.3	13.9'	05°36.9	15.3'	57.3'
5 6	253°46.4 268°46.3	34.8 N22°34.6	354°25.1 8°57.9	13.8' 13.7'	05°52.2 N06°07.5	15.3' 15.3'	57.4' 57.4'
7	283°46.2	34.3	23°30.7	13.7'	06°22.8	15.3'	57.4
8	298°46.1	34.0	38°03.4	13.6'	$06^{\circ}38.1$	15.3'	57.5'
9	313°46.0	• • 33.8	52°36.0	13.6'	06°53.4	15.3'	57.5'
10 11	328°45.9 343°45.8	33.5 33.2	67°08.5 81°41.0	13.5' 13.4'	07°08.7 07°24.0	15.3' 15.2'	57.5' 57.6'
12	358°45.7	N22°33.0	96°13.4	13.3'	N07°39.2	15.2'	57.6'
13	13°45.6	32.7	110°45.8	13.3'	07°54.4	15.2'	57.6'
14 15	28°45.5 43°45.4	32.4 · · 32.1	125°18.1 139°50.3	13.2' 13.1'	08°09.6 08°24.8	15.2' 15.2'	57.7' 57.7'
16	58°45.3	31.9	154°22.4	13.1'	08°40.0	15.1'	57.7'
17	73°45.2	31.6	$168^{\circ}54.5$	13.0'	08°55.1	15.1'	57.8'
18	88°45.1 103°45.0	N22°31.3	183°26.4 197°58.3	12.9'	N09°10.2 09°25.3	15.1'	57.8'
19 20	103 45.0 118°44.9	31.0 30.8	212°30.2	12.8' 12.7'	09 25.3 09°40.4	15.1' 15.0'	57.8' 57.9'
21	133°44.8	30.5	227°01.9	12.7'	09°55.4	15.0'	57.9'
22	148°44.7	30.2	241°33.6	12.6'	10°10.4	15.0'	57.9'
23	163°44.6	29.9	256°05.1	12.5'	10°25.4	14.9'	58.0'
	SD = 15.7'	d = -0.3'		SI	O = 15.6'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°44.5	N22°29.6	270°36.6	12.4'	N10°40.3	14.9'	58.0'
1	193°44.4	29.4	285°08.0	12.3'	10°55.2	14.9'	58.0'
2	208°44.3 223°44.2	29.1 •• 28.8	299°39.4 314°10.6	12.2' 12.1'	11°10.1 11°24.9	14.8' 14.8'	58.1' 58.1'
4	238°44.1	28.5	328°41.7	12.1	11°24.9 11°39.7	14.8	58.1
5	253°44.0	28.2	343°12.8	12.0'	11°54.5	14.7'	58.2'
6	268°43.9 283°43.8	N22°27.9 27.7	357°43.7 12°14.6	11.9' 11.8'	N12°09.2 12°23.9	14.7'	58.2' 58.2'
7 8	283°43.8 298°43.7	27.7 27.4	12°14.6 26°45.3	11.8	12°23.9 12°38.5	14.6' 14.6'	58.2 58.3'
9	313°43.7	• • 27.1	41°16.0	11.6'	12°53.1	14.5	58.3
10	328°43.6	26.8	55°46.6	11.5'	13°07.6	14.5'	58.3'
11 12	343°43.5 358°43.4	26.5 N22°26.2	70°17.0 84°47.4	11.4' 11.3'	13°22.1 N13°36.6	14.4' 14.4'	58.4' 58.4'
13	13°43.3	25.9	99°17.7	11.3	13°50.9	14.4	58.4'
14	28°43.2	25.6	113°47.8	11.1'	14°05.3	14.3'	58.5'
15	43°43.1	• • 25.4	128°17.9	10.9'	14°19.5	14.2'	58.5'
16 17	58°43.0 73°42.9	25.1 24.8	142°47.8 157°17.6	10.8' 10.7'	14°33.8 14°47.9	14.2' 14.1'	58.5' 58.6'
18	88°42.8	N22° 24.5	171°47.4	10.7	N15°02.0	14.1	58.6
19	103°42.7	24.2	186°17.0	10.5'	15°16.1	14.0'	58.6'
20	118°42.6	23.9	200°46.5	10.4'	15°30.0	13.9'	58.7'
21 22	133°42.5 148°42.4	· · 23.6 23.3	215°15.9 229°45.2	10.3' 10.2'	15°44.0 15°57.8	13.8' 13.8'	58.7' 58.7'
23	163°42.3	23.0	244°14.3	10.2	16°11.6	13.7	58.8'
	SD = 15.7'	d = -0.3'			D = 15.8'		
					20.0		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
N 70°						
68°						
66°	////	////	00:58	23:08	////	////
64°	////	////	01:54	22:14	////	////
62°	////	////	02:26	21:42	////	////
60°	////	01:20	02:50	21:19	22:48	////
<b>N</b> 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
N 10°	04:55	05:22	05:44	18:25	18:48	19:15
0°	05:13	05:39	06:01	18:09	18:31	18:57
S 10°	05:29	05:55	06:18	17:52	18:15	18:41
20°	05:45	06:12	06:36	17:34	17:58	18:25
30°	06:00	06:30	06:56	17:14	17:40	18:10
35°	06:09	06:40	07:08	17:02	17:30	18:01
40°	06:18	06:51	07:22	16:49	17:19	17:53
45°	06:27	07:04	07:38	16:33	17:06	17:43
<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
				I		

Lat.		Moonris	e		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°	22:34	22:20	22:03	11:00	12:47	14:44
64°	22:37	22:29	22:19	11:00	12:41	14:29
62°	22:40	22:36	22:32	10:59	12:35	14:17
60°	22:42	22:43	22:44	10:58	12:30	14:07
N 58°	22:45	22:48	22:54	10:57	12:25	13:58
56°	22:47	22:53	23:02	10:57	12:21	13:50
54°	22:48	22:58	23:10	10:56	12:18	13:44
52°	22:50	23:02	23:17	10:56	12:15	13:38
50°	22:52	23:06	23:23	10:55	12:12	13:32
45°	22:55	23:14	23:37	10:54	12:06	13:20
N 40°	22:58	23:21	23:48	10:54	12:00	13:10
35°	23:00	23:27	23:58	10:53	11:56	13:02
30°	23:02	23:33		10:52	11:52	12:55
20°	23:06	23:42	•• ••	10:51	11:45	12:42
N 10° 0°	23:09	23:50		10:50	11:39	12:31
1	23:12	23:58	•• ••	10:49	11:34	12:21
S 10°	23:16		00:06	10:49	11:28	12:11
20°	23:19	•• ••	00:14	10:48	11:22	12:00
30°	23:23		00:24	10:47	11:16	11:48
35° 40°	23:25	•• ••	00:30	10:46	11:12	11:41
40 45°	23:28 23:31		00:36 00:44	10:45 10:44	11:08 11:03	11:33 11:23
		•••••		-		
<b>S</b> 50°	23:35		00:53	10:43	10:57	11:12
52°	23:37		00:57	10:43	10:54	11:07
54° 56°	23:38	•• ••	01:02	10:42	10:51	11:01
56°	23:41 23:43		01:07 01:13	10:42 10:41	10:48 10:44	10:55 10:48
<b>S</b> 60°	23:43		01:13	10:41	10:44 10:40	10:48 10:40
<b>3</b> 60°	25:45	•• ••	01:20	10:41	10:40	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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Thu -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	286° 57.0	135°06.1	N13°08.5	221°30.9	N21°18.7	162°42.0	N20° 10.5	272°41.0	N03°28.6		ЗПА	Dec
								272 41.0 287°43.4		Alpheratz	357°33.4	29°14.1
1	301°59.5	150°05.9	07.5	236°31.5	19.1	177°43.9	10.3		28.6	Ankaa	353°05.8	-42°09.4
2	317°01.9	165°05.7	06.4	251°32.1	19.4	192°45.8	10.2	302°45.8	28.6	Schedar	349°29.5	56°40.8
3	332°04.4	180°05.6	• • 05.3	266°32.7	• • 19.7	207°47.7	• • 10.1	317°48.2	• • 28.7	Diphda	348°46.0	-17°50.3
4	347°06.9	195°05.4	04.2	281°33.3	20.0	222°49.6	10.0	332°50.5	28.7	Achernar	$335^{\circ}19.4$	-57°05.8
5 6	2°09.3 17°11.8	210°05.2 225°05.0	03.1 N13°02.0	296°33.9 311°34.6	20.3 N21°20.7	237°51.5 252°53.4	09.9 N20°09.7	347°52.9 2°55.3	28.7 N03°28.7	Hamal	327°49.9	23°35.2
7	32°14.3	240°04.9	13°00.9	326° 35.2	21.0	267°55.3	09.6	2 55.5 17°57.7	28.7	Polaris	$313^{\circ}38.1$	89°22.2
8	47°16.7	255°04.7	13 00.9 12°59.9	341°35.8	21.0	207 55.3 282°57.2	09.0	33°00.1	28.7	Acamar	$315^{\circ}11.0$	-40°11.6
9	62°19.2	270°04.7	• • 58.8	356° 36.4	• • 21.6	202 57.2 297°59.1	•• 09.4	48°02.5	• • 28.8	Menkar	314°05.0	4°11.7
10	77°21.7	285°04.4	57.7	11°37.0	21.9	313°01.0	09.3	63°04.9	28.8	Mirfak	308°26.8	49°57.1
11	92°24.1	300°04.2	56.6	26°37.6	22.3	328°02.9	09.1	78° 07.3	28.8	Aldebaran	290°38.5	16°33.7
12	107°26.6	315°04.0	N12°55.5	41°38.2	N21°22.6	343°04.8	N20°09.0	93°09.7	N03°28.8	Rigel	281°03.0	-8° 10.2
13	122°29.1	330°03.8	54.4	56°38.8	22.9	358°06.7	08.9	108°12.1	28.8	Capella	280°20.5	46°01.4
14	137°31.5	345°03.7	53.3	71°39.4	23.2	13°08.6	08.8	123°14.5	28.9	Bellatrix	278°21.8	6°22.4
15	152°34.0	0°03.5	• • 52.3	86°40.0	• • 23.5	$28^{\circ}10.5$	• • 08.7	$138^{\circ}16.9$	• • 28.9	Elnath	278°00.6	28°37.7
16	167°36.4	15°03.3	51.2	101°40.7	23.8	43°12.4	08.5	153°19.2	28.9	Alnilam	275°36.8	-1°11.0
17	182°38.9	30°03.2	50.1	116°41.3	24.1	58°14.3	08.4	$168^{\circ}21.6$	28.9	Betelgeuse	270°51.1	7°24.7
18	197°41.4	45°03.0	N12°49.0	131°41.9	N21°24.5	73°16.2	N20°08.3	183°24.0	N03°28.9	Canopus	263°52.4 258°25.5	-52°42.5 -16°45.1
19	212°43.8	60°02.8	47.9	146°42.5	24.8	88°18.1	08.2	198°26.4	28.9	Sirius	256 25.5 255°05.3	
20	227°46.3	75°02.7	46.8	161°43.1	25.1	103°20.0	08.1	213°28.8	29.0	Adhara Procyon	255 05.3 244°49.9	-29°00.4 5°09.4
21	242°48.8	90°02.5	• • 45.7	176°43.7	• • 25.4	$118^{\circ}21.9$	• • 07.9	228°31.2	• • 29.0	Pollux	244 49.9 243°16.2	27°57.7
22	257°51.2	105°02.4	44.6	191°44.3	25.7	133°23.7	07.8	243°33.6	29.0	Avior	234° 14.9	-59°35.7
23	272°53.7	120°02.2	43.5	206°44.9	26.0	148° 25.6	07.7	258°36.0	29.0	Suhail	222°45.8	-43°32.5
Morn	ass. 04:51	11 0 2' d 1	.1′ m-4.10	υ0 6' d0	.3′ m1.30	11 0' d 0	.1′ m-1.80	12 A' d0	.0′ m0.74	Miaplacidus	221°38.9	-69°49.7
ivier.p	04.51 	ν-0.2 u-1	111-4.10	νο.σ ασ	.5 111.30	ν1.9 u-0	.1 111-1.00	ν2.4 do	.0 1110.74	Alphard	217°46.8	-8°46.4
										Regulus	207°33.4	11°50.3
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.9	61°36.7
0	287°56.2	135°02.0	N12°42.4	221°45.5	N21°26.3	163°27.5	N20°07.6	273°38.4	N03°29.0	Denebola	182°23.8	14°25.5
1	302°58.6	150°01.9	41.3	236°46.1	26.7	178°29.4	07.5	288°40.8	29.0	Gienah	175°42.4	-17°41.5
2	318°01.1	165°01.7	40.2	251°46.8	27.0	193°31.3	07.3	303°43.2	29.1		172°58.8	-63° 15.1
3	333°03.5	180°01.6	• • 39.1	266° 47.4	• • 27.3	208°33.2	• • 07.2	318°45.6	• • 29.1	Gacrux		-57° 16.0
4	348°06.0	195°01.4	38.0	281°48.0	27.6	223°35.1	07.1	333°48.0	29.1	Alioth	166°11.9	55°49.2
5	3°08.5	210°01.2	37.0	296°48.6	27.9	238° 37.0	07.0	348°50.4	29.1	Spica	158°21.0	-11°18.1
6	18°10.9	225°01.1	N12°35.9	311°49.2	N21°28.2	253° 38.9	N20°06.9	3°52.8	N03°29.1	Alkaid	152°50.9	49°11.1
7	33°13.4	240°00.9	34.8	326°49.8	28.5	268° 40.8	06.7	18°55.2	29.1	Hadar	148°34.0	-60°30.3
8	48°15.9	255°00.8	33.7	341°50.4	28.8	283° 42.7	06.6	33°57.5	29.2	Menkent	147°56.0	-36°30.2
9	63°18.3	270°00.6	• • 32.6	356°51.0	• • 29.1	298°44.6	• • 06.5	48° 59.9	• • 29.2	Arcturus	145°46.7	19°02.7
10	78°20.8	285°00.5	31.5	11°51.6	29.4	313°46.5	06.4	64°02.3	29.2	Rigil Kent.	139°38.3	-60°57.0
11	93°23.3	300°00.3	30.4	26°52.2	29.8	328°48.4	06.3	79°04.7	29.2	Kochab	$137^{\circ}19.3$	74°03.0
12	108°25.7	315°00.1	N12°29.3	41°52.8	N21°30.1	343°50.3	N20°06.1	94°07.1	N03°29.2	Zuben'ubi	136°54.5	-16°09.2
13	123°28.2	330°00.0	28.2	56°53.5	30.4	358°52.2	06.0	109°09.5	29.2	Alphecca	$126^{\circ}02.5$	26°37.6
14	138°30.7 153°33.1	344°59.8	27.1	71°54.1	30.7	13°54.1	05.9	124°11.9 139°14.3	29.3	Antares	$112^{\circ}14.0$	-26°29.5
15 16	153° 33.1 168° 35.6	359°59.7	• • 26.0	86°54.7	• • 31.0	28°56.0	•• 05.8	139° 14.3 154° 16.7	• • 29.3	Atria	$107^{\circ}06.6$	-69°04.6
16 17	183°38.0	14°59.5 29°59.4	24.9 23.8	101°55.3 116°55.9	31.3 31.6	43° 57.9 58° 59.8	05.7 05.5	169° 19.1	29.3 29.3	Sabik	$102^{\circ}01.0$	-15°45.5
18	198°40.5	44°59.2	N12°22.7		N21°31.9	74°01.7	N20°05.4	184°21.5	N03°29.3	Shaula	96°08.3	-37°07.4
19	213°43.0	59°59.1	21.6	146°57.1	32.2	89°03.6	05.3	199°23.9	29.3	Rasalhague	95°57.1	12°32.5
20	228°45.4	74°58.9	20.5	161°57.7	32.5	104°05.5	05.2	214°26.3	29.3	Eltanin	90°41.1	51°29.2
21	243°47.9	89°58.8	. 19.4	176°58.3	• • 32.8	119°07.4	05.1	229°28.7	. 29.4	Kaus Aust.	83°30.5	-34°22.3
22	258°50.4	104°58.6	18.3	191°58.9	33.1	134°09.3	04.9	244°31.1	29.4	Vega	80°32.0	38°48.5
23	273°52.8	119°58.5	17.2	206°59.6	33.4	149°11.2	04.8	259°33.5	29.4	Nunki	75°45.8	-26°15.8
						-				Altair	61°58.4	8°56.4
Mer.p	ass. 04:47	$\nu$ -0.2′ d-1	1′ m-4.10	u0.6′ d0	.3'  m1.30	$\nu 1.9' \ d-0$	$.1^\prime$ m-1.80	$\nu$ 2.4′ d0.	.0′ m0.74	Peacock	53°03.2	-56°38.8
										Deneb	49°24.5 33°37.3	45°22.4
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir		9°59.8
0	288°55.3	134°58.4	N12°16.0	222°00.2	N21°33.7	164° 13.1	N20°04.7	274°35.9	N03°29.4	Fomalhaut	27°31.0 15°12.9	-46°49.7 -29°28.7
1	303°57.8	149°58.2	14.9	237°00.8	34.0	179° 15.0	04.6	289°38.3	29.4	Scheat	13°43.8	28° 13.5
2	319°00.2	164°58.1	13.8	252°01.4	34.3	194° 16.9	04.5	304°40.7	29.4	Markab	13 43.6 13°28.5	15°20.9
3	334°02.7	179°57.9	• • 12.7	267°02.0	• • 34.6	209°18.8	• • 04.3	319°43.1	• • 29.5	IVIAIRAD	13 20.3	13 20.9
4	349°05.2	194°57.8	11.6	282°02.6	34.9	224°20.7	04.2	334°45.5	29.5	Jul 09 Thu	SHA	Mer.pass
5	4°07.6	209°57.6	10.5	297°03.2	35.2	239°22.6	04.1	349°47.9	29.5	Venus		15:00
6	19°10.1	224°57.5	N12°09.4	312°03.8	N21°35.5	254° 24.5	N20°04.0	4°50.3	N03°29.5	Mars	294°33.9	09:14
7	34°12.5	239°57.4	08.3	327°04.4	35.9	269°26.3	03.8	19°52.7	29.5		235°45.0	13:08
8	49°15.0	254°57.2	07.2	342°05.0	36.2	284°28.2	03.7	34°55.1	29.5	Saturn	345°44.0	05:48
9	64°17.5	269°57.1	•• 06.1	357°05.6	• • 36.5	299°30.1	• • 03.6	49°57.5	• • 29.5	Jul 10 Fri	SHA	Mor pass
10	79°19.9	284°56.9	05.0	12°06.3	36.8	314°32.0	03.5	64°59.9	29.6		207°05.9	Mer.pass 15:00
11	94°22.4	299°56.8	03.9	27°06.9	37.1	329°33.9	03.4	80°02.3	29.6		207 03.9 293°49.4	09:13
12	109°24.9	314°56.7	N12°02.8	42°07.5	N21°37.4	344°35.8	N20°03.2	95°04.7	N03°29.6		235°31.4	13:05
13	124°27.3	329°56.5	01.7	57°08.1	37.7	359° 37.7	03.1	110°07.1	29.6		345°42.2	05:45
14	139°29.8	344°56.4	12°00.5	72°08.7	38.0	14°39.6	03.0	125°09.5	29.6			
15	154°32.3	359°56.2	11°59.4	87°09.3	• • 38.2	29°41.5	• • 02.9	140°11.9	• • 29.6	Jul 11 Sat	SHA	Mer.pass
16	169°34.7	14°56.1	58.3	102°09.9	38.5	44°43.4	02.8	155°14.3	29.6		206°03.1	15:00
17	184°37.2	29°56.0	57.2	117° 10.5	38.8	59°45.3	02.6	170°16.7	29.7		293°04.9	09:12
18	199°39.7	44°55.8	N11°56.1		N21°39.1	74°47.2	N20°02.5	185°19.1			235°17.8	13:01
19	214°42.1	59°55.7	55.0	147°11.7	39.4	89°49.1	02.4	200°21.5	29.7	Saturn	345°40.6	05:41
20	229°44.6	74°55.6	53.9	162°12.3	39.7	104°51.0	02.3	215°23.9	29.7	Horizont	al parallax	
21	244°47.0	89°55.4	• • 52.8	177°13.0	40.0	119°52.9	02.1	230°26.3	• • 29.7	TIOTIZONI	Venus:	0.2
22 23	259°49.5 274°52.0	104°55.3 119°55.2	51.6 50.5	192°13.6 207°14.2	40.3 40.6	134°54.8 149°56.7	02.0 01.9	245°28.7 260°31.1	29.7 29.7		Mars:	0.1
												V
Mer.p	ass. 04:44	u-0.1' d-1	1' m-4.11	u0.6′ $d$ 0	.3′ m1.30	$\nu$ 1.9′ d-0	.1' m-1.80	$\nu$ 2.4′ d0.	.0′ m0.73			

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°42.2	N22°22.7	258°43.4	9.9'	$N16^{\circ}25.3$	13.6'	58.8'
1	193°42.1	22.4	273° 12.3	9.8'	16°38.9	13.6'	58.8'
2	208°42.0 223°41.9	22.1 •• 21.8	287°41.1 302°09.8	9.7' 9.6'	16°52.5 17°05.9	13.5' 13.4'	58.9' 58.9'
4	238°41.8	21.5	316°38.4	9.4'	17° 19.3	13.3'	58.9'
5	253°41.8	21.2	331°06.8	9.3'	17°32.7	13.2'	59.0'
6 7	268°41.7 283°41.6	N22°20.9 20.6	345°35.2 0°03.4	9.2' 9.1'	N17°45.9 17°59.1	13.2' 13.1'	59.0' 59.0'
8	298°41.5	20.3	14°31.4	9.0'	18° 12.1	13.1	59.1
9	313°41.4	• • 20.0	$28^{\circ}59.4$	8.8'	18°25.1	12.9'	59.1'
10	328°41.3	19.7	43°27.2	8.7'	18° 38.0 18° 50.8	12.8'	59.1'
11 12	343°41.2 358°41.1	19.4 N22° 19.1	57° 54.9 72° 22.5	8.6' 8.4'	18°50.8 N19°03.5	12.7' 12.6'	59.2' 59.2'
13	13°41.0	18.8	86°49.9	8.3'	19° 16.1	12.5'	59.2'
14	28°40.9	18.5	101°17.2	8.2'	19°28.6	12.4'	59.3'
15 16	43°40.8 58°40.7	· · 18.2 17.9	115°44.4 130°11.5	8.1' 7.9'	19°41.1 19°53.4	12.3' 12.2'	59.3' 59.3'
17	73°40.6	17.6	144°38.4	7.8'	20°05.6	12.1'	59.4'
18	88°40.6	N22°17.3	159°05.2	7.7'	N20°17.7	12.0'	59.4'
19	103°40.5	16.9	173°31.8	7.5'	20°29.7	11.9'	59.4'
20 21	118°40.4 133°40.3	16.6 •• 16.3	187°58.4 202°24.7	7.4' 7.3'	20°41.6 20°53.4	11.8' 11.7'	59.4' 59.5'
22	148°40.2	16.0	216°51.0	7.1'	21°05.0	11.5'	59.5'
23	163°40.1	15.7	$231^{\circ}17.1$	7.0'	21° 16.6	11.4'	59.5'
	SD = 15.7'	d = -0.3'		SI	D = 16.0'		
Fri	GHA	Doc	GHA		Dec	d	HP
Fri 0	GHA 178°40.0	<b>Dec</b> N22° 15.4	GHA 245°43.1	u 6.9'	Dec N21°28.0	d 11.3'	<b>нР</b> 59.6'
1	193°39.9	15.1	$260^{\circ}09.0$	6.7'	21°39.3	11.2'	59.6'
2	208°39.8	14.8	274°34.7	6.6'	21°50.5	11.1'	59.6'
3 4	223°39.7 238°39.7	· · 14.4 14.1	289°00.3 303°25.7	6.4' 6.3'	22°01.6 22°12.5	10.9' 10.8'	59.7' 59.7'
5	253°39.6	13.8	317°51.0	6.2'	22°23.3	10.7	59.7'
6	268°39.5	N22° 13.5	332°16.2	6.0'	N22°34.0	10.5'	59.7'
7	283°39.4 298°39.3	13.2 12.9	346°41.2 1°06.1	5.9' 5.8'	22°44.5 22°54.9	10.4' 10.3'	59.8' 59.8'
8 9	298 39.3 313°39.2	12.9	1 00.1 15°30.9	5.6'	22 54.9 23°05.2	10.3	59.8'
10	328°39.1	12.2	29°55.5	5.5'	23° 15.3	10.0'	59.9'
11	343°39.0	11.9	44°20.1	5.4'	23°25.3	9.8'	59.9'
12 13	358°38.9 13°38.9	N22°11.6 11.3	58° 44.4 73° 08.7	5.2' 5.1'	N23°35.2 23°44.9	9.7' 9.6'	59.9' 59.9'
14	28°38.8	10.9	87° 32.8	5.0'	23°54.4	9.4	60.0'
15	43°38.7	• • 10.6	101°56.7	4.8'	24°03.8	9.3'	60.0'
16 17	58°38.6 73°38.5	10.3 10.0	116°20.6 130°44.3	4.7' 4.6'	24°13.1 24°22.2	9.1' 8.9'	60.0' 60.1'
18	88°38.4	N22°09.6	145°07.9	4.5'	N24°31.1	8.8'	60.1
19	103°38.3	09.3	159°31.3	4.3'	24°39.9	8.6'	60.1'
20	118°38.2 133°38.2	09.0 •• 08.7	173°54.7 188°17.9		24°48.5 24°57.0	8.5' 8.3'	60.1'
21 22	133 38.2 148°38.1	08.7	202°40.9	4.1' 3.9'	24 57.0 25°05.3	8.1'	60.2' 60.2'
23	163°38.0	08.0	217°03.9	3.8'	25°13.4	8.0'	60.2
	SD = 15.7'	d = -0.3'		SI	D = 16.2'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0	178°37.9	N22°07.7	231°26.7	3.7'	N25°21.4	7.8'	60.2'
1	193°37.8 208°37.7	07.4	245° 49.4 260° 12.0	3.6'	25°29.2 25°36.8	7.6'	60.3'
2 3	208 37.7 223°37.6	07.0 •• 06.7	200 12.0 274°34.5	3.5' 3.3'	25 30.8 25°44.2	7.4' 7.3'	60.3' 60.3'
4	238°37.6	06.4	288°56.8	3.2'	25°51.5	7.1'	60.3
5	253°37.5	06.0	303°19.0	3.1'	25°58.6	6.9'	60.4
6 7	268°37.4 283°37.3	N22°05.7 05.4	317°41.2 332°03.2	3.0' 2.9'	N26°05.5 26°12.2	6.7' 6.5'	60.4' 60.4'
8	298°37.2	05.4	346°25.1	2.8'	26°18.7	6.4	60.4
9	313°37.1	• • 04.7	0°46.9	2.7'	26°25.1	6.2'	60.4'
10 11	328°37.1 343°37.0	04.4 04.0	15°08.6 29°30.1	2.6' 2.5'	26°31.3 26°37.2	6.0' 5.8'	60.5' 60.5'
11	343°37.0 358°36.9	04.0 N22°03.7	43°51.6	2.4'	N26°43.0	5.6'	60.5
13	13°36.8	03.3	$58^{\circ}13.0$	2.3'	26°48.6	5.4'	60.5'
14	28°36.7	03.0	72°34.3	2.2'	26°54.0	5.2'	60.5'
15 16	43°36.6 58°36.6	· · 02.7 02.3	86° 55.5 101° 16.6	2.1' 2.0'	26°59.2 27°04.2	5.0' 4.8'	60.6' 60.6'
17	73°36.5	02.0	115° 37.6	1.9'	27°04.2	4.6'	60.6
18	88°36.4	N22°01.7	129° 58.5	1.8'	N27° 13.7	4.4'	60.6'
19 20	103°36.3 118°36.2	01.3 01.0	144° 19.3 158° 40.1	1.8' 1.7'	27°18.1 27°22.3	4.2' 4.0'	60.6' 60.7'
21	133°36.1	00.6	158 40.1 173°00.8	1.6'	27°26.3	4.0 3.8'	60.7
22	148°36.1	22°00.3	187°21.4	1.5'	27°30.1	3.6'	60.7'
23	163°36.0	21°59.9	201°41.9	1.5'	27°33.6	3.4'	60.7'
	SD = 15.7'	d = -0.3'		SI	D = 16.4'		

	Twi	light			Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°						
<b>N</b> 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	////
$N 58^{\circ}$	////	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
$N 40^{\circ}$	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
<b>N</b> 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
Lat		Moonris	e		Moonset	

Lat.		Moonris	e		Moonset	t
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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°	01:48	03:05	04:22	12:02	12:39	13:27
45°	02:01	03:22	04:44	11:48	12:21	13:05
<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°	02:40	04:18	05:57	11:05	11:22	11:49
58°	02:50	04:33	06:19	10:54	11:05	11:27
<b>S</b> 60°	03:02	04:52	06:48	10:42	10:46	10:58

		Sun		Moon					
Day	Eqn.of			Eqn.of Time   Mer.   Mer.Pass.		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	37-17%			
09	05:11	05:16	12:05	07:00	19:27				
10	05:20	05:24	12:05	07:55	20:25				
11	05:28	05:32	12:06	08:57	21:29				

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	289°54.4	134°55.1	N11°49.4	222°14.8	N21°40.9	164°58.6	N20°01.8	275°33.5	N03°29.8			
1	304°56.9	149°54.9	48.3	237°15.4	41.2	180°00.5	01.7	290°35.9	29.8	Alpheratz	357°33.4	29°14.2
	319°59.4			252°16.0	41.2	195°02.4	01.7	305°38.3		Ankaa	353°05.8	-42°09.4
2		164°54.8	47.2						29.8	Schedar	349°29.5	56°40.8
3	335°01.8	179°54.7	• • 46.1	267°16.6	• • 41.8	210°04.3	•• 01.4	320°40.7	• • 29.8	Diphda	348°46.0	-17°50.3
4	350°04.3	194° 54.5	44.9	282°17.2	42.1	225°06.2	01.3	335°43.1	29.8	Achernar	335°19.3	-57°05.8
5	5°06.8	209°54.4	43.8	297°17.8	42.4	240°08.1	01.2	350°45.5	29.8	Hamal	327°49.8	23°35.2
6	20°09.2	224° 54.3	N11°42.7	312°18.4	N21°42.7	255°10.0	N20°01.0	5°47.9	N03°29.8	Polaris	313°36.3	89°22.2
7	35°11.7	239° 54.2	41.6	327°19.1	43.0	270°11.9	00.9	20°50.3	29.8	Acamar	315°11.0	-40°11.6
8	50°14.2	254°54.0	40.5	342°19.7	43.3	285°13.8	00.8	35°52.7	29.9	Menkar	$314^{\circ}05.0$	4°11.7
9	65°16.6	269° 53.9	• • 39.4	357°20.3	• • 43.6	300°15.6	• • 00.7	50°55.1	• • 29.9	Mirfak	308°26.7	49°57.1
10	80°19.1	284° 53.8	38.2	12°20.9	43.9	315°17.5	00.6	65°57.5	29.9	Aldebaran	290°38.4	16°33.7
11	95°21.5	299° 53.7	37.1	27°21.5	44.1	330°19.4	00.4	80°59.9	29.9	Rigel	281°02.9	-8°10.2
12	110°24.0	314°53.5	N11°36.0	42°22.1	N21°44.4	345°21.3	N20°00.3	96°02.3	N03°29.9	Capella	280°20.4	46°01.4
13	125°26.5	329°53.4	34.9	57°22.7	44.7	0°23.2	00.2	111°04.7	29.9	Bellatrix	278°21.8	6°22.5
14	140°28.9	344°53.3	33.8	72°23.3	45.0	15°25.1	20°00.1	126°07.1	29.9	Elnath	278°00.6	28°37.7
15	155°31.4	359° 53.2	• • 32.6	87°23.9	• • 45.3	30°27.0	19°59.9	141°09.5	• • 30.0	Alnilam	275°36.8	-1°11.0
16	170°33.9	14°53.1	31.5	102°24.5	45.6	45°28.9	59.8	156°11.9	30.0	Betelgeuse	270°51.0	7°24.7
17	185°36.3	29°52.9	30.4	117°25.1	45.9	60°30.8	59.7	171°14.3	30.0	Canopus	263°52.4	-52°42.5
18	200°38.8	44°52.8	N11°29.3	132°25.8	N21°46.2	75°32.7	N19°59.6	186°16.7	N03°30.0	Sirius	258°25.5	-16°45.1
19	215°41.3	59° 52.7	28.1	147°26.4	46.5	90°34.6	59.5	201°19.1	30.0	Adhara	255°05.3	-29°00.4
20	230°43.7	74°52.6	27.0	162°27.0	46.7	105°36.5	59.3	216°21.5	30.0	Procyon	244°49.9	5°09.4
21	245°46.2	89°52.5	• • 25.9	177°27.6	• • 47.0	120°38.4	•• 59.2	231°23.9	• • 30.0	Pollux	243°16.1	27°57.7
22	260°48.7	104°52.4	24.8	192°28.2	47.3	135°40.3	59.1	246°26.4	30.0	Avior	234°14.9	-59°35.7
23	275°51.1	119°52.2	23.7	207°28.8	47.6	150°42.2	59.0	261°28.8	30.0	Suhail	222°45.8	-43°32.5
Mer.p	ass. 04:40	$\nu$ -0.1' d-1	.1′ m-4.11	$ u$ 0.6 $^{\prime}$ d0	.3′ m1.31	$\nu$ 1.9′ d-0	.1′ m-1.80	$\nu$ 2.4′ d0	0′ m0.73	Miaplacidus	221°38.9	-69°49.7
										Alphard	217°46.8	-8°46.4
N 4 -	CIIA	CILA	D	CIIA	D	CIIA	D	CUA	D	Regulus	207°33.4	11°50.3
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.9	61°36.7
0	290°53.6	134°52.1	N11°22.5	222°29.4	N21°47.9	165°44.1 180°46.0	N19°58.8	276°31.2 291°33.6	N03°30.1	Denebola	$182^{\circ}23.8$	14°25.5
1	305°56.0 320°58.5	149°52.0	21.4	237°30.0	48.2		58.7 58.6	291°33.6 306°36.0	30.1	Gienah	175°42.4	-17°41.5
2		164°51.9	20.3	252°30.6	48.5	195°47.9	58.6		30.1	Acrux	172°58.8	-63°15.1
3	336°01.0	179°51.8	• • 19.2	267°31.2	• • 48.8	210°49.8	• • 58.5	321°38.4	30.1	Gacrux	$171^{\circ}50.4$	-57°16.0
4	351°03.4 6°05.9	194°51.7	18.0	282°31.8 297°32.5	49.0	225°51.7	58.4	336°40.8 351°43.2	30.1	Alioth	$166^{\circ}11.9$	55°49.2
5 6	0 05.9 21°08.4	209°51.6 224°51.5	16.9 N11°15.8	312°33.1	49.3 N21°49.6	240°53.6 255°55.5	58.2 N19°58.1	6°45.6	30.1 N03°30.1	Spica	$158^{\circ}21.0$	-11°18.1
7	36°10.8	239°51.3		312 33.1 327°33.7		255 55.5 270°57.4		21°48.0		Alkaid	152°50.9	49°11.1
8	50 10.6 51°13.3	259 51.5 254°51.2	14.6 13.5	342°34.3	49.9 50.2	270 57.4 285°59.3	58.0 57.9	36°50.4	30.1 30.2	Hadar	148°34.1	-60°30.3
9	66°15.8	269°51.1	• • 12.4	357°34.9	50.5	301°01.1	•• 57.7	51°52.8	30.2	Menkent	147°56.0	-36°30.2
10	81°18.2	284°51.0	11.3	12°35.5	50.7	316°03.0	57.6	66°55.2	30.2	Arcturus	145°46.7	19°02.8
11	96°20.7	299° 50.9	10.1	27°36.1	51.0	331°04.9	57.0 57.5	81°57.6	30.2	Rigil Kent.	139°38.3	-60°57.0
12	111°23.2	314° 50.8	N11°09.0	42°36.7	N21°51.3	346°06.8	N19° 57.4	97°00.0	N03°30.2	Kochab	137°19.4	74°03.0
13	111 25.2 126°25.6	329° 50.7	07.9	57°37.3	51.6	1°08.7	57.2	112°02.4	30.2	Zuben'ubi	136°54.5	-16°09.2
14	141°28.1	344° 50.6	06.7	72°37.9	51.0	16°10.6	57.2 57.1	112 02.4 127°04.9	30.2	Alphecca	126°02.5	26°37.6
15	156°30.5	359° 50.5	• • 05.6	87°38.5	52.2	31°12.5	•• 57.0	142°07.3	30.2	Antares	112°14.0	-26°29.5
16	171°33.0	14° 50.4	04.5	102°39.2	52.4	46°14.4	56.9	157°09.7	30.2	Atria	107°06.6	-69°04.6
17	186°35.5	29°50.3	03.3	102 39.2 117°39.8	52.7	61°16.3	56.8	172°12.1	30.2	Sabik	102°01.0	-15°45.5
18	201°37.9	44°50.2	N11°02.2		N21°53.0	76°18.2	N19° 56.6	187°14.5	N03°30.3	Shaula	96°08.3	-37°07.4
19	216°40.4	59°50.1	11°01.1	147°41.0	53.3	91°20.1	56.5	202°16.9	30.3	Rasalhague	95°57.1	12°32.5
20	231°42.9	74°50.0	10°59.9	162°41.6	53.6	106°22.0	56.4	217°19.3	30.3	Eltanin	90°41.1	51°29.2
21	246°45.3	89°49.9	• • 58.8	177°42.2	• • 53.8	121°23.9	56.3	232°21.7	• • 30.3	Kaus Aust.	83°30.4	-34°22.3
22	261°47.8	104°49.8	57.7	192°42.8	54.1	136°25.8	56.1	247°24.1	30.3	Vega	80°31.9	38°48.5
23	276°50.3	119° 49.7	56.5	207°43.4	54.4	151°27.7	56.0	262°26.5	30.3	Nunki	75°45.8	-26°15.8
										Altair	61°58.4	8°56.4
Mer.p	ass. 04:36	$\nu$ -0.1' d-1	1.1'  m-4.12	$\nu$ 0.6′ d0	.3′ m1.31	$\nu 1.9' \ d-0$	$.1^\prime$ m-1.79	$\nu$ 2.4′ d0	.0′ m0.72	Peacock	53°03.2	-56°38.8
										Deneb	49°24.5	45°22.5
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.3	9°59.9
0 0	291°52.7	134° 49.6	N10°55.4	222°44.0	N21°54.7	166°29.6	N19° 55.9	277°28.9	N03°30.3	Al Na'ir	27°31.0	-46°49.7
1	306°55.2	149° 49.5	54.3	237°44.6	54.7	181°31.5	55.8	292°31.3	30.3	Fomalhaut	15°12.9	-29°28.7
2	300 55.2 321°57.7	149 49.5 164° 49.4	54.5 53.1	252°45.3	54.9 55.2	196°33.4	55.6	292 31.3 307°33.8	30.3	Scheat	13°43.8	28°13.6
3	337°00.1	179° 49.3	• • 52.0	267°45.9	• • 55.5	211°35.3	• • 55.5	322°36.2	30.4	Markab	13°28.5	15°20.9
4	352°02.6	179 49.3 194°49.2	50.9	282°46.5	55.8	211 33.3 226°37.2	55.4	337°38.6	30.4	Jul 12 Sun	SHA	Mer.pass
5	7°05.0	209° 49.1	49.7	202 40.5 297°47.1	56.1	241°39.1	55.4	352°41.0	30.4		205°00.6	15:00
6	22°07.5	224° 49.0	N10°48.6		N21°56.3	256°40.9	N19°55.1	7°43.4	N03°30.4		292°20.3	09:11
7	37°10.0	239° 48.9	47.5	327°48.3	56.6	271°42.8	55.0	22°45.8	30.4		235°04.1	12:58
8	52°12.4	254° 48.8	46.3	342°48.9	56.9	286°44.7	54.9	37°48.2	30.4	Saturn	345°39.0	05:37
9	67°14.9	269° 48.7	• • 45.2	357°49.5	• • 57.2	301°46.6	• • 54.8	52°50.6	• • 30.4			
10	82°17.4	284° 48.6	44.0	12°50.1	57.4	316°48.5	54.7	67°53.0	30.4	Jul 13 Mon	SHA	Mer.pass
11	97°19.8	299°48.5	42.9	27°50.7	57.7	331°50.4	54.5	82°55.4	30.4		203°58.6	15:01
12	112°22.3	314°48.4	N10°41.8	42°51.3	N21°58.0	346°52.3	N19°54.4	97°57.9	N03°30.4		291°35.8	09:10
13	127°24.8	329°48.4	40.6	57°52.0	58.3	1°54.2	54.3	113°00.3	30.5		234°50.5	12:55
14	142°27.2	344°48.3	39.5	72°52.6	58.5	16°56.1	54.2	128°02.7	30.5	Saturn	345°37.6	05:33
15	$157^{\circ}29.7$	359°48.2	• • 38.4	87°53.2	• • 58.8	31°58.0	• • 54.0	143°05.1	• • 30.5	Jul 14 Tue	SHA	Mer.pass
16	172°32.2	14°48.1	37.2	102°53.8	59.1	46°59.9	53.9	158°07.5	30.5		202°56.9	15:01
17	187°34.6	29°48.0	36.1	$117^{\circ}54.4$	59.3	62°01.8	53.8	173°09.9	30.5		290°51.3	09:09
18	202°37.1	44°47.9	N10°34.9	132°55.0		77°03.7	N19°53.7	188°12.3			234°36.9	12:52
19	217°39.5	59° 47.8	33.8	147°55.6	21°59.9	92°05.6	53.5	203°14.7	30.5		345°36.2	05:29
20	232°42.0	74°47.7	32.6	$162^{\circ}56.2$	22°00.2	107°07.5	53.4	218°17.2	30.5			
21	247°44.5	89°47.7	• • 31.5	177°56.8	• • 00.4	122°09.4	• • 53.3	233°19.6	• • 30.5	Horizont	al parallax	
22	262°46.9	104°47.6	30.4	192°57.4	00.7	137°11.3	53.2	248°22.0	30.5		Venus:	0.2
23	277°49.4	119°47.5	29.2	$207^{\circ}58.1$	01.0	152°13.2	53.0	263°24.4	30.5		Mars:	0.1
Mers	ass. 04:32	ν-0 1/ d 1	.1′ m-4.13	νη 6/ 40	.3′ m1.31	1/1 Q/ d O	.1′ m-1.79	1/2 // 40	0′ m0.72			
.vici.p		ν 0.1 U-1	7.13	- U.U UU	.5 1111.31	ν 1.5 U-U		ν Δ.Ψ UU				

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°35.9	N21°59.6	$216^{\circ}02.4$	1.4'	N27°37.0	3.2'	60.7'
1	193°35.8	59.3	230°22.8	1.3'	27°40.2	3.0'	60.7'
2	208°35.7	58.9	244°43.1	1.3'	27°43.1	2.7'	60.8'
3	223°35.7 238°35.6	· · 58.6 58.2	259°03.4 273°23.6	1.2' 1.2'	27°45.9 27°48.4	2.5' 2.3'	60.8'
4 5	258 35.0 253°35.5	58.2 57.9	273 23.0 287°43.8	1.1'	27 48.4 27°50.7	2.3 2.1'	60.8' 60.8'
6	268° 35.4	N21° 57.5	302°03.9	1.1'	N27°52.8	1.9'	60.8
7	283°35.3	57.2	316°23.9	1.0'	27°54.7	1.7'	60.8
8	298°35.3	56.8	330°44.0	1.0'	27°56.4	1.5'	60.8'
9	313°35.2	• • 56.5	345°03.9	0.9'	27°57.9	1.2'	60.8'
10	328°35.1	56.1	359°23.9	0.9'	27°59.1	1.0'	60.9'
11	343°35.0	55.8	13°43.8	0.9'	28°00.1	0.8'	60.9'
12 13	358°34.9 13°34.9	N21°55.4 55.1	28°03.7 42°23.6	0.9' 0.8'	N28°00.9 28°01.5	0.6' 0.4'	60.9' 60.9'
14	28°34.8	54.7	56°43.4	0.8	28°01.9	0.4	60.9
15	43°34.7	• • 54.4	71°03.2	0.8'	28°02.0	-0.1	60.9'
16	58°34.6	54.0	85°23.0	0.8'	28°02.0	-0.3'	60.9'
17	73°34.5	53.6	99°42.8	0.8'	28°01.7	-0.5'	60.9'
18	88°34.5	N21°53.3	114°02.6	0.8'	N28°01.2	-0.7'	60.9'
19	103°34.4	52.9	128°22.4	0.8'	28°00.4	-1.0'	60.9'
20	118°34.3 133°34.2	52.6	142°42.1	0.8'	27°59.5	-1.2' -1.4'	60.9'
21 22	133°34.2 148°34.2	· · 52.2 51.9	157°01.9 171°21.7	0.8' 0.8'	27°58.3 27°56.9	-1.4' -1.6'	61.0' 61.0'
23	148 34.2 163°34.1	51.9 51.5	171 21.7 185°41.5	0.8	27°55.3	-1.6 -1.8'	61.0'
23						1.0	U1.U
	SD = 15.7'	d = -0.3'		5	D = 16.6'		
Mon	GHA	Dec	GHA	$\nu$	<b>Dec</b> N27°53.4	d	HP
0 1	178°34.0 193°33.9	N21°51.1 50.8	200°01.3 214°21.2	0.8' 0.9'	N27°53.4 27°51.4	-2.1' -2.3'	61.0' 61.0'
2	208°33.9	50.4	228°41.0	0.9	27°49.1	-2.5'	61.0'
3	223°33.8	50.0	243°00.9	0.9'	27°46.6	-2.7'	61.0'
4	238°33.7	49.7	257°20.8	0.9'	27°43.9	-2.9'	61.0'
5	253°33.6	49.3	271°40.8	1.0'	27°41.0	-3.1'	61.0'
6	268°33.6	N21°49.0	286°00.7	1.0'	N27°37.9	-3.4'	61.0'
7	283°33.5	48.6	300°20.7	1.1'	27°34.5	-3.6'	61.0'
8 9	298°33.4 313°33.3	48.2 •• 47.9	314°40.8 329°00.9	1.1' 1.2'	27°30.9 27°27.1	-3.8' -4.0'	61.0' 61.0'
10	313 33.3 328°33.3	47.5	343°21.1	1.2'	27°23.1	-4.0 -4.2'	61.0'
11	343°33.2	47.1	357°41.3	1.3'	27° 18.9	-4.4'	61.0'
12	358°33.1	N21°46.8	12°01.5	1.3'	N27° 14.5	-4.6'	61.0'
13	13°33.0	46.4	$26^{\circ}21.9$	1.4'	27°09.9	-4.8'	61.0'
14	28°33.0	46.0	40°42.2	1.4'	27°05.0	-5.1'	61.0'
15	43°32.9	• • 45.7	55°02.7	1.5'	27°00.0	-5.3'	61.0'
16 17	58°32.8 73°32.7	45.3 44.9	69°23.2 83°43.8	1.6' 1.7'	26°54.7 26°49.2	-5.5' -5.7'	61.0' 61.0'
18	88°32.7	N21° 44.5	98°04.4	1.7'	N26° 43.5	-5.7 -5.9'	61.0'
19	103°32.6	44.2	112°25.2	1.8'	26°37.7	-6.1'	61.0'
20	118°32.5	43.8	126°46.0	1.9'	26°31.6	-6.3'	60.9'
21	133°32.4	• • 43.4	$141^{\circ}06.9$	2.0'	$26^{\circ}25.3$	-6.5'	60.9'
22	148°32.4	43.0	155°27.9	2.1'	26° 18.8	-6.7'	60.9'
23	163°32.3	42.7	169°49.0	2.2'	26°12.2	-6.9'	60.9'
	SD = 15.7'	d = -0.4'		S	D = 16.6'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°32.2	N21°42.3	$184^{\circ}10.1$	2.3'	N26°05.3	-7.1'	60.9'
1	193°32.2	41.9	198°31.4	2.4'	25°58.2	-7.3	60.9'
2	208°32.1	41.5	212°52.7	2.5'	25°51.0	-7.4'	60.9'
3 4	223°32.0 238°31.9	· · 41.2 40.8	227°14.2 241°35.7	2.6' 2.7'	25°43.5 25°35.9	-7.6' -7.8'	60.9' 60.9'
4 5	253°31.9	40.8 40.4	241 35.7 255°57.4	2.1'	25 35.9 25°28.1	-7.8 -8.0'	60.9'
6	268°31.8	N21°40.0	270°19.2	2.9'	N25°20.1	-8.2'	60.9
7	283°31.7	39.6	284°41.0	3.0'	25°11.9	-8.4'	60.8'
8	298°31.7	39.3	299°03.0	3.1'	25°03.5	-8.6'	60.8'
9	313°31.6	• • 38.9	313°25.1	3.2'	24°55.0	-8.7'	60.8'
10	328°31.5	38.5	327°47.3 342°09.6	3.3'	24°46.2 24°37.3	-8.9'	60.8'
11 12	343°31.5 358°31.4	38.1 N21°37.7	342°09.6 356°32.0	3.4' 3.5'	24°37.3 N24°28.3	-9.1' -9.2'	60.8' 60.8'
13	13°31.3	37.4	10°54.5	3.7'	24° 19.0	-9.2 -9.4'	60.8
14	28°31.3	37.0	25°17.2	3.8'	24°09.6	-9.6'	60.7'
15	43°31.2	• • 36.6	39°40.0	3.9'	24°00.0	-9.7'	60.7'
16	58°31.1	36.2	54°02.9	4.0'	23°50.3	-9.9'	60.7'
17	73°31.0	35.8	68°25.9	4.1'	23°40.3	-10.1'	60.7'
18 19	88°31.0 103°30.9	N21°35.4 35.0	82°49.0 97°12.3	4.3' 4.4'	N23°30.3 23°20.0	-10.2' -10.4'	60.7' 60.7'
19 20	103°30.9 118°30.8	35.0 34.6	97°12.3 111°35.7	4.4° 4.5'	23°20.0 23°09.7	-10.4° -10.5'	60.6
21	133°30.8	34.3	125°59.2	4.6'	23° 59.1	-10.5	60.6
22	148°30.7	33.9	140°22.8	4.8'	22°48.4	-10.8'	60.6
23	163°30.6	33.5	154°46.6	4.9'	22°37.6	-11.0'	60.6'
	SD = 15.7'	d = -0.4'		S	D = 16.6'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	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	////
N 58°	////	02:11	03:17	20:53	21:59	////
56°	00:29	02:35	03:32	20:39	21:35	23:34
54°	01:30	02:54	03:45	20:26	21:17	22:39
52°	02:01	03:09	03:56	20:15	21:01	22:09
50°	02:23	03:23	04:05	20:06	20:48	21:47
45°	03:02	03:50	04:26	19:45	20:21	21:08
<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
N 10°	04:56	05:23	05:46	18:26	18:48	19:15
0°	05:14	05:40	06:02	18:09	18:32	18:58
S 10°	05:30	05:56	06:18	17:53	18:16	18:42
20°	05:45	06:12	06:35	17:36	18:00	18:27
30°	05:59	06:29	06:55	17:17	17:43	18:12
35°	06:07	06:39	07:06	17:05	17:33	18:04
40°	06:16	06:49	07:19	16:53	17:23	17:56
45°	06:25	07:02	07:35	16:37	17:10	17:47
<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
Lat		Moonris	e		Moonset	:

Lat.		Moonris	e		Moonset	:
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°						
<b>N</b> 70°						
68°						
66°						23:13
64°			00:04		23:31	22:33
62°	23:11		01:27	22:03	22:08	22:05
60°		00:19	02:03	20:55	21:31	21:43
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	08:30	09:25	09:43	11:34	13:00	14:57

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

_	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	292°51.9	134°47.4	N10°28.1	222°58.7	N22°01.2	167°15.1	N19°52.9	278°26.8	N03°30.6			
1	307°54.3	149°47.3	26.9	237°59.3	01.5	182°17.0	52.8	293°29.2	30.6	Alpheratz	357°33.3	29°14.2
										Ankaa	353°05.8	-42°09.4
2	322°56.8	164°47.2	25.8	252°59.9	01.8	197°18.8	52.7	308°31.6	30.6	Schedar	349°29.5	56°40.8
3	337°59.3	179°47.2	• • 24.6	268°00.5	• • 02.0	212°20.7	• • 52.5	323°34.0	• • 30.6	Diphda	348°46.0	-17°50.2
4	$353^{\circ}01.7$	194°47.1	23.5	283°01.1	02.3	227°22.6	52.4	338°36.5	30.6			
5	8°04.2	209°47.0	22.4	298°01.7	02.6	242°24.5	52.3	353°38.9	30.6	Achernar	335°19.3	-57°05.7
6	23°06.6	224°46.9	N10°21.2	313°02.3	N22°02.8	257°26.4	N19°52.2	8°41.3	N03°30.6	Hamal	327°49.8	23°35.2
7	38°09.1	239°46.8	20.1	328°02.9	03.1	272°28.3	52.0	23°43.7	30.6	Polaris	313°34.8	89°22.2
										Acamar	315°11.0	-40°11.6
8	53°11.6	254°46.8	18.9	343°03.5	03.4	287°30.2	51.9	38°46.1	30.6	Menkar	314°04.9	4°11.7
9	68°14.0	269°46.7	• • 17.8	358°04.2	• • 03.6	302°32.1	• • 51.8	53°48.5	• • 30.6	Mirfak	308°26.7	49°57.2
10	83° 16.5	284°46.6	16.6	13°04.8	03.9	317°34.0	51.7	68°50.9	30.6			
11	$98^{\circ}19.0$	299°46.5	15.5	28°05.4	04.2	332°35.9	51.5	83°53.4	30.6	Aldebaran	290°38.4	16°33.8
12	113°21.4	314°46.5	N10°14.3	43°06.0	N22°04.4	347°37.8	N19°51.4	98°55.8	N03°30.7	Rigel	281°02.9	-8°10.2
										Capella	280°20.4	46°01.4
13	128°23.9	329°46.4	13.2	58°06.6	04.7	2°39.7	51.3	113°58.2	30.7	Bellatrix	278°21.8	6°22.5
14	143°26.4	344°46.3	12.0	73°07.2	05.0	17°41.6	51.2	129°00.6	30.7	Elnath	278°00.6	28° 37.7
15	158° 28.8	359°46.2	· · 10.9	88°07.8	• • 05.2	32°43.5	• • 51.0	144°03.0	• • 30.7	Alnilam	275°36.7	-1°11.0
16	173°31.3	14°46.2	09.7	103°08.4	05.5	47°45.4	50.9	159°05.4	30.7			
17	188°33.8	29°46.1	08.6	118°09.0	05.8	62°47.3	50.8	174°07.9	30.7	Betelgeuse	270°51.0	7°24.8
18	203°36.2	44°46.0	N10°07.4	133°09.6	N22°06.0	77°49.2	N19°50.7	189°10.3	N03°30.7	Canopus	263°52.4	-52°42.4
										Sirius	258°25.5	-16°45.1
19	218°38.7	59°45.9	06.3	148°10.3	06.3	92°51.1	50.5	204°12.7	30.7	Adhara	255°05.2	-29°00.4
20	233°41.1	74°45.9	05.1	163°10.9	06.5	107°53.0	50.4	219°15.1	30.7	Procyon	244°49.8	5°09.4
21	248°43.6	89°45.8	• • 04.0	178°11.5	• • 06.8	122°54.8	• • 50.3	234°17.5	• • 30.7			
22	263°46.1	104°45.7	02.8	193°12.1	07.1	137°56.7	50.2	249°19.9	30.7	Pollux	243°16.1	27°57.7
23	278°48.5	119°45.7	01.7	208°12.7	07.3	152°58.6	50.0	264°22.4	30.7	Avior	234°14.9	-59°35.7
23	210 40.0									Suhail	222°45.8	-43°32.5
Mer.p	ass. 04:28	$\nu$ -0.1' d-1	1′ m-4.13	$\nu$ 0.6′ d0	.3′ m1.31	$\nu$ 1.9′ d-0	.1′ m-1.79	$\nu 2.4' \ d0$	.0′ m0.71	Miaplacidus	221°38.9	-69°49.7
٠٢										Alphard	217°46.8	-8°46.4
											207°33.4	11°50.3
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus		
0	293°51.0	134°45.6	N10°00.5	223°13.3	N22°07.6	168°00.5	N19°49.9	279°24.8	N03°30.7	Dubhe	193°39.9	61°36.7
				238°13.9				294°27.2		Denebola	182°23.8	14°25.5
1	308°53.5	149°45.5	09°59.4		07.9	183°02.4	49.8		30.7	Gienah	175°42.4	-17°41.5
2	323°55.9	164°45.5	58.2	253°14.5	08.1	198°04.3	49.7	309°29.6	30.8	Acrux	172°58.9	-63°15.1
3	338°58.4	179°45.4	• • 57.1	$268^{\circ}15.1$	• • 08.4	213°06.2	• • 49.5	324°32.0	• • 30.8		171°50.4	-57° 16.0
4	354°00.9	194°45.3	55.9	283°15.7	08.6	228°08.1	49.4	339°34.4	30.8			
5	9°03.3	209°45.3	54.8	298°16.4	08.9	243°10.0	49.3	354°36.9	30.8	Alioth	166°11.9	55°49.2
6	24°05.8	224°45.2	N09°53.6	313°17.0	N22°09.2	258°11.9	N19°49.2	9°39.3	N03°30.8	Spica	158°21.0	-11° 18.1
										Alkaid	152°51.0	49°11.1
7	39°08.3	239°45.1	52.5	328°17.6	09.4	273°13.8	49.0	24°41.7	30.8	Hadar	148°34.1	-60°30.4
8	54° 10.7	254°45.1	51.3	343°18.2	09.7	288°15.7	48.9	39°44.1	30.8	Menkent	147°56.0	-36°30.2
9	69° 13.2	269°45.0	• • 50.1	358°18.8	• • 09.9	303°17.6	• • 48.8	54°46.5	• • 30.8		145°46.7	
10	$84^{\circ}15.6$	284°45.0	49.0	13°19.4	10.2	318° 19.5	48.7	69°48.9	30.8	Arcturus		19°02.8
11	99° 18.1	299°44.9	47.8	28°20.0	10.4	333°21.4	48.5	84°51.4	30.8	Rigil Kent.	139°38.3	-60°57.0
					N22°10.7					Kochab	137°19.4	74°03.0
12	114°20.6	314°44.8	N09°46.7	43°20.6		348°23.3	N19°48.4	99°53.8	N03°30.8	Zuben'ubi	136°54.5	-16°09.2
13	129°23.0	329°44.8	45.5	58°21.2	11.0	3°25.2	48.3	114°56.2	30.8	Alphecca	126°02.5	26°37.6
14	144°25.5	344°44.7	44.4	73°21.8	11.2	18°27.1	48.2	129°58.6	30.8	Antares	112°14.0	-26°29.5
15	159°28.0	359°44.7	• • 43.2	88°22.5	• • 11.5	33°29.0	• • 48.0	145°01.0	• • 30.8			
16	174°30.4	14°44.6	42.0	103°23.1	11.7	48°30.8	47.9	160°03.5	30.8	Atria	107°06.6	-69°04.7
17	189°32.9	29°44.5	40.9	118°23.7	12.0	63°32.7	47.8	175°05.9	30.9	Sabik	102°01.0	-15°45.5
										Shaula	96°08.3	-37°07.4
18	204°35.4	44°44.5	N09°39.7	133°24.3	N22°12.2	78°34.6	N19°47.7	190°08.3	N03°30.9	Rasalhague	95°57.1	12°32.5
19	219°37.8	59°44.4	38.6	148°24.9	12.5	93°36.5	47.5	205°10.7	30.9	Eltanin	90°41.1	51°29.2
20	234°40.3	74°44.4	37.4	163°25.5	12.7	108°38.4	47.4	220°13.1	30.9			-34°22.3
21	249°42.8	89°44.3	• • 36.3	178°26.1	• • 13.0	123°40.3	• • 47.3	235°15.6	• • 30.9	Kaus Aust.	83°30.4	
22	264°45.2	104°44.3	35.1	193°26.7	13.2	138°42.2	47.2	250°18.0	30.9	Vega	80°31.9	38°48.6
										Nunki	75°45.8	-26° 15.8
23	279°47.7	119°44.2	33.9	208°27.3	13.5	153°44.1	47.0	265°20.4	30.9	Altair	61°58.4	8°56.4
Mor n	ass. 04:24	u ∩ 1′ d 1	2′ m-4.14	υ0 6' d0	.3′ m1.31	11 0' d 0	.1′ m-1.79	1/2 A' d0	.0′ m0.71	Peacock	53°03.1	-56° 38.8
vici.p	ass. 07.27	ν-0.1 α-1	2 111-7.17	νο.ο do	.5 1111.51	ν1.9 u-0	.1 111-1.79	ν2. <del>τ</del> α0	.0 1110.71	Deneb	49°24.5	45°22.5
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.3	9°59.9
										Al Na'ir	27°31.0	-46°49.7
0	294°50.1	134°44.2	N09°32.8	223°28.0	N22°13.7	168°46.0	N19°46.9	280°22.8	N03°30.9	Fomalhaut	$15^{\circ}12.9$	-29°28.7
1	309°52.6	149°44.1	31.6	238°28.6	14.0	183°47.9	46.8	295°25.2	30.9	Scheat	13°43.7	28° 13.6
2	324°55.1	164°44.1	30.5	253°29.2	14.2	198°49.8	46.7	310°27.7	30.9	Markab	13°28.4	15° 20.9
3	339°57.5	179°44.0	• • 29.3	268°29.8	• • 14.5	213°51.7	• • 46.5	325°30.1	• • 30.9	ividiNdD	15 20.4	15 20.5
4	355°00.0	194°44.0	28.1	283°30.4	14.7	228°53.6	46.4	340°32.5	30.9	Jul 15 Wed	SHA	Mer.pass
										Venus	201°55.5	15:01
5	10°02.5	209°43.9	27.0	298°31.0	15.0	243°55.5	46.3	355°34.9	30.9			
6	25°04.9	224°43.9	N09°25.8	313°31.6	N22°15.2	258°57.4	N19°46.2	10°37.4	N03°30.9	Mars	290°06.8	09:08
	40°07.4	239°43.8	24.6	328°32.2	15.5	273°59.3	46.0	25°39.8	30.9	Jupiter	234°23.2	12:49
7		254°43.8	23.5	343°32.8	15.7	289°01.2	45.9	40°42.2	30.9	Saturn	345°34.9	05:25
7 8	55°09.9		• • 22.3	358°33.4	• • 16.0	304°03.1	• • 45.8	55°44.6	• • 30.9			
8		269°43 7				319°04.9		70°47.0	30.9	Jul 16 Thu	SHA	Mer.pass
8 9	$70^{\circ}12.3$	269°43.7	21.2	120241	16.2		45.6			Venus	200°54.6	15:01
8 9 10	70°12.3 85°14.8	284°43.7	21.2	13°34.1	10-		45.5					
8 9 10 11	70°12.3 85°14.8 100°17.2	284°43.7 299°43.6	20.0	28°34.7	16.5	334°06.8		85°49.5	30.9	Mare	289°22 3	<u></u>
8 9 10 11	70°12.3 85°14.8 100°17.2 115°19.7	284°43.7 299°43.6 314°43.6		28°34.7 43°35.3	16.5 N22°16.7	349°08.7	N19°45.4	100°51.9	N03°30.9	Mars	289°22.3	
8	70°12.3 85°14.8 100°17.2	284°43.7 299°43.6	20.0	28°34.7						Jupiter	234°09.5	12:46
8 9 10 11 12 13	70°12.3 85°14.8 100°17.2 115°19.7 130°22.2	284°43.7 299°43.6 314°43.6 329°43.5	20.0 N09°18.8 17.7	28°34.7 43°35.3 58°35.9	N22°16.7 17.0	349°08.7 4°10.6	N19°45.4 45.3	100°51.9 115°54.3	N03°30.9 31.0			12:46
8 9 10 11 12 13 14	70°12.3 85°14.8 100°17.2 115°19.7 130°22.2 145°24.6	284°43.7 299°43.6 314°43.6 329°43.5 344°43.5	20.0 N09°18.8 17.7 16.5	28°34.7 43°35.3 58°35.9 73°36.5	N22°16.7 17.0 17.2	349°08.7 4°10.6 19°12.5	N19°45.4 45.3 45.1	100°51.9 115°54.3 130°56.7	N03°30.9 31.0 31.0	Jupiter Saturn	234°09.5 345°33.8	12:46 05:21
8 9 10 11 12 13 14 15	70° 12.3 85° 14.8 100° 17.2 115° 19.7 130° 22.2 145° 24.6 160° 27.1	284°43.7 299°43.6 314°43.6 329°43.5 344°43.5 359°43.4	20.0 N09°18.8 17.7 16.5 · · 15.3	28°34.7 43°35.3 58°35.9 73°36.5 88°37.1	N22°16.7 17.0 17.2 · · 17.5	349°08.7 4°10.6 19°12.5 34°14.4	N19°45.4 45.3 45.1 •• 45.0	100°51.9 115°54.3 130°56.7 145°59.2	N03°30.9 31.0 31.0 · · 31.0	Jupiter Saturn Jul 17 Fri	234°09.5 345°33.8 SHA	12:46 05:21 <b>Mer.pass</b>
8 9 10 11 12 13 14 15	70°12.3 85°14.8 100°17.2 115°19.7 130°22.2 145°24.6	284° 43.7 299° 43.6 314° 43.6 329° 43.5 344° 43.5 359° 43.4 14° 43.4	20.0 N09°18.8 17.7 16.5	28°34.7 43°35.3 58°35.9 73°36.5 88°37.1 103°37.7	N22°16.7 17.0 17.2	349°08.7 4°10.6 19°12.5 34°14.4 49°16.3	N19°45.4 45.3 45.1	100°51.9 115°54.3 130°56.7 145°59.2 161°01.6	N03°30.9 31.0 31.0	Jupiter Saturn	234°09.5 345°33.8	12:46 05:21 <b>Mer.pass</b>
8 9 10 11 12	70° 12.3 85° 14.8 100° 17.2 115° 19.7 130° 22.2 145° 24.6 160° 27.1	284°43.7 299°43.6 314°43.6 329°43.5 344°43.5 359°43.4	20.0 N09°18.8 17.7 16.5 · · 15.3	28°34.7 43°35.3 58°35.9 73°36.5 88°37.1	N22°16.7 17.0 17.2 · · 17.5	349°08.7 4°10.6 19°12.5 34°14.4	N19°45.4 45.3 45.1 •• 45.0	100°51.9 115°54.3 130°56.7 145°59.2	N03°30.9 31.0 31.0 · · 31.0	Jupiter Saturn Jul 17 Fri Venus	234°09.5 345°33.8 <b>SHA</b> 199°54.0	12:46 05:21 <b>Mer.pass</b> 15:01
8 9 10 11 12 13 14 15 16 17	70° 12.3 85° 14.8 100° 17.2 115° 19.7 130° 22.2 145° 24.6 160° 27.1 175° 29.6 190° 32.0	284° 43.7 299° 43.6 314° 43.6 329° 43.5 344° 43.5 359° 43.4 14° 43.4 29° 43.4	20.0 N09°18.8 17.7 16.5 · 15.3 14.2 13.0	28°34.7 43°35.3 58°35.9 73°36.5 88°37.1 103°37.7 118°38.3	N22°16.7 17.0 17.2 •• 17.5 17.7 18.0	349°08.7 4°10.6 19°12.5 34°14.4 49°16.3 64°18.2	N19°45.4 45.3 45.1 •• 45.0 44.9 44.8	100°51.9 115°54.3 130°56.7 145°59.2 161°01.6 176°04.0	N03°30.9 31.0 31.0 · · 31.0 31.0 31.0	Jupiter Saturn Jul 17 Fri Venus Mars	234°09.5 345°33.8 SHA 199°54.0 288°37.8	12:46 05:21 <b>Mer.pass</b> 15:01 09:06
8 9 10 11 12 13 14 15 16 17	70° 12.3 85° 14.8 100° 17.2 115° 19.7 130° 22.2 145° 24.6 160° 27.1 175° 29.6 190° 32.0 205° 34.5	284° 43.7 299° 43.6 314° 43.6 329° 43.5 344° 43.5 359° 43.4 14° 43.4 29° 43.4 44° 43.3	20.0 N09°18.8 17.7 16.5 ·· 15.3 14.2 13.0 N09°11.8	28°34.7 43°35.3 58°35.9 73°36.5 88°37.1 103°37.7 118°38.3 133°38.9	N22°16.7 17.0 17.2 · · 17.5 17.7 18.0 N22°18.2	349°08.7 4°10.6 19°12.5 34°14.4 49°16.3 64°18.2 79°20.1	N19° 45.4 45.3 45.1 •• 45.0 44.9 44.8 N19° 44.6	100°51.9 115°54.3 130°56.7 145°59.2 161°01.6 176°04.0 191°06.4	N03°30.9 31.0 31.0 · · 31.0 31.0 31.0 N03°31.0	Jupiter Saturn Jul 17 Fri Venus Mars Jupiter	234°09.5 345°33.8 <b>SHA</b> 199°54.0 288°37.8 233°55.9	12:46 05:21 <b>Mer.pass</b> 15:01 09:06 12:43
8 9 10 11 12 13 14 15 16 17 18 19	70° 12.3 85° 14.8 100° 17.2 115° 19.7 130° 22.2 145° 24.6 160° 27.1 175° 29.6 190° 32.0 205° 34.5 220° 37.0	284°43.7 299°43.6 314°43.6 329°43.5 344°43.5 359°43.4 14°43.4 29°43.4 44°43.3 59°43.3	20.0 N09°18.8 17.7 16.5 ·· 15.3 14.2 13.0 N09°11.8 10.7	28°34.7 43°35.3 58°35.9 73°36.5 88°37.1 103°37.7 118°38.3 133°38.9 148°39.6	N22°16.7 17.0 17.2 ·· 17.5 17.7 18.0 N22°18.2 18.5	349°08.7 4°10.6 19°12.5 34°14.4 49°16.3 64°18.2 79°20.1 94°22.0	N19°45.4 45.3 45.1 •• 45.0 44.9 44.8 N19°44.6 44.5	100°51.9 115°54.3 130°56.7 145°59.2 161°01.6 176°04.0 191°06.4 206°08.9	N03°30.9 31.0 31.0 · · 31.0 31.0 31.0 N03°31.0 31.0	Jupiter Saturn Jul 17 Fri Venus Mars	234°09.5 345°33.8 SHA 199°54.0 288°37.8	12:46 05:21 <b>Mer.pass</b> 15:01 09:06 12:43
8 9 10 11 12 13 14 15 16 17 18 19 20	70° 12.3 85° 14.8 100° 17.2 115° 19.7 130° 22.2 145° 24.6 160° 27.1 175° 29.6 190° 32.0 205° 34.5 220° 37.0 235° 39.4	284° 43.7 299° 43.6 314° 43.6 329° 43.5 344° 43.5 359° 43.4 14° 43.4 29° 43.4 44° 43.3 59° 43.3 74° 43.2	20.0 N09°18.8 17.7 16.5 ·· 15.3 14.2 13.0 N09°11.8 10.7 09.5	28°34.7 43°35.3 58°35.9 73°36.5 88°37.1 103°37.7 118°38.3 133°38.9 148°39.6 163°40.2	N22°16.7 17.0 17.2 ··· 17.5 17.7 18.0 N22°18.2 18.5 18.7	349°08.7 4°10.6 19°12.5 34°14.4 49°16.3 64°18.2 79°20.1 94°22.0 109°23.9	N19° 45.4 45.3 45.1 · · 45.0 44.9 44.8 N19° 44.6 44.5 44.4	100°51.9 115°54.3 130°56.7 145°59.2 161°01.6 176°04.0 191°06.4 206°08.9 221°11.3	N03°30.9 31.0 31.0 ·· 31.0 31.0 31.0 N03°31.0 31.0 31.0	Jupiter Saturn  Jul 17 Fri  Venus  Mars  Jupiter  Saturn	234°09.5 345°33.8 SHA 199°54.0 288°37.8 233°55.9 345°32.7	12:46 05:21 <b>Mer.pass</b> 15:01 09:06 12:43
8 9 10 11 12 13 14 15 16 17 18 19 20 21	70° 12.3 85° 14.8 100° 17.2 115° 19.7 130° 22.2 145° 24.6 160° 27.1 175° 29.6 190° 32.0 205° 34.5 220° 37.0	284°43.7 299°43.6 314°43.6 329°43.5 344°43.5 359°43.4 14°43.4 29°43.4 44°43.3 59°43.3	20.0 N09°18.8 17.7 16.5 ·· 15.3 14.2 13.0 N09°11.8 10.7	28°34.7 43°35.3 58°35.9 73°36.5 88°37.1 103°37.7 118°38.3 133°38.9 148°39.6	N22°16.7 17.0 17.2 ·· 17.5 17.7 18.0 N22°18.2 18.5	349°08.7 4°10.6 19°12.5 34°14.4 49°16.3 64°18.2 79°20.1 94°22.0	N19°45.4 45.3 45.1 •• 45.0 44.9 44.8 N19°44.6 44.5	100°51.9 115°54.3 130°56.7 145°59.2 161°01.6 176°04.0 191°06.4 206°08.9	N03°30.9 31.0 31.0 · · · 31.0 31.0 31.0 N03°31.0 31.0 31.0 · · · 31.0	Jupiter Saturn  Jul 17 Fri  Venus  Mars  Jupiter  Saturn	234°09.5 345°33.8 <b>SHA</b> 199°54.0 288°37.8 233°55.9 345°32.7	09:07 12:46 05:21 <b>Mer.pass</b> 15:01 09:06 12:43 05:18
8 9 10 11 12 13 14 15 16 17 18 19 20 21	70° 12.3 85° 14.8 100° 17.2 115° 19.7 130° 22.2 145° 24.6 160° 27.1 175° 29.6 190° 32.0 205° 34.5 220° 37.0 235° 39.4	284° 43.7 299° 43.6 314° 43.6 329° 43.5 344° 43.5 359° 43.4 14° 43.4 29° 43.4 44° 43.3 59° 43.3 74° 43.2	20.0 N09°18.8 17.7 16.5 ·· 15.3 14.2 13.0 N09°11.8 10.7 09.5	28°34.7 43°35.3 58°35.9 73°36.5 88°37.1 103°37.7 118°38.3 133°38.9 148°39.6 163°40.2	N22°16.7 17.0 17.2 ··· 17.5 17.7 18.0 N22°18.2 18.5 18.7	349°08.7 4°10.6 19°12.5 34°14.4 49°16.3 64°18.2 79°20.1 94°22.0 109°23.9	N19° 45.4 45.3 45.1 · · 45.0 44.9 44.8 N19° 44.6 44.5 44.4	100°51.9 115°54.3 130°56.7 145°59.2 161°01.6 176°04.0 191°06.4 206°08.9 221°11.3	N03°30.9 31.0 31.0 ·· 31.0 31.0 31.0 N03°31.0 31.0 31.0	Jupiter Saturn  Jul 17 Fri  Venus  Mars  Jupiter  Saturn	234°09.5 345°33.8 SHA 199°54.0 288°37.8 233°55.9 345°32.7	12:46 05:21 <b>Mer.pass</b> 15:01 09:06 12:43
8 9 10 11 12 13 14 15 16 17 18 19 20	70° 12.3 85° 14.8 100° 17.2 115° 19.7 130° 22.2 145° 24.6 160° 27.1 175° 29.6 190° 32.0 205° 34.5 220° 37.0 235° 39.4 250° 41.9 265° 44.4	284° 43.7 299° 43.6 314° 43.6 329° 43.5 344° 43.4 14° 43.4 49° 43.4 44° 43.3 59° 43.3 74° 43.2 89° 43.2 104° 43.2	20.0 N09°18.8 17.7 16.5 ·· 15.3 14.2 13.0 N09°11.8 10.7 09.5 ·· 08.3 07.2	28° 34.7 43° 35.3 58° 35.9 73° 36.5 88° 37.1 103° 37.7 118° 38.3 133° 38.9 148° 39.6 163° 40.2 178° 40.8 193° 41.4	N22°16.7 17.0 17.2 17.5 17.7 18.0 N22°18.2 18.5 18.7 19.0 19.2	349°08.7 4°10.6 19°12.5 34°14.4 49°16.3 64°18.2 79°20.1 94°22.0 109°23.9 124°25.8 139°27.7	N19° 45.4 45.3 45.1 · 45.0 44.9 44.8 N19° 44.6 44.5 44.4 · 44.3 44.1	100°51.9 115°54.3 130°56.7 145°59.2 161°01.6 176°04.0 191°06.4 206°08.9 221°11.3 236°13.7 251°16.1	N03°30.9 31.0 31.0 · · 31.0 31.0 31.0 N03°31.0 31.0 · · 31.0 31.0	Jupiter Saturn  Jul 17 Fri  Venus  Mars  Jupiter  Saturn	234°09.5 345°33.8 <b>SHA</b> 199°54.0 288°37.8 233°55.9 345°32.7	12:46 05:21 Mer.pass 15:01 09:06 12:43 05:18
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23	70° 12.3 85° 14.8 100° 17.2 115° 19.7 130° 22.2 145° 24.6 160° 27.1 175° 29.6 190° 32.0 205° 34.5 220° 37.0 235° 39.4 250° 41.9	284° 43.7 299° 43.6 314° 43.6 329° 43.5 344° 43.4 14° 43.4 29° 43.4 44° 43.3 59° 43.3 74° 43.2 89° 43.2 104° 43.2 119° 43.1	20.0 N09°18.8 17.7 16.5 ·· 15.3 14.2 13.0 N09°11.8 10.7 09.5 ·· 08.3	28° 34.7 43° 35.3 58° 35.9 73° 36.5 88° 37.1 103° 37.7 118° 38.3 133° 38.9 148° 39.6 163° 40.2 178° 40.8 193° 41.4 208° 42.0	N22°16.7 17.0 17.2 ·· 17.5 17.7 18.0 N22°18.2 18.5 18.7 ·· 19.0	349°08.7 4°10.6 19°12.5 34°14.4 49°16.3 64°18.2 79°20.1 94°22.0 109°23.9 124°25.8 139°27.7 154°29.6	N19° 45.4 45.3 45.1 · 45.0 44.9 44.8 N19° 44.6 44.5 44.4 · 44.3	100°51.9 115°54.3 130°56.7 145°59.2 161°01.6 176°04.0 191°06.4 206°08.9 221°11.3 236°13.7 251°16.1 266°18.6	N03°30.9 31.0 31.0 · · · 31.0 31.0 31.0 N03°31.0 31.0 31.0 · · · 31.0	Jupiter Saturn  Jul 17 Fri  Venus  Mars  Jupiter  Saturn	234°09.5 345°33.8 <b>SHA</b> 199°54.0 288°37.8 233°55.9 345°32.7 <b>cal parallax</b> Venus:	12:46 05:21 Mer.pass 15:01 09:06 12:43 05:18

h	Su	n		-011	Moon	70 300	
h							
Wed 0	<b>GHA</b> 178° 30.6	<b>Dec</b> N21°33.1	<b>GHA</b> 169°10.5	ν 5.0'	<b>Dec</b> N22°26.6	d -11.1'	<b>HP</b> 60.6'
1	193°30.5	32.7	183°34.5	5.2'	22° 15.5	-11.3'	60.5
2	208° 30.4	32.3	197°58.7	5.3'	22°04.2	-11.4'	60.5'
3	223°30.4 238°30.3	· · 31.9 31.5	212°23.0 226°47.4	5.4' 5.6'	21°52.8 21°41.2	-11.6' -11.7'	60.5' 60.5'
4 5	258° 30.3° 253° 30.3	31.5	241°11.9	5.0 5.7'	21 41.2 21°29.5	-11.7 -11.8'	60.5
6	268°30.2	N21°30.7	255°36.6	5.8'	N21°17.7	-12.0'	60.4
7	283°30.1	30.3	270°01.4	5.9'	21°05.8	-12.1'	60.4
8 9	298°30.1 313°30.0	29.9 • • 29.5	284°26.4 298°51.5	6.1' 6.2'	20°53.7 20°41.5	-12.2' -12.3'	60.4' 60.4'
10	328°29.9	29.1	313°16.7	6.3'	20°29.1	-12.5'	60.3
11	343°29.9	28.7	327°42.0	6.5'	20°16.7	-12.6'	60.3'
12 13	358°29.8 13°29.7	N21°28.3 27.9	342°07.5 356°33.1	6.6' 6.7'	N20°04.1 19°51.4	-12.7' -12.8'	60.3' 60.3'
14	28°29.7	27.9 27.5	10°58.8	6.9	19 51.4 19°38.6	-12.6 -12.9'	60.2
15	43°29.6	• • 27.1	25°24.7	7.0'	19°25.7	-13.0'	60.2'
16	58°29.5	26.7	39°50.7	7.1'	19°12.7	-13.1'	60.2'
17 18	73°29.5 88°29.4	26.3 N21°25.9	54°16.8 68°43.1	7.3' 7.4'	18°59.6 N18°46.3	-13.2' -13.3'	60.1' 60.1'
19	103°29.4	25.5	83°09.5	7.5'	18° 33.0	-13.4	60.1
20	118°29.3	25.1	97°36.0	7.7'	$18^{\circ}19.5$	-13.5'	60.1'
21	133°29.2	• • 24.7	112°02.7	7.8'	18°06.0	-13.6'	60.0'
22 23	148° 29.2 163° 29.1	24.3 23.9	126°29.4 140°56.3	7.9' 8.0'	17°52.4 17°38.6	-13.7' -13.8'	60.0' 60.0'
_5	SD = 15.7'	d = -0.4'			D = 16.5'	_0.0	
	3D = 15.7	u = -0.4		3	D = 10.5		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°29.1	N21°23.5	155°23.4	8.2'	N17°24.8	-13.9'	59.9'
1 2	193°29.0 208°28.9	23.1 22.7	169°50.5 184°17.8	8.3' 8.4'	17° 10.9 16° 56.9	-14.0' -14.1'	59.9' 59.9'
3	223°28.9	22.3	198°45.2	8.5	16°42.8	-14.2'	59.9'
4	238°28.8	21.9	$213^{\circ}12.8$	8.7'	$16^{\circ}28.7$	-14.2'	59.8'
5	253°28.8 268°28.7	21.5 N21°21.1	227°40.4 242°08.2	8.8' 8.9'	16°14.4 N16°00.1	-14.3' -14.4'	59.8' 59.8'
6 7	283°28.6	20.6	242 08.2 256°36.1	8.9 9.0'	15°45.7	-14.4 -14.5'	59.8 59.7'
8	298° 28.6	20.2	271°04.2	9.1'	15°31.2	-14.5'	59.7'
9	313°28.5	•• 19.8	285°32.3	9.3'	15° 16.7	-14.6'	59.7'
10 11	328°28.5 343°28.4	19.4 19.0	300°00.6 314°29.0	9.4' 9.5'	15°02.0 14°47.4	-14.7' -14.8'	59.6' 59.6'
12	358°28.3	N21°18.6	314 29.0 328°57.5	9.5	N14°32.6	-14.8'	59.6'
13	13°28.3	18.2	343°26.1	9.7'	14° 17.8	-14.9'	59.5'
14	28°28.2	17.8	357°54.8	9.8'	14°02.9	-14.9'	59.5'
15 16	43°28.2 58°28.1	· · 17.3 16.9	12°23.7 26°52.6	10.0' 10.1'	13°48.0 13°33.0	-15.0' -15.1'	59.5' 59.4'
17	73°28.1	16.5	41°21.7	10.2'	13° 17.9	-15.1'	59.4'
18	88°28.0	N21°16.1	55°50.9	10.3'	N13°02.8	-15.2'	59.4'
19 20	103°27.9 118°27.9	15.7 15.3	70°20.2 84°49.6	10.4' 10.5'	12°47.7 12°32.4	-15.2' -15.3'	59.3' 59.3'
21	133°27.8	• • 14.8	99°19.1	10.5'	12° 17.2	-15.3'	59.2'
22	148°27.8	14.4	113°48.7	10.7'	12°01.9	-15.3'	59.2'
23	163°27.7	14.0	128°18.4	10.8'	11°46.5	-15.4'	59.2'
	SD = 15.7'	d = -0.4'		S	D = 16.3'		
Fri	GHA	Dec	GHA	ν	Dec	d	НР
0	178°27.7	N21°13.6	142°48.3	10.9'	N11°31.2	-15.4'	59.1'
1	193°27.6	13.1	157°18.2	11.0'	11°15.7	-15.5'	59.1'
2	208° 27.6 223° 27.5	12.7 · · 12.3	171°48.2 186°18.3	11.1' 11.2'	11°00.3 10°44.8	-15.5' -15.5'	59.1' 59.0'
4	238°27.4	11.9	200°48.6	11.3'	10° 44.8	-15.6'	59.0'
5	253°27.4	11.5	215°18.9	11.4'	10°13.6	-15.6'	59.0'
6	268° 27.3 283° 27.3	N21°11.0 10.6	229°49.3 244°19.8	11.5' 11.6'	N09°58.0 09°42.4	-15.6' -15.7'	58.9' 58.9'
7 8	283°27.3 298°27.2	10.6 10.2	244°19.8 258°50.4	11.6	09°42.4 09°26.7	-15.7' -15.7'	58.9° 58.8'
9	313°27.2	•• 09.7	273°21.1	11.8'	09°11.0	-15.7'	58.8'
10	328°27.1	09.3	287°51.9	11.9'	08°55.3	-15.7'	58.8'
11 12	343°27.1 358°27.0	08.9 N21°08.5	302°22.8 316°53.7	12.0' 12.0'	08°39.6 N08°23.8	-15.8' -15.8'	58.7' 58.7'
13	13° 27.0	08.0	331°24.8	12.1'	08°08.1	-15.8'	58.7'
14	28° 26.9	07.6	345°55.9	12.2'	07°52.3	-15.8'	58.6'
15	43°26.9	•• 07.2	0°27.1	12.3'	07°36.4	-15.8'	58.6'
16 17	58° 26.8 73° 26.8	06.7 06.3	14°58.4 29°29.8	12.4' 12.5'	07°20.6 07°04.8	-15.8' -15.9'	58.5' 58.5'
18	88°26.7	N21°05.9	44°01.2	12.5'	N06°48.9	-15.9'	58.5'
19	103°26.7	05.4	58°32.7	12.6'	06°33.0	-15.9'	58.4'
20 21	118° 26.6 133° 26.6	05.0 •• 04.6	73°04.4 87°36.0	12.7' 12.8'	06°17.2 06°01.3	-15.9' -15.9'	58.4' 58.3'
22	133° 26.6 148° 26.5	04.6	87°36.0 102°07.8	12.8' 12.8'	05°45.4	-15.9' -15.9'	58.3'
23	163° 26.5	03.7	116°39.6	12.9'	05°29.5	-15.9'	58.3'
	SD = 15.7'	d = -0.4'		S	D = 16.1'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	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	////
N 58°	////	02:18	03:22	20:49	21:52	////
56°	00:52	02:41	03:36	20:35	21:30	23:15
54°	01:39	02:59	03:48	20:23	21:12	22:31
52°	02:07	03:14	03:59	20:12	20:57	22:03
50°	02:28	03:27	04:09	20:03	20:45	21:43
45°	03:06	03:53	04:28	19:43	20:19	21:05
N 40°	03:33	04:13	04:45	19:27	19:59	20:39
35°	03:54	04:29	04:58	19:14	19:43	20:18
30°	04:10	04:43	05:10	19:02	19:29	20:01
20°	04:37	05:05	05:30	18:43	19:07	19:35
N 10°	04:57	05:24	05:47	18:26	18:48	19:15
0°	05:14	05:40	06:03	18:10	18:32	18:58
<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

Lat.		Moonris	e		Moonset	
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°		03:24	06:35		00:26 23:04	22:21
N 70°		04:15	06:52	23:34	22:45	22:14
68°		04:46	07:05	23:01	22:30	22:08
66°	02:34	05:09	07:15	22:37	22:17	22:02
64°	03:13	05:27	07:24	22:17	22:07	21:58
62°	03:40	05:41	07:31	22:02	21:58	21:54
60°	04:01	05:53	07:37	21:48	21:50	21:51
N 58°	04:18	06:04	07:43	21:37	21:43	21:48
56°	04:32	06:13	07:48	21:27	21:37	21:45
54°	04:44	06:21	07:52	21:18	21:32	21:42
52°	04:55	06:28	07:56	21:10	21:27	21:40
50°	05:05	06:35	08:00	21:02	21:22	21:38
45°	05:25	06:48	80:80	20:47	21:12	21:33
N 40°	05:41	07:00	08:14	20:34	21:04	21:30
35°	05:55	07:09	08:19	20:23	20:57	21:26
30°	06:07	07:18	08:24	20:13	20:51	21:23
20°	06:27	07:32	08:33	19:56	20:40	21:18
N 10°	06:44	07:45	08:40	19:42	20:30	21:14
0°	07:01	07:56	08:47	19:28	20:21	21:09
S 10°	07:17	08:08	08:54	19:14	20:11	21:05
20°	07:34	08:20	09:01	18:59	20:02	21:00
30°	07:54	08:34	09:09	18:41	19:50	20:55
35°	08:05	08:42	09:14	18:31	19:43	20:52
40°	08:18	08:52	09:19	18:19	19:36	20:48
45°	08:34	09:02	09:25	18:05	19:27	20:44
<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.)

Section	0 1 2 3 4	295°49.3 310°51.7	$134^{\circ}43.1$	N09°04.8	223°42.6	N22°19.7			281°21.0				
1	0 1 2 3 4	295°49.3 310°51.7	$134^{\circ}43.1$	N09°04.8	223°42.6	N22°19.7			281°21.0				
1. \$107.517   1997-85   0.97   2997-82   3.99   1997-83   3.49   3.19   1997-83   3.49   3.19	1 2 3 4	$310^{\circ}51.7$					109 31.3	1113 73.3		1103 31.0			
2 25 52 1 64 40 0 0.5 5 57 43	2 3 4		149 43.0		238 × 43 2	10.0	184°33 4	13.7	206°23 4	31 0	Alpheratz	357°33.3	29°14.2
3 80% 567   199 430   -0.01   289 444   -2.04   224 571.   -0.05   226 283   -3.10   200	3 4		164° 43 0								Ankaa	353°05.7	-42°09.4
5. 1957   1941-429	4										Schedar		
19 110-16 2097-429 0875-00 2097-57 3337-637 227-11 2097-528 1111-315 100-2007-528 2097-438 2097-429 100-2007-528 2097-438 2097-429 100-2007-528 2097-438 2097-429 100-2007-528 2097-438 2097-429 100-2007-528 2097-438 2097-429 100-2007-528 2097-438 2097-429 100-2007-528 2097-438 2097-429 100-2007-528 2097-438 2097-429 100-2007-528 2097-438 2097-429 100-2007-528 2097-438 2097-429 100-2007-528 2097-438 2097-429 100-2007-528 2097-438 209											Diphda	348°45.9	-17°50.2
8 26°94.1 226°42.9 No8°77.8 313°46.3 N22°1.1 296°42.8 N19°45.1 11°35.5 No8°31.0 February 11°34.2 No8°1.0 1.0 40°1.1 0.0	b										Achernar	$335^{\circ}19.2$	-57°05.7
7. 41 0.5 2 29 4.2 8 5.7 32 4.0 2 21 0.5 29 4.0 2 21 0.5 20 20 20 20 20 20 20 20 20 20 20 20 20											Hamal	327°49.8	23°35.2
19 100 0 050 050 050 050 050 050 050 050 0													
\$\$ 95.000													
1													
10	9	71°11.5	269°42.8	• • 54.3	358°48.1	• • 21.9	304°48.5	• • 42.7	56°42.8	• • 31.0			
1	10	86°13.9	284° 42.7	53.2	13°48.7	22.1	319°50.4	42.6	71°45.2	31.0			
A	11	101°16.4	299°42.7	52.0	28°49.3	22.3	334°52.3	42.5	86°47.7	31.0			
141 141-131 324-142 0 005 3 57910 23	12	116°18.9	314°42.7	N08°50.8	43°49.9	N22°22.6	349°54.2	N19°42.4	101°50.1	N03°31.0	_		
14   14    12    13    14    14    15    16	13	131°21.3	329° 42.7	49.6	58°50.6	22.8	4°56.1	42.2	116°52.5	31.0			
15 101-26.2 399-74.6 - 47.3 88"s18													
10 10°227 14°628													
17   191'312   29'4.5											Alnilam	275°36.7	$-1^{\circ}11.0$
18											Betelgeuse	270°51.0	7°24.8
29   221°361   59°425   426   148°542   242   95°075   415   20°070.1   311   5160   222°070.1   311   222°070.1   311   222°145   311											Canopus	263°52.4	-52°42.4
20 289°386 74°425 41.4 193°58.9 24.5 110°093 41.3 22°095 31.1 Ambus 39°42.4 40.3 137°555 24.7 120°193 41.3 22°095 31.1 Sept. 22°296 22°											Sirius	258°25.5	$-16^{\circ}45.1$
31 31 41 0 69 42 4 403 179 55 2 427 129 11 2 112 41.2 271 41.2 27											Adhara	255°05.2	-29°00.4
22 2 286/4.8. 104-74.8													
Mer_pass   04-16   119*124   319   205*57   252   155*15.0   40.9   207*10.8   31.1   Avior   24*14.9   509*357   252   255*15.0   40.9   207*10.8   31.1   Avior   24*14.0   207*33.4   31.1													
Subable   1922   195   10   190													
Mer.pass. 04:16	23	281°46.0	119° 42.4	37.9	208°56.7	25.2	155°15.0	40.9	$267^{\circ}16.8$	31.1			
	Ma:: ::	255 04.16	0 0/ 1 1	2/ m 1 16	10 6/ 10	2/ m1 21	110/ 40	1/ m 1 70	1/2 4/ 2/0	0' m0 70			
Sum         CHA         CHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         PROBLEM         0.7934.84         1179.03         0.9936.84         1034.02         0.1032.00         0.9936.88         1039.00         0.9931.11         0.9036.00         0.9936.83         0.9936.83         0.9932.94         0.9936.83         0.9936.93         0.9938.93         0.9938.93         0.9938.93         0.9938.93         0.9938.93         0.9938.93         0.9938.93         0.9938.93         0.9938.93         0.9938.93 </td <td>ivier.p</td> <td>ass. U4:10</td> <td><math>\nu</math>-0.0° <math>a</math>-1</td> <td>∠ IN-4.10</td> <td>νυ.σ΄ αυ</td> <td>.∠ m1.31</td> <td><math>\nu_{1.9} \ a-0</math></td> <td>.т пл-т./9</td> <td>ν2.4 dU</td> <td>.u mu./u</td> <td></td> <td></td> <td></td>	ivier.p	ass. U4:10	$\nu$ -0.0° $a$ -1	∠ IN-4.10	νυ.σ΄ αυ	.∠ m1.31	$\nu_{1.9} \ a-0$	.т пл-т./9	ν2.4 dU	.u mu./u			
Sin GHA GHA GHA Doc GHA GHA Doc GHA Doc GHA Doc GHA													
0 96°48.4 134°42.4 NO8°367. 223°57.3 N22°52.6 170°16.9 N19°08.8 282°19.2 NO8°31.1 Diesebola 12°25.6 131°18.9 149°42.3 35.6 238°59.7 26.3 185°18.8 40.7 20°72.16 31.1 Clear 12°25.2 12°25.3 14°25.2 14	Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec			
1 311"909													
2 326°533 3 16°423 - 344					223 37.3						Denebola		
3 341°558 179°423 3 320 288°591 361 261 215°226 404, 327°255 311, 4 336°351 314 316 32°507 320°321 320°32 32°402 320°402 309 209°003 266 245°364 40.2 357°314 31.1 31.1 31.1 31.1 31.1 31.1 31.1 3											Gienah	175°42.4	$-17^{\circ}41.5$
4 986°983 919°423 30.0 2885°997 26.3 290°425 40.3 342°289 31.1 51.2 55'442.2 30.0°997 31.2 30.0 10.2°26.8 26.6 245°26.4 40.2 357°31.4 31.1 56'12.0 55'442.2 28.5 320°61.6 27.0 275'30.1 12'33.8 N03'31.1 56'12.0 55'442.2 28.5 320°61.6 27.0 275'30.1 12'33.8 N03'31.1 56'12.0 55'442.2 28.5 320°61.6 27.0 275'30.1 12'33.8 N03'31.1 56'12.0 15'5'44.2 12'3.0 12'3.1 56'12.0 15'5'44.2 12'3.0 12'3.1 56'12.0 15'5'44.2 12'3.0 12'3.1 56'12.0 15'5'44.2 12'3.0 12'3.1 56'12.0 15'5'44.2 12'3.0 12'3.0 12'3.0 12'3.0 13.0 12'3.0 13'1.1 56'12.0 15'5'44.2 12'3.0 12'3.0 12'3.0 12'3.0 13'1.1 56'12.0 15'5'44.2 12'4.0 10'30'4.0 12'3.1 56'12.0 13'4.1 56'12.0 15'4.1 56'12.0											Acrux	172°58.9	$-63^{\circ}15.1$
1 12°00.7 209°42.3 30.9 299°0.3 26.6 245°2.6 40.2 357°31.4 311											Gacrux	171°50.4	-57°16.0
5 12°00.7 29°42.3 30.9 29°00.3 26.6 245°26.4 40.2 357°31.4 31.1 Spica 188°21.0 11°31.8 40°31.1 12°33.8 100°31.1 12°33.8 100°31.1 12°33.8 100°31.1 12°33.8 100°31.1 12°33.8 100°31.1 14°34.0 19°11.1 12°31.5 10°30.2 31.1 14°34.0 19°11.1 14°34.1 100°30.4 11°34.0 11°3													
0 27'03.2 24'42.2 No8'92.7 314'01.0 No2'26.8 260'28.3 Noy'40.1 12'38.8 No3'31.1 Alkiali 15'251.0 49'11.1 0'30.4 6 57'08.1 294'42.2 28.5 320'01.6 27.0 27'39.2 39.9 27'36.2 31.1 Hadra 18.3'31.1 60'30.4 65'708.1 294'42.2 26.1 34'02.2 27.3 290'32.1 39.8 42'38.7 31.1 Alkiali 18.3'21.1 60'30.4 Menkent 147'56.1 36'30.2 10 87'13.1 284'42.2 25.0 14'03.4 27.7 320'35.9 39.5 72'43.5 31.1 Alkiali 18.3'21.1 67'30.4 10'30.4			209°42.3	30.9	299°00.3	26.6	245°26.4	40.2					
7 42'06.7   294'42   285   329'01.6   27.3   297'30.2   39.9   27'30.2   31.1   Hadar   184'34.1   60'30.4   60'30.9   72'10.6   294'12.2   27.3   399'03.21   39.8   42'38.7   31.1   Mer.   187'46.7   197'02.8   27.3   290'32.1   39.8   42'38.7   31.1   Mer.   187'46.7   197'02.8   27.3   290'32.1   39.8   42'38.7   37.1   Mer.   187'46.7   197'02.8   27.3   290'32.1   39.8   42'38.7   31.1   Mer.   187'46.7   197'02.8   27.3   290'32.1   39.8   42'38.7   31.1   Mer.   187'46.7   197'02.8   31.1   Mer.   187'46.9   31.1   Mer.   187'46.7   197'47.2   34.8   34.1   197'47.2   34.8   187'47.2   34.8   34.2	6		224°42.2	N08°29.7	314°01.0	N22°26.8		N19°40.1	12°33.8	N03°31.1			
8 57°01.0	7	42°05.7	239° 42.2	28.5	329°01.6	27.0	275°30.2	39.9		31.1			
9 72-110.6   969-422   250.1   359-902.8   -27.5   305-34.0   -39.7   57-41.1   -31.1   10 87-151   284-422   250.1   14-903.4   27.7   320-95.9   39.5   72-43.5   31.1   11 102-155   309-42.2   23.8   29-904.0   28.0   335-37.8   39.4   87-45.9   31.1   12 117-18.0   314-42.1   1009-22.6   44-904.6   032-22.8   259-39.7   119-39.3   102-48.4   103-31.1   13 132-20.5   329-42.1   21.4   559-65.2   28.4   57-41.5   39.2   117-90.8   31.1   14 147-22.9   344-42.1   19.1   86-90.5   28.4   57-41.5   39.2   117-90.8   31.1   16 177-27.8   14-42.1   17.9   104-90.1   29.1   50-47.2   38.8   162-95.7   31.1   17 192-30.3   29-42.1   10.7   119-90.7   29.3   65-49.1   38.6   176-90.5   31.1   18 207-32.8   44-42.1   10.9   104-90.1   29.1   50-47.2   38.8   162-95.8   13.1   18 207-32.8   24-42.1   10.9   104-90.1   29.1   50-47.2   38.8   162-95.8   31.1   18 207-32.8   24-42.1   10.9   104-90.1   29.3   50-42.3   38.4   208-95.8   31.1   18 207-32.8   24-42.1   10.9   104-90.1   29.3   50-42.3   38.4   208-95.8   31.1   18 207-32.8   24-42.1   10.9   104-90.1   10.9   30.3   125-96.7   38.1   28-91.3   31.1   18 207-32.8   28-42.1   10.4   149-90.8   29.8   95-92.9   38.4   208-95.8   31.1   18 207-32.8   28-42.1   10.4   109-90.8   29.8   95-92.9   38.4   208-95.8   31.1   18 207-32.8   28-42.1   10.4   109-90.8   29.8   95-92.9   38.4   208-95.8   31.1   18 207-32.8   28-42.1   10.9   20.1   179-10.1   30.3   125-96.7   38.1   28-21.8   31.1   18 207-32.8   28-24.1   10.9   20.0   10.8   30.5   106-95.8   38.0   25-91.1   31.1   18 207-32.8   28-24.1   10.9   20.0   20-91.1   30.7   156-90.5   37.9   268-15.1   31.1   18 207-32.8   28-24.1   20.9   20-91.1   20.0   20-91.1   20.0   20-91.1   20.0   20-91.1   20.0   20-91.1   20.0   20-91.1   20.0	8	57°08.1	254° 42.2	27.3	344°02.2	27.3	290°32.1	39.8	42°38.7	31.1			
10 87°131 284°422 2 238 2°040 20 20 30 3°15 7°2435 31.1 1 102°155 299°422 238 2°040 20 20 30 3°378 394 87°459 31.1 2 117°180 314°221 0214 5°052 22 84 5°0597 7°19°393 102°484 N03°31.1 31 313°205 329°421 21.21 20.3 74°059 28.4 5°15 30.2 117°508 31.1 31 147°229 344°221 -19.1 89°055 228 4 5°15 30.2 117°508 31.1 31 132°050 329°421 1 -19.0 104°071 20.1 50°472 38.8 160°581 31.1 31 132°030 39°421 1 17.9 104°071 20.1 50°472 38.8 160°581 31.1 31 132°30 3 2°2421 16.7 119°077 20.3 56°491 38.6 178°005 31.1 31 207°328 44°32.1 108°155 134°083 N22°206 80°510 N19°385 193°03.0 N03°31.1 31 207°328 44°32.1 108°155 134°083 N22°206 80°510 N19°385 193°03.0 N03°31.1 31 207°328 44°32.1 108°155 134°089 20 30 110°548 38.3 22°0764 31.1 31 25°400 2 98°42.0 1.2.0 179°101 3.03 125°567 3.3 1.288°10.3 31.1 31 25°402 2 80°42.0 1.2.0 179°101 3.03 125°567 3.3 1.288°10.3 31.1 31 25°402 80°42.0 1.2.0 179°101 3.05 105°05 37.9 206°15.1 31.1 31 25°500 1472 1942.0 1.2.0 194°10.0 20°4.1 30.5 140°60.5 37.9 206°15.1 31.1 31 25°500 1474 194°2.0 0.05 224°12.0 N22°30.9 171°024 N19°37.8 28°10.0 13.1 140°10.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7	9	72°10.6	269° 42.2	• • 26.1	359°02.8	• • 27.5	305°34.0	• • 39.7		• • 31.1			
11 102°15.5 299°42.2 23.8 29°04.0 28.0 336°37.8 39.4 87°4.5 31.1 Kochab 137°19.5 7°03.0 12 117°18.0 314°42.1 N08°22.6 44°04.6 N22°28.2 360°39.7 N19°39.3 102°44.4 N03°31.1 Kochab 137°19.5 7°03.0 131 132°0.5 320°42.1 21.4 9°05.5 28.7 20°43.4 39.0 132°53.2 31.1 Alpheca: 126°02.5 26°37.6 15 162°25.4 359°42.1 1.91.1 89°06.5 28.7 20°43.4 39.0 132°53.2 31.1 Alpheca: 126°02.5 26°37.6 15 162°25.4 359°42.1 1.91.1 89°06.5 28.7 20°43.4 39.0 132°53.2 31.1 Alpheca: 126°02.5 26°37.6 177°78.1 4°42.1 1.79 104°07.1 29.1 50°47.2 38.8 162°8.1 31.1 Shaula 120°10.6 6.9 10.1 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.													
12 117*18.0 314*42.1 No8*22.6 44*04.6 N22*28.2 350*39.7 N19*39.3 102*48.4 N03*31.1 d											_		
131 132°0.5 329°42.1 21.4 59°0.5 28.4 5°4.15 39.2 117°5.08 31.1 Alpheca 12°0.2 26°37.6 11 14°1.4 147°2.9 344°42.1 20.3 74°0.5 28.7 20°43.4 39.0 132°5.2 31.1 Alpheca 12°0.2 26°37.6 15°1.6 170°7.8 14°42.1 1.79 104°0.7 29.1 50°47.2 38.8 16°5.8 1 31.1 54°3.2 110°0.6 6 6.9 4.7 17°1.9 190°3.0 3°2.8 44°42.1 1.79 104°0.7 29.1 50°47.2 38.8 16°5.8 1 31.1 54°41.2 10.0 10.0 15°45.5 18°2.2 10.0 10.0 10.0 10.0 11.0 11.0 11.0 1													
14   147°22.9   344°42.1   20.3   74°05.9   28.7   20°43.4   39.0   132°53.2   31.1     5											Zuben'ubi		
15   162°25.4   359°42.1											Alphecca		26°37.6
16   177°278   14°42.1   17.9   104°07.1   291   50°47.2   38.8   162°8.1   31.											Antares	$112^{\circ}14.0$	-26°29.5
17 192°303 29°42.1 167 119°07.7 293 66°49.1 38.6 178°00.5 31.1 820°30.6 178°00.5 31.1 820°30.6 178°30.5 11.1 820°30.6 178°30.5 11.1 820°30.6 178°30.5 11.1 820°30.6 178°30.5 11.1 820°30.6 178°30.5 11.1 820°30.6 178°30.5 11.1 820°30.6 178°30.5 11.1 820°30.6 178°30.5 11.1 820°30.6 178°30.5 11.1 820°30.6 178°30.5 11.1 820°30.6 178°30.5 11.1 820°30.6 178°30.5 11.1 820°30.6 178°30.5 11.1 820°30.6 178°30.5 11.1 820°30.6 178°30.6											Atria	107°06.6	-69°04.7
17 192°93.8 44°42.1 No8°15.5 134°08.3 N22°96.6 60°5.1 No9°38.5 178°00.5 31.1 Shaula 96°08.3 37°07.4 No. 119°37.7 14°0.1 No. 10°38.5 19°32.9 No. 110°54.8 138.3 20°0.5 No. 110°54.8 138.3 20°0.8 11.1 Shaula 96°08.3 37°07.4 No. 110°54.5 134°0.8 11.1 Shaula 96°0.8 13.1 No. 110°54.8 138.3 20°0.8 11.1 Shaula 96°0.8 3.3 37°07.4 No. 110°54.6 138.4 208°0.5 No. 110°54.8 138.3 23°0.7 No. 11.1 Shaula 96°0.8 13.1 No. 110°54.8 138.3 23°0.7 No. 11.1 Shaula 90°41.1 51°29.2 No. 110°54.6 138.0 125°40.2 No. 110°42.0 10.8 194°10.8 30.5 140°58.6 38.0 253°12.7 31.1 No. 110°42.0 No. 10.8 194°10.8 30.5 140°58.6 38.0 253°12.7 31.1 No. 110°42.0 No. 10.8 194°10.8 30.5 140°58.6 38.0 253°12.7 31.1 No. 110°42.0 No. 10.8 194°10.8 No. 110°40.2											Sabik	102°01.0	-15°45.5
18 207°32.8 44°42.1 N08°15.5 134°08.3 N22°29.6 80°51.0 N19°38.5 193°03.0 N03°31.1 Rasalhague 20°237°37.7 74°42.0 13.2 164°09.5 30.0 110°54.8 38.3 223°07.8 31.1 Kaus Aust. Vega 22 267°42.6 104°42.0 10.8 194°10.8 30.5 140°88.6 38.0 253°12.7 31.1 Nunki Atlair 61°554. 8°30.4 34°22.3 28°45.1 119°42.0 09.6 299°11.4 30.7 156°00.5 37.9 268°15.1 31.1 Nunki Atlair 61°554. 8°548. 8°51.0 Nunki Atlair 61°554. 8°548. 8°51.1 110°25.0 149°42.0 09.6 299°11.4 30.7 156°00.5 37.9 268°15.1 31.1 Nunki Atlair 61°554. 8°548. 8°54.6 111°40.2 Nunki Atlair 61°554. 8°545.1 Nunki Atlair 61°554. 8°541.1 Nunki	17	192°30.3	29°42.1	16.7	119°07.7	29.3	65°49.1	38.6		31.1			
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Mon         GHA         GHA         Dec         GHA         Ope         All Na'ir         27°30.9         46°49.7           1         312°50.0         149°42.0         06.1         254°13.2         31.4         201°06.2         37.5         313°22.4         31.1         36°24.9         19°42.0         06.1         254°13.2         31.4         201°06.2         37.5         313°22.4         31.1         Markab         13°28.4         15°20.9           5         12°59.9         209°42.0         00.6         299°15.0         32.1         246°11.9         37.1         388°9.7         31.1         Mars         28°02.3         24°42.0         N08°01.4         314°15.7         N22°32.3         261°13.7         N19°37.0         13°32.2         N08°31.1         Mars         28°58.3         30.90°15.0         32.1         246°11.9         37.1         38°2.9         31.1         Mars         28°76.5         31.1         Mars         28°76.8         39.2         21°17.5													
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10 88°12.2 284°42.0 56.6 14°18.1 33.2 321°21.3 36.5 73°41.9 31.1 103°14.7 299°42.0 55.5 29°18.7 33.4 336°23.2 36.3 88°44.3 31.1 11 103°14.7 299°42.0 55.5 29°18.7 33.4 336°23.2 36.3 88°44.3 31.1 11 11 11 11 11 11 11 11 11 11 11 11													
11 103°14.7 299°42.0 55.5 29°18.7 33.4 336°23.2 36.3 88°44.3 31.1													•
12 118°17.1 314°42.0 N07°54.3 44°19.3 N22°33.6 351°25.1 N19°36.2 103°46.8 N03°31.1 133°19.6 329°42.0 53.1 59°19.9 33.8 6°27.0 36.1 118°49.2 31.1 148°22.1 344°42.0 51.9 74°20.6 34.1 21°28.9 36.0 133°51.6 31.1 15 163°24.5 359°42.0 • 50.7 89°21.2 • 34.3 36°30.8 • 35.8 148°54.1 • 31.1 16 178°27.0 14°42.0 49.5 104°21.8 34.5 51°32.7 35.7 163°56.5 31.1 17 193°29.4 29°42.0 48.3 119°22.4 34.7 66°34.6 35.6 178°58.9 31.1 19°32.9 4 29°42.0 48.3 119°22.4 34.7 66°34.6 35.6 178°58.9 31.1 19°32.4 59°42.0 46.0 149°23.6 35.2 96°38.4 35.3 209°03.8 31.1 19°32.3 14.8 1234 1234 1234 1234 1233°33.3 89°42.0 • 43.6 179°24.9 • 35.6 126°42.2 • 35.0 239°08.7 • 31.1 11.1 11.1 11.1 11.1 11.1 11.1 11													
13 133°19.6 329°42.0 53.1 59°19.9 33.8 6°27.0 36.1 118°49.2 31.1 118°49.													09:04
13 133 19.0 329 42.0 53.1 59 19.9 33.8 0 27.0 30.1 118 49.2 31.1 5aturn 345°30.8 05:10 14 148°22.1 344°42.0 51.9 74°20.6 34.1 21°28.9 36.0 133°51.6 31.1 15 163°24.5 359°42.0 · 50.7 89°21.2 · 34.3 36°30.8 · 35.8 148°54.1 · 31.1 17 193°29.4 29°42.0 49.5 104°21.8 34.5 51°32.7 35.7 163°56.5 31.1 18 208°31.9 44°42.0 N07°47.2 134°23.0 N22°34.9 81°36.5 N19°35.4 194°01.4 N03°31.1 19 223°34.4 59°42.0 46.0 149°23.6 35.2 96°38.4 35.3 209°03.8 31.1 234 230°0 238°36.8 74°42.0 44.8 164°24.2 35.4 111°40.3 35.2 224°06.2 31.1 21 253°39.3 80°42.0 · 43.6 179°24.9 · 35.6 126°42.2 · 35.0 239°08.7 · 31.1 21 253°39.3 80°42.0 42.4 194°25.5 35.8 141°44.0 34.9 254°11.1 31.1 22 268°41.8 104°42.0 41.2 209°26.1 36.0 156°45.9 34.8 269°13.6 31.1 Nars: 0.1											Jupiter	233°28.5	12:37
14 148*22.1 344*42.0 51.9 74*20.6 34.1 21*28.9 30.0 133*51.0 31.1 15 163°24.5 359°42.0 · 50.7 89°21.2 · 34.3 36°30.8 · 35.8 148°54.1 · 31.1 16 178°27.0 14°42.0 49.5 104°21.8 34.5 51°32.7 35.7 163°56.5 31.1 17 193°29.4 29°42.0 48.3 119°22.4 34.7 66°34.6 35.6 178°58.9 31.1 18 208°31.9 44°42.0 N07°47.2 134°23.0 N22°34.9 81°36.5 N19°35.4 194°01.4 N03°31.1 19 223°34.4 59°42.0 46.0 149°23.6 35.2 96°38.4 35.3 209°03.8 31.1 20 238°36.8 74°42.0 44.8 164°24.2 35.4 111°40.3 35.2 224°06.2 31.1 21 253°39.3 89°42.0 · 43.6 179°24.9 · 35.6 126°42.2 · 35.0 239°08.7 · 31.1 22 268°41.8 104°42.0 42.4 194°25.5 35.8 141°44.0 34.9 254°11.1 31.1 23 283°44.2 119°42.0 41.2 209°26.1 36.0 156°45.9 34.8 269°13.6 31.1 Mars: 0.1													
16       178°27.0       14°42.0       49.5       104°21.8       34.5       51°32.7       35.7       163°56.5       31.1       Venus       196°54.5       15:01         17       193°29.4       29°42.0       48.3       119°22.4       34.7       66°34.6       35.6       178°58.9       31.1       Mars       286°24.4       09:03         18       208°31.9       44°42.0       N07°47.2       134°23.0       N22°34.9       81°36.5       N19°35.4       194°01.4       N03°31.1       Jupiter       233°14.8       12:34         20       238°36.8       74°42.0       44.8       164°24.2       35.4       111°40.3       35.2       224°06.2       31.1       Saturn       345°30.0       05:06         20       238°39.3       89°42.0       • 43.6       179°24.9       • 35.6       126°42.2       • 35.0       239°08.7       • 31.1       Horizontal parallax         22       268°41.8       104°42.0       42.4       194°25.5       35.8       141°44.0       34.9       254°11.1       31.1       Venus:       0.2         23       283°44.2       119°42.0       41.2       209°26.1       36.0       156°45.9       34.8       269°13.6       31.1       Mars:													
17 193°29.4 29°42.0 48.3 119°22.4 34.7 66°34.6 35.6 178°58.9 31.1 Mars 286°24.4 09:03 18 208°31.9 44°42.0 N07°47.2 134°23.0 N22°34.9 81°36.5 N19°35.4 194°01.4 N03°31.1 19 223°34.4 59°42.0 46.0 149°23.6 35.2 96°38.4 35.3 209°03.8 31.1 20 238°36.8 74°42.0 44.8 164°24.2 35.4 111°40.3 35.2 224°06.2 31.1 21 253°39.3 89°42.0 · 43.6 179°24.9 · 35.6 126°42.2 · 35.0 239°08.7 · 31.1 22 268°41.8 104°42.0 42.4 194°25.5 35.8 141°44.0 34.9 254°11.1 31.1 23 283°44.2 119°42.0 41.2 209°26.1 36.0 156°45.9 34.8 269°13.6 31.1  Mars 286°24.4 09:03  Jupiter 233°14.8 12:34  Saturn 345°30.0 05:06  Horizontal parallax  Venus: 0.2  Mars: 0.1													-
18	16										Venus	$196^{\circ}54.5$	15:01
18											Mars	286°24.4	09:03
19 223°34.4 59°42.0 46.0 149°23.6 35.2 96°38.4 35.3 209°03.8 31.1 20 238°36.8 74°42.0 44.8 164°24.2 35.4 111°40.3 35.2 224°06.2 31.1 21 253°39.3 89°42.0 · 43.6 179°24.9 · 35.6 126°42.2 · 35.0 239°08.7 · 31.1 22 268°41.8 104°42.0 42.4 194°25.5 35.8 141°44.0 34.9 254°11.1 31.1 21.1 23°30.3 11.1 Venus: 0.2 23°34.4 119°42.0 41.2 209°26.1 36.0 156°45.9 34.8 269°13.6 31.1	17	208°31.9	44°42.0	N07°47.2	134°23.0	N22°34.9	81°36.5	N19°35.4	194°01.4	N03°31.1			
20 238°36.8 74°42.0 44.8 164°24.2 35.4 111°40.3 35.2 224°06.2 31.1 21 253°39.3 89°42.0 · 43.6 179°24.9 · 35.6 126°42.2 · 35.0 239°08.7 · 31.1 22 268°41.8 104°42.0 42.4 194°25.5 35.8 141°44.0 34.9 254°11.1 31.1 23 283°44.2 119°42.0 41.2 209°26.1 36.0 156°45.9 34.8 269°13.6 31.1 Mars: 0.1		00000011	59°42.0	46.0	149°23.6	35.2		35.3	209°03.8	31.1			
21       253°39.3       89°42.0       · · 43.6       179°24.9       · · 35.6       126°42.2       · · 35.0       239°08.7       · · 31.1       Horizontal parallax         22       268°41.8       104°42.0       42.4       194°25.5       35.8       141°44.0       34.9       254°11.1       31.1       Venus: 0.2         23       283°44.2       119°42.0       41.2       209°26.1       36.0       156°45.9       34.8       269°13.6       31.1       Mars: 0.1	18	223°34.4											
22       268°41.8       104°42.0       42.4       194°25.5       35.8       141°44.0       34.9       254°11.1       31.1       Venus: 0.2         23       283°44.2       119°42.0       41.2       209°26.1       36.0       156°45.9       34.8       269°13.6       31.1       Mars: 0.1	18 19		74°42.0	44.8	164°24.2	35.4	111 40.5	35.2	224 00.2	31.1			
23 283°44.2 119°42.0 41.2 209°26.1 36.0 156°45.9 34.8 269°13.6 31.1 Mars: 0.1	18 19 20	238°36.8									Horizont	al parallax	
25 255 11.2 115 12.0 12.2 255 25.1 35.0 155 15.5 31.0 255 15.5	18 19 20 21	238°36.8 253°39.3	89°42.0	• • 43.6	$179^{\circ}24.9$	• • 35.6	126°42.2	•• 35.0	239°08.7	• • 31.1	Horizont	•	0.2
Mer.pass. 04:08 $\nu$ -0.0′ $d$ -1.2′ m-4.17 $\nu$ 0.6′ $d$ 0.2′ m1.31 $\nu$ 1.9′ $d$ -0.1′ m-1.79 $\nu$ 2.4′ $d$ 0.0′ m0.69	18 19 20 21 22	238°36.8 253°39.3 268°41.8	89° 42.0 104° 42.0	· · 43.6 42.4	179°24.9 194°25.5	· · 35.6 35.8	126°42.2 141°44.0	· · 35.0 34.9	239°08.7 254°11.1	· · 31.1 31.1	Horizont	Venus:	

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°26.4	N21°03.3	$131^{\circ}11.5$	13.0'	N05°13.6	-15.9'	58.2'
1	193°26.4	02.8	145°43.5	13.0'	04°57.7	-15.9'	58.2'
2	208°26.3 223°26.3	02.4	160°15.5 174°47.6	13.1' 13.2'	04°41.8 04°25.9	-15.9' -15.9'	58.1' 58.1'
4	238°26.2	01.5	189°19.8	13.2'	04°25.9	-15.9'	58.1
5	253°26.2	01.1	203°52.0	13.3'	03°54.1	-15.9'	58.0'
6	268°26.1	N21°00.6	218°24.3	13.4'	N03°38.2	-15.9'	58.0'
7	283°26.1	21°00.2	232°56.7	13.4'	03°22.3	-15.9'	58.0'
8 9	298°26.0 313°26.0	20°59.8 •• 59.3	247°29.1 262°01.5	13.5' 13.5'	03°06.4 02°50.5	-15.9' -15.9'	57.9' 57.9'
10	328°25.9	58.9	276°34.1	13.6'	02°34.7	-15.9'	57.8'
11	343°25.9	58.4	291°06.6	13.6'	02°18.8	-15.8'	57.8'
12	358°25.8	N20°58.0	305°39.3	13.7'	N02°03.0	-15.8'	57.8'
13 14	13°25.8 28°25.7	57.5 57.1	320°11.9 334°44.7	13.7' 13.8'	01°47.1 01°31.3	-15.8' -15.8'	57.7' 57.7'
14 15	28 25.7 43°25.7	56.7	334 44.7 349°17.5	13.8	01 31.3 01°15.5	-15.8'	57.6'
16	58°25.6	56.2	3°50.3	13.9'	00°59.7	-15.8'	57.6'
17	73°25.6	55.8	18°23.2	13.9'	00°44.0	-15.7'	57.6'
18	88°25.5	N20°55.3	32°56.1	14.0'	N00°28.2	-15.7'	57.5'
19 20	103°25.5 118°25.5	54.9 54.4	47°29.1 62°02.1	14.0' 14.1'	N00°12.5 S00°03.2	-15.7' 15.7'	57.5' 57.4'
21	133°25.4	• • 54.0	76°35.1	14.1	00°18.9	15.7'	57.4'
22	148°25.4	53.5	91°08.2	14.1'	00°34.6	15.6'	57.4'
23	163°25.3	53.1	105°41.4	14.2'	00°50.2	15.6'	57.3'
	SD = 15.7'	d = -0.4'		SI	O = 15.9'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°25.3	N20°52.6	$120^{\circ}14.5$	14.2'	S01°05.8	15.6'	57.3'
1	193°25.2 208°25.2	52.2	134°47.7 149°21.0	14.2'	01°21.4	15.6'	57.3'
2	208°25.2 223°25.1	51.7 •• 51.3	149°21.0 163°54.3	14.3' 14.3'	01°36.9 01°52.5	15.5' 15.5'	57.2' 57.2'
4	238°25.1	50.8	178°27.6	14.3'	01°08.0	15.5'	57.2°
5	253°25.1	50.4	193°00.9	14.4'	02°23.4	15.4'	57.1'
6	268°25.0	N20°49.9	207°34.3	14.4'	S02°38.9	15.4'	57.1'
7	283°25.0 298°24.9	49.4 49.0	222°07.7 236°41.1	14.4' 14.4'	02°54.3 03°09.6	15.4' 15.3'	57.0' 57.0'
8 9	298 24.9 313°24.9	49.0 • • 48.5	250 41.1 251°14.5	14.4 14.5'	03 09.6 03°25.0	15.3'	57.0'
10	328°24.9	48.1	265°48.0	14.5'	03°40.3	15.3'	56.9'
11	343°24.8	47.6	$280^{\circ}21.5$	14.5'	03°55.5	15.2'	56.9'
12	358°24.8	N20°47.2	294°55.0	14.5'	S04°10.8	15.2'	56.8'
13 14	13°24.7 28°24.7	46.7 46.2	309°28.5 324°02.1	14.6' 14.6'	04°25.9 04°41.1	15.1' 15.1'	56.8' 56.8'
15	43°24.7	• • 45.8	338°35.7	14.6'	04°56.2	15.1	56.7
16	58°24.6	45.3	353°09.2	14.6'	05°11.3	15.0'	56.7'
17	73°24.6	44.9	7°42.9	14.6'	05°26.3	15.0'	56.7'
18 19	88°24.5 103°24.5	N20°44.4 43.9	22°16.5 36°50.1	14.6' 14.6'	\$05°41.3 05°56.2	14.9' 14.9'	56.6' 56.6'
20	118°24.5	43.5	51°23.7	14.7'	06°11.1	14.9'	56.6
21	133°24.4	• • 43.0	65°57.4	14.7'	06°26.0	14.8'	56.5'
22	148°24.4	42.5	80°31.1	14.7'	06°40.8	14.8'	56.5'
23	163°24.3	$\frac{42.1}{d = -0.5'}$	95°04.7	14.7'	06°55.5	14.7'	56.4'
	SD = 15.7'	d = -0.5'		SL	O = 15.6'		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0 1	178°24.3 193°24.3	N20°41.6 41.1	109°38.4 124°12.1	14.7' 14.7'	\$07°10.2 07°24.9	14.7' 14.6'	56.4' 56.4'
2	208°24.2	40.7	138°45.8	14.7'	07°24.9	14.6	56.3
3	223°24.2	• • 40.2	153°19.5	14.7'	07°54.1	14.5'	56.3'
4	238°24.2	39.7	167°53.2	14.7'	08°08.6	14.5'	56.3'
5 6	253°24.1 268°24.1	39.3 N20°38.8	182°26.9 197°00.6	14.7' 14.7'	08°23.0 \$08°37.4	14.4' 14.4'	56.2' 56.2'
7	283°24.0	38.3	211°34.3	14.7'	08°51.8	14.4	56.2'
8	298°24.0	37.9	226°08.0	14.7'	09°06.1	14.2'	56.1'
9	313°24.0	• • 37.4	240°41.6	14.7'	09°20.3	14.2'	56.1'
10 11	328°23.9 343°23.9	36.9 36.4	255°15.3 269°49.0	14.7' 14.7'	09°34.5 09°48.7	14.1' 14.1'	56.1' 56.0'
11	343°23.9 358°23.9	36.4 N20°36.0	269°49.0 284°22.7	14.7'	09°48.7 \$10°02.7	14.1	56.0'
13	13°23.8	35.5	298°56.3	14.7'	10°16.7	14.0'	56.0'
14	28°23.8	35.0	313°30.0	14.6'	10°30.7	13.9'	55.9'
15 16	43°23.8 58°23.7	• • 34.6	328°03.7	14.6' 14.6'	10°44.6	13.8'	55.9'
16 17	58°23.7 73°23.7	34.1 33.6	342°37.3 357°10.9	14.6′ 14.6′	10°58.4 11°12.2	13.8' 13.7'	55.9' 55.8'
18	88°23.7	N20°33.1	11°44.5	14.6'	\$11°25.9	13.7	55.8'
19	103°23.6	32.6	26°18.1	14.6'	11°39.6	13.6'	55.8'
20	118°23.6	32.2	40°51.7	14.6'	11°53.2	13.5'	55.8'
21 22	133°23.6 148°23.5	· · 31.7 31.2	55°25.3 69°58.8	14.6' 14.5'	12°06.7 12°20.2	13.5' 13.4'	55.7' 55.7'
23	146 23.5 163°23.5	30.7	84°32.4	14.5'	12°20.2	13.4	55.7'
	SD = 15.7'	d = -0.5'		SI	D = 15.4'		

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

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	298°46.7	134°42.0	N07°40.0	224° 26.7	N22°36.2	171°47.8	N19°34.7	284°16.0	N03°31.1			
1	313°49.2	149°42.0	38.8	239° 27.3	36.5	171 47.8 186°49.7	34.7	299°18.4	31.1	Alpheratz	357°33.3	29°14.2
2	313 49.2 328°51.6	149 42.0 164°42.0		259 27.5 254° 27.9	36.7	201°51.6	34.5	314°20.9	31.1	Ankaa	353°05.7	-42°09.4
			37.7							Schedar	349°29.4	56°40.8
3	343°54.1	179°42.0	• • 36.5	269° 28.5	• • 36.9	216°53.5	• • 34.3	329°23.3	· · 31.1	Diphda	348°45.9	-17°50.2
4	358° 56.6	194°42.1	35.3	284°29.1	37.1	231°55.4	34.1	344°25.7	31.1	Achernar	335°19.2	-57°05.7
5	13°59.0	209°42.1	34.1	299°29.8	37.3	246°57.3	34.0	359°28.2	31.1	Hamal	327°49.8	23°35.3
6	29°01.5	224°42.1	N07°32.9	314°30.4	N22°37.5	261°59.2	N19°33.9	14°30.6	N03°31.1	Polaris	313°31.8	89°22.2
7	44°03.9	239°42.1	31.7	329°31.0	37.8	277°01.1	33.8	29°33.1	31.1	Acamar	315°10.9	-40°11.6
8	59°06.4	254°42.1	30.5	344°31.6	38.0	292°03.0	33.6	44°35.5	31.1	Menkar	$314^{\circ}04.9$	4°11.7
9	74°08.9	269°42.1	• • 29.3	359°32.2	• • 38.2	307° 04.9 322° 06.8	• • 33.5	59°37.9	· · 31.1	Mirfak	308°26.6	49°57.2
10	89°11.3	284°42.1	28.2	14°32.8	38.4	322 06.8 337°08.7	33.4	74°40.4	31.1	Aldebaran	290°38.4	16°33.8
11	104° 13.8 119° 16.3	299°42.1	27.0	29°33.4 44°34.1	38.6		33.2	89°42.8 104°45.2	31.1	Rigel	$281^{\circ}02.9$	-8°10.1
12	119 10.3 134° 18.7	314° 42.1 329° 42.2	N07°25.8	59° 34.7	N22°38.8	352°10.6	N19°33.1	104 45.2 119°47.7	N03°31.1	Capella	280°20.4	46°01.4
13	134 18.7 149°21.2		24.6	59 34.7 74°35.3	39.0 39.3	7° 12.5 22° 14.4	33.0 32.9	119 47.7 134°50.1	31.1	Bellatrix	278°21.8	6°22.5
14 15	164° 23.7	344° 42.2 359° 42.2	23.4 •• 22.2	89° 35.9	39.5	37° 16.2	32.9	134 50.1 149°52.6	31.1 · · 31.1	Elnath	278°00.6	28°37.7
16	179° 26.1	14°42.2	21.0	104°36.5	39.7	52° 18.1	32.6	164°55.0	31.1	Alnilam	275°36.7	$-1^{\circ}11.0$
17	179 20.1 194° 28.6	29°42.2	19.8	119° 37.1	39.7	67°20.0	32.5	179°57.4	31.1	Betelgeuse	$270^{\circ}51.0$	7°24.8
18	209° 31.0	44°42.2	N07°18.6	119 37.1 134° 37.7	39.9 N22°40.1	82°21.9	N19°32.3	179 57.4 194°59.9	N03°31.0	Canopus	263°52.3	-52°42.4
19	209 31.0 224° 33.5	59°42.3	17.4	134 37.7 149°38.4	40.1	97°23.8	32.2	210°02.3	31.0	Sirius	258°25.4	-16°45.1
20	239° 36.0	74°42.3	16.2	164° 39.0	40.5	97 25.8 112°25.7	32.2	210 02.3 225°04.8	31.0	Adhara	255°05.2	-29°00.4
21	254° 38.4	89°42.3	15.0	104 39.0 179°39.6	• • 40.5	112 25.7 127° 27.6	31.9	240°07.2	31.0	Procyon	244°49.8	5°09.5
21	254 38.4 269°40.9	89 42.3 104°42.3	13.9	179 39.6 194°40.2	40.7	127 27.6 142°29.5	31.8	240 07.2 255°09.6	31.0	Pollux	$243^{\circ}16.1$	27°57.7
23	209 40.9 284°43.4	104 42.3 119°42.4	13.9	209° 40.8	40.9	142 29.5 157°31.4	31.6	270°12.1	31.0	Avior	234°14.9	-59°35.7
										Suhail	222°45.8	-43°32.4
Mer.p	ass. 04:04	$ u 0.0' \ d-1$	.2′ m-4.18	$ u$ 0.6 $^{\prime}$ d0	.2′ m1.31	$\nu 1.9' \ d$ -0	$.1^\prime$ m-1.79	$\nu$ 2.4′ d-0	.0′ m0.69	Miaplacidus	221°38.9	-69°49.7
										Alphard	217°46.8	-8°46.4
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.4	11°50.3
oved 0	299° 45.8	134°42.4	N07°11.5	224°41.4	N22°41.4	172°33.3	N19°31.6	285°14.5	N03°31.0	Dubhe	193°39.9	61°36.7
1	299 45.8 314°48.3	134 42.4 149°42.4	10.3	224 41.4 239°42.0	N22 41.4 41.6	172 33.3 187°35.2	31.4	285 14.5 300°17.0	31.0	Denebola	182°23.8	14°25.5
2	314 46.3 329°50.8	149 42.4 164°42.4	09.1	254° 42.7	41.8	202°37.1	31.4	315°19.4	31.0	Gienah	175°42.4	-17°41.4
3	344°53.2	179°42.4	•• 07.9	269° 43.3	• • 42.0	202 37.1 217°39.0	31.3	330°21.8	31.0		172°58.9	-63°15.1
4	359° 55.7	179 42.4 194°42.5	06.7	284° 43.9	42.0	217 39.0 232°40.9	31.0	345°24.3	31.0		171°50.4	-57°16.0
5	14° 58.2	209°42.5	05.5	299° 44.5	42.4	247°42.8	30.9	0°26.7	31.0	Alioth	166°12.0	55°49.2
6	30°00.6	209° 42.5	N07°04.3	314°45.1	N22°42.6	262°44.7	N19°30.8	15°29.2	N03°31.0	Spica	158°21.0	-11°18.0
7	45°03.1	239°42.5	03.1	329° 45.7	42.8	277°46.6	30.6	30°31.6	31.0	Alkaid	152°51.0	49°11.1
8	60°05.5	254°42.6	01.9	344°46.3	43.0	292°48.4	30.5	45°34.1	31.0	Hadar	148°34.1	-60°30.4
9	75°08.0	269°42.6	07°00.7	359°47.0	• • 43.2	307°50.3	30.4	60°36.5	31.0		147°56.1	-36°30.2
10	90° 10.5	284°42.6	06°59.5	14°47.6	43.4	322°52.2	30.4	75°38.9	31.0	Arcturus	145°46.7	19°02.8
11	105° 12.9	299°42.7	58.3	29°48.2	43.6	337°54.1	30.1	90°41.4	31.0	Rigil Kent.	139°38.4	-60°57.0
12	120° 15.4	314°42.7	N06°57.1	44°48.8	N22°43.8	352°56.0	N19°30.0	105°43.8	N03°31.0	Kochab	137°19.5	74°03.0
13	135° 17.9	329°42.7	55.9	59°49.4	44.0	7°57.9	29.9	120°46.3	31.0	Zuben'ubi	136°54.5	-16°09.2
14	150° 20.3	344°42.7	54.7	74°50.0	44.2	22°59.8	29.7	135°48.7	31.0	Alphecca	126°02.5	26°37.7
15	165°22.8	359°42.8	53.6	89°50.7	• • 44.4	38°01.7	• • 29.6	150°51.2	31.0	Antares	112°14.0	-26°29.5
16	180°25.3	14°42.8	52.4	104°51.3	44.6	53°03.6	29.5	165°53.6	31.0	Atria	107°06.7	-69°04.7
17	195°27.7	29°42.8	51.2	119°51.9	44.8	68° 05.5	29.3	180°56.0	31.0	Sabik	102°01.0	-15°45.5
18	210°30.2	44°42.9	N06°50.0	134°52.5	N22°45.0	83°07.4	N19°29.2	195°58.5	N03°31.0	Shaula	96°08.3	-37°07.4
19	225°32.7	59°42.9	48.8	149°53.1	45.2	98°09.3	29.1	211°00.9	31.0	Rasalhague	95°57.1	12°32.5
20	240°35.1	74°42.9	47.6	164°53.7	45.4	113° 11.2	29.0	226°03.4	31.0	Eltanin	90°41.1	51°29.2
21	255° 37.6	89°43.0	• • 46.4	179°54.3	• • 45.6	128° 13.1	28.8	241°05.8	• • 31.0	Kaus Aust.	83°30.4	-34°22.3
22	270°40.0	104°43.0	45.2	194°55.0	45.8	143° 15.0	28.7	256°08.3	31.0	Vega	80°32.0	38°48.6
23	285°42.5	119°43.0	44.0	209°55.6	46.0	158° 16.9	28.6	271°10.7	30.9	Nunki	75°45.8	-26°15.8
										Altair	61°58.4	8°56.4
Mer.p	ass. 04:00	$\nu$ 0.0′ d-1	.2′ m-4.19	u0.6′ d0	.2′ m1.30	$\nu 1.9' \ d-0$	$.1^\prime$ m-1.79	$\nu$ 2.4′ d-0	.0′ m0.68	Peacock	53°03.1	-56°38.8
										Deneb	49°24.5	45°22.5
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.2	9°59.9
0	300°45.0	134°43.1	N06°42.8	224° 56.2	N22°46.2	173° 18.8	N19°28.4	286°13.1	N03°30.9	Al Na'ir	27°30.9	-46°49.7
1	315°47.4	149°43.1	41.6	239°56.8	46.4	188° 20.6	28.3	301°15.6	30.9	Fomalhaut	15°12.8	-29°28.7
2	330°49.9	164°43.2	40.4	254° 57.4	46.6	203°22.5	28.2	316°18.0	30.9	Scheat	13°43.7	28°13.6
3	345°52.4	179°43.2	39.2	269°58.0	• • 46.8	218° 24.4	28.0	331°20.5	30.9	Markab	13°28.4	15°20.9
4	0°54.8	194°43.2	38.0	284°58.7	47.0	233°26.3	27.9	346°22.9	30.9	Jul 21 Tue	SHA	Mer.pass
5	15° 57.3	209°43.3	36.8	299°59.3	47.2	248°28.2	27.8	1°25.4	30.9		195°55.3	15:01
6	30°59.8	224°43.3	N06°35.6		N22°47.4	263°30.1	N19°27.6	16°27.8	N03°30.9		285°40.0	09:02
7	46°02.2	239°43.4	34.4	330°00.5	47.6	278° 32.0	27.5	31°30.3	30.9		233°01.1	12:31
8	61°04.7	254°43.4	33.2	345°01.1	47.8	293°33.9	27.4	46°32.7	30.9	Saturn	345°29.3	05:02
9	76°07.1	269°43.4	32.0	0°01.7	• • 48.0	308° 35.8	27.3	61°35.2	30.9			
10	91°09.6	284°43.5	30.8	15°02.3	48.2	323°37.7	27.1	76°37.6	30.9	Jul 22 Wed	SHA	Mer.pass
11	106° 12.1	299°43.5	29.6	30°03.0	48.4	338° 39.6	27.0	91°40.0	30.9		194°56.5	15:01
12	121° 14.5	314°43.6	N06°28.4	45°03.6	N22°48.6	353°41.5	N19°26.9	106°42.5	N03°30.9		284°55.6	09:01
13	136° 17.0	329°43.6	27.2	60°04.2	48.8	8°43.4	26.7	121°44.9	30.9		232°47.5	12:28
14	151° 19.5	344°43.7	26.0	75°04.8	49.0	23°45.3	26.6	136°47.4	30.9	Saturn	345°28.7	04:58
15	166°21.9	359°43.7	24.8	90°05.4	• • 49.2	38° 47.2	26.5	151°49.8	30.9	Jul 23 Thu	SHA	Mer.pass
16	181°24.4	14°43.7	23.6	105°06.0	49.4	53°49.1	26.3	166°52.3	30.9		193°58.1	15:01
17	196°26.9	29°43.8	22.4	120°06.7	49.6	68°51.0	26.2	181°54.7	30.9		284°11.2	09:00
18	211°29.3	44°43.8	N06°21.2	135°07.3	N22°49.8	83°52.8	N19°26.1	196°57.2			232°33.8	12:25
19	226°31.8	59°43.9	20.0	150°07.9	50.0	98° 54.7	25.9	211°59.6	30.8		345°28.2	04:54
20	241°34.3	74°43.9	18.8	165°08.5	50.2	113° 56.6	25.8	227°02.1	30.8			JJ !
21	256° 36.7	89°44.0	• • 17.6	180°09.1	• • 50.4	128° 58.5	• • 25.7	242°04.5	30.8	Horizont	al parallax	
22	271°39.2	104°44.0	16.4	195°09.7	50.6	144°00.4	25.5	257°07.0	30.8		Venus:	0.2
23	$286^{\circ}41.6$	$119^{\circ}44.1$	15.2	210°10.4	50.7	159°02.3	25.4	272°09.4	30.8		Mars:	0.1
			.2′ m-4.20		.2′ m1.30		.1′ m-1.79				·	
ivier.p	ass. 03:56	$\nu$ 0.0° $a$ -1	.∠ 111-4.∠U	$\nu$ 0.0' $a$ 0	.∠ 1111.30	ν1.9 a-0	.т пі-т./9	ν2.4° α-υ	.0′ m0.68			

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°23.5	N20°30.3	99°05.9	14.5'	<b>S</b> 12°46.9	13.3'	55.6'
1	193°23.4	29.8	113°39.4	14.5'	13°00.1	13.2'	55.6'
2 3	208°23.4 223°23.4	29.3 •• 28.8	128°12.9 142°46.3	14.5' 14.4'	13°13.3 13°26.5	13.1' 13.1'	55.6' 55.5'
4	238° 23.3	28.3	157°19.8	14.4'	13°39.5	13.0'	55.5'
5	253°23.3	27.8	$171^{\circ}53.2$	14.4'	13°52.5	12.9'	55.5'
6	268°23.3	N20°27.4	186°26.5	14.4'	\$14°05.4	12.8'	55.5'
7 8	283°23.2 298°23.2	26.9 26.4	200°59.9 215°33.2	14.3' 14.3'	14°18.3 14°31.0	12.8' 12.7'	55.4' 55.4'
9	313°23.2	25.9	230°06.6	14.3'	14° 43.7	12.6'	55.4'
10	328° 23.2	25.4	244°39.8	14.3'	14°56.4	12.6'	55.4'
11	343°23.1	24.9	259°13.1	14.2'	15°08.9	12.5'	55.3'
12 13	358°23.1 13°23.1	N20°24.4 24.0	273°46.3 288°19.5	14.2' 14.2'	\$15°21.4 15°33.8	12.4' 12.3'	55.3' 55.3'
14	28° 23.0	23.5	302°52.7	14.1'	15°46.1	12.2'	55.2'
15	43°23.0	• • 23.0	$317^{\circ}25.8$	14.1'	15°58.4	12.2'	55.2'
16	58°23.0	22.5	331°58.9	14.1'	16°10.5	12.1'	55.2'
17 18	73°23.0 88°22.9	22.0 N20°21.5	346°32.0 1°05.0	14.0' 14.0'	16°22.6 \$16°34.6	12.0' 11.9'	55.2' 55.1'
19	103° 22.9	21.0	15°38.0	14.0'	16°46.6	11.9'	55.1'
20	118°22.9	20.5	30°10.9	13.9'	16°58.4	11.8'	55.1'
21	133°22.9	• • 20.0	44°43.9	13.9'	17°10.2	11.7'	55.1'
22 23	148°22.8 163°22.8	19.5 19.1	59°16.8 73°49.6	13.9' 13.8'	17°21.9 17°33.5	11.6' 11.5'	55.0' 55.0'
23			13 45.0			11.5	33.0
	SD = 15.7'	d = -0.5'		SL	0 = 15.2'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°22.8	N20°18.6	88°22.4	13.8'	\$17°45.0	11.4'	55.0'
1 2	193°22.8 208°22.7	18.1 17.6	102°55.2 117°27.9	13.7' 13.7'	17°56.5 18°07.8	11.4' 11.3'	55.0' 55.0'
3	208 22.7 223°22.7	17.0	117 27.9 132°00.6	13.7'	18 07.8 18°19.1	11.3	55.0 54.9'
4	238° 22.7	16.6	146°33.3	13.6'	18°30.3	11.1'	54.9'
5	253° 22.7	16.1	161°05.9	13.6'	18°41.4	11.0'	54.9'
6	268°22.6 283°22.6	N20°15.6	175°38.5 190°11.0	13.5' 13.5'	\$18°52.4 19°03.3	10.9'	54.9'
7 8	283 22.6 298°22.6	15.1 14.6	190 11.0 204°43.5	13.4	19 03.3 19°14.1	10.8' 10.7'	54.8' 54.8'
9	313°22.6	•• 14.1	219°15.9	13.4'	19°24.9	10.7'	54.8'
10	328° 22.5	13.6	233°48.3	13.4'	19°35.5	10.6'	54.8'
11	343°22.5 358°22.5	13.1 N20°12.6	248°20.7 262°53.0	13.3' 13.3'	19°46.1 \$19°56.6	10.5'	54.8' 54.7'
12 13	13° 22.5	12.1	202 53.0 277°25.2	13.3	20°07.0	10.4' 10.3'	54.7' 54.7'
14	28° 22.4	11.6	291°57.4	13.2'	20°17.2	10.2'	54.7'
15	43°22.4	• • 11.1	306°29.6	13.1'	20°27.4	10.1'	54.7'
16 17	58°22.4 73°22.4	10.6 10.1	321°01.7 335°33.8	13.1' 13.0'	20°37.5 20°47.5	10.0' 9.9'	54.7' 54.6'
18	88° 22.4	N20°09.6	350°05.9	13.0'	\$20°57.4	9.8'	54.6'
19	103°22.3	09.1	4°37.8	12.9'	21°07.3	9.7'	54.6'
20	118°22.3	08.6	19°09.8		21°17.0		54.6'
21 22	133°22.3 148°22.3	· · 08.0 07.5	33°41.7 48°13.5	12.8' 12.8'	21°26.6 21°36.1	9.5' 9.4'	54.6' 54.6'
23	163°22.3	07.5	62°45.3	12.7'	21°45.5	9.4	54.5
	SD = 15.7'	d = -0.5'		SF	0 = 15.0'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0 1	178° 22.2 193° 22.2	N20°06.5 06.0	77°17.0 91°48.7	12.7' 12.6'	\$21°54.8 22°04.1	9.2' 9.1'	54.5' 54.5'
2	208° 22.2	05.5	106°20.4	12.6'	22°13.2	9.1	54.5'
3	223°22.2	• • 05.0	120°51.9	12.5'	22°22.2	8.9'	54.5'
4	238° 22.2	04.5	135°23.5	12.5'	22°31.1	8.8'	54.5'
5 6	253°22.1 268°22.1	04.0 N20°03.5	149°55.0 164°26.4	12.4' 12.4'	22°39.9 <b>S</b> 22°48.6	8.7' 8.6'	54.4' 54.4'
7	283°22.1	02.9	178°57.8	12.3'	22°57.2	8.5'	54.4
8	298° 22.1	02.4	193°29.2	12.3'	23°05.7	8.4'	54.4'
9	313°22.1	• • 01.9	208°00.4	12.2'	23°14.1	8.3'	54.4'
10 11	328°22.1 343°22.0	01.4 00.9	222°31.7 237°02.9	12.2' 12.1'	23°22.4 23°30.6	8.2' 8.1'	54.4' 54.4'
12	358°22.0	N20°00.4	251°34.0	12.1'	\$23°38.6	8.0'	54.3
13	13°22.0	19°59.9	266°05.1	12.0'	23°46.6	7.8'	54.3'
14	28°22.0	59.3	280°36.1 295°07.1	12.0'	23°54.4	7.7'	54.3'
15 16	43°22.0 58°22.0	· · 58.8 58.3	295°07.1 309°38.1	11.9' 11.9'	24°02.2 24°09.8	7.6' 7.5'	54.3' 54.3'
17	73°21.9	57.8	324°09.0	11.8'	24° 17.3	7.4	54.3'
18	88°21.9	N19°57.3	338°39.8	11.8'	S24°24.7	7.3'	54.3'
19	103°21.9 118°21.9	56.8	353°10.6 7°41.3	11.7'	24°32.0 24°39.2	7.2'	54.3'
20 21	118°21.9 133°21.9	56.2 •• 55.7	7°41.3 22°12.0	11.7' 11.6'	24°39.2 24°46.3	7.1' 7.0'	54.2' 54.2'
22	148°21.9	55.2	36°42.6	11.6'	24°53.2	6.8	54.2'
23	163°21.9	54.7	51°13.2	11.5'	25°00.1	6.7'	54.2'
	SD = 15.7'	d = -0.5'	-	SE	0 = 14.9'		

			2026	July 21	l to Ju	l. 23 l
Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
<b>N</b> 72°						
<b>N</b> 70°						
68°	////	////	01:14	22:52	////	////
66°	////	////	02:05	22:04	////	////
64°	////	////	02:37	21:34	////	////
62°	////	01:31	03:00	21:12	22:38	////
60°	////	02:08	03:18	20:54	22:03	////
N 58°	////	02:33	03:33	20:39	21:38	////
56°	01:23	02:53	03:46	20:26	21:18	22:46
54°	01:57	03:09	03:57	20:15	21:02	22:14
52°	02:21	03:23	04:07	20:05	20:49	21:50
50°	02:39	03:35	04:16	19:56	20:37	21:32
45°	03:14	03:59	04:34	19:38	20:13	20:58
<b>N</b> 40°	03:39	04:18	04:49	19:23	19:54	20:33
35°	03:59	04:34	05:02	19:11	19:39	20:14
30°	04:15	04:47	05:13	19:00	19:26	19:58
20°	04:40	05:08	05:32	18:41	19:05	19:33
N 10°	04:59	05:25	05:48	18:25	18:47	19:14
0°	05:15	05:41	06:03	18:10	18:32	18:58
<b>S</b> 10°	05:30	05:55	06:18	17:55	18:18	18:43
20°	05:43	06:10	06:34	17:40	18:03	18:30
30°	05:57	06:26	06:52	17:22	17:47	18:17
35°	06:04	06:35	07:02	17:11	17:39	18:10
40°	06:11	06:44	07:14	17:00	17:29	18:02
45°	06:19	06:55	07:28	16:46	17:18	17:54
<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	16:53	17:37
56°	06:41	07:28	08:12	16:02	16:46	17:32
58°	06:46	07:36	08:23	15:51	16:38	17:27
<b>S</b> 60°	06:52	07:45	08:36	15:37	16:29	17:22
Lat.		Moonris	ie		Moonset	:
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°	16:09			19:20		
<b>N</b> 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
VI EOO	12.25	15.00	16.20	22.02	22.00	22.21

Lat.		Moonris	e		Moonset	:
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°	16:09			19:20		
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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° 40°	11:00	11:29	12:03	00:00	01:00	02:01
40° 45°	10:51 10:41	11:17 11:03	11:48 11:30	00:07 00:16	01:11 01:24	02:15 02:32
<b>S</b> 50°	10:28	10:46	11:08	00:27	01:40	02:53
52° 54°	10:22	10:38	10:57	00:32	01:48	03:03
54°	10:16 10:09	10:29	10:45 10:32	00:38 00:44	01:56 02:06	03:14
58°	10:09	10:18 10:07	10:32	00:44	02:06	03:27 03:43
<b>S</b> 60°	09:52	09:54	09:57	00:51	02:17	03:43
3 00	09.32	05.54	09.31	00.59	04.49	04.01

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

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

h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Fri _	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	301°44.1	134°44.1	N06° 14.0	225°11.0	N22°50.9	174°04.2	N19°25.3	287°11.9	N03°30.8			
1	316°46.6	149°44.2	12.8	240°11.6	51.1	189°06.1	25.2	302°14.3	30.8	Alpheratz	357°33.3	29°14.2
2	331°49.0	164°44.2	11.6	255°12.2	51.3	204°08.0	25.0	317°16.8	30.8	Ankaa	353°05.7	-42°09.4
3	346°51.5	179°44.3	. 10.4	270°12.8	51.5	219°09.9	24.9	332°19.2	30.8	Schedar	349°29.4	56°40.8
	1°54.0	179 44.3 194°44.3						347°21.7		Diphda	348°45.9	-17°50.2
4			09.2	285°13.4	51.7	234°11.8	24.8		30.8	Achernar	335°19.2	-57°05.7
5	16°56.4	209°44.4	07.9	300°14.1	51.9	249°13.7	24.6	2°24.1	30.8	Hamal	327°49.7	23°35.3
6	31°58.9	224°44.5	N06°06.7	315°14.7	N22°52.1	264°15.6	N19°24.5	17°26.6	N03°30.8	Polaris	313°30.1	89°22.2
7	47°01.4	239°44.5	05.5	330°15.3	52.3	279°17.5	24.4	32°29.0	30.8	Acamar	315° 10.9	-40°11.6
8	62°03.8	254°44.6	04.3	345°15.9	52.5	294°19.4	24.2	47°31.5	30.8	Menkar	314°04.9	4°11.7
9	77°06.3	269°44.6	•• 03.1	$0^{\circ}16.5$	• • 52.6	309°21.3	• • 24.1	62°33.9	• • 30.8	Mirfak	308° 26.6	49°57.2
10	92°08.8	284°44.7	01.9	$15^{\circ}17.1$	52.8	324°23.2	24.0	77°36.4	30.7			
11	107°11.2	299°44.7	06°00.7	30°17.8	53.0	339°25.0	23.8	92°38.8	30.7	Aldebaran	290°38.4	16°33.8
12	122°13.7	314°44.8	N05° 59.5	45°18.4	N22°53.2	354°26.9	N19°23.7	107°41.3	N03°30.7	Rigel	281°02.9	-8°10.1
13	137°16.1	329°44.9	58.3	60°19.0	53.4	9°28.8	23.6	122°43.7	30.7	Capella	280° 20.3	46°01.4
14	152°18.6	344°44.9	57.1	75°19.6	53.6	24°30.7	23.4	137°46.2	30.7	Bellatrix	278°21.8	6°22.5
15	167°21.1	359°45.0	• • 55.9	90°20.2	• • 53.8	39°32.6	. 23.3	152°48.6	30.7	Elnath	278°00.5	28°37.7
	182°23.5	14°45.0								Alnilam	275°36.7	$-1^{\circ}11.0$
16			54.7	105°20.8	53.9	54°34.5	23.2	167°51.1	30.7	Betelgeuse	270°51.0	7°24.8
17	197°26.0	29°45.1	53.5	120°21.5	54.1	69°36.4	23.1	182°53.5	30.7	Canopus	263°52.3	-52°42.4
18	212°28.5	44°45.2	N05°52.3	135°22.1	N22°54.3	84°38.3	N19°22.9	197°56.0	N03°30.7	Sirius	258° 25.4	-16°45.1
19	227°30.9	59°45.2	51.1	150°22.7	54.5	99°40.2	22.8	212°58.4	30.7	Adhara	255°05.2	-29°00.4
20	242°33.4	74°45.3	49.9	165°23.3	54.7	114°42.1	22.7	228°00.9	30.7	l l	244° 49.8	5°09.5
21	257°35.9	89°45.3	• • 48.7	180°23.9	• • 54.9	129°44.0	• • 22.5	243°03.3	• • 30.7	Procyon		
22	272°38.3	104°45.4	47.5	195°24.5	55.0	144°45.9	22.4	258°05.8	30.7	Pollux	243°16.1	27°57.7
23	287°40.8	119°45.5	46.3	210°25.2	55.2	159°47.8	22.3	273°08.2	30.7	Avior	234°14.9	-59°35.7
										Suhail	222°45.8	-43°32.4
Mer.p	ass. 03:52	u0.1′ d-1	.2′ m-4.20	$ u$ 0.6 $^{\prime}$ d0	.2′ m1.30	$\nu 1.9' \ d$ -0	.1' m-1.79	$\nu$ 2.4′ d-0	0.0′ m0.67	Miaplacidus	221°38.9	-69°49.6
										Alphard	217°46.8	-8°46.4
٠.		G114	_	6114	_	6114	_	6114	_	Regulus	207°33.4	11°50.3
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.9	61°36.6
0	302°43.3	134°45.5	N05° 45.0	225°25.8	N22°55.4	174°49.7	N19°22.1	288°10.7	N03°30.6	Denebola	182°23.8	14°25.5
1	317°45.7	149°45.6	43.8	240°26.4	55.6	189°51.6	22.0	303°13.1	30.6	Gienah	175°42.4	-17°41.4
2	332°48.2	164°45.7	42.6	255°27.0	55.8	204°53.5	21.9	318°15.6	30.6	Acrux	172°58.9	-63°15.1
3	347°50.6	179°45.7	• • 41.4	270°27.6	• • 56.0	219°55.4	• • 21.7	333°18.0	• • 30.6		171°50.4	-57°16.0
4	2°53.1	194°45.8	40.2	285°28.3	56.1	234°57.3	21.6	348°20.5	30.6	Alioth	166°12.0	55°49.2
5	17°55.6	209°45.9	39.0	300°28.9	56.3	249°59.1	21.5	3°22.9	30.6	Spica	158°21.0	-11°18.0
6	32°58.0	224°45.9	N05°37.8	315°29.5	N22°56.5	265°01.0	N19°21.3	18°25.4	N03°30.6	Alkaid	152°51.0	49°11.1
7	48°00.5	239°46.0	36.6	330°30.1	56.7	280°02.9	21.2	33°27.8	30.6	Hadar	148°34.1	-60°30.4
8	63°03.0	254°46.1	35.4	345°30.7	56.9	295°04.8	21.1	48°30.3	30.6		147°56.1	-36°30.2
9	78°05.4	269°46.2	• • 34.2	0°31.3	• • 57.0	310°06.7	• • 20.9	63°32.8	• • 30.6		145°46.7	19°02.8
10	93°07.9	284°46.2	33.0	15°32.0	57.2	325°08.6	20.8	78°35.2	30.6		139°38.4	-60°57.0
11	108°10.4	299°46.3	31.8	30°32.6	57.4	340°10.5	20.7	93°37.7	30.6	_	137° 19.6	74°03.0
12	123°12.8	314°46.4	N05°30.6	45°33.2	N22°57.6	355°12.4	N19°20.5	108°40.1	N03°30.6	Kochab		
13	138°15.3	329°46.4	29.3	60°33.8	57.8	10°14.3	20.4	123°42.6	30.5	Zuben'ubi	136°54.5	-16°09.2
14	153°17.8	344°46.5	28.1	75°34.4	57.9	25°16.2	20.3	138°45.0	30.5	Alphecca	126°02.5	26°37.7
15	168°20.2	359°46.6	• • 26.9	90°35.1	• • 58.1	40°18.1	• • 20.1	153°47.5	• • 30.5	Antares	112°14.0 107°06.7	-26°29.5
16	183°22.7	14°46.7	25.7	105°35.7	58.3	55°20.0	20.0	168°49.9	30.5	Atria		-69°04.7
17	198°25.1	29°46.7	24.5	120°36.3	58.5	70°21.9	19.9	183°52.4	30.5	Sabik	102°01.0	-15°45.5
18	213°27.6	44°46.8	N05°23.3	135°36.9	N22°58.6	85°23.8	N19° 19.7	198°54.8	N03°30.5	Shaula	96°08.3	-37°07.4
19	228°30.1	59°46.9	22.1	150°37.5	58.8	100°25.7	19.6	213°57.3	30.5	Rasalhague	95°57.1	12°32.5
20	243°32.5	74°47.0	20.9	165°38.2	59.0	115°27.6	19.5	228°59.8	30.5	Eltanin	90°41.1	51°29.3
21	258°35.0	89°47.1	•• 19.7	180°38.8	• • 59.2	130°29.5	•• 19.3	244°02.2	• • 30.5	Kaus Aust.	83°30.4	-34°22.3
										Vega	80°32.0	38°48.6
22	273°37.5	104°47.1	18.5	195°39.4	59.3	145°31.4	19.2	259°04.7	30.5	Nunki	75°45.8	-26°15.8
23	288°39.9	119°47.2	17.2	210°40.0	59.5	160°33.3	19.1	274°07.1	30.5	Altair	61°58.4	8°56.4
Mer.p	ass. 03:48	$\nu$ 0.1′ d-1	.2′ m-4.21	$\nu$ 0.6′ d0	.2′ m1.30	$\nu 1.9' \ d-0$	.1′ m-1.79	$\nu 2.5' \ d-0$	0.0′ m0.67	Peacock	53°03.1	-56°38.8
										Deneb	49°24.5	45°22.5
										Enif	33°37.2	9°59.9
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.9	-46°49.7
0	303°42.4	134°47.3	N05° 16.0	225°40.6	N22°59.7	175°35.1	$N19^{\circ}19.0$	289°09.6	N03°30.4	Fomalhaut	15° 12.8	-29°28.7
1	318°44.9	149°47.4	14.8	240°41.2	22°59.9	190°37.0	18.8	$304^{\circ}12.0$	30.4	Scheat	13°43.7	28°13.6
2	333°47.3	164°47.5	13.6	255°41.9	23°00.0	205°38.9	18.7	$319^{\circ}14.5$	30.4	Markab	13°28.4	15°21.0
3	348°49.8	179°47.5	• • 12.4	270°42.5	• • 00.2	220°40.8	• • 18.6	334°17.0	• • 30.4	ividikaD	10 20.4	
4	3°52.2	194°47.6	11.2	285°43.1	00.4	235°42.7	18.4	349°19.4	30.4	Jul 24 Fri	SHA	Mer.pass
5	18°54.7	209°47.7	10.0	300°43.7	00.6	250°44.6	18.3	4°21.9	30.4		193°00.0	15:01
6	33°57.2	224°47.8	N05°08.8	315°44.3	N23°00.7	265°46.5	N19° 18.2	19°24.3	N03°30.4	Mars		08:59
7	48°59.6	239°47.9	07.6	330°45.0	00.9	280°48.4	18.0	34°26.8	30.4	Jupiter	232°20.1	12:22
8	64°02.1	254°47.9	06.3	345°45.6	01.1	295°50.3	17.9	49°29.2	30.4	Saturn	345°27.8	04:50
9	79°04.6	269°48.0	05.1	0°46.2	01.2	310°52.2	17.8	64°31.7	30.4			
10	94°07.0	284°48.1	03.1	15°46.8	01.4	325°54.1	17.6	79°34.2	30.4	Jul 25 Sat	SHA	Mer.pass
11	109°09.5	299°48.2	03.9	30°47.4	01.4	340°56.0	17.5	94°36.6	30.3		192°02.3	15:01
										Mars	282°42.5	08:58
12	124°12.0	314°48.3	N05°01.5	45°48.1		355°57.9	N19° 17.4	109°39.1	N03°30.3	Jupiter	232°06.4	12:19
13	139°14.4	329°48.4	05°00.3	60°48.7	01.9	10°59.8	17.2	124°41.5	30.3	Saturn	345°27.4	04:47
14	154°16.9	344°48.5	04°59.1	75°49.3	02.1	26°01.7	17.1	139°44.0	30.3			
15	169°19.4	359°48.6	• • 57.9	90°49.9	02.3	41°03.6	•• 17.0	154°46.4	30.3	Jul 26 Sun	SHA	Mer.pass
16	184°21.8	14°48.6	56.6	105°50.5	02.4	56°05.5	16.8	169°48.9	30.3		191°04.9	15:01
17	199°24.3	29°48.7	55.4	120°51.2	02.6	71°07.4	16.7	184°51.4	30.3		281°58.2	08:57
18	214°26.7	44°48.8	N04°54.2		N23°02.8	86°09.2	N19°16.6	199°53.8	N03°30.3	Jupiter	231°52.8	12:16
19	229°29.2	59°48.9	53.0	150°52.4	02.9	101°11.1	16.4	214°56.3	30.3	Saturn	$345^{\circ}27.2$	04:43
20	244°31.7	74°49.0	51.8	165°53.0	03.1	116°13.0	16.3	229°58.7	30.2			
21	259°34.1	89°49.1	• • 50.6	180°53.6	• • 03.3	131°14.9	• • 16.2	245°01.2	• • 30.2	Horizont	al parallax	
22	274°36.6	104°49.2	49.4	195°54.3	03.4	146°16.8	16.0	260°03.7	30.2		Venus:	0.2
23	289°39.1	119°49.3	48.1	210°54.9	03.6	161°18.7	15.9	275°06.1	30.2		Mars:	0.1
N/a:: :-	ass. 03:45	ηO 1/ J 1	.2′ m-4.22	,,0 6/ J0	.2′ m1.30	,,1 0/ -/ 0	.1′ m-1.78	10 E/ J C	0.0' m0.66			
		7/U I: (I-)	/ 101-4 //	νυ σ' <b>α</b> θ	z mu 50	1/ 1 M (I-U)	. III-I / Ŏ	ν/ 3' α-l	סס.טוזו ט.י			

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°21.8	N19°54.2	65°43.8	11.5'	\$25°06.8	6.6'	54.2'
1	193°21.8	53.6	80°14.3	11.4'	$25^{\circ}13.4$	6.5'	54.2'
2	208°21.8	53.1	94°44.7	11.4'	25°19.9	6.4'	54.2'
3	223°21.8	• • 52.6	109°15.1	11.3'	25°26.2	6.3'	54.2'
4 5	238°21.8 253°21.8	52.1 51.5	123°45.5 138°15.8	11.3' 11.3'	25°32.5 25°38.6	6.1' 6.0'	54.2' 54.1'
6	268°21.8	N19°51.0	150 15.0 152°46.0	11.2'	\$25°44.6	5.9'	54.1
7	283°21.8	50.5	167°16.2	11.2'	25°50.5	5.8'	54.1'
8	298°21.7	50.0	181°46.4	11.1'	25°56.3	5.7'	54.1'
9	313°21.7	• • 49.4	$196^{\circ}16.5$	11.1'	$26^{\circ}02.0$	5.5'	54.1'
10	328°21.7	48.9	210°46.6	11.0'	26°07.5	5.4'	54.1'
11	343°21.7	48.4	225°16.6	11.0'	26°12.9	5.3'	54.1'
12 13	358°21.7 13°21.7	N19° 47.8 47.3	239°46.6 254°16.5	10.9' 10.9'	\$26°18.2 26°23.4	5.2' 5.0'	54.1' 54.1'
14	28°21.7	46.8	268°46.4	10.9	26°28.4	5.0 4.9'	54.1'
15	43°21.7	46.3	283°16.3	10.8	26°33.3	4.8'	54.1'
16	58°21.7	45.7	297°46.1	10.8'	26°38.1	4.7'	54.1'
17	73°21.7	45.2	312°15.9	10.7'	$26^{\circ}42.8$	4.5'	54.1'
18	88°21.6	N19°44.7	326°45.6	10.7'	\$26°47.3	4.4'	54.1'
19	103°21.6	44.1	341°15.3	10.7'	26°51.8	4.3'	54.1'
20 21	118°21.6 133°21.6	43.6 •• 43.1	355°45.0 10°14.6	10.6' 10.6'	26°56.0 27°00.2	4.2' 4.0'	54.0' 54.0'
22	133 21.0 148°21.6	42.5	24°44.2	10.5	27°04.2	4.0 3.9'	54.0'
23	163°21.6	42.0	39°13.8	10.5	27°04.2	3.8'	54.0'
	SD = 15.7'				0 = 14.8'		
	3D = 15.7	d = -0.5'		5L	ν = 14.8′		
Sat	GHA	Dec	<b>GHA</b> 53°43.3	ν 10 Ε'	Dec	d 26'	HP
0 1	178°21.6 193°21.6	N19°41.5 40.9	53°43.3 68°12.7	10.5' 10.4'	\$27°11.9 27°15.6	3.6' 3.5'	54.0' 54.0'
2	208°21.6	40.4	82°42.2	10.4	27°19.1	3.4'	54.0'
3	223°21.6	• • 39.8	97°11.6	10.4'	27°22.5	3.3'	54.0'
4	238°21.6	39.3	111°41.0	10.3'	$27^{\circ}25.7$	3.1'	54.0'
5	253°21.6	38.8	126°10.3	10.3'	27°28.9	3.0'	54.0'
6	268°21.6 283°21.6	N19°38.2	140°39.7 155°08.9	10.3'	\$27°31.9 27°34.7	2.9'	54.0'
7 8	283°21.6 298°21.6	37.7 37.1	169°38.2	10.3' 10.2'	27°34.7 27°37.5	2.7' 2.6'	54.0' 54.0'
9	313°21.6	36.6	184°07.4	10.2'	27°40.1	2.5'	54.0'
10	328°21.5	36.1	198°36.6	10.2'	27°42.6	2.3'	54.0'
11	343°21.5	35.5	213°05.8	10.2'	27°44.9	2.2'	54.0'
12	358°21.5	N19°35.0	227°35.0	10.1'	<b>S</b> 27°47.1	2.1'	54.0'
13	13°21.5	34.4	242°04.1	10.1'	27°49.2	1.9'	54.0'
14	28°21.5 43°21.5	33.9	256°33.2 271°02.3	10.1'	27°51.1 27°52.9	1.8' 1.7'	54.0'
15 16	43°21.5 58°21.5	· · 33.4 32.8	271°02.3 285°31.4	10.1' 10.1'	27°52.9 27°54.6	1.7	54.0' 54.0'
17	73°21.5	32.3	300°00.4	10.0'	27°56.1	1.4'	54.0'
18	88°21.5	N19°31.7	314°29.5	10.0'	\$27°57.5	1.3'	54.0'
19	103°21.5	31.2	328°58.5	10.0'	27°58.8	1.1'	54.0'
20	118°21.5	30.6	343°27.5	10.0'	27°59.9	1.0'	54.0'
21	133°21.5	30.1	357°56.5	10.0'	28°00.9	0.9'	54.0'
22 23	148°21.5 163°21.5	29.5 29.0	12°25.5 26°54.4	10.0' 9.9'	28°01.8 28°02.5	0.7' 0.6'	54.0' 54.0'
23	SD = 15.7'	d = -0.5'	20 34.4		0 = 14.7'	0.0	34.0
	3D = 15.7	a = -0.5		3L	0 = 14.7		
Sun	GHA	Dec	GHA	$\nu$	Dec	d o. r.	HP
0 1	178°21.5 193°21.5	N19°28.4 27.9	41°23.4 55°52.3	9.9' 9.9'	\$28°03.1 28°03.6	0.5' 0.3'	54.0' 54.0'
2	208°21.5	27.3	70°21.2	9.9'	28°03.9	0.3	54.0'
3	223°21.5	26.8	84°50.2	9.9'	28°04.1	0.0'	54.0'
4	238°21.5	26.2	99°19.1	9.9'	28°04.1	-0.1'	54.0'
5	253°21.5	25.7	113°48.0	9.9'	28°04.0	-0.2'	54.0'
6	268°21.5	N19°25.1	128°16.9	9.9'	\$28°03.8	-0.4'	54.0'
7 8	283°21.5 298°21.5	24.6 24.0	142°45.8 157°14.7	9.9' 9.9'	28°03.4 28°03.0	-0.5' -0.6'	54.0' 54.0'
9	298 21.5 313°21.5	23.5	157 14.7 171°43.6	9.9 9.9'	28 03.0 28°02.3	-0.6 -0.8'	54.0'
10	328°21.5	22.9	186°12.5	9.9'	28°01.5	-0.9	54.0'
11	343°21.5	22.4	200°41.4	9.9'	28°00.6	-1.0'	54.0'
12	358°21.5	N19°21.8	215°10.3	9.9'	S27°59.6	-1.2'	54.0'
13	13°21.5	21.2	229°39.2	9.9'	27°58.4	-1.3'	54.0'
14 15	28°21.5 43°21.5	20.7 •• 20.1	244°08.1 258°37.0	9.9' 9.9'	27°57.1 27°55.7	-1.5' -1.6'	54.0' 54.1'
15 16	43°21.5 58°21.5	19.6	258° 37.0 273° 05.9	9.9'	27°55.7 27°54.1	-1.0 -1.7'	54.1'
17	73°21.5	19.0	273 05.9 287°34.9	9.9 9.9'	27°52.4	-1.7 -1.9'	54.1'
18	88°21.5	N19° 18.4	302°03.8	10.0'	\$27°50.5	-2.0'	54.1'
19	103°21.5	17.9	316°32.8	10.0'	27°48.5	-2.1'	54.1'
20	118°21.6	17.3	331°01.7	10.0'	27°46.4	-2.3'	54.1'
21	133°21.6 148°21.6	16.8	345°30.7 359°59.7	10.0'	27°44.1 27°41.7	-2.4'	54.1'
22 23	148°21.6 163°21.6	16.2 15.6	359°59.7 14°28.7	10.0' 10.0'	27°41.7 27°39.2	-2.5' -2.7'	54.1' 54.1'
20						2.1	J 11
	SD = 15.7'	d = -0.5'		5L	0 = 14.7'		

			2026	July 2	4 to Ju	ıl. 26
Lat.	<b>Twi</b> Naut.	<b>light</b> Civil	Sunrise	Sunset	<b>Twi</b> Civil	<b>light</b> Naut
N 72°	INAUL.	CIVII			CIVII	INAUL
N 70°						
68°	////	7///	01:35	22:32	7///	7///
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	////
<b>N</b> 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° 52°	02:06	03:15	04:02	20:10	20:57	22:05
52 50°	02:28 02:45	03:28 03:40	04:11 04:20	20:01 19:53	20:44 20:33	21:43 21:26
45°	03:18	04:03	04:20	19:35	20:33	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	20:30
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
<b>N</b> 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° 40°	06:02 06:09	06:33 06:42	07:00 07:11	17:13 17:02	17:41 17:31	18:11 18:04
45°	06:17	06:53	07:11	16:49	17:31	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
Lat.	Fri	Moonris Sat	e Sun	Fri	Moonset Sat	: Sun
N 72°						-
<b>N</b> 70°		_	_		_	
68°						
66°	_	_				_
64°						
62° 60°	19:07 18:20	19:35	21:30 20:22	21:22 22:10	22:41	22:34 23:42
N 58°			19:47			25.42
56°	17:49 17:26	18:58 18:32	19:47	22:41 23:04	23:18 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
<b>N</b> 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° <b>N</b> 10°	14:49 14:26	15:42 15:18	16:34 16:10	00:59 01:20	01:45 02:08	02:35 02:59
0°	14:05	14:56	15:48	01:40	02:30	02.39
<b>S</b> 10°	13:45	14:34	15:25	02:00	02:50	03:43
20°	13:45	14:34	15:25	02:00	02:51	04:07
30°	12:57	13:43	14:34	02:46	03:42	04:35
$35^{\circ}$	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
4 - 0	12:03	12:45	13:35	03:38	04:39	05:34
45° <b>S</b> 50°	11:37	12.43	13:05	05.50	04.55	06:04

12:33

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04:47

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05:22

05:39

05:59

06:23

06:57

06:19

06:36

06:57

07:22

07:58

 $52^{\circ}$ 

54°

56°

 $58^{\circ}$ 

**S** 60°

11:24

11:09

10:52

10:32

10:06

12:01

11:44

11:24

11:00

10:26

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	304°41.5	134°49.4	N04°46.9	225°55.5	N23°03.8	176°20.6	N19°15.8	290°08.6	N03°30.2			
1	319°44.0	149°49.5	45.7	240°56.1	03.9	170 20.0 191°22.5	15.6	305°11.0	30.2	Alpheratz	357°33.2	29°14.2
2	334°46.5	164° 49.5	44.5	255°56.7	04.1	206°24.4	15.5	320°13.5	30.2	Ankaa	353°05.7	-42°09.4
3	349°48.9	179° 49.7	• • 43.3	270°57.4	. 04.1	200°24.4 221°26.3	• • 15.4	335°16.0	30.2	Schedar	349°29.3	56°40.8
4	4°51.4	194° 49.8	42.1	285°58.0	04.2	236°28.2	15.4	350°18.4	30.2	Diphda	348°45.9	-17°50.2
5	19°53.9	209°49.9	40.9	300°58.6	04.4	250°20.2 251°30.1	15.2	5°20.9	30.2	Achernar	$335^{\circ}19.1$	-57°05.7
6	34°56.3	224° 50.0	N04°39.6	315°59.2	N23°04.7	266°32.0	N19°15.0	20°23.3	N03°30.1	Hamal	327°49.7	23°35.3
7	49°58.8	239°50.1	38.4	330°59.8	04.9	281°33.9	14.8	35°25.8	30.1	Polaris	313°28.4	89°22.2
8	65°01.2	254°50.2	37.2	346°00.5	05.1	296°35.8	14.7	50°28.3	30.1	Acamar	315°10.9	-40°11.6
9	80°03.7	269°50.3	36.0	1°01.1	05.2	311°37.7	• • 14.6	65°30.7	30.1	Menkar	314°04.9	4°11.7
10	95°06.2	284°50.4	34.8	16°01.7	05.4	326°39.6	14.4	80°33.2	30.1	Mirfak	308°26.5	49°57.2
11	110°08.6	299° 50.5	33.6	31°02.3	05.5	341°41.5	14.3	95°35.7	30.1	Aldebaran	290°38.3	16°33.8
12	125°11.1	314° 50.6	N04°32.4	46°02.9	N23°05.7	356°43.4	N19°14.2	110°38.1	N03°30.1	Rigel	281°02.9	-8°10.1
13	140°13.6	329°50.7	31.1	61°03.6	05.9	11°45.3	14.0	125°40.6	30.0	Capella	280°20.3	46°01.3
14	155°16.0	344°50.8	29.9	76°04.2	06.0	26°47.1	13.9	140°43.0	30.0	Bellatrix	278°21.7	6°22.5
15	170°18.5	359° 50.9	· · 28.7	91°04.8	• • 06.2	41°49.0	· · 13.8	155°45.5	• • 30.0	Elnath	278°00.5	28°37.7
16	185°21.0	14°51.0	27.5	106°05.4	06.3	56°50.9	13.6	170°48.0	30.0	Alnilam	275°36.7	-1°11.0
17	200°23.4	29°51.1	26.3	121°06.1	06.5	71°52.8	13.5	185°50.4	30.0	Betelgeuse	270°51.0	7°24.8
18	215°25.9	44°51.2	N04°25.1	136°06.7	N23°06.7	86°54.7	N19°13.4	200°52.9	N03°30.0	Canopus	263°52.3	-52°42.4
19	230°28.4	59°51.3	23.8	151°07.3	06.8	101°56.6	13.2	215°55.4	30.0	Sirius	258°25.4	-16°45.0
20	245°30.8	74°51.4	22.6	166°07.9	07.0	116°58.5	13.1	230°57.8	30.0	Adhara	255°05.2	-29°00.4
21	260°33.3	89°51.5	• • 21.4	181°08.5	• • 07.1	132°00.4	• • 13.0	246°00.3	• • 30.0	Procyon	244°49.8	5°09.5
22	275°35.7	104°51.6	20.2	196°09.2	07.3	147°02.3	12.8	261°02.8	29.9	Pollux	243°16.1	27°57.7
23	290°38.2	119°51.7	19.0	211°09.8	07.5	162°04.2	12.7	276°05.2	29.9	Avior	234°14.9	-59°35.6
					.2′ m1.30					Suhail	222°45.8	-43°32.4 -69°49.6
Mer.p	ass. 03:41	$\nu$ 0.1' $d$ -1	.2′ m-4.23	$\nu_{0.6'} d0$	.2′ m1.30	$\nu$ 1.9' d-0	.1′ m-1.78	$\nu$ 2.5' $d$ -0	0.0′ m0.66	Miaplacidus	221°38.9	
										Alphard	217°46.8 207°33.4	-8°46.4 11°50.3
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus		
0	305°40.7	134°51.8	N04°17.8	226°10.4	N23°07.6	177°06.1	N19°12.6	291°07.7	N03°29.9	Dubhe Denebola	193°39.9 182°23.8	61°36.6 14°25.5
1	320°43.1	149°51.9	16.5	241°11.0	07.8	192°08.0	12.4	$306^{\circ}10.1$	29.9		182 23.8 175°42.4	
2	335°45.6	164°52.0	15.3	256°11.7	07.9	207°09.9	12.3	321°12.6	29.9	Gienah		-17°41.4
3	350°48.1	179°52.1	• • 14.1	271°12.3	•• 08.1	222°11.8	• • 12.2	$336^{\circ}15.1$	• • 29.9		172°59.0	-63°15.1
4	5°50.5	194°52.2	12.9	286°12.9	08.2	237°13.7	12.0	351°17.5	29.9		171°50.4	-57°16.0
5	20°53.0	209°52.4	11.7	301°13.5	08.4	252°15.6	11.9	6°20.0	29.9	Alioth	166°12.0 158°21.0	55°49.2 -11°18.0
6	35°55.5	224°52.5	N04°10.5	316°14.1	N23°08.5	267°17.5	N19°11.7	21°22.5	N03°29.8	Spica	158 21.0 152°51.0	-11 18.0 49°11.1
7	50°57.9	239°52.6	09.2	331°14.8	08.7	$282^{\circ}19.4$	11.6	36°24.9	29.8	Alkaid Hadar	148°34.2	-60°30.4
8	66°00.4	254°52.7	08.0	346°15.4	8.80	$297^{\circ}21.3$	11.5	51°27.4	29.8		146 54.2 147°56.1	-36°30.2
9	81°02.9	269°52.8	• • 06.8	1°16.0	• • 09.0	312°23.2	• • 11.3	66°29.9	• • 29.8		147 30.1 145°46.7	19°02.8
10	96°05.3	284°52.9	05.6	$16^{\circ}16.6$	09.2	$327^{\circ}25.1$	11.2	81°32.3	29.8		139°38.4	-60°57.0
11	111°07.8	299°53.0	04.4	31°17.3	09.3	342°26.9	11.1	96°34.8	29.8	Kochab	137°19.6	74°03.0
12	126°10.2	314°53.2	N04°03.2	46°17.9	N23°09.5	357°28.8	N19°10.9	111°37.3	N03°29.8	Zuben'ubi	136°54.5	-16°09.2
13	141°12.7	329°53.3	01.9	61°18.5	09.6	12°30.7	10.8	126°39.7	29.7	Alphecca	126°02.5	26°37.7
14	156°15.2	344°53.4	04°00.7	$76^{\circ}19.1$	09.8	27°32.6	10.7	141°42.2	29.7	Antares	112° 14.0	-26°29.5
15	171°17.6	359° 53.5	03°59.5	$91^{\circ}19.7$	•• 09.9	42°34.5	• • 10.5	156°44.7	• • 29.7	Atria	107°06.7	-69°04.7
16	$186^{\circ}20.1$	14°53.6	58.3	106°20.4	10.1	57°36.4	10.4	171°47.1	29.7	Sabik	102°01.0	-15°45.5
17	201°22.6	29°53.7	57.1	121°21.0	10.2	72°38.3	10.3	186°49.6	29.7	Shaula	96°08.3	-37°07.4
18	216°25.0	44°53.9	N03°55.8		N23°10.4	87°40.2	N19°10.1	201°52.1	N03°29.7	Rasalhague	95°57.1	12°32.5
19	231°27.5	59°54.0	54.6	151°22.2	10.5	102°42.1	10.0	216°54.5	29.7	Eltanin	90°41.1	51°29.3
20	246°30.0	74°54.1	53.4	166°22.9	10.7	117°44.0	09.9	231°57.0	29.6	Kaus Aust.	83°30.4	-34°22.3
21	261°32.4	89°54.2	• • 52.2	181°23.5	• • 10.8	132°45.9	• • 09.7	246°59.5	• • 29.6	Vega	80°32.0	38°48.6
22	276°34.9	104°54.3	51.0	196°24.1	11.0	147°47.8	09.6	262°01.9	29.6	Nunki	75°45.8	-26°15.8
23	291°37.3	119°54.5	49.7	211°24.7	11.1	162°49.7	09.5	277°04.4	29.6	Altair	61°58.4	8°56.4
Mer n	ass. 03:37	$\nu 0.1' d-1$	.2′ m-4.24	$\nu 0.6' d0$	.2′ m1.30	v1 9' d-0	.1′ m-1.78	ν2 5' d-0	0.0' m0.65	Peacock	53°03.1	-56°38.8
										Deneb	49°24.5	45°22.5
										Enif	33°37.2	9°59.9
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.9	-46°49.7
0	306°39.8	134° 54.6	N03°48.5		N23°11.3	177°51.6	N19°09.3	292°06.9	N03°29.6	Fomalhaut	15°12.8	-29°28.7
1	321°42.3	149°54.7	47.3	241°26.0	11.4	192°53.5	09.2	307°09.3	29.6	Scheat	13°43.7	28°13.6
2	336°44.7	164°54.8	46.1	256°26.6	11.6	207°55.4	09.1	322°11.8	29.6	Markab	13°28.4	15°21.0
3	351°47.2	179°54.9	• • 44.9	271°27.2	• • 11.7	222°57.3	• • 08.9	337°14.3	• • 29.6	1.107.11	CIII	
4	6°49.7	194°55.1	43.6	286°27.8	11.8	237°59.2	08.8	352°16.7	29.5	Jul 27 Mon	SHA	Mer.pass
5	21°52.1	209°55.2	42.4	301°28.5	12.0	253°01.1	08.7	7°19.2	29.5		190°07.8	15:01
6	36°54.6	224°55.3	N03°41.2	316°29.1	N23°12.1	268°03.0	N19°08.5	22°21.7	N03°29.5	I	281°14.0	08:56
7	51°57.1	239°55.4	40.0	331°29.7	12.3	283°04.9	08.4	37°24.2	29.5	Jupiter		12:13
8	66°59.5	254°55.6	38.8	346°30.3	12.4	298°06.8	08.3	52°26.6	29.5	Saturn	345°27.1	04:39
9	82°02.0	269°55.7	• • 37.5	1°31.0	12.6	313°08.6	08.1	67°29.1	• • 29.5	Jul 28 Tue	SHA	Mer.pass
10	97°04.5 112°06.9	284°55.8	36.3	16°31.6 31°32.2	12.7	328°10.5	08.0	82°31.6 97°34.0	29.4		189°11.1	15:00
11	112°06.9 127°09.4	299° 56.0 314° 56.1	35.1 N03°33.9	46°32.8	12.9 N23°13.0	343°12.4 358°14.3	07.9 N19°07.7	97°34.0 112°36.5	29.4 N03°29.4	Mars	280°29.7	08:55
12 13	127°09.4 142°11.8	314°56.1 329°56.2	32.7	46°32.8 61°33.5	N23 13.0 13.1	358° 14.3 13° 16.2	N19-07.7 07.6	112°36.5 127°39.0	29.4	Jupiter	$231^{\circ}25.4$	12:10
13	142 11.8 157°14.3	329 56.2 344°56.3	32.7 31.4	76°34.1	13.1	28°18.1	07.6 07.5	127 39.0 142°41.4	29.4 29.4	Saturn	$345^{\circ}27.0$	04:35
										1.1.00.11	C	
15 16	172°16.8 187°19.2	359° 56.5 14° 56.6	· · 30.2 29.0	91°34.7 106°35.3	· · 13.4 13.6	43°20.0 58°21.9	· · 07.3 07.2	157°43.9 172°46.4	· · 29.4 29.4	Jul 29 Wed	SHA	Mer.pass
16 17	187 19.2 202°21.7	14 56.6 29°56.7	29.0 27.8	100 35.3 121°36.0	13.0	73°23.8	07.2 07.1	172 46.4 187°48.9	29.4		188°14.8	15:00
18	202 21.7 217°24.2	29 56.7 44°56.9	N03°26.6		N23°13.9	73 23.8 88°25.7	07.1 N19°06.9	202°51.3	29.3 N03°29.3		279°45.5	08:54
19	217 24.2 232°26.6	59° 57.0	25.3	150° 30.0 151° 37.2	14.0	00 25.7 103°27.6	06.8	202 51.3 217°53.8	29.3	Jupiter		12:07
20	232 20.0 247°29.1	74°57.1	25.5 24.1	166°37.8	14.0	103 27.0 118°29.5	06.6	217 55.6 232°56.3	29.3	Saturn	345°27.1	04:31
21	262°31.6	89° 57.3	• • 22.9	181°38.5	. 14.1	116 29.5 133°31.4	• • 06.5	232 50.3 247°58.7	29.3	Horizont	al parallax	
22	202 31.0 277°34.0	104° 57.4	21.7	196°39.1	14.4	148°33.3	06.4	263°01.2	29.3		Venus:	0.2
23	292°36.5	119°57.5	20.5	211°39.7	14.6	163°35.2	06.2	278°03.7	29.2		Mars:	0.1
										L		
Mer.p	ass. 03:33	$\nu$ 0.1′ <i>d</i> -1	2′ m-4.25	u0.6′ d0	.1' m $1.30$	$\nu 1.9' \ d$ -0	.1′ m-1.78	$\nu$ 2.5′ d-0	0.0′ m0.65			

h	Su	n	Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°21.6	$N19^{\circ}15.1$	$28^{\circ}57.7$	10.0'	S27°36.5	-2.8'	54.1'
1	193°21.6	14.5	43°26.8	10.1'	27°33.7	-2.9'	54.1'
2	208°21.6 223°21.6	14.0 •• 13.4	57°55.8 72°24.9	10.1' 10.1'	27°30.8 27°27.7	-3.1' -3.2'	54.1' 54.1'
4	238°21.6	12.8	86°54.0	10.1	27°24.5	-3.2' -3.3'	54.1
5	253°21.6	12.3	101°23.2	10.1'	27°21.1	-3.5'	54.1'
6	268°21.6	N19°11.7	$115^{\circ}52.3$	10.2'	S27°17.7	-3.6'	54.1'
7	283°21.6	11.1	130°21.5	10.2'	27°14.1	-3.7'	54.2'
8	298°21.6 313°21.6	10.6 •• 10.0	144°50.7 159°19.9	10.2' 10.2'	27°10.3 27°06.5	-3.9'	54.2' 54.2'
9 10	313 21.6 328°21.6	· · 10.0 09.4	159 19.9 173°49.1	10.2	27 00.5 27°02.5	-4.0' -4.1'	54.2'
11	343°21.7	08.9	188° 18.4	10.3'	26°58.3	-4.3'	54.2'
12	358°21.7	N19°08.3	202°47.7	10.3'	S26°54.1	-4.4'	54.2'
13	13°21.7	07.7	217° 17.1	10.4'	26°49.7	-4.5'	54.2'
14 15	28°21.7 43°21.7	07.1 •• 06.6	231°46.4 246°15.8	10.4' 10.4'	26°45.1 26°40.5	-4.7' -4.8'	54.2' 54.2'
16	58°21.7	06.0	260°45.3	10.4	26°35.7	-4.8 -4.9'	54.2
17	73°21.7	05.4	275°14.7	10.5'	26°30.8	-5.0'	54.2'
18	88°21.7	N19°04.9	289°44.2	10.5'	S26°25.7	-5.2'	54.2'
19	103°21.7	04.3	304°13.8	10.6'	26°20.6	-5.3'	54.3'
20 21	118°21.7 133°21.8	03.7 •• 03.1	318°43.3 333°12.9	10.6' 10.6'	26°15.3 26°09.9	-5.4' -5.6'	54.3' 54.3'
22	148°21.8	02.6	347°42.6	10.0	26°04.3	-5.0 -5.7'	54.3'
23	163°21.8	02.0	2°12.3	10.7'	25°58.6	-5.8'	54.3'
	SD = 15.7'	d = -0.6'			0 = 14.8'		
		0.0		J.	11.0		
Tue	<b>GHA</b> 178°21.8	Dec	GHA	ν	Dec	d 5 O	HP
0 1	178°21.8 193°21.8	N19°01.4 00.8	16° 42.0 31° 11.8	10.8' 10.8'	\$25°52.8 25°46.9	-5.9' -6.1'	54.3' 54.3'
2	208°21.8	19°00.3	45°41.6	10.8	25°40.8	-6.2'	54.3'
3	223°21.8	18°59.7	60°11.4	10.9'	25°34.7	-6.3'	54.3'
4	238°21.8	59.1	74°41.3	10.9'	25°28.4	-6.4'	54.3'
5	253°21.9	58.5 N18°58.0	89°11.2 103°41.2	11.0'	25°21.9	-6.5'	54.4'
6 7	268°21.9 283°21.9	N18 58.0 57.4	103°41.2 118°11.2	11.0' 11.1'	\$25°15.4 25°08.7	-6.7' -6.8'	54.4' 54.4'
8	298°21.9	56.8	132°41.3	11.1'	25°01.9	-6.9'	54.4'
9	313°21.9	• • 56.2	$147^{\circ}11.4$	11.2'	24°55.0	-7.0'	54.4'
10	328°21.9	55.6	161°41.6	11.2'	24°48.0	-7.1'	54.4'
11	343°21.9 358°22.0	55.1 N18°54.5	176°11.8 190°42.0	11.2'	24°40.9 <b>5</b> 24°33.6	-7.3'	54.4'
12 13	13° 22.0	53.9	205°12.3	11.3' 11.3'	24°26.2	-7.4' -7.5'	54.4' 54.5'
14	28°22.0	53.3	219°42.7	11.4'	24°18.7	-7.6'	54.5'
15	43°22.0	• • 52.7	$234^{\circ}13.0$	11.4'	$24^{\circ}11.1$	-7.7'	54.5'
16	58°22.0	52.1	248°43.5	11.5'	24°03.4	-7.8'	54.5'
17 18	73°22.0 88°22.0	51.6 N18°51.0	263°14.0 277°44.5	11.5' 11.6'	23°55.5 \$23°47.6	-8.0' -8.1'	54.5' 54.5'
19	103°22.1	50.4	292°15.1	11.6'	23°39.5	-8.2'	54.5'
20	118°22.1	49.8	306°45.7		23°31.3	-8.3'	54.5'
21	133°22.1	• • 49.2	321°16.4	11.7'	23°23.0	-8.4'	54.6'
22 23	148°22.1 163°22.1	48.6 48.0	335°47.2 350°18.0	11.8' 11.8'	23°14.6 23°06.1	-8.5' -8.6'	54.6' 54.6'
23	SD = 15.7'	d = -0.6'	350 16.0		0 = 14.8'	-0.0	34.0
	3D = 15.7	a = -0.0		31	J = 14.6°		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°22.2	N18°47.4	4°48.8	11.9'	\$22°57.4	-8.7'	54.6'
1 2	193°22.2 208°22.2	46.9 46.3	19° 19.7 33° 50.7	11.9' 12.0'	22°48.7 22°39.9	-8.8' -9.0'	54.6' 54.6'
3	208 22.2 223°22.2	• • 45.7	48°21.7	12.0'	22°30.9	-9.0 -9.1'	54.6'
4	238°22.2	45.1	62°52.7	12.1'	22°21.9	-9.2'	54.6'
5	253°22.2	44.5	77°23.8	12.2'	22°12.7	-9.3'	54.7'
6 7	268°22.3 283°22.3	N18°43.9 43.3	91°55.0 106°26.2	12.2' 12.3'	\$22°03.4 21°54.0	-9.4' -9.5'	54.7' 54.7'
7 8	283°22.3 298°22.3	43.3 42.7	106° 26.2 120° 57.4	12.3'	21°54.0 21°44.6	-9.5° -9.6'	54.7' 54.7'
9	313°22.3	42.1	135°28.7	12.4'	21°35.0	-9.7'	54.7'
10	328°22.4	41.5	150°00.1	12.4'	21°25.3	-9.8'	54.7'
11	343°22.4	40.9 N18°40.3	164°31.5	12.5'	21°15.5	-9.9'	54.7'
12 13	358°22.4 13°22.4	N18°40.3 39.7	179°03.0 193°34.5	12.5' 12.6'	\$21°05.6 20°55.6	-10.0' -10.1'	54.8' 54.8'
14	28°22.4	39.1	208°06.1	12.6'	20°45.6	-10.1	54.8'
15	43°22.5	• • 38.6	$222^{\circ}37.7$	12.7'	$20^{\circ}35.4$	-10.3'	54.8'
16	58°22.5	38.0	237°09.4	12.7'	20°25.1	-10.4	54.8'
17	73°22.5	37.4 N18°36.8	251°41.1	12.8'	20°14.7 <b>5</b> 20°04.3	-10.5'	54.8'
18 19	88°22.5 103°22.6	N18°36.8 36.2	266°12.9 280°44.7	12.8' 12.9'	\$20°04.3 19°53.7	-10.6' -10.7'	54.9' 54.9'
20	118°22.6	35.6	295°16.6	12.9'	19°43.1	-10.7'	54.9'
21	133°22.6	• • 35.0	309°48.5	13.0'	19°32.3	-10.8'	54.9'
22	148°22.6	34.4	324°20.5	13.0'	19°21.5	-10.9'	54.9'
23	163°22.6	33.8	338°52.5	13.1'	19°10.5	-11.0'	54.9'
	SD = 15.7'	d = -0.6'		SI	O = 14.9'		

			2026	July 2	7 to Ju	I. 29 U
Lat.	<b>Twi</b> Naut.	<b>light</b> Civil	Sunrise	Sunset	<b>Tw</b> Civil	ilight Naut.
N 72°	IVaut.	CIVII			CIVII	
N 70° 68°	1111	//// ////	00:36	23:21 22:15	//// ////	//// ////
66°	/////	////	01:53 02:30	22:15	////	////
64°	11111	01:13	02:55	21:40	22:54	////
62°	1777	01:58	03:15	20:56	22:11	7777
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
N 10°	05:01	05:27	05:49	18:24	18:46	19:12
0°	05:16	05:41	06:03	18:10	18:32	18:57
<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° 40°	06:00	06:31	06:58	17:16 17:05	17:43	18:13
40 45°	06:07 06:14	06:40 06:50	07:09 07:22	16:52	17:34 17:24	18:07 17:59
<b>S</b> 50° 52°	06:22	07:01	07:37	16:36	17:12	17:52
5∠ 54°	06:26 06:29	07:07 07:13	07:45 07:53	16:29 16:21	17:07 17:01	17:48 17:44
56°	06:33	07:19	08:02	16:12	16:55	17:44
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	ie		Moonse	t
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N $72^{\circ}$						_
<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° 52°	19:37	20:01	20:18	01:02	02:11	03:28
52° 50°	19:22 19:09	19:49 19:38	20:09 20:01	01:18 01:33	02:26 02:38	03:40 03:50
45°	18:42	19:16	19:43	02:02	03:04	04:11
N 40° 35°	18:21 18:03	18:58 18:43	19:29 19:17	02:25 02:44	03:25 03:42	04:28 04:43
30°	17:48	18:43	19:17	02:44	03:42	04:43
20°	17:40	18:07	18:47	03:00	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°	13.10	14.36	15.58	07:37	08·04	08.20

15:58

15:45

15:30

07:37

08:00

08:30

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08:22

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08:20

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08:50

13:19

12:56

12:26

56°

58°

**S**  $60^{\circ}$ 

14:36

14:18

13:56

Thu 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14	GHA 307°39.0 322°41.4 337°43.9 352°46.3 7°48.8	<b>GHA</b> 134°57.7 149°57.8	<b>Dec</b> N03°19.2	<b>GHA</b> 226°40.3	Dec N23°14.7	GHA	Dec	<b>GHA</b> 293°06.2	Dec		SHA	Dec
0 1 2 3 4 5 6 7 8 9 10 11 12 13	307°39.0 322°41.4 337°43.9 352°46.3	134°57.7 149°57.8								1		
1 2 3 4 5 6 7 8 9 10 11 12 13	322°41.4 337°43.9 352°46.3	149°57.8			VZ3 14 /	$178^{\circ}37.1$	$N19^{\circ}06.1$		N03°29.2			
2 3 4 5 6 7 8 9 10 11 12 13	337°43.9 352°46.3		18.0	241°41.0	14.8	193°39.0	06.0	308°08.6	29.2	Alpheratz	357°33.2	29°14.2
3 4 5 6 7 8 9 10 11 12 13	352°46.3	164°58.0	16.8	256°41.6	15.0	208°40.9	05.8	323°11.1	29.2	Ankaa	353°05.6	-42°09.4
4 5 6 7 8 9 10 11 12 13		179°58.1	15.6	271°42.2	15.1	208 40.9 223°42.8	05.7	338°13.6	29.2	Schedar	349°29.3	56°40.8
5 6 7 8 9 10 11 12 13		194°58.2	14.4	286°42.8	15.3	238°44.7	05.6	353°16.0	29.2	Diphda	348°45.8	-17°50.2
6 7 8 9 10 11 12 13	22°51.3	209°58.4	13.1	301°43.5	15.4	253°46.6	05.0	8°18.5	29.2	Achernar	$335^{\circ}19.1$	-57°05.7
7 8 9 10 11 12 13	22 51.3 37°53.7	209 58.4 224°58.5		316°44.1		268°48.5		23°21.0	N03°29.1	Hamal	327°49.7	23°35.3
8 9 10 11 12 13			N03°11.9		N23° 15.5		N19°05.3			Polaris	313°26.8	89°22.2
9 10 11 12 13	52°56.2	239°58.6	10.7	331°44.7	15.7	283°50.4	05.2	38°23.5	29.1	Acamar	315°10.8	-40°11.5
10 11 12 13	67°58.7	254°58.8	09.5	346°45.3	15.8	298°52.3	05.0	53°25.9	29.1	Menkar	314°04.8	4°11.7
11 12 13	83°01.1	269°58.9	• • 08.2	1°46.0	• • 15.9	313°54.2	• • 04.9	68°28.4	• • 29.1	Mirfak	308° 26.5	49°57.2
12 13	98°03.6	284°59.1	07.0	16°46.6	16.1	328°56.1	04.7	83°30.9	29.1	Aldebaran	290°38.3	16°33.8
13	113°06.1	299°59.2	05.8	31°47.2	16.2	343°58.0	04.6	98°33.4	29.1	Rigel	281°02.8	-8°10.1
	128°08.5	314°59.4	N03°04.6	46°47.8	N23°16.3	358°59.9	N19°04.5	113°35.8	N03°29.0	Capella	280°20.3	46°01.3
14	143°11.0	$329^{\circ}59.5$	03.4	61°48.5	16.5	$14^{\circ}01.7$	04.3	128°38.3	29.0	Bellatrix	278°21.7	6°22.5
	158°13.5	344°59.6	02.1	76°49.1	16.6	29°03.6	04.2	143°40.8	29.0	Elnath	278°00.5	28°37.7
15	173°15.9	359°59.8	03°00.9	91°49.7	• • 16.7	44°05.5	• • 04.1	158°43.3	• • 29.0	Alnilam	275°36.6	-1°11.0
16	188°18.4	14°59.9	02°59.7	106°50.3	16.9	59°07.4	03.9	173°45.7	29.0		270°50.9	
17	203°20.8	30°00.1	58.5	121°51.0	17.0	74°09.3	03.8	188°48.2	29.0	Betelgeuse		7°24.8
18	218°23.3	45°00.2	N02°57.2	136°51.6	N23°17.1	89°11.2	N19°03.7	203°50.7	N03°28.9	Canopus	263°52.3	-52°42.4
19	233°25.8	60°00.4	56.0	151°52.2	17.3	104°13.1	03.5	218°53.2	28.9	Sirius	258° 25.4	-16°45.0
20	248°28.2	75°00.5	54.8	166°52.9	17.4	119°15.0	03.4	233°55.6	28.9	Adhara	255°05.2	-29°00.3
21	263°30.7	90°00.7	53.6	181°53.5	17.5	134°16.9	03.2	248°58.1	28.9	Procyon	244°49.8	5°09.5
22	203 30.7 278°33.2	90 00.7 105°00.8	52.4	101 55.5 196°54.1	17.5	134 10.9 149°18.8	03.2	264° 00.6	28.9	Pollux	243°16.1	27°57.7
	278 33.2 293°35.6	105 00.8 120°01.0								Avior	$234^{\circ}14.9$	-59°35.6
23	∠93 35.0	120 01.0	51.1	211°54.7	17.8	164°20.7	03.0	279°03.1	28.9	Suhail	222°45.8	-43°32.4
Mer.p	ass. 03:29	$\nu$ 0.1' d-1.	.2′ m-4.26	$\nu$ 0.6′ d0.	.1′ m1.30	$\nu 1.9' \ d-0$	.1′ m-1.78	$\nu 2.5' \ d-0$	0.0′ m0.64	Miaplacidus	221°39.0	-69°49.6
										Alphard	217°46.8	-8°46.4
										Regulus	207°33.4	11°50.3
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		193°39.9	61°36.6
0	$308^{\circ}38.1$	$135^{\circ}01.1$	N02°49.9	226°55.4	N23°17.9	179°22.6	N19°02.8	294°05.5	N03°28.8	Denebola	182°23.8	14°25.5
1	323°40.6	150°01.3	48.7	241°56.0	18.1	194°24.5	02.7	309°08.0	28.8	Gienah		-17°41.4
2	338°43.0	165°01.4	47.5	256°56.6	18.2	209°26.4	02.6	324°10.5	28.8		172°59.0	-63°15.1
3	353°45.5	$180^{\circ}01.6$	• • 46.2	271°57.2	• • 18.3	224°28.3	• • 02.4	339°13.0	• • 28.8		172 59.0 171°50.5	-57°16.0
4	8°47.9	195°01.7	45.0	286°57.9	18.5	239°30.2	02.3	354°15.4	28.8			
5	23°50.4	210°01.9	43.8	301°58.5	18.6	254°32.1	02.2	9°17.9	28.7	Alioth	166°12.0	55°49.2
6	38°52.9	225°02.0	N02°42.6	316°59.1	N23°18.7	269°34.0	N19°02.0	24°20.4	N03°28.7	Spica	158°21.0	-11°18.0
7	53°55.3	240°02.2	41.3	331°59.7	18.8	284°35.9	01.9	39°22.9	28.7	Alkaid	152°51.0	49°11.1
8	68°57.8	255°02.3	40.1	347°00.4	19.0	299°37.8	01.8	54°25.4	28.7	Hadar	148°34.2	-60°30.4
9	84°00.3	270°02.5	38.9	2°01.0	19.1	314°39.7	01.6	69°27.8	• • 28.7		147°56.1	-36°30.2
10	99°02.7	285°02.6	37.7	17°01.6	19.1	329°41.6	01.5	84°30.3	28.7		145°46.7	19°02.8
										Rigil Kent.	139°38.5	-60°57.0
11	114°05.2	300°02.8	36.5	32°02.3	19.4	344°43.5	01.3	99°32.8	28.6	Kochab	$137^{\circ}19.7$	74°03.0
12	129°07.7	315°03.0	N02°35.2	47°02.9	N23° 19.5	359°45.4	N19°01.2	114°35.3	N03°28.6	Zuben'ubi	136°54.5	$-16^{\circ}09.2$
13	144°10.1	330°03.1	34.0	62°03.5	19.6	14°47.3	01.1	129°37.7	28.6	Alphecca	126°02.5	26°37.7
14	159°12.6	345°03.3	32.8	77°04.1	19.7	29°49.2	00.9	144°40.2	28.6	Antares	112°14.0	-26°29.5
15	174° 15.1	0°03.4	• • 31.6	92°04.8	• • 19.9	44°51.1	8.00	159°42.7	• • 28.6	Atria	107°06.7	-69°04.7
16	$189^{\circ}17.5$	15°03.6	30.3	107°05.4	20.0	59°53.0	00.7	174°45.2	28.5	Sabik	102°01.0	-15°45.5
17	204°20.0	30°03.8	29.1	122°06.0	20.1	74°54.8	00.5	189°47.7	28.5	Shaula	96°08.3	-37°07.4
18	219°22.4	45°03.9	N02°27.9		N23°20.2	89°56.7	$N19^{\circ}00.4$	204°50.1	N03°28.5	Rasalhague	95°57.1	12°32.5
19	234°24.9	60°04.1	26.7	152°07.3	20.4	104°58.6	00.3	219°52.6	28.5	Eltanin	90°41.1	51°29.3
20	249°27.4	75°04.2	25.4	167°07.9	20.5	120°00.5	00.1	234°55.1	28.5	Kaus Aust.	83°30.4	-34°22.3
21	264°29.8	90°04.4	• • 24.2	182°08.5	• • 20.6	135°02.4	19°00.0	249°57.6	• • 28.5	Vega	80°32.0	38°48.6
22	279°32.3	105°04.6	23.0	197°09.2	20.7	150°04.3	18°59.8	265°00.1	28.4	_		
23	294°34.8	120°04.7	21.8	212°09.8	20.8	165°06.2	59.7	280°02.5	28.4	Nunki	75°45.8	-26°15.8
										Altair	61°58.4	8°56.4
Mer.p	ass. 03:25	$\nu$ 0.2′ $d$ -1.	.2′ m-4.26	$\nu$ 0.6′ d0.	.1' m $1.30$	$\nu$ 1.9′ d-0	.1' m-1.78	$\nu$ 2.5′ $d$ -0	0.0′ m0.64	Peacock	53°03.1	-56°38.9
										Deneb	49°24.4	45°22.6
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.2	9°59.9
0 0	309°37.2	135°04.9	N02°20.5		N23°21.0	180°08.1	N18° 59.6	295°05.0	N03°28.4	Al Na'ir	27°30.8	-46°49.7
1	324°39.7	150°05.0	19.3	242°11.1	21.1	195°10.0	59.4	310°07.5	28.4	Fomalhaut	15°12.8	-29°28.6
				242 11.1 257°11.7						Scheat	13°43.6	28°13.6
2	339°42.2	165°05.2	18.1		21.2	210°11.9	59.3	325°10.0	28.4	Markab	13°28.3	15°21.0
3	354°44.6	180°05.4	16.9	272°12.3	• • 21.3	225°13.8	• • 59.2	340°12.5	• • 28.3	I.I. 20 TI	CLIA	Mor ====
4	9°47.1	195°05.5	15.6	287°12.9	21.5	240°15.7	59.0	355°14.9	28.3	Jul 30 Thu	SHA	Mer.pass
5	24°49.6	210°05.7	14.4	302°13.6	21.6	255°17.6	58.9	10°17.4	28.3		187°18.7	15:00
6	39°52.0	225°05.9	N02°13.2		N23°21.7	270°19.5	N18°58.8	25°19.9	N03°28.3		279°01.4	08:53
7	54°54.5	240°06.0	12.0	332°14.8	21.8	285°21.4	58.6	40°22.4	28.3	Jupiter	230°58.1	12:04
8	69°56.9	255°06.2	10.8	347°15.5	21.9	300°23.3	58.5	55°24.9	28.2	Saturn	345°27.2	04:27
9	84°59.4	270°06.4	• • 09.5	2°16.1	• • 22.1	315°25.2	• • 58.3	70°27.3	• • 28.2	Jul 31 Fri	SHA	Mer.pass
10	$100^{\circ}01.9$	285°06.6	08.3	17°16.7	22.2	$330^{\circ}27.1$	58.2	85°29.8	28.2		186°23.0	15:00
11	$115^{\circ}04.3$	300°06.7	07.1	32°17.3	22.3	345°29.0	58.1	100°32.3	28.2			
12	130°06.8	315°06.9	N02°05.9	47°18.0	N23°22.4	0°30.9	N18°57.9	115°34.8	N03°28.2		278°17.3	08:52
13	145°09.3	330°07.1	04.6	62°18.6	22.5	15°32.8	57.8	130°37.3	28.1	Jupiter		12:01
14	160°11.7	345°07.2	03.4	77°19.2	22.6	30°34.7	57.7	145°39.7	28.1	Saturn	345°27.4	04:23
15	175°14.2	0°07.4	02.2	92°19.9	• • 22.8	45°36.6	• • 57.5	160°42.2	• • 28.1	Aug 01 Sat	SHA	Mer.pass
16	190°16.7	15°07.6	02°01.0	107°20.5	22.9	60°38.5	57.4	175°44.7	28.1		185°27.7	15:00
17	205°19.1	30°07.8	01°59.7	122°21.1	23.0	75°40.4	57.2	190°47.2	28.1		277° 33.2	08:51
18	220°21.6	45°07.9	N01°58.5		N23°23.1	90°42.3	N18° 57.1	205°49.7	N03°28.0	Jupiter		
19	235°24.0	60°08.1	57.3	157°21.6	23.2	90°42.3 105°44.2	57.0	200°52.2	28.0			11:58
	250°26.5	75°08.3	57.3 56.1	167°23.0	23.2	105 44.2 120°46.1	56.8	235°54.6	28.0	Saturn	345°27.8	04:19
20									. 28.0	Horizont	al parallax	
21	265°29.0	90°08.5	• • 54.8	182°23.6	• • 23.5	135°48.0	• • 56.7	250°57.1			Venus:	0.2
22	280°31.4	105°08.6	53.6	197°24.3	23.6	150°49.9	56.6	265°59.6	28.0		Mars:	0.2
23	295°33.9	120°08.8	52.4	212°24.9	23.7	165°51.8	56.4	281°02.1	27.9		ividio.	0.1
Mer.n	ass. 03:21	$\nu$ 0.2′ d-1	.2′ m-4.27	$\nu$ 0.6′ d0	.1′ m1.30	$\nu$ 1.9 $^{\prime}$ d-0	.1′ m-1.78	$\nu 2.5' d-0$	0.0′ m0.63			

h	Su	n	Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°22.7	N18°33.2	353°24.6	13.1'	\$18°59.5	-11.1'	54.9'
1 2	193°22.7 208°22.7	32.6 32.0	7°56.8 22°28.9	13.2' 13.2'	18°48.4 18°37.2	-11.2' -11.3'	55.0' 55.0'
3	208 22.7 223°22.7	31.4	37°01.2	13.3'	18°25.9	-11.3 -11.4'	55.0'
4	238°22.8	30.7	51°33.5	13.3'	18°14.6	-11.5'	55.0'
5	253°22.8	30.1	66°05.8	13.4'	18°03.1	-11.5'	55.0'
6	268°22.8 283°22.9	N18° 29.5 28.9	80°38.2 95°10.6	13.4' 13.5'	\$17°51.6 17°39.9	-11.6' -11.7'	55.0' 55.1'
7 8	283 22.9 298°22.9	28.9 28.3	95 10.6 109°43.1	13.5'	17 39.9 17°28.2	-11.7 -11.8'	55.1'
9	313°22.9	27.7	124°15.6	13.6'	17°16.4	-11.9'	55.1'
10	328°22.9	27.1	138°48.2	13.6'	17°04.6	-11.9'	55.1'
11	343°23.0 358°23.0	26.5 N18°25.9	153°20.8 167°53.4	13.7'	16°52.6 \$16°40.6	-12.0'	55.1'
12 13	13°23.0	N18 25.9 25.3	182°26.1	13.7' 13.7'	16°28.5	-12.1' -12.2'	55.1' 55.2'
14	28°23.0	24.7	196°58.9	13.8'	16°16.3	-12.3'	55.2'
15	43°23.1	• • 24.1	211°31.7	13.8'	16°04.0	-12.3'	55.2'
16	58°23.1 73°23.1	23.5	226°04.5 240°37.4	13.9'	15°51.7 15°39.3	-12.4'	55.2' 55.2'
17 18	73°23.1 88°23.2	22.9 N18°22.2	240°37.4 255°10.3	13.9' 14.0'	15°39.3 \$15°26.8	-12.5' -12.6'	55.2' 55.3'
19	103°23.2	21.6	269°43.3	14.0'	15°14.3	-12.6'	55.3'
20	118°23.2	21.0	$284^{\circ}16.3$	14.0'	$15^{\circ}01.6$	-12.7'	55.3'
21	133°23.2	20.4	298°49.3	14.1'	14°48.9	-12.8'	55.3'
22 23	148°23.3 163°23.3	19.8 19.2	313°22.4 327°55.5	14.1' 14.2'	14°36.2 14°23.3	-12.8' -12.9'	55.3' 55.3'
23						14.3	33.3
	SD = 15.7'	d = -0.6'		SI	O = 15.0'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°23.3	N18° 18.6	342°28.7	14.2'	\$14°10.4	-13.0'	55.4'
1 2	193°23.4 208°23.4	18.0 17.3	357°01.9 11°35.1	14.2' 14.3'	13°57.4 13°44.4	-13.0' -13.1'	55.4' 55.4'
3	223°23.4	16.7	26°08.4	14.3'	13°31.3	-13.1	55.4'
4	238°23.5	16.1	$40^{\circ}41.7$	14.3'	$13^{\circ}18.1$	-13.2'	55.4'
5	253°23.5	15.5	55°15.0	14.4'	13°04.9	-13.3'	55.5'
6 7	268°23.5 283°23.6	N18° 14.9 14.3	69°48.4 84°21.8	14.4' 14.4'	\$12°51.6 12°38.2	-13.4' -13.4'	55.5' 55.5'
8	298°23.6	13.6	98°55.3	14.5	12°24.8	-13.4 -13.5'	55.5'
9	313°23.6	• • 13.0	113°28.7	14.5'	12°11.3	-13.5'	55.5'
10	328°23.7	12.4	128°02.2	14.5'	11°57.8	-13.6'	55.5'
11 12	343°23.7 358°23.7	11.8 N18° 11.2	142°35.8 157°09.3	14.6' 14.6'	11°44.2 \$11°30.5	-13.7' -13.7'	55.6' 55.6'
13	13°23.8	10.5	157 09.3 171°42.9	14.6'	11°16.8	-13.7 -13.8'	55.6'
14	28°23.8	09.9	186°16.6	14.6'	11°03.0	-13.8'	55.6'
15	43°23.8	• • 09.3	200°50.2	14.7'	10°49.2	-13.9'	55.6'
16 17	58°23.9 73°23.9	08.7 08.1	215°23.9 229°57.6	14.7' 14.7'	10°35.3 10°21.4	-13.9' -14.0'	55.7' 55.7'
18	88°23.9	N18° 07.4	244°31.3	14.7'	\$10°07.4	-14.0'	55.7'
19	103°24.0	06.8	259°05.0	14.8'	09°53.4	-14.1'	55.7'
20	118°24.0	06.2	273°38.8		09°39.3		55.7'
21 22	133°24.1 148°24.1	· · 05.6 04.9	288°12.6 302°46.4	14.8' 14.8'	09°25.2 09°11.0	-14.2' -14.2'	55.8' 55.8'
23	163°24.1	04.3	317°20.3	14.9'	08°56.8	-14.3'	55.8'
	SD = 15.7'	d = -0.6'		SI	0 = 15.1'		
					10.1		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0 1	178°24.2 193°24.2	N18°03.7 03.1	331°54.1 346°28.0	14.9' 14.9'	\$08°42.5 08°28.2	-14.3' -14.4'	55.8' 55.8'
2	208°24.2	02.4	1°01.9	14.9'	08°13.9	-14.4'	55.9'
3	223°24.3	•• 01.8	15°35.8	14.9'	07°59.5	-14.4'	55.9'
4	238°24.3 253°24.4	01.2	30°09.7 44°43.6	14.9'	07°45.0	-14.5'	55.9'
5 6	253°24.4 268°24.4	18°00.5 N17°59.9	44°43.6 59°17.6	14.9' 15.0'	07°30.5 <b>S</b> 07°16.0	-14.5' -14.6'	55.9' 55.9'
7	283°24.4	59.3	73°51.5	15.0'	07°01.5	-14.6'	56.0'
8	298°24.5	58.7	88°25.5	15.0'	06°46.9	-14.6'	56.0'
9	313°24.5 328°24.5	• • 58.0	102°59.5 117°33.4	15.0' 15.0'	06°32.2 06°17.5	-14.7'	56.0'
10 11	328°24.5 343°24.6	57.4 56.8	117°33.4 132°07.4	15.0' 15.0'	06°17.5 06°02.8	-14.7' -14.7'	56.0' 56.0'
12	358°24.6	N17° 56.1	146°41.4	15.0'	<b>S</b> 05°48.1	-14.8'	56.1'
13	13°24.7	55.5	161°15.4	15.0'	05°33.3	-14.8'	56.1'
14 15	28°24.7 43°24.8	54.9 •• 54.2	175°49.5 190°23.5	15.0' 15.0'	05°18.5 05°03.6	-14.8' -14.9'	56.1' 56.1'
15 16	43°24.8 58°24.8	53.6	190°23.5 204°57.5	15.0'	05°03.6 04°48.8	-14.9' -14.9'	56.1'
17	73°24.8	53.0	$219^{\circ}31.5$	15.0'	04°33.9	-14.9'	56.2'
18	88°24.9	N17°52.3	234°05.5	15.0'	S04°18.9	-15.0'	56.2'
19 20	103°24.9 118°25.0	51.7 51.1	248°39.6 263°13.6	15.0' 15.0'	04°04.0 03°49.0	-15.0' -15.0'	56.2' 56.2'
21	133°25.0	50.4	203 13.0 277°47.6	15.0'	03 49.0 03°34.0	-15.0'	56.2'
22	148°25.0	49.8	292°21.6	15.0'	03°18.9	-15.1'	56.3'
23	163°25.1	49.1	306°55.6	15.0'	03°03.9	-15.1'	56.3'
	SD = 15.8'	d = -0.6'		SI	O = 15.2'		

	Twi	light			Twilight		
Lat.	Naut.	Civil	Sunrise	Sunset	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	
$56^{\circ}$	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	
$35^{\circ}$	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 $10^{\circ}$	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	
<b>S</b> 10°	05:29	05:54	06:16	17:57	18:19	18:44	
$20^{\circ}$	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> $50^{\circ}$	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	
Lat.		Moonris	e		Moonse	t	
∟al.	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	

Lat.		Moonris	е		Moonse	t i
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°	22:40	21:50	21:14		04:09	06:31
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Mer.Pass.		
Duy	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		

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	310°36.4	135°09.0	N01°51.2	227°25.5	N23°23.8	180°53.7	N18° 56.3	296°04.6	N03°27.9		JIIA	
	325°38.8	150°09.0		242°26.2		195°55.6		311°07.1		Alpheratz	357°33.2	29°14.2
1			49.9		23.9		56.2		27.9	Ankaa	353°05.6	-42°09.4
2	340°41.3	165°09.3	48.7	257°26.8	24.0	210°57.5 225°59.3	56.0	326°09.5 341°12.0	27.9	Schedar	349°29.3	56°40.9
3	355°43.8 10°46.2	180°09.5 195°09.7	• • 47.5	272°27.4	• • 24.1		• • 55.9		• • 27.9	Diphda	348°45.8	-17°50.2
4			46.3	287°28.1	24.2	241°01.2	55.7	356°14.5	27.8	Achernar	$335^{\circ}19.1$	-57°05.7
5	25°48.7	210°09.9	45.0	302°28.7	24.4	256°03.1	55.6	11°17.0	27.8	Hamal	327°49.7	23°35.3
6	40°51.2	225°10.1	N01°43.8	317°29.3	N23°24.5	271°05.0	N18°55.5	26°19.5	N03°27.8	Polaris	313°25.4	89°22.2
7	55°53.6	240°10.2	42.6	332°30.0	24.6	286°06.9	55.3	41°22.0	27.8	Acamar	315° 10.8	-40°11.5
8	70°56.1	255°10.4	41.4	347°30.6	24.7	301°08.8	55.2	56°24.5	27.8	Menkar	314°04.8	4°11.7
9	85°58.5	270°10.6	• • 40.1	2°31.2	• • 24.8	316°10.7	• • 55.1	71°26.9	• • 27.7	Mirfak	308° 26.5	49°57.2
10	101°01.0	285°10.8	38.9	17°31.8	24.9	331°12.6	54.9	86°29.4	27.7	Aldebaran	290°38.3	16°33.8
11	116°03.5	300°11.0	37.7	32°32.5	25.0	346°14.5	54.8	101°31.9	27.7	Rigel	281°02.8	-8°10.1
12	131°05.9	315°11.2	N01°36.5		N23°25.1	1°16.4	N18°54.6	116°34.4	N03°27.7	Capella	280°20.3	46°01.3
13	146°08.4	330°11.3	35.2	62°33.7	25.2	16°18.3	54.5	131°36.9	27.6	Bellatrix	278°21.7	6°22.5
14	161°10.9	345°11.5	34.0	77°34.4	25.3	31°20.2	54.4	146°39.4	27.6	Elnath	278°00.5	28°37.7
15	176°13.3	0°11.7	• • 32.8	92°35.0	• • 25.5	46°22.1	• • 54.2	161°41.9	• • 27.6	Alnilam	275°36.6	-1°11.0
16	191°15.8	15°11.9	31.6	107°35.6	25.6	61°24.0	54.1	176°44.3	27.6	Betelgeuse	270°50.9	7°24.8
17	206°18.3	30°12.1	30.3	122°36.3	25.7	76°25.9	54.0	191°46.8	27.6	Canopus	263°52.3	-52°42.3
18	221°20.7	45°12.3	N01°29.1	137°36.9	N23°25.8	91°27.8	N18°53.8	206°49.3	N03°27.5	Sirius	258° 25.4	-16°45.0
19	236°23.2	60°12.5	27.9	152°37.5	25.9	106°29.7	53.7	221°51.8	27.5	Adhara	255°05.2	-29°00.3
20	251°25.6	75°12.7	26.7	167°38.2	26.0	121°31.6	53.5	236°54.3	27.5	Procyon	244°49.8	5°09.5
21	266°28.1	90°12.8	• • 25.4	182°38.8	• • 26.1	136°33.5	• • 53.4	251°56.8	• • 27.5	Pollux	243°16.1	27°57.7
22	281°30.6	105°13.0	24.2	197°39.4	26.2	151°35.4	53.3	266°59.3	27.4	Avior	234° 14.9	-59°35.6
23	296°33.0	120°13.2	23.0	212°40.1	26.3	166°37.3	53.1	282°01.8	27.4	Suhail	234 14.9 222°45.8	-39 35.0 -43°32.4
1/10==	ass. 03:17	υD 2/ 4 1	.2′ m-4.28	1/0 6/ do	.1′ m1.30	1/1 0/ d 0	.1′ m-1.78	1/2 E/ 4 C	.0′ m0.63	Miaplacidus	222 45.6 221°39.0	-43 32.4 -69°49.6
ivier.p	ass. US.11	νυ.∠ u-1	.4 111-4.40	νυ.υ <i>α</i> υ	.1111.30	ν1.9 α-U	.111-1./0	ν2.5 <b>u</b> -C	.0 1110.03	Alphard	221 39.0 217°46.8	-8°46.4
											217 40.8 207°33.4	-6 40.4 11°50.3
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207 33.4 193°40.0	61°36.6
0	311°35.5	135°13.4	N01°21.8	227°40.7	N23°26.4	181°39.2	N18°53.0	297°04.2	N03°27.4	Dubhe	193° 40.0 182° 23.8	14°25.5
1	326°38.0	150°13.6	20.5	242°41.3	26.5	196°41.1	52.9	312°06.7	27.4	Denebola		
2	341°40.4	165°13.8	19.3	257°42.0	26.6	211°43.0	52.7	327°09.2	27.4	Gienah	175°42.4	-17°41.4
3	356°42.9	180°14.0	· · 18.1	272°42.6	26.7	226°44.9	• • 52.6	342°11.7	27.3			-63°15.1
4	11°45.4	195°14.2	16.9	287°43.2	26.8	241°46.8	52.4	357°14.2	27.3	Gacrux	171°50.5	-57°16.0
5	26°47.8	210°14.4	15.6	302°43.9	26.9	256°48.7	52.3	12°16.7	27.3	Alioth	166°12.1	55°49.2
6	41°50.3	225°14.6	N01°14.4	317°44.5	N23°27.0	271°50.6	N18° 52.2	27°19.2	N03°27.3	Spica	158°21.0	-11°18.0
7	56°52.8	240°14.8	13.2	332°45.1	27.1	286°52.5	52.0	42°21.7	27.2	Alkaid	152°51.1	49°11.1
8	71°55.2	255°15.0	12.0	347°45.8	27.2	301°54.4	51.9	57°24.2	27.2	Hadar	148°34.2	-60°30.3
9	86°57.7	270°15.2	10.7	2°46.4	• • 27.3	316°56.3	51.8	72°26.6	27.2	Menkent	147°56.1	-36°30.2
10	102°00.1	285°15.4	09.5	17°47.0	27.4	331°58.2	51.6	87°29.1	27.2	Arcturus	145°46.7	19°02.8
11	117°02.6	300°15.6	08.3	32°47.7	27.5	347°00.1	51.5	102°31.6	27.2	Rigil Kent.	139°38.5	-60°57.0
12	132°05.1	315°15.7	N01°07.1	47°48.3	N23°27.6	2°02.0	N18°51.3	117°34.1	N03°27.1	Kochab	137° 19.7	74°03.0
13	147°07.5	330°15.9	05.8	62°48.9	27.8	17°03.9	51.2	132°36.6	27.1	Zuben'ubi	136°54.5	-16°09.2
14	162°10.0	345°16.1	03.6	77°49.6	27.8	32°05.8	51.2	132 30.0 147°39.1	27.1	Alphecca	126°02.5	26°37.7
								162°41.6		Antares	112°14.0	-26°29.5
15	177°12.5	0°16.3	• • 03.4	92°50.2	• • 28.0	47°07.7	• • 50.9		•• 27.1	Atria	$107^{\circ}06.7$	-69°04.7
16	192°14.9	15°16.5	02.2	107°50.8	28.0	62°09.6	50.8	177°44.1	27.0	Sabik	$102^{\circ}01.1$	-15°45.5
17	207°17.4	30°16.7	01°00.9	122°51.5	28.1	77°11.5	50.6	192°46.6	27.0	Shaula	96°08.3	-37°07.4
18	222°19.9	45°16.9	N00°59.7		N23°28.2	92°13.4	N18°50.5	207°49.1	N03°27.0	Rasalhague	95°57.1	12°32.6
19	237°22.3	60°17.1	58.5	152°52.7	28.3	107°15.3	50.4	222°51.5	27.0	Eltanin	90°41.2	51°29.3
20	252°24.8	75°17.4	57.3	167°53.4	28.4	122°17.2	50.2	237°54.0	26.9	Kaus Aust.	83°30.4	-34°22.3
21	267°27.3	90°17.6	• • 56.0	182°54.0	• • 28.5	137°19.1	50.1	252°56.5	• • 26.9	Vega	80°32.0	38°48.6
22	282°29.7	105°17.8	54.8	197°54.6	28.6	152°21.0	50.0	267°59.0	26.9	Nunki	75°45.8	-26°15.8
23	297°32.2	120°18.0	53.6	212°55.3	28.7	167°22.9	49.8	283°01.5	26.9	Altair	61°58.4	8°56.4
Mer n	ass. 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	Peacock	53°03.1	-56°38.9
				- 0.0 40						Deneb	49°24.4	45°22.6
										Enif	33° 37.2	9°59.9
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.8	-46°49.7
0	312°34.6	135°18.2	N00°52.4	227°55.9	N23°28.8	182°24.8	N18°49.7	298°04.0	N03°26.9	Fomalhaut	15°12.8	-29°28.7
1	327°37.1	150°18.4	51.1	242°56.5	28.9	197°26.7	49.5	313°06.5	26.8	Scheat	13°43.6	28°13.7
2	342°39.6	165°18.6	49.9	257°57.2	29.0	212°28.6	49.4	328°09.0	26.8	Markab	13°28.3	15°21.0
3	357°42.0	180°18.8	• • 48.7	272°57.8	29.1	227°30.5	• • 49.3	343°11.5	• • 26.8			
4	12°44.5	195°19.0	47.5	287°58.4	29.2	242°32.4	49.1	358°14.0	26.8	Aug 02 Sun	SHA	Mer.pass
5	27°47.0	210°19.2	46.2	302°59.1	29.3	257°34.3	49.0	13°16.5	26.7		184°32.6	14:59
6	42°49.4	225°19.4	N00°45.0		N23°29.4	272°36.2	N18°48.9	28°19.0	N03°26.7		276°49.2	08:50
7	57°51.9	240°19.6	43.8	333°00.4	29.5	287°38.0	48.7	43°21.4	26.7	Jupiter		11:55
8	72°54.4	255°19.8	42.6	348°01.0	29.6	302°39.9	48.6	58°23.9	26.7	Saturn	345°28.2	04:15
9	87°56.8	270°20.0	• • 41.3	3°01.6	• • 29.7	317°41.8	• • 48.4	73°26.4	• • 26.6	Aug 03 Mon	SHA	Mer.pass
10	102°59.3	285°20.2	40.1	18°02.3	29.8	332°43.7	48.3	88°28.9	26.6	_	183°37.9	14:59
11	118°01.7	300°20.5	38.9	33°02.9	29.9	347°45.6	48.2	103°31.4	26.6		276° 05.2	08:49
12	133°04.2	315°20.7	N00°37.7	48°03.5	N23°30.0	2°47.5	N18°48.0	118°33.9	N03°26.6	I .	270 03.2 230°03.7	11:52
13	148°06.7	330°20.9	36.4	63°04.2	30.1	17°49.4	47.9	133°36.4	26.5	Saturn		04:11
14	$163^{\circ}09.1$	$345^{\circ}21.1$	35.2	78°04.8	30.1	32°51.3	47.7	148°38.9	26.5	Jaturn	JTJ 40.1	U4.11
15	$178^{\circ}11.6$	0°21.3	• • 34.0	93°05.4	• • 30.2	47°53.2	• • 47.6	163°41.4	• • 26.5	Aug 04 Tue	SHA	Mer.pass
16	$193^{\circ}14.1$	15°21.5	32.8	$108^{\circ}06.1$	30.3	62°55.1	47.5	178°43.9	26.5		182°43.5	14:59
17	$208^{\circ}16.5$	$30^{\circ}21.7$	31.5	123°06.7	30.4	77°57.0	47.3	193°46.4	26.4		275°21.3	08:48
18	223°19.0	45°21.9	N00°30.3	138°07.3	N23°30.5	92°58.9	N18°47.2	208°48.9	N03°26.4		229°50.1	11:49
19	238°21.5	60°22.2	29.1	153°08.0	30.6	108°00.8	47.0	223°51.4	26.4	Saturn		04:07
20	253°23.9	75°22.4	27.9	$168^{\circ}08.6$	30.7	123°02.7	46.9	238°53.9	26.4			
21	268°26.4	90°22.6	• • 26.6	183°09.3	• • 30.8	138°04.6	• • 46.8	253°56.4	• • 26.3	Horizont	al parallax	
22	283°28.9	$105^{\circ}22.8$	25.4	198°09.9	30.9	153°06.5	46.6	268°58.9	26.3		Venus:	0.2
23	298°31.3	120°23.0	24.2	213°10.5	31.0	168°08.4	46.5	284°01.4	26.3		Mars:	0.1
N 4 e ··	255 02.00	10 0/ -l 1	2/ m 4 20	,,0 G/ J0	.1′ m1.30	110/ -10	.1′ m-1.78	10 E/ -10	0/ 20 62			
ivier.p	ass. 03:09	νυ.2 α-1	.2′ m-4.30	νυ.υ αυ	.1 1111.30	ν1.9 a-0	.τ 111-1./δ	ν2.5 a-C	.0′ m0.62			

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°25.1	N17°48.5	321°29.6	15.0'	S02°48.8	-15.1'	56.3'
1 2	193°25.2 208°25.2	47.9 47.2	336°03.6 350°37.6	15.0' 15.0'	02°33.7 02°18.5	-15.1' -15.2'	56.3' 56.4'
3	223°25.3	• • 46.6	5°11.6	15.0'	02°03.4	-15.2'	56.4
4	238°25.3	45.9	19°45.5	15.0'	01°48.2	-15.2'	56.4'
5	253°25.4	45.3	34°19.5 48°53.4	14.9'	01°33.0 S01°17.8	-15.2'	56.4'
6 7	268°25.4 283°25.4	N17°44.7 44.0	48°53.4 63°27.3	14.9' 14.9'	01°02.6	-15.2' -15.2'	56.5' 56.5'
8	298°25.5	43.4	78°01.3	14.9'	00°47.4	-15.2'	56.5
9	313°25.5	• • 42.7	92°35.1	14.9'	00°32.1	-15.3'	56.5'
10 11	328°25.6 343°25.6	42.1 41.4	107°09.0 121°42.9	14.9' 14.8'	00°16.8 500°01.6	-15.3' -15.3'	56.5' 56.6'
12	358°25.7	N17° 40.8	136°16.7	14.8'	N00°13.7	15.3	56.6
13	13°25.7	40.2	150°50.5	14.8'	00°29.0	15.3'	56.6'
14	28°25.8 43°25.8	39.5	165°24.3 179°58.1	14.8'	00°44.3 00°59.6	15.3' 15.3'	56.6'
15 16	43 25.8 58°25.9	· · 38.9 38.2	179 58.1 194°31.8	14.7' 14.7'	00 59.6 01°14.9	15.3'	56.7' 56.7'
17	73°25.9	37.6	209°05.6	14.7'	01°30.3	15.3'	56.7'
18	88°26.0	N17°36.9	223°39.3	14.7'	N01°45.6	15.3'	56.7'
19 20	103°26.0 118°26.1	36.3 35.6	238°12.9 252°46.5	14.6' 14.6'	02°00.9 02°16.3	15.3' 15.3'	56.7' 56.8'
21	133°26.1	• • 35.0	267°20.1	14.6'	02°10.3	15.3'	56.8
22	148°26.2	34.3	281°53.7	14.5'	02°46.9	15.3'	56.8'
23	163°26.2	33.7	296°27.3	14.5'	03°02.3	15.3'	56.8'
	SD = 15.8'	d = -0.6'		SI	O = 15.4'		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°26.3	N17°33.0	311°00.8	14.5'	N03°17.6	15.3'	56.9'
1	193°26.3	32.4	325°34.2	14.4'	03°33.0	15.3'	56.9'
2	208°26.4 223°26.4	31.7 · · 31.1	340°07.6 354°41.0	14.4' 14.3'	03°48.3 04°03.6	15.3' 15.3'	56.9' 56.9'
3 4	238°26.5	30.4	9°14.4	14.3'	04 03.0 04°18.9	15.3'	56.9'
5	253°26.5	29.8	23°47.7	14.3'	04°34.2	15.3'	57.0'
6	268°26.6	N17°29.1	38°21.0	14.2'	N04°49.6	15.3'	57.0'
7 8	283°26.6 298°26.7	28.5 27.8	52°54.2 67°27.4	14.2' 14.1'	05°04.8 05°20.1	15.3' 15.3'	57.0' 57.0'
9	313°26.7	• • 27.2	82°00.5	14.1'	05°35.4	15.3'	57.1'
10	328°26.8	26.5	96°33.6	14.0'	05°50.7	15.2'	57.1'
11 12	343°26.8 358°26.9	25.8 N17° 25.2	111°06.6 125°39.6	14.0' 13.9'	06°05.9 N06°21.1	15.2' 15.2'	57.1' 57.1'
13	13°26.9	24.5	140°12.5	13.9'	06°36.4	15.2'	57.1 57.2'
14	28°27.0	23.9	154°45.4	13.8'	06°51.6	15.2'	57.2'
15	43°27.0 58°27.1	• • 23.2	169°18.2 183°51.0	13.8' 13.7'	07°06.7 07°21.9	15.2'	57.2' 57.2'
16 17	73°27.1	22.6 21.9	103 51.0 198°23.7	13.7'	07 21.9 07°37.0	15.1' 15.1'	57.2 57.3'
18	88°27.2	N17°21.2	212°56.4	13.6'	N07°52.1	15.1'	57.3'
19	103°27.2	20.6	227°29.0	13.5'	08°07.2	15.1'	57.3'
20 21	118°27.3 133°27.4	19.9 •• 19.3	242°01.5 256°34.0	13.5'	08°22.3 08°37.3	15.0' 15.0'	57.3' 57.4'
22	148°27.4	18.6	271°06.4	13.3'	08°52.4	15.0'	57.4
23	163°27.5	17.9	285°38.7	13.3'	09°07.3	15.0'	57.4'
	SD = 15.8'	d = -0.7'		SI	O = 15.5'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°27.5	N17°17.3	300°11.0	13.2'	N09°22.3	14.9'	57.4'
1 2	193°27.6 208°27.6	16.6 15.9	314°43.2 329°15.4	13.1' 13.1'	09°37.2 09°52.1	14.9' 14.9'	57.4' 57.5'
3	208°27.0 223°27.7	. 15.3	343°47.5	13.1	10°07.0	14.8	57.5'
4	238°27.7	14.6	358°19.5	12.9'	10°21.8	14.8'	57.5'
5 6	253°27.8 268°27.9	13.9 N17° 13.3	12°51.4 27°23.3	12.9' 12.8'	10°36.6 N10°51.3	14.8' 14.7'	57.5' 57.6'
7	283°27.9	12.6	41°55.0	12.7'	11°06.1	14.7	57.6'
8	298°28.0	12.0	56°26.8	12.6'	11°20.7	14.6'	57.6'
9	313°28.0	• • 11.3	70°58.4 85°29.9	12.6'	11°35.4	14.6' 14.5'	57.6'
10 11	328°28.1 343°28.2	10.6 10.0	85°29.9 100°01.4	12.5' 12.4'	11°50.0 12°04.5	14.5'	57.7' 57.7'
12	358°28.2	N17°09.3	114°32.8	12.3'	N12°19.0	14.5'	57.7'
13	13°28.3	08.6	129°04.1	12.2'	12°33.4	14.4'	57.7'
14 15	28°28.3 43°28.4	07.9 •• 07.3	143°35.4 158°06.5	12.1' 12.1'	12°47.8 13°02.2	14.4' 14.3'	57.8' 57.8'
16	58°28.4	06.6	172°37.6	12.0'	13°16.5	14.2'	57.8'
17	73°28.5	05.9	187°08.5	11.9'	13°30.8	14.2'	57.8'
18 19	88°28.6 103°28.6	N17°05.3 04.6	201°39.4 216°10.2	11.8' 11.7'	N13°44.9 13°59.1	14.1' 14.1'	57.9' 57.9'
20	103 28.0 118°28.7	03.9	210 10.2 230°40.9	11.6'	13 59.1 14°13.2	14.1	57.9'
21	133°28.8	• • 03.2	245°11.5	11.5'	14°27.2	14.0'	57.9'
22 23	148°28.8 163°28.9	02.6 01.9	259°42.0 274°12.5	11.4' 11.3'	14°41.2 14°55.1	13.9' 13.8'	58.0' 58.0'
23	$\frac{163^{\circ}28.9}{\text{SD} = 15.8'}$	d = -0.7'	2/4 12.5		D = 15.7'	13.8	50.0
	<u></u> 3υ = 15.8′	u = -0.7		31	J = 13.1°		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Junioci	Civil	Naut.
N 72°						
N 70°	////	////	01:43	22:23	////	////
68°	////	////	02:25	21:43	////	////
66°	////	00:53	02:53	21:16	23:08	////
64°	////	01:51	03:14	20:56	22:17	////
62°	////	02:23	03:31	20:39	21:46	////
60°	00:48	02:46	03:45	20:25	21:24	23:15
N 58°	01:40	03:05	03:57	20:14	21:06	22:28
56°	02:10	03:20	04:08	20:03	20:51	22:00
54°	02:32	03:33	04:17	19:55	20:38	21:39
52°	02:49	03:44	04:25	19:47	20:27	21:21
50°	03:04	03:54	04:32	19:39	20:17	21:07
45°	03:32	04:14	04:48	19:24	19:58	20:39
N 40°	03:53	04:30	05:00	19:12	19:42	20:19
35°	04:10	04:43	05:11	19:01	19:29	20:02
30°	04:23	04:54	05:20	18:52	19:18	19:48
20°	04:45	05:13	05:36	18:36	18:59	19:27
N 10°	05:02	05:28	05:50	18:22	18:44	19:10
0°	05:16	05:41	06:03	18:10	18:31	18:56
<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
		N4			N4	

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

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	313°33.8	135°23.2	N00°23.0	228°11.2	N23°31.0	183°10.3	N18°46.4	299°03.9	N03°26.3		JIIA	
1	328°36.2	150°23.5		243°11.8	31.1	198°12.2	46.2	314°06.3	26.2	Alpheratz	357°33.2	29°14.3
2	343°38.7	165°23.7	21.8 20.5	243 11.6 258°12.4	31.1	213°14.1	46.2	329°08.8		Ankaa	353°05.6	-42°09.4
				273°13.1					26.2	Schedar	349°29.2	56°40.9
3	358°41.2	180°23.9	• • 19.3		• • 31.3	228°16.0	• • 45.9	344°11.3	• • 26.2	Diphda	348°45.8	-17°50.2
4	13°43.6	195°24.1	18.1	288°13.7	31.4	243°17.9	45.8	359°13.8	26.2	Achernar	$335^{\circ}19.0$	-57°05.7
5	28°46.1	210°24.3	16.9	303°14.4	31.5	258°19.8	45.7	14°16.3	26.1	Hamal	327°49.7	23°35.3
6	43°48.6	225°24.6	N00°15.6	318°15.0	N23°31.6	273°21.7	N18°45.5	29°18.8	N03°26.1	Polaris	313°23.7	89°22.2
7	58°51.0	240°24.8	14.4	333°15.6	31.7	288°23.6	45.4	44°21.3	26.1	Acamar	315°10.8	-40°11.5
8	73°53.5	255°25.0	13.2	348°16.3	31.7	303°25.5	45.2	59°23.8	26.1	Menkar	314°04.8	4°11.8
9	88°56.0	270°25.2	• • 12.0	3°16.9	• • 31.8	318°27.4	• • 45.1	74°26.3	• • 26.0	Mirfak	308°26.4	49°57.2
10	103°58.4	285°25.5	10.7	18°17.5	31.9	333°29.3	45.0	89°28.8	26.0	Aldebaran	290°38.3	16°33.8
11	119°00.9	300°25.7	09.5	33°18.2	32.0	348°31.2	44.8	104°31.3	26.0	Rigel	281°02.8	-8°10.1
12	134°03.3	315°25.9	N00°08.3	48°18.8	N23°32.1	3°33.1	N18°44.7	119°33.8	N03°26.0	Capella	280° 20.2	46°01.3
13	149°05.8	330°26.1	07.1	63°19.5	32.2	18°35.0	44.5	134°36.3	25.9	Bellatrix	278°21.7	6°22.5
14	164°08.3	345°26.4	05.8	78°20.1	32.2	33°36.9	44.4	149°38.8	25.9	Elnath	278°00.4	28°37.7
15	$179^{\circ}10.7$	0°26.6	• • 04.6	93°20.7	• • 32.3	48°38.8	• • 44.3	164°41.3	• • 25.9	Alnilam	275°36.6	-1°11.0
16	194°13.2	$15^{\circ}26.8$	03.4	108°21.4	32.4	63°40.7	44.1	179°43.8	25.8	Betelgeuse	270°50.9	7°24.8
17	209°15.7	$30^{\circ}27.0$	02.2	123°22.0	32.5	78°42.6	44.0	194°46.3	25.8	Canopus	263°52.3	-52°42.3
18	224°18.1	45°27.3	N00°00.9	138°22.7	N23°32.6	93°44.5	N18°43.9	209°48.8	N03°25.8	Sirius	203 52.3 258° 25.4	-32 42.3 -16°45.0
19	239°20.6	$60^{\circ}27.5$	S00°00.3	153°23.3	32.7	108°46.4	43.7	224°51.3	25.8	!		-10 45.0 -29°00.3
20	254°23.1	75° 27.7	01.5	168°23.9	32.7	123°48.3	43.6	239°53.8	25.7	Adhara	255°05.2	
21	269°25.5	90°28.0	• • 02.7	183°24.6	• • 32.8	138°50.2	• • 43.4	254°56.3	• • 25.7	Procyon	244°49.8	5°09.5
22	284°28.0	105°28.2	03.9	198°25.2	32.9	153°52.1	43.3	269°58.8	25.7	Pollux	243°16.1	27°57.7
23	299°30.5	120°28.4	05.2	213°25.8	33.0	168°54.0	43.2	285°01.3	25.7	Avior	234°14.9	-59°35.6
										Suhail	222°45.8	-43°32.4
Mer.p	ass. 03:05	$\nu$ 0.2′ d-1	.2′ m-4.31	$\nu^{0.6'} d0$	.1′ m1.30	$\nu$ 1.9′ d-0	.1′ m-1.78	$\nu^{2.5'} d$ -0	.0′ m0.61	Miaplacidus	221°39.0	-69°49.6
										Alphard	217°46.8	-8°46.4
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.4	11°50.3
0	314°32.9	135°28.7	\$00°06.4	228°26.5	N23°33.1	183°55.9	N18°43.0	300°03.8	N03°25.6	Dubhe	193°40.0	61°36.6
1	329°35.4	150°28.9	07.6	243°27.1	33.1	198°57.8	42.9	315°06.3	25.6	Denebola	182°23.8	14°25.5
	344°37.8					213°59.7				Gienah	175°42.4	-17°41.4
2		165°29.1	08.8	258°27.8	33.2		42.7	330°08.8	25.6 • • 25.6	Acrux	$172^{\circ}59.0$	-63°15.0
3	359°40.3	180°29.4	• • 10.1	273°28.4	• • 33.3	229°01.6	• • 42.6	345°11.3		Gacrux	171°50.5	-57°16.0
4	14°42.8	195°29.6	11.3	288°29.0	33.4	244°03.5	42.5	0°13.8	25.5	Alioth	$166^{\circ}12.1$	55°49.2
5	29°45.2	210°29.8	12.5	303°29.7	33.4	259°05.4	42.3	15°16.3	25.5	Spica	$158^{\circ}21.0$	-11°18.0
6	44°47.7	225°30.1	S00°13.7	318°30.3	N23°33.5	274°07.3	N18°42.2	30°18.8	N03°25.5	Alkaid	$152^{\circ}51.1$	49°11.1
7	59°50.2	240°30.3	15.0	333°31.0	33.6	289°09.2	42.0	45°21.3	25.4	Hadar	148°34.2	-60°30.3
8	74°52.6	255° 30.5	16.2	348°31.6	33.7	304°11.1	41.9	60°23.8	25.4	Menkent	147°56.1	-36°30.2
9	89°55.1	270°30.8	• • 17.4	3°32.2	• • 33.8	319°13.0	• • 41.8	75°26.3	• • 25.4	Arcturus	145°46.8	19°02.8
10	104°57.6	285°31.0	18.6	18°32.9	33.8	334°14.9	41.6	90°28.8	25.4	Rigil Kent.	139°38.5	-60°57.0
11	120°00.0	300°31.2	19.9	33°33.5	33.9	349°16.8	41.5	105°31.3	25.3	Kochab	137° 19.8	74°03.0
12	135°02.5	315°31.5	S00°21.1	48°34.2	N23°34.0	4°18.7	N18°41.3	120°33.8	N03°25.3	Zuben'ubi	136°54.5	-16°09.2
13	150°05.0	$330^{\circ}31.7$	22.3	63°34.8	34.1	19°20.6	41.2	135°36.3	25.3	Alphecca	126° 02.5	26°37.7
14	165°07.4	345°32.0	23.5	78°35.4	34.1	34°22.5	41.1	150°38.8	25.3	Antares	112° 14.1	-26°29.5
15	180°09.9	0°32.2	• • 24.7	93°36.1	• • 34.2	49°24.4	• • 40.9	165°41.3	• • 25.2	Atria	107°06.8	-69°04.7
16	195°12.3	15°32.4	26.0	108°36.7	34.3	64°26.3	40.8	180°43.8	25.2	Sabik	102°01.1	-15°45.5
17	210°14.8	30°32.7	27.2	123°37.4	34.4	79°28.2	40.6	195°46.3	25.2	Shaula	96°08.3	-37°07.4
18	225°17.3	45°32.9	500°28.4	138°38.0	N23°34.4	94°30.1	N18°40.5	210°48.8	N03°25.1	Rasalhague	95°57.1	12°32.6
19	240°19.7	60°33.2	29.6	153°38.7	34.5	109°32.0	40.4	225°51.3	25.1	Eltanin	90°41.2	51°29.3
20	255°22.2	75°33.4	30.9	168°39.3	34.6	124°33.9	40.2	240°53.8	25.1	Kaus Aust.	83°30.4	-34°22.3
21	270°24.7	90°33.7	• • 32.1	183°39.9	• • 34.6	139°35.8	• • 40.1	255°56.3	• • 25.1		80°32.0	38°48.7
22	285°27.1	105°33.9	33.3	198°40.6	34.7	154°37.7	39.9	270°58.8	25.0	Vega	75° 45.8	
23	300°29.6	120°34.1	34.5	213°41.2	34.8	169°39.6	39.8	286°01.3	25.0	Nunki		-26°15.8
										Altair	61°58.4	8°56.4
Mer.p	ass. 03:01	$\nu 0.2' d1.$	2′ m-4.32	$\nu$ 0.6′ d0	$.1^\prime$ m $1.30$	$\nu 1.9' \ d-0$	.1' m-1.78	$\nu$ 2.5′ d-0	.0′ m0.61	Peacock	53°03.1	-56°38.9
										Deneb	49°24.4	45°22.6
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.2	9°59.9
0	315°32.1	135°34.4	S00°35.7	228°41.9	N23°34.9	184°41.5	N18°39.7	301°03.8	N03°25.0	Al Na'ir	27°30.8	-46°49.7
1	330°34.5	150°34.6	37.0	243°42.5	34.9	199°43.4	39.5	316°06.3	24.9	Fomalhaut	15°12.8	-29°28.7
2	345°37.0	165°34.9	38.2	258°43.1	35.0	214°45.3	39.4	331°08.8	24.9	Scheat	13°43.6	28°13.7
3	0°39.5	180°35.1	• • 39.4	273°43.8	35.1	214 43.3 229°47.2	39.4	346°11.3	24.9	Markab	13°28.3	15°21.0
4	15°41.9	195°35.4	40.6	288°44.4	35.1	244°49.1	39.1	1°13.8	24.9	Aug 05 Wed	SHA	Mer.pass
5	30°44.4	210°35.6	41.9	303°45.1	35.2	259°51.0	39.0	16°16.4	24.8		181°49.5	14:58
6	45°46.8	210 35.0 225°35.9	500°43.1		N23°35.3	274°52.9	N18°38.8	31°18.9	N03°24.8	1	274° 37.4	08:47
7	60°49.3	240°36.1	44.3	333°46.4	35.3	289°54.8	38.7	46°21.4	24.8	Jupiter	_	11:46
8	75°51.8	255°36.4	44.5 45.5	348°47.0	35.4	304°56.7	38.5	61°23.9	24.6	Saturn	345°30.1	04:03
9	90°54.2	270°36.6	• • 46.7	3°47.6	• • 35.5	319°58.6	• • 38.4	76°26.4	• • 24.7			
10	105° 56.7	285°36.9	48.0	18°48.3	35.6	335°00.5	38.3	91°28.9	24.7	Aug 06 Thu	SHA	Mer.pass
	105 56.7 120°59.2	285 36.9 300°37.1	48.0 49.2	18 48.3 33°48.9	35.6 35.6	350°02.4	38.3	91 28.9 106°31.4	24.7 24.7	Venus	$180^{\circ}55.7$	14:58
11	120°59.2 136°01.6		500°50.4	48°49.6	35.0 N23°35.7	5°04.3	38.1 N18°38.0	106 31.4 121°33.9	24.7 N03°24.6	Mars	273°53.6	08:46
12 13	150 01.6 151°04.1	315°37.4 330°37.6	51.6	48 49.6 63°50.2	N23 35.7 35.8	5 04.3 20°06.2	37.8	121 33.9 136°36.4		Jupiter	229°23.0	11:43
									24.6	Saturn		03:59
14	166°06.6	345°37.9	52.8	78°50.9	35.8	35°08.1	37.7	151°38.9	24.6			
15	181°09.0	0°38.1	54.1	93°51.5	• • 35.9	50°10.0	•• 37.6	166°41.4	• • 24.5	Aug 07 Fri	SHA	Mer.pass
16	196°11.5	15°38.4	55.3	108°52.1	35.9	65°11.9	37.4	181°43.9	24.5	1	180°02.3	14:57
17	211°13.9	30°38.7	56.5	123°52.8	36.0	80°13.8	37.3	196°46.4	24.5		273°09.8	08:45
18	226°16.4	45°38.9	S00°57.7	138°53.4	N23°36.1	95°15.7	N18°37.1	211°48.9	N03°24.4		229°09.5	11:40
19	241°18.9	60°39.2	00°58.9	153°54.1	36.1	110°17.6	37.0	226°51.4	24.4	Saturn	345°31.8	03:55
20	256°21.3	75°39.4	01°00.2	168°54.7	36.2	125°19.6	36.9	241°53.9	24.4	Uz.:! ·	ol novelle:	
21	271°23.8	90°39.7	• • 01.4	183°55.4	• • 36.3	140°21.5	• • 36.7	256°56.4	• • 24.4	Horizont	al parallax	0.0
22	286°26.3	105°39.9	02.6	198°56.0	36.3	155°23.4	36.6	271°58.9	24.3		Venus:	0.2
23	301°28.7	120°40.2	03.8	213°56.7	36.4	170°25.3	36.4	287°01.5	24.3		Mars:	0.1
Mern	ass. 02:57	ν0 2/ d1	2′ m-4.33	νη 6' dη	.1′ m1.29	v1 0/ d₋0	.1′ m-1.78	1/2 5/ d. C	0.0′ m0.60			

h	Sun				Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°28.9	$N17^{\circ}01.2$	288°42.8	11.2'	$N15^{\circ}08.9$	13.8'	58.0'
1	193°29.0	17°00.6	303°13.0	11.1'	15°22.7	13.7'	58.0'
2	208°29.1 223°29.1	16°59.9 •• 59.2	317°43.2 332°13.2	11.0' 10.9'	15°36.4 15°50.0	13.6' 13.6'	58.1' 58.1'
4	238° 29.2	58.5	346°43.1	10.8	16°03.6	13.5'	58.1'
5	253°29.2	57.9	1°13.0	10.7'	$16^{\circ}17.1$	13.4'	58.1'
6	268° 29.3	N16°57.2	15°42.7	10.6'	N16° 30.5	13.4'	58.2'
7 8	283°29.4 298°29.4	56.5 55.8	30°12.3 44°41.9	10.5' 10.4'	16°43.9 16°57.2	13.3' 13.2'	58.2' 58.2'
9	313° 29.5	55.1	59°11.3	10.4	10° 37.2	13.1'	58.2
10	328°29.6	54.5	73°40.6	10.2'	17°23.5	13.0'	58.3'
11	343°29.6	53.8	88°09.8	10.1'	17°36.5	13.0'	58.3'
12 13	358°29.7 13°29.8	N16°53.1 52.4	102°38.9 117°07.9	10.0' 9.9'	N17°49.5 18°02.3	12.9' 12.8'	58.3' 58.3'
13 14	28° 29.8	52.4 51.7	117 07.9 131°36.8	9.9 9.8'	18 02.3 18°15.1	12.8	58.4'
15	43° 29.9	• • 51.1	146°05.6	9.7'	18° 27.8	12.6'	58.4'
16	58°30.0	50.4	$160^{\circ}34.2$	9.6'	18°40.5	12.5'	58.4'
17	73°30.0	49.7	175°02.8	9.4'	18°53.0	12.4'	58.4'
18 19	88°30.1 103°30.2	N16°49.0 48.3	189°31.2 203°59.6	9.3' 9.2'	N19°05.4 19°17.7	12.3' 12.2'	58.5' 58.5'
20	105 30.2 118°30.2	46.3 47.6	203 59.0 218°27.8	9.2 9.1'	19 17.7 19°30.0	12.2	58.5'
21	133°30.3	• • 47.0	232°55.9	9.0'	19°42.1	12.0'	58.5'
22	148° 30.4	46.3	247°23.8	8.9'	19°54.2	11.9'	58.6'
23	163°30.4	45.6	261°51.7	8.7'	20°06.1	11.8'	58.6'
	SD = 15.8'	d = -0.7'		SE	O = 15.8'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°30.5	N16°44.9	276°19.5	8.6'	N20° 17.9	11.7'	58.6'
1	193°30.6	44.2	290°47.1	8.5'	20°29.7	11.6'	58.6'
2	208°30.6	43.5	305°14.6	8.4'	20°41.3	11.5'	58.7'
3 4	223°30.7 238°30.8	· · 42.8 42.2	319°42.0 334°09.3	8.3' 8.2'	20°52.8 21°04.2	11.4' 11.3'	58.7' 58.7'
5	253° 30.8	41.5	348°36.4	8.0'	21°15.5	11.2'	58.7'
6	268° 30.9	N16°40.8	3°03.5	7.9'	N21°26.7	11.1'	58.8'
7	283°31.0	40.1	17°30.4	7.8'	21°37.8	11.0'	58.8'
8	298°31.0	39.4	31°57.2	7.7'	21°48.7	10.8'	58.8'
9 10	313°31.1 328°31.2	· · 38.7 38.0	46°23.9 60°50.4	7.6' 7.4'	21°59.6 22°10.3	10.7' 10.6'	58.8' 58.8'
11	343°31.3	37.3	75°16.9	7.3'	22° 20.9	10.5	58.9'
12	358°31.3	N16°36.6	89°43.2	7.2'	N22°31.3	10.3'	58.9'
13	13°31.4	36.0	104°09.4	7.1'	22°41.7	10.2'	58.9'
14 15	28°31.5 43°31.5	35.3 · · 34.6	118°35.5 133°01.4	7.0' 6.8'	22°51.9 23°02.0	10.1' 9.9'	58.9' 59.0'
16	58° 31.6	33.9	147°27.3	6.7'	23°11.9	9.8'	59.0'
17	73°31.7	33.2	161°53.0	6.6'	23°21.7	9.7'	59.0'
18	88°31.8	N16°32.5	176°18.6	6.5'	N23°31.4	9.5'	59.0'
19	103°31.8 118°31.9	31.8	190°44.1 205°09.4	6.4' 6.2'	23°40.9 23°50.4	9.4' 9.3'	59.1'
20 21	133°32.0	31.1 · · 30.4	205 09.4 219°34.7	6.1	23°59.6	9.3 9.1'	59.1' 59.1'
22	148° 32.1	29.7	233°59.8	6.0'	24°08.7	9.0'	59.1'
23	163°32.1	29.0	248°24.8	5.9'	24° 17.7	8.8'	59.2'
	SD = 15.8'	d = -0.7'		SE	0 = 16.0'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178° 32.2	N16°28.3	262°49.7	5.8'	N24°26.5	8.7'	59.2'
1	193°32.3	27.6	277°14.5	5.7'	24°35.2	8.5'	59.2'
2	208°32.3	26.9	291°39.1	5.5'	24°43.7 24°52.1	8.4'	59.2'
3 4	223°32.4 238°32.5	· · 26.2 25.5	306°03.6 320°28.1	5.4' 5.3'	24°52.1 25°00.3	8.2' 8.1'	59.2' 59.3'
5	253° 32.6	24.8	334°52.4	5.2'	25°08.4	7.9'	59.3'
6	268°32.6	N16°24.1	349°16.6	5.1'	N25°16.3	7.8'	59.3'
7	283°32.7	23.4	3°40.6	5.0'	25°24.1	7.6'	59.3'
8 9	298°32.8 313°32.9	22.7 • • 22.0	18°04.6 32°28.5	4.9' 4.8'	25°31.7 25°39.1	7.4' 7.3'	59.4' 59.4'
10	328° 33.0	21.3	46°52.2	4.6	25°46.3	7.3 7.1'	59.4
11	343°33.0	20.6	61°15.9	4.5'	25°53.4	6.9'	59.4'
12	358°33.1	N16°19.9	75°39.4	4.4'	N26°00.4	6.8'	59.4'
13 14	13°33.2 28°33.3	19.2 18.5	90°02.9 104°26.2	4.3' 4.2'	26°07.1 26°13.7	6.6' 6.4'	59.5' 59.5'
14 15	43° 33.3	18.5	104°26.2 118°49.4	4.2 4.1'	26° 13.7 26° 20.1	6.4	59.5' 59.5'
16	58° 33.4	17.1	133°12.5	4.0'	26°26.4	6.1	59.5'
17	73°33.5	16.4	147°35.6	3.9'	26° 32.5	5.9'	59.5'
18	88°33.6	N16°15.7	161°58.5	3.8'	N26° 38.4	5.7'	59.6'
19 20	103°33.6 118°33.7	15.0 14.3	176°21.3 190°44.1	3.7' 3.7'	26°44.1 26°49.6	5.5' 5.4'	59.6' 59.6'
21	133°33.8	13.6	205°06.7	3.6'	26°55.0	5.4	59.6'
22	148°33.9	12.9	219°29.3	3.5'	27°00.1	5.0'	59.6'
23	163°34.0	12.2	233°51.8	3.4'	27°05.1	4.8'	59.7'
	SD = 15.8'	d = -0.7'		SE	0 = 16.1'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
<b>N</b> 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
N 58°	01:54	03:13	04:04	20:07	20:57	22:14
56°	02:20	03:27	04:13	19:57	20:43	21:49
54°	02:40	03:39	04:22	19:49	20:31	21:30
52°	02:56	03:49	04:29	19:41	20:21	21:14
50°	03:10	03:59	04:36	19:34	20:12	21:01
45°	45° 03:36		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
N 10°	05:03	05:28	05:50	18:21	18:43	19:09
0°	05:16	05:41	06:02	18:09	18:31	18:56
<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	e		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
N 58°	21:10	21:22	21:45	13:17	14:58	16:38
56°	21:21	21:39	22:08	13:06	14:42	16:16
54°	21:32	21:53	22:26	12:57	14:28	15:58
52°	21:41	22:05	22:42	12:48	14:16	15:43
50°	21:49	22:16	22:56	12:41	14:05	15:30
45°	22:07	22:40	23:23	12:25	13:44	15:02
<b>N</b> 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				
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	62-40%		
05	06:04	06:01	12:06	04:55	17:21			
06	05:58	05:55	12:06	05:47	18:15			
07	05:51	05:48	12:06	06:45	19:15			

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
	316°31.2	135°40.5		228° 57.3	N23°36.5	185°27.2		302°04.0			ЗПА	Dec
0			S01°05.1	243°57.9			N18°36.3		N03°24.3	Alpheratz	357°33.1	29°14.3
1	331°33.7	150°40.7	06.3		36.5	200°29.1	36.2	317°06.5	24.2	Ankaa	353°05.6	-42°09.4
2	346°36.1	165°41.0	07.5	258°58.6	36.6	215°31.0	36.0	332°09.0	24.2	Schedar	349°29.2	56°40.9
3 4	1°38.6	180°41.2	· · 08.7 09.9	273°59.2	• • 36.6	230°32.9 245°34.8	• • 35.9	347°11.5 2°14.0	• • 24.2	Diphda	348°45.8	-17°50.2
5	16°41.1 31°43.5	195°41.5		288°59.9 304°00.5	36.7	245 34.6 260°36.7	35.7	2 14.0 17°16.5	24.1	Achernar	$335^{\circ}19.0$	-57°05.7
6	46°46.0	210°41.8 225°42.0	11.2 <b>S</b> 01°12.4	319°01.2	36.8 N23°36.8	275°38.6	35.6 N18°35.5	32°19.0	24.1 N03°24.1	Hamal	327°49.6	23°35.3
7	61°48.4	240°42.3	13.6	334°01.8	36.9	290°40.5	35.3	47°21.5	24.1	Polaris	313°21.8	89°22.2
8	76°50.9	255°42.5	14.8	349°02.5	37.0	305°42.4	35.2	62°24.0	24.0	Acamar	315°10.8	-40°11.5
9	91°53.4	270°42.8	. 16.0	4°03.1	• • 37.0	320°44.3	35.0	77°26.5	• • 24.0	Menkar	314°04.8	4°11.8
10	106°55.8	285°43.1	17.3	19°03.8	37.1	335°46.2	34.9	92°29.0	24.0	Mirfak	308°26.4	49°57.2
11	121°58.3	300°43.3	18.5	34°04.4	37.1	350°48.1	34.8	107°31.6	23.9	Aldebaran	290°38.2	16°33.8
12	137°00.8	315°43.6	S01°19.7	49°05.0	N23°37.2	5°50.0	N18°34.6	122°34.1	N03°23.9	Rigel	281°02.8	-8°10.1
13	152°03.2	330°43.9	20.9	64°05.7	37.2	20°51.9	34.5	137°36.6	23.9	Capella	280°20.2	46°01.3
14	167°05.7	345°44.1	22.1	79°06.3	37.3	35°53.8	34.3	152°39.1	23.8	Bellatrix	278°21.7	6°22.5
15	182°08.2	0°44.4	· · 23.3	94°07.0	• • 37.4	50°55.7	• • 34.2	167°41.6	· · 23.8	Elnath	278°00.4	28°37.7
16	197°10.6	15°44.7	24.6	109°07.6	37.4	65°57.6	34.1	182°44.1	23.8	Alnilam	275°36.6	-1°11.0
17	212°13.1	30°44.9	25.8	124°08.3	37.5	80°59.5	33.9	197°46.6	23.7	Betelgeuse	270°50.9	7°24.8 -52°42.3
18	227°15.6	45°45.2	S01°27.0	139°08.9	N23°37.5	96°01.4	N18°33.8	212°49.1	N03°23.7	Canopus Sirius	263°52.2 258°25.4	-52 42.3 -16°45.0
19	242°18.0	60°45.5	28.2	154°09.6	37.6	111°03.3	33.6	227°51.6	23.7	Adhara	255°05.1	-10 45.0 -29°00.3
20	257°20.5	75°45.8	29.4	$169^{\circ}10.2$	37.6	$126^{\circ}05.2$	33.5	242°54.1	23.7	Procyon	255 05.1 244°49.8	-29 00.3 5°09.5
21	272°22.9	90°46.0	• • 30.7	184° 10.9	•• 37.7	141°07.1	• • 33.3	257°56.7	• • 23.6	Pollux	244 49.6 243°16.0	27°57.7
22	287°25.4	105°46.3	31.9	199° 11.5	37.8	156°09.0	33.2	272°59.2	23.6	Avior	234°14.8	-59° 35.6
23	302°27.9	120°46.6	33.1	214° 12.2	37.8	$171^{\circ}10.9$	33.1	288°01.7	23.6	Suhail	234 14.8 222°45.8	-43°32.4
Mern	ass. 02:53	$\nu 0.3' d1$	2' m-4.34	ν0 6' d0	.1′ m1.29	ν1 9' d-N	.1′ m-1.78	ν2 5′ d-0	.0′ m0.60	Miaplacidus	221°39.0	-69°49.6
		- J.J u1.		- 0.0 00		- 1.5 U-U	1.70	- 2.5 u-0		Alphard	217°46.8	-8°46.4
										Regulus	207°33.4	11°50.3
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.0	61°36.6
0	317°30.3	135°46.8	S01°34.3	229°12.8	N23°37.9	186°12.8	N18°32.9	303°04.2	N03°23.5	Denebola	182°23.8	14°25.5
1	332°32.8	150°47.1	35.5	244°13.5	37.9	201°14.7	32.8	318°06.7	23.5	Gienah	175°42.4	-17°41.4
2	347°35.3	165°47.4	36.7	259°14.1	38.0	216°16.6	32.6	333°09.2	23.5		172°59.1	-63°15.0
3	2°37.7	180°47.7	• • 38.0	274°14.7	• • 38.0	231°18.5	• • 32.5	348°11.7	• • 23.4	Gacrux	171°50.5	-57°16.0
4	17°40.2	195°47.9	39.2	289°15.4	38.1	246°20.4	32.4	3°14.2	23.4	Alioth	$166^{\circ}12.1$	55°49.1
5	32°42.7	210°48.2	40.4	304°16.0	38.1	261°22.3	32.2	18°16.7	23.4	Spica	158°21.0	-11°18.0
6	47°45.1	225°48.5	S01°41.6	319° 16.7	N23°38.2	276°24.2	N18°32.1	33°19.3	N03°23.3	Alkaid	152°51.1	49°11.1
7	62°47.6	240°48.8	42.8	334°17.3	38.2	291°26.1	31.9	48°21.8	23.3	Hadar	148°34.3	-60°30.3
8	77°50.1 92°52.5	255°49.0	44.1	349°18.0	38.3	306°28.0 321°29.9	31.8	63°24.3 78°26.8	23.3	Menkent	$147^{\circ}56.1$	-36°30.2
9	92 52.5 107°55.0	270°49.3 285°49.6	· · 45.3 46.5	4° 18.6 19° 19.3	• • 38.3	321 29.9 336°31.8	31.7	78 20.8 93°29.3	• • 23.2	Arcturus	145°46.8	19°02.8
10 11	107 55.0 122°57.4	285 49.6 300°49.9	40.5 47.7	19 19.3 34°19.9	38.4 38.4	350 31.8 351°33.7	31.5 31.4	93 29.3 108°31.8	23.2 23.2	Rigil Kent.	139°38.5	-60°57.0
12	137°59.9	315°50.2	S01°48.9	49° 20.6	N23°38.5	6°35.6	N18°31.2	100° 31.0	N03°23.1	Kochab	137°19.9	74°03.0
13	157 59.9 153°02.4	330°50.4	50.1	64°21.2	38.5	21°37.5	31.1	138°36.8	23.1	Zuben'ubi	136°54.6	-16°09.2
14	168°04.8	345°50.7	51.4	79°21.9	38.6	36°39.4	31.1	153°39.4	23.1	Alphecca	126°02.6	26°37.7
15	183°07.3	0°51.0	52.6	94°22.5	• • 38.6	51°41.3	30.8	168°41.9	• • 23.0	Antares	112°14.1	-26°29.5
16	198°09.8	15°51.3	53.8	109°23.2	38.7	66°43.2	30.7	183°44.4	23.0	Atria	107°06.8	-69°04.7
17	213°12.2	30°51.6	55.0	124°23.8	38.7	81°45.1	30.7	198°46.9	23.0	Sabik	102°01.1	-15°45.5
18	228°14.7	45°51.9	S01°56.2	139°24.5	N23°38.8	96°47.0	N18°30.4	213°49.4	N03°23.0	Shaula	96°08.3	-37°07.4
19	243°17.2	60°52.1	57.4	154°25.1	38.8	111°49.0	30.2	228°51.9	22.9	Rasalhague	95°57.1	12°32.6
20	258°19.6	75°52.4	58.7	169°25.8	38.9	126° 50.9	30.1	243°54.4	22.9	Eltanin	90°41.2	51°29.3
21	273°22.1	90°52.7	01°59.9	184° 26.4	38.9	141°52.8	30.0	258°57.0	22.9	Kaus Aust.	83°30.4	-34°22.3
22	288°24.6	105°53.0	02°01.1	199°27.1	39.0	156° 54.7	29.8	273°59.5	22.8	Vega	80°32.0	38°48.7
23	303°27.0	120°53.3	02.3	214°27.7	39.0	171°56.6	29.7	289°02.0	22.8	Nunki	75°45.8	-26°15.8
_										Altair	61°58.4	8°56.4
Mer.p	ass. 02:50	$\nu$ 0.3′ d1.	2′ m-4.35	$\nu 0.6' d0$	.1′ m1.29	$\nu 1.9' \ d-0$	.1′ m-1.78	$\nu 2.5' d-0$	.0′ m0.59	Peacock	53°03.1	-56°38.9
										Deneb	49°24.4	45°22.6 10°00.0
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir	33°37.2 27°30.8	-46°49.7
0	$318^{\circ}29.5$	135°53.6	S02°03.5	229°28.4	N23°39.1	186°58.5	N18°29.5	304°04.5	N03°22.8	Fomalhaut	27 30.6 15°12.7	-40 49.7 -29°28.6
1	333°31.9	$150^{\circ}53.8$	04.7	$244^{\circ}29.0$	39.1	202°00.4	29.4	$319^{\circ}07.0$	22.7	Scheat	13°43.6	28° 13.7
2	348°34.4	$165^{\circ}54.1$	05.9	$259^{\circ}29.7$	39.2	$217^{\circ}02.3$	29.3	$334^{\circ}09.5$	22.7	Markab	13°28.3	15°21.0
3	3°36.9	180°54.4	•• 07.2	274°30.3	• • 39.2	232°04.2	•• 29.1	349°12.1	• • 22.7			
4	18°39.3	195°54.7	08.4	289°31.0	39.3	$247^{\circ}06.1$	29.0	4°14.6	22.6	Aug 08 Sat	SHA	Mer.pass
5	33°41.8	210°55.0	09.6	304°31.6	39.3	262°08.0	28.8	19°17.1	22.6		179°09.3	14:57
6	48°44.3	225°55.3	S02°10.8	319° 32.3	N23°39.3	277°09.9	N18°28.7		N03°22.6	1	272°26.1	08:44
7	63°46.7	240°55.6	12.0	334°32.9	39.4	292°11.8	28.5	49°22.1	22.5		228°56.0	11:37
8	78°49.2	255°55.9	13.2	349°33.6	39.4	307°13.7	28.4	64°24.6	22.5	Saturn	345°32.8	03:51
9	93°51.7	270°56.2	• • 14.5	4°34.2	• • 39.5	322°15.6	• • 28.3	79°27.1	• • 22.5	Aug 09 Sun	SHA	Mer.pass
10	108°54.1	285°56.5	15.7	19°34.9	39.5	337°17.5	28.1	94°29.7	22.4	-	178°16.5	14:57
11	123°56.6	300°56.8	16.9	34°35.5	39.6	352°19.4	28.0	109°32.2	22.4		271°42.5	08:43
12	138°59.1	315°57.0	S02°18.1	49°36.2	N23°39.6	7°21.3	N18°27.8	124°34.7	N03°22.4		228°42.5	11:34
13	154°01.5	330°57.3	19.3	64°36.8	39.6	22°23.2	27.7	139°37.2	22.3		345°33.8	03:47
14	169°04.0	345°57.6	20.5	79°37.5	39.7	37°25.1	27.6	154°39.7	22.3			
15 16	184°06.4	0°57.9	•• 21.7	94°38.1	•• 39.7	52°27.0	•• 27.4	169°42.3	• • 22.3	Aug 10 Mon	SHA	Mer.pass
16	199°08.9	15°58.2	23.0	109°38.8	39.8	67°28.9	27.3	184°44.8	22.2		177°24.1	14:56
17 18	214°11.4 229°13.8	30°58.5 45°58.8	24.2 \$02°25.4	124°39.5 139°40.1	39.8 N23°39.8	82°30.8 97°32.7	27.1 N18°27.0	199°47.3 214°49.8	22.2 N03°22.1		270°58.9	08:42
18 19	229°13.8 244°16.3	45°58.8 60°59.1	26.6	139°40.1 154°40.8	N23 39.8 39.9	97°32.7 112°34.6	N18 27.0 26.8	214 49.8 229°52.3	22.1		228°29.0	11:31
20	244 16.3 259°18.8	75°59.4	20.0 27.8	169°41.4	39.9 39.9	112 34.6 127°36.5	26.8	229 52.3 244°54.8	22.1	Saturn	345°35.0	03:43
20 21	259° 18.8 274° 21.2	75°59.4 90°59.7	29.0	169°41.4 184°42.1	· · 40.0	127° 36.5 142° 38.4	26.6	244 54.8 259°57.4	22.0	Horizont	al parallax	
22	274 21.2 289°23.7	90°59.7 106°00.0	30.2	104 42.1 199°42.7	40.0	142 36.4 157°40.3	26.4	259 57.4 274°59.9	22.0		Venus:	0.2
23	304°26.2	121°00.3	31.4	214° 43.4	40.0	172°42.3	26.3	290°02.4	22.0		Mars:	0.1
Mer.p	ass. 02:46	$\nu$ 0.3′ d1.	2′ m-4.36	$\nu$ 0.7′ d0	.0′ m1.29	$\nu$ 1.9′ d-0.	.1′ m-1.78	$\nu 2.5' d-0$	.0′ m0.59			

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°34.0	N16°11.5	248°14.2	3.3'	$N27^{\circ}09.9$	4.6'	59.7'
1	193°34.1	10.8	262°36.5	3.2'	27°14.5	4.4'	59.7'
2 3	208°34.2 223°34.3	10.0 •• 09.3	276°58.7 291°20.8	3.1' 3.1'	27°18.9 27°23.2	4.2' 4.0'	59.7' 59.7'
4	238°34.4	08.6	305°42.9	3.0'	27°27.2	3.9'	59.7'
5	253°34.4	07.9	320°04.9	2.9'	$27^{\circ}31.1$	3.7'	59.8'
6	268°34.5	N16°07.2	334°26.8	2.8'	N27°34.7	3.5'	59.8'
7 8	283°34.6 298°34.7	06.5 05.8	348°48.7 3°10.5	2.8' 2.7'	27°38.2 27°41.5	3.3' 3.1'	59.8' 59.8'
9	313°34.8	• • 05.1	17°32.2	2.7'	27°44.5	2.9'	59.8'
10	328°34.9	04.4	$31^{\circ}53.8$	2.6'	27°47.4	2.7'	59.8'
11	343°34.9 358°35.0	03.6	46°15.4 60°37.0	2.5'	27°50.1	2.5'	59.9'
12 13	358°35.0 13°35.1	N16°02.9 02.2	74°58.4	2.5' 2.4'	N27°52.6 27°54.8	2.3' 2.1'	59.9' 59.9'
14	28°35.2	01.5	89°19.9	2.4'	27°56.9	1.9'	59.9'
15	43°35.3	00.8	103°41.3	2.3'	27°58.8	1.7'	59.9'
16	58°35.4 73°35.4	16°00.1 15°59.4	118°02.6 132°23.9	2.3' 2.3'	28°00.5 28°01.9	1.5' 1.3'	59.9'
17 18	88°35.5	N15°58.6	132 23.9 146°45.1	2.3	N28° 03.2	1.1'	60.0' 60.0'
19	103°35.6	57.9	161°06.4	2.2'	28°04.3	0.9'	60.0'
20	118°35.7	57.2	175°27.5	2.2'	28°05.1	0.6'	60.0'
21 22	133°35.8 148°35.9	· · 56.5 55.8	189°48.7 204°09.8	2.1' 2.1'	28°05.8 28°06.2	0.4' 0.2'	60.0' 60.0'
23	163°35.9	55.6 55.1	204 09.8 218°30.9	2.1'	28°06.4	0.2	60.0
	SD = 15.8'	d = -0.7'			D = 16.3'		
		<u> </u>		JI			
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0 1	178°36.0 193°36.1	N15°54.3 53.6	232°52.0 247°13.0	2.1' 2.0'	N28°06.5 28°06.3	-0.2' -0.4'	60.1' 60.1'
2	208°36.2	52.9	261°34.1	2.0'	28°05.9	-0.4 -0.6'	60.1
3	223°36.3	• • 52.2	275°55.1	2.0'	28°05.3	-0.8'	60.1
4	238°36.4	51.5	290°16.1	2.0'	28°04.5	-1.0'	60.1'
5 6	253°36.5 268°36.6	50.7 N15° 50.0	304°37.1 318°58.1	2.0' 2.0'	28°03.5 N28°02.3	-1.2' -1.4'	60.1' 60.1'
7	283°36.6	49.3	333°19.1	2.0'	28°00.9	-1.6'	60.1
8	298°36.7	48.6	347°40.2	2.0'	27°59.2	-1.8'	60.1'
9	313°36.8	• • 47.9	2°01.2	2.0'	27°57.4	-2.0'	60.2'
10 11	328°36.9 343°37.0	47.1 46.4	16°22.2 30°43.2	2.0' 2.0'	27°55.3 27°53.1	-2.3' -2.5'	60.2' 60.2'
12	358°37.1	N15° 45.7	45°04.3	2.1'	N27°50.6	-2.7'	60.2
13	13°37.2	45.0	59°25.3	2.1'	27°47.9	-2.9'	60.2'
14	28°37.3 43°37.4	44.2 •• 43.5	73°46.4 88°07.5	2.1' 2.1'	27°45.1 27°42.0	-3.1' -3.3'	60.2' 60.2'
15 16	43 37.4 58°37.4	42.8	88 07.5 102°28.7	2.1	27 42.0 27°38.7	-3.5'	60.2
17	73°37.5	42.1	116°49.8	2.2'	27°35.2	-3.7'	60.2'
18	88°37.6	N15°41.3	131°11.0	2.2'	N27°31.5	-3.9'	60.2'
19 20	103°37.7 118°37.8	40.6 39.9	145°32.3 159°53.5	2.3' 2.3'	27°27.6 27°23.5	-4.1' -4.3'	60.2' 60.2'
21	133°37.9	• • 39.1	174°14.9	2.4'	27° 19.2	-4.5'	60.2
22	148°38.0	38.4	188°36.2	2.4'	$27^{\circ}14.7$	-4.7'	60.3'
23	163°38.1	37.7	202°57.6	2.5'	27°09.9	-4.9'	60.3'
	SD = 15.8'	d = -0.7'		SI	D = 16.4'		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	178°38.2	N15°37.0	217°19.1	2.5'	N27°05.0	-5.1'	60.3
1	193°38.3	36.2	231°40.6	2.6'	26°59.9	-5.3'	60.3'
2 3	208°38.4 223°38.4	35.5 •• 34.8	246°02.2 260°23.8	2.6' 2.7'	26°54.6 26°49.1	-5.5' -5.7'	60.3' 60.3'
3 4	223°38.4 238°38.5	34.8	260°23.8 274°45.5	2.7'	26° 49.1 26° 43.4	-5.7' -5.9'	60.3
5	253°38.6	33.3	289°07.2	2.8'	26°37.5	-6.1'	60.3'
6	268°38.7	N15° 32.6	303°29.0	2.9'	N26°31.4	-6.3'	60.3'
7 8	283°38.8 298°38.9	31.8 31.1	317°50.9 332°12.8	2.9' 3.0'	26°25.1 26°18.6	-6.5' -6.7'	60.3' 60.3'
9	313°39.0	30.4	346°34.9	3.1'	26°12.0	-6.9'	60.3
10	328°39.1	29.6	0°56.9	3.2'	$26^{\circ}05.1$	-7.0'	60.3'
11	343°39.2 358°39.3	28.9 N15°28.2	15°19.1 29°41.4	3.2'	25°58.1 N25°50.8	-7.2'	60.3'
12 13	358° 39.3 13° 39.4	N15 28.2 27.4	29°41.4 44°03.7	3.3' 3.4'	N25°50.8 25°43.4	-7.4' -7.6'	60.3' 60.3'
14	28°39.5	26.7	58°26.1	3.5'	25°35.8	-7.8'	60.3'
15	43°39.6	• • 26.0	72°48.6	3.6'	25°28.1	-8.0'	60.3'
16 17	58°39.7 73°39.8	25.2 24.5	87°11.2 101°33.9	3.7' 3.8'	25°20.1 25°12.0	-8.1' -8.3'	60.3' 60.3'
18	73°39.8 88°39.9	24.5 N15°23.8	101°33.9 115°56.6	3.8	N25° 03.6	-8.5'	60.3
19	103°40.0	23.0	$130^{\circ}19.5$	3.9'	24°55.2	-8.7'	60.3'
20	118°40.0	22.3	144°42.4	4.0'	24°46.5	-8.8'	60.3'
21 22	133°40.1 148°40.2	· · 21.6 20.8	159°05.5 173°28.6	4.1' 4.2'	24°37.7 24°28.6	-9.0' -9.2'	60.3' 60.3'
23	163°40.3	20.8	173 28.0 187°51.8	4.2	24° 19.5	-9.2 -9.3'	60.3
	SD = 15.8'	d = -0.7'		SI	D = 16.4'		

Twilight						
Lat.	Twi	light	Sunrise	Sunset	Twi	light
	Naut.	Civil		-	Civil	Naut.
N 72°	////	////	01:35	22:28	////	////
<b>N</b> 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
<b>S</b> 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
		Maanria	^		Moonsot	

Lat.		Moonris	e	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 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	29-10%	
08	05:44	05:40	12:06	07:47	20:19		
09	05:36	05:32	12:06	08:52	21:24		
10	05:27	05:23	12:05	09:56	22:27		

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

h	Aries	Ven	us	M	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	319°28.6		S02°32.7	229°44.0	N23°40.1	187°44.2	N18°26.1	305°04.9	N03°21.9	<b>.</b>		
1	334°31.1	151°00.9	33.9	244°44.7	40.1	202°46.1	26.0	320°07.4	21.9	Alpheratz	357°33.1	29°14.3
2	349°33.6	166°01.2	35.1	259° 45.3	40.2	217°48.0	25.9	335°10.0	21.9	Ankaa	353°05.5	-42°09.4
3	4°36.0	181°01.5	36.3	259 45.5 274°46.0	. 40.2	217 46.0 232°49.9	25.7	350°12.5	•• 21.8	Schedar	349°29.2	56°40.9
4						232 49.9 247°51.8		5° 15.0		Diphda	348°45.8	-17°50.2
	19°38.5	196°01.8	37.5	289°46.6 304°47.3	40.2		25.6		21.8	Achernar	$335^{\circ}19.0$	-57°05.7
5	34°40.9	211°02.1	38.7		40.3	262°53.7	25.4	20°17.5	21.8	Hamal	327°49.6	23°35.3
6	49°43.4		S02°39.9	319°47.9	N23°40.3	277°55.6	N18°25.3	35°20.0	N03°21.7	Polaris	313°20.1	89°22.2
7	64°45.9	241°02.7	41.1	334°48.6	40.3	292°57.5	25.1	50°22.6	21.7	Acamar	315°10.7	-40°11.5
8	79°48.3	256°03.0	42.3	349°49.3	40.4	307°59.4	25.0	65°25.1	21.7	Menkar	314°04.7	4°11.8
9	94°50.8	271°03.3	• • 43.6	4°49.9	• • 40.4	323°01.3	• • 24.9	80°27.6	• • 21.6	Mirfak	308°26.4	49°57.2
10	109°53.3	286°03.7	44.8	19°50.6	40.4	338°03.2	24.7	95°30.1	21.6	Aldebaran	290°38.2	16°33.8
11	124°55.7	301°04.0	46.0	34°51.2	40.5	353°05.1	24.6	110°32.6	21.6	Rigel	281°02.8	-8°10.1
12	139°58.2	316°04.3	S02°47.2	49°51.9	N23°40.5	8°07.0	N18°24.4	125°35.2	N03°21.5	Capella	280°20.2	46°01.3
13	155°00.7	331°04.6	48.4	64°52.5	40.5	23°08.9	24.3	140°37.7	21.5	Bellatrix	278°21.6	6°22.5
14	170°03.1	346°04.9	49.6	79°53.2	40.6	38° 10.8	24.2	155°40.2	21.5			
15	185°05.6	1°05.2	• • 50.8	94°53.8	• • 40.6	53° 12.7	• • 24.0	170°42.7	• • 21.4	Elnath	278°00.4	28°37.7
16	200°08.0	16°05.5	52.0	109°54.5	40.6	68° 14.6	23.9	185°45.2	21.4	Alnilam	275°36.6	-1°11.0
17	215°10.5	31°05.8	53.2	124°55.2	40.7	83° 16.5	23.7	200°47.8	21.3	Betelgeuse	270°50.9	7°24.8
18	230°13.0		S02°54.5	139°55.8	N23°40.7	98° 18.4	N18°23.6	215°50.3	N03°21.3	Canopus	263°52.2	-52°42.3
19	245°15.4	61°06.4	55.7	154° 56.5	40.7	113°20.3	23.4	230°52.8	21.3	Sirius	258°25.3	-16°45.0
20	260°17.9	76°06.7	56.9	169° 57.1	40.7	113°20.3 128°22.2	23.4	245° 55.3	21.2	Adhara	$255^{\circ}05.1$	-29°00.3
										Procyon	244°49.7	5°09.5
21	275°20.4	91°07.1	· · 58.1	184°57.8	• • 40.8	143°24.2	• • 23.2	260°57.8	• • 21.2	Pollux	243°16.0	27°57.7
22	290°22.8	106°07.4	02°59.3	199°58.4	40.8	158°26.1	23.0	276°00.4	21.2	Avior	234°14.8	-59°35.6
23	305°25.3	121°07.7	03°00.5	214°59.1	40.9	173°28.0	22.9	291°02.9	21.1	Suhail	222°45.8	-43°32.3
Mern	pass. 02:42	$\nu$ 0.3′ d1.2	" m-4 37	ν0 7' d0	.0′ m1.29	ν1 9' d-0	.1′ m-1.79	$\nu 2.5' d_{-}0$	.0′ m0.58	Miaplacidus	221°39.0	-69°49.6
- wier.p		ν υ.υ.υ u1.2		ν U.1 UU	.5 1111.29	ν 1.9 U-U.	111-1.19	ν 2.5 u-0	.5 1110.50	Alphard	217°46.8	-8°46.4
										Regulus	207°33.3	11°50.3
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	207 33.3 193°40.0	61°36.6
0	320°27.8	136°08.0	S03°01.7	229°59.7	N23°40.9	188° 29.9	N18°22.7	306°05.4	N03°21.1	II		
1	335°30.2	151°08.3	02.9	245°00.4	40.9	203°31.8	22.6	321°07.9	21.1	Denebola	182°23.8	14°25.5
2	350°32.7	166°08.6	04.1	260°01.1	40.9	218°33.7	22.4	336° 10.5	21.0	Gienah		-17°41.4
3	5°35.2	181°09.0	05.3	275°01.7	• • 41.0	233°35.6	22.3	351°13.0	21.0		172°59.1	-63°15.0
4	20°37.6	196°09.3	06.5	290°02.4	41.0	248°37.5	22.2	6° 15.5	21.0	II.	171°50.5	-57°15.9
5	35°40.1	211°09.6	07.8	305°03.0	41.0	263°39.4	22.2	21°18.0	20.9	Alioth	$166^{\circ}12.1$	55°49.1
6	50°42.5		503°09.0	320°03.7	N23°41.1	278° 41.3	N18°21.9	36°20.6	N03°20.9	Spica	158°21.0	-11°18.0
		241°10.2				276 41.3 293°43.2		51°23.1		Alkaid	$152^{\circ}51.1$	49°11.0
7	65°45.0		10.2	335°04.3	41.1		21.7		20.8	Hadar	148°34.3	-60°30.3
8	80°47.5	256°10.5	11.4	350°05.0	41.1	308°45.1	21.6	66°25.6	20.8	Menkent	$147^{\circ}56.1$	-36°30.2
9	95°49.9	271°10.9	• • 12.6	5°05.7	• • 41.1	323°47.0	• • 21.5	81°28.1	• • 20.8	Arcturus	145°46.8	19°02.8
10	110°52.4	286°11.2	13.8	20°06.3	41.2	338°48.9	21.3	96°30.7	20.7	II.	139°38.5	-60°57.0
11	125°54.9	301°11.5	15.0	35°07.0	41.2	353°50.8	21.2	111°33.2	20.7	Kochab	137°19.9	74°03.0
12	140°57.3	$316^{\circ}11.8$	503°16.2	50°07.6	N23°41.2	8°52.7	N18°21.0	126°35.7	N03°20.7	Zuben'ubi	136°54.6	-16°09.2
13	155°59.8	331°12.2	17.4	65°08.3	41.2	23°54.6	20.9	141°38.2	20.6	Alphecca	126°02.6	26°37.7
14	171°02.3	346°12.5	18.6	80°09.0	41.3	38° 56.5	20.7	156°40.7	20.6			
15	186°04.7	1°12.8	• • 19.8	95°09.6	• • 41.3	53°58.5	20.6	171°43.3	• • 20.5	Antares	112°14.1	-26°29.5
16	201°07.2	16°13.1	21.0	110° 10.3	41.3	69°00.4	20.5	186°45.8	20.5	Atria	107°06.8	-69°04.7
17	216°09.7	31°13.4	22.2	125° 10.9	41.3	84°02.3	20.3	201°48.3	20.5	Sabik	102°01.1	-15°45.5
18	231°12.1		S03°23.4	140°11.6	N23°41.4	99°04.2	N18°20.2	216°50.9	N03°20.4	Shaula	96°08.3	-37°07.4
19	246°14.6	61°14.1	24.7	155° 12.2		114°06.1	20.0	231°53.4	20.4	Rasalhague	95°57.1	12°32.6
					41.4	129°08.0				Eltanin	90°41.2	51°29.3
20	261°17.0 276°19.5	76°14.4	25.9	170° 12.9 185° 13.6	41.4		19.9	246°55.9 261°58.4	20.4	Kaus Aust.	83°30.4	-34°22.3
21		91°14.8	• • 27.1		• • 41.4	144°09.9	• • 19.7		• • 20.3	Vega	80°32.0	38°48.7
22	291°22.0	106°15.1	28.3	200°14.2	41.5	159°11.8	19.6	277°01.0	20.3	Nunki	75°45.8	-26°15.8
23	306°24.4	121°15.4	29.5	215° 14.9	41.5	174° 13.7	19.5	292°03.5	20.2	Altair	61°58.3	8°56.5
Mern	pass. 02:38	$\nu$ 0.3' d1.2	2′ m-4.38	$\nu^{0.7'} d0$	.0′ m1.29	ν1.9' d-0	.1′ m-1.79	$\nu^{2.5'} d^{-0}$	.0′ m0.58	Peacock	53°03.0	-56°38.9
										Deneb	49°24.4	45°22.6
										Enif	33°37.2	10°00.0
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.8	-46°49.7
0	321°26.9	$136^{\circ}15.7$	S03°30.7	$230^{\circ}15.5$	N23°41.5	$189^{\circ}15.6$	$N18^{\circ}19.3$	307°06.0	N03°20.2	Fomalhaut	15°12.7	-29°28.6
1	336°29.4	151°16.1	31.9	$245^{\circ}16.2$	41.5	204°17.5	19.2	322°08.5	20.2	Scheat	13°43.6	28°13.7
2	351°31.8	$166^{\circ}16.4$	33.1	$260^{\circ}16.9$	41.5	$219^{\circ}19.4$	19.0	$337^{\circ}11.1$	20.1	Markab	13°28.3	15°21.0
3	6°34.3	181°16.7	• • 34.3	275° 17.5	• • 41.6	234°21.3	• • 18.9	352° 13.6	20.1	ividikaD	10.0	10 41.0
4	21°36.8	196°17.1	35.5	290° 18.2	41.6	249°23.2	18.7	7° 16.1	20.1	Aug 11 Tue	SHA	Mer.pass
5	36°39.2	211°17.4	36.7	305° 18.8	41.6	264°25.1	18.6	22°18.6	20.0	0	176°32.0	14:56
6	51°41.7		S03°37.9	320° 19.5	N23°41.6	279°27.0	N18° 18.5	37°21.2	N03°20.0		270°15.4	08:41
7	66°44.2	241°18.1	39.1	335°20.2	41.6	294°29.0	18.3	52°23.7	19.9	II.	228°15.5	11:28
8	81°46.6	256°18.4	40.3	350°20.8	41.0	309°30.9	18.2	67°26.2	19.9	Saturn	345°36.3	03:39
			40.3 •• 41.5					82°28.8		Jatum	JTJ JU.J	00.09
9	96°49.1	271°18.7		5°21.5	• • 41.7	324°32.8	18.0		19.9	Aug 12 Wed	SHA	Mer.pass
10	111°51.5	286°19.1	42.7	20°22.2	41.7	339°34.7	17.9	97°31.3	19.8	-	175°40.2	14:55
11	126°54.0	301°19.4	43.9	35°22.8	41.7	354°36.6	17.7	112°33.8	19.8		269°32.0	08:40
12	141°56.5		S03°45.1	50°23.5	N23°41.7	9°38.5	N18°17.6	127°36.3	N03°19.8		228°02.1	11:25
13	156°58.9	331°20.1	46.3	65°24.1	41.8	24°40.4	17.5	142°38.9	19.7	Saturn	345°37.7	03:35
14	172°01.4	346°20.4	47.5	80°24.8	41.8	39°42.3	17.3	157°41.4	19.7	Jatuill	5.5 31.1	05.55
15	187°03.9	1°20.7	• • 48.7	95°25.5	• • 41.8	54°44.2	• • 17.2	172°43.9	• • 19.6	Aug 13 Thu	SHA	Mer.pass
16	202°06.3	$16^{\circ}21.1$	49.9	$110^{\circ}26.1$	41.8	69°46.1	17.0	187°46.5	19.6		174°48.8	14:55
17	217°08.8	31°21.4	51.1	125°26.8	41.8	84°48.0	16.9	202°49.0	19.6	Mars		08:39
18	232°11.3		S03°52.3	140°27.5	N23°41.8	99°49.9	N18°16.7	217°51.5	N03° 19.5	Jupiter		11:22
19	247°13.7	61°22.1	53.5	155°28.1	41.8	114°51.8	16.6	232°54.0	19.5	Saturn		03:31
20	262°16.2	76°22.4	54.7	170°28.8	41.9	129°53.7	16.5	247°56.6	19.4	Jatuill	J.J JJ.1	00.01
21	277°18.6	91°22.8	• • 55.9	185°29.4	• • 41.9	144°55.6	. 16.3	262°59.1	. 19.4	Horizont	al parallax	
22	292°21.1	106°23.1	57.1	200°30.1	41.9	159° 57.6	16.2	278°01.6	19.4		Venus:	0.2
23	307°23.6	121°23.5	58.3	215°30.8	41.9	174° 59.5	16.0	293°04.2	19.3		Mars:	0.1
Mer.p	ass. 02:34	$\nu$ 0.3′ $d$ 1.2	' m-4.40	$ u$ 0.7 $^{\prime}$ d0	.0′ m1.29	$\nu$ 1.9′ d-0.	.1′ m-1.79	$\nu$ 2.5′ d-0	.0′ m0.57			

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178° 40.4	$N15^{\circ}19.3$	202°15.2	4.4'	N24° 10.1	-9.5'	60.3'
1 2	193° 40.5 208° 40.6	18.6 17.9	216°38.6 231°02.2	4.5' 4.6'	24°00.6 23°51.0	-9.7' -9.8'	60.2' 60.2'
3	208 40.0 223°40.7	17.1	245°25.8	4.0 4.7'	23°41.1	-9.6 -10.0'	60.2
4	238° 40.8	16.4	259°49.6	4.9'	23°31.1	-10.1'	60.2
5	253°40.9	15.6	274°13.4	5.0'	23°21.0	-10.3'	60.2'
6	268° 41.0 283° 41.1	N15°14.9 14.1	288°37.4 303°01.4	5.1' 5.2'	N23°10.7 23°00.2	-10.5' -10.6'	60.2' 60.2'
7 8	283 41.1 298°41.2	14.1	303 01.4 317°25.6	5.2 5.3'	23 00.2 22°49.6	-10.6	60.2
9	313°41.3	12.7	331°49.9	5.4'	22°38.9	-10.9	60.2'
10	328°41.4	11.9	346°14.3	5.5'	22°28.0	-11.0'	60.2'
11 12	343°41.5 358°41.6	11.2 N15°10.4	0°38.8 15°03.4	5.6' 5.7'	22°16.9 N22°05.7	-11.2' -11.3'	60.2' 60.2'
13	13°41.7	09.7	29°28.2	5.8'	21°54.4	-11.5'	60.1
14	28°41.8	08.9	43°53.0	6.0'	21°42.9	-11.6'	60.1
15	43°41.9	• • 08.2	58°18.0	6.1'	21°31.3	-11.7'	60.1'
16 17	58° 42.0 73° 42.1	07.4 06.7	72°43.0 87°08.2	6.2' 6.3'	21°19.6 21°07.7	-11.9' -12.0'	60.1' 60.1'
18	88° 42.2	N15°06.0	101°33.5	6.4	N20°55.7	-12.1'	60.1
19	103°42.3	05.2	115°58.9	6.5'	20°43.5	-12.3'	60.1'
20	118° 42.4	04.5	130°24.4	6.6'	20°31.3	-12.4'	60.1'
21 22	133° 42.5 148° 42.6	· · 03.7 03.0	144°50.1 159°15.8	6.8' 6.9'	20°18.9 20°06.4	-12.5' -12.6'	60.0' 60.0'
23	163°42.7	03.0	173°41.7	7.0'	19°53.7	-12.8'	60.0
	SD = 15.8'	d = -0.7'			0 = 16.4'		
			-	JI.			
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178° 42.9 193° 43.0	N15°01.5 00.7	188°07.7 202°33.8	7.1' 7.2'	N19°41.0 19°28.1	-12.9' -13.0'	60.0' 60.0'
2	193 43.0 208°43.1	15°00.0	202 33.8 217°00.0	7.2 7.3'	19 28.1 19°15.1	-13.0 -13.1'	60.0
3	223°43.2	14°59.2	231°26.3	7.4'	19°02.0	-13.2'	60.0'
4	238°43.3	58.5	245°52.8	7.6'	18°48.8	-13.3'	59.9'
5 6	253° 43.4 268° 43.5	57.7 N14°57.0	260°19.3 274°46.0	7.7' 7.8'	18° 35.5 N18° 22.1	-13.4' -13.5'	59.9' 59.9'
7	283°43.6	56.2	289°12.8	7.9'	18°08.6	-13.6'	59.9'
8	298°43.7	55.4	303°39.7	8.0'	17°54.9	-13.7'	59.9'
9	313°43.8	• • 54.7	318°06.7	8.1'	17°41.2	-13.8'	59.9'
10 11	328° 43.9 343° 44.0	53.9 53.2	332°33.8 347°01.0	8.2' 8.3'	17° 27.4 17° 13.5	-13.9' -14.0'	59.8' 59.8'
12	358° 44.1	N14°52.4	1°28.4	8.5'	N16°59.5	-14.1'	59.8'
13	13°44.2	51.7	15°55.8	8.6'	16°45.4	-14.2'	59.8'
14	28° 44.3	50.9	30°23.4 44°51.1	8.7'	16°31.2	-14.3'	59.8'
15 16	43° 44.4 58° 44.5	· · 50.2 49.4	44°51.1 59°18.8	8.8' 8.9'	16° 16.9 16° 02.5	-14.4' -14.4'	59.7' 59.7'
17	73° 44.6	48.7	73°46.7	9.0'	15°48.1	-14.5'	59.7'
18	88°44.8	N14°47.9	88°14.7	9.1'	N15°33.6	-14.6'	59.7'
19	103° 44.9 118° 45.0	47.1	102°42.8 117°11.0	9.2' 9.3'	15° 19.0 15° 04.3	-14.7'	59.6'
20 21	118 45.0 133°45.1	46.4 •• 45.6	117 11.0 131°39.3	9.3 9.4'	15 04.3 14°49.5	-14.8'	59.6' 59.6'
22	148°45.2	44.9	146°07.8	9.5'	14°34.7	-14.9'	59.6'
23	163°45.3	44.1	160°36.3	9.6'	14° 19.8	-15.0'	59.6'
	SD = 15.8'	d = -0.7'		SI	0 = 16.4'		
Thu	GHA	Dec	GHA	ν	Dec	d	НР
0	178° 45.4	N14°43.3	175°04.9	ν 9.7'	N14°04.9	-15.0'	59.5'
1	193°45.5	42.6	189°33.6	9.8'	13°49.8	-15.1'	59.5'
2	208°45.6	41.8	204°02.4	9.9'	13°34.7	-15.2'	59.5'
3 4	223° 45.7 238° 45.8	· · 41.1 40.3	218°31.4 233°00.4	10.0' 10.1'	13° 19.6 13° 04.4	-15.2' -15.3'	59.5' 59.4'
5	253°46.0	39.5	247°29.5	10.2'	$12^{\circ}49.1$	-15.3'	59.4
6	268°46.1	N14°38.8	261°58.7	10.3'	N12°33.8	-15.4'	59.4'
7 8	283° 46.2 298° 46.3	38.0 37.3	276°28.0 290°57.4	10.4' 10.5'	12° 18.4 12° 02.9	-15.4' -15.5'	59.4' 59.3'
9	298 46.3 313°46.4	· · 36.5	290 57.4 305°26.9	10.5	12 02.9 11°47.4	-15.5'	59.3'
10	328°46.5	35.7	$319^{\circ}56.5$	10.7'	11°31.9	-15.6'	59.3'
11	343°46.6	35.0	334°26.2	10.8'	11°16.3	-15.6'	59.3'
12 13	358° 46.7 13° 46.8	N14°34.2 33.4	348°56.0 3°25.9	10.9' 11.0'	N11°00.7 10°45.0	-15.7' -15.7'	59.2' 59.2'
14	28°47.0	32.7	17°55.8	11.0'	10° 45.0 10° 29.3	-15.8'	59.2'
15	43°47.1	•• 31.9	32°25.9	11.1'	10° 13.5	-15.8'	59.1'
16	58°47.2	31.1	46°56.0	11.2'	09°57.8 09°41.9	-15.8'	59.1'
17 18	73° 47.3 88° 47.4	30.4 N14°29.6	61°26.2 75°56.5	11.3' 11.4'	09°41.9 N09°26.1	-15.9' -15.9'	59.1' 59.1'
19	103°47.5	28.8	90°26.8	11.5'	09° 10.2	-15.9'	59.1°
20	118°47.6	28.1	104°57.3	11.5'	08°54.2	-16.0'	59.0'
21 22	133° 47.7 148° 47.9	· · 27.3 26.5	119°27.8 133°58.5	11.6' 11.7'	08° 38.3 08° 22.3	-16.0' -16.0'	59.0' 58.9'
23	148°47.9 163°48.0	26.5 25.8	133°58.5 148°29.1	11.7	08° 22.3	-16.0'	58.9'
	SD = 15.8'	d = -0.8'			0 = 16.2'		
				J.	10.2		

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

١			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	4-0%	
	11	05:18	05:13	12:05	10:57	23:26		
	12	05:09	05:04	12:05	11:54	-:-		
	13	04:58	04:53	12:05	12:46	00:20		

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

h	Aries	Ven	ius	M	ars	Jup	iter	Sat	urn		Stars	
- Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	322°26.0	136°23.8	503°59.5	230°31.4	N23°41.9	190°01.4	N18°15.9	308°06.7	N03°19.3			
1	337°28.5	151°24.2	04°00.7	245°32.1	41.9	205°03.3	15.7	323°09.2	19.3	Alpheratz	357°33.1	29°14.3
2	352°31.0	166°24.5	01.9	260°32.8	41.9	220°05.2	15.6	338°11.8	19.2	Ankaa	353°05.5	-42°09.4
3	7°33.4	181°24.9	• • 03.1	275°33.4	• • 42.0	235°07.1	15.5	353°14.3	• • 19.2	Schedar	349°29.1	56°40.9
4	22°35.9	196°25.2	04.3	290°34.1	42.0	250°09.0	15.3	8°16.8	19.1	Diphda	348°45.7	-17°50.2
5	37°38.4	211°25.5	05.5	305°34.7	42.0	265°10.9	15.2	23°19.3	19.1	Achernar	335°18.9	-57°05.7
6	52°40.8	226°25.9	504°06.7	320°35.4	N23°42.0	280°12.8	N18°15.0	38°21.9	N03° 19.1	Hamal	327°49.6	23°35.3
7	67°43.3	241°26.2	07.9	335°36.1	42.0	295°14.7	14.9	53°24.4	19.0	Polaris	313°18.7	89°22.3
8	82°45.8	256°26.6	09.1	350°36.7	42.0	310° 16.6	14.7	68°26.9	19.0	Acamar	315°10.7	-40°11.5
9	97°48.2	271°26.9	• • 10.3	5°37.4	• • 42.0	325° 18.5	• • 14.6	83°29.5	• • 18.9	Menkar	314°04.7	4°11.8
10	112°50.7	286°27.3	11.5	20°38.1	42.0	340°20.4	14.5	98°32.0	18.9	Mirfak	308°26.3	49°57.2
11	127°53.1	301°27.6	12.7	35°38.7	42.0	355°22.4	14.3	113°34.5	18.9	Aldebaran	290°38.2	16°33.8
12	142°55.6	316°28.0	504°13.9	50°39.4	N23°42.1	10°24.3	N18°14.2	128°37.1	N03°18.8	Rigel	281°02.7	-8°10.1
13	157°58.1	331°28.3	15.1	65°40.1	42.1	25°26.2	14.0	143°39.6	18.8	Capella	280°20.1	46°01.3
14	173°00.5	346°28.7	16.3	80°40.7	42.1	40°28.1	13.9	158°42.1	18.7	Bellatrix	278°21.6	6°22.5
15	188°03.0	1°29.0	• • 17.5	95°41.4	• • 42.1	55°30.0	· · 13.7	173°44.7	• • 18.7	Elnath	278°00.4	28°37.7
16	203°05.5	16°29.4	18.7	110°42.1	42.1	70°31.9	13.6	188°47.2	18.7	Alnilam	275°36.5	-1°11.0
17	$218^{\circ}07.9$	31°29.8	19.9	125°42.7	42.1	85°33.8	13.5	203°49.7	18.6	Betelgeuse	270°50.8	7°24.8
18	233°10.4	46°30.1	S04°21.1	140°43.4	N23°42.1	100°35.7	N18°13.3	218°52.3	N03°18.6	Canopus	263°52.2	-52°42.3
19	248°12.9	61°30.5	22.3	155°44.1	42.1	115°37.6	13.2	233°54.8	18.5	Sirius	258°25.3	-16°45.0 -29°00.3
20	263°15.3	76°30.8	23.5	170°44.7	42.1	130°39.5	13.0	248°57.3	18.5	Adhara	255°05.1	
21	278°17.8	91°31.2	• • 24.7	185°45.4	• • 42.1	145°41.4	• • 12.9	263°59.9	• • 18.5	Procyon	244°49.7	5°09.5
22	293°20.2	106°31.5	25.9	200°46.1	42.1	160°43.3	12.7	279°02.4	18.4	Pollux	243°16.0	27°57.7
23	308°22.7	121°31.9	27.1	215°46.7	42.1	175°45.3	12.6	294°04.9	18.4	Avior	234°14.8	-59°35.5
	00.20	0.2/ /1.0	/ 4.41	0.7/ 10	0/ 1.00	1.0/ 1.0	1/ 1.70	0.5/ 1.0	0/ 0.57	Suhail	222°45.8	-43°32.3
ivler.p	pass. 02:30	$\nu$ 0.3′ d1.2	m-4.41	$\nu$ 0.1' d0	.0′ m1.28	$\nu$ 1.9° $d$ -0.	.1′ m-1.79	$\nu$ 2.5′ $d$ -0	0.0′ m0.57	Miaplacidus	221°39.0	-69°49.5
										Alphard	217°46.8	-8°46.4
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
0	323°25.2	136°32.3	504°28.3	230°47.4	N23°42.1	190°47.2	N18°12.5	309°07.5	N03°18.3	Dubhe	193°40.0	61°36.6
1	338°27.6	151°32.6	29.5	245°48.1	42.1	205°49.1	12.3	324°10.0	18.3	Denebola	182°23.8 175°42.5	14°25.5
2	353°30.1	166°33.0	30.7	260°48.7	42.2	220°51.0	12.2	339°12.5	18.3	Gienah		-17°41.4
3	8°32.6	181°33.3	• • 31.9	275°49.4	• • 42.2	235°52.9	· · 12.0	354° 15.1	• • 18.2		172°59.1	-63°15.0
4	23°35.0	196°33.7	33.1	290°50.1	42.2	250° 54.8	11.9	9°17.6	18.2		171°50.6 166°12.1	-57°15.9
5	38°37.5	211°34.1	34.3	305°50.7	42.2	265° 56.7	11.7	24°20.1	18.1	Alioth		55°49.1
6	53°40.0	226°34.4	S04°35.5	320°51.4	N23°42.2	280°58.6	N18°11.6	39°22.7	N03°18.1	Spica	158°21.0	-11° 18.0 49° 11.0
7	68°42.4	241°34.8	36.7	335°52.1	42.2	296°00.5	11.5	54°25.2	18.0	Alkaid Hadar	152°51.1 148°34.3	-60°30.3
8	83°44.9	256°35.1	37.9	350°52.7	42.2	311°02.4	11.3	69°27.7	18.0		146 34.3 147°56.2	-36° 30.2
9	98°47.4	271°35.5	• • 39.0	5°53.4	• • 42.2	326°04.3	• • 11.2	84°30.3	• • 18.0	Arcturus	147 50.2 145°46.8	19°02.8
10	113°49.8	286°35.9	40.2	20°54.1	42.2	341°06.3	11.0	99°32.8	17.9	Rigil Kent.	139°38.6	-60°57.0
11	128°52.3	301°36.2	41.4	35°54.7	42.2	356°08.2	10.9	114°35.3	17.9	Kochab	137°20.0	74°03.0
12	143°54.7	316°36.6	S04°42.6	50°55.4	N23°42.2	$11^{\circ}10.1$	N18°10.7	129°37.9	N03°17.8	Zuben'ubi	136°54.6	-16°09.2
13	158°57.2	331°37.0	43.8	65°56.1	42.2	26°12.0	10.6	144°40.4	17.8	Alphecca	130° 54.0 126° 02.6	-10 09.2 26°37.7
14	173°59.7	346°37.3	45.0	80°56.8	42.2	41°13.9	10.4	159°43.0	17.8	Antares	112° 14.1	-26° 29.5
15	189°02.1	1°37.7	• • 46.2	95°57.4	• • 42.2	56° 15.8	• • 10.3	174°45.5	• • 17.7	Antares	112 14.1 107°06.8	-20°29.5 -69°04.7
16	204°04.6	16°38.1	47.4	110°58.1	42.2	$71^{\circ}17.7$	10.2	189°48.0	17.7	Sabik	107 00.0 102°01.1	-15°45.5
17	219°07.1	31°38.5	48.6	125°58.8	42.2	$86^{\circ}19.6$	10.0	204°50.6	17.6	Shaula	96°08.3	-37°07.4
18	234°09.5	46°38.8	S04°49.8	140°59.4	N23°42.2	101°21.5	N18°09.9	219°53.1	N03°17.6	Rasalhague	95°57.1	12°32.6
19	249°12.0	61°39.2	51.0	156°00.1	42.2	116°23.4	09.7	234°55.6	17.6	Eltanin	90°41.2	51°29.3
20	264°14.5	76°39.6	52.2	171°00.8	42.2	131°25.3	09.6	249°58.2	17.5	Kaus Aust.	83°30.5	-34°22.3
21	279°16.9	91°39.9	• • 53.4	186°01.4	• • 42.2	146°27.3	• • 09.4	265°00.7	• • 17.5	Vega	80°32.0	38°48.7
22	294°19.4	106°40.3	54.5	201°02.1	42.2	161°29.2	09.3	280°03.2	17.4	Nunki	75°45.8	-26° 15.8
23	309°21.8	121°40.7	55.7	216°02.8	42.2	176°31.1	09.2	295°05.8	17.4	Altair	61°58.4	8°56.5
Morr	pass. 02:26	$\nu$ 0.4' d1.2	2' m 4 42	υ0 7' d0	.0′ m1.28	11 0' d 0	.1′ m-1.79	12 5' d C	.0′ m0.56	Peacock	53°03.0	-56°38.9
ivier.p	Dass. 02.20	νο.4 α1.2	. 111-4.42	νο.τ αυ	.0 1111.20	ν1.9 α-0.	.1 111-1.79	ν2.5 u-0	.0 1110.50	Deneb	49°24.4	45° 22.6
										Enif	33°37.2	10°00.0
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.8	-46°49.7
0	324°24.3	$136^{\circ}41.1$	S04°56.9	$231^{\circ}03.5$	N23°42.2	191°33.0	N18°09.0	310°08.3	N03°17.3	Fomalhaut	15°12.7	-29°28.7
1	339°26.8	151°41.4	58.1	246°04.1	42.2	206°34.9	08.9	$325^{\circ}10.9$	17.3	Scheat	13°43.6	28° 13.7
2	354°29.2	$166^{\circ}41.8$	$04^{\circ}59.3$	$261^{\circ}04.8$	42.2	221°36.8	08.7	340°13.4	17.3	Markab	13°28.3	15°21.0
3	9°31.7	181°42.2	$05^{\circ}00.5$	276°05.5	• • 42.2	236°38.7	•• 08.6	$355^{\circ}15.9$	•• 17.2			
4	24°34.2	196°42.6	01.7	291°06.1	42.2	251°40.6	08.4	10° 18.5	17.2	Aug 14 Fri	SHA	Mer.pass
5	39°36.6	211°42.9	02.9	306°06.8	42.2	266°42.5	08.3	25°21.0	17.1	<b>I</b>	173°57.8	14:54
6	54°39.1	226°43.3	S05°04.1	321°07.5	N23°42.2	281°44.4	N18°08.1	40°23.6	N03° 17.1	Mars		08:38
7	69°41.6	241°43.7	05.3	336°08.2	42.1	296° 46.4	0.80	55° 26.1	17.0		227°35.3	11:18
8	84°44.0	256°44.1	06.4	351°08.8	42.1	311°48.3	07.9	70°28.6	17.0	Saturn	345°40.7	03:27
9	99°46.5	271°44.5	• • 07.6	6°09.5	• • 42.1	326°50.2	• • 07.7	85°31.2	•• 17.0	Aug 15 Sat	SHA	Mer.pass
10	114°49.0	286°44.8	8.80	21°10.2	42.1	$341^{\circ}52.1$	07.6	100°33.7	16.9	_	<b>эна</b> 173°07.1	14:53
11	129°51.4	301°45.2	10.0	36°10.8	42.1	356° 54.0	07.4	115°36.2	16.9		267°22.2	08:36
12	144°53.9	316°45.6	S05°11.2	51°11.5	N23°42.1	11°55.9	N18°07.3	130°38.8	N03°16.8		267°22.2 227°22.0	
13	159°56.3	331°46.0	12.4	66°12.2	42.1	26° 57.8	07.1	145°41.3	16.8	Saturn		11:15 03:23
14	174°58.8	346°46.4	13.6	81°12.9	42.1	41°59.7	07.0	160°43.9	16.8	Jatuin	575 44.5	05.25
15	190°01.3	1°46.7	• • 14.8	96°13.5	• • 42.1	$57^{\circ}01.6$	•• 06.9	175°46.4	•• 16.7	Aug 16 Sun	SHA	Mer.pass
16	205°03.7	$16^{\circ}47.1$	15.9	111°14.2	42.1	72°03.5	06.7	190°48.9	16.7		172°16.7	14:53
17	220°06.2	31°47.5	17.1	$126^{\circ}14.9$	42.1	87°05.5	06.6	205°51.5	16.6	Mars		08:35
18	235°08.7	46°47.9	<b>S</b> 05°18.3	141°15.6	N23°42.1	102°07.4	N18°06.4	220°54.0	N03°16.6	1	227°08.7	11:12
19	$250^{\circ}11.1$	61°48.3	19.5	$156^{\circ}16.2$	42.1	$117^{\circ}09.3$	06.3	235°56.6	16.5	Saturn		03:19
20	265°13.6	76°48.7	20.7	171°16.9	42.1	$132^{\circ}11.2$	06.1	$250^{\circ}59.1$	16.5			
21	280°16.1	91°49.1	• • 21.9	186°17.6	• • 42.0	147° 13.1	• • 06.0	266°01.6	•• 16.5	Horizont	al parallax	
22	295°18.5	106°49.5	23.1	201°18.3	42.0	162° 15.0	05.8	281°04.2	16.4		Venus:	0.2
23	$310^{\circ}21.0$	121°49.8	24.2	216°18.9	42.0	$177^{\circ}16.9$	05.7	296°06.7	16.4		Mars:	0.1
Max	pass. 02:22	$\nu$ 0.4' d1.2	0/ m 4 42	107/ 40	.0′ m1.28	1/1 0/ J 0	.1′ m-1.79	1,2 5/ 4 0	.0′ m0.56			
ivier.p	Jass. UZ.ZZ	νυ.4 U1.2	. 111-4.43	$\nu$ 0.1 $a$ -0	.0 1111.20	$\nu$ 1.9 $u$ -0.	. III-1.19	ν2.5 <b>α-</b> υ	.0 1110.30			

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°48.1	N14°25.0	162°59.9	11.8'	$N07^{\circ}50.3$	-16.1'	58.9'
1	193°48.2	24.2	177°30.7	11.9'	07°34.2	-16.1'	58.8'
2	208°48.3	23.5	192°01.7	12.0'	07°18.2	-16.1'	58.8'
3 4	223°48.4 238°48.6	· · 22.7 21.9	206°32.7 221°03.7	12.1' 12.1'	07°02.1 06°46.0	-16.1' -16.1'	58.8' 58.7'
5	253°48.7	21.1	235°34.8	12.1	06°29.8	-16.1	58.7'
6	268°48.8	N14°20.4	250°06.0	12.3'	N06°13.7	-16.2	58.7'
7	283°48.9	19.6	264°37.3	12.3'	05°57.5	-16.2'	58.7'
8	298°49.0	18.8	279°08.6	12.4'	05°41.4	-16.2'	58.6'
9	313°49.1	• • 18.1	293°40.0	12.5'	05°25.2	-16.2'	58.6'
10 11	328°49.3 343°49.4	17.3 16.5	308°11.5 322°43.0	12.5' 12.6'	05°09.0 04°52.8	-16.2' -16.2'	58.6' 58.5'
12	358°49.5	N14° 15.7	337°14.6	12.6'	N04°36.7	-16.2	58.5
13	13°49.6	15.0	351°46.2	12.7'	04°20.5	-16.2	58.5'
14	28°49.7	14.2	6°17.9	12.8'	04°04.3	-16.2'	58.4'
15	43°49.8	• • 13.4	20°49.7	12.8'	03°48.1	-16.2'	58.4'
16 17	58°50.0 73°50.1	12.6 11.9	35°21.5 49°53.4	12.9' 12.9'	03°31.9 03°15.7	-16.2' -16.2'	58.4' 58.3'
18	88°50.2	N14°11.1	64°25.3	13.0'	N02°59.5	-16.2'	58.3
19	103°50.3	10.3	78°57.3	13.0'	02°43.3	-16.2'	58.3'
20	118°50.4	09.5	93°29.3	13.1'	$02^{\circ}27.1$	-16.2'	58.2'
21	133°50.6	• • 08.8	108°01.4	13.1'	02°11.0	-16.2'	58.2'
22	148°50.7	08.0	122°33.5 137°05.7	13.2'	01°54.8	-16.1'	58.2'
23	163°50.8	07.2	137 05.7	13.2'	01°38.7	-16.1'	58.1'
	SD = 15.8'	d = -0.8'		SI	D = 16.1'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°50.9	N14°06.4	151°37.9	13.3'	N01°22.5	-16.1'	58.1'
1 2	193°51.0 208°51.2	05.6 04.9	166°10.1 180°42.4	13.3' 13.3'	01°06.4 00°50.3	-16.1' -16.1'	58.1' 58.0'
3	206 51.2 223°51.3	• • 04.1	100 42.4 195°14.8	13.4'	00°34.2	-16.1'	58.0'
4	238°51.4	03.3	209°47.2	13.4'	00°18.2	-16.1	57.9'
5	253°51.5	02.5	224°19.6	13.5'	$N00^{\circ}02.1$	-16.0'	57.9'
6	268°51.6	N14°01.7	238°52.1	13.5'	S00°13.9	16.0'	57.9'
7	283°51.8	01.0 14°00.2	253°24.6	13.5'	00°29.9 00°45.9	16.0'	57.8'
8 9	298°51.9 313°52.0	14°00.2 13°59.4	267°57.1 282°29.7	13.6' 13.6'	00°45.9 01°01.9	16.0' 15.9'	57.8' 57.8'
10	328°52.1	58.6	297°02.3	13.6'	01°17.8	15.9'	57.7'
11	343°52.3	57.8	311°34.9	13.7'	01°33.7	15.9'	57.7'
12	358°52.4	N13°57.1	326°07.6	13.7'	S01°49.6	15.9'	57.7'
13	13°52.5	56.3	340°40.3	13.7'	02°05.5	15.8'	57.6'
14 15	28°52.6 43°52.8	55.5 •• 54.7	355°13.0 9°45.8	13.8' 13.8'	02°21.3 02°37.1	15.8' 15.8'	57.6' 57.6'
16	58°52.9	53.9	24°18.5	13.8'	02°52.9	15.7	57.5'
17	73°53.0	53.1	38°51.3	13.8'	03°08.6	15.7'	57.5'
18	88°53.1	N13°52.3	53°24.2	13.8'	S03°24.3	15.7'	57.5'
19	103°53.3	51.6	67°57.0	13.9'	03°39.9	15.6'	57.4'
20	118°53.4 133°53.5	50.8 • • 50.0	82°29.9 97°02.8	13.9' 13.9'	03°55.6 04°11.2	15.6' 15.5'	57.4'
21 22	133 53.5 148°53.6	· · 50.0 49.2	97 02.8 111°35.7	13.9'	04 11.2 04°26.7	15.5'	57.4' 57.3'
23	163°53.8	48.4	126°08.6	13.9'	04°42.2	15.5'	57.3'
	SD = 15.8'	d = -0.8'		SI	D = 15.8'		
<b>C</b>	GHA	Dec	GHA		Dec		HP
Sun 0	<b>GHA</b> 178°53.9	Dec N13° 47.6	<b>GHA</b> 140°41.6	u 14.0'	<b>S</b> 04°57.7	<i>d</i> 15.4'	<b>нР</b> 57.2'
1	178 55.9 193°54.0	46.8	155°14.5	14.0'	05°13.1	15.4	57.2'
2	208°54.1	46.0	$169^{\circ}47.5$	14.0'	05°28.5	15.3'	57.2'
3	223°54.3	• • 45.3	184°20.5	14.0'	05°43.8	15.3'	57.1'
4	238°54.4 253°54.5	44.5 43.7	198°53.5 213°26.5	14.0'	05°59.1 06°14.4	15.2'	57.1'
5 6	253°54.5 268°54.6	43.7 N13° 42.9	213°26.5 227°59.5	14.0' 14.0'	06°14.4 \$06°29.6	15.2' 15.2'	57.1' 57.0'
7	283°54.8	42.1	242°32.5	14.0'	06°44.7	15.1	57.0'
8	298°54.9	41.3	257°05.6	14.0'	06°59.8	15.1'	57.0'
9	313°55.0	• • 40.5	271°38.6	14.0'	07°14.9	15.0'	56.9'
10	328°55.2	39.7	286°11.7	14.1'	07°29.9 07°44.8	15.0'	56.9'
11 12	343°55.3 358°55.4	38.9 N13°38.1	300°44.7 315°17.8	14.1' 14.1'	07°44.8 S07°59.7	14.9' 14.8'	56.9' 56.8'
13	13°55.5	37.3	329°50.8	14.1'	08°14.6	14.8	56.8
14	28°55.7	36.6	344°23.9	14.1'	08°29.3	14.7'	56.8'
15	43°55.8	• • 35.8	358°56.9	14.1'	08°44.1	14.7'	56.7'
16	58°55.9	35.0	13°30.0	14.1'	08°58.8	14.6'	56.7'
17 18	73°56.1 88°56.2	34.2 N13°33.4	28°03.1 42°36.1	14.1' 14.0'	09°13.4 \$09°27.9	14.6' 14.5'	56.7' 56.6'
19	103°56.3	32.6	42 30.1 57°09.2	14.0'	09°42.4	14.5 14.4'	56.6'
20	118°56.5	31.8	71°42.2	14.0'	09°56.9	14.4'	56.6
21	133°56.6	• • 31.0	86°15.2	14.0'	10°11.3	14.3'	56.5'
22	148°56.7	30.2	100°48.3	14.0'	10°25.6	14.3'	56.5'
23	163°56.9	29.4	115°21.3	14.0'	10°39.8	14.2'	56.5'
	SD = 15.8'	d = -0.8'		SI	D = 15.6'		

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

August 17, 18, 19 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	325°23.5	136°50.2	S05°25.4	231°19.6	N23°42.0	192° 18.8	N18°05.6	311°09.3	N03° 16.3			
1	340°25.9	151°50.6	26.6	246°20.3	42.0	207° 20.7	05.4	326°11.8	16.3	Alpheratz	357°33.1	29° 14.3
2	355°28.4	166°51.0	27.8	261°20.9	42.0	222°22.7	05.3	341°14.4	16.2	Ankaa	353°05.5	-42°09.4
3	10°30.8	181°51.4	29.0	276°21.6	• • 42.0	237°24.6	• • 05.1	356° 16.9	• • 16.2	Schedar	349°29.1	56°40.9
4	25°33.3	196°51.8	30.2	291°22.3	42.0	252°26.5	05.0	$11^{\circ}19.4$	16.1	Diphda	348°45.7	-17°50.2
5	40°35.8	211°52.2	31.3	306°23.0	42.0	267°28.4	04.8	26°22.0	16.1	Achernar	335°18.9	-57°05.7
6	55°38.2	226°52.6	S05°32.5	321°23.7	N23°41.9	282°30.3	N18°04.7	41°24.5	N03°16.1	Hamal	327°49.6	23°35.3 89°22.3
7	70°40.7	241°53.0	33.7	336°24.3	41.9	297°32.2	04.5	$56^{\circ}27.1$	16.0	Polaris Acamar	313°17.1 315°10.7	-40° 11.5
8	85°43.2	256°53.4	34.9	351°25.0	41.9	$312^{\circ}34.1$	04.4	71°29.6	16.0	Menkar	314°04.7	4° 11.8
9	100°45.6	271°53.8	• • 36.1	6°25.7	• • 41.9	327°36.0	• • 04.3	86°32.1	•• 15.9	Mirfak	308°26.3	49°57.2
10	115°48.1	286°54.2	37.3	21°26.4	41.9	342°37.9	04.1	101°34.7	15.9	Aldebaran	290°38.2	16° 33.8
11	130°50.6	301°54.6	38.4	36°27.0	41.9	357° 39.9	04.0	116° 37.2	15.8	Rigel	281°02.7	-8° 10.1
12	145°53.0	316°55.0	S05°39.6	51°27.7	N23°41.9	12°41.8	N18°03.8	131°39.8	N03°15.8	Capella	280°20.1	46°01.3
13	160°55.5	331°55.4	40.8	66°28.4	41.9	27°43.7	03.7	146°42.3	15.8	Bellatrix	278°21.6	6°22.5
14	175°57.9	346°55.8	42.0	81°29.1	41.8	42°45.6	03.5	161°44.9	15.7	Elnath	278°00.3	28° 37.7
15	191°00.4	1°56.2	• • 43.2	96°29.7	• • 41.8	57° 47.5	• • 03.4	176°47.4	• • 15.7	Alnilam	275°36.5	-1°11.0
16	206°02.9	16°56.6	44.3	111°30.4	41.8	72°49.4	03.3	191°50.0	15.6	Betelgeuse	270°50.8	7°24.8
17	221°05.3	31°57.0	45.5	126°31.1	41.8	87°51.3	03.1	206°52.5	15.6	Canopus	263°52.2	-52°42.3
18	236°07.8	46°57.4 61°57.8	S05°46.7	141°31.8 156°32.4	N23°41.8	102°53.2 117°55.2	N18°03.0	221°55.0 236°57.6	N03°15.5	Sirius	258°25.3	-16°45.0
19 20	251°10.3 266°12.7	76°58.2	47.9 49.1	150 32.4 171°33.1	41.8 41.7	117 55.2 132°57.1	02.8 02.7	250° 57.0 252° 00.1	15.5 15.4	Adhara	255°05.1	-29°00.3
21	281°15.2	91°58.6	50.2	171 33.1 186°33.8	• • 41.7	132 57.1 147°59.0	•• 02.7	267°02.7	15.4	Procyon	244°49.7	5°09.5
22	201 15.2 296°17.7	106°59.0	51.4	201°34.5	41.7	163°00.9	02.5	282°05.2	15.4	Pollux	243°16.0	27°57.7
23	311°20.1	100 59.0 121°59.4	52.6	216°35.2	41.7	178°02.8	02.4	202 03.2 297°07.8	15.4	Avior	234°14.8	-59°35.5
			_							Suhail	222°45.8	-43°32.3
Mer.p	ass. 02:18	$ u$ 0.4 $^{\prime}$ d1.	2′ m-4.44	$ u$ 0.7 $^{\prime}$ d-0	0.0′ m1.28	$\nu 1.9' \ d-0$	$.1^\prime$ m-1.79	$\nu 2.5' \ d-0$	.0′ m0.55	Miaplacidus	221°38.9	-69°49.5
										Alphard	217°46.8	-8°46.4
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
0	326°22.6	136°59.8	S05°53.8	231°35.8	N23°41.7	193°04.7	N18°02.1	312°10.3	N03° 15.3	Dubhe	193°40.0	61°36.5
1	341°25.1	152°00.2	55.0	246°36.5	41.6	208°06.6	02.0	327°12.9	15.2	Denebola	182°23.9	14°25.5
2	356°27.5	167°00.6	56.1	261°37.2	41.6	223°08.5	01.8	342°15.4	15.2	Gienah	175°42.5	-17°41.4
3	11°30.0	182°01.0	57.3	276°37.9	• • 41.6	238° 10.5	01.7	357° 17.9	• • 15.1	Acrux	172°59.1	-63°15.0
4	26°32.4	197°01.4	58.5	291°38.6	41.6	253°12.4	01.5	12°20.5	15.1		171°50.6	-57° 15.9
5	41°34.9	212°01.8	05°59.7	306°39.2	41.6	268°14.3	01.4	27°23.0	15.0	Alioth	166°12.2 158°21.1	55°49.1 -11°18.0
6	56°37.4	227°02.2	S06°00.8	321°39.9	N23°41.5	283°16.2	N18°01.2	42°25.6	N03°15.0	Spica Alkaid	150 21.1 152°51.2	49° 11.0
7	71°39.8	242°02.6	02.0	336°40.6	41.5	$298^{\circ}18.1$	01.1	$57^{\circ}28.1$	14.9	Hadar	132 31.2 148°34.3	-60° 30.3
8	86°42.3	257°03.1	03.2	351°41.3	41.5	313°20.0	00.9	72°30.7	14.9		146 34.3 147°56.2	-36° 30.2
9	101°44.8	272°03.5	• • 04.4	6°42.0	• • 41.5	$328^{\circ}21.9$	8.00	87°33.2	• • 14.9	Arcturus	145°46.8	19°02.8
10	$116^{\circ}47.2$	287°03.9	05.5	21°42.6	41.5	343°23.8	00.7	102°35.8	14.8	Rigil Kent.	139°38.6	-60°57.0
11	131°49.7	302°04.3	06.7	36°43.3	41.4	358°25.8	00.5	117°38.3	14.8	Kochab	137°20.0	74°03.0
12	146°52.2	317°04.7	S06°07.9	51°44.0	N23°41.4	13°27.7	N18°00.4	132°40.9	N03°14.7	Zuben'ubi	136°54.6	-16°09.2
13	161°54.6	332°05.1	09.1	66°44.7	41.4	28° 29.6	00.2	147°43.4	14.7	Alphecca	126°02.6	26° 37.7
14	176°57.1	347°05.5	10.2	81°45.4	41.4	43°31.5	18°00.1	162°45.9	14.6	Antares	112°14.1	-26° 29.5
15	191°59.6	2°06.0	• • 11.4	96°46.0	• • 41.4	58° 33.4	17°59.9	177°48.5	• • 14.6	Atria	107°06.9	-69°04.7
16	207°02.0	17°06.4	12.6	111°46.7	41.3	73°35.3	59.8	192°51.0	14.5	Sabik	$102^{\circ}01.1$	-15°45.5
17	222°04.5	32°06.8	13.8	126°47.4	41.3	88°37.2	59.6	207°53.6	14.5	Shaula	96°08.3	-37°07.4
18	237°06.9	47°07.2	S06°14.9	141°48.1	N23°41.3	103°39.2	N17°59.5	222°56.1	N03°14.4	Rasalhague	$95^{\circ}57.1$	12°32.6
19	252°09.4	62°07.6	16.1	156°48.8	41.3	118°41.1	59.4	237°58.7	14.4	Eltanin	90°41.3	51°29.3
20 21	267°11.9 282°14.3	77°08.0 92°08.5	17.3 •• 18.4	171°49.4 186°50.1	41.2 · · 41.2	133° 43.0 148° 44.9	59.2 •• 59.1	253°01.2 268°03.8	14.4 •• 14.3	Kaus Aust.	83°30.5	-34°22.3
22	202 14.3 297°16.8	107°08.9	19.6	201°50.8	41.2	163°46.8	58.9	283°06.3	14.3	Vega	80°32.0	38° 48.7
23	312°19.3	122°09.3	20.8	216°51.5	41.2	178° 48.7	58.8	298°08.9	14.2	Nunki	75°45.8	-26° 15.8
										Altair	61°58.4	8° 56.5
Mer.p	ass. 02:14	$ u$ 0.4 $^{\prime}$ d1.	2′ m-4.45	$ u$ 0.7 $^{\prime}$ d-0	0.0′ m1.28	$\nu 1.9' \ d-0$	.1' m-1.79	$\nu 2.5' \ d-0$	.0′ m0.55	Peacock	53°03.1	-56° 38.9
										Deneb	49°24.4	45°22.7
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.2	10°00.0
0	327°21.7	137°09.7	S06°22.0	231°52.2	N23°41.1	193°50.6	N17°58.6	313°11.4	N03°14.2	Al Na'ir	27°30.8	-46°49.7
1	342°24.2	152°10.2	23.1	246°52.9	41.1	208° 52.5	58.5	328° 14.0	14.1	Fomalhaut Scheat	15°12.7 13°43.6	-29°28.7 28°13.7
2	357°26.7	167°10.6	24.3	261°53.5	41.1	223°54.5	58.3	343°16.5	14.1	Markab	13°28.3	15°21.0
3	12°29.1	182°11.0	• • 25.5	276°54.2	• • 41.0	238°56.4	• • 58.2	$358^{\circ}19.1$	• • 14.0	ividikaD		13 21.0
4	27°31.6	$197^{\circ}11.4$	26.6	$291^{\circ}54.9$	41.0	253°58.3	58.1	13°21.6	14.0	Aug 17 Mon	SHA	Mer.pass
5	42°34.0	$212^{\circ}11.9$	27.8	$306^{\circ}55.6$	41.0	269°00.2	57.9	28°24.2	13.9		171°26.8	14:52
6	57°36.5	227°12.3	S06°29.0	321°56.3	N23°41.0	284°02.1	N17°57.8	43°26.7	N03° 13.9	Mars		08:34
7	72°39.0	242°12.7	30.2	336°57.0	40.9	299°04.0	57.6	58° 29.3	13.8	Jupiter		11:09
8	87°41.4	257°13.1	31.3	351°57.6	40.9	314°05.9	57.5	73°31.8	13.8	Saturn	345°45.8	03:15
9	102°43.9	272°13.6	• • 32.5	6°58.3	• • 40.9	329°07.9	• • 57.3	88°34.4	• • 13.8	Aug 18 Tue	SHA	Mer.pass
10	117°46.4	287°14.0	33.7	21°59.0	40.8	344°09.8	57.2	103°36.9	13.7	_	170°37.2	14:52
11	132°48.8	302°14.4	34.8	36°59.7	40.8	359°11.7	57.0	118°39.5	13.7	Mars		08:33
12	147°51.3	317°14.9	S06°36.0	52°00.4	N23°40.8	14°13.6	N17°56.9	133°42.0	N03°13.6	Jupiter		11:06
13	162°53.8	332°15.3	37.2	67°01.1	40.8	29°15.5	56.7	148°44.6	13.6	Saturn	345°47.7	03:11
14 15	177°56.2	347°15.7	38.3	82°01.7	40.7	44°17.4	56.6	163°47.1	13.5	A 10		
15 16	192°58.7	2°16.2	· · 39.5	97°02.4	· · 40.7	59°19.4	· · 56.5	178°49.7	· · 13.5	Aug 19 Wed	SHA	Mer.pass
16 17	208°01.2	17°16.6	40.7	112°03.1	40.7 40.6	74°21.3	56.3	193°52.2	13.4		169°48.0	14:51
17	223°03.6 238°06.1	32°17.0 47°17.5	41.8 \$06°43.0	127°03.8 142°04.5	40.6 N23°40.6	89°23.2 104°25.1	56.2 N17°56.0	208°54.8 223°57.3	13.4 N03°13.3	Mars		08:32
18 19	253°08.5	47 17.5 62°17.9	44.2	142 04.5 157°05.2	N23 40.6 40.6	104 25.1 119°27.0	N17 50.0 55.9	223 57.3 238°59.9	13.3	Jupiter		11:03
20	268°11.0	77°18.3	44.2 45.3	157 05.2 172°05.9	40.6	119 27.0 134°28.9	55.9 55.7	250° 59.9 254° 02.4	13.3	Saturn	345°49.7	03:07
20	200 11.0 283°13.5	92°18.8	45.5 • • 46.5	172 05.9 187°06.5	• • 40.5	134 26.9 149°30.8	55.6	269°05.0	13.2	Horizont	al parallax	
22	203 15.5 298°15.9	107°19.2	47.7	202°07.2	40.5	164°32.8	55.4	284°07.5	13.2		Venus:	0.2
23	313°18.4	122°19.6	48.8	217°07.9	40.4	179°34.7	55.3	299°10.1	13.1		Mars:	0.1
ivier.p	ass. 02:10	$\nu$ 0.4' $d1$ .	2′ m-4.46	$\nu$ 0.7' d-0	0.0′ m1.28	$\nu$ 1.9' d-0	.1′ m-1.79	$\nu$ 2.5′ $d$ -0	.0′ m0.54			

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°57.0	N13°28.6	129°54.3	14.0'	S10°54.0	14.1'	56.4'
1 2	193°57.1 208°57.2	27.8 27.0	144°27.3 159°00.3	14.0' 14.0'	11°08.2 11°22.2	14.1' 14.0'	56.4' 56.4'
3	208 57.2 223°57.4	26.2	173°33.3	14.0'	11°36.2	13.9'	56.3
4	238°57.5	25.4	$188^{\circ}06.2$	14.0'	$11^{\circ}50.1$	13.9'	56.3'
5	253°57.6	24.6	202°39.2	13.9'	12°04.0	13.8'	56.3'
6 7	268°57.8 283°57.9	N13°23.8 23.0	217°12.1 231°45.1	13.9' 13.9'	\$12°17.8 12°31.5	13.7' 13.7'	56.2' 56.2'
8	298°58.0	22.2	246°18.0	13.9'	12°45.2	13.6'	56.2
9	313°58.2	• • 21.4	260°50.9	13.9'	12°58.8	13.5'	56.1'
10	328°58.3	20.6	275°23.7	13.9'	13°12.3 13°25.7	13.4'	56.1'
11 12	343°58.4 358°58.6	19.8 N13°19.0	289°56.6 304°29.4	13.8' 13.8'	13°25.7 \$13°39.1	13.4' 13.3'	56.1' 56.0'
13	13°58.7	18.2	319°02.2	13.8'	13°52.4	13.2'	56.0'
14	28°58.9	17.4	333°35.0	13.8'	14°05.6	13.1'	56.0'
15 16	43°59.0 58°59.1	· · 16.6 15.8	348°07.8 2°40.5	13.7' 13.7'	14°18.7 14°31.8	13.1' 13.0'	55.9' 55.9'
17	73°59.3	15.0	17°13.2	13.7'	14° 44.7	12.9'	55.9'
18	88°59.4	N13° 14.2	31°45.9	13.7'	S14°57.7	12.8'	55.9'
19	103°59.5	13.4	46°18.6	13.6'	15°10.5	12.7'	55.8'
20 21	118°59.7 133°59.8	12.6 •• 11.8	60°51.3 75°23.9	13.6' 13.6'	15°23.2 15°35.9	12.7' 12.6'	55.8' 55.8'
22	148°59.9	11.0	89°56.5	13.6'	15°48.5	12.5'	55.7'
23	164°00.1	10.2	104°29.0	13.5'	$16^{\circ}01.0$	12.4'	55.7'
	SD = 15.8'	d = -0.8'		SE	0 = 15.4'		
T., -	СПУ	Das	CHA		Dec		HP
Tue 0	<b>GHA</b> 179°00.2	<b>Dec</b> N13°09.4	<b>GHA</b> 119°01.6	u 13.5'	Dec \$16°13.4	d 12.3'	<b>нР</b> 55.7'
1	194°00.4	08.6	133°34.1	13.5'	16°25.7	12.3'	55.6'
2	209°00.5	07.8	148°06.5	13.4'	16°38.0	12.2'	55.6'
3 4	224°00.6 239°00.8	· · 07.0 06.2	162°39.0 177°11.4	13.4' 13.4'	16°50.2 17°02.2	12.1' 12.0'	55.6' 55.6'
5	254°00.9	05.3	177 11.4 191°43.7	13.4	17°14.2	11.9'	55.5'
6	269°01.0	N13°04.5	$206^{\circ}16.1$	13.3'	S17°26.1	11.8'	55.5'
7	284°01.2	03.7	220°48.4	13.3'	17°38.0	11.7'	55.5'
8 9	299°01.3 314°01.5	02.9 •• 02.1	235°20.7 249°52.9	13.2' 13.2'	17°49.7 18°01.3	11.6' 11.6'	55.5' 55.4'
10	329°01.6	01.3	264°25.1	13.2'	18°12.9	11.5'	55.4'
11	344°01.7	13°00.5	278°57.3	13.1'	18°24.3	11.4'	55.4'
12 13	359°01.9 14°02.0	N12°59.7 58.9	293°29.4 308°01.5	13.1' 13.1'	\$18°35.7 18°47.0	11.3' 11.2'	55.3' 55.3'
14	29°02.2	58.1	300 01.5 322°33.6	13.1	18°58.2	11.1'	55.3'
15	44°02.3	• • 57.3	$337^{\circ}05.6$	13.0'	$19^{\circ}09.3$	11.0'	55.3'
16	59°02.4	56.4	351°37.6 6°09.5	12.9'	19°20.3	10.9'	55.2'
17 18	74°02.6 89°02.7	55.6 N12°54.8	6 09.5 20°41.4	12.9' 12.9'	19°31.2 \$19°42.0	10.8' 10.7'	55.2' 55.2'
19	104°02.9	54.0	35°13.3	12.8'	19°52.7	10.6'	55.2'
20	119°03.0	53.2	49°45.1	12.0	20°03.3		55.1'
21 22	134°03.1 149°03.3	· · 52.4 51.6	64°16.9 78°48.6	12.7' 12.7'	20°13.8 20°24.2	10.4' 10.3'	55.1' 55.1'
23	164°03.4	50.8	93°20.3	12.7'	20°34.5	10.2	55.1'
	SD = 15.8'	d = -0.8'		SE	0 = 15.2'		
	CUA		CIIA				
Wed 0	<b>GHA</b> 179°03.6	<b>Dec</b> N12° 49.9	<b>GHA</b> 107°51.9	u 12.6'	<b>Dec</b> \$20°44.7	d 10.1'	<b>HP</b> 55.1'
1	194°03.7	49.1	$122^{\circ}23.6$	12.6'	20°54.9	10.0'	55.0'
2	209°03.9	48.3	136°55.1	12.5'	21°04.9	9.9'	55.0'
3 4	224°04.0 239°04.1	· · 47.5 46.7	151°26.7 165°58.1	12.5' 12.4'	21°14.8 21°24.6	9.8' 9.7'	55.0' 55.0'
5	254°04.3	45.9	180°29.6	12.4'	21°34.3	9.6'	54.9'
6	269°04.4	N12°45.0	195°01.0	12.4'	S21°43.9	9.5'	54.9'
7 8	284°04.6 299°04.7	44.2 43.4	209°32.3 224°03.6	12.3' 12.3'	21°53.4 22°02.8	9.4' 9.3'	54.9' 54.9'
9	299 04.7 314°04.9	· · 42.6	238°34.9	12.3	22 02.8 22°12.1	9.3 9.2'	54.9'
10	329°05.0	41.8	253°06.1	12.2'	$22^{\circ}21.3$	9.1'	54.8'
11	344°05.2	41.0 N12°40.1	267°37.3	12.1'	22°30.4	9.0'	54.8'
12 13	359°05.3 14°05.4	N12°40.1 39.3	282°08.4 296°39.5	12.1' 12.0'	\$22°39.3 22°48.2	8.9' 8.8'	54.8' 54.8'
14	29°05.6	38.5	$311^{\circ}10.6$	12.0'	22°56.9	8.6'	54.8'
15	44°05.7	• • 37.7	325°41.6	12.0'	23°05.6	8.5'	54.7'
16 17	59°05.9 74°06.0	36.9 36.1	340°12.5 354°43.4	11.9' 11.9'	23°14.1 23°22.5	8.4' 8.3'	54.7' 54.7'
18	89°06.2	N12°35.2	9°14.3	11.8'	523°30.8	8.2'	54.7
19	104°06.3	34.4	23°45.1	11.8'	23°39.0	8.1'	54.7'
20	119°06.5	33.6	38°15.9	11.7'	23°47.1	8.0'	54.6'
21 22	134°06.6 149°06.8	· · 32.8 31.9	52°46.6 67°17.3	11.7' 11.6'	23°55.1 24°02.9	7.9' 7.7'	54.6' 54.6'
23	164°06.9	31.1	81°48.0	11.6'	24°10.7	7.6'	54.6'
	SD = 15.8'	d = -0.8'		SE	0 = 15.0'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
<b>N</b> 72°	////	////	02:44	21:19	////	////
<b>N</b> 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
$60^{\circ}$	02:19	03:31	04:21	19:45	20:34	21:45
<b>N</b> 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
$35^{\circ}$	04:24	04:56	05:22	18:45	19:12	19:43
$30^{\circ}$	04:34	05:04	05:29	18:38	19:03	19:33
$20^{\circ}$	04:51	05:18	05:41	18:27	18:49	19:16
N $10^{\circ}$	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> $10^{\circ}$	05:23	05:48	06:10	17:58	18:20	18:44
$20^{\circ}$	05:31	05:57	06:20	17:48	18:11	18:37
$30^{\circ}$	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> $50^{\circ}$	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
		Moonris	e		Moonset	:
Lat.	Mon	Tue	Wed	Mon	Tue	Wed

Lat.		Moonrise Moonset								
Lat.	Mon	Tue	Wed	Mon	Tue	Wed				
N 72°	13:04			18:09						
N 70°	12:34	15:32		18:41	17:19					
68°	12:12	14:28		19:04	18:24					
66°	11:55	13:53	16:25	19:23	19:00	18:06				
64°	11:41	13:28	15:25	19:38	19:26	19:07				
62°	11:30	13:09	14:51	19:51	19:46	19:41				
60°	11:20	12:53	14:27	20:02	20:03	20:07				
<b>N</b> 58°	11:12	12:40	14:07	20:11	20:17	20:27				
56°	11:04	12:28	13:51	20:20	20:29	20:43				
54°	10:58	12:18	13:38	20:27	20:40	20:57				
52°	10:52	12:09	13:26	20:34	20:49	21:10				
50°	10:46	12:01	13:15	20:40	20:58	21:21				
45°	10:35	11:45	12:53	20:53	21:16	21:44				
N 40°	10:26	11:31	12:36	21:04	21:31	22:02				
35°	10:18	11:19	12:21	21:13	21:43	22:18				
30°	10:11	11:09	12:08	21:21	21:55	22:31				
20°	09:58	10:52	11:46	21:35	22:14	22:55				
N 10°	09:48	10:37	11:28	21:48	22:30	23:15				
0°	09:38	10:23	11:10	22:00	22:46	23:33				
<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	00.04	01:21				
<b>S</b> 60°	08:03	08:04	08:07		00:04	01:37				

		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	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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	328°20.9	137°20.1	S06°50.0	232°08.6	N23° 40.4	194°36.6	N17°55.2	314°12.6	N03°13.0			
1	343°23.3	152°20.5	51.2	247°09.3	40.4	209°38.5	55.0	329° 15.2	13.0	Alpheratz	$357^{\circ}33.1$	29°14.3
2	358°25.8	167°21.0	52.3	262° 10.0	40.3	224°40.4	54.9	344°17.7	13.0	Ankaa	353°05.5	-42°09.4
3	13°28.3	182°21.4	53.5	277° 10.7	. 40.3	239°42.3	• • 54.7	359°20.3	. 12.9	Schedar	349°29.1	56°40.9
4	28°30.7	197°21.8	54.6	292°11.4	40.3	254°44.2	54.6	14°22.8		Diphda	348°45.7	-17°50.2
									12.9	Achernar	$335^{\circ}18.9$	-57°05.7
5	43°33.2	212°22.3	55.8	307°12.0	40.2	269°46.2	54.4	29°25.4	12.8	Hamal	327°49.5	23°35.3
6	58°35.7	227°22.7	S06°57.0	322°12.7	N23° 40.2	284°48.1	N17°54.3	44°27.9	N03°12.8	Polaris	313°15.3	89°22.3
7	73°38.1	242°23.2	58.1	337° 13.4	40.2	299°50.0	54.1	59°30.5	12.7	Acamar	315°10.7	-40°11.5
8	88°40.6	257°23.6	06°59.3	$352^{\circ}14.1$	40.1	314°51.9	54.0	74°33.1	12.7	Menkar	314°04.7	4°11.8
9	103°43.0	272°24.1	07°00.5	7° 14.8	• • 40.1	329°53.8	• • 53.9	89°35.6	• • 12.6	Mirfak	308°26.3	49°57.2
10	118°45.5	287°24.5	01.6	22° 15.5	40.0	344°55.7	53.7	104°38.2	12.6	Aldebaran	290°38.1	16°33.8
11	133°48.0	302°25.0	02.8	37°16.2	40.0	359°57.7	53.6	119°40.7	12.5	1		
12	148°50.4	317°25.4	S07°03.9	52° 16.9	N23°40.0	14°59.6	N17°53.4	134°43.3	N03° 12.5	Rigel	281°02.7	-8°10.1
13	163°52.9	332°25.9	05.1	67° 17.5	39.9	30°01.5	53.3	149°45.8	12.4	Capella	280°20.1	46°01.3
14	178°55.4	347°26.3	06.3	82° 18.2	39.9	45°03.4	53.1	164°48.4	12.4	Bellatrix	278°21.6	6°22.5
15	193°57.8	2°26.8	• • 07.4	97° 18.9	• • 39.9	60°05.3	53.0	179°50.9	. 12.3	Elnath	278°00.3	28°37.7
16	209°00.3	17°27.2	08.6	112° 19.6	39.8	75°07.2	52.8	194°53.5	12.3	Alnilam	275°36.5	-1°11.0
		32°27.7		112 19.0 127°20.3						Betelgeuse	270°50.8	7°24.8
17	224°02.8		09.7		39.8	90°09.2	52.7	209°56.0	12.2	Canopus	263°52.1	-52°42.3
18	239°05.2	47°28.1	S07°10.9	142°21.0	N23°39.7	105°11.1	N17°52.5	224°58.6	N03°12.2	Sirius	258°25.3	-16°45.0
19	254°07.7	62°28.6	12.0	157°21.7	39.7	120°13.0	52.4	240°01.1	12.1	Adhara	255°05.1	-29°00.3
20	269°10.1	77°29.0	13.2	172°22.4	39.7	135°14.9	52.3	255°03.7	12.1	Procyon	244°49.7	5°09.5
21	284°12.6	92°29.5	• • 14.4	187°23.1	• • 39.6	150°16.8	• • 52.1	270°06.3	• • 12.0	Pollux	243°16.0	27°57.7
22	299°15.1	107°29.9	15.5	202°23.8	39.6	165°18.7	52.0	285°08.8	12.0	Avior	234° 14.8	-59°35.5
23	314°17.5	122°30.4	16.7	$217^{\circ}24.4$	39.5	180°20.7	51.8	$300^{\circ}11.4$	11.9	Suhail	234 14.8 222°45.8	-59 35.5 -43°32.3
N 4 = ··	2000	1.0 A/ -11	2/ m 4 47	10 7/ -1 C	0/ -1 27	1 0/ -/ 0	1/ m 1 70	106/ 10	10/ m0 F4			
ivler.p	pass. 02:06	$\nu$ 0.4' $d1$ .	2′ m-4.47	$\nu$ 0.1' d-0	0.0′ m1.27	$\nu_{1.9}$ d-0	.1′ m-1.79	ν2.6′ d-0	.0' m0.54	Miaplacidus	221°38.9	-69°49.5
										Alphard	217°46.8	-8°46.4
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
0	329°20.0	137°30.8	507°17.8	232°25.1	N23°39.5	195°22.6	N17°51.7	315°13.9	N03°11.9	Dubhe	193°40.0	61°36.5
		152°31.3								Denebola	182°23.9	14°25.5
1	344°22.5		19.0	247°25.8	39.5	210°24.5	51.5	330°16.5	11.8	Gienah	175°42.5	-17°41.4
2	359°24.9	167°31.8	20.1	262°26.5	39.4	225°26.4	51.4	345°19.0	11.8	Acrux	$172^{\circ}59.1$	-63°15.0
3	14°27.4	182°32.2	• • 21.3	277° 27.2	• • 39.4	240°28.3	• • 51.2	0°21.6	• • 11.7	Gacrux	171°50.6	-57°15.9
4	29°29.9	197°32.7	22.5	292°27.9	39.3	255°30.2	51.1	$15^{\circ}24.1$	11.7	Alioth	166°12.2	55°49.1
5	44°32.3	212°33.1	23.6	307°28.6	39.3	270°32.2	51.0	30°26.7	11.7	Spica	158°21.1	-11°18.0
6	59°34.8	227°33.6	S07°24.8	322°29.3	N23°39.2	285°34.1	N17°50.8	45°29.3	N03°11.6	Alkaid	152°51.2	49°11.0
7	74°37.3	242°34.1	25.9	337°30.0	39.2	300°36.0	50.7	60°31.8	11.6	Hadar	148°34.4	-60°30.3
8	89°39.7	257°34.5	27.1	352°30.7	39.2	315°37.9	50.5	75°34.4	11.5			-36°30.2
9	104°42.2	272°35.0	• • 28.2	7°31.4	• • 39.1	330°39.8	• • 50.4	90°36.9	• • 11.5		147°56.2	
10	119°44.6	287°35.5	29.4	22°32.1	39.1	345°41.7	50.2	105°39.5	11.4		145°46.8	19°02.8
11	134°47.1	302°35.9	30.5	37° 32.7	39.0	0°43.7	50.1	120°42.0	11.4	Rigil Kent.		-60°57.0
12	149°49.6	317°36.4	S07°31.7	52°33.4	N23°39.0	15°45.6	N17°49.9	135° 44.6	N03°11.3	Kochab	137°20.1	74°03.0
13	164°52.0	332°36.9	32.8	67°34.1	38.9	30°47.5	49.8	150°47.2		Zuben'ubi	136°54.6	-16°09.2
		347°37.3						165°49.7	11.3	Alphecca	126°02.6	26°37.7
14	179°54.5		34.0	82°34.8	38.9	45°49.4	49.6		11.2	Antares	$112^{\circ}14.1$	-26°29.5
15	194°57.0	2°37.8	• • 35.1	97°35.5	• • 38.8	60°51.3	• • 49.5	180°52.3	· · 11.2	Atria	$107^{\circ}06.9$	-69°04.7
16	209°59.4	17°38.3	36.3	112°36.2	38.8	75°53.2	49.4	195°54.8	11.1	Sabik	$102^{\circ}01.1$	-15°45.4
17	225°01.9	32°38.7	37.4	127° 36.9	38.7	90°55.2	49.2	210°57.4	11.1	Shaula	96°08.3	-37°07.4
18	240°04.4	47°39.2	S07°38.6	142°37.6	N23°38.7	$105^{\circ}57.1$	$N17^{\circ}49.1$	225°59.9	N03°11.0	Rasalhague	95°57.1	12°32.6
19	255°06.8	62°39.7	39.7	157°38.3	38.6	120°59.0	48.9	241°02.5	11.0	Eltanin	90°41.3	51°29.3
20	270°09.3	77°40.1	40.9	172°39.0	38.6	$136^{\circ}00.9$	48.8	256°05.1	10.9	Kaus Aust.	83°30.5	-34°22.3
21	285°11.8	92°40.6	• • 42.0	187°39.7	• • 38.6	151°02.8	• • 48.6	271°07.6	• • 10.9			
22	300°14.2	107°41.1	43.2	202°40.4	38.5	166°04.8	48.5	286°10.2	10.8	Vega	80°32.0	38°48.7
23	315°16.7	122°41.6	44.3	217°41.1	38.5	181°06.7	48.3	301°12.7	10.8	Nunki	75°45.8	-26°15.8
										Altair	61°58.4	8°56.5
Mer.p	ass. 02:02	$\nu$ 0.5′ $d$ 1.	2′ m-4.49	$ u$ 0.7 $^{\prime}$ d-0	).0′ m1.27	$\nu 1.9' \ d-0$	.1' m-1.79	$\nu$ 2.6′ d-0	.0′ m0.53	Peacock	53°03.1	-56°38.9
										Deneb	49°24.4	45°22.7
C	CIIA	CIIA	D	CUA	D	CILA	D	CHA	D	Enif	33°37.1	10°00.0
Sat	GHA	GHA	Dec COZ <sup>O</sup> 4F F	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.8	-46°49.8
0	330°19.1	137°42.0	S07°45.5	232°41.8	N23°38.4	196°08.6	N17°48.2	316° 15.3	N03° 10.7	Fomalhaut	$15^{\circ}12.7$	-29°28.7
1	345°21.6	152°42.5	46.6	247° 42.5	38.4	211°10.5	48.0	331°17.9	10.7	Scheat	13°43.6	28°13.7
2	0°24.1	167°43.0	47.8	262°43.2	38.3	226°12.4	47.9	346°20.4	10.6	Markab	13°28.2	15°21.1
3	15°26.5	182°43.5	• • 48.9	277°43.9	• • 38.3	241°14.3	• • 47.8	1°23.0	•• 10.6			
4	$30^{\circ}29.0$	197°44.0	50.1	292°44.6	38.2	$256^{\circ}16.3$	47.6	$16^{\circ}25.5$	10.5	Aug 20 Thu	SHA	Mer.pass
5	45°31.5	212°44.4	51.2	307°45.2	38.2	271°18.2	47.5	$31^{\circ}28.1$	10.5		$168^{\circ}59.2$	14:50
6	60°33.9	227°44.9	S07°52.4	322°45.9	N23°38.1	286°20.1	N17°47.3	46°30.7	N03°10.4	Mars	263°47.7	08:31
7	75°36.4	242°45.4	53.5	337°46.6	38.1	301°22.0	47.2	61°33.2	10.4	Jupiter	226°15.7	11:00
8	90°38.9	257°45.9	54.7	352°47.3	38.0	316°23.9	47.0	76°35.8	10.3	Saturn	345°51.8	03:03
9	105°41.3	272°46.4	• • 55.8	7°48.0	37.9	331°25.9	• • 46.9	91°38.3	. 10.3			
10	120°43.8	287°46.8	57.0	22°48.7	37.9	346°27.8	46.7	106°40.9	10.3	Aug 21 Fri	SHA	Mer.pass
										Venus	$168^{\circ}10.8$	14:49
11	135°46.3	302°47.3	58.1	37°49.4	37.8	1°29.7	46.6	121°43.5	10.2	Mars		08:30
12	150°48.7	317°47.8	S07°59.2	52°50.1	N23°37.8	16°31.6	N17°46.4	136°46.0	N03°10.1	Jupiter		10:57
13	165°51.2	332°48.3	08°00.4	67°50.8	37.7	31°33.5	46.3	151°48.6	10.1	Saturn	345°53.9	02:59
14	180°53.6	347°48.8	01.5	82°51.5	37.7	46°35.5	46.2	166°51.1	10.0	Jatuill	3.3 33.3	02.33
15	195°56.1	2°49.3	• • 02.7	97°52.2	• • 37.6	61°37.4	• • 46.0	181°53.7	• • 10.0	Aug 22 Sat	SHA	Mer.pass
16	210°58.6	17°49.8	03.8	112°52.9	37.6	76°39.3	45.9	196°56.3	09.9		167°22.9	14:49
17	226°01.0	32°50.2	05.0	127°53.6	37.5	91°41.2	45.7	211°58.8	09.9		262°22.6	08:29
18	241°03.5	47°50.7	S08°06.1	142°54.3	N23°37.5	106°43.1	N17° 45.6	227°01.4	N03°09.8	Jupiter		10:54
19	256°06.0	62°51.2	07.2	157°55.0	37.4	121°45.1	45.4	242°03.9	09.7			
20	271°08.4	77°51.7	08.4	172°55.7	37.4	136°47.0	45.3	257°06.5	09.7	Saturn	345°56.2	02:54
		92°52.2							•• 09.6	Horizont	al parallax	
21	286°10.9		· · 09.5	187°56.4	•• 37.3	151°48.9	· · 45.1	272°09.1		1.51.25111	Venus:	0.2
22	301°13.4	107°52.7	10.7	202°57.1	37.2	166°50.8	45.0	287°11.6	09.6		Mars:	0.2
23	316°15.8	122°53.2	11.8	217° 57.8	37.2	181°52.7	44.8	302°14.2	09.5		iviars:	0.1
Mern	ass. 01:58	$\nu 0.5' d1$	1′ m-4.50	$\nu^{0.7'} d_{-0}$	0.0' m1.27	ν1 9' d-0	.1′ m-1.79	ν2 6' d-0	0.1′ m0.53			
- wier.p		ν J.J U1.		νσ.ι u-0	1111.41	ν 1.5 U-U	1.13	ν Δ.Ο · U-U				

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°07.1	$N12^{\circ}30.3$	$96^{\circ}18.6$	11.6'	S24°18.3	7.5'	54.6'
1	194°07.2	29.5	110°49.1	11.5'	24°25.8	7.4'	54.6'
2	209°07.4 224°07.5	28.7 •• 27.8	125° 19.6 139° 50.1	11.5' 11.4'	24°33.2 24°40.5	7.3' 7.2'	54.5' 54.5'
4	239°07.7	27.0	154°20.5	11.4'	24°47.7	7.0'	54.5'
5	254°07.8	26.2	168° 50.9	11.3'	24°54.7	6.9	54.5'
6	269°08.0	N12°25.4	183°21.2	11.3'	S25°01.6	6.8'	54.5'
7	284°08.1	24.5	197°51.5	11.3'	25°08.4	6.7'	54.5'
8	299°08.3	23.7	212°21.8 226°52.0	11.2'	25°15.1 25°21.7	6.6'	54.5' 54.4'
9 10	314°08.4 329°08.6	· · 22.9 22.1	226°52.0 241°22.2	11.2' 11.1'	25°21.7 25°28.1	6.4' 6.3'	54.4' 54.4'
11	344°08.7	21.2	255°52.3	11.1'	25°34.5	6.2	54.4'
12	359°08.9	N12°20.4	270°22.4	11.0'	S25°40.7	6.1'	54.4'
13	14°09.0	19.6	284°52.4	11.0'	25°46.8	6.0'	54.4'
14	29°09.2 44°09.3	18.8	299°22.4 313°52.4	11.0' 10.9'	25°52.7 25°58.6	5.8' 5.7'	54.4'
15 16	59°09.5	· · 17.9 17.1	313 52.4 328°22.3	10.9'	25 58.0 26°04.3	5. <i>1</i> 5.6'	54.4' 54.4'
17	74°09.6	16.3	342°52.2	10.8'	26°09.9	5.5'	54.3'
18	89°09.8	N12° 15.4	357°22.0	10.8'	S26°15.3	5.3'	54.3'
19	104°09.9	14.6	11°51.8	10.8'	26°20.7	5.2'	54.3'
20	119°10.1 134°10.2	13.8	26°21.6 40°51.3	10.7' 10.7'	26°25.9 26°31.0	5.1' 5.0'	54.3' 54.3'
21 22	134 10.2 149°10.4	· · 13.0 12.1	40 51.3 55°21.0	10.7'	26°35.9	5.0 4.8'	54.3'
23	164°10.5	11.3	69°50.7	10.7	26°40.8	4.7'	54.3'
	SD = 15.8'	d = -0.8'			0 = 14.9'		
		<u>u — -0.0</u>		JL			
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°10.7 194°10.8	N12° 10.5 09.6	84°20.3 98°49.9	10.6' 10.6'	\$26°45.5 26°50.1	4.6' 4.5'	54.3'
1 2	194°10.8 209°11.0	09.6 08.8	98° 49.9 113° 19.5	10.6'	26°50.1 26°54.5	4.5'	54.3' 54.2'
3	224°11.1	08.0	113 19.3 127°49.0	10.5'	26°58.8	4.2'	54.2'
4	239°11.3	07.1	142° 18.5	10.5'	27°03.0	4.1'	54.2'
5	254°11.4	06.3	156° 48.0	10.4'	27°07.1	3.9'	54.2'
6	269°11.6 284°11.8	N12°05.5	171°17.4 185°46.8	10.4	\$27°11.0 27°14.8	3.8'	54.2'
7 8	284 11.8 299°11.9	04.6 03.8	185°46.8 200°16.2	10.4' 10.3'	27°14.8 27°18.5	3.7' 3.5'	54.2' 54.2'
9	314°12.1	03.0	214°45.5	10.3'	27°22.0	3.4	54.2'
10	329°12.2	02.1	$229^{\circ}14.8$	10.3'	27°25.5	3.3'	54.2'
11	344°12.4	01.3	243°44.1	10.3'	27°28.7	3.2'	54.2'
12 13	359°12.5 14°12.7	N12°00.5 11°59.6	258° 13.4 272° 42.6	10.2' 10.2'	\$27°31.9 27°34.9	3.0' 2.9'	54.2' 54.2'
14	29°12.8	11 59.0 58.8	272 42.0 287°11.8	10.2'	27°37.8	2.8'	54.2'
15	44°13.0	• • 58.0	301°41.0	10.2'	27°40.5	2.6'	54.2'
16	59°13.2	57.1	$316^{\circ}10.2$	10.1'	27°43.2	2.5'	54.2'
17	74°13.3	56.3	330°39.3	10.1'	27°45.7	2.4'	54.2'
18 19	89°13.5 104°13.6	N11°55.5 54.6	345°08.4 359°37.5	10.1' 10.1'	\$27°48.0 27°50.2	2.2' 2.1'	54.1' 54.1'
20	119°13.8	53.8	14°06.6		27°52.3	2.0'	54.1
21	134°13.9	• • 53.0	28°35.7	10.0'	27°54.3	1.8'	54.1'
22	149°14.1	52.1	43°04.7	10.0'	$27^{\circ}56.1$	1.7'	54.1'
23	164°14.3	51.3	57°33.8	10.0'	27°57.8	1.5'	54.1'
	SD = 15.8'	d = -0.8'		SE	0 = 14.8'		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°14.4	N11°50.4	$72^{\circ}02.8$	10.0'	S27°59.3	1.4'	54.1'
1	194°14.6	49.6	86°31.8	10.0'	28°00.7	1.3'	54.1'
2	209°14.7 224°14.9	48.8 •• 47.9	101°00.8 115°29.7	10.0' 10.0'	28°02.0 28°03.1	1.1' 1.0'	54.1' 54.1'
4	224°14.9 239°15.0	• • 47.9 47.1	115°29.7 129°58.7	10.0'	28°03.1 28°04.2	0.9	54.1' 54.1'
5	254°15.2	46.2	144°27.7	9.9'	28°05.0	0.7'	54.1'
6	269°15.4	N11°45.4	158° 56.6	9.9'	S28°05.8	0.6'	54.1'
7	284°15.5	44.6	173°25.5	9.9'	28°06.4	0.5'	54.1'
8	299°15.7 314°15.8	43.7 •• 42.9	187°54.5 202°23.4	9.9' 9.9'	28°06.8 28°07.2	0.3' 0.2'	54.1' 54.1'
10	314°15.8 329°16.0	42.0	202°23.4 216°52.3	9.9'	28°07.2 28°07.3	0.2	54.1'
11	344°16.2	41.2	231°21.2	9.9'	28°07.4	-0.1	54.1'
12	359°16.3	N11°40.4	245°50.1	9.9'	\$28°07.3	-0.2'	54.1'
13	14°16.5	39.5	260° 19.1	9.9'	28°07.1	-0.4'	54.1'
14 15	29°16.6 44°16.8	38.7 · · 37.8	274°48.0 289°16.9	9.9' 9.9'	28°06.7 28°06.3	-0.5' -0.6'	54.1' 54.1'
16	59°17.0	37.0	209 10.9 303°45.8	9.9' 9.9'	28°05.6	-0.8'	54.1'
17	74°17.1	36.1	318° 14.7	9.9'	28°04.9	-0.9'	54.1'
18	89°17.3	N11°35.3	332°43.6	9.9'	\$28°04.0	-1.0'	54.1'
19	104°17.4 119°17.6	34.5	347°12.5	9.9'	28°02.9	-1.2' -1.3'	54.1'
20 21	119°17.6 134°17.8	33.6 •• 32.8	1°41.5 16°10.4	9.9' 9.9'	28°01.8 28°00.5	-1.3' -1.4'	54.1' 54.1'
22	149°17.9	31.9	30°39.3	9.9'	27°59.0	-1.6'	54.1'
23	164°18.1	31.1	45°08.3	10.0'	27°57.5	-1.7'	54.1'
	SD = 15.8'	d = -0.8'		SE	0 = 14.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Junioce	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
$60^{\circ}$	02:32	03:40	04:29	19:36	20:24	21:31
<b>N</b> 58°	02:51	03:51	04:36	19:29	20:13	21:13
56°	03:06	04:01	04:43	19:22	20:04	20:58
54°	03:19	04:09	04:48	19:17	19:56	20:46
52°	03:30	04:17	04:54	19:11	19:48	20:35
50°	03:40	04:23	04:59	19:07	19:42	20:25
45°	03:59	04:37	05:09	18:57	19:28	20:06
N 40°	04:14	04:49	05:17	18:48	19:17	19:51
35°	04:26	04:58	05:24	18:41	19:08	19:39
30°	04:37	05:06	05:31	18:35	19:00	19:29
20°	04:52	05:19	05:42	18:24	18:47	19:14
N 10°	05:04	05:30	05:51	18:15	18:37	19:02
0°	05:14	05:39	06:00	18:06	18:28	18:52
<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° 58°	05:49	06:32	07:11	16:56	17:35	18:18
58 <b>S</b> 60°	05:50	06:36 06:39	07:16 07:23	16:51 16:44	17:32 17:28	18:18 18:17
3 00	05:51	00:39	07:23	10:44	17:20	10:17
Lat.		Moonris			Moonset	
	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
N 70° 68°						
66°						
64°						=
62°	16:39	18:41		19:35	19:19	_
60°	16:00	17:23	18:22	20:15	20:37	21:26
N 58° 56°	15:32	16:48	17:44	20:43	21:13	22:03
50° 54°	15:11 14:54	16:22 16:02	17:18 16:57	21:05 21:23	21:39 21:59	22:29 22:50
54 52°	14:54	15:45	16:40	21:23	21:59	23:08
50°	14:39	15:45	16:40	21:50	22:10	23:00
45°	13:59	15:00	15:54	22:18	23:01	23:53
N 40°	13:38			22:40	23:24	25.50
35°	13:38	14:37 14:18	15:31 15:12	22:40	23:24	
35°	13:21 13:06	14:18 14:02	15:12	22:58	23:43	00:00
20°	13:06	14:02	14:55 14:27	23:13		00:00
N 10°	12:41	13:11	14.21	23.39	00:02	00.20

)9:24 )9:11	09:57 09:41	10:42 10:25	02:01	03:11	04:12
9:11	09-41	10.25	00.14	00.07	
	05.11	10:25	02:14	03:27	04:29
08:55	09:22	10:04	02:30	03:46	04:50
08:36	08:59	09:38	02:48	04:09	05:16
08:13	08:27	09:02	03:11	04:40	05:52
	Sun			Moon	
Eqn.of	Time	Mer.	Mer.I	Pass.	Age
00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	8-10
nm:ss	mm:ss	hh:mm	hh:mm	hh:mm	49-68%
03:32	03:25	12:03	18:11	05:46	
03:17	03:10	12:03	19:02	06:36	
	08:36 08:13 Eqn.of 00 <sup>h</sup> nm:ss	08:36 08:59 08:13 08:27 Sun Eqn.of Time 00 <sup>h</sup> 12 <sup>h</sup> nm:ss mm:ss 03:32 03:25	88:36 08:59 09:38 88:13 08:27 09:02  Sun  Eqn.of Time Mer. 00 <sup>h</sup> 12 <sup>h</sup> Pass nm:ss mm:ss hh:mm  03:32 03:25 12:03	08:36     08:59     09:38     02:48       08:13     08:27     09:02     03:11       Sun       Eqn.of Time     Mer.     Mer.       00h     12h     Pass     Upper       nm:ss     nm:ss     hh:mm     hh:mm       03:32     03:25     12:03     18:11	Sun         Moon           Eqn.of Time onm:ss mm:ss         Mer. hh:mm hh:mm           03:32         03:25           03:32         03:25           09:02         03:11           03:11         04:40           Moon           Mer. Pass.           Upper Lower           hh:mm         hh:mm           18:11         05:46

13:41

13:18 12:54 12:26 12:10

11:50

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00:50

01:06

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00:44

01:07

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02:29

02:57

01:14

01:36

02:00 02:28

02:45

03:04

03:27

03:57

0°

**S** 10° 20° 30°

35°

40°

45°

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

11:59

11:39

11:17

10:53

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10:21

10:01

09:36

12:49

12:27

12:04 11:37

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10:11

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

h	Aries	Venu	us	М	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
			508°12.9		N23°37.1		N17°44.7	317° 16.8	N03°09.5		SHA	Dec
0	331°18.3 346°20.7	157 55.7 152°54.2		232°58.5 247°59.2		196° 54.7 211° 56.6		317 10.6 332°19.3		Alpheratz	$357^{\circ}33.1$	29° 14.3
1			14.1		37.1		44.6		09.4	Ankaa	353°05.5	-42°09.4
2	1°23.2	167°54.7	15.2	262°59.9	37.0	226°58.5	44.4	347°21.9	09.4	Schedar	349°29.1	56°41.0
3	16°25.7	182°55.2	• • 16.4	278°00.6	• • 37.0	242°00.4	• • 44.3	2°24.4	• • 09.3	Diphda	348°45.7	-17°50.2
4	31°28.1	197°55.7	17.5	293°01.3	36.9	257°02.3	44.1	17°27.0	09.3	Achernar	335°18.8	-57°05.7
5	46°30.6	212°56.2	18.6	308°02.0	36.8	272°04.3	44.0	32°29.6	09.2	Hamal	327°49.5	23°35.4
6	61°33.1		S08°19.8	323°02.7	N23°36.8	287°06.2	N17°43.8	47°32.1	N03°09.2	Polaris	313°13.6	89°22.3
7	76°35.5	242°57.2	20.9	338°03.4	36.7	302°08.1	43.7	62°34.7	09.1	Acamar	315°10.6	-40°11.5
8	91°38.0	257°57.7	22.0	353°04.1	36.7	$317^{\circ}10.0$	43.5	77° 37.3	09.1	Menkar	314°04.7	4°11.8
9	106°40.5	272°58.2	• • 23.2	8°04.8	• • 36.6	332°11.9	• • 43.4	92°39.8	• • 09.0			
10	121°42.9	287°58.7	24.3	23°05.5	36.5	347°13.9	43.2	107°42.4	09.0	Mirfak	308°26.2	49°57.2
11	136°45.4	302°59.2	25.4	38°06.2	36.5	2°15.8	43.1	122°44.9	08.9	Aldebaran	290°38.1	16°33.8
12	151°47.9		S08°26.6	53°06.9	N23°36.4	17° 17.7	N17°43.0	137° 47.5	N03°08.9	Rigel	281°02.7	-8° 10.1
13	166°50.3	333°00.2	27.7	68°07.6	36.4	32° 19.6	42.8	152°50.1	08.80	Capella	280°20.0	46°01.3
14	181°52.8	348°00.7	28.9	83°08.3	36.3	47° 21.5	42.7	167°52.6	08.8	Bellatrix	278°21.5	6°22.5
15	196°55.2	3°01.2	• • 30.0	98°09.0	36.2	62°23.5	42.5	182°55.2	• • 08.7	Elnath	278°00.3	28°37.7
16	211°57.7	18°01.7	31.1	113°09.7	36.2	77° 25.4	42.4	197°57.8	08.7	Alnilam	275°36.5	-1°11.0
17	227°00.2	33°02.2	32.3	128°10.4	36.1	92°27.3	42.2	213°00.3	08.6	Betelgeuse	270°50.8	7°24.8
						107° 29.2	N17°42.1	213 00.3 228°02.9		Canopus	263°52.1	-52°42.3
18	242°02.6		S08°33.4	143°11.1	N23°36.1				N03°08.6	Sirius	258°25.3	-16°45.0
19	257°05.1	63°03.2	34.5	158°11.8	36.0	122°31.1	41.9	243°05.5	08.5	Adhara	255°05.1	-29°00.3
20	272°07.6	78°03.7	35.7	173°12.5	35.9	137°33.1	41.8	258°08.0	08.5	Procyon	244°49.7	5°09.5
21	287°10.0	93°04.2	• • 36.8	188°13.2	• • 35.9	152°35.0	• • 41.6	273°10.6	• • 08.4	Pollux	243°16.0	27°57.7
22	302°12.5	108°04.7	37.9	203°13.9	35.8	167°36.9	41.5	288°13.2	08.4	Avior	234°14.8	-59°35.5
23	317°15.0	123°05.3	39.0	218°14.6	35.7	182°38.8	41.4	303°15.7	08.3	Suhail	222°45.8	-43°32.3
Mara	ass. 01:54	$\nu$ 0.5' d1.1'	m_/ E1	νη 7' Α C	.1′ m1.27	ν1 Ω' d Ω	.1′ m-1.79	1/2 6' d O	0.1' m0.52	Miaplacidus	221°38.9	-43 32.3 -69°49.5
ivier.p	vass. U1.34	$\nu$ 0.5 $a$ 1.1	111-4.31	νυ.ι α-υ	.1111.21	ν1.9 α-U	.11-1.19	ν ∠.υ α-υ	7.1 HIV.32	Alphard	221 38.9 217°46.7	-8° 46.4
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
0	332°17.4		S08°40.2	233°15.3	N23°35.7	197°40.8	N17°41.2	318° 18.3	N03° 08.2	Dubhe	193°40.0	61°36.5
1	347°19.9	153°06.3	41.3	248°16.0	35.6	212°42.7	41.1	333°20.9	08.2	Denebola	182°23.9	14°25.5
2	2°22.4	168°06.8	42.4	263°16.8	35.5	212 42.7 227°44.6	40.9	348°23.4	08.2	Gienah		-17°41.4
						242°46.5			08.1	Acrux	$172^{\circ}59.1$	-63°15.0
3	17°24.8	183°07.3	• • 43.6	278°17.5	• • 35.5		• • 40.8	3°26.0		Gacrux	171°50.6	-57° 15.9
4	32°27.3	198°07.8	44.7	293°18.2	35.4	257°48.4	40.6	18°28.6	08.0	Alioth	166°12.2	55°49.1
5	47°29.7	213°08.4	45.8	308°18.9	35.4	272°50.4	40.5	33°31.1	0.80	Spica	158°21.1	-11°18.0
6	62°32.2		S08°47.0	323°19.6	N23°35.3	287°52.3	N17°40.3	48°33.7	N03°07.9	Alkaid	152°51.2	49°11.0
7	77°34.7	243°09.4	48.1	338°20.3	35.2	302°54.2	40.2	$63^{\circ}36.3$	07.9	Hadar	148°34.4	-60°30.3
8	92°37.1	258°09.9	49.2	353°21.0	35.2	$317^{\circ}56.1$	40.0	78°38.8	07.8		147°56.2	-36° 30.2
9	107°39.6	273°10.4	• • 50.3	8°21.7	• • 35.1	332°58.0	• • 39.9	93°41.4	• • 07.8		145°46.8	19°02.8
10	122°42.1	288°11.0	51.5	23°22.4	35.0	348°00.0	39.8	108°44.0	07.7	Rigil Kent.		-60° 57.0
11	137°44.5	303°11.5	52.6	38°23.1	35.0	3°01.9	39.6	123°46.5	07.7	_	137°20.2	74°03.0
12	152°47.0		S08°53.7	53°23.8	N23°34.9	18°03.8	N17°39.5	138°49.1	N03°07.6	Kochab		
13	167°49.5	333°12.5	54.8	68°24.5	34.8	33°05.7	39.3	153°51.7	07.6	Zuben'ubi	136°54.6	-16°09.2
14	182°51.9	348°13.0	56.0	83°25.2	34.7	48°07.7	39.2	168°54.2	07.5	Alphecca	126°02.6	26°37.7
15	197°54.4	3°13.6	• • 57.1	98°25.9	• • 34.7	63°09.6	• • 39.0	183°56.8	07.5	Antares	112°14.1	-26°29.5
16	212°56.9	18°14.1	58.2	113°26.6	34.6	78° 11.5	38.9	198°59.4	07.4	Atria	107°06.9	-69°04.7
17	227°59.3	33°14.6	08°59.3	113 20.0 128°27.3	34.5	93°13.4	38.7	214°01.9	07.3	Sabik	102°01.1	-15°45.4
								214 01.9 229°04.5		Shaula	96°08.4	-37°07.5
18	243°01.8		S09°00.5	143°28.0	N23°34.5	108° 15.3	N17°38.6		N03°07.3	Rasalhague	95°57.2	12°32.6
19	258°04.2	63°15.7	01.6	158°28.8	34.4	123° 17.3	38.4	244°07.1	07.2	Eltanin	90°41.3	51°29.4
20	273°06.7	78°16.2	02.7	173°29.5	34.3	138° 19.2	38.3	259°09.6	07.2	Kaus Aust.	83°30.5	-34°22.3
21	288°09.2	93°16.7	• • 03.8	188°30.2	• • 34.3	153°21.1	• • 38.1	274° 12.2	•• 07.1	Vega	80°32.0	38° 48.7
22	303°11.6	108°17.3	04.9	203°30.9	34.2	168°23.0	38.0	289°14.8	07.1	Nunki	75°45.8	-26° 15.8
23	318°14.1	123°17.8	06.1	218°31.6	34.1	183°25.0	37.9	304°17.3	07.0	Altair	61°58.4	8° 56.5
Marn	οςς Ω1.Ε1	$\nu$ 0.5' $d$ 1.1'	' m 4 E2	υ0 7′ d C	.1′ m1.26	u1 0/ d 0	.1′ m-1.79		0.1' m0.52	Peacock	53°03.1	-56°38.9
ivier.p	ass. 01:51	$\nu$ 0.5 $a$ 1.1	111-4.32	νυ.ι α-υ	·. 1111.20	ν1.9 α-U	.11-1.19	ν ∠.υ α-υ	7.1 HIV.32	Deneb	49°24.5	45° 22.7
										Enif	33°37.1	10°00.0
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.7	-46°49.8
0	333°16.6		S09°07.2	233°32.3	N23°34.0	198° 26.9	N17°37.7	319° 19.9	N03°07.0	Fomalhaut	27 30.7 15°12.7	-46 49.8 -29°28.7
1	348°19.0	153°18.9	08.3	248°33.0	34.0	213° 28.8	37.6	334°22.5	06.9			I
2	3°21.5	168°19.4	09.4	263°33.7	33.9	228° 30.7	37.4	349°25.0	06.9	Scheat	13°43.5	28°13.8
3	18°24.0	183°19.9	• • 10.5	278°34.4	• • 33.8	243°32.7	37.3	4°27.6	. 06.8	Markab	13°28.2	15°21.1
4	33°26.4	198° 20.5	11.7	293°35.1	33.8	258° 34.6	37.3	19°30.2	06.8	Aug 23 Sun	SHA	Mer.pass
5	48°28.9	213°21.0	12.8	308°35.8	33.7	273° 36.5	37.1	34°32.7	06.7	_	166°35.4	14:48
	48 28.9 63°31.3							49°35.3		Mars		08:28
6			S09°13.9	323°36.5	N23°33.6	288°38.4	N17°36.8		N03°06.6	Jupiter		10:51
7	78°33.8	243°22.1	15.0	338°37.3	33.5	303°40.4	36.7	64°37.9	06.6			
8	93°36.3	258°22.6	16.1	353°38.0	33.5	318°42.3	36.5	79°40.5	06.5	Saturn	345°58.5	02:50
9	108°38.7	273°23.2	• • 17.3	8°38.7	• • 33.4	333°44.2	• • 36.4	94°43.0	• • 06.5	Aug 24 Mon	SHA	Mer.pass
10	123°41.2	288°23.7	18.4	23°39.4	33.3	348°46.1	36.3	109°45.6	06.4	_	165°48.4	14:47
11	138°43.7	303°24.3	19.5	38°40.1	33.2	3°48.0	36.1	124°48.2	06.4	Mars		08:27
12	153°46.1		S09°20.6	53°40.8	N23°33.2	18°50.0	N17°36.0	139°50.7	N03°06.3	Jupiter		10:48
13	168°48.6	333°25.4	21.7	68°41.5	33.1	33°51.9	35.8	154°53.3	06.3			
14	183°51.1	348°25.9	22.8	83°42.2	33.0	48°53.8	35.7	169°55.9	06.2	Saturn	346°00.9	02:46
15	198°53.5	3°26.4	• • 24.0	98°42.9	• • 32.9	63°55.7	• • 35.5	184°58.5	• • 06.2	Aug 25 Tue	SHA	Mer.pass
16	213°56.0	18°27.0	25.1	113°43.7	32.9	78° 57.7	35.4	200°01.0	06.1		165°01.8	14:46
17	228°58.5	33°27.5	26.2	128°44.4	32.8	93°59.6	35.2	215°03.6	06.0	Mars		08:25
18	244°00.9		S09°27.3	143°45.1	N23°32.7	109°01.5	N17°35.1	230°06.2	N03° 06.0	Jupiter		10:45
19	259°03.4	63°28.6	28.4	158°45.8	32.6	124°03.4	34.9	245°08.7	05.9			
	259 05.4 274°05.8	78°29.2	29.5	173° 46.5	32.5	139°05.4	34.9	245 06.7 260°11.3	05.9	Saturn	346°03.3	02:42
20							· · 34.6		05.8	Horizont	al parallax	
21	289°08.3	93°29.7	• • 30.6	188°47.2	• • 32.5	154°07.3		275°13.9			Venus:	0.2
22	304°10.8	108°30.3	31.7	203°47.9	32.4	169°09.2	34.5	290°16.5	05.8		Mars:	0.2
23	319°13.2	123°30.8	32.9	218°48.6	32.3	184°11.1	34.4	305°19.0	05.7		ividi5:	0.1
Mern	ass. 01:47	$\nu$ 0.5′ d1.1′	m-4.53	$\nu 0.7' d-0$	.1′ m1.26	$\nu 1.9' d_{-0}$	.1′ m-1.80	$\nu 2.6' d-0$	0.1' m0.51			
г				. J., u		. 1.5 4 0	2.00	4				

h	Su			Moon			
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°18.3	N11°30.2	59°37.2	10.0'	S27°55.7	-1.8'	54.2'
1 2	194°18.4 209°18.6	29.4 28.5	74°06.2 88°35.2	10.0' 10.0'	27°53.9 27°51.9	-2.0' -2.1'	54.2' 54.2'
3	224°18.7	• • 27.7	103°04.2	10.0'	27°49.8	-2.3'	54.2'
4	239°18.9	26.8	117°33.2	10.0'	27°47.5	-2.4'	54.2'
5	254°19.1 269°19.2	26.0 N11°25.2	132°02.2 146°31.2	10.0' 10.1'	27°45.1 \$27°42.6	-2.5' -2.7'	54.2' 54.2'
6 7	269 19.2 284°19.4	N11 25.2 24.3	146 31.2 161°00.3	10.1	27°40.0	-2.7' -2.8'	54.2'
8	299°19.6	23.5	175°29.3	10.1'	27°37.2	-2.9'	54.2'
9	314°19.7	• • 22.6	189°58.4	10.1'	27°34.2	-3.1'	54.2'
10 11	329°19.9 344°20.1	21.8 20.9	204°27.5 218°56.7	10.1' 10.2'	27°31.2 27°28.0	-3.2' -3.3'	54.2' 54.2'
12	359°20.2	N11°20.1	233°25.8	10.2'	S27°24.7	-3.5'	54.2'
13	14°20.4	19.2	247°55.0	10.2'	27°21.2	-3.6'	54.2'
14 15	29°20.6 44°20.7	18.4 •• 17.5	262°24.2 276°53.4	10.2' 10.2'	27°17.6 27°13.9	-3.7' -3.9'	54.2' 54.2'
16	59°20.9	16.7	270 33.4 291°22.7	10.2	27°10.0	-3.9 -4.0'	54.3
17	74°21.1	15.8	$305^{\circ}51.9$	10.3'	$27^{\circ}06.0$	-4.1'	54.3'
18	89°21.2	N11°15.0	320°21.2 334°50.6	10.3'	\$27°01.9	-4.3'	54.3'
19 20	104°21.4 119°21.6	14.1 13.3	334°50.6 349°19.9	10.4' 10.4'	26°57.7 26°53.3	-4.4' -4.5'	54.3' 54.3'
21	134°21.7	. 12.4	3°49.3	10.4	26°48.8	-4.6'	54.3'
22	149°21.9	11.6	18° 18.7	10.4'	26°44.1	-4.8'	54.3'
23	164°22.1	10.7	32°48.2	10.5'	26°39.4	-4.9'	54.3'
	SD = 15.8'	d = -0.8'		SI	0 = 14.8'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°22.2	N11°09.8	47° 17.6	10.5'	S26°34.5	-5.0'	54.3'
1 2	194°22.4 209°22.6	09.0 08.1	61°47.2 76°16.7	10.5' 10.6'	26°29.4 26°24.3	-5.2' -5.3'	54.3' 54.3'
3	209 22.0 224°22.7	07.3	90°46.3	10.6'	26°19.0	-5.3 -5.4'	54.4'
4	239°22.9	06.4	$105^{\circ}15.9$	10.7'	$26^{\circ}13.6$	-5.5'	54.4'
5	254°23.1	05.6	119°45.6	10.7'	26°08.0	-5.7'	54.4'
6 7	269°23.2 284°23.4	N11°04.7 03.9	134°15.2 148°45.0	10.7' 10.8'	\$26°02.4 25°56.6	-5.8' -5.9'	54.4' 54.4'
8	299°23.6	03.0	163° 14.7	10.8	25°50.7	-6.0'	54.4'
9	314°23.7	•• 02.2	177° 44.5	10.8'	25°44.6	-6.2'	54.4'
10 11	329°23.9 344°24.1	01.3 11°00.4	192°14.4 206°44.2	10.9' 10.9'	25°38.4 25°32.1	-6.3' -6.4'	54.4' 54.4'
12	359°24.2	N10°59.6	200° 44.2 221° 14.2	11.0'	\$25°25.7	-6.5	54.5
13	14°24.4	58.7	235°44.1	11.0'	25°19.2	-6.7'	54.5'
14	29°24.6 44°24.8	57.9 • • 57.0	250°14.1 264°44.2	11.0' 11.1'	25°12.5 25°05.8	-6.8' -6.9'	54.5' 54.5'
15 16	59°24.9	56.2	204 44.2 279°14.2	11.1	25 05.8 24°58.9	-6.9 -7.0'	54.5'
17	74°25.1	55.3	293°44.4	11.2'	24°51.8	-7.1'	54.5'
18	89°25.3	N10°54.4	308°14.5 322°44.7	11.2'	\$24°44.7 24°37.4	-7.3'	54.5'
19 20	104°25.4 119°25.6	53.6 52.7	322°44.7 337°15.0	11.3' 11.3'	24°37.4 24°30.0	-7.4' -7.5'	54.6' 54.6'
21	134°25.8	51.9	351°45.3	11.3'	24°22.5	-7.6'	54.6'
22	149°25.9	51.0	6°15.7	11.4'	24°14.9	-7.7'	54.6'
23	164°26.1	50.1	20°46.0	11.4'	24°07.2	-7.9'	54.6'
	SD = 15.8'	d = -0.9'		SI	0 = 14.8'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°26.3	N10°49.3	35° 16.5	11.5'	\$23°59.3	-8.0'	54.6'
1 2	194°26.5 209°26.6	48.4 47.6	49° 47.0 64° 17.5	11.5' 11.6'	23°51.4 23°43.3	-8.1' -8.2'	54.6' 54.7'
3	224°26.8	46.7	78°48.1	11.6'	23°35.1	-8.3	54.7'
4	239°27.0	45.8	93° 18.7	11.7'	23°26.8	-8.4'	54.7'
5 6	254°27.2 269°27.3	45.0 N10°44.1	107°49.4 122°20.1	11.7' 11.8'	23°18.4 523°09.8	-8.5' -8.6'	54.7' 54.7'
7	209 27.5 284°27.5	43.3	136°50.8	11.8'	23°01.2	-8.8'	54.7'
8	299°27.7	42.4	$151^{\circ}21.6$	11.9'	$22^{\circ}52.4$	-8.9'	54.7'
9	314°27.8 329°28.0	• • 41.5	165°52.5 180°23.4	11.9' 12.0'	22°43.6 22°34.6	-9.0' -9.1'	54.8' 54.8'
10 11	329°28.0 344°28.2	40.7 39.8	180°23.4 194°54.3	12.0'	22°34.6 22°25.5	-9.1' -9.2'	54.8'
12	359°28.4	N10°38.9	209°25.3	12.0'	S22°16.3	-9.3'	54.8'
13	14°28.5	38.1	223°56.4	12.1'	22°07.0	-9.4'	54.8'
14 15	29°28.7 44°28.9	37.2 · · 36.3	238°27.5 252°58.6	12.1' 12.2'	21°57.6 21°48.1	-9.5' -9.6'	54.8' 54.9'
16	59°29.1	35.5	267° 29.8	12.2'	21°38.5	-9.7	54.9'
17	74°29.2	34.6	282°01.1	12.3'	21°28.8	-9.8'	54.9'
18 19	89°29.4 104°29.6	N10°33.7 32.9	296°32.3 311°03.7	12.3' 12.4'	\$21°18.9 21°09.0	-9.9' -10.0'	54.9' 54.9'
20	104 29.0 119°29.8	32.9	325°35.1	12.4'	21 09.0 20°59.0	-10.0	54.9'
21	134°29.9	• • 31.1	340°06.5	12.5'	20°48.9	-10.2'	55.0'
22 23	149°30.1 164°30.3	30.3 29.4	354°38.0 9°09.5	12.5' 12.6'	20°38.6 20°28.3	-10.3' -10.4'	55.0' 55.0'
23	SD = 15.8'	d = -0.9'	9 09.5			-10.4	33.0
	שט = 15.8′	$a = -0.9^{\circ}$		51	0 = 14.9'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
N 72°	Naut.	Civil	Junisc	Juliset	Civil	Naut.
N 72°	////	01:15	03:20	20:41	22:38	////
<b>N</b> 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 $58^{\circ}$	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
N $10^{\circ}$	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> $10^{\circ}$	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
$35^{\circ}$	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	;

Lat.		Moonris	e		Moonset	:
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
N 58°	18:19	18:39	18:50	23:14		00:38
56°	17:56	18:21	18:36	23:37		00:56
54°	17:37	18:06	18:25	23:56	•• ••	01:11
52°	17:22	17:52	18:15		00:11	01:23
50°	17:08	17:41	18:06		00:25	01:35
45°	16:40	17:17	17:46		00:52	01:58
N 40°	16:18	16:57	17:30	00:16	01:14	02:16
35°	15:59	16:41	17:17	00:35	01:32	02:32
30°	15:43	16:27	17:05	00:52	01:47	02:45
20°	15:17	16:03	16:45	01:19	02:13	03:08
N 10° 0°	14:53	15:42	16:27	01:43	02:36	03:28
1	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° 35°	13:20	14:17	15:16	03:19	04:05 04:20	04:45
40°	13:04 12:45	14:03 13:46	15:04 14:50	03:35 03:54	04:20 04:37	04:58 05:13
40 45°	12:45	13:46	14:50	03:54	04:37 04:58	05:13
<b>S</b> 50°	11:54	13:01	14:13	04:46	05:24	05:52
52° 54°	11:40 11:23	12:48 12:34	14:03 13:52	05:00 05:17	05:36 05:51	06:03 06:14
54°	11:23	12:34 12:18	13:52 13:39	05:17	05:51	06:14 06:27
58°	10:39	12:18	13:39	06:01	06:08	06:27
<b>S</b> 60°	10:39	11:33	13:24	06:01	06:53	00:43
3 00	10.00	11.33	13.07	00.33	00.55	07.01

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	334°15.7	138°31.4	509°34.0	233°49.4	N23°32.2	199°13.1	N17°34.2	320°21.6	N03°05.7		JIIA	Dec
	349°18.2	150° 31.4 153° 32.0		233 49.4 248°50.1		214°15.0		335°24.2		Alpheratz	357°33.0	29°14.3
1			35.1		32.2		34.1		05.6	Ankaa	353°05.4	-42°09.4
2	4°20.6	168°32.5	36.2	263°50.8	32.1	229°16.9	33.9	350°26.7	05.6	Schedar	349°29.0	56°41.0
3	19°23.1	183°33.1	• • 37.3	278°51.5	• • 32.0	244°18.8	• • 33.8	5°29.3	• • 05.5	Diphda	348°45.7	-17°50.2
4	34°25.6	198°33.6	38.4	293°52.2	31.9	259°20.8	33.6	20°31.9	05.4	Achernar	335°18.8	-57°05.7
5	49°28.0	213°34.2	39.5	308°52.9	31.8	274°22.7	33.5	35°34.5	05.4	Hamal	327°49.5	23°35.4
6	64°30.5	228°34.7	S09°40.6	323°53.6	N23°31.8	289°24.6	N17°33.3	50°37.0	N03°05.3	Polaris	313°12.0	89°22.3
7	79°33.0	243°35.3	41.7	338°54.3	31.7	304°26.5	33.2	65°39.6	05.3	Acamar	315°10.6	-40°11.5
8	94°35.4	258°35.9	42.8	353°55.1	31.6	319°28.5	33.0	80°42.2	05.2	Menkar	314°04.6	4°11.8
9	109°37.9	273°36.4	• • 43.9	8°55.8	• • 31.5	334°30.4	• • 32.9	95°44.8	• • 05.2	Mirfak	308°26.2	49°57.2
10	124°40.3	288°37.0	45.0	23°56.5	31.4	349°32.3	32.7	110°47.3	05.1			
11	139°42.8	303°37.6	46.2	38° 57.2	31.3	4°34.2	32.6	125°49.9	05.1	Aldebaran	290°38.1	16°33.8
12	154°45.3	318°38.1	S09°47.3	53°57.9	N23°31.3	19°36.2	N17°32.5	140°52.5	N03°05.0	Rigel	281°02.6	-8°10.1
13	169°47.7	333°38.7	48.4	68° 58.6	31.2	34°38.1	32.3	155°55.0	04.9	Capella	280°20.0	46°01.3
14	184°50.2	348°39.2	49.5	83°59.4	31.1	49°40.0	32.2	170° 57.6	04.9	Bellatrix	278°21.5	6°22.5
15	199°52.7	3°39.8	50.6	99°00.1	31.0	64°41.9	• • 32.0	186°00.2	• • 04.8	Elnath	278°00.3	28°37.8
16	214°55.1	18°40.4	51.7	114°00.8	30.9	79°43.9	31.9	201°02.8	04.8	Alnilam	275°36.5	-1°10.9
						94°45.8		201 02.8 216°05.3		Betelgeuse	270°50.8	7°24.8
17	229°57.6	33°41.0	52.8	129°01.5	30.8		31.7		04.7	Canopus	263°52.1	-52°42.3
18	245°00.1	48°41.5	S09°53.9	144°02.2	N23°30.8	109°47.7	N17°31.6	231°07.9	N03°04.7	Sirius	258°25.2	-16°45.0
19	260°02.5	63°42.1	55.0	159°02.9	30.7	124°49.7	31.4	246° 10.5	04.6	Adhara	255°05.0	-29°00.3
20	275°05.0	78°42.7	56.1	174°03.7	30.6	139°51.6	31.3	261°13.1	04.5	Procyon	244°49.7	5°09.5
21	290°07.5	93°43.2	• • 57.2	189°04.4	• • 30.5	154°53.5	• • 31.1	276°15.6	• • 04.5	Pollux	243°15.9	27°57.7
22	305°09.9	108°43.8	58.3	204°05.1	30.4	169°55.4	31.0	291°18.2	04.4	Avior	234°14.8	-59°35.5
23	320°12.4	123°44.4	59.4	$219^{\circ}05.8$	30.3	184°57.4	30.8	$306^{\circ}20.8$	04.4	Suhail	234 14.8 222°45.7	-59 35.5 -43°32.3
N 4 -	01.42	0.6/ 15	1/ 4	0 7/ 10	11/ 1 00	1 0/ / 1	1/ - 1 00	0.6/ 1.0	0.1' m0.51			
ivler.p	ass. 01:43	$\nu$ 0.6' $d$ 1.	1′ m-4.55	$\nu$ 0.1' d-0	0.1′ m1.26	$\nu$ 1.9' d-0	.1′ m-1.80	$\nu$ 2.6′ $d$ -0	.1 m0.51	Miaplacidus	221°38.9	-69°49.5
			_							Alphard	217°46.7	-8°46.4
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
0	335°14.8	138°45.0	\$10°00.5	234°06.5	N23°30.3	199°59.3	N17°30.7	321°23.4	N03°04.3	Dubhe	193°40.0	61°36.5
		153° 45.5				215°01.2		336°25.9		Denebola	182°23.9	14°25.5
1	350°17.3		01.6	249°07.2	30.2		30.6		04.3	Gienah	175°42.5	-17°41.4
2	5°19.8	168°46.1	02.7	264°08.0	30.1	230°03.1	30.4	351°28.5	04.2	Acrux	172°59.2	-63°15.0
3	20°22.2	183°46.7	• • 03.8	279°08.7	• • 30.0	245°05.1	• • 30.3	6°31.1	• • 04.2	Gacrux	171°50.6	-57° 15.9
4	35°24.7	198°47.3	04.9	294°09.4	29.9	260°07.0	30.1	21°33.7	04.1	Alioth	166°12.2	55°49.1
5	50°27.2	213°47.9	06.0	309°10.1	29.8	275°08.9	30.0	36°36.2	04.0	Spica	158°21.1	-11° 18.0
6	65°29.6	228°48.4	S10°07.1	324°10.8	N23°29.7	290°10.8	$N17^{\circ}29.8$	51°38.8	N03°04.0	Alkaid	152°51.2	49°11.0
7	80°32.1	243°49.0	08.2	339°11.6	29.6	305°12.8	29.7	66°41.4	03.9	Hadar	148°34.4	-60°30.3
8	95°34.6	258°49.6	09.3	354°12.3	29.6	320°14.7	29.5	81°44.0	03.9		146 34.4 147°56.2	-36°30.2
9	110°37.0	273°50.2	• • 10.4	9°13.0	• • 29.5	335°16.6	• • 29.4	96°46.6	• • 03.8	l l		
10	125°39.5	288°50.8	11.5	24° 13.7	29.4	350°18.6	29.2	111°49.1	03.8	Arcturus	145°46.8	19°02.8
11	140°41.9	303°51.4	12.6	39° 14.4	29.3	5°20.5	29.1	126°51.7	03.7	Rigil Kent.		-60°57.0
12	155°44.4	318°51.9	\$10°13.7	54° 15.1	N23°29.2	20°22.4	N17°29.0	141°54.3	N03°03.6	Kochab	137°20.2	74°03.0
13	170°46.9	333°52.5		69° 15.9	29.1	35°24.3		156° 56.9		Zuben'ubi	136°54.6	-16°09.2
			14.7				28.8		03.6	Alphecca	$126^{\circ}02.6$	26°37.7
14	185°49.3	348°53.1	15.8	84°16.6	29.0	50°26.3	28.7	171°59.4	03.5	Antares	$112^{\circ}14.1$	-26°29.5
15	200°51.8	3°53.7	• • 16.9	99°17.3	• • 28.9	65°28.2	• • 28.5	187°02.0	• • 03.5	Atria	$107^{\circ}07.0$	-69°04.7
16	215°54.3	18°54.3	18.0	114° 18.0	28.8	80°30.1	28.4	202°04.6	03.4	Sabik	102°01.1	-15°45.4
17	230°56.7	33°54.9	19.1	129° 18.8	28.7	95°32.0	28.2	217°07.2	03.4	Shaula	96°08.4	-37°07.5
18	245°59.2	48°55.5	S10°20.2	144° 19.5	N23°28.6	110°34.0	N17°28.1	232°09.7	N03°03.3	Rasalhague	95°57.2	12°32.6
19	261°01.7	63°56.1	21.3	159°20.2	28.6	125°35.9	27.9	247°12.3	03.2	Eltanin	90°41.3	51°29.4
20	276°04.1	78°56.7	22.4	174°20.9	28.5	140°37.8	27.8	262°14.9	03.2	Kaus Aust.	83°30.5	-34°22.3
21	291°06.6	93°57.3	• • 23.5	189°21.6	• • 28.4	155°39.8	• • 27.6	277°17.5	• • 03.1	Vega	80°32.1	38°48.7
22	306°09.1	108°57.9	24.6	204°22.4	28.3	170°41.7	27.5	292°20.1	03.1			
23	321°11.5	123°58.5	25.7	219°23.1	28.2	185°43.6	27.3	307°22.6	03.0	Nunki	75°45.8	-26°15.8
										Altair	61°58.4	8°56.5
Mer.p	ass. 01:39	u0.6′ $d$ 1.	1'  m-4.56	$\nu$ 0.7′ d-0	$0.1' \; { m m} 1.26$	$\nu 1.9' d-0$	.1' m-1.80	$\nu$ 2.6′ $d$ -0	$0.1' \; \text{m}0.50$	Peacock	53°03.1	-56°38.9
						-				Deneb	49°24.5	45°22.7
F	CIIA	CHA	D	CUA	D	CIIA	D	CUA	D	Enif	33°37.1	10°00.0
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.7	-46°49.8
0	336°14.0	138°59.1	\$10°26.8	234°23.8	N23°28.1	200°45.5	N17°27.2	322°25.2	N03°03.0	Fomalhaut	$15^{\circ}12.7$	-29°28.7
1	351°16.4	153°59.7	27.8	249°24.5	28.0	215°47.5	27.1	337°27.8	02.9	Scheat	13°43.5	28°13.8
2	6°18.9	169°00.3	28.9	264°25.2	27.9	230°49.4	26.9	352°30.4	02.8	Markab	13°28.2	15°21.1
3	21°21.4	184°00.9	• • 30.0	279°26.0	• • 27.8	245°51.3	• • 26.8	7°33.0	• • 02.8		<u></u>	
4	36°23.8	199°01.5	31.1	294°26.7	27.7	260°53.3	26.6	22°35.5	02.7	Aug 26 Wed	SHA	Mer.pass
5	51°26.3	214°02.1	32.2	309°27.4	27.6	275°55.2	26.5	$37^{\circ}38.1$	02.7		164°15.7	14:45
6	66°28.8	229°02.7	S10°33.3	324°28.1	N23°27.5	290°57.1	N17°26.3	52°40.7	N03°02.6	Mars	259°33.6	08:24
7	81°31.2	244°03.3	34.4	339°28.9	27.4	305°59.0	26.2	67°43.3	02.6	Jupiter	224°57.4	10:42
8	96°33.7	259°03.9	35.5	354° 29.6	27.3	321°01.0	26.0	82°45.8	02.5	Saturn	346°05.9	02:38
9	111°36.2	274°04.5	36.5	9°30.3	27.2	336°02.9	25.9	97°48.4	02.4			
10	126°38.6	289°05.1	37.6	24°31.0	27.1	351°04.8	25.7	112°51.0	02.4	Aug 27 Thu	SHA	Mer.pass
11	141°41.1	304°05.7	38.7	39°31.8	27.1	6°06.8	25.6	112 51.0 127°53.6	02.4	Venus	163°30.1	14:44
										Mars	258°51.7	08:23
12	156°43.5	319°06.3	\$10°39.8	54°32.5	N23°26.9	21°08.7	N17°25.4	142°56.2	N03°02.3	Jupiter		10:39
13	171°46.0	334°06.9	40.9	69°33.2	26.9	36°10.6	25.3	157°58.7	02.2	Saturn	346°08.5	02:34
14	186°48.5	349°07.5	42.0	84°33.9	26.8	51°12.6	25.2	173°01.3	02.2			
15	201°50.9	4°08.1	• • 43.0	99° 34.7	• • 26.7	66°14.5	• • 25.0	188°03.9	• • 02.1	Aug 28 Fri	SHA	Mer.pass
16	$216^{\circ}53.4$	19°08.7	44.1	114°35.4	26.6	81°16.4	24.9	203°06.5	02.0		162°45.1	14:43
17	231°55.9	34°09.4	45.2	$129^{\circ}36.1$	26.5	96°18.3	24.7	$218^{\circ}09.1$	02.0	Mars		08:22
18	246°58.3	49°10.0	S10°46.3	144°36.8	N23°26.4	111°20.3	N17°24.6	233°11.7	N03°01.9	Jupiter		10:36
19	262°00.8	64°10.6	47.4	159° 37.6	26.3	126°22.2	24.4	248°14.2	01.9	Saturn		02:30
20	277°03.3	79°11.2	48.4	174°38.3	26.2	141°24.1	24.3	263°16.8	01.8	Saturn	J.V 11.2	02.50
21	292°05.7	94°11.8	• • 49.5	189°39.0	. 26.1	156°26.1	24.1	278° 19.4	01.7	Horizont	al parallax	
22	307°08.2	109°12.4	50.6	204°39.7	26.0	171°28.0	24.0	293°22.0	01.7		Venus:	0.3
23	322°10.7	124°13.1	51.7	219°40.5	25.9	186°29.9	23.8	308°24.6	01.6		Mars:	0.1
										L		
Mer.p	ass. 01:35	$\nu$ 0.6′ d1.	1′ m-4.57	$\nu$ 0.7 $^{\prime}$ d-0	).1′ m1.25	$\nu 1.9' \ d-0$	.1′ m-1.80	$\nu$ 2.6′ d-0	$0.1' \; \text{m}0.50$			

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°30.5	N10°28.5	23°41.1	12.6'	S20°17.9	-10.5'	55.0'
1	194°30.6	27.7	$38^{\circ}12.7$	12.7'	20°07.3	-10.6'	55.0'
2	209°30.8	26.8	52°44.3	12.7'	19°56.7	-10.7'	55.1'
3	224°31.0	• • 25.9	67°16.1	12.8'	19°46.0	-10.8'	55.1'
4	239°31.2 254°31.4	25.1	81°47.8 96°19.6	12.8'	19°35.2 19°24.3	-10.9'	55.1'
5 6	254 31.4 269°31.5	24.2 N10°23.3	90 19.0 110°51.5	12.9' 12.9'	19 24.3 \$19°13.3	-11.0' -11.1'	55.1' 55.1'
7	284°31.7	22.5	125°23.4	12.9'	19°02.2	-11.1	55.2'
8	299°31.9	21.6	139°55.3	13.0'	18°51.0	-11.3'	55.2'
9	314°32.1	20.7	154°27.3	13.0'	18°39.7	-11.4'	55.2'
10	329°32.2	19.9	$168^{\circ}59.3$	13.1'	18°28.4	-11.5'	55.2'
11	344°32.4	19.0	183°31.4	13.1'	18°16.9	-11.5'	55.2'
12	359°32.6	N10°18.1	198°03.5	13.2'	\$18°05.3	-11.6'	55.2'
13 14	14°32.8 29°33.0	17.2 16.4	212°35.7 227°07.9	13.2' 13.3'	17°53.7 17°42.0	-11.7' -11.8'	55.3' 55.3'
15	29 33.0 44°33.1	10.4	241°40.2	13.3'	17 42.0 17°30.2	-11.6 -11.9'	55.3'
16	59°33.3	14.6	256°12.4	13.3'	17°18.3	-12.0'	55.3'
17	74°33.5	13.8	270°44.8	13.4'	17°06.3	-12.1'	55.3'
18	89°33.7	N10°12.9	285°17.2	13.4'	<b>S</b> 16°54.3	-12.1'	55.4'
19	104°33.8	12.0	299°49.6	13.5'	16°42.1	-12.2'	55.4'
20	119°34.0	11.1	314°22.0	13.5'	16°29.9	-12.3'	55.4'
21	134°34.2 149°34.4	· · 10.3	328°54.5 343°27.1	13.5'	16°17.6	-12.4'	55.4'
22 23	149°34.4 164°34.6	09.4 08.5	343°27.1 357°59.6	13.6' 13.6'	16°05.2 15°52.7	-12.5' -12.5'	55.5' 55.5'
23						14.5	33.3
	SD = 15.8'	d = -0.9'		SI	O = 15.0'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0 1	179°34.7 194°34.9	N10°07.7 06.8	12°32.3 27°04.9	13.7' 13.7'	\$15°40.2 15°27.6	-12.6' -12.7'	55.5' 55.5'
2	209°35.1	05.9	41°37.6	13.7'	15 27.0 15°14.9	-12.7 -12.8'	55.5'
3	224°35.3	05.0	56°10.3	13.8'	15°02.1	-12.8'	55.6'
4	239°35.5	04.2	70°43.1	13.8'	14°49.3	-12.9'	55.6'
5	254°35.7	03.3	85°15.9	13.8'	14°36.4	-13.0'	55.6'
6	269°35.8	N10°02.4	99°48.7	13.9'	<b>S</b> 14°23.4	-13.1'	55.6'
7	284°36.0	01.5	114°21.6	13.9'	14°10.3	-13.1'	55.6'
8	299°36.2 314°36.4	10°00.6 09°59.8	128°54.5 143°27.4	13.9'	13°57.2 13°44.0	-13.2' -13.3'	55.7' 55.7'
9 10	314 36.4 329°36.6	09 59.8 58.9	143 27.4 158°00.4	14.0' 14.0'	13 44.0 13°30.7	-13.3'	55.7'
11	344°36.7	58.0	172°33.4	14.0'	13°17.4	-13.4'	55.7'
12	359°36.9	N09°57.1	187°06.4	14.1'	<b>S</b> 13°04.0	-13.5'	55.7'
13	14°37.1	56.3	$201^{\circ}39.5$	14.1'	$12^{\circ}50.5$	-13.5'	55.8'
14	29°37.3	55.4	216°12.6	14.1'	12°37.0	-13.6'	55.8'
15	44°37.5	• • 54.5	230°45.7	14.1'	12°23.4 12°09.7	-13.7'	55.8'
16 17	59°37.7 74°37.8	53.6 52.8	245°18.8 259°52.0	14.2' 14.2'	12 09.7 11°56.0	-13.7' -13.8'	55.8' 55.9'
18	89°38.0	N09°51.9	274°25.2	14.2'	S11°42.2	-13.8'	55.9'
19	104°38.2	51.0	288°58.4	14.3'	11°28.3	-13.9'	55.9'
20	119°38.4	50.1	303°31.7	14.3'	11°14.4	-14.0'	55.9'
21	134°38.6	• • 49.2	318°05.0	14.3'	11°00.5	-14.0'	55.9'
22	149°38.8	48.4	332°38.3	14.3'	10°46.4	-14.1'	56.0'
23	164°38.9	47.5	347°11.6	14.3'	10°32.4	-14.1'	56.0'
	SD = 15.8'	d = -0.9'		SI	O = 15.1'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°39.1	N09°46.6	1°44.9	14.4'	S10°18.2	-14.2'	56.0'
1	194°39.3	45.7	16°18.3	14.4'	10°04.0	-14.2'	56.0'
2	209°39.5	44.8	30°51.7	14.4'	09°49.8	-14.3'	56.0'
3 4	224°39.7 239°39.9	· · 43.9 43.1	45°25.1 59°58.5	14.4' 14.4'	09°35.5 09°21.2	-14.3' -14.4'	56.1' 56.1'
5	259 59.9 254°40.0	43.1	74°31.9	14.4	09°21.2	-14.4' -14.4'	56.1
6	269°40.2	N09°41.3	89°05.4	14.5'	S08°52.3	-14.5'	56.1
7	284°40.4	40.4	103°38.9	14.5'	08°37.8	-14.5'	56.2'
8	299°40.6	39.5	118°12.4	14.5'	08°23.3	-14.6'	56.2'
9	314°40.8	• • 38.7	132°45.9	14.5'	08°08.7	-14.6'	56.2'
10	329°41.0 344°41.2	37.8	147°19.4 161°52.9	14.5'	07°54.1 07°39.4	-14.7'	56.2'
11 12	344°41.2 359°41.3	36.9 N09°36.0	161°52.9 176°26.4	14.5' 14.5'	07°39.4 \$07°24.7	-14.7' -14.8'	56.2' 56.3'
13	14°41.5	35.1	170 20.4 191°00.0	14.6'	07°09.9	-14.8'	56.3
14	29°41.7	34.2	205°33.5	14.6'	06°55.1	-14.8'	56.3
15	44°41.9	• • 33.4	$220^{\circ}07.1$	14.6'	$06^{\circ}40.2$	-14.9'	56.3'
16	59°42.1	32.5	234°40.7	14.6'	06°25.4	-14.9'	56.4'
17	74°42.3	31.6	249°14.2	14.6'	06°10.4	-15.0'	56.4
18 19	89°42.5 104°42.7	N09°30.7 29.8	263°47.8 278°21.4	14.6' 14.6'	\$05°55.5 05°40.5	-15.0' -15.0'	56.4' 56.4'
20	104 42.7 119°42.8	29.8 28.9	278°21.4 292°55.0	14.6'	05°40.5 05°25.5	-15.0 -15.1'	56.4'
21	134°43.0	• • 28.0	307°28.6	14.6'	05°10.4	-15.1	56.5
22	149°43.2	27.2	322°02.2	14.6'	04°55.3	-15.1'	56.5'
23	164°43.4	26.3	336°35.8	14.6'	04°40.2	-15.2'	56.5'
	SD = 15.8'	d = -0.9'		SI	O = 15.3'		

Lat.	Twi	light	Sunrise	Sunset	Tw	ilight
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	////	01:49	03:36	20:23	22:06	////
<b>N</b> 70°	////	02:29	03:53	20:07	21:28	////
68°	////	02:56	04:07	19:53	21:03	23:29
66°	01:34	03:16	04:19	19:42	20:43	22:22
64°	02:10	03:32	04:28	19:33	20:28	21:48
62°	02:35	03:45	04:36	19:25	20:15	21:25
60°	02:54	03:56	04:43	19:19	20:05	21:06
N 58°	03:09	04:06	04:49	19:13	19:56	20:51
56°	03:22	04:14	04:54	19:07	19:48	20:39
54°	03:33	04:21	04:59	19:03	19:41	20:28
52°	03:43	04:27	05:04	18:58	19:34	20:19
50°	03:51	04:33	05:07	18:55	19:29	20:11
45°	04:08	04:45	05:16	18:46	19:17	19:54
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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
<b>S</b> 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
<b>S</b> 60°	05:35	06:23	07:06	16:58	17:41	18:29
		Moonrie			Maansa	

Lat.		Moonris	e		Moonse	t
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°	21:22	20:18	19:38		01:18	03:56
N 70°	20:41	20:00	19:31		01:57	04:12
68°	20:13	19:45	19:24		02:24	04:24
66°	19:51	19:33	19:19	00:42	02:44	04:34
64°	19:34	19:23	19:15	01:12	03:00	04:43
62°	19:19	19:15	19:11	01:34	03:14	04:50
60°	19:07	19:07	19:07	01:52	03:25	04:56
N 58°	18:56	19:01	19:04	02:06	03:35	05:02
56°	18:47	18:55	19:01	02:19	03:43	05:06
54°	18:39	18:50	18:59	02:30	03:50	05:11
52°	18:32	18:45	18:57	02:40	03:57	05:14
50°	18:25	18:41	18:54	02:48	04:03	05:18
45°	18:10	18:31	18:50	03:06	04:16	05:25
<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
<b>N</b> 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°	14:53	16:20	17:47	06:52	06:57	07:01
<b>S</b> 60°	14:41	16:13	17:43	07:04	07:05	07:05

		Sun		Moon			
Day	Eqn.of Time		Mer.	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	Vei	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	$337^{\circ}13.1$	139°13.7	S10°52.7	234°41.2	N23°25.8	201°31.9	$N17^{\circ}23.7$	323°27.1	N03°01.6	Alpheratz	357°33.0	29° 14.4
1	$352^{\circ}15.6$	154°14.3	53.8	249°41.9	25.7	$216^{\circ}33.8$	23.5	338°29.7	01.5	Ankaa	357° 35.0	-42°09.4
2	$7^{\circ}18.0$	$169^{\circ}14.9$	54.9	264°42.7	25.6	231°35.7	23.4	353°32.3	01.5	Schedar	349°29.0	56° 41.0
3	22°20.5	184°15.6	• • 56.0	279°43.4	• • 25.5	246° 37.6	• • 23.2	8°34.9	•• 01.4	Diphda	348°45.7	-17° 50.2
4	37°23.0	199°16.2	57.1	294°44.1	25.4	$261^{\circ}39.6$	23.1	23°37.5	01.3	Achernar	335°18.8	-17 30.2 -57°05.7
5	52°25.4	$214^{\circ}16.8$	58.1	309°44.8	25.3	$276^{\circ}41.5$	23.0	38°40.0	01.3	Hamal	327°49.5	23° 35.4
6	67°27.9	229°17.4	S10°59.2	324°45.6	N23°25.2	291°43.4	N17°22.8	53°42.6	N03°01.2	Polaris	313°10.7	89° 22.3
7	82°30.4	244°18.1	11°00.3	339°46.3	25.1	306°45.4	22.7	68°45.2	01.2			-40°11.5
8	97°32.8	259°18.7	01.4	354°47.0	24.9	321°47.3	22.5	83°47.8	01.1	Acamar	315°10.6	
9	112°35.3	274°19.3	• • 02.4	9°47.8	• • 24.8	336°49.2	• • 22.4	98°50.4	• • 01.0	Menkar	314°04.6	4°11.8
10	127°37.8	289°20.0	03.5	24°48.5	24.7	351°51.2	22.2	113°53.0	01.0	Mirfak	308°26.2	49°57.2
11	142°40.2	304°20.6	04.6	39°49.2	24.6	$6^{\circ}53.1$	22.1	128° 55.5	00.9	Aldebaran	290°38.1	16°33.8
12	157°42.7	319°21.2	S11°05.6	54°49.9	N23°24.5	21°55.0	N17°21.9	143°58.1	N03°00.9	Rigel	281°02.6	-8° 10.1
13	172°45.1	334°21.9	06.7	69°50.7	24.4	36°57.0	21.8	159°00.7	8.00	Capella	280°20.0	46°01.3
14	187°47.6	349°22.5	07.8	84°51.4	24.3	51°58.9	21.6	174°03.3	00.7	Bellatrix	278°21.5	6°22.5
15	202°50.1	4°23.1	• • 08.9	99°52.1	• • 24.2	67°00.8	• • 21.5	189°05.9	• • 00.7	Elnath	278°00.2	28° 37.8
16	217°52.5	19°23.8	09.9	114°52.9	24.1	82°02.7	21.3	204°08.5	00.6	Alnilam	275°36.4	-1° 10.9
17	232°55.0	34°24.4	11.0	129°53.6	24.0	97°04.7	21.2	219°11.0	00.6	Betelgeuse	270°50.7	7°24.8
18	247°57.5	49°25.0	S11°12.1	144°54.3	N23°23.9	112°06.6	N17°21.1	234° 13.6	N03°00.5	Canopus	263°52.1	-52° 42.2
19	262°59.9	64°25.7	13.1	159°55.1	23.8	127°08.5	20.9	249°16.2	00.4	Sirius	258°25.2	-16°45.0
20	278°02.4	79°26.3	14.2	174°55.8	23.7	142° 10.5	20.8	264° 18.8	00.4	Adhara	255°05.0	-29°00.3
21	293°04.9	94°27.0	. 15.3	189°56.5	23.6	157° 12.4	. 20.6	279°21.4	00.4	Procyon	244°49.6	5°09.5
22	308°07.3	109°27.6	16.3	204°57.3	23.5	172° 14.3	20.5	279 21.4 294°24.0	00.3	Pollux	243°15.9	27°57.7
22 23	300 07.3 323°09.8	109 27.0 124°28.2	17.4	204 57.3 219°58.0	23.5	172 14.3 187°16.3	20.3	309° 26.6	00.3	Avior	$234^{\circ}14.7$	-59°35.5
			_							Suhail	222°45.7	-43°32.3
/ler.p	ass. 01:31	$\nu$ 0.6′ d1.	1′ m-4.58	$\nu$ 0.7′ d-0	$0.1'  \mathrm{m}1.25$	$\nu 1.9' \ d-0$	.1′ m-1.80	$\nu$ 2.6′ d-0	.1'  m0.49	Miaplacidus	221°38.9	-69°49.5
										Alphard	217°46.7	-8°46.4
	C	a	-	<b></b>	-		-	<b></b>		Regulus	207°33.3	11°50.3
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.0	61°36.5
0	338°12.3	139°28.9	S11°18.5	234°58.7	N23°23.3	202° 18.2	N17°20.2	324°29.1	N03°00.1	Denebola	182°23.9	14°25.5
1	353°14.7	154°29.5	19.5	249°59.4	23.2	217° 20.1	20.0	339°31.7	00.1	Gienah	175°42.5	-17°41.4
2	8°17.2	169°30.2	20.6	265°00.2	23.0	232°22.1	19.9	354°34.3	00.0		172°59.2	-63° 15.0
3	23°19.6	184°30.8	• • 21.7	280°00.9	• • 22.9	247°24.0	• • 19.7	9°36.9	03°00.0		171°50.6	-57° 15.9
4	38°22.1	199°31.5	22.7	295°01.6	22.8	262°25.9	19.6	24°39.5	02°59.9	Alioth	166°12.2	55°49.1
5	53°24.6	$214^{\circ}32.1$	23.8	310°02.4	22.7	277°27.9	19.4	39°42.1	59.8		158°21.1	-11° 18.0
6	68°27.0	229°32.8	S11°24.8	325°03.1	N23°22.6	292° 29.8	$N17^{\circ}19.3$	54°44.6	N02°59.8	Alkaid	152°51.2	49°11.0
7	83°29.5	244°33.4	25.9	340°03.8	22.5	$307^{\circ}31.7$	19.2	69°47.2	59.7	Hadar	148°34.4	-60°30.3
8	98°32.0	259°34.1	27.0	355°04.6	22.4	322°33.7	19.0	84°49.8	59.7	Menkent	146 34.4 147°56.2	-36° 30.2
9	113°34.4	274°34.7	• • 28.0	10°05.3	• • 22.3	337°35.6	• • 18.9	99°52.4	• • 59.6		147 50.2 145°46.8	19° 02.8
10	128°36.9	289°35.4	29.1	25°06.0	22.2	352° 37.5	18.7	114°55.0	59.5	Arcturus	145 46.8 139°38.7	-60°57.0
11	143°39.4	304°36.1	30.1	40°06.8	22.1	7°39.5	18.6	129°57.6	59.5	Rigil Kent.		
12	158°41.8	319°36.7	S11°31.2	55°07.5	N23°21.9	22°41.4	N17°18.4	145°00.2	N02°59.4	Kochab	137°20.3	74°03.0
13	173°44.3	334°37.4	32.3	70°08.3	21.8	37°43.3	18.3	160°02.7	59.4	Zuben'ubi	136°54.6	-16°09.2
14	188°46.8	349°38.0	33.3	85°09.0	21.7	52°45.3	18.1	175°05.3	59.3	Alphecca	126°02.7	26°37.7
15	203°49.2	4°38.7	• • 34.4	100°09.7	21.6	67° 47.2	. 18.0	190°07.9	• • 59.2	Antares	112°14.1	-26°29.5
16	218°51.7	19°39.4	35.4	115° 10.5	21.5	82°49.1	17.8	205° 10.5	59.2	Atria	107°07.0	-69°04.8
17	233°54.1	34°40.0	36.5	130°11.2	21.4	97°51.1	17.7	220°13.1	59.1	Sabik	102°01.1	-15° 45.4
18	248°56.6	49°40.7	S11°37.6	145°11.9	N23°21.3	112°53.0	N17°17.5	235°15.7	N02°59.1	Shaula	96°08.4	-37°07.5
19	263°59.1	64°41.3	38.6	160°12.7	21.2	127°54.9	17.4	250°18.3	59.0	Rasalhague	95°57.2	12°32.6
20	279°01.5	79°42.0	39.7	175°13.4	21.0	142° 56.9	17.3	265°20.9	58.9	Eltanin	90°41.3	51°29.4
21	279 01.5 294°04.0	94°42.7	• • 40.7	175 13.4 190°14.1	20.9	142 50.9 157°58.8		280° 23.4	• • 58.9	Kaus Aust.	83°30.5	-34°22.3
	309°06.5	109°43.3				173°00.7	•• 17.1	295° 26.0		Vega	80°32.1	38° 48.7
22			41.8	205°14.9	20.8		17.0		58.8	Nunki	75°45.8	-26° 15.8
23	324°08.9	124°44.0	42.8	220°15.6	20.7	188°02.7	16.8	310°28.6	58.8	Altair	$61^{\circ}58.4$	8°56.5
Mer.p	ass. 01:27	$\nu$ 0.6′ d1.	1′ m-4.59	$\nu$ 0.7′ d-0	).1′ m1.25	$\nu 1.9' \ d-0$	.1′ m-1.80	$\nu$ 2.6′ d-0	.1′ m0.49	Peacock	53°03.1	-56° 39.0
										Deneb	49°24.5	45°22.7
			_		_		_		_	Enif	33°37.1	10°00.0
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.7	-46°49.8
0	339°11.4	139°44.7	S11°43.9	235°16.3	N23°20.6	203°04.6	N17°16.7	325°31.2	N02°58.7	Fomalhaut	$15^{\circ}12.6$	-29°28.7
1	354°13.9	154°45.4	44.9	250°17.1	20.5	218°06.5	16.5	340°33.8	58.6	Scheat	13°43.5	28° 13.8
2	9°16.3	169°46.0	46.0	265°17.8	20.4	233°08.5	16.4	355°36.4	58.6	Markab	13°28.2	15°21.1
3	24°18.8	184°46.7	• • 47.0	280°18.6	20.2	248° 10.4	· · 16.2	10°39.0	• • 58.5			
4	39°21.2	199°47.4	48.1	295°19.3	20.1	263°12.3	16.1	25°41.6	58.5	Aug 29 Sat	SHA	Mer.pass
5	54°23.7	214°48.0	49.1	310°20.0	20.0	278°14.3	15.9	40°44.1	58.4	Venus		14:42
6	69°26.2	229°48.7	S11°50.2	325°20.8	N23°19.9	293°16.2	N17°15.8	55°46.7	N02°58.3	Mars	257°28.1	08:21
7	84°28.6	244°49.4	51.2	340°21.5	19.8	$308^{\circ}18.1$	15.6	70°49.3	58.3	Jupiter	$224^{\circ}18.7$	10:33
8	99°31.1	259°50.1	52.3	355°22.3	19.7	$323^{\circ}20.1$	15.5	85°51.9	58.2	Saturn	346°14.0	02:26
9	$114^{\circ}33.6$	274°50.8	• • 53.3	10°23.0	• • 19.5	338°22.0	• • 15.3	100°54.5	• • 58.2	A 20 C	CIIA	N4 - ··
10	129°36.0	289°51.4	54.4	25°23.7	19.4	353°23.9	15.2	115°57.1	58.1	Aug 30 Sun	SHA	Mer.pass
11	144°38.5	304°52.1	55.4	40°24.5	19.3	8°25.9	15.1	130°59.7	58.0		161°16.6	14:41
12	159°41.0	319°52.8	S11°56.5	55°25.2	N23°19.2	23°27.8	N17°14.9	146°02.3	N02°58.0	Mars	256°46.5	08:20
13	174°43.4	334°53.5	57.5	70°26.0	19.1	38° 29.7	14.8	161°04.9	57.9	Jupiter	224°05.9	10:29
14	189°45.9	349°54.2	58.6	85°26.7	19.0	53°31.7	14.6	176°07.4	57.8	Saturn	346°16.9	02:22
15	204°48.4	4°54.9	11°59.6	100°27.4	• 18.8	68°33.6	. 14.5	191°10.0	57.8	Aug 31 Mon	SHA	Mor pace
16	219°50.8	19°55.5	11 59.0 12°00.7	115°28.2	18.7	83°35.6	14.3	206° 12.6	57.7			Mer.pass
	219 50.6 234°53.3	34°56.2	01.7	115 28.2 130°28.9	18.6	98°37.5	14.3	200 12.0 221°15.2	57.7 57.7		160°33.3	14:40
17 18	234 53.3 249°55.7	49°56.9	512°02.7	130 28.9 145°29.7		98 37.5 113°39.4		221 15.2 236°17.8		Mars	256°05.0	08:19
18					N23°18.5		N17°14.0	251° 20.4	N02°57.6	Jupiter		10:26
19	264°58.2	64°57.6	03.8	160°30.4	18.4	128°41.4	13.9		57.5 57.5	Saturn	346°19.8	02:18
	280°00.7	79°58.3	04.8	175°31.1	18.2	143° 43.3 158° 45.2	13.7	266°23.0	57.5	Horizont	al parallax	
20					• • 18.1	168°/6')	• • 13.6	281°25.6	• • 57.4	HUHZUIIL		
20 21	295°03.1	94°59.0	• • 05.9	190°31.9							-	0.3
20 21 22	295°03.1 310°05.6	$109^{\circ}59.7$	06.9	$205^{\circ}32.6$	18.0	$173^{\circ}47.2$	13.4	296°28.2	57.4		Venus:	0.3
20 21	295°03.1										-	0.3 0.1

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°43.6	N09°25.4	351°09.4	14.6'	S04°25.0	-15.2'	56.5
1 2	194°43.8 209°44.0	24.5 23.6	5°43.0 20°16.5	14.6' 14.6'	04°09.8 03°54.6	-15.2' -15.2'	56.5' 56.6'
3	224°44.2	• • 22.7	34°50.1	14.6'	03°39.3	-15.3'	56.6'
4	239°44.3	21.8	49°23.7	14.6'	03°24.1	-15.3'	56.6'
5	254°44.5 269°44.7	20.9 N09° 20.1	63°57.3 78°30.8	14.6' 14.6'	03°08.8 502°53.5	-15.3' -15.3'	56.6' 56.7'
6 7	269 44.7 284°44.9	N09 20.1 19.2	78 30.8 93°04.4	14.6 14.5'	502 53.5 02°38.1	-15.3' -15.4'	56.7'
8	299°45.1	18.3	107°38.0	14.5'	02°22.7	-15.4'	56.7'
9	314°45.3	• • 17.4	122°11.5	14.5'	02°07.3	-15.4'	56.7'
10 11	329°45.5 344°45.7	16.5 15.6	136°45.0 151°18.5	14.5' 14.5'	01°51.9 01°36.5	-15.4' -15.4'	56.7' 56.8'
12	359°45.9	N09° 14.7	165°52.0	14.5	501°21.1	-15.5'	56.8
13	14°46.0	13.8	$180^{\circ}25.5$	14.5'	$01^{\circ}05.6$	-15.5'	56.8'
14	29°46.2 44°46.4	12.9	194°59.0 209°32.5	14.5' 14.4'	00°50.1 00°34.6	-15.5'	56.8'
15 16	59°46.6	· · 12.0 11.2	209 32.5 224°05.9	14.4 14.4'	00°34.6	-15.5' -15.5'	56.8' 56.9'
17	74°46.8	10.3	238°39.3	14.4'	500°03.6	-15.5'	56.9'
18	89°47.0	N09°09.4	253°12.7	14.4'	N00°11.9	15.5'	56.9'
19 20	104°47.2 119°47.4	08.5 07.6	267°46.1 282°19.5	14.4' 14.3'	00°27.5 00°43.0	15.5' 15.6'	56.9' 57.0'
21	134°47.6	• • 06.7	296°52.8	14.3'	00°58.6	15.6'	57.0'
22	149°47.8	05.8	$311^{\circ}26.1$	14.3'	$01^{\circ}14.1$	15.6'	57.0'
23	164°48.0	04.9	325°59.4	14.3'	01°29.7	15.6'	57.0'
	SD = 15.8'	d = -0.9'		SI	O = 15.4'		
Sun	GHA	Dec	GHA	ν	Dec	d	НР
0	179°48.1	N09°04.0	340°32.6	14.2'	N01°45.3	15.6'	57.0'
1	194°48.3	03.1	355°05.9	14.2'	02°00.9	15.6'	57.1'
2 3	209°48.5 224°48.7	02.2 · · 01.3	9°39.1 24°12.2	14.2' 14.1'	02°16.4 02°32.0	15.6' 15.6'	57.1' 57.1'
3 4	224 48.7 239°48.9	09°00.4	24 12.2 38°45.4	14.1'	02 32.0 02°47.6	15.6'	57.1'
5	254°49.1	08°59.5	53°18.5	14.1'	03°03.2	15.6'	57.1'
6	269°49.3	N08°58.7	67°51.5	14.0'	N03°18.7	15.6'	57.2'
7 8	284°49.5 299°49.7	57.8 56.9	82°24.6 96°57.6	14.0' 14.0'	03°34.3 03°49.9	15.6' 15.6'	57.2' 57.2'
9	314°49.9	• • 56.0	111°30.5	13.9'	04°05.4	15.5'	57.2'
10	329°50.1	55.1	126°03.5	13.9'	04°21.0	15.5'	57.2'
11 12	344°50.3 359°50.5	54.2 N08°53.3	140°36.3 155°09.2	13.8' 13.8'	04°36.5 N04°52.0	15.5' 15.5'	57.3' 57.3'
13	14°50.6	52.4	169°42.0	13.8'	05°07.5	15.5'	57.3'
14	29°50.8	51.5	184°14.8	13.7'	05°23.0	15.5'	57.3'
15	44°51.0 59°51.2	• • 50.6	198°47.5	13.7'	05°38.5	15.5'	57.3'
16 17	59°51.2 74°51.4	49.7 48.8	213°20.1 227°52.8	13.6' 13.6'	05°54.0 06°09.5	15.5' 15.4'	57.4' 57.4'
18	89°51.6	N08°47.9	242°25.3	13.5'	N06°24.9	15.4'	57.4'
19	104°51.8	47.0	256°57.9	13.5'	06°40.3	15.4'	57.4
20 21	119°52.0 134°52.2	46.1 •• 45.2	271°30.3 286°02.8	13.4' 13.4'	06°55.7 07°11.1	15.4' 15.4'	57.4' 57.5'
22	149°52.4	44.3	300°35.1	13.3'	07°26.5	15.3'	57.5'
23	164°52.6	43.4	315°07.5	13.3'	07°41.8	15.3'	57.5'
	SD = 15.8'	d = -0.9'		SI	O = 15.6'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°52.8	N08°42.5	329°39.7	13.2'	$N07^{\circ}57.1$	15.3'	57.5'
1 2	194°53.0 209°53.2	41.6 40.7	344°11.9 358°44.1	13.2' 13.1'	08°12.4 08°27.6	15.2' 15.2'	57.5'
3	209 53.2 224°53.4	40.7 •• 39.8	358 44.1 13°16.2	13.1	08°27.6	15.2' 15.2'	57.6' 57.6'
4	239°53.6	38.9	27°48.2	13.0'	08°58.0	15.2'	57.6'
5	254°53.8	38.0	42°20.2	12.9'	09°13.2	15.1'	57.6'
6 7	269°54.0 284°54.2	N08° 37.1 36.2	56°52.1 71°23.9	12.8' 12.8'	N09°28.3 09°43.4	15.1' 15.0'	57.6' 57.7'
8	299°54.3	35.3	85°55.7	12.7'	09°58.4	15.0'	57.7'
9	314°54.5	• • 34.4	100°27.5	12.7'	10°13.4	15.0'	57.7'
10 11	329°54.7 344°54.9	33.5 32.6	114°59.1 129°30.7	12.6' 12.5'	10°28.4 10°43.3	14.9' 14.9'	57.7' 57.7'
12	359°55.1	32.0 N08°31.7	129 30.7 144°02.2	12.5	N10°58.2	14.9	57.7 57.8'
13	14°55.3	30.8	158°33.7	12.4'	11°13.1	14.8'	57.8'
14 15	29°55.5 44°55.7	29.9 •• 29.0	173°05.0 187°36.3	12.3' 12.2'	11°27.9 11°42.6	14.8' 14.7'	57.8' 57.8'
15 16	44 55.7 59 55.9	28.1	187°36.3 202°07.6	12.2'	11°42.6 11°57.3	14.7' 14.7'	57.8'
17	74°56.1	27.2	216°38.7	12.1'	12°12.0	14.6'	57.8'
18	89°56.3	N08° 26.3	231°09.8	12.0'	N12°26.6	14.6'	57.9'
19 20	104°56.5 119°56.7	25.4 24.5	245°40.8 260°11.8	11.9' 11.9'	12°41.1 12°55.6	14.5' 14.4'	57.9' 57.9'
21	134°56.9	• • 23.6	274°42.6	11.8'	13°10.0	14.4'	57.9'
22	149°57.1	22.7	289°13.4	11.7'	13°24.4	14.3'	57.9'
23	164°57.3	21.8	303°44.1	11.6'	13°38.8	14.3'	58.0'
	SD = 15.8'	d = -0.9'		SI	D = 15.7'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	////	02:16	03:51	20:06	21:39	////
N 70°	////	02:48	04:06	19:52	21:09	////
68°	01:09	03:11	04:19	19:40	20:47	22:42
66°	01:57	03:29	04:28	19:31	20:30	21:59
64°	02:26	03:43	04:37	19:23	20:16	21:31
62°	02:47	03:54	04:44	19:16	20:05	21:11
60°	03:04	04:04	04:50	19:10	19:55	20:54
N 58°	03:18	04:13	04:55	19:04	19:47	20:41
56°	03:30	04:20	05:00	19:00	19:39	20:29
54°	03:40	04:27	05:05	18:56	19:33	20:20
52°	03:49	04:33	05:08	18:52	19:27	20:11
50°	03:56	04:38	05:12	18:48	19:22	20:03
45°	04:12	04:49	05:19	18:41	19:11	19:48
N 40°	04:25	04:58	05:26	18:35	19:03	19:36
35°	04:34	05:05	05:31	18:30	18:55	19:26
30°	04:43	05:11	05:36	18:25	18:49	19:18
20°	04:55	05:22	05:44	18:17	18:39	19:06
N 10°	05:05	05:30	05:51	18:10	18:32	18:56
0°	05:12	05:36	05:57	18:04	18:25	18:49
S 10°	05:18	05:42	06:04	17:58	18:19	18:44
20°	05:22	05:48	06:10	17:51	18:13	18:39
30°	05:26	05:54	06:18	17:44	18:08	18:36
35°	05:27	05:56	06:22	17:40	18:05	18:35
40°	05:28	05:59	06:27	17:35	18:02	18:34
45°	05:29	06:03	06:32	17:30	17:59	18:33
<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	е		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° 45°	19:12	20:19 20:24	21:29	06:56	07:18	07:41 07:35
	19:12		21:38	06:58	07:16	
<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° <b>S</b> 60°	19:14	20:42	22:15 22:23	07:04	07:06	07:10
<b>5</b> 60°	19:14	20:47	22:23	07:05	07:05	07:04

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
5	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Upper Lower		
	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	Venus	Mars	Jupiter	Saturn	Stars
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	340° 10.5	140°01.1 \$12°09.0	235°34.1 N23°17.8	203°51.0 N17°13.2	326°33.3 N02°57.2	
1	355°13.0	155°01.8 10.0	250°34.8 17.6	218°53.0 13.0	341°35.9 57.2	Alpheratz 357°33.0 29°14.4
2	10° 15.5	170°02.5 11.1	265°35.6 17.5	233°54.9 12.9	356°38.5 57.1	Ankaa 353°05.4 -42°09.4
3	25° 17.9	185°03.2 · · 12.1	280°36.3 · · 17.4	248°56.8 · · 12.7	11°41.1 · · 57.0	Schedar 349°29.0 56°41.0
4	40°20.4	200°03.9 13.1	295°37.1 17.3	263°58.8 12.6	26°43.7 57.0	Diphda 348°45.6 -17°50.2
5	55°22.8	215°04.6 14.2	310°37.8 17.1	279°00.7 12.4	41°46.3 56.9	Achernar 335°18.8 -57°05.8
6	70°25.3	230°05.3 \$12°15.2	325°38.6 N23°17.0	294°02.7 N17°12.3	56°48.9 N02°56.9	Hamal 327°49.4 23°35.4
7	85°27.8	245°06.0 16.3	340°39.3 16.9	309°04.6 12.1	71°51.5 56.8	Polaris 313°09.1 89°22.3
8	100°30.2	260°06.7 17.3	355°40.0 16.8	324°06.5 12.0	86°54.1 56.7	Acamar 315°10.6 -40°11.5
9	115°32.7	275°07.4 · · 18.3	10°40.8 · · 16.7	339°08.5 · · 11.8	101°56.7 · · 56.7	Menkar 314°04.6 4°11.8
10	130°35.2	290°08.1 19.4	25°41.5 16.5	354° 10.4 11.7	116°59.3 56.6	Mirfak 308°26.1 49°57.2
11	145°37.6	305°08.8 20.4	40°42.3 16.4	9°12.3 11.5	132°01.9 56.5	Aldebaran 290°38.1 16°33.8
12	160°40.1	320°09.5 \$12°21.4	55°43.0 N23°16.3	24°14.3 N17°11.4	147°04.4 N02°56.5	Rigel 281°02.6 -8°10.1
13	175°42.6	335°10.2 22.5	70°43.8 16.2	39°16.2 11.2	162°07.0 56.4	Capella 280°20.0 46°01.3
14	190°45.0	350°10.9 23.5	85°44.5 16.0	54°18.2 11.1	177°09.6 56.4	Bellatrix 278°21.5 6°22.5
15	205°47.5	5°11.7 · · 24.5	100°45.3 ·· 15.9	69°20.1 · · 11.0	192°12.2 · · 56.3	Elnath 278°00.2 28°37.8
16	220°50.0	20°12.4 25.6	115°46.0 15.8	84°22.0 10.8	207°14.8 56.2	Alnilam 275°36.4 -1°10.9
17	235°52.4	35°13.1 26.6	130°46.8 15.6	99°24.0 10.7	222°17.4 56.2	Betelgeuse 270°50.7 7°24.8
18	250°54.9	50°13.8 \$12°27.6	145°47.5 N23°15.5	114°25.9 N17°10.5	237°20.0 N02°56.1	Canopus 263°52.0 -52°42.2
19	265°57.3	65°14.5 28.6	160°48.2 15.4	129°27.8 10.4	252°22.6 56.0	Sirius 258°25.2 -16°45.0 Adhara 255°05.0 -29°00.2
20	280°59.8	80°15.2 29.7	175°49.0 15.3	144°29.8 10.2	267°25.2 56.0	
21	296°02.3	95°16.0 · · 30.7	190°49.7 · · 15.1	159°31.7 · · 10.1	282°27.8 · · 55.9	Procyon 244°49.6 5°09.5 Pollux 243°15.9 27°57.7
22	311°04.7	110°16.7 31.7	205°50.5 15.0	174°33.7 09.9	297°30.4 55.9	1
23	326°07.2	125°17.4 32.8	220°51.2 14.9	189°35.6 09.8	312°33.0 55.8	Avior 234°14.7 -59°35.5 Suhail 222°45.7 -43°32.3
N/a===	pass. 01:19	ν0.7' d1.0' m-4.62	$\nu 0.7' \ d$ -0.1' m1.24	$\nu 1.9' \ d$ -0.1' m-1.80	ν2.6' d-0.1' m0.48	Suhail 222°45.7 -43°32.3 Miaplacidus 221°38.9 -69°49.4
ivier.p	bass. 01:19	νυ.ι α1.υ m-4.62	νυ. <i>ι α</i> -υ.1 m1.24	ν1.9 <i>a</i> -0.1 m-1.80	ν∠.υ <i>α</i> -υ.1 mυ.48	Alphard 217°46.7 -8°46.3
						1
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°33.3 11°50.3 Dubhe 193°40.0 61°36.5
0	341°09.7	140°18.1 \$12°33.8	235°52.0 N23°14.8	204°37.5 N17°09.6	327°35.6 N02°55.7	Denebola 182°23.9 14°25.5
1	$356^{\circ}12.1$	155°18.8 34.8	250°52.7 14.6	219°39.5 09.5	342°38.1 55.7	Gienah 175°42.5 -17°41.4
2	11°14.6	170°19.6 35.8	265°53.5 14.5	234°41.4 09.3	357°40.7 55.6	Acrux 172°59.2 -63°14.9
3	26° 17.1	185°20.3 · · 36.9	280°54.2 · · 14.4	249°43.3 · · 09.2	12°43.3 · · 55.5	Gacrux 172 59.2 -03 14.9
4	41°19.5	200°21.0 37.9	295°55.0 14.2	264°45.3 09.1	27°45.9 55.5	Alioth 166°12.2 55°49.1
5	56°22.0	215°21.8 38.9	310°55.7 14.1	279°47.2 08.9	42°48.5 55.4	Spica 158°21.1 -11°18.0
6	71°24.5	230°22.5 \$12°39.9	325°56.5 N23°14.0	294°49.2 N17°08.8	57°51.1 N02°55.4	Alkaid 152°51.2 49°11.0
7	86°26.9	245°23.2 41.0	340°57.2 13.8	309°51.1 08.6	72°53.7 55.3	Hadar 148°34.4 -60°30.3
8	101°29.4	260°23.9 42.0	355°58.0 13.7	324°53.0 08.5	87°56.3 55.2	Menkent 147°56.2 -36°30.2
9	116°31.8	275°24.7 · · 43.0	10°58.7 · · 13.6	339°55.0 · · 08.3	102°58.9 · · 55.2	Arcturus 145°46.8 19°02.8
10	131°34.3	290°25.4 44.0	25°59.5 13.5	354°56.9 08.2	118°01.5 55.1	Rigil Kent. 139°38.7 -60°56.9
11	146°36.8	305°26.1 45.0	41°00.2 13.3	9°58.9 08.0	133°04.1 55.0	Kochab 137°20.3 74°03.0
12	161°39.2	320°26.9 \$12°46.1	56°01.0 N23°13.2	25°00.8 N17°07.9	148°06.7 N02°55.0	Zuben'ubi 136°54.6 -16°09.2
13	176°41.7	335°27.6 47.1	71°01.7 13.1	40°02.7 07.7	163°09.3 54.9	Alphecca 126°02.7 26°37.7
14	191°44.2	350°28.4 48.1	86°02.5 12.9	55°04.7 07.6	178°11.9 54.8	Antares 112°14.2 -26°29.5
15	206°46.6	5°29.1 · · 49.1	101°03.2 · · 12.8	70°06.6 · · 07.4	193°14.5 · · 54.8	Atria 107°07.1 -69°04.7
16	221°49.1	$20^{\circ}29.8$ 50.1	116°04.0 12.7	85°08.6 07.3	208°17.1 54.7	Sabik 102°01.2 -15°45.4
17	236°51.6	35°30.6 51.1	131°04.7 12.5	$100^{\circ}10.5$ 07.1	223°19.7 54.7	Shaula 96°08.4 -37°07.5
18	251°54.0	50°31.3 \$12°52.2	146°05.5 N23°12.4	115°12.4 N17°07.0	238°22.3 N02°54.6	Rasalhague 95°57.2 12°32.6
19	266° 56.5	65°32.1 53.2	161°06.2 12.3	130°14.4 06.9	253°24.9 54.5	Eltanin 90°41.4 51°29.4
20	281°58.9	80°32.8 54.2	176°07.0 12.1	145°16.3 06.7	268°27.5 54.5	Kaus Aust. 83°30.5 -34°22.3
21	297°01.4	95°33.6 · · 55.2	191°07.7 · · 12.0	160°18.2 · · 06.6	283°30.0 · · 54.4	Vega 80°32.1 38°48.7
22	312°03.9	110°34.3 56.2	206°08.5 11.9	175°20.2 06.4	298°32.6 54.3	Nunki 75°45.9 -26°15.8
23	327°06.3	125°35.1 57.2	221°09.2 11.7	190°22.1 06.3	313°35.2 54.3	Altair 61°58.4 8°56.5
Mer n	pass. 01:15	ν0.7' d1.0' m-4.63	ν0.7' d-0.1' m1.24	$\nu$ 1.9' d-0.1' m-1.81	$\nu$ 2.6' d-0.1' m0.47	Peacock 53°03.1 -56°39.0
						Deneb 49°24.5 45°22.7
						Enif 33°37.1 10°00.0
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°30.7 -46°49.8
0	342°08.8	140°35.8 \$12°58.2	236°10.0 N23°11.6	205°24.1 N17°06.1	328°37.8 N02°54.2	Fomalhaut 15°12.6 -29°28.7
1	357°11.3	155°36.6 12°59.3	251°10.7 11.5	220°26.0 06.0	343°40.4 54.1	Scheat 13°43.5 28°13.8
2	12°13.7	170°37.3 13°00.3	266°11.5 11.3	235°28.0 05.8	358°43.0 54.1	Markab 13°28.2 15°21.1
3	27° 16.2	185°38.1 · · 01.3	281°12.2 · · 11.2	250°29.9 · · 05.7	13°45.6 · · 54.0	
4	42° 18.7	200°38.8 02.3	296°13.0 11.0	265°31.8 05.5	28°48.2 54.0	Sep 01 Tue SHA Mer.pass
5	57°21.1	215°39.6 03.3	311°13.7 10.9	280°33.8 05.4	43°50.8 53.9	Venus 159°50.6 14:39
6	72°23.6	230°40.4 \$13°04.3	326°14.5 N23°10.8	295°35.7 N17°05.2	58°53.4 N02°53.8	Mars 255°23.6 08:17
7	87°26.1	245°41.1 05.3	341°15.3 10.6	310°37.7 05.1	73°56.0 53.8	Jupiter 223°40.5 10:23
8	102°28.5	260°41.9 06.3	356°16.0 10.5	325°39.6 05.0	88°58.6 53.7	Saturn 346°22.8 02:13
9	117°31.0	275°42.6 · · 07.3	11°16.8 · · 10.4	340°41.5 · · 04.8	104°01.2 · · 53.6	Sep 02 Wed SHA Mer.pass
10	132°33.4	290°43.4 08.3	26°17.5 10.2	355° 43.5 04.7	119°03.8 53.6	Venus 159°08.5 14:38
11	147°35.9	305°44.2 09.3	41°18.3 10.1	10°45.4 04.5	134°06.4 53.5	Mars 254°42.3 08:16
12	162°38.4	320°44.9 \$13°10.3	56°19.0 N23°09.9	25°47.4 N17°04.4	149°09.0 N02°53.4	Jupiter 223°27.9 10:20
13	177° 40.8	335°45.7 11.4	71°19.8 09.8	40°49.3 04.2	164°11.6 53.4	Saturn 346°25.9 02:09
14	192°43.3	350°46.5 12.4	86°20.5 09.7	55°51.2 04.1	179°14.2 53.3	
15	207° 45.8	5°47.2 · · 13.4	101°21.3 · · 09.5	70°53.2 · · 03.9	194°16.8 · · 53.2	Sep 03 Thu SHA Mer.pass
16	222°48.2	20°48.0 14.4	116°22.1 09.4	85°55.1 03.8	209°19.4 53.2	Venus 158°27.0 14:37
17	237°50.7	35°48.8 15.4	131°22.8 09.3	100°57.1 03.6	224°22.0 53.1	Mars 254°01.2 08:15
18	252°53.2	50°49.5 \$13°16.4	146°23.6 N23°09.1	115°59.0 N17°03.5	239°24.6 N02°53.1	Jupiter 223°15.3 10:17
19	267°55.6	65°50.3 17.4	161°24.3 09.0	131°00.9 03.3	254°27.2 53.0	Saturn 346°29.0 02:05
20	282°58.1	80°51.1 18.4	176°25.1 08.8	146°02.9 03.2	269°29.8 52.9	Horizontal parallax
21	298°00.6	95°51.9 · · 19.4	191°25.8 · · 08.7	161°04.8 · · 03.1	284°32.4 · · 52.9	Venus: 0.3
22	313°03.0 328°05.5	110°52.6 20.4	206°26.6 08.5	176°06.8 02.9 191°08.7 02.8	299°35.0 52.8	Mars: 0.1
23	J∠0 U5.5	125°53.4 21.4	221°27.4 08.4		314°37.6 52.7	
Mer.p	ass. 01:11	$ u 0.8' \ d1.0' \ \text{m-4.64} $	$ u 0.8' \ d\text{-}0.1' \ \text{m}1.24$	$\nu$ 1.9′ <i>d</i> -0.1′ m-1.81	$ u 2.6' \ d  0.1' \ \text{m} 0.47$	

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

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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
N 58°	03:27	04:20	05:02	18:56	19:38	20:30
56°	03:37	04:27	05:06	18:52	19:31	20:20
54°	03:47	04:33	05:10	18:48	19:25	20:11
52°	03:55	04:38	05:13	18:45	19:20	20:03
50°	04:02	04:43	05:16	18:42	19:15	19:56
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°	04:56	05:22	05:45	18:14	18:37	19:03
<b>N</b> 10°	05:05	05:30	05:51	18:08	18:30	18:54
0°	05:11	05:36	05:56	18:03	18:24	18:48
<b>S</b> 10°	05:16	05:41	06:02	17:58	18:19	18:43
20°	05:20	05:46	06:08	17:52	18:14	18:40
30°	05:22	05:50	06:14	17:46	18:10	18:37
35°	05:23	05:53	06:18	17:42	18:07	18:37
40°	05:24	05:55	06:22	17:38	18:05	18:37
45°	05:23	05:57	06:27	17:33	18:03	18:37
<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	е		Moonset	t
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
N 58°	19:20	19:30	19:49	11:00	12:40	14:20
56°	19:30	19:45	20:09	10:51	12:25	14:00
54°	19:39	19:58	20:26	10:43	12:13	13:43
52°	19:48	20:09	20:41	10:35	12:02	13:29
50°	19:55	20:20	20:54	10:29	11:53	13:17
45°	20:11	20:41	21:21	10:14	11:32	12:51
<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.	Mer.Pass.		
,	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	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
- Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	343°07.9	140°54.2	\$13°22.4	236°28.1	N23°08.3	206°10.7	N17°02.6	329°40.2	N02°52.7			
1	358°10.4	155°55.0	23.4	251°28.9	08.1	221°12.6	02.5	344°42.8	52.6	Alpheratz	357°33.0	29° 14.4
2	13°12.9	170°55.8	24.4	266°29.6	08.0	236°14.5	02.3	359°45.4	52.5	Ankaa	353°05.4	-42°09.4
3	28°15.3	185°56.6	. 25.4	281°30.4	• • 07.8	251°16.5	02.2	14°48.0	• • 52.5	Schedar	349°29.0	56°41.0
4	43°17.8	200°57.3	26.4	296°31.1	07.7	266°18.4	02.2	29°50.6	52.4	Diphda	348°45.6	-17°50.2
5	58°20.3	200°57.3 215°58.1	27.3	311°31.9	07.6	281°20.4	01.9	44°53.2	52.4	Achernar	$335^{\circ}18.7$	-57°05.8
6	73°22.7	230°58.9	\$13°28.3	326°32.7	N23°07.4	296°22.3	N17°01.7	59°55.8	N02°52.3	Hamal	327°49.4	23°35.4
7	88°25.2	245°59.7	29.3	341°33.4	07.3	311°24.3	01.6	74°58.4	52.2	Polaris	313°07.3	89°22.3
8	00 25.2 103°27.7	245 59.7 261°00.5	30.3	356°34.2	07.3 07.1	311 24.3 326°26.2		90°01.0		Acamar	$315^{\circ}10.5$	-40°11.5
9	103 27.7 118°30.1	201 00.5 276°01.3	31.3	11°34.9		341°28.1	01.4		52.1	Menkar	314°04.6	4°11.8
					• • 07.0		•• 01.3	105°03.6	52.1	Mirfak	$308^{\circ}26.1$	49°57.2
10	133°32.6	291°02.1	32.3	26°35.7	06.8	356°30.1	01.1	120°06.2	52.0	Aldebaran	290°38.0	16°33.8
11	148°35.1	306°02.9	33.3	41°36.5	06.7	11°32.0	01.0	135°08.8	51.9	Rigel	281°02.6	-8°10.0
12	163°37.5	321°03.7	S13°34.3	56°37.2	N23°06.5	26°34.0	N17°00.9	150°11.4	N02°51.9	Capella	280°19.9	46°01.3
13	178°40.0	336°04.5	35.3	71°38.0	06.4	41°35.9	00.7	165°14.0	51.8	Bellatrix	278°21.5	6°22.5
14	193°42.4	351°05.3	36.3	86°38.7	06.3	56°37.9	00.6	180°16.6	51.8	Elnath	278°00.2	28° 37.8
15	208°44.9	6°06.1	• • 37.3	101°39.5	• • 06.1	71°39.8	• • 00.4	195°19.2	• • 51.7	Alnilam	275°36.4	-1°10.9
16	223°47.4	21°06.9	38.2	116°40.3	06.0	86°41.7	00.3	210°21.8	51.6	Betelgeuse	270°50.7	7°24.8
17	238°49.8	36° 07.7	39.2	131°41.0	05.8	101°43.7	00.1	225°24.4	51.6	Canopus	263°52.0	-52°42.2
18	253°52.3	51°08.5	S13°40.2	146°41.8	N23°05.7	116°45.6	N17°00.0	240°27.0	N02°51.5	Sirius	258°25.2	-16°45.0
19	268°54.8	66°09.3	41.2	161°42.6	05.5	131°47.6	16°59.8	255°29.6	51.4	Adhara	255°05.0	-29°00.2
20	283°57.2	81°10.1	42.2	176°43.3	05.4	146°49.5	59.7	270°32.2	51.4	Procyon	244°49.6	5°09.5
21	298°59.7	96° 10.9	• • 43.2	191°44.1	• • 05.2	161°51.5	• • 59.5	285°34.8	• • 51.3	Pollux	243°15.9	27°57.7
22	314°02.2	111°11.7	44.2	206°44.8	05.1	176°53.4	59.4	300°37.4	51.2	Avior	234°14.7	-59° 35.5
23	329°04.6	126° 12.5	45.1	221°45.6	04.9	191°55.4	59.2	315°40.0	51.2	Suhail	222°45.7	-43° 32.2
Mern	pass. 01:07	ν0 8' d1	0′ m-4.65	ν0 8' d-0	.1′ m1.23	ν1 9' d-0	.1′ m-1.81	ν2 6' d=0	.1′ m0.46	Miaplacidus	221°38.9	-69°49.4
		- J.J UI.	- 111 -1.03	2 J.O U-0		- I.J U-0	1.01	- Z.O U-U		Alphard	217°46.7	-8°46.3
										Regulus	207°33.3	11°50.3
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.0	61°36.5
0	344°07.1	141°13.3	S13°46.1	236°46.4	N23°04.8	206°57.3	$N16^{\circ}59.1$	330°42.6	N02°51.1	Denebola	182°23.9	14°25.5
1	359°09.5	$156^{\circ}14.1$	47.1	251°47.1	04.6	221°59.2	59.0	345°45.2	51.0	Gienah	175°42.5	-17°41.4
2	14°12.0	171°14.9	48.1	266°47.9	04.5	$237^{\circ}01.2$	58.8	0°47.8	51.0		175 42.5 172°59.2	-17 41.4 -63°14.9
3	29°14.5	$186^{\circ}15.8$	• • 49.1	281°48.7	• • 04.3	252°03.1	• • 58.7	15°50.4	• • 50.9		172 59.2 171°50.6	-03 14.9 -57°15.9
4	44°16.9	$201^{\circ}16.6$	50.1	296°49.4	04.2	$267^{\circ}05.1$	58.5	30°53.0	50.8	1	166°12.2	55°49.0
5	59°19.4	$216^{\circ}17.4$	51.0	311°50.2	04.0	282°07.0	58.4	45°55.6	50.8	Alioth	158°21.1	-11°18.0
6	74°21.9	231°18.2	S13°52.0	326°51.0	N23°03.9	297°09.0	$N16^{\circ}58.2$	60°58.2	N02°50.7	Spica	150 21.1 152°51.3	49°11.0
7	89°24.3	$246^{\circ}19.0$	53.0	341°51.7	03.7	$312^{\circ}10.9$	58.1	76°00.8	50.6	Alkaid	152 51.3 148°34.5	
8	104°26.8	261°19.9	54.0	356°52.5	03.6	327°12.9	57.9	91°03.4	50.6	Hadar		-60°30.3
9	119°29.3	276°20.7	• • 54.9	11°53.3	• • 03.4	342°14.8	• • 57.8	106°06.0	• • 50.5		147°56.2	-36°30.2
10	134°31.7	291°21.5	55.9	26°54.0	03.3	357°16.7	57.6	121°08.6	50.4	Arcturus	145°46.9	19°02.8
11	149°34.2	306° 22.3	56.9	41°54.8	03.1	12°18.7	57.5	136°11.2	50.4	Rigil Kent.	139°38.8	-60°56.9
12	164°36.7	321°23.1	\$13°57.9	56°55.5	N23°03.0	27°20.6	N16°57.3	151°13.8	N02°50.3	Kochab	137°20.4	74°02.9
13	179°39.1	336°24.0	58.8	71°56.3	02.8	42°22.6	57.2	166°16.4	50.2	Zuben'ubi	136°54.6	-16°09.2
14	194°41.6	351°24.8	13°59.8	86°57.1	02.7	57°24.5	57.1	181°19.0	50.2	Alphecca	126°02.7	26° 37.7
15	209°44.0	6°25.6	14°00.8	101°57.8	• • 02.5	72°26.5	56.9	196°21.6	50.1	Antares	112°14.2	-26° 29.5
16	224°46.5	21°26.5	01.8	116°58.6	02.3	87°28.4	56.8	211°24.2	50.1	Atria	107°07.1	-69°04.7
17	239°49.0	36°27.3	02.7	131°59.4	02.4	102°30.4	56.6	226°26.8	50.0	Sabik	102°01.2	-15°45.4
18	254°51.4	51°28.1	S14°03.7	147°00.2	N23°02.1	117°32.3	N16° 56.5	241°29.4	N02°49.9	Shaula	96°08.4	-37° 07.5
19	269°53.9	66°29.0	04 -	162°00.9	01.9	132°34.3		256°32.0	49.8	Rasalhague	95°57.2	12°32.6
	284°56.4	81°29.8	04.7	102 00.9 177°01.7		132 34.3 147°36.2	56.3	271°34.7		Eltanin	90°41.4	51°29.4
20	204 50.4 299°58.8	96°30.6	05.7	177 01.7 192°02.5	01.8	162°38.2	56.2	271 34.7 286°37.3	49.8	Kaus Aust.	83°30.5	-34°22.3
21	315°01.3		•• 06.6	207°03.2	•• 01.6	102 36.2 177°40.1	• • 56.0	301°39.9	• • 49.7	Vega	80°32.1	38°48.7
22		111°31.5	07.6		01.5		55.9		49.6	Nunki	75°45.9	-26° 15.8
23	330°03.8	126°32.3	08.6	222°04.0	01.3	192°42.0	55.7	316°42.5	49.6	Altair	61°58.4	8°56.5
Mer.p	pass. 01:03	$\nu$ 0.8′ d1.	0′ m-4.66	$\nu$ 0.8′ d-0	.1′ m1.23	$\nu$ 1.9′ d-0	$.1^\prime$ m-1.81	$\nu$ 2.6′ d-0	.1'  m0.46	Peacock	53°03.1	-56° 39.0
				-				-		Deneb	49°24.5	45°22.7
•	C	a	-	<b></b>	-	c	-	a	Б	Enif	33°37.1	10°00.0
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.7	-46°49.8
0	345°06.2	141°33.2	\$14°09.5	237°04.8	N23°01.1	207°44.0	N16°55.6	331°45.1	N02°49.5	Fomalhaut	15°12.6	-29°28.7
1	0°08.7	156°34.0	10.5	252°05.5	01.0	222°45.9	55.4	346°47.7	49.4	Scheat	13°43.5	28° 13.8
2	15°11.2	171°34.9	11.5	267°06.3	00.8	237°47.9	55.3	1°50.3	49.4	Markab	13°28.2	15°21.1
3	30°13.6	186°35.7	12.4	282°07.1 297°07.8	• • 00.7	252°49.8	• • 55.2	16°52.9	· · 49.3	Sep 04 Fri	SHA	Mer.pass
4	45°16.1	201°36.6	13.4		00.5	267°51.8	55.0	31°55.5	49.2		<b>эпа</b> 157°46.3	14:36
5	60°18.5	216°37.4	14.4	312°08.6	00.4	282°53.7	54.9 N16° 54.7	46°58.1	49.2		253°20.2	08:14
6	75°21.0	231°38.3	\$14° 15.3	327°09.4	N23°00.2	297°55.7	N16° 54.7	62°00.7	N02°49.1	I	253 20.2 223°02.7	
7	90°23.5	246°39.1	16.3	342°10.2	23°00.1	312°57.6	54.6	77°03.3	49.0			10:14
8	105°25.9	261°40.0	17.2	357°10.9	22°59.9	327°59.6	54.4	92°05.9	49.0	Saturn	346°32.2	02:01
9	120°28.4	276°40.8	• 18.2	12°11.7	• • 59.7	343°01.5	• • 54.3	107°08.5	• • 48.9	Sep 05 Sat	SHA	Mer.pass
10	135°30.9	291°41.7	19.2	27°12.5	59.6	358°03.5	54.1	122°11.1	48.8		157°06.2	14:34
11	150°33.3	306°42.5	20.1	42°13.2	59.4	13°05.4	54.0	137°13.7	48.8	I	252°39.3	08:12
12	165°35.8	321°43.4	\$14°21.1	57°14.0	N22°59.3	28°07.4	N16°53.8	152°16.3	N02°48.7		222°50.2	10:11
13	180°38.3	336°44.3	22.0	72°14.8	59.1	43°09.3	53.7	167°18.9	48.6	Saturn		01:57
14	195°40.7	351°45.1	23.0	87°15.6	58.9	58°11.3	53.5	182°21.5	48.6			
15	210°43.2	6°46.0	• • 24.0	102°16.3	• • 58.8	73°13.2	• • 53.4	197°24.2	• • 48.5	Sep 06 Sun	SHA	Mer.pass
16	225°45.7	21°46.8	24.9	117°17.1	58.6	88°15.2	53.3	212°26.8	48.4	I	156°26.9	14:33
17	240°48.1	36° 47.7	25.9	132°17.9	58.5	103°17.1	53.1	227°29.4	48.4	I	251°58.5	08:11
18	255°50.6	51°48.6	S14°26.8	147°18.6	N22°58.3	118°19.0	N16°53.0	242°32.0	N02°48.3	Jupiter	222°37.8	10:08
19	270°53.0	66°49.4	27.8	162°19.4	58.2	133°21.0	52.8	257°34.6	48.2	Saturn	346°38.8	01:53
20	285°55.5	81°50.3	28.7	177°20.2	58.0	148°22.9	52.7	272°37.2	48.2	11. *	al me	
21	300°58.0	96°51.2	• • 29.7	192°21.0	• • 57.8	163°24.9	• • 52.5	287°39.8	• • 48.1	Horizont	al parallax	0.3
22	316°00.4	111°52.1	30.6	207°21.7	57.7	178°26.8	52.4	302°42.4	48.0		Venus:	0.3
23	331°02.9	126°52.9	31.6	222°22.5	57.5	193°28.8	52.2	317°45.0	48.0		Mars:	0.1
Mern	pass. 00:59	νΩ 8/ d1	0′ m-4.68	ν0 8′ d.0	.2′ m1.23	ν1 Q' d_Ω	.1′ m-1.81	v26/ d.0	.1′ m0.45			
- ινισι.μ		- J.J. UI.		₽ J.U U-U		u-0	1.01	- 2.0 u-0				

h	Su	n	Moon					
Fri	GHA	Dec	GHA	ν	Dec	d	HP	
0	180°12.1	N07° 15.1	278°44.3	4.5'	N26°39.5	5.6'	59.0'	
1 2	195°12.3 210°12.5	14.2 13.3	293°07.8 307°31.3	4.5' 4.4'	26° 45.1 26° 50.5	5.4' 5.2'	59.0' 59.1'	
3	225°12.7	. 12.4	321°54.6	4.3'	26°55.8	5.0'	59.1	
4	240°12.9	11.4	$336^{\circ}18.0$	4.2'	27°00.8	4.9'	59.1'	
5	255°13.1 270°13.3	10.5 N07°09.6	350°41.2 5°04.4	4.2'	27°05.7 N27°10.4	4.7'	59.1'	
6 7	270°13.3 285°13.5	N07°09.6 08.7	5°04.4 19°27.5	4.1' 4.0'	N27° 10.4 27° 14.9	4.5' 4.3'	59.1' 59.1'	
8	300°13.7	07.7	33°50.5	4.0'	27° 19.2	4.1'	59.1'	
9	315°13.9	• • 06.8	48°13.5	3.9'	27°23.3	4.0'	59.1'	
10 11	330°14.1 345°14.3	05.9 05.0	62°36.4 76°59.2	3.8' 3.8'	27°27.3 27°31.1	3.8' 3.6'	59.1' 59.2'	
12	0°14.5	N07° 04.1	91°22.0	3.7'	N27°34.7	3.4	59.2'	
13	15°14.7	03.1	105°44.8	3.7'	27°38.1	3.2'	59.2'	
14 15	30°14.9 45°15.2	02.2 · · 01.3	120°07.4 134°30.1	3.6' 3.6'	27°41.3 27°44.3	3.0' 2.8'	59.2' 59.2'	
16	60°15.4	07°00.4	148°52.7	3.5'	27°47.1	2.6'	59.2'	
17	75°15.6	06°59.4	163°15.2	3.5'	27° 49.8	2.5'	59.2'	
18	90°15.8 105°16.0	N06° 58.5 57.6	177°37.7 192°00.1	3.4' 3.4'	N27°52.2 27°54.5	2.3' 2.1'	59.2' 59.2'	
19 20	105 16.0 120°16.2	57.0 56.7	206°22.5	3.4 3.4'	27°56.6	2.1 1.9'	59.2'	
21	135°16.4	• • 55.7	220°44.9	3.3'	27°58.4	1.7'	59.3'	
22	150°16.6	54.8	235°07.3	3.3'	28°00.1	1.5'	59.3'	
23	165°16.8	53.9	249°29.6	3.3'	28°01.6	1.3'	59.3'	
	SD = 15.9'	d = -0.9'		SI	D = 16.1'			
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	180°17.0	N06°53.0	263°51.8	3.2'	N28°02.9	1.1'	59.3'	
1 2	195°17.2 210°17.4	52.0 51.1	278°14.1 292°36.3	3.2' 3.2'	28°04.0 28°04.9	0.9' 0.7'	59.3' 59.3'	
3	225°17.7	• • 50.2	306°58.5	3.2'	28° 05.6	0.7	59.3'	
4	240°17.9	49.3	321°20.7	3.2'	28°06.2	0.3'	59.3'	
5	255°18.1 270°18.3	48.3 N06°47.4	335°42.9 350°05.0	3.2' 3.1'	28°06.5 N28°06.6	0.1' -0.1'	59.3' 59.3'	
6 7	270 16.3 285°18.5	46.5	4°27.2	3.1'	28° 06.5	-0.1 -0.3	59.3'	
8	300°18.7	45.5	18°49.3	3.1'	28°06.3	-0.5'	59.3'	
9	315°18.9	• • 44.6	33°11.4	3.1'	28°05.8	-0.7'	59.3'	
10 11	330°19.1 345°19.3	43.7 42.8	47°33.5 61°55.7	3.1' 3.1'	28°05.1 28°04.3	-0.9' -1.1'	59.4' 59.4'	
12	0°19.5	N06°41.8	76°17.8	3.1'	N28°03.2	-1.3'	59.4'	
13	15°19.7	40.9	90°39.9	3.1'	28°01.9	-1.5'	59.4	
14 15	30°20.0 45°20.2	40.0 •• 39.0	105°02.0 119°24.2	3.1' 3.2'	28°00.5 27°58.9	-1.6' -1.8'	59.4' 59.4'	
16	60°20.4	38.1	133°46.3	3.2'	27°57.0	-2.0'	59.4	
17	75°20.6	37.2	148°08.5	3.2'	27°55.0	-2.2'	59.4'	
18 19	90°20.8 105°21.0	N06°36.3 35.3	162°30.7 176°52.9	3.2' 3.2'	N27°52.7 27°50.3	-2.4' -2.6'	59.4' 59.4'	
20	120°21.2	34.4	191°15.1		27° 47.7		59.4'	
21	135°21.4	• • 33.5	205°37.4	3.3'	27°44.9	-3.0'	59.4'	
22 23	150°21.6 165°21.8	32.5 31.6	219°59.7 234°22.0	3.3' 3.3'	27°41.8 27°38.6	-3.2' -3.4'	59.4' 59.4'	
23	SD = 15.9'	d = -0.9'			D = 16.2'	3.1	33.1	
			-					
Sun 0	<b>GHA</b> 180°22.1	<b>Dec</b> N06° 30.7	<b>GHA</b> 248°44.3	ν 3.4'	<b>Dec</b> N27° 35.2	d -3.6'	<b>HP</b> 59.4'	
1	195°22.3	29.7	263°06.7	3.4	27°31.6	-3.8'	59.4'	
2	210°22.5	28.8	277°29.1	3.5'	27°27.9	-4.0'	59.4	
3 4	225°22.7 240°22.9	· · 27.9 27.0	291°51.6 306°14.1	3.5' 3.5'	27°23.9 27°19.7	-4.2' -4.4'	59.4' 59.4'	
5	255°23.1	26.0	320°36.6	3.6'	27° 15.3	-4.4 -4.5	59.4	
6	270°23.3	N06°25.1	334°59.2	3.6'	N27° 10.8	-4.7'	59.5'	
7 8	285°23.5 300°23.7	24.2 23.2	349°21.8 3°44.5	3.7' 3.7'	27°06.1 27°01.1	-4.9' -5.1'	59.5' 59.5'	
9	315°24.0	• • 22.3	18°07.3	3.8'	26°56.0	-5.1 -5.3'	59.5'	
10	330°24.2	21.4	$32^{\circ}30.1$	3.9'	$26^{\circ}50.7$	-5.5'	59.5'	
11 12	345°24.4 0°24.6	20.4 N06° 19.5	46°52.9 61°15.8	3.9' 4.0'	26°45.3 N26°39.6	-5.7' -5.8'	59.5' 59.5'	
13	15°24.8	18.6	75°38.8	4.0'	26°33.7	-5.8 -6.0'	59.5'	
14	30°25.0	17.6	90°01.9	4.1'	26°27.7	-6.2'	59.5'	
15	45°25.2	• • 16.7	104°25.0	4.2'	26°21.5	-6.4'	59.5'	
16 17	60°25.4 75°25.6	15.8 14.8	118°48.1 133°11.4	4.2' 4.3'	26° 15.1 26° 08.5	-6.6' -6.7'	59.5' 59.5'	
18	90°25.9	N06° 13.9	147°34.7	4.4'	$N26^{\circ}01.8$	-6.9'	59.5'	
19	105°26.1	13.0	161°58.1	4.5'	25°54.9	-7.1'	59.5'	
20 21	120°26.3 135°26.5	12.0 •• 11.1	176°21.5 190°45.1	4.5' 4.6'	25° 47.8 25° 40.5	-7.3' -7.4'	59.5' 59.5'	
22	150°26.7	10.2	205°08.7	4.7'	25°33.1	-7.4°	59.5'	
23	165°26.9	09.2	219°32.4	4.8'	25°25.5	-7.8'	59.5'	
	SD = 15.9'	d = -0.9'		SI	O = 16.2'			

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	////	02:58	04:21	19:33	20:54	////
N 70°	01:17	03:21	04:32	19:23	20:33	22:30
68°	02:03	03:38	04:41	19:14	20:16	21:48
66°	02:32	03:51	04:48	19:07	20:03	21:21
64°	02:53	04:03	04:54	19:01	19:52	21:00
62°	03:10	04:12	05:00	18:56	19:43	20:44
60°	03:24	04:20	05:04	18:52	19:35	20:31
N 58°	03:35	04:27	05:08	18:48	19:29	20:20
56°	03:45	04:33	05:12	18:44	19:23	20:11
54°	03:53	04:38	05:15	18:41	19:18	20:02
52°	04:01	04:43	05:18	18:38	19:13	19:55
50°	04:07	04:48	05:21	18:36	19:09	19:49
45°	04:21	04:57	05:27	18:30	19:00	19:36
<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	t
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		
,	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	Ve	nus	М	ars	Jup	iter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	346°05.4	141°53.8	S14°32.5	237°23.3	N22°57.3	208°30.7	N16°52.1	332°47.6	N02°47.9			
1	1°07.8	156°54.7	33.5	252°24.1	57.2	223°32.7	51.9	347°50.2	47.8	Alpheratz	357°33.0	29°14.4
2	16° 10.3	171°55.6	34.4	267°24.8	57.0	238°34.6	51.8	2°52.8	47.8	Ankaa	353°05.4	-42°09.4
3	31°12.8	186° 56.4	• • 35.4	282°25.6	56.9	253°36.6	• • 51.6	17°55.4	• • 47.7	Schedar	349°28.9	56°41.0
4	$46^{\circ}15.2$	201°57.3	36.3	297°26.4	56.7	268°38.5	51.5	32°58.0	47.6	Diphda	348°45.6	-17°50.2
5	61°17.7	216°58.2	37.3	312°27.2	56.5	283°40.5	51.4	48°00.6	47.6	Achernar	335°18.7	-57°05.8
6	76°20.2	231°59.1	S14°38.2	327°27.9	N22°56.4	298°42.4	N16°51.2	63°03.3	N02°47.5	Hamal Polaris	327°49.4 313°05.7	23°35.4 89°22.3
7	91°22.6	247°00.0	39.2	342°28.7	56.2	313°44.4	51.1	78°05.9	47.4	Acamar	315°10.5	-40° 11.5
8	106°25.1	262°00.9	40.1	357°29.5	56.1	328°46.3	50.9	93°08.5	47.4	Menkar	314°04.5	4°11.8
9	121°27.5	277°01.8	• • 41.1	12°30.3	• • 55.9	343°48.3	• • 50.8	108°11.1	• • 47.3	Mirfak	308°26.1	49°57.2
10	136°30.0	292°02.7	42.0	27°31.1	55.7	358°50.2	50.6	123°13.7	47.2	Aldebaran	290°38.0	16°33.8
11	151°32.5	307°03.5	43.0	42°31.8	55.6	13°52.2	50.5	138°16.3	47.1	Rigel	281°02.6	-8°10.0
12	166°34.9 181°37.4	322°04.4 337°05.3	\$14°43.9	57°32.6 72°33.4	N22°55.4	28°54.1 43°56.1	N16°50.3	153°18.9 168°21.5	N02°47.1	Capella	$280^{\circ}19.9$	46°01.3
13 14	101 37.4 196°39.9	352°06.2	44.8 45.8	87°34.2	55.2 55.1	43 50.1 58°58.0	50.2 50.0	183°24.1	47.0 46.9	Bellatrix	278°21.4	6°22.5
15	211°42.3	7°07.1	46.7	102°34.9	• • 54.9	74°00.0	• • 49.9	198°26.7	• • 46.9	Elnath	278°00.2	28° 37.8
16	226°44.8	22°08.0	47.7	117°35.7	54.7	89°01.9	49.7	213°29.3	46.8	Alnilam	275°36.4	-1°10.9
17	241°47.3	37°08.9	48.6	132°36.5	54.6	104°03.9	49.6	228°31.9	46.7	Betelgeuse	270°50.7	7°24.8
18	256°49.7	52°09.8	S14°49.5	147°37.3	N22°54.4	119°05.8	N16°49.5	243°34.6	N02°46.7	Canopus	263°52.0	-52°42.2 -16°44.9
19	271°52.2	$67^{\circ}10.7$	50.5	162°38.1	54.2	134°07.8	49.3	258°37.2	46.6	Sirius Adhara	258°25.2 255°05.0	-16 44.9 -29°00.2
20	286°54.6	$82^{\circ}11.6$	51.4	177°38.8	54.1	149°09.7	49.2	273°39.8	46.5	Procyon	244°49.6	5°09.5
21	301°57.1	$97^{\circ}12.5$	• • 52.3	192°39.6	• • 53.9	164°11.7	• • 49.0	288°42.4	• • 46.5	Pollux	243°15.9	27°57.7
22	316°59.6	112° 13.5	53.3	207°40.4	53.7	179°13.6	48.9	303°45.0	46.4	Avior	234°14.7	-59°35.4
23	332°02.0	127° 14.4	54.2	222°41.2	53.6	194°15.6	48.7	318°47.6	46.3	Suhail	222°45.7	-43°32.2
Mer.p	ass. 00:55	$\nu$ 0.9' d1	0′ m-4.69	$\nu$ 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°38.8	-69°49.4
										Alphard	217°46.7	-8°46.3
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
0	347°04.5	142° 15.3	S14°55.2	237°42.0	N22°53.4	209°17.5	N16°48.6	333°50.2	N02°46.3	Dubhe	193°40.0	61°36.4
1	2°07.0	157° 16.2	56.1	252°42.7	53.2	224°19.5	48.4	348°52.8	46.2	Denebola	182°23.9	14°25.5
2	17°09.4	172° 17.1	57.0	267°43.5	53.1	239°21.4	48.3	3°55.4	46.1	Gienah	175°42.5	-17°41.4
3	32°11.9	187° 18.0	• • 58.0	282°44.3	52.9	254°23.4	• • 48.1	18°58.0	• • 46.1		172°59.2	-63°14.9
4	$47^{\circ}14.4$	202°18.9	58.9	297°45.1	52.7	269°25.4	48.0	34°00.6	46.0		171°50.6 166°12.2	-57°15.9 55°49.0
5	$62^{\circ}16.8$	$217^{\circ}19.8$	$14^{\circ}59.8$	312°45.9	52.6	284°27.3	47.9	49°03.3	45.9	Spica	158°21.1	-11° 18.0
6	$77^{\circ}19.3$	232°20.8	<b>S</b> 15°00.7	327°46.6	N22°52.4	299°29.3	N16°47.7	64°05.9	N02°45.8	Alkaid	152°51.3	49° 11.0
7	92°21.8	247°21.7	01.7	342°47.4	52.2	314°31.2	47.6	79°08.5	45.8	Hadar	148°34.5	-60°30.3
8	107°24.2	262°22.6	02.6	357°48.2	52.1	329°33.2	47.4	94°11.1	45.7	Menkent	147°56.2	-36°30.2
9	122°26.7	277°23.5	03.5	12°49.0	• • 51.9	344°35.1	• • 47.3	109°13.7	• • 45.6	Arcturus	$145^{\circ}46.9$	19°02.7
10 11	137°29.1 152°31.6	292°24.5 307°25.4	04.5 05.4	27°49.8 42°50.6	51.7 51.5	359°37.1 14°39.0	47.1 47.0	124°16.3 139°18.9	45.6 45.5	Rigil Kent.	139°38.8	-60°56.9
12	167°34.1	322°26.3	S15°06.3	57°51.3	N22°51.4	29°41.0	N16°46.8	154°21.5	N02°45.4	Kochab	137°20.4	74°02.9
13	182°36.5	337° 27.2	07.2	72°52.1	51.2	44°42.9	46.7	169°24.1	45.4	Zuben'ubi	136°54.7	-16°09.2
14	197°39.0	352°28.2	08.2	87°52.9	51.0	59°44.9	46.5	184°26.8	45.3	Alphecca Antares	126°02.7 112°14.2	26°37.7 -26°29.5
15	$212^{\circ}41.5$	$7^{\circ}29.1$	•• 09.1	102°53.7	• • 50.9	74°46.8	• • 46.4	199°29.4	• • 45.2	Atria	107°07.1	-69°04.7
16	227°43.9	22°30.0	10.0	117°54.5	50.7	89°48.8	46.2	214°32.0	45.2	Sabik	102°01.2	-15°45.4
17	242°46.4	37°31.0	10.9	132°55.3	50.5	104°50.7	46.1	229°34.6 244°37.2	45.1	Shaula	96°08.4	-37°07.5
18 19	257°48.9 272°51.3	52°31.9 67°32.9	\$15°11.8 12.8	147°56.0 162°56.8	N22°50.3 50.2	119°52.7 134°54.6	N16°46.0 45.8	244 37.2 259°39.8	N02°45.0 45.0	Rasalhague	95°57.2	12°32.6
20	287°53.8	82°33.8	13.7	102 50.6 177°57.6	50.2	149°56.6	45.7	274°42.4	44.9	Eltanin	90°41.4	51°29.4
21	302°56.3	97°34.7	• • 14.6	192°58.4	• • 49.8	164°58.5	• • 45.5	289°45.0	• • 44.8	Kaus Aust.	83°30.5	-34°22.3
22	317°58.7	112° 35.7	15.5	207°59.2	49.7	180°00.5	45.4	304°47.6	44.7	Vega	80°32.1	38°48.8
23	333°01.2	127° 36.6	16.4	223°00.0	49.5	195°02.5	45.2	319°50.3	44.7	Nunki Altair	75°45.9 61°58.4	-26°15.8 8°56.5
Morp	ass. 00:52	υ0 0′ d0	9′ m-4.70	10 8' d 0	.2′ m1.22	"3 0' d 0	.1′ m-1.82	12 6' d 0	.1′ m0.45	Peacock	53°03.1	-56° 39.0
- IVIEL.P	ass. 00.32	νο.9 do.	9 111-4.70	νο.σ u-σ	.2 1111.22	ν2.0 u-0	.1 111-1.02	ν2.0 u-0	.1 1110.45	Deneb	49°24.5	45°22.8
										Enif	33°37.1	10°00.0
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	$27^{\circ}30.7$	-46°49.8
0	348°03.6	142°37.6	\$15° 17.4	238°00.8	N22°49.3	210°04.4	N16°45.1	334°52.9	N02°44.6	Fomalhaut	15°12.6	-29°28.7
1 2	3°06.1 18°08.6	157°38.5 172°39.5	18.3 19.2	253°01.6 268°02.3	49.1 49.0	225°06.4 240°08.3	44.9 44.8	349°55.5 4°58.1	44.5 44.5	Scheat	13°43.5	28° 13.8
3	33°11.0	172 39.5 187°40.4	20.1	283°03.1	• • 48.8	255°10.3	• • 44.6	20°00.7	• • 44.4	Markab	13°28.2	15°21.1
4	48° 13.5	202°41.4	21.0	298°03.9	48.6	270°12.2	44.5	35°03.3	44.3	Sep 07 Mon	SHA	Mer.pass
5	63°16.0	217°42.3	21.9	313°04.7	48.4	285°14.2	44.4	50°05.9	44.3		155°48.4	14:32
6	78° 18.4	232°43.3	S15°22.8	328°05.5	N22°48.3	300°16.1	N16°44.2	65°08.5	N02°44.2		$251^{\circ}17.9$	08:10
7	93°20.9	247°44.3	23.8	343°06.3	48.1	$315^{\circ}18.1$	44.1	80°11.2	44.1		222°25.4	10:05
8	108°23.4	262°45.2	24.7	358°07.1	47.9	330°20.0	43.9	95°13.8	44.0	Saturn	346°42.2	01:49
9	123°25.8	277°46.2	• • 25.6	13°07.9	• • 47.7	345°22.0	• • 43.8	110°16.4	• • 44.0	Sep 08 Tue	SHA	Mer.pass
10	138°28.3	292°47.1	26.5	28°08.6	47.6	0°23.9	43.6	125°19.0	43.9		155°10.8	14:30
11	153°30.7	307°48.1	27.4	43°09.4	47.4	15°25.9	43.5	140°21.6	43.8		250°37.5	08:09
12 13	168°33.2 183°35.7	322°49.1 337°50.0	\$15°28.3 29.2	58°10.2 73°11.0	N22°47.2 47.0	30°27.9 45°29.8	N16°43.3 43.2	155°24.2 170°26.8	N02°43.8 43.7	Jupiter	$222^{\circ}13.0$	10:02
14	103 35.7 198°38.1	352°51.0	30.1	88°11.8	46.9	45 29.6 60°31.8	43.2	170 20.8 185°29.4	43.7	Saturn	346°45.7	01:44
15	213° 40.6	7°52.0	31.0	103°12.6	• • 46.7	75°33.7	• • 42.9	200°32.1	• • 43.6	Sep 09 Wed	SHA	Mer.pass
16	228°43.1	22°53.0	31.9	118°13.4	46.5	90°35.7	42.8	215°34.7	43.5		154°33.9	14:29
17	243°45.5	$37^{\circ}53.9$	32.8	133°14.2	46.3	$105^{\circ}37.6$	42.6	230°37.3	43.4		249°57.1	08:08
18	258°48.0	52°54.9	S15°33.7	148°15.0	N22°46.1	120°39.6	N16°42.5	245°39.9	N02°43.4	Jupiter	$222^{\circ}00.8$	09:58
19	273°50.5	67°55.9	34.6	163°15.8	46.0	135°41.5	42.3	260°42.5	43.3	Saturn	346°49.2	01:40
20	288°52.9	82°56.9	35.5	178°16.5	45.8	150°43.5	42.2	275°45.1	43.2	Horizont	al parallax	
21 22	303°55.4 318°57.9	97°57.8 112°58.8	· · 36.4 37.3	193°17.3 208°18.1	•• 45.6 45.4	165°45.5 180°47.4	· · 42.0 41.9	290°47.7 305°50.4	· · 43.1 43.1	1101120111	Venus:	0.3
22	318 57.9 334°00.3	112 58.8 127°59.8	37.3 38.2	208 18.1 223°18.9	45.4 45.3	180 47.4 195°49.4	41.9 41.7	305 50.4 320°53.0	43.1		Mars:	0.1
Mer.p	ass. 00:48	$\nu$ 0.9′ d0.	9′ m-4.71	$\nu$ 0.8′ $d$ -0	.2′ m1.22	$\nu$ 2.0′ d-0	.1′ m-1.82	$\nu$ 2.6′ d-0	.1′ m0.44			

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°27.1	$N06^{\circ}08.3$	$233^{\circ}56.1$	4.9'	$N25^{\circ}17.7$	-8.0'	59.5'
1	195°27.3	07.4	248°20.0	4.9'	25°09.7 25°01.6	-8.1'	59.5'
2 3	210°27.6 225°27.8	06.4 •• 05.5	262°43.9 277°08.0	5.0' 5.1'	25°01.6 24°53.3	-8.3' -8.4'	59.5' 59.5'
4	240°28.0	04.6	291°32.1	5.2'	24°44.9	-8.6'	59.5'
5	255°28.2	03.6	305°56.3	5.3'	24°36.3	-8.8'	59.5'
6 7	270°28.4 285°28.6	N06°02.7 01.7	320°20.5 334°44.9	5.4' 5.5'	N24°27.5 24°18.6	-8.9' -9.1'	59.5' 59.5'
8	300°28.8	06°00.8	349°09.4	5.6'	24°10.0	-9.1 -9.2'	59.5'
9	315°29.0	05°59.9	3°33.9	5.6'	24°00.3	-9.4'	59.5'
10	330°29.3	58.9	17°58.6	5.7'	23°50.9	-9.6'	59.5'
11 12	345°29.5 0°29.7	58.0 N05°57.1	32°23.3 46°48.1	5.8' 5.9'	23°41.3 N23°31.6	-9.7' -9.9'	59.4' 59.4'
13	15°29.9	56.1	61°13.1	6.0'	23°21.7	-10.0'	59.4'
14	30°30.1	55.2	75°38.1	6.1'	23°11.7	-10.1'	59.4'
15 16	45°30.3 60°30.5	· · 54.2 53.3	90°03.2 104°28.4	6.2' 6.3'	23°01.6 22°51.3	-10.3' -10.4'	59.4' 59.4'
17	75°30.8	53.3 52.4	118°53.7	6.4	22°40.9	-10.4	59.4'
18	90°31.0	N05°51.4	133°19.2	6.5'	N22°30.3	-10.7'	59.4'
19	105°31.2	50.5	147°44.7	6.6'	22°19.6	-10.9'	59.4'
20 21	120°31.4 135°31.6	49.6 •• 48.6	162°10.3 176°36.0	6.7' 6.8'	22°08.7 21°57.7	-11.0' -11.1'	59.4' 59.4'
22	150°31.8	47.7	191°01.8	6.9'	21°46.6	-11.3	59.4
23	165°32.0	46.7	205°27.7	7.0'	21°35.4	-11.4'	59.4'
	SD = 15.9'	d = -0.9'		SI	D = 16.2'		
_	GHA	D.	CUA			,	115
Tue 0	GHA 180°32.3	<b>Dec</b> N05° 45.8	<b>GHA</b> 219°53.7	u 7.1'	Dec N21°24.0	<i>d</i> −11.5'	<b>HP</b> 59.4'
1	195°32.5	44.9	234°19.8	7.2'	21°12.5	-11.6'	59.4'
2	210°32.7	43.9	248°46.0	7.3'	21°00.8	-11.8'	59.4'
3 4	225°32.9 240°33.1	· · 43.0 42.0	263°12.4 277°38.8	7.4' 7.5'	20°49.0 20°37.2	-11.9' -12.0'	59.4' 59.4'
5	255°33.3	41.1	292°05.3	7.6'	20°25.1	-12.1'	59.4
6	270°33.5	N05°40.2	306°31.9	7.7'	N20°13.0	-12.3'	59.3'
7	285°33.8	39.2	320°58.6	7.8'	20°00.7	-12.4'	59.3'
8 9	300°34.0 315°34.2	38.3 · · 37.3	335°25.4 349°52.4	7.9' 8.0'	19°48.4 19°35.9	-12.5' -12.6'	59.3' 59.3'
10	330°34.4	36.4	4°19.4	8.1'	19°23.3	-12.7'	59.3'
11	345°34.6	35.5	18°46.5	8.2'	19°10.6	-12.8'	59.3'
12 13	0°34.8 15°35.0	N05° 34.5 33.6	33°13.7 47°41.0	8.3' 8.4'	N18°57.8 18°44.8	-12.9' -13.0'	59.3' 59.3'
14	30°35.3	32.6	62°08.5	8.5'	18°31.8	-13.1'	59.3'
15	45°35.5	•• 31.7	76°36.0	8.6'	18°18.7	-13.2'	59.3'
16	60°35.7 75°35.9	30.8 29.8	91°03.6 105°31.3	8.7' 8.8'	18°05.4 17°52.1	-13.3'	59.2' 59.2'
17 18	90°36.1	N05°28.9	105 51.5 119°59.1	8.9'	N17°38.7	-13.4' -13.5'	59.2'
19	105°36.3	27.9	134°27.0	9.0'	17°25.1	-13.6'	59.2'
20	120°36.6	27.0	148°55.0	9.1'	17°11.5		59.2'
21 22	135°36.8 150°37.0	· · 26.0 25.1	163°23.1 177°51.3	9.2' 9.3'	16°57.8 16°44.0	-13.8' -13.9'	59.2' 59.2'
23	165°37.2	24.2	192°19.6	9.4'	16°30.1	-14.0'	59.2'
	SD = 15.9'	d = -0.9'		SI	O = 16.2'		
Wed	GHA	Dec	GHA	ν	Dec	d	НР
0	180°37.4	N05°23.2	206°48.0	9.5'	N16°16.1	-14.1'	59.1'
1	195°37.6	22.3	$221^{\circ}16.5$	9.6'	16°02.1	-14.2'	59.1'
2 3	210°37.8 225°38.1	21.3	235°45.1 250°13.7	9.7' 9.8'	15°47.9 15°33.7	-14.2' -14.3'	59.1' 59.1'
3 4	240°38.3	19.4	264°42.5	9.6 9.9'	15° 19.4	-14.3 -14.4'	59.1'
5	255°38.5	18.5	279°11.4	9.9'	15°05.0	-14.5'	59.1'
6	270°38.7	N05° 17.6	293°40.3	10.0'	N14°50.5	-14.5'	59.1'
7 8	285°38.9 300°39.1	16.6 15.7	308°09.3 322°38.4	10.1' 10.2'	14°36.0 14°21.4	-14.6' -14.7'	59.0' 59.0'
9	315°39.4	. 14.7	337°07.7	10.2	14°21.4 14°06.7	-14.7	59.0'
10	330°39.6	13.8	351°36.9	10.4'	13°51.9	-14.8'	59.0'
11 12	345°39.8 0°40.0	12.8 N05° 11.9	6°06.3 20°35.8	10.5' 10.6'	13°37.1 N13°22.2	-14.9' -14.9'	59.0' 59.0'
13	15°40.2	10.9	20 35.8 35°05.3	10.6'	13°07.3	-14.9 -15.0'	59.0'
14	30°40.4	10.0	49°35.0	10.7'	12°52.3	-15.1'	58.9'
15	45°40.7	•• 09.1	64°04.7	10.8'	12°37.2	-15.1'	58.9'
16 17	60°40.9 75°41.1	08.1 07.2	78°34.5 93°04.4	10.9' 11.0'	12°22.1 12°06.9	-15.2' -15.2'	58.9' 58.9'
18	90°41.3	N05°06.2	107°34.3	11.0'	N11°51.6	-15.3'	58.9'
19	105°41.5	05.3	122°04.4	11.1'	11°36.4	-15.3'	58.8'
20 21	120°41.7 135°42.0	04.3 •• 03.4	136°34.5 151°04.7	11.2' 11.3'	11°21.0 11°05.6	-15.4' -15.4'	58.8' 58.8'
22	150°42.2	02.4	165°34.9	11.3'	10°50.2	-15.4 -15.5'	58.8'
23	165°42.4	01.5	180°05.3	11.4'	10°34.7	-15.5'	58.8'
	SD = 15.9'	d = -0.9'		SI	O = 16.1'		_

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	00:36	03:16	04:35	19:17	20:35	22:58
N 70°	01:48	03:36	04:44	19:09	20:16	22:00
68°	02:23	03:50	04:51	19:02	20:02	21:27
66°	02:47	04:02	04:58	18:56	19:50	21:04
64°	03:06	04:12	05:03	18:51	19:41	20:46
62°	03:21	04:21	05:07	18:46	19:33	20:32
60°	03:33	04:28	05:11	18:43	19:26	20:20
N 58°	03:43	04:34	05:15	18:39	19:20	20:10
56°	03:52	04:39	05:18	18:36	19:15	20:02
54°	04:00	04:44	05:21	18:34	19:10	19:54
52°	04:06	04:48	05:23	18:31	19:06	19:47
50°	04:12	04:52	05:25	18:29	19:02	19:42
45°	04:25	05:00	05:30	18:24	18:54	19:30
N 40°	04:34	05:07	05:34	18:20	18:48	19:20
35°	04:42	05:12	05:38	18:17	18:43	19:13
30°	04:48	05:17	05:41	18:14	18:38	19:07
20°	04:58	05:24	05:46	18:09	18:31	18:57
N 10° 0°	05:05	05:29	05:50	18:05	18:26	18:51
_	05:10	05:34	05:54	18:01	18:22	18:46
<b>S</b> 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° 40°	05:15 05:14	05:44 05:45	06:10 06:12	17:46 17:43	18:12 18:11	18:41 18:42
45°	05:14	05:45	06:12	17:43	18:10	18:44
<b>S</b> 50°						
52°	05:10 05:09	05:47 05:48	06:20 06:21	17:37 17:35	18:09 18:09	18:46 18:48
54°	05:09	05:48 05:48	06:21	17:35	18:09	18:48 18:49
56°	05:06	05:48	06:26	17:33	18:08	18:51
58°	05:03	05:49	06:28	17:31	18:08	18:53
<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
N 70°			00:48		19:54	19:07
68°	22:00		01:18	20:45	19:23	18:52
66°	23:12		01:39	19:33	18:59	18:40
64°	23:48		01:57	18:56	18:41	18:30
62°		00:14	02:11	18:29	18:25	18:21
60°		00:34	02:23	18:08	18:12	18:14
N 58°		00:50	02:33	17:51	18:01	18:07
56°		01:04	02:42	17:37	17:51	18:01
54°		01:16	02:49	17:24	17:43	17:56
52°		01:26	02:56	17:13	17:35	17:51
50°	00:09	01:36	03:03	17:03	17:28	17:47
45°	00:34	01:55	03:16	16:42	17:12	17:37
N 40°	00:54	02:11	03:27	16:25	17:00	17:29
35°	01:11	02:25	03:37	16:10	16:49	17:22
30°	01:26	02:36	03:45	15:58	16:40	17:16
20°	01:50	02:56	03:59	15:36	16:23	17:05
N 10°	02:11	03:13	04:11	15:17	16:09	16:56
0°	02:31	03:29	04:23	14:59	15:55	16:47
<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	
,	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	Ver	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Thu -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	349°02.8	143°00.8	S15°39.1	238°19.7	N22°45.1	210°51.3	N16°41.6	335°55.6	N02°42.9			
1	4°05.2	158°01.8	40.0	253°20.5	44.9	225°53.3	41.4	350°58.2	42.9	Alpheratz	357°33.0	29° 14.4
2	19°07.7	173°02.8	40.9	268°21.3	44.7	240°55.2	41.3	6°00.8	42.8	Ankaa	353°05.4	-42°09.4
3	34°10.2	188°03.8	41.8	283°22.1	• • 44.5	255°57.2	• • 41.2	21°03.4	42.7	Schedar	349°28.9	56°41.1
4	49°12.6	203°04.8	42.7	298°22.9	44.4	270°59.2	41.0	36°06.0	42.6	Diphda	348°45.6	-17°50.2
5	64°15.1	218°05.7	43.6	313°23.7	44.2	286°01.1	40.9	51°08.7	42.6	Achernar	335°18.7	-57°05.8
6	79°17.6	233°06.7	S15°44.5	328°24.5	N22°44.0	301°03.1	N16° 40.7	66°11.3	N02°42.5	Hamal	327°49.4	23°35.4
7	94°20.0	248°07.7	45.4	343°25.3	43.8	316°05.0	40.6	81°13.9	42.4	Polaris	313°04.4	89°22.3
8	109°22.5	263°08.7	46.3	358°26.1	43.6	331°07.0	40.4	96°16.5	42.4	Acamar	315°10.5	-40°11.5
9	124°25.0	278°09.7	• • 47.2	13°26.9	• • 43.4	346°08.9	• • 40.3	111°19.1	• • 42.3	Menkar	314°04.5	4°11.8
10	139°27.4	293°10.7	48.1	28°27.7	43.3	1°10.9	40.1	126°21.7	42.2	Mirfak	308°26.0	49°57.3
11	154°29.9	308°11.7	49.0	43°28.5	43.1	16°12.9	40.0	141°24.4	42.2	Aldebaran	290°38.0	16°33.8
12	169°32.4	323°12.8	S15°49.8	58°29.2	N22°42.9	31°14.8	N16°39.8	156°27.0	N02°42.1	Rigel	281°02.5	-8°10.0
13	184°34.8	338° 13.8	50.7	73°30.0	42.7	46°16.8	39.7	171°29.6	42.0	Capella	280°19.8	46°01.3
14	199°37.3	353° 14.8	51.6	88°30.8	42.5	61°18.7	39.6	186°32.2	41.9	Bellatrix	278°21.4	6°22.5
15	214°39.7	8° 15.8	• • 52.5	103°31.6	• • 42.3	76°20.7	• • 39.4	201°34.8	• • 41.9	Elnath	278°00.1	28°37.8
16	229°42.2	23°16.8	53.4	118°32.4	42.2	91°22.6	39.3	216°37.4	41.8	Alnilam	275°36.4	-1°10.9
17	244°44.7	38° 17.8	54.3	133°33.2	42.0	106°24.6	39.1	231°40.0	41.7	Betelgeuse	270°50.6	7°24.8
18	259°47.1	53° 18.8	S15°55.2	148°34.0	N22°41.8	121°26.6	N16°39.0	246°42.7	N02°41.7	Canopus	263°51.9	-52°42.2
19	274°49.6	68° 19.8	56.0	163°34.8	41.6	136°28.5	38.8	261°45.3	41.6	Sirius	258°25.1	-16°44.9
20	289°52.1	83°20.9	56.9	178°35.6	41.4	151°30.5	38.7	276°47.9	41.5	Adhara	255°04.9	-29°00.2
21	304°54.5	98°21.9	• • 57.8	193°36.4	• • 41.2	166°32.4	• • 38.5	291°50.5	• • 41.5	Procyon	244°49.6	5°09.5
22	319°57.0	113°22.9	58.7	208°37.2	41.1	181°34.4	38.4	306°53.1	41.4	Pollux	243°15.8	27°57.7
23	334°59.5	128°23.9	59.6	200°37.2 223°38.0	40.9	196°36.3	38.2	321°55.7	41.4	Avior	234°14.6	-59°35.4
										Suhail	222°45.7	-43°32.2
Mer.p	pass. 00:44	$\nu$ 1.0′ d0.9	9′ m-4.72	$\nu$ 0.8′ d-0	0.2′ m1.21	$\nu 2.0' \ d-0$	.1′ m-1.82	$\nu$ 2.6′ d-0	$0.1' \; { m m0.44}$	Miaplacidus	221°38.8	-69°49.4
										Alphard	217°46.7	-8°46.3
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.3	11°50.3
0	350°01.9	143°24.9	\$16°00.5	238°38.8	N22°40.7	211°38.3	N16° 38.1	336°58.4	N02°41.2	Dubhe	193°40.0	61°36.4
1	5°04.4	158°26.0	01.3	253°39.6	40.7	211 36.3 226°40.3	38.0	352°01.0	41.2	Denebola	182°23.9	14°25.5
2	20°06.8	173° 27.0	02.2	268°40.4		241°42.2		7°03.6		Gienah	175°42.5	$-17^{\circ}41.4$
3	35°09.3	173 27.0 188°28.0		283°41.2	40.3 •• 40.1	241 42.2 256°44.2	37.8	22°06.2	41.1		172°59.2	-63°14.9
			03.1	283 41.2 298°42.0		250 44.2 271°46.1	•• 37.7	22 06.2 37°08.8	• • 41.0	Gacrux	171°50.7	$-57^{\circ}15.8$
4	50°11.8	203°29.1	04.0		39.9		37.5		41.0	Alioth	$166^{\circ}12.2$	55°49.0
5	65°14.2	218°30.1	04.8	313°42.8 328°43.6	39.8	286°48.1	37.4	52°11.4	40.9	Spica	$158^{\circ}21.1$	$-11^{\circ}18.0$
6	80°16.7	233°31.1	S16°05.7	328 43.0 343°44.4	N22°39.6	301°50.1	N16° 37.2	67°14.1 82°16.7	N02°40.8	Alkaid	152°51.3	$49^{\circ}11.0$
7	95°19.2	248°32.2	06.6		39.4	316°52.0	37.1		40.7	Hadar	148°34.5	-60°30.3
8	110°21.6	263°33.2	07.5	358°45.2	39.2	331°54.0	36.9	97°19.3	40.7	Menkent	147°56.3	$-36^{\circ}30.1$
9	125°24.1	278°34.3	• • 08.3	13°46.0	• • 39.0	346°55.9	• • 36.8	112°21.9	• • 40.6	Arcturus	145°46.9	19°02.7
10	140°26.6	293°35.3	09.2	28°46.8	38.8	1°57.9	36.7	127°24.5	40.5	Rigil Kent.	139°38.8	-60°56.9
11	155°29.0	308°36.3	10.1	43°47.6	38.6	16°59.9	36.5	142°27.2	40.5	Kochab	137°20.5	74°02.9
12	170°31.5	323°37.4	S16°10.9	58°48.4	N22°38.4	32°01.8	N16°36.4	157°29.8	N02°40.4	Zuben'ubi	136°54.7	$-16^{\circ}09.2$
13	185°34.0	338°38.4	11.8	73°49.2	38.3	47°03.8	36.2	172°32.4	40.3	Alphecca	126°02.7	26°37.7
14	200°36.4	353°39.5	12.7	88°50.0	38.1	62°05.7	36.1	187°35.0	40.2	Antares	112°14.2	-26° 29.5
15	215°38.9	8°40.5	• • 13.5	103°50.8	• • 37.9	77°07.7	• • 35.9	202°37.6	• • 40.2	Atria	107°07.2	-69°04.8
16	230°41.3	23°41.6	14.4	118°51.6	37.7	92°09.7	35.8	217°40.2	40.1	Sabik	102°01.2	$-15^{\circ}45.4$
17	245°43.8	38°42.7	15.3	133°52.4	37.5	107°11.6	35.6	232°42.9	40.0	Shaula	96°08.4	-37°07.5
18	260°46.3	53°43.7	S16°16.1	148°53.2	N22°37.3	122°13.6	N16°35.5	247°45.5	N02°40.0	Rasalhague	95°57.2	12°32.6
19	275°48.7	68°44.8	17.0	163°54.0	37.1	137°15.5	35.3	262°48.1	39.9	Eltanin	90°41.4	51°29.4
20	290°51.2	83°45.8	17.9	178°54.8	36.9	152°17.5	35.2	277°50.7	39.8	Kaus Aust.	83°30.5	-34°22.4
21	305°53.7	98°46.9	• • 18.7	193°55.7	• • 36.7	167°19.5	• • 35.1	292°53.3	• • 39.7	Vega	80°32.1	38°48.8
22	320°56.1	113°48.0	19.6	208°56.5	36.5	182°21.4	34.9	307°56.0	39.7	Nunki	75°45.9	-26°15.8
23	335°58.6	128°49.0	20.5	223°57.3	36.3	197°23.4	34.8	322°58.6	39.6	Altair	61°58.4	8°56.5
Mern	pass. 00:40	$\nu$ 1 0' d0 0	9′ m-4.73	ν0 8′ d-0	0.2' m1.21	ν2 0' d-0	.1′ m-1.82	ν2 6' d-0	0.1' m0.43	Peacock	53°03.1	-56° 39.0
			3	- 5.5 4-0						Deneb	49°24.5	45°22.8
										Enif	33°37.1	10°00.0
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.7	-46°49.8
0	351°01.1	143°50.1	S16°21.3	238°58.1	N22°36.2	212°25.3	N16°34.6	338°01.2	N02°39.5	Fomalhaut	15°12.6	-29°28.7
1	6°03.5	158°51.2	22.2	253°58.9	36.0	227°27.3	34.5	353°03.8	39.5	Scheat	13°43.5	28° 13.8
2	21°06.0	173°52.2	23.0	268°59.7	35.8	242°29.3	34.3	8°06.4	39.4	Markab	13°28.2	15°21.1
3	36°08.4	188°53.3	• • 23.9	284°00.5	• • 35.6	257°31.2	• • 34.2	23°09.0	• • 39.3			
4	51°10.9	203°54.4	24.7	299°01.3	35.4	272°33.2	34.0	$38^{\circ}11.7$	39.2	Sep 10 Thu	SHA	Mer.pass
5	66°13.4	$218^{\circ}55.5$	25.6	$314^{\circ}02.1$	35.2	287°35.2	33.9	53°14.3	39.2		153°58.0	14:27
6	81°15.8	233° 56.5	S16°26.5	329°02.9	N22°35.0	302°37.1	N16°33.8	68°16.9	N02°39.1	Mars		08:06
7	96°18.3	248° 57.6	27.3	344°03.7	34.8	$317^{\circ}39.1$	33.6	83°19.5	39.0		221°48.5	09:55
8	111°20.8	263°58.7	28.2	359°04.5	34.6	332°41.0	33.5	$98^{\circ}22.1$	39.0	Saturn	346°52.8	01:36
9	126°23.2	278° 59.8	• • 29.0	14°05.3	• • 34.4	347°43.0	• • 33.3	113°24.8	• • 38.9	Sep 11 Fri	SHA	Mornass
10	141°25.7	294°00.9	29.9	$29^{\circ}06.1$	34.2	2°45.0	33.2	128°27.4	38.8		3HA 153°23.0	Mer.pass 14:25
11	156°28.2	$309^{\circ}02.0$	30.7	44°06.9	34.0	17°46.9	33.0	143°30.0	38.7		248°36.9	08:05
12	171°30.6	324°03.0	S16°31.6	59°07.7	N22°33.8	32°48.9	N16°32.9	158°32.6	N02°38.7		248 36.9 221°36.4	08:05
13	$186^{\circ}33.1$	$339^{\circ}04.1$	32.4	74°08.6	33.6	47°50.9	32.7	173°35.2	38.6			
14	201°35.6	$354^{\circ}05.2$	33.3	89°09.4	33.5	62°52.8	32.6	188°37.9	38.5	Saturn	346°56.4	01:32
15	216°38.0	9°06.3	• • 34.1	$104^{\circ}10.2$	• • 33.3	77°54.8	• • 32.5	203°40.5	• • 38.4	Sep 12 Sat	SHA	Mer.pass
16	231°40.5	24°07.4	35.0	$119^{\circ}11.0$	33.1	92°56.7	32.3	$218^{\circ}43.1$	38.4		152°49.0	14:24
17	246°42.9	39°08.5	35.8	134°11.8	32.9	107°58.7	32.2	233°45.7	38.3		247°57.0	08:04
18	261°45.4	54°09.6	S16°36.6	149°12.6	N22°32.7	123°00.7	N16°32.0	248°48.3	N02°38.2		221°24.3	09:49
19	276°47.9	$69^{\circ}10.7$	37.5	164°13.4	32.5	138°02.6	31.9	263°51.0	38.2		347°00.1	01:28
20	291°50.3	$84^{\circ}11.8$	38.3	179°14.2	32.3	153°04.6	31.7	278°53.6	38.1			
21	306°52.8	$99^{\circ}12.9$	• • 39.2	194°15.0	• • 32.1	$168^{\circ}06.6$	• • 31.6	293°56.2	• • 38.0	Horizont	al parallax	
22	321°55.3	$114^{\circ}14.0$	40.0	$209^{\circ}15.8$	31.9	183°08.5	31.4	308°58.8	37.9		Venus:	0.3
23	336°57.7	$129^{\circ}15.1$	40.8	$224^{\circ}16.7$	31.7	$198^{\circ}10.5$	31.3	324°01.4	37.9		Mars:	0.1
N 4 -			0/ 4 74				1/ == 1.00		11/ = 0.42			
ivier.p	pass. 00:36	$\nu 1.1' \ d0.9$	ə III-4./4	$\nu$ 0.0 $a$ -0	0.2′ m1.21	ν2.0 <b>α-</b> 0	.1′ m-1.82	$\nu$ 2.0 $a$ -C	0.1′ m0.43			

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°42.6	N05°00.5	$194^{\circ}35.7$	11.5'	$N10^{\circ}19.2$	-15.6'	58.8'
1	195°42.8	04°59.6	209°06.2	11.6'	10°03.6	-15.6'	58.7'
2	210°43.1 225°43.3	58.6 •• 57.7	223°36.8 238°07.4	11.6' 11.7'	09°48.0 09°32.3	-15.7' -15.7'	58.7' 58.7'
4	240°43.5	56.8	252°38.1	11.8'	09°16.6	-15.7'	58.7'
5	255°43.7	55.8	267°08.8	11.8'	$09^{\circ}00.9$	-15.8'	58.7'
6	270°43.9	N04°54.9	281°39.7	11.9'	N08°45.1	-15.8'	58.6'
7 8	285°44.1 300°44.4	53.9 53.0	296°10.6 310°41.5	12.0' 12.0'	08°29.3 08°13.5	-15.8' -15.9'	58.6' 58.6'
9	315°44.6	• • 52.0	325° 12.6	12.1'	00° 13.5	-15.9'	58.6'
10	330°44.8	51.1	$339^{\circ}43.7$	12.2'	07°41.8	-15.9'	58.6'
11	345°45.0 0°45.2	50.1	354°14.8	12.2'	07°25.9 N07°09.9	-15.9'	58.5'
12 13	15°45.2	N04° 49.2 48.2	8°46.0 23°17.3	12.3' 12.3'	06°54.0	-16.0' -16.0'	58.5' 58.5'
14	30°45.7	47.3	37°48.6	12.4'	06°38.0	-16.0'	58.5'
15	45°45.9	• • 46.3	52°20.0	12.4'	06°22.0	-16.0'	58.4'
16	60°46.1 75°46.3	45.4	66°51.5 81°23.0	12.5'	06°06.0 05°49.9	-16.0'	58.4'
17 18	75°46.3 90°46.5	44.4 N04°43.5	95°54.5	12.6' 12.6'	N05°33.9	-16.1' -16.1'	58.4' 58.4'
19	105°46.8	42.5	110°26.1	12.7'	05°17.8	-16.1	58.3'
20	120°47.0	41.6	124°57.8	12.7'	05°01.7	-16.1'	58.3'
21	135°47.2	• • 40.6	139°29.5	12.8'	04°45.6	-16.1'	58.3'
22 23	150°47.4 165°47.6	39.7 38.7	154°01.2 168°33.0	12.8' 12.8'	04°29.5 04°13.4	-16.1' -16.1'	58.3' 58.3'
23	SD = 15.9'					10.1	30.3
	JU = 15.9′	d = -0.9'		51	O = 16.0'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°47.9	N04°37.8	183°04.9	12.9'	N03°57.3	-16.1'	58.2'
1 2	195°48.1 210°48.3	36.8 35.9	197°36.8 212°08.7	12.9' 13.0'	03°41.2 03°25.1	-16.1' -16.1'	58.2' 58.2'
3	210 46.5 225°48.5	34.9	212 06.7 226°40.7	13.0'	03°08.9	-10.1 -16.1'	58.2'
4	240°48.7	34.0	241°12.7	13.1'	02°52.8	-16.1'	58.1'
5	255°48.9	33.0	255° 44.8	13.1'	02°36.7	-16.1'	58.1'
6 7	270°49.2 285°49.4	N04°32.1 31.1	270°16.9 284°49.0	13.1' 13.2'	N02°20.6 02°04.4	-16.1' -16.1'	58.1' 58.1'
8	300°49.6	30.2	204 49.0 299°21.2	13.2'	02 04.4 01°48.3	-16.1'	58.0'
9	315°49.8	• • 29.2	313°53.4	13.2'	01°32.2	-16.1'	58.0'
10	330°50.0	28.3	328° 25.6	13.3'	01°16.1	-16.1'	58.0'
11 12	345°50.3 0°50.5	27.3 N04°26.4	342°57.9 357°30.2	13.3' 13.3'	01°00.0 N00°43.9	-16.1' -16.1'	57.9' 57.9'
13	15°50.7	25.4	12°02.6	13.4	00°27.9	-16.1'	57.9'
14	30°50.9	24.5	26°34.9	13.4'	N00°11.8	-16.0'	57.9'
15	45°51.1	• • 23.5	41°07.3	13.4'	500°04.2	16.0'	57.8'
16 17	60°51.4 75°51.6	22.6 21.6	55°39.8 70°12.2	13.5' 13.5'	00°20.3 00°36.3	16.0' 16.0'	57.8' 57.8'
18	90°51.8	N04°20.7	84° 44.7	13.5'	500°52.3	16.0'	57.8'
19	105°52.0	19.7	99° 17.2	13.5'	$01^{\circ}08.3$	16.0'	57.7'
20	120°52.2	18.7	113°49.8		01°24.2		57.7'
21 22	135°52.5 150°52.7	· · 17.8 16.8	128°22.3 142°54.9	13.6' 13.6'	01°40.1 01°56.1	15.9' 15.9'	57.7' 57.7'
23	165°52.9	15.9	157° 27.5	13.6'	01° 30.1	15.9'	57.6'
	SD = 15.9'	d = -1.0'		SI	0 = 15.9'		
	<u> </u>	<u>u = 1.0</u>					
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	180°53.1 195°53.3	N04°14.9 14.0	172°00.1 186°32.7	13.6' 13.6'	\$02°27.8 02°43.6	15.8' 15.8'	57.6' 57.6'
2	210°53.6	13.0	201°05.4	13.7'	02°59.4	15.8'	57.5'
3	225°53.8	• • 12.1	215°38.0	13.7'	03°15.2	15.7'	57.5'
4	240°54.0	11.1	230° 10.7	13.7'	03°30.9	15.7'	57.5
5 6	255°54.2 270°54.4	10.2 N04°09.2	244°43.4 259°16.1	13.7' 13.7'	03°46.7 \$04°02.3	15.7' 15.6'	57.5' 57.4'
7	270 54.4 285°54.7	08.3	273° 48.8	13.7'	04°18.0	15.6'	57.4'
8	300°54.9	07.3	288°21.6	13.7'	04°33.6	15.6'	57.4'
9	315°55.1	•• 06.4	302°54.3	13.7'	04°49.2	15.5'	57.3'
10 11	330°55.3 345°55.5	05.4 04.4	317°27.0 331°59.8	13.8' 13.8'	05°04.7 05°20.2	15.5' 15.5'	57.3' 57.3'
12	0°55.8	N04°03.5	346°32.5	13.8'	505°35.6	15.4	57.3
13	15°56.0	02.5	1°05.3	13.8'	05°51.0	15.4'	57.2'
14	30°56.2	01.6	15°38.1	13.8'	06°06.4	15.3'	57.2'
15 16	45°56.4 60°56.6	04°00.6 03°59.7	30° 10.8 44° 43.6	13.8' 13.8'	06°21.7 06°37.0	15.3' 15.2'	57.2' 57.1'
17	75°56.9	58.7	59° 16.4	13.8'	06°52.3	15.2'	57.1'
18	90°57.1	N03°57.8	73°49.2	13.8'	S07°07.4	15.1'	57.1'
19	105°57.3	56.8	88°21.9	13.8'	07°22.6	15.1'	57.1'
20 21	120°57.5 135°57.7	55.8 • • 54.9	102°54.7 117°27.5	13.8' 13.8'	07°37.7 07°52.7	15.0' 15.0'	57.0' 57.0'
22	150°58.0	53.9	132°00.2	13.8'	07 52.7 08°07.7	14.9'	57.0'
23	165°58.2	53.0	146°33.0	13.8'	08°22.7	14.9'	56.9'
	SD = 15.9'	d = -1.0'		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
N 58°	03:51	04:41	05:21	18:31	19:11	20:00
56°	03:59	04:46	05:24	18:28	19:06	19:52
54°	04:06	04:50	05:26	18:26	19:02	19:46
52°	04:12	04:54	05:28	18:24	18:58	19:40
50°	04:18	04:57	05:30	18:23	18:55	19:34
45°	04:29	05:04	05:34	18:19	18:48	19:23
N 40°	04:37	05:10	05:37	18:16	18:43	19:15
35°	04:44	05:14	05:40	18:13	18:38	19:08
30°	04:50	05:18	05:42	18:10	18:34	19:03
20°	04:59	05:24	05:47	18:06	18:29	18:54
N 10°	05:05	05:29	05:50	18:03	18:24	18:49
0°	05:09	05:33	05:53	18:00	18:21	18:45
<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	e		Moonset	
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°	03:06	05:29	07:44	18:43	18:08	17:33
N 70°	03:21	05:32	07:37	18:36	18:10	17:43
68°	03:34	05:35	07:31	18:30	18:11	17:51
66°	03:44	05:38	07:27	18:25	18:12	17:58
64°	03:52	05:39	07:23	18:21	18:13	18:04
62°	03:59	05:41	07:20	18:17	18:13	18:09
60°	04:05	05:43	07:17	18:14	18:14	18:14
N 58°	04:11	05:44	07:14	18:11	18:14	18:18
56°	04:15	05:45	07:12	18:09	18:15	18:21
54°	04:20	05:46	07:10	18:06	18:15	18:24
52°	04:23	05:47	07:08	18:04	18:16	18:27
50°	04:27	05:48	07:06	18:02	18:16	18:30
45°	04:34	05:50	07:03	17:58	18:17	18:36
N 40°	04:41	05:51	07:00	17:54	18:18	18:41
35°	04:46	05:53	06:57	17:51	18:18	18:45
30°	04:51	05:54	06:55	17:48	18:19	18:49
20°	04:59	05:56	06:51	17:43	18:20	18:55
N 10°	05:06	05:58	06:48	17:39	18:20	19:01
0°	05:12	05:59	06:45	17:35	18:21	19:06
<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		Moo			
Day	Eqn.o	f Time	Mer.	Mer.Pass.		Age	
Luy	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	Ve	nus		ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	352°00.2	144°16.3	S16°41.7	239°17.5	N22°31.5	213°12.5	N16°31.1	339°04.1	N02°37.8	A		
1	7°02.7	159° 17.4	42.5	254°18.3	31.3	228°14.4	31.0	354°06.7	37.7	Alpheratz	357°33.0	29° 14.4
2	22°05.1	174° 18.5	43.4	$269^{\circ}19.1$	31.1	243°16.4	30.9	9°09.3	37.7	Ankaa	353°05.4	-42°09.4
3	37° 07.6	189° 19.6	• • 44.2	284°19.9	• • 30.9	258°18.3	• • 30.7	24°11.9	• • 37.6	Schedar	349°28.9	56°41.1
4	52° 10.0	204°20.7	45.0	299°20.7	30.7	273°20.3	30.6	39°14.6	37.5	Diphda	348°45.6	-17°50.2
5	67° 12.5	219°21.8	45.9	314°21.5	30.5	288°22.3	30.4	54°17.2	37.4	Achernar	335°18.7	-57°05.8
6	82°15.0	234°23.0	S16°46.7	329°22.3	N22°30.3	303°24.2	N16°30.3	69°19.8	N02°37.4	Hamal	327°49.4	23°35.4
7	97° 17.4	249°24.1	47.5	344°23.2	30.1	$318^{\circ}26.2$	30.1	84°22.4	37.3	Polaris	313°03.0	89°22.3
8	112°19.9	264°25.2	48.4	359°24.0	29.9	333°28.2	30.0	99°25.0	37.2	Acamar	315°10.5	-40°11.5
9	127°22.4	279°26.4	• • 49.2	14°24.8	• • 29.7	348°30.1	• • 29.8	114°27.7	• • 37.1	Menkar	314°04.5 308°26.0	4°11.8
10	142°24.8	294°27.5	50.0	29°25.6	29.5	3°32.1	29.7	129°30.3	37.1	Mirfak		49°57.3
11	157°27.3	309°28.6	50.9	44°26.4	29.3	18°34.1	29.6	144°32.9	37.0	Aldebaran	290°38.0	16°33.8
12	172°29.8	324° 29.7	S16°51.7	59°27.2	N22°29.1	33°36.0	N16°29.4	159°35.5	N02°36.9	Rigel	281°02.5	-8°10.0 46°01.3
13	187°32.2	339°30.9	52.5	74°28.0	28.9	48°38.0	29.3	174°38.1	36.9	Capella Bellatrix	280°19.8 278°21.4	6°22.5
14	202°34.7	354°32.0	53.3	89°28.9	28.7	63°40.0	29.1	189°40.8	36.8	Elnath	278°21.4	28° 37.8
15	217°37.2	9°33.2	• • 54.2	104°29.7	• • 28.5	78°41.9	• • 29.0	204°43.4	• • 36.7	Alnilam	275°36.3	-1°10.9
16	232°39.6	24°34.3	55.0	119°30.5	28.3	93°43.9	28.8	219°46.0	36.6	Betelgeuse	270°50.6	7°24.8
17	247°42.1	39°35.5	55.8	134°31.3	28.1	108°45.9	28.7	234°48.6	36.6	Canopus	263°51.9	-52°42.2
18	262°44.5	54°36.6	<b>S</b> 16°56.6	149°32.1	N22°27.9	123°47.8	N16°28.5	249°51.3	N02°36.5	Sirius	258°25.1	-32 42.2 -16°44.9
19	277°47.0	69°37.7	57.5	164°32.9	27.7	138°49.8	28.4	264°53.9	36.4	Adhara	255°04.9	-10° 44.9
20	292°49.5	84°38.9	58.3	179°33.7	27.5	153°51.8	28.3	279°56.5	36.3	Procyon	255 04.9 244°49.6	-29 00.2 5°09.5
21	307°51.9	99°40.0	•• 59.1	194°34.6	• • 27.3	168°53.7	• • 28.1	294°59.1	• • 36.3	Pollux	244 49.0 243°15.8	5 09.5 27°57.7
22	322°54.4	114°41.2	$16^{\circ}59.9$	209°35.4	27.1	183°55.7	28.0	$310^{\circ}01.7$	36.2	Avior	234° 14.6	-59°35.4
23	337°56.9	129° 42.4	17°00.7	224°36.2	26.9	198°57.7	27.8	325°04.4	36.1	Suhail	234 14.0 222°45.7	-39 33.4 -43°32.2
Mern	pass. 00:32	v1 1' d0	.8′ m-4.75	νη 8' 4 C	0.2′ m1.20	v2 0′ d₋0	.1′ m-1.83	v26' d.0	.1' m0.42	Miaplacidus	221°38.8	-43 32.2 -69°49.4
ivier.p		ν1.1 u0.		νυ.υ <i>u</i> -0	1111.20	ν2.0 u-0	.111-1.03	ν2.0 u-0	.1 1110.42	Alphard	221 36.6 217°46.7	-8°46.3
										Regulus	207°33.3	11°50.3
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.0	61°36.4
0	$352^{\circ}59.3$	$144^{\circ}43.5$	<b>S</b> 17°01.6	239°37.0	N22°26.7	213°59.6	N16°27.7	340°07.0	N02°36.1	Denebola	182°23.9	14° 25.4
1	8°01.8	159° 44.7	02.4	254°37.8	26.5	229°01.6	27.5	355°09.6	36.0	Gienah	175°42.5	-17°41.4
2	23°04.3	174° 45.8	03.2	269°38.7	26.3	244°03.6	27.4	10°12.2	35.9	Acrux	173° 42.3	-63° 14.9
3	38°06.7	189°47.0	• • 04.0	284°39.5	• • 26.1	259°05.5	• • 27.2	25°14.9	• • 35.8		171°50.7	-57° 15.8
4	53°09.2	204°48.2	04.8	299°40.3	25.9	274°07.5	27.1	40°17.5	35.8	Alioth	166°12.3	55°49.0
5	68°11.7	219°49.3	05.6	314°41.1	25.7	289°09.5	27.0	55°20.1	35.7	Spica	158°21.1	-11°18.0
6	83°14.1	234°50.5	S17°06.4	329°41.9	N22°25.5	304°11.4	N16°26.8	70°22.7	N02°35.6	Alkaid	152°51.3	49°11.0
7	98°16.6	249°51.7	07.3	344°42.7	25.3	319°13.4	26.7	85°25.4	35.5	Hadar	148°34.5	-60°30.3
8	113°19.0	264°52.9	08.1	359°43.6	25.1	334°15.4	26.5	100°28.0	35.5	1	147°56.3	-36° 30.1
9	128°21.5	279°54.0	• • 08.9	14°44.4	• • 24.8	349°17.3	• • 26.4	115°30.6	• • 35.4	Arcturus	145°46.9	19°02.7
10	143°24.0	294°55.2	09.7	29°45.2	24.6	4°19.3	26.2	130°33.2	35.3	Rigil Kent.	139°38.8	-60°56.9
11	158°26.4	309°56.4	10.5	44°46.0	24.4	19°21.3	26.1	145°35.9	35.3	Kochab	137°20.5	74°02.9
12	173°28.9	324° 57.6	\$17°11.3	59°46.9	N22°24.2	34°23.2	N16°26.0	160°38.5	N02°35.2	Zuben'ubi	136°54.7	-16°09.1
13	188°31.4	339°58.8	12.1	74°47.7	24.0	49°25.2	25.8	175°41.1	35.1	Alphecca	126°02.7	26°37.7
14	203°33.8	354° 59.9	12.9	89°48.5	23.8	64°27.2	25.7	190°43.7	35.0	Antares	112°14.2	-26° 29.5
15	218°36.3	10°01.1	• • 13.7	104°49.3	• • 23.6	79°29.1	• • 25.5	205°46.3	• • 35.0	Atria	107°07.2	-69°04.7
16	233°38.8	25°02.3	14.5	119°50.1	23.4	94°31.1	25.4	220°49.0	34.9	Sabik	$102^{\circ}01.2$	-15°45.4
17	248°41.2	40°03.5	15.3	134°51.0	23.2	109°33.1	25.2	235°51.6	34.8	Shaula	96°08.5	-37°07.5
18	263°43.7	55°04.7	\$17°16.1	149°51.8	N22°23.0	124°35.0	N16°25.1	250°54.2	N02°34.7	Rasalhague	95°57.2	12°32.6
19	278°46.1	70°05.9	16.9	164°52.6	22.8	139°37.0	24.9	265°56.8	34.7	Eltanin	90°41.5	51°29.4
20	293°48.6	85°07.1	17.7	179°53.4	22.6	154°39.0	24.8	280°59.5	34.6	Kaus Aust.	83°30.6	-34°22.4
21	308°51.1	100°08.3	• • 18.5	194°54.3	• • 22.4	169°40.9	• • 24.7	296°02.1	• • 34.5	Vega	80°32.2	38°48.8
22	323°53.5	115°09.5	19.3	209°55.1	22.2	184°42.9	24.5	311°04.7	34.4	Nunki	75°45.9	-26°15.8
23	338°56.0	130° 10.7	20.1	224°55.9	22.0	199°44.9	24.4	326°07.3	34.4	Altair	61°58.4	8°56.5
Mer.p	ass. 00:28	$\nu 1.2' \ d0.$	.8′ m-4.76	$\nu$ 0.8' d-0	0.2′ m1.20	$\nu 2.0' d-0$	.1′ m-1.83	$\nu 2.6' \ d-0$	.1′ m0.42	Peacock	53°03.1	-56°39.0
·										Deneb	49°24.5	45°22.8
_			_		_		_		_	Enif	$33^{\circ}37.1$	10°00.0
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.7	-46°49.8
0	353°58.5	145°11.9	\$17°20.9	239°56.7	N22°21.7	214°46.9	N16°24.2	341°10.0	N02°34.3	Fomalhaut	$15^{\circ}12.6$	-29°28.7
1	9°00.9	160°13.1	21.7	254°57.5	21.5	229°48.8	24.1	356°12.6	34.2	Scheat	13°43.5	28° 13.8
2	24°03.4	175°14.3	22.5	269°58.4	21.3	244°50.8	23.9	11°15.2	34.1	Markab	13°28.2	15°21.1
3	39°05.9 54°08.3	190° 15.5 205° 16.8	• • 23.3	284°59.2 300°00.0	21.1	259°52.8 274°54.7	• • 23.8	26°17.8 41°20.5	· · 34.1	Sep 13 Sun	SHA	Mer.pass
4	69° 10.8	205° 16.8 220° 18.0	24.1	300°00.0 315°00.8	20.9	274°54.7 289°56.7	23.6	41°20.5 56°23.1	34.0		5ПА 152°16.1	14:22
5 6	84° 13.3	220° 18.0 235° 19.2	24.9 \$17°25.7	315°00.8 330°01.7	20.7 N22°20.5	289°56.7 304°58.7	23.5 N16°23.4	71°25.7	33.9 No2°33.0		247°17.3	08:02
о 7	84°13.3 99°15.7	235° 19.2 250° 20.4	26.5	345°02.5	N22°20.5 20.3	304°58.7 320°00.6	N16°23.4 23.2	71°25.7 86°28.3	N02°33.9 33.8		247 17.3 221°12.3	09:46
8	99° 15.7 114° 18.2	265°21.6	26.5 27.2	0°03.3	20.3	320°00.6 335°02.6	23.2	86°28.3 101°31.0	33.8 33.7	Saturn	347°03.9	01:23
9	114 18.2 129° 20.6	280°22.9	28.0	15°04.2	. 19.9	350°04.6	. 22.9	101 31.0 116°33.6	• • 33.6	Jatuill	3.1 03.3	01.23
	129 20.6 144°23.1	280 22.9 295°24.1	28.8	30°05.0	19.6	5°06.6	22.8	110 33.0 131°36.2	33.6	Sep 14 Mon	SHA	Mer.pass
10 11	144 23.1 159° 25.6	310° 25.3	28.8 29.6	45°05.8	19.6 19.4	20°08.5	22.8 22.6	131°36.2 146°38.8	33.6 33.5	Venus	$151^{\circ}44.2$	14:20
11 12	159 25.0 174°28.0	310 25.3 325°26.6	29.6 \$17°30.4	45 05.8 60°06.6	19.4 N22°19.2	20 08.5 35°10.5	N16°22.5	146 38.8 161°41.5	33.5 N02°33.4		246°37.7	08:01
13	174 28.0 189°30.5	340° 27.8	31.2	75°07.5	N22 19.2 19.0	50°12.5	22.4	101 41.5 176°44.1	33.3	Jupiter	221°00.3	09:43
14	204° 33.0	355°29.0	31.2	90°08.3	18.8	65°14.4	22.4	170 44.1 191°46.7	33.3	Saturn	347°07.7	01:19
14 15	204 33.0 219°35.4	10°30.3	32.7	90 08.3 105°09.1	. 18.6	80°16.4	22.2	206°49.4	33.2	Con 1F To	CH A	Me: =
16	219 35.4 234° 37.9	25°31.5	33.5	105 09.1 120°09.9	18.4	95°18.4	21.9	200 49.4 221°52.0	33.1	Sep 15 Tue	SHA 1510124	Mer.pass
17	234 37.9 249°40.4	40°32.7	34.3	120 09.9 135°10.8	18.2	95 16.4 110°20.4	21.9	236°54.6	33.0		151°13.4	14:18
18	249 40.4 264° 42.8	55° 34.0	34.3 \$17°35.1	150°11.6	N22°18.0	110 20.4 125°22.3	N16°21.6	251°57.2	N02°33.0		245°58.3	08:00
19	204 42.6 279°45.3	70°35.2	35.8	165°12.4	17.7	125 22.3 140°24.3	21.5	266°59.9	32.9		220°48.4	09:40
20	279 45.3 294° 47.7	85° 36.5	36.6	180°13.3	17.7	155°26.3	21.3	282°02.5	32.9	Saturn	347°11.5	01:15
20	309° 50.2	05 30.5 100°37.7	37.4	100 13.3 195°14.1	. 17.3	170°28.2	. 21.3	202 02.5 297°05.1	32.7	Horizont	al parallax	
22	324° 52.7	115° 39.0	38.2	210°14.1	17.1	170 28.2 185°30.2	21.2	312°07.7	32.7		Venus:	0.3
23	339°55.1	130°40.2	38.9	225°15.8	16.9	200°32.2	20.9	327°10.4	32.6		Mars:	0.1
										L	=:=:	
Mer.p	ass. 00:24	$\nu 1.2' \ d0.$	.8′ m-4.77	$\nu$ 0.8′ d-0	).2′ m1.19	$\nu 2.0' \ d-0$	.1′ m-1.83	$\nu$ 2.6′ d-0	.1′ m0.42			

CHA	h	Su	n			Moon		
1996	Sun	GHA	Dec	GHA	ν	Dec	d	HP
2								
3								
The color of the								
The color of th							14.5'	
Section								
19								
10								
1		331°00.6	42.5	306°32.7	13.6'			
13								
14				000 00.0				
15								
17	15		• • 37.7		13.5'		13.9'	56.5'
18								
10								
121°02.8   32.9   91°58.2   13.4'   13°22.5   13.5'   56.3'     136°03.1   ···31.9   106°30.6   13.4'   13°36.0   13.5'   56.3'     22   151°03.3   31.0   121°03.0   13.4'   14°02.9   13.3'   56.2'								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				91°58.2				
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$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$								
Mon   GHA   Dec   181°03.7   N03°29.0   150°07.7   13.3'   514°16.2   13.2'   56.2'   1	23			135~35.4			13.3	50.2
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		SD = 15.9'	d = -1.0'		SE	D = 15.5'		
181°03.7	Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$								
3								
4 241°04.6 25.2 208°16.9 13.2' 15°08.6 12.9' 56.1' 5 256°04.8 24.2 222°49.1 13.2' 15°21.5 12.8' 56.1' 6 271°05.1 N03°23.3 237°21.3 13.2' S15°34.3 12.7' 56.0' 7 286°05.3 22.3 251°53.4 13.1' 15°47.1 12.7' 56.0' 8 301°05.5 21.4 266°25.5 13.1' 15°95.7 12.6' 56.0' 9 316°05.7 · 20.4 280°57.6 13.1' 16°12.3 12.5' 55.0' 10 331°05.9 19.4 295°29.7 13.0' 16°24.8 12.4' 55.9' 11 346°06.2 18.5 310°01.7 13.0' 16°37.2 12.3' 55.9' 12 1°06.4 N03°17.5 324°33.7 13.0' S16°49.5 12.2' 55.9' 13 16°06.6 16.6 333°05.7 12.9' 17°01.8 12.1' 55.8' 14 31°06.8 15.6 333°37.6 12.9' 17°01.8 12.1' 55.8' 15 46°07.0 · 14.6 8°09.5 12.9' 17°01.8 12.1' 55.8' 16 61°07.3 13.7 22°41.3 12.8' 17°37.9 11.9' 55.8' 17 76°07.5 12.7 37°13.2 12.8' 17°37.9 11.9' 55.8' 18 91°07.7 N03°11.8 51°44.9 12.7' S18°01.5 11.7' 55.7' 19 106°07.9 10.8 66°16.7 12.7' 18°13.2 11.6' 55.7' 20 121°08.2 09.8 80°48.4 12.7' 18°13.2 11.6' 55.7' 21 136°08.4 · 08.9 95°20.1 12.6' 18°36.3 11.4' 55.6' 22 151°08.6 07.9 109°51.7 12.6' 18°45.3 11.3' 55.6' 22 151°08.6 07.9 109°51.7 12.6' 18°36.3 11.4' 55.6' 23 166°08.8 07.0 124°23.3 12.6' 18°59.0 11.2' 55.6'   **SD = 15.9' d = -1.0'  **SD = 15.3'  **Tue GHA Dec GHA ν Dec GHA ν Dec d HP 0 181°09.0 N03°06.0 138°54.9 12.5' S19°10.2 11.1' 55.6' 22 11°09.5 04.1 167°57.9 12.4' 19°32.3 10.9' 55.5' 3 226°09.7 · 03.1 182°29.3 12.4' 19°32.3 10.9' 55.5' 4 241°09.9 02.1 197°0.7 12.4' 19°32.3 10.9' 55.5' 5 256°10.2 01.2 211°32.1 12.3' 20°04.8 10.6' 55.5' 4 241°09.9 02.1 197°0.7 12.4' 19°43.3 10.8' 55.5' 3 226°09.7 · 03.1 182°29.3 12.4' 19°32.3 10.9' 55.5' 4 241°09.9 02.1 197°0.7 12.4' 19°43.3 10.8' 55.5' 3 266°10.6 02°59.3 240°34.7 12.2' 20°26.8 10.1' 55.5' 4 241°10.4 N03°00.2 226°03.4 12.3' 20°04.8 10.6' 55.4' 6 271°10.4 N03°00.2 226°03.4 12.3' 20°04.8 10.5' 55.4' 6 271°10.4 N03°00.2 226°03.4 12.3' 20°05.8 10.1' 55.5' 10 331°11.3 56.4 284°08.3 12.1' 20°56.8 10.1' 55.5' 11 346°11.5 55.4 298°39.4 12.1' 21°06.9 10.0' 55.5' 12 66°08.8 301°10.8 53.3 255°05.9 12.2' 20°26.8 10.1' 55.5' 12 136°3.3 47.7 54°46.8 11.7' 22°23.9 9.0' 55.1' 13 16°13.3 47.7 54°46.8 11.7'								
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1       196°09.3       05.0       153°26.4       12.5'       19°21.3       11.0'       55.5'         2       211°09.5       04.1       167°57.9       12.4'       19°32.3       10.9'       55.5'         3       226°09.7       · · 03.1       182°29.3       12.4'       19°43.3       10.8'       55.5'         4       241°09.9       02.1       197°00.7       12.4'       19°54.1       10.7'       55.5'         5       256°10.2       01.2       211°32.1       12.3'       20°04.8       10.6'       55.4'         6       271°10.4       N03°00.2       226°03.4       12.3'       520°15.4       10.6'       55.4'         7       286°10.6       02°59.3       240°34.7       12.2'       20°25.9       10.4'       55.4'         8       301°10.8       58.3       255°05.9       12.2'       20°36.3       10.3'       55.4'         9       316°11.1       · · 57.3       269°37.1       12.2'       20°46.6       10.2'       55.3'         10       331°11.3       56.4       284°08.3       12.1'       20°56.8       10.1'       55.3'         11       346°11.5       55.4       298°39.4       12.1'								
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6         271°10.4         N03°00.2         226°03.4         12.3'         S20°15.4         10.5'         55.4'           7         286°10.6         02°59.3         240°34.7         12.2'         20°25.9         10.4'         55.4'           8         301°10.8         58.3         255°05.9         12.2'         20°36.3         10.3'         55.4'           9         316°11.1         · · · 57.3         269°37.1         12.2'         20°46.6         10.2'         55.3'           10         331°11.3         56.4         284°08.3         12.1'         20°56.8         10.1'         55.3'           11         346°11.5         55.4         298°39.4         12.1'         21°06.9         10.0'         55.3'           12         1°11.7         N02°54.4         313°10.5         12.0'         S21°16.9         9.9'         55.3'           13         16°11.9         53.5         327°41.5         12.0'         S21°26.8         9.8'         55.2'           14         31°12.2         52.5         342°12.5         11.9'         21°36.5         9.7'         55.2'           15         46°12.4         · · · 51.6         356°43.4         11.9'         21°46.2         9.6'								
7         286°10.6         02°59.3         240°34.7         12.2'         20°25.9         10.4'         55.4'           8         301°10.8         58.3         255°05.9         12.2'         20°36.3         10.3'         55.4'           9         316°11.1         · · 57.3         269°37.1         12.2'         20°46.6         10.2'         55.3'           10         331°11.3         56.4         284°08.3         12.1'         20°56.8         10.1'         55.3'           11         346°11.5         55.4         298°39.4         12.1'         21°06.9         10.0'         55.3'           12         1°11.7         N02°54.4         313°10.5         12.0'         521°16.9         9.9'         55.3'           13         16°11.9         53.5         327°41.5         12.0'         21°26.8         9.8'         55.2'           14         31°12.2         52.5         342°12.5         11.9'         21°36.5         9.7'         55.2'           15         46°12.4         · · 51.6         356°43.4         11.9'         21°46.2         9.6'         55.2'           16         61°12.6         50.6         11°14.3         11.9'         21°55.8         9.4'								
8       301°10.8       58.3       255°05.9       12.2'       20°36.3       10.3'       55.4'         9       316°11.1       · · 57.3       269°37.1       12.2'       20°46.6       10.2'       55.3'         10       331°11.3       56.4       284°08.3       12.1'       20°56.8       10.1'       55.3'         11       346°11.5       55.4       298°39.4       12.1'       21°06.9       10.0'       55.3'         12       1°11.7       N02°54.4       313°10.5       12.0'       S21°16.9       9.9'       55.3'         13       16°11.9       53.5       327°41.5       12.0'       21°26.8       9.8'       55.2'         14       31°12.2       52.5       342°12.5       11.9'       21°36.5       9.7'       55.2'         15       46°12.4       · · 51.6       356°43.4       11.9'       21°46.2       9.6'       55.2'         16       61°12.6       50.6       11°14.3       11.9'       21°55.8       9.4'       55.2'         17       76°12.8       49.6       25°45.2       11.8'       22°05.2       9.3'       55.1'         18       91°31.1       N02°48.7       40°16.0       11.8'								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	8	301°10.8	58.3	255°05.9	12.2'	20°36.3	10.3'	55.4'
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	13	16°11.9	53.5	$327^{\circ}41.5$	12.0'	21°26.8	9.8'	55.2'
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
17         76°12.8         49.6         25°45.2         11.8'         22°05.2         9.3'         55.1'           18         91°13.1         N02°48.7         40°16.0         11.8'         S22°14.5         9.2'         55.1'           19         106°13.3         47.7         54°46.8         11.7'         22°3.8         9.1'         55.1'           20         121°13.5         46.7         69°17.5         11.7'         22°32.9         9.0'         55.1'           21         136°13.7         · 45.8         83°48.2         11.7'         22°41.9         8.9'         55.1'           22         151°13.9         44.8         98°18.9         11.6'         22°50.8         8.8'         55.0'           23         166°14.2         43.9         112°49.5         11.6'         22°59.6         8.7'         55.0'								
18         91°13.1         N02°48.7         40°16.0         11.8'         S22°14.5         9.2'         55.1'           19         106°13.3         47.7         54°46.8         11.7'         22°23.8         9.1'         55.1'           20         121°13.5         46.7         69°17.5         11.7'         22°32.9         9.0'         55.1'           21         136°13.7         · · 45.8         83°48.2         11.7'         22°41.9         8.9'         55.1'           22         151°13.9         44.8         98°18.9         11.6'         22°50.8         8.8'         55.0'           23         166°14.2         43.9         112°49.5         11.6'         22°59.6         8.7'         55.0'								
20     121°13.5     46.7     69°17.5     11.7'     22°32.9     9.0'     55.1'       21     136°13.7     · 45.8     83°48.2     11.7'     22°41.9     8.9'     55.1'       22     151°13.9     44.8     98°18.9     11.6'     22°50.8     8.8'     55.0'       23     166°14.2     43.9     112°49.5     11.6'     22°59.6     8.7'     55.0'	18	91°13.1	N02°48.7	40°16.0	11.8'	S22°14.5	9.2'	55.1'
21 136°13.7 ·· 45.8 83°48.2 11.7' 22°41.9 8.9' 55.1' 22 151°13.9 44.8 98°18.9 11.6' 22°50.8 8.8' 55.0' 23 166°14.2 43.9 112°49.5 11.6' 22°59.6 8.7' 55.0'								
22 151°13.9 44.8 98°18.9 11.6' 22°50.8 8.8' 55.0' 23 166°14.2 43.9 112°49.5 11.6' 22°59.6 8.7' 55.0'								
23 166°14.2 43.9 112°49.5 11.6' 22°59.6 8.7' 55.0'								
SD = 15.9'  d = -1.0' $SD = 15.2'$		166°14.2		112°49.5		22°59.6		
		SD = 15.9'	d = -1.0'		SE	D = 15.2'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	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.		Moonris	e		Moonset	
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°	10:04	13:12		16:49	15:18	
<b>N</b> 70°	09:44	12:10		17:12	16:22	
68°	09:29	11:35	14:42	17:29	16:58	15:30
66°	09:16	11:11	13:21	17:43	17:24	16:52
64°	09:06	10:52	12:44	17:55	17:44	17:30
62°	08:57	10:36	12:18	18:05	18:01	17:56
60°	08:50	10:23	11:58	18:14	18:15	18:17
N 58°	08:43	10:12	11:42	18:21	18:27	18:35
56°	08:37	10:03	11:28	18:28	18:37	18:49
54°	08:32	09:54	11:16	18:34	18:46	19:02
52°	08:28	09:47	11:05	18:40	18:54	19:13
50°	08:24	09:40	10:56	18:45	19:02	19:23
45°	08:15	09:26	10:36	18:56	19:18	19:44
N 40°	08:07	09:14	10:20	19:05	19:31	20:01
35°	08:01	09:04	10:06	19:12	19:42	20:15
30°	07:55	08:55	09:55	19:19	19:52	20:28
20°	07:46	08:40	09:35	19:31	20:09	20:49
N 10°	07:37	08:27	09:18	19:42	20:24	21:08
0°	07:30	08:15	09:02	19:51	20:37	21:25
<b>S</b> 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.of	Time	Mer.	Mer.	Age			
,	00 <sup>h</sup>	00 <sup>h</sup> 12 <sup>h</sup>		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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	354° 57.6	145°41.5	S17°39.7	240°16.6	N22°16.7	215°34.2	N16°20.8	342°13.0	N02°32.5			
1	10°00.1	160°42.8	40.5	255°17.4	16.5	230°36.1	20.6	357°15.6	32.5	Alpheratz	357°33.0	29°14.4
2	25°02.5	175°44.0	41.3	270°18.3	16.2	245°38.1	20.5	12°18.2	32.4	Ankaa	353°05.4	-42°09.4
3	40°05.0	190°45.3	42.0	285°19.1	. 16.0	260°40.1	20.3	27°20.9	32.3	Schedar	349°28.9	56°41.1
4	55°07.5	205°46.6	42.8	300°19.9	15.8	275°42.0	20.2	42°23.5	32.2	Diphda	348°45.6	-17°50.2
5	70°09.9	220°47.8	43.6	315°20.7	15.6	290°44.0	20.1	57°26.1	32.2	Achernar	335°18.6	-57°05.8
6	85°12.4	235°49.1	S17°44.3	330°21.6	N22°15.4	305°46.0	N16°19.9	72°28.8	N02°32.1	Hamal	327°49.3	23°35.4
7	100°14.9	250°50.4	45.1	345°22.4	15.2	320°48.0	19.8	87°31.4	32.0	Polaris	313°01.5	89°22.3
8	115° 17.3	265°51.6	45.9	0°23.2	15.0	335°49.9	19.6	102°34.0	31.9	Acamar	315°10.4 314°04.5	-40°11.5 4°11.8
9	130°19.8	280°52.9	• • 46.6	15°24.1	• • 14.7	350°51.9	• • 19.5	117°36.6	• • 31.9	Menkar Mirfak	308°26.0	4 11.6 49°57.3
10	145°22.2	295°54.2	47.4	30°24.9	14.5	5°53.9	19.3	132°39.3	31.8	Aldebaran	290°37.9	16°33.8
11	160°24.7	310°55.5	48.1	45°25.7	14.3	20°55.9	19.2	147°41.9	31.7	Rigel	290° 37.9 281° 02.5	-8° 10.0
12	175°27.2	325°56.8	S17°48.9	60°26.6	N22°14.1	35° 57.8	N16°19.1	162°44.5	N02°31.6	Capella	280°19.8	46°01.3
13	190°29.6	340°58.0	49.7	75°27.4	13.9	50°59.8	18.9	177°47.1	31.6	Bellatrix	278°21.4	6°22.5
14	205°32.1	355°59.3	50.4	90°28.2	13.7	66°01.8	18.8	192°49.8	31.5	Elnath	278°00.1	28° 37.8
15	220°34.6	11°00.6	• • 51.2	105°29.1	• • 13.4	81°03.8	• • 18.6	207°52.4	• • 31.4	Alnilam	275°36.3	-1°10.9
16	235°37.0	26°01.9	51.9	120°29.9	13.2	96°05.7	18.5	222°55.0	31.3	Betelgeuse	270°50.6	7°24.8
17 18	250°39.5 265°42.0	41°03.2 56°04.5	52.7 \$17°53.4	135°30.8 150°31.6	13.0 N22°12.8	111°07.7 126°09.7	18.3 N16°18.2	237°57.7 253°00.3	31.3 N02°31.2	Canopus	263°51.9	-52° 42.2
19	280° 44.4	71°05.8	54.2	165°32.4	12.6	141°11.7	18.0	268°02.9	31.1	Sirius	$258^{\circ}25.1$	-16°44.9
20	295°46.9	86°07.1	55.0	180°33.3	12.3	156° 13.6	17.9	283°05.5	31.0	Adhara	255°04.9	-29°00.2
21	310°49.4	101°08.4	• • 55.7	195°34.1	12.1	171°15.6	. 17.8	298°08.2	31.0	Procyon	244°49.5	5°09.5
22	325°51.8	116°09.7	56.5	210°34.9	11.9	171 13.0 186°17.6	17.6	313°10.8	30.9	Pollux	243°15.8	27°57.7
23	340°54.3	131°11.0	57.2	225°35.8	11.7	201°19.6	17.5	328°13.4	30.8	Avior	234°14.6	-59°35.4
		-								Suhail	222°45.6	-43°32.2
Mer.p	ass. 00:20	$\nu$ 1.3′ d0.	8′ m-4.78	$\nu$ 0.8′ $d$ -0	0.2′ m1.19	$\nu$ 2.0′ d-0	.1′ m-1.83	$\nu$ 2.6′ $d$ -0	.1′ m0.41	Miaplacidus	221°38.8	-69°49.4
										Alphard	217°46.7	-8°46.3
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	207°33.3 193°40.0	11°50.3 61°36.4
0	355°56.7	146°12.3	S17°58.0	240°36.6	N22°11.5	$216^{\circ}21.5$	N16°17.3	343°16.1	N02°30.7	Denebola	193 40.0 182°23.9	14°25.4
1	10°59.2	161°13.7	58.7	255°37.4	11.2	231°23.5	17.2	358°18.7	30.7	Gienah	175°42.5	-17°41.4
2	26°01.7	176°15.0	17°59.4	270°38.3	11.0	246°25.5	17.0	13°21.3	30.6		173° 42.3	-63°14.9
3	41°04.1	191°16.3	18°00.2	285°39.1	• • 10.8	261°27.5	• • 16.9	28°23.9	• • 30.5		171°50.7	-57° 15.8
4	56°06.6	206°17.6	00.9	300°40.0	10.6	276°29.4	16.8	43°26.6	30.4	Alioth	166°12.3	55°49.0
5	71°09.1	221°18.9	01.7	315°40.8	10.4	291°31.4	16.6	58°29.2	30.4	Spica	158°21.1	-11° 18.0
6	86°11.5	236°20.2	S18°02.4	330°41.6	N22°10.1	306°33.4	N16°16.5	73°31.8	N02°30.3	Alkaid	152°51.3	49° 10.9
7	101°14.0	251°21.6	03.2	345°42.5	09.9	321°35.4	16.3	88°34.5	30.2	Hadar	148°34.5	-60°30.2
8	116° 16.5	266°22.9	03.9	0°43.3	09.7	336°37.3	16.2	103°37.1	30.1	Menkent	147°56.3	-36°30.1
9	131°18.9	281°24.2	• • 04.6	15°44.2	• • 09.5	351°39.3	• • 16.0	118°39.7	• • 30.1	Arcturus	145°46.9	19°02.7
10	146°21.4	296°25.6	05.4	30°45.0	09.3	6°41.3	15.9	133°42.3	30.0	Rigil Kent.	139°38.8	-60°56.9
11 12	161°23.9 176°26.3	311°26.9 326°28.2	06.1 \$18°06.9	45°45.8 60°46.7	09.0 N22°08.8	21°43.3 36°45.2	15.8 N16°15.6	148°45.0 163°47.6	29.9 N02°29.8	Kochab	137°20.6	74°02.9
13	170 20.3 191°28.8	341°29.6	07.6	75°47.5	08.6	50 45.2 51°47.2	15.5	103 47.0 178°50.2	29.8	Zuben'ubi	136°54.7	-16°09.1
14	206° 31.2	356°30.9	08.3	90°48.4	08.4	66°49.2	15.3	178 50.2 193°52.9	29.7	Alphecca	126°02.7	26° 37.7
15	221°33.7	11°32.3	09.1	105°49.2	08.2	81°51.2	. 15.2	208°55.5	29.6	Antares	112°14.2	-26° 29.5
16	236° 36.2	26°33.6	09.8	120°50.0	07.9	96°53.1	15.0	223°58.1	29.5	Atria	107°07.2	-69°04.7
17	251°38.6	41°35.0	10.5	135°50.9	07.7	111°55.1	14.9	239°00.7	29.5	Sabik	102°01.2	-15°45.4
18	266°41.1	56°36.3	\$18°11.2	150°51.7	N22°07.5	126°57.1	N16°14.8	254°03.4	N02°29.4	Shaula	96°08.5	-37°07.5
19	281°43.6	71°37.7	12.0	165°52.6	07.3	141°59.1	14.6	269°06.0	29.3	Rasalhague	95°57.3	12°32.6
20	296°46.0	86°39.0	12.7	180°53.4	07.0	157°01.1	14.5	284°08.6	29.2	Eltanin Kaus Aust.	90°41.5 83°30.6	51°29.4 -34°22.4
21	311°48.5	101°40.4	• • 13.4	195°54.3	• • 06.8	172°03.0	• • 14.3	299°11.3	• • 29.2	Vega	80°32.2	-34 22.4 38°48.8
22	326°51.0	116°41.8	14.2	210°55.1	06.6	187°05.0	14.2	314°13.9	29.1	Nunki	75°45.9	-26° 15.8
23	341°53.4	131°43.1	14.9	225°55.9	06.4	202°07.0	14.0	329°16.5	29.0	Altair	61°58.4	8°56.5
Mern	ass. 00:16	v1 3' d0	7′ m-4.78	υ0 8' d-0	0.2' m1.18	v2 0′ d−0	.1′ m-1.83	u2 6′ d−0	.1' m0.41	Peacock	53°03.1	-56° 39.0
IVIEL.P	Jass. 00.10	$\nu$ 1.5 do.	1 111-4.70	νο.σ u-σ	7.2 1111.10	ν2.0 u-0	.1 111-1.05	ν2.0 u-0	.1 1110.41	Deneb	49°24.5	45° 22.8
										Enif	33°37.1	10°00.0
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.7	-46°49.8
0	356°55.9	146°44.5	\$18°15.6	240°56.8	N22°06.1	217°09.0	N16°13.9	344°19.2	N02°28.9	Fomalhaut	$15^{\circ}12.6$	-29°28.7
1	11°58.3	161°45.9	16.3	255°57.6	05.9	232°10.9	13.8	359°21.8	28.9	Scheat	13°43.5	28° 13.9
2	27°00.8	176°47.2 191°48.6	17.0	270°58.5 285°59.3	05.7	247°12.9 262°14.9	13.6	14°24.4	28.8 •• 28.7	Markab	13°28.2	15°21.1
3 4	42°03.3 57°05.7	191°48.6 206°50.0	· · 17.8 18.5	285°59.3 301°00.2	· · 05.5 05.2	262°14.9 277°16.9	· · 13.5 13.3	29°27.0 44°29.7	28.6	Sep 16 Wed	SHA	Mer.pass
5	72°08.2	200 50.0 221°51.3	19.2	316°01.0	05.2	277 10.9 292°18.9	13.3	59°32.3	28.6		150°43.9	14:16
6	87° 10.7	236°52.7	\$18°19.9	331°01.9	N22°04.8	307°20.8	N16°13.0	74°34.9	N02°28.5		245°19.0	07:58
7	102° 13.1	251°54.1	20.6	346°02.7	04.6	322°22.8	12.9	89°37.6	28.4		220°36.6	09:36
8	117° 15.6	266°55.5	21.3	1°03.6	04.3	337°24.8	12.8	104°40.2	28.3	Saturn	347°15.4	01:11
9	132° 18.1	281°56.9	22.1	16°04.4	•• 04.1	352°26.8	• • 12.6	119°42.8	• • 28.3			
10	147° 20.5	296°58.3	22.8	31°05.2	03.9	7°28.8	12.5	134°45.5	28.2	Sep 17 Thu	SHA 150°15 6	Mer.pass
11	162°23.0	$311^{\circ}59.7$	23.5	$46^{\circ}06.1$	03.7	$22^{\circ}30.7$	12.3	149°48.1	28.1		150°15.6	14:14
12	177°25.5	327°01.1	S18°24.2	61°06.9	N22°03.4	37°32.7	N16°12.2	164°50.7	N02°28.0		244°39.9 220°24.8	07:57 09:33
13	192°27.9	342°02.5	24.9	76°07.8	03.2	52°34.7	12.0	179°53.4	28.0		347°19.3	09:33
14	207°30.4	357°03.9	25.6	91°08.6	03.0	67°36.7	11.9	194°56.0	27.9	Jatum	JT1 19.3	01.07
15	222°32.8	12°05.3	• • 26.3	106°09.5	• • 02.7	82°38.7	• • 11.8	209°58.6	• • 27.8	Sep 18 Fri	SHA	Mer.pass
16	237°35.3	27°06.7	27.0	121°10.3	02.5	97°40.6	11.6	225°01.3	27.7		149°48.6	14:12
17	252°37.8	42°08.1	27.7	136°11.2	02.3	112°42.6	11.5	240°03.9	27.7		244°00.9	07:56
18	267°40.2	57°09.5	\$18°28.4	151°12.0	N22°02.1	127°44.6	N16°11.3	255°06.5	N02°27.6		220°13.1	09:30
19	282°42.7	72°10.9	29.1	166°12.9	01.8	142°46.6	11.2	270°09.1	27.5	Saturn	347°23.3	01:03
20	297°45.2	87°12.3	29.8	181°13.7	01.6	157°48.6	11.0	285°11.8	27.4	Horizont	al parallax	
21 22	312°47.6 327°50.1	102°13.7 117°15.1	· · 30.5 31.2	196°14.6 211°15.4	· · 01.4 01.1	172°50.5 187°52.5	· · 10.9 10.8	300°14.4 315°17.0	· · 27.4 27.3		Venus:	0.3
23	342° 52.6	117 15.1 132°16.6	31.2	211 15.4 226°16.3	00.9	202°54.5	10.6	330°19.7	27.2		Mars:	0.1
Mer.p	oass. 00:12	$\nu$ 1.4′ d0.	7′ m-4.79	$\nu$ 0.8′ d-0	0.2′ m1.18	$\nu$ 2.0′ d-0	.1′ m-1.84	$\nu$ 2.6′ d-0	.1′ m0.40			

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	181° 14.4	N02°42.9	127°20.1	11.5'	523°08.2	8.6'	55.0'
1	196°14.6	41.9	141°50.6	11.5'	23°16.8	8.4'	55.0'
2	211°14.8	41.0	156°21.1	11.4'	23°25.2	8.3'	55.0'
3	226°15.1	40.0	170°51.6	11.4'	23°33.5	8.2'	54.9'
4	241°15.3	39.0	185°22.0	11.4'	23°41.7	8.1'	54.9'
5	256° 15.5	38.1	199°52.3	11.3'	23°49.8	8.0'	54.9'
6	271°15.7	$N02^{\circ}37.1$	214°22.7	11.3'	S23°57.8	7.9'	54.9'
7	286°16.0	36.1	228°52.9	11.2'	24°05.7	7.7'	54.9'
8	301°16.2	35.2	243°23.2	11.2'	24°13.4	7.6'	54.8'
9	316° 16.4	• • 34.2	257°53.4	11.2'	24°21.0	7.5'	54.8'
10	331°16.6	33.3	272°23.6	11.1'	24°28.5	7.4'	54.8'
11	346° 16.8	32.3	286°53.7	11.1'	24°35.9	7.3'	54.8'
12	1°17.1	N02°31.3	301°23.8	11.0'	524°43.1	7.1'	54.8'
13	16° 17.3	30.4	315°53.8	11.0'	24°50.3	7.0'	54.7'
14	31°17.5 46°17.7	29.4	330°23.8 344°53.8	11.0' 10.9'	24°57.3 25°04.2	6.9' 6.8'	54.7' 54.7'
15 16	46 17.7 61°18.0	· · 28.4 27.5	344 53.8 359°23.7	10.9	25 04.2 25°10.9	6.6	54.7'
17	76° 18.2	26.5	13°53.6	10.9'	25°10.9	6.5	54.7'
18	91° 18.4	N02°25.5	28°23.5	10.9	\$25°24.1	6.4	54.7
19	106° 18.6	24.6	42°53.3	10.8	25°30.5	6.3	54.6'
20	100 18.0 121° 18.9	23.6	57°23.1	10.7	25°36.7	6.1	54.6
21	136° 19.1	22.6	71°52.8	10.7'	25°42.9	6.0'	54.6'
22	151° 19.3	21.7	86°22.5	10.7'	25°48.9	5.9'	54.6'
23	166° 19.5	20.7	100°52.2	10.6'	25°54.8	5.8'	54.6'
	SD = 15.9'	d = -1.0'			0 = 15.0'		
	3D = 13.9	<u>u = -1.0</u>		JL	7 = 15.0		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°19.7	N02°19.7	115°21.9	10.6'	\$26°00.6	5.6'	54.6'
1	196°20.0	18.8	129°51.5 144°21.1	10.6'	26°06.2	5.5'	54.5'
2	211°20.2	17.8		10.5'	26°11.7	5.4'	54.5'
3	226°20.4 241°20.6	• • 16.8	158°50.6 173°20.1	10.5'	26°17.1	5.3'	54.5'
4 5	241°20.6 256°20.9	15.9 14.9	173°20.1 187°49.6	10.5' 10.5'	26°22.4 26°27.5	5.1' 5.0'	54.5' 54.5'
6	271°21.1	N02°13.9	202°19.1	10.5	526°32.5	4.9'	54.5
7	286°21.3	13.0	202 19.1 216°48.5	10.4	26°37.3	4.7'	54.5'
8	286 21.3 301°21.5	13.0	210 48.5 231°17.9	10.4	26°42.1	4. <i>1</i> 4.6'	54.5'
9	316° 21.8	• • 11.0	245°47.3	10.4	26°46.7	4.5	54.4'
10	331°22.0	10.1	260°16.6	10.3'	26°51.2	4.3'	54.4'
11	346° 22.2	09.1	274°45.9	10.3'	26°55.5	4.2'	54.4'
12	1°22.4	N02°08.1	289°15.2	10.3'	S26°59.7	4.1'	54.4'
13	16°22.6	07.2	303°44.5	10.2'	27°03.8	4.0'	54.4'
14	31°22.9	06.2	$318^{\circ}13.7$	10.2'	$27^{\circ}07.8$	3.8'	54.4'
15	46°23.1	• • 05.2	332°42.9	10.2'	27°11.6	3.7'	54.4'
16	61°23.3	04.3	347°12.1	10.2'	27°15.3	3.6'	54.4'
17	76°23.5	03.3	1°41.3	10.1'	27°18.8	3.4'	54.3'
18	91°23.8	N02°02.3	16°10.4	10.1'	\$27°22.2	3.3'	54.3'
19	106°24.0	01.4	30°39.6	10.1'	27°25.5	3.2'	54.3'
20	121°24.2	02°00.4	45°08.7 59°37.8	10.1' 10.1'	27°28.7	3.0'	54.3'
21	136°24.4 151°24.7	01°59.4	59°37.8 74°06.8	10.1	27°31.7	2.9'	54.3'
22 23	151°24.7 166°24.9	58.5 57.5	74°06.8 88°35.9	10.1	27°34.6 27°37.3	2.8' 2.6'	54.3' 54.3'
23						2.0	J <del>1</del> .J
	SD = 15.9'	d = -1.0'		5L	0 = 14.9'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°25.1	N01°56.5	103°04.9	10.0'	<b>S</b> 27°39.9	2.5'	54.3'
1	196° 25.3	55.6	117°34.0	10.0'	27°42.4	2.3'	54.3'
2	211°25.5	54.6	132°03.0	10.0'	27°44.8	2.2'	54.3'
3	226°25.8	• • 53.6	146°32.0	10.0'	27°47.0	2.1'	54.3'
4	241°26.0	52.7	161°01.0	10.0'	27°49.1	1.9'	54.3'
5	256°26.2	51.7	175°29.9	10.0'	27°51.0	1.8'	54.2'
6	271°26.4 286°26.7	N01°50.7 49.8	189°58.9 204°27.9	10.0' 9.9'	\$27°52.8 27°54.5	1.7'	54.2' 54.2'
7 8	301°26.9	49.8 48.8	204°27.9 218°56.8	9.9'	27°54.5 27°56.0	1.5' 1.4'	54.2' 54.2'
9	301 26.9 316°27.1	48.8	218 50.8 233°25.7	9.9 9.9'	27°57.4	1.4	54.2'
10	331° 27.3	46.9	247°54.7	9.9'	27°58.7	1.1'	54.2'
11	346° 27.6	45.9	262°23.6	9.9'	27°59.8	1.0'	54.2'
12	1°27.8	N01°44.9	276°52.5	9.9'	\$28°00.8	0.9'	54.2'
13	16°28.0	44.0	291°21.4	9.9'	28°01.7	0.7'	54.2'
14	31°28.2	43.0	305°50.4	9.9'	28°02.4	0.6'	54.2'
15	46°28.5	• • 42.0	$320^{\circ}19.3$	9.9'	28°03.0	0.4'	54.2'
16	61°28.7	41.1	$334^{\circ}48.2$	9.9'	28°03.4	0.3'	54.2'
17	76°28.9	40.1	$349^{\circ}17.1$	9.9'	28°03.7	0.2'	54.2'
18	91°29.1	N01°39.1	3°46.0	9.9'	S28°03.9	0.0'	54.2'
19	106°29.3	38.1	18°14.9	9.9'	28°04.0	-0.1'	54.2'
20	121°29.6	37.2	32°43.9	9.9'	28°03.9	-0.2'	54.2'
21	136°29.8	36.2	47°12.8	9.9'	28°03.6	-0.4'	54.2'
22 23	151°30.0 166°30.2	35.2 34.3	61°41.7 76°10.6	9.9' 9.9'	28°03.3 28°02.8	-0.5' -0.6'	54.2' 54.2'
23			70 10.0			-0.0	54.2
	SD = 15.9'	d = -1.0'		SL	0 = 14.8'		

	Twi	light			Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	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
N 58°	04:06	04:54	05:34	18:14	18:53	19:41
56°	04:13	04:58	05:35	18:12	18:50	19:35
54°	04:18	05:01	05:37	18:11	18:47	19:29
52°	04:23	05:04	05:38	18:10	18:44	19:24
50°	04:28	05:06	05:39	18:09	18:42	19:20
45°	04:37	05:11	05:41	18:07	18:37	19:11
$N 40^{\circ}$	04:44	05:16	05:43	18:06	18:33	19:05
35°	04:49	05:19	05:44	18:04	18:29	18:59
30°	04:54	05:22	05:46	18:03	18:27	18:55
20°	05:00	05:26	05:48	18:01	18:23	18:49
N $10^{\circ}$	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
1 -4		Moonris	e		Moonset	:
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°		-			-	-

Lat.		Moonris	e		Moonset	t
Lut.	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° <b>S</b> 60°	06:43	07:01	07:33	00:23	01:48	03:02
<b>5</b> 60°	06:23	06:33	06:58	00:43	02:16	03:37

		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	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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	357°55.0	147° 18.0	S18°32.6	241°17.1	N22°00.7	217°56.5	N16°10.5	345°22.3	N02°27.1			
1	12°57.5	162° 19.4	33.3	256°18.0	00.5	232°58.5	10.3	0°24.9	27.1	Alpheratz	357°33.0	29°14.4
2	28°00.0	177°20.9	34.0	271°18.8	00.3	248°00.4	10.3	15°27.6	27.1	Ankaa	353°05.3	-42°09.4
3	43°02.4	192°22.3	• • 34.7	286°19.7	22°00.0	263°02.4	• 10.1	30°30.2	26.9	Schedar	349°28.9	56°41.1
4	58°04.9	207°23.7	35.4	301°20.5	21°59.8	278°04.4	09.9	45°32.8	26.8	Diphda	348°45.6	-17°50.2
5	73° 07.3	207 25.7 222° 25.2	36.1	316°21.4	59.5	293°06.4	09.8	60°35.5	26.8	Achernar	$335^{\circ}18.6$	-57°05.8
6	88°09.8	237°26.6	\$18°36.8	331°22.2	N21°59.3	308°08.4	N16°09.6	75°38.1	N02°26.7	Hamal	327°49.3	23°35.4
7	103°12.3	252° 28.0		346°23.1	59.3 59.1	323°10.3		90°40.7		Polaris	313°00.0	89°22.4
			37.5				09.5	90 40.7 105°43.4	26.6	Acamar	315°10.4	-40°11.5
8	118° 14.7	267°29.5	38.2	1°23.9	58.8	338°12.3	09.3		26.5	Menkar	314°04.5	4°11.8
9	133°17.2	282°30.9	• • 38.9	16°24.8	• • 58.6	353°14.3	• • 09.2	120°46.0	• • 26.5	Mirfak	308°25.9	49°57.3
10	148° 19.7	297°32.4	39.5	31°25.7	58.4	8°16.3	09.1	135°48.6	26.4	Aldebaran	290°37.9	16°33.8
11	163°22.1	312°33.8	40.2	46°26.5	58.1	23°18.3	08.9	150°51.3	26.3	Rigel	281°02.5	-8°10.0
12	178°24.6	327°35.3	S18°40.9	61°27.4	N21°57.9	38°20.3	N16°08.8	165°53.9	N02°26.2	Capella	$280^{\circ}19.7$	46°01.3
13	193°27.1	342°36.7	41.6	76°28.2	57.7	53°22.2	08.6	180°56.5	26.2	Bellatrix	278°21.3	6°22.5
14	208°29.5	357°38.2	42.3	91°29.1	57.4	68°24.2	08.5	195°59.2	26.1	Elnath	278°00.1	28° 37.8
15	223°32.0	12°39.7	• • 43.0	106°29.9	• • 57.2	83°26.2	• • 08.3	211°01.8	• • 26.0	Alnilam	275°36.3	-1°10.9
16	238°34.5	27°41.1	43.6	121°30.8	57.0	98°28.2	08.2	226°04.4	25.9	Betelgeuse	270°50.6	7°24.8
17	253°36.9	42°42.6	44.3	136°31.6	56.7	113°30.2	08.1	241°07.1	25.9	Canopus	263°51.9	-52° 42.2
18	268°39.4	57°44.1	S18°45.0	151°32.5	N21°56.5	128°32.2	N16°07.9	256°09.7	N02°25.8	Sirius	258°25.1	-16°44.9
19	283°41.8	72°45.5	45.7	166°33.3	56.3	143°34.1	07.8	271°12.3	25.7	Adhara	255°04.9	-29°00.2
20	298°44.3	87°47.0	46.3	181°34.2	56.0	158°36.1	07.6	286°15.0	25.6	Procyon	244°49.5	5°09.5
21	313°46.8	102°48.5	• • 47.0	196°35.1	• • 55.8	173°38.1	• • 07.5	301°17.6	• • 25.5	Pollux	243°15.8	27°57.7
22	328°49.2	117°50.0	47.7	211°35.9	55.6	188°40.1	07.4	316°20.2	25.5	Avior	234°14.6	-59° 35.4
23	343°51.7	132°51.5	48.4	226°36.8	55.3	203°42.1	07.2	331°22.9	25.4	Suhail	222°45.6	-43°32.2
Mern	ass. 00:08	v1 4' d0	7′ m-4.80	ν0 0' d.0	).2' m1.17	v2 0′ d₋0	.1′ m-1.84	v2 6' d.0	.1' m0.40	Miaplacidus	221°38.7	-43 32.2 -69°49.4
- vier.p		ν1. <del>+</del> α0.	00	ν σ.σ · u-0		ν 2.0 u-0	111-1.04	ν 2.0 U-0	1110.40	Alphard	217°46.6	-8°46.3
										Regulus	207°33.2	11°50.3
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.9	61°36.4
0	358°54.2	147°52.9	S18°49.0	241°37.6	N21°55.1	218°44.1	$N16^{\circ}07.1$	346°25.5	N02°25.3	Denebola	182°23.8	14°25.4
1	13°56.6	$162^{\circ}54.4$	49.7	256°38.5	54.9	233°46.0	06.9	1°28.1	25.2	Gienah	175°42.5	-17°41.4
2	$28^{\circ}59.1$	177°55.9	50.4	271°39.3	54.6	248°48.0	06.8	16°30.8	25.2		175 42.5 172°59.2	-17 41.4 -63°14.9
3	44°01.6	192°57.4	• • 51.0	286°40.2	• • 54.4	263°50.0	• • 06.6	31°33.4	• • 25.1	Acrux	172 59.2 171°50.7	-03 14.9 -57°15.8
4	59°04.0	207°58.9	51.7	301°41.1	54.2	278°52.0	06.5	46°36.0	25.0	1		
5	74°06.5	223°00.4	52.4	316°41.9	53.9	293°54.0	06.4	61°38.7	24.9	Alioth	166°12.3	55°49.0
6	89°08.9	238°01.9	S18°53.0	331°42.8	N21°53.7	308°56.0	N16°06.2	76°41.3	N02°24.9	Spica	158°21.1	-11°18.0
7	104°11.4	253°03.4	53.7	346°43.6	53.5	323°58.0	06.1	91°43.9	24.8	Alkaid	152°51.3	49°10.9
8	119°13.9	268°04.9	54.3	1°44.5	53.2	338°59.9	05.9	106°46.6	24.7	Hadar	148°34.5	-60°30.2
9	134°16.3	283°06.4	• • 55.0	16°45.4	• • 53.0	354°01.9	• • 05.8	121°49.2	• • 24.6	Menkent	147°56.3	-36°30.1
10	149° 18.8	298°07.9	55.7	31°46.2	52.7	9°03.9	05.7	136°51.8	24.6	Arcturus	145°46.9	19°02.7
11	164°21.3	313°09.4	56.3	46°47.1	52.5	24°05.9	05.5	151°54.5	24.5	Rigil Kent.	139°38.8	-60°56.9
12	179°23.7	328°11.0	\$18°57.0	61°47.9	N21°52.3	39°07.9	N16°05.4	166°57.1	N02°24.4	Kochab	137°20.6	74°02.9
13	194°26.2	343°12.5	57.6	76°48.8	52.0	54°09.9	05.2	181°59.7	24.3	Zuben'ubi	136°54.7	-16°09.1
14	209°28.7	358° 14.0	58.3	91°49.7	51.8	69°11.9	05.1	197°02.4	24.3	Alphecca	126°02.7	26°37.7
15	224°31.1	13° 15.5	• • 58.9	106°50.5	51.6	84°13.8	• • 04.9	212°05.0	24.2	Antares	112°14.2	-26°29.5
16	239°33.6	28° 17.1	18° 59.6	121°51.4	51.3	99°15.8	04.8	227°07.6	24.1	Atria	107°07.3	-69°04.7
17	254°36.1	43° 18.6	19°00.2	136°52.3	51.1	114°17.8	04.7	242°10.3	24.0	Sabik	102°01.2	-15°45.4
18	269°38.5	58° 20.1	S19°00.9	151°53.1	N21°50.8	129°19.8	N16°04.5	257°12.9	N02°24.0	Shaula	96°08.5	-37°07.5
19	284°41.0	73°21.7	01.5	166°54.0	50.6	144°21.8	04.4	272°15.5	23.9	Rasalhague	95°57.3	12°32.6
20	299°43.4	88° 23.2	02.2	181°54.8	50.4	159°23.8	04.4	287°18.2	23.8	Eltanin	90°41.5	51°29.4
21	314°45.9	103°24.7	• • 02.8	196°55.7	50.1	174°25.8	•• 04.1	302°20.8	• • 23.7	Kaus Aust.	83°30.6	-34°22.4
22	329°48.4	118° 26.3	03.5	211°56.6	49.9	174 25.8 189°27.7	04.1	317°23.4	23.6	Vega	80°32.2	38°48.8
23	344°50.8	133° 27.8	04.1	211 50.0 226°57.4	49.7	204°29.7		332°26.1		Nunki	75°45.9	-26°15.8
	344 30.6	133 21.0	04.1	220 37.4	49.1	204 29.1	03.8	332 20.1	23.6	Altair	61°58.4	8°56.5
Mer.p	ass. 00:04	$\nu 1.5' \ d0.$	7′ m-4.80	$ u$ 0.9 $^{\prime}$ d-0	).2′ m1.17	$\nu$ 2.0′ <i>d</i> -0	.1′ m-1.84	$\nu$ 2.6′ d-0	.1'  m0.40	Peacock	53°03.2	-56° 39.0
										Deneb	49°24.5	45°22.8
N 4 -	CIIA	CIIA	D	CHA	D	CIIA	D	CHA	D	Enif	33°37.1	10°00.1
Mon	GHA	GHA	Dec	GHA	Dec	GHA	<b>Dec</b> N16°03.7	<b>GHA</b> 347°28.7	Dec	Al Na'ir	27°30.7	-46°49.8
0	359°53.3 14°55.8	148° 29.4	\$19°04.8	241°58.3	N21°49.4	219°31.7		347°28.7 2°31.3	N02°23.5	Fomalhaut	15°12.6	-29°28.7
1		163°30.9	05.4	256°59.2	49.2	234°33.7 249°35.7	03.5		23.4	Scheat	13°43.5	28° 13.9
2	29°58.2	178° 32.5 193° 34.0	06.0	272°00.0	48.9		03.4	17°34.0	23.3	Markab	13°28.2	15°21.1
3	45°00.7		06.7	287°00.9	• • 48.7	264°37.7	• • 03.3	32°36.6	• • 23.3	Son 10 Cat	C LI V	Mor noss
4	60°03.2	208°35.6	07.3	302°01.8	48.4	279°39.7	03.1	47°39.2	23.2	Sep 19 Sat	<b>SHA</b> 149°23.0	Mer.pass 14:09
5	75°05.6	223°37.2	07.9	317°02.6	48.2	294°41.7	03.0	62°41.9	23.1	Mars		07:54
6	90°08.1	238°38.7	\$19°08.6	332°03.5	N21°48.0	309°43.6	N16°02.8	77°44.5	N02°23.0	1		
7	105°10.6	253°40.3	09.2	347°04.4	47.7	324°45.6	02.7	92°47.1	23.0	Jupiter		09:27
8	120°13.0	268°41.9	09.8	2°05.2	47.5	339°47.6	02.5	107°49.8	22.9	Saturn	347°27.3	00:58
9	135° 15.5	283°43.4	• • 10.5	17°06.1	• • 47.2	354°49.6	• • 02.4	122°52.4	• • 22.8	Sep 20 Sun	SHA	Mer.pass
10	150° 17.9	298° 45.0	11.1	32°07.0	47.0	9°51.6	02.3	137°55.0	22.7		148°58.8	14:07
11	165°20.4	313°46.6	11.7	47°07.8	46.8	24°53.6	02.1	152°57.7	22.7	Mars		07:53
12	180°22.9	328°48.2	\$19° 12.4	62°08.7	N21°46.5	39°55.6	N16°02.0	168°00.3	N02°22.6	Jupiter		09:24
13	195°25.3	343°49.8	13.0	77°09.6	46.3	54°57.6	01.8	183°03.0	22.5	Saturn		00:54
14	210°27.8	358°51.3	13.6	92°10.4	46.0	69°59.6	01.7	198°05.6	22.4			
15	225°30.3	13°52.9	• • 14.2	107°11.3	• • 45.8	85°01.5	•• 01.6	213°08.2	• • 22.3	Sep 21 Mon	SHA	Mer.pass
16	240°32.7	28°54.5	14.8	122°12.2	45.5	100°03.5	01.4	228°10.9	22.3		148°36.1	14:05
17	255°35.2	43°56.1	15.5	137°13.0	45.3	115°05.5	01.3	243°13.5	22.2	l l	242°05.0	07:52
18	270°37.7	58° 57.7	S19°16.1	152°13.9	N21°45.1	130°07.5	N16°01.1	258°16.1	N02°22.1		219°38.4	09:21
19	285°40.1	73°59.3	16.7	167°14.8	44.8	145°09.5	01.0	273°18.8	22.0	Saturn	347°35.4	00:50
20	300°42.6	89°00.9	17.3	182°15.6	44.6	160°11.5	00.9	288°21.4	22.0	Ua! ·		
21	315°45.0	104°02.5	• • 17.9	197°16.5	• • 44.3	175°13.5	• • 00.7	303°24.0	• • 21.9	Horizont	al parallax	0.4
22	330°47.5	119°04.1	18.6	212°17.4	44.1	190°15.5	00.6	318°26.7	21.8		Venus:	0.4
23	345°50.0	134°05.7	19.2	227°18.3	43.8	205°17.5	00.4	333°29.3	21.7		Mars:	0.1
Mern	ass. 23:57	$\nu 1.6' d0$	6′ m-4.81	ν0 9' d-0	0.2′ m1.16	ν2 0' d-0	.1′ m-1.84	ν2 6' d-0	.1′ m0.39			
.ν.ci.ρ	<u>2</u> 0.01	ν 1.0 UU.	J 111 T.UI	≥ J.J u-0		⊬ <u>-</u> .∪ u-0	1.07	∠ 2.0 U-0				

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	181°30.5	$N01^{\circ}33.3$	90°39.6	10.0'	S28°02.1	-0.8'	54.2'
1	196°30.7	32.3	105°08.5	10.0'	28°01.4	-0.9'	54.2'
2	211°30.9 226°31.1	31.4 · · 30.4	119°37.5 134°06.5	10.0' 10.0'	28°00.5 27°59.4	-1.0' -1.2'	54.2' 54.2'
4	241°31.4	29.4	148°35.5	10.0'	27°58.2	-1.3'	54.2'
5	256°31.6	28.5	$163^{\circ}04.5$	10.0'	27°56.9	-1.4'	54.2'
6	271°31.8	N01°27.5	177°33.5	10.0'	\$27°55.5	-1.6'	54.2'
7 8	286°32.0 301°32.2	26.5 25.6	192°02.5 206°31.5	10.0' 10.1'	27°53.9 27°52.2	-1.7' -1.9'	54.2' 54.2'
9	316°32.5	24.6	200° 31.3 221° 00.6	10.1	27°50.3	-2.0'	54.2'
10	331°32.7	23.6	235°29.6	10.1'	27°48.3	-2.1'	54.2'
11	346°32.9	22.6	249°58.7	10.1'	27°46.2	-2.3'	54.2'
12 13	1°33.1 16°33.4	N01°21.7 20.7	264°27.8 278°57.0	10.1' 10.1'	\$27°44.0 27°41.6	-2.4' -2.5'	54.2' 54.2'
14	31°33.6	19.7	293°26.1	10.1	27°39.0	-2.7'	54.2'
15	46°33.8	• • 18.8	$307^{\circ}55.3$	10.2'	27°36.4	-2.8'	54.2'
16	61°34.0	17.8	322°24.5	10.2'	27°33.6	-2.9'	54.2'
17 18	76°34.3 91°34.5	16.8 N01°15.9	336°53.7 351°22.9	10.2' 10.3'	27°30.7 \$27°27.6	-3.1' -3.2'	54.2' 54.2'
19	106°34.7	14.9	5°52.2	10.3'	27°24.5	-3.3'	54.2'
20	121°34.9	13.9	$20^{\circ}21.5$	10.3'	$27^{\circ}21.1$	-3.4'	54.2'
21	136°35.1	• • 12.9	34°50.8	10.3'	27°17.7	-3.6'	54.2'
22 23	151°35.4 166°35.6	12.0 11.0	49°20.1 63°49.5	10.4' 10.4'	27°14.1 27°10.4	-3.7' -3.8'	54.2' 54.2'
23						3.0	J T. Z
	SD = 15.9'	d = -1.0'		SL	0 = 14.8'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°35.8	N01°10.0	78°18.9	10.4'	\$27°06.6	-4.0'	54.2'
1	196°36.0 211°36.3	09.1 08.1	92°48.3 107°17.8	10.5' 10.5'	27°02.6 26°58.5	-4.1' -4.2'	54.2' 54.3'
2	211 36.3 226°36.5	07.1	107 17.8 121°47.3	10.5'	26°54.3	-4.2 -4.4'	54.3'
4	241°36.7	06.2	136°16.8	10.6'	26°49.9	-4.5'	54.3'
5	256°36.9	05.2	150°46.4	10.6'	26°45.4	-4.6'	54.3'
6 7	271°37.1 286°37.4	N01°04.2 03.2	165°15.9 179°45.6	10.6' 10.7'	\$26°40.8 26°36.1	-4.7' -4.9'	54.3' 54.3'
8	301°37.6	03.2	179 45.0 194°15.2	10.7'	26°31.2	-4.9 -5.0'	54.3'
9	316°37.8	01.3	208°44.9	10.7'	26°26.2	-5.1'	54.3'
10	331°38.0	01°00.3	223°14.6	10.8'	26°21.1	-5.2'	54.3'
11	346°38.3 1°38.5	00° 59.4 N00° 58.4	237°44.4 252°14.2	10.8' 10.8'	26°15.9 \$26°10.5	-5.4'	54.3' 54.3'
12 13	1 38.5 16°38.7	NUU 58.4 57.4	252 14.2 266°44.0	10.8	26°05.0	-5.5' -5.6'	54.3'
14	31°38.9	56.4	281°13.9	10.9'	25°59.4	-5.7'	54.4'
15	46°39.1	• • 55.5	295°43.8	11.0'	25°53.6	-5.9'	54.4'
16 17	61°39.4 76°39.6	54.5 53.5	310°13.8 324°43.8	11.0' 11.0'	25°47.8 25°41.8	-6.0' -6.1'	54.4' 54.4'
18	91°39.8	N00° 52.6	339°13.8	11.1'	\$25°35.7	-6.2	54.4'
19	106°40.0	51.6	353°43.9	11.1'	25°29.4	-6.4'	54.4'
20	121°40.3	50.6	8°14.0		25°23.1	0.0	54.4'
21 22	136°40.5 151°40.7	· · 49.7 48.7	22°44.1 37°14.3	11.2' 11.2'	25°16.6 25°10.0	-6.6' -6.7'	54.4' 54.4'
23	166°40.9	47.7	51°44.6	11.3'	25°03.3	-6.8	54.5'
	SD = 15.9'	d = -1.0'		SE	0 = 14.8'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	181°41.1 196°41.4	N00° 46.7 45.8	66°14.8 80°45.2	11.3' 11.4'	\$24°56.5 24°49.5	-7.0' -7.1'	54.5' 54.5'
2	211°41.6	44.8	95°15.5	11.4'	24°42.4	-7.1 -7.2'	54.5'
3	226°41.8	• • 43.8	109°45.9	11.5'	24°35.2	-7.3'	54.5'
4	241°42.0 256°42.3	42.9 41.9	124°16.4 138°46.9	11.5'	24°27.9 24°20.5	-7.4'	54.5' 54.5'
5 6	256°42.3 271°42.5	41.9 N00°40.9	138°46.9 153°17.4	11.5' 11.6'	24°20.5 \$24°13.0	-7.5' -7.7'	54.6'
7	286°42.7	39.9	167°48.0	11.6'	24°05.3	-7.8'	54.6'
8	301°42.9	39.0	182°18.6	11.7'	23°57.6	-7.9'	54.6'
9 10	316°43.1 331°43.4	· · 38.0 37.0	196°49.3 211°20.0	11.7' 11.8'	23°49.7 23°41.7	-8.0' -8.1'	54.6' 54.6'
10	331 43.4 346°43.6	37.0 36.1	211 20.0 225°50.8	11.8'	23 41.7 23°33.6	-8.1' -8.2'	54.6'
12	1°43.8	N00°35.1	240°21.6	11.8'	S23°25.3	-8.3'	54.6'
13	16°44.0	34.1	254°52.4	11.9'	23°17.0	-8.4'	54.7'
14 15	31°44.3 46°44.5	33.1 · · 32.2	269°23.3 283°54.2	11.9' 12.0'	23°08.6 23°00.0	-8.6' -8.7'	54.7' 54.7'
16	61°44.7	31.2	298°25.2	12.0'	23°51.3	-8.8'	54.7'
17	76°44.9	30.2	312°56.3	12.1'	22°42.6	-8.9'	54.7'
18	91°45.1	N00°29.3	327°27.3	12.1'	\$22°33.7	-9.0'	54.7'
19 20	106°45.4 121°45.6	28.3 27.3	341°58.5 356°29.6	12.2' 12.2'	22°24.7 22°15.6	-9.1' -9.2'	54.8' 54.8'
21	136°45.8	26.3	11°00.8	12.3'	22°06.4	-9.3'	54.8'
22	151°46.0	25.4	25°32.1	12.3'	21°57.1	-9.4'	54.8'
23	166°46.3	24.4	40°03.4	12.3'	21°47.7	-9.5'	54.8'
	SD = 15.9'	d = -1.0'		SE	0 = 14.9'		

	Twi	light			Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut
N 72°	02:45	04:20	05:29	18:15	19:24	20:57
N 70°	03:08	04:30	05:32	18:13	19:14	20:35
68°	03:08	04.30	05.32	18:11	19:14	20:35
66°	03:39	04:37	05:36	18:09	19:01	20:10
64°	03:50	04:49	05:37	18:08	18:56	19:55
62°	03:59	04:54	05:38	18:07	18:51	19:46
60°	04:07	04:58	05:39	18:06	18:48	19:38
N 58°	04:13	05:01	05:40	18:05	18:44	19:32
56°	04:19	05:04	05:41	18:04	18:42	19:26
54°	04:24	05:06	05:42	18:04	18:39	19:21
52°	04:29	05:09	05:43	18:03	18:37	19:17
50°	04:33	05:11	05:43	18:03	18:35	19:13
45°	04:41	05:15	05:45	18:02	18:31	19:05
N 40°	04:47	05:19	05:46	18:01	18:28	18:59
35°	04:52	05:21	05:46	18:00	18:25	18:55
30°	04:55	05:23	05:47	17:59	18:23	18:51
20°	05:01	05:26	05:48	17:58	18:20	18:46
N 10°	05:04	05:28	05:49	17:57	18:18	18:43
0°	05:06	05:30	05:50	17:57	18:17	18:41
<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	:
	Sat	Sun	Mon	Sat	Sun	Mon
N 72°						_
N 70°						_
68°			10.47			24 -
66°		10.46	18:47		20.10	21:56
64°		18:42	18:06		20:19	22:36

Lat.		Moonris	е		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	
<b>N</b> 40°	14:12	14:54	15:29	23:02		00:03
35°	13:53	14:36	15:14	23:21		00:19
30°	13:36	14:22	15:02	23:37	•• ••	00:34
20°	13:09	13:56	14:40		00:03	00:58
N 10°	12:45	13:34	14:21		00:27	01:18
0°	12:23	13:14	14:03	••••	00:48	01:38
<b>S</b> 10°	12:01	12:53	13:45	00:19	01:09	01:57
20°	11:38	12:31	13:26	00:43	01:32	02:18
30°	11:10	12:06	13:04	01:11	01:59	02:41
35°	10:54	11:51	12:51	01:27	02:14	02:55
40°	10:35	11:33	12:35	01:46	02:32	03:11
45°	10:12	11:12	12:17	02:10	02:54	03:30
<b>S</b> 50°	09:42	10:45	11:55	02:39	03:21	03:53
52°	09:28	10:32	11:44	02:54	03:35	04:05
54°	09:11	10:17	11:32	03:11	03:50	04:17
56°	08:51	09:59	11:17	03:31	04:08	04:32
58°	08:25	09:37	11:01	03:57	04:30	04:49
<b>S</b> 60°	07:50	09:09	10:40	04:32	04:59	05:10

		Sun		Moon				
Day	Eqn.of Time		Mer.	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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	0°52.4	149°07.4	S19°19.8	242°19.1	N21°43.6	220°19.4	N16°00.3	348°31.9	N02°21.7			Dec
	0 52.4 15°54.9	149 07.4 164°09.0		242 19.1 257°20.0		235°21.4		3°34.6		Alpheratz	357°33.0	29° 14.5
1			20.4		43.4		00.2		21.6	Ankaa	353°05.3	-42°09.5
2	30°57.4	179°10.6	21.0	272°20.9	43.1	250°23.4	16°00.0	18°37.2	21.5	Schedar	349°28.9	56°41.1
3	45°59.8	194°12.2	• • 21.6	287°21.7	• • 42.9	265°25.4	15°59.9	33°39.9	•• 21.4	Diphda	348°45.6	-17°50.2
4	61°02.3	209°13.8	22.2	302°22.6	42.6	280°27.4	59.7	48°42.5	21.4	Achernar	$335^{\circ}18.6$	-57°05.8
5	76°04.8	224°15.5	22.8	317°23.5	42.4	295°29.4	59.6	63°45.1	21.3	Hamal	327°49.3	23°35.4
6	91°07.2	239°17.1	S19°23.4	332°24.4	N21°42.1	310°31.4	N15°59.5	78°47.8	N02°21.2	Polaris	312°58.7	89°22.4
7	106°09.7	254°18.7	24.0	347°25.2	41.9	325°33.4	59.3	93°50.4	21.1	Acamar	315°10.4	-40°11.5
8	121°12.2	269°20.4	24.6	2°26.1	41.6	340°35.4	59.2	108°53.0	21.0	Menkar	314°04.4	4°11.8
9	136° 14.6	284°22.0	• • 25.2	17°27.0	• • 41.4	355°37.4	• • 59.0	123°55.7	• • 21.0	Mirfak	308°25.9	49°57.3
10	151°17.1	299°23.7	25.8	32°27.9	41.1	10°39.4	58.9	138°58.3	20.9	Aldebaran	290°37.9	16°33.8
11	166° 19.5	314°25.3	26.4	47°28.7	40.9	25°41.4	58.7	154°00.9	20.8	Rigel	281°02.4	-8°10.0
12	181°22.0	329°27.0	S19°27.0	62°29.6	N21°40.6	40°43.3	N15°58.6	169°03.6	N02°20.7	Capella	$280^{\circ}19.7$	46°01.3
13	196° 24.5	344°28.6	27.6	77°30.5	40.4	55°45.3	58.5	184°06.2	20.7	Bellatrix	278°21.3	6°22.5
14	211°26.9	359°30.3	28.2	92°31.4	40.2	70°47.3	58.3	199°08.9	20.6	Elnath	278°00.0	28° 37.8
15	226° 29.4	14°31.9	• • 28.8	107°32.2	• • 39.9	85°49.3	• • 58.2	214°11.5	• • 20.5	Alnilam	275°36.3	-1°10.9
16	241°31.9	29°33.6	29.4	122°33.1	39.7	100°51.3	58.0	229°14.1	20.4	Betelgeuse	270°50.6	7°24.8
17	256°34.3	44°35.2	30.0	137°34.0	39.4	115°53.3	57.9	244°16.8	20.4	Canopus	263°51.8	-52° 42.2
18	271°36.8	59°36.9	\$19°30.6	152°34.9	N21°39.2	130°55.3	N15°57.8	259°19.4	N02°20.3	Sirius	258°25.1	-16°44.9
19	286°39.3	74°38.6	31.2	167°35.7	38.9	145°57.3 160°59.3	57.6	274°22.0 289°24.7	20.2	Adhara	255°04.8	-29°00.2
20	301°41.7	89°40.2	31.7	182°36.6	38.7		57.5	289°24.7 304°27.3	20.1	Procyon	244°49.5	5°09.5
21	316°44.2 331°46.7	104°41.9	• • 32.3	197°37.5 212°38.4	38.4	176°01.3 191°03.3	· · 57.3	304°27.3 319°30.0	• • 20.0	Pollux	243°15.7	27°57.6
22	331°46.7 346°49.1	119°43.6	32.9		38.2		57.2		20.0	Avior	234°14.5	-59° 35.4
23	340 49.1	134°45.3	33.5	227°39.2	37.9	206°05.3	57.1	334°32.6	19.9	Suhail	222°45.6	-43°32.2
Mer.p	ass. 23:53	$\nu$ 1.6′ d0.	6′ m-4.81	$ u$ 0.9 $^{\prime}$ d-0	).2′ m1.16	$\nu$ 2.0′ d-0	.1' m-1.85	$\nu$ 2.6′ d-0	.1' m $0.39$	Miaplacidus	221°38.7	-69°49.4
								-		Alphard	$217^{\circ}46.6$	-8°46.3
\A/ <sub>**</sub> -1	CHA	CHA	Daa	CHA	Das	CHA	Daa	CH A	Daa	Regulus	207°33.2	11°50.2
Wed	GHA 1°51.6	<b>GHA</b> 149°47.0	Dec	<b>GHA</b> 242°40.1	Dec	GHA	Dec	<b>GHA</b> 349°35.2	<b>Dec</b> N02°19.8	Dubhe	193°39.9	61°36.3
0	1°51.6	149°47.0 164°48.7	\$19°34.1 34.7	242°40.1 257°41.0	N21°37.7	221°07.3 236°09.3	N15°56.9	349°35.2 4°37.9		Denebola	182°23.8	14°25.4
1 2	16°54.0 31°56.5	164°48.7 179°50.3	34.7 35.2	257°41.0 272°41.9	37.4 37.2	236°09.3 251°11.2	56.8	4°37.9 19°40.5	19.7 19.7	Gienah	175°42.5	-17°41.4
				272 41.9 287°42.8			56.6				172°59.2	-63°14.9
3	46°59.0	194°52.0	• • 35.8		· · 36.9 36.7	266° 13.2 281° 15.2	• • 56.5	34°43.1 49°45.8	• • 19.6	Gacrux	$171^{\circ}50.7$	-57° 15.8
4	62°01.4 77°03.9	209°53.7	36.4	302°43.6 317°44.5		201 15.2 296°17.2	56.4	49 45.6 64°48.4	19.5	Alioth	$166^{\circ}12.3$	55°49.0
5 6	92°06.4	224°55.4 239°57.1	37.0 \$19°37.5	317 44.5 332°45.4	36.4 N21°36.2	311°19.2	56.2 N15°56.1	79°51.1	19.4 N02°19.4	Spica	$158^{\circ}21.1$	-11°18.0
7	92 00.4 107°08.8	259 57.1 254°58.8		347°46.3		311 19.2 326°21.2		94°53.7		Alkaid	152°51.3	49°10.9
8	107 06.6 122°11.3	270°00.5	38.1 38.7	2°47.2	35.9 35.7	341°23.2	55.9 55.8	94 55.7 109°56.3	19.3 19.2	Hadar	148°34.5	-60°30.2
9	137° 13.8	285°02.2	39.2	17°48.0	•• 35.4	356°25.2	• • 55.7	109°50.3 124°59.0	•• 19.1	Menkent	147°56.3	-36°30.1
10	157 15.6 152° 16.2	300°04.0	39.8	32°48.9	35.4	11°27.2	55.5	140°01.6	19.1	Arcturus	145°46.9	19°02.7
11	167° 18.7	315°05.7	40.4	47°49.8	34.9	26°29.2	55.4	155°04.2	19.0	Rigil Kent.	139°38.9	-60°56.9
12	182°21.1	330°07.4	\$19°40.9	62°50.7	N21°34.7	41°31.2	N15°55.2	170°06.9	N02°18.9	Kochab	137°20.7	74°02.9
13	197°23.6	345°09.1	41.5	77°51.6	34.4	56°33.2	55.1	185°09.5	18.8	Zuben'ubi	136°54.7	-16°09.1
14	212°26.1	0°10.8	42.1	92°52.4	34.4	71°35.2	55.0	200°12.2	18.7	Alphecca	126°02.8	26°37.7
15	212 20.1 227°28.5	15°12.6	• • 42.6	107°53.3	33.9	86°37.2	• • 54.8	215°14.8	• • 18.7	Antares	112°14.2	-26°29.5
16	242°31.0	30°14.3	43.2	107 55.3 122°54.2	33.7	101°39.2	54.7	230°17.4	18.6	Atria	107°07.3	-69°04.7
17	257°33.5	45°16.0	43.8	137°55.1	33.4	116°41.2	54.7	245°20.1	18.5	Sabik	102°01.2	-15° 45.4
18	272°35.9	60°17.8	\$19°44.3	152°56.0	N21°33.1	131°43.2	N15°54.4	260°22.7	N02°18.4	Shaula	96°08.5	-37°07.5
19	287°38.4	75°19.5	44.9	167°56.9	32.9	146°45.2	54.3	275°25.3	18.4	Rasalhague	95°57.3	12° 32.6
20	302°40.9	90°21.3	45.4	182°57.7	32.6	161°47.2	54.1	290°28.0	18.3	Eltanin	90°41.5	51°29.4
21	317°43.3	105°23.0	• • 46.0	197°58.6	• • 32.4	176°49.2	• • 54.0	305°30.6	. 18.2	Kaus Aust.	83°30.6	-34°22.4
22	332°45.8	103°23.0° 120°24.7	46.5	212°59.5	32.4	170° 49.2 191° 51.1	53.9	320°33.3	18.1	Vega	80°32.2	38°48.8
23	347°48.3	135°26.5	47.1	228°00.4	31.9	206°53.1	53.7	335°35.9	18.0	Nunki	75°45.9	-26°15.8
23	347 40.3									Altair	61°58.4	8° 56.5
Mer.p	ass. 23:49	$\nu 1.7' \ d0.$	6′ m-4.81	$ u$ 0.9 $^{\prime}$ d-0	$0.2' \; { m m} 1.15$	$\nu$ 2.0′ d-0	$.1^\prime$ m-1.85	$\nu 2.6' \ d-0$	.1'  m0.38	Peacock	53°03.2	-56° 39.0
										Deneb	49°24.6	45°22.8
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.1	10°00.1
0	2°50.7	150°28.3	S19°47.6	243°01.3	N21°31.6	221°55.1	N15°53.6	350°38.5	N02°18.0	Al Na'ir	27°30.7	-46°49.9
1	17°53.2	165°30.0	48.2	258°02.2	31.4	236°57.1	53.4	5°41.2	17.9	Fomalhaut	15°12.6	-29°28.7
2	32°55.6	180°31.8	48.7	273°03.1	31.1	251°59.1	53.3	20°43.8	17.8	Scheat	13°43.5	28°13.9
3	47°58.1	195°33.5	• • 49.3	288°03.9	30.9	267°01.1	• • 53.2	35°46.4	. 17.7	Markab	13°28.2	15°21.1
4	63°00.6	210°35.3	49.8	303°04.8	30.6	282°03.1	53.0	50°49.1	17.7	Sep 22 Tue	SHA	Mer.pass
5	78°03.0	225°37.1	50.3	318°05.7	30.4	297°05.1	52.9	65°51.7	17.6		148°14.9	14:02
6	93°05.5	240°38.8	S19°50.9	333°06.6	N21°30.1	312°07.1	N15°52.7	80°54.4	N02°17.5		241°26.7	07:50
7	108° 08.0	255°40.6	51.4	348°07.5	29.8	327°09.1	52.6	95°57.0	17.4	1	219°27.0	09:17
8	123° 10.4	270°42.4	52.0	3°08.4	29.6	342°11.1	52.5	110°59.6	17.4	Saturn		00:46
9	138° 12.9	285°44.2	• • 52.5	18°09.3	29.3	357° 13.1	52.3	126°02.3	17.3			
10	153° 15.4	300°46.0	53.0	33°10.1	29.1	12° 15.1	52.2	141°04.9	17.2	Sep 23 Wed		Mer.pass
11	168° 17.8	315°47.8	53.6	48°11.0	28.8	27° 17.1	52.0	156°07.6	17.1		147°55.4	13:59
12	183°20.3	330°49.5	S19°54.1	63°11.9	N21°28.6	42°19.1	N15°51.9	171°10.2	N02°17.0		240°48.5	07:49
13	198°22.8	345°51.3	54.6	78°12.8	28.3	57°21.1	51.8	186°12.8	17.0		219°15.7	09:14
14	213°25.2	0°53.1	55.2	93°13.7	28.0	72°23.1	51.6	201°15.5	16.9	Saturn	347°43.6	00:42
15	228° 27.7	15°54.9	• • 55.7	108°14.6	• • 27.8	87°25.1	• • 51.5	216°18.1	• • 16.8	Sep 24 Thu	SHA	Mer.pass
16	243°30.1	30°56.7	56.2	123°15.5	27.5	102°27.1	51.3	231°20.8	16.7		147°37.5	13:56
17	258°32.6	45°58.6	56.7	$138^{\circ}16.4$	27.3	$117^{\circ}29.1$	51.2	246°23.4	16.7		240°10.6	07:47
18	273°35.1	61°00.4	S19°57.3	153°17.3	N21°27.0	132°31.1	N15°51.1	261°26.0	N02°16.6		219°04.4	09:11
19	288°37.5	$76^{\circ}02.2$	57.8	$168^{\circ}18.2$	26.8	147°33.1	50.9	276°28.7	16.5		347°47.8	00:37
20	303°40.0	91°04.0	58.3	$183^{\circ}19.0$	26.5	162°35.1	50.8	291°31.3	16.4			
21	$318^{\circ}42.5$	106°05.8	• • 58.8	$198^{\circ}19.9$	• • 26.2	$177^{\circ}37.1$	• • 50.6	306°33.9	• • 16.3	Horizont	al parallax	
22	333°44.9	121°07.6	59.3	213°20.8	26.0	192°39.1	50.5	321°36.6	16.3		Venus:	0.4
23	348°47.4	136°09.5	59.9	228°21.7	25.7	$207^{\circ}41.1$	50.4	336°39.2	16.2		Mars:	0.1
Mern	ass. 23:45	v1 8/ d0	5′ m-4.81	νη α' Α. α	0.3' m1.15	v2 ∩′ d₋∩	.1′ m-1.85	v26' d.0	.1′ m0.38			
.vici.p		ν 1.0 UU.		- 5.5 u-C		0 u-0		- 2.0 u-0				

h	Su	n	Moon					
Tue	GHA	Dec	GHA	ν	Dec	d	HP	
0	181°46.5	N00°23.4	54°34.7	12.4'	<b>S</b> 21°38.2	-9.6'	54.9'	
1	196°46.7	22.4	69°06.1	12.4'	21°28.5	-9.7'	54.9'	
2	211°46.9 226°47.1	21.5	83°37.6	12.5'	21°18.8	-9.8' -9.9'	54.9'	
3 4	220°47.1 241°47.4	· · 20.5 19.5	98°09.1 112°40.6	12.5' 12.6'	21°09.0 20°59.1	-9.9 -10.0'	54.9' 54.9'	
5	256° 47.6	18.6	112 40.0 127°12.1	12.6'	20°49.0	-10.0	55.0'	
6	271°47.8	N00°17.6	141°43.8	12.7'	\$20°38.9	-10.2'	55.0'	
7	286°48.0	16.6	$156^{\circ}15.4$	12.7'	20°28.7	-10.3'	55.0'	
8	301°48.2	15.6	170°47.1	12.7'	20°18.3	-10.4'	55.0'	
9	316°48.5	• • 14.7	185°18.9	12.8'	20°07.9	-10.5'	55.0'	
10 11	331°48.7 346°48.9	13.7 12.7	199°50.6 214°22.5	12.8' 12.9'	19°57.4 19°46.8	-10.6' -10.7'	55.1' 55.1'	
12	1°49.1	N00°11.8	214 22.3 228°54.3	12.9'	\$19°36.1	-10.7	55.1	
13	16°49.3	10.8	243°26.2	13.0'	19°25.3	-10.9'	55.1'	
14	31°49.6	09.8	257°58.2	13.0'	19°14.4	-11.0'	55.1'	
15	46°49.8	• • 08.8	272°30.2	13.0'	19°03.4	-11.1'	55.2'	
16	61°50.0	07.9	287°02.2	13.1'	18°52.3	-11.2'	55.2'	
17	76°50.2 91°50.5	06.9 N00°05.9	301°34.3 316°06.4	13.1'	18°41.1 \$18°29.8	-11.3' -11.4'	55.2'	
18 19	91 50.5 106°50.7	04.9	310 06.4 330°38.6	13.2' 13.2'	18°18.4	-11.4 -11.5'	55.2' 55.3'	
20	121° 50.9	04.9	345°10.8	13.2'	18°07.0	-11.5'	55.3'	
21	136°51.1	• • 03.0	359°43.0	13.3'	17°55.4	-11.6'	55.3'	
22	151°51.3	02.0	14°15.3	13.3'	17°43.8	-11.7'	55.3'	
23	$166^{\circ}51.6$	01.1	28°47.6	13.3'	17°32.1	-11.8'	55.3'	
	SD = 15.9'	d = -1.0'		SI	O = 15.0'			
Wed	GHA	Dec	GHA	ν	Dec	d	НР	
0	181°51.8	N00°00.1	43°19.9	13.4'	<b>S</b> 17°20.3	-11.9'	55.4'	
1	196°52.0	S00°00.9	57°52.3	13.4'	17°08.4	-12.0'	55.4'	
2	211°52.2	01.9	72°24.7	13.5'	16°56.4	-12.1'	55.4'	
3 4	226°52.4 241°52.7	· · 02.8 03.8	86°57.2 101°29.7	13.5' 13.5'	16°44.4 16°32.2	-12.1' -12.2'	55.4' 55.5'	
5	256° 52.9	04.8	116°02.2	13.6'	16°20.0	-12.2	55.5'	
6	271°53.1	S00°05.8	130°34.7	13.6'	S16°07.7	-12.4	55.5'	
7	286°53.3	06.7	145°07.3	13.6'	15°55.3	-12.5'	55.5'	
8	301°53.5	07.7	159°39.9	13.7'	15°42.8	-12.5'	55.6'	
9	316°53.8	• • 08.7	174°12.6	13.7'	15°30.3	-12.6'	55.6'	
10 11	331°54.0 346°54.2	09.6 10.6	188°45.3 203°18.0	13.7' 13.7'	15°17.6 15°04.9	-12.7' -12.8'	55.6' 55.6'	
12	1°54.4	500°11.6	203 10.0 217°50.7	13.8'	\$14°52.2	-12.9'	55.7'	
13	16° 54.6	12.6	232°23.5	13.8'	14°39.3	-12.9'	55.7'	
14	31°54.9	13.5	$246^{\circ}56.3$	13.8'	14°26.4	-13.0'	55.7'	
15	46°55.1	• • 14.5	261°29.2	13.9'	14°13.4	-13.1'	55.7'	
16 17	61°55.3 76°55.5	15.5 16.5	276°02.0 290°34.9	13.9' 13.9'	14°00.3 13°47.1	-13.2' -13.2'	55.8' 55.8'	
18	91°55.7	500°17.4	305°07.8	13.9'	\$13°33.9	-13.2 -13.3'	55.8'	
19	106° 56.0	18.4	319°40.8	14.0'	13°20.6	-13.4	55.8'	
20	121°56.2	19.4	$334^{\circ}13.7$	14.0'	13°07.2	-13.4'	55.9'	
21	136° 56.4	• • 20.3	348°46.7	14.0'	12°53.8	-13.5'	55.9'	
22	151°56.6	21.3	3°19.7	14.0'	12°40.3	-13.6'	55.9'	
23	166°56.8	22.3	17°52.7	14.1'	12°26.7	-13.6'	55.9'	
	SD = 15.9'	d = -1.0'		SI	O = 15.1'			
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	181°57.1	S00°23.3	32°25.8	14.1'	\$12°13.1	-13.7'	56.0'	
1 2	196° 57.3 211° 57.5	24.2 25.2	46°58.9 61°32.0	14.1' 14.1'	11°59.4 11°45.6	-13.8' -13.8'	56.0' 56.0'	
3	211 57.5 226° 57.7	. 26.2	76°05.1	14.1	11°31.8	-13.9	56.1	
4	241°57.9	27.2	90°38.2	14.1'	11°17.9	-14.0'	56.1	
5	256°58.1	28.1	$105^{\circ}11.3$	14.2'	11°03.9	-14.0'	56.1'	
6	271°58.4	S00°29.1	119°44.5	14.2'	\$10°49.9	-14.1'	56.1'	
7	286° 58.6	30.1	134°17.7	14.2'	10°35.8	-14.1'	56.2'	
8 9	301°58.8 316°59.0	31.0 · · 32.0	148°50.9 163°24.1	14.2' 14.2'	10°21.7 10°07.5	-14.2' -14.3'	56.2' 56.2'	
10	310 59.0 331°59.2	33.0	103 24.1 177°57.3	14.2'	09°53.2	-14.3'	56.2'	
11	346° 59.5	34.0	192°30.5	14.2'	09°38.9	-14.4'	56.3'	
12	1°59.7	S00°34.9	207°03.8	14.3'	S09°24.5	-14.4'	56.3'	
13	16° 59.9	35.9	221°37.0	14.3'	09°10.1	-14.5'	56.3'	
14	32°00.1	36.9	236°10.3	14.3'	08°55.6	-14.5'	56.4	
15 16	47°00.3 62°00.6	• • 37.9	250°43.6 265°16.9	14.3' 14.3'	08°41.1 08°26.5	-14.6'	56.4'	
16 17	62°00.6 77°00.8	38.8 39.8	265°16.9 279°50.1	14.3'	08°26.5 08°11.9	-14.6' -14.7'	56.4' 56.4'	
18	92°01.0	500°40.8	294°23.4	14.3'	S07°57.2	-14.7	56.5	
19	107°01.2	41.8	308°56.7	14.3'	07°42.5	-14.8'	56.5	
20	122°01.4	42.7	323°30.0	14.3'	$07^{\circ}27.7$	-14.8'	56.5'	
21	137°01.6	• • 43.7	338°03.3	14.3'	07°12.8	-14.9'	56.5'	
22	152°01.9	44.7	352°36.6	14.3'	06°58.0	-14.9'	56.6'	
23	167°02.1	45.6	7°09.9	14.3'	06°43.1	-15.0'	56.6'	
	SD = 15.9'	d = 1.0'	SD = 15.3'					

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

Lat.		Moonris	e		Moonset	i i
Lat.	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
N 40°	15:59	16:25	16:49	01:06	02:11	03:16
35°	15:48	16:17	16:44	01:20	02:21	03:23
30°	15:37	16:10	16:40	01:32	02:31	03:29
20°	15:20	15:57	16:33	01:52	02:46	03:40
N 10°	15:05	15:46	16:26	02:10	03:00	03:49
0°	14:50	15:36	16:20	02:26	03:12	03:57
<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	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	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
- Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	3°49.9	151°11.3	S20°00.4	243°22.6	N21°25.5	222°43.1	N15°50.2	351°41.9	N02°16.1			
1	18°52.3	166° 13.1	00.9	258°23.5	25.2	237°45.1	50.1	6°44.5	16.0	Alpheratz	357°33.0	29° 14.5
2	33°54.8	181°15.0	01.4	273°24.4	25.0	252°47.1	50.0	$21^{\circ}47.1$	16.0	Ankaa	353°05.3	-42°09.5
3	48°57.2	196° 16.8	•• 01.9	288°25.3	• • 24.7	267°49.1	• • 49.8	36°49.8	• • 15.9	Schedar	349°28.9	56°41.1
4	63°59.7	211°18.6	02.4	303°26.2	24.4	282°51.1	49.7	51°52.4	15.8	Diphda	348°45.6 335°18.6	-17°50.2 -57°05.8
5	79°02.2	226°20.5	02.9	$318^{\circ}27.1$	24.2	297°53.1	49.5	$66^{\circ}55.1$	15.7	Achernar Hamal	335 18.0 327°49.3	-57 05.8 23°35.4
6	94°04.6	241°22.3	520°03.4	333°28.0	N21°23.9	312°55.1	N15°49.4	81°57.7	N02°15.6	Polaris	312°57.6	89°22.4
7	109°07.1	256°24.2	03.9	348°28.9	23.7	327°57.1	49.3	97°00.3	15.6	Acamar	315°10.4	-40° 11.5
8	124°09.6	271°26.0	04.4	3°29.8	23.4	342°59.1	49.1	112°03.0	15.5	Menkar	314°04.4	4° 11.8
9	139°12.0	286° 27.9	• • 04.9	18°30.6	• • 23.1	358°01.1	• • 49.0	127°05.6	• • 15.4	Mirfak	308°25.9	49°57.3
10	154°14.5	301°29.7	05.4	33°31.5	22.9	13°03.1	48.8	142°08.3	15.3	Aldebaran	290°37.9	16°33.8
11	169°17.0	316°31.6	05.9	48°32.4	22.6	28°05.1	48.7	157°10.9	15.3	Rigel	281°02.4	-8° 10.0
12	184°19.4	331°33.5	S20°06.4	63°33.3	N21°22.4	43°07.1	N15° 48.6	172°13.5	N02°15.2	Capella	280°19.7	46°01.4
13	199°21.9	346°35.3	06.9	78°34.2	22.1	58°09.1	48.4	187°16.2	15.1	Bellatrix	278°21.3	6°22.5
14	214°24.4 229°26.8	1°37.2	07.4	93°35.1	21.8	73°11.1	48.3	202°18.8	15.0	Elnath	278°00.0	28° 37.8
15 16	229 20.8 244°29.3	16°39.1 31°41.0	· · 07.9 08.4	108°36.0 123°36.9	· · 21.6 21.3	88°13.1 103°15.1	· · 48.2 48.0	217°21.5 232°24.1	· · 15.0 14.9	Alnilam	275°36.2	$-1^{\circ}10.9$
17	244 29.3 259°31.7	46°42.9	08.9	123 30.9 138°37.8	21.3	103 15.1 118°17.1	46.0 47.9	232 24.1 247°26.7	14.9	Betelgeuse	270°50.5	7°24.8
18	274°34.2	61°44.7	S20°09.4	153°38.7	N21°20.8	133°19.1	N15° 47.7	262°29.4	N02°14.7	Canopus	263°51.8	-52° 42.2
19	289°36.7	76° 46.6	09.9	168°39.6	20.5	148°21.1	47.6	202 29.4 277°32.0	14.6	Sirius	258°25.0	-16°44.9
20	304°39.1	91°48.5	10.4	183°40.5	20.3	163°23.1	47.5	292°34.7	14.6	Adhara	255°04.8	-29°00.2
21	319°41.6	106° 50.4	. 10.4	198°41.4	20.0	178°25.1	• • 47.3	307°37.3	. 14.5	Procyon	244°49.5	5°09.5
22	334°44.1	100 50.4 121°52.3	11.3	213°42.3	19.7	170°23.1 193°27.1	47.2	322°39.9	14.4	Pollux	243°15.7	27°57.6
23	349°46.5	136°54.2	11.8	228°43.2	19.5	208°29.1	47.0	337°42.6	14.3	Avior	234°14.5	-59°35.4
										Suhail	222°45.6	-43°32.2
ivler.p	pass. 23:41	ν1.8′ d0.	5′ m-4.82	$\nu$ 0.9′ $d$ -0	).3′ m1.14	ν2.0′ <b>d</b> -0	.1′ m-1.86	$\nu$ 2.6′ $d$ -0	.1′ m0.38	Miaplacidus	221°38.7	-69°49.3
										Alphard	217°46.6 207°33.2	-8°46.3
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus		11°50.2
0	4°49.0	$151^{\circ}56.1$	S20°12.3	243°44.1	N21°19.2	$223^{\circ}31.1$	N15°46.9	352°45.2	$N02^{\circ}14.3$	Dubhe Denebola	193°39.9 182°23.8	61°36.3 14°25.4
1	19°51.5	$166^{\circ}58.0$	12.8	258°45.0	18.9	238°33.2	46.8	7°47.9	14.2	Gienah	175°42.5	-17°41.4
2	34°53.9	$182^{\circ}00.0$	13.3	273°45.9	18.7	253°35.2	46.6	22°50.5	14.1		175 42.5 172°59.2	-17 41.4 -63°14.8
3	49°56.4	$197^{\circ}01.9$	•• 13.7	288°46.8	• • 18.4	268°37.2	• • 46.5	$37^{\circ}53.1$	• • 14.0		171°50.7	-57° 15.8
4	64°58.8	212°03.8	14.2	303°47.7	18.2	283°39.2	46.4	52°55.8	13.9	Alioth	166°12.3	55°48.9
5	80°01.3	227°05.7	14.7	318°48.6	17.9	298°41.2	46.2	67°58.4	13.9	Spica	158°21.1	-11° 18.0
6	95°03.8	242°07.6	S20°15.2	333°49.5	N21°17.6	313°43.2	N15°46.1	83°01.1	N02°13.8	Alkaid	152°51.3	49° 10.9
7	110°06.2	257°09.6	15.6	348°50.4	17.4	328°45.2	45.9	98°03.7	13.7	Hadar	148°34.6	-60° 30.2
8	125°08.7	272°11.5	16.1	3°51.3	17.1	343°47.2	45.8	113°06.3	13.6	Menkent	147°56.3	-36°30.1
9	140°11.2	287°13.4	• • 16.6	18°52.2	• • 16.8	358°49.2	• • 45.7	128°09.0	• • 13.6	Arcturus	145°46.9	19°02.7
10	155°13.6	302°15.4	17.0	33°53.1	16.6	13°51.2	45.5	143°11.6	13.5	Rigil Kent.	139°38.9	-60°56.9
11 12	170°16.1 185°18.6	317°17.3 332°19.2	17.5 \$20°17.9	48°54.0 63°54.9	16.3 N21°16.0	28°53.2 43°55.2	45.4 N15°45.3	158°14.3 173°16.9	13.4 N02°13.3	Kochab	137°20.7	74°02.9
13	200°21.0	347° 21.2	18.4	78°55.8		43 55.2 58°57.2		173 10.9 188°19.6	13.2	Zuben'ubi	136°54.7	$-16^{\circ}09.1$
14	200 21.0 215°23.5	2°23.1	18.9	93°56.7	15.8 15.5	73°59.2	45.1 45.0	203°22.2	13.2	Alphecca	126°02.8	26° 37.7
15	230°26.0	17° 25.1	•• 19.3	108°57.6	. 15.3	89°01.2	• • 44.8	203 22.2 218°24.8	13.1	Antares	112°14.3	-26° 29.5
16	245°28.4	32°27.1	19.3	100° 57.0	15.2	104°03.2	44.7	233°27.5	13.1	Atria	107°07.4	-69°04.7
17	260°30.9	47°29.0	20.2	138°59.4	14.7	119°05.2	44.6	248°30.1	12.9	Sabik	102°01.2	-15°45.4
18	275°33.3	62°31.0	S20°20.7	154°00.3	N21°14.4	134°07.2	N15°44.4	263°32.8	N02°12.9	Shaula	96°08.5	-37°07.5
19	290°35.8	77°33.0	21.1	169°01.2	14.2	149°09.2	44.3	278°35.4	12.8	Rasalhague	95°57.3	12°32.6
20	305°38.3	92°34.9	21.6	184°02.1	13.9	164°11.2	44.2	293°38.0	12.7	Eltanin	90°41.6	51°29.4
21	320°40.7	107°36.9	22.0	199°03.1	• • 13.6	179°13.3	• • 44.0	308°40.7	• • 12.6	Kaus Aust.	83°30.6 80°32.2	-34°22.4 38°48.8
22	335°43.2	122°38.9	22.5	214°04.0	13.4	194°15.3	43.9	323°43.3	12.5	Vega Nunki	75°45.9	-26°15.8
23	350°45.7	137°40.9	22.9	229°04.9	13.1	209°17.3	43.7	338°46.0	12.5	Altair	61°58.5	-20 15.6 8°56.5
Morn	pass. 23:37	11 0/ d0	5′ m-4.81	·0 0/ d 0	).3' m1.14		.1′ m-1.86	12 6' d 0	.1′ m0.37	Peacock	53°03.2	-56°39.0
ivier.p	Jass. 23.31	ν1.9 do.	3 111-4.01	νο.9 α-C		ν2.0 u-0	.1 111-1.00	ν2.0 <i>u</i> -0	.1 1110.57	Deneb	49°24.6	45°22.8
										Enif	33°37.2	10°00.1
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.7	-46°49.9
0	5°48.1	152° 42.8	S20°23.4	244°05.8	N21°12.8	224°19.3	N15° 43.6	353°48.6	N02°12.4	Fomalhaut	15°12.6	-29°28.7
1	20°50.6	167°44.8	23.8	259°06.7	12.6	239°21.3	43.5	8°51.2	12.3	Scheat	13°43.5	28°13.9
2	35°53.1	182°46.8	24.3	274°07.6	12.3	254°23.3	43.3	23°53.9	12.2	Markab	13°28.2	15°21.2
3	50°55.5	197°48.8	• • 24.7	289°08.5	• • 12.0	269°25.3	• • 43.2	38°56.5	12.2	Sep 25 Fri	SHA	Mornes
4	65°58.0	212°50.8 227°52.8	25.1	304°09.4	11.8	284°27.3 299°29.3	43.1	53°59.2	12.1		3HA 147°21.4	Mer.pass 13:54
5 6	81°00.4 96°02.9	227°52.8 242°54.8	25.6 \$20°26.0	319°10.3 334°11.2	11.5 N21°11.2	299°29.3 314°31.3	42.9 N15°42.8	69°01.8 84°04.5	12.0 N02°11.9		239°32.8	07:46
7	96 02.9 111°05.4	242 54.8 257° 56.8	26.4	349°12.1	N21 11.2 11.0	314 31.3 329°33.3	N15 42.8 42.6	99°07.1	11.8		218°53.2	09:08
8	111 05.4 126°07.8	272°58.8	26.4	4°13.0	10.7	344°35.3	42.0	99 07.1 114°09.7	11.8	Saturn	347°52.0	09:00
9	141°10.3	288°00.8	• • 27.3	19°13.9	• • 10.4	359°37.3	• • 42.4	114 09.7 129°12.4	• • 11.7			
10	156°12.8	303°02.9	27.7	34°14.8	10.4	14°39.3	42.2	144°15.0	11.6	Sep 26 Sat	SHA	Mer.pass
11	171°15.2	318°04.9	28.2	49°15.8	09.9	29°41.4	42.1	159°17.7	11.5		147°07.1	13:50
12	186°17.7	333°06.9	S20°28.6	64°16.7	N21°09.6	44°43.4	N15°42.0	174°20.3	N02°11.5		238°55.1	07:45
13	201°20.2	348°08.9	29.0	79°17.6	09.4	59°45.4	41.8	189°22.9	11.4		218°42.2	09:05
14	216°22.6	3°11.0	29.4	94°18.5	09.1	74°47.4	41.7	204°25.6	11.3	Saturn	347°56.2	00:29
15	231°25.1	$18^{\circ}13.0$	• • 29.8	$109^{\circ}19.4$	• • 08.8	89°49.4	• • 41.5	219°28.2	• • 11.2	Sep 27 Sun	SHA	Mer.pass
16	246°27.6	$33^{\circ}15.0$	30.3	124°20.3	08.5	$104^{\circ}51.4$	41.4	234°30.9	11.1		146°54.7	13:47
17	261°30.0	$48^{\circ}17.1$	30.7	$139^{\circ}21.2$	08.3	119°53.4	41.3	249°33.5	11.1		238°17.6	07:43
18	276°32.5	63° 19.1	S20°31.1	154°22.1	N21°08.0	134°55.4	N15°41.1	264°36.2	N02°11.0	Jupiter	218°31.1	09:02
19	291°34.9	78°21.2	31.5	169°23.0	07.7	149°57.4	41.0	279°38.8	10.9	Saturn	348°00.5	00:25
20	306°37.4	93°23.2	31.9	184°24.0	07.5	164°59.4	40.9	294°41.4	10.8	Horizont	al parallax	
21	321°39.9	108°25.3	• • 32.3	199°24.9	•• 07.2	180°01.4	• • 40.7	309°44.1	• • 10.8	norizont	Venus:	0.4
22	336°42.3	123°27.3	32.7	214°25.8	06.9	195°03.5	40.6	324°46.7	10.7		Mars:	0.4
23	351°44.8	138° 29.4	33.1	229°26.7	06.6	210°05.5	40.4	339°49.4	10.6	L		V
Mer.p	pass. 23:33	$\nu$ 2.0′ d0.	4′ m-4.81	$ u$ 0.9 $^{\prime}$ d-0	).3′ m1.13	$\nu$ 2.0′ d-0	.1′ m-1.86	$\nu$ 2.6′ d-0	.1′ m0.37			

h	Sun				Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	182°02.3	<b>S</b> 00°46.6	21°43.2	14.3'	S06°28.1	-15.0'	56.6'
1	197°02.5	47.6	36°16.5	14.3'	06°13.1	-15.0'	56.7'
2	212°02.7 227°02.9	48.6 •• 49.5	50°49.8 65°23.1	14.3' 14.3'	05°58.0 05°43.0	-15.1' -15.1'	56.7' 56.7'
4	242°03.2	50.5	79°56.4	14.3'	05°27.8	-15.1 -15.2'	56.7'
5	257°03.4	51.5	94°29.7	14.3'	05°12.7	-15.2'	56.8'
6	272°03.6	S00°52.5	109°03.0	14.3'	S04°57.5	-15.2'	56.8'
7	287°03.8	53.4	123°36.3	14.3'	04°42.2 04°26.9	-15.3'	56.8'
8 9	302°04.0 317°04.3	54.4 •• 55.4	138°09.6 152°42.8	14.3' 14.2'	04°26.9 04°11.6	-15.3' -15.3'	56.8' 56.9'
10	332°04.5	56.3	167°16.1	14.2'	03°56.3	-15.4'	56.9'
11	347°04.7	57.3	181°49.3	14.2'	03°40.9	-15.4'	56.9'
12	2°04.9	S00°58.3	196°22.5	14.2'	S03°25.5	-15.4'	57.0'
13 14	17°05.1 32°05.3	00°59.3 01°00.2	210°55.7 225°28.9	14.2' 14.2'	03°10.1 02°54.6	-15.5' -15.5'	57.0' 57.0'
15	47°05.6	. 01.2	240°02.1	14.2'	02°39.1	-15.5'	57.0'
16	62°05.8	02.2	254°35.3	14.1'	02°23.6	-15.5'	57.1'
17	77°06.0	03.2	269°08.4	14.1'	02°08.1	-15.6'	57.1'
18	92°06.2	S01°04.1	283°41.5	14.1'	S01°52.5	-15.6'	57.1'
19 20	107°06.4 122°06.6	05.1 06.1	298°14.6 312°47.7	14.1' 14.1'	01°36.9 01°21.3	-15.6' -15.6'	57.1' 57.2'
21	137°06.9	07.1	312 47.7 327°20.8	14.1	01°05.6	-15.7'	57.2'
22	152°07.1	08.0	341°53.8	14.0'	00°50.0	-15.7'	57.2'
23	167°07.3	09.0	356°26.8	14.0'	00°34.3	-15.7'	57.3'
	SD = 15.9'	d = 1.0'	<del></del>	SI	D = 15.4'		
٠.	CUA		CILA			,	
Sat 0	<b>GHA</b> 182°07.5	Dec \$01°10.0	<b>GHA</b> 10°59.8	u 14.0'	Dec 500°18.6	d -15.7'	<b>HP</b> 57.3'
1	197°07.7	10.9	25°32.8	13.9'	500° 10.0 500° 02.9	-15.7'	57.3'
2	212°07.9	11.9	40°05.7	13.9'	N00°12.8	15.7'	57.3'
3	227°08.1	• • 12.9	54°38.6	13.9'	00°28.5	15.7'	57.4
4 5	242°08.4 257°08.6	13.9 14.8	69°11.5 83°44.3	13.8' 13.8'	00°44.3 01°00.0	15.8' 15.8'	57.4' 57.4'
6	272°08.8	501°15.8	98°17.2	13.8'	N01°15.8	15.8'	57.4'
7	287°09.0	16.8	112°49.9	13.7'	01°31.6	15.8'	57.5'
8	302°09.2	17.8	127°22.7	13.7'	01°47.4	15.8'	57.5'
9	317°09.4	• • 18.7	141°55.4	13.7'	02°03.2	15.8'	57.5'
10 11	332°09.7 347°09.9	19.7 20.7	156°28.0 171°00.7	13.6' 13.6'	02°19.0 02°34.8	15.8' 15.8'	57.5' 57.6'
12	2°10.1	S01°21.6	185°33.3	13.6'	N02°50.6	15.8'	57.6'
13	17°10.3	22.6	200°05.8	13.5'	03°06.4	15.8'	57.6'
14	32°10.5	23.6	214°38.3	13.5'	03°22.2	15.8'	57.6'
15 16	47°10.7 62°10.9	· · 24.6 25.5	229°10.8 243°43.2	13.4' 13.4'	03°38.0 03°53.8	15.8' 15.8'	57.7' 57.7'
17	77°11.2	26.5	258°15.6	13.4	03°55.8 04°09.6	15.8'	57.7'
18	92°11.4	S01°27.5	272°47.9	13.3'	N04°25.3	15.8'	57.7'
19	107°11.6	28.5	287°20.2	13.2'	04°41.1	15.8'	57.8'
20	122°11.8	29.4 •• 30.4	301°52.5		04°56.9 05°12.7	15.8'	57.8' 57.8'
21 22	137°12.0 152°12.2	31.4	316°24.7 330°56.8	13.1' 13.1'	05 12.7 05°28.4	15.8' 15.7'	57.8'
23	167°12.4	32.3	345°28.9	13.0'	05°44.1	15.7'	57.9'
	SD = 15.9'	d = 1.0'		SI	D = 15.6'		
Sun	GHA	Dec	GHA	ν	Dec	d	НР
0	182°12.7	S01°33.3	0°00.9	13.0'	N05°59.9	15.7'	57.9'
1	197°12.9	34.3	14°32.9	12.9'	06°15.6	15.7'	57.9'
2	212°13.1 227°13.3	35.3 · · 36.2	29°04.8 43°36.7	12.9' 12.8'	06°31.3 06°46.9	15.7' 15.7'	57.9' 58.0'
3 4	227°13.3 242°13.5	37.2	43°36.7 58°08.5	12.8'	06°46.9 07°02.6	15.7° 15.6'	58.0' 58.0'
5	257°13.7	38.2	72°40.3	12.7'	07°18.2	15.6'	58.0'
6	272°13.9	S01°39.2	87°11.9	12.6'	N07°33.8	15.6'	58.0'
7	287°14.2	40.1	101°43.6	12.6'	07°49.4	15.6'	58.1'
8 9	302°14.4 317°14.6	41.1 •• 42.1	116°15.1 130°46.6	12.5' 12.4'	08°05.0 08°20.5	15.5' 15.5'	58.1' 58.1'
10	332°14.8	43.0	145°18.1	12.4'	08°36.0	15.5'	58.1'
11	347°15.0	44.0	159°49.5	12.3'	08°51.5	15.4'	58.1'
12	2°15.2	S01°45.0	174°20.8	12.2'	N09°06.9	15.4'	58.2'
13 14	17°15.4 32°15.6	46.0 46.9	188°52.0 203°23.2	12.2' 12.1'	09°22.3 09°37.7	15.4' 15.3'	58.2' 58.2'
15	47°15.9	• • 47.9	203 23.2 217°54.3	12.1	09°53.0	15.3'	58.2'
16	62°16.1	48.9	232°25.3	12.0'	10°08.3	15.3'	58.3'
17	77°16.3	49.9	246°56.3	11.9'	10°23.6	15.2'	58.3'
18 19	92°16.5 107°16.7	S01°50.8 51.8	261°27.2 275°58.0	11.8' 11.7'	N10°38.8 10°54.0	15.2' 15.1'	58.3' 58.3'
20	107 16.7 122°16.9	52.8	275 56.0 290°28.7	11.7'	10° 54.0 11° 09.1	15.1	58.3'
21	137°17.1	• • 53.7	304°59.4	11.6'	11°24.2	15.0'	58.4'
22	152°17.3	54.7	319°30.0	11.5'	11°39.2	15.0'	58.4'
23	167°17.6	55.7	334°00.5	11.4'	11°54.2	14.9'	58.4'
	SD = 15.9'	d = 1.0'		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
N 58°	04:28	05:14	05:53	17:48	18:27	19:13
56°	04:32	05:16	05:53	17:49	18:26	19:09
54°	04:36	05:17	05:53	17:49	18:24	19:05
52°	04:39	05:19	05:52	17:49	18:23	19:02
50°	04:42	05:20	05:52	17:49	18:22	18:59
45°	04:48	05:22	05:52	17:50	18:19	18:53
<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
<b>N</b> 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	e		Moonse	t
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°	17:31	16:57	16:18	03:27	05:39	07:56
N 70°	17:28	17:02	16:34	03:36	05:38	07:44
68°	17:26	17:07	16:46	03:43	05:36	07:34
66°	17:24	17:11	16:56	03:49	05:35	07:25
64°	17:22	17:14	17:05	03:53	05:34	07:19
62°	17:21	17:17	17:13	03:58	05:34	07:13
60°	17:19	17:19	17:19	04:01	05:33	07:08
N 58°	17:18	17:21	17:25	04:04	05:32	07:03
56°	17:17	17:23	17:30	04:07	05:32	06:59
54°	17:16	17:25	17:35	04:10	05:31	06:56
52°	17:15	17:27	17:39	04:12	05:31	06:52
50°	17:15	17:28	17:43	04:14	05:31	06:49
45°	17:13	17:31	17:52	04:18	05:30	06:43
N 40°	17:11	17:34	17:59	04:22	05:29	06:38
35°	17:10	17:37	18:05	04:25	05:28	06:33
30°	17:09	17:39	18:10	04:28	05:28	06:29
20°	17:07	17:43	18:20	04:33	05:27	06:23
N 10°	17:06	17:46	18:28	04:37	05:26	06:17
0°	17:04	17:49	18:36	04:41	05:25	06:11
<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	Time	Mer.	Mer.	Mer.Pass.	
- 43	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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	6°47.3	153°31.5	S20°33.5	244°27.6	N21°06.4	225°07.5	N15°40.3	354°52.0	N02°10.5			
1	21°49.7	168° 33.5	34.0	259°28.5	06.1	240°09.5	40.2	9°54.6	10.4	Alpheratz	357°33.0	29°14.5
2	36°52.2	183°35.6	34.4	274°29.4	05.8	255°11.5	40.0	24°57.3	10.4	Ankaa	353°05.3	-42°09.5
3	51°54.7	198°37.7	• • 34.8	289°30.3	05.6	270°13.5	39.9	39°59.9	. 10.3	Schedar	349°28.9	56°41.2
4	66°57.1	213°39.8	35.2	304°31.3	05.3	285°15.5	39.8	55°02.6	10.2	Diphda	348°45.5	-17°50.2
5	81°59.6	228°41.9	35.6	319°32.2	05.0	300°17.5	39.6	70°05.2	10.1	Achernar	335°18.6	-57°05.8
6	97°02.0	243°43.9	S20°35.9	334°33.1	N21°04.7	315°19.5	N15°39.5	85°07.9	N02°10.1	Hamal	327°49.3	23°35.4
7	112°04.5	258°46.0	36.3	349°34.0	04.5	330°21.6	39.4	$100^{\circ}10.5$	10.0	Polaris Acamar	312°56.4 315°10.4	89°22.4 -40°11.6
8	127°07.0	273°48.1	36.7	4°34.9	04.2	345°23.6	39.2	115°13.1	09.9	Menkar	314°04.4	4°11.8
9	142°09.4	288°50.2	• • 37.1	19°35.8	• • 03.9	0°25.6	• • 39.1	130°15.8	• • 09.8	Mirfak	308°25.9	49°57.3
10	157° 11.9	303°52.3	37.5	34°36.8	03.7	15°27.6	38.9	145°18.4	09.7	Aldebaran	290°37.8	16°33.8
11	172°14.4	318° 54.4	37.9	49°37.7	03.4	30°29.6	38.8	160°21.1	09.7	Rigel	281°02.4	-8° 10.0
12	187°16.8	333°56.5	S20°38.3	64°38.6	N21°03.1	45°31.6	N15°38.7	175°23.7	N02°09.6	Capella	280°19.7	46°01.4
13	202°19.3	348°58.6	38.7	79°39.5	02.8	60°33.6	38.5	190°26.4	09.5	Bellatrix	278°21.3	6°22.5
14 15	217°21.8 232°24.2	4°00.8 19°02.9	39.1 •• 39.4	94°40.4 109°41.3	02.6 •• 02.3	75°35.6 90°37.6	38.4 •• 38.3	205°29.0 220°31.6	09.4 •• 09.4	Elnath	278°00.0	28°37.8
16	247°26.7	34°05.0	39.4	109 41.3 124°42.3	02.0	105°39.7	38.1	235°34.3	09.4	Alnilam	275°36.2	$-1^{\circ}10.9$
17	262°29.2	49°07.1	40.2	139°43.2	01.7	120°41.7	38.0	250°36.9	09.2	Betelgeuse	270°50.5	7°24.8
18	277°31.6	64°09.2	\$20°40.6	154°44.1	N21°01.5	135°43.7	N15°37.9	265°39.6	N02°09.1	Canopus	263°51.8	-52°42.2
19	292°34.1	79°11.4	40.9	169°45.0	01.2	150°45.7	37.7	280°42.2	09.0	Sirius	258°25.0	-16°44.9
20	307°36.5	94° 13.5	41.3	184°45.9	00.9	165°47.7	37.6	295°44.8	09.0	Adhara	255°04.8	-29°00.2
21	322°39.0	109° 15.7	• • 41.7	199°46.9	• • 00.6	180°49.7	• • 37.4	310°47.5	• • 08.9	Procyon	244°49.5	5°09.5
22	337°41.5	124° 17.8	42.1	214°47.8	00.4	195°51.7	37.3	325°50.1	08.8	Pollux	243°15.7 234°14.5	27° 57.6 -59° 35.4
23	352°43.9	$139^{\circ}19.9$	42.4	229°48.7	00.1	$210^{\circ}53.8$	37.2	340°52.8	08.7	Avior Suhail	234°14.5 222°45.6	-59°35.4 -43°32.2
Mern	ass. 23:29	1/2 1/ d0	4′ m-4.81	νη α' Α α	.3' m1.13	1/2 0/ 4 0	.1′ m-1.86	1/2 6/ d 0	.1′ m0.36	Miaplacidus	222 45.6 221°38.6	-43 32.2 -69°49.3
ivier.p	ass. 23.29	ν2.1 <b>α</b> 0.	T 111-4.01	νυ. <del>9</del> α-υ	1111.13	ν2.0 α-0	.111-1.00	ν Δ.Ο α-0	.1 1110.30	Alphard	221 38.6 217°46.6	-8°46.3
										Regulus	207°33.2	11°50.2
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.9	61°36.3
0	7°46.4	154° 22.1	S20°42.8	244°49.6	N20°59.8	225°55.8	N15°37.0	355°55.4	N02°08.7	Denebola	182°23.8	14°25.4
1	22°48.9	169°24.2	43.2	259°50.5	59.5	240°57.8	36.9	10°58.1	08.6	Gienah	175°42.5	-17°41.3
2	37°51.3	184°26.4	43.5	274°51.5	59.3	255°59.8	36.8	26°00.7	08.5	Acrux	172°59.2	-63°14.8
3	52°53.8	199°28.6	• • 43.9	289°52.4	• • 59.0	271°01.8	• • 36.6	41°03.3	• • 08.4	Gacrux	$171^{\circ}50.7$	-57° 15.8
4	67°56.3	214°30.7	44.2	304°53.3	58.7	286°03.8	36.5	56°06.0	08.3	Alioth	$166^{\circ}12.3$	55°48.9
5 6	82°58.7 98°01.2	229°32.9 244°35.1	44.6 \$20°45.0	319°54.2 334°55.1	58.4 N20°58.1	301°05.8 316°07.9	36.4 N15°36.2	71°08.6 86°11.3	08.3 N02°08.2	Spica	$158^{\circ}21.1$	-11°18.0
7	113°03.7	259° 37.2	45.3	349°56.1	57.9	331°09.9	36.1	101°13.9	08.1	Alkaid	152°51.3	49° 10.9
8	113 03.7 128°06.1	274°39.4	45.3 45.7	4°57.0	57.9 57.6	346°11.9	35.9	101 13.9 116°16.6	08.0	Hadar	148°34.6	-60°30.2
9	143°08.6	289°41.6	46.0	19°57.9	• • 57.3	1°13.9	• • 35.8	131° 19.2	08.0		147°56.3	-36°30.1
10	158°11.0	304°43.8	46.4	34°58.8	57.0	16°15.9	35.7	146°21.8	07.9	Arcturus	145°46.9	19°02.7
11	173° 13.5	319°46.0	46.7	49°59.8	56.8	31°17.9	35.5	161°24.5	07.8	Rigil Kent.	139°38.9	-60°56.9
12	188°16.0	334°48.2	S20°47.1	65°00.7	N20°56.5	46°19.9	N15°35.4	176°27.1	N02°07.7	Kochab	137°20.7	74°02.8
13	203°18.4	349°50.4	47.4	80°01.6	56.2	61°22.0	35.3	191°29.8	07.6	Zuben'ubi Alphecca	136°54.7 126°02.8	-16°09.1 26°37.6
14	$218^{\circ}20.9$	4°52.6	47.7	95°02.5	55.9	76°24.0	35.1	206°32.4	07.6	Antares	112° 14.3	-26°29.5
15	$233^{\circ}23.4$	19°54.8	• • 48.1	110°03.5	• • 55.6	91°26.0	• • 35.0	221°35.1	• • 07.5	Atria	112 14.3 107°07.4	-20° 29.5 -69° 04.7
16	248°25.8	34° 57.0	48.4	125°04.4	55.4	106°28.0	34.9	236°37.7	07.4	Sabik	102°01.3	-15° 45.4
17	263°28.3	49°59.2	48.8	140°05.3	55.1	121°30.0	34.7	251°40.3	07.3	Shaula	96°08.5	-37°07.5
18	278°30.8	65°01.4	S20°49.1	155°06.2	N20°54.8	136°32.0	N15°34.6	266°43.0	N02°07.3	Rasalhague	95°57.3	12°32.6
19	293°33.2	80°03.6	49.4	170°07.2	54.5	151°34.1	34.5	281°45.6	07.2	Eltanin	90°41.6	51°29.4
20	308°35.7	95°05.8	49.8	185°08.1	54.3	166°36.1	34.3	296°48.3	07.1	Kaus Aust.	83°30.6	-34°22.4
21 22	323°38.1 338°40.6	110°08.0	50.1	200°09.0 215°09.9	• • 54.0	181°38.1 196°40.1	• • 34.2	311°50.9 326°53.6	• • 07.0	Vega	80°32.3	38°48.8
22	358 40.6 353°43.1	125° 10.3 140° 12.5	50.4 50.7	215 09.9 230°10.9	53.7 53.4	211°42.1	34.0 33.9	320 53.0 341°56.2	06.9 06.9	Nunki	75°46.0	-26°15.8
23	333 43.1			230 10.9	55.4			341 50.2	00.9	Altair	61°58.5	8°56.5
Mer.p	ass. 23:25	$\nu$ 2.2′ d0.	4′ m-4.80	$\nu$ 0.9' d-0	1.3'  m 1.12	$\nu 2.0' \ d-0$	$.1^\prime$ m-1.87	$\nu$ 2.6′ d-0	.1'  m0.36	Peacock	53°03.2	-56° 39.0
		-								Deneb	49°24.6	45°22.8
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.2	10°00.1
0	8°45.5	155° 14.7	S20°51.1	245°11.8	N20°53.1	226°44.1	N15°33.8	356°58.9	N02°06.8	Al Na'ir	27°30.8	-46°49.9 -29°28.7
1	23°48.0	170° 17.0	51.4	260°12.7	52.9	241°46.2	33.6	12°01.5	06.7	Fomalhaut Scheat	15°12.6 13°43.5	-29° 28.7 28° 13.9
2	38° 50.5	185° 19.2	51.7	275°13.6	52.6	256°48.2	33.5	27°04.1	06.6	Markab	13°28.2	26 13.9 15°21.2
3	53°52.9	$200^{\circ}21.5$	• • 52.0	$290^{\circ}14.6$	• • 52.3	271°50.2	• • 33.4	42°06.8	• • 06.6			19 21.2
4	68° 55.4	215°23.7	52.3	305°15.5	52.0	286°52.2	33.2	57°09.4	06.5	Sep 28 Mon		Mer.pass
5	83° 57.9	230°26.0	52.7	320°16.4	51.7	301°54.2	33.1	72°12.1	06.4		146°44.2	13:44
6	99°00.3	245°28.2	S20°53.0	335°17.4	N20°51.5	316°56.2	N15°33.0		N02°06.3		237°40.3	07:42
7	114°02.8	260° 30.5	53.3	350°18.3	51.2	331°58.3	32.8	102°17.4	06.2		218°20.2	08:58
8	129°05.3	275°32.7	53.6	5°19.2	50.9	347°00.3	32.7	117°20.0	06.2	Saturn	348°04.7	00:20
9	144°07.7	290°35.0	• • 53.9	20°20.2	50.6	2°02.3	• • 32.6	132°22.6	06.1	Sep 29 Tue	SHA	Mer.pass
10 11	159° 10.2 174° 12.6	305°37.3 320°39.6	54.2 54.5	35°21.1 50°22.0	50.3 50.0	17°04.3 32°06.3	32.4 32.3	147°25.3 162°27.9	06.0 05.9		$146^{\circ}35.7$	13:41
12	174 12.6 189° 15.1	320 39.6 335°41.8	54.5 \$20°54.8	65°22.9	N20°49.8	32 06.3 47°08.4	32.3 N15°32.2	162 27.9 177°30.6	05.9 N02°05.9		$237^{\circ}03.2$	07:40
13	204° 17.6	350°44.1	55.1	80°23.9	49.5	62°10.4	32.0	177 30.0 192°33.2	05.8		218°09.4	08:55
14	219°20.0	5°46.4	55.4	95°24.8	49.3	77°12.4	31.9	207°35.9	05.7	Saturn	348°09.0	00:16
15	234°22.5	20°48.7	• • 55.7	110°25.7	• • 48.9	92°14.4	31.7	222°38.5	05.6	Sep 30 Wed	SHA	Mer.pass
16	249°25.0	35°51.0	56.0	125°26.7	48.6	107°16.4	31.6	237°41.1	05.5		146°29.2	13:37
17	264°27.4	50°53.3	56.3	140°27.6	48.4	122°18.5	31.5	252°43.8	05.5		236°26.2	07:39
18	279°29.9	65°55.6	S20°56.6	155°28.5	N20°48.1	137°20.5	N15°31.3	267°46.4	N02°05.4		217°58.6	08:52
19	294°32.4	80°57.9	56.9	170°29.5	47.8	152°22.5	31.2	282°49.1	05.3		$348^{\circ}13.3$	00:12
20	309°34.8	96°00.2	57.2	185°30.4	47.5	167°24.5	31.1	297°51.7	05.2	11. 1	al ac!!	
21	324°37.3	111°02.5	• • 57.5	200°31.3	• • 47.2	182°26.5	• • 30.9	312°54.4	• • 05.2	Horizont	al parallax	0.4
22	339°39.8	126°04.8	57.8	215°32.3	46.9	197°28.6	30.8	327°57.0	05.1		Venus: Mars:	0.4 0.1
23	354°42.2	141°07.1	58.0	230°33.2	46.7	212°30.6	30.7	342°59.7	05.0		iviars:	0.1
Mer.p	ass. 23:21	$\nu$ 2.2′ d0.	3′ m-4.79	$\nu$ 0.9 $^{\prime}$ d-0	.3′ m1.12	$\nu 2.0' \ d-0$	.1′ m-1.87	$\nu 2.6' \ d-0$	.1′ m0.35			
	Vier.pass. 25.21											

h	Sun				Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	182°17.8	S01°56.7	348°30.9	11.3'	N12°09.2	14.9'	58.4'
1 2	197°18.0 212°18.2	57.6 58.6	3°01.3 17°31.5	11.3' 11.2'	12°24.0 12°38.9	14.8' 14.8'	58.4' 58.5'
3	212 18.2 227°18.4	01°59.6	32°01.7	11.1'	12°53.7	14.7	58.5'
4	242°18.6	$02^{\circ}00.5$	46°31.8	11.0'	$13^{\circ}08.4$	14.7'	58.5'
5	257°18.8	01.5	61°01.8	10.9'	13°23.0	14.6'	58.5'
6 7	272°19.0 287°19.2	\$02°02.5 03.5	75°31.8 90°01.6	10.8' 10.8'	N13° 37.6 13° 52.2	14.5' 14.5'	58.5' 58.5'
8	302°19.5	04.4	104°31.4	10.7'	14°06.6	14.4'	58.6'
9	317°19.7	•• 05.4	119°01.0	10.6'	14°21.0	14.3'	58.6'
10 11	332°19.9 347°20.1	06.4 07.4	133°30.6 148°00.1	10.5' 10.4'	14°35.4 14°49.6	14.3' 14.2'	58.6' 58.6'
12	2°20.3	502°08.3	162°29.5	10.4	N15°03.8	14.1	58.6'
13	17°20.5	09.3	176°58.8	10.2'	15°18.0	14.0'	58.7'
14	32°20.7	10.3	191°28.1	10.1'	15°32.0	14.0'	58.7'
15 16	47°20.9 62°21.1	· · 11.2 12.2	205°57.2 220°26.2	10.0' 9.9'	15°46.0 15°59.9	13.9' 13.8'	58.7' 58.7'
17	77°21.4	13.2	234°55.2	9.8'	16° 13.7	13.7'	58.7'
18	92°21.6	S02°14.2	249°24.0	9.8'	N16°27.4	13.6'	58.7'
19 20	107°21.8 122°22.0	15.1 16.1	263°52.8 278°21.4	9.7' 9.6'	16°41.1 16°54.6	13.6' 13.5'	58.7' 58.8'
21	137°22.2	17.1	276 21.4 292°50.0	9.0 9.5'	10 54.0 17°08.1	13.4	58.8'
22	152°22.4	18.0	307°18.5	9.4'	17°21.5	13.3'	58.8'
23	167°22.6	19.0	321°46.8	9.3'	17°34.8	13.2'	58.8'
	SD = 16.0'	d = 1.0'		SI	0 = 15.9'		
Tue	GHA	Dec	GHA	ν	Dec	d	НР
0	182°22.8	S02°20.0	336°15.1	9.2'	N17°48.0	13.1'	58.8'
1	197°23.0	21.0	350°43.3	9.1'	18°01.1	13.0'	58.8'
2	212°23.2 227°23.4	21.9 •• 22.9	5°11.3 19°39.3	9.0' 8.9'	18° 14.1 18° 27.1	12.9' 12.8'	58.9' 58.9'
4	242°23.7	23.9	34°07.2	8.8'	18°39.9	12.7'	58.9'
5	257°23.9	24.8	48°34.9	8.7'	$18^{\circ}52.6$	12.6'	58.9'
6	272°24.1 287°24.3	S02°25.8 26.8	63°02.6 77°30.2	8.6' 8.5'	N19°05.2 19°17.7	12.5' 12.4'	58.9' 58.9'
7 8	287 24.3 302°24.5	20.8 27.8	91°57.6	8.4'	19 17.7 19°30.1	12.4	58.9'
9	317°24.7	• • 28.7	106°25.0	8.3'	19°42.4	12.2'	58.9'
10	332°24.9	29.7	120°52.3	8.2'	19°54.6	12.1'	59.0'
11 12	347°25.1 2°25.3	30.7 <b>S</b> 02°31.6	135°19.4 149°46.5	8.1' 8.0'	20°06.7 N20°18.6	12.0' 11.8'	59.0' 59.0'
13	17°25.5	32.6	164°13.4	7.9	20°30.5	11.7'	59.0'
14	32°25.7	33.6	178°40.3	7.7'	20°42.2	11.6'	59.0'
15 16	47°25.9 62°26.2	· · 34.6 35.5	193°07.0 207°33.7	7.6' 7.5'	20°53.8 21°05.3	11.5' 11.4'	59.0' 59.0'
17	77°26.4	36.5	207 33.7 222°00.2	7.4'	21° 16.7	11.4	59.0'
18	92°26.6	<b>S</b> 02°37.5	236°26.6	7.3'	N21°27.9	11.1'	59.0'
19	107°26.8 122°27.0	38.4 39.4	250°53.0 265°19.2	7.2' 7.1'	21°39.0 21°50.0	11.0'	59.1' 59.1'
20 21	137°27.2	. 40.4	205 19.2 279°45.4	7.1 7.0'	21 50.0 22°00.9	10.9	59.1'
22	152°27.4	41.4	294°11.4	6.9'	22°11.6	10.6'	59.1'
23	167°27.6	42.3	308°37.3	6.8'	22°22.2	10.5'	59.1'
	SD = 16.0'	d = 1.0'		SI	0 = 16.0'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	182°27.8	S02°43.3	323°03.1	6.7'	$N22^{\circ}32.7$	10.3'	59.1'
1 2	197°28.0 212°28.2	44.3 45.2	337°28.9 351°54.5	6.6' 6.5'	22°43.0 22°53.2	10.2' 10.0'	59.1' 59.1'
3	212°28.2 227°28.4	45.2 • • 46.2	351 54.5 6°20.0	6.4	22°53.2 23°03.2	9.9'	59.1' 59.1'
4	242°28.6	47.2	20°45.5	6.3'	23°13.1	9.8'	59.1'
5	257°28.8	48.1	35°10.8	6.2'	23°22.9	9.6'	59.1'
6 7	272°29.0 287°29.3	S02°49.1 50.1	49°36.0 64°01.2	6.1' 6.0'	N23°32.5 23°42.0	9.5' 9.3'	59.2' 59.2'
8	302°29.5	51.1	78°26.2	5.9'	23°51.3	9.2'	59.2'
9	317°29.7	• • 52.0	92°51.2	5.9'	24°00.5	9.0'	59.2'
10 11	332°29.9 347°30.1	53.0 54.0	107°16.0 121°40.8	5.8' 5.7'	24°09.5 24°18.4	8.9' 8.7'	59.2' 59.2'
12	2°30.3	54.0 \$02°54.9	121 40.8 136°05.4	5. <i>1</i> '	N24°27.1	8.6	59.2'
13	17°30.5	55.9	150°30.0	5.5'	24°35.6	8.4'	59.2'
14	32°30.7	56.9	164°54.5	5.4'	24° 44.0	8.2'	59.2'
15 16	47°30.9 62°31.1	· · 57.8 58.8	179°18.9 193°43.2	5.3' 5.2'	24°52.3 25°00.4	8.1' 7.9'	59.2' 59.2'
17	77°31.3	02°59.8	208°07.4	5.1	25°08.3	7.8'	59.2'
18	92°31.5	S03°00.8	222°31.5	5.0'	N25°16.0	7.6'	59.2'
19 20	107°31.7 122°31.9	01.7 02.7	236°55.6 251°19.5	5.0' 4.9'	25°23.6 25°31.1	7.4' 7.3'	59.2' 59.2'
21	137°32.1	•• 03.7	265°43.4	4.9 4.8'	25°38.3	7.3 7.1'	59.2'
22	152°32.3	04.6	280°07.2	4.7'	25° 45.4	6.9'	59.3'
23	167°32.5	05.6	294°30.9	4.6'	25°52.3	6.7'	59.3'
	SD = 16.0'	d = 1.0'		SI	D = 16.1'		

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

Lat.		Moonris	e		Moonset	į.
Lat.	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
N 58°	17:31	17:40	17:56	08:38	10:18	12:01
56°	17:40	17:53	18:14	08:30	10:05	11:43
54°	17:47	18:05	18:30	08:23	09:55	11:27
52°	17:55	18:15	18:44	08:17	09:45	11:14
50°	18:01	18:24	18:56	08:11	09:36	11:02
45°	18:15	18:44	19:21	07:59	09:18	10:39
N 40°	18:26	19:00	19:41	07:49	09:04	10:19
35°	18:36	19:13	19:57	07:41	08:51	10:03
30°	18:45	19:25	20:12	07:33	08:40	09:50
20°	19:00	19:45	20:37	07:21	08:22	09:26
N 10°	19:13	20:03	20:58	07:10	08:06	09:06
0°	19:26	20:20	21:19	06:59	07:51	08:47
S 10°	19:39	20:37	21:39	06:49	07:36	08:29
20°	19:52	20:55	22:01	06:38	07:21	08:09
30°	20:08	21:17	22:26	06:26	07:03	07:46
35°	20:17	21:29	22:41	06:18	06:52	07:32
40°	20:28	21:43	22:59	06:10	06:40	07:17
45°	20:40	22:01	23:20	06:01	06:26	06:59
<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 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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Thu -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
			520°58.3		N20°46.4						эпа	Dec
0	9°44.7	156°09.5		245°34.1		227°32.6	N15° 30.5	358°02.3	N02°04.9	Alpheratz	357°32.9	29°14.5
1	24°47.1	171°11.8	58.6	260°35.1	46.1	242°34.6	30.4	13°04.9	04.8	Ankaa	353°05.3	-42°09.5
2	39°49.6	186°14.1	58.9	275°36.0	45.8	257°36.6	30.3	28°07.6	04.8	Schedar	349°28.8	56°41.2
3	54°52.1	201°16.4	• • 59.2	290°37.0	• • 45.5	272°38.7	• • 30.1	43°10.2	• • 04.7	Diphda	348°45.5	-17°50.2
4	69°54.5	216° 18.8	59.4	305°37.9	45.2	287°40.7	30.0	58°12.9	04.6	Achernar	335°18.6	-57°05.9
5	84°57.0	231°21.1	20°59.7	320°38.8	45.0	302°42.7	29.9	73°15.5	04.5	Hamal	327°49.3	23°35.5
6	99°59.5	246°23.5	S21°00.0	335°39.8	N20°44.7	317°44.7	N15°29.7	88°18.2	N02°04.5	Polaris	312°54.9	89°22.4
7	115°01.9	261°25.8	00.2	350°40.7	44.4	332°46.7	29.6	103°20.8	04.4	Acamar	315°10.4	-40°11.6
8	130°04.4	276° 28.2	00.5	5°41.6	44.1	347°48.8	29.5	118°23.4	04.3	Menkar	314°04.4	4°11.8
9	145°06.9	291°30.5	00.8	20°42.6	• • 43.8	2°50.8	• • 29.3	133°26.1	• • 04.2	Mirfak	308°25.8	49°57.3
10	160°09.3	306°32.9	01.0	35°43.5	43.5	17°52.8	29.2	148°28.7	04.1	Aldebaran	290°37.8	16°33.8
11	175°11.8	321°35.2	01.3	50°44.4	43.2	32°54.8	29.1	163°31.4	04.1	Rigel	281°02.4	-8°10.0
12	190°14.3	336° 37.6	S21°01.6	65°45.4	N20°43.0	47°56.9	N15°28.9	178°34.0	N02°04.0	Capella	280°19.6	46°01.4
13	205°16.7	351°40.0	01.8	80°46.3	42.7	62°58.9	28.8	193°36.7	03.9	Bellatrix	278°21.3	6°22.5
14	220°19.2	6°42.4	02.1	95°47.3	42.4	78°00.9	28.7	208°39.3	03.8	Elnath	278°00.0	28°37.8
15	235°21.6	21°44.7	• • 02.3	110°48.2	• • 42.1	93°02.9	· · 28.5	223°42.0	• • 03.8	Alnilam	275°36.2	-1°10.9
16	250°24.1	$36^{\circ}47.1$	02.6	$125^{\circ}49.1$	41.8	108°05.0	28.4	238°44.6	03.7	Betelgeuse	270°50.5	7°24.8
17	265°26.6	51°49.5	02.8	140°50.1	41.5	123°07.0	28.3	253°47.2	03.6	1		-52°42.2
18	280°29.0	$66^{\circ}51.9$	S21°03.1	155°51.0	N20°41.2	138°09.0	N15°28.1	268°49.9	N02°03.5	Canopus	263°51.7	-32 42.2 -16°44.9
19	295°31.5	81°54.3	03.3	170°52.0	41.0	153°11.0	28.0	283°52.5	03.5	Sirius	258°25.0	
20	310°34.0	96°56.7	03.6	185°52.9	40.7	168°13.0	27.9	298°55.2	03.4	Adhara	255°04.8	-29°00.2
21	325°36.4	111°59.1	• • 03.8	200°53.8	• • 40.4	183°15.1	• • 27.7	313°57.8	• • 03.3	Procyon	244°49.4	5°09.5
22	340°38.9	127°01.5	04.0	215°54.8	40.1	198°17.1	27.6	329°00.5	03.2	Pollux	243°15.7	27°57.6
23	355°41.4	142°03.9	04.3	230°55.7	39.8	213°19.1	27.5	344°03.1	03.1	Avior	234°14.4	-59°35.4
										Suhail	222°45.5	-43°32.2
Mer.p	bass. 23:17	$\nu$ 2.3′ d0.	3′ m-4.78	$\nu$ 0.9′ $d$ -0	.3'  m1.11	$\nu 2.0' \ d-0$	.1' m-1.87	$\nu$ 2.6′ d-0	.1'  m0.35	Miaplacidus	221°38.6	-69°49.3
										Alphard	217°46.6	-8°46.3
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.2	11°50.2
0	ина 10°43.8	157°06.3	S21°04.5	245°56.7	N20°39.5	228°21.1	N15° 27.3	359°05.8	N02°03.1	Dubhe	193°39.9	61°36.3
1	10 43.8 25°46.3	157 06.3 172°08.7	04.8	245 50.7 260°57.6	39.5	243°23.2	N15 27.3 27.2	359 05.8 14°08.4		Denebola	182°23.8	14°25.4
2	25°46.3 40°48.7	172°08.7 187°11.1	04.8 05.0		39.2 38.9	243°23.2 258°25.2		29°11.0	03.0	Gienah	$175^{\circ}42.5$	-17°41.3
				275°58.6			27.0		02.9	Acrux	172°59.2	-63°14.8
3	55°51.2	202°13.6	• • 05.2	290°59.5	• • 38.7	273°27.2	• • 26.9	44°13.7	• • 02.8	Gacrux	171°50.6	-57°15.7
4	70°53.7	217°16.0	05.5	306°00.4	38.4	288°29.2	26.8	59°16.3	02.8	Alioth	166°12.3	55°48.9
5	85°56.1	232°18.4	05.7	321°01.4	38.1	303°31.3	26.6	74°19.0	02.7	Spica	$158^{\circ}21.1$	-11°18.0
6	100°58.6	247°20.8	S21°05.9	336°02.3	N20°37.8	318°33.3	N15°26.5	89°21.6	N02°02.6	Alkaid	152°51.3	49°10.9
7	116°01.1	262°23.3	06.1	351°03.3	37.5	333°35.3	26.4	104°24.3	02.5	Hadar	148°34.6	-60°30.2
8	131°03.5	277° 25.7	06.4	6°04.2	37.2	348°37.3	26.2	119°26.9	02.4		147°56.3	-36°30.1
9	146°06.0	292°28.2	• • 06.6	21°05.2	• • 36.9	3°39.4	• • 26.1	134°29.5	• • 02.4	Arcturus	145°46.9	19°02.7
10	161°08.5	307°30.6	06.8	$36^{\circ}06.1$	36.6	18°41.4	26.0	149°32.2	02.3	Rigil Kent.	139°38.9	-60°56.8
11	176°10.9	322°33.1	07.0	51°07.1	36.3	33°43.4	25.8	164°34.8	02.2	Kochab	137°20.8	74°02.8
12	191°13.4	337°35.5	S21°07.2	66°08.0	N20°36.1	48°45.5	N15°25.7	179°37.5	$N02^{\circ}02.1$	Zuben'ubi	136°54.7	-16°09.1
13	206°15.9	352°38.0	07.4	81°09.0	35.8	63°47.5	25.6	194°40.1	02.1	Alphecca	126°02.8	26°37.6
14	221°18.3	7°40.4	07.6	96°09.9	35.5	78°49.5	25.4	209°42.8	02.0	Antares	112° 14.3	-26°29.5
15	236°20.8	22°42.9	• • 07.9	111°10.8	• • 35.2	93°51.5	• • 25.3	224°45.4	• • 01.9	Atria	112 14.3 107°07.4	-20°29.3 -69°04.7
16	251°23.2	37°45.4	08.1	126°11.8	34.9	108°53.6	25.2	239°48.1	01.8		107 07.4 102°01.3	-09 04.7 -15°45.4
17	266°25.7	52°47.9	08.3	141°12.7	34.6	123°55.6	25.0	254°50.7	01.7	Sabik		
18	281°28.2	67°50.3	S21°08.5	156°13.7	N20°34.3	138°57.6	N15°24.9	269°53.3	N02°01.7	Shaula	96°08.5	-37°07.4
19	296°30.6	82°52.8	08.7	171°14.6	34.0	153°59.6	24.8	284°56.0	01.6	Rasalhague	95°57.3	12°32.6
20	311°33.1	97°55.3	08.9	186°15.6	33.7	169°01.7	24.6	299°58.6	01.5	Eltanin	90°41.6	51°29.4
21	326°35.6	112°57.8	09.1	201°16.5	• • 33.4	184°03.7	24.5	315°01.3	. 01.4	Kaus Aust.	83°30.7	-34°22.4
22	341°38.0	128°00.3	09.3	216°17.5	33.2	199°05.7	24.4	330°03.9	01.4	Vega	80°32.3	38°48.8
23	356°40.5	143°02.8	09.4	231°18.4	32.9	214°07.8	24.3	345°06.6	01.4	Nunki	75°46.0	-26°15.8
										Altair	61°58.5	8°56.5
Mer.p	bass. 23:13	$\nu$ 2.4′ d0.	2′ m-4.77	$\nu$ 0.9′ d-0	.3'  m1.10	$\nu 2.0' \ d-0$	$.1^\prime$ m-1.88	$\nu 2.6' \ d-0$	.1'  m0.34	Peacock	53°03.2	-56°39.0
										Deneb	49°24.6	45°22.8
c - ·	CIIA	CIIA	D	CIIA	D	CILA	D	CHA	D	Enif	33°37.2	10°00.1
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA 0°00 0	Dec	Al Na'ir	27°30.8	-46°49.9
0	11°43.0	158°05.3	S21°09.6	246°19.4	N20°32.6	229°09.8	N15°24.1	0°09.2	N02°01.2	Fomalhaut	15°12.6	-29°28.7
1	26°45.4	173°07.8	09.8	261°20.3	32.3	244°11.8	24.0	15°11.9	01.1	Scheat	13°43.5	28°13.9
2	41°47.9	188° 10.3	10.0	276°21.3	32.0	259°13.8	23.9	30°14.5	01.0	Markab	13°28.2	15°21.2
3	56°50.4	203°12.8	• • 10.2	291°22.2	• • 31.7	274°15.9	• • 23.7	45°17.1	• • 01.0	Oct 01 T	CIIA	Ma::::
4	71°52.8	218° 15.3	10.4	306°23.2	31.4	289°17.9	23.6	60°19.8	00.9	Oct 01 Thu	SHA	Mer.pass
5	86°55.3	233°17.9	10.6	321°24.1	31.1	304°19.9	23.5	75°22.4	8.00		146°24.8	13:33
6	101°57.7	248°20.4	S21°10.7	336°25.1	N20°30.8	319°22.0	N15°23.3		N02°00.7	1	235°49.5	07:37
7	117°00.2	263°22.9	10.9	351°26.0	30.5	334°24.0	23.2	105°27.7	00.7		217°47.9	08:49
8	132°02.7	278°25.4	11.1	6°27.0	30.2	349°26.0	23.1	120°30.4	00.6	Saturn	348°17.6	00:08
9	147°05.1	293°28.0	• • 11.3	21°27.9	• • 29.9	4°28.0	• • 22.9	135°33.0	• • 00.5	Oct 02 Fri	SHA	Mer.pass
10	162°07.6	308° 30.5	11.4	36°28.9	29.7	19°30.1	22.8	150°35.7	00.4		146°22.5	13:29
11	177°10.1	323°33.1	11.6	51°29.8	29.4	34°32.1	22.7	165°38.3	00.3		235°12.9	07:36
12	192°12.5	338° 35.6	S21°11.8	66°30.8	N20°29.1	49°34.1	N15°22.5	180°40.9	N02°00.3		217°37.3	07.30
13	207°15.0	353°38.1	11.9	81°31.8	28.8	64°36.2	22.4	195°43.6	00.2		348°21.9	00:45
14	222°17.5	8°40.7	12.1	96°32.7	28.5	79°38.2	22.3	210°46.2	00.1	Jatuin	J-U 41.9	00.04
15	237°19.9	23°43.3	• • 12.3	111°33.7	• • 28.2	94°40.2	• • 22.1	225°48.9	• • 00.0	Oct 03 Sat	SHA	Mer.pass
16	252°22.4	38°45.8	12.4	126°34.6	27.9	109°42.3	22.0	240°51.5	$02^{\circ}00.0$		146°22.3	13:25
17	267°24.9	53°48.4	12.6	141°35.6	27.6	124°44.3	21.9	255°54.2	$01^{\circ}59.9$		234°36.4	07:34
18	282°27.3	68°51.0	S21°12.7	156°36.5	N20°27.3	139°46.3	N15°21.7	270°56.8	N01°59.8		217°26.8	08:42
19	297°29.8	83°53.5	12.9	171°37.5	27.0	154°48.3	21.6	285°59.5	59.7		348°26.3	23:55
20	312°32.2	98°56.1	13.0	186°38.4	26.7	169°50.4	21.5	301°02.1	59.6			
21	327°34.7	113°58.7	· · 13.2	201°39.4	26.4	184°52.4	21.3	316°04.8	• • 59.6	Horizont	al parallax	
22	342°37.2	129°01.3	13.3	216°40.4	26.1	199°54.4	21.2	331°07.4	59.5		Venus:	0.4
23	357°39.6	144°03.9	13.5	231°41.3	25.8	214°56.5	21.1	346°10.0	59.4	L	Mars:	0.1
						_						
I\/ler r	pass. 23:09	$\nu$ 2.5′ $d$ 0.	2′ m-4.76	$\nu$ 1.0′ $d$ -0	.3'  m1.10	$\nu$ 2.0′ d-0.	.1' m-1.88	$\nu$ 2.6′ $d$ -0	.1'  m0.33			

h	Sui	+0.1100 se	Moon					
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0 1	182°32.7 197°32.9	\$03°06.6 07.5	308°54.6 323°18.1	4.6' 4.5'	N25°59.1 26°05.6	6.6' 6.4'	59.3' 59.3'	
2	212°33.1	07.5 08.5	323 16.1 337°41.6	4.5 4.4'	26°12.0	6.2	59.3'	
3	212 33.1 227°33.3	09.5	352°05.0	4.3'	26°18.3	6.0'	59.3'	
4	242°33.5	10.5	6°28.4	4.3'	26°24.3	5.9'	59.3'	
5	257°33.7	11.4	20°51.7	4.2'	26°30.2	5.7'	59.3'	
6	272°34.0	S03°12.4	35°14.9	4.1'	$N26^{\circ}35.9$	5.5'	59.3'	
7	287°34.2	13.4	49°38.0	4.1'	26°41.4	5.3'	59.3'	
8	302°34.4	14.3	64°01.1	4.0'	26°46.7	5.1'	59.3'	
9	317°34.6	• • 15.3	78°24.1	4.0'	26°51.9	5.0'	59.3'	
10 11	332°34.8 347°35.0	16.3 17.2	92°47.1 107°10.0	3.9' 3.9'	26°56.8 27°01.6	4.8' 4.6'	59.3' 59.3'	
12	2°35.2	503°18.2	107 10.0 121°32.9	3.8'	N27°06.2	4.4	59.3	
13	17°35.4	19.2	135°55.7	3.7'	27°10.6	4.2'	59.3'	
14	32°35.6	20.1	150°18.4	3.7'	27°14.9	4.0'	59.3'	
15	47°35.8	• • 21.1	164°41.1	3.7'	27°18.9	3.9'	59.3'	
16	62°36.0	22.1	179°03.8	3.6'	27°22.7	3.7'	59.3'	
17	77°36.2	23.0	193°26.4	3.6'	27°26.4	3.5'	59.3'	
18	92°36.4	S03°24.0	207°48.9	3.5'	N27°29.9	3.3'	59.3'	
19	107°36.6	25.0	222°11.5	3.5'	27°33.2	3.1'	59.3'	
20 21	122°36.8 137°37.0	26.0 •• 26.9	236°33.9 250°56.4	3.5' 3.4'	27°36.3 27°39.2	2.9' 2.7'	59.3' 59.3'	
22	157 37.0 152°37.2	27.9	265°18.8	3.4 3.4'	27 39.2 27°41 9	2.7	59.3'	
23	167°37.4	28.9	279°41.2	3.4	27°44.4	2.3	59.3'	
	SD = 16.0'	d = 1.0'		SI	D = 16.2'			
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	182°37.6	S03°29.8	294°03.6	3.3'	N27°46.7	2.1'	59.3'	
1	197°37.8 212°38.0	30.8 31.8	308°25.9 322°48.3	3.3' 3.3'	27°48.8 27°50.8	1.9' 1.7'	59.3' 59.3'	
2	212°38.0 227°38.2	32.7	322°48.3 337°10.6	3.3'	27°50.8 27°52.5	1.7	59.3'	
3 4	242°38.4	33.7	351°32.8	3.3'	27°54.1	1.4'	59.3'	
5	257°38.6	34.7	5°55.1	3.3'	27°55.4	1.2'	59.3'	
6	272°38.8	S03°35.6	20°17.4	3.2'	N27°56.6	1.0'	59.3'	
7	287°39.0	36.6	34°39.6	3.2'	27°57.6	0.8'	59.3'	
8	302°39.2	37.6	49°01.9	3.2'	27°58.3	0.6'	59.3'	
9	317°39.4	• • 38.5	63°24.1	3.2'	27°58.9	0.4'	59.3'	
10	332°39.6	39.5	77°46.3	3.2'	27°59.3	0.2'	59.3'	
11 12	347°39.8 2°40.0	40.5 \$03°41.4	92°08.6 106°30.8	3.2' 3.2'	27°59.5 N27°59.5	-0.0' -0.2'	59.3' 59.3'	
13	17°40.2	42.4	100 50.8 120°53.0	3.3'	27°59.2	-0.2 -0.4'	59.3'	
14	32°40.4	43.4	135°15.3	3.3'	27°58.8	-0.4	59.3'	
15	47°40.6	• • 44.3	149°37.6	3.3'	27°58.2	-0.8'	59.3'	
16	62°40.8	45.3	163°59.8	3.3'	27°57.5	-1.0'	59.3'	
17	77°41.0	46.3	$178^{\circ}22.1$	3.3'	$27^{\circ}56.5$	-1.2'	59.3'	
18	92°41.2	S03°47.2	192°44.4	3.3'	N27°55.3	-1.4'	59.3'	
19	107°41.4		207°06.8	3.4'	00.5	-1.6'	59.3'	
20	122°41.6 137°41.8	49.2 • • 50.1	221°29.1 235°51.5	3.4'	27°52.4 27°50.6	-1.8' -2.0'	59.3'	
21 22	137 41.8 152° 42.0	· · 50.1 51.1	235°51.5 250°13.9	3.4' 3.4'	27°50.6 27°48.6	-2.0' -2.1'	59.3' 59.2'	
23	167°42.1	52.1	264°36.4	3.5'	27°46.5	-2.1 -2.3'	59.2'	
20	SD = 16.0'	d = 1.0'				2.5	33.2	
	JU = 10.0′	u = 1.0°		- 31	O = 16.2'			
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	182°42.3	S03°53.0	278°58.9	3.5'	N27°44.2	-2.5'	59.2'	
1	197°42.5 212°42.7	54.0 55.0	293°21.4 307°43.9	3.6'	27°41.6	-2.7'	59.2'	
2	212°42.7 227°42.9	55.0 • • 55.9	307°43.9 322°06.5	3.6' 3.6'	27°38.9 27°36.0	-2.9' -3.1'	59.2' 59.2'	
3 4	242°43.1	56.9	322 00.5 336°29.2	3.7'	27°30.0	-3.1 -3.3'	59.2'	
5	257°43.3	57.9	350°51.9	3.7'	27°29.6	-3.5'	59.2'	
6	272°43.5	S03°58.8	5°14.6	3.8'	N27°26.2	-3.7'	59.2'	
7	287°43.7	03°59.8	19°37.4	3.8'	27°22.5	-3.8'	59.2'	
8	302°43.9	04°00.8	34°00.2	3.9'	27°18.7	-4.0'	59.2'	
9	317°44.1	• • 01.7	48°23.1	3.9'	27°14.6	-4.2'	59.2'	
10	332°44.3 347°44.5	02.7 03.7	62°46.1 77°09.1	4.0' 4.1'	27°10.4 27°06.0	-4.4' -4.6'	59.2' 59.2'	
11 12	347°44.5 2°44.7	03.7 \$04°04.6	91°32.1	4.1'	27°06.0 N27°01.4	-4.6' -4.8'	59.2'	
13	17°44.9	05.6	105°55.3	4.2'	26°56.7	-4.9'	59.2'	
14	32°45.1	06.6	100° 18.4	4.3'	26°51.7	-4.9 -5.1'	59.2'	
15	47°45.3	• • 07.5	134°41.7	4.3'	26°46.6	-5.3'	59.2'	
16	62°45.5	08.5	149°05.0	4.4'	$26^{\circ}41.3$	-5.5'	59.2'	
17	77°45.7	09.5	163°28.4	4.5'	26°35.8	-5.7'	59.1'	
18	92°45.9	S04°10.4	177°51.9	4.5'	N26°30.2	-5.8'	59.1'	
19	107°46.1 122°46.3	11.4	192°15.4 206°39.1	4.6'	26°24.4 26°18.4	-6.0'	59.1' 59.1'	
20 21	122°46.3 137°46.4	12.4 •• 13.3	206°39.1 221°02.7	4.7' 4.8'	26°18.4 26°12.2	-6.2' -6.3'	59.1' 59.1'	
22	137 46.4 152° 46.6	14.3	221°02.7 235°26.5	4.8 4.9'	26°12.2 26°05.8	-6.5'	59.1'	
23	167°46.8	15.2	249°50.4	4.9'	25°59.3	-6.7'	59.1'	
	SD = 16.0'	d = 1.0'			D = 16.2'			
				- 31				

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
<b>N</b> 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
<b>N</b> 40°	04:59	05:30	05:57	17:41	18:08	18:39
35°	05:01	05:30	05:55	17:43	18:08	18:37
30°	05:02	05:30	05:54	17:44	18:08	18:36
20°	05:04	05:29	05:51	17:47	18:09	18:35
N 10°	05:03	05:28	05:49	17:50	18:11	18:35
0°	05:01	05:25	05:46	17:53	18:13	18:37
S 10°	04:58	05:22	05:44	17:55	18:16	18:41
20°	04:53	05:19	05:41	17:58	18:20	18:46
30°	04:45	05:13	05:37	18:02	18:26	18:54
35°	04:40	05:10	05:35	18:04	18:29	18:59
40°	04:34	05:06	05:33	18:06	18:34	19:06
45°	04:26	05:01	05:30	18:09	18:39	19:14
<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	e		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° 52°	19:10 19:26	20:09 20:26	21:28 21:43	12:54 12:38	14:05 13:48	14:55 14:40
50°	19:20	20:20	21:43	12:36	13:46	14:40
45°	20:09	21:11	22:23	11:56	13:04	13:59
N 40°	20:32	21:34	22:44	11:33	12:41	13:38
35°	20:51	21:53	23:02	11:15	12:21	13:20
30°	21:07	22:09	23:17	10:59	12:05	13:04
20°	21:34	22:37	23:42	10:32	11:37	12:37
N 10°	21:58	23:01		10:09	11:13	12:14
0°	22:20	23:23		09:48	10:50	11:53
S 10°	22:42	23:45		09:26	10:28	11:31
20°	23:06		00:09	09:03	10:04	11:08
30°	23:34		00:37	08:37	09:36	10:41
35°	23:51		00:53	08:21	09:19	10:25
40°		00:10	01:13	08:03	08:59	10:06
45°		00:34	01:36	07:41	08:36	09:43
<b>S</b> 50°		01:04	02:05	07:13	08:06	09:14
52°	00:00	01:19	02:20	07:00	07:51	09:00
54°	00:15	01:36	02:37	06:44	07:33	08:43
56°	00:33	01:57	02:57	06:26	07:12	08:24
58° <b>S</b> 60°	00:55 01:23	02:23 03:00	03:22 03:56	06:04 05:35	06:46 06:09	07:59 07:25
<b>3</b> 60°	01:23	03:00	03:50	05:35	06:09	07:25

		Sun		Moon				
Day	Eqn.of Time		Mer.	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	s	M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	12°42.1		21°13.6	246°42.3	N20°25.5	229°58.5	N15°20.9	1°12.7	N01°59.3			
										Alpheratz	357°32.9	29°14.5
1	27°44.6	174°09.1	13.8	261°43.2	25.2	245°00.5	20.8	16°15.3	59.3	Ankaa	353°05.3	-42°09.5
2	42°47.0	189° 11.7	13.9	276°44.2	25.0	260°02.6	20.7	31°18.0	59.2	Schedar	349°28.8	56°41.2
3	57°49.5		• 14.0	291°45.1	• • 24.7	275°04.6	• • 20.5	46°20.6	• • 59.1	Diphda	348°45.5	-17°50.2
4	72°52.0	$219^{\circ}16.9$	14.2	306°46.1	24.4	290°06.6	20.4	61°23.3	59.0	Achernar	335°18.5	-57°05.9
5	87°54.4	234° 19.5	14.3	321°47.1	24.1	305°08.7	20.3	76°25.9	59.0	Hamal	327°49.3	23°35.5
6	102°56.9	249°22.1 S2	21° 14.4	336°48.0	N20°23.8	320°10.7	$N15^{\circ}20.1$	91°28.6	N01°58.9	Polaris	312°53.6	89°22.4
7	117°59.4	264°24.7	14.6	351°49.0	23.5	335°12.7	20.0	106°31.2	58.8			-40°11.6
8	133°01.8	279°27.3	14.7	6°49.9	23.2	350°14.8	19.9	121°33.8	58.7	Acamar	315°10.3	
9	148°04.3	294°30.0 •	• 14.8	21°50.9	• • 22.9	5°16.8	• • 19.8	136°36.5	• • 58.6	Menkar	314°04.4	4°11.8
10	163°06.7	309°32.6	14.9	36°51.9	22.6	20°18.8	19.6	151°39.1	58.6	Mirfak	308°25.8	49°57.3
11	178°09.2	324° 35.2	15.0	51°52.8	22.3	35°20.9	19.5	166°41.8	58.5	Aldebaran	290°37.8	16°33.9
12	193°11.7		21° 15.2	66°53.8	N20°22.0	50°22.9	N15° 19.4	181°44.4	N01°58.4	Rigel	281°02.4	-8°10.0
13	208°14.1	354°40.5	15.3	81°54.7	21.7	65°24.9	19.2	196°47.1	58.3	Capella	$280^{\circ}19.6$	46°01.4
	200°14.1 223°16.6	9°43.2	15.4	96°55.7	21.7	80°27.0		211°49.7		Bellatrix	278°21.2	6°22.5
14							19.1		58.3	Elnath	277°59.9	28°37.8
15	238°19.1		15.5	111°56.7	• • 21.1	95°29.0	• • 19.0	226°52.4	• • 58.2	Alnilam	275°36.2	$-1^{\circ}10.9$
16	253°21.5	39° 48.5	15.6	126°57.6	20.8	110°31.0	18.8	241°55.0	58.1	Betelgeuse	270°50.5	7°24.8
17	268°24.0	54°51.1	15.7	141°58.6	20.5	125°33.1	18.7	256°57.6	58.0	Canopus	263°51.7	-52°42.2
18	283°26.5		21° 15.8	156°59.6	N20°20.2	140°35.1	N15° 18.6	272°00.3	N01°57.9	Sirius	258°25.0	-16°44.9
19	298°28.9	84°56.4	15.9	172°00.5	19.9	155°37.1	18.4	287°02.9	57.9	Adhara	255°04.8	-29°00.2
20	313°31.4	99°59.1	16.0	187°01.5	19.6	170°39.2	18.3	302°05.6	57.8	Procyon	244°49.4	5°09.5
21	328°33.8		• 16.1	202°02.4	• • 19.3	185°41.2	• • 18.2	317°08.2	• • 57.7	Pollux	243°15.6	27°57.6
22	343°36.3	130°04.5	16.2	217°03.4	19.0	200°43.3	18.0	332°10.9	57.6	Avior	234°14.4	-59°35.4
23	358°38.8	145°07.1	16.3	232°04.4	18.7	215°45.3	17.9	347°13.5	57.6	Suhail	234 14.4 222°45.5	-39 33.4 -43°32.2
Mar	ass. 23:05	ν2.6' d0.1' ι	m_/ 7/	1/1 O/ d O	.3′ m1.09	1/2 N/ 4 N	.1′ m-1.88	1/2 6/ d 0	.1′ m0.33	Miaplacidus	221°38.5	-43 32.2 -69°49.3
ivier.p	ass. ∠3:U5	ν∠.υ dU.1' l	111-4.14	$\nu$ 1.0 $a$ -0	.5 111.09	ν2.0 <b>a</b> -0.	.τ 111-1.δδ	ν2.0 <b>a</b> -0	.1 1110.33			-69°49.3 -8°46.3
										Alphard	217°46.6	-8°46.3 11°50.2
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.2	
0	13°41.2		21°16.4	247°05.3	N20°18.4	230°47.3	N15° 17.8	2°16.2	N01°57.5	Dubhe	193°39.9	61°36.3
1	28°43.7	175° 12.5	16.5	262°06.3	18.1	245°49.4	17.7	17°18.8	57.4	Denebola	182°23.8	14°25.4
2	43°46.2	190° 15.2	16.6	277°07.3	17.8	260°51.4	17.5	32°21.5	57.3	Gienah	175°42.4	-17°41.3
3	58°48.6		16.7	292°08.2	17.5	275°53.4	17.4	47°24.1	• • 57.3	Acrux	172°59.2	-63°14.8
4	73°51.1	220° 20.6	16.8	307°09.2	17.2	290°55.5	17.3	62°26.7	57.2	1	171°50.6	-57°15.7
5	88°53.6	235°23.3	16.8	322°10.2	16.9	305°57.5	17.1	77°29.4	57.1	Alioth	166°12.3	55°48.9
6	103°56.0		21°16.9	337°11.1	N20°16.6	320°59.5	N15° 17.0	92°32.0	N01°57.0	Spica	158°21.1	-11°18.0
7	118°58.5	265°28.7	17.0	352°12.1	16.3	336°01.6	16.9	107°34.7	56.9	Alkaid	152°51.3	49°10.9
8	134°01.0	280°31.4	17.1	7°13.1	16.0	351°03.6	16.7	122°37.3	56.9	Hadar	148°34.6	-60°30.2
9	149°03.4		17.1	22°14.0	. 15.7	6°05.7	. 16.6	137°40.0	• • 56.8	Menkent	147°56.3	-36°30.1
10	164°05.9	310°36.9	17.1	37°15.0	15.4	21°07.7		157° 40.0		Arcturus	145°46.9	19°02.7
	179°08.3	325°39.6		52°16.0		36°09.7	16.5	167°45.3	56.7	Rigil Kent.	139°38.9	-60°56.8
11	179 08.3 194°10.8		17.3 21° 17.3	67°16.9	15.1 N20°14.8	50 09.7 51°11.8	16.3 N15°16.2	182°47.9	56.6	Kochab	137°20.8	74°02.8
12								197°50.5	N01°56.6	Zuben'ubi	136°54.7	-16°09.1
13	209°13.3	355° 45.1	17.4	82°17.9	14.5	66°13.8	16.1		56.5	Alphecca	126°02.8	26°37.6
14	224°15.7	10°47.8	17.5	97°18.9	14.2	81°15.8	16.0	212°53.2	56.4	Antares	112°14.3	-26°29.5
15	239°18.2		17.5	112°19.9	• • 13.9	96°17.9	• • 15.8	227°55.8	• • 56.3	Atria	107°07.4	-69°04.7
16	254°20.7	40°53.3	17.6	127°20.8	13.6	111°19.9	15.7	242°58.5	56.3	Sabik	102°01.3	-15°45.4
17	269°23.1	55° 56.1	17.6	142°21.8	13.3	126°22.0	15.6	258°01.1	56.2	Shaula	96°08.6	-37°07.4
18	284°25.6		21°17.7	157°22.8	N20°13.0	141°24.0	N15° 15.4	273°03.8	N01°56.1	Rasalhague	95°57.3	12°32.6
19	299°28.1	86°01.6	17.8	172°23.7	12.7	156°26.0	15.3	288°06.4	56.0	Eltanin	90°41.6	51°29.4
20	314°30.5	101°04.3	17.8	187°24.7	12.4	171°28.1	15.2	303°09.1	55.9	Kaus Aust.	83°30.7	-34°22.4
21	329°33.0		17.9	202°25.7	• • 12.1	186°30.1	• • 15.0	318°11.7	• • 55.9	Vega	80°32.3	38°48.8
22	344°35.5	131°09.9	17.9	217°26.7	11.8	201°32.2	14.9	333°14.3	55.8	Nunki	75°46.0	-26°15.8
23	359°37.9	146° 12.6	17.9	232°27.6	11.5	216°34.2	14.8	348°17.0	55.7	Altair	61°58.5	8°56.5
Mern	ass. 23:01	ν2.7' d0.1' ι	m-4.72	$\nu 1.0' d-0$	.3′ m1.08	$\nu 2.0' d-0$	.1′ m-1.89	$\nu^{2.6'} d_{-0}$	.1′ m0.33	Peacock	53°03.2	-56°39.0
- Түтст.р		- Z2.1 GO.1 1		- I I I I I	.5 1111.00	- Z.O G O.				Deneb	49°24.6	45°22.8
										Enif	33°37.2	10°00.1
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.8	-46°49.9
0	14°40.4		21°18.0	247°28.6	N20°11.2	231°36.2	N15° 14.7	3°19.6	N01°55.6	Fomalhaut	15°12.6	-29°28.7
1	29°42.8	$176^{\circ}18.2$	18.0	262°29.6	10.9	246°38.3	14.5	18°22.3	55.6	Scheat	13°43.5	28°13.9
2	44°45.3	191°21.0	18.1	277°30.5	10.6	261°40.3	14.4	33°24.9	55.5	Markab	13°28.2	15°21.2
3	59°47.8		18.1	292°31.5	•• 10.3	276°42.4	• • 14.3	48°27.6	• • 55.4			
4	74°50.2	221°26.6	18.1	307°32.5	10.0	291°44.4	14.1	63°30.2	55.3	Oct 04 Sun	SHA	Mer.pass
5	89°52.7	236° 29.3	18.1	322°33.5	09.7	306°46.4	14.0	78°32.9	55.2	Venus	146°24.4	13:21
6	104°55.2	251° 32.1 S2	21° 18.2	337°34.4	N20°09.4	321°48.5	N15° 13.9	93°35.5	N01°55.2	Mars	234°00.2	07:33
7	119°57.6	266° 35.0	18.2	352°35.4	09.1	336°50.5	13.7	108°38.2	55.1	Jupiter	217°16.4	08:39
8	135°00.1	281°37.8	18.2	7°36.4	08.8	351°52.6	13.6	123°40.8	55.0	Saturn	348°30.6	23:51
9	150°02.6	296°40.6 •	18.2	22°37.4	• • 08.5	6°54.6	• • 13.5	138°43.4	• • 54.9	Oct 05 Mon	SHA	Ma:: :
10	165°05.0	311°43.4	18.3	37°38.3	08.2	21°56.6	13.4	153°46.1	54.9		3HA 146°28.6	Mer.pass
11	180°07.5	326°46.2	18.3	52°39.3	07.9	36°58.7	13.2	168°48.7	54.8		233°24.1	13:17
12	195°10.0	341°49.0 S2	21°18.3	67°40.3	N20°07.6	52°00.7	N15° 13.1	183°51.4	N01°54.7	1		07:31
13	210°12.4	$356^{\circ}51.9$	18.3	82°41.3	07.3	67°02.8	13.0	198°54.0	54.6	Jupiter		08:36
14	225°14.9	11°54.7	18.3	97°42.2	07.0	82°04.8	12.8	213°56.7	54.6	Saturn	348°34.9	23:47
15	240°17.3	26°57.5 •	18.3	112°43.2	• • 06.7	97°06.9	• • 12.7	228°59.3	• • 54.5	Oct 06 Tue	SHA	Mer.pass
16	255°19.8	42°00.4	18.3	127°44.2	06.4	112°08.9	12.6	244°02.0	54.4		146°35.0	13:13
17	270°22.3	57°03.2	18.3	142°45.2	06.1	$127^{\circ}10.9$	12.4	259°04.6	54.3		232°48.2	07:30
18	285°24.7		21°18.3	157°46.2	N20°05.8	142°13.0	N15° 12.3	274°07.2	N01°54.2		216°55.9	08:32
19	300°27.2	87°08.9	18.3	172°47.1	05.5	157°15.0	12.2	289°09.9	54.2	Saturn	348°39.3	23:43
20	315°29.7	102°11.7	18.3	187°48.1	05.2	172°17.1	12.1	304°12.5	54.1			20.10
21	330°32.1		18.3	202°49.1	• • 04.9	187°19.1	. 11.9	319°15.2	• • 54.0	Horizont	al parallax	
22	345°34.6	132° 17.5	18.3	217°50.1	04.6	202°21.2	11.8	334°17.8	53.9		Venus:	0.5
23	0°37.1	147°20.3	18.3	232°51.1	04.3	217°23.2	11.7	349°20.5	53.9		Mars:	0.1
ivier.p	ass. 22:58	ν2.8′ d0.0′ ι	111-4.09	$\nu$ 1.0° $a$ -0	.3′ m1.08	$\nu$ 2.0° $a$ -0.	.1′ m-1.89	$\nu$ 2.0° $a$ -0	.1′ m0.33			

h	Sur	1			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	182°47.0	S04°16.2	264°14.3	5.0'	N25°52.6	-6.9'	59.1'
1	197°47.2	17.2	278°38.3	5.1'	25° 45.8	-7.0'	59.1'
2	212°47.4 227°47.6	18.1	293°02.4 307°26.6	5.2'	25°38.8 25°31.6	-7.2'	59.1'
3 4	227°47.6 242°47.8	· · 19.1 20.1	307°26.6 321°50.9	5.3' 5.4'	25° 31.6 25° 24.2	-7.3' -7.5'	59.1' 59.1'
5	257°48.0	21.0	336°15.2	5.4	25° 16.7	-7.7'	59.1
6	272°48.2	S04°22.0	350°39.7	5.5'	N25°09.0	-7.8'	59.1'
7	287°48.4	23.0	5°04.2	5.6'	$25^{\circ}01.2$	-8.0'	59.0'
8	302°48.6	23.9	19°28.9	5.7'	24°53.2	-8.1'	59.0'
9 10	317°48.8 332°49.0	· · 24.9 25.9	33°53.6 48°18.4	5.8' 5.9'	24° 45.1 24° 36.8	-8.3' -8.5'	59.0' 59.0'
11	347°49.1	26.8	62°43.3	6.0'	24° 28.3	-8.6'	59.0'
12	2°49.3	S04°27.8	77°08.3	6.1'	N24° 19.7	-8.8'	59.0'
13	17°49.5	28.7	91°33.4	6.2'	24°11.0	-8.9'	59.0'
14	32°49.7	29.7	105°58.6	6.3'	24°02.1	-9.1'	59.0'
15 16	47°49.9 62°50.1	· · 30.7 31.6	120°23.9 134°49.3	6.4' 6.5'	23°53.0 23°43.8	-9.2' -9.3'	59.0' 59.0'
17	77°50.3	32.6	134 49.3 149°14.8	6.6'	23 43.6 23°34.5	-9.5' -9.5'	59.0'
18	92°50.5	S04°33.6	163°40.3	6.7'	N23°25.0	-9.6'	58.9'
19	107°50.7	34.5	178°06.0	6.8'	23° 15.4	-9.8'	58.9'
20	122°50.9	35.5	192°31.8	6.9'	23°05.6	-9.9'	58.9'
21	137°51.0	• • 36.4	206°57.7	7.0'	22°55.7	-10.0'	58.9'
22 23	152°51.2 167°51.4	37.4 38.4	221°23.7 235°49.8	7.1' 7.2'	22°45.7 22°35.5	-10.2' -10.3'	58.9' 58.9'
23			233 49.8			-10.3	50.9
	SD = 16.0'	d = 1.0'		SI	O = 16.1'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°51.6	S04°39.3	250°15.9	7.3'	N22°25.2	-10.4'	58.9'
1	197°51.8	40.3	264°42.2	7.4'	22°14.7 22°04.2	-10.6'	58.9'
2	212°52.0 227°52.2	41.3 •• 42.2	279°08.6 293°35.1	7.5' 7.6'	22°04.2 21°53.5	-10.7' -10.8'	58.9' 58.9'
4	242°52.4	43.2	308°01.7	7.0 7.7'	21°42.7	-10.6	58.8'
5	257°52.6	44.1	322°28.4	7.8'	21°31.7	-11.1'	58.8'
6	272°52.8	S04°45.1	336°55.2	7.9'	N21°20.6	-11.2'	58.8'
7	287°52.9	46.1	351°22.1	8.0'	21°09.4	-11.3'	58.8'
8	302°53.1 317°53.3	47.0 • • 48.0	5°49.1 20°16.2	8.1' 8.2'	20°58.1 20°46.7	-11.4'	58.8'
9 10	317 53.3 332°53.5	• • 48.0 49.0	20 10.2 34°43.4	8.2 8.3'	20° 46.7 20° 35.2	-11.5' -11.7'	58.8' 58.8'
11	347°53.7	49.9	49°10.7	8.4	20°23.5	-11.8'	58.8'
12	2°53.9	504°50.9	63°38.1	8.5'	N20°11.7	-11.9'	58.8'
13	17°54.1	51.8	78°05.6	8.6'	19°59.8	-12.0'	58.7'
14	32°54.3	52.8	92°33.2	8.7'	19°47.8	-12.1'	58.7'
15 16	47°54.4 62°54.6	· · 53.8 54.7	107°00.9 121°28.7	8.8' 8.9'	19°35.7 19°23.5	-12.2' -12.3'	58.7' 58.7'
17	77°54.8	55.7	135°56.6	9.0'	19° 11.2	-12.4'	58.7
18	92°55.0	S04°56.6	150°24.6	9.1'	N18°58.8	-12.5'	58.7'
19	107°55.2	57.6	164°52.7	9.2'	18°46.3		58.7'
20	122°55.4	58.6	179°20.9	9.3'	18°33.7	-12.7'	58.7'
21 22	137°55.6 152°55.7	04°59.5 05°00.5	193°49.2 208°17.6	9.4' 9.5'	18°20.9 18°08.1	-12.8' -12.9'	58.6' 58.6'
23	167°55.9	03 00.3	200°17.0° 222°46.0	9.6'	17° 55.2	-13.0'	58.6
	SD = 16.0'	d = 1.0'			D = 16.1'		
_							
Tue 0	<b>GHA</b> 182°56.1	Dec \$05°02.4	<b>GHA</b> 237°14.6	u 9.7'	<b>Dec</b> N17° 42.2	d -13.1'	<b>HP</b> 58.6'
1	197°56.3	03.4	251°43.3	9.1 9.8'	17° 29.1	-13.1	58.6'
2	212°56.5	04.3	266°12.1	9.9'	17° 16.0	-13.3	58.6'
3	227°56.7	• • 05.3	280°40.9	10.0'	17°02.7	-13.4'	58.6'
4	242°56.9	06.2	295°09.9	10.0'	16°49.3	-13.4'	58.6'
5 6	257°57.0 272°57.2	07.2 \$05°08.2	309°38.9 324°08.1	10.1' 10.2'	16°35.9 N16°22.4	-13.5' -13.6'	58.5' 58.5'
о 7	272°57.2 287°57.4	09.1	324°08.1 338°37.3	10.2	16°08.8	-13.6	58.5'
8	302°57.6	10.1	353°06.6	10.4	15°55.1	-13.8'	58.5
9	317°57.8	· · 11.0	7°36.0	10.5'	15°41.3	-13.8'	58.5'
10	332°58.0	12.0	22°05.5	10.6'	15°27.5	-13.9'	58.5'
11	347°58.1	13.0	36°35.1	10.7'	15° 13.5	-14.0'	58.5'
12 13	2°58.3 17°58.5	S05°13.9 14.9	51°04.7 65°34.5	10.8' 10.8'	N14°59.6 14°45.5	-14.1' -14.1'	58.4' 58.4'
14	32°58.7	14.9	80°04.3	10.6	14° 45.5	-14.1 -14.2'	58.4'
15	47°58.9	• • 16.8	94°34.2	11.0'	14° 17.2	-14.3'	58.4'
16	62°59.1	17.7	$109^{\circ}04.2$	11.1'	14°02.9	-14.3'	58.4'
17	77°59.2	18.7	123°34.3	11.2'	13°48.6	-14.4'	58.4'
18	92°59.4 107°59.6	\$05°19.7 20.6	138°04.5 152°34.7	11.2' 11.3'	N13°34.2 13°19.7	-14.5'	58.4'
19 20	107°59.6 122°59.8	20.6 21.6	152°34.7 167°05.0	11.3' 11.4'	13° 19.7 13° 05.2	-14.5' -14.6'	58.3' 58.3'
21	138°00.0	22.5	181°35.4	11.5'	13° 50.2	-14.6'	58.3
22	153°00.1	23.5	196°05.9	11.5'	12°36.0	-14.7'	58.3
23	168°00.3	24.5	210°36.5	11.6'	12°21.3	-14.7'	58.3'
	SD = 16.0'	d = 1.0'		SI	O = 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
N 70°	04:18	05:30	06:31	17:04	18:04	19:16
68°	04:26	05:31	06:27	17:08	18:03	19:08
66°	04:32	05:32	06:23	17:12	18:03	19:02
64°	04:37	05:33	06:20	17:15	18:03	18:58
62°	04:41	05:33	06:17	17:18	18:02	18:54
60°	04:45	05:33	06:15	17:21	18:02	18:50
N 58°	04:48	05:34	06:13	17:23	18:02	18:47
56°	04:51	05:34	06:11	17:25	18:02	18:45
54°	04:53	05:34	06:09	17:27	18:02	18:43
52°	04:55	05:34	06:07	17:28	18:02	18:41
50°	04:56	05:34	06:06	17:30	18:02	18:39
45°	05:00	05:34	06:03	17:33	18:03	18:36
N 40°	05:02	05:33	06:00	17:36	18:03	18:34
35°	05:03	05:32	05:58	17:39	18:04	18:33
30°	05:04	05:32	05:56	17:41	18:05	18:32
20°	05:04	05:30	05:52	17:45	18:07	18:32
N 10°	05:03	05:27	05:48	17:48	18:09	18:34
0°	05:00	05:24	05:45	17:52	18:12	18:36
<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	е		Moonset	:
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°						17:57
N 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
N 58°	22:29		00:10	15:58	16:10	16:17
56°	22:45		00:21	15:42	15:59	16:10
54°	22:58		00:30	15:28	15:49	16:03
52°	23:10		00:38	15:16	15:40	15:57
50°	23:20		00:45	15:05	15:32	15:52
45°	23:41		01:01	14:42	15:15	15:41
<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		nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
					N20°04.0						ЗПА	Dec
0	15°39.5	162°23.2	S21°18.3	247°52.0		232°25.2	N15°11.5	4°23.1	N01°53.8	Alpheratz	357°32.9	29°14.5
1	30°42.0	177°26.1	18.3	262°53.0	03.7	247°27.3	11.4	19°25.8	53.7	Ankaa	353°05.3	-42°09.5
2	45°44.4	192°28.9	18.3	277°54.0	03.4	262°29.3	11.3	34°28.4	53.6	Schedar	349° 28.8	56°41.2
3	60°46.9	207°31.8	• • 18.2	292°55.0	• • 03.0	277°31.4	• • 11.2	49°31.0	• • 53.6			
4	75°49.4	222°34.7	18.2	307°56.0	02.7	292°33.4	11.0	64°33.7	53.5	Diphda	348°45.5	-17°50.2
5	90°51.8	237°37.6	18.2	322°56.9	02.4	307°35.5	10.9	79°36.3	53.4	Achernar	335°18.5	-57°05.9
6	105°54.3	252°40.5	S21°18.2	337°57.9	N20°02.1	322°37.5	N15°10.8	94°39.0	N01°53.3	Hamal	327°49.2	23°35.5
7	120°56.8	267°43.4	18.1	352°58.9	01.8	337°39.6	10.6	109°41.6	53.3	Polaris	312°52.7	89°22.4
8	135°59.2	282°46.3		7°59.9	01.5	352°41.6		124°44.3		Acamar	$315^{\circ}10.3$	-40°11.6
			18.1				10.5		53.2	Menkar	314°04.4	4°11.8
9	151°01.7	297°49.2	• • 18.1	23°00.9	• • 01.2	7°43.6	• • 10.4	139°46.9	• • 53.1	Mirfak	308°25.8	49°57.3
10	166°04.2	312°52.1	18.0	38°01.9	00.9	22°45.7	10.3	154°49.6	53.0	Aldebaran	290°37.8	16°33.9
11	181°06.6	327°55.0	18.0	53°02.8	00.6	37°47.7	10.1	169°52.2	52.9	Rigel	281°02.3	-8°10.0
12	196°09.1	342°57.9	S21°18.0	68°03.8	N20°00.3	52°49.8	N15°10.0	184°54.8	N01°52.9	Capella	280° 19.6	46°01.4
13	$211^{\circ}11.6$	358°00.8	17.9	83°04.8	20°00.0	67°51.8	09.9	199°57.5	52.8		278°21.2	6°22.5
14	226°14.0	13°03.8	17.9	98°05.8	$19^{\circ}59.7$	82°53.9	09.7	215°00.1	52.7	Bellatrix		
15	241°16.5	28°06.7	• • 17.8	113°06.8	• • 59.4	97°55.9	• • 09.6	230°02.8	• • 52.6	Elnath	277°59.9	28°37.8
16	256°18.9	43°09.6	17.8	128°07.8	59.1	112°58.0	09.5	245°05.4	52.6	Alnilam	275°36.2	-1°10.9
17	271°21.4	58°12.6	17.7	143°08.8	58.8	128°00.0	09.4	260°08.1	52.5	Betelgeuse	270°50.4	7°24.8
18	286°23.9	73°15.5	S21°17.7	158°09.7	N19°58.5	143°02.1	N15°09.2	275°10.7	N01°52.4	Canopus	263°51.7	-52°42.2
19	301°26.3	88°18.4	17.6	173° 10.7	58.2	158°04.1	09.1	290°13.4	52.3	Sirius	258°24.9	-16°44.9
										Adhara	255°04.7	-29°00.2
20	316°28.8	103°21.4	17.6	188°11.7	57.8	173°06.2	09.0	305°16.0	52.3	Procyon	244°49.4	5°09.5
21	331°31.3	118°24.3	• • 17.5	203°12.7	• • 57.5	188°08.2	• • 08.8	320°18.7	• • 52.2	Pollux	243°15.6	27°57.6
22	346°33.7	133°27.3	17.4	218°13.7	57.2	203°10.3	08.7	335°21.3	52.1	Avior	234° 14.4	-59°35.4
23	1°36.2	148°30.2	17.4	233°14.7	56.9	$218^{\circ}12.3$	08.6	350°23.9	52.0	Suhail	234 14.4 222°45.5	-39 33.4 -43°32.2
ь л.	20:54	0.0/	0/ = 4.67	1 0/ / 0	.3′ m1.07		1/ - 1.00	.06/ 16		l .		-43°32.2 -69°49.3
ivier.p	ass. 22:54	$\nu$ 2.9 a-0.	.0′ m-4.67	$\nu_{1.0}$ a-0	.5 m1.0/	ν2.0 a-0	.1′ m-1.89	ν2.0 a-0	0.1′ m0.34	Miaplacidus	221°38.5	
										Alphard	217°46.5	-8°46.3
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.2	11°50.2
0	16°38.7	163°33.2	S21°17.3	248°15.7	N19°56.6	233°14.3	N15°08.5	5°26.6	N01°52.0	Dubhe	193°39.8	61°36.3
1	31°41.1	178°36.2	17.2	263°16.7	56.3	248°16.4	08.3	20°29.2	51.9	Denebola	182°23.8	14°25.4
2	46°43.6	193°39.1	17.1	278°17.6	56.0	263°18.4	08.2	35°31.9	51.8	Gienah	175°42.4	-17°41.3
3	61°46.0	208°42.1	17.1	293°18.6	55.7	278°20.5	•• 08.1	50°34.5	51.7	Acrux	172°59.2	-63°14.8
										Gacrux	$171^{\circ}50.6$	-57°15.7
4	76°48.5	223°45.1	17.0	308°19.6	55.4	293°22.5	07.9	65°37.2	51.6	Alioth	$166^{\circ}12.3$	55°48.9
5	91°51.0	238°48.1	16.9	323°20.6	55.1	308°24.6	07.8	80°39.8	51.6	Spica	$158^{\circ}21.1$	-11°18.0
6	106°53.4	253°51.0	S21°16.8	338°21.6	N19°54.8	323°26.6	N15°07.7	95°42.5	N01°51.5	Alkaid	152°51.3	49°10.8
7	121°55.9	268°54.0	16.8	353°22.6	54.5	338°28.7	07.6	110°45.1	51.4	Hadar	148°34.6	-60°30.2
8	136°58.4	283°57.0	16.7	8°23.6	54.2	353°30.7	07.4	125°47.7	51.3	Menkent	147°56.3	-36°30.1
9	152°00.8	299°00.0	• • 16.6	23°24.6	• • 53.8	8°32.8	• • 07.3	140°50.4	• • 51.3	Arcturus	145°46.9	19°02.7
10	167°03.3	314°03.0	16.5	38°25.6	53.5	23°34.8	07.2	155°53.0	51.2	Rigil Kent.	139°38.9	-60°56.8
11	182°05.8	329°06.0	16.4	53°26.6	53.2	38°36.9	07.1	170°55.7	51.1	Kochab	137° 20.9	74°02.8
12	197°08.2	344°09.0	S21°16.3	68°27.6	N19°52.9	53°38.9	N15°06.9	185°58.3	N01°51.0	Zuben'ubi	136°54.7	-16°09.1
13	212°10.7	359°12.0	16.2	83°28.6	52.6	68°41.0	06.8	201°01.0	51.0	Alphecca	130° 34.7 126° 02.8	26°37.6
14	227°13.2	$14^{\circ}15.0$	16.1	98°29.5	52.3	83°43.0	06.7	216°03.6	50.9		120 02.8 112°14.3	-26°29.5
15	242°15.6	29°18.0	• • 16.0	113°30.5	• • 52.0	98°45.1	• • 06.5	231°06.3	• • 50.8	Antares		-20 29.5 -69°04.7
16	257°18.1	44°21.1	15.9	128°31.5	51.7	113°47.1	06.4	246°08.9	50.7	Atria	107°07.5	-09 04.7 -15°45.4
17	272°20.5	59°24.1	15.8	143°32.5	51.4	128°49.2	06.3	261°11.5	50.7	Sabik	102°01.3	
18	287°23.0	74°27.1	S21°15.7	158°33.5	N19°51.1	143°51.2	N15°06.2	276°14.2	N01°50.6	Shaula	96°08.6	-37°07.4
19	302°25.5	89°30.2	15.6	173°34.5	50.8	158°53.3	06.0	291°16.8	50.5	Rasalhague	95°57.3	12°32.6
20	317°27.9	104°33.2	15.4	188°35.5	50.4	173°55.3	05.9	306°19.5	50.4	Eltanin	90°41.7	51°29.4
			15.3					300 19.5 321°22.1	50.4	Kaus Aust.	83°30.7	-34°22.4
21	332°30.4	119°36.2		203°36.5	• • 50.1	188°57.4	• • 05.8			Vega	80°32.3	38°48.8
22	347°32.9	134°39.3	15.2	218°37.5	49.8	203°59.5	05.7	336°24.8	50.3	Nunki	75°46.0	-26°15.8
23	2°35.3	149°42.3	15.1	233°38.5	49.5	219°01.5	05.5	351°27.4	50.2	Altair	61°58.5	8°56.5
Mer.p	ass. 22:50	$\nu 3.0' d-0$	.1' m-4.64	$\nu 1.0' d-0$	.3′ m1.06	$\nu 2.0' d-0$	.1′ m-1.90	$\nu 2.6' d-0$	.1' m0.34	Peacock	53°03.3	-56°39.1
										Deneb	49°24.6	45°22.9
										Enif	33°37.2	10°00.1
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.8	-46°49.9
0	17°37.8	164°45.4	S21°15.0	248°39.5	N19°49.2	234°03.6	N15°05.4	6°30.1	N01°50.1	Fomalhaut	15° 12.6	-29°28.7
1	32°40.3	179°48.4	14.8	263°40.5	48.9	249°05.6	05.3	21°32.7	50.0	Scheat	13°43.5	28°13.9
2	47°42.7	194°51.5	14.7	278°41.5	48.6	264°07.7	05.1	36°35.3	50.0			
3	62°45.2	209°54.5	14.6	293°42.5	• • 48.3	279°09.7	05.0	51°38.0	• • 49.9	Markab	13°28.2	15°21.2
4	77°47.6	224°57.6	14.4	308°43.5	48.0	294°11.8	04.9	66°40.6	49.8	Oct 07 Wed	SHA	Mer.pass
5	92°50.1	240°00.7	14.4	323°44.5	47.6	309°13.8	04.9	81°43.3	49.7		146° 43.7	13:08
										Mars		07:28
6	107°52.6	255°03.7	S21°14.2	338°45.5	N19°47.3	324°15.9	N15°04.6	96°45.9	N01°49.7			
7	122°55.0	270°06.8	14.0	353°46.5	47.0	339°17.9	04.5	111°48.6	49.6	Saturn	216° 45.7 348° 43.6	08:29
8	137°57.5	285°09.9	13.9	8°47.5	46.7	354°20.0	04.4	126°51.2	49.5	Saturn	J40 4J.0	23:38
9	153°00.0	300°13.0	· · 13.7	23°48.5	• • 46.4	9°22.0	• • 04.3	141°53.8	• • 49.4	Oct 08 Thu	SHA	Mer.pass
10	168°02.4	315°16.1	13.6	38°49.5	46.1	24°24.1	04.1	156°56.5	49.4	l l	146°54.5	13:03
11	183°04.9	330°19.2	13.4	53°50.5	45.8	39°26.1	04.0	171°59.1	49.3	l .	231°37.0	07:26
12	198°07.4	345°22.3	S21°13.3	68°51.5	N19°45.5	54°28.2	N15°03.9	187°01.8	N01°49.2		216°35.7	08:26
13	213°09.8	0°25.4	13.1	83°52.5	45.2	69°30.2	03.8	202°04.4	49.1	Saturn	348° 47.9	23:34
14	228°12.3	15°28.5	13.0	98°53.5	44.8	84°32.3	03.6	217°07.1	49.1		11.3	
15	243°14.8	30°31.6	• • 12.8	113°54.5	• • 44.5	99°34.4	• • 03.5	232°09.7	• • 49.0	Oct 09 Fri	SHA	Mer.pass
16	258°17.2	45°34.7	12.6	128°55.5	44.2	114°36.4	03.4	247°12.4	48.9	Venus	$147^{\circ}07.6$	12:58
17	273°19.7	60°37.8	12.5	143°56.5	43.9	129°38.5	03.2	$262^{\circ}15.0$	48.8	Mars		07:25
18	288°22.1	75°40.9	S21°12.3	158°57.5	N19°43.6	144°40.5	N15°03.1	277°17.6	N01°48.8	Jupiter		08:23
19	303°24.6	90°44.0	12.1	173°58.5	43.3	159°42.6	03.0	292°20.3	48.7	Saturn		23:30
20	$318^{\circ}27.1$	105°47.1	12.0	188°59.5	43.0	174°44.6	02.9	307°22.9	48.6			
21	333°29.5	120°50.3	• • 11.8	204°00.5	• • 42.7	189°46.7	• • 02.7	322°25.6	• • 48.5	Horizont	tal parallax	
22	348°32.0	135°53.4	11.6	219°01.5	42.3	204°48.7	02.6	337°28.2	48.5		Venus:	0.5
23	3°34.5	150°56.5	11.4	234°02.5	42.0	219°50.8	02.5	352°30.9	48.4		Mars:	0.1
ь л.	20:46	2 1/ / ^	1/ 4.00	1 0/ / 0	.3′ m1.06		1/ - 1.00		1/ 0.25			
ivier.p	ass. 22:46	$\nu$ 3.1 $a$ -0.	.1′ m-4.60	$\nu$ 1.0 $a$ -0	.5 IIIT.00	ν∠.1 a-0	.1' m-1 $.90$	$\nu \angle .0^{\circ} a - 0$	0.1′ m0.35			

h	Sui	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	183°00.5	S05°25.4	225°07.1	11.7'	N12°06.5	-14.8'	58.3'
1 2	198°00.7 213°00.9	26.4 27.3	239°37.8 254°08.6	11.8' 11.8'	11°51.7 11°36.9	-14.9' -14.9'	58.2' 58.2'
3	228° 01.0	28.3	268°39.4	11.9'	11°30.9	-14.9 -15.0'	58.2
4	243°01.2	29.2	283°10.3	12.0'	11°07.0	-15.0'	58.2'
5	258°01.4	30.2	297°41.3	12.0'	10°52.0	-15.0'	58.2'
6 7	273°01.6 288°01.8	S05°31.1 32.1	312°12.3 326°43.4	12.1' 12.2'	N10°37.0 10°21.9	-15.1' -15.1'	58.2' 58.1'
8	303°01.9	33.1	341°14.6	12.2'	10°21.9	-15.1 -15.2'	58.1
9	318°02.1	• • 34.0	355°45.9	12.3'	09°51.5	-15.2'	58.1'
10	333°02.3	35.0	10°17.2	12.4'	09°36.3	-15.3'	58.1'
11 12	348°02.5 3°02.7	35.9 \$05°36.9	24°48.5 39°20.0	12.4' 12.5'	09°21.1 N09°05.8	-15.3' -15.3'	58.1' 58.1'
13	18° 02.8	37.8	53°51.5	12.5'	08°50.5	-15.4'	58.0'
14	33°03.0	38.8	$68^{\circ}23.0$	12.6'	$08^{\circ}35.1$	-15.4'	58.0'
15	48°03.2	• • 39.8	82°54.6	12.7'	08°19.7	-15.4'	58.0'
16 17	63°03.4 78°03.6	40.7 41.7	97°26.3 111°58.0	12.7' 12.8'	08°04.3 07°48.8	-15.5' -15.5'	58.0' 58.0'
18	93°03.7	S05°42.6	126°29.8	12.8'	N07°33.3	-15.5'	58.0'
19	108°03.9	43.6	141°01.6	12.9'	$07^{\circ}17.8$	-15.5'	57.9'
20	123°04.1	44.5	155° 33.5	12.9'	07°02.3	-15.6'	57.9'
21 22	138°04.3 153°04.4	• • 45.5 46.4	170°05.4 184°37.4	13.0' 13.0'	06°46.7 06°31.2	-15.6' -15.6'	57.9' 57.9'
23	168° 04.6	47.4	199°09.4	13.1'	06°15.6	-15.6'	57.9'
	SD = 16.0'	d = 1.0'			D = 15.9'		
	<u>JD = 10.0</u>	<u>u = 1.0</u>			J = 13.9		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	183°04.8 198°05.0	\$05°48.3 49.3	213°41.5 228°13.6	13.1' 13.2'	N05°59.9 05°44.3	-15.6' -15.7'	57.9' 57.8'
2	213°05.0	49.3 50.3	242°45.8	13.2'	05 44.3 05°28.6	-15.7'	57.8'
3	228° 05.3	51.2	257° 18.0	13.3'	05°12.9	-15.7'	57.8'
4	243°05.5	52.2	271°50.2	13.3'	04°57.3	-15.7'	57.8'
5	258° 05.7 273° 05.9	53.1 \$05°54.1	286°22.5 300°54.9	13.3' 13.4'	04°41.6 N04°25.8	-15.7'	57.8'
6 7	273 05.9 288°06.0	55.0	300 54.9 315°27.2	13.4	04°10.1	-15.7' -15.7'	57.7' 57.7'
8	303°06.2	56.0	329°59.6	13.4'	03°54.4	-15.7'	57.7'
9	318°06.4	• • 56.9	344°32.1	13.5'	03°38.6	-15.8'	57.7'
10 11	333°06.6 348°06.7	57.9 58.8	359°04.6 13°37.1	13.5' 13.5'	03°22.9 03°07.1	-15.8' -15.8'	57.7' 57.6'
12	3°06.9	50.0 S05°59.8	28°09.6	13.6'	N02°51.4	-15.8'	57.6'
13	18° 07.1	06°00.7	42° 42.2	13.6'	02°35.6	-15.8'	57.6'
14	33°07.3	01.7	57° 14.8	13.6'	02°19.8	-15.8'	57.6'
15 16	48° 07.4 63° 07.6	· · 02.6 03.6	71°47.5 86°20.1	13.7' 13.7'	02°04.1 01°48.3	-15.8' -15.8'	57.6' 57.5'
17	78° 07.8	03.0	100°52.8	13.7'	01°40.5	-15.8'	57.5'
18	93°07.9	<b>S</b> 06°05.5	115°25.6	13.7'	N01°16.8	-15.8'	57.5'
19	108°08.1	06.5	129°58.3	13.8'	01°01.0	-15.7'	57.5'
20 21	123°08.3 138°08.5	07.4 •• 08.4	144°31.1 159°03.9	13.8' 13.8'	00°45.3 00°29.5	-15.7' -15.7'	57.5' 57.4'
22	153° 08.6	09.3	173°36.7	13.8'	N00°13.8	-15.7'	57.4'
23	168°08.8	10.3	$188^{\circ}09.5$	13.9'	<b>S</b> 00°01.9	15.7'	57.4'
	SD = 16.0'	d = 1.0'		SI	D = 15.8'		
					_		
Fri 0	<b>GHA</b> 183° 09.0	<b>Dec</b> \$06°11.2	<b>GHA</b> 202° 42.4	u 13.9'	Dec \$00°17.7	d 15.7'	<b>HP</b> 57.4'
1	183 09.0 198°09.2	12.2	202 42.4 217°15.3	13.9' 13.9'	00°33.4	15.7'	57.4' 57.4'
2	213°09.3	13.1	231°48.2	13.9'	00°49.0	15.7'	57.3'
3	228°09.5	• • 14.1	246°21.1	13.9'	01°04.7	15.7'	57.3'
4 5	243°09.7 258°09.8	15.0 16.0	260°54.0 275°26.9	13.9' 14.0'	01°20.4 01°36.0	15.6' 15.6'	57.3' 57.3'
6	273° 10.0	S06°16.9	289°59.9	14.0'	S01°51.6	15.6'	57.3'
7	288° 10.2	17.9	304°32.9	14.0'	02°07.2	15.6'	57.2'
8 9	303° 10.3 318° 10.5	18.8 •• 19.8	319°05.8 333°38.8	14.0' 14.0'	02°22.8 02°38.4	15.6' 15.5'	57.2' 57.2'
10	333° 10.5	20.7	348°11.8	14.0'	02°53.9	15.5'	57.2'
11	348° 10.9	21.7	2°44.8	14.0'	03°09.4	15.5'	57.1'
12	3°11.0	S06°22.6	17°17.8	14.0'	S03°24.9	15.5'	57.1'
13 14	18° 11.2 33° 11.4	23.6 24.5	31°50.8 46°23.8	14.0' 14.0'	03°40.4 03°55.8	15.4' 15.4'	57.1' 57.1'
14 15	48° 11.5	24.5	46°23.8 60°56.9	14.0'	03°55.8 04°11.2	15.4' 15.4'	57.1'
16	63°11.7	26.4	75°29.9	14.0'	04°26.6	15.3'	57.0'
17	78°11.9	27.4	90°02.9	14.0'	04°41.9	15.3'	57.0'
18 19	93°12.0 108°12.2	\$06°28.3 29.3	104°35.9 119°08.9	14.0' 14.0'	\$04°57.2 05°12.5	15.3' 15.2'	57.0' 57.0'
20	108° 12.2 123° 12.4	29.3 30.2	119°08.9 133°42.0	14.0'	05°12.5 05°27.8	15.2' 15.2'	57.0° 56.9'
21	138° 12.5	• • 31.2	$148^{\circ}15.0$	14.0'	05°43.0	15.2'	56.9'
22	153°12.7	32.1	162°48.0	14.0'	05°58.1	15.1'	56.9'
23	168°12.9	33.0	177°21.0	14.0'	06°13.3	15.1'	56.9'
	SD = 16.0'	d = 1.0'		SI	O = 15.6'		

Lat.	Twilight		Sunrise	Sunset	Twilight		
Lat.	Naut. Civ		Junise	Juliset	Civil	Naut.	
N 72°	04:23	05:43	06:51	16:42	17:50	19:09	
<b>N</b> 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	

Lat.		Moonris	е		Moonset	
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°	00:19	02:46	05:00	17:10	16:34	16:01
<b>N</b> 70°	00:41	02:54	04:57	16:59	16:32	16:07
68°	00:58	03:00	04:55	16:50	16:31	16:12
66°	01:11	03:05	04:53	16:43	16:29	16:16
64°	01:22	03:10	04:52	16:36	16:28	16:20
62°	01:32	03:13	04:51	16:31	16:27	16:23
60°	01:40	03:17	04:50	16:26	16:26	16:26
N 58°	01:47	03:19	04:49	16:22	16:25	16:29
56°	01:53	03:22	04:48	16:18	16:25	16:31
54°	01:59	03:24	04:47	16:14	16:24	16:33
52°	02:04	03:26	04:47	16:11	16:23	16:35
50°	02:08	03:28	04:46	16:08	16:23	16:36
45°	02:18	03:32	04:45	16:02	16:21	16:40
<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	f Time	Mer.	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	Ve	nus	, M	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	18° 36.9	165°59.7	S21°11.2	249°03.5	N19°41.7	234°52.9	N15° 02.4	7°33.5	N01°48.3	1		
1	33°39.4	181°02.8	11.1	264°04.5	41.4	249°54.9	02.2	22°36.2	48.2	Alpheratz	357°32.9	29°14.5
2	48°41.9	196°06.0	10.9	279°05.5	41.1	264°57.0	02.1	37°38.8	48.2	Ankaa	353°05.3	-42°09.5
3	63°44.3	211°09.1	. 10.7	294°06.5	• • 40.8	279°59.0	02.0	52°41.4	• • 48.1	Schedar	349°28.8	56°41.2
4	78°46.8	226°12.3	10.5	309°07.5	40.5	295°01.1	01.9	67°44.1	48.0	Diphda	348°45.5	-17°50.2
5	93°49.2	241°15.4	10.3	324°08.5	40.2	310°03.1	01.7	82°46.7	47.9	Achernar	335°18.5	-57°05.9
6	108°51.7	256°18.6	S21°10.1	339°09.5	N19°39.8	325°05.2	N15°01.6	97°49.4	N01°47.8	Hamal	327°49.2	23°35.5 89°22.5
7	123°54.2	271°21.8	09.9	354°10.6	39.5	340°07.3	01.5	112°52.0	47.8	Polaris Acamar	312°51.8 315°10.3	-40°11.6
8	$138^{\circ}56.6$	286°24.9	09.7	9°11.6	39.2	355°09.3	01.4	127°54.7	47.7	Menkar	314°04.4	4°11.8
9	153°59.1	301°28.1	• • 09.5	24°12.6	• • 38.9	$10^{\circ}11.4$	•• 01.2	142°57.3	• • 47.6	Mirfak	308° 25.8	49°57.3
10	169°01.6	316°31.3	09.3	39°13.6	38.6	25°13.4	01.1	157°59.9	47.5	Aldebaran	290°37.8	16°33.9
11	184°04.0	331°34.4	09.1	54°14.6	38.3	40°15.5	01.0	173°02.6	47.5	Rigel	281°02.3	-8°10.0
12	199°06.5	346°37.6	S21°08.9	69°15.6	N19°38.0	55°17.6	N15°00.9	188°05.2	N01°47.4	Capella	280° 19.5	46°01.4
13	214°09.0	1°40.8	08.6	84°16.6	37.6	70°19.6	00.7	203°07.9	47.3	Bellatrix	278°21.2	6°22.5
14	229°11.4	16°44.0	08.4	99°17.6	37.3	85°21.7	00.6	218°10.5	47.2	Elnath	277°59.9	28°37.8
15	244°13.9	31°47.2	• • 08.2	114°18.6	• • 37.0	100°23.7	• • 00.5	233°13.2	• • 47.2	Alnilam	275°36.1	$-1^{\circ}10.9$
16	259°16.4	46°50.4	08.0	129°19.6	36.7	115°25.8	00.4	248°15.8	47.1	Betelgeuse	270°50.4	7°24.8
17	274°18.8	61°53.6	07.8	144°20.6	36.4 N19°36.1	130°27.8	00.2	263°18.5	47.0	Canopus	263°51.6	-52°42.2
18 19	289°21.3 304°23.7	76°56.8 92°00.0	\$21°07.5 07.3	159°21.7 174°22.7	35.7	145°29.9 160°32.0	N15°00.1 15°00.0	278°21.1 293°23.7	N01°46.9 46.9	Sirius	258°24.9	-16°44.9
20	319° 26.2	107°03.2	07.3	174 22.7 189°23.7	35.4	175°34.0	14° 59.9	308°26.4	46.8	Adhara	255°04.7	-29°00.2
21	319 20.2 334° 28.7	107 03.2 122°06.4	06.8	204°24.7	35.4	175 34.0 190°36.1	. 59.9	323°29.0	46.7	Procyon	244°49.4	5°09.5
22	349°31.1	137°09.6	06.6	219°25.7	34.8	205°38.1	59.7 59.6	338°31.7	46.6	Pollux	243°15.6	27°57.6
23	4°33.6	152°12.9	06.4	234°26.7	34.5	220°40.2	59.5	353°34.3	46.6	Avior	234°14.3	-59°35.4
			_							Suhail	222°45.5	-43°32.2
_Mer.p	ass. 22:42	$\nu$ 3.1′ d-0.	.2′ m-4.57	$\nu 1.0' d-0$	0.3′ m1.05	$\nu 2.1' d-0$	.1′ m-1.90	$\nu^{2.6'} d-0$	0.1′ m0.36	Miaplacidus	221°38.4	-69°49.3
										Alphard	217°46.5	-8°46.3
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.1	11°50.2
0	19°36.1	$167^{\circ}16.1$	S21°06.1	249°27.7	N19°34.2	235°42.3	N14°59.4	8°37.0	N01°46.5	Dubhe	193°39.8	61°36.3
1	34°38.5	182°19.3	05.9	264°28.7	33.9	250°44.3	59.2	23°39.6	46.4	Denebola Gienah	182°23.8 175°42.4	14°25.4 -17°41.3
2	49°41.0	197°22.5	05.6	279°29.8	33.5	265°46.4	59.1	38°42.2	46.3		175 42.4 172°59.2	-17 41.3 -63°14.8
3	64°43.5	212°25.8	• • 05.4	294°30.8	• • 33.2	280°48.5	• • 59.0	53°44.9	• • 46.3		172 59.2 171°50.6	-03 14.6 -57°15.7
4	79°45.9	227°29.0	05.1	309°31.8	32.9	295°50.5	58.9	68°47.5	46.2	Alioth	166° 12.3	55°48.9
5	94°48.4	242°32.3	04.9	324°32.8	32.6	310°52.6	58.7	83°50.2	46.1	Spica	158° 21.1	-11°18.0
6	109°50.9	257°35.5	S21°04.6	339°33.8	N19°32.3	325°54.6	N14°58.6	98°52.8	N01°46.0	Alkaid	152°51.3	49°10.8
7	124°53.3	272°38.8	04.4	354°34.8	32.0	340°56.7	58.5	113°55.5	46.0	Hadar	148° 34.6	-60°30.2
8	139°55.8	287°42.0	04.1	9°35.8	31.6	355°58.8	58.4	128°58.1	45.9		147°56.3	-36°30.1
9	154°58.2	302°45.3	• • 03.8	24°36.9	• • 31.3	11°00.8	•• 58.2	144°00.7	• • 45.8	Arcturus	145°46.9	19°02.7
10	170°00.7	317°48.5	03.6	39°37.9	31.0	26°02.9	58.1	159°03.4	45.7	Rigil Kent.	139°38.9	-60°56.8
11	185°03.2	332°51.8	03.3	54°38.9	30.7	41°04.9	58.0	174°06.0	45.7	Kochab	$137^{\circ}20.9$	74°02.8
12	200°05.6	347°55.1	S21°03.0	69°39.9	N19°30.4	56°07.0	N14°57.9	189°08.7	N01°45.6	Zuben'ubi	$136^{\circ}54.7$	-16°09.1
13	215°08.1	2°58.3	02.8	84°40.9	30.1	71°09.1 86°11.1	57.7	204°11.3	45.5	Alphecca	$126^{\circ}02.8$	26°37.6
14	230°10.6	18°01.6	02.5	99°41.9	29.7	101°13.2	57.6	219°14.0	45.4	Antares	112°14.3	-26°29.5
15	245°13.0 260°15.5	33°04.9 48°08.2	· · 02.2 01.9	114°43.0 129°44.0	· · 29.4 29.1	101 13.2 116°15.3	•• 57.5 57.4	234°16.6 249°19.2	•• 45.4 45.3	Atria	$107^{\circ}07.5$	-69°04.7
16 17	200 15.5 275° 18.0	63°11.4	01.9	129 44.0 144°45.0	28.8	131°17.3	57.4 57.2	249 19.2 264°21.9	45.3 45.2	Sabik	102°01.3	-15°45.4
18	290° 20.4	78°14.7	S21°01.3	159°46.0	N19°28.5	146°19.4	N14° 57.1	279°24.5	N01°45.1	Shaula	96°08.6	-37°07.4
19	305°22.9	93°18.0	01.1	174°47.0	28.1	161°21.5	57.0	294°27.2	45.1	Rasalhague	95°57.4	12°32.6
20	320° 25.3	108°21.3	00.8	189°48.1	27.8	176°23.5	56.9	309°29.8	45.0	Eltanin	90°41.7	51°29.4
21	335°27.8	123°24.6	. 00.5	204°49.1	• • 27.5	191°25.6	• • 56.8	324°32.5	• • 44.9	Kaus Aust.	83°30.7	-34°22.4
22	350°30.3	138°27.9	21°00.2	219°50.1	27.2	206°27.7	56.6	339°35.1	44.8	Vega	80°32.3	38°48.8
23	5°32.7	153°31.2	20°59.9	234°51.1	26.9	221°29.7	56.5	354°37.7	44.8	Nunki	75°46.0	-26°15.8
										Altair	61°58.5	8°56.5 -56°39.1
ivier.p	ass. 22:38	$\nu$ 3.2 d-0.	.2′ m-4.52	$\nu$ 1.0° $d$ -0	0.3′ m1.04	$\nu$ 2.1 d-0	.1′ m-1.91	ν2.0′ d-0	0.1' m0.36	Peacock Deneb	53°03.3 49°24.7	-56° 39.1 45° 22.9
										Enif	33° 37.2	10°00.1
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27° 30.8	-46°49.9
0	20°35.2	168°34.5	\$20°59.6	249°52.1		236°31.8	$N14^{\circ}56.4$	9°40.4	N01°44.7	Fomalhaut	15°12.6	-40°43.3°
1	35°37.7	183°37.8	59.3	264°53.2	26.2	251°33.8	56.3	24°43.0	44.6	Scheat	13°43.5	28°13.9
2	50°40.1	198°41.1	59.0	279°54.2	25.9	266°35.9	56.1	39°45.7	44.5	Markab	13°28.2	15°21.2
3	65° 42.6	213°44.5	• • 58.7	294°55.2	• • 25.6	281°38.0	• • 56.0	54°48.3	• • 44.5			
4	80°45.1	228°47.8	58.3	309°56.2	25.3	296°40.0	55.9	69°51.0	44.4	Oct 10 Sat	SHA	Mer.pass
5	95°47.5	243°51.1	58.0	324°57.2	25.0	311°42.1	55.8	84°53.6	44.3	Venus Mars	147°22.8 230°26.6	12:53 07:23
6	110°50.0	258°54.4	\$20° 57.7	339°58.3	N19°24.6	326°44.2	N14°55.6	99°56.2	N01°44.2		230° 26.6 216° 15.9	07:23 08:19
7 8	125°52.5 140°54.9	273°57.8 289°01.1	57.4 57.1	354°59.3 10°00.3	24.3 24.0	341°46.2 356°48.3	55.5 55.4	114°58.9 130°01.5	44.2	Saturn	348° 56.6	23:26
9	140°54.9 155°57.4	289°01.1 304°04.4	57.1 •• 56.7	25°01.3	. 23.7	350°48.3 11°50.4	55.4 •• 55.3	130°01.5 145°04.2	44.1 •• 44.0	Jatuill	J-U JU.U	25.20
10	170° 59.8	319°07.8	56.4	40°02.4	23.4	26°52.4	55.1	145 04.2 160°06.8	43.9	Oct 11 Sun	SHA	Mer.pass
11	186°02.3	334°11.1	56.1	55°03.4	23.4	41°54.5	55.0	175°09.5	43.9		147°40.0	12:48
12	201°04.8	349°14.5	\$20°55.8	70°04.4	N19°22.7	56°56.6	N14° 54.9	190°12.1			229°51.7	07:22
13	216° 07.2	4°17.8	55.4	85°05.4	22.4	71°58.6	54.8	205°14.7	43.7		216°06.2	08:16
14	231°09.7	19°21.2	55.1	100°06.5	22.1	87°00.7	54.7	220°17.4	43.7	Saturn	349°00.9	23:21
15	246°12.2	34°24.5	• • 54.7	115°07.5	• • 21.8	102°02.8	• • 54.5	235°20.0	• • 43.6	Oct 12 Mon	SHA	Mer.pass
16	261°14.6	49°27.9	54.4	130°08.5	21.5	117°04.8	54.4	250°22.7	43.5		147°59.3	12:43
17	$276^{\circ}17.1$	64°31.2	54.1	145°09.5	21.1	132°06.9	54.3	265°25.3	43.4	Mars		07:20
18	291°19.6	79°34.6	S20°53.7	$160^{\circ}10.6$	$N19^{\circ}20.8$	147°09.0	N14°54.2	280°28.0	N01°43.4	Jupiter		08:13
19	$306^{\circ}22.0$	94°38.0	53.4	$175^{\circ}11.6$	20.5	$162^{\circ}11.1$	54.0	295°30.6	43.3	Saturn		23:17
20	321°24.5	109°41.4	53.0	190°12.6	20.2	177°13.1	53.9	310°33.2	43.2			
21	336°27.0	124°44.7	• • 52.7	205°13.7	• • 19.8	192°15.2	• • 53.8	325°35.9	• • 43.1	Horizont	al parallax	2.5
22	351°29.4	139°48.1	52.3	220°14.7	19.5	207°17.3	53.7	340°38.5	43.1		Venus:	0.5
23	6°31.9	154°51.5	51.9	235°15.7	19.2	222°19.3	53.6	355°41.2	43.0		Mars:	0.1
Mer.n	ass. 22:34	$\nu 3.3' \ d-0.$	.3′ m-4.48	$\nu 1.0'$ d-0	0.3' m1.03	$\nu 2.1' d-0$	.1′ m-1.91	$\nu 2.6' d-0$	0.1′ m0.37			

h	Sui	n	Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	183°13.1	<b>S</b> 06°34.0	191°54.0	14.0'	S06°28.4	15.1'	56.9'
1	198°13.2	34.9	206°27.0	14.0'	06°43.4	15.0'	56.8'
2 3	213°13.4 228°13.6	35.9 •• 36.8	221°00.0 235°33.0	14.0' 14.0'	06° 58.4 07° 13.4	15.0' 14.9'	56.8' 56.8'
4	243°13.7	37.8	250°05.9	14.0'	07°28.3	14.9'	56.8'
5	258°13.9	38.7	264°38.9	13.9'	07°43.2	14.8'	56.7'
6	273°14.0	S06°39.7	279°11.8	13.9'	S07°58.0	14.8'	56.7'
7	288°14.2	40.6	293°44.8 308°17.7	13.9'	08°12.8	14.7'	56.7'
8 9	303°14.4 318°14.5	41.6 •• 42.5	308°17.7 322°50.6	13.9' 13.9'	08° 27.6 08° 42.3	14.7' 14.6'	56.7' 56.7'
10	333°14.7	43.5	337°23.5	13.9'	08°56.9	14.6'	56.6
11	348°14.9	44.4	351°56.4	13.9'	09°11.5	14.5'	56.6'
12	3°15.0	S06°45.4	6°29.2	13.8'	S09°26.0	14.5'	56.6'
13	18°15.2	46.3	21°02.1	13.8'	09°40.5	14.4'	56.6'
14 15	33°15.4 48°15.5	47.2 •• 48.2	35°34.9 50°07.7	13.8' 13.8'	09°55.0 10°09.3	14.4' 14.3'	56.5' 56.5'
16	63°15.7	49.1	64°40.5	13.8'	10° 23.7	14.3'	56.5
17	78°15.9	50.1	79°13.2	13.7'	$10^{\circ}37.9$	14.2'	56.5'
18	93°16.0	S06°51.0	93°46.0	13.7'	S10°52.1	14.1'	56.4'
19	108°16.2	52.0 52.9	108°18.7	13.7'	11°06.3	14.1'	56.4
20 21	123°16.4 138°16.5	52.9 •• 53.9	122°51.4 137°24.1	13.7' 13.6'	11°20.3 11°34.4	14.0' 14.0'	56.4' 56.4'
22	153°16.7	54.8	151°56.7	13.6'	11°48.3	13.9'	56.4
23	168°16.8	55.7	166°29.3	13.6'	12°02.2	13.8'	56.3'
	SD = 16.0'	d = 0.9'		SE	O = 15.5'		
c	CUA	D	CUA		D-:	_1	LIP
Sun 0	<b>GHA</b> 183°17.0	Dec \$06°56.7	<b>GHA</b> 181°01.9	u 13.6'	<b>Dec</b> \$12° 16.0	d 13.8'	<b>HP</b> 56.3'
1	198°17.2	57.6	195°34.5	13.5'	12°29.8	13.7'	56.3
2	213°17.3	58.6	210°07.0	13.5'	$12^{\circ}43.5$	13.6'	56.3'
3	228°17.5	06°59.5	224°39.5	13.5'	12°57.1	13.6'	56.2'
4	243°17.7 258°17.8	07°00.5 01.4	239°12.0 253°44.5	13.4' 13.4'	13° 10.7 13° 24.2	13.5'	56.2' 56.2'
5 6	258 17.8 273°18.0	507°02.3	268°16.9	13.4	\$13°37.6	13.4' 13.3'	56.2'
7	288°18.1	03.3	282°49.3	13.4'	13°51.0	13.3'	56.1'
8	303°18.3	04.2	297°21.6	13.3'	14°04.2	13.2'	56.1'
9	318°18.5	• • 05.2	311°53.9	13.3'	14° 17.4	13.1'	56.1'
10 11	333°18.6 348°18.8	06.1 07.1	326°26.2 340°58.5	13.3' 13.2'	14° 30.6 14° 43.6	13.1' 13.0'	56.1' 56.1'
12	3°18.9	507°08.0	355°30.7	13.2'	\$14°56.6	12.9'	56.0'
13	18° 19.1	08.9	10°02.9	13.1'	15°09.5	12.8'	56.0'
14	33°19.3	09.9	24°35.0	13.1'	$15^{\circ}22.3$	12.7'	56.0'
15	48°19.4	• • 10.8	39°07.1	13.1'	15° 35.0	12.7'	56.0'
16 17	63°19.6 78°19.7	11.8 12.7	53°39.2 68°11.2	13.0' 13.0'	15° 47.7 16° 00.3	12.6' 12.5'	55.9' 55.9'
18	93°19.9	507°13.7	82°43.2	13.0'	516° 12.8	12.4	55.9'
19	108°20.0	14.6	97°15.2	12.9'	16°25.2	12.3'	55.9'
20	123°20.2	15.5	111°47.1		16° 37.5		55.8'
21	138°20.4	• • 16.5	126°19.0	12.8'	16°49.7	12.2'	55.8'
22 23	153°20.5 168°20.7	17.4 18.4	140°50.9 155°22.7	12.8' 12.8'	17°01.9 17°14.0	12.1' 12.0'	55.8' 55.8'
25	SD = 16.0'	d = 0.9'	155 22.1		0 = 15.4'	12.0	33.0
	<u>JD = 10.0</u>	<u>u = 0.9</u>			7 — 13.4		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0 1	183°20.8 198°21.0	\$07°19.3 20.2	169°54.4 184°26.1	12.7' 12.7'	\$17°25.9 17°37.8	11.9' 11.8'	55.8' 55.7'
2	213°21.2	21.2	198°57.8	12.6'	17°49.6	11.7'	55.7'
3	228°21.3	• • 22.1	213°29.5	12.6'	18°01.3	11.6'	55.7'
4	243°21.5	23.0	228°01.1	12.6'	18° 13.0	11.5'	55.7'
5 6	258°21.6 273°21.8	24.0 \$07°24.9	242°32.6 257°04.1	12.5' 12.5'	18° 24.5 \$18° 35.9	11.4' 11.3'	55.6' 55.6'
7	273 21.6 288°21.9	25.9	271°35.6	12.4	18° 47.2	11.3	55.6'
8	303°22.1	26.8	286°07.0	12.4'	$18^{\circ}58.5$	11.1'	55.6'
9	318°22.2	• • 27.7	300°38.4	12.3'	19°09.6	11.0'	55.6'
10 11	333°22.4 348°22.6	28.7 29.6	315°09.8 329°41.1	12.3' 12.3'	19° 20.7 19° 31.6	11.0' 10.9'	55.5' 55.5'
11	348 22.6 3°22.7	29.6 \$07°30.6	329°41.1 344°12.3	12.3'	19°31.6 \$19°42.5	10.9	55.5'
13	18°22.9	31.5	358°43.5	12.2'	19°53.2	10.7	55.5'
14	33°23.0	32.4	13°14.7	12.1'	20°03.9	10.6'	55.4'
15	48°23.2	• • 33.4	27°45.8	12.1'	20° 14.4	10.4	55.4'
16 17	63°23.3 78°23.5	34.3 35.2	42°16.9 56°47.9	12.0' 12.0'	20° 24.9 20° 35.2	10.3' 10.2'	55.4' 55.4'
18	93°23.6	507°36.2	71°18.9	11.9'	520°45.5	10.2	55.4'
19	108°23.8	37.1	85°49.8	11.9'	20°55.6	10.0'	55.3'
20	123°23.9	38.1	100°20.7	11.9'	21°05.6	9.9'	55.3'
21 22	138°24.1 153°24.2	· · 39.0 39.9	114°51.6 129°22.4	11.8' 11.8'	21°15.6 21°25.4	9.8' 9.7'	55.3' 55.3'
23	153°24.2 168°24.4	39.9 40.9	129°22.4 143°53.2	11.8	21° 25.4 21° 35.1	9. <i>1</i> ′ 9.6′	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
N 70°	04:43	05:54	06:56	16:36	17:37	18:48
68°	04:48	05:52	06:49	16:43	17:39	18:43
66°	04:52	05:51	06:43	16:49	17:41	18:40
64°	04:55	05:50	06:38	16:54	17:42	18:37
62°	04:57	05:49	06:33	16:59	17:43	18:35
60°	04:59	05:48	06:29	17:03	17:45	18:33
N 58°	05:01	05:47	06:26	17:06	17:46	18:31
56°	05:03	05:46	06:23	17:10	17:47	18:30
54°	05:04	05:45	06:20	17:12	17:48	18:29
52°	05:05	05:44	06:18	17:15	17:49	18:28
50°	05:06	05:43	06:15	17:17	17:50	18:27
45°	05:07	05:41	06:10	17:22	17:52	18:26
N 40°	05:08	05:39	06:06	17:27	17:54	18:25
35°	05:08	05:37	06:03	17:30	17:56	18:25
30°	05:07	05:35	05:59	17:34	17:58	18:26
20°	05:06	05:31	05:54	17:40	18:02	18:27
N 10°	05:03	05:27	05:48	17:45	18:06	18:31
0°	04:58	05:23	05:43	17:50	18:11	18:35
S 10°	04:53	05:17	05:38	17:55	18:16	18:41
20°	04:45	05:11	05:33	18:01	18:23	18:49
30°	04:34	05:02	05:27	18:07	18:32	19:00
35°	04:27	04:57	05:23	18:11	18:37	19:07
40°	04:18	04:51	05:19	18:16	18:43	19:16
45°	04:08	04:44	05:14	18:21	18:51	19:27
<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	
<b>N</b> 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
<b>N</b> 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
$35^{\circ}$	05:46	06:49	07:51	17:13	17:41	18:13
$30^{\circ}$	05:42	06:41	07:41	17:18	17:50	18:24
20°	05:34	06:29	07:23	17:28	18:04	18:44
N $10^{\circ}$	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	Vei	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
					N19°18.9				N01°42.9		эпа	Dec
0	21°34.3	169°54.9	S20°51.6	250°16.7		237°21.4	N14°53.4	10°43.8		Alpheratz	357°32.9	29°14.5
1	36°36.8	184°58.3	51.2	265°17.8	18.6	252°23.5	53.3	25°46.5	42.8	Ankaa	353°05.3	-42°09.5
2	51°39.3	200°01.7	50.8	280°18.8 295°19.8	18.2	267°25.5	53.2	40°49.1 55°51.7	42.8	Schedar	$349^{\circ}28.8$	56°41.2
3	66°41.7	215°05.1	50.5		• • 17.9	282°27.6	• • 53.1		• • 42.7	Diphda	348°45.5	-17°50.2
4	81°44.2	230°08.5	50.1	310°20.9	17.6	297°29.7	52.9	70°54.4	42.6	Achernar	335°18.5	-57°05.9
5	96°46.7	245°11.9	49.7	325°21.9	17.3	312°31.7	52.8	85°57.0	42.5	Hamal	327°49.2	23°35.5
6	111°49.1	260°15.3	\$20°49.4	340°22.9	N19°17.0	327°33.8	N14°52.7	100°59.7	N01°42.5	Polaris	$312^{\circ}50.6$	89°22.5
7	126°51.6	275°18.7	49.0	355°24.0	16.6	342°35.9	52.6	116°02.3	42.4	Acamar	$315^{\circ}10.3$	-40°11.6
8	141°54.1	290°22.1	48.6	10°25.0	16.3	357°38.0	52.5	131°04.9	42.3	Menkar	314°04.3	4°11.8
9	156°56.5	305°25.5	• • 48.2	25°26.0	• • 16.0	12°40.0	• • 52.3	146°07.6	• • 42.2	Mirfak	308°25.7	49°57.4
10	171°59.0	320°28.9	47.8	40°27.1	15.7	27°42.1	52.2	161°10.2	42.2	Aldebaran	290°37.7	16°33.9
11	187°01.4	335°32.3	47.4	55°28.1	15.4	42°44.2	52.1	176°12.9	42.1	Rigel	281°02.3	-8°10.1
12	202°03.9	350°35.8	\$20°47.0	70°29.1	N19°15.0	57°46.2	N14°52.0	191°15.5	N01°42.0	Capella	$280^{\circ}19.5$	46°01.4
13	217°06.4	5°39.2	46.6	85°30.2	14.7	72°48.3	51.8	206°18.2	41.9	Bellatrix	278°21.2	6°22.5
14	232°08.8	20°42.6	46.2	100°31.2	14.4	87°50.4	51.7	221°20.8	41.9	Elnath	277°59.9	28°37.8
15	247°11.3	35°46.1	• • 45.8	115°32.2	• • 14.1	102°52.5	• • 51.6	236°23.4	• • 41.8	Alnilam	275°36.1	-1°10.9
16	262°13.8	50°49.5	45.4	130°33.3	13.7	117°54.5	51.5	251°26.1	41.7	Betelgeuse	270°50.4	7°24.8
17	277°16.2	65°52.9	45.0	145°34.3	13.4	132°56.6	51.4	266°28.7	41.7	Canopus	263°51.6	-52°42.2
18	292°18.7	80°56.4	520°44.6	160°35.3	N19°13.1	147°58.7	N14°51.2	281°31.4	N01°41.6	Sirius	258°24.9	-16°45.0
19	307°21.2	95°59.8	44.2	175°36.4	12.8	163°00.8	51.1	296°34.0	41.5	Adhara	255°04.7	-29°00.2
20	322°23.6	111°03.3	43.8	190°37.4	12.5	178°02.8	51.0	311°36.6	41.4	Procyon	244°49.3	5°09.5
21	337°26.1	126°06.7	• • 43.4	205°38.4	. 12.1	193°04.9	• • 50.9	326°39.3	• • 41.4	Pollux	243°15.6	27°57.6
22	352°28.6	141°10.2	43.0	220°39.5	11.8	208°07.0	50.8	341°41.9	41.3	Avior	234°14.3	-59°35.4
23	7°31.0	156°13.6	42.5	235°40.5	11.5	223°09.0	50.6	356°44.6	41.2	Suhail	222°45.4	-43°32.2
Mer.p	ass. 22:30	$\nu$ 3.4′ d-0.	.4′ m-4.43	$\nu$ 1.0′ d-0	.3′ m1.03	$\nu 2.1' \ d-0$	.1′ m-1.92	$\nu 2.6' \ d-0$	0.1' m0.37	Miaplacidus	221°38.4	-69°49.3
										Alphard	217°46.5	-8°46.3
\A/ I	CIIA	CILA	Б	CIIA	Б	CIIA	Б	CIIA	Б	Regulus	207°33.1	11°50.2
Wed	GHA	GHA	Dec Coo <sup>o</sup> 40 1	GHA	<b>Dec</b> N19°11.2	GHA	Dec	GHA	Dec	Dubhe	193°39.8	61°36.2
0	22°33.5	171°17.1	S20°42.1	250°41.6		238°11.1	N14°50.5	11°47.2	N01°41.1	Denebola	182°23.8	14°25.4
1	37°35.9	186°20.6	41.7	265°42.6	10.8	253°13.2	50.4	26°49.9	41.1	Gienah	175°42.4	-17°41.3
2	52°38.4 67°40.9	201°24.0	41.3	280°43.6	10.5	268°15.3	50.3	41°52.5	41.0	Acrux	$172^{\circ}59.2$	-63°14.8
3 4	82°43.3	216°27.5 231°31.0	· · 40.8 40.4	295°44.7	· · 10.2 09.9	283°17.3 298°19.4	50.1	56°55.1 71°57.8	• • 40.9	Gacrux	171°50.6	-57°15.7
5	62 45.5 97°45.8	231 31.0 246°34.4	40.4	310°45.7 325°46.7	09.9	313°21.5	50.0 49.9	87°00.4	40.8	Alioth	$166^{\circ}12.3$	55°48.8
6	97 45.6 112°48.3	240 34.4 261°37.9	\$20°39.5	340°47.8	N19°09.2	328°23.6	49.9 N14°49.8	102°03.1	40.8 N01°40.7	Spica	$158^{\circ}21.1$	-11°18.0
7	112 46.3 127°50.7	201 37.9 276°41.4	39.1	355°48.8	08.9	343°25.6	49.7	102 05.1 117°05.7		Alkaid	152°51.4	49°10.8
8	142°53.2	270 41.4 291°44.9		10°49.9	08.6	358°27.7		132°08.3	40.6	Hadar	148°34.6	-60°30.1
9	142 55.2 157°55.7	306°48.4	38.7 •• 38.2	25°50.9	. 08.3	13°29.8	49.5 • • 49.4	132 06.3 147°11.0	40.6 •• 40.5	Menkent	147°56.3	-36°30.1
	172°58.1	300 46.4 321°51.9		40°52.0	07.9	28°31.9		147 11.0 162°13.6		Arcturus	145°46.9	19°02.7
10	172 58.1 188°00.6		37.8			28 31.9 43°34.0	49.3 49.2	102 13.0 177°16.3	40.4	Rigil Kent.	139°38.9	-60°56.8
11	203°03.1	336°55.3 351°58.8	37.3 \$20°36.9	55°53.0 70°54.0	07.6 N19°07.3	43 34.0 58°36.0	49.2 N14°49.1	177 16.3 192°18.9	40.3 N01°40.3	Kochab	$137^{\circ}20.9$	74°02.8
12	203 03.1 218°05.5			70 54.0 85°55.1				207°21.5		Zuben'ubi	$136^{\circ}54.7$	-16°09.1
13		7°02.3	36.4		07.0	73°38.1 88°40.2	48.9	207 21.5 222°24.2	40.2	Alphecca	126°02.8	26°37.6
14	233°08.0	22°05.8	35.9	100°56.1	06.6		48.8		40.1	Antares	$112^{\circ}14.3$	-26°29.5
15	248°10.4	37°09.3	• • 35.5	115°57.2	• • 06.3	103°42.3	• • 48.7	237°26.8	• • 40.0	Atria	$107^{\circ}07.6$	-69°04.7
16 17	263°12.9 278°15.4	52°12.9 67°16.4	35.0 34.5	130°58.2 145°59.2	06.0 05.7	118°44.3 133°46.4	48.6 48.5	252°29.5 267°32.1	40.0 39.9	Sabik	$102^{\circ}01.3$	-15°45.4
18	276 15.4 293°17.8	82°19.9	520°34.1	145 59.2 161°00.3	N19°05.3	133 40.4 148°48.5	46.5 N14°48.3	282°34.7	N01°39.8	Shaula	$96^{\circ}08.6$	-37°07.4
19	308°20.3	97°23.4	33.6	176°01.3		163°50.6	48.2	202 34.7 297°37.4	39.7	Rasalhague	95°57.4	12°32.6
					05.0					Eltanin	90°41.7	51°29.4
20	323°22.8 338°25.2	112°26.9 127°30.4	33.1 · · 32.7	191°02.4 206°03.4	04.7 •• 04.4	178°52.6 193°54.7	48.1 • • 48.0	312°40.0 327°42.7	39.7 · · 39.6	Kaus Aust.	83°30.7	-34°22.4
21 22	353° 25.2	142°34.0	32.7	200 03.4 221°04.5	04.4	208°56.8	47.9	342°45.3	39.5	Vega	80°32.3	38°48.8
23	8°30.2	142 34.0 157°37.5	31.7	236°05.5	03.7	200°50.0 223°58.9	47.9	357°48.0	39.5	Nunki	75°46.0	-26°15.8
		137 37.3	31.7	230 03.3	05.1					Altair	61°58.5	8°56.5
Mer.p	ass. 22:26	$\nu$ 3.5′ d-0.	.4′ m-4.37	$\nu 1.0' \ d-0$	.3′ m1.02	$\nu 2.1' \ d-0$	$.1^\prime$ m-1 $.92$	$\nu 2.6' \ d-0$	$0.1' \; { m m0.38}$	Peacock	53°03.3	-56°39.1
										Deneb	49° 24.7	45°22.9
Th	CHV	GHA	Doc	GHA	Doc	GHA	Doc	GHA	Doc	Enif	33°37.2	10°00.1
Thu 0	<b>GHA</b> 23°32.6	<b>GHA</b> 172°41.0	<b>Dec</b> \$20°31.2	251°06.6	<b>Dec</b> N19°03.4	239°01.0	<b>Dec</b> N14°47.6	12°50.6	<b>Dec</b> N01°39.4	Al Na'ir	27°30.8	-46°49.9
1	23 32.0 38°35.1	172 41.0 187°44.5	30.7	266°07.6	03.4	254°03.0	N14 47.6 47.5	27°53.2	39.4	Fomalhaut	15°12.6	-29°28.8
	38°35.1 53°37.5			281°08.7				42°55.9		Scheat	13°43.5	28°13.9
2	53° 37.5 68° 40.0	202°48.1 217°51.6	30.2 •• 29.7	281°08.7 296°09.7	02.7 •• 02.4	269°05.1 284°07.2	47.4 •• 47.3	42°55.9 57°58.5	39.2 · · 39.2	Markab	13°28.2	15°21.2
3 4	83°42.5	232°55.1	29.7	311°10.8	02.4	299°09.3	47.3	73°01.2	39.2	Oct 13 Tue	SHA	Mer.pass
4 5	83 42.5 98°44.9	232 55.1 247°58.7	29.3 28.8	311 10.8 326°11.8	02.1	299 09.3 314°11.4	47.1 47.0	73 01.2 88°03.8	39.1		148°20.5	12:37
6	98 44.9 113°47.4	247 58.7 263°02.2	28.8 \$20°28.3	341°12.8	01.8 N19°01.4	314 11.4 329°13.4	47.0 N14°46.9	103°06.4			228°42.4	07:18
7	113 47.4 128°49.9	203 02.2 278°05.8	27.8	356°13.9	01.1	344°15.5	46.8	103 00.4 118°09.1	38.9		215°47.1	08:09
8	143°52.3	278 05.8 293°09.3	27.3	11°14.9	00.8	359°17.6	46.7	133°11.7	38.8	Saturn		23:13
9	158°54.8	308°12.9	26.7	26°16.0	• • 00.5	14°19.7	• • 46.5	148°14.4	38.7			
10	173° 57.3	323°16.4	26.2	41°17.0	19°00.1	29°21.8	46.4	163°17.0	38.7	Oct 14 Wed	SHA	Mer.pass
11	188°59.7	338°20.0	25.7	56°18.1	18°59.8	44°23.8	46.3	178°19.6	38.6		148°43.6	12:32
12	204°02.2	353°23.6	\$20°25.2	71°19.1	N18°59.5	59°25.9	N14°46.2	193°22.3	N01°38.5		228°08.1	07:17
13	219°04.7	8°27.1	24.7	86°20.2	59.1	74°28.0	46.1	208°24.9	38.4		215°37.6	08:06
14	234°07.1	23°30.7	24.2	101°21.2	58.8	89°30.1	45.9	223°27.6	38.4	Saturn	349°13.7	23:09
15	249°09.6	38°34.3	23.7	116°22.3	• • 58.5	104°32.2	• • 45.8	238°30.2	• • 38.3	Oct 15 Thu	SHA	Mer.pass
16	264°12.0	53°37.8	23.1	131°23.4	58.2	119°34.2	45.7	253°32.8	38.2		149°08.4	12:26
17	279°14.5	68°41.4	22.6	146°24.4	57.8	134°36.3	45.6	268°35.5	38.1		227°33.9	07:15
18	294°17.0	83°45.0	S20°22.1	161°25.5	N18°57.5	149°38.4	N14°45.5	283°38.1	N01°38.1		215°28.3	08:03
19	309°19.4	98°48.6	21.5	176°26.5	57.2	164°40.5	45.4	298°40.8	38.0		349° 18.0	23:05
20	324°21.9	113°52.1	21.0	191°27.6	56.9	179°42.6	45.2	313°43.4	37.9			
21	339°24.4	128°55.7	• • 20.5	206°28.6	• • 56.5	194°44.7	• • 45.1	328°46.0	• • 37.9	Horizont	al parallax	
22	354°26.8	143°59.3	19.9	221°29.7	56.2	209°46.7	45.0	343°48.7	37.8		Venus:	0.5
23	9°29.3	159°02.9	19.4	236°30.7	55.9	224°48.8	44.9	$358^{\circ}51.3$	37.7		Mars:	0.1
Mara	ass. 22:22	1/3 E/ 4 O	.5′ m-4.31	11 N/ d N	.3′ m1.01	1/2 1/ d 0	.1′ m-1.92	1/2 6/ 4 0	0.1' m0.38			
ivier.p	uss. ∠∠.∠∠	ν 3.3 u-0.	.5 111-4.31	ν 1.0 U-0	.5 1111.01	ν ∠.1 u-0	.1 111-1.94	ν Δ.Ο U-C	1110.30			

h	Sui	n		1	Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	183°24.5	S07°41.8	158°23.9	11.7'	S21°44.7	9.5'	55.2'
1 2	198°24.7 213°24.9	42.7 43.7	172°54.6 187°25.2	11.6' 11.6'	21°54.2 22°03.6	9.4' 9.3'	55.2' 55.2'
3	228° 25.0	• • 44.6	201°55.8	11.5'	22°12.9	9.2'	55.2'
4	243°25.2	45.5	$216^{\circ}26.3$	11.5'	22°22.0	9.1'	55.1'
5	258°25.3	46.5	230°56.8	11.5'	22°31.1	8.9'	55.1'
6 7	273°25.5 288°25.6	S07°47.4 48.3	245°27.3 259°57.7	11.4' 11.4'	\$22°40.0 22°48.8	8.8' 8.7'	55.1' 55.1'
8	303°25.8	49.3	274°28.0	11.3'	22°57.5	8.6'	55.1'
9	318° 25.9	• • 50.2	288°58.4	11.3'	23°06.1	8.5'	55.1'
10 11	333°26.1 348°26.2	51.1 52.1	303°28.6 317°58.9	11.2' 11.2'	23°14.6 23°23.0	8.4' 8.2'	55.0' 55.0'
12	3°26.4	S07°53.0	332°29.1	11.2'	\$23°31.2	8.1	55.0'
13	18° 26.5	53.9	346°59.2	11.1'	23°39.4	8.0'	55.0'
14 15	33°26.7 48°26.8	54.9 •• 55.8	1°29.3 15°59.4	11.1' 11.0'	23°47.4 23°55.3	7.9' 7.8'	55.0' 54.9'
16	63°26.9	56.7	30° 29.4	11.0'	24°03.0	7.7'	54.9'
17	78°27.1	57.7	44° 59.4	10.9'	24°10.7	7.5'	54.9'
18 19	93°27.2 108°27.4	S07°58.6 07°59.5	59°29.4 73°59.3	10.9' 10.9'	\$24°18.2 24°25.6	7.4' 7.3'	54.9' 54.9'
20	106 27.4 123°27.5	07 59.5 08°00.5	73 59.5 88°29.1	10.9	24°25.0	7.3 7.2'	54.8'
21	138° 27.7	• • 01.4	102°59.0	10.8'	24°40.1	7.0'	54.8'
22	153°27.8 168°28.0	02.3	117°28.8 131°58.5	10.8'	24°47.1 24°54.0	6.9'	54.8' 54.8'
23		03.3	131 58.5	10.7'		6.8'	54.8
	SD = 16.0'	d = 0.9'		SD	= 15.1'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°28.1	S08°04.2	146°28.2	10.7'	S25°00.8	6.7'	54.8'
1 2	198°28.3 213°28.4	05.1 06.0	160°57.9 175°27.6	10.6' 10.6'	25°07.5 25°14.1	6.5' 6.4'	54.8' 54.7'
3	228° 28.6	• • 07.0	189°57.2	10.6'	25°20.5	6.3	54.7'
4	243°28.7	07.9	204°26.7	10.5'	25°26.8	6.2'	54.7'
5 6	258°28.9 273°29.0	08.8 \$08°09.8	218° 56.3 233° 25.8	10.5' 10.5'	25°32.9 \$25°39.0	6.0' 5.9'	54.7' 54.7'
7	273 29.0 288°29.1	10.7	233 25.6 247°55.2	10.5	25°44.9	5.8'	54.7'
8	303°29.3	11.6	262°24.7	10.4'	25°50.7	5.7'	54.6'
9	318°29.4	• • 12.6	276°54.1 291°23.5	10.4'	25°56.3 26°01.8	5.5'	54.6'
10 11	333°29.6 348°29.7	13.5 14.4	291°23.5 305°52.8	10.3' 10.3'	26°01.8 26°07.2	5.4' 5.3'	54.6' 54.6'
12	3°29.9	S08°15.3	320°22.1	10.3'	S26°12.5	5.1'	54.6'
13	18°30.0 33°30.2	16.3	334°51.4 349°20.7	10.3'	26°17.6 26°22.6	5.0' 4.9'	54.6'
14 15	48° 30.2	17.2 •• 18.1	349°20.7 3°49.9	10.2' 10.2'	26°22.6 26°27.5	4.9 4.7'	54.6' 54.5'
16	63°30.4	19.1	18° 19.1	10.2'	26°32.3	4.6'	54.5'
17	78°30.6 93°30.7	20.0 \$08°20.9	32°48.3	10.2'	26°36.9 <b>S</b> 26°41.3	4.5'	54.5'
18 19	93 30.7 108°30.9	21.8	47°17.5 61°46.6	10.1' 10.1'	26°45.7	4.3' 4.2'	54.5' 54.5'
20	123°31.0	22.8	$76^{\circ}15.7$		26°49.9		54.5'
21	138°31.2 153°31.3	• • 23.7	90°44.8	10.1'	26°54.0 26°57.9	3.9'	54.5'
22 23	168°31.4	24.6 25.5	105°13.9 119°42.9	10.1' 10.0'	20 57.9 27°01.7	3.8' 3.7'	54.4' 54.4'
	SD = 16.0'	d = 0.9'			= 14.9'		
Thu 0	<b>GHA</b> 183°31.6	<b>Dec</b> \$08°26.5	<b>GHA</b> 134°12.0	u  10.0'	<b>Dec</b> \$27°05.4	<i>d</i> 3.5'	<b>HP</b> 54.4'
1	198°31.7	27.4	148°41.0	10.0'	27°09.0	3.4	54.4
2	213°31.9	28.3	163°10.0	10.0'	27°12.4	3.3'	54.4'
3 4	228°32.0 243°32.1	· · 29.2 30.2	177°39.0 192°07.9	10.0' 10.0'	27°15.7 27°18.8	3.1' 3.0'	54.4' 54.4'
5	258°32.3	31.1	206°36.9	9.9'	27°21.8	2.9'	54.4
6	273°32.4	S08°32.0	221°05.8	9.9'	\$27°24.7	2.7'	54.3'
7 8	288°32.6 303°32.7	32.9 33.9	235°34.8 250°03.7	9.9' 9.9'	27°27.4 27°30.0	2.6' 2.5'	54.3' 54.3'
9	318°32.8	• • 34.8	264°32.6	9.9' 9.9'	27°32.5	2.3'	54.3'
10	333° 33.0	35.7	279°01.5	9.9'	27°34.8	2.2'	54.3'
11 12	348°33.1 3°33.3	36.6 \$08°37.6	293°30.4 307°59.2	9.9' 9.9'	27°37.0 <b>S</b> 27°39.1	2.1' 1.9'	54.3' 54.3'
13	3 33.3 18°33.4	38.5	322°28.1	9.9' 9.9'	27°41.0	1.8'	54.3'
14	33°33.5	39.4	336° 57.0	9.9'	27°42.8	1.7'	54.3'
15 16	48° 33.7 63° 33.8	· · 40.3 41.3	351°25.9 5°54.7	9.9' 9.9'	27°44.4 27°45.9	1.5' 1.4'	54.3' 54.3'
16 17	78° 33.9	41.3 42.2	5°54.7 20°23.6	9.9' 9.9'	27°45.9 27°47.3	1.4	54.3° 54.2°
18	93°34.1	S08°43.1	34°52.5	9.9'	S27°48.6	1.1'	54.2'
19 20	108°34.2 123°34.4	44.0 44.9	49°21.3 63°50.2	9.9' 9.9'	27°49.7 27°50.6	1.0' 0.8'	54.2' 54.2'
20	123 34.4 138°34.5	· · 45.9	78° 19.1	9.9' 9.9'	27°51.5	0.8	54.2'
22	153°34.6	46.8	92°47.9	9.9'	27°52.2	0.6'	54.2'
23	168°34.8	47.7	107°16.8	9.9'	27°52.7	0.4'	54.2'
	SD = 16.0'	d = 0.9'		SD	= 14.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	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°		05:27	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°							
N 70°							
68°							
66°	13:22			14:14			
64°	12:05			15:31			
62°	11:29	13:18	15:07	16:08	16:04	16:02	
60°	11:04	12:36	13:56	16:34	16:46	17:13	
N 58°	10:43	12:08	13:21	16:55	17:14	17:48	
56°	10:27	11:46	12:55	17:12	17:36	18:14	
54°	10:13	11:29	12:35	17:27	17:55	18:34	
52°	10:00	11:13	12:18	17:40	18:10	18:51	
50°	09:50	11:00	12:04	17:51	18:23	19:06	
45°	09:27	10:33	11:34	18:14	18:51	19:36	
N 40°	09:09			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	
<b>N</b> 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.	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	6-18%			
13	13:38	13:45	11:46	13:54	01:29				
14	13:53	13:59	11:46	14:44	02:19				
15	14:06	14:13	11:46	15:36	03:10				

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	curn		Stars	
Fri –	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
			\$20°18.9						N01° 37.6		SHA	Dec
0	24°31.8	174°06.5		251°31.8	N18°55.6	239° 50.9	N14°44.8	13°53.9		Alpheratz	357°32.9	29°14.5
1	39°34.2	189° 10.1	18.3	266°32.8	55.2	254°53.0	44.6	28°56.6	37.6	Ankaa	353°05.3	-42°09.5
2	54°36.7	204°13.7	17.8	281°33.9	54.9	269°55.1	44.5	43°59.2	37.5	Schedar	349°28.8	56°41.2
3	69°39.2	$219^{\circ}17.3$	•• 17.2	296°34.9	• • 54.6	284° 57.2	• • 44.4	59°01.9	• • 37.4	Diphda	348°45.5	-17°50.2
4	84°41.6	234°20.9	16.7	311°36.0	54.2	299° 59.2	44.3	74°04.5	37.4			
5	99°44.1	249°24.5	16.1	326°37.1	53.9	$315^{\circ}01.3$	44.2	89°07.1	37.3	Achernar	335°18.5	-57°05.9
6	114°46.5	264°28.1	S20°15.5	341°38.1	N18°53.6	330°03.4	N14°44.1	104°09.8	N01°37.2	Hamal	327°49.2	23°35.5
7	129°49.0	279°31.7	15.0	356°39.2	53.3	345°05.5	43.9	119° 12.4	37.1	Polaris	312°49.6	89°22.5
8	144°51.5	294°35.3	14.4	11°40.2	52.9	0°07.6	43.8	134° 15.1	37.1	Acamar	$315^{\circ}10.3$	-40°11.6
9	159°53.9	309°38.9	13.9	26°41.3	• • 52.6	15°09.7	• • 43.7	149° 17.7	• • 37.0	Menkar	314°04.3	4°11.8
										Mirfak	308°25.7	49°57.4
10	174°56.4	324°42.6	13.3	41°42.3	52.3	30°11.7	43.6	164°20.3	36.9	Aldebaran	290°37.7	16°33.9
11	189°58.9	339°46.2	12.7	56°43.4	52.0	45° 13.8	43.5	179°23.0	36.9	Rigel	281°02.3	-8°10.1
12	205°01.3	354° 49.8	S20°12.1	71°44.5	N18°51.6	60° 15.9	N14°43.3	194°25.6	N01°36.8	Capella	280°19.5	46°01.4
13	220°03.8	9°53.4	11.6	86°45.5	51.3	75°18.0	43.2	209°28.3	36.7	Bellatrix	278°21.1	6°22.5
14	235°06.3	24°57.0	11.0	101°46.6	51.0	90°20.1	43.1	224°30.9	36.6	Elnath	277°59.8	28°37.8
15	250°08.7	40°00.7	• • 10.4	116°47.6	• • 50.6	105°22.2	• • 43.0	239° 33.5	• • 36.6			
16	265°11.2	55°04.3	09.8	131°48.7	50.3	120°24.3	42.9	254°36.2	36.5	Alnilam	275°36.1	-1°10.9
17	280°13.7	70°07.9	09.2	146°49.8	50.0	135°26.3	42.8	269°38.8	36.4	Betelgeuse	270°50.4	7°24.8
18	295°16.1	85°11.6	S20°08.6	161°50.8	N18°49.7	150°28.4	N14°42.6	284°41.4	N01°36.4	Canopus	263°51.6	-52°42.2
19	310°18.6	100° 15.2	08.1	176°51.9	49.3	165° 30.5	42.5	299°44.1	36.3	Sirius	258°24.9	-16°45.0
20	325°21.0	115° 18.8	07.5	191°52.9	49.0	180°32.6	42.4	314°46.7	36.2	Adhara	255°04.7	-29°00.2
						100 32.0 195°34.7				Procyon	244°49.3	5°09.4
21	340°23.5	130°22.5	• • 06.9	206°54.0	• • 48.7		• • 42.3	329°49.4	36.1	Pollux	243°15.5	27°57.6
22	355°26.0	145°26.1	06.3	221°55.1	48.3	210°36.8	42.2	344°52.0	36.1	Avior	234°14.3	-59°35.4
23	10°28.4	160°29.8	05.7	236°56.1	48.0	225°38.9	42.0	359° 54.6	36.0	Suhail	222°45.4	-43°32.2
Merr	pass. 22:18	v3.6′ d₋0	.5′ m-4.25	v1 1' d.C	0.3' m1.00	v2 1′ d₋0	.1′ m-1.93	v26' d.0	0.1' m0.39	Miaplacidus	221°38.3	-69°49.3
.,,,,,,		- J.O U-U.		ν 1.1 U-C		u-0	1.95	₽ Z.O U-0		Alphard	217°46.5	-8°46.4
										Regulus	207°33.1	11°50.2
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.8	61°36.2
0	25°30.9	175°33.4	\$20°05.1	251°57.2	N18°47.7	240°41.0	N14°41.9	14°57.3	N01°35.9	Denebola	182°23.8	14°25.4
1	40°33.4	190°37.1	04.5	266°58.3	47.4	255°43.0	41.8	29°59.9	35.8	Gienah	175°42.4	-17°41.3
2	55°35.8	205°40.7	03.9	281°59.3	47.0	$270^{\circ}45.1$	41.7	45°02.6	35.8		173° 42.4 172° 59.2	-63°14.8
3	70°38.3	220°44.4	• • 03.2	297°00.4	• • 46.7	285°47.2	• • 41.6	60°05.2	• • 35.7	Acrux		-03 14.6 -57°15.7
4	85°40.8	235°48.0	02.6	312°01.5	46.4	300°49.3	41.5	75°07.8	35.6	Gacrux	171°50.6	
5	100°43.2	250°51.7	02.0	327°02.5	46.0	315°51.4	41.3	90°10.5	35.6	Alioth	166°12.3	55°48.8
6	115°45.7	265°55.3	S20°01.4	342°03.6	N18°45.7	330°53.5	N14°41.2	105° 13.1	N01°35.5	Spica	158°21.1	-11°18.0
7	130°48.1	280°59.0	00.8	357°04.6	45.4	345°55.6	41.1	120° 15.7	35.4	Alkaid	152°51.4	49°10.8
8	145°50.6	296°02.7	20°00.2	12°05.7	45.0	0°57.7	41.0	135° 18.4	35.4	Hadar	148°34.6	-60°30.1
9	160°53.1	311°06.3	19°59.5	27°06.8	• • 44.7	15° 59.8	• • 40.9	150°21.0	35.3	Menkent	147°56.3	-36°30.1
10	175°55.5	326°10.0	58.9	42°07.8	44.4	31°01.8	40.8	165°23.7	35.2	Arcturus	145°46.9	19°02.7
11	175 55.5 190°58.0	341° 13.7	58.3	57°08.9	44.4	46°03.9	40.6	180°26.3	35.2	Rigil Kent.	139°38.9	-60°56.8
				72°10.0					N01°35.1	Kochab	137°20.9	74°02.7
12	206°00.5	356°17.3	S19°57.7		N18°43.7	61°06.0	N14°40.5	195°28.9		Zuben'ubi	136°54.7	-16°09.1
13	221°02.9	11°21.0	57.0	87°11.0	43.4	76°08.1	40.4	210°31.6	35.0	Alphecca	126°02.8	26°37.6
14	236°05.4	26°24.7	56.4	102°12.1	43.1	91°10.2	40.3	225°34.2	34.9	Antares	112°14.3	-26°29.5
15	251°07.9	41°28.4	• • 55.7	117°13.2	• • 42.7	106° 12.3	• • 40.2	240°36.8	• • 34.9	Atria	107°07.6	-69°04.7
16	266°10.3	56°32.1	55.1	132°14.3	42.4	121°14.4	40.1	255°39.5	34.8	Sabik	102°01.3	-15°45.4
17	281°12.8	71°35.7	54.5	147°15.3	42.1	136° 16.5	39.9	270°42.1	34.7	Shaula	96°08.6	-37°07.4
18	296°15.3	86°39.4	S19°53.8	162°16.4	N18°41.7	151° 18.6	N14°39.8	285° 44.8	N01°34.6	Rasalhague	95°57.4	12°32.6
19	311°17.7	101°43.1	53.2	1// 1/.5	41.4	166° 20.7	39.7	300°47.4	34.6	Eltanin	90°41.7	51°29.4
20	326°20.2	116°46.8	52.5	192°18.5	41.1	181°22.8	39.6	315°50.0	34.5	Kaus Aust.	83°30.7	-34°22.3
21	341°22.6	131°50.5	• • 51.9	207°19.6	• • 40.8	196°24.9	• • 39.5	330°52.7	• • 34.4	Vega	80°32.4	38°48.8
22	356°25.1	146°54.2	51.2	222°20.7	40.4	$211^{\circ}26.9$	39.4	345°55.3	34.4	Nunki	75°46.0	-26°15.8
23	11°27.6	161°57.9	50.6	237°21.7	40.1	226° 29.0	39.3	0°57.9	34.3	Altair	61°58.5	8°56.5
1/1011	22.14	2 6/ 4 0	.6′ m-4.18	1 1/ -/ 0	0.3' m1.00	2 1/ ./ 0	.1′ m-1.93	26/ 40	0.1' m0.39	Peacock	53°03.3	-56°39.1
ivier.p	pass. 22:14	$\nu$ 3.0 $a$ -0.	.0 111-4.10	$\nu_{1.1}$ $a$ -C	7.5 M1.00	ν2.1 <i>α</i> -0	.1 111-1.95	$\nu$ 2.0 $a$ -0	7.1 MO.39	Deneb	49°24.7	45°22.9
										Enif	33°37.2	10°00.1
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		27°30.8	-46°49.9
0	26°30.0	177°01.6	S19°49.9	252°22.8	N18°39.8	241°31.1	N14°39.1	16°00.6	N01°34.2	Al Na'ir		
1	41°32.5	192°05.3	49.2	267°23.9	39.4	256° 33.2	39.0	31°03.2	34.1	Fomalhaut	15°12.6	-29°28.8
2	56°35.0	207° 09.0	48.6	282°25.0	39.1	271°35.3	38.9	46°05.9	34.1	Scheat	13°43.5	28°13.9
3	71°37.4	207 09.0 222° 12.7	. 47.9	297°26.0	• • 38.8	271 33.3 286° 37.4	• • 38.8	61°08.5	34.0	Markab	13°28.2	15°21.2
4	86°39.9	237° 16.4	47.9	312°27.1	38.4	301°39.5	38.7	76°11.1	33.9	Oct 16 Fri	SHA	Mer.pass
											3ПА 149°34.7	12:21
5	101°42.4	252°20.1	46.6	327°28.2	38.1	316°41.6	38.6	91°13.8	33.9			
6	116°44.8	267°23.8	S19°45.9	342°29.3	N18°37.8	331°43.7	N14°38.4	106°16.4	N01°33.8	Mars		07:13
7	131°47.3	282°27.5	45.2	357°30.3	37.4	346° 45.8	38.3	121°19.0	33.7		215°19.1	07:59
8	146°49.8	297°31.2	44.5	12°31.4	37.1	1°47.9	38.2	136°21.7	33.7	Saturn	349°22.2	23:00
9	161°52.2	312°34.9	• • 43.8	27°32.5	• • 36.8	16°50.0	• • 38.1	151°24.3	• • 33.6	Oct 17 Sat	SHA	Mer.pass
10	176°54.7	327°38.6	43.2	42°33.6	36.4	31°52.1	38.0	166°26.9	33.5		150°02.5	12:15
11	191°57.1	342°42.3	42.5	57°34.6	36.1	46°54.2	37.9	181°29.6	33.4		226°26.3	07:12
12	206°59.6	357°46.1	S19°41.8	72°35.7	N18°35.8	61°56.3	N14°37.8	196°32.2	N01°33.4		215°10.1	07:56
13	222°02.1	12°49.8	41.1	87°36.8	35.5	76° 58.4	37.6	211°34.9	33.3	Saturn	349°26.4	22:56
14	237°04.5	$27^{\circ}53.5$	40.4	102°37.9	35.1	92°00.4	37.5	226°37.5	33.2	Jatuin	JTJ 20.4	
15	252°07.0	42°57.2	• • 39.7	117°38.9	• • 34.8	107°02.5	• • 37.4	241°40.1	• • 33.2	Oct 18 Sun	SHA	Mer.pass
16	267°09.5	58°00.9	39.0	132°40.0	34.5	122°04.6	37.3	256°42.8	33.1		150°31.5	12:09
17	282°11.9	73°04.7	38.3	147°41.1	34.1	137°06.7	37.2	271°45.4	33.0	Mars		07:10
18	297°14.4	88°08.4	S19°37.6	162°42.2	N18°33.8	152°08.8	N14°37.1	286°48.0	N01°32.9	Jupiter		07:53
19	312°16.9	103°12.1	36.9	177°43.2	33.5	167° 10.9	36.9	301°50.7	32.9	Saturn		22:52
20	327°19.3	118° 15.9	36.2	192°44.3	33.1	182° 13.0	36.8	316°53.3	32.8	Jutuill	2.3 30.3	
21	342°21.8	133° 19.6	35.5	207°45.4	32.8	197° 15.1	36.7	331°55.9	32.7	Horizont	al parallax	
22	357°24.3	148°23.3	34.8	222°46.5	32.5	212° 17.2	36.6	346° 58.6	32.7		Venus:	0.5
23	12°26.7	163°27.0	34.1	237°47.6	32.1	227° 19.3	36.5	2°01.2	32.6		Mars:	0.1
												_
Wer.p	pass. 22:10	ν3.1′ d-0.	.7′ m-4.11	$\nu$ 1.1' $d$ -0	0.3′ m0.99	$\nu$ 2.1′ d-0	.1′ m-1.94	$\nu$ 2.6′ $d$ -0	0.1′ m0.40			

Fri	h	Sui	Moon					
1 198°35.0	Fri	GHA	Dec	GHA	ν	Dec	d	HP
2 213°35.2								
286°353   · · · · · · · · · · · · · · · · · ·								
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10   333°36.2   57.8   266°35.0   10.00   27°40.9   -1.11   54.11     11   348°36.4   58.7   281°04.1   10.01   27°40.9   -1.12   54.11     12   3°36.5   506°59.7   295°33.1   10.11   527°46.4   -1.5   54.11     13   18°36.6   09°00.6   310°02.1   10.11   27°46.4   -1.5   54.11     15   48°36.9   · · · · · · · · · · · · · · · · · ·		303°36.0	56.0	237°37.1	10.0'		-0.8'	54.1'
11   348°36.4   56.7   281°04.1   10.0   27°48.6   -1.2   54.1     12   3°36.6   508°59.7   295°33.1   10.1   527°47.7   -1.3   54.1     13   18°36.6   0900.6   310°02.1   10.1   27°46.4   -1.5   54.1     14   33°36.8   01.5   324°31.2   10.1   27°46.4   -1.5   54.1     15   48°36.9   0.24   339°03.3   10.1   27°46.4   -1.5   54.1     16   63°37.0   03.3   353°29.4   10.1   27°41.6   -1.9   54.1     17   78°37.2   04.2   7°56.5   10.2   27°35.6   -2.3   54.1     18   93°37.3   S09°05.2   22°27.7   10.2   S27°37.7   -2.0   54.1     19   108°37.4   06.1   36°56.9   10.2   27°33.6   -2.3   54.1     20   123°37.5   70.0   50°56.1   10.2   27°33.6   -2.3   54.1     21   138°37.7   0.70.9   65°55.3   10.3   27°23.0   -2.5   54.1     22   153°37.8   08.8   80°46.6   10.3   27°28.4   -2.7   54.1     32   28333.3   12.5   138°21.9   10.4   27°27.0   -3.0   54.1     22   123°38.3   12.5   138°21.9   10.4   27°27.0   -3.0   54.1     3   228°38.5   13.4   152°51.4   10.4   27°27.0   -3.0   54.1     4   243°38.6   14.3   16°20.8   10.5   27°01.5   -3.4     5   258°38.7   15.2   181°5.3   10.5   27°01.5   -3.4     5   258°38.7   15.2   181°5.3   10.5   27°01.5   -3.4     5   288°39.0   17.1   210°49.3   10.6   26°59.8   -3.8     5   33°39.3   18.0   228°48.5   10.7   26°48.0   -4.2     5   318°39.2   18.9   239°48.5   10.7   26°48.0   -4.2     5   318°39.2   2.1   2.2   2.2   2.2   34.1     13   38°39.7   22.5   22.7   24.1   54.1     14   33°39.9   23.5   312°17.2   10.8   26°30.0   4.7   54.1     15   48'40.0   2.4   326°47.0   10.9   26°20.9   4.9   54.2     16   63°40.1   25.3   341°16.9   10.9   26°20.9   4.9   54.2     17   78'40.2   2.2   2.2   2.3   2.3   341°16.9   10.9   26°20.9   4.9   54.2     19   108°40.5   28.0   38.9   38.9   38.4   310°1.0   26°40.0   4.7   54.2     20   123°41.6   36.2   39.9   36.9   11.1   25°50.0   5.6   54.2     21   138°40.7   22.5   297°47.4   10.8   26°30.0   4.7   54.2     19   108°40.5   28.0   38.9   38.6   38.6   38.6     10   13   33°40.8   38.9   38.5   38.1     11   13   38°								
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Sat         GHA         Dec         GHA         ν         Dec         d         HP           0         183°38.1         509°10.7         109°23.2         10.4'         27°22.9         -2.9'         54.1'           1         198°38.2         11.6         123°52.6         10.4'         27°17.0         -3.2'         54.1'           3         228°38.5         1.13.4         152°51.4         10.4'         27°17.0         -3.2'         54.1'           4         243°38.6         14.3         167°20.8         10.5'         27°07.1         -3.6'         54.1'           5         256°38.7         15.2         181°50.3         10.5'         27°07.1         -3.6'         54.1'           7         288°39.0         17.1         210°49.3         10.6'         26°59.8         -3.8'         54.1'           9         318°39.2         18.0         225°18.9         10.6'         26°59.8         -3.8'         54.1'           10         333°39.3         19.8         254°18.2         10.7'         26°48.0         -4.2'         54.1'           11         348°39.5         20.7         26°34°18.2         10.7'         26°48.0         -4.2'         54.1' <th>23</th> <th></th> <th></th> <th>94-53.9</th> <th></th> <th></th> <th>-2.8</th> <th>54.1</th>	23			94-53.9			-2.8	54.1
1 1 188° 38.1 S09° 10.7 109° 23.2 10.4' S27° 22.9 -2.9' 54.1' 1 198° 38.2 11.6 123° 52.6 10.4' 27° 20.0 -3.0' 54.1' 2 121° 38.3 12.5 138° 21.9 10.4' 27° 13.8 -3.3' 54.1' 3 228° 38.5 · 13.4 152° 51.4 10.4' 27° 13.8 -3.3' 54.1' 4 243° 38.6 14.3 167° 20.8 10.5' 27° 10.5 -3.4' 54.1' 5 25° 38.8 15.2 181° 50.3 10.5' 27° 10.5 -3.4' 54.1' 6 273° 38.8 S09° 16.2 196° 19.8 10.5' S27° 03.5 -3.7' 54.1' 7 288° 39.0 17.1 210° 49.3 10.6' 26° 59.8 -3.8' 54.1' 10 333° 39.3 19.8 225° 18.9 10.6' 26° 56.0 -3.9' 54.1' 11 348° 39.5 20.7 268° 47.9 10.7' 26° 43.8 -4.3' 54.1' 11 348° 39.5 20.7 268° 47.9 10.7' 26° 43.8 -4.3' 54.1' 11 348° 39.5 20.7 268° 47.9 10.7' 26° 33.6 -4.4' 54.1' 11 348° 39.5 20.7 268° 47.9 10.7' 26° 30.4 -4.7' 54.2' 11 348° 39.5 20.7 268° 47.9 10.7' 26° 30.4 -4.5' 54.1' 13 18° 39.7 22.5 297° 47.4 10.8' 26° 35.0 -4.6' 54.1' 14 33° 39.9 23.5 312° 17.2 10.8' 26° 30.4 -4.7' 54.2' 15 48° 40.0 -24.4 326° 47.0 10.9' 26° 20.9 -4.9' 54.2' 17 78° 40.2 26.2 355° 46.9 11.0' 26° 16.0 -5.1' 54.2' 19 108° 40.5 28.0 24° 46.8 11.1' 26° 05.7 -5.3' 54.2' 20 123° 40.6 28.9 39° 16.1 11.1' 26° 00.4 -5.4' 54.2' 21 138° 40.7 -29.8 53° 47.0 11.1' 25° 55.0 -5.6' 54.2' 22 153° 40.9 30.7 68° 17.1 11.2' 25° 49.4 -5.7' 54.2' 22 153° 40.9 30.7 68° 17.1 11.2' 25° 49.4 -5.7' 54.2' 22 153° 40.9 30.7 68° 17.1 11.2' 25° 30.0 -6.0' 54.2' 22 153° 40.9 30.7 68° 17.1 11.2' 25° 49.4 -5.7' 54.2' 31° 280° 42.0 38.9 198° 50.4 11.6' 24° 47.3 -6.8' 54.2' 31° 33° 42.3 34.4 126° 18.1 11.4' 25° 26.0 -6.2' 54.2' 22 153° 40.9 30.7 68° 17.1 11.2' 25° 49.4 -5.7' 54.2' 31° 33° 42.3 34.4 34.8 34.1 36° 41.7 31.7 32° 32.0 -6.0' 54.2' 22 153° 40.9 30.7 68° 17.1 11.2' 25° 49.4 -5.7' 54.2' 31° 33° 42.3 34.8 34.1 36° 41.1 31° 32° 32.0 -6.0' 54.2' 22 153° 40.9 30.7 68° 17.1 11.2' 25° 49.4 -5.7' 54.2' 31° 31° 32° 32.0 -6.0' 54.2' 22 13° 41.8 509° 38.0 184° 19.8 11.5' 25° 00.7 -6.6' 54.2' 22 213° 41.8 509° 38.0 184° 19.8 11.5' 25° 00.7 -6.6' 54.2' 22 213° 41.8 509° 38.0 184° 19.8 11.5' 25° 30.7 -6.0' 54.2' 22 213° 41.8 509° 38.0 184° 19.8 11.5' 22° 30.7 -6.0' 54.2' 24° 30° 30°		SD = 16.0'	d = 0.9'		SD	0 = 14.8'		
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0         183°41.1         S09°32.6         97°17.5         11.3'         S25°37.9         -5.9'         54.2'           1         198°41.2         33.5         111°47.8         11.3'         25°32.0         -6.0'         54.2'           2         213°41.3         34.4         126°18.1         11.4'         25°26.0         -6.2'         54.2'           3         228°41.5         · 35.3         140°48.5         11.4'         25°13.6         -6.3'         54.2'           4         243°41.6         36.2         155°18.9         11.5'         25°13.6         -6.4'         54.2'           5         258°41.7         37.1         169°49.3         11.5'         25°07.2         -6.5'         54.2'           6         273°41.8         S09°38.0         184°19.8         11.5'         25°07.2         -6.6'         54.3'           7         288°42.0         38.9         198°50.4         11.6'         24°54.0         -6.7'         54.3'           8         303°42.1         39.8         213°21.0         11.6'         24°47.3         -6.8'         54.3'           9         318°42.2         -40.7         227°51.6         11.7'         24°33.5         -7.1'		SD = 16.0'				0 = 14.8'		
0         183°41.1         S09°32.6         97°17.5         11.3'         S25°37.9         -5.9'         54.2'           1         198°41.2         33.5         111°47.8         11.3'         25°32.0         -6.0'         54.2'           2         213°41.3         34.4         126°18.1         11.4'         25°26.0         -6.2'         54.2'           3         228°41.5         · 35.3         140°48.5         11.4'         25°13.6         -6.3'         54.2'           4         243°41.6         36.2         155°18.9         11.5'         25°13.6         -6.4'         54.2'           5         258°41.7         37.1         169°49.3         11.5'         25°07.2         -6.5'         54.2'           6         273°41.8         S09°38.0         184°19.8         11.5'         25°07.2         -6.6'         54.3'           7         288°42.0         38.9         198°50.4         11.6'         24°54.0         -6.7'         54.3'           8         303°42.1         39.8         213°21.0         11.6'         24°47.3         -6.8'         54.3'           9         318°42.2         -40.7         227°51.6         11.7'         24°33.5         -7.1'				CILA				
1       198°41.2       33.5       111°47.8       11.3'       25°32.0       -6.0'       54.2'         2       213°41.3       34.4       126°18.1       11.4'       25°26.0       -6.2'       54.2'         3       228°41.5       · · 35.3       140°48.5       11.4'       25°19.8       -6.3'       54.2'         4       243°41.6       36.2       155°18.9       11.5'       25°13.6       -6.4'       54.2'         5       258°41.7       37.1       169°49.3       11.5'       25°07.2       -6.5'       54.3'         6       273°41.8       509°38.0       184°19.8       11.5'       525°00.7       -6.6'       54.3'         7       288°42.0       38.9       198°50.4       11.6'       24°54.0       -6.7'       54.3'         8       303°42.1       39.8       213°21.0       11.6'       24°47.3       -6.8'       54.3'         9       318°42.2       · 40.7       227°51.6       11.7'       24°33.5       -7.1'       54.3'         11       348°42.4       42.6       256°53.0       11.8'       24°26.4       -7.2'       54.3'         12       3°42.6       509°43.5       271°23.8       11.8'								
3       228°41.5       · · · 35.3       140°48.5       11.4'       25°19.8       -6.3'       54.2'         4       243°41.6       36.2       155°18.9       11.5'       25°13.6       -6.4'       54.2'         5       258°41.7       37.1       169°49.3       11.5'       25°07.2       -6.5'       54.3'         6       273°41.8       S09°38.0       184°19.8       11.5'       S25°00.7       -6.6'       54.3'         7       288°42.0       38.9       198°50.4       11.6'       24°54.0       -6.7'       54.3'         8       303°42.1       39.8       213°21.0       11.6'       24°47.3       -6.8'       54.3'         9       318°42.2       · · 40.7       227°51.6       11.7'       24°40.5       -7.0'       54.3'         10       333°42.3       41.6       242°22.3       11.7'       24°33.5       -7.1'       54.3'         11       348°42.4       42.6       256°53.0       11.8'       24°26.4       -7.2'       54.3'         12       3°42.6       509°43.5       271°23.8       11.8'       524°19.2       -7.3'       54.3'         13       18°42.7       44.4       285°54.7       11.9' <th>1</th> <th>198°41.2</th> <th>33.5</th> <th>111°47.8</th> <th>11.3'</th> <th>25°32.0</th> <th>-6.0'</th> <th>54.2'</th>	1	198°41.2	33.5	111°47.8	11.3'	25°32.0	-6.0'	54.2'
4         243°41.6         36.2         155°18.9         11.5'         25°13.6         -6.4'         54.2'           5         258°41.7         37.1         169°49.3         11.5'         25°07.2         -6.5'         54.3'           6         273°41.8         509°38.0         184°19.8         11.5'         \$25°00.7         -6.6'         54.3'           7         288°42.0         38.9         198°50.4         11.6'         24°54.0         -6.7'         54.3'           8         303°42.1         39.8         213°21.0         11.6'         24°47.3         -6.8'         54.3'           9         318°42.2         -40.7         227°51.6         11.7'         24°40.5         -7.0'         54.3'           10         333°42.3         41.6         242°22.3         11.7'         24°33.5         -7.1'         54.3'           11         348°42.4         42.6         256°53.0         11.8'         524°19.2         -7.3'         54.3'           12         3°42.6         509°43.5         271°23.8         11.8'         524°19.2         -7.3'         54.3'           13         18°42.7         44.4         285°54.7         11.9'         24°04.5         -7.5'								
5         258°41.7         37.1         169°49.3         11.5'         25°07.2         -6.5'         54.3'           6         273°41.8         S09°38.0         184°19.8         11.5'         S25°00.7         -6.6'         54.3'           7         288°42.0         38.9         198°50.4         11.6'         24°54.0         -6.7'         54.3'           8         303°42.1         39.8         213°21.0         11.6'         24°47.3         -6.8'         54.3'           9         318°42.2         · 40.7         227°51.6         11.7'         24°40.5         -7.0'         54.3'           10         333°42.3         41.6         242°22.3         11.7'         24°33.5         -7.1'         54.3'           11         348°42.4         42.6         256°53.0         11.8'         524°19.2         -7.3'         54.3'           12         3°42.6         509°43.5         271°23.8         11.8'         524°19.2         -7.3'         54.3'           13         18°42.7         44.4         285°54.7         11.9'         24°04.5         -7.5'         54.3'           15         48°42.9         - 46.2         314°56.5         12.0'         23°57.0         -7.6'								
7       288°42.0       38.9       198°50.4       11.6'       24°54.0       -6.7'       54.3'         8       303°42.1       39.8       213°21.0       11.6'       24°47.3       -6.8'       54.3'         9       318°42.2       · 40.7       227°51.6       11.7'       24°40.5       -7.0'       54.3'         10       333°42.3       41.6       242°22.3       11.7'       24°33.5       -7.1'       54.3'         11       348°42.4       42.6       256°53.0       11.8'       24°26.4       -7.2'       54.3'         12       3°42.6       509°43.5       271°23.8       11.8'       524°19.2       -7.3'       54.3'         13       18°42.7       44.4       285°54.7       11.9'       24°11.9       -7.4'       54.3'         14       33°42.8       45.3       300°25.5       11.9'       24°04.5       -7.5'       54.3'         15       48°42.9       · 46.2       314°56.5       12.0'       23°57.0       -7.6'       54.4'         16       63°43.0       47.1       329°27.4       12.0'       23°41.6       -7.9'       54.4'         18       93°43.3       509°48.9       358°29.5       12.1'		258°41.7				25°07.2		
8       303° 42.1       39.8       213° 21.0       11.6'       24° 47.3       -6.8'       54.3'         9       318° 42.2       · · 40.7       227° 51.6       11.7'       24° 40.5       -7.0'       54.3'         10       333° 42.3       41.6       242° 22.3       11.7'       24° 33.5       -7.1'       54.3'         11       348° 42.4       42.6       256° 53.0       11.8'       24° 26.4       -7.2'       54.3'         12       3° 42.6       509° 43.5       271° 23.8       11.8'       524° 19.2       -7.3'       54.3'         13       18° 42.7       44.4       285° 54.7       11.9'       24° 11.9       -7.4'       54.3'         14       33° 42.8       45.3       300° 25.5       11.9'       24° 04.5       -7.5'       54.3'         15       48° 42.9       · · 46.2       314° 56.5       12.0'       23° 57.0       -7.6'       54.4'         16       63° 43.0       47.1       329° 27.4       12.0'       23° 49.3       -7.7'       54.4'         17       78° 43.2       48.0       343° 58.5       12.1'       23° 41.6       -7.9'       54.4'         18       93° 43.3       509° 48.9       358								
9 318°42.2 ··· 40.7 227°51.6 11.7' 24°40.5 ·7.0' 54.3' 10 333°42.3 41.6 242°22.3 11.7' 24°33.5 ·7.1' 54.3' 11 348°42.4 42.6 256°53.0 11.8' 24°26.4 ·7.2' 54.3' 12 3°42.6 509°43.5 271°33.8 11.8' 524°19.2 ·7.3' 54.3' 13 18°42.7 44.4 285°54.7 11.9' 24°11.9 ·7.4' 54.3' 14 33°42.8 45.3 300°25.5 11.9' 24°04.5 ·7.5' 54.3' 15 48°42.9 ··· 46.2 314°56.5 12.0' 23°57.0 ·7.6' 54.4' 17 78°43.2 48.0 343°58.5 12.1' 23°41.6 ·7.9' 54.4' 18 93°43.3 509°48.9 358°29.5 12.1' \$23°33.7 ·8.0' 54.4' 19 108°43.4 49.8 13°00.6 12.2' 23°25.8 ·8.1' 54.4' 20 123°43.5 50.7 27°31.8 12.2' 23°17.7 ·8.2' 54.4' 21 138°43.6 ··· 51.6 42°03.0 12.3' 23°09.5 ·8.3' 54.4' 22 153°43.7 52.5 56°34.3 12.3' 23°01.2 ·8.4' 54.4' 23 168°43.9 53.4 71°05.6 12.4' 22°52.9 ·8.5' 54.5'								
11       348°42.4       42.6       256°53.0       11.8'       24°26.4       -7.2'       54.3'         12       3°42.6       S09°43.5       271°23.8       11.8'       S24°19.2       -7.3'       54.3'         13       18°42.7       44.4       285°54.7       11.9'       24°11.9       -7.4'       54.3'         14       33°42.8       45.3       300°25.5       11.9'       24°04.5       -7.5'       54.3'         15       48°42.9       · 46.2       314°56.5       12.0'       23°57.0       -7.6'       54.4'         16       63°43.0       47.1       329°27.4       12.0'       23°49.3       -7.7'       54.4'         17       78°43.2       48.0       343°58.5       12.1'       23°41.6       -7.9'       54.4'         18       93°43.3       509°48.9       358°29.5       12.1'       523°33.7       -8.0'       54.4'         19       108°43.4       49.8       13°00.6       12.2'       23°25.8       -8.1'       54.4'         20       123°43.5       50.7       27°31.8       12.2'       23°17.7       -8.2'       54.4'         21       138°43.6       · 51.6       42°03.0       12.3'								
12       3°42.6       S09°43.5       271°23.8       11.8'       S24°19.2       -7.3'       54.3'         13       18°42.7       44.4       285°54.7       11.9'       24°11.9       -7.4'       54.3'         14       33°42.8       45.3       300°25.5       11.9'       24°04.5       -7.5'       54.3'         15       48°42.9       · · 46.2       314°56.5       12.0'       23°57.0       -7.6'       54.4'         16       63°43.0       47.1       329°27.4       12.0'       23°49.3       -7.7'       54.4'         17       78°43.2       48.0       343°58.5       12.1'       23°41.6       -7.9'       54.4'         18       93°43.3       509°48.9       358°29.5       12.1'       523°33.7       -8.0'       54.4'         19       108°43.4       49.8       13°00.6       12.2'       23°25.8       -8.1'       54.4'         20       123°43.5       50.7       27°31.8       12.2'       23°17.7       -8.2'       54.4'         21       138°43.6       · 51.6       42°03.0       12.3'       23°09.5       -8.3'       54.4'         22       153°43.7       52.5       56°34.3       12.3'								
13     18°42.7     44.4     285°54.7     11.9'     24°11.9     -7.4'     54.3'       14     33°42.8     45.3     300°25.5     11.9'     24°04.5     -7.5'     54.3'       15     48°42.9     · 46.2     314°56.5     12.0'     23°57.0     -7.6'     54.4'       16     63°43.0     47.1     329°27.4     12.0'     23°41.6     -7.7'     54.4'       17     78°43.2     48.0     343°58.5     12.1'     23°41.6     -7.9'     54.4'       18     93°43.3     509°48.9     358°29.5     12.1'     \$23°33.7     -8.0'     54.4'       19     108°43.4     49.8     13°00.6     12.2'     23°25.8     -8.1'     54.4'       20     123°43.5     50.7     27°31.8     12.2'     23°17.7     -8.2'     54.4'       21     138°43.6     · 51.6     42°03.0     12.3'     23°09.5     -8.3'     54.4'       22     153°43.7     52.5     56°34.3     12.3'     23°01.2     -8.4'     54.4'       23     168°43.9     53.4     71°05.6     12.4'     22°52.9     -8.5'     54.5'								
15       48°42.9       · · · 46.2       314°56.5       12.0'       23°57.0       -7.6'       54.4'         16       63°43.0       47.1       329°27.4       12.0'       23°49.3       -7.7'       54.4'         17       78°43.2       48.0       343°58.5       12.1'       23°41.6       -7.9'       54.4'         18       93°43.3       S09°48.9       358°29.5       12.1'       S23°33.7       -8.0'       54.4'         19       108°43.4       49.8       13°00.6       12.2'       23°25.8       -8.1'       54.4'         20       123°43.5       50.7       27°31.8       12.2'       23°17.7       -8.2'       54.4'         21       138°43.6       · · 51.6       42°03.0       12.3'       23°09.5       -8.3'       54.4'         22       153°43.7       52.5       56°34.3       12.3'       23°01.2       -8.4'       54.4'         23       168°43.9       53.4       71°05.6       12.4'       22°52.9       -8.5'       54.5'	13	18°42.7	44.4	285°54.7	11.9'	24°11.9	-7.4'	54.3'
16     63°43.0     47.1     329°27.4     12.0'     23°49.3     -7.7'     54.4'       17     78°43.2     48.0     343°58.5     12.1'     23°41.6     -7.9'     54.4'       18     93°43.3     S09°48.9     358°29.5     12.1'     S23°33.7     -8.0'     54.4'       19     108°43.4     49.8     13°00.6     12.2'     23°25.8     -8.1'     54.4'       20     123°43.5     50.7     27°31.8     12.2'     23°17.7     -8.2'     54.4'       21     138°43.6     · · 51.6     42°03.0     12.3'     23°09.5     -8.3'     54.4'       22     153°43.7     52.5     56°34.3     12.3'     23°01.2     -8.4'     54.4'       23     168°43.9     53.4     71°05.6     12.4'     22°52.9     -8.5'     54.5'								
17         78°43.2         48.0         343°58.5         12.1'         23°41.6         -7.9'         54.4'           18         93°43.3         S09°48.9         358°29.5         12.1'         S23°33.7         -8.0'         54.4'           19         108°43.4         49.8         13°00.6         12.2'         23°25.8         -8.1'         54.4'           20         123°43.5         50.7         27°31.8         12.2'         23°17.7         -8.2'         54.4'           21         138°43.6         · · 51.6         42°03.0         12.3'         23°09.5         -8.3'         54.4'           22         153°43.7         52.5         56°34.3         12.3'         23°01.2         -8.4'         54.4'           23         168°43.9         53.4         71°05.6         12.4'         22°52.9         -8.5'         54.5'								
19     108°43.4     49.8     13°00.6     12.2'     23°25.8     -8.1'     54.4'       20     123°43.5     50.7     27°31.8     12.2'     23°17.7     -8.2'     54.4'       21     138°43.6     • 51.6     42°03.0     12.3'     23°09.5     -8.3'     54.4'       22     153°43.7     52.5     56°34.3     12.3'     23°01.2     -8.4'     54.4'       23     168°43.9     53.4     71°05.6     12.4'     22°52.9     -8.5'     54.5'			48.0					
20     123°43.5     50.7     27°31.8     12.2'     23°17.7     -8.2'     54.4'       21     138°43.6     • 51.6     42°03.0     12.3'     23°09.5     -8.3'     54.4'       22     153°43.7     52.5     56°34.3     12.3'     23°01.2     -8.4'     54.4'       23     168°43.9     53.4     71°05.6     12.4'     22°52.9     -8.5'     54.5'								
21       138°43.6       · · 51.6       42°03.0       12.3'       23°09.5       -8.3'       54.4'         22       153°43.7       52.5       56°34.3       12.3'       23°01.2       -8.4'       54.4'         23       168°43.9       53.4       71°05.6       12.4'       22°52.9       -8.5'       54.5'								
22       153°43.7       52.5       56°34.3       12.3'       23°01.2       -8.4'       54.4'         23       168°43.9       53.4       71°05.6       12.4'       22°52.9       -8.5'       54.5'								
	22	153°43.7	52.5	56°34.3	12.3'	23°01.2	-8.4'	54.4'
SD = 16.0'  d = 0.9' $SD = 14.8'$	23		-	71°05.6			-8.5'	54.5'
		SD = 16.0'	d = 0.9'		SD	0 = 14.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Junioci	Civil	Naut.
N 72°	05:04	06:22	07:34	15:55	17:06	18:24
N 70°	05:07	06:17	07:21	16:08	17:11	18:22
68°	05:09	06:13	07:11	16:18	17:16	18:20
66°	05:11	06:10	07:03	16:27	17:19	18:18
64°	05:12	06:07	06:56	16:34	17:23	18:17
62°	05:13	06:04	06:50	16:40	17:25	18:16
60°	05:13	06:02	06:44	16:45	17:28	18:16
N 58°	05:14	05:59	06:39	16:50	17:30	18:15
56°	05:14	05:57	06:35	16:54	17:32	18:15
54°	05:15	05:56	06:32	16:58	17:34	18:15
52°	05:15	05:54	06:28	17:02	17:36	18:15
50°	05:15	05:52	06:25	17:05	17:38	18:15
45°	05:14	05:48	06:18	17:12	17:42	18:16
<b>N</b> 40°	05:14	05:45	06:12	17:18	17:45	18:16
35°	05:13	05:42	06:08	17:23	17:48	18:18
30°	05:11	05:39	06:03	17:27	17:51	18:19
20°	05:07	05:33	05:55	17:35	17:57	18:23
N 10°	05:03	05:27	05:49	17:42	18:03	18:28
0°	04:57	05:21	05:42	17:49	18:10	18:34
<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	
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
<b>N</b> 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

		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	26-44%	
16	14:20	14:26	11:46	16:27	04:01		
17	14:32	14:38	11:45	17:17	04:52		
18	14:44	14:50	11:45	18:06	05:42		

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

h	Aries	Vei	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	27°29.2	178°30.8	\$19°33.4	252°48.6	N18°31.8	242°21.4	N14° 36.4	17°03.9	N01°32.5			
1	42°31.6	193°34.5	32.6	267°49.7	31.5	257°23.5	36.3	32°06.5	32.5	Alpheratz	357°32.9	29°14.5
2	57°34.1	208°38.3	31.9	282°50.8	31.1	272°25.6	36.1	47°09.1	32.4	Ankaa	353°05.3	-42°09.6
3	72°36.6	223°42.0	31.2	297°51.9	30.8	287°27.7	36.0	62°11.8	32.3	Schedar	349°28.8	56°41.3
4	87°39.0	238°45.7	30.5	312°53.0	30.5	302°29.8	35.9	77°14.4	32.2	Diphda	348°45.5	-17°50.2
5	102°41.5	253°49.5	29.8	$327^{\circ}54.1$	30.1	317°31.9	35.8	92°17.0	32.2	Achernar	335° 18.5 327° 49.2	-57°05.9 23°35.5
6	117°44.0	268°53.2	S19°29.0	342°55.1	N18°29.8	332°34.0	N14°35.7	$107^{\circ}19.7$	N01°32.1	Hamal Polaris	327 49.2 312°48.7	23 35.5 89°22.5
7	132°46.4	283°57.0	28.3	357°56.2	29.5	347°36.1	35.6	122°22.3	32.0	Acamar	315°10.3	-40°11.6
8	147°48.9	299°00.7	27.6	12°57.3	29.1	2°38.2	35.5	137°24.9	32.0	Menkar	314°04.3	4°11.8
9	162°51.4	314°04.5	• • 26.8	27°58.4	• • 28.8	17°40.3	• • 35.3	152°27.6	• • 31.9	Mirfak	308° 25.7	49°57.4
10	177°53.8	329°08.2	26.1	42°59.5	28.5	32°42.4	35.2	167°30.2	31.8	Aldebaran	290°37.7	16°33.9
11	192°56.3	344°12.0	25.4	58°00.6	28.1	47°44.5	35.1	182°32.8	31.8	Rigel	281°02.3	-8°10.1
12	207°58.7	359°15.7	\$19°24.6	73°01.6	N18°27.8	62°46.6 77°48.7	N14° 35.0	197°35.5 212°38.1	N01°31.7	Capella	$280^{\circ}19.4$	46°01.4
13 14	223°01.2 238°03.7	14°19.5 29°23.2	23.9 23.1	88°02.7 103°03.8	27.5 27.1	92°50.8	34.9 34.8	212°38.1 227°40.8	31.6 31.6	Bellatrix	$278^{\circ}21.1$	6°22.5
15	253°06.1	44°27.0	22.4	118°04.9	26.8	107°52.9	34.7	242°43.4	31.5	Elnath	277°59.8	28°37.8
16	268°08.6	59°30.7	21.6	133°06.0	26.5	122°55.0	34.6	257°46.0	31.4	Alnilam	275°36.1	-1°11.0
17	283°11.1	74°34.5	20.9	148°07.1	26.1	137°57.1	34.4	272°48.7	31.3	Betelgeuse	270°50.3	7°24.8
18	298° 13.5	89°38.3	S19°20.1	163°08.2	N18°25.8	152°59.2	N14°34.3	287°51.3	N01°31.3	Canopus	263°51.5	-52°42.2
19	313°16.0	104°42.0	19.4	178°09.2	25.5	168°01.3	34.2	302°53.9	31.2	Sirius	258°24.8	-16°45.0
20	$328^{\circ}18.5$	119°45.8	18.6	193°10.3	25.1	183°03.4	34.1	317°56.6	31.1	Adhara	255°04.6	-29°00.2
21	343°20.9	134°49.6	• • 17.9	208°11.4	• • 24.8	198°05.5	• • 34.0	332°59.2	• • 31.1	Procyon Pollux	244° 49.3 243° 15.5	5°09.4 27°57.6
22	358°23.4	149°53.3	17.1	223°12.5	24.5	213°07.6	33.9	348°01.8	31.0	Avior	234° 14.2	-59°35.4
23	13°25.9	164°57.1	16.3	238°13.6	24.1	228°09.7	33.8	3°04.5	30.9	Suhail	234 14.2 222°45.4	-39 35.4 -43°32.2
Mern	ass. 22:06	ν3 7' d-0	.7′ m-4.14	$\nu 1.1' d_{-}$	.3′ m0.98	ν2 1' d-0	.1′ m-1.94	ν2 6' d-0	.1' m0.40	Miaplacidus	221°38.3	-69°49.3
-vici.p		ν J.1 u-0.	1-	ν 1.1 U-U	.5 1110.30	u-0	1.37	u-0		Alphard	217°46.5	-8°46.4
_			_		_		_		_	Regulus	207°33.1	11°50.2
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.7	61°36.2
0	28°28.3	180°00.9	S19°15.6	253°14.7	N18°23.8	243°11.8	N14°33.6	18°07.1	N01°30.9	Denebola	$182^{\circ}23.7$	14°25.4
1	43°30.8	195°04.6	14.8	268°15.8	23.5	258°13.9	33.5	33°09.7	30.8	Gienah	$175^{\circ}42.4$	-17°41.3
2	58°33.2	210°08.4	14.0	283°16.9	23.1	273°16.0	33.4	48°12.4	30.7 · · 30.7	Acrux	$172^{\circ}59.1$	-63°14.7
3 4	73°35.7 88°38.2	225°12.2 240°15.9	· · 13.2 12.5	298°18.0 313°19.0	· · 22.8 22.5	288°18.1 303°20.2	· · 33.3 33.2	63°15.0 78°17.6	· · 30.7 30.6	Gacrux		-57°15.7
5	103° 40.6	255°19.7	11.7	328°20.1	22.3	318°22.3	33.2	93°20.3	30.5	Alioth	166° 12.2	55°48.8
6	118°43.1	270°23.5	\$19° 10.9	343°21.2	N18°21.8	333°24.4	N14°33.0	108°22.9	N01°30.4	Spica	158°21.1	-11°18.0
7	133° 45.6	285°27.3	10.1	358°22.3	21.5	348°26.5	32.9	123°25.5	30.4	Alkaid	152°51.3	49°10.8
8	148°48.0	300°31.0	09.3	13°23.4	21.1	3°28.6	32.7	138°28.2	30.3	Hadar	148°34.6	-60°30.1
9	163°50.5	315°34.8	. 08.6	28°24.5	20.8	18°30.7	32.6	153°30.8	30.2	Menkent	147°56.3	-36°30.1
10	178°53.0	330°38.6	07.8	43°25.6	20.5	33°32.8	32.5	168°33.4	30.2	Arcturus	145°46.9 139°38.9	19°02.6 -60°56.8
11	193°55.4	345°42.4	07.0	58°26.7	20.1	48°35.0	32.4	183°36.1	30.1	Rigil Kent. Kochab	139 36.9 137°21.0	74°02.7
12	208° 57.9	0°46.1	S19°06.2	73°27.8	N18°19.8	63°37.1	N14°32.3	198°38.7	N01°30.0	Zuben'ubi	136°54.7	-16°09.1
13	224°00.4	15°49.9	05.4	88°28.9	19.5	78°39.2	32.2	213°41.3	30.0	Alphecca	126°02.8	26°37.6
14	239°02.8	30°53.7	04.6	103°30.0	19.1	93°41.3	32.1	228°44.0	29.9	Antares	112° 14.3	-26°29.5
15	254°05.3	45°57.5	• • 03.8	118°31.1	• • 18.8	108°43.4	• • 32.0	243°46.6	• • 29.8	Atria	107°07.6	-69°04.7
16	269°07.7	61°01.3	03.0	133°32.2	18.5	123°45.5	31.9	258°49.2	29.8	Sabik	102°01.3	-15°45.4
17	284°10.2	76°05.0	02.2	148°33.3	18.1	138°47.6	31.7	273°51.9	29.7	Shaula	96°08.6	-37°07.4
18	299°12.7	91°08.8	\$19°01.4	163°34.3	N18°17.8	153°49.7	N14°31.6	288°54.5	N01°29.6	Rasalhague	95°57.4	12°32.6
19 20	314° 15.1 329° 17.6	106°12.6 121°16.4	19°00.6 18°59.8	178°35.4 193°36.5	17.4 17.1	168°51.8 183°53.9	31.5 31.4	303°57.1 318°59.8	29.6 29.5	Eltanin	90°41.8	51°29.4
21	344°20.1	136°20.2	• • 59.0	208°37.6	. 16.8	198°56.0	31.4	334°02.4	29.4	Kaus Aust.	83°30.7	-34°22.3
22	359°22.5	151°24.0	58.2	223°38.7	16.4	213°58.1	31.2	349°05.0	29.4	Vega	80°32.4	38°48.8
23	14°25.0	166°27.8	57.4	238°39.8	16.1	229°00.2	31.1	4°07.7	29.3	Nunki	75°46.0	-26°15.8
										Altair	61°58.5	8°56.5
Mer.p	ass. 22:02	$\nu$ 3.8′ d-0.	.8′ m-4.23	$\nu 1.1' d-0$	.3′ m0.97	$\nu 2.1' \ d-0$	.1′ m-1.95	$\nu 2.6' d-0$	.1' m0.41	Peacock	53°03.4	-56°39.1
										Deneb Enif	49° 24.7 33° 37.2	45°22.9 10°00.1
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.8	-46°49.9
0	29°27.5	181°31.6	S18°56.5	253°40.9	$N18^{\circ}15.8$	244°02.3	$N14^{\circ}31.0$	19°10.3	N01°29.2	Fomalhaut	15°12.7	-40 49.9 -29°28.8
1	44°29.9	196°35.3	55.7	268°42.0	15.4	259°04.4	30.8	34°12.9	29.1	Scheat	13°43.5	28°14.0
2	59° 32.4	211°39.1	54.9	283°43.1	15.1	274°06.5	30.7	49°15.6	29.1	Markab	13°28.2	15°21.2
3	74°34.8	226°42.9	• • 54.1	298°44.2	• • 14.8	289°08.7	• • 30.6	64°18.2	• • 29.0	0-/ 10 11		
4	89°37.3	241°46.7	53.3	313°45.3	14.4	304°10.8	30.5	79°20.8	28.9	Oct 19 Mon	SHA 151°01 6	Mer.pass
5	104°39.8	256°50.5	52.4	328°46.4	14.1	319°12.9	30.4 N14°20.2	94°23.5	28.9		151°01.6 225°19.5	12:03 07:08
6 7	119°42.2	271°54.3	\$18° 51.6	343°47.5	N18°13.8	334°15.0 349°17.1	N14° 30.3	109°26.1 124°28.7	N01°28.8	l l	225 19.5 214°52.2	07:08
7 8	134° 44.7 149° 47.2	286°58.1 302°01.9	50.8 49.9	358°48.6 13°49.7	13.4 13.1	4°19.2	30.2 30.1	124°28.7 139°31.4	28.7 28.7	Saturn		22:48
9	164° 49.6	317°05.7	• • 49.1	28°50.8	• • 12.8	19°21.3	• • 30.0	154°34.0	28.6			
10	179°52.1	332°09.5	48.3	43°51.9	12.4	34°23.4	29.8	169°36.6	28.5	Oct 20 Tue	SHA	Mer.pass
11	194°54.6	347°13.3	47.4	58°53.0	12.1	49°25.5	29.7	184°39.3	28.5		151°32.5	11:57
12	209°57.0	2°17.1	<b>S</b> 18°46.6	73°54.1	N18°11.7	64°27.6	N14°29.6	199°41.9	N01°28.4		224°46.4	07:07
13	$224^{\circ}59.5$	17°20.9	45.8	88°55.2	11.4	$79^{\circ}29.7$	29.5	$214^{\circ}44.5$	28.3		214°43.5 349°38.8	07:46 22:44
14	240°02.0	32°24.7	44.9	103°56.3	11.1	94°31.9	29.4	229°47.2	28.3	Saturn	J+3 J0.0	22:44
15	255°04.4	47°28.5	• • 44.1	118°57.4	•• 10.7	109°34.0	• • 29.3	244°49.8	• • 28.2	Oct 21 Wed	SHA	Mer.pass
16	270°06.9	62°32.3	43.2	133°58.5	10.4	124°36.1	29.2	259°52.4	28.1		$152^{\circ}04.1$	11:51
17	285°09.3	77°36.1	42.4	148°59.6	10.1	139°38.2	29.1	274°55.1	28.1		224°13.5	07:05
18	300°11.8	92°39.9	\$18°41.5	164°00.8	N18°09.7	154°40.3	N14°29.0	289°57.7	N01°28.0		214°34.9	07:43
19	315°14.3	107°43.7	40.7	179°01.9	09.4	169°42.4	28.9	305°00.3	27.9	Saturn	349°42.8	22:39
20	330°16.7 345°19.2	122°47.5 137°51.3	39.8 •• 39.0	194°03.0 209°04.1	09.1 •• 08.7	184°44.5 199°46.6	28.7 •• 28.6	320°02.9 335°05.6	27.9 •• 27.8	Horizont	al parallax	
21 22	0°21.7	157 51.3 152°55.1	38.1	209 04.1 224°05.2	08.4	199 46.6 214°48.7	28.5	350°08.2	27.7		Venus:	0.5
23	15°24.1	167°58.9	37.3	239°06.3	08.0	214 46.7 229°50.9	28.4	5°10.8	27.7		Mars:	0.1
										L		
Mer.p	ass. 21:59	$\nu$ 3.8′ $d$ -0.	.8′ m-4.26	$\nu$ 1.1′ d-0	.3′ m0.96	$\nu 2.1' \ d-0$	.1′ m-1.95	$\nu$ 2.6′ d-0	0.1′ m0.41			

h	Sui	Moon								
	GHA		CHA			.,	LID			
Mon 0	GHA 183°44.0	<b>Dec</b> \$09°54.3	<b>GHA</b> 85°36.9	u 12.4'	Dec \$22°44.4	d -8.6'	<b>HP</b> 54.5'			
1	198°44.1	55.2	100°08.3	12.5'	22° 35.8	-8.7'	54.5			
2	213°44.2	56.1	114°39.8	12.5'	22°27.0	-8.8'	54.5			
3	228°44.3	• • 57.0	129°11.3	12.5'	22°18.2	-8.9'	54.5'			
4	243°44.4	57.9	143°42.8	12.6'	22°09.3	-9.0'	54.5'			
5	258°44.6	58.8	158°14.4	12.6'	22°00.3	-9.1'	54.6'			
6	273°44.7	S09°59.7	172°46.1	12.7'	S21°51.2	-9.2'	54.6'			
7	288°44.8	10°00.6	187°17.7	12.7'	21°42.0	-9.3'	54.6'			
8	303°44.9	01.5	201°49.5	12.8'	21°32.6	-9.4'	54.6'			
9	318°45.0	• • 02.4	216°21.3	12.8'	21°23.2 21°13.7	-9.5'	54.6			
10 11	333°45.1 348°45.3	03.3 04.2	230°53.1 245°25.0	12.9' 12.9'	21°13.7 21°04.1	-9.6' -9.7'	54.6' 54.7'			
12	3°45.4	\$10°05.1	259°56.9	13.0'	\$20°54.4	-9.7 -9.8'	54.7			
13	18°45.5	06.1	274°28.8	13.0'	20° 44.6	-9.9'	54.7			
14	33°45.6	07.0	289°00.8	13.0'	20°34.7	-10.0'	54.7			
15	48°45.7	• • 07.9	303°32.9	13.1'	20°24.7	-10.1'	54.7'			
16	63°45.8	8.80	$318^{\circ}05.0$	13.1'	$20^{\circ}14.6$	-10.2'	54.7'			
17	78°45.9	09.6	$332^{\circ}37.1$	13.2'	20°04.4	-10.3'	54.8'			
18	93°46.0	S10°10.5	347°09.3	13.2'	S19°54.1	-10.4'	54.8'			
19	108°46.2	11.4	1°41.5	13.3'	19°43.7	-10.5'	54.8'			
20	123°46.3	12.3	16°13.8	13.3'	19°33.2	-10.6'	54.8'			
21	138°46.4	· · 13.2	30°46.1	13.3'	19°22.7	-10.7'	54.8'			
22	153°46.5	14.1	45°18.4 59°50.8	13.4'	19° 12.0	-10.7'	54.9'			
23	168°46.6	15.0	59-50.8	13.4'	19°01.3	-10.8'	54.9'			
	SD = 16.0'	d = 0.9'		SI	O = 14.9'					
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP			
0	183°46.7	<b>S</b> 10°15.9	74°23.3	13.5'	\$18° 50.4	-10.9'	54.9'			
1	198°46.8	16.8	88°55.7	13.5'	18° 39.5	-11.0'	54.9'			
2	213°46.9	17.7	103°28.2	13.5'	18°28.5	-11.1'	55.0'			
3	228°47.0	• • 18.6	118°00.8	13.6'	18° 17.4	-11.2'	55.0'			
4	243°47.2	19.5	132°33.4	13.6'	18°06.2	-11.3'	55.0'			
5 6	258°47.3 273°47.4	20.4 \$10°21.3	147°06.0 161°38.7	13.7' 13.7'	17°54.9 \$17°43.6	-11.4' -11.4'	55.0' 55.0'			
6 7	2/3°47.4 288°47.5	22.2	161°38.7 176°11.4	13.7'	517°43.6 17°32.1	-11.4° -11.5'	55.0° 55.1'			
8	288 47.5 303°47.6	22.2	176 11.4 190°44.1	13.7	17 32.1 17°20.6	-11.5 -11.6'	55.1'			
9	318°47.7	24.0	205°16.9	13.8'	17° 20.0	-11.7'	55.1			
10	333°47.8	24.9	219°49.7	13.8'	16°57.3	-11.8'	55.1'			
11	348°47.9	25.8	234°22.5	13.9'	16°45.5	-11.9'	55.2'			
12	3°48.0	\$10°26.7	248°55.4	13.9'	S16°33.7	-11.9'	55.2'			
13	18°48.1	27.6	263°28.3	13.9'	16°21.7	-12.0'	55.2'			
14	33°48.2	28.5	278°01.2	14.0'	16°09.7	-12.1'	55.2'			
15	48°48.3	• • 29.4	292°34.2	14.0'	15° 57.6	-12.2'	55.3'			
16	63°48.4 78°48.6	30.3	307°07.2 321°40.2	14.0' 14.1'	15°45.4	-12.3'	55.3'			
17 18	78°48.6 93°48.7	31.2 \$10°32.0	321°40.2 336°13.3	14.1' 14.1'	15°33.2 \$15°20.9	-12.3' -12.4'	55.3' 55.3'			
10	93 48.7 108°48.8	32.9	350°46.3		15°08.5		55.4'			
20	123°48.9	33.8	5°19.5	14.1	15 06.5 14°56.0	-12.5'	55.4'			
21	138°49.0	• • 34.7	19°52.6	14.2	14° 43.4	-12.6'	55.4			
22	153°49.1	35.6	34°25.8	14.2'	14°30.8	-12.7'	55.4			
23	168°49.2	36.5	48°59.0	14.2'	14° 18.1	-12.8'	55.5'			
	SD = 16.1'	d = 0.9'		SI	O = 15.0'					
Wed	GHA	Dec	GHA	ν	Dec	d	НР			
0	183°49.3	S10°37.4	63°32.2	14.2'	S14°05.3	-12.9'	55.5			
1	198°49.4	38.3	78°05.4	14.3'	13°52.5	-12.9'	55.5'			
2	213°49.5	39.2	92°38.7	14.3'	13°39.5	-13.0'	55.6'			
3	228°49.6	• • 40.1	$107^{\circ}12.0$	14.3'	$13^{\circ}26.5$	-13.1'	55.6'			
4	243°49.7	41.0	121°45.3	14.3'	13° 13.5	-13.1'	55.6'			
5	258°49.8	41.9	136°18.6	14.3'	13°00.3	-13.2'	55.6'			
6	273°49.9	\$10°42.7	150°51.9	14.4	\$12°47.1	-13.3'	55.7'			
7	288°50.0	43.6	165°25.3	14.4	12°33.9	-13.3'	55.7'			
8	303°50.1	44.5	179°58.7	14.4'	12°20.5	-13.4'	55.7'			
9	318°50.2 333°50.3	· · 45.4	194°32.1 209°05.5	14.4' 14.4'	12°07.1 11°53.7	-13.5'	55.8'			
10 11	333°50.3 348°50.4	46.3 47.2	209°05.5 223°38.9	14.4' 14.4'	11°53.7 11°40.1	-13.5' -13.6'	55.8' 55.8'			
12	348 50.4 3°50.5	\$10°48.1	223 38.9 238°12.4	14.4	\$11°26.6	-13.6	55.8			
13	18°50.6	49.0	250° 12.4 252° 45.8	14.5	11°12.9	-13.7'	55.9			
14	33°50.7	49.0	267°19.3	14.5	10°59.2	-13.7	55.9			
15	48°50.8	• • 50.7	281°52.8	14.5'	10° 45.4	-13.8'	55.9			
16	63°50.9	51.6	296°26.3	14.5'	10°31.6	-13.9'	56.0			
17	78°51.0	52.5	310°59.8	14.5'	10° 17.7	-14.0'	56.0'			
18	93°51.1	S10°53.4	325°33.3	14.5'	<b>S</b> 10°03.7	-14.0'	56.0'			
19	108°51.2	54.3	340°06.8	14.5'	09°49.7	-14.1'	56.1			
20	123°51.3	55.2	354°40.3	14.5'	09°35.6	-14.1'	56.1			
21	138°51.4	• • 56.0	9°13.9	14.5'	09°21.5	-14.2'	56.1			
22	153°51.5	56.9	23°47.4	14.5'	09°07.3	-14.2'	56.2'			
	168°51.6	57.8	38°20.9	14.5'	08°53.0	-14.3'	56.2'			
23	SD = 16.1'		_		SD = 15.1'					

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	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
<b>N</b> 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
<b>N</b> 40°	05:17	05:48	06:16	17:13	17:41	18:12
35°	05:15	05:44	06:10	17:19	17:45	18:14
30°	05:13	05:41	06:05	17:24	17:48	18:16
20°	05:08	05:34	05:56	17:33	17:55	18:21
N 10°	05:03	05:27	05:49	17:41	18:02	18:27
0°	04:56	05:20	05:41	17:48	18:09	18:34
S 10°	04:48	05:13	05:34	17:56	18:17	18:42
20°	04:37	05:03	05:26	18:04	18:26	18:53
30°	04:23	04:52	05:17	18:13	18:38	19:07
35°	04:14	04:45	05:11	18:19	18:45	19:16
40°	04:03	04:37	05:05	18:25	18:53	19:27
45°	03:50	04:27	04:58	18:33	19:03	19:41
<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

Lat.		Moonris	e		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
<b>N</b> 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		Eqn.of Time Mer.		Mer.Pass.		
	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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	30°26.6	183°02.7	\$18°36.4	254°07.4	N18°07.7	244°53.0	N14°28.3	20°13.5	N01°27.6			
1	45° 29.1	198°06.5	35.5	269°08.5	07.4	259°55.1	28.2	35°16.1	27.5	Alpheratz	357°32.9	29° 14.5
2	60°31.5	213°10.3	34.7	284°09.6	07.4	274°57.2	28.1	50°18.7	27.5	Ankaa	353°05.3	-42°09.6
3						289°59.3				Schedar	349°28.8	56°41.3
	75°34.0	228°14.1	• • 33.8	299°10.7	• • 06.7		• • 28.0	65°21.4	• • 27.4	Diphda	348°45.5	-17°50.2
4	90°36.5	243°17.9	32.9	314°11.8	06.4	305°01.4	27.9	80°24.0	27.3	Achernar	335°18.5	-57°05.9
5	105°38.9	258°21.7	32.1	329°12.9	06.0	320°03.5	27.8	95°26.6	27.3	Hamal	327°49.2	23°35.5
6	120°41.4	273°25.5	\$18°31.2	344°14.0	N18°05.7	335°05.6	N14°27.6	110°29.3	N01°27.2	Polaris	312°48.1	89°22.5
7	135° 43.8	288°29.3	30.3	359° 15.1	05.3	350°07.8	27.5	125°31.9	27.1	Acamar	315°10.3	-40°11.6
8	150°46.3	303°33.1	29.4	14° 16.3	05.0	5°09.9	27.4	140°34.5	27.1	Menkar	314°04.3	4°11.8
9	165°48.8	318°36.9	• • 28.6	29° 17.4	• • 04.7	20°12.0	• • 27.3	155°37.2	• • 27.0	Mirfak	308°25.7	49°57.4
10	180°51.2	333°40.7	27.7	44° 18.5	04.3	$35^{\circ}14.1$	27.2	170°39.8	26.9	Aldebaran	290°37.7	16°33.9
11	195°53.7	348°44.5	26.8	59° 19.6	04.0	50°16.2	27.1	185°42.4	26.8	1		
12	210°56.2	3°48.3	S18°25.9	74°20.7	N18°03.7	65°18.3	N14°27.0	200°45.0	N01°26.8	Rigel	281°02.2	-8°10.1
13	225°58.6	18°52.1	25.0	89°21.8	03.3	80°20.4	26.9	215°47.7	26.7	Capella	280°19.4	46°01.4
14	241°01.1	33°55.9	24.2	104°22.9	03.0	95°22.6	26.8	230°50.3	26.6	Bellatrix	278°21.1	6°22.5
15	256°03.6	48°59.7	23.3	119°24.0	• • 02.7	110°24.7	26.7	245°52.9	26.6	Elnath	277°59.8	28° 37.8
16	271°06.0	64°03.5	22.4	134°25.1	02.3	125°26.8	26.6	260°55.6	26.5	Alnilam	275°36.1	-1°11.0
17	286° 08.5	79°07.3	21.5	149°26.3	02.0	140°28.9	26.4	275°58.2	26.4	Betelgeuse	270°50.3	7°24.8
	301°10.9	94°11.2	\$18°20.6	164° 27.4	N18° 01.6	155°31.0	N14° 26.3		N01°26.4	Canopus	263°51.5	-52° 42.2
18								291°00.8		Sirius	258°24.8	-16°45.0
19	316° 13.4	109°15.0	19.7	179°28.5	01.3	170°33.1	26.2	306°03.5	26.3	Adhara	255°04.6	-29°00.2
20	331°15.9	124°18.8	18.8	194°29.6	01.0	185°35.3	26.1	321°06.1	26.2	Procyon	244°49.3	5°09.4
21	346° 18.3	139°22.6	• • 17.9	209°30.7	• • 00.6	200°37.4	• • 26.0	336°08.7	• • 26.2	Pollux	243°15.5	27° 57.6
22	1°20.8	154°26.4	17.0	224°31.8	18°00.3	215°39.5	25.9	351°11.3	26.1	Avior	234°14.2	-59° 35.4
23	16°23.3	169°30.2	16.1	239°32.9	$17^{\circ}59.9$	230°41.6	25.8	6°14.0	26.0	Suhail	222°45.4	-43°32.2
Mara	21.55	2 0/ 4 0	.9′ m-4.25	1 1/	0.3′ m0.95	,2 1/ d 0	.1′ m-1.95	126/ d C	.1′ m0.41	Miaplacidus	221°38.3	-69°49.3
ivier.p	ass. 21:55	ν3.8 α-0	.9 m-4.25	$\nu_{1.1}$ a-c	1.3 mu.95	$\nu$ 2.1 a-0	.1 m-1.95	$\nu$ 2.0 $a$ -0	.1 mu.41			
										Alphard	217°46.4	-8°46.4
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.1	11°50.2
0	31°25.7	184°34.0	\$18°15.2	254°34.1	N17°59.6	245°43.7	N14°25.7	21°16.6	N01°26.0	Dubhe	193°39.7	61°36.2
1	46°28.2	199°37.8	14.3	269°35.2	59.3	260°45.8	25.6	36°19.2	25.9	Denebola	182°23.7	14°25.3
2	61°30.7	214°41.6	13.4	284°36.3	58.9	275°48.0	25.5	51°21.9	25.9		175°42.4	-17°41.3
3										Acrux	$172^{\circ}59.1$	-63°14.7
	76°33.1	229°45.4	• • 12.5	299°37.4	• • 58.6	290°50.1	• • 25.4	66°24.5	• • 25.8	Gacrux	171°50.6	-57° 15.7
4	91°35.6	244°49.2	11.6	314°38.5	58.3	305°52.2	25.2	81°27.1	25.7	Alioth	$166^{\circ}12.2$	55° 48.8
5	106°38.1	259°53.0	10.7	329°39.6	57.9	320°54.3	25.1	96°29.8	25.7	Spica	$158^{\circ}21.1$	-11° 18.0
6	121°40.5	274°56.8	S18°09.8	344°40.8	N17°57.6	335°56.4	N14°25.0	111°32.4	N01°25.6	Alkaid	152°51.3	49° 10.8
7	136°43.0	290°00.6	08.9	359°41.9	57.2	350°58.6	24.9	126°35.0	25.5	Hadar	148°34.6	-60°30.1
8	151°45.4	305°04.4	08.0	14°43.0	56.9	6°00.7	24.8	141°37.6	25.5	I	147°56.3	-36°30.1
9	166°47.9	320°08.2	• • 07.0	$29^{\circ}44.1$	• • 56.6	21°02.8	• • 24.7	156°40.3	• • 25.4	Arcturus	145°46.9	19°02.6
10	181°50.4	$335^{\circ}12.0$	06.1	44°45.2	56.2	36°04.9	24.6	171°42.9	25.3	Rigil Kent.		-60° 56.8
11	196°52.8	350°15.8	05.2	59°46.3	55.9	51°07.0	24.5	186°45.5	25.3	Kochab	137°21.0	74°02.7
12	211°55.3	5°19.6	S18°04.3	74° 47.5	N17°55.6	66°09.2	N14°24.4	201°48.2	N01°25.2	Zuben'ubi	136°54.7	-16°09.1
13	226° 57.8	20°23.4	03.4	89°48.6	55.2	81°11.3	24.3	216°50.8	25.1	I		
14	242°00.2	35°27.2	02.4	104°49.7	54.9	96°13.4	24.2	231°53.4	25.1	Alphecca	126°02.8	26°37.6
15	257°02.7	50°31.0	• • 01.5	119°50.8	• • 54.5	111°15.5	24.1	246°56.0	• • 25.0	Antares	112°14.3	-26°29.5
16	272°05.2	65°34.8	18°00.6	134°51.9	54.2	126°17.6	24.0	261°58.7	24.9	Atria	107°07.6	-69°04.7
17	287° 07.6	80°38.6	17°59.7	149°53.1	53.9	141°19.8	23.8	277°01.3	24.9	Sabik	102°01.3	-15°45.4
18	302°10.1	95°42.4	\$17°58.7	164° 54.2	N17°53.5	156°21.9	N14°23.7	292°03.9	N01°24.8	Shaula	96°08.6	-37°07.4
19	317° 12.5	110°46.2			F0.0	171°24.0		307°06.6	04.7	Rasalhague	95°57.4	12°32.6
			57.8	179°55.3	53.2		23.6		24.7	Eltanin	90°41.8	51°29.4
20	332°15.0	125°50.0	56.9	194°56.4	52.8	186°26.1	23.5	322°09.2	24.7	Kaus Aust.	83°30.7	-34°22.3
21	347° 17.5	140°53.8	• • 55.9	209°57.6	• • 52.5	201°28.2	• • 23.4	337°11.8	• • 24.6	Vega	80°32.4	38°48.8
22	2°19.9	155°57.6	55.0	224°58.7	52.2	216°30.4	23.3	352°14.4	24.5	Nunki	75°46.1	-26° 15.8
23	17°22.4	171°01.4	54.1	239°59.8	51.8	231°32.5	23.2	$7^{\circ}17.1$	24.5	Altair	61°58.6	8° 56.5
Mern	pass. 21:51	ν3 8' <i>Α</i> -Ω	.9′ m-4.23	v1 1' d.C	0.3' m0.94	ν2 1′ d-Ω	.1′ m-1.96	v2 6' d C	.1′ m0.42	Peacock	53°03.4	-56°39.1
iviei.p	Jass. 21.J1	ν3.6 u-0	.9 111-4.23	ν1.1 u-0	7.5 1110.94	ν2.1 u-0	.1 111-1.90	ν2.0 u-0	.1 1110.42	Deneb	49°24.7	45°22.9
										Enif	33°37.2	10°00.1
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.9	-46°49.9
0	32°24.9	186°05.2	<b>S</b> 17°53.1	255°00.9		246°34.6	N14°23.1	22°19.7		Fomalhaut	27 30.9 15°12.7	-40 49.9 -29°28.8
1	47° 27.3	201°09.0	52.2	270°02.1	51.2	261°36.7	23.0	37°22.3	24.3	Scheat	13°43.5	-29 26.6 28°14.0
2	62°29.8	216°12.8	51.3	285°03.2	50.8	276°38.9	22.9	52°24.9	24.3		13 43.5 13°28.2	
3	77°32.3	231°16.6	50.3	300°04.3	• • 50.5	291°41.0	22.8	67°27.6	24.2	Markab	13 28.2	15°21.2
4	92°34.7	246°20.4	49.4	315°05.4	50.1	306°43.1	22.7	82°30.2	24.1	Oct 22 Thu	SHA	Mer.pass
5	107° 37.2	261°24.2	48.4	330°06.6	49.8	321°45.2	22.6	97°32.8	24.1		152°36.1	11:45
6	107 37.2 122°39.7	276°28.0	\$17°47.5	345°07.7	N17°49.5	336°47.3	N14° 22.5	112°35.5	N01°24.0		223°40.8	07:03
								112 35.5 127°38.1		1	214°26.4	07:03
7	137°42.1	291°31.8	46.5	0°08.8	49.1	351°49.5	22.4		23.9			
8	152°44.6	306°35.6	45.6	15°09.9	48.8	6°51.6	22.2	142°40.7	23.9	Saturn	349°46.9	22:35
9	167°47.0	321°39.4	• • 44.6	30°11.1	• • 48.4	21°53.7	• • 22.1	157°43.3	· · 23.8	Oct 23 Fri	SHA	Mer.pass
10	182°49.5	336°43.2	43.7	45° 12.2	48.1	36°55.8	22.0	172°46.0	23.7		153°08.3	11:39
11	197°52.0	351°47.0	42.7	60°13.3	47.8	51°58.0	21.9	187°48.6	23.7		223°08.3	07:01
12	212°54.4	6°50.8	S17°41.8	75° 14.5	N17°47.4	67°00.1	N14°21.8	202°51.2	N01°23.6		223 08.3 214°18.0	
13	227°56.9	21°54.6	40.8	$90^{\circ}15.6$	47.1	82°02.2	21.7	$217^{\circ}53.8$	23.6			07:36
14	242°59.4	36°58.4	39.9	$105^{\circ}16.7$	46.7	97°04.3	21.6	232°56.5	23.5	Saturn	349°50.9	22:31
15	258°01.8	52°02.1	• • 38.9	120° 17.8	• • 46.4	112°06.5	21.5	247°59.1	• • 23.4	Oct 24 Sat	SHA	Mer.pass
16	273°04.3	67°05.9	38.0	135° 19.0	46.1	127°08.6	21.4	263°01.7	23.4		153°40.4	11:33
17	288°06.8	82°09.7	37.0	150°20.1	45.7	142°10.7	21.3	278°04.4	23.3	1	222°36.1	06:59
18	303°09.2	97°13.5	\$17°36.0		N17°45.4	157°12.9	N14° 21.2	293°07.0	N01°23.2			
19	318° 11.7	112°17.3	35.1	180°22.4	45.0	172°15.0	21.1	308°09.6	23.2		214°09.7	07:33
										Saturn	349°54.8	22:27
20	333°14.1	127°21.1	34.1	195°23.5	44.7	187°17.1	21.0	323°12.2	23.1	Horizon	al parallax	
21	348°16.6	142°24.9	• • 33.2	210°24.6	• • 44.4	202°19.2	• • 20.9	338°14.9	• • 23.0	1.01120111	Venus:	0.5
22	3°19.1	157°28.6	32.2	225°25.8	44.0	217°21.4	20.8	353°17.5	23.0		Mars:	0.5
23	18°21.5	172°32.4	31.2	240°26.9	43.7	232°23.5	20.7	8°20.1	22.9		iviars:	0.1
Mern	ass. 21:47	v3 8' d-0	.9′ m-4.20	$\nu^{1}$ 1' $d_{-}$ 0	0.3′ m0.93	v2 1' d-0	.1′ m-1.96	v2 6' d-0	.1′ m0.42			
iviei.p		ν J.U U-U	.5 111-7.20	ν 1.1 U-C	1110.93	ν Δ.1 U-U	1.90	ν Δ.Ο U-C	.1110.42			

h	Sui	n	Moon						
Thu	GHA	Dec	GHA	ν	Dec	d	HP		
0	183°51.7	<b>S</b> 10°58.7	52°54.5	14.5'	<b>S</b> 08°38.7	-14.4'	56.2'		
1	198°51.8	10°59.6	67°28.0 82°01.6	14.5'	08°24.4	-14.4'	56.3'		
2	213°51.9 228°52.0	11°00.5 · · 01.4	96°35.1	14.5' 14.5'	08° 10.0 07° 55.5	-14.5' -14.5'	56.3' 56.3'		
4	243°52.1	02.2	111°08.7	14.5'	07°41.0	-14.6'	56.3'		
5	258°52.2	03.1	$125^{\circ}42.2$	14.5'	$07^{\circ}26.5$	-14.6'	56.4'		
6	273°52.3	\$11°04.0	140°15.7	14.5'	507°11.9	-14.7'	56.4'		
7 8	288°52.4 303°52.5	04.9 05.8	154°49.3 169°22.8	14.5' 14.5'	06°57.2 06°42.5	-14.7' -14.7'	56.4' 56.5'		
9	318°52.6	06.6	183°56.3	14.5'	06°27.8	-14.8'	56.5'		
10	333°52.7	07.5	198°29.8	14.5'	$06^{\circ}13.0$	-14.8'	56.5'		
11	348°52.8	08.4	213°03.3	14.5'	05°58.1	-14.9'	56.6'		
12 13	3°52.9 18°52.9	\$11°09.3 10.2	227°36.8 242°10.3	14.5' 14.5'	\$05°43.3 05°28.3	-14.9' -15.0'	56.6' 56.6'		
14	33°53.0	11.1	256°43.7	14.5'	05° 13.4	-15.0'	56.7		
15	48°53.1	• • 11.9	271°17.2	14.4'	04°58.4	-15.0'	56.7'		
16	63°53.2	12.8	285°50.6	14.4'	04°43.3	-15.1'	56.7'		
17 18	78°53.3 93°53.4	13.7 \$11°14.6	300°24.0 314°57.4	14.4' 14.4'	04°28.2 504°13.1	-15.1' -15.2'	56.8' 56.8'		
19	108°53.5	15.5	329°30.8	14.4'	03°58.0	-15.2'	56.8		
20	123°53.6	16.3	344°04.2	14.3'	03°42.8	-15.2'	56.9'		
21	138°53.7	•• 17.2	358°37.5	14.3'	03°27.5	-15.3'	56.9'		
22	153°53.8 168°53.9	18.1	13°10.9 27°44.2	14.3'	03°12.3 02°57.0	-15.3'	56.9'		
23		19.0		14.3'		-15.3'	57.0'		
	SD = 16.1'	d = 0.9'		SI	D = 15.3'				
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP		
0	183°54.0	S11°19.8	42°17.4	14.3'	S02°41.6	-15.4'	57.0'		
1	198°54.1 213°54.1	20.7 21.6	56°50.7 71°23.9	14.2' 14.2'	02°26.3 02°10.9	-15.4' -15.4'	57.0' 57.1'		
2	213 54.1 228°54.2	22.5	71 23.9 85°57.1	14.2'	02 10.9 01°55.5	-15.4' -15.4'	57.1'		
4	243°54.3	23.3	100°30.3	14.1'	01°40.0	-15.5'	57.2'		
5	258°54.4	24.2	115°03.4	14.1'	01°24.6	-15.5'	57.2'		
6	273°54.5	\$11°25.1	129°36.5	14.1'	S01°09.1	-15.5'	57.2'		
7 8	288°54.6 303°54.7	26.0 26.8	144°09.6 158°42.7	14.0' 14.0'	00°53.5 00°38.0	-15.5' -15.6'	57.3' 57.3'		
9	318°54.8	• • 27.7	173° 15.7	14.0'	00° 30.0	-15.6'	57.3'		
10	333°54.8	28.6	187°48.6	13.9'	S00°06.8	-15.6'	57.4'		
11	348°54.9	29.5	202°21.6	13.9'	N00°08.8	15.6'	57.4		
12 13	3°55.0 18°55.1	\$11°30.3 31.2	216°54.5 231°27.3	13.9' 13.8'	N00°24.4 00°40.0	15.6' 15.7'	57.4' 57.5'		
14	33°55.2	32.1	246°00.1	13.8'	00°55.7	15.7'	57.5'		
15	48°55.3	• • 33.0	260°32.9	13.7'	$01^{\circ}11.4$	15.7'	57.5'		
16	63°55.4	33.8	275°05.6 289°38.3	13.7'	01°27.1 01°42.8	15.7'	57.6'		
17 18	78°55.5 93°55.5	34.7 \$11°35.6	289 38.3 304°11.0	13.6' 13.6'	01 42.8 N01°58.5	15.7' 15.7'	57.6' 57.6'		
19	108°55.6	36.5	318°43.6	13.5'	02°14.2	15.7'	57.7'		
20	123°55.7	37.3	$333^{\circ}16.1$		02°30.0		57.7'		
21	138°55.8	• • 38.2	347°48.6	13.4'	02°45.7	15.8'	57.7'		
22 23	153°55.9 168°56.0	39.1 39.9	2°21.1 16°53.5	13.4' 13.3'	03°01.5 03°17.2	15.8' 15.8'	57.8' 57.8'		
23	SD = 16.1'	d = 0.9'	10 33.3		D = 15.5'	13.0	37.0		
	<u>JD = 10.1</u>	<u>u = 0.9</u>		JI	J = 13.3				
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP		
0 1	183°56.0 198°56.1	\$11°40.8 41.7	31°25.8 45°58.1	13.3' 13.2'	N03°33.0 03°48.7	15.8' 15.8'	57.8' 57.9'		
2	213°56.2	41.7 42.5	45 58.1 60°30.3	13.2'	03 48.7 04°04.5	15.8'	57.9' 57.9'		
3	228°56.3	• • 43.4	75°02.5	13.1'	04°20.3	15.8'	57.9'		
4	243°56.4	44.3	89°34.6	13.1'	04°36.0	15.8'	58.0'		
5 6	258°56.5 273°56.5	45.2 \$11°46.0	104°06.7 118°38.7	13.0' 12.9'	04°51.8 N05°07.5	15.8' 15.8'	58.0' 58.0'		
7	273 50.5 288°56.6	46.9	118 38.7 133°10.6	12.9' 12.9'	05°23.3	15.8	58.1'		
8	303°56.7	47.8	$147^{\circ}42.5$	12.8'	05°39.0	15.7'	58.1'		
9	318°56.8	• • 48.6	162°14.3	12.7'	05°54.8	15.7'	58.1'		
10 11	333°56.9 348°56.9	49.5 50.4	176°46.0 191°17.7	12.7' 12.6'	06°10.5 06°26.2	15.7' 15.7'	58.2' 58.2'		
12	348 50.9 3°57.0	50.4 \$11°51.2	191 17.7 205°49.3	12.5'	N06°41.9	15.7	58.2		
13	18°57.1	52.1	220°20.8	12.5'	06°57.6	15.7'	58.3'		
14	33°57.2	53.0	234°52.3	12.4'	07°13.3	15.7'	58.3'		
15 16	48°57.3 63°57.3	· · 53.8 54.7	249°23.7 263°55.0	12.3' 12.2'	07°28.9 07°44.6	15.6' 15.6'	58.3' 58.4'		
16 17	63°57.3 78°57.4	54. <i>1</i> 55.6	263°55.0 278°26.3	12.2'	07°44.6 08°00.2	15.6'	58.4' 58.4'		
18	93°57.5	\$11°56.4	292°57.4	12.1'	N08° 15.8	15.6'	58.4		
19	108°57.6	57.3	307°28.5	12.0'	08°31.3	15.5'	58.5'		
20	123°57.6	58.1	321°59.6	11.9'	08°46.9	15.5'	58.5'		
21 22	138°57.7 153°57.8	· · 59.0 11°59.9	336°30.5 351°01.4	11.9' 11.8'	09°02.4 09°17.9	15.5' 15.5'	58.5' 58.5'		
23	168°57.9	12°00.7	5°32.1	11.7'	09°33.3	15.4'	58.6'		
	SD = 16.1'	d = 0.9'		SI	D = 15.8'				

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

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

		Sun			Moon	
Day	Eqn.o	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	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.)

Fig.   CHA	h	Aries	Ve	nus	M	ars	Jup	iter	Sat	urn		Stars	
S 37°20   187°32   187°30   1	Sun	CHA	CHA	Doc	CHV.	Doc	CHA	Doc	CHV	Doc		SHA	Doc
1 472-55 207-400 29.3 277-22 43.0 267-77 20.0 39-25-4 22-8 5-7-4-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1												ЗПА	Dec
2											Alpheratz	357°32.9	29°14.5
3 P°314 22°476 0 274 50°314 12°42 22°32 10°30 12°75 220 50°30 50°40 50°											Ankaa	353°05.3	-42°09.6
4 99°839   29°713   20°4   318°326   40 90°978-1   20°1   88°332   22.6											Schedar	$349^{\circ}28.8$	56°41.3
Section   1985											Diphda	348°45.5	-17°50.2
Section   Color											Achernar	$335^{\circ}18.5$	-57°06.0
18											Hamal	327°49.2	23°35.5
8   153°4.37   300°06.4   22.5   15°37.1   40.6   74°2.6   10.6   186°4.6   12.5   15°37.1   40.6   74°2.6   10.6											Polaris	$312^{\circ}47.5$	89°22.5
10   1864											Acamar	$315^{\circ}10.2$	-40°11.7
1987-86   338*14.0   20.5   45*394   39.9   37*46.9   19.5   173*49.0   22.2   1.5   19.6   19.5   19.6   19.5											Menkar	$314^{\circ}04.3$	4°11.8
11   198's11   393'17,   196   60'495   306   52'490   104   188's16   221   21   21   21   21   21   21											Mirfak	$308^{\circ}25.7$	49°57.4
12   23°356   23°215   176   90°22   38   90°213   114°193   309°942   701°221   60°32   30°											Aldebaran	290°37.7	16°33.9
228'850 38'293 1 176 90'428 899 82'83 192 218'899 220 14 249'85 239'23 116 16 105'439 380 97'54 191 233'99 220 15 249'010 18 32'23 116 10 107'85 39 380 82'83 192 218'899 220 15 249'010 18 32'23 116 10 107'85 39 380 82'83 2111'96 7 190 249'011 1219 18 319'03 13'443 117 140'42 117 140'42 117 140'13 181 187 29'100 N01'217 18 319'30 113'443 117 117 180'42 30 177'21 180'93 N14'187 29'100 N01'217 18 319'30 113'443 117 117 180'42 30 188'08 2 185' 39'12 2 116 18 349'13 118'45 117 117 180'45 30 188'08 2 185' 39'12 2 116 18 349'13 118'45 117 117 180'45 30 188'08 2 185' 39'12 2 116 18 349'13 118'45 117 117 180'45 30 180'65 180'6											Rigel	$281^{\circ}02.2$	-8°10.1
Section   Sect											Capella	$280^{\circ}19.4$	46°01.4
15   229°   101   38°   32°											Bellatrix	$278^{\circ}21.1$	6°22.5
274**034   98**26.   1.6   139**62   37.9   127**97   139   20**04.7   218   218**205   31**010   117**200**50   31**010   31**01											Elnath	277°59.8	28°37.8
17   289'050   39"44   37   150"473   37   6   143"018   188   29"074   218   28"648   315"											Alnilam	275°36.0	-1°11.0
19 3 30°608. 98°44.1 \$13°47.9 108°48.5 NJ1°37.2 188°09. Nl4°18.7 29°10.0 ND2°21.7 Campus 25°04.6 20°00. 20°38°13.3 189°15.0 11.7 180°60.6 360 177°00.1 180°00.7 20°00.2 20°38°13.3 180°00.7 20°00.2 20°38°13.3 180°00.7 20°00.2 20°00.2 180°00.7 20°00.2 20°00.2 180°00.7 20°00.2 20°00.2 180°00.7 20°00.2 20°00.2 180°00.7 20°00.2 20°00.2 180°00.7 20°00.2 20°00.2 180°00.2 20°00.2											Betelgeuse	270°50.3	7°24.8
19   139   138   138   138   138   138   139   138   139   138   139   138   139   138   138   138   138   130											Canopus	263°51.5	-52°42.3
23 39°133 38°136 100°7 199°506 365 188°092 155 22°15C 216 100°122 39°15C 216 100°122 39°1											Sirius	258°24.8	-16°45.0
22 349"18.8 156"89.2 08.7 225"531 38.9 202"10.3 . 18.4 389"17.9 12.4 21.4 22 19"20.7 174"0.9 08.7 25"531 38.9 218"12.5 18.3 389"17.9 12.4 21.4 22"45.3 49"35.4 24"45.5 49"35.4											Adhara	255°04.6	-29°00.2
Morn   GHA   GHA   Dec											Procyon	244°49.2	5°09.4
Mor. pass. 21:43												243°15.5	27°57.6
Mar.											l l		
Maple   Mapl	23	19~20.7	174~02.9	07.7	240~54.2	35.5	233°14.6	18.2	9°23.1	21.4			
Man   GHA   GHA   GHA   Dec	Mer.p	ass. 21:43	$\nu$ 3.8′ d-1	.0′ m-4.20	$\nu 1.1' \ d-0$	0.3' m0.93	$\nu 2.1' \ d-0$	.1′ m-1.97	$\nu 2.6' \ d-0$	.1′ m0.43			
Mon   GHA   GHA   Dec   GHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   Dubble   1937-907.													
Mon GHA CHA Dec Dechola 1827-87.  1 497-25.1 1897-05.7 517-06.7 257-55.3 177-52.2 2497-16.7 187-18.0 17-35.2 1-17-55.3 187-25.2 1-17-55.3 187-25.2 1-17-55.3 187-25.2 1-17-55.3 187-25.2 1-17-55.3 187-25.2 187-25.2 1-17-55.3 187-25.2 1-17-55.3 187-25.2 1-17-55.3 187-25.2 187-25.2 1-17-55.3 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-25.2 1-17-55.2 187-2											Regulus		
0 34°23.1 is 99°06.7 517°06.7 255°55.3 N17°55.2 248°16.7 N14°18.0 24°25.7 N01°21.3 Denebola 182°23.7 14°25.3 1 49°26.5 241°10.4 05.7 270°56.5 3.48 257°16.9 1.78 93°28.4 21.2 Genah 175°24.4 1.72°9.1 6.3°14.7 26°16.2 1.1											_		
2 64°25.6 204°10.4 05.7 270°50.5 34.8 203°13.9 17.9 39°28.4 21.2 21.2 64°25.1 291°14.2 04.7 220°50.5 34.8 203°13.9 17.9 39°28.4 21.2 21.2 64°35.1 291°14.2 04.7 20.3 300°50.8 34.2 293°23.1 17.7 69°33.0 · 21.1 66°32.1 17.7 69°33.0 · 21.1 66°12.2 55°60.6 1.2 66°12.2 66°12.2 56°60.6 1.2 55°60.6 1.													
2 6-67-28.1 291-14.2 0.47 285 57.6 34.5 276-21.0 1.78 54-31.0 21.2 3 79-30.5 234-17.9 0.338 300-58.8 3.42 295-23.1 1.77.6 69-33.6 2.11 4.78 4.79 0.338 300-58.8 3.42 295-23.1 1.77.6 84-36.2 2.11 4.78 4.79 0.38 30.2 295-23.1 1.78 54-31.0 2.12 4.79 0.38 300-58.8 3.31 0.11 3.35 235-27.4 1.75 99-38.9 2.11 4.76 1.78 0.11 0.10 1.78											Gienah	175°42.4	-17°41.3
3 79°30.5 24°17.9 03.8 300°58.8 34.2 293°23.1 17.7 60°33.6 21.1 4 94°35.2 21.1 5 95°18.7 84°35.2 21.1 5 94°35.2 21.1 5 95°18.7 84°35.2 21.1 5 95°18.7 84°35.2 21.1 5 95°18.7 84°35.2 21.1 5 95°18.7 84°35.2 21.1 5 95°38.9 21.0 9 95°18.7 84°35.2 21.1 5 95°38.9 21.0 9 95°35.9 1.0											Acrux	172°59.1	
6 194°33.0 249°21.7 02.8 315°59.9 33.8 308°25.3 17.6 84°36.2 21.1   Alight 166°12.2 55°48.8 6 100°45.5 20°45.6 11.8 33°10.1 33.5 323°27.4 17.5 99°38.9 91.2 0.													
6 126°35.7 9276°39.2 \$17°00.8 331°01.1 33.5 323°27.4 17.5 99°38.9 21.0 \$\$   \$20.0 \$\$   \$10.0 \$1.0 \$1.0 \$1.0 \$1.0 \$1.0 \$1.0 \$1.											l l		
124°37.9 279°29.2 N1°00.8 346°02.2 N1°33.3 382°29.5 N1°1. 1144°1.5 N1°20.9 Alkiaid 152°51.3 49°10.7 N1°1.0 N1°20.9 N1°1.0 N1°20.0													
139*40.4   294*32.9   169*08.7   158*08.   16*04.5   32.5   8*38.   17.2   144*46.7   20.8     140													
8 154*42.9 309*36.7 58.8 16*04.5 53.2 12*3*39.9 17.1 159*49.4 \cdot 20.7 10 184*47.8 339*44.2 56.8 46*06.8 31.8 38*38.1 17.0 174*52.0 20.7 12 184*47.8 339*44.2 56.8 46*06.8 31.8 38*38.1 17.0 174*52.0 20.7 12 14*52.7 95.16 510*58.8 61*07.9 31.4 53*02.2 16.9 189*54.6 20.0 184*47.8 139*38.9 46*05.8 11.9 195*02.3 56*47.9 56.8 61*07.9 31.4 53*02.2 16.9 189*54.6 20.0 18.2 14*2.7 18.2 11*2.0 18													
169"45.3   324"40.4   57.8   31"05.6   53.1   23"35.9   17.1   19"9.40.4   20.7     10   184"74.8   339"44.2   56.8   46"06.8   31.8   38"8.1   17.0   174"52.0   20.7     11   199"50.2   356"47.9   55.8   61"07.9   31.4   53"40.2   16.9   189"54.6   20.6     12   214"52.7   0"51.6   516"54.8   76"09.1   171"31.1   66"42.4   114"16.8   204"57.2   201"20.6     13   229"55.2   24"55.4   53.8   91"10.2   30.7   83"44.5   16.7   219"59.9   20.5     15   260"00.1   55"02.8   51.8   121"12.5   30.1   113"48.8   16.5   250"05.1   20.4     16   275"02.6   70"06.6   50.7   36"13.7   29.7   128"50.9   16.4   265"07.5   10.2   4.8     16   275"02.6   70"06.6   50.7   36"14.8   29.4   143"53.0   16.3   200"10.3   20.2     18   305"07.5   100"14.0   516"48.7   16"10.7   29.0   585"52.   114"6.2   295"13.0   101"20.2     18   305"01.0   115"17.8   47.7   181"17.1   22.7   173"57.3   16.1   310"15.6   20.1     20   335"12.4   130"21.5   46.7   211"19.4   22.0   204"01.6   1.5.9   340"20.8   20.1     22   5"17.4   160"28.9   44.7   226"20.6   277   219"03.7   15.8   355"23.8   19.9     Mer.pass. 21.39   23.8" d-1.0" d-2.2   \(\bar{\text{Limins}}\) 27.2   24"05.9   15.5   40.7   40.1" d-1.3" d-1.3   49.7     15   40.8   40.7   27"2.0   296"0.6   14"15.6   25"28.7   10"26.1   19.9      Mer.pass. 21.39   23.8" d-1.0" d-2.2   \(\bar{\text{Limins}}\) 27.2   24"05.0   15.5   40"31.3   19.7      The GHA GHA GHA Dec GHA D											Menkent		
10   184" 47.8   339" 44.2   56.8   66'06.8   31.8   38" 38.1   17.0   174" 52.0   20.7     11   195" 50.2   354" 47.9   55.8   61'07.9   31.4   53" 40.2   16.9   189" 54.6   20.6     12   214" 52.7   9"51.6   516" 54.8   76'09.1   N17" 31.1   68" 42.4   N14" 16.8   204" 57.2   N01" 20.6     13   229" 55.2   24" 55.4   53.8   91" 10.2   30.7   83" 44.5   16.7   219" 50.5   20.4     15   260" 00.1   55" 02.8   51.8   106" 11.4   30.4   98" 46.6   16.6   235" 02.5   20.4     16   275" 02.6   70" 06.6   50.7   136" 13.7   29.7   128" 50.9   16.4   265" 07.7   20.3     17   290" 05.0   85" 10.3   49.7   151" 14.8   29.4   413" 53.0   16.3   280" 10.3   20.2     18   305" 07.5   100" 14.0   516" 48.7   166" 16.0   N17" 29.0   188" 55.2   N14" 16.2   295" 13.0   N01" 20.2     19   320" 10.0   115" 17.8   47.7   181" 17.1   28.7   173" 57.3   16.1   310" 10.3   20.2     20   335" 12.4   130" 21.5   46.7   196" 18.3   28.4   188" 59.4   16.0   325" 18.2   20.1     21   350" 14.9   145" 52.0   45.7   211" 19.4   28.0   240" 01.6   19.9   340" 28.0     22   55" 17.4   160" 29.9   44.7   226" 20.6   27.7   219" 03.7   15.8   355" 23.5   19.9     Mer. pass. 21:39   \(\bar{\begin{subarray}{c c c c c c c c c c c c c c c c c c c											l l		
11 199°50.2 354°47.9 55.8 16'07.9 131.4 53'40.2 16.9 189°54.6 20.6 17.2 206'52.7 90'50.6 17.2 206'52.7 90'50.6 17.2 206'52.7 90'50.6 17.2 206'52.7 90'50.6 17.2 206'55.4 53.8 91'10.2 30.7 83''44.5 16.7 219°59.9 20.5 15.2 20.4 16.2 25°02.6 17.0 20.6 10.2 25°02.6 10.2 24.2 15.2 20.0 10.2 11.2 25°0.3 106'11.4 30.4 99''46.6 16.6 235''02.5 20.4 16.2 25°02.6 17.0 20.6 10.2 25°02.6 10.2 25°02.6 10.2 25°02.8 51.8 121'12.5 30.1 13''48.8 16.5 250''05.1 20.4 16.2 25°02.6 17.0 20.3 16.2 25°02.6 17.0 20.3 16.2 25°02.6 17.0 20.3 16.2 25°02.6 17.0 20.3 16.2 25°02.6 17.0 20.3 16.2 25°02.6 17.0 20.3 16.2 25°02.6 17.0 20.3 16.2 25°02.6 17.0 20.3 16.2 25°02.6 17.2 20.4 15.2 15.4 20.2 15.2 15.4 20.2 15.4 20.2 15.4 20.2 15.4 20.2 15.4 20.2 15.4 20.2 15.4 20.2 15.4 20.2 15.4 20.2 15.4 20.2 15.4 20.2 15.4 20.2 15.4 20.2 15.4 20.2 15.4 20.2 15.2 15.4 20.2 15.												139°38.9	
13 299°55.2 24°55.4 53.8 91°10.2 30.7 83°44.5 16.7 219°59.9 20.5 14 244°57.6 30°59.1 528 106°11.4 30.4 80°46.6 16.6 235°02.5 20.4 14.8 14.3 14.8 14.3 14.8 16.7 25°0.0 1.5 260°0.1 55°0.2 8 .51.8 121°12.5 30.1 113°4.8 16.5 250°0.5 1 20.4 14.8 100°0.7 20.2 14.8 100°0.7 20.3 17 290°0.5 185°0.2 8 .51.8 121°12.5 30.1 113°4.8 16.5 250°0.5 1 20.4 14.8 100°0.7 20.2 14.8 100°0.7 20.3 17 290°0.5 185°0.5 100°1.4 516°4.7 161°1.7 12.8 17.9 20.1 158°5.2 N14°1.6 225°1.0 3 20°1.0 115°1.7 8 47.7 161°1.7 1 28.7 173°57.3 16.1 310°1.5 6 20.1 19.3 20.3 35°1.2 4 130°2.1 5 46.7 160°1.8 3 28.4 188°59.4 16.0 325°1.8 2 20.1 20.1 20.1 20.2 25°1.4 14.9 145°2.5 45.7 211°19.4 28.0 204°0.1 6 1.5 9 340°2.0 8 20.0 12.3 20°1.8 175°3.2 7 43.7 241°2.1 7 27.3 244°0.5 15.7 10°2.6 1 19.9 14.8 14.8 14.8 14.8 14.8 14.8 14.8 14.8													
14 244°57.6 39°9.1 52.8 106°11.4 30.4 98°46.6 16.6 225°02.5 2.0.4 Aprile 2.0 26°2.5 2.0.4 15°2.8 1.0 20°1.4 30.4 13°43.8 10.5 20°0.5 1 20.4 Aprile 2.0 26°3.5 30.1 13°43.8 10.5 20°0.5 1 20.4 Aprile 2.0 26°3.5 30.1 13°43.8 10.5 20°0.5 1 20.4 Aprile 2.0 26°3.5 30.1 12°43.2 Aprile 2.0 26°3.5 30.1 20°1.4 12°3.5 10.1 20°1.5 10°1.4 20°0.5 11°3.1 28°1.7 20°7.7 40°1.5 10°1.4 20°0.5 11°3.1 20°1.5 10°1.4 20°1.5 10°1.4 20°5.0 11°3.1 28°1.7 10°1.5 10°1											Zuben'ubi	136°54.7	-16°09.1
16 26°00.1 55°02.8 · 51.8 121°12.5 · 30.1 113°4.8 · 16.5 55°05.6 · 1.20.4 16.6 26°0.7 · 20.3 16.2 17.9 20°0.6 5 50°0.6 1 36°13.7 · 29.7 · 128°50.9 16.4 26°0.7 · 20.3 17 · 290°0.5 0 85°10.3 · 49.7 · 151°14.8 · 29.4 · 148°53.0 · 16.3 · 280°10.3 · 20.2 Sabik 102°0.1.4 · 15°43.4 · 181°17.1 · 28.7 · 173°57.3 · 16.1 · 310°15.6 · 20.1 · 181°17.1 · 28.7 · 173°57.3 · 16.1 · 310°15.6 · 20.1 · 181°17.1 · 28.7 · 173°57.3 · 16.1 · 310°15.6 · 20.1 · 181°17.1 · 28.7 · 173°57.3 · 16.1 · 310°15.6 · 20.1 · 181°17.1 · 28.7 · 173°57.3 · 16.1 · 310°15.6 · 20.1 · 181°17.1 · 28.7 · 173°57.3 · 16.1 · 310°15.6 · 20.1 · 181°17.1 · 28.7 · 173°57.3 · 16.1 · 310°15.6 · 20.1 · 181°17.1 · 28.7 · 181°17.1 · 28.4 · 181°18.2 · 29.1 · 181°18.2 · 20.1 · 181°18.2 · 20.1 · 181°18.2 · 20.1 · 181°18.2 · 20.1 · 181°18.2 · 20.1 · 181°18.2 · 20.1 · 181°18.2 · 20.1 · 181°18.2 · 20.1 · 181°18.2 · 20.1 · 181°18.2 · 1											Alphecca	126°02.8	26°37.6
16 275°02.6 70°06.6 50.7 136°13.7 29.7 128°50.9 16.4 265°07.7 20.3 140°05.0 85°10.3 40.7 151°14.8 29.4 143°53.0 16.3 280°10.3 20.2 18 300°05.7 5 100°14.0 \$16°48.7 166°16.0 N17°29.0 158°55.2 N14°16.2 295°13.0 N01°20.2 151°17.8 47.7 181°17.1 28.7 173°57.3 16.1 310°15.6 20.1 15°17.8 47.7 181°17.1 28.7 173°57.3 16.1 310°15.6 20.1 15°17.8 47.7 196°18.3 28.4 188°55.2 N14°16.2 295°13.0 N01°20.2 151°1.5 40.7 196°18.3 28.4 188°55.4 16.0 320°18.6 20.1 15°17.8 47.7 196°18.3 28.4 188°55.4 16.0 320°18.6 20.1 15°17.4 160°28.9 44.7 226°20.6 27.7 219°03.7 15.8 35°23.5 19.9 Nunki 75°46.1 26°15.8 12.2 11.2 11.2 11.2 11.2 11.2 11.2 11											Antares	112° 14.3	-26°29.5
18   305°07.5   100°14.0   516°48.7   166°16.0   117°29.0   158°55.2   114°16.2   295°13.0   101°20.2   115°17.8   47.7   181°17.1   28.7   173°57.3   16.1   310°15.6   20.1   115°17.8   47.7   181°17.1   28.7   173°57.3   16.1   310°15.6   20.1   115°17.8   47.7   181°17.1   28.7   173°57.3   16.1   310°15.6   20.1   115°17.8   47.7   181°17.1   28.7   173°57.3   16.1   310°15.6   20.1   115°17.8   47.7   181°17.1   28.7   173°57.3   16.1   310°15.6   20.1   115°17.8   48.5   129°3.2   20.1   125°2.5   120°2											Atria	$107^{\circ}07.7$	-69°04.7
18   305°07.5   100°14.0   516°48.7   166°16.0   N17°99.0   188°55.2   N14°16.2   295°13.0   N01°90.2   Nasablague   S70.4   130°21.5   46.7   196°18.3   28.4   138°15.4   16.0   325°18.2   20.1   325°18.2   32											Sabik	$102^{\circ}01.4$	-15°45.4
19   320°10.0   115°17.8   47.7   181°17.1   28.7   173°57.3   16.1   310°15.6   20.1   20.1   20.3   20.3   20.3   20.3   20.3   20.1   20.3   20.1   20.3   20.1   20.3   20.1   20.3   20.1   20.3   20.1   20.1   20.3   20.1   20.1   20.3   20.1   20.1   20.3   20.1   20.1   20.3   20.1   20.1   20.3   20.1   20.1   20.1   20.3   20.1   20.1   20.3   20.1   20.1   20.3   20.1   20.											Shaula	96°08.7	-37°07.4
21 356°14.9 145°25.2 .45.7 211°9.4 .28.0 204°9.0 .15.9 346°28.5 .20.0 Vega 83°30.8 .3°30.8 .3°40.2 .20.0 Vega 83°30.8 .3°30.8 .3°40.2 .20.0 Vega 83°30.8 .3°40.2 .20.0 Vega 83°30.8 .3°40.2 .20.0 Vega 83°30.8 .3°40.2 .20.0 Vega 80°32.4 38°40.8 38°4											Rasalhague	95°57.4	12°32.6
21 350°14.9 145°25.2 · 45.7 211°19.4 · 28.0 204°01.6 · 15.9 340°20.8 · 20.0 Vega 80°32.4 38′48.8 Secondary 15°32.7 41.7 226°20.6 27.7 219°03.7 15.8 355°23.5 19.9 Vega 80°32.4 38′48.8 Nunki 75°46.1 -26°15.8											Eltanin	90°41.8	51°29.3
28 6°17.4 160°28.9 44.7 226°20.6 27.7 219°03.7 15.8 355°23.5 19.9 Nunit 75°42.1 26°15.8 48°6.5 Mer.pass. 21:39											Kaus Aust.	83°30.8	-34°22.3
Mer.pass. 21:39   \( \) \\ \\ \\ \) \( \) \( \) \( \) \( \) \( \) \( \) \( \) \( \) \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\											Vega	$80^{\circ}32.4$	38°48.8
Mer.pass. 21:39   v3.8' d-1.0' m-4.22   v1.1' d-0.3' m0.92   v2.1' d-0.1' m-1.97   v2.6' d-0.1' m0.43											Nunki	$75^{\circ}46.1$	-26°15.8
Tue GHA GHA Dec GHA DE	23	20° 19.8	1/5°32.7	43.7	241°21.7	27.3	234°05.9	15.7	10°26.1	19.9	Altair	$61^{\circ}58.6$	8°56.5
Tue GHA GHA Dec GHA DE	Mer.p	ass. 21:39	$\nu$ 3.8′ d-1	.0′ m-4.22	$\nu 1.1' \ d$ -0	0.3′ m0.92	$\nu 2.1' \ d-0$	.1′ m-1.97	$\nu 2.6' \ d-0$	.1' m0.43	Peacock	53°03.4	-56°39.1
Tue GHA GHA CHA Dec GHA Dec GH											Deneb	49°24.8	45°22.9
0 35°22.3 190°36.4 \$16°42.7 256°22.9 N17°27.0 249°08.0 N14°15.6 25°28.7 N01°19.8 1 50°24.7 205°40.1 41.7 271°24.0 26.7 264°10.1 15.5 40°31.3 19.7 266°67.2 220°43.8 40.7 286°25.2 26.3 279°12.3 15.4 55°33.9 19.7 380°29.7 235°47.5 · 39.6 301°26.3 · 26.0 294°14.4 · 15.3 70°36.6 · 19.6 19.6 19.6 19.6 19.6 19.6 19.6 19.6	_			_		_		_		_	Enif	33°37.2	10°00.1
1 50°24.7 205°40.1 41.7 271°24.0 26.7 264°10.1 15.5 40°31.3 19.7 2 65°27.2 220°43.8 40.7 286°25.2 26.3 279°12.3 15.4 55°33.9 19.7 3 80°29.7 235°47.5 39.6 301°26.3 26.0 294°14.4 15.3 70°36.6 19.6 4 95°32.1 250°51.3 38.6 316°27.5 25.6 309°16.6 15.2 85°39.2 19.6 110°34.6 265°55.0 37.6 331°28.6 25.3 324°18.7 15.1 100°41.8 19.5 4 100°41.8 19.5 100°41.8 100°41.8 100°41.8 100°41.8 100°41.8 100°41.8 100°41.8 100°41.8 100°41.8 100°41.8 100°41.8 10													
2 65°27.2 220°43.8 40.7 286°25.2 26.3 279°12.3 15.4 55°33.9 19.7 380°29.7 235°47.5 39.6 301°26.3 · 26.0 294°14.4 · 15.3 70°36.6 · 19.6 4 95°32.1 25°21.2 15°21													
3 80° 29.7 235° 47.5 · 39.6 301° 26.3 · 26.0 294° 14.4 · 15.3 70° 36.6 · 19.6 4 95° 32.1 250° 51.3 38.6 316° 27.5 · 25.6 309° 16.6 15.2 85° 39.2 19.6 5 110° 34.6 265° 55.0 37.6 331° 28.6 25.3 324° 18.7 15.1 100° 41.8 19.5 110° 51.8 19.2 110° 185° 46.9 341° 13.5 32.5 46° 34.4 23.6 39° 29.4 14.6 175° 54.9 19.2 11 200° 49.4 356° 17.2 31.5 61° 35.5 23.2 54° 31.5 14.5 190° 57.5 19.1 110° 110° 11.3 110°											l l		
4 95°32.1 250°51.3 38.6 316°27.5 25.6 309°16.6 15.2 85°39.2 19.6 10.6 19.5 110°34.6 265°55.0 37.6 331°28.6 25.3 324°18.7 15.1 100°41.8 19.5 19.5 100°41.8 19.5 100°41.8 19.5 115°44.4 N01°19.4 115°44.4 N01°19.4 115°44.4 N01°19.4 115°44.5 N11°19.4 N11°19.4 115°44.5 N11°19.4 N											Markab	$13^{\circ}28.2$	15°21.2
5 110°34.6 265°55.0 37.6 331°28.6 25.3 324°18.7 15.1 100°41.8 19.5   6 125°37.1 280°58.7 \$16°36.6 346°29.8 \$N17°24.9 339°20.8 \$N14°15.0 \$115°44.4 \$N01°19.4   7 140°39.5 296°02.4 35.6 1°30.9 24.6 354°23.0 14.9 130°47.1 19.4   8 155°42.0 311°06.1 34.6 16°32.1 24.3 9°25.1 14.8 145°49.7 19.3   9 170°44.5 326°09.8 · 33.6 31°33.2 · 23.9 24°27.3 · 14.7 160°52.3 · 19.2   10 185°46.9 341°13.5 32.5 46°34.4 23.6 39°29.4 14.6 175°54.9 19.2   11 200°49.4 356°17.2 31.5 61°35.5 23.2 54°31.5 14.5 190°57.5 19.1   12 215°51.9 11°20.9 \$16°30.5 76°36.7 \$N17°22.9 69°33.7 \$N14°14.4 206°00.2 \$N01°19.1   13 230°54.3 26°24.6 29.5 91°37.9 22.6 84°35.8 14.3 221°02.8 19.0   14 245°56.8 41°28.3 28.5 106°39.0 22.2 99°38.0 14.2 236°05.4 18.9   15 260°59.2 56°32.0 · 27.5 121°40.2 · 21.9 114°40.1 · 14.1 251°08.0 · 18.9   16 276°01.7 71°35.7 26.4 136°41.3 21.5 129°42.2 14.0 266°10.6 18.8   18 306°06.6 101°43.1 \$516°24.4 166°43.6 \$N17°20.8 159°46.5 \$N14°13.8 296°15.9 \$N01°18.7   19 321°09.1 116°46.7 23.4 181°44.8 20.5 174°48.7 13.7 311°18.5 18.6   20 336°11.6 131°50.4 22.3 196°46.0 20.2 189°50.8 13.6 326°21.1 18.6   21 351°14.0 146°54.1 · 21.3 211°47.1 · 19.8 204°53.0 · 13.5 341°23.7 · 18.5   22 6°16.5 161°57.8 20.3 226°48.3 19.5 219°55.1 13.4 356°26.4 18.4   23 21°19.0 177°01.5 19.3 241°49.4 19.1 234°57.2 13.2 11°29.0 18.4    Venus 154°12.2 11:27   Mars 222°04.0 06:58   Jupiter 214°01.6 07:29   Saturn 349°58.7 22:23   11:27   Mars 221°01.6 07:29   Saturn 349°58.7 30:10.1   150°24.0 1.6 07:29   Saturn 349°58.7 30:10.2    Venus 154°12.2 11:27   Mars 221°01.6 07:29   Saturn 349°58.7 30:10.2    Venus 154°12.2 11:27   Mars 221°01.6 07:29   Saturn 349°58.7 30:10.2   Venus 154°12.2 11:27   Mars 221°01.6 07:29   Saturn 349°58.7 30:10.2   Venus 154°12.2 11:27   Mars 221°01.6 07:29   Saturn 349°58.7 30:10.2   Venus 154°12.2 11:27   Mars 221°01.6 07:29   Saturn 349°58.7 30:10.2   Venus 154°12.2   11:27   Mars 221°01.6 07:29   Saturn 349°58.7 07:20   Saturn 350°02.6 22:11    Venus 155°14.1 11:15   Mars 221°00.6 06:54   Saturn 349°58.7 07:20   Saturn 349°58											Oct 25 C	CIIA	Marrier
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8 155°42.0 311°06.1 34.6 16°32.1 24.3 9°25.1 14.8 145°49.7 19.3 9 170°44.5 326°09.8 · 33.6 31°33.2 · 23.9 24°27.3 · 14.7 160°52.3 · 19.2 10 185°46.9 341°13.5 32.5 46°34.4 23.6 39°29.4 14.6 175°54.9 19.2 11 200°49.4 356°17.2 31.5 61°35.5 23.2 54°31.5 14.5 190°57.5 19.1 12 215°51.9 11°20.9 \$16°30.5 76°36.7 N17°22.9 69°33.7 N14°14.4 206°00.2 N01°19.1 13 230°54.3 26°24.6 29.5 91°37.9 22.6 84°35.8 14.3 221°02.8 19.0 14 245°56.8 41°28.3 28.5 106°39.0 22.2 99°38.0 14.2 236°05.4 18.9 15 260°59.2 56°32.0 · 27.5 121°40.2 · 21.9 114°40.1 · 14.1 251°08.0 · 18.9 16 276°01.7 71°35.7 26.4 136°41.3 21.5 129°42.2 14.0 266°10.6 18.8 18 306°06.6 101°43.1 \$16°24.4 166°43.6 N17°20.8 159°46.5 N14°13.8 296°15.9 N01°18.7 19 321°09.1 116°46.7 23.4 181°44.8 20.5 174°48.7 13.7 311°18.5 18.6 231°19.0 177°01.5 19.3 241°49.4 19.1 234°57.2 13.2 11°29.0 18.4    Saturn 349°58.7 22:23  Saturn 3											l l		
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13 250°54.3 26°24.6 29.5 91°37.9 22.6 84°35.8 14.3 221°02.8 19.0 14 245°56.8 41°28.3 28.5 106°39.0 22.2 99°38.0 14.2 236°05.4 18.9 15 260°59.2 56°32.0 ··· 27.5 121°40.2 ··· 21.9 114°40.1 ··· 14.1 251°08.0 ··· 18.9 16 276°01.7 71°35.7 26.4 136°41.3 21.5 129°42.2 14.0 266°10.6 18.8 17 291°04.2 86°39.4 25.4 151°42.5 21.2 144°44.4 13.9 281°13.3 18.8 18 306°06.6 101°43.1 516°24.4 166°43.6 N17°20.8 159°46.5 N14°13.8 296°15.9 N01°18.7 19 321°09.1 116°46.7 23.4 181°44.8 20.5 174°48.7 13.7 311°18.5 18.6 21 351°14.0 146°54.1 ··· 21.3 211°47.1 ··· 19.8 204°53.0 ··· 13.5 341°23.7 ··· 18.5 210°3.1 11°29.0 18.4 19 10°3.5 19.3 241°49.4 19.1 234°57.2 13.2 11°29.0 18.4 19.0 18.4 19.0 13.0 11°29.0 18.4 19.0 13.0 11°29.0 18.4 19.0 13.0 11°29.0 18.4 19.0 12.0 18.0 12.0 12.0 18.0 12.0 12.0 18.0 12.0 12.0 18.0 12.0 12.0 18.4 19.0 12.0 18.0 12.0 12.0 18.0 12.0 12.0 18.0 12.0 12.0 18.0 12.0 12.0 18.0 12.0 12.0 12.0 18.0 12.0 12.0 12.0 12.0 18.0 12.0 12.0 18.0 12.0 12.0 12.0 18.0 12.0 12.0 12.0 18.0 12.0 12.0 18.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12											I I		
15											Saturn	$350^{\circ}02.6$	
16  276°01.7 71°35.7 26.4 136°41.3 21.5 129°42.2 14.0 266°10.6 18.8 18 17 291°04.2 86°39.4 25.4 151°42.5 21.2 144°44.4 13.9 281°13.3 18.8 18 18 306°06.6 101°43.1 \$16°24.4 166°43.6 \$N17°20.8 159°46.5 \$N14°13.8 296°15.9 \$N01°18.7 19 321°09.1 116°46.7 23.4 181°44.8 20.5 174°48.7 13.7 311°18.5 18.6 21 351°14.0 146°54.1 · · 21.3 211°47.1 · · 19.8 204°53.0 · · 13.5 341°23.7 · · 18.5 22 6°16.5 161°57.8 20.3 226°48.3 19.5 219°55.1 13.4 356°26.4 18.4 18.4 19.1 234°57.2 13.2 11°29.0 18.4													
17 291°04.2 86°39.4 25.4 151°42.5 21.2 144°44.4 13.9 281°13.3 18.8 18 306°06.6 101°43.1 516°24.4 166°43.6 N17°20.8 159°46.5 N14°13.8 296°15.9 N01°18.7 19 321°09.1 116°46.7 23.4 181°44.8 20.5 174°48.7 13.7 311°18.5 18.6 20 336°11.6 131°50.4 22.3 196°46.0 20.2 189°50.8 13.6 326°21.1 18.6 21 351°14.0 146°54.1 · · 21.3 211°47.1 · · 19.8 204°53.0 · · 13.5 341°23.7 · · 18.5 22 6°16.5 161°57.8 20.3 226°48.3 19.5 219°55.1 13.4 356°26.4 18.4 23 21°19.0 177°01.5 19.3 241°49.4 19.1 234°57.2 13.2 11°29.0 18.4  Mars 221°00.6 06:54  Jupiter 213°45.7 07:22  Saturn 350°06.4 22:14  Horizontal parallax  Venus: 0.5  Mars 221°10.6 06:54  Jupiter 213°45.7 07:22  Saturn 350°06.4 22:14													
18  306°06.6													
19 321°09.1 116°46.7 23.4 181°44.8 20.5 174°48.7 13.7 311°18.5 18.6 20 336°11.6 131°50.4 22.3 196°46.0 20.2 189°50.8 13.6 326°21.1 18.6 21 351°14.0 146°54.1 ··· 21.3 211°47.1 ··· 19.8 204°53.0 ··· 13.5 341°23.7 ··· 18.5 22 6°16.5 161°57.8 20.3 226°48.3 19.5 219°55.1 13.4 356°26.4 18.4 23 21°19.0 177°01.5 19.3 241°49.4 19.1 234°57.2 13.2 11°29.0 18.4      Mars: 0.1   Saturn 350°06.4 22:14   Saturn 350°06.4 22:14													
20 336°11.6 131°50.4 22.3 196°46.0 20.2 189°50.8 13.6 326°21.1 18.6 21 351°14.0 146°54.1 ··· 21.3 211°47.1 ··· 19.8 204°53.0 ··· 13.5 341°23.7 ··· 18.5 22 6°16.5 161°57.8 20.3 226°48.3 19.5 219°55.1 13.4 356°26.4 18.4 23 21°19.0 177°01.5 19.3 241°49.4 19.1 234°57.2 13.2 11°29.0 18.4  Horizontal parallax Venus: 0.5 Mars: 0.1													
21       351°14.0       146°54.1       · · · 21.3       211°47.1       · · 19.8       204°53.0       · · 13.5       341°23.7       · · 18.5       Horizontal parallax         22       6°16.5       161°57.8       20.3       226°48.3       19.5       219°55.1       13.4       356°26.4       18.4       Venus: 0.5         23       21°19.0       177°01.5       19.3       241°49.4       19.1       234°57.2       13.2       11°29.0       18.4       Mars: 0.1											Saturn	350~06.4	22:14
22 6°16.5 161°57.8 20.3 226°48.3 19.5 219°55.1 13.4 356°26.4 18.4 Venus: 0.5 23 21°19.0 177°01.5 19.3 241°49.4 19.1 234°57.2 13.2 11°29.0 18.4 Mars: 0.1											Horizont	al parallax	
23 21°19.0 177°01.5 19.3 241°49.4 19.1 234°57.2 13.2 11°29.0 18.4 Mars: 0.1												•	0.5
25 21 15.0 177 01.5 25.0 212 15.1 25.1 25.7 01.2 25.0 10.1													
Mer.pass. 21:35 $\nu 3.7' \ d$ -1.0' m-4.25 $\nu 1.2' \ d$ -0.3' m0.91 $\nu 2.1' \ d$ -0.1' m-1.98 $\nu 2.6' \ d$ -0.1' m0.44													
	Mer.p	ass. 21:35	$\nu$ 3.7′ d-1	.0′ m-4.25	$\nu$ 1.2′ d-0	).3′ m0.91	$\nu 2.1' \ d-0$	.1′ m-1.98	$\nu$ 2.6′ d-0	.1′ m0.44			

h	Sui	n	Moon				
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	183°58.0	<b>S</b> 12°01.6	$20^{\circ}02.8$	11.6'	N09°48.8	15.4'	58.6'
1	198°58.0	02.5	34°33.4	11.5'	10°04.2	15.4'	58.6'
2 3	213°58.1 228°58.2	03.3	49°04.0 63°34.4	11.4' 11.4'	10° 19.5 10° 34.9	15.3' 15.3'	58.7' 58.7'
4	243°58.3	05.0	78°04.8	11.3'	10°50.1	15.2'	58.7
5	258°58.3	05.9	92°35.0	11.2'	11°05.4	15.2'	58.8'
6	273°58.4	S12°06.8	107°05.2	11.1'	N11°20.6	15.2'	58.8'
7 8	288°58.5 303°58.6	07.6 08.5	121°35.3 136°05.3	11.0' 10.9'	11°35.7 11°50.9	15.1' 15.1'	58.8' 58.8'
9	318°58.6	09.3	150° 35.2	10.9	11° 50.9 12° 05.9	15.1	58.9'
10	333°58.7	10.2	165°05.0	10.7'	12° 20.9	15.0'	58.9'
11	348°58.8	11.1	179°34.7	10.6'	12°35.9	14.9'	58.9'
12	3°58.8 18°58.9	\$12°11.9	194°04.3 208°33.9	10.5' 10.4'	N12°50.8 13°05.7	14.9'	59.0'
13 14	33°59.0	12.8 13.6	208 33.9 223°03.3	10.4	13 05.7 13°20.5	14.8' 14.7'	59.0' 59.0'
15	48°59.1	• • 14.5	237°32.6	10.2'	13°35.2	14.7'	59.0'
16	63°59.1	15.4	252°01.8	10.1'	13°49.9	14.6'	59.1'
17	78°59.2	16.2	266°31.0	10.0'	14°04.6	14.6'	59.1'
18 19	93°59.3 108°59.3	\$12°17.1 17.9	281°00.0 295°28.9	9.9' 9.8'	N14°19.1 14°33.6	14.5' 14.4'	59.1' 59.1'
20	108 59.3 123 59.4	17.9 18.8	295°28.9 309°57.7	9.8° 9.7'	14° 33.6 14° 48.0	14.4	59.1° 59.2'
21	138°59.5	• • 19.6	324°26.4	9.6'	15°02.4	14.3'	59.2'
22	153°59.6	20.5	338°55.0	9.5'	15° 16.7	14.2'	59.2'
23	168°59.6	21.3	353°23.5	9.4'	15° 30.9	14.1'	59.2'
	SD = 16.1'	d = 0.9'		SE	0 = 16.0'		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	183°59.7	\$12°22.2	7°51.9	9.3'	N15°45.0	14.1'	59.3'
1	198°59.8	23.1	22°20.2	9.2'	15°59.1	14.0'	59.3'
2	213°59.8	23.9	36°48.4	9.1'	16° 13.1	13.9'	59.3'
3	228°59.9 244°00.0	• • 24.8	51°16.5 65°44.4	9.0'	16°27.0 16°40.8	13.8'	59.3'
4 5	244 °00.0 259°00.0	25.6 26.5	80°12.3	8.9' 8.7'	16° 40.8 16° 54.5	13.7' 13.6'	59.4' 59.4'
6	274°00.1	\$12°27.3	94°40.0	8.6'	N17° 08.2	13.6'	59.4'
7	289°00.2	28.2	109°07.7	8.5'	$17^{\circ}21.7$	13.5'	59.4'
8	304°00.2	29.0	123°35.2	8.4'	17°35.2	13.4'	59.5'
9	319°00.3	• • 29.9	138°02.6	8.3'	17°48.6	13.3'	59.5'
10 11	334°00.4 349°00.4	30.7 31.6	152°29.9 166°57.1	8.2' 8.1'	18°01.8 18°15.0	13.2' 13.1'	59.5' 59.5'
12	4°00.5	\$12°32.4	181°24.1	8.0'	N18° 28.1	13.0'	59.5'
13	19°00.6	33.3	$195^{\circ}51.1$	7.8'	$18^{\circ}41.1$	12.9'	59.6'
14	34°00.6	34.1	210°17.9	7.7'	18° 54.0	12.8'	59.6'
15 16	49°00.7 64°00.7	· · 35.0 35.8	224°44.7 239°11.3	7.6' 7.5'	19°06.7 19°19.4	12.7' 12.6'	59.6' 59.6'
17	79°00.8	36.7	253°37.8	7.4'	19° 31.9	12.4	59.6'
18	94°00.9	S12°37.5	268°04.1	7.3'	N19°44.4	12.3'	59.7'
19	109°00.9	38.4	282°30.4	7.2'	19°56.7	12.2'	59.7'
20	124°01.0	39.2	296°56.6	7.0'	20°08.9 20°21.0	12.1' 12.0'	59.7'
21 22	139°01.1 154°01.1	· · 40.1 40.9	311°22.6 325°48.5	6.9' 6.8'	20°21.0 20°33.0	12.0 11.9'	59.7' 59.7'
23	169°01.2	41.8	340°14.3	6.7'	20°44.8	11.7'	59.7'
	SD = 16.1'	d = 0.9'		SE	0 = 16.2'		
_							
Tue 0	<b>GHA</b> 184°01.2	Dec \$12°42.6	<b>GHA</b> 354°40.0	u 6.6'	Dec N20° 56.6	d 11.6'	<b>HP</b> 59.8'
1	199°01.3	43.5	9°05.6	6.5	21°08.2	11.5	59.8'
2	214°01.4	44.3	23°31.1	6.3'	21°19.6	11.3'	59.8'
3	229°01.4	• • 45.2	37°56.4	6.2'	21°31.0	11.2'	59.8'
4 5	244°01.5 259°01.5	46.0 46.8	52°21.6 66°46.8	6.1' 6.0'	21°42.2 21°53.3	11.1' 10.9'	59.8' 59.8'
6	259°01.5 274°01.6	46.8 \$12°47.7	66°46.8 81°11.8	6.0° 5.9'	21°53.3 N22°04.2	10.9	59.8'
7	289°01.7	48.5	95°36.7	5.8'	22°15.0	10.7	59.9'
8	304°01.7	49.4	110°01.4	5.7'	22°25.7	10.5'	59.9'
9	319°01.8	• • 50.2	124°26.1	5.6'	22°36.2	10.4'	59.9'
10 11	334°01.8 349°01.9	51.1 51.9	138°50.7 153°15.1	5.5' 5.3'	22°46.5 22°56.8	10.2' 10.1'	59.9' 59.9'
12	4°02.0	\$1.9 \$12°52.8	167°39.5	5.3 5.2'	N23°06.9	9.9'	59.9'
13	19°02.0	53.6	182°03.7	5.1'	23°16.8	9.8'	59.9'
14	34°02.1	54.4	196°27.8	5.0'	23° 26.6	9.6'	59.9'
15	49°02.1	• • 55.3	210°51.9	4.9'	23°36.2	9.5'	60.0'
16 17	64°02.2 79°02.2	56.1 57.0	225°15.8 239°39.6	4.8' 4.7'	23°45.7 23°55.0	9.3' 9.2'	60.0' 60.0'
18	94°02.3	\$12°57.8	259° 59.0 254° 03.3	4.6'	N24° 04.1	9.2	60.0
19	109°02.3	58.6	268°26.9	4.5'	24°13.1	8.8'	60.0'
20	124°02.4	12°59.5	282°50.4	4.4'	24°21.9	8.7'	60.0'
21 22	139°02.5 154°02.5	13°00.3 01.2	297°13.8 311°37.2	4.3' 4.2'	24°30.6 24°39.1	8.5' 8.3'	60.0' 60.0'
23	169°02.6	01.2	311°37.2 326°00.4	4.2° 4.1°	24° 39.1 24° 47.4	8.3'	60.0'
	SD = 16.1'	d = 0.8'		SE	0 = 16.3'		

N 72° 05:42 N 70° 05:40 68° 05:39 66° 05:38	O7:02 06:53 06:45 06:38 06:32 06:27	08:21 08:02 07:46 07:34 07:23	15:05 15:25 15:40 15:53	Civil 16:24 16:34 16:42 16:49	Naut. 17:44 17:46 17:47
N 70° 05:40 68° 05:39	06:53 06:45 06:38 06:32	08:02 07:46 07:34	15:25 15:40	16:34 16:42	17:46
68° 05:39	06:45 06:38 06:32	07:46 07:34	15:40	16:42	
	06:38 06:32	07:34			17:47
660   NE.20	06:32		15:53	16.40	
		07:23		10:49	17:49
64° 05:36	06.27		16:04	16:54	17:50
62° 05:35		07:14	16:12	17:00	17:51
60° 05:34	06:23	07:07	16:20	17:04	17:53
N 58° 05:33	06:19	07:00	16:27	17:08	17:54
56° 05:32	06:15	06:54	16:33	17:12	17:55
54° 05:31	06:12	06:49	16:38	17:15	17:56
52° 05:29	06:09	06:44	16:43	17:18	17:58
50° 05:28	06:06	06:40	16:48	17:21	17:59
45° 05:26	06:00	06:30	16:57	17:27	18:02
N 40° 05:23	05:54	06:22	17:05	17:33	18:05
35° 05:20	05:49	06:15	17:12	17:38	18:08
30° 05:17	05:45	06:09	17:18	17:43	18:11
20° 05:10	05:36	05:59	17:29	17:51	18:17
N 10° 05:03	05:28	05:49	17:38	18:00	18:25
0° 04:55	05:19	05:41	17:47	18:09	18:33
<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.		Moonri	se		Moonse	t
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°	14:03			07:31		
N 70°	14:27	13:26		07:10	10:00	
68°		14:10		06:53	09:17	
66°		14:40	13:54	06:40	08:49	11:34
64°		15:02	14:46	06:29	08:28	10:43
62°		15:20	15:18	06:20	08:11	10:12
60°		15:35	15:42	06:13	07:57	09:48
N 58°		15:48	16:02	06:06	07:45	09:30
56°		15:59	16:18	06:00	07:35	09:14
54°		16:09	16:32	05:54	07:26	09:01
52°		16:18	16:44	05:50	07:18	08:49
50°		16:26	16:55	05:45	07:11	08:39
45°		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°		17:09	17:52	05:21	06:32	07:46
30°		17:20	18:05	05:16	06:23	07:33
20°		17:38	18:28	05:06	06:07	07:12
N 10°		17:54	18:48	04:57	05:53	06:53
0°		18:09	19:07	04:49	05:40	06:36
S 10°		18:24	19:26	04:41	05:27	06:19
20°		18:40	19:47	04:32	05:13	06:01
30°		18:59	20:11	04:22	04:58	05:40
35°		19:10	20:25	04:16	04:49	05:27
40°		19:23	20:41	04:10	04:39	05:13
45°		19:38	21:01	04:03	04:27	04:57
<b>S</b> 50°		19:57	21:25	03:54	04:12	04:37
52°		20:06	21:38	03:50	04:06	04:27
54°		20:16	21:51	03:45	03:58	04:17
56°		20:27	22:07	03:41	03:50	04:04
58°		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

		Sun				
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	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	Ve:	`	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0 0	36°21.4	192°05.1	\$16°18.3	256°50.6	N17°18.8	249°59.4	N14°13.1	26°31.6	N01°18.3		ЗПА	
1	51°23.9	207°08.8	17.2	271°51.8	18.5	265°01.5	13.0	41°34.2	18.3	Alpheratz	$357^{\circ}32.9$	29°14.6
2	66°26.3	207 08.8 222°12.5	16.2	286°52.9	18.1	280°03.7	12.9	56°36.8	18.2	Ankaa	353°05.3	-42°09.6
3	81°28.8	237°16.2	15.2	301°54.1	. 17.8	295°05.8	• • 12.8	71°39.5	18.1	Schedar	349°28.8	56°41.3
4	96°31.3	252°19.8	14.2	316°55.2	17.4	310°08.0	12.7	86°42.1	18.1	Diphda	348°45.5	-17°50.3
5	111°33.7	267°23.5	13.1	331°56.4	17.4	325°10.1	12.7	101°44.7	18.0	Achernar	335°18.5	-57°06.0
6	126°36.2	282°27.2	\$16°12.1	346°57.6	N17°16.7	340°12.2	N14°12.5	116°47.3	N01°18.0	Hamal	327°49.2	23°35.5
7	141°38.7	297°30.8	11.1	1°58.7	16.4	355°14.4	12.4	131°49.9	17.9	Polaris	312°46.5	89°22.6
8	156°41.1	312°34.5	10.1	16°59.9	16.1	10°16.5	12.3	146°52.6	17.8	Acamar	315°10.2	-40°11.7
9	171°43.6	327°38.1	09.0	32°01.1	15.7	25°18.7	12.2	161°55.2	• • 17.8	Menkar	314°04.3	4°11.8
10	186°46.1	342°41.8	08.0	47°02.2	15.4	40°20.8	12.1	176°57.8	17.7	Mirfak	308°25.6	49°57.4
11	201°48.5	357°45.4	07.0	62°03.4	15.0	55°23.0	12.0	192°00.4	17.7	Aldebaran	290°37.6	16°33.9
12	216°51.0	12°49.1	S16°06.0	77°04.6	N17°14.7	70°25.1	N14°12.0	207°03.0	N01°17.6	Rigel	281°02.2	-8°10.1
13	231°53.5	27°52.7	04.9	92°05.7	14.3	85°27.3	11.9	222°05.7	17.5	Capella	280°19.4	46°01.4
14	246°55.9	42°56.4	03.9	107°06.9	14.0	100°29.4	11.8	237°08.3	17.5	Bellatrix	278°21.1	6°22.5
15	261°58.4	58°00.0	• • 02.9	122°08.1	· · 13.7	115°31.6	• • 11.7	252°10.9	• • 17.4	Elnath	277°59.7	28°37.8
16	277°00.8	73°03.7	01.8	137°09.2	13.3	130°33.7	11.6	267°13.5	17.3	Alnilam	275°36.0	-1°11.0
17	292°03.3	88°07.3	16°00.8	152°10.4	13.0	145°35.9	11.5	282°16.1	17.3	Betelgeuse	270°50.3 263°51.5	7°24.8 -52°42.3
18	307°05.8	103°11.0	S15°59.8	167°11.6	N17°12.6	160°38.0	N14°11.4	297°18.8	N01°17.2	Canopus Sirius	258° 24.8	-52 42.3 -16°45.0
19	322°08.2	118°14.6	58.8	182°12.7	12.3	175°40.2	11.3	312°21.4	17.2	Adhara	255° 04.6	-10 45.0 -29°00.3
20	337°10.7	133°18.2	57.7	197°13.9	11.9	190°42.3	11.2	327°24.0	17.1	Procyon	244°49.2	5°09.4
21	352°13.2	148°21.9	• • 56.7	212°15.1	•• 11.6	205°44.5	• • 11.1	342°26.6	• • 17.0	Pollux	244 49.2 243° 15.4	27°57.6
22	7°15.6	163°25.5	55.7	227°16.2	11.3	220°46.6	11.0	357°29.2	17.0	Avior	234° 14.1	-59°35.4
23	22°18.1	178°29.1	54.6	242°17.4	10.9	235°48.7	10.9	12°31.8	16.9	Suhail	222°45.3	-43°32.2
Mern	ass. 21:31	$\nu$ 3.7′ d-1.	.0′ m-4 27	ν1 2' d-0	.3′ m0.90	ν2 1' d-0	.1′ m-1.98	ν2 6' d-0	.1′ m0.44	Miaplacidus	221°38.1	-69°49.3
сг.р		- 5.1 0 1.		- 1.2 0-0						Alphard	217°46.4	-8°46.4
			_		_		_		_	Regulus	207°33.0	11°50.2
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.7	61°36.2
0	37°20.6	193°32.7	S15°53.6	257°18.6	N17°10.6	250°50.9	N14°10.8	27°34.5	N01°16.9	Denebola	182°23.7	14°25.3
1	52°23.0	208°36.4	52.6	272°19.7	10.2	265°53.0	10.7	42°37.1	16.8	Gienah	175°42.4	-17°41.3
2	67°25.5	223°40.0	51.5	287°20.9	09.9	280°55.2	10.6	57°39.7	16.7	Acrux	172°59.1	-63°14.7
3	82°28.0	238°43.6	• • 50.5	302°22.1	• • 09.6	295°57.3	• • 10.5	72°42.3	• • 16.7	Gacrux	171°50.5	-57°15.7
4	97°30.4	253°47.2	49.5	317°23.2	09.2	310°59.5	10.4	87°44.9	16.6	Alioth	166°12.2	55°48.7
5	112°32.9	268°50.8	48.5	332°24.4	08.9	326°01.6	10.3	102°47.5	16.6	Spica	$158^{\circ}21.1$	-11°18.0
6	127°35.3	283°54.4	\$15°47.4	347°25.6	N17°08.5	341°03.8	N14°10.2	117°50.2	N01°16.5	Alkaid	152°51.3	49°10.7
7	142°37.8	298°58.0	46.4	2°26.8	08.2	356°05.9	10.1	132°52.8	16.4	Hadar	148°34.6	-60°30.1
8	157°40.3	314°01.6	45.4	17°27.9	07.8	11°08.1	10.0	147°55.4	16.4	Menkent	147°56.3	-36°30.0
9	172°42.7	329°05.2	• • 44.3	32°29.1	• • 07.5	26°10.2	• • 09.9	162°58.0	16.3	Arcturus	145°46.9	19°02.6
10 11	187°45.2 202°47.7	344°08.8	43.3	47°30.3 62°31.5	07.2	41°12.4 56°14.6	09.8	178°00.6	16.3	Rigil Kent.	139°38.9	-60°56.7
12	202 47.7 217°50.1	359°12.4 14°16.0	42.3 \$15°41.2	77°32.6	06.8 N17°06.5	71°16.7	09.7 N14°09.6	193°03.3 208°05.9	16.2 N01°16.2	Kochab	$137^{\circ}21.0$	74°02.7
13	232°52.6	29°19.6	40.2	92°33.8	06.1	86°18.9	09.5	208 05.9 223°08.5	16.1	Zuben'ubi	136°54.7	-16°09.1
14	247°55.1	44°23.2	39.2	92 33.8 107°35.0	05.8	101°21.0	09.5	238°11.1	16.1	Alphecca	126°02.8	26°37.6
15	262°57.5	59°26.8	38.1	107 35.0 122°36.2	• • 05.4	116°23.2	09.4	253°13.7	. 16.0	Antares	112°14.3	-26°29.5
16	202 37.3 278°00.0	74°30.4	37.1	137°37.3	05.4	131°25.3	09.3	268°16.3	15.9	Atria	107° 07.7	-69°04.6
17	293°02.5	89°34.0	36.1	157° 37.5	04.8	131°23.3 146°27.5	09.2	283°19.0	15.9	Sabik	102°01.4	-15°45.4
18	308°04.9	104°37.6	\$15°35.0	167°39.7	N17°04.4	161°29.6	N14°09.0	298°21.6	N01°15.8	Shaula	96°08.7	-37°07.4
19	323°07.4	119°41.1	34.0	182°40.9	04.1	176°31.8	08.9	313°24.2	15.7	Rasalhague	95°57.4	12°32.6
20	338°09.8	134°44.7	33.0	197°42.0	03.7	191°33.9	08.8	328°26.8	15.7	Eltanin	90°41.8	51°29.3
21	353°12.3	149°48.3	32.0	212°43.2	03.4	206°36.1	08.7	343°29.4	15.6	Kaus Aust.	83°30.8	-34°22.3
22	8°14.8	164°51.9	30.9	227°44.4	03.0	221°38.2	08.6	358°32.0	15.6	Vega	80°32.4	38°48.8
23	23°17.2	179°55.4	29.9	242°45.6	02.7	236°40.4	08.5	13°34.6	15.5	Nunki	75°46.1	-26°15.8
										Altair	61°58.6	8°56.5
Mer.p	ass. 21:27	$\nu$ 3.6′ $d$ -1.	.0′ m-4.26	$\nu$ 1.2' d-0	.3′ m0.89	$\nu 2.1' d-0$	.1′ m-1.99	$\nu$ 2.6° d-0	.1′ m0.45	Peacock	53°03.4 49°24.8	-56°39.1 45°22.9
	_		_		_		_		_	Deneb Enif	49 24.8 33°37.3	45 22.9 10°00.1
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27° 30.9	-46°49.9
0	$38^{\circ}19.7$	194°59.0	S15°28.9	257°46.7	N17°02.4	251°42.5	N14°08.4	28°37.3	$N01^{\circ}15.4$	Fomalhaut	15° 12.7	-40 49.9 -29°28.8
1	53°22.2	$210^{\circ}02.5$	27.8	272°47.9	02.0	$266^{\circ}44.7$	08.3	43°39.9	15.4	Scheat	13° 43.5	28°14.0
2	68°24.6	$225^{\circ}06.1$	26.8	$287^{\circ}49.1$	01.7	281°46.9	08.2	58°42.5	15.3	Markab	13° 28.2	15°21.2
3	83°27.1	240°09.7	• • 25.8	302°50.3	•• 01.3	296°49.0	• • 08.1	73°45.1	• • 15.3			
4	98°29.6	255°13.2	24.7	317°51.5	01.0	311°51.2	0.80	88°47.7	15.2	Oct 28 Wed	SHA	Mer.pass
5	113°32.0	270°16.8	23.7	332°52.6	00.6	326°53.3	07.9	103°50.3	15.1		155°43.7	11:09
6	128°34.5	285°20.3	S15°22.7	347°53.8	N17°00.3	341°55.5	N14°07.8	118°53.0	N01°15.1	Mars		06:52
7	143°37.0	300°23.9	21.7	2°55.0	17°00.0	356°57.6	07.7	133°55.6	15.0		213°38.0	07:19
8	158°39.4	315°27.4	20.6	17°56.2	16°59.6	11°59.8	07.6	148°58.2	15.0	Saturn	350°10.2	22:10
9	173°41.9	330°30.9	• • 19.6	32°57.4	• • 59.3	27°01.9	• • 07.5	164°00.8	• • 14.9	Oct 29 Thu	SHA	Mer.pass
10	188°44.3	345°34.5	18.6	47°58.6	58.9	42°04.1	07.5	179°03.4	14.9		156° 12.2	11:03
11	203°46.8	0°38.0	17.5	62°59.7	58.6	57°06.3	07.4	194°06.0	14.8	Mars		06:50
12	218°49.3	15°41.5	\$15°16.5	78°00.9	N16°58.2	72°08.4	N14°07.3	209°08.6	N01°14.7	Jupiter	213°30.3	07:16
13	233°51.7 248°54.2	30°45.1 45°48.6	15.5 14.4	93°02.1 108°03.3	57.9 57.6	87°10.6 102°12.7	07.2 07.1	224°11.3 239°13.9	14.7	Saturn	$350^{\circ}13.9$	22:06
14 15	248 54.2 263°56.7	45 48.6 60°52.1	. 13.4	108 03.3 123°04.5	57.0	102 12.7 117°14.9	07.1	254°16.5	14.6 •• 14.6	0-+ 20 F :	CIIA	Me::::
15 16	203 50.7 278°59.1	75°55.6	12.4	123 04.5 138°05.7	56.9	117 14.9 132°17.0	06.9	254 16.5 269°19.1	14.5	Oct 30 Fri	SHA 156° 20. 2	Mer.pass
17	278 59.1 294°01.6	75 55.0 90°59.2	12.4	158 05.7 153°06.9	56.5	132 17.0 147°19.2	06.9	269 19.1 284°21.7	14.5 14.4		156°39.3	10:57
18	309°04.1	90° 59.2 106° 02.7	\$15°10.3	168°08.0	N16°56.2	162°21.4	N14°06.7	299°24.3	N01°14.4	Mars Jupiter	219°27.0	06:48 07:12
19	324°06.5	100 02.7 121°06.2	09.3	183°09.2	55.8	102 21.4 177°23.5	06.6	314°26.9	14.3	Saturn	213°22.8 350°17.6	
20	339°09.0	136°09.7	08.3	198° 10.4	55.5	192°25.7	06.5	329°29.6	14.3	Saturn	330 11.0	22:02
21	354°11.5	150 09.7 151°13.2	•• 07.3	213°11.6	• • 55.2	207°27.8	• • 06.4	344°32.2	14.2	Horizont	al parallax	
22	9°13.9	166°16.7	06.2	228°12.8	54.8	222°30.0	06.3	359°34.8	14.2		Venus:	0.5
23	24°16.4	181°20.2	05.2	243°14.0	54.5	237°32.2	06.2	14°37.4	14.1		Mars:	0.1
ivier.p	ass. 21:23	$\nu$ 3.6′ d-1.	.u m-4.20	$\nu$ 1.2° $d$ -0	.3′ m0.88	$\nu$ 2.2 d-0	.1′ m-1.99	$\nu$ 2.0° $d$ -0	.1′ m0.45			

h	Sur	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	184°02.6	S13°02.8	340°23.5	4.0'	N24°55.6	8.0'	60.0'
1	199°02.7	03.7	354°46.5	3.9'	25°03.6	7.8'	60.0'
2	214°02.7	04.5	9°09.5	3.8'	25°11.4	7.6'	60.1'
3	229°02.8	• • 05.4	23°32.3	3.8'	$25^{\circ}19.0$	7.5'	60.1'
4	244°02.8	06.2	37°55.1	3.7'	25°26.5	7.3'	60.1'
5	259°02.9	07.0	52°17.7	3.6'	25°33.8	7.1'	60.1'
6	274°02.9	\$13°07.9	66°40.3	3.5'	N25°40.9	6.9'	60.1'
7	289°03.0	08.7	81°02.8	3.4'	25° 47.8	6.7'	60.1
8	304°03.0 319°03.1	09.5	95°25.3 109°47.6	3.4'	25°54.5 26°01.1	6.6' 6.4'	60.1
9 10	319 03.1 334°03.1	· · 10.4 11.2	109 47.6 124°09.9	3.3' 3.2'	26°07.5	6.2	60.1' 60.1'
11	349°03.2	12.0	138° 32.1	3.1'	26°13.7	6.0'	60.1
12	4°03.2	513°12.9	152°54.2	3.1'	N26° 19.7	5.8'	60.1
13	19°03.3	13.7	167°16.3	3.0'	26°25.5	5.6'	60.1
14	34°03.3	14.5	181°38.3	2.9'	26°31.1	5.4'	60.1'
15	49°03.4	• • 15.4	196°00.2	2.9'	26°36.5	5.2'	60.1'
16	64°03.4	16.2	$210^{\circ}22.1$	2.8'	26°41.8	5.0'	60.1'
17	79°03.5	17.0	224°43.9	2.8'	26°46.8	4.9'	60.1'
18	94°03.5	<b>S</b> 13°17.9	239°05.6	2.7'	N26°51.6	4.7'	60.1'
19	109°03.6	18.7	253°27.3	2.6'	26° 56.3	4.5'	60.1'
20	124°03.6	19.5	267°49.0	2.6'	27°00.8	4.3'	60.1
21	139°03.7	• • 20.4	282°10.6	2.5'	27° 05.0	4.1'	60.1
22 23	154°03.7 169°03.7	21.2 22.0	296° 32.1 310° 53.6	2.5' 2.5'	27°09.1 27°13.0	3.9' 3.7'	60.1' 60.1'
23			310 33.0			3.1	00.1
	SD = 16.1'	d = 0.8'		SI	D = 16.4'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	184°03.8	S13°22.9	325°15.1	2.4'	N27°16.6	3.5'	60.1
1	199°03.8	23.7	339°36.5	2.4'	27°20.1	3.3'	60.1'
2	214°03.9 229°03.9	24.5	353°57.9 8°19.3	2.4' 2.3'	27°23.4 27°26.4	3.1' 2.9'	60.1'
3 4	229 03.9 244°04.0	· · 25.3 26.2	8 19.3 22°40.6	2.3'	27°29.3	2.9 2.7'	60.1' 60.1'
5	259°04.0	27.0	37°01.9	2.3'	27°31.9	2.5'	60.1
6	274°04.1	\$13°27.8	51°23.2	2.3'	N27°34.4	2.3'	60.1
7	289°04.1	28.7	65°44.4	2.2'	27°36.6	2.0'	60.1
8	304°04.1	29.5	80°05.7	2.2'	27°38.7	1.8'	60.1'
9	319°04.2	• • 30.3	94°26.9	2.2'	$27^{\circ}40.5$	1.6'	60.1'
10	334°04.2	31.1	108°48.1	2.2'	27° 42.2	1.4'	60.1'
11	349°04.3	32.0	123°09.3	2.2'	27°43.6	1.2'	60.0'
12	4°04.3	S13°32.8	137°30.5 151°51.7	2.2'	N27°44.8 27°45.9	1.0' 0.8'	60.0'
13 14	19°04.3 34°04.4	33.6 34.4	151 51.7 166° 12.9	2.2' 2.2'	27 45.9 27°46.7	0.6	60.0' 60.0'
15	49°04.4	35.3	180°34.1	2.2'	27°47.3	0.4	60.0
16	64°04.5	36.1	194°55.3	2.2'	27°47.7	0.2'	60.0'
17	79°04.5	36.9	209° 16.6	2.2'	27°47.9	0.0'	60.0'
18	94°04.5	S13°37.7	223°37.8	2.2'	N27°47.9	-0.2'	60.0'
19	109°04.6	38.6	237°59.0	2.3'	27° 47.7	-0.4'	60.0'
20	124°04.6	39.4	252°20.3	2.3'	27°47.3	-0.6'	60.0'
21	139°04.7	• • 40.2	266°41.6	2.3'	27°46.7	-0.8'	60.0'
22	154°04.7	41.0	281°02.9	2.3'	27°45.9	-1.0'	60.0'
23	$\frac{169^{\circ}04.7}{SD = 16.1'}$	$\frac{41.8}{d = 0.8'}$	295°24.2	2.4'	D = 16.4'	-1.2'	60.0'
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	184°04.8	\$13°42.7	309°45.6 324°07.0	2.4'	N27°43.7	-1.4'	59.9'
1 2	199°04.8 214°04.8	43.5 44.3	324°07.0 338°28.4	2.4' 2.5'	27° 42.3 27° 40.6	-1.6' -1.8'	59.9' 59.9'
3	214 04.8 229°04.9	44.3 •• 45.1	352°49.9	2.5'	27° 40.6 27° 38.8	-1.8 -2.0'	59.9' 59.9'
3 4	244°04.9	45.1	7°11.4	2.6'	27°36.8	-2.0 -2.2'	59.9'
5	259°05.0	46.8	21°33.0	2.6'	27°34.6	-2.4	59.9'
6	274°05.0	S13°47.6	35°54.6	2.7'	N27°32.2	-2.6'	59.9'
7	289°05.0	48.4	$50^{\circ}16.3$	2.7'	27°29.5	-2.8'	59.9'
8	304°05.1	49.2	64°38.0	2.8'	$27^{\circ}26.7$	-3.0'	59.9'
9	319°05.1	• • 50.0	78°59.7	2.8'	27°23.7	-3.2'	59.8'
10	334°05.1	50.9	93°21.6	2.9'	27°20.5	-3.4'	59.8'
11	349°05.2	51.7	107°43.4	2.9'	27°17.1	-3.6'	59.8'
12 13	4°05.2 19°05.2	\$13°52.5 53.3	122°05.4 136°27.4	3.0' 3.1'	N27°13.5 27°09.7	-3.8' -4.0'	59.8' 59.8'
13 14	19°05.2 34°05.3	53.3 54.1	136° 27.4 150° 49.5	3.1'	27°09.7 27°05.8	-4.0° -4.2°	59.8'
14 15	49°05.3	54.1	150 49.5 165°11.6	3.1	27 05.8 27°01.6	-4.2 -4.4'	59.8'
16	64° 05.3	55.8	179°33.8	3.3'	26°57.2	-4.5'	59.8'
17	79°05.3	56.6	193°56.1	3.4	26°52.7	-4.7'	59.7'
18	94°05.4	S13°57.4	208° 18.5	3.5'	N26°48.0	-4.9'	59.7'
19	109°05.4	58.2	222°41.0	3.5'	26°43.0	-5.1'	59.7'
20	124°05.4	59.0	$237^{\circ}03.5$	3.6'	26°37.9	-5.3'	59.7'
21	139°05.5	13° 59.8	251°26.1	3.7'	26°32.7	-5.5'	59.7'
22	154°05.5	14°00.6	265°48.8	3.8'	26°27.2	-5.6'	59.7'
23	169°05.5	01.5	280°11.6	3.9'	26°21.6	-5.8'	59.6'
	SD = 16.1'	d = 0.8'		SI	D = 16.3'		

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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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	e		Moonset	:
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°						
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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	n		
Day	Eqn.of	Eqn.of Time		Mer.	Mer.Pass.			
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper 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.)

Second   Color   Col	h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
0 97188   369727   516702   257152   Mes   541   257153   Mes   541   257154   3471	Sat	CHV.	CHA	Doc	CHV.	Doc	CHA	Doc	CHA	Doc		SHV	Doc
1													
2   09738   206907   001   207175   514   207900   006   567-52   138   54000   507900   50											Alpheratz	$357^{\circ}32.9$	29°14.6
8 8 **Pool 2											Ankaa	353°05.3	-42°09.6
9 11973 7 29737 15701 181918 528 122740 1057 138   Horizon 15714 29730.   9 11973 1 29741											Schedar	349°28.8	56°41.3
14   11   12   17   14   18   18   18   18   18   18   18											Diphda	348°45.5	-17°50.3
Section   1987   1988											Achernar	$335^{\circ}18.5$	-57°06.0
14   16   16   17   17   17   17   17   17											Hamal	327°49.2	23°35.5
18											Polaris	312°45.8	89°22.6
10											Acamar	$315^{\circ}10.2$	-40°11.7
10   180°43   348°88   530   48°271   570   570   47°55   50   510°63   13.5											Menkar	314°04.3	4°11.8
10   180											Mirfak	308°25.6	49°57.4
11 201900 1270000 127000 127000 127000 127000 127000 127000 127000 127000 1270000 127000 127000 127000 127000 127000 127000 127000 127000 1270											Aldebaran	290°37.6	
14   140													
Belatar   1978													
18													
											1		
19 367980													
200   200   201													
Simple   S													
Adabas   250, 250, 250, 250, 250, 250, 250, 250,	18			S14°45.8		N16°48.0		N14°04.4		N01°13.0			
23   36   18   18   18   18   18   18   18   1				44.8		47.6				13.0			
23   20   13   16   29   29   29   20   20   20   20   20	20			43.8				04.2		12.9			
23   25   15   15   15   15   15   15   15	21	355°10.6	152°36.5	• • 42.7		• • 46.9		• • 04.1		• • 12.8			
March   Marc													
Misphodus   Misp	23	$25^{\circ}15.5$	182°43.3	40.7	243°42.6	46.3	238°24.1	03.9	$15^{\circ}40.1$	12.7			
Sun   GHA   GHA   Dec   GHA	Mar =	255 21.10	1/3 E/ 1/ 1	0' m 4 00	u1 2/ d 0	3' m0 97	1/2 2/ d 0	1/ m 2.00	1126/ 40	11 m0 46			
Sum   GHA   CHA   Dec   GHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   Dubbh   1973   1960   197	ivier.p	ass. ∠1:19	ν s.s a-1	.0 111-4.09	ν1.∠ a-U	.5 1110.87	ν2.2 <b>α-</b> 0	.111-2.00	ν2.0 a-C	IIIU.40			
Sum GHA CHA Dec CHA D													
0 40°18.0 40°18.0 117°46.7 514°39.7 258°43.8 N16°45.9 253°26.2 N14°03.9 30°42.7 N01°12.7 Donebola 182°23.7 14°25.2 16 51 15°36.2 23°27.5 38.7 32°34.5 0 48.2 288°30.6 03.7 60°47.9 12.6 Acrus 172°59.0 -63°14.7 63°3.8 72.6 12.6 12.6 12.6 12.6 12.6 12.6 12.6 1	Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec			
1 55°20.4 22°50.6 387.7 278°40.9 45.6 268°20.4 03.8 45°45.3 12.6 Grant 157.42.3 277.42.3 277.42.3 3 88°25.4 22°57.0 0.36.7 303°47.4 0.44.9 298°32.7 0.36. 75°50.5 0.12.5 4100°27.8 255°00.4 35.6 318°46.6 44.5 313°34.9 0.35 00°53.1 1.2.4 516°12.5 57°15.6 5.12.4 516°10.3 28°25.1 15°30.3 273°03.8 34.6 333°40.8 44.2 328°37.1 0.34 105°55.8 12.4 516°32.5 35°10.7 0.34 105°32.5 100°32.5	0	40°18.0	197°46.7	S14°39.7	258°43.8	N16°45.9	253° 26.2	N14°03.9	30°42.7	N01°12.7			
70°29 27°516 37.7 288°402 49.2 288°306 33.7 60°479 12.6 388°505 12.6 12.6 12.6 12.6 12.6 12.6 12.6 12.6	1		212°50.2			45.6			45°45.3	12.6			
88"25.4 22"57.0 36.7 303"47.4 44.9 298"32.7 33.6 75"50.5 12.5 4 100"27.8 28"50.4 35.6 315"40.6 43.5 313"49.8 44.2 313"39.9 35.6 15"30.5 318"40.6 43.5 313"49.9 35.6 15"30.5 318"40.6 43.5 313"49.9 31.6 15"25.3 12.4 105"55.8 12.4 105"55.8 12.4 105"55.8 12.4 105"55.8 12.4 105"55.8 12.4 105"55.8 12.4 105"55.8 12.4 105"55.8 12.4 105"55.8 12.4 105"55.8 10.2 12.5 15"45.0 105"55.8 10.2 12.5 15"45.0 105"55.8 12.4 105"55.8 10.2 12.5 15"45.0 105"55.8 10.2 12.5 15"45.0 105"55.8 10.2 12.5 15"45.0 105"55.8 10.2 12.5 15"45.0 10.5 15"50.3 10.2 12.5 15"45.0 10.5 15"50.0 10.2 12.5 15"45.0 10.5 15"50.0 10.5 12.5 15"45.0 10.5 15"50.0 10.5 12.5 15"45.0 10.5 15"50.0 10.5 12.5 15"45.0 10.5 15"50.0 10.5 15"0.0 10.5 12.5 15"45.0 10.5 15"50.0 10.5 15"0.0 10.5 15"50.0 10.													
100°278   256°004   35.6   318°446   44.5   313°349   315°349   315°450   100°558   12.4     100°328   288°072   S14°33.6   348°31.0   N16°439   343°39.2   114°033   120°558   N10°12.3   Alkadi   152°51.3													
11													
Section   Sect													
7 145°55.2 300°10.6 32.6 3°52.2 43.5 388°4.1, 4 03.2 136°0.10 12.3 18 16°67.7 318°14.0 31.6 18°53.4 43.2 13°43.6 03.1 151°03.6 12.2 Hotary 148°34.7 60°30.1 151°03.6 12.2 Hotary 148°34.7 60°30.1 151°03.6 12.2 Hotary 148°34.7 60°30.1 151°03.6 12.2 Hotary 148°56.3 36°30.1 190°42.6 348°40.8 29.6 48°55.8 42.5 43°47.9 0.29 181°08.8 12.1 Right Kent. 139°38.9 16°02.6 11 200°45.1 3°42.2 E.6 63°57.0 42.1 88°50.1 0.28 196°11.4 12.1 Koch 137°21.0 Koch 137°2													
8 160°37.7 318°14.0 316. 18°53.4 43.2 13°43.6 03.1 151°03.6 12.2 Menkent 14°76.3 33°54.6 0.28 28°45.7 0.30.1 165°06.8 12.2 12.2 helicity 140°32.0 100°42.6 348°02.8 29.6 48°55.8 42.5 43°47.9 02.9 181°08.8 12.1 12.1 12.1 12.1 12.1 12.1 12.1 1													
175°40.2   333°17.4   30.6   33°54.6   42.8   28°45.7   0.30.0   166°06.2   1.12.2   1.12.1   1.12.2   1.12.1   1.12.2   1.12.1   1.12.2													
10   190°42.6   348°20.8   29.6   48°55.8   42.5   43°47.9   0.9   181°08.8   12.1											Menkent		
11 205°45.1 3"24.2 28.6 63°57.0 42.1 58"50.1 0.2.8 196"11.4 12.1 (Schab) 13"21.0 12.2 12"246.6 13"24.2 12"246.6 13"5.2 24"31.5 13"5.2 24"31.5 12"3.2 12"14.0 N01°12.0 2.0 2.0 13"31.0 26.6 33"59.4 41.5 88"54.4 0.2.6 2.26°16.6 11.9 4.0 14.2 12.5 1.0 14.2 14.2 14.2 14.2 14.2 14.2 14.2 14.2											Arcturus		19°02.6
12 220°47.6 18°27.6 18°27.6 78°58.2 N16°41.8 73°52.2 N14°0.7 211°14.0 N01°12.0 12.0 13°550.0 33°31.0 26.6 33°59.4 41.5 88°54.4 0.6 226°14.0 11.9 14.0 14.0 14.0 14.0 14.0 14.0 14.0 14.0													
13 235°50.0 33°31.0 26.6 93°59.4 41.5 88°54.4 0.2 226°16.6 11.9 14.9 21.0 11.9 21.0 15.5 265°25.5 48°43.3 25.5 109°00.6 41.1 103°56.6 0.2 24°19.2 11.9 11.0 11.0 11.0 11.0 11.0 11.0 11.0											Kochab		74°02.7
14 250°52.5 48°34.3 25.5 109°00.6 41.1 103°56.6 0.2.6 24°19.2 11.9   Antares 112°14.3 2-60°29.5   152°54.9 63°77.											Zuben'ubi	136°54.7	-16°09.1
16   265°54   63°377   24.5   124°01.8   40.8   118°587   0.2.5   256°21.9   11.8   Africal 107°077   66°04.6   125°45.4   128°57   128°45   11.8   128°57.4   128°41.1   23.5   139°30.3   40.4   143°0.9   02.3   286°27.1   11.7   11.7   128°57.4   128°1.1   127°07.4   128°1.1   127°07.4   128°1.1   127°07.4   128°1.1   1											Alphecca	126°02.8	26°37.5
16   280°57.4   78°41.1   23.5   139°03.0   40.4   134°00.9   02.4   271°24.5   11.8   18.7   17.9   18.7   18.8   17.0   17.7   18.8   17.0   18.8											Antares	$112^{\circ}14.3$	-26°29.5
18   31   31   32   33   34   34   34   34   34   34											Atria	$107^{\circ}07.7$	-69°04.6
18   311°02.3   108°47.8   514°21.5   169°65.4   N16°99.7   164°65.3   N14°02.2   301°29.7   N01°11.7     19   326°04.8   123°51.2   20.5   184°06.6   39.4   179°07.4   0.20   331°34.9   11.6     20   341°07.3   138°54.6   19.5   199°07.8   39.1   194°09.6   0.20   331°34.9   11.6     21   356°09.7   153°57.9   · 18.5   214°09.0   · 38.7   209°11.8   · 0.19   346°37.5   · 11.5     22   11°12.2   169°01.3   17.5   229°10.3   38.4   224°13.9   0.18   174°0.1   11.4     22   11°12.2   169°01.3   17.5   229°10.3   38.4   224°13.9   0.18   174°0.1   11.4     32   26°14.7   184°04.6   16.5   244°11.5   38.0   239°16.1   0.17   16°42.7   11.4     Mer.pass. 21:15   v3.4′ d-1.0′ m-4.17   v1.2′ d-0.3′ m0.86   v2.2′ d-0.1′ m-2.00   v2.6′ d-0.1′ m0.46     Mer.pass. 21:15   v3.4′ d-1.0′ m-4.17   v1.2′ d-0.3′ m0.86   v2.2′ d-0.1′ m-2.00   v2.6′ d-0.1′ m0.46     Mer.pass. 21:15   v3.4′ d-1.0′ m-4.17   v1.2′ d-0.3′ m0.86   v2.2′ d-0.1′ m-2.00   v2.6′ d-0.1′ m0.46     Mer.pass. 21:15   v3.4′ d-1.0′ m-4.17   v1.2′ d-0.3′ m0.86   v2.2′ d-0.1′ m-2.00   v2.6′ d-0.1′ m0.46     Mer.pass. 21:15   v3.4′ d-1.0′ m-4.17   v1.2′ d-0.3′ m0.86   v2.2′ d-0.1′ m-2.00   v2.6′ d-0.1′ m0.46     Mer.pass. 21:15   v3.4′ d-1.0′ m-4.17   v1.2′ d-0.3′ m0.86   v2.2′ d-0.1′ m-2.00   v2.6′ d-0.1′ m0.46   Pec.   Emin d-1° s-6° 5.8   s65.5     Mer.pass. 21:15   v3.4′ d-1.0′ m-4.17   v1.5′ d-0.3′ m0.86   v2.2′ d-0.1′ m-2.00   v2.6′ d-0.1′ m0.46   Pec.   Emin d-1° s-6° 5.8   s65.5     Mer.pass. 21:15   v3.4′ d-1.0′ m-4.17   v1.2′ d-0.3′ m0.86   v2.2′ d-0.1′ m-2.00   v2.6′ d-0.1′ m0.46   Pec.   Emin d-1° s-6° 5.8   s65.5   v3.4′ s-1.0′ m-2.00   v2.6′ d-0.1′ m0.46   Pec.   Emin d-1° s-1° s-6° 5.9   S65.5   S65° 3.9   S65° 3.0											Sabik	102°01.4	-15°45.4
19   326°048   123°512   20.5   184°06.6   39.4   179°07.4   02.1   316°32.3   11.6   11.6   11.6   11.6   12.0											Shaula	96°08.7	-37°07.4
21 356°09.7 153°57.9 18.5 214°09.0 38.7 209°11.8 0.19.3 316°34.9 11.6 (Saus Aust. 22°11.9°12.2 169°01.3 17.5 229°10.3 38.4 224°13.9 0.18 1°40.1 11.4 (Nunki 75°46.1 26°15.8 48°22.9 11.9°12.2 169°01.3 17.5 229°10.3 38.4 224°13.9 0.18 1°40.1 11.4 (Nunki 75°46.1 26°15.8 48°15.5 11.5 (Vaga 80°32.4 38°48.7 11.5 (Vaga 80°32.4 (Vaga 80°32.4 11.5 (Vaga 80°32.4 11.5 (Vaga 80°32.4 (Vaga 80°32.4 11.5 (Vaga 80°32.4 (Vaga 8											Rasalhague	95°57.4	12°32.6
21 356°09.7 152°57.9 · 18.5 214°09.0 · 38.7 209°11.8 · 01.9 346°37.5 · 11.5 Vega 80°32.4 38′48.7 Vega 80°32.4 Na°4** Vega 80°32.4 Na											Eltanin	90°41.8	51°29.3
1°122   16°01.3   17.5   22°10.3   38.4   224°13.9   01.8   1°40.1   11.4   11.4   11.4   23°01.5   24°11.5   38.0   23°01.1   01.7   16°42.7   11.4   11.													
22 11°12.2 169°01.3 17.5 229°10.3 38.4 224°13.9 01.8 1°40.1 11.4    Mer.pass. 21:15											Vega	80°32.4	38°48.7
Mer.pass. 21:15   v3.4' d-1.0' m-4.17   v1.2' d-0.3' m0.86   v2.2' d-0.1' m-2.00   v2.6' d-0.1' m0.46   Peacock   53°0.5   56°3.91   58°6.5											_	75°46.1	-26°15.8
Mor. pars. 21:15   V3.4' d-1.0' m-4.17   V1.2' d-0.3' m0.86   V2.2' d-0.1' m-2.00   V2.6' d-0.1' m0.46   Peacock   53°0.35   -56°39.1	23	26°14.7	184°04.6	16.5	244°11.5	38.0	239° 16.1	01.7	16° 42.7	11.4	1		
Mon   GHA   GHA   Dec   GHA	Mern	ass 21·15	ν3 4' d-1	0′ m-4 17	v1 2' d-0	3′ m0.86	v2 2′ d-0	1′ m-2 00	1/2 6' d-0	11' m0 46			
Mon GHA GHA GHA Dec	- IVICI.P	a33. 21.13	ν 5. τ u I	.0 111 4.17	ν1.2 d 0	.5 1110.00	ν Z.Z α σ	.1 111 2.00	ν 2.0 · u · c	7.1 1110.40			
Mon         GHA         GHA         Dec         GHars         Chenus         Chenus         Geral         Chenus         Geral         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         All Na'ir fromalhaut for 150.         Chenus         15° 12.7         29° 24.8         40° 1.0         10.5         34° 18.7         30° 31° 10.9         10° 10° 10° 10° 10° 10° 10° 10° 10° 10°													
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3       86°24.5       244°18.0       · 12.5       304°16.3       · 36.7       299°24.8       · 01.4       76°53.2       · 11.2       Oct 31 Sat       SHA       Mer.pass         4       101°27.0       259°21.3       11.5       319°17.5       36.3       314°27.0       01.3       91°55.8       11.1       Uenus       15°04.9       10.5       34°18.7       36.0       329°29.1       01.2       106°58.4       11.1       Uenus       15°04.9       10.52       06°46.4       10.1       106°58.4       11.1       Uenus       15°04.9       10.52       06.6       109°11.0       00°44.2       00°40.3       08.6       4°21.1       35.3       359°35.5       01.0       137°03.6       10.9       109°26.6       10.9       10°50.6       109°27.0       10°9.0       <	2	$71^{\circ}22.1$		13.5	289°15.1	37.0	284°22.6	01.5					
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13		221°46.7	19°47.8	S14°03.6	79°27.2	N16°33.6	74°44.4	N14°00.5	212° 16.6				
14 251°51.6 49°54.4 01.6 109°29.6 32.9 104°48.7 00.4 242°21.8 10.6 15 266°54.1 64°57.7 14°00.6 124°30.8 · · · 32.6 119°50.9 · · · 00.3 257°24.5 · · · 10.5 16 281°56.6 80°01.0 13°59.7 139°32.0 32.2 134°53.1 00.2 272°27.1 10.5 17 296°59.0 95°04.3 58.7 154°33.3 31.9 149°55.2 00.1 287°29.7 10.4 18 312°01.5 110°07.6 S13°57.7 169°34.5 N16°31.5 164°57.4 N14°00.0 302°32.3 N01°10.3 19 327°03.9 125°10.9 56.7 184°35.7 31.2 179°59.6 13°59.9 317°34.9 10.3 20 342°06.4 140°14.2 55.7 199°36.9 30.8 195°01.8 59.8 332°37.5 10.2 21 357°08.9 155°17.4 · · · 54.8 214°38.1 · · · 30.5 210°03.9 · · 59.7 347°40.1 · · 10.2 22 12°11.3 170°20.7 53.8 229°39.3 30.2 225°06.1 59.6 2°42.7 10.1 23 27°13.8 185°24.0 52.8 244°40.6 29.8 240°08.3 59.6 17°45.3 10.1    Saturn 350°24.7 21:33   Nov 02 Mon SHA   Mer.pass   Venus 157°50.8 10.41     Mars 217°55.5 06.43     Jupiter 213°01.2 07:02     Saturn 350°24.7 21:33													
15       266°54.1       64°57.7       14°00.6       124°30.8       · · · 32.6       119°50.9       · · · 00.3       257°24.5       · · · 10.5       Nov 02 Mon       SHA       Mer.pass         16       281°56.6       80°01.0       13°59.7       139°32.0       32.2       134°53.1       00.2       272°27.1       10.5       Venus       157°50.8       10:41         17       296°59.0       95°04.3       58.7       154°33.3       31.9       149°55.2       00.1       287°29.7       10.4       Mars       217°55.5       06:43         18       312°01.5       110°07.6       513°57.7       169°34.5       N16°31.5       164°57.4       N14°00.0       302°32.3       N01°10.3       Jupiter       213°01.2       07:02         20       342°06.4       140°14.2       55.7       199°36.9       30.8       195°01.8       59.8       332°37.5       10.2         21       357°08.9       155°17.4       · · 54.8       214°38.1       · · 30.5       210°03.9       · · 59.7       347°40.1       · · 10.2       Horizontal parallax         22       12°11.3       170°20.7       53.8       229°39.3       30.2       225°06.1       59.6       2°42.7       10.1       Mars:       0											Saturn	350°24.7	21:53
16											Nov 02 Mon	SHA	Mer.nass
17 296°59.0 95°04.3 58.7 154°33.3 31.9 149°55.2 00.1 287°29.7 10.4 18 312°01.5 110°07.6 \$13°57.7 169°34.5 \$N16°31.5 164°57.4 \$N14°00.0 302°32.3 \$N01°10.3 19 327°03.9 125°10.9 56.7 184°35.7 31.2 179°59.6 13°59.9 317°34.9 10.3 20 342°06.4 140°14.2 55.7 199°36.9 30.8 195°01.8 59.8 332°37.5 10.2 21 357°08.9 155°17.4 · · 54.8 214°38.1 · · 30.5 210°03.9 · · 59.7 347°40.1 · · 10.2 22 12°11.3 170°20.7 53.8 229°39.3 30.2 225°06.1 59.6 2°42.7 10.1 23 27°13.8 185°24.0 52.8 244°40.6 29.8 240°08.3 59.6 17°45.3 10.1  Mars 217°55.5 06:43  Jupiter 213°01.2 07:02  Saturn 350°28.2 21:49  Horizontal parallax  Venus: 0.5  Mars: 0.1													
18 312°01.5 110°07.6 \$13°57.7 169°34.5 N16°31.5 164°57.4 N14°00.0 302°32.3 N01°10.3 19 327°03.9 125°10.9 56.7 184°35.7 31.2 179°59.6 13°59.9 317°34.9 10.3 20 342°06.4 140°14.2 55.7 199°36.9 30.8 195°01.8 59.8 332°37.5 10.2 21 357°08.9 155°17.4 · · · 54.8 214°38.1 · · · 30.5 210°03.9 · · · 59.7 347°40.1 · · · 10.2 22 12°11.3 170°20.7 53.8 229°39.3 30.2 225°06.1 59.6 2°42.7 10.1 23 27°13.8 185°24.0 52.8 244°40.6 29.8 240°08.3 59.6 17°45.3 10.1													
19 327°03.9 125°10.9 56.7 184°35.7 31.2 179°59.6 13°59.9 317°34.9 10.3 20 342°06.4 140°14.2 55.7 199°36.9 30.8 195°01.8 59.8 332°37.5 10.2 21 357°08.9 155°17.4 · · 54.8 214°38.1 · · 30.5 210°03.9 · · 59.7 347°40.1 · · 10.2 22 12°11.3 170°20.7 53.8 229°39.3 30.2 225°06.1 59.6 2°42.7 10.1 23 27°13.8 185°24.0 52.8 244°40.6 29.8 240°08.3 59.6 17°45.3 10.1    Saturn 350°28.2 21:49     Horizontal parallax   Venus: 0.5     Mars: 0.1													
20 342°06.4 140°14.2 55.7 199°36.9 30.8 195°01.8 59.8 332°37.5 10.2 21 357°08.9 155°17.4 · · · 54.8 214°38.1 · · · 30.5 210°03.9 · · 59.7 347°40.1 · · 10.2 22 12°11.3 170°20.7 53.8 229°39.3 30.2 225°06.1 59.6 2°42.7 10.1 23 27°13.8 185°24.0 52.8 244°40.6 29.8 240°08.3 59.6 17°45.3 10.1  Horizontal parallax Venus: 0.5 Mars: 0.1													
21       357°08.9       155°17.4       · · 54.8       214°38.1       · · 30.5       210°03.9       · · 59.7       347°40.1       · · 10.2       Horizontal parallax         22       12°11.3       170°20.7       53.8       229°39.3       30.2       225°06.1       59.6       2°42.7       10.1       Venus:       0.5         23       27°13.8       185°24.0       52.8       244°40.6       29.8       240°08.3       59.6       17°45.3       10.1       Mars:       0.1											Jaturn	JJU 20.2	21:49
22 12°11.3 170°20.7 53.8 229°39.3 30.2 225°06.1 59.6 2°42.7 10.1 Venus: 0.5 23 27°13.8 185°24.0 52.8 244°40.6 29.8 240°08.3 59.6 17°45.3 10.1 Mars: 0.1											Horizont	al parallax	
23 27°13.8 185°24.0 52.8 244°40.6 29.8 240°08.3 59.6 17°45.3 10.1 Mars: 0.1												•	0.5
25 27 25.5 165 27.6 52.6 27.7 16.5 25.6 27.6 66.5 55.6 27.7 16.5 27.7 16.5 27.7 16													
Mer.pass. 21:11 $\nu 3.3' \ d$ -1.0' m-4.25 $\nu 1.2' \ d$ -0.3' m0.85 $\nu 2.2' \ d$ -0.1' m-2.01 $\nu 2.6' \ d$ -0.1' m0.47													
	Mer.p	ass. 21:11	$\nu$ 3.3′ d-1	.0′ m-4.25	$\nu$ 1.2′ d-0	.3′ m0.85	$\nu^{2.2'} d-0$	.1′ m-2.01	$\nu^{2.6'} d^{-0}$	0.1′ m0.47			

h	Sui	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	184°05.6	<b>S</b> 14°02.3	294°34.5	4.0'	$N26^{\circ}15.7$	-6.0'	59.6'
1	199°05.6	03.1	308°57.4	4.1'	26°09.7	-6.2'	59.6'
2 3	214°05.6 229°05.6	03.9	323°20.5 337°43.7	4.2' 4.2'	26°03.6 25°57.2	-6.3' -6.5'	59.6' 59.6'
4	244°05.7	05.5	352°06.9	4.3'	25°50.7	-6.7'	59.6'
5	259°05.7	06.3	$6^{\circ}30.2$	4.4'	25°44.0	-6.9'	59.6'
6	274°05.7	\$14°07.1	20°53.7	4.5'	N25°37.1	-7.0'	59.5'
7 8	289°05.7 304°05.8	07.9 08.7	35°17.2 49°40.9	4.6' 4.7'	25°30.1 25°22.9	-7.2' -7.4'	59.5' 59.5'
9	319°05.8	• • 09.6	64°04.6	4.8'	25° 15.5	-7.5	59.5'
10	334°05.8	10.4	78°28.5	5.0'	25°08.0	-7.7'	59.5'
11	349°05.9 4°05.9	11.2 \$14°12.0	92°52.4 107°16.5	5.1' 5.2'	25°00.3 N24°52.5	-7.8' -8.0'	59.4'
12 13	4 05.9 19°05.9	12.8	107 10.5 121°40.6	5.2 5.3'	1V24 52.5 24°44.5	-8.0 -8.2'	59.4' 59.4'
14	34°05.9	13.6	136°04.9	5.4'	24°36.3	-8.3	59.4'
15	49°05.9	• • 14.4	150°29.3	5.5'	24°28.0	-8.5'	59.4'
16 17	64°06.0 79°06.0	15.2 16.0	164°53.8 179°18.4	5.6' 5.7'	24° 19.5 24° 10.9	-8.6' -8.8'	59.4' 59.3'
18	94°06.0	\$14°16.8	179 18.4 193°43.1	5.8'	N24°02.1	-8.9'	59.3'
19	109°06.0	17.6	208°07.9	5.9'	23°53.2	-9.1'	59.3'
20	124°06.1	18.4	222°32.9	6.1'	23°44.1	-9.2'	59.3'
21 22	139°06.1 154°06.1	· · 19.2 20.0	236°57.9 251°23.1	6.2' 6.3'	23°34.9 23°25.6	-9.4' -9.5'	59.3' 59.2'
23	169°06.1	20.0	265°48.4	6.4	23°16.1	-9.5' -9.6'	59.2'
	SD = 16.1'	d = 0.8'			D = 16.3'		
	<u> </u>	<u>u — 0.0</u>		ال			
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	184°06.1 199°06.2	\$14°21.6 22.4	280°13.8 294°39.3	6.5' 6.6'	N23°06.4 22°56.7	-9.8' -9.9'	59.2' 59.2'
1 2	199°06.2 214°06.2	22.4	294°39.3 309°04.9	6.7	22°56.7 22°46.8	-9.9' -10.0'	59.2' 59.2'
3	229°06.2	• • 24.0	323°30.7	6.9'	22°36.7	-10.2'	59.1'
4	244°06.2	24.8	337°56.5	7.0'	22°26.6	-10.3'	59.1'
5	259°06.2 274°06.3	25.6 \$14°26.4	352°22.5 6°48.6	7.1' 7.2'	22°16.3 N22°05.8	-10.4' -10.6'	59.1' 59.1'
6 7	289°06.3	27.2	21°14.8	7.3'	21°55.3	-10.0	59.1'
8	304°06.3	28.0	35°41.1	7.4'	21°44.6	-10.8'	59.0'
9	319°06.3	• • 28.8	50°07.5	7.6'	21°33.8	-10.9'	59.0'
10 11	334°06.3 349°06.3	29.6 30.4	64°34.1 79°00.8	7.7' 7.8'	21°22.9 21°11.8	-11.0' -11.2'	59.0' 59.0'
12	4°06.4	S14°31.2	93°27.5	7.9	N21°00.7	-11.2	59.0'
13	19°06.4	32.0	107°54.4	8.0'	20°49.4	-11.4'	58.9'
14	34°06.4	32.8	122°21.5	8.1'	20°38.0	-11.5'	58.9'
15 16	49°06.4 64°06.4	· · 33.6 34.4	136°48.6 151°15.8	8.2' 8.4'	20°26.5 20°14.9	-11.6' -11.7'	58.9' 58.9'
17	79°06.4	35.2	165°43.2	8.5'	20°03.2	-11.8'	58.9'
18	94°06.4	<b>S</b> 14°36.0	180°10.6	8.6'	N19°51.4	-11.9'	58.8'
19	109°06.5	36.8	194°38.2 209°05.9	8.7' 8.8'	19°39.4 19°27.4	-12.0' -12.1'	58.8'
20 21	124°06.5 139°06.5	37.6 •• 38.4	209 05.9 223°33.7	8.9'	19 27.4 19°15.3	-12.1 -12.2'	58.8' 58.8'
22	154°06.5	39.2	238°01.6	9.0'	19°03.0	-12.3'	58.7'
23	169°06.5	40.0	252°29.7	9.1'	18°50.7	-12.4'	58.7'
	SD = 16.1'	d = 0.8'		SI	O = 16.1'		
Man	GHA	Doo	GHA		Dee		НР
Mon 0	<b>GHA</b> 184°06.5	<b>Dec</b> \$14°40.8	266°57.8	u 9.2'	<b>Dec</b> N18° 38.3	d -12.5'	<b>нР</b> 58.7'
1	199°06.5	41.6	$281^{\circ}26.0$	9.4'	18°25.8	-12.6'	58.7'
2	214°06.5	42.4	295°54.4	9.5'	18° 13.1	-12.7'	58.7'
3 4	229°06.6 244°06.6	· · 43.2 44.0	310°22.9 324°51.4	9.6' 9.7'	18°00.4 17°47.6	-12.8' -12.9'	58.6' 58.6'
5	259°06.6	44.7	339°20.1	9.8'	17°34.8	-13.0'	58.6'
6	274°06.6	S14°45.5	353°48.9	9.9'	N17°21.8	-13.1'	58.6'
7 8	289°06.6 304°06.6	46.3 47.1	8°17.8 22°46.7	10.0' 10.1'	17°08.7 16°55.6	-13.1' -13.2'	58.5' 58.5'
9	304°06.6 319°06.6	47.1 •• 47.9	22°46.7 37°15.8	10.1	16° 55.6 16° 42.4	-13.2' -13.3'	58.5'
10	334°06.6	48.7	51°45.0	10.3'	$16^{\circ}29.1$	-13.4'	58.5'
11	349°06.6	49.5	66°14.3	10.4'	16° 15.7	-13.4'	58.5'
12 13	4°06.6 19°06.6	\$14°50.3 51.1	80°43.7 95°13.2	10.5' 10.6'	N16°02.3 15°48.8	-13.5' -13.6'	58.4' 58.4'
14	34°06.6	51.1	95 13.2 109°42.8	10.0	15° 35.2	-13.0 -13.7'	58.4'
15	49°06.7	• • 52.6	$124^{\circ}12.5$	10.8'	$15^{\circ}21.5$	-13.7'	58.4'
16	64°06.7	53.4	138°42.3	10.9'	15°07.8	-13.8'	58.3'
17 18	79°06.7 94°06.7	54.2 \$14°55.0	153°12.1 167°42.1	11.0' 11.1'	14°54.0 N14°40.1	-13.9' -13.9'	58.3' 58.3'
19	109°06.7	55.8	182°12.2	11.1	14° 26.2	-13.9 -14.0'	58.3'
20	124°06.7	56.6	$196^{\circ}42.3$	11.2'	14° 12.2	-14.1'	58.3'
21	139°06.7	• • 57.3	211°12.6	11.3'	13°58.1	-14.1'	58.2'
22 23	154°06.7 169°06.7	58.1 58.9	225°42.9 240°13.3	11.4' 11.5'	13°44.0 13°29.8	-14.2' -14.2'	58.2' 58.2'
23	SD = 16.1'	d = 0.8'	- 10 13.3			17.4	30.2
	2D = 10.1	$a = 0.8^{\circ}$		51	O = 16.0'		

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

Lat.		Moonris	e		Moonset	ŧ
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°			21:43			16:26
N 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
N 40°	21:50	23:05		12:22	13:02	13:34
35°	22:05	23:16		12:06	12:49	13:25
30°	22:18	23:26		11:52	12:38	13:16
20°	22:41	23:44		11:28	12:18	13:02
N 10°	23:00	23:59		11:07	12:01	12:50
0°	23:18		00:13	10:47	11:45	12:38
<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

## November 03, 04, 05 UT (Tue., Wed., Thu.)

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	42°16.3	200°27.2	\$13°51.8	259°41.8	N16°29.5	255°10.5	N13°59.5	32°47.9	N01°10.0			
1	42 10.3 57° 18.7	200°27.2 215°30.5	50.8	274°43.0	29.1	270°12.6	59.4	47°50.5	10.0	Alpheratz	357°33.0	29°14.6
2	72°21.2	230°33.8	49.9	289°44.2	28.8	285°14.8	59.4	62°53.1	09.9	Ankaa	353°05.3	-42°09.6
3	87°23.7	245°37.0	• • 48.9	304° 45.4	. 28.4	300°17.0	• • 59.2	77°55.7	•• 09.9	Schedar	349°28.8	56°41.3
3 4	102°26.1	245 37.0 260°40.3	47.9	319°46.6	28.1	315°19.2	59.2	92°58.3	09.8	Diphda	348°45.5	-17°50.3
										Achernar	$335^{\circ}18.5$	-57°06.0
5 6	117°28.6 132°31.0	275°43.5 290°46.8	46.9	334°47.9 349°49.1	27.8	330°21.4	59.0	108°00.9	09.8	Hamal	327°49.2	23°35.5
	132 31.0 147°33.5		\$13°46.0	4°50.3	N16°27.4	345°23.5 0°25.7	N13°58.9	123°03.5 138°06.2	N01°09.7	Polaris	312°45.4	89°22.6
7		305°50.0	45.0		27.1		58.8		09.6	Acamar	$315^{\circ}10.2$	-40°11.7
8	162°36.0	320°53.2	44.0	19°51.5	26.7	15°27.9	58.8	153°08.8	09.6	Menkar	314°04.3	4°11.8
9	177°38.4	335°56.5	• • 43.1	34°52.8	• • 26.4	30°30.1	• • 58.7	168°11.4	• • 09.5	Mirfak	308°25.6	49°57.4
10	192°40.9	350°59.7	42.1	49°54.0	26.0	45°32.3	58.6	183°14.0	09.5	Aldebaran	290°37.6	16°33.9
11	207°43.4	6°02.9	41.1 \$13°40.2	64°55.2	25.7	60°34.4	58.5	198°16.6 213°19.2	09.4	Rigel	281°02.2	-8°10.1
12	222° 45.8	21°06.1		79°56.4	N16°25.4	75°36.6	N13°58.4		N01°09.4	Capella	$280^{\circ}19.3$	46°01.4
13	237° 48.3 252° 50.8	36°09.3 51°12.6	39.2	94°57.6 109°58.9	25.0	90°38.8 105°41.0	58.3	228°21.8 243°24.4	09.3	Bellatrix	278°21.0	6°22.5
14 15	267°53.2	66°15.8	38.2 •• 37.3	109 56.9 125°00.1	24.7 •• 24.3	105 41.0 120°43.2	58.2 •• 58.1	243 24.4 258°27.0	09.3 •• 09.2	Elnath	277°59.7	28°37.8
16	207 55.2 282°55.7	81°19.0	36.3	140°01.3	24.0	135°45.3	58.0	273°29.6	09.2	Alnilam	275°36.0	-1°11.0
17	202 55.7 297°58.2	96°22.2	35.4	155° 02.5	23.7	150°47.5	58.0	273 29.0 288°32.2		Betelgeuse	270°50.2	7°24.8
	313°00.6	90°22.2 111°25.4	513°34.4	170°03.8	N16°23.3	165°49.7		303°34.8	09.1	Canopus	263°51.4	-52°42.3
18							N13°57.9		N01°09.1	Sirius	258° 24.7	-16°45.0
19 20	328°03.1 343°05.5	126°28.6 141°31.8	33.4 32.5	185°05.0 200°06.2	23.0 22.6	180°51.9 195°54.1	57.8 57.7	318°37.4 333°40.0	09.0 09.0	Adhara	255°04.5	-29°00.3
20	343 05.5 358°08.0	141 31.8 156°35.0	32.5	200 06.2 215°07.4	. 22.0	195 54.1 210°56.2	• • 57.6	348°42.6	•• 08.9	Procyon	244°49.2	5°09.4
22	13° 10.5	156° 35.0 171° 38.1	30.6	215°07.4 230°08.7	21.9	210°56.2 225°58.4	57.5	348 42.6 3°45.2	08.9	Pollux	243°15.4	27°57.6
23	28° 12.9	171 38.1 186°41.3	29.6	230 08.7 245°09.9	21.9	225 58.4 241°00.6	57.5 57.4	3 45.2 18°47.8	08.9	Avior	$234^{\circ}14.0$	-59°35.4
23	20 12.9									Suhail	222°45.2	-43°32.2
Mer.p	ass. 21:07	$\nu$ 3.3′ <i>d</i> -1.	.0′ m-4.31	$\nu$ 1.2′ d-0	.3′ m0.83	$\nu$ 2.2′ d-0	.1′ m-2.02	$\nu$ 2.6′ d-0	.1′ m0.47	Miaplacidus	221°38.0	-69°49.3
										Alphard	217°46.3	-8°46.4
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.0	11°50.1
0	43° 15.4	201°44.5	\$13°28.7	260°11.1	N16°21.3	256°02.8	N13°57.3	33°50.4	N01°08.7	Dubhe	193°39.6	61°36.1
1	58° 17.9	216°47.7	27.7	275° 12.3	20.9	271°05.0	57.3	48°53.0	08.7	Denebola	182°23.7	14°25.3
2	73°20.3	231°50.8	26.8	290°13.6	20.6	286°07.2	57.2	63°55.6	08.6	Gienah	175°42.3	-17°41.4
3	88°22.8	246°54.0	25.8	305°14.8	20.2	301°09.3	57.1	78°58.2	• • 08.6	Acrux	172°59.0	-63°14.7
4	103°25.3	261°57.2	24.9	320° 16.0	19.9	316°11.5	57.0	94°00.8	08.5	Gacrux	171°50.5	-57°15.6
5	118° 27.7	277°00.3	23.9	335°17.3	19.6	331°13.7	56.9	109°03.4	08.5	Alioth	166°12.2	55°48.7
6	133°30.2	292°03.5	S13°23.0	350° 18.5	N16° 19.2	346°15.9	N13°56.8	124°06.0	N01°08.4	Spica	158°21.0	-11°18.0
7	148°32.6	307°06.6	22.0	5° 19.7	18.9	1°18.1	56.7	139°08.6	08.4	Alkaid	152°51.3	49°10.7
8	163°35.1	322°09.8	21.1	20°21.0	18.5	16°20.3	56.6	154°11.2	08.3	Hadar	148°34.5	-60°30.1
9	178° 37.6	337°12.9	20.2	35°22.2	• • 18.2	31°22.5	• • 56.6	169°13.9	08.3	Menkent	147°56.3	-36°30.0
10	193°40.0	352°16.1	19.2	50°23.4	17.8	46°24.6	56.5	184°16.5	08.2	Arcturus	145°46.9 139°38.9	19°02.6 -60°56.7
11	208°42.5	7°19.2	18.3	65°24.6	17.5	61°26.8	56.4	$199^{\circ}19.1$	08.2	Rigil Kent. Kochab	139 36.9 137°21.0	74°02.6
12	223°45.0	22°22.3	S13°17.3	80°25.9	N16°17.2	76°29.0	N13°56.3	214°21.7	N01°08.1	Zuben'ubi	136°54.7	-16°09.1
13	238°47.4	37°25.5	16.4	95°27.1	16.8	91°31.2	56.2	229°24.3	08.1	Alphecca	130° 34.7 126° 02.8	26°37.5
14	253°49.9	52°28.6	15.5	110°28.3	16.5	106°33.4	56.1	244°26.9	08.0	Antares	112° 14.3	-26°29.5
15	268°52.4	67°31.7	• • 14.5	125°29.6	• • 16.1	121°35.6	• • 56.0	259°29.5	• • 08.0	Atria	112 14.3 107°07.7	-69°04.6
16	283°54.8	82°34.8	13.6	140°30.8	15.8	136°37.8	56.0	274°32.1	07.9	Sabik	102°01.4	-15°45.4
17	298°57.3	97°37.9	12.7	155°32.0	15.5	151°40.0	55.9	289°34.7	07.9	Shaula	96°08.7	-37°07.4
18	313°59.8	112°41.1	S13°11.7	170°33.3	N16° 15.1	166°42.1	N13°55.8	304°37.3	N01°07.8	Rasalhague	95°57.4	12°32.6
19	329°02.2	127°44.2	10.8	185°34.5	14.8	181°44.3	55.7	319°39.9	07.8	Eltanin	90°41.9	51°29.3
20	344°04.7	142°47.3	09.9	200°35.8	14.4	196°46.5	55.6	334°42.5	07.7	Kaus Aust.	83°30.8	-34°22.3
21	359°07.1	157°50.4	• • 09.0	215°37.0	•• 14.1	211°48.7	• • 55.5	349°45.1	• • 07.7	Vega	80°32.5	38°48.7
22	14°09.6	172°53.5	08.0	230°38.2	13.8	226°50.9	55.4	4°47.7	07.6	Nunki	75°46.1	-26°15.8
23	29°12.1	187°56.6	07.1	245°39.5	13.4	241°53.1	55.4	19°50.3	07.6	Altair	61°58.6	8°56.5
Mer.p	ass. 21:04	$\nu 3.2' \ d-1$	.0′ m-4.38	$\nu 1.2^{\prime} d-0$	0.3′ m0.82	$\nu 2.2' d-0$	.1′ m-2.02	$\nu 2.6' d-0$	.1′ m0.48	Peacock	53°03.5	-56°39.1
·										Deneb	49°24.8	45°22.9
		<u> </u>	_		_	<b></b>	_	<b></b> -		Enif	33°37.3	10°00.1
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°30.9	-46°50.0
0	44° 14.5	202°59.6	\$13°06.2	260°40.7	N16° 13.1	256°55.3	N13°55.3	34°52.9	N01°07.5	Fomalhaut	$15^{\circ}12.7$	-29°28.8
1	59° 17.0	218°02.7	05.3	275°41.9	12.7	271°57.5	55.2	49°55.5	07.4	Scheat	13°43.6	28°14.0
2	74°19.5	233°05.8	04.3	290°43.2	12.4	286°59.6	55.1	64°58.1	07.4	Markab	13°28.2	15°21.2
3	89°21.9	248°08.9	• • 03.4	305°44.4	• • 12.0	302°01.8	• • 55.0	80°00.7	• • 07.3	No. 02 T	CIIA	Ma:: :-
4	104°24.4	263°12.0	02.5	320°45.7	11.7	317°04.0	54.9	95°03.3	07.3	Nov 03 Tue	SHA 150° 11 0	Mer.pass
5	119°26.9	278°15.0	01.6	335°46.9	11.4	332°06.2	54.8	110°05.9	07.2		158° 11.0 217° 25.5	10:36
6	134°29.3	293°18.1	\$13°00.7	350°48.1	N16°11.0	347°08.4	N13°54.8	125°08.5	N01°07.2	!	217° 25.5 212° 54.2	06:41 06:58
7	149°31.8	308°21.1	12°59.8	5°49.4	10.7	2°10.6 17°12.8	54.7 54.6	140°11.1 155°13.7	07.1	Saturn	350° 31.7	21:45
8 9	164°34.3 179°36.7	323°24.2 338°27.3	58.9 • • 58.0	20°50.6 35°51.9	10.3 · · 10.0	17°12.8 32°15.0	54.6 •• 54.5	155° 13.7 170° 16.3	07.1 · · 07.0	Saturn	JJU J1./	21:45
9 10	179 36.7 194° 39.2	358 27.3 353°30.3	57.0	50°53.1	09.7	32 15.0 47°17.2	54.5 54.4	170 16.3 185°18.9	07.0	Nov 04 Wed	SHA	Mer.pass
11	209° 41.6	8°33.4	56.1	65°54.3	09.7	62°19.4	54.4	200°21.5	06.9	l	$158^{\circ}29.1$	10:31
12	209 41.0 224° 44.1	23°36.4	\$12°55.2	80° 55.6	N16°09.0	77°21.6	N13°54.3	215°24.1	N01°06.9	!	216°55.7	06:39
13	239° 46.6	38°39.4	54.3	95°56.8	08.6	92°23.8	54.2	230°26.7	06.8	Jupiter	212°47.4	06:55
14	254°49.0	53°42.5	53.4	110°58.1	08.3	107°25.9	54.1	245°29.3	06.8	Saturn	350°35.0	21:41
15	269°51.5	68°45.5	52.5	125°59.3	08.0	122°28.1	• • 54.0	260°31.9	• • 06.7	Nov 05 Thu	SHA	Mer.pass
16	284°54.0	83°48.5	51.6	141°00.6	07.6	137°30.3	53.9	275°34.5	06.7		158° 45.1	10:26
17	299°56.4	98°51.6	50.7	156°01.8	07.3	152°32.5	53.8	290°37.1	06.6	Mars		06:37
18	314°58.9	113°54.6	S12°49.8	171°03.1	N16°06.9	167°34.7	N13°53.7	305°39.7	N01°06.6	Jupiter		06:51
19	330°01.4	128°57.6	48.9	186°04.3	06.6	182°36.9	53.7	320°42.3	06.5	Saturn	350°38.3	21:37
20	345°03.8	144°00.6	48.0	201°05.5	06.3	197°39.1	53.6	335°44.9	06.5			
21	0°06.3	159°03.6	• • 47.1	$216^{\circ}06.8$	•• 05.9	212°41.3	• • 53.5	$350^{\circ}47.5$	• • 06.4	Horizont	al parallax	
22	15°08.7	174°06.6	46.2	231°08.0	05.6	227°43.5	53.4	$5^{\circ}50.1$	06.4		Venus:	0.5
23	30°11.2	189°09.6	45.4	246°09.3	05.2	242°45.7	53.3	20°52.7	06.3		Mars:	0.1
Mer n	ass. 21:00	ν3 1′ d-0	.9′ m-4.44	ν1 2' d-0	0.3′ m0.81	ν2 2' d-Ω	.1′ m-2.03	ν2 6′ d-0	.1′ m0.48			
р		0				0						

h	Sui	Moon					
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	184°06.7	S14°59.7	254°43.8	11.6'	N13°15.6	-14.3'	58.2
1	199°06.7	15°00.5	269°14.4	11.7'	13°01.3	-14.3'	58.1'
2	214°06.7	01.3	283°45.1	11.8'	12°47.0	-14.4'	58.1'
3	229°06.7	•• 02.0	298° 15.9	11.8'	12°32.6	-14.4'	58.1'
4	244°06.7 259°06.7	02.8	312°46.7 327°17.6	11.9'	12°18.1 12°03.6	-14.5'	58.1'
5 6	259 06.7 274°06.7	03.6 \$15°04.4	327 17.0 341°48.7	12.0' 12.1'	N11°49.1	-14.5' -14.6'	58.1' 58.0'
7	289°06.7	05.2	356°19.7	12.1	11°34.5	-14.6'	58.0'
8	304°06.7	05.9	10°50.9	12.2'	11°19.9	-14.7'	58.0'
9	319°06.7	• • 06.7	25°22.1	12.3'	11°05.2	-14.7'	58.0'
10	334°06.7	07.5	39°53.4	12.4'	10°50.4	-14.8'	57.9'
11	349°06.7	08.3	54°24.8	12.5'	10°35.7	-14.8'	57.9'
12 13	4°06.7 19°06.7	\$15°09.1 09.8	68°56.3 83°27.8	12.5' 12.6'	N10°20.9 10°06.0	-14.8' -14.9'	57.9' 57.9'
14	34°06.7	10.6	97°59.4	12.7'	09°51.2	-14.9'	57.9'
15	49°06.7	. 11.4	112°31.1	12.7'	09°36.2	-14.9'	57.8'
16	64°06.7	12.2	127°02.8	12.8'	09°21.3	-15.0'	57.8'
17	79°06.7	12.9	141°34.6	12.9'	09°06.3	-15.0'	57.8'
18	94°06.7	<b>S</b> 15°13.7	156°06.5	12.9'	N08°51.3	-15.0'	57.8'
19	109°06.7	14.5	170°38.4	13.0'	08°36.3	-15.1'	57.7'
20	124°06.7 139°06.7	15.3 •• 16.0	185°10.4 199°42.5	13.1'	08°21.2 08°06.1	-15.1'	57.7'
21 22	139 06.7 154°06.7	· · 16.0 16.8	199 42.5 214°14.6	13.1' 13.2'	08 06.1 07°51.0	-15.1' -15.2'	57.7' 57.7'
23	169°06.7	17.6	214 14.0 228°46.8	13.2'	07°35.8	-15.2'	57.7'
	SD = 16.1'	d = 0.8'			D = 15.9'		
	SD = 10.1	a = 0.8'		51	J = 15.9'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	184°06.7 199°06.7	\$15°18.4 19.1	243°19.0 257°51.3	13.3' 13.3'	N07°20.6 07°05.4	-15.2' -15.2'	57.6' 57.6'
2	199 06.7 214°06.7	19.1	257 51.3 272°23.6	13.4	07 05.4 06°50.2	-15.2'	57.6'
3	229°06.6	20.7	286° 56.0	13.4'	06°35.0	-15.3'	57.6'
4	244°06.6	21.4	301°28.4	13.5'	$06^{\circ}19.7$	-15.3'	57.5'
5	259°06.6	22.2	316°00.9	13.5'	06°04.4	-15.3'	57.5'
6	274°06.6	S15°23.0	330°33.5	13.6'	N05°49.1	-15.3'	57.5'
7 8	289°06.6 304°06.6	23.8 24.5	345°06.1 359°38.7	13.6' 13.7'	05°33.8 05°18.5	-15.3' -15.3'	57.5' 57.5'
9	319°06.6	. 25.3	14° 11.4	13.7'	05°03.2	-15.3'	57.4'
10	334°06.6	26.1	28°44.1	13.8'	04°47.8	-15.4'	57.4'
11	349°06.6	26.8	43°16.9	13.8'	04°32.5	-15.4'	57.4'
12	4°06.6	<b>S</b> 15°27.6	57°49.7	13.9'	N04°17.1	-15.4'	57.4'
13 14	19°06.6 34°06.5	28.4 29.1	72°22.6 86°55.5	13.9' 13.9'	04°01.7 03°46.3	-15.4' -15.4'	57.3' 57.3'
15	49°06.5	29.1	00 55.5 101°28.4	14.0'	03°30.9	-15.4'	57.3'
16	64°06.5	30.7	116°01.4	14.0'	03°15.5	-15.4'	57.3'
17	79°06.5	31.4	130°34.4	14.0'	$03^{\circ}00.2$	-15.4'	57.3'
18	94°06.5	<b>S</b> 15°32.2	145°07.4	14.1'	N02°44.8	-15.4'	57.2'
19	109°06.5	33.0	159°40.5	14.1'	02°29.4	-15.4'	57.2'
20 21	124°06.5 139°06.5	33.7 •• 34.5	174°13.6 188°46.7	14.1' 14.2'	02°14.0 01°58.6	-15.4' -15.4'	57.2' 57.2'
22	154°06.4	35.3	203° 19.9	14.2'	01°43.2	-15.4'	57.2 57.1'
23	169°06.4	36.0	217°53.0	14.2'	01°27.8	-15.4'	57.1'
	SD = 16.1'	d = 0.8'		SI	D = 15.7'		
<b>T</b> I.	GHA	D	GHA		D-:	d	LIP
Thu 0	GHA 184°06.4	<b>Dec</b> \$15°36.8	GHA 232°26.3	u 14.2'	<b>Dec</b> N01°12.4	d -15.4'	<b>HP</b> 57.1'
1	199°06.4	37.5	246° 59.5	14.3'	00°57.0	-15.4'	57.1
2	214°06.4	38.3	261°32.8	14.3'	00°41.6	-15.4'	57.1'
3	229°06.4	•• 39.1	276°06.0	14.3'	00°26.2	-15.4'	57.0'
4	244°06.4	39.8	290°39.4	14.3'	N00°10.9	-15.4'	57.0'
5	259°06.3 274°06.3	40.6 \$15°41.3	305°12.7	14.3'	\$00°04.5 \$00°19.8	15.3'	57.0'
6 7	274°06.3 289°06.3	\$15°41.3 42.1	319°46.0 334°19.4	14.4' 14.4'	00°19.8	15.3' 15.3'	57.0' 56.9'
8	304°06.3	42.1	348°52.8	14.4'	00°50.4	15.3'	56.9'
9	319°06.3	• • 43.6	3°26.2	14.4'	01°05.7	15.3'	56.9'
10	334°06.3	44.4	$17^{\circ}59.6$	14.4'	$01^{\circ}21.0$	15.3'	56.9'
11	349°06.2	45.1	32°33.0	14.4'	01°36.3	15.3'	56.9'
12	4°06.2	\$15°45.9	47°06.5	14.4'	S01°51.6	15.2'	56.8'
13 14	19°06.2 34°06.2	46.6 47.4	61°39.9 76°13.4	14.5' 14.5'	02°06.8 02°22.0	15.2' 15.2'	56.8' 56.8'
15	49°06.2	• 48.2	90°46.8	14.5'	02°22.0	15.2'	56.8
16	64°06.1	48.9	105°20.3	14.5'	02°52.4	15.1'	56.8'
17	79°06.1	49.7	$119^{\circ}53.8$	14.5'	03°07.5	15.1'	56.7'
18	94°06.1	S15°50.4	134°27.3	14.5'	503°22.6	15.1'	56.7'
19 20	109°06.1 124°06.1	51.2 51.9	149°00.8 163°34.3	14.5' 14.5'	03°37.7 03°52.8	15.1' 15.0'	56.7' 56.7'
20	124°06.1 139°06.0	51.9 · · 52.7	163° 34.3 178° 07.7	14.5'	03°52.8 04°07.9	15.0°	56.6'
22	154°06.0	53.4	192°41.2	14.5'	04°07.9	15.0'	56.6'
23	169°06.0	54.2	207°14.7	14.5'	04°37.9	15.0'	56.6'
	SD = 16.1'	d = 0.8'		SI	O = 15.6'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	06:18	07:43	09:16	14:09	15:43	17:07
<b>N</b> 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
N 10°	05:04	05:29	05:51	17:36	17:58	18:23
0°	04:54	05:19	05:40	17:47	18:08	18:33
<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			
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	
S 10°	01:13	01:56	02:36	13:19	14:09	14:58	
20°	01:24	02:01	02:36	13:11	14:06	15:00	
30°	01:35	02:07	02:37	13:02	14:03	15:02	
35°	01:42	02:11	02:37	12:57	14:01	15:04	
40°	01:49	02:14	02:37	12:51	13:59	15:05	
45°	01:58	02:19	02:38	12:44	13:56	15:07	
<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	f Time	Mer.	Mer.	Mer.Pass.		
	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.)

3	h	Aries	Ven	ius	M	ars	Jup	oiter	Sat	urn	Stars		
04 67 13.7 20 12.6 5.2 12.4 6.5 26.10.5 11.6 10.5 10.6 10.5 12.7 10.5 11.6 10.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12	Fri –	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
10 007161 2097156 430 707118 046 227201 532 597579 0.2													
2 97 78 18 0 297 18 0 427 297 13 0 0.2 297 18 0 0.2 297 18 0 0.0 297 18 0 0.0 2 2													
9 90 91.1   299 91.0   4.41,8   300 143   5.93   302 94   5.73   5.00   81 93.0   0.01													
1													56°41.3
5   100°00   279°175   441   380°108   0.22   32°189   5.02   32°189   110°02   0.00													-17°50.3
137.285   286*305   512*302   331*180   N16*020   346*011   N17*27   126*180   N20*020   372*45   367*27   372*40   372*45   37													
7 1 189 300 9 309 315 5 33 6 919.3 0 0.2 3 970.3 5 27 142"13.4 0.59 6 10.0 0.0 1 10.0 10.0 10.0 10.0 10.0 1													
8   1673.14   324°184   37.4   21°20.5   0.22   18°0.5   5.26   150°1.6   0.59   Medias   314°1.4   34°1.1     10   100°1.35   39°9.34   3.05   30°2.13   0.12   30°7.7   5.25   71°1.6   0.58   Mirka   314°1.4   34°1.1     11   20°4.8   38°9.34   3.04   30°2.3   0.12   30°7.7   5.25   32°2.3   0.07   37°7.   75°2.3   0.07   0													
9 1903-89 389*394 4 95.5 80*218 0.18 39*077 9:25 171*186 0.08 8 180*212 0.58 1 11 12 10 195*38 38*4*24 3 53.7 81*230 0.15 48*099 5.24 180*212 0.58 1 11 12 10 195*38 38*4*24 3 53.7 81*230 0.15 48*099 5.24 180*212 0.58 1 11 12 10 195*38 1 11 12 10 195*38 1 11 12 10 195*38 1 11 12 10 195*38 1 11 12 10 195*38 1 11 12 12 11 12 12 12 12 12 12 12 12 1													
10   193*  33   354*  24   5.7   3.1*  2.0   0.15   48*  69*  69*  2.5   2.4   186*  2.12   0.58   Mirror											1		4°11.8
11 20 40.48 9 94.3 94.8 06.24 100.09 07.10 09.10 09.25 09.20 10.23 00.123.8 00.7											<b>I</b>		49°57.4
12 227-412 247-83 5127-80 81-255 N16-08 76-14 20.3 22 216-26 N010-57													16°33.9
132 207 45.7 39*12. 331 90*26 0.05 99*16.4 522 23*29.0 0.5.0   Elasher 272*31.0   6"22.   12													-8°10.1
142 55° 492 55° 494 1 322 111°380   10° 118° 10° 138° 521 240° 136 0.55   685 0.05   180° 130° 130° 130° 130° 130° 130° 130° 13													46°01.4
15 2070-506 60 96731 - 31.3   126*29.3   15*98   125*20.8 - 52.0   20*134.2 - 0.55   Adaptate											Bellatrix		6°22.5
16 288*33.1 88*00 30.5 30.5 11*30.6 395 318*23.0 519 276*36.8 05.5 18*30.6 100*03.0 20.5 15*18.8 501 15*52.5 518. 201*30.4 05.4 18*30.6 30.5 18*30.6 18*30.6 18*30.6 18*30.6 18*30.6 18*30.6 18*30.6 18*30.6 18*30.6 18*30.6 18*30.6 18*30.6 18*30.6 18*30.6 18*30.6 18*30.6 18*30.6 1													28°37.8
12 300°55.6 100°30   20.6 156°31.8   591 155°35.2   51.8   201°39.4   05.4   201°46.1   221°46.1   15.3 315°50.8   150°50.8   127°50.7   171°15.2   171°15.2   171°15.3   171°15											Alnilam		$-1^{\circ}11.0$
18 1815 810 115150 120708 279 180731 101550 812 207 171331 1015508 1681 2710 331500 1 30708 270 120736 5 81 1907318 51.0 30708 20 3407030 1451117 270 201736 8 581 1907318 51.0 307472 8 0.53 1907318 51.0 307473 8 0.53 1907318 51.0 307473 8 0.53 1907318 51.0 307473 8 0.53 1907318 51.0 307473 8 0.53 1907318 51.0 307473 8 0.53 1907318 51.0 307473 8 0.53 1907318 51.0 307473 8 0.53 1907318 51.0 307473 8 0.53 1907318 51.0 307473 8 0.53 1907318 51.0 307473 8 0.53 1907318 51.0 307473 8 0.53 1907318 51.0 307473 8 0.53 1907473 8 0.53 1907418 51.0 307473 8 0.53 1907418 51.0 307473 8 0.53 1907418 51.0 307473 8 0.53 1907418 51.0 307473 8 0.53 1907418 51.0 307473 8 0.53 190743 8 0.53 190											Betelgeuse	270°50.2	7°24.8
190 331*00.5 130*08.8 27.9 186*34.3 89.4 183*296 51.7 221*46.6 6.4 4											Canopus	263°51.4	-52°42.3
20											Sirius	258°24.7	-16°45.0
1											Adhara	255°04.5	-29°00.3
16											Procyon	244°49.2	5°09.4
Mer. pass   20:56											Pollux	243°15.4	27°57.6
Mar. pass. 20:56											Avior	$234^{\circ}14.0$	-59°35.4
State   GHA	23	31 10.3							∠1 35.0	∪5.∠		222°45.2	-43°32.2
State   GHA	Mer.p	ass. 20:56	$\nu$ 3.0′ d-0.9	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°38.0	-69°49.3
Set							-				Alphard	$217^{\circ}46.3$	-8°46.4
46°12.8 20°23.4 \$12°23.6 20°40.6 \text{N15°56.7} \$25°8.06 \text{N15°56.7} \$25°8.06 \text{N15°56.7} \$25°8.00 \$13°51.3 \text{N15°56.7} \$20°00.2 \text{Off.} \$10\$ \$20°00.2 \text{Off.} \$10\$ \$20°00.2 \$20°1.3 \$20°0.2 \$20°	٠.	CIIA	CILA	Б	CIIA	Б	CILA	Б.	CIIA	Б	Regulus	207°33.0	$11^{\circ}50.1$
1 61°15.3 20°26.3 22.7 27°41.9 56.4 27°342.8 51.2 52°00.2 06.1 Clean 17°52.3 11°50.4 20°10.2 10°51.4 20°50.4											Dubhe	193°39.5	$61^{\circ}36.1$
3 91°20 2 250°32 0 - 21.1 30°436 0 - 55.4 318°495 5 - 50.9 97°079 0 - 49											Denebola	182°23.7	14°25.3
9 91°202 25°320 0 -21.1 306°44.4 · .95.7 303°47.3 · .91.0 82°05.4 · .05.0 6.7   5 121°25.1 265°43.0 · .20.2 32°45.6 · .55.4 318°49.5 · .50.9 07'07.9 0.9   6 136°27.6 298°40.7 512°18.5 336°40.9 · .50.0 333°81.7 · .09.9 112°10.6   8 166°32.5 325°46.4 16.8 21°50.7 · .54.4 3°56.1 50.7 142°15.7 · 04.8   1 181°35.0 336°43.0 · 10.0 36°52.0 · .53.7 34°00.5 · .50.5 172°20.9 · 04.7   1 181°35.0 340°49.3 · .10.0 36°52.0 · .53.7 34°00.5 · .50.5 172°20.9 · 04.7   1 181°35.0 340°49.3 · .10.0 36°52.0 · .53.7 34°00.5 · .50.5 172°20.9 · 04.7   1 121°39.9 10°55.0 1 1.3 36°59.7 · .52.3 49°02.7 · .50.5 172°20.9 · 04.6   1 121°39.9 10°55.0 1 1.3 36°59.5 · .53.0 66°04.9 · .50.4 20°26.1 · 04.6   1 121°39.9 10°55.0 1 1.3 15°55.7 115°5.7 10°55.0 1 1.3 36°50.5 · 05.0 12°20.0 · .04.7   1 121°39.9 10°55.0 1 1.3 15°55.7 115°5.2 15°5.7 10°55.0 1 1.3 36°50.5 10°50.0 120°27.3 1 04.5   1 121°39.9 10°55.0 1 1.3 10°55.0 1 1.3 19°15.9 · .50.0 222°31.3 · 04.5   1 121°39.9 10°55.0 1 1.3 10°55.7 115°5.3 139°15.9 · .50.2 222°31.3 · 04.5   1 121°39.9 10°55.0 1 1.3 10°55.7 115°3.5 1 115°3.1 50.1 262°36.5 · 04.4   1 121°39.9 10°55.0 1 1.3 10°55.7 115°3.1 139°15.9 · .50.0 223°31.3 · 04.5   1 121°39.9 10°55.0 1 1.3 10°55.7 115°3.5 1 139°15.9 · .50.1 262°36.5 · 04.4   1 121°39.1 110°14.9 110°3.0 115°3.0 1 115°3.1 115°3.3 15°3.0 1 110°3.0 1 110°3.0 1 110°3.0 1 110°3.0 1 110°3.0 1 110°3.0 1 110°3.0 1 110°3.0 1 110°3.0 1 11											Gienah	175°42.3	$-17^{\circ}41.4$
166											Acrux	172°59.0	-63°14.7
121 225.1 280 37.8 19.4 336 40.9 55.0 337 51.7 50.9 112 10.0 6.9 40.0 112 10.0 6.8 136 136 27.6 295 40.7 12 116 20.1 136 31.0 136 43.6 17.7 6 49.4 54.4 376.1 50.7 142 13.7 04.8 145 41 12 12 13 10 10 43.6 17.7 6 49.4 54.4 376.1 50.7 142 13.7 04.8 145 41 12 12 13 10 10 196 37.5 355 52.1 52.5 15.2 15.5 15.3 25 34.4 49.02.7 50.5 172 20.9 04.7 4.5 11 12 11 30.9 10 15 50.0 136 52.0 15.2 15.5 2 15.2 15.5 2 15.2 15.2 15.2											Gacrux	171°50.4	$-57^{\circ}15.6$
1 136°27.6 26°540.7 S12°18.5 351°48.2 N15°64.7 348°53.9 N13°50.8 127°13.1 N01°04.8 Alkaid 152°31.3 404°0.8 166°32.5 325°46.4 10.8 21°50.7 540 18°88.3 50.6 157°1.8 3 0.47°. 144°15.7 0.48 166°32.5 325°46.4 10.8 21°50.7 540 18°88.3 50.6 157°18.3 0.47°. 144°15.7 0.48 166°32.5 325°46.4 10.8 21°50.7 540 18°88.3 50.6 172°0.9 0.04.7 10. 196°37.5 355°52.2 15.2 51°53.2 53.4 49°0.2 50.5 172°0.9 0.04.7 10. 196°37.5 355°52.2 15.2 51°53.2 53.4 49°0.2 50.5 187°3.5 0.46 10.46 12.1 211°3.9 10°55.0 14.3 66°54.5 53.0 64°0.9 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0											Alioth	$166^{\circ}12.2$	55°48.7
151°30.1 310°43.6 11.7.7 6°49.4 54.4 3°56.1 50.7 142°15.7 04.8 163°47.8 150°50.1 120°50.1 150°18.3 04.7 Molecular 140°45.2 36°50.0 150°18.3 10.4 150°19.1 15													-11°18.0
16 166 32.5 325 46.4 16.8 21°507 54.0 18°58.3 50.6 15°18.3 04.7 16.6 16.8 21°507 54.0 18°58.3 50.6 15°18.3 04.7 16.6 16.8 14.7 16.9 16.9 11.2 11°30.3 30.40 16.8 16.8 16.5 17.2 16.9 17.2 16.9 196°37.5 355°52.2 15.2 15.2 51°53.2 53.4 49°0.7 50.5 187°3.5 04.6 16.8 14.7 56.2 3.6°3.0 10 196°37.5 355°52.2 15.2 15.2 51°53.2 53.4 49°0.7 50.5 187°3.5 04.6 16.2 12.2 26°42.4 25°57.9 \$12°13.5 81°55.7 \$15°52.7 \$70°0.1 \$130°50.3 21°72.8 7 \$10°0.4 5 1.2 11.2 11°3.9 10.5 11.2 11°3.2 11.2 11°3.2 11.2 11°3.2 11.2 11°3.2 11.2 11°3.2 11.2 11°3.2 11.2 11°3.2 11.2 11°3.2 11.2 11°3.2 11.2 11°3.2 11.2 11°3.2 11.2 11°3.2											Alkaid	152°51.3	49°10.7
9 181°35,0 340°493 3. 16.0 36°52.0 53.7 34°00.5 50.5 187°20.9 0.47 Acturus 145°46,9 19°0.0 10 169°37.5 35°9.5 22 15.2 51°93.2 51°33.2 53.4 49°0.7 50.5 187°2.5 04.6 [Right Kent. 139°3.9 0.6°5.6 1121°3.9 10°55.0 14.3 66°54.5 53.0 64°04.9 50.4 020°2.6 1 04.0 [Right Kent. 139°3.9 0.6°5.6 12 21°3.9 10°55.0 14.3 66°54.5 53.0 64°04.9 50.4 020°2.6 1 04.0 [Right Kent. 139°3.9 0.6°5.6 131°3.7 10°04.5 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0											Hadar	148°34.5	-60°30.0
10 196°37.5   355°52.2   15.2   51.5   51.5   53.0   66°94.5   53.0   64°9.3   50.2   232°31.5   64.5											Menkent	147°56.2	-36°30.0
10 196°375 9 10°550 14.3 66°545 53.0 66°44 9 50.7 187°235 04.6 12 226°42.4 25°57 9 512°13.5 81°557 N15°52.7 79°07.1 N13°50.3 217°28.7 N01°04.6 12 226°42.4 3 41°07 12.7 96°57.0 52.3 99°09.3 50.2 232°31.3 04.5 14 256°47.3 56°03.6 11.8 111°58.3 52.0 109°11.5 50.1 247°33.9 04.5 14 256°47.3 56°03.6 11.8 111°58.3 52.0 109°11.5 50.1 247°33.9 04.5 14 256°47.3 10°12.1 09.4 117°02.1 126°99.5 51.7 124°13.7 50.1 262°36.5 04.4 14 14 14 14 14 14 14 14 14 14 14 14 14											1		19°02.6
11 2117399 10°550 14.3 66°48.5 130°50.0 64°04.9 50.4 202°26.1 04.6 Kochab 137°21.0 74°02.0 12 226°42.4 29°570 512°135 81°55.7 N15°52.7 79°07.1 N15°50.3 21°26.7 N10°04.5 (Abpheca 136°54.7 11.0 126°57.0 52.3 94°09.3 50.2 232°31.3 0.45 136°54.7 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0											<u> </u>		-60°56.7
12 226*42.4 8 41°0.07 12.7 96*57.0 52.3 94°0.93 50.2 232°31.3 0.45   14 256*47.3 56*03.6 11.8 111*58.3 52.0 109*11.5 50.1 247*33.9 0.44   15 271*98 71*06.4 1.11.0 126*59.5 51.7 124*13.7 v.50.1 262*36.5 v.04.4   16 286*52.2 86*09.3 10.2 142*0.8 51.3 139*15.9 50.0 277*30.1 0.43   17 301*94.7 101*01.2 1 09.4 157*02.1 51.0 154*18.1 4.9 292*17.7 0.43   18 316*57.2 116*01.49 \$12*08.5 172*03.3 N15*50.6 169*20.3 N13*94.8 307*44.3 N01*04.2   18 316*57.2 116*01.49 \$12*08.5 172*03.3 N15*50.6 169*20.3 N13*94.8 307*44.3 N01*04.2   18 316*57.2 116*01.49 \$12*08.5 172*03.3 N15*50.6 169*20.3 N13*94.8 307*44.3 N01*04.2   18 316*07.2 16*04.0 0.69 202*05.9 50.0 199*24.7 49.7 322*46.8 0.42   20 347*02.1 146*20.6 0.69 202*05.9 50.0 199*24.7 49.7 32*46.8 0.42   21 2*04.6 161*23.4 v.66.1 217*07.1 49.6 214*25.9 v.49.6 352*52.0 0.41   10 323*20*20*20*20*3.9 50.0 199*24.7 49.5 7*54.6 0.41   Nunki 75*46.1 -26*15.   10 47*12.0 199*29.0 0.45 247*09.7 49.0 244*31.3 49.4 22*57.2 0.40   10 47*12.0 20*03.19 \$12*03.6 22*00*3.m0.7 m.79   10 47*12.0 20*03.19 \$12*03.6 22*00*3.19 \$10*40.2   11 62*04.4 22*034.7 0.28 277*12.2 48.3 274*95.8 49.3 53*02.4 0.39   10 47*12.0 20*03.19 \$12*03.6 22*00*3.9 10.5 46.6 304*40.2 v.49 1. 83*07.6 0.38   10 0 47*12.0 20*03.19 \$12*03.6 22*00*3.0 30*14.4 49.0 98*10.2 0.38   10 0 47*12.0 20*03.19 \$12*03.6 22*00*3.0 30*14.4 49.0 98*10.2 0.38   10 10*1378.6 20*03.3 10.0 2.0 292*15.5 47.9 289*38.0 49.2 68*05.0 0.39   10 22*04.3 21*04.3 10*00.4 322*16.0 47.3 319*42.4 49.0 98*10.2 0.38   10 10*1378.6 36*93.7 5.5 6 52*23.7 45.2 49.9 55.6 48.5 188*25.7 0.36   10 10*13786.7 20*04.8 11*05.9 5.5 6 52*23.7 44.8 49.0 98*10.2 0.38   10 10*1378.6 36*93.7 5.5 6 52*23.7 45.2 49.9 55.6 48.5 188*25.7 0.3   10 10*13786.4 57*10.5 55.1 12*26.4 45.6 348*33.4 41.4 48.0 132*31.3 0.3   11 2*12*24.3 28*10*45.8 11*25.5 112*26.7 44.9 10*31.8 188*25.7 0.3   11 2*12*24.3 28*10*45.8 11*25.5 112*26.7 44.9 1													74°02.6
13 241"44.8 41"00.7 12.7 96"57.0 52.3 94"09.3 50.2 232"31.3 04.5 142 256"67.3 56"03.6 11.8 11"58.3 52.0 109"11.5 50.1 247"33.9 04.4 16"201.8 11"58.3 52.0 109"11.5 50.1 247"33.9 04.4 16"201.8 11"58.3 52.0 109"11.5 50.1 247"39.1 04.3 18"31.5 10"01.2 1.0 10"12.1 09.4 157"02.1 51.0 154"18.1 49.9 292"41.7 04.3 18"31.5 12"01.3 11"59.6 131"17.8 07.7 187"04.6 50.3 184"22.5 49.7 322"46.8 04.2 11"21"3.3 20"01.4 16"201.4 16"64.5 12"03.3 11"59.6 131"17.8 07.7 187"04.6 50.3 184"22.5 49.7 322"46.8 04.2 11"21"3.3 20"01.4 16"20.6 0.69.9 020"05.9 50.0 199"24.7 04.7 0.3 32"54.0 04.2 11"21"3.9 04.5 11"21"3.3 20"01.4 16"20.2 10.6 0.69.9 020"05.9 50.0 199"24.7 04.7 0.3 32"54.0 04.1 22"01.7 0.17"6.2 0.5 0.3 232"08.4 49.3 22"89.1 44.9 49.5 2"54.6 04.1 18"4.5 12"2.2 17"70.0 17"6"26.2 05.3 232"08.4 49.3 22"89.1 44.9 49.5 2"54.6 04.1 18"4.1 1				S12° 13.5				N13°50.3		N01°04.5	1		-16°09.1
14 256°47.9 56°03.6 11.8 11.9 112°86.3 52.0 109°11.5 50.1 26°36.5 0.44   Antares 112°14.3 26°39.1   Antares 112°12.1 26°30.3   Antares 112°12.1   Antares 112°12.1   Antares 112°12.1   Antares 112°14.3 26°39.1   Antares 112°12.1   Antares 112°14.3 26°39.1   Antares 112°12.1   Antares 112°12.1   Antares 112°14.3 26°39.1   Antares 112°14.3 26°39.1   Antares 112°12.1   Anta													26°37.5
15 271'498 71'006 10	14												-26°29.5
16 286°52 86°093 10.2 142°00.8 51.3 139°15.9 50.0 277°391 04.3 15°36.7 10°12.1 10°4.1 15°46.													-69°04.6
17 301°947   101°12.1   09.4   157°02.1   51.0   154°18.1   49.9   292°4.1   04.2   18 31°97.2   116°12.1   09.4   157°02.1   51.0   169°20.3   113°40.8   307°44.3   101°04.2   19 331°95.1   131°17.8   07.7   187°04.6   50.3   184°2.5   49.7   322°46.8   04.2   21 2°04.6   161°3.4   · · · · · · · · · · · · · · · · · ·													-15°45.4
18 316°57.2 116°14.9 \$12°08.5 117°18.0 77 187°04.6 50.3 184°22.5 49.7 32°244.3 N01°04.2 Page 32°46.6 131°17.8 07.7 187°04.6 50.3 184°22.5 49.7 337°49.4 04.2 Page 32°46.6 121°40°17.1 · 49.6 214°26.6 · 49.6 24°49.6 · 49.6 38°25.2 · 0.41 Vegs 80°32.5 38°48. 22°47.0 · 0.41 Vegs 80°32.5 38°48. 22°47.0 · 0.41 Vegs 80°32.5 38°48. 49.3 22°59.9 · 49.5 7°54.6 · 0.41 Nunki 72°46.1 ° 26°54.2 · 0.5 ° 26°40.9 ° 49.0 ° 244°31.3 · 49.4 · 22°57.2 · 0.40 Nunki 72°46.1 ° 26°54.2 · 0.5 ° 26°40.9 ° 49.0 ° 244°31.3 · 49.4 · 22°57.2 · 0.40 Nunki 72°46.1 ° 26°54.4 · 22°34.7 · 0.8 27°712.2 · 48.3 274°35.8 · 49.3 58°02.4 · 0.3 ° 26°44.3 · 0.1 ° 27°30.9 · 46°50.0 · 0.3 ° 28°31.5 · 0.2 ° 29°13.5 · 47.9 ° 28°38.0 · 49.2 · 68°05.0 · 0.3 ° 28°40.3 · 0.2 ° 29°13.5 · 47.9 ° 28°38.0 · 49.2 · 68°05.0 · 0.3 ° 28°40.3 · 0.2 ° 20°48.6 · 11°58.8 · 35°14.1 · 58°45.1 · 28°45.4 · 49.0 · 98°10.2 · 0.38 · 13°45.4 · 0.3 ° 28°44.2 · 31°34.5 · 28°44.6 · 49.9 · 98°10.2 · 0.38 · 13°45.4 · 0.3 ° 28°44.2 · 31°45.6 · 31°45.4 · 0.3 ° 28°44.2 · 31°45.6 · 31°45.4 · 0.3 ° 28°44.4 · 48.0 · 13°31.2 · 0.3 ° 28°45.2 · 12°24.1 · 45.6 · 34°46.8 · N13°48.9 · 128°15.4 · N01°03.7 · Mars 215°55.9 · 06.3 · 31°45.4 · 0.1 ° 21°29.3 · 11°20.5 · 54.8 · 67°44.9 · 44.9 · 64°57.9 · 48.5 · 23°33.5 · 50°41.6 · 21°34.5 · 21°27.8 · 0.4 ° 21°37.3 · 46.9 · 31°44.6 · 49.9 · 13°12.8 · 0.3 ° 0.3 ° 0.3 ° 0.4 ° 0.4 ° 0.4 ° 0.4 ° 0.4 ° 0.4 ° 0.4 ° 0.4 ° 0.4 ° 0.3 ° 0.3 ° 0.4 °											1		-37°07.4
19 331°9.6   131°17.8   07.7   187°04.6   50.3   189°24.7   49.7   322°40.8   04.2   20 34°02.1   146°20.6   06.9   202°05.9   50.0   199°24.7   49.7   337°49.4   04.2   21 2°04.6   161°23.4   · · · · · · · · · · · · · · · · · ·				S12°08.5				N13°49.8		N01°04.2			12°32.6
20 347°02.1 146°20.6 06.9 202°05.9 50.0 199°24.7 49.7 337°49.4 04.2 24.2 12°04.6 161°23.4 · o.6.1 217°07.1 · +9.6 214°26.9 · +9.6 352°52.0 · 0.4.1 Vga 80°32.5 38°48.   22 17°07.0 176°26.2 05.3 232°08.4 49.3 229°9.1 49.5 7°54.6 04.1   23 32°09.5 191°29.0 04.5 247°09.7 49.0 244°31.3 49.4 22°57.2 04.0   24 070.5 191°29.0 04.5 247°09.7 49.0 244°31.3 49.4 22°57.2 04.0   25 070.5 191°29.0 04.5 247°09.7 49.0 244°31.3 49.4 22°57.2 04.0   25 070.5 191°29.0 04.5 247°09.7 49.0 244°31.3 49.4 22°57.2 04.0   25 070.5 191°29.0 04.5 247°09.7 49.0 244°31.3 49.4 22°57.2 04.0   25 070.5 191°29.0 04.5 247°09.7 49.0 244°31.3 49.4 22°57.2 04.0   25 070.5 191°29.0 04.5 247°09.7 49.0 244°31.3 49.4 22°57.2 04.0   25 070.5 191°29.0 04.5 247°09.7 49.0 244°31.3 49.4 22°57.2 04.0   25 070.5 191°29.0 04.5 247°09.7 49.0 244°31.3 49.4 22°57.2 04.0   25 070.5 191°29.0 04.5 247°09.7 49.0 244°31.3 49.4 22°57.2 04.0   25 070.5 191°29.0 04.5 247°09.7 49.0 244°31.3 49.4 22°57.2 04.0   26 070.5 191°29.0 04.5 247°09.7 49.0 244°31.3 49.4 22°57.2 04.0   26 070.5 191°29.0 04.5 262°19.9 N15°48.6 259°33.6 N13°49.3 37°59.8 N01°04.0   26 16 16 14 221°34.7 02.8 277°12.2 48.3 274°35.8 49.3 53°02.4 03.9   25 1°40.3 · · · · · · · · · · · · · · · · · · ·											_		51°29.3
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Mer.pass. 20:52   v2.9' d-0.9' m-4.55   v1.3' d-0.3' m0.79   v2.2' d-0.1' m-2.04   v2.6' d-0.0' m0.49   Peacock   S3° 03.5   56° 39.	23	32°09.5	191°29.0	04.5	247°09.7	49.0	244°31.3	49.4	22°57.2	04.0	<b>I</b>		8°56.5
Sun   GHA   GHA   Dec   GHA	Mern	nass 20:52	v2 9' d-0 9	9′ m-4 55	$\nu 1.3' d-0$	3′ m0 79	v2 2' d-0	1′ m-2 04	ν2 6' d-0	0′ m0 49			-56°39.1
Sun         GHA         GHA         Dec         Al Na"a         270°30.9         -46°50.0         27°30.9         -46°50.0         -46°50.0         Al Na"a         27°90.8         Al Na"a         27°90.8         Al Na"a         27°90.8         Al Na"a         27°90.8         Al Na"a         28°0.0         29°938.0         49.2         68°05.0         03.9         30°0.0         30.9         50.0         38°07.6         0.0         33.8         40.2         68°05.0         03.9         80°0.0         30.9         80°0.0         30.9         80°0.0         40°0.0         48°0.0         98°0.0         38°0.0         40°0.0         48°0.0         13°12.8         03.7         Markab         13°3.2         20°0.0         48°0.0         13°12.8         03.7         Markab         13°3.2         40°0.0         48°0.0         118°12.8	Wici.p		- Z.5 G 0.5								<u> </u>		45°22.9
Sun         GHA         Dec         Horizontal parallax           1         62°14.4         221°34.7         02.8         277°12.2         48.3         274°35.8         49.3         53°02.4         03.9         68°05.0         03.9         68°05.0         03.9         48.6         10°21.8         266°43.0         12°00.4         322°16.0         47.3         319°42.4         49.0         98°10.2         03.8         Markab         13°28.2         15°21.           5         122°24.3         281°45.8         11°59.6         337°17.3         46.9         334°44.6         48.9         113°12.8         03.7         Mars         215°55.9         60.3         46.9         48.8         143°18.0         03.6         Mars         215°5.9         60.3         46.2         4°49.0         48.8         143°18.0         03.6         Mars         215°5.9         06.3         4°49.0         48.8         143°18.0         03.6													10°00.1
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5         122°24.3         281°45.8         11°59.6         337°17.3         46.9         334°44.6         48.9         113°12.8         03.7         Venus         158°58.9         10:2           6         137°26.7         296°48.6         511°58.8         352°18.6         N15°46.6         349°46.8         N13°48.9         128°15.4         N01°03.7         Mars         215°56.9         06:3           7         152°29.2         311°51.4         58.0         7°19.8         46.2         4°49.0         48.8         143°18.0         03.6         Jupiter         212°34.2         06:3           9         182°34.1         341°57.0         56.4         37°22.4         45.6         34°53.4         48.6         173°23.1         03.5         Saturm         350°41.6         21:3           10         197°36.6         356°59.7         55.6         52°23.7         45.2         49°55.6         48.5         188°25.7         03.5         Nov 07 Sat         Venus         159°10.5         10:1         Mars         215°27.8         06:3           12 22°31.1         22°741.5         27°55.3         511°54.0         82°62.6         N15°46.6         80°00.1         N13°48.4         218°30.9         N01°03.4         Mars													
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182°34.1   341°57.0   · · · 56.4   37°22.4   · · · 45.6   34°53.4   · · · 48.6   173°23.1   · · · 03.5													06:48
10 197°36.6 356°59.7 55.6 52°23.7 45.2 49°55.6 48.5 188°25.7 03.5 11 21°02.5 54.8 67°24.9 44.9 64°57.9 48.5 203°28.3 03.4 12 227°41.5 27°05.3 \$11°54.0 82°26.2 N15°44.6 80°00.1 N13°48.4 218°30.9 N01°03.4 13 242°44.0 42°08.0 53.2 97°27.5 44.2 95°02.3 48.3 233°33.5 03.4 14 257°46.4 57°10.8 52.5 112°28.7 43.9 110°04.5 48.2 248°36.1 03.3 15 272°48.9 72°13.5 · 51.7 127°30.0 · 43.5 125°06.7 · 48.2 263°38.7 · 03.3 16 287°51.4 87°16.3 50.9 142°31.3 43.2 140°08.9 48.1 278°41.3 03.2 17 302°53.8 102°19.0 50.1 157°32.6 42.9 155°11.1 48.0 293°43.9 03.2 18 317°56.3 117°21.7 \$11°49.3 172°33.9 N15°42.5 170°13.3 N13°47.9 308°46.4 N01°03.1 19 332°58.8 132°24.5 48.5 187°35.1 42.2 185°15.6 47.8 323°49.0 03.1 20 348°01.2 147°27.2 47.8 202°36.4 41.9 200°17.8 47.8 323°49.0 03.1 21 20°27.6 42.9 155°11.1 48.0 293°49.0 03.1 21 21°20°1.6 06:4 5aturn 350°47.9 21:2 21°21.6 06:4 5aturn 350°47.9 21°21.0 06:4 5aturn 350°47.9 21°21.0 06:4 5aturn 350°47.9 21°21.0 06:4 5aturn 350											Saturn	350°41.6	21:33
10 197 36.6 356 59.7 55.6 52 23.7 49.2 49 55.6 48.5 188 25.7 03.5 120 23° 28.3 03.4 12 22° 39.1 12° 02.5 54.8 67° 24.9 44.9 64° 57.9 48.5 203° 28.3 03.4 12 227° 41.5 27° 05.3 511° 54.0 82° 26.2 N15° 44.6 80° 00.1 N13° 48.4 218° 30.9 N01° 03.4 13 242° 44.0 42° 08.0 53.2 97° 27.5 44.2 95° 02.3 48.3 233° 33.5 03.4 14 257° 46.4 57° 10.8 52.5 112° 28.7 43.9 110° 04.5 48.2 248° 36.1 03.3 15 272° 48.9 72° 13.5 · 51.7 127° 30.0 · 43.5 125° 06.7 · 48.2 263° 38.7 · 03.3 16 287° 51.4 87° 16.3 50.9 142° 31.3 43.2 140° 08.9 48.1 278° 41.3 03.2 17 302° 53.8 102° 19.0 50.1 157° 32.6 42.9 155° 11.1 48.0 293° 43.9 03.2 117° 21.7 511° 49.3 172° 33.9 N15° 42.5 170° 13.3 N13° 47.9 308° 46.4 N01° 03.1 19 332° 58.8 132° 24.5 48.5 187° 35.1 42.2 185° 15.6 47.8 323° 49.0 03.1 20 348° 01.2 147° 27.2 47.8 202° 36.4 41.9 200° 17.8 47.8 323° 49.0 03.1 20 338° 51.6 03.0 21 33° 03.7 162° 29.9 · 47.0 217° 37.7 · 41.5 215° 20.0 · 47.7 353° 54.2 · 03.0 14 29° 13.5 45.4 45.4 247° 40.2 40.8 245° 24.4 47.5 23° 59.4 02.9 15 Mars: 0.1											Nov 07 Sat	SHA	Mer.pass
11											<b>I</b>		10:16
12 227 41.5 27 05.3 \$11 54.0 \$82 26.2 \$N15 44.0 \$95 02.3 \$48.3 \$233 33.5 \$03.4 \$320 44.0 \$42 080.0 \$53.2 \$97 07.5 \$44.2 \$95 02.3 \$48.3 \$233 33.5 \$03.4 \$310 04.5 \$48.2 \$248 36.1 \$03.3 \$350 04.8 \$21.2 \$27 048.9 \$72 07.3 5 \cdots 51.7 \$12 07 03.0 \$\cdots 43.5 \$125 06.7 \$\cdots 48.2 \$248 36.1 \$03.3 \$350 04.8 \$21.2 \$27 04.8 \$350 04.8 \$21.2 \$27 04.8 \$350 04.8 \$21.2 \$27 04.8 \$350 04.8 \$21.2 \$27 04.8 \$350 04.8 \$21.2 \$27 04.8 \$27 0													06:33
13 242 44.0 42 08.0 53.2 97 27.5 44.2 95 02.3 48.3 233 33.5 03.4   14 257° 46.4 57° 10.8 52.5 112° 28.7 43.9 110° 04.5 48.2 248° 36.1 03.3   15 272° 48.9 72° 13.5 · 51.7 127° 30.0 · 43.5 125° 06.7 · · · 48.2 263° 38.7 · · · 03.3   16 287° 51.4 87° 16.3 50.9 142° 31.3 43.2 140° 08.9 48.1 278° 41.3 03.2   17 302° 53.8 102° 19.0 50.1 157° 32.6 42.9 155° 11.1 48.0 293° 43.9 03.2   18 317° 56.3 117° 21.7 \$11° 49.3 172° 33.9 N15° 42.5 170° 13.3 N13° 47.9 308° 46.4 N01° 03.1   19 332° 58.8 132° 24.5 48.5 187° 35.1 42.2 185° 15.6 47.8 323° 49.0 03.1   20 348° 01.2 147° 27.2 47.8 202° 36.4 41.9 200° 17.8 47.8 338° 51.6 03.0   21 3° 03.7 162° 29.9 · · 47.0 217° 37.7 · · · 41.5 215° 20.0 · · · 47.7 353° 54.2 · · 03.0   22 18° 06.2 177° 32.7 46.2 232° 39.0 41.2 230° 22.2 47.6 8° 56.8 02.9   23 33° 08.6 192° 35.4 45.4 247° 40.2 40.8 245° 24.4 47.5 23° 59.4 02.9    Mars: 0.1													06:44
14 257 46.4 57 10.8 5.2.5 112 28.7 43.9 110 04.5 48.2 248 36.1 03.3 15 272 48.9 72 13.5 · · 51.7 127 30.0 · · 43.5 125 06.7 · · · 48.2 263 38.7 · · · 03.3 Venus 159 19.9 10:1 7 302 53.8 102 19.0 50.1 157 32.6 42.9 155 11.1 48.0 293 43.9 03.2 18 317 56.3 117 21.7 511 49.3 172 33.9 N15 42.5 170 13.3 N13 47.9 308 46.4 N01 03.1 19 332 58.8 132 24.5 48.5 187 35.1 42.2 185 15.6 47.8 323 49.0 03.1 20 348 01.2 147 27.2 47.8 202 36.4 41.9 200 17.8 47.8 323 49.0 03.1 21 3 03.7 162 29.9 · · 47.0 217 37.7 · · 41.5 215 20.0 · · 47.7 353 54.2 · · 03.0 21 18 06.2 177 32.7 46.2 232 39.0 41.2 230 22.2 47.6 8 56.8 02.9 23 59.4 02.9 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10													21:28
16       287°51.4       87°16.3       50.9       142°31.3       43.2       140°08.9       48.1       278°41.3       03.2       Venus 159°19.9       10:1         17       302°53.8       102°19.0       50.1       157°32.6       42.9       155°11.1       48.0       293°43.9       03.2       Mars 214°59.0       06:3         18       317°56.3       117°21.7       \$11°49.3       172°33.9       N15°42.5       170°13.3       N13°47.9       308°46.4       N01°03.1       Jupiter 212°21.6       06:4         19       332°58.8       132°24.5       48.5       187°35.1       42.2       185°15.6       47.8       323°49.0       03.1       Saturn 350°47.9       21:2         20       348°01.2       147°27.2       47.8       202°36.4       41.9       200°17.8       47.8       338°51.6       03.0         21       3°03.7       162°29.9       · 47.0       217°37.7       · 41.5       215°20.0       · 47.7       353°54.2       · 03.0         22       18°06.2       177°32.7       46.2       232°39.0       41.2       230°22.2       47.6       8°56.8       02.9         23       33°08.6       192°35.4       45.4       247°40.2       40.8       245°24.													
17 302°53.8 102°19.0 50.1 157°32.6 42.9 155°11.1 48.0 293°43.9 03.2 18 317°56.3 117°21.7 \$11°49.3 172°33.9 N15°42.5 170°13.3 N13°47.9 308°46.4 N01°03.1 19 332°58.8 132°24.5 48.5 187°35.1 42.2 185°15.6 47.8 323°49.0 03.1 20 348°01.2 147°27.2 47.8 202°36.4 41.9 200°17.8 47.8 338°51.6 03.0 21 33°03.7 162°29.9 · 47.0 217°37.7 · 41.5 215°20.0 · 47.7 353°54.2 · 03.0 22 18°06.2 177°32.7 46.2 232°39.0 41.2 230°22.2 47.6 8°56.8 02.9 23 33°08.6 192°35.4 45.4 247°40.2 40.8 245°24.4 47.5 23°59.4 02.9 Mars: 0.1													Mer.pass
18											I		10:12
19 332°58.8 132°24.5 48.5 187°35.1 42.2 185°15.6 47.8 323°49.0 03.1 20 348°01.2 147°27.2 47.8 202°36.4 41.9 200°17.8 47.8 338°51.6 03.0 21 3°03.7 162°29.9 · 47.0 217°37.7 · 41.5 215°20.0 · 47.7 353°54.2 · 03.0 22 18°06.2 177°32.7 46.2 232°39.0 41.2 230°22.2 47.6 8°56.8 02.9 23 33°08.6 192°35.4 45.4 247°40.2 40.8 245°24.4 47.5 23°59.4 02.9 Mars: 0.1													06:31
20 348°01.2 147°27.2 47.8 202°36.4 41.9 200°17.8 47.8 338°51.6 03.0 21 3°03.7 162°29.9 · 47.0 217°37.7 · 41.5 215°20.0 · 47.7 353°54.2 · 03.0 30.0 30.0 30.0 30.0 30.0 30.0 30													06:41
21 3°03.7 162°29.9 ··· 47.0 217°37.7 ··· 41.5 215°20.0 ··· 47.7 353°54.2 ··· 03.0 Horizontal parallax 22 18°06.2 177°32.7 46.2 232°39.0 41.2 230°22.2 47.6 8°56.8 02.9 23 33°08.6 192°35.4 45.4 247°40.2 40.8 245°24.4 47.5 23°59.4 02.9 Mars: 0.1											Saturn	350°47.9	21:24
22 18°06.2 177°32.7 46.2 232°39.0 41.2 230°22.2 47.6 8°56.8 02.9 Venus: 0.5 23 33°08.6 192°35.4 45.4 247°40.2 40.8 245°24.4 47.5 23°59.4 02.9 Mars: 0.1											Under	al parallas	
23 33°08.6 192°35.4 45.4 247°40.2 40.8 245°24.4 47.5 23°59.4 02.9 Mars: 0.1											HORIZONI	•	0 5
25 35 36.0 152 36.1 16.1 211 16.2 16.0 215 21.1 17.5 25 35.1 32.3													
Mer.pass. 20:48 $\nu 2.8' \ d$ -0.8' m-4.60 $\nu 1.3' \ d$ -0.3' m0.78 $\nu 2.2' \ d$ -0.1' m-2.04 $\nu 2.6' \ d$ -0.0' m0.49	23	33~08.6	192°35.4	45.4	247~40.2	40.8	245~24.4	47.5				ividi5:	0.1
	Mer.n	ass. 20:48	$\nu 2.8' \frac{1}{d-0.8}$	3′ m-4.60	$\nu 1.3' d-0$	.3′ m0.78	$\nu 2.2' d-0$	.1′ m-2.04	$\nu 2.6' d-0$	.0′ m0.49			

h	Sui	Moon					
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	184°06.0	<b>S</b> 15°54.9	221°48.2	14.5'	S04°52.8	14.9'	56.6'
1	199°05.9	55.7	236°21.7	14.5'	05°07.8	14.9'	56.6'
2	214°05.9 229°05.9	56.4 •• 57.2	250°55.2 265°28.7	14.5' 14.5'	05°22.7 05°37.5	14.9' 14.8'	56.5' 56.5'
3 4	244°05.9	57.9	280°02.2	14.5	05°52.3	14.8	56.5'
5	259°05.8	58.7	294°35.7	14.5'	06°07.1	14.8'	56.5'
6	274°05.8	<b>S</b> 15°59.4	$309^{\circ}09.1$	14.5'	S06°21.9	14.7'	56.5'
7	289°05.8	16°00.2	323°42.6	14.4'	06°36.6	14.7'	56.4'
8	304°05.8 319°05.7	00.9 •• 01.7	338°16.0 352°49.4	14.4'	06°51.3 07°06.0	14.6' 14.6'	56.4
9 10	319°05.7 334°05.7	· · 01.7 02.4	352°49.4 7°22.9	14.4' 14.4'	07°06.0	14.6	56.4' 56.4'
11	349°05.7	03.2	21°56.3	14.4'	07°35.1	14.5'	56.4
12	4°05.7	<b>S</b> 16°03.9	36°29.7	14.4'	<b>S</b> 07°49.7	14.5'	56.3'
13	19°05.6	04.7	51°03.1	14.4'	08°04.1	14.4'	56.3'
14 15	34°05.6 49°05.6	05.4 •• 06.2	65°36.4 80°09.8	14.3' 14.3'	08°18.6 08°33.0	14.4' 14.3'	56.3' 56.3'
16	64°05.5	06.9	94°43.1	14.3'	08°47.3	14.3'	56.3
17	79°05.5	07.6	109°16.4	14.3'	09°01.6	14.2'	56.2'
18	94°05.5	<b>S</b> 16°08.4	123°49.7	14.3'	S09°15.8	14.2'	56.2'
19	109°05.5	09.1	138°23.0 152°56.2	14.2'	09°30.1	14.2'	56.2'
20 21	124°05.4 139°05.4	09.9 •• 10.6	152°56.2 167°29.4	14.2' 14.2'	09°44.2 09°58.3	14.1' 14.0'	56.2' 56.2'
22	154°05.4	11.4	182°02.7	14.2'	10°12.3	14.0'	56.1
23	169°05.3	12.1	196°35.8	14.2'	10°26.3	13.9'	56.1'
	SD = 16.1'	d = 0.8'		SL	0 = 15.4'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	184°05.3 199°05.3	\$16°12.8 13.6	211°09.0 225°42.1	14.1' 14.1'	\$10°40.3 10°54.2	13.9' 13.8'	56.1' 56.1'
2	214°05.2	14.3	240°15.2	14.1'	10° 04.2	13.8'	56.0'
3	229°05.2	• • 15.1	254°48.3	14.0'	11°21.8	13.7'	56.0'
4	244°05.2	15.8	$269^{\circ}21.3$	14.0'	$11^{\circ}35.5$	13.7'	56.0'
5	259°05.1	16.5	283°54.4	14.0'	11°49.1	13.6'	56.0'
6 7	274°05.1 289°05.1	\$16°17.3 18.0	298°27.3 313°00.3	14.0' 13.9'	\$12°02.7 12°16.3	13.5' 13.5'	56.0' 55.9'
8	304°05.0	18.7	327°33.2	13.9'	12° 29.8	13.4	55.9'
9	319°05.0	• • 19.5	342°06.1	13.9'	12°43.2	13.3'	55.9'
10	334°05.0	20.2	356°39.0	13.8'	12°56.5	13.3'	55.9'
11 12	349°04.9 4°04.9	20.9 \$16°21.7	11°11.8 25°44.6	13.8' 13.8'	13°09.8 \$13°23.0	13.2' 13.2'	55.9' 55.9'
13	19°04.8	22.4	40°17.3	13.7'	13°36.2	13.1	55.8'
14	34°04.8	23.1	54°50.1	13.7'	13°49.2	13.0'	55.8'
15	49°04.8	• • 23.9	69°22.8	13.6'	14°02.3	12.9'	55.8'
16 17	64°04.7 79°04.7	24.6 25.3	83°55.4 98°28.0	13.6' 13.6'	14°15.2 14°28.1	12.9' 12.8'	55.8' 55.8'
18	94°04.7	516°26.1	98 28.0 113°00.6	13.5'	\$14°40.9	12.7	55.7'
19	109°04.6	26.8	127°33.1	13.5'	14°53.6	12.7'	55.7'
20	124°04.6	27.5	142°05.6	13.5'	15°06.3	12.6'	55.7'
21	139°04.5 154°04.5	· · 28.3 29.0	156°38.0 171°10.5	13.4' 13.4'	15°18.9 15°31.4	12.5' 12.4'	55.7' 55.7'
22 23	169°04.5	29.0	171 10.5 185°42.8	13.4	15° 43.8	12.4'	55.6'
	SD = 16.1'	d = 0.7'			0 = 15.3'		
Sun	<b>GHA</b> 184°04.4	<b>Dec</b> \$16°30.5	<b>GHA</b> 200°15.1	ν	Dec \$15°56.1	d 12.2'	<b>HP</b> 55.6'
0 1	184 04.4 199°04.4	31.2	200 15.1 214°47.4	13.3' 13.2'	16°08.4	12.3' 12.2'	55.6'
2	214°04.3	31.9	229°19.7	13.2'	16°20.6	12.1'	55.6'
3	229°04.3	• • 32.6	243°51.9	13.2'	16°32.7	12.0'	55.6'
4	244°04.3 259°04.2	33.4 34.1	258°24.0 272°56.1	13.1' 13.1'	16°44.8 16°56.7	12.0' 11.9'	55.5' 55.5'
5 6	259 04.2 274°04.2	34.1 \$16°34.8	272 50.1 287°28.2	13.1	\$17°08.6	11.9	55.5'
7	289°04.1	35.5	302°00.2	13.0'	17°20.4	11.7'	55.5'
8	304°04.1	36.3	316°32.2	12.9'	17°32.1	11.6'	55.5'
9	319°04.0 334°04.0	• • 37.0	331°04.1 345°36.0	12.9'	17°43.7 17°55.2	11.5'	55.4'
10 11	334°04.0 349°03.9	37.7 38.4	345°36.0 0°07.8	12.8' 12.8'	17°55.2 18°06.7	11.4' 11.4'	55.4' 55.4'
12	4°03.9	S16°39.2	14°39.6	12.7'	\$18°18.0	11.3	55.4
13	19°03.9	39.9	29°11.3	12.7'	18°29.3	11.2'	55.4'
14	34°03.8	40.6	43°43.0	12.6'	18°40.5	11.1'	55.4'
15 16	49°03.8 64°03.7	· · 41.3 42.1	58°14.7 72°46.3	12.6' 12.5'	18°51.6 19°02.5	11.0' 10.9'	55.3' 55.3'
16 17	64°03.7 79°03.7	42.1 42.8	72°46.3 87°17.8	12.5'	19°02.5 19°13.4	10.9	55.3'
18	94°03.6	S16°43.5	101°49.3	12.4'	\$19°24.2	10.7	55.3'
19	109°03.6	44.2	116°20.8	12.4'	19°35.0	10.6'	55.3'
20	124°03.5	44.9	130°52.2	12.3'	19°45.6	10.5'	55.2'
21 22	139°03.5 154°03.4	· · 45.7 46.4	145°23.5 159°54.8	12.3' 12.3'	19°56.1 20°06.5	10.4' 10.3'	55.2' 55.2'
23	169°03.4	47.1	174°26.1	12.2'	20°16.8	10.3	55.2'
	SD = 16.1'	d = 0.7'		SF	0 = 15.2'		
	-						

	Twi	liaht	Ι. Ι		Twilight		
Lat.		•	Sunrise	Sunset		•	
	Naut.	Civil			Civil	Naut.	
N 72°	06:30	07:57	09:38	13:48	15:29	16:56	
N 70°	06:23	07:40	09:02	14:24	15:46	17:03	
68°	06:17	07:26	08:36	14:50	16:00	17:09	
66°	06:12	07:15	08:17	15:09	16:11	17:14	
64°	06:08	07:06	08:01	15:25	16:20	17:18	
62°	06:04	06:58	07:48	15:38	16:29	17:22	
60°	06:00	06:51	07:37	15:49	16:36	17:26	
N 58°	05:57	06:45	07:28	15:59	16:42	17:29	
56°	05:54	06:39	07:20	16:07	16:48	17:32	
54°	05:51	06:34	07:12	16:14	16:53	17:35	
52°	05:49	06:29	07:06	16:21	16:57	17:38	
50°	05:46	06:25	07:00	16:27	17:02	17:40	
45°	05:40	06:15	06:47	16:40	17:11	17:46	
N 40°	05:35	06:07	06:36	16:51	17:20	17:52	
35°	05:30	06:00	06:27	17:00	17:27	17:57	
30°	05:25	05:54	06:18	17:09	17:33	18:02	
20°	05:15	05:41	06:04	17:23	17:46	18:12	
N 10°	05:05	05:30	05:52	17:35	17:57	18:22	
0°	04:54	05:19	05:40	17:47	18:09	18:34	
<b>S</b> 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	
<b>S</b> 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	
<b>S</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	
N 70°	04:29	06:34	09:05	14:01	13:30	12:35
68°	04:22	06:16	08:24	14:11	13:49	13:17
66°	04:16	06:02	07:56	14:20	14:05	13:46
64°	04:10	05:50	07:35	14:27	14:18	14:08
62°	04:06	05:41	07:18	14:33	14:29	14:26
60°	04:02	05:32	07:04	14:38	14:39	14:41
N 58°	03:59	05:25	06:52	14:43	14:47	14:53
56°	03:56	05:19	06:42	14:47	14:55	15:04
54°	03:53	05:13	06:33	14:51	15:01	15:14
52°	03:50	05:08	06:25	14:54	15:07	15:23
50°	03:48	05:03	06:18	14:57	15:13	15:31
45°	03:43	04:53	06:03	15:04	15:24	15:47
<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
<b>S</b> 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.of	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	Vei	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	48°11.1	207°38.1	S11°44.7	262°41.5	N15°40.5	260°26.6	N13°47.5	39°02.0	N01°02.9			
1	63°13.6	222°40.8	43.9	277° 42.8	40.2	275°28.8	47.4	54°04.6	02.8	Alpheratz	357°33.0	29°14.6
2	$78^{\circ}16.0$	237°43.5	43.1	292°44.1	39.8	290°31.0	47.3	69°07.2	02.8	Ankaa	353°05.4	-42°09.6
3	93°18.5	252°46.2	• • 42.4	307°45.4	• • 39.5	305°33.3	• • 47.2	84°09.7	• • 02.7	Schedar Diphda	349° 28.9 348° 45.5	56°41.4 -17°50.3
4	108°20.9	267°48.9	41.6	322°46.6	39.2	320°35.5	47.1	99°12.3	02.7	Achernar	335° 18.5	-57°06.0
5	123°23.4	282°51.6	40.9	337°47.9	38.8	335°37.7	47.1	114° 14.9	02.6	Hamal	327°49.2	23°35.5
6	138°25.9	297°54.3	S11°40.1	352°49.2	N15°38.5	350°39.9	N13°47.0	129° 17.5	N01°02.6	Polaris	312°44.6	89°22.6
7 8	153°28.3	312°57.0	39.3	7°50.5	38.2	5° 42.1 20° 44.3	46.9	144°20.1 159°22.7	02.5	Acamar	$315^{\circ}10.2$	-40°11.7
9	168°30.8 183°33.3	327°59.7 343°02.3	38.6 •• 37.8	22°51.8 37°53.1	37.8 · · 37.5	20°44.3 35°46.6	46.8 •• 46.8	159 22.7 174° 25.3	02.5 · · 02.4	Menkar	$314^{\circ}04.3$	4°11.8
10	103 35.3 198°35.7	358° 05.0	37.0	52° 54.3	37.3	50°48.8	46.7	174 23.3 189° 27.9	02.4	Mirfak	308° 25.6	49°57.5
11	213°38.2	13° 07.7	36.3	67°55.6	36.8	65°51.0	46.6	204°30.5	02.4	Aldebaran	290°37.6	16°33.9
12	228°40.7	28°10.3	S11°35.6	82°56.9	N15°36.5	80°53.2	N13°46.5	219°33.0	N01°02.3	Rigel	281°02.1	-8°10.1
13	243°43.1	43°13.0	34.8	97°58.2	36.1	95°55.4	46.5	234°35.6	02.3	Capella Bellatrix	280° 19.3 278° 21.0	46°01.4 6°22.5
14	258°45.6	58° 15.7	34.1	112°59.5	35.8	110°57.6	46.4	249°38.2	02.2	Elnath	270° 21.0° 277° 59.7	28°37.8
15	273°48.1	73°18.3	• • 33.3	128°00.8	• • 35.5	125° 59.9	• • 46.3	264° 40.8	• • 02.2	Alnilam	275°35.9	-1°11.0
16	288°50.5	88°21.0	32.6	143°02.1	35.1	141°02.1	46.2	279°43.4	02.1	Betelgeuse	270°50.2	7°24.8
17	303°53.0 318°55.4	103°23.6	31.9	158°03.3 173°04.6	34.8	156°04.3	46.2	294°46.0	02.1	Canopus	263°51.4	-52°42.3
18 19	318°55.4 333°57.9	118°26.3 133°28.9	\$11°31.1 30.4	173°04.6 188°05.9	N15°34.5 34.1	171°06.5 186°08.7	N13°46.1 46.0	309°48.6 324°51.2	N01°02.0 02.0	Sirius	258° 24.7	-16°45.0
20	349°00.4	148°31.5	29.7	203° 07.2	33.8	201° 10.9	45.9	339°53.7	02.0	Adhara	255°04.5	-29°00.3
21	4°02.8	163°34.2	. 28.9	218°08.5	• • 33.4	216° 13.2	• • 45.9	354° 56.3	01.9	Procyon	244°49.1	5°09.4
22	19°05.3	178°36.8	28.2	233°09.8	33.1	231° 15.4	45.8	9°58.9	01.9	Pollux	243°15.3	27°57.6
23	34°07.8	193°39.4	27.5	248°11.1	32.8	246° 17.6	45.7	25°01.5	01.8	Avior	234°14.0	-59°35.4
		-								Suhail	222°45.2	-43°32.2 -69°49.3
ivier.p	ass. 20:44	ν2.1 α-0.	.8′ m-4.64	$\nu_{1.3}$ a-0	.3′ m0.77	ν2.2 α-0	.1′ m-2.05	$\nu$ 2.0° $a$ -0	.0′ m0.50	Miaplacidus Alphard	221°37.9 217°46.3	-69°49.3 -8°46.4
										Regulus	217 40.3 207°32.9	11°50.1
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.5	61°36.1
0	49°10.2	208°42.0	S11°26.7	263°12.4	N15°32.4	261°19.8	N13°45.6	40°04.1	N01°01.8	Denebola	182°23.6	14°25.3
1	64°12.7	223°44.7	26.0	278° 13.7	32.1	276°22.0	45.6	55°06.7	01.7	Gienah	175°42.3	-17°41.4
2 3	79°15.2 94°17.6	238° 47.3	25.3	293°14.9	31.8	291°24.3	45.5	70°09.3	01.7	Acrux	172°58.9	-63°14.7
3 4	94 17.6 109°20.1	253° 49.9 268° 52.5	· · 24.6 23.9	308° 16.2 323° 17.5	· · 31.4 31.1	306°26.5 321°28.7	•• 45.4 45.3	85° 11.8 100° 14.4	· · 01.6 01.6	Gacrux	171°50.4	-57°15.6
5	109 20.1 124°22.5	283°55.1	23.9	338° 18.8	30.8	336°30.9	45.3	115° 17.0	01.6	Alioth	166°12.1	55°48.7
6	139°25.0	298° 57.7	S11°22.4	353°20.1	N15°30.4	351°33.2	N13°45.2	130° 19.6	N01°01.5	Spica	158°21.0	-11°18.0
7	154°27.5	314°00.3	21.7	8°21.4	30.1	6°35.4	45.1	145°22.2	01.5	Alkaid	152°51.3	49°10.7
8	169°29.9	329°02.9	21.0	23°22.7	29.8	21°37.6	45.0	160°24.8	01.4	Hadar Menkent	148°34.5 147°56.2	-60°30.0 -36°30.0
9	184°32.4	344°05.4	20.3	38°24.0	• • 29.4	36°39.8	• • 45.0	175°27.3	• • 01.4	Arcturus	147 50.2 145°46.9	19°02.6
10	199°34.9	359°08.0	19.6	53°25.3	29.1	51°42.0	44.9	190°29.9	01.3	Rigil Kent.	139°38.9	-60°56.7
11	214°37.3	14° 10.6	18.9	68°26.6	28.8	66°44.3	44.8	205°32.5	01.3	Kochab	137°21.1	74°02.6
12	229°39.8	29°13.2	S11°18.2	83°27.9	N15°28.4	81°46.5	N13°44.7	220°35.1	N01°01.3	Zuben'ubi	136°54.7	-16°09.1
13	244°42.3	44°15.7	17.5	98°29.2	28.1	96°48.7	44.7	235° 37.7	01.2	Alphecca	126°02.8	26°37.5
14	259°44.7	59°18.3	16.8	113°30.5	27.7	111°50.9	44.6	250°40.3	01.2	Antares	$112^{\circ}14.4$	-26°29.5
15 16	274°47.2 289°49.7	74°20.9 89°23.4	· · 16.1 15.4	128°31.8 143°33.1	· · 27.4 27.1	126°53.2 141°55.4	• • 44.5 44.4	265° 42.9 280° 45.4	· · 01.1 01.1	Atria	$107^{\circ}07.7$	-69°04.6
17	304°52.1	104° 26.0	14.7	143 33.1 158° 34.4	26.7	156° 57.6	44.4	295° 48.0	01.1	Sabik	102°01.4	-15°45.4
18	319°54.6	119°28.5	S11°14.0	173°35.7	N15°26.4	171°59.8	N13°44.3	310°50.6	N01°01.0	Shaula	96°08.7	-37°07.4
19	334°57.0	134°31.1	13.3	188°37.0	26.1	187°02.1	44.2	325°53.2	01.0	Rasalhague	95°57.4	12°32.5
20	349°59.5	149°33.6	12.6	203°38.3	25.7	202°04.3	44.1	340°55.8	00.9	Eltanin Kaus Aust.	90°41.9 83°30.8	51°29.3 -34°22.3
21	5°02.0	164°36.1	• • 11.9	218°39.6	• • 25.4	$217^{\circ}06.5$	• • 44.1	355°58.4	• • 00.9	Vega	80°32.5	38°48.7
22	20°04.4	179°38.7	11.2	233°40.9	25.1	232°08.7	44.0	11°00.9	8.00	Nunki	75°46.1	-26°15.8
23	35°06.9	194°41.2	10.6	248°42.2	24.7	247°11.0	43.9	26°03.5	8.00	Altair	61°58.6	8°56.5
Mer.p	ass. 20:40	$\nu 2.6' \ d-0.$	.7′ m-4.68	$\nu$ 1.3′ d-0	.3′ m0.75	$\nu 2.2' \ d-0$	.1′ m-2.06	$\nu 2.6' \ d-0$	.0′ m0.50	Peacock	53°03.5	-56°39.1
										Deneb	49°24.9	45°22.9
\A/ <sub>*</sub> -1	CHA	CHA	Daa	GHA	Daa	CHA	Daa	GHA	Doo	Enif	33°37.3	10°00.1
Wed 0	<b>GHA</b> 50°09.4	<b>GHA</b> 209° 43.7	<b>Dec</b> \$11°09.9	263°43.5	<b>Dec</b> N15°24.4	<b>GHA</b> 262°13.2	<b>Dec</b> N13°43.8	41°06.1	<b>Dec</b> N01°00.7	Al Na'ir	27°31.0	-46°50.0
1	65°11.8	224°46.3	09.2	278° 44.8	24.1	277° 15.4	43.8	56°08.7	00.7	Fomalhaut Scheat	15° 12.7	-29°28.8 28°14.0
2	80°14.3	239° 48.8	08.5	293°46.1	23.7	292° 17.6	43.7	71°11.3	00.7	Markab	13°43.6 13°28.3	28 14.0 15°21.2
3	95°16.8	254°51.3	• • 07.8	308°47.4	• • 23.4	$307^{\circ}19.9$	• • 43.6	86°13.9	• • 00.6			13 41.4
4	$110^{\circ}19.2$	$269^{\circ}53.8$	07.2	323°48.7	23.1	$322^{\circ}22.1$	43.6	$101^{\circ}16.4$	00.6	Nov 09 Mon	SHA	Mer.pass
5	125°21.7	284°56.3	06.5	338°50.0	22.7	337°24.3	43.5	116° 19.0	00.5	Venus	159°27.0	10:08
6	140°24.2	299°58.8	S11°05.8	353°51.3	N15°22.4	352°26.6	N13°43.4	131°21.6	N01°00.5	Mars	214°30.4	06:29
7	155°26.6	315°01.3	05.2	8°52.6	22.1	7°28.8	43.3	146°24.2	00.4	Jupiter	212°15.5	06:37
8	170°29.1 185°31.5	330°03.8 345°06.3	04.5	23°53.9 38°55.2	21.7	22°31.0 37°33.2	43.3 • • 43.2	161°26.8 176°29.3	00.4	Saturn	350°50.9	21:20
9	200°34.0		03.8		• • 21.4	52° 35.5		176 29.3 191°31.9		Nov 10 Tue	SHA	Mer.pass
10 11	200 34.0 215°36.5	0°08.8 15°11.3	03.2 02.5	53°56.5 68°57.8	21.1 20.7	52 35.5 67°37.7	43.1 43.1	206°34.5	00.3 00.3	Venus	159°31.8	10:03
12	230°38.9	30° 13.7	S11°01.9	83°59.1	N15° 20.4	82°39.9	N13°43.0	200° 34.3 221° 37.1	N01°00.2	Mars	214°02.1	06:27
13	245°41.4	45° 16.2	01.2	99°00.4	20.1	97° 42.2	42.9	236°39.7	00.2	Jupiter	212°09.6	06:34
14	260°43.9	60°18.7	11°00.5	114°01.7	19.7	112°44.4	42.8	251°42.3	00.2	Saturn	350°53.9	21:16
15	275°46.3	75°21.1	$10^{\circ}59.9$	129°03.0	• • 19.4	$127^{\circ}46.6$	• • 42.8	266°44.8	•• 00.1	Nov 11 Wed	SHA	Mer.pass
16	290°48.8	90°23.6	59.2	144°04.3	19.1	142°48.9	42.7	281°47.4	00.1	Venus	159°34.4	09:59
17	305°51.3	105°26.1	58.6	159°05.7	18.7	157°51.1	42.6	296°50.0	0.00	Mars	213°34.1	06:25
18	320°53.7	120°28.5	\$10°58.0	174°07.0	N15°18.4	172°53.3	N13°42.6	311°52.6	N01°00.0	Jupiter	212°03.8	06:30
19	335°56.2	135°31.0	57.3	189°08.3	18.1	187°55.5	42.5	326°55.2	00°59.9	Saturn	350°56.7	21:12
20 21	350°58.7 6°01.1	150°33.4 165°35.9	56.7 •• 56.0	204°09.6 219°10.9	17.7 •• 17.4	202°57.8 218°00.0	42.4 • • 42.3	341°57.7 357°00.3	59.9 •• 59.9	Horizont	al parallax	
22	21°03.6	180°38.3	55.4	234°12.2	17.1	233°02.2	42.3	12°02.9	59.8		Venus:	0.5
23	36°06.0	195° 40.7	54.8	249°13.5	16.7	248° 04.5	42.2	27°05.5	59.8		Mars:	0.1
										_		
ivier.p	ass. 20:36	$\nu$ 2.5 $a$ -0.	.7′ m-4.71	$\nu$ 1.5 a-0	.3′ m0.74	$\nu 2.2^{\circ} a-0$	.1′ m-2.06	$\nu$ 2.0 $a$ -0	.0′ m0.51			

h	Sui	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	184°03.3	S16°47.8	188°57.3	12.2'	\$20°27.1	10.1'	55.2'
1 2	199°03.3 214°03.2	48.5 49.2	203°28.4 217°59.5	12.1' 12.1'	20° 37.2 20° 47.2	10.0' 9.9'	55.2' 55.1'
3	229°03.2	50.0	217 39.5 232°30.6	12.1	20° 57.1	9.8'	55.1'
4	244°03.1	50.7	$247^{\circ}01.6$	12.0'	$21^{\circ}06.9$	9.7'	55.1'
5	259°03.1	51.4	261°32.5	11.9'	21°16.6	9.6'	55.1'
6 7	274°03.0 289°03.0	\$16°52.1 52.8	276°03.4 290°34.3	11.9' 11.8'	\$21°26.3 21°35.8	9.5' 9.4'	55.1' 55.1'
8	304°02.9	53.5	305°05.1	11.8'	21°45.2	9.3'	55.0'
9	319°02.9	• • 54.2	319°35.8	11.7'	21°54.5	9.2'	55.0'
10 11	334°02.8 349°02.8	55.0 55.7	334°06.5 348°37.2	11.7' 11.6'	22°03.6 22°12.7	9.1' 9.0'	55.0' 55.0'
12	4°02.7	516°56.4	3°07.8	11.6'	S22°21.7	8.9'	55.0'
13	19°02.7	57.1	17°38.4	11.5'	$22^{\circ}30.5$	8.7'	55.0'
14	34°02.6	57.8	32°08.9	11.5'	22°39.3	8.6'	54.9'
15 16	49°02.5 64°02.5	· · 58.5 59.2	46°39.3 61°09.7	11.4' 11.4'	22°47.9 22°56.4	8.5' 8.4'	54.9' 54.9'
17	79°02.4	16°59.9	75°40.1	11.3'	23°04.9	8.3'	54.9'
18	94°02.4	<b>S</b> 17°00.6	90°10.4	11.3'	\$23°13.1	8.2'	54.9'
19 20	109°02.3 124°02.3	01.3 02.0	104°40.7 119°10.9	11.2' 11.2'	23°21.3 23°29.4	8.1' 8.0'	54.9' 54.8'
20	124 02.3 139°02.2	02.0	119 10.9 133°41.1	11.1'	23°29.4 23°37.3	8.0 7.8'	54.8'
22	154°02.1	03.5	148°11.2	11.1'	23°45.2	7.7'	54.8'
23	169°02.1	04.2	162°41.3	11.0'	23°52.9	7.6'	54.8'
	SD = 16.1'	d = 0.7'		SE	0 = 15.0'		
Tue	GHA	Dec	GHA	ν	Dec	d	НР
0	184°02.0	\$17°04.9	177°11.4	11.0'	\$24°00.5	<i>a</i> 7.5'	54.8'
1	199°02.0	05.6	191°41.4	11.0'	$24^{\circ}08.0$	7.4'	54.8'
2	214°01.9	06.3	206°11.3	10.9'	24° 15.3	7.2'	54.8'
3 4	229°01.8 244°01.8	· · 07.0 07.7	220°41.2 235°11.1	10.9' 10.8'	24° 22.6 24° 29.7	7.1' 7.0'	54.7' 54.7'
5	259°01.7	08.4	249°40.9	10.8'	24°36.7	6.9'	54.7'
6	274°01.7	<b>S</b> 17°09.1	264°10.7	10.7'	S24°43.6	6.8'	54.7'
7 8	289°01.6 304°01.5	09.8 10.5	278°40.4 293°10.1	10.7' 10.7'	24°50.3 24°57.0	6.6' 6.5'	54.7' 54.7'
9	319°01.5	. 11.2	293 10.1 307°39.8	10.7	24 57.0 25°03.5	6.4	54. <i>1</i> ′
10	334°01.4	11.9	322°09.4	10.6'	25°09.8	6.3'	54.6'
11	349°01.4	12.6	336°39.0	10.5'	25°16.1	6.1'	54.6'
12 13	4°01.3 19°01.2	\$17°13.3 14.0	351°08.6 5°38.1	10.5' 10.5'	\$25°22.2 25°28.2	6.0' 5.9'	54.6' 54.6'
14	34°01.2	14.7	20°07.5	10.4	25°34.1	5.8'	54.6'
15	49°01.1	• • 15.4	34°37.0	10.4'	25°39.9	5.6'	54.6'
16 17	64°01.0 79°01.0	16.1 16.8	49°06.4 63°35.8	10.4' 10.3'	25° 45.5 25° 51.0	5.5' 5.4'	54.5' 54.5'
18	94°00.9	\$17°17.5	78°05.1	10.3	\$25°56.4	5.2'	54.5
19	109°00.8	18.2	92°34.4	10.3'	$26^{\circ}01.6$	5.1'	54.5'
20	124°00.8	18.9	107°03.7		26°06.7 26°11.7	0.0	54.5'
21 22	139°00.7 154°00.6	· · 19.6 20.3	121°32.9 136°02.1	10.2' 10.2'	26° 11.7 26° 16.5	4.9' 4.7'	54.5' 54.5'
23	169°00.6	20.9	150°31.3	10.2'	26°21.3	4.6'	54.5'
	SD = 16.1'	d = 0.7'		SE	0 = 14.9'		
Wed	GHA	Dec	GHA	ν	Dec	d	НР
0	184°00.5	S17°21.6	165°00.5	10.1'	\$26°25.9	4.5'	54.4'
1	199°00.4	22.3	179°29.6	10.1'	26°30.3	4.3'	54.4
2 3	214°00.4 229°00.3	23.0	193°58.7 208°27.8	10.1' 10.1'	26° 34.6 26° 38.8	4.2' 4.1'	54.4' 54.4'
3 4	244°00.2	24.4	208 27.8 222°56.9	10.1	26° 42.9	4.1 3.9'	54.4' 54.4'
5	259°00.2	25.1	237°25.9	10.0'	26°46.8	3.8'	54.4'
6	274°00.1 289°00.0	\$17°25.8 26.5	251°54.9 266°23.9	10.0'	\$26° 50.6 26° 54.3	3.7'	54.4' 54.4'
7 8	289°00.0 304°00.0	26.5 27.2	266°23.9 280°52.9	10.0' 10.0'	26°54.3 26°57.8	3.5' 3.4'	54.4
9	318°59.9	• • 27.9	295°21.9	9.9'	27°01.2	3.3'	54.3'
10	333°59.8	28.5	309°50.8	9.9'	27°04.4	3.1'	54.3'
11 12	348°59.7 3°59.7	29.2 \$17°29.9	324°19.7 338°48.6	9.9' 9.9'	27°07.6 <b>S</b> 27°10.6	3.0' 2.9'	54.3' 54.3'
13	18°59.6	30.6	353° 17.5	9.9'	27° 13.4	2.7'	54.3
14	33°59.5	31.3	7°46.4	9.9'	27° 16.1	2.6'	54.3'
15	48°59.5	• • 32.0	22°15.3	9.9'	27°18.7	2.4'	54.3'
16 17	63°59.4 78°59.3	32.7 33.3	36°44.2 51°13.0	9.9' 9.8'	27°21.2 27°23.5	2.3' 2.2'	54.3' 54.2'
18	93°59.2	\$17°34.0	65°41.9	9.8'	\$27°25.7	2.0'	54.2'
19	108°59.2	34.7	80°10.7	9.8'	27°27.7	1.9'	54.2'
20 21	123°59.1 138°59.0	35.4 •• 36.1	94°39.5 109°08.4	9.8' 9.8'	27° 29.6 27° 31.4	1.8' 1.6'	54.2' 54.2'
22	138°59.0 153°58.9	36.8	109°08.4 123°37.2	9.8° 9.8°	27°31.4 27°33.0	1.5	54.2' 54.2'
23	168°58.9	37.4	138°06.0	9.8'	27°34.5	1.4'	54.2'
	SD = 16.1'	d = 0.7'		SE	0 = 14.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut
N 72°	06:41	08:11	10:02	13:24	15:16	16:45
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> $10^{\circ}$	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
$30^{\circ}$	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
1 -4		Moonris	se .		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	

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Mer.Pass.		
,	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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Thu -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	51°08.5	210°43.2	S10°54.1	264°14.8	N15°16.4	263°06.7	N13°42.1	42°08.1	N00°59.7		эпа	Dec
1	66°11.0	210 45.2 225°45.6	53.5	279°16.1	16.1	278°08.9	42.1	57°10.6	59.7	Alpheratz	357°33.0	29°14.6
2	81°13.4	240°48.0	53.5 52.9	279 10.1 294°17.5	15.7	276 06.9 293°11.2	42.1	72°13.2	59.7 59.7	Ankaa	353°05.4	-42°09.6
3			52.2					87°15.8		Schedar	349°28.9	56°41.4
3 4	96°15.9	255°50.4		309°18.8	. 15.4	308°13.4	• • 41.9		• • 59.6	Diphda	348°45.5	-17°50.3
5	111°18.4	270°52.9	51.6 51.0	324°20.1	15.1	323°15.6 338°17.9	41.8	102°18.4	59.6	Achernar	$335^{\circ}18.5$	-57°06.1
6	126°20.8 141°23.3	285°55.3 300°57.7	\$1.0 \$10°50.4	339°21.4 354°22.7	14.8 N15°14.4	353°20.1	41.8 N13°41.7	117°20.9 132°23.5	59.5 N00°59.5	Hamal	327°49.2	23°35.5
7	156°25.8	316°00.1	49.7	9°24.0	14.1	8°22.3	41.6	147°26.1	59.5	Polaris	$312^{\circ}44.1$	89°22.7
8	171°28.2	331°02.5	49.1	24°25.3	13.8	23°24.6	41.6	162°28.7	59.4	Acamar	315°10.2	-40°11.7
9	186°30.7	346°04.9	• • 48.5	39°26.7	• • 13.4	38°26.8	• • 41.5	177°31.3	• • 59.4	Menkar	314°04.2	4°11.8
10	201°33.2	1°07.3	47.9	54°28.0	13.1	53°29.1	41.4	192°33.8	59.3	Mirfak	308°25.6	49°57.5
11	216°35.6	16°09.7	47.3	69°29.3	12.8	68°31.3	41.4	207°36.4	59.3	Aldebaran	290°37.6	16°33.9
12	231°38.1	31°12.1	S10°46.7	84°30.6	N15°12.4	83°33.5	N13°41.3	222°39.0	N00°59.3	Rigel	281°02.1	-8°10.1
13	246°40.5	46°14.4	46.1	99°31.9	12.1	98°35.8	41.2	237°41.6	59.2	Capella	280°19.2	46°01.4
14	261°43.0	61°16.8	45.5	114°33.3	11.8	113°38.0	41.1	252°44.2	59.2	Bellatrix	278°21.0	6°22.5
15	276°45.5	$76^{\circ}19.2$	• • 44.8	129°34.6	• • 11.4	128°40.2	• • 41.1	267°46.7	• • 59.1	Elnath	277°59.6	28°37.8
16	291°47.9	91°21.6	44.2	144°35.9	11.1	143°42.5	41.0	282°49.3	59.1	Alnilam	275°35.9	-1°11.0 7°24.8
17	306°50.4	106°23.9	43.6	159°37.2	10.8	158°44.7	40.9	297°51.9	59.1	Betelgeuse	270°50.2	
18	321°52.9	121°26.3	S10°43.0	174°38.5	N15°10.4	173°46.9	N13°40.9	312°54.5	N00°59.0	Canopus Sirius	263°51.3 258°24.7	-52°42.3 -16°45.0
19	336°55.3	136°28.6	42.5	189°39.9	10.1	188°49.2	40.8	327°57.0	59.0	Adhara	255°04.4	-10 45.0 -29°00.3
20	351°57.8	151°31.0	41.9	204°41.2	09.8	203°51.4	40.7	342°59.6	58.9	Procyon	244°49.1	5°09.4
21	7°00.3	166°33.3	• • 41.3	219°42.5	• • 09.5	218°53.7	• • 40.7	358°02.2	• • 58.9	Pollux	243°15.3	27°57.6
22	22°02.7	181°35.7	40.7	234°43.8	09.1	233°55.9	40.6	13°04.8	58.9	Avior	234°13.9	-59°35.4
23	37°05.2	196°38.0	40.1	249°45.1	8.80	248°58.1	40.5	28°07.3	58.8	Suhail	222°45.2	-43°32.2
Mern	ass. 20:32	v2 4' d-0	.6′ m-4.74	v1 3' d-0	.3′ m0.73	v2 2' d-0	.1′ m-2.07	v2 6' d-0	.0′ m0.51	Miaplacidus	221°37.9	-69°49.3
- Wici.p	20.52	VZ.+ U U	.0 111 7.77	ν1.5 d 0	.5 1110.75	VZ.Z U 0		ν 2.0 · u · 0	.0 1110.31	Alphard	217°46.3	-8°46.4
										Regulus	207°32.9	11°50.1
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.5	61°36.1
0	52°07.6	211°40.4	S10°39.5	264°46.5	N15°08.5	264°00.4	N13°40.5	43°09.9	N00°58.8	Denebola	182°23.6	14°25.3
1	67°10.1	226°42.7	38.9	279°47.8	08.1	279°02.6	40.4	58°12.5	58.7	Gienah	175°42.3	-17°41.4
2	82°12.6	241°45.0	38.3	294°49.1	07.8	294°04.9	40.3	73°15.1	58.7	Acrux	172°58.9	-63°14.7
3	97°15.0	256°47.4	• • 37.8	309°50.4	• • 07.5	309°07.1	• • 40.2	88°17.7	• • 58.7	Gacrux	171°50.4	-57° 15.6
4	112°17.5	271°49.7	37.2	324°51.8	07.1	324°09.3	40.2	103°20.2	58.6	Alioth	$166^{\circ}12.1$	55°48.7
5	127°20.0	286°52.0	36.6	339°53.1	06.8	339°11.6	40.1	118°22.8	58.6	Spica	$158^{\circ}21.0$	-11°18.0
6	142°22.4	301°54.3	\$10°36.0	354°54.4	N15°06.5	354°13.8	N13°40.0	133°25.4	N00°58.5	Alkaid	152°51.3	49° 10.6
7	157°24.9	316°56.7	35.5	9°55.7	06.1	9°16.1	40.0	148°28.0	58.5	Hadar	148°34.5	-60°30.0
8 9	172°27.4 187°29.8	331°59.0 347°01.3	34.9	24°57.1 39°58.4	05.8 •• 05.5	24°18.3 39°20.6	39.9 • • 39.8	163°30.5 178°33.1	58.5 •• 58.4	Menkent	147°56.2	-36°30.0
10	202°32.3	2°03.6	· · 34.3 33.7	59 56.4 54°59.7	05.2	59°20.0 54°22.8	39.8	176 33.1 193°35.7	58.4	Arcturus	145°46.9	19°02.5
11	202 32.3 217°34.8	2 03.0 17°05.9	33.2	70°01.1	04.8	69°25.0	39.6 39.7	208°38.3	58.3	Rigil Kent.	139°38.9	-60°56.7
12	232°37.2	32°08.2	\$10°32.6	85°02.4	N15°04.5	84°27.3	N13°39.6	200° 30.3 223° 40.8	N00°58.3	Kochab	137°21.1	74°02.6
13	247°39.7	47°10.4	32.1	100°03.7	04.2	99°29.5	39.6	238°43.4	58.3	Zuben'ubi	136°54.7	-16°09.1
14	262°42.1	62°12.7	31.5	115°05.0	03.8	114°31.8	39.5	253°46.0	58.2	Alphecca	126°02.8	26°37.5
15	277°44.6	77°15.0	30.9	130°06.4	• • 03.5	129°34.0	• • 39.4	268°48.6	• • 58.2	Antares	112°14.3	-26°29.4
16	292°47.1	92°17.3	30.4	145°07.7	03.2	144°36.3	39.4	283°51.1	58.2	Atria	107°07.7	-69°04.6
17	307°49.5	107°19.6	29.8	160°09.0	02.9	159°38.5	39.3	298°53.7	58.1	Sabik	102°01.4	-15°45.4
18	322°52.0	122°21.8	S10°29.3	175°10.4	N15°02.5	174°40.7	N13°39.2	313°56.3	N00°58.1	Shaula	96°08.7	-37°07.4
19	337°54.5	$137^{\circ}24.1$	28.7	190°11.7	02.2	189°43.0	39.2	328°58.8	58.0	Rasalhague	95°57.4	12°32.5
20	352°56.9	152°26.4	28.2	205°13.0	01.9	204°45.2	39.1	344°01.4	58.0	Eltanin	90°41.9 83°30.8	51°29.3 -34°22.3
21	7°59.4	167°28.6	• • 27.7	220°14.4	• • 01.5	219°47.5	• • 39.0	359°04.0	• • 58.0	Kaus Aust. Vega	80°32.5	-34 22.3 38°48.7
22	23°01.9	182°30.9	27.1	235°15.7	01.2	234°49.7	39.0	14°06.6	57.9	Nunki	75°46.1	-26° 15.8
23	38°04.3	197°33.1	26.6	250°17.0	00.9	249°52.0	38.9	29°09.1	57.9	Altair	61°58.6	8°56.5
Mern	ass. 20:28	1/2 3' d-0	.6′ m-4.77	11 3' d-0	.3′ m0.72	1/2 2 <sup>1</sup> d-0	.1′ m-2.07	u2 6′ d−0	.0′ m0.52	Peacock	53°03.5	-56°39.1
- IVIEL.P	435. 20.20	ν2.5 u-0	.0 111-4.77	ν1.5 u-0	.5 1110.72	ν2.2 u-0	.1 111-2.07	ν2.0 u-0	.0 1110.32	Deneb	49°24.9	45°22.9
										Enif	33°37.3	10°00.1
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.0	-46°50.0
0	53°06.8	212°35.4	<b>S</b> 10°26.0	265°18.4	N15°00.6	264°54.2	N13°38.8	44°11.7	N00°57.9	Fomalhaut	15°12.7	-29°28.8
1	68°09.3	227°37.6	25.5	280°19.7	15°00.2	279°56.5	38.8	59°14.3	57.8	Scheat	13°43.6	28°14.0
2	83°11.7	242°39.9	25.0	295°21.0	14°59.9	294°58.7	38.7	74°16.9	57.8	Markab	13°28.3	15°21.2
3	98°14.2	257°42.1	• • 24.4	310°22.4	• • 59.6	310°01.0	• • 38.6	89°19.4	•• 57.7	Nov. 10 T	SHA	Marine
4	113°16.6	272°44.4	23.9	325°23.7	59.2	325°03.2	38.6	104°22.0	57.7	Nov 12 Thu		Mer.pass
5	128°19.1	287°46.6	23.4	340°25.1	58.9	340°05.4	38.5	119°24.6	57.7	Venus Mars	159°34.7 213°06.3	09:56 06:22
6	143°21.6	302°48.8	\$10°22.8	355°26.4	N14°58.6	355°07.7	N13°38.4	134°27.1	N00°57.6	Jupiter		06:22
7 8	158°24.0 173°26.5	317°51.0 332°53.2	22.3	10°27.7	58.3 57.9	10°09.9 25°12.2	38.4 38.3	149°29.7 164°32.3	57.6	Saturn	350°59.5	21:08
9	173° 26.5 188° 29.0	332°53.2 347°55.5	21.8 · · 21.3	25°29.1 40°30.4	57.9 •• 57.6	25°12.2 40°14.4	38.3 •• 38.2	164°32.3 179°34.9	57.6 •• 57.5	Jatuill	JJU J9.J	21.00
10	203°31.4	2°57.7	20.8	55°31.7	57.3	40 14.4 55°16.7	38.2	179 34.9 194°37.4	57.5	Nov 13 Fri	SHA	Mer.pass
11	203 31.4 218°33.9	2 57.7 17°59.9	20.8	70°33.1	56.9	70°18.9	38.1	209°40.0	57.5 57.4		159°32.7	09:52
12	233°36.4	33°02.1	\$10°19.7	85°34.4	N14°56.6	85°21.2	N13°38.1	224°42.6	N00°57.4	Mars		06:20
13	248°38.8	48°04.3	19.2	100°35.8	56.3	100°23.4	38.0	239°45.1	57.4		211°52.7	06:23
14	263°41.3	63°06.5	18.7	115°37.1	56.0	115°25.7	37.9	254°47.7	57.3	Saturn	351°02.3	21:04
15	278°43.8	78°08.7	. 18.2	130°38.4	• • 55.6	130°27.9	37.9	269°50.3	57.3	Nov 14 Sat	SHA	Mer.pass
16	293°46.2	93°10.9	17.7	145°39.8	55.3	145°30.2	37.8	284°52.9	57.3		159°28.6	09:48
17	308°48.7	108°13.1	17.2	160°41.1	55.0	160°32.4	37.7	299°55.4	57.2		212°11.6	06:18
18	323°51.1	123°15.2	S10°16.7	175°42.5	N14°54.7	175°34.7	N13°37.7	314°58.0	N00°57.2		211°47.4	06:19
19	338°53.6	138°17.4	16.2	190°43.8	54.3	190°36.9	37.6	330°00.6	57.1		351°04.9	21:00
20	$353^{\circ}56.1$	153°19.6	15.7	205°45.2	54.0	205°39.2	37.5	345°03.1	57.1			
21	8°58.5	168°21.8	• • 15.2	220°46.5	• • 53.7	220°41.4	• • 37.5	0°05.7	•• 57.1	Horizont	al parallax	
22	24°01.0	183°23.9	14.7	235°47.9	53.4	235°43.7	37.4	15°08.3	57.0		Venus:	0.4
23	39°03.5	198°26.1	14.2	250°49.2	53.0	250°46.0	37.3	30°10.9	57.0		Mars:	0.1
Mern	ass. 20:24	ν2.2' d-Ω	.5′ m-4.80	ν1.3′ d-0	.3′ m0.71	ν2.2' d-Ω	.1′ m-2.08	ν2.6′ d-Ω	.0′ m0.52			

h	Sui	า			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	183°58.8	\$17°38.1	152°34.8	9.8'	\$27°35.9	1.2'	54.2'
1	198°58.7	38.8	167°03.7	9.8'	$27^{\circ}37.1$	1.1'	54.2'
2	213°58.6	39.5	181°32.5	9.8'	27°38.2	1.0'	54.2'
3	228°58.6 243°58.5	• • 40.2	196°01.3	9.8'	27°39.1	0.8'	54.2'
4 5	243°58.5 258°58.4	40.8 41.5	210°30.1 224°59.0	9.8' 9.8'	27°40.0 27°40.6	0.7' 0.5'	54.1' 54.1'
6	273°58.3	\$17°42.2	239°27.8	9.0	S27°41.2	0.4	54.1
7	288°58.2	42.9	253°56.7	9.9'	27°41.6	0.3	54.1
8	303°58.2	43.5	268°25.5	9.9'	27°41.9	0.1'	54.1'
9	318°58.1	• • 44.2	282°54.4	9.9'	27°42.0	0.0'	54.1'
10	333°58.0	44.9	297°23.3	9.9'	27°42.0	-0.1'	54.1'
11	348°57.9 3°57.8	45.6 \$17°46.2	311°52.2 326°21.1	9.9' 9.9'	27°41.9 \$27°41.6	-0.3' -0.4'	54.1' 54.1'
12 13	3 57.8 18°57.8	46.9	320 21.1 340°50.0	9.9 9.9'	27°41.2	-0.4 -0.5'	54.1'
14	33°57.7	47.6	355°18.9	10.0'	27°40.7	-0.7	54.1'
15	48°57.6	• • 48.3	9°47.9	10.0'	27°40.0	-0.8'	54.1'
16	63°57.5	48.9	24°16.9	10.0'	27°39.2	-0.9'	54.1'
17	78°57.4	49.6	38°45.9	10.0'	27°38.3	-1.1'	54.1'
18	93°57.4	\$17°50.3	53°14.9	10.0'	\$27°37.2	-1.2'	54.1'
19 20	108°57.3 123°57.2	50.9 51.6	67°43.9 82°13.0	10.1' 10.1'	27°36.0 27°34.6	-1.3' -1.5'	54.0' 54.0'
21	123 57.2 138°57.1	52.3	82 13.0 96°42.0	10.1	27°33.2	-1.5 -1.6'	54.0'
22	153°57.0	52.9	111°11.1	10.1	27°31.6	-1.7'	54.0'
23	168°56.9	53.6	125°40.3	10.2'	27° 29.8	-1.9'	54.0'
	SD = 16.1'	d = 0.7'		SE	0 = 14.8'		
_							
Fri	<b>GHA</b> 183°56.9	Dec \$17°54.3	<b>GHA</b> 140°09.4	u 10.2'	Dec \$27° 27.9	d -2.0'	<b>HP</b> 54.0'
0 1	183 56.9 198°56.8	54.9	140 09.4 154°38.6	10.2	27°25.9	-2.0 -2.1'	54.0'
2	213°56.7	55.6	169°07.8	10.2	27°23.8	-2.3'	54.0'
3	228°56.6	• • 56.3	183°37.0	10.3'	$27^{\circ}21.5$	-2.4'	54.0'
4	243°56.5	56.9	198°06.3	10.3'	$27^{\circ}19.1$	-2.5'	54.0'
5	258°56.4	57.6	212°35.6	10.3'	27°16.6	-2.7'	54.0'
6	273°56.3 288°56.2	\$17°58.3 58.9	227°04.9 241°34.3	10.4' 10.4'	\$27°13.9 27°11.2	-2.8' -2.9'	54.0' 54.0'
7 8	288 50.2 303°56.2	58.9 17°59.6	241 34.3 256°03.7	10.4	27 11.2 27°08.2	-2.9 -3.0'	54.0'
9	318°56.1	18°00.3	270°33.2	10.5'	27°05.2	-3.2'	54.0'
10	333°56.0	00.9	285°02.6	10.5'	27°02.0	-3.3'	54.0'
11	348°55.9	01.6	299°32.1	10.5'	26°58.7	-3.4'	54.0'
12	3°55.8	\$18°02.2	314°01.7	10.6	\$26°55.3	-3.6'	54.0'
13 14	18°55.7 33°55.6	02.9 03.6	328°31.3 343°00.9	10.6' 10.7'	26°51.7 26°48.1	-3.7' -3.8'	54.0' 54.0'
15	48°55.5	• • 04.2	357°30.6	10.7	26°44.2	-3.0' -3.9'	54.0'
16	63°55.4	04.9	12°00.3	10.7'	26°40.3	-4.1'	54.0'
17	78°55.4	05.5	26°30.0	10.8'	26°36.3	-4.2'	54.0'
18	93°55.3	S18°06.2	40°59.8	10.8'	S26°32.1	-4.3'	54.0'
19	108°55.2	06.9	55°29.7	10.9'	26°27.8	-4.4'	54.0'
20	123°55.1 138°55.0	07.5 •• 08.2	69°59.5 84°29.5	10.9' 11.0'	26°23.3 26°18.8	-4.6' -4.7'	54.0' 54.0'
21 22	150 55.0 153°54.9	· · 08.2 08.8	98°59.4	11.0'	26°14.1	-4.1' -4.8'	54.0'
23	168°54.8	09.5	113°29.4	11.1'	26°09.3	-4.9'	54.0'
	SD = 16.2'	d = 0.7'		SE	0 = 14.7'		
Sat	GHA	Dec	GHA		Dec	d	НР
0 0	183°54.7	\$18°10.1	127°59.5	u 11.1'	\$26°04.4	-5.0'	54.0'
1	198°54.6	10.8	142°29.6	11.2'	25°59.4	-5.2	54.0'
2	213°54.5	11.4	156°59.8	11.2'	25°54.2	-5.3'	54.0'
3	228°54.4	•• 12.1	171°30.0	11.3'	25°48.9	-5.4'	54.0'
4	243°54.3	12.7	186°00.2	11.3'	25°43.5	-5.5'	54.0'
5 6	258°54.2 273°54.1	13.4 \$18°14.0	200°30.5 215°00.9	11.4' 11.4'	25°38.0 \$25°32.4	-5.6' -5.7'	54.0' 54.0'
7	273 54.1 288°54.0	14.7	215 00.9 229°31.3	11.5'	25° 26.6	-5.1' -5.9'	54.0'
8	303°53.9	15.4	244°01.7	11.5'	25°20.8	-6.0'	54.0'
9	318°53.8	• • 16.0	258°32.2	11.6'	25°14.8	-6.1'	54.0'
10	333°53.8	16.6	273°02.8	11.6'	25°08.7	-6.2'	54.0'
11	348°53.7	17.3	287°33.4	11.7'	25°02.5	-6.3'	54.0'
12 13	3°53.6 18°53.5	\$18°17.9 18.6	302°04.1 316°34.8	11.7' 11.8'	\$24°56.2 24°49.7	-6.4' -6.5'	54.0' 54.0'
14	33°53.4	19.2	310 34.6 331°05.5	11.8'	24 49.7 24°43.2	-6.7'	54.0'
15	48°53.3	• • 19.9	345°36.3	11.9'	24°36.5	-6.8'	54.0'
16	63°53.2	20.5	0°07.2	11.9'	24° 29.7	-6.9'	54.0'
17	78°53.1	21.2	14°38.1	12.0'	24°22.8	-7.0'	54.1'
18 19	93°53.0 108°52.9	\$18°21.8 22.5	29°09.1 43°40.1	12.0' 12.1'	\$24°15.9 24°08.8	-7.1' -7.2'	54.1' 54.1'
20	108 52.9 123°52.8	22.5	43 40.1 58°11.2	12.1'	24 08.8 24°01.5	-7.2 -7.3'	54.1'
21	138°52.7	23.7	72°42.3	12.2'	23°54.2	-7.4'	54.1
22	153°52.6	24.4	87°13.5	12.2'	23°46.8	-7.5'	54.1'
23	168°52.5	25.0	101°44.8	12.3'	23°39.3	-7.6'	54.1'
	SD = 16.2'	d = 0.7'		SE	0 = 14.7'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut. Civil 06:52 08:25		Junise	Juliset	Civil	Naut.
N 72°	06:52	08:25	10:33	12:54	15:03	16:35
<b>N</b> 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
<b>N</b> 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°	5° 05:48 06:2		06:55	16:33	17:05	17:40
<b>N</b> 40°			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
<b>N</b> 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.		Moonris	e		Moonset	
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
<b>N</b> 70°						
68°						
66°						
64°			14:40			17:28
62°	13:46	13:58	13:57	14:53	16:28	18:11
60°	12:39	13:13	13:28	16:00	17:12	18:39
N 58°	12:05	12:43	13:06	16:35	17:42	19:01
56°	11:39	12:21	12:48	17:00	18:04	19:19
54°	11:19	12:02	12:32	17:20	18:22	19:34
52°	11:02	11:47	12:19	17:37	18:38	19:47
50°	10:48	11:33	12:07	17:52	18:51	19:58
45°	10:18	11:05	11:43	18:21	19:19	20:22
<b>N</b> 40°	09:55	10:43	11:23	18:44	19:40	20:40
35°	09:36	10:25	11:07	19:03	19:58	20:56
30°	09:20	10:09	10:53	19:19	20:13	21:10
20°	08:53	09:43	10:28	19:46	20:39	21:33
N 10°	08:29	09:20	10:07	20:10	21:02	21:53
0°	08:07	08:58	09:48	20:32	21:22	22:11
<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°	04:12	05:09	06:23		00:24	00:54
<b>S</b> 60°	03:38	04:37	05:58	00:08	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.)

h	Aries	Venus		Mars		Jupiter		Saturn		Stars		
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	54°05.9	213°28.2	S10°13.7	265°50.5	N14°52.7	265°48.2	N13°37.3	45° 13.4	N00°57.0			
1	69°08.4	228°30.4	13.2	280°51.9	52.4	280° 50.5	37.2	60°16.0	56.9	Alpheratz	357°33.0	29°14.6
2	84°10.9	243°32.6	12.7	295°53.2	52.0	295°52.7	37.2	75° 18.6	56.9	Ankaa	353°05.4	-42°09.6
3	99°13.3	258°34.7	12.3	310°54.6	51.7	310°55.0	• • 37.1	90°21.1	56.9	Schedar	349°28.9	56°41.4
4	114°15.8	273°36.8	11.8	325°55.9	51.4	325° 57.2	37.0	105°23.7	56.8	Diphda	348° 45.5	-17°50.3
5	129°18.3	288°39.0	11.3	340°57.3	51.1	340°59.5	37.0	120°26.3	56.8	Achernar	335°18.5	-57°06.1
6	144°20.7	303°41.1	\$10°10.8	355°58.6	N14°50.7	356°01.7	N13°36.9	135°28.8	N00° 56.8	Hamal	327°49.1	23°35.5
7	159°23.2	318°43.3	10.3	11°00.0	50.4	11°04.0	36.8	150°31.4	56.7	Polaris	312°43.9	89°22.7
8	174°25.6	333°45.4	09.9	26°01.3	50.1	26°06.2	36.8	165°34.0	56.7	Acamar	315°10.2	-40°11.7
9	189°28.1	348° 47.5	• • 09.4	41°02.7	• • 49.8	41°08.5	• • 36.7	180°36.5	• • 56.6	Menkar	314°04.2	4°11.8
10	204°30.6	3°49.6	08.9	56°04.0	49.4	56° 10.7	36.6	195°39.1	56.6	Mirfak	308°25.5	49°57.5
11	219°33.0	18°51.8	08.5	71°05.4	49.1	71°13.0	36.6	210°41.7	56.6	Aldebaran	290°37.5 281°02.1	16°33.9
12	234°35.5	33°53.9	S10°08.0	86°06.7	N14°48.8	86° 15.3	N13°36.5	225°44.2	N00° 56.5	Rigel Capella	281 02.1 280°19.2	-8°10.1 46°01.4
13	249°38.0	48°56.0	07.5	101°08.1	48.5	$101^{\circ}17.5$	36.5	240°46.8	56.5	Bellatrix	278° 21.0	6°22.5
14	264°40.4	63°58.1	07.1	116°09.4	48.1	$116^{\circ}19.8$	36.4	255°49.4	56.5	Elnath	277° 59.6	28°37.8
15	279°42.9	79°00.2	• • 06.6	131°10.8	• • 47.8	131°22.0	• • 36.3	270°51.9	• • 56.4	Alnilam	275°35.9	-1°11.0
16	294°45.4	94°02.3	06.2	146° 12.2	47.5	146°24.3	36.3	285° 54.5	56.4	Betelgeuse	270°50.2	7°24.8
17	309°47.8	109°04.4	05.7	161°13.5	47.2	161°26.5	36.2	300°57.1	56.4	Canopus	263°51.3	-52°42.3
18	324°50.3	124°06.5	\$10°05.3	176°14.9	N14°46.8	176°28.8	N13°36.1	315°59.7	N00°56.3	Sirius	258°24.7	-16°45.0
19	339°52.7	139°08.6	04.8	191°16.2	46.5	191°31.1	36.1	331°02.2	56.3	Adhara	255°04.4	-29°00.3
20	354°55.2	154° 10.7	04.3	206°17.6	46.2	206°33.3	36.0	346°04.8	56.3	Procyon	244°49.1	5°09.4
21	9°57.7	169°12.8	•• 03.9	221°18.9	• • 45.9	221°35.6	• • 36.0	1°07.4	56.2	Pollux	243°15.3	27°57.6
22	25°00.1	184° 14.8	03.5	236°20.3	45.5 45.2	236° 37.8	35.9	16°09.9	56.2	Avior	234°13.9	-59°35.4
23	40°02.6	199°16.9	03.0	251°21.6	45.2	251°40.1	35.8	31°12.5	56.2	Suhail	222°45.1	-43°32.2
Mer.p	pass. 20:20	$\nu$ 2.2′ d-0	.5′ m-4.82	$\nu$ 1.3 $^{\prime}$ d-0	0.3′ m0.69	$\nu 2.3' \ d-0$	.1′ m-2.09	$\nu$ 2.6′ d-0	.0′ m0.53	Miaplacidus	221°37.8	-69°49.3
		-				-		-		Alphard	$217^{\circ}46.2$	-8°46.4
Man	CHV	CUA	Doc	CHA	Doc	CHV	Doc	GHA	Doc	Regulus	$207^{\circ}32.9$	$11^{\circ}50.1$
Mon	<b>GHA</b> 55°05.1	<b>GHA</b> 214° 19.0	Dec \$10°02.6	<b>GHA</b> 266°23.0	<b>Dec</b> N14 <sup>o</sup> 44.9	<b>GHA</b> 266° 42.4	Dec		<b>Dec</b> N00° 56.1	Dubhe	193°39.4	61°36.1
0 1	55°05.1 70°07.5	214° 19.0 229° 21.0	\$10°02.6 02.1	266°23.0 281°24.4	N14°44.9 44.6	266° 42.4 281° 44.6	N13°35.8 35.7	46° 15.0 61° 17.6	56.1	Denebola	182°23.6	14°25.3
2	70 07.5 85°10.0	244°23.1	02.1	281 24.4 296°25.7	44.0 44.2	281 44.6 296°46.9	35.7 35.7	76°20.2	56.1 56.1	Gienah	175°42.2	-17°41.4
3	100°12.5	259°25.2	•• 01.7	311°27.1	. 43.9	311°49.1	• • 35.6	91°22.7	56.0	Acrux	172°58.9	-63°14.7
4	115°14.9	274°27.2	01.3	326°28.4	43.6	326°51.4	35.5	106°25.3	56.0	Gacrux	171°50.4	-57°15.6
5	130°17.4	289°29.3	00.4	341°29.8	43.3	341°53.7	35.5	121°27.9	55.9	Alioth	166°12.1	55°48.6
6	145°19.9	304°31.3	\$10°00.0	356°31.2	N14°43.0	356°55.9	N13°35.4	136°30.4	N00°55.9	Spica	158°21.0	-11°18.0
7	160°22.3	319°33.4	09°59.5	11°32.5	42.6	11°58.2	35.3	151°33.0	55.9	Alkaid	152°51.3	49°10.6
8	175°24.8	334° 35.4	59.1	26°33.9	42.3	27°00.4	35.3	166°35.6	55.8	Hadar	148°34.4	-60°30.0
9	190°27.2	349° 37.5	• • 58.7	41°35.2	42.0	42°02.7	35.2	181°38.1	55.8	Menkent	147°56.2	-36°30.0
10	205°29.7	4°39.5	58.3	56°36.6	41.7	57°05.0	35.2	196°40.7	55.8	Arcturus	145°46.9	19°02.5
11	220°32.2	19°41.5	57.9	71°38.0	41.3	72°07.2	35.1	211°43.3	55.7	Rigil Kent.	139°38.8	-60°56.7
12	235°34.6	34°43.6	S09°57.4	86°39.3	N14°41.0	87°09.5	N13°35.0	226° 45.8	N00°55.7	Kochab	137°21.0 136°54.7	74°02.6
13	250°37.1	49°45.6	57.0	101°40.7	40.7	102°11.8	35.0	241°48.4	55.7	Zuben'ubi Alphecca	136 54.7 126°02.8	-16°09.1 26°37.5
14	265°39.6	64°47.6	56.6	$116^{\circ}42.1$	40.4	$117^{\circ}14.0$	34.9	256°51.0	55.6	Antares	120 02.8 112°14.3	-26°29.4
15	280°42.0	79°49.6	• • 56.2	131°43.4	• • 40.0	$132^{\circ}16.3$	• • 34.9	271°53.5	• • 55.6	Antares	112 14.3 107°07.7	-20°29.4 -69°04.6
16	295°44.5	94°51.6	55.8	146°44.8	39.7	$147^{\circ}18.5$	34.8	$286^{\circ}56.1$	55.6	Sabik	107 07.7 102°01.4	-09 04.0 -15°45.4
17	310°47.0	109°53.7	55.4	161°46.2	39.4	$162^{\circ}20.8$	34.7	301°58.7	55.5	Shaula	96°08.7	-13° 43.4 -37° 07.4
18	325°49.4	124°55.7	S09°55.0	176°47.5	N14°39.1	177°23.1	N13°34.7	317°01.2	N00°55.5	Rasalhague	95°57.4	12°32.5
19	340°51.9	139°57.7	54.6	191°48.9	38.8	192°25.3	34.6	332°03.8	55.5	Eltanin	90°41.9	51°29.3
20	355°54.4	154° 59.7	54.2	206°50.3	38.4	$207^{\circ}27.6$	34.6	347°06.3	55.4	Kaus Aust.	83°30.8	-34°22.3
21	10°56.8	170°01.7	• • 53.8	221°51.6	• • 38.1	222°29.9	• • 34.5	2°08.9	• • 55.4	Vega	80°32.5	38°48.7
22	25°59.3	185°03.7	53.4	236°53.0	37.8	$237^{\circ}32.1$	34.4	$17^{\circ}11.5$	55.4	Nunki	75°46.1	-26°15.8
23	41°01.7	200°05.7	53.0	251°54.4	37.5	252°34.4	34.4	32° 14.0	55.3	Altair	61°58.6	8°56.5
Mern	pass. 20:16	v2 1' d-0	.4′ m-4.84	v1 4' d-0	0.3' m0.68	v2 3' d-0	.1′ m-2.09	v2 6' d-0	.0′ m0.53	Peacock	53°03.6	-56°39.1
- vici.p		u-0		ν 1.¬ U-C		- 2.5 u-0	2.03	- Z.O U-0	.5 1110.55	Deneb	49° 24.9	45°22.9
										Enif	33°37.3	10°00.1
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.0	-46°50.0
0	56°04.2	215°07.6	S09°52.6	266°55.7	N14°37.2	267°36.7	N13°34.3	47°16.6	N00°55.3	Fomalhaut	15°12.7	-29°28.8
1	71°06.7	230°09.6	52.2	281°57.1	36.8	282°38.9	34.3	62° 19.2	55.3	Scheat	13°43.6	28°14.0
2	86°09.1	245°11.6	51.8	296°58.5	36.5	297°41.2	34.2	77°21.7	55.2	Markab	13°28.3	15°21.2
3	101°11.6 116°14.1	260°13.6	· · 51.4	311°59.8	· · 36.2	312°43.5 327°45.7	34.1	92°24.3 107°26.8	· · 55.2	Nov 15 Sun	SHA	Mer.pass
4 5	116°14.1 131°16.5	275° 15.6 290° 17.5	51.0 50.6	327°01.2 342°02.6	35.9 35.5	327°45.7 342°48.0	34.1 34.0	107° 26.8 122° 29.4	55.2 55.1	Venus	5ПА 159°22.3	09:45
6	131°16.5 146°19.0	290°17.5 305°19.5	50.6 S09°50.3	342°02.6 357°04.0	35.5 N14°35.2	342°48.0 357°50.3	34.0 N13°34.0	122°29.4 137°32.0	55.1 N00°55.1	Mars	211° 44.6	06:16
7	140 19.0 161°21.5	305 19.5 320°21.4	49.9	12°05.3	34.9	12°52.5	33.9	157° 32.0 152° 34.5	55.1	Jupiter	211°42.3	06:16
8	176°23.9	335°23.4	49.5	27° 06.7	34.9	27°54.8	33.9	167°37.1	55.0	Saturn	351°07.5	20:56
9	191°26.4	350°25.4	• • 49.1	42°08.1	• • 34.3	42°57.1	• • 33.8	182°39.7	55.0			
10	206°28.8	5°27.3	48.8	57°09.5	33.9	57°59.3	33.7	197° 42.2	55.0	Nov 16 Mon	SHA	Mer.pass
11	221°31.3	20°29.3	48.4	72°10.8	33.6	73°01.6	33.7	212° 44.8	55.0	Venus	159°13.9	09:41
12	236°33.8	35°31.2	S09°48.0	87°12.2	N14°33.3	88°03.9	N13°33.6	227° 47.3	N00°54.9	Mars	211°17.9	06:14
13	251°36.2	50°33.2	47.7	102°13.6	33.0	103°06.2	33.6	242°49.9	54.9	Jupiter	211°37.3	06:12
14	266°38.7	65°35.1	47.3	$117^{\circ}15.0$	32.7	118°08.4	33.5	257°52.5	54.9	Saturn	351°10.0	20:51
15	281°41.2	80°37.0	• • 46.9	$132^{\circ}16.3$	• • 32.3	133° 10.7	• • 33.4	272°55.0	• • 54.8	Nov 17 Tue	SHA	Mer.pass
16	296°43.6	$95^{\circ}39.0$	46.6	$147^{\circ}17.7$	32.0	$148^{\circ}13.0$	33.4	$287^{\circ}57.6$	54.8		159°03.4	09:38
17	311°46.1	110°40.9	46.2	$162^{\circ}19.1$	31.7	163°15.2	33.3	303°00.1	54.8		210°51.5	06:12
18	326°48.6	125°42.8	S09°45.9	177°20.5	N14°31.4	178° 17.5	N13°33.3	318°02.7	N00° 54.7		$211^{\circ}32.5$	06:09
19	341°51.0	140°44.7	45.5	192°21.8	31.1	193° 19.8	33.2	333°05.3	54.7	Saturn	351°12.4	20:47
20	356°53.5	155°46.6	45.1	207°23.2	30.7	208°22.1	33.2	348°07.8	54.7	Ue-te-	al navall-	
21	11°56.0	170°48.6	• • 44.8	222°24.6	30.4	223°24.3	• • 33.1	3°10.4	• • 54.6	Horizont	al parallax	0.4
22	26°58.4	185°50.5	44.4	237°26.0	30.1	238° 26.6	33.0	18° 12.9	54.6		Venus: Mars:	0.4 0.1
23	42°00.9	200°52.4	44.1	252°27.4	29.8	253°28.9	33.0	33° 15.5	54.6		iviars:	0.1
Mer.p	pass. 20:12	$\nu 2.0' \ d-0$	.4′ m-4.85	$\nu$ 1.4 $^{\prime}$ d-0	0.3′ m0.67	$\nu 2.3' \ d-0$	.1′ m-2.10	$\nu$ 2.6′ d-0	.0′ m0.54			

h	Sui	n	Moon				
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	183°52.4	S18°25.7	$116^{\circ}16.1$	12.4'	S23°31.6	-7.7'	54.1'
1	198°52.3	26.3	130°47.4	12.4'	23°23.9	-7.8'	54.1'
2	213°52.1	27.0	145°18.8	12.5'	23°16.0	-8.0'	54.1'
3 4	228°52.0 243°51.9	· · 27.6 28.2	159°50.3 174°21.8	12.5' 12.6'	23°08.1 23°00.0	-8.1' -8.2'	54.1' 54.1'
5	258°51.8	28.9	174 21.6 188°53.4	12.6'	23° 51.9	-o.∠ -8.3'	54.1'
6	273°51.7	S18°29.5	203°25.0	12.7'	S22°43.6	-8.4	54.2'
7	288°51.6	30.1	$217^{\circ}56.7$	12.7'	22°35.3	-8.5'	54.2'
8	303°51.5	30.8	232°28.4	12.8'	22°26.8	-8.6'	54.2'
9	318°51.4	• • 31.4	247°00.2	12.8'	22° 18.2	-8.7'	54.2'
10	333°51.3	32.0	261°32.0	12.9'	22°09.6	-8.8'	54.2'
11 12	348°51.2 3°51.1	32.7 \$18°33.3	276°03.9 290°35.8	12.9' 13.0'	22°00.8 <b>S</b> 21°52.0	-8.9' -9.0'	54.2' 54.2'
13	18°51.0	34.0	305°07.8	13.0'	21°43.0	-9.0' -9.0'	54.2'
14	33°50.9	34.6	319°39.9	13.1'	21°34.0	-9.1'	54.2'
15	48°50.8	• • 35.2	$334^{\circ}12.0$	13.1'	21°24.8	-9.2'	54.3'
16	63°50.7	35.8	$348^{\circ}44.1$	13.2'	$21^{\circ}15.6$	-9.3'	54.3'
17	78°50.6	36.5	3°16.3	13.3'	21°06.3	-9.4'	54.3'
18	93°50.5	\$18°37.1	17°48.6	13.3'	S20°56.8	-9.5'	54.3'
19 20	108°50.3 123°50.2	37.7 38.4	32°20.9 46°53.2	13.4' 13.4'	20° 47.3 20° 37.7	-9.6' -9.7'	54.3' 54.3'
21	138°50.1	39.0	61°25.6	13.5'	20° 28.0	-9.1 -9.8'	54.3'
22	153°50.0	39.6	75°58.1	13.5'	20° 18.2	-9.9'	54.3'
23	168°49.9	40.3	90°30.6	13.6'	20°08.3	-10.0'	54.4'
	SD = 16.2'	d = 0.6'		Çſ	0 = 14.8'		
	JD — 10.2	u — 0.0		3L	J — 14.0		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	183°49.8 198°49.7	\$18°40.9 41.5	105°03.1 119°35.7	13.6' 13.6'	\$19°58.4 19°48.3	-10.1' -10.1'	54.4' 54.4'
2	213°49.6	41.5	119 35.7 134°08.4	13.7'	19 40.3 19°38.2	-10.1	54.4'
3	228°49.5	• • 42.8	148°41.1	13.7'	19° 27.9	-10.2	54.4'
4	243°49.3	43.4	163°13.8	13.8'	19° 17.6	-10.4	54.4'
5	258°49.2	44.0	177°46.6	13.8'	$19^{\circ}07.2$	-10.5'	54.5'
6	273°49.1	S18°44.6	192°19.5	13.9'	S18°56.7	-10.6'	54.5'
7	288°49.0	45.3	206°52.4	13.9'	18°46.1	-10.7'	54.5
8 9	303°48.9 318°48.8	45.9 • • 46.5	221°25.3 235°58.3	14.0' 14.0'	18° 35.5 18° 24.7	-10.7' -10.8'	54.5' 54.5'
10	318 48.8 333°48.7	47.1	250°31.3	14.1'	18 24.7 18°13.9	-10.8 -10.9'	54.5'
11	348°48.6	47.7	265°04.3	14.1'	18°03.0	-10.9	54.6'
12	3°48.4	<b>S</b> 18°48.4	279°37.4	14.1'	S17°52.0	-11.1'	54.6'
13	18°48.3	49.0	294°10.6	14.2'	$17^{\circ}41.0$	-11.1'	54.6'
14	33°48.2	49.6	308°43.8	14.2'	17°29.8	-11.2'	54.6'
15 16	48°48.1 63°48.0	· · 50.2 50.8	323°17.0 337°50.3	14.3' 14.3'	17° 18.6 17° 07.3	-11.3' -11.4'	54.6' 54.6'
10 17	78°47.9	50.8 51.5	352°23.6	14.3'	17 07.3 16°55.9	-11.4 -11.5'	54.0 54.7'
18	93°47.7	\$18°52.1	6°56.9	14.4'	S16°44.4	-11.5'	54.7
19	108°47.6	52.7	21°30.3	14.4'	16°32.9	-11.6'	54.7'
20	123°47.5	53.3	$36^{\circ}03.7$	14.5'	$16^{\circ}21.3$	-11.7'	54.7'
21	138°47.4	• • 53.9	50°37.2	14.5'	16°09.6	-11.8'	54.7'
22	153°47.3	54.5	65°10.7	14.5'	15°57.9	-11.8'	54.8'
23	168°47.1	55.1	79°44.2	14.6'	15°46.0	-11.9'	54.8'
	SD = 16.2'	d = 0.6'		SI	0 = 14.8'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°47.0	<b>S</b> 18°55.8	94°17.8	14.6'	<b>S</b> 15°34.1	-12.0'	54.8'
1	198°46.9	56.4	108°51.4	14.6'	15°22.2	-12.0'	54.8'
2	213°46.8	57.0	123°25.0	14.7'	15° 10.1	-12.1'	54.9'
3 4	228°46.7 243°46.5	· · 57.6 58.2	137°58.6 152°32.3	14.7' 14.7'	14°58.0 14°45.8	-12.2' -12.3'	54.9' 54.9'
5	258°46.4	58.8	167°06.1	14.7	14 45.6 14°33.5	-12.3'	54.9'
6	273°46.3	\$18°59.4	181°39.8	14.8'	\$14°21.2	-12.4'	54.9'
7	288°46.2	19°00.0	196°13.6	14.8'	14°08.8	-12.5'	55.0'
8	303°46.1	00.6	210°47.4	14.8'	$13^{\circ}56.4$	-12.5'	55.0'
9	318°45.9	• • 01.3	225°21.2	14.9'	13°43.8	-12.6'	55.0'
10	333°45.8	01.9	239°55.1	14.9'	13°31.2	-12.7'	55.0'
11 12	348°45.7 3°45.6	02.5 \$19°03.1	254°29.0 269°02.9	14.9' 14.9'	13° 18.6 \$13° 05.9	-12.7' -12.8'	55.1' 55.1'
13	3 45.0 18°45.4	03.7	269 02.9 283°36.8	14.9 15.0'	12°53.1	-12.8 -12.9'	55.1'
14	33°45.3	04.3	298°10.8	15.0'	12°40.2	-12.9'	55.1
15	48°45.2	• • 04.9	312°44.7	15.0'	$12^{\circ}27.3$	-13.0'	55.2'
16	63°45.1	05.5	$327^{\circ}18.7$	15.0'	$12^{\circ}14.3$	-13.0'	55.2'
17	78°44.9	06.1	341°52.8	15.0'	12°01.3	-13.1'	55.2'
18	93°44.8	\$19°06.7	356°26.8 11°00.8	15.1'	\$11°48.2	-13.2'	55.2'
19 20	108°44.7 123°44.6	07.3 07.9	11°00.8 25°34.9	15.1' 15.1'	11°35.0 11°21.8	-13.2' -13.3'	55.3' 55.3'
21	138°44.4	08.5	40°09.0	15.1'	11 21.6 11°08.6	-13.3'	55.3'
22	153°44.3	09.1	54°43.1	15.1'	10°55.2	-13.4	55.4'
23	168°44.2	09.7	69°17.2	15.1'	10°41.8	-13.4'	55.4'
	SD = 16.2'	d = 0.6'		SI	O = 14.9'		

Lat.	Twilight		Sunrise	Sunset	Twilight		
Lat.	Naut. Civil		Juliuse	Juliset	Civil	Naut.	
N 72°	07:03	08:39	11:31	11:57	14:49	16:25	
N 70°	06:52	08:15	09:56	13:32	15:13	16:36	
68°	06:44	07:57	09:18	14:11	15:31	16:45	
66°	06:36	07:43	08:51	14:38	15:46	16:52	
64°	06:30	07:30	08:31	14:58	15:58	16:59	
62°	06:24	07:20	08:14	15:15	16:09	17:05	
60°	06:19	07:11	08:00	15:28	16:18	17:10	
<b>N</b> 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	
<b>S</b> 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	////	

Lat.		Moonris	e		Moonset	:
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 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
<b>N</b> 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	
<b>N</b> 10°	10:52	11:34	12:14	22:42	23:30	
0°	10:35	11:21	12:04	22:57	23:42	
S 10°	10:18	11:07	11:55	23:13	23:53	
20°	10:00	10:53	11:44	23:29		00:06
30°	09:39	10:36	11:32	23:47	•• ••	00:20
35°	09:27	10:26	11:25	23:58		00:28
40°	09:13	10:15	11:18		00:10	00:37
45°	08:56	10:02	11:08	•• ••	00:25	00:48
<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

		Sun		Moon			
Day	Eqn.of	f 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	27-45%	
15	15:29	15:24	11:45	16:46	04:23		
16	15:19	15:14	11:45	17:31	05:09		
17	15:08	15:02	11:45	18:15	05:53		

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

h	Aries	Ve	nus	M	ars	Jup	iter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	57°03.3	215°54.3	S09°43.8	267°28.7	N14°29.5	268°31.1	N13°32.9	48°18.1	N00°54.5			
1	72°05.8	230°56.2	43.4	282°30.1	29.1	283°33.4	32.9	63°20.6	54.5	Alpheratz	357°33.0	29°14.6
2	87°08.3	245°58.1	43.1	297°31.5	28.8	298°35.7	32.8	78°23.2	54.5	Ankaa	353°05.4	-42°09.7
3	102° 10.7	261°00.0	• • 42.7	312°32.9	• • 28.5	313°38.0	• • 32.8	93°25.7	• • 54.4	Schedar	349°28.9	56°41.4
4	117° 13.2	276°01.9	42.4	327°34.3	28.2	328°40.2	32.7	108°28.3	54.4	Diphda	348° 45.5	-17°50.3
5	132° 15.7	291°03.7	42.1	342°35.7	27.9	343°42.5	32.7	123°30.8	54.4	Achernar	335° 18.6	-57°06.1
6	147° 18.1	306°05.6	S09°41.7	357° 37.0	N14°27.6	358°44.8	N13°32.6	138°33.4	N00°54.4	Hamal	327°49.1	23°35.5
7	162°20.6	321°07.5	41.4	12°38.4	27.2	13°47.1	32.5	153°36.0	54.3	Polaris	312°44.0	89°22.7
8	177°23.1	336°09.4	41.1	27°39.8	26.9	28°49.3	32.5	168°38.5	54.3	Acamar	315°10.2	-40°11.8
9	192°25.5	351°11.3	• • 40.7	42°41.2	26.6	43°51.6	• • 32.4	183°41.1	• • 54.3	Menkar	314°04.2	4°11.8
10	207°28.0	6°13.1	40.4	57°42.6	26.3	58°53.9	32.4	198°43.6	54.2	Mirfak Aldebaran	308°25.5	49°57.5 16°33.9
11	222°30.5	21°15.0	40.1	72°44.0	26.0	73°56.2	32.3	213°46.2	54.2	Rigel	290°37.5 281°02.1	-8°10.1
12	237°32.9	36°16.9	S09°39.8	87°45.4	N14°25.6	88°58.4	N13°32.3	228°48.8	N00°54.2	Capella	280° 19.2	-6 10.1 46°01.4
13	252°35.4	51°18.7	39.4	102°46.7	25.3	104°00.7	32.2	243°51.3	54.1	Bellatrix	278° 20.9	6°22.5
14	267° 37.8	66°20.6	39.1	$117^{\circ}48.1$	25.0	119°03.0	32.1	258°53.9	54.1	Elnath	277° 59.6	28°37.8
15	282°40.3	81°22.4	· · 38.8	132°49.5	• • 24.7	134°05.3	• • 32.1	273°56.4	• • 54.1	Alnilam	275°35.9	-1°11.0
16	297°42.8	96°24.3	38.5	147°50.9	24.4	149°07.6	32.0	288°59.0	54.1	Betelgeuse	270°50.1	7°24.8
17	312°45.2	111°26.1	38.2	162°52.3	24.1	164°09.8	32.0	304°01.5	54.0	Canopus	263°51.3	-52°42.4
18	327° 47.7	126°28.0	S09°37.9	177°53.7	N14°23.7	179°12.1	N13°31.9	319°04.1	N00°54.0	Sirius	258° 24.6	-16°45.1
19	342°50.2	141°29.8	37.6	192°55.1	23.4	194°14.4	31.9	334°06.6	54.0	Adhara	255°04.4	-29°00.3
20	357° 52.6	156°31.6	37.3	207°56.5	23.1	209°16.7	31.8	349°09.2	53.9	Procyon	244°49.1	5°09.4
21	12°55.1	171°33.5	•• 37.0	222°57.9	• • 22.8	224°18.9	• • 31.8	4°11.8	• • 53.9	Pollux	243°15.3	27°57.6
22	27°57.6	186°35.3	36.7	237°59.3	22.5	239°21.2	31.7	19°14.3	53.9	Avior	234°13.9	-59°35.4
23	43°00.0	201°37.1	36.4	253°00.7	22.2	254°23.5	31.7	34°16.9	53.8	Suhail	222°45.1	-43°32.2
Mer.p	ass. 20:08	$\nu 1.9' d-0.0$	.3′ m-4.87	$\nu$ 1.4 $^{\prime}$ d-0	.3′ m0.65	$\nu 2.3' d-0$	1' m-2.10	$\nu 2.6' d-0$	.0′ m0.54	Miaplacidus	221°37.8	-69°49.3
- 1										Alphard	217°46.2	-8°46.4
	CIIA	CIIA	Б	CIIA		CIIA	Б	CIIA	Б	Regulus	$207^{\circ}32.9$	11°50.1
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA 40°10.4	Dec	Dubhe	193°39.4	61°36.1
0	58°02.5	216°38.9	S09°36.1	268°02.0	N14°21.8	269°25.8	N13°31.6	49°19.4	N00°53.8	Denebola	182°23.6	14°25.3
1	73°04.9	231°40.8	35.8	283°03.4	21.5	284°28.1	31.5	64°22.0	53.8	Gienah	175°42.2	-17°41.4
2	88°07.4 103°09.9	246°42.6	35.5	298°04.8	21.2	299°30.3	31.5	79°24.5	53.8 • • 53.7	Acrux	172°58.8	-63°14.7
3 4	103 09.9 118°12.3	261°44.4 276°46.2	· · 35.2 34.9	313°06.2 328°07.6	· · 20.9 20.6	314°32.6 329°34.9	· · 31.4 31.4	94°27.1 109°29.6	· · 53.7 53.7	Gacrux	171°50.3	-57°15.6
5	116 12.3 133°14.8	270 40.2 291°48.0	34.9	343°09.0	20.0	344°37.2	31.4	109 29.0 124°32.2	53. <i>1</i> 53.7	Alioth	$166^{\circ}12.1$	55°48.6
6	133 14.6 148° 17.3	306°49.8	509°34.3	358° 10.4	N14° 20.0	359°39.5	N13°31.3	124 32.2 139°34.8	N00°53.6	Spica	158°21.0	-11°18.0
7	163° 19.7	300°49.8 321°51.6	34.0	13° 11.8	19.6	14°41.8	31.2	159° 34.8 154° 37.3	53.6	Alkaid	152°51.3	49°10.6
8	178° 22.2	336°53.4	33.7	28° 13.2	19.3	29°44.0	31.2	169°39.9	53.6	Hadar	148°34.4	-60°30.0
9	193°24.7	351°55.2	• • 33.5	43° 14.6	• • 19.0	44°46.3	31.1	184°42.4	• • 53.5	Menkent	147°56.2	-36°30.0
10	208° 27.1	6°57.0	33.2	58° 16.0	18.7	59°48.6	31.1	199°45.0	53.5	Arcturus	145°46.8	19°02.5
11	223°29.6	21°58.8	32.9	73° 17.4	18.4	74°50.9	31.0	214°47.5	53.5	Rigil Kent.	139°38.8	-60°56.7
12	238°32.1	37°00.5	S09°32.6	88° 18.8	N14° 18.1	89°53.2	N13°31.0	229°50.1	N00°53.5	Kochab	137°21.0	74°02.5
13	253°34.5	52°02.3	32.4	103°20.2	17.7	104°55.4	30.9	244°52.6	53.4	Zuben'ubi	136°54.7	-16°09.1
14	268° 37.0	67°04.1	32.1	118°21.6	17.4	119°57.7	30.8	259°55.2	53.4	Alphecca	126°02.8	26°37.5
15	283°39.4	82°05.9	31.8	133°23.0	17.1	135°00.0	30.8	274°57.7	• • 53.4	Antares	112°14.3	-26°29.4
16	298°41.9	97°07.6	31.6	148° 24.4	16.8	150°02.3	30.7	290°00.3	53.3	Atria	107°07.7	-69°04.6
17	313°44.4	112°09.4	31.3	163°25.8	16.5	165°04.6	30.7	305°02.8	53.3	Sabik	102°01.4	-15°45.4
18	328°46.8	127°11.2	S09°31.0	178° 27.2	N14°16.2	180°06.9	N13°30.6	320°05.4	N00°53.3	Shaula	96°08.7	-37°07.4 12°32.5
19	343°49.3	142°12.9	30.8	193°28.6	15.9	195°09.2	30.6	335°08.0	53.3	Rasalhague	95°57.5	
20	358°51.8	157°14.7	30.5	208°30.0	15.5	210°11.4	30.5	350°10.5	53.2	Eltanin Kaus Aust.	90°41.9 83°30.8	51°29.3 -34°22.3
21	13°54.2	172°16.4	• • 30.2	223°31.4	• • 15.2	225°13.7	• • 30.5	5°13.1	• • 53.2	Vega	80°32.5	-34 22.3 38°48.7
22	28°56.7	187°18.2	30.0	238°32.8	14.9	240°16.0	30.4	20°15.6	53.2	Nunki	75°46.1	-26°15.8
23	43°59.2	202°19.9	29.7	253°34.2	14.6	255°18.3	30.4	35°18.2	53.2	Altair	61°58.7	8°56.5
Morp	ass. 20:05	11 8' d 0	.3′ m-4.88	11 1' d 0	.3′ m0.64	1/2 3/ d 0	1' m-2.11	12 6' d C	.0′ m0.55	Peacock	53°03.6	-56°39.1
- IVIEL.P	Jass. 20.03	ν1.0 u-0.	.5 111-4.00	ν1.4 u-0	.5 1110.04	ν2.5 u-0		ν2.0 u-0	.0 1110.55	Deneb	49° 24.9	45°22.9
										Enif	33°37.3	10°00.1
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.0	-46°50.0
0	59°01.6	217°21.7	S09°29.5	268°35.6	N14°14.3	270°20.6	N13°30.3	50°20.7	N00°53.1	Fomalhaut	15°12.7	-29°28.8
1	74°04.1	232°23.4	29.2	283°37.0	14.0	285°22.9	30.3	65°23.3	53.1	Scheat	13°43.6	28°14.0
2	89°06.6	247°25.2	29.0	298°38.4	13.7	300°25.2	30.2	80°25.8	53.1	Markab	13°28.3	15°21.2
3	104°09.0	262°26.9	• • 28.7	313°39.9	• • 13.4	315°27.5	30.2	95°28.4	• • 53.0	Nov 18 Wed	SHA	Man :
4	119°11.5	277°28.6	28.5	328°41.3	13.0	330°29.7	30.1	110°30.9	53.0	!		Mer.pass
5	134°13.9	292°30.4	28.3	343°42.7	12.7	345°32.0	30.1	125°33.5	53.0	<b>I</b>	158°50.9	09:35
6	149°16.4	307°32.1	S09°28.0		N14°12.4	0°34.3	N13°30.0	140°36.0	N00°53.0		210°25.4	06:10 06:05
7 8	164° 18.9 179° 21.3	322°33.8 337°35.5	27.8 27.5	13°45.5 28°46.9	12.1 11.8	15°36.6 30°38.9	30.0 29.9	155°38.6 170°41.1	52.9 52.9	Jupiter Saturn	211°27.8 351°14.7	20:43
9	179°21.3 194°23.8	352°37.2	27.5 • • 27.3	28° 46.9 43° 48.3	11.8	30°38.9 45°41.2	29.9	170°41.1 185°43.7	52.9 • • 52.9	Jatuin	JJI 14.1	20.43
10	209° 26.3	7°38.9	27.3	43 46.3 58°49.7	11.5	45 41.2 60°43.5	29.9	200°46.2	52.8	Nov 19 Thu	SHA	Mer.pass
11	209 20.3 224° 28.7	7 36.9 22°40.6	26.8	73°51.1	10.9	75°45.8	29.8	200 40.2 215°48.8	52.8		158° 36.5	09:32
12	239° 31.2	37°42.4	S09°26.6	88°52.5	N14° 10.5	90°48.1	N13°29.7	230°51.3	N00°52.8		209°59.6	06:07
13	254°33.7	52°44.1	26.4	103°54.0	10.2	105°50.3	29.7	245°53.9	52.8		211°23.3	06:01
14	269°36.1	67°45.8	26.2	118°55.4	09.9	120°52.6	29.6	260°56.4	52.7	Saturn	351°16.9	20:39
15	284°38.6	82°47.4	25.9	133°56.8	• • 09.6	135°54.9	29.6	275°59.0	• • 52.7	Nov 20 Fri	SHA	Mer.pass
16	299°41.0	97°49.1	25.7	148° 58.2	09.3	150°57.2	29.5	291°01.5	52.7		158° 20.1	09:29
17	314°43.5	112°50.8	25.5	163°59.6	09.0	165°59.5	29.5	306°04.1	52.7	1	209°34.0	06:05
18	329°46.0	127°52.5	S09°25.3	179°01.0	N14°08.7	181°01.8	N13°29.4	321°06.6	N00°52.6		211°19.0	05:58
19	344°48.4	142°54.2	25.1	194°02.4	08.4	196°04.1	29.4	$336^{\circ}09.2$	52.6		351°19.1	20:35
20	359°50.9	157°55.9	24.9	209°03.9	08.1	211°06.4	29.3	$351^{\circ}11.7$	52.6			
21	14° 53.4	172°57.5	• • 24.6	224°05.3	•• 07.7	226°08.7	• • 29.3	6°14.3	• • 52.6	Horizont	al parallax	
22	29°55.8	187°59.2	24.4	239°06.7	07.4	241°11.0	29.2	21°16.8	52.5		Venus:	0.4
23	44°58.3	203°00.9	24.2	254°08.1	07.1	256°13.3	29.2	36°19.4	52.5		Mars:	0.1
Mern	pass. 20:01	$\nu 1.7' d-0$	.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			
	Mer.pass. 20:01 $\nu$ 1											

h	Sui	Moon					
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	183°44.1	S19°10.3	83°51.3	15.1'	\$10°28.4	-13.5'	55.4'
1 2	198° 43.9 213° 43.8	10.9 11.5	98°25.5 112°59.6	15.1' 15.2'	10°14.9 10°01.3	-13.6' -13.6'	55.4' 55.5'
3	228° 43.7	12.1	127°33.8	15.2'	09°47.7	-13.7	55.5'
4	243°43.5	12.7	142°07.9	15.2'	09°34.1	-13.7'	55.5'
5	258° 43.4 273° 43.3	13.3 \$19°13.9	156° 42.1 171° 16.3	15.2' 15.2'	09°20.3 509°06.6	-13.8' -13.8'	55.6' 55.6'
6 7	273 43.3 288°43.2	14.5	171 10.5 185°50.5	15.2'	08°52.7	-13.6 -13.9'	55.6'
8	303°43.0	15.1	200°24.7	15.2'	08°38.9	-13.9'	55.6'
9	318° 42.9	•• 15.7	214°58.9	15.2'	08°24.9	-14.0'	55.7'
10 11	333° 42.8 348° 42.6	16.3 16.9	229°33.1 244°07.2	15.2' 15.2'	08°11.0 07°57.0	-14.0' -14.1'	55.7' 55.7'
12	3°42.5	S19°17.4	258°41.4	15.2'	507°42.9	-14.1'	55.8'
13	18° 42.4	18.0	273° 15.6	15.2'	07°28.8	-14.2'	55.8'
14 15	33° 42.2 48° 42.1	18.6 •• 19.2	287°49.8 302°24.0	15.2' 15.2'	07°14.6 07°00.4	-14.2' -14.3'	55.8' 55.9'
16	63°42.0	19.8	316°58.2	15.2'	06°46.1	-14.3'	55.9'
17	78°41.8	20.4	331°32.4	15.2'	06°31.9	-14.3'	55.9'
18 19	93°41.7 108°41.6	\$19°21.0 21.6	346°06.5 0°40.7	15.2' 15.1'	\$06°17.5 06°03.1	-14.4' -14.4'	56.0' 56.0'
20	123°41.4	22.2	15° 14.8	15.1	05°48.7	-14.5'	56.0'
21	138°41.3	• • 22.7	29°49.0	15.1'	$05^{\circ}34.2$	-14.5'	56.1'
22 23	153°41.2 168°41.0	23.3 23.9	44°23.1 58°57.2	15.1' 15.1'	05°19.7 05°05.2	-14.5' -14.6'	56.1' 56.1'
23						-14.0	30.1
	SD = 16.2'	d = 0.6'		SI	D = 15.1'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	183° 40.9 198° 40.7	S19°24.5 25.1	73°31.3 88°05.4	15.1' 15.1'	\$04°50.6 04°36.0	-14.6' -14.7'	56.2' 56.2'
2	213° 40.6	25.1	102°39.5	15.1	04°30.0	-14.7'	56.2'
3	228°40.5	26.3	$117^{\circ}13.5$	15.0'	04°06.6	-14.7'	56.3'
4	243° 40.3 258° 40.2	26.8	131°47.5 146°21.6	15.0'	03°51.9 03°37.1	-14.8'	56.3'
5 6	258 40.2 273°40.1	27.4 \$19°28.0	140 21.0 160°55.5	15.0' 15.0'	503°22.3	-14.8' -14.8'	56.3' 56.4'
7	288°39.9	28.6	$175^{\circ}29.5$	14.9'	03°07.5	-14.9'	56.4'
8	303°39.8	29.2	190°03.5	14.9'	02°52.6	-14.9'	56.4'
9 10	318° 39.6 333° 39.5	· · 29.7 30.3	204°37.4 219°11.3	14.9' 14.9'	02°37.7 02°22.8	-14.9' -15.0'	56.5' 56.5'
11	348°39.4	30.9	233°45.1	14.8'	02°07.8	-15.0'	56.6'
12	3°39.2	S19°31.5	248° 19.0	14.8'	S01°52.9	-15.0'	56.6'
13 14	18° 39.1 33° 38.9	32.0 32.6	262°52.8 277°26.5	14.8' 14.7'	01°37.8 01°22.8	-15.0' -15.1'	56.6' 56.7'
15	48° 38.8	33.2	292°00.3	14.7'	01°07.7	-15.1'	56.7'
16	63°38.7	33.8	306°34.0	14.7'	00°52.6	-15.1'	56.7'
17 18	78°38.5 93°38.4	34.3 \$19°34.9	321°07.6 335°41.3	14.6' 14.6'	00°37.5 \$00°22.4	-15.1' -15.2'	56.8' 56.8'
19	108° 38.2	35.5	350° 14.9	14.6'	S00°07.2	-15.2'	56.8'
20	123°38.1	36.1	4°48.4		N00°08.0		56.9'
21 22	138° 37.9 153° 37.8	· · 36.6 37.2	19°21.9 33°55.4	14.5' 14.4'	00°23.2 00°38.4	15.2' 15.2'	56.9' 57.0'
23	168° 37.7	37.8	48°28.8	14.4'	00°53.6	15.3'	57.0'
	SD = 16.2'	d = 0.6'		SI	D = 15.3'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	183°37.5	\$19°38.3	63°02.2	14.3'	N01°08.9	15.3'	57.0'
1	198°37.4	38.9	77°35.5	14.3'	01°24.2	15.3'	57.1'
2 3	213°37.2 228°37.1	39.5 •• 40.1	92°08.8 106°42.1	14.2' 14.2'	01°39.4 01°54.8	15.3' 15.3'	57.1' 57.1'
4	243°36.9	40.1	121°15.3	14.1'	01° 34.0 02° 10.1	15.3'	57.2'
5	258° 36.8	41.2	135°48.4	14.1'	02°25.4	15.3'	57.2'
6 7	273°36.6 288°36.5	\$19°41.8 42.3	150°21.5 164°54.5	14.0' 14.0'	N02°40.7 02°56.1	15.4' 15.4'	57.3' 57.3'
8	288 30.5 303°36.3	42.3 42.9	104 54.5 179°27.5	14.0 13.9'	02 50.1 03°11.5	15.4' 15.4'	57.3'
9	318°36.2	• • 43.4	194°00.4	13.9'	03°26.8	15.4'	57.4'
10	333°36.0 348°35.9	44.0	208°33.3	13.8'	03°42.2	15.4'	57.4'
11 12	348° 35.9 3° 35.7	44.6 \$19°45.1	223°06.1 237°38.8	13.7' 13.7'	03°57.6 N04°13.0	15.4' 15.4'	57.5' 57.5'
13	18°35.6	45.7	$252^{\circ}11.5$	13.6'	04°28.3	15.4'	57.5'
14	33°35.4 48°35.3	46.3	266°44.1	13.5'	04°43.7	15.4'	57.6'
15 16	48°35.3 63°35.1	· · 46.8 47.4	281°16.6 295°49.1	13.5' 13.4'	04°59.1 05°14.5	15.4' 15.4'	57.6' 57.7'
17	78°35.0	47.9	$310^{\circ}21.5$	13.3'	05°29.9	15.4'	57.7'
18	93°34.8	\$19°48.5	324°53.9	13.3'	N05°45.3	15.4'	57.7'
19 20	108°34.7 123°34.5	49.1 49.6	339°26.1 353°58.3	13.2' 13.1'	06°00.6 06°16.0	15.4' 15.4'	57.8' 57.8'
21	138°34.4	• • 50.2	8°30.5	13.1'	06°31.4	15.4'	57.9'
22	153°34.2	50.7	23°02.5	13.0'	06°46.7	15.3'	57.9'
23	$\frac{168^{\circ}34.1}{SD = 16.2'}$	$\frac{51.3}{d = 0.6'}$	37°34.5	12.9'	$07^{\circ}02.1$ 0 = 15.6'	15.3'	57.9'
	JU = 10.2′	$u = 0.0^{\circ}$		51	ν = 13.0°		

	Twi	light			Twilight		
Lat.	Naut.	Civil	Sunrise	Sunset	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	////	
					N.A		

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

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0 0	60°00.8	218°02.6	509°24.0	269°09.5	N14°06.8	271°15.6	N13°29.1	51°21.9	N00° 52.5		эпа	Dec
		216 02.0 233°04.2		284°10.9		271 15.0 286°17.9		66°24.5		Alpheratz	357°33.0	29°14.6
1	75°03.2		23.8		06.5		29.1		52.4	Ankaa	353°05.4	-42°09.7
2	90°05.7	248°05.9	23.6	299°12.4	06.2	301°20.2	29.0	81°27.0	52.4	Schedar	349°28.9	56°41.4
3	105°08.2	263°07.5	• • 23.4	314°13.8	• • 05.9	316°22.4	• • 29.0	96°29.6	• • 52.4	Diphda	348° 45.6	-17°50.3
4	120°10.6	278°09.2	23.2	329°15.2	05.6	331°24.7	28.9	111°32.1	52.4	Achernar	335°18.6	-57°06.1
5	135°13.1	293°10.8	23.0	344°16.6	05.3	346°27.0	28.9	126° 34.7	52.3	Hamal	327°49.2	23°35.5
6	150°15.5	308° 12.5	S09°22.8	359°18.0	N14°04.9	1°29.3	N13°28.8	141°37.2	N00°52.3	Polaris	312°44.0	89°22.7
7	165°18.0	323°14.1	22.6	14° 19.5	04.6	16°31.6	28.8	156° 39.7	52.3	Acamar	315° 10.2	-40°11.8
8	180°20.5	338° 15.8	22.4	29°20.9	04.3	31°33.9	28.7	171°42.3	52.3	Menkar	314°04.2	4°11.8
9	195°22.9	353° 17.4	• • 22.3	44°22.3	• • 04.0	46° 36.2	• • 28.7	186°44.8	• • 52.2	Mirfak	308° 25.5	49°57.5
10	210°25.4	$8^{\circ}19.1$	22.1	59°23.7	03.7	61°38.5	28.6	201°47.4	52.2	Aldebaran	290°37.5	16°33.9
11	225°27.9	23°20.7	21.9	74°25.1	03.4	76°40.8	28.6	216°49.9	52.2	Rigel	281°02.1	-8°10.1
12	240°30.3	$38^{\circ}22.3$	S09°21.7	89°26.6	$N14^{\circ}03.1$	91°43.1	N13°28.5	231°52.5	N00°52.2	Capella	280°19.2	46°01.4
13	255°32.8	53°23.9	21.5	104°28.0	02.8	106°45.4	28.5	246°55.0	52.1			6°22.5
14	270°35.3	68° 25.6	21.3	119°29.4	02.5	121°47.7	28.4	261°57.6	52.1	Bellatrix	278°20.9	
15	285°37.7	83°27.2	• • 21.2	134°30.8	· · 02.2	$136^{\circ}50.0$	• • 28.4	$277^{\circ}00.1$	•• 52.1	Elnath	277°59.6	28°37.8
16	300°40.2	98°28.8	21.0	149°32.3	01.9	151°52.3	28.3	292°02.7	52.1	Alnilam	275°35.9	-1°11.0
17	315°42.6	113°30.4	20.8	164°33.7	01.6	166° 54.6	28.3	307°05.2	52.0	Betelgeuse	270°50.1	7°24.8
18	330°45.1	128°32.0	S09°20.6	179°35.1	N14°01.2	181°56.9	N13°28.2	322°07.8	N00°52.0	Canopus	263°51.3	-52°42.4
19	345°47.6	143°33.6	20.5	194°36.6	00.9	196° 59.2	28.2	337° 10.3	52.0	Sirius	258° 24.6	-16°45.1
20	0°50.0	158° 35.2	20.3	209°38.0	00.6	212°01.5	28.1	352° 12.8	52.0	Adhara	255°04.4	-29°00.3
21	15°52.5	173°36.8	20.1	224°39.4	00.3	227°03.8	28.1	7° 15.4	51.9	Procyon	244°49.0	5°09.4
22	30°55.0	188°38.4	20.1	239°40.8	14°00.0	242°06.1	28.0	22°17.9	51.9	Pollux	243° 15.2	27°57.6
23	45°57.4	203°40.0	19.8	254° 42.3	14 00.0 13°59.7	257°08.4	28.0	37°20.5	51.9	Avior	234° 13.8	-59°35.4
23	75 51.4							-		Suhail	$222^{\circ}45.1$	-43°32.2
Mer.p	ass. 19:57	$\nu$ 1.7′ d-0	.2′ m-4.89	$\nu$ 1.4′ d-0	$0.3'  \mathrm{m}0.61$	$\nu$ 2.3′ d-0	.0′ m-2.12	$\nu$ 2.5′ d-0	.0′ m0.56	Miaplacidus	$221^{\circ}37.7$	-69°49.3
<u>.</u>						-		-		Alphard	$217^{\circ}46.2$	-8°46.4
_			_		_		_		_	Regulus	207°32.8	11°50.1
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.4	61°36.0
0	60°59.9	218°41.6	S09°19.6	269°43.7	N13°59.4	272° 10.7	N13°27.9	52°23.0	N00°51.9	Denebola	182°23.6	14°25.2
1	76°02.4	233°43.2	19.5	284°45.1	59.1	287° 13.0	27.9	67°25.6	51.8	Gienah	175°42.2	-17°41.4
2	91°04.8	248°44.8	19.3	299°46.6	58.8	302° 15.3	27.9	82°28.1	51.8	l .	172°58.8	-63°14.7
3	106°07.3	263°46.4	• • 19.2	314°48.0	• • 58.5	317° 17.6	• • 27.8	97°30.7	• • 51.8		171°50.3	-57°15.6
4	121°09.8	278°48.0	19.0	329°49.4	58.2	332° 19.9	27.8	112°33.2	51.8	Alioth	166° 12.1	55°48.6
5	136°12.2	293°49.5	18.9	344°50.9	57.9	347°22.2	27.7	127° 35.7	51.7	Spica	158°21.0	-11°18.0
6	151°14.7	$308^{\circ}51.1$	509°18.7	359°52.3	N13°57.6	2°24.5	N13°27.7	142°38.3	N00°51.7	Alkaid	152°51.2	49°10.6
7	$166^{\circ}17.1$	323°52.7	18.6	$14^{\circ}53.7$	57.3	$17^{\circ}26.8$	27.6	157°40.8	51.7	Hadar	148° 34.4	-60°30.0
8	181°19.6	338° 54.2	18.4	29°55.2	56.9	$32^{\circ}29.1$	27.6	172°43.4	51.7	Menkent	147°56.2	-36°30.0
9	196°22.1	353°55.8	• • 18.3	44°56.6	• • 56.6	47°31.4	• • 27.5	187°45.9	• • 51.6		147 30.2 145°46.8	19°02.5
10	211°24.5	8°57.4	18.1	59°58.0	56.3	62°33.7	27.5	202°48.5	51.6	Arcturus		
11	226°27.0	23°58.9	18.0	74°59.5	56.0	77°36.0	27.4	$217^{\circ}51.0$	51.6	Rigil Kent.	139°38.8	-60°56.7
12	241°29.5	39°00.5	509°17.9	90°00.9	N13°55.7	92°38.3	N13°27.4	232°53.5	N00°51.6	Kochab	137°21.0	74°02.5
13	256°31.9	54°02.0	17.7	105°02.3	55.4	107°40.6	27.3	247°56.1	51.6	Zuben'ubi	136°54.7	-16°09.1
14	271°34.4	69°03.6	17.6	120°03.8	55.1	122° 42.9	27.3	262°58.6	51.5	Alphecca	126°02.8	26°37.4
15	286°36.9	84°05.1	17.5	135°05.2	• • 54.8	137°45.3	27.3	278°01.2	51.5	Antares	112°14.3	-26°29.4
16	301°39.3	99°06.7	17.3	150°06.6	54.5	152° 47.6	27.2	293°03.7	51.5	Atria	107°07.7	-69°04.5
17	316°41.8	114°08.2	17.3	165°08.1	54.2	167°49.9	27.2	308°06.3	51.5	Sabik	102°01.4	-15°45.4
18	331°44.3	129°09.8	S09°17.1	180°09.5	N13°53.9	182°52.2	N13°27.1	323°08.8	N00°51.4	Shaula	96°08.7	-37°07.4
19	346°46.7	144°11.3	16.9	195°11.0	53.6	197°54.5	27.1	338°11.3	51.4	Rasalhague	95°57.5	12°32.5
20	1°49.2	159°12.8	16.8	210° 12.4	53.3	212° 56.8	27.1	353° 13.9	51.4	Eltanin	90°42.0	51°29.2
	16°51.6	174° 14.4	16.7	210 12.4 225°13.9	• • 53.0	212 50.8 227°59.1	• • 27.0	8° 16.4	• • 51.4	Kaus Aust.	83°30.8	-34°22.3
21	31°54.1			240° 15.3		243°01.4	26.9	23° 19.0		Vega	80°32.5	38°48.7
22		189°15.9	16.6		52.7				51.3	Nunki	75°46.2	-26°15.8
23	46°56.6	204°17.4	16.4	255° 16.7	52.4	258°03.7	26.9	38°21.5	51.3	Altair	$61^{\circ}58.7$	8°56.5
Mer.p	ass. 19:53	$\nu$ 1.6′ d-0.	.2′ m-4.90	$\nu 1.4' \ d-0$	.3' m0.60	$\nu 2.3' \ d-0$	.0′ m-2.13	$\nu 2.5' \ d-0$	.0′ m0.56	Peacock	53°03.6	-56°39.1
										Deneb	49°24.9	45°22.9
			_		_		_		_	Enif	33°37.3	10°00.1
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	$27^{\circ}31.0$	-46°50.0
0	61°59.0	219°18.9	509°16.3	270°18.2	N13°52.1	273°06.0	N13°26.8	53°24.0	N00°51.3	Fomalhaut	$15^{\circ}12.8$	-29°28.8
1	77°01.5	234°20.4	16.2	285°19.6	51.8	288°08.3	26.8	68°26.6	51.3	Scheat	$13^{\circ}43.6$	28°14.0
2	92°04.0	249°22.0	16.1	300°21.1	51.5	303°10.6	26.8	83°29.1	51.3	Markab	$13^{\circ}28.3$	15°21.2
3	107°06.4	264°23.5	• • 16.0	315°22.5	• • 51.2	318° 12.9	• • 26.7	98°31.7	• • 51.2	N 25 -		
4	122°08.9	279°25.0	15.9	330°24.0	50.9	333° 15.2	26.7	113°34.2	51.2	Nov 21 Sat	SHA	Mer.pass
5	137°11.4	294° 26.5	15.8	345°25.4	50.5	348° 17.6	26.6	128°36.7	51.2	Venus	158°01.8	09:27
6	152°13.8	309°28.0	S09°15.7	0°26.8	N13°50.2	3° 19.9	N13°26.6	143°39.3	N00°51.2	Mars	209°08.8	06:03
7	167°16.3	324°29.5	15.6	15°28.3	49.9	18°22.2	26.5	158°41.8	51.1	Jupiter		05:54
8	182°18.8	339°31.0	15.5	30°29.7	49.6	33°24.5	26.5	173°44.4	51.1	Saturn	351°21.2	20:31
9	197°21.2	354°32.5	• • 15.4	45°31.2	• • 49.3	48°26.8	• • 26.5	188°46.9	• • 51.1	Nov 22 Sun	SHA	Mer.pass
10	212°23.7	9°34.0	15.3	60°32.6	49.0	63°29.1	26.4	203°49.4	51.1		<b>эна</b> 157°41.7	09:24
11	$227^{\circ}26.1$	24°35.4	15.2	75°34.1	48.7	78°31.4	26.4	$218^{\circ}52.0$	51.1		208°43.8	
12	242°28.6	39°36.9	S09°15.1	90°35.5	N13°48.4	93°33.7	N13°26.3	233°54.5	N00°51.0	Mars	208°43.8 211°10.8	06:01
13	$257^{\circ}31.1$	54°38.4	15.0	105°37.0	48.1	108°36.0	26.3	$248^{\circ}57.1$	51.0	Jupiter		05:50
14	272°33.5	69°39.9	14.9	120°38.4	47.8	123°38.4	26.2	263°59.6	51.0	Saturn	351°23.1	20:27
15	287°36.0	84°41.4	• • 14.8	135°39.9	• • 47.5	138°40.7	• • 26.2	$279^{\circ}02.1$	• • 51.0	Nov 23 Mon	SHA	Mer.pass
16	302°38.5	99°42.8	14.7	150°41.3	47.2	153°43.0	26.1	294°04.7	50.9		157° 19.9	09:22
17	317°40.9	114°44.3	14.6	165°42.8	46.9	168°45.3	26.1	309°07.2	50.9	Mars	208° 19.1	05:58
18	332°43.4	129°45.8	S09°14.5	180°44.2	N13°46.6	183°47.6	N13°26.1	324°09.8	N00° 50.9	Jupiter	211°07.0	05:47
19	347°45.9	144°47.2	14.4	195°45.7	46.3	198°49.9	26.0	339° 12.3	50.9	Saturn	351°25.0	20:23
20	2°48.3	159°48.7	14.4	210°47.1	46.0	213°52.2	26.0	354° 14.8	50.9	Jatuill	JJ1 2J.U	20.23
21	17°50.8	174° 50.2	. 14.3	225°48.6	• • 45.7	228° 54.5	25.9	9°17.4	• • 50.8	Horizont	al parallax	
22	32°53.2	189°51.6	14.2	240°50.0	45.4	243°56.9	25.9	24° 19.9	50.8		Venus:	0.4
23	47°55.7	204°53.1	14.1	255°51.5	45.1	258° 59.2	25.8	39°22.4	50.8		Mars:	0.1
Mer.p	ass. 19:49	$\nu$ 1.5′ d-0.	.1′ m-4.90	$\nu 1.4' \ d-0$	.3′ m0.58	$\nu 2.3' \ d-0$	.0′ m-2.14	$\nu 2.5' \ d-0$	.0′ m0.57			

h	Sui			Moon			
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	183°33.9	S19°51.8	52°06.4	12.8'	N07° 17.4	15.3'	58.0'
1 2	198°33.8 213°33.6	52.4 52.9	66°38.2 81°09.9	12.7' 12.7'	07°32.7 07°48.1	15.3' 15.3'	58.0' 58.1'
3	228°33.5	• • 53.5	95°41.6	12.6'	08°03.4	15.3'	58.1'
4	243°33.3	54.1	110°13.2	12.5'	08° 18.6	15.3'	58.1'
5	258°33.2 273°33.0	54.6	124°44.7 139°16.1	12.4'	08°33.9 N08°49.1	15.2'	58.2'
6 7	2/3°33.0 288°32.9	\$19°55.2 55.7	139°16.1 153°47.4	12.3' 12.2'	09°04.3	15.2' 15.2'	58.2' 58.2'
8	303°32.7	56.3	168°18.6	12.1'	09° 19.5	15.2'	58.3'
9	318°32.5	• • 56.8	182°49.7	12.0'	09°34.7	15.1'	58.3'
10 11	333°32.4 348°32.2	57.4 57.9	197°20.8 211°51.7	11.9' 11.9'	09°49.9 10°05.0	15.1' 15.1'	58.4' 58.4'
12	3°32.1	51.9 \$19°58.4	211 31.7 226°22.6	11.8'	N10°20.1	15.1	58.4
13	18°31.9	59.0	240°53.3	11.7'	10°35.1	15.0'	58.5'
14	33°31.8	19°59.5	255°24.0	11.6'	10°50.2	15.0'	58.5'
15 16	48°31.6 63°31.4	20°00.1 00.6	269°54.6 284°25.0	11.5' 11.4'	11°05.1 11°20.1	15.0' 14.9'	58.6' 58.6'
17	78°31.3	01.2	298°55.4	11.3'	11°35.0	14.9'	58.6'
18	93°31.1	S20°01.7	313°25.7	11.2'	N11°49.9	14.8'	58.7'
19	108°31.0 123°30.8	02.3	327°55.8 342°25.9	11.1'	12°04.8 12°19.6	14.8'	58.7'
20 21	123°30.8 138°30.6	02.8 •• 03.3	342°25.9 356°55.8	10.9' 10.8'	12°19.6 12°34.3	14.8' 14.7'	58.8' 58.8'
22	153°30.5	03.9	11°25.7	10.7'	12°49.0	14.7'	58.8'
23	168°30.3	04.4	25°55.4	10.6'	13°03.7	14.6'	58.9'
	SD = 16.2'	d = 0.6'	<del></del>	SE	O = 15.8'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0 0	183°30.2	S20°05.0	GHA 40°25.0	$\nu$ 10.5'	N13° 18.3	а 14.6'	<b>пР</b> 58.9'
1	198°30.0	05.5	54°54.5	10.4'	13°32.9	14.5'	58.9'
2	213°29.8	06.0	69°23.9	10.3'	13° 47.4	14.5'	59.0'
3 4	228°29.7 243°29.5	· · 06.6 07.1	83°53.2 98°22.4	10.2' 10.1'	14°01.8 14°16.2	14.4' 14.3'	59.0' 59.1'
5	258°29.4	07.7	112°51.5	9.9'	14° 30.6	14.3'	59.1'
6	273°29.2	S20°08.2	127°20.4	9.8'	N14°44.8	14.2'	59.1'
7	288°29.0 303°28.9	08.7 09.3	141°49.2 156°17.9	9.7' 9.6'	14°59.0 15°13.2	14.2' 14.1'	59.2' 59.2'
8 9	303 28.9 318°28.7	09.8	150 17.9 170°46.5	9.6 9.5'	15 13.2 15°27.3	14.1 14.0'	59.2'
10	333°28.5	10.3	185°15.0	9.3'	15°41.3	13.9'	59.3'
11	348°28.4	10.9	199°43.3	9.2'	15°55.2	13.9'	59.3'
12 13	3°28.2 18°28.0	\$20°11.4 11.9	214°11.6 228°39.7	9.1' 9.0'	N16°09.1 16°22.9	13.8' 13.7'	59.3' 59.4'
14	33°27.9	12.5	243°07.7	8.9'	16° 36.6	13.6'	59.4'
15	48°27.7	• • 13.0	257°35.5	8.7'	16°50.3	13.6'	59.4'
16	63°27.5 78°27.4	13.5	272°03.2 286°30.8	8.6' 8.5'	17°03.8 17°17.3	13.5'	59.5'
17 18	78 27.4 93°27.2	14.0 \$20°14.6	286 30.8 300°58.3	8.3'	17 17.3 N17°30.7	13.4' 13.3'	59.5' 59.6'
19	108°27.0	15.1	315°25.7	8.2'	17°44.0	13.2'	59.6'
20	123°26.9	15.6	329°52.9	8.1'	17°57.2		59.6'
21 22	138°26.7 153°26.5	· · 16.2 16.7	344°20.0 358°46.9	8.0' 7.8'	18° 10.4 18° 23.4	13.0' 12.9'	59.7' 59.7'
23	168°26.4	17.2	13°13.8	7.7'	18°36.3	12.8'	59.7'
	SD = 16.2'	d = 0.5'		SE	0 = 16.1'		
	CUA		CILA				
Mon 0	<b>GHA</b> 183°26.2	<b>Dec</b> \$20°17.7	<b>GHA</b> 27°40.4	u 7.6'	<b>Dec</b> N18° 49.2	d 12.7'	<b>HP</b> 59.7'
1	198°26.0	18.3	42°07.0	7.4'	19°01.9	12.6'	59.8'
2	213°25.9	18.8	56°33.5	7.3'	19° 14.6	12.5'	59.8'
3 4	228°25.7 243°25.5	· · 19.3 19.8	70°59.8 85°25.9	7.2' 7.0'	19°27.1 19°39.5	12.4' 12.3'	59.8' 59.9'
5	258°25.3	20.3	99°52.0	6.9'	19°51.8	12.2'	59.9'
6	273°25.2	S20°20.9	114°17.9	6.8'	N20°04.1	12.1'	59.9'
7 8	288°25.0 303°24.8	21.4 21.9	128°43.6 143°09.3	6.6' 6.5'	20°16.1 20°28.1	12.0' 11.9'	60.0' 60.0'
9	318°24.7	• • 22.4	145 09.5 157°34.8	6.4	20° 40.0	11.7'	60.0
10	333°24.5	22.9	$172^{\circ}00.2$	6.2'	$20^{\circ}51.7$	11.6'	60.1'
11	348°24.3	23.5 \$20°24.0	186°25.4	6.1'	21°03.3 N21°14.8	11.5'	60.1'
12 13	3°24.1 18°24.0	\$20°24.0 24.5	200°50.5 215°15.5	6.0' 5.8'	N21° 14.8 21° 26.2	11.4' 11.2'	60.1' 60.1'
14	33°23.8	25.0	229°40.3	5.7'	21°37.4	11.1'	60.2'
15	48°23.6	• • 25.5	244°05.0	5.6'	21°48.5	11.0'	60.2'
16 17	63°23.4 78°23.3	26.0 26.5	258°29.6 272°54.0	5.4' 5.3'	21°59.5 22°10.3	10.8' 10.7'	60.2' 60.2'
18	93°23.1	\$20°27.1	287°18.4	5.2'	N22°21.0	10.7	60.3
19	108°22.9	27.6	301°42.5	5.1'	22°31.6	10.4'	60.3'
20	123°22.7	28.1	316°06.6	4.9'	22° 42.0	10.3'	60.3'
21 22	138°22.6 153°22.4	· · 28.6 29.1	330°30.5 344°54.3	4.8' 4.7'	22°52.3 23°02.4	10.1' 10.0'	60.3' 60.4'
23	168°22.2	29.6	359°18.0	4.5'	23°12.4	9.8'	60.4
	SD = 16.2'	d = 0.5'		SE	O = 16.3'		

N 72°         O7:24         O9:08         ■         14:24         16:08           N 70°         O7:11         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         17:07           56°         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         <	Lat.	Twi	light	Sunrise	Sunset	Twi	light
N 70°         07:11         08:38         10:45         12:46         14:53         16:21           68°         07:00         08:17         09:47         13:44         15:15         16:31           66°         06:51         08:00         09:14         14:18         15:32         16:40           64°         06:43         07:46         08:50         14:42         15:46         16:48           62°         06:36         07:34         08:31         15:01         15:58         16:55           60°         06:30         07:24         08:15         15:17         16:08         17:01           N 58°         06:25         07:15         08:02         15:30         16:17         17:07           56°         06:25         07:15         08:02         15:30         16:17         17:07           56°         06:25         07:15         08:02         15:30         16:17         17:07           56°         06:25         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	Lat.	Naut.	Civil	Junisc	Junioce	Civil	Naut.
68°         07:00         08:17         09:47         13:44         15:15         16:31           66°         06:51         08:00         09:14         14:18         15:32         16:40           64°         06:43         07:46         08:50         14:42         15:46         16:48           62°         06:36         07:34         08:31         15:01         15:58         16:55           60°         06:30         07:24         08:15         15:17         16:08         17:01           N 58°         06:25         07:15         08:02         15:30         16:17         17:07           56°         06:20         07:07         07:50         15:41         16:25         17:12           54°         06:15         07:00         07:41         15:51         16:32         17:16           52°         06:11         06:53         07:32         16:00         16:39         17:20           50°         06:07         06:47         07:24         16:08         16:44         17:24           45°         05:58         06:34         07:07         16:25         16:57         17:33           N 40°         05:50         06:23	N 72°	07:24	09:08			14:24	16:08
66° 06:51 08:00 09:14 14:18 15:32 16:40 64° 06:43 07:46 08:50 14:42 15:46 16:48 62° 06:36 07:34 08:31 15:01 15:58 16:55 60° 06:30 07:24 08:15 15:17 16:08 17:01 N 58° 06:25 07:15 08:02 15:30 16:17 17:07 56° 06:20 07:07 07:50 15:41 16:25 17:12 54° 06:15 07:00 07:41 15:51 16:32 17:16 52° 06:11 06:53 07:32 16:00 16:39 17:20 50° 06:07 06:47 07:24 16:08 16:44 17:24 45° 05:58 06:34 07:07 16:25 16:57 17:33 N 40° 05:58 06:34 07:07 16:25 16:57 17:18 17:42 35° 05:43 06:14 06:41 16:51 17:18 17:49 30° 05:36 06:05 06:31 17:01 17:27 17:56 20° 05:23 05:49 06:13 17:19 17:43 18:09 N 10° 05:09 05:35 05:57 17:35 17:57 18:23 0° 04:55 05:20 05:43 17:50 18:12 18:37 S 10° 04:39 05:05 05:28 18:05 18:27 18:54 20° 04:19 04:48 05:12 18:21 18:45 19:13 30° 03:35 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 04:27 04:53 18:40 19:06 19:38 35° 03:39 04:14 04:42 18:51 19:19 19:54 40° 03:20 03:58 04:30 19:03 19:34 20:13 45° 02:55 03:40 04:15 19:18 19:53 20:38 S 50° 01:07 02:35 03:27 20:07 20:59 21:29 58° //// 02:15 03:14 20:19 21:19 ////	N 70°	07:11	08:38	10:45	12:46	14:53	16:21
64° 06:43 07:46 08:50 14:42 15:46 16:48 62° 06:36 07:34 08:31 15:01 15:58 16:55 60° 06:30 07:24 08:15 15:17 16:08 17:01 N 58° 06:25 07:15 08:02 15:30 16:17 17:07 56° 06:20 07:07 07:50 15:41 16:25 17:12 54° 06:15 07:00 07:41 15:51 16:32 17:16 52° 06:11 06:53 07:32 16:00 16:39 17:20 50° 06:07 06:47 07:24 16:08 16:44 17:24 45° 05:58 06:34 07:07 16:25 16:57 17:33 N 40° 05:50 06:23 06:53 16:39 17:08 17:42 35° 05:43 06:14 06:41 16:51 17:18 17:49 30° 05:36 06:05 06:05 06:31 17:01 17:27 17:56 20° 05:23 05:49 06:13 17:01 17:27 17:56 20° 05:23 05:49 06:13 17:01 17:27 17:57 18:23 0° 04:55 05:20 05:43 17:50 18:12 18:37 S 10° 04:39 05:05 05:28 18:05 18:27 18:54 20° 04:19 04:48 05:12 18:21 18:45 19:13 30° 03:55 04:27 04:53 18:40 19:06 19:38 35° 03:39 04:14 04:42 18:51 19:19 19:54 40° 03:20 03:58 04:27 04:53 18:40 19:06 19:38 40° 04:55 03:20 03:58 04:30 19:03 19:34 20:13 45° 02:55 03:40 04:15 19:18 19:53 20:38 S 50° 02:21 03:16 03:56 19:37 20:18 21:13 52° 02:02 03:04 03:48 19:46 20:29 21:32 54° 01:39 02:50 03:38 19:55 20:43 21:56 56° 01:07 02:35 03:74 20:19 21:19 ////		07:00	08:17	09:47	13:44	15:15	16:31
62° 06:36 07:34 08:31 15:01 15:58 16:55 60° 06:30 07:24 08:15 15:17 16:08 17:01 N 58° 06:25 07:15 08:02 15:30 16:17 17:07 56° 06:20 07:07 07:50 15:41 16:25 17:12 54° 06:15 07:00 07:41 15:51 16:32 17:16 52° 06:11 06:53 07:32 16:00 16:39 17:20 50° 06:07 06:47 07:24 16:08 16:44 17:24 45° 05:58 06:34 07:07 16:25 16:57 17:33 N 40° 05:50 06:23 06:53 16:39 17:08 17:42 35° 05:43 06:14 06:41 16:51 17:18 17:49 30° 05:36 06:05 06:31 17:01 17:27 17:56 20° 05:23 05:49 06:13 17:10 17:27 17:57 18:23 0° 04:55 05:20 05:43 17:50 18:12 18:37 S 10° 04:39 05:05 05:28 18:05 18:27 18:54 20° 04:19 04:48 05:12 18:21 18:45 19:13 30° 03:55 04:27 04:53 18:40 19:06 19:38 35° 03:39 04:14 04:42 18:51 19:19 19:54 40° 03:20 03:58 04:27 04:53 18:40 19:06 19:38 45° 02:55 03:40 04:15 19:18 19:53 20:38 S 50° 02:21 03:16 03:56 19:37 20:18 21:13 52° 02:02 03:04 03:48 19:46 20:29 21:32 54° 01:39 02:50 03:38 19:55 20:43 21:56 56° 01:07 02:35 03:27 20:70 20:59 22:29 58° //// 02:15 03:14 20:19 21:19 ////		06:51	08:00	09:14	14:18	15:32	16:40
60°         06:30         07:24         08:15         15:17         16:08         17:01           N 58°         06:25         07:15         08:02         15:30         16:17         17:07           56°         06:20         07:07         07:50         15:41         16:25         17:12           54°         06:15         07:00         07:41         15:51         16:32         17:16           52°         06:11         06:53         07:32         16:00         16:39         17:20           50°         06:07         06:47         07:24         16:08         16:44         17:24           45°         05:58         06:34         07:07         16:25         16:57         17:33           N 40°         05:50         06:23         06:53         16:39         17:08         17:42           35°         05:43         06:14         06:41         16:51         17:18         17:49           30°         05:36         06:05         06:31         17:01         17:27         17:56           20°         05:23         05:49         06:13         17:19         17:43         18:09           N 10°         05:09         05:35	1	06:43	07:46		1	15:46	16:48
N 58°         06:25         07:15         08:02         15:30         16:17         17:07           56°         06:20         07:07         07:50         15:41         16:25         17:12           54°         06:15         07:00         07:41         15:51         16:32         17:16           52°         06:11         06:53         07:32         16:00         16:39         17:20           50°         06:07         06:47         07:24         16:08         16:44         17:24           45°         05:58         06:34         07:07         16:25         16:57         17:33           N 40°         05:50         06:23         06:53         16:39         17:08         17:42           35°         05:43         06:14         06:41         16:51         17:18         17:42           30°         05:36         06:05         06:31         17:01         17:27         17:56           20°         05:23         05:49         06:13         17:19         17:43         18:09           N 10°         05:09         05:35         05:57         17:35         17:57         18:23           0°         04:55         05:20	1						
56°         06:20         07:07         07:50         15:41         16:25         17:12           54°         06:15         07:00         07:41         15:51         16:32         17:16           52°         06:11         06:53         07:32         16:00         16:39         17:20           50°         06:07         06:47         07:24         16:08         16:44         17:24           45°         05:58         06:34         07:07         16:25         16:57         17:33           N 40°         05:50         06:23         06:53         16:39         17:08         17:49           30°         05:36         06:05         06:31         17:01         17:27         17:56           20°         05:23         05:49         06:13         17:19         17:43         18:09           N 10°         05:09         05:35         05:57         17:35         17:57         18:23           0°         04:55         05:20         05:43         17:50         18:12         18:37           5 10°         04:39         05:05         05:28         18:05         18:27         18:54           20°         04:19         04:48	60°	06:30	07:24	08:15	15:17	16:08	17:01
54°         06:15         07:00         07:41         15:51         16:32         17:16           52°         06:11         06:53         07:32         16:00         16:39         17:20           50°         06:07         06:47         07:24         16:08         16:44         17:24           45°         05:58         06:34         07:07         16:25         16:57         17:33           N 40°         05:50         06:23         06:53         16:39         17:08         17:42           35°         05:43         06:14         06:41         16:51         17:18         17:49           30°         05:36         06:05         06:31         17:01         17:27         17:56           20°         05:23         05:49         06:13         17:19         17:43         18:09           N 10°         05:09         05:35         05:57         17:35         17:57         18:23           0°         04:55         05:20         05:43         17:50         18:12         18:37           5 10°         04:39         05:05         05:28         18:05         18:27         18:54           20°         04:19         04:48		06:25	07:15	08:02	15:30	16:17	17:07
52°         06:11         06:53         07:32         16:00         16:39         17:20           50°         06:07         06:47         07:24         16:08         16:44         17:24           45°         05:58         06:34         07:07         16:25         16:57         17:33           N 40°         05:50         06:23         06:53         16:39         17:08         17:42           35°         05:43         06:14         06:41         16:51         17:18         17:49           30°         05:36         06:05         06:31         17:19         17:43         18:09           N 10°         05:09         05:35         05:57         17:35         17:57         18:23           0°         04:55         05:20         05:43         17:50         18:12         18:37           S 10°         04:39         05:05         05:28         18:05         18:27         18:54           20°         04:19         04:48         05:12         18:21         18:45         19:13           30°         03:55         04:27         04:53         18:40         19:06         19:38           35°         03:39         04:14	56°	06:20	07:07	07:50	15:41	16:25	17:12
50°         06:07         06:47         07:24         16:08         16:44         17:24           45°         05:58         06:34         07:07         16:25         16:57         17:33           N 40°         05:50         06:23         06:53         16:39         17:08         17:42           35°         05:43         06:14         06:41         16:51         17:18         17:49           30°         05:36         06:05         06:31         17:01         17:27         17:56           20°         05:23         05:49         06:13         17:19         17:43         18:09           N 10°         05:09         05:35         05:57         17:35         17:57         18:23           0°         04:35         05:20         05:43         17:50         18:12         18:37           S 10°         04:39         05:05         05:28         18:05         18:27         18:54           20°         04:19         04:48         05:12         18:05         18:27         18:54           20°         04:19         04:48         05:12         18:40         19:06         19:38           35°         03:39         04:14		06:15	07:00	07:41	15:51	16:32	17:16
45°         05:58         06:34         07:07         16:25         16:57         17:33           N 40°         05:50         06:23         06:53         16:39         17:08         17:42           35°         05:43         06:14         06:41         16:51         17:18         17:49           30°         05:36         06:05         06:31         17:01         17:27         17:56           20°         05:23         05:49         06:13         17:19         17:43         18:09           N 10°         05:09         05:35         05:57         17:35         17:57         18:23           0°         04:55         05:20         05:43         17:50         18:12         18:37           S 10°         04:39         05:05         05:28         18:05         18:27         18:54           20°         04:19         04:48         05:12         18:31         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			06:53	07:32	16:00		17:20
N 40° 05:50 06:23 06:53 16:39 17:08 17:42 35° 05:43 06:14 06:41 16:51 17:18 17:49 30° 05:36 06:05 06:31 17:01 17:27 17:56 20° 05:23 05:49 06:13 17:19 17:43 18:09 N 10° 05:09 05:35 05:57 17:35 17:57 18:23 0° 04:55 05:20 05:43 17:50 18:12 18:37 S 10° 04:39 05:05 05:28 18:05 18:27 18:54 20° 04:19 04:48 05:12 18:21 18:45 19:13 30° 03:55 04:27 04:53 18:40 19:06 19:38 35° 03:39 04:14 04:42 18:51 19:19 19:54 40° 03:20 03:58 04:30 19:03 19:34 20:13 45° 02:55 03:40 04:15 19:18 19:53 20:38 S 50° 02:21 03:16 03:56 19:37 20:18 21:13 52° 02:02 03:04 03:48 19:46 20:29 21:32 54° 01:39 02:50 03:38 19:55 20:43 21:56 56° 01:07 02:35 03:14 20:19 21:19 ////							
35°         05:43         06:14         06:41         16:51         17:18         17:49           30°         05:36         06:05         06:31         17:01         17:27         17:56           20°         05:23         05:49         06:13         17:19         17:43         18:09           N 10°         05:09         05:35         05:57         17:35         17:57         18:23           0°         04:55         05:20         05:43         17:50         18:12         18:37           S 10°         04:39         05:05         05:28         18:05         18:27         18:54           20°         04:19         04:48         05:12         18:21         18:45         19:13           30°         03:55         04:27         04:53         18:40         19:06         19:38           35°         03:39         04:14         04:42         18:51         19:19         19:54           40°         03:20         03:58         04:30         19:03         19:34         20:13           45°         02:55         03:40         04:15         19:18         19:53         20:38           S 50°         02:21         03:16	45°	05:58	06:34	07:07	16:25	16:57	17:33
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		05:50	06:23	06:53	16:39	17:08	17:42
20°         05:23         05:49         06:13         17:19         17:43         18:09           N 10°         05:09         05:35         05:57         17:35         17:57         18:23           0°         04:55         05:20         05:43         17:50         18:12         18:37           S 10°         04:39         05:05         05:28         18:05         18:27         18:54           20°         04:19         04:48         05:12         18:21         18:45         19:13           30°         03:55         04:27         04:53         18:40         19:06         19:38           35°         03:39         04:14         04:42         18:51         19:19         19:54           40°         03:20         03:58         04:30         19:03         19:34         20:13           45°         02:55         03:40         04:15         19:18         19:53         20:38           5 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		05:43	06:14	06:41	16:51	17:18	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		05:36	06:05	06:31	17:01	17:27	
0°         04:55         05:20         05:43         17:50         18:12         18:37           S 10°         04:39         05:05         05:28         18:05         18:27         18:54           20°         04:19         04:48         05:12         18:21         18:45         19:13           30°         03:55         04:27         04:53         18:40         19:06         19:38           35°         03:39         04:14         04:42         18:51         19:19         19:54           40°         03:20         03:58         04:30         19:03         19:34         20:13           45°         02:55         03:40         04:15         19:18         19:53         20:38           5 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							
S 10°         04:39         05:05         05:28         18:05         18:27         18:54           20°         04:19         04:48         05:12         18:21         18:45         19:13           30°         03:55         04:27         04:53         18:40         19:06         19:38           35°         03:39         04:14         04:42         18:51         19:19         19:54           40°         03:20         03:58         04:30         19:03         19:34         20:13           45°         02:55         03:40         04:15         19:18         19:53         20:38           5 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           56°         01:39         02:35         03:27         20:07         20:59         22:29           58°         ////         02:15         03:14         20:19         21:19         ////					l		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0°	04:55	05:20	05:43	17:50	18:12	18:37
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>5</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         ////		04:39	05:05	05:28	18:05	18:27	18:54
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           \$ 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         ////		04:19	04:48	05:12	18:21		19:13
40°         03:20         03:58         04:30         19:03         19:34         20:13           45°         02:55         03:40         04:15         19:18         19:53         20:38           S 50°         02:21         03:16         03:56         19:37         20:18         21:13           52°         02:02         03:04         03:48         19:46         20:29         21:32           54°         01:39         02:50         03:38         19:55         20:43         21:56           56°         01:07         02:35         03:27         20:07         20:59         22:29           58°         ////         02:15         03:14         20:19         21:19         ////							
45°         02:55         03:40         04:15         19:18         19:53         20:38           \$ 50°         02:21         03:16         03:56         19:37         20:18         21:13           52°         02:02         03:04         03:48         19:46         20:29         21:32           54°         01:39         02:50         03:38         19:55         20:43         21:56           56°         01:07         02:35         03:27         20:07         20:59         22:29           58°         ////         02:15         03:14         20:19         21:19         ////							
S 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         ////							
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         ////		02:55	03:40	04:15	19:18	19:53	20:38
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     ////					19:37	20:18	21:13
56° 01:07 02:35 03:27 20:07 20:59 22:29 58° //// 02:15 03:14 20:19 21:19 ////							
58°   /// 02:15 03:14   20:19 21:19 ///							
<b>S</b> 60°   /// 01:50 02:59   20:35 21:45 ///							
	<b>S</b> 60°	////	01:50	02:59	20:35	21:45	////

Lat.			Moonris	e		Moonset	į.
Lat.		Sat	Sun	Mon	Sat	Sun	Mon
N 72	0	12:39	11:37		04:26	07:13	
N 70	0	12:55	12:15		04:13	06:37	
68		13:08	12:41	11:47	04:03	06:12	09:01
66		13:19	13:02	12:36	03:54	05:53	08:14
64		13:28	13:19	13:07	03:47	05:38	07:43
62		13:35	13:33	13:31	03:40	05:25	07:21
60		13:42	13:44	13:50	03:35	05:15	07:03
N 58		13:48	13:55	14:06	03:30	05:06	06:48
56		13:53	14:04	14:19	03:26	04:57	06:35
54		13:58	14:12	14:31	03:22	04:50	06:24
52		14:03	14:19	14:41	03:19	04:44	06:14
50		14:07	14:26	14:51	03:16	04:38	06:05
45	D	14:15	14:40	15:11	03:09	04:26	05:47
N 40		14:23	14:51	15:27	03:04	04:16	05:32
35		14:29	15:02	15:41	02:59	04:07	05:19
30		14:34	15:10	15:53	02:55	04:00	05:08
20		14:44	15:26	16:13	02:48	03:47	04:50
N 10		14:53	15:39	16:32	02:42	03:35	04:33
0'		15:01	15:52	16:49	02:36	03:25	04:18
<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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	62°58.2	219°54.5	509°14.0	270°53.0	N13°44.8	274°01.5	N13°25.8	54°25.0	N00°50.8			
1	78°00.6	234°56.0	14.0	270 55.0 285° 54.4	44.5	289°03.8	25.8	69°27.5	50.8	Alpheratz	357°33.0	29°14.6
	93°03.1				44.3	304°06.1		84°30.0		Ankaa	353°05.4	-42°09.7
2		249°57.4	13.9	300°55.9			25.7		50.7	Schedar	349°28.9	56°41.4
3	108°05.6	264°58.9	· · 13.8	315°57.3	• • 43.9	319°08.4	• • 25.7	99°32.6	• • 50.7	Diphda	348°45.6	$-17^{\circ}50.3$
4	123°08.0	280°00.3	13.8	330°58.8	43.6	334°10.8	25.6	114°35.1	50.7	Achernar	335°18.6	-57°06.1
5	138° 10.5	295°01.7	13.7	346°00.2	43.3	349°13.1	25.6	129°37.7	50.7	Hamal	327°49.1	23°35.5
6	153° 13.0	310°03.2	S09°13.6	1°01.7	N13°43.0	4°15.4	N13°25.6	144°40.2	N00°50.7	Polaris	312°43.8	89°22.7
7	168° 15.4	325°04.6	13.6	16°03.2	42.7	19°17.7	25.5	159°42.7	50.6	Acamar	315°10.2	-40°11.8
8	183° 17.9	340°06.0	13.5	31°04.6	42.4	34°20.0	25.5	174°45.3	50.6	Menkar	314°04.2	4°11.8
9	198°20.4	355°07.4	• • 13.4	46°06.1	• • 42.1	49°22.3	• • 25.4	189°47.8	• • 50.6	1		
10	213°22.8	10°08.9	13.4	61°07.5	41.8	64°24.7	25.4	204°50.3	50.6	Mirfak	308°25.5	49°57.5
11	228°25.3	25°10.3	13.3	76°09.0	41.5	79°27.0	25.4	219°52.9	50.5	Aldebaran	290°37.5	16°33.8
12	243°27.7	40°11.7	S09°13.3	91°10.5	N13°41.2	94°29.3	N13°25.3	234°55.4	N00°50.5	Rigel	281°02.1	-8°10.2
13	258° 30.2	55°13.1	13.2	106°11.9	40.9	109°31.6	25.3	249°57.9	50.5	Capella	280°19.1	46°01.4
14	273°32.7	70°14.5	13.2	121° 13.4	40.6	124°33.9	25.2	265°00.5	50.5	Bellatrix	278°20.9	6°22.5
15	288°35.1	85°15.9	13.1	136° 14.9	. 40.3	139°36.3	25.2	280°03.0	• • 50.5	Elnath	277°59.6	28°37.8
						154°38.6		295°05.5		Alnilam	275°35.9	$-1^{\circ}11.0$
16	303°37.6	100°17.3	13.1	151°16.3	40.0		25.1		50.4	Betelgeuse	$270^{\circ}50.1$	7°24.8
17	318°40.1	115°18.7	13.0	166° 17.8	39.7	169°40.9	25.1	310°08.1	50.4	Canopus	263°51.2	-52°42.4
18	333°42.5	130°20.1	S09°13.0	181° 19.2	N13°39.4	184°43.2	N13°25.1	325°10.6	N00°50.4	Sirius	258°24.6	-16°45.1
19	348°45.0	145°21.5	12.9	196°20.7	39.1	199°45.5	25.0	340°13.1	50.4	Adhara	255°04.4	-29°00.4
20	3°47.5	160°22.9	12.9	211°22.2	38.8	214°47.9	25.0	355°15.7	50.4	Procyon	244°49.0	5°09.4
21	$18^{\circ}49.9$	175°24.3	• • 12.9	226°23.6	• • 38.5	229°50.2	• • 24.9	10°18.2	• • 50.4	Pollux	244 49.0 243°15.2	27°57.5
22	33°52.4	190°25.7	12.8	241°25.1	38.2	244°52.5	24.9	25°20.7	50.3	1		
23	48°54.9	205°27.1	12.8	256° 26.6	37.9	259°54.8	24.9	40°23.3	50.3	Avior	234°13.8	-59°35.5
										Suhail	222°45.0	-43°32.2
Mer.p	ass. 19:45	$\nu$ 1.4′ $d$ -0	.1′ m-4.90	$\nu$ 1.5′ $d$ -0	.3′ m0.57	$\nu 2.3' \ d-0$	.0′ m-2.14	$\nu$ 2.5′ $d$ -0	0.0′ m0.57	Miaplacidus	221°37.7	-69°49.3
										Alphard	217°46.2	-8°46.4
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°32.8	$11^{\circ}50.1$
										Dubhe	193°39.3	$61^{\circ}36.0$
0	63°57.3	220°28.5	509°12.8	271°28.1	N13°37.6	274°57.1	N13°24.8	55°25.8	N00°50.3	Denebola	$182^{\circ}23.5$	$14^{\circ}25.2$
1	78° 59.8	235°29.8	12.7	286° 29.5	37.4	289°59.5	24.8	70°28.3	50.3	Gienah	175°42.2	$-17^{\circ}41.4$
2	94°02.2	250°31.2	12.7	301°31.0	37.1	305°01.8	24.7	85°30.9	50.3	Acrux	172°58.8	-63°14.7
3	109°04.7	265°32.6	• • 12.7	$316^{\circ}32.5$	• • 36.8	320°04.1	• • 24.7	100°33.4	• • 50.2		171°50.3	-57°15.6
4	124°07.2	280°34.0	12.6	331°33.9	36.5	335°06.4	24.7	115°35.9	50.2	Alioth	166°12.0	55°48.6
5	139°09.6	295°35.3	12.6	346°35.4	36.2	350°08.8	24.6	130°38.5	50.2	Spica	158° 20.9	-11°18.0
6	154°12.1	310°36.7	S09°12.6	1°36.9	N13°35.9	5°11.1	N13°24.6	145°41.0	N00°50.2		150° 20.9° 152° 51.2	49°10.6
7	$169^{\circ}14.6$	325°38.1	12.6	16°38.3	35.6	20°13.4	24.6	160°43.5	50.2	Alkaid		
8	184°17.0	340°39.4	12.6	31°39.8	35.3	35°15.7	24.5	175°46.1	50.1	Hadar	148°34.4	-60°30.0
9	199° 19.5	355°40.8	12.5	46°41.3	35.0	50°18.1	24.5	190°48.6	50.1	Menkent	147°56.2	-36°30.0
10	214°22.0	10°42.1	12.5	61°42.8	34.7	65°20.4	24.4	205°51.1	50.1	Arcturus	145°46.8	19°02.5
										Rigil Kent.	139°38.8	-60°56.6
11	229°24.4	25°43.5	12.5	76°44.2	34.4	80°22.7	24.4	220°53.7	50.1	Kochab	$137^{\circ}21.0$	74°02.5
12	244°26.9	40°44.8	S09°12.5	91°45.7	N13°34.1	95°25.0	N13°24.4	235°56.2	N00°50.1	Zuben'ubi	136°54.6	$-16^{\circ}09.1$
13	259°29.4	55°46.2	12.5	106°47.2	33.8	110°27.4	24.3	250°58.7	50.0	Alphecca	126°02.8	26°37.4
14	274°31.8	70°47.5	12.5	121°48.7	33.5	125°29.7	24.3	266°01.3	50.0	Antares	112° 14.3	-26°29.4
15	289° 34.3	85°48.9	• • 12.5	$136^{\circ}50.1$	• • 33.2	140°32.0	• • 24.2	281°03.8	• • 50.0	Atria	107°07.7	-69°04.5
16	304°36.7	100°50.2	12.5	151°51.6	32.9	155°34.3	24.2	296°06.3	50.0	Sabik	102°01.4	-15°45.4
17	319°39.2	115°51.5	12.4	$166^{\circ}53.1$	32.6	170°36.7	24.2	311°08.9	50.0	Shaula	96°08.7	-37°07.4
18	334°41.7	130°52.9	509°12.4	181°54.6	N13°32.3	185°39.0	N13°24.1	326°11.4	N00°50.0	1	95°57.5	12°32.5
19	349°44.1	145°54.2	12.4	196°56.1	32.0	200°41.3	24.1	341°13.9	49.9	Rasalhague		
20	4°46.6	160°55.5	12.4	211°57.5	31.7	215°43.7	24.1	356°16.4	49.9	Eltanin	90°42.0	51°29.2
21	19°49.1	175°56.9	12.4	226° 59.0	31.5	230°46.0	24.0	11°19.0	• • 49.9	Kaus Aust.	83°30.8	-34°22.3
22	34°51.5	190°58.2	12.4	242°00.5	31.2	245°48.3	24.0	26°21.5	49.9	Vega	80°32.5	38°48.7
										Nunki	75°46.2	-26°15.8
23	49°54.0	205°59.5	12.5	257°02.0	30.9	260°50.6	23.9	41°24.0	49.9	Altair	61°58.7	8°56.5
Mer.n	ass. 19:41	$\nu$ 1.4′ d-0	.0′ m-4.91	$\nu 1.5' \ d-0$	.3′ m0.55	$\nu 2.3' \ d-0$	.0′ m-2.15	$\nu 2.5' \ d-0$	0.0′ m0.58	Peacock	53°03.6	$-56^{\circ}39.1$
										Deneb	49°24.9	45°22.9
										Enif	33°37.3	10°00.1
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.0	-46°50.0
0	64°56.5	221°00.8	S09°12.5	272°03.5	N13°30.6	275°53.0	N13°23.9	56°26.6	N00°49.9	Fomalhaut	15°12.8	-29°28.8
1	79°58.9	$236^{\circ}02.1$	12.5	287°04.9	30.3	290°55.3	23.9	$71^{\circ}29.1$	49.8	Scheat	13°43.6	28°14.0
2	95°01.4	251°03.4	12.5	302°06.4	30.0	305°57.6	23.8	86°31.6	49.8	Markab	13° 28.3	15°21.2
3	$110^{\circ}03.9$	266°04.7	• • 12.5	317°07.9	• • 29.7	321°00.0	• • 23.8	101°34.1	• • 49.8	Iviainab	10.0	1.2
4	125°06.3	281°06.1	12.5	332°09.4	29.4	336°02.3	23.8	116°36.7	49.8	Nov 24 Tue	SHA	Mer.pass
5	140°08.8	296°07.4	12.5	347° 10.9	29.1	351°04.6	23.7	131°39.2	49.8		156° 56.3	09:19
6	155°11.2	311°08.7	S09°12.5	2°12.4	N13°28.8	6°07.0	N13°23.7	146°41.7	N00°49.7	Mars		05:56
7	170° 13.7	326°10.0	12.5	17° 13.8	28.5	21°09.3	23.7	161°44.3	49.7	1	211°03.3	05:43
										Saturn	351°26.8	20:19
8	185° 16.2	341°11.2	12.6	32°15.3	28.2	36°11.6	23.6	176°46.8	49.7	Saturn	JJ1 ZU.0	20:19
9	200° 18.6	356°12.5	•• 12.6	47°16.8	• • 27.9	51°14.0	• • 23.6	191°49.3	• • 49.7	Nov 25 Wed	SHA	Mer.pass
10	215°21.1	11°13.8	12.6	62°18.3	27.6	66°16.3	23.5	206°51.8	49.7	1	156°31.1	09:17
11	230°23.6	26°15.1	12.6	77° 19.8	27.4	81°18.6	23.5	221°54.4	49.7	Mars		05:54
12	245°26.0	41°16.4	S09°12.7	92°21.3	N13°27.1	96°20.9	N13°23.5	236°56.9	N00°49.6	Jupiter		05:39
13	260°28.5	56°17.7	12.7	107°22.8	26.8	111°23.3	23.4	251°59.4	49.6	Saturn	351° 28.5	
14	275°31.0	71°19.0	12.7	122°24.3	26.5	126°25.6	23.4	267°02.0	49.6	Saturn	301 20.5	20:15
15	290°33.4	86°20.2	• • 12.7	137°25.7	• • 26.2	141°28.0	• • 23.4	282°04.5	• • 49.6	Nov 26 Thu	SHA	Mer.pass
16	305°35.9	101°21.5	12.8	152° 27.2	25.9	156°30.3	23.3	297°07.0	49.6		156°04.4	09:15
17	320°38.4	116°22.8	12.8	167°28.7	25.6	171°32.6	23.3	312°09.5	49.6	Mars		05:51
18	335°40.8	131°24.1	S09°12.8	182°30.2	N13°25.3	186°35.0	N13°23.3	327°12.1	N00°49.6	Jupiter		05:36
19	350°43.3	146°25.3	12.9	197°31.7	25.0	201°37.3	23.2	342°14.6	49.5			
20	5° 45.7	140°25.5	12.9	212°33.2	24.7	201 37.3 216°39.6	23.2	357°17.1	49.5	Saturn	351°30.1	20:11
										Horizont	al parallax	
21	20°48.2	176°27.8	• • 13.0	227°34.7	• • 24.5	231°42.0	• • 23.2	12°19.6	• • 49.5	1101120111	Venus:	0.4
22	35°50.7	191°29.1	13.0	242°36.2	24.2	246°44.3	23.1	27°22.2	49.5		Mars:	0.4
23	50°53.1	206°30.4	13.1	257°37.7	23.9	261°46.6	23.1	42°24.7	49.5		iviars:	0.1
Mars	ass. 19:37	v1 3/ d0	0′ m-4.91	1/1 5/ d O	.3′ m0.54	1/2 3/ 40	.0′ m-2.16	1/25/ 40	0.0′ m0.58			
iviei.p	uss. 15.51	ν1.5 u0.	O 111-4.31	ν1.5 U-0	.5 1110.54	ν 2.5 u-0	111-2.10	ν Δ.σ u-C	1110.30			

J11 —	011010=	T0.1227 Sec						
h	Sui	า			Moon			
Tue	GHA	Dec	GHA	ν	Dec	d	HP	
0	183°22.0	\$20°30.1	13°41.5	4.4'	N23°22.2	9.7'	60.4	
1	198°21.9	30.6	28°04.9	4.3'	23°31.8	9.5'	60.4	
2	213°21.7	31.1	42°28.2	4.2'	23°41.4	9.4'	60.5	
3	228°21.5	• • 31.6	56°51.4	4.0'	23°50.7	9.2'	60.5'	
4	243°21.3	32.1	$71^{\circ}14.4$	3.9'	23°59.9	9.0'	60.5'	
5	258°21.1	32.6	85°37.3	3.8'	24°08.9	8.9'	60.5'	
6	273°21.0	520°33.2	$100^{\circ}00.1$	3.7'	N24° 17.8	8.7'	60.5'	
7	288° 20.8	33.7	114°22.8	3.6'	24°26.5	8.5'	60.6'	
8	303°20.6	34.2	128°45.4	3.4'	24°35.0	8.4'	60.6'	
9	318°20.4	• • 34.7	143°07.8	3.3'	24°43.4	8.2'	60.6'	
10	333°20.2	35.2	157°30.2 171°52.4	3.2'	24°51.6	8.0'	60.6	
11	348°20.1	35.7 \$20°36.2	171°52.4 186°14.5	3.1'	24°59.6	7.8'	60.6'	
12 13	3° 19.9 18° 19.7	36.7	186° 14.5 200° 36.5	3.0' 2.9'	N25°07.4 25°15.1	7.7' 7.5'	60.7' 60.7'	
14	33° 19.5	30.7 37.2	200 50.5 214°58.4	2.8'	25°22.5	7.3	60.7	
15	48° 19.3	• • 37.7	214 30.4 229°20.2	2.7'	25°29.8	7.1	60.7	
16	63° 19.2	38.2	243°41.9	2.6'	25°36.9	6.9'	60.7'	
17	78° 19.0	38.7	258°03.5	2.5'	25°43.8	6.7'	60.7'	
18	93° 18.8	S20°39.2	272°25.0	2.4'	N25° 50.6	6.5'	60.7'	
19	108° 18.6	39.7	286°46.4	2.3'	25°57.1	6.4'	60.8'	
20	123°18.4	40.2	$301^{\circ}07.7$	2.2'	$26^{\circ}03.5$	6.2'	60.8'	
21	138° 18.2	• • 40.6	$315^{\circ}28.9$	2.1'	$26^{\circ}09.6$	6.0'	60.8'	
22	153° 18.1	41.1	329°50.0	2.0'	26° 15.6	5.8'	60.8'	
23	168° 17.9	41.6	344°11.0	2.0'	26°21.4	5.6'	60.8'	
	SD = 16.2'	d = 0.5'		SI	D = 16.5'			
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	183° 17.7 198° 17.5	\$20°42.1	358°32.0 12°52.9	1.9' 1.8'	N26°27.0 26°32.3	5.4' 5.2'	60.8' 60.8'	
1 2	198° 17.5 213° 17.3	42.6 43.1	12°52.9 27°13.7	1.8	26°32.3 26°37.5	5.2'	60.8	
3	213 17.3 228° 17.1	. 43.1	41°34.4	1.6'	26°42.5	5.0 4.8'	60.9	
4	243°16.9	44.1	55°55.0	1.6'	26°47.2	4.6'	60.9	
5	258° 16.8	44.6	70° 15.6	1.5'	26°51.8	4.4'	60.9	
6	273°16.6	S20°45.1	84°36.1	1.5'	N26° 56.2	4.2'	60.9'	
7	288°16.4	45.6	98° 56.6	1.4'	27°00.3	3.9'	60.9'	
8	303° 16.2	46.0	113° 17.0	1.3'	27°04.3	3.7'	60.9'	
9	318°16.0	• • 46.5	127°37.3	1.3'	27°08.0	3.5'	60.9'	
10	333°15.8 348°15.6	47.0	141°57.6 156°17.8	1.2' 1.2'	27°11.5 27°14.9	3.3' 3.1'	60.9'	
11 12	348 15.0 3°15.4	47.5 \$20°48.0	150 17.8 170°38.0	1.1'	N27°18.0	2.9'	60.9' 60.9'	
13	18° 15.2	48.5	184°58.1	1.1'	27° 20.9	2.7	60.9	
14	33° 15.1	49.0	199° 18.2	1.1'	27°23.5	2.5'	60.9'	
15	48° 14.9	• • 49.4	213°38.3	1.0'	27°26.0	2.3'	60.9	
16	63°14.7	49.9	227°58.3	1.0'	27°28.3	2.0'	60.9'	
17	78° 14.5	50.4	$242^{\circ}18.3$	1.0'	$27^{\circ}30.3$	1.8'	60.9'	
18	93°14.3	\$20°50.9	256°38.3	1.0'	N27°32.1	1.6'	60.9'	
19	108° 14.1	51.4	270°58.3		27°33.7	1.4'	60.9'	
20	123°13.9	51.8	285°18.2	0.9'	27°35.1	1.2'	60.9'	
21	138°13.7	• • 52.3	299°38.1	0.9'	27°36.3	1.0'	60.9'	
22 23	153° 13.5 168° 13.3	52.8 53.3	313°58.0 328°17.9	0.9' 0.9'	27°37.2 27°38.0	0.7' 0.5'	60.9' 60.9'	
23			320 17.9			0.5	00.9	
	SD = 16.2'	d = 0.5'	SD = 16.6'					
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	183°13.1	\$20°53.8	342°37.8	0.9'	N27°38.5	0.3	60.9	
1	198° 12.9	54.2	356° 57.7	0.9'	27°38.8	0.1'	60.9'	
2	213°12.8	54.7	$11^{\circ}17.6$	0.9'	27°38.9	-0.1'	60.9'	
3	228° 12.6	• • 55.2	25°37.5	0.9'	27°38.8	-0.3'	60.9'	
4	243°12.4	55.7	39°57.4	0.9'	27°38.4	-0.6'	60.9'	
5	258°12.2	56.1	54°17.3	0.9'	27°37.9	-0.8'	60.9'	
6	273°12.0 288°11.8	\$20°56.6	68°37.3	1.0'	N27°37.1	-1.0'	60.9'	
7 2	288°11.8 303°11.6	57.1 57.5	82°57.2 97°17.2	1.0' 1.0'	27°36.1 27°34.9	-1.2' -1.4'	60.9' 60.9'	
8 9	303°11.6 318°11.4	57.5 • • 58.0	97°17.2 111°37.2	1.0'	27° 34.9 27° 33.5	-1.4° -1.6'	60.9'	
10	318 11.4 333° 11.2	58.5	111 37.2 125°57.2	1.1'	27°33.5	-1.0 -1.9'	60.9	
11	348°11.0	59.0	140°17.3	1.1'	27°30.0	-2.1'	60.9	
12	3°10.8	S20°59.4	154° 37.4	1.2'	N27°27.9	-2.3	60.9	
13	$18^{\circ}10.6$	20°59.9	168°57.6	1.2'	27°25.6	-2.5'	60.9'	
14	33° 10.4	21°00.4	183° 17.8	1.2'	27°23.1	-2.7'	60.9'	
15	48°10.2	• • 00.8	197°38.0	1.3'	27°20.4	-2.9'	60.9'	
16	63°10.0	01.3	211°58.3	1.3'	27°17.5	-3.1'	60.9'	
17	78°09.8 93°09.6	01.8 <b>S</b> 21°02.2	226°18.7	1.4'	27°14.4 N27°11.0	-3.3'	60.8'	
18 19	93°09.6 108°09.4	02.7	240°39.1 254°59.5	1.5' 1.5'	N27°11.0 27°07.5	-3.5' -3.7'	60.8' 60.8'	
20	108 09.4 123°09.2	02.7	269°20.1	1.6'	27°07.5	-3. <i>1</i> -4.0'	60.8	
21	138°09.0	03.6	283°40.7	1.7'	26° 59.8	-4.2	60.8	
22	153°08.8	04.1	298°01.3	1.7'	26°55.6	-4.4'	60.8	
22	168°08.6	04.5	$312^{\circ}22.1$	1.8'	26°51.3	-4.6'	60.8'	
23	100 00.0							
23	SD = 16.2'	d = 0.5'		SI	D = 16.6'			

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	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
<b>N</b> 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	e		Moonset	:
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
<b>N</b> 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
<b>N</b> 40°	16:12	17:09	18:17	06:51	08:08	09:17
35°	16:29	17:27	18:36	06:34	07:49	08:58
30°	16:43	17:44	18:52	06:21	07:33	08:42
20°	17:09	18:11	19:19	05:57	07:06	08:14
<b>N</b> 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
<b>S</b> 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

		Sun					
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	15-17	l
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	99-97%	Į
24	13:28	13:20	11:47	-:-	11:34		
25	13:11	13:02	11:47	00:06	12:39		l
26	12:53	12:43	11:47	01:13	13:46		ĺ

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	turn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	65°55.6	221°31.6	S09°13.1	272°39.2	N13°23.6	276°49.0	N13°23.1	57°27.2	N00°49.5			
1	80°58.1	236°32.9	13.1	287°40.7	23.3	291°51.3	23.0	72°29.7	49.4	Alpheratz	357°33.0	29° 14.6
2	96°00.5	251°34.1	13.1	302°42.2	23.0	306°53.6	23.0	87°32.3	49.4	Ankaa	353°05.4	-42°09.7
3	111°03.0	266°35.4	. 13.2	317°43.7	• • 22.7	321°56.0	• • 23.0	102°34.8	• • 49.4	Schedar	349°28.9	56°41.4
4	126°05.5	281°36.6	13.2	332°45.2	22.4	336°58.3	22.9	102 34.8 117°37.3	49.4	Diphda	348°45.6	-17°50.3
5	141°07.9	201 30.0 296°37.8		347°46.7		352°00.7		117 37.3 132°39.8		Achernar	$335^{\circ}18.6$	-57°06.1
			13.3	2°48.2	22.1		22.9		49.4	Hamal	$327^{\circ}49.1$	23°35.5
6	156°10.4	311°39.1	S09°13.4		N13°21.9	7°03.0	N13°22.8	147°42.4	N00°49.4	Polaris	312°43.7	89°22.7
7	171°12.9	326°40.3	13.5	17°49.7	21.6	22°05.3	22.8	162°44.9	49.3	Acamar	$315^{\circ}10.2$	-40°11.8
8	186°15.3	341°41.5	13.5	32°51.2	21.3	37°07.7	22.8	177°47.4	49.3	Menkar	314°04.2	4°11.8
9	201°17.8	356°42.8	• • 13.6	47°52.7	• • 21.0	52° 10.0	• • 22.7	192°49.9	• • 49.3	Mirfak	308°25.5	49° 57.5
10	216°20.2	11°44.0	13.6	62°54.2	20.7	67°12.4	22.7	207°52.5	49.3	Aldebaran	290°37.5	16°33.8
11	231°22.7	26°45.2	13.7	77°55.7	20.4	82°14.7	22.7	222°55.0	49.3	Rigel	281°02.0	-8°10.2
12	246°25.2	41°46.4	S09°13.8	92°57.2	N13°20.1	97° 17.0	N13°22.6	237°57.5	N00°49.3	Capella	280°19.1	46°01.5
13	261°27.6	56°47.7	13.8	107°58.7	19.8	112° 19.4	22.6	253°00.0	49.3	Bellatrix	278°20.9	6°22.5
14	276°30.1	71°48.9	13.9	123°00.2	19.6	127°21.7	22.6	268°02.6	49.2	Elnath	277°59.5	28° 37.8
15	291°32.6	86°50.1	• • 14.0	138°01.7	• 19.3	142°24.1	• • 22.5	283°05.1	• • 49.2	Alnilam	275°35.8	-1°11.0
16	306°35.0	101°51.3	14.0	153°03.2	19.0	157°26.4	22.5	298°07.6	49.2	Betelgeuse	270°50.1	7°24.7
17	321°37.5	116°52.5	14.1	168°04.7	18.7	172°28.7	22.5	313°10.1	49.2	Canopus	263°51.2	-52°42.4
18	336°40.0	131°53.7	S09°14.2	183°06.2	N13°18.4	187°31.1	N13°22.5	328° 12.6	N00°49.2	Sirius	258°24.6	-16°45.1
19	351°42.4	146°54.9	14.2	198°07.7	18.1	202°33.4	22.4	343° 15.2	49.2	Adhara	255°04.3	-29°00.4
20	6°44.9	161°56.1	14.3	213°09.2	17.8	217°35.8	22.4	358° 17.7	49.2	Procyon	244°49.0	5°09.3
21	21°47.4	176°57.3	• • 14.4	228°10.7	• • 17.6	232°38.1	• • 22.4	13°20.2	• • 49.1	Pollux	243°15.2	27°57.5
22	36°49.8	191°58.5	14.5	243°12.2	17.3	247°40.5	22.3	28°22.7	49.1	Avior	234°13.7	-59° 35.5
23	51°52.3	206°59.7	14.6	258°13.7	17.0	262°42.8	22.3	43°25.3	49.1	Suhail	222°45.0	-43°32.2
Mern	ass. 19:33	v1 3' d0	0′ m-4.90	v1.5' d.0	0.3′ m0.52	v2 3' d-∩	.0′ m-2.16	v25' d 0	0.0′ m0.59	Miaplacidus	221°37.6	-69°49.3
ivier.p	19.33	ν1.3 dU.	0 111-4.90	ν1.5 α-U	,.J IIIU.5∠	ν2.3 U-U	.0 111-2.10	ν2.5 U-C	1110.39	Alphard	221 37.6 217°46.1	-8°46.5
										Regulus	217 40.1 207°32.8	-8 40.5 11°50.1
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	_	207 32.8 193°39.3	61°36.0
0	66°54.7	222°00.9	509°14.6	273°15.2	N13°16.7	277°45.1	N13°22.3	58°27.8	N00°49.1	Dubhe	193°39.3 182°23.5	14°25.2
1	81°57.2	237°02.1	14.7	288°16.7	16.4	292°47.5	22.2	73°30.3	49.1	Denebola	182°23.5 175°42.2	
2	96°59.7	252°03.3	14.8	303°18.2	16.1	307°49.8	22.2	88°32.8	49.1	Gienah		-17°41.4
3	112°02.1	267°04.5	• • 14.9	318°19.8	• • 15.8	322°52.2	22.2	103°35.3	• • 49.1		172°58.7	-63°14.7
4	127°04.6	282°05.7	15.0	333°21.3	15.6	337°54.5	22.1	118° 37.9	49.0		171°50.2	-57° 15.6
5	142°07.1	297°06.8	15.1	348°22.8	15.3	352°56.9	22.1	133°40.4	49.0	Alioth	166°12.0	55°48.6
6	157°09.5	312°08.0	S09°15.2	3°24.3	N13°15.0	7°59.2	N13°22.1	148°42.9	N00°49.0	Spica	158°20.9	-11°18.1
7	172°12.0	327°09.2	15.3	18°25.8	14.7	23°01.6	22.0	163°45.4	49.0	Alkaid	152°51.2	49° 10.5
8	187°14.5	342°10.4	15.4	33°27.3	14.4	38°03.9	22.0	178° 47.9	49.0	Hadar	148°34.3	-60°30.0
9	202°16.9	357°11.5	• • 15.5	48°28.8	•• 14.1	53°06.3	• • 22.0	193°50.5	• • 49.0	!	147°56.1	-36° 30.0
10	202 10.9 217°19.4	12°12.7	15.6	63°30.3	13.9	68°08.6	21.9	208°53.0	49.0	Arcturus	145°46.8	19°02.5
11	232°21.9	27°13.9	15.6	78°31.9	13.6	83°11.0	21.9	200° 55.0 223° 55.5	49.0	Rigil Kent.	139°38.7	-60°56.6
12	247°24.3	42°15.0	S09°15.7	93°33.4	N13°13.3	98° 13.3	N13°21.9	238°58.0	N00°48.9	Kochab	137°21.0	74°02.5
13	262°26.8	57°16.2		108°34.9	13.0	96 15.5 113°15.6		254°00.5		Zuben'ubi	136°54.6	-16°09.1
	202 20.6 277°29.2	72°17.3	15.9	106 34.9 123°36.4	12.7	113 15.0 128°18.0	21.9	269°03.1	48.9	Alphecca	126°02.8	26°37.4
14			16.0				21.8	284°05.6	48.9	Antares	$112^{\circ}14.3$	-26°29.4
15	292°31.7	87°18.5	16.1	138°37.9	• • 12.4	143°20.3	• • 21.8		• • 48.9	Atria	$107^{\circ}07.7$	-69°04.5
16	307°34.2	102°19.6	16.2	153°39.4	12.2	158°22.7	21.8	299°08.1	48.9	Sabik	102°01.4	-15°45.4
17	322°36.6	117°20.8	16.3	168°41.0	11.9	173°25.0	21.7	314°10.6	48.9	Shaula	96°08.7	-37°07.4
18	337°39.1	132°21.9	S09°16.4	183°42.5	N13°11.6	188°27.4	N13°21.7	329°13.1	N00°48.9	Rasalhague	95°57.4	12°32.5
19	352°41.6	147°23.1	16.5	198°44.0	11.3	203°29.7	21.7	344°15.7	48.8	Eltanin	90°42.0	51°29.2
20	7°44.0	162°24.2	16.6	213°45.5	11.0	218°32.1	21.6	359° 18.2	48.8	Kaus Aust.	83°30.8	-34°22.3
21	22°46.5	177°25.4	• • 16.7	228°47.0	• • 10.8	233°34.4	• • 21.6	14°20.7	• • 48.8	Vega	80°32.5	38° 48.7
22	37°49.0	192°26.5	16.8	243°48.6	10.5	248° 36.8	21.6	29°23.2	48.8	Nunki	75°46.2	-26° 15.8
23	52°51.4	207°27.6	17.0	258°50.1	10.2	263°39.1	21.6	44°25.7	48.8	Altair	61°58.7	8° 56.5
Mern	ass. 19:29	$\nu 1.2' d0$	1' m-4.90	$\nu 1.5' d_{-0}$	0.3' m0.51	ν2 3' d-0	.0′ m-2.17	ν2 5' d-0	0.0' m0.59	Peacock	53°03.6	-56° 39.0
										Deneb	49°25.0	45°22.9
										Enif	33°37.3	10°00.1
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.0	-46° 50.0
0	67°53.9	222°28.8	S09°17.1	273°51.6	N13°09.9	278°41.5	N13°21.5	59°28.2	N00°48.8	Fomalhaut	15°12.8	-29°28.8
1	82°56.3	237°29.9	17.2	288°53.1	09.6	293°43.9	21.5	74°30.8	48.8	Scheat	13°43.6	28°14.0
2	97°58.8	252°31.0	17.3	303°54.6	09.4	308°46.2	21.5	89°33.3	48.8	Markab	13°28.3	15°21.2
3	113°01.3	267°32.2	• • 17.4	318°56.2	•• 09.1	323°48.6	• • 21.4	104°35.8	• • 48.8			
4	128°03.7	282°33.3	17.6	333°57.7	8.80	338° 50.9	21.4	119°38.3	48.7	Nov 27 Fri	SHA	Mer.pass
5	143°06.2	297°34.4	17.7	348°59.2	08.5	353°53.3	21.4	134°40.8	48.7	1	155°36.0	09:13
6	158°08.7	312°35.5	S09°17.8	4°00.7	N13°08.2	8°55.6	N13°21.4	149°43.3	N00°48.7	Mars		05:49
7	173°11.1	327°36.6	17.9	19°02.3	08.0	23°58.0	21.3	164°45.9	48.7		210°53.4	05:32
8	$188^{\circ}13.6$	342°37.8	18.1	34°03.8	07.7	39°00.3	21.3	179°48.4	48.7	Saturn	351°31.6	20:07
9	$203^{\circ}16.1$	357°38.9	• • 18.2	49°05.3	•• 07.4	54°02.7	• • 21.3	194°50.9	• • 48.7	Nov 28 Sat	SHA	Mer.pass
10	218°18.5	12°40.0	18.3	64°06.9	07.1	69°05.0	21.2	209°53.4	48.7		155°06.2	09:11
11	233°21.0	27°41.1	18.5	79°08.4	06.8	84°07.4	21.2	224°55.9	48.7		_	05:46
12	248°23.5	42°42.2	S09°18.6	94°09.9	N13°06.6	99°09.7	N13°21.2	239°58.4	N00°48.6	Mars Jupiter		
13	263°25.9	57°43.3	18.7	109°11.4	06.3	$114^{\circ}12.1$	21.2	255°01.0	48.6			05:28
14	278°28.4	72°44.4	18.9	124°13.0	06.0	$129^{\circ}14.5$	21.1	270°03.5	48.6	Saturn	351°33.0	20:03
15	293°30.8	87°45.5	• • 19.0	139°14.5	•• 05.7	$144^{\circ}16.8$	• • 21.1	285°06.0	• • 48.6	Nov 29 Sun	SHA	Mer.pass
16	308°33.3	102°46.6	19.2	154°16.0	05.5	$159^{\circ}19.2$	21.1	300°08.5	48.6		154°34.9	09:09
17	323°35.8	117°47.7	19.3	169°17.6	05.2	174°21.5	21.1	315°11.0	48.6	Mars		05:44
18	338°38.2	132°48.8	509°19.4	184°19.1	N13°04.9	189°23.9	N13°21.0	330° 13.5	N00°48.6	Jupiter		05:24
19	353°40.7	147°49.8	19.6	199°20.6	04.6	204°26.2	21.0	345°16.0	48.6	Saturn		19:59
20	8°43.2	162°50.9	19.7	214°22.2	04.3	219°28.6	21.0	0°18.6	48.6	Sutuill		10.00
21	23°45.6	177°52.0	• • 19.9	229°23.7	04.1	234°31.0	20.9	15°21.1	• • 48.5	Horizont	al parallax	
22	38°48.1	192°53.1	20.0	244°25.2	03.8	249°33.3	20.9	30°23.6	48.5		Venus:	0.4
23	53°50.6	207°54.2	20.2	259°26.8	03.5	264°35.7	20.9	45°26.1	48.5		Mars:	0.1
Mer.p	ass. 19:25	$\nu_{1.1'} d0.$	1′ m-4.90	$\nu$ 1.5' d-0	0.3′ m0.49	ν2.4′ d-0	.0′ m-2.18	$\nu$ 2.5' d-0	0.0′ m0.60			

h	Sui	า			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	183°08.4	S21°05.0	326°42.9	1.9'	N26°46.7	-4.8'	60.8'
1 2	198°08.2 213°08.0	05.4 05.9	341°03.8 355°24.7	2.0' 2.1'	26°41.9 26°37.0	-5.0' -5.2'	60.7' 60.7'
3	228°07.8	06.4	9°45.8	2.1'	26°31.8	-5.2 -5.4'	60.7
4	243°07.6	06.8	24°06.9	2.2'	$26^{\circ}26.4$	-5.6'	60.7'
5	258°07.4	07.3	38°28.2	2.3'	26°20.9	-5.7'	60.7'
6 7	273°07.2 288°07.0	\$21°07.7 08.2	52°49.5 67°10.9	2.4' 2.5'	N26°15.1 26°09.2	-5.9' -6.1'	60.7' 60.7'
8	303°06.8	08.6	81°32.4	2.6'	26°03.1	-6.3'	60.6
9	318°06.6	•• 09.1	95°54.0	2.7'	25°56.8	-6.5'	60.6'
10	333°06.4 348°06.2	09.6	110°15.7 124°37.6	2.8'	25°50.3 25°43.6	-6.7'	60.6'
11 12	348 06.2 3°06.0	10.0 \$21°10.5	124 37.6 138°59.5	2.9' 3.0'	25 43.0 N25°36.7	-6.9' -7.1'	60.6' 60.6'
13	18°05.8	10.9	153°21.5	3.1'	25°29.6	-7.2	60.6'
14	33°05.6	11.4	167°43.6	3.2'	25°22.4	-7.4'	60.5'
15 16	48°05.4 63°05.2	· · 11.8 12.3	182°05.9 196°28.2	3.4' 3.5'	25°15.0 25°07.4	-7.6' -7.8'	60.5' 60.5'
17	78°04.9	12.7	210°50.7	3.6'	24°59.6	-7.8 -7.9'	60.5
18	93°04.7	S21°13.2	225°13.3	3.7'	N24°51.7	-8.1'	60.5'
19	108°04.5	13.6	239°36.0	3.8'	24°43.6	-8.3	60.4'
20 21	123°04.3 138°04.1	14.1 •• 14.5	253°58.8 268°21.7	3.9' 4.1'	24°35.3 24°26.9	-8.4' -8.6'	60.4' 60.4'
22	153°03.9	14.9	282°44.8	4.1	24° 20.9	-8.8'	60.4
23	168°03.7	15.4	297°08.0	4.3'	24°09.5	-8.9'	60.3'
	SD = 16.2'	d = 0.5'	-	SI	D = 16.6'		
٠.						,	LIE
Sat 0	<b>GHA</b> 183°03.5	<b>Dec</b> <b>S</b> 21°15.8	<b>GHA</b> 311°31.3	u 4.4'	<b>Dec</b> N24°00.6	<i>d</i> -9.1′	<b>HP</b> 60.3'
1	198°03.3	16.3	325°54.7	4.5	23°51.5	-9.1 -9.2	60.3
2	213°03.1	16.7	340°18.2	4.7'	23°42.3	-9.4'	60.3'
3 4	228°02.9 243°02.7	· · 17.2 17.6	354°41.9 9°05.7	4.8' 4.9'	23°32.9 23°23.3	-9.5' -9.7'	60.3' 60.2'
5	258°02.4	18.0	9 05.7 23°29.6	4.9 5.1'	23°13.6	-9.7 -9.8'	60.2
6	273°02.2	S21°18.5	37°53.7	5.2'	N23°03.8	-10.0'	60.2'
7	288°02.0	18.9	52°17.9	5.3'	22°53.8	-10.1'	60.2'
8 9	303°01.8 318°01.6	19.4 •• 19.8	66°42.2 81°06.6	5.4' 5.6'	22°43.7 22°33.4	-10.3' -10.4'	60.1' 60.1'
10	333°01.4	20.2	95°31.2	5.0 5.7'	22°23.0	-10.4	60.1
11	348°01.2	20.7	109°55.9	5.8'	22°12.4	-10.7'	60.1
12	3°01.0	S21°21.1	124°20.7	6.0'	N22°01.7	-10.8'	60.0'
13 14	18°00.8 33°00.5	21.5 22.0	138°45.7 153°10.8	6.1' 6.2'	21°50.9 21°40.0	-10.9' -11.1'	60.0' 60.0'
15	48°00.3	22.4	167°36.0	6.4	21°28.9	-11.1	59.9'
16	63°00.1	22.8	$182^{\circ}01.4$	6.5'	$21^{\circ}17.7$	-11.3'	59.9'
17	77°59.9	23.3	196°26.9	6.6'	21°06.4	-11.4'	59.9'
18 19	92°59.7 107°59.5	\$21°23.7 24.1	210°52.5 225°18.2	6.8' 6.9'	N20°54.9 20°43.4	-11.6' -11.7'	59.9' 59.8'
20	122°59.3	24.6	239°44.1		20°31.7		59.8'
21	137°59.0	• • 25.0	254°10.1	7.1'	20° 19.9	-11.9'	59.8'
22	152°58.8 167°58.6	25.4	268°36.3 283°02.5	7.3'	20°07.9 19°55.9	-12.0' -12.1'	59.8' 59.7'
23		25.9	283 02.5	7.4'		-12.1	59.7
	SD = 16.2'	d = 0.4'		51	D = 16.5'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	182°58.4 197°58.2	\$21°26.3 26.7	297°28.9 311°55.5	7.5' 7.7'	N19°43.8 19°31.5	-12.2' -12.4'	59.7' 59.7'
2	212°58.2	26.7 27.1	311 55.5 326°22.1	7.7 7.8'	19° 31.5 19° 19.2	-12.4 -12.5'	59.7° 59.6'
3	227°57.7	• • 27.6	340°48.9	7.9'	19°06.7	-12.6'	59.6'
4	242°57.5	28.0	355°15.8	8.0'	18°54.2	-12.7'	59.6'
5 6	257°57.3 272°57.1	28.4 \$21°28.8	9°42.9 24°10.0	8.2' 8.3'	18° 41.5 N18° 28.8	-12.8' -12.8'	59.5' 59.5'
7	287°56.9	29.2	38°37.3	8.4'	18° 15.9	-12.9'	59.5'
8	302°56.7	29.7	53°04.8	8.5'	18°03.0	-13.0'	59.5'
9	317°56.4	30.1	67°32.3	8.7'	17°50.0	-13.1'	59.4'
10 11	332°56.2 347°56.0	30.5 30.9	82°00.0 96°27.7	8.8' 8.9'	17°36.8 17°23.6	-13.2' -13.3'	59.4' 59.4'
12	2°55.8	S21°31.3	110°55.7	9.0'	N17° 10.3	-13.4	59.3'
13	17°55.6	31.8	125°23.7	9.1'	16°57.0	-13.5'	59.3'
14 15	32°55.3 47°55.1	32.2 · · 32.6	139°51.8 154°20.1	9.3' 9.4'	16°43.5 16°30.0	-13.5' -13.6'	59.3' 59.2'
15 16	47 55.1 62°54.9	33.0	154 20.1 168°48.5	9.4 9.5'	16° 30.0	-13.0 -13.7'	59.2'
17	77°54.7	33.4	183°17.0	9.6'	16°02.7	-13.8'	59.2'
18	92°54.5	S21°33.8	197°45.6	9.7'	N15°48.9	-13.8'	59.1'
19 20	107°54.2 122°54.0	34.3 34.7	212°14.3 226°43.2	9.8' 10.0'	15°35.1 15°21.2	-13.9' -14.0'	59.1' 59.1'
21	137°53.8	35.1	241°12.2	10.0	15° 21.2	-14.0'	59.1'
22	152°53.6	35.5	255°41.2	10.2'	14°53.2	-14.1'	59.0'
23	167°53.3	35.9	270°10.4	10.3'	14°39.1	-14.2'	59.0'
	SD = 16.2'	d = 0.4'		SI	D = 16.3'		

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

		Sun		Moon			
Day	Eqn.of	Eqn.of Time		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	92-74%	
27	12:34	12:24	11:48	02:19	14:51		
28	12:14	12:04	11:48	03:22	15:52		
29	11:54	11:43	11:48	04:20	16:46		

## November 30, 01, 02 UT (Mon., Tue., Wed.)

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	68°53.0	222°55.2	S09°20.3	274°28.3	N13°03.2	279°38.0	N13°20.9	60°28.6	N00°48.5			
1	83°55.5	237°56.3	20.5	289°29.8	03.0	294°40.4	20.8	75°31.1	48.5	Alpheratz	357°33.0	29° 14.6
2	98°58.0	252°57.4	20.6	304°31.4	02.7	309°42.8	20.8	90°33.6	48.5	Ankaa	353°05.4	-42°09.7
3	114°00.4	267°58.5	20.8	319°32.9	02.4	324°45.1	20.8	105°36.2	• • 48.5	Schedar	349°28.9	56°41.4
4	129°02.9	282°59.5	21.0	334°34.5	02.1	339°47.5	20.8	120°38.7	48.5	Diphda	348°45.6	-17°50.3
5	144°05.3	298°00.6	21.1	349°36.0	01.9	354°49.8	20.7	135°41.2	48.5	Achernar	335°18.6	-57°06.1
6	159°07.8	313°01.7	S09°21.3	4°37.5	N13°01.6	9°52.2	N13°20.7	150°43.7	N00°48.5	Hamal	327°49.1	23°35.5
7	$174^{\circ}10.3$	328°02.7	21.4	19°39.1	01.3	24°54.6	20.7	165°46.2	48.4	Polaris	312°44.0	89°22.8
8	189°12.7	343°03.8	21.6	34°40.6	01.0	39°56.9	20.7	180°48.7	48.4	Acamar	315°10.2 314°04.2	-40° 11.8 4° 11.8
9	204°15.2	358°04.8	• • 21.8	49°42.2	00.8	54° 59.3	• • 20.6	195°51.2	• • 48.4	Menkar Mirfak	308°25.5	4 11.6 49°57.5
10	$219^{\circ}17.7$	13°05.9	21.9	64°43.7	00.5	$70^{\circ}01.6$	20.6	$210^{\circ}53.7$	48.4	Aldebaran	290°37.5	16°33.9
11	234°20.1	28°06.9	22.1	79°45.3	13°00.2	85°04.0	20.6	225°56.3	48.4	Rigel	281°02.0	-8° 10.2
12	249°22.6	43°08.0	S09°22.3	94°46.8	N12°59.9	100°06.4	N13°20.6	240°58.8	N00°48.4	Capella	280°19.1	46°01.5
13	264°25.1	58°09.0	22.4	109°48.3	59.7	115°08.7	20.5	256°01.3	48.4	Bellatrix	278°20.9	6°22.5
14	279°27.5	73°10.1	22.6	124°49.9	59.4	130°11.1	20.5	271°03.8	48.4	Elnath	277°59.5	28° 37.8
15	294°30.0	88°11.1	• • 22.8	139°51.4	• • 59.1	145°13.5	• • 20.5	286°06.3	• • 48.4	Alnilam	275°35.8	-1°11.0
16	309°32.5	103°12.1	23.0	154°53.0	58.9	160°15.8	20.5	301°08.8	48.4	Betelgeuse	270°50.1	7°24.7
17	324°34.9 339°37.4	118°13.2	23.1	169°54.5	58.6	175°18.2	20.4	316°11.3 331°13.8	48.4	Canopus	263°51.2	-52° 42.4
18 19	354°39.8	133°14.2 148°15.3	\$09°23.3 23.5	184°56.1 199°57.6	N12°58.3 58.0	190°20.5 205°22.9	N13°20.4 20.4	346° 16.3	N00°48.3 48.3	Sirius	258°24.6	-16°45.1
20	9°42.3	163°16.3	23.7	214°59.2	57.8	200°25.3	20.4	1°18.9	48.3	Adhara	255°04.3	-29°00.4
21	24°44.8	178°17.3	23.9	230°00.7	• • 57.5	235°27.6	. 20.4	16°21.4	• 48.3	Procyon	244°49.0	5°09.3
22	39°47.2	193°18.3	24.0	245°02.3	57.2	250°30.0	20.3	31°23.9	48.3	Pollux	243°15.1	27°57.5
23	54°49.7	208°19.4	24.0	260°03.8	57.2	265°32.4	20.3	46° 26.4	48.3	Avior	234°13.7	-59° 35.5
								-		Suhail	222°45.0	-43°32.2
Mer.p	ass. 19:21	$\nu 1.1' d0.$	2′ m-4.89	$\nu 1.5' d-0$	0.3′ m0.48	$\nu 2.4' d-0$	.0′ m-2.19	$\nu^{2.5'} d-0$	.0′ m0.60	Miaplacidus	221°37.6	-69°49.4
										Alphard	217°46.1	-8°46.5
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°32.7	11°50.1
0	69°52.2	223°20.4	S09°24.4	275°05.4	N12°56.7	280°34.7	N13°20.3	61°28.9	N00°48.3	Dubhe	193°39.2 182°23.5	61°36.0 14°25.2
1	84°54.6	238°21.4	24.6	290°06.9	56.4	295°37.1	20.2	76°31.4	48.3	Denebola Gienah	182°23.5 175°42.1	14°25.2 -17°41.4
2	99°57.1	253°22.4	24.8	305°08.5	56.1	$310^{\circ}39.5$	20.2	91°33.9	48.3		175 42.1 172°58.7	-17 41.4 -63°14.7
3	$114^{\circ}59.6$	268°23.4	• • 25.0	$320^{\circ}10.0$	• • 55.9	325°41.8	20.2	106°36.4	• • 48.3	Gacrux	172 50.7 171°50.2	-57° 15.6
4	$130^{\circ}02.0$	283°24.4	25.2	$335^{\circ}11.6$	55.6	340°44.2	20.2	121°38.9	48.3	Alioth	166°12.0	55°48.6
5	145°04.5	298°25.4	25.4	$350^{\circ}13.1$	55.3	355°46.6	20.1	136°41.4	48.2	Spica	158°20.9	-11° 18.1
6	$160^{\circ}06.9$	313°26.5	S09°25.6	5°14.7	N12°55.1	10°48.9	N13°20.1	151°44.0	N00°48.2	Alkaid	152°51.2	49° 10.5
7	$175^{\circ}09.4$	328°27.5	25.7	$20^{\circ}16.2$	54.8	$25^{\circ}51.3$	20.1	166°46.5	48.2	Hadar	148°34.3	-60° 30.0
8	190°11.9	343°28.5	25.9	35°17.8	54.5	40°53.7	20.1	181°49.0	48.2	Menkent	147°56.1	-36° 30.0
9	205°14.3	358°29.5	• • 26.1	50°19.4	• • 54.2	55°56.1	20.1	196°51.5	• • 48.2	Arcturus	145°46.8	19°02.5
10	220°16.8	13°30.5	26.3	65°20.9	54.0	70°58.4	20.0	211°54.0	48.2	Rigil Kent.	139°38.7	-60°56.6
11	235°19.3	28°31.5	26.5	80°22.5	53.7	86°00.8	20.0	226°56.5	48.2	Kochab	$137^{\circ}21.0$	74°02.5
12	250°21.7 265°24.2	43°32.5	S09°26.7	95°24.0	N12°53.4	101°03.2 116°05.5	N13°20.0	241°59.0 257°01.5	N00°48.2	Zuben'ubi	$136^{\circ}54.6$	-16°09.2
13	265 24.2 280°26.7	58°33.4 73°34.4	26.9 27.1	110°25.6 125°27.1	53.2 52.9	116 05.5 131°07.9	20.0	257 01.5 272°04.0	48.2	Alphecca	126°02.8	26°37.4
14	200 20.7 295°29.1	75 34.4 88°35.4	27.1	125 27.1 140°28.7	52.6	131 07.9 146°10.3	19.9 •• 19.9	272 04.0 287°06.5	48.2 •• 48.2	Antares	112°14.3	-26°29.4
15 16	310°31.6	00 35.4 103°36.4	27.4	155°30.3	52.4	140 10.3 161°12.7	19.9	302°09.0	48.2	Atria	107°07.7	-69°04.5
17	325°34.1	118°37.4	27.8	170°31.8	52.4	176° 15.0	19.9	317°11.5	48.2	Sabik	102°01.3	-15°45.4
18	340°36.5	133°38.4	S09°28.0	185°33.4	N12°51.8	191°17.4	N13°19.9	332°14.0	N00°48.1	Shaula	96°08.7	-37°07.4
19	355°39.0	148°39.4	28.2	200°35.0	51.6	206° 19.8	19.8	347° 16.5	48.1	Rasalhague	95°57.4	12°32.5
20	10°41.4	163°40.3	28.4	215°36.5	51.3	221°22.1	19.8	2°19.1	48.1	Eltanin	90°42.0	51°29.2
21	25°43.9	178°41.3	28.6	230°38.1	51.0	236°24.5	• • 19.8	17°21.6	• • 48.1	Kaus Aust.	83°30.8	-34°22.3
22	40°46.4	193°42.3	28.8	245°39.6	50.8	251°26.9	19.8	$32^{\circ}24.1$	48.1	Vega	80°32.6	38°48.6
23	55°48.8	208°43.2	29.0	260°41.2	50.5	266°29.3	19.7	47°26.6	48.1	Nunki Altair	75°46.2 61°58.7	-26° 15.8 8° 56.5
1/101110	10.17	1 0/ 40	2′ m-4.89	1 6/ -1 0	0.3' m0.46	2 4/ 4 0	.0′ m-2.19		.0′ m0.61	Peacock	53°03.6	-56°39.0
ivier.p	ass. 19:17	$\nu_{1.0}$ au.	2 m-4.89	$\nu$ 1.0 $a$ -0	0.3° mu.40	$\nu_{2.4}$ a-0	.0 m-2.19	ν2.5 a-0	.0 m0.01	Deneb	49°25.0	45°22.9
										Enif	33°37.4	10°00.1
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.1	-46° 50.0
0	70°51.3	223°44.2	S09°29.3	275°42.8	N12°50.2	281°31.6	N13°19.7	62°29.1	N00°48.1	Fomalhaut	15°12.8	-29°28.8
1	85°53.8	238°45.2	29.5	290°44.3	50.0	296°34.0	19.7	77°31.6	48.1	Scheat	13°43.6	28° 14.0
2	100°56.2	253°46.1	29.7	305°45.9	49.7	311°36.4	19.7	92°34.1	48.1	Markab	13°28.3	15°21.2
3	115°58.7	268°47.1	• • 29.9	320°47.5	• • 49.4	326°38.8	• • 19.7	107°36.6	• • 48.1	Nov. 20 N4-	CHA	Me:: ====
4	131°01.2	283°48.1	30.1	335°49.0	49.2	341°41.1	19.6	122°39.1	48.1	Nov 30 Mon	<b>SHA</b> 154°02.2	Mer.pass 09:08
5	146°03.6	298°49.0	30.4	350°50.6 5°52.2	48.9 N12°48.6	356°43.5	19.6 N13°10.6	137°41.6 152°44.1	48.1	Venus		09:08 05:42
6 7	161°06.1 176°08.5	313°50.0 328°50.9	\$09°30.6 30.8	5°52.2 20°53.8	N12°48.6 48.4	11°45.9 26°48.3	N13°19.6 19.6	167° 46.6	N00°48.1	Jupiter		05:42
8	176°08.5 191°11.0	328°50.9 343°51.9	30.8 31.0	20°53.8 35°55.3	48.4 48.1	26°48.3 41°50.6	19.6 19.6	167°46.6 182°49.1	48.1 48.1	Saturn	351°35.6	19:55
9	206°13.5	358°52.8	• • 31.3	50°56.9	47.8	56°53.0	19.0	102 49.1 197°51.6	• • 48.0			
10	200°15.5 221°15.9	13°53.8	31.5	65°58.5	47.6	71°55.4	19.5	212°54.1	48.0	Dec 01 Tue	SHA	Mer.pass
11	236°18.4	28°54.7	31.7	81°00.0	47.3	86° 57.8	19.5	212 54.1 227°56.6	48.0		153°28.2	09:06
12	251°20.9	43°55.7	S09°32.0	96°01.6	N12°47.1	102°00.2	N13°19.5	242°59.1	N00°48.0	Mars		05:39
13	266°23.3	58°56.6	32.2	111°03.2	46.8	117°02.5	19.5	258°01.6	48.0		210°42.6	05:17
14	281°25.8	73°57.5	32.4	126°04.8	46.5	132°04.9	19.4	273°04.1	48.0	Saturn	351°36.7	19:51
15	296°28.3	88°58.5	• • 32.7	141°06.3	• • 46.3	$147^{\circ}07.3$	• • 19.4	288°06.6	• • 48.0	Dec 02 Wed	SHA	Mer.pass
16	311°30.7	$103^{\circ}59.4$	32.9	$156^{\circ}07.9$	46.0	$162^{\circ}09.7$	19.4	$303^{\circ}09.1$	48.0		152°52.9	09:04
17	326°33.2	$119^{\circ}00.3$	33.1	$171^{\circ}09.5$	45.7	$177^{\circ}12.0$	19.4	$318^{\circ}11.6$	48.0		204°51.5	05:37
18	341°35.7	134°01.3	S09°33.4	186°11.1	N12°45.5	192° 14.4	N13°19.4	333°14.1	N00°48.0		210°40.3	05:13
19	356°38.1	149°02.2	33.6	201°12.6	45.2	207° 16.8	19.3	348° 16.7	48.0		351°37.8	19:47
20	11°40.6	164°03.1	33.9	216°14.2	45.0	222°19.2	19.3	3°19.2	48.0	шаш	al navall-	
21	26°43.0	179°04.0	34.1	231°15.8	• • 44.7	237°21.6	19.3	18°21.7	• 48.0	Horizont	al parallax	0.3
22	41°45.5	194°05.0	34.4	246°17.4	44.4	252°23.9	19.3	33°24.2	48.0		Venus: Mars:	0.3 0.1
23	56°48.0	209°05.9	34.6	261°19.0	44.2	267°26.3	19.3	48°26.7	48.0	L	ividi5.	0.1
Mer.p	ass. 19:13	$\nu$ 1.0′ d0.	2′ m-4.88	$\nu$ 1.6′ d-0	0.3′ m0.44	$\nu 2.4' \ d-0$	.0′ m-2.20	$\nu 2.5' \ d-0$	.0′ m0.61			

h	Sui	า	Moon						
Mon	GHA	Dec	GHA	ν	Dec	d	HP		
0	182°53.1	S21°36.3	284°39.7	10.4'	N14°24.9	-14.2'	59.0'		
1 2	197°52.9 212°52.7	36.7 37.1	299°09.1 313°38.6	10.5' 10.6'	14° 10.7 13° 56.4	-14.3' -14.3'	58.9' 58.9'		
3	212 52.7 227°52.5	37.5	328°08.2	10.0	13°42.1	-14.3 -14.4'	58.9'		
4	242°52.2	38.0	342°37.9	10.8'	$13^{\circ}27.7$	-14.5'	58.8'		
5	257°52.0	38.4	357°07.7	10.9'	13°13.2	-14.5'	58.8'		
6 7	272°51.8 287°51.6	\$21°38.8 39.2	11°37.7 26°07.7	11.0' 11.1'	N12°58.7 12°44.1	-14.6' -14.6'	58.8' 58.7'		
8	302°51.3	39.6	40°37.8	11.2'	12° 29.5	-14.7'	58.7		
9	317°51.1	• • 40.0	55°08.0	11.3'	12° 14.9	-14.7'	58.7'		
10 11	332°50.9 347°50.6	40.4 40.8	69°38.3 84°08.7	11.4' 11.5'	12°00.2 11°45.4	-14.7' -14.8'	58.6' 58.6'		
12	2°50.4	521°41.2	98°39.2	11.6'	N11°30.7	-14.8'	58.6		
13	17°50.2	41.6	113°09.8	11.7'	11° 15.8	-14.9'	58.5'		
14	32°50.0	42.0	127°40.5	11.8'	11°01.0	-14.9'	58.5'		
15 16	47°49.7 62°49.5	• • 42.4 42.8	142°11.3 156°42.1	11.9' 11.9'	10°46.1 10°31.1	-14.9' -15.0'	58.5' 58.4'		
17	77°49.3	43.2	171°13.1	12.0'	10°16.1	-15.0'	58.4'		
18	92°49.1	S21°43.6	$185^{\circ}44.1$	12.1'	N10°01.1	-15.0'	58.4'		
19 20	107°48.8 122°48.6	44.0 44.4	200°15.2 214°46.4	12.2' 12.3'	09°46.1 09°31.0	-15.1' -15.1'	58.3' 58.3'		
21	122 48.0 137°48.4	• • 44.8	214 40.4 229°17.7	12.3 12.4'	09 31.0 09°15.9	-15.1'	58.3'		
22	152°48.1	45.2	243°49.1	12.4'	09°00.8	-15.2'	58.2'		
23	167°47.9	45.6	258°20.5	12.5'	08°45.6	-15.2'	58.2'		
	SD = 16.2'	d = 0.4'		SI	O = 16.1'				
Tue	GHA	Dec	GHA	ν	Dec	d	НР		
0	182°47.7	S21°45.9	272°52.0	12.6'	N08°30.5	-15.2'	58.2'		
1	197°47.4	46.3	287°23.6	12.7'	08° 15.3	-15.2'	58.1'		
2 3	212°47.2 227°47.0	46.7 •• 47.1	301°55.3 316°27.0	12.7' 12.8'	08°00.0 07°44.8	-15.2' -15.3'	58.1' 58.1'		
4	242°46.8	47.5	330°58.9	12.9'	07°29.5	-15.3'	58.0'		
5	257°46.5	47.9	345°30.7	13.0'	$07^{\circ}14.2$	-15.3'	58.0'		
6	272°46.3 287°46.1	S21°48.3	0°02.7 14°34.7	13.0'	N06° 58.9 06° 43.6	-15.3'	58.0'		
7 8	302°45.8	48.7 49.1	14°34.7 29°06.8	13.1' 13.1'	06° 43.6 06° 28.3	-15.3' -15.3'	57.9' 57.9'		
9	317°45.6	• • 49.4	43°38.9	13.2'	06°12.9	-15.4	57.9'		
10	332°45.4	49.8	58°11.1	13.3'	05°57.6	-15.4'	57.9'		
11 12	347°45.1 2°44.9	50.2 <b>S</b> 21°50.6	72°43.4 87°15.8	13.3' 13.4'	05°42.2 N05°26.8	-15.4' -15.4'	57.8' 57.8'		
13	17°44.7	51.0	101°48.1	13.4'	05°11.4	-15.4'	57.8'		
14	32°44.4	51.4	$116^{\circ}20.6$	13.5'	$04^{\circ}56.1$	-15.4'	57.7'		
15 16	47°44.2 62°43.9	· · 51.8 52.1	130°53.1 145°25.7	13.6' 13.6'	04°40.7 04°25.3	-15.4' -15.4'	57.7' 57.7'		
17	77°43.7	52.1	145 25.7 159°58.3	13.7'	04 25.3 04°09.9	-15.4'	57.6'		
18	92°43.5	S21°52.9	174°30.9	13.7'	N03°54.4	-15.4'	57.6'		
19	107°43.2	53.3	189°03.6	13.8'	03°39.0	-15.4'	57.6'		
20 21	122°43.0 137°42.8	53.7 •• 54.0	203°36.4 218°09.2	13.8' 13.9'	03°23.6 03°08.2	-15.4' -15.4'	57.5' 57.5'		
22	152°42.5	54.4	232°42.1	13.9'	02°52.8	-15.4	57.5		
23	167°42.3	54.8	247°15.0	13.9'	02°37.4	-15.4'	57.4'		
	SD = 16.2'	d = 0.4'		SI	O = 15.9'				
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP		
0	182°42.1	S21°55.2	261°47.9	14.0'	N02°22.0	-15.4'	57.4'		
1	197°41.8 212°41.6	55.5	276°20.9	14.0' 14.1'	02°06.6 01°51.3	-15.4' -15.4'	57.4'		
2	212°41.6 227°41.3	55.9 •• 56.3	290°53.9 305°27.0	14.1'	01°51.3 01°35.9	-15.4' -15.4'	57.4' 57.3'		
4	242°41.1	56.7	$320^{\circ}00.1$	14.1'	01°20.5	-15.4'	57.3'		
5	257°40.9	57.0	334°33.2	14.2'	01°05.2	-15.3'	57.3'		
6 7	272°40.6 287°40.4	\$21°57.4 57.8	349°06.4 3°39.6	14.2' 14.2'	N00°49.8 00°34.5	-15.3' -15.3'	57.2' 57.2'		
8	302°40.2	58.1	18°12.8	14.3'	00° 19.2	-15.3'	57.2'		
9	317°39.9	• • 58.5	32°46.1	14.3'	N00°03.9	-15.3'	57.1'		
10 11	332°39.7 347°39.4	58.9 59.2	47°19.4 61°52.7	14.3' 14.4'	\$00°11.4 00°26.7	15.3' 15.3'	57.1' 57.1'		
11	2°39.2	59.2 \$21°59.6	76°26.1	14.4'	500°42.0	15.3	57.1		
13	17°38.9	22°00.0	90°59.5	14.4'	00°57.2	15.2'	57.0'		
14	32°38.7	00.3	105°32.9	14.4'	01°12.4	15.2'	57.0'		
15 16	47°38.5 62°38.2	· · 00.7 01.1	120°06.3 134°39.7	14.4' 14.5'	01°27.6 01°42.8	15.2' 15.2'	57.0' 56.9'		
17	77°38.0	01.4	149°13.2	14.5'	01°58.0	15.1	56.9		
18	92°37.7	S22°01.8	163°46.7	14.5'	502°13.1	15.1'	56.9'		
19 20	107°37.5 122°37.3	02.2 02.5	178°20.2 192°53.7	14.5' 14.5'	02°28.2 02°43.3	15.1' 15.1'	56.8' 56.8'		
20	122°37.3 137°37.0	· · 02.5	192°53.7 207°27.3	14.6'	02°43.3 02°58.3	15.1° 15.0'	56.8		
22	152°36.8	03.2	222°00.8	14.6'	03°13.4	15.0'	56.8'		
23	167°36.5	03.6	236°34.4	14.6'	03°28.4	15.0'	56.7'		
	SD = 16.2'	d = 0.4'		SI	D = 15.7'				

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
N 72°	07:51	09:50			13:47	15:46
N 70°	07:35	09:11			14:27	16:03
68°	07:21	08:44	10:36	13:01	14:54	16:16
66°	07:10	08:23	09:47	13:51	15:14	16:27
64°	07:01	08:06	09:16	14:21	15:31	16:36
62°	06:53	07:52	08:53	14:44	15:45	16:45
60°	06:46	07:41	08:35	15:03	15:57	16:52
N 58°	06:39	07:30	08:20	15:18	16:07	16:58
56°	06:33	07:21	08:07	15:31	16:16	17:04
54°	06:28	07:13	07:55	15:42	16:24	17:10
52°	06:23	07:06	07:46	15:52	16:32	17:15
50°	06:18	06:59	07:37	16:01	16:38	17:19
45°	06:08	06:45	07:18	16:20	16:53	17:30
N 40°	05:59	06:32	07:02	16:35	17:05	17:39
35°	05:50	06:22	06:49	16:48	17:16	17:47
30°	05:43	06:12	06:38	17:00	17:26	17:55
20°	05:28	05:55	06:19	17:19	17:43	18:10
N 10°	05:13	05:39	06:01	17:36	17:59	18:25
0°	04:57	05:23	05:45	17:53	18:15	18:41
<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
N 58°	22:50		00:20	12:40	12:45	12:49
56°	22:54		00:21	12:35	12:43	12:49
54°	22:59		00:22	12:30	12:40	12:50
52°	23:02		00:23	12:25	12:38	12:50
50°	23:05		00:24	12:21	12:37	12:51
45°	23:13		00:25	12:12	12:33	12:51
N 40°	23:18		00:27	12:04	12:29	12:52
35°	23:24	•• ••	00:28	11:57	12:26	12:53
30°	23:28	•• ••	00:29	11:52	12:23	12:53
20°	23:36	•• ••	00:31	11:41	12:19	12:54
N 10°	23:42		00:33	11:32	12:15	12:55
0°	23:49		00:34	11:24	12:11	12:55
<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.	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	Ve	nus		ars	Jup	oiter	Sat	urn		Stars	
Thu -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	71°50.4	224°06.8	S09°34.8	276°20.5	N12°43.9	282°28.7	N13° 19.3	63°29.2	N00°48.0			
1	86°52.9	239°07.7	35.1	291°22.1	43.6	297°31.1	19.2	78°31.7	48.0	Alpheratz	357°33.0	29°14.6
2	101°55.4	254°08.6	35.3	306°23.7	43.4	312°33.5	19.2	93°34.2	48.0	Ankaa	353°05.4	-42°09.7
3	116°57.8	269°09.5	• • 35.6	321°25.3	• • 43.1	327°35.9	• • 19.2	108°36.7	• • 47.9	Schedar	349°28.9	56°41.4
4	132°00.3	284°10.5	35.8	336°26.9	42.9	342°38.2	19.2	123°39.2	47.9	Diphda	348°45.6	-17°50.3
5	147°02.8	299°11.4	36.1	351°28.5	42.6	357°40.6	19.2	138°41.7	47.9	Achernar	335°18.6	-57°06.1
6	162°05.2	314° 12.3	S09°36.4	6°30.0	N12°42.3	12°43.0	N13° 19.1	153°44.2	N00°47.9	Hamal	327°49.1	23°35.5
7	177°07.7	329°13.2	36.6	21°31.6	42.1	27°45.4	19.1	168°46.7	47.9	Polaris	312°44.4	89°22.8
8	192°10.2	344°14.1	36.9	36°33.2	41.8	42°47.8	19.1	183°49.2	47.9	Acamar	315°10.2	-40°11.8
9	$207^{\circ}12.6$	359°15.0	• • 37.1	51°34.8	• • 41.6	57°50.2	• • 19.1	198°51.7	• • 47.9	Menkar	314°04.2	4°11.8
10	222°15.1	14° 15.9	37.4	66°36.4	41.3	72°52.5	19.1	213°54.2	47.9	Mirfak	308°25.5	49°57.5
11	237°17.5	29°16.8	37.6	81°38.0	41.1	87°54.9	19.1	228°56.7	47.9	Aldebaran	290°37.5	16°33.8
12	252°20.0	44°17.7	S09°37.9	96°39.6	N12°40.8	102°57.3	N13°19.0	243°59.2	N00°47.9	Rigel	281°02.0	-8°10.2 46°01.5
13	267°22.5	59° 18.5	38.2	$111^{\circ}41.1$	40.5	$117^{\circ}59.7$	19.0	259°01.7	47.9	Capella Bellatrix	280°19.1 278°20.9	6°22.5
14	282°24.9	74° 19.4	38.4	126°42.7	40.3	$133^{\circ}02.1$	19.0	274°04.2	47.9	Elnath	277°59.5	28°37.8
15	297°27.4	89°20.3	• • 38.7	141°44.3	• • 40.0	148°04.5	• • 19.0	289°06.7	• • 47.9	Alnilam	277 39.3 275°35.8	-1°11.0
16	312°29.9	104°21.2	39.0	156° 45.9	39.8	$163^{\circ}06.9$	19.0	304°09.2	47.9	Betelgeuse	270°50.1	7°24.7
17	327°32.3	119°22.1	39.2	171°47.5	39.5	$178^{\circ}09.3$	19.0	$319^{\circ}11.7$	47.9	Canopus	263°51.2	-52°42.4
18	342°34.8	134°23.0	S09°39.5	186°49.1	N12°39.2	193°11.6	N13° 18.9	334°14.2	N00°47.9	Sirius	258°24.5	-32 42.4 -16°45.1
19	357°37.3	149°23.8	39.8	201°50.7	39.0	208°14.0	18.9	349°16.7	47.9		255°04.3	-10°43.1
20	12°39.7	164°24.7	40.0	$216^{\circ}52.3$	38.7	223°16.4	18.9	$4^{\circ}19.2$	47.9	Adhara Procyon	255 04.3 244°48.9	-29 00.4 5°09.3
21	27°42.2	179°25.6	• • 40.3	231°53.9	• • 38.5	238°18.8	• • 18.9	19°21.7	• • 47.9	Pollux	244 46.9 243°15.1	27°57.5
22	42°44.6	194° 26.5	40.6	246°55.5	38.2	253°21.2	18.9	34°24.2	47.9	Avior	234°13.7	-59°35.5
23	57°47.1	209°27.3	40.9	261°57.1	38.0	268°23.6	18.9	49°26.7	47.9	Suhail	234 13.7 222°45.0	-39 33.3 -43°32.3
Mern	pass. 19:09	νη α' 4n	2′ m-4.88	v1 6' d 0	0.3' m0.43	ν2 4' d-Ω	.0′ m-2.21	ν25' d.C	0.0' m0.62	Miaplacidus	221°37.5	-43 32.3 -69°49.4
ivier.p	Juss. 19.U9	νυ.σ u0.		ν 1.0 <i>u</i> -0	,.5 1110.43	ν2. <del>4</del> u-0	111-2.21	ν Δ. J U-U	7.0 1110.02	Alphard	221 37.5 217°46.1	-8°46.5
										Regulus	207°32.7	11°50.0
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.2	61°36.0
0	72°49.6	224°28.2	S09°41.1	$276^{\circ}58.7$	N12°37.7	283°26.0	N13° 18.8	$64^{\circ}29.1$	N00°47.9	Denebola	182°23.5	14°25.2
1	87°52.0	239°29.1	41.4	292°00.3	37.5	298°28.4	18.8	79°31.6	47.9	Gienah	175°42.1	-17°41.4
2	102°54.5	254°29.9	41.7	307°01.9	37.2	313°30.8	18.8	94°34.1	47.9		173°58.6	-63°14.7
3	$117^{\circ}57.0$	269°30.8	• • 42.0	322°03.5	• • 36.9	328°33.1	• • 18.8	109°36.6	• • 47.9		171°50.1	-57°15.6
4	132°59.4	284°31.7	42.2	337°05.1	36.7	343°35.5	18.8	124°39.1	47.9	Alioth	166°11.9	55°48.5
5	148°01.9	299°32.5	42.5	352°06.7	36.4	358°37.9	18.8	139°41.6	47.8	Spica	158°20.9	-11°18.1
6	163°04.4	314°33.4	S09°42.8	7°08.3	N12°36.2	13°40.3	N13°18.8	154°44.1	N00°47.8	Alkaid	152°51.2	49°10.5
7	178°06.8	329°34.2	43.1	22°09.9	35.9	28°42.7	18.7	169°46.6	47.8	Hadar	148°34.3	-60°30.0
8	193°09.3	344°35.1	43.4	37° 11.5	35.7	43°45.1	18.7	184°49.1	47.8		147°56.1	-36°30.0
9	208°11.8	359°35.9	• • 43.7	52° 13.1	• • 35.4	58°47.5	• • 18.7	199°51.6	• • 47.8	Arcturus	145°46.8	19°02.5
10	223°14.2	14°36.8	44.0	67° 14.7	35.2	73°49.9	18.7	214°54.1	47.8	Rigil Kent.	139°38.7	-60°56.6
11	238°16.7	29°37.6	44.2	82°16.3	34.9	88°52.3	18.7	229°56.6	47.8	Kochab	137°20.9	74°02.4
12	253°19.1	44°38.5	S09°44.5	97°17.9	N12°34.7	103°54.7	N13° 18.7	244°59.1	N00°47.8	Zuben'ubi	136°54.6	-16°09.2
13	268°21.6	59°39.3	44.8	112° 19.5	34.4	118°57.1	18.7	260°01.6	47.8	Alphecca	126°02.8	26°37.4
14	283°24.1	74°40.1	45.1	127°21.1	34.2	133°59.5	18.6	275°04.1	47.8	Antares	112°14.3	-26°29.4
15	298°26.5	89°41.0	• • 45.4	142°22.7	• • 33.9	149°01.9	• • 18.6	290°06.6	• • 47.8	Atria	107°07.7	-69°04.5
16	313°29.0	104°41.8	45.7	157°24.3	33.7	164°04.2	18.6	305°09.1	47.8	Sabik	102°01.3	-15°45.4
17	328°31.5	119°42.6	46.0	172°25.9	33.4	179°06.6	18.6	320°11.6	47.8	Shaula	96°08.7	-37°07.4
18	343°33.9	134° 43.5	S09°46.3	187°27.5	N12°33.1	194°09.0	N13° 18.6	335°14.1	N00°47.8	Rasalhague	95°57.4	12°32.5
19	358°36.4	149°44.3	46.6	202°29.1	32.9	209°11.4	18.6	350°16.6	47.8	Eltanin	90°42.0	51°29.2
20	13°38.9	164° 45.1	46.9	217°30.7	32.6	224°13.8	18.6	5°19.1	47.8	Kaus Aust.	83°30.8	-34°22.3
21	28°41.3	179°46.0	• • 47.2	232°32.3	• • 32.4	239°16.2	• • 18.5	20°21.6	• • 47.8	Vega	80°32.6	38°48.6
22	43°43.8	194°46.8	47.5	247°33.9	32.1	254°18.6	18.5	35°24.0	47.8	Nunki	75°46.2	-26°15.8
23	58°46.3	209°47.6	47.8	262°35.6	31.9	269°21.0	18.5	50°26.5	47.8	Altair	61°58.7	8°56.5
Mer.p	bass. 19:06	$\nu$ 0.9′ d0.	3′ m-4.87	$\nu 1.6' \ d-0$	0.3′ m0.41	$\nu 2.4' \ d-0$	.0′ m-2.21	$\nu 2.5' \ d-0$	0.0′ m0.62	Peacock	53°03.7	-56°39.0
								-		Deneb	49°25.0	45°22.8
_	C	<b></b>	-	6111		c	-	<b></b>	-	Enif	33°37.4	10°00.1
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	$27^{\circ}31.1$	-46°50.0
0	73°48.7	224°48.4	S09°48.1	277°37.2	N12°31.6	284°23.4	N13° 18.5	65°29.0	N00°47.8	Fomalhaut	$15^{\circ}12.8$	-29°28.8
1	88°51.2	239°49.3	48.4	292°38.8	31.4	299°25.8	18.5	80°31.5	47.8	Scheat	13°43.7	28°14.0
2	103°53.6	254°50.1	48.7	307°40.4	31.1	314°28.2	18.5	95°34.0	47.8	Markab	13°28.3	15°21.2
3	118°56.1 133°58.6	269°50.9	· · 49.0	322°42.0	30.9	329°30.6	18.5	110°36.5 125°39.0	· · 47.8	Dec 03 Thu	SHA	Mer.pass
4 5	133°58.6 149°01.0	284°51.7 299°52.5	49.3 49.6	337°43.6 352°45.2	30.6 30.4	344°33.0 359°35.4	18.5	125°39.0 140°41.5	47.8 47.8		5ПА 152°16.4	09:03
6	149°01.0 164°03.5	299°52.5 314°53.3	49.6 \$09°49.9	352°45.2 7°46.9	30.4 N12°30.1	359°35.4 14°37.8	18.4 N13°18.4	140°41.5 155°44.0	47.8	Mars		05:34
7	104 03.5 179°06.0	314 53.3 329°54.1	50.2	7 46.9 22°48.5	N12°30.1 29.9	14 37.8 29°40.2	N13° 18.4 18.4	155 44.0 170°46.5	N00°47.8 47.8		210°38.3	05:09
8	179°06.0 194°08.4	329°54.1 344°54.9	50.2 50.6	22°48.5 37°50.1	29.9 29.7	29°40.2 44°42.6	18.4 18.4	170°46.5 185°49.0	47.8 47.8	Saturn	351°38.7	19:43
9	209°10.9	344 54.9 359°55.7	50.9	52°51.7	29.4	44 42.6 59°45.0	18.4	200°51.5	47.8	Jatuill	JJ1 JU.1	19.43
10	209 10.9 224°13.4	14° 56.5	51.2	67°53.3	29.4	74°47.4	18.4	200 51.5 215°54.0	47.8	Dec 04 Fri	SHA	Mer.pass
10	224°13.4 239°15.8	14°56.5 29°57.3	51.2 51.5	82°54.9	29.2 28.9	74°47.4 89°49.8	18.4 18.4	215°54.0 230°56.5	47.8 47.8	Venus	151°38.6	09:02
	254°18.3	29 57.3 44°58.1	51.5 S09°51.8	97°56.6	28.9 N12°28.7	89 49.8 104°52.2	N13° 18.4	230 56.5 245°58.9	47.8 N00°47.8	Mars		05:32
12 13	254 18.3 269°20.7	59°58.9	52.1	97 50.0 112°58.2	N12 28.7 28.4	104 52.2 119°54.6	N13 18.4 18.4	245 58.9 261°01.4	47.8	Jupiter	210°36.4	05:05
14	284°23.2	74° 59.7	52.1 52.4	112 56.2 127°59.8	28.2	119 54.0 134°57.0	18.3	276°03.9	47.8	Saturn	351°39.6	19:39
15	204 23.2 299°25.7	90°00.5	52.8	127 59.6 143°01.4	27.9	134 57.0 149°59.4	18.3	270 03.9 291°06.4	• • 47.8	Dec OF C-	CHA	Me:: ====
16	299 25.7 314°28.1	105°01.3	53.1	145 01.4 158°03.0	27.7	149 59.4 165°01.8	18.3	306°08.9	47.8	Dec 05 Sat	SHA 150° 50.7	Mer.pass
17	329°30.6	105 01.3 120°02.1	53.4	173° 04.7	27.4	180°04.2	18.3	321°11.4	47.8	!	150°59.7	09:00
18	344°33.1	135° 02.1	509°53.7	173 04.7 188° 06.3	N12°27.2	195°06.6	N13° 18.3	336°13.9	N00°47.8	Mars		05:29
19	359°35.5	150°03.7	54.1	203°07.9	26.9	210°09.0	18.3	351°16.4	47.8	Saturn	210°34.7 351°40.3	05:02 10:35
20	14°38.0	165° 04.4	54.4	218° 09.5	26.7	225°11.4	18.3	6°18.9	47.8	Saturn	JUL 40.3	19:35
21	29°40.5	180°05.2	• • 54.7	233°11.2	. 26.4	240°13.8	18.3	21°21.4	• • 47.8	Horizont	al parallax	
22	44°42.9	195°06.0	55.0	248°12.8	26.2	255°16.2	18.3	36°23.8	47.8		Venus:	0.3
23	59°45.4	210°06.8	55.4	263°14.4	26.0	270°18.6	18.2	51°26.3	47.8		Mars:	0.1
Mer.p	pass. 19:02	$\nu$ 0.8′ d0.	3′ m-4.86	$\nu$ 1.6' d-0	0.2′ m0.40	$\nu$ 2.4′ d-0	.0′ m-2.22	$\nu$ 2.5′ $d$ -0	0.0′ m0.63			

h	Sui	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	182°36.3	S22°04.0	251°08.0	14.6'	S03°43.3	14.9'	56.7'
1 2	197°36.0 212°35.8	04.3 04.7	265°41.5 280°15.1	14.6' 14.6'	03°58.3 04°13.2	14.9' 14.9'	56.7' 56.6'
3	227°35.5	05.0	294°48.8	14.6'	04°28.1	14.8'	56.6'
4	242°35.3	05.4	309°22.4	14.6'	04°42.9	14.8'	56.6'
5	257°35.1 272°34.8	05.7	323°56.0 338°29.6	14.6'	04°57.7 \$05°12.5	14.8'	56.6'
6 7	272°34.8 287°34.6	\$22°06.1 06.4	338°29.6 353°03.2	14.6' 14.6'	505°12.5 05°27.3	14.7' 14.7'	56.5' 56.5'
8	302°34.3	06.8	7°36.9	14.6'	05°42.0	14.7'	56.5
9	317°34.1	•• 07.1	22°10.5	14.6'	05°56.7	14.6'	56.5'
10 11	332°33.8 347°33.6	07.5 07.8	36°44.1 51°17.7	14.6' 14.6'	06°11.3 06°25.9	14.6' 14.6'	56.4' 56.4'
12	2°33.3	\$22°08.2	65°51.4	14.6'	S06°40.4	14.5	56.4
13	17°33.1	08.5	80°25.0	14.6'	$06^{\circ}55.0$	14.5'	56.4'
14	32°32.8	08.9	94°58.6	14.6'	07°09.4	14.4'	56.3'
15 16	47°32.6 62°32.3	· · 09.2 09.6	109°32.2 124°05.8	14.6' 14.6'	07°23.9 07°38.3	14.4' 14.3'	56.3' 56.3'
17	77°32.1	09.9	138°39.4	14.6'	07°52.6	14.3'	56.2'
18	92°31.8	S22°10.3	153°13.0	14.6'	S08°06.9	14.3'	56.2'
19 20	107°31.6 122°31.3	10.6 11.0	167°46.6 182°20.1	14.6' 14.6'	08°21.1 08°35.3	14.2' 14.2'	56.2' 56.2'
21	137°31.1	11.3	196°53.7	14.5	08°49.5	14.1	56.1
22	152°30.8	11.6	211°27.2	14.5'	09°03.6	14.1'	56.1'
23	167°30.6	12.0	226°00.7	14.5'	09°17.7	14.0'	56.1'
	SD = 16.2'	d = 0.4'		SE	0 = 15.5'		
Fri	GHA	Dec	GHA	ν	Dec	d	НР
0	182°30.3	S22°12.3	240°34.2	14.5'	S09°31.7	14.0'	56.1'
1	197°30.1	12.7	255°07.7	14.5'	09°45.6	13.9'	56.0'
2	212°29.8 227°29.6	13.0 •• 13.3	269°41.2 284°14.7	14.5' 14.4'	09°59.5 10°13.4	13.9' 13.8'	56.0' 56.0'
4	242°29.3	13.7	298°48.1	14.4'	10° 13.4° 10° 27.2	13.7'	56.0'
5	257°29.1	14.0	$313^{\circ}21.5$	14.4'	$10^{\circ}40.9$	13.7'	56.0'
6	272°28.8 287°28.6	\$22°14.3	327°54.9 342°28.3	14.4'	\$10°54.6 11°08.3	13.6'	55.9'
7 8	302°28.3	14.7 15.0	342°28.3 357°01.6	14.3' 14.3'	11°08.3 11°21.8	13.6' 13.5'	55.9' 55.9'
9	317°28.1	• • 15.3	11°34.9	14.3'	11°35.4	13.5'	55.9'
10	332°27.8	15.7	26°08.2	14.3'	11°48.8	13.4'	55.8'
11 12	347°27.6 2°27.3	16.0 \$22°16.3	40°41.5 55°14.8	14.2' 14.2'	12°02.2 \$12°15.6	13.3' 13.3'	55.8' 55.8'
13	17°27.1	16.7	69°48.0	14.2'	12°28.8	13.2'	55.8'
14	32°26.8	17.0	84°21.2	14.2'	12°42.0	13.1'	55.7'
15 16	47°26.6 62°26.3	· · 17.3 17.7	98°54.3 113°27.5	14.1' 14.1'	12°55.2 13°08.3	13.1' 13.0'	55.7' 55.7'
17	77°26.0	18.0	113 27.5 128°00.6	14.1'	13°21.3	13.0'	55.7'
18	92°25.8	<b>S</b> 22°18.3	142°33.6	14.0'	<b>S</b> 13°34.3	12.9'	55.7'
19	107°25.5 122°25.3	18.6	157°06.6 171°39.6	14.0'	13°47.1 14°00.0	12.8'	55.6'
20 21	122 25.3 137°25.0	19.0 •• 19.3	171 39.6 186°12.6	14.0 13.9'	14 00.0 14°12.7	12.8	55.6' 55.6'
22	152°24.8	19.6	200°45.5	13.9'	14°25.4	12.6'	55.6'
23	167°24.5	19.9	215°18.4	13.9'	14°38.0	12.5'	55.5'
	SD = 16.2'	d = 0.3'		SE	0 = 15.3'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°24.3	\$22°20.3	229°51.3	13.8'	S14°50.5	12.5'	55.5'
1 2	197°24.0 212°23.7	20.6 20.9	244°24.1 258°56.9	13.8' 13.7'	15°03.0 15°15.4	12.4' 12.3'	55.5' 55.5'
3	212 23.7 227°23.5	. 21.2	273°29.6	13.7'	15° 27.7	12.2'	55.5'
4	242°23.2	21.5	288°02.3	13.7'	15°40.0	12.2'	55.4'
5 6	257°23.0 272°22.7	21.9 \$22°22.2	302°35.0 317°07.6	13.6' 13.6'	15°52.2 \$16°04.3	12.1' 12.0'	55.4' 55.4'
7	272 22.7 287°22.5	22.5	317 07.6 331°40.2	13.5'	16° 16.3	12.0 11.9'	55.4'
8	302°22.2	22.8	$346^{\circ}12.7$	13.5'	$16^{\circ}28.2$	11.9'	55.4'
9	317°21.9	• • 23.1	0°45.2	13.5'	16°40.1 16°51.9	11.8'	55.3'
10 11	332°21.7 347°21.4	23.4 23.8	15°17.7 29°50.1	13.4' 13.4'	16°51.9 17°03.6	11.7' 11.6'	55.3' 55.3'
12	2°21.2	\$22°24.1	44°22.5	13.3'	S17°15.2	11.5'	55.3'
13	17°20.9	24.4	58°54.8	13.3'	17°26.7	11.5'	55.3'
14 15	32°20.6 47°20.4	24.7 •• 25.0	73°27.1 87°59.3	13.2' 13.2'	17° 38.2 17° 49.6	11.4' 11.3'	55.2' 55.2'
16	62°20.1	25.3	102°31.5	13.1'	17 49.0 18°00.8	11.3	55.2'
17	77°19.9	25.6	117°03.6	13.1'	18° 12.0	11.1'	55.2'
18 19	92°19.6 107°19.3	\$22°25.9 26.2	131°35.7 146°07.7	13.0' 13.0'	\$18°23.2 18°34.2	11.0' 10.9'	55.2' 55.1'
20	107°19.3 122°19.1	26.2 26.5	146°07.7 160°39.7	13.0	18° 34.2 18° 45.1	10.9'	55.1'
21	137°18.8	• • 26.8	$175^{\circ}11.7$	12.9'	18°56.0	10.8'	55.1'
22 23	152°18.6 167°18.3	27.2 27.5	189°43.6 204°15.4	12.8' 12.8'	19°06.7 19°17.4	10.7'	55.1' 55.1'
23			∠∪4 15.4			10.6'	55.1
	SD = 16.2'	d = 0.3'		SL	0 = 15.1'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	07:59	10:04			13:36	15:41
N 70°	07:42	09:21			14:19	15:58
68°	07:28	08:52	10:55	12:44	14:48	16:12
66°	07:16	08:30	09:57	13:43	15:10	16:24
64°	07:06	08:12	09:24	14:16	15:28	16:34
62°	06:58	07:58	09:00	14:40	15:42	16:42
60°	06:50	07:46	08:41	14:59	15:54	16:50
N 58°	06:43	07:35	08:25	15:15	16:05	16:57
56°	06:37	07:26	08:12	15:29	16:14	17:03
54°	06:32	07:17	08:00	15:40	16:23	17:08
52°	06:27	07:10	07:50	15:50	16:30	17:13
50°	06:22	07:03	07:40	16:00	16:37	17:18
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
<b>S</b> 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	////
				1		

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
<b>N</b> 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.o	f 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	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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	74°47.9	225°07.6	S09°55.7	278° 16.1	N12°25.7	285°21.0	N13° 18.2	66°28.8	N00° 47.8		SHA	Dec
	89°50.3	240°08.3	56.0	276 10.1 293°17.7		300°23.5		81°31.3		Alpheratz	357°33.0	29°14.6
1					25.5		18.2		47.8	Ankaa	353°05.5	-42°09.7
2	104°52.8 119°55.2	255°09.1	56.3	308° 19.3 323° 20.9	25.2	315°25.9 330°28.3	18.2	96°33.8	47.8	Schedar	$349^{\circ}29.0$	56°41.4
		270°09.9	56.7		• • 25.0	330 28.3 345°30.7	18.2	111°36.3	• • 47.8	Diphda	348°45.6	-17°50.3
4	134°57.7	285°10.6	57.0	338°22.6	24.7	0°33.1	18.2	126°38.8	47.8	Achernar	$335^{\circ}18.7$	-57°06.1
5 6	150°00.2	300°11.4	57.3	353°24.2 8°25.8	24.5 N12°24.3	15°35.5	18.2 N13° 18.2	141°41.3 156°43.8	47.8	Hamal	327°49.2	23°35.5
7	165°02.6 180°05.1	315°12.2 330°12.9	\$09°57.7 58.0	0 25.0 23°27.5	24.0	30°37.9		171° 46.2	N00°47.8	Polaris	$312^{\circ}44.6$	89°22.8
8	195°07.6	345°13.7	58.4	25 27.5 38°29.1	23.8	45°40.3	18.2 18.2	171 40.2 186° 48.7	47.8	Acamar	$315^{\circ}10.2$	-40°11.8
9	210°10.0	0°14.4	58.7	50° 29.1	. 23.5	45 40.3 60°42.7	18.1	201°51.2	47.8 • • 47.8	Menkar	314°04.2	$4^{\circ}11.8$
10	210 10.0 225°12.5	15°15.2	59.0	68°32.4	23.3	75°45.1	18.1	201 51.2 216°53.7	47.8	Mirfak	308°25.5	49°57.5
11	240°15.0	30°16.0	59.4	83°34.0	23.0	90°47.5	18.1	231° 56.2	47.8	Aldebaran	290°37.5	16°33.8
12	255°17.4	45°16.7	S09°59.7	98°35.6	N12°22.8	105°49.9	N13° 18.1	246°58.7	N00°47.8	Rigel	281°02.0	-8°10.2
13	270°19.9	60°17.5	10°00.1	113°37.3	22.6	100°52.3	18.1	262°01.2	47.8	Capella	$280^{\circ}19.1$	46°01.5
14	270 19.9 285°22.4	75°18.2	00.4	113 37.3 128°38.9	22.3	120 52.3 135°54.8	18.1	202 01.2 277°03.7	47.8	Bellatrix	278°20.9	6°22.5
15	300°24.8	90°19.0	00.7	143° 40.5	22.1	150°57.2	18.1	292°06.1	• • 47.8	Elnath	277°59.5	28°37.8
16	315°27.3	105° 19.7	01.1	158° 42.2	21.8	165°59.6	18.1	307°08.6	47.8	Alnilam	275°35.8	$-1^{\circ}11.1$
17	330°29.7	120°20.4	01.4	173° 43.8	21.6	181°02.0	18.1	322°11.1	47.8	Betelgeuse	$270^{\circ}50.1$	7°24.7
18	345°32.2	135°21.2	\$10°01.8	188° 45.5	N12°21.4	196°04.4	N13° 18.1	337°13.6	N00°47.8	Canopus	263°51.2	-52°42.5
19	0°34.7	150°21.9	02.1	203°47.1	21.1	211°06.8	18.1	352°16.1	47.8	Sirius	258° 24.5	-16°45.1
20	15°37.1	165°22.7	02.1	218° 48.7	20.9	211 00.0 226°09.2	18.1	7°18.6	47.8	Adhara	255°04.3	-29°00.4
21	30°39.6	180°23.4	02.8	233°50.4	. 20.6	241°11.6	18.1	22°21.1	• • 47.8	Procyon	244°48.9	5°09.3
22	45°42.1	195°24.1	03.2	248° 52.0	20.4	256°14.0	18.0	37°23.5	47.8	Pollux	243°15.1	27°57.5
23	60°44.5	210°24.9	03.5	263°53.7	20.4	271°16.5	18.0	52°26.0	47.8	Avior	234° 13.7	-59°35.5
										Suhail	222°44.9	-43°32.3
Mer.p	ass. 18:58	$\nu$ 0.8′ d0.	3′ m-4.86	$\nu$ 1.6 $^{\prime}$ d-0	0.2′ m0.38	$\nu$ 2.4′ d-0	.0′ m-2.23	$\nu 2.5' \ d0$	.0′ m0.63	Miaplacidus	221°37.5	-69°49.4
										Alphard	217°46.1	-8°46.5
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°32.7	11°50.0
0	75°47.0	225°25.6	S10°03.9	278° 55.3	N12° 19.9	286°18.9	N13° 18.0	67°28.5	N00° 47.8	Dubhe	193°39.1	61°36.0
1	90°49.5	240°26.3	04.2	276 55.5 293°57.0	19.7	301°21.3	18.0	82°31.0	47.8	Denebola	182°23.4	14°25.2
2	105°51.9	255°27.1	04.2	308° 58.6	19.4	316°23.7	18.0	97°33.5	47.8	Gienah	175°42.1	-17°41.4
3	120°54.4	270°27.8	05.0	324°00.3	19.2	331°26.1	• 18.0	112°36.0	47.8		172°58.6	-63°14.7
4	135°56.9	285°28.5	05.3	339°01.9	19.0	346°28.5	18.0	127°38.5	47.8		171°50.1	-57°15.6
5	150°59.3	300°29.2	05.7	354°03.5	18.7	1°30.9	18.0	142°40.9	47.8	1	166°11.9	55°48.5
6	166°01.8	315°29.9	S10°06.0	9°05.2	N12° 18.5	16°33.3	N13° 18.0	157°43.4	N00°47.8	Spica	158° 20.8	-11°18.1
7	181°04.2	330°30.7	06.4	24°06.8	18.3	31°35.8	18.0	172° 45.9	47.9	Alkaid	152°51.1	49°10.5
8	196°06.7	345°31.4	06.7	39°08.5	18.0	46°38.2	18.0	187°48.4	47.9	Hadar	148°34.2	-60°30.0
9	211°09.2	0°32.1	07.1	54°10.1	• • 17.8	61°40.6	• • 18.0	202°50.9	47.9	1	147°56.1	-36°30.0
10	226°11.6	15°32.8	07.5	69°11.8	17.5	76°43.0	18.0	217°53.4	47.9	Arcturus	145°46.8	19°02.4
11	241°14.1	30°33.5	07.8	84° 13.4	17.3	91°45.4	18.0	232°55.8	47.9	Rigil Kent.	139°38.7	-60°56.6
12	256°16.6	45°34.2	\$10°08.2	99° 15.1	N12° 17.1	106°47.8	N13° 17.9	247°58.3	N00°47.9	Kochab	137°20.9	74°02.4
13	271°19.0	60°34.9	08.6	114° 16.8	16.8	121°50.3	17.9	263°00.8	47.9	Zuben'ubi	136°54.6	-16°09.2
14	286°21.5	75°35.6	08.9	129° 18.4	16.6	136°52.7	17.9	278°03.3	47.9	Alphecca	126°02.8	26°37.4
15	301°24.0	90°36.3	09.3	144°20.1	. 16.4	151°55.1	17.9	293°05.8	47.9	Antares	112°14.3	-26°29.4
16	316°26.4	105°37.0	09.7	159°21.7	16.1	166°57.5	17.9	308°08.3	47.9	Atria	107°07.7	-69°04.5
17	331°28.9	120°37.7	10.0	174°23.4	15.9	181°59.9	17.9	323° 10.7	47.9	Sabik	102°01.3	-15°45.4
18	346°31.3	135°38.4	\$10°10.4	189°25.0	N12° 15.7	197°02.3	N13° 17.9		N00°47.9	Shaula	96°08.7	-37°07.4
19	1°33.8	150°39.1	10.8	204°26.7	15.4	212°04.8	17.9	353° 15.7	47.9	Rasalhague	95°57.4	12°32.5
20	16°36.3	165°39.8	11.2	219°28.3	15.2	227°07.2	17.9	8° 18.2	47.9	Eltanin	90°42.0	51°29.2
21	31°38.7	180°40.5	• • 11.5	234°30.0	• • 15.0	242°09.6	17.9	23°20.7	• • 47.9	Kaus Aust.	83°30.8	-34°22.3
22	46°41.2	195°41.2	11.9	249°31.7	14.7	257°12.0	17.9	38°23.1	47.9	Vega	80°32.6	38°48.6
23	61°43.7	210°41.9	12.3	264°33.3	14.5	272°14.4	17.9	53°25.6	47.9	Nunki	75°46.2	-26°15.8
										Altair	61°58.7	8°56.5
Mer.p	bass. 18:54	$\nu$ 0.7' d0.	4′ m-4.85	$\nu$ 1.6′ $d$ -0	0.2′ m0.36	$\nu$ 2.4′ d-0	.0′ m-2.23	$\nu$ 2.5′ $d0$	.0′ m0.63	Peacock	53°03.7	-56°39.0
										Deneb	49°25.0 33°37.4	45°22.8
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.4 27°31.1	10°00.1
0	76°46.1	225°42.6	S10°12.7	279°35.0	N12° 14.3	287°16.9	N13° 17.9	68°28.1	N00°47.9	Al Na'ir Fomalhaut	27°31.1 15°12.8	-46°50.0 -29°28.8
1	91°48.6	240°43.3	13.0	294°36.6	14.0	302°19.3	17.9	83°30.6	47.9	Scheat	15 12.8 13°43.7	-29 28.8 28°14.0
2	106°51.1	255°44.0	13.4	309°38.3	13.8	317°21.7	17.9	98°33.1	47.9	Markab	13 43.7 13°28.3	28 14.0 15°21.2
3	121°53.5	270°44.7	• • 13.8	324°40.0	• • 13.6	332°24.1	• • 17.9	113°35.5	• • 47.9	IVIdIKaD	10.0	19 41.4
4	136°56.0	285°45.3	14.2	339°41.6	13.3	347°26.6	17.9	128°38.0	47.9	Dec 06 Sun	SHA	Mer.pass
5	151°58.5	300°46.0	14.6	354°43.3	13.1	2°29.0	17.9	143°40.5	47.9	Venus	$150^{\circ}19.7$	08:59
6	167°00.9	315°46.7	S10°14.9	9°45.0	N12° 12.9	17°31.4	N13° 17.9		N00°47.9	Mars	203°28.2	05:26
7	182°03.4	330°47.4	15.3	24°46.6	12.7	32°33.8	17.9	173°45.5	47.9	Jupiter	$210^{\circ}33.2$	04:58
8	197°05.8	345°48.0	15.7	39°48.3	12.4	47°36.2	17.9	188°47.9	47.9	Saturn	$351^{\circ}41.0$	19:31
9	212°08.3	0°48.7	• • 16.1	54°50.0	• • 12.2	62°38.7	• • 17.9	203°50.4	• • 48.0	Dec 07 14	CIIA	Ma:: :-
10	227°10.8	15°49.4	16.5	$69^{\circ}51.6$	12.0	77°41.1	17.8	$218^{\circ}52.9$	48.0	Dec 07 Mon	SHA	Mer.pass
11	242°13.2	$30^{\circ}50.1$	16.9	84°53.3	11.7	92°43.5	17.8	233°55.4	48.0		149°38.6	08:58
12	257°15.7	45°50.7	S10°17.2	99°55.0	N12°11.5	107°45.9	N13°17.8	248°57.9	N00°48.0		203°08.3	05:24
13	272°18.2	60°51.4	17.6	$114^{\circ}56.6$	11.3	122°48.4	17.8	264°00.3	48.0		210°31.9	04:54
14	287°20.6	$75^{\circ}52.1$	18.0	$129^{\circ}58.3$	11.0	137°50.8	17.8	$279^{\circ}02.8$	48.0	Saturn	351°41.5	19:27
15	302°23.1	90°52.7	• • 18.4	$145^{\circ}00.0$	• • 10.8	152°53.2	• • 17.8	$294^{\circ}05.3$	• • 48.0	Dec 08 Tue	SHA	Mer.pass
16	$317^{\circ}25.6$	$105^{\circ}53.4$	18.8	$160^{\circ}01.6$	10.6	167°55.6	17.8	$309^{\circ}07.8$	48.0		148°56.5	08:57
17	332°28.0	$120^{\circ}54.0$	19.2	$175^{\circ}03.3$	10.4	182°58.1	17.8	$324^{\circ}10.3$	48.0		202°48.8	05:21
18	347°30.5	135°54.7	S10°19.6	190°05.0	N12° 10.1	198°00.5	N13°17.8	339°12.7	N00°48.0		210°30.7	04:50
19	2°33.0	150°55.4	20.0	$205^{\circ}06.7$	09.9	213°02.9	17.8	$354^{\circ}15.2$	48.0		351°42.0	19:23
20	17°35.4	$165^{\circ}56.0$	20.4	220°08.3	09.7	228°05.3	17.8	$9^{\circ}17.7$	48.0			
21	32°37.9	$180^{\circ}56.7$	• • 20.8	$235^{\circ}10.0$	• • 09.5	243°07.8	• • 17.8	$24^{\circ}20.2$	• • 48.0	Horizont	al parallax	
22	47°40.3	195°57.3	21.2	250°11.7	09.2	258°10.2	17.8	39°22.6	48.0		Venus:	0.3
23	62°42.8	210°58.0	21.6	265°13.4	09.0	273°12.6	17.8	54°25.1	48.0		Mars:	0.1
Mern	ass. 18:50	νη 7' Αη	4′ m-4.84	v1 7' d.0	0.2′ m0.34	v2 4' d₋∩	.0′ m-2.24	1/2 5/ dn	.0′ m0.64			
.vici.p		- J.1 UU.	0-	ν 1.1 U-C		ν <u>-</u> . ¬ u-0		- Z.5 UU				

h	Sui	n					
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	182°18.0	<b>S</b> 22°27.8	218°47.2	12.8'	S19°28.0	10.5'	55.1'
1 2	197°17.8 212°17.5	28.1 28.4	233°19.0 247°50.7	12.7'	19° 38.5 19° 48.9	10.4'	55.0'
3	212 17.5 227°17.2	. 28.4	247 50.7 262°22.3	12.7' 12.6'	19 48.9 19°59.2	10.3' 10.2'	55.0' 55.0'
4	242°17.0	29.0	276°53.9	12.6'	20°09.4	10.1	55.0'
5	257°16.7	29.3	291°25.5	12.5'	20° 19.5	10.0'	55.0'
6	272°16.4 287°16.2	\$22°29.6	305°57.0 320°28.4	12.4	\$20°29.5 20°39.4	9.9'	55.0'
7 8	302°15.9	29.9 30.2	320°28.4 334°59.8	12.4' 12.3'	20° 39.4 20° 49.2	9.8' 9.7'	54.9' 54.9'
9	317°15.7	30.5	349°31.2	12.3'	20°59.0	9.6'	54.9'
10	332°15.4	30.8	4°02.5	12.2'	21°08.6	9.5'	54.9'
11	347°15.1	31.1	18°33.7 33°04.9	12.2'	21°18.1 521°27.5	9.4'	54.9'
12 13	2°14.9 17°14.6	\$22°31.3 31.6	47°36.1	12.1' 12.1'	21°36.8	9.3' 9.2'	54.9' 54.8'
14	32°14.3	31.9	62°07.2	12.0'	21°46.0	9.1'	54.8'
15	47°14.1	• • 32.2	76°38.2	12.0'	21°55.2	9.0'	54.8'
16	62°13.8	32.5	91°09.2	11.9'	22°04.2	8.9'	54.8'
17 18	77°13.5 92°13.3	32.8 \$22°33.1	105°40.1 120°11.0	11.9' 11.8'	22°13.1 522°21.8	8.8' 8.7'	54.8' 54.8'
19	107°13.0	33.4	134°41.8	11.8'	22°30.5	8.6'	54.7'
20	122°12.7	33.7	149°12.6	11.7'	$22^{\circ}39.1$	8.5'	54.7'
21	137°12.5	• • 34.0	163°43.4	11.7'	22°47.6	8.4'	54.7'
22 23	152°12.2 167°11.9	34.3 34.5	178°14.0 192°44.7	11.6' 11.6'	22°55.9 23°04.2	8.3' 8.1'	54.7' 54.7'
23		d = 0.3'				0.1	J T. I
	SD = 16.2'	a = 0.3		SL	0 = 15.0'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°11.7	S22°34.8	207°15.3	11.5'	\$23°12.3	8.0'	54.7'
1 2	197°11.4 212°11.1	35.1 35.4	221°45.8 236°16.3	11.5' 11.4'	23°20.4 23°28.3	7.9' 7.8'	54.7' 54.6'
3	212°11.1 227°10.9	35.4 · · 35.7	250°46.7	11.4 11.4'	23° 28.3 23° 36.1	7.8	54.6'
4	242°10.6	36.0	265°17.1	11.3'	23°43.8	7.6'	54.6'
5	257°10.3	36.2	279°47.5	11.3'	23°51.3	7.5'	54.6'
6	272°10.1 287°09.8	\$22°36.5 36.8	294°17.7 308°48.0	11.2' 11.2'	\$23°58.8 24°06.1	7.3' 7.2'	54.6'
7 8	287°09.8 302°09.5	36.8 37.1	308°48.0 323°18.2	11.2'	24° 06.1 24° 13.4	7.2	54.6' 54.6'
9	317°09.2	37.4	337°48.3	11.1'	24°20.5	7.0'	54.5'
10	332°09.0	37.6	352°18.4	11.1'	24°27.5	6.9'	54.5'
11	347°08.7 2°08.4	37.9 \$22°38.2	6°48.5 21°18.5	11.0' 11.0'	24°34.4 <b>S</b> 24°41.1	6.8' 6.6'	54.5' 54.5'
12 13	2 08.4 17°08.2	38.5	21 18.5 35°48.5	10.9	24° 47.8	6.5	54.5'
14	32°07.9	38.7	50°18.4	10.9'	24°54.3	6.4	54.5'
15	47°07.6	• • 39.0	64°48.3	10.8'	25°00.7	6.3'	54.5'
16 17	62°07.3 77°07.1	39.3 39.6	79°18.1 93°47.9	10.8' 10.8'	25°06.9 25°13.1	6.2' 6.0'	54.5' 54.4'
18	92°06.8	\$22°39.8	93 47.9 108°17.7	10.7	\$25°19.1	5.9'	54.4
19	107°06.5	40.1	122°47.4	10.7'	25°25.0	5.8'	54.4'
20	122°06.3	40.4	137°17.1		25°30.8	5.7'	54.4'
21 22	137°06.0 152°05.7	· · 40.6 40.9	151°46.7 166°16.3	10.6' 10.6'	25° 36.5 25° 42.0	5.5' 5.4'	54.4' 54.4'
23	167°05.4	40.9	180°45.9	10.5	25°47.4	5.4	54.4'
	SD = 16.2'	d = 0.3'			0 = 14.9'		
	<u>JD = 10.2</u>	<u>u = 0.5</u>		JL	7 — 14.9		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°05.2 197°04.9	\$22°41.5	195°15.4	10.5'	\$25°52.7	5.2'	54.4'
1 2	197°04.9 212°04.6	41.7 42.0	209°44.9 224°14.3	10.5' 10.4'	25° 57.8 26° 02.9	5.0' 4.9'	54.3' 54.3'
3	227°04.3	• • 42.2	238°43.8	10.4	26°07.8	4.8'	54.3'
4	242°04.1	42.5	253°13.2	10.4'	26° 12.5	4.6'	54.3'
5	257°03.8 272°03.5	42.8 \$22°43.0	267°42.5 282°11.8	10.3' 10.3'	26° 17.2 \$26° 21.7	4.5' 4.4'	54.3' 54.3'
6 7	272°03.5 287°03.2	\$22°43.0 43.3	282°11.8 296°41.1	10.3'	26°26.1	4.4	54.3'
8	302°03.0	43.6	311°10.4	10.2	26°30.3	4.1'	54.3'
9	317°02.7	• • 43.8	325°39.6	10.2'	26°34.5	4.0'	54.3'
10 11	332°02.4 347°02.1	44.1 44.3	340°08.8 354°38.0	10.2' 10.2'	26° 38.5 26° 42.3	3.9' 3.7'	54.3' 54.2'
11	2°01.9	44.3 \$22°44.6	9°07.1	10.2	26°42.3 \$26°46.1	3.6'	54.2'
13	17°01.6	44.9	23°36.3	10.1	26°49.7	3.5'	54.2'
14	32°01.3	45.1	38°05.4	10.1	26°53.1	3.3'	54.2'
15 16	47°01.0 62°00.8	· · 45.4 45.6	52°34.5 67°03.5	10.1' 10.0'	26° 56.5 26° 59.7	3.2' 3.1'	54.2' 54.2'
16 17	62°00.8 77°00.5	45.6 45.9	67°03.5 81°32.6	10.0'	26°59.7 27°02.7	3.1° 2.9'	54.2'
18	92°00.2	S22°46.1	96°01.6	10.0'	S27°05.7	2.8'	54.2'
19	106°59.9	46.4	110°30.6	10.0'	27°08.5	2.7'	54.2'
20	121°59.7 136°59.4	46.6 • • 46.9	124°59.6 139°28.6	10.0' 10.0'	27°11.2 27°13.7	2.5' 2.4'	54.2' 54.1'
21 22	136°59.4 151°59.1	· · 46.9 47.1	139°28.6 153°57.5	10.0° 9.9°	27°13.7 27°16.1	2.4'	54.1' 54.1'
23	166°58.8	47.4	168°26.5	9.9'	27° 18.4	2.1'	54.1'
	SD = 16.2'	d = 0.3'		SF	0 = 14.8'		
				J.	11.0		

		2020	5 Decer	nber uc	to De	c. Uð	
Lat.	Twi	light	Sunrise	Sunset	Twi	light	
Lat.	Naut.	Civil	Junisc	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	
N 58°	06:47	07:39	08:30	15:13	16:03	16:55	
56°	06:41	07:29	08:16	15:27	16:13	17:02	
54°	06:35	07:23	08:04	15:39	16:22	17:02	
52°	06:30	07:21	07:53	15:49	16:29	17:13	
50°	06:25	07:06	07:44	15:59	16:37	17:18	
45°	06:14	06:51	07:24	16:18	16:52	17:29	
N 40°		06:38	07:08	16:35		17:39	
35°	06:04 05:55	06:38	06:55	16:35	17:05 17:16	17:39	
30°				l			
20°	05:47 05:31	06:17 05:58	06:43 06:22	17:00 17:20	17:26 17:44	17:56 18:12	
N 10°	05:31	05:36	06:22	17:20	18:01	18:27	
0°	03.10	05:42	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° 45°	03:11	03:52	04:24	19:19	19:51	20:32	
-	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° <b>S</b> 60°	////	01:45	02:55	20:49	21:59	////	
3 00	////	01:06	02:36	21:08	22:39	////	
Lat.		Moonris		Moonset			
	Sun	Mon	Tue	Sun	Mon	Tue	
N 72°							
<b>N</b> 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	

Lat.		Moonris	e		Moonset	
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°						
<b>N</b> 70°						
68°	08:28			10:44		
66°	07:34			11:38		
64°	07:02	09:04		12:11	11:50	
62°	06:39	08:21	10:05	12:36	12:34	12:35
60°	06:20	07:52	09:20	12:55	13:03	13:20
N 58°	06:04	07:30	08:51	13:11	13:25	13:49
56°	05:51	07:13	08:28	13:25	13:44	14:12
54°	05:40	06:58	08:10	13:37	13:59	14:30
52°	05:30	06:45	07:55	13:48	14:12	14:46
50°	05:21	06:33	07:41	13:57	14:24	15:00
45°	05:02	06:10	07:14	14:17	14:49	15:28
N 40°	04:47	05:51	06:52	14:33	15:08	15:50
35°	04:34	05:35	06:34	14:47	15:25	16:08
30°	04:23	05:21	06:19	14:59	15:39	16:24
20°	04:04	04:58	05:53	15:20	16:03	16:50
<b>N</b> 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	f Time	Mer.	Mer.	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	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	77°45.3	225°58.6	S10°22.0	280°15.0	N12°08.8	288°15.1	N13° 17.8	69°27.6	N00° 48.0			
1	92°47.7	240°59.3	22.4	295°16.7	08.5	303°17.5	17.8	84°30.1	48.0	Alpheratz	357°33.0	29°14.6
2	107°50.2	255° 59.9	22.8	310°18.4	08.3	318° 19.9	17.8	99°32.5	48.0	Ankaa	353°05.5	-42°09.7
3	122°52.7	271°00.5	• • 23.2	325°20.1	08.1	333°22.3	• • 17.8	114°35.0	• • 48.1	Schedar	349°29.0	56°41.4
4	137°55.1	286°01.2	23.6	340°21.8	07.9	348°24.8	17.8	129°37.5	48.1	Diphda	348°45.6	-17°50.3
5	152°57.6	301°01.8	24.0	355°23.4	07.6	3°27.2	17.8	144°40.0	48.1	Achernar	335° 18.7 327° 49.1	-57°06.2 23°35.6
6	168°00.1	316°02.5	S10°24.4	10°25.1	N12°07.4	18°29.6	N13°17.8	159°42.5	N00°48.1	Hamal Polaris	312°44.9	89°22.8
7	183°02.5	331°03.1	24.8	25°26.8	07.2	33°32.1	17.8	174°44.9	48.1	Acamar	315°10.2	-40°11.9
8	198°05.0	346°03.7	25.2	40°28.5	07.0	48°34.5	17.8	189°47.4	48.1	Menkar	314°04.2	4°11.8
9	213°07.5	1°04.4	• • 25.6	55°30.2	• • 06.8	63°36.9	• • 17.8	204°49.9	• • 48.1	Mirfak	308°25.5	49°57.5
10	228°09.9	16°05.0	26.0	70°31.9	06.5	78°39.4	17.8	219°52.4	48.1	Aldebaran	290°37.5	16°33.8
11	243°12.4 258°14.8	31°05.6	26.4	85°33.5	06.3	93°41.8 108°44.2	17.8	234°54.8 249°57.3	48.1	Rigel	281°02.0	-8°10.2
12 13	273°17.3	46°06.2 61°06.9	\$10°26.8 27.2	100°35.2 115°36.9	N12°06.1 05.9	106 44.2 123°46.7	N13° 17.8 17.8	249 57.3 264°59.8	N00°48.1 48.1	Capella	$280^{\circ}19.1$	46°01.5
14	273 17.3 288°19.8	76°07.5	27.2	130°38.6	05.9	138°49.1	17.8	280°02.3	48.1	Bellatrix	278°20.8	6°22.5
15	303°22.2	91°08.1	28.0	145°40.3	05.4	153°51.5	. 17.8	295°04.7	• • 48.1	Elnath	277°59.5	28°37.8
16	318°24.7	106°08.7	28.5	160°42.0	05.2	168°54.0	17.8	310°07.2	48.1	Alnilam	275°35.8	-1°11.1
17	333°27.2	121°09.4	28.9	175°43.7	05.0	183°56.4	17.8	325°09.7	48.1	Betelgeuse	270°50.0	7°24.7
18	348°29.6	136° 10.0	<b>S</b> 10°29.3	190°45.4	N12°04.8	198°58.8	N13° 17.8	340°12.1	N00°48.2	Canopus	263°51.2 258°24.5	-52°42.5 -16°45.1
19	3°32.1	151° 10.6	29.7	205°47.0	04.5	214°01.3	17.8	$355^{\circ}14.6$	48.2	Sirius Adhara	250° 24.5° 255° 04.3	-10 45.1 -29°00.4
20	18°34.6	166°11.2	30.1	220°48.7	04.3	229°03.7	17.8	$10^{\circ}17.1$	48.2	Procyon	244°48.9	5°09.3
21	33°37.0	181°11.8	• • 30.5	235°50.4	• • 04.1	244°06.1	• • 17.8	25°19.6	• • 48.2	Pollux	243°15.1	27°57.5
22	48°39.5	196° 12.4	30.9	250°52.1	03.9	259°08.6	17.8	40°22.0	48.2	Avior	234°13.6	-59°35.5
23	63°42.0	211°13.0	31.4	265°53.8	03.7	274°11.0	17.8	55°24.5	48.2	Suhail	222°44.9	-43°32.3
Mer.p	ass. 18:46	$\nu$ 0.6′ d0.	4′ m-4.83	$\nu$ 1.7 $^{\prime}$ d-0	0.2′ m0.33	$\nu 2.4' \ d-0$	.0′ m-2.25	$\nu$ 2.5′ d0	.0′ m0.64	Miaplacidus	221°37.4	-69°49.4
										Alphard	$217^{\circ}46.1$	-8°46.5
Thu	CHV	CHV	Doc	CHA	Dos	CHA	Doc	CHA	Doc	Regulus	207°32.7	11°50.0
Thu 0	<b>GHA</b> 78°44.4	<b>GHA</b> 226° 13.6	<b>Dec</b> \$10°31.8	<b>GHA</b> 280°55.5	<b>Dec</b> N12°03.4	<b>GHA</b> 289°13.4	<b>Dec</b> N13° 17.8	<b>GHA</b> 70°27.0	<b>Dec</b> N00° 48.2	Dubhe	193°39.1	61°36.0
1	93°46.9	241°14.3	32.2	295°57.2	03.2	304°15.9	17.8	85°29.5	48.2	Denebola	182°23.4	14°25.2
2	108°49.3	256° 14.9	32.6	310°58.9	03.0	319°18.3	17.8	100°31.9	48.2	Gienah	175°42.1	-17°41.4
3	123°51.8	271° 15.5	• • 33.0	326°00.6	02.8	334°20.8	• • 17.8	115°34.4	• • 48.2		172°58.5 171°50.1	-63°14.7 -57°15.6
4	138°54.3	$286^{\circ}16.1$	33.5	341°02.3	02.6	349°23.2	17.8	130°36.9	48.2	Alioth	171 50.1 166°11.9	-57 15.0 55°48.5
5	153°56.7	301°16.7	33.9	356°04.0	02.3	4°25.6	17.8	145°39.3	48.2	Spica	158° 20.8	-11°18.1
6	168°59.2	316° 17.3	<b>S</b> 10°34.3	$11^{\circ}05.7$	$N12^{\circ}02.1$	19°28.1	N13° 17.8	160°41.8	N00°48.3	Alkaid	152°51.1	49°10.5
7	184°01.7	331°17.9	34.7	26°07.4	01.9	34°30.5	17.8	$175^{\circ}44.3$	48.3	Hadar	148°34.2	-60°30.0
8	199°04.1	346° 18.4	35.2	41°09.1	01.7	49°32.9	17.8	190°46.8	48.3		147°56.0	-36°30.0
9	214°06.6	1°19.0	• • 35.6	56°10.8	• • 01.5	64°35.4	• • 17.8	205°49.2	• • 48.3	Arcturus	$145^{\circ}46.7$	19°02.4
10 11	229°09.1 244°11.5	16° 19.6 31° 20.2	36.0 36.4	71°12.5 86°14.2	01.3 01.0	79°37.8 94°40.3	17.8 17.8	220°51.7 235°54.2	48.3 48.3	Rigil Kent.	139°38.6	-60°56.6
12	259°14.0	46° 20.8	S10°36.9	101°15.9	N12°00.8	109°42.7	N13° 17.8	250°56.6	N00°48.3	Kochab	137°20.9	74°02.4
13	274°16.5	61°21.4	37.3	116°17.6	00.6	124°45.1	17.8	265°59.1	48.3	Zuben'ubi	136°54.6 126°02.8	-16°09.2 26°37.4
14	289°18.9	76°22.0	37.7	131°19.3	00.4	139°47.6	17.8	281°01.6	48.3	Alphecca Antares	112° 14.3	-26°29.4
15	304°21.4	91°22.6	• • 38.2	$146^{\circ}21.0$	• • 00.2	154°50.0	• • 17.8	$296^{\circ}04.1$	• • 48.3	Atria	107°07.6	-69°04.5
16	319°23.8	106°23.1	38.6	161°22.7	12°00.0	169°52.5	17.8	311°06.5	48.3	Sabik	102°01.3	-15°45.4
17	334°26.3	121°23.7	39.0	176°24.4	11°59.7	184°54.9	17.8	326°09.0	48.3	Shaula	96°08.7	-37°07.4
18	349°28.8	136°24.3	S10°39.5	191°26.1	N11°59.5	199°57.4	N13°17.9	341°11.5	N00°48.4	Rasalhague	95°57.4	12°32.5
19	4°31.2	151°24.9	39.9	206°27.8	59.3	214°59.8	17.9	356°13.9	48.4	Eltanin	90°42.0	51°29.2
20 21	19°33.7 34°36.2	166°25.5 181°26.0	40.3 •• 40.8	221°29.6 236°31.3	59.1 •• 58.9	230°02.2 245°04.7	17.9 •• 17.9	11°16.4 26°18.9	48.4 •• 48.4	Kaus Aust.	83°30.8	-34°22.3
22	49°38.6	196° 26.6	41.2	251°33.0	58.7	260°07.1	17.9	41°21.3	48.4	Vega	80°32.6	38°48.6
23	64°41.1	211°27.2	41.6	266°34.7	58.5	275°09.6	17.9	56°23.8	48.4	Nunki	75°46.2	-26°15.8
		- 0.6/ -10	4′ m-4.82						0/ 0 65	Altair Peacock	61°58.7 53°03.7	8°56.5 -56°39.0
ivier.p	ass. 18:42	$\nu$ 0.6° $a$ 0.	4 m-4.82	$\nu_{1.7}$ a-c	0.2′ m0.31	ν2.4 au.	0′ m-2.26	ν2.5 αυ	.0′ m0.65	Deneb	49°25.0	45°22.8
										Enif	33°37.4	10°00.1
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.1	-46°50.0
0	79°43.6	226°27.7	S10°42.1	281°36.4	N11°58.2	290°12.0	N13°17.9	71°26.3	N00°48.4	Fomalhaut	15°12.8	-29°28.8
1	94°46.0	241°28.3	42.5	296°38.1	58.0	305°14.5	17.9	86°28.7	48.4	Scheat	13°43.7	28°14.0
2	109°48.5 124°50.9	256°28.9 271°29.4	43.0 •• 43.4	311°39.8 326°41.5	57.8 • • 57.6	320°16.9 335°19.3	17.9 •• 17.9	101°31.2 116°33.7	48.4 •• 48.4	Markab	13°28.3	15°21.2
4	139°53.4	271 29.4 286°30.0	43.4	341°43.2	57.4	350°21.8	17.9	131°36.1	48.5	Dec 09 Wed	SHA	Mer.pass
5	159 55.4 154°55.9	301°30.6	45.6 44.3	356°45.0	57.4 57.2	5°24.2	17.9 17.9	146°38.6	48.5		148° 13.3	08:56
6	169°58.3	316°31.1	\$10°44.7	11°46.7	N11°57.0	20°26.7	N13° 17.9		N00° 48.5	I	202°29.8	05:18
7	185°00.8	331°31.7	45.2	26°48.4	56.8	35°29.1	17.9	176°43.5	48.5	1	210°29.8	04:46
8	200°03.3	346° 32.2	45.6	41°50.1	56.6	50°31.6	17.9	191°46.0	48.5	Saturn	351°42.3	19:19
9	215°05.7	1°32.8	• • 46.1	56°51.8	• • 56.3	65°34.0	• • 17.9	206°48.5	• • 48.5	De- 10 T	CIIA	Marrier
10	230°08.2	16°33.3	46.5	71°53.6	56.1	80°36.5	17.9	221°50.9	48.5	Dec 10 Thu	<b>SHA</b> 147°29.2	Mer.pass 08:55
11	245°10.7	31°33.9	47.0	86°55.3	55.9	95°38.9	17.9	236°53.4	48.5		202°11.1	05:16
12	260°13.1	46°34.5	S10°47.4	101°57.0	N11°55.7	110°41.4	N13°17.9	251°55.9	N00°48.5		210°29.0	04:42
13	275°15.6	61°35.0	47.9	116°58.7	55.5	125°43.8	17.9	266°58.3	48.5		351°42.6	19:15
14 15	290°18.1	76°35.5	48.3	132°00.4	55.3	140°46.3	17.9	282°00.8	48.6			
15 16	305°20.5 320°23.0	91°36.1 106°36.6	· · 48.8 49.2	147°02.2 162°03.9	· · 55.1 54.9	155°48.7 170°51.2	· · 17.9 18.0	297°03.3 312°05.7	•• 48.6 48.6	Dec 11 Fri	SHA	Mer.pass
17	335°25.4	100 30.0 121°37.2	49.2 49.7	102 03.9 177°05.6	54.9 54.7	170 51.2 185°53.6	18.0	312 05.7 327°08.2	48.6	1	146°44.2 201°52.8	08:54
18	350°27.9	136° 37.7	\$10°50.1	192°07.3	N11°54.5	200°56.1	N13° 18.0		N00°48.6		201°52.8 210°28.5	05:13 04:38
19	5°30.4	151°38.3	50.6	207°09.1	54.3	215°58.5	18.0	357°13.1	48.6		351°42.7	19:11
20	20°32.8	166° 38.8	51.0	222°10.8	54.1	231°01.0	18.0	12°15.6	48.6			19.11
21	35°35.3	181°39.3	• • 51.5	237°12.5	• • 53.8	246°03.4	• 18.0	27°18.1	• • 48.6	Horizont	al parallax	
22	50°37.8	196°39.9	51.9	252°14.2	53.6	261°05.9	18.0	42°20.5	48.6		Venus:	0.3
23	65°40.2	211°40.4	52.4	267°16.0	53.4	276°08.3	18.0	57°23.0	48.7		Mars:	0.1
Mer.p	ass. 18:38	$\nu$ 0.6′ d0.	4′ m-4.81	$\nu$ 1.7′ d-0	0.2′ m0.29	$\nu$ 2.4′ d0.	0′ m-2.26	$\nu$ 2.5′ d0	.0′ m0.65			
						-						

h	Sui	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	181°58.6	<b>S</b> 22°47.6	$182^{\circ}55.4$	9.9'	\$27°20.5	2.0'	54.1'
1	196° 58.3	47.9	197°24.3	9.9'	27°22.5	1.9'	54.1'
2	211°58.0 226°57.7	48.1 •• 48.4	211°53.2 226°22.1	9.9' 9.9'	27°24.4 27°26.1	1.7' 1.6'	54.1' 54.1'
4	241°57.4	48.6	240°51.0	9.9'	27°27.7	1.5'	54.1'
5	256° 57.2	48.9	$255^{\circ}19.9$	9.9'	27°29.2	1.3'	54.1'
6	271°56.9	S22°49.1	269°48.8	9.9'	\$27°30.5	1.2'	54.1'
7 8	286°56.6 301°56.3	49.4 49.6	284°17.7 298°46.6	9.9' 9.9'	27°31.7 27°32.7	1.1' 0.9'	54.1' 54.1'
9	316° 56.0	• • 49.8	313° 15.5	9.9'	27°33.7	0.8	54.1'
10	331°55.8	50.1	327°44.3	9.9'	27°34.5	0.7'	54.0'
11	346°55.5	50.3	342°13.2	9.9'	27°35.1	0.5'	54.0'
12 13	1°55.2 16°54.9	\$22°50.6 50.8	356° 42.1 11° 11.0	9.9' 9.9'	\$27°35.6 27°36.0	0.4' 0.2'	54.0' 54.0'
14	31°54.6	51.0	25°39.9	9.9'	27°36.2	0.2	54.0'
15	46°54.4	• • 51.3	$40^{\circ}08.8$	9.9'	27°36.4	-0.0'	54.0'
16	61°54.1	51.5	54°37.7	9.9'	27°36.3	-0.2'	54.0'
17 18	76°53.8 91°53.5	51.7 \$22°52.0	69°06.6 83°35.6	9.9' 9.9'	27°36.2 \$27°35.9	-0.3' -0.4'	54.0' 54.0'
19	106° 53.2	52.2	98°04.5	10.0'	27°35.4	-0.4 -0.6'	54.0'
20	121°53.0	52.4	112°33.5	10.0'	27°34.9	-0.7	54.0'
21	136°52.7	• • 52.7	$127^{\circ}02.4$	10.0'	27°34.2	-0.8'	54.0'
22	151°52.4	52.9	141°31.4	10.0'	27°33.4	-1.0'	54.0'
23	166°52.1	53.1	156°00.4	10.0'	27°32.4	-1.1'	54.0'
	SD = 16.2'	d = 0.2'		SE	0 = 14.8'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°51.8	S22°53.4	170°29.4	10.0'	527°31.3	-1.2'	54.0'
1	196° 51.5	53.6	184°58.5	10.1'	27°30.1	-1.4'	54.0'
2	211°51.3	53.8	199°27.5	10.1'	27°28.7	-1.5'	54.0'
3 4	226°51.0 241°50.7	• • 54.0 54.3	213°56.6 228°25.7	10.1' 10.1'	27°27.2 27°25.6	-1.6' -1.8'	53.9' 53.9'
5	256° 50.4	54.5	242°54.9	10.1	27°23.8	-1.9'	53.9
6	271°50.1	S22°54.7	257°24.0	10.2'	S27°21.9	-2.0'	53.9'
7	286° 49.8	55.0	271°53.2	10.2'	27°19.9	-2.2'	53.9'
8	301°49.6	55.2	286°22.4	10.2'	27°17.7	-2.3'	53.9'
9 10	316°49.3 331°49.0	• • 55.4 55.6	300°51.6 315°20.9	10.3' 10.3'	27°15.4 27°13.0	-2.4' -2.6'	53.9' 53.9'
11	346°48.7	55.8	329°50.2	10.3	27°10.4	-2.7	53.9'
12	1°48.4	S22°56.1	344°19.5	10.4'	<b>S</b> 27°07.8	-2.8'	53.9'
13	16°48.1	56.3	358°48.9	10.4'	27°05.0	-2.9'	53.9'
14 15	31°47.8 46°47.6	56.5 •• 56.7	13°18.3 27°47.7	10.4' 10.5'	27°02.0 26°59.0	-3.1' -3.2'	53.9' 53.9'
16	61°47.3	56.9	42°17.1	10.5	26°55.8	-3.3	53.9
17	76°47.0	57.2	$56^{\circ}46.6$	10.5'	$26^{\circ}52.4$	-3.5'	53.9'
18	91°46.7	S22°57.4	71°16.2	10.6'	\$26°49.0	-3.6'	53.9'
19	106°46.4 121°46.1	57.6 57.8	85° 45.7 100° 15.4	10.6'	26°45.4 26°41.7	-3.7' -3.8'	53.9' 53.9'
20 21	121 46.1 136° 45.8	58.0	100 15.4 114°45.0	10.7	26° 37.9	-3.8 -4.0'	53.9'
22	151°45.6	58.2	129° 14.7	10.7'	26°33.9	-4.1'	53.9'
23	166° 45.3	58.4	143°44.4	10.8'	26°29.8	-4.2'	53.9'
	SD = 16.2'	d = 0.2'		SE	0 = 14.7'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	181°45.0	\$22°58.6	158°14.2	10.8'	\$26°25.6	-4.3'	53.9'
1	196°44.7	58.9	172°44.1	10.9'	26°21.3	-4.5'	53.9'
2	211°44.4	59.1	187°13.9	10.9'	26°16.8	-4.6'	53.9'
3 4	226°44.1 241°43.8	· · 59.3 59.5	201°43.8 216°13.8	11.0' 11.0'	26°12.3 26°07.6	-4.7' -4.8'	53.9' 53.9'
5	256° 43.6	59.5 59.7	210 13.8 230°43.8	11.1'	26°02.8	-4.9'	53.9
6	271°43.3	S22°59.9	245°13.9	11.1'	S25°57.8	-5.1'	53.9'
7	286°43.0	$23^{\circ}00.1$	259° 44.0	11.2'	25°52.8	-5.2'	53.9'
8	301°42.7 316°42.4	00.3	274°14.1 288°44.3	11.2'	25°47.6 25°42.3	-5.3'	53.9'
9 10	310 42.4 331°42.1	· · 00.5 00.7	288 44.3 303°14.6	11.3' 11.3'	25 42.3 25°36.9	-5.4' -5.5'	53.9' 53.9'
11	346°41.8	00.9	317°44.9	11.4	25°31.3	-5.6'	53.9'
12	1°41.5	<b>S</b> 23°01.1	332° 15.2	11.4'	\$25°25.7	-5.8'	53.9'
13	16°41.2	01.3	346°45.6	11.5'	25°19.9	-5.9'	53.9'
14 15	31°41.0 46°40.7	01.5 · · 01.7	1°16.1 15°46.6	11.5' 11.6'	25°14.1 25°08.1	-6.0' -6.1'	53.9' 53.9'
16	61°40.4	01.7	30°17.2	11.6'	25°01.9	-6.2'	53.9'
17	76°40.1	02.1	44°47.8	11.7'	24°55.7	-6.3	53.9'
18	91°39.8	<b>S</b> 23°02.3	59° 18.5	11.7'	\$24°49.4	-6.4'	53.9'
19	106°39.5	02.5	73°49.2	11.8'	24°42.9	-6.6'	53.9'
20 21	121°39.2 136°38.9	02.7 •• 02.9	88°20.0 102°50.8	11.8' 11.9'	24°36.4 24°29.7	-6.7' -6.8'	53.9' 53.9'
22	150° 38.6	03.1	102 50.8 117°21.7	12.0'	24°22.9	-6.9'	53.9'
23	166°38.3	03.3	131°52.7	12.0'	24°16.0	-7.0'	53.9'
	SD = 16.2'	d = 0.2'		SE	0 = 14.7'		

	Twi	light			Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	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
N 10°	05:17	05:43	06:06	17:39	18:02	18:28
0°	05:00	05:27	05:49	17:56	18:19	18:45
<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	
Lat.	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° 54°	09:32	10:19	10:50	14:55	15:54	17:06
54°	09:12 08:55	10:00 09:44	10:34 10:20	15:15 15:32	16:13 16:29	17:22 17:36
50°	08:41	09:44	10:20	15:32	16:43	17:48
45°	08:12	09:01	09:42	16:15	17:11	18:12
N 40°	07:49	08:39	09:21	16:38	17:33	18:32
35°	07:30	08:20	09:04	16:57	17:51	18:49
30°	07:14	08:04	08:50	17:13	18:07	19:03
20°	06:47	07:37	08:25	17:41	18:33	19:27
N 10°	06:23	07:14	08:03	18:04	18:56	19:47
0°	06:01	06:53	07:43	18:26	19:17	20:06
S 10°	05:39	06:31	07:23	18:48	19:38	20:26
20°	05:16	06:08	07:01	19:12	20:01	20:46
30°	04:49	05:41	06:36	19:39	20:27	21:09
35°	04:33	05:25	06:21	19:55	20:42	21:23
40° 45°	04:14 03:52	05:06 04:44	06:03 05:42	20:14 20:36	21:00 21:21	21:39 21:58
1						
<b>S</b> 50° 52°	03:23	04:15	05:16	21:05	21:48	22:21
52°	03:09 02:53	04:01 03:44	05:03 04:48	21:19 21:36	22:01 22:16	22:32 22:45
56°	02:33	03:44	04:46	21:55	22:10	22:45
58°	02:34	03:25	04:31	22:20	22:55	23:16
<b>S</b> 60°	01:38	02:28	03:43	22:52	23:23	23:37

		Sun		Moon			
Day	Eqn.of	f 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	Stars
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	80°42.7	226°40.9 \$10°52		291°10.8 N13°18.0	72°25.5 N00°48.7	
1	95°45.2	241°41.5 53		306°13.2 18.0	87°27.9 48.7	Alpheratz 357°33.0 29°14.6
2	110°47.6	256°42.0 53		321°15.7 18.0	102°30.4 48.7	Ankaa 353°05.5 -42°09.7
3	125°50.1	271°42.5 · · 54		336°18.1 · · 18.0	117°32.9 · · 48.7	Schedar 349°29.0 56°41.4
4	140°52.6	286°43.0 54		351°20.6 18.0	132°35.3 48.7	Diphda 348°45.6 -17°50.3
5	155°55.0	301°43.6 55		6°23.0 18.0	147°37.8 48.7	Achernar 335°18.7 -57°06.2
6	170°57.5	316°44.1 \$10°55		21°25.5 N13°18.0	162°40.2 N00°48.7	Hamal 327°49.1 23°35.6
7	185°59.9	331°44.6 56		36°27.9 18.1	177°42.7 48.8	Polaris 312°45.4 89°22.8
8	201°02.4	346°45.1 56	5 42°31.6 51.6	51°30.4 18.1	192°45.2 48.8	Acamar 315°10.2 -40°11.9
9	216°04.9	1°45.7 · · 57	0 57°33.3 · · 51.4	66°32.9 · · 18.1	207°47.6 · · 48.8	Menkar 314°04.2 4°11.8
10	231°07.3	16°46.2 57	4 72°35.0 51.2	81°35.3 18.1	222°50.1 48.8	Mirfak 308°25.5 49°57.6
11	246°09.8	31°46.7 57	9 87°36.8 51.0	96°37.8 18.1	237°52.6 48.8	Aldebaran 290°37.4 16°33.8
12	261°12.3	46°47.2 \$10°58	4 102°38.5 <b>N</b> 11°50.8	111°40.2 N13°18.1	252°55.0 N00°48.8	Rigel 281°02.0 -8°10.2 Capella 280°19.0 46°01.5
13	276°14.7	61°47.7 58	8 117°40.3 50.6	126°42.7 18.1	267°57.5 48.8	Bellatrix 278°20.8 6°22.5
14	291°17.2	76°48.2 59		141°45.1 18.1	282°59.9 48.8	Elnath 277° 59.5 28° 37.8
15	306°19.7	91°48.7 10°59		$156^{\circ}47.6 \cdots 18.1$	298°02.4 · · 48.9	Alnilam 275°35.8 -1°11.1
16	321°22.1	106°49.2 11°00		171°50.1 18.1	313°04.9 48.9	Betelgeuse 270°50.0 7°24.7
17	336°24.6	121°49.7 00		186°52.5 18.1	328°07.3 48.9	Canopus 263°51.1 -52°42.5
18	351°27.1	136°50.2 \$11°01		201°55.0 N13°18.1	343°09.8 N00°48.9	Sirius 258°24.5 -16°45.2
19	6°29.5	151°50.8 01		216°57.4 18.2	358°12.2 48.9	Adhara 255°04.3 -29°00.4
20	21°32.0	166°51.3 02		231°59.9 18.2	13°14.7 48.9	Procyon 244°48.9 5°09.3
21	36°34.4	181°51.8 · · · 02		247°02.3 · · 18.2	28°17.2 · · 48.9	Pollux 243°15.1 27°57.5
22	51°36.9	196°52.3 03		262°04.8 18.2	43°19.6 48.9	Avior 234°13.6 -59°35.5
23	66°39.4	211°52.7 03	5 267°57.7 48.6	277°07.3 18.2	58°22.1 49.0	Suhail 222°44.9 -43°32.3
Mer.p	ass. 18:34	ν0.5′ d0.5′ m-4.8	$\nu 1.7' \ d$ -0.2' m0.27	ν2.5' d0.0' m-2.27	ν2.5' d0.0' m0.66	Miaplacidus 221°37.4 -69°49.4
						Alphard 217°46.0 -8°46.5
_	C	C114 -	C114 -	CIIA =	CUA -	Regulus 207°32.6 11°50.0
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°39.0 61°36.0
0	81°41.8	226°53.2 \$11°04		292°09.7 N13°18.2	73°24.5 N00°49.0	Denebola 182°23.4 14°25.2
1	96°44.3	241°53.7 04		307°12.2 18.2	88°27.0 49.0	Gienah 175°42.0 -17°41.4
2	111°46.8	256°54.2 05		322°14.6 18.2	103°29.5 49.0	Acrux 172°58.5 -63°14.7
3	126°49.2	271°54.7 · · · 05		337°17.1 · · 18.2	118°31.9 · · 49.0	Gacrux 171°50.0 -57°15.6
4	141°51.7	286°55.2 05		352°19.6 18.2	133°34.4 49.0	Alioth 166°11.8 55°48.5
5	156°54.2	301°55.7 06		7°22.0 18.3	148°36.8 49.0	Spica 158°20.8 -11°18.1
6	171°56.6	316°56.2 \$11°06		22°24.5 N13°18.3	163°39.3 N00°49.1 178°41.8 49.1	Alkaid 152°51.1 49°10.5
7	186°59.1	331°56.7 07		37°27.0 18.3		Hadar 148°34.2 -60°30.0
8	202°01.6 217°04.0	346°57.2 07 1°57.6 · · 08		52°29.4 18.3 67°31.9 •• 18.3	193°44.2 49.1 208°46.7 • 49.1	Menkent 147°56.0 -36°30.0
9	217 04.0 232°06.5					Arcturus 145°46.7 19°02.4
10 11	232 06.5 247°08.9	16°58.1 08 31°58.6 09		82°34.3 18.3 97°36.8 18.3	223°49.1 49.1 238°51.6 49.1	Rigil Kent. 139°38.6 -60°56.6
12	262°11.4	46°59.1 S11°09		112°39.3 N13°18.3	253°54.1 N00°49.1	Kochab 137°20.9 74°02.4
13	277°13.9	61°59.6 10		127°41.7 18.3	268°56.5 49.2	Zuben'ubi 136°54.5 -16°09.2
14	292°16.3	77°00.0 10		142°44.2 18.3	283°59.0 49.2	Alphecca 126°02.7 26°37.3
15	307°18.8	92°00.5 · · 11		157°46.7 · · 18.4	299°01.4 · · 49.2	Antares 112°14.3 -26°29.4
16	322°21.3	107°01.0 11		172°49.1 18.4	314°03.9 49.2	Atria 107°07.6 -69°04.4
17	337°23.7	107 01.0 11 122°01.4 12		187°51.6 18.4	329°06.3 49.2	Sabik 102°01.3 -15°45.5
18	352°26.2	137°01.9 \$11°12		202°54.1 N13°18.4	344°08.8 N00°49.2	Shaula 96°08.6 -37°07.4
19	7°28.7	152°02.4 13		217°56.5 18.4	359°11.3 49.2	Rasalhague 95°57.4 12°32.4
20	22°31.1	167°02.9 13		232°59.0 18.4	14°13.7 49.3	Eltanin 90°42.0 51°29.1
21	37°33.6	182°03.3 ·· 14		248°01.5 · · 18.4	29°16.2 · · 49.3	Kaus Aust. 83°30.8 -34°22.3
22	52°36.0	197°03.8 14		263°03.9 18.4	44°18.6 49.3	Vega 80°32.6 38°48.6
23	67°38.5	212°04.2 15		278°06.4 18.5	59°21.1 49.3	Nunki 75°46.1 -26°15.8
						Altair 61°58.7 8°56.5
Mer.p	ass. 18:30	$\nu$ 0.5′ $d$ 0.5′ m-4.7	9 $\nu 1.7' \ d$ -0.2' m0.25	$\nu 2.5' \ d0.0' \ \text{m}-2.28$	$\nu 2.5' \ d0.0' \ m0.66$	Peacock 53°03.7 -56°39.0
				<del>_</del>		Deneb 49°25.0 45°22.8
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°37.4 10°00.0 Al Na'ir 27°31.1 -46°50.0
0	82°41.0	227°04.7 \$11°15		293°08.9 N13°18.5	74°23.5 N00°49.3	Al Na'ir 27°31.1 -46°50.0 Fomalhaut 15°12.8 -29°28.9
1	97°43.4	242°05.2 16		308°11.3 18.5	89°26.0 49.3	Scheat 13°43.7 28°14.0
2	112°45.9	257°05.6 16		323°13.8 18.5	104°28.4 49.3	Markab 13°28.3 15°21.2
3	127°48.4	272°06.1 · · 17	0 328°46.9 · · 43.1	338°16.3 · · 18.5	119°30.9 · · 49.4	IVIAINAU 13 20.3 13 21.2
4	142°50.8	287°06.5 17		353°18.7 18.5	134°33.4 49.4	Dec 12 Sat SHA Mer.pass
5	157°53.3	302°07.0 18		8°21.2 18.5	149°35.8 49.4	Venus 145°58.2 08:53
6	172°55.8	317°07.4 \$11°18		23°23.7 N13°18.5	164°38.3 N00°49.4	Mars 201°35.0 05:10
7	187°58.2	332°07.9 19		38°26.1 18.6	179°40.7 49.4	Jupiter 210°28.1 04:35
8	203°00.7	347°08.3 19		53°28.6 18.6	194°43.2 49.4	Saturn 351° 42.8 19:07
9	218°03.2	2°08.8 · · 20		68°31.1 · · 18.6	209°45.6 · · 49.5	Dec 13 Sun SHA Mer.pass
10	233°05.6	17°09.2 20		83°33.6 18.6	224°48.1 49.5	Venus 145°11.4 08:52
11	248°08.1	32°09.7 21		98°36.0 18.6	239°50.5 49.5	Mars 201°17.6 05:07
12	263°10.5	47°10.1 \$11°21		113°38.5 N13°18.6	254°53.0 N00°49.5	Jupiter 210°27.9 04:31
13	278°13.0	62°10.6 22		128°41.0 18.6	269°55.4 49.5	Saturn 351°42.7 19:03
14	293°15.5	77°11.0 22		143°43.4 18.7	284°57.9 49.5	
15	308°17.9	92°11.4 · · 23		158°45.9 · · 18.7	300°00.4 · · 49.5	Dec 14 Mon SHA Mer.pass
16	323°20.4	107°11.9 23		173°48.4 18.7	315°02.8 49.6	Venus 144°23.7 08:51
17	338°22.9	122°12.3 24		188°50.9 18.7	330°05.3 49.6	Mars 201°00.6 05:05
18	353°25.3	137°12.8 \$11°24		203°53.3 N13°18.7	345°07.7 N00°49.6	Jupiter 210°27.9 04:27
19	8°27.8	152°13.2 25		218°55.8 18.7	0°10.2 49.6	Saturn 351°42.6 18:59
20	23°30.3	167°13.6 25		233°58.3 18.7	15°12.6 49.6	Horizontal parallax
21	38°32.7 53°35.2	182°14.1 · · 26		249°00.8 · · 18.8	30°15.1 · · 49.6 45°17.5 49.7	Venus: 0.3
22 23	68°37.7	197°14.5 26 212°14.9 27		264°03.2 18.8 279°05.7 18.8		Mars: 0.1
Mer.p	ass. 18:26	u0.5′ $d$ 0.5′ $m$ -4.7	8 $\nu 1.8' \ d$ -0.2' m0.23	$\nu 2.5' \ d0.0' \ \text{m-}2.29$	$\nu 2.5' \ d0.0' \ m0.67$	
			_			

h	Sui	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	181°38.1	\$23°03.5	146°23.7	12.1'	524°09.0	-7.1'	53.9'
1	196°37.8	03.7	$160^{\circ}54.7$	12.1'	$24^{\circ}01.9$	-7.2'	53.9'
2	211°37.5	03.8	175°25.9	12.2'	23°54.7	-7.3'	53.9'
3	226°37.2	• • 04.0	189°57.0	12.2'	23°47.4	-7.4'	53.9'
4 5	241°36.9 256°36.6	04.2 04.4	204°28.3 218°59.6	12.3' 12.4'	23°40.0 23°32.4	-7.5' -7.6'	53.9' 53.9'
6	271°36.3	\$23°04.6	233°30.9	12.4'	\$23°24.8	-7.7'	53.9'
7	286°36.0	04.8	248°02.3	12.5'	23° 17.1	-7.8'	53.9'
8	301°35.7	05.0	262°33.8	12.5'	23°09.2	-7.9'	53.9'
9	316°35.4	• • 05.2	277°05.3	12.6'	23°01.3	-8.0'	53.9'
10 11	331°35.1 346°34.8	05.3 05.5	291°36.9 306°08.6	12.6' 12.7'	22°53.2 22°45.1	-8.1' -8.2'	54.0' 54.0'
12	1°34.6	523°05.7	320°40.3	12.7	\$22°36.9	-0.2 -8.3'	54.0'
13	16°34.3	05.9	335°12.0	12.8'	22°28.5	-8.4	54.0'
14	31°34.0	06.1	349°43.9	12.9'	$22^{\circ}20.1$	-8.5'	54.0'
15	46°33.7	• • 06.3	4°15.7	12.9'	22°11.5	-8.6'	54.0'
16 17	61°33.4 76°33.1	06.4 06.6	18°47.7 33°19.7	13.0' 13.1'	22°02.9 21°54.2	-8.7' -8.8'	54.0' 54.0'
18	91°32.8	\$23°06.8	33 19.7 47°51.7	13.1'	S21°45.3	-0.0 -8.9'	54.0'
19	106°32.5	07.0	62°23.8	13.2'	21°36.4	-9.0'	54.0'
20	121°32.2	07.1	76°56.0	13.2'	21°27.4	-9.1'	54.0'
21	136°31.9	• • 07.3	91°28.2	13.3'	21°18.3	-9.2'	54.0'
22	151°31.6	07.5	106°00.5	13.3'	21°09.1	-9.3'	54.0'
23	166°31.3	07.7	120°32.8	13.4'	20°59.8	-9.4'	54.0'
	SD = 16.2'	d = 0.2'		SI	O = 14.7'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°31.0	\$23°07.8	135°05.2	13.5'	\$20°50.4	-9.5'	54.0'
1 2	196°30.7 211°30.4	08.0 08.2	149°37.7 164°10.2	13.5' 13.6'	20°41.0 20°31.4	-9.6' -9.6'	54.1' 54.1'
3	211 30.4 226°30.2	08.3	178°42.7	13.6'	20° 31.4 20° 21.8	-9.0 -9.7'	54.1'
4	241°29.9	08.5	193°15.4	13.7'	20°12.0	-9.8'	54.1'
5	256°29.6	08.7	207°48.0	13.7'	20°02.2	-9.9'	54.1'
6	271°29.3	S23°08.9	222°20.8	13.8'	\$19°52.3	-10.0'	54.1'
7	286°29.0 301°28.7	09.0	236°53.5	13.8'	19°42.3 19°32.3	-10.1'	54.1'
8 9	301°28.7 316°28.4	09.2 •• 09.4	251°26.4 265°59.3	13.9' 13.9'	19° 32.3 19° 22.1	-10.2' -10.2'	54.1' 54.1'
10	331°28.1	09.5	280°32.2	14.0'	19° 11.9	-10.2	54.1'
11	346°27.8	09.7	295°05.2	14.0'	19°01.5	-10.4'	54.1'
12	1°27.5	S23°09.8	309°38.3	14.1'	\$18°51.1	-10.5'	54.2'
13	16°27.2	10.0	324°11.4	14.2'	18° 40.7	-10.6'	54.2'
14 15	31°26.9 46°26.6	10.2 •• 10.3	338°44.5 353°17.7	14.2' 14.3'	18° 30.1 18° 19.4	-10.6' -10.7'	54.2' 54.2'
16	61°26.3	10.5	7°51.0	14.3'	18° 08.7	-10.7	54.2'
17	76°26.0	10.7	22°24.3	14.4'	17°57.9	-10.9'	54.2'
18	91°25.7	S23°10.8	36°57.6	14.4'	S17°47.1	-10.9'	54.2'
19	106°25.4	11.0	51°31.0	14.5'	17°36.1	-11.0'	54.2'
20 21	121°25.1 136°24.8	11.1 •• 11.3	66°04.5 80°38.0	14.5' 14.5'	17° 25.1 17° 14.0	-11.1' -11.2'	54.3' 54.3'
22	150°24.5	11.4	95°11.5	14.6'	17°14.0	-11.2'	54.3'
23	166°24.2	11.6	109°45.1	14.6'	16°51.6	-11.3'	54.3'
	SD = 16.2'	d = 0.2'		SI	O = 14.7'		
Mon	GHA	Dec	GHA		Dec	d	HP
0	181°23.9	S23°11.7	<b>GПА</b> 124°18.8	u 14.7'	S16° 40.3	a -11.4'	пР 54.3'
1	196°23.6	11.9	138°52.4	14.7'	16° 28.9	-11.5	54.3'
2	211°23.3	12.0	153°26.2	14.8'	16° 17.4	-11.5'	54.3'
3	226°23.0	• • 12.2	167°59.9	14.8'	16°05.9	-11.6'	54.3'
4 5	241°22.7 256°22.5	12.3 12.5	182°33.7 197°07.6	14.9' 14.9'	15° 54.3 15° 42.6	-11.7' -11.7'	54.4' 54.4'
6	250 22.5 271°22.2	523°12.6	211°41.5	14.9'	\$15° 30.9	-11.7	54.4
7	286°21.9	12.8	226°15.4	15.0'	15° 19.1	-11.9'	54.4'
8	301°21.6	12.9	240°49.4	15.0'	15°07.2	-11.9'	54.4'
9	316°21.3	• • 13.1	255°23.4	15.1'	14°55.3	-12.0'	54.4'
10 11	331°21.0 346°20.7	13.2 13.4	269°57.5 284°31.6	15.1' 15.1'	14°43.3 14°31.2	-12.1' -12.1'	54.5' 54.5'
11	1°20.4	13.4 \$23°13.5	284 31.6 299°05.7	15.1	\$14° 19.1	-12.1	54.5
13	16°20.1	13.7	313°39.9	15.2'	14°06.9	-12.2'	54.5'
14	31°19.8	13.8	328°14.1	15.2'	13°54.7	-12.3'	54.5'
15	46°19.5	• • 14.0	342°48.3	15.3'	13°42.3	-12.4'	54.5'
16 17	61°19.2 76°18.9	14.1 14.2	357°22.6 11°56.9	15.3' 15.3'	13° 30.0 13° 17.5	-12.4' -12.5'	54.6' 54.6'
18	76 18.9 91°18.6	523°14.4	26°31.2	15.4'	\$13°05.1	-12.5'	54.6
19	106°18.3	14.5	41°05.6	15.4'	12°52.5	-12.6'	54.6'
20	121°18.0	14.6	55°39.9	15.4'	12°39.9	-12.7'	54.6'
21	136°17.7	• • 14.8	70°14.4	15.5'	12°27.2	-12.7'	54.7'
22 23	151°17.4 166°17.1	14.9 15.1	84°48.8 99°23.3	15.5' 15.5'	12° 14.5 12° 01.7	-12.8' -12.8'	54.7' 54.7'
23	SD = 16.2'	d = 0.2'			D = 14.8'	-12.0	J+.1
	JD — 10.2	u — 0.2		JI	_ 14.0		

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
<b>N</b> 40°	06:09	06:43	07:13	16:35	17:06	17:40
35°	05:59	06:31	06:59	16:49	17:17	17:49
30°	05:51	06:21	06:47	17:01	17:28	17:57
20°	05:35	06:02	06:26	17:22	17:46	18:14
N 10°	05:19	05:45	06:08	17:41	18:03	18:30
0°	05:02	05:28	05:50	17:58	18:20	18:47
S 10°	04:43	05:10	05:33	18:15	18:38	19:05
20°	04:21	04:50	05:14	18:34	18:59	19:28
30°	03:52	04:25	04:53	18:56	19:23	19:57
35°	03:34	04:10	04:40	19:09	19:38	20:15
40°	03:11	03:52	04:25	19:24	19:56	20:38
45°	02:41	03:30	04:07	19:41	20:19	21:08
<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	е		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		
N 58°	11:25	11:35	11:41	18:09	19:33	20:55		
56°	11:10	11:24	11:33	18:24	19:43	21:02		
54°	10:57	11:14	11:26	18:36	19:52	21:08		
52°	10:46	11:05	11:20	18:47	20:00	21:13		
50°	10:36	10:57	11:15	18:57	20:08	21:18		
45°	10:14	10:41	11:03	19:17	20:23	21:29		
N 40°	09:57	10:27	10:52	19:34	20:36	21:37		
35°	09:42	10:15	10:44	19:47	20:46	21:45		
30°	09:30	10:05	10:36	19:59	20:56	21:51		
20° N 10°	09:08 08:49	09:47 09:32	10:23 10:11	20:20 20:37	21:12 21:25	22:02 22:12		
0°	08:31	09:32	10:11	20:57	21:25	22:12		
1 -								
<b>S</b> 10° 20°	08:13 07:54	09:02 08:47	09:50 09:38	21:10 21:27	21:51 22:05	22:30 22:39		
30°	07:34	08:28	09:36	21:27	22:05	22:59		
35°	07:32	08:18	09:24	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	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	8-21%	
12	06:32	06:18	11:54	14:42	02:19		
13	06:04	05:50	11:54	15:28	03:05		
14	05:36	05:21	11:55	16:11	03:49		

# December 15, 16, 17 UT (Tue., Wed., Thu.)

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	83°40.1	227° 15.3	S11°27.5	284°24.2	N11°39.2	294°08.2	N13° 18.8	75°22.4	N00°49.7			
1	98°42.6	242° 15.8	28.0	299°26.0	39.0	309°10.7	18.8	90°24.9	49.7	Alpheratz	357°33.1	29°14.6
2	113°45.0	257° 16.2	28.5	314°27.8	38.8	324°13.1	18.8	105°27.3	49.7	Ankaa	353°05.5	-42°09.7
3	128°47.5	272° 16.6	29.0	329°29.6	38.6	339°15.6	• • 18.8	120°29.8	• • 49.8	Schedar	349°29.0	56°41.5
4	143°50.0	287° 17.0	29.5	344°31.4	38.5	354°18.1	18.9	135°32.2	49.8	Diphda	348°45.6	-17°50.3
5	158°52.4	302°17.4	30.0	359°33.2	38.3	9°20.6	18.9	150°34.7	49.8	Achernar	335°18.7	-57°06.2
6	173°54.9	317°17.9	\$11°30.5	14°35.0	N11°38.1	24°23.1	N13°18.9	165°37.1	N00°49.8	Hamal	327°49.2	23°35.6
7	188°57.4	332°18.3	31.0	29°36.8	37.9	39°25.5	18.9	180°39.6	49.8	Polaris	312°46.2	89°22.8
8	203°59.8	347° 18.7	31.5	44°38.5	37.7	54°28.0	18.9	195°42.0	49.8	Acamar	315°10.2	-40°11.9
9	219°02.3	2° 19.1	32.1	59°40.3	• • 37.5	69°30.5	18.9	210°44.5	• • 49.9	Menkar	314°04.2	4°11.8
10	234°04.8	17° 19.5	32.6	74°42.1	37.4	84°33.0	19.0	225°46.9	49.9	Mirfak	308°25.5	49°57.6
11	249°07.2	32° 19.9	33.1	89°43.9	37.2	99°35.4	19.0	240°49.4	49.9	Aldebaran	290°37.4	16°33.8
12	264°09.7	47°20.3	S11°33.6	104°45.7	N11°37.0	114°37.9	N13°19.0	255°51.8	N00°49.9	Rigel	281°02.0	-8°10.2
13	279°12.1	62°20.8	34.1	119°47.5	36.8	129°40.4	19.0	270°54.3	49.9	Capella	280°19.0	46°01.5
14	294°14.6	77°21.2	34.6	134°49.3	36.6	144°42.9	19.0	285°56.7	49.9	Bellatrix	278°20.8	6°22.5
15	309°17.1	92°21.6	• • 35.1	149°51.1	• • 36.5	159°45.4	19.0	300°59.2	• • 50.0	Elnath	277°59.5	28°37.8
16	324°19.5	107°22.0	35.6	164°52.9	36.3	174°47.8	19.1	316°01.6	50.0	Alnilam	275°35.8	-1°11.1
17	339°22.0	122°22.4	36.1	179°54.7	36.1	189°50.3	19.1	331°04.1	50.0	Betelgeuse	270°50.0	7°24.7
18	354°24.5	137°22.8	S11°36.7	194°56.5	N11°35.9	204°52.8	N13°19.1	346°06.5	N00°50.0	Canopus	263°51.1	-52°42.5
19	9°26.9	152°23.2	37.2	209°58.3	35.7	219°55.3	19.1	1°09.0	50.0	Sirius	258°24.5	-16°45.2
20	24°29.4	167°23.6	37.7	225°00.1	35.6	234°57.8	19.1	16°11.4	50.1	Adhara	255°04.2	-29°00.5
21	39°31.9	182°24.0	• • 38.2	240°01.9	• • 35.4	250°00.3	19.1	31°13.9	50.1	Procyon	244°48.9	5°09.3
22	54°34.3	197°24.4	38.7	255°03.7	35.2	265°02.7	19.2	46°16.3	50.1	Pollux	243°15.0	27°57.5
23	69°36.8	212°24.8	39.2	270°05.5	35.0	280°05.2	19.2	61°18.8	50.1	Avior	234°13.6	-59°35.6
										Suhail	222°44.8	-43°32.3
ivler.p	ass. 18:22	$\nu$ 0.4′ $d$ 0.	5′ m-4.77	$\nu$ 1.8′ $d$ -0	0.2′ m0.21	$\nu$ 2.5′ d0.	.0′ m-2.29	$\nu$ 2.5′ $d0$	.0′ m0.67	Miaplacidus	221°37.3	-69°49.4
										Alphard	217°46.0	-8°46.5
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°32.6	11°50.0
0	84°39.3	227°25.2	S11°39.8	285°07.3	N11°34.9	295°07.7	N13°19.2	76°21.2	N00°50.1	Dubhe	193°39.0	61°36.0
1	99°41.7	242°25.6	40.3	300°09.1	34.7	310°10.2	19.2	91°23.7	50.1	Denebola	182°23.3	14°25.1
2	114°44.2	257°25.9	40.8	315°10.9	34.5	325°12.7	19.2	106°26.1	50.2	Gienah	175°42.0	-17°41.4
3	129°46.6	272°26.3	• • 41.3	330°12.7	• • 34.3	340°15.2	• • 19.3	121°28.5	• • 50.2		172°58.4	-63°14.7
4	144°49.1	287° 26.7	41.8	345°14.5	34.2	355°17.6	19.3	136°31.0	50.2		171°50.0	-57°15.6 55°48.5
5	159°51.6	302°27.1	42.4	0°16.3	34.0	10°20.1	19.3	151°33.4	50.2	Alioth	166°11.8 158°20.8	-11°18.1
6	174°54.0	317°27.5	S11°42.9	15°18.2	N11°33.8	25°22.6	N13°19.3	166°35.9	N00°50.2	Spica Alkaid	150 20.6 152°51.0	49°10.4
7	189°56.5	332°27.9	43.4	30°20.0	33.6	40°25.1	19.3	181°38.3	50.3	Hadar	152 51.0 148°34.1	-60°30.0
8	204°59.0	347°28.3	43.9	45°21.8	33.5	55°27.6	19.4	196°40.8	50.3		146 34.1 147°56.0	-36°30.0
9	220°01.4	2°28.6	• • 44.4	60°23.6	• • 33.3	70°30.1	• • 19.4	211°43.2	• • 50.3	Arcturus	147 30.0 145°46.7	19°02.4
10	235°03.9	17°29.0	45.0	75°25.4	33.1	85°32.6	19.4	226°45.7	50.3	Rigil Kent.	145 40.7 139°38.6	-60°56.6
11	250°06.4	32°29.4	45.5	90°27.2	32.9	100°35.1	19.4	241°48.1	50.3	Kochab	137°20.8	74°02.4
12	265°08.8	47°29.8	S11°46.0	105°29.0	N11°32.8	115°37.5	N13°19.4	256°50.6	N00°50.4	Zuben'ubi	136°54.5	-16°09.2
13	280°11.3	62°30.2	46.5	120°30.8	32.6	130°40.0	19.4	271°53.0	50.4	Alphecca	126°02.7	26°37.3
14	295°13.8	77° 30.5	47.1	135°32.7	32.4	145°42.5	19.5	286°55.4	50.4	Antares	112° 14.2	-26°29.4
15	$310^{\circ}16.2$	92°30.9	• • 47.6	150°34.5	• • 32.3	160°45.0	• • 19.5	301°57.9	• • 50.4	Atria	107°07.6	-69°04.4
16	$325^{\circ}18.7$	107°31.3	48.1	165°36.3	32.1	175°47.5	19.5	$317^{\circ}00.3$	50.4	Sabik	102°01.3	-15°45.5
17	340°21.1	122°31.6	48.6	180°38.1	31.9	190°50.0	19.5	332°02.8	50.5	Shaula	96°08.6	-37°07.3
18	355°23.6	137°32.0	S11°49.2	195°39.9	N11°31.7	205°52.5	$N13^{\circ}19.5$	347°05.2	N00°50.5	Rasalhague	95°57.4	12°32.4
19	10°26.1	152°32.4	49.7	210°41.7	31.6	220°55.0	19.6	2°07.7	50.5	Eltanin	90°42.0	51°29.1
20	25°28.5	167°32.7	50.2	225°43.6	31.4	235°57.5	19.6	$17^{\circ}10.1$	50.5	Kaus Aust.	83°30.8	-34°22.3
21	40°31.0	182°33.1	• • 50.7	240°45.4	• • 31.2	250°59.9	• • 19.6	$32^{\circ}12.6$	• • 50.5	Vega	80°32.6	38°48.6
22	55°33.5	197°33.5	51.3	255°47.2	31.1	266°02.4	19.6	47°15.0	50.6	Nunki	75°46.1	-26°15.8
23	70°35.9	212°33.8	51.8	270°49.0	30.9	281°04.9	19.7	62°17.4	50.6	Altair	61°58.7	8°56.5
Mern	ass. 18:18	ν0 Δ' d0	5′ m-4.76	1/1 8' d-C	0.2′ m0.20	1/2 5' d0	.0′ m-2.30	1/2 A' d0	.0′ m0.67	Peacock	53°03.7	-56°39.0
- IVICI.P	ass. 10.10	νο. <del>-</del> αο.	3 111-4.70	ν1.0 u-0	7.2 1110.20	ν2.5 do.	.0 111-2.30	ν2. <del>4</del> ασ	.0 1110.07	Deneb	49°25.0	45°22.8
										Enif	33°37.4	10°00.0
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.1	-46°50.0
0	85°38.4	227°34.2	S11°52.3		N11°30.7	296°07.4	N13°19.7	77°19.9	N00°50.6	Fomalhaut	15°12.8	-29°28.9
1	100°40.9	242°34.6	52.9	300°52.7	30.6	311°09.9	19.7	92°22.3	50.6	Scheat	13°43.7	28°14.0
2	115°43.3	257°34.9	53.4	315°54.5	30.4	326°12.4	19.7	107°24.8	50.6	Markab	13°28.4	15°21.2
3	130°45.8	272°35.3	• • 53.9	330°56.3	30.2	341°14.9	• • 19.7	122°27.2	• • 50.7			
4	145°48.2	287°35.6	54.5	345°58.2	30.0	356°17.4	19.8	137°29.7	50.7	Dec 15 Tue	SHA	Mer.pass
5	160°50.7	302°36.0	55.0	1°00.0	29.9	11°19.9	19.8	152°32.1	50.7	I	143°35.2	08:51
6	175°53.2	317°36.3	S11°55.5	16°01.8	N11°29.7	26°22.4	N13°19.8	167°34.5	N00°50.7	Mars		05:02
7	190°55.6	332°36.7	56.1	31°03.6	29.5	41°24.9	19.8	182°37.0	50.8		210°28.1	04:23
8	205°58.1	347°37.0	56.6	46°05.5	29.4	56°27.4	19.8	197°39.4	50.8	Saturn	351°42.3	18:55
9	221°00.6	2°37.4	• • 57.1	61°07.3	• • 29.2	71°29.9	• • 19.9	212°41.9	• • 50.8	Dec 16 Wed	SHA	Mer.pass
10	236°03.0	17°37.7	57.7	76°09.1	29.1	86°32.4	19.9	227°44.3	50.8		142°45.9	08:50
11	251°05.5	32°38.1	58.2	91°11.0	28.9	101°34.8	19.9	242°46.8	50.8	Mars		04:59
12	266°08.0	47°38.4	S11°58.7	106°12.8	N11°28.7	116°37.3	N13°19.9	257°49.2	N00°50.9		210°28.5	04:19
13	281°10.4	62°38.8	59.3	121°14.6	28.6	131°39.8	20.0	272°51.6	50.9	Saturn	351°41.9	18:52
14	296°12.9	77°39.1	11°59.8	136°16.5	28.4	146°42.3	20.0	287°54.1	50.9			
15	311°15.4	92°39.5	12°00.3	151°18.3	• • 28.2	161°44.8	• • 20.0	302°56.5	50.9	Dec 17 Thu	SHA	Mer.pass
16	326°17.8	107°39.8	00.9	166°20.1	28.1	176°47.3	20.0	317°59.0	50.9		141°55.8	08:50
17	341°20.3	122°40.1	01.4	181°22.0	27.9	191°49.8	20.0	333°01.4	51.0		200°12.5	04:56
18	356°22.7	137°40.5	\$12°02.0	196°23.8	N11°27.7	206°52.3	N13°20.1	348°03.8	N00°51.0		210°29.0	04:15
19	11°25.2	152°40.8	02.5	211°25.7	27.6	221°54.8	20.1	3°06.3	51.0	Saturn	351°41.5	18:48
20	26°27.7	167°41.1	03.0	226°27.5	27.4	236°57.3	20.1	18°08.7	51.0	Horizont	tal parallax	
21	41°30.1 56°32.6	182°41.5	03.6	241°29.3	•• 27.3	251°59.8	20.1	33°11.2 48°13.6	· · 51.1	1.0.12011	Venus:	0.3
22	50°32.6 71°35.1	197°41.8	04.1	256°31.2 271°33.0	27.1	267°02.3 282°04.8	20.2		51.1		Mars:	0.3
23	11 35.1	212°42.1	04.7		26.9		20.2	63°16.0	51.1	L		V.1
Mer.p	ass. 18:14	$\nu$ 0.4′ d0.	5′ m-4.75	$\nu$ 1.8′ d-0	0.2′ m0.18	$\nu 2.5' \ d0.$	.0′ m-2.31	$\nu$ 2.4′ d0	.0′ m0.68			

h	Sui	า			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	181°16.8	S23°15.2	113°57.8	15.5'	S11°48.9	-12.9'	54.7'
1	196° 16.5	15.3	128°32.3	15.6'	11°36.0	-12.9'	54.7'
2	211°16.2	15.5	143°06.9	15.6'	11°23.1	-13.0'	54.8'
3 4	226° 15.9 241° 15.6	· · 15.6 15.7	157°41.5 172°16.1	15.6' 15.6'	11°10.1 10°57.1	-13.0' -13.1'	54.8' 54.8'
5	256° 15.3	15.7	172 10.1 186°50.7	15.6'	10° 37.1	-13.1'	54.8'
6	271°15.0	S23°16.0	201°25.3	15.7'	S10°30.8	-13.2'	54.8'
7	$286^{\circ}14.7$	16.1	$216^{\circ}00.0$	15.7'	10°17.6	-13.2'	54.9'
8	301°14.4	16.2	230°34.7	15.7'	10°04.4	-13.3'	54.9'
9 10	316°14.1 331°13.8	· · 16.4 16.5	245°09.4 259°44.1	15.7' 15.7'	09°51.1 09°37.8	-13.3' -13.4'	54.9' 54.9'
11	346° 13.5	16.6	274°18.8	15.7'	09°24.4	-13.4'	54.9'
12	1°13.2	S23°16.7	288°53.6	15.8'	S09°10.9	-13.5'	55.0'
13	16°12.9	16.9	$303^{\circ}28.3$	15.8'	08°57.5	-13.5'	55.0'
14	31°12.6	17.0	318°03.1	15.8'	08°43.9	-13.6'	55.0'
15 16	46°12.3 61°12.0	· · 17.1 17.2	332°37.9 347°12.7	15.8' 15.8'	08°30.4 08°16.8	-13.6' -13.7'	55.0' 55.1'
17	76°11.7	17.2	1°47.5	15.8'	08°03.1	-13.7'	55.1'
18	91°11.4	S23°17.5	16°22.3	15.8'	S07°49.4	-13.7'	55.1'
19	106°11.0	17.6	$30^{\circ}57.1$	15.8'	07°35.7	-13.8'	55.1'
20	121°10.7	17.7	45°31.9	15.8'	07°21.9	-13.8'	55.2'
21 22	136° 10.4 151° 10.1	· · 17.8 17.9	60°06.7 74°41.6	15.8' 15.8'	07°08.1 06°54.2	-13.9' -13.9'	55.2' 55.2'
22	151°10.1 166°09.8	17.9 18.1	74°41.6 89°16.4	15.8'	06°54.2	-13.9' -13.9'	55.2' 55.2'
_5	SD = 16.2'	d = 0.1'			D = 14.9'		
	5D = 10.2	a = 0.1		31	$J = 14.9^{\circ}$		
Wed	<b>GHA</b> 181°09.5	<b>Dec</b> \$23° 18.2	GHA	u 15.8'	<b>Dec</b> 506°26.4	d 14.0'	HP
0 1	181°09.5 196°09.2	18.3	103°51.2 118°26.1	15.8'	06°12.4	-14.0' -14.0'	55.3' 55.3'
2	211°08.9	18.4	133°00.9	15.8'	05°58.4	-14.0'	55.3'
3	226°08.6	• 18.5	147°35.7	15.8'	05°44.3	-14.1'	55.3'
4	241°08.3	18.6	$162^{\circ}10.6$	15.8'	05°30.2	-14.1'	55.4'
5	256°08.0	18.7	176°45.4	15.8'	05°16.1	-14.2'	55.4'
6 7	271°07.7 286°07.4	\$23°18.8 19.0	191°20.2 205°55.0	15.8' 15.8'	\$05°02.0 04°47.8	-14.2' -14.2'	55.4' 55.5'
8	301°07.1	19.0	205 55.0 220°29.8	15.8'	04 47.6 04°33.6	-14.2'	55.5'
9	316°06.8	19.2	235°04.6	15.8'	04°19.3	-14.3'	55.5'
10	331°06.5	19.3	249°39.4	15.8'	04°05.0	-14.3'	55.5'
11	346°06.2	19.4	264°14.2	15.8'	03°50.7	-14.3'	55.6'
12 13	1°05.9 16°05.6	\$23° 19.5 19.6	278° 48.9 293° 23.7	15.7' 15.7'	\$03°36.4 03°22.0	-14.4' -14.4'	55.6' 55.6'
14	31°05.3	19.0	307°58.4	15.7'	03°22.0	-14.4'	55.7'
15	46°05.0	• • 19.8	322°33.1	15.7'	02°53.2	-14.5'	55.7'
16	61°04.7	19.9	337° 07.8	15.7'	02°38.7	-14.5'	55.7'
17	76°04.4	20.0 \$23° 20.1	351° 42.5 6° 17.2	15.7'	02°24.3 502°09.8	-14.5'	55.7'
18 19	91°04.1 106°03.8	20.2	6°17.2 20°51.8	15.6' 15.6'	01°55.2	-14.5' -14.5'	55.8' 55.8'
20	121°03.5	20.3	35°26.4	15.6'	01°40.7	-14.6'	55.8'
21	136°03.2	20.4	50°01.0	15.6'	$01^{\circ}26.1$	-14.6'	55.9'
22	151°02.9	20.5	64°35.6	15.5'	$01^{\circ}11.5$	-14.6'	55.9'
23	166°02.6	20.6	79°10.1	15.5'	00°56.9	-14.6'	55.9'
	SD = 16.2'	d = 0.1'		SI	O = 15.1'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°02.3	<b>S</b> 23°20.7	93°44.7	15.5'	500°42.3	-14.7'	56.0'
1	196°01.9	20.8	108° 19.1	15.5'	00°27.6 \$00°12.9	-14.7' -14.7'	56.0'
2	211°01.6 226°01.3	20.9	122°53.6 137°28.0	15.4' 15.4'	N00°12.9	-14.7' 14.7'	56.0' 56.1'
4	241°01.0	21.1	152°02.4	15.4'	00°16.5	14.7	56.1
5	256°00.7	21.2	166°36.8	15.3'	00°31.2	14.7'	56.1'
6	271°00.4	523°21.2	181°11.1	15.3'	N00°45.9	14.8'	56.2'
7 8	286°00.1 300°59.8	21.3 21.4	195°45.4 210°19.6	15.2' 15.2'	01°00.7 01°15.4	14.8' 14.8'	56.2' 56.2'
9	300 59.8 315°59.5	. 21.4	210 19.6 224°53.8	15.2'	01 15.4 01°30.2	14.8	56.2 56.3'
10	330° 59.2	21.6	239°28.0	15.1'	01°45.0	14.8'	56.3'
11	345°58.9	21.7	$254^{\circ}02.1$	15.1'	01°59.8	14.8'	56.3'
12	0°58.6	\$23°21.8	268°36.2	15.0'	N02°14.6	14.8'	56.4'
13 14	15°58.3 30°58.0	21.9 21.9	283°10.2 297°44.2	15.0' 14.9'	02°29.5 02°44.3	14.8' 14.8'	56.4' 56.4'
15	45° 57.7	22.0	312° 18.1	14.9'	02°59.1	14.8	56.5
16	60°57.4	22.1	$326^{\circ}52.0$	14.8'	03°14.0	14.9'	56.5'
17	75° 57.1	22.2	341°25.9	14.8'	03°28.8	14.9'	56.5'
18	90°56.8	\$23°22.3	355°59.7	14.7'	N03°43.7	14.9'	56.6'
19 20	105° 56.5 120° 56.1	22.3 22.4	10°33.4 25°07.1	14.7' 14.6'	03°58.6 04°13.4	14.9' 14.9'	56.6' 56.7'
21	120 50.1 135°55.8	• 22.5	25 07.1 39°40.7	14.6'	04 13.4 04°28.3	14.9'	56.7'
22	150° 55.5	22.6	54° 14.3	14.5'	04°43.1	14.9'	56.7'
23	165°55.2	22.7	68°47.8	14.4'	04°58.0	14.9'	56.8'
	SD = 16.2'	d = 0.1'		SI	D = 15.3'		

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

Lat.		Moonris	е		Moonset	;
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°	12:44	12:11	11:40	21:30	23:33	
<b>N</b> 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	Venus	Mars	Jupiter	Saturn	Stars
- Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA
0	86°37.5	227°42.5 \$12°05.2	286°34.9 N11°26.8	297°07.3 N13°20.2	78°18.5 N00°51.1	
1	101°40.0	242°42.8 05.7	301°36.7 26.6	312°09.8 20.2	93°20.9 51.1	Alpheratz 357°33.1
2	116°42.5	257°43.1 06.3	316°38.6 26.4	327°12.3 20.3	108°23.3 51.2	Ankaa 353°05.5
3	131°44.9	272°43.5 · · 06.8	331°40.4 · · 26.3	342°14.8 · · 20.3	123°25.8 · · 51.2	Schedar 349°29.0
4	146°47.4	287°43.8 07.4	346°42.2 26.1	357°17.3 20.3	138°28.2 51.2	Diphda 348°45.6
5	161°49.9	302°44.1 07.9	1°44.1 26.0	12°19.8 20.3	153°30.7 51.2	Achernar 335°18.7
6	176°52.3	317°44.4 \$12°08.5	16°45.9 N11°25.8	27°22.3 N13°20.4	168°33.1 N00°51.3	Hamal 327°49.2 Polaris 312°46.9
7	191°54.8	332°44.7 09.0	31°47.8 25.7	42°24.8 20.4	183°35.5 51.3	Acamar 315°10.2
8	206°57.2	347°45.1 09.5	46°49.6 25.5	57°27.3 20.4	198°38.0 51.3	Menkar 314°04.2
9	221°59.7	2°45.4 · · 10.1	61°51.5 · · 25.3	72°29.8 · · 20.4	213°40.4 · · 51.3	Mirfak 308°25.5
10	237°02.2 252°04.6	17°45.7 10.6 32°46.0 11.2	76°53.3 25.2	87°32.3 20.5	228°42.9 51.3	Aldebaran 290°37.4
11 12	252 04.6 267°07.1	32°46.0 11.2 47°46.3 \$12°11.7	91°55.2 25.0 106°57.0 N11°24.9	102°34.8 20.5 117°37.3 N13°20.5	243°45.3 51.4 258°47.7 N00°51.4	Rigel 281°02.0
13	282°09.6	62°46.6 12.3	121°58.9 24.7	132°39.8 20.5	273°50.2 51.4	Capella 280°19.0
14	297°12.0	77° 47.0 12.8	137°00.8 24.6	147°42.3 20.6	288°52.6 51.4	Bellatrix 278°20.8
15	312°14.5	92°47.3 · · 13.4	152°02.6 · · 24.4	162°44.8 · · 20.6	303°55.0 · · 51.5	Elnath 277° 59.5
16	327°17.0	107° 47.6 13.9	167°04.5 24.2	177°47.4 20.6	318°57.5 51.5	Alnilam 275°35.8
17	$342^{\circ}19.4$	122°47.9 14.5	182°06.3 24.1	192°49.9 20.6	333°59.9 51.5	Betelgeuse 270°50.0
18	357°21.9	137°48.2 <b>S</b> 12°15.0	197°08.2 N11°23.9	207°52.4 N13°20.7	349°02.3 N00°51.5	Canopus 263°51.1 Sirius 258°24.5
19	$12^{\circ}24.3$	152°48.5 15.6	212°10.0 23.8	222°54.9 20.7	4°04.8 51.6	Adhara 255°04.2
20	27°26.8	167°48.8 16.1	227°11.9 23.6	237°57.4 20.7	$19^{\circ}07.2$ 51.6	Procyon 244°48.9
21	42°29.3	182°49.1 · · 16.7	242°13.8 · · 23.5	252°59.9 · · 20.7	34°09.6 · · 51.6	Pollux 243°15.0
22	57°31.7	197°49.4 17.2	257°15.6 23.3	268°02.4 20.8	49°12.1 51.6	Avior 234°13.5
23	72°34.2	212°49.7 17.8	272°17.5 23.2	283°04.9 20.8	64°14.5 51.7	Suhail 222° 44.8
Mer.p	ass. 18:11	$ u 0.3' \ d0.5' \ \text{m-4.74} $	$\nu 1.8' \ d$ -0.2' m0.16	$\nu$ 2.5′ $d$ 0.0′ $m$ -2.31	$\nu 2.4' \ d0.0' \ m0.68$	Miaplacidus 221°37.3
						Alphard 217°46.0
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°32.6
0	87°36.7	227°50.0 \$12°18.3	287°19.3 N11°23.0	298°07.4 N13°20.8	79°17.0 N00°51.7	Dubhe 193°39.0 Denebola 182°23.3
1	102°39.1	242°50.3 18.9	302°21.2 22.9	313°09.9 20.8	94°19.4 51.7	Denebola 182°23.3 Gienah 175°42.0
2	117°41.6	257°50.6 19.4	317°23.1 22.7	328°12.4 20.9	109°21.8 51.7	Acrux 172°58.4
3	132°44.1	272°50.9 · · 20.0	332°24.9 · · 22.6	343°14.9 · · 20.9	124°24.3 · · 51.8	Gacrux 171°50.0
4	147°46.5	287°51.2 20.5	347°26.8 22.4	358°17.4 20.9	139°26.7 51.8	Alioth 166°11.8
5	162°49.0	302°51.5 21.1	2°28.7 22.3	13°19.9 20.9	154°29.1 51.8	Spica 158° 20.8
6	177°51.5	317°51.8 \$12°21.6	17°30.5 N11°22.1	28°22.5 N13°21.0	169°31.6 N00°51.8	Alkaid 152° 51.0
7	192°53.9	332°52.1 22.2	32°32.4 22.0	43°25.0 21.0	184°34.0 51.9	Hadar 148°34.1
8 9	207°56.4 222°58.8	347°52.4 22.8 2°52.6 •• 23.3	47°34.3 21.8 62°36.2 · · 21.7	58°27.5 21.0 73°30.0 · · 21.1	199°36.4 51.9 214°38.9 • 51.9	Menkent 147°56.0
10	238°01.3	17°52.9 23.9	77°38.0 21.5	88°32.5 21.1	229°41.3 51.9	Arcturus 145°46.7
11	253°03.8	32°53.2 24.4	92°39.9 21.4	103°35.0 21.1	244°43.7 52.0	Rigil Kent. 139°38.5
12	268°06.2	47°53.5 \$12°25.0	107°41.8 N11°21.2	118°37.5 N13°21.1	259°46.2 N00°52.0	Kochab 137°20.8
13	283°08.7	62°53.8 25.5	122°43.6 21.1	133°40.0 21.2	274°48.6 52.0	Zuben'ubi 136°54.5 Alphecca 126°02.7
14	298°11.2	77°54.1 26.1	137°45.5 20.9	148°42.5 21.2	289°51.0 52.0	Antares 112° 14.2
15	313°13.6	92°54.3 · · 26.7	152°47.4 · · 20.8	163°45.1 · · 21.2	304°53.5 · · 52.1	Atria 107°07.6
16	328°16.1	107°54.6 27.2	167°49.3 20.6	178°47.6 21.2	319°55.9 52.1	Sabik 102°01.3
17	343°18.6	122°54.9 27.8	182°51.2 20.5	193°50.1 21.3	334°58.3 52.1	Shaula 96°08.6
18	358°21.0	137°55.2 \$12°28.3	197°53.0 N11°20.3	208°52.6 N13°21.3	350°00.7 N00°52.1	Rasalhague 95°57.4
19	13°23.5	152°55.5 28.9	212°54.9 20.2 227°56.8 20.0	223°55.1 21.3	5°03.2 52.2	Eltanin 90°42.0
20 21	28°26.0 43°28.4	167°55.7 29.4 182°56.0 · · 30.0	227°56.8 20.0 242°58.7 •• 19.9	238°57.6 21.4 254°00.1 •• 21.4	20°05.6 52.2 35°08.0 •• 52.2	Kaus Aust. 83°30.8
22	58°30.9	197°56.3 30.6	258°00.6 19.7	269°02.6 21.4	50°10.5 52.2	Vega 80°32.6
23	73°33.3	212°56.5 31.1	273°02.4 19.6	284°05.2 21.5	65°12.9 52.3	Nunki 75°46.1
						Altair 61°58.7 Peacock 53°03.7
ivier.p	bass. 18:07	ν0.3′ d0.6′ m-4.73	$\nu 1.9' \ d$ -0.2' m0.14	ν2.5′ d0.0′ m-2.32	ν2.4' d0.0' m0.69	Peacock 53°03.7 Deneb 49°25.1
						Enif 33°37.4
Sun	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°31.1
0	88°35.8 103°38.3	227°56.8 \$12°31.7	288°04.3 N11°19.5	299°07.7 N13°21.5	80°15.3 N00°52.3	Fomalhaut 15°12.9
1 2	103°38.3 118°40.7	242°57.1 32.2 257°57.3 32.8	303°06.2 19.3 318°08.1 19.2	314°10.2 21.5 329°12.7 21.5	95°17.8 52.3 110°20.2 52.3	Scheat 13°43.7
3	118 40.7 133°43.2	257 57.3 32.8 272°57.6 · · 33.4	318 08.1 19.2 333°10.0 · · 19.0	344°15.2 · · 21.6	110 20.2 52.3 125°22.6 · · 52.4	Markab 13°28.4
4	148°45.7	287°57.9 33.9	348°11.9 18.9	359°17.7 21.6	140°25.1 52.4	Dec 18 Fri SHA
5	163°48.1	302°58.1 34.5	3°13.7 18.7	14°20.3 21.6	155°27.5 52.4	Venus 141°04.9
6	178°50.6	317°58.4 \$12°35.1	18°15.6 N11°18.6	29°22.8 N13°21.7	170°29.9 N00°52.4	Mars 199° 57.3
7	193°53.1	332°58.7 35.6	33°17.5 18.5	44°25.3 21.7	185°32.3 52.5	Jupiter 210°29.8
8	208°55.5	347°58.9 36.2	48°19.4 18.3	59°27.8 21.7	200°34.8 52.5	Saturn 351°40.9
9	223°58.0	2°59.2 · · 36.8	63°21.3 · · 18.2	74°30.3 · · 21.7	215°37.2 · · 52.5	Dec 19 Sat SHA
10	239°00.4	17°59.4 37.3	78°23.2 18.0	89°32.9 21.8	230°39.6 52.5	Venus 140°13.3
11 12	254°02.9 269°05.4	32°59.7 37.9 47°59.9 \$12°38.4	93°25.1 17.9 108°27.0 N11°17.7	104°35.4 21.8 119°37.9 N13°21.8	245°42.1 52.6 260°44.5 N00°52.6	Mars 199° 42.7
13	284°07.8	63°00.2 39.0	123°28.9 17.6	134°40.4 21.9	275°46.9 52.6	Jupiter 210°30.7
14	299°10.3	78°00.5 39.6	138°30.8 17.5	149°42.9 21.9	290°49.3 52.7	Saturn 351°40.3
15	314°12.8	93°00.7 · · 40.1	153°32.7 · · 17.3	164°45.4 · · 21.9	305°51.8 · · 52.7	Dec 20 Sun SHA
16	329°15.2	108°01.0 40.7	168°34.6 17.2	179°48.0 22.0	320°54.2 52.7	Venus 139°21.0
17	$344^{\circ}17.7$	123°01.2 41.3	183°36.5 17.1	194°50.5 22.0	335°56.6 52.7	Mars 199°28.5
18	359°20.2	138°01.4 <b>S</b> 12°41.8	198°38.4 N11°16.9	209°53.0 N13°22.0	350°59.1 N00°52.8	Jupiter 210°31.9
19	14°22.6	153°01.7 42.4	213°40.3 16.8	224°55.5 22.1	6°01.5 52.8	Saturn 351°39.5
20	29°25.1	168°01.9 43.0 183°02.2 · · 43.6	228°42.2 16.6 243°44.1 · · 16.5	239°58.1 22.1	21°03.9 52.8 36°06.3 · · 52.8	Horizontal parallax
21 22	44°27.6 59°30.0	183°02.2 · · 43.6 198°02.4 44.1	243°44.1 · · 16.5 258°46.0 16.4	255°00.6 · · 22.1 270°03.1 22.1	36°06.3 · · 52.8 51°08.8 52.9	Venus:
23	74°32.5	213°02.7 44.7	273°47.9 16.2	285°05.6 22.2	66°11.2 52.9	Mars:
	pass. 18:03	ν0.3' d0.6' m-4.71	$\nu 1.9' \ d$ -0.1' m0.12	$\nu 2.5' \ d0.0' \ \text{m-}2.33$	$\nu$ 2.4' d0.0' m0.69	
ivier.p	vass. 10.US	νυ.5 du.0 m-4./1	ν1.9 U-U.1 IIIU.12	ν2.3 du.u iii-2.33	ν2. <del>4</del> αυ.υ πυ.υ <del>9</del>	

Dec 29°14.6

-42°09.7

56°41.5 -17°50.4

-57°06.2

23°35.6 89°22.9

-40°11.9

4°11.8

49°57.6 16°33.8

-8°10.2

 $46^{\circ}01.5$ 6°22.4

28°37.8 -1°11.1

7°24.7 -52°42.5

-16°45.2

-29°00.5

 $5^{\circ}09.3$ 

27°57.5 -59°35.6

-43°32.3 -69°49.4

-8°46.5

11°50.0

 $61^{\circ}36.0$ 

14°25.1

-17°41.4 -63°14.7 -57°15.6 55°48.5 -11°18.1

49°10.4 -60°30.0 -36°30.0

19°02.4 -60°56.6

74°02.4 -16°09.2

26°37.3

-26°29.4

-26°29.4 -69°04.4 -15°45.5 -37°07.3 12°32.4 51°29.1

-34°22.3 38°48.6

-26°15.8 8°56.4

-56°39.0

45°22.8

 $10^{\circ}00.0$ 

 $-46^{\circ}50.0$ 

-29°28.9

28°14.0 15°21.2

Mer.pass

08:49 04:53

04:11 18:44 Mer.pass 08:48

04:50 04:07 18:40 Mer.pass

08:48

04:47 04:03

18:36

0.3

0.1

h	Sui	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°54.9	S23°22.7	83°21.2	14.4'	$N05^{\circ}12.9$	14.9'	56.8'
1	195°54.6	22.8	97°54.6	14.3'	05°27.7	14.9'	56.8'
2	210°54.3 225°54.0	22.9 •• 23.0	112°27.9 127°01.2	14.3' 14.2'	05°42.6 05°57.4	14.9' 14.8'	56.9' 56.9'
4	240°53.7	23.0	141°34.4	14.1'	06°12.3	14.8'	56.9'
5	255°53.4	23.1	$156^{\circ}07.5$	14.1'	$06^{\circ}27.1$	14.8'	57.0'
6	270°53.1	\$23°23.2	170°40.6	14.0'	N06°42.0	14.8'	57.0'
7 8	285°52.8 300°52.5	23.2 23.3	185°13.5 199°46.5	13.9' 13.8'	06°56.8 07°11.6	14.8' 14.8'	57.1' 57.1'
9	315°52.2	• • 23.4	214°19.3	13.8'	07°26.4	14.8'	57.1'
10	330°51.9	23.5	228°52.1	13.7'	07°41.2	14.8'	57.2'
11 12	345°51.6 0°51.2	23.5 \$23°23.6	243°24.8 257°57.4	13.6' 13.5'	07°56.0 N08°10.7	14.8' 14.7'	57.2' 57.3'
13	15°50.9	23.6	257 57.4 272°29.9	13.5'	08° 25.5	14.7'	57.3'
14	30°50.6	23.7	287°02.3	13.4'	08°40.2	14.7'	57.3'
15	45°50.3	• • 23.8	301°34.7	13.3'	08°54.9	14.7'	57.4'
16 17	60°50.0 75°49.7	23.8 23.9	316°07.0 330°39.2	13.2' 13.1'	09°09.6 09°24.3	14.7' 14.6'	57.4' 57.5'
18	90°49.4	\$23°24.0	345°11.3	13.0'	N09°38.9	14.6'	57.5'
19	105°49.1	24.0	359°43.4	12.9'	09°53.6	14.6'	57.5'
20	120°48.8	24.1	14°15.3	12.8'	10°08.2	14.6'	57.6'
21 22	135°48.5 150°48.2	· · 24.1 24.2	28°47.1 43°18.9	12.8' 12.7'	10°22.7 10°37.3	14.5' 14.5'	57.6' 57.7'
23	165°47.9	24.2	57°50.6	12.6'	10°51.8	14.5'	57.7'
	SD = 16.2'	d = 0.1'		SI	0 = 15.5'		
Sat	<b>GHA</b> 180°47.6	<b>Dec</b> \$23°24.3	<b>GHA</b> 72°22.1	u 12.5'	<b>Dec</b> N11°06.3	<i>d</i> 14.5'	<b>HP</b> 57.7'
0 1	180°47.6 195°47.2	\$23°24.3 24.4	72°22.1 86°53.6	12.5'	N11°06.3 11°20.7	14.5' 14.4'	57.7° 57.8'
2	210°46.9	24.4	101°25.0	12.3'	11°35.1	14.4'	57.8'
3	225°46.6	• • 24.5	115°56.3	12.2'	11°49.5	14.4'	57.9'
4 5	240°46.3 255°46.0	24.5 24.6	130°27.4 144°58.5	12.1' 12.0'	12°03.9 12°18.2	14.3' 14.3'	57.9' 57.9'
6	270°45.7	\$23°24.6	159°29.5	11.9'	N12°32.5	14.2	58.0'
7	285°45.4	24.7	174°00.3	11.8'	$12^{\circ}46.7$	14.2'	58.0'
8	300°45.1	24.7	188°31.1	11.7'	13°00.9	14.1'	58.1'
9 10	315°44.8 330°44.5	· · 24.8 24.8	203°01.8 217°32.3	11.5' 11.4'	13°15.0 13°29.1	14.1' 14.1'	58.1' 58.1'
11	345°44.2	24.0	232°02.7	11.3'	13°43.2	14.0'	58.2
12	0°43.9	S23°24.9	246°33.1	11.2'	N13°57.2	14.0'	58.2'
13 14	15°43.6 30°43.2	25.0 25.0	261°03.3 275°33.4	11.1' 11.0'	14°11.2 14°25.1	13.9' 13.9'	58.3' 58.3'
15	45°42.9	25.1	275 33.4 290°03.3	10.9'	14 25.1 14°38.9	13.8'	58.3'
16	60°42.6	25.1	304°33.2	10.7'	14°52.7	13.7'	58.4'
17	75°42.3	25.2	319°03.0	10.6'	15°06.5	13.7'	58.4'
18 19	90°42.0 105°41.7	\$23°25.2 25.2	333°32.6 348°02.1	10.5' 10.4'	N15°20.1 15°33.8	13.6' 13.6'	58.5' 58.5'
20	120°41.4	25.2	2°31.5		15° 47.3		58.6'
21	135°41.1	• • 25.3	$17^{\circ}00.7$	10.1'	16°00.8	13.4'	58.6'
22	150°40.8	25.4	31°29.9	10.0'	16° 14.2	13.4'	58.6'
23	165°40.5	25.4	45°58.9	9.9'	16°27.6	13.3'	58.7'
	SD = 16.2'	d = 0.1'		SL	O = 15.7'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°40.2	\$23°25.4	60°27.8	9.8'	N16°40.9	13.2'	58.7'
1 2	195°39.9 210°39.5	25.5 25.5	74°56.6 89°25.2	9.6' 9.5'	16°54.1 17°07.3	13.1' 13.1'	58.8' 58.8'
3	225°39.2	• • 25.5	103°53.7	9.4'	17°20.3	13.0'	58.8'
4	240°38.9	25.6	118°22.1	9.2'	17°33.3	12.9'	58.9'
5 6	255°38.6 270°38.3	25.6 \$23°25.6	132°50.3 147°18.4	9.1' 9.0'	17°46.2 N17°59.1	12.8' 12.8'	58.9' 59.0'
7	285°38.0	25.7	161°46.4	9.0 8.8'	18° 11.8	12.7'	59.0'
8	300°37.7	25.7	$176^{\circ}14.3$	8.7'	18°24.5	12.6'	59.0'
9	315°37.4	• • 25.7	190°42.0	8.6'	18° 37.1 18° 49.6	12.5'	59.1'
10 11	330°37.1 345°36.8	25.8 25.8	205°09.5 219°37.0	8.4' 8.3'	18°49.6 19°02.0	12.4' 12.3'	59.1' 59.2'
12	0°36.5	\$23°25.8	234°04.3	8.2'	N19°14.3	12.2'	59.2'
13	15°36.1	25.8	248°31.4	8.0'	19°26.5	12.1'	59.2'
14 15	30°35.8 45°35.5	25.9 •• 25.9	262°58.5 277°25.4	7.9' 7.7'	19°38.6 19°50.6	12.0' 11.9'	59.3' 59.3'
15 16	45°35.5 60°35.2	25.9	277°25.4 291°52.1	7.7° 7.6'	19°50.6 20°02.5	11.9	59.3' 59.4'
17	75°34.9	25.9	$306^{\circ}18.7$	7.5'	20°14.3	11.7'	59.4
18	90°34.6	\$23°26.0	320°45.2	7.3'	N20°26.1	11.6'	59.4'
19 20	105°34.3 120°34.0	26.0 26.0	335°11.5 349°37.7	7.2' 7.0'	20°37.6 20°49.1	11.5' 11.4'	59.5' 59.5'
20	120°34.0 135°33.7	. 26.0	349°37.7 4°03.7	7.0° 6.9'	20°49.1 21°00.5	11.4	59.5' 59.6'
22	150°33.4	26.0	18°29.6	6.8'	21°11.8	11.1'	59.6'
23	165°33.1	26.1	32°55.4	6.6'	21°22.9	11.0'	59.6'
	SD = 16.2'	d = 0.0'		SE	0 = 16.0'		

	Twi	light			Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	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
<b>S</b> 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	t
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°	11:06	10:21		01:38	04:00	
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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	
	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	Stars
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	89°34.9	228°02.9 \$12°4		300°08.1 N13°22.2	81°13.6 N00°52.9	
1	104°37.4		5.8 303°51.7 16.0	315°10.7 22.2	96°16.0 53.0	Alpheratz 357°33.1 29°14.6
2	119°39.9		6.4 318°53.6 15.8	330°13.2 22.3	111°18.5 53.0	Ankaa 353°05.5 -42°09.7
						Schedar 349°29.1 56°41.5
3	134°42.3	273°03.6 · · 4		345°15.7 · · 22.3	126°20.9 · · 53.0	Diphda 348°45.6 -17°50.4
4	149°44.8			0°18.2 22.3	141°23.3 53.0	Achernar 335°18.8 -57°06.2
5	164°47.3		8.1 3°59.3 15.4	15°20.8 22.4	156°25.7 53.1	Hamal 327°49.2 23°35.6
6	179°49.7	318°04.3 \$12°4		30°23.3 N13°22.4	171°28.2 N00°53.1	Polaris 312°47.5 89°22.9
7	194°52.2		9.3 34°03.1 15.2	45°25.8 22.4	186°30.6 53.1	Acamar 315°10.2 -40°11.9
8	209°54.7		$9.8   49^{\circ}05.0   15.0$	60°28.3 22.5	201°33.0 53.2	Menkar 314°04.2 4°11.8
9	224°57.1	3°05.0 · · 5		75°30.9 · · 22.5	216°35.4 · · 53.2	Mirfak 308°25.5 49°57.6
10	239°59.6		1.0 79°08.9 14.8	90°33.4 22.5	231°37.9 53.2	Aldebaran 290°37.4 16°33.8
11	255°02.1		1.5 94°10.8 14.6	105°35.9 22.6	246°40.3 53.2	Rigel 281°02.0 -8°10.2
12	270°04.5	48°05.7 \$12°5		120°38.4 N13°22.6	261°42.7 N00°53.3	Capella 280°19.0 46°01.5
13	285°07.0		2.7 124°14.6 14.4	135°41.0 22.6	276°45.1 53.3	Bellatrix 278°20.8 6°22.4
14	300°09.4		3.3 139°16.5 14.2	150°43.5 22.7	291°47.6 53.3	Elnath 277°59.4 28°37.8
15	315°11.9	93°06.4 · · 5		165°46.0 · · 22.7	306°50.0 · · 53.4	Alnilam 275°35.8 -1°11.1
16	330°14.4		4.4 169°20.4 14.0	180°48.6 22.7	321°52.4 53.4	Betelgeuse 270°50.0 7°24.7
17	345°16.8		5.0 184°22.3 13.8	195°51.1 22.8	336°54.8 53.4	Canopus 263°51.1 -52°42.5
18	0°19.3	138°07.0 \$12°5		210°53.6 N13°22.8	351°57.3 N00°53.4	Sirius 258°24.5 -16°45.2
19	15°21.8		6.1 214°26.1 13.6	225°56.1 22.8	6°59.7 53.5	Adhara 255°04.2 -29°00.5
20	30°24.2		$6.7   229^{\circ}28.1   13.5$	240°58.7 22.9	22°02.1 53.5	Procyon 244°48.8 5°09.3
21	45°26.7	183°07.7 · · · 5		256°01.2 · · 22.9	37°04.5 · · 53.5	Pollux 243°15.0 27°57.5
22	60°29.2		7.9 259°31.9 13.2	271°03.7 22.9	52°07.0 53.6	Avior 234°13.5 -59°35.6
23	75°31.6	213°08.1 5	8.4 274°33.8 13.1	286°06.3 23.0	67°09.4 53.6	Suhail 222°44.8 -43°32.3
Morn	ass. 17:59	ν0.2' d0.6' m-4	70 $\nu 1.9' \ d$ -0.1' m0.10	$\nu 2.5' \ d0.0' \ \text{m-}2.34$	$\nu 2.4' \ d0.0' \ m0.69$	Miaplacidus 221°37.3 -69°49.4
ivier.p	ass. 11.39	νυ.∠ αυ.υ m-4	ν1.9 α-0.1 III0.10	ν Δ.3	ν Δ.Ψ	Alphard 217°46.0 -8°46.5
						Regulus 207°32.6 11°50.0
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°38.9 61°36.0
0	90°34.1	228°08.3 \$12°5	9.0 289°35.8 <b>N</b> 11°12.9	301°08.8 N13°23.0	82°11.8 N00°53.6	Denebola 182°23.3 14°25.1
1	105°36.6	243°08.5 12°5	9.6 304°37.7 12.8	316°11.3 23.0	97°14.2 53.6	
2	120°39.0	258°08.7 13°0	0.2 319°39.6 12.7	331°13.9 23.1	112°16.6 53.7	Gienah 175°42.0 -17°41.5
3	135°41.5	273°08.9 · · 0		346°16.4 · · 23.1	127°19.1 · · 53.7	Acrux 172°58.3 -63°14.7
4	150°43.9		1.3 349°43.5 12.4	1°18.9 23.2	142°21.5 53.7	Gacrux 171°49.9 -57°15.6
5	165°46.4		1.9 4°45.4 12.3	16°21.5 23.2	157°23.9 53.8	Alioth 166°11.7 55°48.5
6	180°48.9	318°09.5 \$13°0		31°24.0 N13°23.2	172°26.3 N00°53.8	Spica 158°20.7 -11°18.1
7	195°51.3		3.1 34°49.3 12.1	46°26.5 23.3	187°28.8 53.8	Alkaid 152°51.0 49°10.4
8	210°53.8		3.7 49°51.2 11.9	61°29.1 23.3	202°31.2 53.9	Hadar 148°34.0 -60°30.0
9	225°56.3	3°10.1 · · · 0		76°31.6 · · 23.3	217°33.6 · · 53.9	Menkent 147°55.9 -36°30.0
10	240°58.7		4.8 79°55.1 11.7	91°34.1 23.4	232°36.0 53.9	Arcturus 145°46.7 19°02.4
11	256°01.2		5.4 94°57.0 11.6	106°36.7 23.4	247°38.4 54.0	Rigil Kent. 139°38.5 -60°56.6
12	271°03.7	48°10.7 \$13°0		121°39.2 N13°23.4	262°40.9 N00°54.0	Kochab 137°20.7 74°02.3
13	286°06.1		$6.6   125^{\circ}00.9   11.3$	136°41.7 23.5	277°43.3 54.0	Zuben'ubi 136°54.5 -16°09.2
14	301°08.6		$7.1   140^{\circ}02.8   11.2$	150°44.3 23.5	292°45.7 54.0	Alphecca 126°02.7 26°37.3
	316°11.1	93°11.3 · · · 0		166°46.8 · · 23.5	307°48.1 · · 54.1	Antares 112°14.2 -26°29.4
15 16	331°13.5					Atria 107°07.5 -69°04.4
16 17	346°16.0		8.3 170°06.7 11.0 8.9 185°08.6 10.8	181°49.3 23.6 196°51.9 23.6	322°50.5 54.1 337°53.0 54.1	Sabik 102°01.3 -15°45.5
18	1°18.4			211°54.4 N13°23.7		Shaula 96°08.6 -37°07.3
	16°20.9					Rasalhague 95°57.4 12°32.4
19						Eltanin 90°42.0 51°29.1
20	31°23.4		0.6 230°14.4 10.5	241°59.5 23.7	23°00.2 54.2	Kaus Aust. 83°30.8 -34°22.3
21	46°25.8	183°12.5 · · 1		257°02.0 · · 23.8	38°02.6 · · 54.3	Vega 80°32.6 38°48.5
22	61°28.3		1.8 260°18.3 10.2	272°04.6 23.8	53°05.0 54.3	Nunki 75°46.1 -26°15.8
23	76°30.8	213°12.8 1	2.4 275°20.3 10.1	287°07.1 23.8	68°07.5 54.3	Altair 61°58.7 8°56.4
Mer.p	ass. 17:55	$\nu$ 0.2′ d0.6′ m-4	69 $\nu 1.9' \ d$ -0.1' m0.08	$\nu 2.5' \ d0.0' \ \text{m-}2.34$	$\nu$ 2.4′ $d$ 0.0′ $m$ 0.70	Peacock 53°03.7 -56°39.0
						Deneb 49°25.1 45°22.8
					G114 =	Enif 33°37.4 10°00.0
Wed	GHA	GHA Dec		GHA Dec	GHA Dec	Al Na'ir 27°31.2 -46°50.0
0	91°33.2	228°13.0 \$13°1		302°09.6 N13°23.9	83°09.9 N00°54.4	Fomalhaut 15°12.9 -29°28.9
1	106°35.7		$3.5   305^{\circ}24.2   09.9$	317°12.2 23.9	98°12.3 54.4	Scheat 13°43.7 28°14.0
2	121°38.2		4.1 320°26.1 09.8	332°14.7 24.0	113°14.7 54.4	Markab 13°28.4 15°21.2
3	136°40.6	273°13.5 · · 1		347°17.3 · · 24.0	128°17.1 · · 54.4	Dec 21 Man CHA A4
4	151°43.1		5.3 350°30.0 09.5	2°19.8 24.0	143°19.6 54.5	Dec 21 Mon SHA Mer.pass
5	166°45.6		$5.9$ $5^{\circ}32.0$ $09.4$	17°22.3 24.1	158°22.0 54.5	Venus 138°28.0 08:48
6	181°48.0	318°14.1 \$13°1		32°24.9 N13°24.1	173°24.4 N00°54.5	Mars 199°14.8 04:44
7	196°50.5		7.0 35°35.9 09.2	47°27.4 24.1	188°26.8 54.6	Jupiter 210°33.2 03:59
8	211°52.9		7.6 50°37.8 09.1	62°30.0 24.2	203°29.2 54.6	Saturn 351°38.7 18:32
9	226°55.4	3°14.6 · · 1		77°32.5 · · 24.2	218°31.6 · · 54.6	Dec 22 Tue SHA Mer.pass
10	241°57.9		8.8 80°41.7 08.8	92°35.0 24.3	233°34.1 54.7	Venus 137°34.2 08:47
11	257°00.3		9.4 95°43.7 08.7	107°37.6 24.3	248°36.5 54.7	Mars 199°01.7 04:41
12	272°02.8	48°15.1 \$13°2		122°40.1 N13°24.3	263°38.9 N00°54.7	Jupiter 210°34.7 03:55
13	287°05.3		0.6 125°47.6 08.5	137°42.7 24.4	278°41.3 54.8	Saturn 351°37.7 18:28
14	302°07.7		1.1 140°49.6 08.4	152°45.2 24.4	293°43.7 54.8	
15	317°10.2	93°15.6 · · 2		167°47.8 · · 24.5	308°46.1 · · 54.8	Dec 23 Wed SHA Mer.pass
16	332°12.7		2.3 170°53.5 08.2	182°50.3 24.5	323°48.5 54.9	Venus 136°39.8 08:47
17	347°15.1		2.9 185°55.5 08.0	197°52.8 24.5	338°51.0 54.9	Mars 198°49.0 04:38
18	2°17.6	138°16.1 \$13°2		212°55.4 N13°24.6	353°53.4 N00°54.9	Jupiter 210°36.4 03:51
19	17°20.1		4.1 215°59.4 07.8	227°57.9 24.6	8°55.8 55.0	Saturn 351°36.7 18:24
20	32°22.5		4.7 231°01.4 07.7	243°00.5 24.6	23°58.2 55.0	11
21	47°25.0	183°16.6 · · 2		258°03.0 · · 24.7	39°00.6 · · 55.0	Horizontal parallax
22	62°27.4		5.9 261°05.3 07.5	273°05.6 24.7	54°03.0 55.1	Venus: 0.3
23	77°29.9	213°16.9 2	6.4 276°07.3 07.4	288°08.1 24.8	69°05.5 55.1	Mars: 0.1
Mern	ass. 17:51	ν0.2' d0.6' m-4	$\frac{1}{68} \frac{1.9' \text{ d-0.1' m0.05}}{\nu}$	ν2.5' d0.0' m-2.35	$\nu$ 2.4' d0.0' m0.70	

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°32.7	\$23°26.1	$47^{\circ}21.0$	6.5'	N21°33.9	10.9'	59.7'
1	195°32.4	26.1	61°46.5	6.3'	21°44.8	10.8'	59.7'
2	210°32.1 225°31.8	26.1 •• 26.1	76°11.8 90°37.0	6.2' 6.0'	21°55.6 22°06.3	10.7' 10.5'	59.7' 59.8'
4	240°31.5	26.1	105°02.0	5.9'	22°16.8	10.5	59.8'
5	255°31.2	26.1	119°26.9	5.8'	22°27.2	10.3'	59.9'
6	270°30.9	S23°26.2	$133^{\circ}51.7$	5.6'	N22°37.5	10.1'	59.9'
7	285°30.6	26.2	148°16.3	5.5'	22°47.6	10.0'	59.9'
8 9	300°30.3 315°30.0	26.2 •• 26.2	162°40.8 177°05.1	5.3' 5.2'	22°57.6 23°07.4	9.9' 9.7'	60.0' 60.0'
10	330°29.7	26.2	177 05.1 191°29.3	5.2 5.1'	23 07.4 23°17.1	9.7 9.6'	60.0
11	345°29.3	26.2	205°53.4	4.9'	23°26.7	9.4'	60.1
12	0°29.0	<b>S</b> 23°26.2	220°17.3	4.8'	N23°36.1	9.3'	60.1'
13	15°28.7	26.2	234°41.1 249°04.7	4.6'	23°45.4 23°54.5	9.1'	60.1'
14 15	30°28.4 45°28.1	26.2 •• 26.2	249°04.7 263°28.2	4.5' 4.4'	23°54.5 24°03.5	9.0' 8.8'	60.2' 60.2'
16	60°27.8	26.2	277°51.6	4.2'	24°12.3	8.7'	60.2'
17	75°27.5	26.2	$292^{\circ}14.8$	4.1'	24°21.0	8.5'	60.3'
18	90°27.2	\$23°26.2	306°37.9	4.0'	N24°29.5	8.3'	60.3'
19	105°26.9	26.2	321°00.9	3.8' 3.7'	24° 37.8	8.2' 8.0'	60.3'
20 21	120°26.6 135°26.2	26.2 •• 26.2	335°23.7 349°46.4	3.6'	24°46.0 24°54.0	8.0 7.8'	60.4' 60.4'
22	150°25.9	26.2	4°09.0	3.4'	25°01.8	7.7'	60.4
23	165°25.6	26.2	18°31.4	3.3'	25°09.5	7.5'	60.5
	SD = 16.3'	d = 0.0'		S	D = 16.3'		
т.	CUA	D			D-:	.1	LIP
Tue 0	<b>GHA</b> 180°25.3	Dec 523°26.2	<b>GHA</b> 32°53.7	$\nu$ 3.2'	Dec N25° 17.0	d 7.3'	<b>HP</b> 60.5'
1	195°25.0	26.2	47°15.9	3.1'	25°24.3	7.1	60.5
2	210°24.7	26.2	61°38.0	2.9'	25°31.5	7.0'	60.5'
3	225°24.4	• • 26.2	76°00.0	2.8'	25°38.4	6.8'	60.6'
4 5	240°24.1 255°23.8	26.2 26.2	90°21.8 104°43.5	2.7' 2.6'	25°45.2 25°51.8	6.6' 6.4'	60.6' 60.6'
6	270°23.5	523°26.2	119°05.1	2.5'	N25°58.3	6.2	60.7
7	285°23.1	26.2	133°26.6	2.4'	26°04.5	6.1'	60.7'
8	300°22.8	26.2	147°47.9	2.3'	26°10.6	5.9'	60.7'
9	315°22.5	• • 26.2	162°09.2	2.2'	26°16.4	5.7'	60.7'
10 11	330°22.2 345°21.9	26.2 26.2	176°30.4 190°51.4	2.1' 2.0'	26°22.1 26°27.6	5.5' 5.3'	60.8' 60.8'
12	0°21.6	523°26.2	205°12.4	1.9'	N26°32.9	5.1'	60.8
13	15°21.3	26.1	219°33.2	1.8'	26°37.9	4.9'	60.8'
14	30°21.0	26.1	233°54.0	1.7'	26°42.8	4.7'	60.9'
15	45°20.7 60°20.4	• • 26.1	248°14.6 262°35.2	1.6' 1.5'	26° 47.5 26° 52.0	4.5'	60.9'
16 17	75°20.1	26.1 26.1	202 35.2 276°55.7	1.5 1.4'	26°56.3	4.3' 4.1'	60.9' 60.9'
18	90°19.7	\$23°26.1	291°16.1	1.3'	N27°00.4	3.9'	61.0'
19	105°19.4	26.0	305°36.4	1.2'	27°04.2	3.7'	61.0'
20	120°19.1	26.0	319°56.6		27°07.9	3.5'	61.0'
21 22	135°18.8 150°18.5	· · 26.0 26.0	334°16.8 348°36.9	1.1' 1.0'	27°11.3 27°14.6	3.2' 3.0'	61.0' 61.0'
23	165°18.2	26.0	2°56.9	1.0'	27° 17.6	2.8'	61.1
	SD = 16.3'	d = -0.0'		S	D = 16.5'		
	GHA		CIIA			,	
Wed 0	БНА 180°17.9	<b>Dec</b> \$23°25.9	<b>GHA</b> 17°16.9	u 0.9'	<b>Dec</b> N27° 20.4	d 2.6'	<b>HP</b> 61.1'
1	195°17.6	25.9	31°36.7	0.8'	27°23.1	2.4'	61.1
2	210°17.3	25.9	45°56.6	0.8'	27° 25.4	2.2'	61.1'
3	225°17.0	• • 25.9	60°16.4	0.7'	27°27.6	2.0'	61.1'
4 5	240°16.6 255°16.3	25.8 25.8	74°36.1 88°55.7	0.7' 0.6'	27°29.6 27°31.3	1.7' 1.5'	61.2' 61.2'
6	270°16.0	\$23°25.8	103°15.4	0.6'	N27°32.9	1.3'	61.2'
7	285°15.7	25.8	117°35.0	0.5'	27°34.2	1.1'	61.2'
8	300°15.4	25.7	131°54.5	0.5'	27°35.3	0.9'	61.2'
9 10	315°15.1 330°14.8	· · 25.7 25.7	146°14.0 160°33.5	0.5' 0.5'	27°36.1 27°36.8	0.6' 0.4'	61.2' 61.2'
10	330 14.8 345°14.5	25.7 25.7	160 33.5 174°53.0	0.5	27 36.8 27°37.2	0.4	61.3
12	0°14.2	\$23°25.6	189°12.4	0.4'	N27°37.4	-0.0'	61.3'
13	15°13.9	25.6	203°31.8	0.4'	27°37.4	-0.2	61.3'
14 15	30°13.5 45°13.2	25.6 •• 25.5	217°51.2 232°10.6	0.4' 0.4'	27°37.2 27°36.7	-0.5'	61.3'
15 16	45°13.2 60°12.9	25.5	232°10.6 246°30.0	0.4'	27°36.7 27°36.0	-0.7' -0.9'	61.3' 61.3'
17	75°12.6	25.4	260°49.3	0.4	27°35.1	-1.1'	61.3
18	90°12.3	\$23°25.4	275°08.7	0.4'	N27°34.0	-1.3'	61.3'
19	105°12.0	25.4	289°28.1	0.4'	27° 32.6	-1.6'	61.3'
20 21	120°11.7 135°11.4	25.3 •• 25.3	303°47.5 318°06.9	0.4' 0.4'	27°31.1 27°29.3	-1.8' -2.0'	61.4' 61.4'
22	150°11.1	25.3	332°26.3	0.4	27°27.3	-2.0 -2.2'	61.4
23	165°10.8	25.2	346°45.7	0.4'	27°25.0	-2.5'	61.4'
	SD = 16.3'	d = -0.0'		S	D = 16.7'		

Lat.	Twilight		Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
N 72°	08:26	10:58			12:59	15:31
<b>N</b> 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
<b>N</b> 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
<b>N</b> 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
<b>S</b> 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	е	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	
N 40°	13:57	14:47	15:51	04:20	05:38	06:52	
35°	14:13	15:05	16:10	04:06	05:21	06:33	
30°	14:26	15:21	16:26	03:53	05:05	06:17	
20°	14:49	15:47	16:53	03:32	04:40	05:49	
N 10°	15:09	16:10	17:17	03:14	04:18	05:26	
0°	15:28	16:32	17:39	02:57	03:58	05:04	
<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.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	87-98%
21	02:11	01:56	11:58	21:43	09:12	
22	01:41	01:26	11:59	22:48	10:15	
23	01:12	00:57	11:59	23:55	11:21	

# December 24, 25, 26 UT (Thu., Fri., Sat.)

h	Aries	Ve	nus		ars	Jup	oiter	Sat	urn		Stars	
Thu -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	92°32.4	228° 17.0	S13°27.0	291°09.2	N11°07.3	303° 10.7	N13°24.8	84°07.9	N00°55.1			
1	107°34.8	243°17.2	27.6	306°11.2	07.2	318° 13.2	24.8	99°10.3	55.2	Alpheratz	357°33.1	29°14.6
2	122°37.3	258° 17.4	28.2	321°13.2	07.1	333° 15.8	24.9	114°12.7	55.2	Ankaa	353°05.5	-42°09.7
3	137°39.8	273° 17.5	• • 28.8	336°15.1	• • 06.9	348° 18.3	• • 24.9	129°15.1	• • 55.2	Schedar	349°29.1	56°41.5
4	152°42.2	288° 17.7	29.4	351°17.1	06.8	3°20.8	25.0	144°17.5	55.3	Diphda	348°45.6	-17°50.4
5	167°44.7	303°17.8	30.0	$6^{\circ}19.1$	06.7	18° 23.4	25.0	159°19.9	55.3	Achernar	335°18.8	-57°06.2
6	182°47.2	318° 18.0	S13°30.6	21°21.1	N11°06.6	33°25.9	N13°25.1	174°22.3	N00°55.3	Hamal	327°49.2	23°35.6
7	197°49.6	333°18.1	31.2	36°23.0	06.5	48°28.5	25.1	189°24.8	55.4	Polaris	312°48.0	89°22.9
8	212°52.1	348°18.2	31.7	51°25.0	06.4	63°31.0	25.1	204°27.2	55.4	Acamar	315°10.3	-40°11.9
9	227°54.6	3°18.4	• • 32.3	66°27.0	• • 06.3	78°33.6	• • 25.2	$219^{\circ}29.6$	• • 55.4	Menkar	314°04.2	4°11.8
10	242°57.0	$18^{\circ}18.5$	32.9	81°29.0	06.2	93°36.1	25.2	234°32.0	55.5	Mirfak	308°25.5	49°57.6
11	257°59.5	33°18.7	33.5	96°31.0	06.1	108°38.7	25.3	249°34.4	55.5	Aldebaran	290°37.4	16°33.8
12	273°01.9	48° 18.8	S13°34.1	111°32.9	N11°06.0	123°41.2	N13°25.3	264°36.8	N00°55.5	Rigel	281°02.0	-8°10.2 46°01.5
13	288°04.4	63°19.0	34.7	126°34.9	05.9	138°43.8	25.3	279°39.2	55.6	Capella	280°19.0 278°20.8	6°22.4
14	303°06.9	$78^{\circ}19.1$	35.3	141°36.9	05.8	153°46.3	25.4	294°41.6	55.6	Bellatrix Elnath	276 20.6 277°59.4	28°37.8
15	$318^{\circ}09.3$	93°19.2	• • 35.9	156°38.9	• • 05.7	168°48.9	• • 25.4	309°44.1	• • 55.6	Alnilam	277 39.4 275°35.7	-1°11.1
16	333°11.8	$108^{\circ}19.4$	36.5	171°40.9	05.6	183°51.4	25.5	324°46.5	55.7	Betelgeuse	270°50.0	7°24.7
17	348°14.3	123° 19.5	37.1	186°42.8	05.5	198°54.0	25.5	339°48.9	55.7	Canopus	263°51.1	-52°42.6
18	3°16.7	$138^{\circ}19.6$	<b>S</b> 13°37.7	201°44.8	N11°05.4	213°56.6	N13°25.5	354°51.3	N00°55.7	Sirius	258°24.5	-32 42.0 -16°45.2
19	18°19.2	153° 19.8	38.3	216°46.8	05.3	$228^{\circ}59.1$	25.6	9°53.7	55.8	Adhara	255°04.2	-10° 45.2 -29° 00.5
20	33°21.7	$168^{\circ}19.9$	38.9	231°48.8	05.2	244°01.7	25.6	24°56.1	55.8	Procyon	244°48.8	5°09.3
21	48°24.1	183°20.0	• • 39.4	246°50.8	•• 05.1	259°04.2	• • 25.7	39°58.5	• • 55.8	Pollux	243°15.0	27°57.5
22	63°26.6	198° 20.2	40.0	261°52.8	05.0	274°06.8	25.7	55°00.9	55.9	Avior	234°13.5	-59°35.6
23	78°29.1	213°20.3	40.6	276°54.8	04.9	289°09.3	25.8	70°03.3	55.9		234 13.5 222°44.8	-39 35.0 -43°32.4
1/100	17.47	1/0 2/ 40	6′ m-4.67	1/2 D/ 4 C	0.1' m0.03	1/2 5/ 40	.0′ m-2.36	1/2 4/ 40	.0′ m0.70	Suhail Miaplacidus	222 44.8 221°37.2	-43 32.4 -69°49.5
ivier.p	pass. 17:47	νυ.∠ au.	U 111-4.01	ν2.0 a-C	IIIU.U3	ν2.5 aU	.0 111-2.30	ν2.4 dU	.0 1110.70	Alphard	221°37.2 217°45.9	-69°49.5 -8°46.6
										Regulus	217 45.9 207°32.5	-8 46.6 11°50.0
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°38.9	61°36.0
0	93°31.5	228°20.4	S13°41.2	291°56.8	N11°04.8	$304^{\circ}11.9$	N13°25.8	$85^{\circ}05.8$	N00°55.9	Dubne	193 38.9 182°23.3	14°25.1
1	108°34.0	243°20.6	41.8	306°58.8	04.7	$319^{\circ}14.4$	25.8	$100^{\circ}08.2$	56.0	Gienah	162 23.3 175°41.9	-17°41.5
2	123°36.4	258° 20.7	42.4	322°00.7	04.6	334°17.0	25.9	$115^{\circ}10.6$	56.0		173°58.3	-63°14.7
3	138°38.9	273°20.8	• • 43.0	337°02.7	• • 04.5	$349^{\circ}19.5$	• • 25.9	130°13.0	• • 56.0		172 30.3 171°49.9	-57°15.6
4	153°41.4	288° 20.9	43.6	352°04.7	04.4	4°22.1	26.0	145°15.4	56.1	Alioth	166°11.7	55°48.4
5	168°43.8	303°21.1	44.2	7°06.7	04.3	$19^{\circ}24.6$	26.0	160°17.8	56.1	Spica	158°20.7	-11°18.1
6	183°46.3	318°21.2	<b>S</b> 13°44.8	22°08.7	N11°04.2	34°27.2	N13°26.1	175°20.2	N00° 56.2	Alkaid	150° 51.0	49°10.4
7	198°48.8	333°21.3	45.4	$37^{\circ}10.7$	04.1	49° 29.8	26.1	$190^{\circ}22.6$	56.2	Hadar	148°34.0	-60°30.0
8	213°51.2	348°21.4	46.0	52°12.7	04.0	64°32.3	26.1	205°25.0	56.2		147°55.9	-36°30.0
9	228°53.7	3°21.5	• • 46.6	67°14.7	• • 03.9	79°34.9	• • 26.2	220°27.4	• • 56.3	Arcturus	145°46.6	19°02.4
10	243°56.2	18°21.6	47.2	82°16.7	03.8	94°37.4	26.2	235°29.8	56.3	Rigil Kent.	139°38.4	-60°56.6
11	258°58.6	33°21.8	47.8	97°18.7	03.7	109°40.0	26.3	250°32.2	56.3	Kochab	137°20.7	74°02.3
12	274°01.1	48°21.9	S13°48.4	112°20.7	N11°03.6	124° 42.5	N13°26.3	265°34.7	N00°56.4	Zuben'ubi	136°54.4	-16°09.2
13	289°03.6	63°22.0	49.0	127°22.7	03.5	139° 45.1	26.4	280°37.1	56.4	Alphecca	126°02.7	26°37.3
14	304°06.0	78°22.1	49.5	142°24.7	03.4	154° 47.7	26.4	295°39.5	56.4	Antares	112°14.2	-26°29.4
15	319°08.5	93°22.2	• • 50.1	157°26.7	• • 03.3	169° 50.2	• • 26.5	310°41.9	• • 56.5	Atria	107°07.5	-69°04.4
16	334°10.9	108°22.3	50.7	172°28.8	03.2	184°52.8	26.5	325°44.3	56.5	Sabik	102°01.3	-15°45.5
17	349°13.4	123°22.4	51.3	187°30.8	03.1	199°55.3	26.5	340°46.7	56.5	Shaula	96°08.6	-37°07.3
18	4°15.9	138°22.5	S13°51.9	202°32.8	N11°03.0	214°57.9	N13°26.6	355°49.1	N00°56.6	Rasalhague	95°57.4	12°32.4
19	19°18.3	153°22.6	52.5	217°34.8	02.9	230°00.5	26.6	10°51.5	56.6	Eltanin	90°42.0	$51^{\circ}29.1$
20	34°20.8	168°22.8	53.1	232°36.8	02.8	245°03.0	26.7	25°53.9	56.7	Kaus Aust.	83°30.8	-34°22.3
21	49°23.3	183°22.9	• • 53.7	247°38.8	• • 02.8	260°05.6	• • 26.7	40°56.3	• • 56.7	Vega	80°32.6	38°48.5
22	64°25.7	198°23.0	54.3	262°40.8	02.7	275°08.1	26.8	55°58.7	56.7	Nunki	75°46.1	$-26^{\circ}15.8$
23	79°28.2	213°23.1	54.9	277°42.8	02.6	290° 10.7	26.8	71°01.1	56.8	Altair	$61^{\circ}58.7$	8°56.4
Mer.p	bass. 17:43	$\nu 0.1' d0.$	6′ m-4.66	$\nu 2.0' \ d-0$	0.1' m0.01	$\nu 2.6' \ d0$	.0′ m-2.36	$\nu 2.4' d0$	.0′ m0.71	Peacock	53°03.7	-56°39.0
<u> </u>										Deneb	49°25.1	45°22.8
	C	<b></b>	-		-		-	<b></b>	-	Enif	33°37.4	10°00.0
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.2	-46°50.0
0	94°30.7	228°23.2	S13°55.5	292°44.8	N11°02.5	305°13.3	N13°26.9	86°03.5	N00°56.8	Fomalhaut	$15^{\circ}12.9$	-29°28.9
1	109°33.1	243°23.3	56.1	307°46.9	02.4	320° 15.8	26.9	101°05.9	56.8	Scheat	13°43.7	28°14.0
2	124°35.6	258° 23.4	56.7	322°48.9	02.3	335° 18.4	27.0	116°08.3	56.9	Markab	13°28.4	15°21.2
3	139°38.0	273°23.5	· · 57.3	337°50.9 352°52.9	•• 02.2	350°21.0	•• 27.0	131°10.8	· · 56.9	Dec 24 Thu	SHA	Mer.pass
4	154°40.5	288°23.6	57.9		02.1	5°23.5	27.0	146°13.2	56.9		3HA 135°44.7	08:47
5 6	169°43.0 184°45.4	303°23.7 318°23.8	58.5	7°54.9 22°56.9	02.0	20°26.1 35°28.6	27.1	161°15.6 176°18.0	57.0		135 44.7 198°36.9	04:35
7	184 45.4 199°47.9	318 23.8 333°23.8	\$13°59.1 13°59.7	22 50.9 37°59.0	N11°01.9 01.9	50°31.2	N13°27.1 27.2	176 18.0 191°20.4	N00° 57.0 57.1		210°38.3	04.33
8	199°47.9 214°50.4	333° 23.8 348° 23.9	13°59.7 14°00.3	53°01.0	01.9 01.8	65°33.8	27.2 27.2	191°20.4 206°22.8	57.1 57.1	Saturn	351°35.5	18:21
9	214 50.4 229°52.8	348 23.9 3°24.0	00.9	68°03.0	01.8	80°36.3	27.3	206 22.8 221°25.2	57.1	Jatuill	551 55.5	10.21
10	229 52.6 244°55.3	18° 24.1	01.5	83°05.0	01.6	95°38.9	27.3	236°27.6	57.2	Dec 25 Fri	SHA	Mer.pass
10	244 55.3 259°57.8	18° 24.1 33° 24.2	01.5	98°07.1	01.6	95° 38.9 110° 41.5	27.3 27.4	236°27.6 251°30.0	57.2 57.2	Venus	134°48.9	08:47
12	275°00.2	48° 24.3	514°02.7	96 07.1 113°09.1	N11°01.4	110 41.5 125°44.0	N13°27.4	266°32.4	N00° 57.2		198°25.2	04:32
13	275 00.2 290°02.7	48 24.3 63°24.4	03.3	113 09.1 128°11.1	01.3	125 44.0 140°46.6	N13 27.4 27.5	200 32.4 281°34.8	57.3	Jupiter	210°40.4	03:43
14	305°05.2	78° 24.5	03.5	143°13.1	01.3	155°49.2	27.5 27.5	201 34.0 296°37.2	57.3	Saturn	351°34.2	18:17
15	305 05.2 320°07.6	93°24.6	04.5	143 15.1 158°15.2	01.3	170°51.7	27.6	311°39.6	57.4	Dec 26.6 :	CLIA	Man
16	335°10.1	93°24.6	05.1	173° 17.2	01.1	170 51.7 185°54.3	27.6	326°42.0	57.4	Dec 26 Sat	SHA	Mer.pass
17	350°12.5	106 24.0 123°24.7	05.1	173 17.2 188°19.2	01.1	200° 56.9	27.0	341°44.4	57.4 57.4		133°52.5	08:46
18	5°15.0	123 24.7 138° 24.8	514°06.3	203°21.3	N11°00.9	200 56.9 215°59.4	N13° 27.7	356°46.8	57.4 N00°57.5		198°14.2	04:28
19	20°17.5	150° 24.0° 153° 24.9	06.9	203 21.3 218°23.3	00.8	215 59.4 231°02.0	27.7	11°49.2	57.5		210°42.6	03:38
20	20 17.5 35°19.9	168° 25.0	00.9	210 25.3 233°25.3	00.8	246°04.6	27.7	26°51.6	57.5 57.5	Saturn	351°32.9	18:13
20	50°22.4	183° 25.0	08.1	233 25.3 248°27.4	00.8	240 04.0 261°07.1	27.8	20 51.0 41°54.0	57.5	Horizont	al parallax	
22	65°24.9	198°25.1	08.7	263°29.4	00.7	276°09.7	27.9	56°56.4	57.6		Venus:	0.2
23	80°27.3	213°25.2	09.3	278°31.4	00.5	291°12.3	27.9	71°58.8	57.7		Mars:	0.2
Mer.p	bass. 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			

h	Su	n	Moon						
Thu	GHA	Dec	GHA	ν	Dec	d	HP		
0	180°10.5	S23°25.2	1°05.1	0.5'	N27°22.6	-2.7'	61.4'		
1 2	195°10.1 210°09.8	25.1 25.1	15°24.6 29°44.1	0.5' 0.5'	27°19.9 27°17.0	-2.9' -3.1'	61.4' 61.4'		
3	210 09.8 225°09.5	. 25.0	44°03.7	0.6'	27°17.0	-3.1 -3.3'	61.4		
4	240°09.2	25.0	58° 23.2	0.6'	27° 10.5	-3.6'	61.4'		
5	255°08.9	25.0	72°42.9	0.7'	27°07.0	-3.8'	61.4'		
6	270°08.6 285°08.3	\$23°24.9 24.9	87°02.5 101°22.2	0.7' 0.8'	N27°03.2 26°59.2	-4.0' -4.2'	61.4' 61.4'		
7 8	285 08.3 300°08.0	24.9 24.8	101 22.2 115°42.0	0.8	26°55.0	-4.2 -4.4'	61.4		
9	315°07.7	• • 24.8	130°01.8	0.9'	26°50.6	-4.6'	61.4		
10	330°07.4	24.7	144°21.7	0.9'	26°46.0	-4.8'	61.4'		
11 12	345°07.0 0°06.7	24.7 \$23°24.6	158°41.6 173°01.6	1.0' 1.1'	26°41.1 N26°36.1	-5.1' -5.3'	61.4' 61.4'		
13	15°06.4	24.6	187°21.7	1.1'	26°30.8	-5.5'	61.4'		
14	30°06.1	24.5	201°41.8	1.2'	26°25.4	-5.7'	61.4'		
15	45°05.8 60°05.5	• • 24.5	216°02.0	1.3'	26°19.7	-5.9'	61.4'		
16 17	75°05.2	24.4 24.3	230°22.3 244°42.6	1.4' 1.4'	26°13.8 26°07.7	-6.1' -6.3'	61.4' 61.4'		
18	90°04.9	S23°24.3	259°03.1	1.5'	N26°01.4	-6.5	61.4'		
19	105°04.6	24.2	273°23.6	1.6'	25° 54.9	-6.7'	61.4'		
20	120°04.3 135°04.0	24.2	287°44.2 302°04.9	1.7'	25°48.2 25°41.4	-6.9'	61.4'		
21 22	150°03.6	· · 24.1	302 04.9 316°25.7	1.8' 1.9'	25 41.4 25°34.3	-7.1' -7.3'	61.4' 61.3'		
23	165°03.3	24.0	330°46.6	2.0'	25°27.0	-7.5°	61.3		
	SD = 16.3'	d = -0.0'		S	D = 16.7'				
Fri 0	<b>GHA</b> 180°03.0	Dec \$23°23.9	<b>GHA</b> 345° 07.6	u  2.1'	<b>Dec</b> N25°19.5	d -7.7'	<b>HP</b> 61.3'		
1	195°02.7	23.9	359° 28.7	2.1	25°11.9	-7.7 -7.9'	61.3		
2	210°02.4	23.8	13°49.9	2.3'	25°04.0	-8.0'	61.3'		
3	225°02.1	• • 23.8	28°11.2	2.4'	24°56.0	-8.2'	61.3'		
4 5	240°01.8 255°01.5	23.7 23.6	42°32.6 56°54.1	2.5' 2.6'	24°47.7 24°39.3	-8.4' -8.6'	61.3' 61.3'		
6	270°01.2	S23°23.6	71°15.8	2.7'	N24°30.8	-8.8'	61.3'		
7	285°00.9	23.5	85°37.5	2.9'	24°22.0	-8.9'	61.3'		
8	300°00.6	23.4	99°59.4	3.0'	24°13.0	-9.1'	61.2'		
9 10	315°00.2 329°59.9	· · 23.4 23.3	114°21.3 128°43.4	3.1' 3.2'	24°03.9 23°54.6	-9.3' -9.5'	61.2' 61.2'		
11	344°59.6	23.2	143°05.6	3.3'	23°45.2	-9.6'	61.2'		
12	359°59.3	\$23°23.1	157° 28.0	3.4'	N23°35.5	-9.8'	61.2'		
13 14	14°59.0 29°58.7	23.1 23.0	171°50.4 186°13.0	3.6' 3.7'	23°25.8 23°15.8	-10.0' -10.1'	61.2' 61.1'		
15	29 56.7 44°58.4	22.9	200°35.7	3.8'	23° 05.7	-10.1	61.1		
16	59°58.1	22.9	214°58.5	3.9'	22°55.4	-10.4'	61.1'		
17	74°57.8	22.8	229°21.5	4.1'	22°45.0	-10.6'	61.1'		
18 19	89°57.5 104°57.2	\$23°22.7 22.6	243°44.5 258°07.7	4.2' 4.3'	N22°34.4 22°23.6	-10.7' -10.9'	61.1' 61.1'		
20	119°56.9	22.6	272°31.1		22° 12.7				
21	134°56.5	• • 22.5	286°54.5	4.6'	22°01.7	-11.2'	61.0'		
22	149°56.2	22.4	301°18.1 315°41.9	4.7'	21°50.5 21°39.2	-11.3'	61.0'		
23	164°55.9	22.3	315-41.9	4.9'		-11.5'	61.0'		
	SD = 16.3'	d = -0.1'			D = 16.7'				
Sat	GHA	Dec	GHA	ν	Dec	d	HP		
0	179°55.6 194°55.3	\$23°22.2 22.2	330°05.7 344°29.7	5.0' 5.1'	N21°27.7 21°16.1	-11.6'	61.0'		
1 2	194 55.3 209° 55.0	22.2	344 29.7 358° 53.8	5.1	21° 16.1 21° 04.3	-11.7' -11.9'	60.9' 60.9'		
3	224°54.7	• • 22.0	$13^{\circ}18.1$	5.4'	20°52.5	-12.0'	60.9'		
4	239°54.4	21.9	27° 42.5	5.5'	20°40.4	-12.1'	60.9'		
5 6	254°54.1 269°53.8	21.8 \$23°21.7	42°07.0 56°31.7	5.7' 5.8'	20°28.3 N20°16.0	-12.3' -12.4'	60.8' 60.8'		
7	284°53.5	21.7	70°56.4	5.9'	20°03.6	-12.4	60.8		
8	299°53.2	21.6	85°21.4	6.1'	$19^{\circ}51.1$	-12.6'	60.8'		
9	314°52.9	• • 21.5	99°46.4	6.2'	19°38.5	-12.7'	60.7'		
10 11	329°52.5 344°52.2	21.4 21.3	114°11.6 128°36.9	6.3' 6.5'	19°25.8 19°12.9	-12.9' -13.0'	60.7' 60.7'		
12	359°51.9	\$23°21.2	143°02.4	6.6'	N18°59.9	-13.1	60.7		
13	14°51.6	21.1	157°28.0	6.7'	18°46.8	-13.2'	60.6'		
14 15	29°51.3 44°51.0	21.0 •• 20.9	171°53.7 186°19.5	6.9' 7.0'	18°33.6 18°20.3	-13.3' -13.4'	60.6' 60.6'		
15 16	44 51.0 59°50.7	20.9	186° 19.5 200° 45.5	7.0	18° 20.3 18° 06.9	-13.4 -13.5'	60.5		
17	74°50.4	20.7	215°11.6	7.2'	17°53.4	-13.6'	60.5'		
18	89°50.1	\$23°20.6	229°37.9	7.4'	N17°39.8	-13.7'	60.5'		
19 20	104°49.8 119°49.5	20.6 20.5	244°04.3 258°30.8	7.5' 7.6'	17°26.2 17°12.4	-13.8' -13.9'	60.5' 60.4'		
21	119 49.5 134°49.2	20.4	256 50.6 272° 57.4	7.8'	16°58.5	-13.9 -14.0'	60.4		
22	149°48.9	20.3	287°24.2	7.9'	16°44.5	-14.1'	60.4'		
23	164°48.5	20.2	301°51.0	8.0'	16°30.5	-14.1'	60.3'		
	SD = 16.3'	d = -0.1'		S	D = 16.6'				

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	08:27	10:57			13:03	15:33
<b>N</b> 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
<b>N</b> 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
$20^{\circ}$	05:41	06:08	06:32	17:28	17:52	18:19
<b>N</b> 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
<b>S</b> 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
$30^{\circ}$	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	e		Moonset	t
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
NI 70°			16.20			12.01

Lat.		Moonris	е	Moonset				
Lat.	Thu	Fri	Sat	Thu	Fri	Sat		
N 72°								
N 70°			16:29			13:01		
68°			17:11			12:17		
66°		14:49	17:39		12:34	11:48		
64°		15:41	18:01		11:41	11:25		
62°	14:01	16:13	18:17	11:04	11:08	11:07		
60°	14:42	16:37	18:31	10:23	10:44	10:52		
N 58°	15:09	16:56	18:43	09:55	10:24	10:39		
56°	15:31	17:11	18:54	09:33	10:08	10:28		
54°	15:49	17:25	19:03	09:15	09:54	10:18		
52°	16:04	17:36	19:11	09:00	09:41	10:09		
50°	16:17	17:47	19:18	08:46	09:31	10:01		
45°	16:44	18:08	19:33	08:19	09:08	09:44		
<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		
N 10°	18:26	19:33	20:36	06:33	07:37	08:34		
0°	18:47	19:50	20:48	06:12	07:17	08:19		
<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		

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	95°29.8	228°25.3	S14°09.9	293°33.5	N11°00.4	306°14.8	N13°28.0	87°01.2	N00°57.7			
1	110°32.3	243°25.3	10.5	308° 35.5	00.4	321°17.4	28.0	102°03.6	57.7	Alpheratz	357°33.1	29°14.6
2	125°34.7	258°25.4	11.1	323°37.5	00.3	336°20.0	28.1	117°06.0	57.8	Ankaa	353°05.5	-42°09.7
3	140°37.2	273°25.5	. 11.7	338° 39.6	00.2	351°22.6	28.1	132°08.4	• • 57.8	Schedar	349°29.1	56°41.5
4	155°39.7	288°25.6	12.3	353°41.6	00.1	6°25.1	28.2	147° 10.8	57.9	Diphda	348°45.6	-17°50.4
5	170°42.1	303°25.6	12.9	8°43.7	00.0	21°27.7	28.2	162° 13.2	57.9	Achernar	335°18.8	-57°06.2
6	185°44.6	318°25.7	\$14°13.5	23°45.7	N11°00.0	36°30.3	N13°28.3	177° 15.6	N00° 57.9	Hamal	327°49.2	23°35.6
7	200°47.0	333°25.8	14.1	38°47.8	10°59.9	51°32.8	28.3	192°18.0	58.0	Polaris	312°49.0	89°22.9
8	215°49.5	348°25.8	14.7	53°49.8	59.8	66°35.4	28.4	207°20.4	58.0	Acamar	315°10.3	-40°11.9
9	230°52.0	3°25.9	• • 15.3	$68^{\circ}51.8$	• • 59.7	81°38.0	• • 28.4	222°22.8	• • 58.0	Menkar	314°04.2 308°25.5	4°11.8 49°57.6
10	245°54.4	18°26.0	15.9	83°53.9	59.6	96°40.6	28.5	$237^{\circ}25.2$	58.1	Mirfak Aldebaran	308 25.5 290°37.4	16°33.8
11	260°56.9	33°26.0	16.5	98°55.9	59.6	$111^{\circ}43.1$	28.5	252°27.6	58.1	Rigel	290 37.4 281°02.0	-8°10.3
12	275°59.4	48°26.1	<b>S</b> 14°17.1	113°58.0	N10°59.5	126°45.7	N13°28.6	267°30.0	N00°58.2	Capella	280° 19.0	46°01.5
13	291°01.8	63°26.2	17.7	129°00.0	59.4	141°48.3	28.6	282°32.4	58.2	Bellatrix	278° 20.8	6°22.4
14	306°04.3	78°26.2	18.3	144°02.1	59.3	156° 50.9	28.7	297°34.8	58.2	Elnath	277°59.4	28°37.8
15	321°06.8	93°26.3	• • 18.9	159°04.1	• • 59.3	171°53.4	• • 28.7	312° 37.2	• • 58.3	Alnilam	275°35.7	-1°11.1
16	336°09.2	108°26.3	19.5	174°06.2	59.2	186°56.0	28.8	327°39.6	58.3	Betelgeuse	270°50.0	7°24.7
17	351°11.7	123°26.4	20.1	189°08.3	59.1	201°58.6	28.8	342°42.0	58.4	Canopus	263°51.1	-52°42.6
18	6°14.2	138°26.4	S14°20.7	204° 10.3	N10°59.1	217°01.2	N13°28.9	357°44.4	N00°58.4	Sirius	258°24.4	-16°45.2
19	21°16.6 36°19.1	153°26.5 168°26.6	21.3 21.9	219° 12.4 234° 14.4	59.0 58.9	232°03.7 247°06.3	28.9	12°46.8 27°49.2	58.4	Adhara	255°04.2	-29°00.5
20				234 14.4 249°16.5		262°08.9	29.0	42°51.6	58.5	Procyon	244°48.8	5°09.3
21 22	51°21.5 66°24.0	183°26.6 198°26.7	· · 22.5 23.1	249° 16.5 264° 18.5	• • 58.8 58.8	262°08.9 277°11.5	· · 29.0 29.1	42°51.6 57°54.0	· · 58.5 58.6	Pollux	243°15.0	27°57.5
23	81°26.5	213°26.7	23.1	204 16.5 279°20.6	58.7	277 11.5 292°14.0	29.1	72°56.4	58.6	Avior	234°13.5	-59°35.6
							-			Suhail	222°44.7	-43°32.4
Mer.p	ass. 17:35	$\nu$ 0.1′ d0.	6′ m-4.64	$\nu$ 2.0′ <i>d</i> -0	.1' m-0.03	$\nu 2.6' \ d0$	.0′ m-2.38	$\nu$ 2.4′ d0	.0′ m0.71	Miaplacidus	221°37.2	-69°49.5
										Alphard	217°45.9	-8°46.6
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°32.5	11°50.0
0	96°28.9	228°26.8	S14°24.3	294°22.7	N10°58.6	307°16.6	N13°29.2	87°58.8	N00°58.6	Dubhe	193°38.8	61°36.0
1	111°31.4	243°26.8	24.9	309° 24.7	58.6	322° 19.2	29.2	103°01.2	58.7	Denebola	182°23.2	14°25.1
2	126°33.9	258°26.9	25.5	324° 26.8	58.5	337°21.8	29.3	118°03.6	58.7	Gienah	175°41.9	-17°41.5
3	141°36.3	273°26.9	26.1	339°28.9	• • 58.4	352°24.3	29.3	133°06.0	• • 58.8	Acrux	172°58.2 171°49.8	-63°14.7 -57°15.6
4	156°38.8	288°26.9	26.7	354°30.9	58.3	7°26.9	29.4	148°08.4	58.8	Gacrux	171 49.8 166°11.6	55°48.4
5	171°41.3	303°27.0	27.3	9°33.0	58.3	22°29.5	29.4	163°10.8	58.8	Alioth Spica	158° 20.7	-11°18.1
6	186°43.7	318°27.0	S14°27.9	24°35.0	N10°58.2	37°32.1	N13°29.5	178° 13.2	N00°58.9	Alkaid	150° 20.7 152° 50.9	49°10.4
7	201°46.2	333°27.1	28.5	39°37.1	58.1	52°34.7	29.5	$193^{\circ}15.6$	58.9	Hadar	148° 33.9	-60°30.0
8	$216^{\circ}48.6$	348°27.1	29.1	54°39.2	58.1	67°37.2	29.6	$208^{\circ}18.0$	59.0	Menkent	147°55.9	-36°30.0
9	231°51.1	3°27.2	• • 29.7	69°41.3	• • 58.0	82°39.8	• • 29.6	223°20.4	• • 59.0	Arcturus	145°46.6	19°02.3
10	246°53.6	18°27.2	30.3	84°43.3	57.9	97°42.4	29.7	238° 22.8	59.0	Rigil Kent.	139°38.4	-60°56.6
11	261°56.0	33°27.2	30.9	99° 45.4	57.9	112°45.0	29.7	253°25.2	59.1	Kochab	137°20.6	74°02.3
12	276°58.5	48°27.3	\$14°31.5	114° 47.5	N10°57.8	127° 47.6	N13°29.8	268°27.6	N00°59.1	Zuben'ubi	136°54.4	-16°09.2
13	292°01.0	63°27.3	32.1	129°49.5	57.7	142°50.1	29.8	283°30.0	59.2	Alphecca	126°02.6	26°37.3
14	307°03.4	78°27.3	32.7	144°51.6	57.7	157°52.7	29.9	298°32.4	59.2	Antares	112°14.2	-26°29.4
15	322°05.9	93°27.4	• • 33.3	159°53.7	• • 57.6	172°55.3	• • 29.9	313°34.8	• • 59.2	Atria	107°07.4	-69°04.4
16	337°08.4	108°27.4	33.9	174°55.8	57.5	187°57.9 203°00.5	30.0	328° 37.2	59.3	Sabik	$102^{\circ}01.2$	-15°45.5
17 18	352°10.8 7°13.3	123°27.4 138°27.5	34.5 \$14°35.1	189° 57.9 204° 59.9	57.5 N10°57.4	203 00.5 218°03.1	30.1 N13°30.1	343°39.6 358°41.9	59.3 N00°59.4	Shaula	96°08.6	-37°07.3
19	7 13.3 22°15.8	150° 27.5 153° 27.5	35.7	204 59.9 220°02.0	57.4 57.4	233°05.6	30.2	13°44.3	59.4	Rasalhague	95°57.4	12°32.4
20	37°18.2	168° 27.5	36.3	235°04.1	57.4	248°08.2	30.2	28°46.7	59.4	Eltanin	90°42.0	51°29.0
21	52°20.7	183°27.6	36.9	250°06.2	• • 57.2	263°10.8	30.2	43°49.1	• • 59.5	Kaus Aust.	83°30.8	-34°22.3
22	67°23.1	198°27.6	37.5	265°08.3	57.2	278° 13.4	30.3	58°51.5	59.5	Vega	80°32.6	38°48.5
23	82°25.6	213°27.6	38.1	280° 10.3	57.1	293°16.0	30.4	73°53.9	59.6	Nunki	75°46.1	-26°15.8
										Altair	61°58.7	8°56.4
Mer.p	bass. 17:31	$\nu$ 0.0′ d0.	6′ m-4.63	$\nu^{2.1'} d^{-0}$	.1′ m-0.05	$\nu$ 2.6′ d0	.1′ m-2.38	$\nu^{2.4'} d0$	.0′ m0.72	Peacock	53°03.7	-56°39.0
									<del></del>	Deneb Enif	49°25.1 33°37.4	45°22.8 10°00.0
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.2	-46°50.0
0	97°28.1	228°27.6	S14°38.7	$295^{\circ}12.4$	$N10^{\circ}57.0$	$308^{\circ}18.6$	$N13^{\circ}30.4$	88°56.3	N00°59.6	Fomalhaut	15° 12.9	-40° 30.0° -29° 28.9
1	112°30.5	243°27.7	39.3	310° 14.5	57.0	323°21.1	30.5	103°58.7	59.7	Scheat	13°43.7	28°14.0
2	127°33.0	258°27.7	39.9	325° 16.6	56.9	338°23.7	30.5	119°01.1	59.7	Markab	13°28.4	15°21.2
3	142°35.5	273°27.7	• • 40.5	340°18.7	• • 56.9	353°26.3	• • 30.6	134°03.5	• • 59.7			
4	157°37.9	288°27.7	41.1	355°20.8	56.8	8°28.9	30.6	149°05.9	59.8	Dec 27 Sun	SHA	Mer.pass
5	172°40.4	303°27.7	41.7	10°22.9	56.8	23°31.5	30.7	164°08.3	59.8	1	132°55.5	08:46
6	187°42.9	318°27.8	\$14°42.3	25°25.0	N10°56.7	38°34.1	N13°30.7	179°10.7	N00°59.9	1	198°03.7	04:25
7	202°45.3	333°27.8	43.0	40°27.1	56.6	53°36.7	30.8	194°13.1	00°59.9	Jupiter Saturn	210°45.0 351°31.4	03:34
8	217°47.8	348°27.8 3°27.8	43.6	55° 29.2 70° 31.2	56.6	68°39.2	30.9	209°15.5	01°00.0	Saturn	JUL 31.4	18:09
9	232°50.3 247°52.7	3°27.8 18°27.8	•• 44.2 44.8	70°31.2 85°33.3	· · 56.5 56.5	83°41.8 98°44.4	· · 30.9	224°17.8 239°20.2	· · 00.0 00.0	Dec 28 Mon	SHA	Mer.pass
10 11	247 52.7 262°55.2	18°27.8 33°27.8	44.8 45.4	85°33.3 100°35.4	56.5 56.4	98°44.4 113°47.0	31.0 31.0	239° 20.2 254° 22.6	00.0		131°57.8	08:46
12	202 55.2 277°57.6	48°27.8	\$14°46.0	100 35.4 115°37.5	N10°56.4	113 47.0 128°49.6	N13°31.1	269°25.0	N01°00.1		197°53.7	04:22
13	293°00.1	63°27.9	46.6	130°39.6	56.3	143°52.2	31.1	284°27.4	00.2		210°47.7	03:30
14	308°02.6	78°27.9	47.2	145°41.7	56.2	158° 54.8	31.2	299°29.8	00.2	Saturn	351°29.9	18:05
15	323°05.0	93°27.9	• • 47.8	160°43.8	56.2	173°57.4	31.2	314°32.2	00.2	Dec 29 Tue	SHA	Mer.pass
16	338°07.5	108°27.9	48.4	175° 45.9	56.1	189°00.0	31.3	329°34.6	00.3		130°59.6	08:46
17	353°10.0	123°27.9	49.0	190°48.0	56.1	204°02.5	31.3	344°37.0	00.3		197°44.4	04:19
18	8°12.4	138°27.9	S14°49.6	205°50.1	N10°56.0	219°05.1	N13°31.4	359°39.4	N01°00.4	Jupiter		03:26
19	23°14.9	153°27.9	50.2	$220^{\circ}52.3$	56.0	234°07.7	31.5	$14^{\circ}41.8$	00.4	Saturn	351°28.2	18:01
20	38°17.4	$168^{\circ}27.9$	50.8	$235^{\circ}54.4$	55.9	$249^{\circ}10.3$	31.5	29°44.2	00.5			
21	53°19.8	183°27.9	• • 51.4	250° 56.5	• • 55.9	264°12.9	• • 31.6	44°46.5	• • 00.5	Horizont	al parallax	2.2
22	68°22.3	198°27.9	52.0	265°58.6	55.8	279°15.5	31.6	59°48.9	00.5		Venus:	0.2
23	83°24.7	213°27.9	52.6	281°00.7	55.8	294°18.1	31.7	74°51.3	00.6		Mars:	0.2
Mer.p	ass. 17:27	$\nu 0.0' d0.$	6′ m-4.61	$\nu 2.1' \ d-0$	.1′ m-0.07	$\nu 2.6' d0$	.1′ m-2.39	$\nu 2.4' d0$	.0′ m0.72			
· F												

h	Su	n	Moon						
Sun	GHA	Dec	GHA	ν	Dec	d	HP		
0	179°48.2	\$23°20.1	316°18.1	8.1'	N16°16.3	-14.2'	60.3'		
1 2	194°47.9 209°47.6	20.0 19.9	330°45.2 345°12.5	8.3' 8.4'	16°02.1 15°47.8	-14.3' -14.4'	60.3' 60.2'		
3	209 47.0 224°47.3	. 19.8	345 12.5 359°39.8	8.5'	15 47.6 15°33.4	-14.4 -14.5'	60.2		
4	239°47.0	19.7	14°07.4	8.6'	15°19.0	-14.5'	60.2'		
5	254°46.7	19.6	28°35.0	8.8'	15°04.4	-14.6'	60.1'		
6	269°46.4 284°46.1	\$23°19.4 19.3	43°02.7 57°30.6	8.9' 9.0'	N14°49.8 14°35.2	-14.7' -14.7'	60.1' 60.1'		
7 8	284 46.1 299°45.8	19.3	57 30.6 71°58.6	9.0 9.1'	14 35.2 14°20.4	-14.7 -14.8'	60.0'		
9	314°45.5	19.1	86°26.7	9.2'	14°05.6	-14.9'	60.0'		
10	329°45.2	19.0	100°54.9	9.3'	13°50.8	-14.9'	60.0'		
11	344°44.9	18.9	115°23.3	9.5'	13°35.9	-15.0'	59.9'		
12 13	359°44.6 14°44.3	\$23°18.8 18.7	129°51.7 144°20.3	9.6' 9.7'	N13°20.9 13°05.8	-15.0' -15.1'	59.9' 59.9'		
14	29°43.9	18.6	158°49.0	9.8'	13°50.7	-15.1'	59.8'		
15	44°43.6	• • 18.5	173°17.7	9.9'	12°35.6	-15.2'	59.8'		
16	59°43.3	18.4	187°46.6	10.0'	12°20.4	-15.2'	59.8'		
17 18	74°43.0 89°42.7	18.2 \$23°18.1	202°15.7 216°44.8	10.1' 10.2'	12°05.2 N11°49.9	-15.3' -15.3'	59.7' 59.7'		
19	104°42.4	18.0	210 44.0 231°14.0	10.2	11°34.5	-15.3 -15.4'	59.6'		
20	119°42.1	17.9	245°43.3	10.4	11°19.1	-15.4	59.6'		
21	134°41.8	• • 17.8	260°12.7	10.5'	11°03.7	-15.5'	59.6'		
22	149°41.5	17.7	274°42.3	10.6'	10°48.3	-15.5'	59.5'		
23	164°41.2	17.5	289°11.9	10.7'	10°32.8	-15.5'	59.5'		
	SD = 16.3'	d = -0.1'		SI	O = 16.4'				
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP		
0	179°40.9	S23°17.4	303°41.6	10.8'	N10°17.2	-15.6'	59.5'		
1	194°40.6	17.3	318°11.4	10.9'	10°01.7	-15.6'	59.4'		
2	209°40.3 224°40.0	17.2 •• 17.1	332°41.3 347°11.4	11.0' 11.1'	09°46.1 09°30.4	-15.6' -15.7'	59.4' 59.3'		
4	239°39.7	16.9	1°41.5	11.1	09°30.4	-15.7'	59.3'		
5	254°39.4	16.8	16°11.7	11.3'	08°59.1	-15.7'	59.3'		
6	269°39.1	S23°16.7	30°42.0	11.4'	N08°43.4	-15.7'	59.2'		
7	284°38.8	16.6	45°12.3	11.5'	08°27.6	-15.8'	59.2'		
8 9	299°38.4 314°38.1	16.4 •• 16.3	59°42.8 74°13.4	11.6' 11.6'	08°11.9 07°56.1	-15.8' -15.8'	59.2' 59.1'		
10	329°37.8	16.2	88°44.0	11.7'	07°40.3	-15.8'	59.1'		
11	344°37.5	16.1	103°14.7	11.8'	07°24.5	-15.8'	59.0'		
12	359°37.2	S23°15.9	117°45.5	11.9'	N07°08.6	-15.8'	59.0'		
13 14	14°36.9 29°36.6	15.8 15.7	132°16.4 146°47.4	12.0' 12.0'	06°52.8 06°36.9	-15.9' -15.9'	59.0' 58.9'		
15	44°36.3	. 15.5	161°18.4	12.1'	06°21.1	-15.9'	58.9'		
16	59°36.0	15.4	$175^{\circ}49.5$	12.2'	06°05.2	-15.9'	58.8'		
17	74°35.7	15.3	190°20.7	12.3'	05°49.3	-15.9'	58.8'		
18 19	89°35.4 104°35.1	\$23°15.1 15.0	204°52.0 219°23.3	12.3' 12.4'	N05°33.4 05°17.5	-15.9' -15.9'	58.8' 58.7'		
20	119°34.8	14.9	219 23.3 233°54.7		05°01.6				
21	134°34.5	• • 14.7	248°26.2	12.5'	04°45.7	-15.9'	58.6'		
22	149°34.2	14.6	262°57.7	12.6'	04°29.8	-15.9'	58.6'		
23	164°33.9	14.4	277°29.3	12.7'	04°13.9	-15.9'	58.6'		
	SD = 16.3'	d = -0.1'		SI	O = 16.2'				
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP		
0 1	179°33.6 194°33.3	\$23°14.3 14.2	292°01.0 306°32.7	12.7' 12.8'	N03°58.0 03°42.1	-15.9' -15.9'	58.5'		
2	194 33.3 209°33.0	14.2 14.0	306°32.7 321°04.5	12.8 12.9'	03°42.1 03°26.2	-15.9' -15.9'	58.5' 58.4'		
3	224°32.7	13.9	335°36.4	12.9'	03°10.3	-15.9'	58.4		
4	239°32.4	13.7	$350^{\circ}08.3$	13.0'	02°54.4	-15.9'	58.4'		
5	254°32.1 269°31.8	13.6 \$23°13.5	4°40.3 19°12.3	13.0'	02°38.5 N02°22.7	-15.9' -15.9'	58.3'		
6 7	269°31.8 284°31.4	13.3	19°12.3 33°44.4	13.1' 13.1'	02°22.7	-15.9° -15.8'	58.3' 58.3'		
8	299°31.1	13.2	48°16.5	13.2'	01°51.0	-15.8'	58.2'		
9	314°30.8	•• 13.0	62°48.7	13.2'	01°35.2	-15.8'	58.2'		
10	329°30.5	12.9	77°20.9	13.3'	01°19.3	-15.8'	58.1'		
11 12	344°30.2 359°29.9	12.7 \$23°12.6	91°53.2 106°25.6	13.3' 13.4'	01°03.6 N00°47.8	-15.8' -15.8'	58.1' 58.1'		
13	14°29.6	12.4	120°57.9	13.4'	00°32.0	-15.7	58.0'		
14	29°29.3	12.3	135°30.4	13.5'	00°16.3	-15.7'	58.0'		
15	44°29.0	• • 12.1	150°02.8	13.5'	N00°00.5	-15.7'	57.9'		
16 17	59°28.7 74°28.4	12.0 11.8	164°35.3 179°07.9	13.5' 13.6'	\$00°15.2 00°30.8	15.7' 15.7'	57.9' 57.9'		
18	74 28.4 89°28.1	523°11.7	179 07.9 193°40.5	13.6'	500°46.5	15.6'	57.9 57.8'		
19	104°27.8	11.5	208°13.1	13.7'	01°02.1	15.6'	57.8'		
20	119°27.5	11.4	222°45.7	13.7'	01°17.7	15.6'	57.7'		
21 22	134°27.2 149°26.9	· · 11.2 11.1	237°18.4 251°51.2	13.7' 13.8'	01°33.3 01°48.8	15.5' 15.5'	57.7' 57.7'		
22	149°26.9 164°26.6	11.1 10.9	251°51.2 266°23.9	13.8'	01°48.8 02°04.4	15.5'	57.7° 57.6'		
	SD = 16.3'	d = -0.1'			D = 16.0'	_0.0			
					20.0				

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	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°	06:38	07:20	07:58	16:05	16:43	17:25
45°	06:27	07:04	07:38	16:25	16:59	17:36
<b>N</b> 40°	06:16	06:50	07:21	16:42	17:13	17:47
35°	06:07	06:39	07:07	16:56	17:24	17:56
30°	05:58	06:28	06:55	17:08	17:35	18:05
20°	05:42	06:10	06:34	17:30	17:54	18:21
N 10°	05:26	05:52	06:15	17:48	18:11	18:37
0°	05:09	05:35	05:58	18:05	18:28	18:54
S 10°	04:50	05:17	05:40	18:23	18:46	19:13
20°	04:28	04:57	05:21	18:42	19:06	19:35
30°	03:59	04:32	05:00	19:03	19:31	20:04
35°	03:40	04:17	04:47	19:16	19:46	20:23
40°	03:17	03:59	04:32	19:31	20:04	20:46
45°	02:47	03:36	04:14	19:49	20:26	21:16
<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	ŧ
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
N 40°	21:02	22:14	23:23	10:03	10:31	10:55
35°	21:09	22:17	23:22	09:55	10:27	10:55
30°	21:15	22:19	23:21	09:48	10:23	10:54
20°	21:24	22:23	23:19	09:36	10:16	10:53
N 10°	21:33	22:26	23:17	09:24	10:10	10:52
0°	21:41	22:30	23:15	09:14	10:05	10:52
S 10°	21:49	22:33	23:14	09:04	09:59	10:51
20°	21:58	22:36	23:12	08:52	09:53	10:50
30°	22:07	22:40	23:10	08:39	09:46	10:49
35°	22:13	22:42	23:09	08:32	09:42	10:48
40°	22:19	22:45	23:08	08:23	09:37	10:48
45°	22:26	22:48	23:07	08:13	09:32	10:47
<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

## 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°27.2	228°27.9	\$14°53.2	296°02.8	N10°55.7	309°20.7	N13°31.7	89°53.7	N01°00.6			
1	113°29.7	243°27.9	53.8	311°04.9	55.7	324°23.3	31.8	104°56.1	00.7	Alpheratz	357°33.1	29°14.6
2	128°32.1	258°27.9	54.4	326°07.0	55.6	339°25.9	31.9	119°58.5	00.7	Ankaa	353°05.6	-42°09.7
3	143°34.6	273°27.9	• • 55.0	341°09.1	• • 55.6	354°28.5	• • 31.9	135°00.9	00.8	Schedar	349°29.1	56°41.5
4	$158^{\circ}37.1$	288°27.9	55.6	$356^{\circ}11.2$	55.5	9°31.1	32.0	150°03.3	8.00	Diphda Achernar	348°45.6 335°18.8	-17°50.4 -57°06.2
5	173°39.5	303°27.9	56.2	11° 13.4	55.5	24°33.7	32.0	165°05.7	00.9	Hamal	327°49.2	23°35.6
6	188°42.0	318°27.9	<b>S</b> 14°56.8	$26^{\circ}15.5$	N10°55.4	39°36.2	N13°32.1	180°08.0	N01°00.9	Polaris	312°50.1	89°22.9
7	203°44.5	333°27.9	57.4	41° 17.6	55.4	54° 38.8	32.1	195°10.4	00.9	Acamar	315°10.3	-40°11.9
8	218°46.9	348°27.9	58.0	56° 19.7	55.3	69°41.4	32.2	210°12.8	01.0	Menkar	314°04.2	4°11.8
9	233°49.4	3°27.9	• • 58.6	71°21.8	• • 55.3	84°44.0	• • 32.2	225°15.2	• • 01.0	Mirfak	308°25.5	49°57.6
10 11	248°51.9 263°54.3	18°27.9 33°27.8	59.2 14°59.8	86°24.0 101°26.1	55.2 55.2	99° 46.6 114° 49.2	32.3 32.4	240°17.6 255°20.0	01.1 01.1	Aldebaran	290°37.4	16°33.8
12	203 54.3 278°56.8	48°27.8	\$15°00.4	101 20.1 116°28.2	N10°55.2	114 49.2 129°51.8	N13°32.4	270°22.4	N01°01.2	Rigel	281°02.0	-8°10.3
13	293°59.2	63°27.8	01.0	131°30.3	55.1	144°54.4	32.5	285°24.8	01.2	Capella	280°19.0	46°01.5
14	309°01.7	78°27.8	01.6	146°32.4	55.1	159° 57.0	32.5	300°27.1	01.2	Bellatrix	278°20.8	6°22.4
15	324°04.2	93°27.8	02.2	161°34.6	• • 55.0	174° 59.6	• • 32.6	315°29.5	• • 01.3	Elnath	277°59.4	28°37.8
16	339°06.6	108°27.8	02.8	176°36.7	55.0	$190^{\circ}02.2$	32.6	330°31.9	01.3	Alnilam	275°35.7	-1°11.1 7°24.7
17	$354^{\circ}09.1$	123°27.8	03.4	191°38.8	54.9	205°04.8	32.7	345°34.3	01.4	Betelgeuse Canopus	270°50.0 263°51.1	-52°42.6
18	$9^{\circ}11.6$	138°27.7	S15°04.0	206°41.0	N10°54.9	220°07.4	N13°32.8	0°36.7	N01°01.4	Sirius	258° 24.4	-16°45.2
19	24° 14.0	153°27.7	04.6	221°43.1	54.9	235° 10.0	32.8	15°39.1	01.5	Adhara	255°04.2	-29°00.5
20	39° 16.5	168°27.7	05.2	236° 45.2	54.8	250° 12.6	32.9	30°41.5	01.5	Procyon	244°48.8	5°09.3
21	54° 19.0	183°27.7	• • 05.8	251° 47.4	• • 54.8	265° 15.2	• • 32.9	45°43.9	• • 01.6	Pollux	243°14.9	27°57.5
22	69°21.4	198°27.7	06.4	266°49.5	54.7	280°17.8	33.0	60°46.2	01.6	Avior	$234^{\circ}13.5$	-59°35.6
23	84°23.9	213°27.6	07.0	281°51.6	54.7	295°20.4	33.1	75°48.6	01.7	Suhail	222°44.7	-43°32.4
Mer.p	ass. 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 $^{\prime}$ d0	.0′ m0.72	Miaplacidus	221°37.1	-69°49.5
										Alphard	217°45.9	-8°46.6
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°32.5	11°50.0
0	99°26.4	228°27.6	S15°07.6	296°53.8	N10°54.6	$310^{\circ}23.0$	N13°33.1	90°51.0	N01°01.7	Dubhe Denebola	193°38.8 182°23.2	61°36.0 14°25.1
1	$114^{\circ}28.8$	243°27.6	08.2	311°55.9	54.6	$325^{\circ}25.6$	33.2	105°53.4	01.7	Gienah	175°41.9	-17°41.5
2	129°31.3	258°27.6	8.80	326°58.0	54.6	340°28.2	33.2	120°55.8	01.8	Acrux	172°58.2	-63°14.7
3	144°33.7	273°27.5	• • 09.4	342°00.2	• • 54.5	355°30.8	• • 33.3	135°58.2	• • 01.8	Gacrux	171°49.8	-57°15.6
4	159°36.2	288°27.5	10.0	357°02.3	54.5	10°33.4	33.3	151°00.6	01.9	Alioth	$166^{\circ}11.6$	55°48.4
5 6	174°38.7 189°41.1	303°27.5 318°27.4	10.6 \$15°11.2	12°04.4 27°06.6	54.5 N10°54.4	25°36.0 40°38.6	33.4 N13°33.5	166°02.9 181°05.3	01.9 N01°02.0	Spica	158°20.6	-11°18.1
7	204°43.6	333°27.4	11.8	42°08.7	54.4	55°41.2	33.5	196°07.7	02.0	Alkaid	152°50.9	49°10.4
8	219°46.1	348°27.4	12.4	57° 10.9	54.3	70°43.8	33.6	211°10.1	02.1	Hadar	148°33.9	-60°30.0
9	234°48.5	3°27.3	• • 13.0	72°13.0	• • 54.3	85°46.4	33.6	226°12.5	02.1	Menkent	147°55.8	-36°30.0
10	249°51.0	18°27.3	13.6	$87^{\circ}15.2$	54.3	100°49.0	33.7	241°14.9	02.1	Arcturus Rigil Kent.	145°46.6 139°38.4	19°02.3 -60°56.6
11	264°53.5	33°27.3	14.2	102° 17.3	54.2	115°51.6	33.8	256°17.2	02.2	Kochab	137° 20.6	74°02.3
12	279°55.9	48°27.2	S15°14.8	117° 19.5	N10°54.2	130°54.2	N13°33.8	271°19.6	N01°02.2	Zuben'ubi	136°54.4	-16°09.2
13	294°58.4	63°27.2	15.4	132°21.6	54.2	145°56.8	33.9	286°22.0	02.3	Alphecca	126°02.6	26°37.3
14	310°00.8	78°27.2	16.0	147°23.8	54.1	160°59.4	33.9	301°24.4	02.3	Antares	$112^{\circ}14.1$	-26°29.4
15 16	325°03.3 340°05.8	93°27.1 108°27.1	· · 16.6 17.2	162°25.9 177°28.1	· · 54.1 54.1	176°02.0 191°04.6	· · 34.0 34.1	316°26.8 331°29.2	· · 02.4 02.4	Atria	107°07.4	-69°04.4
17	355°08.2	123°27.0	17.8	192°30.2	54.0	206° 07.2	34.1	346°31.5	02.5	Sabik	102°01.2	-15°45.5
18	10° 10.7	138°27.0	S15°18.4	207°32.4	N10°54.0	221°09.8	N13°34.2	1°33.9	N01°02.5	Shaula	96°08.6 95°57.4	-37°07.3 12°32.4
19	$25^{\circ}13.2$	153°27.0	19.0	222°34.5	54.0	$236^{\circ}12.5$	34.2	16°36.3	02.6	Rasalhague Eltanin	95° 57.4 90° 42.0	51°29.0
20	$40^{\circ}15.6$	168°26.9	19.6	237°36.7	53.9	251°15.1	34.3	31°38.7	02.6	Kaus Aust.	83°30.8	-34°22.3
21	$55^{\circ}18.1$	183°26.9	• • 20.2	252°38.8	• • 53.9	$266^{\circ}17.7$	• • 34.4	46°41.1	• • 02.7	Vega	80°32.6	38°48.5
22	70°20.6	198°26.8	20.8	267°41.0	53.9	281°20.3	34.4	61°43.4	02.7	Nunki	75°46.1	-26°15.8
23	85°23.0	213°26.8	21.4	282°43.2	53.9	296°22.9	34.5	76°45.8	02.8	Altair	61°58.7	8°56.4
Mer.p	ass. 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	53°03.7	-56°39.0
										Deneb	49°25.1	45°22.7
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°37.4	10°00.0
0	100°25.5	228°26.7	S15°22.0	297°45.3	N10°53.8	311°25.5	N13°34.5	91°48.2	N01°02.8	Al Na'ir	27°31.2	-46°50.0
1	115°28.0	243°26.7	22.6	312° 47.5	53.8	326°28.1	34.6	106°50.6	02.8	Fomalhaut Scheat	15° 12.9 13° 43.8	-29°28.9 28°14.0
2	130°30.4	258°26.6	23.2	327°49.7	53.8	341°30.7	34.7	121°53.0	02.9	Markab	13 43.8 13°28.4	28 14.0 15°21.2
3	$145^{\circ}32.9$	273°26.6	• • 23.8	$342^{\circ}51.8$	• • 53.7	$356^{\circ}33.3$	• • 34.7	136°55.4	• • 02.9		15 20.1	
4	$160^{\circ}35.3$	288°26.5	24.4	357° 54.0	53.7	11°35.9	34.8	151°57.7	03.0	Dec 30 Wed	SHA	Mer.pass
5	175°37.8	303°26.5	25.0	12°56.2	53.7	26°38.5	34.9	167°00.1	03.0		130°00.7	08:46
6	190°40.3	318°26.4	S15°25.6	27°58.3	N10°53.7	41°41.1	N13°34.9		N01°03.1		197°35.6	04:15
7	205° 42.7	333°26.4	26.2	43°00.5	53.6	56°43.7	35.0	197°04.9	03.1	Jupiter Saturn	210°53.5 351°26.5	03:22
8 9	220° 45.2 235° 47.7	348°26.3 3°26.3	26.8 • • 27.4	58° 02.7 73° 04.8	53.6 •• 53.6	71°46.4 86°49.0	35.0 · · 35.1	212°07.3 227°09.6	03.2 · · 03.2	Saturn	JUL 20.5	17:58
10	250°50.1	3 20.3 18°26.2	28.0	73 04.8 88°07.0	53.6	101°51.6	35.2	242°12.0	03.2	Dec 31 Thu	SHA	Mer.pass
11	265°52.6	33°26.1	28.6	103°09.2	53.5	116° 54.2	35.2	257°14.4	03.3		129°01.3	08:46
12	280°55.1	48°26.1	S15°29.2	118°11.3	N10°53.5	131°56.8	N13°35.3	272°16.8	N01°03.4		197°27.4	04:12
13	295° 57.5	$63^{\circ}26.0$	29.8	$133^{\circ}13.5$	53.5	$146^{\circ}59.4$	35.4	$287^{\circ}19.2$	03.4	Jupiter Saturn	210°56.6 351°24.7	03:18 17:54
14	311°00.0	78°26.0	30.4	148° 15.7	53.5	162°02.0	35.4	302°21.5	03.5			11.34
15	326°02.5	93°25.9	• • 31.0	163°17.9	• • 53.5	177°04.6	35.5	317°23.9	• • 03.5	Jan 01 Fri	SHA	Mer.pass
16	341°04.9	108°25.8	31.6	178°20.1	53.4	192°07.2	35.5	332°26.3	03.6		128°01.2	08:46
17 18	356°07.4 11°09.8	123°25.8 138°25.7	32.2 \$15°32.8	193°22.2 208°24.4	53.4 N10°53.4	207°09.9 222°12.5	35.6 N13°35.7	347°28.7 2°31.1	03.6 N01°03.6		197°19.8	04:08
19	26°12.3	150°25.7 153°25.6	33.4	206 24.4 223°26.6	53.4	222 12.5 237° 15.1	35.7	17°33.4	03.7		211°00.0 351°22.7	03:14 17:50
20	41°14.8	168°25.6	34.0	238°28.8	53.3	252° 17.7	35.8	32°35.8	03.7			11.30
21	56° 17.2	183°25.5	• • 34.6	253°31.0	• • 53.3	267°20.3	• • 35.9	47°38.2	• • 03.8	Horizont	al parallax	
22	71° 19.7	198°25.4	35.2	268°33.2	53.3	282°22.9	35.9	62°40.6	03.8		Venus:	0.2
23	86°22.2	213°25.4	35.8	283°35.3	53.3	297°25.5	36.0	77°42.9	03.9		Mars:	0.2
Mer.p	ass. 17:15	$\nu$ -0.0′ d0	.6′ m-4.58	$\nu$ 2.2′ d-0	.0′ m-0.14	$\nu 2.6' \ d0.$	1′ m-2.41	$\nu$ 2.4′ d0	.0′ m0.73			

h	Su	n			Moon			
Wed	GHA	Dec	GHA	ν	Dec	d	HP	
0	179° 26.3	\$23°10.7	280°56.7	13.8'	S02°19.9	15.5'	57.6'	
1	194° 26.0	10.6	295°29.5	13.8'	02°35.3	15.4	57.6'	
2	209° 25.7	10.0	310°02.4	13.9	02°50.7	15.4	57.5'	
3	209 25.7 224°25.4	. 10.4	310 02.4 324°35.2	13.9	02 50.7 03°06.1	15.4'	57.5'	
4	239° 25.1	10.3	339°08.1	13.9'	03°21.5	15.4	57.3'	
5	254°24.8	09.9	353°41.1	13.9	03°36.8	15.3'	57.4'	
6	269° 24.5	S23°09.8	8°14.0	14.0'	503°52.1	15.2'	57.4	
7	284°24.2	09.6	22°47.0	14.0'	04°07.3	15.2'	57.4	
8	299° 23.9	09.0	37°19.9	14.0'	04°07.3	15.2'	57.3'	
9	314°23.6	09.3	51°53.0	14.0'	04° 22.0	15.1'	57.3	
10	329° 23.3	09.3	66°26.0	14.0'	04°52.9	15.1	57.3'	
11	344°23.0	08.9	80°59.0	14.1'	04° 32.9 05° 07.9	15.0'	57.2'	
12	359° 22.7	\$23°08.8	95°32.1	14.1	505°23.0	15.0'	57.1	
13	14° 22.4	08.6	110°05.1	14.1	05°38.0	15.0'	57.1'	
14	29°22.1	08.4	124°38.2	14.1	05°53.0	14.9'	57.1'	
15	44°21.8	08.3	139°11.3	14.1	05° 53.0	14.9	57.1°	
16	59°21.5	08.1	159 11.5 153°44.4	14.1	06°22.8	14.8	57.0'	
17	74°21.2	07.9	168° 17.5	14.1	06°37.6	14.8	57.0'	
18	89° 20.9	523°07.7	100 17.5 182°50.6	14.1	506°52.4	14.7	56.9'	
18 19	89°20.9 104°20.6	523°07.7 07.6	182°50.6 197°23.7	14.1' 14.1'	07°07.1	14.7' 14.7'	56.9'	
20	104°20.6 119°20.3	07.6 07.4	211°56.9	14.1' 14.1'	07°07.1	14.7 14.6'	56.9'	
20	119°20.3 134°20.0	• • 07.2	211°56.9 226°30.0	14.1' 14.1'	07°21.8 07°36.4	14.6'	56.8	
22	134 20.0 149°19.7	07.2	241°03.1	14.1'	07 30.4 07°51.0	14.5	56.8	
23	149 19.7 164°19.4	06.9	241 03.1 255°36.3	14.1'	07 51.0 08°05.5	14.5'	56.8'	
23			233 30.3			14.3	50.0	
	SD = 16.3'	d = -0.2'		SE	0 = 15.7'			
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	179° 19.1	\$23°06.7	270°09.4	14.1'	S08°20.0	14.4'	56.7'	
1	194° 18.8	06.5	284°42.5	14.1'	08°34.4	14.4'	56.7'	
2	209°18.5	06.3	299°15.7	14.1'	08°48.8	14.3'	56.6'	
3	224°18.2	• • 06.2	313°48.8	14.1'	09°03.1	14.3'	56.6'	
4	239°17.9	06.0	328°21.9	14.1'	09°17.3	14.2'	56.6'	
5	254° 17.6	05.8	342°55.1	14.1'	09°31.5	14.1'	56.5'	
6	269°17.3	\$23°05.6	357°28.2	14.1'	S09°45.7	14.1'	56.5'	
7	284°17.0	05.4	12°01.3	14.1'	09°59.8	14.0'	56.5'	
8	299°16.7	05.2	26°34.4	14.1'	10°13.8	14.0'	56.4'	
9	314°16.4	•• 05.1	41°07.5	14.1'	10°27.8	13.9'	56.4'	
10	$329^{\circ}16.1$	04.9	55°40.6	14.1'	10°41.7	13.8'	56.4'	
11	344°15.8	04.7	70°13.6	14.1'	$10^{\circ}55.5$	13.8'	56.3'	
12	359° 15.5	S23°04.5	84°46.7	14.0'	<b>S</b> 11°09.3	13.7'	56.3'	
13	14°15.2	04.3	99°19.7	14.0'	$11^{\circ}23.0$	13.7'	56.3'	
14	29° 14.9	04.1	113°52.8	14.0'	11°36.7	13.6'	56.3'	
15	44° 14.6	• • 03.9	128°25.8	14.0'	11°50.2	13.5'	56.2'	
16	59° 14.3	03.7	142°58.8	14.0'	12°03.8	13.5'	56.2'	
17	74° 14.0	03.6	157°31.8	14.0'	12°17.2	13.4'	56.2'	
18	89° 13.7	S23°03.4	172°04.7	13.9'	<b>S</b> 12°30.6	13.3'	56.1'	
19	104° 13.4	03.2	186°37.7	13.9'	12°43.9	13.3'	56.1'	
20	119° 13.1	03.0	201°10.6	13.9'	12°57.2	13.2'	56.1'	
21	134° 12.8	• • 02.8	215°43.5	13.9'	13°10.4	13.1'	56.0'	
22	149° 12.5	02.6	230°16.4	13.9'	13°23.5	13.0'	56.0'	
23	164°12.2	02.4	244°49.2	13.8'	13°36.5	13.0'	56.0'	
	SD = 16.3'	d = -0.2'		SE	0 = 15.5'			
Fri	GHA	Dec	GHA	ν	Dec	d	HP	
0	179°11.9	\$23°02.2	259°22.1	13.8'	S13°49.5	12.9'	55.9'	
1	194°11.6	02.0	273°54.9	13.8'	14°02.4	12.8'	55.9'	
2	209°11.3	01.8	288°27.6	13.8'	14°15.2	12.7'	55.9'	
3	224°11.1	01.6	303°00.4	13.7'	14°28.0	12.7'	55.9'	
4	239° 10.8	01.4	317°33.1	13.7'	14°40.6	12.6'	55.8'	
5	254° 10.5	01.2	332°05.8	13.7'	14°53.2	12.5'	55.8'	
6	269° 10.2	\$23°01.0	346°38.5	13.6'	\$15°05.8	12.4'	55.8'	
7	284°09.9	00.8	1°11.1	13.6'	15°18.2	12.4'	55.7'	
8	299°09.6	00.6	15°43.8	13.6'	15°30.6	12.3'	55.7'	
9	314°09.3	00.4	30°16.3	13.5'	15°42.9	12.2'	55.7'	
10	329°09.0	00.2	44°48.9	13.5'	15°55.1	12.1'	55.7'	
11	344°08.7	23°00.0	59°21.4	13.5'	16°07.2	12.0'	55.6'	
12	359°08.4	S22°59.8	73°53.9	13.4'	S16°19.3	12.0'	55.6'	
13	14°08.1	59.6	88°26.3	13.4'	16°31.2	11.9'	55.6'	
14	29°07.8	59.3	102°58.7	13.4'	16°43.1	11.8'	55.5'	
15	44° 07.5	59.1	117°31.1	13.3'	16°54.9	11.7'	55.5'	
16	59°07.2	58.9	132°03.5	13.3'	17°06.6	11.6'	55.5'	
17	74°06.9	58.7	146°35.8	13.3'	17°18.3	11.5'	55.5'	
18	89°06.6	\$22°58.5	161°08.0	13.2'	<b>S</b> 17°29.8	11.5'	55.4'	
19	104°06.3	58.3	175°40.3	13.2'	17°41.3	11.4'	55.4'	
20	119°06.0	58.1	190°12.5	13.2'	17°52.6	11.3'	55.4'	
21	134°05.7	• • 57.9	204°44.6	13.1'	18°03.9	11.2'	55.4'	
22	149°05.4	57.7	$219^{\circ}16.7$	13.1'	$18^{\circ}15.1$	11.1'	55.3'	
23	164°05.2	57.4	233°48.8	13.0'	18°26.2	11.0'	55.3'	
	SD = 16.3'	d = -0.2'	SD = 15.3'					

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Junioci	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
<b>N</b> 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° 0°	05:27	05:54	06:16	17:50	18:12	18:39
_	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° 40°	03:43 03:20	04:19 04:01	04:49 04:34	19:17 19:32	19:47	20:23
40 45°	03:20	04:01	04:34	19:32	20:05 20:27	20:46 21:16
<b>S</b> 50°	02:05	03:10	03:54	20:12	20:56	22:00
52° 54°	01:39 00:57	02:55 02:38	03:43 03:31	20:22 20:34	21:10 21:28	22:26 23:07
54°	////	02:38 02:16	03:31 03:17	20:34	21:28 21:49	23:07 ////
50°	1111	02:16	03:17	20:48	21:49	1111
<b>S</b> 60°	11111	01:46	03:01	21:04	23:01	////
<b>5</b> 00	1777	01.02	V2.11		25.01	1111

Lat.		Moonris	e		Moonset	t
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°		01:59	04:31	10:31	09:53	08:56
<b>N</b> 70°		01:44	03:55	10:38	10:10	09:33
68°		01:33	03:31	10:44	10:24	09:59
66°		01:23	03:12	10:48	10:35	10:20
64°		01:15	02:57	10:52	10:45	10:36
62°		01:09	02:44	10:56	10:53	10:50
60°		01:03	02:34	10:59	11:00	11:01
N 58°		00:58	02:24	11:02	11:06	11:11
56°		00:53	02:16	11:05	11:12	11:20
54°		00:49	02:09	11:07	11:17	11:28
52°		00:46	02:03	11:09	11:21	11:35
50°		00:42	01:57	11:11	11:25	11:42
45°		00:35	01:45	11:15	11:34	11:56
<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
N 10°		00:06	00:55	11:33	12:13	12:54
0°		00:00	00:44	11:37	12:21	13:06
<b>S</b> 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
	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	