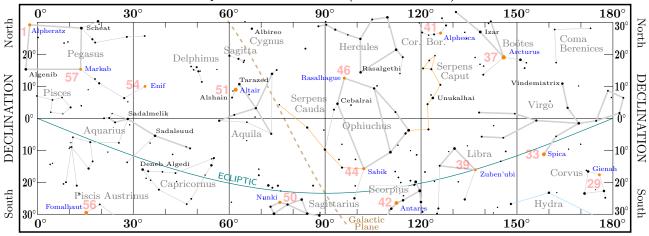
#### GENERATED USING SKYFIELD

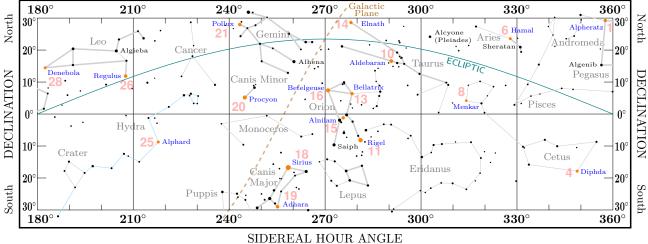
http://rhodesmill.org/skyfield/

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



#### SIDEREAL HOUR ANGLE

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



# THE NAUTICAL ALMANAC

# 2024

Author: Andrew Bauer
Original concept from: Enno Rodegerdts

April 3, 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 http://thenauticalalmanac.com 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 (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	100°09.1	219° 12.0	S18°46.2	193°05.8	\$23°57.7	66°27.9	N12° 15.8	124°22.4	\$11°50.3			
1	115°11.5	234°11.4	46.8	208°06.2	57.7	81°30.4	15.9	139°24.6	50.3	Alpheratz	357°35.7	29°13.5
2	130°14.0	249° 10.7	47.5	223°06.7	57.8	96°32.9	15.9	154°26.9	50.2	Ankaa	353°08.0	-42°10.8
3	145°16.5	264°10.0	• • 48.1	238°07.1	• • 57.9	111°35.3	• • 15.9	169°29.1	• • 50.1	Schedar	349°32.0	56°40.4
4	$160^{\circ}18.9$	279°09.4	48.8	253°07.6	57.9	126°37.8	15.9	184°31.4	50.0	Diphda Achernar	348°48.1 335°20.6	-17°51.5 -57°07.2
5	175°21.4	294°08.7	49.4	268°08.0	58.0	141°40.2	15.9	199°33.6	49.9	Hamal	327°52.0	23°34.6
6	190°23.9	309°08.0	S18°50.1	283°08.4	S23°58.0	156°42.7	N12° 15.9	214°35.9	S11°49.8	Polaris	314°08.6	89°22.2
7	205°26.3	324°07.3	50.8	298°08.9	58.1	171°45.2	15.9	229°38.2	49.8	Acamar	315°12.2	-40°12.7
8	220°28.8	339°06.7	51.4	313°09.3	58.2	186° 47.6	16.0	244°40.4	49.7	Menkar	314°06.8	4°11.0
9	235°31.3 250°33.7	354°06.0 9°05.3	•• 52.1	328°09.7	· · 58.2 58.3	201°50.1 216°52.5	16.0	259°42.7 274°44.9	• • 49.6	Mirfak	$308^{\circ}29.1$	49°56.9
10 11	265°36.2	9 05.5 24° 04.6	52.7 53.4	343°10.2 358°10.6	58.3	210 52.5 231°55.0	16.0 16.0	274 44.9 289°47.2	49.5 49.4	Aldebaran	290°40.3	16°33.5
12	280°38.6	39°04.0	\$18°54.0	13° 11.0	\$23°58.4	246° 57.5	N12° 16.0	304°49.4	\$11°49.3	Rigel	281°04.4	-8°10.5
13	295°41.1	54°03.3	54.7	28° 11.5	58.5	261°59.9	16.0	319°51.7	49.3	Capella	280°22.7	46°01.4
14	310°43.6	69°02.6	55.3	43°11.9	58.5	277°02.4	16.1	334°53.9	49.2	Bellatrix	278°23.5	6°22.3
15	325°46.0	84°01.9	• • 56.0	58°12.3	• • 58.6	292°04.8	• • 16.1	349°56.2	• • 49.1	Elnath	278°02.6 275°38.3	28°37.7
16	340°48.5	99°01.3	56.6	73°12.8	58.6	307°07.3	16.1	4°58.4	49.0	Alnilam Betelgeuse	270°52.7	-1°11.2 7°24.7
17	355°51.0	114°00.6	57.3	88°13.2	58.7	322°09.7	16.1	20°00.7	48.9	Canopus	263°52.2	-52°42.5
18	10°53.4	128°59.9	S18°57.9	103° 13.7	S23°58.7	337° 12.2	N12°16.1	35°02.9	S11°48.8	Sirius	258° 26.6	-16°44.9
19	25°55.9	143°59.2	58.5	118°14.1	58.8	352°14.6	16.1	50°05.2	48.8	Adhara	255°06.1	-29°00.2
20	40°58.4 56°00.8	158° 58.6	59.2	133°14.5	58.8	7°17.1	16.2	65°07.4	48.7	Procyon	244°51.4	5°09.8
21 22	71°03.3	173°57.9 188°57.2	18°59.8 19°00.5	148° 15.0 163° 15.4	• • 58.9 58.9	22°19.5 37°22.0	· · 16.2 16.2	80°09.7 95°12.0	•• 48.6 48.5	Pollux	243°18.0	27°58.0
23	86°05.7	203° 56.5	01.1	178° 15.4	59.0	52°24.5	16.2	110°14.2	48.4	Avior	$234^{\circ}14.5$	-59°35.0
			_							Suhail	222°46.6	-43°31.6
Mer.p	ass. 17:17	$\nu$ -0.7′ d0.	.7′ m-4.02	$\nu$ 0.4′ d0.	$.1' \; m1.37$	$\nu 2.5' \ d0.$	0′ m-2.59	$\nu 2.3' \ d-0$	$.1^\prime$ m0.95	Miaplacidus	221°37.7	-69°48.7
										Alphard	217°48.3 207°35.1	-8°45.7 11°51.0
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	193°41.7	61°37.0
0	101°08.2	$218^{\circ}55.8$	<b>S</b> 19°01.8	193°16.3	523°59.1	$67^{\circ}26.9$	$N12^{\circ}16.2$	$125^{\circ}16.5$	<b>S</b> 11°48.3	Denebola	182°25.7	14°26.2
1	116°10.7	233°55.2	02.4	208°16.7	59.1	82°29.4	16.2	140°18.7	48.3	Gienah	175°44.4	-17°40.4
2	131°13.1	248° 54.5	03.0	223°17.1	59.2	97°31.8	16.3	155°21.0	48.2	Acrux	173°01.0	-63°13.6
3	146°15.6	263°53.8	• • 03.7	238° 17.6	59.2	112°34.3 127°36.7	16.3	170°23.2 185°25.5	48.1	Gacrux	$171^{\circ}52.6$	-57°14.5
4 5	161°18.1 176°20.5	278°53.1 293°52.4	04.3 04.9	253° 18.0 268° 18.4	59.3 59.3	142° 39.2	16.3 16.3	200°27.7	48.0 47.9	Alioth	166° 13.7	55°49.5
6	191°23.0	308°51.7	S19°05.6	283° 18.9	\$23°59.4	157°41.6	N12°16.3	215°30.0	\$11°47.8	Spica	158°23.3	-11°17.1
7	206°25.5	323°51.1	06.2	298° 19.3	59.4	172°44.1	16.3	230°32.2	47.8	Alkaid	152°52.8	49°11.3
8	221°27.9	338°50.4	06.8	313° 19.7	59.5	187°46.5	16.4	245°34.5	47.7	Hadar Menkent	148° 37.5 147° 58.8	-60°29.0 -36°29.1
9	236°30.4	353°49.7	•• 07.5	328°20.2	•• 59.5	202°49.0	• • 16.4	260°36.7	• • 47.6	Arcturus	147° 38.8	19°03.3
10	251°32.9	8°49.0	08.1	343°20.6	59.5	217°51.4	16.4	275°39.0	47.5	Rigil Kent.	139°41.8	-60°55.8
11	266°35.3	23°48.3	08.7	358°21.0	59.6	232°53.9	16.4	290°41.2	47.4	Kochab	$137^{\circ}20.4$	74°03.1
12	281°37.8	38° 47.6	\$19°09.4	13°21.5	\$23°59.6	247° 56.3 262° 58.8	N12°16.4	305°43.5	\$11°47.3	Zuben'ubi	$136^{\circ}57.2$	-16°08.4
13 14	296°40.2 311°42.7	53°46.9 68°46.2	10.0 10.6	28°21.9 43°22.3	59.7 59.7	262°58.8 278°01.2	16.5 16.5	320°45.7 335°48.0	47.2 47.2	Alphecca	$126^{\circ}04.7$	26°37.9
15	326°45.2	83° 45.6	11.3	58° 22.8	• • 59.8	293°03.7	16.5	350°50.2	• • 47.1	Antares	112° 17.2	-26°29.0
16	341°47.6	98° 44.9	11.9	73°23.2	59.8	308°06.1	16.5	5°52.5	47.0	Atria	107°12.7	-69°04.1
17	356°50.1	113°44.2	12.5	88°23.6	59.9	323°08.6	16.5	20°54.7	46.9	Sabik Shaula	102°04.1 96°11.9	-15°45.3 -37°07.2
18	$11^{\circ}52.6$	128°43.5	519°13.1		\$23°59.9	338°11.0	N12° 16.6	35°57.0	<b>S</b> 11°46.8	Rasalhague	95°59.7	12°32.5
19	26°55.0	143°42.8	13.8	118° 24.5		353°13.4	16.6	50°59.2	46.7	Eltanin	90°43.1	51°29.0
20	41°57.5	158° 42.1	14.4	133°24.9	0.00	8°15.9	16.6	66°01.5	46.7	Kaus Aust.	83°34.1	-34°22.4
21	57°00.0	173°41.4	• • 15.0	148°25.3	• • 00.0	23°18.3	• • 16.6	81°03.7	• • 46.6	Vega	$80^{\circ}34.2$	38°48.3
22 23	72°02.4 87°04.9	188°40.7 203°40.0	15.6 16.2	163°25.8 178°26.2	00.1 00.1	38°20.8 53°23.2	16.6 16.7	96°06.0 111°08.2	46.5	Nunki	75°49.2	-26°16.1
									46.4	Altair	62°01.1	8°55.9
Mer.p	ass. 17:13	$\nu$ -0.7′ d0.	.6′ m-4.01	$\nu$ 0.4′ d0.	.1' m $1.37$	$\nu 2.5' \ d0.$	0′ m-2.58	$\nu 2.3' \ d-0$	$.1^\prime$ m $0.95$	Peacock	53°07.6	-56°39.6
										Deneb Enif	49° 26.8 33° 39.9	45°22.0 9°59.1
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27° 34.3	-46°50.9
0	102°07.4	218°39.3	\$19°16.9	193°26.6	S24°00.2	68°25.7	$N12^{\circ}16.7$	126°10.5	S11°46.3	Fomalhaut	27 34.3 15°15.6	-40 50.9 -29°29.9
1	$117^{\circ}09.8$	233°38.6	17.5	$208^{\circ}27.1$	00.2	$83^{\circ}28.1$	16.7	$141^{\circ}12.7$	46.2	Scheat	13°46.2	28°12.9
2	132°12.3	248°37.9	18.1	223°27.5	00.3	98°30.6	16.7	156°15.0	46.1	Markab	13° 30.9	15°20.1
3	147°14.7	263°37.2	• • 18.7	238° 27.9	• • 00.3	113°33.0	• • 16.7	171°17.2	• • 46.1			
4	162°17.2	278°36.6	19.3	253°28.4	00.3	128°35.4	16.8	186°19.5	46.0	Jan 01 Mon	SHA	Mer.pass
5	177°19.7	293°35.9	20.0	268°28.8	00.4	143°37.9	16.8	201°21.7	45.9	Venus Mars	119°03.0 92°56.7	09:24 11:07
6 7	192°22.1 207°24.6	308°35.2	\$19°20.6		\$24°00.4	158° 40.3	N12°16.8	216°24.0 231°26.2	\$11°45.8	Jupiter	92°56.7 326°18.9	19:31
7 8	207°24.6 222°27.1	323°34.5 338°33.8	21.2 21.8	298°29.7 313°30.1	00.4 00.5	173° 42.8 188° 45.2	16.8 16.8	231 26.2 246°28.5	45.7 45.6	Saturn	24° 13.3	15:40
9	237°29.5	353° 33.1	• • 22.4	328° 30.5	• • 00.5	203° 47.7	•• 16.9	240°20.5 261°30.7	• • 45.5			
10	252°32.0	8°32.4	23.0	343°31.0	00.6	218°50.1	16.9	276°33.0	45.5	Jan 02 Tue	SHA	Mer.pass
11	267°34.5	23°31.7	23.6	$358^{\circ}31.4$	00.6	233°52.5	16.9	291°35.2	45.4	Venus Mars	117°47.6 92°08.0	09:25 11:07
12	282°36.9	38°31.0	S19°24.2	13°31.8	S24°00.6	248°55.0	N12°16.9	306°37.5	S11°45.3	Jupiter		19:27
13	297°39.4	53°30.3	24.8	28°32.2	00.7	263°57.4	17.0	321°39.7	45.2	Saturn	24°08.2	15:37
14 15	312°41.8	68°29.6	25.5	43°32.7	00.7	278°59.9	17.0	336°42.0 351°44.2	45.1			
15 16	327°44.3 342°46.8	83°28.9 98°28.2	· · 26.1 26.7	58° 33.1 73° 33.5	· · 00.7 00.8	294°02.3 309°04.7	· · 17.0 17.0	351°44.2 6°46.5	•• 45.0 44.9	Jan 03 Wed	<b>SHA</b> 116° 32.0	Mer.pass
17	357°49.2	113° 27.5	27.3	88°34.0	00.8	324° 07.2	17.0	21°48.7	44.9	Venus Mars	91° 19.3	09:26 11:06
18	12°51.7	128° 26.8	\$19°27.9	103°34.4	\$24°00.8	339°09.6	N12° 17.1	36°50.9	S11°44.8		326° 18.3	19:23
19	27°54.2	$143^{\circ}26.1$	28.5	118° 34.8	00.9	$354^{\circ}12.1$	17.1	51°53.2	44.7	Saturn	24°03.1	15:33
20	42°56.6	158° 25.4	29.1	133°35.2	00.9	9°14.5	17.1	66°55.4	44.6	11. 1		
21	57°59.1	173°24.7	•• 29.7	148°35.7	• • 00.9	24°16.9	• • 17.1	81°57.7	• • 44.5	Horizont	al parallax Venus:	0.1
22 23	73°01.6 88°04.0	188°24.0 203°23.2	30.3 30.9	163°36.1 178°36.5	01.0 01.0	39°19.4 54°21.8	17.2 17.2	96°59.9 112°02.2	44.4 44.3		venus: Mars:	0.1
										L		¥
Mer.p	ass. 17:09	$\nu$ -0.7′ d0.	.6′ m-4.01	$\nu$ 0.4′ d0.	.0′ m1.37	$\nu$ 2.4′ d0.	0′ m-2.58	$\nu$ 2.2′ d-0	.1′ m0.96			

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	179°13.8	\$23°03.5	$301^{\circ}02.0$	16.1'	$N12^{\circ}37.6$	-12.7'	54.1'
1	194°13.5	03.3	315°37.0	16.1'	12°24.9	-12.8'	54.1'
2 3	209°13.2 224°12.9	03.1	330°12.2 344°47.3	16.2' 16.2'	12°12.1 11°59.3	-12.8' -12.9'	54.1' 54.1'
4	239°12.6	02.7	359°22.6	16.3'	11°46.5	-12.9'	54.1'
5	254°12.3	02.5	13°57.8	16.3'	11°33.6	-12.9'	54.1'
6	269°12.0 284°11.7	\$23°02.3	28°33.1	16.4	N11°20.6	-13.0'	54.1'
7 8	284°11.7 299°11.4	02.1 01.9	43°08.5 57°43.9	16.4' 16.5'	11°07.6 10°54.6	-13.0' -13.1'	54.1' 54.1'
9	314°11.2	01.7	72°19.4	16.5'	10°41.6	-13.1'	54.1'
10	329°10.9	01.5	86°54.9	16.5'	10°28.5	-13.1'	54.1'
11 12	344°10.6 359°10.3	01.3 \$23°01.1	101°30.4 116°06.0	16.6' 16.6'	10°15.4 N10°02.2	-13.2' -13.2'	54.1' 54.1'
13	14°10.0	00.9	110 00.0 130°41.6	16.7	09°49.0	-13.2'	54.1'
14	29°09.7	00.7	145°17.2	16.7'	09°35.8	-13.3'	54.1'
15	44°09.4	• • 00.5	159°52.9	16.7'	09°22.5	-13.3'	54.1'
16 17	59°09.1 74°08.8	00.3 23°00.1	174°28.7 189°04.4	16.8' 16.8'	09°09.2 08°55.9	-13.3' -13.4'	54.1' 54.1'
18	89°08.5	\$22°59.9	203°40.2	16.8'	N08°42.5	-13.4'	54.1
19	104°08.2	59.7	$218^{\circ}16.1$	16.9'	08°29.1	-13.4'	54.1'
20	119°07.9	59.5	232°51.9	16.9'	08°15.7	-13.5'	54.1'
21 22	134°07.6 149°07.3	· · 59.3 59.1	247°27.8 262°03.7	16.9' 17.0'	08°02.2 07°48.8	-13.5' -13.5'	54.1' 54.1'
23	164°07.0	58.9	202 03.7 276°39.7	17.0'	07°35.3	-13.5'	54.1
	SD = 16.3'	d = -0.2'			0 = 14.8'		
	- 10.5		-	JI			
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	179°06.7 194°06.4	\$22°58.7 58.5	291°15.7 305°51.7	17.0' 17.0'	N07°21.7 07°08.2	-13.6' -13.6'	54.1' 54.1'
2	209°06.1	58.2	320° 27.7	17.0 17.1'	07 06.2 06°54.6	-13.6'	54.1'
3	224°05.9	• • 58.0	335°03.8	17.1'	06°41.0	-13.6'	54.1'
4	239°05.6	57.8	349°39.9	17.1'	06°27.3	-13.7'	54.1'
5 6	254°05.3 269°05.0	57.6 \$22°57.4	4°16.0 18°52.1	17.1' 17.1'	06°13.7 N06°00.0	-13.7' -13.7'	54.1' 54.1'
7	284°04.7	57.2	33°28.2	17.2	05°46.3	-13.7'	54.1
8	299°04.4	57.0	48°04.4	17.2'	05°32.6	-13.7'	54.1'
9	314°04.1	• • 56.7	62°40.6	17.2'	05°18.8	-13.8'	54.1'
10 11	329°03.8 344°03.5	56.5 56.3	77°16.8 91°53.0	17.2' 17.2'	05°05.0 04°51.3	-13.8' -13.8'	54.1' 54.1'
12	359°03.2	S22°56.1	106°29.2	17.2'	N04°37.4	-13.8'	54.2'
13	14°02.9	55.9	121°05.4	17.2'	04°23.6	-13.8'	54.2'
14	29°02.6 44°02.3	55.6 • • 55.4	135°41.7 150°17.9	17.3' 17.3'	04°09.8 03°55.9	-13.9' -13.9'	54.2' 54.2'
15 16	59°02.1	55.2	164°54.2	17.3	03°42.0	-13.9'	54.2'
17	74°01.8	55.0	179°30.5	17.3'	03°28.1	-13.9'	54.2'
18	89°01.5	S22°54.7	194°06.8	17.3'	N03°14.2	-13.9'	54.2'
19 20	104°01.2 119°00.9	54.5 54.3	208°43.1 223°19.4	17.3' 17.3'	03°00.3 02°46.4	-13.9'	54.2' 54.2'
21	134°00.6	• • 54.1	223 19.4 237°55.7	17.3	02°40.4	-13.9 -14.0'	54.2'
22	149°00.3	53.8	252°32.0	17.3'	$02^{\circ}18.5$	-14.0'	54.2'
23	164°00.0	53.6	267°08.3	17.3'	02°04.5	-14.0'	54.2'
	SD = 16.3'	d = -0.2'		SI	O = 14.8'		
Wed	GHA	Dec	GHA	ν	Dec	d	НР
0	178°59.7	S22°53.4	281°44.6	17.3'	N01°50.5	-14.0'	54.2'
1	193°59.4	53.1	296°20.9	17.3'	01°36.5	-14.0'	54.3'
2 3	208°59.1 223°58.9	52.9	310°57.2 325°33.5	17.3' 17.3'	01°22.5 01°08.5	-14.0'	54.3'
3 4	223°58.9 238°58.6	· · 52.7 52.5	325°33.5 340°09.8	17.3' 17.3'	01°08.5 00°54.5	-14.0' -14.0'	54.3' 54.3'
5	253°58.3	52.2	354°46.0	17.3'	00°40.4	-14.0'	54.3'
6	268°58.0	S22°52.0	9°22.3	17.3'	N00°26.4	-14.0'	54.3'
7 8	283°57.7 298°57.4	51.7 51.5	23°58.6 38°34.8	17.3' 17.2'	N00°12.3 S00°01.7	-14.1' 14.1'	54.3' 54.3'
9	298 57.4 313°57.1	51.3	58° 34.8	17.2'	00°15.8	14.1'	54.3'
10	328°56.8	51.0	67°47.3	17.2'	00°29.8	14.1'	54.4'
11	343°56.5	50.8	82°23.5	17.2'	00°43.9	14.1'	54.4'
12 13	358°56.3 13°56.0	\$22°50.6 50.3	96°59.8 111°36.0	17.2' 17.2'	\$00°58.0 01°12.1	14.1' 14.1'	54.4' 54.4'
14	28°55.7	50.3	111 30.0 126°12.1	17.2'	01°26.1	14.1	54.4
15	43°55.4	• • 49.8	140°48.3	17.1'	01°40.2	14.1'	54.4'
16	58°55.1	49.6	155°24.4	17.1'	01°54.3	14.1'	54.4'
17 18	73°54.8 88°54.5	49.4 \$22°49.1	170°00.5 184°36.6	17.1' 17.1'	02°08.4 \$02°22.5	14.1' 14.1'	54.4' 54.5'
19	103°54.2	48.9	199°12.7	17.1	02°36.5	14.1	54.5
20	118°53.9	48.6	213°48.8	17.0'	02°50.6	14.1'	54.5'
21 22	133°53.7 148°53.4	· · 48.4 48.1	228°24.8 243°00.8	17.0' 17.0'	03°04.7 03°18.8	14.1' 14.1'	54.5' 54.5'
23	148°53.4 163°53.1	48.1 47.9	243°00.8 257°36.8	16.9'	03°18.8 03°32.8	14.1	54.5'
	SD = 16.3'	d = -0.2'			O = 14.8'		
		<u> </u>		- 31			

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	08:23	10:41			13:27	15:45
<b>N</b> 70°	08:05	09:49			14:19	16:03
68°	07:50	09:16			14:52	16:18
66°	07:37	08:53	10:27	13:41	15:15	16:31
64°	07:26	08:34	09:49	14:19	15:34	16:41
62°	07:17	08:18	09:23	14:45	15:49	16:51
60°	07:09	08:05	09:02	15:06	16:02	16:59
N 58°	07:02	07:54	08:45	15:23	16:14	17:06
56°	06:56	07:44	08:31	15:37	16:24	17:12
54°	06:50	07:35	08:19	15:49	16:32	17:18
52°	06:44	07:28	80:80	16:00	16:40	17:24
50°	06:39	07:20	07:58	16:09	16:47	17:29
45°	06:28	07:05	07:38	16:29	17:03	17:40
<b>N</b> 40°	06:18	06:52	07:22	16:46	17:16	17:50
35°	06:08	06:40	07:08	17:00	17:28	17:59
30°	06:00	06:30	06:56	17:12	17:38	18:08
20°	05:44	06:11	06:35	17:32	17:56	18:24
N 10°	05:28	05:54	06:17	17:50	18:13	18:39
0°	05:11	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	05:24	18:43	19:08	19:37
30°	04:02	04:35	05:03	19:05	19:32	20:05
35°	03:44	04:20	04:50	19:17	19:47	20:23
40°	03:21	04:03	04:35	19:32	20:05	20:46
45°	02:52	03:41	04:18	19:50	20:27	21:15
<b>S</b> 50°	02:08	03:12	03:56	20:11	20:55	21:59
52°	01:42	02:57	03:45	20:22	21:10	22:24
54°	01:02	02:40	03:33	20:34	21:27	23:03
56°	////	02:19	03:20	20:47	21:48	////
58°	////	01:51	03:03	21:04	22:15	////
<b>S</b> 60°	////	01:08	02:44	21:23	22:58	////

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

Sun

Moon

#### January 04, 05, 06 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	103°06.5	218°22.5	\$19°31.5	193°37.0	\$24°01.0	69°24.2	N12° 17.2	127°04.4	S11°44.3			
1	118°09.0	233°21.8	32.1	208°37.4	01.1	84°26.7	17.2	142°06.7	44.2	Alpheratz	$357^{\circ}35.7$	29°13.5
2	133°11.4	248°21.1	32.7	223°37.8	01.1	99°29.1	17.2	157°08.9	44.1	Ankaa	353°08.0	-42°10.8
3	148°13.9	263°20.4	· · 33.3	238°38.3	01.1	114°31.5	· · 17.3	172°11.2	• • 44.0	Schedar	349°32.0	56°40.4
4	$163^{\circ}16.3$	$278^{\circ}19.7$	33.9	253°38.7	01.2	129°34.0	17.3	187°13.4	43.9	Diphda	348°48.2	-17°51.5
5	178°18.8	293° 19.0	34.5	268°39.1	01.2	144°36.4	17.3	202°15.7	43.8	Achernar Hamal	335°20.7 327°52.0	-57°07.2 23°34.6
6	193°21.3	308° 18.3	\$19°35.1	283°39.5	S24°01.2	159°38.8	N12°17.3	217°17.9	S11°43.7	Polaris	314°09.8	89°22.2
7	208°23.7	323° 17.6	35.7	298°40.0	01.2	174°41.3	17.4	232°20.2	43.7	Acamar	315°12.2	-40°12.7
8	223°26.2	338° 16.9	36.2	313°40.4	01.3	189°43.7	17.4	247°22.4	43.6	Menkar	314°06.8	4°11.0
9	238°28.7	353°16.2	• • 36.8	328°40.8 343°41.2	• • 01.3	204°46.1	•• 17.4	262°24.7	• • 43.5	Mirfak	308°29.1	49°56.9
10 11	253°31.1 268°33.6	8° 15.5 23° 14.8	37.4 38.0	343 41.2 358°41.7	01.3 01.3	219°48.6 234°51.0	17.4 17.5	277°26.9 292°29.1	43.4 43.3	Aldebaran	290°40.3	16°33.5
12	283°36.1	38° 14.0	\$19°38.6	13°42.1	524°01.4	249°53.4	N12° 17.5	307°31.4	\$11°43.2	Rigel	281°04.4	-8°10.5
13	298°38.5	53° 13.3	39.2	28° 42.5	01.4	264°55.9	17.5	322°33.6	43.1	Capella	280°22.7	46°01.4
14	313°41.0	68° 12.6	39.8	43°43.0	01.4	279°58.3	17.5	337°35.9	43.1	Bellatrix	278°23.5	6°22.3
15	328°43.5	83°11.9	• • 40.4	58°43.4	• • 01.4	295°00.7	• • 17.6	352°38.1	• • 43.0	Elnath	278°02.6	28°37.7
16	343°45.9	98°11.2	40.9	73°43.8	01.5	$310^{\circ}03.2$	17.6	7°40.4	42.9	Alnilam Betelgeuse	275°38.3 270°52.7	-1°11.2 7°24.7
17	358°48.4	113° 10.5	41.5	88°44.2	01.5	325°05.6	17.6	22°42.6	42.8	Canopus	263°52.2	-52°42.5
18	13°50.8	128°09.8	S19°42.1	103°44.7	S24°01.5	340°08.0	N12°17.6	37°44.9	S11°42.7	Sirius	258° 26.6	-16°44.9
19	28°53.3	143°09.1	42.7	118° 45.1	01.5	355°10.5	17.7	52°47.1	42.6	Adhara	255°06.1	-29°00.3
20	43°55.8	158°08.3	43.3	133° 45.5	01.6	10°12.9	17.7	67°49.3	42.5	Procyon	244°51.4	5°09.8
21 22	58°58.2 74°00.7	173°07.6 188°06.9	· · 43.9 44.4	148°45.9 163°46.4	· · 01.6 01.6	25°15.3 40°17.7	· · 17.7 17.7	82°51.6 97°53.8	· · 42.4 42.4	Pollux	243°18.0	27°58.0
23	89°03.2	203°06.2	45.0	178° 46.8	01.6	55°20.2	17.7	112°56.1	42.4	Avior	234°14.5	-59°35.0
										Suhail	222°46.6	-43°31.6
Mer.p	oass. 17:05	$\nu$ -0.7′ d0.	.6′ m-4.00	$\nu$ 0.4′ d0	.0′ m1.37	$\nu$ 2.4′ d0.	.0′ m-2.57	$\nu$ 2.2′ d-0	.1' m0.96	Miaplacidus	221°37.7	-69°48.7
										Alphard	217°48.3 207°35.1	-8°45.7 11°50.9
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	193°41.7	61°37.0
0	104°05.6	218°05.5	S19°45.6	193°47.2	S24°01.6	70°22.6	N12°17.8	127°58.3	S11°42.2	Denebola	182°25.7	14°26.2
1	119°08.1	233°04.8	46.2	208°47.7	01.7	85°25.0	17.8	143°00.6	42.1	Gienah	175°44.4	-17°40.4
2	134°10.6	248°04.0	46.7	223°48.1	01.7	100°27.5	17.8	158°02.8	42.0	Acrux	173°01.0	-63°13.6
3 4	149°13.0 164°15.5	263°03.3 278°02.6	· · 47.3 47.9	238° 48.5 253° 48.9	· · 01.7 01.7	115°29.9 130°32.3	· · 17.9 17.9	173°05.1 188°07.3	· · 41.9 41.8	Gacrux	171°52.6	-57°14.6
5	179°17.9	293°01.9	48.5	268°49.4	01.7	145°34.7	17.9	203°09.5	41.7	Alioth	166° 13.7	55°49.5
6	194°20.4	308°01.2	S19°49.0	283°49.8	S24°01.8	160°37.2	N12° 17.9	218°11.8	S11°41.7	Spica	158°23.2	-11°17.1
7	209°22.9	323°00.4	49.6	298°50.2	01.8	175°39.6	18.0	233°14.0	41.6	Alkaid Hadar	152°52.8 148°37.4	49°11.3 -60°29.0
8	224°25.3	337°59.7	50.2	313°50.6	01.8	190°42.0	18.0	248°16.3	41.5	Menkent	146 37.4 147°58.8	-36°29.1
9	239°27.8	352°59.0	• • 50.8	328°51.1	•• 01.8	205°44.4	• • 18.0	263°18.5	• • 41.4	Arcturus	145°48.8	19°03.3
10	254°30.3	7°58.3	51.3	343°51.5	01.8	220°46.9	18.1	278°20.8	41.3	Rigil Kent.	139°41.8	-60°55.8
11	269°32.7	22°57.6	51.9	358°51.9	01.8	235°49.3	18.1	293°23.0	41.2	Kochab	137°20.4	74°03.1
12	284°35.2	37°56.8	S19°52.5	13°52.3	\$24°01.9	250°51.7	N12° 18.1	308°25.3	\$11°41.1	Zuben'ubi	$136^{\circ}57.1$	-16°08.4
13 14	299°37.7 314°40.1	52°56.1 67°55.4	53.0 53.6	28°52.8 43°53.2	01.9 01.9	265°54.1 280°56.6	18.1 18.2	323°27.5 338°29.7	41.0 41.0	Alphecca	126°04.7	26°37.9
15	329°42.6	82°54.7	• • 54.2	58° 53.6	• • 01.9	295° 59.0	18.2	353°32.0	• • 40.9	Antares	112°17.2	-26°29.0
16	344°45.1	97°53.9	54.7	73°54.0	01.9	311°01.4	18.2	8°34.2	40.8	Atria	107°12.7	-69°04.1
17	359°47.5	112°53.2	55.3	88°54.5	01.9	326°03.8	18.3	23°36.5	40.7	Sabik Shaula	102°04.1 96°11.9	-15°45.3 -37°07.2
18	14°50.0	127°52.5	S19°55.8	103°54.9	S24°01.9	341°06.2	N12° 18.3	38°38.7	S11°40.6	Rasalhague	95°59.7	12°32.5
19	29°52.4	142°51.8	56.4	118°55.3	01.9	356°08.7	18.3	53°41.0	40.5	Eltanin	90°43.1	51°29.0
20	44°54.9	157°51.0	57.0	133°55.7	02.0	11°11.1	18.3	68°43.2	40.4	Kaus Aust.	83°34.0	-34°22.4
21	59°57.4	172°50.3	• • 57.5	148°56.2	• • 02.0	26°13.5	• • 18.4	83°45.4	• • 40.3	Vega	80°34.2	38°48.3
22	74°59.8 90°02.3	187° 49.6 202° 48.9	58.1	163°56.6 178°57.0	02.0	41°15.9 56°18.3	18.4	98°47.7 113°49.9	40.3	Nunki	75°49.2	-26°16.1
23			58.6		02.0		18.4		40.2	Altair	62°01.1	8°55.8
Mer.p	oass. 17:01	$\nu$ -0.7' d0	.6′ m-4.00	$\nu$ 0.4′ d0	.0′ m1.36	$\nu$ 2.4′ d0.	.0′ m-2.56	$\nu$ 2.2′ d-0	.1' m0.96	Peacock	53°07.6	-56°39.6
										Deneb Enif	49°26.8 33°39.9	45°22.0 9°59.1
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27° 34.3	-46°50.9
0	105°04.8	$217^{\circ}48.1$	S19°59.2	193°57.4	S24°02.0	$71^{\circ}20.8$	$N12^{\circ}18.4$	128°52.2	S11°40.1	Fomalhaut	15° 15.6	-29°29.9
1	120°07.2	232°47.4	19°59.7	208°57.9	02.0	86°23.2	18.5	143°54.4	40.0	Scheat	13°46.2	28°12.9
2	135°09.7	247°46.7	20°00.3	223°58.3	02.0	101°25.6	18.5	158°56.6	39.9	Markab	13°30.9	15°20.1
3	150°12.2	262°45.9	• • 00.8	238°58.7	• • 02.0	116°28.0	· · 18.5	173°58.9	• • 39.8	Jan 04 Thu	CIIA	M
4 5	165°14.6 180°17.1	277° 45.2 292° 44.5	01.4 02.0	253°59.1 268°59.6	02.0 02.0	131°30.4 146°32.9	18.6 18.6	189°01.1 204°03.4	39.7 39.6		<b>SHA</b> 115° 16.1	Mer.pass 09:27
6	195°19.6	307°43.7	S20°02.5	284°00.0		161°35.3	N12° 18.6	219°05.6	S11°39.6	Mars	90°30.5	11:05
7	210°22.0	322°43.0	03.1	299°00.4	02.1	176°37.7	18.7	234°07.9	39.5	Jupiter	326°17.7	19:19
8	225°24.5	337°42.3	03.6	314°00.8	02.1	191°40.1	18.7	249°10.1	39.4	Saturn	23°57.9	15:29
9	240°26.9	352°41.5	•• 04.1	$329^{\circ}01.3$	•• 02.1	$206^{\circ}42.5$	• • 18.7	$264^{\circ}12.3$	• • 39.3	Jan 05 Fri	SHA	Mer.pass
10	255°29.4	7°40.8	04.7	344°01.7	02.1	221°44.9	18.7	279°14.6	39.2		113°59.8	09:28
11	270°31.9	22°40.1	05.2	359°02.1	02.1	236°47.4	18.8	294°16.8	39.1	Mars	89°41.6	11:05
12 13	285°34.3 300°36.8	37°39.3 52°38.6	\$20°05.8 06.3	14°02.5 29°02.9	\$24°02.1 02.1	251°49.8 266°52.2	N12° 18.8 18.8	309°19.1 324°21.3	\$11°39.0 38.9	Jupiter	$326^{\circ}17.0$	19:15
14	315°39.3	67°37.9	06.9	44°03.4	02.1	200 52.2 281°54.6	18.9	339°23.5	38.8	Saturn	23°52.7	15:26
15	330°41.7	82°37.1	• • 07.4	59°03.8	02.1	296°57.0	. 18.9	354°25.8	• • 38.8	Jan 06 Sat	SHA	Mer.pass
16	345°44.2	97°36.4	08.0	74°04.2	02.1	311°59.4	18.9	9°28.0	38.7		112°43.4	09:29
17	0°46.7	112° 35.7	08.5	89°04.6	02.1	327°01.8	19.0	24°30.3	38.6	Mars	88°52.7	11:04
18	15°49.1	127°34.9	S20°09.0		S24°02.1	342°04.3	N12°19.0	39°32.5	S11°38.5		326°16.0	19:12
19	30°51.6	142°34.2	09.6	119°05.5	02.1	357°06.7	19.0	54°34.7	38.4	Saturn	23°47.4	15:22
20 21	45°54.0 60°56.5	157° 33.5 172° 32.7	10.1 •• 10.6	134°05.9 149°06.3	02.1 · · 02.1	12°09.1 27°11.5	19.1 •• 19.1	69°37.0 84°39.2	38.3 · · 38.2	Horizont	al parallax	
22	75°59.0	172 32.7 187°32.0	11.2	164° 06.7	02.1	42°13.9	19.1	99°41.5	38.1		Venus:	0.1
23	91°01.4	202°31.2	11.7	179°07.2	02.1	57° 16.3	19.1	114°43.7	38.0		Mars:	0.1
	pass. 16:57		.6′ m-4.00		.0′ m1.36		.0′ m-2.55		.1′ m0.96	·		

h	Su	Moon					
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°52.8	<b>S</b> 22°47.6	$272^{\circ}12.7$	16.9'	S03°46.9	14.1'	54.6'
1	193°52.5	47.4	286°48.6	16.9'	04°01.0	14.1'	54.6'
2	208°52.2 223°51.9	47.1 •• 46.9	301°24.5 316°00.3	16.8' 16.8'	04°15.0 04°29.1	14.0' 14.0'	54.6' 54.6'
4	238°51.7	46.6	330°36.1	16.8	04°23.1	14.0'	54.6'
5	253°51.4	46.4	345°11.9	16.7'	04°57.2	14.0'	54.6'
6	268°51.1	S22°46.1	359° 47.7	16.7'	S05°11.2	14.0'	54.7'
7	283°50.8 298°50.5	45.9	14°23.4 28°59.0	16.7' 16.6'	05°25.2 05°39.2	14.0'	54.7'
8 9	298°50.5 313°50.2	45.6 •• 45.4	28° 59.0 43° 34.6	16.6	05° 53.2	14.0' 14.0'	54.7' 54.7'
10	328°49.9	45.1	58° 10.2	16.5	06°07.2	14.0'	54.7'
11	343°49.7	44.8	72°45.8	16.5'	$06^{\circ}21.2$	14.0'	54.8'
12	358°49.4	S22°44.6	87°21.2	16.4	S06°35.1	13.9'	54.8'
13 14	13°49.1 28°48.8	44.3 44.1	101°56.7 116°32.1	16.4' 16.4'	06°49.1 07°03.0	13.9' 13.9'	54.8' 54.8'
15	43°48.5	43.8	131° 07.4	16.3'	07°16.9	13.9'	54.8'
16	58°48.2	43.5	$145^{\circ}42.7$	16.3'	$07^{\circ}30.8$	13.9'	54.9'
17	73°48.0	43.3	160° 18.0	16.2'	07°44.7	13.9'	54.9'
18 19	88°47.7 103°47.4	\$22°43.0 42.8	174°53.2 189°28.3	16.1' 16.1'	\$07°58.6 08°12.4	13.8' 13.8'	54.9' 54.9'
20	118°47.1	42.5	204°03.4	16.0'	08°26.2	13.8'	54.9'
21	133°46.8	• • 42.2	218°38.5	16.0'	08°40.0	13.8'	55.0'
22	148°46.5	42.0	233° 13.5	15.9'	08°53.8	13.8'	55.0'
23	163°46.3	41.7	247° 48.4	15.9'	09°07.6	13.7'	55.0'
	SD = 16.3'	d = -0.2'		SE	0 = 14.9'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°46.0	S22°41.4	262°23.2	15.8'	S09°21.3	13.7'	55.0'
1	193°45.7 208°45.4	41.2	276°58.0 291°32.8	15.7'	09°35.1 09°48.8	13.7'	55.1'
2	208°45.4 223°45.1	40.9 •• 40.6	291° 32.8 306° 07.4	15.7' 15.6'	10°02.4	13.7' 13.6'	55.1' 55.1'
4	238°44.8	40.3	320°42.1	15.5'	10°16.1	13.6'	55.1'
5	253°44.6	40.1	$335^{\circ}16.6$	15.5'	$10^{\circ}29.7$	13.6'	55.2'
6	268°44.3	\$22°39.8	349°51.1	15.4'	\$10°43.3	13.6'	55.2'
7 8	283°44.0 298°43.7	39.5 39.3	4°25.5 18°59.8	15.3' 15.3'	10°56.8 11°10.4	13.5' 13.5'	55.2' 55.2'
9	313°43.4	39.0	33°34.1	15.2'	11°23.9	13.5'	55.3'
10	328°43.2	38.7	48°08.3	15.1'	11°37.3	13.4'	55.3'
11	343°42.9 358°42.6	38.4 \$22°38.2	62° 42.4 77° 16.4	15.0'	11°50.8 512°04.2	13.4'	55.3'
12 13	358 42.6 13°42.3	37.9	91°50.4	15.0' 14.9'	12°17.5	13.4' 13.3'	55.3' 55.4'
14	28°42.0	37.6	106°24.3	14.8'	12°30.9	13.3'	55.4'
15	43°41.7	• • 37.3	120°58.1	14.7'	12°44.2	13.3'	55.4'
16 17	58°41.5 73°41.2	37.0 36.8	135°31.9 150°05.5	14.7' 14.6'	12°57.4 13°10.6	13.2' 13.2'	55.5' 55.5'
18	88°40.9	\$22°36.5	164°39.1	14.5'	\$13°23.8	13.1'	55.5'
19	103°40.6	36.2	$179^{\circ}12.6$	14.4'	$13^{\circ}36.9$	13.1'	55.5'
20	118°40.4	35.9	193°46.0		13°50.0		55.6'
21 22	133°40.1 148°39.8	· · 35.6 35.3	208° 19.3 222° 52.5	14.2' 14.1'	14°03.1 14°16.1	13.0' 13.0'	55.6' 55.6'
23	163°39.5	35.1	237°25.6	14.0'	14°29.1	12.9'	55.7'
	SD = 16.3'	d = -0.3'		SE	0 = 15.0'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0	178°39.2	S22°34.8	251°58.7	14.0'	S14°42.0	12.9'	55.7'
1	193°39.0	34.5	266°31.6	13.9'	14°54.8	12.8'	55.7'
2	208°38.7 223°38.4	34.2 •• 33.9	281°04.5 295°37.3	13.8' 13.7'	15°07.7 15°20.4	12.8' 12.7'	55.7' 55.8'
3 4	223 38.4 238°38.1	33.6	295 37.3 310°10.0	13.6'	15°20.4 15°33.1	12.7' 12.7'	55.8'
5	253°37.8	33.3	324°42.5	13.5'	$15^{\circ}45.8$	12.6'	55.8'
6	268°37.6	\$22°33.0	339° 15.0	13.4'	\$15°58.4	12.6'	55.9'
7 8	283°37.3 298°37.0	32.7 32.5	353°47.4 8°19.7	13.3' 13.2'	16°11.0 16°23.5	12.5' 12.4'	55.9' 55.9'
9	313°36.7	32.2	22°51.9	13.1'	16° 25.5 16° 35.9	12.4'	56.0'
10	328°36.5	31.9	$37^{\circ}24.0$	13.0'	$16^{\circ}48.3$	12.3'	56.0'
11	343°36.2	31.6	51°55.9	12.9'	17°00.6	12.3'	56.0'
12 13	358°35.9 13°35.6	\$22°31.3 31.0	66°27.8 80°59.6	12.8' 12.7'	\$17°12.9 17°25.1	12.2' 12.1'	56.1' 56.1'
14	28°35.4	30.7	95°31.2	12.6'	17°37.2	12.1'	56.1'
15	43°35.1	• • 30.4	110°02.8	12.4'	$17^{\circ}49.3$	12.0'	56.2'
16	58°34.8	30.1	124°34.2	12.3'	18°01.3	11.9'	56.2'
17 18	73°34.5 88°34.3	29.8 \$22° 29.5	139°05.6 153°36.8	12.2' 12.1'	18°13.2 \$18°25.1	11.9' 11.8'	56.2' 56.3'
19	103°34.0	29.2	168° 07.9	12.1	18°36.9	11.7	56.3
20	118°33.7	28.9	182°38.9	11.9'	18°48.6	11.7'	56.3'
21	133°33.4	• • 28.6	197°09.8	11.8'	19°00.3	11.6'	56.4'
22 23	148°33.2 163°32.9	28.3 28.0	211° 40.6 226° 11.3	11.7' 11.5'	19°11.9 19°23.4	11.5' 11.4'	56.4' 56.4'
20	SD = 16.3'	d = -0.3'			0 = 15.2'	T	55. T
	JD — 10.3	u — -0.3		JL	, — 13.2		

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

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

		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	52-32%	
04	04:29	04:43	12:05	06:01	18:21		
05	04:56	05:10	12:05	06:42	19:03		
06	05:23	05:36	12:06	07:26	19:49		

#### January 07, 08, 09 UT (Sun., Mon., Tue.)

Fig.   GIAA   Cit	h	Aries	Ve	nus		ars	Jup	oiter	Sat	urn		Stars	
1	Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
1 1919-06.4   3279-08   128   2009-08   0.21   877.11   0.12   144-08.2   37.6   37.6   357.00   0.471.00   2 1 1970-08   2077-20   1.14   2049-08   0.21   1877-08   1.02   1.02   3 1017-18   277.77   1.14   2049-08   0.21   1877-08   1.03   1007-18   1.071.00   1.071.00   3 1017-18   277.77   1.14   2049-08   0.21   1877-08   1.03   1007-18   1.071.00   1.071.00   1.071.00   3 1017-18   2077-20   1.14   2049-08   0.21   1877-08   1.03   1.007-18   1.071.00   1.071.00   1.071.00   3 1017-18   2077-20   1.071.00   2071-18   1.02													
Second   1967	1	121°06.4	232°29.8	12.8		02.1	$87^{\circ}21.1$	19.2	144°48.2	37.9			
Section   Color   Co				13.3		02.1							
10   19   19   19   19   19   19   19													
6													
7 211212 2 32253 160 209105 021 177556 164 207003 372 6											Hamal	$327^{\circ}52.0$	
8 226°236 337°246 165 314°110 0.01 192°380 104 260°081 372 4 Aphret 910°290 109 210°20 150°225 7°231 175 38'118 0.01 22°426 109 22°426 109 22°406 1012 100°200 171 175 38'118 0.01 22°426 109 22°426													
9   941   551   552   58   170   357   14   0.11   2074 0.4   195   267   508   3.3   1   1   1   1   1   1   1   1   1													
11 20 20 31 3 27 22 3 143 4 39712 2 101 327 45 2 105 20 397 45 1 105 20 397 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10							207°40.4		265°06.1				
13   301   30   30   30   30   30   30	10	256°28.5	7°23.1	17.5	344°11.8	02.1		19.5	280°08.3	37.1	I		
13   13   13   13   13   13   13   13													
14 al 16*384 6 9*20.1 10.6 4*01.5 0.0 28*29.4 10.6 340*17.3 36.7 15*18.5 30*20.8 20*18.5 20*18.5 0.0													
15 346*3.3 8*194.6 **.201 9*7*14.3 **.020 3**12**3.1 10**12**3. 36.6 16**16**3.6 9**18.6 **.077 **.07**14.3 **.020 3**12**3.1 10**12**3.1											Bellatrix	$278^{\circ}23.5$	6°22.3
19 96°433 91°186 207 74°18,3 02.0 112°197 10718 90.5 36.4 (2.12 80°186 122°197 107°182 122°198 112°197 107°182 122°198 112°197 107°182 122°198 112°198 107°192 112°198 108°192 112°198 112°19													
11   14-58   127179													
19   13   15   17   17   18   20   19   19   18   18   18   18   18   18													
Adhara   287-01.   397-02.   397-03.   397-0	18	16°48.3	$127^{\circ}17.1$	S20°21.7	104°15.2	S24°02.0	343°02.1	N12° 19.8	40°26.2	S11°36.4			
14   15   15   17   17   18   17   18   18   18   18													
Pollus   247   10.0   10.0   10.0   27   10.0   27   10.0   27   10.0   27   10.0   27   10.0   27   10.0   27   27   27   20.0   27   27   27   27   27   27   27   2													
Mer. pass. 16.53													
Mon													
Mon   GHA   GHA   Dec   GHA				_									
Mon   GHA   GHA   Dec   GHA   Dec   CHA   Dec   Dibbe   1873   175	Mer.p	ass. 16:53	$\nu$ -0.7′ d0.	.5′ m-3.99	$\nu$ 0.4′ d-0	.0′ m1.36	$\nu$ 2.4′ d0.	0′ m-2.54	$\nu$ 2.2′ d-0	.1′ m0.96			
Mon   GHA													
0 107-030 0 107	Mon						GHA		GHA				
1 122°05.0 247°11.1 25.8 22°11.9 0.5 30°18.1 0.19 88°18.9 20. 145°4.19 35.7 3.7 3.7 3.7 3.7 3.7 3.7 3.7 3.7 3.7 3													
152"10.4   262"10.4   26.3   239"19.0   0.19   131"6.1   20.1   175"46.4   35.5   5.5   3.5   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5   5.7   14.6   5.5													
167"129   27"09.6   268   254"194   019   133"26.1   2011   190"48.6   35.5     5182"154   292"099   27.3   298"198   019   148"28.5   2011   200"58.0   35.4     61 197"178   30"061   520"278   284"202   524"61.9   168"39.0   N12"022   220"53.1   51"35.3     7 212"20.3   322"074   28.3   299"20.6   019   178"33.3   20.2   220"53.1   51"35.3     8 227"22.8   33"06.6   28.8   314"21.1   01.8   193"35.7   0.3   250"57.5   35.1     9 242"25.2   332"05.9   2.93   329"21.5   5.10   8. 208"38.1   2.03   250"57.5   35.1     1 272"30.2   22"04.3   30.3   359"2.3   50.1   8. 208"38.1   2.03   250"57.5   35.1     1 272"30.2   22"04.3   30.3   359"2.3   50.1   8. 208"38.1   2.03   2.00"604.3   34.8     1 287"30.5   57"03.6   520"30.8   14"22.7   524"01.8   253"45.3   N12"00.4   311"05.5   511"34.7     1 330"35.1   52"03.8   31.3   29"23.2   018   268"42.9   0.5   311"05.5   511"34.7     1 330"35.1   52"03.3   3.13   3.92"3.5   0.12"20.4   311"05.5   511"34.7     1 331"37.5   67"02.1   31.8   44"23.6   0.17   208"52.5   2.05   36"01.3   34.6     1 31"37.5   67"02.1   31.8   44"23.6   0.17   208"52.5   2.05   36"13.2   3.4     1 31"37.5   67"02.1   31.8   44"23.6   0.17   208"52.5   2.05   36"13.2   3.4     1 31"37.5   67"02.1   31.8   44"23.6   0.17   208"52.5   2.05   36"13.2   3.4     1 27"29.9   141"58.8   33.3   38"24.8   0.17   208"52.5   2.05   36"13.2   3.4     1 28"29.9   141"58.8   33.3   38"24.8   0.17   208"52.5   2.05   36"13.2   3.4     1 28"29.9   141"58.8   33.3   34"31.0   31"56.9   50"17.3   34.5     1 28"29.9   141"58.8   33.3   34"31.0   34"59.9   111"58.6   31"3.3   34"31.0   34"59.9   34"5											Acrux	173°00.9	-63°13.6
5											1		
7 212°03 322°07.4 283 29°206 019 178°33 202 228°515 \$11°353 352 448°11.7 2020 328°553 \$12°353 \$52 448°11.7 2020 328°552 333°066 288 314°21.1 018 193°35.7 20.3 250°57.5 35.1 4444°14.4 277.4 -60°200 10°207.7 7°651 29.8 344°21.9 018 223°0.5 20.3 281°0.2 04.3 36.8 38°1.2 0.3 265°59.8 31.2 0.2 265°59.8 31.2 0.3 265°59.8 31.2 0.3 265°59.8 31.2 0.3 265°59.8 31.2 0.3 265°59.8 31.2 0.3 265°59.8 31.2 0.3 265°59.8 31.2 0.2 265°59.8 31.2 0.3 265°59.8 31.2 0.3 265°59.8 31.2 0.2 265°59.8 31.2 0.2 265°59.8 31.2 265°59.8													
7 212°9.03 322°07.4 28.3 299°20.6 0.19 178°33.3 20.2 235°57.5 35.1   8 22°22.8 337°06.6 28.8 314°21.1 0.18 199°35.7 20.3 250°57.5 35.1   9 242°25.2 352°05.9 29.3 329°21.5 0.18 208°38.1 20.3 250°57.5 35.1   10 25°77.7 7°05.1 29.8 344°21.9 0.18 223°04.0 5 20.3 21°02.0 34.9   11 272°30.2 22°04.3 30.3 359°22.3 0.18 238°42.9 20.4 296°04.3 34.8   12 28°32.6 37°03.6 S02°30.8 14°22.7 S24°01.8 253°45.5 N12°20.4 296°04.5 31°44.7   13 302°35.1 55°02.8 31.3 29°22.2 0.18 286°47.7 20.4 326°08.7 34.6   14 31°73.5 6°02.1 31.8 4*25.6 0.17 283°50.1 20.5 34°11.0 31°40.7   15 332°40.0 82°01.3 32.3 55°24.0 0.17 283°50.1 20.5 34°11.0 34.4   17 2°44.9 111°99.8 33.3 89°24.8 0.17 326°57.3 20.6 26°17.7 34.3   18 1°47.4 126°9.0 S02°33.8 104°25.3 S02*01.7 243°9.9 N12°20.6 41°19.9 \$1334.2   18 1°47.4 126°9.0 S02°33.8 104°25.5 0.16 50°02.1 20.6 56°22.1 34.1   18 1°47.4 126°9.0 S02°33.8 143°25.1 0.16 14°04.5 20.7 71°24.4 31.6   18 1°27.3 186°66.0 33.8 143°25.1 0.16 14°04.5 20.7 71°24.8 31.0   18 1°47.4 126°9.0 \$0.0 33.3 19°27.3 0.16 59°02.1 20.6 56°2.1 34.1   18 1°47.4 126°9.0 \$0.0 33.3 149°25.5 0.16 29°06.9 20.7 86°26.6 33.9   20 47°52.3 156°57.5 34.8 134°25.1 0.16 14°04.5 20.7 71°24.4 31.0   18 1°47.4 126°6.0 35.8 146°25.0 0.16 44°0.9 20.8 101°28.8 33.8   18 1°47.5 3186°66.0 35.8 149°25.5 0.16 29°06.9 20.7 86°26.6 33.9   22 77°57.3 186°66.0 35.8 149°25.5 0.16 29°06.9 20.7 86°26.6 33.9   22 78°57.3 186°66.0 35.8 149°25.5 0.16 59°11.7 20.8 116°31.1 33.7   23 18°0.0 40.5 14.3 14.3 14.2 1.0 1.0 14°0.9 3.0 10°28.8 33.8   18 18°47.1 24°4													
8 227°228 337°066 2 28.8 314°211 0.18 193°35.7 203 290°57.5 35.1 9 242°252 335°069 9 .29.3 329°21.5 0.18 208°38.1 203 265°59.8 35.0 10 25°27.7 7°05.1 29.8 344°21.9 0.18 223°40.5 203 265°59.8 35.0 11 27°20.2 22°04.3 30.3 359°22.3 0.18 238°42.9 20.4 296°04.3 34.8 11 27°30.2 22°04.3 30.3 359°22.3 0.18 238°42.9 20.4 296°04.3 34.8 11 27°32.6 37°03.6 52°20.8 11.9 22.7 54°01.8 253°45.3 N12°20.4 31°06.5 511°34.7 14 31°37.5 57°02.8 31.3 29°23.2 0.18 268°47.7 20.4 31°10.5 511°34.7 14 31°37.5 57°02.8 31.3 42°23.6 0.1.7 283°50.1 20.5 341°11.0 34.6 15 332°40.0 82°01.3 32.3 52°34.0 0.1.7 298°52.5 20.5 356°13.2 345.4 16 347°42.5 97°00.6 32.8 74°24.4 0.1.7 313°54.9 20.5 11°15.4 34.4 11°199.8 33.3 89°24.8 0.1.7 328°57.3 20.6 11°15.4 34.4 11°199.8 33.3 89°24.8 0.1.7 328°57.3 20.6 11°15.4 34.4 11°199.8 33.3 89°24.8 0.1.7 328°57.3 20.6 11°15.4 34.4 11°199.8 33.3 44°31.19°25.7 0.16 359°02.1 20.6 41°19.9 511°34.2 18 17°47.4 126°590. 522°33.8 104°25.5 524°01.7 343°59.7 N12°20.6 41°19.9 511°34.2 19 32°49.9 141°58.3 343. 119°25.7 0.16 359°02.1 20.6 56°22.1 34.1 21 62°34.8 171°56.8 35.3 149°26.5 0.16 29°0.9 20.7 86°26.6 33.9 40°2.2 20°2.0 47°52.3 166°55.3 36.8 164°26.9 0.16 44°09.3 20.8 101°28.8 33.4 Nunki 75°49.2 266°16.1 22°2.2 21°	7	$212^{\circ}20.3$	322°07.4	28.3	299°20.6	01.9			235°55.3				
9 242°25-2 352°05-9 (29.43) 329°21.5 · 0.18 208°38.1 · 20.3 265°59.8 · 35.0 (10 265°5													
11 272°30.2 22°04.3 30.3 359°22.3 01.8 238°42.9 20.4 296°04.3 34.8 Kochab 13°27.0 37°403.1 22°30.6 37°30.6 520°30.8 14°227 524°01.8 238°45.3 NLZ°20.4 311°05.6 \$11°34.7 46.1 31°37.5 67°0.2 1 31.8 46°23.6 01.7 283°50.1 20.5 341°11.0 34.6 Alphacca 136°04.7 20°1.3 32°40.0 82°01.3 3.3 59°24.0 01.7 288°50.1 20.5 341°11.0 34.6 Alphacca 136°04.7 22°2.0 15 332°40.0 82°01.3 3.3 59°24.0 01.7 288°50.1 20.5 341°11.0 34.6 Alphacca 12°1.2 26°29.0 Alphace 12°1.2 26°1.2 341.0 Alphace 12°1.2 26°1.2 Alphac													
12   287°32.6   37°03.6   200°30.8   14°22.7   S24°01.8   253°45.3   N12°20.4   311°06.5   S11°34.7     13 30°35.1   52°02.8   31.3   29°32.2   01.8   268°47.7   20.4   326°08.7   34.6     14 317°37.5   67°02.1   31.8   44°32.6   01.7   288°52.5   20.5   341°11.0   34.6     15 332°40.0   82°01.3   32.3   59°40.0   01.7   288°52.5   20.5   356°13.2   34.5     16 347°42.5   97°00.6   32.8   74°24.4   01.7   313°54.9   20.5   11°13.4   34.4     317°37.5   67°02.1   31.8   44°32.6   01.7   288°52.5   20.5   356°13.2   34.5     18 1°74.4   126°59.0   S20°33.8   104°25.3   S24°01.7   338°59.7   320.6   26°11.7   34.1     18 1°74.4   126°59.0   S20°33.8   104°25.3   S24°01.7   338°59.7   120°0.6   41°19.9   S11°34.2     20 4°65.3   156°57.5   34.8   134°26.1   01.6   14°04.5   20.7   71°24.4   34.0     21 6°654.8   171°56.8   35.3   149°26.5   01.6   29°06.9   20.7   86°26.6   33.9     22 7°657.3   186°56.0   35.8   164°26.9   01.6   44°09.3   20.8   101°28.8   33.8     22 7°657.3   186°56.0   35.8   164°26.9   01.6   44°09.3   20.8   101°28.8   33.8     23 92°59.7   201°55.3   30.3   179°27.3   01.6   59°11.7   20.8   116°31.1   33.7     Mer.past. 16.49   W.0.8' d0.5' m-3.99   W.4' d-0.0' m1.56   W.2.4' d0.0' m-2.53   W.2.2' d-0.1' m0.97     1 123°04.7   231°55.7   37.2   209°28.2   01.5   89°16.4   20.9   146°35.5   33.6     1 123°04.7   231°55.7   37.2   229°28.2   01.5   89°16.4   20.9   146°35.5   33.6     1 188°17.0   306°49.9   80°39.7   284°30.3   S24°01.4   164°28.4   N12°21.1   221°46.7   S11°33.1     1 168°17.0   306°49.9   80°39.7   284°30.3   S24°01.4   164°28.4   N12°21.1   221°46.7   S11°33.1     1 288°31.8   36°45.3   S20°42.5   14°32.8   S24°01.5   39°39.4   31°30.9   15°20.1     1 2 333°39.2   81°43.0   44.0   59°34.0   01.1   299°49.9   21.4   34°04.5   33.2     1 2 38°339.2   21°46.1   42.1   39°35.7   01.0   39°49.4   21.1   221°46.5   S11°33.1     1 38°44.1   01.1   329°34.7   01.1   299°30.7   01.4   40°30.8   21.1   221°45.5   S11°33.1     1 38°49.0   141°40.0   48.8   199°37.3   01.2   299°4												139°41.7	
13 302°35.1 52°02.8 31.3 29°23.2 01.8 268°47.7 20.4 326°08.7 34.6 Alpheca 126°04.7 26°37.9 15 332°40.0 82°01.3 32.3 59°24.0 01.7 298°52.5 20.5 356°13.2 34.5 Alpheca 126°04.7 26°37.9 16 347°42.5 97°00.6 32.8 74°24.4 01.7 328°52.5 20.5 356°13.2 34.5 Alpheca 126°04.7 34.3 16 17°14.4 126°50.5 20°38.8 104°25.3 \$24°01.7 326°57.3 20.6 26°17.7 34.3 Sabik 102°12.6 69°04.0 328°49.9 141°58.3 34.3 119°25.7 01.6 359°02.1 20.6 56°22.1 34.1 18.1 11°56.8 35.3 149°25.5 01.6 29°05.9 0.20 47°52.3 156°35.5 34.8 134°26.1 01.6 14°04.5 20.7 71°24.4 34.0 24.2 22°27.5 3.3 149°25.5 01.6 29°05.9 0.20 36°26.6 33.9 22°2 77°57.3 186°56.0 35.8 164°26.9 01.6 44°09.3 20.8 101°28.8 33.8 104°25.5 10.6 29°05.9 0.20 36°26.5 33.9 22°2 77°57.3 186°56.0 35.8 164°26.9 01.6 44°09.3 20.8 101°28.8 33.8 10.8 10.8 19°11.7 20.8 116°31.1 33.7 34.1 416°20.1 48°55.8 10.6 24°0.0 m.2.5 10.6 108°02.2 216°54.5 \$20°36.8 179°27.3 01.6 59°11.7 20.8 116°31.1 33.7 34.0 44.6 20.9 146°3.0 34.6 24.4 188°12.0 276°51.4 38.7 269°26.0 01.5 104°18.8 20.9 161°37.8 33.5 186°30.6 261°52.2 38.2 239°20.0 01.5 104°18.8 20.9 161°37.8 33.5 186°30.6 261°52.2 38.2 239°20.0 01.5 104°18.8 20.9 161°37.8 33.5 184°26.2 286°12.4 31.1 10.1 31°31.3 12°30.4 138°31.5 13°30.9 15°20.1 123°4.5 20°36.8 44.4 40.6 314°31.1 01.3 149°36.0 21.0 20°44.5 33.2 140°40.4 32.4 138°31.5 21°40.4 31.1 21°31.4 31°40.0 41.4 134°31.5 21.1 221°46.7 511°31.1 340°4.0 11°21.2 28°31.8 36°4.5 32°42.4 40.1 328°31.5 10.1 329°40.4 21.3 296°57.9 32.6 31.9 11°23.0 130°33.3 21°40.1 111°24.6 344°31.9 01.3 229°40.4 21.3 296°57.9 32.6 31.9 11°24.2 33.3 131°30.3 11°30.3 31°40.0 141°40.0 45.8 119°35.3 224°41.4 149°56.0 21.2 266°57.5 32.7 11°33°4.1 110°41.5 44.9 89°34.9 01.3 299°40.4 21.3 296°57.9 32.6 31.9 110°20.1 326°40.0 33.4 44.5 33.2 11°24°45.5 11°24													
14 317"37.5 67"02.1 31.8 44"23.6 01.7 283"90.1 20.5 341"11.0 34.6 34.6 347"42.5 97"00.6 32.8 74"24.4 01.7 313"64.9 20.5 11"15.4 34.4 34.4 34.4 34.7 34.5 32"8"57.3 20.6 26"1.7 34.3 34.5 34.5 34.5 34.5 34.5 34.5 34.5													
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18   1747.4   126°59.0   \$20°33.8   104°25.3   \$24°01.7   343°59.7   \$10°20.6   41°19.9   \$11°34.2   \$11°44.5   \$10°45.7   \$13°45.2   \$19°32°49.9   141°58.3   34.3   119°25.7   01.6   359°02.1   20.6   56°22.1   34.1   \$11°25.7   01.6   359°02.1   20.6   56°22.1   34.1   \$11°25.7   01.6   359°02.1   20.6   56°22.1   34.1   \$11°25.7   01.6   359°02.1   20.6   56°22.1   34.1   \$11°25.7   01.6   20°06.9   20.7   86°26.6   33.9   \$12°32.5   20°25.7   20°25.7   20°25.7   318°55.0   35.8   164°26.9   01.6   44°0.3   20.8   101°28.8   33.8   \$13°40.2   \$10°55.3   36.3   179°27.3   01.6   59°11.7   20.8   110°31.1   33.7   \$116°31.1   33.	16		97°00.6	32.8	74°24.4	01.7	313°54.9	20.5	11°15.4	34.4			
18													
20 47°523 156°575 34.8 134°261 01.6 14°04.5 20.7 71°24.4 34.0 83°34.0 -34°22.4 21°2554.8 171°558 3.3 149°26.5 01.6 29°06.9 0.2 7 86°26.6 0.33.9 4.0 80°34.2 38°48.2 22 77°57.3 186°56.0 35.8 164°26.9 01.6 44°09.3 20.8 101°28.8 33.8 Nunkir 5°249.2 26°16.1 Altair 62°01.1 8°55.8 Nunkir 5°249.2 26°16.1 Altair 62°01.1 8°55.8 11°33.1 16°31.1 33.7 Nunkir 5°49.2 26°16.1 Altair 62°01.1 8°55.8 11°32°0.2 11°28.8 116°31.1 33.7 Nunkir 5°49.2 26°16.1 Altair 62°01.1 8°55.8 Nunkir 62°01.1 8°01.1 Nunkir 62°01.1 Nunkir 62°01.1 Nunkir 62°01.1				0.4.0						0.4.4	Rasalhague		
Care													
22   77°57.3   186°56.0   35.8   164°26.9   01.6   44°09.3   20.8   101°28.8   33.8   Nunki   75°49.2   2-26°16.1   23°59.7   201°55.3   36.3   179°27.3   01.6   59°11.7   20.8   116°31.1   33.7													
Mer.pass. 16:49   ν-0.8' d0.5' m-3.99   ν-0.4' d-0.0' m1.36   ν-2.4' d0.0' m-2.53   ν-2.2' d-0.1' m0.97													
Mer.pass   16:49   V-0.8' d0.5' m-3.99   V-0.4' d-0.0' m1.36   V-2.4' d0.0' m-2.53   V-2.2' d-0.1' m0.97   Peacok   53° 07.6   56° 39.6   Deneb   49° 26.8   45° 22.0   Mer.pass   V-0.8' d0.5' m-3.99   V-0.4' d-0.0' m1.36   V-0.8' d0.0' m-2.53   V-0.1' m0.97   Peacok   49° 26.8   45° 22.0   Mer.pass   V-0.8' d0.0' m-2.53   V-0.8' d0.0' m-2.53   V-0.1' m0.97   Peacok   53° 07.6   56° 39.6   Deneb   49° 26.8   45° 22.0   Mer.pass   V-0.8' d0.0' m-2.53   V-0.8'	23	92°59.7		36.3		01.6	59°11.7	20.8	116°31.1		1		
Tue GHA GHA Dec GHA DE	Mern	ass 16:40	υ-0.8' d0	5' m-3 00	υ0 Δ' d-0	0' m1 36	1/2 A' d0	0′ m-2 53	1/2 2' d-0	1′ m0 07			
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11 273°29.3 21°46.1 42.1 359°32.4 01.3 239°40.4 21.3 296°57.9 32.6 12 288°31.8 36°45.3 \$20°42.5 14°32.8 \$24°01.2 254°42.8 \$N12°21.3 312°00.1 \$511°32.6 13 303°34.2 51°44.6 43.0 29°33.2 01.2 269°45.2 21.3 327°02.4 32.5 14 318°36.7 66°43.8 43.5 44°33.6 01.2 284°47.5 21.4 342°04.6 32.4 15 333°39.2 81°43.0 · 44.0 59°34.0 · 01.2 299°49.9 · 21.4 357°06.8 · 32.3 16 348°41.6 96°42.3 44.4 74°34.4 01.1 314°52.3 21.4 12°09.1 32.2 17 3°44.1 111°41.5 44.9 89°34.9 01.1 329°54.7 21.5 27°11.3 32.1 18 18°46.5 126°40.7 \$20°45.4 104°35.3 \$24°01.1 344°57.1 \$N12°21.5 42°13.5 \$511°32.0 19 33°49.0 141°40.0 45.8 119°35.7 01.0 359°59.5 21.6 57°15.8 31.9 20 48°51.5 156°39.2 46.3 134°36.1 01.0 15°01.9 21.6 72°18.0 31.8 21 63°53.9 171°38.4 · 46.8 149°36.5 · 01.0 30°04.3 · 21.6 87°20.2 · 31.7 22 78°56.4 186°37.7 47.2 164°37.0 00.9 45°06.6 21.7 102°22.4 31.6 23 93°58.9 201°36.9 47.7 179°37.4 00.9 60°09.0 21.7 117°24.7 31.6													
12 288°31.8 36°45.3 520°42.5 14°32.8 524°01.2 254°42.8 N12°21.3 312°00.1 511°32.6 13 303°34.2 51°44.6 43.0 29°33.2 01.2 269°45.2 21.3 327°02.4 32.5 14 318°36.7 66°43.8 43.5 44°33.6 01.2 284°47.5 21.4 342°04.6 32.4 15 333°39.2 81°43.0 · · · 44.0 59°34.0 · · · 01.2 299°49.9 · · · 21.4 357°06.8 · · · 32.3 16 348°41.6 96°42.3 44.4 74°34.4 01.1 314°52.3 21.4 12°09.1 32.2 18 18°46.5 126°40.7 520°45.4 104°35.3 524°01.1 344°57.1 N12°21.5 42°13.5 511°32.0 19 33°49.0 141°40.0 45.8 119°35.7 01.0 359°59.5 21.6 57°15.8 31.9 20 48°51.5 156°39.2 46.3 134°36.1 01.0 15°01.9 21.6 72°18.0 31.8 21 63°53.9 171°38.4 · · · 46.8 149°36.5 · · · 01.0 30°04.3 · · · 21.6 87°20.2 · · · 31.7 47.2 164°37.0 00.9 45°06.6 21.7 102°22.4 31.6 31.6 Mars: 0.1 0.1 23°37.4 00.9 60°09.0 21.7 117°24.7 31.6				42.1									
13 303 3.2 51 44.6 43.0 29 33.2 01.2 269 45.2 21.3 32 7 02.4 32.5 14 318 36.7 66 43.8 43.5 44 33.6 01.2 284 47.5 21.4 342 04.6 32.4 15 333 39.2 81 43.0 · · · 44.0 59 34.0 · · · 01.2 299 49.9 · · · 21.4 357 06.8 · · · 32.3 16 348 41.6 96 22.3 44.4 74 34.4 01.1 314 52.3 21.4 12 09.1 32.2 17 3 44.1 111 1.5 44.9 89 34.9 01.1 329 54.7 21.5 27 11.3 32.1 18 18 46.5 126 40.7 520 45.4 104 35.3 524 01.1 344 57.1 N12 21.5 42 13.5 511 32.0 19 33 49.0 141 40.0 45.8 119 35.7 01.0 359 59.5 21.6 57 15.8 31.9 20 48 51.5 156 39.2 46.3 134 36.1 01.0 15 01.9 21.6 72 18.0 31.8 21 63 53.9 171 38.4 · · · 46.8 149 36.5 · · · 01.0 30 04.3 · · · 21.6 87 20.2 · · · 31.7 22 78 56.4 186 37.7 47.2 164 37.0 00.9 45 06.6 21.7 102 22.4 31.6 23 93 58.9 201 36.9 47.7 179 37.4 00.9 60 09.0 21.7 117 24.7 31.6													
14 318 30.7 66 43.8 43.5 44 33.6 01.2 284 47.5 21.4 342 04.6 32.4 15 333 39.2 81 43.0 · 44.0 59 34.0 · 01.2 299 49.9 · 21.4 357 06.8 · 32.3 16 348 41.6 96 42.3 44.4 74 34.4 01.1 314 52.3 21.4 12 09.1 32.2 17 3 44.1 111 41.5 44.9 89 34.9 01.1 329 54.7 21.5 27 11.3 32.1 18 18 46.5 126 40.7 520 45.4 104 35.3 524 01.1 344 57.1 N12 21.5 42 13.5 511 32.0 19 33 49.0 141 40.0 45.8 119 35.7 01.0 359 59.5 21.6 57 15.8 31.9 20 48 51.5 156 39.2 46.3 134 36.1 01.0 15 01.9 21.6 72 18.0 31.8 21 63 53.9 171 38.4 · 46.8 149 36.5 · 01.0 30 04.3 · 21.6 87 20.2 · 31.7 22 78 56.4 186 37.7 47.2 164 37.0 00.9 45 06.6 21.7 102 22.4 31.6 23 93 58.9 201 36.9 47.7 179 37.4 00.9 60 09.0 21.7 117 24.7 31.6   Jan 09 Tue SHA Mer.pass Venus 108 52.3 09:33  Mars 86 25.6 11:02  Jupiter 326 11.9 19:00  Saturn 23 31.1 15:12  Horizontal parallax  Venus: 0.1  Mars: 0.1													
16 348°41.6 96°42.3 44.4 74°34.4 01.1 314°52.3 21.4 12°09.1 32.2 Venus 108°52.3 09:33 17 3°44.1 111°41.5 44.9 89°34.9 01.1 329°54.7 21.5 27°11.3 32.1 Mars 86°25.6 11:02 18 18°46.5 126°40.7 \$20°45.4 104°35.3 \$24°01.1 344°57.1 N12°21.5 42°13.5 \$11°32.0 19 33°49.0 141°40.0 45.8 119°35.7 01.0 359°59.5 21.6 57°15.8 31.9 20 48°51.5 156°39.2 46.3 134°36.1 01.0 15°01.9 21.6 72°18.0 31.8 21 63°53.9 171°38.4 · 46.8 149°36.5 · 01.0 30°04.3 · 21.6 87°20.2 · 31.7 22 78°56.4 186°37.7 47.2 164°37.0 00.9 45°06.6 21.7 102°22.4 31.6 23 93°58.9 201°36.9 47.7 179°37.4 00.9 60°09.0 21.7 117°24.7 31.6 Wars: 0.1													
17 3°44.1 111°41.5 44.9 89°34.9 01.1 329°54.7 21.5 27°11.3 32.1 18 18°46.5 126°40.7 \$20°45.4 104°35.3 \$24°01.1 344°57.1 \$N12°21.5 42°13.5 \$\$11°32.0 19 33°49.0 141°40.0 45.8 119°35.7 01.0 359°59.5 21.6 57°15.8 31.9 20 48°51.5 156°39.2 46.3 134°36.1 01.0 15°01.9 21.6 72°18.0 31.8 21 63°53.9 171°38.4 · 46.8 149°36.5 · 01.0 30°04.3 · 21.6 87°20.2 · 31.7 22 78°56.4 186°37.7 47.2 164°37.0 00.9 45°06.6 21.7 102°22.4 31.6 23 93°58.9 201°36.9 47.7 179°37.4 00.9 60°09.0 21.7 117°24.7 31.6  Mars 86°25.6 11:02  Jupiter 326°11.9 19:00 Saturn 23°31.1 15:12  Horizontal parallax Venus: 0.1 Mars: 0.1													
18       18°46.5       126°40.7       \$20°45.4       104°35.3       \$24°01.1       344°57.1       \$N12°21.5       42°13.5       \$\$11°32.0       \$Jupiter       326°11.9       \$19:00         19       33°49.0       141°40.0       45.8       \$119°35.7       \$01.0       \$359°59.5       \$21.6       \$57°15.8       \$31.9         20       48°51.5       \$156°39.2       46.3       \$134°36.1       \$01.0       \$15°01.9       \$21.6       \$72°18.0       \$31.8         21       \$63°53.9       \$171°38.4       \$													
19 33°49.0 141°40.0 45.8 119°35.7 01.0 359°59.5 21.6 57°15.8 31.9 20 48°51.5 156°39.2 46.3 134°36.1 01.0 15°01.9 21.6 72°18.0 31.8 21 63°53.9 171°38.4 · 46.8 149°36.5 · 01.0 30°04.3 · 21.6 87°20.2 · 31.7 22 78°56.4 186°37.7 47.2 164°37.0 00.9 45°06.6 21.7 102°22.4 31.6 23 93°58.9 201°36.9 47.7 179°37.4 00.9 60°09.0 21.7 117°24.7 31.6    Saturn 23°31.1 15:12     Horizontal parallax   Venus: 0.1     Mars: 0.1											I		
20 48°51.5 156°39.2 46.3 134°36.1 01.0 15°01.9 21.6 72°18.0 31.8 21 63°53.9 171°38.4 · 46.8 149°36.5 · 01.0 30°04.3 · 21.6 87°20.2 · 31.7 22 78°56.4 186°37.7 47.2 164°37.0 00.9 45°06.6 21.7 102°22.4 31.6 23 93°58.9 201°36.9 47.7 179°37.4 00.9 60°09.0 21.7 117°24.7 31.6  Horizontal parallax Venus: 0.1 Mars: 0.1													
22 78°56.4 186°37.7 47.2 164°37.0 00.9 45°06.6 21.7 102°22.4 31.6 Venus: 0.1 23 93°58.9 201°36.9 47.7 179°37.4 00.9 60°09.0 21.7 117°24.7 31.6 Mars: 0.1													
23 93°58.9 201°36.9 47.7 179°37.4 00.9 60°09.0 21.7 117°24.7 31.6 Mars: 0.1											Horizont	•	0.1
25 35 36.5 261 36.5 11.1 115 31.1 06.5 06 05.6 21.1 117 21.1 31.6													
Mer.pass. 16:45 $\nu$ -0.8′ d0.5′ m-3.98 $\nu$ 0.4′ d-0.0′ m1.36 $\nu$ 2.4′ d0.0′ m-2.53 $\nu$ 2.2′ d-0.1′ m0.97											L		*
	Mer.p	ass. 16:45	$\nu$ -0.8′ d0.	.5′ m-3.98	$\nu$ 0.4′ d-0	.U′ m1.36	$\nu$ 2.4′ d0.	U' m-2.53	$\nu$ 2.2′ d-0	.1′ m0.97			

h	Su			Moon			
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°32.6	\$22°27.7	$240^{\circ}41.8$	11.4'	<b>S</b> 19°34.8	11.3'	56.5'
1	193°32.3 208°32.1	27.4	255°12.3 269°42.6	11.3'	19°46.1 19°57.4	11.3' 11.2'	56.5'
2	208 32.1 223°31.8	27.1 •• 26.8	209 42.0 284°12.8	11.2' 11.1'	19 57.4 20°08.6	11.1'	56.5' 56.6'
4	238°31.5	26.4	298°42.9	11.0'	20°19.7	11.0'	56.6'
5	253°31.2	26.1	$313^{\circ}12.8$	10.8'	20°30.7	10.9'	56.6'
6	268°31.0	\$22°25.8	327°42.6	10.7'	\$20°41.6	10.8'	56.7'
7 8	283°30.7 298°30.4	25.5 25.2	342°12.4 356°42.0	10.6' 10.5'	20°52.4 21°03.2	10.7' 10.7'	56.7' 56.7'
9	313°30.2	24.9	11°11.4	10.3	21°13.8	10.6'	56.8'
10	328°29.9	24.6	25°40.8	10.2'	21°24.4	10.5'	56.8'
11	343°29.6	24.3	40°10.0	10.1'	21°34.8	10.4'	56.8'
12 13	358°29.3 13°29.1	\$22°24.0 23.6	54°39.1 69°08.1	10.0' 9.8'	\$21°45.2 21°55.5	10.3' 10.2'	56.9' 56.9'
14	28°28.8	23.3	83°36.9	9.6 9.7'	21°05.7	10.2	56.9'
15	43°28.5	23.0	98°05.6	9.6'	22°15.7	10.0'	57.0'
16	58°28.3	22.7	112°34.2	9.5'	22°25.7	9.9'	57.0'
17	73°28.0	22.4 \$22°22.1	127°02.7	9.3'	22°35.5	9.8'	57.1'
18 19	88°27.7 103°27.4	21.7	141°31.1 155°59.3	9.2' 9.1'	\$22°45.3	9.6' 9.5'	57.1' 57.1'
20	118°27.2	21.7	155 59.5 170°27.4	9.1 9.0'	22° 54.9 23° 04.5	9.5 9.4'	57.1 57.2'
21	133°26.9	• • 21.1	184°55.3	8.8'	23°13.9	9.3'	57.2'
22	148°26.6	20.8	199°23.2	8.7'	23°23.2	9.2'	57.2'
23	163°26.4	20.5	213°50.9	8.6'	23°32.4	9.1'	57.3'
	SD = 16.3'	d = -0.3'		SE	0 = 15.4'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°26.1	S22°20.1	228°18.4	8.4'	S23°41.5	9.0'	57.3'
1	193°25.8	19.8	242°45.9	8.3'	23°50.4	8.8'	57.3'
2	208°25.6 223°25.3	19.5 •• 19.2	257°13.2 271°40.4	8.2' 8.1'	23°59.3 24°08.0	8.7' 8.6'	57.4' 57.4'
3 4	223 25.3 238°25.0	18.8	271 40.4 286°07.5	8.1 7.9'	24 08.0 24°16.6	8.5'	57.4 57.5'
5	253°24.8	18.5	300°34.4	7.8'	24°25.0	8.3'	57.5'
6	268°24.5	S22°18.2	$315^{\circ}01.2$	7.7'	<b>S</b> 24°33.4	8.2'	57.5'
7	283°24.2	17.8	329°27.9	7.6'	24°41.6	8.1'	57.6'
8 9	298°23.9 313°23.7	17.5 •• 17.2	343°54.5 358°20.9	7.4' 7.3'	24°49.6 24°57.6	7.9' 7.8'	57.6' 57.6'
10	328°23.4	16.9	12°47.2	7.2'	25°05.4	7.6 7.7'	57.0°
11	343°23.1	16.5	27°13.4	7.1'	25°13.1	7.5'	57.7'
12	358°22.9	S22°16.2	41°39.4	6.9'	S25°20.6	7.4'	57.7'
13 14	13°22.6 28°22.3	15.9 15.5	56°05.4 70°31.2	6.8' 6.7'	25°28.0 25°35.2	7.3' 7.1'	57.8' 57.8'
15	43°22.1	15.2	84°56.8	6.6'	25°42.3	7.1	57.6 57.9'
16	58°21.8	14.9	99°22.4	6.4'	25°49.3	6.8'	57.9'
17	73°21.6	14.5	$113^{\circ}47.8$	6.3'	$25^{\circ}56.1$	6.7'	57.9'
18	88°21.3	\$22°14.2	128°13.2	6.2'	S26°02.8	6.5'	58.0'
19 20	103°21.0 118°20.8	13.8 13.5	142°38.4 157°03.4	6.1' 6.0'	26°09.3 26°15.7	6.4' 6.2'	58.0' 58.0'
21	133°20.5	13.2	171°28.4	5.8'	26°21.9	6.1	58.1'
22	148°20.2	12.8	185°53.3	5.7'	26°27.9	5.9'	58.1'
23	163°20.0	12.5	200°18.0	5.6'	26°33.8	5.7'	58.1'
	SD = 16.3'	d = -0.3'		SE	0 = 15.6'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178° 19.7	<b>S</b> 22°12.1	214°42.6	5.5'	S26°39.6	5.6'	58.2'
1	193°19.4	11.8	229°07.1	5.4'	26°45.2	5.4'	58.2'
2	208°19.2 223°18.9	11.5 •• 11.1	243°31.5 257°55.8	5.3' 5.2'	26°50.6 26°55.8	5.3' 5.1'	58.3' 58.3'
4	238°18.6	10.8	272°20.0	5.1'	20° 55.8 27° 00.9	4.9'	58.3'
5	253°18.4	10.4	286°44.0	5.0'	27°05.8	4.8'	58.4'
6	268°18.1	\$22°10.1	301°08.0	4.9'	\$27°10.6	4.6'	58.4'
7 8	283°17.9 298°17.6	09.7 09.4	315°31.9 329°55.6	4.8' 4.7'	27°15.2 27°19.6	4.4' 4.2'	58.4' 58.5'
9	298 17.0 313°17.3	09.4	329 55.0 344°19.3	4. <i>1</i> 4.6'	27 19.6 27°23.8	4.2 4.1'	58.5'
10	328°17.1	08.7	358°42.9	4.5'	$27^{\circ}27.9$	3.9'	58.5'
11	343°16.8	08.3	13°06.3	4.4'	27°31.8	3.7'	58.6'
12 13	358°16.6 13°16.3	\$22°08.0 07.6	27°29.7 41°53.0	4.3' 4.2'	\$27°35.5 27°39.0	3.5' 3.3'	58.6' 58.6'
13 14	28°16.0	07.6 07.3	41°53.0 56°16.2	4.2 4.1'	27° 39.0 27° 42.3	3.3'	58.7
15	43°15.8	06.9	70°39.3	4.0'	27°45.5	3.0'	58.7'
16	58° 15.5	06.6	85°02.3	3.9'	27°48.5	2.8'	58.7'
17	73°15.2	06.2	99°25.3	3.9'	27°51.3	2.6'	58.8'
18 19	88°15.0 103°14.7	\$22°05.9 05.5	113°48.1 128°10.9	3.8' 3.7'	\$27°53.9 27°56.3	2.4' 2.2'	58.8' 58.8'
20	105 14.7 118°14.5	05.5	142°33.6	3. <i>1</i> 3.6'	27°58.6	2.2	58.9'
21	133°14.2	• • 04.8	$156^{\circ}56.3$	3.6'	28°00.6	1.9'	58.9'
22	148°14.0	04.4	171°18.8	3.5'	28°02.5	1.7'	58.9'
23	163°13.7	04.1	185°41.3	3.4'	28°04.2	1.5'	59.0'
	SD = 16.3'	d = -0.3'		SE	0 = 15.9'		

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

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

		Sun		Moon				
Day	Eqn.of	f Time	Mer.	Mer.	Age			
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	26-28		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	23-8%		
07	05:50	06:03	12:06	08:14	20:40			
80	06:16	06:28	12:06	09:07	21:35			
09	06:41	06:54	12:07	10:05	22:36			

## January 10, 11, 12 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	109°01.3	216°36.1	\$20°48.2	194°37.8	\$24°00.9	75°11.4	N12°21.8	132°26.9	S11°31.5			
1	124°03.8	231°35.3	48.6	209°38.2	00.8	90°13.8	21.8	147°29.1	31.4	Alpheratz	357°35.7	29°13.5
2	139°06.3	246°34.6	49.1	224°38.6	00.8	105°16.2	21.8	162°31.4	31.3	Ankaa	353°08.0	-42°10.8
3	154°08.7	261°33.8	49.6	239°39.0	00.8	120°18.6	21.9	177°33.6	31.2	Schedar	349°32.1	56°40.4
4	$169^{\circ}11.2$	276°33.0	50.0	254°39.5	00.7	135°21.0	21.9	192°35.8	31.1	Diphda	348°48.2	-17°51.5
5	184°13.6	291°32.3	50.5	269°39.9	00.7	150°23.3	22.0	207°38.1	31.0	Achernar	335°20.7	-57°07.2
6	$199^{\circ}16.1$	306°31.5	S20°50.9	284°40.3	S24°00.7	165°25.7	N12°22.0	222°40.3	S11°30.9	Hamal Polaris	327°52.0 314°11.7	23°34.6 89°22.2
7	214°18.6	321°30.7	51.4	299°40.7	00.6	180°28.1	22.0	237°42.5	30.8	Acamar	315°12.2	-40°12.7
8	229°21.0	336° 29.9	51.8	314°41.1	00.6	195°30.5	22.1	252°44.8	30.7	Menkar	314°06.9	4°11.0
9	244°23.5	351°29.2	• • 52.3	329°41.5	• • 00.6	210°32.9	• • 22.1	267°47.0	• • 30.6	Mirfak	308°29.1	49°57.0
10	259°26.0	6°28.4	52.8	344°42.0	00.5	225°35.3	22.2	282°49.2	30.5	Aldebaran	290°40.3	16°33.5
11	274°28.4	21°27.6	53.2	359°42.4	00.5	240°37.6	22.2	297°51.5	30.4	Rigel	281°04.4	-8°10.5
12	289°30.9 304°33.4	36°26.8 51°26.1	\$20°53.7	14° 42.8 29° 43.2	\$24°00.4	255°40.0 270°42.4	N12°22.3	312°53.7 327°55.9	\$11°30.4	Capella	280°22.7	46°01.4
13 14	319°35.8	66°25.3	54.1 54.6	29 43.2 44°43.6	00.4 00.4	270 42.4 285°44.8	22.3 22.3	342°58.2	30.3 30.2	Bellatrix	278°23.5	6°22.3
15	334°38.3	81°24.5	55.0	59°44.0	. 00.4	300°47.2	22.4	358°00.4	• • 30.1	Elnath	278°02.6	28°37.7
16	349°40.8	96°23.7	55.5	74°44.4	00.3	315°49.6	22.4	13°02.6	30.0	Alnilam	275°38.3	-1°11.2
17	4°43.2	111°22.9	55.9	89°44.9	00.2	330°51.9	22.5	28°04.8	29.9	Betelgeuse	270°52.7	7°24.7
18	19°45.7	126°22.2	S20°56.4	104°45.3	\$24°00.2	345°54.3	N12°22.5	43°07.1	S11°29.8	Canopus	263°52.2	-52°42.5
19	34°48.1	141°21.4	56.8	119°45.7	00.2	0°56.7	22.5	58°09.3	29.7	Sirius	258°26.6	-16°45.0 -29°00.3
20	49°50.6	156°20.6	57.2	134°46.1	00.1	$15^{\circ}59.1$	22.6	73°11.5	29.6	Adhara	255°06.1 244°51.4	-29 00.3 5°09.8
21	64°53.1	171°19.8	•• 57.7	149°46.5	•• 00.1	31°01.5	• • 22.6	88°13.8	• • 29.5	Procyon Pollux	244 51.4 243°17.9	5 09.8 27°58.0
22	79°55.5	186° 19.1	58.1	164°46.9	0.00	46°03.8	22.7	103°16.0	29.4	Avior	234° 14.4	-59°35.1
23	94°58.0	201°18.3	58.6	179°47.4	0.00	61°06.2	22.7	118°18.2	29.3	Suhail	222°46.5	-43°31.6
Mer.p	ass. 16:41	$\nu$ -0.8' d0	.5′ m-3.98	$\nu$ 0.4′ d-0	.0′ m1.36	$\nu$ 2.4′ d0.	0′ m-2.52	$\nu 2.2' \ d-0$	.1′ m0.97	Miaplacidus	221°37.6	-69°48.7
										Alphard	217°48.3	-8°45.7
	6114	6114	_	6114	_	6114	-	6114	_	Regulus	207°35.1	11°50.9
Thu 0	<b>GHA</b> 110°00.5	<b>GHA</b> 216° 17.5	<b>Dec</b> \$20°59.0	<b>GHA</b> 194° 47.8	<b>Dec</b> \$23°59.9	<b>GHA</b> 76° 08.6	<b>Dec</b> N12°22.8	<b>GHA</b> 133°20.5	<b>Dec</b> \$11°29.2	Dubhe	193°41.6	61°37.0
0 1	110°00.5 125°02.9	216°17.5 231°16.7	520°59.0 59.5	194°47.8 209°48.2	59.9	91°11.0	22.8	133°20.5 148°22.7	29.2	Denebola	182°25.7	14°26.2
2	125 02.9 140°05.4	231 16.7 246°15.9	59.5 20°59.9	209 48.2 224°48.6	59.9 59.9	91 11.0 106°13.3	22.8	148 22.7 163°24.9	29.2 29.1	Gienah	175°44.4	-17°40.4
3	155°07.9	261°15.2	21°00.3	239°49.0	• • 59.8	121°15.7	22.9	178°27.2	29.0		173°00.9	-63°13.6
4	170°10.3	276° 14.4	00.8	254°49.4	59.8	136° 18.1	22.9	193°29.4	28.9	1	171°52.5	-57°14.6
5	185°12.8	291°13.6	01.2	269°49.9	59.7	151°20.5	23.0	208°31.6	28.8	Alioth	166°13.6	55°49.5
6	200°15.3	306°12.8	S21°01.6	284°50.3	S23°59.7	166°22.8	N12°23.0	223°33.8	S11°28.7	Spica	158°23.2	-11°17.2
7	215°17.7	$321^{\circ}12.0$	02.1	299°50.7	59.6	181°25.2	23.1	238°36.1	28.6	Alkaid Hadar	152°52.7 148°37.3	49°11.3 -60°29.0
8	230°20.2	$336^{\circ}11.2$	02.5	$314^{\circ}51.1$	59.6	196°27.6	23.1	253°38.3	28.5		146 37.3 147°58.7	-36°29.1
9	245°22.6	351°10.5	• • 02.9	329°51.5	• • 59.5	211°30.0	• • 23.2	268°40.5	• • 28.4	Arcturus	147° 38.7	19°03.3
10	$260^{\circ}25.1$	6°09.7	03.4	344°51.9	59.5	226°32.4	23.2	283°42.8	28.3	Rigil Kent.	139°41.7	-60°55.8
11	275°27.6	21°08.9	03.8	359°52.3	59.4	241°34.7	23.2	298°45.0	28.2	Kochab	137°20.3	74°03.1
12	290°30.0	36°08.1	S21°04.2	14°52.8	S23°59.4	256°37.1	N12°23.3	313°47.2	S11°28.1	Zuben'ubi	$136^{\circ}57.1$	-16°08.4
13	305°32.5	51°07.3	04.6	29°53.2	59.3	271°39.5	23.3	328°49.4	28.0	Alphecca	$126^{\circ}04.7$	26°37.8
14	320°35.0	66°06.5	05.1	44°53.6	59.3 •• 59.2	286°41.8 301°44.2	23.4	343°51.7 358°53.9	27.9	Antares	$112^{\circ}17.1$	-26°29.0
15 16	335°37.4 350°39.9	81°05.7 96°05.0	· · 05.5 05.9	59°54.0 74°54.4	· · 59.2 59.2	301 44.2 316°46.6	· · 23.4 23.5	13°56.1	· · 27.9 27.8	Atria	$107^{\circ}12.6$	-69°04.0
17	5°42.4	111°04.2	06.3	89°54.8	59.2	331°49.0	23.5	28°58.4	27.7	Sabik	102°04.0	-15°45.3
18	20°44.8	126°03.4	S21°06.8	104°55.2	S23°59.1	346°51.3	N12°23.6	44°00.6	S11°27.6	Shaula	96°11.9	-37°07.2
19	35°47.3	141°02.6	07.2	119°55.7	59.0	1°53.7	23.6	59°02.8	27.5	Rasalhague	95°59.6	12°32.4
20	50°49.8	156°01.8	07.6	134°56.1	59.0	16° 56.1	23.6	74°05.0	27.4	Eltanin	90°43.1	51°29.0
21	65°52.2	171°01.0	08.0	149° 56.5	• • 58.9	31°58.4	• • 23.7	89°07.3	27.3	Kaus Aust. Vega	83°34.0	-34°22.4 38°48.2
22	80°54.7	186°00.2	08.4	164°56.9	58.9	47°00.8	23.7	104°09.5	27.2	Nunki	80°34.2 75°49.2	-26°16.1
23	95°57.1	200°59.4	08.9	179°57.3	58.8	62°03.2	23.8	$119^{\circ}11.7$	27.1	Altair	62°01.1	8°55.8
Mern	ass. 16:37	v-0.8' d0	.4′ m-3.98	ν0 4' d-0	.0′ m1.36	ν2 4' dΩ	0′ m-2.51	v2 2' d-0	.1′ m0.97	Peacock	53°07.6	-56°39.6
		- 0.0 40								Deneb	49°26.8	45°22.0
			_		_		_		_	Enif	33°39.9	9°59.1
Fri	GHA	GHA	Dec	GHA 104° 57 7	<b>Dec</b> \$23°58.8	GHA	Dec	GHA	Dec	Al Na'ir	27°34.3	-46°50.9
0 1	110°59.6 126°02.1	215°58.7 230°57.9	\$21°09.3 09.7	194°57.7 209°58.1	523°58.8 58.7	77°05.6 92°07.9	N12°23.8 23.9	134°14.0 149°16.2	\$11°27.0 26.9	Fomalhaut	15°15.6	-29°29.9
2	141°04.5	230 57.9 245°57.1	10.1	209 58.1 224°58.6	58.7	92 07.9 107°10.3	23.9	149 10.2 164°18.4	26.8	Scheat	13°46.2	28°12.8
3	156°07.0	260°56.3	10.1	239°59.0	• • 58.6	107 10.3 122°12.7	24.0	179°20.6	26.7	Markab	13°30.9	15°20.1
4	171°09.5	275°55.5	10.9	254°59.4	58.5	137° 15.0	24.0	194°22.9	26.6	Jan 10 Wed	SHA	Mer.pass
5	186°11.9	290°54.7	11.3	269°59.8	58.5	152°17.4	24.1	209°25.1	26.6		107°34.8	09:34
6	201°14.4	305°53.9	S21°11.8	285°00.2	S23°58.4	167° 19.8	$N12^{\circ}24.1$	224°27.3	S11°26.5	Mars	$85^{\circ}36.5$	11:01
7	$216^{\circ}16.9$	$320^{\circ}53.1$	12.2	$300^{\circ}00.6$	58.4	$182^{\circ}22.1$	24.1	239°29.5	26.4	Jupiter		18:56
8	231°19.3	335°52.3	12.6	315°01.0	58.3	197°24.5	24.2	254°31.8	26.3	Saturn	23°25.6	15:08
9	246°21.8	350°51.5	• • 13.0	330°01.5	• • 58.3	212°26.9	• • 24.2	269°34.0	• • 26.2	Jan 11 Thu	SHA	Mer.pass
10	261°24.3	5°50.7	13.4	345°01.9	58.2	227°29.2	24.3	284°36.2	26.1		106°17.0	09:35
11	276°26.7	20°49.9	13.8	0°02.3	58.1	242°31.6	24.3	299°38.5	26.0	Mars	84°47.3	11:01
12	291°29.2	35°49.2	\$21°14.2	15°02.7 30°03.1	\$23°58.1	257°34.0	N12°24.4	314°40.7 329°42.9	\$11°25.9	Jupiter		18:52
13 14	306°31.6 321°34.1	50° 48.4 65° 47.6	14.6 15.0	45°03.5	58.0 58.0	272°36.3 287°38.7	24.4 24.5	329°42.9 344°45.1	25.8 25.7	Saturn	23°20.0	15:04
14 15	321 34.1 336°36.6	80°46.8	15.0	45 03.5 60°03.9	58.0	302°41.1	24.5	344 45.1 359°47.4	25.7	lan 12 E.:	CUV	Mar noor
16	350°30.0	95°46.0	15.4	75°04.4	57.8	317°43.4	24.5	14°49.6	25.5	Jan 12 Fri	SHA 104°59.0	Mer.pass 09:37
17	6°41.5	110° 45.2	16.2	90°04.8	57.8 57.8	332°45.8	24.6	29°51.8	25.4	Venus Mars	83°58.1	09:37 11:00
18	21°44.0	125° 44.4	S21°16.6	105°05.2	\$23°57.7	347°48.2	N12°24.7	44°54.0	S11°25.3		326°05.9	18:49
19	36°46.4	140°43.6	17.0	120°05.6	57.6	2°50.5	24.7	59°56.3	25.2	Saturn	23°14.3	15:01
20	51°48.9	155°42.8	17.4	135°06.0	57.6	17°52.9	24.8	74°58.5	25.1			10.01
21	$66^{\circ}51.4$	$170^{\circ}42.0$	• • 17.8	$150^{\circ}06.4$	• • 57.5	$32^{\circ}55.3$	• • 24.8	90°00.7	• • 25.0	Horizont	al parallax	
22	81°53.8	185°41.2	18.2	165°06.8	57.5	47°57.6	24.9	105°02.9	25.0		Venus:	0.1
23	96°56.3	200°40.4	18.6	180°07.2	57.4	63°00.0	24.9	120°05.2	24.9		Mars:	0.1
Mer.p	ass. 16:33	$\nu$ -0.8' d0	.4′ m-3.97	$\nu 0.4' \ d-0$	.1′ m1.36	$\nu 2.4' \ d0.$	0′ m-2.50	$\nu 2.2' \ d-0$	.1′ m0.97			

h	Su	n	Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°13.4	S22°03.7	200°03.7	3.4'	\$28°05.6	1.3'	59.0'
1	193°13.2	03.4	214°26.1 228°48.4	3.3'	28°06.9 28°08.0	1.1'	59.0'
2	208° 12.9 223° 12.7	03.0 •• 02.6	228°48.4 243°10.7	3.2' 3.2'	28°08.0 28°08.9	0.9' 0.7'	59.1' 59.1'
4	238° 12.4	02.3	257°32.9	3.1'	28°09.6	0.5'	59.1'
5	253°12.1	01.9	271°55.0	3.1'	28°10.1	0.3'	59.2'
6	268°11.9	\$22°01.5	286°17.1	3.0'	\$28°10.4	0.1'	59.2'
7 8	283°11.6 298°11.4	01.2 00.8	300°39.1 315°01.1	3.0' 3.0'	28°10.6 28°10.5	-0.1' -0.3'	59.2' 59.3'
9	313°11.1	. 00.5	329°23.1	2.9'	28°10.2	-0.5	59.3'
10	328°10.9	22°00.1	343°45.0	2.9'	28°09.7	-0.7'	59.3'
11	343°10.6	21°59.7	358°06.9	2.9'	28°09.0	-0.9'	59.3'
12 13	358° 10.4 13° 10.1	\$21°59.3 59.0	12°28.8 26°50.6	2.8' 2.8'	\$28°08.1 28°07.0	-1.1' -1.3'	59.4' 59.4'
14	28° 09.8	58.6	41°12.4	2.8'	28°05.8	-1.5'	59.4'
15	43°09.6	• • 58.2	55°34.2	2.8'	28°04.3	-1.7'	59.5'
16	58°09.3	57.9	69°56.0	2.7'	28°02.6	-1.9'	59.5'
17	73°09.1	57.5 \$21°57.1	84°17.7 98°39.4	2.7'	28°00.7 \$27°58.6	-2.1'	59.5'
18 19	88°08.8 103°08.6	56.7	98°39.4 113°01.2	2.7' 2.7'	27°56.3	-2.3' -2.5'	59.5' 59.6'
20	118° 08.3	56.4	113 01.2 127°22.9	2.7'	27°53.8	-2.5' -2.7'	59.6'
21	133°08.1	• • 56.0	141°44.6	2.7'	27°51.1	-2.9'	59.6'
22	148°07.8	55.6	156°06.3	2.7'	27°48.2	-3.1'	59.6'
23	163°07.6	55.2	170°28.0	2.7'	27°45.1	-3.3'	59.7'
	SD = 16.3'	d = -0.4'		S	D = 16.1'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°07.3	S21°54.9	184°49.7	2.7'	S27°41.8	-3.5'	59.7'
1	193°07.1	54.5	199°11.5	2.7'	27°38.2	-3.7'	59.7'
2	208°06.8	54.1	213°33.2	2.7'	27°34.5	-3.9'	59.7'
3 4	223°06.5 238°06.3	· · 53.7 53.3	227°54.9 242°16.7	2.8' 2.8'	27°30.6 27°26.5	-4.1' -4.3'	59.8' 59.8'
5	250 00.5 253°06.0	53.5 53.0	242 10.7 256°38.5	2.8'	27°22.2	-4.5'	59.8'
6	268° 05.8	S21°52.6	271°00.3	2.8'	S27°17.6	-4.7'	59.8'
7	283°05.5	52.2	$285^{\circ}22.1$	2.9'	27°12.9	-4.9'	59.9'
8	298°05.3	51.8	299°44.0	2.9'	27°08.0	-5.1'	59.9'
9	313°05.0	• • 51.4	314°05.9 328°27.8	2.9'	27°02.9	-5.3'	59.9'
10 11	328° 04.8 343° 04.5	51.1 50.7	328°27.8 342°49.7	3.0' 3.0'	26°57.6 26°52.1	-5.5' -5.7'	59.9' 59.9'
12	358° 04.3	S21°50.3	357°11.7	3.0'	\$26°46.4	-5.9	60.0'
13	13°04.0	49.9	11°33.8	3.1'	26°40.4	-6.1'	60.0'
14	28°03.8	49.5	25°55.9	3.1'	26°34.3	-6.3'	60.0'
15 16	43°03.5 58°03.3	· · 49.1 48.7	40°18.0 54°40.2	3.2' 3.2'	26°28.1 26°21.6	-6.5' -6.7'	60.0' 60.0'
17	73°03.0	48.3	69°02.4	3.2 3.3'	26°14.9	-6.7 -6.9'	60.1
18	88°02.8	S21°47.9	83°24.7	3.3'	S26°08.0	-7.1'	60.1
19	103°02.5	47.6	97°47.0	3.4'	$26^{\circ}01.0$	-7.2'	60.1'
20	118°02.3	47.2	112°09.4		25°53.7	-7.4'	60.1'
21 22	133°02.1 148°01.8	· · 46.8 46.4	126°31.9 140°54.4	3.5' 3.6'	25°46.3 25°38.6	-7.6' -7.8'	60.1' 60.2'
23	163°01.6	46.4	140 54.4 155°17.0	3.7'	25°30.8	-7.6 -8.0'	60.2
	SD = 16.3'	d = -0.4'			D = 16.3'		
Fri 0	<b>GHA</b> 178°01.3	<b>Dec</b> \$21°45.6	<b>GHA</b> 169°39.6	ν 3.7'	<b>Dec</b> \$25°22.8	d -8.2'	<b>HP</b> 60.2'
1	178°01.3 193°01.1	\$21 45.6 45.2	169°39.6 184°02.4	3.7° 3.8′	25° 14.7	-8.2 -8.4'	60.2'
2	208° 00.8	44.8	198°25.2	3.9'	25°06.3	-8.5'	60.2'
3	223°00.6	• • 44.4	212°48.0	3.9'	24°57.8	-8.7'	60.2'
4	238°00.3	44.0	227°11.0	4.0'	24°49.1	-8.9'	60.2'
5 6	253°00.1 267°59.8	43.6 \$21°43.2	241°34.0 255°57.1	4.1' 4.2'	24°40.2 \$24°31.1	-9.1' -9.2'	60.3' 60.3'
7	282° 59.6	42.8	270°20.3	4.2	24°21.8	-9.2 -9.4'	60.3
8	297° 59.4	42.4	284°43.5	4.3'	24°12.4	-9.6'	60.3'
9	312°59.1	• • 42.0	299°06.9	4.4'	24°02.8	-9.8'	60.3'
10	327°58.9	41.6	313°30.3	4.5'	23°53.1	-9.9'	60.3'
11 12	342°58.6 357°58.4	41.2 \$21°40.8	327°53.8 342°17.4	4.6' 4.7'	23°43.2 \$23°33.1	-10.1' -10.3'	60.3' 60.3'
13	12° 58.1	40.4	356°41.1	4.8	23°22.8	-10.3	60.3
14	27° 57.9	40.0	11°04.9	4.9'	23°12.4	-10.6'	60.4
15	42°57.6	• • 39.6	25°28.7	5.0'	23°01.8	-10.7'	60.4'
16	57° 57.4	39.2	39°52.7	5.1'	22°51.1	-10.9'	60.4
17 18	72°57.2 87°56.9	38.8 \$21°38.3	54°16.7 68°40.9	5.1' 5.2'	22°40.2 \$22°29.2	-11.0' -11.2'	60.4' 60.4'
18	102° 56.7	37.9	83°05.1	5.2 5.3'	22°18.0	-11.2 -11.4'	60.4'
20	117° 56.4	37.5	97°29.5	5.4'	22°06.6	-11.5'	60.4
21	132° 56.2	• • 37.1	111°53.9	5.5'	21°55.1	-11.6'	60.4'
22	147°56.0	36.7	126°18.4	5.6'	21°43.5	-11.8'	60.4
23	162°55.7	36.3	140°43.1	5.7'	21°31.7	-11.9'	60.4'
	SD = 16.3'	d = -0.4'		S	D = 16.4'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut
N 72°	08:10	10:09			14:07	16:06
<b>N</b> 70°	07:54	09:30			14:46	16:22
68°	07:41	09:03	10:55	13:21	15:13	16:35
66°	07:30	08:42	10:06	14:10	15:34	16:46
64°	07:20	08:25	09:35	14:41	15:50	16:56
62°	07:12	08:12	09:12	15:04	16:04	17:04
60°	07:05	08:00	08:54	15:22	16:16	17:11
N 58°	06:58	07:49	08:39	15:37	16:26	17:18
56°	06:53	07:40	08:26	15:50	16:35	17:23
54°	06:47	07:32	08:15	16:01	16:44	17:29
52° 50°	06:42	07:25	08:05	16:11	16:51	17:34
50 45°	06:37 06:27	07:18 07:04	07:56 07:37	16:20 16:39	16:58 17:12	17:38 17:49
<b>N</b> 40° 35°	06:18 06:09	06:51	07:21	16:54	17:24	17:58 18:06
30°	06:09	06:41 06:31	07:08 06:57	17:07 17:19	17:35 17:45	18:14
20°	05:46	06:14	06:37	17:38	18:02	18:29
N 10°	05:32	05:58	06:20	17:55	18:18	18:44
0°	05:16	05:42	06:04	18:11	18:34	19:00
<b>S</b> 10°	04:58	05:25	05:48	18:28	18:50	19:17
20°	04:37	05:06	05:30	18:45	19:09	19:38
30°	04:10	04:43	05:10	19:05	19:32	20:05
35°	03:53	04:29	04:58	19:17	19:46	20:22
40°	03:31	04:12	04:44	19:31	20:03	20:43
45°	03:04	03:51	04:27	19:48	20:24	21:11
<b>S</b> 50°	02:24	03:24	04:07	20:08	20:50	21:50
52°	02:02	03:11	03:57	20:18	21:04	22:12
54°	01:31	02:55	03:46	20:29	21:19	22:42
56°	00:25	02:36	03:33	20:41	21:38	23:39
58°	////	02:12	03:18	20:56	22:01	////
<b>S</b> 60°	////	01:39	03:01	21:13	22:34	////
Lat.	1 14/ 1	Moonris		1	Moonset	
N 72°	Wed	Thu	Fri	Wed	Thu	Fri
N 70°						_
68°						
66°			12:29			14:14
64°			11:29			15:14
62°		11:03	10:54		13:28	15:47
60°	09:40	10:16	10:29	12:37	14:14	16:12
<b>N</b> 58°	09:01	09:46	10:08	13:16	14:44	16:31
56°	08:34	09:23	09:52	13:43	15:07	16:47
54°	08:12	09:04	09:37	14:04	15:26	17:01
52°	07:54	08:48	09:25	14:22	15:41	17:13
50°	07:39	08:34	09:14	14:37	15:55	17:24
45°	07:08	08:06	08:50	15:08	16:23	17:46
	06:45	07:43	08:32	15:32	16:44	18:03
<b>N</b> 40°						
35°	06:25	07:25	08:16	15:51	17:02	18:18
35° 30°	06:08	07:09	08:02	16:08	17:18	18:31
35° 30° 20°	06:08 05:40	07:09 06:42	08:02 07:39	16:08 16:36	17:18 17:44	18:31 18:52
35° 30°	06:08	07:09	08:02	16:08	17:18	18:31

	1			l					
<b>S</b> 50°	02:08	03:17	04:41	20:06	20:53	21:26			
52°	01:53	03:03	04:29	20:20	21:05	21:36			
54°	01:36	02:46	04:16	20:37	21:19	21:46			
56°	01:15	02:26	04:00	20:57	21:36	21:58			
58°	00:49	02:01	03:41	21:22	21:55	22:12			
<b>S</b> 60°	00:13	01:28	03:18	21:56	22:19	22:27			
		Sun			Moon	Age			
Day	Eqn.of	<b>Sun</b> f Time	Mer.	Mer.	Pass.	Age			
Day	Eqn.of		Mer. Pass	Mer. Upper		Age 29-1			
Day	1 :	f Time			Pass.	_			
<b>Day</b>	00 <sup>h</sup>	f Time	Pass	Upper	Pass. Lower	29-1			
	00 <sup>h</sup> mm:ss	f Time 12 <sup>h</sup> mm:ss	Pass hh:mm	Upper hh:mm	Pass. Lower hh:mm 23:40	29-1			
10	00 <sup>h</sup> mm:ss	f Time 12 <sup>h</sup> mm:ss	Pass hh:mm 12:07	Upper hh:mm 11:08	Pass. Lower hh:mm	29-1			

06:59

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18:10 18:37

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19:36

18:27

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19:09 19:35

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19:45

20:03 20:24

20:36

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21:06

04:53

04:30 04:06 03:38

03:21

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02:38

 $0^{\circ}$ 

**S** 10° 20° 30°

35°

40°

45°

05:57

05:35

05:11 04:44

04:28

04:09

03:46

January 13, 14, 15 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	111°58.8	215°39.6	S21°19.0	195°07.7	\$23°57.3	78°02.3	N12°25.0	135°07.4	S11°24.8			
1	127°01.2	230°38.8	19.4	210°08.1	57.3	93°04.7	25.0	150°09.6	24.7	Alpheratz	357°35.7	29°13.5
2	142°03.7	245°38.0	19.7	225°08.5	57.2	108° 07.1	25.0	165°11.8	24.6	Ankaa	353°08.0	-42°10.8
3	157°06.1	260°37.2	20.1	240°08.9	57.1	123°09.4	25.1	180°14.1	24.5	Schedar	349°32.1	56°40.4
4	172°08.6	275°36.4	20.5	255°09.3	57.1	138° 11.8	25.1	195°16.3	24.4	Diphda	348°48.2	-17°51.5
5	$187^{\circ}11.1$	290°35.6	20.9	270°09.7	57.0	153° 14.1	25.2	210°18.5	24.3	Achernar	335°20.7	-57°07.2
6	202°13.5	305°34.8	S21°21.3	285°10.1	S23°56.9	168° 16.5	N12°25.2	225°20.7	S11°24.2	Hamal	327°52.0	23°34.6 89°22.2
7	$217^{\circ}16.0$	320°34.0	21.7	$300^{\circ}10.6$	56.9	183° 18.9	25.3	240°23.0	24.1	Polaris Acamar	314°13.1 315°12.2	-40°12.7
8	$232^{\circ}18.5$	335°33.2	22.1	$315^{\circ}11.0$	56.8	198°21.2	25.3	255°25.2	24.0	Menkar	314°06.9	4°11.0
9	247°20.9	350°32.4	• • 22.4	330°11.4	• • 56.7	213°23.6	• • 25.4	270°27.4	• • 23.9	Mirfak	308° 29.2	49°57.0
10	262°23.4	5°31.6	22.8	345°11.8	56.6	228°25.9	25.4	285°29.6	23.8	Aldebaran	290°40.3	16°33.5
11	277°25.9	20°30.8	23.2	0°12.2	56.6	243°28.3	25.5	300°31.9	23.7	Rigel	281°04.4	-8°10.5
12	292°28.3	35°30.0	S21°23.6	15°12.6	S23°56.5	258°30.7	N12°25.5	315°34.1	S11°23.6	Capella	280°22.7	46°01.4
13	307°30.8	50°29.2	24.0	30°13.0	56.4	273°33.0	25.6	330°36.3	23.5	Bellatrix	278°23.5	6°22.3
14 15	322°33.3 337°35.7	65°28.4 80°27.6	24.3 •• 24.7	45°13.4 60°13.9	56.4 •• 56.3	288°35.4 303°37.7	25.6 •• 25.7	345°38.5 0°40.8	23.4 •• 23.4	Elnath	278°02.6	28°37.7
16	352°38.2	95°26.8	25.1	75°14.3	56.2	318° 40.1	25.7	15°43.0	23.3	Alnilam	275°38.2	$-1^{\circ}11.2$
17	7°40.6	110°26.0	25.5	90°14.7	56.1	333° 42.4	25.8	30°45.2	23.2	Betelgeuse	270°52.6	7°24.7
18	22°43.1	125°25.2	S21°25.8	105°15.1	S23°56.1	348° 44.8	N12°25.8	45°47.4	S11°23.1	Canopus	263°52.2	-52°42.5
19	37°45.6	140°24.4	26.2	120°15.5	56.0	3°47.1	25.9	60°49.7	23.0	Sirius	258°26.6	-16°45.0
20	52°48.0	155°23.6	26.6	135°15.9	55.9	18° 49.5	25.9	75°51.9	22.9	Adhara	255°06.1	-29°00.3
21	67°50.5	170°22.7	26.9	150°16.3	• • 55.9	33°51.9	26.0	90°54.1	• • 22.8	Procyon	244°51.3	5°09.8
22	82°53.0	185°21.9	27.3	$165^{\circ}16.7$	55.8	48°54.2	26.0	105°56.3	22.7	Pollux	243°17.9 234°14.4	27°58.0 -59°35.1
23	97°55.4	$200^{\circ}21.1$	27.7	$180^{\circ}17.2$	55.7	$63^{\circ}56.6$	26.1	$120^{\circ}58.6$	22.6	Avior Suhail	234° 14.4 222° 46.5	-59°35.1 -43°31.7
Morn	ass. 16:29	1/-U 8/ 40	.4′ m-3.97	υΩΛ' Α Ω	.1′ m1.36	1/2 1/ 40	0′ m-2.49	1/2 2/ d 0	.1' m0.97	Miaplacidus	222°46.5 221°37.6	-43°31.7 -69°48.7
ivier.p	ass. 10.29	ν-0.0 α0	.+ 111-3.91	νυ.4 α-0	.1111.30	ν Δ.4 UU.	U 111-2.49	ν Δ.Δ α-U	.1 1110.91	Alphard	221 37.0 217°48.3	-69 48.7 -8°45.8
										Regulus	207°35.0	11°50.9
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.6	61°37.0
0	112°57.9	215°20.3	S21°28.0	195°17.6	S23°55.6	78°58.9	N12°26.1	136°00.8	S11°22.5	Denebola	182°25.6	14°26.2
1	128°00.4	230°19.5	28.4	210°18.0	55.5	94°01.3	26.2	151°03.0	22.4	Gienah	175°44.3	-17°40.4
2	143°02.8	245°18.7	28.8	225°18.4	55.5	109°03.6	26.2	166°05.2	22.3	Acrux	173°00.9	-63°13.6
3	158°05.3	260°17.9	• • 29.1	240°18.8	• • 55.4	124°06.0	· · 26.3	181°07.5	• • 22.2	Gacrux	$171^{\circ}52.4$	-57°14.6
4	173°07.7	275°17.1	29.5	255°19.2	55.3	139°08.3	26.4	196°09.7	22.1	Alioth	$166^{\circ}13.6$	55°49.5
5 6	188°10.2 203°12.7	290°16.3 305°15.5	29.9 \$21°30.2	270°19.6 285°20.0	55.2 \$23°55.2	154° 10.7 169° 13.0	26.4 N12°26.5	211°11.9 226°14.1	22.0 \$11°21.9	Spica	158°23.2	-11°17.2
7	203 12.7 218°15.1	320° 14.7	30.6	300°20.5	55.1	184° 15.4	26.5	241°16.3	21.8	Alkaid	152°52.7	49°11.3
8	233°17.6	335°13.9	30.9	315°20.9	55.0	199° 17.7	26.6	256°18.6	21.7	Hadar	148°37.3	-60°29.0
9	248°20.1	350°13.1	31.3	330°21.3	• • 54.9	214°20.1	26.6	271°20.8	21.6		147°58.7	-36°29.1
10	263°22.5	5°12.2	31.7	345°21.7	54.8	229°22.4	26.7	286°23.0	21.5	Arcturus	145°48.7	19°03.3
11	278°25.0	20°11.4	32.0	0°22.1	54.8	244°24.8	26.7	301°25.2	21.5	Rigil Kent. Kochab	139°41.6 137°20.2	-60°55.8 74°03.0
12	293°27.5	35° 10.6	S21°32.4	15°22.5	S23°54.7	259°27.1	N12°26.8	316°27.5	S11°21.4	Zuben'ubi	137 20.2 136°57.0	-16°08.5
13	308°29.9	50°09.8	32.7	30°22.9	54.6	274°29.5	26.8	331°29.7	21.3	Alphecca	130° 57.0 126° 04.6	-10 06.5 26°37.8
14	323°32.4	65°09.0	33.1	45°23.3	54.5	289°31.8	26.9	346°31.9	21.2	Antares	112° 17.1	-26°29.1
15	338°34.9	80°08.2	• • 33.4	60°23.7	• • 54.4	304°34.2	• • 26.9	1°34.1	• • 21.1	Atria	107°12.5	-69°04.0
16	353°37.3	95°07.4	33.8	75°24.2	54.3	319°36.5	27.0	16°36.4	21.0	Sabik	102°04.0	-15°45.3
17	8°39.8	110°06.6	34.1	90°24.6	54.3	334°38.9	27.0	31°38.6	20.9	Shaula	96°11.8	-37°07.2
18	23°42.2	125°05.8	S21°34.5	105°25.0	S23°54.2	349°41.2	N12°27.1	46°40.8	S11°20.8	Rasalhague	95°59.6	12°32.4
19	38°44.7	140°04.9	34.8	120°25.4	54.1	4°43.6	27.1	61°43.0	20.7	Eltanin	90°43.1	51°28.9
20	53°47.2 68°49.6	155°04.1 170°03.3	35.2 •• 35.5	135°25.8 150°26.2	54.0 •• 53.9	19° 45.9 34° 48.3	27.2 •• 27.2	76°45.2 91°47.5	20.6 •• 20.5	Kaus Aust.	83°34.0	-34°22.4
21 22	83°52.1	170 03.3 185°02.5	35.8	165°26.6	53.8	49° 50.6	27.2	106°49.7	20.4	Vega	80°34.2	38°48.2
23	98°54.6	200°01.7	36.2	180°27.0	53.8	64° 53.0	27.4	100°49.7 121°51.9	20.4	Nunki	75°49.1	-26°16.1
										Altair	62°01.1	8°55.8
Mer.p	ass. 16:25	$\nu$ -0.8' d0	.4′ m-3.97	$\nu$ 0.4′ d-0	.1' m $1.35$	$\nu$ 2.4′ d0.	1'  m-2.49	$\nu$ 2.2′ d-0	$0.1^\prime$ m $0.97$	Peacock	53°07.6	-56°39.6
										Deneb	49°26.8	45°21.9
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir	33°39.9 27°34.3	9°59.1 -46°50.9
0	113°57.0	215°00.9	\$21°36.5	195°27.5	\$23°53.7	79°55.3	N12°27.4	136°54.1	S11°20.2	Fomalhaut	27 34.3 15°15.6	-46 50.9 -29°29.9
1	128°59.5	$230^{\circ}00.1$	36.9	$210^{\circ}27.9$	53.6	94°57.7	27.5	$151^{\circ}56.3$	20.1	Scheat	13°46.2	28°12.8
2	144°02.0	244°59.2	37.2	225°28.3	53.5	110°00.0	27.5	166°58.6	20.0	Markab	13°30.9	15°20.1
3	159°04.4	259°58.4	• • 37.5	240°28.7	• • 53.4	125°02.3	• • 27.6	182°00.8	• • 19.9			
4	174°06.9	274°57.6	37.9	255°29.1	53.3	140°04.7	27.6	197°03.0	19.8	Jan 13 Sat	SHA	Mer.pass
5	189°09.4	289°56.8	38.2	270°29.5	53.2	155°07.0	27.7	212°05.2	19.7		103°40.8	09:38
6	204°11.8	304°56.0	S21°38.5	285°29.9	\$23°53.1	170°09.4	N12°27.7	227°07.5	\$11°19.6	Mars Jupiter	83°08.9 326°03.6	10:59 18:45
7 8	219°14.3 234°16.7	319°55.2 334°54.3	38.9 39.2	300°30.3 315°30.7	53.0 53.0	185°11.7 200°14.1	27.8 27.8	242°09.7 257°11.9	19.5 19.4	Jupiter	23°08.6	18:45 14:57
9	234 10.7 249°19.2	334 54.3 349°53.5	39.5	315 30.7 330°31.2	52.9	200 14.1 215°16.4	27.9	257 11.9 272°14.1	19.4			
10	249 19.2 264°21.7	4° 52.7	39.9	345°31.6	52.8	230° 18.7	27.9	287°16.3	19.3	Jan 14 Sun	SHA	Mer.pass
11	279°24.1	19°51.9	40.2	0°32.0	52.7	245°21.1	28.0	302°18.6	19.2	I	102°22.4	09:39
12	294°26.6	34°51.1	S21°40.5	15°32.4	S23°52.6	260°23.4	N12°28.1	317°20.8	S11°19.1	Mars	82°19.7	10:59
13	309°29.1	49°50.3	40.9	30°32.8	52.5	275°25.8	28.1	332°23.0	19.0	Jupiter		18:41
14	324°31.5	64°49.4	41.2	45°33.2	52.4	$290^{\circ}28.1$	28.2	$347^{\circ}25.2$	18.9	Saturn	23°02.9	14:54
15	339°34.0	79°48.6	• • 41.5	60°33.6	• • 52.3	$305^{\circ}30.5$	• • 28.2	$2^{\circ}27.4$	• • 18.8	Jan 15 Mon	SHA	Mer.pass
16	354°36.5	94°47.8	41.8	75°34.0	52.2	$320^{\circ}32.8$	28.3	$17^{\circ}29.7$	18.7		101°03.8	09:40
17	9°38.9	109°47.0	42.2	90°34.4	52.1	335°35.1	28.3	32°31.9	18.6	Mars	81°30.4	10:58
18	24°41.4	124° 46.2	S21°42.5	105°34.9	S23°52.0	350° 37.5	N12°28.4	47°34.1	S11°18.5		$325^{\circ}58.3$	18:37
19	39°43.8	139°45.3	42.8	120°35.3	51.9	5°39.8	28.4	62°36.3	18.4	Saturn	22°57.1	14:50
20	54°46.3	154°44.5	43.1	135°35.7	51.8	20°42.1	28.5	77°38.5	18.3	Horizont	al parallax	
21	69°48.8	169°43.7	· · 43.4	150°36.1	· · 51.7	35°44.5	· · 28.6	92°40.8	18.2	1101120111	Venus:	0.1
22 23	84°51.2 99°53.7	184° 42.9 199° 42.1	43.8 44.1	165°36.5 180°36.9	51.6 51.5	50°46.8 65°49.2	28.6 28.7	107°43.0 122°45.2	18.1 18.0		Mars:	0.1
										L	=:=:	-
Mer.p	ass. 16:22	$\nu$ -0.8′ d0.	.3′ m-3.96	$\nu$ 0.4′ d-0	.1′ m1.35	$\nu$ 2.3′ d0.	1′ m-2.48	$\nu 2.2' \ d-0$	0.1′ m0.98			

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	177°55.5	S21°35.9	155°07.8	5.8'	S21°19.7	-12.1'	60.4
1 2	192°55.2 207°55.0	35.5 35.1	169°32.6 183°57.5	5.9' 6.0'	21°07.7 20°55.4	-12.2' -12.4'	60.4' 60.4'
3	222°54.8	• • 34.6	198°22.6	6.1	20°43.1	-12.5'	60.4
4	237°54.5	34.2	212°47.7	6.2'	20°30.6	-12.6'	60.4'
5	252°54.3 267°54.0	33.8 \$21°33.4	227°12.9 241°38.2	6.3' 6.4'	20°18.0 \$20°05.2	-12.8' -12.9'	60.4' 60.4'
6 7	267 54.0 282°53.8	33.4	241 38.2 256°03.7	6.5	19°52.3	-12.9 -13.0'	60.4
8	297°53.6	32.6	270°29.2	6.6'	19°39.3	-13.1'	60.4
9	312°53.3	• • 32.1	284°54.8	6.7'	19°26.2	-13.3'	60.4'
10 11	327°53.1 342°52.8	31.7 31.3	299°20.6 313°46.4	6.8' 6.9'	19°12.9 18°59.5	-13.4' -13.5'	60.4' 60.4'
12	357°52.6	\$21°30.9	328°12.3	7.0'	\$18°46.0	-13.6'	60.4
13	12°52.4	30.4	$342^{\circ}38.4$	7.1'	$18^{\circ}32.4$	-13.7'	60.4'
14 15	27°52.1 42°51.9	30.0 •• 29.6	357°04.5 11°30.7	7.2' 7.3'	18°18.6 18°04.8	-13.8' -14.0'	60.4' 60.4'
16	57°51.7	29.2	25°57.1	7.3 7.4'	17°50.8	-14.0 -14.1'	60.4
17	72°51.4	28.8	40°23.5	7.5'	$17^{\circ}36.8$	-14.2'	60.4'
18	87°51.2	S21°28.3	54°50.0	7.6'	\$17°22.6	-14.3'	60.4
19 20	102°51.0 117°50.7	27.9 27.5	69°16.7 83°43.4	7.7' 7.8'	17°08.3 16°53.9	-14.4' -14.5'	60.4' 60.4'
21	132°50.5	27.0	98°10.2	7.9'	16°39.4	-14.6'	60.4
22	147°50.3	26.6	112°37.2	8.0'	16°24.9	-14.7'	60.4'
23	162°50.0	26.2	127°04.2	8.1'	16°10.2	-14.8'	60.4'
	SD = 16.3'	d = -0.4'		SI	O = 16.5'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177°49.8	S21°25.8	141°31.3	8.2'	\$15°55.4	-14.9'	60.4'
1	192°49.6 207°49.3	25.3 24.9	155°58.5 170°25.9	8.3' 8.4'	15°40.5 15°25.6	-15.0' -15.0'	60.4' 60.4'
2	207°49.3 222°49.1	· · 24.5	170°25.9 184°53.3	8.4 8.5'	15° 25.6 15° 10.5	-15.0' -15.1'	60.4
4	237°48.9	24.0	199°20.8	8.6'	14°55.4	-15.2'	60.4
5	252°48.6	23.6	213°48.4	8.7'	14°40.2	-15.3'	60.4
6 7	267°48.4 282°48.2	\$21°23.2 22.7	228°16.1 242°43.8	8.8' 8.9'	\$14°24.9 14°09.5	-15.4' -15.5'	60.4' 60.4'
8	297°47.9	22.3	257°11.7	9.0'	13°54.1	-15.5'	60.4
9	312°47.7	• • 21.9	271°39.7	9.1'	13°38.6	-15.6'	60.3'
10 11	327°47.5 342°47.2	21.4 21.0	286°07.7 300°35.9	9.1' 9.2'	13°22.9 13°07.3	-15.7' -15.7'	60.3' 60.3'
12	357°47.0	\$21°20.5	315°04.1	9.3'	\$12°51.5	-15.8'	60.3
13	12°46.8	20.1	329°32.4	9.4'	12°35.7	-15.9'	60.3'
14 15	27°46.6 42°46.3	19.7 •• 19.2	344°00.8 358°29.3	9.5' 9.6'	12°19.8 12°03.9	-15.9' -16.0'	60.3' 60.3'
16	57°46.1	18.8	12°57.8	9.6'	12 03.9 11°47.9	-16.1	60.3
17	72°45.9	18.3	$27^{\circ}26.5$	9.7'	$11^{\circ}31.9$	-16.1'	60.3'
18	87°45.6 102°45.4	\$21°17.9	41°55.2	9.8'	\$11°15.7 10°59.6	-16.2'	60.2'
19 20	102 45.4 117°45.2	17.4 17.0	56°24.0 70°52.9	9.9' 10.0'	10°59.6	-16.2' -16.3'	60.2' 60.2'
21	132°45.0	• • 16.6	85°21.9	10.0'	10°27.1	-16.3	60.2
22	147°44.7	16.1	99°50.9	10.1'	10°10.7	-16.4'	60.2'
23	162°44.5	15.7	114°20.0	10.2'	09°54.4	-16.4'	60.2'
	SD = 16.3'	d = -0.4'		51	O = 16.5'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	177°44.3 192°44.0	\$21°15.2 14.8	128°49.2 143°18.5	10.3' 10.3'	\$09°37.9 09°21.5	-16.5' -16.5'	60.2' 60.1'
2	207°43.8	14.3	157°47.8	10.4	09°21.5	-16.5'	60.1
3	222°43.6	• • 13.9	172°17.2	10.5'	08°48.4	-16.6'	60.1'
4 5	237°43.4 252°43.1	13.4 13.0	186°46.7 201°16.2	10.5' 10.6'	08°31.8 08°15.2	-16.6' -16.7'	60.1' 60.1'
6	267°42.9	\$21° 12.5	201 10.2 215°45.8	10.0	507°58.5	-16.7	60.1
7	282°42.7	12.1	230°15.5	10.7'	07°41.8	-16.7'	60.1'
8	297° 42.5 312° 42.2	11.6 · · 11.2	244°45.3 259°15.1	10.8' 10.9'	07°25.1 07°08.4	-16.8' -16.8'	60.0' 60.0'
10	312 42.2 327°42.0	10.7	259 15.1 273°44.9	10.9'	07 06.4 06°51.6	-16.8'	60.0
11	342°41.8	10.3	288°14.8	11.0'	06°34.8	-16.8'	60.0'
12	357°41.6	S21°09.8	302°44.8	11.0'	506°18.0	-16.9'	60.0'
13 14	12°41.4 27°41.1	09.3 08.9	317°14.8 331°44.9	11.1' 11.1'	06°01.1 05°44.2	-16.9' -16.9'	59.9' 59.9'
15	42°40.9	•• 08.4	346°15.1	11.2'	$05^{\circ}27.3$	-16.9	59.9'
16	57°40.7	08.0	$0^{\circ}45.3$	11.3'	05°10.4	-16.9'	59.9'
17 18	72°40.5 87°40.2	07.5 \$21°07.1	15°15.5 29°45.8	11.3' 11.4'	04°53.5 \$04°36.6	-16.9' -16.9'	59.9' 59.8'
19	102°40.0	06.6	29 45.8 44°16.2	11.4 11.4'	04°19.6	-16.9 -17.0'	59.8'
20	117°39.8	06.1	58°46.6	11.4'	04°02.7	-17.0'	59.8'
21 22	132°39.6 147°39.4	· · 05.7 05.2	73°17.0 87°47.5	11.5' 11.5'	03°45.7 03°28.7	-17.0' -17.0'	59.8' 59.8'
23	147 39.4 162°39.1	05.2 04.7	102°18.1	11.5 11.6'	03 28.7 03°11.7	-17.0'	59.8 59.7'
	SD = 16.3'	d = -0.4'			0 = 16.4'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	08:04	09:58			14:21	16:15
<b>N</b> 70°	07:49	09:22			14:56	16:30
68°	07:36	08:57	10:40	13:38	15:22	16:42
66°	07:26	08:37	09:57	14:21	15:41	16:52
64°	07:17	08:21	09:29	14:49	15:57	17:01
62°	07:09	80:80	09:07	15:11	16:10	17:09
60°	07:02	07:57	08:50	15:28	16:22	17:16
<b>N</b> 58°	06:56	07:47	08:35	15:43	16:31	17:22
56°	06:51	07:38	08:23	15:55	16:40	17:28
54°	06:45	07:30	08:12	16:06	16:48	17:33
52°	06:41	07:23	08:02	16:16	16:55	17:38
50°	06:36	07:17	07:54	16:24	17:01	17:42
45°	06:26	07:03	07:36	16:43	17:15	17:52
<b>N</b> 40°	06:17	06:51	07:21	16:57	17:27	18:01
35°	06:09	06:40	07:08	17:10	17:38	18:09
30°	06:02	06:31	06:57	17:21	17:47	18:16
20°	05:47	06:14	06:38	17:40	18:04	18:31
<b>N</b> 10°	05:32	05:58	06:21	17:57	18:19	18:45
0°	05:17	05:43	06:05	18:13	18:35	19:01
<b>S</b> 10°	05:00	05:27	05:49	18:28	18:51	19:18
20°	04:39	05:08	05:32	18:45	19:10	19:38
30°	04:13	04:45	05:12	19:05	19:32	20:04
35°	03:56	04:32	05:01	19:17	19:46	20:21
40°	03:35	04:15	04:47	19:30	20:02	20:42
45°	03:09	03:55	04:31	19:46	20:22	21:08
<b>S</b> 50°	02:30	03:29	04:11	20:06	20:48	21:46
52°	02:09	03:16	04:02	20:15	21:01	22:07
54°	01:41	03:01	03:51	20:26	21:15	22:34
56°	00:53	02:43	03:39	20:38	21:33	23:18
58°	////	02:20	03:25	20:52	21:55	////
<b>S</b> 60°	////	01:50	03:08	21:09	22:25	////

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

## January 16, 17, 18 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	114°56.2	214°41.2	S21°44.4	195°37.3	S23°51.5	80°51.5	N12°28.7	137°47.4	S11°17.9			
1	129°58.6	229°40.4	44.7	210°37.7	51.4	95°53.8	28.8	152°49.6	17.8	Alpheratz	357°35.8	29°13.5
2	145°01.1	244°39.6	45.0	225°38.1	51.3	110°56.2	28.8	167°51.9	17.7	Ankaa	353°08.1	-42°10.8
3	160°03.6	259°38.8	• • 45.3	240°38.6	• • 51.2	125°58.5	• • 28.9	182°54.1	• • 17.6	Schedar	349°32.1	56°40.4
4	175°06.0	274°37.9	45.6	255°39.0	51.1	141°00.8	29.0	197°56.3	17.5	Diphda	348°48.2	-17°51.5
5	190°08.5	289°37.1	46.0	270°39.4	51.0	156°03.2	29.0	212°58.5	17.4	Achernar	335°20.8	-57°07.2
6	205°11.0	304°36.3	S21°46.3	285°39.8	S23°50.9	171°05.5	N12°29.1	228°00.7	S11°17.3	Hamal	327°52.1	23°34.6 89°22.2
7	220°13.4	$319^{\circ}35.5$	46.6	300°40.2	50.8	186°07.9	29.1	243°02.9	17.2	Polaris Acamar	314°14.5 315°12.2	-40°12.7
8	$235^{\circ}15.9$	334°34.6	46.9	315°40.6	50.7	201°10.2	29.2	258°05.2	17.1	Menkar	314°06.9	4° 11.0
9	$250^{\circ}18.3$	349°33.8	• • 47.2	330°41.0	• • 50.6	$216^{\circ}12.5$	• • 29.2	273°07.4	• • 17.0	Mirfak	308°29.2	49°57.0
10	265°20.8	4°33.0	47.5	345°41.4	50.4	231° 14.9	29.3	288°09.6	16.9	Aldebaran	290°40.3	16°33.5
11	280°23.3	19°32.2	47.8	0°41.8	50.3	246° 17.2	29.4	303°11.8	16.8	Rigel	281°04.4	-8°10.5
12	295°25.7	34°31.3	S21°48.1	15°42.3	S23°50.2	261° 19.5	N12°29.4	318°14.0	S11°16.7	Capella	280°22.7	46°01.4
13	310°28.2	49°30.5	48.4	30°42.7	50.1	276°21.9	29.5	333°16.3	16.6	Bellatrix	278°23.5	6°22.3
14	325°30.7	64°29.7	48.7	45°43.1	50.0	291°24.2	29.5	348°18.5	16.5	Elnath	278°02.6	28°37.7
15	340°33.1	79°28.9	• • 49.0	60°43.5	• • 49.9	306°26.5	• • 29.6	3°20.7	• • 16.4	Alnilam	275°38.3	-1°11.2
16	355°35.6	94°28.0	49.3	75°43.9	49.8	321°28.9	29.6	18°22.9	16.4	Betelgeuse	270°52.7	7°24.7
17	10°38.1	109°27.2	49.6	90°44.3	49.7	336°31.2	29.7	33°25.1	16.3	Canopus	263°52.2	-52°42.6
18	25°40.5	124°26.4	S21°49.9	105°44.7 120°45.1	\$23°49.6	351°33.5	N12°29.8	48°27.4	\$11°16.2	Sirius	258°26.6	-16°45.0
19 20	40°43.0 55°45.5	139°25.6 154°24.7	50.2 50.5	120°45.1 135°45.5	49.5 49.4	6°35.9 21°38.2	29.8 20.0	63°29.6 78°31.8	16.1 16.0	Adhara	$255^{\circ}06.1$	-29°00.3
20	55°45.5 70°47.9	154° 24.7 169° 23.9	50.5 • • 50.8	135° 45.5 150° 46.0	49.4 •• 49.3	36° 40.5	29.9 •• 29.9	78°31.8 93°34.0	16.0 •• 15.9	Procyon	$244^{\circ}51.3$	5°09.8
22	70 47.9 85°50.4	169 23.9 184°23.1	51.1	165° 46.4	49.3	51° 42.8	30.0	93 34.0 108°36.2	15.8	Pollux	243°17.9	27°58.0
23	100°52.8	104 23.1 199°22.2	51.1	180°46.8	49.2	66° 45.2	30.0	100 30.2 123°38.4	15.6	Avior	234°14.4	-59°35.1
										Suhail	222°46.5	-43°31.7
Mer.p	ass. 16:18	$\nu$ -0.8 $'$ d0	.3′ m-3.96	$\nu$ 0.4′ d-0	.1' m $1.35$	$\nu$ 2.3′ d0.	.1′ m-2.47	$\nu$ 2.2' d-0	$0.1' \; { m m0.98}$	Miaplacidus	221°37.6	-69°48.8
										Alphard	217°48.2	-8°45.8
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.0	11°50.9
0	115°55.3	214°21.4	S21°51.6	195° 47.2	S23°49.0	81° 47.5	N12°30.1	138°40.7	S11°15.6	Dubhe	193°41.5	61°37.0
1	130°57.8	229° 20.6	51.9	210° 47.6	48.9	96°49.8	30.2	153°42.9	15.5	Denebola	182°25.6	14°26.2
2	146°00.2	244° 19.8	52.2	225°48.0	48.8	111°52.2	30.2	168°45.1	15.4	Gienah	175°44.3	-17°40.5
3	161°02.7	259° 18.9	52.5	240°48.4	• • 48.6	126°54.5	30.3	183°47.3	• • 15.3		173°00.8	-63°13.6
4	176°05.2	274° 18.1	52.8	255° 48.8	48.5	141°56.8	30.3	198°49.5	15.2	1	171°52.4	-57°14.6
5	191°07.6	289° 17.3	53.1	270°49.2	48.4	156°59.1	30.4	213°51.7	15.1	Alioth	166°13.5	55°49.5
6	206°10.1	304°16.4	S21°53.4	285°49.7	S23°48.3	172°01.5	N12°30.5	228°54.0	S11°15.0	Spica	158°23.1 152°52.7	-11°17.2 49°11.3
7	221°12.6	$319^{\circ}15.6$	53.6	300°50.1	48.2	187°03.8	30.5	243°56.2	14.9	Alkaid Hadar	152 52.7 148°37.3	-60°29.0
8	236°15.0	$334^{\circ}14.8$	53.9	315°50.5	48.1	$202^{\circ}06.1$	30.6	258°58.4	14.8		140°58.6	-36°29.1
9	251°17.5	349°13.9	• • 54.2	330°50.9	• • 48.0	$217^{\circ}08.5$	• • 30.6	274°00.6	• • 14.7	Arcturus	147 38.0 145°48.7	19°03.3
10	$266^{\circ}19.9$	4°13.1	54.5	345°51.3	47.9	232° 10.8	30.7	289°02.8	14.6	Rigil Kent.	139°41.6	-60°55.8
11	281°22.4	19° 12.3	54.8	0°51.7	47.8	$247^{\circ}13.1$	30.8	304°05.0	14.5	Kochab	137°20.1	74°03.0
12	296°24.9	34°11.4	S21°55.0	15°52.1	\$23°47.6	262°15.4	$N12^{\circ}30.8$	319°07.3	S11°14.4	Zuben'ubi	136°57.0	-16°08.5
13	311°27.3	49°10.6	55.3	30°52.5	47.5	$277^{\circ}17.8$	30.9	334°09.5	14.3	Alphecca	126°04.6	26°37.8
14	326°29.8	64°09.8	55.6	45°52.9	47.4	292°20.1	30.9	349°11.7	14.2	Antares	112°17.1	-26°29.1
15	341°32.3	79°08.9	• • 55.9	60°53.3	• • 47.3	307°22.4	• • 31.0	4°13.9	• • 14.1	Atria	107°12.5	-69°04.0
16	356°34.7	94°08.1	56.1	75°53.8	47.2	322°24.7	31.1	19°16.1	14.0	Sabik	102°04.0	-15°45.3
17	11°37.2	109°07.3	56.4	90°54.2	47.1	337°27.1	31.1	34°18.3	13.9	Shaula	96°11.8	-37°07.2
18	26°39.7	124°06.4	S21°56.7	105°54.6	S23°46.9	352°29.4	N12°31.2	49°20.6	S11°13.8	Rasalhague	95°59.6	12°32.4
19	41°42.1	139°05.6	56.9	120°55.0	46.8	7°31.7	31.2	64°22.8	13.7	Eltanin	90°43.0	51°28.9
20	56°44.6	154°04.8	57.2	135°55.4	46.7	22°34.0	31.3	79°25.0	13.6	Kaus Aust.	83°34.0	-34°22.4
21	71°47.1	169°03.9	• • 57.5	150°55.8	• • 46.6	37°36.4	· · 31.4	94°27.2	• • 13.5	Vega	80°34.2	38°48.2
22	86°49.5	184°03.1	57.7	165°56.2	46.5	52°38.7	31.4	109°29.4	13.4	Nunki	75°49.1	-26°16.1
23	101°52.0	199°02.3	58.0	180°56.6	46.4	67°41.0	31.5	124°31.6	13.3	Altair	62°01.1	8°55.8
Mer.p	ass. 16:14	$\nu$ -0.8' d0	.3′ m-3.96	$\nu$ 0.4′ $d$ -0	.1'  m1.35	$\nu 2.3' \ d0.$	1' m-2.46	$\nu$ 2.2' d-0	$0.1' \; { m m0.98}$	Peacock	53°07.6	-56°39.6
										Deneb	49°26.8	45°21.9
Thu	GHA	GHA	Doc	GHA	Dos	GHA	Doc	GHA	Doc	Enif	33°39.9	9°59.0
0 0	116°54.4	214°01.4	<b>Dec</b> \$21°58.3	195° 57.0	Dec \$23°46.2	82° 43.3	<b>Dec</b> N12°31.6	139°33.9	<b>Dec</b> \$11°13.2	Al Na'ir	27°34.3	-46°50.9
1	131°56.9	214 01.4 229°00.6	58.5	210° 57.5	46.1	97° 45.6	31.6	154°36.1	13.1	Fomalhaut	15°15.6	-29°29.9
2	146°59.4	243°59.8	58.8	225° 57.9	46.0	112°48.0	31.7	169°38.3	13.0	Scheat	13°46.2	28°12.8
3	162°01.8	258° 58.9	• • 59.0	240°58.3	• • 45.9	127°50.3	31.7	184°40.5	. 12.9	Markab	13°30.9	15°20.1
4	177°04.3	273°58.1	59.3	255°58.7	45.8	142° 52.6	31.8	199°42.7	12.8	Jan 16 Tue	SHA	Mer.pass
5	192°06.8	288° 57.3	59.6	270°59.1	45.6	157°54.9	31.9	214°44.9	12.7	Venus	99°45.1	09:42
6	207°09.2	303°56.4	S21°59.8	285°59.5	S23°45.5	172°57.2	N12°31.9	229°47.1	S11°12.6	Mars	80°41.2	10:57
7	222°11.7	318°55.6	22°00.1	300°59.9	45.4	187°59.6	32.0	244°49.4	12.5	Jupiter	$325^{\circ}55.3$	18:34
8	$237^{\circ}14.2$	333°54.7	00.3	$316^{\circ}00.3$	45.3	203°01.9	32.1	259°51.6	12.4	Saturn	22°51.2	14:47
9	$252^{\circ}16.6$	348°53.9	•• 00.6	$331^{\circ}00.7$	• • 45.1	$218^{\circ}04.2$	• • 32.1	274°53.8	• • 12.3	lan 17 M/s-1	CUA	Mor noor
10	$267^{\circ}19.1$	3°53.1	8.00	$346^{\circ}01.1$	45.0	233°06.5	32.2	289°56.0	12.2	Jan 17 Wed Venus	<b>SHA</b> 98°26.1	Mer.pass 09:43
11	$282^{\circ}21.5$	18° 52.2	01.1	1°01.6	44.9	248°08.8	32.2	304°58.2	12.1	Mars	98 20.1 79°51.9	10:57
12	297°24.0	33°51.4	S22°01.3	16°02.0	S23°44.8	263°11.2	N12°32.3	320°00.4	S11°12.0	Jupiter	79 51.9 325°52.2	18:30
13	312°26.5	48° 50.6	01.6	31°02.4	44.7	278° 13.5	32.4	335°02.7	12.0	Saturn	22° 45.4	14:43
14	327°28.9	63°49.7	01.8	46°02.8	44.5	293°15.8	32.4	350°04.9	11.9			11.73
15	342°31.4	78° 48.9	02.1	61°03.2	• • 44.4	308°18.1	• • 32.5	5°07.1	• • 11.8	Jan 18 Thu	SHA	Mer.pass
16	357°33.9	93°48.0	02.3	76°03.6	44.3	323°20.4	32.6	20°09.3	11.7	Venus	97°07.0	09:44
17	12°36.3	108° 47.2	02.6	91°04.0	44.1	338°22.7	32.6	35°11.5	11.6	Mars	79°02.6	10:56
18	27°38.8	123°46.4	S22°02.8	106°04.4	\$23°44.0	353°25.1	N12°32.7	50°13.7	S11°11.5	Jupiter	325°48.9	18:26
19	42°41.3	138° 45.5	03.1	121°04.8	43.9	8°27.4	32.7	65°15.9	11.4	Saturn	22°39.4	14:40
20	57°43.7	153°44.7	03.3	136°05.2	43.8	23°29.7	32.8	80°18.2	11.3	Horizont	al parallax	
21	72°46.2	168°43.8	03.5	151°05.7	• • 43.6	38°32.0	• • 32.9	95°20.4	• • 11.2	TIOTIZOTIL	Venus:	0.1
22	87°48.7	183°43.0	03.8	166°06.1	43.5	53°34.3	32.9	110°22.6	11.1		Mars:	0.1
23	102°51.1	198°42.2	04.0	181°06.5	43.4	68°36.6	33.0	125°24.8	11.0			V.=
Mer.p	ass. 16:10	$\nu$ -0.8′ d0	.3′ m-3.95	$\nu$ 0.4′ d-0	$.1'~\mathrm{m}1.35$	$\nu$ 2.3′ d0.	.1′ m-2.45	$\nu$ 2.2′ d-0	$0.1^\prime$ m $0.98$			

h	Su	n	Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	177°38.9	<b>S</b> 21°04.3	116°48.6	11.6'	S02°54.8	-17.0'	59.7'
1 2	192°38.7 207°38.5	03.8 03.3	131° 19.2 145° 49.9	11.7' 11.7'	02°37.8 02°20.8	-17.0' -17.0'	59.7' 59.7'
3	207 36.5 222°38.3	02.9	145 49.9 160°20.6	11.7'	02°20.8	-17.0'	59.7'
4	237°38.0	02.4	174°51.3	11.8'	01°46.8	-17.0'	59.6'
5	252°37.8	01.9	189°22.1	11.8'	01°29.8	-17.0'	59.6'
6 7	267°37.6 282°37.4	\$21°01.5 01.0	203°52.9 218°23.7	11.8' 11.9'	\$01°12.9 00°55.9	-17.0' -17.0'	59.6' 59.6'
8	297°37.2	00.5	232°54.6	11.9'	00°38.9	-17.0 -16.9'	59.6'
9	312°37.0	21°00.1	247°25.5	11.9'	00°22.0	-16.9'	59.5'
10	327°36.7	20°59.6	261°56.4	11.9'	S00°05.1	-16.9'	59.5'
11 12	342°36.5 357°36.3	59.1 \$20°58.7	276°27.3 290°58.3	12.0' 12.0'	N00°11.9 N00°28.8	16.9' 16.9'	59.5' 59.5'
13	12°36.1	58.2	305°29.3	12.0'	00°45.7	16.9'	59.4
14	27°35.9	57.7	320°00.3	12.0'	01°02.5	16.9'	59.4'
15 16	42°35.7 57°35.4	· · 57.2 56.8	334°31.3 349°02.4	12.1' 12.1'	01°19.4 01°36.2	16.8' 16.8'	59.4' 59.4'
17	72°35.2	56.3	3°33.5	12.1'	01°53.0	16.8	59.4 59.3'
18	87°35.0	\$20°55.8	18°04.6	12.1'	N02°09.8	16.8'	59.3'
19	102°34.8	55.3	32°35.7	12.1'	02°26.6	16.7'	59.3'
20 21	117°34.6 132°34.4	54.8 •• 54.4	47°06.8 61°37.9	12.1' 12.1'	02°43.3 03°00.0	16.7' 16.7'	59.3' 59.2'
22	132 34.4 147°34.2	53.9	76°09.1	12.1	03°16.7	16.6'	59.2'
23	162°34.0	53.4	90°40.2	12.2'	03°33.3	16.6'	59.2'
	SD = 16.3'	d = -0.5'		SI	D = 16.3'		
ا- ۱۸۸۰	CUV	Das	GHA		Dec	۔	ЫÞ
Wed	<b>GHA</b> 177°33.7	<b>Dec</b> \$20°52.9	GHA 105°11.4	u 12.2'	<b>Dec</b> N03°49.9	d 16.6'	<b>HP</b> 59.2'
1	192°33.5	52.4	119°42.6	12.2'	04°06.5	16.5'	59.1'
2	207°33.3	52.0	134° 13.7	12.2'	04°23.1	16.5	59.1'
3 4	222°33.1 237°32.9	· · 51.5 51.0	148° 44.9 163° 16.1	12.2' 12.2'	04°39.6 04°56.1	16.5' 16.4'	59.1' 59.1'
5	252°32.7	50.5	103 10.1 177° 47.3	12.2'	04 30.1 05°12.5	16.4	59.1°
6	267°32.5	S20°50.0	192° 18.5	12.2'	N05°28.9	16.4	59.0'
7	282°32.3	49.5	206°49.7	12.2'	05°45.2	16.3'	59.0'
8 9	297°32.1 312°31.8	49.1 •• 48.6	221°20.9 235°52.0	12.2' 12.2'	06°01.5 06°17.8	16.3' 16.2'	59.0' 58.9'
10	327°31.6	48.1	250°23.2	12.2'	06°34.0	16.2	58.9'
11	342°31.4	47.6	264°54.4	12.2'	$06^{\circ}50.2$	16.1'	58.9'
12	357°31.2 12°31.0	\$20°47.1	279°25.6 293°56.7	12.2'	N07°06.3	16.1'	58.9'
13 14	27°30.8	46.6 46.1	293°56.7 308°27.9	12.1' 12.1'	07°22.4 07°38.4	16.0' 16.0'	58.8' 58.8'
15	42°30.6	• • 45.6	322°59.0	12.1'	07°54.4	15.9'	58.8'
16	57°30.4	45.1	337°30.1	12.1'	08°10.3	15.9'	58.8'
17 18	72°30.2 87°30.0	44.6 \$20°44.2	352°01.3 6°32.4	12.1' 12.1'	08°26.2 N08°42.0	15.8' 15.7'	58.7' 58.7'
19	102°29.8	43.7	21°03.4	12.1'	08°57.7	15.7'	58.7
20	117°29.6	43.2	35°34.5	12.0'	09°13.4	15.6'	58.7'
21	132°29.4	• • 42.7	50°05.6	12.0'	09°29.0	15.6'	58.6'
22 23	147°29.2 162°28.9	42.2 41.7	64°36.6 79°07.6	12.0' 12.0'	09°44.6 10°00.1	15.5' 15.4'	58.6' 58.6'
20	SD = 16.3'	d = -0.5'	- 13 01.0		O = 16.1'	20	
Thu 0	<b>GHA</b> 177°28.7	Dec \$20°41.2	<b>GHA</b> 93°38.6	u  12.0'	<b>Dec</b> N10°15.6	d 15.4'	<b>HP</b> 58.5'
1	177°28.7 192°28.5	40.7	93°38.6 108°09.5	12.0 11.9'	10°30.9	15.4 15.3'	58.5'
2	207°28.3	40.2	$122^{\circ}40.5$	11.9'	10°46.3	15.2'	58.5'
3	222°28.1	•• 39.7	137°11.4	11.9'	11°01.5 11°16.7	15.2'	58.5'
4 5	237°27.9 252°27.7	39.2 38.7	151° 42.3 166° 13.2	11.9' 11.8'	11°16.7 11°31.8	15.1' 15.0'	58.4' 58.4'
6	267°27.5	S20°38.2	180°44.0	11.8'	N11°46.8	15.0'	58.4'
7	282°27.3	37.7	195°14.8	11.8'	12°01.8	14.9'	58.4'
8 9	297°27.1 312°26.9	37.2 •• 36.7	209°45.6 224°16.3	11.7' 11.7'	12°16.7 12°31.5	14.8' 14.7'	58.3' 58.3'
10	312 20.9 327°26.7	36.2	238° 47.1	11.7'	12°46.3	14.7	58.3'
11	342°26.5	35.7	253° 17.7	11.6'	13°00.9	14.6'	58.3'
12	357°26.3	\$20°35.2	267°48.4	11.6'	N13°15.5	14.5'	58.2'
13 14	12°26.1 27°25.9	34.7 34.1	282°19.0 296°49.6	11.6' 11.5'	13°30.0 13°44.5	14.4' 14.4'	58.2' 58.2'
15	42°25.7	33.6	311°20.1	11.5'	13°58.8	14.3	58.1
16	57°25.5	33.1	325°50.6	11.5'	14°13.1	14.2'	58.1'
17	72°25.3	32.6	340°21.1 354°51.5	11.4'	14°27.3	14.1'	58.1'
18 19	87°25.1 102°24.9	\$20°32.1 31.6	354°51.5 9°21.9	11.4' 11.3'	N14°41.4 14°55.4	14.0' 13.9'	58.1' 58.0'
20	117°24.7	31.1	23°52.3	11.3'	15°09.3	13.8'	58.0'
21	132°24.5	• • 30.6	38°22.6	11.3'	15°23.2	13.7'	58.0'
22 23	147°24.3 162°24.1	30.1 29.6	52°52.8 67°23.0	11.2' 11.2'	15°36.9 15°50.6	13.7' 13.6'	58.0' 57.9'
23	SD = 16.3'	d = -0.5'	01 23.0		D = 16.0'	13.0	31.8
	JD — 10.3	u — -0.5		31	J — 10.0		

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

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

		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	26-48%	
16	09:24	09:35	12:10	16:45	04:21		
17	09:45	09:55	12:10	17:33	05:09		
18	10.05	10.15	12.10	18.21	05.57		

## January 19, 20, 21 UT (Fri., Sat., Sun.)

Fig.   Color	h _	Aries	Ven	ius	M	ars	Jup	oiter	Sat	urn		Stars	
1	- Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
2 1175 50 0 2276 5 06 5 27 0 0													
2   177-95   147-96   047   226-07   040   113-96   333   187-35   100   040											Alpheratz		
1											Ankaa		
1											I		
5   1997/99   288*71   0.54   277*08   4.0   198*90   3.34   15*81   10.4   15*81   10.4   15*81   10.5   15*81   10.5   15*81   10.7   10.7   10.											Diphda		
6 20°686 300°83 32°056 20°06 123°023 173°28 N12°354 20°403 511°30 7 Colored N14°156 20°07 170°27 10°0 10°08 10°09											I		
223*10.8 318*58.6 0.99 90.709.8 4.23 188*51. 33.5 15*0.45.5 10.2 Moral 318*10.6 4.13 188*10.6 4.13 1													
8 28°133 38°140 06.1 310°102 42.2 203°7.7 3.6 26°7.4 10.1 46.2 203°10.2 3°10.0 68 34°11.0 42.1 23°10.0 68 34°11.0 42.1 23°10.0 68 34°11.0 42.1 23°10.0 10.0 46.1 23°10.0 68 34°11.0 42.1 23°10.0 10.0 46.1 23°10.0 48.1 23°10.0 48.1 10.0 41.1 23°10.0 48.1 10.0 41.1 23°10.0 48.1 10.0 48.1													
19   287   1.5   348   1.57   0.6   3.67   1.0   1.0   1.0   2.0   1.0   2.0   1.0   2.0   1.0   1.0   2.0   1.0   1.0   2.0   1.0   1.0   2.0   1.0   1.0   2.0   1.0   1.0   2.0   1.0   1.0   2.0   1.0   1.0   2.0   1.0   1.0   2.0   1.0   1.0   2.0   1.0   2.0   1.0   2.0   1.0   2.0   1.0   2.0													
10   2006   182   39   29   0.06   346   11   41   32   24   22   33   7   2006   41   23   41   32   32   32   32   32   33   33   3													
11   283°207   283°30   06.8   1°11.4   4.18   289°104   33.8   395°1.4   06.8   08.8   08.9   12.2   289°2.7   06.1   13.5   279°1.6   07.2   289°1.5   07.2   07.2   07.2   07.2   13.5   27.2   07.5   07.2   0											I		
22 08°323 6 48°303 072 31°12 122°415 29°100 339 38°58 08 06 1233 13 32°326 073 073 074 0712 415 29°100 339 38°58 08 095 123 074 0713 41 32°100 0713 0713 113 113 113 113 113 113 113 113 113											I		
131 31375.6 6 3795.7 1074 46126 41.4 2071.3 34.0 33578.6 0.66   College   Co													
14 339"361 67 37"25 07.4 46"12.6 41.2 92"11.3 34.0 350"58.0 0.55 16 343"30.5 78"257 7.7 077 07130 4.12 92"13.0 34.1 21"02.4 0.51 16 358"31.0 57"27.7 073 77"13.0 4.12 32"13.0 34.1 32"13.0 34.1 21"02.4 0.51 18 28"17.5 12"261 52"261 073 78"13.3 41.1 32"13.0 34.1 21"02.4 0.51 18 28"17.5 12"261 52"08 3 10"14.3 52"40.8 34.1 21"02.4 0.51 19 43"40.4 158"25.3 06.5 12"14.7 40.7 0"22.9 34.3 06"50.2 10"0.0 158"21.0 158"24.0 168.1 168"15.1 40.6 2"25.2 34.4 98"13.3 06.0 22 88"47.8 128"26.7 0.2 10"15.9 40.3 98"27.5 34.4 98"13.5 0.8 18"11.3 05"21.9 0.9 12"15.9 0.9 12"15.9 40.3 98"27.5 34.4 98"13.5 0.8 18"11.3 05"21.9 0.9 12"15.9 0.9 12"15.9 40.3 98"27.5 34.4 98"13.5 0.8 18"13.3 05"2.1 05"2.1 0.9 12"15.9 0.9 12"15.9 40.3 98"27.5 34.4 98"13.5 0.8 18"13.3 05"2.1 0.9 12"15.9 0.9 12"15.9 40.3 98"27.5 34.4 98"13.5 0.8 18"13.3 05"2.1 0.9 12"15.9 0.9 12"15.9 40.3 98"27.5 34.4 98"13.5 0.8 18"13.3 05"2.1 0.9 12"15.9 0.9 12"15.9 40.3 98"27.5 34.4 98"13.5 0.8 18"13.3 05"2.1 0.9 12"15.9 0.9 1													
15   383°30.5   387°28.7   0.077   0.113.5   41.1   309°13.6   34.0   0.004   21°02.4   0.004   21°02.4   0.004   21°02.4   0.004   21°02.4   0.004													
16 368*33.0 00.9272.8 07.9 76*13.5 41.1 324*15.9 34.1 21*02.4 09.3 17 12*13*2.5 106*27.0 06.1 91*13.9 41.0 339*18.2 39.2 36*04.6 09.2 18.2 36*04.6 09.2 18.2 36*04.7 18.2 32*13.9 41.0 339*18.2 39.2 36*04.6 09.2 18.2 36*04.7 18.2 32*13.0 06*14.3 \$23*40.8 \$34*20.5 \$117*32.2 \$10.0 8.2 \$10.0 \$1.0 \$1.0 \$1.0 \$1.0 \$1.0 \$1.0 \$1.	15								6°00.2				
18   18   18   18   18   18   18   18	16	358°33.0	93°27.8	07.9	76°13.5	41.1	324°15.9	34.1	21°02.4				
18 28*37.9   132*26.1   52*26.3   106*14.3   52*40.8   354*30.5   112*34.2   196.6   511*09.1   19 43*40.4   138*25.3   30.5   121*44   40.8   136*15.1   40.6   24*32.2   34.4   84*13.1   30.8   21 73*45.3   156*23.6   60.8   136*15.1   40.6   24*32.2   34.4   96*13.3   60.8   21 73*45.3   156*23.6   60.8   136*15.1   40.6   24*32.2   34.4   96*13.3   60.8   21 73*45.3   156*23.6   60.8   136*15.1   40.6   24*32.2   34.4   96*13.3   60.8   21 73*45.3   156*23.6   60.8   136*15.1   40.6   60.8   136*15.1   40.6   60.8   21 73*45.3   156*23.6   60.8   136*15.1   40.6   60.8   126*17.9   66.6   21 73*45.3   156*23.6   60.8   136*15.1   40.1   60*32.1   34.6   126*17.9   66.6   22 40*17.8   22 40.8   24.8   22.8   24.						41.0							
Second   S	18	28°37.9	123°26.1	522°08.3	106° 14.3	S23°40.8	354° 20.5	N12°34.2					
20													
1					$136^{\circ}15.1$								
22	21												
Sat   Char   C													
Miss											I		
Sat GHA  OHA  OHA  OHA  OHA  OHA  OHA  OHA	14		O 0/ -10 0	2/ m 2 0F									
Second   Color   Col	ivier.p	Dass. 10:00	$\nu$ -0.8 $a$ 0.2	∠ 111-3.95	$\nu$ 0.4 $a$ -0	.1 m1.35	ν2.3 a0.	ı III-∠.45	$\nu$ 2.2 $a$ -0	.1 INU.98			
Sat   CHA													
18 18 97 7 21 32 10 52 90 6 10 6 10 6 10 7 523 40 0 8 4 34 4 10 12 34 6 14 12 01 51 10 8 5 1 10 8 5 1 13 13 14 13 14 14 13 14 14 14 14 14 14 14 14 14 14 14 14 14	Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec			
1 133°55,2 228°30,2 09.8 211°17.1 39.9 9°367 347 150°223 08.4 2 148°57.7 243°19.3 10.0 226°17.6 39.7 114°39.0 34.8 116°26.8 0.82,2 4 178°20,2 627°17.7 10.4 250°18.4 39.7 114°39.0 34.8 180°26.8 0.82,2 4 178°20,2 627°17.7 10.4 250°18.4 39.4 144°3.6 34.9 201°29.0 08.1 5 194°05.0 288°16.6 10.6 271°18.8 39.3 150°45.9 35.0 210°31.2 08.0 6 208°07.5 303°16.0 52°210.8 280°19.2 528°39.1 174°48.2 N12°55.0 210°31.2 08.0 7 224°10.0 318°15.1 11.0 301°19.6 39.0 180°90.5 55.1 246°35.6 07.8 8 228°12.4 333°14.3 11.2 313°20.0 38.6 229°8.2 35.2 201°37.6 07.8 11 284°17.4 381°13.1 11.8 31°20.0 38.6 229°8.2 35.2 201°37.6 07.8 11 284°17.4 381°13.1 11.8 31°20.0 38.6 229°8.2 35.2 201°37.6 07.8 11 284°17.4 381°13.1 11.8 31°20.0 38.6 229°8.7 35.4 300°47.4 07.4 11 290°22.3 33°10.0 52°210.8 182°21.0 16°21.7 523°8.3 265°02.0 N12°35.4 321°46.7 51°07.3 12 290°22.3 33°10.0 52°20.1 16°21.7 523°8.3 265°02.0 N12°35.4 321°46.7 51°07.3 13 31°48.4 486°10.0 12.2 31°22.1 38.1 280°4.3 35.5 380°48.4 07.2 14 330°27.2 63°00.2 12.4 46°22.5 38.0 295°06.6 35.6 351°51.1 07.1 40°40.1 180°40											I		
2 148°57.7 243°19.3 10.0 226°17.6 39.7 114°39.0 34.8 171°24.5 08.3 3 164°07.2 241°18.0 39.0 6 122°41.3 34.8 180°26.8 08.2 4 171°20.0 281°18.5 10.0 256°18.4 39.4 144°43.6 34.9 201°29.0 08.1 Alich 167°13.5 55°46.5 194°60.0 288°18.8 10.6 271°18.8 39.3 159°45.5 35.0 201°31.0 08.0 5 10.0 200°17.5 30.0 391°10.0 286°19.2 523°39.0 174°48.2 31°35.0 231°33.4 \$11°07.8 Alich 167°13.5 55°40.5 200°17.0 391°13.3 11.1 280°19.2 523°39.0 174°48.2 31°35.0 231°33.4 \$11°07.8 Alich 167°13.5 55°40.5 200°17.0 391°1.0 391		133°55.2							156°22.3				
1 164°00.1 288°18.5 . 10.2 241°18.0 . 39.6 120°41.3 . 34.8 180°28.8 . 0.82.   4 179°02.6 273°17.7	2						114°39.0		171°24.5				
4 179°026 273°177 0.4 250°184 394 144°436 34.9 201°290 0.81 5 194°05 0 288°16 10.6 27°188 393 150°45.9 35.0 210°31.2 0.0 0.81 6.6°13.3 55°45.9 5.0 200°07.5 300°16.0 522°10.8 286°19.2 528°99.1 174°482 N12°35.0 231°33.4 511°07.9 4.63 11.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1	3	164°00.1	258° 18.5	• • 10.2	241°18.0	• • 39.6	129°41.3	• • 34.8	186°26.8	• • 08.2			
5	4	179°02.6	273°17.7	10.4	256°18.4	39.4	144°43.6	34.9	201°29.0	08.1			
7 229°07.5 309°16.0 318°15.1 11.0 30°19.6 39.0 189°05.5 351.2 26°35.6 07.8 4 140°35.6 07.8 8 239°12.4 333°14.3 11.2 316°20.0 38.9 204°52.8 35.2 26°37.8 07.7 4 140°58.6 36°29.1 120°19.8 18°11.7 11.3 316°20.0 38.9 204°52.8 35.2 26°37.8 07.7 4 140°58.6 36°29.1 120°19.8 18°11.7 11.3 316°20.8 38.6 234°57.4 35.3 291°42.2 07.5 4 140°58.6 36°29.1 120°19.8 18°11.7 11.3 45°48.7 13°20.4 38.7 21°29.7 35.4 300°44.4 07.4 140°58.6 36°29.1 120°19.8 18°11.7 11.3 45°48.7 121.3 31.2 240°99.7 35.4 300°44.4 07.4 140°8.6 36°29.1 120°19.8 18°11.7 11.3 45°48.7 121.3 31.2 240°99.7 35.4 300°44.4 07.4 140°49.8 18°11.7 11.3 45°48.7 121.3 31.2 240°99.7 35.4 300°44.4 07.4 140°49.8 18°11.7 11.3 45°48.7 121.3 31.2 240°49.8 18°11.7 11.3 145°48.7 121.3 31.2 240°49.8 18°11.7 11.3 140°48.2 11.2 25°38.3 26°02.0 N12°55.4 321°46.7 511°07.3 21.6 11.2 11.2 11.2 11.2 11.2 11.2 11.2	5	194°05.0	$288^{\circ}16.8$	10.6	271°18.8	39.3	159°45.9	35.0	216°31.2	08.0	I		
8 239°14.9 318°15.1 11.0 301°10.6 39.0 180°90.5 35.1 246°35.6 07.8   8 239°14.2 333°14.3 11.2 301°20.0 38.9 204°82.8 35.2 276°40.0 0.76.   9 254°14.9 348°13.4 11.4 331°20.4 38.7 210°55.1 35.2 276°40.0 0.76.   11 284°19.8 18°11.7 11.8 1°21.3 38.4 240°99.7 35.4 306°44.4 0.74.   11 284°19.8 18°11.7 11.8 1°21.3 38.4 240°99.7 35.4 306°44.4 0.74.   11 284°19.8 18°11.7 11.8 1°21.3 38.4 240°99.7 35.4 306°44.4 0.74.   11 284°19.8 18°11.7 11.8 1°21.3 38.4 240°99.7 35.4 306°44.4 0.74.   11 314°24.8 48°10.0 12.2 31°22.1 38.1 280°04.3 35.5 336°48.9 0.72.   11 314°24.8 48°10.0 12.2 31°22.1 38.1 280°04.3 35.5 336°48.9 0.72.   11 328°27.2 63°09.2 12.4 46°22.5 38.0 295°06.6 35.6 6°53.3 0.07.   11 34°34.9 29.7 78°08.3 12.6 61°22.9 3.78 310°08.9 35.6 6°53.3 0.07.   11 4°34.6 108°06.6 13.0 91°23.7 37.5 340°13.5 35.8 36°57.7 0.68   18 29°37.1 122°36.8 522°13.1 01°24.1 32°37.4 355°15.8 N12°35.8 51°59.9 11°06.7   18 29°37.1 123°06.8 522°13.2 106°24.1 32°37.4 355°15.8 N12°35.8 51°59.9 11°06.7   18 29°37.1 123°06.8 522°13.1 01°24.1 316°24.9 37.1 25°20.4 36.0 82°04.3 0.05   18 29°37.1 123°06.8 522°13.1 136°24.9 37.1 25°20.4 36.0 82°04.3 0.05   18 20°37.4 136°04.1 136 186°03.2 36.8 55°20.4 36.0 82°04.3 0.05   18 20°37.4 136°04.1 136 186°25.8 36.8 55°20.6 N12°36.8 12°00.5 0.06   19 30°40.2 139°04.2 139°05.5 0.6 86°20.8 30.6 56°25.0 36.1 12°08.8 0.0 3   10 110°51.9 213°00.7 522°14.3 196°26.5 523°36.5 85°20.6 N12°36.8 12°10.6 0.0   11 136°54.9 213°00.7 522°14.3 196°26.5 523°36.5 85°20.6 N12°36.3 157°15.4 0.0   11 136°54.9 213°00.7 522°14.3 196°26.5 523°36.5 85°20.6 N12°36.3 157°15.4 0.0   11 136°54.9 213°00.7 522°14.3 196°26.5 523°36.5 85°20.6 N12°36.3 157°15.4 0.0   11 136°54.9 213°00.7 522°14.3 196°26.5 523°36.5 85°20.6 N12°36.5 187°10.8 0.0   11 136°54.9 213°00.7 522°14.3 196°26.5 523°36.5 85°20.6 N12°36.3 157°15.4 0.0   11 136°54.9 213°00.7 522°14.3 196°26.5 523°36.5 85°20.6 N12°36.5 112°08.4 0.0   11 136°54.9 213°00.7 522°14.3 196°26.5 523°36.5 85°20.6 N12°36.5 112°08.4 0.0   11 136°54.5 240°14.5 140°14.5 140°26.5 140°14.5 140°14.5 140	6	209°07.5		S22°10.8	286°19.2	S23°39.1	174°48.2	N12°35.0	231°33.4	S11°07.9			
8 239°124 9 348°134 1112 316°200 389 200°828 35.2 261°378 07.7 9 259°149 348°134 1114 331°204 387 219°551 35.2 2676°40 07.6 11 284°198 18°11.7 11.8 16°21.3 38.4 249°9.7 35.4 306°44.7 07.4 12 299°22.3 33°10.9 52°12.0 16°21.7 523°83 36 265°02.0 N12°35.4 321°46.7 511°07.3 13 314°24.8 48°10.0 12.2 31°22.1 38.1 280°04.3 35.5 336°48.7 510°07.2 14 329°27.2 63°09.2 12.4 46°22.5 38.0 295°06.6 35.6 351°51.1 07.1 15 344°29.7 78°08.3 12.6 61°22.9 37.8 310°08.9 35.6 6°553. 305°151.1 07.1 16 359°32.1 93°07.5 12.8 76°23.3 37.7 325°11.2 35.7 21°55.5 06.9 17 14°34.6 108°06.6 13.0 91°23.7 37.5 340°13.5 38.8 36°57.0 70.0 18 29°37.1 123°05.8 52°13.2 106°24.1 522°374 355°15.8 N12°35.8 15°59.9 511°06.7 19 44°39.5 138°04.9 2134. 121°24.5 37.2 10°18.1 39.9 67°02.1 06.6 21 74°44.5 168°03.2 13.8 151°25.4 36.9 37.1 25°20.4 30.0 82°04.3 06.5 8181819.9 67°02.1 74°44.5 168°03.2 13.8 151°25.4 36.9 70°7.3 36.2 127°10.6 6.6 1320.9 37.0 1818.1 39.9 67°02.1 06.6 132.0 183°0.4 13.9 166°25.8 36.8 55°25.0 36.1 112°08.8 06.3 Nunki 75°340. 34°42.2 28°44.9 188°01.5 14.1 181°25.2 36.6 70°27.3 36.2 127°11.0 06.2 240°45.8 40°45.9 136°26.5 227°26.6 523°36.5 85°25.6 36.1 112°08.8 06.3 Nunki 75°340. 34°42.2 34°45.0 14.0 14.0 14.0 14.0 14.0 14.0 14.0 14	7	224°10.0	$318^{\circ}15.1$	11.0	$301^{\circ}19.6$	39.0	189°50.5	35.1	246°35.6	07.8			
9 256°1474 33°12.66 11.6 346°20.8 38.6 2346°7.4 35.2 276°40.0 · · · · · · · · · · · · · · · · · ·	8	239°12.4	333°14.3	11.2	$316^{\circ}20.0$	38.9	204°52.8	35.2		07.7			
11   2269   17.4   3"12.6   11.6   346°20.8   38.6   234°57.4   35.3   291°42.2   07.5     12   2299°22.3   33°10.9   522°12.0   16°21.7   523°38.3   265°02.0   N12°35.4   321°46.7   511°07.3     13   314°24.8   48°10.0   12.2   31°22.1   38.1   280°04.3   35.5   336°44.6   511°07.3     14   329°27.2   63°09.2   12.4   46°22.5   38.0   295°06.6   35.6   351°51.1   07.1     15   346°27.7   78°08.3   12.6   61°22.9   37.8   310°08.9   35.6   65°53.0   07.0     16   359°32.1   93°07.5   12.8   76°23.3   37.7   325°11.2   35.7   21°55.5   06.9     17   14°34.6   108°66.6   13.0   91°23.7   37.5   340°13.5   35.8   36°57.0   68.8     18   29°37.1   123°05.8   522°13.2   106°24.1   523°37.4   355°15.8   N12°35.8   51°59.9   511°06.7     19   44°39.5   138°04.9   13.4   121°24.5   37.2   10°18.1   35.9   67°02.1     20   59°42.0   153°04.1   13.6   136°4.9   37.1   25°20.4   36.0   82°0.4   36.5     21   74°44.5   168°03.2   13.9   166°25.8   36.8   55°25.0   36.1   112°08.8   06.3     22   104°49.4   198°01.5   14.1   181°25.2   36.6   70°27.3   36.2   127°11.0   06.2     23   104°49.4   198°01.5   14.1   181°25.2   36.6   70°27.3   36.2   127°11.0   06.2     24   136°68.2   22°58.9   14.7   226°27.4   36.2   115°42.3   36.2   127°11.0   06.2     24   196°58.8   242°58.9   14.7   226°27.4   36.2   115°42.3   36.2   127°11.0   06.2     24   149°56.8   242°58.9   14.7   226°27.4   36.2   115°42.3   36.4   127°11.0   06.2     24   149°56.8   242°58.9   14.7   226°27.4   36.2   115°42.3   36.4   127°11.0   06.2     24   149°56.8   242°58.9   14.7   226°27.4   36.2   115°42.3   36.4   127°11.0   06.2     24   149°56.8   242°58.9   14.7   226°27.4   36.2   115°42.3   36.4   127°11.0   06.2     24   149°56.8   242°58.9   14.7   226°27.4   36.2   115°42.3   36.4   127°11.0   06.2     24   149°56.8   242°58.9   14.7   226°27.4   36.2   115°42.3   36.5   127°13.4   102°13.0   36.2     24   149°56.8   242°59.9   147°32.4   126°28.0   36.5   127°13.4   102°13.0   126°13.0   126°13.0   126°13.0   126°13.0   126°13.0   126°13.0	9	254°14.9	348°13.4	• • 11.4	331°20.4	• • 38.7	$219^{\circ}55.1$	• • 35.2	276°40.0	• • 07.6			
112 294*19.8   18*11.7   11.8   1*21.3   34.4   249*19.7   35.4   300*44.4   50*7.4   12 29*22.3   33*10.9   \$52*2*12.0   16*2.1   \$52*3*8.3   266*02.0   N12*3.5   316*3.4   50*7.4   14 336*72.2   63*0.9   2 12.4   46*22.5   38.0   298*0.66   35.5   35*15.1   07.1   15 344*29.7   78*08.3   1.26   61*22.9   3.78   310*08.9   3.56   6*93.3   070.0   16 359*32.1   93*07.5   12.8   76*23.3   37.7   32*51.1   35.7   21*55   06.9   17 14*34.6   108*06.6   13.0   91*23.7   37.5   346*13.5   38.8   36*57.7   06.8   18 29*37.1   123*05.8   \$52*13.2   106*24.1   \$23*37.4   33*55*15.8   N12*38.8   51*59.9   \$11*06.1   19 4*39.5   138*04.9   13.4   12*24.5   37.2   10*18.1   35.9   67*02.1   06.8   21 74*44.5   168*03.2   13.8   15*25.4   35.9   40*22.7   36.1   19*06.5   06.4   22 89*46.9   183*02.4   13.9   166*25.8   36.8   55*25.0   36.1   112*08.8   06.3   23 104*49.4   198*01.5   14.1   181*26.2   36.8   70*27.3   36.2   12*71.10   06.2    Mer.pass. 16:02   \$\nu_{\nu} \cdot delta \tau \tau \tau \tau \tau \tau \tau \t	10	269°17.4	3°12.6	11.6		38.6	234° 57.4	35.3		07.5			
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Mer.pass. 16:02   \( \nu \cdot \cd													
Sun GHA GHA   GHA Dec	23	104°49.4	198°01.5	14.1	181°26.2	36.6	70°27.3	36.2	127°11.0	06.2	Altair	62°01.1	8°55.8
Sun GHA GHA Dec GHA	Mer.p	pass. 16:02	$\nu$ -0.8' d0.2	2′ m-3.95	$\nu 0.4' \ d-0$	.1′ m1.35	$\nu 2.3' d0.$	1′ m-2.44	$\nu 2.2' \ d-0$	.1′ m0.98	Peacock	53°07.6	-56°39.6
Sun         GHA         GHA         Dec         Chenus         Parallal         Personal Parallal         Personal Parallal         Chenus         26°29.2         29°29.0         GBA         Al Na'ir         27°34.3         46°50.9         ESP120.0         28°12.8         40°11.0         36°.0         28°12.8         40°11.0         36°.0         20°22.0         05°.7         40°.0         40°.0											Deneb	49°26.8	45°21.9
0 119°51.9 213°00.7 S22°14.3 196°26.6 S23°36.5 85°29.6 N12°36.3 142°13.2 S11°06.1 134°54.3 227°59.8 14.5 211°27.0 36.3 100°31.9 36.3 157°15.4 06.0 149°56.8 242°58.9 14.7 226°27.4 36.2 115°34.2 36.4 172°17.6 05.9 3164°59.3 257°58.1 · 14.9 241°27.8 · 36.0 130°36.5 · 36.5 187°19.8 · 05.8 4 180°01.7 272°57.2 15.0 256°28.2 35.9 145°38.8 36.5 202°22.0 05.7 51.9 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	_			_		_		_		_			
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3 164°59.3 257°58.1 · 14.9 241°27.8 · 36.0 130°36.5 · 36.5 187°19.8 · 05.8 4 180°01.7 272°57.2 15.0 256°28.2 35.9 145°38.8 36.5 202°22.0 05.7 195°04.2 287°56.4 15.2 271°28.6 35.7 160°41.1 36.6 217°24.2 05.6 6 210°06.6 302°55.5 522°15.4 286°29.1 523°35.6 175°43.4 N12°36.7 232°26.4 511°05.5 7 225°09.1 317°54.7 15.6 301°29.5 35.4 190°45.7 36.7 247°28.6 05.4 8 240°11.6 332°53.8 15.7 316°29.9 35.3 205°48.0 36.8 262°30.9 05.3 10.5 2 255°14.0 347°53.0 · 15.9 331°30.3 · 35.1 220°50.3 · 36.9 277°33.1 · 05.2 10 270°16.5 2°52.1 16.1 346°30.7 34.9 235°52.6 37.0 292°35.3 05.1 1 285°19.0 17°51.3 16.2 1°31.1 34.8 250°54.9 37.0 307°37.5 05.0 12 300°21.4 32°50.4 522°16.4 16°31.5 523°34.6 265°57.2 N12°37.1 322°39.7 511°04.9 1315°33.9 47°49.6 16.6 31°31.9 34.5 280°59.5 37.2 337°41.9 04.8 330°26.4 62°48.7 16.8 46°32.3 34.3 296°01.8 37.2 352°44.1 04.7 15°33.8 107°46.1 17.3 91°33.6 33.8 341°08.7 37.4 37°50.7 04.4 18 30°36.2 122°45.3 522°17.4 106°34.0 523°33.7 356°11.0 N12°37.5 52°53.0 511°04.3 19 45°38.7 137°44.4 17.6 121°34.4 33.5 11°13.3 37.6 67°55.2 04.2 20 60°41.1 152°43.6 17.7 136°34.8 33.4 26°15.5 37.7 82°57.4 04.1 1910°4.1 152°43.6 167°42.7 · 17.9 151°35.2 · 33.2 41°17.8 · 37.7 97°59.6 · 04.0 1910°41.0 18.2 181°36.0 32.9 71°22.4 37.9 128°04.0 03.8 10.1 Mars: 0.1 10.1 10.1 10.1 10.1 10.1 10.1 10.1													
4       180°01.7       272°57.2       15.0       256°28.2       35.9       145°38.8       36.5       202°22.0       05.7       Jan 19 Fri       SHA       Mer.pass         5       195°04.2       287°56.4       15.2       271°28.6       35.7       160°41.1       36.6       217°24.2       05.6       Venus       95°47.7       09.46         6       210°06.6       302°55.5       522°15.4       286°29.1       523°35.6       175°43.4       N12°36.7       232°26.4       510°05.5       Mars       78°13.3       10:55         8       240°11.6       332°53.8       15.7       316°29.9       35.3       205°48.0       36.8       262°30.9       05.3       521°19.4       36°9.0       35.3       205°48.0       36.8       262°30.9       05.3       521°19.4       36°9.0       36.9       277°33.1       05.2       521°19.4       36°30.7       34.9       235°52.6       37.0       292°35.3       05.1       521°19.4       36°30.7       34.9       235°52.6       37.0       292°35.3       05.1       36.1       36.1       36°30.7       37.0       292°35.3       05.1       36.1       36.1       36°30.7       37.0       30°29°37.5       05.0       37.0       390°37.5       05											Markab	13°30.9	15°20.0
5 195°04.2 287°56.4 15.2 271°28.6 35.7 160°41.1 36.6 217°24.2 05.6 6 210°06.6 302°55.5 \$22°15.4 286°29.1 \$23°35.6 175°43.4 N12°36.7 232°26.4 \$511°05.5 7 225°09.1 317°54.7 15.6 301°29.5 35.4 190°45.7 36.7 247°28.6 05.4 8 240°11.6 332°53.8 15.7 316°29.9 35.3 205°48.0 36.8 262°30.9 05.3 25°41.0 347°53.0 · 15.9 331°30.3 · 35.1 220°50.3 · 36.9 277°33.1 · 05.2 10 270°16.5 2°52.1 16.1 346°30.7 34.9 235°52.6 37.0 292°35.3 05.1 11 285°19.0 17°51.3 16.2 1°31.1 34.8 250°54.9 37.0 307°37.5 05.0 12 300°21.4 32°50.4 \$22°16.4 16°31.5 \$23°34.6 265°57.2 N12°37.1 322°39.7 \$11°04.9 13 315°23.9 47°49.6 16.6 31°31.9 34.5 280°59.5 37.2 337°41.9 04.8 14 330°26.4 62°48.7 16.8 46°32.3 34.3 296°01.8 37.2 352°44.1 04.7 15°33.8 107°46.1 17.3 91°33.6 33.8 341°08.7 37.4 37°50.7 04.4 18 30°36.2 122°45.3 \$22°17.4 106°34.0 \$23°33.7 356°11.0 N12°37.5 52°53.0 \$11°04.9 140°1.1 \$22°27.4 \$14:33 11°04.1 \$22°43.6 17.7 136°34.8 33.4 26°15.5 37.7 82°57.4 04.1 152°43.6 17.7 136°34.8 33.4 26°15.											lan 10 E.	Ç LI A	Mornes
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7 225°09.1 317°54.7 15.6 301°29.5 35.4 190°45.7 36.7 247°28.6 05.4 8 240°11.6 332°53.8 15.7 316°29.9 35.3 205°48.0 36.8 262°30.9 05.3 9 255°14.0 347°53.0 · 15.9 331°30.3 · 35.1 220°50.3 · 36.9 277°33.1 · · · 05.2 10 270°16.5 2°52.1 16.1 346°30.7 34.9 235°52.6 37.0 292°35.3 05.1 11 285°19.0 17°51.3 16.2 1°31.1 34.8 250°54.9 37.0 307°37.5 05.0 12 300°21.4 32°50.4 \$22°16.4 16°31.5 \$23°34.6 265°57.2 N12°37.1 322°39.7 \$511°04.9 13 315°23.9 47°49.6 16.6 31°31.9 34.5 280°59.5 37.2 337°41.9 04.8 14 330°26.4 62°48.7 16.8 46°32.3 34.3 296°01.8 37.2 352°44.1 04.7 15°33.8 107°46.1 17.3 91°33.6 33.8 341°08.7 37.4 37°50.7 04.4 18 30°36.2 122°45.3 \$22°17.4 106°34.0 \$23°33.7 356°11.0 N12°37.5 \$22°48.5 04.5 10°49.4 17.6 121°34.4 33.5 11°13.3 37.6 67°55.2 04.2 06°41.1 152°43.6 17.7 136°34.8 33.4 26°15.5 37.7 82°57.4 04.1 15°543.6 167°42.7 · · 17.9 151°35.2 · · 33.2 41°17.8 · · 37.7 97°59.6 · · 04.0 04.0 18.2 181°36.0 32.9 71°22.4 37.9 128°04.0 03.8   Jupiter 325°45.4 18:23 Saturn 22°33.4 14:36  Jupiter 325°45.4 Saturn 22°33.4 14:36  Jupiter 325°45.4 Saturn 22°33.4 14:36  Jupiter 325°45.4 18:23 Saturn 22°33.4 14:36  Jupiter 325°45.4 Saturn 22°33.4 14:36													
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11 285°19.0 17°51.3 16.2 1°31.1 34.8 250°54.9 37.0 307°37.5 05.0 12 300°21.4 32°50.4 \$22°16.4 16°31.5 \$23°34.6 265°57.2 N12°37.1 322°39.7 \$11°04.9 13 315°23.9 47°49.6 16.6 31°31.9 34.5 280°59.5 37.2 337°41.9 04.8 14 330°26.4 62°48.7 16.8 46°32.3 34.3 296°01.8 37.2 352°44.1 04.7 15 345°28.8 77°47.8 · 16.9 61°32.7 · 34.2 311°04.1 · 37.3 7°46.3 · 04.6 16 0°31.3 92°47.0 17.1 76°33.2 34.0 326°06.4 37.4 22°48.5 04.5 17 15°33.8 107°46.1 17.3 91°33.6 33.8 341°08.7 37.4 37°50.7 04.4 18 30°36.2 122°45.3 \$22°17.4 106°34.0 \$23°33.7 356°11.0 N12°37.5 52°53.0 \$11°04.3 19 45°38.7 137°44.4 17.6 121°34.4 33.5 11°13.3 37.6 67°55.2 04.2 20 60°41.1 152°43.6 17.7 136°34.8 33.4 26°15.5 37.7 82°57.4 04.1 21 75°43.6 167°42.7 · 17.9 151°35.2 · 33.2 41°17.8 · 37.7 97°59.6 · 04.0 22°21.3 14:29 105°48.5 197°41.0 18.2 181°36.0 32.9 71°22.4 37.9 128°04.0 03.8 05.0 05.0 Mars 77°24.0 10:55 10:54											Jan 20 Sat		Mer.pass
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13 315°23.9 47°49.6 16.6 31°31.9 34.5 280°59.5 37.2 337°41.9 04.8 14 330°26.4 62°48.7 16.8 46°32.3 34.3 296°01.8 37.2 352°44.1 04.7 15 345°28.8 77°47.8 · 16.9 61°32.7 · · 34.2 311°04.1 · · 37.3 7°46.3 · · 04.6 16 0°31.3 92°47.0 17.1 76°33.2 34.0 326°06.4 37.4 22°48.5 04.5 17 15°33.8 107°46.1 17.3 91°33.6 33.8 341°08.7 37.4 37°50.7 04.4 18 30°36.2 122°45.3 \$22°17.4 106°34.0 \$23°33.7 356°11.0 \$N12°37.5 52°53.0 \$11°04.3 19 45°38.7 137°44.4 17.6 121°34.4 33.5 11°13.3 37.6 67°55.2 04.2 20 60°41.1 152°43.6 17.7 136°34.8 33.4 26°15.5 37.7 82°57.4 04.1 21 75°43.6 167°42.7 · · 17.9 151°35.2 · · 33.2 41°17.8 · · 37.7 97°59.6 · · 04.0 22°27.3 14:29 105°48.5 197°41.0 18.2 181°36.0 32.9 71°22.4 37.9 128°04.0 03.8        Jupiter 325°41.7 18:19													
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15 345°28.8 77°47.8 · · · 16.9 61°32.7 · · · 34.2 311°04.1 · · · 37.3 7°46.3 · · · 04.6 0°31.3 92°47.0 17.1 76°33.2 34.0 326°06.4 37.4 22°48.5 04.5 17 15°33.8 107°46.1 17.3 91°33.6 33.8 341°08.7 37.4 37°50.7 04.4 18 30°36.2 122°45.3 \$22°17.4 106°34.0 \$23°33.7 356°11.0 \$N12°37.5 \$52°53.0 \$11°04.3 19 45°38.7 137°44.4 17.6 121°34.4 33.5 11°13.3 37.6 67°55.2 04.2 20 60°41.1 152°43.6 17.7 136°34.8 33.4 26°15.5 37.7 82°57.4 04.1 21 75°43.6 167°42.7 · · 17.9 151°35.2 · · 33.2 41°17.8 · · 37.7 97°59.6 · · 04.0 22 90°46.1 182°41.9 18.1 166°35.6 33.0 56°20.1 37.8 113°01.8 03.9 128°04.0 03.8        Jan 21 Sun SHA Mer.pass Venus 93°08.8 09:49											Saturn	22°27.4	14:33
16 0°31.3 92°47.0 17.1 76°33.2 34.0 326°06.4 37.4 22°48.5 04.5 15°33.8 107°46.1 17.3 91°33.6 33.8 341°08.7 37.4 37°50.7 04.4 18 30°36.2 122°45.3 \$22°17.4 106°34.0 \$23°33.7 356°11.0 \$N12°37.5 52°53.0 \$11°04.3 19 45°38.7 137°44.4 17.6 121°34.4 33.5 11°13.3 37.6 67°55.2 04.2 20 60°41.1 152°43.6 17.7 136°34.8 33.4 26°15.5 37.7 82°57.4 04.1 21 75°43.6 167°42.7 · 17.9 151°35.2 · 33.2 41°17.8 · 37.7 97°59.6 · 04.0 22 90°46.1 182°41.9 18.1 166°35.6 33.0 56°20.1 37.8 113°01.8 03.9 128°04.0 03.8											Inn 21 C.	CHA	Ma:: :
17													
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21       75°43.6       167°42.7       · · 17.9       151°35.2       · · 33.2       41°17.8       · · 37.7       97°59.6       · · 04.0       Horizontal parallax         22       90°46.1       182°41.9       18.1       166°35.6       33.0       56°20.1       37.8       113°01.8       03.9         23       105°48.5       197°41.0       18.2       181°36.0       32.9       71°22.4       37.9       128°04.0       03.8											Saturn	22 21.3	14:29
22 90°46.1 182°41.9 18.1 166°35.6 33.0 56°20.1 37.8 113°01.8 03.9 Venus: 0.1 23 105°48.5 197°41.0 18.2 181°36.0 32.9 71°22.4 37.9 128°04.0 03.8 Mars: 0.1											Horizont	al parallax	
23 105°48.5 197°41.0 18.2 181°36.0 32.9 71°22.4 37.9 128°04.0 03.8 Mars: 0.1											1	-	0.1
												Mars:	
<u>Mier.pass. 15:58</u> <u>ν-0.9' d0.2' m-3.94</u> <u>ν0.4' d-0.2' m1.34</u> <u>ν2.3' d0.1' m-2.43</u> <u>ν2.2' d-0.1' m0.98</u>													
	ivler.p	pass. 15:58	$\nu$ -0.9′ d0.2	∠ m-3.94	$\nu$ 0.4′ $d$ -0	.2′ m1.34	$\nu$ 2.3′ d0.	ı m-2.43	$\nu$ 2.2′ d-0	.1' mU.98			

h	Su	n	Moon					
Fri	GHA	Dec	GHA	ν	Dec	d	HP	
0	177°23.9	S20°29.0	81°53.2	11.1'	$N16^{\circ}04.1$	13.5'	57.9'	
1	192°23.7	28.5	96°23.3	11.1'	16°17.6	13.4'	57.9'	
2	207°23.5 222°23.3	28.0	110°53.4 125°23.5	11.0'	16°31.0 16°44.3	13.3' 13.2'	57.9'	
3 4	222°23.3 237°23.1	· · 27.5 27.0	125°23.5 139°53.4	11.0' 10.9'	16°44.3 16°57.5	13.1'	57.8' 57.8'	
5	252°22.9	26.5	154°23.4	10.9	10° 37.5	13.1	57.8'	
6	267°22.8	S20°25.9	168°53.3	10.8'	N17°23.5	12.9'	57.8'	
7	282°22.6	25.4	183°23.1	10.8'	17°36.4	12.8'	57.7'	
8	297°22.4	24.9	197°52.9	10.7'	17°49.2	12.7'	57.7'	
9	312°22.2	• • 24.4	212°22.7	10.7'	18°01.9	12.6'	57.7'	
10 11	327°22.0 342°21.8	23.9 23.4	226°52.4 241°22.0	10.6' 10.6'	18°14.5 18°27.0	12.5' 12.4'	57.7' 57.6'	
12	357°21.6	520°22.8	255°51.6	10.5	N18°39.4	12.4	57.6	
13	12°21.4	22.3	270°21.2	10.5'	18°51.7	12.2'	57.6'	
14	27°21.2	21.8	284°50.6	10.4'	19°03.8	12.1'	57.5'	
15	42°21.0	• • 21.3	299°20.1	10.4'	19°15.9	12.0'	57.5'	
16	57°20.8 72°20.6	20.7 20.2	313°49.5 328°18.8	10.3' 10.3'	19°27.8 19°39.7	11.8'	57.5'	
17 18	72 20.6 87°20.4	20.2 \$20°19.7	342°48.1	10.3	N19°51.4	11.7' 11.6'	57.5' 57.4'	
19	102°20.2	19.2	357°17.3	10.2'	20°03.0	11.5'	57.4	
20	117°20.1	18.6	11°46.5	10.1'	20°14.5	11.4'	57.4'	
21	132°19.9	• • 18.1	26°15.6	10.1'	20°25.9	11.3'	57.4'	
22	147°19.7	17.6	40°44.6	10.0'	20°37.2	11.2'	57.3'	
23	162°19.5	17.0	55°13.7	10.0'	20°48.3	11.0'	57.3'	
	SD = 16.2'	d = -0.5'		SE	0 = 15.8'			
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0 1	177°19.3 192°19.1	\$20°16.5 16.0	69°42.6 84°11.5	9.9' 9.8'	N20°59.4 21°10.3	10.9' 10.8'	57.3' 57.3'	
2	207°18.9	15.5	98°40.3	9.8'	21 10.3 21°21.1	10.6	57.3 57.2'	
3	222°18.7	. 14.9	113°09.1	9.7'	21°31.8	10.6	57.2'	
4	237°18.5	14.4	127°37.9	9.7'	21°42.3	10.4	57.2'	
5	252°18.4	13.9	142°06.5	9.6'	21°52.8	10.3'	57.2'	
6	267°18.2	S20°13.3	156°35.2	9.6'	N22°03.1	10.2'	57.1'	
7	282°18.0	12.8	171°03.7	9.5'	22°13.3 22°23.3	10.1'	57.1'	
8 9	297°17.8 312°17.6	12.3 •• 11.7	185°32.2 200°00.7	9.5' 9.4'	22°23.3 22°33.3	9.9' 9.8'	57.1' 57.1'	
10	312 17.0 327°17.4	11.2	214°29.1	9.3'	22°43.1	9.7'	57.1°	
11	342°17.2	10.7	228°57.5	9.3'	22°52.8	9.6'	57.0'	
12	357°17.1	S20°10.1	243°25.8	9.2'	N23°02.3	9.4'	57.0'	
13	12°16.9	09.6	257°54.0	9.2'	23°11.7	9.3'	57.0'	
14	27°16.7 42°16.5	09.0 •• 08.5	272°22.2 286°50.3	9.1' 9.1'	23°21.0 23°30.2	9.2'	56.9'	
15 16	42 16.5 57°16.3	· · 08.5 08.0	280 50.3 301°18.4	9.1 9.0'	23°39.2	9.0' 8.9'	56.9' 56.9'	
17	72°16.1	07.4	315°46.4	9.0'	23°48.1	8.8'	56.9'	
18	87°15.9	S20°06.9	330°14.4	8.9'	N23°56.8	8.6'	56.9'	
19	102°15.8	06.3	344°42.3	8.9'	24°05.5	8.5'	56.8'	
20	117°15.6	05.8	359°10.2	8.8'	24°14.0	8.3'	56.8'	
21 22	132°15.4 147°15.2	· · 05.2 04.7	13°38.0 28°05.8	8.8' 8.7'	24°22.3 24°30.5	8.2' 8.1'	56.8' 56.8'	
23	162°15.0	04.7	42°33.5	8.7'	24°38.6	7.9'	56.7	
	SD = 16.2'	d = -0.5'			0 = 15.6'			
C			CUA			.i	LIP	
Sun 0	<b>GHA</b> 177°14.9	<b>Dec</b> \$20°03.6	<b>GHA</b> 57°01.2	ν 8.6'	<b>Dec</b> N24°46.5	d 7.8'	<b>HP</b> 56.7'	
1	192°14.7	03.1	71°28.9	8.6'	24°54.3	7.7'	56.7'	
2	207°14.5	02.5	85°56.4	8.5'	25°02.0	7.5'	56.7'	
3	222°14.3	• • 02.0	100°24.0	8.5'	25°09.5	7.4'	56.6'	
4	237°14.1	01.4	114°51.5	8.4'	25°16.8	7.2'	56.6'	
5 6	252°14.0 267°13.8	00.9 \$20°00.3	129°18.9 143°46.3	8.4' 8.4'	25°24.1 N25°31.1	7.1' 6.9'	56.6' 56.6'	
7	282°13.6	19°59.8	143 40.3 158°13.7	8.3'	25°38.1	6.8'	56.6'	
8	297°13.4	59.2	172°41.0	8.3'	25°44.9	6.6'	56.5	
9	312°13.2	• • 58.7	187°08.3	8.2'	25°51.5	6.5'	56.5'	
10	327°13.1	58.1	201°35.5	8.2'	25°58.0	6.4	56.5	
11	342°12.9	57.6 \$19°57.0	216°02.7 230°29.9	8.2'	26°04.4 N26°10.6	6.2'	56.5'	
12 13	357°12.7 12°12.5	519°57.0 56.5	230°29.9 244°57.0	8.1' 8.1'	N26°10.6 26°16.6	6.1' 5.9'	56.4' 56.4'	
14	27°12.4	55.9	259°24.1	8.1	26°22.5	5.8'	56.4	
15	42°12.2	• • 55.4	273°51.1	8.0'	26°28.3	5.6'	56.4	
16	57°12.0	54.8	288°18.1	8.0'	26°33.9	5.5'	56.4'	
17	72°11.8	54.2	302°45.1	8.0'	26°39.3	5.3'	56.3'	
18	87°11.6 102°11.5	\$19°53.7	317°12.1	7.9'	N26°44.7 26°49.8	5.2'	56.3'	
19 20	102°11.5 117°11.3	53.1 52.6	331°39.0 346°05.9	7.9' 7.9'	26°49.8 26°54.8	5.0' 4.8'	56.3' 56.3'	
21	132°11.1	52.0	0°32.8	7.8'	26°59.7	4.7	56.2	
22	147°11.0	51.5	14°59.6	7.8'	27°04.4	4.5'	56.2	
23	162°10.8	50.9	29°26.4	7.8'	27°08.9	4.4'	56.2'	
	SD = 16.2'	d = -0.5'		SE	0 = 15.5'			

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

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

		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	59-79%
19	10:24	10:34	12:11	19:11	06:46	
20	10:43	10:52	12:11	20:03	07:37	
21	11:01	11:09	12:11	20:58	08:30	

## January 22, 23, 24 UT (Mon., Tue., Wed.)

h	Aries	Ver	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	120°51.0	212°40.1	S22°18.4	196°36.4	\$23°32.7	86°24.7	N12°37.9	143°06.2	S11°03.7			
1	135°53.5	227°39.3	18.5	211°36.9	32.6	101°27.0	38.0	158°08.4	03.6	Alpheratz	357°35.8	29°13.4
2	150°55.9	242°38.4	18.7	226°37.3	32.4	116°29.3	38.1	173°10.6	03.5	Ankaa	353°08.1	-42°10.8
3	165°58.4	257°37.6	• • 18.8	241°37.7	• • 32.2	131°31.6	• • 38.2	188°12.8	• • 03.4	Schedar	349°32.2	56°40.4
4	181°00.9	272°36.7	19.0	256°38.1	32.1	146°33.9	38.2	203°15.0	03.3	Diphda Achernar	348°48.2 335°20.8	-17°51.5 -57°07.2
5	196°03.3	287°35.9	19.1	271°38.5	31.9	161°36.2	38.3	218°17.2	03.2	Hamal	327°52.1	-37 07.2 23°34.6
6	211°05.8	302°35.0	\$22°19.3	286°38.9	S23°31.7	176°38.5	N12°38.4	233°19.5	S11°03.1	Polaris	314°16.9	89°22.2
7	226°08.3	317°34.1	19.4	301°39.3	31.6	191°40.7	38.5	248°21.7	03.0	Acamar	315°12.3	-40°12.7
8	241°10.7	332°33.3	19.6	316°39.7	31.4	206°43.0	38.5	263°23.9	02.9	Menkar	314°06.9	4°11.0
9	256°13.2 271°15.6	347°32.4 2°31.6	• • 19.7	331°40.1	• • 31.2	221°45.3 236°47.6	• • 38.6	278°26.1	• • 02.8	Mirfak	308°29.2	49°57.0
10 11	271 15.0 286°18.1	2 31.0 17°30.7	19.9 20.0	346°40.6 1°41.0	31.1 30.9	250 47.0 251°49.9	38.7 38.7	293°28.3 308°30.5	02.7 02.6	Aldebaran	290°40.3	16°33.5
12	301°20.6	32°29.9	\$22°20.2	16°41.4	\$23°30.7	266° 52.2	N12°38.8	323°32.7	S11°02.5	Rigel	281°04.4	-8°10.5
13	316°23.0	47°29.0	20.3	31°41.8	30.6	281°54.5	38.9	338°34.9	02.4	Capella	280°22.7	46°01.4
14	331°25.5	62°28.1	20.4	46°42.2	30.4	296° 56.8	39.0	353°37.1	02.3	Bellatrix	278°23.5	6°22.3
15	346°28.0	77°27.3	• • 20.6	61°42.6	• • 30.2	311°59.0	• • 39.0	8°39.3	• • 02.2	Elnath Alnilam	278°02.6 275°38.3	28°37.7 -1°11.2
16	1°30.4	92°26.4	20.7	76°43.0	30.1	327°01.3	39.1	23°41.5	02.1	Betelgeuse	270°52.6	7°24.7
17	16°32.9	107°25.6	20.8	91°43.4	29.9	342°03.6	39.2	38°43.7	02.0	Canopus	263°52.2	-52°42.6
18	31°35.4	122°24.7	\$22°21.0	106°43.8	\$23°29.7	357°05.9	N12°39.3	53°45.9	S11°01.9	Sirius	258°26.6	-16°45.0
19	46°37.8	137°23.8	21.1	121°44.3	29.6	12°08.2	39.3	68°48.1	01.8	Adhara	255°06.1	-29°00.3
20	61°40.3	152°23.0	21.3	136°44.7	29.4	27°10.5	39.4	83°50.4	01.6	Procyon	244°51.3	5°09.8
21 22	76°42.8 91°45.2	167°22.1 182°21.3	· · 21.4 21.5	151°45.1 166°45.5	· · 29.2 29.0	42° 12.8 57° 15.0	· · 39.5 39.5	98°52.6 113°54.8	· · 01.5 01.4	Pollux	243°17.9	27°58.0
23	91 45.2 106°47.7	102 21.3 197° 20.4	21.5	181°45.9	28.9	72° 17.3	39.5	113 54.6 128°57.0	01.4	Avior	234°14.4	-59°35.1
_										Suhail	222°46.5	-43°31.7
ivler.p	ass. 15:54	$\nu$ -0.9' d0.	∠ m-3.94	$\nu$ 0.4' $d$ -0	.2′ m1.34	$\nu$ 2.3′ d0.	1′ m-2.42	$\nu$ 2.2' d-0	0.1' m0.98	Miaplacidus Alphard	221°37.5 217°48.2	-69°48.8 -8°45.8
										Regulus	217 46.2 207°35.0	-6 45.6 11°50.9
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.5	61°37.1
0	121°50.1	212°19.5	S22°21.8	196°46.3	\$23°28.7	87° 19.6	N12°39.7	143°59.2	S11°01.2	Denebola	182°25.6	14°26.1
1	136°52.6	227°18.7	21.9	211°46.7	28.5	102°21.9	39.8	159°01.4	01.1	Gienah	175°44.3	-17°40.5
2	151°55.1 166°57.5	242°17.8 257°17.0	22.0 · · 22.2	226°47.1 241°47.5	28.4 •• 28.2	117°24.2 132°26.5	39.8 •• 39.9	174°03.6 189°05.8	01.0 · · 00.9		173°00.7	-63°13.7
4	182°00.0	272°16.1	22.3	256°48.0	28.0	132 20.5 147°28.7	40.0	204°08.0	00.9		171°52.3	-57°14.6
5	197°02.5	287° 15.2	22.4	271°48.4	27.8	162°31.0	40.1	219°10.2	00.7	Alioth	166°13.5	55°49.5
6	212°04.9	302°14.4	S22°22.5	286°48.8	S23°27.7	177°33.3	N12°40.1	234°12.4	S11°00.6	Spica	158°23.1	-11°17.2
7	227°07.4	$317^{\circ}13.5$	22.6	301°49.2	27.5	192°35.6	40.2	249°14.6	00.5	Alkaid Hadar	152°52.6 148°37.2	49°11.3 -60°29.1
8	242°09.9	332°12.6	22.8	316°49.6	27.3	207°37.9	40.3	$264^{\circ}16.8$	00.4		140°58.6	-36°29.1
9	257°12.3	347°11.8	• • 22.9	331°50.0	• • 27.1	222°40.1	• • 40.4	279°19.0	• • 00.3	Arcturus	145°48.7	19°03.3
10	272°14.8	2°10.9	23.0	346°50.4	26.9	237°42.4	40.4	294°21.2	00.2	Rigil Kent.	139°41.5	-60°55.8
11	287°17.3	17°10.1	23.1 \$22°23.2	1°50.8 16°51.2	26.8 \$23°26.6	252°44.7	40.5	309°23.5 324°25.7	00.1	Kochab	$137^{\circ}20.0$	74°03.0
12 13	302°19.7 317°22.2	32°09.2 47°08.3	23.3	31°51.7	26.4	267° 47.0 282° 49.3	N12° 40.6 40.7	339°27.9	\$11°00.0 10°59.9	Zuben'ubi	136°57.0	-16°08.5
14	332°24.6	62°07.5	23.5	46°52.1	26.2	202 49.5 297°51.5	40.7	354°30.1	59.8	Alphecca	126°04.6	26°37.8
15	347°27.1	77°06.6	23.6	61°52.5	. 26.1	312°53.8	40.8	9°32.3	• • 59.7	Antares	112°17.0	-26°29.1
16	2°29.6	92°05.7	23.7	76°52.9	25.9	327°56.1	40.9	24°34.5	59.6	Atria Sabik	107°12.4 102°03.9	-69°04.0 -15°45.3
17	17°32.0	$107^{\circ}04.9$	23.8	91°53.3	25.7	342°58.4	41.0	39°36.7	59.5	Shaula	96°11.8	-13 45.3 -37°07.2
18	32°34.5	122°04.0	\$22°23.9	106°53.7	\$23°25.5	358°00.7	N12°41.0	54°38.9	S10°59.4	Rasalhague	95°59.6	12°32.4
19	47°37.0	137°03.2	24.0	121°54.1	25.3	13°02.9	41.1	69°41.1	59.3	Eltanin	90°43.0	51°28.9
20	62°39.4	152°02.3	24.1	136°54.5	25.2	28° 05.2	41.2	84°43.3	59.2	Kaus Aust.	83°33.9	-34°22.4
21 22	77°41.9 92°44.4	167°01.4 182°00.6	· · 24.2 24.3	151°54.9 166°55.4	· · 25.0 24.8	43°07.5 58°09.8	· · 41.3 41.3	99°45.5 114°47.7	· · 59.1 59.0	Vega	80°34.2	38°48.2
23	92 44.4 107°46.8	196° 59.7	24.3	181°55.8	24.6	73° 12.0	41.4	129°49.9	58.9	Nunki	75°49.1	-26°16.0
										Altair	62°01.1	8°55.8
Mer.p	ass. 15:50	$\nu$ -0.9' d0.	1′ m-3.94	$\nu$ 0.4′ d-0	.2′ m1.34	$\nu$ 2.3′ d0.	1′ m-2.42	$\nu^{2.2'} d$ -0	0.1′ m0.98	Peacock Deneb	53°07.6 49°26.8	-56°39.5 45°21.9
										Enif	33°39.9	9°59.0
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°34.3	-46°50.9
0	122°49.3	211°58.8	S22°24.5	196°56.2	S23°24.4	88° 14.3	N12°41.5	144°52.1	\$10°58.8	Fomalhaut	15° 15.7	-29°29.9
1	137°51.7	226°58.0	24.6	211°56.6	24.2	103°16.6	41.6	159°54.3	58.7	Scheat	13°46.2	28°12.8
2	152°54.2	241°57.1	24.7	226°57.0	24.1	118° 18.9	41.7	174°56.5	58.6	Markab	13°30.9	15°20.0
3 4	167°56.7 182°59.1	256° 56.2 271° 55.4	· · 24.8 24.9	241°57.4 256°57.8	· · 23.9 23.7	133°21.1 148°23.4	· · 41.7 41.8	189°58.7 205°00.9	• • 58.5 58.4	Jan 22 Mon	SHA	Mer.pass
5	198°01.6	271 55.4 286° 54.5	25.0	271°58.2	23.7	163°25.7	41.8	200°03.2	58.3	Venus	91°49.1	09:50
6	213°04.1	301°53.6	S22°25.1	286°58.7	S23°23.3	178° 28.0	N12°42.0	235°05.4	S10°58.2	Mars	75°45.4	10:53
7	228°06.5	316°52.8	25.2	301°59.1	23.1	193°30.2	42.0	250°07.6	58.1	Jupiter	$325^{\circ}33.7$	18:12
8	243°09.0	331°51.9	25.3	316°59.5	22.9	208° 32.5	42.1	265°09.8	58.0	Saturn	22°15.2	14:25
9	258°11.5	346°51.1	• • 25.4	331°59.9	• • 22.8	223°34.8	• • 42.2	280°12.0	• • 57.9	Jan 23 Tue	SHA	Mer.pass
10	273°13.9	1°50.2	25.5	347°00.3	22.6	238°37.1	42.3	295°14.2	57.8 57.7	Venus	90°29.4	09:51
11 12	288°16.4 303°18.9	16°49.3 31°48.5	25.6 \$22°25.7	2°00.7 17°01.1	22.4 \$23°22.2	253°39.3 268°41.6	42.3 N12° 42.4	310°16.4 325°18.6	57.7 \$10°57.6	Mars	74°56.2	10:53
13	303 18.9 318°21.3	31 48.5 46°47.6	25.7	32°01.5	22.0	283°43.9	42.5	340°20.8	510 57.6 57.5	Jupiter	325°29.5	18:08
14	333°23.8	61°46.7	25.8	47°01.9	21.8	298°46.1	42.6	355°23.0	57.4	Saturn	22°09.0	14:22
15	348°26.2	76°45.9	• • 25.9	62°02.4	• • 21.6	313°48.4	• • 42.7	10°25.2	• • 57.3	Jan 24 Wed	SHA	Mer.pass
16	$3^{\circ}28.7$	91°45.0	26.0	77°02.8	21.4	$328^{\circ}50.7$	42.7	$25^{\circ}27.4$	57.2	Venus	89°09.5	09:53
17	18°31.2	106°44.1	26.1	92°03.2	21.2	343°53.0	42.8	40°29.6	57.1	Mars	74°06.9	10:52
18	33°33.6	121°43.3	S22°26.2	107°03.6	\$23°21.0	358°55.2	N12°42.9	55°31.8	\$10°57.0	Jupiter		18:04
19	48°36.1	136° 42.4	26.2	122°04.0	20.9	13°57.5	43.0	70°34.0	56.9	Saturn	22°02.8	14:18
20 21	63°38.6 78°41.0	151°41.5 166°40.7	26.3 •• 26.4	137°04.4 152°04.8	20.7 •• 20.5	28°59.8 44°02.0	43.0 •• 43.1	85°36.2 100°38.4	56.7 •• 56.6	Horizont	al parallax	
22	93°43.5	181°39.8	26.5	167°05.2	20.3	59°04.3	43.1	115°40.6	56.5		Venus:	0.1
23	108°46.0	196° 38.9	26.5	182°05.7	20.1	74°06.6	43.3	130°42.8	56.4		Mars:	0.1
	ass. 15:46	$\nu$ -0.9' d0.			.2′ m1.34		1′ m-2.41		0.1′ m0.98	<del></del>		
ivier.p	uss. 15.40	ν-υ.9 αυ.	ı 111-J.94	ν υ.Ψ u-U	1111.34	ν Δ.3 u0.	± 111-2.41	ν Δ.Δ U-U	1110.90			

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	177°10.6	\$19°50.3	43°53.2	7.8'	N27°13.3	4.2'	56.2'
1 2	192°10.4 207°10.3	49.8 49.2	58°20.0 72°46.8	7.8' 7.7'	27°17.5 27°21.6	4.1' 3.9'	56.2' 56.1'
3	207 10.3 222°10.1	• • 48.7	87°13.5	7.7'	27°25.5	3.8'	56.1
4	237°09.9	48.1	101°40.2	7.7'	27°29.3	3.6'	56.1'
5	252°09.7	47.5	116°06.9	7.7'	27°32.9	3.5'	56.1'
6	267°09.6 282°09.4	\$19°47.0 46.4	130°33.6 145°00.2	7.7' 7.7'	N27°36.4 27°39.7	3.3' 3.2'	56.1' 56.0'
7 8	282 09.4 297°09.2	46.4 45.8	145 00.2 159°26.9	7.7 7.6'	27 39.7 27°42.8	3.2 3.0'	56.0'
9	312°09.1	• • 45.3	173°53.6	7.6'	27°45.8	2.8'	56.0'
10	327°08.9	44.7	188°20.2	7.6'	27°48.7	2.7'	56.0'
11 12	342°08.7 357°08.6	44.1 \$19°43.6	202°46.8 217°13.4	7.6' 7.6'	27°51.4 N27°53.9	2.5' 2.4'	56.0' 55.9'
13	12°08.4	43.0	231°40.1	7.6'	27°56.3	2.4	55.9'
14	27°08.2	42.4	246°06.7	7.6'	27°58.5	2.1'	55.9'
15	42°08.0	• • 41.9	260°33.3	7.6'	28°00.5	1.9'	55.9'
16 17	57°07.9 72°07.7	41.3 40.7	274°59.9 289°26.5	7.6' 7.6'	28°02.4 28°04.2	1.7' 1.6'	55.9' 55.8'
18	87°07.5	519°40.1	303°53.2	7.6'	N28°05.8	1.4	55.8'
19	102°07.4	39.6	318°19.8	7.6'	28°07.2	1.3'	55.8'
20	117°07.2	39.0	332°46.4	7.6'	28°08.5	1.1'	55.8'
21	132°07.0 147°06.9	• • 38.4	347°13.1 1°39.7	7.7'	28°09.6 28°10.5	1.0'	55.8'
22 23	147 06.9 162°06.7	37.8 37.3	1 39.7 16°06.4	7.7' 7.7'	28°11.3	0.8' 0.6'	55.7' 55.7'
	SD = 16.2'	d = -0.6'			0 = 15.3'		
	JD — 10.2	u = -0.0		)L	· — 13.3°		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177°06.5	\$19°36.7	30°33.1	7.7'	N28°12.0	0.5'	55.7'
1 2	192°06.4 207°06.2	36.1 35.5	44°59.8 59°26.5	7.7' 7.7'	28°12.5 28°12.8	0.3' 0.2'	55.7' 55.7'
3	222°06.1	• • 35.0	73°53.2	7.8'	28°13.0	0.2	55.6'
4	237°05.9	34.4	88°20.0	7.8'	28°13.0	-0.1'	55.6'
5	252°05.7	33.8	102°46.8	7.8'	28°12.9	-0.3'	55.6'
6 7	267°05.6 282°05.4	\$19°33.2 32.6	117°13.6 131°40.4	7.8' 7.9'	N28°12.6 28°12.2	-0.4' -0.6'	55.6' 55.6'
8	297°05.2	32.0 32.1	131 40.4 146°07.3	7.9' 7.9'	28°11.6	-0.0 -0.7'	55.5'
9	312°05.1	• • 31.5	160°34.1	7.9'	28°10.9	-0.9'	55.5'
10	327°04.9	30.9	175°01.1	7.9'	28°10.0	-1.0'	55.5'
11 12	342°04.8 357°04.6	30.3 \$19°29.7	189°28.0 203°55.0	8.0' 8.0'	28°08.9 N28°07.7	-1.2' -1.4'	55.5' 55.5'
13	12°04.4	29.1	203 55.0 218°22.0	8.1'	28°06.4	-1.4 -1.5'	55.5'
14	27°04.3	28.6	232°49.1	8.1'	28°04.8	-1.7'	55.4'
15	42°04.1	• • 28.0	247°16.1	8.1'	28°03.2	-1.8'	55.4'
16 17	57°04.0 72°03.8	27.4 26.8	261°43.3 276°10.4	8.2' 8.2'	28°01.4 27°59.4	-2.0' -2.1'	55.4' 55.4'
18	87°03.6	\$19°26.2	290°37.7	8.3'	N27°57.3	-2.3'	55.4'
19	102°03.5	25.6	$305^{\circ}04.9$	8.3'	$27^{\circ}55.1$	-2.4'	55.3'
20	117°03.3	25.0	319°32.2	8.3'	27°52.7		55.3'
21 22	132°03.2 147°03.0	· · 24.5 23.9	333°59.6 348°27.0	8.4' 8.4'	27°50.1 27°47.4	-2.7' -2.8'	55.3' 55.3'
23	162°02.8	23.3	2°54.4	8.5'	27°44.6	-3.0'	55.3'
	SD = 16.2'	d = -0.6'		SE	0 = 15.2'		
					10.1		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	177°02.7 192°02.5	\$19°22.7 22.1	17°21.9 31°49.5	8.6' 8.6'	N27°41.6 27°38.5	-3.1' -3.3'	55.3' 55.2'
2	207°02.4	21.5	46°17.1	8.7'	27°35.2	-3.4'	55.2'
3	222°02.2	• • 20.9	60°44.7	8.7'	27°31.8	-3.6'	55.2'
4	237°02.1	20.3	75°12.4	8.8'	27°28.2	-3.7'	55.2'
5 6	252°01.9 267°01.8	19.7 \$19° 19.1	89°40.2 104°08.0	8.8' 8.9'	27°24.5 N27°20.7	-3.8' -4.0'	55.2' 55.2'
7	282°01.6	18.5	118°35.9	9.0'	27°16.7	-4.1'	55.1'
8	297°01.4	17.9	133°03.9	9.0'	27°12.5	-4.3'	55.1'
9	312°01.3	•• 17.3	147°31.9	9.1' 9.1'	27°08.3	-4.4'	55.1'
10 11	327°01.1 342°01.0	16.7 16.1	162°00.0 176°28.1	9.1' 9.2'	27°03.9 26°59.3	-4.5' -4.7'	55.1' 55.1'
12	357°00.8	S19° 15.5	190°56.3	9.3'	N26°54.7	-4.8'	55.1'
13	12°00.7	14.9	205°24.6	9.3'	26°49.8	-4.9'	55.0'
14 15	27°00.5 42°00.4	14.3 · · 13.7	219°53.0 234°21.4	9.4' 9.5'	26°44.9 26°39.8	-5.1' -5.2'	55.0' 55.0'
15 16	42°00.4 57°00.2	13.1	234°21.4 248°49.9	9.5° 9.6'	26°39.8 26°34.6	-5.2 -5.3'	55.0' 55.0'
17	72°00.1	12.5	263°18.4	9.6'	26°29.3	-5.5'	55.0'
18	86°59.9	\$19°11.9	277°47.0	9.7'	N26°23.8	-5.6'	55.0'
19 20	101°59.8 116°59.6	11.3 10.7	292°15.7 306°44.5	9.8' 9.8'	26°18.2 26°12.5	-5.7' -5.9'	54.9' 54.9'
20	110°59.6 131°59.5	10.1	306 44.5 321°13.4	9.8° 9.9'	26°12.5 26°06.6	-5.9° -6.0'	54.9' 54.9'
22	146°59.3	09.5	335°42.3	10.0'	26°00.6	-6.1'	54.9'
23	161°59.2	08.9	350°11.3	10.1'	25°54.5	-6.2'	54.9'
	SD = 16.2'	d = -0.6'		SE	0 = 15.1'		

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

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

		Sun			Moon				
Day	Eqn.of Time   Mer.   Mer.Pass.		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	86-97%			
22	11:18	11:26	12:11	21:53	09:25				
23	11:34	11:42	12:12	22:48	10:21				
24	11:49	11:57	12:12	23:41	11:15				

## January 25, 26, 27 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	123°48.4	211°38.1	\$22°26.6	197°06.1	\$23°19.9	89°08.8	N12°43.4	145°45.0	S10°56.3			
1	138°50.9	226°37.2	26.7	212°06.5	19.7	104°11.1	43.4	160°47.2	56.2	Alpheratz	357°35.8	29°13.4
2	153°53.4	241°36.3	26.8	227°06.9	19.5	119° 13.4	43.5	175°49.4	56.1	Ankaa	353°08.1	-42°10.8
3	168°55.8	256° 35.5	• • 26.8	242°07.3	• • 19.3	134° 15.7	• • 43.6	190°51.6	• • 56.0	Schedar	349°32.2	56°40.4
4	183°58.3	271°34.6	26.9	257°07.7	19.1	$149^{\circ}17.9$	43.7	205°53.8	55.9	Diphda	348°48.2	-17°51.5
5	199°00.7	286°33.7	27.0	272°08.1	18.9	164°20.2	43.8	220°56.0	55.8	Achernar	335°20.8	-57°07.2
6	214°03.2	301°32.9	S22°27.0	287°08.5	S23°18.7	179°22.5	N12°43.8	235°58.3	S10°55.7	Hamal	327°52.1	23°34.6
7	229°05.7	$316^{\circ}32.0$	27.1	302°09.0	18.5	194°24.7	43.9	251°00.5	55.6	Polaris	314°18.3	89°22.3
8	244°08.1	331°31.1	27.2	317°09.4	18.3	209°27.0	44.0	266°02.7	55.5	Acamar Menkar	315°12.3 314°06.9	-40°12.7 4°11.0
9	259°10.6	346°30.3	• • 27.2	332°09.8	•• 18.1	224° 29.3	• • 44.1	281°04.9	• • 55.4	Mirfak	308°29.2	49°57.0
10	274°13.1	1°29.4	27.3	347°10.2	17.9	239°31.5	44.2	296°07.1	55.3	Aldebaran	290°40.3	16°33.5
11	289°15.5	$16^{\circ}28.5$	27.4	2°10.6	17.7	254° 33.8	44.2	311°09.3	55.2	Rigel	290 40.3 281°04.4	-8°10.5
12	304°18.0	$31^{\circ}27.6$	\$22°27.4	$17^{\circ}11.0$	S23°17.5	269°36.0	N12°44.3	326°11.5	\$10°55.1	Capella	280°22.7	46°01.4
13	319°20.5	46°26.8	27.5	32°11.4	17.3	284°38.3	44.4	341°13.7	55.0	Bellatrix	278°23.5	6°22.3
14	334°22.9	$61^{\circ}25.9$	27.5	47°11.8	17.1	299°40.6	44.5	356°15.9	54.9	Elnath	278°02.6	28°37.7
15	349°25.4	76°25.0	• • 27.6	62°12.3	• • 16.9	314°42.8	• • 44.6	$11^{\circ}18.1$	• • 54.8	Alnilam	275°38.3	-1°11.3
16	4°27.9	91°24.2	27.6	77° 12.7	16.7	329°45.1	44.6	26°20.3	54.7	Betelgeuse	270°52.6	7°24.7
17	19°30.3	106°23.3	27.7	92°13.1	16.5	344° 47.4	44.7	41°22.5	54.6	Canopus	263°52.3	-52°42.6
18	34°32.8	121°22.4	S22°27.8	107° 13.5	S23°16.3	359°49.6	N12°44.8	56°24.7	S10°54.5	Sirius	258°26.6	-16°45.0
19	49°35.2	136°21.6	27.8	122°13.9	16.1	14°51.9	44.9	71°26.9	54.4	Adhara	255°06.1	-29°00.4
20	64°37.7	151°20.7	27.9	137°14.3	15.9	29°54.2	45.0	86°29.1	54.3	Procyon	244°51.3	5°09.8
21	79°40.2	166°19.8	• • 27.9	152°14.7	• • 15.7	44°56.4	• • 45.0	101°31.3	• • 54.2	Pollux	243°17.9	27°58.0
22	94°42.6	181°19.0	28.0	167° 15.2	15.5	59°58.7	45.1	116°33.5	54.1	Avior	234°14.4	-59°35.1
23	109°45.1	196°18.1	28.0	182°15.6	15.3	75°00.9	45.2	131°35.7	54.0	Suhail	222°46.5	-43°31.7
Mer.n	pass. 15:42	$\nu$ -0.9' d0	.1′ m-3.93	$\nu 0.4' \ d-0$	0.2′ m1.34	$\nu$ 2.3' d0	1' m-2.40	$\nu^{2.2'}$ d-0	0.1' m0.99	Miaplacidus	221°37.5	-69°48.8
										Alphard	217°48.2	-8°45.8
			_		_		_		_	Regulus	207°35.0	11°50.9
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.4	61°37.1
0	124°47.6	211° 17.2	S22°28.1	197°16.0	\$23°15.1	90°03.2	N12°45.3	146°37.9	S10°53.9	Denebola	182°25.5	14°26.1
1	139°50.0	226°16.4	28.1	212°16.4	14.9	105°05.5	45.4	161°40.1	53.8	Gienah		-17°40.5
2	154°52.5	241°15.5	28.1	227°16.8	14.7	120°07.7	45.4	176°42.3	53.7	Acrux	173°00.7	-63°13.7
3	169°55.0	256° 14.6	· · 28.2	242°17.2	• • 14.5	135° 10.0	• • 45.5	191°44.5	• • 53.6		171°52.3	-57°14.6
4	184°57.4	271°13.7	28.2	257°17.6	14.3	150° 12.2	45.6	206°46.7	53.4	Alioth	166°13.4	55°49.5
5	199°59.9	286°12.9	28.3	272°18.0	14.1	165°14.5	45.7	221°48.9	53.3	Spica	158°23.1	-11°17.2
6	215°02.4	301°12.0	S22°28.3	287°18.5	\$23°13.9	180° 16.8	N12°45.8	236°51.1	S10°53.2	Alkaid	152°52.6	49°11.3
7	230°04.8	316°11.1	28.3	302°18.9	13.7	195°19.0	45.8	251°53.3	53.1	Hadar	148°37.1	-60°29.1
8	245°07.3	331°10.3	28.4	317°19.3	13.4	210°21.3	45.9	266°55.5	53.0	Menkent	147°58.5	-36°29.1
9	260°09.7	346°09.4	• • 28.4	332°19.7	• • 13.2	225°23.5	• • 46.0	281°57.7	• • 52.9	Arcturus	145°48.6	19°03.2
10	275°12.2	1°08.5	28.5	347°20.1	13.0	240°25.8	46.1	296°59.9	52.8	Rigil Kent.	139°41.5	-60°55.8
11	290°14.7	16°07.7	28.5 \$22°28.5	2°20.5	12.8	255°28.1	46.2 N12°46.3	312°02.1	52.7	Kochab	$137^{\circ}19.9$	74°03.0
12	305°17.1	31°06.8		17°20.9	\$23°12.6	270°30.3		327°04.3	\$10°52.6	Zuben'ubi	$136^{\circ}56.9$	-16°08.5
13	320°19.6	46°05.9 61°05.0	28.5	32°21.4 47°21.8	12.4	285°32.6 300°34.8	46.3	342°06.5 357°08.7	52.5	Alphecca	126°04.5	26°37.8
14	335°22.1		28.6		12.2	300 34.8 315°37.1	46.4		52.4	Antares	$112^{\circ}17.0$	-26°29.1
15	350°24.5 5°27.0	76°04.2 91°03.3	• • 28.6	62°22.2 77°22.6	· · 12.0 11.8	315 37.1 330°39.3	• • 46.5	12°10.9 27°13.1	• • 52.3	Atria	$107^{\circ}12.3$	-69°04.0
16 17	20°29.5	106°02.4	28.6 28.7	92°23.0	11.6	345°41.6	46.6 46.7	42°15.3	52.2 52.1	Sabik	102°03.9	-15°45.3
18	35°31.9	100 02.4 121°01.6	\$22°28.7	107° 23.4	\$23°11.3	0°43.9	N12°46.8	57°17.5	\$10°52.0	Shaula	96°11.8	-37°07.2
19	50°34.4	136°00.7	28.7	107 23.4 122°23.8		15°46.1	46.8	72°19.7	F# 0	Rasalhague	95°59.5	12°32.4
20	65°36.8	150° 59.8	28.7	137° 24.3	11.1 10.9	30°48.4	46.9	87°21.9	51.9 51.8	Eltanin	90°43.0	51°28.9
21	80°39.3	165°58.9	• • 28.8	157° 24.5	10.7	45° 50.6	• • 47.0	102°24.1	• • 51.7	Kaus Aust.	83°33.9	-34°22.4
22	95°41.8	180°58.1	28.8	167°25.1	10.7	60°52.9	47.0	102 24.1 117°26.3	51.6	Vega	80°34.1	38°48.2
23	110°44.2	195°57.2	28.8	182°25.5	10.3	75°55.1	47.2	132°28.5	51.5	Nunki	75°49.1	-26°16.0
										Altair	62°01.1	8°55.8
Mer.p	ass. 15:38	$\nu$ -0.9' d0.	.0′ m-3.93	$\nu$ 0.4′ d-0	).2′ m1.34	$\nu 2.3' \ d0.$	.1′ m-2.39	$\nu$ 2.2' d-0	$0.1' \; { m m0.99}$	Peacock	53°07.5	-56°39.5
										Deneb	49°26.8	45°21.9
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.9	9°59.0
0 0	125°46.7	210°56.3	\$22°28.8	197°25.9	\$23° 10.1	90°57.4	N12° 47.3	147°30.7	\$10°51.4	Al Na'ir	27°34.3	-46°50.9
1	140°49.2	225°55.5	28.8	212° 26.3	09.8	105°59.6	47.3	162°32.9	51.3	Fomalhaut	15°15.7	-29°29.9
2	155°51.6	240°54.6	28.9	227° 26.7	09.6	121°01.9	47.4	177°35.1	51.2	Scheat	13°46.2	28°12.8
3	170°54.1	255° 53.7	28.9	242°27.1	09.4	136°04.1	• • 47.5	192°37.3	• • 51.1	Markab	13°30.9	15°20.0
4	185°56.6	270°52.8	28.9	257°27.6	09.2	151°06.4	47.6	207°39.5	51.0	Jan 25 Thu	SHA	Mer.pass
5	200°59.0	285°52.0	28.9	272°28.0	09.0	166°08.7	47.7	222°41.7	50.9	Venus	87°49.6	09:54
6	216°01.5	300°51.1	S22°28.9	287°28.4	\$23°08.8	181° 10.9	N12°47.8	237°43.9	S10°50.8	Mars	73°17.6	10:51
7	231°04.0	315°50.2	28.9	302°28.8	08.5	196° 13.2	47.8	252°46.1	50.6	Jupiter	325°20.4	18:01
8	246°06.4	330°49.4	28.9	317°29.2	08.3	211° 15.4	47.9	267°48.3	50.5	Saturn	21°56.6	14:15
9	261°08.9	345°48.5	• • 28.9	332°29.6	•• 08.1	226° 17.7	• • 48.0	282°50.5	• • 50.4	1 25 5 :	CIII	
10	276°11.3	0°47.6	28.9	347°30.0	07.9	241°19.9	48.1	297°52.7	50.3	Jan 26 Fri	SHA	Mer.pass
11	291°13.8	15°46.7	28.9	2°30.5	07.7	256° 22.2	48.2	312°54.9	50.2	Venus	86°29.7	09:55
12	306°16.3	30°45.9	S22°29.0	17°30.9	\$23°07.4	271°24.4	N12°48.3	327°57.1	S10°50.1	Mars	72°28.4	10:51
13	321°18.7	45°45.0	29.0	32°31.3	07.2	286° 26.7	48.3	342°59.3	50.0	Jupiter	325°15.6	17:57
14	336°21.2	60°44.1	29.0	47°31.7	07.0	301°28.9	48.4	358°01.5	49.9	Saturn	21°50.3	14:11
15	351°23.7	75°43.3	• • 29.0	$62^{\circ}32.1$	06.8	$316^{\circ}31.2$	• • 48.5	13°03.7	• • 49.8	Jan 27 Sat	SHA	Mer.pass
16	6°26.1	90°42.4	29.0	77°32.5	06.6	331°33.4	48.6	28°05.9	49.7	Venus	85°09.6	09:57
17	21°28.6	105°41.5	29.0	92°33.0	06.3	346°35.7	48.7	43°08.1	49.6	Mars	71°39.2	10:50
18	36°31.1	120°40.6	S22°29.0	107°33.4	\$23°06.1	1°37.9	N12°48.8	58°10.3	S10°49.5	Jupiter		17:53
19	51°33.5	135°39.8	29.0	122°33.8	05.9	16°40.2	48.9	73°12.5	49.4	Saturn	21°44.0	14:08
20	66°36.0	150°38.9	28.9	137°34.2	05.7	31°42.4	48.9	88°14.7	49.3			
21	81°38.5	165°38.0	• • 28.9	152°34.6	• • 05.4	46°44.7	• • 49.0	$103^{\circ}16.9$	• • 49.2	Horizont	al parallax	
22	96°40.9	$180^{\circ}37.2$	28.9	$167^{\circ}35.0$	05.2	61°46.9	49.1	$118^{\circ}19.1$	49.1		Venus:	0.1
23	111°43.4	195°36.3	28.9	182°35.4	05.0	$76^{\circ}49.1$	49.2	133°21.3	49.0		Mars:	0.1
Mars	pass. 15:34	1/=0 0/ d0	.0′ m-3.93	ν0 Λ/ Α O	0.2′ m1.34		.1′ m-2.39	1/2 2/ A C	0.1' m0.99			
- wier.p		ν 0.5 u0.		νσ. <del>τ</del> α-υ		ν2.5 u0.		ν Δ. Δ · U · U	1110.33			

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	176°59.0	S19°08.3	4°40.3	10.1'	N25°48.3	-6.4'	54.9'
1 2	191°58.9 206°58.7	07.7 07.1	19°09.5 33°38.7	10.2' 10.3'	25°41.9 25°35.4	-6.5' -6.6'	54.9' 54.8'
3	221°58.6	• • 06.5	48°08.0	10.4'	25°28.8	-6.7'	54.8'
4	236°58.4	05.9	62°37.4	10.5'	25°22.1	-6.8'	54.8'
5 6	251°58.3 266°58.1	05.3 \$19°04.7	77°06.9 91°36.4	10.5' 10.6'	25°15.2 N25°08.3	-7.0' -7.1'	54.8' 54.8'
7	281°58.0	04.1	91 30.4 106°06.0	10.0	25°01.2	-7.1 -7.2'	54.8'
8	296°57.8	03.5	120°35.7	10.8'	24°54.0	-7.3'	54.8'
9	311°57.7	• • 02.8	135°05.5 149°35.4	10.9'	24°46.7	-7.4'	54.7'
10 11	326°57.6 341°57.4	02.2 01.6	149° 35.4 164° 05.3	10.9' 11.0'	24°39.2 24°31.7	-7.5' -7.7'	54.7' 54.7'
12	356°57.3	S19°01.0	178°35.3	11.1'	N24°24.0	-7.8'	54.7'
13	11°57.1	19°00.4	193°05.5	11.2'	24°16.3	-7.9'	54.7'
14 15	26°57.0 41°56.8	18°59.8 · · 59.2	207°35.6 222°05.9	11.3' 11.4'	24°08.4 24°00.4	-8.0' -8.1'	54.7' 54.7'
16	56°56.7	58.5	236°36.3	11.4'	23°52.3	-8.2	54.6'
17	71°56.5	57.9	251°06.7	11.5'	23°44.1	-8.3'	54.6'
18	86°56.4 101°56.3	\$18°57.3 56.7	265°37.2 280°07.8	11.6' 11.7'	N23°35.8 23°27.4	-8.4'	54.6'
19 20	101°56.3 116°56.1	56.7 56.1	280°07.8 294°38.5	11.7	23°27.4 23°18.8	-8.5' -8.6'	54.6' 54.6'
21	131°56.0	• • 55.5	309°09.3	11.9'	23°10.2	-8.7'	54.6'
22	146°55.8	54.8	323°40.2	11.9'	23°01.5	-8.8'	54.6'
23	161°55.7	54.2	338°11.1	12.0'	22°52.7	-8.9'	54.5'
	SD = 16.2'	d = -0.6'		SI	D = 15.0'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°55.6	S18°53.6	352°42.1 7°13.3	12.1'	N22°43.7 22°34.7	-9.0'	54.5'
1 2	191°55.4 206°55.3	53.0 52.4	7°13.3 21°44.4	12.2' 12.3'	22°34.7 22°25.6	-9.1' -9.2'	54.5' 54.5'
3	221°55.1	51.7	36° 15.7	12.4'	22°16.4	-9.3'	54.5
4	236°55.0	51.1	50°47.1	12.4'	22°07.1	-9.4'	54.5'
5 6	251°54.9 266°54.7	50.5 \$18°49.9	65° 18.5 79° 50.1	12.5' 12.6'	21°57.7 N21°48.2	-9.5' -9.6'	54.5' 54.5'
7	281°54.6	49.9	79 50.1 94°21.7	12.7'	21°38.6	-9.0 -9.7'	54.5'
8	296°54.4	48.6	108°53.4	12.8'	21°28.9	-9.8'	54.4'
9	311°54.3	• • 48.0	123°25.1	12.9'	21°19.1	-9.9'	54.4'
10 11	326°54.2 341°54.0	47.4 46.7	137°57.0 152°28.9	12.9' 13.0'	21°09.3 20°59.3	-9.9' -10.0'	54.4' 54.4'
12	356°53.9	\$18°46.1	167°00.9	13.1'	N20°49.3	-10.1	54.4'
13	11°53.8	45.5	181°33.0	13.2'	20°39.2	-10.2'	54.4'
14 15	26°53.6 41°53.5	44.9 •• 44.2	196°05.2 210°37.5	13.3' 13.3'	20°29.0 20°18.7	-10.3' -10.4'	54.4' 54.4'
16	56°53.4	43.6	210 37.5 225°09.8	13.4	20°18.7	-10.4'	54.4 54.3'
17	71°53.2	43.0	$239^{\circ}42.3$	13.5'	$19^{\circ}57.9$	-10.5'	54.3'
18	86°53.1 101°52.9	S18° 42.3	254° 14.8 268° 47.3	13.6'	N19°47.4 19°36.7	-10.6' -10.7'	54.3' 54.3'
19 20	101 52.9 116°52.8	41.7 41.1	283° 20.0	13.7' 13.7'	19 30.7 19°26 1		54.3 54.3'
21	131°52.7	• • 40.4	297°52.7	13.8'	19°15.3	-10.8'	54.3'
22	146°52.6	39.8	312°25.6	13.9'	19°04.5	-10.9'	54.3'
23	161°52.4	39.2	326°58.5	14.0'	18°53.6	-11.0'	54.3'
	SD = 16.2'	d = -0.6'		SI	O = 14.9'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	176°52.3 191°52.2	\$18°38.5 37.9	341°31.4 356°04.5	14.0' 14.1'	N18°42.6 18°31.5	-11.1' -11.1'	54.3' 54.3'
2	206°52.0	37.9 37.3	10°37.6	14.1	18°20.4	-11.1 -11.2'	54.3 54.2'
3	221°51.9	• • 36.6	$25^{\circ}10.8$	14.3'	18°09.2	-11.3'	54.2'
4	236°51.8	36.0	39°44.1	14.3'	17°57.9	-11.3'	54.2'
5 6	251°51.6 266°51.5	35.4 \$18°34.7	54° 17.4 68° 50.8	14.4' 14.5'	17°46.6 N17°35.2	-11.4' -11.5'	54.2' 54.2'
7	281°51.4	34.1	83°24.3	14.6'	17°23.7	-11.5'	54.2
8	296°51.2	33.4	97°57.9	14.6'	17°12.2	-11.6'	54.2'
9 10	311°51.1 326°51.0	· · 32.8 32.2	112°31.5 127°05.2	14.7' 14.8'	17°00.5 16°48.9	-11.7' -11.7'	54.2' 54.2'
11	341°50.9	32.2 31.5	127 05.2 141°39.0	14.8'	16° 48.9	-11. <i>1</i> -11.8'	54.2'
12	356°50.7	S18°30.9	156° 12.8	14.9'	N16°25.4	-11.9'	54.2'
13	11°50.6 26°50.5	30.2	170°46.7 185°20.7	15.0'	16°13.5 16°01.6	-11.9'	54.2'
14 15	26°50.5 41°50.3	29.6 • • 29.0	185°20.7 199°54.7	15.0' 15.1'	16°01.6 15°49.6	-12.0' -12.0'	54.1' 54.1'
16	56°50.2	28.3	214°28.9	15.2'	15°37.6	-12.1'	54.1'
17	71°50.1	27.7	229°03.0	15.2'	15°25.5	-12.1'	54.1'
18 19	86°50.0 101°49.8	\$18°27.0 26.4	243°37.3 258°11.6	15.3' 15.4'	N15°13.4 15°01.2	-12.2' -12.3'	54.1' 54.1'
20	116°49.7	25.7	272°45.9	15.4'	14°48.9	-12.3'	54.1
21	131°49.6	• • 25.1	287°20.4	15.5'	14°36.6	-12.4'	54.1'
22 23	146°49.5 161°49.3	24.4 23.8	301°54.9 316°29.4	15.5' 15.6'	14°24.3 14°11.9	-12.4' -12.5'	54.1' 54.1'
23			310 29.4			-12.5	54.1
	SD = 16.2'	d = -0.6'		SI	O = 14.8'		

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

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

		Sun		Moon				
Day	Eqn.of	Eqn.of Time		Mer.	Pass.	Age		
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	14-16		
	mm:ss mm:ss		hh:mm	hh:mm	hh:mm	99-98%		
25	12:04	12:11	12:12	-:-	12:06			
26	12:18	12:24	12:12	00:30	12:54			
27	12:31	12:37	12:13	01:16	13:38			

h	Aries	Ve	nus	M	ars	Jար	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	$126^{\circ}45.8$	210°35.4	S22°28.9	197°35.9	\$23°04.8	91°51.4	N12°49.3	148°23.5	S10°48.9	Alpheratz	357°35.8	29°13.4
1	141°48.3	225°34.5	28.9	212°36.3	04.5	106°53.6	49.4	163°25.7	48.8	Ankaa	353°08.1	-42°10.8
2	156°50.8	240°33.7	28.9	227°36.7	04.3	121°55.9	49.4	178°27.9	48.7	Schedar	349°32.2	56°40.3
3	171°53.2	255°32.8	• • 28.9	242°37.1	•• 04.1	136°58.1	• • 49.5	193°30.1	• • 48.6	Diphda	348°48.2	-17°51.5
4	186°55.7	270°31.9	28.9	257°37.5	03.9	152°00.4	49.6	208°32.3	48.5	Achernar	335°20.9	-57°07.2
5	201°58.2	285°31.0	28.9	272°37.9	03.6	167°02.6	49.7	223°34.5	48.3	Hamal	327°52.1	23°34.6
6	217°00.6	300°30.2	522°28.8	287°38.3	S23°03.4	182°04.9	N12°49.8	238°36.7	S10°48.2	Polaris	314°19.9	89°22.3
7	232°03.1	315°29.3	28.8	302°38.8	03.2	197°07.1	49.9	253°38.9	48.1	Acamar	315°12.3	-40°12.8
8	247°05.6	330°28.4	28.8	317°39.2	02.9	212°09.4	50.0	268°41.1	48.0	Menkar	314°06.9	4°11.0
9	262°08.0 277°10.5	345°27.6	• • 28.8	332°39.6	• • 02.7	227°11.6	50.1	283°43.3	• • 47.9	Mirfak	308°29.2	49°57.0
10 11	277 10.5 292°12.9	0°26.7 15°25.8	28.8 28.7	347°40.0 2°40.4	02.5 02.3	242°13.8 257°16.1	50.1 50.2	298°45.5 313°47.7	47.8 47.7	Aldebaran	290°40.3	$16^{\circ}33.5$
12	307°15.4	30°24.9	\$22° 28.7	2 40.4 17°40.8	523°02.0	272°18.3	N12°50.3	313 47.7 328°49.9	\$10°47.6	Rigel	281°04.4	-8°10.5
13	307 15.4 322°17.9	45°24.1	28.7	32°41.3	01.8	287°20.6	50.4	343°52.1	47.5	Capella	280°22.7	46°01.4
14	337°20.3	60°23.2	28.7	47°41.7	01.6	302°22.8	50.5	358°54.3	47.4	Bellatrix	278°23.5	6°22.3
15	352°22.8	75°22.3	28.6	62°42.1	01.3	317°25.1	• • 50.6	13°56.5	• • 47.3	Elnath	278°02.6	28°37.7
16	7°25.3	90°21.4	28.6	77°42.5	01.1	332°27.3	50.7	28°58.7	47.2	Alnilam	275°38.3	-1°11.3
17	22°27.7	105°20.6	28.6	92°42.9	00.9	347°29.5	50.7	44°00.9	47.1	Betelgeuse	270°52.7	7°24.7
18	37°30.2	120°19.7	S22°28.5	107°43.3	\$23°00.6	2°31.8	N12°50.8	59°03.1	S10°47.0	Canopus	263°52.3	-52°42.6
19	52°32.7	135°18.8	28.5	122°43.8	00.4	17°34.0	50.9	74°05.3	46.9	Sirius	258°26.6	-16°45.0
20	67°35.1	150°18.0	28.5	137°44.2	23°00.2	32°36.3	51.0	89°07.5	46.8	Adhara	255°06.1	-29°00.4
21	82°37.6	165°17.1	• • 28.5	152°44.6	22°59.9	47°38.5	• • 51.1	104°09.7	• • 46.7	Procyon	244°51.3	5°09.7
22	97°40.1	180°16.2	28.4	167°45.0	59.7	62°40.8	51.2	$119^{\circ}11.9$	46.6	Pollux	243°17.9	27°58.1
23	112°42.5	195°15.3	28.4	182°45.4	59.5	77°43.0	51.3	$134^{\circ}14.1$	46.5	Avior	234°14.4	-59°35.2
			.0′ m-3.93		.2′ m1.33		.1′ m-2.38	112 2/ 4 0	.1′ m0.99	Suhail Miaplacidus	222°46.4 221°37.5	-43°31.7 -69°48.8
ivier.p	ass. 15:30	$\nu$ -0.9 a-0	.0 111-3.93	νυ.4 a-0	.∠ 1111.33	ν2.2 aU	.1 111-2.38	ν2.2 <b>a</b> -0	.1 1110.99	Alphard	221°37.5 217°48.2	-69 48.8 -8 45.8
										Regulus	207°35.0	11°50.9
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.4	61°37.1
0	127°45.0	210°14.5	S22°28.3	197°45.8	\$22°59.2	92°45.2	N12°51.4	149°16.3	S10°46.4	Denebola	182°25.5	14°26.1
1	142°47.4	225°13.6	28.3	212°46.3	59.0	107°47.5	51.4	164°18.5	46.3	Gienah	175°44.2	-17°40.5
2	157°49.9	240°12.7	28.3	227°46.7	58.7	122°49.7	51.5	179°20.7	46.1		173°00.7	-63°13.7
3	172°52.4	255°11.8	• • 28.2	242°47.1	• • 58.5	137°51.9	• • 51.6	194°22.9	• • 46.0		171°52.3	-57°14.7
4	187°54.8	270°11.0	28.2	257°47.5	58.3	152°54.2	51.7	209°25.1	45.9	Alioth	166°13.4	55°49.5
5	202°57.3	285°10.1	28.1	272°47.9	58.0	167°56.4	51.8	224°27.3	45.8	Spica	158°23.0	-11°17.2
6	217°59.8	300°09.2	\$22°28.1	287°48.3	S22°57.8	182°58.7	N12°51.9	239°29.5	\$10°45.7	Alkaid	152°52.5	49°11.3
7	233°02.2	315°08.4	28.1	302°48.7	57.6	198°00.9	52.0	254°31.7	45.6	Hadar	148°37.1	-60°29.1
8	248°04.7	330°07.5	28.0	317°49.2	57.3	213°03.1	52.1	269°33.9	45.5	Menkent	147°58.5	-36°29.2
9	263°07.2	345°06.6	• • 28.0	332°49.6	• • 57.1	228°05.4	• • 52.2	284°36.1	• • 45.4	Arcturus	145°48.6	19°03.2
10	278°09.6	0°05.7	27.9	347°50.0	56.8	243°07.6	52.2	299°38.3	45.3	Rigil Kent.	139°41.4	-60°55.8
11	293°12.1 308°14.6	15°04.9	27.9	2°50.4	56.6	258°09.8	52.3 N12°52.4	314°40.5	45.2	Kochab	$137^{\circ}19.9$	74°03.0
12	308 14.6 323°17.0	30°04.0 45°03.1	\$22°27.8	17°50.8 32°51.3	\$22°56.3	273°12.1 288°14.3	N12 52.4 52.5	329°42.6 344°44.8	\$10°45.1	Zuben'ubi	136°56.9	$-16^{\circ}08.5$
13 14	338°19.5	60°02.2	27.8 27.7	32 51.3 47°51.7	56.1 55.9	200 14.3 303°16.6	52.5 52.6	359°47.0	45.0 44.9	Alphecca	126°04.5	26°37.8
15	353°21.9	75°01.4	•• 27.6	62°52.1	• • 55.6	318° 18.8	• • 52.7	14°49.2	• • 44.8	Antares	112°17.0	-26°29.1
16	8°24.4	90°00.5	27.6	77°52.5	55.4	333°21.0	52.7	29°51.4	44.7	Atria	107°12.3	-69°04.0
17	23°26.9	104°59.6	27.5	92°52.9	55.1	348°23.3	52.9	44°53.6	44.6	Sabik	102°03.9	-15°45.3
18	38°29.3	119°58.7	\$22°27.5	107°53.3	S22°54.9	3°25.5	N12°53.0	59°55.8	S10°44.5	Shaula	96°11.7	-37°07.2
19	53°31.8	134°57.9	27.4	122°53.8	54.6	18°27.7	53.0	74°58.0	44.4	Rasalhague	95°59.5	12°32.4
20	68°34.3	149°57.0	27.4	137°54.2	54.4	33°30.0	53.1	90°00.2	44.3	Eltanin	90°43.0	51°28.9
21	83°36.7	164°56.1	27.3	152°54.6	• • 54.2	48°32.2	• • 53.2	105°02.4	• • 44.1	Kaus Aust.	83°33.9	-34°22.4
22	98°39.2	179°55.3	27.2	167°55.0	53.9	63°34.4	53.3	120°04.6	44.0	Vega	80°34.1 75°49.1	38°48.1
23	113°41.7	194°54.4	27.2	182°55.4	53.7	78°36.7	53.4	135°06.8	43.9	Nunki Altair	62°01.0	-26°16.0 8°55.8
N 4 - · · · ·	15.06		.0′ m-3.92	- 0 4/ -1 0	.2′ m1.33		.1′ m-2.37		1/ 0.00	Peacock	53°07.5	-56°39.5
ivier.p	ass. 15:26	ν-0.9 α-0	.0 111-3.92	$\nu_{0.4} = a_{-0}$	m1.33	ν2.2 αυ	.1 111-2.31	ν2.2 <b>α-</b> 0	.1′ m0.99	Deneb	49°26.8	45°21.9
										Enif	33°39.9	9°59.0
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°34.3	-46°50.9
0	128°44.1	209°53.5	\$22°27.1	197°55.8	S22°53.4	93°38.9	N12°53.5	150°09.0	S10°43.8	Fomalhaut	15°15.7	-29°29.9
1	143°46.6	224°52.6	27.0	212°56.3	53.2	108°41.1	53.6	165°11.2	43.7	Scheat	13°46.3	28°12.8
2	158°49.0	239°51.8	27.0	227°56.7	52.9	123°43.4	53.7	180°13.4	43.6	Markab	13°30.9	$15^{\circ}20.0$
3	173°51.5	254°50.9	• • 26.9	242°57.1	• • 52.7	138°45.6	• • 53.8	195°15.6	• • 43.5			
4	188°54.0	269°50.0	26.8	257°57.5	52.4	153°47.8	53.8	210°17.8	43.4	Jan 28 Sun	SHA 93°40.6	Mer.pass
5	203°56.4	284°49.1	26.8	272°57.9	52.2	168°50.1	53.9	225°20.0	43.3	Venus	83°49.6	09:58
6	218°58.9	299°48.3	\$22°26.7	287°58.3	\$22°51.9	183°52.3	N12°54.0	240°22.2	\$10°43.2	Mars Jupiter	70°50.0 325°05.6	10:49 17:50
7 8	234°01.4	314°47.4	26.6 26.5	302°58.8	51.7	198°54.5	54.1 54.2	255°24.4	43.1 43.0	Saturn	21°37.7	17:50
8 9	249°03.8 264°06.3	329°46.5 344°45.7	26.5 •• 26.5	317°59.2 332°59.6	51.4 •• 51.2	213°56.7 228°59.0	54.2 •• 54.3	270°26.6 285°28.8	43.0 •• 42.9	Jatuill		14.04
9 10	204 00.3 279°08.8	359°44.8	26.4	348°00.0	50.9	244°01.2	54.4	300°31.0	42.8	Jan 29 Mon	SHA	Mer.pass
11	279 08.8 294°11.2	14°43.9	26.4	3°00.4	50.9	259°03.4	54.4 54.5	315°33.2	42.6	Venus	82°29.5	10:00
12	309°13.7	29°43.0	\$22°26.2	18°00.9	\$22°50.4	274°05.7	N12°54.6	330°35.4	\$10°42.6	Mars	70°00.9	10:49
13	324°16.2	44°42.2	26.1	33°01.3	50.2	289°07.9	54.7	345°37.6	42.5	Jupiter	325°00.2	17:46
14	339°18.6	59°41.3	26.1	48°01.7	49.9	304°10.1	54.8	0°39.8	42.3	Saturn	21°31.3	14:01
15	354°21.1	74°40.4	26.0	63°02.1	• • 49.7	319°12.3	• • 54.8	15°41.9	• • 42.2	Jan 30 Tue	SHA	Mer.pass
16	9°23.5	89°39.5	25.9	78°02.5	49.4	334°14.6	54.9	30°44.1	42.1	Venus	81°09.4	10:01
10		104°38.7	25.8	93°02.9	49.2	349°16.8	55.0	45°46.3	42.0	Mars	69°11.7	10:48
17	24°26.0				S22°48.9	4°19.0	N12°55.1	60°48.5	S10°41.9	Jupiter		17:43
	24°26.0 39°28.5	119°37.8	S22°25.7	108°03.4	022 .0.5			00 10.0		Jupitei	324°54.8	
17	39°28.5 54°30.9	119°37.8 134°36.9	25.6	108 03.4 123°03.8	48.6	19°21.3	55.2	75°50.7	41.8	Saturn		
17 18	39°28.5 54°30.9 69°33.4						55.2 55.3		41.8 41.7	Saturn	21°24.9	13:57
17 18 19 20 21	39°28.5 54°30.9 69°33.4 84°35.9	134°36.9 149°36.1 164°35.2	25.6 25.6 •• 25.5	123°03.8 138°04.2 153°04.6	48.6 48.4 •• 48.1	19°21.3 34°23.5 49°25.7	55.3 •• 55.4	75°50.7 90°52.9 105°55.1	41.7 · · 41.6	Saturn	21°24.9	13:57
17 18 19 20 21 22	39°28.5 54°30.9 69°33.4 84°35.9 99°38.3	134°36.9 149°36.1 164°35.2 179°34.3	25.6 25.6 •• 25.5 25.4	123°03.8 138°04.2 153°04.6 168°05.0	48.6 48.4 •• 48.1 47.9	19°21.3 34°23.5 49°25.7 64°27.9	55.3 •• 55.4 55.5	75°50.7 90°52.9 105°55.1 120°57.3	41.7 •• 41.6 41.5	Saturn	21°24.9 tal parallax Venus:	0.1
17 18 19 20 21	39°28.5 54°30.9 69°33.4 84°35.9	134°36.9 149°36.1 164°35.2	25.6 25.6 •• 25.5	123°03.8 138°04.2 153°04.6	48.6 48.4 •• 48.1	19°21.3 34°23.5 49°25.7	55.3 •• 55.4	75°50.7 90°52.9 105°55.1	41.7 · · 41.6	Saturn	21°24.9	13:57

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	176°49.2	S18°23.1	331°04.0	15.7'	N13°59.4	-12.5'	54.1'
1	191°49.1	22.5	345°38.7	15.7'	13°46.9	-12.6'	54.1'
2	206°49.0	21.8	0°13.4	15.8'	13°34.3	-12.6'	54.1'
3	221°48.8	• • 21.2	14°48.2	15.8'	13°21.7	-12.7'	54.1'
4 5	236°48.7 251°48.6	20.5 19.9	29°23.0 43°57.9	15.9' 15.9'	13°09.1 12°56.4	-12.7' -12.7'	54.1' 54.0'
6	251 48.6 266°48.5	19.9 \$18° 19.2	43 57.9 58°32.9	16.0'	N12°43.6	-12.7	54.0'
7	281°48.4	18.6	73°07.9	16.1	12°30.9	-12.8'	54.0'
8	296°48.2	17.9	87°42.9	16.1'	12°18.0	-12.9'	54.0'
9	311°48.1	• • 17.3	102°18.0	16.2'	12°05.2	-12.9'	54.0'
10	326°48.0	16.6	$116^{\circ}53.2$	16.2'	11°52.3	-13.0'	54.0'
11	341°47.9	16.0	131°28.4	16.3'	11°39.3	-13.0'	54.0'
12	356°47.8	\$18° 15.3	146°03.6	16.3'	N11°26.3	-13.0'	54.0'
13	11°47.6 26°47.5	14.7 14.0	160°39.0 175°14.3	16.4' 16.4'	11°13.3 11°00.2	-13.1' -13.1'	54.0' 54.0'
14 15	20 47.5 41°47.4	14.0	175 14.3 189°49.7	16.4	11 00.2 10°47.1	-13.1'	54.0'
16	56°47.3	12.7	204°25.1	16.5'	10°33.9	-13.1	54.0'
17	71°47.2	12.0	219°00.6	16.5'	10°20.8	-13.2'	54.0'
18	86°47.0	S18°11.4	233°36.2	16.6'	N10°07.5	-13.3'	54.0'
19	101°46.9	10.7	248°11.7	16.6'	09°54.3	-13.3'	54.0'
20	116°46.8	10.1	262°47.3	16.7'	09°41.0	-13.3'	54.0'
21	131°46.7	09.4	277°23.0	16.7'	09°27.7	-13.3'	54.0'
22 23	146°46.6 161°46.5	08.7 08.1	291°58.7 306°34.4	16.7' 16.8'	09°14.3 09°01.0	-13.4' -13.4'	54.0' 54.0'
23			500 34.4			-13.4	54.0
	SD = 16.2'	d = -0.6'		SI	D = 14.7'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°46.3	S18°07.4	321°10.2	16.8'	N08°47.6	-13.4'	54.0'
1	191°46.2	06.8	335°46.0	16.8'	$08^{\circ}34.1$	-13.5'	54.0'
2	206°46.1	06.1	350°21.8	16.9'	08°20.6	-13.5'	54.0'
3	221°46.0	• • 05.4	4°57.7	16.9'	08°07.2	-13.5'	54.0'
4	236°45.9 251°45.8	04.8	19°33.6 34°09.6	16.9'	07°53.6 07°40.1	-13.6'	54.0'
5 6	251°45.8 266°45.7	04.1 \$18°03.4	48°45.5	17.0' 17.0'	07°40.1 N07°26.5	-13.6' -13.6'	54.0' 54.0'
7	281°45.5	02.8	63°21.5	17.0'	07°12.9	-13.6'	54.0'
8	296°45.4	02.1	77°57.6	17.1	06°59.3	-13.6'	54.0'
9	311°45.3	01.4	92°33.6	17.1'	06°45.6	-13.7'	54.0'
10	326°45.2	8.00	$107^{\circ}09.7$	17.1'	$06^{\circ}32.0$	-13.7'	54.0'
11	341°45.1	$18^{\circ}00.1$	121°45.8	17.1'	06°18.3	-13.7'	54.0'
12	356°45.0	S17°59.4	136°22.0	17.2'	N06°04.5	-13.7'	54.0'
13	11°44.9 26°44.8	58.8	150°58.1 165°34.3	17.2'	05°50.8 05°37.1	-13.8'	54.0'
14 15	20 44.8 41°44.7	58.1 •• 57.4	105 34.3 180°10.5	17.2' 17.2'	05 37.1 05°23.3	-13.8' -13.8'	54.0' 54.0'
16	56°44.5	56.7	194°46.8	17.2	05°09.5	-13.8'	54.0'
17	71°44.4	56.1	209°23.0	17.3'	04°55.7	-13.8'	54.0'
18	86°44.3	S17°55.4	223°59.3	17.3'	N04°41.8	-13.8'	54.0'
19	101°44.2	54.7	238°35.6	17.3'	04°28.0	-13.9'	54.0'
20	116°44.1	54.1	253°11.9	17.3'	04°14.1	-13.9'	54.0'
21	131°44.0 146°43.9	• • 53.4	267°48.2	17.3'	04°00.3 03°46.4	-13.9'	54.0'
22 23	146°43.9 161°43.8	52.7 52.0	282°24.5 297°00.9	17.3' 17.4'	03°46.4	-13.9' -13.9'	54.0' 54.0'
2.5	SD = 16.2'	d = -0.7'			O = 14.7'	15.5	31.0
	3D = 10.2	u = -0.7		31	J = 14.7		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°43.7	\$17°51.4	311°37.2	17.4	N03°18.6	-13.9'	54.0'
1 2	191°43.6 206°43.5	50.7 50.0	326°13.6 340°50.0	17.4' 17.4'	03°04.6 02°50.7	-13.9' -14.0'	54.0' 54.0'
3	200 43.5 221°43.4	• • 49.3	355°26.4	17.4 17.4'	02°36.7	-14.0'	54.0'
4	236°43.3	48.7	10°02.8	17.4'	02°22.8	-14.0'	54.0'
5	251°43.1	48.0	24°39.2	17.4'	02°08.8	-14.0'	54.0'
6	266°43.0	<b>S</b> 17°47.3	39°15.6	17.4'	N01°54.8	-14.0'	54.0'
7	281°42.9	46.6	53°52.0	17.4'	01°40.8	-14.0'	54.0'
8	296°42.8	45.9	68°28.4	17.4	01°26.8	-14.0'	54.0'
9 10	311°42.7 326°42.6	•• 45.3 44.6	83°04.8 97°41.3	17.4' 17.4'	01°12.8 00°58.8	-14.0' -14.0'	54.0' 54.0'
10 11	326°42.6 341°42.5	44.6 43.9	97°41.3 112°17.7	17.4' 17.4'	00°58.8 00°44.8	-14.0' -14.0'	54.0° 54.1'
12	356°42.4	\$17°43.2	112 17.7 126°54.1	17.4	N00°30.8	-14.0'	54.1
13	11°42.3	42.5	141°30.5	17.4'	00°16.8	-14.0'	54.1'
14	26°42.2	41.8	156°07.0	17.4'	N00°02.7	-14.0'	54.1'
15	41°42.1	• • 41.2	170°43.4	17.4'	S00°11.3	14.0'	54.1'
16	56°42.0	40.5	185°19.8	17.4	00°25.3	14.0'	54.1'
17	71°41.9	39.8	199°56.2	17.4'	00°39.3	14.0'	54.1'
18 19	86°41.8 101°41.7	\$17°39.1 38.4	214°32.6 229°09.0	17.4' 17.4'	\$00°53.4 01°07.4	14.0' 14.0'	54.1' 54.1'
20	101 41.7 116°41.6	36.4 37.7	243°45.4	17.4' 17.4'	01 07.4 01°21.4	14.0'	54.1'
21	131°41.5	37.0	258°21.7	17.4'	01°35.5	14.0'	54.1'
22	146°41.4	36.4	272°58.1	17.3'	01°49.5	14.0'	54.1'
23	161°41.3	35.7	287°34.4	17.3'	$02^{\circ}03.5$	14.0'	54.1'
	SD = 16.2'	d = -0.7'	-	SI	D = 14.7'		

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

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

		Sun			Moon				
Day	Eqn.of Time		Mer.	Mer.	Mer.Pass.				
,	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%			
28	12:43	12:49	12:13	01:59	14:20				
29	12:55	13:00	12:13	02:40	14:59				
30	13:05	13:10	12:13	03:19	15:38				

January 31, 01, 02 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	129°43.3	209° 32.6	\$22°25.2	198°05.9	S22°47.4	94°32.4	N12°55.7	151°01.7	\$10°41.3			
1	144°45.7	224°31.7	25.1	213°06.3	47.1	109°34.6	55.8	166°03.9	41.2	Alpheratz		29°13.4
2	159°48.2	239° 30.8	25.0	228°06.7	46.8	124°36.8	55.9	181°06.1	41.1	Ankaa	353°08.1	-42°10.8
3	174°50.6	254°29.9	24.9	243°07.1	• • 46.6	139°39.1	55.9	196°08.3	• • 41.0	Schedar	349°32.2	56°40.3
4	189°53.1	269°29.1	24.8	258°07.6	46.3	154°41.3	56.0	211° 10.5	40.9	Diphda	348°48.2	-17°51.5
5	204°55.6	284°28.2	24.7	273°08.0	46.1	169°43.5	56.1	226° 12.7	40.8	Achernar	335°20.9	-57°07.2
6	219°58.0	299°27.3	S22°24.6	288°08.4	S22°45.8	184°45.7	N12°56.2	241°14.9	S10°40.6	Hamal	327°52.1 314°21.5	23°34.6 89°22.3
7	235°00.5	314°26.5	24.5	303°08.8	45.6	199°48.0	56.3	256° 17.1	40.5	Polaris Acamar	314°21.3	-40°12.8
8	250°03.0	329°25.6	24.4	318°09.2	45.3	214°50.2	56.4	271°19.3	40.4	Menkar	314°06.9	4°11.0
9	265°05.4	344°24.7	• • 24.3	333°09.7	• • 45.0	229°52.4	• • 56.5	286°21.5	• • 40.3	Mirfak	308°29.3	49°57.0
10	280°07.9	359°23.8	24.2	348°10.1	44.8	244°54.6	56.6	301°23.7	40.2	Aldebaran	290°40.3	16°33.5
11	295°10.4	14°23.0	24.1	3°10.5	44.5	259°56.9	56.7	316°25.8	40.1	Rigel	281°04.4	-8°10.5
12	310°12.8 325°15.3	29°22.1 44°21.2	\$22°24.0	18°10.9 33°11.3	\$22°44.2	274°59.1 290°01.3	N12°56.8	331°28.0 346°30.2	\$10°40.0	Capella	280°22.7	46°01.4
13 14	340°17.8	59° 20.3	23.9 23.8	48°11.8	44.0 43.7	305°03.5	56.9 57.0	1°32.4	39.9 39.8	Bellatrix	278°23.5	6°22.2
15	355°20.2	74° 19.5	• • 23.7	63°12.2	• • 43.5	320°05.7	•• 57.1	16°34.6	39.7	Elnath	278°02.6	28°37.7
16	10°22.7	89° 18.6	23.5	78°12.6	43.2	335°08.0	57.2	31°36.8	39.6	Alnilam	275°38.3	-1°11.3
17	25°25.1	104° 17.7	23.4	93°13.0	42.9	350°10.2	57.3	46°39.0	39.5	Betelgeuse	270°52.7	7°24.7
18	40°27.6	119°16.9	S22°23.3	108°13.4	S22°42.7	5°12.4	N12°57.3	61°41.2	S10°39.4	Canopus	263°52.3	-52°42.6
19	55°30.1	134°16.0	23.2	123°13.9	42.4	20°14.6	57.4	76°43.4	39.3	Sirius	258°26.6 255°06.1	-16°45.0 -29°00.4
20	70°32.5	$149^{\circ}15.1$	23.1	138°14.3	42.1	$35^{\circ}16.8$	57.5	91°45.6	39.2	Adhara Procyon	255 00.1 244°51.3	-29 00.4 5°09.7
21	85°35.0	164° 14.2	• • 23.0	153°14.7	• • 41.9	$50^{\circ}19.1$	• • 57.6	106°47.8	• • 39.1	Pollux	244 51.3 243°17.9	27°58.1
22	100°37.5	179°13.4	22.8	168°15.1	41.6	65°21.3	57.7	121°50.0	38.9	Avior	234°14.4	-59°35.2
23	115°39.9	194° 12.5	22.7	183°15.5	41.3	80°23.5	57.8	136°52.2	38.8	Suhail	222°46.4	-43°31.8
Mer.p	ass. 15:19	$\nu$ -0.9' d-0	0.1' m-3.92	$\nu$ 0.4′ d-0	.3′ m1.33	$\nu 2.2' \ d0.$	1′ m-2.36	$\nu 2.2' \ d-0$	.1′ m0.99	Miaplacidus	221°37.5	-69°48.9
										Alphard	217°48.2	-8°45.8
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.0	11°50.9
Thu 0	<b>GПА</b> 130°42.4	209°11.6	S22°22.6	198°16.0	S22°41.1	95°25.7	N12°57.9	БПА 151°54.4	S10°38.7	Dubhe	193°41.4	61°37.1
1	145°44.9	224° 10.8	22.5	213°16.4	40.8	110°27.9	58.0	166° 56.6	38.6	Denebola	182°25.5	14°26.1
2	160°47.3	239°09.9	22.4	228°16.8	40.5	125°30.2	58.1	181°58.8	38.5	Gienah	175°44.2	-17°40.5
3	175°49.8	254°09.0	22.2	243°17.2	• • 40.3	140°32.4	58.2	197° 00.9	• • 38.4		173°00.6	-63°13.7
4	190°52.3	269°08.1	22.1	258°17.6	40.0	155°34.6	58.3	212°03.1	38.3	Gacrux		-57°14.7
5	205°54.7	284°07.3	22.0	273°18.1	39.7	170°36.8	58.4	227°05.3	38.2	Alioth Spica	166°13.4 158°23.0	55°49.5 -11°17.2
6	220°57.2	299°06.4	S22°21.9	288°18.5	S22°39.4	185°39.0	N12°58.5	242°07.5	S10°38.1	Alkaid	150° 23.0° 152° 52.5	49°11.3
7	235°59.6	$314^{\circ}05.5$	21.7	303°18.9	39.2	200°41.2	58.6	$257^{\circ}09.7$	38.0	Hadar	148°37.0	-60°29.1
8	$251^{\circ}02.1$	329°04.7	21.6	318°19.3	38.9	215°43.5	58.7	272°11.9	37.9		147°58.5	-36°29.2
9	266°04.6	344°03.8	• • 21.5	333°19.7	• • 38.6	230°45.7	• • 58.8	287° 14.1	• • 37.8	Arcturus	145°48.6	19°03.2
10	281°07.0	359°02.9	21.3	348°20.2	38.4	245°47.9	58.9	302°16.3	37.7	Rigil Kent.	139°41.4	-60°55.8
11	296°09.5	14°02.0	21.2	3°20.6	38.1	260°50.1	59.0	317°18.5	37.6	Kochab	$137^{\circ}19.8$	74°03.0
12 13	311°12.0 326°14.4	29°01.2 44°00.3	\$22°21.1 20.9	18°21.0 33°21.4	\$22°37.8 37.5	275°52.3 290°54.5	N12°59.0 59.1	332°20.7 347°22.9	\$10°37.5 37.3	Zuben'ubi	136°56.9	-16°08.5
14	341°16.9	58° 59.4	20.9	48°21.8	37.3	305°56.8	59.1	2°25.1	37.3 37.2	Alphecca	126°04.5	26°37.8
15	356° 19.4	73° 58.6	. 20.7	63°22.3	• • 37.0	320°59.0	59.3	17° 27.3	37.1	Antares	112°17.0	-26°29.1
16	11°21.8	88° 57.7	20.5	78°22.7	36.7	336°01.2	59.4	32°29.5	37.0	Atria	107°12.2	-69°04.0
17	26°24.3	103°56.8	20.4	93°23.1	36.5	351°03.4	59.5	47°31.7	36.9	Sabik	102°03.9	-15°45.3
18	41°26.7	118°56.0	S22°20.2	108°23.5	S22°36.2	6°05.6	N12°59.6	62°33.8	S10°36.8	Shaula	96°11.7 95°59.5	-37°07.2 12°32.4
19	56°29.2	133°55.1	20.1	123°24.0	35.9	21°07.8	59.7	77°36.0	36.7	Rasalhague	95° 59.5 90° 42.9	51°28.8
20	71°31.7	148°54.2	19.9	138°24.4	35.6	$36^{\circ}10.0$	59.8	92°38.2	36.6	Eltanin Kaus Aust.	83°33.9	-34°22.4
21	86°34.1	163°53.3	• • 19.8	153°24.8	• • 35.3	51°12.2	12°59.9	107°40.4	• • 36.5	Vega	80°34.1	38°48.1
22	101°36.6	178°52.5	19.6	168°25.2	35.1	66°14.5	13°00.0	122°42.6	36.4	Nunki	75°49.0	-26°16.0
23	116°39.1	193°51.6	19.5	183°25.6	34.8	81°16.7	00.1	137° 44.8	36.3	Altair	62°01.0	8°55.8
Mer.p	ass. 15:15	$\nu$ -0.9' d-0	0.1' m-3.92	$\nu$ 0.4′ d-0	.3′ m1.33	$\nu$ 2.2' d0.	1′ m-2.35	$\nu 2.2' \ d-0$	.1′ m0.99	Peacock	53°07.5	-56°39.5
										Deneb	49°26.8	45°21.9
E»i	CHV	CHV	Dos	CHV	Doc	CHA	Dos	GHA	Doc	Enif	33°39.9	9°59.0
Fri 0	<b>GHA</b> 131°41.5	<b>GHA</b> 208° 50.7	<b>Dec</b> <b>S</b> 22°19.4	<b>GHA</b> 198°26.1	Dec \$22°34.5	<b>GHA</b> 96°18.9	<b>Dec</b> N13°00.2	GHA 152° 47.0	Dec \$10°36.2	Al Na'ir	27°34.3	-46°50.9
1	146°44.0	200° 30.7 223° 49.9	19.2	213°26.5	34.2	111°21.1	00.3	167°49.2	36.1	Fomalhaut	15°15.7	-29°29.9
2	161°46.5	238°49.0	19.1	228°26.9	34.0	126°23.3	00.4	182°51.4	36.0	Scheat Markab	13°46.3 13°30.9	28°12.8
3	176°48.9	253°48.1	• • 18.9	243°27.3	• • 33.7	141°25.5	00.5	197°53.6	• • 35.8	Markab	13 30.9	15°20.0
4	191°51.4	268°47.3	18.7	258°27.8	33.4	156°27.7	00.6	$212^{\circ}55.8$	35.7	Jan 31 Wed	SHA	Mer.pass
5	$206^{\circ}53.9$	283°46.4	18.6	273°28.2	33.1	171°29.9	00.7	$227^{\circ}58.0$	35.6	Venus	79°49.3	10:02
6	221°56.3	298° 45.5	S22°18.4	288°28.6	S22°32.8	186°32.1	N13°00.8	243°00.2	S10°35.5	Mars	68°22.6	10:47
7	236°58.8	313°44.6	18.3	303°29.0	32.6	201°34.4	00.9	258°02.3	35.4	Jupiter	324°49.1	17:39
8	252°01.2	328° 43.8	18.1	318°29.4	32.3	216°36.6	01.0	273°04.5	35.3	Saturn	21°18.4	13:54
9	267°03.7	343°42.9	17.0	333°29.9	• • 32.0	231°38.8	01.1	288°06.7	35.2	Feb 01 Thu	SHA	Mer.pass
10 11	282°06.2 297°08.6	358°42.0 13°41.2	17.8 17.6	348°30.3 3°30.7	31.7 31.4	246°41.0 261°43.2	01.2 01.3	303°08.9 318°11.1	35.1 35.0	Venus	$78^{\circ}29.2$	10:04
11	312°11.1	13 41.2 28°40.3	17.6 \$22°17.5	18°31.1	522°31.1	201 43.2 276°45.4	N13°01.4	318 11.1 333°13.3	\$10°34.9	Mars	67°33.6	10:47
13	327°13.6	43°39.4	17.3	33°31.6	30.9	270°45.4 291°47.6	01.5	348° 15.5	34.8	Jupiter		17:36
14	342°16.0	58° 38.6	17.1	48°32.0	30.6	306°49.8	01.6	3°17.7	34.7	Saturn	21°12.0	13:50
15	357°18.5	73°37.7	• • 17.0	63°32.4	30.3	321°52.0	01.6	18° 19.9	• • 34.6	Feb 02 Fri	SHA	Mer.pass
16	12°21.0	88°36.8	16.8	78°32.8	30.0	336°54.2	01.7	33°22.1	34.4	Venus	77°09.2	10:05
17	27°23.4	103°36.0	16.6	93°33.3	29.7	351°56.4	01.8	48°24.3	34.3	Mars	66°44.5	10:46
18	42°25.9	118°35.1	S22°16.5	108°33.7	S22°29.4	6°58.6	N13°01.9	63°26.5	<b>S</b> 10°34.2		324°37.3	17:32
19	57°28.4	133°34.2	16.3	123°34.1	29.2	22°00.9	02.0	78°28.6	34.1	Saturn	21°05.5	13:47
20	72°30.8	148°33.4	16.1	138°34.5	28.9	37°03.1	02.1	93°30.8	34.0	Ua!-a	al parallas	
21	87°33.3	163°32.5	• • 16.0	153°34.9	• • 28.6	52°05.3	02.2	108°33.0	• • 33.9	norizont	al parallax Venus:	0.1
22 23	102°35.7 117°38.2	178°31.6 193°30.8	15.8 15.6	168°35.4 183°35.8	28.3 28.0	67°07.5 82°09.7	02.3 02.4	123°35.2 138°37.4	33.8 33.7		Mars:	0.1
												-
Mer.p	ass. 15:11	$\nu$ -0.9′ d-0	0.2′ m-3.91	$\nu$ 0.4′ d-0	.3′ m1.32	$\nu$ 2.2′ d0.	1′ m-2.34	$\nu$ 2.2′ d-0	.1′ m0.99			

1	h	Su	n			Moon		
191°411   34.3   316°471   17.3   02°316   14.0   54.2	Wed	GHA	Dec	GHA	ν	Dec	d	HP
2	0	176°41.2	S17°35.0	$302^{\circ}10.7$	17.3'	S02°17.5	14.0'	54.2'
3								54.2'
236°40.8   32.2   0°35.9   17.2   03°31.6   14.0   54.2   6   266°40.6   S17°30.8   29°48.4   17.2   33°35.6   14.0   54.2   7   281°40.7   30.1   44°24.6   17.2   33°35.6   14.0   54.2   8   296°40.4   29.5   59°0.7   71.1   04°32.5   14.0   54.2   9   311°40.3   28.8   73°36.9   17.1   04°32.5   14.0   54.2   10   326°40.2   28.1   88°13.0   17.1   04°37.4   13.9   54.3   11   341°40.1   27.4   102°49.1   17.1   04°31.4   13.9   54.3   12   356°40.1   517°26.7   17.25.2   17.0   05°91.2   13.9   54.3   13   11°40.0   260   132°01.2   17.0   05°91.2   13.9   54.3   14   26°39.9   25.3   146°37.2   17.0   05°93.1   13.9   54.3   15   41°39.8   24.6   161°13.2   16.9   05°47.0   13.9   54.3   16   56°39.7   23.9   175°49.1   16.9   05°40.9   13.8   54.4   17   71°39.6   23.2   190°25.0   16.8   06°42.4   13.8   54.4   19   101°39.4   21.8   219°36.8   16.8   06°42.4   13.8   54.4   20   116°39.3   21.1   234°12.6   16.8   06°42.4   13.8   54.4   21   131°39.2   20.4   248°48.3   16.7   07°10.0   13.8   54.4   22   146°9.1   19.7   263°24.0   16.7   07°37.6   13.7   54.4   23   161°30.0   19.0   277°59.7   16.6   07°37.6   13.7   54.4   24   26°38.8   15.5   350°57.5   16.4   08°46.0   13.6   54.4   25   266°38.4   517°41.1   20°08.2   16.5   08°32.4   13.6   54.8   25   251°38.5   14.8   5°32.9   16.4   08°46.0   13.6   54.8   26   266°38.4   517°41.1   20°08.2   16.3   09°13.2   13.6   54.4   27   281°38.3   11.2   78°29.2   16.1   10°07.3   13.5   54.4   28   296°38.2   12.7   49°18.8   16.2   09°40.3   13.5   54.4   28   296°38.2   12.7   49°18.8   16.2   09°40.3   13.5   54.4   28   266°38.4   517°01.3   28°34.9   15.7   11°27.6   13.3   54.4   29   311°38.1   11.2   78°29.2   16.1   10°07.3   13.5   54.4   29   311°38.1   11.2   78°29.2   16.1   10°07.3   13.5   54.4   20   16°37.5   07.7   151°24.1   15.8   10°47.6   13.3   54.4   21   131°37.1   0.34   238°51.9   15.7   11°27.6   13.3   54.4   21   131°37.1   0.34   238°51.9   15.7   11°27.6   13.3   54.4   22   166°36.4   516°57.0   96°8.9   15.7   11								54.2'
5   251°40.7   31.5   15°12.1   17.2   03°27.6   14.0   54.2								54.2'
Color								54.2'
Section   Sect								54.2'
10   316°40.2   28.1   88°13.0   17.1   04°23.5   14.0   54.2     11   341°40.1   27.4   102°49.1   17.1   04°37.4   13.9   54.3     12   356°40.1   51°926.7   117°25.2   17.0   505°05.3   13.9   54.3     13   11°40.0   26.0   132°01.2   17.0   05°19.2   13.9   54.3     14   26°39.9   25.3   146°37.2   17.0   05°33.1   13.9   54.3     15   41°39.8   -24.6   616°13.2   16.9   06°0.0   13.9   54.3     16   56°39.7   23.9   175°49.1   16.9   06°0.0   13.9   54.3     18   86°39.5   51°22.5   500.0   16.8   606°28.6   13.8   54.4     19   101°39.4   21.8   219°36.8   16.8   06°42.4   13.8   54.4     10   11°39.2   -2.04   248°48.3   16.7   07°10.0   13.8   54.4     11   131°39.2   -2.04   248°48.3   16.7   07°10.0   13.8   54.4     22   146°39.1   19.7   263°24.0   16.7   07°23.8   13.8   54.4     23   161°39.0   517°18.3   292°35.4   16.6   507°51.3   13.7   54.2     24   26°38.8   16.9   321°46.5   66.5   50°38.1   13.7   54.2     25   206°38.8   16.9   321°46.5   66.5   50°38.4   13.7   54.2     25   206°38.4   517°14.3   292°35.4   66   80°40.3   13.7   54.2     26   206°38.4   517°14.3   292°35.5   16.8   08°42.4   13.6   54.2     27   281°38.3   13.4   34°43.5   6.3   09°40.3   13.5   54.4     28   296°38.4   517°14.1   20°08.2   63.3   09°40.3   13.5   54.4     29   311°38.1   11.2   63°54.0   16.1   09°53.9   13.6   54.2     29   311°38.1   11.2   78°29.2   16.1   10°07.3   13.5   54.4     29   311°38.1   11.2   78°29.2   16.1   10°07.3   13.5   54.4     13   13°37.8   09.1   127'4   15.8   11°14.3   13.3   54.4     14   26°37.7   08.4   136°49.2   15.9   11°01.0   13.3   54.1     15   41°37.6   0.77   151°24.1   15.8   11°14.3   13.3   54.2     16   56°37.5   0.70   06°58.9   15.7   11°01.0   13.3   54.1     17   13°37.5   06.3   180°33.6   15.7   11°01.0   13.3   54.1     15   41°37.0   0.2   253°26.3   15.3   12°46.7   13.9   54.2     16   56°37.5   0.70   06°59.9   311°3.2   54.4     17   13°37.5   0.3   180°33.6   15.7   11°01.0   13.3   54.4     15   11°37.8   0.0   11°35.9   11°01.0   13.3   54.2	7						14.0'	54.2'
10   336° 40.2   28.1   88° 13.0   17.1'   04° 37.4   13.9'   54.2     11   341° 40.1   27.4   102° 49.1   17.1'   04° 51.4   13.9'   54.3     12   356° 40.1   517° 26.7   117° 25.2   17.0'   505° 05.3   13.9'   54.3     13   11° 40.0   26.0   132° 01.2   17.0'   05° 30.3   13.9'   54.3     14   26° 39.9   25.3   146° 37.2   17.0'   05° 31.3   13.9'   54.3     15   41° 39.8								54.2'
11   341° 40.1   27.4   102° 49.1   17.1'   04° 51.4   13.9'   54.3     12   356° 40.1   S17° 26.7   117° 25.2   17.0'   S05° 05.3   13.9'   54.3     13   11° 40.0   26.0   132° 01.2   17.0'   05° 19.2   13.9'   54.3     14   26° 39.9   25.3   146° 37.2   17.0'   05° 19.2   13.9'   54.3     15   41° 39.8   2.46   61° 13.2   16.9'   06° 14.8   13.8'   54.4     16   56° 39.7   23.9   175° 49.1   16.9'   06° 10.8   13.8'   54.4     17   71° 39.6   23.2   199° 25.0   16.9'   06° 14.8   13.8'   54.4     19   101° 39.4   21.8   219° 36.8   16.8'   06° 42.4   13.8'   54.4     20   116° 39.3   21.1   234° 12.6   16.8'   06° 42.4   13.8'   54.4     21   131° 39.2   2.24   248° 48.3   16.7'   07° 10.0   13.8'   54.4     22   146° 39.1   19.7   263° 24.0   16.1'   07° 37.6   13.7'   54.4     22   146° 39.1   19.7   263° 24.0   16.6'   07° 37.6   13.7'   54.4     22   206° 38.8   16.9   321° 45.5   16.6'   07° 37.6   13.7'   54.4     22   206° 38.8   16.9   321° 45.5   16.6'   08° 35.0   13.7'   54.5     2   206° 38.6   15.5   336° 22.0   16.5'   08° 32.4   13.6'   54.5     3   221° 38.7   16.2   336° 22.0   16.5'   08° 32.4   13.6'   54.5     4   236° 38.6   15.5   336° 22.0   16.5'   08° 32.4   13.6'   54.5     5   251° 38.5   14.8   5° 32.9   16.4'   08° 46.0   13.6'   54.5     6   266° 38.4   517° 14.1   20° 08.2   16.3'   509° 13.2   13.6'   54.6     9   311° 38.1   1.12.0   63° 54.0   16.1'   09° 53.9   13.5'   54.6     9   311° 38.1   1.12.0   63° 54.0   16.1'   09° 53.9   13.5'   54.6     10   326° 38.1   11.2   78° 29.2   16.1'   10° 07.3   13.5'   54.6     11   34° 38.0   10.5   93° 04.3   16.0'   10° 20.8   13.5'   54.6     12   356° 37.9   517° 07.0   165° 58.9   15.7'   11° 27.6   13.3'   54.6     13   11° 37.8   09.1   12° 14.3   15.9'   11° 14.0   13.3'   54.7     15   41° 37.6   0.7'   150° 24.1   15.8'   11° 14.0   13.3'   54.7     16   56° 36.5   57.7   356° 36.5   57.7   356° 37.5   16.6'   13° 50.5   13.5'   54.6     20   116° 37.2   04.1   224° 17.4   15.5'   12° 07.3   13.2'   54.5     15   41° 37.								
13								54.3'
14								54.3'
16	13		26.0		17.0'		13.9'	54.3'
16								54.3'
17 71°39.6 23.2 199°25.0 16.9' 06°14.8 13.8' 54.4 18 86°39.5 S17°22.5 205°00.9 16.8' S06°28.6 13.8' 54.4 20 116°39.3 21.1 234°12.6 16.8' 06°56.2 13.8' 54.4 21 131°39.2 · 20.4 248°48.3 16.7' 07°01.0 13.8' 54.4 22 146°39.1 19.7 263°24.0 16.7' 07°23.8 13.8' 54.4 22 146°39.0 19.0 277°59.7 16.6' 07°37.6 13.7' 54.2  SD = 16.2' d = -0.7'  Thu GHA Dec GHA ν Dec d HP 0 176°38.9 S17°18.3 292°35.4 16.6' S07°51.3 13.7' 54.2 2 206°38.8 16.9 321°46.5 16.5' 08°18.7 13.7' 54.5 4 236°38.6 15.5 336°22.0 16.5' 08°32.4 13.6' 54.5 5 251°38.5 14.8 5°32.9 16.4' 08°46.0 13.6' 54.5 5 251°38.5 14.8 5°32.9 16.4' 08°46.0 13.6' 54.5 6 266°38.4 S17°14.1 20°08.2 16.3' S09°13.2 13.6' 54.5 8 296°38.2 12.7 49°18.8 16.2' 09°40.3 13.5' 54.6 9 311°38.1 · 12.0 63°54.0 16.1' 10°07.3 13.5' 54.6 10 326°38.1 11.2 78°29.2 16.1' 10°07.3 13.5' 54.6 11 341°38.0 10.5 93°04.3 15.9' 10°40.8 13.4' 54.7 11 341°38.0 10.5 93°04.3 15.9' 10°40.8 13.4' 54.7 12 356°37.9 S17°09.8 10°39.3 16.0' 10°20.8 13.4' 54.7 14 26°37.7 08.4 136°49.2 15.9' 11°01.0 13.3' 54.7 15 41°37.6 · 0.77 151°24.1 15.8' 11°41.3 13.3' 54.7 16 56°37.5 07.0 165°58.9 15.7' 11°27.6 13.3' 54.8 20 116°37.0 02.0 268°00.6 15.3' 12°59.7 13.0' 54.5 18 86°37.4 S17°05.6 198°08.3 15.6' S11°54.1 13.2' 54.8 21 131°37.1 0.0.0 227 253°26.3 15.3' 12°46.7 13.0' 54.5 22 146°37.0 02.7 253°26.3 15.3' 12°46.7 13.0' 54.5 22 146°37.0 02.7 253°26.3 15.3' 12°46.7 13.0' 54.5 23 16°37.5 06.3 180°33.6 15.7' 11°40.9 13.2' 54.8 24 236°36.5 58.4 340°51.2 14.9' 14°04.3 12.2' 54.8 25 21°36.5 57.7 356°25.1 14.8' 14°71.1 12.7' 55.5 26 266°36.4 S16°57.0 9°58.9 14.7' 14°42.6 12.6' 55.1 3 11°358.5 50.0 310°33.1 15.2' 51.6' 51.5' 51.2°07.3 13.2' 54.6' 10 326°38.1 54.0 16.9 16°59.9 11°0.1 15.1' 13°55.7 12°0.5 13.1' 54.6' 25 21°36.5 54.0 16.1' 10°07.3 13.2' 54.8' 11 31°37.8 0.9 1 12°14.1 15.5' 12°0.7 13.2' 54.8' 12 131°37.1 0.0 1.0 13.3' 54.7 11.0 1.0 13.3' 54.7 11.0 11.0 11.0 13.3' 54.7 11.0 11.0 11.0 11.0 11.0 11.0 11.0 11								
18								54.4'
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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$	22		02.7		15.3'		13.0'	54.9'
Fri GHA Dec GHA ν Dec d HP  0 176°36.9 \$17°01.3 282°34.9 15.2' \$13°12.7 13.0' 54.9  1 191°36.8 17°00.6 297°09.1 15.1' 13°25.7 12.9' 54.9  2 206°36.7 16°59.9 311°43.2 15.0' 13°38.6 12.9' 55.0  3 221°36.6 · 59.1 326°17.2 15.0' 13°51.5 12.8' 55.0  4 236°36.5 58.4 340°51.2 14.9' 14°04.3 12.8' 55.0  5 251°36.5 57.7 355°25.1 14.8' 14°17.1 12.7' 55.0  6 266°36.4 \$16°57.0 9°58.9 14.7' \$14°29.9 12.7' 55.1  7 281°36.3 56.3 24°32.6 14.7' 14°42.6 12.6' 55.1  8 296°36.2 55.6 39°06.3 14.6' 14°55.2 12.6' 55.1  9 311°36.1 · 54.8 53°39.8 14.5' 15°07.8 12.5' 55.1  10 326°36.1 54.1 68°13.3 14.4' 15°20.4 12.5' 55.2  11 341°36.0 53.4 82°46.7 14.3' 15°32.9 12.4' 55.2  12 356°35.9 \$16°52.7 97°20.0 14.2' \$15°47.3 12.4' 55.2  13 11°35.8 52.0 111°53.3 14.1' 16°10.0 12.3' 55.3  14 26°35.8 51.2 126°26.4 14.1' 16°10.0 12.3' 55.3  15 41°35.7 · 50.5 140°59.5 14.0' 16°22.3 12.2' 55.3  16 56°36.6 49.8 155°32.4 13.9' 16°34.5 12.2' 55.3  17 71°35.5 49.1 170°05.3 13.8' 16°46.7 12.1' 55.4  18 86°35.5 \$16°48.3 184°38.1 13.7' \$16°58.8 12.0' 55.4  20 116°35.3 46.9 213°43.4 13.5' 17°22.9 11.9' 55.4  21 131°35.2 · 46.2 228°15.9 13.4' 17°34.8 11.9' 55.5	23	161°37.0	02.0	268°00.6	15.3'	12°59.7	13.0'	54.9'
0       176°36.9       S17°01.3       282°34.9       15.2'       S13°12.7       13.0'       54.9         1       191°36.8       17°00.6       297°09.1       15.1'       13°25.7       12.9'       54.9         2       206°36.7       16°59.9       311°43.2       15.0'       13°38.6       12.9'       55.0         3       221°36.6       ··· 59.1       326°17.2       15.0'       13°51.5       12.8'       55.0         4       236°36.5       58.4       340°51.2       14.9'       14°04.3       12.8'       55.0         5       251°36.5       57.7       355°25.1       14.8'       14°17.1       12.7'       55.0         6       266°36.4       \$16°57.0       9°58.9       14.7'       \$14°29.9       12.7'       55.0         7       281°36.3       56.3       24°32.6       14.7'       14°42.6       12.6'       55.1         8       296°36.2       55.6       39°06.3       14.6'       14°55.2       12.6'       55.1         9       311°36.1       ·· 54.8       53°39.8       14.5'       15°07.8       12.5'       55.1         10       326°36.1       54.1       68°13.3       14.4'		SD = 16.2'	d = -0.7'		SE	0 = 14.9'		
0       176°36.9       S17°01.3       282°34.9       15.2'       S13°12.7       13.0'       54.9         1       191°36.8       17°00.6       297°09.1       15.1'       13°25.7       12.9'       54.9         2       206°36.7       16°59.9       311°43.2       15.0'       13°38.6       12.9'       55.0         3       221°36.6       ··· 59.1       326°17.2       15.0'       13°51.5       12.8'       55.0         4       236°36.5       58.4       340°51.2       14.9'       14°04.3       12.8'       55.0         5       251°36.5       57.7       355°25.1       14.8'       14°17.1       12.7'       55.0         6       266°36.4       S16°57.0       9°58.9       14.7'       S14°29.9       12.7'       55.0         7       281°36.3       56.3       24°32.6       14.7'       14°42.6       12.6'       55.1         8       296°36.2       55.6       39°06.3       14.6'       14°55.2       12.6'       55.1         9       311°36.1       ·· 54.8       53°39.8       14.5'       15°07.8       12.5'       55.1         10       326°36.1       54.1       68°13.3       14.4'	Fri	GHA	Dec	GHA	ν	Dec	d	HP
2       206°36.7       16°59.9       311°43.2       15.0'       13°38.6       12.9'       55.0         3       221°36.6       ··· 59.1       326°17.2       15.0'       13°51.5       12.8'       55.0         4       236°36.5       58.4       340°51.2       14.9'       14°04.3       12.8'       55.0         5       251°36.5       57.7       355°25.1       14.8'       14°17.1       12.7'       55.0         6       266°36.4       S16°57.0       9°58.9       14.7'       S14°29.9       12.7'       55.1         7       281°36.3       56.3       24°32.6       14.7'       S14°29.9       12.7'       55.1         8       296°36.2       55.6       39°06.3       14.6'       14°55.2       12.6'       55.1         9       311°36.1       ·· 54.8       53°39.8       14.5'       15°07.8       12.5'       55.1         10       326°36.1       54.1       68°13.3       14.4'       15°20.4       12.5'       55.1         11       341°36.0       53.4       82°46.7       14.3'       15°32.9       12.4'       55.2         12       356°35.9       516°52.7       97°20.0       14.2'       S15°		176°36.9		282°34.9		S13°12.7		54.9'
3       221°36.6       · · · 59.1       326°17.2       15.0'       13°51.5       12.8'       55.0         4       236°36.5       58.4       340°51.2       14.9'       14°04.3       12.8'       55.0         5       251°36.5       57.7       355°25.1       14.8'       14°17.1       12.7'       55.0         6       266°36.4       S16°57.0       9°58.9       14.7'       S14°29.9       12.7'       55.1         7       281°36.3       56.3       24°32.6       14.7'       14°42.6       12.6'       55.1         8       296°36.2       55.6       39°06.3       14.6'       14°55.2       12.6'       55.1         9       311°36.1       · · 54.8       53°39.8       14.5'       15°07.8       12.5'       55.1         10       326°36.1       54.1       68°13.3       14.4'       15°07.8       12.5'       55.2         11       341°36.0       53.4       82°46.7       14.3'       15°32.9       12.4'       55.2         12       356°35.9       516°52.7       97°20.0       14.2'       S15°45.3       12.4'       55.2         13       11°35.8       52.0       111°53.3       14.1'       16°								54.9'
4       236°36.5       58.4       340°51.2       14.9'       14°04.3       12.8'       55.0         5       251°36.5       57.7       355°25.1       14.8'       14°17.1       12.7'       55.0         6       266°36.4       \$16°57.0       9°58.9       14.7'       \$14°29.9       12.7'       55.1         7       281°36.3       56.3       24°32.6       14.7'       14°42.6       12.6'       55.1         8       296°36.2       55.6       39°06.3       14.6'       14°55.2       12.6'       55.1         9       311°36.1       · 54.8       53°39.8       14.5'       15°07.8       12.5'       55.1         10       326°36.1       54.1       68°13.3       14.4'       15°20.4       12.5'       55.2         11       341°36.0       53.4       82°46.7       14.3'       15°32.9       12.4'       55.2         12       356°35.9       \$16°52.7       97°20.0       14.2'       \$15°45.3       12.4'       55.2         13       \$11°35.8       52.0       \$111°53.3       \$14.1'       \$15°57.7       \$12.3'       55.2         14       26°35.8       51.2       \$126°26.4       \$14.1'       \$16°1								55.0'
5         251°36.5         57.7         355°25.1         14.8'         14°17.1         12.7'         55.0           6         266°36.4         \$16°57.0         9°58.9         14.7'         \$14°29.9         12.7'         55.1           7         281°36.3         56.3         24°32.6         14.7'         14°42.6         12.6'         55.1           8         296°36.2         55.6         39°06.3         14.6'         14°55.2         12.6'         55.1           9         311°36.1         · · · 54.8         53°39.8         14.5'         15°07.8         12.5'         55.1           10         326°36.1         54.1         68°13.3         14.4'         15°20.4         12.5'         55.2           11         341°36.0         53.4         82°46.7         14.3'         15°32.9         12.4'         55.2           12         356°35.9         \$16°52.7         97°20.0         14.2'         \$15°45.3         12.4'         55.2           13         11°35.8         52.0         111°53.3         14.1'         15°57.7         12.3'         55.2           14         26°35.8         51.2         126°26.4         14.1'         16°10.0         12.3'         55.								55.0' 55.0'
6         266° 36.4         \$16° 57.0         9° 58.9         14.7'         \$14° 29.9         12.7'         55.1           7         281° 36.3         56.3         24° 32.6         14.7'         14° 42.6         12.6'         55.1           8         296° 36.2         55.6         39° 06.3         14.6'         14° 55.2         12.6'         55.1           9         311° 36.1         · · 54.8         53° 39.8         14.5'         15° 07.8         12.5'         55.2           10         326° 36.1         54.1         68° 13.3         14.4'         15° 20.4         12.5'         55.2           11         341° 36.0         53.4         82° 46.7         14.3'         15° 32.9         12.4'         55.2           12         356° 35.9         516° 52.7         97° 20.0         14.2'         515° 45.3         12.4'         55.2           13         11° 35.8         52.0         111° 53.3         14.1'         15° 57.7         12.3'         55.2           14         26° 35.8         51.2         126° 26.4         14.1'         16° 10.0         12.3'         55.2           15         41° 35.7         · · 50.5         140° 59.5         14.0'         16° 22.3								55.0'
8       296°36.2       55.6       39°06.3       14.6'       14°55.2       12.6'       55.1         9       311°36.1       · · 54.8       53°39.8       14.5'       15°07.8       12.5'       55.1         10       326°36.1       54.1       68°13.3       14.4'       15°20.4       12.5'       55.2         11       341°36.0       53.4       82°46.7       14.3'       15°32.9       12.4'       55.2         12       356°35.9       516°52.7       97°20.0       14.2'       S15°45.3       12.4'       55.2         13       11°35.8       52.0       111°53.3       14.1'       15°57.7       12.3'       55.2         14       26°35.8       51.2       126°26.4       14.1'       16°10.0       12.3'       55.3         15       41°35.7       · · 50.5       140°59.5       14.0'       16°22.3       12.2'       55.3         16       56°35.6       49.8       155°32.4       13.9'       16°34.5       12.2'       55.3         17       71°35.5       49.1       170°05.3       13.8'       16°46.7       12.1'       55.4         18       86°35.5       516°48.3       184°38.1       13.7'       516°	6	266° 36.4	S16°57.0			<b>S</b> 14°29.9	12.7'	55.1'
9       311°36.1       · · · 54.8       53°39.8       14.5'       15°07.8       12.5'       55.1         10       326°36.1       54.1       68°13.3       14.4'       15°20.4       12.5'       55.2         11       341°36.0       53.4       82°46.7       14.3'       15°32.9       12.4'       55.2         12       356°35.9       516°52.7       97°20.0       14.2'       S15°45.3       12.4'       55.2         13       11°35.8       52.0       111°53.3       14.1'       15°57.7       12.3'       55.2         14       26°35.8       51.2       126°26.4       14.1'       16°10.0       12.3'       55.3         15       41°35.7       · · · 50.5       140°59.5       14.0'       16°22.3       12.2'       55.3         16       56°35.6       49.8       155°32.4       13.9'       16°34.5       12.2'       55.3         17       71°35.5       49.1       170°05.3       13.8'       16°46.7       12.1'       55.4         18       86°35.5       516°48.3       184°38.1       13.7'       S16°58.8       12.0'       55.4         20       116°35.3       46.9       213°43.4       13.5'       <								55.1'
10       326°36.1       54.1       68°13.3       14.4'       15°20.4       12.5'       55.2         11       341°36.0       53.4       82°46.7       14.3'       15°32.9       12.4'       55.2         12       356°35.9       S16°52.7       97°20.0       14.2'       S15°45.3       12.4'       55.2         13       11°35.8       52.0       111°53.3       14.1'       15°57.7       12.3'       55.2         14       26°35.8       51.2       126°26.4       14.1'       16°10.0       12.3'       55.3         15       41°35.7       · · · 50.5       140°59.5       14.0'       16°22.3       12.2'       55.3         16       56°35.6       49.8       155°32.4       13.9'       16°34.5       12.2'       55.3         17       71°35.5       49.1       170°05.3       13.8'       16°46.7       12.1'       55.4         18       86°35.5       516°48.3       184°38.1       13.7'       516°58.8       12.0'       55.4         19       101°35.4       47.6       199°10.8       13.6'       17°10.9       12.0'       55.4         20       116°35.3       46.9       213°43.4       13.5'       1								55.1'
11       341°36.0       53.4       82°46.7       14.3'       15°32.9       12.4'       55.2         12       356°35.9       \$16°52.7       97°20.0       14.2'       \$15°45.3       12.4'       55.2         13       11°35.8       52.0       111°53.3       14.1'       15°57.7       12.3'       55.2         14       26°35.8       51.2       126°26.4       14.1'       16°10.0       12.3'       55.3         15       41°35.7       · · · 50.5       140°59.5       14.0'       16°22.3       12.2'       55.3         16       56°35.6       49.8       155°32.4       13.9'       16°46.7       12.1'       55.4         17       71°35.5       49.1       170°05.3       13.8'       16°46.7       12.1'       55.4         18       86°35.5       \$16°48.3       184°38.1       13.7'       \$16°58.8       12.0'       55.4         19       101°35.4       47.6       199°10.8       13.6'       17°10.9       12.0'       55.4         20       116°35.3       46.9       213°43.4       13.5'       17°22.9       11.9'       55.4         21       131°35.2       · · 46.2       228°15.9       13.4'								55.1° 55.2'
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								55.2'
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	12	356°35.9			14.2'	<b>S</b> 15°45.3	12.4'	55.2'
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								55.2'
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								55.3'
17     71°35.5     49.1     170°05.3     13.8'     16°46.7     12.1'     55.4       18     86°35.5     \$16°48.3     184°38.1     13.7'     \$16°58.8     12.0'     55.4       19     101°35.4     47.6     199°10.8     13.6'     17°10.9     12.0'     55.4       20     116°35.3     46.9     213°43.4     13.5'     17°22.9     11.9'     55.4       21     131°35.2     · 46.2     228°15.9     13.4'     17°34.8     11.9'     55.5								55.3'
18     86°35.5     \$16°48.3     184°38.1     13.7'     \$16°58.8     12.0'     55.4       19     101°35.4     47.6     199°10.8     13.6'     17°10.9     12.0'     55.4       20     116°35.3     46.9     213°43.4     13.5'     17°22.9     11.9'     55.4       21     131°35.2     · · · 46.2     228°15.9     13.4'     17°34.8     11.9'     55.5								55.4'
20 116°35.3 46.9 213°43.4 13.5' 17°22.9 11.9' 55.4 21 131°35.2 ·· 46.2 228°15.9 13.4' 17°34.8 11.9' 55.5	18	86°35.5	<b>S</b> 16°48.3	184°38.1	13.7'	S16°58.8		55.4'
21 131°35.2 ·· 46.2 228°15.9 13.4' 17°34.8 11.9' 55.5								55.4'
								55.4'
								55.5'
		161°35.1						55.5'
SD = 16.2'  d = -0.7' $SD = 15.0'$		SD = 16.2'	d = -0.7'		SE	0 = 15.0'		

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

Lat. Wed Thu	Fri			
vvcu rnu	1 11	Wed	Thu	Fri
<b>N</b> 72°	02:32	09:09	08:34	07:42
N 70° ···· 00:00	02:02	09:15	08:49	08:13
68° 23:50 ····	01:41	09:20	09:01	08:36
66° 23:42 ····	01:24	09:25	09:11	08:55
64°   23:35 ····	01:10	09:28	09:19	09:09
62° 23:29 ····	00:59	09:31	09:27	09:22
60° 23:24 ····	00:49	09:34	09:33	09:33
N 58° 23:19 ⋯	00:41	09:37	09:39	09:42
56° 23:15 ····	00:34	09:39	09:44	09:50
54°   23:12 · · · ·	00:27	09:41	09:48	09:58
52° 23:09 ····	00:21	09:43	09:53	10:04
50° 23:06 ····	00:16	09:44	09:56	10:10
45° 22:59 ····	00:05	09:48	10:04	10:23
<b>N</b> 40° 22:54 23:55		09:51	10:11	10:34
35° 22:50 23:48	•• ••	09:54	10:17	10:43
30° 22:46 23:41	•• ••	09:56	10:22	10:51
20° 22:39 23:29	•• ••	10:00	10:31	11:05
N 10° 22:33 23:18	•• ••	10:04	10:39	11:18
0° 22:28 23:09	23:53	10:07	10:47	11:29
<b>S</b> 10° 22:22 22:59	23:39	10:10	10:55	11:41
20° 22:16 22:49	23:25	10:14	11:03	11:54
30° 22:10 22:37	23:08	10:18	11:12	12:08
35° 22:06 22:31	22:59	10:20	11:17	12:16
40° 22:02 22:23	22:48	10:23	11:23	12:26
45° 21:57 22:15	22:35	10:26	11:31	12:37
<b>S</b> 50° 21:51 22:04	22:20	10:30	11:39	12:51
52° 21:49 21:59	22:13	10:32	11:43	12:57
54° 21:46 21:54	22:05	10:34	11:48	13:05
56° 21:43 21:48	21:56	10:36	11:53	13:13
58° 21:39 21:42	21:46	10:38	11:58	13:22
<b>S</b> 60° 21:35 21:35	21:35	10:41	12:04	13:32

		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	77-60%
31	13:15	13:20	12:13	03:58	16:17	
01	13:24	13:28	12:13	04:37	16:58	
02	13:33	13:36	12:14	05:19	17:41	

#### February 03, 04, 05 UT (Sat., Sun., Mon.)

Section   Sec	h	Aries	Vei	nus	M	ars	Jup	oiter	Sat	urn		Stars	
1	Sat -	CHV.	CHA	Doc	CHA	Doc	CHA.	Doc	CHV	Doc		SHA	Doc
1 147'41 237'20 153 237'35 27'41 237'45 22'41'1 237'45 27'41 27'15 24'15													
2   107   456   288   282   151   282											Alpheratz		
3 177 46.1 2577.3 1.140 2577.5 1.268 16218.5 10.28 2646.2 13.3													
14   1987   1997   19													
22 25 25 26 26 27 25 21 13 26 27 26 27 27 26 27 27 26 27 27 26 27 27 27 27 27 27 27 27 27 27 27 27 27		192°50.5			258°37.9	26.6			213°48.4				
Part	5	$207^{\circ}53.0$	283°25.6	14.5	273°38.3	26.3		03.0	228°50.6				
9 28° 03. 39° 29° 140 140° 150 0 - 51 22° 177° 130 130° 277° 371				S22°14.3		\$22°26.0							
19 20 20 30 30 30 30 30 30 30 30 30 30 30 30 30													
13   12   13   13   13   14   15   15   15   15   15   15   15													
11   238°07.0   38°0.0   38°													
13 329°12 2 9"195 52"132 18"413 52"242 2 7"838 1819"0.7 334"0.9 510"3.3 36"0.6 1.3 20"0.5 1.3 20"0.5 1.3 30"0.6 1.3 20"0.5 1.3 20"0.5 1.3 30"0.6 1.3 20"0.5 1.3 20"0.5 1.3 30"0.6 1.3 20.2 6 6 6 6 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6											Aldebaran	290°40.3	16°33.5
33 28°12.2   48°18.6   13.0   33°41.7   299   29°40.5   0.88   399°81   3.22   14.5   391°16.2   39											Rigel	$281^{\circ}04.4$	-8°10.5
14   15   15   15   16   17   12   12   18   18   12   12   18   18													
15   183° 17.6   183° 18.7   19.   12.6   183° 18.7   19.											1		
15 13°20.1 88°1.00 12.4 78°4.30 22.0 337°4.7 04.1 34°4.7 31.9 8.0 4 1.0 1.2 49°1.6 31.8 1.8 1.0 1.2 1.2 03°1.3 22.1 1.2 03°1.3 22.2 1.0 108°4.30 22°2.2 1.0 108°4.30 22°2.2 1.0 108°4.30 1.0 108°4.30 1.0 108°4.30 1.0 1.0 1.0 108°4.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1													
19   19   19   19   19   19   19   19	16	$13^{\circ}20.1$	88°16.0	12.4		23.0	337°47.1	04.1	$34^{\circ}14.7$	31.9			
Simple   S	17		103°15.2	12.2	93°43.4		352°49.3	04.2	49°16.8	31.8			
Adham   25°06.1   25°00.4   27°35.5   28°32.4   163°11.7   11.4   123°44.7   21.9   27°55.0   0.8.5   0.8°23.4   3.3.1   27°50.7   22°10.3°14.9   103°14				S22°12.0									
A													
Policy   248   179   186   178   186   178   186   178   186   178   186   178   186   178   186   178   186   178   186   187   1													
Mer. pass. 15:07													
Sun   GHA   CHA   Dec   GHA												$234^{\circ}14.4$	-59°35.2
Sun   GHA   OPC   GHA   Dec   GHA	23	118 37.3									Suhail	222°46.4	-43°31.8
Sun   GHA   CHA   Dec   GHA   Dec   GHA   Dec   CHA   Dec   Dubbh   2073   1950   1951   1950   1951   1950   1951   1950   1951   1950	Mer.p	ass. 15:07	$\nu$ -0.9' d-0	.2′ m-3.91	$\nu$ 0.4′ d-0	.3′ m1.32	$\nu$ 2.2′ d0.	1′ m-2.34	$\nu 2.2' \ d-0$	$0.1' \; { m m0.99}$			
Sum GHA  OL 137-39.8 208°19.1 52°11.8 19.8 404 52°20.7 98°04.7 1813°04.9 1813°2.2 510°3.1 Deebola 18.7°2.5 11°3.1 11°4.0 14.7°4.													
0 133*39.8 0 20*09.1 522*10.8 108*405 \$22*207 0 9:04.7 N13*049 154*32.2 \$10*31.0   Denebola 162*25.5 14*26.1   148*62.3 223*09.2 230*06.2 11.0 223*40.8 223*07.4 11.0 4. 228*47.3 201 123*09.1 0.5.1 184*36.6 30.8   Actual 173*00.6 63*13.7   Colored 175*25.1 148*36.6 20.8 10.8 12.2 238*37.7 10.8 143*11.3 0.5.2 1193*38. 30.7   Colored 175*25.5 14*25.2   Colored 175*25.2   Col	Sun	GHA	GHA	Dec	GHA	Dec		Dec		Dec	_		
1 148° 42.3 23° 68.2   106 213° 46.8   204   113° 60.9   05.0   160° 344   30.9   2 161° 447   238° 07.4   104   228° 47.7   0.19   311° 130° 130   05.0   160° 34.4   30.9   3 176° 47.2   238° 07.6   100   243° 47.7   1.19   314° 11.3   05.2   199° 38.8   3.07   4 193° 43.7   238° 05.6   100   228° 48.7   1.19   159° 13.5   05.2   199° 38.8   3.07   5 193° 47.7   238° 05.6   100   228° 48.7   1.19   159° 13.7   05.2   199° 38.8   3.07   6 1932° 45.6   238° 05.6   100   228° 48.0   1.19   159° 13.7   05.2   199° 38.8   3.07   7 238° 57.1   313° 60.0   04.4   303° 49.4   18.6   203° 20.1   05.6   228° 47.5   30.2   8 253° 59.5   328° 02.2   00.2   318° 49.8   18.3   218° 22.3   05.7   274° 49.7   30.1   8 253° 59.5   328° 02.2   00.2   318° 49.8   18.3   218° 22.3   05.7   274° 49.7   30.1   8 253° 59.5   328° 00.5   03.3 ° 50.2   18.8   18.0   233° 24.5   05.8   238° 51.0   00.4   11 299° 60   12° 59.6   08.5   33° 50.1   17.7   248° 26.7   05.9   304° 54.1   29.9   11 299° 60   12° 59.6   08.5   35° 51.1   17.4   263° 28.9   06.0   313° 56.3   29.8   12 314° 60.4   27° 58.7   522° 68.3   18° 51.5   522° 17.1   278° 31.1   N13° 60.1   334° 58.5   510° 29.7   13 329° 118   42° 57.9   08.1   33° 52.0   16.8   293° 33.3   06.2   380° 00.6   29.6   13 329° 118   42° 57.9   08.1   33° 52.0   16.8   293° 33.3   06.2   380° 00.6   29.6   13 329° 118   42° 57.9   08.1   33° 52.0   16.8   293° 33.3   06.2   380° 00.6   29.6   14 344° 14.3   57° 57.0   07.9   48° 52.4   16.5   308° 35.5   06.3   50° 22.8   29.5   15 359° 16.8   72° 56.1   07.6   68° 52.8   16.1   322° 37.7   06.4   20° 50.0   29.4   15 359° 16.8   72° 56.1   07.6   68° 52.8   16.1   322° 37.7   06.4   20° 50.0   29.4   16 14° 122   70° 40.4   70° 53.3   07.4   78° 53.2   07.4   78° 53.2   07.4   78° 53.2   07.4   78° 53.2   07.4   78° 53.2   07.4   78° 53.2   07.4   78° 53.2   07.4   78° 53.2   07.4   78° 53.2   07.4   78° 53.2   07.4   78° 53.2   07.4   78° 53.2   07.4   78° 53.3   07.4   78° 53.3   07.4   78° 53.3   07.4   78° 53.3   07.4   78° 53.3   0	0	$133^{\circ}39.8$	$208^{\circ}09.1$	S22°10.8	198°46.4	S22°20.7	98°04.7	N13°04.9	154°32.2	S10°31.0			
2 163°44', 2 285°05 104 228°47, 3 201 128°091 551 184°366 308 3 174°47, 2 285°05 104 228°47, 3 201 128°091 551 184°366 308 3 187°47, 4 193°48', 5 100 258°481 195 158°135 653 214°409 30.6 Alloth 166°133 55°495 65 205°521 230°48. 8 20906 288°494 522°1816 188°17, 7 187°55 22°431 305 596 205°521 230°48. 8 20906 288°494 522°1816 188°17, 7 187°55 24°47, 4 187°50 24°57, 4 187°50 24°57,													
193° 49.7   266° 95.6   10.0   256° 19.6   10.0													
5 206*92.1 288*04.8 09.8 273*48.5 19.2 173*15.7 05.4 229*43.1 30.5											Gacrux	$171^{\circ}52.2$	-57°14.7
7 228°54.6 298°03.0 522°09.6 288°49.0 522°18.9 188°17.0 N13°05.5 244°43.3 S10°30.3 594.0 4.0 20.0 10.0 284°04.5 338°02.0 2.0 4.0 299°47.5 30.2 1.0 284°04.5 382°02.2 348°10.3 0.0 48.0 333°50.2 18.0 233°24.5 0.6 8.0 299°41.9 30.0 10.2 284°04.5 388°00.5 0.8 7 348°50.7 17.7 248°26.7 0.5 9 304°54.1 299.0 11.2 296°06.9 12°99.6 0.8 5 3°51.1 174 263°28.9 0.6 0.0 319°56.3 29.8 11.2 296°06.9 12°99.6 0.8 5 3°51.1 174 263°28.9 0.6 0.0 319°56.3 29.8 11.2 296°06.9 12°99.6 0.8 5 3°51.1 174 263°28.9 0.6 0.0 319°56.3 29.8 11.2 296°06.9 12°99.6 0.8 5 3°51.1 174 263°28.9 0.6 0.0 319°56.3 29.8 11.3 329°11.8 42°57.9 0.8 1.3 32°21.6 16.8 293°33.3 0.6 2.0 350°00.6 29.6 14.3 340°14.3 57°57.0 0.7 48°52.4 16.5 300°35.5 0.6 3 5°02.8 29.5 14.3 340°14.3 57°57.0 0.7 48°52.4 16.5 300°35.5 0.6 3 5°02.8 29.5 14.3 14°19.2 87°55.3 0.7 4 78°53.2 15.8 338°9.8 0.5 55°00.2 29.4 16.1 14°19.2 87°55.3 0.7 4 78°53.2 15.8 338°9.8 0.5 55°00.2 29.4 16.1 14°19.2 87°55.3 0.7 4 78°53.2 15.8 338°9.8 0.5 55°00.2 29.4 18.4 40°2.2 117°53.6 522°07.0 108°54.1 522°15.2 8°44.2 N13°06.7 65°11.6 S10°29.0 5.2 50.2 50.2 50.2 50.2 50.2 50.2 50.											Alioth		
8 236°57.1 313°03.0 094 303°49.4 18.6 203°20.1 05.6 259°47.5 30.2 Alhali 16°2.5.2 49°1.1.3 18°2.3 08°7.2 18°1.0 28°4.0 19°0.2 18°1.0 28°4.0 19°0.2 18°1.0 28°4.0 19°0.2 18°1.0 28°4.0 19°0.2 18°1.0 28°4.0 19°0.2 18°1.0 28°4.0 19°0.2 18°1.0 233°2.4 5 05.8 289°51.9 30.0 18°1.0 18°1.0 19°0.2 18°1.0 18°1.0 19°0.2 18°1.0 18°1.0 19°0.2 18°1.0 18°1.0 19°0.2 18°1.0													
8 253°955 338°02.2 09.2 318'49.8 18.3 218'22.3 05.7 274'49.7 30.1 67.0 29.2 18.0 233'49.8 18.0 233'24.5 05.8 298'51.0 30.0 10 284'04.5 358'00.5 08.7 348'50.7 17.7 248'26.7 05.9 304'54.1 29.9 11 299'06.9 12'59.6 08.5 35'51.1 17.4 268'26.7 05.9 304'54.1 29.9 8 12'0.2 14'0.0 27'0.5 11.7 298'26.7 17.7 248'26.7 05.9 304'54.1 29.9 8 12'0.2 14'0.0 27'0.5 11.7 248'26.7 05.9 304'54.1 29.9 8 12'0.2 14'0.0 27'0.5 11.7 248'26.7 05.9 304'54.1 29.9 8 12'0.2 14'0.0 27													
269°02.0   343°01.3   0.89   333°50.2   18.0   233°24.5   0.68   289°51.9   0.30.0   Mellorini   14°36.5   0.30.9   10   284°04.5   386°00.5   0.87   348°50.7   17.7   248°26.7   0.99   304°54.5   0.99   304°54.5   0.99   348°50.7   17.7   248°26.7   0.99   304°54.5   0.99   348°50.7   0.99   348°50.7   17.7   248°26.7   0.99   348°50.1   339°11.8   42°57.9   0.81   33°52.0   16.8   293°33.3   0.62   350°00.6   2.96   2.95   3.99													
10 284°04.5 388°00.5 087 388'0.7 17.7 248°26.7 09.9 304°54.1 29.9   11 299°06.9 12°59.6 08.5 3°51.1 17.4 268°28.0 06.0 319°56.3 29.8   12 314°09.4 27°58.7 52°08.3 18°51.5 522°17.1 278°31.1 N13°06.1 334°58.5 510°29.7   13 339°11.8 42°57.9 08.1 33°52.0 16.8 299°33.3 00.2 350°06.0 29.6   15 359°16.8 72°57.0 07.9 48°52.4 10.5 308°35.5 00.3 5°02.8 29.5   15 359°16.8 72°57.0 07.9 48°52.4 10.5 308°35.5 00.3 5°02.8 29.5   16 14°19.2 87°55.3 07.4 78°53.2 15.8 338°39.8 06.5 35°07.2 29.3   17 29°21.7 102°54.4 07.2 93°53.7 15.5 353°42.0 06.6 50°0.9 29.3   18 44°24.2 117°53.6 522°07.0 108°54.1 522°15.2 8°44.2 N13°06.7 66°11.6 \$10°29.0   19 59°26.6 132°32.7 06.7 123°54.5 14.9 23°64.6 06.8 80°13.8 28.9   20 74°29.1 147°51.8 06.5 138°54.9 14.6 38°48.6 06.9 99°16.0 28.8   21 89°31.6 102°51.0 06.0 168°55.8 14.0 68°53.0 07.1 125°20.4 28.8   22 104°34.0 177°50.1 06.0 168°55.8 14.0 68°53.0 07.1 125°20.4 28.6   23 119°36.5 102°49.2 05.8 183°55.2 137 83°55.2 07.2 140°2.5 28.5   21 149°41.4 222°47.5 05.3 213°57.1 13.1 113°59.6 07.5 170°26.9 28.3   21 149°41.4 222°47.5 05.3 213°57.1 13.1 113°59.6 07.5 170°26.9 28.3   21 149°44.3 227°44.9 04.6 258°38.4 12.1 158°06.1 07.8 215°33.5 28.0   21 149°44.3 227°44.9 04.6 258°38.4 12.1 158°06.1 07.8 215°33.5 28.0   21 149°45.3 222°45.3 292°42.2 288°59.2 22°11.5 188°10.5 07.8 215°33.5 28.0   22 150°36.8 32°39.8 03.0 440.4 10.0 264°21.5 08.5 320°48.8 72.2   23 190°36.1 223°39.8 03.0 440.4 10.0 264°21.5 08.5 320°48.8 72.2   23 190°36.1 223°39.8 03.0 440.4 10.0 264°21.5 08.5 320°48.8 72.2   24 290°37.1 322°44.0 03.9 303°59.7 11.2 204°12.7 08.1 260°40.1 27.6   24 250°5.5 200°51.3 282°41.5 03.7 319°00.1 10.0 219°14.9 08.2 25°74.9 500°27.7   239°56.2 312°42.4 03.9 330°90.7 10.0 249°13.0 08.8 555.4 26.9   24 250°5.5 200°51.3 322°41.5 03.7 319°00.1 10.0 219°14.9 08.2 25°75.5 26.8   25 200°51.3 200°41.5 04.0 17.7 90°35.0 08.4 330°32.4 00.0 130°65.2 27.5   25 200°51.3 322°41.5 03.7 319°00.1 10.0 264°21.5 08.5 320°48.8 72.2   25 200°51.3 322°41.5 03.7 319°00.1 10.0 264°21.5 08.5 320°48.8 72.2   25 200°51.5 3	9								289°51.9				
11 239°06.9 12°596. 08.5 3°51.1 174 263°28.9 06.0 319°56.3 29.8   12 314°94.2 27°58.7 522°08.3 18°51.5 522°17.1 27°83.1 N13°06.1 334°85.5 510°29.7   13 329°11.8 42°57.9 08.1 33°52.0 16.8 293°33.3 06.2 350°00.6 29.6   14 344°14.3 57°57.0 07.9 48°52.4 16.5 308°35.5 06.2 350°00.6 29.4   16 14°19.2 87°55.3 07.4 78°53.2 15.8 338°93.8 06.2 350°00.6 29.4   16 14°19.2 87°55.3 07.4 78°53.2 15.8 338°93.8 06.5 35°07.2 29.3   17 29°21.7 102°54.4 07.2 93°53.7 15.5 353°42.0 06.6 50°09.4 29.2   18 44°24.2 117°53.6 522°0.7 018°54.1 522°15.2 842 N13°06.7 65°11.6 \$10°20.2 \$Shalla \$00°11.7 *30°72.2 \$130°35.5 \$12°32.4 \$1.5 \$1.5 \$1.5 \$1.5 \$1.5 \$1.5 \$1.5 \$1.5	10	284°04.5	358°00.5	08.7	348°50.7	17.7	248°26.7	05.9	304°54.1	29.9	I		
12 314'99.4 27'58.7 9 08.1 33'95.0 16.8 133'95.0 16.8 133'95.0 16.8 133'95.0 16.8 133'95.0 16.8 133'95.0 16.8 133'95.0 16.8 133'95.0 17.9 16.8 133'95.0 17.9 16.8 133'95.0 17.9 16.8 133'95.0 17.9 16.8 133'95.0 17.9 16.8 133'95.0 17.0 17.9 18.8 18.8 18.8 18.9 18.9 18.9 18.9 18													
13 329°11.8 42°579 08.1 33°52.0 16.8 299°33.3 60.2 35°00.6 29.6 14 34°4.3 55°57.0 07.9 48°52.4 16.5 308°35.5 66.3 5°02.8 29.5 15 359°16.8 72°56.1 0.76.6 63°52.8 16.1 322°37.7 0.64 20°05.0 29.4 Atria 107°12.2 69°04.0 17 190°15.3 17 29°21.7 102°54.4 07.2 93°53.7 15.5 353°42.0 0.6 50°09.4 29.2 18 40°42.2 11°53.6 \$22°07.0 108°54.1 \$22°15.2 \$353°42.0 0.6 6 50°09.4 29.2 18 40°42.2 11°53.6 \$22°07.0 108°54.1 \$22°15.2 \$342.0 0.6 6 50°09.4 29.2 18 40°42.2 11°53.6 \$22°07.0 108°54.1 \$22°15.2 \$342.0 0.6 6 50°09.4 29.2 18 40°22.1 \$40°40.1 \$12°15.8 0.6 5 138°54.9 14.9 23°46.4 0.6 8 80°13.8 28.9 15°45.3 18°40.2 18°													
After											Alphecca	$126^{\circ}04.5$	26°37.8
16											Antares		
18													
18													
19 59°26.6 132°52.7 06.7 123°54.5 14.9 23°46.4 06.8 80°13.8 28.9 20 74°29.1 147°51.8 06.5 138°54.9 14.6 38°48.6 06.9 95°16.0 28.8 Kaus Aust. 83°33.9 -34°22.4 22 104°34.0 177°50.1 06.0 168°55.8 14.0 68°55.0 07.1 110°18.2 · 28.7 Vega 80°34.1 38°48.1 22 104°34.0 177°50.1 06.0 168°55.8 14.0 68°55.0 07.1 110°18.2 · 28.7 Vega 80°34.1 38°48.1 Nunki 75°49.0 -26°16.0 08.8 110°36.5 192°49.2 05.8 183°56.2 13.7 83°55.2 07.2 140°22.5 28.5 Mer.pass. 15:03 ν-0.9′ d-0.2′ m-3.91 ν-0.4′ d-0.3′ m1.32 ν-2.2′ d-0.1′ m-2.33 ν-2.2′ d-0.1′ m0.99 Peacock 53°07.5 -56°39.5 Peacock 53°07.5 P													
20	19	59°26.6	132°52.7	06.7	123°54.5	14.9	23°46.4	06.8	80°13.8	28.9	_		
21	20			06.5			38°48.6	06.9	95°16.0	28.8			
23   119° 36.5   192° 49.2   05.8   183° 56.2   13.7   83° 55.2   07.2   140° 22.5   28.5     Mer.pass. 15:03   ν-0.9' d-0.2' m-3.91   ν0.4' d-0.3' m1.32   ν2.2' d0.1' m-2.33   ν2.2' d-0.1' m0.99     Mon   GHA   GHA   Dec   GHA   Dec   GHA   Dec   134° 38.9   20° 48.4   \$22° 05.6   188° 56.7   \$22° 13.4   98° 57.4   \$113° 07.4   155° 24.7   \$10° 28.4   \$114° 41.4   22° 47.5   05.3   213° 57.1   13.1   113° 59.6   07.5   170° 26.9   28.3   28.2   164° 43.9   237° 46.7   05.1   228° 57.5   12.8   129° 01.8   07.6   188° 29.1   28.2   28.2   28.2   28.2   28.4   04.4   273° 58.8   11.8   174° 08.3   07.9   215° 33.5   28.0   28.4   297° 49.2   282° 49.5   297° 49.1   290° 41.8   290° 44.4   273° 58.8   11.8   174° 08.3   07.9   28.2   275° 42.2   27.5   27.8   292° 27.7   239° 56.2   312° 42.4   03.9   303° 59.7   11.2   204° 12.7   08.1   260° 40.1   27.6   27.8   27.9				• • 06.3		•• 14.3				• • 28.7			
Mer.pass   15:03   \( \nu \)													
Mon   GHA   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Signal   S	23	119°36.5	192°49.2	05.8	183°56.2	13.7	83°55.2	07.2	140°22.5	28.5	I		
Mon GHA GHA GHA   GHA   Dec	Mer.p	ass. 15:03	$\nu$ -0.9' d-0	.2′ m-3.91	$\nu$ 0.4′ d-0	.3′ m1.32	$\nu 2.2' \ d0.$	1' m-2.33	$\nu$ 2.2′ d-0	$0.1' \; \text{m} 0.99$	Peacock	53°07.5	-56°39.5
Mon         GHA         GHA         Dec         Horizontal parallax           0         1.49°41.4         222°47.5         05.3         213°57.1         13.1         113°59.6         07.5         170°26.9         28.3           3         179°46.3         252°45.8         0.49         243°57.9         12.5         144°04.0         0.77.7         200°31.3         228.1           4         194°48.8         267°44.9         04.6         258°58.4         12.1         159°06.1         07.8         215°33.5         28.0           6         224°53.7         297°43.2         282°04.2         288°59.2         252°11.5         189°00.5         N13°08.0         245°37.9         10°27.7         Markab         13°30.9         10°49.2         10°40.2         27°5         24°37.2         27°5         24°37.2													
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14 345 13.4 57 36.3 02.2 49 02.7 09.0 309 28.0 08.8 5 55.4 20.9 15 0° 15.9 72° 35.5 · · · · · 02.0 64° 03.1 · · · · 08.7 324° 30.2 · · · 08.9 20° 57.6 · · · 26.8 16 15° 18.4 87° 34.6 01.7 79° 03.5 08.4 339° 32.4 09.0 35° 59.7 26.7 17 30° 20.8 102° 33.8 01.5 94° 03.9 08.1 354° 34.6 09.1 51° 01.9 26.5 18 45° 23.3 117° 32.9 522° 01.2 109° 04.4 522° 07.8 9° 36.8 N13° 09.2 66° 04.1 510° 26.4 19 60° 25.8 132° 32.0 01.0 124° 04.8 07.4 24° 39.0 09.3 81° 06.3 26.3 20 75° 28.2 147° 31.2 00.7 139° 05.2 07.1 39° 41.2 09.4 96° 08.5 26.2 21 90° 30.7 162° 30.3 · · · 00.4 154° 05.7 · · · 06.8 54° 43.3 · · · 09.5 111° 10.7 · · · 26.1 22 105° 33.2 177° 29.5 22° 00.2 169° 06.1 06.5 69° 45.5 09.6 126° 12.9 26.0 23 120° 35.6 192° 28.6 21° 59.9 184° 06.5 06.2 84° 47.7 09.7 141° 15.1 25.9	13												
16													
17 30°20.8 102°33.8 01.5 94°03.9 08.1 354°34.6 09.1 51°01.9 26.5 18 45°23.3 117°32.9 \$22°01.2 109°04.4 \$22°07.8 9°36.8 N13°09.2 66°04.1 \$10°26.4 19 60°25.8 132°32.0 01.0 124°04.8 07.4 24°39.0 09.3 81°06.3 26.3 20 75°28.2 147°31.2 00.7 139°05.2 07.1 39°41.2 09.4 96°08.5 26.2 21 90°30.7 162°30.3 · · · 00.4 154°05.7 · · · 06.8 54°43.3 · · · 09.5 111°10.7 · · · 26.1 22 105°33.2 177°29.5 22°00.2 169°06.1 06.5 69°45.5 09.6 126°12.9 26.0 23 120°35.6 192°28.6 21°59.9 184°06.5 06.2 84°47.7 09.7 141°15.1 25.9  Mars 64°17.7 10:44  Jupiter 324°18.4 17:22  Saturn 20°45.8 13:36  Horizontal parallax  Venus: 0.1  Mars 64°17.7 10:44  Venus: 0.1													
18													
19 60°25.8 132°32.0 01.0 124°04.8 07.4 24°39.0 09.3 81°06.3 26.3 20 75°28.2 147°31.2 00.7 139°05.2 07.1 39°41.2 09.4 96°08.5 26.2 21 90°30.7 162°30.3 · 00.4 154°05.7 · 06.8 54°43.3 · 09.5 111°10.7 · 26.1 22 105°33.2 177°29.5 22°00.2 169°06.1 06.5 69°45.5 09.6 126°12.9 26.0 23 120°35.6 192°28.6 21°59.9 184°06.5 06.2 84°47.7 09.7 141°15.1 25.9    Saturn 20°45.8 13:36   Saturn 20°45.8   Saturn 20°45.8 13:36   Saturn 20°45.8   Saturn 20°45.8 13:36   Saturn 20													
20 75°28.2 147°31.2 00.7 139°05.2 07.1 39°41.2 09.4 96°08.5 26.2 21 90°30.7 162°30.3 ·· 00.4 154°05.7 ·· 06.8 54°43.3 ·· 09.5 111°10.7 ·· 26.1 22 105°33.2 177°29.5 22°00.2 169°06.1 06.5 69°45.5 09.6 126°12.9 26.0 23 120°35.6 192°28.6 21°59.9 184°06.5 06.2 84°47.7 09.7 141°15.1 25.9  Horizontal parallax Venus: 0.1  Mars: 0.1													
21       90°30.7       162°30.3       · · · 00.4       154°05.7       · · · 06.8       54°43.3       · · · 09.5       111°10.7       · · · 26.1       Horizontal parallax         22       105°33.2       177°29.5       22°00.2       169°06.1       06.5       69°45.5       09.6       126°12.9       26.0       Venus:       0.1         23       120°35.6       192°28.6       21°59.9       184°06.5       06.2       84°47.7       09.7       141°15.1       25.9       Mars:       0.1													15.50
23 120°35.6 192°28.6 21°59.9 184°06.5 06.2 84°47.7 09.7 141°15.1 25.9 Mars: 0.1	21		$162^{\circ}30.3$	• • 00.4	$154^{\circ}05.7$	• • 06.8	54°43.3	•• 09.5	$111^{\circ}10.7$	• • 26.1	Horizont	•	
25 120 30.0 152 20.0 21 30.5 101 00.5 00.2 01 11.1 00.1 111 15.1 20.5													
Mer.pass. 14:59 $\nu$ -0.9′ $d$ -0.2′ m-3.91 $\nu$ 0.4′ $d$ -0.3′ m1.32 $\nu$ 2.2′ $d$ 0.1′ m-2.32 $\nu$ 2.2′ $d$ -0.1′ m0.99	23	120°35.6	192°28.6	21°59.9	184°06.5	06.2			141°15.1	25.9		iviars:	0.1
	Mer.p	ass. 14:59	$\nu$ -0.9′ d-0	.2′ m-3.91	$\nu$ 0.4′ d-0	.3′ m1.32	$\nu$ 2.2′ d0.	1′ m-2.32	$\nu$ 2.2′ d-0	$0.1' \; \text{m} 0.99$			

h	Su	n	Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	176°35.0	S16°44.0	271°52.8	13.1'	S18°10.2	11.7'	55.5'
1	191°34.9	43.3	286°24.9	13.0'	18°21.8	11.6'	55.6'
2	206°34.9	42.5	300°56.9	12.9'	18°33.4	11.5'	55.6'
3	221°34.8	• • 41.8	315°28.8	12.8'	18°45.0	11.5'	55.6'
4	236°34.7 251°34.6	41.1 40.4	330°00.6 344°32.3	12.7'	18°56.4 19°07.8	11.4'	55.7'
5 6	251 34.6 266°34.6	40.4 \$16°39.6	344 32.3 359°03.9	12.6' 12.5'	S19°19.1	11.3' 11.2'	55.7' 55.7'
7	281°34.5	38.9	13°35.4	12.4	19°30.4	11.2'	55.8'
8	296°34.4	38.2	28°06.7	12.3'	19°41.5	11.1'	55.8'
9	311°34.4	• • 37.4	42°38.0	12.2'	19°52.6	11.0'	55.8'
10	326°34.3	36.7	57°09.2	12.1'	20°03.6	10.9'	55.9'
11	341°34.2	36.0	71°40.2	11.9'	20°14.5	10.8'	55.9'
12 13	356°34.1 11°34.1	\$16°35.2 34.5	86°11.2 100°42.0	11.8' 11.7'	\$20°25.4 20°36.2	10.8' 10.7'	55.9' 55.9'
14	26°34.0	33.8	100 42.0 115°12.7	11.6'	20°36.2	10.7	56.0'
15	41°33.9	• • 33.0	129°43.4	11.5'	20°57.4	10.5	56.0'
16	56°33.9	32.3	144°13.9	11.4'	21°07.9	10.4	56.0'
17	71°33.8	31.6	158°44.2	11.3'	21°18.4	10.3'	56.1'
18	86°33.7	S16°30.8	173°14.5	11.2'	S21°28.7	10.2'	56.1'
19	101°33.7	30.1	187°44.7	11.0'	21°38.9	10.2'	56.1'
20	116°33.6	29.4	202°14.7	10.9'	21°49.1	10.1'	56.2'
21 22	131°33.5 146°33.5	· · 28.6 27.9	216°44.6 231°14.4	10.8' 10.7'	21°59.2 22°09.1	10.0' 9.9'	56.2' 56.2'
23	140 33.5 161°33.4	27.9 27.1	231 14.4 245°44.1	10.7	22 09.1 22°19.0	9.9 9.8'	56.2 56.3
23						5.0	
	SD = 16.2'	d = -0.7'		SL	0 = 15.1'		
Sun	GHA	Dec	GHA	ν 10 4'	Dec	d 0.7'	HP
0 1	176°33.3 191°33.3	\$16°26.4 25.7	260°13.7 274°43.1	10.4' 10.3'	\$22°28.7 22°38.4	9.7' 9.6'	56.3' 56.4'
2	206°33.2	24.9	289°12.5	10.3	22°48.0	9.5	56.4
3	221°33.1	• • 24.2	303°41.7	10.1'	22°57.4	9.4'	56.4'
4	236°33.1	23.4	318°10.8	10.0'	23°06.8	9.3'	56.5'
5	251°33.0	22.7	332°39.7	9.8'	23°16.1	9.1'	56.5'
6	266°32.9 281°32.9	\$16°22.0	347°08.6 1°37.3	9.7'	\$23°25.2 23°34.3	9.0'	56.5'
7 8	281 32.9 296°32.8	21.2 20.5	1°37.3 16°05.9	9.6' 9.5'	23° 43.2	8.9' 8.8'	56.6' 56.6'
9	311°32.8	. 19.7	30°34.4	9.4	23°52.0	8.7'	56.6'
10	326°32.7	19.0	45°02.7	9.2'	24°00.7	8.6'	56.7'
11	341°32.6	18.2	59°31.0	9.1'	24°09.3	8.5'	56.7'
12	356°32.6	S16°17.5	73°59.1	9.0'	524°17.8	8.4'	56.7'
13	11°32.5 26°32.5	16.8 16.0	88°27.1 102°55.0	8.9'	24°26.1 24°34.4	8.2'	56.8'
14 15	41°32.4	15.3	102 55.0 117°22 7	8.7' 8.6'	24 34.4 24°42.5	8.1' 8.0'	56.8' 56.9'
16	56°32.3	14.5	131°50.3	8.5'	24°50.5	7.9'	56.9'
17	71°32.3	13.8	$146^{\circ}17.8$	8.4'	24°58.4	7.7'	56.9'
18	86°32.2	S16°13.0	160°45.2	8.3'	S25°06.1	7.6'	57.0'
19	101°32.2	12.3	175°12.5	8.1'	25°13.7	7.5'	57.0'
20	116°32.1 131°32.0	11.5 · · 10.8	189°39.6 204°06.6	8.0' 7.9'	25°21.2 25°28.6	7.4' 7.2'	57.1' 57.1'
21 22	131 32.0 146°32.0	10.8	204 06.6 218°33.5	7.9 7.8'	25 28.0 25°35.8	7.2 7.1'	57.1'
23	161°31.9	09.3	233°00.3	7.6'	25°42.9	7.0'	57.1°
	SD = 16.2'	d = -0.7'			0 = 15.4'		
N/	CUA	De-	CUA		D	ر ا	шр
Mon 0	<b>GHA</b> 176°31.9	<b>Dec</b> \$16°08.5	<b>GHA</b> 247°26.9	u 7.5'	<b>Dec</b> \$25°49.8	d 6.8'	<b>HP</b> 57.2'
1	191°31.8	07.8	261°53.4	7.4	25°56.6	6.7	57.2'
2	206°31.8	07.0	$276^{\circ}19.8$	7.3'	26°03.3	6.5'	57.3'
3	221°31.7	• • 06.3	290°46.1	7.2'	26°09.9	6.4'	57.3'
4	236°31.6	05.5	305°12.3	7.0'	26°16.2	6.3'	57.4'
5 6	251°31.6 266°31.5	04.8 \$16°04.0	319°38.3 334°04.3	6.9' 6.8'	26°22.5 \$26°28.6	6.1' 6.0'	57.4' 57.4'
о 7	200°31.5 281°31.5	03.3	334°04.3 348°30.1	6.7'	26°34.6	5.8'	57.4° 57.5'
8	296°31.4	02.5	2°55.8	6.6'	26°40.4	5.7'	57.5'
9	311°31.4	•• 01.7	$17^{\circ}21.4$	6.5'	26°46.0	5.5'	57.6'
10	326°31.3	01.0	31°46.8	6.4'	26°51.5	5.4'	57.6'
11	341°31.3	16°00.2	46°12.2	6.2'	26°56.9	5.2'	57.6'
12 13	356°31.2 11°31.1	\$15°59.5 58.7	60°37.4 75°02.6	6.1' 6.0'	\$27°02.1 27°07.1	5.0' 4.9'	57.7' 57.7'
14	26°31.1	58.0	89°27.6	5.9'	27°12.0	4.9 4.7'	57.7 57.8'
15	41°31.0	• • 57.2	103°52.5	5.8'	27°16.8	4.6'	57.8'
16	56°31.0	56.4	118°17.3	5.7'	27°21.3	4.4'	57.8'
17	71°30.9	55.7	132°42.0	5.6'	27°25.7	4.2'	57.9'
18 19	86°30.9 101°30.8	\$15°54.9 54.2	147°06.6 161°31.1	5.5' 5.4'	\$27°30.0 27°34.0	4.1' 3.9'	57.9' 58.0'
20	101°30.8 116°30.8	54.2 53.4	161 31.1 175°55.5	5.4	27°34.0 27°38.0	3.9	58.0'
21	131°30.7	• • 52.6	190°19.8	5.2'	27°41.7	3.6'	58.0'
22	146°30.7	51.9	204°44.0	5.1'	27°45.3	3.4'	58.1'
23	161°30.6	51.1	219°08.1	5.0'	27°48.7	3.2'	58.1'
	SD = 16.2'	d = -0.8'		SE	0 = 15.6'		

				•		
Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Juliuse	Juliset	Civil	Naut.
N 72°	07:00	08:27	10:08	14:21	16:02	17:29
N 70°	06:54	08:10	09:32	14:57	16:19	17:36
68°	06:48	07:57	09:07	15:22	16:32	17:41
66°	06:43	07:46	08:47	15:41	16:43	17:46
64°	06:39	07:36	08:32	15:57	16:52	17:50
62°	06:35	07:28	08:19	16:10	17:00	17:54
60°	06:31	07:21	80:80	16:21	17:07	17:58
N 58°	06:28	07:15	07:58	16:30	17:13	18:01
56°	06:25	07:09	07:50	16:38	17:19	18:04
54°	06:22	07:04	07:43	16:46	17:24	18:07
52°	06:19	07:00	07:36	16:52	17:29	18:09
50°	06:17	06:55	07:30	16:58	17:33	18:12
45°	06:11	06:46	07:17	17:11	17:42	18:17
N 40°	06:05	06:38	07:06	17:22	17:50	18:23
35°	06:00	06:30	06:57	17:31	17:58	18:28
30°	05:55	06:24	06:49	17:39	18:04	18:33
20°	05:45	06:12	06:35	17:53	18:16	18:42
N 10°	05:35	06:00	06:22	18:06	18:27	18:53
0°	05:24	05:49	06:10	18:17	18:39	19:04
<b>S</b> 10°	05:11	05:36	05:58	18:29	18:51	19:17
20°	04:55	05:22	05:46	18:42	19:05	19:32
30°	04:34	05:05	05:31	18:57	19:22	19:53
35°	04:22	04:55	05:22	19:05	19:32	20:05
40°	04:06	04:42	05:12	19:15	19:45	20:21
45°	03:46	04:27	05:00	19:27	19:59	20:40
<b>S</b> 50°	03:20	04:08	04:46	19:41	20:18	21:06
52°	03:07	03:59	04:39	19:47	20:27	21:19
54°	02:51	03:49	04:32	19:55	20:37	21:34
56°	02:32	03:37	04:23	20:03	20:49	21:53
58°	02:07	03:24	04:14	20:12	21:02	22:17
<b>S</b> 60°	01:31	03:07	04:03	20:23	21:18	22:51
Lat.		Moonris	ie		Moonset	
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°						
<b>N</b> 70°	04:55			06:54		
68°	03.24	_	_	07.56	_	_

Lat.		Moonris	e		Moonset	
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°						
N 70°	04:55			06:54		
68°	03:54			07:56		
66°	03:20	06:04		08:31	07:29	
64°	02:56	04:59		08:57	08:35	
62°	02:36	04:24	06:28	09:17	09:10	09:00
60°	02:21	03:59	05:43	09:33	09:36	09:45
N 58°	02:08	03:40	05:14	09:47	09:56	10:15
56°	01:56	03:23	04:52	09:59	10:13	10:37
54°	01:46	03:09	04:33	10:10	10:28	10:56
52°	01:38	02:57	04:18	10:19	10:40	11:12
50°	01:30	02:47	04:05	10:28	10:52	11:26
45°	01:13	02:25	03:37	10:46	11:15	11:54
N 40°	01:00	02:07	03:16	11:01	11:34	12:16
35°	00:48	01:52	02:58	11:13	11:49	12:34
30°	00:38	01:39	02:43	11:24	12:03	12:50
20°	00:21	01:17	02:17	11:43	12:26	13:17
N 10°	00:06	00:58	01:55	12:00	12:47	13:40
0°		00:41	01:34	12:15	13:06	14:02
<b>S</b> 10°		00:24	01:14	12:31	13:25	14:23
20°		00:05	00:52	12:48	13:45	14:47
30°	23:44		00:27	13:07	14:09	15:14
35°	23:32		00:12	13:18	14:23	15:30
40° 45°	23:18 23:01	23:55 23:35		13:31 13:47	14:40 14:59	15:48 16:11
<b>S</b> 50°	22:40	23:09	23:51	14:06	15:24	16:40
52° 54°	22:31	22:57	23:36	14:15	15:36	16:54
54°	22:20 22:08	22:43 22:27	23:19 22:59	14:26 14:37	15:49 16:05	17:11 17:30
58°	22:08	22:27	22:59	14:51	16:05	17:30 17:55
<b>S</b> 60°	21:34	21:43	22:35	15:06	16:24	18:28
_ 5 00	21.31	21.43	22.01	15.00	10.41	10.20

		Sun			Moon	
Day	Eqn.of	f 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	50-30%
03	13:40	13:43	12:14	06:04	18:28	
04	13:47	13:50	12:14	06:53	19:20	
05	13:53	13:55	12:14	07:48	20:17	

#### February 06, 07, 08 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	135°38.1	207°27.8	S21°59.7	199°06.9	S22°05.9	99°49.9	N13°09.8	156° 17.3	S10°25.8			
1	150°40.6	222°26.9	59.4	214°07.4	05.5	114°52.1	09.9	171°19.4	25.7	Alpheratz	357°35.8	29°13.4
2	165°43.0	237°26.0	59.1	229°07.8	05.2	129°54.3	10.0	186°21.6	25.6	Ankaa	353°08.1	-42°10.8
3	180°45.5	252°25.2	• • 58.9	244°08.2	. 04.9	144°56.5	10.1	201°23.8	• • 25.5	Schedar	349°32.3	56°40.3
4	195°47.9	267°24.3	58.6	259°08.7	04.6	159°58.6	10.1	216°26.0	25.3	Diphda	348°48.2	-17°51.5
5	210°50.4	282°23.5	58.3	274°09.1	04.3	175°00.8	10.4	231°28.2	25.2	Achernar	335°20.9	-57°07.2
6	225°52.9	297°22.6	S21°58.1	289°09.5	S22°03.9	190°03.0	N13°10.5	246°30.4	S10°25.1	Hamal	327°52.1	23°34.6
7	240°55.3	312°21.8	57.8	304°10.0	03.6	205°05.2	10.6	261°32.6	25.0	Polaris	314°24.0	89°22.3
8	255°57.8	327°20.9	57.5	319°10.4	03.3	220°07.4	10.7	276°34.8	24.9	Acamar	315°12.3	-40°12.8
9	271°00.3	342°20.1	• • 57.3	334°10.8	• • 03.0	235°09.6	. 10.8	291°36.9	• • 24.8	Menkar	314°06.9	4°11.0
10	286°02.7	357° 19.2	57.0	349°11.3	02.6	250°11.7	10.9	306°39.1	24.7	Mirfak	308°29.3	49°57.0
11	301°05.2	12°18.3	56.7	4°11.7	02.3	265°13.9	11.0	321°41.3	24.6	Aldebaran	290°40.3	16°33.5
12	316°07.7	27° 17.5	S21°56.5	19°12.1	S22°02.0	280°16.1	N13°11.1	336°43.5	S10°24.5	Rigel	281°04.4	-8°10.5
13	331°10.1	42°16.6	56.2	34°12.5	01.7	295°18.3	11.2	351°45.7	24.4	Capella	280°22.7	46°01.5
14	346°12.6	57° 15.8	55.9	49°13.0	01.7	310°20.5	11.3	6°47.9	24.3	Bellatrix	278°23.5	6°22.2
15	1°15.1	72°14.9	• • 55.6	64°13.4	• • 01.0	325°22.6	11.4	21°50.1	24.1	Elnath	278°02.6	28°37.7
16	16°17.5	87°14.1	55.4	79°13.8	00.7	340°24.8	11.5	36°52.3	24.0	Alnilam	275°38.3	-1°11.3
17	31°20.0	102° 13.2	55.1	94°14.3	00.4	355°27.0	11.6	51°54.4	23.9	Betelgeuse	270°52.7	7°24.6
18	46°22.4	117° 12.4	S21°54.8	109°14.7	\$22°00.0	10°29.2	N13°11.7	66° 56.6	S10°23.8	Canopus	263°52.3	-52°42.7
19	61°24.9	132°11.5	54.5	124°15.1	21°59.7	25°31.4	11.8	81°58.8	23.7	Sirius	258°26.6	-16°45.1
20	76°27.4	147° 10.6	54.2	139°15.6	59.4	40°33.5	11.9	97°01.0	23.6	Adhara	255°06.1	-29°00.4
21	91°29.8	162°09.8	• • 53.9	154°16.0	• • 59.1	55°35.7	12.0	112°03.2	23.5	Procyon	244°51.3	5°09.7
22	106°32.3	177° 08.9	53.7	169°16.4	58.7	70°37.9	12.1	127°05.4	23.4	Pollux	243°17.9	27°58.1
23	121°34.8	192°08.1	53.4	184°16.9	58.4	85°40.1	12.3	142° 07.6	23.3	Avior	234°14.4	-59°35.2
										Suhail	222°46.4	-43°31.8
Mer.p	ass. 14:55	$\nu$ -0.9′ d-0	).3′ m-3.91	$\nu$ 0.4′ d-0	0.3′ m1.32	$\nu 2.2' \ d0.$	1' m-2.32	$\nu$ 2.2′ d-0	.1' m $0.99$	Miaplacidus	221°37.5	-69°48.9
										Alphard	217°48.2	-8°45.8
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.9	11°50.9
0	136°37.2	207° 07.2	S21°53.1	199°17.3	S21°58.1	100°42.3	N13°12.4	157°09.8	\$10°23.2	Dubhe	193°41.3	61°37.1
1	151°39.7	222°06.4	52.8	214°17.7	57.8	115°44.4	12.5	172°11.9	23.1	Denebola	182°25.5	14°26.1
2	166°42.2	237°05.5	52.5	229°18.2	57.4	130°46.6	12.6	187° 14.1	22.9	Gienah		-17°40.5
3	181°44.6	252°04.7	• • 52.2	244°18.6	57.1	145°48.8	12.7	202° 16.3	22.8		173°00.5	-63°13.7
4	196°47.1	267°03.8	51.9	259°19.0	56.8	160°51.0	12.8	217° 18.5	22.7		171°52.2	-57°14.7
5	211°49.6	282°03.0	51.6	274°19.5	56.4	175°53.1	12.9	232°20.7	22.6	Alioth	166°13.3	55°49.5
6	226°52.0	297°02.1	S21°51.3	289°19.9	S21°56.1	190°55.3	N13°13.0	247°22.9	S10°22.5	Spica	158°23.0	-11°17.3
7	241°54.5	312°01.3	51.0	304°20.3	55.8	205°57.5	13.1	262°25.1	22.4	Alkaid	152°52.4	49°11.3
8	256°56.9	327°00.4	50.7	319°20.8	55.4	220°59.7	13.2	277°27.2	22.3	Hadar	148°37.0	-60°29.1
9	271°59.4	341°59.6	• • 50.4	334°21.2	• • 55.1	236°01.8	• • 13.3	292°29.4	22.2	1	147°58.4	-36°29.2
10	287°01.9	356° 58.7	50.2	349°21.6	54.8	251°04.0	13.4	307°31.6	22.1	Arcturus	145°48.5	19°03.2
11	302°04.3	11°57.9	49.9	4°22.1	54.4	266°06.2	13.5	322°33.8	22.0	Rigil Kent.		-60°55.8
12	317°06.8	26° 57.0	S21°49.6	19°22.5	S21°54.1	281°08.4	N13°13.6	337°36.0	S10°21.8	Kochab Zuben'ubi	137° 19.7 136° 56.8	74°03.0 -16°08.5
13	332°09.3	41°56.2	49.2	34°22.9	53.8	296°10.5	13.8	352°38.2	21.7	Alphecca	130 50.6 126°04.4	26°37.8
14	$347^{\circ}11.7$	56°55.3	48.9	49°23.4	53.4	311°12.7	13.9	7°40.4	21.6	Antares	112° 16.9	-26°29.1
15	2°14.2	71°54.5	• • 48.6	64°23.8	• • 53.1	326°14.9	• • 14.0	22°42.6	• • 21.5	Atria	107° 12.1	-20°29.1 -69°04.0
16	$17^{\circ}16.7$	86°53.6	48.3	79°24.2	52.8	341°17.1	14.1	37°44.7	21.4	Sabik	102°03.8	-15°45.3
17	$32^{\circ}19.1$	101°52.8	48.0	94°24.7	52.4	356°19.2	14.2	52°46.9	21.3	Shaula	96°11.7	-37°07.2
18	47°21.6	$116^{\circ}51.9$	S21°47.7	109°25.1	S21°52.1	11°21.4	N13°14.3	67°49.1	S10°21.2	Rasalhague	95°59.5	12°32.4
19	62°24.1	131°51.1	47.4	124°25.5	51.8	26°23.6	14.4	82°51.3	21.1	Eltanin	90°42.9	51°28.8
20	77°26.5	146°50.2	47.1	139°26.0	51.4	41°25.8	14.5	97°53.5	21.0	Kaus Aust.	83°33.8	-34°22.4
21	92°29.0	161°49.4	• • 46.8	154°26.4	•• 51.1	56°27.9	• • 14.6	112°55.7	• • 20.9	Vega	80°34.1	38°48.1
22	107°31.4	176°48.5	46.5	169°26.8	50.7	71°30.1	14.7	127°57.9	20.7	Nunki	75°49.0	-26°16.0
23	122°33.9	191°47.7	46.2	184°27.3	50.4	86°32.3	14.8	143°00.0	20.6	Altair	62°01.0	8°55.8
Mern	ass. 14:51	v-0.9' d-0	0.3' m-3.90	υ0 4' d-0	0.3′ m1.32	v2 2' d0	1' m-2.31	v2 2' d-0	.1′ m0.99	Peacock	53°07.5	-56°39.5
- IVICI.P	ass. 14.51	ν-0.9 α-0	.5 111-5.90	νο.τ α-ο	7.5 1111.52	ν2.2 ασ.	111-2.51	ν Ζ.Ζ · u-0	.1 1110.99	Deneb	49°26.8	45°21.8
										Enif	33°39.9	9°59.0
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°34.3	-46°50.8
0	137°36.4	206°46.8	S21°45.9	199°27.7	S21°50.1	101°34.5	N13°14.9	158°02.2	S10°20.5	Fomalhaut	15° 15.7	-29°29.9
1	152°38.8	221°46.0	45.5	214°28.1	49.7	116°36.6	15.0	173°04.4	20.4	Scheat	13°46.3	28°12.8
2	167°41.3	236°45.1	45.2	229°28.6	49.4	131°38.8	15.2	188°06.6	20.3	Markab	13°30.9	15°20.0
3	182°43.8	251°44.3	• • 44.9	244°29.0	• • 49.0	146°41.0	• • 15.3	203°08.8	• • 20.2			
4	197°46.2	266°43.4	44.6	259°29.4	48.7	161°43.1	15.4	218°11.0	20.1	Feb 06 Tue	SHA	Mer.pass
5	212°48.7	281°42.6	44.3	274°29.9	48.4	176°45.3	15.5	233°13.2	20.0	Venus	71°49.7	10:11
6	227°51.2	296°41.7	S21°43.9	289°30.3	S21°48.0	191°47.5	N13°15.6	248° 15.3	\$10° 19.9	Mars	63°28.9	10:43
7	242°53.6	311°40.9	43.6	304°30.7	47.7	206°49.6	15.7	263°17.5	19.8	Jupiter	324°11.8	17:18
8	257°56.1	326°40.1	43.3	319°31.2	47.3	221°51.8	15.8	278°19.7	19.7	Saturn	20°39.2	13:33
9	272°58.6	341°39.2	• • 43.0	334°31.6	• • 47.0	236°54.0	15.9	293°21.9	• • 19.5	Feb 07 Wed	SHA	Mer.pass
10	288°01.0	356°38.4	42.6	349°32.0	46.7	251°56.2	16.0	308°24.1	19.4	Venus	70°30.0	10:12
11	303°03.5	11°37.5	42.3	4°32.5	46.3	266°58.3	16.1	323°26.3	19.3	Mars	62°40.1	10:43
12	318°05.9	26°36.7	\$21°42.0	19°32.9	\$21°46.0	282°00.5	N13°16.2	338°28.5	\$10° 19.2	Jupiter	324°05.0	17:15
13	333°08.4	41°35.8	41.7	34°33.4	45.6	297°02.7	16.4	353°30.6	19.1	Saturn	20°32.5	13:29
14	348°10.9	56°35.0	41.3	49°33.8	45.3	312°04.8	16.5	8°32.8	19.0			
15 16	3°13.3	71°34.1	· · 41.0	64°34.2	• • 44.9	327°07.0	· · 16.6	23°35.0	18.9	Feb 08 Thu	SHA	Mer.pass
16 17	18°15.8	86°33.3	40.7	79°34.7	44.6	342°09.2	16.7	38°37.2	18.8	Venus	69°10.5	10:13
17	33°18.3 48°20.7	101°32.4	40.3	94°35.1 109°35.5	44.2 \$21°43.9	357°11.3 12°13.5	16.8 N13°16.9	53°39.4	18.7 \$10°18 5	Mars	61°51.3	10:42
18 19	48° 20.7 63° 23.2	116°31.6 131°30.8	\$21°40.0 39.7	109°35.5 124°36.0	43.6	12°13.5 27°15.7	N13 16.9 17.0	68°41.6 83°43.8	\$10° 18.5	Jupiter		17:11
20	78°25.7	131 30.8 146°29.9	39.7 39.3	124 36.0 139°36.4	43.0	42°17.8	17.0 17.1	98° 45.9	18.4	Saturn	20°25.9	13:26
20	78° 25.7 93° 28.1	146° 29.9 161° 29.1	· · 39.3	139°36.4 154°36.8	· · 42.9	42°17.8 57°20.0	17.1	98° 45.9 113° 48.1	18.3 •• 18.2	Horizont	al parallax	
22	93 20.1 108°30.6	101 29.1 176°28.2	38.6	169°37.3	42.5	72°22.2	17.2	113 46.1 128°50.3	18.1		Venus:	0.1
23	100° 30.0° 123° 33.0°	170 28.2 191°27.4	38.3	184°37.7	42.3	87°24.3	17.3 17.4	143° 52.5	18.0		Mars:	0.1
Mer.p	ass. 14:47	$\nu$ -0.8′ d-0	0.3′ m-3.90	$\nu$ 0.4′ $d$ -0	0.3′ m1.31	$\nu$ 2.2′ d0.	.1′ m-2.30	$\nu$ 2.2′ d-0	.1' m $0.99$			

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	176°30.6	S15°50.4	233°32.1	4.9'	S27°51.9	3.1'	58.2'
1	191°30.5 206°30.5	49.6	247°56.0 262°19.8	4.8'	27°54.9	2.9'	58.2'
2	206 30.5 221°30.4	48.8 •• 48.1	202 19.8 276°43.5	4.7' 4.6'	27°57.8 28°00.5	2.7' 2.5'	58.2' 58.3'
4	236° 30.4	47.3	291°07.2	4.6'	28°03.0	2.3'	58.3'
5	251°30.3	46.5	$305^{\circ}30.7$	4.5'	28°05.4	2.2'	58.4'
6	266°30.3	S15°45.8	319°54.2	4.4'	\$28°07.5	2.0'	58.4'
7 8	281°30.3 296°30.2	45.0 44.2	334°17.6 348°40.9	4.3' 4.2'	28°09.5 28°11.3	1.8' 1.6'	58.4' 58.5'
9	311° 30.2	• • 43.5	3°04.1	4.2'	28°12.9	1.4'	58.5'
10	326°30.1	42.7	$17^{\circ}27.2$	4.1'	28°14.4	1.2'	58.6'
11	341°30.1	41.9	31°50.3	4.0'	28°15.6	1.1'	58.6'
12 13	356°30.0 11°30.0	\$15°41.2 40.4	46°13.3 60°36.3	3.9' 3.9'	\$28°16.7 28°17.5	0.9' 0.7'	58.6' 58.7'
14	26° 29.9	39.6	74°59.1	3.8'	28°18.2	0.7	58.7'
15	41°29.9	• • 38.9	89°21.9	3.7'	28°18.7	0.3'	58.8'
16	56°29.9	38.1	103°44.7	3.7'	28°19.0	0.1'	58.8'
17 18	71°29.8 86°29.8	37.3 \$15°36.6	118°07.4 132°30.0	3.6' 3.6'	28°19.1 \$28°19.0	-0.1' -0.3'	58.8' 58.9'
19	101°29.7	35.8	132 30.0 146°52.6	3.5'	28°18.7	-0.5'	58.9'
20	116° 29.7	35.0	161°15.1	3.5'	28°18.3	-0.7'	59.0'
21	131° 29.6	• • 34.2	175°37.6	3.4'	28°17.6	-0.9'	59.0'
22 23	146°29.6 161°29.6	33.5 32.7	190°00.0 204°22.4	3.4' 3.3'	28°16.7 28°15.7	-1.1' -1.3'	59.0' 59.1'
23			204 22.4			-1.3	J9.1
	SD = 16.2'	d = -0.8'		S	D = 15.9'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176° 29.5	\$15°31.9	218°44.8	3.3'	S28°14.4	-1.5'	59.1'
1	191°29.5	31.2	233°07.1	3.3'	28°12.9	-1.7'	59.2'
2	206°29.4 221°29.4	30.4 •• 29.6	247°29.3 261°51.6	3.2' 3.2'	28°11.3 28°09.4	-1.9' -2.1'	59.2' 59.2'
4	236° 29.4	28.8	201 31.0 276°13.8	3.2'	28°07.4	-2.1 -2.3'	59.2 59.3'
5	251°29.3	28.1	290°36.0	3.2'	28°05.1	-2.5'	59.3'
6	266°29.3	\$15°27.3	304°58.1	3.1'	S28°02.7	-2.7'	59.3'
7 8	281°29.2 296°29.2	26.5 25.7	319°20.3 333°42.4	3.1' 3.1'	28°00.0 27°57.2	-2.9' -3.1'	59.4' 59.4'
9	311° 29.2	• • 24.9	348°04.5	3.1	27°54.1	-3.1 -3.3'	59.4 59.5'
10	326°29.1	24.2	2°26.6	3.1'	27°50.9	-3.5'	59.5'
11	341°29.1	23.4	16°48.6	3.1'	27°47.4	-3.7'	59.5'
12 13	356°29.1 11°29.0	\$15°22.6 21.8	31°10.7 45°32.8	3.1' 3.1'	\$27°43.8 27°39.9	-3.9' -4.1'	59.6' 59.6'
14	26° 29.0	21.0	45 52.6 59°54.8	3.1'	27°35.9	-4.1 -4.3'	59.6'
15	41°28.9	• • 20.3	74°16.9	3.1'	27°31.6	-4.5'	59.7'
16	56°28.9	19.5	88°38.9	3.1'	27°27.1	-4.7'	59.7'
17 18	71°28.9 86°28.8	18.7 \$15°17.9	103°01.0 117°23.1	3.1' 3.1'	27°22.5 \$27°17.6	-4.9' -5.1'	59.7' 59.8'
19	101°28.8	17.1	131°45.2	3.1'	27°12.6	-5.1 -5.3'	59.8'
20	116°28.8	16.4	146°07.3	3.1'	27°07.3	-5.5'	59.8'
21	131°28.7	• • 15.6	160°29.4	3.1'	27°01.9	-5.7'	59.9'
22 23	146°28.7 161°28.7	14.8 14.0	174°51.5 189°13.7	3.2' 3.2'	26°56.2 26°50.4	-5.9' -6.0'	59.9' 59.9'
23			109 13.7			-0.0	59.9
	SD = 16.2'	d = -0.8'		5	D = 16.1'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°28.6	\$15°13.2	203°35.9	3.2'	S26°44.3	-6.2'	60.0'
1	191°28.6	12.4	217°58.1 232°20.3	3.2'	26°38.1	-6.4'	60.0'
2	206°28.6 221°28.5	11.7 •• 10.9	232°20.3 246°42.6	3.3' 3.3'	26°31.6 26°25.0	-6.6' -6.8'	60.0' 60.1'
4	236° 28.5	10.1	261°04.9	3.3'	26°18.2	-7.0'	60.1
5	251°28.5	09.3	275°27.2	3.4'	26°11.1	-7.2'	60.1'
6	266°28.4 281°28.4	\$15°08.5 07.7	289°49.6 304°12.0	3.4' 3.5'	\$26°03.9 25°56.5	-7.4'	60.2'
7 8	281°28.4 296°28.4	07.7 06.9	304°12.0 318°34.4	3.5'	25°56.5 25°48.9	-7.6' -7.8'	60.2' 60.2'
9	311°28.4	06.2	332°56.9	3.5'	25°41.1	-8.0'	60.3
10	326°28.3	05.4	347°19.5	3.6'	$25^{\circ}33.1$	-8.2'	60.3'
11	341°28.3 356°28.3	04.6 \$15°03.8	1°42.1 16°04.7	3.6' 3.7'	25°24.9 \$25°16.6	-8.4'	60.3'
12 13	356°28.3 11°28.2	03.0	16°04.7 30°27.4	3.7'	525°16.6 25°08.0	-8.5' -8.7'	60.3' 60.4'
14	26°28.2	02.2	44°50.2	3.8'	24°59.3	-8.9'	60.4
15	41°28.2	• • 01.4	59°13.0	3.9'	24°50.4	-9.1'	60.4'
16	56°28.2	15°00.6	73°35.9	3.9'	24°41.3	-9.3'	60.4'
17 18	71°28.1 86°28.1	14°59.8 \$14°59.0	87°58.8 102°21.8	4.0' 4.1'	24°32.0 \$24°22.5	-9.5' -9.6'	60.5' 60.5'
19	101°28.1	58.2	102 21.8 116°44.9	4.1'	24°12.9	-9.0 -9.8'	60.5
20	116°28.1	57.4	$131^{\circ}08.0$	4.2'	24°03.1	-10.0'	60.6'
21	131°28.0	• • 56.7	145°31.2	4.3'	23°53.1	-10.2'	60.6'
22 23	146°28.0 161°28.0	55.9 55.1	159°54.4 174°17.8	4.3' 4.4'	23°42.9 23°32.6	-10.3' -10.5'	60.6' 60.6'
23			117 11.0			10.5	00.0
	SD = 16.2'	d = -0.8'		S	D = 16.4'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	06:49	08:14	09:46	14:43	16:16	17:41
<b>N</b> 70°	06:44	07:59	09:16	15:13	16:31	17:46
68°	06:39	07:47	08:54	15:35	16:43	17:51
66°	06:35	07:37	08:37	15:53	16:52	17:55
64°	06:31	07:28	08:22	16:07	17:01	17:58
62°	06:28	07:21	08:11	16:18	17:08	18:01
60°	06:25	07:15	08:00	16:29	17:14	18:04
<b>N</b> 58°	06:22	07:09	07:52	16:37	17:20	18:07
56°	06:20	07:04	07:44	16:45	17:25	18:09
54°	06:17	06:59	07:37	16:52	17:30	18:12
52°	06:15	06:55	07:31	16:58	17:34	18:14
50°	06:13	06:51	07:25	17:04	17:38	18:16
45°	06:08	06:42	07:13	17:16	17:46	18:21
<b>N</b> 40°	06:03	06:35	07:03	17:26	17:54	18:26
35°	05:58	06:28	06:54	17:34	18:00	18:31
30°	05:54	06:22	06:47	17:42	18:07	18:35
20°	05:44	06:11	06:33	17:55	18:18	18:44
N $10^{\circ}$	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	05:37	05:59	18:29	18:50	19:16
20°	04:57	05:24	05:47	18:41	19:04	19:31
30°	04:38	05:08	05:33	18:54	19:20	19:50
35°	04:25	04:58	05:25	19:03	19:30	20:02
40°	04:10	04:46	05:16	19:12	19:41	20:17
45°	03:52	04:32	05:05	19:23	19:55	20:35
<b>S</b> 50°	03:27	04:14	04:51	19:36	20:12	20:59
52°	03:15	04:06	04:45	19:42	20:21	21:12
54°	03:00	03:56	04:38	19:49	20:30	21:26
56°	02:43	03:45	04:30	19:56	20:41	21:43
58°	02:21	03:32	04:22	20:05	20:54	22:04
<b>S</b> 60°	01:51	03:17	04:11	20:15	21:08	22:32
		Moonris	e		Moonset	:
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
<b>N</b> 70°						
68°						
66°						
64°	1					

Lat.		Moonris	e		Moonset	
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
N 70°						
68°						
66°						
64°			10:13			11:44
62°			09:11			12:46
60°	07:19	08:16	08:36	10:13	11:27	13:20
N 58°	06:40	07:40	08:11	10:53	12:04	13:45
56°	06:13	07:13	07:51	11:20	12:30	14:04
54°	05:51	06:52	07:34	11:42	12:51	14:21
52°	05:33	06:35	07:19	12:00	13:08	14:35
50°	05:18	06:20	07:06	12:15	13:23	14:47
45°	04:47	05:50	06:40	12:46	13:53	15:12
N 40°	04:24	05:26	06:19	13:10	14:16	15:32
35°	04:04	05:07	06:02	13:29	14:35	15:49
30°	03:47	04:50	05:47	13:46	14:52	16:03
20°	03:19	04:22	05:21	14:15	15:19	16:28
N 10° 0°	02:55	03:57	04:59	14:39	15:43	16:48
	02:33	03:35	04:38	15:02	16:05	17:08
<b>S</b> 10°	02:10	03:12	04:17	15:25	16:27	17:27
20°	01:46	02:48	03:55	15:49	16:50	17:47
30° 35°	01:18	02:20	03:29 03:13	16:17	17:17	18:11 18:24
40°	01:02 00:43	02:03 01:43	03:13	16:34 16:54	17:33 17:52	18:24 18:40
45°	00:43	01:43	02:34	17:18	18:14	18:59
1	00.20					
<b>S</b> 50° 52°		00:49	02:06	17:48 18:03	18:42 18:56	19:22 19:33
54°		00:34 00:17	01:53 01:37	18:03	19:12	19:33 19:45
56°	23:56		01:37	18:42	19:12	19:45
58°	23:29		00:57	19:09	19:53	20:16
S 60°	22:51		00:37	19:46	20:23	20:36
			00.2.	1 255	_00	_0.00

		Sun			Moon	
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age
Juy	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%
06	13:58	14:00	12:14	08:47	21:18	
07	14:02	14:04	12:14	09:50	22:21	
08	14:05	14:07	12:14	10:53	23:24	

## February 09, 10, 11 UT (Fri., Sat., Sun.)

h	Aries	Ve	nus	Ma	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	138° 35.5	206° 26.5	S21°38.0	199°38.2	S21°41.8	102°26.5	N13° 17.6	158°54.7	\$10°17.9			
1	153°38.0	221°25.7	37.6	214°38.6	41.5	117°28.7	17.7	173°56.9	17.8	Alpheratz	357°35.8	29°13.4
2	168° 40.4	236°24.9	37.3	229°39.0	41.1	132°30.8	17.8	188°59.0	17.7	Ankaa	353°08.1	-42°10.8
3	183°42.9	251°24.0	36.9	244°39.5	40.8	147°33.0	• • 17.9	204°01.2	• • 17.6	Schedar	349°32.3	56°40.3
4	198°45.4	266°23.2	36.6	259°39.9	40.4	162°35.2	18.0	219°03.4	17.4	Diphda	348°48.2	-17°51.5
5	213°47.8	281°22.3	36.2	274°40.3	40.1	177°37.3	18.1	234°05.6	17.3	Achernar	335°20.9	-57°07.2 23°34.6
6	228°50.3	296°21.5	S21°35.9	289°40.8	S21°39.7	192°39.5	N13° 18.2	249°07.8	S10°17.2	Hamal Polaris	327°52.1 314°25.5	89°22.3
7	243°52.8	311°20.7	35.5	304°41.2	39.4	207°41.6	18.3	264°10.0	17.1	Acamar	314° 23.3	-40°12.8
8	258° 55.2	326°19.8	35.2	319°41.7	39.0	222°43.8	18.4	279°12.2	17.0	Menkar	314°06.9	4°11.0
9	273°57.7	341°19.0	• • 34.8	334°42.1	• • 38.7	237°46.0	• • 18.6	294°14.3	• • 16.9	Mirfak	308° 29.3	49°57.0
10	289°00.2	356°18.1	34.5	349°42.5	38.3	252°48.1	18.7	309°16.5	16.8	Aldebaran	290°40.4	16°33.5
11	304°02.6	11°17.3	34.1	4°43.0	38.0	267°50.3	18.8	324°18.7	16.7	Rigel	281°04.4	-8°10.5
12	319°05.1 334°07.5	26°16.5 41°15.6	S21°33.8	19°43.4 34°43.8	\$21°37.6	282°52.5 297°54.6	N13° 18.9	339°20.9 354°23.1	\$10°16.6	Capella	280°22.7	46°01.5
13 14	349° 10.0	56°14.8	33.4 33.1	34 43.6 49°44.3	37.3 36.9	312° 56.8	19.0 19.1	9°25.3	16.5 16.3	Bellatrix	$278^{\circ}23.5$	6°22.2
15	4°12.5	71°13.9	32.7	64°44.7	36.5	327°58.9	19.2	24°27.5	. 16.2	Elnath	278°02.6	28°37.7
16	19° 14.9	86°13.1	32.4	79°45.2	36.2	343°01.1	19.3	39°29.6	16.1	Alnilam	275°38.3	-1°11.3
17	34° 17.4	101°12.3	32.0	94°45.6	35.8	358°03.3	19.4	54°31.8	16.0	Betelgeuse	270°52.7	7°24.6
18	49° 19.9	116°11.4	S21°31.6	109°46.0	S21°35.5	13°05.4	N13° 19.6	69°34.0	S10°15.9	Canopus	263°52.3	-52°42.7
19	64°22.3	131°10.6	31.3	124°46.5	35.1	28°07.6	19.7	84°36.2	15.8	Sirius	258°26.6	-16°45.1
20	79°24.8	146°09.8	30.9	139°46.9	34.8	43°09.7	19.8	99°38.4	15.7	Adhara	255°06.1 244°51.3	-29°00.4 5°09.7
21	94°27.3	$161^{\circ}08.9$	• • 30.5	154°47.4	• • 34.4	$58^{\circ}11.9$	• • 19.9	114°40.6	•• 15.6	Procyon Pollux	244 51.3 243°17.9	27°58.1
22	109°29.7	176°08.1	30.2	169°47.8	34.0	73° 14.1	20.0	129°42.7	15.5	Avior	234° 14.4	-59°35.2
23	124°32.2	191°07.2	29.8	184°48.2	33.7	88° 16.2	20.1	144°44.9	15.4	Suhail	222°46.4	-43°31.8
Mer.r	pass. 14:43	$\nu$ -0.8' d-0	.3′ m-3.90	$\nu$ 0.4′ d-0	.3′ m1.31	$\nu 2.2' d0.$	1' m-2.30	$\nu 2.2' \ d-0$	.1′ m0.99	Miaplacidus	221°37.5	-69°48.9
										Alphard	217°48.2	-8°45.8
C-4	CHA	CIIA	D	CIIA	D	CIIA	D	CHA	D	Regulus	$207^{\circ}34.9$	11°50.9
Sat 0	<b>GHA</b> 139°34.7	<b>GHA</b> 206°06.4	<b>Dec</b> <b>S</b> 21°29.4	<b>GHA</b> 199°48.7	<b>Dec</b> \$21°33.3	<b>GHA</b> 103°18.4	<b>Dec</b> N13° 20.2	<b>GHA</b> 159°47.1	<b>Dec</b> \$10°15.2	Dubhe	193°41.3	61°37.1
1	154° 37.1	200 00.4 221°05.6	29.4	214°49.1	33.0	118° 20.5	20.3	174°49.3	15.1	Denebola	182°25.4	14°26.1
2	169°39.6	236°04.7	28.7	229°49.6	32.6	133°22.7	20.4	189°51.5	15.0	Gienah	175°44.1	-17°40.6
3	184°42.0	251°03.9	28.3	244°50.0	• • 32.3	148° 24.9	20.6	204°53.7	• • 14.9		173°00.5	-63°13.8
4	199°44.5	266°03.1	28.0	259° 50.4	31.9	163°27.0	20.7	219°55.8	14.8		171°52.1	-57°14.7
5	214°47.0	281°02.2	27.6	274°50.9	31.5	178°29.2	20.8	234°58.0	14.7	Alioth	166° 13.3 158° 22.9	55°49.5 -11°17.3
6	229°49.4	296°01.4	S21°27.2	289°51.3	S21°31.2	193°31.3	N13°20.9	250°00.2	S10°14.6	Spica Alkaid	150° 22.9° 152° 52.4	49°11.3
7	244°51.9	$311^{\circ}00.6$	26.8	304°51.8	30.8	208°33.5	21.0	265°02.4	14.5	Hadar	132 32.4 148°36.9	-60°29.1
8	259°54.4	$325^{\circ}59.7$	26.5	$319^{\circ}52.2$	30.5	223°35.6	21.1	280°04.6	14.4		147°58.4	-36°29.2
9	274°56.8	340°58.9	• • 26.1	334°52.6	• • 30.1	238° 37.8	• • 21.2	295°06.8	• • 14.2	Arcturus	145°48.5	19°03.2
10	289°59.3	355°58.1	25.7	349°53.1	29.7	253°40.0	21.3	310°09.0	14.1	Rigil Kent.	139°41.2	-60°55.8
11	305°01.8	10°57.2	25.3	4°53.5	29.4	268°42.1	21.5	325°11.1	14.0	Kochab	$137^{\circ}19.6$	74°03.0
12 13	320°04.2 335°06.7	25°56.4 40°55.6	\$21°24.9 24.5	19°54.0 34°54.4	\$21°29.0 28.6	283°44.3 298°46.4	N13°21.6 21.7	340°13.3 355°15.5	\$10°13.9 13.8	Zuben'ubi	$136^{\circ}56.8$	-16°08.5
14	350°09.2	55°54.7	24.3	49°54.8	28.3	313°48.6	21.7	10°17.7	13.7	Alphecca	126°04.4	26°37.7
15	5° 11.6	70°53.9	. 23.8	64°55.3	• • 27.9	328° 50.7	21.9	25°19.9	• • 13.6	Antares	112° 16.9	-26°29.1
16	20° 14.1	85°53.1	23.4	79°55.7	27.5	343°52.9	22.0	40°22.1	13.5	Atria	107°12.0	-69°04.0
17	35° 16.5	100°52.2	23.0	94°56.2	27.2	358°55.0	22.1	55°24.2	13.4	Sabik	102°03.8	-15°45.3
18	50° 19.0	115°51.4	S21°22.6	109°56.6	S21°26.8	13°57.2	N13°22.2	70°26.4	S10°13.2	Shaula Rasalhague	96° 11.6 95° 59.4	-37°07.2 12°32.3
19	65°21.5	$130^{\circ}50.6$	22.2	124°57.1	26.4	28°59.4	22.4	85°28.6	13.1	Eltanin	90°42.9	51°28.8
20	80°23.9	$145^{\circ}49.7$	21.8	139°57.5	26.1	44°01.5	22.5	100°30.8	13.0	Kaus Aust.	83°33.8	-34°22.4
21	95°26.4	160°48.9	• • 21.4	154° 57.9	• • 25.7	59°03.7	• • 22.6	115°33.0	• • 12.9	Vega	80°34.1	38°48.1
22	110°28.9	175°48.1	21.1	169°58.4	25.3	74°05.8	22.7	130°35.2	12.8	Nunki	75°49.0	-26°16.0
23	125°31.3	190°47.3	20.7	184°58.8	25.0	89°08.0	22.8	145°37.3	12.7	Altair	62°01.0	8°55.8
Mer.p	ass. 14:39	$\nu$ -0.8' d-0	.4' m-3.90	$\nu$ 0.4′ d-0	.4′ m1.31	$\nu 2.2' \ d0.$	1' m-2.29	$\nu$ 2.2′ d-0	.1′ m0.99	Peacock	53°07.5	-56°39.5
										Deneb	49°26.8	45°21.8
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.9	9°59.0
0	140°33.8	205°46.4	S21°20.3	199°59.3	S21°24.6	104° 10.1	N13°22.9	160°39.5	S10°12.6	Al Na'ir	27°34.3	-46°50.8
1	155° 36.3	220°45.6	19.9	214°59.7	24.2	119° 12.3	23.0	175°41.7	12.5	Fomalhaut Scheat	15° 15.7 13° 46.3	-29°29.9 28°12.8
2	170°38.7	235°44.8	19.5	230°00.2	23.9	134° 14.4	23.2	190°43.9	12.4	Markab	13° 46.3 13° 30.9	28° 12.8 15° 20.0
3	185°41.2	250°43.9	• • 19.1	245°00.6	• • 23.5	$149^{\circ}16.6$	• • 23.3	205°46.1	• • 12.3	IVIAIKAD	13 30.9	13 20.0
4	200°43.6	$265^{\circ}43.1$	18.7	$260^{\circ}01.0$	23.1	164° 18.7	23.4	220°48.3	12.1	Feb 09 Fri	SHA	Mer.pass
5	215°46.1	280°42.3	18.3	275°01.5	22.8	179°20.9	23.5	235°50.4	12.0	Venus	67°51.0	10:15
6	230°48.6	295°41.5	S21°17.9	290°01.9	S21°22.4		N13°23.6	250°52.6	S10°11.9	Mars	61°02.6	10:41
7	245°51.0	310°40.6	17.5	305°02.4	22.0	209°25.2	23.7	265°54.8	11.8	Jupiter	323°51.0	17:08
8	260°53.5	325°39.8	17.1	320°02.8	21.7	224°27.3	23.8	280°57.0	11.7	Saturn	20° 19.2	13:22
9	275°56.0	340°39.0	16.7	335°03.3	• • 21.3	239°29.5	• • 24.0	295°59.2	• • 11.6	Feb 10 Sat	SHA	Mer.pass
10 11	290°58.4 306°00.9	355°38.1 10°37.3	16.3 15.8	350°03.7 5°04.1	20.9 20.5	254°31.6 269°33.8	24.1 24.2	311°01.4 326°03.5	11.5 11.4	Venus	$66^{\circ}31.8$	10:16
12	300 00.9 321°03.4	25°36.5	\$21°15.4	20°04.6	521°20.2	209 33.8 284°35.9	N13°24.3	341°05.7	\$10°11.3	Mars	60°14.0	10:40
13	336° 05.8	40°35.7	15.0	35°05.0	19.8	299°38.1	24.4	356°07.9	11.1	Jupiter	323°43.7	17:04
14	351°08.3	55°34.8	14.6	50°05.5	19.4	314°40.2	24.5	11°10.1	11.0	Saturn	20°12.5	13:19
15	6° 10.8	70°34.0	14.2	65°05.9	• • 19.0	329°42.4	24.6	26°12.3	• • 10.9	Feb 11 Sun	SHA	Mer.pass
16	21°13.2	85°33.2	13.8	80°06.4	18.7	344°44.5	24.8	41°14.5	10.8	Venus	65°12.6	10:17
17	$36^{\circ}15.7$	100°32.4	13.4	95°06.8	18.3	$359^{\circ}46.7$	24.9	56°16.6	10.7	Mars	59°25.5	10:40
18	51° 18.1	115°31.5	<b>S</b> 21°13.0	110°07.3	S21°17.9	14°48.8	N13°25.0	71°18.8	<b>S</b> 10°10.6	Jupiter		17:01
19	66°20.6	130°30.7	12.6	125°07.7	17.5	29°51.0	25.1	86°21.0	10.5	Saturn	20°05.7	13:15
20	81°23.1	145°29.9	12.1	140°08.1	17.2	44°53.1	25.2	101°23.2	10.4	Ua!-a4	al parallax	
21	96° 25.5	160°29.1	•• 11.7	155°08.6	16.8	59°55.3	• • 25.3	116°25.4	10.3	Horizont	Venus:	0.1
22 23	111°28.0 126°30.5	175°28.3 190°27.4	11.3 10.9	170°09.0 185°09.5	16.4 16.0	74° 57.4 89° 59.6	25.4 25.6	131°27.5 146°29.7	10.1 10.0		Mars:	0.1
												V.1
Mer.p	bass. 14:35	$\nu$ -0.8′ d-0	.4′ m-3.90	$\nu$ 0.4′ d-0	.4′ m1.31	$\nu$ 2.2′ d0.	1′ m-2.28	$\nu$ 2.2′ d-0	.1' m $0.99$			

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	176°28.0	\$14°54.3	188°41.2	4.5'	\$23°22.0	-10.7'	60.6'
1 2	191°27.9 206°27.9	53.5 52.7	203°04.7 217°28.2	4.6' 4.6'	23°11.4 23°00.5	-10.9' -11.0'	60.7' 60.7'
3	221°27.9	• • 51.9	231°51.8	4.7'	22°49.5	-11.2'	60.7'
4	236°27.9	51.1	246°15.5	4.8'	22°38.3	-11.3'	60.7'
5	251°27.8 266°27.8	50.3 \$14°49.5	260°39.3 275°03.2	4.9' 4.9'	22°27.0 522°15.4	-11.5' -11.7'	60.8' 60.8'
6 7	200 27.8 281°27.8	514 49.5 48.7	275 03.2 289°27.1	4.9 5.0'	22°03.8	-11.7 -11.8'	60.8
8	296°27.8	47.9	303°51.1	5.1'	21°51.9	-12.0'	60.8'
9	311°27.7	• • 47.1	318°15.2	5.2'	21°40.0	-12.1'	60.8'
10 11	326°27.7 341°27.7	46.3 45.5	332°39.4 347°03.7	5.3' 5.4'	21°27.8 21°15.5	-12.3' -12.4'	60.9' 60.9'
12	356°27.7	\$14°44.7	1°28.1	5.4'	S21°03.1	-12.6'	60.9'
13	11°27.7	43.9	15°52.5	5.5'	20°50.5	-12.7'	60.9'
14 15	26°27.6 41°27.6	43.1 •• 42.3	30°17.0 44°41.6	5.6' 5.7'	20°37.7 20°24.9	-12.9' -13.0'	60.9' 60.9'
16	56°27.6	41.5	59°06.3	5.8'	20°11.8	-13.2'	61.0'
17	71°27.6	40.7	73°31.1	5.9'	19°58.7	-13.3'	61.0'
18 19	86°27.6 101°27.6	\$14°39.9 39.1	87°56.0 102°20.9	6.0' 6.0'	\$19°45.4 19°31.9	-13.4' -13.6'	61.0' 61.0'
20	101 27.6 116°27.5	39.1	102 20.9 116°46.0	6.1	19 31.9 19°18.3	-13.0 -13.7'	61.0'
21	131°27.5	• • 37.5	131°11.1	6.2'	19°04.6	-13.8'	61.0'
22	146°27.5	36.7	145°36.3	6.3'	18°50.8	-14.0'	61.0'
23	161°27.5	35.9	160°01.6	6.4'	18°36.8	-14.1'	61.0'
	SD = 16.2'	d = -0.8'		SI	O = 16.5'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°27.5	\$14°35.1	174°27.0	6.5'	\$18°22.7	-14.2'	61.1'
1 2	191°27.4 206°27.4	34.3 33.4	188°52.5 203°18.1	6.6' 6.7'	18°08.5 17°54.1	-14.3' -14.5'	61.1' 61.1'
3	221°27.4	32.6	217°43.8	6.8	17°39.7	-14.6'	61.1'
4	236°27.4	31.8	$232^{\circ}09.5$	6.8'	$17^{\circ}25.1$	-14.7'	61.1'
5	251°27.4 266°27.4	31.0 \$14°30.2	246°35.4 261°01.3	6.9' 7.0'	17°10.4 \$16°55.6	-14.8' -14.9'	61.1' 61.1'
6 7	281°27.4	29.4	201 01.3 275°27.3	7.0 7.1'	16°40.6	-14.9 -15.0'	61.1
8	296°27.3	28.6	289°53.4	7.2'	16°25.6	-15.1'	61.1'
9	311°27.3	• • 27.8	304°19.6	7.3'	16°10.5	-15.2'	61.1'
10 11	326°27.3 341°27.3	27.0 26.2	318°45.9 333°12.3	7.4' 7.5'	15°55.2 15°39.8	-15.4' -15.5'	61.1' 61.1'
12	356°27.3	\$14°25.4	347°38.7	7.5'	S15°24.4	-15.6'	61.1'
13	11°27.3	24.6	2°05.2	7.6'	15°08.8	-15.6'	61.1'
14 15	26°27.3 41°27.3	23.7	16°31.9 30°58.6	7.7' 7.8'	14°53.2 14°37.5	-15.7' -15.8'	61.1' 61.2'
16	56°27.2	22.1	45°25.4	7.8 7.9'	14°21.6	-15.6' -15.9'	61.2'
17	71°27.2	21.3	59°52.2	8.0'	$14^{\circ}05.7$	-16.0'	61.2'
18 19	86°27.2 101°27.2	\$14°20.5 19.7	74°19.2 88°46.2	8.0' 8.1'	\$13°49.7 13°33.6	-16.1' -16.2'	61.2' 61.2'
20	101 27.2 116°27.2		103°13.4	8.2'	13°17.4		61.2'
21	131°27.2	• • 18.0	117°40.6	8.3'	13°01.2	-16.3'	61.2'
22	146°27.2 161°27.2	17.2	132°07.8 146°35.2	8.4'	12°44.8 12°28.4	-16.4'	61.2'
23	SD = 16.2'	$\frac{16.4}{d = -0.8'}$	140 35.2	8.4'	0 = 16.7'	-16.5'	61.2'
	3D = 10.2	u = -0.6		J.	J = 10.7		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	176°27.2 191°27.2	\$14° 15.6 14.8	161°02.6 175°30.2	8.5' 8.6'	\$12°11.9 11°55.4	-16.6' -16.6'	61.1' 61.1'
2	206°27.2	14.0	189°57.7	8.7'	11°38.7	-16.7	61.1'
3	221°27.2	• • 13.2	204°25.4	8.7'	11°22.0	-16.8'	61.1'
4 5	236°27.1 251°27.1	12.3 11.5	218°53.2 233°21.0	8.8' 8.9'	11°05.3 10°48.5	-16.8' -16.9'	61.1' 61.1'
6	266°27.1	\$14° 10.7	247°48.9	9.0'	\$10°31.6	-16.9	61.1'
7	281°27.1	09.9	262°16.8	9.0'	10°14.6	-17.0'	61.1'
8 9	296°27.1 311°27.1	09.1 •• 08.2	276°44.9 291°13.0	9.1' 9.2'	09°57.6 09°40.6	-17.1' -17.1'	61.1' 61.1'
10	326°27.1	07.4	305°41.1	9.2' 9.2'	09°23.5	-17.1 -17.2'	61.1
11	341°27.1	06.6	320°09.4	9.3'	09°06.3	-17.2'	61.1'
12 13	356°27.1 11°27.1	\$14°05.8 05.0	334°37.7 349°06.0	9.4' 9.4'	\$08°49.1 08°31.9	-17.2' -17.3'	61.1' 61.1'
13 14	26°27.1	05.0	349 06.0 3°34.5	9.4 9.5'	08°14.6	-17.3'	61.1
15	41°27.1	• • 03.3	18°03.0	9.6'	07°57.2	-17.4'	61.0'
16	56°27.1	02.5	32°31.5	9.6'	07°39.9	-17.4'	61.0'
17 18	71°27.1 86°27.1	01.7 \$14°00.9	47°00.2 61°28.8	9.7' 9.7'	07°22.5 <b>S</b> 07°05.0	-17.4' -17.5'	61.0' 61.0'
19	101°27.1	14°00.9	75°57.6	9.8'	06°47.5	-17.5'	61.0'
20	116°27.1	13°59.2	90°26.4	9.9'	06°30.0	-17.5'	61.0'
21 22	131°27.1 146°27.1	· · 58.4 57.6	104°55.2 119°24.1	9.9' 10.0'	06°12.5 05°54.9	-17.6' -17.6'	61.0' 61.0'
23	140°27.1	56.7	119 24.1 133°53.1	10.0'	05°37.4	-17.6'	60.9'
	SD = 16.2'	d = -0.8'		SI	D = 16.7'		

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

Lat.		Moonris	е		Moonset	:
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°	_	10:51	09:43	_	15:21	18:24
<b>N</b> 70°		10:14	09:28		15:56	18:35
68°	10:57	09:48	09:17	13:11	16:21	18:44
66°	10:01	09:27	09:07	14:05	16:39	18:52
64°	09:28	09:11	08:59	14:38	16:54	18:58
62°	09:03	08:57	08:52	15:01	17:07	19:03
60°	08:43	08:45	08:45	15:20	17:17	19:08
<b>N</b> 58°	08:26	08:35	08:40	15:36	17:26	19:12
56°	08:12	08:26	08:35	15:49	17:34	19:15
54°	08:00	08:18	08:30	16:00	17:41	19:18
52°	07:49	08:11	08:26	16:11	17:47	19:21
50°	07:40	08:04	08:23	16:19	17:53	19:24
45°	07:19	07:50	08:15	16:38	18:05	19:29
<b>N</b> 40°	07:03	07:38	80:80	16:54	18:15	19:34
35°	06:49	07:28	08:02	17:06	18:23	19:38
30°	06:36	07:19	07:57	17:17	18:31	19:41
20°	06:15	07:04	07:48	17:36	18:43	19:47
N 10°	05:57	06:51	07:40	17:53	18:54	19:53
0°	05:40	06:38	07:33	18:08	19:04	19:57
<b>S</b> 10°	05:22	06:25	07:25	18:23	19:14	20:02
20°	05:04	06:12	07:17	18:39	19:25	20:07
30°	04:42	05:56	07:08	18:57	19:37	20:13
35°	04:29	05:47	07:03	19:07	19:44	20:16
40°	04:15	05:36	06:57	19:19	19:52	20:20
45°	03:57	05:24	06:50	19:33	20:01	20:24
<b>S</b> 50°	03:36	05:09	06:41	19:50	20:12	20:29
52°	03:25	05:02	06:37	19:58	20:16	20:31
54°	03:13	04:54	06:33	20:07	20:22	20:33
56°	03:00	04:45	06:28	20:17	20:28	20:36
58°	02:44	04:35	06:22	20:28	20:35	20:39
<b>S</b> 60°	02:25	04:23	06:16	20:41	20:42	20:42

		Sun				
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	2-2%
09	14:08	14:09	12:14	11:54	-:-	
10	14:10	14:11	12:14	12:51	00:23	
11	14:11	14:12	12:14	13:45	01:19	

#### February 12, 13, 14 UT (Mon., Tue., Wed.)

CHA	h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
1	Mon -	GHA	GHA	Dec	GHA.	Dec	GHA	Dec	GHA.	Dec		SHA	Dec
1													
2   17   17   17   18   20   20   20   20   20   20   20   2													
180											I		
101													
20 11 17 20 20 20 20 20 20 20 20 20 20 20 20 20	4					14.1			221°40.6				
Section   Color	5	$216^{\circ}45.2$		08.3	275°12.2	13.8		26.3		09.4			
0													
10													
13   10   10   10   10   10   10   10													
11 307°00 0 1717.6 05.8 5°14.8 1.5 20°2.5 27.0 326°5.9 08.7 1 12 32°2.02 25°10.8 22°10.8 22°10.8 22°10.8 12°10.1 20°10.8 11°10.1 20°2.2 11°10.1 20°10.8 11°10.1 20°10.8 11°10.1 20°10.8 11°10.1 20°10.8 11°10.1 20°10.8 11°10.1 20°10.8 11°10.1 20°10.8 11°10.1 20°10.8 11°10.1 20°10.8 11°10.													
22 127275 0 40155 0 40155 0 401 9 36157 1 107 30190 7 27 3 57500 3 680											Aldebaran	290°40.4	16°33.5
14 337°05 0 4015 0 404 9015 0 107 307°29 6 27 2 897°03 0 85 1 1 307°10 0 107°10 0 107°10 1 10											Rigel	281°04.4	
15   17   17   17   17   18   18   18   18													
16 22124 88135 036 80171 036 036 83713 036 037 037 327 037 40 031 137 148 85135 036 801 137 148 85135 036 801 137 148 85135 036 801 137 148 85135 036 801 137 148 85135 036 801 137 148 85135 036 801 137 148 85135 036 801 137 148 85135 036 801 137 148 85135 036 148 148 148 148 148 148 148 148 148 148													
18   25   17   18   18   18   18   18   18   18											l l		
19	16	$22^{\circ}12.4$	85°13.5	03.6	$80^{\circ}17.1$	09.6	345°36.0	27.5	42°06.8	08.1	I		
Sinks 288° 5616'-65 1 20' 21' 27' 7 135' 110' 22' 21' 27' 7 135' 110' 22' 21' 27' 7 135' 110' 22' 21' 27' 7 135' 110' 22' 21' 27' 7 17' 17' 17' 18' 20' 20' 20' 21' 27' 17' 17' 17' 17' 17' 17' 17' 17' 17' 1	17	$37^{\circ}14.8$	100°12.7	03.1	95°17.5	09.2	0°38.2	27.6	57°09.0	0.80	_		
Adham   285 00.2   297 00.4   2019	18			S21°02.7		S21°08.8							
20   20   20   20   20   20   20   20											1		
14   17   17   17   17   17   18   18   18											I		
Mer. pass. 1.4.31													
Tue GHA CHA CHA Dec GHA DEC GH											Avior	$234^{\circ}14.4$	-59°35.3
The GHA GHA GHA Dec G		127 29.0									Suhail		
Free   CHA	Mer.p	ass. 14:31	$\nu$ -0.8' d-0	).4′ m-3.90	$\nu$ 0.4′ d-0	.4′ m1.31	$\nu 2.1' \ d0.$	1′ m-2.28	$\nu$ 2.2′ d-0	.1'  m0.99			
Time GHA													
1427321 205 07.0 S21 00.0 200 207 521 065 10 07 531 N13 285 1027243 510 07.2 1 1 157945 200 201 20 20737 521 065 1 120 20735 3 286 1027243 510 07.2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	_		
1 157°345 220"06.1 20"95.6 215°2.1 06.1 120"85.3 28.6 177'2.65 07.1 217'37.0 235'03.3 591. 220"2.16 06.7 135°7.4 28.7 127'2.87 07.0 1.8	0	142°32.1	205°07.0	S21°00.0	200°20.7	S21°06.5	$105^{\circ}53.1$	$N13^{\circ}28.5$	162°24.3	S10°07.2			
2 1172-37.0 255-08.3 951. 230-21.6 05.7 135-87.4 28.7 192-28.7 07.0 3 150-99.6 28.8 207-30.8 0.05 4 173-00.5 -63-31.8 4 202-41.9 205-08.5 205-02.5 250-52.4 0.04 166-01.7 28.9 222-33.0 0.68 1.05-08.7 1.05-08				20°59.6									
5 217°44 4 280°0.29 57.8 22 260°2.24 04.9 166°0.17 28.9 22°33.0 06.8 Aloth 166°13.2 55°40.5 517°144 4 280°0.29 57.8 25°2.29 04.5 181°0.38 29.1 237°35.2 06.7 5 06.													
5 217*44.4 280°02.9 57.8 275*2.9 0.4.5 181°03.8 29.1 227*35.2 0.6.7 140°06.6 132*0.5 25.0 140°06.6 132*0.5 25.0 140°06.6 132*0.5 140°06.6 132*0.5 140°06.6 132*0.5 140°06.6 132*0.5 140°06.6 132*0.5 140°06.6 132*0.5 140°06.6 132*0.5 140°06.6 132*0.5 140°06.6 132*0.5 140°06.6 132*0.5 140°06.6 132*0.5 140°06.6 132*0.5 140°06.6 132*0.5 140°06.6 132*0.5 140°06.6 140°											Gacrux	$171^{\circ}52.1$	-57°14.7
Section   Continue											Alioth	$166^{\circ}13.2$	55°49.5
8 626751.8 325°00.5 56.4 300°24.2 03.4 226°01.03 29.4 282°41.7 06.4   9 277°54.2 339°59.6 55.9 335°24.7 · 0.30 241°12.4 · 29.5 297°43.9 · 0.64   11 307°59.2 9°58.0 55.9 35°24.7 · 0.30 241°12.4 · 29.5 297°43.9 · 0.64   12 33°01.6 24°57.2 \$20°54.6 20°26.0 \$21°01.8 286°14.5 29.6 312°46.1 06.1   13 307°59.2 9°58.0 55.0 5°25.6 02.2 771°16.7 29.8 327°43.3 06.0   13 338°04.1 39°55.4 54.1 35°26.5 01.4 301°20.9 30.0 357°5.7 05.6   13 338°04.1 39°55.6 53.6 60°25.0 01.0 316°23.1 30.1 12°48.6 55.7   15 8°09.0 69°54.8 53.2 66°27.4 · 0.06 311°23.1 30.1 12°48.6 57.7   15 8°09.0 69°54.8 53.2 66°27.4 · 0.06 311°23.1 30.1 12°48.6 57.7   16 23°11.5 84°54.0 52.7 80°27.8 21°00.2 346°27.4 30.3 42°52.0 55.5   18 53°16.4 114°52.4 \$20°51.8 110°28.7 \$20°69.4 10°31.6 N13°3.0 58°01.4 05.4   18 53°16.4 114°52.5 \$20°54.8 110°28.7 \$20°69.4 10°31.6 N13°3.0 6 73°0.6 510°05.2   19 68°18.9 129°51.5 513 125°20.2 59.9 31°33.8 30.7 88°0.7 05.1   19 68°18.9 129°51.5 513 125°20.2 59.0 31°33.8 30.7 88°0.7 05.0   22 113°26.3 174°49.1 49.9 170°30.6 57.9 76°40.2 31.1 133°12.3 48   22 113°26.3 174°49.1 49.9 170°30.6 57.9 76°40.2 31.1 133°12.3 48   22 113°26.3 174°49.1 49.9 170°30.6 57.9 76°40.2 31.1 133°12.3 48   22 113°36.1 414°3.2 2044°4.5 \$20°51.8 1.6 50°57.1 \$20°57.1 116°34.0 N13°3.1 133°12.3 48   Nunki 75°49.0 200°31.5 \$30°59.4 12°30.7 \$30.4 \$8   Nunki 75°49.0 200°31.5 \$30°59.4 12°30.7 \$30.4 \$8   Nunki 75°49.0 200°31.5 \$30°59.4 12°30.7 \$30.4 \$8   Nunki 75°49.0 200°31.5 \$30°59.4 12°30.0 \$30°40.4													
8 262°51.8 325°0.5 56.4 300°42.2 03.4 226°10.3 29.4 282°41.7 06.4 1.83°8.3 325°0.5 10 292°56.7 384°88.8 55.5 360°52.5 0.22 271°316.7 29.8 327°48.1 06.0 11 30°59.2 9°58.0 55.0 5°25.6 0.22 271°316.7 29.8 327°48.3 06.0 1232°30.6 24°57.2 \$20°54.6 20°22.0 \$21°01.8 286°38.8 N13°29.9 30.0 367°55.5 10°65.9 13 338°06.6 54°55.6 53.6 50°25.0 01.4 301°20.9 30.0 367°55.7 510°65.9 15 60°00.6 60°55.0 14.3 30°20.9 30.0 367°55.7 510°65.9 15 60°00.6 60°55.0 14.3 30°20.9 30.0 367°55.7 510°65.9 15 60°00.6 60°55.8 15 60°22.2 271°30.0 0.5 6 15 60°55.0 14.3 30°20.9 30.0 367°55.7 510°65.9 15 60°00.6 60°55.0 14.3 30°20.9 30.0 367°55.0 510°65.9 15 60°00.6 60°55.0 14.3 30°20.9 30.0 367°55.0 510°65.9 15 60°00.6 60°55.0 14.3 30°20.9 30.0 367°55.0 510°65.9 15 60°00.6 60°55.0 14.3 30°20.9 10.0 316°23.1 30.1 12°64.8 50°52.4 50°52.0 55.6 15 60°52.0 15 60°52													
9 277°542 339°596													
10 292*56.7 354*58.8 55.5 862*56 02.2 272*16.7 29.8 327*46.1 06.1 130*59.2 9*58.0 55.5 86.0 52.6 02.2 272*16.7 29.8 327*46.3 06.0 14.3 36.0 12.3 33*01.6 24*57.2 520*54.6 12.2 272*16.7 29.8 327*46.3 06.0 14.3 36*26.5 51.0 6.0 14.3 36*26.5 51.0 6.0 14.3 36*26.5 51.0 6.0 14.3 36*26.5 51.0 6.0 14.3 36*26.5 51.0 6.0 14.3 36*26.5 51.0 6.0 14.3 36*26.5 51.0 6.0 14.3 36*26.5 51.0 6.0 14.3 35*26.5 51.0 6.0 14.3 36*26.5 51.0									297°43.9		1		
11 307-99.2 9'58.0 55.0 525.0 80'25.2 271'81.67 29.8 327'48.3 00.0 12 337'30.6 24'57.2 \$20'94.6 20'26.0 \$21'01.8 36'83.8 N13'29.9 327'48.3 \$0.0 1.0 12'81.3 38'90.1 39'56.4 54.1 39'56.4 54.1 39'56.5 5.5 3.6 50'26.9 01.0 310'20.9 30.0 357'52.7 0.5.8 1.0 1.0 12'81.0 12'81.	10	292°56.7	354°58.8	55.5	350°25.1	02.6	$256^{\circ}14.5$	29.6	$312^{\circ}46.1$	06.1			
12   323°01.6   24°57.2   \$20°54.6   54.1   33°26.5   501.4   301°20.9   300   33°79.5   7   05.8   16°08.5   16°0													
14 353°06.6 54°55.6 53.6 50°26.9 01.0 316°23.1 30.1 12°54.8 05.7 April 12°16.9 26°29.1 16°38.0 31°25.2 30.2 27°57.0 0.56.6 16°23°11.5 84°54.0 52.7 80°27.8 12°00.2 346°27.4 30.3 42°59.2 05.5 18°40.9 9°53.2 5.2 95°28.8 1°29.5 30.5 58°01.4 054.5 18°51.6 110°28.7 \$20°59.8 1°29.5 30.5 58°01.4 054.5 18°31.6 110°28.7 \$20°59.8 1°29.5 30.5 58°01.4 054.5 18°31.6 110°28.7 \$20°59.8 1°29.5 30.5 58°01.4 054.5 18°31.6 110°28.7 \$20°59.8 1°29.5 30.5 58°01.4 054.5 18°31.6 110°28.7 \$20°59.8 1°29.5 30.5 58°01.4 054.5 18°02°0.8 18°24.5 19°0.8 110°28.7 \$20°59.8 1°29.5 30.5 58°01.4 054.5 18°0.5 19°0.5 21°0.5 18°0.5 18°0.5 18°0.5 19°0.5 21°0.5 18°0.5 19°0.5 21°0.5 18°0.5 19°0.5 21°0.5 18°0.5 19°0.5 21°0.5 18°0.5 18°0.5 19°0.5 21°0.5 18°0.5 19°0.5 21°0.5 18°0.5 19°0.5 21°0.5 18°0.5 18°0.5 19°0.5 21°0.5 18°0													
16   23   11.5   86   90.0   69   54.8     53.2   65   27.4     0.06   331   25.2     30.2   27   57.0     0.06   0.54     17   38   14.0   99   53.2   52.2   95   28.3   20   59.8   1   29.5   30.5   58   01.4   0.54     18   53   16.4   114   52.4   S20   51.8   110   26.7   S20   59.8   1   29.5   30.5   58   01.4   0.54     19   68   18.9   129   51.5   51.3   125   29.2   29.0   31   33.8   30.7   88   05.7   05.1     20   83   21.3   144   50.7   50.8   140   29.7   56.6   46   95.9   30.8   103   07.9   05.0     21   19   29   23.8   159   49.9   50.4   155   30.1   55.3   61   33.0   30.3   118   10.1   0.4.9     22   113   26.3   174   49.1   49.9   170   30.6   57.9   76   40.2   31.1   133   12.3   04.8     Mer.pass. 14:27   \$\nu_{\nu_{\nu_{\nu_{\nu_{\nu_{\nu_{\nu_{											Alphecca	126°04.4	26°37.7
16   23°11.5   84°54.0   52.7   80°27.8   21°00.2   346°27.4   30.3   42°59.2   05.5   5.5   10°3.2											Antares	$112^{\circ}16.9$	-26°29.1
18 53°164   14°82.4   \$20°81.8   110°28.7   \$20°89.8   1°29.5   30.5   \$8°01.4   05.4   \$510.6   14°82.4   \$20°81.8   110°28.7   \$20°89.4   16°31.6   113°30.6   73°03.6   510°05.2   \$10.6   14°82.1   \$20°81.5   51.3   125°29.2   59.0   31°33.8   30.7   38°05.7   05.1   \$11.6   13°30.6   73°03.6   10°5.2   \$13.6   12°32.3   144°50.7   50.8   140°29.7   58.6   64°35.9   30.8   103°07.9   05.0   \$12°10.3   12°20.2   113°26.3   174°49.1   49.9   170°30.6   57.9   76°40.2   31.1   133°12.3   04.8   \$12.3   04.8   \$13.3   33°33.8   34°22.4   \$13°26.3   174°49.1   49.9   170°30.6   57.9   76°40.2   31.1   133°12.3   04.8   \$10.6   04.7   \$10.6   \$10.6   04.7   \$10.6   04.7   \$10.6   04.7   \$10.6   04.7   \$10.6   04.7   \$10.6   04.7   \$10.6   04.7   \$10.6   04.7   \$10.6   \$10.6   04.7   \$10.6   04.7   \$10.6   04.7   \$10.6   04.7   \$10.6   04.7   \$10.6   04.7   \$10.6   04.7   \$10.6   04.7   \$10.6   \$10.6   04.7   \$10													
18   53° 164   114° 52.4   \$20° 51.8   110° 28.7   \$20° 59.0   31° 33.6   \$30.7   \$30° 50.5   \$10° 55.2   \$10° 68° 18.9   129° 51.5   51.3   125° 29.2   59.0   31° 33.8   30.7   88° 05.7   05.1   \$20° 83.3   144° 50.7   50.8   140° 29.7   58.6   66° 35.9   30.8   103° 07.9   05.0   \$10° 82.3   159° 49.9   0.50.4   155° 30.1   0.53.3   0.57.5   0.59.4   12° 32.3   128° 28.7   189° 48.3   49.4   185° 30.1   57.5   91° 42.3   31.2   148° 14.5   04.7   \$10.0													
19   68° 18.9   129° 15.5   51.3   125° 29.2   59.0   31° 338   30.7   88° 05.7   05.1     20   83° 21.3   148° 50.7   50.8   140° 29.7   58.6   46° 35.9   30.8   103° 07.9   05.0     21   198° 23.8   159° 49.9   · · · · · · · · · · · · · · · · · ·													
21 98°23.8 159°49.9 · 50.4 155°30.1 · 58.8 160°39.9 · 30.8 103°0.9 118°10.1 · 04.9   22 113°26.3 174°49.1 · 49.9 170°30.6 · 57.9 76°40.2 · 31.1 133°12.3 · 04.8   Nunki 75°49.0 · -26°16.0   Nunki 75°49.0 · -26°1	19	68° 18.9	129°51.5	51.3	125°29.2	59.0	31°33.8	30.7	88°05.7	05.1			
22   113° 26.3   174° 49.1   49.9   170° 30.6   57.9   76° 40.2   31.1   133° 12.3   04.8     23   128° 28.7   189° 48.3   49.4   185° 31.0   57.5   91° 42.3   31.2   148° 14.5   04.7     Mer.pass. 14:27   ν-0.8′ d-0.4′ m-3.89   ν-0.4′ d-0.4′ m1.30   ν-2.1′ d0.1′ m-2.27   ν-2.2′ d-0.1′ m0.99     Wed   GHA   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   156° 31.5   163° 16.6   510° 04.6     1   158° 33.7   219° 46.7   48.5   215° 31.9   56.7   121° 46.6   31.4   178° 18.8   04.5     2   173° 36.1   234° 45.9   48.0   230° 32.4   56.3   136° 48.7   31.5   193° 21.0   04.3     3   188° 38.6   249° 45.1   √4.7   245° 32.8   √5.5   151° 50.8   31.7   208° 32.2   04.2     4   203° 41.1   264° 44.3   47.1   260° 33.3   55.5   166° 53.0   31.8   223° 25.4   04.1     5   218° 48.5   299° 43.5   46.6   275° 33.7   55.1   181° 55.1   31.9   238° 28.1     6   233° 40.0   294° 42.7   520° 46.1   290° 34.2   50° 54.3   211° 59.4   32.1   268° 31.9   03.8     8   263° 50.9   324° 41.1   45.1   320° 35.1   53.9   227° 01.5   32.2   288° 36.3   03.6     9   278° 53.4   339° 0.3   44.7   335° 35.5   53.5   240° 36.6   230° 32.4   240° 36.3   230° 35.1   257° 05.8   32.5   313° 38.5   03.5     10   293° 55.8   354° 39.5   44.2   350° 36.0   53.1   257° 05.8   32.5   313° 38.5   03.5     11   308° 58.3   9° 38.7   43.7   5° 36.4   52.7   272° 07.9   32.6   2828° 40.6   03.3     12   324° 08.8   24° 37.8   520° 43.2   20° 36.5   520° 27.3   278° 10.0   N13° 32.7   343° 42.8   510° 03.2     13   339° 03.2   39° 37.0   42.7   35° 37.3   51.9   300° 12.2   32.8   368° 45.0   03.1     13   349° 03.2   39° 37.0   42.7   35° 38.2   51.1   332° 16.4   33.1   28° 49.4   02.9     16   24° 10.6   84° 34.6   41.2   80° 38.7   50.7   347° 18.6   33.2   43° 55.5   50.8     17   39° 13.1   99° 33.8   40.8   95° 39.2   50.3   29° 20.7   33.3   58° 55.7   02.7     18   54° 156   114° 33.0   520° 40.3   110° 39.6   520° 49.9   17° 22.8   N13° 33.4   73° 55.9   510° 02.6     19   69° 18.0   129° 32.2   38.8   155° 41.0   44.8	20	83°21.3	144°50.7	50.8	140°29.7	58.6	46°35.9	30.8	103°07.9	05.0			
23   128°28.7   189°48.3   49.4   185°31.0   57.5   91°42.3   31.1   133°12.3   04.8						• • 58.3				• • 04.9			
Mer.pass. 14:27   \(\nu \)-0.8' \(d \)-0.4' \(m \)-3.89   \(\nu \)-0.4' \(d \)-0.4' \(m \)-1.30   \(\nu \)-1.1' \(d \)-0.1' \(m \)-2.27   \(\nu \)-2.2' \(d \)-0.1' \(m \)-0.9   \(d \)-0.6' \(d \)-0.1' \(m \)-0.9   \(d \)-0.8' \(d \)-0.4' \(m \)-3.89   \(\nu \)-0.4' \(d \)-0.4' \(m \)-1.30   \(\nu \)-1.1' \(d \)-0.1' \(m \)-2.27   \(d \)-0.1' \(m \)-0.9   \(d \)-0.1' \(m \)-0.9   \(d \)-0.6' \(d \)-0.1' \(d \)-0.1' \(m \)-0.9   \(d \)-0.1' \(d \)-0.1' \(m \)-0.9   \(d \)-0.1' \(d											_		
Wed         GHA         GHA         Dec         GHA         No         All Nair         27° 34.3         46° 50.8         Formalhaut         15° 15.7         29° 29°.9         9° 90°.0         9° 00°.0         All Nair         27° 34.3         46° 50.8         Formalhaut         15° 15.7         29° 29°.29         9° 90°.0         All Nair         27° 34.3         46° 50.8         Formalhaut         15° 15.7         29° 29° 39°.9         9° 90°.0         All Nair         27° 34.3         46° 50.8         8° 33.7         208° 23.2         0.42         200°34.1         264° 44.3         47.1         260° 33.3         55.5         16° 53.0         31.6° 48.7         31.5         193° 21.0         04.3         Markab         13° 30.9         15° 20.0           5         218° 43.5         27° 43.5         46.6         275° 33.7         55.1         181° 55.1         31.9         238° 27.6         04.0         Venus         63° 53.7         10:19           6         233° 46° 48.5         30° 30° 41.9 </td <td>23</td> <td>128°28.7</td> <td>189°48.3</td> <td>49.4</td> <td>185°31.0</td> <td>57.5</td> <td>91°42.3</td> <td>31.2</td> <td>148°14.5</td> <td>04.7</td> <td>l l</td> <td></td> <td></td>	23	128°28.7	189°48.3	49.4	185°31.0	57.5	91°42.3	31.2	148°14.5	04.7	l l		
Wed         GHA         GHA         Dec         Al Na'ir         27° 34.3         3-46° 50.8         60.9         60.8         60.8         60.9 <td>Mer.p</td> <td>ass. 14:27</td> <td><math>\nu</math>-0.8' d-0</td> <td>0.4′ m-3.89</td> <td><math>\nu</math>0.4′ d-0</td> <td>.4′ m1.30</td> <td><math>\nu 2.1' \ d0.</math></td> <td>1' m-2.27</td> <td><math>\nu</math>2.2′ d-0</td> <td>.1′ m0.99</td> <td>Peacock</td> <td></td> <td></td>	Mer.p	ass. 14:27	$\nu$ -0.8' d-0	0.4′ m-3.89	$\nu$ 0.4′ d-0	.4′ m1.30	$\nu 2.1' \ d0.$	1' m-2.27	$\nu$ 2.2′ d-0	.1′ m0.99	Peacock		
Wed         GHA         CHA         Dec         GHA         Dec         Cenus         Cenus         Cenus         Cenus         Cenus         Gas         28         26         23° 46.0         234° 45.9         48.0         23° 3.3         55.5         166° 53.0         31.8         223° 25.4         04.1         40.1         Markab         13° 30.9         15° 20.0           1         218° 48.5         29° 43.5         46.6         276° 33.7         55.1         181° 55.1         31.1         31° 30° 32.2         288° 34.1         0													
0 143° 31.2 204° 47.5 \$20° 49.0 200° 31.5 \$20° 57.1 106° 44.4 \$N13° 31.3 163° 16.6 \$10° 04.6 158° 33.7 219° 46.7 48.5 215° 31.9 56.7 121° 46.6 31.4 178° 18.8 04.5 215° 31.9 48.0 230° 32.4 56.3 136° 48.7 31.5 193° 21.0 04.3 31.8 °838.6 249° 45.1 · · · 47.5 245° 32.8 · · 55.9 151° 50.8 · · 31.7 208° 23.2 · · 04.2 4 203° 41.1 264° 44.3 47.1 260° 33.3 555.5 168° 53.0 31.8 233° 25.4 04.1 5 218° 43.5 270° 43.5 46.6 275° 33.7 55.1 181° 55.1 31.9 238° 27.6 04.0 6 233° 46.0 294° 42.7 \$20° 46.1 290° 34.2 \$20° 54.7 196° 57.2 \$N13° 32.0 \$253° 29.7 \$10° 03.9 7 248° 48.5 309° 41.9 45.6 305° 34.6 54.3 211° 59.4 32.1 268° 31.9 03.8 226° 34.3 339° 40.3 · · · 44.7 335° 35.5 · · 53.5 242° 03.6 · · · 32.4 298° 36.3 · · 03.6 10 293° 55.8 354° 39.5 44.2 350° 36.0 53.1 257° 05.8 32.5 313° 38.5 03.5 12 320° 328° 40.0 293° 55.8 354° 39.5 44.2 350° 36.0 53.1 257° 05.8 32.5 313° 38.5 03.5 12 320° 328° 40.6 03.3 12 324° 00.8 24° 37.8 \$20° 43.7 \$5° 36.4 \$52.7 \$272° 07.9 32.6 328° 40.0 03.1 133° 39° 30.2 32° 21.2 32.8 358° 45.0 03.1 133° 39° 33.8 40.8 95° 39.2 50° 3.3 \$20° 12.2 32.8 358° 45.0 03.1 134° 30° 32.2 11° 52.0 11° 52.2 13.08 15° 69° 18.0 129° 32.2 39.8 125° 40.1 49.5 32° 24.9 33.6 88° 58.1 02.4 14° 31.4 39.3 140° 40.5 49.0 47° 27.1 33.7 104° 00.3 02.3 110° 39.6 \$20° 49.9 17° 22.8 N13° 33.4 73° 55.9 \$10° 02.6 114° 31.0 129° 32.2 39.8 125° 40.1 49.5 32° 24.9 33.6 88° 58.1 02.4 14° 25.4 174° 29.8 38.3 170° 41.4 48.2 77° 31.3 33.9 134° 04.6 02.1 14° 25.4 174° 29.8 38.3 170° 41.4 48.2 77° 31.3 33.9 134° 04.6 02.1 14° 25.4 174° 29.8 38.3 170° 41.4 48.2 77° 31.3 33.9 134° 04.6 02.1 14° 25.4 174° 29.8 38.3 170° 41.4 48.2 77° 31.3 33.9 134° 04.6 02.1 14° 25.4 174° 29.8 38.3 170° 41.4 48.2 77° 31.3 33.9 134° 04.6 02.1 14° 25.4 174° 29.8 38.3 170° 41.4 48.2 77° 31.3 33.9 134° 04.6 02.1 14° 25.4 174° 29.8 38.3 170° 41.4 48.2 77° 31.3 33.9 134° 04.6 02.1 14° 25.4 174° 29.8 38.3 170° 41.4 48.2 77° 31.3 33.9 134° 04.6 02.1 14° 25.4 174° 29.8 38.3 170° 41.4 48.2 77° 31.3 33.9 134° 04.6 02.1 14° 25.4 174° 29.8 38.3 170° 41.4 48.2 77° 31.3 33.9 134	Wed	GHA	GHΔ	Dec	GHΔ	Dec	GHΔ	Dec	СΗΔ	Dec	1		
1 158°33.7 219°46.7 48.5 215°31.9 56.7 121°46.6 31.4 178°18.8 04.5 215°31.9 31.9 56.7 121°46.6 31.4 178°18.8 04.5 217°33.7 36.1 234°45.9 48.0 230°32.4 56.3 136°48.7 31.5 193°21.0 04.3 Markab 13°30.9 15°20.0 14.2 4 203°41.1 264°44.3 47.1 260°33.3 55.5 166°53.0 31.8 223°25.4 04.1 260°33.3 40.2 249°45.5 279°43.5 46.6 275°33.7 55.1 181°55.1 31.9 238°27.6 04.0 4.1 280°33.2 4.0 4.1 250°34.2 520°54.7 196°57.2 N13°32.0 253°29.7 510°30.9 4.8 48.5 309°41.9 45.6 305°34.6 54.3 211°59.4 32.1 268°31.9 03.8 26°55.9 324°41.1 45.1 320°35.1 53.9 227°01.5 32.2 263°34.1 03.7 9278°53.4 339°40.3 44.7 335°35.5 55.5 242°03.6 32.4 298°36.3 03.6 10 293°55.8 354°39.5 44.2 350°36.0 53.1 257°05.8 32.5 313°38.5 03.5 11 308°58.3 9°38.7 44.2 350°36.0 53.1 257°05.8 32.5 313°38.5 03.5 1223°20.9 324°00.8 24°37.8 \$520°43.2 20°36.9 \$20°52.3 287°10.0 N13°32.7 343°42.8 \$10°32.2 40.8 24°37.8 \$20°43.7 \$536.4 52.7 272°07.9 32.6 328°40.6 03.3 123°32.2 133°38.5 03.5 125°30.9 20°52.3 287°10.0 N13°32.7 343°42.8 \$10°03.2 133°30.1 34°4.2 13.0 13°47.2 03.0 14.3 36°33.2 45°15.5 02.8 166°51.0 34°45.1 30°40.8 4°34.6 41.2 80°38.7 50.7 347°18.6 33.2 43°51.5 02.8 166°16.3 10°31.3 10°31.3 199°33.8 40.8 95°39.2 50.3 2°20.7 33.3 58°83.7 02.7 18 56°1.0 129°32.2 39.8 125°40.1 49.5 32°24.9 33.6 88°8.1 02.4 54°45.4 14°31.4 39.3 140°40.5 49.0 47°27.1 33.7 104°00.3 02.3 110°32.2 114°25.4 174°25.8 38.3 170°41.4 48.2 77°31.3 33.9 134°04.6 02.1 114°25.4 174°25.8 38.3 170°41.4 48.2 77°31.3 33.9 134°04.6 02.1 14°25.4 174°25.8 38.3 170°41.4 48.2 77°31.3 33.9 134°04.6 02.1 14°25.4 174°25.8 38.3 170°41.4 48.2 77°31.3 33.9 134°04.6 02.1 14°25.4 174°25.8 38.3 170°41.4 48.2 77°31.3 33.9 134°04.6 02.1 14°25.4 174°25.8 183°31.9 47°31.5 34.0 149°06.8 02.0 148°31.4 149°0.1 149°06.8 02.0 148°31.4 149°0.1 14													
2 173°36.1 234°45.9 48.0 230°32.4 56.3 136°48.7 31.5 193°21.0 04.3   3 188°38.6 249°45.1 · · · 47.5 245°32.8 · · 55.9 151°50.8 · · · 31.7 208°23.2 · · 04.2   4 203°41.1 264°44.3 47.1 260°33.3 55.5 166°53.0 31.8 223°25.4 04.1   5 218°43.5 279°43.5 46.6 275°33.7 55.1 181°55.1 31.9 238°27.6 04.0   6 233°46.0 294°42.7 \$20°46.1 290°34.2 \$20°54.7 196°57.2 N13°32.0 253°29.7 \$10°03.9   7 248°48.5 309°41.9 45.6 305°34.6 54.3 211°59.4 32.1 268°31.9 03.8   263°50.9 324°41.1 45.1 320°35.1 53.9 227°01.5 32.2 283°34.1 03.7   9 278°53.4 339°40.3 · · · 44.7 335°35.5 · · 53.5 242°03.6 · · · 32.4 298°36.3 · · · 03.6   10 293°55.8 354°39.5 44.2 350°36.0 53.1 257°05.8 32.5 313°38.5 03.5   11 308°58.3 9°38.7 43.7 5°36.4 52.7 7272°07.9 32.6 328°40.6 03.3   12 324°00.8 24°37.8 \$20°43.2 20°36.9 \$20°52.3 287°10.0 N13°32.7 343°42.8 \$10°03.2   13 339°03.2 39°37.0 42.7 35°37.3 51.9 302°12.2 32.8 358°45.0 03.1   14 354°05.7 54°36.2 42.2 50°37.8 51.5 317°14.3 33.0 13°47.2 03.0   15 9°08.2 69°35.4 · · · · · · · · · · · · · · · · · · ·													
The color of the			234°45.9			56.3				04.3			
5 218°43.5 279°43.5 46.6 275°33.7 55.1 181°55.1 31.9 238°27.6 04.0   6 233°46.0 294°42.7 \$20°46.1 290°34.2 \$20°54.7 196°57.2 N13°32.0 253°29.7 \$10°03.9   7 248°48.5 309°41.9 45.6 305°34.6 54.3 211°59.4 32.1 268°31.9 03.8   8 263°50.9 324°41.1 45.1 320°35.1 53.9 227°01.5 32.2 283°34.1 03.7   9 278°53.4 339°40.3 · · 44.7 335°35.5 · · 53.5 242°03.6 · · 32.4 298°36.3 · · · 03.6   10 293°55.8 354°39.5 44.2 350°36.0 53.1 257°05.8 32.5 313°38.5 03.5   11 308°58.3 9°38.7 43.7 5°36.4 52.7 272°07.9 32.6 328°40.6 03.3   12 324°00.8 24°37.8 \$20°43.2 20°36.9 \$20°52.3 287°10.0 N13°32.7 343°42.8 \$10°03.2   13 339°03.2 39°37.0 42.7 35°37.3 51.9 302°12.2 32.8 358°45.0 03.1   14 354°05.7 54°36.2 42.2 50°37.8 51.5 317°14.3 33.0 13°47.2 03.0   15 9°08.2 69°35.4 · · · 41.7 65°38.2 · · 51.1 332°16.4 · · 33.1 28°49.4 · · · 02.9   16 24°10.6 84°34.6 41.2 80°38.7 50.7 347°18.6 33.2 43°51.5 02.8   17 39°13.1 99°33.8 40.8 95°39.2 50.3 2°20.7 33.3 58°53.7 02.7   18 54°15.6 114°33.0 \$20°40.3 110°39.6 \$20°49.9 17°22.8 N13°33.4 73°55.9 \$10°02.6   19 69°18.0 129°32.2 39.8 125°40.1 49.5 32°24.9 33.6 88°58.1 02.4   20 84°20.5 144°31.4 39.3 140°40.5 49.0 47°27.1 33.7 104°00.3 02.3   21 99°22.9 159°30.6 · · 38.8 155°41.0 · · 48.6 62°29.2 · · 33.8 119°02.5 · · · 02.2   22 114°25.4 174°29.8 38.3 170°41.4 48.2 77°31.3 33.9 134°04.6 02.1   23 129°27.9 189°29.0 37.8 185°41.9 47.8 92°33.5 34.0 149°06.8 02.0    10.109	3	188°38.6	249°45.1	• • 47.5		•• 55.9		•• 31.7		•• 04.2			
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12  324°00.8  24°37.8  S20°43.2  20°36.9  S20°52.3  287°10.0  N13°32.7  343°42.8  S10°03.2   13  339°03.2  39°37.0  42.7  35°37.3  51.9  302°12.2  32.8  358°45.0  03.1   14  354°05.7  54°36.2  42.2  50°37.8  51.5  317°14.3  33.0  13°47.2  03.0   15  9°08.2  69°35.4  ·· 41.7  65°38.2  ·· 51.1  332°16.4  ·· 33.1  28°49.4  ·· 02.9   16  24°10.6  84°34.6  41.2  80°38.7  50.7  347°18.6  33.2  43°51.5  02.8   17  39°13.1  99°33.8  40.8  95°39.2  50.3  2°20.7  33.3  58°53.7  02.7   18  54°15.6  114°33.0  S20°40.3  110°39.6  S20°49.9  17°22.8  N13°33.4  73°55.9  510°02.6   19  69°18.0  129°32.2  39.8  125°40.1  49.5  32°24.9  33.6  88°58.1  02.4   20  84°20.5  144°31.4  39.3  140°40.5  49.0  47°27.1  33.7  104°00.3  02.3   21  99°22.9  159°30.6  ·· 38.8  155°41.0 ·· 48.6  62°29.2  ·· 33.8  119°02.5  ·· 02.2   22  114°25.4  174°29.8  38.3  170°41.4  48.2  77°31.3  33.9  134°04.6  02.1   23  129°27.9  189°29.0  37.8  185°41.9  47.8  92°33.5  34.0  149°06.8  02.0   N13°32.7  343°42.8  510°03.2   343°42.8  510°03.2   343°42.8  510°03.2   343°42.8  510°03.2   343°42.8  510°03.2   343°42.8  510°03.2   343°42.8  510°03.2   343°42.8  510°03.2   343°47.2  03.0   340°47.2  03.0   340°47.2  03.0   340°47.2  03.0   340°47.2  03.0   340°47.2  03.0   340°47.2  03.0   340°47.2  03.0   340°47.2  03.0   340°47.5  02.9   340°51.5  02.8   340°49.4  ·· 02.9   340°40.6  32°49.4  ·· 02.9   340°40.6  32°49.4  ·· 02.9   340°40.6  32°49.4  ·· 02.9   340°40.6  32°49.4  ·· 02.4   340°40.5  34°40.6  32°40.4   340°40.5  34°40.6  32°40.4   340°40.5  34°40.6  32°40.4   340°40.5  34°40.6  32°40.4   340°40.5  34°40.6  32°40.4   340°40.5  34°40.6  32°40.4   340°40.5  34°40.6  32°40.4   340°40.5  34°40.6  32°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°40.5  34°40.4   340°											I		
13 339°03.2 39°37.0 42.7 35°37.3 51.9 302°12.2 32.8 358°45.0 03.1   14 354°05.7 54°36.2 42.2 50°37.8 51.5 317°14.3 33.0 13°47.2 03.0   15 9°08.2 69°35.4 ··· 41.7 65°38.2 ··· 51.1 332°16.4 ··· 33.1 28°49.4 ··· 02.9   16 24°10.6 84°34.6 41.2 80°38.7 50.7 347°18.6 33.2 43°51.5 02.8   17 39°13.1 99°33.8 40.8 95°39.2 50.3 2°20.7 33.3 58°53.7 02.7   18 54°15.6 114°33.0 \$20°40.3 110°39.6 \$20°49.9 17°22.8 N13°33.4 73°55.9 \$10°02.6   19 69°18.0 129°32.2 39.8 125°40.1 49.5 32°24.9 33.6 88°58.1 02.4   20 84°20.5 144°31.4 39.3 140°40.5 49.0 47°27.1 33.7 104°00.3 02.3   21 99°22.9 159°30.6 ··· 38.8 155°41.0 ··· 48.6 62°29.2 ··· 33.8 119°02.5 ··· 02.2   22 114°25.4 174°29.8 38.3 170°41.4 48.2 77°31.3 33.9 134°04.6 02.1   23 129°27.9 189°29.0 37.8 185°41.9 47.8 92°33.5 34.0 149°06.8 02.0    Saturn 19°52.2 13:08  Feb 14 Wed SHA Mer.pass Venus 61°16.3 10:21													
14 354°05.7 54°36.2 42.2 50°37.8 51.5 317°14.3 33.0 13°47.2 03.0 15°9°08.2 69°35.4 · · · · · · · · · · · · · · · · · · ·													
16       24°10.6       84°34.6       41.2       80°38.7       50.7       347°18.6       33.2       43°51.5       02.8       Venus       61°16.3       10:21         17       39°13.1       99°33.8       40.8       95°39.2       50.3       2°20.7       33.3       58°53.7       02.7       Mars       57°00.3       10:38         18       54°15.6       114°33.0       S20°40.3       110°39.6       S20°49.9       17°22.8       N13°33.4       73°55.9       S10°02.6       Jupiter       323°13.2       16:51         19       69°18.0       129°32.2       39.8       125°40.1       49.5       32°24.9       33.6       88°58.1       02.4       Saturn       19°45.4       13:05         20       84°20.5       144°31.4       39.3       140°40.5       49.0       47°27.1       33.7       104°00.3       02.3       32.3       43°25.4       14°25.4       174°29.8       38.3       170°41.4       48.2       77°31.3       33.9       134°04.6       02.1       40.1       40.1       40.1       40.1       40.2       40.2       40.2       40.2       40.2       40.2       40.2       40.2       40.2       40.2       40.2       40.2       40.2       40.2 <td></td>													
17 39°13.1 99°33.8 40.8 95°39.2 50.3 2°20.7 33.3 58°53.7 02.7 18 54°15.6 114°33.0 \$20°40.3 110°39.6 \$20°49.9 17°22.8 \$N13°33.4 73°55.9 \$10°02.6 19 69°18.0 129°32.2 39.8 125°40.1 49.5 32°24.9 33.6 88°58.1 02.4 20 84°20.5 144°31.4 39.3 140°40.5 49.0 47°27.1 33.7 104°00.3 02.3 21 99°22.9 159°30.6 ··· 38.8 155°41.0 ··· 48.6 62°29.2 ··· 33.8 119°02.5 ··· 02.2 22 114°25.4 174°29.8 38.3 170°41.4 48.2 77°31.3 33.9 134°04.6 02.1 23 129°27.9 189°29.0 37.8 185°41.9 47.8 92°33.5 34.0 149°06.8 02.0  Mars 57°00.3 10:38  Jupiter 323°13.2 16:51  Saturn 19°45.4 13:05  Horizontal parallax  Venus: 0.1  Mars: 0.1													
18 54°15.6 114°33.0 \$20°40.3 110°39.6 \$20°49.9 17°22.8 \$N13°33.4 73°55.9 \$10°02.6 \$19 69°18.0 129°32.2 39.8 125°40.1 49.5 32°24.9 33.6 88°58.1 02.4 \$19 69°2.9 159°30.6 \cdots 38.8 155°41.0 \cdots 48.6 62°29.2 \cdots 33.8 119°02.5 \cdots 02.2 \$14°25.4 174°29.8 38.3 170°41.4 48.2 77°31.3 33.9 134°04.6 02.1 \$21 129°27.9 189°29.0 37.8 185°41.9 47.8 92°33.5 34.0 149°06.8 02.0 \$21 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.													
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21       99°22.9       159°30.6       · · 38.8       155°41.0       · · 48.6       62°29.2       · · 33.8       119°02.5       · · 02.2       Horizontal parallax         22       114°25.4       174°29.8       38.3       170°41.4       48.2       77°31.3       33.9       134°04.6       02.1       Venus: 0.1         23       129°27.9       189°29.0       37.8       185°41.9       47.8       92°33.5       34.0       149°06.8       02.0       Mars: 0.1													15.05
23 129°27.9 189°29.0 37.8 185°41.9 47.8 92°33.5 34.0 149°06.8 02.0 Mars: 0.1		99°22.9	159°30.6			• • 48.6	62°29.2		$119^{\circ}02.5$		Horizont	•	
25 125 27.5 105 25.0 57.0 105 115 17.0 12.0													
Mer.pass. 14:24 $\nu$ -0.8′ $d$ -0.5′ m-3.89 $\nu$ 0.5′ $d$ -0.4′ m1.30 $\nu$ 2.1′ $d$ 0.1′ m-2.27 $\nu$ 2.2′ $d$ -0.1′ m0.98	23	129°27.9										iviars:	0.1
	Mer.p	ass. 14:24	$\nu$ -0.8′ d-0	0.5′ m-3.89	$\nu$ 0.5′ d-0	.4′ m1.30	$\nu$ 2.1′ d0.	1′ m-2.27	$\nu$ 2.2′ d-0	.1′ m0.98			

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	176°27.1	S13°55.9	148°22.1	10.1'	S05°19.7	-17.6'	60.9'
1 2	191°27.1 206°27.1	55.1 54.3	162°51.2 177°20.3	10.1' 10.2'	05°02.1 04°44.5	-17.6' -17.7'	60.9' 60.9'
3	200 27.1 221°27.1	53.4	177 20.3 191°49.5	10.2'	04° 44.5	-17.7'	60.9
4	236°27.1	52.6	$206^{\circ}18.7$	10.3'	04°09.1	-17.7'	60.9'
5	251°27.1	51.8	220°47.9	10.3'	03°51.4	-17.7'	60.8'
6 7	266°27.1 281°27.1	\$13°51.0 50.1	235°17.2 249°46.6	10.3' 10.4'	\$03°33.7 03°16.0	-17.7' -17.7'	60.8' 60.8'
8	296°27.1	49.3	264°16.0	10.4	02°58.3	-17.7'	60.8
9	311°27.1	• • 48.5	278°45.4	10.5'	02°40.6	-17.7'	60.8'
10 11	326°27.1 341°27.1	47.6 46.8	293°14.9 307°44.4	10.5' 10.5'	02°22.9 02°05.2	-17.7' -17.7'	60.7' 60.7'
12	356°27.1	513°46.0	307 44.4 322°13.9	10.6'	501°47.4	-17.7	60.7
13	11°27.1	45.1	336°43.5	10.6'	01°29.7	-17.7'	60.7'
14	26°27.1	44.3	351°13.1	10.6'	01°12.0	-17.7'	60.7'
15 16	41°27.1 56°27.1	· · 43.5 42.7	5°42.8 20°12.4	10.7' 10.7'	00°54.3 00°36.6	-17.7' -17.7'	60.6' 60.6'
17	71°27.1	41.8	34°42.2	10.7'	00°18.9	-17.7'	60.6
18	86°27.1	<b>S</b> 13°41.0	49°11.9	10.8'	S00°01.3	-17.7'	60.6'
19 20	101°27.1 116°27.1	40.2 39.3	63°41.7 78°11.5	10.8' 10.8'	N00°16.4 00°34.0	17.6' 17.6'	60.5' 60.5'
21	131°27.2	38.5	92°41.3	10.8	00°51.7	17.6'	60.5
22	146°27.2	37.7	$107^{\circ}11.1$	10.9'	$01^{\circ}09.3$	17.6'	60.5'
23	161°27.2	36.8	121°41.0	10.9'	01°26.9	17.6'	60.4'
	SD = 16.2'	d = -0.8'		SI	O = 16.6'		
Tue	GHA	Dec	GHA	ν	Dec	d	НР
0	176°27.2	S13°36.0	$136^{\circ}10.9$	10.9'	N01°44.4	17.5'	60.4'
1	191°27.2	35.2	150°40.8	10.9'	02°01.9	17.5	60.4
2	206°27.2 221°27.2	34.3 · · 33.5	165°10.7 179°40.7	10.9' 11.0'	02°19.4 02°36.9	17.5' 17.4'	60.4' 60.3'
4	236°27.2	32.6	194°10.6	11.0'	02°54.4	17.4	60.3
5	251°27.2	31.8	208°40.6	11.0'	03°11.8	17.4'	60.3'
6	266°27.2 281°27.2	\$13°31.0 30.1	223°10.6 237°40.6	11.0' 11.0'	N03°29.2 03°46.5	17.3' 17.3'	60.3' 60.2'
7 8	281 27.2 296°27.3	29.3	257 40.6 252°10.6	11.0'	03 46.5 04°03.8	17.3'	60.2'
9	311°27.3	• • 28.5	266°40.6	11.0'	04°21.1	17.2'	60.2'
10	326°27.3	27.6	281°10.7 295°40.7	11.0'	04°38.3 04°55.5	17.2'	60.1
11 12	341°27.3 356°27.3	26.8 \$13°25.9	295 40.7 310°10.7	11.0' 11.1'	N05°12.6	17.1' 17.1'	60.1' 60.1'
13	11°27.3	25.1	324°40.8	11.1'	05°29.7	17.0'	60.1
14	26°27.3	24.3	339°10.8	11.1'	05°46.8	17.0'	60.0'
15 16	41°27.3 56°27.3	· · 23.4 22.6	353°40.9 8°11.0	11.1' 11.1'	06°03.8 06°20.7	16.9' 16.9'	60.0' 60.0'
17	71°27.4	21.7	22°41.0	11.1'	06°37.6	16.8	59.9'
18	86°27.4	S13°20.9	37°11.1	11.1'	N06°54.5	16.8'	59.9'
19 20	101°27.4 116°27.4	20.1 19.2	51°41.1 66°11.2	11.1' 11.0'	07°11.2 07°28.0	16.7' 16.7'	59.9' 59.8'
21	131°27.4	19.2	80°41.2	11.0'	07 26.0 07°44.7	16.6'	59.8'
22	146°27.4	17.5	95°11.3	11.0'	08°01.3	16.6'	59.8'
23	161°27.4	16.7	109°41.3	11.0'	08°17.8	16.5'	59.7'
	SD = 16.2'	d = -0.8'		SI	O = 16.5'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°27.5	\$13° 15.8	124°11.3	11.0'	N08°34.3	16.4	59.7'
1 2	191°27.5 206°27.5	15.0 14.2	138°41.3 153°11.3	11.0' 11.0'	08°50.7 09°07.1	16.4' 16.3'	59.7' 59.7'
3	200°27.5	13.3	167°41.3	11.0'	09°23.4	16.2	59.6'
4	236°27.5	12.5	182°11.3	11.0'	09°39.6	16.2'	59.6'
5 6	251°27.5 266°27.6	11.6 \$13° 10.8	196°41.3 211°11.2	11.0' 10.9'	09°55.8 N10°11.9	16.1' 16.0'	59.6' 59.5'
7	281°27.6	09.9	225°41.2	10.9'	10°27.9	15.9'	59.5'
8	296°27.6	09.1	240°11.1	10.9'	10°43.8	15.9'	59.5'
9 10	311°27.6 326°27.6	· · 08.2 07.4	254°41.0 269°10.9	10.9' 10.9'	10°59.7 11°15.5	15.8' 15.7'	59.4' 59.4'
11	341°27.7	06.5	283°40.7	10.9	11°31.2	15.6'	59.4 59.3'
12	356°27.7	<b>S</b> 13°05.7	298°10.6	10.8'	N11°46.8	15.6'	59.3'
13 14	11°27.7 26°27.7	04.8 04.0	312°40.4 327°10.2	10.8' 10.8'	12°02.4 12°17.8	15.5' 15.4'	59.3' 59.2'
14 15	26°27.7 41°27.7	03.1	327°10.2 341°40.0	10.8	12°17.8 12°33.2	15.4	59.2' 59.2'
16	56°27.8	02.3	356°09.7	10.7'	12°48.5	15.2'	59.2'
17	71°27.8	01.4	10°39.4	10.7'	13°03.7	15.1'	59.1'
18 19	86°27.8 101°27.8	\$13°00.6 12°59.7	25°09.1 39°38.8	10.7' 10.6'	N13°18.9 13°33.9	15.0' 14.9'	59.1' 59.1'
20	116°27.9	58.9	54°08.4	10.6'	13°48.9	14.9	59.0'
21	131°27.9	• • 58.0	68°38.0	10.6'	14°03.7	14.8'	59.0'
22 23	146°27.9 161°27.9	57.2 56.3	83°07.6 97°37.2	10.5' 10.5'	14°18.5 14°33.1	14.7' 14.6'	59.0' 58.9'
20	SD = 16.2'	d = -0.8'	- 31 31.2		D = 16.3'	21.0	55.5
	<u> </u>	<u>u — -0.0</u>		ال	_ 10.5		

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

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

## February 15, 16, 17 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	144°30.3	204° 28.2	\$20°37.3	200°42.3	\$20°47.4	107°35.6	N13°34.2	164° 09.0	\$10°01.9			
1	159°32.8	219°27.4	36.8	215°42.8	47.0	122°37.7	34.3	179° 11.2	01.8	Alpheratz	357°35.8	29°13.4
2	174°35.3	234° 26.6	36.3	230°43.2	46.6	137°39.8	34.4	194° 13.4	01.7	Ankaa	353°08.2	-42°10.7
3	189°37.7	249°25.9	35.8	245°43.7	46.2	152°42.0	• • 34.5	209° 15.5	01.6	Schedar	349°32.3	56°40.3
4	204°40.2	$264^{\circ}25.1$	35.3	260°44.2	45.8	$167^{\circ}44.1$	34.6	224°17.7	01.4	Diphda	348°48.3	-17°51.5
5	219°42.7	$279^{\circ}24.3$	34.8	275°44.6	45.4	182°46.2	34.8	239°19.9	01.3	Achernar Hamal	335°21.0 327°52.2	-57°07.2 23°34.6
6	234°45.1	294°23.5	S20°34.3	290°45.1	\$20°45.0	197°48.4	N13°34.9	254°22.1	<b>S</b> 10°01.2	Polaris	314°28.6	89°22.3
7	249°47.6	309° 22.7	33.8	305°45.5	44.6	212°50.5	35.0	269°24.3	01.1	Acamar	315°12.4	-40°12.8
8	264°50.1	324°21.9	33.3	320°46.0	44.2	227°52.6	35.1	284°26.4	01.0	Menkar	314°07.0	4°11.0
9	279°52.5	339°21.1	• • 32.7	335°46.4	• • 43.8	242°54.7	• • 35.3	299°28.6	• • 00.9	Mirfak	308°29.3	49°57.0
10 11	294°55.0 309°57.4	354° 20.3 9° 19.5	32.2 31.7	350°46.9 5°47.3	43.3 42.9	257°56.9 272°59.0	35.4 35.5	314°30.8 329°33.0	00.8 00.7	Aldebaran	290°40.4	16°33.5
12	309 57.4 324°59.9	9 19.5 24° 18.7	520°31.2	20°47.8	\$20°42.5	288°01.1	N13°35.6	344°35.2	\$10°00.5	Rigel	281°04.4	-8°10.5
13	340°02.4	39° 17.9	30.7	35°48.3	42.1	303°03.2	35.7	359°37.3	00.4	Capella	280°22.8	46°01.5
14	355°04.8	54° 17.1	30.2	50°48.7	41.7	318°05.4	35.9	14°39.5	00.3	Bellatrix	278°23.5	6°22.2
15	10°07.3	69° 16.3	• • 29.7	65°49.2	• • 41.3	333°07.5	• • 36.0	29°41.7	• • 00.2	Elnath	278°02.6	28°37.7
16	25°09.8	84°15.5	29.2	80°49.6	40.9	348°09.6	36.1	44°43.9	00.1	Alnilam	275°38.3 270°52.7	-1°11.3 7°24.6
17	$40^{\circ}12.2$	$99^{\circ}14.7$	28.6	95°50.1	40.5	3°11.7	36.2	59°46.1	$10^{\circ}00.0$	Betelgeuse Canopus	263°52.4	-52°42.7
18	55°14.7	$114^{\circ}13.9$	\$20°28.1	110°50.5	S20°40.1	18°13.9	N13°36.3	74°48.2	509°59.9	Sirius	258°26.6	-32 42.7 -16°45.1
19	70°17.2	129° 13.1	27.6	125°51.0	39.6	33°16.0	36.5	89°50.4	59.8	Adhara	255°06.2	-29°00.4
20	85°19.6	144° 12.3	27.1	140°51.5	39.2	48°18.1	36.6	104°52.6	59.6	Procyon	244°51.3	5°09.7
21	100°22.1	159°11.6	• • 26.6	155°51.9	• • 38.8	63°20.2	• • 36.7	119°54.8	• • 59.5	Pollux	243°17.9	27°58.1
22 23	115°24.6 130°27.0	174° 10.8 189° 10.0	26.0 25.5	170°52.4 185°52.8	38.4 38.0	78°22.3 93°24.5	36.8 37.0	134°57.0 149°59.1	59.4	Avior	$234^{\circ}14.5$	-59°35.3
23	130 27.0	-		103 32.0	36.0				59.3	Suhail	222°46.4	-43°31.8
Mer.p	ass. 14:20	$\nu$ -0.8′ d-0	.5′ m-3.89	$\nu$ 0.5′ d-0	.4′ m1.30	$\nu 2.1' \ d0.$	1′ m-2.26	$\nu 2.2' \ d-0$	$0.1^\prime$ m $0.98$	Miaplacidus	221°37.6	-69°49.0
										Alphard	217°48.2	-8°45.9
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	207°34.9 193°41.2	11°50.9 61°37.1
0	145°29.5	$204^{\circ}09.2$	\$20°25.0	200°53.3	<b>S</b> 20°37.6	$108^{\circ}26.6$	N13°37.1	165°01.3	509°59.2	Denebola	182°25.4	14°26.1
1	160°31.9	219°08.4	24.5	215°53.7	37.2	123°28.7	37.2	180°03.5	59.1	Gienah	175°44.1	-17°40.6
2	175°34.4	234°07.6	23.9	230°54.2	36.7	138°30.8	37.3	195°05.7	59.0	Acrux	173°00.5	-63°13.8
3 4	190°36.9 205°39.3	249°06.8 264°06.0	· · 23.4 22.9	245°54.7 260°55.1	· · 36.3 35.9	153°33.0 168°35.1	· · 37.4 37.6	210°07.9 225°10.0	• • 58.9 58.7	Gacrux	$171^{\circ}52.1$	-57°14.7
5	200°41.8	279°05.2	22.4	275°55.6	35.5	183°37.2	37.7	240°12.2	58.6	Alioth	166°13.2	55°49.5
6	235°44.3	294°04.5	\$20°21.8	290°56.0	S20°35.1	198°39.3	N13°37.8	255° 14.4	S09°58.5	Spica	158°22.9	-11°17.3
7	250°46.7	309°03.7	21.3	305°56.5	34.6	213°41.4	37.9	270° 16.6	58.4	Alkaid Hadar	152°52.3 148°36.8	49°11.3 -60°29.1
8	265°49.2	$324^{\circ}02.9$	20.8	320°57.0	34.2	228°43.6	38.1	285°18.8	58.3	Menkent	146 50.6 147°58.4	-36°29.2
9	280°51.7	339°02.1	• • 20.2	335°57.4	• • 33.8	243°45.7	• • 38.2	300°20.9	• • 58.2	Arcturus	145°48.5	19°03.2
10	295°54.1	354°01.3	19.7	350°57.9	33.4	258°47.8	38.3	315°23.1	58.1	Rigil Kent.	139°41.2	-60°55.9
11	310°56.6	9°00.5	19.2	5°58.3	33.0 \$20°32.6	273°49.9	38.4	330°25.3	58.0	Kochab	$137^{\circ}19.5$	74°03.0
12 13	325°59.0 341°01.5	23°59.7 38°59.0	\$20° 18.6 18.1	20°58.8 35°59.3	32.1	288°52.0 303°54.2	N13°38.5 38.7	345°27.5 0°29.7	\$09° 57.9 57.7	Zuben'ubi	136°56.8	-16°08.5
14	356°04.0	53° 58.2	17.6	50°59.7	31.7	318°56.3	38.8	15°31.8	57.6	Alphecca	126°04.4	26°37.7
15	11°06.4	68° 57.4	17.0	66°00.2	• • 31.3	333°58.4	38.9	30°34.0	• • 57.5	Antares	112°16.8	-26°29.1
16	26°08.9	83°56.6	16.5	81°00.6	30.9	349°00.5	39.0	45°36.2	57.4	Atria Sabik	107°11.9 102°03.8	-69°04.0 -15°45.3
17	$41^{\circ}11.4$	98° 55.8	15.9	96°01.1	30.4	4°02.6	39.2	60°38.4	57.3	Shaula	96°11.6	-37°07.2
18	56°13.8	113°55.0	S20°15.4	111°01.6	S20°30.0	19°04.8	N13°39.3	75°40.6	S09°57.2	Rasalhague	95°59.4	12°32.3
19	71°16.3	128° 54.3	14.8	126°02.0	29.6	34°06.9	39.4	90°42.7	57.1	Eltanin	90°42.8	51°28.8
20 21	86°18.8 101°21.2	143°53.5 158°52.7	14.3 •• 13.8	141°02.5 156°02.9	29.2 •• 28.8	49°09.0 64°11.1	39.5 •• 39.6	105°44.9 120°47.1	57.0 •• 56.8	Kaus Aust.	83°33.8	-34°22.4
22	116°23.7	173° 51.9	13.2	171°03.4	28.3	79°13.2	39.8	135°49.3	56.7	Vega	80°34.0	38°48.1
23	131°26.2	188°51.1	12.7	186°03.9	27.9	94°15.3	39.9	150°51.5	56.6	Nunki	75°48.9	-26°16.0
Man			.5′ m-3.89		.4′ m1.30		1' m-2.25		.1′ m0.98	Altair Peacock	62°01.0 53°07.4	8°55.7 -56°39.4
ivier.p	ass. 14:16	ν-0.8 α-0	.5 m-3.89	$\nu$ 0.5 a-0	.4 m1.30	$\frac{\nu_{2.1}}{}$ au.	1 m-2.25	ν2.2 a-0	0.1 MU.98	Deneb	49°26.8	45°21.8
										Enif	33°39.9	9°59.0
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°34.3	-46°50.8
0	146°28.6	203°50.3	\$20°12.1	201°04.3	\$20°27.5	109°17.5	N13°40.0	165°53.6	S09°56.5	Fomalhaut	$15^{\circ}15.7$	-29°29.9
1	161°31.1 176°33.5	218° 49.6 233° 48.8	11.6	216°04.8 231°05.2	27.1	124°19.6 139°21.7	40.1	180°55.8 195°58.0	56.4 56.3	Scheat	13°46.3	28°12.7
2	176°33.5 191°36.0	233° 48.8 248° 48.0	11.0 · · 10.5	231°05.2 246°05.7	26.6 •• 26.2	139°21.7 154°23.8	40.3 • • 40.4	211°00.2	56.3 •• 56.2	Markab	13°30.9	15°20.0
4	206°38.5	263° 47.2	09.9	261°06.2	25.8	169°25.9	40.4	211 00.2 226°02.4	56.1	Feb 15 Thu	SHA	Mer.pass
5	221°40.9	278° 46.4	09.4	276°06.6	25.4	184°28.0	40.6	241°04.5	55.9	Venus	59°57.9	10:23
6	236°43.4	293°45.7	S20°08.8	291°07.1	S20°24.9	199°30.2	N13°40.8	256°06.7	S09°55.8	Mars	56°12.0	10:37
7	251°45.9	308°44.9	08.2	306°07.6	24.5	214°32.3	40.9	271°08.9	55.7	Jupiter	323°05.2	16:47
8	266°48.3	323°44.1	07.7	321°08.0	24.1	229°34.4	41.0	286°11.1	55.6	Saturn	19°38.7	13:02
9	281°50.8	338° 43.3	• • 07.1	336°08.5	• • 23.6	244°36.5	• • 41.1	301°13.3	• • 55.5	Feb 16 Fri	SHA	Mer.pass
10	296°53.3	353°42.6	06.6	351°08.9	23.2	259°38.6	41.3	316°15.4	55.4	Venus	58°39.7	10:24
11 12	311°55.7 326°58.2	8°41.8 23°41.0	06.0 \$20°05.4	6°09.4 21°09.9	22.8 \$20°22.4	274°40.7 289°42.8	41.4 N13°41.5	331°17.6 346°19.8	55.3 \$09°55.2	Mars	55°23.8	10:36
13	342°00.7	38° 40.2	04.9	36°10.3	21.9	304°45.0	41.6	1°22.0	55.0	Jupiter	322°57.1	16:44
14	357°03.1	53° 39.5	04.3	51°10.8	21.5	319°47.1	41.8	16°24.2	54.9	Saturn	19°31.8	12:58
15	12°05.6	68° 38.7	• • 03.8	66°11.3	• • 21.1	334°49.2	• • 41.9	31°26.3	• • 54.8	Feb 17 Sat	SHA	Mer.pass
16	27°08.0	83°37.9	03.2	$81^{\circ}11.7$	20.6	349°51.3	42.0	$46^{\circ}28.5$	54.7	Venus	57°21.7	10:25
17	42°10.5	98°37.1	02.6	96°12.2	20.2	4°53.4	42.1	61°30.7	54.6	Mars	54°35.7	10:35
18	57°13.0	113° 36.4	\$20°02.1	111°12.7	\$20°19.8	19°55.5	N13°42.3	76°32.9	S09°54.5	Jupiter		16:40
19	72°15.4 87°17.9	128° 35.6	01.5	126°13.1 141°13.6	19.3 18.9	34°57.6 49°59.7	42.4 42.5	91°35.0 106°37.2	54.4 54.3	Saturn	19°25.0	12:55
20 21	87°17.9 102°20.4	143°34.8 158°34.0	00.9 20°00.3	141°13.6 156°14.0	18.9	49°59.7 65°01.9	42.5 • • 42.6	106°37.2 121°39.4	54.3 •• 54.1	Horizont	al parallax	
22	117°22.8	173° 33.3	19°59.8	171°14.5	18.0	80°04.0	42.7	136°41.6	54.0		Venus:	0.1
23	132°25.3	188° 32.5	59.2	186°15.0	17.6	95°06.1	42.9	151° 43.8	53.9		Mars:	0.1
Mern	ass. 14:12	ν-0.8' d-0	.5′ m-3.89	ν0.5' d-0	.4′ m1.29	ν2 1' dΩ	1′ m-2.25	v2 21 d=0	0.1′ m0.98			
ivici.þ		ν 0.0 u-0	.5 111-5.09	νσ.σ u-0		ν Δ.1 UU.	- 111-4.43	ν 2.2 u-0	1110.30			

h	Su	n	Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	176°27.9	<b>S</b> 12°55.5	$112^{\circ}06.7$	10.5'	N14°47.7	14.5'	58.9'
1	191°28.0	54.6	126°36.2	10.5'	15°02.2	14.4'	58.9'
2	206°28.0 221°28.0	53.8 •• 52.9	141°05.6 155°35.1	10.4' 10.4'	15°16.6 15°30.9	14.3' 14.2'	58.8' 58.8'
4	236°28.0	52.9	170°04.4	10.4	15° 45.1	14.1	58.8'
5	251°28.1	51.2	184°33.8	10.3'	15°59.1	14.0'	58.7'
6	266°28.1	S12°50.4	$199^{\circ}03.1$	10.3'	$N16^{\circ}13.1$	13.9'	58.7'
7	281°28.1	49.5	213°32.4	10.2'	16°27.0	13.8'	58.6'
8 9	296°28.1 311°28.2	48.6 •• 47.8	228°01.6 242°30.8	10.2' 10.2'	16°40.8 16°54.4	13.7' 13.6'	58.6' 58.6'
10	311 28.2 326°28.2	46.9	242 30.8 257°00.0	10.2	10 54.4 17°08.0	13.5	58.5'
11	341°28.2	46.1	271°29.1	10.1'	17°21.5	13.3'	58.5
12	356°28.3	S12°45.2	285°58.2	10.0'	N17°34.8	13.2'	58.5'
13	11°28.3	44.4	300°27.2	10.0'	17°48.0	13.1'	58.4'
14 15	26°28.3 41°28.3	43.5 •• 42.6	314°56.3 329°25.2	10.0' 9.9'	18°01.2 18°14.2	13.0' 12.9'	58.4' 58.4'
16	56°28.4	41.8	343°54.1	9.9'	18°27.1	12.8'	58.3'
17	71°28.4	40.9	358° 23.0	9.8'	18°39.9	12.7'	58.3'
18	86°28.4	S12°40.1	12°51.9	9.8'	N18°52.5	12.6'	58.3'
19	101°28.5	39.2	27°20.7	9.8'	19°05.1	12.4'	58.2'
20 21	116°28.5 131°28.5	38.4 •• 37.5	41° 49.4 56° 18.1	9.7' 9.7'	19°17.5 19°29.8	12.3' 12.2'	58.2' 58.1'
22	131 28.5 146°28.5	36.6	70°46.8	9. <i>1</i> 9.6'	19 29.8 19°42.0	12.2	58.1'
23	161°28.6	35.8	85° 15.4	9.6'	19°54.1	12.0'	58.1
	SD = 16.2'	d = -0.9'		SE	0 = 16.1'		
					20.1		
Fri	<b>GHA</b> 176°28.6	Dec	<b>GHA</b> 99° 44.0	ν	Dec N20°06.0	d 11.8'	HP
0 1	176°28.6 191°28.6	\$12°34.9 34.1	99°44.0 114°12.6	9.5' 9.5'	N20°06.0 20°17.9	11.8	58.0' 58.0'
2	206°28.7	33.2	128° 41.1	9.5'	20°29.6	11.6'	58.0'
3	221°28.7	• • 32.3	143°09.5	9.4'	20°41.2	11.5'	57.9'
4	236°28.7	31.5	157° 37.9	9.4'	20°52.6	11.3'	57.9'
5	251°28.8	30.6	172°06.3	9.3'	21°04.0 N21°15.2	11.2'	57.9'
6 7	266°28.8 281°28.8	\$12°29.7 28.9	186°34.6 201°02.9	9.3' 9.2'	N21°15.2 21°26.2	11.1' 10.9'	57.8' 57.8'
8	296°28.9	28.0	201 02.9 215°31.1	9.2'	21°37.2	10.9	57.8'
9	311°28.9	• • 27.1	229°59.3	9.1'	21°48.0	10.7'	57.7'
10	326°28.9	26.3	244°27.4	9.1'	21°58.7	10.6'	57.7'
11	341°29.0	25.4	258° 55.5	9.1'	22°09.2	10.4'	57.7'
12 13	356°29.0 11°29.1	\$12°24.6 23.7	273°23.6 287°51.6	9.0' 9.0'	N22°19.7 22°29.9	10.3' 10.2'	57.6' 57.6'
14	26°29.1	22.8	302° 19.6	9.0 8.9'	22°40.1	10.2	57.6'
15	41°29.1	• • 22.0	316°47.5	8.9'	22°50.1	9.9'	57.5'
16	56°29.2	21.1	331° 15.4	8.8'	23°00.0	9.7'	57.5'
17	71°29.2 86°29.2	20.2 \$12°19.4	345°43.2 0°11.0	8.8'	23°09.7 N23°19.4	9.6'	57.5' 57.4'
18 19	86 29.2 101°29.3	18.5	14°38.7	8.8' 8.7'	23°28.8	9.5' 9.3'	57.4' 57.4'
20	116°29.3	17.6	29°06.5	8.7'	23°38.1		57.4'
21	131°29.3	•• 16.7	43°34.1	8.6'	23°47.3	9.0'	57.3'
22	146°29.4	15.9	58°01.8	8.6'	23°56.4	8.9'	57.3'
23	161°29.4	15.0	72°29.3	8.5'	24°05.3	8.8'	57.3'
	SD = 16.2'	d = -0.9'		SE	0 = 15.8'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°29.5	S12°14.1	86°56.9	8.5'	N24°14.1	8.6'	57.2'
1 2	191°29.5 206°29.5	13.3 12.4	101°24.4 115°51.9	8.5' 8.4'	24°22.7 24°31.2	8.5' 8.3'	57.2' 57.2'
3	206°29.5 221°29.6	12.4	115°51.9 130°19.3	8.4' 8.4'	24°31.2 24°39.5	8.3'	57.2 57.1'
4	236°29.6	10.7	144° 46.7	8.4'	24°47.7	8.0'	57.1
5	251°29.7	09.8	159° 14.0	8.3'	24°55.7	7.9'	57.1'
6	266°29.7	\$12°08.9	173°41.4	8.3'	N25°03.6	7.8'	57.0'
7 8	281°29.7 296°29.8	08.0 07.2	188°08.6 202°35.9	8.2' 8.2'	25°11.4 25°19.0	7.6' 7.5'	57.0' 57.0'
9	296 29.8 311°29.8	06.3	202 35.9 217°03.1	8.2'	25 19.0 25°26.4	7.5 7.3'	57.0 56.9'
10	326°29.9	05.4	231°30.3	8.1'	25°33.7	7.2'	56.9'
11	341°29.9	04.6	245°57.4	8.1'	25°40.9	7.0'	56.9'
12 13	356°30.0 11°30.0	\$12°03.7 02.8	260°24.5 274°51.6	8.1' 8.1'	N25°47.9 25°54.8	6.9' 6.7'	56.8' 56.8'
13 14	26°30.0	02.8 01.9	274°51.6 289°18.7	8.1'	25°54.8 26°01.5	6.6'	56.8'
15	41°30.1	01.1	303°45.7	8.0'	26°08.0	6.4	56.7'
16	56°30.1	12°00.2	318° 12.7	8.0'	26°14.4	6.3'	56.7'
17	71°30.2	11°59.3	332°39.7	7.9'	26°20.7	6.1'	56.7'
18 19	86°30.2 101°30.3	\$11°58.4 57.6	347°06.6 1°33.5	7.9' 7.9'	N26°26.8 26°32.7	5.9' 5.8'	56.6' 56.6'
20	101 30.3 116°30.3	57.0 56.7	1 33.5 16°00.4	7.9 7.9'	26°38.5	5.8' 5.6'	56.6'
21	131°30.4	• • 55.8	30°27.3	7.9'	26°44.2	5.5'	56.6'
22	146°30.4	54.9	44°54.2	7.8'	26°49.6	5.3'	56.5'
23	161°30.5	54.1	59°21.0	7.8'	26°55.0	5.2'	56.5'
	SD = 16.2'	d = -0.9'		SE	0 = 15.6'		

N 72° N 70°	Naut. 06:12 06:11 06:10	O7:32 07:23	Sunrise 08:51	Sunset	Civil	Naut.
N 70°	06:11		08:51	15 20		
		07.23		15:39	16:58	18:18
	06:10	01.23	08:31	15:58	17:07	18:19
	00.10	07:15	08:16	16:13	17:15	18:20
	06:08	07:08	08:04	16:26	17:21	18:22
	06:07	07:02	07:53	16:36	17:27	18:23
	06:06	06:58	07:44	16:45	17:32	18:24
60°	06:04	06:53	07:37	16:52	17:36	18:25
	06:03	06:49	07:30	16:59	17:40	18:26
	06:02	06:46	07:24	17:05	17:44	18:27
	06:01	06:42	07:19	17:10	17:47	18:28
	06:00	06:39	07:14	17:15	17:50	18:29
	05:59	06:36	07:10	17:19	17:52	18:30
45°	05:56	06:30	07:00	17:28	17:59	18:33
	05:53	06:25	06:52	17:36	18:04	18:36
	05:50	06:20	06:46	17:43	18:09	18:39
	05:47	06:15	06:40	17:49	18:13	18:42
	05:41	06:06	06:29	17:59	18:22	18:48
	05:33	05:58	06:20	18:09	18:30	18:55
0°	05:25	05:50	06:11	18:17	18:39	19:03
	05:15	05:40	06:02	18:26	18:48	19:13
	05:02	05:29	05:52	18:36	18:59	19:25
	04:46	05:16	05:41	18:47	19:12	19:41
	04:36	05:08	05:34	18:53	19:20	19:51
	04:23	04:58	05:27	19:01	19:29	20:04
45°	04:08	04:46	05:18	19:09	19:41	20:19
<b>S</b> 50°	03:48	04:32	05:07	19:20	19:55	20:39
	03:38	04:25	05:02	19:25	20:02	20:49
	03:26	04:17	04:57	19:30	20:09	21:00
	03:13	04:09	04:51	19:36	20:18	21:13
	02:57	03:59	04:44	19:43	20:28	21:28
<b>S</b> 60°	02:37	03:47	04:36	19:50	20:39	21:47

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	6-8	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	33-54%	
15	14:08	14:07	12:14	17:07	04:41		
16	14:06	14:04	12:14	17:59	05:33		
17	14:02	14:00	12:14	18:54	06:26		

#### February 18, 19, 20 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	147° 27.8	203°31.7	\$19°58.6	201°15.4	\$20°17.2	110°08.2	N13°43.0	166°45.9	S09°53.8			
1	162°30.2	218°31.0	58.1	216°15.9	16.7	125° 10.3	43.1	181°48.1	53.7	Alpheratz	357°35.8	29°13.4
2	177°32.7	233°30.2	57.5	231°16.4	16.3	140° 12.4	43.2	196°50.3	53.6	Ankaa	353°08.2	-42°10.7
3	192°35.2	248°29.4	• • 56.9	246°16.8	• • 15.9	155° 14.5	• • 43.4	211°52.5	• • 53.5	Schedar	349°32.3	56°40.3
4	207°37.6	263°28.6	56.3	261°17.3	15.4	$170^{\circ}16.6$	43.5	226°54.7	53.4	Diphda	348°48.3	-17°51.5
5	$222^{\circ}40.1$	278°27.9	55.7	276°17.8	15.0	$185^{\circ}18.7$	43.6	241°56.8	53.2	Achernar Hamal	335°21.0 327°52.2	-57°07.1 23°34.6
6	237° 42.5	293°27.1	S19°55.2	291°18.2	\$20°14.6	200° 20.9	N13°43.8	256°59.0	S09°53.1	Polaris	314° 29.8	89°22.3
7	252°45.0	308°26.3	54.6	306°18.7	14.1	215°23.0	43.9	272°01.2	53.0	Acamar	315°12.4	-40°12.7
8	267° 47.5	323°25.6	54.0	321°19.2	13.7	230°25.1	44.0	287°03.4	52.9	Menkar	314°07.0	4°11.0
9	282°49.9	338°24.8	• • 53.4	336°19.6	• • 13.3	245°27.2	• • 44.1	302°05.6	• • 52.8	Mirfak	308°29.4	49°57.0
10 11	297°52.4 312°54.9	353°24.0 8°23.3	52.8 52.3	351°20.1 6°20.6	12.8 12.4	260°29.3 275°31.4	44.3 44.4	317°07.7 332°09.9	52.7 52.6	Aldebaran	290°40.4	16°33.5
12	312 54.9 327° 57.3	o 23.3 23°22.5	52.3 \$19°51.7	21°21.0	520°11.9	275 31.4 290°33.5	N13°44.5	347°12.1	509°52.4	Rigel	281°04.4	-8°10.6
13	342°59.8	38°21.7	51.1	36°21.5	11.5	305° 35.6	44.6	2°14.3	52.3	Capella	280°22.8	46°01.5
14	358°02.3	53°21.0	50.5	51°22.0	11.1	320°37.7	44.8	17°16.5	52.2	Bellatrix	278°23.5	6°22.2
15	13°04.7	68°20.2	• • 49.9	66°22.4	• • 10.6	335°39.8	• • 44.9	32°18.6	• • 52.1	Elnath	278°02.6	28°37.7
16	28°07.2	83°19.4	49.3	81°22.9	10.2	350°41.9	45.0	47°20.8	52.0	Alnilam	275°38.3 270°52.7	-1°11.3 7°24.6
17	43°09.7	98°18.7	48.7	96°23.4	09.8	5°44.0	45.1	62°23.0	51.9	Betelgeuse Canopus	263°52.4	-52°42.7
18	58° 12.1	113°17.9	S19°48.1	111°23.8	S20°09.3	20°46.1	N13°45.3	77°25.2	S09°51.8	Sirius	258° 26.7	-16°45.1
19	73° 14.6	128°17.1	47.5	126°24.3	08.9	35°48.3	45.4	92°27.3	51.7	Adhara	255°06.2	-29°00.4
20	88° 17.0	143°16.4	47.0	141°24.8	08.4	50°50.4	45.5	107°29.5	51.5	Procyon	244°51.3	5°09.7
21 22	103° 19.5 118° 22.0	158°15.6 173°14.8	• • 46.4 45.8	156°25.2 171°25.7	· · 08.0 07.5	65°52.5 80°54.6	•• 45.6 45.8	122°31.7 137°33.9	· · 51.4 51.3	Pollux	243°17.9	27°58.1
23	110 22.0 133° 24.4	173 14.6 188°14.1	45.0	171 25.7 186°26.2	07.5	95° 56.7	45.8	157° 35.9 152° 36.1	51.3	Avior	234° 14.5	-59°35.3
			_							Suhail	222°46.4	-43°31.9
Mer.p	ass. 14:08	$\nu$ -0.8′ d-0	0.6′ m-3.89	$\nu 0.5' \ d-0$	.4′ m1.29	$\nu 2.1' d0.$	1′ m-2.24	$\nu 2.2' \ d-0$	.1′ m0.98	Miaplacidus	221°37.6	-69°49.0
										Alphard Regulus	217°48.2 207°34.9	-8°45.9 11°50.9
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.2	61°37.1
0	148°26.9	203°13.3	S19°44.6	201°26.6	S20°06.7	110°58.8	N13°46.0	167°38.2	S09°51.1	Denebola	182°25.4	14°26.1
1	163°29.4	218°12.6	44.0	216°27.1	06.2	126°00.9	46.1	182°40.4	51.0	Gienah	$175^{\circ}44.1$	-17°40.6
2	178°31.8	233°11.8	43.4	231°27.6	05.8	141°03.0	46.3	197°42.6	50.9	Acrux	173°00.4	-63°13.8
3 4	193°34.3 208°36.8	248°11.0 263°10.3	· · 42.8 42.2	246°28.0 261°28.5	· · 05.3 04.9	156°05.1 171°07.2	· · 46.4 46.5	212°44.8 227°47.0	· · 50.8 50.6	Gacrux	171°52.0	-57°14.8
5	200° 30.0° 223° 39.2	278°09.5	41.6	276°29.0	04.9	186°09.3	46.6	242°49.1	50.5	Alioth	166°13.2	55°49.5
6	238°41.7	293°08.8	S19°41.0	291°29.4	S20°04.0	201°11.4	N13°46.8	257°51.3	S09°50.4	Spica	158°22.9	-11°17.3
7	253°44.1	308°08.0	40.4	306°29.9	03.6	216° 13.5	46.9	272°53.5	50.3	Alkaid Hadar	152°52.3 148°36.8	49°11.3 -60°29.1
8	268°46.6	323°07.2	39.8	321°30.4	03.1	231°15.6	47.0	287°55.7	50.2	Menkent	146 50.6 147°58.3	-36°29.2
9	$283^{\circ}49.1$	338°06.5	• • 39.1	336°30.9	•• 02.7	$246^{\circ}17.7$	• • 47.2	302°57.8	• • 50.1	Arcturus	145°48.4	19°03.2
10	298°51.5	353°05.7	38.5	351°31.3	02.2	261°19.8	47.3	318°00.0	50.0	Rigil Kent.	139°41.1	-60°55.9
11	313°54.0	8°05.0	37.9	6°31.8	01.8	276°21.9	47.4	333°02.2	49.9	Kochab	$137^{\circ}19.4$	74°03.0
12	328° 56.5	23°04.2	\$19°37.3	21°32.3	\$20°01.3	291°24.0 306°26.1	N13° 47.5	348°04.4	S09°49.7	Zuben'ubi	$136^{\circ}56.7$	-16°08.5
13 14	343°58.9 359°01.4	38°03.5 53°02.7	36.7 36.1	36°32.7 51°33.2	00.9 00.4	306°26.1 321°28.2	47.7 47.8	3°06.6 18°08.7	49.6 49.5	Alphecca	126°04.3	26°37.7
15	14°03.9	68°01.9	• • 35.5	66°33.7	20°00.0	336° 30.3	• • 47.9	33°10.9	• • 49.4	Antares	112°16.8	-26°29.1
16	29°06.3	83°01.2	34.9	81°34.1	19°59.5	351°32.4	48.0	48°13.1	49.3	Atria	107°11.9	-69°04.0
17	44°08.8	98°00.4	34.3	96°34.6	59.1	6°34.5	48.2	63°15.3	49.2	Sabik Shaula	102°03.7 96°11.5	-15°45.3 -37°07.2
18	59°11.3	112°59.7	S19°33.6	111°35.1	S19°58.6	21°36.6	N13°48.3	78°17.5	S09°49.1	Rasalhague	95°59.4	12°32.3
19	74° 13.7	127°58.9	33.0	126°35.6	58.2	36°38.7	48.4	93°19.6	49.0	Eltanin	90°42.8	51°28.8
20	89°16.2	142°58.2	32.4	141°36.0	57.7	51°40.8	48.6	108°21.8	48.8	Kaus Aust.	83°33.7	-34°22.4
21	104° 18.6	157°57.4	• • 31.8	156°36.5	• • 57.3	66°42.9	• • 48.7	123°24.0	• • 48.7	Vega	80°34.0	38°48.1
22 23	119°21.1 134°23.6	172°56.7 187°55.9	31.2 30.5	171°37.0 186°37.4	56.8 56.4	81°45.0 96°47.1	48.8 48.9	138°26.2 153°28.3	48.6 48.5	Nunki	75°48.9	-26°16.0
										Altair	62°00.9	8°55.7
Mer.p	ass. 14:04	$\nu$ -0.8′ d-0	0.6′ m-3.89	$\nu$ 0.5′ d-0	.4′ m1.29	$\nu 2.1' \ d0.$	1′ m-2.24	$\nu 2.2' \ d-0$	.1' m $0.98$	Peacock	53°07.4	-56°39.4
										Deneb Enif	49° 26.8 33° 39.8	45°21.8 9°59.0
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27° 34.3	-46°50.8
0	149°26.0	202°55.2	S19°29.9	201°37.9	S19°55.9	$111^{\circ}49.2$	N13°49.1	168°30.5	S09°48.4	Fomalhaut	15° 15.7	-29°29.8
1	164°28.5	217°54.4	29.3	216°38.4	55.5	126°51.3	49.2	183°32.7	48.3	Scheat	13°46.3	28°12.7
2	179°31.0	232°53.7	28.7	231°38.9	55.0	141°53.4	49.3	198°34.9	48.2	Markab	13°30.9	15°20.0
3	194° 33.4	247°52.9	• • 28.1	246°39.3	• • 54.6	156° 55.5	• • 49.5	213°37.1	• • 48.0	F-1- 10 C	CIIA	N4
4 5	209°35.9 224°38.4	262°52.2 277°51.4	27.4 26.8	261°39.8 276°40.3	54.1 53.7	171°57.6 186°59.7	49.6 49.7	228°39.2 243°41.4	47.9 47.8	Feb 18 Sun Venus	<b>SHA</b> 56°04.0	Mer.pass 10:26
6	239° 40.8	292°50.7	\$19°26.2	270°40.3 291°40.7	\$19°53.2	202°01.8	N13°49.8	258°43.6	\$09°47.7	Mars	53°47.7	10:35
7	254° 43.3	307°49.9	25.5	306°41.2	52.8	217°03.9	50.0	273°45.8	47.6	Jupiter	322°40.4	16:37
8	269° 45.8	322°49.2	24.9	321°41.7	52.3	232°06.0	50.1	288°48.0	47.5	Saturn	19° 18.2	12:51
9	284°48.2	337°48.4	• • 24.3	336°42.2	• • 51.8	247°08.1	• • 50.2	303°50.1	• • 47.4	F-1- 10 M	CLIA	N4
10	299°50.7	352°47.7	23.7	351°42.6	51.4	262°10.2	50.4	318°52.3	47.3	Feb 19 Mon Venus	<b>SHA</b> 54°46.4	Mer.pass 10:28
11	314°53.1	7°46.9	23.0	6°43.1	50.9	277°12.3	50.5	333°54.5	47.1	Mars	54° 40.4	10:28
12	329°55.6	22°46.2	\$19°22.4	21°43.6	\$19°50.5	292°14.4	N13°50.6	348°56.7	\$09°47.0	Jupiter	322°31.9	16:34
13 14	344°58.1 0°00.5	37°45.4 52°44.7	21.8 21.1	36°44.1 51°44.5	50.0 49.6	307°16.5 322°18.6	50.7 50.9	3°58.8 19°01.0	46.9 46.8	Saturn	19°11.3	12:48
15	15°03.0	67°43.9	. 20.5	66°45.0	• • 49.1	322 16.0 337°20.7	51.0	34°03.2	46.7	Feb 20 Tue	SHA	Mer pass
16	30° 05.5	82°43.2	19.9	81°45.5	48.7	352°22.8	51.1	49°05.4	46.6	Venus	5HA 53°29.1	Mer.pass 10:29
17	45°07.9	97°42.4	19.2	96°46.0	48.2	7°24.9	51.3	64°07.6	46.5	Mars	52° 11.9	10:33
18	60°10.4	112°41.7	S19°18.6	111°46.4	S19°47.7	22°27.0	N13°51.4	79°09.7	S09°46.4	Jupiter		16:30
19	75° 12.9	127°41.0	17.9	126°46.9	47.3	37°29.1	51.5	94°11.9	46.2	Saturn	$19^{\circ}04.5$	12:44
20	90°15.3	142°40.2	17.3	141°47.4	46.8	52°31.2	51.6	109°14.1	46.1	Harizant	al parallax	
21 22	105° 17.8 120° 20.3	157°39.5 172°38.7	· · 16.7	156°47.9 171°48.3	· · 46.4 45.9	67°33.3 82°35.4	· · 51.8 51.9	124°16.3 139°18.4	· · 46.0 45.9	1101120111	Venus:	0.1
23	120 20.3 135°22.7	172 38.7 187°38.0	16.0 15.4	171 48.3 186°48.8	45.9 45.4	82 35.4 97°37.5	51.9 52.0	154°20.6	45.9 45.8		Mars:	0.1
										L		
ivler.p	ass. 14:00	$\nu$ -0.8′ $d$ -0	0.6′ m-3.89	$\nu$ 0.5′ $d$ -0	.5′ m1.29	$\nu$ 2.1′ d0.	1′ m-2.23	$\nu$ 2.2′ d-0	.1′ m0.98			

h	Su	n	Moon				
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	176°30.5	<b>S</b> 11°53.2	73°47.8	7.8'	N27°00.2	5.0'	56.5'
1 2	191°30.5 206°30.6	52.3 51.4	88°14.6 102°41.4	7.8' 7.8'	27°05.2 27°10.1	4.9' 4.7'	56.4' 56.4'
3	200 30.0 221°30.6	50.5	117°08.1	7.7'	27°14.8	4.6	56.4
4	236°30.7	49.7	131°34.9	7.7'	$27^{\circ}19.3$	4.4'	56.3'
5	251°30.7	48.8	146°01.6	7.7'	27°23.7	4.2'	56.3'
6 7	266°30.8 281°30.8	\$11°47.9 47.0	160°28.3 174°55.0	7.7' 7.7'	N27°28.0 27°32.1	4.1' 3.9'	56.3' 56.3'
8	296°30.9	46.1	174 55.0 189°21.7	7.7'	27°36.0	3.8'	56.2
9	311°30.9	• • 45.3	203°48.4	7.7'	27°39.8	3.6'	56.2'
10	326°31.0	44.4	218°15.1	7.7'	27°43.4	3.5'	56.2'
11 12	341°31.0 356°31.1	43.5 \$11°42.6	232°41.8 247°08.5	7.7' 7.7'	27°46.8 N27°50.2	3.3' 3.1'	56.1' 56.1'
13	11°31.1	41.7	261°35.1	7.7'	27°53.3	3.0'	56.1
14	26°31.2	40.9	276°01.8	7.7'	27°56.3	2.8'	56.1'
15	41°31.2	• • 40.0	290°28.5 304°55.1	7.7'	27°59.1 28°01.8	2.7'	56.0'
16 17	56°31.3 71°31.3	39.1 38.2	304 55.1 319 21.8	7.7' 7.7'	28°01.8 28°04.3	2.5' 2.4'	56.0' 56.0'
18	86°31.4	S11° 37.3	333°48.5	7.7'	N28°06.7	2.2'	56.0'
19	101°31.4	36.5	348°15.2	7.7'	28°08.9	2.0'	55.9'
20	116°31.5 131°31.5	35.6	2°41.9 17°08.6	7.7'	28°10.9 28°12.8	1.9'	55.9' 55.9'
21 22	131 31.5 146°31.6	· · 34.7	31°35.3	7.7' 7.7'	28 12.8 28°14.6	1.7' 1.6'	55.9'
23	161°31.7	32.9	46°02.0	7.7'	28°16.2	1.4'	55.8'
	SD = 16.2'	d = -0.9'		SE	0 = 15.4'		
Mon 0	<b>GHA</b> 176°31.7	<b>Dec</b> <b>S</b> 11°32.0	<b>GHA</b> 60°28.8	u 7.8'	Dec N28°17.6	d 1.3'	<b>HP</b> 55.8'
1	170 31.7 191°31.8	31.1	74°55.5	7.8'	28°18.8	1.1'	55.8'
2	206°31.8	30.3	89°22.3	7.8'	28°20.0	1.0'	55.8'
3	221°31.9	• • 29.4	103°49.1	7.8'	28°20.9	0.8'	55.7'
4 5	236°31.9 251°32.0	28.5 27.6	118°15.9 132°42.7	7.8' 7.8'	28°21.7 28°22.4	0.6' 0.5'	55.7' 55.7'
6	266°32.0	S11°26.7	147°09.5	7.9'	N28°22.8	0.3	55.7'
7	281°32.1	25.8	161°36.4	7.9'	28°23.2	0.2'	55.6'
8	296°32.2 311°32.2	24.9 •• 24.1	176°03.3 190°30.2	7.9'	28°23.4 28°23.4	0.0' -0.1'	55.6'
9 10	311 32.2 326°32.3	23.2	204°57.2	8.0' 8.0'	28°23.3	-0.1 -0.3'	55.6' 55.6'
11	341°32.3	22.3	219°24.2	8.0'	28°23.0	-0.4	55.5'
12	356°32.4	\$11°21.4	233°51.2	8.0'	N28°22.5	-0.6'	55.5'
13 14	11°32.4 26°32.5	20.5 19.6	248°18.2 262°45.3	8.1' 8.1'	28°22.0 28°21.2	-0.7' -0.9'	55.5' 55.5'
15	41°32.6	. 18.7	202 45.3 277°12.4	8.1	28°20.3	-0.9	55.4'
16	56°32.6	17.8	291°39.6	8.2'	28°19.3	-1.2'	55.4'
17	71°32.7	16.9	306°06.8	8.2'	28°18.1	-1.3'	55.4'
18 19	86°32.7 101°32.8	\$11°16.0 15.2	320°34.0 335°01.2	8.3' 8.3'	N28°16.8 28°15.3	-1.5' -1.6'	55.4' 55.4'
20	116°32.9	14.3	349°28.6	8.4'	28°13.6		55.3'
21	131°32.9	• • 13.4	3°55.9	8.4'	28°11.8	-1.9'	55.3'
22	146°33.0 161°33.0	12.5	18°23.3 32°50.7	8.4'	28°09.9 28°07.8	-2.1' -2.2'	55.3'
23		11.6	32-50.7	8.5'		-2.2	55.3'
	SD = 16.2'	d = -0.9'		SL	0 = 15.2'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°33.1 191°33.2	\$11° 10.7 09.8	47°18.2 61°45.8	8.5' 8.6'	N28°05.6 28°03.2	-2.4'	55.3' 55.2'
1 2	191°33.2 206°33.2	09.8 08.9	61°45.8 76°13.4	8.6'	28°03.2 28°00.7	-2.5' -2.7'	55.2' 55.2'
3	221°33.3	08.0	90°41.0	8.7'	27°58.0	-2.8'	55.2'
4	236°33.3	07.1	105°08.7	8.7'	27°55.2	-3.0'	55.2'
5 6	251°33.4 266°33.5	06.2 \$11°05.3	119°36.4 134°04.2	8.8' 8.9'	27°52.2 N27°49.1	-3.1' -3.2'	55.1' 55.1'
7	281°33.5	04.4	148°32.1	8.9'	27°45.9	-3.4	55.1
8	296°33.6	03.6	163°00.0	9.0'	27°42.5	-3.5'	55.1'
9 10	311°33.7 326°33.7	· · 02.7 01.8	177°28.0 191°56.0	9.0' 9.1'	27°39.0 27°35.3	-3.7' -3.8'	55.1' 55.1'
10	320 33.7 341°33.8	01.8	191 56.0 206°24.1	9.1' 9.1'	27 35.3 27°31.5	-3.8° -3.9°	55.1° 55.0'
12	356°33.9	S11°00.0	220°52.2	9.2'	N27°27.6	-4.1'	55.0'
13	11°33.9	10°59.1	235°20.5	9.3'	27°23.5	-4.2'	55.0'
14 15	26°34.0 41°34.0	58.2 •• 57.3	249°48.7 264°17.1	9.3' 9.4'	27°19.3 27°14.9	-4.4' -4.5'	55.0' 55.0'
16	56°34.1	56.4	278°45.5	9.4 9.5'	27°10.4	-4.5 -4.6'	54.9'
17	71°34.2	55.5	293°13.9	9.5'	27°05.8	-4.8'	54.9'
18	86°34.2	\$10°54.6	307°42.5	9.6'	N27°01.1	-4.9'	54.9'
19 20	101°34.3 116°34.4	53.7 52.8	322°11.1 336°39.7	9.7' 9.7'	26°56.2 26°51.1	-5.0' -5.2'	54.9' 54.9'
21	131°34.4	51.9	351°08.5	9.8'	26°46.0	-5.2 -5.3'	54.9
22	146°34.5	51.0	5°37.3	9.9'	26°40.7	-5.4'	54.8'
23	161°34.6	50.1	20°06.2	10.0'	26°35.3	-5.5'	54.8'
	SD = 16.2'	d = -0.9'		SE	0 = 15.1'		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	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	64-82%	
18	13:58	13:56	12:14	19:49	07:21		
19	13:53	13:50	12:14	20:44	08:16		
20	13:48	13:45	12:14	21:37	09:11		

## February 21, 22, 23 UT (Wed., Thu., Fri.)

h	Aries	<b>V</b> e	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
o 0	150°25.2	202°37.2	\$19°14.7	201°49.3	\$19°45.0	112°39.6	N13°52.2	169°22.8	S09°45.7			
		202°37.2 217°36.5						169°22.8 184°25.0		Alpheratz	357°35.8	29°13.4
1	165°27.6		14.1	216°49.8	44.5	127°41.7	52.3		45.6	Ankaa	353°08.2	-42°10.7
2	180°30.1 195°32.6	232°35.8	13.4	231°50.2	44.1 •• 43.6	142°43.8 157°45.9	52.4 •• 52.5	199°27.2 214°29.3	45.4	Schedar	$349^{\circ}32.3$	56°40.3
3		247°35.0	• • 12.8	246°50.7					• • 45.3	Diphda	348°48.3	-17°51.4
4	210°35.0	262°34.3	12.1	261°51.2	43.1	172°47.9	52.7	229°31.5	45.2	Achernar	335°21.0	-57°07.1
5	225°37.5	277°33.5	11.5	276°51.7	42.7	187°50.0	52.8	244°33.7	45.1	Hamal	327°52.2	23°34.6
6	240°40.0	292°32.8	\$19° 10.8	291°52.1	S19°42.2	202°52.1	N13°52.9	259°35.9	S09°45.0	Polaris	314°31.2	89°22.3
7	255°42.4	307°32.1	10.2	306°52.6	41.8	217°54.2	53.1	274°38.0	44.9	Acamar	315°12.4	-40°12.7
8	270°44.9	322°31.3	09.5	321°53.1	41.3	232°56.3	53.2	289°40.2	44.8	Menkar	314°07.0	4°11.0
9	285°47.4	337°30.6	• • 08.9	336°53.6	• • 40.8	247°58.4	• • 53.3	304°42.4	• • 44.7	Mirfak	308°29.4	49°57.0
10	300°49.8	352°29.8	08.2	351°54.0	40.4	263°00.5	53.4	319°44.6	44.5	Aldebaran	290°40.4	16°33.5
11	315°52.3	7°29.1	07.6	6°54.5	39.9	278°02.6	53.6	334°46.8	44.4	Rigel	281°04.5	-8°10.6
12	330°54.7	22°28.4	S19°06.9	21°55.0	S19°39.4	293°04.7	N13°53.7	349°48.9	S09°44.3	Capella	280°22.8	46°01.5
13	345°57.2	37°27.6	06.2	36°55.5	39.0	308°06.8	53.8	$4^{\circ}51.1$	44.2	Bellatrix	278°23.5	6°22.2
14	0°59.7	52°26.9	05.6	51°55.9	38.5	323°08.9	54.0	19°53.3	44.1	Elnath	278°02.6	28°37.7
15	16°02.1	67°26.2	• • 04.9	66°56.4	• • 38.0	338°11.0	• • 54.1	34° 55.5	• • 44.0	Alnilam	275°38.3	-1°11.3
16	31°04.6	82°25.4	04.3	$81^{\circ}56.9$	37.6	353°13.0	54.2	49°57.6	43.9	Betelgeuse	270°52.7	7°24.6
17	46°07.1	97°24.7	03.6	96°57.4	37.1	8°15.1	54.4	64°59.8	43.8		263°52.4	-52°42.7
18	61°09.5	112°24.0	S19°02.9	111°57.9	S19°36.6	23°17.2	N13°54.5	80°02.0	S09°43.6	Canopus	203 52.4 258°26.7	-32 42.7 -16°45.1
19	76°12.0	127°23.2	02.3	126°58.3	36.2	38°19.3	54.6	95°04.2	43.5	Sirius		-10 45.1 -29°00.4
20	91°14.5	142°22.5	01.6	141°58.8	35.7	53°21.4	54.8	110°06.4	43.4	Adhara	255°06.2	
21	106°16.9	157°21.8	• • 01.0	156°59.3	• • 35.2	68°23.5	• • 54.9	125°08.5	• • 43.3	Procyon	244°51.3	5°09.7
22	121°19.4	172°21.0	19°00.3	171°59.8	34.8	83°25.6	55.0	140° 10.7	43.2	Pollux	243°17.9	27°58.1
23	136°21.9	187°20.3	18°59.6	187°00.2	34.3	98°27.7	55.1	155° 12.9	43.1	Avior	234°14.5	-59°35.3
										Suhail	222°46.4	-43°31.9
Mer.p	ass. 13:56	$\nu$ -0.7′ d-0	0.6′ m-3.88	$\nu$ 0.5′ $d$ -0	.5′ m1.29	$\nu 2.1' d0$	.1′ m-2.23	$\nu$ 2.2′ d-0	.1' m $0.97$	Miaplacidus	221°37.6	-69°49.0
										Alphard	217°48.1	-8°45.9
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.9	11°50.9
0	151°24.3	202°19.6	\$18° 59.0	202°00.7	519°33.8	113°29.8	N13°55.3	170°15.1	S09°43.0		193°41.2	61°37.1
	151 24.3 166°26.8	202° 19.6 217° 18.8	518 59.0	202°00.7 217°01.2	33.4	113°29.8 128°31.9	N13 55.3 55.4	170° 15.1 185° 17.2	42.8	Denebola	182°25.4	14°26.1
1										Gienah	$175^{\circ}44.1$	-17°40.6
2	181°29.2	232°18.1	57.6	232°01.7	32.9	143°33.9	55.5	200°19.4	42.7	Acrux	173°00.4	-63°13.8
3	196°31.7	247° 17.4	• • 56.9	247°02.2	• • 32.4	158°36.0	• • 55.7	215°21.6	• • 42.6	Gacrux	171°52.0	-57°14.8
4	211°34.2	262°16.6	56.3	262°02.6	31.9	173°38.1	55.8	230°23.8	42.5	Alioth	$166^{\circ}13.1$	55°49.5
5	226°36.6	277° 15.9	55.6	277°03.1	31.5	188°40.2	55.9	245°26.0	42.4	Spica	158°22.9	-11°17.3
6	241°39.1	292° 15.2	S18°54.9	292°03.6	S19°31.0	203°42.3	N13°56.1	260°28.1	S09°42.3	Alkaid	152°52.3	49°11.3
7	256°41.6	307° 14.4	54.3	307°04.1	30.5	218°44.4	56.2	275°30.3	42.2	Hadar	148°36.8	-60°29.2
8	271°44.0	322°13.7	53.6	322°04.6	30.1	233°46.5	56.3	290°32.5	42.1		147°58.3	-36°29.2
9	286°46.5	337°13.0	• • 52.9	337°05.0	•• 29.6	248°48.6	• • 56.4	305°34.7	• • 41.9	Arcturus	145°48.4	19°03.2
10	301°49.0	$352^{\circ}12.3$	52.2	352°05.5	29.1	263°50.6	56.6	320°36.8	41.8	Rigil Kent.	139°41.1	-60°55.9
11	$316^{\circ}51.4$	$7^{\circ}11.5$	51.5	7°06.0	28.6	278°52.7	56.7	335°39.0	41.7	Kochab	137° 19.4	74°03.0
12	331°53.9	22°10.8	S18°50.9	22°06.5	S19°28.2	293°54.8	N13°56.8	350°41.2	S09°41.6	Zuben'ubi		-16°08.6
13	346°56.4	$37^{\circ}10.1$	50.2	37°07.0	27.7	308°56.9	57.0	5°43.4	41.5	Alphecca	136 56.7 126°04.3	-16 08.6 26°37.7
14	1°58.8	52°09.4	49.5	52°07.4	27.2	323°59.0	57.1	20°45.6	41.4			
15	17°01.3	67°08.6	• • 48.8	67°07.9	• • 26.8	339°01.1	• • 57.2	35°47.7	• • 41.3	Antares	112°16.8	-26°29.1
16	32°03.7	82°07.9	48.1	82°08.4	26.3	354°03.2	57.4	50°49.9	41.1	Atria	107°11.8	-69°04.0
17	47°06.2	97°07.2	47.5	97°08.9	25.8	9°05.2	57.5	65°52.1	41.0	Sabik	102°03.7	-15°45.3
18	62°08.7	112°06.5	S18°46.8	112°09.4	S19°25.3	24°07.3	N13°57.6	80°54.3	S09°40.9	Shaula	96°11.5	-37°07.2
19	77°11.1	127°05.7	46.1	127°09.8	24.9	39°09.4	57.8	95° 56.4	40.8	Rasalhague	95°59.3	12°32.3
20	92°13.6	142°05.0	45.4	142°10.3	24.4	54°11.5	57.9	110°58.6	40.7	Eltanin	90°42.8	51°28.8
21	107°16.1	157°04.3	• • 44.7	157°10.8	23.9	69°13.6	• • 58.0	126°00.8	• • 40.6	Kaus Aust.	83°33.7	-34°22.4
22	107 10.1 122°18.5	172°03.6	44.0	172°11.3	23.4	84°15.7	58.2	141°03.0	40.5	Vega	80°34.0	38°48.0
	137°21.0	187° 02.8		187°11.8	22.9	99°17.8	58.3	156° 05.2		Nunki	75°48.9	-26°16.0
23	137 21.0	107 02.0	43.3			99 17.0	30.3	150 05.2	40.4	Altair	62°00.9	8°55.7
Mer.p	ass. 13:52	$\nu$ -0.7′ $d$ -0	0.7′ m-3.88	$\nu$ 0.5′ $d$ -0	.5′ m1.28	$\nu$ 2.1′ d0.	1' m-2.22	$\nu$ 2.2′ d-0	.1' m $0.97$	Peacock	53°07.4	-56°39.4
										Deneb	49°26.7	45°21.8
	C	<b></b>	-	<b></b>	_	a	-	<b></b>	ь.	Enif	33°39.8	9°59.0
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°34.3	-46°50.8
0	152°23.5	202°02.1	\$18°42.6	202°12.3	S19°22.5	114°19.8	N13°58.4	171°07.3	S09°40.2	Fomalhaut	$15^{\circ}15.7$	-29°29.8
1	167°25.9	217°01.4	41.9	217°12.7	22.0	129°21.9	58.6	186°09.5	40.1	Scheat	13°46.3	28°12.7
2	182°28.4	232°00.7	41.3	232°13.2	21.5	144°24.0	58.7	201°11.7	40.0	Markab	13°30.9	15°20.0
3	197°30.9	247°00.0	• • 40.6	247°13.7	• • 21.0	159°26.1	• • 58.8	216°13.9	• • 39.9			
4	212°33.3	261°59.2	39.9	262°14.2	20.6	174°28.2	58.9	231°16.0	39.8	Feb 21 Wed	SHA	Mer.pass
5	227°35.8	276°58.5	39.2	277°14.7	20.1	189°30.2	59.1	246°18.2	39.7	Venus	52°12.1	10:30
6	242°38.2	291°57.8	S18°38.5	292°15.2	S19°19.6	204°32.3	N13°59.2	261°20.4	S09°39.6	Mars	51°24.1	10:32
7	257°40.7	$306^{\circ}57.1$	37.8	307°15.6	19.1	219°34.4	59.3	276°22.6	39.4	Jupiter	322°14.4	16:27
8	272°43.2	321°56.4	37.1	322°16.1	18.6	234°36.5	59.5	291°24.8	39.3	Saturn	18°57.6	12:41
9	287°45.6	336°55.6	• • 36.4	337°16.6	• • 18.2	249°38.6	• • 59.6	306°26.9	• • 39.2	Eak 22 Th	CHA	Mo:: ====
10	302°48.1	351°54.9	35.7	352°17.1	17.7	264°40.7	59.7	321°29.1	39.1	Feb 22 Thu	SHA	Mer.pass
11	317°50.6	6°54.2	35.0	7°17.6	17.2	279°42.7	13°59.9	336°31.3	39.0	Venus	50°55.2	10:31
12	332°53.0	21°53.5	<b>S</b> 18°34.3	22°18.1	\$19°16.7	294°44.8	N14°00.0	351°33.5	S09°38.9	Mars	50°36.4	10:32
13	347°55.5	$36^{\circ}52.8$	33.6	37°18.5	16.2	309°46.9	00.1	6°35.6	38.8	Jupiter	322°05.4	16:24
14	2°58.0	51°52.1	32.9	52°19.0	15.7	324°49.0	00.3	21°37.8	38.7	Saturn	18°50.8	12:37
15	18°00.4	66°51.4	• • 32.2	67°19.5	• • 15.3	339°51.1	00.4	36°40.0	• • 38.5	Feb 23 Fri	SHA	Mer.pass
16	33°02.9	81°50.6	31.5	82°20.0	14.8	354°53.1	00.5	51°42.2	38.4	Venus	49°38.7	10:32
17	48°05.3	96°49.9	30.8	97°20.5	14.3	9°55.2	00.7	66°44.3	38.3	Mars	49°48.8	10:32
18	63°07.8	111°49.2	\$18°30.0	112°21.0	S19°13.8	24°57.3	N14°00.8	81°46.5	S09°38.2	Jupiter	321°56.4	16:20
19	78°10.3	111 49.2 126°48.5	29.3	112°21.5	13.3	39°59.4	00.9	96°48.7	38.1			
20	93°12.7	141° 47.8	29.5	142°21.9	12.8	55°01.5	00.9	111°50.9	38.0	Saturn	18°43.9	12:34
	93°12.7 108°15.2								38.0	Horizont	al parallax	
21		156° 47.1	· · 27.9	157°22.4	11.0	70°03.5	01.2	126°53.1			Venus:	0.1
22	123°17.7	171°46.4	27.2	172°22.9	11.9	85°05.6	01.3	141°55.2	37.8 27.6		Mars:	0.1
23	138°20.1	186° 45.7	26.5	187°23.4	11.4	100°07.7	01.5	156° 57.4	37.6		141013.	0.1
Mer.p	ass. 13:48	$\nu$ -0.7′ d-0	0.7′ m-3.88	$\nu$ 0.5′ d-0	.5′ m1.28	$\nu 2.1' \ d0.$	1′ m-2.22	$\nu$ 2.2′ d-0	.1′ m0.97			

	C	-0.0022 360	Moon						
h	Su								
Wed 0	<b>GHA</b> 176°34.7	<b>Dec</b> \$10°49.2	<b>GHA</b> 34°35.1	u 10.0'	<b>Dec</b> N26°29.8	d -5.7'	<b>HP</b> 54.8'		
1	191°34.7	48.3	49°04.2	10.1	26°24.1	-5.8'	54.8'		
2	206°34.8	47.4	63°33.2	10.2'	$26^{\circ}18.3$	-5.9'	54.8'		
3	221°34.9	• • 46.5	78°02.4	10.2'	26°12.4	-6.0'	54.8'		
4	236°34.9 251°35.0	45.6 44.7	92°31.7 107°01.0	10.3' 10.4'	26°06.3 26°00.2	-6.2' -6.3'	54.7' 54.7'		
5 6	251 35.0 266°35.1	510°43.8	107 01.0 121°30.4	10.4	N25°53.9	-6.4'	54.7		
7	281°35.1	42.9	135°59.8	10.5'	25°47.5	-6.5	54.7'		
8	296°35.2	42.0	150°29.4	10.6'	25°40.9	-6.7'	54.7'		
9	311°35.3	• • 41.1	164°59.0	10.7'	25°34.3	-6.8'	54.7'		
10 11	326°35.3 341°35.4	40.2 39.3	179°28.7 193°58.5	10.8' 10.9'	25°27.5 25°20.6	-6.9' -7.0'	54.6' 54.6'		
12	356°35.5	510°38.4	208° 28.3	10.9	N25°13.6	-7.1'	54.6		
13	11°35.6	37.5	222°58.3	11.0'	25°06.5	-7.2'	54.6'		
14	26°35.6	36.6	237°28.3	11.1'	24°59.2	-7.4'	54.6'		
15	41°35.7 56°35.8	· · 35.7	251°58.4 266°28.5	11.2' 11.2'	24°51.9 24°44.4	-7.5'	54.6		
16 17	71°35.9	34.8	200 28.5 280° 58.8	11.2	24 44.4 24°36.8	-7.6' -7.7'	54.6' 54.5'		
18	86°35.9	S10°33.0	295°29.1	11.4'	N24°29.1	-7.8'	54.5		
19	101°36.0	32.1	309°59.5	11.5'	24°21.3	-7.9'	54.5'		
20	116°36.1	31.2	324°30.0	11.6'	24°13.4	-8.0'	54.5'		
21	131°36.1 146°36.2	30.2	339°00.5 353°31.2	11.6'	24°05.4 23°57.3	-8.1' -8.2'	54.5' 54.5'		
22 23	146°36.2 161°36.3	29.3 28.4	353°31.2 8°01.9	11.7' 11.8'	23°57.3 23°49.0	-8.2 -8.3'	54.5'		
23		d = -0.9'	- 0 01.9			0.5	5 1.5		
	SD = 16.2'	$a = -0.9^{\circ}$		51	D = 14.9'				
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP		
0	176°36.4 191°36.4	\$10°27.5	22°32.7 37°03.6	11.9'	N23°40.7 23°32.3	-8.4'	54.5'		
1 2	191°36.4 206°36.5	26.6 25.7	51°34.6	12.0' 12.0'	23°23.7	-8.5' -8.6'	54.4' 54.4'		
3	200 30.5 221°36.6	• • 24.8	66° 05.6	12.1'	23°15.1	-8.7'	54.4		
4	236°36.7	23.9	80° 36.7	12.2'	23°06.3	-8.8'	54.4'		
5	251°36.7	23.0	95° 07.9	12.3'	22°57.5	-8.9'	54.4'		
6	266°36.8	\$10°22.1	109°39.2	12.4'	N22°48.6	-9.0'	54.4'		
7 8	281°36.9 296°37.0	21.2 20.3	124° 10.6 138° 42.0	12.4' 12.5'	22°39.5 22°30.4	-9.1' -9.2'	54.4' 54.4'		
9	311°37.1	. 19.4	153° 13.6	12.6'	22°21.1	-9.2'	54.3		
10	326°37.1	18.5	167° 45.2	12.7'	22°11.8	-9.4'	54.3'		
11	341°37.2	17.5	182° 16.8	12.8'	22°02.4	-9.5'	54.3'		
12	356°37.3 11°37.4	\$10°16.6 15.7	196° 48.6 211° 20.4	12.8' 12.9'	N21°52.9 21°43.3	-9.6' -9.7'	54.3' 54.3'		
13 14	26°37.4	15.7	211 20.4 225°52.4	13.0'	21 43.3 21°33.6	-9.7 -9.8'	54.3'		
15	41°37.5	• • 13.9	240°24.4	13.1'	21°23.8	-9.9'	54.3'		
16	56°37.6	13.0	254° 56.4	13.2'	21°13.9	-10.0'	54.3'		
17	71°37.7 86°37.8	12.1 \$10°11.2	269°28.6 284°00.8	13.2' 13.3'	21°03.9 N20°53.9	-10.0'	54.3' 54.2'		
18 19	101°37.8	10.3	204 00.6 298°33 1	13.4	20°43.8	-10.1' -10.2'	54.2 54.2		
20	116°37.9	09.3	313°05.5	13.5'	20°33.5	-10.3	54.2'		
21	131°38.0	•• 08.4	327° 38.0	13.5'	20°23.2	-10.4'	54.2'		
22	146°38.1	07.5	342° 10.5	13.6'	20°12.9	-10.5'	54.2'		
23	161°38.2	06.6	356°43.1	13.7'	20°02.4	-10.5'	54.2'		
	SD = 16.2'	d = -0.9'		Si	D = 14.8'				
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP		
0	176°38.3	\$10°05.7	11° 15.8	13.8'	N19°51.8	-10.6'	54.2'		
1 2	191°38.3 206°38.4	04.8 03.9	25°48.6 40°21.4	13.8' 13.9'	19°41.2 19°30.5	-10.7' -10.8'	54.2' 54.2'		
3	200 38.4 221°38.5	. 03.9	54° 54.4	14.0'	19° 30.5	-10.6	54.2'		
4	236°38.6	02.0	69°27.3	14.1'	19°08.9	-10.9'	54.2'		
5	251°38.7	01.1	84°00.4	14.1'	18°57.9	-11.0'	54.1'		
6	266°38.7 281°38.8	\$10°00.2 09°59.3	98° 33.5 113° 06.7	14.2' 14.3'	N18°46.9 18°35.8	-11.1' -11.2'	54.1' 54.1'		
7 8	281 38.8 296°38.9	09°59.3 58.4	113°06.7 127°40.0	14.3'	18° 35.8 18° 24.7	-11.2' -11.2'	54.1'		
9	311°39.0	57.5	142° 13.4	14.4'	18°13.5	-11.3'	54.1'		
10	$326^{\circ}39.1$	56.6	156° 46.8	14.5'	18°02.2	-11.4'	54.1'		
11	341°39.2	55.6 \$09°54.7	171°20.3	14.6'	17°50.8	-11.4'	54.1'		
12 13	356°39.3 11°39.3	509°54.7 53.8	185° 53.8 200° 27.4	14.6' 14.7'	N17°39.4 17°27.9	-11.5' -11.6'	54.1' 54.1'		
14	26°39.4	52.9	215°01.1	14.7	17°16.3	-11.6'	54.1		
15	41°39.5	• • 52.0	229°34.9	14.8'	17°04.7	-11.7'	54.1'		
16	56°39.6	51.1	244°08.7	14.9'	16°53.0	-11.8'	54.1'		
17 18	71°39.7 86°39.8	50.1 \$09°49.2	258° 42.6 273° 16.6	15.0' 15.0'	16°41.2 N16°29.4	-11.8' -11.9'	54.1' 54.0'		
18 19	86°39.8 101°39.9	509°49.2 48.3	273°16.6 287°50.6	15.0° 15.1'	16°29.4 16°17.5	-11.9' -11.9'	54.0°		
20	116°39.9	47.4	302°24.7	15.1	16°05.5	-12.0'	54.0'		
21	131°40.0	• • 46.5	316° 58.8	15.2'	15°53.5	-12.1'	54.0'		
22	146°40.1	45.6	331°33.0	15.3'	15°41.5	-12.1'	54.0'		
23	161°40.2	44.6	346°07.3	15.3'	15°29.3	-12.2'	54.0'		
	SD = 16.2'	d = -0.9'		SI	D = 14.8'				

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

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

		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	89-98%
21	13:41	13:38	12:14	22:27	10:02	
22	13:35	13:31	12:14	23:14	10:51	
23	13:27	13:23	12:13	23:57	11:36	

## February 24, 25, 26 UT (Sat., Sun., Mon.)

Section   China   China   Dec   China   C	h	Aries	Vei	nus	M	ars	Jup	oiter	Sat	urn		Stars	
1	Sat	CHV.	CHA.	Doc	CHA	Doc	CHA	Doc	CHV	Doc		SHV	Doc
1   1007     1007													
2 1877.5 231.455 24.4 22.2 2774.8 06.9 1871.5 0.02 2776.6 17.73 Access 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.74 17.0 1970.6 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0											Alpheratz		
3													
2.25   1.25   2.05   1.25   2.05													
28 28 37 3	4					09.0			232°08.3				
8 221142   2019	5	$228^{\circ}34.9$	276°41.4	22.2	277°26.3	08.5		02.3	$247^{\circ}10.5$	37.0			
9. 287-6.9. 307-19. 309. 300 307-29. 300. 287-79. 300. 289-79. 300. 307-79. 300. 306-79. 300. 307-79. 300. 307-79. 300. 307-79. 300. 307-79. 300. 307-79. 300. 307-79. 300. 307-79. 300. 307-79. 300. 307-79. 300. 300. 307-79. 300. 300. 307-79. 300. 300. 300. 307-79. 300. 300. 307-79. 300. 300. 307-79. 300. 300. 300. 300. 300. 300. 300. 30											I		
10   303													
13   38   37   37   37   37   37   38   38													
11 318"497 6 37.72											Mirfak	308°29.4	49°57.0
13   383*192   23   23   24   24   24   25   27   27   28   28   28   28   28   28											Aldebaran	290°40.4	16°33.5
14   16   17   17   18   18   18   18   18   18													
14   3°571   3°570   6°5143   15.0   6°5143   15.0   6°5143   15.0   6°5143   3°570   15.5   3													
Amalian   200	14	$3^{\circ}57.1$	51°35.0	15.7	52°30.7	04.1	325°38.8	03.5	22°30.1				
18													
19													
19													
20											Sirius	258°26.7	-16°45.1
1997 4.3   1567 4.0   1999   1797 4.0   1979 4.0   1970 4.0   1979 4.0   1970 4.0   1979 4.0   19													
22   134"168   171"29-4   0.99   172"3-6   19"00.1   88"65-4   0.45   142"47.5   35.0   Mer. pass. 13.44   \$\nu -0.7' \ d-0.7' \ m-3.88   \$\nu 0.5' \ d-0.5' \ m1.28   \$\nu 2.1' \ d-0.1' \ m-2.21   \$\nu 2.2' \ d-0.1' \ m-0.96   Miaghacidus   221"3.6   69"35.0   89"													
March   Marc											1		
Misphoides   Mis	23	$139^{\circ}19.3$	$186^{\circ}28.7$	09.1	187°35.1	$18^{\circ}59.6$	$100^{\circ}57.5$	04.7	157°49.7	34.9			
Sum GHA Sim G	Mer n	ass 13·44	$\nu$ -0.7' d-0	7′ m-3.88	$\nu 0.5' d-0$	5′ m1 28	$\nu 2.1' d0$	1′ m-2 21	$\nu^2 2' d-0$	1′ m0 96			
Section   Sign		455. 15.11	- 0.1 4 0		- V 0.5 U 0		- Z.I GO.						
196"21.7   201"28.0   518"08.4   202"38.6   518"59.1   115"99.6   N14"04.8   172"51.8   509"34.8	•	CILA	CIIA	Б	CILA		CIIA		CIIA				
1 169°42 2 161°27.3 0'7.7 217°36.1 58.6 131°01.7 04.9 187°54.0 34.7 2 188°67.2 231°26.6 0.69 223°36.6 0.69 223°36.6 0.69 223°36.6 0.69 223°36.6 0.69 23°36.6 0.6											Dubhe		
184°67   231°266   0.69   222°366   58.1   146°037   0.51   202°562   34.6   Accuming the property of the pr											I		
199°91. 240°259. 0.60.2 247°371. 0.57.6 161°058. 0.65.2 217°884. 0.34.5 4 218°10. 201°25. 0.55. 226°376. 37.1 176°079. 0.53. 233°0.06. 34.3 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5													
24 - 214 - 31.6   261 - 25.2   05.5   262 - 37.6   57.1   176 - 07.0   05.3   233 - 00.6   34.3   34.6   27.7   34.6   27.7   38.6   244 - 36.7   34.2   27.7   38.6   37.													
6 229°34.1 276°24.5 04.7 277°38.0 95.7 191°10.0 95.5 248°0.7 34.1   Sic 249°11.3						57.1			233°00.6				
7 294°36.5 291°23.8 19°04.0 292°38.5 518°36.2 200°12.0 N14°05.6 203°04.9 S09°34.1 34.0 Alaid 152°52.2 49°11.3 7 29°30.3 00°39.0 30°39.0 55.7 22°14.1 05.8 278°07.1 34.0 Hadrid 148°36.7 60°29.2 82°37.3 40°3.2 32°39.5 55.2 236°16.2 05.9 293°99.3 33.9 Hadrid 148°36.7 60°29.2 Menkent 147°58.3 36°29.3 10°304°46.4 351°21.0 01.0 352°40.5 54.2 266°20.3 06.2 323°13.6 33.6 Hadrid 148°36.7 130°40.4 130°40.4 338°1.3 21°19.7 51°59.5 22°41.5 518°33.2 296°24.5 N14°06.4 333°18.0 S09°34.4 S09°32.4 Hadrid 148°36.7 130°40.5 130°40	5	$229^{\circ}34.1$	276°24.5	04.7	277°38.0	56.7	$191^{\circ}10.0$	05.5	248°02.7	34.2			
8 278°414 321°224 0.25 302°39.5 55.2 236°16.2 0.69 293°09.3 33.9   9 289°43.9 336°21.7 0.17 337°40.0 · 54.7 251°18.2 · 06.0 308°11.4 · 33.8   10 308°46.8 6°20.3 18°00.3 7°41.0 53.7 281°22.4 06.3 388°15.8 33.6   11 319°48.8 6°20.3 18°00.3 7°41.0 53.7 281°22.4 06.3 388°15.8 33.6   12 334°15.1 21°19.7 517°95.5 22°41.5 518°3.2 296°24.5 Nal*0.4 353°18.0 509°33.4   14 4°55.2 51°18.3 58.0 52°42.5 52.2 336°22.4 06.3 388°15.8 33.6   13 349°53.8 36°19.0 58.8 37°42.0 52.7 311°26.5 06.6 8°20.1 33.3   14 4°55.2 51°18.3 58.0 52°42.5 52.2 336°28.6 06.7 23°22.3 33.2   15 19°58.7 66°17.6 ° 57.3 66°43.0 · 51.7 341°30.7 · 06.8 38°24.5 · 33.1   16 35°01.2 81°16.9 56.5 82°43.4 51.2 356°32.7 07.0 53°26.7 33.0   18 65°06.1 111°15.5 517°56.0 112°44.4 518°50.2 26°36.9 Nal*0.7 06.8 38°24.5 · 33.0   18 65°06.1 111°15.5 517°56.1 112°44.4 518°50.2 26°36.9 Nal*0.7 06.8 38°24.5 · 33.0   19 80°08.6 126°14.8 54.3 127°44.9 49.7 41°38.9 07.4 98°33.2 32.6   19 80°08.6 126°14.8 54.3 127°44.9 49.7 41°38.9 07.4 98°33.2 32.6   19 80°08.6 126°14.8 54.3 127°44.9 49.7 41°38.9 07.4 98°33.2 32.6   10 110°13.5 156°13.4 · 52.8 157°45.9 · 48.7 71°43.1 · 07.6 128°37.6 · 32.4   21 110°13.5 156°13.4 · 52.8 157°45.9 · 48.7 71°43.1 · 07.6 128°37.6 · 32.4   21 110°13.5 156°13.4 · 52.8 157°45.9 · 48.7 71°43.1 · 07.6 128°37.6 · 32.4   22 128°15.9 11°11.27 · 52.0 172°46.9 4.7 101°47.2 · 07.9 158°41.9 32.2   22 128°15.9 11°11.27 · 52.0 · 122°44.9 4.8 2 86°45.1 · 07.8 143°39.7 · 32.3   30 140°18.4 186°12.0 · 51.2 187°45.9 · 48.7 71°43.1 · 07.6 128°76.0 · 32.4   30 110°47.2 · 07.9 188°41.9 · 32.2   30 140°18.4 186°12.0 · 51.2 187°45.9 · 48.7 71°43.1 · 07.6 128°76.0 · 32.4   30 140°18.4 186°12.0 · 51.2 187°45.9 · 48.7 71°43.1 · 07.6 128°76.0 · 32.4   30 140°18.4 186°12.0 · 51.2 187°45.9 · 48.7 71°43.1 · 07.6 128°76.0 · 32.4   30 140°18.4 186°12.0 · 51.2 187°45.9 · 48.7 71°43.1 · 07.6 128°76.0 · 32.4   30 140°18.4 186°12.0 · 51.2 187°45.9 · 48.7 71°43.1 · 07.6 128°76.0 · 32.4   30 140°18.4 186°12.0 · 51.2 187°45.9 · 48.7 71°43.1 · 07.6 128°76.0 · 31.4   30 140°18.4 186°12													
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16   35°01.2   81°16.9   56.5   82°43.4   51.2   356°32.7   07.0   53°26.7   33.0     17   50°03.6   96°16.2   55.8   97°43.9   50.7   11°34.8   07.1   62°8.9   32.0     18   66°06.1   111°15.5   517°55.0   112°44.4   518°50.2   26°36.9   N14°07.2   83°31.0   509°32.8     20   99°11.0   141°14.1   53.5   142°45.4   49.2   56°41.0   07.5   113°35.4   32.5     21   110°13.5   156°14.4   55.8   157°45.9   48.7   71°43.1   0.76   128°37.6   32.5     22   125°15.9   171°12.7   52.0   172°46.4   48.2   86°45.1   07.8   143°39.7   32.3     31   40°18.4   186°12.0   51.2   187°46.9   47.7   101°47.2   07.9   158°41.9   32.2     Mer.pass. 13:40   \$\frac{1}{2}\cdot -0.7'\tag{4.7}\tag{4.8}   \$\frac{1}{2}\cdot -0.5'\tag{4.7}\tag{4.8}   \$\frac{1}{2}\cdot -0.5'\tag{4.8}   \$\frac{1}{2}\cdot -0.5'\tag{5.8}   \$\frac{1}{2}\cd													
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20   95°11.0   141°14.1   53.5   142°45.4   49.2   56°41.0   07.5   113°35.4   32.5   Kaus Aust   Saus Aust   S											Rasalhague		
22   110°13.5   156°13.4													
23   140°18.4   186°12.0   51.2   187°46.9   47.7   101°47.2   07.9   158°41.9   32.2     Mer.pass. 13:40   ν-0.7′ d-0.7′ m-3.88   ν0.5′ d-0.5′ m1.28   ν2.1′ d0.1′ m-2.21   ν2.2′ d-0.1′ m0.96     Mon   GHA   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   11.3   517°50.5   202°47.4   518°47.2   116°49.3   N14°08.1   173°44.1   509°32.1   509°32.1   510°32.3   216°10.7   49.7   217°47.9   46.7   131°51.4   08.2   188°46.3   32.0   08.7   520°49.4   45.1   176°57.6   08.6   233°52.8   31.6   233°33.2   276°07.9   46.7   277°49.9   44.6   191°59.6   08.7   248°55.0   31.5   31.3   31.3   30°05.5   45.2   307°50.8   43.6   222°03.8   40.6   222°03.8   40.6   233°52.8   31.6   275°40.6   312°05.9   44.4   322°51.3   43.1   237°05.8   09.1   278°59.3   31.3   31.2   320°48.0   6°03.8   42.1   7°52.8   42.1   267°10.0   09.4   324°05.9   30.9   30.7   31.1   350°52.9   36°02.4   40.6   37°53.8   40.6   312°16.1   09.8   95°54.5   30.6   03.8   20.5   330°30.3   30.6   05.5   31.5   31.0   30.5   32.5   33.6   32°55.7   37.5   97°55.8   38.6   12°24.4   10.4   66°21.1   30.2													
Mor. pass. 13:40   \(\nu \cdot \)   \(\nu \cdo \cdo \cdot \)   \(\nu \cd	22	$125^{\circ}15.9$	$171^{\circ}12.7$	52.0	172°46.4	48.2	$86^{\circ}45.1$	07.8	143°39.7	32.3	_		
Mer.pass. 13:40   ν-0.7' d-0.7' m-3.88   ν-0.5' d-0.5' m1.28   ν-2.1' d0.1' m-2.21   ν-2.2' d-0.1' m0.96   Peacock   53°07.3   -56°30.4   Save   S	23	$140^{\circ}18.4$	$186^{\circ}12.0$	51.2	187°46.9	47.7	101°47.2	07.9	158°41.9	32.2	l l		
Mon         GHA         GHA         Dec         GHA         Sog* 32.1         Enfif         33° 39.8         9° 59.0           1         170° 23.3         216° 10.7         49.7         217° 47.9         46.7         131° 51.4         08.2         188° 46.3         32.0         186° 25.8         231° 10.0         49.0         232° 48.4         46.2         146° 55.5         08.5         218° 50.6         31.7         50° 60° 88.1         33° 39.8         8° 80° 12.7         Markab         15° 15.6         229° 29.8         50° 20.9         46.7         176° 57.6         08.6         238° 52.8         31.6         50° 20.9         46.7         176° 57.6         08.6         238° 52.8         31.6         50° 20.9         46.7         176° 57.6         08.6         238° 52.8         31.6         42.9         46.7         176° 57.6         08.6         238° 52.8         31.6         42.9         20° 20° 43.0         36° 05.2         45.2         30° 50° 58.4         45.2         170° 44.1         20° 20° 31.3         31.6         42.9         2	Mer.p	ass. 13:40	$\nu$ -0.7' d-0	.7′ m-3.88	$\nu 0.5' \ d-0$	.5′ m1.28	$\nu 2.1' d0.$	1' m-2.21	$\nu 2.2' \text{ d-0}$	.1′ m0.96			
Mon         GHA         CHA         Dec         GHA         Dec         Horizontal parallax           1         170°23.3         216°10.7         49.7         217°47.9         46.7         131°51.4         08.2         188°46.3         32.0         156°20.9         60°25.2         10°44         46.2         146°53.4         08.3         20°48.4         31.9         31.3         31.9         48°21.7         49.9         45.6         161°55.6         08.6         233°52.8         31.6         31.7         49.9         46.7         27°49.9         44.6         191°59.6         08.7         248°55.0         31.5         48°22.3         10°30°45.5         30°0.9													
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3 200°28.3 246°09.3 · · · 48.2 247°48.9 · · · 45.6 161°55.5 · · · 08.5 218°50.6 · · · 31.7 4		185°25.8					146°53.4						
5 230°33.2 276°07.9 46.7 277°49.9 44.6 191°59.6 08.7 248°55.0 31.5 6 246°35.7 291°07.2 \$17°45.9 292°50.4 \$18°44.1 207°01.7 \$N14°08.9 263°57.2 \$509°31.4 \$10.30	3	$200^{\circ}28.3$	$246^{\circ}09.3$	• • 48.2	247°48.9	• • 45.6	$161^{\circ}55.5$	• • 08.5		• • 31.7			
6 245°35.7 291°07.2 \$17°45.9 292°50.4 \$18°44.1 207°01.7 \$N14°08.9 263°57.2 \$09°31.4 \$7 260°38.1 306°06.5 45.2 307°50.8 43.6 222°03.8 09.0 278°59.3 31.3 \$1.3 27°64.6 321°05.9 44.4 322°51.3 43.1 237°05.8 09.1 294°01.5 31.2 \$1.0 305°45.5 351°04.5 42.9 352°52.3 42.1 267°10.0 09.4 324°05.9 30.9 30.7 11.1 320°48.0 6°03.8 42.1 7°52.8 41.6 282°12.0 09.5 339°08.0 30.8 12 335°50.4 21°03.1 \$17°41.3 22°53.3 \$18°41.1 297°14.1 \$N14°09.7 354°10.2 \$09°30.7 \$13.1 \$15°55.4 \$10°1.7 39.8 52°54.3 40.1 327°18.2 10.0 24°14.6 30.5 15 20°57.8 66°01.1 39.0 67°54.8 39.6 342°20.3 10.1 39°16.7 130.2 \$40°16.7 130.2 \$10°30.1 \$10°30.1 \$12°30.1 \$10°													
7 260° 38.1 306° 06.5 45.2 307° 50.8 43.6 222° 03.8 09.0 278° 59.3 31.3 31.3 8 275° 40.6 321° 05.9 44.4 322° 51.3 43.1 237° 05.8 09.1 294° 01.5 31.2 9 290° 43.0 336° 05.2 · 43.6 337° 51.8 · 42.6 252° 07.9 · 09.3 309° 03.7 · 31.1 10 305° 45.5 351° 04.5 42.9 352° 52.3 42.1 267° 10.0 09.4 324° 05.9 30.9 11 320° 48.0 6° 03.8 42.1 7° 52.8 41.6 282° 12.0 09.5 339° 08.0 30.8 12 335° 50.4 21° 03.1 \$17° 41.3 22° 53.3 \$18° 41.1 297° 14.1 \$14° 09.7 \$354° 10.2 \$509° 30.7 13 \$350° 52.9 \$36° 02.4 \$40.6 37° 53.8 \$40.6 \$312° 16.1 \$09.8 \$9° 12.4 \$30.6 14 \$5° 55.4 \$51° 01.7 \$39.8 \$52° 54.3 \$40.1 \$327° 18.2 \$10.0 \$24° 14.6 \$30.5 15 \$20° 57.8 \$66° 01.1 · 39.0 \$67° 54.8 · 39.6 \$342° 20.3 · 10.1 \$39° 16.7 · 30.4 \$50.5 \$10.36 \$17° 51° 02.8 \$95° 59.7 \$37.5 \$97° 55.8 \$38.6 \$12° 24.4 \$10.4 \$69° 21.1 \$30.2 \$10.2 \$40° 14.9 \$10.2 \$10													
8 275°40.6 321°05.9 44.4 322°51.3 43.1 237°05.8 09.1 294°01.5 31.2 920°43.0 336°05.2 · 43.6 337°51.8 · 42.6 252°07.9 · 09.3 309°03.7 · 31.1 10 305°45.5 351°04.5 42.9 352°52.3 42.1 267°10.0 09.4 324°05.9 30.9 11 320°48.0 6°03.8 42.1 7°52.8 41.6 282°12.0 09.5 339°08.0 30.8 12 335°50.4 21°03.1 \$17°41.3 22°53.3 \$18°41.1 297°14.1 N14°09.7 354°10.2 \$099°30.7 13 350°52.9 36°02.4 40.6 37°53.8 40.6 312°16.1 09.8 9°12.4 30.5 14 5°55.4 51°01.7 39.8 52°54.3 40.1 327°18.2 10.0 24°14.6 30.5 15 20°57.8 66°01.1 · 39.0 67°54.8 · 39.6 342°20.3 · 10.1 39°16.7 · 30.4 16 36°00.3 81°00.4 38.3 82°55.3 39.1 357°22.3 10.2 54°18.9 30.3 17 51°02.8 95°59.7 37.5 97°55.8 38.6 12°24.4 10.4 69°21.1 30.2 18 66°05.2 110°59.0 \$17°36.7 112°56.3 \$18°38.0 27°26.5 N14°10.5 84°23.3 \$09°30.0 \$19 81°07.7 125°58.3 36.0 127°56.8 37.5 42°28.5 10.6 99°25.5 29.9 20 96°10.2 140°57.7 35.2 142°57.3 37.0 57°30.6 10.8 114°27.6 29.8 111°12.6 155°57.0 · 34.4 157°57.8 · 36.5 72°32.7 · 10.9 129°29.8 · 29.7 212°28.4 16:10 \$21.2 \$10.1 \$10.2 \$150°34.2 \$29.5 \$10.2											1		
9 290°43.0 336°05.2 · 43.6 337°51.8 · 42.6 252°07.9 · 09.3 309°03.7 · · 31.1 10 305°45.5 351°04.5 42.9 352°52.3 42.1 267°10.0 09.4 324°05.9 30.9 11 320°48.0 6°03.8 42.1 7°52.8 41.6 282°12.0 09.5 339°08.0 30.8 12 335°50.4 21°03.1 \$17°41.3 22°53.3 \$18°41.1 297°14.1 N14°09.7 354°10.2 \$09°30.7 13 350°52.9 36°02.4 40.6 37°53.8 40.6 312°16.1 09.8 9°12.4 30.6 14 5°55.4 51°01.7 39.8 52°54.3 40.1 327°18.2 10.0 24°14.6 30.5 15 20°57.8 66°01.1 · · 39.0 67°54.8 · · 39.6 342°20.3 · · 10.1 39°16.7 · · · 30.4 16 36°00.3 81°00.4 38.3 82°55.3 39.1 357°22.3 10.2 54°18.9 30.3 17 51°02.8 95°59.7 37.5 97°55.8 38.6 12°24.4 10.4 69°21.1 30.2 18 66°05.2 110°59.0 \$17°36.7 112°56.3 \$18°38.0 27°26.5 N14°10.5 84°23.3 \$09°30.0 19 81°07.7 125°58.3 36.0 127°56.8 37.5 42°28.5 10.6 99°25.5 29.9 20 96°10.2 140°57.7 35.2 142°57.3 37.0 57°30.6 10.8 114°27.6 29.8 111°12.6 155°57.0 · · 34.4 157°57.8 · · 36.5 72°32.7 · · 10.9 129°29.8 · · 29.7 29.5 10.1 Mars: 0.1 18°23.2 12.23													
10  305° 45.5  351° 04.5  42.9  352° 52.3  42.1  267° 10.0  09.4  324° 05.9  30.9   11  320° 48.0  6° 03.8  42.1  7° 52.8  41.6  282° 12.0  09.5  339° 08.0  30.8   12  335° 50.4  21° 03.1  517° 41.3  22° 53.3  518° 41.1  297° 14.1  N14° 09.7  354° 10.2  509° 30.7   13  350° 52.9  36° 02.4  40.6  37° 53.8  40.6  312° 16.1  09.8  9° 12.4  30.6   14  5° 55.4  51° 01.7  39.8  52° 54.3  40.1  327° 18.2  10.0  24° 14.6  30.5   15  20° 57.8  66° 01.1  ∴ 39.0  67° 54.8  ∴ 39.6  342° 20.3  ∴ 10.1  39° 16.7  ∴ 30.4   16  36° 00.3  81° 00.4  38.3  82° 55.3  39.1  357° 22.3  10.2  54° 18.9  30.3   17  51° 02.8  95° 59.7  37.5  97° 55.8  38.6  12° 24.4  10.4  69° 21.1  30.2   18  66° 05.2  110° 59.0  517° 36.7  112° 56.3  518° 38.0  27° 26.5  N14° 10.5  84° 23.3  509° 30.0   19  81° 07.7  125° 58.3  36.0  127° 56.8  37.5  42° 28.5  10.6  99° 25.5  29.9   20  96° 10.2  140° 57.7  35.2  142° 57.3  37.0  57° 30.6  10.8  114° 27.6  29.8   21  111° 12.6  155° 57.0  ∴ 34.4  157° 57.8  ∴ 36.5  72° 32.7  ∴ 10.9  129° 29.8  ∴ 29.7   22  126° 15.1  170° 56.3  33.6  172° 58.3  36.0  87° 34.7  11.0  144° 32.0  29.6   23  141° 17.5  185° 55.6  32.9  187° 58.8  35.5  102° 36.8  11.2  159° 34.2  29.5    10  30° 10.2  140° 57.7  35.2  142° 57.3  36.0  87° 34.7  11.0  144° 32.0  29.6   24  111° 12.6  155° 57.0  ∴ 34.4  157° 57.8  ∴ 36.5  72° 32.7  ∴ 10.9  129° 29.8  ∴ 29.7   25  126° 15.1  170° 56.3  33.6  172° 58.3  36.0  87° 34.7  11.0  144° 32.0  29.6   140° 17.5  185° 55.6  32.9  187° 58.8  35.5  102° 36.8  11.2  159° 34.2  29.5													
11 320° 48.0 6° 03.8 42.1 7° 52.8 41.6 282° 12.0 09.5 339° 08.0 30.8 12 335° 50.4 21° 03.1 \$17° 41.3 22° 53.3 \$18° 41.1 297° 14.1 \$14° 09.7 354° 10.2 \$509° 30.7 \$13 350° 52.9 36° 02.4 40.6 37° 53.8 40.6 312° 16.1 09.8 9° 12.4 30.6 14 5° 55.4 51° 01.7 39.8 52° 54.3 40.1 327° 18.2 10.0 24° 14.6 30.5 15 20° 57.8 66° 01.1 39.0 67° 54.8 39.6 342° 20.3 10.1 39° 16.7 30.4 51.0 30.3 17 51° 02.8 95° 59.7 37.5 97° 55.8 38.6 12° 24.4 10.4 69° 21.1 30.2 18 66° 05.2 110° 59.0 \$17° 36.7 \$112° 56.3 \$18° 38.0 \$27° 26.5 \$14° 10.5 \$40° 28.5 \$10.6 \$99° 25.5 \$29.9 \$20 96° 10.2 \$140° 57.7 \$35.2 \$142° 57.3 \$37.0 \$57° 30.6 \$10.8 \$114° 27.6 \$29.8 \$21 \$111° 12.6 \$155° 57.0 \$34.4 \$157° 57.8 \$36.5 \$72° 32.7 \$10.9 \$129° 29.8 \$29.7 \$21 \$111° 12.6 \$155° 57.0 \$34.4 \$157° 57.8 \$35.5 \$102° 36.8 \$11.2 \$159° 34.2 \$29.5 \$10.1 \$10° 50.1 \$1.2 \$1.0 \$1.1 \$1.2 \$1.1 \$1.1													
12 335°50.4 21°03.1 S17°41.3 22°53.3 S18°41.1 297°14.1 N14°09.7 354°10.2 S09°30.7   13 350°52.9 36°02.4 40.6 37°53.8 40.6 312°16.1 09.8 9°12.4 30.6   14 5°55.4 51°01.7 39.8 52°54.3 40.1 327°18.2 10.0 24°14.6 30.5   15 20°57.8 66°01.1 ···39.0 67°54.8 ···39.6 342°20.3 ···10.1 39°16.7 ···30.4   16 36°00.3 81°00.4 38.3 82°55.3 39.1 357°22.3 10.2 54°18.9 30.3   17 51°02.8 95°59.7 37.5 97°55.8 38.6 12°24.4 10.4 69°21.1 30.2   18 66°05.2 110°59.0 S17°36.7 112°56.3 S18°38.0 27°26.5 N14°10.5 84°23.3 S09°30.0   19 81°07.7 125°58.3 36.0 127°56.8 37.5 42°28.5 10.6 99°25.5 29.9   20 96°10.2 140°57.7 35.2 142°57.3 37.0 57°30.6 10.8 114°27.6 29.8   21 111°12.6 155°57.0 ···34.4 157°57.8 ···36.5 72°32.7 ···10.9 129°29.8 ···29.7   22 126°15.1 170°56.3 33.6 172°58.3 36.0 87°34.7 11.0 144°32.0 29.6   23 141°17.5 185°55.6 32.9 187°58.8 35.5 102°36.8 11.2 159°34.2 29.5      Mars 48 13.9 10:29		320°48.0		42.1		41.6							
13 350 52.9 36 02.4 40.6 37 53.8 40.6 312 16.1 09.8 9 12.4 30.6 14 5°55.4 51°01.7 39.8 52°54.3 40.1 327°18.2 10.0 24°14.6 30.5 15 20°57.8 66°01.1 39.0 67°54.8 39.6 342°20.3 10.1 39°16.7 30.4 16 36°00.3 81°00.4 38.3 82°55.3 39.1 357°22.3 10.2 54°18.9 30.3 17 51°02.8 95°59.7 37.5 97°55.8 38.6 12°24.4 10.4 69°21.1 30.2 18 66°05.2 110°59.0 \$17°36.7 112°56.3 \$18°38.0 \$27°26.5 \$N14°10.5 \$4°23.3 \$509°30.0 19 81°07.7 125°58.3 36.0 127°56.8 37.5 42°28.5 10.6 99°25.5 29.9 20 96°10.2 140°57.7 35.2 142°57.3 37.0 57°30.6 10.8 114°27.6 29.8 21 111°12.6 155°57.0 34.4 157°57.8 36.5 72°32.7 10.9 129°29.8 29.7 29.7 22 126°15.1 170°56.3 33.6 172°58.3 36.0 87°34.7 11.0 144°32.0 29.6 21 11°10.5 185°55.6 32.9 187°58.8 35.5 102°36.8 11.2 159°34.2 29.5							297°14.1						
14 5 55.4 51 01.7 39.8 52 54.3 40.1 327 18.2 10.0 24 14.6 30.5 10.5 10.5 10.5 10.5 10.5 10.5 10.5 1													
16       36°00.3       81°00.4       38.3       82°55.3       39.1       357°22.3       10.2       54°18.9       30.3       30.3       Venus       45°50.5       10:36         17       51°02.8       95°59.7       37.5       97°55.8       38.6       12°24.4       10.4       69°21.1       30.2       Mars       47°26.5       10:28         18       66°05.2       110°59.0       S17°36.7       112°56.3       S18°38.0       27°26.5       N14°10.5       84°23.3       S09°30.0       S0°30.0       Jupiter       321°28.4       16:10         19       81°07.7       125°58.3       36.0       127°56.8       37.5       42°28.5       10.6       99°25.5       29.9       Saturn       18°23.2       12:23         20       96°10.2       140°57.7       35.2       142°57.3       37.0       57°30.6       10.8       114°27.6       29.8       29.8       29.7       40°20.2       29.8       29.7       40°20.2       29.8       40°20.2       29.8       40°20.2       29.8       40°20.2       40°20.2       40°20.2       40°20.2       40°20.2       40°20.2       40°20.2       40°20.2       40°20.2       40°20.2       40°20.2       40°20.2       40°20.2       40°20.2													
17 51°02.8 95°59.7 37.5 97°55.8 38.6 12°24.4 10.4 69°21.1 30.2 18 66°05.2 110°59.0 \$17°36.7 112°56.3 \$18°38.0 27°26.5 \$N14°10.5 84°23.3 \$509°30.0 19 81°07.7 125°58.3 36.0 127°56.8 37.5 42°28.5 10.6 99°25.5 29.9 20 96°10.2 140°57.7 35.2 142°57.3 37.0 57°30.6 10.8 114°27.6 29.8 21 111°12.6 155°57.0 · · · 34.4 157°57.8 · · · 36.5 72°32.7 · · 10.9 129°29.8 · · · 29.7 22 126°15.1 170°56.3 33.6 172°58.3 36.0 87°34.7 11.0 144°32.0 29.6 23 141°17.5 185°55.6 32.9 187°58.8 35.5 102°36.8 11.2 159°34.2 29.5  Mars 47°26.5 10:28  Jupiter 321°28.4 16:10  Saturn 18°23.2 12:23  Horizontal parallax  Venus: 0.1  Mars 47°26.5 10:28  Jupiter 321°28.4 16:10  Saturn 18°23.2 12:23													
18 66°05.2 110°59.0 \$17°36.7 112°56.3 \$18°38.0 27°26.5 \$N14°10.5 84°23.3 \$509°30.0 \$19 81°07.7 125°58.3 36.0 127°56.8 37.5 42°28.5 10.6 99°25.5 29.9 \$20 96°10.2 140°57.7 35.2 142°57.3 37.0 57°30.6 10.8 114°27.6 29.8 \$21 111°12.6 155°57.0 34.4 157°57.8 36.5 72°32.7 10.9 129°29.8 29.7 \$22 126°15.1 170°56.3 33.6 172°58.3 36.0 87°34.7 11.0 144°32.0 29.6 23 141°17.5 185°55.6 32.9 187°58.8 35.5 102°36.8 11.2 159°34.2 29.5 \$21.0 \$2											I		
19 81°07.7 125°58.3 36.0 127°56.8 37.5 42°28.5 10.6 99°25.5 29.9 20 96°10.2 140°57.7 35.2 142°57.3 37.0 57°30.6 10.8 114°27.6 29.8 21 111°12.6 155°57.0 34.4 157°57.8 36.5 72°32.7 10.9 129°29.8 29.7 22 126°15.1 170°56.3 33.6 172°58.3 36.0 87°34.7 11.0 144°32.0 29.6 23 141°17.5 185°55.6 32.9 187°58.8 35.5 102°36.8 11.2 159°34.2 29.5 32.9 Mars: 0.1													
20 96°10.2 140°57.7 35.2 142°57.3 37.0 57°30.6 10.8 114°27.6 29.8 21 111°12.6 155°57.0 ·· 34.4 157°57.8 ·· 36.5 72°32.7 ·· 10.9 129°29.8 ·· 29.7 22 126°15.1 170°56.3 33.6 172°58.3 36.0 87°34.7 11.0 144°32.0 29.6 23 141°17.5 185°55.6 32.9 187°58.8 35.5 102°36.8 11.2 159°34.2 29.5  Horizontal parallax Venus: 0.1 Mars: 0.1													
22 126°15.1 170°56.3 33.6 172°58.3 36.0 87°34.7 11.0 144°32.0 29.6 Venus: 0.1 23 141°17.5 185°55.6 32.9 187°58.8 35.5 102°36.8 11.2 159°34.2 29.5 Mars: 0.1			140°57.7	35.2	$142^{\circ}57.3$		57°30.6		$114^{\circ}27.6$				
23 141°17.5 185°55.6 32.9 187°58.8 35.5 102°36.8 11.2 159°34.2 29.5 Mars: 0.1											Horizont	-	0.1
25 111 11.5 105 05.0 02.5 101 05.0 05.5 102 05.0 11.2 155 01.2 25.5													
Mer.pass. 13:36 $\nu$ -0.7′ $d$ -0.8′ m-3.88 $\nu$ 0.5′ $d$ -0.5′ m1.27 $\nu$ 2.1′ $d$ 0.1′ m-2.20 $\nu$ 2.2′ $d$ -0.1′ m0.96	23	141-17.5										iviais.	0.1
	Mer.p	ass. 13:36	$\nu$ -0.7′ d-0	.8′ m-3.88	$\nu$ 0.5′ d-0	.5′ m1.27	$\nu 2.1' d0.$	1′ m-2.20	$\nu$ 2.2′ d-0	.1′ m0.96			

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	176°40.3	S09°43.7	0°41.6	15.4'	N15° 17.1	-12.2'	54.0'
1	191°40.4	42.8	15°16.0	15.5'	15°04.9	-12.3'	54.0'
2	206° 40.5	41.9	29°50.5	15.5'	14°52.6	-12.4'	54.0'
3	221°40.6	• • 41.0	44°25.0	15.6'	14°40.3	-12.4'	54.0'
4	236° 40.6 251° 40.7	40.0 39.1	58°59.5 73°34.2	15.6'	14°27.8 14°15.4	-12.5'	54.0'
5 6	251 40.7 266° 40.8	509°38.2	73 34.2 88°08.9	15.7' 15.7'	N14°02.9	-12.5' -12.6'	54.0' 54.0'
7	281°40.9	37.3	102°43.6	15.8'	13°50.3	-12.6'	54.0'
8	296°41.0	36.4	117°18.4	15.8'	13°37.7	-12.7'	54.0'
9	311°41.1	• • 35.4	131°53.2	15.9'	13°25.1	-12.7'	54.0'
10	326°41.2	34.5	146°28.1	15.9'	13° 12.3	-12.8'	54.0'
11	341°41.3	33.6	161°03.1	16.0'	12°59.6	-12.8'	54.0'
12	356°41.4 11°41.5	S09°32.7 31.8	175°38.1 190°13.1	16.1' 16.1'	N12°46.8 12°33.9	-12.8' -12.9'	54.0' 54.0'
13 14	26°41.6	31.8	190°13.1 204°48.2	16.1	12° 33.9 12° 21.1	-12.9' -12.9'	54.0 53.9'
15	41°41.6	• • 29.9	219°23.4	16.2'	12°08.1	-12.9 -13.0'	53.9'
16	56°41.7	29.0	233°58.6	16.2'	11°55.1	-13.0'	53.9'
17	71°41.8	28.1	248°33.8	16.3'	11°42.1	-13.1'	53.9'
18	86°41.9	S09°27.1	263°09.1	16.3'	N11°29.1	-13.1'	53.9'
19	101°42.0	26.2	277°44.5	16.4'	11° 15.9	-13.1'	53.9'
20	116° 42.1	25.3	292°19.8	16.4'	11°02.8	-13.2'	53.9'
21 22	131° 42.2 146° 42.3	· · 24.4 23.4	306°55.3 321°30.7	16.5' 16.5'	10°49.6 10°36.4	-13.2' -13.3'	53.9' 53.9'
23	146°42.3 161°42.4	23.4 22.5	321°30.7 336°06.2	16.6	10° 36.4 10° 23.2	-13.3'	53.9' 53.9'
23						10.0	55.5
	SD = 16.2'	d = -0.9'		SI	O = 14.7'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0 1	176° 42.5 191° 42.6	\$09°21.6 20.7	350°41.8 5°17.4	16.6' 16.6'	N10°09.9 09°56.5	-13.3' -13.4'	53.9' 53.9'
2	191°42.6 206°42.7	20.7 19.7	5°17.4 19°53.0	16.6	09°56.5	-13.4' -13.4'	53.9' 53.9'
3	221°42.8	. 18.8	34°28.7	16.7	09°29.8	-13.4'	53.9'
4	236° 42.9	17.9	49°04.4	16.7'	09°16.3	-13.5'	53.9'
5	251°43.0	17.0	63°40.1	16.8'	09°02.9	-13.5'	53.9'
6	266°43.1	S09°16.0	78°15.9	16.8'	N08°49.4	-13.5'	53.9'
7	281° 43.1 296° 43.2	15.1	92°51.7 107°27.6	16.8'	08°35.9 08°22.3	-13.6'	53.9'
8 9	296°43.2 311°43.3	14.2 •• 13.3	107°27.6 122°03.5	16.9' 16.9'	08° 22.3	-13.6' -13.6'	53.9' 53.9'
10	326° 43.4	12.3	136°39.4	16.9'	07°55.1	-13.6'	53.9'
11	341°43.5	11.4	151°15.3	17.0'	07°41.5	-13.7'	53.9'
12	356°43.6	S09°10.5	165°51.3	17.0'	N07°27.8	-13.7'	53.9'
13	11°43.7	09.5	180°27.3	17.0'	07°14.1	-13.7'	53.9'
14	26° 43.8 41° 43.9	08.6	195°03.3	17.1'	07°00.4	-13.7'	53.9'
15 16	41°43.9 56°44.0	· · 07.7 06.8	209°39.4 224°15.5	17.1' 17.1'	06°46.7 06°32.9	-13.8' -13.8'	53.9' 53.9'
17	71°44.1	05.8	238°51.6	17.1	06° 19.1	-13.8'	53.9'
18	86°44.2	S09°04.9	253°27.7	17.2'	N06°05.3	-13.8'	53.9'
19	101°44.3	04.0	268°03.9	17.2'	$05^{\circ}51.5$	-13.9'	53.9'
20	116°44.4	03.0	282°40.0	17.2'	05°37.6	-13.9'	53.9'
21	131° 44.5	• • 02.1	297°16.2	17.2'	05°23.8	-13.9'	53.9'
22	146° 44.6 161° 44.7	01.2	311°52.5	17.2'	05°09.9 04°56.0	-13.9'	53.9' 53.9'
23		00.3	326°28.7	17.3'		-13.9'	53.9
	SD = 16.2'	d = -0.9'		SI	O = 14.7'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°44.8	S08°59.3	341°04.9	17.3'	N04°42.0	-13.9'	53.9'
1	191°44.9	58.4	355°41.2	17.3'	04°28.1 04°14.1	-14.0'	53.9'
2	206° 45.0 221° 45.1	57.5 •• 56.5	10°17.5 24°53.8	17.3' 17.3'	04°14.1 04°00.2	-14.0' -14.0'	53.9' 53.9'
3 4	221 45.1 236°45.2	55.6	24 53.8 39°30.1	17.3'	04 00.2 03°46.2	-14.0'	53.9'
5	251° 45.3	54.7	54°06.5	17.3	03°32.2	-14.0'	53.9'
6	266° 45.4	S08°53.7	68°42.8	17.4'	N03°18.2	-14.0'	53.9'
7	281°45.5	52.8	83°19.2	17.4'	03°04.1	-14.0'	53.9'
8	296°45.6	51.9	97°55.6	17.4	02°50.1	-14.0'	53.9'
9	311° 45.7 326° 45.8	• • 50.9	112°31.9 127°08.3	17.4' 17.4'	02°36.1 02°22.0	-14.1'	53.9'
10 11	326°45.8 341°45.9	50.0 49.1	127°08.3 141°44.7	17.4' 17.4'	02°22.0 02°07.9	-14.1' -14.1'	53.9' 53.9'
12	356° 46.0	508°48.1	156°21.1	17.4	N01°53.9	-14.1	53.9
13	11°46.1	47.2	170°57.5	17.4'	01°39.8	-14.1'	53.9'
14	26°46.2	46.3	185°34.0	17.4'	01°25.7	-14.1'	53.9'
15	41°46.4	• • 45.3	200°10.4	17.4	01°11.6	-14.1'	53.9'
16 17	56° 46.5 71° 46.6	44.4 43.5	214°46.8 229°23.2	17.4' 17.4'	00°57.5 00°43.4	-14.1' -14.1'	54.0' 54.0'
18	71 46.6 86°46.7	43.5 \$08°42.5	243°59.6	17.4	N00°29.3	-14.1	54.0'
19	101°46.8	41.6	258°36.1	17.4	00° 15.2	-14.1'	54.0'
20	116°46.9	40.7	273°12.5	17.4'	$N00^{\circ}01.0$	-14.1'	54.0'
21	131° 47.0	• • 39.7	287°48.9	17.4	500°13.1	14.1'	54.0'
22 23	146° 47.1 161° 47.2	38.8 37.9	302°25.3 317°01.7	17.4' 17.4'	00°27.2 00°41.3	14.1' 14.1'	54.0' 54.0'
23			31/ 01./			14.1	J4.U
	SD = 16.2'	d = -0.9'		SI	O = 14.7'		

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

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

		Sun			Moon	
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	15-17
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	100-98%
24	13:19	13:15	12:13	-:-	12:18	
25	13:10	13:05	12:13	00:38	12:58	
26	13:01	12:56	12:13	01:18	13:37	

## February 27, 28, 29 UT (Tue., Wed., Thu.)

h	Aries		nus		ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
	156° 20.0		\$17°32.1	202°59.3	\$18°35.0		N14°11.3		S09°29.4		SHA	Dec
0	171°22.5	200°54.9 215°54.3		202 59.3 217°59.8		117°38.9 132°40.9		174°36.3 189°38.5		Alpheratz	357°35.9	29°13.4
1		215 54.5 230°53.6	31.3		34.5		11.5	204°40.7	29.2	Ankaa	353°08.2	-42°10.7
2	186°24.9		30.5	233°00.3	34.0	147°43.0	11.6		29.1	Schedar	349°32.4	56°40.2
3	201°27.4	245°52.9	• • 29.7	248°00.8	• • 33.5	162°45.0	• • 11.7	219°42.9	• • 29.0	Diphda	348°48.3	-17°51.4
4	216°29.9	260°52.2	29.0	263°01.3	32.9	177°47.1	11.9	234°45.0	28.9	Achernar	335°21.1	-57°07.1
5	231°32.3	275°51.6	28.2	278°01.8	32.4	192°49.2	12.0	249°47.2	28.8	Hamal	327°52.2	23°34.6
6	246°34.8	290°50.9	S17°27.4	293°02.3	S18°31.9	207°51.2	N14°12.1	264°49.4	S09°28.7	Polaris	314°34.3	89°22.2
7	261°37.3	305°50.2	26.6	308°02.8	31.4	222°53.3	12.3	279°51.6	28.6	Acamar	315° 12.5	-40°12.7
8	276°39.7	320°49.5	25.8	323°03.3	30.9	237°55.4	12.4	294°53.8	28.5	Menkar	314°07.0	4°11.0
9	291°42.2	335°48.9	• • 25.0	338°03.8	• • 30.4	252°57.4	• • 12.5	309°55.9	• • 28.3	Mirfak	308° 29.4	49°57.0
10	306°44.6	350°48.2	24.3	353°04.3	29.9	267°59.5	12.7	324°58.1	28.2	Aldebaran	290°40.4	16°33.5
11	321°47.1	5°47.5	23.5	8°04.8	29.3	283°01.5	12.8	340°00.3	28.1		290 40.4 281°04.5	-8°10.6
12	336°49.6	20°46.8	S17°22.7	23°05.3	S18°28.8	298°03.6	N14°13.0	355°02.5	S09°28.0	Rigel		
13	351°52.0	35°46.2	21.9	38°05.8	28.3	313°05.7	13.1	10°04.6	27.9	Capella	280°22.8	46°01.5
14	6°54.5	50° 45.5	21.1	53°06.3	27.8	328°07.7	13.2	25°06.8	27.8	Bellatrix	278°23.6	6°22.2
15	21°57.0	65°44.8	• • 20.3	68°06.8	• • 27.3	343°09.8	• • 13.4	40°09.0	• • 27.7	Elnath	278°02.7	28°37.7
16	36°59.4	80°44.2	19.5	83°07.3	26.8	358°11.8	13.5	55°11.2	27.5	Alnilam	275°38.4	-1°11.3
17	52°01.9	95°43.5	18.7	98°07.8	26.2	13°13.9	13.6	70°13.3	27.4	Betelgeuse	270°52.7	7°24.6
18	67°04.4	110°42.8	S17°17.9	113°08.3	\$18°25.7	28°16.0	N14°13.8	85° 15.5	S09°27.3	Canopus	263°52.5	-52°42.7
19	82°06.8	125° 42.1	17.1	128°08.8	25.2	43°18.0	13.9	100° 17.7	27.2	Sirius	258°26.7	-16°45.1
20	97°09.3	140°41.5	16.3	143°09.3	24.7	58°20.1	14.1	115° 19.9	27.1	Adhara	255°06.2	-29°00.5
21	112°11.8	155° 40.8	15.6	143 09.3 158°09.8	• • 24.2	73°22.1	14.2	130°22.1	• • 27.0	Procyon	244°51.3	5°09.7
22	112 11.8 127°14.2	155 40.8 170°40.1	14.8	158 09.8 173°10.3	23.7	73 22.1 88°24.2	14.2	130 22.1 145°24.2	26.9	Pollux	243°17.9	27°58.1
						103°26.2				Avior	$234^{\circ}14.5$	-59°35.3
23	142°16.7	185°39.5	14.0	188°10.8	23.1		14.5	160°26.4	26.7	Suhail	222°46.4	-43°31.9
Mer.p	ass. 13:32	$\nu$ -0.7′ d-0	).8′ m-3.88	$\nu$ 0.5′ d-0	.5′ m1.27	$\nu 2.1' \ d0.$	1' m-2.20	$\nu$ 2.2' d-0	.1'  m0.95	Miaplacidus	221°37.6	-69°49.0
					-					Alphard	217°48.2	-8°45.9
			_		_		-		_	Regulus	207°34.9	11°50.9
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.2	61°37.2
0	157° 19.1	200°38.8	<b>S</b> 17°13.2	203°11.3	S18°22.6	118°28.3	N14°14.6	175° 28.6	S09°26.6	Denebola	182°25.4	14°26.1
1	172°21.6	215°38.1	12.4	218°11.8	22.1	133°30.4	14.7	190°30.8	26.5	Gienah		-17°40.6
2	187°24.1	230°37.5	11.6	233°12.3	21.6	148°32.4	14.9	205°32.9	26.4		173°00.4	-63°13.9
3	202°26.5	245°36.8	• • 10.8	248°12.8	• • 21.1	163°34.5	• • 15.0	220°35.1	• • 26.3		173 00.4 171°52.0	-57°14.8
4	217°29.0	260°36.1	10.0	263°13.3	20.5	178°36.5	15.2	235°37.3	26.2	1	166° 13.1	55°49.5
5	232°31.5	275°35.5	09.2	278°13.8	20.0	193°38.6	15.3	250°39.5	26.1	Alioth		
6	247°33.9	290°34.8	S17°08.4	293°14.3	S18°19.5	208°40.6	N14°15.4	265°41.6	S09°26.0	Spica	158°22.8	-11°17.3
7	262°36.4	305°34.1	07.6	308°14.8	19.0	223°42.7	15.6	280°43.8	25.8	Alkaid	152°52.2	49°11.3
8	277°38.9	320°33.5	06.7	323°15.3	18.5	238°44.8	15.7	295°46.0	25.7	Hadar	148°36.7	-60°29.2
9	292°41.3	335°32.8	• • 05.9	338°15.8	• • 17.9	253°46.8	. 15.9	310°48.2	25.6		147°58.3	-36°29.3
10	307°43.8	350°32.2	05.1	353°16.3	17.4	268°48.9	16.0	325°50.4	25.5	Arcturus	145°48.4	19°03.2
11	322°46.2	5° 31.5	04.3	8°16.8	16.9	283°50.9	16.1	340°52.5	25.4	Rigil Kent.	139°41.0	-60°55.9
12	322 40.2 337°48.7	20°30.8	517°03.5	23°17.3	518°16.4	298°53.0	N14°16.3	355° 54.7		Kochab	137°19.2	74°03.0
									S09°25.3	Zuben'ubi	136°56.7	-16°08.6
13	352°51.2	35°30.2	02.7	38°17.8	15.8	313°55.0	16.4	10°56.9	25.2	Alphecca	126°04.3	26°37.7
14	7°53.6	50° 29.5	01.9	53°18.3	15.3	328°57.1	16.5	25°59.1	25.0	Antares	$112^{\circ}16.7$	-26°29.1
15	22°56.1	65°28.8	• • 01.1	68°18.8	• • 14.8	343°59.1	• • 16.7	41°01.2	• • 24.9	Atria	107°11.7	-69°04.0
16	37°58.6	80°28.2	17°00.3	83°19.3	14.3	359°01.2	16.8	56°03.4	24.8	Sabik	102°03.7	-15°45.3
17	53°01.0	95°27.5	16°59.5	98°19.8	13.7	14°03.3	17.0	71°05.6	24.7	Shaula	96°11.5	-37°07.2
18	68°03.5	110°26.9	S16°58.7	113°20.3	S18°13.2	29°05.3	N14°17.1	86°07.8	S09°24.6	Rasalhague	95°59.3	12°32.3
19	83°06.0	125°26.2	57.8	128°20.8	12.7	44°07.4	17.2	101°09.9	24.5	Eltanin	90°42.7	51°28.8
20	98°08.4	140°25.5	57.0	143°21.3	12.2	59°09.4	17.4	$116^{\circ}12.1$	24.4	Kaus Aust.	83°33.6	-34°22.4
21	113°10.9	155°24.9	• • 56.2	158°21.8	• • 11.6	74°11.5	• • 17.5	131°14.3	• • 24.3	Vega	80°33.9	38°48.0
22	128°13.4	170°24.2	55.4	173°22.3	11.1	89°13.5	17.7	$146^{\circ}16.5$	24.1	Nunki	75°48.9	-26°16.0
23	143°15.8	185°23.6	54.6	188°22.8	10.6	104°15.6	17.8	161°18.7	24.0	1		
										Altair	62°00.9	8°55.7
Mer.p	ass. 13:29	$\nu$ -0. $l'$ $d$ -0	).8′ m-3.88	$\nu$ 0.5′ $d$ -0	.5′ m1.27	$\nu^{2.1'} d0.$	.1′ m-2.19	$\nu$ 2.2' d-0	.1′ m0.95	Peacock	53°07.3	-56°39.4
										Deneb	49°26.7	45°21.7
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.8	9°59.0
0	158°18.3	200°22.9	\$16°53.8	203°23.3	\$18°10.1	119°17.6	N14°17.9	176°20.8	S09°23.9	Al Na'ir	27°34.2	-46°50.7
1	173° 20.7	215° 22.3	52.9	203°23.3° 218°23.8	09.5	134°19.7	18.1	191°23.0	23.8	Fomalhaut	15° 15.6	-29°29.8
2	173 20.7 188°23.2	230°21.6	52.9	233°24.3	09.0	149°21.7	18.2	206°25.2	23.7	Scheat	13°46.3	28°12.7
3	203°25.7	230 21.0 245°21.0	51.3	233 24.3 248°24.8	•• 08.5	164°23.8	18.3	200 25.2 221°27.4	23.6	Markab	13°30.9	15°20.0
	203 25.7 218°28.1	245 21.0 260°20.3	50.5	248 24.8 263°25.3	08.0	104 23.8 179°25.8	18.5	221 27.4 236°29.5		Feb 27 Tue	SHA	Mer.pass
4									23.5	Venus	44°34.9	10:37
5	233°30.6	275°19.6	49.7	278°25.9	07.4	194°27.9	18.6	251°31.7	23.3	Mars	44°34.9 46°39.3	10:37
6	248°33.1	290°19.0	\$16°48.8	293°26.4	\$18°06.9	209°29.9	N14°18.8	266°33.9	S09°23.2			
7	263°35.5	305°18.3	48.0	308°26.9	06.4	224°32.0	18.9	281°36.1	23.1	Jupiter	321°18.8	16:07
8	278°38.0	320°17.7	47.2	323°27.4	05.8	239°34.1	19.0	296°38.2	23.0	Saturn	18° 16.3	12:20
9	293°40.5	335°17.0	• • 46.4	338°27.9	• • 05.3	254°36.1	19.2	311°40.4	• • 22.9	Feb 28 Wed	SHA	Mer.pass
10	308°42.9	350° 16.4	45.5	353°28.4	04.8	269°38.2	19.3	326°42.6	22.8	Venus	43°19.7	10:38
11	323°45.4	5° 15.7	44.7	8°28.9	04.2	284°40.2	19.5	341°44.8	22.7	Mars	45°52.1	10:27
12	338°47.8	20° 15.1	S16°43.9	23°29.4	\$18°03.7	299°42.3	N14°19.6	356°47.0	S09°22.5	Jupiter	321°09.2	16:04
13	353°50.3	35°14.4	43.0	38°29.9	03.2	314°44.3	19.7	11°49.1	22.4	Saturn	18°09.4	12:16
14	8°52.8	50° 13.8	42.2	53°30.4	02.7	329°46.4	19.9	26°51.3	22.3	Jatuill	25 55.7	12.10
15	23°55.2	65° 13.1	• • 41.4	68°30.9	•• 02.1	344°48.4	• • 20.0	41°53.5	• • 22.2	Feb 29 Thu	SHA	Mer.pass
16	38°57.7	$80^{\circ}12.5$	40.6	83°31.4	01.6	359°50.5	20.2	56°55.7	22.1	Venus	42°04.6	10:39
17	54°00.2	95°11.8	39.7	98°31.9	01.1	14°52.5	20.3	71°57.8	22.0	Mars	45°05.0	10:26
18	69°02.6	110°11.2	S16°38.9	113°32.4	S18°00.5	29°54.6	N14°20.4	87°00.0	S09°21.9	Jupiter		16:01
19	84°05.1	$125^{\circ}10.5$	38.1	128°32.9	18°00.0	44°56.6	20.6	$102^{\circ}02.2$	21.8	Saturn	18°02.5	12:13
20	99°07.6	140°09.9	37.2	143°33.5	17°59.5	59°58.7	20.7	117°04.4	21.6	- Catain		
21	114°10.0	155°09.2	36.4	158°34.0	• • 58.9	75°00.7	20.9	132°06.5	. 21.5	Horizont	al parallax	
22	129°12.5	170°08.6	35.5	173°34.5	58.4	90°02.8	21.0	147°08.7	21.4		Venus:	0.1
23	144°15.0	185°07.9	34.7	188°35.0	57.9	105°04.8	21.1	162°10.9	21.3		Mars:	0.1
Mer.p	ass. 13:25	$\nu$ -0.7′ d-0	).8′ m-3.88	$\nu$ 0.5′ d-0	.5′ m1.27	$\nu 2.1' \ d0.$	.1′ m-2.19	$\nu$ 2.2' d-0	.1'  m0.95			

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	176°47.3	<b>S</b> 08°36.9	$331^{\circ}38.1$	17.4'	S00°55.4	14.1'	54.0'
1	191°47.4	36.0	346°14.5	17.4	01°09.5	14.1'	54.0'
2 3	206° 47.5 221° 47.6	35.0 •• 34.1	0°50.9 15°27.3	17.4' 17.4'	01°23.7 01°37.8	14.1' 14.1'	54.0' 54.0'
4	236° 47.7	33.2	30°03.6	17.4	01°51.9	14.1'	54.0'
5	251°47.8	32.2	44°40.0	17.3'	$02^{\circ}06.0$	14.1'	54.0'
6	266° 47.9	S08°31.3	59°16.4	17.3'	S02°20.1	14.1'	54.0'
7 8	281°48.0 296°48.2	30.4 29.4	73°52.7 88°29.0	17.3' 17.3'	02°34.2 02°48.3	14.1' 14.1'	54.0' 54.0'
9	311° 48.3	28.5	103°05.3	17.3	02°40.3	14.1	54.0'
10	326°48.4	27.5	$117^{\circ}41.6$	17.3'	03°16.4	14.1'	54.1'
11	341°48.5	26.6	132°17.9	17.3'	03°30.5	14.1'	54.1'
12 13	356° 48.6 11° 48.7	S08°25.7 24.7	146°54.1 161°30.4	17.2' 17.2'	\$03°44.5 03°58.6	14.0' 14.0'	54.1' 54.1'
14	26° 48.8	23.8	176°06.6	17.2'	03° 30.0	14.0'	54.1'
15	41°48.9	• • 22.9	$190^{\circ}42.8$	17.2'	04°26.7	14.0'	54.1'
16	56° 49.0	21.9	205°18.9	17.1'	04°40.7	14.0'	54.1'
17 18	71°49.1 86°49.2	21.0 \$08°20.0	219°55.1 234°31.2	17.1' 17.1'	04°54.7 \$05°08.6	14.0' 14.0'	54.1' 54.1'
19	101°49.4	19.1	249°07.3	17.1	05°22.6	14.0'	54.1'
20	116°49.5	18.2	263°43.4	17.0'	05°36.6	13.9'	54.1'
21	131°49.6	• • 17.2	278°19.4	17.0'	05°50.5	13.9'	54.1'
22	146° 49.7 161° 49.8	16.3	292°55.4 307°31.4	17.0'	06°04.4 06°18.3	13.9' 13.9'	54.2'
23		15.3	307 31.4	17.0'		13.9	54.2'
	SD = 16.1'	d = -0.9'		SE	0 = 14.7'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°49.9	<b>S</b> 08°14.4	322°07.4	16.9'	<b>S</b> 06°32.2	13.9'	54.2'
1	191°50.0	13.4	336°43.3	16.9'	06°46.1	13.8'	54.2'
2	206° 50.1 221° 50.2	12.5 •• 11.6	351°19.2 5°55.1	16.9' 16.8'	06°59.9 07°13.8	13.8' 13.8'	54.2' 54.2'
3 4	236° 50.4	10.6	20°30.9	16.8'	07 13.6 07°27.6	13.8'	54.2'
5	251° 50.5	09.7	35°06.7	16.7'	07°41.4	13.8'	54.2'
6	266° 50.6	S08°08.7	49°42.4	16.7'	507°55.1	13.7'	54.2'
7 8	281°50.7 296°50.8	07.8 06.8	64°18.1 78°53.8	16.7' 16.6'	08°08.9 08°22.6	13.7' 13.7'	54.2' 54.3'
9	296 50.8 311°50.9	05.9	78 53.8 93°29.4	16.6'	08°22.6	13.7'	54.3'
10	326°51.0	05.0	108°05.0	16.5'	08°49.9	13.6'	54.3'
11	341°51.2	04.0	122°40.5	16.5'	09°03.6	13.6'	54.3'
12	356°51.3 11°51.4	\$08°03.1 02.1	137°16.0 151°51.5	16.5' 16.4'	509°17.2 09°30.7	13.6'	54.3'
13 14	26° 51.5	02.1	151°51.5 166°26.9	16.4	09°30.7 09°44.3	13.5' 13.5'	54.3' 54.3'
15	41°51.6	08°00.2	181°02.3	16.3'	09°57.8	13.5'	54.3'
16	56° 51.7	$07^{\circ}59.3$	195°37.6	16.3'	10°11.3	13.5'	54.4'
17	71°51.8 86°52.0	58.4 \$07°57.4	210°12.9 224°48.1	16.2'	10°24.7 \$10°38.2	13.4'	54.4'
18 19	101°52.1	56.5	239°23.2	16.2' 16.1'	10°51.6	13.4' 13.4'	54.4' 54.4'
20	116° 52.2	55.5	253°58.4		11°04.9		54.4'
21	131°52.3	• • 54.6	268°33.4	16.0'	11°18.2	13.3'	54.4'
22	146°52.4	53.6	283°08.4 297°43.4	16.0'	11°31.5 11°44.8	13.2'	54.4'
23	161°52.5	52.7	297 43.4	15.9'		13.2'	54.5'
	SD = 16.1'	d = -0.9'		SL	0 = 14.8'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°52.7	<b>S</b> 07°51.7	$312^{\circ}18.3$	15.8'	S11°58.0	13.2'	54.5'
1	191°52.8	50.8	326°53.1	15.8'	12°11.1	13.1'	54.5'
2 3	206° 52.9 221° 53.0	49.8 •• 48.9	341°27.9 356°02.6	15.7' 15.7'	12°24.3 12°37.4	13.1' 13.0'	54.5' 54.5'
4	236°53.1	47.9	10°37.3	15.6'	12°50.4	13.0'	54.5'
5	251°53.2	47.0	$25^{\circ}11.9$	15.5'	13°03.4	13.0'	54.6'
6	266° 53.4	S07°46.1	39°46.4	15.5'	\$13°16.4	12.9'	54.6'
7 8	281°53.5 296°53.6	45.1 44.2	54°20.9 68°55.3	15.4' 15.3'	13°29.3 13°42.2	12.9' 12.8'	54.6' 54.6'
9	290 53.0 311°53.7	• • 43.2	83°29.6	15.3'	13 42.2 13°55.0	12.8'	54.6'
10	326°53.8	42.3	98°03.9	15.2'	14°07.8	12.7'	54.6'
11	341°54.0	41.3	112°38.1	15.1'	14°20.5	12.7'	54.7'
12 13	356°54.1 11°54.2	\$07°40.4 39.4	127°12.2 141°46.3	15.1' 15.0'	\$14°33.2 14°45.8	12.6' 12.6'	54.7' 54.7'
13 14	26° 54.3	39.4 38.5	141 46.3 156°20.3	15.0 14.9'	14 45.8 14°58.4	12.5	54.7' 54.7'
15	41°54.4	• • 37.5	$170^{\circ}54.2$	14.8'	15°11.0	12.5'	54.7'
16	56° 54.6	36.6	185°28.0	14.8'	15°23.4	12.4'	54.7'
17 18	71°54.7 86°54.8	35.6 \$07°34.7	200°01.8 214°35.5	14.7' 14.6'	15°35.9 \$15°48.2	12.4' 12.3'	54.8' 54.8'
19	80 54.8 101°54.9	33.7	214 35.5 229°09.1	14.6 14.5'	16°00.6	12.3'	54.8'
20	116°55.0	32.8	243°42.7	14.5'	16°12.8	12.2'	54.8'
21	131°55.2	• • 31.8	258°16.2	14.4'	16°25.0	12.1'	54.8'
22 23	146° 55.3 161° 55.4	30.9 29.9	272°49.5 287°22.8	14.3' 14.2'	16°37.2 16°49.3	12.1' 12.0'	54.9' 54.9'
23			201 22.8			12.0	54.9
	SD = 16.1'	d = -0.9'		SE	0 = 14.9'		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper Lower		18-20	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	95-83%	
27	12:51	12:46	12:13	01:57	14:16		
28	12:40	12:35	12:13	02:36	14:56		
29	12:29	12:24	12:12	03:16	15:37		

## March 01, 02, 03 UT (Fri., Sat., Sun.)

h	Aries	Ve	nus		ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	159° 17.4	200°07.3	S16°33.9	203°35.5	S17°57.3	120°06.8	N14°21.3	177°13.1	S09°21.2			
1	174° 19.9	215°06.7	33.0	218°36.0	56.8	135°08.9	21.4	192°15.3	21.1	Alpheratz	357°35.9	29°13.3
2	189°22.3	230°06.0	32.2	233°36.5	56.2	150° 10.9	21.6	207°17.4	21.0	Ankaa	353°08.2	-42°10.7
3	204°24.8	245°05.4	• • 31.4	248°37.0	• • 55.7	165° 13.0	• • 21.7	222°19.6	20.8	Schedar	349°32.4	56°40.2
4	219°27.3	260°04.7	30.5	263°37.5	55.2	180° 15.0	21.8	237°21.8	20.7	Diphda	348°48.3	-17°51.4
5	234°29.7	275°04.1	29.7	278°38.0	54.6	195° 17.1	22.0	252°24.0	20.6	Achernar	335°21.1	-57°07.1
6	249°32.2	290°03.4	S16°28.8	293°38.5	\$17°54.1	210° 19.1	N14°22.1	267°26.1	S09°20.5	Hamal	327°52.2	23°34.6
7	264°34.7	305°02.8	28.0	308°39.1	53.6	225°21.2	22.3	282°28.3	20.4	Polaris	314°35.6	89°22.2
8	279°37.1	320°02.2	27.1	323°39.6	53.0	240°23.2	22.4	297°30.5	20.3	Acamar	315° 12.5	-40°12.7
9	294°39.6	335°01.5	26.3	338°40.1	52.5	255°25.3	• • 22.5	312°32.7	20.2	Menkar	314°07.0	4°11.0
10	309°42.1	350°00.9	25.4	353°40.6	52.0	270°27.3	22.7	327°34.8	20.1	Mirfak	308°29.4	49°57.0
11	324° 44.5	5°00.2	24.6	8°41.1	51.4	285°29.4	22.8	342°37.0	19.9	Aldebaran	290°40.4	16°33.5
12	339°47.0	19°59.6	\$16°23.8	23°41.6	S17°50.9	300°31.4	N14°23.0	357°39.2	S09°19.8	Rigel	281°04.5	-8°10.6
13	354°49.5	34°59.0	22.9	38°42.1	50.3	315°33.5	23.1	12°41.4	19.7	Capella	280°22.9	46°01.5
14	9°51.9	49°58.3	22.1	53°42.6	49.8	330°35.5	23.2	27°43.6	19.6	Bellatrix	278°23.6	6°22.2
15	24°54.4	64°57.7	• • 21.2	68°43.1	49.3	345°37.5	• • 23.4	42°45.7	• • 19.5	Elnath	278°02.7	28°37.7
16	39°56.8	79°57.0	20.4	83°43.6	48.7	0°39.6	23.5	57°47.9	19.4	Alnilam	275°38.4	-1°11.3
17	54°59.3	94°56.4	19.5	98°44.2	48.2	15°41.6	23.7	72°50.1	19.3	Betelgeuse	270°52.8	7°24.6
18	70°01.8	109°55.8	S16°18.7	113° 44.7	\$17°47.6	30°43.7	N14°23.8	87°52.3	S09°19.1	Canopus	263°52.5	-52°42.7
19	85°04.2	124°55.1	17.8	128° 45.2	47.1	45°45.7	23.9	102°54.4	19.0	Sirius	258° 26.7	-16°45.1
20	100°06.7	139°54.5	16.9	143° 45.7	46.6	60°47.8	24.1	117°56.6	18.9	Adhara	255°06.2	-29°00.5
21	115°09.2	154°53.9	. 16.1	158° 46.2	• • 46.0	75°49.8	24.2	132°58.8	• • 18.8	Procyon	244°51.4	5°09.7
22	130° 11.6	169°53.2	15.2	173° 46.7	45.5	90°51.9	24.2	132 30.0 148°01.0	18.7	Pollux	243°17.9	27°58.1
23	145° 14.1	184°52.6	14.4	173 40.7 188° 47.2	44.9	105°53.9	24.4	163°03.1	18.6	Avior	234°14.5	-59°35.3
										Suhail	222°46.5	-43°31.9
Mer.p	ass. 13:21	$\nu$ -0.6' d-0	0.8′ m-3.88	$\nu$ 0.5′ d-0	.5′ m1.27	$\nu 2.0' \ d0.$	1'  m-2.18	$\nu$ 2.2′ d-0	$.1^\prime$ m0.96	Miaplacidus	221°37.6	-69°49.0
						-				Alphard	217°48.2	-8°45.9
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.9	11°50.9
0 0	160° 16.6	199°52.0	\$16°13.5	203° 47.7	S17°44.4	120°55.9	N14°24.7	178°05.3	S09°18.5	Dubhe	193°41.2	61°37.2
1	175° 19.0	199 52.0 214°51.3	12.7	203 47.7 218°48.3	43.8	120 55.9 135°58.0	24.8	178 05.3 193°07.5	18.3	Denebola	182°25.4	14°26.1
2	175 19.0 190° 21.5	214 51.3 229°50.7	11.8	233°48.8	43.3	151°00.0	24.8	208°09.7		Gienah	175°44.0	-17°40.6
3	205° 23.9	244°50.1	. 10.9	233 46.6 248°49.3	. 42.8	166°02.1	25.1	208 09.7 223°11.9	18.2 •• 18.1	Acrux	173°00.3	-63°13.9
4	205 23.9 220°26.4	259°49.4	10.9	246 49.3 263°49.8	42.0	181°04.1	25.2	238°14.0		Gacrux	171°52.0	-57°14.8
	235° 28.9	259 49.4 274°48.8						250°14.0° 253°16.2	18.0	Alioth	$166^{\circ}13.1$	55°49.5
5			09.2	278°50.3	41.7	196°06.2	25.4		17.9	Spica	158°22.8	-11°17.3
6	250°31.3 265°33.8	289°48.2 304°47.5	\$16°08.4	293°50.8	\$17°41.1	211°08.2 226°10.2	N14°25.5	268°18.4 283°20.6	\$09°17.8	Alkaid	152°52.2	49°11.3
7		304 47.5 319°46.9	07.5	308°51.3	40.6	241°12.3	25.6	283 20.6 298°22.7	17.7	Hadar	148°36.7	-60°29.2
8	280°36.3		06.6	323°51.8	40.0		25.8		17.6	Menkent	147°58.2	-36°29.3
9	295°38.7	334°46.3	• • 05.8	338° 52.4	• • 39.5	256°14.3	• • 25.9	313°24.9	• • 17.4	Arcturus	145°48.4	19°03.2
10	310°41.2	349°45.6	04.9	353°52.9	38.9	271°16.4	26.1	328°27.1	17.3	Rigil Kent.	139°41.0	-60°55.9
11	325° 43.7	4°45.0	04.0	8°53.4	38.4	286°18.4	26.2	343°29.3	17.2	Kochab	$137^{\circ}19.2$	74°03.0
12	340°46.1	19°44.4	\$16°03.2	23°53.9	\$17°37.8	301°20.5	N14°26.3	358°31.4	509°17.1	Zuben'ubi	136°56.7	-16°08.6
13	355°48.6 10°51.1	34°43.7 49°43.1	02.3	38° 54.4 53° 54.9	37.3	316°22.5 331°24.5	26.5	13°33.6 28°35.8	17.0	Alphecca	$126^{\circ}04.2$	26°37.7
14			01.4		36.8		26.6		16.9	Antares	$112^{\circ}16.7$	-26°29.1
15	25°53.5 40°56.0	64°42.5 79°41.9	16°00.6 15°59.7	68° 55.4 83° 56.0	36.2	346°26.6 1°28.6	• • 26.8	43°38.0 58°40.2	. 16.8	Atria	$107^{\circ}11.6$	-69°04.0
16 17	55° 58.4	94°41.9	15 59.7 58.8	98° 56.5	35.7 35.1	16°30.7	26.9 27.1	73°42.3	16.6	Sabik	102°03.6	-15°45.3
18	71°00.9	109°40.6	\$15°58.0	113° 57.0	\$17° 34.6	31°32.7	N14°27.2	88°44.5	16.5 \$09°16.4	Shaula	$96^{\circ}11.4$	-37°07.2
19	86°03.4	109 40.0 124°40.0		113 57.0 128° 57.5	0.4.0	46°34.7	07.0	103°46.7		Rasalhague	95°59.3	12°32.3
20	101°05.8	139°39.4	57.1 56.2	143°58.0	34.0 33.5	61°36.8	27.3 27.5	103°48.9	16.3 16.2	Eltanin	90°42.7	51°28.7
21	116° 08.3	159° 39.4° 154° 38.7	55.3	143 58.0 158° 58.5	32.9	76°38.8	27.6	133°51.0	. 16.1	Kaus Aust.	83°33.6	-34°22.3
22	131° 10.8	169°38.1	54.5	173° 59.1	32.4	91°40.9	27.8	148°53.2	16.0	Vega	80°33.9	38°48.0
23	146° 13.2	184°37.5	53.6	173 59.1 188° 59.6	31.8	106°42.9	27.8	163°55.4	15.8	Nunki	75°48.8	-26°16.0
	140 13.2	104 37.3				100 42.9	21.9	103 55.4	15.0	Altair	62°00.9	8°55.7
Mer.p	ass. 13:17	$\nu$ -0.6' d-0	0.9′ m-3.88	$\nu$ 0.5 $'$ d-0	0.5'  m 1.26	$\nu 2.0' \ d0.$	1'  m-2.18	$\nu 2.2' \ d-0$	.1' m $0.96$	Peacock	53°07.3	-56°39.4
										Deneb	49°26.7	45°21.7
C	CIIA	CHA	D	CIIA	D	CIIA	D	CIIA	D	Enif	33°39.8	9°59.0
Sun 0	<b>GHA</b> 161° 15.7	<b>GHA</b> 199°36.9	Dec \$15°52.7	<b>GHA</b> 204°00.1	Dec \$17°31.3	<b>GHA</b> 121° 44.9	<b>Dec</b> N14°28.0	<b>GHA</b> 178°57.6	<b>Dec</b> \$09°15.7	Al Na'ir	27°34.2	-46°50.7
1	101 15.7 176° 18.2	214°36.2	\$15°52.7 51.8	204 00.1 219°00.6	30.7	121 44.9 136°47.0	28.2	178 57.6 193°59.7	15.6	Fomalhaut	15°15.6	-29°29.8
2	176 18.2 191°20.6	214 36.2 229°35.6	51.8 51.0	219 00.6 234°01.1	30.7	150 47.0 151°49.0	28.2	193 59.7 209°01.9		Scheat	13°46.3	28°12.7
3	206° 23.1	229°35.6 244°35.0	50.1	234°01.1 249°01.6	30.2 •• 29.6	151° 49.0 166° 51.0	28.3	209°01.9 224°04.1	15.5 •• 15.4	Markab	13°30.9	15°20.0
3 4	206 23.1 221°25.6	244 35.0 259°34.4	49.2	249 01.6 264°02.2	29.0	181°53.1	28.6	224 04.1 239°06.3	15.3	Mar 01 Fri	SHA	Mer.pass
4 5	221 25.0 236° 28.0	259 34.4 274°33.8	49.2 48.3	204 02.2 279°02.7	29.1	181 53.1 196°55.1	28.8	254°08.5	15.3	Venus	3⊓A 40°49.9	10:40
6	251° 30.5	274 33.8 289°33.1	48.3 \$15°47.4	279 02.7 294°03.2	\$17°28.0	211°57.2	28.8 N14°28.9	269°10.6	509°15.1	Mars	40° 49.9 44° 18.1	10:40
7	266° 32.9	304°32.5	46.6	309°03.7	27.4	211 57.2 226°59.2	29.0	284°12.8	14.9	Jupiter	320°49.4	15:57
8	200 32.9 281°35.4	304 32.5 319°31.9	46.6 45.7	309 03.7 324°04.2	26.8	242° 01.2	29.0	284 12.8 299°15.0	14.9	Saturn	17°55.7	12:09
9	201 35.4 296° 37.9	334°31.3	• • 44.8	339°04.7	26.3	257°03.3	29.2	314°17.2	. 14.6	Jatuill	21 33.1	12.03
10	311° 40.3	349°30.7	43.9	354° 05.3	25.7	272°05.3	29.5	329°19.3	14.7	Mar 02 Sat	SHA	Mer.pass
11	326° 42.8	4°30.0	43.9	9°05.8	25.7	287° 07.3	29.5	344°21.5	14.5	Venus	39°35.4	10:41
12	341°45.3	19°29.4	\$15°42.1	24°06.3	\$17°24.6	302°09.4	N14°29.8	359°23.7	509°14.4	Mars	43°31.2	10:24
13	356° 47.7	34°28.8	41.2	39°06.8	24.1	317°11.4	29.9	14°25.9	14.3	Jupiter	320°39.4	15:54
14	11° 50.2	49°28.2	40.4	54°07.3	23.5	332°13.5	30.0	29°28.1	14.1	Saturn	17°48.8	12:06
15	26° 52.7	64°27.6	• • 39.5	69°07.9	23.0	347° 15.5	30.2	44°30.2	. 14.1	Mar 03 Sun	SHA	Mer.pass
16	41°55.1	79°27.0	38.6	84°08.4	22.4	2°17.5	30.2	59°32.4	13.9	Venus	38°21.2	10:42
17	56° 57.6	94°26.3	37.7	99°08.9	21.9	17°19.6	30.5	74°34.6	13.9	Venus	38 21.2 42°44.4	
18	72°00.1	94 20.3 109°25.7	\$15°36.8	114° 09.4	\$17°21.3	32°21.6	N14°30.6	89°36.8	509°13.7	I		10:24 15:51
19	87° 02.5	109 25.7 124°25.1	35.9	129°09.9	20.7	47°23.6	30.8	104°38.9	13.6	Jupiter Saturn		15:51
20	102°05.0	139°24.5	35.9	144° 10.4	20.7	62°25.7	30.9	119°41.1	13.5	Saturn	17°41.9	12:02
21	102 03.0 117°07.4	154°23.9	• • 34.1	159° 11.0	19.6	77°27.7	• • 31.0	134°43.3	• • 13.4	Horizont	al parallax	
22	132°09.9	169°23.3	33.2	174° 11.5	19.1	92°29.7	31.2	149°45.5	13.4		Venus:	0.1
23	147°12.4	184°22.7	32.3	189° 12.0	18.5	107°31.8	31.3	164°47.6	13.1		Mars:	0.1
										L		
Mer.p	bass. 13:13	$\nu$ -0.6′ d-0	0.9′ m-3.88	$\nu$ 0.5′ $d$ -0	0.6′ m1.26	$\nu$ 2.0′ d0.	1′ m-2.17	$\nu 2.2' \ d-0$	.1'  m0.97			

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	176°55.5	S07°29.0	301°56.1	14.1'	S17°01.3	12.0'	54.9'
1	191°55.7	28.0	316°29.2	14.1'	$17^{\circ}13.2$	11.9'	54.9'
2	206°55.8	27.1	331°02.3	14.0'	17°25.1	11.8'	54.9'
3	221°55.9	• • 26.1	345°35.3	13.9'	17°37.0	11.8'	55.0'
4 5	236°56.0 251°56.1	25.2 24.2	0°08.1 14°41.0	13.8' 13.7'	17°48.7 18°00.5	11.7' 11.6'	55.0' 55.0'
6	266°56.3	\$07°23.3	29°13.7	13.6'	\$18°12.1	11.6'	55.0'
7	281°56.4	22.3	43°46.3	13.5'	18°23.7	11.5'	55.0'
8	296°56.5	21.3	58°18.9	13.5'	18°35.2	11.4'	55.1'
9	311°56.6	• • 20.4	72°51.3	13.4'	18°46.6	11.4'	55.1'
10	326°56.8	19.4	87°23.7	13.3'	18°58.0	11.3'	55.1'
11	341°56.9 356°57.0	18.5 \$07°17.5	101°55.9 116°28.1	13.2'	19°09.2 \$19°20.5	11.2'	55.1' 55.2'
12 13	350°57.0 11°57.1	16.6	116 28.1 131°00.2	13.1' 13.0'	19°31.6	11.1' 11.1'	55.2' 55.2'
14	26°57.3	15.6	145°32.2	12.9'	19° 42.7	11.0'	55.2'
15	41°57.4	14.7	160°04.1	12.8'	19°53.6	10.9'	55.2'
16	56°57.5	13.7	174°35.9	12.7'	$20^{\circ}04.6$	10.8'	55.3'
17	71°57.6	12.8	189°07.6	12.6'	20°15.4	10.7'	55.3'
18	86°57.8	S07°11.8	203°39.2	12.5'	\$20°26.1	10.7'	55.3'
19 20	101°57.9 116°58.0	10.9 09.9	218°10.7 232°42.2	12.4' 12.3'	20°36.8 20°47.4	10.6' 10.5'	55.3' 55.4'
20	131°58.1	09.0	232 42.2 247°13.5	12.3	20 47.4 20°57.9	10.5	55.4'
22	146°58.3	08.0	261°44.7	12.1'	21°08.3	10.4	55.4'
23	161°58.4	07.0	276°15.8	12.0'	21°18.6	10.2'	55.4'
	SD = 16.1'	d = -1.0'		SE	O = 15.0'		
Ca.	GHA	Des	GHA		Dee	۔	НР
Sat 0	176°58.5	<b>Dec</b> <b>S</b> 07°06.1	дпа 290°46.8	u 11.9'	<b>Dec</b> \$21°28.9	d 10.1'	55.5'
1	191°58.7	05.1	305°17.7	11.8'	21°39.0	10.1'	55.5'
2	206°58.8	04.2	319°48.6	11.7'	$21^{\circ}49.1$	10.0'	55.5'
3	221°58.9	• • 03.2	334°19.3	11.6'	21°59.0	9.9'	55.5'
4	236°59.0 251°59.2	02.3 01.3	348°49.9 3°20.4	11.5' 11.4'	22°08.9 22°18.7	9.8' 9.7'	55.6' 55.6'
5 6	251 59.2 266°59.3	507°00.3	3 20.4 17°50.8	11.4	522°28.4	9.7	55.6'
7	281°59.4	06°59.4	32°21.1	11.2'	22°38.0	9.5'	55.6'
8	296°59.6	58.4	46°51.3	11.1'	22°47.4	9.4'	55.7'
9	311°59.7	• • 57.5	61°21.4	11.0'	22°56.8	9.3'	55.7'
10	326°59.8	56.5	75°51.3	10.9'	23°06.1	9.2'	55.7'
11 12	341°59.9 357°00.1	55.6 \$06°54.6	90°21.2 104°51.0	10.8' 10.7'	23°15.3 523°24.4	9.1' 9.0'	55.8' 55.8'
13	12°00.2	53.6	119°20.6	10.7	23°33.4	8.9'	55.8'
14	27°00.3	52.7	133°50.2	10.4'	23°42.2	8.8'	55.8'
15	42°00.5	•• 51.7	148°19.6	10.3'	23°51.0	8.7'	55.9'
16	57°00.6	50.8	162°49.0	10.2'	23°59.7	8.5'	55.9'
17 18	72°00.7 87°00.9	49.8 \$06°48.9	177°18.2 191°47.3	10.1' 10.0'	24°08.2 <b>S</b> 24°16.6	8.4' 8.3'	55.9' 56.0'
19	102°01.0	47.9	206°16.3	9.9'	24°25.0	8.2	56.0'
20	117°01.1	46.9	220°45.2	9.8'	24°33.2	8.1'	56.0'
21	132°01.2	• • 46.0	$235^{\circ}14.0$	9.7'	$24^{\circ}41.3$	8.0'	56.1'
22	147°01.4	45.0	249°42.7	9.6'	24°49.2	7.9'	56.1'
23	162°01.5	44.1	264°11.3	9.5'	24°57.1	7.7'	56.1'
	SD = 16.1'	d = -1.0'		SE	D = 15.1'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177°01.6	S06°43.1	278°39.7	9.4'	S25°04.8	7.6'	56.2'
1 2	192°01.8 207°01.9	42.1 41.2	293°08.1 307°36.3	9.2' 9.1'	25°12.5 25°20.0	7.5' 7.4'	56.2' 56.2'
3	207°01.9 222°02.0	· · 40.2	307°36.3 322°04.5	9.1	25°27.3	7.4° 7.2'	56.3
4	237°02.2	39.3	336°32.5	8.9'	25°34.6	7.1'	56.3'
5	252°02.3	38.3	351°00.4	8.8'	25°41.7	7.0'	56.3'
6	267°02.4	S06°37.3	5°28.2	8.7'	\$25°48.7	6.9'	56.3'
7	282°02.6 297°02.7	36.4	19°55.9 34°23.5	8.6' 8.5'	25°55.5 26°02.3	6.7'	56.4'
8 9	297°02.7 312°02.8	35.4 •• 34.5	34°23.5 48°51.0	8.5° 8.4'	26°02.3 26°08.9	6.6' 6.5'	56.4' 56.4'
10	327°03.0	33.5	63°18.4	8.3'	26°15.3	6.3	56.5'
11	342°03.1	32.5	77°45.7	8.2'	26°21.7	6.2'	56.5'
12	357°03.2	S06°31.6	92°12.9	8.1'	S26°27.9	6.1'	56.5'
13 14	12°03.4 27°03.5	30.6 29.7	106°39.9 121°06.9	8.0' 7.9'	26°33.9 26°39.8	5.9' 5.8'	56.6' 56.6'
14 15	42°03.6	28.7	121°06.9 135°33.8	7.9° 7.8'	26° 39.8 26° 45.6	5.6'	56.7
16	57°03.8	27.7	150°00.5	7.7'	26°51.3	5.5'	56.7'
17	72°03.9	26.8	164°27.2	7.6'	26°56.8	5.3'	56.7'
18	87°04.1	S06°25.8	178°53.7	7.5'	\$27°02.1	5.2'	56.8'
19 20	102°04.2 117°04.3	24.8 23.9	193°20.2 207°46.6	7.4' 7.3'	27°07.3 27°12.4	5.1' 4.9'	56.8' 56.8'
20	117°04.3 132°04.5	22.9	207°46.6 222°12.8	7.3° 7.2'	27°12.4 27°17.3	4.9 4.8'	56.9
22	147°04.6	22.9	236°39.0	7.1'	27°17.3	4.6'	56.9'
23	162°04.7	21.0	251°05.0	7.0'	27°26.6	4.5'	56.9'
	SD = 16.1'	d = -1.0'		SE	0 = 15.3'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	05:03	06:21	07:29	16:57	18:06	19:24
<b>N</b> 70°	05:08	06:19	07:20	17:05	18:07	19:18
68°	05:13	06:17	07:13	17:12	18:09	19:13
66°	05:17	06:16	07:07	17:18	18:10	19:09
64°	05:20	06:15	07:02	17:23	18:11	19:06
62°	05:22	06:14	06:58	17:27	18:12	19:03
60°	05:25	06:13	06:54	17:31	18:13	19:01
N 58°	05:26	06:12	06:51	17:34	18:14	18:59
56°	05:28	06:11	06:48	17:37	18:14	18:58
54°	05:29	06:10	06:45	17:40	18:15	18:56
52°	05:30	06:09	06:43	17:42	18:16	18:55
50°	05:31	06:08	06:40	17:44	18:17	18:54
45°	05:32	06:06	06:35	17:49	18:19	18:53
<b>N</b> 40°	05:33	06:04	06:31	17:53	18:20	18:52
35°	05:33	06:02	06:28	17:57	18:22	18:52
30°	05:33	06:00	06:24	18:00	18:24	18:52
20°	05:31	05:57	06:19	18:06	18:28	18:53
$N 10^{\circ}$	05:28	05:52	06:14	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	05:42	06:04	18:20	18:41	19:06
$20^{\circ}$	05:10	05:36	05:58	18:25	18:48	19:14
30°	04:59	05:28	05:52	18:32	18:56	19:24
35°	04:52	05:22	05:48	18:35	19:01	19:31
40°	04:44	05:16	05:44	18:39	19:07	19:40
45°	04:33	05:09	05:39	18:44	19:14	19:50
<b>S</b> 50°	04:19	05:00	05:33	18:50	19:23	20:03
52°	04:13	04:55	05:30	18:53	19:27	20:10
54°	04:05	04:50	05:27	18:56	19:32	20:17
56°	03:57	04:45	05:24	18:59	19:37	20:26
58°	03:47	04:39	05:20	19:02	19:44	20:35
<b>S</b> 60°	03:35	04:32	05:16	19:06	19:50	20:46
Lat.		Moonris	e		Moonset	
∟at.	Fri	Sat	Sun	Fri	Sat	Sun
<b>N</b> 72°	03:22			04:16		
<b>N</b> 70°	01:56			05:43		
600	01.10			00.00		

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

		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	75-57%	
01	12:18	12:12	12:12	03:59	16:22		
02	12:06	12:00	12:12	04:46	17:11		
03	11:53	11:47	12:12	05:37	18:05		

h	Aries	Ven	ius	M	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	162°14.8	199°22.0	S15°31.5	204°12.5	\$17°18.0	122°33.8	N14°31.5	179° 49.8	S09° 13.0			Dec
1	102 14.8 177°17.3	214° 21.4	30.6	219°13.0	17.4	137°35.8	31.6	179 49.8 194°52.0	12.9	Alpheratz	357°35.9	29°13.3
2	192°19.8	229° 20.8	29.7	234°13.6	16.8	152°37.9	31.8	209°54.2	12.8	Ankaa	353°08.2	-42°10.7
3	207°22.2	244°20.2	• • 28.8	249°14.1	. 16.3	167°39.9	31.9	224° 56.4	12.7	Schedar	349° 32.4	56°40.2
4	222°24.7	259° 19.6	27.9	264°14.6	15.7	182°41.9	32.0	239° 58.5	12.6	Diphda	348°48.3	-17°51.4
5	237°27.2	274°19.0	27.0	279°15.1	15.2	197°44.0	32.2	255°00.7	12.4	Achernar	335°21.1	-57°07.1
6	252°29.6	289°18.4	S15°26.1	294°15.6	S17°14.6	212°46.0	N14°32.3	270°02.9	S09°12.3	Hamal	327°52.2 314°36.7	23°34.6 89°22.2
7	$267^{\circ}32.1$	304°17.8	25.2	$309^{\circ}16.2$	14.0	227°48.0	32.5	285°05.1	12.2	Polaris Acamar	314 30.7 315°12.5	-40°12.7
8	282°34.5	319° 17.2	24.3	324°16.7	13.5	242°50.1	32.6	300°07.2	12.1	Menkar	314°07.0	4°11.0
9	297°37.0	334° 16.6	• • 23.4	339°17.2	• • 12.9	257°52.1	• • 32.8	315°09.4	• • 12.0	Mirfak	308° 29.5	49°57.0
10	312°39.5	349° 15.9	22.5	354°17.7	12.4	272°54.1	32.9	330°11.6	11.9	Aldebaran	290°40.5	16°33.5
11	327°41.9	4°15.3	21.6	9°18.3	11.8	287°56.2 302°58.2	33.0	345° 13.8	11.8	Rigel	281°04.5	-8°10.6
12 13	342°44.4 357°46.9	19° 14.7 34° 14.1	\$15°20.7 19.8	24°18.8 39°19.3	\$17°11.2 10.7	302 58.2 318°00.2	N14°33.2 33.3	0° 16.0 15° 18.1	S09°11.7 11.5	Capella	$280^{\circ}22.9$	46°01.5
14	12°49.3	49° 13.5	18.9	54°19.8	10.7	333°02.3	33.5	30° 20.3	11.5	Bellatrix	278°23.6	6°22.2
15	27°51.8	64° 12.9	17.9	69°20.3	• • 09.6	348°04.3	33.6	45° 22.5	11.3	Elnath	278°02.7	28°37.7
16	42°54.3	79°12.3	17.0	84°20.9	09.0	3°06.3	33.8	60°24.7	11.2	Alnilam	275°38.4	-1°11.3
17	57°56.7	94°11.7	16.1	99°21.4	08.4	18°08.3	33.9	75°26.8	11.1	Betelgeuse	270°52.8	7°24.6
18	72°59.2	$109^{\circ}11.1$	S15°15.2	114°21.9	S17°07.9	33°10.4	N14°34.0	90°29.0	S09°11.0	Canopus	263°52.5	-52°42.7 -16°45.1
19	88°01.7	124°10.5	14.3	129°22.4	07.3	48°12.4	34.2	105°31.2	10.9	Sirius Adhara	258° 26.7 255° 06.2	-16 45.1 -29°00.5
20	103°04.1	139°09.9	13.4	144°23.0	06.7	63°14.4	34.3	120°33.4	10.7	Procyon	244°51.4	5°09.7
21	118°06.6	154°09.3	• • 12.5	159°23.5	• • 06.2	78°16.5	• • 34.5	135° 35.5	• • 10.6	Pollux	243°17.9	27°58.1
22	133°09.0	169°08.7	11.6	174°24.0	05.6	93°18.5	34.6	150°37.7	10.5	Avior	234° 14.6	-59°35.4
23	148°11.5	184°08.1	10.7	189°24.5	05.0	108°20.5	34.8	165°39.9	10.4	Suhail	222°46.5	-43°31.9
Mer.p	ass. 13:09	$\nu$ -0.6' d-0.9	9′ m-3.88	$\nu$ 0.5′ d-0	.6′ m1.26	$\nu 2.0' \ d0.$	1' m-2.17	$\nu$ 2.2′ d-0	.1'  m $0.97$	Miaplacidus	221°37.7	-69°49.1
										Alphard	$217^{\circ}48.2$	-8°45.9
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.9	11°50.9
0	163°14.0	199° 07.5	S15°09.8	204°25.1	S17°04.5	123°22.6	N14°34.9	180°42.1	S09°10.3	Dubhe	193°41.2	61°37.2
1	178°16.4	214°06.9	08.8	219°25.6	03.9	138°24.6	35.1	195°44.3	10.2	Denebola	182°25.3 175°44.0	14°26.1
2	193°18.9	229°06.3	07.9	234°26.1	03.3	153°26.6	35.2	210°46.4	10.1	Gienah	175 44.0 173°00.3	-17°40.6 -63°13.9
3	208°21.4	244°05.7	• • 07.0	249°26.6	• • 02.8	168°28.6	• • 35.3	225°48.6	• • 10.0	Gacrux	173 00.3 171°51.9	-57°14.8
4	223°23.8	259°05.1	06.1	264°27.2	02.2	183°30.7	35.5	240°50.8	09.8	Alioth	166° 13.1	55°49.5
5	238°26.3	274°04.5	05.2	279°27.7	01.6	198°32.7	35.6	255°53.0	09.7	Spica	158° 22.8	-11°17.3
6	253°28.8	289°03.9	S15°04.3	294°28.2	S17°01.1	213°34.7	N14°35.8	270°55.1	S09°09.6	Alkaid	152°52.2	49°11.3
7	268°31.2	304°03.3	03.4	309°28.7	17°00.5	228°36.8	35.9	285° 57.3	09.5	Hadar	$148^{\circ}36.6$	-60°29.2
8 9	283°33.7 298°36.2	319°02.7 334°02.1	02.4 •• 01.5	324°29.3 339°29.8	16°59.9 •• 59.4	243°38.8 258°40.8	36.1 · · 36.2	300°59.5 316°01.7	09.4 · · 09.3	Menkent	$147^{\circ}58.2$	-36°29.3
10	313°38.6	349°01.5	15°00.6	354°30.3	58.8	273°42.8	36.4	331°03.9	09.3	Arcturus	145°48.3	19°03.2
11	328°41.1	4°00.9	14°59.7	9°30.8	58.2	288°44.9	36.5	346°06.0	09.2	Rigil Kent.	139°40.9	-60°55.9
12	343°43.5	19°00.3	S14°58.8	24°31.4	S16°57.7	303°46.9	N14°36.6	1°08.2	S09°08.9	Kochab	137°19.1	74°03.0
13	358°46.0	33°59.7	57.8	39°31.9	57.1	318°48.9	36.8	16° 10.4	8.80	Zuben'ubi Alphecca	136°56.6 126°04.2	-16°08.6 26°37.7
14	13°48.5	48°59.1	56.9	54°32.4	56.5	333°51.0	36.9	31°12.6	08.7	Antares	120° 04.2 112° 16.7	-26°29.1
15	28°50.9	63°58.5	• • 56.0	69°32.9	• • 56.0	348°53.0	• • 37.1	46° 14.7	• • 08.6	Atria	107° 11.6	-69°04.0
16	43°53.4	78° 57.9	55.1	84°33.5	55.4	3°55.0	37.2	61°16.9	08.5	Sabik	102°03.6	-15°45.3
17	58°55.9	93°57.3	54.1	99°34.0	54.8	18°57.0	37.4	76°19.1	08.4	Shaula	$96^{\circ}11.4$	-37°07.2
18 19	73°58.3 89°00.8	108° 56.7 123° 56.1	\$14°53.2 52.3	114°34.5 129°35.0	\$16°54.3 53.7	33°59.1 49°01.1	N14°37.5 37.7	91°21.3 106°23.5	509°08.3 08.1	Rasalhague	95°59.3	12°32.3
20	104°03.3	138°55.6	51.4	144°35.6	53.1	64°03.1	37.7	100°25.5 121°25.6	08.0	Eltanin	90°42.6	51°28.7
21	119°05.7	153°55.0	50.4	159°36.1	• • 52.5	79°05.1	37.9	136° 27.8	• • 07.9	Kaus Aust.	83°33.6	-34°22.3
22	134°08.2	168°54.4	49.5	174°36.6	52.0	94°07.2	38.1	151°30.0	07.8	Vega	80°33.9	38°48.0
23	149°10.7	183°53.8	48.6	189°37.2	51.4	109°09.2	38.2	166°32.2	07.7	Nunki	75°48.8	-26°16.0
		0.6/ -1.04		-0.5/ -1.0				-22/-10		Altair Peacock	62°00.9 53°07.3	8°55.7 -56°39.4
ivier.p	ass. 13:05	$\nu$ -0.6' d-0.9	9 m-3.88	$\nu$ 0.5 a-0	.6′ m1.26	ν2.0 au.	1′ m-2.16	$\nu$ 2.2′ d-0	.1 mu.98	Deneb	49°26.7	45°21.7
										Enif	33°39.8	9°59.0
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°34.2	-46°50.7
0	164°13.1	198°53.2	S14°47.6	204°37.7	<b>S</b> 16°50.8	124°11.2	N14°38.4	181°34.3	S09°07.6	Fomalhaut	$15^{\circ}15.6$	-29°29.8
1	179°15.6	213°52.6	46.7	219°38.2	50.2	139°13.2	38.5	196° 36.5	07.5	Scheat	13°46.3	28°12.7
2	194°18.0	228° 52.0	45.8	234°38.7	49.7	154°15.3	38.7	211°38.7	07.3	Markab	13°30.9	15°20.0
3	209°20.5	243°51.4	• • 44.9	249°39.3	• • 49.1	169°17.3 184°19.3	• • 38.8	226°40.9	•• 07.2	Mar 04 Mon	SHA	May nass
4 5	224°23.0 239°25.4	258° 50.8 273° 50.2	43.9 43.0	264°39.8 279°40.3	48.5 48.0	184 19.3 199°21.3	39.0 39.1	241°43.1 256°45.2	07.1 07.0	Venus	37°07.2	Mer.pass 10:43
6	254°27.9	288° 49.7	\$14°42.1	294°40.9	\$16°47.4	214°23.4	N14°39.2	271° 47.4	S09°06.9	Mars	41°57.7	10:43
7	269°30.4	303°49.1	41.1	309°41.4	46.8	229°25.4	39.4	286°49.6	06.8	Jupiter	320°19.0	15:48
8	284°32.8	318° 48.5	40.2	324°41.9	46.2	244°27.4	39.5	301°51.8	06.7	Saturn	17°35.0	11:59
9	299°35.3	333°47.9	• • 39.3	339°42.4	• • 45.7	259°29.4	• • 39.7	316°53.9	• • 06.6	14 OF T	CLIA	74
10	314°37.8	348°47.3	38.3	354°43.0	45.1	274°31.4	39.8	331°56.1	06.4	Mar 05 Tue	SHA	Mer.pass
11	329°40.2	3°46.7	37.4	9°43.5	44.5	289°33.5	40.0	346°58.3	06.3	Venus Mars	35°53.5 41°11.1	10:44 10:22
12	344°42.7	18°46.1	S14°36.4	24°44.0	S16°43.9	304°35.5	N14°40.1	2°00.5	S09°06.2	Jupiter	320°08.6	15:44
13	359°45.2	33°45.6	35.5	39°44.6	43.3	319°37.5	40.3	17°02.7	06.1	Saturn	17°28.1	11:55
14 15	14°47.6 29°50.1	48° 45.0 63° 44.4	34.6 •• 33.6	54°45.1 69°45.6	42.8 •• 42.2	334°39.5 349°41.6	40.4 •• 40.6	32°04.8 47°07.0	06.0 •• 05.9	Mac OC M		
15 16	29°50.1 44°52.5	63°44.4 78°43.8	32.7	84°46.2	41.6	4°43.6	40.7	47°07.0 62°09.2	05.8	Mar 06 Wed Venus	<b>SHA</b> 34°40.1	Mer.pass 10:45
17	59°55.0	93°43.2	31.7	99°46.7	41.0	19°45.6	40.7	77° 11.4	05.6	Venus	34°40.1 40°24.6	10:45
18	74°57.5	108° 42.6	\$14°30.8	114°47.2	\$16°40.5	34°47.6	N14°41.0	92°13.5	S09°05.5	Jupiter		15:41
19	89°59.9	123°42.1	29.9	129°47.7	39.9	49°49.6	41.1	107° 15.7	05.4	Saturn	17°21.2	11:52
20	105°02.4	138°41.5	28.9	144°48.3	39.3	64°51.7	41.3	122° 17.9	05.3			
21	120°04.9	153°40.9	• • 28.0	159°48.8	• • 38.7	79°53.7	• • 41.4	137°20.1	• • 05.2	Horizont	al parallax Venus:	0.1
22	135°07.3	168° 40.3	27.0	174°49.3	38.1	94°55.7	41.6	152°22.3	05.1		venus: Mars:	0.1 0.1
23	150°09.8	183°39.7	26.1	189°49.9	37.6	109°57.7	41.7	167°24.4	05.0		141013.	J.1
Mer.p	ass. 13:01	$\nu$ -0.6′ d-0.9	9′ m-3.88	$\nu$ 0.5′ d-0	.6′ m1.25	$\nu 2.0' \ d0.$	1′ m-2.16	$\nu$ 2.2′ d-0	.1' m $0.99$			

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	177°04.9	S06°20.0	265°31.0	6.9'	S27°31.1	4.3'	57.0'
1	192°05.0	19.1	279°56.9	6.8'	27°35.4	4.1'	57.0'
2 3	207°05.1 222°05.3	18.1 •• 17.1	294°22.6 308°48.3	6.7' 6.6'	27°39.5 27°43.5	4.0' 3.8'	57.0' 57.1'
4	237°05.4	16.2	323°13.9	6.5	27°47.4	3.7'	57.1'
5	252°05.6	15.2	337°39.4	6.4'	27°51.0	3.5'	57.2'
6 7	267°05.7 282°05.8	\$06° 14.2 13.3	352°04.8 6°30.1	6.3' 6.2'	\$27°54.5 27°57.9	3.4' 3.2'	57.2' 57.2'
8	297°06.0	12.3	20°55.4	6.1	28°01.1	3.0'	57.3'
9	312°06.1	• • 11.3	$35^{\circ}20.5$	6.1'	28°04.1	2.9'	57.3'
10 11	327°06.2 342°06.4	10.4 09.4	49°45.6 64°10.5	6.0' 5.9'	28°07.0 28°09.7	2.7' 2.5'	57.3' 57.4'
12	357°06.5	S06°08.5	78°35.4	5.8'	528°12.2	2.5	57.4
13	12°06.7	07.5	93°00.3	5.7'	28°14.6	2.2'	57.5'
14 15	27°06.8 42°06.9	06.5 •• 05.6	107°25.0 121°49.7	5.7' 5.6'	28° 16.8 28° 18.8	2.0' 1.9'	57.5' 57.5'
16	57°07.1	04.6	121 49.7 136°14.3	5.5'	28°20.6	1.7'	57.6'
17	72°07.2	03.6	150°38.8	5.4'	28°22.3	1.5'	57.6'
18	87°07.4 102°07.5	S06°02.7	165°03.2 179°27.6	5.4'	\$28°23.8 28°25.1	1.3'	57.6'
19 20	102 07.5 117°07.6	01.7 06°00.7	179 27.6 193°51.9	5.3' 5.2'	28°26.3	1.2' 1.0'	57.7' 57.7'
21	132°07.8	05°59.8	208°16.2	5.2'	28°27.3	0.8'	57.8'
22	147°07.9	58.8	222°40.4	5.1'	28°28.1	0.6'	57.8'
23	162°08.1	57.8	237°04.5	5.1'	28°28.7	0.4'	57.8'
	SD = 16.1'	d = -1.0'		SI	O = 15.5'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177°08.2	S05°56.9	251°28.5	5.0'	\$28°29.1	0.3'	57.9'
1 2	192°08.3 207°08.5	55.9 54.9	265°52.6 280°16.5	4.9' 4.9'	28° 29.4 28° 29.5	0.1' -0.1'	57.9' 58.0'
3	222°08.6	• • 54.0	294°40.4	4.8'	28° 29.4	-0.1	58.0'
4	237°08.8	53.0	309°04.2	4.8'	28°29.1	-0.5'	58.0'
5 6	252°08.9 267°09.0	52.0 \$05° 51.1	323°28.0 337°51.8	4.7' 4.7'	28°28.7 \$28°28.0	-0.6' -0.8'	58.1' 58.1'
7	282°09.2	50.1	352°15.5	4.7'	28° 27.2	-0.6 -1.0'	58.1
8	297°09.3	49.1	6°39.1	4.6'	28°26.2	-1.2'	58.2'
9	312°09.5 327°09.6	· · 48.1 47.2	21°02.7 35°26.3	4.6' 4.5'	28°25.0 28°23.6	-1.4'	58.2' 58.3'
10 11	327 09.6 342°09.8	47.2 46.2	35 20.3 49°49.9	4.5'	28°22.0	-1.6' -1.8'	58.3'
12	357°09.9	S05°45.2	64°13.4	4.5'	\$28°20.3	-1.9'	58.3'
13	12°10.0 27°10.2	44.3	78°36.8 93°00.3	4.4'	28° 18.3 28° 16.2	-2.1'	58.4'
14 15	42°10.2	43.3 •• 42.3	93°00.3 107°23.7	4.4' 4.4'	28° 16.2 28° 13.9	-2.3' -2.5'	58.4' 58.5'
16	57° 10.5	41.4	121°47.1	4.4'	28°11.4	-2.7'	58.5'
17	72°10.6	40.4 \$05°39.4	136°10.5	4.3'	28°08.7 \$28°05.8	-2.9' -3.1'	58.5'
18 19	87°10.8 102°10.9	38.5	150°33.8 164°57.1	4.3' 4.3'	28° 02.7	-3.1 -3.3'	58.6' 58.6'
20	$117^{\circ}11.1$	37.5	179°20.4		27°59.4	-3.5'	58.7'
21	132°11.2	• • 36.5	193°43.7	4.3' 4.3'	27°56.0	-3.6'	58.7'
22 23	147°11.3 162°11.5	35.5 34.6	208°07.0 222°30.3	4.3'	27°52.3 27°48.5	-3.8' -4.0'	58.7' 58.8'
	SD = 16.1'	d = -1.0'		SI	D = 15.8'		
Wed 0	<b>GHA</b> 177°11.6	<b>Dec</b> \$05°33.6	<b>GHA</b> 236°53.6	ν 4.3'	Dec \$27° 44.5	d -4.2'	<b>HP</b> 58.8'
1	192°11.8	32.6	$251^{\circ}16.8$	4.3'	27°40.3	-4.4'	58.9'
2	207°11.9	31.7	265°40.1	4.3'	27°35.8 27°31.2	-4.6'	58.9'
3 4	222°12.1 237°12.2	· · 30.7 29.7	280°03.3 294°26.6	4.3' 4.3'	27° 31.2 27° 26.5	-4.8' -5.0'	58.9' 59.0'
5	252°12.4	28.7	$308^{\circ}49.8$	4.3'	$27^{\circ}21.5$	-5.2'	59.0'
6	267°12.5	S05°27.8 26.8	323°13.1	4.3'	\$27°16.3 27°11.0	-5.4'	59.1' 59.1'
7 8	282°12.7 297°12.8	25.8 25.8	337°36.4 351°59.7	4.3' 4.3'	27 11.0 27°05.4	-5.5' -5.7'	59.1'
9	312°12.9	• • 24.9	6°23.0	4.3'	26°59.7	-5.9'	59.2'
10	327°13.1 342°13.2	23.9	20°46.3 35°09.6	4.3' 4.3'	26°53.8 26°47.7	-6.1' -6.3'	59.2'
11 12	342°13.2 357°13.4	22.9 <b>S</b> 05°21.9	49°32.9	4.4'	26°47.7 \$26°41.4	-6.5'	59.2' 59.3'
13	12°13.5	21.0	63°56.3	4.4'	26°34.9	-6.7'	59.3'
14	27°13.7	20.0	78°19.7	4.4'	26°28.2	-6.9'	59.4'
15 16	42°13.8 57°14.0	· · 19.0 18.1	92°43.1 107°06.5	4.4' 4.5'	26°21.4 26°14.3	-7.0' -7.2'	59.4' 59.4'
17	72°14.1	17.1	121°30.0	4.5	$26^{\circ}07.1$	-7.4'	59.5'
18	87°14.3	S05°16.1	135°53.5	4.5'	\$25°59.7	-7.6'	59.5'
19 20	102°14.4 117°14.6	15.1 14.2	150°17.0 164°40.6	4.6' 4.6'	25°52.1 25°44.3	-7.8' -8.0'	59.5' 59.6'
21	132°14.7	• • 13.2	179°04.1	4.6'	25°36.3	-8.1'	59.6'
22	147°14.9	12.2	193°27.8	4.7'	25°28.2	-8.3'	59.7'
23	162°15.0	11.2	207°51.4	4.7'	25°19.9	-8.5'	59.7'
	SD = 16.1'	d = -1.0'		SI	O = 16.0'		

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

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

		Sun			Moon		
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	l
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	24-26	l
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	46-26%	
04	11:41	11:34	12:12	06:33	19:02		l
05	11:27	11:20	12:11	07:32	20:03		
06	11:13	11:06	12:11	08:33	21:04		l

## March 07, 08, 09 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	165°12.3	198°39.2	\$14°25.1	204° 50.4	\$16°37.0	124°59.8	N14°41.9	182°26.6	S09°04.9			
1	180°14.7	213°38.6	24.2	219° 50.9	36.4	140°01.8	42.0	102 20.0 197°28.8	04.7	Alpheratz	357°35.9	29°13.3
2	195°17.2	213 38.0 228°38.0	23.2	219 50.9 234°51.5		155°03.8	42.0	212°31.0	04.7	Ankaa	353°08.2	-42°10.7
					35.8					Schedar	349°32.4	56°40.2
3	210°19.6	243°37.4	• • 22.3	249°52.0	• • 35.2	170°05.8	• • 42.3	227°33.1	• • 04.5	Diphda	348°48.3	$-17^{\circ}51.4$
4	225°22.1	258°36.8	21.3	264° 52.5	34.7	185°07.8	42.4	242°35.3	04.4	Achernar	335°21.1	-57°07.1
5	240°24.6	273°36.3	20.4	279°53.1	34.1	200°09.8	42.6	257°37.5	04.3	Hamal	327°52.2	23°34.6
6	255°27.0	288°35.7	S14°19.4	294°53.6	S16°33.5	215°11.9	N14°42.7	272°39.7	S09°04.2	Polaris	314°38.0	89°22.2
7	270°29.5	303°35.1	18.5	309°54.1	32.9	230°13.9	42.9	287°41.9	04.1	Acamar	315°12.5	-40°12.7
8	285°32.0	318°34.5	17.5	324°54.7	32.3	245°15.9	43.0	302°44.0	04.0	Menkar	314°07.0	4°11.0
9	300°34.4	333°34.0	•• 16.6	339°55.2	• • 31.8	260°17.9	• • 43.2	317°46.2	• • 03.8		308°29.5	49°56.9
10	315°36.9	348°33.4	15.6	354°55.7	31.2	275°19.9	43.3	332°48.4	03.7	Mirfak		
11	330°39.4	3°32.8	14.7	9°56.3	30.6	290°22.0	43.5	347°50.6	03.6	Aldebaran	290°40.5	16°33.5
12	345°41.8	18°32.2	<b>S</b> 14°13.7	24°56.8	<b>S</b> 16°30.0	305°24.0	N14°43.6	2°52.7	S09°03.5	Rigel	281°04.5	-8°10.6
13	0°44.3	33°31.7	12.8	39°57.3	29.4	320°26.0	43.8	17°54.9	03.4	Capella	280°22.9	46°01.5
14	15°46.8	48°31.1	11.8	54°57.9	28.8	335°28.0	43.9	32°57.1	03.3	Bellatrix	278°23.6	6°22.2
15	30°49.2	63°30.5	10.8	69°58.4	28.3	350°30.0	• • 44.1	47°59.3	03.2	Elnath	278°02.7	28°37.7
16	45°51.7	78°29.9	09.9	84°58.9	27.7	5°32.1	44.2	63°01.5	03.0	Alnilam	275°38.4	$-1^{\circ}11.3$
										Betelgeuse	270°52.8	$7^{\circ}24.6$
17	60°54.1	93°29.4	08.9	99°59.5	27.1	20°34.1	44.3	78°03.6	02.9	Canopus	263°52.5	-52°42.7
18	75°56.6	108°28.8	\$14°08.0	115°00.0	S16°26.5	35°36.1	N14°44.5	93°05.8	S09°02.8	Sirius	258°26.7	$-16^{\circ}45.1$
19	90°59.1	123°28.2	07.0	130°00.5	25.9	50°38.1	44.6	108°08.0	02.7	Adhara	255°06.2	-29°00.5
20	106°01.5	138°27.7	06.1	145°01.1	25.3	65°40.1	44.8	123°10.2	02.6	Procyon	244°51.4	5°09.7
21	121°04.0	153°27.1	•• 05.1	$160^{\circ}01.6$	• • 24.7	80°42.1	• • 44.9	138°12.4	• • 02.5	Pollux	243°17.9	27°58.1
22	136°06.5	168°26.5	04.1	$175^{\circ}02.1$	24.2	95°44.2	45.1	153°14.5	02.4	Avior	234°14.6	-59°35.4
23	151°08.9	183°25.9	03.2	190°02.7	23.6	110°46.2	45.2	168°16.7	02.3	Suhail	222°46.5	-43°31.9
N 4	10.57	- 0 6/ -1 0	0/ 2.00	-0.5/ -1.0	0.6' m1.25	- 2 0/ -10	1/ 2.15	2.2/ -1.0	1/ 0.00			
ivier.p	bass. 12:57	$\nu$ -0.6° $a$ -0	.9′ m-3.88	$\nu$ 0.5° $a$ -0	0.6° m1.25	$\nu$ 2.0° $a$ 0.	1′ m-2.15	$\nu$ 2.2 a-0	.1′ m0.99	Miaplacidus	221°37.7	-69°49.1
										Alphard	217°48.2	-8°45.9
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.9	11°50.9
0	166°11.4	198°25.4	\$14°02.2	205°03.2	S16°23.0	125°48.2	N14°45.4	183°18.9	S09°02.1	Dubhe	193°41.1	61°37.2
	181°13.9	213°24.8		200° 03.2		140°50.2		198°21.1		Denebola	182°25.3	$14^{\circ}26.1$
1			01.2		22.4		45.5		02.0	Gienah	175°44.0	-17°40.6
2	196°16.3	228°24.2	14°00.3	235°04.3	21.8	155°52.2	45.7	213°23.2	01.9	Acrux	173°00.3	-63°13.9
3	211°18.8	243°23.7	13°59.3	250°04.8	• • 21.2	170°54.2	• • 45.8	228°25.4	• • 01.8	Gacrux	171°51.9	$-57^{\circ}14.9$
4	226°21.3	258°23.1	58.3	265°05.4	20.6	185°56.2	46.0	243°27.6	01.7	Alioth	166°13.0	55°49.5
5	241°23.7	273°22.5	57.4	280°05.9	20.1	200°58.3	46.1	258°29.8	01.6	Spica	158°22.8	-11°17.3
6	256°26.2	288°22.0	S13°56.4	295°06.4	S16° 19.5	216°00.3	N14°46.3	273°32.0	S09°01.5	Alkaid	152°52.2	49°11.3
7	271°28.6	303°21.4	55.4	$310^{\circ}07.0$	18.9	231°02.3	46.4	288°34.1	01.4	Hadar	148°36.6	-60°29.2
8	286°31.1	318°20.8	54.5	325°07.5	18.3	246°04.3	46.5	303°36.3	01.2		147°58.2	-36°29.3
9	301°33.6	333°20.3	• • 53.5	340°08.0	• • 17.7	261°06.3	• • 46.7	318°38.5	• • 01.1			
10	316°36.0	348°19.7	52.5	355°08.6	17.1	276°08.3	46.8	333°40.7	01.0	Arcturus	145°48.3	19°03.2
11	331°38.5	3°19.1	51.6	10°09.1	16.5	291°10.3	47.0	348°42.9	00.9	Rigil Kent.	139°40.9	-60°55.9
12	346°41.0	18°18.6	\$13°50.6	25°09.7	S16° 15.9	306°12.4	N14°47.1	3°45.0	S09°00.8	Kochab	137°19.1	74°03.0
13	1°43.4	33°18.0	49.6	40° 10.2	15.3	321°14.4	47.3	18°47.2	00.7	Zuben'ubi	136°56.6	-16°08.6
				55° 10.7						Alphecca	126°04.2	26°37.7
14	16°45.9	48°17.5	48.7		14.7	336°16.4	47.4	33°49.4	00.6	Antares	112°16.6	$-26^{\circ}29.1$
15	31°48.4	63°16.9	• • 47.7	70°11.3	• • 14.2	351°18.4	• • 47.6	48°51.6	• • 00.5	Atria	$107^{\circ}11.5$	-69°04.0
16	46°50.8	78°16.3	46.7	85°11.8	13.6	6°20.4	47.7	63°53.7	00.3	Sabik	102°03.6	-15°45.4
17	61°53.3	93°15.8	45.7	100° 12.4	13.0	21°22.4	47.9	78°55.9	00.2	Shaula	$96^{\circ}11.4$	-37°07.2
18	76°55.8	108°15.2	S13°44.8	115° 12.9	S16°12.4	36°24.4	N14°48.0	93°58.1	S09°00.1	Rasalhague	95°59.2	12°32.3
19	91°58.2	123°14.6	43.8	130°13.4	11.8	51°26.5	48.2	109°00.3	09°00.0	Eltanin	90°42.6	51°28.7
20	107°00.7	138°14.1	42.8	145° 14.0	11.2	66°28.5	48.3	124°02.5	08°59.9	Kaus Aust.	83°33.6	-34°22.3
21	122°03.1	153°13.5	• • 41.8	$160^{\circ}14.5$	• • 10.6	81°30.5	• • 48.5	139°04.6	• • 59.8	Vega	80°33.9	38°48.0
22	137°05.6	168°13.0	40.9	$175^{\circ}15.1$	10.0	96°32.5	48.6	154°06.8	59.7			
23	152°08.1	183°12.4	39.9	190° 15.6	09.4	111°34.5	48.8	169°09.0	59.5	Nunki	75°48.8	-26°16.0
										Altair	62°00.8	8°55.7
Mer.p	bass. 12:53	u-0.6′ $d$ -1	.0′ m-3.88	$\nu$ 0.5′ $d$ -0	0.6′ m1.25	$\nu$ 2.0′ d0.	1′ m-2.15	$\nu$ 2.2′ d-0	1.1'  m 0.99	Peacock	53°07.2	-56°39.4
										Deneb	49°26.7	45°21.7
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.8	9°59.0
0 0	167°10.5	198°11.9	\$13°38.9	205° 16.1	\$16°08.8	126°36.5	N14°48.9	184°11.2	508°59.4	Al Na'ir	27°34.2	-46°50.7
1	182°13.0	213°11.3	37.9	205 16.1 220° 16.7	08.2	120 30.5 141°38.5	N14 48.9 49.0	184 11.2 199°13.4	508 59.4	Fomalhaut	15°15.6	-29°29.8
										Scheat	13°46.2	28°12.7
2	197°15.5	228°10.7	36.9	235°17.2	07.6	156°40.5	49.2	214°15.5	59.2	Markab	13°30.9	15°20.0
3	212°17.9	243°10.2	• • 36.0	250°17.8	• • 07.0	171°42.5	• • 49.3	229°17.7	59.1	Mar. 07 TI	CHA	Me:
4	227°20.4	258°09.6	35.0	265°18.3	06.4	186°44.6	49.5	244°19.9	59.0	Mar 07 Thu	SHA	Mer.pass
5	242°22.9	273°09.1	34.0	280°18.8	05.9	201°46.6	49.6	259°22.1	58.9	Venus	33°26.9	10:46
6	257°25.3	288°08.5	\$13°33.0	295° 19.4	S16°05.3	216°48.6	N14°49.8	274°24.2	S08°58.8	Mars	39°38.1	10:20
7	272°27.8	303°08.0	32.0	310° 19.9	04.7	231°50.6	49.9	289°26.4	58.6	Jupiter	319°47.5	15:38
8	287°30.2	318°07.4	31.0	325°20.5	04.1	246°52.6	50.1	304°28.6	58.5	Saturn	17°14.4	11:49
9	302°32.7	333°06.8	• • 30.1	340°21.0	• • 03.5	261°54.6	• • 50.2	319°30.8	• • 58.4	Mar. 00 F :	CLIA	Mau
10	317°35.2	348°06.3	29.1	355°21.5	02.9	276°56.6	50.4	334°33.0	58.3	Mar 08 Fri	SHA	Mer.pass
11	332°37.6	3°05.7	28.1	10°22.1	02.3	291°58.6	50.5	349°35.1	58.2	Venus	32°14.0	10:47
12	347°40.1	18°05.2	\$13°27.1	25°22.6	S16°01.7	307°00.6	N14°50.7	4°37.3	S08°58.1	Mars	38°51.8	10:19
13	2°42.6	33°04.6	26.1	40°23.2	01.1	322°02.6	50.8	19°39.5	58.0	Jupiter	319°36.8	15:35
14	17°45.0	48°04.1	25.1	55°23.7	16°00.5	337°04.7	51.0	34°41.7	57.9	Saturn	17°07.5	11:45
15	32°47.5	63°03.5	•• 24.1	70° 24.3	15° 59.9	352°06.7	51.1	49°43.9	57.7	Ma:: 00 C-	СПУ	Me:: ====
						7°08.7				Mar 09 Sat	SHA	Mer.pass
16	47°50.0	78°03.0	23.1	85°24.8	59.3		51.3	64°46.0	57.6	Venus	31°01.3	10:48
17	62°52.4	93°02.4	22.2	100°25.3	58.7	22°10.7	51.4	79°48.2	57.5	Mars	38°05.6	10:19
18	77°54.9	108°01.9	\$13°21.2	115°25.9	S15°58.1	37°12.7	N14°51.6	94°50.4	S08°57.4	Jupiter		15:31
19	92°57.4	123°01.3	20.2	130°26.4	57.5	52°14.7	51.7	109°52.6	57.3	Saturn	17°00.6	11:42
20	107°59.8	138°00.8	19.2	145°27.0	56.9	67°16.7	51.9	124°54.8	57.2			
21	123°02.3	153°00.2	• • 18.2	160°27.5	• • 56.3	82°18.7	• • 52.0	139°56.9	•• 57.1	Horizont	al parallax	
22	138°04.7	167°59.7	17.2	175°28.1	55.7	97°20.7	52.2	154°59.1	57.0		Venus:	0.1
23	153°07.2	182°59.1	16.2	190°28.6	55.1	112°22.7	52.3	170°01.3	56.8		Mars:	0.1
N 4 -	10:40				6/ 5-1 05							
Mer.p	bass. 12:49	$\nu$ -0.6′ d-1	.0′ m-3.88	$\nu$ 0.5′ $d$ -0	0.6′ m1.25	$\nu$ 2.0′ d0.	1′ m-2.14	$\nu$ 2.2′ d-0	.1′ m1.00			

h	Su	n	Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	177°15.2	<b>S</b> 05°10.3	222° 15.1	4.7'	\$25°11.3	-8.7'	59.7'
1	192°15.3 207°15.5	09.3 08.3	236°38.9 251°02.7	4.8' 4.8'	25°02.7 24°53.8	-8.9'	59.8' 59.8'
2	207 15.5 222°15.6	07.4	265° 26.5	4.8 4.9'	24 53.8 24°44.8	-9.0' -9.2'	59.8'
4	237°15.8	06.4	279°50.4	4.9'	24°35.5	-9.4	59.9'
5	252°15.9	05.4	294° 14.3	5.0'	24° 26.1	-9.6'	59.9'
6	267°16.1 282°16.2	S05°04.4	308°38.3 323°02.3	5.0'	\$24°16.6 24°06.8	-9.7'	59.9'
7 8	282°16.2 297°16.4	03.5 02.5	323°02.3 337°26.4	5.1' 5.1'	24°06.8 23°56.9	-9.9' -10.1'	60.0' 60.0'
9	312°16.5	• • 01.5	351°50.5	5.2'	23°46.8	-10.3	60.0'
10	327°16.7	05°00.5	6°14.7	5.2'	23°36.6	-10.4'	60.1'
11 12	342°16.8 357°17.0	04°59.6 \$04°58.6	20°39.0 35°03.3	5.3' 5.4'	23°26.2 523°15.6	-10.6' -10.8'	60.1' 60.1'
13	12°17.1	57.6	49° 27.6	5.4'	23°04.8	-10.8	60.2
14	27°17.3	56.6	63°52.0	5.5'	22°53.9	-11.1'	60.2'
15	42°17.4	• • 55.7	78° 16.5	5.5'	22°42.8	-11.2'	60.2'
16 17	57°17.6 72°17.7	54.7 53.7	92°41.0 107°05.6	5.6' 5.7'	22°31.6 22°20.2	-11.4' -11.6'	60.3' 60.3'
18	87°17.9	504° 52.7	107 05.0 121°30.3	5.7'	\$22°08.6	-11.7	60.3
19	102°18.0	51.8	135°55.0	5.8'	21°56.9	-11.9'	60.4'
20	117°18.2	50.8	150° 19.8	5.8'	21°45.0	-12.0'	60.4'
21 22	132°18.3 147°18.5	· · 49.8 48.8	164°44.6 179°09.5	5.9' 6.0'	21°32.9 21°20.8	-12.2' -12.3'	60.4'
23	147°18.5 162°18.6	48.8 47.9	179°09.5 193°34.5	6.0'	21° 20.8 21° 08.4	-12.5'	60.5' 60.5'
-	SD = 16.1'	d = -1.0'			D = 16.3'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	177°18.8 192°18.9	\$04°46.9 45.9	207°59.5 222°24.7	6.1' 6.2'	\$20°55.9 20°43.3	-12.6' -12.8'	60.5' 60.5'
2	192°18.9 207°19.1	45.9 44.9	222°24.7 236°49.8	6.2'	20° 43.3 20° 30.5	-12.8 -12.9'	60.6
3	222°19.3	• • 43.9	251° 15.1	6.3'	20° 17.6	-13.1'	60.6'
4	237°19.4	43.0	265°40.4	6.4'	20°04.5	-13.2'	60.6'
5 6	252°19.6 267°19.7	42.0 \$04°41.0	280°05.8 294°31.2	6.4' 6.5'	19°51.3 \$19°37.9	-13.4' -13.5'	60.7' 60.7'
7	282°19.9	40.0	308° 56.7	6.6'	19°24.4	-13.6'	60.7
8	297°20.0	39.1	323°22.3	6.7'	19° 10.8	-13.8'	60.7'
9	312°20.2	• • 38.1	337°48.0	6.7'	18°57.0	-13.9'	60.8'
10 11	327°20.3 342°20.5	37.1 36.1	352°13.7 6°39.5	6.8' 6.9'	18°43.1 18°29.1	-14.0' -14.2'	60.8' 60.8'
12	357°20.6	S04°35.2	21°05.3	6.9	\$18° 14.9	-14.3	60.8
13	12°20.8	34.2	$35^{\circ}31.3$	7.0'	18°00.6	-14.4'	60.9'
14	27°21.0 42°21.1	33.2	49°57.3 64°23.3	7.1'	17°46.2 17°31.6	-14.5'	60.9'
15 16	42°21.1 57°21.3	· · 32.2 31.2	78° 49.5	7.1' 7.2'	17° 31.6 17° 17.0	-14.7' -14.8'	60.9' 60.9'
17	72°21.4	30.3	93° 15.7	7.3'	17°02.2	-14.9'	60.9'
18	87°21.6	S04°29.3	107°41.9	7.3'	<b>S</b> 16°47.3	-15.0'	61.0'
19	102°21.7 117°21.9	28.3 27.3	122°08.3 136°34.7	7.4' 7.5'	16°32.3 16°17.1	-15.1'	61.0'
20 21	117 21.9 132°22.0	26.3	130° 34.7 151° 01.2	7.5'	16°17.1 16°01.9	-15.2 -15.4'	61.0' 61.0'
22	147°22.2	25.4	165° 27.7	7.6'	15°46.5	-15.5'	61.0'
23	162°22.4	24.4	179°54.3	7.7'	$15^{\circ}31.1$	-15.6'	61.1'
	SD = 16.1'	d = -1.0'		S	D = 16.5'		
c-·	CUA	D	CIIA		D-:	.1	LID
Sat 0	<b>GHA</b> 177°22.5	<b>Dec</b> <b>S</b> 04°23.4	<b>GHA</b> 194°21.0	ν 7.7'	<b>Dec</b> \$15° 15.5	d -15.7'	HP 61.1'
1	192°22.7	22.4	208°47.8	7.8'	$14^{\circ}59.8$	-15.8'	61.1'
2	207°22.8	21.5	223° 14.6	7.9'	14°44.0	-15.9'	61.1'
3 4	222°23.0 237°23.1	· · 20.5 19.5	237°41.5 252°08.4	7.9' 8.0'	14°28.2 14°12.2	-16.0' -16.1'	61.1' 61.1'
5	252°23.3	18.5	266° 35.4	8.1'	13°56.1	-16.2	61.2
6	267°23.5	S04°17.5	281°02.5	8.1'	S13°40.0	-16.3'	61.2'
7	282°23.6	16.6	295°29.6	8.2'	13°23.7	-16.3'	61.2'
8 9	297°23.8 312°23.9	15.6 •• 14.6	309°56.8 324°24.1	8.3' 8.3'	13°07.3 12°50.9	-16.4' -16.5'	61.2' 61.2'
10	312 23.9 327°24.1	13.6	338°51.4	8.4'	12°34.4	-16.6'	61.2'
11	342°24.2	12.6	353° 18.7	8.4'	12° 17.8	-16.7'	61.2'
12	357°24.4	\$04°11.7	7°46.2	8.5'	\$12°01.1	-16.8'	61.3'
13 14	12°24.6 27°24.7	10.7 09.7	22°13.7 36°41.2	8.6' 8.6'	11°44.3 11°27.5	-16.8' -16.9'	61.3' 61.3'
15	42°24.9	08.7	51°08.8	8.7'	11°10.6	-17.0'	61.3
16	57°25.0	07.7	$65^{\circ}36.5$	8.7'	10°53.6	-17.1'	61.3'
17	72°25.2 87°25.4	06.8 \$04°05.8	80°04.2 94°32.0	8.8'	10°36.5 \$10°19.4	-17.1'	61.3'
18 19	87°25.4 102°25.5	504°05.8 04.8	94°32.0 108°59.8	8.8' 8.9'	10° 02.2	-17.2' -17.3'	61.3' 61.3'
20	117°25.7	03.8	123° 27.7	8.9'	09°44.9	-17.3'	61.3
21	132°25.8	• • 02.8	137°55.7	9.0'	09°27.6	-17.4'	61.3'
22 23	147°26.0 162°26.2	01.9 00.9	152°23.6 166°51.7	9.0' 9.1'	09° 10.2 08° 52.7	-17.4' -17.5'	61.3' 61.3'
23			100 31.7			-11.5	01.3
	SD = 16.1'	d = -1.0'		S	D = 16.7'		

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

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

		Sun		Moon				
Day	Eqn.of	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	16-3%		
07	10:59	10:52	12:11	09:34	22:04			
80	10:45	10:37	12:11	10:32	23:00			
09	10:30	10:22	12:10	11:28	23:54			

## March 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 0	168°09.7	197°58.6	\$13° 15.2	205°29.1	\$15°54.5	127°24.7	N14°52.4	185°03.5	S08° 56.7			
1	183°12.1	212°58.0	14.2	200°29.7	53.9	142°26.7	52.6	200° 05.6	56.6	Alpheratz	357°35.9	29°13.3
2	103 12.1 198°14.6	212 56.0 227° 57.5	13.2	235°30.2	53.9	142 20.7 157°28.8	52.0 52.7	200 05.0 215°07.8	56.5	Ankaa	353°08.2	-42°10.7
3	213° 17.1						• • 52.9	215 07.8 230° 10.0		Schedar	349°32.4	56°40.2
	213 17.1 228°19.5	242°56.9	• • 12.2	250°30.8	• • 52.7	172°30.8				Diphda	348°48.3	-17°51.4
4		257°56.4	11.2	265°31.3	52.1	187°32.8	53.0	245°12.2	56.3	Achernar	$335^{\circ}21.1$	-57°07.1
5	243°22.0	272°55.9	10.2	280°31.9	51.5	202°34.8	53.2 N14°53.3	260°14.4	56.2	Hamal	327°52.2	23°34.6
6 7	258°24.5 273°26.9	287°55.3 302°54.8	\$13°09.2	295°32.4 310°33.0	\$15°50.9	217°36.8 232°38.8	53.5	275° 16.5 290° 18.7	\$08°56.1	Polaris	314°39.4	89°22.2
8	273 20.9 288°29.4	317°54.2	08.2		50.3			305°20.9	55.9	Acamar	$315^{\circ}12.5$	-40°12.7
		317 54.2 332°53.7	07.2	325°33.5	49.7	247°40.8	53.6		55.8	Menkar	314°07.0	4°11.0
9	303°31.8		• • 06.2	340°34.0	• • 49.1	262°42.8	• • 53.8	320°23.1	• • 55.7	Mirfak	308°29.5	49°56.9
10	318°34.3	347°53.1	05.2	355°34.6	48.5	277°44.8 292°46.8	53.9	335°25.3	55.6	Aldebaran	290°40.5	16°33.5
11	333°36.8	2°52.6	04.2	10°35.1	47.9		54.1 N14°54.2	350°27.4	55.5	Rigel	281°04.5	-8°10.6
12	348°39.2	17°52.0	\$13°03.2	25°35.7	\$15°47.3	307°48.8		5°29.6	\$08°55.4	Capella	280°22.9	46°01.5
13	3°41.7	32°51.5	02.2	40°36.2	46.7	322°50.8	54.4	20°31.8	55.3	Bellatrix	278°23.6	6°22.2
14	18°44.2	47°51.0	01.2	55°36.8	46.1	337°52.8	54.5	35°34.0	55.2	Elnath	278°02.7	28°37.7
15	33°46.6	62°50.4	13°00.2	70°37.3	• • 45.5	352°54.8	• • 54.7	50°36.2	• • 55.0	Alnilam	275°38.4	-1°11.3
16	48°49.1	77° 49.9	12°59.2	85°37.9	44.9	7°56.8	54.8	65°38.3	54.9	Betelgeuse	270°52.8	7°24.6
17	63°51.6	92°49.3	58.2	100°38.4	44.2	22°58.8	55.0	80°40.5	54.8	Canopus	263°52.6	-52°42.7
18	78°54.0	107°48.8	\$12°57.2	115°39.0	S15°43.6	38°00.8	N14°55.1	95°42.7	S08°54.7	Sirius	258°26.7	-16°45.1
19	93°56.5 108°59.0	122°48.3 137°47.7	56.2	130°39.5 145°40.1	43.0	53°02.8	55.3	110°44.9 125°47.1	54.6	Adhara	255°06.3	-29°00.5
20			55.2		42.4	68°04.9	55.4	125 47.1 140°49.2	54.5	Procyon	244°51.4	5°09.7
21	124°01.4	152° 47.2	• • 54.2	160°40.6	• • 41.8	83°06.9	• • 55.6		• • 54.4	Pollux	243°17.9	27°58.1
22	139°03.9	167° 46.6	53.2	175°41.2	41.2	98°08.9	55.7	155°51.4	54.3	Avior	234°14.6	-59°35.4
23	154°06.3	182°46.1	52.2	190°41.7	40.6	113°10.9	55.9	170°53.6	54.1	Suhail	222°46.5	-43°32.0
Mer.p	ass. 12:45	$\nu$ -0.5' d-1	0′ m-3.88	$\nu$ 0.5′ d-0	.6′ m1.24	$\nu 2.0' \ d0.$	1′ m-2.14	$\nu 2.2' \ d-0$	.1′ m1.00	Miaplacidus	221°37.7	-69°49.1
		-				-		-		Alphard	217°48.2	-8°45.9
	CIIA	CIIA	Б	CILA	Б	CIIA	Б	CIIA	Б	Regulus	207°34.9	11°50.9
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	$193^{\circ}41.1$	61°37.2
0	169°08.8	197° 45.6	S12°51.2	205°42.2	S15°40.0	128°12.9	N14°56.0	185°55.8	S08°54.0	Denebola	$182^{\circ}25.3$	14°26.1
1	184°11.3	212°45.0	50.2	220°42.8	39.4	143°14.9	56.2	200°58.0	53.9	Gienah	175°44.0	-17°40.7
2	199°13.7	227° 44.5	49.1	235°43.3	38.8	158°16.9	56.3	216°00.1	53.8	Acrux	173°00.3	-63°13.9
3	214°16.2	242°44.0	• • 48.1	250°43.9	• • 38.2	173°18.9	• • 56.5	231°02.3	• • 53.7	Gacrux	171°51.9	-57°14.9
4	229°18.7	257° 43.4	47.1	265°44.4	37.6	188°20.9	56.6	246°04.5	53.6	Alioth	166°13.0	55°49.5
5	244°21.1	272°42.9	46.1	280°45.0	37.0	203°22.9	56.8	261°06.7	53.5	Spica	158°22.8	-11°17.3
6	259°23.6	287° 42.3	S12°45.1	295°45.5	S15°36.4	218°24.9	N14°56.9	276°08.9	S08°53.4	Alkaid	$152^{\circ}52.1$	49°11.3
7	274°26.1	302°41.8	44.1	310°46.1	35.7	233°26.9	57.1	291°11.0	53.2	Hadar	148°36.6	-60°29.2
8	289°28.5	317°41.3	43.1	325°46.6	35.1	248°28.9	57.2	306° 13.2	53.1	Menkent	147°58.2	-36°29.3
9	304°31.0	332°40.7	• • 42.1	340°47.2	• • 34.5	263°30.9	•• 57.4	321° 15.4	• • 53.0	Arcturus	145°48.3	19°03.2
10	319°33.4	347° 40.2	41.0	355°47.7	33.9	278°32.9	57.5	336° 17.6	52.9	Rigil Kent.	139°40.9	-60°56.0
11	334°35.9	2°39.7	40.0	10°48.3	33.3	293°34.9	57.6	351°19.8	52.8	Kochab	$137^{\circ}19.0$	74°03.0
12	349°38.4	17°39.1	\$12°39.0	25°48.8	S15°32.7	308°36.9	N14°57.8	6°21.9	\$08° 52.7	Zuben'ubi	136°56.6	-16°08.6
13	4°40.8	32°38.6	38.0	40°49.4	32.1	323°38.9	57.9	21°24.1	52.6	Alphecca	$126^{\circ}04.2$	26°37.7
14	19°43.3	47°38.1	37.0	55°49.9	31.5	338°40.9	58.1	36°26.3	52.5	Antares	$112^{\circ}16.6$	-26°29.1
15	34°45.8	62°37.6	• • 36.0	70°50.5	• • 30.9	353°42.9	• • 58.2	51°28.5	• • 52.4	Atria	$107^{\circ}11.4$	-69°04.0
16	49°48.2	77°37.0	34.9	85°51.0	30.3	8°44.9	58.4	66° 30.7	52.2	Sabik	102°03.6	-15°45.4
17	64°50.7	92°36.5	33.9	100°51.6	29.6	23°46.9	58.5	81°32.8	52.1	Shaula	$96^{\circ}11.3$	-37°07.2
18	79°53.2	107°36.0	\$12°32.9	115°52.1	S15°29.0	38°48.9	N14°58.7	96°35.0	\$08°52.0	Rasalhague	95°59.2	12°32.3
19	94°55.6	122°35.4	31.9	130°52.7	28.4	53°50.9	58.8	111°37.2	51.9	Eltanin	90°42.6	51°28.7
20	109°58.1	137°34.9	30.9	145°53.2	27.8	68°52.9	59.0	126°39.4	51.8	Kaus Aust.	83°33.5	-34°22.3
21	125°00.6	152°34.4	• • 29.8	160°53.8 175°54.3	• • 27.2	83°54.9	59.1	141°41.6	• • 51.7	Vega	80°33.8	38°48.0
22	140°03.0	167°33.8	28.8		26.6	98°56.9	59.3	156°43.7	51.6	Nunki	75°48.8	-26°16.0
23	155°05.5	182°33.3	27.8	190°54.9	26.0	113°58.9	59.4	171°45.9	51.5	Altair	62°00.8	8°55.7
Mer.p	ass. 12:41	$\nu$ -0.5' d-1	0′ m-3.88	$\nu$ 0.5′ d-0	.6′ m1.24	$\nu 2.0' \ d0.$	1′ m-2.14	$\nu$ 2.2′ d-0	.1' m $1.01$	Peacock	53°07.2	-56°39.4
										Deneb	49°26.6	45°21.7
<b>T</b>	CHA	CHA	D	CIIA	D	CHA	D	CIIA	D	Enif	33°39.8	9°59.0
Tue	<b>GHA</b> 170°07.9	<b>GHA</b> 197°32.8	<b>Dec</b> \$12°26.8	<b>GHA</b> 205°55.5	Dec \$15°25.4	<b>GHA</b> 129°00.9	<b>Dec</b> N14°59.6	<b>GHA</b> 186° 48.1	<b>Dec</b> \$08°51.3	Al Na'ir	27°34.2	-46°50.7
0 1	170 07.9 185°10.4	197 32.8 212°32.3	25.7	205 55.5 220°56.0	24.7	129 00.9 144°02.9	N14 59.6 59.7	201°50.3	51.2	Fomalhaut	15°15.6	-29°29.8
						144°02.9 159°04.9	59.7 14°59.9	201°50.3 216°52.5		Scheat	13°46.2	28°12.7
2	200°12.9 215°15.3	227°31.7 242°31.2	24.7	235°56.6	24.1 •• 23.5	159°04.9 174°06.9	14°59.9 15°00.0	210°52.5 231°54.6	51.1 •• 51.0	Markab	13°30.9	15°20.0
3 4	215 15.3 230°17.8	242 31.2 257°30.7	· · 23.7 22.7	250°57.1 265°57.7	22.9	174 06.9 189°08.9	00.2	231 54.6 246°56.8	50.9	Mar 10 Sun	SHA	Mer.pass
4 5	245°20.3	257 30.7 272°30.2	22.7	205 57.7 280°58.2	22.9	204°10.9	00.2	240 50.8 261°59.0	50.9 50.8	Venus	29°48.9	10:48
6	245 20.3 260°22.7	272 30.2 287°29.6	\$12°20.6	280 58.2 295°58.8	\$15°21.7	204 10.9 219°12.9	N15°00.5	201 59.0 277°01.2	50.8 S08° 50.7	Mars	37° 19.5	10:48
7	275°25.2	302°29.1	19.6	295 56.6 310°59.3	21.1	219 12.9 234°14.9	00.6	277 01.2 292°03.4	50.6	Jupiter	319° 15.1	15:28
8	275 25.2 290°27.7	317° 28.6	18.6	325°59.9	20.4	234 14.9 249°16.9	00.8	307° 05.5	50.4	Saturn	16°53.8	11:38
9	305°30.1	332°28.1	•• 17.5	341°00.4	. 19.8	264°18.9	•• 00.9	307 03.3 322°07.7	. 50.4			
10	320°32.6	347° 27.5	16.5	356°01.0	19.0	279°20.9	01.1	337°09.9	50.2	Mar 11 Mon	SHA	Mer.pass
11	335°35.1	2° 27.0	15.5	11°01.5	18.6	279 20.9 294°22.9	01.1	352° 12.1	50.2	Venus	28°36.8	10:49
12	350°37.5	17° 26.5	\$12° 14.4	26°02.1	\$15°18.0	309°24.9	N15°01.4	7° 14.3	S08° 50.0	Mars	36°33.4	10:17
13	5°40.0	32° 26.0	13.4	41°02.6	17.4	309 24.9 324°26.9	01.5	22° 16.4	49.9	Jupiter		15:25
14	20°42.4	47° 25.5	12.4	56°03.2	16.7	339°28.9	01.5	37° 18.6	49.9	Saturn	16°47.0	11:35
15	35°44.9	62°24.9	11.3	71°03.8	16.1	354°30.9	•• 01.8	52° 20.8	• • 49.7	Mar 12 T	C LI A	Mor noon
16	50°47.4	77° 24.4	10.3	86°04.3	15.5	9°32.8	02.0	67° 23.0	49.7	Mar 12 Tue	SHA	Mer.pass
	50 47.4 65°49.8	92°23.9	09.3	80 04.3 101°04.9	15.5	9 32.8 24°34.8	02.0	82° 25.2	49.5 49.4	Venus	27°24.8	10:50
17 18	80°52.3	92 23.9 107°23.4	512°08.2	101 04.9 116°05.4	\$15°14.3	24 34.8 39°36.8	N15°02.3	97° 27.3	49.4 \$08°49.3	Mars	35°47.5	10:16
19	95°54.8	107 23.4 122° 22.9	07.2	131°06.0	13.7	54°38.8	02.4	97 27.3 112°29.5	49.3	Jupiter		15:22
20	95 54.6 110°57.2	137° 22.3	06.2	146°06.5	13.7	69°40.8	02.4	112 29.5 127°31.7	49.2	Saturn	16°40.1	11:31
21	110 57.2 125°59.7	157 22.3 152° 21.8	05.1	140 00.5 161°07.1	13.0	84°42.8	• • 02.7	142° 33.9	• • 49.0	Horizont	al parallax	
22	141°02.2	167°21.3	04.1	176°07.6	11.8	99°44.8	02.7	142 33.9 157°36.1	48.9		Venus:	0.1
23	156°04.6	182°20.8	03.1	191°08.2	11.2	114°46.8	03.0	172°38.2	48.8		Mars:	0.1
Mer.p	ass. 12:37	$\nu$ -0.5' d-1	0′ m-3.88	$\nu$ 0.6′ $d$ -0	.6′ m1.24	$\nu$ 2.0′ d0.	1′ m-2.13	$\nu$ 2.2′ d-0	.1′ m1.01			

h	Su	n	Moon				
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	177°26.3	S03°59.9	$181^{\circ}19.8$	9.1'	S08°35.2	-17.6'	61.3'
1	192°26.5	58.9	195°47.9	9.2'	08°17.7	-17.6'	61.4
2	207°26.6 222°26.8	57.9 •• 56.9	210°16.1 224°44.3	9.2' 9.3'	08°00.1 07°42.4	-17.7' -17.7'	61.4' 61.4'
4	237°27.0	56.0	239°12.6	9.3'	07°24.7	-17.7'	61.4
5	252°27.1	55.0	253°40.9	9.4'	07°07.0	-17.8'	61.4'
6	267°27.3	S03°54.0	268°09.2	9.4'	506°49.2	-17.8'	61.4
7 8	282°27.4 297°27.6	53.0 52.0	282°37.6 297°06.1	9.4' 9.5'	06°31.4 06°13.5	-17.9' -17.9'	61.4' 61.4'
9	312°27.8	• • 51.1	311°34.5	9.5'	05°55.6	-17.9'	61.4
10	327°27.9	50.1	326°03.0	9.6'	05°37.7	-18.0'	61.4'
11	342°28.1	49.1	340°31.6	9.6'	05°19.7	-18.0'	61.4'
12 13	357°28.2 12°28.4	\$03°48.1 47.1	355°00.2 9°28.8	9.6' 9.7'	S05°01.7 04°43.7	-18.0' -18.1'	61.4' 61.4'
14	27°28.6	46.1	23°57.5	9.7' 9.7'	04°45.7	-18.1'	61.3
15	42°28.7	• • 45.2	38°26.1	9.7'	04°07.5	-18.1'	61.3'
16	57°28.9	44.2	52°54.9	9.7'	03°49.5	-18.1'	61.3'
17	72°29.1 87°29.2	43.2 \$03°42.2	67°23.6 81°52.4	9.8'	03°31.3 \$03°13.2	-18.1' -18.1'	61.3' 61.3'
18 19	87 29.2 102°29.4	41.2	96°21.2	9.8' 9.8'	02°55 1	-18.1 -18.2'	61.3
20	117°29.5	40.3	110°50.0	9.9'	02°36.9	-18.2'	61.3'
21	132°29.7	• • 39.3	125°18.9	9.9'	02°18.7	-18.2'	61.3'
22	147°29.9	38.3	139°47.8	9.9'	02°00.6	-18.2'	61.3'
23	162°30.0	37.3	154°16.7	9.9'	01°42.4	-18.2'	61.3'
	SD = 16.1'	d = -1.0'		SI	O = 16.7'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177°30.2	S03°36.3	168°45.6	9.9'	S01°24.2	-18.2'	61.3'
1 2	192°30.4 207°30.5	35.3 34.4	183°14.5 197°43.5	10.0' 10.0'	01°06.0 00°47.8	-18.2' -18.2'	61.3' 61.3'
3	207 30.5 222°30.7	• • 33.4	197 43.5 212°12.5	10.0'	00°47.8	-18.2'	61.2'
4	237°30.8	32.4	226°41.5	10.0'	S00°11.4	-18.2	61.2'
5	252°31.0	31.4	241°10.5	10.0'	N00°06.7	18.2'	61.2'
6	267°31.2	S03°30.4	255°39.5	10.0'	N00°24.9	18.2'	61.2'
7 8	282°31.3 297°31.5	29.4 28.5	270°08.6 284°37.6	10.1' 10.1'	00°43.1 01°01.2	18.1' 18.1'	61.2' 61.2'
9	312°31.7	27.5	299°06.7	10.1	01°19.3	18.1	61.2'
10	327°31.8	26.5	313°35.8	10.1'	01°37.4	18.1'	61.1'
11	342°32.0	25.5	328°04.9	10.1'	01°55.5	18.1'	61.1'
12 13	357°32.2 12°32.3	\$03°24.5 23.5	342°34.0 357°03.1	10.1' 10.1'	N02°13.6 02°31.6	18.0' 18.0'	61.1' 61.1'
14	27°32.5	22.6	11°32.2	10.1	02°31.0	18.0'	61.1
15	42°32.7	• • 21.6	26°01.3	10.1'	03°07.7	18.0'	61.1'
16	57°32.8	20.6	40°30.4	10.1'	03°25.6	17.9'	61.0'
17 18	72°33.0 87°33.2	19.6 \$03° 18.6	54°59.5 69°28.6	10.1' 10.1'	03°43.6 N04°01.5	17.9' 17.9'	61.0' 61.0'
19	102°33.3	17.6	83°57.7	10.1	04°19.3	17.9	61.0'
20	117°33.5	16.6	98°26.8	10.1'	04°37.2		61.0'
21	132°33.7	•• 15.7	112°55.9	10.1'	04°55.0	17.8'	60.9'
22	147°33.8 162°34.0	14.7	127°25.0 141°54.1	10.1'	05°12.7 05°30.4	17.7'	60.9'
23	SD = 16.1'	$\frac{13.7}{d = -1.0'}$	141 54.1	10.1'	05 30.4 0 = 16.7'	17.7'	60.9'
	3D = 10.1	a = -1.0		31	J = 10.7		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	177°34.2 192°34.3	S03°12.7 11.7	156°23.2 170°52.3	10.1' 10.1'	N05°48.1 06°05.7	17.6' 17.6'	60.9' 60.8'
2	207°34.5	10.7	170 52.3 185°21.4	10.1	06°23.3	17.5	60.8
3	222°34.7	• • 09.8	199°50.4	10.0'	06°40.8	17.5'	60.8'
4	237°34.8	08.8	214°19.5	10.0'	06°58.3	17.4	60.8'
5 6	252°35.0 267°35.2	07.8 \$03°06.8	228°48.5 243°17.5	10.0' 10.0'	07°15.7 N07°33.0	17.4' 17.3'	60.8' 60.7'
6 7	267°35.2 282°35.3	05.8	243°17.5 257°46.5	10.0'	07°50.3	17.3	60.7'
8	297°35.5	04.8	272°15.5	10.0'	08°07.6	17.2'	60.7'
9	312°35.7	• • 03.8	286°44.5	10.0'	08°24.7	17.1'	60.6'
10 11	327°35.8 342°36.0	02.9 01.9	301°13.5 315°42.4	9.9' 9.9'	08°41.9 08°58.9	17.0' 17.0'	60.6' 60.6'
12	342 36.0 357°36.2	503°00.9	315 42.4 330°11.3	9.9'	N09°15.9	16.9	60.6
13	12°36.3	$02^{\circ}59.9$	344°40.2	9.9'	09°32.8	16.8'	60.5'
14	27°36.5	58.9	359°09.1	9.9'	09°49.6	16.8'	60.5
15 16	42°36.7 57°36.8	· · 57.9 56.9	13°38.0 28°06.8	9.8' 9.8'	10°06.4 10°23.1	16.7' 16.6'	60.5' 60.4'
16 17	57°36.8 72°37.0	56.9 56.0	28°06.8 42°35.6	9.8° 9.8'	10°23.1 10°39.7	16.5	60.4
18	87°37.2	S02°55.0	57°04.4	9.8'	N10°56.3	16.5	60.4'
19	102°37.3	54.0	71°33.1	9.7'	11°12.7	16.4	60.4
20 21	117°37.5 132°37.7	53.0 •• 52.0	86°01.9 100°30.6	9.7' 9.7'	11°29.1 11°45.4	16.3' 16.2'	60.3' 60.3'
22	132 37.7 147°37.9	51.0	100 30.6 114°59.3	9. <i>1</i> 9.6'	11 45.4 12°01.6	16.2	60.3
23	162°38.0	50.0	129°27.9	9.6'	12°17.8	16.0'	60.2'
	SD = 16.1'	d = -1.0'		SI	O = 16.6'		

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

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

## March 13, 14, 15 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	171°07.1	197°20.3	\$12°02.0	206°08.8	S15°10.6	129°48.8	N15°03.2	187°40.4	S08°48.7			
1	186°09.5	212°19.7	12°01.0	221°09.3	09.9	144°50.8	03.3	202°42.6	48.5	Alpheratz	357°35.9	29°13.3
2	201°12.0	227°19.2	11°59.9	236°09.9	09.3	159°52.8	03.5	217°44.8	48.4	Ankaa	353°08.2	-42°10.6
3	216° 14.5	242°18.7	• • 58.9	251°10.4	• • 08.7	174°54.8	03.6	232°47.0	• • 48.3	Schedar	349°32.4	56°40.2
4	231°16.9	257°18.2	57.9	266°11.0	08.1	189°56.8	03.8	247°49.2	48.2	Diphda	348°48.3	-17°51.4
5	$246^{\circ}19.4$	272°17.7	56.8	281°11.5	07.5	204°58.8	03.9	262°51.3	48.1	Achernar Hamal	335°21.2 327°52.3	-57°07.0 23°34.6
6	261°21.9	287°17.2	S11°55.8	296°12.1	<b>S</b> 15°06.8	220°00.8	N15°04.1	277°53.5	S08°48.0	Polaris	314° 40.6	89°22.2
7	276°24.3	302°16.7	54.7	311°12.7	06.2	235°02.8	04.2	292°55.7	47.9	Acamar	315° 12.5	-40°12.7
8	291°26.8	317°16.1	53.7	326°13.2	05.6	250°04.8	04.4	307°57.9	47.8	Menkar	314°07.1	4°11.0
9	306°29.3	332°15.6	• • 52.7	341°13.8	• • 05.0	265°06.8	• • 04.5	323°00.1	• • 47.6	Mirfak	308° 29.5	49°56.9
10 11	321°31.7 336°34.2	347°15.1 2°14.6	51.6 50.6	356°14.3 11°14.9	04.3 03.7	280°08.8 295°10.7	04.7 04.8	338°02.2 353°04.4	47.5	Aldebaran	290°40.5	16°33.4
12	350° 34.2 351° 36.7	2 14.0 17°14.1	\$11°49.5	26°15.4	\$15°03.1	310° 12.7	N15°05.0	8°06.6	47.4 \$08°47.3	Rigel	281°04.6	-8°10.6
13	6°39.1	32°13.6	48.5	41°16.0	02.5	325° 14.7	05.1	23°08.8	47.2	Capella	280°22.9	46°01.5
14	21°41.6	47°13.1	47.4	56°16.6	01.9	340°16.7	05.3	38°11.0	47.1	Bellatrix	278°23.6	6°22.2
15	36°44.0	62°12.6	• • 46.4	71°17.1	• • 01.2	355° 18.7	• • 05.4	53°13.1	• • 47.0	Elnath	278°02.7	28°37.7
16	51°46.5	77°12.0	45.3	86°17.7	00.6	$10^{\circ}20.7$	05.6	68°15.3	46.9	Alnilam	275°38.4	-1°11.3
17	66°49.0	92°11.5	44.3	101°18.2	15°00.0	25°22.7	05.7	83°17.5	46.8	Betelgeuse Canopus	270°52.8 263°52.6	7°24.6 -52°42.8
18	81°51.4	$107^{\circ}11.0$	<b>S</b> 11°43.3	116°18.8	<b>S</b> 14°59.4	40°24.7	N15°05.9	98°19.7	S08°46.6	Sirius	258° 26.8	-16°45.1
19	96°53.9	122°10.5	42.2	131°19.4	58.7	55° 26.7	06.0	113°21.9	46.5	Adhara	255°06.3	-29°00.5
20	111°56.4	137°10.0	41.2	146°19.9	58.1	70°28.7	06.2	128°24.0	46.4	Procyon	244°51.4	5°09.7
21	126°58.8	152°09.5	• • 40.1	161°20.5	• • 57.5	85°30.7	06.3	143°26.2	• • 46.3	Pollux	243°18.0	27°58.1
22 23	142°01.3 157°03.8	167°09.0	39.1	176°21.0 191°21.6	56.9 56.2	100°32.7 115°34.7	06.5	158°28.4 173°30.6	46.2	Avior	234°14.6	-59°35.4
23	157 05.6	182°08.5	38.0				06.6		46.1	Suhail	222°46.5	-43°32.0
Mer.p	ass. 12:33	$\nu$ -0.5' d-1	0′ m-3.88	$\nu$ 0.6′ d-0	.6′ m1.24	$\nu 2.0' \ d0.$	2′ m-2.13	$\nu 2.2' \ d-0$	$.1^\prime$ m $1.01$	Miaplacidus	221°37.7	-69°49.1
										Alphard	217°48.2	-8°45.9
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	207°34.9 193°41.1	11°50.9 61°37.2
0	$172^{\circ}06.2$	$197^{\circ}08.0$	<b>S</b> 11°37.0	206°22.2	<b>S</b> 14°55.6	$130^{\circ}36.6$	$N15^{\circ}06.8$	188°32.8	508°46.0	Denebola	182°25.3	14°26.1
1	187°08.7	212°07.5	35.9	221°22.7	55.0	145°38.6	06.9	203°35.0	45.9	Gienah	175°44.0	-17°40.7
2	202°11.1	227°07.0	34.9	236°23.3	54.4	160°40.6	07.1	218°37.1	45.7	Acrux	173°00.3	-63°14.0
3 4	217° 13.6 232° 16.1	242°06.5 257°05.9	· · 33.8 32.8	251°23.8 266°24.4	· · 53.7 53.1	175° 42.6 190° 44.6	· · 07.2 07.4	233°39.3 248°41.5	•• 45.6 45.5	Gacrux	171°51.9	-57°14.9
5	247° 18.5	272°05.4	31.7	281°25.0	52.5	205°46.6	07.4	263°43.7	45.5 45.4	Alioth	166°13.0	55°49.6
6	262°21.0	287°04.9	S11°30.6	296°25.5	S14°51.8	220°48.6	N15°07.7	278°45.9	S08°45.3	Spica	158°22.8	-11°17.3
7	277°23.5	302°04.4	29.6	311°26.1	51.2	235°50.6	07.9	293°48.0	45.2	Alkaid	152°52.1 148°36.5	49°11.3 -60°29.3
8	292°25.9	317°03.9	28.5	326°26.6	50.6	250°52.6	0.80	308°50.2	45.1	Hadar Menkent	146 50.5 147°58.2	-00 29.3 -36°29.3
9	307°28.4	332°03.4	• • 27.5	341°27.2	• • 50.0	265°54.6	•• 08.2	323°52.4	• • 45.0	Arcturus	145°48.3	19°03.2
10	322°30.9	347°02.9	26.4	356°27.8	49.3	280° 56.5	08.3	338°54.6	44.9	Rigil Kent.	139°40.8	-60°56.0
11	337°33.3	2°02.4	25.4	11°28.3	48.7	295°58.5 311°00.5	08.5	353°56.8	44.7	Kochab	$137^{\circ}19.0$	74°03.0
12 13	352°35.8 7°38.3	17°01.9 32°01.4	\$11°24.3 23.3	26°28.9 41°29.5	\$14°48.1 47.4	311 00.5 326°02.5	N15°08.6 08.8	8°59.0 24°01.1	\$08°44.6 44.5	Zuben'ubi	136°56.6	-16°08.6
14	7 36.3 22°40.7	47°00.9	22.2	56°30.0	46.8	341°04.5	08.9	39°03.3	44.4	Alphecca	126°04.1	26°37.7
15	37°43.2	62°00.4	• • 21.1	71°30.6	• • 46.2	356°06.5	09.1	54°05.5	• • 44.3	Antares	112°16.6	-26°29.1
16	52°45.6	76°59.9	20.1	86°31.1	45.6	11°08.5	09.2	69°07.7	44.2	Atria Sabik	107°11.4 102°03.5	-69°04.0 -15°45.4
17	67°48.1	91°59.4	19.0	101°31.7	44.9	$26^{\circ}10.5$	09.4	84°09.9	44.1	Shaula	96°11.3	-37°07.2
18	82°50.6	106°58.9	S11°18.0	116°32.3	S14°44.3	41°12.5	N15°09.5	99°12.0	S08°44.0	Rasalhague	95°59.2	12°32.3
19	97°53.0	121°58.4	16.9	131°32.8	43.7	56° 14.4	09.7	114°14.2	43.9	Eltanin	90°42.6	51°28.7
20	112°55.5 127°58.0	136°57.9 151°57.4	15.8 •• 14.8	146°33.4 161°34.0	43.0 •• 42.4	71°16.4 86°18.4	09.8 · · 10.0	129°16.4 144°18.6	43.7 •• 43.6	Kaus Aust.	83°33.5	-34°22.3
21 22	143°00.4	166°56.9	13.7	176°34.5	41.8	101°20.4	10.0	159°20.8	43.5	Vega	80°33.8	38°48.0
23	158°02.9	181°56.4	12.6	191°35.1	41.1	116°22.4	10.3	174°23.0	43.4	Nunki	75°48.7	-26°16.0
				-						Altair	62°00.8	8°55.7
Mer.p	ass. 12:30	$\nu$ -0.5′ $d$ -1	1′ m-3.88	$\nu$ 0.6′ d-0	.6′ m1.23	$\nu$ 2.0° d0.	2′ m-2.12	$\nu$ 2.2' <b>d</b> -0	.1′ m1.02	Peacock Deneb	53°07.2 49°26.6	-56°39.3 45°21.7
										Enif	33°39.8	9°58.9
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°34.2	-46°50.7
0	173°05.4	196°55.9	S11°11.6	206°35.7	S14°40.5	131°24.4	N15° 10.4	189°25.1	508°43.3	Fomalhaut	$15^{\circ}15.6$	-29°29.8
1	188°07.8	211°55.4	10.5	221°36.2	39.9	146°26.4	10.6	204°27.3	43.2	Scheat	13°46.2	28°12.7
2	203° 10.3 218° 12.8	226°54.9 241°54.4	09.5 •• 08.4	236°36.8 251°37.3	39.2 · · 38.6	161°28.3 176°30.3	10.7 · · 10.9	219°29.5 234°31.7	43.1 •• 43.0	Markab	13°30.9	15°19.9
4	210 12.0 233°15.2	256°53.9	07.3	266°37.9	38.0	170 30.3 191°32.3	11.0	249°33.9	42.9	Mar 13 Wed	SHA	Mer.pass
5	248° 17.7	271°53.4	06.3	281°38.5	37.3	206°34.3	11.0	264°36.0	42.7	Venus	26°13.2	10:51
6	263°20.1	286°52.9	S11°05.2	296°39.0	\$14°36.7	221°36.3	N15°11.3	279°38.2	S08°42.6	Mars	35°01.7	10:15
7	278°22.6	301°52.4	04.1	311°39.6	36.1	236°38.3	11.5	294°40.4	42.5	Jupiter	$318^{\circ}41.7$	15:19
8	293°25.1	$316^{\circ}51.9$	03.1	326°40.2	35.4	251°40.3	11.6	309°42.6	42.4	Saturn	16°33.3	11:28
9	308°27.5	331°51.4	• • 02.0	341°40.7	• • 34.8	266°42.3	• • 11.8	324°44.8	• • 42.3	Mar 14 Thu	SHA	Mer.pass
10	323°30.0	346°51.0	11°00.9	356°41.3	34.2	281°44.2	11.9	339°47.0	42.2	Venus	25°01.8	10:52
11 12	338° 32.5 353° 34.9	1°50.5 16°50.0	10°59.8 \$10°58.8	11°41.9 26°42.4	33.5 \$14°32.9	296°46.2 311°48.2	12.1 N15°12.2	354°49.1 9°51.3	42.1 \$08°42.0	Mars	$34^{\circ}15.9$	10:14
13	8°37.4	31°49.5	57.7	41°43.0	32.3	326° 50.2	12.4	24°53.5	41.8	Jupiter		15:16
14	23°39.9	46°49.0	56.6	56°43.6	31.6	341°52.2	12.5	39°55.7	41.7	Saturn	16°26.6	11:24
15	$38^{\circ}42.3$	61°48.5	• • 55.6	$71^{\circ}44.1$	• • 31.0	$356^{\circ}54.2$	•• 12.7	54°57.9	• • 41.6	Mar 15 Fri	SHA	Mer.pass
16	53°44.8	76°48.0	54.5	86°44.7	30.4	11°56.1	12.8	70°00.1	41.5	Venus	23°50.6	10:53
17	68°47.3	91°47.5	53.4	101°45.3	29.7	26°58.1	13.0	85°02.2	41.4	Mars	33°30.3	10:13
18	83° 49.7 98° 52.2	106°47.0	\$10°52.3	116°45.8	\$14°29.1	42°00.1	N15° 13.1	100°04.4	\$08°41.3	Jupiter		15:12
19 20	98°52.2 113°54.6	121°46.5 136°46.0	51.3 50.2	131°46.4 146°47.0	28.5 27.8	57°02.1 72°04.1	13.3 13.5	115°06.6 130°08.8	41.2 41.1	Saturn	16° 19.8	11:21
21	113 54.0 128°57.1	150 40.0 151°45.5	• • 49.1	140 47.0 161°47.5	27.2	87°06.1	. 13.5	145°11.0	• • 41.1	Horizont	al parallax	
22	143°59.6	166°45.1	48.0	176°48.1	26.5	102°08.0	13.8	160°13.2	40.8		Venus:	0.1
23	159°02.0	181°44.6	47.0	191°48.7	25.9	$117^{\circ}10.0$	13.9	$175^{\circ}15.3$	40.7		Mars:	0.1
Mer n	ass. 12:26	$\nu$ -0.5' d-1	1′ m-3.88	ν0.6′ d-0	.6′ m1.23	$\nu 2.0' d0$	2′ m-2.12	ν2.2' d-Ω	.1′ m1.02			

h	Su	Moon					
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	177°38.2	S02°49.1	143°56.5	9.6'	$N12^{\circ}33.8$	16.0'	60.2'
1	192°38.4	48.1	158°25.1	9.6'	12°49.8	15.9'	60.2'
2	207°38.5 222°38.7	47.1 •• 46.1	172°53.6 187°22.2	9.5' 9.5'	13°05.6 13°21.4	15.8' 15.7'	60.1' 60.1'
4	237° 38.9	45.1	201°50.7	9.5'	13°37.1	15.6'	60.1
5	252°39.0	44.1	216°19.1	9.4'	13°52.6	15.5'	60.0'
6	267°39.2	S02°43.1	230°47.5	9.4'	$N14^{\circ}08.1$	15.4'	60.0'
7	282°39.4	42.2	245°15.9	9.3'	14°23.5	15.3'	60.0'
8 9	297°39.6 312°39.7	41.2 •• 40.2	259°44.2 274°12.6	9.3' 9.3'	14°38.8 14°54.0	15.2' 15.1'	59.9' 59.9'
10	312 39.7 327°39.9	39.2	274 12.0 288°40.8	9.3 9.2'	14 54.0 15°09.1	15.1	59.9'
11	342°40.1	38.2	303°09.1	9.2'	15°24.0	14.9'	59.8'
12	357° 40.2	S02°37.2	317°37.3	9.2'	N15°38.9	14.8'	59.8'
13	12° 40.4	36.2	332°05.4	9.1'	15°53.7	14.7'	59.8'
14 15	27° 40.6 42° 40.8	35.3 · · 34.3	346°33.5 1°01.6	9.1' 9.0'	16°08.3 16°22.9	14.5' 14.4'	59.7' 59.7'
16	57° 40.9	33.3	15°29.6	9.0'	16°37.3	14.3'	59.6'
17	72°41.1	32.3	29°57.6	9.0'	16°51.6	14.2'	59.6'
18	87°41.3	S02°31.3	44°25.6	8.9'	N17°05.8	14.1'	59.6'
19	102°41.4	30.3	58°53.5 73°21.4	8.9'	17°19.9 17°33.9	14.0'	59.5'
20 21	117°41.6 132°41.8	29.3 •• 28.3	73°21.4 87°49.2	8.8' 8.8'	17°33.9 17°47.7	13.8' 13.7'	59.5' 59.5'
22	147° 42.0	27.4	102°17.0	8.7'	18°01.4	13.6'	59.4
23	162°42.1	26.4	116°44.7	8.7'	18°15.1	13.5'	59.4'
	SD = 16.1'	d = -1.0'		S	D = 16.4'		
<b>-</b>						,	
Thu 0	<b>GHA</b> 177° 42.3	Dec \$02°25.4	<b>GHA</b> 131°12.4	u 8.7'	<b>Dec</b> N18°28.5	d 13.4'	<b>HP</b> 59.3'
1	177 42.5 192° 42.5	24.4	131 12.4 145°40.1	8.6'	18°41.9	13.4	59.3'
2	207°42.6	23.4	$160^{\circ}07.7$	8.6'	$18^{\circ}55.1$	13.1'	59.3'
3	222° 42.8	• • 22.4	174°35.3	8.5'	19°08.2	13.0'	59.2'
4	237° 43.0 252° 43.2	21.4 20.4	189°02.8 203°30.3	8.5' 8.4'	19°21.2 19°34.1	12.9' 12.7'	59.2'
5 6	252 43.2 267°43.3	20.4 S02°19.5	203 30.3 217°57.7	8.4	N19°46.8	12.7	59.1' 59.1'
7	282° 43.5	18.5	232°25.1	8.4'	19°59.4	12.5'	59.1'
8	297°43.7	17.5	246°52.5	8.3'	20°11.9	12.3'	59.0'
9	312°43.9	• • 16.5	261°19.8	8.3'	20°24.2	12.2'	59.0'
10 11	327°44.0 342°44.2	15.5 14.5	275°47.0 290°14.2	8.2' 8.2'	20°36.4 20°48.4	12.1' 11.9'	59.0' 58.9'
12	357° 44.4	502°13.5	304°41.4	8.1'	N21°00.3	11.8'	58.9
13	12° 44.5	12.5	319°08.5	8.1'	21°12.1	11.6'	58.8'
14	27°44.7	11.6	333°35.6	8.0'	21°23.8	11.5'	58.8'
15	42°44.9	• • 10.6	348°02.7	8.0'	21°35.3	11.4'	58.8'
16 17	57° 45.1 72° 45.2	09.6 08.6	2°29.7 16°56.6	8.0' 7.9'	21°46.6 21°57.8	11.2' 11.1'	58.7' 58.7'
18	87° 45.4	S02°07.6	31°23.6	7.9'	N22°08.9	10.9'	58.6'
19	102°45.6	06.6	45°50.4	7.8'	22°19.8	10.8'	58.6'
20	117° 45.8	05.6	60°17.3	7.8'	22°30.6	10.0	58.6'
21 22	132° 45.9 147° 46.1	· · 04.6 03.7	74°44.1 89°10.8	7.8' 7.7'	22°41.3 22°51.8	10.5' 10.3'	58.5' 58.5'
23	162° 46.3	03.7	103°37.5	7.7'	23°02.1	10.3	58.4
	SD = 16.1'	d = -1.0'		S	D = 16.2'		
F!	GHA	Dec	CIIA		D	d	HP
Fri 0	<b>GHA</b> 177 <sup>°</sup> 46.5	S02°01.7	<b>GHA</b> 118°04.2	ν 7.6'	<b>Dec</b> N23°12.3	<i>a</i> 10.0'	нР 58.4'
1	192°46.6	02°00.7	132°30.9	7.6'	23°22.3	9.9'	58.4
2	207°46.8	$01^{\circ}59.7$	146°57.4	7.6'	23°32.2	9.7'	58.3'
3	222° 47.0	• • 58.7	161°24.0	7.5'	23°42.0	9.6'	58.3'
4 5	237° 47.2 252° 47.3	57.7 56.7	175°50.5 190°17.0	7.5' 7.5'	23°51.6 24°01.0	9.4' 9.3'	58.2' 58.2'
6	267° 47.5	S01°55.8	204°43.5	7.4'	N24°10.3	9.1	58.2'
7	282°47.7	54.8	219°09.9	7.4'	24°19.4	9.0'	58.1'
8	297°47.9	53.8	233°36.3	7.3'	24°28.4	8.8'	58.1'
9 10	312°48.1 327°48.2	· · 52.8 51.8	248°02.6 262°28.9	7.3' 7.3'	24°37.2 24°45.9	8.7' 8.5'	58.0' 58.0'
10	327 48.2 342°48.4	51.8 50.8	262 28.9 276°55.2	7.3'	24 45.9 24°54.4	8.4'	58.0'
12	357° 48.6	S01°49.8	291°21.5	7.2'	N25°02.8	8.2'	57.9'
13	12°48.8	48.8	305°47.7	7.2'	25°10.9	8.0'	57.9'
14 15	27° 48.9 42° 49.1	47.8 •• 46.9	320°13.9 334°40.0	7.2' 7.1'	25°19.0 25°26.9	7.9' 7.7'	57.8'
15 16	42°49.1 57°49.3	• • 46.9 45.9	334°40.0 349°06.2	7.1' 7.1'	25°26.9 25°34.6	7.7° 7.6'	57.8' 57.8'
17	72° 49.5	44.9	3°32.3	7.1'	25°42.1	7.4	57.7'
18	87°49.6	S01°43.9	17°58.4	7.1'	N25°49.5	7.2'	57.7'
19	102°49.8	42.9	32°24.4	7.0'	25°56.7	7.1'	57.6'
20 21	117°50.0 132°50.2	41.9 •• 40.9	46°50.5 61°16.5	7.0' 7.0'	26°03.8 26°10.7	6.9' 6.7'	57.6' 57.6'
22	147° 50.3	39.9	75°42.5	7.0' 7.0'	26°17.5	6.6'	57.5'
23	162°50.5	39.0	90°08.5	7.0'	26°24.1	6.4	57.5'
	SD = 16.1'	d = -1.0'		S	D = 15.9'		

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

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

		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	10-28%	
13	09:27	09:19	12:09	14:56	02:29		
14	09:11	09:02	12:09	15:50	03:22		
15	08:54	08:46	12:09	16:45	04:17		

# March 16, 17, 18 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	174°04.5	196° 44.1	\$10°45.9	206°49.2	\$14°25.3	132°12.0	N15°14.1	190° 17.5	S08° 40.6			
1	189°07.0	211°43.6	44.8	221°49.8	24.6	147°14.0	14.2	205° 19.7	40.5	Alpheratz	357°35.9	29°13.3
2	204°09.4	226° 43.1	43.7	236°50.4	24.0	162°16.0	14.4	220°21.9	40.4	Ankaa	353°08.2	-42°10.6
3	219°11.9	241°42.6	• • 42.7	251°51.0	23.3	177°18.0	• • 14.5	235°24.1	• • 40.3	Schedar	349°32.4	56°40.2
4	$234^{\circ}14.4$	$256^{\circ}42.1$	41.6	266°51.5	22.7	192°19.9	14.7	250°26.2	40.2	Diphda	348°48.3	-17°51.4
5	249°16.8	271°41.6	40.5	281°52.1	22.1	$207^{\circ}21.9$	14.8	265°28.4	40.1	Achernar	335°21.2	-57°07.0 23°34.6
6	264°19.3	286°41.2	S10°39.4	296°52.7	S14°21.4	222°23.9	N15°15.0	280°30.6	S08°40.0	Hamal Polaris	327°52.3 314°41.4	89°22.2
7	279°21.7	301°40.7	38.4	311°53.2	20.8	237°25.9	15.1	295°32.8	39.9	Acamar	315° 12.5	-40°12.7
8	294°24.2	316°40.2	37.3	326°53.8	20.2	252°27.9	15.3	310°35.0	39.7	Menkar	314°07.1	4°11.0
9	309°26.7	331°39.7	• • 36.2	341°54.4	• • 19.5	267°29.9	• • 15.4	325°37.2	• • 39.6	Mirfak	308° 29.5	49°56.9
10	324°29.1	346°39.2	35.1	356°54.9	18.9	282°31.8	15.6	340°39.3	39.5	Aldebaran	290°40.5	16°33.4
11	339°31.6	1°38.7	34.0	11°55.5	18.2	297°33.8	15.7	355°41.5	39.4	Rigel	281°04.6	-8°10.6
12	354°34.1	16°38.2	\$10°32.9	26°56.1	\$14°17.6	312°35.8	N15°15.9	10°43.7	\$08°39.3	Capella	280°23.0	46°01.5
13 14	9°36.5 24°39.0	31°37.8 46°37.3	31.9 30.8	41°56.7 56°57.2	16.9 16.3	327°37.8 342°39.8	16.0 16.2	25°45.9 40°48.1	39.2 39.1	Bellatrix	278°23.6	6°22.2
15	39°41.5	61°36.8	• • 29.7	71°57.8	. 15.7	357°41.7	16.3	55° 50.3	39.1	Elnath	278°02.8	28°37.7
16	54°43.9	76°36.3	28.6	86°58.4	15.0	12°43.7	16.5	70°52.4	38.9	Alnilam	275°38.4	-1°11.3
17	69°46.4	91°35.8	27.5	101°58.9	14.4	27°45.7	16.6	85° 54.6	38.7	Betelgeuse	270°52.8	7°24.6
18	84°48.9	106°35.3	S10°26.4	116°59.5	S14°13.7	42°47.7	N15°16.8	100° 56.8	S08°38.6	Canopus	263°52.6	-52°42.8
19	99°51.3	121°34.9	25.4	132°00.1	13.1	57°49.7	17.0	115°59.0	38.5	Sirius	258°26.8	-16°45.1
20	114°53.8	136°34.4	24.3	147°00.7	12.5	72°51.6	17.1	131°01.2	38.4	Adhara	255°06.3 244°51.4	-29°00.5 5°09.7
21	129°56.2	151°33.9	• • 23.2	162°01.2	• • 11.8	87°53.6	• • 17.3	146°03.4	• • 38.3	Procyon Pollux	244 51.4 243°18.0	27°58.1
22	144°58.7	166°33.4	22.1	177°01.8	11.2	102°55.6	17.4	161°05.5	38.2	Avior	234° 14.7	-59°35.4
23	160°01.2	181°32.9	21.0	192°02.4	10.5	117°57.6	17.6	176°07.7	38.1	Suhail	222°46.5	-43°32.0
Mer n	ass. 12:22	$\nu$ -0.5' d-1	1′ m-3.88	$\nu 0.6' d-0$	.6′ m1.23	$\nu^2 0' d0$	2′ m-2.12	$\nu^2 2' d-0$	.1′ m1.02	Miaplacidus	221°37.8	-69°49.1
- IVICI.P		ν 0.5 u 1			.0 1111.25	- V2.0 U0.		ν 2.2 d 0	.1 1111.02	Alphard	217°48.2	-8°45.9
_			_		_		_		_	Regulus	207°34.9	11°50.9
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.1	61°37.2
0	175°03.6	196°32.5	\$10° 19.9	207°02.9	\$14°09.9	132°59.6	N15°17.7	191°09.9	S08°38.0	Denebola	$182^{\circ}25.3$	14°26.1
1	190°06.1	211°32.0	18.8	222°03.5	09.2	148°01.5	17.9	206°12.1	37.9	Gienah	175°44.0	-17°40.7
2 3	205°08.6 220°11.0	226°31.5 241°31.0	17.7 •• 16.7	237°04.1 252°04.7	08.6 •• 07.9	163°03.5 178°05.5	18.0 •• 18.2	221°14.3 236°16.5	37.7 •• 37.6	Acrux	173°00.2	-63°14.0
3 4	235°13.5	256° 30.6	15.6	267°05.2	07.9	176 05.5 193°07.5	18.3	250 10.5 251° 18.7	37.5	Gacrux	171°51.9	-57°14.9
5	250°16.0	271°30.1	14.5	282°05.8	06.7	208°09.5	18.5	266° 20.8	37.4	Alioth	166°13.0	55°49.6
6	265°18.4	286° 29.6	\$10° 13.4	297°06.4	S14°06.0	223°11.4	N15°18.6	281°23.0	S08° 37.3	Spica	158°22.7	-11°17.4
7	280°20.9	301°29.1	12.3	312°07.0	05.4	238°13.4	18.8	296°25.2	37.2	Alkaid	152°52.1	49°11.3
8	295°23.4	316°28.6	11.2	327°07.5	04.7	253°15.4	18.9	311°27.4	37.1	Hadar	148°36.5	-60°29.3
9	310°25.8	331°28.2	. 10.1	342°08.1	• • 04.1	268°17.4	. 19.1	326° 29.6	37.0	Menkent	147°58.1	-36°29.3
10	325°28.3	346°27.7	09.0	357°08.7	03.4	283°19.4	19.2	341°31.8	36.9	Arcturus Rigil Kent.	145°48.3 139°40.8	19°03.2 -60°56.0
11	340°30.7	1°27.2	07.9	12°09.2	02.8	298°21.3	19.4	356°33.9	36.7	Kochab	139 40.8 137° 18.9	74°03.0
12	355°33.2	16°26.7	S10°06.8	27°09.8	S14°02.1	313°23.3	N15°19.5	11°36.1	S08°36.6	Zuben'ubi	136° 56.6	-16°08.6
13	10°35.7	$31^{\circ}26.3$	05.7	42°10.4	01.5	328°25.3	19.7	26°38.3	36.5	Alphecca	126° 04.1	26°37.7
14	25°38.1	46°25.8	04.6	$57^{\circ}11.0$	8.00	343°27.3	19.8	41°40.5	36.4	Antares	112° 16.6	-26°29.1
15	40°40.6	61°25.3	• • 03.6	72°11.5	14°00.2	358°29.2	• • 20.0	56° 42.7	• • 36.3	Atria	107°11.3	-69°04.0
16	55°43.1	76°24.8	02.5	87°12.1	13°59.5	13°31.2	20.2	71°44.9	36.2	Sabik	102°03.5	-15°45.4
17	70°45.5	91°24.4	01.4	102°12.7	58.9	28°33.2	20.3	86°47.0	36.1	Shaula	$96^{\circ}11.3$	-37°07.2
18	85°48.0	106°23.9	\$10°00.3	117°13.3	\$13°58.3	43°35.2	N15°20.5	101°49.2	\$08°36.0	Rasalhague	95°59.2	12°32.3
19 20	100°50.5 115°52.9	121°23.4 136°23.0	09°59.2	132°13.9 147°14.4	57.6	58°37.1 73°39.1	20.6 20.8	116°51.4 131°53.6	35.9 35.8	Eltanin	90°42.5	51°28.7
21	130°55.4	150° 23.0° 151° 22.5	58.1 •• 57.0	162°15.0	57.0 • • 56.3	88°41.1	20.9	131 55.0 146°55.8	35.6	Kaus Aust.	83°33.5	-34°22.3
22	145°57.9	166° 22.0	55.9	177°15.6	55.7	103°43.1	21.1	161°58.0	35.5	Vega	80°33.8	38°48.0
23	161°00.3	181°21.5	54.8	192°16.2	55.0	118°45.1	21.2	177°00.1	35.4	Nunki	75°48.7	-26°16.0
										Altair	62°00.8	8°55.7
Mer.p	ass. 12:18	$\nu$ -0.5′ d-1	1′ m-3.88	$\nu 0.6' \ d-0$	.6′ m1.23	$\nu 2.0' d0.$	2′ m-2.11	$\nu$ 2.2′ d-0	.1′ m1.02	Peacock Deneb	53°07.1 49°26.6	-56°39.3 45°21.7
										Enif	33°39.7	9°58.9
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°34.2	-46°50.7
0	176°02.8	$196^{\circ}21.1$	S09°53.7	$207^{\circ}16.7$	S13°54.4	133°47.0	N15°21.4	192°02.3	S08°35.3	Fomalhaut	15°15.6	-29°29.8
1	191°05.2	211°20.6	52.6	222°17.3	53.7	148°49.0	21.5	207°04.5	35.2	Scheat	13°46.2	28°12.7
2	206°07.7	226°20.1	51.5	237°17.9	53.1	163°51.0	21.7	222°06.7	35.1	Markab	13°30.9	15°19.9
3	221°10.2	241°19.7	• • 50.4	252°18.5	• • 52.4	178°53.0	• • 21.8	237°08.9	• • 35.0	Ma:: 16 C	ÇU.A	Mar north
4	236°12.6	256°19.2	49.3	267°19.0	51.8	193°54.9	22.0	252°11.1 267°13.3	34.9	Mar 16 Sat Venus	<b>SHA</b> 22°39.6	Mer.pass 10:53
5 6	251°15.1 266°17.6	271°18.7 286°18.2	48.2 \$09°47.1	282°19.6 297°20.2	51.1 \$13°50.5	208°56.9 223°58.9	22.1 N15°22.3	267°13.3 282°15.4	34.8 \$08°34.7	Mars	22 39.0 32°44.8	10:53
7	281°20.0	301° 17.8	46.0	312°20.8	49.8	239°00.9	22.4	202 13.4 297°17.6	34.5	Jupiter	318°07.5	15:09
8	201°20.0° 296°22.5	316° 17.3	44.9	327°21.3	49.2	254°02.8	22.4	312° 19.8	34.4	Saturn	16°13.0	11:17
9	311°25.0	331° 16.8	• • 43.8	342°21.9	• • 48.5	269°04.8	22.8	327°22.0	• • 34.3			
10	326°27.4	346° 16.4	42.7	357°22.5	47.9	284°06.8	22.9	342°24.2	34.2	Mar 17 Sun	SHA	Mer.pass
11	341°29.9	1°15.9	41.6	12°23.1	47.2	299°08.8	23.1	357°26.4	34.1	Venus	21°28.8	10:54
12	356°32.3	16° 15.4	S09°40.4	27°23.7	S13°46.5	314°10.7	N15°23.2	12°28.5	S08°34.0	Mars	31°59.3	10:11
13	11°34.8	31°15.0	39.3	42°24.2	45.9	$329^{\circ}12.7$	23.4	$27^{\circ}30.7$	33.9	Jupiter Saturn	317°55.9 16°06.3	15:06 11:14
14	26°37.3	46° 14.5	38.2	57°24.8	45.2	344°14.7	23.5	42°32.9	33.8	Jatuin	10 00.3	11.14
15	41°39.7	61°14.0	• • 37.1	72°25.4	• • 44.6	359°16.6	• • 23.7	57°35.1	• • 33.7	Mar 18 Mon	SHA	Mer.pass
16	56°42.2	76° 13.6	36.0	87°26.0	43.9	14°18.6	23.8	72°37.3	33.5	Venus	20°18.3	10:55
17	71°44.7	91°13.1	34.9	102°26.6	43.3	29°20.6	24.0	87°39.5	33.4	Mars	31°14.0	10:10
18	86°47.1	106°12.7	S09°33.8	117°27.1	\$13°42.6	44°22.6	N15°24.1	102°41.7	S08°33.3	Jupiter		15:03
19 20	101°49.6 116°52.1	121°12.2 136°11.7	32.7 31.6	132°27.7 147°28.3	42.0 41.3	59°24.5 74°26.5	24.3 24.4	117°43.8 132°46.0	33.2 33.1	Saturn	15°59.6	11:10
20	110 52.1 131°54.5	150 11.7 151°11.3	30.5	147 28.3 162°28.9	· · 40.7	74 20.5 89°28.5	24.4	132 46.0 147°48.2	33.1	Horizont	al parallax	
22	131 54.5 146°57.0	166° 10.8	29.4	102 28.9 177°29.5	40.7	104°30.5	24.0	162° 50.4	32.9		Venus:	0.1
23	161°59.5	181°10.3	28.3	192°30.0	39.4	119°32.4	24.9	177°52.6	32.8		Mars:	0.1
					.6′ m1.23							
ivier.p	ass. 12:14	$\nu$ -0.5' $a$ -1	1′ m-3.88	νυ.σ· α-0	.u m1.23	ν2.0′ <b>α</b> 0.	2′ m-2.11	$\nu$ 2.2 $a$ -0	.1′ m1.03			

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	177°50.7	S01°38.0	$104^{\circ}34.4$	6.9'	$N26^{\circ}30.5$	6.3'	57.4'
1	192°50.9	37.0	119°00.4	6.9'	26° 36.7	6.1'	57.4
2	207°51.1 222°51.2	36.0 •• 35.0	133°26.3 147°52.2	6.9' 6.9'	26°42.8 26°48.8	5.9' 5.8'	57.4' 57.3'
4	237°51.4	34.0	162°18.1	6.9'	26°54.5	5.6'	57.3'
5	252°51.6	33.0	$176^{\circ}44.0$	6.9'	$27^{\circ}00.1$	5.4'	57.2'
6	267°51.8	S01°32.0	191°09.9	6.9'	N27°05.5 27°10.8	5.3'	57.2'
7 8	282°51.9 297°52.1	31.0 30.1	205°35.8 220°01.7	6.9' 6.9'	27° 10.8 27° 15.9	5.1' 4.9'	57.2' 57.1'
9	312°52.3	29.1	234°27.5	6.9'	27°20.9	4.8'	57.1'
10	327°52.5	28.1	248°53.4	6.9'	27°25.6	4.6'	57.1'
11 12	342°52.7 357°52.8	27.1 <b>S</b> 01°26.1	263°19.2 277°45.1	6.9' 6.9'	27°30.2 N27°34.7	4.4' 4.3'	57.0' 57.0'
13	12°53.0	25.1	277 45.1 292°10.9	6.9	27°39.0	4.3 4.1'	57.0'
14	27°53.2	24.1	306°36.8	6.9'	27°43.1	3.9'	56.9'
15	42°53.4	• • 23.1	321°02.6	6.9'	27°47.0	3.8'	56.9'
16 17	57°53.6 72°53.7	22.1 21.2	335°28.5 349°54.4	6.9' 6.9'	27°50.8 27°54.4	3.6' 3.4'	56.8' 56.8'
18	87°53.9	S01°20.2	4°20.2	6.9	N27°57.8	3.3'	56.8'
19	102°54.1	19.2	$18^{\circ}46.1$	6.9'	28°01.1	3.1'	56.7'
20	117°54.3	18.2	33°12.0	6.9'	28°04.2	3.0'	56.7'
21 22	132°54.5 147°54.6	· · 17.2 16.2	47°37.9 62°03.8	6.9' 6.9'	28° 07.2 28° 10.0	2.8' 2.6'	56.7' 56.6'
23	147 54.6 162°54.8	15.2	76°29.8	6.9'	28° 10.0	2.5	56.6'
	SD = 16.1'	d = -1.0'			O = 15.7'		
				JI			
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	177°55.0 192°55.2	S01°14.2 13.3	90°55.7 105°21.7	7.0' 7.0'	N28°15.1 28°17.3	2.3' 2.1'	56.6' 56.5'
2	192 55.2 207°55.4	13.3	105 21.7 119°47.7	7.0°	28°19.5	2.1	56.5'
3	222°55.5	11.3	134°13.7	7.0'	28°21.4	1.8'	56.5'
4	237°55.7	10.3	148°39.7	7.1'	28°23.2	1.6'	56.4'
5 6	252°55.9 267°56.1	09.3 <b>S</b> 01°08.3	163°05.8 177°31.8	7.1' 7.1'	28°24.9 N28°26.3	1.5' 1.3'	56.4' 56.4'
7	282°56.3	07.3	177 51.6 191°58.0	7.1'	28° 27.7	1.1'	56.3
8	297°56.4	06.3	206°24.1	7.2'	28°28.8	1.0'	56.3'
9	312°56.6	• • 05.3	220°50.3	7.2'	28°29.8	0.8'	56.3'
10 11	327°56.8 342°57.0	04.4 03.4	235°16.5 249°42.7	7.2' 7.3'	28°30.6 28°31.3	0.7' 0.5'	56.2' 56.2'
12	357°57.2	S01°02.4	264°09.0	7.3'	N28°31.8	0.3	56.2'
13	12°57.3	01.4	278°35.3	7.3'	28°32.1	0.2'	56.1'
14	27°57.5	01°00.4 00°59.4	293°01.6	7.4'	28°32.3 28°32.3	0.0'	56.1'
15 16	42°57.7 57°57.9	00°59.4 58.4	307°28.0 321°54.4	7.4' 7.5'	28° 32.3 28° 32.2	-0.1' -0.3'	56.1' 56.0'
17	72°58.1	57.4	336°20.9	7.5'	28°31.9	-0.5	56.0'
18	87°58.2	500°56.4	350°47.4	7.6'	N28°31.4	-0.6'	56.0'
19	102°58.4	55.5	5°14.0 19°40.6	7.6'	28°30.8 28°30.1	-0.8' -0.9'	55.9'
20 21	117°58.6 132°58.8	54.5 •• 53.5	19°40.6 34°07.2	7.6' 7.7'	28° 30.1 28° 29.1	-0.9 -1.1'	55.9' 55.9'
22	147°59.0	52.5	48°33.9	7.7'	28°28.1	-1.2'	55.8'
23	162°59.1	51.5	63°00.7	7.8'	$28^{\circ}26.8$	-1.4'	55.8'
	SD = 16.1'	d = -1.0'		SI	O = 15.4'		
	CUA		CIIA		ъ	,	
Mon 0	<b>GHA</b> 177°59.3	<b>Dec</b> \$00° 50.5	<b>GHA</b> 77°27.5	u 7.9'	<b>Dec</b> N28° 25.5	d -1.5'	<b>HP</b> 55.8'
1	192°59.5	49.5	91°54.3	7.9'	28°23.9	-1.7'	55.7'
2	207°59.7	48.5	106°21.2	8.0'	28°22.2	-1.8'	55.7'
3 4	222°59.9 238°00.1	· · 47.5 46.6	120°48.2 135°15.2	8.0' 8.1'	28°20.4 28°18.4	-2.0' -2.1'	55.7' 55.7'
5	253°00.1	46.6 45.6	135 15.2 149°42.3	8.1'	28°16.2	-2.1 -2.3'	55.6'
6	268°00.4	S00°44.6	164°09.4	8.2'	N28°14.0	-2.4'	55.6'
7	283°00.6 298°00.8	43.6	178°36.6	8.3' 8.3'	28°11.5 28°08.9	-2.6'	55.6'
8 9	298°00.8 313°01.0	42.6 •• 41.6	193°03.9 207°31.2	8.4'	28°08.9 28°06.2	-2.7' -2.9'	55.5' 55.5'
10	328°01.2	40.6	221°58.6	8.5'	28°03.3	-3.0'	55.5'
11	343°01.3	39.6	236°26.1	8.5'	28°00.3	-3.2'	55.5'
12 13	358°01.5 13°01.7	\$00°38.6 37.7	250°53.6 265°21.2	8.6' 8.7'	N27°57.1 27°53.8	-3.3' -3.5'	55.4' 55.4'
13 14	28°01.9	37.7 36.7	205°21.2 279°48.8	8.7' 8.7'	27°53.8 27°50.3	-3.5° -3.6'	55.4' 55.4'
15	43°02.1	• • 35.7	$294^{\circ}16.6$	8.8'	27°46.7	-3.7'	55.4'
16	58°02.2	34.7	308°44.4	8.9'	27°43.0	-3.9'	55.3'
17 18	73°02.4 88°02.6	33.7 <b>S</b> 00°32.7	323°12.2 337°40.2	8.9' 9.0'	27°39.1 N27°35.1	-4.0' -4.2'	55.3' 55.3'
18	103°02.8	31.7	352°08.2	9.0 9.1'	27° 30.9	-4.2 -4.3'	55.3'
20	118°03.0	30.7	6°36.3	9.2'	27°26.6	-4.4'	55.2'
21	133°03.2 148°03.3	• • 29.7	21°04.4 35°32.7	9.2'	27°22.2 27°17.6	-4.6'	55.2'
22 23	148°03.3 163°03.5	28.8 27.8	35°32.7 50°01.0	9.3' 9.4'	27° 17.6 27° 12.9	-4.7' -4.8'	55.2' 55.2'
	SD = 16.1'	d = -1.0'			D = 15.2'		
	<u> </u>	J — -1.0		ال	_ 13.2		

			1			
Lat.	Twi	light	Sunrise	Sunset	Twi	light
	Naut.	Civil			Civil	Naut.
N 72°	03:38	05:04	06:11	18:07	19:15	20:43
<b>N</b> 70°	03:54	05:10	06:11	18:08	19:09	20:26
68°	04:07	05:15	06:11	18:08	19:03	20:12
66°	04:17	05:19	06:10	18:08	18:59	20:02
64°	04:26	05:23	06:10	18:08	18:55	19:53
62°	04:33	05:26	06:10	18:08	18:52	19:46
60°	04:39	05:28	06:09	18:08	18:50	19:39
<b>N</b> 58°	04:44	05:30	06:09	18:08	18:48	19:34
56°	04:48	05:32	06:09	18:08	18:46	19:30
54°	04:52	05:34	06:09	18:09	18:44	19:26
52°	04:56	05:35	06:09	18:09	18:42	19:22
50°	04:59	05:36	06:09	18:09	18:41	19:19
45°	05:05	05:39	06:08	18:09	18:38	19:13
<b>N</b> 40°	05:09	05:41	06:08	18:09	18:36	19:08
35°	05:13	05:42	06:07	18:10	18:35	19:04
30°	05:15	05:43	06:07	18:10	18:34	19:01
20°	05:19	05:44	06:06	18:10	18:32	18:58
N 10°	05:20	05:45	06:06	18:11	18:32	18:56
0°	05:20	05:44	06:05	18:11	18:32	18:56
<b>S</b> 10°	05:19	05:43	06:04	18:12	18:33	18:58
20°	05:15	05:41	06:03	18:13	18:35	19:01
30°	05:10	05:38	06:02	18:14	18:38	19:06
35°	05:06	05:36	06:01	18:15	18:40	19:10
40°	05:01	05:33	06:00	18:16	18:43	19:14
45°	04:55	05:30	05:59	18:17	18:46	19:20
<b>S</b> 50°	04:47	05:25	05:58	18:18	18:50	19:28
52°	04:43	05:23	05:57	18:18	18:52	19:32
54°	04:39	05:21	05:56	18:19	18:54	19:36
56°	04:33	05:18	05:56	18:20	18:57	19:41
58°	04:28	05:15	05:55	18:20	19:00	19:47
<b>S</b> 60°	04:21	05:12	05:54	18:21	19:03	19:53
	1					

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

		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	38-59%	
16	08:37	08:29	12:08	17:42	05:14		
17	08:20	08:11	12:08	18:38	06:10		
18	08.03	07.54	12.08	19:33	07:06		

## March 19, 20, 21 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	177°01.9	196°09.9	S09°27.2	207°30.6	\$13°38.7	134° 34.4	N15°25.1	192°54.8	S08°32.7			
1	192°04.4	211°09.4	26.0	222°31.2	38.0	149°36.4	25.2	207°57.0	32.6	Alpheratz	357°35.8	29°13.3
2	207°06.8	226°08.9	24.9	237°31.8	37.4	164°38.3	25.4	222°59.1	32.4	Ankaa	353°08.2	-42°10.6
3	222°09.3	241°08.5	• • 23.8	252°32.4	• • 36.7	179°40.3	• • 25.5	238°01.3	32.3	Schedar	349°32.4	56°40.2
4	237°11.8	256°08.0	22.7	267°32.9	36.1	194° 42.3	25.7	253°03.5	32.2	Diphda	348°48.3	-17°51.4
5	252°14.2	271°07.6	21.6	282°33.5	35.4	209°44.3	25.8	268°05.7	32.1	Achernar	335°21.2	-57°07.0
6	267° 16.7	286°07.1	S09°20.5	297°34.1	\$13°34.8	224°46.2	N15°26.0	283°07.9	S08°32.0	Hamal	327°52.3	23°34.5
7	282°19.2	301°06.6	19.4	312°34.7	34.1	239° 48.2	26.1	298°10.1	31.9	Polaris	314°42.4	89°22.2
8	297°21.6	316°06.2	18.3	327°35.3	33.5	254°50.2	26.3	313°12.3	31.8	Acamar	315°12.6	-40°12.7
9	312°24.1	331°05.7	• • 17.1	342°35.8	• • 32.8	269°52.1	26.4	328°14.4	• • 31.7	Menkar	314°07.1	4°11.0
10	327°26.6	346°05.3	16.0	357°36.4	32.1	284°54.1	26.6	343°16.6	31.6	Mirfak	308°29.5	49°56.9
11	342°29.0	1°04.8	14.9	12°37.0	31.5	299°56.1	26.7	358°18.8	31.5	Aldebaran	290°40.5 281°04.6	16°33.4 -8°10.6
12	357°31.5	16°04.3	S09°13.8	27°37.6	S13°30.8	314°58.1	N15°26.9	13°21.0	S08°31.3	Rigel	281 04.6 280°23.0	-8 10.6 46°01.5
13	12°34.0	31°03.9	12.7	42°38.2	30.2	330°00.0	27.0	28°23.2	31.2	Capella Bellatrix	278° 23.6	6°22.2
14	$27^{\circ}36.4$	46°03.4	11.6	57°38.8	29.5	345°02.0	27.2	43°25.4	31.1	Elnath	278° 02.8	28°37.7
15	42°38.9	61°03.0	· · 10.5	72°39.3	• • 28.9	0°04.0	• • 27.4	58°27.6	• • 31.0	Alnilam	275°38.4	-1°11.3
16	57°41.3	76°02.5	09.3	87°39.9	28.2	15°05.9	27.5	73°29.7	30.9	Betelgeuse	270°52.8	7°24.6
17	72°43.8	91°02.1	08.2	102°40.5	27.5	30°07.9	27.7	88°31.9	30.8	Canopus	263°52.6	-52°42.8
18	87°46.3	106°01.6	S09°07.1	117°41.1	S13°26.9	45°09.9	N15°27.8	103°34.1	S08°30.7	Sirius	258° 26.8	-16°45.1
19	102°48.7	121°01.2	06.0	132°41.7	26.2	60°11.8	28.0	118°36.3	30.6	Adhara	255°06.3	-29°00.5
20	117°51.2	136°00.7	04.9	147°42.3	25.6	75°13.8	28.1	133°38.5	30.5	Procyon	244°51.4	5°09.7
21	132°53.7	151°00.2	• • 03.7	162°42.8	• • 24.9	90°15.8	· · 28.3	148°40.7	30.4	Pollux	243°18.0	27°58.1
22	147°56.1	165°59.8	02.6	177°43.4	24.2	105°17.7	28.4	163°42.9	30.3	Avior	234°14.7	-59°35.4
23	162°58.6	180°59.3	01.5	192°44.0	23.6	120°19.7	28.6	178°45.0	30.1	Suhail	222°46.5	-43°32.0
Mer.p	ass. 12:10	$\nu$ -0.5' d-1	1′ m-3.88	$\nu$ 0.6′ d-0	.7′ m1.22	$\nu$ 2.0′ d0.	2' m-2.11	$\nu 2.2' \ d-0$	.1′ m1.03	Miaplacidus	221°37.8	-69°49.1
									-	Alphard	217°48.2	-8°45.9
\A/I	CIIA	CHA	D	CIIA	D	CIIA	D	CHA	D	Regulus	207°34.9	$11^{\circ}50.9$
Wed 0	<b>GHA</b> 178°01.1	<b>GHA</b> 195°58.9	<b>Dec</b> \$09°00.4	<b>GHA</b> 207°44.6	Dec \$13°22.9	<b>GHA</b> 135°21.7	<b>Dec</b> N15° 28.7	<b>GHA</b> 193°47.2	Dec \$08°30.0	Dubhe	193°41.1	61°37.3
1	178 01.1 193°03.5	195 58.9 210°58.4	08°59.3	207 44.6 222°45.2	22.3	155 21.7 150°23.7	28.9	193 47.2 208°49.4	29.9	Denebola	182°25.3	$14^{\circ}26.1$
2	208° 06.0	210 56.4 225°58.0	06 59.5 58.1	222 45.2 237°45.8	22.5	165° 25.6	29.0	206 49.4 223°51.6	29.9	Gienah	175°44.0	-17°40.7
3	208 00.0 223°08.5	240°57.5	57.0	252°46.3	20.9	180° 27.6	29.0	238°53.8	29.7	Acrux	173°00.2	-63°14.0
4	238° 10.9	255°57.1	55.9	267°46.9	20.3	195°29.6	29.4	253°56.0	29.6	Gacrux	171°51.9	-57°14.9
5	253° 13.4	270°56.6	54.8	282°47.5	19.6	210° 31.5	29.4	268°58.2	29.5	Alioth	166°13.0	55°49.6
6	268° 15.8	285°56.2	S08°53.7	297°48.1	\$13°19.0	225° 33.5	N15°29.7	284°00.3	S08°29.4	Spica	158° 22.7	-11°17.4
7	283° 18.3	300°55.7	52.5	312°48.7	18.3	240°35.5	29.8	299°02.5	29.3	Alkaid	152°52.1	49°11.3
8	298° 20.8	315°55.3	51.4	327°49.3	17.6	255° 37.4	30.0	314°04.7	29.2	Hadar	148°36.5	-60°29.3
9	313°23.2	330°54.8	50.3	342°49.9	• • 17.0	270°39.4	30.1	329°06.9	29.0	Menkent	147°58.1	-36°29.3
10	328° 25.7	345°54.4	49.2	357°50.4	16.3	285°41.4	30.3	344°09.1	28.9	Arcturus	145°48.2	19°03.2
11	343°28.2	0°53.9	48.0	12°51.0	15.6	300°43.3	30.4	359°11.3	28.8	Rigil Kent.	139°40.8	-60°56.0
12	358° 30.6	15°53.5	S08°46.9	27°51.6	\$13°15.0	315°45.3	N15°30.6	14°13.5	S08°28.7	Kochab	137° 18.9	74°03.1
13	13°33.1	30°53.0	45.8	42°52.2	14.3	330°47.3	30.7	29°15.6	28.6	Zuben'ubi	136°56.5	-16°08.6
14	28° 35.6	45°52.6	44.7	57°52.8	13.6	345°49.2	30.9	44°17.8	28.5	Alphecca	126°04.1	26°37.7
15	43°38.0	60°52.1	• • 43.5	72°53.4	• • 13.0	0°51.2	• • 31.0	59°20.0	• • 28.4	Antares	112° 16.5 107° 11.3	-26°29.1
16	58° 40.5	75°51.7	42.4	87°54.0	12.3	15°53.2	31.2	74°22.2	28.3	Atria Sabik	107 11.3 102°03.5	-69°04.0 -15°45.4
17	73°42.9	90°51.2	41.3	102°54.5	11.7	30°55.1	31.4	89°24.4	28.2	Shaula	96°11.2	-15° 45.4 -37° 07.2
18	88°45.4	105°50.8	S08°40.1	$117^{\circ}55.1$	S13°11.0	45°57.1	N15°31.5	104°26.6	S08°28.1	Rasalhague	95°59.1	-37 07.2 12°32.3
19	103°47.9	120°50.3	39.0	132°55.7	10.3	60°59.1	31.7	119°28.8	28.0	Eltanin	90°42.5	51°28.7
20	118°50.3	135°49.9	37.9	147°56.3	09.7	76°01.0	31.8	134°31.0	27.8	Kaus Aust.	83°33.4	-34°22.3
21	133°52.8	150°49.4	• • 36.8	162°56.9	•• 09.0	91°03.0	• • 32.0	149°33.1	• • 27.7	Vega	80°33.7	38°48.0
22	148°55.3	165°49.0	35.6	177°57.5	08.3	106°05.0	32.1	164°35.3	27.6	Nunki	75°48.7	-26°16.0
23	163°57.7	180°48.5	34.5	192°58.1	07.7	121°06.9	32.3	179°37.5	27.5	Altair	62°00.8	8°55.7
Mern	ass. 12:06	v-0.5′ d-1	.1′ m-3.88	ν0 6' d-0	.7′ m1.22	v2 0' d0	2′ m-2.10	v2 2' d-0	.1′ m1.03	Peacock	53°07.1	-56°39.3
- Wici.p	433. 12.00	ν 0.5 u 1				ν 2.0 do.		ν Z.Z α 0	.1 1111.05	Deneb	49°26.6	45°21.7
										Enif	33°39.7	9°58.9
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°34.1	-46°50.6
0	179°00.2	195°48.1	S08°33.4	207°58.7	S13°07.0	136°08.9	N15°32.4	194°39.7	S08°27.4	Fomalhaut	15°15.6	-29°29.8
1	194°02.7	210°47.6	32.2	222°59.2	06.3	151°10.9	32.6	209°41.9	27.3	Scheat	13°46.2	28°12.7
2	209°05.1	225°47.2	31.1	237°59.8	05.7	166°12.8	32.7	224°44.1	27.2	Markab	13°30.9	15°19.9
3	224°07.6 239°10.1	240°46.7	30.0	253°00.4 268°01.0	05.0	181° 14.8 196° 16.7	• • 32.9	239°46.3	•• 27.1	Mar 19 Tue	SHA	Mor page
4	254° 12.5	255°46.3	28.8		04.3	211° 18.7	33.0 33.2	254°48.5 269°50.6	27.0 26.0	Venus	5ПА 19°08.0	Mer.pass 10:56
5 6	269° 15.0	270°45.8 285°45.4	27.7 \$08°26.6	283°01.6	03.7 \$13°03.0		33.2 N15°33.4	269°50.6 284°52.8	26.9 \$08°26.8	Mars	30° 28.7	10:50
	269° 15.0 284° 17.4	285°45.4 300°45.0	S08°26.6 25.5	298°02.2 313°02.8	02.3	226°20.7 241°22.6	N15 33.4 33.5	284 52.8 299°55.0	S08°26.8	Jupiter	30 20.7 317°32.5	15:00
7 8	284 17.4 299° 19.9	300 45.0 315°44.5	25.5 24.3	313 02.8 328°03.4	02.3	241 22.6 256° 24.6	33.5 33.7	299 55.0 314°57.2	26.6 26.5	Saturn	15° 52.8	11:07
9	314° 22.4	330°44.1	23.2	343°04.0	•• 01.0	271° 26.6	• • 33.8	329°59.4	. 26.4			
10	329° 24.8	345°43.6	22.0	358°04.5	13°00.3	286° 28.5	34.0	345°01.6	26.3	Mar 20 Wed	SHA	Mer.pass
11	344°27.3	0°43.2	20.9	13°05.1	13° 59.7	301°30.5	34.1	0°03.8	26.2	Venus	17°57.8	10:56
12	359°29.8	15°42.7	S08°19.8	28°05.7	S12°59.0	316°32.5	N15°34.3	15°05.9	S08°26.1	Mars	29°43.5	10:09
13	14°32.2	30°42.3	18.6	43°06.3	58.3	331°34.4	34.4	30°08.1	26.0	Jupiter	317°20.6	14:57
14	29°34.7	45°41.9	17.5	58°06.9	57.7	346°36.4	34.6	45°10.3	25.9	Saturn	15°46.2	11:03
15	44° 37.2	60°41.4	• • 16.4	73°07.5	• • 57.0	1°38.3	• • 34.7	60°12.5	• • 25.8	Mar 21 Thu	SHA	Mer.pass
16	59°39.6	75°41.0	15.2	88°08.1	56.3	16°40.3	34.9	75°14.7	25.7	Venus	16°47.9	10:57
17	$74^{\circ}42.1$	90°40.5	14.1	103°08.7	55.7	31°42.3	35.1	90°16.9	25.6	Mars	28°58.5	10:08
18	89°44.6	105°40.1	S08°13.0	118°09.3	<b>S</b> 12°55.0	46°44.2	N15°35.2	$105^{\circ}19.1$	S08°25.4	Jupiter		14:53
19	104°47.0	120°39.7	11.8	133°09.9	54.3	61°46.2	35.4	120°21.3	25.3	Saturn	15°39.5	11:00
20	119°49.5	135°39.2	10.7	148°10.5	53.6	76°48.2	35.5	135°23.5	25.2			
21	134°51.9	150°38.8	• • 09.5	163°11.0	• • 53.0	91°50.1	• • 35.7	150°25.6	• • 25.1	Horizont	al parallax	0.1
22	149°54.4	165°38.3	08.4	178°11.6	52.3	106°52.1	35.8	165°27.8	25.0		Venus:	0.1
23	164°56.9	180°37.9	07.3	193°12.2	51.6	121°54.0	36.0	180°30.0	24.9		Mars:	0.1
Mer.n	ass. 12:02	$\nu$ -0.4' d-1	1′ m-3.88	$\nu 0.6' \ d-0$	.7′ m1.22	$\nu^{2.0' \ d0}$	2′ m-2.10	$\nu^{2.2'} d^{-0}$	.1′ m1.03			

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°03.7	S00°26.8	$64^{\circ}29.4$	9.5'	$N27^{\circ}08.1$	-5.0'	55.1'
1	193°03.9	25.8	78°57.8	9.5'	27°03.1	-5.1'	55.1'
2	208°04.1 223°04.3	24.8 •• 23.8	93°26.4 107°55.0	9.6' 9.7'	26°58.0 26°52.7	-5.2' -5.4'	55.1' 55.1'
4	238°04.5	22.8	122°23.7	9.8'	26°47.4	-5.5'	55.0'
5	253°04.6	21.8	$136^{\circ}52.5$	9.9'	26°41.9	-5.6'	55.0'
6	268°04.8	500°20.9	151°21.3	9.9'	N26°36.3	-5.7'	55.0'
7 8	283°05.0 298°05.2	19.9 18.9	165°50.3 180°19.3	10.0' 10.1'	26°30.5 26°24.6	-5.9' -6.0'	55.0' 55.0'
9	313°05.4	17.9	194° 48.4	10.2	26°18.6	-6.1	54.9'
10	328°05.6	16.9	$209^{\circ}17.6$	10.3'	$26^{\circ}12.5$	-6.2'	54.9'
11	343°05.7	15.9	223°46.8 238°16.2	10.4	26°06.3	-6.4'	54.9'
12 13	358°05.9 13°06.1	S00°14.9 13.9	252° 45.6	10.4' 10.5'	N25°59.9 25°53.4	-6.5' -6.6'	54.9' 54.8'
14	28°06.3	12.9	267° 15.2	10.6'	25°46.8	-6.7'	54.8'
15	43°06.5	•• 12.0	281°44.8	10.7'	25°40.1	-6.8'	54.8'
16	58°06.7 73°06.8	11.0	296°14.4 310°44.2	10.8'	25°33.2 25°26.3	-7.0'	54.8'
17 18	73°06.8 88°07.0	10.0 \$00°09.0	310°44.2 325°14.1	10.9' 10.9'	25°26.3 N25°19.2	-7.1' -7.2'	54.8' 54.7'
19	103°07.2	08.0	339°44.0	11.0'	25°12.0	-7.3	54.7'
20	118°07.4	07.0	$354^{\circ}14.0$	11.1'	25°04.7	-7.4'	54.7'
21	133°07.6	• • 06.0	8°44.1	11.2'	24°57.2	-7.5'	54.7'
22 23	148°07.8 163°08.0	05.0 04.1	23°14.3 37°44.6	11.3' 11.4'	24°49.7 24°42.1	-7.6' -7.8'	54.7' 54.7'
23	SD = 16.1'	d = -1.0'	- 31 44.0		0 = 15.0'	.7.0	57.1
	3D = 10.1′	$a = -1.0^{\circ}$		51	∠ = 15.0°		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°08.1	S00°03.1	52° 15.0	11.5'	N24°34.3	-7.9'	54.6'
1 2	193°08.3 208°08.5	02.1 01.1	66° 45.4 81° 16.0	11.5' 11.6'	24°26.5 24°18.5	-8.0' -8.1'	54.6' 54.6'
3	208 08.5 223°08.7	500°00.1	95°46.6	11.7	24 18.5 24°10.4	-8.1 -8.2'	54.6'
4	238°08.9	N00°00.9	110° 17.3	11.8'	24°02.2	-8.3	54.6'
5	253°09.1	01.9	124° 48.1	11.9'	23°53.9	-8.4'	54.5'
6	268°09.3 283°09.4	N00°02.9	139° 19.0 153° 49.9	12.0'	N23°45.6 23°37.1	-8.5'	54.5'
7 8	283°09.4 298°09.6	03.9 04.8	153°49.9 168°21.0	12.0' 12.1'	23°28.5	-8.6' -8.7'	54.5' 54.5'
9	313°09.8	• • 05.8	182°52.1	12.2'	23°19.8	-8.8'	54.5'
10	328°10.0	06.8	$197^{\circ}23.3$	12.3'	23°11.0	-8.9'	54.5'
11	343°10.2	07.8	211°54.6	12.4'	23°02.1	-9.0'	54.5'
12 13	358°10.4 13°10.6	N00°08.8 09.8	226°26.0 240°57.4	12.5' 12.5'	N22°53.1 22°44.0	-9.1' -9.2'	54.4' 54.4'
14	28°10.7	10.8	255°29.0	12.6'	22°34.8	-9.3'	54.4'
15	43°10.9	• • 11.8	$270^{\circ}00.6$	12.7'	22°25.6	-9.4'	54.4'
16	58°11.1	12.7	284°32.3 299°04.1	12.8'	22°16.2	-9.5'	54.4'
17 18	73°11.3 88°11.5	13.7 N00°14.7	299 04.1 313°36.0	12.9' 13.0'	22°06.7 N21°57.2	-9.6' -9.6'	54.4' 54.3'
19	103°11.7	15.7	328° 08.0	13.0'	21°47.5	-9.7'	54.3'
20	118°11.9	16.7	342° 40.0		21°37.8	-9.8'	54.3'
21	133°12.0 148°12.2	• • 17.7	357°12.1 11°44.3	13.2'	21°28.0 21°18.1	-9.9'	54.3'
22 23	148° 12.2 163° 12.4	18.7 19.7	26° 16.6	13.3' 13.4'	21°18.1 21°08.1	-10.0' -10.1'	54.3' 54.3'
25	SD = 16.1'	d = -1.0'	20 10.0		D = 14.9'	-10.1	J4.5
	3D = 10.1	a = -1.0		- 31	J = 14.9		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°12.6	N00°20.6	40°49.0 55°21.4	13.4'	N20°58.0	-10.2'	54.3'
1 2	193°12.8 208°13.0	21.6 22.6	55°21.4 69°53.9	13.5' 13.6'	20°47.9 20°37.6	-10.2' -10.3'	54.3' 54.2'
3	223°13.2	• • 23.6	84°26.5	13.7'	20°27.3	-10.3	54.2'
4	238°13.3	24.6	98°59.2	13.7'	20°16.9	-10.5'	54.2'
5	253°13.5 268°13.7	25.6 N00°26.6	113°31.9 128°04.8	13.8' 13.9'	20°06.4 N19°55.8	-10.6' -10.6'	54.2' 54.2'
6 7	268°13.7 283°13.9	N00°26.6 27.6	128°04.8 142°37.7	13.9° 14.0'	N19°55.8 19°45.2	-10.6° -10.7'	54.2' 54.2'
8	298°14.1	28.5	157° 10.6	14.1'	19°34.5	-10.8	54.2'
9	313°14.3	• • 29.5	171° 43.7	14.1'	19°23.7	-10.9'	54.2'
10	328°14.5 343°14.7	30.5	186°16.8	14.2'	19°12.8 19°01.8	-11.0'	54.2'
11 12	343°14.7 358°14.8	31.5 N00°32.5	200° 50.0 215° 23.3	14.3' 14.3'	19°01.8 N18°50.8	-11.0' -11.1'	54.1' 54.1'
13	13°15.0	33.5	229°56.6	14.4'	18°39.7	-11.2	54.1
14	28°15.2	34.5	244°30.0	14.5'	18°28.5	-11.2'	54.1'
15	43°15.4	• • 35.4	259°03.5	14.6'	18°17.3	-11.3'	54.1'
16 17	58°15.6 73°15.8	36.4 37.4	273°37.1 288°10.7	14.6' 14.7'	18°06.0 17°54.6	-11.4' -11.4'	54.1' 54.1'
18	88°16.0	N00°38.4	302°44.4	14.8'	N17°43.2	-11.5'	54.1'
19	103°16.2	39.4	317° 18.2	14.8'	17°31.7	-11.6'	54.1'
20	118°16.3	40.4	331°52.0	14.9'	17°20.1	-11.6'	54.1'
21 22	133°16.5 148°16.7	· · 41.4 42.4	346°25.9 0°59.8	15.0' 15.0'	17°08.4 16°56.7	-11.7' -11.8'	54.1' 54.1'
23	163°16.9	43.3	15°33.9	15.1'	16°45.0	-11.8'	54.0'
	SD = 16.0'	d = 1.0'		SI	D = 14.8'		
				- 31	17.0		

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

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

Day		Sun				
Dav		Time	Mer.	Mer.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	9-11
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	68-84%
19	07:45	07:36	12:08	20:24	07:59	
20	07:27	07:19	12:07	21:12	08:48	
21	07:10	07:01	12:07	21:56	09:34	

## March 22, 23, 24 UT (Fri., Sat., Sun.)

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	179°59.3	195°37.5	508°06.1	208° 12.8	S12°51.0	136°56.0	N15°36.1	195°32.2	S08°24.8			
1	195°01.8	210°37.0	05.0	223°13.4	50.3	151°58.0	36.3	210°34.4	24.7	Alpheratz	357°35.8	29°13.3
										Ankaa	353°08.2	-42°10.6
2	210°04.3	225°36.6	03.8	238°14.0	49.6	166°59.9	36.4	225°36.6	24.6	Schedar	349°32.4	56°40.1
3	225°06.7	240°36.1	• • 02.7	253°14.6	• • 48.9	182°01.9	• • 36.6	240°38.8	• • 24.5	Diphda	348°48.3	-17°51.4
4	240°09.2	255°35.7	01.6	268° 15.2	48.3	197°03.9	36.8	255°41.0	24.4	Achernar	335°21.2	-57°07.0
5	255°11.7	270°35.3	08°00.4	283°15.8	47.6	212°05.8	36.9	270°43.1	24.2	Hamal	327°52.3	23°34.5
6	270°14.1	285°34.8	S07°59.3	298° 16.4	S12°46.9	227°07.8	N15°37.1	285°45.3	S08°24.1	Polaris	314°43.6	89°22.2
7	285°16.6	300°34.4	58.1	313° 17.0	46.3	242°09.7	37.2	300°47.5	24.0	Acamar	315°12.6	-40°12.7
8	$300^{\circ}19.0$	315°34.0	57.0	328° 17.6	45.6	257°11.7	37.4	315°49.7	23.9			
9	315°21.5	330°33.5	• • 55.9	343° 18.2	• • 44.9	272°13.7	• • 37.5	330°51.9	• • 23.8	Menkar	314°07.1	4°11.0
10	330°24.0	345°33.1	54.7	358° 18.7	44.2	287° 15.6	37.7	345°54.1	23.7	Mirfak	308°29.6	49°56.9
11	345°26.4	0°32.6	53.6	13° 19.3	43.6	302°17.6	37.8	0°56.3	23.6	Aldebaran	290°40.5	16°33.4
12	0°28.9	15°32.2	507°52.4	28° 19.9	S12°42.9	317° 19.5	N15°38.0	15°58.5	S08°23.5	Rigel	281°04.6	-8°10.6
13	15°31.4	30°31.8	51.3	43°20.5	42.2	332°21.5	38.1	31°00.7	23.4	Capella	280°23.0	46°01.5
14	30°33.8	45°31.3	50.1	58°21.1	41.5	347°23.5	38.3	46°02.8		Bellatrix	278°23.7	6°22.2
	45° 36.3					2°25.4			23.3	Elnath	278°02.8	28°37.7
15		60°30.9	• • 49.0	73°21.7	• • 40.9		• • 38.5	61°05.0	• • 23.2	Alnilam	275°38.5	-1°11.3
16	60°38.8	75°30.5	47.8	88°22.3	40.2	17°27.4	38.6	76°07.2	23.1	Betelgeuse	270°52.8	$7^{\circ}24.6$
17	75°41.2	90°30.0	46.7	103°22.9	39.5	32°29.3	38.8	91°09.4	22.9	Canopus	263°52.7	-52°42.8
18	90°43.7	105°29.6	S07°45.6	118° 23.5	S12°38.9	47°31.3	N15°38.9	$106^{\circ}11.6$	S08°22.8	Sirius	258°26.8	-16°45.1
19	105°46.2	120°29.2	44.4	133°24.1	38.2	62°33.3	39.1	121°13.8	22.7	Adhara	255°06.3	-29°00.5
20	120°48.6	135°28.7	43.3	148°24.7	37.5	77°35.2	39.2	136°16.0	22.6			
21	$135^{\circ}51.1$	150°28.3	• • 42.1	163°25.3	• • 36.8	92°37.2	• • 39.4	151°18.2	• • 22.5	Procyon	244°51.4	5°09.7
22	150°53.5	165°27.9	41.0	178°25.9	36.2	107°39.1	39.5	166°20.3	22.4	Pollux	243°18.0	27°58.1
23	165°56.0	180°27.4	39.8	193°26.5	35.5	122°41.1	39.7	181°22.5	22.3	Avior	234°14.7	-59°35.4
										Suhail	222°46.5	-43°32.0
Mer.p	pass. 11:58	$\nu$ -0.4′ d-1	.1′ m-3.88	$\nu$ 0.6′ $d$ -0	0.7′ m1.22	$\nu^{2.0'} d0.$	2′ m-2.10	$\nu$ 2.2′ d-0	.1′ m1.04	Miaplacidus	221°37.8	-69°49.2
										Alphard	217°48.2	-8°45.9
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.9	11°50.9
0	180° 58.5	195°27.0	S07°38.7	208°27.1	\$12°34.8	137°43.0	N15°39.8	196°24.7	S08°22.2	Dubhe	193°41.1	61°37.3
1	196°00.9	210°26.6	37.5	223°27.7	34.1	152°45.0	40.0	211°26.9	22.1	Denebola	182°25.3	14°26.1
2		225°26.1		238°28.3		167° 47.0		226°29.1		Gienah	175°44.0	-17°40.7
	211°03.4		36.4		33.4		40.2		22.0	Acrux	173°00.2	-63°14.0
3	226°05.9	240°25.7	• • 35.2	253°28.9	• • 32.8	182°48.9	• • 40.3	241°31.3	• • 21.9	Gacrux	171°51.9	-57°15.0
4	241°08.3	255°25.3	34.1	268°29.5	32.1	197°50.9	40.5	256°33.5	21.8	Alioth	166°13.0	55°49.6
5	256° 10.8	270°24.9	32.9	283°30.1	31.4	212°52.8	40.6	271°35.7	21.6	Spica	158°22.7	-11°17.4
6	271°13.3	285°24.4	S07°31.8	298°30.7	S12°30.7	227°54.8	N15°40.8	286°37.9	S08°21.5	Alkaid	152°52.1	49°11.3
7	286° 15.7	300°24.0	30.6	313°31.2	30.1	242°56.8	40.9	301°40.1	21.4	Hadar	148°36.5	-60°29.3
8	301°18.2	315°23.6	29.5	328°31.8	29.4	257°58.7	41.1	316°42.2	21.3	Menkent	147°58.1	-36°29.4
9	316°20.6	330°23.1	• • 28.3	343°32.4	• • 28.7	273°00.7	• • 41.2	331°44.4	• • 21.2	Arcturus	145°48.2	19°03.2
10	331°23.1	345°22.7	27.2	358°33.0	28.0	288°02.6	41.4	346°46.6	21.1	Rigil Kent.	139°40.7	-60°56.0
11	346°25.6	0°22.3	26.0	13°33.6	27.4	303°04.6	41.6	1°48.8	21.0	Kochab	137° 18.8	74°03.1
12	1°28.0	15°21.8	507°24.9	28°34.2	S12°26.7	318°06.5	N15°41.7	$16^{\circ}51.0$	S08°20.9	Zuben'ubi	136°56.5	-16°08.6
13	16°30.5	30°21.4	23.7	43°34.8	26.0	333°08.5	41.9	31°53.2	20.8	Alphecca	126°04.1	26°37.7
14	31°33.0	45°21.0	22.5	58°35.4	25.3	348°10.4	42.0	46°55.4	20.7	Antares	112°16.5	-26°29.1
15	46°35.4	60°20.6	• • 21.4	73°36.0	• • 24.6	3°12.4	• • 42.2	61°57.6	• • 20.6	Atria	107°11.2	-69°04.0
16	61°37.9	75°20.1	20.2	88°36.6	24.0	18° 14.4	42.3	76°59.8	20.5	Sabik	102°03.5	-15°45.4
17	76°40.4	90°19.7	19.1	103°37.2	23.3	33°16.3	42.5	92°01.9	20.3	Shaula	96°11.2	-37°07.2
18	91°42.8	105°19.3	S07°17.9	118°37.8	<b>S</b> 12°22.6	48°18.3	N15°42.6	$107^{\circ}04.1$	S08°20.2	Rasalhague	95°59.1	12°32.3
19	106°45.3	120°18.9	16.8	133°38.4	21.9	63°20.2	42.8	122°06.3	20.1	Eltanin	90°42.5	51°28.7
20	121°47.8	135°18.4	15.6	148°39.0	21.2	78°22.2	42.9	137°08.5	20.0	Kaus Aust.	83°33.4	-34°22.3
21	136°50.2	150°18.0	• • 14.5	163°39.6	• • 20.6	93°24.1	• • 43.1	152°10.7	• • 19.9	Vega	80°33.7	38°48.0
22	151°52.7	165°17.6	13.3	178°40.2	19.9	108°26.1	43.3	167°12.9	19.8			-26°16.0
23	166°55.1	180°17.2	12.2	193°40.8	19.2	123°28.0	43.4	182°15.1	19.7	Nunki	75°48.7	
										Altair	62°00.7	8°55.7
Mer.p	bass. 11:54	$\nu$ -0.4′ d-1	.1′ m-3.88	$\nu$ 0.6′ $d$ -0	0.7′ m1.21	$\nu$ 2.0° d0.	2′ m-2.09	$\nu$ 2.2′ <b>d</b> -0	.1′ m1.04	Peacock	53°07.1	-56°39.3
										Deneb	49°26.6	45°21.7
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.7	9°58.9
0	181°57.6	195°16.7	S07°11.0	208°41.4	S12° 18.5	138° 30.0	N15°43.6	197°17.3	S08°19.6	Al Na'ir	27°34.1	-46°50.6
1	197°00.1	210°16.3	09.8	200° 41.4 223° 42.0	17.8	153° 32.0	43.7	212°19.5	19.5	Fomalhaut	15° 15.6	-29°29.7
2	212°02.5	210 10.3 225°15.9	09.8	238° 42.6	17.0	168° 33.9	43.7	212 19.5 227°21.7	19.5	Scheat	13°46.2	28°12.6
3	212 02.5 227°05.0	240°15.5	07.5	250° 42.0° 253° 43.2	16.5	183° 35.9	• • 44.0	242°23.8	. 19.4	Markab	13°30.9	15°19.9
3 4	242° 07.5	240 15.5 255°15.0	06.4	253 43.2 268°43.8	15.8	183 35.9 198°37.8	44.0	242 23.8 257°26.0		Mar 22 Fri	SHA	Mer.pass
				208 43.8 283°44.4				257 20.0 272°28.2	19.2	Venus	15°38.1	10:58
5	257°09.9	270°14.6	05.2		15.1	213°39.8	44.3 N15°44.5		19.1	Mars	28° 13.5	10:56
6	272°12.4	285°14.2	S07°04.0	298° 45.0	\$12°14.4	228°41.7	N15° 44.5	287°30.4	S08°18.9			
7	287°14.9	300°13.8	02.9	313°45.6	13.7	243°43.7	44.7	302°32.6	18.8	Jupiter	316°56.7	14:50
8	302°17.3	315°13.3	01.7	328° 46.2	13.1	258° 45.6	44.8	317°34.8	18.7	Saturn	15°32.9	10:56
9	317° 19.8	330°12.9	07°00.6	343°46.8	• • 12.4	273°47.6	• • 45.0	332°37.0	• • 18.6	Mar 23 Sat	SHA	Mer.pass
10	332°22.2	345°12.5	06°59.4	358° 47.4	11.7	288°49.5	45.1	347°39.2	18.5	Venus	14°28.5	10:59
11	347°24.7	0°12.1	58.2	13°48.0	11.0	303°51.5	45.3	2°41.4	18.4	Mars	27°28.6	10:06
12	2°27.2	15°11.6	\$06°57.1	28°48.6	\$12°10.3	318°53.5	N15° 45.4	17°43.6	S08°18.3	Jupiter	316°44.6	14:47
13	17°29.6	30°11.2	55.9	43°49.2	09.6	333°55.4	45.6	32°45.7	18.2	Saturn	15°26.3	10:53
14	32°32.1	45°10.8	54.8	58°49.8	09.0	348°57.4	45.7	47°47.9	18.1			
15	47°34.6	60°10.4	• • 53.6	73°50.4	• • 08.3	3°59.3	• • 45.9	62°50.1	• • 18.0	Mar 24 Sun	SHA	Mer.pass
16	62°37.0	75°10.0	52.4	88°51.0	07.6	19°01.3	46.0	77°52.3	17.9	Venus	13° 19.1	10:59
17	77°39.5	90°09.5	51.3	103°51.6	06.9	34°03.2	46.2	92°54.5	17.8	Mars	26°43.8	10:05
18	92°42.0	105°09.1	S06°50.1	118°52.2	S12°06.2	49°05.2	N15°46.4	107°56.7	S08°17.7	Jupiter	$316^{\circ}32.4$	14:44
19	107°44.4	120°08.7	48.9	133°52.8	05.5	64°07.1	46.5	122°58.9	17.5	Saturn	15° 19.7	10:49
20	122°46.9	135°08.3	47.8	148°53.4	04.9	79°09.1	46.7	138°01.1	17.4			
21	137° 49.4	150°07.9	• • 46.6	163°54.0	• • 04.2	94°11.0	• • 46.8	153°03.3	• • 17.3	Horizont	al parallax	0.4
22	152°51.8	165°07.4	45.5	178°54.6	03.5	109° 13.0	47.0	168°05.5	17.2		Venus:	0.1
23	167°54.3	180°07.0	44.3	193°55.2	02.8	124°14.9	47.1	183°07.7	17.1		Mars:	0.1
Mern	pass. 11:50	$\nu$ -0 4' d-1	.2′ m-3.88	$\nu$ 0.6' d=0	0.7′ m1.21	ν2 0' d0	2′ m-2.09	ν2 2' d-Ω	.1′ m1.04			
		- 0 4 1		- 5.5 0 0								

h	Sui	า			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°17.1	N00°44.3	$30^{\circ}07.9$	15.2'	$N16^{\circ}33.1$	-11.9'	54.0'
1	193°17.3 208°17.5	45.3 46.3	44°42.1 59°16.3	15.2' 15.3'	16°21.2 16°09.3	-12.0'	54.0'
2	208 17.5 223°17.7	40.3 · · 47.3	73°50.6	15.3'	16 09.3 15°57.2	-12.0' -12.1'	54.0' 54.0'
4	238°17.8	48.3	88°24.9	15.4'	15°45.2	-12.1'	54.0'
5	253°18.0	49.3	102°59.3	15.5'	15°33.0	-12.2'	54.0'
6	268°18.2 283°18.4	N00°50.2 51.2	117°33.8 132°08.3	15.5' 15.6'	N15°20.8 15°08.6	-12.2' -12.3'	54.0' 54.0'
7 8	283 18.4 298°18.6	51.2 52.2	132 08.3 146°42.9	15.6'	15 08.6 14°56.3	-12.3 -12.4'	54.0'
9	313°18.8	53.2	161°17.5	15.7'	14°43.9	-12.4	54.0'
10	328°19.0	54.2	175°52.2	15.7'	14°31.5	-12.5'	54.0'
11	343°19.2 358°19.3	55.2 N00°56.2	190°26.9 205°01.7	15.8' 15.8'	14° 19.1 N14° 06.5	-12.5'	54.0' 54.0'
12 13	358 19.3 13°19.5	57.1	205 01.7 219°36.6	15.8 15.9'	13°54.0	-12.6' -12.6'	54.0'
14	28°19.7	58.1	234°11.5	16.0'	13°41.3	-12.7'	54.0'
15	43°19.9	00°59.1	248°46.4	16.0'	13°28.7	-12.7'	54.0'
16	58°20.1 73°20.3	01°00.1	263°21.4 277°56.5	16.1' 16.1'	13°16.0 13°03.2	-12.8'	53.9'
17 18	73°20.3 88°20.5	01.1 N01°02.1	277°56.5 292°31.6	16.1	N12°50.4	-12.8' -12.9'	53.9' 53.9'
19	103°20.7	03.1	307°06.7	16.2'	12°37.5	-12.9'	53.9'
20	118°20.8	04.0	321°41.9	16.2'	12°24.6	-13.0'	53.9'
21	133°21.0	• • 05.0	336°17.2	16.3'	12°11.7	-13.0'	53.9'
22 23	148°21.2 163°21.4	06.0 07.0	350°52.5 5°27.8	16.3' 16.4'	11°58.7 11°45.6	-13.0' -13.1'	53.9' 53.9'
23	SD = 16.0'	d = 1.0'	3 21.0		D = 14.7'	10.1	55.5
	<u> </u>	u — 1.0		اد	14.1		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°21.6 193°21.8	N01°08.0 09.0	20°03.2 34°38.6	16.4' 16.5'	N11°32.5 11°19.4	-13.1' -13.2'	53.9' 53.9'
2	208°22.0	10.0	34 38.0 49°14.1	16.5	11 19.4 11°06.3	-13.2'	53.9'
3	223°22.2	. 10.9	63°49.6	16.5'	10°53.1	-13.2'	53.9'
4	238°22.4	11.9	$78^{\circ}25.1$	16.6'	10°39.8	-13.3'	53.9'
5	253°22.5 268°22.7	12.9 N01°13.9	93°00.7 107°36.4	16.6'	10°26.5 N10°13.2	-13.3'	53.9'
6 7	283°22.9	14.9	107 30.4 122°12.0	16.7' 16.7'	09°59.9	-13.4' -13.4'	53.9' 53.9'
8	298°23.1	15.9	136°47.7	16.7'	09°46.5	-13.4	53.9'
9	313°23.3	• • 16.8	151°23.5	16.8'	09°33.1	-13.5'	53.9'
10	328°23.5	17.8	165°59.2	16.8'	09°19.6 09°06.1	-13.5'	53.9'
11 12	343°23.7 358°23.9	18.8 N01°19.8	180°35.0 195°10.9	16.8' 16.9'	N08°52.6	-13.5' -13.6'	53.9' 53.9'
13	13°24.1	20.8	209°46.7	16.9'	08°39.0	-13.6'	53.9'
14	28°24.2	21.8	224°22.6	16.9'	08°25.4	-13.6'	53.9'
15	43°24.4 58°24.6	• • 22.8	238°58.6 253°34.5	17.0'	08°11.8 07°58.2	-13.6'	53.9'
16 17	73°24.8	23.7 24.7	253 34.5 268°10.5	17.0' 17.0'	07 58.2 07°44.5	-13.7' -13.7'	53.9' 53.9'
18	88°25.0	N01°25.7	282°46.5	17.0'	N07°30.8	-13.7'	53.9'
19	103°25.2	26.7	297°22.6	17.1'	$07^{\circ}17.1$	-13.8'	53.9'
20	118°25.4	27.7	311°58.6		07°03.3		53.9'
21 22	133°25.6 148°25.8	· · 28.7 29.6	326°34.7 341°10.8	17.1' 17.1'	06°49.5 06°35.7	-13.8' -13.8'	53.9' 53.9'
23	163°25.9	30.6	355°47.0	17.2'	06°21.9	-13.9	53.9'
	SD = 16.0'	d = 1.0'		SI	D = 14.7'		
c	Cnv	Das			Das	اد	HP
Sun 0	<b>GHA</b> 178°26.1	<b>Dec</b> N01°31.6	<b>GHA</b> 10°23.1	u 17.2'	<b>Dec</b> N06° 08.0	d -13.9'	HP 53.9'
1	193°26.3	32.6	24°59.3	17.2'	05°54.2	-13.9'	53.9
2	208°26.5	33.6	39°35.5	17.2'	05°40.2	-13.9'	53.9'
3 4	223°26.7 238°26.9	· · 34.6 35.5	54°11.7 68°47.9	17.2'	05°26.3 05°12.4	-13.9'	53.9'
4 5	238°26.9 253°27.1	35.5 36.5	68°47.9 83°24.2	17.2' 17.3'	05°12.4 04°58.4	-14.0' -14.0'	53.9' 53.9'
6	268°27.3	N01°37.5	98°00.5	17.3'	N04°44.4	-14.0'	53.9
7	283°27.5	38.5	112°36.7	17.3'	04°30.4	-14.0'	53.9'
8	298°27.6	39.5	127°13.0	17.3'	04°16.4	-14.0'	53.9'
9 10	313°27.8 328°28.0	· · 40.5 41.4	141°49.3 156°25.6	17.3' 17.3'	04°02.4 03°48.3	-14.0' -14.1'	53.9' 53.9'
11	343°28.2	42.4	171°02.0	17.3'	03°34.3	-14.1'	53.9
12	358°28.4	N01°43.4	185°38.3	17.3'	N03°20.2	-14.1'	53.9'
13	13°28.6	44.4	200°14.7	17.4'	03°06.1	-14.1'	53.9'
14 15	28°28.8 43°29.0	45.4 •• 46.4	214°51.0 229°27.4	17.4' 17.4'	02°52.0 02°37.9	-14.1' -14.1'	53.9' 53.9'
16	58°29.2	47.3	244°03.7	17.4	02°23.7	-14.1	53.9'
17	73°29.3	48.3	258°40.1	17.4'	02°09.6	-14.2'	54.0'
18	88°29.5	N01°49.3	273°16.5	17.4'	N01°55.5	-14.2'	54.0'
19 20	103°29.7 118°29.9	50.3 51.3	287°52.9 302°29.2	17.4' 17.4'	01°41.3 01°27.1	-14.2' -14.2'	54.0' 54.0'
21	133°30.1	• • 52.2	317°05.6	17.4	01°13.0	-14.2'	54.0'
22	148°30.3	53.2	331°42.0	17.4'	00°58.8	-14.2'	54.0'
23	163°30.5	54.2	346°18.4	17.4'	00°44.6	-14.2'	54.0'
	SD = 16.0'	d = 1.0'		SI	D = 14.7'		

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

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

		Sun			Moon	
Day		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	91-98%
22	06:52	06:43	12:07	22:38	10:17	
23	06:34	06:25	12:06	23:17	10:58	
24	06:15	06:06	12:06	23:56	11:37	

h	Aries	Vei	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	182°56.7	195° 06.6	S06°43.1	208°55.8	\$12°02.1	139°16.9	N15°47.3	198° 09.8	S08°17.0			
1	197°59.2	210°06.2	42.0	223°56.4	01.4	154°18.8	47.4	213° 12.0	16.9	Alpheratz	357°35.8	29°13.3
2	213°01.7	225°05.8	40.8	238°57.1	00.7	169°20.8	47.6	228° 14.2	16.8	Ankaa	353°08.2	-42°10.6
3	228°04.1	240°05.4	39.6	253°57.7	12°00.1	184°22.7	47.8	243°16.4	16.7	Schedar	349°32.4	56°40.1
4	243°06.6	255°04.9	38.5	268°58.3	11°59.4	199°24.7	47.9	258° 18.6	16.6	Diphda	348°48.3	-17°51.4
5	258°09.1	270°04.5	37.3	283°58.9	58.7	214°26.6	48.1	273°20.8	16.5	Achernar	335°21.2 327°52.3	-57°07.0 23°34.5
6	273°11.5	285°04.1	506°36.1	298°59.5	S11°58.0	229°28.6	N15°48.2	288°23.0	508° 16.4	Hamal Polaris	314°44.6	89°22.2
7	288°14.0	300°03.7	35.0	314°00.1	57.3	244°30.5	48.4	303°25.2	16.3	Acamar	315°12.6	-40°12.7
8	303°16.5	315°03.3	33.8	329°00.7	56.6	259°32.5	48.5	318°27.4	16.2	Menkar	314°07.1	4°11.0
9	318°18.9	330°02.8	• • 32.6	344°01.3	• • 55.9	274°34.4	• • 48.7	333°29.6	• • 16.0	Mirfak	308°29.6	49°56.9
10	333°21.4	345°02.4	31.5	359°01.9 14°02.5	55.3	289°36.4	48.8	348°31.8	15.9	Aldebaran	290°40.5	16°33.4
11 12	348°23.8 3°26.3	0°02.0 15°01.6	30.3 \$06°29.1	29°03.1	54.6 \$11°53.9	304°38.3 319°40.3	49.0 N15°49.2	3°34.0 18°36.1	15.8 \$08° 15.7	Rigel	$281^{\circ}04.6$	-8°10.6
13	18°28.8	30°01.2	28.0	44°03.7	53.2	334°42.2	49.3	33°38.3	15.6	Capella	$280^{\circ}23.0$	46°01.5
14	33°31.2	45°00.8	26.8	59°04.3	52.5	349°44.2	49.5	48° 40.5	15.5	Bellatrix	278°23.7	6°22.2
15	48°33.7	60°00.4	25.6	74°04.9	• • 51.8	4°46.1	• • 49.6	63° 42.7	15.4	Elnath	278°02.8	28°37.7
16	63°36.2	74°59.9	24.4	89°05.5	51.1	19°48.1	49.8	78° 44.9	15.3	Alnilam	275°38.5	-1°11.3
17	78°38.6	89°59.5	23.3	104°06.1	50.4	34°50.0	49.9	93°47.1	15.2	Betelgeuse	270°52.8	7°24.6
18	93°41.1	104°59.1	S06°22.1	119°06.7	S11°49.7	49°52.0	N15°50.1	108°49.3	S08°15.1	Canopus Sirius	263°52.7 258°26.8	-52°42.8 -16°45.1
19	108°43.6	119°58.7	20.9	134°07.3	49.1	64°53.9	50.2	123°51.5	15.0	Adhara	255°06.3	-29°00.5
20	123°46.0	134°58.3	19.8	149°07.9	48.4	79°55.9	50.4	138°53.7	14.9	Procyon	244°51.4	5°09.7
21	138°48.5	149°57.9	• • 18.6	164°08.5	• • 47.7	94°57.8	• • 50.6	153°55.9	• • 14.8	Pollux	243° 18.0	27°58.1
22	153°51.0	164°57.5	17.4	179°09.1	47.0	109°59.8	50.7	168°58.1	14.7	Avior	234° 14.7	-59°35.4
23	168°53.4	179°57.0	16.2	194°09.8	46.3	125°01.7	50.9	184°00.3	14.5	Suhail	$222^{\circ}46.5$	-43°32.0
Mer.p	ass. 11:46	$\nu$ -0.4 $'$ d-1	.2′ m-3.88	$\nu$ 0.6′ d-0	.7′ m1.21	$\nu 2.0' \ d0.$	2′ m-2.09	$\nu$ 2.2′ d-0	.1' m $1.04$	Miaplacidus	221°37.9	-69°49.2
				-				-		Alphard	217°48.2	-8°45.9
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.9	11°50.9
0	183°55.9	194°56.6	S06° 15.1	209°10.4	S11°45.6	140°03.7	N15°51.0	199°02.4	508°14.4	Dubhe Denebola	193°41.2	61°37.3
1	198°58.3	209°56.2	13.9	224°11.0	44.9	155°05.6	51.2	214°04.6	14.3	Gienah	182°25.3 175°44.0	14°26.1 -17°40.7
2	214°00.8	224°55.8	12.7	239°11.6	44.2	170°07.6	51.3	229°06.8	14.2		173°44.0	-63°14.0
3	229°03.3	239°55.4	• • 11.6	254°12.2	• • 43.5	185°09.5	•• 51.5	244°09.0	• • 14.1	Gacrux	171°51.9	-57°15.0
4	244°05.7	254° 55.0	10.4	269°12.8	42.8	200°11.5	51.6	259°11.2	14.0	Alioth	166° 13.0	55°49.6
5	259°08.2	269°54.6	09.2	284°13.4	42.2	215°13.4	51.8	274°13.4	13.9	Spica	158°22.7	-11°17.4
6	274°10.7	284°54.2	S06°08.0	299°14.0	S11°41.5	230°15.4	N15°52.0	289° 15.6	508° 13.8	Alkaid	152°52.1	49°11.4
7	289°13.1	299°53.7	06.9	314°14.6	40.8	245°17.3	52.1	304° 17.8	13.7	Hadar	$148^{\circ}36.4$	-60°29.3
8 9	304°15.6 319°18.1	314°53.3 329°52.9	05.7 •• 04.5	329°15.2 344°15.8	40.1 •• 39.4	260°19.3 275°21.2	52.3 • • 52.4	319°20.0 334°22.2	13.6 •• 13.5	Menkent	$147^{\circ}58.1$	-36°29.4
10	334°20.5	344° 52.5	03.3	359°16.4	38.7	290°23.2	52.4	349° 24.4	13.4	Arcturus	145°48.2	19°03.2
11	349°23.0	359°52.1	02.2	14°17.0	38.0	305°25.1	52.7	4°26.6	13.3	Rigil Kent.	139°40.7	-60°56.0
12	4°25.5	14°51.7	S06°01.0	29°17.7	S11°37.3	320°27.1	N15°52.9	19°28.8	508° 13.2	Kochab	137° 18.8 136° 56.5	74°03.1 -16°08.6
13	19°27.9	29°51.3	05°59.8	44°18.3	36.6	335°29.0	53.0	34°31.0	13.0	Zuben'ubi Alphecca	130 50.5 126°04.1	26°37.7
14	34°30.4	44°50.9	58.6	59°18.9	35.9	350°30.9	53.2	49°33.1	12.9	Antares	112° 16.5	-26°29.2
15	49°32.8	59°50.5	• • 57.5	74°19.5	• • 35.2	5°32.9	• • 53.4	64°35.3	• • 12.8	Atria	107° 11.2	-69°04.0
16	64°35.3	74°50.1	56.3	89°20.1	34.5	20°34.8	53.5	79°37.5	12.7	Sabik	$102^{\circ}03.5$	-15°45.4
17 18	79°37.8 94°40.2	89°49.7 104°49.2	55.1	104°20.7 119°21.3	33.8 \$11°33.1	35°36.8	53.7 N15°53.8	94°39.7 109°41.9	12.6	Shaula	$96^{\circ}11.2$	-37°07.2
19	109°42.7	104 49.2 119°48.8	\$05°53.9 52.7	119 21.3 134°21.9	32.5	50°38.7 65°40.7	54.0	109 41.9 124° 44.1	S08° 12.5 12.4	Rasalhague	95°59.1	12°32.3
20	109 42.7 124°45.2	134° 48.4	51.6	149°22.5	31.8	80°42.6	54.1	139° 46.3	12.4	Eltanin	90°42.4	51°28.7
21	139°47.6	149°48.0	50.4	164°23.1	31.1	95°44.6	• • 54.3	154° 48.5	. 12.2	Kaus Aust.	83°33.4	-34°22.3
22	154°50.1	164°47.6	49.2	179°23.7	30.4	110°46.5	54.4	169°50.7	12.1	Vega	80°33.7	38°48.0
23	169°52.6	179°47.2	48.0	194°24.4	29.7	125°48.5	54.6	184°52.9	12.0	Nunki Altair	75°48.6 62°00.7	-26°16.0 8°55.7
Morp	ass. 11:42	0 4' d 1	.2′ m-3.88	·0 6/ d 0	.7′ m1.21	11 0 <sup>1</sup> d0	2′ m-2.08		.1′ m1.04	Peacock	53°07.0	-56°39.3
- ivier.p	d55. 11.42	ν-0.4 u-1	.2 111-3.00	$\nu$ 0.0 $u$ -0	.7 1111.21	ν1.9 do.	2 111-2.00	ν2.2 <b>u</b> -0	.1 1111.04	Deneb	49°26.5	45°21.7
										Enif	33°39.7	9°58.9
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°34.1	-46°50.6
0	184°55.0	194° 46.8	S05°46.8	209°25.0	S11°29.0	140°50.4	N15°54.8	199°55.1	S08°11.9	Fomalhaut	$15^{\circ}15.6$	-29°29.7
1	199°57.5	209°46.4	45.7	224°25.6 239°26.2	28.3	155°52.4	54.9	214°57.3	11.8	Scheat	13°46.2	28°12.6
2 3	214°59.9 230°02.4	224°46.0 239°45.6	44.5 •• 43.3	239°26.2 254°26.8	27.6 •• 26.9	170°54.3 185°56.2	55.1 •• 55.2	229°59.5 245°01.7	11.7 •• 11.6	Markab	13°30.9	15°19.9
4	245°04.9	254° 45.0	42.1	269°27.4	26.2	200°58.2	55.4	260°03.8	11.4	Mar 25 Mon	SHA	Mer.pass
5	260°07.3	269° 44.8	40.9	284°28.0	25.5	216°00.1	55.5	275°06.0	11.3	Venus	12°09.9	11:00
6	275°09.8	284° 44.4	S05°39.8	299°28.6	S11°24.8	231°02.1	N15°55.7	290°08.2	S08°11.2	Mars	25°59.1	10:04
7	290°12.3	299°44.0	38.6	314°29.2	24.1	246°04.0	55.8	305°10.4	11.1	Jupiter	$316^{\circ}20.1$	14:41
8	$305^{\circ}14.7$	314°43.6	37.4	329°29.8	23.4	261°06.0	56.0	320°12.6	11.0	Saturn	$15^{\circ}13.1$	10:46
9	320°17.2	329°43.1	• • 36.2	344°30.5	• • 22.7	276°07.9	• • 56.2	335°14.8	• • 10.9	Mar 26 Tue	SHA	Mer.pass
10	335°19.7	344°42.7	35.0	359°31.1	22.0	291°09.9	56.3	350° 17.0	10.8	Venus	11°00.7	11:01
11	350°22.1	359°42.3	33.9	14°31.7	21.3	306°11.8	56.5	5°19.2	10.7	Mars	25° 14.5	10:03
12	5°24.6 20°27.1	14°41.9	S05°32.7	29°32.3 44°32.9	\$11°20.6	321°13.7	N15°56.6	20°21.4 35°23.6	\$08° 10.6	Jupiter	$316^{\circ}07.8$	14:38
13 14	20°27.1 35°29.5	29°41.5 44°41.1	31.5 30.3	59°33.5	19.9 19.2	336°15.7 351°17.6	56.8 56.9	50° 25.8	10.5 10.4	Saturn	15°06.6	10:42
15	50°32.0	59° 40.7	• • 29.1	74°34.1	19.2	6°19.6	57.1	65° 28.0	10.4	Mar 27 Wed	SHA	Mer.pass
16	65°34.4	74° 40.3	27.9	89°34.7	17.8	21°21.5	57.2	80°30.2	10.3	Venus	<b>эна</b> 9°51.8	11:01
17	80°36.9	89°39.9	26.8	104°35.4	17.1	36°23.5	57.4	95° 32.4	10.1	Mars	24°29.9	10:02
18	95°39.4	104°39.5	S05°25.6	119°36.0	S11°16.4	51°25.4	N15°57.6	110°34.6	S08°10.0	Jupiter		14:35
19	110°41.8	119°39.1	24.4	134°36.6	15.7	66°27.3	57.7	125°36.8	09.9	Saturn	15°00.1	10:39
20	125°44.3	134°38.7	23.2	149°37.2	15.0	81°29.3	57.9	140°39.0	09.8	Horizont	al parallax	
21	140°46.8 155°49.2	149°38.3	22.0	164°37.8	14.4	96°31.2	· · 58.0	155°41.1 170°43.3	09.6	Horizont	Venus:	0.1
22 23	155°49.2 170°51.7	164°37.9 179°37.5	20.8 19.6	179°38.4 194°39.0	13.7 13.0	111°33.2 126°35.1	58.2 58.3	170°43.3 185°45.5	09.5 09.4		Mars:	0.1
										L		
Mer.p	ass. 11:38	$\nu$ -0.4′ $d$ -1	.2′ m-3.88	$\nu$ 0.6′ $d$ -0	.7′ m1.20	$\nu$ 1.9′ d0.	2′ m-2.08	$\nu$ 2.2′ d-0	.1′ m1.05			

h	Sui	า			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178° 30.7	N01°55.2	0°54.8	17.4'	N00°30.4	-14.2'	54.0'
1 2	193°30.9 208°31.1	56.2 57.2	15°31.1 30°07.5	17.4' 17.4'	00°16.2 N00°02.0	-14.2' -14.2'	54.0' 54.0'
3	208 31.1 223°31.2	58.1	44°43.9	17.4	S00°12.2	14.2'	54.0'
4	238°31.4	$01^{\circ}59.1$	59°20.2	17.4'	00°26.4	14.2'	54.0'
5	253°31.6	02°00.1	73°56.6	17.3'	00°40.6	14.2'	54.0'
6 7	268°31.8 283°32.0	N02°01.1 02.1	88°32.9 103°09.3	17.3' 17.3'	\$00°54.8 01°09.1	14.2' 14.2'	54.0' 54.0'
8	298° 32.2	03.0	103 09.5 117°45.6	17.3'	01°23.3	14.2'	54.0'
9	313°32.4	• • 04.0	$132^{\circ}21.9$	17.3'	01°37.5	14.2'	54.0'
10	328° 32.6 343° 32.8	05.0 06.0	146°58.2 161°34.5	17.3' 17.3'	01°51.7 02°05.9	14.2' 14.2'	54.0'
11 12	343 32.8 358°32 9	N02°07.0	101 34.5 176°10.8	17.3	502°20.1	14.2'	54.0' 54.1'
13	13°33.1	08.0	190°47.0	17.2'	02°34.3	14.2'	54.1'
14	28°33.3	08.9	205°23.3	17.2'	02°48.5	14.2'	54.1'
15 16	43°33.5 58°33.7	· · 09.9 10.9	219°59.5 234°35.7	17.2' 17.2'	03°02.6 03°16.8	14.2' 14.2'	54.1' 54.1'
17	73° 33.9	11.9	249°11.9	17.2'	03°31.0	14.2'	54.1
18	88°34.1	$N02^{\circ}12.9$	263°48.1	17.1'	S03°45.1	14.1'	54.1'
19	103°34.3	13.8	278° 24.2	17.1'	03°59.3	14.1'	54.1'
20 21	118°34.5 133°34.7	14.8 •• 15.8	293°00.3 307°36.4	17.1' 17.1'	04°13.4 04°27.5	14.1' 14.1'	54.1' 54.1'
22	148° 34.8	16.8	322° 12.5	17.1'	04°21.3	14.1'	54.1'
23	163°35.0	17.8	336°48.6	17.0'	$04^{\circ}55.8$	14.1'	54.1'
	SD = 16.0'	d = 1.0'		SI	O = 14.7'		
т.	CUA	D	CIIA		D-:	J	UP
Tue 0	<b>GHA</b> 178° 35.2	<b>Dec</b> N02°18.7	<b>GHA</b> 351°24.6	u 17.0'	Dec \$05°09.9	d 14.1'	<b>HP</b> 54.1'
1	193°35.4	19.7	6°00.6	17.0'	05°23.9	14.1'	54.2'
2	208° 35.6	20.7	20°36.6	16.9'	05°38.0	14.0'	54.2'
3 4	223°35.8 238°36.0	· · 21.7 22.7	35° 12.5 49° 48.4	16.9' 16.9'	05°52.0 06°06.1	14.0' 14.0'	54.2' 54.2'
5	250° 36.2	23.6	64°24.3	16.9'	06°20.1	14.0'	54.2'
6	268° 36.4	N02°24.6	79°00.2	16.8'	S06°34.1	14.0'	54.2'
7	283°36.5	25.6	93°36.0	16.8'	06°48.0	14.0'	54.2'
8 9	298°36.7 313°36.9	26.6 •• 27.6	108°11.8 122°47.5	16.7' 16.7'	07°02.0 07°15.9	13.9' 13.9'	54.2' 54.2'
10	328° 37.1	28.5	137°23.2	16.7	07°15.9	13.9	54.2'
11	343°37.3	29.5	151°58.9	16.6'	07°43.7	13.9'	54.2'
12	358° 37.5	N02°30.5	166°34.5	16.6'	S07°57.6	13.8'	54.3'
13 14	13°37.7 28°37.9	31.5 32.5	181°10.1 195°45.7	16.6' 16.5'	08°11.4 08°25.3	13.8' 13.8'	54.3' 54.3'
15	43°38.1	33.4	210°21.2	16.5'	08°39.1	13.8'	54.3'
16	58° 38.3	34.4	224°56.7	16.4'	08°52.8	13.7'	54.3'
17 18	73°38.4 88°38.6	35.4 N02°36.4	239°32.1 254°07.5	16.4' 16.3'	09°06.6 509°20.3	13.7' 13.7'	54.3' 54.3'
19	103°38.8	37.3	268° 42.8	16.3	09°33.9	13.6'	54.3
20	118°39.0	38.3	283°18.1		09°47.6	13.6'	54.3'
21	133°39.2	• • 39.3	297°53.4	16.2'	10°01.2	13.6'	54.4'
22 23	148°39.4 163°39.6	40.3 41.3	312°28.6 327°03.7	16.2' 16.1'	10°14.8 10°28.3	13.6' 13.5'	54.4' 54.4'
25	SD = 16.0'	d = 1.0'			D = 14.8'	15.5	
		<u>u = 1.0</u>			J = 14.0		
Wed	GHA	Dec	GHA	ν	Dec	d 12.5'	HP
0 1	178°39.8 193°40.0	N02°42.2 43.2	341°38.8 356°13.9	16.1' 16.0'	\$10°41.9 10°55.3	13.5' 13.4'	54.4' 54.4'
2	208°40.1	44.2	10°48.9	15.9'	11°08.8	13.4'	54.4'
3	223°40.3	• • 45.2	25°23.8	15.9'	11°22.2	13.4'	54.4'
4 5	238° 40.5 253° 40.7	46.1 47.1	39°58.7 54°33.6	15.8' 15.8'	11°35.6 11°48.9	13.3' 13.3'	54.4' 54.4'
6	268° 40.9	N02°48.1	69°08.4	15.7'	\$12°02.2	13.3'	54.5
7	283°41.1	49.1	83°43.1	15.7'	12°15.5	13.2'	54.5'
8 9	298° 41.3 313° 41.5	50.1 •• 51.0	98°17.8 112°52.4	15.6' 15.6'	12°28.7 12°41.9	13.2' 13.1'	54.5' 54.5'
10	313 41.5 328°41.7	52.0	112 52.4 127°26.9	15.5'	12 41.9 12°55.0	13.1	54.5'
11	343°41.9	53.0	142°01.4	15.4'	13°08.1	13.0'	54.5
12	358°42.0	N02°54.0	156° 35.8	15.4'	S13°21.1	13.0'	54.5'
13 14	13° 42.2 28° 42.4	54.9 55.9	171°10.2 185°44.5	15.3' 15.2'	13°34.1 13°47.1	12.9' 12.9'	54.5' 54.6'
14 15	43° 42.4	· · 56.9	200° 18.7	15.2'	13 47.1 14°00.0	12.9' 12.9'	54.6'
16	58°42.8	57.9	$214^{\circ}52.9$	15.1'	14°12.8	12.8'	54.6'
17	73°43.0	58.8	229°27.0	15.0'	14°25.6	12.8'	54.6'
18 19	88° 43.2 103° 43.4	N02°59.8 03°00.8	244°01.1 258°35.0	15.0' 14.9'	\$14°38.4 14°51.1	12.7' 12.6'	54.6' 54.6'
20	118° 43.6	01.8	273°08.9	14.8'	15°03.7	12.6'	54.6
21	133°43.7	• • 02.8	287°42.8	14.8'	15°16.3	12.5'	54.7'
22 23	148° 43.9 163° 44.1	03.7 04.7	302°16.5 316°50.2	14.7' 14.6'	15°28.9 15°41.3	12.5' 12.4'	54.7' 54.7'
23	SD = 16.0'	d = 1.0'	310 30.2			12.4	34.7
	2D = 10.0	$a = 1.0^{\circ}$		51	O = 14.8'		

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

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

		Sun			Moon	Age 15-17 m 100-97%		
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age		
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	15-17		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	100-97%		
25	05:57	05:48	12:06	-:-	12:16			
26	05:39	05:30	12:06	00:35	12:55			
27	05:21	05:12	12:05	01:16	13:36			

## March 28, 29, 30 UT (Thu., Fri., Sat.)

Diphele	1 _	Aries	Vei	nus	M	ars	Jup	oiter	Sat	urn		Stars	
220"56.0 200"56.7 17.3 224"40.3 11.6 186"39.0 \$8.7 215"49.9 09.2 Abdute 2. 2015"59.1 224"36.3 11.6 12. 234"45.0 10.0 11.6 186"39.0 \$8.7 215"49.9 10.0 1 2. 241"45.0 10.0 21.0 11.7 40.0 5.8 2. 2015"51.5 208"35.5 11.6 12. 234"45.0 10.0 21.0 11.4 8 5.0 20"55.7 6.0 8.8 Abdute 2. 241"45.0 10.0 21.0 11.4 8 5.0 20"55.7 6.0 8.8 Abdute 2. 241"45.0 10.0 21.0 11.4 8 5.0 20"55.7 6.0 8.8 Abdute 2. 241"45.0 10.0 21.0 11.4 8 5.0 20"55.7 6.0 8.8 Abdute 2. 241"45.0 10.0 21.0 11.4 8 5.0 20"55.7 6.0 8.8 Abdute 2. 241"45.0 10.0 21.0 11.4 8 5.0 20"55.7 6.0 8.8 Abdute 2. 241"45.0 10.0 21.0 11.4 8 5.0 20"55.7 6.0 8.8 Abdute 2. 241"45.0 10.0 21.0 11.4 8 5.0 20"55.7 6.0 8.8 Abdute 2. 241"45.0 10.0 21.0 11.4 8 5.0 20"55.7 6.0 8.8 Abdute 2. 241"45.0 10.0 21.0 11.4 8 5.0 20.0 20"55.7 6.0 30.0 10.0 10.0 10.0 10.0 10.0 10.0 10	hu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
200°56.6   200°56.7   17.3   224°40.3   11.6   156°39.0   58.7   215°49.9   90.92   Abdull   220°56.5   220°	)	185°54.2	194°37.1	505°18.5	209°39.6	S11°12.3	141°37.1	N15°58.5	200°47.7	S08°09.3		0570050	000100
2   215-59.1   224-96.3   16.1   239-49.9   10.0   171-49.9   58.8   230-52.1   09.1   3   231-01.0   224-92.5   13.7   224-94.2   10.0   171-49.9   58.8   230-52.1   09.1   4   240-04.0   224-92.5   13.7   224-94.2   10.0   221-94.8   59.1   200-96.5   08.9   4   240-04.0   224-92.5   13.7   224-94.2   10.0   221-94.8   59.1   200-96.5   08.9   4   240-04.0   224-92.5   13.7   224-94.2   10.0   221-94.8   59.1   200-96.5   08.9   4   240-94.1   299-94.8   59.1   231-94.8   311-20.1   311-40.7   311-40.8   311-20.1   311-40.8   321-31.5   0.0   324-94.8   311-20.1   311-40.7   311-31.5   0.0   324-94.8   0.0   271-56.5   157-50.9   321-05.3   08.5   4   240-94.1   231-94.8   231-94.8   231-94.8   0.0   271-56.5   157-50.9   321-05.3   08.5   4   240-94.1   231-94.8   231-94.8   231-94.8   0.0   271-56.5   157-50.9   321-05.3   08.5   4   240-94.1   231-94.8   231-94.8   0.0   231-56.5   157-50.9   321-05.3   08.5   4   240-94.1   231-94.8   0.0   231-56.8   0.0   231-56.5   157-50.9   321-05.3   0.0   341-46.8   4   240-94.2   241-94.8   0.0   241-56.8   0.0   241-56.5   157-50.9   321-05.3   0.0   341-46.8   4   240-94.2   240-94.8   0.0   241-56.8   0.0   241-56.5   157-50.9   321-05.3   0.0   4   240-94.1   241-94.8   0.0   241-56.8   0.0   241-56.5   157-50.9   0.0   321-04.8   4   240-94.1   241-94.8   0.0   241-94.8   0.0												357°35.8	29° 13.3
3											Ankaa	353°08.2	-42°10.6
1.   260° 0.0   256° 3.5   13.7   269° 2.1   20.5   201° 4.8   9.1   200° 3.5   08.8   Mechanical Color   200° 3.1   20											Schedar	349°32.4	56°40.1
5 261 06.5 269 33.1 12.5 264 42.7 08.8 216 46.8 59.3 275 83.7 08.8 Handle College Col											Diphda	348°48.3	-17°51.4
March   Marc											Achernar	335°21.2	-57°07.0
Poles   Po												327°52.3	23°34.5
Method   M												314°45.4	89°22.2
Methods	7	291°11.4	299°34.3	10.2	314°43.9	07.4		59.6	306°03.1	08.6		315°12.6	-40°12.7
1	3	306°13.9	314°33.9	09.0	329°44.6	06.7	261°52.6	59.7	321°05.3	08.5		314°07.1	4° 11.0
Adobbana	9	321°16.3	329°33.5	• • 07.8	344° 45.2	• • 06.0	276°54.5	15°59.9	336°07.5	• • 08.4		308°29.6	49°56.9
Fig.   1.0	0	336°18.8	344°33.1	06.6	359°45.8	05.3	291°56.5	$16^{\circ}00.1$	351°09.7	08.3			
Capella 14 36°28.2 29°31.0 30.0 44°47.6 30.1 33°02.3 00.5 45°16.3 00.0 Bollariza 14 36°28.7 46°31.5 01.8 59°48.3 00.1 47.7 7°06.2 00.7 51°15.5 00.7	1	351°21.3	359°32.7	05.4	14°46.4	04.6	306°58.4	00.2	6°11.9	08.2		290°40.6	16°33.4
13   21°26.2   22°31.9   03.0   44°47.6   03.1   33°02.3   00.5   30°16.3   08.0   Capella												281°04.6	-8°10.6
144 36 36 36 7 44 31.5 0 18 59 48.3 0.24 39.204.2 00.7 51.85 0.78 Eleitative Series 15 51.34 59 31.1 19 31.1 50 31.1 32.2 50 50 50 50 50 50 50 50 50 50 50 50 50												280°23.0	46°01.5
15 5 1°31.1 0°5°0.6 74°48.9 0 · 0.1.7 7°0.6 2 · . 0.08 06°20.7 0.07.7 Amiliam 16 66°33.6 74°39.0 4°59.5 89°49.5 0.1.0 22°98.1 0.10 81°22.9 0°7.5 Carposis 17 81°36.0 89°30.3 58.3 104°59.1 11°0.03 31°0.1 0.1.1 96°25.0 0°7.5 Carposis 18 99°38.5 104°29.9 505.9 134°51.3 58.9 6°7.3 0.0.6 141°3.6 0°7.2 Carposis 19 111°41.0 11°29.5 55.9 134°51.3 58.9 6°7.3 0.0.6 141°3.6 0°7.2 Carposis 20 126°43.4 134°29.1 19°29.7 · 53.5 164°52.6 · 57.5 91°17.8 · 0.16 141°3.6 0°7.2 Carposis 21 141°45.9 149°28.7 · 53.5 164°52.6 · 57.5 91°17.8 · 0.18 156°33.8 · 0.7.1 Proceed 22 156°44.4 164°28.3 52.3 179°53.2 56.8 112°19.8 0.9 171°50.0 0.00 Proceed 23 171°50.8 179°27.9 51.1 194°53.8 56.1 12°19.8 0.9 171°50.0 0.00 Proceed 24 186°73.3 11°34 1.0 140°37.5 504°49.9 20°14.4 510°54.4 140°33.8 110°34.2 1.0 16°38.2 200.9  Fr											Bellatrix	278°23.7	6°22.2
16 66°336 7°307 04°307 08°305 88°405 01.0 22°2081 01.0 81°22.9 07.6 Bedelgeuse 98°305 10°209 08°305 10°209 08°371 119°507 510°303 37°10.1 01.1 90°20 07°50 07°54 18°9013 37°10.1 01.1 90°20 08°07.4 190°101 19°101 11°10 11°101 11°207 0852 08°74 190°101 19°201 08°51 190°101 190°201 08°51 190°201 08											Elnath	278°02.8	28°37.7
18											Alnilam	275°38.5	$-1^{\circ}11.3$
Second   18											Betelgeuse	270°52.9	7°24.6
Sinius 19 111/410 119/299 Sys-71 119/90/ S10/996 Sys-12 0 103 1126/294 0 73 1 105/197 119 111/410 119/295 S559 145/913 S82 82/15 9 10.6 141/116 072 1 105/946 1 149/913 S552 S658 1127/918 0 118 116/938 0 77 1 105/946 1 149/913 S552 S658 1127/918 0 118 116/938 0 77 1 105/946 1 149/913 S552 S658 1127/918 0 118 116/938 0 77 1 105/946 1 149/913 S552 S658 1 127/918 0 118 116/938 0 77 1 105/946 1 106/938 0 179/927 S11. 194/53 S 561. 127/918 0 118 116/938 0 77 1 105/946 1 106/938 0 179/927 S11. 194/53 S 561. 127/918 0 118 116/938 0 77 1 105/946 1 106/938 0 179/927 S11. 194/53 S 561. 127/918 0 128 116/938 0 105/948 1 105/938 0 105/948 1 105/938 0 105/948 1 105/938 0 105/948 1											Canopus	263°52.7	-52°42.8
Adhara												258°26.8	-16°45.1
Procedure   Pro	9		119°29.5	55.9		58.9		01.5	126°29.4	07.3		255°06.4	-29°00.5
Political   Poli	0		134°29.1	54.7	149°51.9	58.2		01.6	141°31.6	07.2		244°51.5	5°09.7
Mer. pass. 11:34   \( \buildrel{\text{Policy} 19 \) 51.1   194*538   51.2   21°2°2.17   02.1   186*382   06.9   06.9	1	141°45.9	149°28.7	• • 53.5	164°52.6	• • 57.5	97°17.8	• • 01.8	156°33.8	• • 07.1			
Mer   pass   11:34   Mer   pass   171*50.8   179*27.9   S. 11.1   194*3.8   S. 10.1   127*21.7   O.2.1   186*3.2   O.6.9   O.6.9   O.6.9   O.7.9   O.2.9	2	156°48.4	164°28.3		179°53.2	56.8	112°19.8	01.9	171°36.0	07.0		243°18.0	27°58.1
Mer.pass   11:34	3	171°50.8	179°27.9	51.1	194°53.8	56.1	127°21.7	02.1	186°38.2	06.9		234°14.8	-59°35.4
Fri												222°46.6	-43°32.0
From   GHA	ler.pas	ss. 11:34	$\nu$ -0.4' d-1	.2′ m-3.88	$\nu$ 0.6′ d-0	).7′ m1.20	$\nu 1.9' \ d0.$	2′ m-2.08	$\nu$ 2.2′ d-0	.1′ m1.05		221°37.9	-69°49.2
CHA   CH											Alphard	217°48.2	-8°45.9
1 1 201658 2 002°71 8487 224°55.0 540 49.9 209°84.4 \$10°554. \$142°236. \$116°02.2 \$20°40.4 \$08°06.8 \$06.7 \$1	·-:	CHV	CHV	Doc	CHV	Doc	CHV	Doc	СПУ	Doc	Regulus	207°34.9	11°50.9
1 201°55.8 2 294°27.1 48.7 224°55.0 54.7 157°25.6 02.4 216°42.6 06.7 d.Genah.  2 216°58.2 224°25.2 7 47.5 239°55.7 54.0 172°27.5 02.6 231°4.8 06.6 Acrux  3 232°00.7 239°26.346.3 224°55.0 5.53 187°29.502.7 246°47.006.5 d.Genah.  4 247°03.2 254°25.9 45.2 269°56.9 52.6 022°31.4 0.9 246°47.006.5 d.Genah.  5 262°05.6 269°25.5 44.0 284°57.5 51.9 217°33.3 03.0 276°51.4 06.3 d.Genah.  8 307°13.0 314°24.3 40.4 322°59.4 49.8 262°39.1 03.5 321°58.0 05.9 d.Genah.  8 307°13.0 314°24.3 40.4 322°59.4 49.8 262°39.1 03.6 32°15.6 50.9 05.9 d.Genah.  10 337°17.9 344°23.6 38.0 0°00.6 48.4 2292°43.0 03.8 352°02.4 50.5 d.Genah.  11 352°20.4 359°23.2 36.8 15°01.2 47.7 307°45.0 04.0 7°04.6 50.5 d.Genah.  12 7°22.9 14°22.8 504°35.6 380.0 0°00.6 48.4 2292°43.0 03.8 352°02.4 50.5 d.Genah.  12 7°22.9 14°22.8 504°35.6 380.0 0°00.6 48.4 2292°43.0 04.0 7°04.6 50.5 d.Genah.  12 7°22.9 14°22.8 504°35.6 380.0 0°00.6 48.4 2292°43.0 04.0 7°04.6 50.5 d.Genah.  12 7°22.9 14°22.8 504°35.6 380.0 0°00.6 44.4 52°21.2 50.0 0.5 d.Genah.  13 22°25.3 29°22.4 34.4 45°02.4 46.3 352°50.8 04.4 52°11.2 50.3 d.Genah.  14 37°27.8 44°22.0 33.2 66°03.1 44°50.4 65.0 352°50.8 04.4 52°11.2 50.3 d.Genah.  15 52°30.3 59°21.6 32.0 75°03.7 44.8 50°52.0 170°1.3 4.0 50.2 d.Genah.  16 67°32.7 74°21.2 30.8 90°04.3 41.1 22°54.6 04.7 82°15.6 50.1 d.Genah.  18 99°37.6 104°20.4 504°28.4 126°05.5 106°2.1 27°2.1 04.8 60.1 d.Genah.  18 99°37.6 104°20.4 504°28.4 126°05.5 106°2.0 170°1.8 05.0 d.Genah.  18 99°37.6 104°20.4 504°28.4 126°05.5 106°05.1 112°19.9 508°0.9 d.4 d.Genah.  19 112°40.1 119°20.2 72.2 135°06.2 42.0 68°00.5 5.0 176°05.5 157°05.5 0.04.6 d.Genah.  18 99°37.7 104°1.2 1.2 12°2.0 135°06.0 39.9 113°06.3 05.7 172°28.7 04.5 04.5 04.7 d.Genah.  18 20°127.4 224°17.3 18.9 240°10.5 37.1 173°14.0 06.1 227°35.5 0.04.6 05.0 05.0 05.0 05.0 05.0 05.0 05.0 05											Dubhe	193°41.2	61°37.3
2 216°88.2 224°26.7 47.5 239°55.7 54.0 172°27.5 0.26 231°44.8 06.6 Acrus 3 232°07.7 239°52.3 · 46.3 254°55.3 · 53.3 187°20.5 · 0.07 246°47.0 · 0.65.5 6 26.2 247°37.2 0.33 30°37.1 0.65.4 06.4 247°03.2 254°25.9 45.2 269°56.9 5.26 202°31.4 0.29 261°49.2 06.4 06.4 36.2 247°08.1 284°25.1 \$04°42.8 299°58.1 \$10°51.2 232°35.3 \$16°03.2 291°53.6 \$08°06.2 \$4.2 247°37.2 0.33 30°575.4 0.63 \$5.2 247°37.2 0.33 30°575.8 0.5 0.5 \$4.2 247°37.2 0.33 30°575.8 0.5 0.5 \$4.2 247°37.2 0.33 30°575.8 0.5 0.5 \$4.2 247°37.2 0.33 30°575.8 0.5 0.5 \$4.2 247°37.2 0.33 30°575.8 0.5 0.5 \$4.2 247°37.2 0.33 30°575.8 0.5 0.5 \$4.2 247°37.2 0.33 30°575.8 0.5 \$4.2 247°37.2 \$4.2 247°3.3 \$4.2 247°3.2 \$4.9 8.2 262°39.1 0.35 321°58.0 \$5.9 \$4.2 \$4.9 8.2 262°39.1 0.35 321°58.0 \$5.9 \$4.2 \$4.9 8.2 262°39.1 0.35 321°58.0 \$5.9 \$4.2 \$4.9 8.2 \$6.2 39.1 0.35 321°58.0 \$5.9 \$4.2 \$4.9 8.2 \$6.2 39.1 0.35 321°58.0 \$5.9 \$4.2 \$4.9 \$4.9 \$4.2 \$4.0 \$4.2 \$4.2 \$4.2 \$4.2 \$4.2 \$4.2 \$4.2 \$4.2											Denebola	182°25.3	14°26.1
3 232°00.7 239°26.3 · · · 66.3 254°56.3 · · 53.3 187°29.5 · · · 0.27 266°47.0 · · 0.65. 4 247°37.2 266°46.2 · 0.65. 4 0 284°57.5 · 51.9 217°33.3 · 0.30 276°51.4 · 0.6.3 6 277°08.1 · 0.6.5 269°25.5 · 44.0 284°57.5 · 51.9 217°33.3 · 0.30 276°51.4 · 0.6.3 6 277°08.1 · 0.6.5 269°25.5 · 44.0 284°57.5 · 51.9 217°33.3 · 0.30 276°51.4 · 0.6.3 6 277°08.1 · 0.5.9 299°24.7 · 41.6 314°58.7 · 50.5 247°37.2 · 0.3.3 306′55.8 · 06.1 Alkaid Hadar 3 00°13.0 314°24.3 · 40.4 329°95.4 · 40.8 202°39.1 · 0.3.6 337°00.2 · 0.5.9 4 Merkent 1.3 52°0.4 · 39°24.2 · 0.3.9 2 345°00.0 · 49.1 277°41.1 · 0.3.6 337°00.2 · 0.5.9 4 Merkent 1.3 52°0.4 · 39°24.2 · 36.8 · 15°0.1 2 · 47.7 · 307°45.0 · 0.40 · 7°04.6 · 0.5.6 · 0.5.1 ·											Gienah	175°44.0	$-17^{\circ}40.7$
4 247°03.2 254°25.9 45.2 269°55.9 52.6 202°31.4 0.2.9 261°49.2 06.4 Aliocht 5 25°20°56. 260°55.5 44.0 284°57.5 51.9 217°33.3 03.0 276°51.4 06.3 Short 6 277°08.1 284°52.1 504°42.8 299°58.1 \$10°51.2 232°35.3 \$106°02.2 291°53.6 \$08°06.2 Aliocht 6 307°13.0 314°24.3 40.4 320°59.4 49.8 262°30.1 03.5 320°58.0 05.9 Menkent 7 30°31.0 314°24.3 60.4 320°59.4 49.8 262°30.1 03.5 320°58.0 05.9 Menkent 7 30°31.7 9 344°23.6 38.0 10°00.6 48.4 292°43.0 03.8 352°02.4 05.7 Rigil Kent. 11 352°20.4 359°23.2 36.8 15°01.2 47.7 307°45.0 04.0 7°04.6 05.6 \$05.5 \$112 7°2.9 14°22.8 504°35.6 30°01.8 \$10°47.0 322°45.9 \$10.6 0.5 \$20°05.5 \$20°05.5 \$20°05.5 \$20°05.1 \$											Acrux	173°00.2	-63°14.0
4 247°03.2 254°25.9 45.2 269°56.9 52.6 202°31.4 0.29 261°49.2 06.4 Alioth 5 262°05.6 260°25.5 44.0 284°57.5 51.9 217°33.3 03.0 27°65.1 4 06.3 Spice 6 277°08.1 284°25.1 504°42.8 299°88.1 510°51.2 232°35.3 N16°03.2 291°53.6 08°06.2 Alkaid 8 307°13.0 314°24.3 40.4 329°89.4 49.8 262°39.1 03.5 321°88.0 05.9 Merkent 8 307°13.0 314°24.3 40.4 329°89.4 49.8 262°39.1 03.5 321°88.0 05.9 Merkent 10 337°17.9 344°33.6 33.0 0°00.6 48.4 292°43.0 03.8 352°02.4 05.7 Right Kent. 11 352°20.4 359°33.2 36.8 15°01.2 47.7 307°45.0 04.0 7°04.6 05.6 Right Kent. 12 7°22.9 14°22.8 504°35.6 30°01.8 510°47.0 322°40.9 N16°04.1 2°04.6 05.6 Right Kent. 13 22°25.3 29°22.4 34.4 45°02.4 46.3 337°48.8 04.3 37°09.0 05.4 Alphecac 14 37°27.8 44°22.0 33.2 60°03.1 45.6 352°58.8 04.4 52°11.2 05.3 Alatase 15 52°30.3 59°21.6 32.0 75°03.7 44.8 75°2.7 04.6 06°713.4 05.2 Altia 18°93.7 6 104°0.4 500°4.5 220°4.3 44.4 22°54.6 04.7 82°15.6 05.1 Sabiki 17 82°35.2 89°20.8 29.6 105°04.9 43.4 37°56.6 04.9 97°17.8 05.0 Shaula 19°12°40.1 119°20.0 272. 135°06.2 42.0 68°00.5 105°2.1 127°22.1 04.8 Eltanin Ken.pass. 11:31 P12°45.1 119°20.0 272. 135°06.2 42.0 68°00.5 105°2.1 127°22.1 04.8 Eltanin Ken.pass. 11:31 P12°45.1 199°18.4 22.4 195°08.6 39.2 128°08.2 05.8 187°30.9 04.4 Altai Altair Mer.pass. 11:31 P12°57. 504°1.1 13°30°1.2 120°09.3 S10°38.5 183°10.1 N16°06.0 20°33.5 04.4 Altai Altair Mer.pass. 11:31 P12°57.4 224°17.3 18.9 240°10.5 37.1 128°08.2 05.8 187°30.9 04.4 Altair Scheat 19°32°1.1 13°30°1.2 140°1.1 13°30°1.2 120°09.3 S10°38.5 183°10.1 N16°06.0 20°33.5 04.4 Altair Fommlant 19°32°1.1 13°3.5 12.9 31°13.6 3.5 10°32.7 74°1.1 30°13.0 S10°3.2 127°22.1 04.8 Eltanin Kaus Austria 12°25°4.9 209°1.7 20.1 225°09.9 37.8 158°1.2 10°61.1 13°3.0 S6°0.3 30.0 13°7.9 06.6 262°41.9 03.8 Hermitair 11.3 10°00.3 10°10.1 10°30.3 10°30.5 10°30.2 127°22.1 04.1 10°30.3 10°30.												171°51.9	-57°15.0
Spice 1 284°25.5				45.2		52.6				06.4		166°13.0	55°49.6
6 277°081 294°251 504°428 304°428 310°51.2 232°35.3 NI6'03.2 291°55.8 06°0.6 Alkaid 8 307°13.0 314°24.3 404 329°59.4 49.8 262°39.1 03.5 321°58.0 05.9 Menkent 30 337°13.0 314°24.3 404 329°59.4 49.8 262°39.1 03.5 321°58.0 05.9 Menkent 30 337°17.9 344°33.6 38.0 0°0.0 · 49.1 277°41.1 · 03.6 337°0.0 2 · 05.8 Actual 352°0.2 4 05.7 Rigil Kent. 10 337°17.9 344°3.6 38.0 0°0.0 · 49.4 47.7 307°45.0 04.0 7°0.4 6 05.6 Menkent 322°59.2 4 34.4 45°0.2 4 47.7 307°45.0 04.0 7°0.4 6 05.6 S.0 6°0.5 13 22°5.3 29°2.2 4 34.4 45°0.2 4 46.3 337°48.8 04.3 37°0.0 05.4 Actual 32°25.3 29°2.2 4 34.4 45°0.2 4 46.3 337°48.8 04.4 52°11.2 05.3 Actual 32°25.3 29°2.2 4 34.4 45°0.2 4 46.3 337°48.8 04.4 52°11.2 05.3 Actual 32°25.8 9°0.1 6 · 32.0 75°0.3 7 · 44.8 7°52.7 · 04.6 6 7°13.4 · 05.2 Actual 32°25.8 80°0.8 92.6 105°0.4 43.4 37°56.6 0.4 9 9°17.8 0.5 0.5 Actual 32°35.2 80°0.0 8 20.6 105°0.4 43.4 37°56.6 0.4 9 9°17.8 0.5 0.5 Actual 32°35.2 80°0.0 8 20.6 105°0.4 41.3 43°56.6 0.4 9 9°17.8 0.5 0.5 Actual 32°35.2 80°0.0 8 20.6 105°0.4 41.3 83°0.2 4 05.4 142°2.4 3 0.4 7 8.2 112°40.1 119°2.0 27.2 135°0.6 2 40.0 68°0.0 5 05.2 127°2.1 1 48 Elstain 20 127°42.6 134°19.6 25.0 156°0.6 41.3 83°0.4 4 05.0 5.5 05.2 127°2.1 1 48 Elstain 20 127°42.6 134°19.6 25.0 156°0.6 41.3 83°0.4 4 05.0 4 142°2.4 3 0.4 7 4.0 6.8 80°0.2 0.5 5 05.2 127°2.1 1 48 Elstain 20 127°45.0 149°18.8 226 180°0.8 39.9 113°0.6 3 0.5 5 15°2.6 5 0.4 6 0.6 6 0.5 6 0.5 1	5	262°05.6	269°25.5	44.0	284°57.5	51.9	217°33.3	03.0	276°51.4	06.3		158°22.7	-11°17.4
7 292*10.5 299*24.7 41.6 314*58.7 50.5 249*32.2 03.3 306*58.8 06.1 Menkent 8 307*13.0 314*24.3 40.4 329*94.0 49.8 262*991 03.5 321*58.0 05.9 9 322*15.5 329*24.0 · · · · · · · · · · · · · · · · · · ·	5	277°08.1	284°25.1	504°42.8	299°58.1	S10°51.2	232°35.3	$N16^{\circ}03.2$	291°53.6	S08°06.2		150° 52.7	49°11.4
8 307*13.0 314*24.3 40.4 329*99.4 49.8 262*39.1 03.5 321*88.0 05.9 Menkent 30*9 322*155 329*24.0 ·39.2 345*00.0 ·49.1 277*41.1 ·03.6 337*00.2 ·05.8 1.0 337*17.9 344*23.6 38.0 0*0.6 48.4 292*43.0 03.8 352*02.4 05.7 6.1 1 352*20.4 359*23.2 36.8 15*01.2 47.7 307*45.0 04.0 7*04.6 05.6 5.1 12*7*29.9 14*22.8 504*35.6 30*01.8 510*47.0 322*46.9 N16*04.1 22*06.8 508*05.5 13 22*25.3 29*22.4 34.4 45*02.4 46.3 337*48.8 04.3 37*09.0 05.4 Alphecca 15 52*30.3 59*21.6 ·32.0 075.0 31. 45.6 352*50.8 04.4 52*11.2 05.3 Alphecca 15 52*30.3 59*21.6 ·32.0 75*03.1 44.8 7*52.7 ·04.6 67*13.4 ·05.2 Altria 52*04 15.7 **2*12 30.8 90*43 44.1 22*54.6 04.7 **2*13.4 ·05.2 Altria 52*11.2 05.3 Altria 52*11.2 05.0 5.1 12*19.9 508*04.9 112*04.1 119*20.0 27.2 135*06.2 42.0 68*00.5 05.2 12*7*22.1 04.8 Eltanin 12*19.0 12*7*42.6 134*91.6 26.0 150*06.8 41.3 83*02.4 05.4 142*24.3 04.7 Vega 12*14*245.0 149*19.2 0*24.8 165*07.4 ·04.6 98*04.3 ·05.5 15*7*26.5 ·04.6 Vega 15*7*47.5 164*18.8 23.6 180*08.0 39.9 113*06.3 05.7 172*28.7 04.5 Nunki Altani 6**11.3 12*19.9 009*17.7 20.1 225*09.9 37.8 158*02.2 05.8 187*30.9 04.4 Nunki 12*20*54.9 190*17.7 255*11.1 ·3.6.4 188*15.9 ·0.6.5 202*33.1 508*04.3 Altani 6**1.2 22*21*75*4 22*4*17.3 1.8 9 240*10.5 37.1 173*14.0 06.3 23*2*37.5 04.1 22*2*175*4 22*4*17.3 1.8 9 240*10.5 37.1 173*14.0 06.3 23*2*37.5 04.1 22*2*175*4 22*4*17.3 1.8 9 240*10.5 37.1 173*14.0 06.3 23*2*37.5 04.1 22*2*175*4 22*4*17.3 1.8 9 240*10.5 37.1 173*14.0 06.3 23*2*37.5 04.1 24*3*0.3 13*2*2*13.1 134*14.9 11.7 330*14.2 32.8 26*3*25.6 07.2 322*07.5 04.1 33*3*2*39.1 30*3*14.1 300*13.0 \$10*34.2 238*2*37.0 7.1 33*8*2*9.1 33*3*14.1 300*13.0 \$10*34.2 238*2*1.8 N16*06.9 292*46.3 508*03.6 Mars 52*11.1 335*19.5 359*13.7 08.1 15*16.1 30.7 300*13.0 \$10*34.2 233*2*1.8 N16*06.9 292*46.3 508*03.0 13.5 13.1 135*3*19.5 359*13.7 08.1 15*16.1 30.7 30.0 323*31.4 N16*06.9 292*46.3 508*03.0 3.5 13.1 135*3*19.5 359*13.7 08.1 15*16.1 30.7 30.0 323*31.4 N16*06.9 292*46.3 508*03.0 13.5 13.1 135*3*1	7	292°10.5	299°24.7	41.6	314°58.7	50.5	247°37.2	03.3	306°55.8	06.1			
9 322°15.5 329°24.0 · · · · · · · · · · · · · · · · · · ·	3								321°58.0			148°36.4	-60°29.3
10 337°17.9 344°23.6 38.0 0°00.6 48.4 292°43.0 03.8 352°02.4 05.7 Rigii Kent. Li 352°0.4 359°3.2 36.8 15°01.2 47.7 30°45.0 04.0 7°04.6 05.6 Kechab 12 7°22.9 14°22.8 S04°35.6 30°01.8 S10°47.0 322°46.9 N16°04.1 22°06.8 S08°05.5 Rigii Kent. Kochab 13 22°25.3 29°22.4 34.4 45°02.4 46.3 337°48.8 04.3 37°09.0 05.4 Alphecca 14 37°37.8 44°22.0 33.2 60°03.1 45.6 352°50.8 04.4 52°11.2 05.3 Alphecca 15 52°30.3 59°21.6 · 32.0 75°03.7 · 44.8 7°52.7 · 04.6 67°13.4 · 05.2 Alpha 11 11 11 11 11 11 11 11 11 11 11 11 11												147°58.1	-36°29.4
11   352°20.4   359°23.2   36.8   15°01.2   47.7   307°45.0   04.0   7°04.6   05.6   Check     13   22°25.3   29°22.4   34.4   45°02.4   46.3   337°48.8   04.3   37°09.0   05.4     14   37°27.8   44°22.0   33.2   60°03.1   45.6   352°50.8   04.4   52°11.2   05.3     15   52°30.3   59°21.6   32.0   75°03.7   44.8   7°52.7   04.6   67°13.4   0.52     16   67°32.7   74°21.2   30.8   90°04.3   44.1   22°54.6   04.7   82°15.6   05.1     17   82°35.2   89°0.8   29.6   105°04.9   43.4   37°56.6   04.7   82°15.6   05.1     18   97°37.6   104°20.4   S04°28.4   120°05.5   S10°42.7   52°58.5   N16°05.1   112°19.9   S08°04.9     19   112°40.1   119°20.0   27.2   135°06.2   42.0   086°00.5   05.2   127°22.1   04.8     19   112°40.1   119°20.0   27.2   135°06.2   42.0   086°00.5   05.2   127°22.1   04.8     19   112°40.1   119°20.0   27.2   135°06.8   40.3   38°02.4   05.4   142°24.3   04.7     21   142°45.0   149°19.2   2.4 8   165°07.4   0.4 0.6   98°04.3   0.5.5   157°26.5   0.4.6     17   22°57.7   179°18.4   22.4   195°08.6   39.2   128°08.2   05.8   187°30.9   04.4     Mer. pass. 11:31   ν-0.4' d-1.2' m-3.88   ν0.6' d-0.7' m1.20   ν1.9' d0.2' m-2.07   ν2.2' d-0.1' m1.05     Sat GHA												145°48.2	19°03.2
12											Rigil Kent.	139°40.7	-60°56.0
13											Kochab	137°18.8	74°03.1
14   37° 27.8   44° 22.0   33.2   66° 03.1   45.6   352° 50.8   0.44   52° 11.2   05.3   Alpheces											Zuben'ubi	136°56.5	$-16^{\circ}08.6$
Sect   GHA   Continue   Continu											Alphecca	126°04.0	26°37.7
16 67°32.7 74°21.2 30.8 90°04.3 44.1 22°54.6 04.7 82°15.6 05.1 3abik Artital 17 82°35.2 89°20.8 29.6 105°04.9 43.4 37°56.6 04.9 97°17.8 05.0 Sabik Shaula 18 97°37.6 104°20.4 S04°28.4 120°05.5 S10°42.7 52°528.5 N16°05.1 112°19.9 S08°04.9 19 112°40.1 119°20.0 27.2 135°06.2 42.0 68°00.5 05.2 127°22.1 04.8 21 142°45.0 149°19.2 · 24.8 165°07.4 · 40.6 98°04.3 · 05.5 157°26.5 · 04.6 Vega 22 157°47.5 164°18.8 23.6 180°08.0 39.9 113°06.3 05.7 172°28.7 04.5 Nunki Altairi Mer.pass. 11:31											Antares	$112^{\circ}16.5$	-26°29.2
16 67°32.7 74°21.2 30.8 90°04.3 44.1 22°54.6 04.7 82°15.6 05.1 17 82°35.2 89°20.8 29.6 105°04.9 43.4 37°55.6 04.9 97°17.8 05.0 18 97°37.6 104°20.4 504°28.4 120°05.5 \$10°42.7 52°58.5 \$106°05.1 112°19.9 \$08°04.9 112°40.1 119°20.0 27.2 135°06.2 42.0 68°00.5 05.2 127°22.1 04.8 Eltanin Kaus Arabina 119°20.0 27.2 135°06.2 42.0 68°00.5 05.2 127°22.1 04.8 12°21 142°45.0 149°19.2 · 24.8 165°07.4 · 40.6 98°0.4 3 · 0.5.5 157°6.5 · 0.4.6 12°21 142°45.5 164°18.8 23.6 180°08.0 39.9 113°06.3 05.7 172°28.7 04.5 Vega 137°50.0 179°18.4 22.4 195°08.6 39.2 128°08.2 05.8 187°30.9 04.4 141.3 12°19°18.4 22.4 195°08.6 39.2 128°08.2 05.8 187°30.9 04.4 141.3 12°20°54.9 209°17.7 20.1 225°09.3 \$10°38.5 158°12.1 06.1 217°35.3 04.2 210°09.3 \$10°38.5 158°12.1 06.1 217°35.3 04.2 2217°57.4 224°17.3 18.9 240°10.5 37.1 173°14.0 06.3 232°37.5 04.1 217°35.3 04.2 2217°57.4 224°17.3 18.9 240°10.5 37.1 173°14.0 06.3 232°37.5 04.1 33°32.8 23°916.9 · 17.7 255°11.1 · 36.4 188°15.9 · 06.5 247°39.7 · 04.0 Markab 14 248°02.3 254°16.5 16.5 270°11.7 35.7 203°17.9 06.6 262°41.9 03.8 Mark 15 263°04.8 269°16.1 15.3 285°12.4 34.9 218°19.8 06.8 277°44.1 03.7 40.4 Markab 15 263°04.8 269°16.1 15.3 285°12.4 34.9 218°19.8 06.8 277°44.1 03.7 40.4 Markab 15 263°04.8 269°16.1 15.3 285°12.4 34.9 218°19.8 06.8 277°44.1 03.7 40.4 Markab 15 20°0.7 299°0.7 299°15.3 12.9 315°13.6 33.5 248°23.7 07.1 307°48.5 03.5 345°14.9 323°24.6 329°14.5 · 10.5 345°14.9 · 32.1 278°27.6 · 07.4 337°52.9 · 03.3 191°13.6 335°15.5 31.4 07.7 7°57.3 03.1 191°10.6 58.5 136°0.1 2.7 83°3.3 08.0 38°01.7 02.9 530°1.7 034°1.1 340°14.9 11.7 330°14.2 32.8 263°25.6 07.2 322°50.7 03.4 31.1 310°13.7 081°1.1 340°14.9 11.7 330°14.2 32.8 263°25.5 07.2 322°50.7 03.4 31.1 310°13.5 15°13.6 33.5 248°23.7 07.1 307°48.5 03.5 320°31.1 340°14.9 11.7 330°14.2 32.8 263°25.5 07.2 322°50.7 03.4 31.1 340°14.9 11.7 330°14.2 32.8 263°25.5 07.2 322°50.7 03.4 31.1 340°14.9 11.7 330°14.2 32.8 263°25.5 07.2 322°50.7 03.4 31.1 340°14.9 11.7 330°14.2 32.8 263°25.5 07.6 352°55.1 03.2 32°50.7 03.4 32°50.7 05.7 45°17.3 29.3 338°35.3 0											Atria	$107^{\circ}11.1$	-69°04.0
18   97°37.6   104°20.4   504°28.4   120°05.5   \$10°4.9   508°4.9   508°4.9   120°1.0   120°4	6					44.1				05.1		102°03.4	-15°45.4
18	7	82°35.2	89°20.8	29.6	105°04.9	43.4	37°56.6		97°17.8			96°11.2	-37°07.2
19 112°40.1 119°20.0 27.2 135°06.2 42.0 66°00.5 05.2 127°22.1 04.8 Eltanin Kav Samuri 119°20.0 127°42.6 134°19.6 26.0 150°06.8 41.3 83°02.4 05.4 142°24.3 04.7 142°24.3 04.7 142°24.3 04.7 142°24.5 142°24.5 142°24.3 04.7 142°24.3 04.7 142°24.5 142°24.5 142°25.0 149°19.2 · 24.8 165°07.4 · 40.6 98°04.3 · 05.5 157°26.5 · 04.6 14.5 142°24.3 172°28.7 04.5 127°28.7 127°28.7 04.5 127°28.7 127°28.7 04.5 127°28.7 127°28.7 04.5 127°28.7 127°28.7 04.5 127°28.7 127°28.7 127°28.7 04.5 127°28.7 127	8	97°37.6	104°20.4	504°28.4	120°05.5	S10°42.7	52°58.5	$N16^{\circ}05.1$	112°19.9	S08°04.9		95°59.1	12°32.3
20   12/7 42.6   134 19.6   20.0   150 06.8   41.3   83 02.4   05.4   142 24.3   04.7   21   142 45.0   149 19.2   · · · · · · · · · · · · · · · · · ·	9	112°40.1	119°20.0	27.2	135°06.2	42.0	68°00.5	05.2	$127^{\circ}22.1$	04.8		90°42.4	51°28.7
142° 45.0   149° 19.2   · · · · · · · · · · · · · · · · · ·	0	127°42.6	134°19.6	26.0	150°06.8	41.3	83°02.4	05.4	142°24.3	04.7			
Vega												83°33.4	-34°22.3
Number											_	80°33.7	38°48.0
Mar.pass. 11:31												75°48.6	-26°16.0
Sat         GHA         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         Enif           0         187°52.4         194°18.0         504°21.3         210°09.3         510°38.5         143°10.1         N16°06.0         202°33.1         508°04.3         Fomalhaut           1         202°54.9         209°17.7         20.1         225°09.9         37.8         158°12.1         06.1         217°35.3         04.2         Scheat           2         217°57.4         224°17.3         18.9         240°10.5         37.1         173°14.0         06.3         232°37.5         04.1         Markab           3         232°59.8         239°16.9         1.7.7         255°11.1         36.4         188°15.9         0.65         247°39.7         04.0           4         248°02.3         254°16.5         16.5         270°11.7         35.7         203°17.9         06.6         262°41.9         03.8         Mar 28 Thu           5         263°04.8         269°16.1         15.3         285°12.4         34.9         218°19.8         06.8         277°44.1         03.7         Venus           7	.5	172 30.0	179 10.4	22.4	193 00.0		120 00.2		107 30.9	04.4	Altair	62°00.7	8°55.7
Sat         GHA         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         Al Na'ir           0         187°52.4         194°18.0         504°21.3         210°09.3         510°38.5         143°10.1         N16°06.0         202°33.1         508°04.3         Al Na'ir           1         202°54.9         209°17.7         20.1         225°09.9         37.8         158°12.1         06.1         217°35.3         04.2         Scheat           2         217°57.4         224°17.3         18.9         240°10.5         37.1         173°14.0         06.3         232°37.5         04.1         Markab           4         248°02.3         254°16.5         16.5         270°11.7         35.7         203°17.9         06.6         262°41.9         03.8         Markab           5         263°04.8         269°16.1         15.3         285°12.4         34.9         218°19.8         06.8         277°44.1         03.7         03.7         06.6         262°41.9         03.8         Mars           7         293°09.7         299°15.3         12.9         315°13.6         33.5         248°23.7         07.1         307°48.5         03.	ler.pas	ss. 11:31	$\nu$ -0.4' d-1	.2′ m-3.88	$\nu$ 0.6′ d-0	).7′ m1.20	$\nu 1.9' \ d0.$	2′ m-2.07	$\nu$ 2.2′ d-0	.1' m $1.05$		53°07.0	-56°39.3
Sat         GHA         GHA         Dec         Al Na'ir           1         202°54.9         194°18.0         504°21.3         210°09.9         37.8         158°12.1         06.1         217°35.3         04.2         Scheat           3         232°59.8         239°16.9         · 17.7         255°11.1         · 36.4         188°15.9         · 06.5         247°39.7         · 04.0           4         248°02.3         254°16.5         16.5         270°11.7         35.7         203°17.9         06.6         262°41.9         03.8           5         263°04.8         269°16.1         15.3         285°12.4         34.9         218°19.8         06.8         277°44.1         03.7           6         278°07.2         284°15.7         504°14.1         300°13.0         510°34.2         233°21.8												49°26.5	45°21.7
0 187°52.4 194°18.0 S04°21.3 210°09.3 S10°38.5 143°10.1 N16°06.0 202°33.1 S08°04.3 Formaliant 202°54.9 209°17.7 20.1 225°09.9 37.8 158°12.1 06.1 217°35.3 04.2 Scheat 322°57.4 224°17.3 18.9 240°10.5 37.1 173°14.0 06.3 232°37.5 04.1 Markab 3 232°59.8 239°16.9 · 17.7 255°11.1 · 36.4 188°15.9 · 06.5 247°39.7 · 04.0 4248°02.3 254°16.5 16.5 270°11.7 35.7 203°17.9 06.6 262°41.9 03.8 5 263°04.8 269°16.1 15.3 285°12.4 34.9 218°19.8 06.8 277°44.1 03.7 Venus 230°0.7 299°15.3 12.9 315°13.6 33.5 248°23.7 07.1 307°48.5 03.5 Jupiter 3 308°12.1 314°14.9 11.7 330°14.2 32.8 263°25.6 07.2 322°50.7 03.4 Saturn 9 323°14.6 329°14.5 · 10.5 345°14.9 · 32.1 278°27.6 · 07.4 337°52.9 · 03.3 10 338°17.1 344°14.1 09.3 0°15.5 31.4 293°29.5 07.6 352°55.1 03.2 11 353°19.5 359°13.7 08.1 15°16.1 30.7 308°31.4 07.7 7°57.3 03.1 12 8°22.0 14°13.3 S04°06.9 30°16.7 S10°30.0 323°33.4 N16°07.9 22°59.5 S08°03.0 Mars 313°23°24.5 29°13.0 05.7 45°17.3 29.3 338°35.3 08.0 38°01.7 02.9 14 38°26.9 44°12.6 04.5 60°18.0 28.6 353°37.2 08.2 53°03.9 02.8 15 53°29.4 59°12.2 · 03.3 75°18.6 · 27.8 8°39.2 · 08.3 68°06.1 · 02.7 Mar 30 Sat Venus 318°33.3 89°11.4 04°00.9 105°19.8 26.4 38°43.0 08.6 98°10.5 02.5 Mars 13°33.3 119°10.6 58.5 135°21.1 25.0 68°46.9 09.0 128°14.9 02.3 Saturn 5aturn 9.00.0 128°14.9 02.3				_		_		_		_	Enif	33°39.7	9°58.9
1 202°54.9 209°17.7 20.1 225°09.9 37.8 158°12.1 06.1 217°35.3 04.2 Scheat 217°57.4 224°17.3 18.9 240°10.5 37.1 173°14.0 06.3 232°37.5 04.1 322°59.8 239°16.9 · 17.7 255°11.1 · 36.4 188°15.9 · 06.5 247°39.7 · 04.0 4248°02.3 254°16.5 16.5 270°11.7 35.7 203°17.9 06.6 262°41.9 03.8 5 263°04.8 269°16.1 15.3 285°12.4 34.9 218°19.8 06.8 277°44.1 03.7 Venus 36 308°12.1 314°14.9 11.7 330°14.2 32.8 263°25.6 07.2 322°50.7 03.4 314°14.9 11.7 330°14.2 32.8 263°25.6 07.2 322°50.7 03.4 5aturn 333°14.6 329°14.5 · 10.5 345°14.9 · 32.1 278°27.6 · 07.4 337°52.9 · 03.3 10 338°17.1 344°14.1 09.3 0°15.5 31.4 293°29.5 07.6 352°55.1 03.2 11 353°19.5 359°13.7 08.1 15°16.1 30.7 308°31.4 07.7 7°57.3 03.1 12 8°22.0 14°13.3 \$04°0.9 30°16.7 \$10°30.0 323°33.4 \$016°0.7 9 22°59.5 \$08°03.0 13 23°24.5 29°13.0 05.7 45°17.3 29.3 338°35.3 08.0 38°01.7 02.9 14 38°26.9 44°12.6 04.5 60°18.0 28.6 353°37.2 08.2 53°03.9 02.8 17 83°34.3 89°11.4 04°00.9 105°19.8 26.4 38°43.0 08.6 98°10.5 02.5 Mars 319°15.0 130°39.3 119°10.6 58.5 135°21.1 25.0 68°46.9 09.0 128°14.9 02.3 Saturn 13°39.3 119°10.6 58.5 135°21.1 25.0 68°46.9 09.0 128°14.9 02.3 Saturn 5aturn			GHA				GHA				Al Na'ir	$27^{\circ}34.1$	-46°50.6
1 202°54.9 209°17.7 20.1 225°09.9 37.8 158°12.1 06.1 217°35.3 04.2 224°17.3 18.9 240°10.5 37.1 173°14.0 06.3 232°37.5 04.1 323°59.8 239°16.9 · 17.7 255°11.1 · 36.4 188°15.9 · 06.5 247°39.7 · 04.0 428°02.3 254°16.5 16.5 270°11.7 35.7 203°17.9 06.6 262°41.9 03.8 5 263°04.8 269°16.1 15.3 285°12.4 34.9 218°19.8 06.8 277°44.1 03.7 Venus 6 278°07.2 284°15.7 504°14.1 300°13.0 \$10°34.2 233°21.8 \$16°06.9 292°46.3 \$08°03.6 Mars 7 293°09.7 299°15.3 12.9 315°13.6 33.5 248°23.7 07.1 307°48.5 03.5 Jupiter 8 308°12.1 314°14.9 11.7 330°14.2 32.8 263°25.6 07.2 322°50.7 03.4 5 310°338°12.1 344°14.1 09.3 40°15.5 31.4 293°29.5 07.6 352°55.1 03.2 1338°17.1 344°44.1 09.3 0°15.5 31.4 293°29.5 07.6 352°55.1 03.2 1333°19.5 359°13.7 08.1 15°16.1 30.7 308°31.4 07.7 7°57.3 03.1 12 8°22.0 14°13.3 \$04°06.9 30°16.7 \$10°30.0 323°33.4 \$10°07.9 22°59.5 \$08°03.0 Mars 12 8°22.0 14°13.3 \$04°06.9 30°16.7 \$10°30.0 323°33.4 \$10°07.9 22°59.5 \$08°03.0 Jupiter 12 8°22.0 14°13.3 \$04°06.9 30°16.7 \$10°30.0 323°33.4 \$10°07.9 22°59.5 \$08°03.0 Jupiter 12 8°22.0 14°13.3 \$04°06.9 30°16.7 \$10°30.0 323°33.4 \$10°07.9 22°59.5 \$08°03.0 Jupiter 12 8°22.0 \$14°13.3 \$04°06.9 \$30°16.7 \$10°30.0 \$338°31.4 07.7 7°57.3 03.1 \$0.1 \$10°30.0 \$10°30.											Fomalhaut	$15^{\circ}15.6$	-29°29.7
2 217°57.4 224°17.3 18.9 240°10.5 37.1 173°14.0 06.3 232°37.5 04.1 3 232°59.8 239°16.9 · 17.7 255°11.1 · · · · · · · · · · · · · · · · · ·								06.1		04.2		13°46.2	28°12.6
3 232°59.8 239°16.9 ··17.7 255°11.1 ··36.4 188°15.9 ··06.5 247°39.7 ··04.0 4 248°02.3 254°16.5 16.5 270°11.7 35.7 203°17.9 06.6 262°41.9 03.8 5 263°04.8 269°16.1 15.3 285°12.4 34.9 218°19.8 06.8 277°44.1 03.7 6 278°07.2 284°15.7 S04°14.1 300°13.0 S10°34.2 233°21.8 N16°06.9 292°46.3 S08°03.6 7 293°09.7 299°15.3 12.9 315°13.6 33.5 248°23.7 07.1 307°48.5 03.5 308°03.6 9 308°12.1 314°14.9 11.7 330°14.2 32.8 263°25.6 07.2 322°50.7 03.4 337°45.9 ··03.3 10 338°17.1 344°14.1 09.3 0°15.5 31.4 293°29.5 07.6 352°55.1 03.2 11 353°19.5 359°13.7 08.1 15°16.1 30.7 308°31.4 07.7 7°57.3 03.1 12 8°22.0 14°13.3 S04°06.9 30°16.7 S10°30.0 323°33.4 N16°07.9 22°59.5 S08°03.0 Mars 13 23°24.5 29°13.0 05.7 45°17.3 29.3 338°35.3 08.0 38°01.7 02.9 14 38°26.9 44°12.6 04.5 60°18.0 28.6 353°37.2 08.2 53°03.9 02.8 15 53°29.4 59°12.2 ··03.3 75°18.6 ··27.8 8°39.2 ··08.3 68°06.1 ··02.7 16 68°31.9 74°11.8 02.1 90°19.2 27.1 23°41.1 08.5 83°08.3 02.6 14 Venus 13 39°3.4 89°11.4 04°00.9 105°19.8 26.4 38°43.0 08.6 98°10.5 02.5 Mars 13°08.0 113°12.7 S08°02.4 19 113°39.3 119°10.6 58.5 135°21.1 25.0 68°46.9 09.0 128°14.9 02.3 138°14.9 02.3	2	217°57.4		18.9	240° 10.5	37.1	173°14.0	06.3		04.1		13°30.9	15° 19.9
5         263°04.8         269°16.1         15.3         285°12.4         34.9         218°19.8         06.8         277°44.1         03.7         Venus           6         278°07.2         284°15.7         S04°14.1         300°13.0         S10°34.2         233°21.8         N16°06.9         292°46.3         S08°03.6         Mars           7         293°09.7         299°15.3         12.9         315°13.6         33.5         248°23.7         07.1         307°48.5         03.5         Jupiter           8         308°12.1         314°14.9         11.7         330°14.2         32.8         263°25.6         07.2         322°50.7         03.4         Saturn           9         323°14.6         3329°14.5         · 10.5         345°14.9         · 32.1         278°27.6         · 07.4         337°52.9         · 03.3           10         338°17.1         344°14.1         09.3         0°15.5         31.4         293°29.5         07.6         352°55.1         03.2           11         353°19.5         359°13.7         08.1         15°16.1         30.7         308°31.4         07.7         7°57.3         03.1         03.2           12         8°22.0         14°13.3         504°06.9 <t< td=""><td>3</td><td>232°59.8</td><td>239°16.9</td><td>• • 17.7</td><td><math>255^{\circ}11.1</math></td><td>• • 36.4</td><td>188°15.9</td><td>• • 06.5</td><td>247°39.7</td><td>• • 04.0</td><td></td><td></td><td></td></t<>	3	232°59.8	239°16.9	• • 17.7	$255^{\circ}11.1$	• • 36.4	188°15.9	• • 06.5	247°39.7	• • 04.0			
5         263°04.8         269°16.1         15.3         285°12.4         34.9         218°19.8         06.8         277°44.1         03.7         Venus           6         278°07.2         284°15.7         S04°14.1         300°13.0         S10°34.2         233°21.8         N16°06.9         292°46.3         S08°03.6         Mars           7         293°09.7         299°15.3         12.9         315°13.6         33.5         248°23.7         07.1         307°48.5         03.5         Jupiter           8         308°12.1         314°14.9         11.7         330°14.2         32.8         263°25.6         07.2         322°50.7         03.4         Saturn           9         323°14.6         329°14.5         · 10.5         345°14.9         · 32.1         278°27.6         · 07.4         337°52.9         · 03.3           10         338°17.1         344°14.1         09.3         0°15.5         31.4         293°29.5         07.6         352°55.1         03.2           11         353°19.5         359°13.7         08.1         15°16.1         30.7         308°31.4         07.7         7°57.3         03.1         Mars           12         8°22.0         14°13.3         504°06.9 <td< td=""><td>1</td><td>248°02.3</td><td><math display="block">254^{\circ}16.5</math></td><td>16.5</td><td>270°11.7</td><td>35.7</td><td>203°17.9</td><td>06.6</td><td>262°41.9</td><td>03.8</td><td>Mar 28 Thu</td><td>SHA</td><td>Mer.pass</td></td<>	1	248°02.3	$254^{\circ}16.5$	16.5	270°11.7	35.7	203°17.9	06.6	262°41.9	03.8	Mar 28 Thu	SHA	Mer.pass
6 278°07.2 284°15.7 S04°14.1 300°13.0 S10°34.2 233°21.8 N16°06.9 292°46.3 S08°03.6 7 293°09.7 299°15.3 12.9 315°13.6 33.5 248°23.7 07.1 307°48.5 03.5 31.4 293°21.8 308°12.1 314°14.9 11.7 330°14.2 32.8 263°25.6 07.2 322°50.7 03.4 9 323°14.6 329°14.5 · 10.5 345°14.9 · 32.1 278°27.6 · 07.4 337°52.9 · 03.3 10 338°17.1 344°14.1 09.3 0°15.5 31.4 293°29.5 07.6 352°55.1 03.2 11 353°19.5 359°13.7 08.1 15°16.1 30.7 308°31.4 07.7 7°57.3 03.1 12 8°22.0 14°13.3 S04°06.9 30°16.7 S10°30.0 323°33.4 N16°07.9 22°59.5 S08°03.0 13 23°24.5 29°13.0 05.7 45°17.3 29.3 338°35.3 08.0 38°01.7 02.9 14 38°26.9 44°12.6 04.5 60°18.0 28.6 353°37.2 08.2 53°03.9 02.8 15 53°29.4 59°12.2 · 03.3 75°18.6 · 27.8 8°39.2 · 08.3 68°06.1 · 02.7 53turn 16 68°31.9 74°11.8 02.1 90°19.2 27.1 23°41.1 08.5 83°08.3 02.6 17 83°34.3 89°11.4 04°00.9 105°19.8 26.4 38°43.0 08.6 98°10.5 02.5 Mars 18 98°36.8 104°11.0 S03°59.7 120°20.5 S10°25.7 53°45.0 N16°08.8 113°12.7 S08°02.4 19 113°39.3 119°10.6 58.5 135°21.1 25.0 68°46.9 09.0 128°14.9 02.3 Saturn											Venus	8°42.9	11:02
7 293°09.7 299°15.3 12.9 315°13.6 33.5 248°23.7 07.1 307°48.5 03.5 8 308°12.1 314°14.9 11.7 330°14.2 32.8 263°25.6 07.2 322°50.7 03.4 9 323°14.6 329°14.5 · 10.5 345°14.9 · 32.1 278°27.6 · 07.4 337°52.9 · 03.3 10 338°17.1 344°14.1 09.3 0°15.5 31.4 293°29.5 07.6 352°55.1 03.2 11 353°19.5 359°13.7 08.1 15°16.1 30.7 308°31.4 07.7 7°57.3 03.1 12 8°22.0 14°13.3 \$04°06.9 30°16.7 \$10°30.0 323°33.4 \$0.0 38°01.7 02.9 13 23°24.5 29°13.0 05.7 45°17.3 29.3 338°35.3 08.0 38°01.7 02.9 14 38°26.9 44°12.6 04.5 60°18.0 28.6 353°37.2 08.2 53°03.9 02.8 15 53°29.4 59°12.2 · 03.3 75°18.6 · 27.8 8°39.2 · 08.3 68°06.1 · 02.7 \$310°30.5 \$210°30.5 \$10°30.7 \$10°												23°45.5	10:01
8 308°12.1 314°14.9 11.7 330°14.2 32.8 263°25.6 07.2 322°50.7 03.4 9 323°14.6 329°14.5 · 10.5 345°14.9 · 32.1 278°27.6 · 07.4 337°52.9 · 03.3 10 338°17.1 344°14.1 09.3 0°15.5 31.4 293°29.5 07.6 352°55.1 03.2 11 353°19.5 359°13.7 08.1 15°16.1 30.7 308°31.4 07.7 7°57.3 03.1 12 8°22.0 14°13.3 \$04°06.9 30°16.7 \$10°30.0 323°33.4 \$N16°07.9 22°59.5 \$08°03.0 13 23°24.5 29°13.0 05.7 45°17.3 29.3 338°35.3 08.0 38°01.7 02.9 14 38°26.9 44°12.6 04.5 60°18.0 28.6 353°37.2 08.2 53°03.9 02.8 15 53°29.4 59°12.2 · 03.3 75°18.6 · 27.8 8°39.2 · 08.3 68°06.1 · 02.7 5321.1 25.0 68°46.9 09.0 128°14.9 02.3 Saturn 13°39.3 119°10.6 58.5 135°21.1 25.0 68°46.9 09.0 128°14.9 02.3 Saturn Saturn												315°42.9	14:32
9 323°14.6 329°14.5 ··10.5 345°14.9 ··32.1 278°27.6 ··07.4 337°52.9 ··03.3  10 338°17.1 344°14.1 09.3 0°15.5 31.4 293°29.5 07.6 352°55.1 03.2  11 353°19.5 359°13.7 08.1 15°16.1 30.7 308°31.4 07.7 7°57.3 03.1  12 8°22.0 14°13.3 S04°06.9 30°16.7 S10°30.0 323°33.4 N16°07.9 22°59.5 S08°03.0  13 23°24.5 29°13.0 05.7 45°17.3 29.3 338°35.3 08.0 38°01.7 02.9  14 38°26.9 44°12.6 04.5 60°18.0 28.6 353°37.2 08.2 53°03.9 02.8  15 53°29.4 59°12.2 ··03.3 75°18.6 ··27.8 8°39.2 ··08.3 68°06.1 ··02.7  16 68°31.9 74°11.8 02.1 90°19.2 27.1 23°41.1 08.5 83°08.3 02.6  17 83°34.3 89°11.4 04°0.9 105°19.8 26.4 38°43.0 08.6 98°10.5 02.5  18 98°36.8 104°11.0 S03°59.7 120°20.5 S10°25.7 53°45.0 N16°08.8 113°12.7 S08°02.4  19 113°39.3 119°10.6 58.5 135°21.1 25.0 68°46.9 09.0 128°14.9 02.3												14°53.6	10:35
10 338°17.1 344°14.1 09.3 0°15.5 31.4 293°29.5 07.6 352°55.1 03.2 11 353°19.5 359°13.7 08.1 15°16.1 30.7 308°31.4 07.7 7°57.3 03.1 12 8°22.0 14°13.3 \$04°06.9 30°16.7 \$10°30.0 323°33.4 \$16°07.9 22°59.5 \$08°03.0 13 23°24.5 29°13.0 05.7 45°17.3 29.3 338°35.3 08.0 38°01.7 02.9 14 38°26.9 44°12.6 04.5 60°18.0 28.6 353°37.2 08.2 53°03.9 02.8 15 53°29.4 59°12.2 ···03.3 75°18.6 ···27.8 8°39.2 ···08.3 68°06.1 ···02.7 16 68°31.9 74°11.8 02.1 90°19.2 27.1 23°41.1 08.5 83°08.3 02.6 17 83°34.3 89°11.4 04°00.9 105°19.8 26.4 38°43.0 08.6 98°10.5 02.5 Mars 18 98°36.8 104°11.0 \$03°59.7 120°20.5 \$10°25.7 53°45.0 \$16°08.8 113°12.7 \$08°02.4 19 113°39.3 119°10.6 58.5 135°21.1 25.0 68°46.9 09.0 128°14.9 02.3											Saturii	±1 33.0	10.00
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11 353 19.5 359 13.7 08.1 15 16.1 30.7 308 31.4 07.7 757.3 03.1 12 8°22.0 14°13.3 \$04°06.9 30°16.7 \$10°30.0 323°33.4 \$016°07.9 22°59.5 \$08°03.0 34°01.7 02.9 338°35.3 08.0 38°01.7 02.9 31.4 38°26.9 44°12.6 04.5 60°18.0 28.6 353°37.2 08.2 53°03.9 02.8 15 53°29.4 59°12.2 ··· 03.3 75°18.6 ··· 27.8 8°39.2 ··· 08.3 68°06.1 ··· 02.7 5aturn 16 68°31.9 74°11.8 02.1 90°19.2 27.1 23°41.1 08.5 83°08.3 02.6 17 83°34.3 89°11.4 04°00.9 105°19.8 26.4 38°43.0 08.6 98°10.5 02.5 18 98°36.8 104°11.0 \$03°59.7 120°20.5 \$10°25.7 53°45.0 \$016°08.8 113°12.7 \$08°02.4 \$02.5 \$10°25.7 \$113°39.3 119°10.6 \$8.5 135°21.1 25.0 68°46.9 09.0 128°14.9 02.3 \$22.5 \$345.0 \$34.5 \$												7°34.2	11:02
12 8 22.0 14 13.3 504 00.9 30 16.7 510 30.0 323 338 35.3 08.0 38 01.7 02.9  13 23 24.5 29 13.0 05.7 45 17.3 29.3 338 35.3 08.0 38 01.7 02.9  14 38 26.9 44 12.6 04.5 60 18.0 28.6 353 37.2 08.2 53 03.9 02.8  15 53 29.4 59 12.2 ··· 03.3 75 18.6 ··· 27.8 8 93.2 ··· 08.3 68 06.1 ··· 02.7  16 68 31.9 74 11.8 02.1 90 19.2 27.1 23 41.1 08.5 83 08.3 02.6  17 83 34.3 89 11.4 04 00.9 105 19.8 26.4 38 43.0 08.6 98 10.5 02.5  18 98 36.8 104 11.0 S03 59.7 120 20.5 S10 25.7 53 45.0 N16 08.8 113 12.7 S08 02.4  19 113 39.3 119 10.6 58.5 135 21.1 25.0 68 46.9 09.0 128 14.9 02.3 Saturn												23°01.1	10:00
13 23°24.5 29°13.0 09.7 45°17.3 29.3 338°35.3 08.0 38°01.7 02.9 14 38°26.9 44°12.6 04.5 60°18.0 28.6 353°37.2 08.2 53°03.9 02.8 15 53°29.4 59°12.2 ···03.3 75°18.6 ···27.8 8°39.2 ···08.3 68°06.1 ···02.7 16 68°31.9 74°11.8 02.1 90°19.2 27.1 23°41.1 08.5 83°08.3 02.6 17 83°34.3 89°11.4 04°00.9 105°19.8 26.4 38°43.0 08.6 98°10.5 02.5 18 98°36.8 104°11.0 S03°59.7 120°20.5 S10°25.7 53°45.0 N16°08.8 113°12.7 S08°02.4 19 113°39.3 119°10.6 58.5 135°21.1 25.0 68°46.9 09.0 128°14.9 02.3 Saturn												315°30.3	14:29
14 38 20.9 44 12.0 04.5 00 18.0 26.0 353 37.2 06.2 53 03.9 02.8 15 53°29.4 59°12.2 ··· 03.3 75°18.6 ··· 27.8 8°39.2 ··· 08.3 68°06.1 ··· 02.7 16 68°31.9 74°11.8 02.1 90°19.2 27.1 23°41.1 08.5 83°08.3 02.6 17 83°34.3 89°11.4 04°00.9 105°19.8 26.4 38°43.0 08.6 98°10.5 02.5 Mars 18 98°36.8 104°11.0 S03°59.7 120°20.5 S10°25.7 53°45.0 N16°08.8 113°12.7 S08°02.4 Jupiter 19 113°39.3 119°10.6 58.5 135°21.1 25.0 68°46.9 09.0 128°14.9 02.3 Saturn												14°47.1	10:32
16       68°31.9       74°11.8       02.1       90°19.2       27.1       23°41.1       08.5       83°08.3       02.6       Venus         17       83°34.3       89°11.4       04°00.9       105°19.8       26.4       38°43.0       08.6       98°10.5       02.5       Mars         18       98°36.8       104°11.0       S03°59.7       120°20.5       S10°25.7       53°45.0       N16°08.8       113°12.7       S08°02.4       Jupiter         19       113°39.3       119°10.6       58.5       135°21.1       25.0       68°46.9       09.0       128°14.9       02.3       Saturn	4			04.5		28.6		08.2	53°03.9	02.8	Jatuin	14 41.1	10.32
16       68°31.9       74°11.8       02.1       90°19.2       27.1       23°41.1       08.5       83°08.3       02.6       Venus         17       83°34.3       89°11.4       04°00.9       105°19.8       26.4       38°43.0       08.6       98°10.5       02.5       Mars         18       98°36.8       104°11.0       S03°59.7       120°20.5       S10°25.7       53°45.0       N16°08.8       113°12.7       S08°02.4       Jupiter         19       113°39.3       119°10.6       58.5       135°21.1       25.0       68°46.9       09.0       128°14.9       02.3       Saturn	5	53°29.4	59°12.2	• • 03.3	75° 18.6	• • 27.8	8°39.2	• • 08.3	$68^{\circ}06.1$	• • 02.7	Mar 30 Sat	SHA	Mer.pass
17     83°34.3     89°11.4     04°00.9     105°19.8     26.4     38°43.0     08.6     98°10.5     02.5     Mars       18     98°36.8     104°11.0     S03°59.7     120°20.5     S10°25.7     53°45.0     N16°08.8     113°12.7     S08°02.4     Jupiter       19     113°39.3     119°10.6     58.5     135°21.1     25.0     68°46.9     09.0     128°14.9     02.3     Saturn												6°25.6	11:03
18     98°36.8     104°11.0     S03°59.7     120°20.5     S10°25.7     53°45.0     N16°08.8     113°12.7     S08°02.4     Jupiter       19     113°39.3     119°10.6     58.5     135°21.1     25.0     68°46.9     09.0     128°14.9     02.3     Saturn												22°16.8	09:59
19 113°39.3 119°10.6 58.5 135°21.1 25.0 68°46.9 09.0 128°14.9 02.3 Saturn												315°17.7	14:25
Cutain													
20 128°41 7 134°10 2 57 3 150°21 7 24 2 22°40 0 00 1 142°17 1 02 2		113 39.3 128°41.7	134°10.0	57.3	150°21.7	24.3	83°48.8	09.0	143°17.1	02.3	Saturn	14°40.7	10:28
											Horizont	al parallax	
21 210 1112 213 0310 0012 100 2210 2010 0010 0												Venus:	0.1
22 158°46.6 164°09.5 54.9 180°22.9 22.9 113°52.7 09.4 173°21.5 02.0												Mars:	0.1
23 173°49.1 179°09.1 53.7 195°23.6 22.2 128°54.6 09.6 188°23.7 01.9	J	1/3 49.1	179 09.1	53.7	195 23.0	22.2	128 54.0	09.6	168 23.7	01.9		141013.	V.1
Mer.pass. 11:27 $\nu$ -0.4′ $d$ -1.2′ m-3.88 $\nu$ 0.6′ $d$ -0.7′ m1.20 $\nu$ 1.9′ $d$ 0.2′ m-2.07 $\nu$ 2.2′ $d$ -0.1′ m1.05	ler.pa	ss. 11:27	$\nu$ -0.4' d-1	.2′ m-3.88	$\nu$ 0.6' d-0	).7′ m1.20	$\nu$ 1.9 $^{\prime}$ $d$ 0	2′ m-2.07	$\nu$ 2.2' d-0	.1′ m1.05			

h	Sui	-0.0130 sec			Moon		
Thu 0	<b>GHA</b> 178°44.3	<b>Dec</b> N03°05.7	<b>GHA</b> 331°23.8	u 14.5'	Dec \$15° 53.8	d 12.4'	<b>HP</b> 54.7'
1	193°44.5	06.7	345°57.4	14.5'	16°06.1	12.3'	54.7'
2	208°44.7	07.6	0°30.9	14.4'	$16^{\circ}18.5$	12.2'	54.7'
3	223°44.9	• • 08.6	15°04.3	14.3'	$16^{\circ}30.7$	12.2'	54.8'
4	238°45.1	09.6	29°37.6	14.2'	16°42.9	12.1'	54.8'
5 6	253°45.3 268°45.4	10.6 N03°11.5	44°10.8 58°44.0	14.2' 14.1'	16°55.0 \$17°07.1	12.1' 12.0'	54.8' 54.8'
7	283°45.6	12.5	73°17.1	14.1	17° 19.1	11.9'	54.8'
8	298°45.8	13.5	87°50.1	13.9'	17°31.0	11.9'	54.8'
9	313°46.0	• • 14.5	$102^{\circ}23.0$	13.9'	$17^{\circ}42.9$	11.8'	54.9'
10	328°46.2	15.4	116°55.9	13.8'	17°54.7 18°06.4	11.7'	54.9'
11 12	343°46.4 358°46.6	16.4 N03°17.4	131°28.6 146°01.3	13.7' 13.6'	18°06.4 S18°18.1	11.7' 11.6'	54.9' 54.9'
13	13°46.8	18.4	160°33.9	13.5'	18° 29.7	11.5	54.9'
14	28°47.0	19.3	175°06.5	13.4'	18°41.2	11.4'	54.9'
15	43°47.1	• • 20.3	189°38.9	13.4'	18°52.6	11.4'	55.0'
16	58°47.3 73°47.5	21.3 22.3	204°11.3 218°43.5	13.3' 13.2'	19°04.0 19°15.3	11.3' 11.2'	55.0' 55.0'
17 18	73 47.5 88°47.7	N03°23.2	218 43.5 233°15.7	13.1'	19 15.3 \$19°26.5	11.1'	55.0'
19	103°47.9	24.2	247°47.8	13.0'	19° 37.7	11.1'	55.0'
20	118°48.1	25.2	$262^{\circ}19.8$	12.9'	$19^{\circ}48.7$	11.0'	55.0'
21	133°48.3	• • 26.1	276°51.7	12.8'	19°59.7	10.9'	55.1'
22	148°48.5 163°48.7	27.1	291°23.6	12.7' 12.7'	20° 10.6 20° 21.4	10.8'	55.1'
23		28.1	305°55.3			10.7'	55.1'
	SD = 16.0'	d = 1.0'		SE	0 = 14.9'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°48.8 193°49.0	N03°29.1	320°26.9 334°58.5	12.6'	\$20°32.2 20°42.8	10.7' 10.6'	55.1'
1 2	193°49.0 208°49.2	30.0 31.0	334°58.5 349°30.0	12.5' 12.4'	20°42.8 20°53.4	10.6	55.1' 55.2'
3	206 49.2 223°49.4	32.0	4°01.4	12.4	20°53.4 21°03.9	10.5	55.2'
4	238°49.6	33.0	18°32.6	12.2'	21°14.2	10.3'	55.2'
5	253°49.8	33.9	33°03.8	12.1'	$21^{\circ}24.5$	10.2'	55.2'
6	268°50.0	N03°34.9	47°34.9	12.0'	S21°34.8	10.1'	55.2'
7 8	283°50.2 298°50.4	35.9 36.8	62°05.9 76°36.9	11.9' 11.8'	21°44.9 21°54.9	10.0' 9.9'	55.3' 55.3'
9	313°50.5	37.8	91°07.7	11.7	21°04.9	9.8'	55.3'
10	328°50.7	38.8	105°38.4	11.6'	22°14.7	9.7'	55.3'
11	343°50.9	39.8	120°09.0	11.5'	22°24.4	9.6'	55.3'
12	358°51.1	N03°40.7	134°39.6	11.4'	\$22°34.1	9.5'	55.4'
13 14	13°51.3 28°51.5	41.7 42.7	149°10.0 163°40.4	11.3' 11.2'	22°43.6 22°53.1	9.4' 9.3'	55.4' 55.4'
15	43°51.7	• • 43.6	178° 10.4	11.2'	23°02.4	9.2'	55.4'
16	58°51.9	44.6	192°40.8	11.1'	$23^{\circ}11.6$	9.1'	55.4'
17	73°52.0	45.6	207°10.8	11.0'	23°20.8	9.0'	55.5'
18 19	88°52.2 103°52.4	N03°46.6 47.5	221°40.8 236°10.6	10.9' 10.8'	\$23°29.8 23°38.7	8.9' 8.8'	55.5' 55.5'
20	118°52.6	48.5	250°40.4	10.7	23°47.5	8.7'	55.5'
21	133°52.8	• • 49.5	265°10.1	10.6'	23°56.2	8.6'	55.5'
22	148°53.0	50.4	279°39.6	10.5'	24°04.8	8.5'	55.6'
23	163°53.2	51.4	294°09.1	10.4'	24°13.3	8.4'	55.6'
	SD = 16.0'	d = 1.0'		SE	0 = 15.0'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°53.4	N03°52.4	308°38.5	10.3'	S24°21.7	8.3'	55.6'
1	193°53.5	53.4	323°07.8	10.2'	24°30.0	8.1'	55.6'
2	208°53.7 223°53.9	54.3 •• 55.3	337°37.0 352°06.1	10.1' 10.0'	24°38.1 24°46.1	8.0' 7.9'	55.7' 55.7'
3 4	238°54.1	56.3	6°35.0	9.9'	24 40.1 24°54.1	7.9 7.8'	55.7'
5	253°54.3	57.2	21°03.9	9.8'	$25^{\circ}01.8$	7.7'	55.7'
6	268°54.5	N03°58.2	35°32.7	9.7'	S25°09.5	7.6'	55.8'
7	283°54.7 298°54.9	03°59.2 04°00.1	50°01.4 64°30.0	9.6'	25° 17.1 25° 24.5	7.4'	55.8'
8 9	298°54.9 313°55.0	04°00.1 •• 01.1	64°30.0 78°58.6	9.5' 9.4'	25°24.5 25°31.8	7.3' 7.2'	55.8' 55.8'
10	328°55.2	02.1	93°27.0	9.3'	25°39.0	7.1	55.9'
11	343°55.4	03.1	107°55.3	9.2'	25°46.0	6.9'	55.9'
12	358°55.6	N04°04.0	122°23.5	9.1'	\$25°53.0	6.8'	55.9'
13 14	13°55.8 28°56.0	05.0 06.0	136°51.6 151°19.7	9.0' 8.9'	25°59.8 26°06.4	6.7' 6.5'	55.9' 56.0'
14 15	43°56.0	06.9	151° 19.7 165° 47.6	8.9°	26° 13.0	6.4	56.0'
16	58°56.4	07.9	180°15.5	8.8'	26° 19.4	6.3'	56.0'
17	73°56.5	08.9	194°43.2	8.7'	$26^{\circ}25.6$	6.1'	56.0'
18	88°56.7	N04°09.8	209°10.9	8.6'	S26°31.8	6.0'	56.1
19 20	103°56.9 118°57.1	10.8 11.8	223°38.5 238°06.0	8.5' 8.4'	26° 37.8 26° 43.6	5.9' 5.7'	56.1' 56.1'
21	118 57.1 133°57.3	. 12.7	252°33.4	8.3'	26°49.3	5. <i>1</i> 5.6'	56.1'
22	148°57.5	13.7	267°00.7	8.2'	26°54.9	5.4'	56.2'
23	163°57.7	14.7	281°27.9	8.1'	27°00.4	5.3'	56.2'
	SD = 16.0'	d = 1.0'		SE	0 = 15.2'		

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

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

		Sun			Moon	
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	18-20
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	93-81%
28	05:03	04:54	12:05	01:58	14:20	
29	04:45	04:36	12:05	02:43	15:08	
30	04:27	04:18	12:04	03:33	15:59	

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	188°51.6	194° 08.7	S03°52.5	210°24.2	S10°21.5	143°56.6	N16°09.7	203°25.9	508°01.8			
1	203°54.0	209°08.3	51.2	210 24.2 225°24.8	20.7	158° 58.5	09.9	203 23.9 218°28.1	01.6	Alpheratz	$357^{\circ}35.8$	29°13.3
2	203 54.0 218° 56.5	209 08.3 224° 07.9	50.0	240°25.4	20.7	174°00.4	10.1	233°30.3	01.5	Ankaa	353°08.2	-42°10.6
3	233°59.0	239° 07.5	• • 48.8	255°26.1	. 19.3	189°02.4	. 10.1	248° 32.5	01.4	Schedar	349°32.4	56°40.1
4	249°01.4	254°07.1	47.6	270°26.7	18.6	204°04.3	10.2	263°34.7	01.4	Diphda	348°48.3	-17°51.4
5	264°03.9	269°06.7	46.4	285°27.3	17.9	219°06.2	10.5	278°36.9	01.3	Achernar	335°21.2	-57°07.0
6	279°06.4	284°06.4	S03°45.2	300°27.9	S10°17.2	234°08.2	N16° 10.7	293°39.1	S08°01.1	Hamal	327°52.3	23°34.5
7	294°08.8	299°06.0	44.0	315°28.6	16.5	249° 10.1	10.8	308°41.3	01.0	Polaris	$314^{\circ}46.0$	89°22.1
8	309°11.3	314°05.6	42.8	330°29.2	15.8	264° 12.0	11.0	323°43.5	00.9	Acamar	315°12.6	-40°12.6
9	324° 13.8	329°05.2	• • 41.6	345°29.8	15.0	279° 14.0	. 11.1	338°45.7	. 00.8	Menkar	314°07.1	4°11.0
10	339° 16.2	344°04.8	40.4	0°30.4	14.3	294°15.9	11.3	353°47.9	00.7	Mirfak	308°29.6	49°56.9
11	354° 18.7	359°04.4	39.2	15°31.1	13.6	309°17.8	11.5	8°50.1	00.6	Aldebaran	290°40.6	16°33.4
12	9°21.1	14°04.0	503°38.0	30°31.7	\$10°12.9	324°19.8	N16°11.6	23°52.3	S08°00.5	Rigel	281°04.6	-8° 10.6
13	24°23.6	29°03.6	36.8	45°32.3	12.2	339°21.7	11.8	38° 54.5	00.4	Capella	280°23.0	46°01.5
14	39°26.1	44°03.3	35.6	60°32.9	11.5	354°23.6	11.9	53°56.7	00.3	Bellatrix	278°23.7	6°22.2
15	54°28.5	59°02.9	• • 34.4	75°33.6	• • 10.8	9°25.6	• • 12.1	68°58.9	• • 00.2	Elnath	278°02.8	28°37.7
16	69°31.0	74°02.5	33.2	90°34.2	10.0	24°27.5	12.2	84°01.1	00.1	Alnilam	275°38.5	-1°11.3
17	84°33.5	89°02.1	32.0	105°34.8	09.3	39°29.4	12.4	99°03.3	$0.00^{\circ}$	Betelgeuse	270°52.9	7°24.6
18	99°35.9	104°01.7	S03°30.8	120°35.4	\$10°08.6	54°31.4	N16°12.6	114°05.5	S07°59.9	Canopus	263°52.7 258°26.8	-52°42.8 -16°45.1
19	114°38.4	119°01.3	29.6	135°36.1	07.9	69°33.3	12.7	129°07.7	59.8	Sirius		-16 45.1 -29°00.5
20	129°40.9	134°00.9	28.4	150°36.7	07.2	84°35.2	12.9	144°09.9	59.7	Adhara	255°06.4	
21	144°43.3	149°00.6	• • 27.2	165°37.3	• • 06.5	99°37.1	• • 13.0	159°12.0	• • 59.6	Procyon Pollux	244°51.5 243°18.0	5°09.7 27°58.1
22	159°45.8	164°00.2	25.9	180°37.9	05.8	114°39.1	13.2	174° 14.2	59.5	1	243°18.0 234°14.8	-59°35.5
23	174°48.2	178°59.8	24.7	195°38.6	05.0	129°41.0	13.3	189°16.4	59.4	Avior Suhail	234°14.8 222°46.6	-59° 35.5 -43° 32.0
1/10= =	ass 11.22	υ_0 Λ' Δ 1	.2′ m-3.88	1/0 6/ A 0	.7′ m1.19	,,1 0/ do	.2′ m-2.07	1/2 2/ 4 0	.1′ m1.05	Miaplacidus	222°46.6 221°37.9	-43° 32.0 -69° 49.2
ivier.p	ass. 11:23	$\nu$ -0.4 a-1	.∠ m-3.ŏŏ	$\nu$ 0.0° $a$ -0	. <i>i</i> m1.19	$\nu_{1.9}$ a0	.∠ m-∠.U/	ν2.2 α-0	.ı ını.U5	Miaplacidus	221°37.9 217°48.2	-69°49.2 -8°45.9
										Regulus	217 46.2 207°34.9	-6 45.9 11°50.9
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	207 34.9 193°41.2	61°37.3
0	$189^{\circ}50.7$	193°59.4	S03°23.5	210°39.2	S10°04.3	144°42.9	$N16^{\circ}13.5$	$204^{\circ}18.6$	S07°59.3	Dubne	193 41.2 182°25.3	14°26.1
1	204°53.2	208°59.0	22.3	225°39.8	03.6	159°44.9	13.7	$219^{\circ}20.8$	59.2	Gienah	182 25.3 175°44.0	-17°40.7
2	219°55.6	223°58.6	21.1	240°40.5	02.9	174°46.8	13.8	234°23.0	59.0	1	173 44.0 173°00.2	-17 40.7 -63°14.1
3	234°58.1	238°58.3	• • 19.9	255°41.1	•• 02.2	189°48.7	• • 14.0	249°25.2	• • 58.9		173 00.2 171°51.8	-03 14.1 -57°15.0
4	250°00.6	253°57.9	18.7	270°41.7	01.5	204°50.7	14.1	264°27.4	58.8	Alioth	166°12.9	55° 49.6
5	265°03.0	268°57.5	17.5	285°42.3	00.7	219°52.6	14.3	279°29.6	58.7	Spica	158°22.7	-11°17.4
6	280°05.5	283°57.1	S03°16.3	300°43.0	S10°00.0	234°54.5	N16° 14.4	294°31.8	S07°58.6	Alkaid	150° 52.7	49°11.4
7	295°08.0	298°56.7	15.1	315°43.6	$09^{\circ}59.3$	249°56.4	14.6	309°34.0	58.5	Hadar	148°36.4	-60°29.3
8	$310^{\circ}10.4$	313°56.3	13.9	330°44.2	58.6	264°58.4	14.7	324°36.2	58.4		140°58.0	-36° 29.4
9	$325^{\circ}12.9$	328°55.9	•• 12.7	345°44.9	• • 57.9	280°00.3	• • 14.9	339°38.4	• • 58.3	Arcturus	145°48.2	19°03.2
10	340° 15.4	343°55.6	11.5	0°45.5	57.2	295°02.2	15.1	354°40.6	58.2	Rigil Kent.		-60°56.1
11	355° 17.8	358°55.2	10.2	15°46.1	56.4	310°04.2	15.2	9°42.8	58.1	Kochab	137°18.7	74°03.1
12	$10^{\circ}20.3$	13°54.8	S03°09.0	30°46.7	S09°55.7	325°06.1	$N16^{\circ}15.4$	24°45.0	S07°58.0	Zuben'ubi	136°56.5	-16°08.6
13	25°22.7	28°54.4	07.8	45°47.4	55.0	340°08.0	15.5	39°47.2	57.9	Alphecca	126°04.0	26°37.7
14	40°25.2	43°54.0	06.6	60°48.0	54.3	355°09.9	15.7	54°49.4	57.8	Antares	112°16.5	-26°29.2
15	55°27.7	58°53.6	• • 05.4	75°48.6	• • 53.6	10°11.9	• • 15.8	69°51.6	• • 57.7	Atria	107°11.0	-69°04.0
16	70°30.1	73°53.3	04.2	90°49.3	52.9	25°13.8	16.0	84°53.9	57.6	Sabik	102°03.4	-15°45.4
17	85°32.6	88°52.9	03.0	105°49.9	52.1	40°15.7	16.2	99°56.1	57.5	Shaula	96°11.1	-37°07.2
18	100°35.1	103°52.5	S03°01.8	120°50.5	S09°51.4	55° 17.7	N16°16.3	114° 58.3	S07°57.4	Rasalhague	95°59.1	12°32.3
19	115° 37.5	118°52.1	03°00.6	135°51.1	50.7	70° 19.6	16.5	130°00.5	57.3	Eltanin	90°42.4	51°28.7
20	130°40.0	133°51.7	02°59.4	150°51.8	50.0	85°21.5	16.6	145°02.7	57.2	Kaus Aust.	83°33.3	-34°22.3
21	145°42.5	148°51.4	• • 58.1	165°52.4	• • 49.3	100°23.4	• • 16.8	160°04.9	•• 57.1	Vega	80°33.6	38°48.0
22	160°44.9	163°51.0	56.9	180°53.0	48.5	115°25.4	16.9	175°07.1	57.0	Nunki	75°48.6	-26° 16.0
23	175°47.4	178°50.6	55.7	195°53.7	47.8	130°27.3	17.1	190°09.3	56.9	Altair	62°00.7	8°55.7
Mer.p	ass. 11:19	$\nu$ -0.4' d-1	.2′ m-3.88	$\nu 0.6' \ d-0$	.7′ m1.19	$\nu 1.9' d0$	.2′ m-2.07	$\nu 2.2' \ d-0$	.1′ m1.06	Peacock	53°07.0	-56° 39.3
										Deneb	49°26.5	45°21.6
_			_		_		_	<b></b> -	_	Enif	33°39.7	9°58.9
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	$27^{\circ}34.1$	-46° 50.6
0	190°49.9	193°50.2	S02°54.5	210°54.3	S09°47.1	145°29.2	N16° 17.3	205°11.5	S07°56.8	Fomalhaut	15°15.5	-29°29.7
1	205°52.3	208°49.8	53.3	225°54.9	46.4	160°31.2	17.4	220°13.7	56.7	Scheat	13°46.2	28° 12.6
2	220°54.8	223°49.4	52.1	240°55.5	45.7	175°33.1	17.6	235°15.9	56.6	Markab	13°30.9	15° 19.9
3	235° 57.2	238°49.1	• • 50.9	255°56.2	• • 44.9	190°35.0	· · 17.7	250°18.1	· · 56.5	Mar 31 Sun	SHA	Mer.pass
4	250° 59.7 266° 02.2	253°48.7	49.7	270°56.8	44.2	205°36.9	17.9	265°20.3	56.4	Venus	5HA 5°17.1	11:04
5	266°02.2 281°04.6	268° 48.3	48.5 \$02°47.2	285°57.4	43.5	220°38.9	18.0 N16° 18.2	280°22.5 295°24.7	56.3	Mars	5 17.1 21°32.6	09:58
6 7	281°04.6 296°07.1	283°47.9 298°47.5	S02°47.2	300°58.1 315°58.7	\$09°42.8 42.1	235° 40.8 250° 42.7	18.3	295°24.7 310°26.9	S07° 56.2	Jupiter	315°05.0	14:22
8	311°09.6	298°47.5 313°47.2	46.0 44.8	315°58.7 330°59.3	42.1	250° 42.7 265° 44.6	18.3 18.5	310° 26.9 325° 29.1	56.1 55.9	Saturn	14°34.3	10:25
9	326° 12.0	313 47.2 328°46.8	• • 43.6	346°00.0	. 40.6	280° 46.6	18.7	340°31.3	55.8	Jaturn	11 37.3	10.23
10	341°14.5	343°46.4	42.4	1°00.6	39.9	295°48.5	18.8	355° 33.5	55.7	Apr 01 Mon	SHA	Mer.pass
11	356° 17.0	358° 46.0	41.2	16°01.2	39.9	310°50.4	19.0	10°35.7	55.6	Venus	4°08.7	11:04
12	11° 19.4	13° 45.6	S02°40.0	31°01.9	S09°38.5	325°52.4	N16° 19.1	25°37.9	S07°55.5	Mars	20°48.5	09:57
13	26°21.9	28° 45.3	38.8	46°02.5	37.7	340°54.3	19.3	40°40.1	55.4	Jupiter	314°52.2	14:19
14	41°24.4	43°44.9	37.5	61°03.1	37.0	355°56.2	19.4	55°42.3	55.3	Saturn	14°27.9	10:21
15	56°26.8	58° 44.5	• • 36.3	76°03.8	36.3	10°58.1	19.6	70° 44.5	55.2	Apr 02 Tue	SHA	Mer.pass
16	71°29.3	73°44.1	35.1	91°04.4	35.6	26°00.1	19.8	85°46.7	55.1	Venus	3°00.4	11:05
17	86°31.7	88° 43.7	33.9	106°05.0	34.9	41°02.0	19.9	100°48.9	55.0	Mars	3 00.4 20°04.4	09:56
18	101°34.2	103°43.4	S02°32.7	121°05.7	S09°34.1	56°03.9	N16° 20.1	115°51.1	S07°54.9	Jupiter		14:16
19	116° 36.7	118° 43.0	31.5	136°06.3	33.4	71°05.8	20.2	130°53.3	54.8	Saturn	14°21.6	10:18
20	131°39.1	133° 42.6	30.3	151°06.9	32.7	86°07.8	20.4	145°55.5	54.7	Jatuill	1 F 41.U	10.10
21	146°41.6	148° 42.2	• • 29.0	166°07.6	32.0	101°09.7	20.5	160° 57.7	• • 54.6	Horizont	al parallax	
22	161°44.1	163°41.9	27.8	181°08.2	31.2	116° 11.6	20.7	175°59.9	54.5		Venus:	0.1
23	$176^{\circ}46.5$	$178^{\circ}41.5$	26.6	196°08.8	30.5	131°13.5	20.9	191°02.1	54.4		Mars:	0.1
											-	
ivier.p	ass. 11:15	$\nu$ -0.4' $a$ -1	.2′ m-3.88	$\nu$ 0.0° $a$ -0	.7′ m1.19	$\nu$ 1.9' $a0$	.2′ m-2.06	$\nu 2.2^{\circ}$ a-0	.1′ m1.06			

<u>-</u> L	C	_			— +09.13		
h	Sur	<u> </u>			Moon		
Sun	GHA	Dec	GHA	$\nu$	Dec	d F 2'	HP
0 1	178°57.9 193°58.0	N04°15.6 16.6	295°55.0 310°22.1	8.0' 8.0'	\$27°05.7 27°10.8	5.2' 5.0'	56.2' 56.2'
2	208°58.2	17.6	324°49.0	7.9'	27°15.9	4.9'	56.3
3	223°58.4	• • 18.5	339°15.9	7.8'	27°20.7	4.7'	56.3'
4	238°58.6	19.5	353°42.7	7.7'	27°25.4	4.6'	56.3'
5	253°58.8	20.5	8°09.4	7.6'	27°30.0	4.4'	56.3'
6 7	268°59.0 283°59.2	N04°21.4 22.4	22°36.1 37°02.6	7.5' 7.5'	\$27°34.4 27°38.7	4.3' 4.1'	56.4' 56.4'
8	203 59.2 298°59.3	23.4	51°29.1	7.3 7.4'	27°42.9	4.1 4.0'	56.4'
9	313°59.5	• • 24.3	65°55.5	7.3'	27°46.8	3.8'	56.5
10	328°59.7	25.3	80°21.8	7.2'	27°50.6	3.7'	56.5'
11	343°59.9	26.3	94°48.0	7.2'	27°54.3	3.5'	56.5'
12	359°00.1	N04°27.2	109°14.2	7.1'	\$27°57.8	3.4'	56.5'
13 14	14°00.3 29°00.5	28.2 29.2	123°40.3 138°06.3	7.0' 6.9'	28°01.2 28°04.4	3.2' 3.0'	56.6' 56.6'
15	44°00.6	30.1	150° 00.3	6.9'	28°07.4	2.9'	56.6
16	59°00.8	31.1	166°58.1	6.8'	28°10.3	2.7'	56.7'
17	74°01.0	32.1	181°23.9	6.7'	28°13.0	2.6'	56.7'
18	89°01.2	N04°33.0	195°49.7	6.7'	528°15.6	2.4'	56.7'
19	104°01.4	34.0	210°15.4 224°41.0	6.6'	28°18.0	2.2'	56.7'
20 21	119°01.6 134°01.8	35.0 •• 35.9	224°41.0 239°06.5	6.6' 6.5'	28°20.3 28°22.3	2.1' 1.9'	56.8' 56.8'
22	149°01.9	36.9	259°00.5	6.4	28°24.2	1.7'	56.8
23	164°02.1	37.8	267°57.5	6.4	28°26.0	1.6'	56.9'
	SD = 16.0'	d = 1.0'		SI	0 = 15.3'		
					10.0		
Mon	<b>GHA</b> 179°02.3	<b>Dec</b> N04°38.8	<b>GHA</b> 282°22.9	$\nu$	<b>Dec</b> \$28° 27.6	d 1.4'	HP
0 1	179 02.3 194°02.5	39.8	282 22.9 296°48.2	6.3' 6.3'	28°29.0	1.4	56.9' 56.9'
2	209°02.7	40.7	311°13.4	6.2	28°30.2	1.1'	57.0'
3	224°02.9	• • 41.7	325°38.7	6.2'	28°31.3	0.9'	57.0'
4	239°03.1	42.7	340°03.8	6.1'	28°32.2	0.7'	57.0'
5	254°03.2	43.6	354°28.9	6.1'	28°33.0	0.6'	57.0'
6 7	269°03.4 284°03.6	N04°44.6 45.6	8°54.0 23°19.0	6.0' 6.0'	\$28°33.6 28°34.0	0.4' 0.2'	57.1' 57.1'
8	299°03.8	45.0 46.5	25 19.0 37°44.0	5.9'	26°34.0	0.2	57.1'
9	314°04.0	• • 47.5	52°09.0	5.9'	28°34.3	-0.1	57.2'
10	329°04.2	48.4	66°33.9	5.9'	28°34.2	-0.3'	57.2'
11	344°04.4	49.4	80°58.7	5.8'	28°33.9	-0.5'	57.2'
12	359°04.5	N04°50.4	95°23.5	5.8'	\$28°33.4	-0.6'	57.3'
13 14	14°04.7 29°04.9	51.3 52.3	109°48.3 124°13.1	5.8' 5.7'	28°32.8 28°32.0	-0.8' -1.0'	57.3' 57.3'
15	44°05.1	53.3	138°37.8	5.7'	28°31.0	-1.0	57.3 57.4'
16	59°05.3	54.2	153°02.5	5.7'	28°29.9	-1.3'	57.4'
17	74°05.5	55.2	$167^{\circ}27.2$	5.6'	28°28.5	-1.5'	57.4'
18	89°05.6	N04°56.1	181°51.8	5.6'	\$28°27.0	-1.7'	57.5'
19	104°05.8 119°06.0	57.1	196°16.5 210°41.1	5.6' 5.6'	28°25.3 28°23.5		57.5'
20 21	134°06.0	58.1 04°59.0	210°41.1 225°05.7	5.6'	28°23.5 28°21.4	-2.0' -2.2'	57.5' 57.6'
22	149°06.4	05°00.0	239°30.2	5.6'	28°19.2	-2.4	57.6'
23	164°06.6	00.9	253°54.8	5.5'	28°16.8	-2.6'	57.6'
	SD = 16.0'	d = 1.0'		SI	D = 15.5'		
<b>T</b>	GHA	Dec	GHA		Dec	d	HP
Tue 0	179°06.8	N05°01.9	268°19.3	u 5.5'	S28°14.3	-2.7'	57.7'
1	194°06.9	02.9	282°43.8	5.5'	28°11.5	-2.9	57.7'
2	209°07.1	03.8	297°08.3	5.5'	28°08.6	-3.1'	57.7'
3	224°07.3	• • 04.8	311°32.9	5.5'	28°05.5	-3.3'	57.8'
4	239°07.5	05.7	325°57.4 340°21.8	5.5'	28°02.2 27°58.8	-3.5'	57.8'
5 6	254°07.7 269°07.9	06.7 N05°07.7	340°21.8 354°46.3	5.5' 5.5'	27°58.8 <b>S</b> 27°55.2	-3.6' -3.8'	57.8' 57.9'
7	284°08.0	08.6	9°10.8	5.5'	27°51.3	-3.0 -4.0'	57.9'
8	299°08.2	09.6	23°35.3	5.5'	27°47.4	-4.2'	57.9'
9	314°08.4	• • 10.5	37°59.8	5.5'	27°43.2	-4.3'	58.0'
10	329°08.6	11.5	52°24.3	5.5'	27°38.8	-4.5'	58.0'
11	344°08.8 359°09.0	12.5 N05°13.4	66°48.9 81°13.4	5.5' 5.5'	27°34.3 <b>S</b> 27°29.6	-4.7' -4.9'	58.0'
12 13	359°09.0 14°09.1	N05°13.4 14.4	81°13.4 95°37.9	5.5' 5.5'	527°29.6 27°24.8	-4.9° -5.1'	58.1' 58.1'
14	29°09.3	15.3	110°02.4	5.6'	27° 19.7	-5.1 -5.2	58.1
15	44°09.5	16.3	124°27.0	5.6'	27°14.5	-5.4	58.2'
16	59°09.7	17.3	138°51.6	5.6'	$27^{\circ}09.1$	-5.6'	58.2'
17	74°09.9	18.2	153°16.2	5.6'	27°03.5	-5.8'	58.2'
18	89°10.1	N05°19.2	167°40.8	5.6'	\$26°57.7	-5.9'	58.3'
19 20	104°10.2 119°10.4	20.1 21.1	182°05.4 196°30.1	5.7' 5.7'	26°51.8 26°45.7	-6.1' -6.3'	58.3' 58.3'
21	134°10.4	22.0	210°54.7	5.7'	26°39.4	-6.5'	58.4
22	149°10.8	23.0	225°19.4	5.7'	26°33.0	-6.6'	58.4'
23	164°11.0	24.0	239°44.2	5.8'	26°26.3	-6.8'	58.4'
	SD = 16.0'	d = 1.0'		SI	O = 15.7'		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
- 45	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	21-23	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	72-52%	
31	04:09	04:00	12:04	04:26	16:54		
01	03:51	03:42	12:04	05:23	17:52		
02	03:33	03:24	12:03	06:22	18:51		

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	191°49.0	193°41.1	S02°25.4	211°09.5	S09°29.8	146° 15.5	N16°21.0	206°04.3	S07°54.3			
1	206°51.5	208°40.7	24.2	226°10.1	29.1	161°17.4	21.2	221°06.5	54.2	Alpheratz	357°35.8	29°13.3
2	221°53.9	223°40.3	23.0	241°10.7	28.4	176° 19.3	21.3	236°08.7	54.1	Ankaa	353°08.2	-42°10.5
3	236° 56.4	238°40.0	• • 21.8	256°11.4	27.6	191°21.2	21.5	251°10.9	• • 54.0	Schedar	349°32.4	56°40.1
4	251°58.9	253°39.6	20.5	271°12.0	26.9	206° 23.2	21.6	266°13.1	53.9	Diphda	348°48.3	-17°51.4
5	267°01.3			286°12.6		200°25.2 221°25.1		281°15.3		Achernar	$335^{\circ}21.2$	-57°06.9
	282°03.8	268°39.2 283°38.8	19.3		26.2	221 25.1 236° 27.0	21.8	281 15.3 296°17.5	53.8 S07°53.7	Hamal	327°52.3	23°34.5
6			S02°18.1	301°13.3	S09°25.5		N16°21.9			Polaris	314°46.7	89°22.1
7	297°06.2	298°38.4	16.9	316°13.9	24.7	251°28.9	22.1	311°19.7	53.6	Acamar	$315^{\circ}12.6$	-40°12.6
8	312°08.7	313°38.1	15.7	331°14.5	24.0	266°30.9	22.3	326°21.9	53.5	Menkar	$314^{\circ}07.1$	4°11.0
9	327°11.2	328°37.7	• • 14.5	346°15.2	• • 23.3	281°32.8	• • 22.4	341°24.1	• • 53.4	Mirfak	308°29.6	49°56.9
10	342°13.6	343°37.3	13.3	1°15.8	22.6	296°34.7	22.6	356°26.3	53.3	Aldebaran	290°40.6	16°33.4
11	357° 16.1	358°36.9	12.0	16°16.4	21.8	311°36.6	22.7	11°28.5	53.2	Rigel	281°04.6	-8° 10.5
12	12° 18.6	13°36.6	S02°10.8	31°17.1	S09°21.1	326° 38.5	N16°22.9	26°30.7	S07°53.1	Capella	280°23.1	46°01.5
13	$27^{\circ}21.0$	28°36.2	09.6	46°17.7	20.4	341°40.5	23.0	41°32.9	53.0	Bellatrix	278°23.7	6°22.2
14	42°23.5	43°35.8	08.4	61°18.3	19.7	356°42.4	23.2	56°35.1	52.9	Elnath	278°02.8	28°37.7
15	57°26.0	58°35.4	• • 07.2	$76^{\circ}19.0$	• • 18.9	11°44.3	• • 23.4	71°37.3	• • 52.8	Alnilam	275°38.5	-1°11.3
16	72°28.4	73°35.1	06.0	$91^{\circ}19.6$	18.2	26°46.2	23.5	86°39.5	52.7	Betelgeuse	270°52.9	7°24.6
17	87°30.9	88°34.7	04.7	$106^{\circ}20.2$	17.5	41°48.2	23.7	101°41.7	52.6	-	263°52.8	-52°42.8
18	102°33.3	103°34.3	S02°03.5	121°20.9	S09°16.8	56°50.1	N16°23.8	116°44.0	S07°52.5	Canopus	203 52.6 258°26.8	-52 42.6 -16°45.1
19	117°35.8	118°33.9	02.3	136°21.5	16.0	71°52.0	24.0	131°46.2	52.4	Sirius		-10 45.1 -29°00.5
20	132°38.3	133°33.5	02°01.1	151°22.1	15.3	86°53.9	24.1	146°48.4	52.3	Adhara	255°06.4	
21	147° 40.7	148°33.2	01°59.9	166°22.8	• • 14.6	101°55.9	• • 24.3	161°50.6	• • 52.2	Procyon	244°51.5	5°09.7
22	162°43.2	163°32.8	58.7	181°23.4	13.9	116°57.8	24.5	176°52.8	52.1	Pollux	243°18.0	27°58.1
23	177°45.7	178°32.4	57.4	196°24.1	13.1	131°59.7	24.6	191°55.0	52.0	Avior	234°14.8	-59°35.5
										Suhail	222°46.6	-43°32.0
Mer.p	ass. 11:11	$\nu$ -0.4' d-1	.2′ m-3.88	$\nu$ 0.6′ d-0	.7′ m1.19	$\nu$ 1.9′ d0.	.2′ m-2.06	$\nu$ 2.2′ d-0	.1' m $1.06$	Miaplacidus	221°38.0	-69°49.2
										Alphard	217°48.2	-8°45.9
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.9	11°50.9
										Dubhe	193°41.2	61°37.3
0	192°48.1	193°32.0 208°31.7	S01°56.2	211°24.7	509°12.4	147°01.6	N16°24.8	206°57.2 221°59.4	\$07°51.9	Denebola	182°25.3	$14^{\circ}26.1$
1	207°50.6		55.0	226°25.3	11.7	162°03.5	24.9		51.7	Gienah	175°43.9	$-17^{\circ}40.7$
2	222°53.1	223°31.3	53.8	241°26.0	11.0	177°05.5	25.1	237°01.6	51.6	Acrux	173°00.2	$-63^{\circ}14.1$
3	237°55.5	238°30.9	• • 52.6	256°26.6	• • 10.2	192°07.4	• • 25.2	252°03.8	• • 51.5	Gacrux	171°51.8	$-57^{\circ}15.0$
4	252°58.0	253°30.5	51.3	271°27.2	09.5	207°09.3	25.4	267°06.0	51.4	Alioth	166°12.9	55° 49.6
5	268°00.5	268°30.2	50.1	286°27.9	08.8	222°11.2	25.5	282°08.2	51.3	Spica	158°22.7	-11° 17.4
6	283°02.9	283°29.8	S01°48.9	301°28.5	S09°08.0	237°13.1	N16°25.7	297°10.4	S07°51.2	Alkaid	152°52.0	49°11.4
7	298°05.4	298°29.4	47.7	$316^{\circ}29.1$	07.3	$252^{\circ}15.1$	25.9	$312^{\circ}12.6$	51.1	Hadar	148°36.4	-60°29.4
8	313°07.8	313°29.0	46.5	331°29.8	06.6	267°17.0	26.0	327°14.8	51.0	Menkent	147°58.0	-36°29.4
9	328°10.3	328°28.7	• • 45.3	346°30.4	•• 05.9	282°18.9	• • 26.2	342°17.0	• • 50.9	Arcturus	145°48.2	19°03.2
10	343°12.8	343°28.3	44.0	1°31.1	05.1	297°20.8	26.3	357°19.2	50.8	Rigil Kent.		-60°56.1
11	358° 15.2	358°27.9	42.8	16°31.7	04.4	312°22.8	26.5	12°21.4	50.7	Kochab	137°18.7	74°03.1
12	13° 17.7	13°27.5	S01°41.6	31°32.3	S09°03.7	327°24.7	N16°26.6	27°23.6	S07°50.6		136°56.5	-16°08.6
13	28°20.2	28°27.2	40.4	46°33.0	03.0	342°26.6	26.8	42°25.8	50.5	Zuben'ubi	130° 50.5 126° 04.0	
14	43°22.6	43°26.8	39.2	61°33.6	02.2	357°28.5	27.0	57°28.0	50.4	Alphecca		26°37.7
15	58°25.1	58°26.4	• • 37.9	76°34.2	• • 01.5	12°30.4	27.1	72°30.2	• • 50.3	Antares	112°16.4	-26°29.2
16	73°27.6	73°26.0	36.7	91°34.9	00.8	27° 32.4	27.3	87°32.4	50.2	Atria	107°11.0	-69°04.0
17	88°30.0	88°25.7	35.5	106°35.5	09°00.0	42°34.3	27.4	102°34.7	50.1	Sabik	102°03.4	-15°45.4
18	103°32.5	103°25.3	S01°34.3	121°36.2	S08°59.3	57°36.2	N16°27.6	117°36.9	S07°50.0	Shaula	96°11.1	-37°07.2
19	118° 35.0	118°24.9	33.1	136°36.8	58.6	72°38.1	27.7	132°39.1	49.9	Rasalhague	95°59.0	12°32.3
20	133° 37.4	133°24.5	31.8	151°37.4	57.9	87° 40.0	27.9	147°41.3	49.8	Eltanin	90°42.3	51°28.7
21	148° 39.9	148°24.2	• • 30.6	166°38.1	•• 57.1	102°42.0	28.1	162°43.5	• • 49.7	Kaus Aust.	83°33.3	-34°22.3
22	163° 42.3	163°23.8	29.4	181°38.7	56.4	102 42.0 117°43.9	28.2	102 45.5 177°45.7	49.7	Vega	80°33.6	38°48.0
										Nunki	75°48.6	-26°16.0
23	178°44.8	178°23.4	28.2	196°39.4	55.7	132°45.8	28.4	192°47.9	49.5	Altair	62°00.7	8°55.7
Mer.p	ass. 11:07	$\nu$ -0.4 $'$ d-1	.2′ m-3.89	$\nu$ 0.6′ d-0	.7′ m1.18	$\nu$ 1.9′ d0.	.2′ m-2.06	$\nu$ 2.2′ d-0	.1′ m1.06	Peacock	53°06.9	-56° 39.3
										Deneb	49°26.5	$45^{\circ}21.6$
		<u> </u>	_		_		_	<b></b> -	_	Enif	33°39.6	9°58.9
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°34.0	-46°50.6
0	193°47.3	193°23.0	S01°27.0	211°40.0	S08°54.9	147° 47.7		207°50.1	S07°49.4	Fomalhaut	$15^{\circ}15.5$	-29°29.7
1	208°49.7	208°22.7	25.7	226°40.6	54.2	162°49.6	28.7	222°52.3	49.3	Scheat	13°46.2	$28^{\circ}12.6$
2	223°52.2	223°22.3	24.5	241°41.3	53.5	177°51.6	28.8	237°54.5	49.2	Markab	13°30.8	$15^{\circ}19.9$
3	238°54.7	238°21.9	· · 23.3	256°41.9	• • 52.7	192°53.5	• • 29.0	252°56.7	• • 49.1			
4	253°57.1	253°21.5	22.1	271°42.6	52.0	207°55.4	29.1	267°58.9	49.0	Apr 03 Wed	SHA	Mer.pass
5	268°59.6	268°21.2	20.9	286°43.2	51.3	222°57.3	29.3	283°01.1	48.9	Venus	1°52.1	11:06
6	284°02.1	283°20.8	S01°19.6	301°43.8	S08°50.6	237°59.2	N16°29.5	298°03.3	S07°48.8	Mars	19°20.5	09:55
7	299°04.5	298°20.4	18.4	316°44.5	49.8	253°01.1	29.6	313°05.5	48.7	Jupiter	314°26.5	14:13
8	$314^{\circ}07.0$	313°20.1	17.2	331°45.1	49.1	268°03.1	29.8	328°07.7	48.6	Saturn	14°15.3	10:14
9	$329^{\circ}09.4$	328°19.7	• • 16.0	346°45.8	• • 48.4	283°05.0	• • 29.9	343°09.9	• • 48.5	A 04 T	CIIA	N/a
10	$344^{\circ}11.9$	343°19.3	14.8	1°46.4	47.6	298°06.9	30.1	$358^{\circ}12.1$	48.4	Apr 04 Thu	SHA 0°43.0	Mer.pass
11	$359^{\circ}14.4$	358°18.9	13.5	16°47.0	46.9	313°08.8	30.2	13°14.4	48.3	Venus	0°43.9	11:06
12	14° 16.8	13°18.6	S01°12.3	31°47.7	508°46.2	328° 10.7	N16°30.4	28°16.6	507°48.2	Mars	18°36.6	09:54
13	$29^{\circ}19.3$	28°18.2	11.1	46°48.3	45.4	$343^{\circ}12.7$	30.6	43°18.8	48.1	Jupiter	314°13.5	14:10
14	44°21.8	43°17.8	09.9	61°49.0	44.7	358° 14.6	30.7	58°21.0	48.0	Saturn	14°09.0	10:11
15	59°24.2	58°17.4	08.6	76°49.6	• • 44.0	13° 16.5	30.9	73°23.2	• • 47.9	Apr 05 Fri	SHA	Mer.pass
16	74°26.7	73°17.1	07.4	91°50.2	43.2	28° 18.4	31.0	88°25.4	47.8	Venus	359°35.8	11:07
17	89°29.2	88°16.7	06.2	106°50.9	42.5	43° 20.3	31.2	103°27.6	47.7	Mars	17°52.7	09:53
18	104°31.6	103°16.3	S01°05.0	121°51.5	S08°41.8	58° 22.2	N16°31.3	118°29.8	S07°47.6	Jupiter	314°00.4	14:07
19	119°34.1	118°16.0	03.8	136°52.2	41.0	73°24.2	31.5	133°32.0	47.5	Saturn	14°02.8	10:07
20	134° 36.6	133°15.6	02.5	151°52.8	40.3	88° 26.1	31.7	148°34.2	47.4	Saturn	14 U2.0	10:01
21	149° 39.0	148°15.2	•• 01.3	166°53.5	39.6	103°28.0	•• 31.8	163°36.4	• • 47.3	Horizont	al parallax	
22	164° 41.5	163°14.8	01.3 01°00.1	181°54.1	38.8	118° 29.9	32.0	178°38.6	47.2		Venus:	0.1
23	179° 43.9	178°14.5	00°58.9	196°54.7	38.1	133°31.8	32.0	193°40.8	47.1		Mars:	0.1
Mer.p	ass. 11:03	$\nu$ -0.4' d-1	.2′ m-3.89	$\nu$ 0.6′ d-0	.7′ m1.18	$\nu$ 1.9′ d0.	.2′ m-2.06	$\nu$ 2.2′ d-0	.1′ m1.06			

h	Sui	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°11.1	N05°24.9	254°08.9	5.8'	\$26° 19.5	-7.0'	58.5'
1 2	194°11.3 209°11.5	25.9 26.8	268°33.7 282°58.5	5.8' 5.8'	26° 12.6 26° 05.4	-7.1' -7.3'	58.5' 58.5'
3	224°11.7	• • 27.8	202 30.3 297°23.4	5.9'	25°58.1	-7.5'	58.6'
4	239°11.9	28.7	311°48.2	5.9'	$25^{\circ}50.6$	-7.7'	58.6'
5	254° 12.1	29.7	326°13.2 340°38.1	6.0'	25°42.9 \$25°35.1	-7.8'	58.6'
6 7	269°12.2 284°12.4	N05°30.7 31.6	340°38.1 355°03.1	6.0' 6.0'	25°27.1	-8.0' -8.2'	58.7' 58.7'
8	299° 12.6	32.6	9°28.1	6.1'	25° 19.0	-8.3	58.7'
9	314° 12.8	• • 33.5	23°53.2	6.1'	25° 10.6	-8.5'	58.8'
10 11	329°13.0 344°13.2	34.5 35.4	38° 18.3 52° 43.5	6.2' 6.2'	25°02.1 24°53.5	-8.7' -8.8'	58.8' 58.8'
12	359° 13.3	N05° 36.4	67°08.7	6.2	\$24° 44.6	-9.0'	58.9'
13	14°13.5	37.3	81°33.9	6.3'	$24^{\circ}35.6$	-9.2'	58.9'
14	29°13.7 44°13.9	38.3 •• 39.2	95°59.2 110°24.6	6.3' 6.4'	24° 26.5 24° 17.2	-9.3' -9.5'	58.9'
15 16	59°14.1	40.2	110 24.6 124°50.0	6.4	24 17.2 24°07.7	-9.5 -9.6'	59.0' 59.0'
17	74°14.2	41.2	139° 15.4	6.5'	23°58.1	-9.8'	59.0'
18	89°14.4	N05°42.1	153°40.9	6.5'	\$23°48.3	-10.0'	59.1'
19 20	104° 14.6 119° 14.8	43.1 44.0	168°06.4 182°32.0	6.6' 6.6'	23°38.3 23°28.2	-10.1' -10.3'	59.1' 59.1'
21	134° 15.0	• • 45.0	196° 57.6	6.7'	23° 17.9	-10.3	59.2'
22	149° 15.1	45.9	211°23.3	6.7'	23°07.5	-10.6'	59.2'
23	164°15.3	46.9	225°49.1	6.8'	22°56.9	-10.7'	59.2'
	SD = 16.0'	d = 1.0'		S	D = 15.9'		
Thu	GHA	Dec	GHA	ν	Dec	d	НР
0	179° 15.5	N05°47.8	$240^{\circ}14.9$	6.9'	\$22°46.2	-10.9'	59.3'
1	194° 15.7	48.8	254°40.7	6.9'	22°35.3	-11.0'	59.3'
2	209° 15.9 224° 16.0	49.7 •• 50.7	269°06.6 283°32.6	7.0' 7.0'	22°24.3 22°13.1	-11.2' -11.3'	59.3' 59.4'
3 4	239° 16.2	51.6	203 32.0 297°58.6	7.0 7.1'	22°01.8	-11.5'	59.4 59.4
5	254°16.4	52.6	$312^{\circ}24.7$	7.1'	21°50.3	-11.6'	59.4'
6	269° 16.6	N05°53.5	326°50.8	7.2'	\$21°38.6	-11.8'	59.5'
7 8	284° 16.8 299° 16.9	54.5 55.4	341°17.0 355°43.2	7.2' 7.3'	21°26.9 21°15.0	-11.9' -12.1'	59.5' 59.5'
9	314° 17.1	56.4	10°09.5	7.4'	21°02.9	-12.2'	59.6'
10	329° 17.3	57.3	24°35.9	7.4'	20°50.7	-12.3'	59.6'
11 12	344° 17.5 359° 17.7	58.3 N05°59.3	39°02.3 53°28.8	7.5' 7.5'	20°38.4 \$20°25.9	-12.5' -12.6'	59.6' 59.6'
13	14° 17.8	06°00.2	67°55.3	7.6'	20° 13.3	-12.0 -12.7'	59.0 59.7'
14	29°18.0	01.2	$82^{\circ}21.9$	7.7'	$20^{\circ}00.5$	-12.9'	59.7'
15	44°18.2 59°18.4	02.1	96°48.6 111°15.3	7.7'	19° 47.7 19° 34.6	-13.0'	59.7'
16 17	74° 18.6	03.1 04.0	111 15.3 125°42.0	7.8' 7.8'	19 34.6 19°21.5	-13.1' -13.3'	59.8' 59.8'
18	89° 18.7	N06°05.0	140°08.9	7.9'	S19°08.2	-13.4	59.8'
19	104°18.9	05.9	154° 35.8	7.9'	18° 54.8	-13.5'	59.9'
20 21	119° 19.1 134° 19.3	06.9 •• 07.8	169°02.7 183°29.7	8.0' 8.1'	18° 41.3 18° 27.6	-13.7' -13.8'	59.9' 59.9'
22	149° 19.5	08.7	197°56.8	8.1'	18° 13.9	-13.9'	59.9'
23	164°19.6	09.7	212°23.9	8.2'	18°00.0	-14.0'	60.0'
	SD = 16.0'	d = 1.0'		S	D = 16.2'		
Fri	GHA	Dec	GHA	ν	Dec	d	НР
0	179° 19.8	N06° 10.6	226°51.0	8.2'	<b>S</b> 17°45.9	-14.1'	60.0'
1 2	194°20.0 209°20.2	11.6 12.5	241°18.3 255°45.6	8.3' 8.3'	17° 31.8 17° 17.5	-14.3' -14.4'	60.0' 60.1'
3	209 20.2 224°20.3	12.5	255 45.6 270°12.9	8.4'	17 17.5 17°03.2	-14.4 -14.5'	60.1
4	239° 20.5	14.4	284°40.3	8.5'	16°48.7	-14.6'	60.1'
5	254°20.7 269°20.9	15.4 N06° 16.3	299°07.8 313°35.3	8.5'	16° 34.1 \$16° 19.4	-14.7' -14.8'	60.1' 60.2'
6 7	269°20.9 284°21.1	N06° 16.3 17.3	313°35.3 328°02.8	8.6' 8.6'	16° 04.5	-14.8° -14.9°	60.2'
8	299°21.2	18.2	$342^{\circ}30.5$	8.7'	15°49.6	-15.0'	60.2'
9	314°21.4	• 19.2	356°58.1	8.7'	15°34.6	-15.1'	60.2'
10 11	329°21.6 344°21.8	20.1 21.1	11°25.8 25°53.6	8.8' 8.8'	15° 19.4 15° 04.2	-15.2' -15.3'	60.3' 60.3'
12	359°21.9	N06°22.0	40°21.5	8.9'	\$14°48.8	-15.4'	60.3
13	14°22.1	23.0	54°49.3	8.9'	14° 33.4	-15.5'	60.3'
14 15	29°22.3 44°22.5	23.9 •• 24.9	69°17.3 83°45.2	9.0' 9.0'	14° 17.8 14° 02.2	-15.6' -15.7'	60.4' 60.4'
15 16	44°22.5 59°22.7	25.8	98° 13.3	9.0	14°02.2 13°46.5	-15.7' -15.8'	60.4
17	74°22.8	26.7	112°41.4	9.1'	13°30.6	-15.9'	60.4
18	89°23.0	N06°27.7	127°09.5	9.2'	\$13°14.7	-16.0'	60.5
19 20	104°23.2 119°23.4	28.6 29.6	141°37.7 156°05.9	9.2' 9.3'	12°58.7 12°42.6	-16.1' -16.2'	60.5' 60.5'
21	119 23.4 134°23.5	30.5	170°34.1	9.3'	12° 26.4	-16.2	60.5
22	149°23.7	31.5	185°02.5	9.4'	12° 10.2	-16.4'	60.5'
23	164°23.9	32.4	199°30.8	9.4'	11°53.8	-16.4'	60.6'
	SD = 16.0'	d = 0.9'		S	D = 16.4'		

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

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

		Sun		Moon			
Day	Eqn.of	Eqn.of Time		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	41-20%	
03	03:15	03:07	12:03	07:21	19:49		
04	02:58	02:49	12:03	08:18	20:45		
05	02:41	02:32	12:03	09:13	21:39		

h	Aries	`	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
	194° 46.4	193°14.1	S00°57.6	211°55.4	S08°37.4	148°33.7	N16°32.3		S07°47.0		SHA	Dec
0	209°48.9	208° 13.7		211 55.4 226°56.0		140 33.7 163°35.7	32.4	208° 43.0 223° 45.2	46.9	Alpheratz	357°35.8	29° 13.3
1	209 46.9 224°51.3		56.4		36.7					Ankaa	353°08.2	-42° 10.5
2		223°13.3	55.2	241°56.7	35.9	178° 37.6	32.6	238° 47.5	46.8	Schedar	349°32.4	56°40.1
3	239°53.8	238° 13.0	• • 54.0	256°57.3	• • 35.2	193°39.5	• • 32.7	253°49.7	• • 46.7	Diphda	348°48.3	-17°51.3
4	254°56.3	253°12.6	52.8	271°58.0	34.5	208°41.4	32.9	268°51.9	46.6	Achernar	335°21.2	-57°06.9
5	269°58.7	268°12.2	51.5	286°58.6	33.7	223°43.3	33.1	283°54.1	46.5	Hamal	327°52.3	23°34.5
6	285°01.2	283°11.9	S00°50.3	301°59.2	S08°33.0	238°45.2	N16°33.2	298° 56.3	S07°46.4	Polaris	314°47.5	89°22.1
7	300°03.7	298°11.5	49.1	316°59.9	32.3	253°47.2	33.4	313°58.5	46.3	Acamar	315°12.6	-40°12.6
8	315°06.1	313°11.1	47.9	332°00.5	31.5	$268^{\circ}49.1$	33.5	329°00.7	46.2	Menkar	314°07.1	4°11.0
9	330°08.6	328° 10.7	• • 46.6	347°01.2	• • 30.8	283°51.0	• • 33.7	344°02.9	• • 46.1	Mirfak	308°29.6	49°56.9
10	$345^{\circ}11.1$	343°10.4	45.4	2°01.8	30.0	298°52.9	33.8	359°05.1	46.0	Aldebaran	290°40.6	16°33.4
11	0°13.5	$358^{\circ}10.0$	44.2	$17^{\circ}02.5$	29.3	313°54.8	34.0	14°07.3	45.9	Rigel	281°04.6	-8° 10.5
12	15° 16.0	13°09.6	S00°43.0	32°03.1	508°28.6	328°56.7	N16°34.2	29°09.5	S07°45.8		280°23.1	46°01.5
13	30°18.4	28°09.3	41.8	47°03.7	27.8	343°58.7	34.3	$44^{\circ}11.7$	45.7	Capella	278°23.7	6°22.2
14	45°20.9	43°08.9	40.5	62°04.4	27.1	359°00.6	34.5	59° 13.9	45.6	Bellatrix		
15	60°23.4	58° 08.5	· · 39.3	77°05.0	· · 26.4	14°02.5	• • 34.6	$74^{\circ}16.1$	• • 45.5	Elnath	278°02.8	28°37.7
16	75°25.8	73°08.1	38.1	92°05.7	25.6	29°04.4	34.8	89°18.4	45.4	Alnilam	275°38.5	-1°11.3
17	90°28.3	88°07.8	36.9	107°06.3	24.9	44°06.3	34.9	104°20.6	45.3	Betelgeuse	270°52.9	7°24.6
18	105°30.8	103°07.4	S00°35.6	122°07.0	508°24.2	59°08.2	N16°35.1	119°22.8	S07°45.2	Canopus	263°52.8	-52°42.8
19	120° 33.2	118° 07.0	34.4	137°07.6	23.4	74° 10.1	35.3	134°25.0	45.1	Sirius	258°26.9	-16°45.1
20	135° 35.7	133°06.7	33.2	152°08.3	22.7	89°12.1	35.4	149°27.2	45.0	Adhara	255°06.4	-29°00.5
21	150° 38.2	148° 06.3	• • 32.0	167°08.9	22.0	104° 14.0	35.6	164° 29.4	• • 44.9	Procyon	244°51.5	5°09.7
22	165° 40.6	163°05.9	30.7	182°09.5	21.2	119° 15.9	35.7	179°31.6	44.8	Pollux	243°18.0	27°58.1
23	180° 43.1	103 05.9 178°05.5	29.5	102 09.5 197°10.2	20.5	134° 17.8	35.7	179 31.0 194°33.8	44.6	Avior	234°14.9	-59°35.5
										Suhail	222°46.6	-43°32.0
Mer.p	ass. 10:59	$\nu$ -0.4' d-1	2′ m-3.89	$\nu$ 0.6′ d-0	.7′ m1.18	u 1.9' d0.	.2′ m-2.05	$\nu$ 2.2′ d-0	.1' m $1.06$	Miaplacidus	221°38.0	-69°49.2
<u>.</u>	-	-		-		-				Alphard	$217^{\circ}48.2$	-8°45.9
_	6114	6114	_		_	C114	_		_	Regulus	207°34.9	11°50.9
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.2	61°37.3
0	195° 45.5	193°05.2	S00°28.3	212°10.8	S08°19.8	149° 19.7	N16°36.0	209°36.0	S07°44.6	Denebola	182°25.3	14°26.1
1	210°48.0	208° 04.8	27.1	227°11.5	19.0	164°21.6	36.2	224°38.2	44.5	Gienah	175°43.9	-17°40.7
2	225°50.5	223°04.4	25.8	242°12.1	18.3	179°23.5	36.3	239°40.4	44.4		173°00.2	-63°14.1
3	240°52.9	238°04.1	• • 24.6	$257^{\circ}12.8$	• • 17.6	194°25.5	• • 36.5	254°42.7	• • 44.3		171°51.8	-57° 15.0
4	255°55.4	253°03.7	23.4	272°13.4	16.8	209°27.4	36.7	269°44.9	44.2	Alioth	166°12.9	55°49.7
5	270°57.9	268°03.3	22.2	$287^{\circ}14.1$	16.1	224°29.3	36.8	284°47.1	44.1	Spica	158°22.7	-11° 17.4
6	286°00.3	283°02.9	S00°20.9	302°14.7	508°15.3	239°31.2	N16°37.0	299°49.3	S07°44.0	Alkaid	150° 52.7	49°11.4
7	301°02.8	298°02.6	19.7	$317^{\circ}15.4$	14.6	254°33.1	37.1	314°51.5	43.9	Hadar	148°36.3	-60°29.4
8	316°05.3	313°02.2	18.5	$332^{\circ}16.0$	13.9	269°35.0	37.3	329°53.7	43.8		146 50.5 147°58.0	-36°29.4
9	331°07.7	328°01.8	• • 17.3	347°16.7	• • 13.1	284°36.9	• • 37.4	344°55.9	• • 43.7			
10	346° 10.2	343°01.5	16.1	2°17.3	12.4	299°38.9	37.6	359°58.1	43.6	Arcturus	145°48.2	19°03.2
11	1°12.7	358°01.1	14.8	17°17.9	11.7	314°40.8	37.8	15°00.3	43.5	Rigil Kent.	139°40.6	-60°56.1
12	16° 15.1	13°00.7	S00°13.6	32°18.6	S08°10.9	329°42.7	N16°37.9	30°02.5	S07°43.4	Kochab	137°18.7	74°03.1
13	31° 17.6	28° 00.4	12.4	47°19.2	10.2	344°44.6	38.1	45°04.7	43.3	Zuben'ubi	136°56.4	-16°08.6
14	46°20.0	43°00.0	11.2	62°19.9	09.4	359°46.5	38.2	60°07.0	43.2	Alphecca	126°04.0	26°37.8
15	61°22.5	57° 59.6	09.9	77°20.5	08.7	14°48.4	•• 38.4	75°09.2	• • 43.1	Antares	112°16.4	-26°29.2
16	76° 25.0	72°59.2	08.7	92°21.2		29°50.3	38.5	90°11.4		Atria	$107^{\circ}10.9$	-69°04.1
	91°27.4			92 21.2 107°21.8	08.0				43.0	Sabik	102°03.4	-15°45.4
17		87°58.9	07.5		07.2	44°52.2	38.7	105°13.6	42.9	Shaula	$96^{\circ}11.1$	-37°07.2
18	106°29.9	102°58.5	500°06.3	122°22.5	S08°06.5	59°54.2	N16°38.8	120°15.8	507°42.8	Rasalhague	95°59.0	12°32.3
19	121°32.4	117°58.1	05.0	137°23.1	05.8	74°56.1	39.0	135°18.0	42.7	Eltanin	90°42.3	51°28.7
20	136°34.8	132° 57.8	03.8	152°23.8	05.0	89°58.0	39.2	150°20.2	42.6	Kaus Aust.	83°33.3	-34°22.3
21	151°37.3	147°57.4	• • 02.6	167°24.4	• • 04.3	104°59.9	• • 39.3	165°22.4	• • 42.5	Vega	80°33.6	38°48.0
22	166°39.8	162°57.0	01.4	182°25.1	03.5	120°01.8	39.5	180°24.6	42.4	Nunki	75°48.5	-26° 16.0
23	181° 42.2	177°56.6	00.1	197°25.7	02.8	135°03.7	39.6	195°26.8	42.3	Altair	62°00.6	8°55.7
Mer n	ass. 10:55	$\nu$ -0 4' d-1	2′ m-3.89	ν0 6' d-0	.7′ m1.18	$v^{1} 9' d0$	2′ m-2.05	ν2 2' d-0	.1′ m1.06	Peacock	53°06.9	-56°39.3
- тист.р	10.55				.,	- I.5 do.				Deneb	49°26.4	45°21.6
										Enif	33°39.6	9°58.9
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°34.0	-46°50.6
0	196°44.7	$192^{\circ}56.3$	N00°01.1	212°26.4	508°02.1	150°05.6	$N16^{\circ}39.8$	$210^{\circ}29.0$	S07°42.2	Fomalhaut	15°15.5	-29°29.7
1	$211^{\circ}47.1$	$207^{\circ}55.9$	02.3	227°27.0	01.3	165°07.5	39.9	225°31.3	42.1	Scheat	13°46.1	28°12.6
2	226°49.6	222°55.5	03.5	242°27.7	$08^{\circ}00.6$	$180^{\circ}09.5$	40.1	$240^{\circ}33.5$	42.0	Markab	13°30.8	15° 19.9
3	241°52.1	237°55.2	• • 04.8	257°28.3	$07^{\circ}59.8$	$195^{\circ}11.4$	• • 40.3	255°35.7	• • 41.9	Iviainab		10 19.9
4	256°54.5	252°54.8	06.0	272°29.0	59.1	$210^{\circ}13.3$	40.4	270°37.9	41.8	Apr 06 Sat	SHA	Mer.pass
5	271°57.0	267°54.4	07.2	287°29.6	58.4	$225^{\circ}15.2$	40.6	$285^{\circ}40.1$	41.7	Venus		11:07
6	286°59.5	282°54.1	N00°08.4	302°30.3	S07°57.6	240°17.1	N16°40.7	300°42.3	S07°41.6	Mars	$17^{\circ}09.0$	09:52
7	302°01.9	297°53.7	09.7	317°30.9	56.9	255° 19.0	40.9	315°44.5	41.5	Jupiter	313°47.3	14:04
8	317°04.4	312°53.3	10.9	332°31.6	56.2	270°20.9	41.0	330°46.7	41.4	Saturn	13°56.6	10:04
9	332°06.9	327°52.9	. 12.1	347°32.2	• • 55.4	285°22.8	41.2	345°48.9	• • 41.3			
10	347°09.3	342°52.6	13.3	2°32.9	54.7	300°24.7	41.3	0°51.2	41.2	Apr 07 Sun	SHA	Mer.pass
11	2°11.8	357°52.2	14.6	17°33.5	53.9	315°26.6	41.5	15°53.4	41.1	Venus	357°19.6	11:08
12	17°14.3	12°51.8	N00°15.8	32°34.2	S07°53.2	330°28.6	N16°41.7	30°55.6	S07°41.0	Mars	16°25.3	09:51
13	32°16.7	27°51.5	17.0	47°34.8	52.5	345°30.5	41.8	45° 57.8	40.9	Jupiter		14:01
14	47° 19.2	42°51.1	18.2	62°35.5	51.7	0°32.4	42.0	61°00.0	40.8	Saturn	13°50.5	10:00
15	62°21.6	57° 50.7	19.5	77°36.1	51.0	15°34.3	• • 42.1	76°02.2	• • 40.7	Apr 00 14-	CHA	Me:: ====
	77° 24.1	72°50.4	20.7	92°36.8	50.2	15 34.3 30°36.2	42.1	76 02.2 91°04.4	40.7	Apr 08 Mon	SHA	Mer.pass
16 17											356°11.6	11:09
17	92°26.6 107°29.0	87°50.0	21.9 N00°22.1	107°37.4	49.5	45°38.1	42.4 N16°42.6	106°06.6	40.5	Mars	15°41.7	09:50
18		102°49.6	N00°23.1	122°38.1	S07°48.8	60°40.0		121°08.8	\$07°40.4	Jupiter		13:58
19	122°31.5	117° 49.3	24.4	137°38.7	48.0	75°41.9	42.8	136°11.1	40.3	Saturn	13°44.4	09:57
20	137°34.0	132°48.9	25.6	152°39.4	47.3	90°43.8	42.9	151°13.3	40.2	Horizont	al narallav	
21	152°36.4	147°48.5	• • 26.8	167°40.0	• • 46.5	105° 45.7	• • 43.1	166° 15.5	• • 40.1	norizont	al parallax	0.1
22	167°38.9	162°48.1	28.0	182°40.7	45.8	120°47.7	43.2	181°17.7	40.0		Venus:	0.1
23	182°41.4	177° 47.8	29.3	197°41.3	45.0	135°49.6	43.4	196° 19.9	39.9		Mars:	0.1
Mern	ass. 10:51	ν-0 Δ' d1	.2′ m-3.89	ν0.6/ d.0	.7′ m1.17	1/1 0/ d0	.2′ m-2.05	v2 2/ d.0	.1′ m1.06			
ο		. J., UI	5.05	. J.J u-0		. I.J UU.		u - u				

h	Sur	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°24.1	N06°33.4	213°59.2	9.4'	S11°37.4	-16.5'	60.6'
1 2	194°24.2 209°24.4	34.3 35.2	228°27.6 242°56.1	9.5' 9.5'	11°20.9 11°04.3	-16.6' -16.7'	60.6' 60.6'
3	224°24.6	36.2	257°24.6	9.6'	10°47.6	-16.7	60.6
4	239°24.8	37.1	271°53.2	9.6'	10°30.9	-16.8'	60.7'
5	254°24.9 269°25.1	38.1	286°21.8 300°50.4	9.6'	10°14.1 S09°57.2	-16.9'	60.7'
6 7	269°25.1 284°25.3	N06°39.0 40.0	300°50.4 315°19.1	9.7' 9.7'	509°57.2 09°40.3	-16.9' -17.0'	60.7' 60.7'
8	299°25.5	40.9	329°47.8	9.7'	09°23.2	-17.1	60.7'
9	314°25.6	• • 41.8	344°16.5	9.8'	09°06.2	-17.1'	60.8'
10 11	329°25.8 344°26.0	42.8 43.7	358°45.3 13°14.1	9.8' 9.8'	08°49.0 08°31.8	-17.2' -17.3'	60.8' 60.8'
12	359°26.2	N06°44.7	27°43.0	9.0	508° 14.6	-17.3'	60.8
13	14°26.3	45.6	42°11.8	9.9'	07°57.3	-17.4'	60.8'
14	29°26.5	46.6	56°40.7	9.9'	07°39.9	-17.4	60.8'
15 16	44°26.7 59°26.9	· · 47.5 48.4	71°09.7 85°38.6	10.0' 10.0'	07°22.5 07°05.0	-17.5' -17.5'	60.8' 60.9'
17	74°27.0	49.4	100°07.6	10.0'	06° 47.5	-17.6'	60.9'
18	89°27.2	$N06^{\circ}50.3$	114°36.6	10.0'	<b>S</b> 06°30.0	-17.6'	60.9'
19	104°27.4 119°27.6	51.3 52.2	129°05.6 143°34.7	10.0'	06°12.3 05°54.7	-17.6'	60.9'
20 21	119°27.6 134°27.7	52.2 · · 53.1	143°34.7 158°03.7	10.1' 10.1'	05°54.7 05°37.0	-17.7' -17.7'	60.9' 60.9'
22	149°27.9	54.1	172°32.8	10.1'	05° 19.3	-17.8'	60.9
23	164°28.1	55.0	187°01.9	10.1'	05°01.5	-17.8'	60.9'
	SD = 16.0'	d = 0.9'		SI	D = 16.5'		
Sun	GHA	Dec	GHA	ν	Dec	d	НР
0	179°28.3	N06°56.0	201°31.0	10.1'	S04°43.7	-17.8'	60.9'
1	194°28.4	56.9	$216^{\circ}00.2$	10.2'	04°25.9	-17.9'	61.0'
2	209°28.6 224°28.8	57.8	230°29.3 244°58.5	10.2'	04°08.0 03°50.1	-17.9'	61.0' 61.0'
3 4	224 28.8 239°29.0	· · 58.8 06°59.7	244 58.5 259°27.7	10.2' 10.2'	03°50.1 03°32.2	-17.9' -17.9'	61.0'
5	254°29.1	07°00.7	273°56.9	10.2'	03° 14.2	-18.0'	61.0'
6	269°29.3	N07°01.6	288°26.1	10.2'	S02°56.3	-18.0'	61.0'
7 8	284°29.5 299°29.7	02.5 03.5	302°55.3 317°24.5	10.2' 10.2'	02°38.3 02°20.3	-18.0' -18.0'	61.0' 61.0'
9	314°29.8	• • 04.4	311° 53.8	10.2'	02° 02.3	-18.0'	61.0
10	329°30.0	05.3	346°23.0	10.2'	$01^{\circ}44.2$	-18.1'	61.0'
11	344°30.2	06.3	0°52.2	10.2'	01°26.2	-18.1'	61.0'
12 13	359°30.3 14°30.5	N07°07.2 08.2	15°21.5 29°50.7	10.2' 10.2'	\$01°08.1 00°50.0	-18.1' -18.1'	61.0' 61.0'
14	29°30.7	09.1	44°20.0	10.2'	00°31.9	-18.1	61.0'
15	44°30.9	• • 10.0	58°49.2	10.2'	S00°13.8	-18.1'	61.0'
16 17	59°31.0 74°31.2	11.0 11.9	73°18.5 87°47.7	10.2' 10.2'	N00°04.2 00°22.3	18.1' 18.1'	61.0' 61.0'
18	89°31.4	N07°12.8	102°16.9	10.2'	N00° 40.4	18.1	61.0'
19	104°31.6	13.8	$116^{\circ}46.2$	10.2'	00°58.5	18.1'	61.0'
20	119°31.7		131°15.4		01°16.6		61.0'
21 22	134°31.9 149°32.1	· · 15.6 16.6	145°44.6 160°13.8	10.2' 10.2'	01°34.7 01°52.7	18.1' 18.1'	61.0' 61.0'
23	164°32.2	17.5	174°43.0	10.2'	02°10.8	18.0'	61.0'
	SD = 16.0'	d = 0.9'		SI	D = 16.6'		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	179°32.4	N07°18.4	189°12.2	10.2'	N02°28.8	18.0'	61.0'
1	194°32.6	19.4	203°41.4	10.2'	02°46.8	18.0'	61.0'
2	209°32.8 224°32.9	20.3	218°10.6 232°39.7	10.1' 10.1'	03°04.8 03°22.8	18.0' 18.0'	61.0' 61.0'
4	239°33.1	22.2	232 39.7 247°08.8	10.1	03°22.8	18.0 17.9'	61.0'
5	254°33.3	23.1	261°38.0	10.1'	03°58.7	17.9'	61.0'
6	269°33.4 284°33.6	N07°24.0 25.0	276°07.1 290°36.1	10.1' 10.1'	N04°16.6 04°34.5	17.9'	61.0'
7 8	284°33.6 299°33.8	25.0 25.9	305°05.2	10.1	04° 34.5 04° 52.4	17.9' 17.8'	61.0' 61.0'
9	314°33.9	• • 26.8	$319^{\circ}34.2$	10.0'	05° 10.2	17.8'	61.0'
10	329°34.1	27.8	334°03.2	10.0'	05°28.0	17.8'	61.0'
11 12	344°34.3 359°34.5	28.7 N07°29.6	348°32.2 3°01.2	10.0' 9.9'	05° 45.8 N06° 03.5	17.7' 17.7'	60.9' 60.9'
13	14°34.6	30.6	17°30.1	9.9'	06°21.2	17.6	60.9
14	29°34.8	31.5	31°59.1	9.9'	06°38.8	17.6'	60.9'
15 16	44°35.0 59°35.1	• • 32.4	46°27.9 60°56.8	9.9'	06°56.4 07°13.9	17.5'	60.9'
16 17	59°35.1 74°35.3	33.4 34.3	60°56.8 75°25.6	9.8' 9.8'	07°13.9 07°31.4	17.5' 17.4'	60.9' 60.9'
18	89°35.5	N07°35.2	89°54.4	9.8'	N07°48.9	17.4'	60.9'
19	104°35.6	36.2	104°23.2	9.7'	08°06.3	17.3'	60.9'
20 21	119°35.8 134°36.0	37.1 •• 38.0	118°51.9 133°20.6	9.7' 9.7'	08°23.6 08°40.9	17.3' 17.2'	60.8' 60.8'
22	134 30.0 149°36.2	38.9	133 20.0 147°49.2	9.7 9.6'	08°58.2	17.2'	60.8
23	164°36.3	39.9	162°17.9	9.6'	09°15.3	17.1'	60.8'
	SD = 16.0'	d = 0.9'		SI	D = 16.6'		

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

Lat.		Moonris	е		Moonset	
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°	06:10	05:26	04:47	14:37	17:12	19:49
<b>N</b> 70°	05:54	05:22	04:52	14:49	17:12	19:36
68°	05:42	05:18	04:56	14:59	17:12	19:25
66°	05:32	05:15	04:59	15:07	17:11	19:17
64°	05:23	05:12	05:02	15:13	17:11	19:09
62°	05:15	05:10	05:05	15:19	17:11	19:03
60°	05:09	05:08	05:07	15:24	17:11	18:58
N 58°	05:03	05:06	05:09	15:28	17:11	18:53
56°	04:58	05:05	05:11	15:32	17:10	18:49
54°	04:53	05:03	05:13	15:35	17:10	18:46
52° 50°	04:49	05:02	05:14	15:38 15:41	17:10	18:42 18:39
45°	04:45 04:37	05:01 04:58	05:16 05:19	15:41	17:10 17:10	18:39
1						
N 40° 35°	04:30	04:56	05:21	15:52	17:10	18:27
35°	04:24 04:18	04:54 04:52	05:24 05:26	15:56 16:00	17:09 17:09	18:23 18:19
20°	04:18	04:52	05:20	16:00	17:09	18:19
N 10°	04:01	04:47	05:32	16:12	17:09	18:05
0°	03:53	04:44	05:35	16:17	17:08	18:00
S 10°	03:45	04:42	05:38	16:22	17:08	17:54
20°	03:37	04:39	05:42	16:28	17:08	17:48
30°	03:27	04:36	05:46	16:34	17:07	17:41
35°	03:22	04:35	05:48	16:37	17:07	17:37
40°	03:15	04:33	05:50	16:41	17:07	17:33
45°	03:08	04:31	05:53	16:46	17:06	17:27
<b>S</b> 50°	02:59	04:28	05:57	16:51	17:06	17:21
52°	02:55	04:27	05:59	16:53	17:06	17:18
54°	02:50	04:25	06:00	16:56	17:06	17:15
56°	02:45	04:24	06:02	16:59	17:05	17:12
58°	02:39	04:22	06:05	17:02	17:05	17:08
<b>S</b> 60°	02:33	04:20	06:07	17:06	17:05	17:04

		Sun		Moon			
Day	Eqn.of 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	11-1%	
06	02:24	02:15	12:02	10:05	22:31		
07	02:07	01:59	12:02	10:56	23:22		
08	01:50	01:42	12:02	11:47	-:-		

h	Aries	`	nus	, M	ars	Jur	oiter	Sat	urn		Stars	
-												
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0 1	197° 43.8 212° 46.3	192°47.4 207°47.0	N00° 30.5 31.7	212°42.0 227°42.6	\$07°44.3 43.6	150°51.5 165°53.4	N16°43.5 43.7	211°22.1 226°24.3	\$07°39.8 39.7	Alpheratz	357°35.8	29°13.3
2	212 40.3 227°48.7	207 47.0 222°46.7	32.9	242°43.3	43.0 42.8	180°55.3	43.7	241°26.5	39.7	Ankaa	353°08.2	-42°10.5
3	242°51.2	237°46.3	34.2	242 43.3 257°43.9	. 42.0	100 55.3 195°57.2	• • 44.0	241 20.5 256°28.8	39.5	Schedar	349°32.4	56°40.1
4	257° 53.7	252°45.9	35.4	272°44.6	41.3	210°59.1	44.2	271°31.0	39.4	Diphda	348°48.3	-17°51.3
5	272°56.1	267°45.6	36.6	287°45.2	40.6	226°01.0	44.3	286°33.2	39.3	Achernar	335°21.2	-57°06.9
6	287°58.6	282°45.2	N00° 37.9	302°45.9	S07°39.9	241°02.9	N16°44.5	301°35.4	S07°39.2	Hamal	327°52.3	23°34.5
7	303°01.1	297°44.8	39.1	317°46.5	39.1	256°04.8	44.6	316°37.6	39.1	Polaris	314°48.1	89°22.1
8	318°03.5	312°44.4	40.3	332°47.2	38.4	271°06.7	44.8	331°39.8	39.0	Acamar	315°12.6	-40°12.6
9	333°06.0	327°44.1	• • 41.5	347°47.8	• • 37.6	286°08.7	• • 44.9	346°42.0	• • 38.9	Menkar	314°07.1	4°11.0
10	348°08.5	342°43.7	42.8	2°48.5	36.9	301°10.6	45.1	1°44.2	38.8	Mirfak	308° 29.6 290° 40.6	49°56.9 16°33.4
11	3°10.9	357°43.3	44.0	17°49.1	36.1	$316^{\circ}12.5$	45.2	16°46.5	38.8	Aldebaran Rigel	290 40.0 281°04.7	-8°10.5
12	18° 13.4	12°43.0	N00°45.2	32°49.8	S07°35.4	331°14.4	N16°45.4	31°48.7	S07°38.7	Capella	280°23.1	-6°10.5
13	33° 15.9	27°42.6	46.4	47°50.4	34.7	346°16.3	45.6	46°50.9	38.6	Bellatrix	278°23.7	6°22.2
14	48° 18.3	42°42.2	47.7	62°51.1	33.9	1°18.2	45.7	61°53.1	38.5	Elnath	278°02.9	28°37.7
15	63°20.8	57°41.9	• • 48.9	77°51.8	• • 33.2	16°20.1	• • 45.9	76°55.3	• • 38.4	Alnilam	275°38.5	-1°11.3
16	78°23.2	72°41.5	50.1	92°52.4	32.4	31°22.0	46.0	91°57.5	38.3	Betelgeuse	270°52.9	7°24.6
17	93°25.7	87°41.1	51.3	107°53.1	31.7	46°23.9	46.2 N16°46.3	106°59.7	38.2	Canopus	263°52.8	-52°42.7
18 19	108° 28.2 123° 30.6	102°40.8 117°40.4	N00° 52.6 53.8	122°53.7 137°54.4	\$07°30.9 30.2	61°25.8 76°27.7	46.5	122°01.9 137°04.2	\$07°38.1 38.0	Sirius	258°26.9	-16°45.1
20	138° 33.1	117 40.4 132°40.0	55.0	157°55.0	29.5	91°29.6	46.7	157°04.2	37.9	Adhara	255°06.4	-29°00.5
21	153° 35.1	147°39.6	56.2	167°55.7	. 28.7	106°31.5	• • 46.8	167°08.6	• • 37.8	Procyon	244°51.5	5°09.7
22	168° 38.0	162°39.3	57.5	182°56.3	28.0	100°31.5	47.0	182°10.8	37.7	Pollux	243°18.1	27°58.1
23	183° 40.5	177°38.9	58.7	197°57.0	27.2	136°35.4	47.1	197°13.0	37.6	Avior	234°14.9	-59°35.5
										Suhail	222°46.6	-43°32.0
Mer.p	ass. 10:47	$\nu$ -0.4′ $d1$	.2′ m-3.89	$\nu$ 0.7 d-0	.7′ m1.17	$\nu$ 1.9′ d0.	2′ m-2.05	$\nu$ 2.2′ d-0	.1′ m1.07	Miaplacidus	221°38.1	-69°49.2
										Alphard Regulus	217°48.2 207°34.9	-8°45.9 11°50.9
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.2	61°37.3
0	198°43.0	192°38.5	N00° 59.9	212°57.6	S07°26.5	151°37.3	$N16^{\circ}47.3$	212°15.2	S07°37.5	Denebola	182° 25.3	14°26.1
1	213°45.4	207°38.2	$01^{\circ}01.1$	227°58.3	25.7	166°39.2	47.4	227°17.4	37.4	Gienah	175°43.9	-17°40.7
2	228° 47.9	222°37.8	02.4	242°58.9	25.0	181°41.1	47.6	242°19.7	37.3	Acrux	173°00.2	-63°14.1
3	243°50.4	237°37.4	• • 03.6	257°59.6	• • 24.2	196°43.0	• • 47.7	257°21.9	• • 37.2	Gacrux	171°51.8	-57°15.0
4	258°52.8	252°37.1	04.8	273°00.3	23.5	211°44.9	47.9	272°24.1	37.1	Alioth	166°12.9	55°49.7
5	273°55.3	267°36.7	06.0	288°00.9	22.8	226°46.8	48.1	287°26.3	37.0	Spica	$158^{\circ}22.7$	-11°17.4
6	288° 57.7	282°36.3	N01°07.3	303°01.6	S07°22.0	241°48.7 256°50.6	N16°48.2	302°28.5	S07°36.9	Alkaid	$152^{\circ}52.0$	49°11.4
7 8	304°00.2 319°02.7	297°36.0 312°35.6	08.5 09.7	318°02.2 333°02.9	21.3 20.5	256 50.6 271°52.5	48.4 48.5	317°30.7 332°32.9	36.8	Hadar	148°36.3	-60°29.4
9	334° 05.1	312 35.0 327°35.2	• • 10.9	348°03.5	. 19.8	271 52.5 286°54.4	· · 48.7	347°35.1	36.7 · · 36.6	Menkent	147°58.0	-36°29.4
10	349°07.6	342°34.8	12.2	3°04.2	19.0	301°56.3	48.8	2°37.4	36.5	Arcturus	145°48.2	19°03.2
11	4° 10.1	357°34.5	13.4	18°04.8	18.3	316°58.2	49.0	17°39.6	36.4	Rigil Kent.	139°40.6	-60°56.1
12	19° 12.5	12°34.1	N01° 14.6	33°05.5	S07°17.5	332°00.1	N16°49.1	32°41.8	S07°36.3	Kochab	137°18.6	74°03.2
13	34° 15.0	27°33.7	15.8	48°06.2	16.8	347°02.1	49.3	47°44.0	36.2	Zuben'ubi	136°56.4	-16°08.6
14	49° 17.5	42°33.4	17.1	63°06.8	16.1	2°04.0	49.5	62°46.2	36.1	Alphecca	126°04.0	26°37.8
15	$64^{\circ}19.9$	57°33.0	• • 18.3	78°07.5	• • 15.3	17°05.9	• • 49.6	77°48.4	• • 36.0	Antares Atria	112°16.4 107°10.9	-26°29.2 -69°04.1
16	79°22.4	72°32.6	19.5	93°08.1	14.6	32°07.8	49.8	92°50.7	35.9	Sabik	107 10.9 102°03.3	-09 04.1 -15°45.4
17	94° 24.8	87°32.3	20.7	108°08.8	13.8	47°09.7	49.9	107°52.9	35.8	Shaula	96°11.1	-37°07.2
18	109°27.3	102°31.9	N01°22.0	123°09.4	S07°13.1	62°11.6	N16°50.1	122°55.1	S07°35.7	Rasalhague	95°59.0	12°32.3
19	124° 29.8	117°31.5	23.2	138°10.1	12.3	77°13.5	50.2	137°57.3	35.6	Eltanin	90°42.3	51°28.8
20	139°32.2	132°31.1	24.4	153°10.7	11.6	92°15.4	50.4	152°59.5	35.5	Kaus Aust.	83°33.3	-34°22.3
21	154°34.7	147°30.8	• • 25.6	168°11.4	• • 10.8	107°17.3	• • 50.6	168°01.7	• • 35.4	Vega	80°33.6	38°48.0
22	169°37.2	162°30.4	26.9	183°12.1	10.1	122°19.2	50.7	183°03.9	35.3	Nunki	75°48.5	-26°16.0
23	184°39.6	177°30.0	28.1	198°12.7	09.3	137°21.1	50.9	198°06.2	35.2	Altair	62°00.6	8°55.7
Mer.p	ass. 10:43	$\nu$ -0.4 $'$ d1	.2′ m-3.89	$\nu$ 0.7′ d-0	$.7'  \mathrm{m}1.17$	$\nu 1.9' \ d0.$	2′ m-2.04	$\nu$ 2.2′ d-0	.1'  m1.07	Peacock	53°06.9	-56°39.3
										Deneb	49°26.4	45°21.6
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.6	9°59.0
0	199° 42.1	192°29.7	N01°29.3	213°13.4	S07°08.6	152°23.0	N16°51.0	213°08.4	S07°35.1	Al Na'ir Fomalhaut	27°34.0 15°15.5	-46°50.6 -29°29.7
1	214° 44.6	207°29.3	30.5	228°14.0	07.8	167°24.9	51.2	228°10.6	35.0	Scheat	15 15.5 13°46.1	-29 29.7 28°12.6
2	229°47.0	222°28.9	31.8	$243^{\circ}14.7$	07.1	$182^{\circ}26.8$	51.3	243°12.8	35.0	Markab	13° 30.8	15°19.9
3	244° 49.5	237°28.6	• • 33.0	258°15.3	• • 06.4	197°28.7	•• 51.5	258°15.0	• • 34.9			
4	259°52.0	252°28.2	34.2	273°16.0	05.6	212°30.6	51.6	273°17.2	34.8	Apr 09 Tue	SHA	Mer.pass
5	274° 54.4	267°27.8	35.4	288°16.7	04.9	227°32.5	51.8	288°19.5	34.7	Venus	355°03.6	11:09
6	289°56.9	282°27.4	N01°36.7	303°17.3	S07°04.1	242°34.4	N16°52.0	303°21.7	S07°34.6	Mars	14°58.1	09:49
7	304°59.3	297°27.1	37.9	318°18.0	03.4	257°36.3	52.1	318°23.9	34.5	Jupiter	313°07.7	13:55
8 9	320°01.8 335°04.3	312°26.7	39.1 •• 40.3	333°18.6 348°19.3	02.6 •• 01.9	272°38.2 287°40.1	52.3 •• 52.4	333°26.1 348°28.3	34.4 •• 34.3	Saturn	13°38.3	09:53
9 10	350°06.7	327°26.3 342°26.0	41.6	348 19.3 3°20.0	01.1	302°42.0	52.6	348 28.3 3°30.5	34.3	Apr 10 Wed	SHA	Mer.pass
11	5° 09.2	357°25.6	42.8	18°20.6	01.1 07°00.4	302 42.0 317°44.0	52.0 52.7	3 30.5 18°32.7	34.2	Venus	353°55.6	11:10
12	20° 11.7	12°25.2	N01°44.0	33°21.3	S06°59.6	332°45.9	N16°52.9	33°35.0	507°34.0	Mars	14°14.7	09:48
13	35° 14.1	27°24.9	45.2	48°21.9	58.9	347°47.8	53.0	48°37.2	33.9	Jupiter	312°54.3	13:52
14	50°16.6	42°24.5	46.5	63°22.6	58.1	2°49.7	53.2	63°39.4	33.8	Saturn	13°32.3	09:50
15	$65^{\circ}19.1$	$57^{\circ}24.1$	• • 47.7	$78^{\circ}23.2$	• • 57.4	$17^{\circ}51.6$	• • 53.4	78°41.6	• • 33.7	Apr 11 Thu	SHA	Mer.pass
16	$80^{\circ}21.5$	$72^{\circ}23.8$	48.9	93°23.9	56.6	$32^{\circ}53.5$	53.5	93°43.8	33.6	Venus	352°47.6	11:10
17	95° 24.0	87°23.4	50.1	108°24.6	55.9	47°55.4	53.7	108°46.0	33.5	Mars	13°31.3	09:47
18	110°26.5	102°23.0	N01°51.4	123°25.2	S06°55.1	62°57.3	N16°53.8	123°48.3	S07°33.4	Jupiter		13:49
19	125°28.9	117°22.6	52.6	138°25.9	54.4	77°59.2	54.0	138°50.5	33.3	Saturn	13°26.3	09:46
20	140°31.4	132°22.3	53.8	153°26.5	53.6	93°01.1	54.1	153°52.7	33.2	Horizont	al parallax	
21	155° 33.8	147°21.9	· · 55.0	168°27.2	· · 52.9	108°03.0	· · 54.3	168°54.9	· · 33.1	1101120111	Venus:	0.1
22 23	170° 36.3 185° 38.8	162°21.5 177°21.2	56.3 57.5	183°27.9 198°28.5	52.1 51.4	123°04.9 138°06.8	54.4 54.6	183°57.1 198°59.3	33.0 32.9		Mars:	0.1
Mer.p	ass. 10:39	$\nu$ -0.4′ $d1$	.2′ m-3.89	$\nu$ 0.7′ d-0	.7′ m1.17	$\nu$ 1.9′ d0.	2′ m-2.04	$\nu$ 2.2′ d-0	.1′ m1.07			

h	Sui	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179° 36.5	N07°40.8	176°46.4	9.5'	N09°32.4	17.0'	60.8'
1 2	194° 36.7 209° 36.8	41.7 42.7	191°15.0 205°43.5	9.5' 9.5'	09°49.5 10°06.4	17.0' 16.9'	60.8' 60.7'
3	224°37.0	• • 43.6	220° 11.9	9.4'	10° 00.4	16.8	60.7
4	239°37.2	44.5	234°40.4	9.4'	10°40.2	16.8'	60.7'
5	254°37.3	45.4	249°08.7	9.3'	10°57.0	16.7'	60.7'
6 7	269°37.5 284°37.7	N07°46.4 47.3	263°37.1 278°05.4	9.3' 9.2'	N11°13.7 11°30.3	16.6' 16.5'	60.7' 60.7'
8	299° 37.8	48.2	292°33.6	9.2'	11°46.8	16.5	60.6
9	314°38.0	• • 49.2	307°01.8	9.2'	12°03.3	16.4'	60.6'
10 11	329°38.2 344°38.3	50.1 51.0	321°30.0 335°58.1	9.1' 9.1'	12° 19.7 12° 36.0	16.3' 16.2'	60.6' 60.6'
12	359°38.5	N07°51.9	350° 26.2	9.0'	N12°52.2	16.1	60.6
13	14°38.7	52.9	4°54.2	9.0'	13°08.3	16.0'	60.5'
14	29°38.8 44°39.0	53.8	19°22.1 33°50.1	8.9'	13°24.3 13°40.3	15.9'	60.5
15 16	44 39.0 59°39.2	· · 54.7 55.6	48° 17.9	8.9' 8.8'	13° 40.3 13° 56.1	15.9' 15.8'	60.5' 60.5'
17	74°39.3	56.6	62°45.7	8.8'	14°11.9	15.7'	60.4
18	89°39.5	N07°57.5	77° 13.5	8.7'	N14°27.6	15.6'	60.4'
19 20	104°39.7 119°39.8	58.4 07° 59.3	91°41.2 106°08.9	8.7' 8.6'	14°43.1 14°58.6	15.5' 15.4'	60.4' 60.4'
21	134° 40.0	07 59.3 08°00.3	120° 36.5	8.6'	15° 14.0	15.4	60.3
22	149°40.2	01.2	135°04.0	8.5'	15°29.2	15.2'	60.3'
23	164°40.3	02.1	149°31.5	8.4'	15°44.4	15.0'	60.3'
	SD = 16.0'	d = 0.9'		S	D = 16.6'		
Wed	GHA	Dec	GHA	ν	Dec	d	НР
0	179° 40.5	N08°03.0	163°59.0	8.4'	N15° 59.4	14.9'	60.3
1	194°40.7	04.0	178°26.4	8.3'	16° 14.4	14.8'	60.2'
2	209°40.8 224°41.0	04.9 •• 05.8	192°53.7 207°21.0	8.3' 8.2'	16°29.2 16°43.9	14.7' 14.6'	60.2' 60.2'
4	239°41.2	06.7	207 21.0 221°48.2	8.2'	16°58.5	14.5	60.1
5	254°41.3	07.6	$236^{\circ}15.4$	8.1'	$17^{\circ}13.0$	14.4'	60.1'
6	269°41.5 284°41.7	N08°08.6	250°42.5 265°09.6	8.1'	N17°27.4 17°41.6	14.3'	60.1
7 8	284 41.7 299°41.8	09.5 10.4	265°09.6 279°36.6	8.0' 7.9'	17°41.6 17°55.8	14.1' 14.0'	60.1' 60.0'
9	314° 42.0	• • 11.3	294°03.5	7.9'	18°09.8	13.9'	60.0'
10	329° 42.2	12.3	308°30.4	7.8'	18°23.7	13.8'	60.0'
11 12	344° 42.3 359° 42.5	13.2 N08°14.1	322°57.2 337°24.0	7.8' 7.7'	18°37.4 N18°51.0	13.6' 13.5'	59.9' 59.9'
13	14° 42.7	15.0	351°50.7	7.7'	19°04.5	13.4	59.9'
14	29°42.8	15.9	6°17.4	7.6'	19° 17.9	13.2'	59.8'
15 16	44°43.0 59°43.1	· · 16.9 17.8	20°44.0 35°10.5	7.5' 7.5'	19°31.2 19°44.3	13.1' 13.0'	59.8' 59.8'
17	74°43.3	18.7	49°37.0	7.4'	19° 57.2	12.8'	59.7'
18	89°43.5	N08° 19.6	64°03.4	7.4'	N20° 10.1	12.7'	59.7'
19 20	104°43.6 119°43.8	20.5 21.4	78°29.8 92°56.1	7.3' 7.3'	20°22.8 20°35.3	12.6' 12.4'	59.7' 59.6'
21	134° 44.0	22.4	107° 22.4	7.2'	20° 35.3	12.4	59.6'
22	149°44.1	23.3	121°48.6	7.2'	$21^{\circ}00.1$	12.1'	59.6'
23	164°44.3	24.2	136°14.8	7.1'	21°12.2	12.0'	59.5'
	SD = 16.0'	d = 0.9'		S	D = 16.4'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	179°44.5 194°44.6	N08°25.1 26.0	150° 40.9 165° 06.9	7.0' 7.0'	N21°24.2 21°36.0	11.8' 11.7'	59.5' 59.5'
2	194 44.6 209°44.8	27.0	179° 32.9	7.0 6.9'	21°47.7	11.7 11.6'	59.5 59.4'
3	224°44.9	• • 27.9	193°58.8	6.9'	21°59.3	11.4'	59.4'
4	239° 45.1 254° 45.3	28.8 29.7	208°24.7 222°50.6	6.8'	22°10.7 22°21.9	11.3' 11.1'	59.4'
5 6	254°45.3 269°45.4	29.7 N08°30.6	222°50.6 237°16.3	6.8' 6.7'	N22° 33.0	10.9'	59.3' 59.3'
7	284°45.6	31.5	$251^{\circ}42.1$	6.7'	22°44.0	10.8'	59.3'
8	299°45.8	32.5	266° 07.8	6.6'	22°54.8	10.6'	59.2'
9 10	314°45.9 329°46.1	· · 33.4 34.3	280°33.4 294°59.0	6.6' 6.5'	23°05.4 23°15.9	10.5' 10.3'	59.2' 59.1'
11	344°46.2	35.2	309°24.5	6.5	23°26.2	10.2	59.1
12	359°46.4	N08°36.1	323°50.0	6.4'	N23°36.4	10.0'	59.1'
13 14	14°46.6 29°46.7	37.0 37.9	338° 15.5 352° 40.9	6.4' 6.4'	23°46.4 23°56.2	9.8' 9.7'	59.0' 59.0'
15	44°46.9	• • 38.9	7°06.2	6.3	24°05.9	9.7 9.5'	59.0'
16	59°47.0	39.8	21°31.6	6.3'	$24^{\circ}15.4$	9.4'	58.9'
17	74°47.2	40.7	35°56.8	6.2'	24°24.8	9.2'	58.9'
18 19	89° 47.4 104° 47.5	N08° 41.6 42.5	50°22.1 64°47.3	6.2' 6.2'	N24°34.0 24°43.0	9.0' 8.9'	58.8' 58.8'
20	$119^{\circ}47.7$	43.4	79°12.4	6.1'	24°51.9	8.7'	58.8'
21	134°47.9	• • 44.3	93°37.5	6.1'	25°00.6	8.5'	58.7'
22 23	149°48.0 164°48.2	45.2 46.2	108°02.6 122°27.7	6.1' 6.0'	25°09.1 25°17.5	8.4' 8.2'	58.7' 58.7'
_5	SD = 16.0'	d = 0.9'			D = 16.2'	0.2	
					_ 10.2		

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

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

		Sun			Moon			
	Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
	,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	1-3	
L		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	0-7%	
	09	01:34	01:26	12:01	12:40	00:13		
	10	01:18	01:10	12:01	13:34	01:06		
	11	01:02	00:54	12:01	14:30	02:02		

April 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	200°41.2	192°20.8	N01°58.7	213°29.2	S06°50.7	153°08.7	N16°54.8	214°01.6	S07°32.8			
1	215°43.7	207° 20.4	01°59.9	228° 29.8	49.9	168° 10.6	54.9	229°03.8	32.7	Alpheratz	357°35.8	29°13.3
2	230°46.2	222°20.0	02°01.2	243°30.5	49.2	183° 12.5	55.1	244°06.0	32.6	Ankaa	353°08.2	$-42^{\circ}10.5$
3	245°48.6	237° 19.7	02.4	258°31.2	• • 48.4	198° 14.4	• • 55.2	259°08.2	• • 32.5	Schedar	349°32.4	56°40.1
4	260°51.1	252° 19.3	03.6	273°31.8	47.7	213° 16.3	55.4	274°10.4	32.4	Diphda	348°48.2	$-17^{\circ}51.3$
										Achernar	$335^{\circ}21.2$	-57°06.9
5	275°53.6	267°18.9	04.8	288°32.5	46.9	228° 18.2	55.5	289°12.7	32.3	Hamal	327°52.3	23°34.5
6	290°56.0	282°18.6	N02°06.1	303°33.1	S06°46.2	243°20.1	N16°55.7	304°14.9	S07°32.3	Polaris	314°48.3	89°22.1
7	305°58.5	297° 18.2	07.3	318°33.8	45.4	258°22.0	55.8	319°17.1	32.2	Acamar	315°12.6	-40°12.6
8	321°00.9	312° 17.8	08.5	333°34.5	44.7	273°23.9	56.0	334°19.3	32.1	Menkar	314°07.1	4°11.0
9	336°03.4	327° 17.5	• • 09.7	348°35.1	• • 43.9	288°25.8	• • 56.2	349°21.5	• • 32.0	Mirfak	308°29.6	49°56.9
10	351°05.9	$342^{\circ}17.1$	11.0	3°35.8	43.2	303°27.7	56.3	4°23.7	31.9	Aldebaran	290°40.6	16°33.4
11	6°08.3	357° 16.7	12.2	18°36.4	42.4	318°29.6	56.5	19°26.0	31.8	Rigel	281°04.7	-8°10.5
12	21°10.8	$12^{\circ}16.3$	N02°13.4	33°37.1	S06°41.7	333°31.5	N16°56.6	34°28.2	S07°31.7	Capella	280°23.1	46°01.4
13	36°13.3	$27^{\circ}16.0$	14.6	48°37.8	40.9	348°33.4	56.8	49°30.4	31.6		278°23.7	6°22.2
14	51°15.7	42° 15.6	15.8	63°38.4	40.2	3°35.3	56.9	64°32.6	31.5	Bellatrix		
15	66°18.2	$57^{\circ}15.2$	• • 17.1	$78^{\circ}39.1$	• • 39.4	18° 37.2	• • 57.1	79°34.8	• • 31.4	Elnath	278°02.9	28°37.7
16	81°20.7	72°14.9	18.3	93°39.8	38.7	33°39.1	57.2	94°37.1	31.3	Alnilam	275°38.5	-1°11.3
17	96°23.1	87° 14.5	19.5	108°40.4	37.9	48°41.0	57.4	109°39.3	31.2	Betelgeuse	270°52.9	7°24.6
18	111°25.6	102° 14.1	N02°20.7	123°41.1	S06°37.2	63°42.9	N16°57.6	124°41.5	S07°31.1	Canopus	263°52.9	-52°42.7
19	126°28.1	117° 13.7	22.0	138°41.7	36.4	78° 44.8	57.7	139°43.7	31.0	Sirius	258°26.9	-16°45.1
20	141°30.5	117 13.7 132°13.4	23.2	150 41.7 153° 42.4	35.7	93°46.7	57.7 57.9	159° 45.7 154° 45.9	30.9	Adhara	255°06.4	-29°00.5
				168° 43.1			58.0	169°48.1		Procyon	244°51.5	5°09.7
21	156°33.0	147°13.0	• • 24.4			108°48.6				Pollux	243°18.1	27°58.1
22	171°35.4	162°12.6	25.6	183°43.7	34.2	123°50.5	58.2	184°50.4	30.7	Avior	234°14.9	-59°35.5
23	186°37.9	177°12.3	26.9	198°44.4	33.4	138°52.4	58.3	199°52.6	30.6	Suhail	222°46.6	-43°32.1
Mern	ass. 10:36	$\nu$ -0 4' d1	.2′ m-3.89	ν0 7' d-0	0.7′ m1.16	ν1 9' dΩ	2′ m-2.04	ν2 2' d-Ω	.1′ m1.07	Miaplacidus	221°38.1	-69°49.2
		<i>ν</i> σ.¬ σ1	5.09	- 5.1 U-0		×1.5 GO.	2.07	- Z.Z U-0		Alphard	217°48.2	-8°45.9
											207°34.9	11°50.9
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus		
0	201°40.4	192°11.9	N02°28.1	213°45.0	506°32.7	153°54.3	N16°58.5	214°54.8	S07°30.5	Dubhe	193°41.2	61°37.4
1	216°42.8	207° 11.5	29.3	228° 45.7	31.9	168° 56.2	58.6	229°57.0	30.4	Denebola	182°25.3	14°26.1
2	231°45.3	222° 11.1	30.5	243°46.4	31.2	183°58.1	58.8	244°59.2	30.3	Gienah	175°43.9	-17°40.7
3	246°47.8	237° 10.8	31.7	258° 47.0	30.4	199°00.0	• • 59.0	260°01.5	• • 30.2	Acrux	173°00.2	-63°14.1
4	261°50.2	252° 10.4	33.0	273°47.7	29.6	214°01.9	59.1	275°03.7	30.2	Gacrux	171°51.8	-57°15.1
										Alioth	$166^{\circ}12.9$	55°49.7
5	276°52.7	267°10.0	34.2	288°48.4	28.9	229°03.8	59.3	290°05.9	30.1	Spica	158°22.7	$-11^{\circ}17.4$
6	291°55.2	282°09.7	N02°35.4	303°49.0	S06°28.1	244°05.7	N16°59.4	305°08.1	S07°30.0	Alkaid	152°52.0	49°11.4
7	306°57.6	297°09.3	36.6	318° 49.7	27.4	259°07.6	59.6	320°10.3	29.9	Hadar	148°36.3	-60°29.4
8	322°00.1	312°08.9	37.9	333°50.4	26.6	274°09.5	59.7	335°12.6	29.8	Menkent	147°58.0	-36°29.4
9	337°02.6	327°08.5	• • 39.1	348°51.0	• • 25.9	289°11.4	$16^{\circ}59.9$	350°14.8	• • 29.7	Arcturus	145°48.2	19°03.2
10	352°05.0	342°08.2	40.3	$3^{\circ}51.7$	25.1	304°13.3	$17^{\circ}00.0$	5°17.0	29.6	Rigil Kent.	139°40.6	-60°56.1
11	7°07.5	357°07.8	41.5	18°52.3	24.4	319° 15.2	00.2	20°19.2	29.5	Kochab	137°18.6	74°03.2
12	22°09.9	12°07.4	N02°42.7	33°53.0	S06°23.6	334°17.1	N17°00.3	35°21.4	S07°29.4	Zuben'ubi	136°56.4	
13	37°12.4	27°07.1	44.0	48°53.7	22.9	349° 19.0	00.5	50°23.7	29.3			-16°08.6
14	52°14.9	42°06.7	45.2	63°54.3	22.1	4°20.9	00.7	65°25.9	29.2	Alphecca	126°04.0	26°37.8
15	67°17.3	57°06.3	46.4	78°55.0	21.4	19°22.8	00.8	80°28.1	29.1	Antares	112°16.4	-26°29.2
16	82°19.8	72°05.9	47.6	93°55.7	20.6	34°24.7	01.0	95°30.3	29.0	Atria	107°10.8	-69°04.1
17	97°22.3	87°05.6	48.9	108° 56.3	19.9	49° 26.6	01.0	110°32.5	28.9	Sabik	102°03.3	-15°45.4
			N02°50.1					125°34.8		Shaula	$96^{\circ}11.0$	-37°07.2
18	112°24.7	102°05.2		123°57.0	S06°19.1	64°28.5	N17°01.3		S07°28.8	Rasalhague	95°59.0	12°32.3
19	127°27.2	117°04.8	51.3	138°57.7	18.4	79°30.4	01.4	140°37.0	28.7	Eltanin	90°42.3	51°28.8
20	142°29.7	132°04.4	52.5	153°58.3	17.6	94°32.3	01.6	155°39.2	28.6	Kaus Aust.	83°33.2	-34°22.3
21	157°32.1	147°04.1	• • 53.7	168°59.0	• • 16.9	109°34.2	• • 01.7	170°41.4	• • 28.5	Vega	80°33.5	38°48.0
22	172°34.6	162°03.7	55.0	183°59.7	16.1	124°36.1	01.9	185°43.6	28.4	Nunki	75°48.5	-26°16.0
23	187°37.1	$177^{\circ}03.3$	56.2	199°00.3	15.4	139°38.0	02.1	200°45.9	28.4	Altair	62°00.6	8°55.7
Marn	10.22	1. O 1/ d1	.2′ m-3.89	10 7' d 0	0.8' m1.16	u1 0/ d0	2′ m-2.04		.1′ m1.07	Peacock	53°06.8	-56°39.3
ivier.p	ass. 10:32	ν-0.4 α1	.∠ 111-3.89	$\nu$ 0.1 $a$ -0	.0 111.10	ν1.9 a0.	∠ 111-∠.U4	ν2.2 <b>a</b> -0	.111.07	Deneb	49°26.4	-50 39.3 45°21.6
										Enif	33°39.6	9°59.0
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°34.0	-46°50.5
0	202°39.5	192°03.0	N02°57.4	214°01.0	506°14.6	154°39.9	N17°02.2	215°48.1	S07°28.3	Fomalhaut		-46°50.5 -29°29.7
1	217°42.0	207°02.6	58.6	229°01.6	13.9	169°41.8	02.4	230°50.3	28.2		15°15.5	
2	232°44.4	222°02.2	02°59.8	244°02.3	13.1	184°43.7	02.5	245°52.5	28.1	Scheat	13°46.1	28°12.6
3	247°46.9	237°01.8	02 39.0 03°01.1	259°03.0	12.3	199°45.6	02.7	240°54.7	. 28.0	Markab	13°30.8	15°19.9
4	262°49.4	257 01.8 252°01.5	03 01.1	259 03.0 274°03.6	11.6	214° 47.5	02.8	275°57.0	27.9	Apr 12 Fri	SHA	Mer.pass
											351°39.6	11:11
5	277°51.8	267°01.1	03.5	289°04.3	10.8	229°49.4	03.0	290°59.2	27.8		351 39.0 12°47.9	
6	292°54.3	282°00.7	N03°04.7	304°05.0	S06°10.1	244°51.3	N17°03.1	306°01.4	S07°27.7	Mars		09:46
7	307°56.8	297°00.3	05.9	319°05.6	09.3	259°53.2	03.3	321°03.6	27.6	Jupiter	312°27.5	13:46
8	322°59.2	312°00.0	07.2	334°06.3	08.6	274°55.1	03.5	336°05.9	27.5	Saturn	13°20.3	09:42
9	338°01.7	326°59.6	• • 08.4	349°07.0	• • 07.8	289°57.0	• • 03.6	351°08.1	• • 27.4	Apr 13 Sat	SHA	Mer.pass
10	353°04.2	341°59.2	09.6	4°07.6	07.1	304°58.9	03.8	6°10.3	27.3		350°31.5	
11	8°06.6	356°58.8	10.8	19°08.3	06.3	320°00.8	03.9	21°12.5	27.2	Venus		11:11
12	23°09.1	11°58.5	N03°12.0	34°09.0	506°05.6	335°02.7	N17°04.1	36°14.7	507°27.1	Mars	12°04.7	09:45
13	38°11.6	26°58.1	13.3	49°09.6	04.8	350°04.6	04.2	51°17.0	27.0	Jupiter		13:43
14	53°14.0	41°57.7	14.5	64°10.3	04.1	5°06.5	04.4	66°19.2	26.9	Saturn	13°14.4	09:39
15	68°16.5	56° 57.4	15.7	79°11.0	03.3	20°08.4	• • 04.5	81°21.4	26.8	Apr 14 Sun	SHA	Mer pass
16	83°18.9	71°57.0	16.9	94°11.6	02.6	35° 10.3	04.7	96°23.6	26.7			Mer.pass
										Venus		11:12
17	98°21.4	86°56.6	18.1	109°12.3	01.8	50° 12.1	04.8	111°25.9	26.7	Mars	11°21.5	09:44
18	113°23.9	101°56.2	N03°19.4	124°13.0	\$06°01.0	65°14.0	N17°05.0	126°28.1	\$07°26.6	Jupiter		13:40
19	128°26.3	116°55.9	20.6	139°13.6	06°00.3	80° 15.9	05.2	141°30.3	26.5	Saturn	13°08.6	09:35
20	143°28.8	131°55.5	21.8	154° 14.3	05°59.5	95°17.8	05.3	156°32.5	26.4	ш!	ol novella	
21	158°31.3	146°55.1	· · 23.0	169° 15.0	• • 58.8	110° 19.7	• • 05.5	171°34.7	• • 26.3	norizoni	al parallax	0.1
22	173°33.7	161°54.7	24.2	184° 15.6	58.0	125°21.6	05.6	186°37.0	26.2		Venus:	0.1
23	188°36.2	176°54.4	25.5	199°16.3	57.3	140°23.5	05.8	201°39.2	26.1		Mars:	0.1
1/10==	10.20	η_Ω Λ/ ຝ1	.2′ m-3.89	υΩ 7/ d Ω	0.8' m1.16	,,1 0/ do	.2′ m-2.04	1/2 2/ 4 0	.1′ m1.07			
ivier.p	ass. 10:28	ν-U.4' dl	.∠ m-3.ŏ9	$\nu$ 0.1 a-0	.o m1.10	$\nu_{1.9'} a_{0.}$	∠ m-∠.U4	ν2.2 a-0	.1 m1.U/			

h	Sui	1			Moon		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°48.3	N08°47.1	136°52.7	6.0'	N25°25.7	8.0'	58.6
1	194°48.5	48.0	151°17.7	6.0'	25°33.7	7.9'	58.6
2	209°48.7	48.9	165°42.7	5.9'	25°41.5	7.7'	58.5
3	224°48.8	• • 49.8	180°07.6	5.9'	25°49.2	7.5'	58.5
4	239°49.0	50.7	194°32.5	5.9'	25°56.7	7.3'	58.5
5	254°49.1	51.6	208°57.4	5.9'	26°04.1	7.2'	58.4
6	269°49.3	N08°52.5	223°22.2	5.8'	N26°11.2	7.0'	58.4
7	284°49.4	53.4	237°47.1	5.8'	26°18.2	6.8'	58.3
8	299°49.6	54.4	252°11.9	5.8'	26°25.0	6.6'	58.3
9	314°49.8	• • 55.3	266°36.7	5.8'	26°31.7	6.5'	58.3
10	329°49.9	56.2	281°01.4	5.8'	26°38.1	6.3'	58.2
.1	344°50.1	57.1	295°26.2	5.7'	26°44.4	6.1'	58.2
12	359°50.2	N08°58.0	309°50.9	5.7'	N26°50.5	5.9'	58.1
13	14°50.4	58.9	324°15.7	5.7'	26°56.5	5.8'	58.1
L4	29°50.6	08°59.8	338°40.4	5.7'	27°02.3	5.6'	58.1
.5	44°50.7	09°00.7	353°05.1	5.7'	27°07.8	5.4'	58.0
16	59°50.9	01.6	7°29.8	5.7'	27°13.3	5.2'	58.0
.7	74°51.0	02.5	21°54.5	5.7'	$27^{\circ}18.5$	5.1'	57.9
18	89°51.2	N09°03.4	36°19.2	5.7'	$N27^{\circ}23.6$	4.9'	57.9
9	104°51.3	04.3	50°43.9	5.7'	27°28.4	4.7'	57.9
20	119°51.5	05.3	65°08.5	5.7'	27°33.1	4.5'	57.8
21	134°51.7	• • 06.2	79°33.2	5.7'	27°37.7	4.4'	57.8
22	149°51.8	07.1	93°57.9	5.7'	27°42.0	4.2'	57.7
3	164°52.0	08.0	108°22.6	5.7'	27°46.2	4.0'	57.7
	SD = 15.9'	d = 0.9'		SI	D = 16.0'		
at	<b>GHA</b> 179°52.1	<b>Dec</b> N09°08.9	<b>GHA</b> 122°47.3	ν Ε 7'	Dec	d 20'	HP
) 1	179°52.1 194°52.3	09.8	122°47.3 137°12.0	5.7' 5.7'	N27°50.2 27°54.0	3.8' 3.6'	57.7
1	194°52.3 209°52.4		137°12.0 151°36.8	5.7' 5.7'	27°54.0 27°57.7	3.6 3.5'	57.6
2		10.7					57.6
3	224°52.6	•• 11.6	166°01.5	5.8'	28°01.1	3.3'	57.5
4	239°52.8	12.5	180°26.2	5.8'	28°04.4	3.1'	57.5
5	254°52.9	13.4	194°51.0	5.8'	28°07.6	2.9'	57.5
6	269°53.1	N09°14.3	209°15.8	5.8'	N28°10.5	2.8'	57.4
7	284°53.2	15.2	223°40.6	5.8'	28°13.3	2.6'	57.4
8	299°53.4	16.1	238°05.4	5.9'	28°15.9	2.4'	57.4
9	314°53.5	• • 17.0	252°30.3	5.9'	28°18.3	2.2'	57.3
.0	329°53.7	17.9	266°55.2	5.9'	28°20.5	2.1'	57.3
.1	344°53.9	18.8	281°20.1	5.9'	28°22.6	1.9'	57.2
.2	359°54.0	N09°19.7	295°45.0	6.0'	N28°24.5	1.7'	57.2
.3	14°54.2	20.6	310°10.0	6.0'	28°26.2	1.5'	57.2
L <b>4</b>	29°54.3	21.5	324°35.0	6.0'	28°27.7	1.4'	57.1
15	44°54.5	• • 22.4	339°00.0	6.1'	28°29.1	1.2'	57.1
16	59°54.6	23.3	353°25.1	6.1'	28°30.3	1.0'	57.0
L7	74°54.8	24.2	7°50.2	6.2'	28°31.3	0.9'	57.0
18	89°54.9	N09°25.1	22°15.3	6.2'	N28°32.2	0.7'	57.0
.9	104°55.1		36°40.5	6.2'	28°32.8		56.9
20	119°55.2	26.9	51°05.8	6.3'	28°33.4	0.3'	56.9
21	134°55.4	• • 27.8	65°31.1	6.3'	28°33.7	0.2'	56.9
22	149°55.6	28.7	79°56.4	6.4'	28°33.9	0.0'	56.8
3	164°55.7	29.6	94°21.8	6.4'	28°33.9	-0.2'	56.8
	SD = 15.9'	d = 0.9'		SI	O = 15.7'		
un	GHA	Dec	GHA	$\nu$	Dec	d	НР
0	179°55.9	N09°30.5	$108^{\circ}47.2$	6.5'	N28°33.7	-0.3'	56.7
1	194°56.0	31.4	123°12.7	6.5'	28°33.4	-0.5'	56.7
2	209°56.2	32.3	$137^{\circ}38.2$	6.6'	28°32.9	-0.7'	56.7
3	224°56.3	• • 33.2	$152^{\circ}03.8$	6.7'	28°32.2	-0.8'	56.6
4	239°56.5	34.1	$166^{\circ}29.5$	6.7'	28°31.4	-1.0'	56.6
5	254°56.6	35.0	180°55.2	6.8'	28°30.4	-1.2'	56.6
5	269°56.8	N09°35.9	195°21.0	6.8'	N28°29.3	-1.3'	56.5
	284°56.9	36.8	209°46.8	6.9'	28°27.9	-1.5'	56.5
7	299°57.1	37.7	224°12.7	7.0'	28°26.5	-1.6'	56.5
	299 37.1			7.0'	28°24.8	-1.8'	56.4
8	314°57.2	• • 38.6	238°38.7	7.0			56.4
8 9		· · 38.6 39.5	238°38.7 253°04.7	7.0 7.1'	28°23.0	-2.0'	30.4
3 9 .0	314°57.2				28°23.0 28°21.1	-2.0' -2.1'	
8 9 .0 .1	314°57.2 329°57.4	39.5	253°04.7	7.1'			56.4
8 9 .0 .1	314°57.2 329°57.4 344°57.5	39.5 40.4	253°04.7 267°30.8	7.1' 7.2'	28°21.1	-2.1'	56.4 56.3
8 9 .0 .1 .2	314°57.2 329°57.4 344°57.5 359°57.7	39.5 40.4 N09°41.3	253°04.7 267°30.8 281°57.0	7.1' 7.2' 7.2'	28°21.1 N28°19.0	-2.1' -2.3'	56.4 56.3 56.3
8 9 .0 .1 .2 .3	314°57.2 329°57.4 344°57.5 359°57.7 14°57.8	39.5 40.4 N09°41.3 42.2	253°04.7 267°30.8 281°57.0 296°23.2	7.1' 7.2' 7.2' 7.3'	28°21.1 N28°19.0 28°16.7	-2.1' -2.3' -2.4' -2.6'	56.4 56.3 56.3 56.3
8 9 .0 .1 .2 .3 .4	314°57.2 329°57.4 344°57.5 359°57.7 14°57.8 29°58.0	39.5 40.4 N09°41.3 42.2 43.1 • • 44.0	253°04.7 267°30.8 281°57.0 296°23.2 310°49.5	7.1' 7.2' 7.2' 7.3' 7.4' 7.5'	28°21.1 N28°19.0 28°16.7 28°14.3	-2.1' -2.3' -2.4' -2.6' -2.7'	56.4 56.3 56.3 56.3 56.2
8 9 .0 .1 .2 .3 .4	314°57.2 329°57.4 344°57.5 359°57.7 14°57.8 29°58.0 44°58.1	39.5 40.4 N09°41.3 42.2 43.1	253°04.7 267°30.8 281°57.0 296°23.2 310°49.5 325°15.9	7.1' 7.2' 7.2' 7.3' 7.4'	28°21.1 N28°19.0 28°16.7 28°14.3 28°11.7 28°09.0	-2.1' -2.3' -2.4' -2.6' -2.7' -2.9'	56.4 56.3 56.3 56.2 56.2
8 9 .0 .1 .2 .3 .4 .5	314°57.2 329°57.4 344°57.5 359°57.7 14°57.8 29°58.0 44°58.1 59°58.3 74°58.5	39.5 40.4 N09°41.3 42.2 43.1 • 44.0 44.9 45.8	253°04.7 267°30.8 281°57.0 296°23.2 310°49.5 325°15.9 339°42.4 354°08.9	7.1' 7.2' 7.2' 7.3' 7.4' 7.5' 7.5' 7.6'	28°21.1 N28°19.0 28°16.7 28°14.3 28°11.7 28°09.0 28°06.1	-2.1' -2.3' -2.4' -2.6' -2.7' -2.9' -3.0'	56.4 56.3 56.3 56.2 56.2 56.2
7 8 9 0 1 2 3 4 5 6 7 8 9	314°57.2 329°57.4 344°57.5 359°57.7 14°57.8 29°58.0 44°58.1 59°58.3	39.5 40.4 N09°41.3 42.2 43.1 • • 44.0 44.9 45.8 N09°46.7	253°04.7 267°30.8 281°57.0 296°23.2 310°49.5 325°15.9 339°42.4	7.1' 7.2' 7.2' 7.3' 7.4' 7.5' 7.5' 7.6' 7.7'	28°21.1 N28°19.0 28°16.7 28°14.3 28°11.7 28°09.0	-2.1' -2.3' -2.4' -2.6' -2.7' -2.9' -3.0' -3.2'	56.4 56.3 56.3 56.2 56.2 56.1 56.1
8 9 0 .1 2 .3 .4 .5 .6 .7 .8	314°57.2 329°57.4 344°57.5 359°57.7 14°57.8 29°58.0 44°58.1 59°58.3 74°58.5 89°58.6	39.5 40.4 N09° 41.3 42.2 43.1 · · 44.0 44.9 45.8 N09° 46.7 47.6	253°04.7 267°30.8 281°57.0 296°23.2 310°49.5 325°15.9 339°42.4 354°08.9 8°35.5 23°02.2	7.1' 7.2' 7.2' 7.3' 7.4' 7.5' 7.5' 7.6' 7.7' 7.8'	28°21.1 N28°19.0 28°16.7 28°14.3 28°11.7 28°09.0 28°06.1 N28°03.0 27°59.8	-2.1' -2.3' -2.4' -2.6' -2.7' -2.9' -3.0' -3.2' -3.3'	56.4 56.3 56.3 56.2 56.2 56.1 56.1
8 9 .0 .1 .2 .3 .4 .5 .6	314°57.2 329°57.4 344°57.5 359°57.7 14°57.8 29°58.0 44°58.1 59°58.3 74°58.5	39.5 40.4 N09° 41.3 42.2 43.1 · · 44.0 44.9 45.8 N09° 46.7 47.6 48.4	253°04.7 267°30.8 281°57.0 296°23.2 310°49.5 325°15.9 339°42.4 354°08.9 8°35.5 23°02.2 37°29.0	7.1' 7.2' 7.2' 7.3' 7.4' 7.5' 7.5' 7.6' 7.7' 7.8' 7.9'	28°21.1 N28°19.0 28°16.7 28°14.3 28°11.7 28°09.0 28°06.1 N28°03.0 27°59.8 27°56.5	-2.1' -2.3' -2.4' -2.6' -2.7' -2.9' -3.0' -3.2' -3.3' -3.5'	56.4 56.3 56.3 56.2 56.2 56.1 56.1 56.1
3 0 0 1 2 3 4 5 6 7 8 9	314°57.2 329°57.4 344°57.5 359°57.7 14°57.8 29°58.0 44°58.1 59°58.3 74°58.5 89°58.6 104°58.8 119°58.9	39.5 40.4 N09° 41.3 42.2 43.1 · · 44.0 44.9 45.8 N09° 46.7 47.6 48.4 · · 49.3	253°04.7 267°30.8 281°57.0 296°23.2 310°49.5 325°15.9 339°42.4 354°08.9 8°35.5 23°02.2	7.1' 7.2' 7.2' 7.3' 7.4' 7.5' 7.6' 7.7' 7.8' 7.9' 7.9'	28°21.1 N28°19.0 28°16.7 28°14.3 28°11.7 28°09.0 28°06.1 N28°03.0 27°59.8	-2.1' -2.3' -2.4' -2.6' -2.7' -2.9' -3.0' -3.2' -3.3' -3.5' -3.6'	56.4 56.3 56.3 56.2 56.2 56.1 56.1 56.1 56.0
3 9 0 1 2 3 4 5 6 7 8 9	314°57.2 329°57.4 344°57.5 359°57.7 14°57.8 29°58.0 44°58.1 59°58.3 74°58.5 89°58.6 104°58.8 119°58.9	39.5 40.4 N09° 41.3 42.2 43.1 · · 44.0 44.9 45.8 N09° 46.7 47.6 48.4	253°04.7 267°30.8 281°57.0 296°23.2 310°49.5 325°15.9 339°42.4 354°08.9 8°35.5 23°02.2 37°29.0 51°55.8	7.1' 7.2' 7.2' 7.3' 7.4' 7.5' 7.5' 7.6' 7.7' 7.8' 7.9'	28°21.1 N28°19.0 28°16.7 28°14.3 28°11.7 28°09.0 28°06.1 N28°03.0 27°59.8 27°56.5 27°53.0	-2.1' -2.3' -2.4' -2.6' -2.7' -2.9' -3.0' -3.2' -3.3' -3.5'	56.4 56.3 56.3 56.2 56.2 56.1 56.1 56.1

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

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

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.Pass.		Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	4-6	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	14-32%	
12	00:47	00:39	12:01	15:29	02:59		
13	00:31	00:24	12:00	16:27	03:58		
14	00:17	00:09	12:00	17:24	04:56		

April 15, 16, 17 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	203° 38.7	191°54.0	N03°26.7	214° 17.0	S05°56.5	155°25.4	N17°05.9	216°41.4	S07°26.0			
1	203 38.7 218°41.1	206°53.6	27.9	214 17.0 229°17.6	55.8	170°27.3	06.1	231°43.6	25.9	Alpheratz	357°35.8	29°13.3
2	233°43.6	200 53.0 221°53.2	27.9	244° 18.3	55.0	170°27.3 185°29.2	06.1	246°45.9	25.8	Ankaa	353°08.1	-42°10.5
3	248° 46.1	236°52.9	30.3	259° 19.0	• • 54.3	200°31.1	06.4	240 43.9 261°48.1	• • 25.7	Schedar	349°32.3	56°40.1
4	263°48.5	251°52.5	31.5	274° 19.7	53.5	215°33.0	06.5	276°50.3	25.6	Diphda	348°48.2	-17°51.3
5	278° 51.0	266°52.1	32.8	289° 20.3	52.7	230°34.9	06.7	291°52.5	25.5	Achernar	$335^{\circ}21.2$	-57°06.9
6	293°53.4	281°51.7	N03°34.0	304°21.0	S05°52.0	245°36.8	N17°06.9	306°54.7	S07°25.4	Hamal	327°52.3	23°34.5
7	308° 55.9	296°51.4	35.2	319°21.7	51.2	260°38.7	07.0	321°57.0	25.3	Polaris	$314^{\circ}48.6$	$89^{\circ}22.1$
8	323°58.4	311°51.0	36.4	334°22.3	50.5	275°40.6	07.2	336°59.2	25.3	Acamar	315°12.6	-40°12.6
9	339°00.8	326°50.6	37.6	349°23.0	• • 49.7	290°42.5	07.3	352°01.4	25.2	Menkar	314°07.1	4°11.0
10	354°03.3	341°50.2	38.8	4°23.7	49.0	305°44.4	07.5	7°03.6	25.1	Mirfak	308°29.6	49°56.9
11	9°05.8	356°49.9	40.1	19°24.3	48.2	320°46.3	07.6	22°05.9	25.0	Aldebaran	290°40.6	16°33.4
12	24°08.2	11°49.5	N03°41.3	34°25.0	S05°47.5	335°48.2	N17°07.8	37°08.1	S07°24.9	Rigel	281°04.7	-8°10.5
13	$39^{\circ}10.7$	26°49.1	42.5	49°25.7	46.7	350°50.1	07.9	52°10.3	24.8	Capella	280°23.1	46°01.4
14	54° 13.2	41°48.7	43.7	64°26.3	45.9	5°52.0	08.1	67°12.5	24.7	Bellatrix	278°23.7	6°22.2
15	$69^{\circ}15.6$	56°48.3	• • 44.9	79°27.0	• • 45.2	20°53.9	• • 08.2	82°14.8	• • 24.6	Elnath	278°02.9	28°37.7
16	84°18.1	71°48.0	46.1	94°27.7	44.4	35°55.7	08.4	97°17.0	24.5	Alnilam	275°38.5	-1°11.3
17	99° 20.5	86°47.6	47.4	109°28.3	43.7	50°57.6	08.6	112°19.2	24.4	Betelgeuse	270°52.9 263°52.9	7°24.6 -52°42.7
18	114°23.0	101°47.2	N03°48.6	124°29.0	S05°42.9	65°59.5	N17°08.7	127°21.4	S07°24.3	Canopus Sirius	258°26.9	-32 42.7 -16°45.1
19	$129^{\circ}25.5$	$116^{\circ}46.8$	49.8	139°29.7	42.2	81°01.4	08.9	142°23.7	24.2		255°06.4	-10 45.1 -29°00.5
20	$144^{\circ}27.9$	131°46.5	51.0	154°30.4	41.4	96°03.3	09.0	157°25.9	24.1	Adhara Procyon	255 06.4 244°51.5	-29 00.5 5°09.7
21	159° 30.4	146°46.1	• • 52.2	169°31.0	• • 40.6	111°05.2	•• 09.2	172°28.1	• • 24.0	Pollux	244 51.5 243°18.1	27°58.1
22	174°32.9	161°45.7	53.4	184°31.7	39.9	126°07.1	09.3	187°30.3	24.0	Avior	234° 14.9	-59°35.5
23	189°35.3	176°45.3	54.7	199°32.4	39.1	141°09.0	09.5	202°32.6	23.9	Suhail	222°46.7	-43°32.1
Mern	ass. 10:24	$\nu$ -0 4' d1	.2′ m-3.90	ν0 7' d=0	.8′ m1.16	ν1 9' dΩ	.2′ m-2.03	v2 2' d-C	.1' m1.07	Miaplacidus	221°38.1	-69°49.2
ν.σι.ρ		<i>ν</i> σ. <del>γ</del> σ1.	3.30	- 5.1 u-0		- 1.5 uU.		-2.2 U-C		Alphard	217°48.2	-8°45.9
										Regulus	207°34.9	11°50.9
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.2	61°37.4
0	204°37.8	191°45.0	N03°55.9	214°33.0	S05°38.4	156° 10.9	N17°09.6	217°34.8	S07°23.8	Denebola	182°25.3	14°26.1
1	219° 40.3	206°44.6	57.1	229°33.7	37.6	171°12.8	09.8	232°37.0	23.7	Gienah	175°43.9	-17°40.7
2	234° 42.7	221°44.2	58.3	244°34.4	36.9	186°14.7	09.9	247°39.2	23.6	Acrux	173°00.2	-63°14.1
3	249° 45.2	236°43.8	03°59.5	259°35.0	• • 36.1	201°16.6	• • 10.1	262°41.5	• • 23.5		171°51.8	-57°15.1
4	264° 47.7	251°43.4	04°00.7	274°35.7	35.4	216°18.5	10.3	277°43.7	23.4	Alioth	166°12.9	55°49.7
5	279°50.1	266°43.1	02.0	289°36.4	34.6	231°20.4	10.4	292°45.9	23.3	Spica	158°22.6	-11°17.4
6	294°52.6	281°42.7	N04°03.2	304°37.1	S05°33.8	246°22.3	N17°10.6	307°48.1	S07°23.2	Alkaid	152°52.0	49°11.4
7	309°55.0	296°42.3	04.4	319° 37.7	33.1	261°24.2	10.7	322°50.4	23.1	Hadar	148°36.3	-60°29.4
8	324° 57.5	311°41.9	05.6	334°38.4	32.3	276°26.0	10.9	337°52.6	23.0	Menkent	147°58.0	-36°29.4
9	340°00.0	326°41.6	• • 06.8	349°39.1	• • 31.6	291°27.9	• • 11.0	352°54.8	• • 22.9	Arcturus	145°48.1	19°03.2
10	355°02.4	341°41.2	08.0	4°39.7	30.8	306°29.8	11.2	7°57.0	22.8	Rigil Kent.	139°40.6	-60°56.1
11	10°04.9	356°40.8	09.2	19°40.4	30.1	321°31.7	11.3	22°59.3	22.7	Kochab	$137^{\circ}18.6$	74°03.2
12	25°07.4	11°40.4	N04°10.5	34°41.1	S05°29.3	336°33.6	N17°11.5	38°01.5	S07°22.7	Zuben'ubi	136°56.4	-16°08.7
13	40°09.8	26°40.0	11.7	49°41.8	28.5	351°35.5	11.6	53°03.7	22.6	Alphecca	126°03.9	26°37.8
14	55° 12.3	41°39.7	12.9	64°42.4	27.8	6°37.4	11.8	68°05.9	22.5	Antares	$112^{\circ}16.3$	-26°29.2
15	70°14.8	56°39.3	• • 14.1	79°43.1	• • 27.0	21°39.3	• • 12.0	83°08.2	• • 22.4	Atria	107°10.8	-69°04.1
16	85°17.2	71°38.9	15.3	94°43.8	26.3	36°41.2	12.1	98°10.4	22.3	Sabik	102°03.3	-15°45.4
17	100° 19.7	86°38.5	16.5	109°44.4 124°45.1	25.5 \$05°24.7	51°43.1	12.3 N17°12.4	113°12.6	22.2	Shaula	$96^{\circ}11.0$	-37°07.2
18	115°22.2	101°38.2	N04°17.7	124 45.1 139° 45.8		66°45.0		128°14.8	S07°22.1	Rasalhague	95°58.9	12°32.3
19	130°24.6	116°37.8 131°37.4	18.9		24.0	81°46.9	12.6	143°17.1	22.0	Eltanin	90°42.2	51°28.8
20 21	145°27.1 160°29.5	131 37.4 146°37.0	20.2 •• 21.4	154° 46.5 169° 47.1	23.2 •• 22.5	96°48.8 111°50.7	12.7 • • 12.9	158°19.3 173°21.5	21.9 · · 21.8	Kaus Aust.	83°33.2	-34°22.3
22	175° 32.0	161°36.6	22.6	184° 47.1	21.7	111 50.7 126°52.5	13.0	173 21.5 188°23.8	21.7	Vega	80°33.5	38°48.0
23	175 32.0 190°34.5	176°36.3	23.8	199°48.5	21.7	141°54.4	13.0	203°26.0	21.7	Nunki	75°48.4	-26°16.0
	190 34.5	170 30.3	23.0	199 40.5	21.0	141 34.4	13.2			Altair	62°00.6	8°55.7
Mer.p	ass. 10:20	$\nu$ -0.4' d1.	.2′ m-3.90	$\nu$ 0.7′ d-0	1.8'  m 1.15	$\nu 1.9' \ d0.$	.2′ m-2.03	$\nu$ 2.2′ d-0	$0.1' \; {\sf m} 1.07$	Peacock	53°06.8	-56°39.2
										Deneb	49°26.3	45°21.6
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.6	9°59.0
oved 0	205° 36.9	191°35.9	N04°25.0	214°49.2	S05°20.2	156°56.3		218°28.2	S07°21.6	Al Na'ir	27°33.9	-46°50.5
1	200° 39.4	206°35.5	26.2	214 49.2 229°49.8	19.4	171°58.2	13.5	233°30.4	21.5	Fomalhaut	15°15.5	-29°29.7
2	235°41.9	200°35.3 221°35.1	27.4	244° 50.5	18.7	187°00.1	13.7	248°32.7	21.4	Scheat	13°46.1	28°12.6
3	250°44.3	236°34.7	. 28.6	259°51.2	•• 17.9	202°02.0	• • 13.8	263°34.9	. 21.3	Markab	13°30.8	15°19.9
4	265°46.8	251°34.4	29.9	274°51.8	17.2	217°03.9	14.0	278°37.1	21.2	Apr 15 Mon	SHA	Mer.pass
5	280°49.3	266°34.0	31.1	289°52.5	16.4	232°05.8	14.1	293°39.3	21.1	Venus		11:13
6	295°51.7	281°33.6	N04°32.3	304°53.2	S05°15.7	247°07.7	N17°14.3	308°41.6	S07°21.0	Mars	10°38.3	09:42
7	310°54.2	296°33.2	33.5	319°53.9	14.9	262°09.6	14.4	323°43.8	20.9	Jupiter	311°46.8	13:37
8	325° 56.6	311°32.8	34.7	334° 54.5	14.1	277°11.5	14.6	338°46.0	20.8	Saturn	$13^{\circ}02.8$	09:32
9	$340^{\circ}59.1$	326°32.4	• • 35.9	349°55.2	• • 13.4	292°13.4	• • 14.7	353°48.2	• • 20.7	A. 10 T	6114	
10	$356^{\circ}01.6$	341°32.1	37.1	4°55.9	12.6	307°15.2	14.9	8°50.5	20.6	Apr 16 Tue	SHA	Mer.pass
11	11°04.0	356°31.7	38.3	19°56.6	11.9	322°17.1	15.0	23°52.7	20.5	Venus		11:13
12	26°06.5	11°31.3	N04°39.5	34°57.2	S05°11.1	337°19.0	N17°15.2	38°54.9	S07°20.5	Mars	9°55.2	09:41
13	41°09.0	26°30.9	40.8	49°57.9	10.3	$352^{\circ}20.9$	15.3	53°57.2	20.4	Jupiter Saturn	311°33.1	13:34
14	$56^{\circ}11.4$	41°30.5	42.0	64°58.6	09.6	7°22.8	15.5	68°59.4	20.3	Saturn	12°57.0	09:28
15	$71^{\circ}13.9$	56°30.2	• • 43.2	79°59.3	• • 08.8	22°24.7	• • 15.7	84°01.6	• • 20.2	Apr 17 Wed	SHA	Mer.pass
16	$86^{\circ}16.4$	$71^{\circ}29.8$	44.4	94°59.9	08.1	$37^{\circ}26.6$	15.8	99°03.8	20.1		345°58.9	11:14
17	$101^{\circ}18.8$	86°29.4	45.6	110°00.6	07.3	52°28.5	16.0	$114^{\circ}06.1$	20.0	Mars	9°12.2	09:40
18	116°21.3	101°29.0	N04°46.8	125°01.3	\$05°06.5	67°30.4	N17°16.1	129°08.3	S07°19.9	Jupiter	$311^{\circ}19.4$	13:31
19	131°23.8	116°28.6	48.0	140°02.0	05.8	82°32.3	16.3	144°10.5	19.8	Saturn	12°51.3	09:25
20	146°26.2	131°28.2	49.2	155°02.6	05.0	97°34.2	16.4	159°12.8	19.7	11. 1	al ac::-!!	
21	161°28.7	146°27.9	• • 50.4	170°03.3	• • 04.3	112°36.0	• • 16.6	174°15.0	• • 19.6	Horizont	al parallax	0.1
22	176°31.1	161°27.5	51.6	185°04.0	03.5	127°37.9	16.7	189°17.2	19.5		Venus:	0.1
23	191°33.6	176°27.1	52.8	200°04.6	02.7	142°39.8	16.9	204°19.4	19.4		Mars:	0.1
Mer.n	ass. 10:16	$\nu$ -0.4' d1	.2′ m-3.90	$\nu 0.7' \ d-0$	.8′ m1.15	$\nu 1.9' \ d0$	.2′ m-2.03	$\nu 2.2' d-0$	0.1′ m1.07			
				0								

h	Sur			Moon			
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°59.5	N09°52.0	95°16.9	8.2'	N27°41.6	-4.1'	55.9'
1 2	194°59.7 209°59.8	52.9 53.8	109°44.1 124°11.3	8.3' 8.4'	27°37.6 27°33.4	-4.2' -4.4'	55.9' 55.9'
3	209 59.8 225°00.0	54.7	138°38.7	8.4	27° 29.0	-4.4 -4.5'	55.8'
4	240°00.1	55.6	$153^{\circ}06.1$	8.5'	27°24.5	-4.6'	55.8'
5	255°00.3	56.5	167°33.7	8.6'	27°19.8	-4.8'	55.8'
6 7	270°00.4 285°00.6	N09°57.4 58.3	182°01.3 196°29.0	8.7' 8.8'	N27°15.1 27°10.1	-4.9' -5.1'	55.7' 55.7'
8	300°00.7	09°59.1	210°56.8	8.9'	27°05.1	-5.1 -5.2	55.7'
9	315°00.8	10°00.0	225°24.7	9.0'	26°59.9	-5.3'	55.6'
10	330°01.0	00.9	239°52.7	9.1'	26° 54.6	-5.5'	55.6'
11 12	345°01.1 0°01.3	01.8 N10°02.7	254°20.7 268°48.9	9.2' 9.3'	26°49.1 N26°43.5	-5.6' -5.7'	55.6' 55.6'
13	15°01.4	03.6	283°17.2	9.4'	26° 37.8	-5.9'	55.5'
14	30°01.6	04.5	297°45.5	9.4'	26°31.9	-6.0'	55.5'
15 16	45°01.7 60°01.9	· · 05.4 06.3	312°14.0 326°42.5	9.5' 9.6'	26°25.9 26°19.8	-6.1' -6.2'	55.5' 55.4'
17	75°02.0	07.1	341°11.1	9.7'	26° 13.6	-6.4'	55.4'
18	90°02.2	N10°08.0	355°39.9	9.8'	N26°07.2	-6.5'	55.4'
19	105°02.3	08.9	10°08.7	9.9'	26°00.8	-6.6'	55.4'
20 21	120°02.5 135°02.6	09.8 •• 10.7	24°37.6 39°06.6	10.0' 10.1'	25°54.1 25°47.4	-6.7' -6.9'	55.3' 55.3'
22	150°02.8	11.6	53°35.8	10.2'	25°40.6	-7.0'	55.3'
23	165°02.9	12.5	68°05.0	10.3'	25°33.6	-7.1'	55.2'
	SD = 15.9'	d = 0.9'		SI	D = 15.3'		
<b>T</b>	CUA	D	CHA		D	.,	LID
Tue 0	<b>GHA</b> 180°03.1	<b>Dec</b> N10°13.3	<b>GHA</b> 82°34.3	u 10.4'	<b>Dec</b> N25° 26.5	d -7.2'	<b>HP</b> 55.2'
1	195°03.2	14.2	97°03.7	10.5'	$25^{\circ}19.3$	-7.3'	55.2'
2	210°03.4	15.1	111°33.2	10.6'	25° 12.0	-7.4'	55.2'
3 4	225°03.5 240°03.6	· · 16.0 16.9	126°02.8 140°32.5	10.7' 10.8'	25°04.5 24°57.0	-7.5' -7.7'	55.1' 55.1'
5	255°03.8	17.8	155°02.3	10.0	24°49.3	-7.8	55.1
6	270°03.9	N10°18.6	169°32.1	11.0'	N24°41.6	-7.9'	55.1'
7 8	285°04.1 300°04.2	19.5 20.4	184°02.1 198°32.2	11.1' 11.2'	24°33.7 24°25.7	-8.0' -8.1'	55.0' 55.0'
9	315°04.4	. 21.3	213°02.4	11.3'	24° 25.7 24° 17.6	-8.2'	55.0'
10	330°04.5	22.2	227°32.7	11.4'	24°09.4	-8.3'	55.0'
11	345°04.7	23.1	242°03.0	11.5'	24°01.1	-8.4'	55.0'
12 13	0°04.8 15°05.0	N10°23.9 24.8	256°33.5 271°04.0	11.6' 11.7'	N23°52.6 23°44.1	-8.5' -8.6'	54.9' 54.9'
14	30°05.1	25.7	285°34.7	11.7'	23°35.5	-8.7'	54.9'
15	45°05.2	• • 26.6	300°05.4	11.8'	23°26.8	-8.8'	54.9'
16 17	60°05.4 75°05.5	27.5 28.3	314°36.3 329°07.2	11.9' 12.0'	23°18.0 23°09.0	-8.9' -9.0'	54.8' 54.8'
18	90°05.7	N10°29.2	343°38.3	12.1'	N23°00.0	-9.0 -9.1'	54.8'
19	105°05.8	30.1	358°09.4	12.2'	$22^{\circ}50.9$	-9.2'	54.8'
20	120°06.0	31.0	12°40.6	12.3'	22°41.7 22°32.4	-9.3'	54.8'
21 22	135°06.1 150°06.2	· · 31.9 32.7	27°11.9 41°43.3	12.4' 12.5'	22°32.4 22°23.0	-9.4' -9.5'	54.7' 54.7'
23	165°06.4	33.6	56°14.8	12.6'	22°13.5	-9.6'	54.7'
	SD = 15.9'	d = 0.9'		SI	O = 15.1'		
Wed	GHA	Dec	GHA	ν	Dec	d	НР
0	180°06.5	N10°34.5	70°46.4	12.7'	N22°03.9	-9.7'	54.7'
1	195°06.7	35.4	85°18.1	12.8'	21°54.3	-9.8'	54.7'
2 3	210°06.8 225°07.0	36.2 · · 37.1	99°49.8 114°21.7	12.9' 12.9'	21°44.5 21°34.7	-9.8' -9.9'	54.6' 54.6'
4	240°07.1	38.0	114 21.7 128°53.6	13.0'	21°24.7	-9.9 -10.0'	54.6'
5	255°07.2	38.9	143°25.7	13.1'	21° 14.7	-10.1'	54.6'
6 7	270°07.4 285°07.5	N10°39.8 40.6	157°57.8 172°30.0	13.2' 13.3'	N21°04.6 20°54.4	-10.2' -10.3'	54.6' 54.5'
8	300°07.7	41.5	172 30.0 187°02.3	13.4'	20° 44.2	-10.3'	54.5'
9	315°07.8	• • 42.4	201°34.7	13.5'	20°33.8	-10.4'	54.5'
10	330°08.0 345°08.1	43.3	216°07.1	13.5'	20°23.4 20°12.9	-10.5'	54.5'
11 12	345°08.1 0°08.2	44.1 N10°45.0	230°39.7 245°12.3	13.6' 13.7'	20° 12.9 N20° 02.3	-10.6' -10.7'	54.5' 54.5'
13	15°08.4	45.9	259°45.0	13.8'	19°51.6	-10.7'	54.4'
14	30°08.5	46.8	274°17.8	13.9'	19°40.9	-10.8'	54.4'
15 16	45°08.7 60°08.8	· · 47.6 48.5	288°50.7 303°23.6	14.0' 14.0'	19°30.0 19°19.2	-10.9' -11.0'	54.4' 54.4'
17	75°08.9	49.4	303 23.0 317°56.7	14.1	19°19.2	-11.0'	54.4
18	90°09.1	N10°50.2	332°29.8	14.2'	N18° 57.2	-11.1'	54.4'
19 20	105°09.2 120°09.4	51.1 52.0	347°03.0 1°36.3	14.3' 14.4'	18° 46.0 18° 34.9	-11.2' -11.2'	54.4' 54.3'
21	120 09.4 135°09.5	52.0 • • 52.9	1 36.3 16°09.6	14.4 14.4'	18° 23.6	-11.2 -11.3'	54.3'
22	150°09.6	53.7	$30^{\circ}43.1$	14.5'	18° 12.3	-11.4'	54.3'
23	165°09.8	54.6	45°16.6	14.6'	18°00.9	-11.5'	54.3'
	SD = 15.9'	d = 0.9'		SI	0 = 14.9'		

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

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

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	7-9	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	42-62%	
15	00:02	00:05	12:00	18:18	05:52		
16	00:12	00:19	12:00	19:08	06:43		
17	00:26	00:33	11:59	19:53 07:31			

h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	206°36.1	191°26.7	N04°54.1	215°05.3	\$05°02.0	157°41.7	$N17^{\circ}17.0$	$219^{\circ}21.7$	S07°19.4	Alpheratz	357°35.8	29°13.3
1	221°38.5	206° 26.3	55.3	230°06.0	01.2	172°43.6	17.2	234°23.9	19.3	Ankaa	353°08.1	-42°10.5
2	236°41.0	221°26.0	56.5	245°06.7	05°00.5	187°45.5	17.3	249°26.1	19.2	Schedar	349°32.3	56°40.0
3	251°43.5	236°25.6	•• 57.7	260°07.3	04°59.7	202°47.4	• • 17.5	264°28.4	• • 19.1	Diphda	348°48.2	-17°51.3
4 5	266°45.9 281°48.4	251°25.2 266°24.8	04°58.9 05°00.1	275°08.0 290°08.7	58.9 58.2	217°49.3 232°51.2	17.7 17.8	279°30.6 294°32.8	19.0	Achernar	$335^{\circ}21.2$	-57°06.8
6	296°50.9	281°24.4	N05°01.3	305°09.4	50.2 S04°57.4	247°53.1	N17° 18.0	309°35.0	18.9 S07°18.8	Hamal	327°52.3	23°34.5
7	311°53.3	296°24.0	02.5	320° 10.1	56.7	262°54.9	18.1	324°37.3	18.7	Polaris	314°49.1	89°22.1
8	326°55.8	311°23.6	03.7	335°10.7	55.9	277°56.8	18.3	339°39.5	18.6	Acamar	315°12.6	-40°12.6
9	341°58.3	326° 23.3	04.9	350°11.4	55.1	292°58.7	• • 18.4	354°41.7	• • 18.5	Menkar	314°07.1	4°11.0
10	357°00.7	341°22.9	06.1	5°12.1	54.4	308°00.6	18.6	9°44.0	18.5	Mirfak	308°29.6	49°56.8 16°33.4
11	12°03.2	356°22.5	07.3	20°12.8	53.6	323°02.5	18.7	24°46.2	18.4	Aldebaran Rigel	290°40.6 281°04.7	-8°10.5
12	27°05.6	11°22.1	N05°08.5	35°13.4	S04°52.9	338°04.4	$N17^{\circ}18.9$	39°48.4	S07°18.3	Capella	280°23.1	-6°10.5
13	42°08.1	26°21.7	09.7	50°14.1	52.1	353°06.3	19.0	54°50.7	18.2	Bellatrix	278°23.8	6°22.2
14	57°10.6	41°21.3	10.9	65°14.8	51.3	8°08.2	19.2	69°52.9	18.1	Elnath	278°02.9	28°37.7
15	72°13.0	56°21.0	• • 12.2	80° 15.5	• • 50.6	23° 10.1	• • 19.3	84°55.1	• • 18.0	Alnilam	275°38.6	-1°11.3
16	87°15.5	71°20.6	13.4	95°16.1	49.8	38°11.9	19.5	99°57.3	17.9	Betelgeuse	270°52.9	$7^{\circ}24.6$
17	102°18.0 117°20.4	86°20.2 101°19.8	14.6 N05°15.8	110°16.8 125°17.5	49.1	53° 13.8 68° 15.7	19.6 N17° 19.8	114°59.6 130°01.8	17.8 S07°17.7	Canopus	263°52.9	-52°42.7
18 19	117 20.4 132°22.9	101 19.8 116° 19.4	17.0	140° 18.2	\$04°48.3 47.5	83°17.6	20.0	145°04.0	17.6	Sirius	258°26.9	-16°45.1
20	132 22.9 147°25.4	110 19.4 131°19.0	18.2	140 16.2 155° 18.8	46.8	98° 19.5	20.0	160°06.3	17.5	Adhara	255°06.5	-29°00.5
21	162°27.8	131 19.0 146° 18.6	•• 19.4	170° 19.5	• • 46.0	113°21.4	. 20.1	175°08.5	17.5	Procyon	244°51.5	5°09.7
22	177°30.3	161° 18.3	20.6	185° 20.2	45.3	128°23.3	20.3	190°10.7	17.4	Pollux	243°18.1	27°58.1
23	192°32.7	176° 17.9	21.8	200° 20.9	44.5	143°25.2	20.6	205°13.0	17.3	Avior	234°15.0	-59°35.5
										Suhail	222°46.7	-43°32.1
Mer.p	bass. 10:12	$\nu$ -0.4′ d1	.2′ m-3.90	$\nu$ 0.7′ d-0	.8′ m1.15	$\nu 1.9' d0$	.2′ m-2.03	$\nu 2.2' \ d-0$	0.1' m1.07	Miaplacidus	221°38.2	-69°49.2
										Alphard	217°48.3	-8°45.9
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	207°34.9 193°41.2	11°50.9 61°37.4
0	207°35.2	191° 17.5	N05°23.0	215°21.5	S04°43.7	$158^{\circ}27.1$	$N17^{\circ}20.7$	220°15.2	S07°17.2	Denebola	182°25.3	14°26.1
1	222°37.7	$206^{\circ}17.1$	24.2	230°22.2	43.0	173°28.9	20.9	235°17.4	17.1	Gienah	175°43.9	-17°40.7
2	237°40.1	221°16.7	25.4	245°22.9	42.2	188°30.8	21.0	$250^{\circ}19.7$	17.0	Acrux		-63°14.2
3	252°42.6	236° 16.3	• • 26.6	260°23.6	• • 41.5	203°32.7	• • 21.2	265°21.9	•• 16.9		171°51.8	-57°15.1
4	267°45.1	251° 15.9	27.8	275°24.3	40.7	218°34.6	21.3	280°24.1	16.8	Alioth	166°12.9	55°49.7
5	282°47.5	266° 15.5	29.0	290°24.9	39.9	233°36.5	21.5	295°26.3	16.7	Spica	158°22.6	-11°17.4
6	297°50.0	281°15.2	N05°30.2	305°25.6	S04°39.2	248°38.4	N17°21.6	310°28.6	S07°16.6	Alkaid	152°52.0	49°11.5
7	312°52.5	296°14.8	31.4	320°26.3	38.4	263°40.3	21.8	325°30.8	16.6	Hadar	148°36.3	-60°29.4
8	327°54.9	311°14.4	32.6	335°27.0	37.6	278° 42.2	21.9	340°33.0	16.5	Menkent	$147^{\circ}58.0$	-36°29.4
9	342°57.4 357°59.9	326°14.0 341°13.6	• • 33.8	350°27.6 5°28.3	• • 36.9	293°44.0	• • 22.1	355°35.3 10°37.5	16.4	Arcturus	$145^{\circ}48.1$	19°03.2
10 11	13°02.3	356° 13.2	35.0 36.2	20° 29.0	36.1 35.4	308°45.9 323°47.8	22.3 22.4	25°39.7	16.3 16.2	Rigil Kent.	139°40.5	-60°56.1
12	28°04.8	11°12.8	N05°37.4	35° 29.7	504°34.6	338°49.7	N17° 22.6	40°42.0	507°16.1	Kochab	137°18.6	74°03.2
13	43°07.2	26° 12.4	38.6	50°30.4	33.8	353°51.6	22.7	55°44.2	16.0	Zuben'ubi	136°56.4	-16°08.7
14	58°09.7	41° 12.1	39.8	65°31.0	33.1	8°53.5	22.9	70°46.4	15.9	Alphecca	126°03.9	26°37.8
15	73°12.2	56° 11.7	41.0	80°31.7	32.3	23°55.4	23.0	85°48.7	• • 15.8	Antares	112°16.3	-26°29.2
16	88°14.6	71°11.3	42.2	95°32.4	31.6	38° 57.3	23.2	100°50.9	15.8	Atria Sabik	107° 10.7 102° 03.3	-69°04.1 -15°45.4
17	103°17.1	$86^{\circ}10.9$	43.4	110°33.1	30.8	53°59.1	23.3	$115^{\circ}53.1$	15.7	Shaula	96° 11.0	-15 45.4 -37°07.2
18	118°19.6	101°10.5	N05°44.6	125°33.8	S04°30.0	69°01.0	$N17^{\circ}23.5$	130°55.4	S07°15.6	Rasalhague	95°58.9	12°32.3
19	133°22.0	$116^{\circ}10.1$	45.8	140°34.4	29.3	84°02.9	23.6	145°57.6	15.5	Eltanin	90°42.2	51°28.8
20	148°24.5	131°09.7	47.0	155°35.1	28.5	99°04.8	23.8	160°59.8	15.4	Kaus Aust.	83°33.2	-34°22.3
21	163°27.0	146°09.3	• • 48.2	170°35.8	• • 27.7	114°06.7	· · 23.9	176°02.1	• • 15.3	Vega	80°33.5	38°48.0
22	178°29.4	161°08.9	49.4	185°36.5	27.0	129°08.6	24.1	191°04.3	15.2	Nunki	75°48.4	-26°16.0
23	193°31.9	176°08.5	50.6	200°37.1	26.2	144° 10.5	24.2	206°06.5	15.1	Altair	62°00.5	8°55.7
Mer.p	ass. 10:08	$ u$ -0.4 $^{\prime}$ $d1$	.2′ m-3.90	$\nu$ 0.7′ $d$ -0	.8'  m1.15	$\nu 1.9' d0$	.2′ m-2.03	$\nu 2.2' \ d-0$	$0.1' \; { m m} 1.07$	Peacock	53°06.7	-56°39.2
										Deneb	49°26.3	45°21.6
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.5	9°59.0
0	208°34.3	191°08.2	N05°51.8	215°37.8	S04°25.5	159° 12.4	N17°24.4	221°08.8	S07°15.0	Al Na'ir Fomalhaut	27°33.9 15°15.4	-46°50.5 -29°29.6
1	223°36.8	206°07.8	53.0	230°38.5	24.7	174° 14.2	24.5	236°11.0	15.0	Scheat	13°46.1	-29 29.0 28°12.6
2	238°39.3	$221^{\circ}07.4$	54.2	245°39.2	23.9	$189^{\circ}16.1$	24.7	251°13.2	14.9	Markab	13° 30.8	15°19.9
3	253°41.7	236°07.0	•• 55.4	260°39.9	• • 23.2	204° 18.0	• • 24.9	266°15.5	• • 14.8			
4	268°44.2	251°06.6	56.6	275°40.5	22.4	219° 19.9	25.0	281°17.7	14.7	Apr 18 Thu	SHA	Mer.pass
5	283°46.7	266°06.2	57.8	290°41.2	21.6	234°21.8	25.2	296°19.9	14.6	Venus	344°50.6	11:15
6	298°49.1	281°05.8	N05°59.0	305°41.9	S04°20.9	249°23.7	N17°25.3	311°22.2	S07°14.5	Mars	8°29.2	09:39
7	313°51.6	296°05.4	06°00.2	320°42.6	20.1	264°25.6	25.5	326°24.4	14.4	Jupiter	311°05.6	13:28
8	328°54.1	311°05.0	01.4	335°43.3	19.4	279°27.4	25.6	341°26.6	14.3	Saturn	12°45.6	09:21
9 10	343°56.5 358°59.0	326°04.6 341°04.2	· · 02.6 03.8	350°43.9 5°44.6	· · 18.6	294°29.3 309°31.2	· · 25.8 25.9	356°28.9 11°31.1	14.2	Apr 19 Fri	SHA	Mer.pass
10 11	358 59.0 14°01.5	341°04.2 356°03.8	03.8 05.0	5°44.6 20°45.3	17.8 17.1	309°31.2 324°33.1	25.9 26.1	26°33.3	14.2 14.1	Venus		11:15
12	29°03.9	11°03.5	N06°06.2	35° 46.0	504°16.3	339°35.0	N17° 26.2	41°35.6	507°14.0	Mars	7°46.3	09:38
13	44°06.4	26°03.1	07.4	50°46.7	15.5	354°36.9	26.4	56°37.8	13.9	Jupiter	310°51.8	13:25
14	59°08.8	41°02.7	08.6	65°47.3	14.8	9°38.8	26.5	71°40.0	13.8	Saturn	12°40.0	09:18
15	74°11.3	56°02.3	• • 09.8	80°48.0	• • 14.0	24°40.6	26.7	86°42.3	13.7	Apr 20 Sat	SHA	Mer.pass
16	89°13.8	71°01.9	11.0	95°48.7	13.3	39°42.5	26.8	101°44.5	13.6	Venus		11:16
17	104°16.2	86°01.5	12.2	110°49.4	12.5	54°44.4	27.0	116°46.7	13.5	Mars	7°03.5	09:37
18	119°18.7	$101^{\circ}01.1$	N06°13.4	$125^{\circ}50.1$	S04°11.7	69°46.3	$N17^{\circ}27.1$	131°49.0	S07°13.4	Jupiter	310°38.0	13:21
19	134°21.2	$116^{\circ}00.7$	14.6	140°50.7	11.0	84°48.2	27.3	146°51.2	13.4	Saturn	12°34.4	09:14
20	149°23.6	131°00.3	15.8	155°51.4	10.2	99°50.1	27.5	161°53.4	13.3			
21	164°26.1	145°59.9	• • 17.0	170°52.1	• • 09.4	114°52.0	• • 27.6	176°55.7	• • 13.2	Horizont	al parallax	0.1
22	179°28.6	160°59.5	18.2	185°52.8	08.7	129°53.8	27.8	191°57.9	13.1		Venus: Mars:	0.1 0.1
23	194°31.0	175°59.1	19.3	200°53.5	07.9	144°55.7	27.9	207°00.1	13.0		ividi5.	0.1
Mer.p	ass. 10:04	$\nu$ -0.4' d1	.2′ m-3.90	$\nu$ 0.7′ d-0	.8′ m1.14	$\nu 1.9' \ d0.$	.2′ m-2.02	$\nu$ 2.2′ d-0	0.1'  m 1.07			

h	Sui	า			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°09.9	N10°55.5	59°50.1	14.7'	N17°49.5	-11.5'	54.3'
1	195°10.1	56.3	74°23.8	14.7'	17°37.9	-11.6'	54.3'
2	210°10.2 225°10.3	57.2	88°57.5 103°31.3	14.8'	17°26.4 17°14.7	-11.6'	54.3' 54.3'
3 4	225 10.3 240°10.5	· · 58.1 58.9	103 31.3 118°05.2	14.9' 14.9'	17 14.7 17°03.0	-11.7' -11.8'	54.3 54.2'
5	255°10.6	56.9 10°59.8	132°39.1	14.9 15.0'	16°51.2	-11.8'	54.2'
6	270°10.7	N11°00.7	147°13.1	15.1'	N16°39.4	-11.9'	54.2
7	285°10.9	01.6	161°47.2	15.1'	16°27.5	-12.0'	54.2'
8	300°11.0	02.4	176°21.3	15.2'	16° 15.5	-12.0'	54.2'
9	315°11.2	• • 03.3	190°55.6	15.3'	$16^{\circ}03.5$	-12.1'	54.2'
10	330°11.3	04.2	205°29.8	15.3'	15°51.5	-12.1'	54.2'
11	345°11.4	05.0	220°04.2	15.4'	15°39.3	-12.2'	54.2'
12	$0^{\circ}11.6$	N11°05.9	234°38.6	15.5'	$N15^{\circ}27.1$	-12.2'	54.2'
13	15°11.7	06.8	249°13.0	15.5'	15° 14.9	-12.3'	54.2'
14	30°11.8	07.6	263°47.6	15.6'	15°02.6	-12.3'	54.1'
15	45°12.0 60°12.1	• • 08.5	278°22.1 292°56.8	15.6'	14°50.3 14°37.9	-12.4'	54.1' 54.1'
16 17	75°12.2	09.4 10.2	292 50.8 307°31.5	15.7' 15.8'	14 37.9 14°25.4	-12.5' -12.5'	54.1'
18	75 12.2 90°12.4	N11°11.1	307 31.5 322°06.3	15.8'	N14°12.9	-12.5	54.1
19	105°12.5	11.9	336°41.1	15.0	14°00.3	-12.6'	54.1
20	105 12.5 120°12.7	11.9	351°15.9	15.9'	14 00.3 13°47.7	-12.0 -12.7'	54.1'
21	135°12.8	13.7	5°50.9	16.0'	13°35.1	-12.7'	54.1
22	150°12.9	14.5	20°25.9	16.0'	13°22.4	-12.7'	54.1'
23	165°13.1	15.4	35°00.9	16.1'	13°09.6	-12.8'	54.1
						0	
	SD = 15.9'	d = 0.9'		51	D = 14.8'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°13.2	N11°16.3	49°36.0	16.1'	N12°56.8	-12.8'	54.1'
1	195°13.3	17.1	64°11.1	16.2	12°44.0	-12.9'	54.1'
2	210°13.5	18.0	78°46.3	16.2	12°31.1	-12.9'	54.1'
3	225°13.6 240°13.7	• • 18.8	93°21.6 107°56.8	16.3'	12° 18.2 12° 05.2	-13.0'	54.0'
4 5	240 13.7 255°13.9	19.7 20.6	107 50.8 122°32.2	16.3' 16.4'	12 05.2 11°52.2	-13.0' -13.1'	54.0' 54.0'
6	270°14.0	N11°21.4	137°07.6	16.4	N11°39.2	-13.1'	54.0'
7	285°14.1	22.3	151°43.0	16.5	11°26.1	-13.1'	54.0'
8	300°14.3	23.2	166°18.5	16.5'	11°12.9	-13.2'	54.0'
9	315°14.4	• • 24.0	180°54.0	16.6'	10°59.7	-13.2'	54.0'
10	330°14.5	24.9	195°29.5	16.6'	10°46.5	-13.3'	54.0'
11	345°14.7	25.7	$210^{\circ}05.1$	16.6'	10°33.3	-13.3'	54.0'
12	0°14.8	N11°26.6	224°40.7	16.7'	N10°20.0	-13.3'	54.0'
13	15°14.9	27.4	239°16.4	16.7'	10°06.7	-13.4'	54.0'
14	30°15.1	28.3	253°52.1	16.7'	09°53.3	-13.4'	54.0'
15	45°15.2	• • 29.2	268°27.9	16.8'	09°39.9	-13.4'	54.0'
16	60°15.3 75°15.5	30.0 30.9	283°03.7 297°39.5	16.8'	09°26.5 09°13.0	-13.5'	54.0'
17 18	90°15.6	30.9 N11°31.7	297 39.5 312°15.3	16.9' 16.9'	N08° 59.5	-13.5' -13.5'	54.0' 54.0'
19	105°15.7		326°51.2		08°46.0		54.0'
20	120°15.9	33.4	341°27.1	16.9	08°32.4	-13.6'	54.0'
21	135°16.0	34.3	356°03.1	17.0'	08° 18.8	-13.6'	54.0'
22	150°16.1	35.2	10°39.0	17.0'	08°05.2	-13.6'	54.0'
23	165°16.2	36.0	25°15.1	17.0'	07°51.6	-13.7'	54.0'
	SD = 15.9'	d = 0.9'			D = 14.7'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
<b>0</b>	180°16.4	N11°36.9	39°51.1	ν 17.1'	N07°37.9	-13.7'	54.0'
1	195°16.5	37.7	54°27.1	17.1	07°24.2	-13.7'	54.0'
2	210°16.6	38.6	69°03.2	17.1'	07°10.4	-13.8'	54.0'
3	225°16.8	• • 39.4	83°39.3	17.1'	06°56.7	-13.8'	54.0'
4	240°16.9	40.3	$98^{\circ}15.5$	17.2'	06°42.9	-13.8'	54.0'
5		41.1	112°51.6	17.2'	$06^{\circ}29.1$	-13.8'	54.0'
6	255°17.0						54.0'
7	270°17.2	N11°42.0	127°27.8	17.2'	N06°15.3	-13.9'	
8	270°17.2 285°17.3	N11°42.0 42.8	$142^{\circ}04.0$	17.2' 17.2'	N06°15.3 06°01.4	-13.9'	54.0'
0	270°17.2 285°17.3 300°17.4	N11°42.0 42.8 43.7	142°04.0 156°40.2	17.2' 17.2' 17.2'	N06°15.3 06°01.4 05°47.5	-13.9' -13.9'	54.0' 54.0'
9	270°17.2 285°17.3 300°17.4 315°17.5	N11°42.0 42.8 43.7 •• 44.5	142°04.0 156°40.2 171°16.4	17.2' 17.2' 17.2' 17.2'	N06° 15.3 06° 01.4 05° 47.5 05° 33.6	-13.9' -13.9' -13.9'	54.0' 54.0' 54.0'
10	270°17.2 285°17.3 300°17.4 315°17.5 330°17.7	N11°42.0 42.8 43.7 •• 44.5 45.4	142°04.0 156°40.2 171°16.4 185°52.7	17.2' 17.2' 17.2' 17.2' 17.3'	N06° 15.3 06° 01.4 05° 47.5 05° 33.6 05° 19.7	-13.9' -13.9' -13.9' -13.9'	54.0' 54.0' 54.0' 54.0'
10 11	270°17.2 285°17.3 300°17.4 315°17.5 330°17.7 345°17.8	N11°42.0 42.8 43.7 •• 44.5 45.4 46.2	142°04.0 156°40.2 171°16.4 185°52.7 200°28.9	17.2' 17.2' 17.2' 17.2' 17.3' 17.3'	N06° 15.3 06° 01.4 05° 47.5 05° 33.6 05° 19.7 05° 05.8	-13.9' -13.9' -13.9' -13.9' -14.0'	54.0' 54.0' 54.0' 54.0' 54.0'
10 11 12	270°17.2 285°17.3 300°17.4 315°17.5 330°17.7 345°17.8 0°17.9	N11°42.0 42.8 43.7 •• 44.5 45.4 46.2 N11°47.1	142°04.0 156°40.2 171°16.4 185°52.7 200°28.9 215°05.2	17.2' 17.2' 17.2' 17.2' 17.3' 17.3' 17.3'	N06° 15.3 06° 01.4 05° 47.5 05° 33.6 05° 19.7 05° 05.8 N04° 51.8	-13.9' -13.9' -13.9' -13.9' -14.0'	54.0' 54.0' 54.0' 54.0' 54.0' 54.0'
10 11 12 13	270°17.2 285°17.3 300°17.4 315°17.5 330°17.7 345°17.8 0°17.9 15°18.1	N11° 42.0 42.8 43.7 •• 44.5 45.4 46.2 N11° 47.1 48.0	142°04.0 156°40.2 171°16.4 185°52.7 200°28.9 215°05.2 229°41.5	17.2' 17.2' 17.2' 17.2' 17.3' 17.3' 17.3' 17.3'	N06° 15.3 06° 01.4 05° 47.5 05° 33.6 05° 19.7 05° 05.8 N04° 51.8 04° 37.8	-13.9' -13.9' -13.9' -13.9' -14.0' -14.0'	54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0'
10 11 12 13 14	270°17.2 285°17.3 300°17.4 315°17.5 330°17.7 345°17.8 0°17.9 15°18.1 30°18.2	N11° 42.0 42.8 43.7 · · 44.5 45.4 46.2 N11° 47.1 48.0 48.8	142°04.0 156°40.2 171°16.4 185°52.7 200°28.9 215°05.2 229°41.5 244°17.8	17.2' 17.2' 17.2' 17.2' 17.3' 17.3' 17.3' 17.3' 17.3'	N06°15.3 06°01.4 05°47.5 05°33.6 05°19.7 05°05.8 N04°51.8 04°37.8 04°23.8	-13.9' -13.9' -13.9' -13.9' -14.0' -14.0' -14.0'	54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0'
10 11 12 13 14 15	270°17.2 285°17.3 300°17.4 315°17.5 330°17.7 345°17.8 0°17.9 15°18.1 30°18.2 45°18.3	N11° 42.0 42.8 43.7 • 44.5 45.4 46.2 N11° 47.1 48.0 48.8 • 49.7	142°04.0 156°40.2 171°16.4 185°52.7 200°28.9 215°05.2 229°41.5 244°17.8 258°54.1	17.2' 17.2' 17.2' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3'	N06°15.3 06°01.4 05°47.5 05°33.6 05°19.7 05°05.8 N04°51.8 04°37.8 04°23.8 04°09.8	-13.9' -13.9' -13.9' -13.9' -14.0' -14.0' -14.0' -14.0' -14.0'	54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0'
10 11 12 13 14 15 16	270°17.2 285°17.3 300°17.4 315°17.5 330°17.7 345°17.8 0°17.9 15°18.1 30°18.2 45°18.3 60°18.4	N11° 42.0 42.8 43.7 • 44.5 45.4 46.2 N11° 47.1 48.0 48.8 • 49.7 50.5	142°04.0 156°40.2 171°16.4 185°52.7 200°28.9 215°05.2 229°41.5 244°17.8 258°54.1 273°30.4	17.2' 17.2' 17.2' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3'	N06° 15.3 06° 01.4 05° 47.5 05° 33.6 05° 19.7 05° 05.8 N04° 51.8 04° 37.8 04° 23.8 04° 09.8 03° 55.8	-13.9' -13.9' -13.9' -13.9' -14.0' -14.0' -14.0' -14.0' -14.0' -14.0'	54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0'
10 11 12 13 14 15 16 17	270°17.2 285°17.3 300°17.4 315°17.5 330°17.7 345°17.8 0°17.9 15°18.1 30°18.2 45°18.3 60°18.4 75°18.6	N11° 42.0 42.8 43.7 · · 44.5 45.4 46.2 N11° 47.1 48.0 48.8 · · 49.7 50.5 51.3	142°04.0 156°40.2 171°16.4 185°52.7 200°28.9 215°05.2 229°41.5 244°17.8 258°54.1 273°30.4 288°06.8	17.2' 17.2' 17.2' 17.2' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3'	N06° 15.3 06° 01.4 05° 47.5 05° 33.6 05° 19.7 05° 05.8 N04° 51.8 04° 23.8 04° 23.8 04° 09.8 03° 55.8 03° 41.7	-13.9' -13.9' -13.9' -14.0' -14.0' -14.0' -14.0' -14.0' -14.0' -14.1'	54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0'
10 11 12 13 14 15 16 17	270°17.2 285°17.3 300°17.4 315°17.5 330°17.7 345°17.8 0°17.9 15°18.1 30°18.2 45°18.3 60°18.4 75°18.6 90°18.7	N11° 42.0 42.8 43.7 · · 44.5 45.4 46.2 N11° 47.1 48.0 48.8 · · 49.7 50.5 51.3 N11° 52.2	142°04.0 156°40.2 171°16.4 185°52.7 200°28.9 215°05.2 229°41.5 244°17.8 258°54.1 273°30.4 288°06.8 302°43.1	17.2' 17.2' 17.2' 17.2' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3'	N06° 15.3 06° 01.4 05° 47.5 05° 33.6 05° 19.7 05° 05.8 N04° 51.8 04° 37.8 04° 23.8 04° 99.8 03° 55.8 03° 41.7 N03° 27.7	-13.9' -13.9' -13.9' -14.0' -14.0' -14.0' -14.0' -14.0' -14.1' -14.1'	54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0'
10 11 12 13 14 15 16 17	270°17.2 285°17.3 300°17.4 315°17.5 330°17.7 345°17.8 0°17.9 15°18.1 30°18.2 45°18.3 60°18.4 75°18.6	N11° 42.0 42.8 43.7 · · 44.5 45.4 46.2 N11° 47.1 48.0 48.8 · · 49.7 50.5 51.3	142°04.0 156°40.2 171°16.4 185°52.7 200°28.9 215°05.2 229°41.5 244°17.8 258°54.1 273°30.4 288°06.8	17.2' 17.2' 17.2' 17.2' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3'	N06° 15.3 06° 01.4 05° 47.5 05° 33.6 05° 19.7 05° 05.8 N04° 51.8 04° 23.8 04° 23.8 04° 09.8 03° 55.8 03° 41.7	-13.9' -13.9' -13.9' -14.0' -14.0' -14.0' -14.0' -14.0' -14.0' -14.1'	54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0'
10 11 12 13 14 15 16 17 18 19	270°17.2 285°17.3 300°17.4 315°17.5 330°17.7 345°17.8 0°17.9 15°18.1 30°18.2 45°18.3 60°18.4 75°18.6	N11° 42.0 42.8 43.7 · 44.5 45.4 46.2 N11° 47.1 48.0 48.8 · 49.7 50.5 51.3 N11° 52.2 53.0	142°04.0 156°40.2 171°16.4 185°52.7 200°28.9 215°05.2 229°41.5 244°17.8 258°54.1 273°30.4 288°06.8 302°43.1 317°19.5	17.2' 17.2' 17.2' 17.2' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3' 17.4' 17.4'	N06° 15.3 06° 01.4 05° 47.5 05° 33.6 05° 19.7 05° 05.8 N04° 51.8 04° 37.8 04° 23.8 04° 09.8 03° 55.8 03° 41.7 N03° 27.7 03° 13.6	-13.9' -13.9' -13.9' -14.0' -14.0' -14.0' -14.0' -14.0' -14.1' -14.1'	54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0'
10 11 12 13 14 15 16 17 18 19 20	270°17.2 285°17.3 300°17.4 315°17.5 330°17.7 345°17.8 0°17.9 15°18.1 30°18.2 45°18.3 60°18.4 75°18.6 90°18.7 105°18.8	N11° 42.0 42.8 43.7 · 44.5 45.4 46.2 N11° 47.1 48.0 48.8 · 49.7 50.5 51.3 N11° 52.2 53.0 53.9	142°04.0 156°40.2 171°16.4 185°52.7 200°28.9 215°05.2 229°41.5 244°17.8 258°54.1 273°30.4 288°06.8 302°43.1 317°19.5 331°55.8 346°32.2 1°08.6	17.2' 17.2' 17.2' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3' 17.4' 17.4'	N06° 15.3 06° 01.4 05° 47.5 05° 33.6 05° 19.7 05° 05.8 N04° 51.8 04° 37.8 04° 23.8 04° 09.8 03° 55.8 03° 41.7 N03° 27.7 03° 13.6 02° 59.5 02° 45.4 02° 31.3	-13.9' -13.9' -13.9' -14.0' -14.0' -14.0' -14.0' -14.0' -14.1' -14.1' -14.1'	54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0'
10 11 12 13 14 15 16 17 18 19 20 21	270°17.2 285°17.3 300°17.4 315°17.5 330°17.7 345°17.8 0°17.9 15°18.1 30°18.2 45°18.3 60°18.4 75°18.6 90°18.7 105°18.8	N11° 42.0 42.8 43.7 · 44.5 45.4 46.2 N11° 47.1 48.0 48.8 · 49.7 50.5 51.3 N11° 52.2 53.0 53.9 · 54.7	142°04.0 156°40.2 171°16.4 185°52.7 200°28.9 215°05.2 229°41.5 244°17.8 258°54.1 273°30.4 288°06.8 302°43.1 317°19.5 331°55.8 346°32.2	17.2' 17.2' 17.2' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3' 17.3' 17.4' 17.4' 17.4' 17.4'	N06° 15.3 06° 01.4 05° 47.5 05° 33.6 05° 19.7 05° 05.8 N04° 51.8 04° 37.8 04° 23.8 04° 09.8 03° 55.8 03° 41.7 N03° 27.7 03° 13.6 02° 59.5 02° 45.4	-13.9' -13.9' -13.9' -14.0' -14.0' -14.0' -14.0' -14.0' -14.1' -14.1' -14.1' -14.1' -14.1'	54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0' 54.0'

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

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

		Sun		Moon			
Day	Eqn.o	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	71-86%	
18	00:40	00:46	11:59	20:36	08:15		
19	00:53	00:59	11:59	21:16	08:56		
20	01:05	01:12	11:59	21:55	09:36		

April 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	209° 33.5	190°58.7	N06°20.5	215°54.2	S04°07.2	159°57.6	N17°28.1	222°02.4	S07°12.9			
1	209 33.3 224° 36.0	205°58.3	21.7	230°54.8	06.4	174°59.5	28.2	237°04.6	12.8	Alpheratz	$357^{\circ}35.7$	29°13.3
2	239° 38.4	205 56.5 220°57.9	22.9	230 54.6 245°55.5	05.6	174 59.5 190°01.4	28.4	252°06.9	12.6	Ankaa	353°08.1	-42°10.4
										Schedar	349°32.3	56°40.0
3	254°40.9	235°57.5	• • 24.1	260°56.2	• • 04.9	205°03.3	• • 28.5	267°09.1	• • 12.6	Diphda	348°48.2	$-17^{\circ}51.3$
4	269°43.3	250°57.1	25.3	275°56.9	04.1	220°05.1	28.7	282°11.3	12.6	Achernar	335°21.2	-57°06.8
5	284°45.8	265°56.7	26.5	290°57.6	03.3	235°07.0	28.8	297°13.6	12.5	Hamal	327°52.3	23°34.5
6	299°48.3	280°56.3	N06°27.7	305°58.2	S04°02.6	250°08.9	N17°29.0	312°15.8	S07°12.4	Polaris	314°49.5	89°22.0
7	314°50.7	295°56.0	28.9	320°58.9	01.8	265°10.8	29.1	327°18.0	12.3	Acamar	315°12.6	-40°12.5
8	329°53.2	310°55.6	30.1	335°59.6	01.0	280°12.7	29.3	342°20.3	12.2	Menkar	314°07.1	4°11.0
9	344°55.7	325°55.2	• • 31.3	351°00.3	04°00.3	295°14.6	• • 29.4	357°22.5	• • 12.1	Mirfak	308°29.6	49°56.8
10	359°58.1	340°54.8	32.5	6°01.0	03°59.5	310°16.5	29.6	12°24.7	12.0	Aldebaran	290°40.6	16°33.4
11	15°00.6	355°54.4	33.7	21°01.7	58.8	325°18.3	29.7	27°27.0	11.9	Rigel	281°04.7	-8°10.5
12	30°03.1	10°54.0	N06°34.8	36°02.3	S03°58.0	340°20.2	N17°29.9	42°29.2	S07°11.9	Capella	280°23.1	46°01.4
13	45°05.5	25°53.6	36.0	51°03.0	57.2	355°22.1	30.0	57°31.4	11.8	Bellatrix	278°23.8	6°22.2
14	60°08.0	40°53.2	37.2	66°03.7	56.5	10°24.0	30.2	72°33.7	11.7	Elnath	278°02.9	28°37.7
15	75° 10.4	55°52.8	• • 38.4	81°04.4	• • 55.7	25°25.9	• • 30.3	87°35.9	• • 11.6	Alnilam	275°38.6	-1°11.3
16	90°12.9	70°52.4	39.6	96°05.1	54.9	40°27.8	30.5	102°38.2	11.5	Betelgeuse	270°52.9	7°24.6
17	105° 15.4	85°52.0	40.8	111°05.8	54.2	55°29.6	30.7	117°40.4	11.4	Canopus	263°52.9	-52°42.7
18	120° 17.8	100°51.6	N06°42.0	126°06.4	S03°53.4	70°31.5	N17°30.8	132°42.6	S07°11.3	Sirius	258°26.9	-16°45.1
19	135°20.3	115°51.2	43.2	141°07.1	52.6	85°33.4	31.0	147°44.9	11.2	Adhara	255°06.5	-29°00.5
20	150°22.8	130°50.8	44.4	156°07.8	51.9	100°35.3	31.1	162°47.1	11.2	Procyon	244°51.5	5°09.7
21	165°25.2	145°50.4	• • 45.6	171°08.5	51.1	115°37.2	· · 31.3	177°49.3	• • 11.1	Pollux	243°18.1	27°58.1
22	180°27.7	160°50.0	46.7	186°09.2	50.3	130°39.1	31.4	192°51.6	11.0	Avior	234°15.0	-59°35.5
23	195°30.2	175°49.6	47.9	201°09.8	49.6	145°40.9	31.6	207°53.8	10.9	Suhail	222°46.7	-43°32.1
Mer.p	ass. 10:00	$ u$ -0.4 $^{\prime}$ d1	.2′ m-3.90	$\nu$ 0.7′ d-0	.8′ m1.14	$\nu$ 1.9 $^{\prime}$ d0.	.2′ m-2.02	$\nu$ 2.2′ d-0	.1′ m1.07	Miaplacidus	221°38.2	-69°49.3
										Alphard	217°48.3	-8°45.9
	6114	6114	_	6114	-	6114	_	6114	_	Regulus	207°34.9	11°50.9
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.3	61°37.4
0	210°32.6	190°49.2	N06°49.1	216° 10.5	S03°48.8	160°42.8	N17°31.7	222°56.1	S07°10.8	Denebola	$182^{\circ}25.3$	14°26.1
1	225°35.1	205°48.8	50.3	231°11.2	48.1	175°44.7	31.9	237°58.3	10.7	Gienah	175°43.9	-17°40.7
2	240°37.6	220°48.4	51.5	246°11.9	47.3	190°46.6	32.0	253°00.5	10.6	Acrux	$173^{\circ}00.2$	-63°14.2
3	255° 40.0	235°48.0	• • 52.7	261°12.6	• • 46.5	205°48.5	• • 32.2	268°02.8	• • 10.5	Gacrux	171°51.9	-57°15.1
4	270°42.5	250°47.6	53.9	276°13.3	45.8	220°50.4	32.3	283°05.0	10.5	Alioth	$166^{\circ}12.9$	55°49.7
5	285°44.9	265°47.2	55.1	291°13.9	45.0	235°52.2	32.5	298°07.2	10.4	Spica	158°22.6	-11°17.4
6	300°47.4	280°46.8	N06°56.2	306°14.6	S03°44.2	250°54.1	N17°32.6	313°09.5	S07°10.3	Alkaid	152°52.0	49°11.5
7	315°49.9	295°46.4	57.4	321°15.3	43.5	265°56.0	32.8	328°11.7	10.2	Hadar	148°36.3	-60°29.5
8	330° 52.3 345° 54.8	310°46.0	58.6	336°16.0	42.7	280°57.9	32.9	343°14.0 358°16.2	10.1	Menkent	$147^{\circ}58.0$	-36°29.5
9		325°45.6	06°59.8	351°16.7	• • 41.9	295°59.8	· · 33.1		• • 10.0	Arcturus	$145^{\circ}48.1$	19°03.2
10	0° 57.3 15° 59.7	340°45.2	07°01.0	6°17.4	41.2	311°01.7	33.2	13°18.4 28°20.7	09.9	Rigil Kent.	139°40.5	-60°56.2
11 12	31°02.2	355°44.8 10°44.4	02.2 N07°03.4	21°18.1 36°18.7	40.4 \$03°39.6	326°03.5 341°05.4	33.4 N17°33.5	43°22.9	09.9 \$07°09.8	Kochab	$137^{\circ}18.6$	74°03.2
	31 02.2 46°04.7					356°07.3				Zuben'ubi	136°56.4	-16°08.7
13	46 04.7 61°07.1	25°44.0	04.5	51°19.4 66°20.1	38.9	11°09.2	33.7	58°25.1 73°27.4	09.7	Alphecca	126°03.9	26°37.8
14	76°09.6	40°43.6	05.7		38.1 · · · 37.3		33.8		09.6 •• 09.5	Antares	112°16.3	-26°29.2
15		55°43.2	• • 06.9	81°20.8		26°11.1	• • 34.0	88°29.6		Atria	$107^{\circ}10.7$	-69°04.1
16 17	91° 12.0 106° 14.5	70°42.8 85°42.4	08.1 09.3	96°21.5 111°22.2	36.6 35.8	41°12.9 56°14.8	34.1 34.3	103°31.9 118°34.1	09.4 09.3	Sabik	102°03.3	-15°45.4
18	100° 14.5° 17.0	100°41.9	N07°10.5	111 22.2 126°22.8	S03°35.1	71°16.7	N17°34.4	133°36.3	S07°09.2	Shaula	$96^{\circ}11.0$	-37°07.2
19		100 41.9 115°41.5		141°23.5				133 30.3 148°38.6		Rasalhague	95°58.9	12°32.3
	136° 19.4		11.6		34.3	86°18.6	34.6	146 36.0 163°40.8	09.2	Eltanin	90°42.2	51°28.8
20	151°21.9 166°24.4	130°41.1 145°40.7	12.8 •• 14.0	156°24.2 171°24.9	33.5 · · 32.8	101°20.5 116°22.4	34.8	103 40.8 178°43.1	09.1 •• 09.0	Kaus Aust.	83°33.2	-34°22.3
21 22	181°26.8	160°40.3	15.2	171 24.9 186°25.6	32.0	131°24.2	· · 34.9 35.1	176 45.1 193°45.3	08.9	Vega	80°33.5	38°48.0
23	196° 29.3	175°39.9	16.4	201°26.3	31.2	131 24.2 146°26.1	35.1	208°47.5	08.9	Nunki	75°48.4	-26°16.0
	190 29.3	175 39.9	10.4	201 20.3	31.2	140 20.1		200 41.3	00.0	Altair	62°00.5	8°55.7
Mer.p	ass. 09:56	$\nu$ -0.4 $'$ d1	.2′ m-3.90	$\nu$ 0.7′ d-0	1.8'  m 1.14	$\nu 1.9' \ d0.$	.2′ m-2.02	$\nu 2.2' \ d-0$	.1' m $1.07$	Peacock	53°06.7	-56°39.2
										Deneb	49°26.3	45°21.6
т	GHA	GHA	Doc	GHA	Doc	GHA	Dec	GHA	Doc	Enif	33°39.5	9°59.0
Tue 0	211°31.8	бна 190°39.5	<b>Dec</b> N07°17.5	216° 27.0	Dec \$03°30.5	161°28.0	<b>Dec</b> N17°35.4	223°49.8	<b>Dec</b> \$07°08.7	Al Na'ir	27°33.9	-46°50.5
1	211 31.6 226°34.2	205°39.1	18.7	210 27.0 231°27.6	29.7	101 28.0 176°29.9	35.5	238°52.0	08.6	Fomalhaut	15°15.4	-29°29.6
2	241°36.7	205 39.1 220°38.7	19.9	246°28.3	28.9	170 29.9 191°31.8	35.5 35.7	250° 52.0 253° 54.3	08.6	Scheat	13°46.1	28°12.6
3	256° 39.2	235°38.3	•• 21.1	240 26.3 261°29.0	. 28.2	206°33.6	• • 35.8	268°56.5	08.5	Markab	13°30.7	15°19.9
4	271°41.6	250°37.9	22.3	201 29.0 276°29.7	27.4	200 35.0 221°35.5	36.0	283°58.7	08.4	Apr 21 Sun	SHA	Mer.pass
5	271 41.0 286°44.1	265°37.5	23.5	270 29.7 291°30.4	26.6	236°37.4	36.1	299°01.0	08.4		341°25.2	11:16
6	301°46.5	280°37.1	N07°24.6	306°31.1	S03°25.9	251°39.3	N17°36.3	314°03.2	S07°08.2	Mars	6°20.7	09:36
7	316° 49.0	295°36.7	25.8	321°31.8	25.1	266°41.2	36.4	329°05.5	08.1		310°24.1	13:18
8	331°51.5	310°36.3	27.0	336°32.4	24.3	281°43.0	36.6	344°07.7	08.0	Saturn	12°28.9	09:10
9	346°53.9	325°35.9	•• 28.2	351°33.1	• • 23.6	296°44.9	36.7	359°09.9	08.0			
10	1°56.4	340°35.5	29.4	6°33.8	22.8	311°46.8	36.9	14°12.2	07.9	Apr 22 Mon	SHA	Mer.pass
11	16°58.9	355°35.0	30.5	21°34.5	22.0	326°48.7	37.0	29°14.4	07.8		340°16.6	11:17
12	32°01.3	10°34.6	N07°31.7	36°35.2	S03°21.3	341°50.6	N17°37.2	44°16.7	S07°07.7	Mars	5°37.9	09:35
13	47°03.8	25°34.2	32.9	51°35.9	20.5	356°52.5	37.3	59°18.9	07.6		310°10.2	13:15
14	62°06.3	40°33.8	34.1	66° 36.6	19.7	11°54.3	37.5	74°21.1	07.5	Saturn	12°23.4	09:07
15	77°08.7	55°33.4	35.2	81°37.2	• • 19.0	26°56.2	• • 37.6	89°23.4	07.4	Apr 23 Tue	SHA	Mer.pass
16	92°11.2	70°33.0	36.4	96°37.9	18.2	41°58.1	37.8	104°25.6	07.4		339°07.8	11:18
17	107° 13.7	85°32.6	37.6	111°38.6	17.4	57°00.0	37.9	119°27.9	07.3	Mars	4°55.2	09:34
18	122° 16.1	100°32.2	N07°38.8	126°39.3	S03°16.7	72°01.9	N17°38.1	134°30.1	S07°07.2		309°56.2	13:12
19	137° 18.6	115°31.8	39.9	141°40.0	15.9	87°03.7	38.2	149°32.3	07.1	Saturn	12°18.0	09:03
20	152°21.0	130°31.4	41.1	156° 40.7	15.1	102°05.6	38.4	164°34.6	07.0	Jatuill	12 10.0	09.03
21	167°23.5	145°31.0	42.3	171°41.4	• • 14.4	117°07.5	• • 38.5	179°36.8	06.9	Horizont	al parallax	
22	182°26.0	160°30.5	43.5	186°42.0	13.6	132°09.4	38.7	194°39.1	06.8		Venus:	0.1
23	197°28.4	175°30.1	44.6	201°42.7	12.9	147°11.3	38.8	209°41.3	06.8		Mars:	0.1
ivier.p	ass. 09:52	$\nu$ -0.4' d1	.2′ m-3.90	$\nu$ 0.1' $a$ -0	.8′ m1.14	$\nu$ 1.9' $d$ 0.	.2′ m-2.02	$\nu$ 2.2' $a$ -0	.1′ m1.07			

h	Sur	า			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°19.5	N11°57.3	30°21.3	17.4'	N02°03.0	-14.2'	54.0'
1 2	195°19.6 210°19.7	58.1 59.0	44°57.7 59°34.0	17.4' 17.4'	01°48.8 01°34.7	-14.2' -14.2'	54.0' 54.0'
3	225°19.8	11°59.8	74°10.4	17.4'	01°20.5	-14.2'	54.1
4	240°20.0	$12^{\circ}00.7$	88°46.8	17.4'	$01^{\circ}06.3$	-14.2'	54.1'
5	255°20.1	01.5	103°23.2	17.4'	00°52.1	-14.2'	54.1'
6 7	270°20.2 285°20.3	N12°02.4 03.2	117°59.5 132°35.9	17.4' 17.4'	N00°37.9 00°23.7	-14.2' -14.2'	54.1' 54.1'
8	300°20.5	04.0	147°12.2	17.3'	N00°09.5	-14.2'	54.1'
9	315°20.6	• • 04.9	161°48.6	17.3'	S00°04.7	14.2'	54.1'
10 11	330°20.7 345°20.8	05.7 06.6	176°24.9 191°01.2	17.3' 17.3'	00°18.9 00°33.1	14.2' 14.2'	54.1' 54.1'
12	0°20.9	N12°07.4	205°37.6	17.3	500°47.3	14.2	54.1
13	15°21.1	08.3	220°13.9	17.3'	01°01.6	14.2'	54.1'
14	30°21.2	09.1	234°50.2	17.3'	01°15.8	14.2'	54.1'
15 16	45°21.3 60°21.4	· · 09.9 10.8	249°26.4 264°02.7	17.3' 17.3'	01°30.0 01°44.2	14.2' 14.2'	54.1' 54.1'
17	75°21.6	11.6	278°39.0	17.2'	01°58.5	14.2'	54.1'
18	90°21.7	N12°12.5	293°15.2	17.2'	S02°12.7	14.2'	54.2'
19 20	105°21.8 120°21.9	13.3 14.1	307°51.4 322°27.6	17.2' 17.2'	02°26.9 02°41.1	14.2' 14.2'	54.2' 54.2'
21	135°22.1	. 15.0	322 21.0 337°03.8	17.2'	02° 41.1	14.2'	54.2'
22	150°22.2	15.8	351°39.9	17.1'	$03^{\circ}09.5$	14.2'	54.2'
23	165°22.3	16.7	6°16.1	17.1'	03°23.7	14.2'	54.2'
	SD = 15.9'	d = 0.8'		SI	O = 14.7'		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	180°22.4	$N12^{\circ}17.5$	20°52.2	17.1'	S03°37.9	14.2'	54.2'
1	195°22.5	18.3	35°28.3	17.1'	03°52.1	14.2'	54.2'
2	210°22.7 225°22.8	19.2 •• 20.0	50°04.3 64°40.4	17.0' 17.0'	04°06.3 04°20.4	14.2' 14.2'	54.2' 54.2'
4	240°22.9	20.8	79°16.4	17.0'	04°34.6	14.1'	54.2'
5	255°23.0	21.7	93°52.4	17.0'	04°48.8	14.1'	54.2'
6	270°23.1 285°23.3	N12°22.5 23.4	108°28.3 123°04.2	16.9' 16.9'	\$05°02.9 05°17.0	14.1' 14.1'	54.3' 54.3'
7 8	285 23.3 300°23.4	24.2	123 04.2 137°40.1	16.9'	05 17.0 05°31.1	14.1 14.1'	54.3'
9	315°23.5	• • 25.0	152°16.0	16.8'	05°45.2	14.1'	54.3'
10	330°23.6	25.9	166°51.8	16.8'	05°59.3	14.1'	54.3'
11 12	345°23.7 0°23.9	26.7 N12°27.5	181°27.6 196°03.4	16.8' 16.7'	06°13.4 \$06°27.4	14.0' 14.0'	54.3' 54.3'
13	15°24.0	28.4	210°39.1	16.7'	06°41.4	14.0'	54.3'
14	30°24.1	29.2	225°14.8	16.6'	06°55.5	14.0'	54.3'
15 16	45°24.2 60°24.3	· · 30.0 30.9	239°50.4 254°26.0	16.6' 16.6'	07°09.5 07°23.4	14.0' 14.0'	54.4' 54.4'
17	75°24.5	31.7	269°01.6	16.5	07 23.4 07°37.4	13.9'	54.4'
18	90°24.6	N12°32.5	283°37.1	16.5'	<b>S</b> 07°51.3	13.9'	54.4'
19	105°24.7	33.4	298°12.6	16.4	08°05.2	13.9'	54.4'
20 21	120°24.8 135°24.9	34.2 •• 35.0	312°48.0 327°23.4	16.4' 16.3'	08° 19.1 08° 33.0	13.9' 13.8'	54.4' 54.4'
22	150°25.0	35.9	341°58.7	16.3'	08° 46.8	13.8'	54.4'
23	165°25.2	36.7	356°34.0	16.3'	09°00.6	13.8'	54.4'
	SD = 15.9'	d = 0.8'		SI	O = 14.8'		
Tue	GHA	Dec	GHA	ν	Dec	d	НР
0	180°25.3	N12°37.5	11°09.3	16.2'	S09°14.4	13.8'	54.5'
1	195°25.4 210°25.5	38.3 39.2	25°44.5 40°19.6	16.2' 16.1'	09°28.2 09°41.9	13.7'	54.5'
2 3	210°25.5 225°25.6	39.2 • • 40.0	40°19.6 54°54.7	16.1	09°41.9 09°55.6	13.7' 13.7'	54.5' 54.5'
4	240°25.7	40.8	69°29.8	16.0'	10°09.3	13.6'	54.5'
5	255°25.9	41.7	84°04.8	15.9'	10°22.9	13.6'	54.5'
6 7	270°26.0 285°26.1	N12°42.5 43.3	98°39.7 113°14.6	15.9' 15.8'	\$10°36.5 10°50.1	13.6' 13.5'	54.5' 54.5'
8	300°26.2	44.1	127°49.4	15.8'	11°03.6	13.5'	54.6'
9	315°26.3	• • 45.0	142°24.2	15.7'	11°17.1	13.5'	54.6'
10 11	330°26.4 345°26.6	45.8 46.6	156°58.9 171°33.6	15.7' 15.6'	11°30.6 11°44.0	13.4' 13.4'	54.6' 54.6'
12	0°26.7	46.6 N12°47.4	171 33.6 186°08.2	15.5	511°57.4	13.4	54.6
13	15°26.8	48.3	200°42.7	15.5'	$12^{\circ}10.8$	13.3'	54.6'
14	30°26.9	49.1	215°17.2	15.4'	12°24.1	13.3'	54.6'
15 16	45°27.0 60°27.1	· · 49.9 50.7	229°51.6 244°26.0	15.4' 15.3'	12°37.4 12°50.6	13.2' 13.2'	54.7' 54.7'
17	75°27.2	51.6	259°00.3	15.2'	13°03.8	13.1	54.7
18	90°27.3	N12°52.4	273°34.5	15.2'	\$13°16.9	13.1'	54.7'
19 20	105°27.5 120°27.6	53.2 54.0	288°08.7 302°42.8	15.1' 15.0'	13°30.0 13°43.1	13.1' 13.0'	54.7' 54.7'
21	135°27.7	• • 54.9	317°16.8	15.0'	13°56.1	13.0'	54.7
22	150°27.8	55.7	331°50.7	14.9'	14°09.0	12.9'	54.8'
23	165°27.9	56.5	346°24.6	14.8'	14°21.9	12.9'	54.8'
	SD = 15.9'	d = 0.8'	SI	O = 14.9'			

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

Lat.		Moonris	е		Moonset	:
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°	16:50	18:52	21:13	04:17	03:45	03:08
<b>N</b> 70°	16:47	18:39	20:43	04:16	03:51	03:24
68°	16:45	18:28	20:21	04:15	03:56	03:36
66°	16:43	18:20	20:04	04:14	04:01	03:46
64°	16:41	18:13	19:50	04:13	04:04	03:55
62°	16:40	18:07	19:38	04:12	04:07	04:02
60°	16:39	18:02	19:28	04:12	04:10	04:09
N 58°	16:38	17:57	19:20	04:11	04:13	04:15
56°	16:37	17:53	19:12	04:11	04:15	04:20
54°	16:36	17:49	19:06	04:10	04:17	04:24
52°	16:35	17:46	19:00	04:10	04:19	04:29
50°	16:34	17:43	18:54	04:10	04:21	04:32
45°	16:33	17:37	18:43	04:09	04:24	04:41
N 40°	16:31	17:31	18:33	04:08	04:27	04:48
35°	16:30	17:27	18:25	04:08	04:30	04:54
30°	16:29	17:23	18:18	04:07	04:32	04:59
20° N 10°	16:28 16:26	17:16 17:10	18:06 17:56	04:06 04:05	04:37 04:40	05:08 05:16
0°	16:25	17:10	17:50	04:05	04:40	05:10
1						
<b>S</b> 10°	16:24	16:59	17:36	04:04	04:47	05:32
20° 30°	16:22 16:21	16:53 16:46	17:26 17:14	04:03 04:02	04:51 04:55	05:40 05:49
35°	16:21	16:43	17:14	04:02	04:55	05:49
40°	16:19	16:38	17:07	04:01	05:00	06:01
45°	16:18	16:33	16:51	04:01	05:03	06:01
<b>S</b> 50°	16:16	16:28	16:40	03:59	05:07	06:17
52°	16:16	16:28	16:40	03:59	05:07	06:17
54°	16:15	16:22	16:30	03:58	05:09	06:26
56°	16:14	16:19	16:24	03:58	05:11	06:31
58°	16:13	16:15	16:17	03:57	05:16	06:36
<b>S</b> 60°	16:12	16:11	16:10	03:56	05:18	06:43

		Sun		Moon			
Day	Eqn.of	f Time	Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	13-15	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	92-99%	
21	01:18	01:24	11:59	22:34	10:15		
22	01:30	01:35	11:58	23:14	10:54		
23	01:41	01:47	11:58	23:56	11:35		

April 24, 25, 26 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	212° 30.9	190°29.7	N07° 45.8	216°43.4	S03°12.1	162°13.1	N17°39.0	224°43.6	S07°06.7			
1	227°33.4	205°29.3	47.0	231°44.1	11.3	177°15.0	39.1	239°45.8	06.6	Alpheratz	357°35.7	29°13.3
2	242°35.8	220°28.9	48.2	246°44.8	10.6	192°16.9	39.3	254°48.0	06.5	Ankaa	353°08.1	-42°10.4
3	257°38.3	235°28.5	• • 49.3	261°45.5	09.8	207°18.8	• • 39.4	269°50.3	• • 06.4	Schedar	349°32.3	56°40.0
4	272°40.8	250°28.1	50.5	276°46.2	09.0	222°20.7	39.6	284°52.5	06.3	Diphda	348°48.2	-17°51.3
5	287°43.2	265°27.7	51.7	291°46.9	08.3	237°22.5	39.7	299°54.8	06.2	Achernar	335°21.2	-57°06.8
6	302°45.7	280°27.3	N07°52.9	306°47.5	S03°07.5	252°24.4	N17°39.9	314°57.0	S07°06.2	Hamal	327°52.3 314°49.6	23°34.5 89°22.0
7	$317^{\circ}48.1$	295°26.8	54.0	321°48.2	06.7	267°26.3	40.0	329°59.2	06.1	Polaris Acamar	314 49.6 315°12.6	-40°12.5
8	$332^{\circ}50.6$	310°26.4	55.2	336°48.9	06.0	282°28.2	40.2	345°01.5	06.0	Menkar	314°07.1	4°11.0
9	$347^{\circ}53.1$	325°26.0	• • 56.4	351°49.6	• • 05.2	297°30.1	• • 40.3	0°03.7	• • 05.9	Mirfak	308° 29.6	49°56.8
10	2°55.5	340°25.6	57.6	6°50.3	04.4	312°31.9	40.5	15°06.0	05.8	Aldebaran	290°40.6	16°33.4
11	17°58.0	355°25.2	58.7	21°51.0	03.7	327°33.8	40.7	30°08.2	05.7	Rigel	281°04.7	-8°10.5
12	33°00.5	10°24.8	N07°59.9	36°51.7	S03°02.9	342°35.7	N17°40.8	45°10.5	S07°05.7	Capella	280°23.1	46°01.4
13	48°02.9	25°24.4	08°01.1	51°52.4	02.1	357°37.6	41.0	60°12.7	05.6	Bellatrix	278°23.8	6°22.2
14 15	63°05.4 78°07.9	40°24.0 55°23.5	02.2 · · 03.4	66°53.0 81°53.7	01.4 03°00.6	12°39.4 27°41.3	41.1 •• 41.3	75°14.9 90°17.2	05.5 •• 05.4	Elnath	$278^{\circ}02.9$	28°37.7
16	93° 10.3	70°23.1	04.6	96°54.4	03°59.8	42°43.2	41.4	105°19.4	05.3	Alnilam	275°38.6	-1°11.3
17	108° 12.8	85°22.7	05.8	111°55.1	59.1	57°45.1	41.6	100°21.7	05.2	Betelgeuse	270°53.0	7°24.6
18	123° 15.3	100°22.3	N08°06.9	126°55.8	S02°58.3	72°47.0	N17°41.7	135°23.9	S07°05.1	Canopus	263°52.9	-52°42.7
19	138° 17.7	115°21.9	08.1	141°56.5	57.5	87°48.8	41.9	150°26.2	05.1	Sirius	258°26.9	-16°45.1
20	153° 20.2	130°21.5	09.3	156°57.2	56.8	102°50.7	42.0	165°28.4	05.0	Adhara	255°06.5	-29°00.5
21	168° 22.6	145°21.0	· · 10.4	171°57.9	• • 56.0	117°52.6	• • 42.2	180°30.7	• • 04.9	Procyon	244°51.6	5°09.7
22	183°25.1	160°20.6	11.6	186°58.6	55.2	132°54.5	42.3	195°32.9	04.8	Pollux	243°18.1	27°58.1
23	198°27.6	$175^{\circ}20.2$	12.8	201°59.2	54.5	$147^{\circ}56.4$	42.5	210°35.1	04.7	Avior Suhail	234°15.0 222°46.7	-59°35.5 -43°32.1
Mara	ass. 09:48	1/_N A/ A1	.2′ m-3.90	υΩ 7/ A Ω	.8' m1.13	1/1 0/ d0	2′ m-2.02	1/2 2/ 4 0	.1′ m1.07	Miaplacidus	222°46.7 221°38.3	-43°32.1 -69°49.3
ivier.p	ass. 09.40	ν-0.4 <i>α</i> Ι	.∠ 111-3.90	νυ.ι α-0	.0 1111.13	ν1.9 d0.	∠ 11F∠.U∠	ν Δ.Δ      α-0	.1 1111.07	Alphard	221 38.3 217°48.3	-8°45.9
										Regulus	207°35.0	11°50.9
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.3	61°37.4
0	213°30.0	190°19.8	N08° 13.9	216°59.9	S02°53.7	162°58.2	N17°42.6	225°37.4	S07°04.6	Denebola	182°25.3	14°26.2
1	228°32.5	205°19.4	15.1	232°00.6	52.9	178°00.1	42.8	240°39.6	04.6	Gienah	175°44.0	-17°40.7
2	243°35.0	220°19.0	16.3	247°01.3	52.2	193°02.0	42.9	255°41.9	04.5	Acrux	173°00.2	-63°14.2
3	258° 37.4	235°18.5	• • 17.4	262°02.0	51.4	208°03.9	• • 43.1	270°44.1	• • 04.4	Gacrux	$171^{\circ}51.9$	-57°15.1
4	273°39.9	250°18.1	18.6	277°02.7	50.6	223°05.7	43.2	285°46.4	04.3	Alioth	$166^{\circ}13.0$	55°49.7
5 6	288° 42.4 303° 44.8	265°17.7 280°17.3	19.8 N08° 20.9	292°03.4 307°04.1	49.9 \$02°49.1	238°07.6 253°09.5	43.4 N17°43.5	300°48.6 315°50.9	04.2 \$07°04.1	Spica	158°22.6	-11°17.4
7	318° 47.3	295°16.9	22.1	322°04.8	48.3	268°11.4	43.7	330°53.1	04.1	Alkaid	152°52.0	49°11.5
8	333° 49.7	310°16.5	23.3	337°05.4	47.6	283°13.3	43.8	345°55.3	04.1	Hadar	148°36.3	-60°29.5
9	348°52.2	325°16.0	24.4	352°06.1	• • 46.8	298°15.1	• • 44.0	0°57.6	• • 03.9		147°58.0	-36°29.5
10	3°54.7	340°15.6	25.6	7°06.8	46.0	313°17.0	44.1	15°59.8	03.8	Arcturus	145°48.1	19°03.3
11	18°57.1	355°15.2	26.8	22°07.5	45.3	328°18.9	44.3	31°02.1	03.7	Rigil Kent.	139° 40.5 137° 18.6	-60°56.2 74°03.2
12	33°59.6	10°14.8	N08° 27.9	37°08.2	S02°44.5	343°20.8	N17°44.4	46°04.3	S07°03.6	Kochab Zuben'ubi	137 18.6 136°56.4	-16°08.7
13	49°02.1	$25^{\circ}14.4$	29.1	52°08.9	43.7	358°22.6	44.6	61°06.6	03.5	Alphecca	130° 30.4 126° 03.9	-10 06.7 26°37.8
14	64°04.5	40°13.9	30.2	67°09.6	43.0	13°24.5	44.7	76°08.8	03.5	Antares	112° 16.3	-26°29.2
15	79°07.0	55°13.5	• • 31.4	82°10.3	• • 42.2	28°26.4	• • 44.9	$91^{\circ}11.1$	• • 03.4	Atria	107° 10.7	-69°04.1
16	94°09.5	70°13.1	32.6	97°11.0	41.4	43°28.3	45.0	106°13.3	03.3	Sabik	102°03.2	-15°45.4
17	109°11.9	85°12.7	33.7	112°11.6	40.7	58°30.2	45.2	121°15.6	03.2	Shaula	96°10.9	-37°07.2
18	124° 14.4	100°12.2	N08°34.9	127°12.3	S02°39.9	73°32.0	N17°45.3	136°17.8	S07°03.1	Rasalhague	95°58.9	12°32.3
19	139° 16.9	115°11.8	36.1	142°13.0	39.1	88°33.9	45.5	151°20.0	03.0	Eltanin	90°42.1	51°28.8
20	154° 19.3	130°11.4	37.2	157°13.7	38.4	103°35.8	45.6	166°22.3	03.0	Kaus Aust.	83°33.1	-34°22.3
21	169°21.8 184°24.2	145°11.0 160°10.6	•• 38.4	172°14.4 187°15.1	• • 37.6	118°37.7 133°39.5	• • 45.8	181°24.5 196°26.8	02.9	Vega	80°33.4	38°48.0
22 23	184 24.2 199° 26.7	175°10.1	39.5 40.7	202°15.8	36.8 36.1	133 39.5 148°41.4	45.9 46.1	211°29.0	02.8 02.7	Nunki	75°48.4	-26°16.0
23	199 20.7					140 41.4	40.1			Altair	62°00.5	8°55.7
Mer.p	ass. 09:44	$ u$ -0.4 $^{\prime}$ $d1$	.2′ m-3.90	$\nu$ 0.7′ $d$ -0	1.8'  m 1.13	$\nu 1.9' \ d0.$	2′ m-2.02	$\nu 2.2' \ d-0$	.1'  m1.07	Peacock	53°06.7	-56°39.2
				-		-				Deneb	49°26.3	45°21.6
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.5	9°59.0
0	214° 29.2	190°09.7	N08°41.9	217°16.5	S02°35.3	163°43.3	N17°46.2	226°31.3	S07°02.6	Al Na'ir Fomalhaut	27°33.9 15°15.4	-46°50.5 -29°29.6
1	229° 31.6	205°09.3	43.0	232°17.2	34.5	178°45.2	46.4	241°33.5	02.5	Scheat	15° 15.4 13° 46.0	-29° 29.6 28° 12.6
2	244° 34.1	220°08.9	44.2	247°17.9	33.7	193°47.0	46.5	256°35.8	02.5	Markab	13° 30.7	26 12.0 15°19.9
3	259°36.6	235°08.4	• • 45.3	$262^{\circ}18.5$	• • 33.0	208°48.9	• • 46.7	271°38.0	•• 02.4	ividikaD	13 30.1	10 19.9
4	274°39.0	250°08.0	46.5	$277^{\circ}19.2$	32.2	223°50.8	46.8	286°40.3	02.3	Apr 24 Wed	SHA	Mer.pass
5	289°41.5	265°07.6	47.7	292°19.9	31.4	238°52.7	47.0	301°42.5	02.2		337°58.8	11:18
6	304°44.0	280°07.2	N08°48.8	307°20.6	S02°30.7	253°54.6	N17°47.1	316°44.8	S07°02.1	Mars	4°12.5	09:33
7	319°46.4	295°06.7	50.0	322°21.3	29.9	268°56.4	47.3	331°47.0	02.0	Jupiter		13:09
8	334°48.9	310°06.3	51.1	337°22.0	29.1	283°58.3	47.4	346°49.2	02.0	Saturn	12°12.7	09:00
9	349°51.4	325°05.9	• • 52.3	352°22.7	• • 28.4	299°00.2	• • 47.6	1°51.5	•• 01.9	Apr 25 Thu	SHA	Mer.pass
10	4°53.8	340°05.5	53.4 54.6	7°23.4 22°24.1	27.6 26.8	314°02.1	47.7 47.0	16°53.7 31°56.0	01.8	Venus		11:19
11 12	19° 56.3 34° 58.7	355°05.0 10°04.6	54.6 N08°55.8	37°24.8	26.8 \$02°26.1	329°03.9 344°05.8	47.9 N17°48.0	46°58.2	01.7 \$07°01.6	Mars	$3^{\circ}29.9$	09:32
13	50°01.2	25°04.2	56.9	52°25.5	25.3	359°07.7	N17 48.0 48.2	40 58.2 62°00.5	01.6	Jupiter		13:06
14	65°03.7	40°03.8	58.1	67°26.1	24.5	14°09.6	48.3	77°02.7	01.5	Saturn	12°07.3	08:56
15	80°06.1	55°03.3	08° 59.2	82°26.8	• • 23.8	29°11.4	• • 48.5	92°05.0	01.4	Apr 26 Fri	SHA	Mer.pass
16	95°08.6	70°02.9	09°00.4	97°27.5	23.0	44°13.3	48.6	107°07.2	01.3		335°40.5	11:20
17	110° 11.1	85°02.5	01.5	112°28.2	22.2	59°15.2	48.8	122°09.5	01.2	Mars	2°47.3	09:30
18	125° 13.5	$100^{\circ}02.0$	N09°02.7	127°28.9	S02°21.5	74°17.1	N17°48.9	137°11.7	S07°01.1		309°14.1	13:03
19	140° 16.0	115°01.6	03.8	142°29.6	20.7	89°18.9	49.1	152°14.0	01.1	Saturn	$12^{\circ}02.1$	08:53
20	155° 18.5	130°01.2	05.0	157°30.3	19.9	104°20.8	49.2	167°16.2	01.0	11. * -	al ac::-!!	
21	170° 20.9	145°00.8	• • 06.1	172°31.0	. 19.2	119°22.7	• • 49.4	182°18.5	• • 00.9	Horizont	al parallax Venus:	0.1
22	185°23.4	160°00.3	07.3	187°31.7	18.4	134°24.6	49.5	197°20.7	00.8		Venus: Mars:	0.1 0.1
23	200°25.9	174°59.9	08.4	202°32.4	17.6	149°26.4	49.7	212°23.0	00.7		ividio.	0.1
Mer.p	ass. 09:40	$ u$ -0.4 $^{\prime}$ $d1$	.2′ m-3.91	$\nu$ 0.7′ d-0	.8′ m1.13	$\nu$ 1.9′ d0.	2′ m-2.01	$\nu$ 2.2′ d-0	.1' m $1.07$			

h	Sui	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°28.0	N12°57.3	0°58.4	14.7'	<b>S</b> 14°34.8	12.8'	54.8'
1 2	195°28.1 210°28.2	58.1 59.0	15°32.2 30°05.9	14.7' 14.6'	14°47.6 15°00.3	12.8' 12.7'	54.8' 54.8'
3	225° 28.4	12°59.8	44°39.5	14.5	15°13.0	12.6'	54.8
4	240°28.5	$13^{\circ}00.6$	59°13.0	14.4'	$15^{\circ}25.7$	12.6'	54.8'
5	255°28.6	01.4	73°46.4	14.4'	15°38.3	12.5'	54.9'
6 7	270°28.7 285°28.8	N13°02.2 03.1	88° 19.8 102° 53.1	14.3' 14.2'	\$15°50.8 16°03.3	12.5' 12.4'	54.9' 54.9'
8	300°28.9	03.1	117°26.3	14.1'	16° 15.7	12.4'	54.9'
9	315°29.0	• • 04.7	$131^{\circ}59.5$	14.1'	$16^{\circ}28.0$	12.3'	54.9'
10	330°29.1 345°29.2	05.5 06.3	146°32.5 161°05.5	14.0' 13.9'	16°40.3 16°52.6	12.2'	54.9'
11 12	0°29.3	N13°07.1	101 05.5 175°38.4	13.8'	\$17°04.7	12.2' 12.1'	55.0' 55.0'
13	15° 29.5	08.0	190°11.2	13.7'	17°16.8	12.0'	55.0'
14	30°29.6	08.8	204°44.0	13.7'	17°28.9	12.0'	55.0'
15 16	45°29.7 60°29.8	· · 09.6 10.4	219°16.6 233°49.2	13.6' 13.5'	17°40.8 17°52.7	11.9' 11.8'	55.0' 55.0'
17	75° 29.9	11.2	248°21.7	13.4'	18°04.6	11.8'	55.1'
18	90°30.0	N13°12.0	262°54.1	13.3'	<b>S</b> 18°16.3	11.7'	55.1'
19 20	105°30.1 120°30.2	12.8 13.7	277°26.4 291°58.7	13.2' 13.1'	18°28.0 18°39.6	11.6' 11.5'	55.1' 55.1'
20	120 30.2 135°30.3	13.7	291 58.7 306°30.8	13.1	18 39.0 18°51.2	11.5'	55.1'
22	150° 30.4	15.3	321°02.9	13.0'	19°02.6	11.4'	55.1'
23	165°30.5	16.1	335°34.9	12.9'	19°14.0	11.3'	55.2'
	SD = 15.9'	d = 0.8'		SE	0 = 14.9'		
Thu	GHA	Dec	GHA	ν	Dec	d	НР
0	180°30.6	N13° 16.9	350°06.7	ν 12.8'	\$19°25.3	11.2'	55.2'
1	195°30.8	17.7	4°38.5	12.7'	$19^{\circ}36.5$	11.2'	55.2'
2	210°30.9	18.5	19° 10.2	12.6'	19°47.7	11.1'	55.2'
3 4	225°31.0 240°31.1	· · 19.3 20.2	33°41.9 48°13.4	12.5' 12.4'	19°58.8 20°09.8	11.0' 10.9'	55.2' 55.2'
5	255°31.2	21.0	62°44.8	12.3'	20°20.7	10.8'	55.3'
6	270°31.3	N13°21.8	77°16.2	12.3'	S20°31.5	10.7'	55.3'
7 8	285°31.4 300°31.5	22.6 23.4	91°47.4 106°18.6	12.2' 12.1'	20°42.2 20°52.8	10.6' 10.6'	55.3' 55.3'
9	315°31.6	24.2	100 16.0 120°49.7	12.1	20 52.6 21°03.4	10.5	55.3'
10	330°31.7	25.0	135°20.6	11.9'	21°13.9	10.4'	55.3'
11	345°31.8	25.8	149°51.5	11.8'	21°24.2	10.3'	55.4'
12 13	0°31.9 15°32.0	N13°26.6 27.4	164°22.3 178°53.0	11.7' 11.6'	\$21°34.5 21°44.7	10.2' 10.1'	55.4' 55.4'
14	30°32.1	28.2	193°23.6	11.5'	21°54.8	10.0'	55.4'
15	45° 32.2	• • 29.0	207°54.1	11.4'	22°04.8	9.9'	55.4'
16 17	60°32.3 75°32.4	29.9 30.7	222°24.5 236°54.8	11.3' 11.2'	22°14.7 22°24.5	9.8' 9.7'	55.5' 55.5'
18	90°32.5	N13°31.5	250° 54.6 251° 25.0	11.1'	\$22°34.2	9.6	55.5'
19	105°32.6	32.3	265°55.2	11.0'	22°43.8	9.5'	55.5'
20	120°32.7	33.1	280°25.2		22°53.3 23°02.7	٠	55.5'
21 22	135° 32.8 150° 32.9	· · 33.9 34.7	294°55.1 309°25.0	10.8' 10.7'	23°02.7 23°11.9	9.3' 9.2'	55.5' 55.6'
23	165°33.0	35.5	323°54.7	10.6'	23°21.1	9.1'	55.6'
	SD = 15.9'	d = 0.8'	-	SE	0 = 15.0'		
F.:	CUA	Dec	CIIA		D-:	.1	HP
Fri 0	<b>GHA</b> 180°33.1	Dec N13°36.3	<b>GHA</b> 338° 24.4	u 10.6'	Dec \$23°30.2	<i>d</i> 9.0'	<b>нР</b> 55.6'
1	195°33.2	37.1	352°53.9	10.5'	23°39.1	8.8'	55.6'
2	210°33.3	37.9	7°23.4 21°52.7	10.4'	23°48.0	8.7'	55.6'
3 4	225°33.5 240°33.6	· · 38.7 39.5	21°52.7 36°22.0	10.3' 10.2'	23°56.7 24°05.3	8.6' 8.5'	55.7' 55.7'
5	255°33.7	40.3	50°51.2	10.1	24°13.8	8.4	55.7'
6	270°33.8	N13°41.1	65°20.2	10.0'	\$24°22.2	8.3'	55.7'
7 8	285°33.9 300°34.0	41.9 42.7	79°49.2 94°18.1	9.9' 9.8'	24°30.5 24°38.7	8.2' 8.0'	55.7' 55.8'
9	315°34.1	• • 43.5	108° 46.9	9.6 9.7'	24° 36.7 24° 46.7	7.9'	55.8'
10	330°34.2	44.3	123°15.6	9.6'	24°54.6	7.8'	55.8'
11	345°34.3 0°34.4	45.1 N13°45.9	137°44.2 152°12.7	9.5' 9.4'	25°02.4 \$25°10.1	7.7' 7.5'	55.8' 55.8'
12 13	15°34.4	N13 45.9 46.7	152° 12.7 166° 41.1	9.4	25°17.6	7.5° 7.4'	55.8° 55.9'
14	30°34.5	47.5	181°09.5	9.2'	25°25.0	7.3'	55.9'
15	45°34.6	• • 48.3	195°37.7	9.1'	25°32.3	7.2'	55.9'
16 17	60°34.7 75°34.8	49.1 49.9	210°05.8 224°33.9	9.1' 9.0'	25°39.5 25°46.5	7.0' 6.9'	55.9' 55.9'
18	90°34.9	N13°50.7	239°01.9	8.9'	\$25°53.4	6.8'	56.0'
19	105°35.0	51.5	253°29.7	8.8'	26°00.2	6.6'	56.0'
20	120°35.1 135°35.2	52.3	267°57.5 282°25.2	8.7' 8.6'	26°06.8 26°13.3	6.5' 6.4'	56.0' 56.0'
21 22	135° 35.2 150° 35.3	· · 53.1 53.8	282°25.2 296°52.8	8.6° 8.5'	26°13.3 26°19.7	6.4	56.0'
23	165° 35.4	54.6	311° 20.4	8.4'	26°25.9	6.1	56.1'
	SD = 15.9'	d = 0.8'		SE	0 = 15.2'		
	_						

			2024	April 24	to Ap	r. 26
Lat.	Twi	light	Sunrise	Sunset	Twilight	
Lat.	Naut.	Civil	Surrise	Sunset	Civil	Naut
N 72°	////	////	02:34	21:27	////	////
N 70°	////	01:00	03:02	20:58	23:10	////
68°	7777	01:55	03:23	20:36	22:07	7777
66°	////	02:27	03:39	20:19	21:33	////
64°	00:53	02:50	03:53	20:05	21:09	23:16
62°	01:41	03:08	04:04	19:54	20:50	22:20
60°	02:11	03:23	04:13	19:44	20:35	21:49
N 58°	02:32	03:36	04:22	19:36	20:22	21:26
56°	02:32	03:46	04:29	19:28	20:22	21:09
54°	03:04	03:56	04:29	19:21	20:02	20:54
52°	03:16	04:04	04:41	19:16	19:53	20:42
50°	03:26	04:11	04:47	19:10	19:46	20:31
45°	03:47	04:26	04:58	18:59	19:30	20:09
<b>N</b> 40°	04:04	04:39	05:07	18:49	19:18	19:53
35°	04:17	04:49	05:15	18:41	19:08	19:40
30°	04:28	04:57	05:22	18:34	18:59	19:29
20°	04:45	05:12	05:34	18:22	18:44	19:11
N 10°	04:58	05:23	05:45	18:11	18:33	18:58
0°	05:09	05:33	05:54	18:01	18:23	18:47
<b>S</b> 10°	05:18	05:43	06:04	17:52	18:13	18:38
$20^{\circ}$	05:26	05:52	06:14	17:41	18:04	18:30
$30^{\circ}$	05:33	06:01	06:25	17:30	17:54	18:23
$35^{\circ}$	05:36	06:06	06:32	17:23	17:49	18:19
40°	05:40	06:11	06:39	17:16	17:44	18:16
45°	05:43	06:18	06:48	17:07	17:38	18:12
<b>S</b> 50°	05:47	06:25	06:58	16:57	17:30	18:08
52°	05:48	06:28	07:03	16:52	17:27	18:07
54°	05:50	06:31	07:08	16:47	17:24	18:05
56°	05:51	06:35	07:14	16:41	17:20	18:04
58°	05:53	06:39	07:20	16:34	17:16	18:02
<b>S</b> 60°	05:54	06:43	07:28	16:27	17:11	18:00
Lat		Moonris	ie .		Moonse	t
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°				02:14		
<b>N</b> 70°	23:44			02:47	01:19	
68°	22:36			03:10	02:28	_
66°	22:01		00:52	03:29	03:04	01:54
64°	21:36	23:39		03:44	03:31	03:07
62°	21:16	23:03		03:57	03:51	03:44
60°	21:00	22:38		04:08	04:08	04:10
N 58°	20:47	22:18	23:50	04:17	04:22	04:31
56°	20:35	22:01	23:27	04:26	04:35	04:48
54°	20:25	21.47	23:09	04:33	04.45	05:03

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	215°28.3	189°59.5	N09°09.6	217°33.1	S02°16.9	164°28.3	N17°49.8	227°25.2	S07°00.6			
1	230°30.8	204°59.0	10.7	232°33.8	16.1	179°30.2	50.0	242°27.5	00.6	Alpheratz	357°35.7	29°13.3
2	245°33.2	219°58.6	11.9	247°34.4	15.3	194°32.1	50.1	257°29.7	00.5	Ankaa	353°08.1	-42°10.4
3	260°35.7	234°58.2	· · 13.0	262°35.1	• • 14.6	209°33.9	• • 50.3	272°32.0	00.4	Schedar	349°32.3	56°40.0
4	275°38.2	249°57.8	14.2	277°35.8	13.8	224°35.8	50.4	287°34.2	00.3	Diphda	348°48.2	-17°51.3
5	290°40.6	264°57.3	15.3	292°36.5	13.0	239°37.7	50.6	302°36.5	00.2	Achernar	335°21.2	-57°06.8
6	305°43.1	279°56.9	N09°16.5	307°37.2	S02°12.3	254°39.6	N17°50.7	317°38.7	S07°00.2	Hamal	327°52.2	23°34.5
7	320°45.6	294°56.5	17.6	322°37.9	11.5	269°41.4	50.9	332°41.0	00.1	Polaris	314°49.4	89°22.0
8	335°48.0	309°56.0	18.8	337°38.6	10.7	284°43.3	51.0	347°43.2	07°00.0	Acamar	315°12.6	-40°12.5
9	350°50.5	324°55.6	• • 19.9	352°39.3	· · 10.0	299°45.2	• • 51.2	2°45.5	06°59.9	Menkar	314°07.1	4°11.0
10	5°53.0	339°55.2	21.1	7°40.0	09.2	314°47.1	51.3	17°47.7	59.8	Mirfak	308°29.6	49°56.8
11	20°55.4	354°54.7	22.2	22°40.7	08.4	329°48.9	51.5	32°50.0	59.7	Aldebaran	290°40.6	16°33.4
12	35°57.9	9°54.3	N09°23.4	37°41.4	S02°07.7	344°50.8	N17°51.6	47°52.2	S06°59.7	Rigel	281°04.7	-8°10.5
13	51°00.4	24°53.9	24.5	52°42.1	06.9	359°52.7	51.8	62°54.5	59.6	Capella	280°23.2	46°01.4
14	66°02.8	39°53.4	25.7	67° 42.8	06.1	14°54.6	51.9	77°56.7	59.5	Bellatrix	278°23.8	6°22.2
15	81°05.3	54°53.0	26.8	82°43.4	• • 05.3	29°56.4	• • 52.1	92°59.0	• • 59.4	Elnath	278°02.9	28°37.7
16	96°07.7	69°52.6	28.0	97°44.1	04.6	44°58.3	52.2	108°01.2	59.3	Alnilam	275°38.6	-1°11.3
17	111° 10.2	84°52.1	29.1	112°44.8	03.8	60°00.2	52.4	123°03.5	59.3	Betelgeuse	270°53.0	7°24.6
18	126° 12.7	99°51.7	N09°30.3	127° 45.5	S02°03.0	75°02.1	N17°52.5	138°05.7	S06°59.2	Canopus	263°53.0	-52°42.7
19	141°15.1	114°51.2	31.4	142°46.2	02.3	90°03.9	52.7	153°08.0	59.1	Sirius	258°26.9	-16°45.1
20	156° 17.6	129°50.8	32.5	157° 46.9	01.5	105°05.8	52.8	168°10.2	59.0	Adhara	255°06.5	-29°00.5
21	171°20.1	144°50.4	33.7	172° 47.6	• • 00.7	120°07.7	• • 52.9	183°12.5	• • 58.9	Procyon	244°51.6	5°09.7
22	186°22.5	159°49.9	34.8	187°48.3	02°00.0	135°09.6	53.1	198°14.7	58.8	Pollux	243°18.1	27°58.1
23	201°25.0	174°49.5	36.0	202°49.0	01°59.2	150°11.4	53.2	213°17.0	58.8	Avior	234°15.1	-59°35.5
			_							Suhail	222°46.7	-43°32.1
Mer.p	ass. 09:37	$\nu$ -0.4' d1	.2′ m-3.91	$\nu$ 0.7′ d-0	.8′ m1.13	$\nu 1.9' \ d0.$	.1′ m-2.01	$\nu$ 2.2' d-0	.1′ m1.07	Miaplacidus	221°38.3	-69°49.3
										Alphard	217°48.3	-8°45.9
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.0	11°50.9
0	216° 27.5	189°49.1	N09°37.1	217°49.7	S01°58.4	165°13.3	N17°53.4	228°19.2	S06°58.7	Dubhe	193°41.3	61°37.4
1	231°29.9	204°48.6	38.3	232°50.4	57.7	180°15.2	53.5	243°21.5	58.6	Denebola	182°25.3	14°26.2
2	246°32.4	219°48.2	39.4	247°51.1	56.9	195°17.1	53.7	258°23.7	58.5	Gienah	175°43.9	-17°40.7
3	261°34.8	234°47.8	• • 40.5	262°51.8	56.1	210°18.9	• • 53.8	273°26.0	• • 58.4	Acrux	173°00.2	-63°14.2
4	276° 37.3	249°47.3	41.7	277°52.5	55.4	225°20.8	54.0	288°28.2	58.4	Gacrux	171°51.9	-57°15.1
5	291°39.8	264°46.9	42.8	292°53.2	54.6	240°22.7	54.1	303°30.5	58.3	Alioth	166°13.0	55°49.7
6	306° 42.2	279°46.4	N09°44.0	307°53.8	S01°53.8	255°24.6	N17°54.3	318°32.7	S06°58.2	Spica	158°22.6	-11°17.4
7	321°44.7	294°46.0	45.1	322°54.5	53.1	270°26.4	54.4	333°35.0	58.1	Alkaid	152°52.0	49°11.5
8	336° 47.2	309°45.6	46.3	337°55.2	52.3	285°28.3	54.6	348°37.2	58.0	Hadar	148°36.3	-60°29.5
9	351°49.6	324°45.1	• • 47.4	352°55.9	51.5	300°30.2	• • 54.7	3°39.5	• • 58.0	Menkent	147°58.0	-36°29.5
10	6°52.1	339°44.7	48.5	7°56.6	50.8	315°32.0	54.9	18°41.7	57.9	Arcturus	145°48.1	19°03.3
11	21°54.6	354°44.2	49.7	22°57.3	50.0	330°33.9	55.0	33°44.0	57.8	Rigil Kent.	139°40.5	-60°56.2
12	36°57.0	9°43.8	N09°50.8	37°58.0	S01°49.2	345°35.8	N17°55.2	48°46.2	S06°57.7	Kochab	137°18.6	74°03.2
13	51°59.5	24°43.4	51.9	52°58.7	48.5	0°37.7	55.3	63°48.5	57.6	Zuben'ubi	136°56.4	-16°08.7
14	67°02.0	39°42.9	53.1	67° 59.4	47.7	15°39.5	55.5	78°50.7	57.6	Alphecca	126°03.9	26°37.8
15	82°04.4	54°42.5	• • 54.2	83°00.1	• • 46.9	30°41.4	• • 55.6	93°53.0	• • 57.5	Antares	112°16.3	-26°29.2
16	97°06.9	69°42.0	55.4	98°00.8	46.2	45°43.3	55.8	108°55.2	57.4	Atria	107°10.6	-69°04.1
17	112°09.3	84°41.6	56.5	113°01.5	45.4	60°45.2	55.9	123°57.5	57.3	Sabik	102°03.2	-15°45.4
18	127°11.8	99°41.1	N09°57.6	128°02.2	S01°44.6	75°47.0	N17°56.1	138°59.8	S06°57.2	Shaula	96°10.9	-37°07.2
19	142°14.3	114°40.7	58.8	143°02.9	43.8	90°48.9	56.2	154°02.0	57.2	Rasalhague	95°58.9	12°32.3
20	157° 16.7	129°40.3	09°59.9	158°03.6	43.1	105°50.8	56.4	169°04.3	57.1	Eltanin	90°42.1	51°28.8
21	172° 19.2	144°39.8	10°01.0	173°04.3	• • 42.3	120°52.7	• • 56.5	184°06.5	• • 57.0	Kaus Aust.	83°33.1	-34°22.3
22	187°21.7	159°39.4	02.2	188°05.0	41.5	135°54.5	56.7	199°08.8	56.9	Vega	80°33.4	38°48.0
23	202°24.1	174°38.9	03.3	203°05.6	40.8	150°56.4	56.8	214°11.0	56.8	Nunki	75°48.4	-26°16.0
										Altair	62°00.5	8°55.7
Mer.p	ass. 09:33	$\nu$ -0.4' d1	.1′ m-3.91	$\nu$ 0.7 d-0	.8′ m1.13	$\nu_{1.9}$ do.	.1′ m-2.01	$\nu$ 2.3′ $d$ -0	.1′ m1.07	Peacock	53°06.6	-56°39.2 45°21.7
										Deneb	49°26.2	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.5 27°33.8	9°59.0 -46°50.5
0	217°26.6	189°38.5	N10°04.4	218°06.3	S01°40.0	165°58.3	N17°57.0	229°13.3	S06°56.8	Al Na'ir Fomalhaut	27°33.8 15°15.4	-46°50.5 -29°29.6
1	232°29.1	204°38.0	05.6	233°07.0	39.2	181°00.1	57.1	244°15.5	56.7	Scheat	15 15.4 13°46.0	-29 29.6 28°12.6
2	247°31.5	219°37.6	06.7	248°07.7	38.5	196°02.0	57.3	259°17.8	56.6	Markab	13° 40.0 13° 30.7	28 12.6 15°20.0
3	262°34.0	234°37.1	07.8	263°08.4	37.7	211°03.9	• • 57.4	274°20.0	56.5	iviarkaD	13 30.7	13 20.0
4	277°36.5	249°36.7	09.0	278°09.1	36.9	226°05.8	57.6	289°22.3	56.4	Apr 27 Sat	SHA	Mer.pass
5	292°38.9	264°36.3	10.1	293°09.8	36.2	241°07.6	57.7	304°24.5	56.4	Venus	334°31.2	11:20
6	307°41.4	279°35.8	N10°11.2	308° 10.5	S01°35.4	256°09.5	N17°57.9	319°26.8	S06°56.3	Mars	2°04.7	09:29
7	322°43.8	294°35.4	12.4	323°11.2	34.6	271°11.4	58.0	334°29.0	56.2	Jupiter		13:00
8	337°46.3	309°34.9	13.5	338°11.9	33.9	286°13.2	58.2	349°31.3	56.1	Saturn	11°56.9	08:49
9	352°48.8	324°34.5	• • 14.6	353°12.6	• • 33.1	301°15.1	• • 58.3	4°33.6	• • 56.0	A 20 C		
10	7°51.2	339°34.0	15.8	8°13.3	32.3	316°17.0	58.4	19°35.8	56.0	Apr 28 Sun	SHA	Mer.pass
11	22°53.7	354°33.6	16.9	23°14.0	31.6	331°18.9	58.6	34°38.1	55.9	Venus		11:21
12	37°56.2	9°33.1	N10°18.0	38° 14.7	S01°30.8	346°20.7	N17°58.7	49°40.3	S06°55.8	Mars	1°22.2	09:28
13	52°58.6	24°32.7	19.1	53° 15.4	30.0	1°22.6	58.9	64°42.6	55.7	Jupiter	308°45.9	12:57
14	68°01.1	39°32.2	20.3	$68^{\circ}16.1$	29.3	16°24.5	59.0	79°44.8	55.6	Saturn	11°51.8	08:45
15	83°03.6	54°31.8	• • 21.4	83°16.8	• • 28.5	31°26.4	• • 59.2	94°47.1	• • 55.6	Apr 29 Mon	SHA	Mer.pass
16	98°06.0	69°31.3	22.5	98° 17.5	27.7	46°28.2	59.3	109°49.3	55.5	Venus		11:22
17	113°08.5	84°30.9	23.6	113° 18.2	26.9	61°30.1	59.5	124°51.6	55.4	Mars	0°39.7	09:27
18	128°11.0	99°30.4	N10°24.8	128° 18.9	501°26.2	76°32.0	N17°59.6	139°53.9	S06°55.3	Jupiter	308°31.7	12:55
19	143°13.4	114°30.0	25.9	143°19.5	25.4	91°33.8	59.8	154°56.1	55.2	Saturn	11°46.7	08:42
20	158° 15.9	129°29.5	27.0	158° 20.2	24.6	106°35.7	17°59.9	169°58.4	55.2			
21	173°18.3	144°29.1	• • 28.2	173°20.9	• • 23.9	121°37.6	18°00.1	185°00.6	• • 55.1	Horizont	al parallax	
22	188°20.8	159°28.6	29.3	188°21.6	23.1	$136^{\circ}39.5$	00.2	200°02.9	55.0		Venus:	0.1
23	203°23.3	174°28.2	30.4	203°22.3	22.3	151°41.3	00.4	$215^{\circ}05.1$	54.9		Mars:	0.1
Mern	ass. 09:29	ν-0 4' d1	.1′ m-3.91	$\nu$ 0.7' d=0	.8′ m1.12	ν1 9' d0	.1′ m-2.01	ν2 3' d-0	0.1' m1.07			
ivici.p	.u.s. U.S.Z.S	ν O.T UI	. T 111-0.91	ν υ. ι u-υ	1111.12	ν 1.5 UU.	. + 111-4.UI	ν Δ.υ - U				

h	Sur	1			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°35.5	N13°55.4	325°47.8	8.4'	S26°32.0	6.0'	56.1'
1	195°35.6	56.2	$340^{\circ}15.2$	8.3'	$26^{\circ}38.0$	5.8'	56.1'
2	210°35.7	57.0	354°42.4	8.2'	26°43.8	5.7'	56.1'
3	225°35.8	• • 57.8	9°09.6	8.1'	26°49.5	5.5'	56.1'
4	240°35.9 255°36.0	58.6 13°59.4	23°36.7 38°03.8	8.0' 7.9'	26°55.0 27°00.4	5.4'	56.2'
5 6	255 36.0 270°36.1	N14°00.2	52°30.7	7.9'	\$27°05.6	5.2' 5.1'	56.2' 56.2'
7	285°36.2	01.0	66°57.6	7.9 7.8'	27°10.7	4.9'	56.2
8	300°36.3	01.8	81°24.4	7.7'	27°15.7	4.8'	56.3
9	315°36.4	• • 02.6	95°51.1	7.6'	27°20.5	4.7'	56.3'
10	330°36.5	03.3	110°17.7	7.6'	$27^{\circ}25.1$	4.5'	56.3'
11	345°36.6	04.1	124°44.3	7.5'	27°29.6	4.4'	56.3'
12	0°36.7	N14°04.9	139°10.8	7.4'	S27°34.0	4.2'	56.3'
13	15°36.8	05.7	153°37.2	7.4'	27°38.2	4.0'	56.4
14 15	30°36.9 45°36.9	06.5 •• 07.3	168°03.5 182°29.8	7.3' 7.2'	27°42.2 27°46.1	3.9' 3.7'	56.4' 56.4'
16	60°37.0	08.1	196°56.0	7.1	27°49.9	3.6'	56.4
17	75°37.1	08.9	211°22.2	7.1'	27°53.4	3.4'	56.4
18	90°37.2	N14°09.7	225°48.3	7.0'	S27°56.9	3.3'	56.5'
19	105°37.3	10.4	$240^{\circ}14.3$	7.0'	28°00.1	3.1'	56.5'
20	120°37.4	11.2	254°40.2	6.9'	28°03.2	3.0'	56.5'
21	135°37.5 150°37.6	• • 12.0	269°06.1	6.8'	28°06.2	2.8'	56.5'
22 23	150°37.6 165°37.7	12.8 13.6	283°32.0 297°57.8	6.8' 6.7'	28°09.0 28°11.6	2.6' 2.5'	56.6' 56.6'
23			291 31.8			∠.5	50.0
	SD = 15.9'	d = 0.8'		SI	O = 15.3'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°37.8	N14°14.4	312°23.5	6.7'	\$28°14.1	2.3'	56.6'
1	195°37.9	15.1	326°49.2	6.6'	28°16.4	2.1'	56.6'
2	210°38.0 225°38.0	15.9	341°14.8 355°40.4	6.6'	28°18.5 28°20.5	2.0'	56.6'
3 4	225°38.0 240°38.1	· · 16.7 17.5	355°40.4 10°05.9	6.5' 6.5'	28°20.5 28°22.3	1.8' 1.6'	56.7' 56.7'
5	255°38.2	18.3	24°31.4	6.4	28°24.0	1.5'	56.7
6	270°38.3	N14°19.1	38°56.8	6.4	\$28°25.5	1.3'	56.7'
7	285°38.4	19.8	53°22.2	6.3'	28°26.8	1.2'	56.8'
8	300°38.5	20.6	67°47.5	6.3'	28°27.9	1.0'	56.8'
9	315°38.6	• • 21.4	82°12.9	6.3'	28°28.9	0.8'	56.8'
10	330°38.7	22.2	96°38.1	6.2'	28°29.7	0.6'	56.8'
11	345°38.8	23.0 N14°23.7	111°03.4	6.2'	28°30.4	0.5'	56.8'
12 13	0°38.8 15°38.9	N14°23.7 24.5	125°28.6 139°53.7	6.2' 6.1'	\$28°30.9 28°31.2	0.3' 0.1'	56.9' 56.9'
14	30°39.0	25.3	154°18.9	6.1	28°31.3	-0.0'	56.9
15	45°39.1	26.1	168°44.0	6.1'	28°31.3	-0.2	56.9'
16	60°39.2	26.8	$183^{\circ}09.1$	6.1'	28°31.1	-0.4'	57.0'
17	75°39.3	27.6	197°34.1	6.0'	28°30.7	-0.5'	57.0'
18	90°39.4	N14°28.4	211°59.2	6.0'	\$28°30.1	-0.7'	57.0'
19	105°39.5	29.2	226°24.2	6.0'	28°29.4 28°28.5	-0.9'	57.0'
20 21	120°39.5 135°39.6	30.0 · · 30.7	240°49.2 255°14.2	6.0' 6.0'	28°27.5	-1.1' -1.2'	57.1' 57.1'
22	150°39.7	31.5	269°39.2	6.0'	28°26.3	-1.4'	57.1'
23	165°39.8	32.3	284°04.1	5.9'	28°24.8	-1.6'	57.1'
	SD = 15.9'	d = 0.8'		SI	D = 15.4'		
Mon	GHA	Dec	GHA		Dec	d	HP
0 0	180°39.9	Dec N14°33.1	298°29.1	u 5.9'	S28°23.3	a -1.7'	пР 57.2'
1	195°40.0	33.8	312°54.0	5.9'	28°21.5	-1.9'	57.2'
2	210°40.1	34.6	327°18.9	5.9'	28°19.6	-2.1'	57.2'
3	225°40.1	• • 35.4	341°43.8	5.9'	28°17.5	-2.3'	57.2'
4	240°40.2	36.1	356°08.8	5.9'	28°15.2	-2.4'	57.2'
5	255°40.3 270°40.4	36.9 N14°37.7	10°33.7 24°58.6	5.9'	28°12.8 528°10.2	-2.6'	57.3'
6 7	270°40.4 285°40.5	N14°37.7 38.5	24°58.6 39°23.5	5.9' 5.9'	28°10.2 28°07.4	-2.8' -3.0'	57.3' 57.3'
8	300°40.6	39.2	59 23.5 53°48.5	5.9'	28°04.4	-3.0 -3.1'	57.3'
9	315°40.6	• • 40.0	68°13.4	5.9'	28°01.3	-3.3'	57.4
10	330°40.7	40.8	82°38.3	6.0'	27°58.0	-3.5'	57.4'
11	345°40.8	41.5	97°03.3	6.0'	27°54.5	-3.6'	57.4'
12	0°40.9	N14°42.3	111°28.2	6.0'	\$27°50.9	-3.8'	57.4'
13	15°41.0	43.1	125°53.2	6.0'	27°47.1	-4.0'	57.5'
14 15	30°41.1 45°41.1	43.8 •• 44.6	140°18.2 154°43.2	6.0' 6.0'	27°43.1 27°38.9	-4.2' -4.3'	57.5' 57.5'
16	45 41.1 60°41.2	45.4	154 43.2 169°08.3	6.0'	27°34.6	-4.5'	57.5'
17	75°41.3	46.1	183°33.3	6.1	27°30.1	-4.7'	57.6'
18	90°41.4	N14°46.9	197°58.4	6.1'	S27°25.4	-4.8'	57.6'
19	105°41.5	47.7	$212^{\circ}23.5$	6.1'	27°20.5	-5.0'	57.6'
20	120°41.5	48.4	226°48.6	6.1'	27°15.5	-5.2'	57.6'
21	135°41.6	• • 49.2	241°13.7	6.2'	27°10.3	-5.4'	57.7'
22	150°41.7 165°41.8	50.0 50.7	255°38.9 270°04.1	6.2'	27°05.0 26°59.5	-5.5'	57.7'
23		50.7	210-04.1	6.2'		-5.7'	57.7'
	SD = 15.9'	d = 0.8'		SI	O = 15.6'		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	19-21	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	91-76%	
27	02:22	02:27	11:58	02:22	14:50		
28	02:31	02:35	11:57	03:18	15:47		
29	02:40	02:44	11:57	04:16	16:45		

THE CHA CHA Dec CHA De	h	Aries	•	nus	•	ars	Jur	oiter	Sat	urn		Stars	
0 2 127-57 189"277 NUP315 218730 50"316 186"412 N18"005 200"77. 96"54.8	-												
1 2 22 34 32 20 20 27 37 2 26 23 23 27 200 1904-00 101 201-10 5-2 4 30 201-10 1904-00 101 201-10 5-2 4 30 201-10 1904-00 101 201-10 5-2 4 30 201-10 1904-00 101 201-10 5-2 4 30 201-10 1904-00 101 201-10 5-2 4 30 201-10 1904-00 101 201-10 5-2 4 30 201-10 1904-00 101 201-10 5-2 4 30 201-10 1904-00 101 201-10 5-2 4 30 201-10 1904-00 101 201-10 5-2 4 30 201-10 1904-00 101 201-10 5-2 4 30 201-10 1904-00 101 201-10 5-2 4 30 201-10 1904-00 101 201-10 5-2 4 30 201-10 1904-00 101 201-10 1904-00 101-10 1904												SHA	Dec
2 94°997 219°808 338 28°974 9 200 196°49 9 00 200°110 5 5 7											Alpheratz	357°35.7	29°13.3
3 28 293.1 23 28 28 3											Ankaa	353°08.1	-42°10.4
4 2079-56 24079-50 360 2470-58 1150 2267507 0.1.1 20071-6 5-5 20071-0 1.7 20070-0 1.1 20071-6 5-5 20070-0 1.7 20070-0 1.1 20071-6 5-5 20070-0 1.7 20070-0 1.1 20071-6 5-5 20070-0 1.1 2007											Schedar	349°32.3	56°40.0
5 90 90% 81  264 924											Diphda	348°48.2	$-17^{\circ}51.3$
8   86   80   279   276   810   813   83   83   82   81   81   82   82   83   83   83   83   83   83											Achernar	$335^{\circ}21.2$	-57°06.8
7 23°430 294°215 5 94 23°279 102 271'503 106 35°322 5 94.3   Propose 34'004 30'004 114											Hamal	327°52.2	23°34.5
8 88% 45 90 90°42   40.5 880°36   154 880°8 2   01.7 80°07 54 54 2   44.7 840°8 1   14.7 820°60   0.10 90°07 54   54.1											Polaris	314°49.3	89°22.0
9 83 37-79 302-732.6 - 4.16 303-29.3 - 14.7 302-700.0 - 0.19 5-72.7 - 54.1											Acamar	$315^{\circ}12.6$	-40°12.5
10 8 95-04 339*232 4.27 8*30.0 13.9 317*01.9 02.0 02.0 02.0 02.0 05*30.0 54.1 Minus 250.0 4.2 11.2 235*23.5 34*227 4.3 24.0 235*30.1 13.1 335*03.8 0.21 37*02.5 56.1 4.3 24.0 11.2 235*33.5 0.0 12.2 12.4 12.2 12.2 12.4 12.2 12.2 12.4 12.2 12.2											Menkar	314°07.1	4°11.0
11 2 39°52 3 35°27 430 22°307 131 33°08 6 100°03 55°32 5 50 0											Mirfak	308°29.6	49°56.8
12 83*55.3 9*22.3 NOT-560 36*31.4 50*11.2 33*70*56 NOT-50.5 506*53.0 \$											Aldebaran	290°40.6	16°33.4
13											Rigel	281°04.7	-8°10.5
14   697   00.2   097   13   47.2   668   13.8   10.1   13.7   13.8   10.1   13.7   13.8											Capella	280°23.2	46°01.4
15											Bellatrix	278°23.8	
19   99'052   09'204   495   99"342   093   47"131   0.29   110"435   5.56   19   110"435   5.56   19   110"435   1.56   1.75											Elnath	278°02.9	28°37.7
17 114°07.6 84°20.0 506 113°349.0 855 62°150 830 125°48 8 555											Alnilam	275°38.6	$-1^{\circ}11.3$
18 129"10.1 99"19.5 N10"51.7 128"35. 501"07.7 7"116.9 N18"03.2 140"8.8 506"51.4 1 14"19.8 52.8 143"36.3 07.0 92"18.7 03.3 155"50.3 53.3 1.5 19"1.5 129"18.6 5.3 15"50.3 07.0 10"10"50.5 0.3 15"50.3 155"5											Betelgeuse	270°53.0	$7^{\circ}24.7$
19											Canopus	263°53.0	-52°42.7
20 197150 1297180 1397180 1397180 13981970 06.2 107206 03.5 107625 53.3 Achthard 2018 227467 2018 227180 22											Sirius	258°27.0	-16°45.1
Procycle   1971   197											Adhara	255°06.5	-29°00.5
Pollum   P													
Mar. pars. 09:25   \( \text{Def} \)   199   117   17   17   17   180   183   184   194   137   143   138   20   20   30   22   25   593   33.0   33													
Second Column   Second Colum											1		
More pass. 69:25	23	204°22.4	174° 17.2	57.3	203°39.0	03.9	152°26.2	03.9	215°59.3	53.0	1		
March   GHA   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   Deck	Mer n	ass. 09:25	$\nu$ -0.5' d1	.1' m-3.91	ν0.7′ d-0	0.8' m1.12	$\nu$ 1.9 $'$ d0	1' m-2.01	$\nu 2.3' d-0$	.1' m1.07			
CHA	р		- 0.0 41										
Orl 219-24													
0 219°249   9 1916.7   110°95   233°44   218°307   50°1031   167°281   188°041   231°10.16   506°53.0   506°53	Wed										_		
1 23*27.3 204*16.3 10*99.5 233*40.4 02.4 182*30.0 04.2 246*03.8 52.9													
2 2 269 298 2 29°18 18 11°06 288°411 01.0 01.0 19°318 01.4 281°06.1 52.8 3 26°32.2 23°18 1.4 01.7 281°18 15.2 24°18 1.4 01.7 281°18 1.4 01.7 2											1		
3 266*32.3 234*15.4 · O.1.7 263*41.8 · O.08 · O.08 · O.27 270*10.6 · D.27 270*	2			$11^{\circ}00.6$				04.4					
4 279-34.7 249-14.9 02.8 278-42.5 0.1-00.1 227-35.6 0.47. 291-10.6 52.6 0.206-32.7 266-11.4 0.39.9 293-43.2 00-59.3 242-37.4 0.4.8 300-12.9 5.6 5.2 0.006-32.7 279-14.0 N11-05.0 308-43.9 500-58.5 257-39.3 N18-04.9 321-15.1 506-52.5 5.6 5.2 0.006-32.7 279-14.0 N11-05.0 308-43.9 500-58.5 277-33.2 1.0 0.006-32.7 296-13.0 0.006-32.3 296-32.7 296-13.0 0.006-32.3 296-32.1 296-13.3 0.0 0.2 333-46.0 0.5 0.5 0.2 302-49.0 0.5.4 0.5 2.3 303-17.4 0.5 2.4 4.5 2.2 0.5 1.3 303-17.4 0.5 2.4 4.5 2.2 0.5 1.3 303-17.4 0.5 2.3 303-17.4 0.5 2.3 303-17.4 0.5 2.3 303-17.4 0.5 2.3 303-17.4 0.5 2.3 303-17.4 0.5 2.3 303-17.4 0.5 2.3 303-17.4 0.5 2.3 303-17.4 0.5 2.3 303-17.4 0.5 2.3 303-17.4 0.5 2.3 303-17.4 0.5 2.3 303-17.4 0.5 2.3 303-17.4 0.5 2.3 303-17.4 0.5 2.3 303-17.4 0.5 2.2 302-17.4 0.5 2.3 303-17.4 0.5 2.2 302-17.4 0.5 2.3 303-17.4 0.5 2.2 302-17.4 0.5 2.3 303-17.4 0.5 2.2 302-17.4 0.5 2.3 303-17.4 0.5 2.2 302-17.4 0.5 2.4 303-17.4 0.5 2.2 302-17.4 0.5 2.4 303-17.4 0.5 2.2 302-17.4 0.5 2.4 303-17.4 0.5 2.2 302-17.4 0.5 2.4 303-17.4 0.5 2.2 302-17.4 0.5 2.4 303-17.4 0.5 2.2 302-17.4 0.5 2.4 303-17.4 0.5 2.2 302-17.4 0.5 2.4 303-17.4 0.5 2.2 302-17.4 0.5 2.4 303-17.4 0.5 2.2 302-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.2 302-17.4 0.5 2.4 303-17.4 0.5 2.2 302-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.2 302-17.4 0.5 2.4 303-17.4 0.5 2.2 302-17.4 0.5 2.4 303-17.4 0.5 2.4 303-17.4 0.5 2.2 302-17.4 0.5 2.4 303-17.4 0.5 2.2 302-17.4 0.5 2.2 302-17.4 0.5 2.4 303-	3			• • 01.7				• • 04.5		• • 52.7			
5 299°37-2 29°14-14	4	279°34.7	$249^{\circ}14.9$	02.8	278°42.5	$01^{\circ}00.1$	227°35.6	04.7	291°10.6	52.6			
99 939.7 *** 199 199.7 *** 199 199.5 *** 308*33 *** 500.5 *** 57.8 *** 27*33. *** 190 52.1 *** 336*17.4 *** 52.4 *** 44.6 *** 199 52.3 *** 45.6 *** 57.8 *** 27*4 1.2 *** 55.1 *** 50.5 *** 52.5	5	294°37.2	$264^{\circ}14.4$	03.9	293°43.2	00°59.3	242°37.4	04.8	$306^{\circ}12.9$				
7 324-42.1	6	309°39.7	279°14.0	N11°05.0	308°43.9	S00°58.5	257° 39.3	N18°04.9	321°15.1	S06°52.5			
8 399'44.6	7	$324^{\circ}42.1$	294° 13.5	06.2	323°44.6	57.8	$272^{\circ}41.2$	05.1		52.4			
9 354*47.1 0 96.4 359*12.1 00.5 8*46.7 55.5 317*46.8 05.5 21°24.2 52.2 11 24°52.0 339*12.1 00.5 8*46.7 55.5 317*46.8 05.5 21°24.2 52.2 11 24°52.0 34*11.7 10.6 23°47.4 54.7 332°48.7 05.7 36°52.0 52.2 11 24°52.0 34°11.7 11.6 10.6 23°47.4 54.7 332°48.7 05.7 36°26.4 52.1 12 39°54.4 9°11.2 N11°11.7 38°48.8 53.2 2°52.4 10.6 1.8 18°32.5 51.9 15.0 85°01.8 54°03.8 15.0 83°50.2 51.6 32°56.1 06.3 96°35.4 51.8 51.9 15.0 83°50.2 51.6 32°56.1 06.3 96°35.4 51.8 16.1 100°43. 66°03.9 16.1 98°50.9 50.9 44°76.8 0.6 1 11°37.5 51.7 51.7 51.7 51.7 51.7 51.7 51.7 5				07.3	338°45.3	57.0		05.2		52.3			
10 9°49.5 399°12.1 09.5 8°46.7 55.5 317°46.8 05.5 21°42.2 52.2 87.6 87.6 87.6 87.6 11 24°52.0 354°11.7 10.6 23°47.4 54.7 332°48.7 65.7 36°26.2 52.1 87.6 87.6 137°18.5 74°8.3 30°48.8 1 50°53.9 347°50.5 N18°05.8 51°26.7 50°52.0 12°40.7 12.8 38°48.8 150°53.9 347°50.5 N18°05.8 51°26.7 50°52.0 14 69°59.4 39°10.3 13.9 68°49.5 52.4 17°54.3 06.1 81°33.2 51.9 140°40.1 16.2 60°59.4 39°10.3 13.9 68°49.5 52.4 17°54.3 06.1 81°33.2 51.9 140°40.1 16.2 60°59.1 16.1 98°50.9 50.9 47°58.0 06.4 111°37.7 51.7 51.7 53.6 16.1 100°04.3 69°09.3 16.1 98°50.9 50.9 47°58.0 06.4 111°37.7 51.7 53.6 16.1 16.2 60°59.1 16.1 16.2 60°59.9 66.6 126°40.0 51.6 51.6 140°19.1 140°41.7 114°09.9 19.4 140°41.7 114°41.1 140°41.1	9		324°12.6	• • 08.4	353°46.0	• • 56.2	302°44.9	• • 05.4	$6^{\circ}21.9$	• • 52.3			
11 24°52.0 364°11.7 10.6 23°47.4 54.7 332°48.7 05.7 36°52.4 52.1 23°52.4 06.0 66°30.9 52.0 21°23.4 06°30.9 52.0 13°3 54°56.9 24°10.7 12.8 53°48.8 53.2 2°52.4 06.0 66°30.9 52.0 140°60.3 13°3 54°56.9 24°10.7 12.8 53°48.8 53.2 2°52.4 06.0 66°30.9 52.0 15.0 180°30.9 15.0	10		$339^{\circ}12.1$	09.5	8°46.7	55.5		05.5	21°24.2	52.2			
12 39 54.6 9 24 10.7 1 28 53 48.1 \$00°83.9 347′50.5 \$180°05.8 \$12°28.7 \$00°52.0 13 547′56.9 24 10.7 1 28.6 \$53′48.8 532 42°52.4 10.6 66°59.9 \$2.0 14 69°59.9 \$1.9 13.9 68°49.5 52.4 17°54.3 \$0.6 1 81°33.2 \$1.9 1.7 115°06.8 \$4°09.8 1.5 1.0 \$83°50.2 \$1.6 1 98°59.9 \$0.9 47′58.0 \$0.6 1 11°37.7 \$1.7 115°06.8 \$4°08.9 \$1.5 1.0 113°51.6 \$0.1 62°59.9 \$0.6 126°40.0 \$1.6 18 130′00.2 \$99°08.4 \$111°18.3 128°52.3 \$00°49.3 78°01.7 \$18°06.7 \$141°42.2 \$06°51.6 \$1.8 130′00.2 \$99°08.4 \$111°18.3 128°52.3 \$00°49.3 78°01.7 \$18°80.7 \$141°42.2 \$06°51.6 \$1.5 \$1.5 \$1.5 \$1.7 \$115°06.5 \$1.0 \$1.0 \$1.0 \$1.0 \$1.0 \$1.0 \$1.0 \$1.0	11	24°52.0		10.6							_		
13 54*569 4 39*10.3 13.9 68*49.5 52.4 17.54.3 06.0 66*30.9 52.0 Alpheca 126*03.9 26*27.8 15 65*01.8 5*09.8 15.0 83*50.2 · 51.6 32*50.1 · 0.6.3 96*35.4 · 51.8 Arias 112*16.2 *0.6*29.9 15 65*01.8 5*09.8 1.50 83*50.2 · 51.6 32*50.1 · 0.6.3 96*35.4 · 51.8 Arias 107*10.6 *69*04.1 115*06.8 84*08.9 17.2 113*51.6 50.1 62*59.9 0.6.6 126*0.0 51.6 51.6 51.6 51.6 11.6 50.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	12	39°54.4	9°11.2	N11°11.7	38°48.1	S00°53.9	347°50.5	N18°05.8	51°28.7		1		
14 69°894 39°103 13.9 68°495 52.4 17°84.3 06.1 81°33.2 51.9 4Arises 12°16.2 26°29.2 116°15 88°01.8 54°00.8 1.50 83°50.2 51.6 32°56.1 06.3 96°35.4 51.8 Atria 107°10.6 -69°04.1 17 115°06.8 84°09.9 17.2 113°51.6 50.1 62°59.9 06.6 126°04.0 51.6 Shaula 10°00.2 99°08.4 N11°18.3 128°52.3 500°49.3 78°01.7 N18°06.7 141°42.2 506°51.6 Shaula 29°58.9 11°31.2 11°17°17.6 114°07.9 19.4 143°83.0 48.6 93°03.6 06.9 150°44.5 51.5 Eltamin 96°10.9 -37°07.2 11°18°16.6 146°10.0 158°53.7 47.8 108°05.5 07.0 1718.6 8 51.4 Eltamin 96°42.1 51°28.8 12°10.2 190°19.1 159°06.5 22.8 188°55.1 46.2 138°09.2 07.3 2015°1.3 51.3 Vega 205°21.6 174°06.0 23.9 203°55.8 45.5 153°11.1 07.4 216°53.5 51.2 Vega 80°33.4 338°48.1 20°32.2 190°1.0 174°06.0 23.9 203°55.8 45.5 153°11.1 07.4 216°53.5 51.2 Vega 80°33.4 338°48.1 0.2 0.3 2.0 10°42.1 17 m-3.91 v.0.7 d.0.8 m1.1 2 v.1.9 d.0.1 m-2.01 v.2.3 d.0.1 m.0.7 Vega 80°33.4 338°48.1 0.2 0.3 2.0 10°42.1 12°40.2 12°40.3 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0		54°56.9	24°10.7		53°48.8	53.2	2°52.4						
15 88°01.8 54°08.8 . 15.0 83°50.2						52.4							
16 100°04.3 69°09.3 16.1 98°50.9 50.9 47°58.0 66.4 111°37.7 51.7 51.7 115°61.6 88 48°08.9 17.2 113°51.6 50.1 62°59.9 66.6 126°40.0 51.6 18 130°09.2 99°08.4 N11°18.3 128°52.3 500°49.3 78°01.7 N18°06.7 141°42.2 506°51.6 5haula 99°32.1 114°07.9 19.4 143°53.0 48.6 93°03.6 66.9 156°44.5 51.5 51.5 140°07.0 114°07.9 19.4 143°53.0 48.6 93°03.6 66.9 156°44.5 51.5 51.5 140°07.0 114°07.0 19.4 143°53.0 48.6 93°03.6 06.9 156°44.5 51.5 140°07.0 114°07.0 115°68.5 14.6 128°03.2 100°14.1 115°6.6 144°07.0 121.7 173°54.4 14.7 123°07.3 107.2 186°49.0 15.3 51.3 14.8 142°0.0 123°0.2 100°14.1 115°1.5 14.5 14.5 14.5 14.5 14.5 14.5 14.5 1													
17 115°06.8 84°08.9 17.2 113°51.6 50.1 62°59.9 0.6 126°40.0 51.6 18 130°90.2 99°08.4 N11°18.3 128°02.3 500°49.3 78°01.7 N18°06.7 141°42.2 506°51.6 16 144°07.0 121°14.0 143°53.0 48.6 93°03.6 0.6 9 156°44.5 51.5 15 15 15 15 15 15 15 15 15 15 15 15 15	16	100°04.3	69°09.3	16.1	98°50.9	50.9	47°58.0	06.4	111°37.7	51.7			
18 130°09.9 99°08.4 M1°18.3 128°52.3 S00°49.3 78°01.7 N18°06.7 141°42.5 S06°51.6 Rasalhague 95°58.9 12°32.4 190°14.1 11°07.9 19.4 143°53.0 48.6 93°03.6 0.6 91.56°44.5 51.5 15.5 15.2 106°14.2 129°07.5 20.6 158°55.7 47.8 108°05.5 07.0 171°46.8 51.4 Kau Aust. 33°33.1 -34°22.3 20°21.0 17°40.6 23.9 20°55.8 45.5 153°11.1 0°7.4 216°53.5 51.2 10°51.3 51.3 1.3 10°2.2 10°51.1 159°06.5 22.8 188°55.1 46.2 138°09.2 07.3 201°51.3 51.3 10.3 10.3 10.3 10.3 10.3 10.3 10.3 1	17	$115^{\circ}06.8$	84°08.9	17.2	113°51.6	50.1	62°59.9	06.6		51.6			
19 145°11.7 114°07.9 19.4 143°53.0 48.6 93°03.6 06.9 156′44.5 51.5   20 160′14.2 129°07.5 20.6 158°53.7 47.8 108°05.5 07.0 171°46.8 51.4   21 175°16.6 144°07.0 · 21.7 173°54.4 · 47.0 123°07.3 · 07.2 186°49.0 · 51.3   22 190°19.1 159°66.5 22.8 188°55.1 46.2 138°09.2 07.3 201°51.3 51.3   23 205°21.6 174°06.0 23.9 203°55.8 45.5 153°11.1 07.4 216°53.5 51.2   23 205°21.6 174°06.0 23.9 203°55.8 45.5 153°11.1 07.4 216°53.5 51.2   24 205°21.6 174°06.0 23.9 203°55.8 45.5 153°11.1 07.4 216°53.5 51.2   25 20°22.0 188°05.6 N11°25.0 218°56.5 \$00°44.7 168°13.0 N18°07.6 231°55.8 \$06°51.1   25 250°28.9 219°04.6 27.2 248°57.9 43.2 198°16.7 07.9 246°58.1 51.0   24 280°33.9 249°03.7 29.4 278°59.3 41.6 228°20.4 08.2 292°04.8 50.8   25 295°36.3 264°03.2 30.5 294°00.0 40.9 243°22.3 08.3 307°07.1 50.7   26 310°38.8 279°02.8 N11°31.6 309°00.7 \$00°40.1 258°24.2 N18°08.5 322°04.8 50.6   26 310°38.8 279°02.8 N11°31.6 309°00.7 \$00°40.1 258°24.2 N18°08.5 322°04.8 50.8   27 325°41.3 294°0.3 32.7 324°01.4 39.3 273°26.0 08.6 33°21.1 50.4   25 310°38.8 279°02.8 N11°31.6 309°00.7 \$00°40.1 258°24.2 N18°08.5 322°04.8 50.8   27 325°41.3 294°0.3 32.7 324°01.4 39.3 273°26.0 08.6 33°21.1 50.4   28 310°38.8 279°02.8 N11°31.6 309°00.7 \$00°40.1 258°24.2 N18°08.5 322°04.8 50.8   28 340°43.7 309°01.8 33.8 339°02.1 38.6 288°27.9 08.8 352°13.9 50.5   28 340°43.7 339°0.9 36.0 9°03.5 37.0 318°31.6 09.1 22°18.4 50.3   29 355°66.1 32°59.4 33.3 54°05.6 34.7 3°37.2 09.5 67°25.2 50.1   20 10°48.7 339°0.9 36.0 9°03.5 37.0 318°31.6 09.1 22°18.4 50.3   31 10°04.8 7 339°0.9 36.0 9°03.5 37.0 318°31.6 09.1 22°18.4 50.3   31 10°04.8 7 339°0.9 36.0 9°03.5 37.0 318°31.6 09.1 22°18.4 50.3   31 10°05.6 88.0 42.6 99°07.7 32.4 48°42.8 09.9 112°32.0 49.9   31 10°04.8 7 339°0.9 36.0 9°03.5 37.0 318°31.6 09.1 22°18.4 50.3   31 10°04.8 7 339°0.9 36.0 9°03.5 37.0 318°31.6 09.1 22°18.4 50.3   31 10°04.8 7 339°0.9 36.0 9°03.5 37.0 318°31.6 09.1 22°18.4 50.3   31 10°04.8 7 339°0.9 36.0 9°03.5 37.0 318°31.6 09.1 22°18.4 50.3   31 10°04.8 7 339°0.9 38.8 230°0.9 30°0.0 30°0.0 30°0.0 30°0	18	130°09.2	99°08.4	N11°18.3	128°52.3	S00°49.3	78°01.7	N18°06.7	141°42.2	S06°51.6			
160°14.2 129°07.5 20.6 158°53.7 47.8 108°05.5 07.0 171°46.8 51.4 Vega 83°33.1 34°22.3 21 175°16.6 144°07.0 21.7 173°54.4 47.0 123°07.3 07.0 171°46.8 51.4 Vega 80°33.1 34°32.3 22°190°19.1 159°06.5 22.8 188°55.1 46.2 138°09.2 07.3 201°51.3 51.3 Nunki 75°48.3 -26°16.0 Nunki 75°	19	145°11.7	$114^{\circ}07.9$	19.4	143°53.0	48.6	93°03.6	06.9	156°44.5	51.5			
21 175°16.6 144°07.0 · · · · · · · · · · · · · · · · · · ·	20	160°14.2	129°07.5	20.6	158°53.7	47.8	108°05.5	07.0	171°46.8	51.4			
22 190°19.1 150°06.5 22.8 188°55.1 46.2 138°09.2 07.3 201°51.3 51.3 Numki 75°48.3 56.40.1 23°05°21.6 174°06.0 23.9 203°55.8 45.5 153°11.1 07.4 216°53.5 51.2 Numki 75°48.3 2-6°16.0 Altair 64°20.5 8-558.0 65°31.1 Numki 75°40.1 Marki 75°48.3 2-6°16.0 Altair 64°20.5 8-558.0 65°30.2 Numki 75°48.3 2-6°16.0 Altair 64°20.5 8-558.0 65°30.2 Numki 75°48.3 2-6°16.0 Numk													
23 205°21.6 174°06.0 23.9 203°55.8 45.5 153°11.1 07.4 216°53.5 51.2   Normal (73 46.3 20 10.0)   Normal (73 46.3 20.0)   Normal (73 46.0 20.0)   N											_		
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14 70°58.5 38°59.0 40.4 69°06.3 34.0 18°39.1 09.6 82°27.5 50.0 15 86°01.0 53°58.5 · · 41.5 84°07.0 · · 33.2 33°41.0 · · · 09.8 97°29.7 · · · 50.0 16 101°03.4 68°58.0 42.6 99°07.7 32.4 48°42.8 09.9 112°32.0 49.9 17 116°05.9 83°57.5 43.6 114°08.4 31.7 63°44.7 10.1 127°34.2 49.8 18 131°08.4 98°57.1 N11°44.7 129°09.1 500°30.9 78°46.6 N18°10.2 142°36.5 506°49.7 19 146°10.8 113°56.6 45.8 144°09.8 30.1 93°48.4 10.4 157°38.8 49.7 20 161°13.3 128°56.1 46.9 159°10.5 29.4 108°50.3 10.5 172°41.0 49.6 21 176°15.8 143°55.6 · · 48.0 174°11.2 · · · 28.6 123°52.2 · · · 10.7 187°43.3 · · · 49.5 22 191°18.2 158°55.2 49.1 189°11.9 27.8 138°54.1 10.8 202°45.6 49.4 23 206°20.7 173°54.7 50.2 204°12.6 27.1 153°55.9 11.0 217°47.8 49.4    May 02 Thu SHA   Mer.pass   May 02 Thu   SHA   Mer.pass   Mars   328°41.6 11:24   11°36.7 08:35													12:49
15       86°01.0       53°58.5       · · · 41.5       84°07.0       · · 33.2       33°41.0       · · · 09.8       97°29.7       · · 50.0       May 02 Thu       SHA       Mer.pass         16       101°03.4       68°58.0       42.6       99°07.7       32.4       48°42.8       09.9       112°32.0       49.9       Venus       328°41.6       11:24         17       116°05.9       83°57.5       43.6       114°08.4       31.7       63°44.7       10.1       127°34.2       49.8       Mars       358°32.5       09:24         18       131°08.4       98°57.1       N11°44.7       129°09.1       500°30.9       78°46.6       N18°10.2       142°36.5       506°49.7       Jupiter       307°48.9       12:46         20       161°13.3       128°56.1       46.9       159°10.5       29.4       108°50.3       10.5       172°41.0       49.6       49.6       5aturn       11°31.8       08:31         21       176°15.8       143°55.6       48.0       174°11.2       28.6       123°52.2       10.7       187°43.3       49.5       49.4       49.4       49.4       49.4       49.4       49.4       49.4       49.4       49.4       49.4       49.4       49.4											Saturn	11° 36.7	08:35
16       101°03.4       68°58.0       42.6       99°07.7       32.4       48°42.8       09.9       112°32.0       49.9       Venus       328°41.6       11:24         17       116°05.9       83°57.5       43.6       114°08.4       31.7       63°44.7       10.1       127°34.2       49.8       Mars       358°32.5       09:24         18       131°08.4       98°57.1       N11°44.7       129°09.1       500°30.9       78°46.6       N18°10.2       142°36.5       506°49.7       Jupiter       307°48.9       12:46         19       146°10.8       113°56.6       45.8       144°09.8       30.1       93°48.4       10.4       157°38.8       49.7       Saturn       11°31.8       08:31         20       161°13.3       128°56.1       46.9       159°10.5       29.4       108°50.3       10.5       172°41.0       49.6       11°31.8       08:31         21       176°15.8       143°55.6       48.0       174°11.2       28.6       123°52.2       10.7       187°43.3       49.5       49.4       49.4       49.4       49.4       49.4       49.4       49.4       49.4       49.4       49.4       49.4       49.4       49.4       49.4       49.4											NA- 00 T	CIII	N 4
17													
18													
19       146°10.8       113°56.6       45.8       144°09.8       30.1       93°48.4       10.4       157°38.8       49.7         20       161°13.3       128°56.1       46.9       159°10.5       29.4       108°50.3       10.5       172°41.0       49.6         21       176°15.8       143°55.6       48.0       174°11.2       28.6       123°52.2       10.7       187°43.3       49.5         22       191°18.2       158°55.2       49.1       189°11.9       27.8       138°54.1       10.8       202°45.6       49.4         23       206°20.7       173°54.7       50.2       204°12.6       27.1       153°55.9       11.0       217°47.8       49.4     Horizontal parallax  Venus:  0.1  Mars:  0.1											1		
20 161°13.3 128°56.1 46.9 159°10.5 29.4 108°50.3 10.5 172°41.0 49.6 21 176°15.8 143°55.6 · 48.0 174°11.2 · 28.6 123°52.2 · 10.7 187°43.3 · 49.5 22 191°18.2 158°55.2 49.1 189°11.9 27.8 138°54.1 10.8 202°45.6 49.4 23 206°20.7 173°54.7 50.2 204°12.6 27.1 153°55.9 11.0 217°47.8 49.4  Horizontal parallax Venus: 0.1 Mars: 0.1													12:46
21       176°15.8       143°55.6       · · 48.0       174°11.2       · · 28.6       123°52.2       · · 10.7       187°43.3       · · 49.5       Horizontal parallax         22       191°18.2       158°55.2       49.1       189°11.9       27.8       138°54.1       10.8       202°45.6       49.4       Venus: 0.1         23       206°20.7       173°54.7       50.2       204°12.6       27.1       153°55.9       11.0       217°47.8       49.4       Mars: 0.1											Saturn	11°31.8	08:31
22 191°18.2 158°55.2 49.1 189°11.9 27.8 138°54.1 10.8 202°45.6 49.4 Venus: 0.1 23 206°20.7 173°54.7 50.2 204°12.6 27.1 153°55.9 11.0 217°47.8 49.4 Mars: 0.1											Horizont	al narallas	
23 206°20.7 173°54.7 50.2 204°12.6 27.1 153°55.9 11.0 217°47.8 49.4 Mars: 0.1											HORIZON	•	Λ 1
25 260 26.1 175 51.1 56.2 261 12.0 27.1 155 50.5 12.0 27.1 155 50.5													
Mer.pass. $09:17$ $\nu$ -0.5′ $d1.1′$ m-3.91 $\nu$ 0.7′ $d$ -0.8′ m1.12 $\nu$ 1.9′ $d$ 0.1′ m-2.01 $\nu$ 2.3′ $d$ -0.1′ m1.07	23	206~20.7	1/3~54.7	50.2	204~12.6	27.1	153~55.9	11.0	217~47.8	49.4		ividi5.	0.1
	Mer.n	ass. 09:17	$\nu$ -0.5' d1	.1′ m-3.91	$\nu$ 0.7′ d-0	0.8′ m1.12	$\nu 1.9' d0$	.1′ m-2.01	$\nu 2.3' d-0$	.1′ m1.07			

h	Sui	า	Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°41.9	N14°51.5	284°29.4	6.3'	S26°53.8	-5.9'	57.7'
1	195°41.9	52.3	298°54.6	6.3'	26°47.9	-6.0'	57.8'
2	$210^{\circ}42.0$	53.0	313° 19.9	6.3'	26°41.9	-6.2'	57.8'
3	225°42.1	• • 53.8	327°45.3	6.4'	26°35.7	-6.4	57.8'
4	240° 42.2 255° 42.3	54.6 55.3	342°10.7 356°36.1	6.4'	26°29.4 26°22.8	-6.5'	57.8'
5 6	255 42.3 270°42.3	55.3 N14°56.1	350 30.1 11°01.5	6.5' 6.5'	20 22.8 S26°16.1	-6.7' -6.8'	57.9' 57.9'
7	285°42.4	56.8	25° 27.0	6.5	26°09.3	-0.0 -7.0'	57.9'
8	300°42.5	57.6	39°52.6	6.6'	26°02.3	-7.2	57.9'
9	315°42.6	• • 58.4	54°18.2	6.6'	25°55.1	-7.3'	58.0'
10	330° 42.7	59.1	68°43.8	6.7'	25°47.8	-7.5'	58.0'
11	345°42.7	14°59.9	83°09.5	6.7'	25°40.3	-7.7'	58.0'
12	0° 42.8 15° 42.9	N15°00.6 01.4	97°35.2 112°01.0	6.8' 6.8'	\$25°32.6 25°24.8	-7.8'	58.0'
13 14	30° 43.0	01.4	112°01.0 126°26.8	6.9	25° 24.8 25° 16.9	-8.0' -8.1'	58.1' 58.1'
15	45° 43.0	. 02.9	140°52.7	6.9	25°08.7	-8.3	58.1
16	60°43.1	03.7	155° 18.6	7.0'	25°00.4	-8.4	58.1'
17	75°43.2	04.4	169°44.6	7.0'	24°52.0	-8.6'	58.2'
18	90°43.3	N15°05.2	184°10.6	7.1'	S24°43.4	-8.7'	58.2'
19	105°43.3	05.9	198°36.7	7.1'	24°34.7	-8.9'	58.2'
20	120°43.4	06.7	213°02.8	7.2'	24°25.8	-9.1'	58.2'
21 22	135° 43.5 150° 43.6	· · · 07.5 08.2	227°29.0 241°55.3	7.3' 7.3'	24°16.7 24°07.5	-9.2' -9.4'	58.3' 58.3'
23	165° 43.6	09.0	256° 21.6	7.4'	24 07.3 23°58.1	-9.4 -9.5'	58.3
	SD = 15.9'					3.3	- 5.5
	ວບ = 15.9′	d = 0.8'		SI	O = 15.7'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	180°43.7 195°43.8	N15°09.7 10.5	270°48.0 285°14.4	7.4' 7.5'	\$23°48.6 23°39.0	-9.7' -9.8'	58.3' 58.4'
2	210° 43.9	11.2	299°40.9	7.5'	23°29.2	-9.0 -9.9'	58.4'
3	225°43.9	• • 12.0	314°07.4	7.6'	23°19.2	-10.1'	58.4'
4	240°44.0	12.7	328°34.0	7.7'	23°09.2	-10.2'	58.4'
5	255°44.1	13.5	343°00.7	7.7'	22°58.9	-10.4'	58.5'
6	270° 44.2 285° 44.2	N15°14.2	357°27.4 11°54.2	7.8'	\$22°48.5 22°38.0	-10.5'	58.5'
7 8	285°44.2 300°44.3	15.0 15.7	26°21.1	7.8' 7.9'	22° 38.0 22° 27.4	-10.7' -10.8'	58.5' 58.5'
9	315° 44.4	16.5	40°48.0	8.0'	22°16.6	-10.8 -10.9'	58.6'
10	330°44.4	17.2	55° 14.9	8.0'	22°05.6	-11.1'	58.6'
11	345°44.5	18.0	69°42.0	8.1'	21°54.6	-11.2'	58.6'
12	0°44.6	N15° 18.7	84°09.1	8.2'	521°43.4	-11.3'	58.6'
13	15° 44.7 30° 44.7	19.5 20.2	98°36.2 113°03.5	8.2' 8.3'	21°32.0 21°20.6	-11.5'	58.7'
14 15	45° 44.8	. 21.0	113 03.5 127°30.7	6.3 8.3'	21°09.0	-11.6' -11.7'	58.7' 58.7'
16	60°44.9	21.7	141°58.1	8.4'	20°57.2	-11.9'	58.7'
17	75°44.9	22.5	$156^{\circ}25.5$	8.5'	20°45.4	-12.0'	58.8'
18	90°45.0	N15°23.2	170°53.0	8.5'	520°33.4	-12.1'	58.8'
19	105°45.1	24.0	185°20.5	8.6'	20°21.2	-12.2'	58.8'
20 21	120° 45.1 135° 45.2	24.7 •• 25.4	199°48.1 214°15.8	8.7' 8.7'	20°09.0 19°56.6	-12.4' -12.5'	58.8' 58.9'
22	150°45.2	26.2	214 15.6 228°43.5	6. <i>1</i> 8.8'	19°50.0	-12.5'	58.9'
23	165° 45.3	26.9	243°11.3	8.8'	19°31.5	-12.7'	58.9'
	SD = 15.9'	d = 0.8'		SI	D = 15.9'		
<b>T</b> I.	GHA	D	GHA		Dec	d	HP
Thu 0	<b>GHA</b> 180°45.4	<b>Dec</b> N15°27.7	257°39.1	$\nu$ 8.9'	S19°18.8	a -12.9'	<b>нР</b> 58.9'
1	195° 45.5	28.4	272°07.0	9.0'	19°05.9	-12.9 -13.0'	58.9'
2	210°45.6	29.2	286°35.0	9.0'	18°53.0	-13.1'	59.0'
3	225° 45.6	• • 29.9	301°03.0	9.1'	18°39.9	-13.2'	59.0'
4	240°45.7	30.6	315°31.1	9.2'	18°26.7	-13.3'	59.0'
5 6	255° 45.8 270° 45.8	31.4 N15°32.1	329°59.3 344°27.5	9.2' 9.3'	18°13.3 \$17°59.9	-13.4' -13.5'	59.0' 59.1'
7	270 45.8 285°45.9	32.9	344 27.5 358°55.8	9.3' 9.3'	17°46.4	-13.5 -13.7'	59.1'
8	300°46.0	33.6	13°24.1	9.4'	17°32.7	-13.8'	59.1'
9	315°46.0	• • 34.3	27°52.5	9.4'	$17^{\circ}19.0$	-13.9'	59.1'
10	330°46.1	35.1	42°20.9	9.5'	17°05.1	-14.0'	59.2'
11	345°46.1	35.8	56°49.4	9.6'	16°51.1	-14.1'	59.2'
12 13	0°46.2 15°46.3	N15°36.6 37.3	71°18.0 85°46.6	9.6' 9.7'	\$16°37.0 16°22.9	-14.2' -14.3'	59.2' 59.2'
13 14	30°46.3	37.3 38.0	85 46.6 100°15.3	9.7 9.7'	16°22.9	-14.3 -14.4'	59.2 59.3'
15	45°46.4	• • 38.8	114° 44.0	9.8'	15°54.2	-14.5'	59.3'
16	60°46.5	39.5	129° 12.8	9.8'	15°39.7	-14.6'	59.3'
17	75°46.5	40.2	143°41.6	9.9'	15°25.1	-14.7'	59.3'
18 19	90° 46.6 105° 46.7	N15°41.0 41.7	158° 10.5 172° 39.4	9.9' 10.0'	\$15°10.5 14°55.7	-14.8' -14.9'	59.3' 59.4'
20	105°46.7 120°46.7	41.7 42.4	172°39.4 187°08.4	10.0'	14°55.7 14°40.9	-14.9' -14.9'	59.4' 59.4'
21	135° 46.8	• • 43.2	201°37.5	10.1	14° 40.9	-14.9	59.4
22	150°46.9	43.9	$216^{\circ}06.5$	10.1'	14°10.9	-15.1'	59.4'
23	165°46.9	44.7	230°35.7	10.2'	13°55.7	-15.2'	59.4'
	SD = 15.9'	d = 0.7'		SI	O = 16.1'		

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

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

h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	221°23.2	188°54.2	N11°51.3	219°13.3	S00°26.3	168°57.8	N18°11.1	232°50.1	506°49.3	A I	357°35.7	29°13.3
1	236°25.6	203°53.7	52.4	234°14.0	25.5	183°59.7	11.2	247°52.4	49.2	Alpheratz Ankaa	357 35.7 353°08.0	-42°10.4
2	251°28.1	218°53.2	53.5	249°14.7	24.8	$199^{\circ}01.5$	11.4	262°54.6	49.1	Schedar	349°32.2	56°40.0
3	266°30.5	233°52.8	• • 54.6	264°15.4	• • 24.0	214°03.4	•• 11.5	277° 56.9	• • 49.0	Diphda	349° 32.2	-17°51.2
4	281°33.0	248°52.3	55.7	$279^{\circ}16.1$	23.2	229°05.3	11.7	292°59.1	49.0	Achernar	335°21.2	-57°06.8
5	296°35.5	263°51.8	56.7	294°16.8	22.5	244°07.1	11.8	308°01.4	48.9	Hamal	327°52.2	23°34.5
6	311°37.9	278°51.3	N11°57.8	309°17.5	S00°21.7	259°09.0	N18°12.0	323°03.7	S06°48.8	Polaris	314°49.4	89°22.0
7	326°40.4	293°50.8	11°58.9	324°18.2	20.9	274°10.9	12.1	338°05.9	48.7	Acamar	315°12.6	-40°12.5
8	341°42.9	308°50.4	12°00.0	339°18.9	20.2	289°12.7	12.3	353°08.2	48.7	Menkar	314°07.1	4°11.0
9	356°45.3	323°49.9	• • 01.1	354°19.6	• • 19.4	304°14.6	• • 12.4	8°10.5	• • 48.6	Mirfak	308°29.6	49°56.8
10	11°47.8	338°49.4	02.2	9°20.3	18.6	319°16.5	12.6	23°12.7	48.5	Aldebaran	290°40.6	16°33.4
11	26°50.3	353°48.9	03.3	24°21.0	17.9	334°18.3	12.7	38° 15.0 53° 17.3	48.4	Rigel	281°04.7	-8°10.5
12	41°52.7 56°55.2	8°48.4 23°48.0	N12°04.4	39°21.7 54°22.4	\$00°17.1	349°20.2 4°22.1	N18°12.9	53 17.3 68° 19.5	S06°48.4	Capella	$280^{\circ}23.2$	46°01.4
13 14	71°57.7	23 46.0 38°47.5	05.4 06.5	69°23.1	16.3 15.6	19°23.9	13.0 13.1	83°21.8	48.3 48.2	Bellatrix	278°23.8	6°22.3
15	87°00.1	53°47.0	•• 07.6	84°23.8	14.8	34°25.8	. 13.3	98°24.1	• • 48.1	Elnath	278°02.9	28°37.7
16	102°02.6	68°46.5	08.7	99°24.5	14.0	49°27.7	13.4	113°26.3	48.1	Alnilam	275°38.6	$-1^{\circ}11.3$
17	117°05.0	83°46.0	09.8	114°25.2	13.3	64°29.5	13.4	128°28.6	48.0	Betelgeuse	270°53.0	7°24.7
18	132°07.5	98°45.5	N12°10.9	129°25.9	S00°12.5	79°31.4	N18°13.7	143°30.9	S06°47.9	Canopus	263°53.0	-52°42.7
19	147°10.0	113°45.0	11.9	144°26.6	11.7	94°33.3	13.9	158°33.1	47.8	Sirius	258°27.0	-16°45.1
20	162°12.4	128°44.6	13.0	159°27.3	11.0	109°35.1	14.0	173°35.4	47.8	Adhara	255°06.5	-29°00.5
21	177°14.9	143°44.1	14.1	174°28.0	. 10.2	124°37.0	• • 14.2	188°37.6	• • 47.7	Procyon	244°51.6	5°09.7
22	192°17.4	158°43.6	15.2	189°28.7	09.4	139°38.9	14.3	203°39.9	47.6	Pollux	243°18.2	27°58.1
23	207°19.8	173°43.1	16.3	204°29.4	08.7	154°40.7	14.5	218°42.2	47.5	Avior	234° 15.1	-59°35.5
										Suhail	222°46.8	-43°32.1
Mer.p	bass. 09:13	$\nu$ -0.5′ $d1$	.1′ m-3.91	$\nu$ 0.7′ d-0	0.8′ m1.11	$\nu 1.9' d0.$	.1′ m-2.01	$\nu 2.3' d-0$	.1′ m1.07	Miaplacidus	221°38.4	-69°49.3
										Alphard	217°48.3	-8°45.9
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.0	11°50.9 61°37.4
0	222°22.3	188°42.6	N12°17.4	219°30.1	S00°07.9	169°42.6	N18°14.6	233°44.4	S06°47.5	Dubhe	193°41.3 182°25.3	
1	237°24.8	203°42.1	18.4	234°30.8	07.1	184°44.5	14.7	248°46.7	47.4	Denebola Gienah	182 25.3 175°44.0	14°26.2 -17°40.8
2	252°27.2	218°41.6	19.5	249°31.5	06.4	199°46.3	14.9	263°49.0	47.3	Acrux	173°44.0	-17 40.6 -63°14.2
3	267°29.7	233°41.1	• • 20.6	264°32.2	• • 05.6	214°48.2	• • 15.0	278°51.2	• • 47.3		173 00.3 171°51.9	-03 14.2 -57°15.2
4	282°32.1	248°40.7	21.7	279°32.9	04.8	$229^{\circ}50.1$	15.2	293°53.5	47.2	Alioth	166° 13.0	55°49.8
5	297°34.6	263°40.2	22.7	294°33.6	04.1	244°51.9	15.3	308°55.8	47.1	Spica	158° 22.6	-11°17.4
6	312°37.1	278°39.7	N12°23.8	309°34.3	500°03.3	259°53.8	N18° 15.5	323°58.0	S06°47.0	Alkaid	150° 52.0	49°11.5
7	327°39.5	293°39.2	24.9	324°35.0	02.5	274°55.7	15.6	339°00.3	47.0	Hadar	148°36.2	-60°29.5
8	342°42.0	308°38.7	26.0	339°35.7	01.8	289°57.5	15.8	354°02.6	46.9	Menkent	147°57.9	-36°29.5
9	357°44.5	323°38.2	• • 27.0	354°36.4	• • 01.0	304°59.4	•• 15.9	9°04.8	• • 46.8	Arcturus	145°48.1	19°03.3
10	12°46.9	338°37.7	28.1	9°37.1	S00°00.2	320°01.3	16.0	24°07.1	46.7	Rigil Kent.	139°40.5	-60°56.2
11	27°49.4	353°37.2	29.2	24°37.8	N00°00.5	335°03.1	16.2	39°09.4	46.7	Kochab	137°18.5	74°03.3
12	42°51.9	8°36.7	N12°30.3	39°38.5	N00°01.3	350°05.0	N18°16.3	54°11.6	506°46.6	Zuben'ubi	136°56.3	-16°08.7
13	57°54.3	23°36.2	31.3	54°39.2	02.1	5°06.9	16.5	69°13.9	46.5	Alphecca	126°03.9	26°37.8
14	72°56.8	38°35.7	32.4	69°39.9	02.8	20°08.7	16.6	84°16.2	46.4	Antares	$112^{\circ}16.2$	-26°29.2
15	87°59.3	53°35.3	• • 33.5	84°40.6	• • 03.6	35°10.6	. 16.8	99°18.5	• • 46.4	Atria	$107^{\circ}10.5$	-69°04.2
16	103°01.7	68°34.8	34.6	99°41.3	04.4	50°12.5	16.9	114°20.7	46.3	Sabik	$102^{\circ}03.2$	-15°45.4
17	118°04.2 133°06.6	83°34.3 98°33.8	35.6 N12°36.7	114°42.0 129°42.7	05.1	65°14.3 80°16.2	17.1 N18°17.2	129°23.0 144°25.3	46.2 \$06°46.1	Shaula	$96^{\circ}10.9$	-37°07.2
18 19	148°09.1	90 33.0 113°33.3	37.8	129 42.7 144°43.4	N00°05.9 06.7	95°18.0	17.4	159° 27.5	46.1	Rasalhague	95°58.8	12°32.4
20	163°11.6	113 33.3 128°32.8	38.8	159°44.1	07.4	110°19.9	17.5	174°29.8	46.0	Eltanin	90°42.1	51°28.8
21	178°14.0	143°32.3	• • 39.9	174°44.8	•• 08.2	125°21.8	17.6	189°32.1	• • 45.9	Kaus Aust.	83°33.0	-34°22.3
22	193°16.5	158°31.8	41.0	189°45.5	09.0	140°23.6	17.8	204°34.3	45.8	Vega	80°33.4	38°48.1
23	208°19.0	173°31.3	42.0	204°46.2	09.7	155°25.5	17.9	219°36.6	45.8	Nunki	75°48.3	-26°16.0
										Altair	62°00.4	8°55.8
Mer.p	ass. 09:09	$\nu$ -0.5' $d1$	.1' m-3.91	$\nu 0.7' \ d-0$	0.8′ m1.11	$\nu$ 1.9′ d0.	.1' m-2.01	$\nu 2.3' \ d-0$	$.1^\prime$ m $1.07$	Peacock	53°06.5	-56°39.2
										Deneb	49°26.2 33°39.4	45°21.7 9°59.0
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif		-46°50.5
0	223°21.4	188°30.8	N12°43.1	219°46.9	N00°10.5	170°27.4	N18°18.1	234°38.9	S06° 45.7	Al Na'ir Fomalhaut	27°33.8 15°15.3	-40 50.5 -29°29.6
1	238°23.9	203°30.3	44.2	234°47.6	11.3	$185^{\circ}29.2$	18.2	249°41.1	45.6	Scheat	13°46.0	28°12.6
2	253°26.4	218°29.8	45.2	249°48.3	12.0	$200^{\circ}31.1$	18.4	264°43.4	45.6	Markab	13° 30.7	15°20.0
3	268°28.8	233°29.3	• • 46.3	264°49.0	• • 12.8	$215^{\circ}33.0$	• 18.5	279°45.7	• • 45.5			
4	283°31.3	248°28.8	47.4	279°49.7	13.6	230°34.8	18.7	294°47.9	45.4	May 03 Fri	SHA	Mer.pass
5	298°33.8	263°28.3	48.4	294°50.4	14.3	245°36.7	18.8	309°50.2	45.3	Venus	327°31.0	11:25
6	313°36.2	278°27.8	N12°49.5	309°51.1	N00°15.1	260°38.6	N18°18.9	324°52.5	<b>S</b> 06°45.3	Mars	357°50.1	09:23
7	328°38.7	293°27.3	50.6	324°51.8	15.9	275°40.4	19.1	339°54.8	45.2	Jupiter	307°34.6	12:43
8	343°41.1	308°26.8	51.6	339°52.5	16.6	290°42.3	19.2	354°57.0	45.1	Saturn	11°26.9	08:27
9	358°43.6	323°26.3	• • 52.7	354°53.2	• • 17.4	305°44.2	• • 19.4	9°59.3	• • 45.0	May 04 Sat	SHA	Mer.pass
10	13°46.1	338°25.8	53.8	9°53.9	18.2	320°46.0	19.5	25°01.6	45.0	Venus		11:26
11	28°48.5	353°25.3	54.8	24°54.6	18.9	335°47.9	19.7	40°03.8	44.9	Mars	357°07.8	09:22
12	43°51.0	8°24.8	N12°55.9	39°55.3	N00°19.7	350°49.8	N18°19.8	55°06.1	\$06°44.8	Jupiter	307°20.3	12:40
13 14	58°53.5 73°55.9	23°24.3 38°23.8	56.9 58.0	54°56.0 69°56.7	20.5 21.2	5°51.6 20°53.5	20.0	70°08.4 85°10.6	44.8	Saturn	11°22.2	08:24
14 15	73 55.9 88°58.4	58°23.3	58.0 12°59.1	69 56.7 84°57.4	22.0	20 53.5 35°55.3	20.1 20.2	100°12.9	44.7 •• 44.6	May OF C	CIIA	N4e
15 16	88 58.4 104°00.9	53 23.3 68°22.8	12 59.1 13°00.1	99°58.1	22.8	50°57.2	20.4	100 12.9 115°15.2	44.5	May 05 Sun	SHA	Mer.pass
17	104 00.9 119°03.3	83°22.3	01.2	99 58.1 114°58.8	22.8	65°59.1	20.4	115 15.2 130°17.5	44.5 44.5	Venus		11:26
18	134°05.8	98°21.8	N13°02.2	129°59.5	N00°24.3	81°00.9	N18°20.7	145° 19.7	\$06°44.4	Mars	356°25.5	09:20 12:37
19	149°08.2	113°21.3	03.3	145°00.2	25.1	96°02.8	20.8	160°22.0	44.3	Jupiter	307°05.9 11°17.4	12:37
20	164° 10.7	113 21.3 128°20.8	03.3	160°00.9	25.1	111°04.7	21.0	175°24.3	44.2	Saturn	11 11.4	08:20
21	179°13.2	143°20.3	• • 05.4	175°01.6	26.6	126°06.5	. 21.1	175°24.5	• • 44.2	Horizont	al parallax	
22	194°15.6	158°19.8	06.5	190°02.3	27.3	141°08.4	21.3	205°28.8	44.1		Venus:	0.1
23	209°18.1	173°19.3	07.5	205°03.0	28.1	156°10.3	21.4	220°31.1	44.0		Mars:	0.1
										-		
ivier.p	ass. 09:05	$\nu$ -0.5' $d1$	.1' m-3.91	νυ.ι' d0	.8′ m1.11	$\nu$ 1.9′ $d0$ .	.1′ m-2.00	$\nu$ 2.3′ $d$ -0	.1' m $1.07$			

h	Sui	า	Moon						
Fri	GHA	Dec	GHA	ν	Dec	d	HP		
0	180°47.0	N15°45.4	245°04.9	10.2'	S13°40.5	-15.3'	59.5'		
1	195°47.0	46.1	259°34.1	10.3'	13°25.2	-15.4'	59.5'		
2	210°47.1	46.8	274°03.4	10.3'	13°09.8	-15.5'	59.5'		
3 4	225°47.2 240°47.2	· · 47.6 48.3	288°32.7 303°02.0	10.4' 10.4'	12°54.4 12°38.8	-15.5' -15.6'	59.5' 59.6'		
4 5	240 47.2 255°47.3	48.3 49.0	303 02.0 317°31.5	10.4	12 38.8 12°23.2	-15.0 -15.7'	59.6'		
6	270°47.3	N15°49.8	332°00.9	10.5'	\$12°07.5	-15.8'	59.6'		
7	285°47.4	50.5	346°30.4	10.5'	11°51.7	-15.9'	59.6'		
8	300°47.5	51.2	0°59.9	10.6'	11°35.9	-15.9'	59.6'		
9	315°47.5	• • 52.0	15°29.5	10.6'	11° 19.9	-16.0'	59.7'		
10	330°47.6	52.7 53.4	29°59.1	10.6'	11°03.9 10°47.9	-16.1'	59.7'		
11 12	345°47.6 0°47.7	53.4 N15°54.1	44°28.8 58°58.4	10.7' 10.7'	10 47.9 \$10°31.7	-16.1' -16.2'	59.7' 59.7'		
13	15°47.8	54.9	73°28.1	10.7'	10° 15.5	-16.3	59.7'		
14	30°47.8	55.6	87°57.9	10.8'	09°59.2	-16.3'	59.7'		
15	45°47.9	• • 56.3	$102^{\circ}27.7$	10.8'	09°42.9	-16.4'	59.8'		
16	60°47.9	57.0	116°57.5	10.8'	09°26.5	-16.5'	59.8'		
17	75°48.0	57.8	131°27.3	10.9'	09°10.0	-16.5'	59.8'		
18 19	90°48.1 105°48.1	N15°58.5 59.2	145°57.2 160°27.1	10.9' 10.9'	\$08°53.5 08°37.0	-16.6' -16.6'	59.8' 59.8'		
20	105 46.1 120°48.2	59.∠ 15°59.9	174°57.0	11.0'	08°20.3	-16.7	59.6 59.9'		
21	135°48.2	16°00.7	189°27.0	11.0'	08°03.6	-16.7'	59.9'		
22	150°48.3	01.4	203°57.0	11.0'	07°46.9	-16.8'	59.9'		
23	165°48.3	02.1	218°27.0	11.0'	$07^{\circ}30.1$	-16.8'	59.9'		
	SD = 15.9'	d = 0.7'		SI	D = 16.2'				
٠.									
Sat 0	<b>GHA</b> 180°48.4	<b>Dec</b> N16°02.8	<b>GHA</b> 232°57.0	u 11.0'	Dec 507°13.3	d -16.9'	<b>HP</b> 59.9'		
1	195°48.5	03.6	247°27.0	11.1'	06° 56.4	-16.9	59.9'		
2	210°48.5	04.3	261°57.1	11.1'	06°39.4	-17.0'	59.9'		
3	225°48.6	•• 05.0	276°27.2	11.1'	$06^{\circ}22.5$	-17.0'	60.0'		
4	240°48.6	05.7	290°57.3	11.1'	06°05.4	-17.1'	60.0'		
5	255°48.7 270°48.7	06.4 N16°07.2	305°27.4 319°57.5	11.1'	05°48.4 \$05°31.3	-17.1'	60.0'		
6 7	270°48.7 285°48.8	07.9	319°57.5 334°27.7	11.1' 11.2'	05°14.1	-17.1' -17.2'	60.0' 60.0'		
8	300°48.8	07.9	348°57.8	11.2'	05 14.1 04°56.9	-17.2'	60.0'		
9	315°48.9	• • 09.3	3°28.0	11.2'	04°39.7	-17.2	60.0'		
10	330°48.9	10.0	17°58.2	11.2'	04°22.5	-17.3'	60.1'		
11	345°49.0	10.7	32°28.4	11.2'	04°05.2	-17.3'	60.1'		
12	0°49.1	N16°11.5	46°58.6	11.2'	\$03°47.9	-17.3'	60.1		
13 14	15°49.1 30°49.2	12.2 12.9	61°28.8 75°59.0	11.2' 11.2'	03°30.6 03°13.2	-17.4' -17.4'	60.1' 60.1'		
15	45°49.2	. 13.6	90°29.2	11.2'	03° 15.2	-17.4'	60.1		
16	60°49.3	14.3	104°59.4	11.2'	02°38.4	-17.4'	60.1		
17	75°49.3	15.0	$119^{\circ}29.6$	11.2'	$02^{\circ}21.0$	-17.5'	60.1'		
18	90°49.4	N16°15.7	133°59.8	11.2'	S02°03.5	-17.5'	60.2'		
19	105°49.4	16.5	148°30.0	11.2'	01°46.0	-17.5'	60.2'		
20 21	120°49.5 135°49.5	17.2 •• 17.9	163°00.2 177°30.4	11.2' 11.2'	01°28.6 01°11.0	-17.5' -17.5'	60.2' 60.2'		
22	150°49.6	18.6	192°00.6	11.2'	00°53.5	-17.5'	60.2		
23	165°49.6	19.3	206°30.8	11.2'	00°36.0	-17.5'	60.2		
	SD = 15.9'	d = 0.7'		SI	D = 16.3'				
					Б.	,			
Sun 0	<b>GHA</b> 180°49.7	<b>Dec</b> N16°20.0	<b>GHA</b> 221°01.0	u 11.2'	Dec \$00° 18.5	d -17.5'	<b>HP</b> 60.2'		
1	180 49.7 195°49.7	20.7	221 01.0 235°31.1	11.2'	500 18.5 500°00.9	-17.5'	60.2'		
2	210°49.8	21.4	250°01.3	11.1'	N00° 16.6	17.6	60.2		
3	225°49.8	•• 22.1	264°31.4	11.1'	00°34.2	17.6'	60.2'		
4	240°49.9	22.8	279°01.6	11.1'	00°51.7	17.6'	60.2'		
5	255°49.9	23.6	293°31.7	11.1'	01°09.3	17.6'	60.2'		
6 7	270°50.0 285°50.0	N16°24.3 25.0	308°01.8 322°31.9	11.1' 11.1'	N01°26.8 01°44.4	17.6' 17.5'	60.3' 60.3'		
8	285 50.0 300°50.1	25.0 25.7	322 31.9 337°01.9	11.1	01 44.4 02°01.9	17.5'	60.3		
9	315°50.1	. 26.4	351°32.0	11.0'	02°19.5	17.5	60.3		
10	330°50.2	27.1	6°02.0	11.0'	02°37.0	17.5'	60.3		
11	345°50.2	27.8	20°32.0	11.0'	02°54.5	17.5'	60.3'		
12	0°50.3	N16°28.5	35°02.0	11.0'	N03°12.0	17.5	60.3'		
13	15°50.3	29.2	49°32.0	10.9'	03°29.5 03°47.0	17.5'	60.3'		
14 15	30°50.4 45°50.4	29.9 · · 30.6	64°01.9 78°31.8	10.9' 10.9'	03°47.0 04°04.5	17.5' 17.4'	60.3' 60.3'		
16	60°50.4	31.3	93°01.6	10.9	04 04.5 04°21.9	17.4 17.4'	60.3		
17	75°50.5	32.0	107°31.5	10.8'	04°39.4	17.4	60.3		
18	90°50.5	N16°32.7	122°01.3	10.8'	N04°56.8	17.4'	60.3'		
19	105°50.6	33.4	136°31.1	10.7'	05°14.1	17.3'	60.3'		
20	120°50.6	34.1	151°00.8	10.7'	05°31.5	17.3'	60.3'		
21 22	135°50.7 150°50.7	· · 34.8 35.5	165°30.5 180°00.2	10.7' 10.6'	05°48.8 06°06.1	17.3' 17.3'	60.3' 60.3'		
23	165°50.7	35.5 36.2	180°00.2 194°29.8	10.6'	06°23.3	17.3' 17.2'	60.3'		
23			197 49.0			11.4	00.0		
	SD = 15.9'	d = 0.7'		SI	D = 16.4'				

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

Lat.		Moonris	е		Moonset	;
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°	04:43	03:55	03:17	11:40	14:16	16:44
N 70°	04:22	03:47	03:17	11:59	14:20	16:38
68°	04:05	03:40	03:18	12:14	14:24	16:32
66°	03:51	03:34	03:18	12:26	14:28	16:28
64°	03:39	03:28	03:19	12:36	14:30	16:24
62°	03:29	03:24	03:19	12:44	14:33	16:21
60°	03:21	03:20	03:19	12:51	14:35	16:18
N 58°	03:13	03:17	03:20	12:57	14:37	16:16
56°	03:06	03:14	03:20	13:03	14:38	16:14
54°	03:00	03:11	03:20	13:08	14:40	16:12
52°	02:55	03:08	03:20	13:12	14:41	16:10
50°	02:50	03:06	03:20	13:16	14:42	16:08
45°	02:39	03:01	03:21	13:25	14:45	16:05
N 40°	02:30	02:56	03:21	13:32	14:47	16:02
35°	02:23	02:53	03:22	13:38	14:49	15:59
30°	02:16	02:49	03:22	13:43	14:50	15:57
20°	02:04	02:44	03:22	13:52	14:53	15:53
N 10° 0°	01:54	02:39	03:23	14:00	14:55	15:50
1	01:44	02:34	03:23	14:08	14:57	15:47
<b>S</b> 10°	01:34	02:29	03:24	14:15	14:59	15:44
20° 30°	01:23	02:24 02:18	03:24	14:23	15:02	15:40
35°	01:11 01:04	02:18	03:25 03:25	14:31 14:36	15:04 15:06	15:37 15:34
40°	00:56	02:15	03:25	14:30	15:00	15:34
45°	00:30	02:11	03:26	14:49	15:09	15:32
<b>S</b> 50°	00:35	02:01	03:27	14:56	15:11	15:26
52°	00:30	01:59	03:27	15:00	15:12	15:24
54°	00:24	01:56	03:28	15:04	15:13	15:22
56°	00:17	01:53	03:28	15:08	15:14	15:21
58°	00:10	01:50	03:29	15:13	15:16	15:18
<b>S</b> 60°	00:01	01:46	03:29	15:18	15:17	15:16

I			Sun		Moon			
	Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age	
	,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	25-27	
l		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	33-13%	
	03	03:08	03:11	11:57	07:56	20:21		
١	04	03:14	03:16	11:57	08:46	21:10		
١	05	03:19	03:21	11:57	09:35	22:00		

	h	Aries	Venus		Mars		Jup	Jupiter Satu		turn S		Stars	
20   202   202   203	Mon -	CH4	CHV	Doc	CH 4	Doc		Doc		Dos		CHV	Doc
1 987-240 1887-182 0.96 287-65 2.96 1897-140 1.77 287-65 4.9 4.9 357-00 4.9 4.9 2.7 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9													
2 241255 2181177 127 207605 3014 221177 120 207505 3014 2014 3014 2014 2014 2014 2014 2014 2014 2014 2											Alpheratz	357°35.7	29°13.3
3 990/200 2331/12 2 1.17 280/90 122 1226/177 220 200/90 2 1.37											Ankaa	353°08.0	-42°10.4
4.98   3.94   3.96   3.97   3.97   3.07											Schedar	349°32.2	56°40.0
Septiment of the property of											Diphda		
14   14   14   15   15   15   15   15											Achernar		
7 229°378 299°18 2918 2 159 25°087 342 276°85 225 380°493 43.5 Accord 151°19.0											Hamal		
8 Alf-Wall 38 98 147 170 3 407 04 35.0 901200 227 305 515 434 0 350 147 170 30 350 350 110 158 305 350 110 158 305 350 120 38 120 158 30 350 110 144 32 338 117 191 101018 35 5 321 308 30 120 158 43.2 13 95 95.0 22 121 22 22 55 129 38 8 678.4 18721 30 167 30 100 158 30 133 147 100 158 30 130 147 110 110 110 110 110 110 110 110 110 11													
9 98° 427 22° 122° 122 101 1 970 1 9											Acamar		
14   14   14   15   15   15   15   15											1		
11   24°9-77   393*132   201   29°115   373   387°326   231   40°93   342   231°127   231°121   24°122   30°321   31°325   30°123   31°325   31°3													
12 4 4*901 8 27*120 M3*212 40*121 908*38 1 991*34 5 M8*233 50*00 500*431 6*10.5											l .		
13										506°43.1			
14   74"  55.5   63"  11.0   2.3.4   70"  13.6   30"  13.2   22"  19.0   2.3.4   10"  10"  10"  10.0   10"  10"  10"  10"  10"  10"  10"  1													
15   105°00.0   65°10.6   25°4.1   107°15.0   41.1   15°15.2   23°18.0   10°09.7   4.20   20°12.1   10°09.7   4.20   20°12.1   10°09.7   4.20   20°12.1   10°09.7   4.20   20°12.1   10°09.7   4.20   20°12.1   10°09.7   4.20   20°12.1   10°09.7   4.20   20°12.1   10°09.7   4.20   20°12.1   10°09.7   4.20   20°12.1   10°09.7   4.20   20°12.1   10°09.7   4.20											1		
105 '000 68'106													
15   150°025   39°006   130°175   150°176													
18   18   19   18   19   18   19   18   18													
19   190°074   113°001   285   145°171   443   96°475   243   161°165   42.6   24.7													
105   105													
100712.3   143708.0   -0.06   175718.5   -44.9   126751.3   -24.6   101721.1   -22.5   125718.6   12671.7   -127707.0   32.7   205710.0   46.5   156755.0   24.8   221725.6   42.3   Sahali   22276.8   -32371.7   -32571.0   -32571.													
195-148   185-075   31.6   1991-19.2   45.7   1411-19.3   24.7   206*23.4   42.4   24.8   211-19.2   171-19.0   32.7   205*19.9   46.5   156*55.0   24.8   2211-19.5   2211-19.7   2211-													
Mer. pass. 09-01											1		
Tue   GHA   CHA   Dec   GHA   Dec   GHA   Dec   CHA   Dec   CHA   Dec   CHA													
Tue GHA GHA Dec GHA DE													
Time   Gira   Gira   Gira   Dec   Gira   Dec   Cira   Dec   Cira   Dec   Cira   Dec   Dubhe   193741.   137951.	Mer.p	ass. 09:01	$\nu$ -0.5′ d1	.1′ m-3.91	$\nu$ 0.7 d0	.8′ m1.11	$\nu 1.9' d0.$	1′ m-2.00	$\nu 2.3' \ d-0$	.1′ m1.0 <i>1</i>			
Tue GHA													
225°197, 188°065 N13°37, 220°206 N00°472 171°599 N18°250 236°729 506°422 Dembols 125°343 47°362 2 255°246 218°054 338°213 480 186°587 251 231°302 422 6 Genth 175°400 177°402 2 255°246 218°054 379 280°224 48.8 20°200 6 253 266°325 42.1 40.2 40.2 40.2 40.2 40.2 40.2 40.2 40.2	Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	_		
2 265°24 dc 218°04 338°08 358°80 23 488 285°213 480 186°587 551 251°302 422 2 265°305 421 3 3 270°27.1 233°049 3.88 265°227 · 4495 217°024 .254 281°347 · 42.0 42.0 42.0 500°320 263°039 38.9 260°234 50.3 232°04.3 25.6 296°37.0 42.0 500°320 263°039 38.9 295°241 51.1 247°062 .2 57 311°30.3 41.9 556°325 421 57.0 40.0 40.0 40.0 40.0 40.0 40.0 40.0 4	0										1		
2 255°24.6 218°05.4 35.8 250°22.0 48.8 202°00.6 25.3 266°32.5 42.1 320°00.6 25.3 266°32.7 42.1 320°04.9 36.8 256°22.7 4.95 211°02.4 2.54 281°39.7 42.0 42.0 42.0 42.0 42.0 42.0 42.0 42.0													
270°27.1 233°04.9											1		
288°90, 288°04, 37.9 280°23, 4 50.3 222°04, 3 5.6 296°37, 42.0 31°39, 3 4.9 42.0 31°39, 3 4.9 38.9 280°23, 4 51.1 247°06, 2 5.7 31°39, 3 4.9 42.0 31°348, 3 80°32, 3 4.0 31°348, 800°51, 8 26°08, 8 18°25, 8 31°39, 3 4.9 4.7 4.7 4.0 4.0 31°348, 800°51, 8 26°08, 8 18°25, 8 31°39, 3 4.1 7, 8 4.1 7, 8 4.1 7, 8 4.1 7, 8 4.1 7, 8 4.1 7, 8 4.1 7, 8 4.1 7, 8 4.1 7, 8 4.1 7, 8 4.1 7, 8 4.1 7, 8 4.1 7, 8 4.1 7, 8 4.1 7, 8 4.1 7, 8 4.1 8, 8 5.1 8, 8 7.1									281°34.7				
6 316°34.5 276°33.4 N13°40.0 310°24.8 N00°18.8 26°36.0 N18°25.8 326°41.6 \$66°41.8 \$46°41.8 \$46°41.7 \$47°40.9 \$41.0 \$305°25.5 \$5.6 \$27°60.0 \$18°60.0 \$18°25.8 \$26°41.6 \$36°41.8 \$48°43.8 \$41.7 \$41.0 \$4											1		
6 315°34.5 278°03.4 N13°40.0 310°24.8 N00°51.8 262°08.0 N18°25.8 320°41.6 S06°41.8 3 SILL 34 14.7 7 30°37.0 293°02.9 41.0 310°24.8 N00°51.8 262°08.0 N18°25.8 320°41.6 S06°41.8 34.1 Hadar 148°25.2 6°22.6 14.1 14.7 14.1 15.1 15.1 14.1 15.1 14.1 15.1 15.1	5												
7 330°37.0 298°0.29 41.0 325°25.5 52.6 277°0.99 26.0 341°4.38 41.7 Hold 148°35.2 % 149°1.2 % 140	6	315°34.5	278°03.4	N13°40.0			262°08.0		326°41.6				
8 345°99.4 308°02.3 42.0 340°26.3 53.3 292°11.8 261 350°46.1 41.7 41.6 19.0 350°27.5 51.1 30°46.8 353°01.8 4.3 135°27.0 54.1 30°13.6 -0.26.3 11°48.4 41.6 15°44.3 338°01.3 44.1 10°27.7 54.9 322°15.5 26.4 26°50.7 41.5 11.3 0°46.8 353°00.8 45.1 25°28.4 55.6 337°17.4 26.6 41°52.5 505°41.4 13.1 10°3.0 12°2.5 12°2.5 12°2.9 18°2.6 7 50°55.2 506°41.4 13.1 10°3.0 12°2.5 11.3 0°46.8 353°00.8 45.1 25°28.4 55.6 337°17.4 26.6 41°52.5 506°41.4 13.1 10°3.0 12°2.5 11.3 0°46.8 353°00.8 45.1 10°3.0 12°2.2 11.0 10°56.1 12°2.5 10°3.0 11.0 11°4.0 11	7	330°37.0	293°02.9	41.0	325°25.5	52.6	277°09.9	26.0	341°43.8				
9 0°41.9 323°01.8 4.1 10°27.7 54.9 322°15.5 26.4 26°50.7 41.5 11 30°46.8 353°00.8 45.1 26°28.4 55.6 337°17.4 26.6 41°52.9 41.5 12 48°49.3 8°00.2 N13°46.2 40°29.1 N0°56.4 32°19.2 N18°26.7 56°55.2 60°41.4 13 60°51.7 22°59.7 47.2 55°29.8 57.2 7°21.1 26.8 71°57.5 41.3 13 60°51.7 22°59.7 47.2 55°29.8 57.2 7°21.1 26.8 71°57.5 41.3 14 75°54.2 37°59.2 48.2 70°30.5 57.9 22°29.2 7.0 86°59.8 41.3 15 90°56.7 52°55.7 49.3 85°31.2 °55.9 72°22.9 27.0 86°59.8 41.3 16 10°59.1 67°55.2 50.3 100°31.9 00°59.5 52°6.7 27.3 117°04.3 41.1 17 121°01.6 82°57.6 51.3 115°32.6 01°00.2 67°28.5 27.4 132°06.6 41.0 18 136°04.1 97°57.1 N13°52.4 130°33.3 N10°10.0 82°30.4 N18°27.6 147°08.9 60°41.0 18 136°04.1 97°57.1 N13°52.4 130°33.3 N10°10.0 82°30.4 N18°27.6 147°08.9 60°41.0 18 136°00.0 12°56.6 53.4 145°34.0 01.7 97°32.3 27.7 162°11.1 40.9 10 16°00.0 12°56.5 53.4 145°34.0 01.7 97°32.3 27.7 162°11.1 40.9 10 16°00.0 12°56.5 55.5 175°35.4 0.3.3 127°36.0 ·28.0 192°15.7 40.8 Kaus Aust. 83°33.0 34°22.2 121°16.4 172°54.5 57.5 20°36.8 04.8 157°39.7 28.3 222°20.2 40.6 N18°35.0 56.5 190°36.1 04.0 142°37.8 28.1 207°18.0 40.7 40.7 20.2 22°18.8 187°54.0 N13°58.5 520°37.6 N10°05.6 154.4 40.8 42.2 426°23.2 21°16.4 172°54.5 57.5 20°36.8 04.8 157°39.7 28.3 222°20.2 40.6 N18°35.2 22°20.2 40.6 N18°35.2 20°37.5 N10°05.6 172°41.0 N18°28.4 237°22.5 00°40.6 N18°45.2 20°37.8 N10°50.6 172°41.0 N18°28.4 237°22.5 00°40.6 N18°45.2 20°37.5 N10°50.6 172°41.0 N18°28.4 237°22.5 00°40.6 N18°45.2 20°37.5 N10°50.6 172°41.0 N18°28.4 237°22.5 00°40.6 N18°45.4 20°45.2 20°45.3 N10°45.4 20°45.2 20°45.3 N10°50.6 172°41.0 N18°45.4 237°25.5 00°40.6 N18°45.4 20°45.4	8	345°39.4	308°02.3	42.0		53.3	292°11.8	26.1	356°46.1	41.7			
10	9	0°41.9	323°01.8	• • 43.1	355°27.0	• • 54.1	307°13.6	• • 26.3	11°48.4		1		
11 30°46.8 33°400.8 45.1 25°28.4 55.6 33°717.4 26.6 41°52.9 41.5 (According to the content of th	10	15°44.3	338°01.3	44.1		54.9	322°15.5	26.4		41.5			
12 45*49.3 8*00.2 N3*46.2 40*29.1 N00*56.4 352*19.2 N18*26.7 56*55.2 S06*41.4 T 36*56.3 16*08.7 12*36*1.4 T 56*51.7 22*59.9 7 47.2 55*29.8 57.2 7*21.1 12*6.8 71*57.5 41.3 Alphacea 136*63.3 16*08.7 12*1.1 12*10.6 82*59.8 14.3 Alphacea 12*6.9 3.9 6*37.8 Alphacea 12*6.9 3.9 6*37.8 Alphacea 12*6.9 3.9 6*37.8 Alphacea 12*6.2 26*09.2 Alphacea 12*6.9 3.9 6*37.8 Alphacea 12*6.9 3.9 5.0 6*37.8 Alphacea 12*6.9 3.0 5.0 6*37.8 Alphacea 12*6.9 3.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5	11	30°46.8	353°00.8	45.1	25°28.4	55.6	337°17.4	26.6	41°52.9	41.5			
13 60°51.7 22°89.7 47.2 55°28.8 57.2 7°21.1 26.8 71°87.5 41.3 Alpheca 126°0.9 26°37.8 141.3 41.7 575.42 37°54.2 37°54.2 37°4.8 27.1 102°0.2 0 41.2 15.0 0°55.7 52°8.7 · 49.3 86°31.2 · 22°22.9 27.0 86°9.8 41.3 17°0.4 3 41.1 17°1.0 16 82°57.6 51.3 115°32.6 01°0.0 2 67°2.8 5 27.4 132°0.6 41.0 18.3 18°0.4 19°5.1 113°3.5 10°3.3 N01°0.1 0 82°30.4 N18°2.7 6 147°0.8 9 50°4.1 19°1.0 12°0.5 6.6 53.4 145°3.4 0 01.7 97°3.2 3 18°2.7 6 140°8.9 50°4.1 49.9 151°0.5 112°5.6 5 53.4 145°3.4 0 01.7 97°3.2 3 12°7.7 162°1.1 14.9 151°0.5 112°5.6 5 53.4 145°3.4 0 01.7 97°3.2 3 12°7.7 162°1.1 40.9 151°0.5 12°5.6 5 53.4 145°3.4 0 01.7 97°3.2 3 12°7.3 14 40.8 140°1.2 12°1.1 140°1.2 140°1.	12	45°49.3	8°00.2	N13°46.2	40°29.1	N00°56.4	352°19.2	N18°26.7	56°55.2	S06°41.4			
14 75*54.2 37*99.4 48.2 70*30.5 57.9 22*22.9 27.0 86*99.8 41.3 Antares 112*16.2 26*29.2 16 105*50.7 52*98.7	13	60°51.7	22°59.7	47.2	55°29.8	57.2	$7^{\circ}21.1$	26.8	71°57.5				
15 90°50.7 52°88.7 · 49.3 85°31.2 · 98.67 37°24.8 · 27.1 102°02.0 · 41.2   16 106°99.1 6°99.2 50.3 100°31.9 · 98.67 37°24.8 · 27.1 102°02.0 · 41.2   17 121°01.6 82°57.6 51.3 115°32.6 01°00.2 67°28.5 27.4 132°06.6 41.0   18 136°04.1 9°57.1 N13°52.4 130°33.3 N01°01.0 2 67°28.5 27.4 132°06.9 41.0   19 151°06.5 112°56.6 53.4 146°34.0 01.7 97°23.3 27.7 162°11.1 40.9   10 16°00.0 127°56.1 54.4 160°34.7 02.5 112°34.1 27.8 17°13.4 40.8   12 181°11.5 142°55.5 · 55.5 175°35.4 · 03.3 127°36.0 · 28.0 192°15.7 · 40.8   12 2 106°13.9 157°55.0 56.5 100°36.1 04.0 142°37.8 28.1 207°18.0 40.7   12 2 21°16.4 172°54.5 57.5 205°36.8 04.8 157°39.7 28.3 222°20.2 40.0   14 2 3 2 11°16.4 172°54.5 57.5 205°36.8 04.8 157°39.7 28.3 222°20.2 40.0   14 2 3 2 11°16.4 172°54.5 57.5 205°36.8 04.8 157°39.7 28.3 222°20.2 40.0   15 2 2 26°38.8 187°54.0 N13°58.5 220°37.5 N01°05.6 172°41.6 N18°28.4 237°22.5 506°40.6   15 2 2 26°38.8 187°54.0 N13°58.5 220°37.5 N01°05.6 172°41.6 N18°28.4 237°22.5 506°40.6   15 2 2 26°38.2 187°54.0 N13°58.5 220°37.5 N01°05.6 172°41.6 N18°28.4 237°22.5 506°40.6   15 2 2 26°38.2 187°51.8 0.6 25°39.6 0.7 9 217°47.2 28.8 282°29.4 40.3   15 2 26°51.3 0.37 295°41.0 09.4 247°50.9 29.1 312°33.9 40.2   16 316°33.6 277°950.8 N14°04.7 310°41.7 N01°01.0 220°25.7 N18°29.3 27°40.5 N18°30.1 57°49.9 S06°39.7   17 31°36.1 020°32.4 10.9 277°46.6 29.4 342°38.5 40.1   18 346°38.6 30°94.7 60.7 340°43.2 11.7 202°45.5 29.5 35°40.7 40.0   10 16°43.5 337°48.7 08.8 10°44.6 13.2 323°00.2 29.8 27°45.3 39.9   10 16°43.5 337°48.7 08.8 10°44.6 13.2 323°00.2 29.8 27°45.3 39.9   10 16°43.5 337°48.7 08.8 10°44.6 N19°44.8 350°0.9 N18°30.1 57°49.9 506°39.7   11 31°40.0 352°44.9 11.8 55°46.7 11.5 8°05.8 8°05.8 03.3 7°29.9 506°3.9 7   11 31°40.0 352°44.9 11.8 55°46.7 11.5 8°05.8 03.3 7°29.9 506°3.9 7   11 31°40.0 352°44.4 N14°10.8 40°46.0 N01°41.7 830°09.5 30.5 102°65.7 39.5   11 31°40.0 352°44.9 11.9 115°40.5 11.5 8°05.8 03.3 7°29.9 50°3.9 7   11 31°40.0 352°44.9 11.8 55°40.7 11.5 8°05.8 03.3 11.9 10.0 48°5.8   11 31°40.0 352°44.9 11.9 10°48.8 11.7 8°30.	14	75°54.2	37°59.2	48.2	70°30.5	57.9	22°22.9	27.0	86°59.8	41.3			
16 106*69.1 67*58.2 50.3 100*31.9 00*99.5 52*26.7 27.3 132*06.6 41.0 172*10.1 6 82*57.6 51.3 115*92.6 01*00.2 67*28.5 27.4 132*06.6 41.0 172*01.6 82*0.4 N18*27.6 147*08.9 506*41.0 172*01.0 172	15	90°56.7	52°58.7	• • 49.3	85°31.2	• • 58.7	37°24.8	• • 27.1	102°02.0	• • 41.2			
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181°11.5   142°55.5   175°35.4   0.40   142°37.8   281   129°15.7   0.40.8   0.80°33.4   38°48.1     22   196°13.9   157°55.0   56.5   190°36.1   0.40   142°37.8   281   220°20.2   40.6     Mer.pass. 08:57   ν-0.5′ d1.0′ m-3.91   ν-0.7′ d0.8′ m1.10   ν-0.9′ d0.1′ m-2.00   ν-0.3′ d-0.1′ m1.07     Wed   GHA   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   0.81   0.	20												
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Mer.pass. 08:57         \$\nu_{0.05}^{1}\text{ d} \cdot 1.0^{1}\text{ m} - 3.91\$         \$\nu_{0.05}^{1}\text{ d} \cdot 0.1^{1}\text{ m} - 2.00\$         \$\nu_{0.05}^{2}\text{ d} \cdot 0.1^{1}\text{ m} \cdot 1.07\$         Peacock \$53^{\circ} 0.65^{\circ} - 56^{\circ} 39.2\$         \$\nu_{0.05}^{\overline{0}}\text{ d} \cdot 0.1^{1}\text{ m} \cdot 1.07\$         Peacock \$53^{\circ} 0.65^{\circ} - 56^{\circ} 39.2\$         \$\nu_{0.05}^{\overline{0}}\text{ d} \cdot 0.1^{1}\text{ m} \cdot 1.07\$         Peacock \$53^{\circ} 0.65^{\circ} - 56^{\circ} 39.2\$         \$\nu_{0.05}^{\overline{0}}\text{ d} \cdot 0.1^{1}\text{ m} \cdot 1.07\$         Peacock \$53^{\circ} 0.65^{\circ} - 56^{\circ} 39.2\$         \$\nu_{0.05}^{\overline{0}}\text{ d} \cdot 0.1^{1}\text{ m} \cdot 1.07\$         Peacock \$53^{\circ} 0.65^{\circ} - 56^{\circ} 39.2\$         \$\nu_{0.05}^{\overline{0}}\text{ d} \cdot 0.1^{1}\text{ m} \cdot 1.07\$         Peacock \$53^{\circ} 0.65^{\circ} - 56^{\circ} 39.2\$         \$\nu_{0.05}^{\overline{0}}\text{ d} \cdot 0.1^{1}\text{ m} \cdot 1.07\$         Peacock \$53^{\circ} 0.65^{\circ} - 56^{\circ} 39.2\$         \$\nu_{0.05}^{\overline{0}}\text{ d} \cdot 0.1^{1}\text{ m} \cdot 1.07\$         Peacock \$53^{\circ} 0.5^{\circ} 0.9.2\$         \$\nu_{0.05}^{\overline{0}}\text{ d} \cdot 0.1^{1}\text{ m} \cdot 1.07\$         Peacock \$53^{\circ} 0.5^{\circ} 3.9.2\$         \$\nu_{0.05}^{\overline{0}}\text{ d} \cdot 0.1^{1}\text{ m} \cdot 1.07\$         \$\nu_{0.05}^{\overline{0}}\text{ d} \cdot 0.1^{1}\text{ d} \cdot 0.1^{1}\text{ d} \cdot 0.1^{1}\text	23	211°16.4	172°54.5	57.5	205°36.8	04.8	157°39.7	28.3	222° 20.2	40.6			
Wed         GHA         GHA         Dec         All Nai'r         237°22.5         S06°40.6         Femilhaut         15°15.3         -29°34.7         46°50.5         Fomalhaut         15°15.3         -29°39.6         22°37.7         40.5         Scheat         13°36.6         22°45.3         28.7         26°27.1         40.4         Markab         Scheat         13°40.0         28°12.6           2 256°23.8         217°52.9         14°00.6         250°38.9         07.1         202°45.3         28.7         267°27.1         40.4         Markab         13°30.6         15°20.0           4 286°28.7         247°51.8         02.6         280°40.3         38.6         232°49.0         29°31.6         40.3         40.3         40.3         40.3         40.3         40.3         40.3         40.1         40.0         40.0         40.0         40.0         40.0         40.0         40.0         40.0         40.0         40.0         40.0         40.0         40.0         40.0         40.0         40.0         40.0	Mer n	ass 08:57	$\nu$ -0.5' d1	0′ m-3 91	$\nu 0.7' d0$	8′ m1 10	$v^{1} 9' d0$	1′ m-2 00	v2 3' d-0	1' m1 07			
Wed         GHA         GHA         Dec         Al Na'ir         27°3.7.         -46°50.5         36°50.2         06°50.3         21°26.2         22°52.4         13°59.6         238°38.2         06.3         187°43.4         28.6         256°27.4         40.4         286°22.7         21°52.2         14°0.0         26°59.38         0°7.9         21°747.2         2.28.8         282°29.4         40.3         40.0         40.0         40.0         40.0         40.0         40.0         40.0         40.0         40.0         40.0	- тист.р		- U.S GI	.0 111 0.51		.0 1111.10	ν 1.5 · G 0.						
Wed         GHA         CHA         Dec         GHA         Poe         Al Na'ir         279-29-6           1         241°21.3         202°53.4         13°59.6         235°38.2         06.3         187°43.4         28.6         252°24.8         40.5         Scheat         13°64.0         28°12.6           2         256°23.8         217°52.9         14°00.6         250°38.9         07.1         202°45.3         28.7         267°27.1         40.4         40.4         40.4         40.7         40.4         40.4         40.4         40.3         40.2         40.2         40.3         40.2         40.2         40.3         40.2         40.2         40.3         40.2													
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14													
16       106°58.3       67°45.5       14.9       100°48.8       17.8       53°11.4       30.7       117°59.0       39.4       Venus       321°35.1       11:29         17       122°00.7       82°44.9       15.9       115°49.5       18.5       68°13.2       30.8       133°01.2       39.4       Mars       354°18.7       09:17         18       137°03.2       97°44.4       N14°16.9       130°50.2       N01°19.3       83°15.1       N18°31.0       148°03.5       506°39.3       Jupiter       306°22.7       12:28         19       152°05.7       112°43.9       18.0       145°50.9       20.1       98°16.9       31.1       163°05.8       39.2         20       167°08.1       127°43.3       19.0       160°51.6       20.8       113°18.8       31.3       178°08.1       39.2         21       182°10.6       142°42.8       20.0       175°52.3       21.6       128°20.7       31.4       193°10.4       39.1         22       197°13.1       157°42.3       21.0       190°53.0       22.3       143°22.5       31.5       208°12.6       39.0         23       212°15.5       172°41.7       22.0       205°53.7       23.1       158°24.4													
17       122°00.7       82°44.9       15.9       115°49.5       18.5       68°13.2       30.8       133°01.2       39.4       Mars       354°18.7       09:17         18       137°03.2       97°44.4       N14°16.9       130°50.2       N01°19.3       83°15.1       N18°31.0       148°03.5       506°39.3       Jupiter       306°22.7       12:28         19       152°05.7       112°43.9       18.0       145°50.9       20.1       98°16.9       31.1       163°05.8       39.2         20       167°08.1       127°43.3       19.0       160°51.6       20.8       113°18.8       31.3       178°08.1       39.2         21       182°10.6       142°42.8       · 20.0       175°52.3       · 21.6       128°20.7       · 31.4       193°10.4       · 39.1       Horizontal parallax         22       197°13.1       157°42.3       21.0       190°53.0       22.3       143°22.5       31.5       208°12.6       39.0       Mars:       0.1         23       212°15.5       172°41.7       22.0       205°53.7       23.1       158°24.4       31.7       223°14.9       39.0       Mars:       0.1													
18       137°03.2       97°44.4       N14°16.9       130°50.2       N01°19.3       83°15.1       N18°31.0       148°03.5       506°39.3       Jupiter       306°22.7       12:28         19       152°05.7       112°43.9       18.0       145°50.9       20.1       98°16.9       31.1       163°05.8       39.2         20       167°08.1       127°43.3       19.0       160°51.6       20.8       113°18.8       31.3       178°08.1       39.2         21       182°10.6       142°42.8       · 20.0       175°52.3       · 21.6       128°20.7       · 31.4       193°10.4       · 39.1       Horizontal parallax         22       197°13.1       157°42.3       21.0       190°53.0       22.3       143°22.5       31.5       208°12.6       39.0       Venus:       0.1         23       212°15.5       172°41.7       22.0       205°53.7       23.1       158°24.4       31.7       223°14.9       39.0       Mars:       0.1											1		
19 152°05.7 112°43.9 18.0 145°50.9 20.1 98°16.9 31.1 163°05.8 39.2 20 167°08.1 127°43.3 19.0 160°51.6 20.8 113°18.8 31.3 178°08.1 39.2 21 182°10.6 142°42.8 · 20.0 175°52.3 · 21.6 128°20.7 · 31.4 193°10.4 · 39.1 22 197°13.1 157°42.3 21.0 190°53.0 22.3 143°22.5 31.5 208°12.6 39.0 23 212°15.5 172°41.7 22.0 205°53.7 23.1 158°24.4 31.7 223°14.9 39.0 Mars: 0.1													
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21       182°10.6       142°42.8       · · 20.0       175°52.3       · · 21.6       128°20.7       · · 31.4       193°10.4       · · 39.1       Horizontal parallax         22       197°13.1       157°42.3       21.0       190°53.0       22.3       143°22.5       31.5       208°12.6       39.0       Venus: 0.1         23       212°15.5       172°41.7       22.0       205°53.7       23.1       158°24.4       31.7       223°14.9       39.0       Mars: 0.1											Saturn	11~03.7	08:09
22 197°13.1 157°42.3 21.0 190°53.0 22.3 143°22.5 31.5 208°12.6 39.0 Venus: 0.1 23 212°15.5 172°41.7 22.0 205°53.7 23.1 158°24.4 31.7 223°14.9 39.0 Mars: 0.1											Horizont	al parallax	
23 212°15.5 172°41.7 22.0 205°53.7 23.1 158°24.4 31.7 223°14.9 39.0 Mars: 0.1											1.5.125110	-	0.1
25 212 15.5 172 17.1 22.6 26.5 55.1 25.1 15.0 27.1 52.1 25.2 17.5 55.6													
Mer.pass. 08:53 $\nu$ -0.5' d1.0' m-3.91 $\nu$ 0.7' d0.8' m1.10 $\nu$ 1.9' d0.1' m-2.00 $\nu$ 2.3' d-0.1' m1.07											L	=:=:	
	Mer.p	ass. 08:53	$\nu$ -0.5' d1	.0′ m-3.91	$\nu$ 0.7′ d0	.8′ m1.10	$\nu 1.9' d0.$	.1′ m-2.00	$\nu 2.3' d-0$	.1′ m1.07			

h	Sui	n	Moon					
Mon	GHA	Dec	GHA	ν	Dec	d	HP	
0	180°50.8	$N16^{\circ}36.9$	$208^{\circ}59.4$	10.6'	N06°40.6	17.2'	60.3'	
1	195°50.9	37.6	223°29.0	10.5'	06°57.8	17.1'	60.3'	
2 3	210°50.9 225°50.9	38.3 •• 39.0	237°58.5 252°28.0	10.5' 10.4'	07°14.9 07°32.0	17.1' 17.1'	60.3' 60.3'	
4	240°51.0	39.7	266°57.4	10.4	07°49.1	17.0'	60.3	
5	255°51.0	40.4	281°26.8	10.3'	08°06.1	17.0'	60.3'	
6	270°51.1	N16°41.1	295°56.1	10.3'	N08°23.1	16.9'	60.3'	
7 8	285°51.1 300°51.2	41.8 42.5	310°25.4 324°54.7	10.2' 10.2'	08° 40.0 08° 56.9	16.9' 16.8'	60.3' 60.3'	
9	315°51.2	• • 43.2	339°23.9	10.2	06 50.9 09°13.7	16.8'	60.3	
10	330°51.2	43.9	353°53.0	10.1'	09°30.5	16.7'	60.3'	
11	345°51.3	44.6	8°22.1	10.0'	09°47.2	16.7'	60.3'	
12 13	0°51.3 15°51.4	N16°45.3 46.0	22°51.1 37°20.1	10.0' 9.9'	N10°03.9 10°20.5	16.6' 16.5'	60.3' 60.3'	
14	30°51.4	46.7	51°49.1	9.9 9.9'	10°20.5	16.5	60.3	
15	45°51.4	• • 47.4	66°18.0	9.8'	10°53.5	16.4	60.2'	
16	60°51.5	48.0	80°46.8	9.8'	11° 10.0	16.4'	60.2'	
17	75°51.5 90°51.6	48.7 N16°49.4	95°15.6 109°44.3	9.7'	11°26.3 N11°42.6	16.3'	60.2' 60.2'	
18 19	90 51.6 105°51.6	50.1	109 44.3 124°12.9	9.7' 9.6'	11°58.8	16.2' 16.1'	60.2	
20	120°51.6	50.8	138°41.5	9.5'	12° 15.0	16.1'	60.2	
21	135°51.7	• • 51.5	$153^{\circ}10.1$	9.5'	12°31.0	16.0'	60.2'	
22	150°51.7	52.2	167°38.5	9.4'	12° 47.0	15.9'	60.2'	
23	165°51.8	52.9	182°06.9	9.4'	13°03.0	15.8'	60.2'	
	SD = 15.8'	d = 0.7'		SE	O = 16.4'			
Tue	GHA	Dec	GHA	ν	Dec	d	HP	
0	180°51.8	N16°53.6	196°35.3	9.3'	N13°18.8	15.8'	60.2'	
1	195°51.8	54.2	211°03.6	9.2'	13°34.6	15.7'	60.2'	
2	210°51.9	54.9	225°31.8	9.2'	13°50.2	15.6'	60.1'	
3 4	225°51.9 240°51.9	· · 55.6 56.3	240°00.0 254°28.1	9.1' 9.0'	14°05.8 14°21.3	15.5' 15.4'	60.1' 60.1'	
5	255°52.0	50.5 57.0	268°56.1	9.0' 9.0'	14 21.3 14°36.7	15.4	60.1	
6	270°52.0	N16°57.7	283°24.0	8.9'	N14°52.1	15.2'	60.1	
7	285°52.1	58.4	297°51.9	8.8'	15°07.3	15.1'	60.1'	
8	300°52.1	59.0	312°19.8	8.8'	15°22.4	15.0'	60.1'	
9 10	315°52.1 330°52.2	16°59.7 17°00.4	326°47.5 341°15.2	8.7' 8.6'	15°37.5 15°52.4	14.9' 14.8'	60.0' 60.0'	
11	345°52.2	01.1	355°42.8	8.5'	15° 52.4 16° 07.3	14.6 14.7'	60.0	
12	0°52.2	N17°01.8	10°10.4	8.5'	N16°22.0	14.6'	60.0'	
13	15°52.3	02.4	24°37.9	8.4'	16°36.6	14.5'	60.0'	
14	30°52.3 45°52.3	03.1	39°05.3 53°32.6	8.3'	16°51.2 17°05.6	14.4'	60.0'	
15 16	45°52.3 60°52.4	· · 03.8 04.5	53° 32.6 67° 59.9	8.3' 8.2'	17° 19.9	14.3' 14.2'	60.0' 59.9'	
17	75°52.4	05.2	82°27.1	8.1'	17°34.1	14.1'	59.9'	
18	90°52.4	N17°05.8	96°54.2	8.1'	N17°48.2	14.0'	59.9'	
19	105°52.5	06.5	111°21.2	8.0'	18°02.2	13.9'	59.9'	
20 21	120°52.5 135°52.5	07.2 •• 07.9	125°48.2 140°15.1	7.9' 7.8'	18° 16.0 18° 29.8	13.7' 13.6'	59.9' 59.8'	
22	150°52.6	08.6	154°42.0	7.8'	18° 43.4	13.5'	59.8'	
23	165°52.6	09.2	169°08.7	7.7'	$18^{\circ}56.9$	13.4'	59.8'	
	SD = 15.8'	d = 0.7'		SE	D = 16.4'			
Wed	GHA	D	GHA		D	.,		
vved 0	<b>GHA</b> 180°52.6	<b>Dec</b> N17°09.9	<b>GHA</b> 183°35.4	u 7.6'	<b>Dec</b> N19° 10.3	d 13.3'	<b>HP</b> 59.8'	
1	195°52.7	10.6	198°02.0	7.5	19°23.5	13.1'	59.8'	
2	210°52.7	11.3	212°28.6	7.5'	19°36.6	13.0'	59.7'	
3	225°52.7	•• 11.9	226°55.0	7.4'	19°49.6	12.9'	59.7'	
4 5	240°52.8 255°52.8	12.6 13.3	241°21.4 255°47.8	7.3' 7.3'	20°02.5 20°15.2	12.7' 12.6'	59.7' 59.7'	
6	270°52.8	N17°14.0	270°14.0	7.2'	N20° 27.9	12.5'	59.7'	
7	285°52.9	14.6	284°40.2	7.1'	20°40.3	12.3'	59.6'	
8	300°52.9	15.3	299°06.3	7.0'	20°52.6	12.2'	59.6'	
9 10	315°52.9 330°53.0	· · 16.0 16.6	313°32.4 327°58.4	7.0' 6.9'	21°04.8 21°16.9	12.1' 11.9'	59.6' 59.6'	
10	330 53.0 345°53.0	16.6	327 58.4 342°24.3	6.8'	21 16.9 21°28.8	11.8'	59.6° 59.5'	
12	0°53.0	N17°18.0	356°50.1	6.8'	N21°40.6	11.6'	59.5'	
13	15°53.0	18.6	11°15.9	6.7'	21°52.2	11.5'	59.5'	
14	30°53.1	19.3	25°41.6 40°07.2	6.6'	22°03.7	11.3'	59.5'	
15 16	45°53.1 60°53.1	· · 20.0 20.7	40°07.2 54°32.8	6.6' 6.5'	22° 15.0 22° 26.2	11.2' 11.0'	59.4' 59.4'	
17	75°53.2	21.3	68°58.3	6.4	22°37.2	10.9'	59.4'	
18	90°53.2	N17°22.0	83°23.7	6.4'	N22°48.1	10.7'	59.4'	
19	105°53.2	22.7	97°49.1	6.3'	22°58.8	10.6'	59.3'	
20 21	120°53.2 135°53.3	23.3	112°14.4 126°39.6	6.2' 6.2'	23°09.4 23°19.8	10.4' 10.3'	59.3' 59.3'	
22	150°53.3	24.6	120 39.0 141°04.8	6.2 6.1'	23° 30.1	10.3	59.3'	
23	165°53.3	25.3	155°30.0	6.1'	23°40.2	9.9'	59.2'	
	SD = 15.8'	d = 0.7'	-	SE	D = 16.3'			

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

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

		Sun		Moon			
Day	Eqn.of	f 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	6-0%	
06	03:23	03:25	11:57	10:25	22:51		
07	03:27	03:29	11:57	11:18	23:45		
08	03:31	03:32	11:56	12:13	-:-		

h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	$227^{\circ}18.0$	187°41.2	N14°23.0	220°54.4	N01°23.9	173°26.3	N18°31.8	$238^{\circ}17.2$	S06°38.9	Alpheratz	357°35.6	29°13.3
1	242°20.4	202°40.7	24.0	235°55.1	24.6	188°28.1	32.0	253° 19.5	38.8	Ankaa	353°08.0	-42°10.4
2	257°22.9	217°40.1	25.0	250°55.8	25.4	203°30.0	32.1	268°21.8	38.8	Schedar	349°32.2	56°40.0
3	272°25.4	232°39.6	. 26.1	265°56.6	• • 26.1	218°31.8	• • 32.2	283°24.0	• • 38.7	Diphda	348°48.1	-17°51.2
4	287°27.8	247°39.0	27.1	280°57.3	26.9	233°33.7	32.4	298°26.3	38.6	Achernar	335°21.1	-57°06.7
5	302°30.3	262°38.5	28.1	295°58.0	27.7	248°35.6	32.5	313°28.6	38.6	Hamal	327°52.2	23°34.5
6	317°32.8	277°38.0	N14°29.1	310°58.7	N01°28.4	263°37.4	N18°32.7	328°30.9	S06°38.5	Polaris	314°48.8	89°22.0
7	332°35.2	292°37.4	30.1	325°59.4	29.2	278°39.3	32.8	343°33.2	38.4	Acamar	315°12.6	-40°12.5
8 9	347°37.7 2°40.2	307°36.9 322°36.3	31.1 · · 32.1	341°00.1 356°00.8	30.0 · · 30.7	293°41.1 308°43.0	33.0 · · 33.1	358°35.4 13°37.7	38.4 •• 38.3	Menkar	$314^{\circ}07.1$	$4^{\circ}11.0$
9 10	2 40.2 17°42.6	322 30.3 337°35.8	33.1	11°01.5	31.5	306 43.0 323°44.9	33.2	28° 40.0	38.2	Mirfak	308°29.6	49°56.8
11	32°45.1	352°35.3	34.1	26°02.2	32.2	338°46.7	33.4	43° 42.3	38.1	Aldebaran	290°40.6	16°33.4
12	47°47.6	7°34.7	N14°35.1	41°02.9	N01°33.0	353°48.6	N18°33.5	58°44.6	506°38.1	Rigel	281°04.7	-8°10.5
13	62°50.0	22°34.2	36.1	56°03.6	33.8	8°50.5	33.7	73°46.9	38.0	Capella	280°23.2	46°01.4
14	77°52.5	37° 33.6	37.1	71°04.3	34.5	23°52.3	33.8	88°49.1	37.9	Bellatrix	278°23.8	6°22.3
15	92°54.9	52°33.1	38.1	86°05.0	• • 35.3	38°54.2	• • 33.9	103°51.4	• • 37.9	Elnath	278°02.9	28°37.7
16	107°57.4	67°32.5	39.2	101°05.7	36.0	53°56.0	34.1	118°53.7	37.8	Alnilam	275°38.6	-1°11.2
17	122°59.9	82°32.0	40.2	116°06.4	36.8	68°57.9	34.2	133°56.0	37.7	Betelgeuse	270°53.0	7°24.7
18	138°02.3	97°31.5	N14°41.2	131°07.1	N01°37.6	83°59.8	N18°34.4	148°58.3	S06°37.7	Canopus	263°53.0	-52°42.7
19	153°04.8	112°30.9	42.2	146°07.8	38.3	99°01.6	34.5	164°00.5	37.6	Sirius	258°27.0	-16°45.1
20	168°07.3	127°30.4	43.2	161°08.5	39.1	$114^{\circ}03.5$	34.6	179°02.8	37.5	Adhara	255°06.6	-29°00.5
21	183°09.7	142°29.8	• • 44.2	$176^{\circ}09.3$	• • 39.9	129°05.3	• • 34.8	$194^{\circ}05.1$	• • 37.5	Procyon	244°51.6 243°18.2	5°09.7 27°58.1
22	$198^{\circ}12.2$	157°29.3	45.2	$191^{\circ}10.0$	40.6	144°07.2	34.9	209°07.4	37.4	Pollux		
23	213°14.7	172°28.7	46.2	$206^{\circ}10.7$	41.4	159°09.1	35.1	224°09.7	37.3	Avior	234°15.2 222°46.8	-59°35.5 -43°32.1
Ma: :-	255 00.40	,, O E/ J1	.0′ m-3.91	,,O 7/ JO	.8′ m1.10	,,1 0/ J0	1' m-2.00	1,2 2/ 4 0	.1′ m1.06	Suhail	222°46.8 221°38.5	-43°32.1 -69°49.3
ivier.p	ass. 08:49	ν-0.5 α1	.0 111-3.91	νυ.ι αυ	.0 101.10	$\nu$ 1.9 $a$ 0.	111-∠.UU	ν2.3 <b>α</b> -0	.1111.00	Miaplacidus Alphard	221°38.5 217°48.3	-69°49.3 -8°45.9
										Regulus	207°35.0	11°50.9
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.4	61°37.4
0	$228^{\circ}17.1$	187°28.2	N14°47.2	221°11.4	N01°42.1	$174^{\circ}10.9$	N18°35.2	$239^{\circ}12.0$	S06°37.3	Denebola	182°25.3	14°26.2
1	243°19.6	202°27.6	48.2	$236^{\circ}12.1$	42.9	$189^{\circ}12.8$	35.4	254° 14.2	37.2	Gienah	175°44.0	-17°40.8
2	$258^{\circ}22.1$	$217^{\circ}27.1$	49.1	251°12.8	43.7	$204^{\circ}14.6$	35.5	$269^{\circ}16.5$	37.1	Acrux	173°00.3	-63°14.3
3	273°24.5	232°26.5	• • 50.1	266°13.5	• • 44.4	$219^{\circ}16.5$	• • 35.6	$284^{\circ}18.8$	• • 37.1	Gacrux	171°51.9	-57°15.2
4	288°27.0	247°26.0	51.1	281°14.2	45.2	234°18.4	35.8	299°21.1	37.0	Alioth	166°13.0	55°49.8
5	303°29.4	262°25.4	52.1	296°14.9	45.9	249°20.2	35.9	314°23.4	36.9	Spica	158°22.6	-11°17.4
6	318°31.9	277°24.9	N14°53.1	311° 15.6	N01°46.7	264°22.1	N18°36.1	329°25.7	S06°36.9	Alkaid	152°52.0	49°11.6
7	333°34.4	292°24.3	54.1	326° 16.3	47.5	279°23.9	36.2	344°27.9	36.8	Hadar	148°36.2	-60°29.5
8	348°36.8	307°23.8	55.1	341°17.0	48.2	294°25.8	36.3	359° 30.2	36.7	Menkent	147°57.9	-36°29.5
9	3°39.3	322°23.2	• • 56.1	356° 17.7	• • 49.0	309°27.7	• • 36.5	14°32.5	• • 36.7	Arcturus	145°48.1	19°03.3
10	18°41.8	337°22.7	57.1	11°18.4	49.7	324°29.5	36.6	29°34.8	36.6	Rigil Kent.	139°40.5	-60°56.2
11	33°44.2	352°22.1	58.1	26°19.1	50.5	339°31.4	36.8	44°37.1	36.5	Kochab	137°18.6	74°03.3
12	48°46.7	7°21.6	N14°59.1	41°19.8	N01°51.3	354°33.3	N18°36.9	59°39.4	S06°36.5	Zuben'ubi	136°56.3	-16°08.7
13	63°49.2	22°21.0	15°00.1	56°20.6	52.0	9°35.1	37.0	74°41.6	36.4	Alphecca	126°03.9	26°37.9
14	78°51.6	37°20.5	01.1	71°21.3	52.8	24°37.0	37.2	89°43.9	36.3	Antares	112°16.2	-26°29.2
15	93°54.1 108°56.6	52° 19.9 67° 19.4	•• 02.1	86°22.0 101°22.7	• • 53.5	39°38.8 54°40.7	• • 37.3	104°46.2 119°48.5	36.3	Atria	$107^{\circ}10.5$	-69°04.2
16 17	106 50.0 123°59.0	82° 18.8	03.0 04.0	101 22.7 116°23.4	54.3 55.1	69°42.6	37.5 37.6	134°50.8	36.2 36.1	Sabik	102°03.1	-15°45.4
18	139°01.5	97° 18.3	N15°05.0	131°24.1	N01°55.8	84°44.4	N18°37.7	149°53.1	S06°36.1	Shaula	96°10.8	-37°07.3
19	154°03.9	112° 17.7	06.0	146°24.8	56.6	99°46.3	37.9	164° 55.3	36.0	Rasalhague	95°58.8	12°32.4
20	169°06.4	127° 17.1	07.0	161°25.5	57.3	114°48.1	38.0	179°57.6	35.9	Eltanin	90°42.0	51°28.9
21	184°08.9	142° 16.6	08.0	176° 26.2	58.1	129°50.0	38.2	194°59.9	35.9	Kaus Aust.	83°33.0	-34°22.3
22	199°11.3	157° 16.0	09.0	191°26.9	58.9	144°51.9	38.3	210°02.2	35.8	Vega	80°33.3	38°48.1
23	214°13.8	172° 15.5	09.9	206°27.6	59.6	159°53.7	38.4	225°04.5	35.7	Nunki	75°48.3	-26°16.0
										Altair	62°00.4	8°55.8
Mer.p	ass. 08:45	$\nu$ -0.5′ $d1$	.0′ m-3.92	u 0.7' d0	.8'  m1.10	$\nu$ 1.9′ d0.	1' m-2.00	$\nu 2.3' \ d-0$	.1' m $1.06$	Peacock	53°06.5	-56°39.2
										Deneb	49°26.1	45°21.7
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.4	9°59.0
0	229°16.3	187° 14.9	N15°10.9	221°28.3	N02°00.4	174°55.6	N18°38.6	240°06.8	S06°35.7	Al Na'ir Fomalhaut	27°33.7 15°15.3	-46°50.4 -29°29.6
1	244°18.7	202° 14.4	11.9	236°29.0	01.1	189°57.4	38.7	255°09.1	35.6	Scheat	15 15.3 13°45.9	-29 29.6 28°12.6
2	$259^{\circ}21.2$	217° 13.8	12.9	251°29.7	01.9	204°59.3	38.9	$270^{\circ}11.3$	35.5	Markab	13°30.6	15°20.0
3	274°23.7	232°13.2	• • 13.9	266°30.4	• • 02.6	220°01.2	• • 39.0	$285^{\circ}13.6$	• • 35.5	IviaiNab	13 30.0	10.0
4	$289^{\circ}26.1$	$247^{\circ}12.7$	14.8	281°31.2	03.4	235°03.0	39.1	$300^{\circ}15.9$	35.4	May 09 Thu	SHA	Mer.pass
5	304°28.6	$262^{\circ}12.1$	15.8	$296^{\circ}31.9$	04.2	250°04.9	39.3	$315^{\circ}18.2$	35.3	Venus	320°23.2	11:30
6	319°31.1	277°11.6	N15°16.8	311°32.6	N02°04.9	265°06.7	N18°39.4	330°20.5	S06°35.3	Mars	353°36.4	09:16
7	334°33.5	292°11.0	17.8	$326^{\circ}33.3$	05.7	280°08.6	39.6	$345^{\circ}22.8$	35.2	Jupiter	306°08.3	12:25
8	349°36.0	307° 10.4	18.8	341°34.0	06.4	295°10.5	39.7	0°25.1	35.1	Saturn	10°59.2	08:06
9	4°38.4	322°09.9	• • 19.7	356° 34.7	• • 07.2	310°12.3	• • 39.8	15°27.3	• • 35.1	May 10 Fri	SHA	Mer.pass
10	19°40.9	337°09.3	20.7	11°35.4	08.0	325°14.2	40.0	30°29.6	35.0	Venus	319°11.1	11:31
11	34°43.4	352°08.7	21.7	26°36.1	08.7	340°16.0	40.1	45°31.9	34.9	Mars	352°54.2	09:15
12	49°45.8	7°08.2	N15°22.7	41°36.8	N02°09.5	355°17.9	N18°40.3	60°34.2	S06°34.9	Jupiter	305°53.8	12:22
13	64°48.3	22°07.6	23.6	56°37.5	10.2	10°19.8	40.4	75°36.5	34.8	Saturn	10°54.8	08:02
14	79°50.8	37°07.0	24.6	71°38.2	11.0	25°21.6	40.5	90°38.8	34.8			
15	94°53.2	52°06.5	• • 25.6	86°38.9	• • 11.8	40°23.5	• • 40.7	105°41.1	• • 34.7	May 11 Sat	SHA	Mer.pass
16	109°55.7	67°05.9	26.6	101°39.6	12.5	55°25.3	40.8	120°43.4	34.6	Venus	317°58.6	11:31
17	124°58.2	82°05.4	27.5	116°40.3	13.3	70°27.2	41.0	135°45.6	34.6	Mars	352°12.1	09:14
18	140°00.6	97°04.8	N15°28.5	131°41.1	N02°14.0	85°29.0 100°30.9	N18°41.1	150° 47.9 165° 50.2	\$06°34.5	Jupiter	305°39.3	12:19
19	155°03.1 170°05.6	112°04.2 127°03.7	29.5	146°41.8 161°42.5	14.8	100°30.9 115°32.8	41.2	165°50.2 180°52.5	34.4	Saturn	10°50.5	07:58
20 21	170°05.6 185°08.0	127°03.7 142°03.1	30.4 •• 31.4	161°42.5 176°43.2	15.5 •• 16.3	115°32.8 130°34.6	41.4 •• 41.5	180°52.5 195°54.8	34.4	Horizon	al parallax	
22	200°10.5	142 03.1 157°02.5	32.4	176 43.2 191°43.9	17.1	130 34.6 145°36.5	41.5	210° 57.1	· · 34.3 34.2		Venus:	0.1
23	200°10.5 215°12.9	172°02.0	33.3	206° 44.6	17.1	160°38.3	41.7	225°59.4	34.2		Mars:	0.1
										1		
Mer.p	ass. 08:41	$ u$ -0.6 $^{\prime}$ $d1$	.0′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.8′ m1.09	u 1.9' d0	1′ m-2.00	$\nu 2.3' \ d-0$	.1'  m1.06			

Thu 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 22 23	GHA  180°53.3 195°53.4 210°53.4 225°53.4 240°53.4 255°53.5 270°53.5 285°53.5 300°53.6 345°53.6 0°53.6 15°53.7 45°53.7 75°53.8 90°53.8 105°53.8 120°53.8 150°53.9 166°53.9	Dec N17°26.0 26.6 27.3 ·· 28.0 28.6 29.3 N17°29.9 30.6 31.3 ·· 31.9 32.6 33.2 N17°33.9 34.6 35.2 ·· 35.9 36.5 37.2 N17°37.8	GHA 169°55.0 184°20.0 198°45.0 213°09.9 227°34.7 241°59.5 256°24.2 270°48.9 285°13.5 299°38.1 314°02.7 328°27.2 342°51.6 357°16.0 11°40.4 26°04.7 40°29.0 54°53.3 69°17.5	ν 6.0' 6.0' 5.9' 5.8' 5.7' 5.7' 5.6' 5.5' 5.5' 5.5' 5.5' 5.4' 5.3' 5.3' 5.3' 5.3'	Dec N23°50.1 23°59.9 24°09.5 24°19.0 24°28.3 24°37.4 24°55.2 25°03.8 25°12.3 25°20.6 25°28.7 N25°36.6 25°44.4 25°59.4 26°06.7	d 9.8' 9.6' 9.5' 9.3' 9.1' 9.0' 8.8' 8.6' 8.5' 8.3' 7.9' 7.6' 7.4'	HP 59.2 59.2 59.1 59.1 59.1 59.0 59.0 59.0 58.9 58.9 58.8 58.8 58.8
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	195°53.4 210°53.4 225°53.4 240°53.4 255°53.5 270°53.5 285°53.5 300°53.6 345°53.6 0°53.6 15°53.7 45°53.7 60°53.7 75°53.8 90°53.8 120°53.8 120°53.8 120°53.8	26.6 27.3 · · 28.0 28.6 29.3 N17° 29.9 30.6 31.3 · · 31.9 32.6 33.2 N17° 33.9 34.6 35.2 · · 35.9 36.5 37.2 N17° 37.8 38.5 39.1	184°20.0 198°45.0 213°09.9 227°34.7 241°59.5 256°24.2 270°48.9 285°13.5 299°38.1 314°02.7 328°27.2 342°51.6 357°16.0 11°40.4 26°04.7 40°29.0 54°53.3 69°17.5	6.0' 5.9' 5.8' 5.7' 5.6' 5.6' 5.5' 5.5' 5.4' 5.3' 5.3' 5.3' 5.2'	23°59.9 24°09.5 24°19.0 24°28.3 24°37.4 N24°46.4 24°55.2 25°03.8 25°12.3 25°20.6 25°28.7 N25°36.6 25°44.4 25°52.0 25°59.4 26°06.7	9.6' 9.5' 9.3' 9.1' 9.0' 8.8' 8.6' 8.5' 8.3' 7.9' 7.8' 7.6' 7.4'	59.2 59.1 59.1 59.1 59.0 59.0 59.0 58.9 58.9 58.8 58.8
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	210°53.4 225°53.4 240°53.4 255°53.5 270°53.5 285°53.5 300°53.6 345°53.6 0°53.6 15°53.7 30°53.7 45°53.7 60°53.7 75°53.8 90°53.8 105°53.8 120°53.8 120°53.8	27.3 · · 28.0 28.6 29.3 N17°29.9 30.6 31.3 · · 31.9 32.6 33.2 N17°33.9 34.6 35.2 · · 35.9 36.5 37.2 N17°37.8 38.5 39.1	198°45.0 213°09.9 227°34.7 241°59.5 256°24.2 270°48.9 285°13.5 299°38.1 314°02.7 328°27.2 342°51.6 357°16.0 11°40.4 26°04.7 40°29.0 54°53.3 69°17.5	5.9' 5.8' 5.8' 5.7' 5.6' 5.6' 5.5' 5.5' 5.4' 5.3' 5.3' 5.3' 5.2'	24°09.5 24°19.0 24°28.3 24°37.4 N24°46.4 24°55.2 25°03.8 25°12.3 25°20.6 25°28.7 N25°36.6 25°44.4 25°52.0 25°59.4 26°06.7	9.5' 9.3' 9.1' 9.0' 8.8' 8.6' 8.5' 8.3' 8.1' 7.9' 7.8' 7.6' 7.4'	59.1 59.1 59.1 59.0 59.0 59.0 58.9 58.9 58.8 58.8
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	225°53.4 240°53.4 255°53.5 270°53.5 285°53.5 300°53.6 345°53.6 0°53.6 15°53.7 30°53.7 45°53.7 60°53.7 75°53.8 90°53.8 120°53.8 120°53.8	. · · 28.0 28.6 29.3 N17°29.9 30.6 31.3 · · 31.9 32.6 33.2 N17°33.9 34.6 35.2 · · 35.9 36.5 37.2 N17°37.8 38.5 39.1	213°09.9 227°34.7 241°59.5 256°24.2 270°48.9 285°13.5 299°38.1 314°02.7 328°27.2 342°51.6 357°16.0 11°40.4 26°04.7 40°29.0 54°53.3 69°17.5	5.8' 5.8' 5.7' 5.6' 5.6' 5.5' 5.5' 5.4' 5.4' 5.3' 5.3' 5.3' 5.3' 5.2'	24°19.0 24°28.3 24°37.4 N24°46.4 24°55.2 25°03.8 25°12.3 25°20.6 25°28.7 N25°36.6 25°44.4 25°52.0 25°59.4 26°06.7	9.3' 9.1' 9.0' 8.8' 8.6' 8.5' 8.3' 8.1' 7.9' 7.6' 7.4' 7.2'	59.1 59.1 59.0 59.0 59.0 58.9 58.9 58.8 58.8
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	240°53.4 255°53.5 270°53.5 285°53.5 300°53.6 315°53.6 0°53.6 15°53.7 30°53.7 45°53.7 60°53.7 75°53.8 90°53.8 105°53.8 120°53.8 150°53.9	28.6 29.3 N17°29.9 30.6 31.3 · 31.9 32.6 33.2 N17°33.9 34.6 35.2 · 35.9 36.5 37.2 N17°37.8 38.5 39.1	227°34.7 241°59.5 256°24.2 270°48.9 285°13.5 299°38.1 314°02.7 328°27.2 342°51.6 357°16.0 11°40.4 26°04.7 40°29.0 54°53.3 69°17.5	5.8' 5.7' 5.7' 5.6' 5.6' 5.5' 5.5' 5.4' 5.4' 5.3' 5.3' 5.3' 5.3' 5.2'	24°28.3 24°37.4 N24°46.4 24°55.2 25°03.8 25°12.3 25°20.6 25°28.7 N25°36.6 25°44.4 25°52.0 25°59.4 26°06.7	9.1' 9.0' 8.8' 8.6' 8.5' 8.3' 8.1' 7.9' 7.6' 7.4' 7.2'	59.1 59.0 59.0 59.0 58.9 58.9 58.8 58.8
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	255°53.5 270°53.5 285°53.5 300°53.5 315°53.6 345°53.6 0°53.6 15°53.7 45°53.7 60°53.7 75°53.8 90°53.8 105°53.8 120°53.8 150°53.9	29.3 N17°29.9 30.6 31.3 · 31.9 32.6 33.2 N17°33.9 34.6 35.2 · 35.9 36.5 37.2 N17°37.8 38.5 39.1	241°59.5 256°24.2 270°48.9 285°13.5 299°38.1 314°02.7 328°27.2 342°51.6 357°16.0 11°40.4 26°04.7 40°29.0 54°53.3 69°17.5	5.7' 5.7' 5.6' 5.6' 5.5' 5.5' 5.5' 5.4' 5.4' 5.3' 5.3' 5.3' 5.3'	24°37.4 N24°46.4 24°55.2 25°03.8 25°12.3 25°20.6 25°28.7 N25°36.6 25°44.4 25°52.0 25°59.4 26°06.7	9.0' 8.8' 8.6' 8.5' 8.3' 8.1' 7.9' 7.6' 7.4' 7.2'	59.1 59.0 59.0 59.0 58.9 58.9 58.8 58.8
6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	270°53.5 285°53.5 300°53.6 315°53.6 345°53.6 0°53.6 15°53.7 45°53.7 60°53.7 75°53.8 90°53.8 105°53.8 120°53.8 150°53.9	N17°29.9 30.6 31.3 · 31.9 32.6 33.2 N17°33.9 34.6 35.2 · 35.9 36.5 37.2 N17°37.8 38.5 39.1	256°24.2 270°48.9 285°13.5 299°38.1 314°02.7 328°27.2 342°51.6 357°16.0 11°40.4 26°04.7 40°29.0 54°53.3 69°17.5	5.7' 5.6' 5.6' 5.5' 5.5' 5.5' 5.4' 5.4' 5.3' 5.3' 5.3' 5.3'	N24°46.4 24°55.2 25°03.8 25°12.3 25°20.6 25°28.7 N25°36.6 25°44.4 25°52.0 25°59.4 26°06.7	8.8' 8.6' 8.5' 8.3' 8.1' 7.9' 7.8' 7.6' 7.4' 7.2'	59.0 59.0 59.0 58.9 58.9 58.8 58.8
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	285°53.5 300°53.5 315°53.6 345°53.6 0°53.6 15°53.7 45°53.7 60°53.7 75°53.8 90°53.8 105°53.8 120°53.8	30.6 31.3 · · 31.9 32.6 33.2 N17°33.9 34.6 35.2 · · 35.9 36.5 37.2 N17°37.8 38.5 39.1	270°48.9 285°13.5 299°38.1 314°02.7 328°27.2 342°51.6 357°16.0 11°40.4 26°04.7 40°29.0 54°53.3 69°17.5	5.6' 5.6' 5.5' 5.5' 5.5' 5.4' 5.4' 5.3' 5.3' 5.3' 5.2'	24°55.2 25°03.8 25°12.3 25°20.6 25°28.7 N25°36.6 25°44.4 25°52.0 25°59.4 26°06.7	8.6' 8.5' 8.3' 8.1' 7.9' 7.8' 7.6' 7.4' 7.2'	59.0 59.0 58.9 58.9 58.8 58.8 58.8
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	300°53.5 315°53.6 330°53.6 0°53.6 0°53.7 30°53.7 45°53.7 75°53.8 90°53.8 105°53.8 120°53.8 150°53.9	31.3 · · 31.9 32.6 33.2 N17°33.9 34.6 35.2 · · 35.9 36.5 37.2 N17°37.8 38.5 39.1	285°13.5 299°38.1 314°02.7 328°27.2 342°51.6 357°16.0 11°40.4 26°04.7 40°29.0 54°53.3 69°17.5	5.6' 5.5' 5.5' 5.5' 5.4' 5.4' 5.3' 5.3' 5.3' 5.2'	25°03.8 25°12.3 25°20.6 25°28.7 N25°36.6 25°44.4 25°52.0 25°59.4 26°06.7	8.5' 8.3' 8.1' 7.9' 7.8' 7.6' 7.4' 7.2'	59.0 58.9 58.9 58.9 58.8 58.8
9 10 11 12 13 14 15 16 17 18 19 20 21 22	315°53.6 330°53.6 345°53.6 0°53.6 15°53.7 30°53.7 45°53.7 75°53.8 90°53.8 105°53.8 120°53.8	** 31.9 32.6 33.2 N17°33.9 34.6 35.2 ** 35.9 36.5 37.2 N17°37.8 38.5 39.1	299° 38.1 314° 02.7 328° 27.2 342° 51.6 357° 16.0 11° 40.4 26° 04.7 40° 29.0 54° 53.3 69° 17.5	5.5' 5.5' 5.5' 5.4' 5.4' 5.3' 5.3' 5.3' 5.2'	25°12.3 25°20.6 25°28.7 N25°36.6 25°44.4 25°52.0 25°59.4 26°06.7	8.3' 8.1' 7.9' 7.8' 7.6' 7.4' 7.2'	58.9 58.9 58.8 58.8 58.8
10 11 12 13 14 15 16 17 18 19 20 21 22	330°53.6 345°53.6 0°53.6 15°53.7 30°53.7 45°53.7 75°53.8 90°53.8 105°53.8 120°53.8 150°53.9	32.6 33.2 N17°33.9 34.6 35.2 · · 35.9 36.5 37.2 N17°37.8 38.5 39.1	314°02.7 328°27.2 342°51.6 357°16.0 11°40.4 26°04.7 40°29.0 54°53.3 69°17.5	5.5' 5.5' 5.4' 5.4' 5.3' 5.3' 5.3' 5.2'	25°20.6 25°28.7 N25°36.6 25°44.4 25°52.0 25°59.4 26°06.7	8.1' 7.9' 7.8' 7.6' 7.4' 7.2'	58.9 58.9 58.8 58.8 58.8
11 12 13 14 15 16 17 18 19 20 21 22	345°53.6 0°53.6 15°53.7 30°53.7 45°53.7 60°53.7 75°53.8 90°53.8 105°53.8 120°53.8 150°53.9	33.2 N17°33.9 34.6 35.2 · · 35.9 36.5 37.2 N17°37.8 38.5 39.1	328°27.2 342°51.6 357°16.0 11°40.4 26°04.7 40°29.0 54°53.3 69°17.5	5.5' 5.4' 5.4' 5.3' 5.3' 5.3' 5.2'	25°20.6 25°28.7 N25°36.6 25°44.4 25°52.0 25°59.4 26°06.7	7.9' 7.8' 7.6' 7.4' 7.2'	58.8 58.8 58.8 58.8
11 12 13 14 15 16 17 18 19 20 21 22	0°53.6 15°53.7 30°53.7 45°53.7 60°53.7 75°53.8 90°53.8 105°53.8 120°53.8 150°53.9	33.2 N17°33.9 34.6 35.2 · · 35.9 36.5 37.2 N17°37.8 38.5 39.1	342°51.6 357°16.0 11°40.4 26°04.7 40°29.0 54°53.3 69°17.5	5.5' 5.4' 5.4' 5.3' 5.3' 5.3' 5.2'	N25°36.6 25°44.4 25°52.0 25°59.4 26°06.7	7.8' 7.6' 7.4' 7.2'	58.8 58.8 58.8 58.8
12 13 14 15 16 17 18 19 20 21	0°53.6 15°53.7 30°53.7 45°53.7 60°53.7 75°53.8 90°53.8 105°53.8 120°53.8 150°53.9	N17°33.9 34.6 35.2 ·· 35.9 36.5 37.2 N17°37.8 38.5 39.1	357°16.0 11°40.4 26°04.7 40°29.0 54°53.3 69°17.5	5.4' 5.4' 5.3' 5.3' 5.3' 5.2'	N25°36.6 25°44.4 25°52.0 25°59.4 26°06.7	7.8' 7.6' 7.4' 7.2'	58.8 58.8 58.8
13 14 15 16 17 18 19 20 21 22	15°53.7 30°53.7 45°53.7 60°53.7 75°53.8 90°53.8 105°53.8 120°53.8 150°53.8	34.6 35.2 ·· 35.9 36.5 37.2 N17°37.8 38.5 39.1	357°16.0 11°40.4 26°04.7 40°29.0 54°53.3 69°17.5	5.4' 5.3' 5.3' 5.3' 5.2'	25°44.4 25°52.0 25°59.4 26°06.7	7.6' 7.4' 7.2'	58.8 58.8
14 15 16 17 18 19 20 21 22	30°53.7 45°53.7 60°53.7 75°53.8 90°53.8 105°53.8 120°53.8 135°53.8	35.2 · · 35.9 36.5 37.2 N17°37.8 38.5 39.1	11° 40.4 26° 04.7 40° 29.0 54° 53.3 69° 17.5	5.3' 5.3' 5.3' 5.2'	25°52.0 25°59.4 26°06.7	7.4' 7.2'	58.8
15 16 17 18 19 20 21 22	45°53.7 60°53.7 75°53.8 90°53.8 105°53.8 120°53.8 135°53.8 150°53.9	35.9 36.5 37.2 N17°37.8 38.5 39.1	26°04.7 40°29.0 54°53.3 69°17.5	5.3' 5.3' 5.2'	25°59.4 26°06.7	7.2'	
16 17 18 19 20 21 22	60°53.7 75°53.8 90°53.8 105°53.8 120°53.8 135°53.8 150°53.9	36.5 37.2 N17°37.8 38.5 39.1	40°29.0 54°53.3 69°17.5	5.3' 5.2'	26°06.7		50.1
17 18 19 20 21 22	75°53.8 90°53.8 105°53.8 120°53.8 135°53.8 150°53.9	37.2 N17°37.8 38.5 39.1	54°53.3 69°17.5	5.2'		/ 1	58.7
18 19 20 21 22	90°53.8 105°53.8 120°53.8 135°53.8 150°53.9	N17°37.8 38.5 39.1	69°17.5		26°13.8	6.9'	58.7
19 20 21 22	105°53.8 120°53.8 135°53.8 150°53.9	38.5 39.1			20 13.8 N26°20.6		
20 21 22	120°53.8 135°53.8 150°53.9	39.1				6.7'	58.6
21 22	135°53.8 150°53.9		83°41.7	5.2'	26°27.4	6.5'	58.6
22	150°53.9		98°05.9	5.1'	26°33.9	6.4'	58.6
		• • 39.8	112°30.0	5.1'	26°40.3	6.2'	58.6
23	165°53 0	40.4	126°54.1	5.1'	26°46.5	6.0'	58.5
	100 00.9	41.1	141°18.2	5.1'	26°52.5	5.8'	58.5
-	SD = 15.8'	d = 0.7'		SI	O = 16.1'		
- Fri	GHA	Dec	GHA	ν	Dec	d	HF
0	180°53.9	N17°41.7	155°42.3	5.1'	N26°58.3	5.6'	58.5
1	195° 53.9	42.4	170°06.4	5.0'	27°03.9	5.5'	58.4
2	210°53.9	43.0	184°30.4	5.0'	27°09.4	5.3'	58.4
	210 55.9 225°54.0	. 43.7	104 30.4 198°54.4	5.0'	27 09.4 27°14.7	5.3 5.1'	58.4
3							
4	240°54.0	44.3	213°18.4	5.0'	27°19.8	4.9'	58.3
5	255°54.0	45.0	227°42.4	5.0'	27°24.7	4.7'	58.3
6	270°54.0	N17°45.6	242°06.4	5.0'	N27°29.4	4.6'	58.3
7	285°54.0	46.3	256°30.4	5.0'	27°34.0	4.4'	58.2
8	300°54.1	46.9	270°54.3	5.0'	27°38.4	4.2'	58.2
9	315°54.1	• • 47.6	285°18.3	5.0'	27°42.5	4.0'	58.1
10	330°54.1	48.2	299°42.3	5.0'	27°46.5	3.8'	58.1
11	345°54.1	48.9	314°06.3	5.0'	27°50.4	3.6'	58.1
12	$0^{\circ}54.1$	$N17^{\circ}49.5$	328°30.2	5.0'	$N27^{\circ}54.0$	3.5'	58.0
13	15°54.2	50.2	342°54.2	5.0'	27°57.5	3.3'	58.0
14	30°54.2	50.8	357°18.2	5.0'	28°00.7	3.1'	58.0
15	45°54.2	• • 51.5	11°42.2	5.0'	28°03.8	2.9'	57.9
16	60°54.2	52.1	26°06.2	5.0'	28°06.7	2.7'	57.9
17	75°54.2	52.7	40°30.3	5.1'	28°09.5	2.5'	57.9
18	90°54.2	N17°53.4	54°54.3	5.1'	N28°12.0	2.4'	57.8
19	105°54.2	54.0	69°18.4	5.1'	28°14.4	2.2'	57.8
20	120°54.3	54.7	83°42.5	5.1'	28°16.6	2.0'	57.8
21	135°54.3	• • 55.3	98°06.6	5.1'	28°18.6	1.8'	57.7
22	150°54.3	55.9	112°30.7	5.2'	28°20.4	1.6'	57.
23	165°54.3	56.6	126°54.9	5.2'	28°22.0	1.5'	57.
	SD = 15.8'	d = 0.7'		SI	D = 15.9'		
Sat	GHA	Dec	GHA	ν	Dec	d	HF
οαι 0	180°54.3	N17°57.2	141°19.1	ν 5.2'	N28°23.5	1.3'	57.6
1	180 54.3 195°54.3	N17 57.2 57.9	141 19.1 155°43.4	5.2 5.3'	28°24.7	1.1'	57.6
2	195 54.3 210°54.4	57.9 58.5	155 43.4 170°07.6	5.3'	28°25.8	0.9'	57.6
3	210°54.4 225°54.4	58.5	170°07.6 184°31.9	5.3'	28° 25.8 28° 26.8		57.5
		17°59.8	184°31.9 198°56.3		28°26.8 28°27.5	0.7'	
4	240°54.4			5.4'		0.6'	57.5
5	255°54.4	18°00.4	213°20.7	5.4'	28°28.1	0.4'	57.4
6	270°54.4	N18°01.0	227°45.1	5.5'	N28°28.4	0.2'	57.4
7	285°54.4	01.7	242°09.6	5.5'	28°28.7	0.0'	57.4
8	300°54.4	02.3	256°34.1	5.6'	28°28.7	-0.1'	57.3
9	315°54.4	• • 03.0	270°58.7	5.6'	28°28.5	-0.3'	57.3
10	330°54.5	03.6	285°23.3	5.7'	28°28.2	-0.5'	57.3
11	345°54.5	04.2	299°48.0	5.7'	28°27.7	-0.7'	57.2
12	0°54.5	N18°04.8	314°12.8	5.8'	N28°27.1	-0.8'	57.2
13	15°54.5	05.5	328°37.6	5.9'	28°26.2	-1.0'	57.2
14	30°54.5	06.1	343°02.4	5.9'	28°25.2	-1.2'	57.1
15	45°54.5	• • 06.7	357°27.3	6.0'	28°24.0	-1.3'	57.1
16	60°54.5	07.4	11°52.3	6.1'	28°22.7	-1.5'	57.:
17	75°54.5	08.0	26°17.4	6.1'	28°21.2	-1.7'	57.0
18	90°54.5	N18°08.6	40°42.5	6.2'	N28°19.5	-1.9'	57.0
19	105° 54.6	09.3	55°07.7	6.3	28°17.6	-2.0'	57.0
20	105 54.6 120°54.6	09.5	69°32.9	6.3	28°15.6	-2.0 -2.2'	56.9
21	120 54.6 135°54.6		83°58.3	6.4'	28°13.4	-2.2 -2.3'	56.9
	135°54.6 150°54.6	• • 10.5	83°58.3 98°23.7		28°13.4 28°11.1		
22 23	150°54.6 165°54.6	11.1 11.8	98°23.7 112°49.2	6.5' 6.6'	28°11.1 28°08.6	-2.5' -2.7'	56.9 56.8
23	SD = 15.8'	d = 0.6'	112 49.2		D = 15.7'	-2.1	30.0

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
<b>N</b> 70°	////	////	01:28	22:33	////	////
68°	////	////	02:11	21:46	////	////
66°	////	00:34	02:40	21:16	23:41	////
64°	////	01:37	03:02	20:53	22:21	////
62°	////	02:10	03:19	20:36	21:46	////
60°	00:30	02:34	03:33	20:21	21:21	23:42
<b>N</b> 58°	01:27	02:53	03:46	20:09	21:02	22:30
56°	01:57	03:08	03:56	19:58	20:46	21:58
54°	02:20	03:21	04:05	19:49	20:33	21:36
52°	02:37	03:32	04:13	19:40	20:22	21:17
50°	02:52	03:42	04:21	19:33	20:12	21:02
45°	03:21	04:03	04:37	19:17	19:51	20:33
<b>N</b> 40°	03:42	04:19	04:49	19:04	19:34	20:12
35°	03:59	04:32	05:00	18:53	19:21	19:55
30°	04:13	04:44	05:10	18:43	19:09	19:40
20°	04:35	05:02	05:26	18:27	18:51	19:18
<b>N</b> 10°	04:52	05:18	05:40	18:13	18:35	19:01
0°	05:06	05:31	05:53	18:00	18:22	18:47
<b>S</b> 10°	05:18	05:44	06:06	17:47	18:09	18:34
20°	05:30	05:56	06:19	17:33	17:56	18:23
30°	05:41	06:10	06:35	17:18	17:43	18:11
35°	05:47	06:17	06:44	17:09	17:35	18:06
40°	05:53	06:25	06:54	16:58	17:27	18:00
45°	05:59	06:34	07:06	16:46	17:18	17:53
<b>S</b> 50°	06:06	06:45	07:20	16:32	17:07	17:46
52°	06:09	06:50	07:27	16:25	17:02	17:43
54°	06:12	06:55	07:35	16:18	16:57	17:40
56°	06:16	07:01	07:43	16:09	16:51	17:36
58°	06:20	07:08	07:52	16:00	16:44	17:32
<b>S</b> 60°	06:24	07:15	08:03	15:49	16:37	17:28
				1		

Lat.		Moonris	e		Moonset	:
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
<b>N</b> 70°						
68°						
66°	01:08			00:01		
64°	02:21					
62° 60°	02:57	02:47	04.00		00:28	01.10
	03:24	03:35	04:09	23:40		01:13
N 58°	03:44	04:06	04:48	23:10		00:34
56° 54°	04:02 04:16	04:29 04:48	05:15 05:36	22:47 22:28	22.45	00:06
54 52°	04:16	04:48 05:04	05:50	22:28	23:45 23:27	
50°	04:29	05:04	06:09	21:59	23:12	
45°	05:04	05:47	06:40	21:31	22:41	23:38
N 40°	05:23	06:09	07:04	21:09	22:17	23:15
35°	05:39	06:28	07:24	20:51	21:58	22:56
30°	05:53	06:44	07:41	20:36	21:41	22:39
20°	06:17	07:11	08:09	20:09	21:13	22:11
N 10°	06:38	07:35	08:34	19:47	20:48	21:47
0°	06:57	07:57	08:57	19:26	20:26	21:25
<b>S</b> 10°	07:17	08:19	09:19	19:05	20:03	21:02
20°	07:38	08:43	09:44	18:42	19:39	20:38
30°	08:03	09:11	10:13	18:16	19:10	20:09
35°	08:17	09:27	10:30	18:01	18:53	19:52
40° 45°	08:34 08:55	09:46 10:10	10:49 11:14	17:43 17:22	18:34 18:10	19:33 19:09
<b>S</b> 50°	09:20	10:40	11:45	16:55	17:40	18:38
52° 54°	09:33 09:47	10:55 11:12	12:00 12:18	16:42 16:27	17:24 17:07	18:22 18:04
56°	10:04	11:12	12:18	16:27	16:46	17:43
58°	10:04	12:00	13:08	15:49	16:40	17:45
S 60°	10:50	12:37	13:49	15:23	15:41	16:34
<b>5</b> 00	10.50	12.51	15.75	15.25	15.71	10.54

		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	1-10%	
09	03:33	03:35	11:56	13:11	00:42		
10	03:36	03:37	11:56	14:11	01:41		
11	03:37	03:38	11:56	15:11	02:41		

May 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	230°15.4	187°01.4	N15°34.3	221°45.3	N02°18.6	175°40.2	N18°41.9	241°01.7	S06°34.1			
1	245°17.9	202°00.8	35.3	236°46.0	19.3	175°40.2	42.1	256°04.0	34.0	Alpheratz	357°35.6	29°13.3
2	260°20.3	217°00.2	36.2	251°46.7	20.1	205°43.9	42.2	271°06.2	34.0	Ankaa	353°08.0	$-42^{\circ}10.3$
3	275°22.8	231°59.7	• • 37.2	266°47.4	20.8	220°45.8	• • 42.4	286°08.5	33.9	Schedar	349°32.1	56°40.0
4	290°25.3	246°59.1	38.2	281°48.1	21.6	235°47.6	42.5	301°10.8	33.8	Diphda	348°48.1	-17°51.2
5	305°27.7	261°58.5	39.1	296°48.8	22.4	250°49.5	42.6	316°13.1	33.8	Achernar	335°21.1	-57°06.7
6	320°30.2	276°58.0	N15°40.1	311°49.5	N02°23.1	265°51.4	N18°42.8	331° 15.4	S06°33.7	Hamal	327°52.2	23°34.5
7	335°32.7	291°57.4	41.1	326°50.2	23.9	280°53.2	42.9	346° 17.7	33.7	Polaris	314°48.3	89°21.9
8	350°35.1	306°56.8	42.0	341°51.0	24.6	295°55.1	43.1	1°20.0	33.6	Acamar	315°12.6	-40°12.4
9	5°37.6	321°56.2	• • 43.0	356°51.7	• • 25.4	310°56.9	• • 43.2	16°22.3	• • 33.5	Menkar	314°07.1	4°11.0
10	20°40.0	336°55.7	43.9	11°52.4	26.1	325°58.8	43.3	31°24.6	33.5	Mirfak	308°29.6	49°56.8
11	35°42.5	351°55.1	44.9	26°53.1	26.9	341°00.7	43.5	46°26.8	33.4	Aldebaran	290°40.6	16°33.4
12	50°45.0	6°54.5	N15°45.9	41°53.8	N02°27.7	356°02.5	N18°43.6	61°29.1	S06°33.3	Rigel	281°04.7	-8°10.5
13	65°47.4	21°53.9	46.8	56°54.5	28.4	11°04.4	43.8	76°31.4	33.3	Capella	280°23.2	46°01.4
14	80°49.9	36°53.4	47.8	71°55.2	29.2	26°06.2	43.9	91°33.7	33.2	Bellatrix	278°23.8 278°02.9	6°22.3 28°37.7
15	95°52.4	51°52.8	• • 48.7	86°55.9	• • 29.9	41°08.1	• • 44.0	106°36.0	• • 33.1	Elnath Alnilam	276 02.9 275°38.6	-1°11.2
16	110°54.8	66°52.2	49.7	101°56.6	30.7	56°10.0	44.2	121°38.3	33.1	Betelgeuse	270°53.0	7°24.7
17	125°57.3	$81^{\circ}51.6$	50.6	116°57.3	31.4	71°11.8	44.3	136°40.6	33.0	Canopus	263°53.1	-52°42.7
18	140°59.8	96°51.1	N15°51.6	131°58.0	N02°32.2	86°13.7	N18°44.4	151°42.9	<b>S</b> 06°32.9	Sirius	258° 27.0	-16°45.1
19	156°02.2	111°50.5	52.6	146°58.7	33.0	101°15.5	44.6	166°45.2	32.9	Adhara	255°06.6	-29°00.4
20	171°04.7	126°49.9	53.5	161°59.4	33.7	116°17.4	44.7	181°47.5	32.8	Procyon	244°51.6	5°09.7
21	186°07.2	141°49.3	• • 54.5	177°00.2	• • 34.5	131°19.2	• • 44.9	196°49.7	• • 32.8	Pollux	243°18.2	27°58.1
22	201°09.6	156°48.8	55.4	192°00.9	35.2	146°21.1	45.0	211°52.0	32.7	Avior	234°15.2	-59°35.5
23	216°12.1	171°48.2	56.4	207°01.6	36.0	161°23.0	45.1	226°54.3	32.6	Suhail	222°46.8	-43°32.1
Mer.n	ass. 08:38	$\nu$ -0.6' d1	.0′ m-3.92	$\nu 0.7' d0$	.8′ m1.09	$\nu 1.9' \ d0$	1' m-2.00	ν2.3′ d-0	.1′ m1.06	Miaplacidus	221°38.5	-69°49.3
		- 0.0 01								Alphard	217°48.3	-8°45.9
										Regulus	207°35.0	11°50.9
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.4	61°37.4
0	231°14.5	186°47.6	N15°57.3	222°02.3	N02°36.7	176°24.8	N18°45.3	241°56.6	S06°32.6	Denebola	182°25.3	14°26.2
1	246°17.0	201°47.0	58.3	237°03.0	37.5	191°26.7	45.4	256°58.9	32.5	Gienah	175°44.0	-17°40.8
2	261°19.5	216°46.4	15°59.2	252°03.7	38.2	206°28.5	45.6	272°01.2	32.4	Acrux	173°00.3	-63°14.3
3	276°21.9	231°45.8	16°00.2	267°04.4	• • 39.0	221°30.4	• • 45.7	287°03.5	• • 32.4	Gacrux	171°51.9	-57°15.2
4	291°24.4	246°45.3	01.1	282°05.1	39.8	236°32.3	45.8	302°05.8	32.3	Alioth	166°13.0	55°49.8
5	306°26.9	261°44.7	02.1	297°05.8	40.5	251°34.1	46.0	317°08.1	32.3	Spica	$158^{\circ}22.6$	-11°17.4
6	321°29.3	276°44.1	N16°03.0	312°06.5	N02°41.3	266°36.0	N18°46.1	332°10.4	S06°32.2	Alkaid	152°52.0	49°11.6
7	336°31.8	291°43.5	03.9	327°07.2	42.0	281°37.8	46.2	347°12.7	32.1	Hadar	148°36.2	-60°29.6
8	351°34.3	306°42.9	04.9	342°07.9	42.8	296°39.7	46.4	2°15.0	32.1	Menkent	147°57.9	-36°29.5
9	6°36.7	321°42.4	• • 05.8	357°08.7	• • 43.5	311°41.6	• • 46.5	17°17.2	• • 32.0	Arcturus	$145^{\circ}48.1$	19°03.3
10	21°39.2	336°41.8 351°41.2	06.8	12°09.4 27°10.1	44.3	326°43.4	46.7	32° 19.5 47° 21.8	31.9	Rigil Kent.	139°40.5	-60°56.3
11	36°41.7 51°44.1	6°40.6	07.7 N16°08.7	42°10.1	45.0 N02°45.8	341°45.3 356°47.1	46.8 N18°46.9	47 21.8 62°24.1	31.9 \$06°31.8	Kochab	137°18.6	74°03.3
12 13	66°46.6	21°40.0	09.6	57°11.5	46.6	11°49.0	47.1	77°26.4		Zuben'ubi	136°56.3	-16°08.7
14	81°49.0	36°39.4	10.5	72°12.2	47.3	26°50.8	47.1	92°28.7	31.7 31.7	Alphecca	126°03.9	26°37.9
15	96°51.5	50° 39.4 51° 38.8	. 11.5	87°12.9	• 48.1	41°52.7	•• 47.4	107°31.0	•• 31.6	Antares	112°16.2	-26°29.2
16	90°51.5 111°54.0	66°38.3	12.4	102°13.6	48.8	56°54.6	47.4	107 31.0 122°33.3	31.6	Atria	107°10.4	-69°04.2
17	111 54.0 126°56.4	81°37.7	13.4	102 13.0 117°14.3	49.6	71°56.4	47.6	137°35.6	31.5	Sabik	102°03.1	-15°45.4
18	141°58.9	96°37.1	N16°14.3	132°15.0	N02°50.3	86°58.3	N18°47.8	152°37.9	S06°31.4	Shaula	96°10.8	-37°07.3
19	157°01.4	111°36.5	15.2	147°15.7	51.1	102°00.1	47.9	167° 40.2	31.4	Rasalhague	95°58.8	12°32.4
20	172°03.8	126°35.9	16.2	162°16.4	51.8	117°02.0	48.0	182° 42.5	31.3	Eltanin	90°42.0	51°28.9
21	187°06.3	141°35.3	17.1	177°17.2	• • 52.6	132°03.9	• • 48.2	197°44.8	31.2	Kaus Aust.	83°33.0	-34°22.3
22	202°08.8	156°34.7	18.0	192°17.9	53.3	147°05.7	48.3	212°47.1	31.2	Vega	80°33.3	38°48.1
23	217°11.2	171°34.1	19.0	207°18.6	54.1	162°07.6	48.5	227°49.4	31.1	Nunki	75°48.2	-26°16.0
										Altair	62°00.4	8°55.8
Mer.p	ass. 08:34	$\nu$ -0.6′ d0	.9′ m-3.92	$\nu$ 0.7′ d0	.8′ m1.09	$\nu 1.9' d0.$	1' m-2.00	$\nu 2.3' \ d-0$	$.1^\prime$ m $1.06$	Peacock	53°06.4	-56°39.2
										Deneb	49°26.1 33°39.4	45°21.7 9°59.0
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif		
0	232°13.7	186°33.5	N16°19.9		N02°54.8	177°09.4	N18°48.6	242°51.7	S06°31.1	Al Na'ir Fomalhaut	27°33.7 15°15.3	-46°50.4 -29°29.5
1	247°16.2	201°32.9	20.8	237°20.0	55.6	192°11.3	48.7	257° 53.9	31.0	Scheat	13°45.9	-29 29.5 28°12.6
2	262°18.6	216°32.4	21.8	252°20.7	56.4	207°13.1	48.9	272°56.2	30.9	Markab	13° 30.6	15°20.0
3	$277^{\circ}21.1$	231°31.8	• • 22.7	$267^{\circ}21.4$	• • 57.1	222°15.0	• • 49.0	287°58.5	• • 30.9	ividiNaD		13 20.0
4	292°23.5	246°31.2	23.6	$282^{\circ}22.1$	57.9	$237^{\circ}16.9$	49.1	303°00.8	30.8	May 12 Sun	SHA	Mer.pass
5	307°26.0	261°30.6	24.6	297°22.8	58.6	$252^{\circ}18.7$	49.3	318°03.1	30.8		316°46.0	11:32
6	322°28.5	276°30.0	N16°25.5	312°23.5	N02°59.4	267°20.6	N18°49.4	333°05.4	S06°30.7	Mars	351°29.9	09:13
7	337°30.9	291°29.4	26.4	$327^{\circ}24.2$	03°00.1	282°22.4	49.6	348°07.7	30.6	Jupiter	305°24.8	12:16
8	352°33.4	306°28.8	27.4	342°24.9	00.9	297°24.3	49.7	3°10.0	30.6	Saturn	10°46.3	07:55
9	7°35.9	321°28.2	• • 28.3	357°25.7	•• 01.6	312°26.2	• • 49.8	18° 12.3	• • 30.5	May 13 Mon	SHA	Mer.pass
10	22°38.3	336°27.6	29.2	12°26.4	02.4	327°28.0	50.0	33°14.6	30.4		315°33.0	11:33
11	37°40.8	351°27.0	30.1	27°27.1	03.1	342°29.9	50.1	48°16.9	30.4	Mars		09:11
12	52°43.3	6°26.4	N16°31.1	42°27.8	N03°03.9	357°31.7	N18°50.2	63°19.2	S06°30.3	Jupiter		12:13
13	67°45.7	21°25.8	32.0	57°28.5	04.6	12°33.6	50.4	78°21.5	30.3	Saturn	10°42.1	07:51
14	82°48.2	36°25.2	32.9	72°29.2	05.4	27°35.4	50.5	93°23.8	30.2			
15	97°50.7	51°24.6	• • 33.8	87°29.9	• • 06.1	42°37.3	• • 50.7	108°26.1	• • 30.1	May 14 Tue	SHA	Mer.pass
16	112°53.1	66°24.0	34.8	102°30.6	06.9	57°39.2	50.8	123°28.4	30.1		314°19.8	11:34
17	127°55.6	81°23.4	35.7	117°31.3	07.7	72°41.0	50.9	138° 30.7	30.0	Mars		09:10
18	142°58.0	96°22.8	N16°36.6	132°32.0	N03°08.4	87°42.9	N18°51.1	153°33.0	506°30.0	Jupiter		12:10
19	158°00.5	111°22.2	37.5	147°32.7	09.2	102°44.7	51.2	168°35.3	29.9	Saturn	10°38.0	07:47
20	173°03.0	126°21.6	38.4	162°33.5	09.9	117°46.6	51.3	183°37.6	29.8	Horizont	al parallax	
21	188°05.4	141°21.0	• • 39.4	177°34.2	• • 10.7	132°48.4	• • 51.5	198°39.9	• • 29.8	1101120111	Venus:	0.1
22	203°07.9	156°20.4	40.3	192°34.9	11.4	147°50.3	51.6	213°42.2	29.7		Mars:	0.1
23	218°10.4	171°19.8	41.2	207°35.6	12.2	162°52.2	51.7	228°44.5	29.7		ividi 5.	0.1
Mer.pa	ass. 08:30	$\nu$ -0.6′ d0	.9′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.8′ m1.09	$\nu$ 1.9′ d0.	1′ m-2.00	$\nu$ 2.3′ d-0	.1′ m1.06			

h	Sur	า			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°54.6	$N18^{\circ}12.4$	$127^{\circ}14.7$	6.6'	$N28^{\circ}05.9$	-2.8'	56.8'
1	195°54.6	13.0	141°40.4	6.7'	28°03.1	-3.0'	56.7'
2 3	210°54.6 225°54.6	13.6 •• 14.3	156°06.1 170°31.9	6.8' 6.9'	28°00.1 27°56.9	-3.2' -3.3'	56.7' 56.7'
4	240°54.6	14.9	184°57.8	7.0'	27°53.6	-3.5'	56.6'
5	255°54.6	15.5	199°23.7	7.1'	$27^{\circ}50.1$	-3.6'	56.6'
6	270°54.7	N18°16.1	213°49.8	7.1'	N27° 46.5 27° 42.7	-3.8'	56.6'
7 8	285°54.7 300°54.7	16.8 17.4	228°15.9 242°42.2	7.2' 7.3'	27°42.7 27°38.8	-3.9' -4.1'	56.5' 56.5'
9	315°54.7	. 18.0	257°08.5	7.4	27°34.7	-4.2'	56.5
10	330°54.7	18.6	271°34.9	7.5'	27°30.5	-4.4'	56.4'
11	345°54.7	19.3	286°01.4	7.6'	27°26.1	-4.5'	56.4'
12 13	0°54.7 15°54.7	N18°19.9 20.5	300°28.0 314°54.7	7.7' 7.8'	N27°21.6 27°16.9	-4.7' -4.8'	56.4' 56.3'
14	30°54.7	20.5	329°21.5	7.8 7.9'	27°10.9	-4.0 -5.0'	56.3
15	45°54.7	• • 21.7	343°48.4	8.0'	27°07.1	-5.1'	56.3'
16	60°54.7	22.3	$358^{\circ}15.3$	8.1'	27°02.0	-5.2'	56.2'
17	75°54.7	23.0 N18°23.6	12°42.4 27°09.6	8.2'	26°56.8 N26°51.4	-5.4'	56.2'
18 19	90°54.7 105°54.7	N18 23.6	41°36.9	8.3' 8.4'	26° 45.8	-5.5' -5.7'	56.2' 56.1'
20	120°54.7	24.8	56°04.2	8.5'	26° 40.2	-5.8'	56.1'
21	135°54.7	• • 25.4	70°31.7	8.6'	26°34.4	-5.9'	56.1'
22	150°54.7	26.0	84°59.3	8.7'	26°28.4	-6.1'	56.1'
23	165°54.7	26.7	99°27.0	8.8'	26°22.4	-6.2'	56.0'
	SD = 15.8'	d = 0.6'		SI	O = 15.5'		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	180°54.7	N18°27.3	113°54.8	8.9'	N26° 16.2	-6.3	56.0'
1	195°54.7	27.9	128°22.6	9.0'	26°09.8	-6.5'	56.0'
2	210°54.7	28.5	142°50.6	9.1'	26°03.4	-6.6'	55.9'
3 4	225°54.8 240°54.8	· · 29.1 29.7	157°18.7 171°46.9	9.2' 9.3'	25°56.8 25°50.0	-6.7' -6.8'	55.9' 55.9'
5	255°54.8	30.3	186°15.2	9.4'	25°43.2	-0.0'	55.8'
6	270°54.8	N18°30.9	200°43.6	9.5'	N25°36.2	-7.1'	55.8'
7	285°54.8	31.5	$215^{\circ}12.1$	9.6'	$25^{\circ}29.1$	-7.2'	55.8'
8	300°54.8	32.1	229°40.8	9.7'	25°21.9	-7.3'	55.8'
9 10	315°54.8 330°54.8	· · 32.8	244°09.5 258°38.3	9.8' 9.9'	25°14.6 25°07.1	-7.5' -7.6'	55.7' 55.7'
11	345°54.8	34.0	273°07.2	10.0'	24°59.5	-7.7'	55.7'
12	0°54.8	N18°34.6	287°36.3	10.1'	N24°51.8	-7.8'	55.6'
13	15°54.8	35.2	302°05.4	10.3'	24°44.0	-7.9'	55.6'
14 15	30°54.8 45°54.8	35.8 •• 36.4	316°34.7 331°04.0	10.4' 10.5'	24°36.1 24°28.1	-8.0' -8.1'	55.6' 55.5'
16	60°54.8	37.0	345°33.5	10.5	24 20.1 24°19.9	-8.3'	55.5'
17	75°54.8	37.6	0°03.1	10.7'	24°11.7	-8.4'	55.5'
18	90°54.8	N18°38.2	14°32.7	10.8'	N24°03.3	-8.5'	55.5'
19	105°54.8	38.8	29°02.5	10.9'	23°54.8 23°46.3	-8.6'	55.4'
20 21	120°54.8 135°54.8	39.4 •• 40.0	43°32.4 58°02.4	11.0' 11.1'	23° 46.3 23° 37.6	-8.7' -8.8'	55.4' 55.4'
22	150°54.7	40.6	72°32.5	11.2'	23°28.8	-8.9'	55.4'
23	165°54.7	41.2	87°02.7	11.3'	23° 19.9	-9.0'	55.3'
	SD = 15.8'	d = 0.6'		SI	D = 15.3'		
Tue	GHA	Dec	GHA	ν	Dec	d	НР
0	180°54.7	N18°41.8	101°33.0	11.4'	$N23^{\circ}10.9$	-9.1'	55.3'
1	195°54.7	42.4	116°03.4	11.5'	23°01.8	-9.2'	55.3'
2 3	210°54.7 225°54.7	43.0 • • 43.6	130°33.9 145°04.5	11.6' 11.7'	22°52.6 22°43.4	-9.3' -9.4'	55.3' 55.2'
3 4	225°54.7 240°54.7	44.2	145°04.5 159°35.3	11.7	22°43.4 22°34.0	-9.4° -9.5'	55.2' 55.2'
5	255°54.7	44.8	174°06.1	11.9'	22°24.5	-9.6'	55.2'
6	270°54.7	N18°45.4	188°37.0	12.0'	N22° 14.9	-9.7'	55.2'
7	285°54.7	46.0	203°08.0	12.1'	22°05.3	-9.8'	55.1'
8 9	300°54.7 315°54.7	46.6 • • 47.2	217°39.1 232°10.4	12.2' 12.3'	21°55.5 21°45.7	-9.8' -9.9'	55.1' 55.1'
10	330°54.7	47.8	246°41.7	12.4	21° 35.7	-10.0'	55.1
11	345°54.7	48.4	$261^{\circ}13.1$	12.5'	21°25.7	-10.1'	55.0'
12	0°54.7	N18°49.0	275°44.6	12.6'	N21°15.6	-10.2'	55.0'
13 14	15°54.7 30°54.7	49.6 50.2	290°16.2 304°47.9	12.7' 12.8'	21°05.4 20°55.2	-10.3' -10.4'	55.0' 55.0'
14 15	30°54.7 45°54.7	50.2 • • 50.8	304°47.9 319°19.7	12.8'	20° 55.2 20° 44.8	-10.4' -10.4'	55.0 54.9'
16	60°54.7	51.3	333°51.6	13.0'	20°34.4	-10.5	54.9'
17	75°54.7	51.9	$348^{\circ}23.6$	13.1'	20°23.8	-10.6'	54.9'
18	90°54.7	N18°52.5	2°55.7	13.2'	N20° 13.2	-10.7'	54.9'
19 20	105°54.6 120°54.6	53.1 53.7	17°27.9 32°00.2	13.3' 13.4'	20°02.6 19°51.8	-10.8' -10.8'	54.9' 54.8'
20	120°54.6 135°54.6	53.7	46°32.6	13.4	19°51.8 19°41.0	-10.8° -10.9°	54.8'
22	150°54.6	54.9	61°05.0	13.5'	19°30.1	-11.0'	54.8'
23	165°54.6	55.5	75°37.6	13.6'	19° 19.1	-11.1'	54.8'
	SD = 15.8'	d = 0.6'		SI	O = 15.1'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
N 70°	////	////	01:00	23:04	////	////
68°	////	////	01:56	22:02	////	////
66°	////	////	02:28	21:28	////	////
64°	////	01:19	02:52	21:03	22:40	////
62°	////	01:58	03:11	20:44	21:58	////
60°	////	02:24	03:26	20:28	21:31	////
N 58°	01:11	02:44	03:39	20:15	21:10	22:48
56°	01:46	03:01	03:50	20:04	20:53	22:10
54°	02:11	03:15	04:00	19:54	20:39	21:44
52°	02:30	03:27	04:09	19:45	20:27	21:25
50°	02:46	03:37	04:16	19:37	20:16	21:09
45°	03:16	03:59	04:33	19:21	19:55	20:38
<b>N</b> 40°	03:38	04:16	04:46	19:07	19:38	20:15
35°	03:56	04:30	04:58	18:55	19:23	19:57
30°	04:10	04:42	05:08	18:45	19:12	19:43
20°	04:33	05:01	05:25	18:28	18:52	19:20
<b>N</b> 10°	04:51	05:17	05:39	18:14	18:36	19:02
0°	05:06	05:31	05:53	18:00	18:22	18:47
<b>S</b> 10°	05:19	05:44	06:06	17:46	18:08	18:34
20°	05:31	05:57	06:21	17:32	17:55	18:22
30°	05:43	06:12	06:37	17:16	17:41	18:10
35°	05:49	06:19	06:46	17:06	17:33	18:04
40°	05:55	06:28	06:57	16:55	17:24	17:57
45°	06:02	06:38	07:09	16:43	17:15	17:50
<b>S</b> 50°	06:10	06:49	07:25	16:28	17:03	17:42
52°	06:13	06:54	07:32	16:20	16:58	17:39
54°	06:17	07:00	07:40	16:13	16:52	17:35
56°	06:20	07:06	07:48	16:04	16:46	17:32
58°	06:24	07:13	07:58	15:54	16:39	17:27
<b>S</b> 60°	06:29	07:21	08:10	15:42	16:31	17:23
	ı			ı		1

Lat.		Moonris	e		Moonset	:
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°						
<b>N</b> 70°						
68°						
66°			07:08			03:55
64°		05:20	07:48		03:57	03:14
62°	04:13	06:24	08:15	03:10	02:53	02:46
60°	05:22	06:58	08:36	02:01	02:18	02:24
N 58°	05:57	07:23	08:53	01:26	01:53	02:07
56°	06:22	07:43	09:08	01:00	01:33	01:52
54°	06:42	07:59	09:20	00:40	01:16	01:39
52°	06:59	08:14	09:31	00:23	01:01	01:27
50°	07:14	08:26	09:40	00:08	00:49	01:17
45°	07:43	08:51	10:01		00:22	00:56
N 40°	08:06	09:11	10:17	••••	00:02	00:38
35°	08:25	09:28	10:31	23:44		00:24
30°	08:41	09:42	10:43	23:29		00:11
20° N 10°	09:09	10:07 10:28	11:03 11:20	23:03 22:41	23:49 23:30	•• ••
0°	09:32 09:54	10:28	11:20	22:41	23:30	23:59
1 -				-		
<b>S</b> 10°	10:16	11:07	11:53	21:59	22:54	23:44
20° 30°	10:39 11:07	11:28 11:52	12:10 12:30	21:37 21:11	22:34 22:12	23:29 23:11
35°	11:07	12:06	12:30	20:55	22:12	23:11
40°	11:23	12:00	12:42	20:35	21:36	23:00
45°	12:04	12:42	13:10	20:37	21:45	22:34
<b>S</b> 50°						
5 50°	12:32 12:46	13:06 13:17	13:30 13:38	19:47 19:33	21:01 20:50	22:16 22:07
52°	12:46	13:17 13:31	13:38 13:49	19:33 19:17	20:50	22:07 21:58
56°	13:03	13:31	14:00	19:17	20:38	21:58
58°	13:45	14:03	14:00	18:35	20:23	21:47
S 60°	14:17	14:05	14:13	18:04	19:45	21:33
3 00	14.11	14.43	14.40	10.04	13.43	41.41

		Sun		Moon			
Day	Eqn.of	Eqn.of Time		Mer.	Mer.Pass.		
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	4-6	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	18-36%	
12	03:38	03:39	11:56	16:07	03:39		
13	03:39	03:39	11:56	17:00	04:34		
14	03:39	03:39	11:56	17:48	05:24		

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

h	Aries	`	nus	M	ars	Jup	oiter	Sat	urn		Stars	
\A/I	CIIA	CIIA	D	CIIA	D	CHA	D	CIIA	D		SHA	D
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	233°12.8	186° 19.2	N16°42.1	222°36.3	N03°12.9	177°54.0	N18°51.9	243°46.8	S06°29.6	Alpheratz	357°35.6	29°13.3
1	248°15.3	201°18.6	43.0	237°37.0	13.7	192°55.9	52.0	258°49.0	29.5	Ankaa	353°08.0	-42°10.3
2	263°17.8	216° 18.0	43.9	252°37.7	14.4	207°57.7	52.2	273°51.3	29.5	Schedar	349°32.1	56°40.0
3	278°20.2	231° 17.4	• • 44.8	267°38.4	• • 15.2	222°59.6	• • 52.3	288°53.6	• • 29.4	Diphda	348°48.1	-17°51.2
4	293°22.7	$246^{\circ}16.8$	45.8	282°39.1	15.9	238°01.4	52.4	303°55.9	29.3	Achernar	335°21.1	-57°06.7
5	308°25.1	261°16.2	46.7	297°39.8	16.7	253°03.3	52.6	318°58.2	29.3	I	327°52.2	23°34.5
6	323°27.6	$276^{\circ}15.6$	N16°47.6	312°40.5	N03°17.4	268°05.2	N18°52.7	334°00.5	S06°29.2	Hamal	321° 52.2 314° 48.0	23 34.5 89°21.9
7	338°30.1	$291^{\circ}15.0$	48.5	327°41.3	18.2	283°07.0	52.8	349°02.8	29.2	Polaris		
8	353°32.5	306°14.4	49.4	342°42.0	18.9	298°08.9	53.0	4°05.1	29.1	Acamar	315°12.6	-40°12.4
9	8°35.0	321°13.8	• • 50.3	357°42.7	• • 19.7	313°10.7	• • 53.1	19°07.4	• • 29.0	Menkar	314°07.1	4°11.0
10	23°37.5	336° 13.2	51.2	12°43.4	20.4	328°12.6	53.3	34°09.7	29.0	Mirfak	308°29.6	49°56.8
11	38°39.9	351°12.6	52.1	27°44.1	21.2	343°14.5	53.4	49° 12.0	28.9	Aldebaran	290°40.6	16°33.4
12	53°42.4	6°11.9	N16°53.0	42°44.8	N03°21.9	358°16.3	N18°53.5	64°14.3	S06°28.9	Rigel	281°04.7	-8°10.5
										Capella	280°23.2	46°01.4
13	68°44.9	21°11.3	53.9	57°45.5	22.7	13°18.2	53.7	79°16.6	28.8	Bellatrix	278°23.8	6°22.3
14	83°47.3	36°10.7	54.8	72°46.2	23.4	28°20.0	53.8	94°18.9	28.7	Elnath	278°02.9	28°37.7
15	98°49.8	51° 10.1	• • 55.8	87°46.9	• • 24.2	43°21.9	• • 53.9	109°21.2	• • 28.7	Alnilam	275°38.6	-1°11.2
16	113°52.3	66°09.5	56.7	102°47.6	24.9	58°23.7	54.1	124°23.5	28.6	Betelgeuse	270°53.0	7°24.7
17	128°54.7	81°08.9	57.6	117°48.3	25.7	73°25.6	54.2	139°25.8	28.6	Canopus	263°53.1	-52°42.7
18	143°57.2	96°08.3	$N16^{\circ}58.5$	132°49.1	N03°26.4	88°27.5	N18°54.3	154°28.1	S06°28.5	Sirius	258°27.0	-16°45.1
19	158°59.6	$111^{\circ}07.7$	16°59.4	147°49.8	27.2	103°29.3	54.5	169°30.4	28.4	Adhara	255°06.6	-10 43.1 -29°00.4
20	174°02.1	$126^{\circ}07.1$	17°00.3	162°50.5	27.9	118°31.2	54.6	184°32.7	28.4			
21	189°04.6	141°06.5	• • 01.2	177°51.2	• • 28.7	133°33.0	• • 54.8	199°35.0	• • 28.3	Procyon	244°51.6	5°09.7
22	204°07.0	156°05.8	02.1	192°51.9	29.4	148°34.9	54.9	214°37.3	28.3	Pollux	243°18.2	27°58.1
23	219°09.5	171°05.2	03.0	207°52.6	30.2	163°36.7	55.0	229°39.6	28.2	Avior	234°15.2	-59°35.5
										Suhail	222°46.8	-43°32.1
Mer.p	ass. 08:26	$\nu$ -0.6' d0	.9′ m-3.92	u0.7′ d0	.8′ m1.08	$\nu 1.9' \ d0.$	1'  m-2.00	$\nu 2.3' \ d-0$	.1'  m1.06	Miaplacidus	221°38.6	-69°49.3
										Alphard	217°48.3	-8°45.9
The	CHA	CHA	Das	CHA	Das	CH A	Daa	CHA	Daa	Regulus	207°35.0	11°50.9
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.4	61°37.4
0	234°12.0	186°04.6	N17°03.9	222°53.3	N03°30.9	178°38.6	N18°55.2	244°41.9	S06°28.1	Denebola	182°25.4	14°26.2
1	249°14.4	201°04.0	04.8	237°54.0	31.7	193°40.5	55.3	259°44.2	28.1		175°44.0	-17°40.8
2	264°16.9	$216^{\circ}03.4$	05.7	252°54.7	32.4	208°42.3	55.4	274°46.5	28.0		173°00.3	-63°14.3
3	$279^{\circ}19.4$	231°02.8	• • 06.6	267°55.4	• • 33.2	223°44.2	• • 55.6	289°48.8	• • 28.0		171°51.9	-57°15.2
4	294°21.8	246°02.2	07.5	282°56.1	33.9	238°46.0	55.7	304°51.1	27.9	Alioth	166°13.0	55°49.8
5	309°24.3	261°01.5	08.3	297°56.9	34.7	253°47.9	55.8	319°53.4	27.9	1		
6	324°26.8	276°00.9	N17°09.2	312°57.6	N03°35.4	268°49.7	N18°56.0	334°55.7	S06° 27.8	Spica	158°22.6	-11°17.4
7	339°29.2	291°00.3	10.1	327°58.3	36.2	283°51.6	56.1	349°58.0	27.7	Alkaid	152°52.0	49°11.6
8	354°31.7	305°59.7	11.0	342°59.0	36.9	298°53.5	56.2	5°00.3	27.7	Hadar	148°36.2	-60°29.6
9	9°34.1	320°59.1	•• 11.9	357°59.7	• • 37.7	313°55.3	56.4	20°02.6	• • 27.6	Menkent	147°57.9	-36°29.5
						313°55.3 328°57.2		35°04.9		Arcturus	$145^{\circ}48.1$	19°03.3
10	24°36.6	335°58.5	12.8	13°00.4	38.4		56.5		27.6	Rigil Kent.	139°40.5	-60°56.3
11	39°39.1	350° 57.8	13.7	28°01.1	39.2	343°59.0	56.7	50°07.2	27.5	Kochab	$137^{\circ}18.6$	74°03.3
12	54°41.5	5°57.2	N17°14.6	43°01.8	N03°39.9	359°00.9	N18°56.8	65°09.5	S06°27.4	Zuben'ubi	136°56.3	-16°08.7
13	69°44.0	20° 56.6	15.5	58°02.5	40.7	14°02.7	56.9	80° 11.8	27.4	Alphecca	126°03.8	26°37.9
14	84°46.5	35°56.0	16.4	73°03.2	41.4	29°04.6	57.1	95°14.1	27.3	Antares	112°16.2	-26°29.2
15	99°48.9	50°55.4	• • 17.2	88°04.0	• • 42.2	44°06.5	• • 57.2	$110^{\circ}16.4$	• • 27.3	Atria	107°10.4	-69°04.2
16	114°51.4	65°54.7	18.1	103°04.7	42.9	59°08.3	57.3	125°18.7	27.2	Sabik	102°03.1	-15°45.4
17	129°53.9	$80^{\circ}54.1$	19.0	118°05.4	43.7	74°10.2	57.5	140°21.0	27.1	1		
18	144°56.3	95°53.5	N17°19.9	133°06.1	N03°44.4	89°12.0	N18°57.6	155°23.4	S06°27.1	Shaula	96°10.8	-37°07.3
19	159°58.8	110°52.9	20.8	148°06.8	45.2	104°13.9	57.7	170°25.7	27.0	Rasalhague	95°58.8	12°32.4
20	175°01.2	125°52.2	21.7	163°07.5	45.9	119°15.7	57.9	185°28.0	27.0	Eltanin	90°42.0	51°28.9
21	190°03.7	140°51.6	• • 22.6	178°08.2	• • 46.7	134°17.6	• • 58.0	200°30.3	26.9	Kaus Aust.	83°32.9	-34°22.3
	205°06.2	155°51.0	23.4	193°08.9	47.4	149°19.5		215°32.6		Vega	80°33.3	38°48.1
22							58.1		26.9	Nunki	75°48.2	-26°16.0
23	220°08.6	170°50.4	24.3	208°09.6	48.2	164°21.3	58.3	230°34.9	26.8	Altair	62°00.3	8°55.8
Mer.n	ass. 08:22	$\nu$ -0.6' d0	.9′ m-3.92	$\nu$ 0.7' d0	.7′ m1.08	$\nu$ 1.9 $^{\prime}$ d0	.1' m-2.00	$\nu 2.3' \ d-0$	.1′ m1.05	Peacock	53°06.4	-56°39.2
ог.р		- 3.3 40								Deneb	49°26.1	45°21.7
										Enif	33°39.3	9°59.0
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.6	-46°50.4
0	$235^{\circ}11.1$	185°49.7	$N17^{\circ}25.2$	223°10.3	N03°48.9	179°23.2	N18°58.4	245°37.2	S06°26.7	Fomalhaut	15°15.2	-29°29.5
1	$250^{\circ}13.6$	$200^{\circ}49.1$	26.1	238°11.0	49.7	194°25.0	58.5	260°39.5	26.7	Scheat	13°45.9	28°12.6
2	$265^{\circ}16.0$	215°48.5	26.9	253°11.8	50.4	209°26.9	58.7	275°41.8	26.6	Markab	13°30.6	15°20.0
3	280°18.5	230°47.9	• • 27.8	268°12.5	• • 51.2	224°28.7	• • 58.8	290°44.1	• • 26.6	ividikaD	10.0	13 20.0
4	295°21.0	245°47.2	28.7	283°13.2	51.9	239°30.6	59.0	305°46.4	26.5	May 15 Wed	SHA	Mer.pass
5	310°23.4	260°46.6	29.6	298°13.9	52.6	254°32.4	59.1	320°48.7	26.5		313°06.4	11:35
6	325°25.9	275°46.0	N17°30.5	313°14.6	N03°53.4	269°34.3	N18°59.2	335°51.0	S06°26.4	Mars	349°23.5	09:09
7	340°28.4	275 40.0 290°45.4	31.3	328°15.3	54.1	284°36.2	59.4	350°53.3	26.3	Jupiter	304°41.2	12:07
								5° 55.6		Saturn	10°33.9	07:44
8	355°30.8	305°44.7	32.2	343°16.0	54.9	299°38.0	59.5		26.3	Jaturn	10 33.9	01.44
9	10°33.3	320°44.1	• • 33.1	358°16.7	• • 55.6	314°39.9	• • 59.6	20°57.9	• • 26.2	May 16 Thu	SHA	Mer.pass
10	25°35.7	335°43.5	33.9	13°17.4	56.4	329°41.7	59.8	36°00.2	26.2	1 -	311°52.6	11:36
11	40°38.2	350°42.8	34.8	28°18.1	57.1	344°43.6	18°59.9	51°02.5	26.1	Mars	348°41.3	09:08
12	55°40.7	5°42.2	N17°35.7	43°18.9	N03°57.9	359°45.4	N19°00.0	66°04.8	S06°26.0	Jupiter	304°26.6	12:04
13	70°43.1	20°41.6	36.6	58°19.6	58.6	14°47.3	00.2	81°07.1	26.0	Saturn	10°30.0	07:40
14	85°45.6	35°40.9	37.4	73°20.3	03°59.4	29°49.2	00.3	96°09.4	25.9	Saturn	10 30.0	07:40
15	$100^{\circ}48.1$	50°40.3	• • 38.3	88°21.0	04°00.1	44°51.0	• • 00.4	$111^{\circ}11.7$	• • 25.9	May 17 Fri	SHA	Mer.pass
16	115°50.5	65°39.7	39.2	103°21.7	00.9	59°52.9	00.6	$126^{\circ}14.0$	25.8		310°38.6	11:37
17	130°53.0	80°39.0	40.0	118°22.4	01.6	74°54.7	00.7	141° 16.3	25.8	Mars		09:07
18	145°55.5	95°38.4	N17°40.9	133°23.1	N04°02.4	89°56.6	N19°00.8	156° 18.7	S06°25.7	Jupiter		12:01
19	160°57.9	110°37.8	41.8	148°23.8	03.1	104°58.4	01.0	171°21.0	25.6			
20	176°00.4	110 37.8 125°37.1	42.6	163°24.5	03.1	120°00.3	01.0	186°23.3	25.6	Saturn	10°26.1	07:36
								201°25.6		Horizont	al parallax	
21	191°02.8	140°36.5	• • 43.5	178°25.2	•• 04.6	135°02.2	01.2		• • 25.5	1.3.12311	Venus:	0.1
22	206°05.3	155°35.9	44.3	193°26.0	05.3	150°04.0	01.4	216°27.9	25.5		Mars:	0.1
23	221°07.8	170°35.2	45.2	208°26.7	06.1	165°05.9	01.5	231°30.2	25.4		iviai 5.	0.1
Mern	ass. 08:18	$\nu$ -0.6' d0	.9′ m-3.92	$\nu^{0.7'}$ do	.7′ m1.08	$\nu$ 1 9' d0	.1′ m-2.00	$\nu 2.3' d_{-}0$	.1′ m1.05			
.т.ст.р		. 0.0 00	5.52	- 5.1 40		. 1.5 UO.		u-0				

h	Sui	Moon						
Wed	GHA	Dec	GHA	ν	Dec	d	HP	
0	180°54.6	N18°56.1	90°10.2	13.7'	N19°08.0	-11.1'	54.8'	
1 2	195° 54.6 210° 54.6	56.6 57.2	104°42.9 119°15.8	13.8' 13.9'	18°56.9 18°45.7	-11.2' -11.3'	54.7' 54.7'	
3	225° 54.6	57.8	119 15.8 133°48.7	14.0'	18°34.4	-11.3'	54.7'	
4	240°54.6	58.4	$148^{\circ}21.6$	14.1'	$18^{\circ}23.1$	-11.4'	54.7'	
5	255°54.6	59.0	162°54.7	14.2'	18°11.7	-11.5'	54.7'	
6 7	270° 54.6 285° 54.5	N18°59.6 19°00.1	177°27.9 192°01.1	14.2' 14.3'	N18°00.2 17°48.7	-11.5' -11.6'	54.7' 54.6'	
8	300° 54.5	00.7	206°34.4	14.4'	17°37.1	-11.7'	54.6'	
9	315° 54.5	•• 01.3	221°07.8	14.5'	17°25.4	-11.7'	54.6'	
10 11	330° 54.5 345° 54.5	01.9 02.5	235°41.3 250°14.9	14.6' 14.6'	17°13.7 17°01.9	-11.8' -11.8'	54.6' 54.6'	
12	0°54.5	02.5 N19°03.0	264°48.5	14.7	N16°50.1	-11.6	54.6'	
13	15° 54.5	03.6	279°22.2	14.8'	16°38.2	-12.0'	54.5'	
14	30°54.5	04.2	293°56.0	14.9'	16°26.2	-12.0'	54.5'	
15 16	45° 54.5 60° 54.4	· · 04.8 05.4	308°29.9 323°03.8	14.9' 15.0'	16°14.2 16°02.1	-12.1' -12.1'	54.5' 54.5'	
17	75° 54.4	05.9	337°37.8	15.1'	15°50.0	-12.2'	54.5'	
18	90°54.4	$N19^{\circ}06.5$	352°11.9	15.2'	$N15^{\circ}37.8$	-12.2'	54.5'	
19	105° 54.4 120° 54.4	07.1 07.7	6°46.1 21°20.3	15.2' 15.3'	15°25.5 15°13.2	-12.3' -12.4'	54.4' 54.4'	
20 21	120 54.4 135°54.4	08.2	21 20.3 35°54.6	15.3 15.4'	15 13.2 15°00.9	-12.4' -12.4'	54.4' 54.4'	
22	150° 54.4	08.8	50°29.0	15.4'	14°48.5	-12.5'	54.4'	
23	165°54.3	09.4	65°03.4	15.5'	14°36.0	-12.5'	54.4'	
	SD = 15.8′	d = 0.6'		SI	O = 14.9'			
Thu	GHA	Dec	GHA	ν	Dec	d	НР	
0	180°54.3	N19° 10.0	79°37.9	15.6'	$N14^{\circ}23.5$	-12.6'	54.4'	
1	195°54.3	10.5	94°12.4	15.6'	14°10.9	-12.6'	54.4'	
2	210° 54.3 225° 54.3	11.1 · · 11.7	108°47.1 123°21.7	15.7' 15.7'	13°58.3 13°45.7	-12.7' -12.7'	54.4' 54.3'	
4	240° 54.3	12.3	137°56.5	15.8'	13°33.0	-12.7' -12.7'	54.3'	
5	255° 54.3	12.8	152°31.3	15.9'	13°20.2	-12.8'	54.3'	
6	270°54.2	N19° 13.4	167°06.2	15.9'	N13°07.4	-12.8'	54.3'	
7 8	285° 54.2 300° 54.2	14.0 14.5	181°41.1 196°16.1	16.0' 16.0'	12°54.6 12°41.7	-12.9' -12.9'	54.3' 54.3'	
9	315°54.2	15.1	210°51.1	16.1'	12°28.8	-13.0'	54.3'	
10	330° 54.2	15.7	225°26.2	16.1'	12°15.9	-13.0'	54.3'	
11 12	345°54.2 0°54.1	16.2 N19°16.8	240°01.3 254°36.5	16.2' 16.2'	12°02.9 N11°49.8	-13.0' -13.1'	54.3' 54.3'	
13	15°54.1	17.4	269°11.8	16.3	11°36.7	-13.1'	54.3'	
14	30°54.1	17.9	283°47.1	16.3'	11°23.6	-13.2'	54.2'	
15	45°54.1	• • 18.5	298°22.4	16.4	11°10.5	-13.2'	54.2'	
16 17	60° 54.1 75° 54.1	19.1 19.6	312°57.8 327°33.3	16.4' 16.5'	10°57.3 10°44.0	-13.2' -13.3'	54.2' 54.2'	
18	90° 54.0	N19°20.2	342°08.8	16.5'	N10°30.8	-13.3'	54.2'	
19	105°54.0	20.7	356° 44.3	16.6'	10°17.5	-13.3'	54.2'	
20 21	120° 54.0 135° 54.0	21.3 · · 21.9	11°19.9 25°55.5	16.6' 16.7'	10°04.1 09°50.8	-13.4' -13.4'	54.2' 54.2'	
22	150°54.0	22.4	40°31.1	16.7'	09°37.4	-13.4 -13.4'	54.2'	
23	165°53.9	23.0	55°06.8	16.7'	09°23.9	-13.5'	54.2'	
	SD = 15.8'	d = 0.6'		SI	O = 14.8'			
Fri	GHA	Dec	GHA	ν	Dec	d	HP	
0	180°53.9	$N19^{\circ}23.6$	69°42.6	16.8'	$N09^{\circ}10.5$	-13.5'	54.2'	
1	195°53.9	24.1	84°18.4	16.8'	08°57.0	-13.5'	54.2'	
2	210° 53.9 225° 53.9	24.7 •• 25.2	98°54.2 113°30.0	16.8' 16.9'	08°43.4 08°29.9	-13.6' -13.6'	54.2' 54.2'	
4	240°53.8	25.8	128°05.9	16.9'	08°16.3	-13.6'	54.1'	
5	255° 53.8	26.3	142°41.8	16.9'	08°02.7	-13.6'	54.1'	
6 7	270°53.8 285°53.8	N19°26.9 27.5	157°17.8 171°53.8	17.0' 17.0'	N07°49.0 07°35.4	-13.7' -13.7'	54.1' 54.1'	
8	205 55.0 300°53.8	28.0	171 55.6 186° 29.8	17.0'	07°35.4	-13.7'	54.1	
9	315°53.7	• • 28.6	201°05.8	17.1'	07°08.0	-13.7'	54.1'	
10	330°53.7 345°53.7	29.1 29.7	215°41.9 230°18.0	17.1'	06°54.2 06°40.5	-13.8'	54.1'	
11 12	345°53.7 0°53.7	29.7 N19°30.2	230° 18.0 244° 54.1	17.1' 17.1'	06°40.5 N06°26.7	-13.8' -13.8'	54.1' 54.1'	
13	15°53.6	30.8	259°30.2	17.2'	$06^{\circ}12.9$	-13.8'	54.1'	
14	30°53.6	31.3	274°06.4	17.2'	05°59.1	-13.9'	54.1'	
15 16	45° 53.6 60° 53.6	· · 31.9 32.4	288° 42.6 303° 18.8	17.2' 17.2'	05°45.2 05°31.3	-13.9' -13.9'	54.1' 54.1'	
17	75°53.6	33.0	317°55.0	17.2'	05°17.4	-13.9'	54.1'	
18	90°53.5	N19°33.5	332°31.3	17.3'	N05°03.5	-13.9'	54.1'	
19 20	105° 53.5 120° 53.5	34.1 34.6	347°07.5 1°43.8	17.3' 17.3'	04°49.6 04°35.7	-13.9' -14.0'	54.1' 54.1'	
21	120 53.5 135°53.5	34.0	1 43.8 16°20.1	17.3'	04 35.7 04°21.7	-14.0' -14.0'	54.1'	
22	150°53.4	35.7	$30^{\circ}56.4$	17.3'	04°07.7	-14.0'	54.1'	
23	165°53.4	36.3	45°32.7	17.3'	03°53.7	-14.0'	54.1'	
	SD = 15.8'	d = 0.6'		SI	O = 14.8'			

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

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

	h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
1 291127 207940 469 207828 1 776 187060 018 201948 23 3												SHA	Dec
1	0			N17°46.1		N04°06.8		N19°01.6		S06°25.4	Alpheratz	357° 35 6	20°133
1													
1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2											I		
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27 342 50 267 347 347 347 347 347 347 347 347 347 34													
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14 1 2 37 3 39 276 6 95 2 28 32 1 10 3 49 28 1 10 31 15 57 9 24.7					358°33.8						Mirfak	308°29.6	49°56.8
12 5°308 5°308 5°209 117563 4"356 104158 0930 107031 6"7030 506°247 6"457 2"30°203 0"5047 50725 508°247 6"407 50726 508°247 6"5047 508°247 6"5047 508°247 6"5047 508°247 6"5047 508°247 6"5047 508°247 6"5047 508°247 6"5047 508°247 6"5047 508°247 6"5047 508°247 6"5047 508°247 6"5047 508°247 6"5047 508°247 6"5047 508°247 6"5047 5047 508°247 6"5047 5047 5047 5047 5047 5047 5047 5047											Aldebaran	290°40.6	$16^{\circ}33.4$
14   16   16   17   17   18   18   18   18   18   18											Rigel	281°04.7	-8°10.5
14   66   447   35   26   56.0   56.0   73   37.3   37.3   39.3   37.3   39.3												280°23.2	
15											Bellatrix		
16   16   40.7   66724.3   17.597   100.7887   187   690.73.4   0.38   12770.4   24.5   127.11   131.521   131.521   131.521   132.521   131.501   131.521   132.521   131.501   131.521													
17 131*52.1 89*23.7 18*00.6 18*39.4 19.5 75*39.3 0.39 14*21.7 24.4 18*2.2 19.5 18.5 18*2.2 19.5 18.5 18.5 18*2.2 19.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18											I		
18											_		
19   161°571   110°224   0.23   148°409   210   106°430   042   172°163   243   Adlus   250°06   100°060   242°17   220°1000   140°211   0.40   178°423   0.225   135'467   0.44   20°21.0   0.42   27°253   241   1.40   240°152   220°260   170°198   0.50   0.50   20°20.0   0.42   27°253   241   0.40   240°21.0   0.42   27°253   241   0.40   240°21.0   0.42   240°21.0													
20 1/6*95 125*218 03.1 163*41.6 21.7 120*44.9 04.3 187*18.6 24.2 Propose 34*10.5 3.9 1.0 140*21.1 1.0 40.1 178*2.3 12.5 153*46.7 0.1 4.0 20*21.0 1.0 24.2 Propose 34*10.5 27*53.1 20*21.0 10*21.0 10*21.1 1.0 40.1 178*2.3 12.5 153*46.7 0.1 4.0 20*21.0 1.2 22.2 22.2 22.0 170*55.1 155*0.5 0.4 8 183*43.0 23.2 150*48.6 04.6 22*73.3 2.4 1.0 1.0 179*3.8 0.1 179*3.8 0.5 10.0 179*3.8 0.5 10.0 179*3.8 0.5 10.0 179*3.8 0.5 10.0 179*3.8 0.5 10.0 179*3.8 0.0 179*3.8 0.5 10.0 179*3.8 0.5 10.0 179*3.8 0.5 10.0 179*3.8 0.0 179*3.8 0.0 179*3.8 0.0 179*3.8 0.0 179*3.8 0.0 179*3.8 0.0 179*3.8 0.0 179*3.8 0.0 179*3.8 0.0 179*3.8 0.0 179*3.8 0.0 179*3.0											I		
129°   120°   140°   140°   121°   1.0   1.0   178°   123   125°   130°   140°   1.0   1		176°59.5											
22 207°045 155°205 048 193°430 23.2 150°46 04.6 217°233 41													
Mer.past. 08:14													
Mer.pass. 08:14													
Same   Change   Cha			1, 0.6/ 20								I		
Sun         CHA         CEA         Dec         CHA         Dec         Dec         Dubble         19/21 50         233*44.4         Not*2.47         180*52.3         No*0*0*0*1.2         277*20.9         20*2.4         Decbods         182*2.5         4.4*2.0         2.2*2*16.8         2.6*2         20*2*16.8         2.0*2*16.8         2.6*2         20*2*57.9         0.0*2         20*3*8.8         2.2*2         2.2*2*16.8         2.0*2         20*2*3*8.8         2.2*9         2.6*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.1*2*16.9         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.0*2*16.8         2.	ivier.p	Jass. U8:14	ν-υ.ο αυ	.9 111-3.92	νυ. <i>ι</i> αυ	. <i>i</i> III1.Uŏ	$\nu$ 1.9 d0.	.1 111-2.00	ν2.3 α-0	.1 1111.05			
Sign GHA (HA) Dec (HA													
0 237'094 185'192 N18'065 223'444 N04'247, 185'233 N19'048 247'275 S06'24.0   Doeshola 182'254' 14'262 C 20'75'33 22' 24' 185'241 195'541 195'543 N19'048 247'275 S06'24.0   Gleana 175'440 . 12'462 C 20'75'35 32' 24' 185'541 195'541 195'543 N19'048 247'275' 255' 252 23' 257'348 23' 23' 24' 252' 257'353 N18'264 0 93' 285'45' 3 27' 72' 240'5507 N34' 397'371 238 N19'048 257' 247'5151 195'7512 N19'056	Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	_		
1 25°211.8 07018.5 07.3 238°45.1 25.4 195°41. 05.0 26°30.2 24.0 (Giana) 17°40.8 17°40	0			N18°06.5		N04°24.7		N19°04.8		S06°24.0			
2 67°143 29°1792 49°165 090 405 293°485 200 22°579 052 29°348 2039 405 200 29°1879 405 200 29°1879 100 20°1879 10	1			07.3		25.4		05.0		24.0	1		
3 82° 10.8 g 210° 10.2 c 30° 17.2 c 30° 0 28° 40.5 c 20.9 c 20° 57.9 c 30° 2. 20° 34.8 c 23.9 c 30° 54.8 c 30° 37° 37° 1 23.8 c 30° 37° 37° 37° 37° 38° 38° 38° 38° 38° 38° 38° 38° 38° 38													
3 977-19.2 249-16.6 98 283-47.3 27.7 240-50.6 05.5 312-21.7 260-15.9 10.7 298-48.0 28.4 250-16. 05.5 312-21.7 260-15.9 10.7 298-48.0 28.4 250-16. 05.5 312-21.7 260-15.9 10.7 298-48.0 28.4 250-16. 05.5 312-21.7 260-15.7 312-21.7 260-15.7 312-21.7 260-15.7 312-21.7 260-15.7 312-21.7 260-15.7 312-21.7 260-15.7 312-21.7													
5 312*21.7 Spica 188*22.6 111*17.6 10.7 298*8.0 28.4 256*01.6 0.5.5 322*29.4 23.7 Spica 188*22.6 111*17*17*17*17*17*17*17*17*17*17*17*17*													
5													
8 37°29.1 305°14.0 13.2 343°59.1 30.6 301°07.1 05.9 7°6.4 23.6 6 23.6 6 23.6 10 1.0 2°34.0 33.5°12.7 14.9 13°51.5 32.1 331°10.8 06.2 37°51.0 225 4.0 14.9 13°51.5 32.1 331°10.8 06.2 37°51.0 225 4.0 14.9 13°51.5 32.1 331°10.8 06.2 37°51.0 225 4.0 14.9 13°51.5 32.1 331°10.8 06.2 37°51.0 225 4.0 14.9 13°51.5 32.1 331°10.8 06.2 37°51.0 225 4.0 14.9 13°51.5 32.1 331°10.8 06.2 37°51.0 225 4.0 14.9 13°51.5 32.1 331°10.8 06.2 37°51.0 225 4.0 14.9 13°51.5 32.1 331°10.8 06.2 37°51.0 225 4.0 14.9 14.9 14.9 14.9 14.9 14.9 14.9 14.9											Alkaid		49°11.6
9 12°316 320°133 · 140 358°508 · 31.4 316°090 · 06.0 22°48,7 · 23.5											Hadar	148°36.2	-60°29.6
10 27"340 335"127 14.9 13"515 32.1 331"10.8 06.2 37"51.0 23.5 Rigil Kent. 13"61.6 40.5 36.5 350"13.4 Kochab 13"718.6 74"03.3 12 57"34.9 5"11.4 N18"16.5 42"52.9 N04"33.6 1"14.6 N10"06.4 67"55.6 506"33.4 Kochab 13"718.6 74"03.3 12"57"4.4 20"10.7 17.4 \$8"52.9 N04"33.6 1"14.6 N10"06.4 67"55.6 506"33.4 Kochab 13"718.6 74"70.3 13"51.1 12"3 15"10.2 46.3 50"09.4 · 19.0 \$8"55.1 31"18.3 06.7 98"00.2 23.3 Alphecc. 12"03.8 26"37.9 Alphecc. 12"04.8 26"3.9 Alphecc. 12"04.8 26"3.1 Shall 10"10.4 Ge9"04.2 Sha											Menkent	147°57.9	-36°29.5
11 42°36.5 390°12.0 15.7 28°52.2 32.9 346°12.7 06.3 52°53.3 23.4 Ngg Neff. 139°0.5 0.30.3 13 72°41.4 20°10.7 17.4 S8°53.6 43°3.9 11.4 87°4.9 38°0.1 182 20°10.7 17.4 58°53.6 43.3 16°16.4 06.6 82°57.0 23.3 Alphecus 126°0.8 14 87°4.9 38°0.1 182 73°54.4 35.1 31°18.3 06.7 98°00.2 23.3 Alphecus 126°0.8 22.3 16°10.2 46.3 50°0.9 4 10.0 88°55.1 35.8 46°0.1 .0 68 113°0.5 5 23.2 Altare 112°16.2 26°29.2 17 122°51.3 80°0.8 1 20.7 118°56.5 37.3 76°2.8 07.1 143°0.7 2 23.1 Sabik 102°0.3 118°3.5 13°1.3 10°2.5 23.2 17 132°51.3 80°0.8 1 20.7 118°56.5 37.3 76°2.8 07.1 143°0.7 2 23.1 Sabik 102°0.3 118°45.4 Sabik 102°0.3 118°45.9 30°0.8 1 20.7 118°56.5 37.3 76°2.8 07.1 143°0.7 2 23.1 Sabik 102°0.3 118°45.4 Sabik 102°0.3 118°3.2 118°3.0 11.1 140°0.5 2.3 1 655°58.6 39.5 121°29.4 0.7.5 188°14.1 22.9 Sabik 102°0.3 118°57.4 Sabik 102°0.3 118°59.3 18.4 Sabik 102°0.3 118°59.3 18.5 121°29.4 0.7.5 188°14.1 22.9 Sabik 102°0.3 18°59.3											Arcturus	$145^{\circ}48.1$	19°03.3
12 57°38.9 5°11.4 NIB°16.5 43°52.9 NO8°33.6 1°14.6 NI9°06.4 67°55.6 So6°24.4 Zuben ibi 13°6.93 - 16′08.7 NI8°13.1 31°18.3 06.7 08°00.2 2.3 Alarse 11°14.4 20°0.3 1°10.2 NO8°13.3 Soff 11°14.4 Soff 20°1.0 NO8°14.3 Soff 20°1.2 NO8°14.4 Soff 20°1.0 NO8°14.3 Soff 20°1.4 NO8°14.4 Soff 20°1.0 NO8°14.4 NO8°14.4 Soff 20°1.0 NO8°14.4 N											Rigil Kent.	139°40.5	-60°56.3
13 72°41.4 20°10.7 17.4 58°53.6 34.3 16°16.4 06.6 82°57.9 23.3 Alpheca 128°03.2 2°37.9 148 87°39.3 3°10.1 18.2 73°54.4 35.1 31°18.3 06.7 98°00.2 23.3 Alpheca 22.3 15 102°46.3 50°09.4 19.0 88°55.1 53.8 46°20.1 06.8 113°02.5 23.2 Alpheca 23.1 5102°46.3 50°09.4 19.0 88°55.1 53.8 46°20.1 06.8 113°02.5 23.2 Alpheca 21.1 12°16.2 -26°29.2 Alpha 128°55.3 3.3 46°20.1 06.8 113°02.5 23.2 Alpha 12°10.2 Alpha 12°15.3 80°08.1 20.7 118°56.5 37.3 76°23.8 07.1 143°07.2 138°09.5 506°23.0 Alpha 12°16.5 Alpha 12°10.2 A											Kochab	$137^{\circ}18.6$	74°03.3
A   R7°43,9   35°10,1   18,2   73°64,4   35,1   31°18,3   66.7   98°00,2   23.3   Alphaeca   12°16,2 = 26°29,2 = 26°29,2   210°10,3   80°08,1   19.8   103°58,8   36.6   61°22,0   07.0   128°04,5   23.1   Alphaeca   12°16,2 = 26°29,2   24.1   11°48,8   65°08,7   19.8   103°58,8   36.6   61°22,0   07.0   128°04,5   23.1   Alphaeca   12°16,2 = 26°29,2   24.1   18°45,7   38.8   106°27,6   07.4   173°11,8   23.0   19°10,8   22.3   148°57,9   38.8   106°27,6   07.4   173°11,8   23.0   173°13,7   18°20,1											Zuben'ubi		
15 102°46.3   50°09.4   190   88°55.1   35.8   46°20.1   06.8   113°02.5   23.2     Attrail   107°10.4													
16   117°48.8   65°08.7   19.8   103°55.8   36.6   61°22.0   07.0   128°04.9   23.1   133°55.3   30°08.1   20.7   118°65.6   37.3   76°23.8   07.1   143°07.2   23.1   184°07.2   23.1   184°07.2   23.1   184°07.9   19.0											Antares		
18 147°537 9°074 NIB°215 133°672 N04°380 91°257 N19°072 158°095 506°330 Rasilhague 95′58.8 12°32.4 19 162°56.2 110°06.8 2.3 148°57.9 38.8 106°27.6 07.4 173°11.8 2.3 158°095 506°30.0 170°11 140°05.5 2.4 0 178°59.3 39.5 122°29.4 07.5 188°14.1 22.9 Kaus Aust. 33°32.9 34°22.3 22°208°03.6 150°04.1 25°06.8 24.8 194°00.0 41.0 151°33.1 07.8 218°18.7 22.8 18.0 150°04.1 25°06.1 150°04.1 25°06.2 209°0.7 41.7 166°35.0 07.9 23°21.0 22.8 1416°56.2 209°0.7 41.7 166°35.0 07.9 23°21.0 22.8 1416°56.2 209°0.7 41.7 166°35.0 07.9 23°21.0 22.8 1416°56.2 209°0.7 41.7 166°35.0 07.9 23°21.0 22.8 1416°56.2 209°0.7 41.7 166°35.0 07.9 23°21.0 22.8 1416°67.6 209°0.7 41.7 166°35.0 07.9 23°21.0 22.8 1416°67.6 209°0.7 41.7 106°35.0 10.9 10.1 10.1 10.1 10.1 10.1 10.1 10													
18													
19 162°56.2 110°06.8 22.3 148°57.9 38.8 106°27.6 07.4 173°11.8 23.0 170°58.7 125°06.1 23.1 163°58.6 39.5 121°29.4 07.5 188°14.1 22.9 170°58.7 125°06.1 23.1 163°58.6 39.5 121°29.4 07.5 188°14.1 22.9 170°58.7 125°04.8 24.8 194°00.0 41.0 151°33.1 07.8 218°18.7 22.8 180°33.3 38°48.1 170°5.2 155°04.8 24.8 194°00.0 41.0 151°33.1 07.8 218°18.7 22.8 180°33.3 38°48.1 170°5.2 155°04.8 24.8 194°00.0 41.0 151°33.1 07.8 218°18.7 22.8 180°33.3 38°48.1 180°30.2 155°04.8 24.8 194°00.0 41.0 151°33.1 07.8 218°18.7 22.8 180°30.0 10.9 233°21.0 22.8 181°30.5 07.9 233°21.0 22.8 181°30.8 180°30.5 185°03.5 185°03.5 185°03.5 185°03.5 185°03.5 185°03.5 185°03.5 185°03.5 185°03.5 185°03.5 185°03.5 185°03.5 185°03.5 185°03.2 24°05.2 181°30.8 190°30.7 08.2 263°25.7 22.7 180°30.3 185°33.3 180°05.2 180°30.5 185°03.5 185°03.5 185°03.5 185°03.5 185°03.2 24°05.2 180°30.3 180°30.5 185°03.5											I		
20 177°58.7 125°06.1 231 163°58.6 39.5 121°29.4 07.5 188°14.1 22.9 1193°01.1 140°05.5 · 24.0 178°59.3 · 40.3 136°31.3 · 07.6 203°16.4 · 22.9 28 140°05.5 155°04.8 24.8 194°00.0 41.0 151°33.1 · 07.8 218°18.7 22.8 140°05.5 170°04.1 25.6 209°00.7 41.7 166°35.0 07.9 233°21.0 22.8 141air 62°00.3 38°54.8 140°0.0 170°04.1 25.6 209°00.7 41.7 166°35.0 07.9 233°21.0 22.8 141air 62°00.3 8°55.8 140°0.0 170°04.1 25.6 209°00.7 141.7 166°35.0 07.9 233°21.0 22.8 141air 62°00.3 8°55.8 140°0.0 140.0													
1 193°01.1 140°05.5 · · · · · · · · · · · · · · · · · ·													51°28.9
22   208°03.6   155°04.8   24.8   194°00.0   41.0   151°33.1   07.8   218°18.7   22.8   New part of the property of the pro													
23° 06.1   170° 04.1   25.6   299° 00.7   41.7   166° 35.0   07.9   233° 21.0   22.8   Altair   62° 00.3   8° 55.8     Mer. pass. 08:10   ν-0.6′ d0.8′ m-3.92   ν-0.7′ d0.7′ m1.08   ν-1.9′ d0.1′ m-2.00   ν-2.3′ d-0.1′ m1.05   Peacock   53° 06.3   56° 39.2     Mon   GHA   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   Secondary   Secondar		208°03.6							218° 18.7				
Mer.pass. 08:10   v-0.6' d0.8' m-3.92   v0.7' d0.7' m1.08   v1.9' d0.1' m-2.00   v2.3' d-0.1' m1.05   Peacock   53° 06.3   -56° 39.2   Mor. of the second   v6.5'   v1.9' d0.1' m-2.00   v2.3' d-0.1' m1.05   Peacock   v6.5' 0.5   v6.5' 0.5' 0.5   v6.5' 0.5' 0.5   v6.5' 0.5   v6.5' 0.5   v6.5' 0.5   v6.5' 0.5   v6.5' 0.5' 0.5   v6.5' 0.5' 0.5   v6.5' 0.5   v6.5' 0.5   v6.5' 0.5   v6.5' 0.5   v6.5' 0.5' 0.5   v6.5' 0.5' 0.5' 0.5   v6.5' 0.5' 0.5' 0.5' 0.5' 0.5' 0.5' 0.5' 0		223°06.1	170°04.1	25.6	209°00.7	41.7			233°21.0				
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Mon         GHA         GHA         Dec         All Nairs         273.6         -46°50.4         46°50.4         46°50.4         46°50.4         46°50.4         46°50.4         224°01.5         N04°42.5         181°36.8         N19°08.0         248°23.4         506°22.7         50°22.7         50°22.7         50°22.7         50°22.7         50°22.7         50°22.7         50°22.7         50°22.7         50°22.7         50°22.7         50°22.7         50°22.7         50°22.7         50°22.7         50°22.7         50°22.7         50°22.7         50°22.1         50°22.0         40°23°3.5         282°23.3         28°31.5         230°01.5         22.8         269°03.6         44.7         226°42.4         08.4         293°30.3         22.6         6         225°33.2         32°30.5         29°03.0         46.2         256°46.1         08.7         323°34.9         22.5         50°22.4         Mars         34°17.1         60°22.3         34°25.8         289°58.8         322         329°06.4         47.7         286°49.8         09.0         353°39.5         22.3         34°17.1         09.0         40°22.3 <td>ivier.p</td> <td>oass. 08:10</td> <td><math>\nu</math>-0.6 au</td> <td>.8 m-3.92</td> <td>νο.τ αυ</td> <td>./ m1.08</td> <td><math>\nu</math>1.9 <math>a</math>0.</td> <td>.1 m-2.00</td> <td><math>\nu</math>2.3 a-0</td> <td>.1 m1.05</td> <td>l l</td> <td></td> <td></td>	ivier.p	oass. 08:10	$\nu$ -0.6 au	.8 m-3.92	νο.τ αυ	./ m1.08	$\nu$ 1.9 $a$ 0.	.1 m-2.00	$\nu$ 2.3 a-0	.1 m1.05	l l		
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10											May 19 Sun	SHA	Mer.pass
11 43 35.6 349 56.2 35.4 29 09.3 50.6 340 57.2 09.5 53 46.8 22.1 12 58° 38.1 4° 55.5 N18° 36.2 44° 10.0 N04° 51.4 1° 59.1 N19° 09.6 68° 51.1 506° 22.1 13° 73° 40.5 19° 54.9 37.0 59° 10.7 52.1 17° 01.0 09.8 83° 53.4 22.0 14 88° 43.0 34° 54.2 37.8 74° 11.4 52.8 32° 02.8 09.9 98° 55.7 22.0 15 103° 45.5 49° 53.5 · · 38.7 89° 12.1 · · · 53.6 47° 04.7 · · · 10.0 113° 58.1 · · · 21.9 1618° 47.9 64° 52.9 39.5 104° 12.8 54.3 62° 06.5 10.1 129° 00.4 21.9 17 133° 50.4 79° 52.2 40.3 119° 13.5 55.1 77° 08.4 10.3 144° 02.7 21.8 18 148° 52.9 94° 51.5 N18° 41.1 134° 14.2 N04° 55.8 92° 10.2 N19° 10.4 159° 05.0 506° 21.8 19 163° 55.3 109° 50.8 41.9 149° 14.9 56.5 107° 12.1 10.5 174° 07.3 21.7 20 178° 57.8 124° 50.2 42.7 164° 15.7 57.3 122° 13.9 10.7 189° 09.6 21.6 21 194° 00.3 139° 49.5 · · 43.5 179° 16.4 · · 58.0 137° 15.8 · · 10.8 204° 12.0 · · · 21.6 21.5 24° 05.2 169° 48.2 45.1 209° 17.8 59.5 167° 19.5 11.1 234° 16.6 21.5 Mars: 0.1													
13 73°40.5 19°54.9 37.0 59°10.7 52.1 17°01.0 09.8 83°53.4 22.0 14 88°43.0 34°54.2 37.8 74°11.4 52.8 32°02.8 09.9 98°55.7 22.0 15 103°45.5 49°53.5 · 38.7 89°12.1 · 53.6 47°04.7 · 10.0 113°58.1 · 21.9 16 118°47.9 64°52.9 39.5 104°12.8 54.3 62°06.5 10.1 129°00.4 21.9 17 133°50.4 79°52.2 40.3 119°13.5 55.1 77°08.4 10.3 144°02.7 21.8 18 148°52.9 94°51.5 N18°41.1 134°14.2 N04°55.8 92°10.2 N19°10.4 159°05.0 S06°21.8 19 163°55.3 109°50.8 41.9 149°14.9 56.5 107°12.1 10.5 174°07.3 21.7 20 178°57.8 124°50.2 42.7 164°15.7 57.3 122°13.9 10.7 189°09.6 21.6 21 194°00.3 139°49.5 · 43.5 179°16.4 · 58.0 137°15.8 · 10.8 204°12.0 · 21.6 22 209°02.7 154°48.8 44.3 194°17.1 58.8 152°17.7 10.9 219°14.3 21.5    23 224°05.2 169°48.2 45.1 209°17.8 59.5 167°19.5 11.1 234°16.6 21.5											Mars		09:05
14 88°43.0 34°54.2 37.8 74°11.4 52.8 32°02.8 09.9 98°55.7 22.0 15 103°45.5 49°53.5 · · 38.7 89°12.1 · · · 53.6 47°04.7 · · · 10.0 113°58.1 · · · 21.9 16 118°47.9 64°52.9 39.5 104°12.8 54.3 62°06.5 10.1 129°00.4 21.9 17 133°50.4 79°52.2 40.3 119°13.5 55.1 77°08.4 10.3 144°02.7 21.8 18 148°52.9 94°51.5 N18°41.1 134°14.2 N04°55.8 92°10.2 N19°10.4 159°05.0 \$06°21.8 19 163°55.3 109°50.8 41.9 149°14.9 56.5 107°12.1 10.5 174°07.3 21.7 20 178°57.8 124°50.2 42.7 164°15.7 57.3 122°13.9 10.7 189°09.6 21.6 21 194°00.3 139°49.5 · · 43.5 179°16.4 · · 58.0 137°15.8 · · 10.8 204°12.0 · · 21.6 22 209°02.7 154°48.8 44.3 194°17.1 58.8 152°17.7 10.9 219°14.3 21.5    23 224°05.2 169°48.2 45.1 209°17.8 59.5 167°19.5 11.1 234°16.6 21.5      Saturn 10°18.5 07:29   May 20 Mon SHA Mer.pass     Venus 306°55.0 11:40      Mars 345°52.9 09.03      Mars 345°52.9 09.03      Saturn 10°18.5 07:29      May 20 Mon SHA Mer.pass      Venus 306°55.0 11:40      Mars 345°52.9 09.03      Saturn 10°18.5 07:29      May 20 Mon SHA Mer.pass      Venus 306°55.0 11:40      Mars 345°52.9 09.03      Saturn 10°18.5 07:29      Mars 306°55.0 11:40      Mars 345°52.9 09.03      Saturn 10°18.5 07:29      Mars 306°55.0 11:40      Mars 345°52.9 09.03      Saturn 10°18.5 07:29      Mars 306°55.0 11:40      Mars 345°52.9 09.03      Saturn 10°18.5 07:29      May 20 Mon SHA Mer.pass      Venus 306°55.0 11:40      Mars 345°52.9 09.03      Saturn 10°18.5 07:29      May 20 Mon SHA Mer.pass      Venus 306°55.0 11:40      Mars 345°52.9 09.03      Saturn 10°18.5 07:29      May 20 Mon SHA Mer.pass      Venus 306°55.0 11:40      Mars 345°52.9 09.03      Saturn 10°18.5 07:29      Mars 345°52.9 09.03      Mar													
15 103°45.5 49°53.5 · · · 38.7 89°12.1 · · · 53.6 47°04.7 · · · 10.0 113°58.1 · · · 21.9 18°47.9 64°52.9 39.5 104°12.8 54.3 62°06.5 10.1 129°00.4 21.9 17 133°50.4 79°52.2 40.3 119°13.5 55.1 77°08.4 10.3 144°02.7 21.8 18 148°52.9 94°51.5 N18°41.1 134°14.2 N04°55.8 92°10.2 N19°10.4 159°05.0 506°21.8 19 163°55.3 109°50.8 41.9 149°14.9 56.5 107°12.1 10.5 174°07.3 21.7 20 178°57.8 124°50.2 42.7 164°15.7 57.3 122°13.9 10.7 189°09.6 21.6 21 194°00.3 139°49.5 · · · 43.5 179°16.4 · · 58.0 137°15.8 · · 10.8 204°12.0 · · 21.6 22 209°02.7 154°48.8 44.3 194°17.1 58.8 152°17.7 10.9 219°14.3 21.5 23 224°05.2 169°48.2 45.1 209°17.8 59.5 167°19.5 11.1 234°16.6 21.5 Mars: 0.1											Saturn	10°18.5	07:29
16 118°47.9 64°52.9 39.5 104°12.8 54.3 62°06.5 10.1 129°00.4 21.9 17 133°50.4 79°52.2 40.3 119°13.5 55.1 77°08.4 10.3 144°02.7 21.8 18 148°52.9 94°51.5 N18°41.1 134°14.2 N04°55.8 92°10.2 N19°10.4 159°05.0 506°21.8 19 163°55.3 109°50.8 41.9 149°14.9 56.5 107°12.1 10.5 174°07.3 21.7 20 178°57.8 124°50.2 42.7 164°15.7 57.3 122°13.9 10.7 189°09.6 21.6 21 194°00.3 139°49.5 · · 43.5 179°16.4 · · 58.0 137°15.8 · · 10.8 204°12.0 · · 21.6 22 209°02.7 154°48.8 44.3 194°17.1 58.8 152°17.7 10.9 219°14.3 21.5 23 224°05.2 169°48.2 45.1 209°17.8 59.5 167°19.5 11.1 234°16.6 21.5 Mars: 0.1											May 20 Mar	CH A	Mor pass
17 133°50.4 79°52.2 40.3 119°13.5 55.1 77°08.4 10.3 144°02.7 21.8 148°52.9 94°51.5 N18°41.1 134°14.2 N04°55.8 92°10.2 N19°10.4 159°05.0 S06°21.8 19 163°55.3 109°50.8 41.9 149°14.9 56.5 107°12.1 10.5 174°07.3 21.7 20 178°57.8 124°50.2 42.7 164°15.7 57.3 122°13.9 10.7 189°09.6 21.6 21 194°00.3 139°49.5 · · 43.5 179°16.4 · · 58.0 137°15.8 · · 10.8 204°12.0 · · 21.6 22 209°02.7 154°48.8 44.3 194°17.1 58.8 152°17.7 10.9 219°14.3 21.5 23 224°05.2 169°48.2 45.1 209°17.8 59.5 167°19.5 11.1 234°16.6 21.5 Mars: 0.1													
18 148°52.9 94°51.5 N18°41.1 134°14.2 N04°55.8 92°10.2 N19°10.4 159°05.0 S06°21.8 19 163°55.3 109°50.8 41.9 149°14.9 56.5 107°12.1 10.5 174°07.3 21.7 20 178°57.8 124°50.2 42.7 164°15.7 57.3 122°13.9 10.7 189°09.6 21.6 21 194°00.3 139°49.5 · 43.5 179°16.4 · 58.0 137°15.8 · 10.8 204°12.0 · 21.6 22 209°02.7 154°48.8 44.3 194°17.1 58.8 152°17.7 10.9 219°14.3 21.5 23 224°05.2 169°48.2 45.1 209°17.8 59.5 167°19.5 11.1 234°16.6 21.5 Mars: 0.1													
19 163°55.3 109°50.8 41.9 149°14.9 56.5 107°12.1 10.5 174°07.3 21.7 20 178°57.8 124°50.2 42.7 164°15.7 57.3 122°13.9 10.7 189°09.6 21.6 21 194°00.3 139°49.5 · · 43.5 179°16.4 · · 58.0 137°15.8 · · 10.8 204°12.0 · · 21.6 22 209°02.7 154°48.8 44.3 194°17.1 58.8 152°17.7 10.9 219°14.3 21.5 23 224°05.2 169°48.2 45.1 209°17.8 59.5 167°19.5 11.1 234°16.6 21.5 Mars: 0.1											I		
20 178°57.8 124°50.2 42.7 164°15.7 57.3 122°13.9 10.7 189°09.6 21.6 21 194°00.3 139°49.5 · · 43.5 179°16.4 · · 58.0 137°15.8 · · 10.8 204°12.0 · · 21.6 22 209°02.7 154°48.8 44.3 194°17.1 58.8 152°17.7 10.9 219°14.3 21.5 23 224°05.2 169°48.2 45.1 209°17.8 59.5 167°19.5 11.1 234°16.6 21.5 Mars: 0.1											1		
21       194°00.3       139°49.5       · · 43.5       179°16.4       · · 58.0       137°15.8       · · 10.8       204°12.0       · · 21.6       Horizontal parallax         22       209°02.7       154°48.8       44.3       194°17.1       58.8       152°17.7       10.9       219°14.3       21.5       Venus:       0.1         23       224°05.2       169°48.2       45.1       209°17.8       59.5       167°19.5       11.1       234°16.6       21.5       Mars:       0.1													
22       209°02.7       154°48.8       44.3       194°17.1       58.8       152°17.7       10.9       219°14.3       21.5       Venus: 0.1         23       224°05.2       169°48.2       45.1       209°17.8       59.5       167°19.5       11.1       234°16.6       21.5       Mars: 0.1											Horizont	tal parallax	
23 224°05.2 169°48.2 45.1 209°17.8 59.5 167°19.5 11.1 234°16.6 21.5 Mars: 0.1	22	209°02.7	154°48.8			58.8	152°17.7						
Mer pass 08:06 ν-0.7' d0.8' m-3.92 ν0.7' d0.7' m1.07 ν1.9' d0.1' m-2.00 ν2.3' d-0.1' m1.05	23	224°05.2	169°48.2	45.1	209°17.8	59.5	$167^{\circ}19.5$	11.1	$234^{\circ}16.6$	21.5		Mars:	0.1
	Mern	nass 08:06	ν-0 7' d0	8' m-3 02	νη 7/ Αη	7′ m1 07	v1 0/ d0	1′ m-2 00	v2 3/ d.0	1' m1 05			

h	Sur	Moon						
Sat	GHA	Dec	GHA	ν	Dec	d	HP	
0	180°53.4	N19°36.8	60°09.1	17.3'	N03°39.7	-14.0'	54.1'	
1	195°53.4	37.4	74°45.4	17.4'	03°25.7	-14.0'	54.1'	
2	210°53.3	37.9	89°21.7	17.4	03°11.7	-14.0'	54.1'	
3 4	225°53.3 240°53.3	· · 38.4 39.0	103°58.1 118°34.5	17.4' 17.4'	02°57.6 02°43.6	-14.1' -14.1'	54.1' 54.1'	
5	255°53.2	39.0 39.5	110 34.5 133°10.8	17.4'	02°43.0	-14.1'	54.1'	
6	270°53.2	N19°40.1	147°47.2	17.4	N02°15.4	-14.1'	54.1'	
7	285°53.2	40.6	$162^{\circ}23.6$	17.4'	02°01.3	-14.1'	54.1'	
8	300°53.2	41.2	177°00.0	17.4'	01°47.2	-14.1'	54.1'	
9	315°53.1	• • 41.7	191°36.4	17.4	01°33.1	-14.1'	54.1'	
10 11	330°53.1 345°53.1	42.2 42.8	206°12.8 220°49.1	17.4' 17.4'	01°19.0 01°04.8	-14.1' -14.1'	54.1' 54.2'	
12	0°53.1	N19°43.3	235°25.5	17.4	N00°50.7	-14.1'	54.2'	
13	15°53.0	43.8	$250^{\circ}01.9$	17.4'	00°36.6	-14.1'	54.2'	
14	30°53.0	44.4	264°38.3	17.4'	00°22.4	-14.2'	54.2'	
15 16	45°53.0 60°52.9	• • 44.9 45.5	279°14.6 293°51.0	17.4' 17.4'	N00°08.3 S00°05.9	-14.2' 14.2'	54.2' 54.2'	
17	75°52.9	45.5 46.0	293 51.0 308°27.4	17.4	00° 20.0	14.2	54.2'	
18	90°52.9	N19°46.5	323°03.7	17.3'	S00°34.2	14.2'	54.2'	
19	105°52.9	47.1	337°40.0	17.3'	00°48.4	14.2'	54.2'	
20	120°52.8	47.6	352°16.4	17.3'	01°02.5	14.2'	54.2'	
21 22	135°52.8 150°52.8	· · 48.1 48.7	6°52.7 21°29.0	17.3' 17.3'	01°16.7 01°30.9	14.2' 14.2'	54.2' 54.2'	
23	150 52.8 165°52.7	48.7 49.2	21 29.0 36°05.3	17.3'	01 30.9 01°45.0	14.2'	54.2'	
23					$01^{\circ}43.0$ 0 = 14.8'	± 1.4	- 1.2	
	SD = 15.8'	d = 0.5'		51	/ 14.8 = ر			
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0 1	180°52.7 195°52.7	N19°49.7 50.3	50°41.5 65°17.8	17.2' 17.2'	\$01°59.2 02°13.4	14.2' 14.2'	54.2' 54.2'	
2	210°52.6	50.3 50.8	79°54.0	17.2'	02°13.4	14.2'	54.2'	
3	225°52.6	51.3	94°30.2	17.2'	02°41.7	14.2'	54.3'	
4	240°52.6	51.8	$109^{\circ}06.4$	17.2'	$02^{\circ}55.8$	14.1'	54.3'	
5	255°52.5	52.4	123°42.6	17.1'	03°10.0	14.1'	54.3'	
6 7	270°52.5 285°52.5	N19°52.9 53.4	138°18.7 152°54.8	17.1' 17.1'	\$03°24.1 03°38.3	14.1' 14.1'	54.3' 54.3'	
8	300°52.4	54.0	167°30.9	17.1'	03°52.4	14.1	54.3'	
9	315°52.4	• • 54.5	182°07.0	17.0'	04°06.5	14.1'	54.3'	
10	330°52.4	55.0	$196^{\circ}43.1$	17.0'	04°20.6	14.1'	54.3'	
11	345°52.3	55.5	211°19.1	17.0'	04°34.7	14.1'	54.3'	
12 13	0°52.3 15°52.3	N19°56.1 56.6	225°55.1 240°31.0	17.0' 16.9'	\$04°48.8 05°02.9	14.1' 14.1'	54.3' 54.3'	
14	30°52.2	50.0 57.1	255°07.0	16.9'	05 02.9 05°17.0	14.1	54.4'	
15	45°52.2	• • 57.6	269°42.8	16.9'	05°31.0	14.0'	54.4'	
16	60°52.2	58.2	$284^{\circ}18.7$	16.8'	$05^{\circ}45.1$	14.0'	54.4'	
17	75°52.1	58.7	298°54.5	16.8'	05°59.1	14.0'	54.4'	
18 19	90°52.1 105°52.1	N19°59.2 19°59.7	313°30.3 328°06.1	16.8' 16.7'	\$06° 13.1 06° 27.1	14.0' 14.0'	54.4' 54.4'	
20	120°52.0	20°00.2	342°41.8	16.7'	06°41.1	14.0'	54.4'	
21	135°52.0	• • 00.8	$357^{\circ}17.5$	16.6'	06°55.1	14.0'	54.4'	
22	150°52.0	01.3	11°53.1	16.6'	07°09.0	13.9'	54.4'	
23	165°51.9	01.8	26°28.7	16.5'	07°23.0	13.9'	54.5'	
	SD = 15.8′	15.8' $d = 0.5'$ SD = 14.8'						
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	180°51.9	$N20^{\circ}02.3$	41°04.2	16.5'	<b>S</b> 07°36.9	13.9'	54.5'	
1	195°51.9	02.8	55°39.7	16.5'	07°50.8	13.9'	54.5'	
2 3	210°51.8 225°51.8	03.3	70°15.2 84°50.6	16.4' 16.4'	08°04.6 08°18.5	13.8' 13.8'	54.5' 54.5'	
3 4	240°51.7	04.4	99°26.0	16.3'	08°32.3	13.8'	54.5'	
5	255°51.7	04.9	$114^{\circ}01.3$	16.3'	08°46.1	13.8'	54.5'	
6	270°51.7	N20°05.4	128°36.5	16.2'	S08°59.9	13.8'	54.6'	
7	285°51.6 300°51.6	05.9	143°11.8 157°46.9	16.2'	09°13.6 09°27.4	13.7'	54.6'	
8 9	300°51.6 315°51.6	06.4 •• 06.9	157°46.9 172°22.0	16.1' 16.1'	09°27.4 09°41.1	13.7' 13.7'	54.6' 54.6'	
10	330°51.5	07.5	186°57.1	16.0'	09°54.7	13.6'	54.6'	
11	345°51.5	08.0	201°32.1	15.9'	10°08.4	13.6'	54.6'	
12	0°51.4	N20°08.5	216°07.0	15.9'	\$10°22.0	13.6'	54.6'	
13 14	15°51.4 30°51.4	09.0 09.5	230°41.9 245°16.8	15.8' 15.8'	10°35.6 10°49.1	13.5' 13.5'	54.7' 54.7'	
14 15	45°51.3	10.0	245 10.8 259°51.5	15.8 15.7'	10 49.1 11°02.6	13.5'	54.7'	
16	60°51.3	10.5	274°26.2	15.7'	11°16.1	13.4	54.7'	
17	75°51.2	11.0	289°00.9	15.6'	11°29.6	13.4'	54.7'	
18	90°51.2	N20°11.5	303°35.5	15.5'	\$11°43.0	13.4'	54.7'	
19 20	105°51.2 120°51.1	12.0 12.5	318°10.0 332°44.5	15.5' 15.4'	11°56.3 12°09.7	13.3' 13.3'	54.7' 54.8'	
21	135°51.1	. 13.0	347°18.9	15.4	12 09.7 12°23.0	13.3'	54.8'	
22	150°51.0	13.5	1°53.2	15.3'	12°36.2	13.2'	54.8'	
23	165°51.0	14.0	16°27.4	15.2'	12°49.5	13.2'	54.8'	
	SD = 15.8'	d = 0.5'		SI	O = 14.9'			

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

N 72°         14:19         16:18         18:29         02:40         02:09         01:35           N 70°         14:20         16:09         18:06         02:36         02:12         01:46           68°         14:20         16:02         17:50         02:33         02:15         01:56           66°         14:20         15:56         17:36         02:30         02:17         02:04           64°         14:20         15:51         17:25         02:28         02:19         02:10           60°         14:21         15:46         17:16         02:26         02:21         02:16           60°         14:21         15:46         17:16         02:26         02:21         02:16           60°         14:21         15:33         17:01         02:22         02:24         02:23         02:21           N 6°         14:21         15:37         16:55         02:21         02:25         02:30           54°         14:21         15:34         16:49         02:20         02:26         02:33           52°         14:21         15:32         16:44         02:17         02:28         02:27         02:37           50°	Lat.		Moonris	e		Moonset	t
N 70°         14:20         16:09         18:06         02:36         02:12         01:46           68°         14:20         16:02         17:50         02:33         02:15         01:56           66°         14:20         15:56         17:36         02:30         02:17         02:04           64°         14:20         15:51         17:25         02:28         02:19         02:10           60°         14:21         15:46         17:16         02:26         02:21         02:10           60°         14:21         15:43         17:08         02:24         02:23         02:21           00°         14:21         15:33         17:01         02:22         02:24         02:23           56°         14:21         15:34         16:49         02:20         02:26         02:30           54°         14:21         15:32         16:44         02:18         02:27         02:37           50°         14:21         15:30         16:40         02:17         02:28         02:40           45°         14:21         15:25         16:30         02:15         02:30         02:45           N 40°         14:22         15:15	Lat.	Sat	Sun	Mon	Sat	Sun	Mon
68°         14:20         16:02         17:50         02:33         02:15         01:56           66°         14:20         15:56         17:36         02:30         02:17         02:04           64°         14:20         15:51         17:25         02:28         02:19         02:10           62°         14:21         15:46         17:16         02:26         02:21         02:16           60°         14:21         15:43         17:08         02:24         02:23         02:21           N 58°         14:21         15:39         17:01         02:22         02:24         02:26           56°         14:21         15:37         16:55         02:21         02:25         02:30           54°         14:21         15:34         16:49         02:20         02:26         02:33           52°         14:21         15:32         16:44         02:18         02:27         02:37           50°         14:21         15:25         16:30         02:15         02:30         02:46           N 40°         14:22         15:18         16:15         02:13         02:32         02:52           35°         14:22         15:18	N 72°	14:19	16:18	18:29	02:40	02:09	01:35
66°         14:20         15:56         17:36         02:30         02:17         02:04           64°         14:20         15:51         17:25         02:28         02:19         02:10           62°         14:21         15:46         17:16         02:26         02:21         02:16           60°         14:21         15:43         17:08         02:24         02:23         02:21           N 58°         14:21         15:39         17:01         02:22         02:24         02:25           56°         14:21         15:37         16:55         02:21         02:25         02:30           54°         14:21         15:34         16:49         02:20         02:26         02:33           52°         14:21         15:32         16:44         02:18         02:27         02:37           50°         14:21         15:30         16:40         02:17         02:28         02:40           45°         14:21         15:25         16:30         02:15         02:30         02:46           N 40°         14:22         15:18         16:15         02:11         02:34         02:57           30°         14:22         15:18	N 70°	14:20	16:09	18:06	02:36	02:12	01:46
64°         14:20         15:51         17:25         02:28         02:19         02:10           62°         14:21         15:46         17:16         02:26         02:21         02:16           60°         14:21         15:43         17:08         02:24         02:23         02:21           N 58°         14:21         15:39         17:01         02:22         02:24         02:26           56°         14:21         15:37         16:55         02:21         02:25         02:30           54°         14:21         15:37         16:49         02:20         02:26         02:33           52°         14:21         15:32         16:44         02:18         02:27         02:37           50°         14:21         15:30         16:40         02:17         02:28         02:40           45°         14:21         15:25         16:30         02:15         02:30         02:46           N 40°         14:22         15:18         16:15         02:11         02:34         02:57           30°         14:22         15:15         16:09         02:10         02:35         03:01           20°         14:22         15:10	68°	14:20	16:02	17:50	02:33	02:15	01:56
62° 14:21 15:46 17:16 02:26 02:21 02:16 60° 14:21 15:43 17:08 02:24 02:23 02:21   N 58° 14:21 15:39 17:01 02:22 02:24 02:26 56° 14:21 15:37 16:55 02:21 02:25 02:30   54° 14:21 15:34 16:49 02:20 02:26 02:33   52° 14:21 15:32 16:44 02:18 02:27 02:37   50° 14:21 15:30 16:40 02:17 02:28 02:40   45° 14:21 15:30 16:40 02:17 02:28 02:40   45° 14:21 15:25 16:30 02:15 02:30 02:46   N 40° 14:22 15:13 16:15 02:11 02:34 02:57   30° 14:22 15:18 16:15 02:11 02:34 02:57   30° 14:22 15:15 16:09 02:10 02:37 03:08   N 10° 14:22 15:15 16:09 02:10 02:37 03:08   N 10° 14:22 15:06 15:50 02:05 02:39 03:15   0° 14:22 15:02 15:42 02:02 02:41 03:21   S 10° 14:23 14:58 15:34 02:00 02:43 03:27   20° 14:23 14:58 15:34 02:00 02:43 03:27   20° 14:23 14:43 15:05 01:57 02:45 03:34   30° 14:23 14:49 15:15 01:55 02:47 03:41   35° 14:23 14:49 15:15 01:55 02:47 03:41   35° 14:23 14:43 15:03 01:51 02:50 03:50   45° 14:24 14:39 14:56 01:49 02:52 03:56   S 50° 14:24 14:33 14:43 01:45 02:55 04:06   54° 14:24 14:31 14:39 01:44 02:56 04:10   56° 14:24 14:29 14:38 01:40 02:59 04:18	66°	14:20	15:56	17:36	02:30	02:17	02:04
60°         14:21         15:43         17:08         02:24         02:23         02:21           N 58°         14:21         15:39         17:01         02:22         02:24         02:26           56°         14:21         15:37         16:55         02:21         02:25         02:30           54°         14:21         15:34         16:49         02:20         02:26         02:33           50°         14:21         15:32         16:44         02:18         02:27         02:37           50°         14:21         15:30         16:40         02:17         02:28         02:40           45°         14:21         15:25         16:30         02:15         02:30         02:46           N 40°         14:22         15:18         16:15         02:11         02:30         02:46           N 40°         14:22         15:18         16:15         02:11         02:32         02:52           30°         14:22         15:15         16:09         02:10         02:35         03:01           20°         14:22         15:10         15:59         02:07         02:37         03:08           N 10°         14:22         15:06		14:20	15:51	17:25	02:28	02:19	02:10
N 58°         14:21         15:39         17:01         02:22         02:24         02:26           56°         14:21         15:37         16:55         02:21         02:25         02:30           54°         14:21         15:34         16:49         02:20         02:26         02:33           52°         14:21         15:32         16:44         02:18         02:27         02:37           50°         14:21         15:30         16:40         02:17         02:28         02:40           N 40°         14:22         15:21         16:30         02:15         02:30         02:46           N 40°         14:22         15:11         16:22         02:13         02:32         02:52           35°         14:22         15:15         16:09         02:10         02:33         03:01           20°         14:22         15:10         15:59         02:07         02:37         03:08           N 10°         14:22         15:06         15:50         02:05         02:39         03:15           0°         14:23         14:58         15:34         02:00         02:41         03:21           S 10°         14:23         14:53		14:21	15:46	17:16	02:26	02:21	02:16
56°         14:21         15:37         16:55         02:21         02:25         02:30           54°         14:21         15:34         16:49         02:20         02:26         02:33           52°         14:21         15:32         16:44         02:18         02:27         02:37           50°         14:21         15:30         16:40         02:17         02:28         02:40           45°         14:21         15:50         16:30         02:15         02:30         02:46           N 40°         14:22         15:18         16:15         02:11         02:32         02:52           35°         14:22         15:18         16:15         02:11         02:34         02:57           30°         14:22         15:15         16:09         02:10         02:35         03:01           20°         14:22         15:10         15:59         02:07         02:37         03:08           N 10°         14:22         15:06         15:50         02:05         02:39         03:15           0°         14:23         14:58         15:34         02:00         02:41         03:21           \$10°         14:23         14:58	1	14:21	15:43	17:08	02:24	02:23	02:21
54°         14:21         15:34         16:49         02:20         02:26         02:33           52°         14:21         15:32         16:44         02:18         02:27         02:37           50°         14:21         15:30         16:40         02:17         02:28         02:40           45°         14:21         15:25         16:30         02:15         02:30         02:46           N 40°         14:22         15:21         16:22         02:13         02:32         02:52           35°         14:22         15:18         16:15         02:11         02:34         02:57           30°         14:22         15:15         16:09         02:10         02:35         03:01           20°         14:22         15:10         15:59         02:07         02:37         03:08           N 10°         14:22         15:06         15:50         02:05         02:39         03:15           0°         14:23         14:58         15:34         02:00         02:41         03:21           S 10°         14:23         14:58         15:34         02:00         02:43         03:27           20°         14:23         14:58		14:21	15:39	17:01	02:22	02:24	02:26
52°         14:21         15:32         16:44         02:18         02:27         02:37           50°         14:21         15:30         16:40         02:17         02:28         02:40           45°         14:21         15:25         16:30         02:15         02:30         02:46           N 40°         14:22         15:21         16:22         02:13         02:32         02:52           35°         14:22         15:18         16:15         02:11         02:34         02:57           30°         14:22         15:15         16:09         02:10         02:35         03:01           20°         14:22         15:15         16:59         02:07         02:37         03:08           N 10°         14:22         15:06         15:50         02:05         02:39         03:15           0°         14:23         14:58         15:34         02:00         02:41         03:21           20°         14:23         14:58         15:34         02:00         02:43         03:27           20°         14:23         14:45         15:55         01:57         02:45         03:34           30°         14:23         14:49	56°	14:21	15:37	16:55	02:21	02:25	02:30
50°         14:21         15:30         16:40         02:17         02:28         02:40           45°         14:21         15:25         16:30         02:15         02:30         02:46           N 40°         14:22         15:21         16:22         02:13         02:32         02:52           35°         14:22         15:18         16:15         02:11         02:34         02:57           30°         14:22         15:15         16:09         02:10         02:35         03:01           20°         14:22         15:10         15:59         02:07         02:37         03:08           N 10°         14:22         15:06         15:50         02:05         02:39         03:15           0°         14:22         15:02         15:42         02:02         02:41         03:21           S 10°         14:23         14:58         15:34         02:00         02:43         03:27           20°         14:23         14:453         15:25         01:57         02:45         03:34           30°         14:23         14:49         15:15         01:55         02:47         03:41           35°         14:23         14:43		14:21	15:34	16:49	02:20	02:26	02:33
45°         14:21         15:25         16:30         02:15         02:30         02:46           N 40°         14:22         15:21         16:22         02:13         02:32         02:52           35°         14:22         15:18         16:15         02:11         02:34         02:57           30°         14:22         15:15         16:09         02:10         02:35         03:01           20°         14:22         15:10         15:59         02:07         02:37         03:08           N 10°         14:22         15:06         15:50         02:05         02:39         03:15           0°         14:22         15:02         15:42         02:02         02:41         03:21           S 10°         14:23         14:58         15:34         02:00         02:43         03:27           20°         14:23         14:45         15:15         01:57         02:45         03:34           30°         14:23         14:49         15:15         01:55         02:47         03:41           35°         14:23         14:46         15:10         01:53         02:49         03:45           40°         14:23         14:43		14:21	15:32	16:44	02:18		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		14:21	15:30	16:40	02:17	02:28	02:40
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	45°	14:21	15:25	16:30	02:15	02:30	02:46
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		14:22	15:21	16:22	02:13	02:32	02:52
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	35°	14:22	15:18	16:15	02:11	02:34	02:57
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		14:22	15:15	16:09	02:10	02:35	03:01
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		14:22	15:10	15:59	02:07	02:37	03:08
S 10°         14:23         14:58         15:34         02:00         02:43         03:27           20°         14:23         14:53         15:25         01:57         02:45         03:34           30°         14:23         14:49         15:15         01:55         02:47         03:41           35°         14:23         14:46         15:10         01:53         02:49         03:45           40°         14:23         14:43         15:03         01:51         02:50         03:50           45°         14:24         14:39         14:56         01:49         02:52         03:56           S 50°         14:24         14:35         14:47         01:46         02:54         04:03           52°         14:24         14:33         14:43         01:45         02:55         04:06           54°         14:24         14:31         14:39         01:44         02:56         04:10           56°         14:24         14:29         14:34         01:42         02:57         04:14           58°         14:25         14:26         14:28         01:40         02:59         04:18		I					
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	1	14:22	15:02	15:42	02:02	02:41	03:21
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		14:23	14:58	15:34	02:00	02:43	03:27
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		14:23	14:53	15:25	01:57	02:45	03:34
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		14:23	14:49	15:15	01:55	02:47	
45°         14:24         14:39         14:56         01:49         02:52         03:56           \$ 50°         14:24         14:35         14:47         01:46         02:54         04:03           52°         14:24         14:33         14:43         01:45         02:55         04:06           54°         14:24         14:31         14:39         01:44         02:56         04:10           56°         14:24         14:29         14:34         01:42         02:57         04:14           58°         14:25         14:26         14:28         01:40         02:59         04:18					0 - 10 - 0		
S 50°         14:24         14:35         14:47         01:46         02:54         04:03           52°         14:24         14:33         14:43         01:45         02:55         04:06           54°         14:24         14:31         14:39         01:44         02:56         04:10           56°         14:24         14:29         14:34         01:42         02:57         04:14           58°         14:25         14:26         14:28         01:40         02:59         04:18							
52°     14:24     14:33     14:43     01:45     02:55     04:06       54°     14:24     14:31     14:39     01:44     02:56     04:10       56°     14:24     14:29     14:34     01:42     02:57     04:14       58°     14:25     14:26     14:28     01:40     02:59     04:18	1	14:24	14:39	14:56	01:49	02:52	03:56
54°     14:24     14:31     14:39     01:44     02:56     04:10       56°     14:24     14:29     14:34     01:42     02:57     04:14       58°     14:25     14:26     14:28     01:40     02:59     04:18							
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58°   14:25   14:26   14:28   01:40   02:59   04:18		l			-		
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<b>S</b> 60°   14:25		1					
	<b>S</b> 60°	14:25	14:23	14:22	01:39	03:00	04:23

May 21, 22, 23 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
		184°47.5	N18°45.9		N05°00.2	182°21.4	N19°11.2	249° 18.9	S06°21.4		эпа	Dec
0	239°07.7			224°18.5						Alpheratz	357°35.5	29°13.3
1	254°10.1	199°46.8	46.7	239°19.2	01.0	197°23.2	11.3	264°21.2	21.4	Ankaa	353°07.9	-42°10.3
2	269°12.6	214°46.2	47.5	254°19.9	01.7	212°25.1	11.5	279°23.5	21.3	Schedar	349°32.1	56°40.0
3	284°15.0	229°45.5	• • 48.3	269°20.6	• • 02.4	227°26.9	• • 11.6	294°25.8	• • 21.3	Diphda	348°48.1	-17°51.2
4	299°17.5	244° 44.8	49.1	284°21.3	03.2	242°28.8	11.7	309°28.2	21.2	Achernar	335°21.1	-57°06.6
5	314°20.0	259°44.1	49.9	299°22.1	03.9	257°30.7	11.9	324°30.5	21.2			23°34.5
6	329°22.4	274°43.5	N18°50.7	314°22.8	N05°04.7	272°32.5	N19°12.0	339°32.8	S06°21.1	Hamal	327°52.1	
7	344°24.9	289°42.8	51.5	329°23.5	05.4	287°34.4	12.1	354°35.1	21.1	Polaris	314°47.1	89°21.9
8	359°27.4	304°42.1	52.3	344°24.2	06.1	302°36.2	12.3	9°37.4	21.0	Acamar	315°12.6	-40°12.4
9	14°29.8	319°41.4	53.1	359°24.9	06.9	317°38.1	. 12.4	24°39.7	· · 21.0	Menkar	314°07.0	$4^{\circ}11.0$
10	29°32.3	334°40.8	53.9	14°25.6	07.6	332°39.9	12.5	39°42.1	20.9	Mirfak	308°29.6	49°56.8
	44°34.8							54° 44.4		Aldebaran	290°40.6	16°33.4
11		349°40.1	54.7	29°26.3	08.3	347°41.8	12.6		20.9	Rigel	281°04.7	-8°10.5
12	59°37.2	4°39.4	N18°55.4	44°27.0	N05°09.1	2°43.6	N19°12.8	69°46.7	S06°20.8	Capella	280°23.2	46°01.4
13	74°39.7	19°38.7	56.2	59°27.7	09.8	17°45.5	12.9	84°49.0	20.8	Bellatrix	278°23.8	6°22.3
14	89°42.2	34°38.0	57.0	74°28.4	10.5	32°47.4	13.0	99°51.3	20.7	Elnath	278°02.9	28°37.7
15	104°44.6	49°37.4	• • 57.8	89°29.2	• • 11.3	47°49.2	• • 13.2	114°53.7	• • 20.7	Alnilam	275°38.6	-1°11.2
16	$119^{\circ}47.1$	64°36.7	58.6	104°29.9	12.0	62°51.1	13.3	$129^{\circ}56.0$	20.6	Betelgeuse	270°53.0	7°24.7
17	134°49.5	79°36.0	18°59.4	119°30.6	12.8	77°52.9	13.4	144°58.3	20.6			
18	149°52.0	94°35.3	N19°00.2	134°31.3	N05°13.5	92°54.8	N19°13.6	160°00.6	S06°20.5	Canopus	263°53.1	-52°42.6
19	164°54.5	109°34.6	01.0	149°32.0	14.2	107°56.6	13.7	175°02.9	20.4	Sirius	258°27.0	-16°45.0
20	179°56.9	124° 34.0	01.7	164°32.7	15.0	122°58.5	13.8	190°05.2	20.4	Adhara	255°06.6	-29°00.4
21	179 50.9 194°59.4	139°33.3	02.5	179°33.4	15.7	138°00.3	• • 14.0	205° 07.6	. 20.4	Procyon	244°51.6	5°09.7
21	210°01.9	159 33.3 154°32.6	03.3	179 33.4 194°34.1	16.4	158 00.3 153°02.2	14.0	205 07.6 220°09.9	20.3	Pollux	243°18.2	$27^{\circ}58.1$
										Avior	234°15.3	-59°35.5
23	225°04.3	169°31.9	04.1	209°34.8	17.2	168°04.1	14.2	235°12.2	20.2	Suhail	222°46.9	-43°32.1
Mer n	ass. 08:02	$\nu$ -0.7' d0	.8′ m-3.92	$\nu 0.7' d0$	.7′ m1.07	$\nu$ 1.9 $^{\prime}$ d0	.1′ m-2.00	$\nu 2.3' d-0$	.1′ m1.05	Miaplacidus	221°38.7	-69°49.3
										Alphard	217°48.4	-8°45.9
										Regulus	207°35.0	11°50.9
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.5	61°37.5
0	240°06.8	184°31.2	N19°04.9	224°35.5	N05°17.9	183°05.9	$N19^{\circ}14.3$	250° 14.5	S06°20.2	Denebola	182°25.4	14°26.2
1	255°09.3	199°30.6	05.6	239°36.3	18.6	198°07.8	14.5	$265^{\circ}16.8$	20.1	Gienah	175°44.0	-17°40.8
2	270°11.7	214°29.9	06.4	254°37.0	19.4	213°09.6	14.6	$280^{\circ}19.2$	20.1		175°44.0 173°00.4	-17 40.8 -63°14.3
3	285°14.2	229° 29.2	• • 07.2	269°37.7	• • 20.1	228°11.5	• • 14.7	295°21.5	• • 20.0	Acrux		
4	300°16.7	244° 28.5	08.0	284°38.4	20.8	243°13.3	14.9	310°23.8	20.0		171°51.9	-57°15.2
5	315°19.1	259° 27.8	08.8	299°39.1	21.6	258°15.2	15.0	325°26.1	19.9	Alioth	166°13.0	55°49.8
6	330°21.6	274°27.1	N19°09.5	314°39.8	N05°22.3	273°17.0	N19°15.1	340°28.4	S06°19.9	Spica	158°22.6	-11°17.4
7	345°24.0	289°26.4	10.3	329°40.5	23.0	288°18.9	15.3	355°30.8	19.8	Alkaid	152°52.0	49°11.6
										Hadar	148°36.2	-60°29.6
8	0°26.5	304°25.8	11.1	344°41.2	23.8	303°20.8	15.4	10°33.1	19.8	Menkent	147°57.9	-36°29.5
9	15°29.0	319°25.1	• • 11.8	359°41.9	• • 24.5	318°22.6	• • 15.5	25°35.4	• • 19.7	Arcturus	145°48.1	19°03.3
10	30°31.4	334° 24.4	12.6	14°42.6	25.2	333°24.5	15.6	40°37.7	19.7	Rigil Kent.	139°40.5	-60°56.3
11	45°33.9	349°23.7	13.4	29°43.4	26.0	348°26.3	15.8	55°40.0	19.6	Kochab	137°18.6	74°03.4
12	60°36.4	4°23.0	N19°14.2	44°44.1	N05°26.7	3°28.2	N19°15.9	70°42.4	S06° 19.6	Zuben'ubi	136°56.3	-16°08.7
13	75°38.8	19°22.3	14.9	59°44.8	27.4	18°30.0	16.0	85°44.7	19.5	Alphecca	126°03.8	26°37.9
14	90°41.3	$34^{\circ}21.6$	15.7	74°45.5	28.2	33°31.9	16.2	100°47.0	19.5	Antares	112°16.1	-26°29.2
15	105°43.8	49°20.9	• • 16.5	89°46.2	• • 28.9	48°33.7	• • 16.3	115°49.3	• • 19.4	Atria	107°10.3	-69°04.2
16	120°46.2	64°20.2	17.2	104°46.9	29.6	63°35.6	16.4	130°51.6	19.4	Sabik	102°03.1	-15°45.4
17	135°48.7	$79^{\circ}19.6$	18.0	119°47.6	30.4	78°37.5	16.6	145°54.0	19.3	Shaula	96°10.7	-13 43.4 -37°07.3
18	150°51.1	$94^{\circ}18.9$	N19°18.8	134°48.3	N05°31.1	93°39.3	N19°16.7	160°56.3	S06°19.3		95°58.7	12°32.4
19	165°53.6	$109^{\circ}18.2$	19.5	149°49.0	31.8	108°41.2	16.8	175°58.6	19.2	Rasalhague		
20	180°56.1	124° 17.5	20.3	164°49.7	32.6	123°43.0	16.9	191°00.9	19.2	Eltanin	90°42.0	51°28.9
21	195°58.5	139° 16.8	· · 21.0	179°50.5	• • 33.3	138°44.9	17.1	206° 03.2	19.1	Kaus Aust.	83°32.9	-34°22.3
22	211°01.0	154° 16.1	21.8	194°51.2	34.0	153°46.7	17.2	221°05.6	19.1	Vega	80°33.3	38°48.1
										Nunki	75°48.2	-26°16.0
23	226°03.5	169° 15.4	22.6	209°51.9	34.8	168°48.6	17.3	236°07.9	19.0	Altair	62°00.3	8°55.8
Mer.pa	ass. 07:58	$\nu$ -0.7′ d0	.8′ m-3.92	$\nu$ 0.7 $^{\prime}$ d0	.7′ m1.07	$\nu$ 1.9′ d0.	.1′ m-2.00	$\nu 2.3' \ d-0$	.1′ m1.04	Peacock	53°06.3	-56°39.2
										Deneb	49°26.0	45°21.7
										Enif	33°39.3	9°59.0
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.6	-46°50.4
0	241°05.9	$184^{\circ}14.7$	$N19^{\circ}23.3$	224°52.6	N05°35.5	183°50.4	N19°17.5	251°10.2	506°19.0	Fomalhaut	15°15.2	-29°29.5
1	256°08.4	$199^{\circ}14.0$	24.1	239°53.3	36.2	198°52.3	17.6	$266^{\circ}12.5$	18.9	Scheat	13°45.8	28°12.7
2	271°10.9	214°13.3	24.8	254°54.0	37.0	213°54.1	17.7	281°14.9	18.9	Markab	13°30.5	15°20.0
3	286°13.3	229°12.6	• • 25.6	269°54.7	• • 37.7	228°56.0	• • 17.9	296° 17.2	• • 18.8	ividikaD	10.00.0	10.00
4	301°15.8	244°11.9	26.4	284°55.4	38.4	243°57.9	18.0	311° 19.5	18.8	May 21 Tue	SHA	Mer.pass
5	316°18.3	259° 11.2	27.1	299°56.1	39.2	258°59.7	18.1	326°21.8	18.7		305°39.8	11:41
6	331°20.7	274° 10.5	N19°27.9	314°56.8	N05°39.9	274°01.6	N19°18.2	341°24.2	S06° 18.7	Mars		09:02
7	346°23.2	289°09.8	28.6	329°57.6	40.6	289°03.4	18.4	356°26.5	18.6	Jupiter	303°13.7	11:49
8	1°25.6	304°09.1	29.4	344°58.3	41.4	304°05.3	18.5	11°28.8	18.6	Saturn	10°11.2	07:22
9	16°28.1	319°08.4	30.1	359°59.0	• • 42.1	319°07.1	18.6	26°31.1	• 18.5	Jutuill		V22
10	31°30.6	334°07.7	30.9	14°59.7	42.1	334°09.0	18.8	41°33.4	18.5	May 22 Wed	SHA	Mer.pass
11	46°33.0	349°07.0	31.6	30°00.4	43.6	349°10.8	18.9	56° 35.8	18.4	Venus	304°24.4	11:42
12	40°35.5	4°06.3	N19°32.4	45°01.1	N05°44.3	4°12.7	N19°19.0	71°38.1	S06° 18.4	Mars	344°28.7	09:01
	76°38.0	4 06.3 19°05.6	33.1	45 01.1 60°01.8	45.0	4 12.7 19°14.6		71 38.1 86°40.4		Jupiter	$302^{\circ}59.1$	11:46
13							19.1		18.3	Saturn	$10^{\circ}07.7$	07:18
14	91°40.4	34°04.9	33.9	75°02.5	45.7	34°16.4	19.3	101°42.7	18.3		<u></u>	
15	106°42.9	49°04.2	• • 34.6	90°03.2	• • 46.5	49°18.3	•• 19.4	116°45.1	• • 18.2	May 23 Thu	SHA	Mer.pass
16	121°45.4	64°03.5	35.3	105°03.9	47.2	64°20.1	19.5	131°47.4	18.2	Venus		11:44
17	136°47.8	79°02.8	36.1	120°04.6	47.9	79°22.0	19.7	146°49.7	18.1	Mars		09:00
18	151°50.3	94°02.1	N19°36.8	135°05.4	N05°48.7	94°23.8	N19°19.8	161°52.0	S06°18.1	Jupiter	302°44.5	11:43
19	166°52.8	109°01.4	37.6	150°06.1	49.4	109°25.7	19.9	176°54.4	18.0	Saturn	$10^{\circ}04.3$	07:14
20	181°55.2	124°00.7	38.3	165°06.8	50.1	124°27.5	20.0	191°56.7	18.0			
21	196°57.7	139°00.0	• • 39.1	180°07.5	• • 50.9	139°29.4	20.2	206°59.0	• • 18.0	Horizont	al parallax	
22	212°00.1	153°59.3	39.8	195°08.2	51.6	154°31.3	20.3	222°01.3	17.9		Venus:	0.1
23	227°02.6	168°58.6	40.5	210°08.9	52.3	$169^{\circ}33.1$	20.4	237°03.7	17.9		Mars:	0.1
N 4 -	07.54	0 7/ /0	9/ == 2.00		7/ 1 07		1/ 2.00	0.2/	0/ 1 0 4			
ivier.pa	ass. 07:54	$\nu$ -0.1' $a0$	.8′ m-3.92	$\nu$ 0.1' $a$ 0	.7′ m1.07	$\nu$ 1.9 $a$ 0.	.1′ m-2.00	$\nu$ 2.5° $a$ -0	.0′ m1.04			

h	Sui	า			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°50.9	N20°14.5	31°01.6	15.1'	S13°02.6	13.1'	54.8'
1	195°50.9	15.1	45°35.8	15.1'	13°15.8	13.1'	54.8'
2	210°50.9	15.6	60°09.8	15.0'	13°28.9	13.0'	54.9'
3 4	225° 50.8 240° 50.8	· · 16.1 16.6	74°43.8 89°17.7	14.9' 14.8'	13°41.9 13°54.9	13.0' 13.0'	54.9' 54.9'
5	255° 50.7	17.1	103°51.5	14.8	13° 54.9 14° 07.9	12.9'	54.9'
6	270°50.7	N20°17.6	118°25.3	14.7'	S14°20.8	12.9'	54.9'
7	285°50.6	18.1	132°59.0	14.6'	14°33.6	12.8'	55.0'
8	300°50.6	18.6	147°32.6	14.5'	14°46.4	12.8'	55.0'
9 10	315°50.6 330°50.5	· · 19.0 19.5	162°06.1 176°39.6	14.5' 14.4'	14°59.2 15°11.9	12.7' 12.7'	55.0' 55.0'
11	345° 50.5	20.0	170 39.0 191°12.9	14.4	15°11.9	12.6'	55.0'
12	0°50.4	N20°20.5	205°46.2	14.2'	S15°37.1	12.5'	55.0'
13	15°50.4	21.0	$220^{\circ}19.4$	14.1'	$15^{\circ}49.7$	12.5'	55.1'
14	30°50.3	21.5	234°52.6	14.0'	16°02.2	12.4	55.1'
15 16	45° 50.3 60° 50.2	· · 22.0 22.5	249°25.6 263°58.6	14.0' 13.9'	16°14.6 16°27.0	12.4' 12.3'	55.1' 55.1'
17	75° 50.2	23.0	278°31.5	13.8'	16°39.3	12.2'	55.1'
18	90° 50.2	N20°23.5	293°04.2	13.7'	S16°51.5	12.2'	55.2'
19	105°50.1	24.0	307°36.9	13.6'	17°03.7	12.1'	55.2'
20	120°50.1	24.5	322°09.6	13.5'	17°15.8	12.1'	55.2'
21 22	135° 50.0 150° 50.0	· · 25.0 25.5	336° 42.1 351° 14.5	13.4' 13.4'	17°27.9 17°39.9	12.0' 11.9'	55.2' 55.2'
23	150°50.0 165°49.9	25.5 26.0	351 14.5 5°46.9	13.4	17° 39.9 17° 51.8	11.9' 11.9'	55.2' 55.2'
20	SD = 15.8'				0 = 15.0'	11.3	55.2
	שנ = 15.8′	d = 0.5'		5L	ν = 15.0'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°49.9	$N20^{\circ}26.4$	$20^{\circ}19.2$	13.2'	<b>S</b> 18°03.7	11.8'	55.3'
1	195°49.8	26.9	34°51.3	13.1'	18°15.4	11.7'	55.3'
2	210°49.8 225°49.7	27.4 •• 27.9	49°23.4 63°55.4	13.0' 12.9'	18°27.2 18°38.8	11.6' 11.6'	55.3' 55.3'
3 4	225 49.7 240°49.7	28.4	78° 27.3	12.9	18°50.4	11.5	55.3'
5	255°49.6	28.9	92°59.1	12.7'	19°01.9	11.4	55.4'
6	270°49.6	N20°29.4	107°30.8	12.6'	<b>S</b> 19°13.3	11.3'	55.4'
7	285° 49.5	29.8	122°02.4	12.5'	19°24.6	11.3'	55.4'
8	300° 49.5 315° 49.4	30.3 · · 30.8	136°33.9 151°05.4	12.4' 12.3'	19°35.9 19°47.1	11.2'	55.4'
9 10	315 49.4 330°49.4	· · 30.8 31.3	165°36.7	12.3	19 47.1 19°58.2	11.1' 11.0'	55.4' 55.5'
11	345°49.3	31.8	180° 07.9	12.1'	20°09.2	10.9'	55.5'
12	0°49.3	N20°32.3	194°39.0	12.0'	S20°20.1	10.8'	55.5'
13	15°49.2	32.7	209° 10.1	11.9'	20°31.0	10.8'	55.5'
14	30°49.2	33.2	223°41.0	11.8'	20°41.7 20°52.4	10.7' 10.6'	55.6'
15 16	45°49.1 60°49.1	· · 33.7 34.2	238°11.8 252°42.6	11.7' 11.6'	20°52.4 21°03.0	10.5	55.6' 55.6'
17	75°49.0	34.7	267°13.2	11.5'	21°13.5	10.4	55.6'
18	90°49.0	N20°35.1	281°43.7	11.4'	S21°23.9	10.3'	55.6'
19	105°48.9	35.6	296°14.2	11.3'	21°34.2	10.2'	55.7'
20	120°48.9	36.1	310°44.5		21°44.4 21°54.5		55.7'
21 22	135° 48.8 150° 48.8	· · 36.6 37.0	325°14.7 339°44.9	11.1' 11.0'	21°54.5 22°04.5	10.0' 9.9'	55.7' 55.7'
23	165° 48.7	37.5	354°14.9	10.9'	22°14.4	9.8'	55.7'
	SD = 15.8'	d = 0.5'		SE	0 = 15.1'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d o =:	HP
0 1	180° 48.7 195° 48.6	N20°38.0 38.5	8°44.8 23°14.7	10.8' 10.7'	\$22°24.3 22°34.0	9.7' 9.6'	55.8' 55.8'
2	210°48.6	38.9	37°44.4	10.6'	22°43.6	9.5'	55.8'
3	225°48.5	• • 39.4	52°14.0	10.5'	22°53.1	9.4'	55.8'
4	240°48.5	39.9	66°43.5	10.4'	23°02.5	9.3'	55.8'
5	255° 48.4 270° 48.4	40.3 N20°40.8	81°12.9 95°42.2	10.3' 10.2'	23°11.8 \$23°21.0	9.2' 9.1'	55.9' 55.9'
6 7	270°48.4 285°48.3	N20°40.8 41.3	95° 42.2 110° 11.5	10.2	23°30.1	9.1'	55.9'
8	300°48.2	41.8	110 11.5 124°40.6	10.1	23°39.1	8.9'	55.9'
9	315°48.2	• • 42.2	$139^{\circ}09.6$	9.9'	23°47.9	8.7'	56.0'
10	330°48.1	42.7	153°38.5	9.8'	23°56.7	8.6'	56.0'
11	345°48.1	43.2	168° 07.3	9.7'	24°05.3	8.5'	56.0'
12 13	0°48.0 15°48.0	N20°43.6 44.1	182°36.0 197°04.6	9.6' 9.5'	\$24°13.8 24°22.2	8.4' 8.3'	56.0' 56.0'
14	30° 47.9	44.1 44.6	211°33.1	9.5 9.4'	24°22.2 24°30.5	8.2'	56.1'
15	45°47.9	• • 45.0	226°01.5	9.3'	24°38.6	8.0'	56.1'
16	60°47.8	45.5	240°29.8	9.2'	24°46.6	7.9'	56.1'
17	75° 47.7	45.9	254°58.0	9.1'	24°54.6	7.8'	56.1'
18 19	90° 47.7 105° 47.6	N20°46.4 46.9	269°26.1 283°54.1	9.0' 8.9'	\$25°02.3 25°10.0	7.7' 7.5'	56.2' 56.2'
20	105 47.6 120° 47.6	40.9 47.3	203 54.1 298°22.0	8.8'	25°17.5	7.5 7.4'	56.2'
21	135° 47.5	• • 47.8	312°49.8	8.7'	25°24.9	7.3	56.2'
22	150° 47.5	48.3	327° 17.6	8.6'	25°32.2	7.1'	56.2'
23	165°47.4	48.7	341°45.2	8.5'	25°39.3	7.0'	56.3'
	SD = 15.8'	d=0.5'		SE	0 = 15.2'		

Lat	Twi	light	Sunrise	Surset	Twi	ilight
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°						
<b>N</b> 70°						
68°	////	////	00:58	23:03	////	////
66°	////	////	01:52	22:05	////	////
64°	////	////	02:24	21:32	////	////
62°	////	01:17	02:48	21:08	22:41	////
60°	////	01:55	03:06	20:49	22:01	////
<b>N</b> 58°	////	02:21	03:22	20:33	21:34	////
56°	01:10	02:41	03:35	20:20	21:14	22:48
54°	01:45	02:58	03:46	20:09	20:57	22:11
52°	02:09	03:12	03:56	19:58	20:43	21:46
50°	02:28	03:24	04:05	19:49	20:31	21:27
45°	03:03	03:48	04:24	19:30	20:06	20:51
<b>N</b> 40°	03:28	04:07	04:39	19:15	19:47	20:26
35°	03:48	04:23	04:52	19:02	19:31	20:06
30°	04:04	04:36	05:03	18:51	19:18	19:50
$20^{\circ}$	04:29	04:58	05:22	18:32	18:56	19:24
<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 $10^{\circ}$	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
$30^{\circ}$	05:47	06:17	06:42	17:11	17:37	18:06
35°	05:55	06:26	06:53	17:00	17:28	17:59
40°	06:02	06:35	07:05	16:48	17:18	17:51
45°	06:10	06:47	07:19	16:34	17:06	17:43
<b>S</b> 50°	06:20	07:00	07:36	16:17	16:53	17:33
52°	06:24	07:06	07:45	16:08	16:47	17:29
54°	06:28	07:13	07:54	15:59	16:40	17:25
56°	06:33	07:20	08:04	15:49	16:33	17:20
58°	06:38	07:28	08:16	15:37	16:25	17:15
<b>S</b> 60°	06:44	07:37	08:29	15:24	16:16	17:09
	Moonris		ie.		Moonse	t
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
		*****	illu	00:50	· · · · ·	
N 72°	21:56			22:55		
<b>N</b> 70°	20:32			01:14	00:20	
68°	19:54			01:33	01:00	
66°	19:27	21:45		01:48	01:27	00:48
640	10.07	21.02	22.50	00.01	01.40	01.21

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

		Sun		Moon				
Day	Eqn.o	f Time	Mer.	Mer.	Pass.	Age		
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	13-15		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	93-100%		
21	03:24	03:22	11:57	22:36	10:14			
22	03:19	03:17	11:57	23:24	10:59			
23	03:15	03:12	11:57	-:-	11:49			

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
	242°05.1	183°57.9	N19°41.3	225°09.6	N05°53.0	184°35.0	N19°20.6	252°06.0	506°17.8			
0										Alpheratz	357°35.5	29°13.3
1	257°07.5	198°57.2	42.0	240°10.3	53.8	199°36.8	20.7	267°08.3	17.8	Ankaa	353°07.9	-42°10.3
2	272°10.0	213°56.5	42.7	255°11.0	54.5	214°38.7	20.8	282°10.6	17.7	Schedar	349°32.0	56°40.0
3	$287^{\circ}12.5$	228°55.8	• • 43.5	270°11.7	• • 55.2	229°40.5	• • 20.9	297°13.0	• • 17.7	Diphda	348°48.0	-17°51.2
4	302°14.9	243°55.1	44.2	285°12.5	56.0	244°42.4	21.1	312°15.3	17.6			
5	317°17.4	258°54.3	44.9	300°13.2	56.7	259°44.2	21.2	327°17.6	17.6	Achernar	335°21.0	-57°06.6
6	332°19.9	273°53.6	N19°45.7	315°13.9	N05°57.4	274°46.1	N19°21.3	342°19.9	S06°17.5	Hamal	$327^{\circ}52.1$	23°34.5
7	347°22.3	288°52.9	46.4	330°14.6	58.2	289°48.0	21.5	357°22.3	17.5	Polaris	314°46.2	89°21.9
										Acamar	$315^{\circ}12.6$	-40°12.4
8	2°24.8	303°52.2	47.1	345°15.3	58.9	304°49.8	21.6	12°24.6	17.4	Menkar	314°07.0	$4^{\circ}11.1$
9	17°27.3	318°51.5	• • 47.9	0°16.0	05°59.6	319°51.7	• • 21.7	27°26.9	• • 17.4	Mirfak	308° 29.5	49°56.7
10	32°29.7	333°50.8	48.6	15°16.7	06°00.3	334°53.5	21.8	42°29.3	17.3	Aldebaran	290°40.6	16°33.4
11	47°32.2	348°50.1	49.3	30°17.4	01.1	349°55.4	22.0	57°31.6	17.3	Rigel	281°04.7	-8°10.5
12	62°34.6	3°49.4	N19°50.0	45°18.1	N06°01.8	4°57.2	$N19^{\circ}22.1$	72°33.9	S06°17.2	Capella	280°23.2	46°01.4
13	$77^{\circ}37.1$	18°48.7	50.8	60°18.8	02.5	19°59.1	22.2	87°36.2	17.2			
14	92°39.6	33°48.0	51.5	75°19.6	03.2	35°00.9	22.4	102°38.6	17.1	Bellatrix	278°23.8	6°22.3
15	107°42.0	48°47.2	• • 52.2	90°20.3	• • 04.0	50°02.8	• • 22.5	117°40.9	• • 17.1	Elnath	278°02.9	28°37.7
16	122°44.5	63°46.5	52.9	105°21.0	04.7	65°04.7	22.6	132°43.2	17.0	Alnilam	275°38.6	-1°11.2
17	137°47.0	78°45.8	53.7	120°21.7	05.4	80°06.5	22.7	147°45.5	17.0	Betelgeuse	270°53.0	7°24.7
	152°49.4	93°45.1		135°22.4	N06°06.2	95°08.4	N19°22.9	162°47.9	S06°16.9	Canopus	263°53.1	-52°42.6
18			N19°54.4							Sirius	258°27.0	-16°45.0
19	167°51.9	108°44.4	55.1	150°23.1	06.9	110°10.2	23.0	177°50.2	16.9	Adhara	255°06.6	-29°00.4
20	182°54.4	123°43.7	55.8	165°23.8	07.6	125°12.1	23.1	192°52.5	16.9	Procyon	244°51.6	5°09.7
21	197°56.8	138°43.0	• • 56.5	180°24.5	• • 08.3	140°13.9	• • 23.3	207°54.9	• • 16.8	Pollux	243°18.2	27°58.1
22	212°59.3	153°42.2	57.3	195°25.2	09.1	155°15.8	23.4	222°57.2	16.8	Avior	234° 15.3	-59°35.5
23	228°01.8	168°41.5	58.0	210°25.9	09.8	170°17.6	23.5	237°59.5	16.7		234 15.3 222°46.9	-39 33.5 -43°32.1
N 4	07.50		7/ 2.00		_					Suhail		
Mer.p	ass. 07:50	$\nu$ -0.7′ d0	.7′ m-3.92	$\nu$ 0.7' d0	.7′ m1.06	$\nu^{1.9'} d0$	.1′ m-2.00	$\nu^{2.3'} d^{-0}$	0.0′ m1.04	Miaplacidus	221°38.7	-69°49.3
										Alphard	217°48.4	-8°45.9
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.0	11°50.9
0	243°04.2	183°40.8	N19°58.7	225°26.6	N06°10.5	185°19.5	N19°23.6	253°01.8	506°16.7	Dubhe	193°41.5	61°37.5
										Denebola	182°25.4	14°26.2
1	258°06.7	198°40.1	19°59.4	240°27.4	11.2	200°21.3	23.8	268°04.2	16.6	Gienah	175°44.0	-17°40.8
2	273°09.1	213°39.4	20°00.1	255°28.1	12.0	215°23.2	23.9	283°06.5	16.6	Acrux	173°00.4	-63°14.3
3	$288^{\circ}11.6$	228°38.6	• • 00.8	270°28.8	• • 12.7	230°25.1	• • 24.0	298°08.8	• • 16.5		171°52.0	-57°15.2
4	303°14.1	243°37.9	01.5	285°29.5	13.4	245°26.9	24.1	313°11.2	16.5	Alioth	166°13.1	55°49.8
5	318°16.5	258°37.2	02.3	300°30.2	14.1	260°28.8	24.3	328°13.5	16.4	Spica	158° 22.6	-11°17.4
6	333°19.0	273°36.5	N20°03.0	315°30.9	N06°14.9	275°30.6	N19°24.4	343°15.8	S06°16.4		150° 52.0	49°11.6
7	348°21.5	288°35.8	03.7	330°31.6	15.6	290°32.5	24.5	358°18.1	16.3	Alkaid		
8	3°23.9	303°35.0	04.4	345°32.3	16.3	305°34.3	24.7	13°20.5	16.3	Hadar	148°36.2	-60°29.6
9	18°26.4	318°34.3	• • 05.1	0°33.0	17.0	320°36.2	• • 24.8	28°22.8	. 16.2		147°57.9	-36°29.5
						335°38.0				Arcturus	145°48.1	19°03.3
10	33°28.9	333°33.6	05.8	15°33.7	17.8		24.9	43°25.1	16.2	Rigil Kent.	139°40.5	-60°56.3
11	48°31.3	348°32.9	06.5	30°34.4	18.5	350°39.9	25.0	58°27.5	16.2	Kochab	$137^{\circ}18.6$	74°03.4
12	63°33.8	3°32.2	N20°07.2	45°35.2	N06°19.2	5°41.8	N19°25.2	73°29.8	S06°16.1	Zuben'ubi	136°56.3	-16°08.7
13	78°36.2	18°31.4	07.9	60°35.9	19.9	20°43.6	25.3	88°32.1	16.1	Alphecca	126°03.8	26°37.9
14	93°38.7	33°30.7	08.6	75°36.6	20.7	35°45.5	25.4	103°34.5	16.0	Antares	112°16.1	-26°29.2
15	108°41.2	48°30.0	• • 09.3	90°37.3	• • 21.4	50°47.3	• • 25.5	118°36.8	• • 16.0	Atria	107° 10.3	-69°04.2
16	123°43.6	63°29.3	10.0	105°38.0	22.1	65°49.2	25.7	133°39.1	15.9	Sabik	107° 10.5	-15°45.3
17	138°46.1	78°28.5	10.7	120°38.7	22.8	80°51.0	25.8	148°41.5	15.9			
18	153°48.6	93°27.8	N20°11.4	135°39.4	N06°23.6	95°52.9	N19°25.9	163°43.8	S06°15.8	Shaula	96°10.7	-37°07.3
19	168°51.0	108°27.1	12.1	150°40.1	24.3	110°54.7	26.1	178°46.1	15.8	Rasalhague	95°58.7	12°32.4
20	183°53.5	123°26.4	12.8	165°40.8	25.0	125°56.6	26.2	193°48.4	15.7	Eltanin	90°41.9	51°28.9
	198° 56.0	138°25.6		180°41.5		140°58.5		208°50.8	15.7	Kaus Aust.	83°32.9	-34°22.3
21			• • 13.5		• • 25.7		• • 26.3			Vega	80°33.2	38°48.2
22	213°58.4	153°24.9	14.2	195°42.2	26.5	156°00.3	26.4	223°53.1	15.6	Nunki	$75^{\circ}48.1$	-26°16.0
23	229°00.9	168°24.2	14.9	210°43.0	27.2	171°02.2	26.6	238°55.4	15.6	Altair	62°00.3	8°55.8
Mern	ass. 07:46	v-0.7' d0	.7′ m-3.92	υ0 7' d0	.7′ m1.06	1/1 0/ d0	.1' m-2.00	1/2 3' d-C	0.0' m1.04	Peacock	53°06.3	-56°39.2
- Wici.p	433. 07.40	ν σ.τ ασ	.7 111 3.32	- VO.1 UO	., 1111.00	ν1.5 do.	111 2.00	ν 2.5 α C	.0 1111.04	Deneb	49°26.0	45°21.7
										Enif	33°39.3	9°59.1
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.5	-46°50.4
0	244°03.4	183°23.4	N20°15.6	225°43.7		186°04.0	N19°26.7	253°57.8	S06°15.6	Fomalhaut	15° 15.2	-40° 30.4 -29° 29.5
1	259°05.8	198°22.7	16.3	240°44.4	28.6	201°05.9	26.8	269°00.1	15.5	Scheat	13°45.8	
2	274°08.3	213°22.0	17.0	255°45.1	29.4	216°07.7	26.9	284°02.4	15.5			28°12.7
3	289°10.7	213°22.0° 228°21.2	•• 17.6	270°45.8	30.1	231°09.6	. 27.1	299°04.8	15.4	Markab	13°30.5	15°20.0
4	304°13.2	243°20.5	18.3	285°46.5	30.1	246°11.4	27.1	314°07.1	15.4	May 24 Fri	SHA	Mer.pass
	319° 15.7	243 20.5 258°19.8				261°13.3					301°52.8	11:45
5			19.0	300°47.2	31.5		27.3	329°09.4	15.3		301 52.8 343°04.5	08:59
6	334°18.1	273°19.1	N20°19.7	315°47.9	N06°32.2	276°15.2	N19°27.5	344°11.8	S06°15.3	Mars		
7	349°20.6	288°18.3	20.4	330°48.6	33.0	291°17.0	27.6	359°14.1	15.2	Jupiter	302°29.9	11:40
8	4°23.1	303°17.6	21.1	345°49.3	33.7	306°18.9	27.7	14°16.4	15.2	Saturn	10°00.9	07:10
9	19°25.5	318°16.9	• • 21.8	0°50.0	• • 34.4	321°20.7	• • 27.8	29°18.8	• • 15.1	May 25 Sat	SHA	Mer.pass
10	34°28.0	333°16.1	22.4	15°50.8	35.1	336°22.6	28.0	44°21.1	15.1		300°36.6	11:46
11	49°30.5	348°15.4	23.1	30°51.5	35.9	351°24.4	28.1	59°23.4	15.1			
12	64°32.9	3°14.7	N20°23.8	45°52.2	N06°36.6	6°26.3	N19°28.2	74°25.8	S06°15.0	Mars		08:58
13	79°35.4	18°13.9	24.5	60°52.9	37.3	21°28.1	28.3	89°28.1	15.0	Jupiter		11:37
14	94°37.9	33°13.2	25.2	75°53.6	38.0	36°30.0	28.5	104°30.4	14.9	Saturn	9°57.6	07:07
15	109°40.3	48°12.5	• • 25.8	90°54.3	• • 38.7	51°31.9	28.6	119°32.8	14.9	May 26 5	C LIV	Mor noon
	109 40.3 124°42.8	46 12.5 63°11.7	26.5	90°54.5 105°55.0	39.5	66°33.7	28.7	134°35.1	14.8	May 26 Sun	SHA	Mer.pass
16										Venus		11:47
17	139°45.2	78°11.0	27.2	120°55.7	40.2	81°35.6	28.8	149°37.4	14.8	Mars		08:57
18	154°47.7	93°10.2	N20°27.9	135°56.4	N06°40.9	96°37.4	N19°29.0	164°39.8	S06°14.7		302°00.7	11:34
19	169°50.2	108°09.5	28.5	150°57.1	41.6	111°39.3	29.1	179°42.1	14.7	Saturn	9°54.4	07:03
20	184°52.6	123°08.8	29.2	165°57.8	42.3	126°41.1	29.2	194°44.4	14.7			
21	$199^{\circ}55.1$	138°08.0	• • 29.9	180°58.6	• • 43.1	141°43.0	• • 29.3	209°46.8	• • 14.6	Horizont	al parallax	
22	214°57.6	153°07.3	30.6	195°59.3	43.8	156°44.8	29.5	224°49.1	14.6		Venus:	0.1
23	230°00.0	168°06.5	31.2	211°00.0	44.5	171°46.7	29.6	239°51.5	14.5		Mars:	0.1
										<del>_</del>		
ivler.p	ass. 07:43	ν-υ. <i>ι'</i> d0	.7′ m-3.92	$\nu$ 0.1' d0	.7′ m1.06	$\nu$ 1.9′ $d0$	.1′ m-2.00	$\nu$ 2.3′ d-0	0.0′ m1.03			

h	Sui	า			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°47.3	$N20^{\circ}49.2$	$356^{\circ}12.7$	8.4'	\$25°46.3	6.9'	56.3'
1	195°47.3	49.6	10°40.1	8.3'	25°53.2	6.7'	56.3'
2	210°47.2 225°47.2	50.1 •• 50.5	25°07.4 39°34.7	8.2' 8.1'	25°59.9 26°06.5	6.6' 6.5'	56.3' 56.3'
4	240°47.1	51.0	54°01.8	8.1'	26°13.0	6.3'	56.4'
5	255°47.1	51.5	68°28.9	8.0'	$26^{\circ}19.3$	6.2'	56.4'
6	270°47.0 285°46.9	N20°51.9	82°55.9 97°22.7	7.9'	\$26°25.5	6.0'	56.4
7 8	285°46.9 300°46.9	52.4 52.8	97°22.7 111°49.5	7.8' 7.7'	26°31.5 26°37.4	5.9' 5.7'	56.4' 56.5'
9	315°46.8	• • 53.3	126°16.2	7.6'	26°43.1	5.6'	56.5'
10	330°46.8	53.7	140°42.8	7.5'	26°48.7	5.5'	56.5'
11	345°46.7 0°46.6	54.2 N20°54.6	155°09.4 169°35.8	7.4' 7.4'	26°54.2 \$26°59.5	5.3' 5.2'	56.5'
12 13	0 46.6 15°46.6	N20 54.0 55.1	169 35.8 184°02.2	7.4 7.3'	27°04.6	5.2 5.0'	56.5' 56.6'
14	30°46.5	55.5	198°28.4	7.2'	27°09.6	4.9'	56.6'
15	45°46.4	• • 56.0	212°54.6	7.1'	27°14.5	4.7'	56.6'
16 17	60°46.4 75°46.3	56.4 56.9	227°20.8 241°46.8	7.0' 7.0'	27°19.2 27°23.7	4.5' 4.4'	56.6' 56.6'
18	90°46.3	N20°57.3	241 40.8 256°12.8	6.9	\$27°28.1	4.4	56.7'
19	105°46.2	57.8	270°38.7	6.8'	27°32.3	4.1'	56.7'
20	120°46.1	58.2	285°04.5	6.8'	27°36.4	3.9'	56.7'
21 22	135°46.1 150°46.0	· · 58.7 59.1	299°30.3 313°55.9	6.7' 6.6'	27°40.3 27°44.1	3.8' 3.6'	56.7' 56.8'
23	165°46.0	59.1 59.6	313 55.9 328°21.6	6.6	27 44.1 27°47.7	3.4'	56.8
	SD = 15.8'	d = 0.5'			O = 15.3'		
		<u>u = 0.5</u>		JI			
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	180°45.9 195°45.8	N21°00.0 00.4	342°47.1 357°12.6	6.5' 6.4'	\$27°51.1 27°54.4	3.3' 3.1'	56.8' 56.8'
2	195°45.8 210°45.8	00.4	357°12.6 11°38.0	6.4	27°54.4 27°57.5	3.1 2.9'	56.8
3	225°45.7	• • 01.3	26°03.4	6.3'	28°00.5	2.8'	56.9'
4	240°45.6	01.8	40°28.7	6.2'	28°03.3	2.6'	56.9'
5 6	255°45.6 270°45.5	02.2 N21°02.7	54°53.9 69°19.1	6.2' 6.1'	28°05.9 \$28°08.3	2.5' 2.3'	56.9' 56.9'
7	285°45.4	03.1	83°44.3	6.1	28°10.6	2.1'	56.9
8	300°45.4	03.5	98°09.4	6.0'	28°12.7	2.0'	57.0'
9	315°45.3	• • 04.0	112°34.4	6.0'	28°14.7	1.8'	57.0'
10 11	330°45.2 345°45.2	04.4 04.8	126°59.4 141°24.3	5.9' 5.9'	28°16.5 28°18.1	1.6' 1.4'	57.0' 57.0'
12	0°45.1	N21°05.3	155°49.2	5.9'	\$28°19.5	1.3'	57.1
13	15°45.0	05.7	$170^{\circ}14.1$	5.8'	28°20.8	1.1'	57.1'
14	30°45.0 45°44.9	06.2	184°38.9 199°03.7	5.8'	28°21.9 28°22.8	0.9'	57.1'
15 16	45°44.9 60°44.8	· · 06.6 07.0	199°03.7 213°28.4	5.7' 5.7'	28°22.8 28°23.6	0.8' 0.6'	57.1' 57.1'
17	75°44.8	07.5	227°53.2	5.7'	28°24.2	0.4	57.2'
18	90°44.7	N21°07.9	242°17.8	5.7'	528°24.6	0.2'	57.2'
19 20	105°44.6 120°44.6	08.3 08.8	256°42.5 271°07.1	5.6' 5.6'	28°24.8 28°24.8	0.1' -0.1'	57.2' 57.2'
21	135°44.5	•• 09.2	285°31.7	5.6'	28°24.7	-0.1	57.2'
22	150°44.4	09.6	299°56.3	5.6'	28°24.4	-0.5'	57.3'
23	165°44.4	10.0	314°20.9	5.5'	28°24.0	-0.6'	57.3'
	SD = 15.8'	d = 0.4'		SI	O = 15.5'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°44.3	N21°10.5	328°45.4	5.5'	\$28°23.3	-0.8'	57.3'
1	195°44.2	10.9	343°10.0	5.5'	28°22.5	-1.0'	57.3'
2	210°44.2 225°44.1	11.3 •• 11.8	357°34.5 11°59.0	5.5' 5.5'	28°21.5 28°20.4	-1.2' -1.3'	57.3' 57.4'
4	240°44.0	12.2	26°23.5	5.5'	28° 19.0	-1.5'	57.4 57.4'
5	255°44.0	12.6	40°48.0	5.5'	28°17.5	-1.7'	57.4'
6	270°43.9	N21°13.0	55°12.4	5.5'	\$28°15.8	-1.9'	57.4'
7 8	285°43.8 300°43.8	13.5 13.9	69°36.9 84°01.4	5.5' 5.5'	28°13.9 28°11.9	-2.1' -2.2'	57.4' 57.5'
9	315°43.7	• • 14.3	98°25.9	5.5'	28°09.6	-2.2 -2.4'	57.5'
10	330°43.6	14.7	112°50.4	5.5'	28°07.2	-2.6'	57.5'
11	345°43.5	15.1	127°14.9	5.5'	28°04.6	-2.8'	57.5'
12 13	0°43.5 15°43.4	N21°15.6 16.0	141°39.4 156°03.9	5.5' 5.5'	\$28°01.9 27°59.0	-2.9' -3.1'	57.5' 57.6'
14	30°43.3	16.4	170°28.4	5.5'	27°55.8	-3.3'	57.6'
15	45°43.3	• • 16.8	184°53.0	5.6'	27°52.6	-3.5'	57.6'
16 17	60°43.2 75°43.1	17.2 17.7	199°17.5 213°42.1	5.6' 5.6'	27°49.1 27°45.5	-3.6' -3.8'	57.6' 57.6'
18	75°43.1 90°43.0	17.7 N21°18.1	213°42.1 228°06.7	5.6'	27°45.5 \$27°41.7	-3.8 -4.0'	57.0
19	105°43.0	18.5	242°31.3	5.6'	27°37.7	-4.2'	57.7'
20	120°42.9	18.9	256°55.9	5.7'	27°33.5	-4.3'	57.7'
21 22	135°42.8 150°42.8	· · 19.3 19.7	271°20.6 285°45.3	5.7' 5.7'	27°29.2 27°24.7	-4.5' -4.7'	57.7' 57.7'
23	150 42.8 165°42.7	20.2	285 45.3 300°10.0	5. <i>1</i> 5.8'	27°20.0	-4.7 -4.8'	57.7 57.8'
	SD = 15.8'	d = 0.4'			D = 15.6'		
					_5.0		

Lat.	Twi	light	Sunrise	Sunset	Twi	ilight
Lat.	Naut.	Civil	Suririse	Sunset	Civil	Naut.
N 72°						
<b>N</b> 70°						
68°	////	////	00:26	////	////	////
66°	////	////	01:40	22:18	////	////
64°	////	////	02:15	21:41	////	////
62°	////	01:01	02:41	21:15	22:58	////
60°	////	01:46	03:00	20:55	22:11	////
N 58°	////	02:14	03:16	20:39	21:42	////
56°	00:56	02:36	03:30	20:25	21:20	23:03
54°	01:36	02:53	03:42	20:13	21:02	22:20
52°	02:03	03:08	03:52	20:02	20:48	21:53
50°	02:23	03:20	04:02	19:53	20:35	21:33
45°	02:59	03:45	04:21	19:34	20:09	20:55
<b>N</b> 40°	03:26	04:05	04:37	19:18	19:49	20:29
35°	03:46	04:21	04:50	19:04	19:33	20:09
30°	04:02	04:35	05:01	18:53	19:20	19:52
20°	04:28	04:57	05:21	18:33	18:57	19:26
N $10^{\circ}$	04:49	05:15	05:38	18:16	18:39	19:06
0°	05:05	05:31	05:53	18:01	18:23	18:49
<b>S</b> 10°	05:21	05:46	06:09	17:45	18:07	18:33
20°	05:35	06:02	06:25	17:29	17:52	18:19
30°	05:49	06:18	06:44	17:10	17:35	18:05
$35^{\circ}$	05:56	06:27	06:55	16:59	17:26	17:57
40°	06:04	06:38	07:07	16:46	17:16	17:49
45°	06:13	06:49	07:22	16:32	17:04	17:41
<b>S</b> 50°	06:23	07:03	07:40	16:14	16:51	17:31
52°	06:27	07:09	07:48	16:05	16:44	17:27
54°	06:32	07:16	07:58	15:56	16:37	17:22
56°	06:37	07:24	08:09	15:45	16:30	17:17
58°	06:42	07:32	08:21	15:33	16:21	17:11
<b>S</b> 60°	06:48	07:42	08:35	15:19	16:11	17:05
				ı	N.4	

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

		Sun		Moon				
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age		
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	16-18		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	100-93%		
24	03:09	03:07	11:57	00:16	12:43			
25	03:04	03:00	11:57	01:12	13:41			
26	02:57	02:54	11:57	02:10	14:40			

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Mon -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dos		SHA	Doc
Mon									Dec		ЗПА	Dec
0	245°02.5	183°05.8	N20°31.9	226°00.7	N06°45.2	186°48.5	N19°29.7	254° 53.8	S06°14.5	Alpheratz	357°35.5	29°13.3
1	260°05.0	198°05.1	32.6	241°01.4	45.9	201°50.4	29.8	269°56.1	14.4	Ankaa	353°07.9	-42°10.3
2	275°07.4	213°04.3	33.2	256°02.1	46.7	216°52.3	30.0	284°58.5	14.4	Schedar	349°32.0	56°40.0
3	290°09.9	228°03.6	• • 33.9	271°02.8	• • 47.4	231°54.1	• • 30.1	300°00.8	• • 14.3	Diphda	348°48.0	-17°51.1
4	305°12.4	243°02.8	34.6	286°03.5	48.1	246°56.0	30.2	315°03.1	14.3	Achernar	335°21.0	-57°06.6
5	320°14.8	$258^{\circ}02.1$	35.2	301°04.2	48.8	261°57.8	30.3	330°05.5	14.3	Hamal	327°52.1	23°34.5
6	$335^{\circ}17.3$	273°01.4	N20°35.9	316°04.9	N06°49.5	276°59.7	N19°30.5	345°07.8	S06°14.2	Polaris	314°45.4	89°21.9
7	$350^{\circ}19.7$	288°00.6	36.6	331°05.6	50.3	292°01.5	30.6	$0^{\circ}10.1$	14.2	Acamar	315°12.6	-40°12.4
8	5°22.2	302°59.9	37.2	346°06.3	51.0	307°03.4	30.7	15° 12.5	14.1		314°07.0	4°11.1
9	20°24.7	$317^{\circ}59.1$	• • 37.9	1°07.1	• • 51.7	322°05.2	• • 30.8	30°14.8	• • 14.1	Menkar		
10	35°27.1	332°58.4	38.5	16°07.8	52.4	337°07.1	31.0	45°17.1	14.0	Mirfak	308°29.5	49°56.7
11	50°29.6	347°57.6	39.2	31°08.5	53.1	352°09.0	31.1	$60^{\circ}19.5$	14.0	Aldebaran	290°40.6	16°33.5
12	65°32.1	2°56.9	N20°39.9	46°09.2	N06°53.9	7°10.8	N19°31.2	75°21.8	S06°14.0	Rigel	281°04.7	-8°10.4
13	80°34.5	17°56.1	40.5	61°09.9	54.6	22°12.7	31.4	90°24.2	13.9	Capella	280°23.2	46°01.3
14	95°37.0	32°55.4	41.2	76°10.6	55.3	37°14.5	31.5	105°26.5	13.9	Bellatrix	278°23.8	6°22.3
15	110°39.5	47°54.7	• • 41.8	91°11.3	• • 56.0	52°16.4	• • 31.6	120°28.8	• • 13.8	Elnath	278°02.9	28°37.7
16	125°41.9	62°53.9	42.5	106°12.0	56.7	67°18.2	31.7	135°31.2	13.8	Alnilam	275°38.6	-1°11.2
17	140°44.4	77°53.2	43.1	121°12.7	57.4	82°20.1	31.9	150°33.5	13.7	Betelgeuse	270°53.0	7°24.7
18	155°46.9	92°52.4	N20°43.8	136°13.4	N06°58.2	97°21.9	N19°32.0	165°35.8	S06°13.7	Canopus	263°53.1	-52°42.6
19	170°49.3	107°51.7	44.4	150°13.4	58.9	112°23.8	32.1	180°38.2	13.7	Sirius	258°27.0	-16°45.0
20	170 49.3 185°51.8	107 51.7 122°50.9	45.1	166°14.8	06°59.6	112 25.6 127°25.7	32.1	195° 40.5	13.6	Adhara	255°06.6	-29°00.4
										Procyon	244°51.6	5°09.7
21	200°54.2	137°50.2	• • 45.7	181°15.6 196°16.3	07°00.3	142°27.5	• • 32.4	210°42.9	13.6	Pollux	243°18.2	$27^{\circ}58.1$
22	215°56.7	152°49.4	46.4		01.0	157°29.4	32.5	225° 45.2	13.5	Avior	234°15.3	-59°35.5
23	230°59.2	167°48.7	47.0	211°17.0	01.7	172°31.2	32.6	240°47.5	13.5	Suhail	222°46.9	-43°32.1
Mer n	ass. 07:39	$\nu$ -0.7' d0	.7′ m-3.92	$\nu$ 0.7' d0	.7′ m1.06	$\nu 1.9' d0$	1' m-2.00	$\nu 2.3' d-0$	.0′ m1.03	Miaplacidus	221°38.8	-69°49.3
		- 0.1 00		- 5.1 40		- 1.5 40.				Alphard	217°48.4	-8°45.9
										Regulus	207°35.0	11°50.9
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.5	61°37.5
0	246°01.6	182°47.9	N20°47.7	226°17.7	N07°02.5	187°33.1	N19°32.7	255°49.9	S06°13.4	Denebola	182°25.4	14°26.2
1	261°04.1	197°47.2	48.3	241°18.4	03.2	202°34.9	32.9	270°52.2	13.4	Gienah	175°44.0	-17°40.8
2	276°06.6	212°46.4	49.0	$256^{\circ}19.1$	03.9	217°36.8	33.0	285°54.6	13.4			-17 40.6 -63°14.3
3	291°09.0	227°45.7	• • 49.6	271°19.8	• • 04.6	232°38.6	• • 33.1	300°56.9	• • 13.3	Acrux	173°00.4	
4	306°11.5	242°44.9	50.2	286°20.5	05.3	247°40.5	33.2	315°59.2	13.3	Gacrux	171°52.0	-57°15.2
5	321°14.0	257°44.1	50.9	301°21.2	06.0	262°42.4	33.3	331°01.6	13.2	Alioth	166°13.1	55°49.9
6	336°16.4	272°43.4	N20°51.5	316°21.9	N07°06.8	277°44.2	N19°33.5	346°03.9	S06°13.2	Spica	158°22.6	-11°17.4
7	351°18.9	287°42.6	52.2	331°22.6	07.5	292°46.1	33.6	1°06.3	13.1	Alkaid	152°52.0	49°11.6
8	6°21.4	302°41.9	52.8	346°23.3	08.2	307°47.9	33.7	16°08.6	13.1	Hadar	148°36.2	-60°29.6
9	21°23.8	317°41.1	• • 53.4	1°24.1	•• 08.9	322°49.8	• • 33.8	31° 10.9	13.1	Menkent	147°57.9	-36°29.5
	36°26.3	332°40.4		16°24.8		337°51.6		46°13.3		Arcturus	145°48.1	19°03.3
10			54.1		09.6		34.0		13.0	Rigil Kent.	139°40.5	-60°56.3
11	51°28.7	347°39.6	54.7	31°25.5	10.3	352°53.5	34.1	61°15.6	13.0	Kochab	$137^{\circ}18.7$	74°03.4
12	66°31.2	2°38.9	N20°55.3	46°26.2	N07°11.0	7°55.3	N19°34.2	76°18.0	S06°12.9	Zuben'ubi	136°56.3	-16°08.7
13	81°33.7	17°38.1	56.0	61°26.9	11.8	22°57.2	34.3	91°20.3	12.9	Alphecca	126°03.8	26°37.9
14	96°36.1	32°37.4	56.6	76°27.6	12.5	37°59.1	34.5	106°22.6	12.9	Antares	$112^{\circ}16.1$	-26°29.2
15	111°38.6	47°36.6	• • 57.2	91°28.3	• • 13.2	53°00.9	• • 34.6	121°25.0	• • 12.8	Atria	107°10.3	-69°04.2
16	126°41.1	62°35.8	57.9	106°29.0	13.9	68°02.8	34.7	136°27.3	12.8	Sabik	102°03.0	-15°45.3
17	141°43.5	77°35.1	58.5	121°29.7	14.6	83°04.6	34.8	151°29.7	12.7	Shaula	96°10.7	-37°07.3
18	156°46.0	92°34.3	N20°59.1	136°30.4	N07°15.3	98°06.5	N19°35.0	166°32.0	S06°12.7	Rasalhague	95°58.7	12°32.4
19	171°48.5	107°33.6	20°59.8	151°31.1	16.0	113°08.3	35.1	181°34.3	12.6	Eltanin	90°41.9	51°28.9
20	186°50.9	122°32.8	21°00.4	166°31.8	16.8	128°10.2	35.2	196°36.7	12.6	Kaus Aust.	83°32.9	-34°22.3
21	201°53.4	137°32.0	•• 01.0	181°32.6	• • 17.5	143°12.0	• • 35.3	211°39.0	• • 12.6	Vega	80°33.2	38°48.2
22	216°55.8	152°31.3	01.6	196°33.3	18.2	158°13.9	35.5	226°41.4	12.5	Nunki	75°48.1	-26°16.0
23	231°58.3	167°30.5	02.3	211°34.0	18.9	173°15.8	35.6	241°43.7	12.5	Altair	62°00.3	8°55.8
	07.05	0.0/	<i>cl</i> 2.00	0.7/ 10	7/ 1.05	1.0/.10	1/ 0.00	0.0/0	0/ 1.00		53°06.2	
Mer.p	ass. 07:35	$\nu$ -0.8° d0	.6′ m-3.92	$\nu$ 0.7 d0	.7′ m1.05	$\nu$ 1.9° d0.	1' m-2.00	$\nu$ 2.3′ d-0	.0′ m1.03	Peacock		-56°39.2
										Deneb	49°25.9	45°21.7
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.2	9°59.1
0	247°00.8	182°29.8	N21°02.9		N07°19.6	188°17.6	N19°35.7	256°46.0	S06°12.4	Al Na'ir	27°33.5	-46°50.4
1	262°03.2	197°29.0	03.5	241°35.4	20.3	203°19.5	35.8	271°48.4	12.4	Fomalhaut	15° 15.1	-29°29.5
2	277°05.7	212°28.2	04.1	256°36.1	21.0	218°21.3	36.0	286°50.7	12.4	Scheat	13°45.8	28°12.7
3	292°08.2	212 26.2 227°27.5	• • 04.7	271°36.8	21.8	233°23.2	36.1	301°53.1	. 12.4	Markab	13°30.5	15°20.0
4	307°10.6	242°26.7	05.4	271 30.6 286°37.5	22.5	233 23.2 248°25.0	36.2	316°55.4	12.3	May 27 Mon	SHA	Mer.pass
5	307 10.0 322°13.1	242 20.7 257°25.9	06.0	301°38.2	23.2	263°26.9	36.3	331° 57.8	12.3	Venus	298°03.3	11:48
6	322 13.1 337°15.6	257 25.9 272°25.2		301 38.2 316°38.9		203 20.9 278°28.7		331 57.8 347°00.1	506°12.2	Mars	340°58.2	08:56
			N21°06.6		N07°23.9		N19°36.4				301°46.1	
7	352°18.0	287°24.4	07.2	331°39.6	24.6	293°30.6	36.6	2°02.4	12.2	Jupiter		11:31
8	7°20.5	302°23.6	07.8	346°40.3	25.3	308°32.5	36.7	17°04.8	12.1	Saturn	9°51.3	06:59
9	22°23.0	317°22.9	• • 08.4	1°41.0	· · 26.0	323°34.3	36.8	32°07.1	· · 12.1	May 28 Tue	SHA	Mer.pass
10	37°25.4	332°22.1	09.0	16°41.7	26.7	338°36.2	36.9	47°09.5	12.0	Venus	296°46.3	11:49
11	52°27.9	347°21.3	09.7	31°42.5	27.4	353°38.0	37.1	62°11.8	12.0	Mars	340°16.0	08:54
12	67°30.3	2°20.6	N21°10.3	46°43.2		8°39.9	N19°37.2	77° 14.2	S06°12.0	Jupiter	301°31.4	11:28
13	82°32.8	17°19.8	10.9	61°43.9	28.9	23°41.7	37.3	92°16.5	11.9	Saturn	9°48.2	06:56
14	97°35.3	32°19.0	11.5	76°44.6	29.6	38°43.6	37.4	107° 18.9	11.9	Jatuill	J 10.2	55.50
15	112°37.7	47°18.3	• • 12.1	91°45.3	• • 30.3	53°45.4	• • 37.6	$122^{\circ}21.2$	• • 11.8	May 29 Wed	SHA	Mer.pass
16	127°40.2	62°17.5	12.7	106°46.0	31.0	68°47.3	37.7	$137^{\circ}23.5$	11.8	Venus	295°29.0	11:51
17	142°42.7	77°16.7	13.3	121°46.7	31.7	83°49.2	37.8	152°25.9	11.8	Mars	339°33.9	08:53
18	157°45.1	92°16.0	N21°13.9	136°47.4	N07°32.4	98°51.0	N19°37.9	167°28.2	S06°11.7	Jupiter	301°16.8	11:25
19	172°47.6	107°15.2	14.5	151°48.1	33.1	113°52.9	38.1	182°30.6	11.7	Saturn	9°45.3	06:52
20	187°50.1	122°14.4	15.1	166°48.8	33.8	128°54.7	38.2	197°32.9	11.6	Jatuill	J 10.0	00.52
21	202°52.5	137°13.7	15.7	181°49.5	• • 34.6	143°56.6	38.3	212°35.3	11.6	Horizont	al parallax	
22	217°55.0	152°12.9	16.3	196°50.2	35.3	158°58.4	38.4	227°37.6	11.6		Venus:	0.1
23	232°57.5	167°12.1	16.9	211°50.9	36.0	174°00.3	38.5	242°40.0	11.5		Mars:	0.1
Mer.p	ass. 07:31	$\nu$ -0.8′ d0	.6′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.7′ m1.05	$\nu$ 1.9′ d0.	.1′ m-2.00	$\nu 2.3' \ d-0$	.0′ m1.03			

h	Sui	า			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°42.6	$N21^{\circ}20.6$	$314^{\circ}34.8$	5.8'	S27°15.2	-5.0'	57.8'
1	195°42.5	21.0	328°59.6	5.8'	27° 10.1	-5.2'	57.8'
2 3	210°42.5 225°42.4	21.4 •• 21.8	343°24.4 357°49.3	5.9' 5.9'	27°05.0 26°59.6	-5.4' -5.5'	57.8' 57.8'
4	240°42.3	22.2	12°14.2	5.9'	26°54.1	-5.5' -5.7'	57.8'
5	255°42.2	22.6	26°39.1	6.0'	26°48.4	-5.9'	57.9'
6	270°42.2	N21°23.0	$41^{\circ}04.1$	6.0'	S26°42.5	-6.0'	57.9'
7	285°42.1	23.5	55°29.2	6.1'	26°36.5	-6.2'	57.9'
8	300°42.0 315°41.9	23.9	69°54.3 84°19.4	6.1' 6.2'	26° 30.3 26° 23.9	-6.4' -6.5'	57.9' 57.9'
9 10	315 41.9 330°41.9	24.3	98°44.6	6.2'	26° 23.9 26° 17.4	-6.7'	57.9 58.0'
11	345°41.8	25.1	113°09.8	6.3	26° 10.7	-6.9'	58.0'
12	0°41.7	N21°25.5	127°35.1	6.3'	S26°03.8	-7.0'	58.0'
13	15°41.6	25.9	142°00.4	6.4'	25°56.8	-7.2'	58.0'
14 15	30°41.6 45°41.5	26.3 · · 26.7	156°25.8 170°51.2	6.4' 6.5'	25° 49.6 25° 42.3	-7.3' -7.5'	58.0' 58.0'
16	60°41.4	27.1	185°16.7	6.6'	25° 34.8	-7.7'	58.1'
17	75°41.3	27.5	199°42.3	6.6'	25°27.1	-7.8'	58.1'
18	90°41.3	N21°27.9	214°07.9	6.7'	S25°19.3	-8.0'	58.1'
19	105°41.2	28.3	228°33.6	6.7'	25°11.3	-8.1'	58.1'
20 21	120°41.1 135°41.0	28.7 •• 29.1	242°59.3 257°25.1	6.8' 6.9'	25°03.2 24°54.9	-8.3' -8.4'	58.1' 58.1'
22	150°40.9	29.5	271°51.0	6.9	24° 46.5	-8.6'	58.2
23	165°40.9	29.9	286°16.9	7.0'	24°37.9	-8.7'	58.2'
	SD = 15.8'	d = 0.4'		SE	0 = 15.8'		
_							
Tue	<b>GHA</b> 180°40.8	<b>Dec</b> N21°30.3	<b>GHA</b> 300°42.9	u  7.1'	Dec 524° 29.1	d -8.9'	<b>HP</b> 58.2'
0 1	180°40.8 195°40.7	N21 30.3 30.7	300°42.9 315°09.0	7.1° 7.1°	24° 20.2	-8.9° -9.0°	58.2' 58.2'
2	210°40.6	31.1	329°35.1	7.2'	24°11.2	-9.2	58.2
3	225°40.6	• • 31.5	$344^{\circ}01.3$	7.3'	24°02.0	-9.3'	58.3'
4	240°40.5	31.9	358°27.6	7.3'	23°52.7	-9.5'	58.3'
5 6	255°40.4 270°40.3	32.3 N21°32.7	12°53.9 27°20.3	7.4' 7.5'	23°43.2 <b>S</b> 23°33.6	-9.6' -9.8'	58.3' 58.3'
7	270 40.3 285°40.2	33.1	41°46.8	7.5'	23°23.8	-9.8 -9.9'	58.3'
8	300°40.2	33.5	56°13.4	7.6'	23°13.9	-10.1'	58.3'
9	315°40.1	• • 33.9	70°40.0	7.7'	23°03.8	-10.2'	58.4'
10	330°40.0	34.3	85°06.7	7.8'	22°53.6	-10.3'	58.4'
11 12	345°39.9 0°39.8	34.7 N21°35.0	99°33.5 114°00.3	7.8' 7.9'	22°43.3 <b>5</b> 22°32.8	-10.5' -10.6'	58.4' 58.4'
13	15°39.8	35.4	114 00.3 128°27.2	8.0'	22° 22.2	-10.7	58.4'
14	30°39.7	35.8	142°54.2	8.1'	22°11.5	-10.9'	58.4'
15	45°39.6	• • 36.2	157°21.2	8.1'	22°00.6	-11.0'	58.4'
16	60°39.5 75°39.4	36.6	171°48.4 186°15.6	8.2' 8.3'	21°49.6 21°38.5	-11.1' -11.3'	58.5'
17 18	90°39.3	37.0 N21°37.4	200°42.9	8.4'	S21°27.2	-11.3	58.5' 58.5'
19	105°39.3	37.8	215°10.2	8.4'	21°15.8	-11.5'	58.5'
20	120°39.2	38.1	229°37.7	8.5'	21°04.3	-11.6'	58.5'
21	135°39.1	• • 38.5	244°05.2	8.6'	20°52.6	-11.8'	58.5'
22 23	150°39.0 165°38.9	38.9 39.3	258°32.7 273°00.4	8.7' 8.7'	20° 40.9 20° 29.0	-11.9' -12.0'	58.6' 58.6'
23	SD = 15.8'	d = 0.4'	273 00.4		0 = 15.9'	-12.0	30.0
	3D = 15.6	a = 0.4		3L	J = 15.9		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	180°38.9 195°38.8	N21°39.7 40.1	287°28.1 301°55.9	8.8' 8.9'	\$20°17.0 20°04.8	-12.1' -12.2'	58.6' 58.6'
2	195°38.8 210°38.7	40.1 40.4	301°55.9 316°23.8	8.9'	20°04.8 19°52.6	-12.2 -12.4'	58.6'
3	225°38.6	• • 40.8	330°51.7	9.0'	19° 40.2	-12.5'	58.6'
4	240°38.5	41.2	345°19.8	9.1'	19°27.7	-12.6'	58.6'
5	255°38.4 270°38.3	41.6 N21°42.0	359°47.9	9.2'	19° 15.1 \$19° 02.4	-12.7' -12.8'	58.7'
6 7	270°38.3 285°38.3	N21°42.0 42.3	14°16.0 28°44.3	9.2' 9.3'	519°02.4 18°49.6	-12.8° -12.9°	58.7' 58.7'
8	300°38.2	42.7	43°12.6	9.4'	18° 36.7	-13.0'	58.7'
9	315°38.1	• • 43.1	57°41.0	9.5'	$18^{\circ}23.6$	-13.1'	58.7'
10	330°38.0	43.5	72°09.4	9.5'	18° 10.5	-13.3'	58.7'
11 12	345°37.9 0°37.8	43.9 N21°44.2	86°37.9 101°06.5	9.6' 9.7'	17°57.2 \$17°43.9	-13.4' -13.5'	58.7' 58.8'
13	0 37.8 15°37.8	N21 44.2 44.6	101 06.5 115°35.2	9.7 9.7'	17°30.4	-13.5' -13.6'	58.8'
14	30°37.7	45.0	130°03.9	9.8'	17° 16.9	-13.7'	58.8'
15	45°37.6	• • 45.3	144°32.7	9.9'	17°03.2	-13.8'	58.8'
16	60°37.5	45.7	159°01.6	9.9'	16° 49.5	-13.9'	58.8'
17 18	75°37.4 90°37.3	46.1 N21°46.5	173°30.6 187°59.6	10.0' 10.1'	16° 35.6 \$16° 21.7	-13.9' -14.0'	58.8' 58.8'
19	105°37.2	46.8	202°28.6	10.1	16° 07.6	-14.0 -14.1'	58.9'
20	120°37.1	47.2	216°57.8	10.2'	15°53.5	-14.2'	58.9'
21	135°37.1	• • 47.6	231°27.0	10.3'	15°39.3	-14.3'	58.9'
22 23	150°37.0 165°36.9	47.9 48.3	245°56.2 260°25.5	10.3' 10.4'	15°24.9 15°10.5	-14.4'	58.9' 58.9'
23		$\frac{48.3}{d = 0.4'}$	∠00 ∠5.5			-14.5'	56.9
	SD = 15.8'	$a = 0.4^{\circ}$		SL	O = 16.0'		

	Turil	light	I		Tud	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°						
<b>N</b> 70°						
68°						
66°	////	////	01:27	22:31	////	////
64°	////	////	02:07	21:50	////	////
62°	////	00:43	02:34	21:22	23:19	////
60°	////	01:37	02:55	21:01	22:21	////
<b>N</b> 58°	////	02:07	03:12	20:44	21:49	////
56°	00:39	02:30	03:26	20:30	21:26	23:23
54°	01:28	02:48	03:38	20:17	21:07	22:29
52°	01:57	03:04	03:49	20:06	20:52	22:00
50°	02:18	03:17	03:59	19:57	20:39	21:38
45°	02:56	03:43	04:19	19:36	20:12	20:59
N 40°	03:23	04:03	04:35	19:20	19:52	20:32
35°	03:44	04:20	04:49	19:06	19:35	20:11
30°	04:01	04:34	05:00	18:55	19:21	19:54
20°	04:28	04:56	05:20	18:34	18:59	19:27
N 10°	04:48	05:15	05:38	18:17	18:40	19:06
0°	05:06	05:32	05:54	18:01	18:23	18:49
<b>S</b> 10°	05:21	05:47	06:10	17:45	18:08	18:34
20°	05:36	06:03	06:27	17:28	17:52	18:19
30°	05:50	06:20	06:46	17:09	17:35	18:04
35° 40°	05:58	06:29	06:57 07:10	16:57	17:25	17:56
40 45°	06:06 06:15	06:40 06:52	07:10 07:25	16:45 16:29	17:15 17:02	17:48 17:39
<b>S</b> 50° 52°	06:26	07:06	07:43 07:52	16:11	16:48	17:29
5∠ 54°	06:30 06:35	07:13 07:20	07:52	16:02 15:52	16:42 16:34	17:24 17:19
56°	06:40	07:28	08:13	15:32	16:26	17:19
58°	06:46	07:20	08:26	15:29	16:18	17:14
<b>S</b> 60°	06:52	07:47	08:40	15:14	16:07	17:02
Lat.	Mon	Moonris Tue	s <b>e</b> Wed	Mon	Moonset Tue	: Wed
N 72°						
<b>N</b> 70°		_	04:10		_	06:14
68°			03:09			07:13
66°		04:06	02:33		04:21	07:47
64°		02:33	02:08		05:53	08:12
62°	02:07	01:55	01:48	04:18	06:30	08:31
60°	01:18	01:28	01:31	05:07	06:57	08:46
N 58°	00:47	01:07	01:17	05:38	07:17	08:59
56°	00:23	00:49	01:05	06:01	07:34	09:11
54°	00:04	00:34	00:54	06:20	07:48	09:20
52°		00:21	00:45	06:36	08:01	09:29
50°		00:10	00:36	06:50	08:12	09:37
45°	23:46		00:18	07:18	08:34	09:53
$N 40^{\circ}$	23:27		00:03	07:40	08:52	10:07
35°	23:11	23:51		07:58	09:08	10:18
$30^{\circ}$	22:57	23:40		08:13	09:21	10:28
20°	22:33	23:21		08:40	09:43	10:45
	22:12	23:04	23:51	09:02	10:02	11:00
N 10°				09:23	10:20	11:13
0°	21:53	22:48	23:40			
0° <b>S</b> 10°	21:53 21:33	22:48 22:32	23:40 23:29	09:44	10:37	11:27
0° <b>S</b> 10° 20°	21:33 21:13	22:32 22:16	23:29 23:17	09:44 10:06	10:56	11:41
0° <b>S</b> 10° 20° 30°	21:33 21:13 20:48	22:32 22:16 21:56	23:29 23:17 23:03	09:44 10:06 10:32	10:56 11:18	11:41 11:57
0° <b>S</b> 10° 20° 30° 35°	21:33 21:13 20:48 20:34	22:32 22:16 21:56 21:45	23:29 23:17 23:03 22:55	09:44 10:06 10:32 10:47	10:56 11:18 11:30	11:41 11:57 12:07
0° \$ 10° 20° 30° 35° 40°	21:33 21:13 20:48 20:34 20:17	22:32 22:16 21:56 21:45 21:31	23:29 23:17 23:03 22:55 22:46	09:44 10:06 10:32 10:47 11:04	10:56 11:18 11:30 11:44	11:41 11:57 12:07 12:17
0° <b>S</b> 10° 20° 30° 35° 40° 45°	21:33 21:13 20:48 20:34 20:17 19:57	22:32 22:16 21:56 21:45 21:31 21:16	23:29 23:17 23:03 22:55 22:46 22:35	09:44 10:06 10:32 10:47 11:04 11:25	10:56 11:18 11:30 11:44 12:01	11:41 11:57 12:07 12:17 12:30
0° <b>S</b> 10° 20° 30° 35° 40° 45° <b>S</b> 50°	21:33 21:13 20:48 20:34 20:17 19:57	22:32 22:16 21:56 21:45 21:31 21:16 20:56	23:29 23:17 23:03 22:55 22:46 22:35 22:22	09:44 10:06 10:32 10:47 11:04 11:25	10:56 11:18 11:30 11:44 12:01 12:22	11:41 11:57 12:07 12:17 12:30 12:45
0° \$ 10° 20° 30° 35° 40° 45° \$ 50° 52°	21:33 21:13 20:48 20:34 20:17 19:57 19:32 19:20	22:32 22:16 21:56 21:45 21:31 21:16 20:56 20:47	23:29 23:17 23:03 22:55 22:46 22:35 22:22 22:16	09:44 10:06 10:32 10:47 11:04 11:25 11:51 12:04	10:56 11:18 11:30 11:44 12:01 12:22 12:32	11:41 11:57 12:07 12:17 12:30 12:45 12:52
0° \$ 10° 20° 30° 35° 40° 45° \$ 50° 52° 54°	21:33 21:13 20:48 20:34 20:17 19:57 19:32 19:20 19:06	22:32 22:16 21:56 21:45 21:31 21:16 20:56 20:47 20:37	23:29 23:17 23:03 22:55 22:46 22:35 22:22 22:16 22:09	09:44 10:06 10:32 10:47 11:04 11:25 11:51 12:04 12:18	10:56 11:18 11:30 11:44 12:01 12:22 12:32 12:43	11:41 11:57 12:07 12:17 12:30 12:45 12:52 12:59
0° \$ 10° 20° 30° 35° 40° 45° \$ 50° 52° 54° 56°	21:33 21:13 20:48 20:34 20:17 19:57 19:32 19:20 19:06 18:50	22:32 22:16 21:56 21:45 21:31 21:16 20:56 20:47 20:37 20:25	23:29 23:17 23:03 22:55 22:46 22:35 22:22 22:16 22:09 22:01	09:44 10:06 10:32 10:47 11:04 11:25 11:51 12:04 12:18 12:35	10:56 11:18 11:30 11:44 12:01 12:22 12:32 12:43 12:55	11:41 11:57 12:07 12:17 12:30 12:45 12:52 12:59 13:08
0° \$ 10° 20° 30° 35° 40° 45° \$ 50° 52° 54° 56° 58°	21:33 21:13 20:48 20:34 20:17 19:57 19:32 19:20 19:06 18:50 18:30	22:32 22:16 21:56 21:45 21:31 21:16 20:56 20:47 20:37 20:25 20:11	23:29 23:17 23:03 22:55 22:46 22:35 22:22 22:16 22:09 22:01 21:52	09:44 10:06 10:32 10:47 11:04 11:25 11:51 12:04 12:18 12:35 12:55	10:56 11:18 11:30 11:44 12:01 12:22 12:32 12:43 12:55 13:10	11:41 11:57 12:07 12:17 12:30 12:45 12:52 12:59 13:08 13:18
0° \$ 10° 20° 30° 35° 40° 45° \$ 50° 52° 54° 56°	21:33 21:13 20:48 20:34 20:17 19:57 19:32 19:20 19:06 18:50	22:32 22:16 21:56 21:45 21:31 21:16 20:56 20:47 20:37 20:25	23:29 23:17 23:03 22:55 22:46 22:35 22:22 22:16 22:09 22:01	09:44 10:06 10:32 10:47 11:04 11:25 11:51 12:04 12:18 12:35	10:56 11:18 11:30 11:44 12:01 12:22 12:32 12:43 12:55	11:41 11:57 12:07 12:17 12:30 12:45 12:52 12:59 13:08
0° \$ 10° 20° 30° 35° 40° 45° \$ 50° 52° 54° 56° 58°	21:33 21:13 20:48 20:34 20:17 19:57 19:32 19:20 19:06 18:50 18:30	22:32 22:16 21:56 21:45 21:31 21:16 20:56 20:47 20:37 20:25 20:11	23:29 23:17 23:03 22:55 22:46 22:35 22:22 22:16 22:09 22:01 21:52	09:44 10:06 10:32 10:47 11:04 11:25 11:51 12:04 12:18 12:35 12:55	10:56 11:18 11:30 11:44 12:01 12:22 12:32 12:43 12:55 13:10	11:41 11:57 12:07 12:17 12:30 12:45 12:52 12:59 13:08 13:18
0° \$ 10° 20° 30° 35° 40° 45° \$ 50° 52° 54° 56° 58°	21:33 21:13 20:48 20:34 20:17 19:57 19:32 19:20 19:06 18:50 18:30 18:06	22:32 22:16 21:56 21:45 21:31 21:16 20:56 20:47 20:37 20:25 20:11 19:55	23:29 23:17 23:03 22:55 22:46 22:35 22:22 22:16 22:09 22:01 21:52	09:44 10:06 10:32 10:47 11:04 11:25 11:51 12:04 12:18 12:35 12:55	10:56 11:18 11:30 11:44 12:01 12:22 12:32 12:43 12:55 13:10 13:26	11:41 11:57 12:07 12:17 12:30 12:45 12:52 12:59 13:08 13:18

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Thu -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
	247°59.9				N07°36.7			257° 42.3	S06°11.5		SHA	
0		182°11.3	N21°17.5	226°51.7		189°02.1	N19°38.7			Alpheratz	357°35.5	29°13.3
1	263°02.4	197° 10.6	18.1	241°52.4	37.4	204°04.0	38.8	272°44.6	11.4	Ankaa	353°07.8	-42°10.2
2	278°04.8	212°09.8	18.7	256°53.1	38.1	219°05.9	38.9	287°47.0	11.4	Schedar	349°32.0	56°40.0
3	293°07.3	227°09.0	• • 19.3	271°53.8	• • 38.8	234°07.7	• • 39.0	302°49.3	• • 11.4	Diphda	348°48.0	-17°51.1
4	308°09.8	242°08.2	19.9	286°54.5	39.5	249°09.6	39.2	$317^{\circ}51.7$	11.3	Achernar	335°21.0	-57°06.6
5	323°12.2	257° 07.5	20.5	301°55.2	40.2	264°11.4	39.3	332°54.0	11.3			
6	338°14.7	272°06.7	N21°21.1	316°55.9	N07°40.9	279°13.3	N19°39.4	347°56.4	S06°11.2	Hamal	327°52.1	23°34.5
7	353°17.2	287°05.9	21.7	331°56.6	41.6	294°15.1	39.5	2°58.7	11.2	Polaris	314°44.8	89°21.9
8	8°19.6	302°05.1	22.2	346°57.3	42.4	309°17.0	39.6	18°01.1	11.2	Acamar	315°12.6	-40°12.3
9	23°22.1	317°04.4	22.8	1°58.0	• • 43.1	324°18.8	• • 39.8	33°03.4	11.1	Menkar	314°07.0	4°11.1
10	38°24.6	332°03.6	23.4	16°58.7	43.8	339°20.7	39.9	48°05.8	11.1	Mirfak	308°29.5	49°56.7
										Aldebaran	290°40.6	16°33.5
11	53°27.0	347°02.8	24.0	31°59.4	44.5	354°22.6	40.0	63°08.1	11.0	Rigel	281°04.7	-8°10.4
12	68°29.5	2°02.0	N21°24.6	47°00.1	N07°45.2	9°24.4	N19°40.1	78° 10.5	S06°11.0	Capella	280°23.1	46°01.3
13	83°32.0	17°01.3	25.2	62°00.8	45.9	24°26.3	40.3	93°12.8	11.0	Bellatrix	278°23.8	6°22.3
14	98°34.4	32°00.5	25.8	77°01.5	46.6	39°28.1	40.4	108° 15.2	10.9	Elnath	278°02.9	28°37.7
15	113°36.9	46° 59.7	· · 26.3	92°02.3	• • 47.3	54°30.0	• • 40.5	123° 17.5	• • 10.9	Alnilam	275°38.6	-1°11.2
16	128°39.3	61°58.9	26.9	107°03.0	48.0	69°31.8	40.6	138° 19.8	10.8	Betelgeuse	270°53.0	7°24.7
17	143°41.8	$76^{\circ}58.1$	27.5	122°03.7	48.7	84°33.7	40.7	153°22.2	10.8			
18	158°44.3	91°57.4	N21°28.1	137°04.4	N07°49.4	99°35.6	N19°40.9	168°24.5	S06°10.8	Canopus	263°53.1	-52°42.6
19	173°46.7	106° 56.6	28.7	152°05.1	50.1	114°37.4	41.0	183°26.9	10.7	Sirius	258°27.0	-16°45.0
20	188°49.2	121°55.8	29.2	167°05.8	50.8	129°39.3	41.1	198°29.2	10.7	Adhara	255°06.6	-29°00.4
21	203°51.7	136°55.0	29.8	182°06.5	51.5	144°41.1	41.2	213°31.6	. 10.7	Procyon	244°51.6	5°09.8
22	218°54.1	150° 55.0° 151° 54.2	30.4	102 00.3 197°07.2	52.3	159°43.0	41.4	228°33.9	10.7	Pollux	243°18.2	$27^{\circ}58.1$
										Avior	234°15.4	-59°35.4
23	233°56.6	166°53.5	31.0	212°07.9	53.0	174°44.8	41.5	243°36.3	10.6	Suhail	222°46.9	-43°32.0
Mer n	ass. 07:27	$\nu$ -0.8' d0	.6′ m-3.92	$\nu 0.7' d0$	.7′ m1.05	$\nu 1.9' d0$	.1′ m-2.00	$\nu 2.3' d-0$	.0′ m1.02	Miaplacidus	221°38.8	-69°49.3
										Alphard	217°48.4	-8°45.9
										Regulus	207°35.1	11°50.9
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.6	61°37.5
0	248°59.1	181°52.7	N21°31.5	227°08.6	N07°53.7	189°46.7	N19°41.6	258°38.6	S06°10.5	Denebola	182°25.4	14°26.2
1	264°01.5	196°51.9	32.1	242°09.3	54.4	204°48.5	41.7	273°41.0	10.5	Gienah	175°44.0	-17°40.8
2	279°04.0	211°51.1	32.7	257°10.0	55.1	219°50.4	41.8	288°43.3	10.5		173°44.0	-63°14.3
3	294°06.4	226°50.3	• • 33.2	272°10.7	• • 55.8	234°52.3	• • 42.0	303°45.7	• • 10.4	Acrux		
4	309°08.9	241°49.5	33.8	287°11.4	56.5	249°54.1	42.1	318°48.0	10.4	Gacrux	171°52.0	-57°15.2
5	324°11.4	256° 48.7	34.4	302°12.1	57.2	264°56.0	42.2	333°50.4	10.4	Alioth	166°13.1	55°49.9
6	339°13.8	271°48.0	N21°34.9	317°12.9	N07°57.9	279°57.8	N19°42.3	348°52.7	S06°10.3	Spica	158°22.6	-11°17.4
	354°16.3					279 57.8 294°59.7		3°55.1		Alkaid	152°52.0	49°11.6
7		286° 47.2	35.5	332°13.6	58.6		42.4		10.3	Hadar	148°36.3	-60°29.6
8	9°18.8	301°46.4	36.1	347° 14.3	07°59.3	310°01.5	42.6	18°57.4	10.2	Menkent	147°57.9	-36°29.5
9	24°21.2	316° 45.6	• • 36.6	2°15.0	0.00°80	325°03.4	• • 42.7	33°59.8	· · 10.2	Arcturus	145°48.1	19°03.3
10	39°23.7	331°44.8	37.2	$17^{\circ}15.7$	00.7	340°05.2	42.8	49°02.1	10.2	Rigil Kent.	139°40.5	-60°56.3
11	54°26.2	346°44.0	37.8	32°16.4	01.4	355°07.1	42.9	64°04.5	10.1	Kochab	137°18.7	74°03.4
12	69°28.6	1°43.2	N21°38.3	$47^{\circ}17.1$	N08°02.1	$10^{\circ}09.0$	N19°43.1	79°06.8	S06°10.1	Zuben'ubi	136°56.3	-16°08.7
13	84°31.1	16°42.5	38.9	62°17.8	02.8	25°10.8	43.2	94°09.2	10.1	Alphecca	126°03.8	26°37.9
14	99°33.6	31°41.7	39.4	77° 18.5	03.5	40°12.7	43.3	$109^{\circ}11.5$	10.0		112° 16.1	-26°29.2
15	114°36.0	46°40.9	• • 40.0	92°19.2	• • 04.2	55°14.5	• • 43.4	124°13.9	• • 10.0	Antares	107° 10.1	-20°29.2 -69°04.3
16	129°38.5	61°40.1	40.6	107°19.9	04.9	70°16.4	43.5	$139^{\circ}16.2$	09.9	Atria Sabik	107 10.2 102°03.0	-09 04.3 -15°45.3
17	144°40.9	76°39.3	41.1	122°20.6	05.6	85°18.2	43.7	154° 18.6	09.9	Shaula	96°10.7	-13°45.3
18	159°43.4	91°38.5	N21°41.7	137°21.3	N08°06.3	100°20.1	N19°43.8	169°20.9	S06°09.9		95°58.7	12°32.4
19	174°45.9	106°37.7	42.2	152°22.0	07.0	115°22.0	43.9	184°23.3	09.8	Rasalhague		
20	189°48.3	121°36.9	42.8	167°22.7	07.7	130°23.8	44.0	199°25.6	09.8	Eltanin	90°41.9	51°29.0
21	204°50.8	136° 36.1	43.3	182°23.4	• • 08.4	145°25.7	• • 44.1	214°28.0	09.8	Kaus Aust.	83°32.8	-34°22.3
22	219°53.3	151°35.3	43.9	197°24.2	09.1	160°27.5	44.3	229°30.3	09.7	Vega	80°33.2	38°48.2
						175°29.4				Nunki	75°48.1	-26°16.0
23	234°55.7	166°34.5	44.4	212°24.9	09.8	175 29.4	44.4	244°32.7	09.7	Altair	62°00.2	8°55.8
Mer.p	ass. 07:23	$\nu$ -0.8' d0	.6′ m-3.92	$\nu$ 0.7′ d0	.7′ m1.05	$\nu 1.9' \ d0.$	.1′ m-2.00	$\nu 2.3' \ d-0$	.0' m1.02	Peacock	53°06.2	-56°39.2
										Deneb	49°25.9	45°21.7
										Enif	33°39.2	9°59.1
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.5	-46°50.4
0	249°58.2	181°33.8	N21°45.0	227°25.6	N08°10.6	190°31.2	N19°44.5	259°35.1	S06°09.7	Fomalhaut	15°15.1	-29°29.5
1	265°00.7	196°33.0	45.5	242°26.3	11.3	205°33.1	44.6	274°37.4	09.6	Scheat	13°45.8	28°12.7
2	280°03.1	211°32.2	46.1	257°27.0	12.0	220°34.9	44.7	289°39.8	09.6		13°30.5	15°20.0
3	295°05.6	226° 31.4	• • 46.6	272°27.7	12.7	235°36.8	• • 44.9	304°42.1	09.5	Markab	10 00.0	13 20.0
4	310°08.0	241°30.6	47.1	287°28.4	13.4	250°38.7	45.0	319°44.5	09.5	May 30 Thu	SHA	Mer.pass
5	325° 10.5	256° 29.8	47.7	302°29.1	14.1	265°40.5	45.1	334°46.8	09.5	Venus	294°11.4	11:52
6	340°13.0	271°29.0	N21°48.2	317°29.8	N08°14.8	280°42.4	N19°45.2	349°49.2	S06°09.4	Mars	338°51.7	08:52
										Jupiter	301°02.2	11:22
7	355°15.4	286°28.2	48.8	332°30.5	15.5	295°44.2	45.3	4°51.5	09.4	Saturn	9°42.4	06:48
8	10°17.9	301°27.4	49.3	347°31.2	16.2	310°46.1	45.5	19°53.9	09.4	Saturn	9 42.4	υυ:4δ
9	25°20.4	316°26.6	• • 49.8	2°31.9	· · 16.9	325°47.9	• • 45.6	34°56.2	• • 09.3	May 31 Fri	SHA	Mer.pass
10	40°22.8	331°25.8	50.4	17°32.6	17.6	340°49.8	45.7	49°58.6	09.3	Venus	292°53.6	11:53
11	55°25.3	346°25.0	50.9	32°33.3	18.3	355°51.7	45.8	65°00.9	09.3	Mars	338°09.6	08:51
12	70°27.8	1°24.2	N21°51.5	47°34.0	N08°19.0	10°53.5	N19°45.9	80°03.3	S06°09.2	Jupiter	300°47.6	11:19
13	85°30.2	16°23.4	52.0	62°34.7	19.7	25°55.4	46.1	95°05.6	09.2			
14	$100^{\circ}32.7$	31°22.6	52.5	77°35.4	20.4	40°57.2	46.2	$110^{\circ}08.0$	09.1	Saturn	9°39.6	06:44
15	115°35.2	46°21.8	• • 53.1	92°36.2	• • 21.1	55°59.1	• • 46.3	125°10.4	•• 09.1	Jun 01 Sat	SHA	Mer.pass
16	130°37.6	61°21.0	53.6	107°36.9	21.8	71°00.9	46.4	140° 12.7	09.1	Venus	291°35.6	11:54
17	145°40.1	76°20.2	54.1	122°37.6	22.5	86°02.8	46.5	155° 15.1	09.0	Mars	337°27.4	
18	160°42.5	91° 19.4	N21°54.6	137°38.3	N08°23.2	101°04.7	N19°46.7	170° 17.4	S06°09.0			08:50
19	175°45.0	106° 18.6	55.2	152° 39.0	23.9	101 04.7 116°06.5	46.8	185° 19.8	09.0	Jupiter	300°33.0	11:17
20	175 45.0 190°47.5	100 18.0 121°17.8	55.7	167°39.7	24.6	131°08.4	46.9	200°22.1	08.9	Saturn	9°36.9	06:41
	190 47.5 205°49.9	121 17.8 136° 17.0	56.2	182° 40.4	. 25.2	131 08.4 146°10.2	46.9 •• 47.0	200 22.1 215°24.5	08.9	Horizont	al parallax	
21											Venus:	0.1
22	220°52.4	151°16.2	56.7	197°41.1	25.9	161°12.1	47.1	230°26.8	08.9		Mars:	0.1
23	235°54.9	166°15.4	57.3	212°41.8	26.6	176°13.9	47.3	245°29.2	08.8		141013.	V.1
Mer.n	ass. 07:19	$\nu$ -0.8' d0	.5′ m-3.92	$\nu 0.7' \ d0$	.7′ m1.04	$\nu 1.9' \ d0.$	.1′ m-2.00	$\nu 2.4' \ d-0$	.0′ m1.02			

h	Sui	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°36.8	N21°48.7	274°54.9	10.4'	S14°56.1	-14.6'	58.9'
1 2	195°36.7 210°36.6	49.0 49.4	289°24.4 303°53.9	10.5' 10.6'	14°41.5 14°26.8	-14.7' -14.7'	58.9' 58.9'
3	225°36.5	49.8	318°23.5	10.6'	14° 20.6	-14.7 -14.8'	59.0'
4	240°36.4	50.1	$332^{\circ}53.1$	10.7'	13°57.3	-14.9'	59.0'
5	255°36.4	50.5	347°22.8	10.7'	13°42.4	-15.0'	59.0'
6 7	270°36.3 285°36.2	N21°50.9 51.2	1°52.5 16°22.3	10.8' 10.8'	\$13°27.4 13°12.3	-15.1' -15.1'	59.0' 59.0'
8	300°36.1	51.6	30°52.1	10.0	13° 12.3° 12° 57.2	-15.1 -15.2'	59.0'
9	315°36.0	• • 51.9	45°22.1	11.0'	12°42.0	-15.3'	59.0'
10	330°35.9 345°35.8	52.3	59°52.0 74°22.0	11.0'	12°26.7 12°11.4	-15.3'	59.0'
11 12	0°35.7	52.7 N21°53.0	74 22.0 88°52.1	11.1' 11.1'	511°56.0	-15.4' -15.5'	59.1' 59.1'
13	15°35.6	53.4	103°22.2	11.2'	11°40.5	-15.5'	59.1'
14	30°35.6	53.7	117°52.3	11.2'	11°24.9	-15.6'	59.1'
15 16	45°35.5 60°35.4	• • 54.1 54.5	132°22.5 146°52.8	11.2' 11.3'	11°09.3 10°53.6	-15.7' -15.7'	59.1' 59.1'
17	75°35.3	54.8	161°23.1	11.3'	10° 35.0	-15.8'	59.1
18	90°35.2	N21°55.2	175°53.4	11.4'	S10°22.1	-15.9'	59.1'
19	105°35.1	55.5	190°23.8	11.4'	10°06.2	-15.9'	59.1'
20 21	120°35.0 135°34.9	55.9 •• 56.2	204°54.2 219°24.6	11.5' 11.5'	09°50.3 09°34.4	-16.0' -16.0'	59.2' 59.2'
22	150°34.8	56.6	233°55.1	11.5'	09° 18.3	-16.1'	59.2'
23	165°34.7	56.9	248°25.7	11.6'	$09^{\circ}02.3$	-16.1'	59.2'
	SD = 15.8'	d = 0.4'		SI	D = 16.1'		
E.:!	СПУ	Das	CH 4		Das	٠.	μп
Fri 0	<b>GHA</b> 180°34.6	<b>Dec</b> N21°57.3	<b>GHA</b> 262°56.2	u 11.6'	Dec \$08°46.1	d -16.2'	<b>HP</b> 59.2'
1	195°34.5	57.6	277°26.9	11.6'	08°29.9	-16.2'	59.2'
2	210°34.5	58.0	291°57.5	11.7'	08° 13.7	-16.3'	59.2'
3 4	225°34.4 240°34.3	· · 58.3 58.7	306°28.2 320°58.9	11.7' 11.7'	07°57.4 07°41.1	-16.3' -16.4'	59.2' 59.2'
5	255°34.2	59.0	335°29.6	11.8'	07°24.8	-16.4	59.2'
6	270°34.1	N21°59.4	350°00.4	11.8'	S07°08.3	-16.5'	59.3'
7	285°34.0	21°59.7	4°31.2	11.8'	06°51.9	-16.5'	59.3'
8 9	300°33.9 315°33.8	22°00.1 •• 00.4	19°02.0 33°32.8	11.8' 11.9'	06°35.4 06°18.9	-16.5' -16.6'	59.3' 59.3'
10	330°33.7	00.4	48°03.7	11.9'	06°02.3	-16.6'	59.3'
11	345°33.6	01.1	62°34.6	11.9'	05°45.7	-16.6'	59.3'
12	0°33.5 15°33.4	N22°01.5	77°05.5 91°36.4	11.9'	\$05°29.1 05°12.4	-16.7' -16.7'	59.3'
13 14	30°33.3	01.8 02.1	91°36.4 106°07.3	11.9' 12.0'	05°12.4 04°55.7	-16.7' -16.7'	59.3' 59.3'
15	45°33.2	02.5	120°38.3	12.0'	04°39.0	-16.8'	59.3'
16	60°33.1	02.8	135°09.3	12.0'	04°22.2	-16.8'	59.3'
17 18	75°33.0 90°32.9	03.2 N22°03.5	149°40.3 164°11.3	12.0' 12.0'	04°05.4 \$03°48.6	-16.8' -16.8'	59.3' 59.4'
19	105°32.8	03.8	178°42.3	12.0'	03°31.8	-16.9'	59.4
20	120°32.8	04.2	193°13.3		03°14.9		59.4'
21	135°32.7 150°32.6	· · 04.5 04.8	207°44.4 222°15.4	12.0' 12.1'	02°58.1 02°41.2	-16.9' -16.9'	59.4' 59.4'
22 23	165°32.5	04.8 05.2	222 15.4 236°46.5	12.1'	02 41.2 02°24.3	-16.9'	59.4 59.4'
	SD = 15.8'	d = 0.4'			D = 16.1'		
Sat 0	<b>GHA</b> 180°32.4	<b>Dec</b> N22°05.5	<b>GHA</b> 251°17.5	u  12.1'	Dec 502°07.3	d -16.9'	<b>HP</b> 59.4'
1	180 32.4 195°32.3	05.9	251 17.5 265°48.6	12.1'	01°50.4	-10.9 -17.0'	59.4 59.4'
2	210°32.2	06.2	280°19.6	12.1'	01°33.4	-17.0'	59.4'
3 4	225°32.1 240°32.0	· · 06.5 06.9	294°50.7 309°21.8	12.1' 12.1'	01°16.5 00°59.5	-17.0' -17.0'	59.4' 59.4'
5	255°31.9	00.9	309 21.8 323°52.8	12.1'	00°59.5	-17.0'	59.4'
6	270°31.8	N22°07.5	338°23.9	12.1'	S00°25.5	-17.0'	59.4'
7	285°31.7	07.8	352°54.9	12.0'	S00°08.5	-17.0'	59.4'
8 9	300°31.6 315°31.5	08.2 •• 08.5	7°26.0 21°57.0	12.0' 12.0'	N00°08.5 00°25.5	17.0' 17.0'	59.4' 59.4'
10	330°31.4	08.8	36°28.0	12.0'	00°42.5	17.0'	59.4'
11	345°31.3	09.2	50°59.1	12.0'	00°59.5	17.0'	59.5'
12 13	0°31.2 15°31.1	N22°09.5 09.8	65°30.1 80°01.1	12.0' 12.0'	N01°16.5 01°33.5	17.0' 17.0'	59.5' 59.5'
13	30°31.0	10.1	94°32.0	12.0'	01°50.5	17.0' 17.0'	59.5'
15	45°30.9	• • 10.5	$109^{\circ}03.0$	11.9'	$02^{\circ}07.5$	17.0'	59.5'
16	60°30.8	10.8	123°34.0	11.9'	02°24.5	17.0'	59.5'
17 18	75°30.7 90°30.6	11.1 N22°11.4	138°04.9 152°35.8	11.9' 11.9'	02°41.5 N02°58.4	17.0' 17.0'	59.5' 59.5'
19	105°30.5	11.8	167°06.7	11.9'	03° 15.4	16.9'	59.5'
20	120°30.4	12.1	181°37.5	11.8'	03°32.3	16.9'	59.5'
21	135°30.3 150°30.2	• • 12.4	196°08.4 210°39.2	11.8'	03°49.2 04°06.2	16.9'	59.5'
22 23	165°30.2	12.7 13.0	210°39.2 225°10.0	11.8' 11.8'	04°06.2 04°23.0	16.9' 16.9'	59.5' 59.5'
	SD = 15.8'	d = 0.3'		SI	O = 16.2'		

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

Lat.		Moonris	е		Moonset	:
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°	03:13	02:19	01:40	09:00	11:39	14:03
<b>N</b> 70°	02:46	02:08	01:38	09:26	11:48	14:00
68°	02:24	01:58	01:36	09:45	11:55	13:58
66°	02:08	01:50	01:34	10:00	12:00	13:57
64°	01:54	01:43	01:33	10:12	12:05	13:55
62°	01:42	01:37	01:32	10:23	12:09	13:54
60°	01:32	01:31	01:31	10:31	12:13	13:53
N 58°	01:23	01:27	01:30	10:39	12:16	13:52
56°	01:15	01:23	01:29	10:46	12:19	13:51
54°	01:08	01:19	01:28	10:52	12:21	13:50
52°	01:02	01:15	01:27	10:57	12:24	13:50
50°	00:56	01:12	01:27	11:02	12:26	13:49
45°	00:44	01:06	01:25	11:12	12:30	13:48
<b>N</b> 40°	00:34	01:00	01:24	11:21	12:34	13:47
35°	00:25	00:55	01:23	11:28	12:37	13:46
30°	00:17	00:51	01:22	11:35	12:40	13:45
20°	00:03	00:43	01:21	11:46	12:45	13:43
N 10°		00:36	01:19	11:55	12:49	13:42
0°		00:30	01:18	12:04	12:53	13:41
<b>S</b> 10°		00:23	01:17	12:13	12:57	13:39
20°		00:17	01:15	12:22	13:01	13:38
30°		00:09	01:14	12:33	13:05	13:36
35°		00:04	01:13	12:39	13:08	13:35
40° 45°	23:59		01:12	12:45	13:10	13:34
	23:53		01:11	12:53	13:14	13:33
<b>S</b> 50°	23:46		01:09	13:03	13:18	13:32
52°	23:43		01:09	13:07	13:20	13:31
54°	23:39		01:08	13:12	13:21	13:30
56°	23:35		01:07	13:17	13:24	13:30
58° <b>S</b> 60°	23:30 23:25		01:07 01:06	13:23 13:29	13:26 13:29	13:29 13:28
<b>5</b> 60°	23:25	•••••	01:00	13:29	13:29	13:28

	Sun Moon							
Day	Day Eqn.of Time		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	58-36%		
30	02:27	02:23	11:58	05:52	18:17			
31	02:19	02:14	11:58	06:41	19:05			
01	02:09	02:05	11:58	07:29	19:53			

h	Aries	Ver	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	250°57.3	181°14.6	N21°57.8	227° 42.5	N08°27.3	191°15.8	N19°47.4	260°31.6	S06°08.8	Alpheratz	357°35.4	29°13.3
1	265°59.8	196° 13.8	58.3	242°43.2	28.0	206°17.6	47.5	275°33.9	08.8	Ankaa	353°07.8	-42°10.2
2	281°02.3	211°13.0	58.8	257°43.9	28.7	221°19.5	47.6	290°36.3	08.7	Schedar	349°31.9	56°40.0
3	296°04.7	226° 12.2	• • 59.4	272°44.6	• • 29.4	236°21.4	• • 47.7	305°38.6	• • 08.7	Diphda	348°48.0	-17°51.1
4	$311^{\circ}07.2$	$241^{\circ}11.4$	$21^{\circ}59.9$	287°45.3	30.1	251°23.2	47.9	320°41.0	08.7	Achernar	335°21.0	-17 31.1 -57°06.6
5	326°09.7	$256^{\circ}10.6$	22°00.4	302°46.0	30.8	$266^{\circ}25.1$	48.0	335°43.3	08.6	1		23°34.5
6	341°12.1	271°09.8	N22°00.9	317°46.7	N08°31.5	281°26.9	N19°48.1	350°45.7	S06°08.6	Hamal	327°52.1	
7	356° 14.6	286°09.0	01.4	332°47.4	32.2	296°28.8	48.2	5°48.1	08.6	Polaris	314°44.1	89°21.8
8	11°17.0	301°08.2	01.9	347°48.1	32.9	311°30.6	48.3	20°50.4	08.5	Acamar	315°12.5	-40°12.3
9	26° 19.5	316°07.4	02.4	2°48.9	33.6	326°32.5	• • 48.5	35°52.8	. 08.5	Menkar	314°07.0	$4^{\circ}11.1$
10	41°22.0	331°06.6	03.0	17°49.6	34.3	341°34.4	48.6	50°55.1	08.4	Mirfak	308°29.5	49°56.7
11	56°24.4	346°05.8	03.5	32°50.3	35.0	356°36.2	48.7	65°57.5	08.4	Aldebaran	290°40.6	$16^{\circ}33.5$
							N19° 48.8			Rigel	281°04.7	-8°10.4
12	71°26.9	1°04.9	N22°04.0	47°51.0	N08°35.7	11°38.1		80°59.8	S06°08.4	Capella	280°23.1	46°01.3
13	86°29.4	16°04.1	04.5	62°51.7	36.4	26°39.9	48.9	96°02.2	08.3	Bellatrix	278°23.8	6°22.3
14	101°31.8	31°03.3	05.0	77°52.4	37.1	41°41.8	49.1	111°04.6	08.3	Elnath	278°02.9	28°37.7
15	116°34.3	46°02.5	• • 05.5	92°53.1	• • 37.8	56°43.6	• • 49.2	126°06.9	• • 08.3	Alnilam	275°38.6	-1°11.2
16	131°36.8	61°01.7	06.0	107°53.8	38.5	71°45.5	49.3	141°09.3	08.2	Betelgeuse	270°53.0	7°24.7
17	146°39.2	76°00.9	06.5	122°54.5	39.2	86°47.4	49.4	$156^{\circ}11.6$	08.2	Canopus	263°53.1	-52°42.6
18	161°41.7	91°00.1	N22°07.0	137°55.2	N08°39.9	101°49.2	N19°49.5	171°14.0	S06°08.2		258°27.0	-32 42.0 -16°45.0
19	$176^{\circ}44.1$	105°59.3	07.5	152°55.9	40.6	$116^{\circ}51.1$	49.7	186°16.3	08.1	Sirius		
20	191°46.6	120°58.5	08.0	167° 56.6	41.3	131°52.9	49.8	201°18.7	08.1	Adhara	255°06.6	-29°00.4
21	206°49.1	135°57.7	08.5	182°57.3	42.0	146°54.8	49.9	216°21.1	08.1	Procyon	244°51.6	5°09.8
22	221°51.5	150°56.9	09.0	197°58.0	42.7	161°56.6	50.0	231°23.4	08.0	Pollux	243°18.2	27°58.1
23	236°54.0	165°56.0	09.5	212°58.7	43.3	176°58.5	50.1	246°25.8	08.0	Avior	234°15.4	-59°35.4
_										Suhail	222°46.9	-43°32.0
Mer.p	ass. 07:15	$\nu$ -0.8' d0.5	5′ m-3.92	$\nu$ 0.7′ d0	.7′ m1.04	$\nu 1.9' \ d0$	.1′ m-2.00	$\nu$ 2.4′ d-0	0.0′ m1.02	Miaplacidus	221°38.9	-69°49.3
										Alphard	217°48.4	-8°45.9
			_		_		-		_	Regulus	207°35.1	11°50.9
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.6	61°37.5
0	251°56.5	$180^{\circ}55.2$	N22°10.0	227°59.4	N08°44.0	192°00.4	$N19^{\circ}50.2$	$261^{\circ}28.1$	S06°08.0	Denebola	182°25.4	14°26.2
1	266°58.9	$195^{\circ}54.4$	10.5	243°00.1	44.7	207°02.2	50.4	276°30.5	07.9	Gienah	175°44.0	-17°40.8
2	282°01.4	$210^{\circ}53.6$	11.0	258°00.8	45.4	222°04.1	50.5	291°32.9	07.9		173°44.0	-17 40.8 -63°14.3
3	297°03.9	225°52.8	• • 11.5	273°01.5	• • 46.1	237°05.9	• • 50.6	306°35.2	• • 07.9			
4	312°06.3	240°52.0	12.0	288°02.2	46.8	252°07.8	50.7	321°37.6	07.8	1	171°52.0	-57°15.2
5	327°08.8	255°51.2	12.5	303°02.9	47.5	267°09.6	50.8	336°39.9	07.8	Alioth	166°13.1	55°49.9
6	342°11.3	270°50.3	N22°13.0	318°03.7	N08°48.2	282°11.5	N19°51.0	351°42.3	S06°07.8	Spica	158°22.6	-11°17.4
	357° 13.7	285°49.5				297°13.4		6°44.7		Alkaid	152°52.0	49°11.6
7	357 13.7 12°16.2		13.4	333°04.4 348°05.1	48.9	297 13.4 312°15.2	51.1		07.7 07.7	Hadar	148°36.3	-60°29.6
8		300°48.7	13.9		49.6		51.2	21°47.0	07.7	Menkent	147°57.9	-36°29.6
9	27° 18.6	315°47.9	• • 14.4	3°05.8	• • 50.3	327°17.1	51.3	36°49.4	• • 07.7	Arcturus	145°48.1	19°03.4
10	42°21.1	330°47.1	14.9	18°06.5	51.0	342°18.9	51.4	51°51.7	07.6	Rigil Kent.	139°40.5	-60°56.3
11	57°23.6	345°46.3	15.4	33°07.2	51.7	357°20.8	51.5	66°54.1	07.6	Kochab	137°18.7	74°03.4
12	$72^{\circ}26.0$	0°45.5	N22°15.9	48°07.9	N08°52.4	12°22.6	N19°51.7	81°56.5	S06°07.6	Zuben'ubi	136°56.3	-16°08.7
13	87°28.5	$15^{\circ}44.6$	16.3	63°08.6	53.0	27° 24.5	51.8	96°58.8	07.5	Alphecca	126°03.8	26°37.9
14	$102^{\circ}31.0$	$30^{\circ}43.8$	16.8	78°09.3	53.7	42°26.4	51.9	$112^{\circ}01.2$	07.5			
15	117°33.4	45°43.0	17.3	93°10.0	• • 54.4	57°28.2	• • 52.0	127°03.6	• • 07.5	Antares	112°16.1	-26°29.2
16	132°35.9	60°42.2	17.8	108° 10.7	55.1	72°30.1	52.1	142°05.9	07.4	Atria	107°10.2	-69°04.3
17	147°38.4	75°41.4	18.3	123°11.4	55.8	87°31.9	52.3	157°08.3	07.4	Sabik	102°03.0	-15°45.3
18	162°40.8	90°40.6	N22°18.7	138° 12.1	N08°56.5	102°33.8	N19°52.4	172°10.6	S06°07.4	Shaula	96°10.7	-37°07.3
19	102 40.8 177°43.3	105°39.7	19.2	150° 12.1° 153° 12.8	0	102 33.6 117°35.6	F0 F	172 10.0 187°13.0	07.3	Rasalhague	95°58.7	12°32.5
	177 45.5 192°45.8				57.2 57.0		52.5 52.6			Eltanin	90°41.9	51°29.0
20		120°38.9	19.7	168° 13.5	57.9	132°37.5	52.6	202°15.4	07.3	Kaus Aust.	83°32.8	-34°22.3
21	207°48.2	135°38.1	• • 20.2	183°14.2	58.6	147°39.4	• • 52.7	217°17.7	• • 07.3	Vega	80°33.2	38°48.2
22	222°50.7	150°37.3	20.6	198°14.9	59.3	162°41.2	52.8	232°20.1	07.3	Nunki	75°48.1	-26°16.0
23	237°53.1	165°36.5	21.1	213° 15.6	59.9	177°43.1	53.0	247°22.5	07.2	Altair	62°00.2	8°55.9
Mern	ass. 07:11	$\nu$ -0.8' d0.5	5′ m_3 02	ν0 7′ d0	.7′ m1.04	1/1 0/ d0	.1′ m-2.00	1/2 A/ d C	0.0' m1.01	Peacock	53°06.2	-56°39.2
ivier.p	uss. UI.II	ν-0.0 α0.	J 111-J.94	νσ.τ u0	., 1111.04	ν1.9 UU.	.111-2.00	ν2. <del>4</del> U-C	1111.U1	Deneb	49°25.9	45°21.8
										Enif	33°39.2	9°59.1
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	1		
0	252°55.6	180°35.6	N22°21.6	228° 16.3		192°44.9	N19°53.1	262°24.8	S06°07.2	Al Na'ir	27°33.4	-46°50.4
1	267°58.1	195°34.8	22.0	243° 17.0	01.3	207°46.8	53.2	277°27.2	07.2	Fomalhaut	15°15.1	-29°29.5
2	283°00.5	210° 34.0	22.5	243 17.0 258° 17.7	02.0	207 40.8 222° 48.6	53.2	292°29.5	07.2	Scheat	13°45.7	28°12.7
			23.0				53.4	292 29.5 307°31.9	07.1	Markab	13°30.4	15°20.0
3	298°03.0	225° 33.2		273°18.4	• • 02.7	237°50.5				lum 00 Co	CHA	Ma:
4	313°05.5	240°32.3	23.4	288° 19.1	03.4	252°52.4	53.5	322°34.3	07.1	Jun 02 Sun	SHA	Mer.pass
5	328°07.9	255°31.5	23.9	303°19.9	04.1	267°54.2	53.7	337°36.6	07.0		290°17.3	11:56
6	343° 10.4	270°30.7	N22°24.4	318°20.6	N09°04.8	282°56.1	N19°53.8	352°39.0	S06°07.0	Mars	336°45.2	08:49
7	358° 12.9	285°29.9	24.8	333°21.3	05.5	297°57.9	53.9	7°41.4	07.0	Jupiter		11:14
8	13° 15.3	$300^{\circ}29.1$	25.3	348°22.0	06.1	312°59.8	54.0	22°43.7	06.9	Saturn	9°34.2	06:37
9	$28^{\circ}17.8$	$315^{\circ}28.2$	• • 25.7	3°22.7	• • 06.8	328°01.6	• • 54.1	$37^{\circ}46.1$	• • 06.9	Luc 02 14	CIIA	Ma:::::
10	43°20.2	330°27.4	26.2	18°23.4	07.5	343°03.5	54.2	52°48.5	06.9	Jun 03 Mon	SHA	Mer.pass
11	58°22.7	345°26.6	26.6	33°24.1	08.2	358°05.4	54.4	67°50.8	06.8	Venus		11:57
12	73°25.2	0°25.8	N22°27.1	48° 24.8	N09°08.9	13°07.2	N19°54.5	82°53.2	S06°06.8	Mars		08:48
13	88° 27.6	15°24.9	27.5	63°25.5	09.6	28°09.1	54.6	97°55.5	06.8	Jupiter		11:11
14	103°30.1	30°24.1	28.0	78° 26.2	10.3	43° 10.9	54.7	112°57.9	06.7	Saturn	9°31.7	06:33
										1 00 -	C	-
15	118° 32.6	45°23.3	. 28.4	93°26.9	• • 11.0	58° 12.8	• • 54.8	128°00.3	06.7	Jun 04 Tue	SHA	Mer.pass
16	133°35.0	60°22.4	28.9	108°27.6	11.6	73°14.7	54.9	143°02.6	06.7	Venus		11:58
17	148°37.5	75°21.6	29.3	123°28.3	12.3	88°16.5	55.1	158°05.0	06.7	Mars		08:46
18	163°40.0	90°20.7	N22°29.8	138°29.0	N09°13.0	103°18.4	N19°55.2	173°07.4	\$06°06.6	Jupiter	299°49.3	11:08
19	178°42.4	$105^{\circ}19.9$	30.3	153°29.7	13.7	118°20.2	55.3	188°09.7	06.6	Saturn	9°29.2	06:29
20	193°44.9	$120^{\circ}19.1$	30.7	168°30.4	14.4	133°22.1	55.4	203°12.1	06.6			
21	208°47.4	135° 18.3	• • 31.2	183°31.1	•• 15.1	148°23.9	• • 55.5	$218^{\circ}14.5$	• • 06.5	Horizont	al parallax	
22	223°49.8	$150^{\circ}17.4$	31.6	198°31.8	15.8	163°25.8	55.6	233°16.8	06.5		Venus:	0.1
23	238°52.3	165°16.6	32.1	213°32.5	16.4	178°27.7	55.8	248°19.2	06.5		Mars:	0.1
Mer.p	ass. 07:07	$\nu$ -0.8′ d0.	5′ m-3.92	u0.7′ $d$ 0	.7′ m1.04	$\nu$ 1.9′ d0.	.1′ m-2.00	$\nu$ 2.4′ d-0	0.0′ m1.01			

h	Sur	า			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°30.0	N22°13.4	239°40.8	11.7'	N04°39.9	16.8'	59.5'
1 2	195°29.9 210°29.8	13.7 14.0	254°11.5 268°42.2	11.7' 11.7'	04°56.7 05°13.6	16.8' 16.8'	59.5' 59.5'
3	210 29.8 225°29.7	. 14.3	200 42.2 283°12.9	11.6'	05 13.0 05°30.4	16.8	59.5'
4	240°29.6	14.6	297°43.5	11.6'	05°47.1	16.7'	59.5'
5	255°29.5	15.0	$312^{\circ}14.1$	11.6'	06°03.9	16.7'	59.5'
6	270°29.4	N22°15.3	326°44.7	11.5'	N06°20.6	16.7'	59.5'
7 8	285°29.3 300°29.2	15.6 15.9	341°15.2 355°45.7	11.5' 11.5'	06°37.3 06°53.9	16.6' 16.6'	59.5' 59.5'
9	315°29.1	. 16.2	10°16.1	11.4'	07° 10.5	16.6'	59.5'
10	330°29.0	16.5	24°46.6	11.4'	$07^{\circ}27.1$	16.5'	59.5'
11	345°28.9	16.8	39°16.9	11.3'	07°43.6	16.5	59.5'
12 13	0°28.8 15°28.7	N22°17.1 17.5	53°47.3 68°17.5	11.3' 11.2'	N08°00.1 08°16.6	16.5' 16.4'	59.5' 59.5'
14	30°28.6	17.8	82°47.8	11.2'	08°33.0	16.4	59.5'
15	45°28.5	• • 18.1	97°18.0	11.1'	08°49.4	16.3'	59.5'
16	60°28.4	18.4	111°48.1	11.1'	09°05.7	16.3'	59.5'
17 18	75°28.2 90°28.1	18.7 N22°19.0	126°18.2 140°48.2	11.0' 11.0'	09°22.0 N09°38.2	16.2' 16.2'	59.5' 59.5'
19	105°28.0	19.3	155°18.2	10.9'	09°54.3	16.1	59.5'
20	120°27.9	19.6	169°48.2	10.9'	10° 10.5	16.1'	59.5'
21	135°27.8	•• 19.9	$184^{\circ}18.0$	10.8'	$10^{\circ}26.5$	16.0'	59.5'
22	150°27.7	20.2	198°47.9	10.8'	10°42.5	16.0'	59.5'
23	165°27.6	20.5	213°17.7	10.7'	10°58.5	15.9'	59.5'
	SD = 15.8'	d = 0.3'		SE	0 = 16.2'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°27.5	N22°20.8	227°47.4	10.7'	N11°14.4	15.8'	59.5'
1 2	195°27.4 210°27.3	21.1 21.4	242°17.0 256°46.6	10.6' 10.5'	11°30.2 11°46.0	15.8' 15.7'	59.5' 59.5'
3	225°27.2	21.7	271°16.2	10.5'	12°01.7	15.6'	59.5'
4	240°27.1	22.0	285°45.6	10.4'	$12^{\circ}17.3$	15.6'	59.4'
5	255°27.0 270°26.9	22.3 N22°22.6	300°15.1 314°44.4	10.4'	12°32.9 N12°48.4	15.5'	59.4
6 7	270 20.9 285°26.8	22.9	314 44.4 329°13.7	10.3' 10.2'	13°03.8	15.4' 15.4'	59.4' 59.4'
8	300°26.7	23.2	343°42.9	10.2'	13° 19.2	15.3'	59.4'
9	315°26.6	• • 23.5	358°12.1	10.1'	13°34.5	15.2'	59.4'
10 11	330°26.5 345°26.4	23.8 24.1	12°41.2 27°10.2	10.0' 10.0'	13°49.7 14°04.8	15.1' 15.1'	59.4' 59.4'
12	0°26.2	N22°24.4	41°39.2	9.9'	N14° 19.9	15.0'	59.4
13	15°26.1	24.7	56°08.0	9.8'	14°34.8	14.9'	59.4'
14 15	30°26.0 45°25.9	25.0 •• 25.3	70°36.9 85°05.6	9.7' 9.7'	14°49.7 15°04.5	14.8' 14.7'	59.4' 59.4'
16	60°25.8	25.6	99°34.3	9.6'	15° 19.2	14.6	59.4'
17	75°25.7	25.9	$114^{\circ}02.9$	9.5'	15°33.9	14.5'	59.4'
18	90°25.6	N22°26.2	128°31.4	9.5'	N15°48.4	14.4'	59.3'
19 20	105°25.5 120°25.4	26.5 26.7	142°59.9 157°28.2	9.4' 9.3'	16°02.9 16°17.2	14.4' 14.3'	59.3' 59.3'
21	135°25.3	• • 27.0	171°56.6	9.2'	16°31.5	14.2'	59.3'
22	150°25.2	27.3	$186^{\circ}24.8$	9.2'	16°45.6	14.1'	59.3'
23	165°25.1	27.6	200°52.9	9.1'	16°59.7	14.0'	59.3'
	SD = 15.8'	d = 0.3'		SE	0 = 16.2'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°25.0	N22°27.9	215°21.0	9.0'	N17°13.6	13.9'	59.3'
1 2	195°24.8 210°24.7	28.2 28.5	229°49.0 244°17.0	8.9' 8.8'	17°27.5 17°41.3	13.8' 13.7'	59.3' 59.3'
3	225°24.6	28.7	258°44.8	8.8'	17°54.9	13.5'	59.3'
4	240°24.5	29.0	$273^{\circ}12.6$	8.7'	18°08.5	13.4'	59.2'
5	255°24.4	29.3	287°40.3	8.6'	18°21.9	13.3'	59.2'
6 7	270°24.3 285°24.2	N22°29.6 29.9	302°07.9 316°35.4	8.5' 8.5'	N18° 35.2 18° 48.4	13.2' 13.1'	59.2' 59.2'
8	300°24.1	30.2	331°02.9	8.4	19°01.5	13.1	59.2'
9	315°24.0	• • 30.4	345°30.3	8.3'	19° 14.5	12.9'	59.2'
10	330°23.9	30.7	359°57.6	8.2'	19°27.4	12.7'	59.2'
11 12	345°23.7 0°23.6	31.0 N22°31.3	14°24.8 28°51.9	8.1' 8.1'	19°40.1 N19°52.8	12.6' 12.5'	59.2' 59.1'
13	15°23.5	31.6	43°19.0	8.0'	20°05.3	12.4	59.1'
14	30°23.4	31.8	57°46.0	7.9'	20°17.7	12.3'	59.1'
15 16	45°23.3 60°23.2	· · 32.1 32.4	72°12.9 86°39.7	7.8' 7.7'	20°29.9 20°42.0	12.1' 12.0'	59.1' 59.1'
17	75°23.1	32.4 32.7	86 39.7 101°06.4	7.7' 7.7'	20° 54.1	12.0 11.9'	59.1'
18	90°23.0	N22°32.9	115°33.1	7.6'	N21°05.9	11.7'	59.1'
19	105°22.9	33.2	129°59.7	7.5'	21°17.7	11.6'	59.0'
20 21	120°22.7 135°22.6	33.5 · · 33.8	144°26.2 158°52.6	7.4' 7.4'	21°29.3 21°40.8	11.5' 11.3'	59.0' 59.0'
22	150°22.5	34.0	173°19.0	7.3'	21°52.1	11.2'	59.0'
23	165°22.4	34.3	187°45.2	7.2'	22°03.3	11.1'	59.0'
	SD = 15.8'	d = 0.3'		SE	0 = 16.2'		

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

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

		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	25-8%	
02	02:00	01:55	11:58	08:18	20:42		
03	01:50	01:45	11:58	09:07	21:33		
04	01:40	01:35	11:58	10:00	22:28		

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	253°54.7	180°15.8	N22°32.5	228°33.2	N09° 17.1	193°29.5	N19°55.9	263°21.6	S06°06.4			
1	268° 57.2	100 15.6 195°14.9	33.0	243°33.9	17.8	208°31.4	56.0	203 21.0 278°23.9	06.4	Alpheratz	357°35.4	29°13.3
2	200 57.2 283°59.7	210°14.1	33.4	243 33.9 258°34.6	18.5	200 31.4 223°33.2	56.1	276 23.9 293°26.3	06.4	Ankaa	353°07.8	-42°10.2
3	203 59.7 299°02.1	210 14.1 225°13.3	33.8	273°35.3	19.2	223 33.2 238°35.1	. 56.2	293 20.3 308°28.7	06.4	Schedar	349°31.9	56°40.0
3 4	299 02.1 314°04.6	225 13.3 240°12.5	34.3	273 35.3 288°36.0	19.2	258 35.1 253°36.9	56.3	308 28.7 323°31.0	06.3	Diphda	348°48.0	$-17^{\circ}51.1$
4 5	314 04.6 329°07.1	240 12.5 255°11.6	34.3 34.7	303°36.7	20.6	268°38.8	56.5	323 31.0 338°33.4		Achernar	$335^{\circ}20.9$	-57°06.6
6	329°07.1 344°09.5	255°11.6 270°10.8	34.7 N22°35.2	303°36.7 318°37.4	N09°21.2	268° 38.8 283° 40.7	56.5 N19°56.6	338°33.4 353°35.8	06.3 \$06°06.3	Hamal	$327^{\circ}52.0$	23°34.5
7	344 09.5 359°12.0	270 10.8 285°10.0	N22 35.2 35.6	318 37.4 333°38.1	21.9	283 40.7 298°42.5	N19 56.6 56.7	353 35.8 8°38.1	06.2	Polaris	$314^{\circ}42.9$	$89^{\circ}21.8$
8	359 12.0 14°14.5	285 10.0 300°09.1	35.0 36.0	348°38.8	21.9	298 42.5 313°44.4	56.8	8 38.1 23°40.5	06.2	Acamar	$315^{\circ}12.5$	-40°12.3
9	14 14.5 29° 16.9	300 09.1 315°08.3	36.5	348 38.8 3°39.6	23.3	313 44.4 328°46.2	56.9	23 40.5 38°42.9	06.2	Menkar	314°07.0	$4^{\circ}11.1$
10	44° 19.4	330°07.5	36.9	3 39.0 18°40.3	24.0	343°48.1	57.0	50 42.9 53°45.2	06.1	Mirfak	$308^{\circ}29.5$	49°56.7
11	59° 21.9	345°06.6	37.3	33°41.0	24.0	358°50.0	57.0 57.2	68°47.6	06.1	Aldebaran	290°40.6	16°33.5
12	74° 24.3	0°05.8	N22°37.8	48°41.7	N09° 25.3	13°51.8	N19°57.3	83°50.0	506°06.1	Rigel	281°04.7	-8°10.4
13	89° 26.8	15°05.0	38.2	63°42.4	26.0	28°53.7	57.4	98°52.4	06.1	Capella	280°23.1	46°01.3
14	104°29.2	30°04.1	38.6	78°43.1	26.7	43°55.5	57.5	113°54.7	06.0	Bellatrix	278°23.8	6°22.3
15	119°31.7	45°03.3	39.0	93°43.8	27.4	58°57.4	• • 57.6	128°57.1	• • 06.0	Elnath	278°02.9	28°37.7
16	134°34.2	60°02.5	39.5	108°44.5	28.1	73°59.2	57.7	143°59.5	06.0	Alnilam	275°38.6	-1°11.2
17	149°36.6	75°01.6	39.9	123°45.2	28.8	89°01.1	57.9	159°01.8	05.9	Betelgeuse	270°53.0	7°24.7
18	164°39.1	90°00.8	N22°40.3	138°45.9	N09°29.4	104°03.0	N19°58.0	174°04.2	S06°05.9	Canopus	263°53.2	-52°42.6
19	179°41.6	105°00.0	40.7	153°46.6	30.1	119°04.8	58.1	189°06.6	05.9	Sirius	258°27.0	-16°45.0
20	194°44.0	119°59.1	41.2	168°47.3	30.8	134°06.7	58.2	204°08.9	05.8	Adhara	255°06.6	-29°00.4
21	209°46.5	134°58.3	• • 41.6	183°48.0	• • 31.5	149°08.5	• • 58.3	219°11.3	• • 05.8	Procyon	244°51.6	5°09.8
22	224°49.0	149°57.5	42.0	198°48.7	32.2	164°10.4	58.4	234°13.7	05.8	Pollux	243°18.2	27°58.1
23	239°51.4	164°56.6	42.4	213°49.4	32.8	179°12.3	58.5	249°16.0	05.8	Avior	234°15.4	-59°35.4
_			_			-				Suhail	222°46.9	-43°32.0
iVler.p	ass. 07:03	$\nu$ -0.8′ $d0$	.4′ m-3.92	$\nu$ 0.1' d0	.7′ m1.04	$\nu$ 1.9′ $d0$	.1′ m-2.00	$\nu$ 2.4′ $d$ -0	.0′ m1.01	Miaplacidus	221°38.9	-69°49.3
										Alphard	217°48.4	-8°45.9
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.1	11°50.9
0	254°53.9	179°55.8	N22°42.8	228°50.1	N09°33.5	194°14.1	N19°58.7	264°18.4	S06°05.7	Dubhe	193°41.6	61°37.5
1	269° 56.4	194°54.9	43.2	243°50.8	34.2	209°16.0	58.8	279°20.8	05.7	Denebola	182°25.4	14°26.2 -17°40.8
2	284°58.8	209°54.1	43.7	258°51.5	34.9	224°17.8	58.9	294°23.2	05.7	Gienah	175°44.0 173°00.4	-17°40.8 -63°14.3
3	300°01.3	224°53.3	• • 44.1	273°52.2	• • 35.6	239°19.7	• • 59.0	309°25.5	• • 05.6			
4	315°03.7	239°52.4	44.5	288°52.9	36.2	254°21.5	59.1	324°27.9	05.6		171°52.0	-57°15.3
5	330°06.2	254°51.6	44.9	303°53.6	36.9	269°23.4	59.2	339°30.3	05.6	Alioth	166°13.1	55°49.9 -11°17.4
6	345°08.7	269°50.7	N22°45.3	318°54.3	N09°37.6	284°25.3	N19°59.4	354°32.6	S06°05.6	Spica	158°22.6	
7	0°11.1	284°49.9	45.7	333°55.0	38.3	299°27.1	59.5	9°35.0	05.5	Alkaid	152°52.1	49°11.7
8	15° 13.6	299°49.1	46.1	348°55.7	39.0	$314^{\circ}29.0$	59.6	24°37.4	05.5	Hadar Menkent	148°36.3 147°57.9	-60°29.6 -36°29.6
9	$30^{\circ}16.1$	314°48.2	• • 46.5	3°56.4	• • 39.6	329°30.8	• • 59.7	39°39.8	• • 05.5	Menkent	147°57.9 145°48.1	-36° 29.6 19° 03.4
10	45° 18.5	329°47.4	46.9	18°57.1	40.3	344°32.7	59.8	54°42.1	05.4	Arcturus Rigil Kent.	145°48.1 139°40.5	-60°56.3
11	60°21.0	344°46.5	47.3	33°57.8	41.0	359°34.6	19°59.9	69°44.5	05.4	Kigii Kent. Kochab	139 40.5 137°18.7	-00 50.3 74°03.4
12	75°23.5	359°45.7	N22°47.7	48°58.5	N09°41.7	14°36.4	N20°00.0	84°46.9	S06°05.4	Zuben'ubi	136°56.3	-16°08.7
13	$90^{\circ}25.9$	14°44.9	48.1	$63^{\circ}59.2$	42.4	29°38.3	00.2	99°49.2	05.4	Alphecca	130 50.3 126°03.8	-16 08.7 26°38.0
14	105°28.4	29°44.0	48.5	78°59.9	43.0	44°40.1	00.3	114°51.6	05.3	Antares	112° 16.1	-26°29.2
15	120°30.9	44°43.2	• • 48.9	94°00.6	• • 43.7	59°42.0	• • 00.4	129°54.0	•• 05.3	Atria	107° 10.2	-69°04.3
16	$135^{\circ}33.3$	59°42.3	49.3	$109^{\circ}01.3$	44.4	74°43.9	00.5	144°56.4	05.3	Sabik	107 10.2 102°03.0	-09 04.3 -15°45.3
17	150°35.8	74°41.5	49.7	124°02.0	45.1	89°45.7	00.6	159°58.7	05.3	Shaula	96° 10.6	-37°07.3
18	165°38.2	89°40.6	N22°50.1	139°02.7	N09°45.7	104°47.6	N20°00.7	175°01.1	S06°05.2	Rasalhague	95°58.7	12°32.5
19	180°40.7	104°39.8	50.5	154°03.4	46.4	119°49.4	8.00	190°03.5	05.2	Eltanin	90°41.9	51°29.0
20	195°43.2	119°39.0	50.9	169°04.1	47.1	134°51.3	01.0	205°05.9	05.2	Kaus Aust.	83°32.8	-34°22.3
21	210°45.6	134°38.1	• • 51.3	184°04.9	• • 47.8	149°53.2	•• 01.1	220°08.2	•• 05.1	Vega	80°33.2	38°48.2
22	225°48.1	149°37.3	51.7	199°05.6	48.5	164°55.0	01.2	235°10.6	05.1	Nunki	75°48.1	-26°16.0
23	240°50.6	164°36.4	52.1	214°06.3	49.1	179°56.9	01.3	250°13.0	05.1	Altair	62°00.2	8°55.9
Mern	ass. 06:59	v-0.8′ d0	.4′ m-3.92	νη 7' Αυ	.7′ m1.03	1/1 Q <sup>1</sup> d0	.1′ m-2.00	ν2 Δ' d.C	.0′ m1.00	Peacock	53°06.1	-56°39.2
- vici.p		ν 0.0 d0		ν υ.τ u0	., ,,,,,,,	ν 1.5 UU.	.11-2.00	ν Δ.Ψ U-U	.5 1111.00	Deneb	49° 25.9	45°21.8
										Enif	33°39.2	9°59.1
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.4	-46°50.4
0	255°53.0	179°35.6	N22°52.5	229°07.0	N09°49.8	194°58.7	N20°01.4	265°15.3	S06°05.1	Fomalhaut	15° 15.1	-29°29.5
1	270°55.5	194°34.7	52.9	244°07.7	50.5	210°00.6	01.5	280°17.7	05.0	Scheat	13°45.7	28°12.7
2	285°58.0	209°33.9	53.3	259°08.4	51.2	225°02.4	01.6	295°20.1	05.0	Markab	13°30.4	15°20.0
3	301°00.4	224°33.0	• • 53.6	274°09.1	• • 51.8	240°04.3	• • 01.8	310°22.5	• • 05.0			
4	316°02.9	239°32.2	54.0	289°09.8	52.5	255°06.2	01.9	325°24.8	05.0	Jun 05 Wed	SHA	Mer.pass
5	331°05.4	254°31.3	54.4	304°10.5	53.2	270°08.0	02.0	340°27.2	04.9	Venus	286°21.0	12:00
6	346°07.8	269°30.5	N22°54.8	319°11.2	N09°53.9	285°09.9	N20°02.1	355°29.6	S06°04.9	Mars	334°38.5	08:45
7	1°10.3	284°29.6	55.2	334°11.9	54.5	300°11.7	02.2	10°32.0	04.9	Jupiter	299°34.8	11:05
8	16° 12.7	299°28.8	55.5	349°12.6	55.2	315°13.6	02.3	25°34.3	04.8	Saturn	9°26.8	06:26
9	31°15.2	314°28.0	• • 55.9	4°13.3	• • 55.9	330°15.5	• • 02.4	40°36.7	• • 04.8	Jun 06 Thu	SHA	Mer.pass
10	46° 17.7	329°27.1	56.3	19°14.0	56.6	345°17.3	02.6	55°39.1	04.8	Venus		12:01
11	61°20.1	344°26.3	56.7	34°14.7	57.2	0°19.2	02.7	70°41.5	04.8	Mars	333°56.2	08:44
12	76°22.6	359°25.4	N22°57.1	49°15.4	N09°57.9	15°21.0	N20°02.8	85°43.8	S06°04.7	Jupiter	299°20.2	11:02
13	91°25.1	14°24.6	57.4	64°16.1	58.6	30°22.9	02.9	100°46.2	04.7	Saturn	9°24.5	06:22
14	106°27.5	29°23.7	57.8	79°16.8	59.3	45°24.8	03.0	115°48.6	04.7			
15	121°30.0	44°22.9	• • 58.2	94°17.5	09°59.9	60°26.6	• • 03.1	130°51.0	• • 04.7	Jun 07 Fri	SHA	Mer.pass
16	136°32.5	59°22.0	58.5	109°18.2	10°00.6	75°28.5	03.2	145°53.3	04.6	Venus	283°42.5	12:02
17	151°34.9	74°21.2	58.9	124°18.9	01.3	90°30.3	03.4	160°55.7	04.6	Mars	333°13.9	08:43
18	166°37.4	89°20.3	N22°59.3	139°19.6	N10°01.9	105°32.2	N20°03.5	175°58.1	S06°04.6	Jupiter	299°05.7	10:59
19	181°39.9	104°19.5	22°59.6	154°20.3	02.6	120°34.1	03.6	191°00.5	04.6	Saturn	9°22.3	06:18
20	196°42.3	119°18.6	23°00.0	169°21.0	03.3	135°35.9	03.7	206°02.9	04.5	Horizont	al parallax	
21	211°44.8 226°47.2	134°17.8	00.4	184°21.7	04.0	150°37.8	03.8	221°05.2	04.5	1.01120111	Venus:	0.1
22		149°16.9	00.7	199°22.4 214°23.1	04.6 05.3	165°39.6	03.9	236°07.6	04.5 04.5		Mars:	0.1
23	241°49.7	164°16.0	01.1	214°23.1	05.3	180°41.5	04.0	251°10.0	04.5		141013.	V.1
Mer.p	ass. 06:55	$\nu$ -0.8′ d0	.4′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.7′ m1.03	$\nu$ 1.9′ d0.	.1′ m-2.00	$\nu$ 2.4′ $d$ -0	.0′ m1.00			

J. I.	C	-0.0219 360		-011		J9 36C	
h	Sui	n			Moon		
Wed		Dec	GHA	$\nu$	Dec	d	HP
0 1	180°22.3 195°22.2	N22°34.6 34.8	202°11.4 216°37.6	7.1' 7.0'	N22°14.4 22°25.3	10.9' 10.8'	59.0' 58.9'
2	210°22.1	35.1	231°03.6	7.0'	22°36.1	10.6'	58.9'
3	225°22.0	• • 35.4	245°29.6	6.9'	22°46.7	10.5'	58.9'
4	240°21.8	35.6	$259^{\circ}55.5$	6.8'	22°57.2	10.3'	58.9'
5	255°21.7	35.9	274°21.3	6.8'	23°07.5	10.2'	58.9'
6 7	270°21.6 285°21.5	N22°36.2 36.4	288°47.1 303°12.8	6.7' 6.6'	N23°17.7 23°27.8	10.1' 9.9'	58.9' 58.8'
8	300°21.4	36.7	303 12.6 317°38.4	6.5	23°37.7	9.9 9.7'	58.8'
9	315°21.3	37.0	332°03.9	6.5	23°47.4	9.6'	58.8'
10	330°21.2	37.2	$346^{\circ}29.4$	6.4'	23°57.0	9.4'	58.8'
11	345°21.1	37.5	0°54.8	6.3'	24°06.5	9.3'	58.8'
12	0°20.9	N22°37.8	15°20.1	6.3'	N24°15.8 24°24.9	9.1'	58.7'
13 14	15°20.8 30°20.7	38.0 38.3	29°45.4 44°10.6	6.2' 6.1'	24°24.9 24°33.9	9.0' 8.8'	58.7' 58.7'
15	45° 20.6	• • 38.5	58° 35.7	6.1	24° 42.7	8.7'	58.7
16	60° 20.5	38.8	73°00.8	6.0'	24°51.3	8.5'	58.7'
17	75°20.4	39.1	87°25.8	6.0'	24°59.8	8.3'	58.6'
18	90°20.3	N22°39.3	101°50.8	5.9'	N25°08.2	8.2'	58.6'
19	105°20.1	39.6	116° 15.7	5.8'	25° 16.3	8.0'	58.6'
20 21	120°20.0 135°19.9	39.8 •• 40.1	130°40.5 145°05.3	5.8' 5.7'	25°24.3 25°32.2	7.8' 7.7'	58.6' 58.6'
22	150°19.8	40.1	159° 30.1	5.7'	25°39.8	7.7 7.5'	58.5
23	165° 19.7	40.6	173°54.7	5.6'	25°47.3	7.3'	58.5
	SD = 15.8'	d = 0.3'		SI	D = 16.1'		
					10.1		
Thu	<b>GHA</b> 180° 19.6	Dec	GHA	$\nu$	Dec	d 7.01	HP
0 1	180° 19.6 195° 19.4	N22°40.8 41.1	188° 19.4 202° 43.9	5.6' 5.5'	N25°54.6 26°01.8	7.2' 7.0'	58.5' 58.5'
2	210° 19.3	41.1	202 43.9 217°08.5	5.5'	26°08.8	6.8'	58.4
3	225° 19.2	41.6	231°33.0	5.4'	26° 15.6	6.6'	58.4'
4	240°19.1	41.9	245°57.4	5.4'	26°22.3	6.5'	58.4'
5	255°19.0	42.1	260°21.8	5.4'	26°28.7	6.3'	58.4'
6	270°18.9	N22°42.4	274°46.2	5.3'	N26°35.0	6.1'	58.3'
7 8	285° 18.7 300° 18.6	42.6 42.9	289°10.5 303°34.8	5.3' 5.3'	26°41.2 26°47.1	5.9' 5.8'	58.3' 58.3'
9	315° 18.5	43.1	303 34.6 317°59.0	5.3' 5.2'	26°52.9	5.6'	58.3'
10	330° 18.4	43.3	332°23.3	5.2'	26°58.5	5.4'	58.3
11	345°18.3	43.6	346°47.4	5.2'	27°03.9	5.2'	58.2'
12	0°18.2	N22°43.8	1°11.6	5.1'	N27°09.1	5.1'	58.2'
13	15° 18.0	44.1	15°35.7 29°59.9	5.1'	27°14.2 27°19.1	4.9'	58.2'
14 15	30°17.9 45°17.8	44.3 •• 44.6	29 59.9 44°23.9	5.1' 5.1'	27 19.1 27°23.8	4.7' 4.5'	58.2' 58.1'
16	60°17.7	44.8	58° 48.0	5.1	27°28.3	4.3'	58.1
17	75° 17.6	45.1	73°12.1	5.0'	27°32.7	4.2'	58.1'
18	90°17.5	N22°45.3	87°36.1	5.0'	N27°36.8	4.0'	58.1'
19	105° 17.3	45.5	102°00.1		27°40.8	3.8'	58.0'
20	120°17.2	45.8	116°24.1	5.0'	27° 44.6	3.6'	58.0'
21 22	135° 17.1 150° 17.0	· · 46.0 46.3	130°48.1 145°12.1	5.0' 5.0'	27°48.2 27°51.7	3.4' 3.3'	58.0' 57.9'
23	165° 16.9	46.5	159°36.1	5.0'	27°55.0	3.1'	57.9'
	SD = 15.8'	d = 0.3'			D = 16.0'		
		<u>u = 0.5</u>					
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	180° 16.7 195° 16.6	N22°46.7 47.0	174°00.1 188°24.1	5.0' 5.0'	N27°58.0 28°00.9	2.9' 2.7'	57.9' 57.9'
2	210° 16.5	47.0 47.2	202°48.1	5.0'	28°03.6	2.7	57.9 57.8'
3	225° 16.4	• • 47.4	217° 12.1	5.0'	28°06.2	2.4'	57.8'
4	240°16.3	47.7	$231^{\circ}36.1$	5.0'	28°08.5	2.2'	57.8'
5	255° 16.2	47.9	246°00.1	5.0'	28°10.7	2.0'	57.8'
6	270°16.0	N22°48.1	260°24.2	5.0'	N28° 12.7	1.8'	57.7'
7 8	285° 15.9 300° 15.8	48.4 48.6	274°48.2 289°12.3	5.1' 5.1'	28° 14.5 28° 16.1	1.6' 1.4'	57.7' 57.7'
9	315° 15.7	· · 48.8	303°36.3	5.1'	28° 17.6	1.4	57.7 57.6'
10	330° 15.6	49.1	318°00.4	5.1'	28° 18.9	1.1'	57.6'
11	345°15.4	49.3	332°24.6	5.2'	$28^{\circ}19.9$	0.9'	57.6'
12	0°15.3	N22°49.5	346°48.7	5.2'	N28° 20.8	0.7'	57.6'
13	15° 15.2	49.7	1°12.9	5.2'	28°21.6	0.5'	57.5'
14 15	30° 15.1 45° 15.0	50.0 •• 50.2	15°37.1 30°01.4	5.2' 5.3'	28°22.1 28°22.5	0.4' 0.2'	57.5' 57.5'
16	45 15.0 60°14.8	50.2	44°25.6	5.3'	28° 22.5	0.2	57.5 57.4'
17	75° 14.7	50.4	58° 50.0	5.4'	28°22.7	-0.2	57.4
18	90°14.6	N22°50.9	73°14.3	5.4'	N28°22.5	-0.3	57.4
19	105° 14.5	51.1	87°38.7	5.4'	28°22.2	-0.5	57.4
20	120°14.3	51.3	102°03.2	5.5'	28°21.7	-0.7'	57.3
21 22	135° 14.2 150° 14.1	· · 51.5 51.8	116°27.7 130°52.2	5.5' 5.6'	28°21.0 28°20.1	-0.9' -1.0'	57.3' 57.3'
23	165° 14.1	51.8 52.0	130°52.2 145°16.8	5.6'	28° 20.1 28° 19.1	-1.0 -1.2'	57.3° 57.2'
23	SD = 15.8'	d = 0.2'	1.0 10.0		D = 15.8'	1.2	01.2
	<u>ان – 15.0</u>	<u>u — U.Z</u>		اد	13.0		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
N 72°						
N 70°						
68°						
66°	////	////	00:47	23:15	////	////
64°	////	////	01:46	22:14	////	////
62°	////	////	02:18	21:40	////	////
60°	////	01:11	02:42	21:16	22:49	////
N 58°	////	01:51	03:01	20:57	22:08	////
56°	////	02:17	03:17	20:41	21:41	////
54°	01:05	02:38	03:31	20:28	21:20	22:55
52°	01:42	02:55	03:42	20:16	21:03	22:17
50°	02:06	03:09	03:53	20:05	20:49	21:52
45°	02:49	03:37	04:14	19:44	20:21	21:09
N 40°	03:18	03:59	04:31	19:26	19:59	20:40
35°	03:40	04:17	04:46	19:12	19:41	20:18
30°	03:58	04:31	04:59	18:59	19:26	20:00
20°	04:26	04:55	05:20	18:38	19:02	19:31
N 10°	04:48	05:15	05:38	18:19	18:42	19:09
0°	05:07	05:33	05:55	18:02	18:25	18:51
S 10°	05:23	05:49	06:12	17:46	18:08	18:34
20°	05:39	06:06	06:30	17:28	17:51	18:19
30°	05:54	06:24	06:50	17:07	17:33	18:03
35°	06:03	06:34	07:02	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	17:25
52°	06:38	07:21	08:01	15:56	16:36	17:20
54°	06:43	07:29	08:12	15:45	16:28	17:14
56°	06:49	07:38	08:24	15:33	16:20	17:08
58°	06:55	07:47	08:38	15:19	16:10	17:02
<b>S</b> 60°	07:02	07:58	08:54	15:03	15:59	16:55
	ı			1		

Lat.		Moonris	e		Moonset	
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°						
N 70°						
68°						
66°	80:00					
64°	00:45 23:59	00:00		22:41		
62°	01:12	01:06	00:50	21:35	23:57	
60°	01:33	01:41	02:02	21:01	22:44	23:53
N 58°	01:50	02:06	02:38	20:36	22:09	23:16
56°	02:05	02:27	03:04	20:16	21:43	22:49
54°	02:18	02:44	03:24	19:59	21:23	22:28
52°	02:29	02:58	03:41	19:45	21:06	22:10
50°	02:39	03:11	03:56	19:33	20:51	21:55
45°	03:00	03:38	04:26	19:07	20:21	21:25
<b>N</b> 40°	03:17	03:59	04:50	18:47	19:58	21:01
35°	03:31	04:16	05:09	18:30	19:39	20:41
30°	03:44	04:31	05:26	18:15	19:23	20:25
20°	04:06	04:57	05:54	17:51	18:55	19:56
N 10°	04:25	05:20	06:18	17:30	18:31	19:32
0°	04:43	05:41	06:41	17:10	18:09	19:09
<b>S</b> 10°	05:01	06:02	07:03	16:50	17:47	18:46
20°	05:20	06:25	07:28	16:29	17:24	18:22
30°	05:42	06:51	07:56	16:05	16:56	17:53
35°	05:56	07:07	08:13	15:51	16:40	17:36
40°	06:11	07:25	08:33	15:35	16:21	17:17
45°	06:29	07:47	08:57	15:15	15:58	16:53
<b>S</b> 50°	06:52	08:16	09:28	14:51	15:29	16:22
52°	07:04	08:30	09:43	14:40	15:15	16:06
54°	07:16	08:46	10:01	14:26	14:59	15:48
56°	07:31	09:05	10:23	14:11	14:39	15:26
58°	07:48	09:29	10:51	13:53	14:15	14:58
<b>S</b> 60°	08:09	10:00	11:31	13:32	13:43	14:18

	Sun			Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	28-1	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	3-0%	
05	01:29	01:24	11:59	10:56	23:25		
06	01:18	01:13	11:59	11:55	-:-		
07	01:07	01:01	11:59	12:55	00:25		

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0 0	256° 52.2	179° 15.2	N23°01.5	229°23.8	N10°06.0	БПА 195°43.4	Dec N20°04.1	266°12.4	S06°04.4			
	271°54.6	179 15.2 194°14.3		244° 24.5	06.7	210° 45.2	04.3	281°14.7	04.4	Alpheratz	357°35.4	29°13.3
1 2	271 54.6 286°57.1	194 14.3 209°13.5	01.8 02.2	244 24.5 259°25.2	06.7 07.3	210 45.2 225° 47.1	04.3 04.4	281 14.7 296°17.1	04.4	Ankaa	353°07.8	$-42^{\circ}10.2$
3	301°59.6	209 13.5 224°12.6	02.5	259 25.2 274°25.9	08.0	240°48.9	04.5	311°19.5	•• 04.4	Schedar	349°31.8	56°40.0
4	317°02.0	239°11.8	02.9	289° 26.6	08.7	255° 50.8	04.5	326°21.9	04.4	Diphda	348°47.9	-17°51.1
5	332°04.5	254°10.9	03.3	304° 27.3	09.3	270° 52.7	04.0	341°24.3	04.3	Achernar	335°20.9	-57°06.5
6	347°07.0	269° 10.1	N23°03.6	319°28.0	N10°10.0	285° 54.5	N20°04.8	356°26.6	S06°04.3	Hamal	327°52.0	23°34.5
7	2°09.4	284°09.2	04.0	334°28.7	10.7	300°56.4	04.9	11°29.0	04.2	Polaris	$314^{\circ}41.7$	89°21.8
8	17°11.9	299°08.4	04.3	349°29.4	11.3	315°58.2	05.0	26°31.4	04.2	Acamar	315°12.5	-40°12.3
9	32°14.3	314°07.5	04.7	4°30.1	. 12.0	331°00.1	05.2	41°33.8	04.2	Menkar	314°07.0	4°11.1
10	47° 16.8	329°06.6	05.0	19°30.8	12.7	346°02.0	05.3	56°36.1	04.2	Mirfak	308°29.4	49°56.7
11	62° 19.3	344°05.8	05.4	34°31.5	13.4	1°03.8	05.4	71°38.5	04.1	Aldebaran	290°40.5	16°33.5
12	77°21.7	359°04.9	N23°05.7	49°32.2	N10°14.0	16°05.7	N20°05.5	86°40.9	S06°04.1	Rigel	281°04.7	-8°10.4
13	92°24.2	14°04.1	06.1	64°32.9	14.7	31°07.5	05.6	101°43.3	04.1	Capella	280°23.1	46°01.3
14	107°26.7	29°03.2	06.4	79°33.6	15.4	46°09.4	05.7	116°45.7	04.1	Bellatrix	278°23.8	6°22.3
15	$122^{\circ}29.1$	44°02.4	• • 06.8	94°34.3	• • 16.0	61°11.3	• • 05.8	131°48.0	• • 04.1	Elnath	278°02.9	28°37.7
16	137°31.6	59°01.5	07.1	109°35.0	16.7	$76^{\circ}13.1$	05.9	146°50.4	04.0	Alnilam	275°38.6	-1°11.2
17	$152^{\circ}34.1$	74°00.7	07.4	124°35.7	17.4	91°15.0	06.1	161°52.8	04.0	Betelgeuse Canopus	270°53.0 263°53.2	7°24.7 -52°42.5
18	167°36.5	88° 59.8	N23°07.8	139°36.4	N10°18.0	$106^{\circ}16.8$	$N20^{\circ}06.2$	176°55.2	S06°04.0	Sirius	258°27.0	-32 42.5 -16°45.0
19	182°39.0	103°58.9	08.1	154°37.1	18.7	121° 18.7	06.3	191°57.6	04.0	Adhara	258 27.0 255°06.6	-16 45.0 -29°00.4
20	197°41.5	118°58.1	08.5	169° 37.8	19.4	136° 20.6	06.4	206°59.9	03.9	Procyon	244°51.6	5°09.8
21	212°43.9	133°57.2	• • 08.8	184° 38.5	• • 20.0	151°22.4	• • 06.5	222°02.3	• • 03.9	Pollux	244 51.0 243°18.2	27°58.1
22	227°46.4	148°56.4	09.1	199°39.2	20.7	166°24.3	06.6	237°04.7	03.9	Avior	234°15.4	-59°35.4
23	242°48.8	163°55.5	09.5	214°39.9	21.4	181°26.1	06.7	252°07.1	03.9	Suhail	222°46.9	-43°32.0
Mern	ass. 06:51	ν-0 9' d0	.4′ m-3.92	ν0 7' d0	.7′ m1.03	$\nu$ 1 9' d0	.1′ m-2.00	ν2 4' d-Ω	.0′ m1.00	Miaplacidus	221°38.9	-69°49.3
-νισι.μ		- 0.5 dO.	5.32	ν U.1 UU		- 1.5 UU.	2.00	∠2.∓ U-0		Alphard	217°48.4	-8°45.9
										Regulus	207°35.1	11°50.9
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.6	61°37.5
0	257°51.3	178°54.6	N23°09.8	229° 40.6	N10°22.0	196°28.0	N20°06.8	267°09.5	S06°03.8	Denebola	182°25.4	14°26.2
1	272°53.8	193°53.8	10.1	244°41.3	22.7	211°29.9	07.0	282°11.8	03.8	Gienah	175°44.0	-17°40.8
2	287°56.2	208°52.9	10.5	259° 42.0	23.4	226°31.7	07.1	297°14.2	03.8	Acrux	173°00.5	-63°14.3
3	302°58.7	223°52.1	• • 10.8	274° 42.7	• • 24.0	241°33.6	• • 07.2	312°16.6	• • 03.8	Gacrux	171°52.0	-57°15.3
4	318°01.2	238°51.2	11.1	289°43.4	24.7	256°35.5	07.3	327°19.0	03.7	Alioth	$166^{\circ}13.1$	55°49.9
5	333°03.6	253°50.3	11.4	304°44.1	25.4	271°37.3	07.4	342°21.4	03.7	Spica	158°22.6	-11°17.4
6	348°06.1	268° 49.5	N23°11.8	319°44.8	N10°26.0	286°39.2	N20°07.5	357°23.8	S06°03.7	Alkaid	152°52.1	49°11.7
7	3°08.6	283°48.6	12.1	334°45.5	26.7	301°41.0	07.6	12°26.1 27°28.5	03.7	Hadar	$148^{\circ}36.3$	-60°29.7
8	18°11.0	298° 47.8	12.4	349°46.2	27.4	316°42.9	07.7		03.6	Menkent	147°57.9	-36°29.6
9	33°13.5	313°46.9	•• 12.7	4°46.9	• • 28.0	331°44.8 346°46.6	•• 07.9	42°30.9	• • 03.6	Arcturus	145°48.1	19°03.4
10 11	48° 16.0 63° 18.4	328°46.0	13.1	19°47.6 34°48.3	28.7	1°48.5	08.0	57°33.3 72°35.7	03.6	Rigil Kent.	$139^{\circ}40.5$	-60°56.4
	78° 20.9	343° 45.2 358° 44.3	13.4 N23°13.7	34 48.3 49°49.0	29.4 N10°30.0	1 48.5 16°50.3	08.1 N20°08.2	72 35.7 87°38.1	03.6 \$06°03.5	Kochab	$137^{\circ}18.8$	74°03.4
12 13	93° 23.3	13° 43.4	14.0	49 49.0 64°49.7	30.7	31°52.2	08.3	102°40.4	03.5	Zuben'ubi	136°56.3	-16°08.7
14	93° 25.3 108° 25.8	28° 42.6	14.0	79° 50.4	31.4	46°54.1	08.4	102 40.4 117°42.8	03.5	Alphecca	126°03.8	26°38.0
15	100° 25.0° 123° 28.3	43°41.7	14.7	94°51.1	32.0	61°55.9	08.5	117 42.8 132°45.2	• • 03.5	Antares	112°16.1	-26°29.2
16	138°30.7	58° 40.9	15.0	109°51.8	32.7	76° 57.8	08.6	147°47.6	03.5	Atria	107°10.2	-69°04.3
17	153° 33.2	73° 40.9	15.3	109°51.6	33.3	91°59.6	08.7	162°50.0	03.4	Sabik	102°03.0	-15°45.3
18	168°35.7	88°39.1	N23°15.6		N10°34.0	107°01.5	N20°08.9	177°52.4	S06°03.4	Shaula	96°10.6	-37°07.3
19	183°38.1	103°38.3	15.9	154°53.9	34.7	122°03.4	09.0	192°54.7	03.4	Rasalhague	95°58.7	12°32.5
20	198° 40.6	118° 37.4	16.2	169°54.6	35.3	137°05.2	09.1	207°57.1	03.4	Eltanin	90°41.9	51°29.0
21	213°43.1	133°36.5	. 16.5	184°55.3	36.0	152°07.1	09.2	222°59.5	. 03.3	Kaus Aust.	83°32.8	-34°22.3
22	228° 45.5	148° 35.7	16.8	199°56.0	36.7	167°09.0	09.3	238°01.9	03.3	Vega	80°33.2	38°48.2
23	243°48.0	163°34.8	17.1	214°56.7	37.3	182°10.8	09.4	253°04.3	03.3	Nunki	75°48.0	-26°16.0
										Altair	62°00.2	8°55.9
Mer.p	ass. 06:47	$\nu$ -0.9′ d0.	.3′ m-3.92	u0.7′ $d$ 0	.7' m $1.03$	$\nu$ 1.9′ d0.	.1′ m-2.00	$\nu$ 2.4′ d-0	.0′ m1.00	Peacock	53°06.1	-56°39.2
										Deneb	49°25.8 33°39.2	45°21.8
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif		9°59.1
0	258°50.5	178°33.9	N23°17.5	229°57.4		197° 12.7		268°06.7	S06°03.3	Al Na'ir Fomalhaut	27°33.4 15°15.0	-46°50.4 -29°29.5
1	273°52.9	193°33.1	17.8	244°58.1	38.6	212°14.5	09.6	283°09.0	03.3	Scheat	15 15.0 13°45.7	-29 29.5 28°12.7
2	288°55.4	208°32.2	18.1	259°58.8	39.3	$227^{\circ}16.4$	09.7	298°11.4	03.2	Markab	13°30.4	15°20.1
3	303°57.8	223°31.3	• • 18.4	$274^{\circ}59.5$	• • 40.0	242°18.3	• • 09.9	313°13.8	• • 03.2			10 20.1
4	$319^{\circ}00.3$	238°30.5	18.7	$290^{\circ}00.2$	40.6	$257^{\circ}20.1$	10.0	$328^{\circ}16.2$	03.2	Jun 08 Sat	SHA	Mer.pass
5	334°02.8	$253^{\circ}29.6$	19.0	$305^{\circ}00.9$	41.3	$272^{\circ}22.0$	10.1	343°18.6	03.2		282°23.0	12:04
6	349°05.2	268° 28.7	N23°19.3	320°01.6	N10°41.9	287°23.8	N20° 10.2	358°21.0	<b>S</b> 06°03.1	Mars	332°31.6	08:42
7	4°07.7	283°27.9	19.6	335°02.3	42.6	302°25.7	10.3	13°23.4	03.1	Jupiter		10:56
8	19° 10.2	298°27.0	19.9	350°03.0	43.3	317°27.6	10.4	28°25.7	03.1	Saturn	9°20.2	06:14
9	34°12.6	313°26.1	20.2	5°03.7	• • 43.9	332°29.4	• • 10.5	43°28.1	• • 03.1	Jun 09 Sun	SHA	Mer.pass
10	49° 15.1	328°25.3	20.4	20°04.4	44.6	347°31.3	10.6	58°30.5	03.1	Venus		12:05
11	64° 17.6	343°24.4	20.7	35°05.1	45.2	2°33.2	10.7	73°32.9	03.0	Mars		08:41
12	79°20.0	358°23.5	N23°21.0	50°05.8	N10°45.9	17°35.0	N20° 10.9	88°35.3	S06°03.0	Jupiter		10:53
13	94°22.5	13°22.7	21.3	65°06.5	46.6	32°36.9	11.0	103°37.7	03.0	Saturn	9°18.2	06:10
14	109°25.0	28°21.8	21.6	80°07.2	47.2	47°38.7	11.1	118°40.1	03.0			
15	124°27.4	43°20.9	• • 21.9	95°07.9	• • 47.9	62°40.6	• • 11.2	133°42.5	• • 02.9	Jun 10 Mon	SHA	Mer.pass
16	139°29.9	58°20.0	22.2	110°08.6	48.5	77° 42.5	11.3	148°44.8	02.9		279°43.5	12:06
17	154°32.3	73°19.2	22.5	125°09.3	49.2	92°44.3	11.4 N20°11.5	163°47.2	02.9		331°07.0	08:40
18 19	169°34.8 184°37.3	88° 18.3 103° 17.4	N23°22.8 23.0	140° 10.0 155° 10.7	N10°49.9	107°46.2 122°48.1	N20° 11.5	178°49.6 193°52.0	S06°02.9		298°22.2	10:50
	184° 37.3 199° 39.7				50.5 51.2	122°48.1 137°49.9	11.6 11.7	193°52.0 208°54.4	02.9	Saturn	9°16.2	06:07
20 21	199° 39.7 214° 42.2	118° 16.6 133° 15.7	23.3 · · 23.6	170°11.4 185°12.1	51.2 •• 51.8	137°49.9 152°51.8	11.7 •• 11.8	208°54.4 223°56.8	02.8 · · 02.8	Horizont	al parallax	
22	214 42.2 229°44.7	133 15.7 148°14.8	23.0	200° 12.8	52.5	167°53.6	12.0	223 50.8 238°59.2	02.8		Venus:	0.1
23	244° 47.1	163°14.0	24.2	215° 13.5	53.2	182°55.5	12.0	254°01.6	02.8		Mars:	0.1
Mer.p	ass. 06:44	$\nu$ -0.9' d0.	.3′ m-3.92	u0.7′ $d$ 0	.7′ m1.02	$\nu$ 1.9′ d0.	.1′ m-2.00	$\nu$ 2.4′ d-0	.0′ m0.99			

h	Sui			Moon			
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°13.9	N22°52.2	159°41.4	5.7'	N28° 17.9	-1.4'	57.2'
1	195°13.7	52.4	174°06.2	5.8'	$28^{\circ}16.5$	-1.6'	57.2'
2	210°13.6	52.6	188°30.9	5.8'	28° 14.9	-1.7'	57.2'
3	225°13.5	• • 52.9	202°55.7	5.9'	28° 13.2	-1.9'	57.1'
4 5	240°13.4 255°13.3	53.1 53.3	217°20.6 231°45.6	5.9' 6.0'	28°11.3 28°09.2	-2.1' -2.2'	57.1' 57.1'
6	270°13.1	N22°53.5	246°10.6	6.1	N28° 07.0	-2.2 -2.4'	57.0'
7	285°13.0	53.7	260°35.6	6.1	28°04.6	-2.6'	57.0'
8	300°12.9	53.9	275°00.8	6.2'	28°02.0	-2.7'	57.0'
9	315°12.8	• • 54.2	289°26.0	6.3'	$27^{\circ}59.3$	-2.9'	57.0'
10	330°12.6	54.4	303°51.3	6.4'	27°56.4	-3.1'	56.9'
11	345°12.5	54.6	318°16.7	6.4	27°53.3	-3.2'	56.9'
12 13	0°12.4 15°12.3	N22°54.8 55.0	332°42.1 347°07.6	6.5' 6.6'	N27°50.1 27°46.7	-3.4' -3.5'	56.9' 56.8'
14	30°12.2	55.0 55.2	1°33.2	6.7	27°43.2	-3.5' -3.7'	56.8'
15	45°12.0	• • 55.4	15°58.9	6.8'	27°39.5	-3.7 -3.9'	56.8'
16	60°11.9	55.6	30°24.7	6.8'	27°35.6	-4.0'	56.8'
17	75°11.8	55.8	44°50.5	6.9'	27°31.6	-4.2'	56.7'
18	90°11.7	N22°56.1	59°16.4	7.0'	N27°27.4	-4.3'	56.7'
19	105°11.5	56.3	73°42.5	7.1'	27°23.1	-4.5'	56.7'
20	120°11.4	56.5	88°08.6	7.2'	27°18.6	-4.6'	56.6'
21 22	135°11.3 150°11.2	· · 56.7 56.9	102°34.8 117°01.1	7.3' 7.4'	27°14.0 27°09.2	-4.8' -4.9'	56.6' 56.6'
23	165°11.0	50.9 57.1	117 01.1 131°27.4	7.4 7.5'	27 09.2 27°04.3	-4.9 -5.1'	56.5'
						Ų.1	- 5.5
	SD = 15.8′	d = 0.2'		51	D = 15.6'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°10.9 195°10.8	N22°57.3	145°53.9	7.6'	N26°59.2	-5.2'	56.5'
1 2	195°10.8 210°10.7	57.5 57.7	160°20.5 174°47.1	7.7' 7.8'	26°54.0 26°48.6	-5.4' -5.5'	56.5' 56.5'
3	225°10.5	• • 57.9	189°13.9	7.9'	26°43.1	-5.7'	56.4
4	240°10.4	58.1	203°40.8	8.0'	26° 37.5	-5.8'	56.4'
5	255°10.3	58.3	$218^{\circ}07.7$	8.1'	$26^{\circ}31.7$	-5.9'	56.4'
6	270°10.2	N22°58.5	232°34.8	8.2'	N26°25.7	-6.1'	56.3'
7	285°10.0 300°09.9	58.7	247°01.9	8.3'	26° 19.6 26° 13.4	-6.2'	56.3'
8 9	300°09.9 315°09.8	58.9 •• 59.1	261°29.2 275°56.5	8.4' 8.5'	26° 13.4 26° 07.1	-6.4' -6.5'	56.3' 56.3'
10	330°09.7	59.3	290°24.0	8.6'	26°00.6	-6.6'	56.2'
11	345°09.5	59.5	304°51.5	8.7'	25° 54.0	-6.8'	56.2'
12	0°09.4	N22°59.7	319°19.2	8.8'	N25° 47.2	-6.9'	56.2'
13	15°09.3	22°59.9	333°47.0	8.9'	25°40.3	-7.0'	56.1'
14	30°09.2 45°09.0	23°00.1 •• 00.3	348°14.9 2°42.8	9.0' 9.1'	25°33.3 25°26.2	-7.1' -7.3'	56.1
15 16	45 09.0 60°08.9	00.4	2 42.8 17°10.9	9.1 9.2'	25 20.2 25°18.9	-7.3 -7.4'	56.1' 56.1'
17	75°08.8	00.6	31°39.1	9.3'	25°11.5	-7.5'	56.0'
18	90°08.7	N23°00.8	46°07.4	9.4'	N25°04.0	-7.6'	56.0'
19	105°08.5	01.0	$60^{\circ}35.8$	9.5'	24°56.4	-7.8'	56.0'
20	120°08.4	01.2	75°04.3	9.6'	24°48.6	-7.9'	55.9'
21	135°08.3 150°08.2	• • 01.4	89°32.9	9.7'	24°40.8	-8.0'	55.9'
22 23	150°08.2 165°08.0	01.6 01.8	104°01.7 118°30.5	9.8' 9.9'	24°32.8 24°24.7	-8.1' -8.2'	55.9' 55.9'
23	SD = 15.7'	d = 0.2'	110 30.5		D = 15.4'	-0.2	33.9
	3υ = 15. <i>l</i> ′	a = 0.2		51	∪ = 15.4′		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°07.9	N23°02.0	132°59.4	10.0'	N24°16.4	-8.3'	55.8'
1 2	195°07.8 210°07.7	02.1 02.3	147°28.5 161°57.6	10.2' 10.3'	24°08.1 23°59.6	-8.5' -8.6'	55.8' 55.8'
3	210°07.7 225°07.5	· · · 02.5	161°57.6 176°26.9	10.4	23°59.6 23°51.1	-8.6° -8.7'	55.8'
4	240°07.4	02.7	170°20.9 190°56.3	10.4	23°42.4	-8.8'	55.7'
5	255°07.3	02.9	$205^{\circ}25.8$	10.6'	23°33.6	-8.9'	55.7'
6	270°07.2	N23°03.1	219°55.4	10.7'	N23°24.7	-9.0'	55.7'
7	285°07.0	03.2	234°25.0	10.8'	23°15.8	-9.1'	55.7'
8 9	300°06.9 315°06.8	03.4 •• 03.6	248°54.9 263°24.8	10.9' 11.0'	23°06.7 22°57.5	-9.2' -9.3'	55.6' 55.6'
10	315°06.8 330°06.6	03.8	263°24.8 277°54.8	11.1'	22°57.5 22°48.2	-9.3° -9.4'	55.6'
11	345°06.5	04.0	292°24.9	11.1	22° 38.8	-9.4 -9.5'	55.6'
12	0°06.4	N23°04.1	306°55.1	11.3'	N22°29.3	-9.6'	55.5'
13	15°06.3	04.3	321°25.5	11.4'	22° 19.7	-9.7'	55.5'
14	30°06.1	04.5	335°55.9	11.5'	22°10.0	-9.8'	55.5'
15 16	45°06.0 60°05.9	· · 04.7 04.8	350°26.4 4°57.1	11.6' 11.8'	22°00.2 21°50.3	-9.9' -10.0'	55.5' 55.4'
16 17	75°05.8	04.8 05.0	4°57.1 19°27.9	11.8 11.9'	21° 50.3 21° 40.3	-10.0	55.4' 55.4'
18	90°05.6	N23°05.2	33°58.7	12.0'	N21°30.3	-10.1	55.4'
19	105°05.5	05.4	48°29.7	12.1'	21°20.1	-10.2'	55.4'
20	120°05.4	05.5	63°00.7	12.2'	21°09.9	-10.3'	55.3'
21	135°05.2 150°05.1	· · 05.7 05.9	77°31.9 92°03.2	12.3' 12.4'	20°59.6 20°49.1	-10.4'	55.3' 55.3'
22 23	165°05.1	05.9 06.1	92°03.2 106°34.5	12.4 12.5'	20° 49.1 20° 38.6	-10.5' -10.6'	55.3'
23	SD = 15.7'	d = 0.2'			D = 15.2'	20.0	55.5
	3D = 15.7	a = 0.2		51	υ = 15.2°		

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

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

		Sun			Moon	
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	2-4
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	3-13%
08	00:55	00:50	11:59	13:54	01:25	
09	00:44	00:38	11:59	14:49	02:22	
10	00:32	00:26	12:00	15:40 03:15		

June 11, 12, 13 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	259°49.6	178°13.1	N23°24.4	230°14.2	N10°53.8	197°57.4	N20°12.2	269°03.9	S06°02.8			
1	274° 52.1	176 13.1 193°12.2	24.7	245°14.9	54.5	212°59.2	12.3	284°06.3	02.7	Alpheratz	357°35.4	29°13.3
2	289°54.5	208°11.3	25.0	260°15.6	55.1	228°01.1	12.4	299°08.7	02.7	Ankaa	353°07.7	-42°10.2
3	304°57.0	223°10.5	25.3	275°16.3	55.8	243°03.0	. 12.5	314°11.1	02.7	Schedar	349°31.8	56°40.0
4	319°59.5	238°09.6	25.5	290°17.0	56.4	258°04.8	12.6	329°13.5	02.7	Diphda	348°47.9	-17°51.1
5	335°01.9	253°08.7	25.8	305°17.7	57.1	273°06.7	12.7	344°15.9	02.7	Achernar	335°20.9	-57°06.5
6	350°04.4	268°07.8	N23°26.1	320°18.4	N10°57.7	288°08.5	N20°12.8	359°18.3	S06°02.6	Hamal	327°52.0	23°34.5
7	5°06.8	283°07.0	26.3	335°19.1	58.4	303°10.4	12.9	14°20.7	02.6	Polaris Acamar	314°40.8 315°12.5	89°21.8
8	20°09.3	298°06.1	26.6	350°19.8	59.1	318°12.3	13.0	29°23.1	02.6	Menkar	315 12.5 314°06.9	-40°12.3 4°11.1
9	$35^{\circ}11.8$	313°05.2	• • 26.9	5°20.5	10°59.7	333°14.1	• • 13.2	44°25.4	• • 02.6	Mirfak	308° 29.4	49°56.7
10	50°14.2	328°04.4	27.1	20°21.2	11°00.4	348°16.0	13.3	59°27.8	02.6	Aldebaran	290° 40.5	16°33.5
11	65° 16.7	343°03.5	27.4	35°21.9	01.0	3°17.9	13.4	74°30.2	02.5	Rigel	281°04.7	-8°10.4
12	80° 19.2	358°02.6	N23°27.7	50°22.6	N11°01.7	18° 19.7	N20°13.5	89°32.6	S06°02.5	Capella	280°23.1	46°01.3
13	95°21.6	13°01.7	27.9	65°23.3	02.3	33°21.6	13.6	104°35.0	02.5	Bellatrix	278° 23.7	6°22.3
14	110°24.1	28°00.9	28.2	80°24.0	03.0	48°23.4	13.7	119°37.4	02.5	Elnath	278°02.9	28°37.7
15	125°26.6	43°00.0	• • 28.4	95°24.7	• • 03.6	63°25.3	• • 13.8	134°39.8	• • 02.5	Alnilam	275°38.6	$-1^{\circ}11.2$
16	140°29.0	57°59.1	28.7 29.0	110°25.4 125°26.1	04.3	78°27.2 93°29.0	13.9	149°42.2 164°44.6	02.4	Betelgeuse	270°53.0	$7^{\circ}24.7$
17 18	155°31.5 170°33.9	72°58.2 87°57.4	N23° 29.2	125 26.1 140°26.8	04.9 N11°05.6	93 29.0 108°30.9	14.0 N20°14.1	104 44.0 179°47.0	02.4 \$06°02.4	Canopus	$263^{\circ}53.2$	-52°42.5
19	170 33.9 185°36.4	102°56.5	29.5	155°27.5	06.3	108 30.9 123°32.8	14.3	179 47.0 194°49.4	02.4	Sirius	258° 27.0	$-16^{\circ}45.0$
20	200°38.9	117°55.6	29.7	170°28.2	06.9	138°34.6	14.4	209°51.7	02.4	Adhara	255°06.6	-29°00.3
21	215°41.3	132°54.7	30.0	185°28.9	• • 07.6	153°36.5	• • 14.5	224°54.1	02.3	Procyon	244°51.6	5°09.8
22	230°43.8	147°53.9	30.2	200°29.6	08.2	168°38.3	14.6	239°56.5	02.3	Pollux	243°18.2	27°58.1
23	245°46.3	162°53.0	30.5	215°30.3	08.9	183°40.2	14.7	254°58.9	02.3	Avior	234°15.4	-59°35.4
_				-						Suhail	222°47.0	-43°32.0
Mer.p	ass. 06:40	$\nu$ -0.9° d0	.3′ m-3.92	$\nu$ 0.7 d0	.7′ m1.02	$\nu$ 1.9° d0.	1′ m-2.00	$\nu$ 2.4′ d-0	.0′ m0.99	Miaplacidus	221°39.0 217°48.4	-69°49.2
										Alphard Regulus	217 48.4 207°35.1	-8°45.9 11°50.9
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.7	61°37.5
0	260°48.7	$177^{\circ}52.1$	N23°30.7	230°31.0	$N11^{\circ}09.5$	$198^{\circ}42.1$	$N20^{\circ}14.8$	270°01.3	S06°02.3	Dubne	193 41.7 182°25.4	14°26.2
1	$275^{\circ}51.2$	$192^{\circ}51.2$	31.0	245°31.7	10.2	213°43.9	14.9	285°03.7	02.3	Gienah	175° 44.0	-17°40.8
2	290°53.7	207°50.3	31.2	260°32.4	10.8	228°45.8	15.0	300°06.1	02.2	l l	173°00.5	-63°14.4
3	305°56.1	222°49.5	• • 31.5	275°33.1	• • 11.5	243°47.7	•• 15.1	315°08.5	• • 02.2		171°52.0	-57°15.3
4	320°58.6	237°48.6	31.7	290°33.8	12.1	258°49.5	15.2	330°10.9	02.2	l l	166°13.2	55°49.9
5	336°01.1	252°47.7	32.0	305°34.5	12.8	273°51.4	15.3	345°13.3	02.2	Spica	158°22.7	-11°17.4
6	351°03.5	267°46.8	N23°32.2	320°35.2	N11°13.4	288°53.3	N20°15.4	0°15.7	S06°02.2	Alkaid	152°52.1	49°11.7
7	6°06.0	282°46.0	32.4	335°35.9	14.1	303°55.1	15.6	15°18.1	02.1	Hadar	148°36.3	-60°29.7
8	21°08.4	297°45.1	32.7	350°36.6	14.7	318°57.0	15.7	30°20.5	02.1	Menkent	147°57.9	-36°29.6
9	36° 10.9 51° 13.4	312°44.2 327°43.3	· · 32.9 33.2	5°37.3 20°38.0	· · 15.4 16.0	333°58.8 349°00.7	15.8	45°22.9 60°25.2	• • 02.1	Arcturus	$145^{\circ}48.1$	19°03.4
10 11	66° 15.8	342°42.4	33.4	20 36.0 35°38.7	16.0	4°02.6	15.9 16.0	75°27.6	02.1 02.1	Rigil Kent.	139°40.5	-60°56.4
12	81°18.3	357°41.6	N23°33.6	50°39.4	N11° 17.3	19°04.4	N20°16.1	90°30.0	S06°02.1	Kochab	137° 18.8	74°03.5
13	96°20.8	12°40.7	33.9	65°40.1	18.0	34°06.3	16.2	105°32.4	02.0	Zuben'ubi	136°56.3	-16°08.7
14	111°23.2	27°39.8	34.1	80°40.8	18.6	49°08.2	16.3	120°34.8	02.0	Alphecca	126°03.8	26°38.0
15	126°25.7	42°38.9	34.3	95°41.5	19.3	64°10.0	. 16.4	135°37.2	02.0	Antares	112°16.1	-26°29.2
16	141°28.2	57°38.0	34.5	110°42.2	19.9	79°11.9	16.5	150°39.6	02.0	Atria	107°10.2	-69°04.3
17	156°30.6	72°37.2	34.8	125°42.9	20.6	94°13.8	16.6	165°42.0	02.0	Sabik Shaula	102°03.0 96°10.6	-15°45.3 -37°07.3
18	171°33.1	87°36.3	N23°35.0	140°43.6	N11°21.2	109°15.6	N20°16.7	180°44.4	S06°01.9	Rasalhague	96°10.6 95°58.7	-37 07.3 12°32.5
19	186°35.6	102°35.4	35.2	155°44.3	21.9	124°17.5	16.8	195°46.8	01.9	Eltanin	90°41.9	51°29.0
20	201°38.0	117°34.5	35.5	170°45.0	22.5	139°19.4	17.0	210°49.2	01.9	Kaus Aust.	83°32.8	-34°22.4
21	216°40.5	132°33.6	• • 35.7	185°45.7	• • 23.2	154°21.2	•• 17.1	225°51.6	• • 01.9	Vega	80°33.1	38°48.2
22	231°42.9	147°32.8	35.9	200°46.4	23.8	169°23.1	17.2	240°54.0	01.9	Nunki	75°48.0	-26°16.0
23	246°45.4	162°31.9	36.1	215°47.1	24.4	184°24.9	17.3	255°56.4	01.9	Altair	62°00.2	8°55.9
Mer.p	ass. 06:36	$\nu$ -0.9' d0	.2′ m-3.92	$\nu 0.7' d0$	.7′ m1.02	$\nu 1.9' d0.$	1' m-2.00	$\nu 2.4' \ d-0$	.0′ m0.98	Peacock	53°06.0	-56°39.2
										Deneb	49°25.8	45°21.8
	6114		_	G.1.4	_	6114	_	6114		Enif	$33^{\circ}39.1$	9°59.1
Thu	GHA	GHA	Dec	GHA	Dec	GHA	<b>Dec</b> N20°17.4	GHA	Dec	Al Na'ir	27°33.3	-46°50.4
0 1	261°47.9 276°50.3	177°31.0 192°30.1	N23°36.3 36.6	230°47.8 245°48.5	N11°25.1 25.7	199°26.8 214°28.7	N20°17.4 17.5	270°58.8 286°01.2	S06°01.8 01.8	Fomalhaut	15° 15.0	-29°29.4
2	270 50.5 291°52.8	207°29.2	36.8	245 46.5 260°49.2	25.7 26.4	214 20.7 229°30.5	17.5 17.6	301°03.6	01.8	Scheat	13°45.6	28°12.7
3	306° 55.3	207 29.2 222°28.4	37.0	200 49.2 275°49.9	. 27.0	244°32.4	17.7	316°06.0	01.8	Markab	13°30.4	15°20.1
4	321°57.7	237°27.5	37.0	290°50.6	27.7	259°34.3	17.7	331°08.4	01.8	Jun 11 Tue	SHA	Mer.pass
5	337°00.2	252°26.6	37.4	305°51.2	28.3	274°36.1	17.9	346°10.8	01.7		278°23.5	12:08
6	352°02.7	267°25.7	N23°37.6		N11°29.0	289°38.0	N20°18.0	1°13.2	506°01.7	Mars	$330^{\circ}24.6$	08:39
7	$7^{\circ}05.1$	282°24.8	37.8	335°52.6	29.6	304°39.9	18.1	$16^{\circ}15.5$	01.7	Jupiter		10:47
8	22°07.6	297°23.9	38.1	350°53.3	30.3	$319^{\circ}41.7$	18.2	31°17.9	01.7	Saturn	9°14.3	06:03
9	37° 10.0	312°23.1	• • 38.3	5°54.0	• • 30.9	334°43.6	• • 18.4	46°20.3	• • 01.7	Jun 12 Wed	SHA	Mer.pass
10	52°12.5	327°22.2	38.5	20°54.7	31.6	349°45.5	18.5	61°22.7	01.7		277°03.4	12:09
11	67° 15.0	342°21.3	38.7	35°55.4	32.2	4°47.3	18.6	76°25.1	01.6	l l	329°42.3	08:38
12	82°17.4	357°20.4	N23°38.9	50°56.1	N11°32.8	19°49.2	N20°18.7	91°27.5	S06°01.6		297°53.3	10:44
13	97°19.9	12°19.5	39.1	65°56.8	33.5	34°51.1	18.8	106°29.9	01.6	Saturn	9°12.6	05:59
14	112°22.4	27°18.6	39.3	80°57.5	34.1	49°52.9	18.9	121°32.3	01.6			
15 16	127°24.8	42°17.8	· · 39.5	95°58.2	· · 34.8	64°54.8	19.0	136°34.7	· · 01.6	Jun 13 Thu	SHA	Mer.pass
16 17	142°27.3 157°29.8	57°16.9 72°16.0	39.7 39.9	110°58.9 125°59.6	35.4 36.1	79°56.6 94°58.5	19.1 19.2	151°37.1 166°39.5	01.6 01.5		275°43.1	12:11
17 18	157° 29.8 172° 32.2	87°15.1	39.9 N23°40.1		36.1 N11°36.7	94 58.5 110°00.4	N20°19.3	181°41.9	01.5 \$06°01.5		328°59.9	08:36
19	172 32.2 187°34.7	102°14.2	40.3	156°01.0	37.3	110 00.4 125°02.2	19.4	196°44.3	01.5	Jupiter Saturn	297°38.9	10:41
20	202° 37.2	102 14.2 117°13.3	40.5	171°01.7	38.0	140°04.1	19.4	211°46.7	01.5	Saturn	9°10.9	05:55
21	217°39.6	132°12.5	40.7	186°02.4	• • 38.6	155°06.0	• • 19.6	226°49.1	01.5	Horizont	al parallax	
22	232°42.1	147°11.6	40.9	201°03.1	39.3	170°07.8	19.7	241°51.5	01.5		Venus:	0.1
23	247°44.5	$162^{\circ}10.7$	41.1	216°03.8	39.9	185°09.7	19.8	256°53.9	01.5		Mars:	0.1
Mara	255 06.22	1/_O O/ do	2/ m 3 01	υΩ 7/ dΩ	.6′ m1.02	1/1 0/ 40	1′ m-2.00	1/2 1/ 4 0	.0′ m0.98			
ivier.p	Mer.pass. 06:32 $\nu$ -0.9′ $d$ 0.2′ m-3.91		νυ.ι΄ αυ	.0 1111.02	$\nu_{1.9}$ a0.	ı 111-∠.UU	ν2.4° α-0	.0 1110.98				

h	Sun				Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°04.9	N23°06.2	121°06.0	12.6'	N20°28.1	-10.7'	55.2'
1	195°04.7	06.4	$135^{\circ}37.6$	12.7'	$20^{\circ}17.4$	-10.7'	55.2'
2	210°04.6	06.6	150°09.2	12.8'	20°06.7	-10.8'	55.2'
3	225°04.5	• • 06.7	164°41.0	12.9'	19°55.8	-10.9'	55.2'
4	240°04.3 255°04.2	06.9	179°12.9 193°44.8	13.0'	19°44.9 19°34.0	-11.0'	55.1'
5 6	255 04.2 270°04.1	07.1 N23°07.2	208° 16.9	13.1' 13.2'	N19°22.9	-11.1' -11.1'	55.1' 55.1'
7	285°04.0	07.4	222°49.0	13.2'	19°11.8	-11.1	55.1'
8	300°03.8	07.6	237°21.3	13.3'	19°00.6	-11.3'	55.1'
9	315°03.7	• • 07.7	251°53.6	13.4'	18°49.3	-11.3'	55.0'
10	330°03.6	07.9	$266^{\circ}26.0$	13.5'	18°38.0	-11.4'	55.0'
11	345°03.4	08.0	280°58.6	13.6'	18°26.5	-11.5'	55.0'
12	0°03.3	N23°08.2	295°31.2	13.7' 13.8'	N18°15.1	-11.6'	55.0'
13 14	15°03.2 30°03.1	08.4 08.5	310°03.9 324°36.7	13.8	18°03.5 17°51.9	-11.6' -11.7'	55.0' 54.9'
15	45° 02.9	08.7	339°09.6	14.0'	17°40.2	-11.7' -11.7'	54.9'
16	60°02.8	08.8	353°42.5	14.1'	17°28.5	-11.8'	54.9'
17	75°02.7	09.0	8° 15.6	14.1'	17°16.7	-11.9'	54.9'
18	90°02.5	N23°09.2	22°48.7	14.2'	N17°04.8	-11.9'	54.9'
19	105°02.4	09.3	37°22.0	14.3'	$16^{\circ}52.9$	-12.0'	54.8'
20	120°02.3	09.5	51°55.3	14.4'	16°40.9	-12.1'	54.8'
21	135°02.1 150°02.0	•• 09.6	66°28.7 81°02.1	14.5'	16°28.8	-12.1' -12.2'	54.8'
22 23	150°02.0 165°01.9	09.8 09.9	81°02.1 95°35.7	14.6' 14.6'	16°16.7 16°04.5	-12.2' -12.2'	54.8' 54.8'
23						-14.4	J+.0
	SD = 15.7'	d = 0.2'		SI	D = 15.1'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°01.8	N23°10.1	110°09.3	14.7'	N15°52.3	-12.3'	54.7'
1 2	195°01.6 210°01.5	10.2 10.4	124°43.0 139°16.8	14.8' 14.9'	15°40.0 15°27.7	-12.3' -12.4'	54.7' 54.7'
3	210 01.5 225°01.4	. 10.4	159 10.6 153°50.7	14.9	15 27.7 15°15.3	-12.4 -12.4'	54.7'
4	240°01.2	10.7	168° 24.6	15.0'	15°02.9	-12.5'	54.7'
5	255°01.1	10.8	182°58.7	15.1'	14°50.4	-12.5'	54.7'
6	270°01.0	N23°11.0	197°32.7	15.2'	N14°37.8	-12.6'	54.6'
7	285°00.8	11.1	212°06.9	15.2'	14°25.3	-12.6'	54.6'
8	300°00.7	11.3	226°41.1	15.3'	14°12.6	-12.7'	54.6'
9	315°00.6 330°00.5	· · 11.4 11.6	241°15.5 255°49.8	15.4' 15.4'	13°59.9 13°47.2	-12.7' -12.8'	54.6' 54.6'
10 11	345°00.3	11.0	255 49.8 270°24.3	15.4 15.5'	13 47.2 13°34.4	-12.8'	54.6'
12	0°00.2	N23°11.9	284°58.8	15.6'	N13°21.6	-12.9'	54.6'
13	15°00.1	12.0	299°33.4	15.6'	13°08.8	-12.9'	54.5'
14	29°59.9	12.1	314°08.0	15.7'	$12^{\circ}55.8$	-12.9'	54.5'
15	44° 59.8	• • 12.3	328°42.7	15.8'	12°42.9	-13.0'	54.5'
16	59°59.7	12.4	343°17.5	15.8'	12°29.9	-13.0'	54.5'
17 18	74°59.5 89°59.4	12.6 N23°12.7	357°52.3 12°27.2	15.9' 15.9'	12°16.9 N12°03.8	-13.1' -13.1'	54.5' 54.5'
19	104° 59.3	12.8	27°02.1	16.0'	11°50.7	-13.1'	54.5'
20	119° 59.1	13.0	41°37.1	16.1	11°37.6	-13.2'	54.4'
21	134°59.0	· · 13.1	56° 12.2	16.1'	11°24.4	-13.2'	54.4'
22	149°58.9	13.3	70°47.3	16.2'	11°11.2	-13.3'	54.4'
23	164°58.8	13.4	85°22.5	16.2'	10°57.9	-13.3'	54.4'
	SD = 15.7'	d = 0.2'		SI	D = 14.9'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179° 58.6	N23°13.5	99°57.7	16.3'	N10°44.6	-13.3'	54.4'
1	194°58.5	13.7	114°33.0	16.3'	10°31.3	-13.4'	54.4'
2	209°58.4	13.8	129°08.3	16.4'	10°17.9	-13.4'	54.4'
3	224°58.2	• • 13.9	143°43.7	16.4	10°04.6	-13.4'	54.4'
4	239°58.1 254°58.0	14.1 14.2	158° 19.1	16.5'	09°51.1 09°37.7	-13.4'	54.4'
5 6	254°58.0 269°57.8	14.2 N23°14.3	172°54.6 187°30.1	16.5' 16.6'	09°37.7 N09°24.2	-13.5' -13.5'	54.4' 54.3'
7	284° 57.7	N23 14.3 14.5	202°05.7	16.6'	09° 10.7	-13.5'	54.3'
8	299° 57.6	14.6	216°41.3	16.7	08°57.2	-13.6'	54.3'
9	314°57.4	• • 14.7	$231^{\circ}16.9$	16.7'	08°43.6	-13.6'	54.3'
10	329° 57.3	14.8	245°52.6	16.7'	08°30.0	-13.6'	54.3'
11	344°57.2	15.0	260°28.3	16.8'	08°16.4	-13.6'	54.3'
12 13	359°57.0 14°56.9	N23°15.1 15.2	275°04.1 289°39.9	16.8' 16.8'	N08°02.8 07°49.1	-13.7' -13.7'	54.3' 54.3'
13 14	29° 56.8	15.2 15.4	289° 39.9 304° 15.8	16.8	07°49.1 07°35.4	-13.7' -13.7'	54.3'
15	44° 56.6	15.5	318°51.7	16.9	07°21.7	-13.7'	54.3'
16	59° 56.5	15.6	333° 27.6	17.0'	07°08.0	-13.8'	54.3'
17	74° 56.4	15.7	348°03.5	17.0'	06°54.2	-13.8'	54.3'
18	89°56.2	N23° 15.8	2°39.5	17.0'	N06°40.4	-13.8'	54.2'
19 20	104°56.1 119°56.0	16.0 16.1	17°15.5 31°51.6	17.0' 17.1'	06°26.6 06°12.8	-13.8'	54.2' 54.2'
20	119°56.0 134°55.8	16.1	31°51.6 46°27.6	17.1' 17.1'	06°12.8 05°59.0	-13.8' -13.9'	54.2' 54.2'
22	149° 55.7	16.3	61°03.7	17.1	05°45.1	-13.9'	54.2'
23	164°55.6	16.4	75°39.9	17.2'	05°31.3	-13.9'	54.2'
	SD = 15.7'	d = 0.1'		SI	D = 14.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Juliuse	Juliset	Civil	Naut.
N 72°						
<b>N</b> 70°						
68°						
66°	////	////	00:02	////	////	////
64°	////	////	01:36	22:25	////	////
62°	////	////	02:12	21:49	////	////
60°	////	00:57	02:37	21:23	23:04	////
<b>N</b> 58°	////	01:44	02:57	21:03	22:17	////
56°	////	02:12	03:14	20:47	21:48	////
54°	00:53	02:34	03:28	20:33	21:27	23:09
52°	01:35	02:52	03:40	20:20	21:09	22:26
50°	02:02	03:06	03:51	20:10	20:54	21:59
45°	02:46	03:36	04:13	19:47	20:25	21:14
<b>N</b> 40°	03:16	03:58	04:31	19:30	20:02	20:44
35°	03:39	04:16	04:45	19:15	19:44	20:21
30°	03:58	04:31	04:58	19:02	19:29	20:02
20°	04:26	04:56	05:20	18:40	19:04	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
<b>S</b> 10°	05:24	05:51	06:14	17:46	18:09	18:35
20°	05:40	06:08	06:32	17:28	17:52	18:19
30° 35°	05:57	06:27	06:53	17:07	17:33	18:03
40°	06:05	06:37	07:05	16:55	17:23 17:11	17:55 17:45
40 45°	06:15 06:25	06:49 07:02	07:19 07:36	16:41 16:24	16:58	17:45
1				-		
<b>S</b> 50° 52°	06:36	07:18	07:56	16:04	16:42	17:23
52° 54°	06:42 06:47	07:25 07:33	08:06 08:17	15:54 15:43	16:35 16:27	17:18 17:13
56°	06:47	07:33 07:42	08:17	15:43	16:27	17:13 17:07
58°	07:00	07:42	08:44	15:30	16:18	17:07
<b>S</b> 60°	07:07	08:04	09:01	14:59	15:56	16:53

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

		Sun		Moon				
Day	Eqn.of	Time	Mer.	Mer.	Age			
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	5-7		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	21-39%		
11	00:19	00:13	12:00	16:26	04:03			
12	00:07	00:01	12:00	17:09	04:48			
13	00:06	00:12	12:00	17:49	05:29			

June 14, 15, 16 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	262°47.0	177°09.8	N23°41.3	231°04.5	N11°40.6	200°11.6	N20°20.0	271°56.3	S06°01.4	1		
1	277°49.5	192°08.9	41.4	246°05.2	41.2	215° 13.4	20.1	286°58.7	01.4	Alpheratz	$357^{\circ}35.3$	29° 13.3
2	292°51.9	207°08.0	41.6	261°05.9	41.8	230°15.3	20.2	302°01.1	01.4	Ankaa	353°07.7	$-42^{\circ}10.2$
3	307°54.4	222°07.1	41.8	276°06.6	42.5	245° 17.2	20.3	317°03.5	01.4	Schedar	349°31.8	56°40.0
4	322°56.9	237°06.3	42.0	291°07.3	43.1	260°19.0	20.4	332°05.9	01.4	Diphda	348°47.9	-17°51.1
5	337°59.3	252°05.4	42.0	306°08.0	43.1	275°20.9	20.4	347°08.3	01.4	Achernar	335°20.8	-57°06.5
6	353°01.8	267°04.5	N23°42.4	321°08.7	43.0 N11°44.4	275 20.9 290°22.8	N20° 20.6	2°10.7	S06°01.3	Hamal	327°52.0	23°34.5
7	8°04.3	282°03.6	42.6	336°09.4	45.0	305°24.6		17° 13.1	01.3	Polaris	314°39.9	89°21.8
	23°06.7						20.7	32° 15.5		Acamar	315°12.5	-40° 12.3
8		297°02.7	42.7	351°10.1	45.7	320°26.5	20.8		01.3	Menkar	314°06.9	$4^{\circ}11.1$
9	38°09.2	312°01.8	• • 42.9	6°10.8	• • 46.3	335°28.4	• • 20.9	47° 17.9	• • 01.3	Mirfak	308°29.4	49° 56.7
10	53°11.7	327°00.9	43.1	21°11.5	47.0	350°30.2	21.0	62°20.3	01.3	Aldebaran	290°40.5	16°33.5
11	68°14.1	342°00.0	43.3	36°12.2	47.6	5°32.1	21.1	77°22.7	01.3	Rigel	281°04.7	-8° 10.4
12	83°16.6	356° 59.2	N23°43.5	51°12.9	N11°48.2	20°34.0	N20°21.2	92°25.1	S06°01.2	Capella	280°23.1	46°01.3
13	98°19.0	11°58.3	43.6	66°13.6	48.9	35°35.8	21.3	107° 27.5	01.2	Bellatrix	278°23.7	6°22.3
14	113°21.5	26°57.4	43.8	81° 14.3	49.5	50°37.7	21.4	122°29.9	01.2	Elnath	278°02.9	28° 37.7
15	128°24.0	41°56.5	• • 44.0	96° 14.9	• • 50.1	65°39.6	· · 21.5	137° 32.3	• • 01.2	Alnilam	275°38.6	-1°11.2
16	143°26.4	56° 55.6	44.1	111° 15.6	50.8	80°41.4	21.7	152°34.7	01.2	Betelgeuse	270°53.0	7°24.7
17	158°28.9	71°54.7	44.3	126°16.3	51.4	95°43.3	21.8	167°37.1	01.2	Canopus	263°53.2	-52° 42.5
18	173°31.4	86°53.8	N23°44.5	$141^{\circ}17.0$	N11°52.1	110°45.2	N20°21.9	182°39.5	506°01.2	Sirius	258°27.0	-16° 45.0
19	188°33.8	101°52.9	44.7	$156^{\circ}17.7$	52.7	125°47.0	22.0	197°41.9	01.1		255°06.6	-10° 43.0 -29° 00.3
20	203°36.3	$116^{\circ}52.1$	44.8	171°18.4	53.3	140°48.9	22.1	212°44.3	01.1	Adhara	255°06.6 244°51.6	-29°00.3 5°09.8
21	218°38.8	131°51.2	• • 45.0	$186^{\circ}19.1$	• • 54.0	155°50.8	• • 22.2	227°46.8	• • 01.1	Procyon		
22	233°41.2	146°50.3	45.2	201°19.8	54.6	170°52.6	22.3	242°49.2	01.1	Pollux	243°18.2	27°58.1
23	248°43.7	161°49.4	45.3	$216^{\circ}20.5$	55.2	185°54.5	22.4	257°51.6	01.1	Avior	234°15.5	-59°35.4
										Suhail	222°47.0	-43°32.0
Mer.p	pass. 06:28	$\nu$ -0.9′ d0	.2′ m-3.91	$\nu$ 0. $\ell'$ d0	.6′ m1.01	$\nu^{1.9'} d0.$	.1′ m-2.01	ν2.4′ d-0	0.0′ m0.98	Miaplacidus	221°39.0	-69°49.2
										Alphard	217°48.4	-8°45.9
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.1	11°50.9
0 0	263°46.1	176°48.5	N23°45.5	231°21.2	N11°55.9	200°56.4	N20° 22.5	272°54.0	S06°01.1	Dubhe	193°41.7	61°37.5
1	203 40.1 278°48.6	170 46.5 191°47.6	45.6	231 21.2 246°21.9	56.5	200 50.4 215°58.2	22.6	272 54.0 287°56.4	01.1	Denebola	182°25.4	14°26.2
2		206°46.7		240 21.9 261°22.6						Gienah	175°44.0	-17°40.8
	293°51.1		45.8		57.2	231°00.1	22.7	302°58.8	01.0	Acrux	173°00.5	-63° 14.4
3	308°53.5	221°45.8	• • 46.0	276°23.3	• • 57.8	246°02.0	• • 22.8	318°01.2	•• 01.0	Gacrux	$171^{\circ}52.1$	-57° 15.3
4	323°56.0	236°44.9	46.1	291°24.0	58.4	261°03.8	22.9	333°03.6	01.0	Alioth	166°13.2	55°49.9
5	338°58.5	251°44.1	46.3	306°24.7	59.1	276°05.7	23.0	348°06.0	01.0	Spica	158°22.7	-11° 17.4
6	354°00.9	266° 43.2	N23°46.4	321°25.4	N11°59.7	291°07.6	N20°23.1	3°08.4	506°01.0	Alkaid	152°52.1	49°11.7
7	9°03.4	281°42.3	46.6	336°26.1	$12^{\circ}00.3$	306°09.4	23.2	18° 10.8	01.0	Hadar	148°36.3	-60° 29.7
8	24°05.9	296°41.4	46.7	351°26.8	01.0	321°11.3	23.3	33° 13.2	01.0		147°57.9	-36°29.6
9	39°08.3	311°40.5	• • 46.9	6°27.5	• • 01.6	336°13.2	• • 23.4	48°15.6	• • 00.9	Arcturus	145°48.1	19°03.4
10	54°10.8	326°39.6	47.0	21°28.2	02.2	351°15.0	23.5	63°18.0	00.9	Rigil Kent.	139°40.5	-60°56.4
11	69°13.3	341°38.7	47.2	36°28.9	02.9	6°16.9	23.6	78°20.4	00.9	Kochab	137°18.8	74°03.5
12	84°15.7	356° 37.8	N23°47.3	$51^{\circ}29.6$	$N12^{\circ}03.5$	21°18.8	N20°23.8	93°22.8	506°00.9	Zuben'ubi	136°56.3	-16°08.7
13	99°18.2	11°36.9	47.5	66°30.3	04.1	36°20.6	23.9	108°25.2	00.9	Alphecca	126°03.8	26°38.0
14	114°20.6	26°36.0	47.6	81°31.0	04.8	51°22.5	24.0	123°27.6	00.9	Antares	112° 16.1	-26° 29.2
15	129°23.1	41°35.2	• • 47.8	96°31.7	• • 05.4	66°24.4	• • 24.1	138°30.0	• • 00.9	Atria	107° 10.1	-20° 29.2 -69° 04.3
16	144°25.6	56°34.3	47.9	111°32.3	06.0	81°26.2	24.2	153°32.4	00.9	Sabik	107 10.2 102°03.0	-09 04.3 -15°45.3
17	159°28.0	71°33.4	48.0	126°33.0	06.7	96°28.1	24.3	168°34.8	8.00			-15 45.3 -37°07.3
18	174°30.5	86°32.5	N23°48.2	141°33.7	N12°07.3	111°30.0	N20°24.4	183°37.3	506°00.8	Shaula	96°10.6	
19	189°33.0	101°31.6	48.3	156°34.4	07.9	126°31.8	24.5	198°39.7	8.00	Rasalhague	95°58.6	12°32.5
20	204°35.4	116°30.7	48.5	171°35.1	08.6	141°33.7	24.6	213°42.1	00.8	Eltanin	90°41.9	51°29.0
21	219°37.9	131° 29.8	48.6	186°35.8	09.2	156° 35.6	24.7	228° 44.5	00.8	Kaus Aust.	83°32.8	-34°22.4
22	234°40.4	146° 28.9	48.7	201°36.5	09.8	171°37.4	24.8	243°46.9	00.8	Vega	80°33.1	38°48.3
23	249°42.8	161°28.0	48.9	216°37.2	10.5	186°39.3	24.9	258°49.3	00.8	Nunki	75°48.0	-26° 16.0
2.5	249 42.0									Altair	62°00.1	8°55.9
Mer.p	pass. 06:24	$\nu$ -0.9 $'$ d0	.2′ m-3.91	$ u$ 0.7 $^{\prime}$ d0	$.6'  \mathrm{m}1.01$	$\nu 1.9' \ d0.$	1'  m-2.01	$\nu$ 2.4′ d-0	0.0′ m0.97	Peacock	53°06.0	-56°39.2
										Deneb	49°25.8	45°21.8
	CIIA	CIIA	Б	CIIA	Б.	CIIA	Б	CIIA	Б	Enif	33°39.1	9°59.1
Sun	GHA 264°45.2	GHA 176° 27 1	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.3	-46°50.4
0	264°45.3	176°27.1	N23°49.0	231°37.9		201°41.2	N20°25.0	273°51.7	\$06°00.7	Fomalhaut	15°15.0	-29°29.4
1	279°47.7	191°26.2	49.1	246°38.6	11.7	216°43.0	25.1	288° 54.1	00.7	Scheat	13°45.6	28° 12.7
2	294°50.2	206°25.4	49.3	261°39.3	12.3	231°44.9	25.2	303°56.5	00.7	Markab	13°30.3	15°20.1
3	309°52.7	221°24.5	• • 49.4	276°40.0	13.0	246°46.8	• • 25.3	318° 58.9	•• 00.7	l 14 F '	SHA	Me:: = -:
4	324°55.1	236°23.6	49.5	291°40.7	13.6	261°48.6	25.4	334°01.3	00.7	Jun 14 Fri		Mer.pass
5	339°57.6	251°22.7	49.6	306°41.4	14.2	276°50.5	25.5	349°03.7	00.7		274°22.8	12:12
6	355°00.1	266°21.8	N23°49.8	321°42.1	N12°14.9	291°52.4	N20°25.6	4°06.1	S06°00.7	Mars	328°17.5	08:35
7	10°02.5	281°20.9	49.9	336°42.8	15.5	306°54.2	25.7	19°08.5	00.7	Jupiter		10:38
8	25°05.0	296°20.0	50.0	351°43.5	16.1	321°56.1	25.8	34°11.0	00.6	Saturn	9°09.3	05:51
9	40°07.5	311°19.1	• • 50.1	6°44.2	• • 16.8	336°58.0	• • 25.9	49°13.4	• • 00.6	Jun 15 Sat	SHA	Mer.pass
10	55°09.9	326° 18.2	50.3	21°44.9	17.4	351°59.8	26.0	64° 15.8	00.6		273°02.4	12:13
11	70°12.4	341° 17.3	50.4	36° 45.6	18.0	7°01.7	26.1	79° 18.2	00.6		327°35.1	08:34
12	85°14.9	356° 16.4	N23°50.5	51°46.2	N12°18.6	22°03.6	N20°26.3	94°20.6	S06°00.6	Jupiter		10:35
13	100°17.3	11° 15.5	50.6	66°46.9	19.3	37°05.5	26.4	109°23.0	00.6	Saturn	9°07.8	05:47
14	$115^{\circ}19.8$	26°14.6	50.7	81°47.6	19.9	52°07.3	26.5	$124^{\circ}25.4$	00.6	Saturn	9 01.0	03.41
15	130°22.2	41° 13.7	• • 50.8	96°48.3	• • 20.5	67°09.2	• • 26.6	$139^{\circ}27.8$	• • 00.6	Jun 16 Sun	SHA	Mer.pass
16	145°24.7	$56^{\circ}12.9$	51.0	111°49.0	21.1	82°11.1	26.7	$154^{\circ}30.2$	00.6	Venus		12:15
17	160°27.2	71°12.0	51.1	126°49.7	21.8	97°12.9	26.8	169°32.6	00.5	Mars		08:33
18	175°29.6	86°11.1	N23°51.2	141°50.4	N12°22.4	112° 14.8	N20° 26.9	184°35.0	506°00.5	Jupiter		10:32
19	190°32.1	101° 10.2	51.3	156°51.1	23.0	127° 16.7	27.0	199°37.5	00.5	Saturn	9°06.4	05:44
20	205°34.6	116°09.3	51.4	171°51.8	23.7	142° 18.5	27.1	214°39.9	00.5	Jatuill	3 30.4	
21	220°37.0	131°08.4	51.5	186° 52.5	24.3	157° 20.4	27.2	229°42.3	• • 00.5	Horizont	al parallax	
22	235°39.5	146° 07.5	51.6	201°53.2	24.9	172°22.3	27.3	244° 44.7	00.5		Venus:	0.1
23	250°42.0	161°06.6	51.7	216°53.9	25.5	187°24.1	27.4	259°47.1	00.5		Mars:	0.1
Mer.p	pass. 06:20	$ u$ -0.9 $^{\prime}$ d0	.1' m-3.91	$ u$ 0.7 $^{\prime}$ d0	.6′ m1.01	u 1.9' d0.	1′ m-2.01	$\nu$ 2.4 $^{\prime}$ d-0	0.0′ m0.97			

h	Sui			Moon			
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	179°55.5	N23°16.6	90°16.0	17.2'	N05° 17.4	-13.9'	54.2'
1	194°55.3 209°55.2	16.7	104°52.2 119°28.4	17.2'	05°03.5 04°49.5	-13.9'	54.2'
2	209 55.2 224°55.1	16.8 •• 16.9	119 28.4 134°04.6	17.2' 17.2'	04 49.5 04°35.6	-13.9' -14.0'	54.2' 54.2'
4	239°54.9	17.0	148°40.8	17.3	04°21.7	-14.0'	54.2'
5	254°54.8	17.1	163°17.1	17.3'	04°07.7	-14.0'	54.2'
6	269°54.7	N23°17.3	177°53.4	17.3	N03°53.7	-14.0'	54.2'
7 8	284°54.5 299°54.4	17.4 17.5	192°29.7 207°06.0	17.3' 17.3'	03°39.7 03°25.7	-14.0' -14.0'	54.2' 54.2'
9	314°54.3	. 17.6	221°42.3	17.3	03° 11.7	-14.0'	54.2'
10	329°54.1	17.7	236°18.6	17.3'	02°57.7	-14.0'	54.2'
11	344°54.0	17.8	250°55.0	17.4	02°43.7	-14.0'	54.2'
12 13	359°53.9 14°53.7	N23°17.9 18.0	265°31.3 280°07.7	17.4' 17.4'	N02°29.6 02°15.6	-14.0' -14.1'	54.2' 54.2'
14	29°53.6	18.1	294°44.1	17.4	02°13.0	-14.1'	54.2'
15	44°53.5	• • 18.3	309°20.5	17.4'	01°47.5	-14.1'	54.2'
16	59°53.3	18.4	323°56.8	17.4'	01°33.4	-14.1'	54.2'
17	74°53.2	18.5	338°33.2	17.4	01°19.3	-14.1'	54.2'
18 19	89°53.1 104°52.9	N23°18.6 18.7	353°09.6 7°46.0	17.4' 17.4'	N01°05.2 00°51.1	-14.1' -14.1'	54.2' 54.2'
20	119°52.8	18.8	22°22.4	17.4	00°37.0	-14.1	54.2'
21	134°52.7	• • 18.9	36°58.8	17.4	00°22.9	-14.1'	54.2'
22	149°52.5	19.0	51°35.2	17.4'	N00°08.8	-14.1'	54.2'
23	164°52.4	19.1	66°11.6	17.4'	S00°05.2	14.1'	54.2'
	SD = 15.7'	d = 0.1'		SI	D = 14.8'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0 0	179°52.3	N23°19.2	80°48.0	ν 17.4'	500°19.4	14.1'	54.2'
1	194°52.1	19.3	95°24.4	17.4'	00°33.5	14.1'	54.2'
2	209°52.0	19.4	110°00.8	17.4'	00°47.6	14.1'	54.2'
3	224°51.9 239°51.7	• • 19.5	124°37.2	17.4	01°01.7	14.1'	54.2'
4 5	239°51.7 254°51.6	19.6 19.7	139°13.5 153°49.9	17.4' 17.3'	01°15.8 01°29.9	14.1' 14.1'	54.2' 54.2'
6	269°51.4	N23°19.8	168°26.2	17.3'	S01°43.9	14.1	54.2'
7	284°51.3	19.9	183°02.6	17.3'	01°58.0	14.1'	54.2'
8	299°51.2	20.0	197°38.9	17.3'	02°12.1	14.1'	54.2'
9	314°51.0	· · 20.1	212°15.2	17.3'	02°26.2	14.1'	54.2'
10 11	329°50.9 344°50.8	20.2 20.3	226°51.5 241°27.8	17.3' 17.3'	02°40.3 02°54.4	14.1' 14.1'	54.3' 54.3'
12	359°50.6	N23°20.4	256°04.0	17.2	503°08.4	14.1	54.3'
13	14°50.5	20.4	270°40.3	17.2'	03°22.5	14.1'	54.3'
14	29°50.4	20.5	285°16.5	17.2'	03°36.6	14.0'	54.3'
15	44°50.2	• • 20.6	299°52.7 314°28.8	17.2'	03°50.6	14.0'	54.3'
16 17	59°50.1 74°50.0	20.7 20.8	314°28.8 329°05.0	17.1' 17.1'	04°04.6 04°18.7	14.0' 14.0'	54.3' 54.3'
18	89°49.8	N23°20.9	343°41.1	17.1	504°32.7	14.0'	54.3'
19	104°49.7	21.0	$358^{\circ}17.2$	17.1'	04°46.7	14.0'	54.3'
20	119°49.6	21.1	12°53.3		05°00.7	14.0'	54.3'
21 22	134°49.4 149°49.3	· · 21.2 21.2	27°29.3 42°05.3	17.0' 17.0'	05°14.6 05°28.6	14.0' 14.0'	54.3' 54.3'
23	149 49.3 164°49.2	21.2	42 05.3 56°41.3	16.9'	05 28.6 05°42.6	14.0 13.9'	54.4'
20	SD = 15.7'	d = 0.1'			D = 14.8'	20.5	
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0 1	179°49.0 194°48.9	N23°21.4 21.5	71°17.2 85°53.2	16.9' 16.9'	\$05°56.5 06°10.4	13.9' 13.9'	54.4' 54.4'
2	209°48.8	21.6	100°29.0	16.8'	06°24.3	13.9'	54.4'
3	224°48.6	• • 21.7	115°04.9	16.8'	06°38.2	13.9'	54.4'
4	239°48.5	21.7	129°40.7	16.8'	06°52.1	13.9'	54.4'
5 6	254°48.4 269°48.2	21.8 N23°21.9	144°16.4 158°52.2	16.7' 16.7'	07°05.9 <b>S</b> 07°19.8	13.8' 13.8'	54.4' 54.4'
7	269 48.2 284° 48.1	N23 21.9 22.0	158°52.2 173°27.9	16.6'	07° 33.6	13.8'	54.4° 54.4°
8	299°48.0	22.1	188°03.5	16.6'	07°47.4	13.8'	54.5'
9	314°47.8	• • 22.1	202°39.1	16.6'	08°01.2	13.8'	54.5'
10	329°47.7	22.2	217°14.7	16.5'	08°14.9	13.7'	54.5'
11 12	344°47.5 359°47.4	22.3 N23°22.4	231°50.2 246°25.6	16.5' 16.4'	08°28.6 508°42.3	13.7' 13.7'	54.5' 54.5'
13	14°47.3	22.4	261°01.0	16.4	08° 56.0	13.7'	54.5'
14	29°47.1	22.5	275°36.4	16.3'	09°09.7	13.6'	54.5'
15	44°47.0	• • 22.6	$290^{\circ}11.7$	16.3'	09°23.3	13.6'	54.5'
16	59°46.9	22.7	304°47.0	16.2	09°36.9	13.6'	54.6'
17 18	74°46.7 89°46.6	22.7 N23°22.8	319°22.2 333°57.4	16.2' 16.1'	09°50.5 \$10°04.0	13.5' 13.5'	54.6' 54.6'
19	104°46.5	22.9	348°32.5	16.1	10°17.5	13.5'	54.6'
20	119°46.3	22.9	3°07.5	16.0'	10°31.0	13.5'	54.6'
21	134°46.2	• • 23.0	17°42.5	15.9'	10°44.5	13.4'	54.6'
22	149°46.1	23.1	32°17.4	15.9'	10°57.9	13.4'	54.7'
23	164°45.9	23.1	46°52.3	15.8'	11°11.3	13.4'	54.7'
	SD = 15.7'	d = 0.1'		SI	D = 14.8'		

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

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

		Sun			Moon	1		
Day	Eqn.of	Eqn.of Time		Mer.	Age			
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	8-10		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	48-67%		
14	00:18	00:25	12:00	18:28	06:09			
15	00:31	00:37	12:01	19:07	06:47			
16	00:44	00:50	12:01	19:47	07:27			

June 17, 18, 19 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	265° 44.4	176°05.7	N23°51.8	231° 54.6	N12°26.2	202°26.0	N20° 27.5	274°49.5	S06°00.5		эпа	Dec
1	280°46.9	170 05.7 191°04.8	51.9	246° 55.3	26.8	202 20.0 217°27.9	27.6	289°51.9	00.5	Alpheratz	357°35.3	29°13.3
2	200 40.9 295°49.4	206°03.9	52.0	240 55.5 261°56.0	27.4	217 27.9 232°29.7	27.0	269 51.9 304°54.3	00.5	Ankaa	353°07.7	-42°10.2
				201 50.0 276°56.7		232 29.7 247°31.6				Schedar	349°31.7	56°40.0
3	310°51.8	221°03.0	52.1		• • 28.0		• • 27.8	319°56.7	• • 00.4	Diphda	348°47.9	$-17^{\circ}51.1$
4	325°54.3	236°02.1	52.2	291°57.4	28.7	262°33.5	27.9	334°59.2	00.4	Achernar	335°20.8	-57°06.5
5	340°56.7	251°01.2	52.3	306°58.1	29.3	277°35.4	28.0	350°01.6	00.4	Hamal	327°52.0	23°34.6
6	355°59.2	266°00.3	N23°52.4	321°58.7	N12°29.9	292°37.2	N20°28.1	5°04.0	506°00.4	Polaris	314°38.7	89°21.8
7	11°01.7	280°59.4	52.5	336°59.4	30.5	307°39.1	28.2	20°06.4	00.4	Acamar	$315^{\circ}12.5$	-40°12.2
8	26°04.1	295°58.6	52.6	352°00.1	31.1	322°41.0	28.3	35°08.8	00.4	Menkar	314°06.9	$4^{\circ}11.1$
9	41°06.6	310°57.7	• • 52.7	7°00.8	• • 31.8	337° 42.8	• • 28.4	50°11.2	• • 00.4	Mirfak	308°29.4	49°56.7
10	56°09.1	325°56.8	52.8	22°01.5	32.4	352°44.7	28.5	65°13.6	00.4	Aldebaran	290°40.5	16°33.5
11	71°11.5	340°55.9	52.9	37°02.2	33.0	7°46.6	28.6	80°16.0	00.3	Rigel	281°04.7	-8°10.4
12	86°14.0	355°55.0	N23°53.0	52°02.9	N12°33.6	22°48.4	N20°28.7	95°18.5	506°00.3	Capella	280°23.1	46°01.3
13	101°16.5	10°54.1	53.1	67°03.6	34.3	37°50.3	28.8	110°20.9	00.3	Bellatrix	278°23.7	6°22.3
14	116° 18.9	25°53.2	53.1	82°04.3	34.9	52°52.2	28.9	125°23.3	00.3	Elnath	278°02.9	28°37.7
15	131°21.4	40°52.3	• • 53.2	97°05.0	• • 35.5	67°54.1	• • 29.0	140°25.7	• • 00.3	Alnilam	275°38.6	$-1^{\circ}11.2$
16	146°23.8	55°51.4	53.3	112°05.7	36.1	82°55.9	29.1	155°28.1	00.3	Betelgeuse	270°52.9	7°24.7
17	161°26.3	70°50.5	53.4	127°06.4	36.7	97°57.8	29.2	170°30.5	00.3	Canopus	263°53.2	-52°42.5
18	176°28.8	85°49.6	N23°53.5	142°07.1	N12°37.4	112°59.7	N20°29.3	185°32.9	506°00.3	Sirius	258°27.0	-16°45.0
19	191°31.2 206°33.7	100°48.7	53.6	157°07.8 172°08.5	38.0	128°01.5 143°03.4	29.4	200°35.3 215°37.8	00.3	Adhara	255°06.6	-29°00.3
20		115°47.8	53.6		38.6		29.5		00.3	Procyon	244°51.6	5°09.8
21	221°36.2	130°46.9	53.7	187°09.2	39.2	158°05.3	• • 29.6	230°40.2 245°42.6	00.2	Pollux	243°18.2	$27^{\circ}58.1$
22	236° 38.6	145°46.0	53.8 53.0	202°09.8	39.9	173°07.1	29.7		00.2	Avior	234°15.5	-59°35.4
23	251°41.1	160°45.1	53.9	217° 10.5	40.5	188°09.0	29.8	260°45.0	00.2	Suhail	222°47.0	-43°32.0
Mer.p	ass. 06:16	$\nu$ -0.9 $'$ d0	.1' m-3.91	$ u$ 0.7 $^{\prime}$ d0	.6′ m1.01	$\nu 1.9' \ d0.$	1' m-2.01	$\nu$ 2.4′ d-0	.0′ m0.97	Miaplacidus	221°39.0	-69°49.2
								-		Alphard	217°48.4	-8°45.9
т	CHV	CHA	Doc	CUA	Doc	CUA	Doc	CHA	Doc	Regulus	$207^{\circ}35.1$	11°50.9
Tue	<b>GHA</b> 266° 43.6	<b>GHA</b> 175° 44.2	Dec	GHA	Dec	GHA	Dec	GHA 275°47.4	Dec	Dubhe	193°41.7	61°37.5
0	266°43.6 281°46.0	175°44.2 190°43.3	N23°53.9	232°11.2 247°11.9	N12°41.1	203°10.9 218°12.8	N20°29.9	275°47.4 290°49.8	\$06°00.2	Denebola	182°25.4	14°26.2
1	281°46.0 296°48.5	190° 43.3 205° 42.4	54.0 54.1	247°11.9 262°12.6	41.7 42.3	218° 12.8 233° 14.6	30.0	290°49.8 305°52.3	00.2	Gienah	175°44.0	-17°40.7
2			54.1				30.1		00.2		173°00.5	-63°14.4
3	311°51.0	220°41.5	54.1	277°13.3	• • 42.9	248°16.5	30.2	320°54.7 335°57.1	00.2	Gacrux	$171^{\circ}52.1$	-57°15.3
4	326°53.4	235°40.6	54.2	292°14.0	43.6	263°18.4	30.4		00.2	Alioth	$166^{\circ}13.2$	55°49.9
5	341°55.9	250°39.7	54.3	307°14.7	44.2	278°20.2	30.5	350°59.5	00.2	Spica	158°22.7	-11°17.4
6	356° 58.3	265°38.9	N23°54.4	322°15.4	N12°44.8	293°22.1	N20° 30.6	6°01.9	\$06°00.2	Alkaid	152°52.1	49°11.7
7	12°00.8	280°38.0	54.4	337°16.1	45.4	308°24.0	30.7	21°04.3	00.2	Hadar	148°36.3	-60°29.7
8	27°03.3	295°37.1	54.5	352° 16.8	46.0	323°25.8	30.8	36°06.7	00.1	Menkent	147°58.0	-36°29.6
9	42°05.7	310°36.2	• • 54.5	7°17.5	• • 46.7	338°27.7 353°29.6	· · 30.9	51°09.2	• • 00.1	Arcturus	145°48.1	19°03.4
10	57°08.2 72°10.7	325°35.3	54.6	22°18.2	47.3		31.0	66°11.6	00.1	Rigil Kent.	139°40.5	-60°56.4
11 12	72 10.7 87°13.1	340°34.4 355°33.5	54.7 N23°54.7	37° 18.9 52° 19.6	47.9 N12°48.5	8°31.5 23°33.3	31.1 N20°31.2	81°14.0 96°16.4	00.1 \$06°00.1	Kochab	$137^{\circ}18.9$	74°03.5
	102° 15.6									Zuben'ubi	136°56.3	-16°08.7
13	102 15.0 117° 18.1	10°32.6	54.8	67° 20.2 82° 20.9	49.1 49.7	38°35.2	31.3	111°18.8 126°21.2	00.1	Alphecca	126°03.8	26°38.0
14	117 10.1 132° 20.5	25°31.7	54.8			53°37.1 68°38.9	31.4		00.1	Antares	$112^{\circ}16.1$	-26°29.2
15		40°30.8	• • 54.9	97°21.6	50.4		· · 31.5	141°23.7		Atria	$107^{\circ}10.2$	-69°04.3
16 17	147°23.0 162°25.5	55°29.9 70°29.0	55.0 55.0	112°22.3 127°23.0	51.0 51.6	83°40.8 98°42.7	31.6 31.7	156°26.1 171°28.5	00.1 00.1	Sabik	102°03.0	-15°45.3
		70 29.0 85°28.1	N23°55.1	142° 23.7		96 42.7 113°44.6	N20° 31.8	171 20.5 186°30.9		Shaula	96°10.6	-37°07.3
18 19	177°27.9	100°27.2		142 23.7 157°24.4	N12°52.2	113 44.0 128°46.4		201°33.3	\$06°00.1	Rasalhague	95°58.6	12°32.5
	192°30.4		55.1		52.8		31.9		00.0	Eltanin	90°41.9	51°29.1
20	207°32.8 222°35.3	115°26.3 130°25.4	55.2 •• 55.2	172°25.1 187°25.8	53.4 •• 54.1	143°48.3 158°50.2	32.0	216°35.7 231°38.2	00.0	Kaus Aust.	83°32.7	-34°22.4
21 22	237° 37.8	130°25.4° 145°24.5	55.3	202° 26.5	54.7	173° 52.0	· · 32.1 32.2	246°40.6	00.0	Vega	80°33.1	38°48.3
	251° 31.0 252° 40.2	145 24.5 160°23.6	55.3	202 20.5 217°27.2		173 52.0 188°53.9		240 40.0 261°43.0		Nunki	75°48.0	-26°16.0
23	252 40.2	100 25.0	55.5		55.3	100 55.9	32.3	201 43.0	00.0	Altair	62°00.1	8°55.9
Mer.p	ass. 06:12	$\nu$ -0.9' d0	.1' m-3.91	$\nu$ 0.7′ d0	.6′ m1.00	$\nu 1.9' \ d0.$	1' m-2.01	$\nu$ 2.4′ d-0	.0′ m0.96	Peacock	53°06.0	-56°39.2
										Deneb	49°25.8	45°21.8
\A/- I	CIIA	CIIA	D	CIIA	D	CIIA	D	CIIA	D	Enif	33°39.1	9°59.1
Wed	GHA	<b>GHA</b> 175°22.7	Dec	GHA	Dec	GHA	Dec	<b>GHA</b> 276°45.4	Dec	Al Na'ir	27°33.3	-46°50.4
0	267° 42.7 282° 45.2		N23°55.3	232°27.9 247°28.6	N12°55.9	203°55.8	N20° 32.4		S06°00.0	Fomalhaut	15°14.9	-29°29.4
1		190°21.8	55.4		56.5	218° 57.7	32.5	291°47.8	00.0	Scheat	13°45.6	28°12.7
2	297°47.6	205°20.9	55.4	262°29.3	57.1 •• 57.7	233°59.5	32.6	306°50.3	0.00	Markab	13°30.3	15°20.1
3	312°50.1 327°52.6	220°20.0 235°19.1	· · 55.5	277°29.9 292°30.6		249°01.4 264°03.3	· · 32.7	321°52.7 336°55.1	00.0	Jun 17 Mon	SHA	Mer.pass
4			55.5	292°30.6 307°31.3	58.3		32.8		00.0		270°21.3	12:16
5	342°55.0	250° 18.2	55.5 N22° 55.6		59.0	279°05.1	32.9	351°57.5	00.0		326°10.2	08:32
6	357°57.5	265°17.3	N23°55.6	322°32.0	N12°59.6	294°07.0	N20° 33.0	6°59.9	\$06°00.0	Jupiter		10:29
7 8	13°00.0 28°02.4	280° 16.4 295° 15.5	55.6 55.7	337°32.7 352°33.4	13°00.2 00.8	309°08.9 324°10.8	33.1 33.2	22°02.4 37°04.8	06°00.0 05°59.9	Saturn	9°05.1	05:40
9	28°02.4 43°04.9	295° 15.5 310° 14.6	55.7 •• 55.7	352°33.4 7°34.1	01.4	324°10.8 339°12.6	· · 33.3	52°07.2	· · 59.9	Jatuin	3 UU.I	05.40
10	43 04.9 58°07.3	310 14.6 325°13.7	55.7 55.7	7 34.1 22°34.8	02.0	354° 14.5	33.4	67°09.6	59.9 59.9	Jun 18 Tue	SHA	Mer.pass
11	58 07.3 73°09.8	325 13.7 340°12.9	55. <i>1</i> 55.8	22 34.8 37°35.5	02.0	9°16.4	33.4 33.5	82°12.0	59.9 59.9	Venus	269°00.7	12:18
12	73 09.8 88°12.3	340 12.9 355°12.0	55.8 N23°55.8	52° 36.2	N13°03.2	9 16.4 24°18.2	33.5 N20°33.6	97°14.5	59.9 \$05°59.9	Mars	325°27.7	08:31
13	88 12.3 103°14.7	355 12.0 10°11.1	N23 55.8 55.8	52 36.2 67°36.9	03.9	39°20.1	33.7	97 14.5 112°16.9	505 59.9 59.9	Jupiter	296°27.3	10:26
13 14	103 14.7 118° 17.2	25° 10.2	55.8	82° 37.6	03.9	54°22.0	33.7 33.8	112 16.9 127°19.3	59.9 59.9	Saturn	9°03.9	05:36
14 15	118 17.2 133° 19.7	40°09.3	55.9	97°38.2	05.1	69°23.9	33.9	127 19.3 142°21.7	· · 59.9	lus 10 14/	CIIA	Ma:: ::
15 16	133 19.7 148° 22.1	40 09.3 55°08.4	55.9 55.9	97 38.2 112°38.9	05.7	84° 25.7	34.0	142 21.7 157°24.1	59.9 59.9	Jun 19 Wed	SHA	Mer.pass
17	148 22.1 163°24.6	55 08.4 70°07.5	55.9 55.9	112 38.9 127°39.6	05.7 06.3	99° 27.6	34.0 34.1	157 24.1 172°26.6	59.9 59.9		267°40.0	12:19
18	103 24.0 178° 27.1	85°06.6	N23°55.9	142° 40.3	N13°06.9	114° 29.5	N20° 34.2	172 20.0 187°29.0	59.9 S05°59.9		324°45.2 296°13.1	08:30 10:33
19	176 27.1 193°29.5	100°05.7	56.0	157°41.0	07.5	114 29.5 129°31.4	34.3	202°31.4	59.9	Jupiter		10:23
20	208° 32.0	100 05.7 115°04.8	56.0	172°41.7	07.5	144° 33.2	34.4	202 31.4 217°33.8	59.9	Saturn	9°02.7	05:32
21	200° 32.0 223° 34.4	130°03.9	• • 56.0	187° 42.4	08.7	159° 35.1	• • 34.5	232°36.2	• • 59.9	Horizont	al parallax	
22	238° 36.9	145°03.0	56.0	202°43.1	09.3	174° 37.0	34.6	232 30.2 247°38.7	59.9		Venus:	0.1
23	253° 39.4	160°02.1	56.0	217° 43.8	10.0	189°38.8	34.7	262°41.1	59.8		Mars:	0.1
Mer.p	ass. 06:08	$\nu$ -0.9′ d0	.0′ m-3.91	$\nu$ 0.7′ d0	.6′ m1.00	$\nu$ 1.9′ d0.	1′ m-2.01	$\nu$ 2.4′ d-0	.0′ m0.96			

h	Sui	า	Moon					
Mon	GHA	Dec	GHA	ν	Dec	d	HP	
0	179°45.8	N23°23.2	61°27.1	15.8'	S11°24.7	13.3'	54.7'	
1 2	194°45.7 209°45.5	23.3 23.3	76°01.9 90°36.6	15.7' 15.6'	11°38.0 11°51.3	13.3' 13.3'	54.7' 54.7'	
3	224°45.4	. 23.4	105°11.2	15.6'	12°04.5	13.2'	54.7'	
4	239°45.3	23.5	$119^{\circ}45.7$	15.5'	12° 17.7	13.2'	54.7'	
5	254°45.1	23.5	134°20.2	15.4'	12°30.9 <b>S</b> 12°44.0	13.1'	54.8'	
6 7	269°45.0 284°44.8	N23°23.6 23.7	148°54.7 163°29.0	15.4' 15.3'	12°57.1	13.1' 13.1'	54.8' 54.8'	
8	299°44.7	23.7	178°03.3	15.2'	13° 10.2	13.0'	54.8'	
9	314°44.6	• • 23.8	192°37.5	15.1'	13°23.2	13.0'	54.8'	
10 11	329°44.4 344°44.3	23.8 23.9	207°11.7 221°45.7	15.1' 15.0'	13° 36.2 13° 49.1	12.9' 12.9'	54.9' 54.9'	
12	359°44.2	N23°24.0	236°19.7	14.9'	\$14°02.0	12.8'	54.9'	
13	14°44.0	24.0	$250^{\circ}53.7$	14.8'	$14^{\circ}14.8$	12.8'	54.9'	
14	29°43.9 44°43.8	24.1	265°27.5 280°01.3	14.8' 14.7'	14°27.6 14°40.3	12.7'	54.9'	
15 16	59°43.6	· · 24.1 24.2	280 01.3 294°35.0	14.7 14.6'	14 40.3 14°53.0	12.7' 12.6'	55.0' 55.0'	
17	74°43.5	24.2	309°08.6	14.5'	15°05.7	12.6'	55.0'	
18	89°43.4	N23°24.3	323°42.1	14.4'	\$15°18.3	12.5'	55.0'	
19 20	104°43.2 119°43.1	24.3 24.4	338°15.5 352°48.9	14.4' 14.3'	15° 30.8 15° 43.3	12.5' 12.4'	55.0' 55.1'	
21	134°43.0	24.4	7°22.2	14.2'	15°55.7	12.4'	55.1'	
22	149°42.8	24.5	21°55.4	14.1'	16°08.1	12.3'	55.1'	
23	164°42.7	24.5	36°28.5	14.0'	16°20.4	12.3'	55.1'	
	SD = 15.7'	d = 0.1'		SE	0 = 14.9'			
Tue	GHA	Dec	GHA	ν	Dec	d	HP	
0	179°42.5	N23°24.6	51°01.5	13.9'	<b>S</b> 16°32.7	12.2'	55.1'	
1	194°42.4	24.6	65°34.4	13.8'	16°44.9	12.1'	55.2'	
2	209°42.3 224°42.1	24.7 •• 24.7	80°07.3 94°40.1	13.8' 13.7'	16°57.0 17°09.1	12.1' 12.0'	55.2' 55.2'	
4	239°42.0	24.8	109°12.7	13.6'	17°21.1	12.0'	55.2'	
5	254°41.9	24.8	123°45.3	13.5'	17° 33.0	11.9'	55.2'	
6	269°41.7 284°41.6	N23°24.9	138°17.8 152°50.2	13.4' 13.3'	\$17°44.9 17°56.8	11.8'	55.3'	
7 8	284 41.6 299°41.5	24.9 25.0	152°50.2 167°22.5	13.3'	17°56.8 18°08.5	11.8' 11.7'	55.3' 55.3'	
9	314°41.3	• • 25.0	181°54.7	13.1'	18° 20.2	11.6'	55.3'	
10	329°41.2	25.1	196°26.8	13.0'	18°31.8	11.5'	55.4'	
11 12	344°41.1 359°40.9	25.1 N23°25.1	210°58.8 225°30.7	12.9' 12.8'	18° 43.4 \$18° 54.8	11.5' 11.4'	55.4' 55.4'	
13	14°40.8	25.2	240°02.5	12.7'	19°06.2	11.3'	55.4'	
14	29°40.7	25.2	254°34.2	12.6'	$19^{\circ}17.6$	11.3'	55.5'	
15 16	44°40.5 59°40.4	· · 25.3 25.3	269°05.8 283°37.4	12.5' 12.4'	19° 28.8 19° 40.0	11.2' 11.1'	55.5' 55.5'	
17	74°40.2	25.3 25.3	203 37.4 298°08.8	12.4	19 40.0 19°51.1	11.1	55.5'	
18	89°40.1	N23°25.4	312°40.1	12.2'	S20°02.1	10.9'	55.5'	
19	104°40.0 119°39.8	25.4	327°11.3	12.1'	20°13.0 20°23.9	10.9'	55.6'	
20 21	119°39.8 134°39.7	25.4 •• 25.5	341°42.4 356°13.4	12.0' 11.9'	20° 23.9 20° 34.7	10.8' 10.7'	55.6' 55.6'	
22	149°39.6	25.5	10°44.3	11.8'	20°45.4	10.6'	55.6'	
23	164°39.4	25.5	25°15.1	11.7'	20°56.0	10.5'	55.7'	
	SD = 15.7'	d = 0.0'		SE	0 = 15.0'			
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	179°39.3	N23°25.6	39°45.8	11.6'	S21°06.5	10.4	55.7'	
1 2	194°39.2 209°39.0	25.6 25.6	54°16.4 68°46.9	11.5' 11.4'	21°16.9 21°27.2	10.3' 10.2'	55.7' 55.7'	
3	224°38.9	• • 25.7	83°17.2	11.3'	21°37.4	10.1	55.8'	
4	239°38.8	25.7	97°47.5	11.2'	21°47.6	10.1'	55.8'	
5 6	254°38.6 269°38.5	25.7 N23°25.8	112°17.6 126°47.7	11.0' 10.9'	21°57.6 \$22°07.6	10.0' 9.9'	55.8' 55.8'	
7	284°38.3	25.8	141°17.6	10.8	22° 17.5	9.8'	55.9	
8	299°38.2	25.8	155°47.5	10.7'	22°27.2	9.7'	55.9'	
9 10	314°38.1 329°37.9	· · 25.8 25.9	170°17.2 184°46.8	10.6' 10.5'	22°36.9 22°46.4	9.6' 9.5'	55.9' 55.9'	
11	329 37.9 344°37.8	25.9 25.9	184 46.8 199°16.3	10.5	22°55.9	9.5 9.3'	55.9 56.0'	
12	359°37.7	N23°25.9	213°45.7	10.3'	S23°05.2	9.2'	56.0'	
13	14°37.5	25.9	228°15.0	10.2'	23° 14.5	9.1'	56.0'	
14 15	29°37.4 44°37.3	26.0 •• 26.0	242°44.2 257°13.2	10.1' 10.0'	23°23.6 23°32.6	9.0' 8.9'	56.1' 56.1'	
16	59°37.1	26.0	271°42.2	9.8'	23°41.5	8.8'	56.1	
17	74°37.0	26.0	286°11.0	9.7'	23°50.3	8.7'	56.1'	
18 19	89°36.9 104°36.7	N23°26.0 26.1	300°39.8 315°08.4	9.6' 9.5'	\$23°59.0 24°07.6	8.6' 8.5'	56.2' 56.2'	
20	119°36.6	26.1	329°36.9	9.5 9.4'	24°16.1	8.3'	56.2	
21	134°36.4	• • 26.1	$344^{\circ}05.3$	9.3'	24°24.4	8.2'	56.2'	
22	149°36.3 164°36.2	26.1	358°33.6	9.2'	24° 32.6	8.1'	56.3'	
23		26.1	13°01.8	9.1'	24°40.7	8.0'	56.3'	
	SD = 15.7'	d = 0.0'	-	5L	0 = 15.2'			

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

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

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Age		
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	11-13	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	75-90%	
17	00:57	01:03	12:01	20:30	08:08		
18	01:10	01:16	12:01	21:16	08:52		
19	01:23	01:29	12:01	22:06	09:40		

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Th	CHA	GHA	Dec	GHA	Dec						SHA	D
Thu 0	<b>GHA</b> 268° 41.8	175°01.2	N23°56.0	232°44.5	N13°10.6	<b>GHA</b> 204°40.7	<b>Dec</b> N20°34.8	<b>GHA</b> 277° 43.5	<b>Dec</b> \$05°59.8		ЗПА	Dec
1	208 41.8 283°44.3	175 01.2 190°00.3		232 44.5 247°45.2	11.2	204 40.7 219°42.6		277 43.5 292°45.9		Alpheratz	357°35.3	29°13.3
	298°46.8	204°59.4	56.1	247 45.2 262°45.9		219 42.0 234°44.5	34.9	292 45.9 307°48.4	59.8	Ankaa	353°07.6	-42°10.2
2 3	296 40.6 313°49.2		56.1	202 45.9 277°46.5	11.8 •• 12.4	249°46.3	35.0	307 46.4 322°50.8	59.8	Schedar	349°31.7	56°40.0
4	313 49.2 328°51.7	219°58.5 234°57.6	· · 56.1 56.1	277 40.5 292°47.2	13.0	249 40.3 264°48.2	· · 35.1 35.2	337°53.2	•• 59.8 59.8	Diphda	348°47.8	-17°51.1
5	343°54.2	234 57.0 249°56.7		307°47.9	13.6	204 46.2 279°50.1	35.2 35.3	352° 55.6	59.8	Achernar	335°20.8	-57°06.5
6	358° 56.6	264° 55.8	56.1 N23°56.1	307 47.9 322°48.6	N13°14.2	279 50.1 294°52.0	N20°35.4	7°58.1	59.6 S05°59.8	Hamal	$327^{\circ}51.9$	23°34.6
7	13° 59.1	279°54.9	56.1	337°49.3	14.8	309°53.8	35.5	23°00.5	59.8	Polaris	314°37.3	89°21.8
8	29°01.6	294°54.0	56.1	352°50.0	15.4	324°55.7	35.6	38°02.9	59.8	Acamar	315°12.4	-40°12.2
9	44°04.0	309°53.1	56.1	7°50.7	. 16.0	339°57.6	• • 35.7	53°05.3	• • 59.8	Menkar	314°06.9	4°11.1
10	59°06.5	324°52.2	56.1	22°51.4	16.6	354°59.5	35.8	68°07.7	59.8	Mirfak	308° 29.3	49°56.7
11	74°08.9	339°51.3	56.1	37°52.1	17.2	10°01.3	35.9	83°10.2	59.8	Aldebaran	290°40.5	16°33.5
12	89°11.4	354°50.4	N23°56.1	52°52.8	N13°17.8	25°03.2	N20°36.0	98° 12.6	S05°59.8	Rigel	281°04.7	-8°10.4
13	104° 13.9	9°49.5	56.1	67°53.5	18.4	40°05.1	36.1	113° 15.0	59.8	Capella	280°23.1	46°01.3
14	119° 16.3	24°48.6	56.1	82°54.2	19.1	55°06.9	36.2	128° 17.4	59.8	Bellatrix	278°23.7	6°22.3
15	134° 18.8	39°47.7	56.1	97°54.8	• • 19.7	70°08.8	36.3	143° 19.9	• • 59.8	Elnath	278°02.8	28°37.7
16	149°21.3	54°46.8	56.1	112°55.5	20.3	85°10.7	36.4	158° 22.3	59.7	Alnilam	275°38.5	-1°11.2
17	164°23.7	69°45.9	56.1	127°56.2	20.9	100°12.6	36.5	173°24.7	59.7	Betelgeuse	270°52.9	7°24.7
18	179°26.2	84°45.0	N23°56.1	142°56.9	N13°21.5	115°14.4	N20°36.6	188°27.1	S05°59.7	Canopus	263°53.2	-52°42.5
19	194°28.7	99°44.1	56.1	157°57.6	22.1	130°16.3	36.7	203°29.6	59.7	Sirius	258°27.0	-16°45.0
20	209°31.1	114°43.2	56.1	172°58.3	22.7	145°18.2	36.8	218°32.0	59.7	Adhara	255°06.6	-29°00.3
21	224°33.6	129°42.3	56.1	187°59.0	23.3	160°20.1	• • 36.9	233°34.4	59.7	Procyon	244°51.6	5°09.8
22	239°36.1	144°41.4	56.1	202°59.7	23.9	175°21.9	36.9	248°36.8	59.7	Pollux	243°18.2	27°58.1
23	254°38.5	159°40.6	56.0	218°00.4	24.5	190°23.8	37.0	263°39.3	59.7	Avior	234° 15.5	-59°35.4
										Suhail	222°47.0	-43°32.0
Mer.p	oass. 06:04	$\nu$ -0.9′ d0	.0′ m-3.91	u0.7′ d0	.6′ m1.00	$\nu$ 1.9′ d0.	1' m-2.01	$\nu$ 2.4′ d-0	.0'  m0.95	Miaplacidus	221°39.1	-69°49.2
										Alphard	217°48.4	-8°45.9
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.1	11°50.9
0	269°41.0	174°39.7	N23°56.0	233°01.1	N13°25.1	205°25.7	N20°37.1	278°41.7	S05°59.7	Dubhe	193°41.7	61°37.5
1	284°43.4	189°38.8	56.0	248°01.7	25.7	220°27.6	37.2	293°44.1	59.7	Denebola	182°25.4	14°26.2
2	299°45.9	204°37.9	56.0	263°02.4	26.3	235°29.4	37.3	308°46.6	59.7	Gienah	175°44.1	-17°40.7
3	314°48.4	219°37.0	• • 56.0	278°03.1	. 26.9	250°31.3	37.4	323°49.0	• • 59.7		173°00.6	-63°14.4
4	329°50.8	234°36.1	56.0	293°03.8	27.5	265°33.2	37.5	338°51.4	59.7	I	171°52.1	-57°15.3
5	344°53.3	249°35.2	55.9	308°04.5	28.1	280°35.1	37.6	353°53.8	59.7	Alioth	166°13.2	55°49.9
6	359°55.8	264°34.3	N23°55.9	323°05.2	N13°28.7	295°36.9	N20°37.7	8°56.3	S05°59.7	Spica	158°22.7	-11°17.4
7	14°58.2	279°33.4	55.9	338°05.9	29.3	310°38.8	37.8	23°58.7	59.7	Alkaid	152°52.1	49°11.7
8	30°00.7	294°32.5	55.9	353°06.6	29.9	325°40.7	37.9	39°01.1	59.7	Hadar	148°36.3	-60°29.7
9	45°03.2	309°31.6	• • 55.8	8°07.3	30.5	340°42.6	• • 38.0	54°03.5	• • 59.7		147°58.0	-36°29.6
10	60°05.6	324°30.7	55.8	23°08.0	31.1	355°44.4	38.1	69°06.0	59.7	Arcturus	145°48.1	19°03.4
11	75°08.1	339°29.8	55.8	38°08.7	31.7	10°46.3	38.2	84°08.4	59.7	Rigil Kent.	139°40.5	-60°56.4
12	90°10.6	354°28.9	N23°55.8	53°09.3	N13°32.3	25°48.2	N20°38.3	99° 10.8	S05°59.7	Kochab	137° 18.9	74°03.5
13	105°13.0	9°28.0	55.7	68°10.0	32.9	40°50.1	38.4	114° 13.3	59.7	Zuben'ubi	136°56.3	-16°08.7
14	120° 15.5	24°27.1	55.7	83°10.7	33.5	55°51.9	38.5	129° 15.7	59.6	Alphecca	126°03.8	26°38.0
15	135° 17.9	39°26.2	• • 55.7	98°11.4	• • 34.1	70°53.8	• • 38.6	144°18.1	• • 59.6	Antares	112°16.1	-26°29.2
16	150°20.4	54°25.3	55.6	113°12.1	34.7	85°55.7	38.7	159° 20.5	59.6	Atria	107° 10.2 102° 03.0	-69°04.4
17	165°22.9	69°24.4	55.6	128°12.8	35.3	100°57.6	38.8	174°23.0	59.6	Sabik		-15°45.3 -37°07.3
18	180°25.3	84°23.5	N23°55.6	143°13.5	N13°35.9	115°59.4	N20°38.9	189°25.4	S05°59.6	Shaula	96° 10.6 95° 58.6	-37 07.3 12°32.5
19	195°27.8	99°22.6	55.5	158°14.2	36.5	131°01.3	39.0	204°27.8	59.6	Rasalhague		51°29.1
20	210°30.3	114°21.7	55.5	173°14.9	37.1	146°03.2	39.1	219°30.3	59.6	Eltanin	90°41.9 83°32.7	-34°22.4
21	225°32.7	129°20.8	• • 55.4	188°15.5	• • 37.7	161°05.1	• • 39.2	234°32.7	• • 59.6	Kaus Aust. Vega	80°33.1	-34 22.4 38°48.3
22	240°35.2	144°19.9	55.4	203°16.2	38.3	176°06.9	39.3	249°35.1	59.6		75° 48.0	-26°15.9
23	255°37.7	159°19.0	55.4	218°16.9	38.9	191°08.8	39.4	264°37.5	59.6	Nunki Altair	62°00.1	-20 15.9 8°55.9
	06.00	0.0/ 1.0	0/ 2.01	0.7/ 10	.6′ m0.99	1.0/	1/ 2.01	24/10	0/ 0.05	Peacock	53°06.0	-56°39.2
ivier.p	pass. 06:00	$\nu$ -0.9° $a$ -0	0.0′ m-3.91	$\nu$ 0.7 au	.6' mu.99	$\nu$ 1.9° $a$ 0.	1′ m-2.01	$\nu$ 2.4° $a$ -0	.0′ m0.95	Deneb	49° 25.8	-50 39.2 45°21.8
										Enif	33°39.1	9°59.1
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27° 33.3	-46°50.4
0	270°40.1	174°18.1	N23°55.3	233°17.6	N13°39.5	206°10.7	N20°39.5	279°40.0	\$05°59.6	Fomalhaut	27 33.3 15°14.9	-46 50.4 -29°29.4
1	285°42.6	189°17.2	55.3	248°18.3	40.1	221°12.6	39.6	294°42.4	59.6	Scheat	13°45.6	-29 29.4 28°12.7
2	$300^{\circ}45.1$	204°16.3	55.2	263°19.0	40.7	$236^{\circ}14.4$	39.7	309°44.8	59.6	Markab	13° 30.3	15°20.1
3	$315^{\circ}47.5$	$219^{\circ}15.4$	• • 55.2	$278^{\circ}19.7$	• • 41.3	251°16.3	• • 39.8	324°47.3	• • 59.6	Iviaikab		20.1
4	$330^{\circ}50.0$	234°14.5	55.1	293°20.4	41.9	266°18.2	39.9	339°49.7	59.6	Jun 20 Thu	SHA	Mer.pass
5	$345^{\circ}52.4$	249°13.6	55.1	$308^{\circ}21.1$	42.5	281°20.1	40.0	$354^{\circ}52.1$	59.6	I	266° 19.3	12:21
6	0°54.9	264°12.7	N23°55.0	323°21.8	N13°43.1	296°21.9	N20°40.1	9°54.6	S05°59.6	I	324°02.6	08:29
7	15°57.4	279°11.9	55.0	$338^{\circ}22.4$	43.6	311°23.8	40.2	24°57.0	59.6	Jupiter		10:20
8	$30^{\circ}59.8$	294°11.0	54.9	353°23.1	44.2	326°25.7	40.3	39°59.4	59.6	Saturn	9°01.7	05:28
9	46°02.3	$309^{\circ}10.1$	• • 54.9	8°23.8	• • 44.8	341°27.6	• • 40.4	55°01.8	• • 59.6	lun 21 E.:	C L A	Mor noss
10	61°04.8	324°09.2	54.8	23°24.5	45.4	356°29.5	40.5	70°04.3	59.6	Jun 21 Fri	<b>SHA</b> 264° 58.7	Mer.pass 12:22
11	76°07.2	339°08.3	54.7	38°25.2	46.0	11°31.3	40.6	85°06.7	59.6		323°20.1	08:28
12	91°09.7	354°07.4	N23°54.7	53°25.9	N13°46.6	26°33.2	N20°40.7	100°09.1	<b>S</b> 05°59.6		323°20.1 295°44.7	10:17
13	$106^{\circ}12.2$	9°06.5	54.6	68°26.6	47.2	41°35.1	40.8	$115^{\circ}11.6$	59.6	Saturn	295 44.7 9°00.7	05:24
14	121°14.6	24°05.6	54.6	83°27.3	47.8	56°37.0	40.8	130°14.0	59.6	Saturn	9 00.7	05:24
15	$136^{\circ}17.1$	39°04.7	• • 54.5	98°28.0	• • 48.4	71°38.8	• • 40.9	145°16.4	• • 59.6	Jun 22 Sat	SHA	Mer.pass
16	151° 19.6	54°03.8	54.4	113°28.6	49.0	86°40.7	41.0	160°18.9	59.6		263°38.0	12:24
17	$166^{\circ}22.0$	69°02.9	54.4	128°29.3	49.6	101°42.6	41.1	175°21.3	59.6		322°37.5	08:26
18	181°24.5	84°02.0	N23°54.3	143°30.0		116°44.5	N20°41.2	190°23.7	S05°59.6	Jupiter	295°30.6	10:14
19	196°26.9	99°01.1	54.2	158°30.7	50.8	131°46.3	41.3	205°26.2	59.6	Saturn	8°59.8	05:20
20	211°29.4	114°00.2	54.2	173°31.4	51.4	146°48.2	41.4	220°28.6	59.6		-1 "	
21	226°31.9	128°59.3	• • 54.1	188°32.1	• • 52.0	161°50.1	• • 41.5	235°31.0	• • 59.6	Horizont	al parallax	
22	241°34.3	143°58.4	54.0	203°32.8	52.5	176°52.0	41.6	250°33.5	59.6		Venus:	0.1
23	256°36.8	158°57.5	54.0	218°33.5	53.1	191°53.8	41.7	265°35.9	59.6		Mars:	0.1
Merr	pass. 05:56	ν-0 9' d-0	0.0′ m-3.91	ν0 7' d0	.6′ m0.99	ν1 9' dΩ	1′ m-2.02	ν2 4' d-Ω	.0′ m0.95			
			0.31				2.02					

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°36.0	N23°26.1	27°29.9	9.0'	S24°48.7	7.9'	56.3'
1	194°35.9	26.2	41°57.8	8.9'	24°56.5	7.7'	56.3'
2	209°35.8 224°35.6	26.2 •• 26.2	56°25.7 70°53.5	8.8' 8.6'	25°04.3 25°11.9	7.6' 7.5'	56.4' 56.4'
4	239°35.5	26.2	85°21.1	8.5'	25°19.4	7.3	56.4
5	254°35.4	26.2	99°48.6	8.4'	25°26.7	7.2'	56.5'
6	269°35.2	N23°26.2	$114^{\circ}16.1$	8.3'	<b>S</b> 25°33.9	7.1'	56.5'
7	284°35.1	26.2	128° 43.4	8.2'	25°41.0	6.9'	56.5'
8 9	299°35.0 314°34.8	26.2 •• 26.2	143°10.6 157°37.8	8.1' 8.0'	25° 47.9 25° 54.7	6.8' 6.7'	56.5' 56.6'
10	314 34.6 329°34.7	26.3	157 57.6 172°04.8	6.0 7.9'	25° 54.7 26° 01.4	6.5	56.6
11	344°34.6	26.3	186°31.7	7.8'	26°08.0	6.4	56.6'
12	359°34.4	N23°26.3	200°58.5	7.7'	S26°14.3	6.3'	56.6'
13	14°34.3	26.3	215°25.2	7.6'	26° 20.6	6.1'	56.7'
14 15	29°34.1 44°34.0	26.3 •• 26.3	229°51.8 244°18.4	7.5' 7.4'	26° 26.7 26° 32.7	6.0' 5.8'	56.7' 56.7'
16	59°33.9	26.3	258° 44.8	7.3	26°38.5	5.7	56.8'
17	74°33.7	26.3	273°11.1	7.2'	26°44.2	5.5'	56.8'
18	89°33.6	N23°26.3	287°37.3	7.1'	<b>S</b> 26°49.7	5.4'	56.8'
19	104°33.5	26.3	302°03.5	7.0'	26°55.1	5.2'	56.8'
20 21	119°33.3 134°33.2	26.3 •• 26.3	316°29.5 330°55.4	6.9' 6.9'	27°00.3 27°05.4	5.1' 4.9'	56.9' 56.9'
22	134 33.2 149°33.1	26.3	345°21.3	6.8	27°10.3	4.9 4.8'	56.9
23	164°32.9	26.3	359°47.1	6.7'	27° 15.1	4.6'	56.9'
	SD = 15.7'	d = 0.0'		SI	D = 15.4'		
		<u>u — 0.0</u>	-	اد			
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	179°32.8 194°32.7	N23°26.3 26.3	14°12.7 28°38.3	6.6' 6.5'	\$27°19.7 27°24.2	4.5' 4.3'	57.0' 57.0'
2	194 32.7 209°32.5	26.3 26.3	28 38.3 43°03.8	6.4'	27°28.5	4.3 4.1'	57.0'
3	224°32.4	. 26.3	57°29.3	6.3'	27°32.6	4.0'	57.1'
4	239°32.3	26.3	71°54.6	6.3'	27°36.6	3.8'	57.1'
5	254°32.1	26.3	86° 19.9	6.2'	27°40.4	3.7'	57.1'
6	269°32.0	N23°26.3	100°45.1	6.1'	\$27°44.0	3.5'	57.1'
7 8	284°31.8 299°31.7	26.3 26.2	115° 10.2 129° 35.2	6.0' 6.0'	27°47.5 27°50.9	3.3' 3.2'	57.2' 57.2'
9	314°31.6	. 26.2	144° 00.2	5.9'	27°54.0	3.0'	57.2'
10	329°31.4	26.2	$158^{\circ}25.1$	5.8'	27°57.0	2.8'	57.2'
11	344°31.3	26.2	172°49.9	5.8'	27°59.8	2.7'	57.3'
12	359°31.2 14°31.0	N23°26.2 26.2	187°14.6 201°39.3	5.7' 5.6'	\$28°02.5 28°05.0	2.5' 2.3'	57.3'
13 14	29°30.9	26.2	201 39.3 216°04.0	5.6'	28°05.0	2.3	57.3' 57.3'
15	44°30.8	26.2	230°28.5	5.5'	28°09.4	2.0'	57.4'
16	59°30.6	26.2	244°53.0	5.4'	28°11.4	1.8'	57.4'
17	74°30.5	26.1	259° 17.5	5.4'	28°13.2	1.6'	57.4'
18 19	89°30.4 104°30.2	N23°26.1 26.1	273°41.9 288°06.2	5.3' 5.3'	\$28° 14.8 28° 16.3	1.4' 1.3'	57.4' 57.5'
20	119°30.1	26.1	302°30.5		28° 17.6	1.1'	57.5'
21	134°30.0	26.1	316°54.7	5.2'	28° 18.6	0.9'	57.5'
22	149°29.8	26.1	331°18.9	5.2'	$28^{\circ}19.6$	0.7'	57.5'
23	164°29.7	26.0	345°43.1	5.1'	28°20.3	0.6'	57.6'
	SD = 15.7'	d = -0.0'		SI	O = 15.5'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°29.6	N23°26.0	0°07.2	5.1'	\$28°20.9	0.4'	57.6'
1	194°29.4	26.0	14°31.3	5.0'	28°21.3	0.2'	57.6'
2	209°29.3 224°29.2	26.0 •• 26.0	28°55.3 43°19.3	5.0' 5.0'	28°21.5 28°21.5	0.0' -0.2'	57.6' 57.7'
3 4	239°29.0	25.9	43 19.3 57°43.3	5.0 4.9'	28° 21.3	-0.2 -0.3	57.7'
5	254°28.9	25.9	72°07.2	4.9'	$28^{\circ}21.0$	-0.5	57.7'
6	269°28.8	N23°25.9	86°31.1	4.9'	\$28°20.5	-0.7'	57.7'
7	284°28.6 299°28.5	25.9 25.8	100°55.0 115°18.9	4.9' 4.8'	28° 19.8 28° 18.9	-0.9'	57.8'
8 9	299°28.5 314°28.3	25.8 •• 25.8	115°18.9 129°42.7	4.8' 4.8'	28° 18.9 28° 17.8	-1.1' -1.2'	57.8' 57.8'
10	329°28.2	25.8	144°06.6	4.8'	28° 16.6	-1.4	57.8'
11	344°28.1	25.8	158° 30.4	4.8'	28° 15.1	-1.6'	57.9'
12	359°27.9	N23°25.7	172°54.2	4.8'	\$28° 13.5	-1.8'	57.9'
13 14	14°27.8 29°27.7	25.7 25.7	187°18.0 201°41.8	4.8' 4.8'	28°11.7 28°09.7	-2.0' -2.2'	57.9' 57.9'
15	29 27.7 44°27.5	25.7	201 41.8 216°05.5	4.8'	28° 07.6	-2.2 -2.3'	57.9 58.0'
16	59°27.4	25.6	$230^{\circ}29.3$	4.8'	$28^{\circ}05.2$	-2.5'	58.0'
17	74°27.3	25.6	244°53.1	4.8'	28°02.7	-2.7'	58.0'
18	89°27.1	N23°25.6	259°16.9 273°40.6	4.8'	\$28°00.0	-2.9'	58.0'
19 20	104°27.0 119°26.9	25.5 25.5	273°40.6 288°04.4	4.8' 4.8'	27°57.1 27°54.0	-3.1' -3.3'	58.0' 58.1'
21	134°26.7	• • 25.5	302°28.2	4.8'	27°50.8	-3.4'	58.1
22	149°26.6	25.4	$316^{\circ}52.0$	4.8'	27°47.3	-3.6'	58.1'
23	164°26.5	25.4	331°15.9	4.8'	27°43.7	-3.8'	58.1'
	SD = 15.7'	d = -0.0'		SI	D = 15.7'		

l at	Twi	light	C	C	Tw	ilight
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°						
<b>N</b> 70°						
68°						
66°						
64°	////	////	01:31	22:33	////	////
62° 60°		//// 00:49	02:09 02:36	21:54 21:28	//// 23:14	//// ////
N 58°	////	01:41	02:56	21:07	22:23	////
56°	11111	02:11	03:13	20:51	21:53	////
54°	00:45	02:33	03:28	20:36	21:31	23:19
52°	01:32	02:51	03:40	20:24	21:13	22:31
50°	02:00	03:06	03:51	20:13	20:58	22:03
45°	02:46	03:36	04:13	19:50	20:28	21:18
N 40° 35°	03:17 03:40	03:59 04:17	04:31 04:47	19:32 19:17	20:05 19:47	20:47 20:24
30°	03:59	04:17	05:00	19:04	19:32	20:24
20°	04:28	04:57	05:22	18:42	19:07	19:36
<b>N</b> 10°	04:50	05:18	05:41	18:23	18:46	19:13
0°	05:09	05:36	05:58	18:06	18:28	18:54
<b>S</b> 10°	05:27	05:53	06:16	17:48	18:11	18:37
20° 30°	05:43	06:10	06:34	17:30 17:08	17:54 17:35	18:21 18:05
30°	05:59 06:08	06:29 06:40	06:56 07:08	16:56	17:35 17:24	17:56
40°	06:17	06:52	07:22	16:42	17:12	17:46
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° 56°	06:51	07:37	08:21	15:43	16:27	17:13
58°	06:57 07:04	07:46 07:56	08:34 08:48	15:30 15:16	16:18 16:08	17:07 17:00
<b>S</b> 60°	07:11	08:08	09:06	14:58	15:56	16:53
Lat.		Moonris	e		Moonse	t
	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
N 70°						
68° 66°						
64°						
62°	22:03			00:06		
		_	_	23:52		_
60°	21:09	22:36	23:21	00:36	00:47	01:23
N 58°	20:37	21:55	22:46	00:58	01:20	02:03
56° 54°	20:13 19:53	21:27 21:06	22:20 22:00	01:17 01:32	01:44 02:04	02:31 02:53
54°	19:33	20:48	21:43	01:32	02:04	02:55
50°	19:23	20:32	21:28	01:58	02:34	03:26
45°	18:54	20:01	20:59	02:22	03:03	03:57
<b>N</b> 40°	18:32	19:37	20:35	02:42	03:26	04:21
35°	18:14	19:18	20:16	02:59	03:45	04:41
30° 20°	17:58 17:31	19:01 18:32	20:00 19:32	03:13 03:38	04:01 04:29	04:58 05:27
20 <b>N</b> 10°	17:31	18:32 18:08	19:32	03:58	04:29	05:27
0°	16:47	17:45	18:45	03:39	05:15	05:31
	16:26	17:23	18:23	04:39	05:37	06:37
<b>S</b> 10°	10.20					
<b>S</b> 10° 20°	16:04	16:58	17:59	05:00	06:01	07:01
20° 30°	16:04 15:38	16:58 16:30	17:59 17:31	05:25	06:28	07:29
20° 30° 35°	16:04 15:38 15:22	16:58 16:30 16:14	17:59 17:31 17:14	05:25 05:40	06:28 06:45	07:29 07:46
20° 30°	16:04 15:38	16:58 16:30	17:59 17:31	05:25	06:28	07:29

ĺ			Sun				
İ	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%
	20	01:36	01:42	12:02	23:01	10:33	
	21	01:49	01:55	12:02	23:59	11:30	
	22	02:02	02:08	12:02	-:-	12:30	

16:01

15:46

15:29

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14:05

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09:14

 ${\tt https://pypi.org/project/skyalmanac/}$ 

09:00

09:15

09:32

09:53

10:20

10:57

**S** 50°

52°

54° 56° 58°

14:17

14:04

13:49

13:31

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15:01

14:46

14:29

14:08

13:42

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

Simple   GiA	h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
1	Sun	CHA	CHA	Doc	CHV.	Doc	CHA.	Doc	CHA	Doc		SHV	Doc
1 901-417 1 985-57 5.3 52 947-148 943 2011-107 54 200 500 500 500 500 500 500 500 500 500													
2 931-42 2 931-42 2 931-43 8 373 293-55 549 920-55 949 301-42 931											Alpheratz		29°13.4
10													
4 314'e1   231'50   516   297'36   546   277'02   422   340'46   59.6   477'8   59.6   477'8   59.6   477'8   59.6   477'8   59.6   477'8   59.6   477'8   59.6   477'8   59.6   477'8   59.6   477'8   59.6   477'8   59.6   477'8   59.6   477'8   59.6   477'8   59.6   477'8   59.6   477'8   59.6   477'8   59.6   477'8   477'8   59.6   477'8													I
S all Sills 1. 246 12.2 5.5.5 308 137.6 5.0.2 2010.1 1. 24.3 105 10.5 5.0.6 1. 24.0 1													
8 3 190 00 200 26 5 5 3.3 353 30 5 9 1 29 20 20 20 20 20 20 20 20 20 20 20 20 20	5	346°51.6	248°52.2										
1	6	1°54.1	263°51.3	N23°53.4	323°38.3	N13°57.3		N20°42.4	10°52.9	S05°59.6			
1				53.3		57.9		42.5		59.6			
13													I
11 97764													
1													
13 10°113 8 "45-0													
14   122°1136   23°441   5.27   83°448   0.06   7.7°226   4.11   131°14   5.95   15   137°16   23°441   5.26   69°445   0.06   7.7°23   4.12   140°140   5.95   15   137°16   38°452   38°452   5.26   69°445   0.06   7.7°25   4.12   1.12°17   5.95   18   182°26   83°405   5.27   5.95   5.07   5.07   5.07   5.07   5.07   5.07   5.07   19   197°261   98°96   5.23   188°472   0.49   132°31   4.56   0.00°240   5.95   10   127°31   138°376   5.52   138°477   0.55   140°33   4.37   5.07   5.95   5.07   5.07   11   227°31   138°376   5.52   138°476   0.07   1.07°35   0.48   2.29°35   5.95   5.07   5.07   5.07   11   227°31   138°376   5.52   138°486   0.01   102°35   0.48   2.29°35   5.95   5.07					53-42.4						Capella	280°23.0	46°01.3
15   15   15   25   37   43   25   25   25   48   45   20   25   72   23   48   24   16   19   9.95     16   15   15   15   25   37   43   25   23   18   48   20   23   27   48   20   23   27   48   20   23   27   48   20   23   27   20   20   22   22   20   20   23   23											Bellatrix	278°23.7	6°22.3
19   12"187   3"4"   3"5"											Elnath		
167   21.2   68   48   4.5   4.5   28   45.8   6.7   100"277   4.4   179"19.7   50.5   50"69.5     19   197"20.1   68   38"40.5   50"50.3   1.58"47.2   4.7   4.													
18   12   12   13   13   14   15   15   13   14   15   15   15   15   15   15   15													
1977-201   977-201   978-306   523   158°47.2   049   132°31.4   43.6   200°24.6   59.5													
22 24738 113737 250 250 250 250 250 250 250 250 250 250	19	$197^{\circ}26.1$	98°39.6	52.3	158°47.2	04.9	132°31.4	43.6	206°24.6	59.5			
Polity   24°18.2   27°8.5   14°3°8.5   32.0   328°48.5   328°48.	20	$212^{\circ}28.6$	113°38.7	52.2	173°47.9	05.5	147°33.3	43.7	221°27.0	59.5			
22   22   23   25   25   25   25   25	21	227°31.0	128° 37.8	•• 52.1	188°48.6	•• 06.1		• • 43.8		•• 59.5			
Mer. pass. 05.52													
Mon GHA	23	257°35.9	158°36.1	51.9	218°50.0	07.2	192°38.9	44.0	266°34.4	59.5			I
Mon   GHA   GHA   Dec   GHA	Mer.p	ass. 05:52	$\nu$ -0.9' d-0	0.1′ m-3.91	$\nu 0.7' d0$	.6′ m0.99	$\nu 1.9' d0.$	1′ m-2.02	$\nu 2.4' \ d-0$	.0′ m0.94			
Mon   CHA			- 0.5 4 0	0.31									
272"344   173"35.2   N25"51.7   233"51.7   N14"07.8   207"40.8   N20"41.1   281"36.8   506"59.5   Control   128"34.9   188"34.3   51.6   284"51.4   084"51.4   281"36.8   506"59.5   Control   291"34.3   293"33.4   51.6   284"51.4   084   222"42.7   44.2   23"69.3   25"5.5   44.2   23"61.4   291"32.2   291"32.3   291"33.3   291"33.4   10.2   207"48.3   44.4   311"41.7   59.5   48.3   291"32.5   51.4   291"52.5   291"52.5	N4	CIIA	CIIA	D	CHA	D	CIIA	D	CHA	D	Regulus	$207^{\circ}35.1$	11°50.9
2 300°43.3 203°33.4 51.5 263°52.0 090 237°4.6 4 4.2 296°39.2 59.5 5											Dubhe		
302*43.3 203*33.4 51.5 263*52.0 09.0 237*44.6 44.3 311*417 59.5 317*64.5 218*23.5 51.4 278*52.7 09.6 252*64.6 44.3 311*417 59.5 433*4.1 19.5 4.3 21*41.4 59.5 59.5 48.6 323*4.3 23*4.3 23*31.6 1.3 23*33.4 10.2 26*64.6 44.4 311*64.5 59.5 59.5 48.6 323*31.6 59.5 59.5 59.5 59.5 59.5 59.5 59.5 59											Denebola		
317*46.8 218*32.5 5.51.4 278*32.7 0.90.6 252*46.4 0.44.4 326*44.1 0.99.5 d. 347*50.7 28*30.3 5.51.4 0.522*30.5 230*34.8 0.51.2 230*34.8 1.07 225*30.3 44.6 356*49.0 5.95 d. 347*50.7 28*30.7 3.08*36.1 10.7 225*50.2 44.6 356*49.0 5.95 d. 347*50.7 28*30.5 5.1.2 308*36.1 10.7 225*50.2 10.50*30.3 5.95 d. 347*50.7 28*30.5 5.1.2 308*36.1 10.7 225*50.2 10.50*30.3 5.95 d. 347*50.7 28*30.5 5.0 1.0 338*35.5 11.9 312*54.0 44.8 26*33.9 5.96 d. 348*30.3 23*36.8 10.50*30.3 28*30.5 5.0 5.0 5.85*36.2 12.5 327*55.8 44.9 41*56.3 5.96 d. 348*30.3 232*36.2 5.06 23*37.5 13.7 357*99.6 45.0 556*38.7 5.96 d. 348*30.3 232*36.2 5.06 23*37.5 13.7 357*99.6 45.0 56*38.7 5.96 d. 348*30.3 232*36.2 5.06 23*37.5 13.7 357*99.6 45.0 10.60*30.3 50.2 5.0 5.0 5.0 58*30.2 14.2 13*01.5 4.51 87*03.0 5.96 d. 348*30.3 5.96 d. 348*30.3 232*36.2 5.00 3.88*36.2 14.2 13*01.5 4.51 87*03.0 5.96 d. 348*30.3 5.96													
5 347°9.07   248°30.7   51.3   293°31.4   10.2   267°48.3   44.5   341°46.5   595.5   546°39.6   534°90.7   248°30.7   51.2   306°59.1   10.7   282°60.2   44.6   366°49.0   595.5   565°58.7   578°32.2   268°29.8   N23°51.1   323°54.8   N14°11.3   297°52.1   N20°44.7   11°51.6   505°59.6   595.													
5 347°9.07   246°30.7 51.2   308°54.1   10.7   282°9.02   44.6   336°49.0   99.5   6 2°83.2   263°9.8   N23°81.1   323°54.8   M14°11.3   297°9.2   N20°44.7   11°51.4   50°59.6   7 17°55.7   276°8.29   51.0   338°55.5   11.9   312°54.0   44.8   26°53.9   59.6   8 32°8.81   293°8.0   50.9   335°6.2   11.5   327°58.6   44.9   41°56.3   59.6   10 63°0.3   332°6.2   50.6   23°57.5   11.9   312°54.0   44.8   26°53.9   59.6   11 78°05.5   338°25.3   50.5   38°8.2   14.2   13°01.5   45.1   87°03.6   59.6   11 78°05.5   338°25.3   50.5   38°8.2   14.2   13°01.5   45.1   87°03.6   59.6   12 93°08.0   333°45.5   N23°50.1   53°58.9   114°02.7   114°14.8   28°03.4   N20°45.2   102°06.1   50°59.6   13 100°10.4   8°23.6   50.3   68°59.6   15.4   43°05.2   45.3   117°08.5   59.6   14 122°12.9   23°22.7   50.2   44°00.3   10.0   58°07.1   45.4   132°10.9   99.6   Antara   12°61.6   15°57.8   53°59.9   44.9   14°03.0   14°03.0   14°03.0   45.6   16°215.8   99.6   Antara   12°61.6   26°29.2   15 138°15.4   38°11.8   50.1   99°01.0   16.6   73°09.0   45.5   147°13.4   59.6   Antara   12°61.6   26°29.2   16 135°17.8   53°20.9   49.9   114°01.7   117.1   88°10.9   45.6   16°215.8   99.6   Antara   12°10.1   69°04.4   18 188°22.8   83°19.1   N22°49.7   144°03.0   M14°18.3   118°14.6   N20°45.8   192°20.7   50°59.6   Rashage   99°8.6   61.2   40°8.2   40°													
6 2°83.2 268°29.8 N22°81.1 323°84.8 N14°11.3 29°82.1 N20°44.7 11°51.4 508°59.6   Shick 150°59.7 17°8.89 510. 338°55.5 10.9 312°540. 44.8 26°53.9 59.6   Hada 148°26.3 60°29.7   8 32°88.1 293°8.0 50.9 353°56.2 12.5 32°755.8 44.9 41°56.3 59.6   Hada 148°26.3 60°29.7   10 63°03.0 323°62.5 50.6 23°57.5 13.7 35°759.6 45.0 72°01.2 59.6   Hada 148°26.3 60°29.7   11 78°05.5 338°55.3 50.5 38°58.2 11.2 13°10.5 451.1 87°03.6 59.6   Hada 148°26.3 60°29.7   12 93°08.0 353°245 N22°50.4 53°58.9 N14°14.8 28°03.4 N20°45.2 102°0.5 505°59.6   Hada 147°38.0 36°20.6   Hada 147°38.0 36°20.6   Hada 148°26.3 60°29.6   Hada													
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8 32°8.1 293°28.0 509 383°46.2 12.5 32°76.8 44.9 41′56.3 59.6 Menkert 147°8.8 0 36°20.6 9 48°00.6 308°27.1 50.8 8′56.8 13.1 342°77.7 45.0 56′58.7 59.6 10 63°03.0 323°26.2 50.6 23°57.5 13.7 357°59.6 45.0 72′01.2 59.6 11 78°05.5 338°58.2 50.5 38′58.2 14.2 13°01.5 45.1 87°03.6 59.6 12 93°08.0 333°24.5 20°325.0 50.5 38′58.2 14.2 13°01.5 45.1 87°03.6 59.6 12 93°08.0 33°24.5 12°32′50.4 53°58.9 N14°14.8 28°03.4 N20′45.2 102′06.1 508′99.6 12 13°10.4 8°23.6 50.3 68′59.6 15.4 43′05.2 43.1 117′06°3.0 14°12.3 112°12.9 19.6 59.6 15.4 43′05.2 43.1 117′06°3.0 14°12.3 118′15.4 38°21.8 50.1 99°01.0 16.6 73°09.0 45.5 147′13.4 59.6 112°12.4 123°12.9 99.0 45.6 16°27.1 45.4 132°12.9 99.0 45.6 16°27.3 14°27.3 18°27.3 18°27.3 49.9 114′01.7 17.1 88°10.9 45.6 162′15.8 59.6 147′13.4 59.6	7	$17^{\circ}55.7$	278°28.9	51.0	338°55.5	11.9	312°54.0	44.8	26°53.9	59.6			
9 48°00.6 308°27.1 . 50.8 8°50.8 . 13.1 342°57.7 . 45.0 56°58.7 . 59.6 10 6°30.3 332°62.2 50.6 23°57.5 13.7 35°79.6 45.0 72°01.2 59.6 11 78°05.5 338°25.3 50.5 38°58.2 14.2 13°01.5 45.1 87°03.6 59.6 11 98°03.4 80°04.2 102°06.1 505°9.6 12.9 30°00. 353°42.5 N23°50.4 53°58.9 141°41.8 20°30.4 N20°45.2 102°06.1 505°9.6 13°108°10.4 8°23.6 50.3 68°59.6 15.4 43°05.2 45.3 117°08.5 59.6 14 123°12.9 23°22.7 50.2 84°00.3 16.0 58°07.1 45.4 132°10.5 59.6 15.1 12.9 23°22.7 50.2 84°00.3 16.0 58°07.1 45.4 132°10.5 59.6 15.1 138°15.4 38°21.8 50.1 99°01.0 · 16.6 73°09.0 · 45.5 147°13.4 · 59.6 16.5 153°17.8 53°20.9 49.9 114°01.7 17.1 88°10.9 45.6 162°15.8 59.6 162°15.8 59.6 16.5 153°17.8 53°20.9 49.8 129°02.3 17.7 103°12.8 45.7 17°18.3 59.6 18.1 183°22.8 83°19.1 N23°49.1 144°03.0 141°18.3 118°14.6 N20°48.8 102°20.7 505°9.6 198°25.2 98°18.2 49.6 159°03.7 18.9 133°16.5 45.9 20°23.1 59.6 198°25.2 98°18.2 49.6 159°03.7 18.9 133°16.5 45.9 20°23.1 59.6 122°24°33.2 128°16.4 · 49.3 189°05.1 · 20.0 163°20.3 · 46.1 237°28.0 · 59.6 124°1.2 128°30.2 128°16.4 · 49.3 189°05.1 · 20.0 163°20.3 · 46.1 237°28.0 · 59.6 124°1.2 128°30.2 128°16.4 · 49.3 189°05.1 · 20.0 163°20.3 · 46.1 237°28.0 · 59.6 North 18.8 183°49.2 240°10.8 20.4 12.2 193°24.0 · 46.3 26°73.2 9 59.6 124°1.0 14.6 12.0 14.0 14.0 14.0 14.0 14.0 14.0 14.0 14	8	$32^{\circ}58.1$	293°28.0	50.9	353°56.2	12.5	327°55.8	44.9	41°56.3	59.6			I
10 63°03.0 323°26.2 50.6 38°86.2 14.2 13°01.5 45.1 87°01.6 45.0 72°01.2 59.6 12 93°08.0 353°24.5 N23°50.4 538°58.9 N14°14.8 28°03.4 N20°45.2 102°06.1 505°59.6 13.1 08°10.4 8°23.6 50.3 68°59.6 15.4 43°05.2 45.3 117°06.5 538°5.9 59.6 14.2 123°12.9 23°22.7 50.2 84°00.3 10.0 58°07.1 45.4 132°10.9 59.6 16.1 133°17.8 53°20.0 49.9 114°01.7 17.1 88°10.9 45.5 147°13.4 59.6 16.1 133°17.8 53°20.0 49.9 114°01.7 17.1 88°10.9 45.5 147°13.4 59.6 16.1 133°17.8 53°20.0 49.9 114°01.7 17.1 88°10.9 45.6 162°15.8 59.6 18.8 183°22.8 83°19.1 N23°99.7 144°03.0 N14°18.3 118°14.6 N20°48.8 192°20.7 505°59.6 18.8 183°22.8 83°19.1 N23°99.7 144°03.0 N14°18.3 118°14.6 N20°48.8 192°20.7 505°59.6 18.2 122°23°20.2 128°16.449.3 189°05.8 1.2 20°0.2 133°27.7 113°17.3 49.4 174°04.4 19.5 148°18.4 46.0 222°25.6 59.6 18.2 243°32.6 143°15.5 49.2 20°405.8 20.6 178°22.2 46.2 225°30.5 59.6 19.6 19.5 143°15.5 49.2 20°405.8 20.6 178°22.2 46.2 225°30.5 59.6 19.6 19.5 143°15.5 49.2 20°405.8 20.6 178°22.2 46.2 252°30.5 59.6 19.6 19.5 143°15.5 49.2 20°405.8 20.6 178°22.2 46.2 252°30.5 59.6 19.6 19.5 143°15.5 49.2 20°405.8 20.6 178°22.2 46.2 252°30.5 59.6 19.6 19.6 19.5 143°15.5 49.2 20°405.8 20.6 178°22.2 46.2 252°30.5 59.6 19.6 19.6 19.6 19.6 19.6 19.6 19.6 1	9			• • 50.8		• • 13.1		• • 45.0		•• 59.6			
11 78°05.5 387°24.5 N23°50.4 53°58.9 N42°14.8 28°03.4 N20°45.2 102°03.6 S05°59.6 S05°59.6 133°10.9 N42°14.8 13°01.5 48.1 187°03.6 S05°59.6 133°10.9 N42°14.8 132°01.5 48.1 117°08.5 S05°59.6 14 123°12.9 23°22.7 50.2 84°00.3 16.0 58°07.1 48.4 132°10.9 59.6 N25°07.1 148°13.4 S05.6 N25°07.1 148°13.4 S05.6 N25°07.1 148°13.4 S05.6 N25°07.1 148°13.4 S05.6 N25°07.1 148°13.4 N25°0.2 N25°0													
13 108"10.4 8°23.6 50.3 66°9.6 15.4 43°05.2 45.3 117'08.5 59.6 14.6 12.20.1 20.5 138"15.4 38°21.8 50.1 99°01.0 16.6 73°09.0 4.5.5 147'13.4 59.6 140"21.8 59.6 16 153"1.8 59.6 20.0 49.8 120"02.3 17.7 103"12.8 45.7 177"18.3 59.6 59.6 18.2 80°0.0 49.8 120"02.3 17.7 103"12.8 45.7 177"18.3 59.6 59.6 19.8 20.0 49.8 120"02.3 17.7 103"12.8 45.7 177"18.3 59.6 59.6 19.8 20.0 213"27.7 113"17.3 49.4 14"40.3 0 N14"81.3 118"14.6 N20"45.8 102"22.1 59.6 20 213"27.7 113"17.3 49.4 14"40.4 19.5 148"18.4 40.0 22"2.56 59.6 22 243"32.6 143"15.5 49.2 20"05.8 20.6 178"22.2 46.2 252"30.5 59.6 143"15.5 49.2 20"05.8 20.6 178"22.2 46.2 252"30.5 59.6 143"15.5 49.2 20"05.8 20.6 178"22.2 46.2 252"30.5 59.6 143"15.5 49.2 20"05.8 20.6 178"22.2 46.2 252"30.5 59.6 143"15.5 49.2 20"05.8 20.6 178"22.2 46.2 252"30.5 59.6 143"15.5 49.2 20"05.8 20.6 178"22.2 46.2 252"30.5 59.6 143"15.5 49.2 20"05.8 20.6 178"22.2 46.2 252"30.5 59.6 143"15.5 49.2 20"05.8 20.6 178"22.2 46.2 252"30.5 59.6 143"15.5 49.2 20"05.8 20.6 178"22.2 46.2 252"30.5 59.6 144"1.6 20"0.1 m-3.9 1 \(\nu \) \											_		
14 123°12.9 23°22.7 50.2 84°00.3 16.0 58°07.1 45.4 132°10.9 59.6 150.8 20°32.1 120°10.1 1.6 153°17.8 52°20.9 49.9 114°01.7 17.1 88°10.9 45.6 162°15.8 59.6 162°15.8 59.6 17.1 168°20.3 68°20.0 49.8 129°02.3 17.7 103°12.8 45.7 17°18.3 59.6 198°02.7 18.9 133°16.5 49.9 20°22.7 505°59.6 198°25.2 98°18.2 49.6 199°03.7 18.9 133°16.5 49.9 20°22.5 50.5 59.6 198°27.7 115°17.3 49.4 174°04.4 19.5 148°18.4 46.0 22°25.6 59.6 192°27.7 115°17.3 49.4 174°04.4 19.5 148°18.4 46.0 22°25.6 59.6 192°27.7 115°17.3 49.4 174°04.5 19.0 163°20.3 46.1 23°22.8 19.5 15.5 49.2 204°05.8 20.6 178°22.2 46.2 25°20.5 59.6 19.6 19.6 19.6 19.6 19.6 19.6 19.6 1											Zuben'ubi	$136^{\circ}56.3$	-16°08.7
18 138"1.8   33°21.8   36°21.8   50.1   99°01.0   11.6   73°09.0   45.5   147°13.4   59.6   18 138"1.8   53°20.9   49.8   129°02.3   17.7   103°12.8   45.7   171°18.3   59.6   18 183"22.8   83°19.1   N23°49.7   44°03.0   N14°18.3   118°14.6   N20°45.8   192°20.7   S05°59.6   19 196°52.2   98°18.2   49.6   159°03.7   18.9   133°16.5   45.9   20°23.1   59.6   20 213"27.7   113"17.3   49.4   174"04.4   19.5   148"18.4   46.0   22°256.5   59.6   21 228"30.2   128"16.4   49.3   189°05.1   20.0   163°20.3   46.1   237"28.0   59.6   22 243"32.6   143°15.5   49.2   204°05.8   20.6   178°22.2   46.2   252°30.5   59.6   23 288"35.1   158°14.6   49.0   219°06.5   21.2   193°24.0   46.3   257°22.9   59.6   24 33"32.6   173"13.8   N23"48.9   234"07.1   N14"21.8   208"25.9   N20"46.4   228"25.3   505°59.6   25 348"4.9   218"11.1   48.5   279°09.2   22.5   253°31.6   46.6   32"24.5   59.6   25 348"4.9   218"11.1   48.5   279°09.2   22.5   253°31.6   46.6   32"24.7   59.6   26 3"3"5.7   3293"06.6   47.8   354"12.6   268"33.4   46.7   342"45.1   59.6   27 18"54.8   278"07.5   47.9   339"12.0   25.8   318"39.1   47.0   27°55.4   59.6   28 33"57.3   293"06.6   47.8   354"12.6   26.4   328"41.3   N14"25.3   298"37.7   343"24.4   239"07.1   353"03.1   150"10.1   256"33.4   47.0   27°557.3   59.6   28 33"57.3   293"06.6   47.8   354"12.6   26.4   328"41.7   47.8   47.0   27°557.3   59.6   38 33"57.3   293"06.6   47.8   354"12.6   26.4   328"41.7   47.8   47.0   27°557.3   59.6   38 33"57.3   293"06.6   47.8   354"12.6   26.4   328"41.7   47.8   47.8   47.0   27°557.3   59.6   38 34"4.9   238"11.1   353"0.8   34"12.5   26.4   328"41.3   34"1.3   34"1.4											Alphecca		
16 153°17.8 53°20.9 49.9 114°01.7 17.1 88°10.9 45.6 162°15.8 59.6 17.1 18.8 59.6 17.1 18.8 59.6 17.1 18.8 59.6 17.1 18.8 59.6 18.1 18.3 18.3 18.3 18.3 18.3 18.3 18.3													
17   166°20.3   66°20.0   49.8   129°02.3   17.7   103°12.8   45.7   177°18.3   59.6   18   183°22.8   83°19.1   N23°49.7   144°03.0   N14°18.3   118°11.6   N20°45.8   102°20.7   S0°55.6   59.6   180°20.7   13°17.3   49.4   174°04.4   19.5   148°18.4   46.0   222°25.6   59.6   59.6   180°27.7   113°17.3   49.4   174°04.4   19.5   148°18.4   46.0   222°25.6   59.6   59.6   180°27.7   113°17.3   49.4   174°04.4   19.5   148°18.4   46.0   222°25.6   59.6   180°27.7   113°17.3   49.4   174°05.5   21.0   163°20.3   46.1   222°25.6   59.6   180°27.7   180°3.2   143°15.5   49.2   204°05.8   20.6   178°22.2   46.2   252°30.5   59.6   180°3.2   38°43.3   38°43.3   38°43.3   38°43.8   24.9   218°11.1   48.5   297°07.8   22.4   223°27.8   46.5   297°37.8   59.6   48.6   282°35.3   50°59.6   48.6   282°35.3   50°59.6   48.6   282°35.3   283°42.5   203°12.0   48.6   264°05.5   22.9   238°29.7   46.6   327°42.7   59.6   48.6   33°47.4   233°10.2   48.4   294°09.3   48.2   230°10.6   47.7   266°33.4   46.7   327°42.5   59.6   48.6   246°03.3   46.7   33°47.4   233°10.2   48.4   294°09.3   48.2   230°10.6   47.7   283°35.3   46.7   327°42.7   59.6   48.6   266°03.4   47.6   266°33.4   46.7   46.6   327°42.7   59.6   48.6   266°03.4   47.6   266°33.4   46.7   46.6   327°42.7   59.6   48.6   266°03.4   47.6   266°33.4   46.7   46.6   327°42.7   59.6   48.6   266°03.4   47.6   266°33.4   46.7   46.6   327°42.7   59.6   48.6   47.4   48.6   266°03.4   47.6   266°33.4   46.7   46.6   327°42.7   59.6   48.6   47.4   48.6													
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19 196°25.2 98°18.2 49.6 159°03.7 18.9 133°16.5 45.9 207°23.1 59.6 213°27.7 113°17.3 49.4 174°04.4 19.5 148°18.4 46.0 22°25.6 59.6 2122°25.6 59.6 223°25.6 143°15.5 49.2 204°05.8 20.6 163°20.3 · 46.1 237°28.0 · 59.6 Vega 33°32.7 34°22.4 23°32.6 143°15.5 49.2 204°05.8 20.6 178°22.2 46.2 25°30.5 59.6 Numit 75°48.0 · 26°15.9 140°25.7 140°25.2 140°25.2 193°24.0 46.3 26°32.9 59.6 Numit 75°48.0 · 26°15.9 140°25.7 140°25.2 140°25													
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10 64 0.2.2 323 04.9 47.5 24 14.0 27.6 358 44.7 47.3 72 59.8 59.6 11 79°04.7 338°04.0 47.4 39°14.7 28.1 13°46.6 47.4 88°02.2 59.6 12 94°07.1 353°03.1 N23°47.2 54°15.4 N14°28.7 28°48.5 N20°47.5 103°04.7 505°59.6 13 109°09.6 8°02.2 47.1 69°16.1 29.3 43°50.4 47.6 118°07.1 59.6 14 124°12.0 23°01.3 46.9 84°16.8 29.9 58°52.2 47.7 133°09.5 59.6 15 139°14.5 38°00.4 46.8 99°17.4 30.4 73°54.1 47.8 148°12.0 59.6 15 154°17.0 52°59.5 46.6 114°18.1 31.0 88°56.0 47.9 163°14.4 59.6 17 169°19.4 67°58.6 46.5 129°18.8 31.6 103°57.9 48.0 178°16.9 59.6 19 199°24.4 97°56.8 46.1 159°20.2 32.7 134°01.7 48.1 208°21.8 59.6 20 214°26.8 112°56.0 46.0 174°20.9 33.3 149°03.5 48.2 223°24.2 59.6 21 229°29.3 127°55.1 45.8 189°21.6 33.9 164°05.4 48.3 238°26.6 59.6 22 244°31.8 142°54.2 45.7 204°22.2 34.4 179°07.3 48.4 253°29.1 59.6 23 259°34.2 157°53.3 45.5 219°22.9 35.0 194°09.2 48.5 268°31.5 59.6 400.2 400.1 47.5 12.2 11.5 12.2 11.5 12.2 11.5 12.3 12.2 12.2 12.2 12.2 12.2 12.2 12.2											Jun 24 Mon	SHA	Mer.pass
12 94°07.1 358°03.1 N23°47.2 54°15.4 N14°28.7 28°48.5 N20°47.5 103°04.7 S05°59.6 13 109°09.6 8°02.2 47.1 69°16.1 29.3 43°50.4 47.6 118°07.1 59.6 14 124°12.0 23°01.3 46.9 84°16.8 29.9 58°52.2 47.7 133°09.5 59.6 15 139°14.5 38°00.4 · 46.8 99°17.4 · 30.4 73°54.1 · 47.8 148°12.0 · 59.6 16 154°17.0 52°59.5 46.6 114°18.1 31.0 88°56.0 47.9 163°14.4 59.6 17 169°19.4 67°58.6 46.5 129°18.8 31.6 103°57.9 48.0 178°16.9 59.6 18 184°21.9 82°57.7 N23°46.3 144°19.5 N14°32.2 118°59.8 N20°48.0 193°19.3 S05°59.6 19 199°24.4 97°56.8 46.1 159°20.2 32.7 134°01.7 48.1 208°21.8 59.6 20 214°26.8 112°56.0 46.0 174°20.9 33.3 149°03.5 48.2 223°24.2 59.6 21 229°29.3 127°55.1 · 45.8 189°21.6 · 33.9 164°05.4 · 48.3 238°26.6 · 59.6 22 244°31.8 142°54.2 45.7 204°22.2 34.4 179°07.3 48.4 253°29.1 59.6 23 259°34.2 157°53.3 45.5 219°22.9 35.0 194°09.2 48.5 268°31.5 59.6  Mars 321°12.3 08:24 Jupiter 295°02.4 10:08 Saturn 8°58.4 05:13  Mars 321°12.3 08:24 Jupiter 295°02.4 10:08 Saturn 8°58.4 05:13													
13 109°09.6 8°02.2 47.1 69°16.1 29.3 43°50.4 47.6 118°07.1 59.6 14 124°12.0 23°01.3 46.9 84°16.8 29.9 58°52.2 47.7 133°09.5 59.6 15 139°14.5 38°00.4 · 46.8 99°17.4 · 30.4 73°54.1 · 47.8 148°12.0 · 59.6 16 154°17.0 52°59.5 46.6 114°18.1 31.0 88°56.0 47.9 163°14.4 59.6 17 169°19.4 67°58.6 46.5 129°18.8 31.6 103°57.9 48.0 178°16.9 59.6 18 184°21.9 82°57.7 N23°46.3 144°19.5 N14°32.2 118°59.8 N20°48.0 193°19.3 S05°59.6 19 199°24.4 97°56.8 46.1 159°20.2 32.7 134°01.7 48.1 208°21.8 59.6 20 214°26.8 112°56.0 46.0 174°20.9 33.3 149°03.5 48.2 223°24.2 59.6 21 229°29.3 127°55.1 · 45.8 189°21.6 · 33.9 164°05.4 · 48.3 238°26.6 · 59.6 22 244°31.8 142°54.2 45.7 204°22.2 34.4 179°07.3 48.4 253°29.1 59.6 23 259°34.2 157°53.3 45.5 219°22.9 35.0 194°09.2 48.5 268°31.5 59.6 31.5 59.6											Mars	$321^{\circ}12.3$	08:24
14 124°12.0 23°01.3 46.9 84°16.8 29.9 58°52.2 47.7 133°09.5 59.6 15 139°14.5 38°00.4 · 46.8 99°17.4 · 30.4 73°54.1 · 47.8 148°12.0 · 59.6 16 154°17.0 52°59.5 46.6 114°18.1 31.0 88°56.0 47.9 163°14.4 59.6 17 169°19.4 67°58.6 46.5 129°18.8 31.6 103°57.9 48.0 178°16.9 59.6 18 184°21.9 82°57.7 N23°46.3 144°19.5 N14°32.2 118°59.8 N20°48.0 193°19.3 S05°59.6 19 199°24.4 97°56.8 46.1 159°20.2 32.7 134°01.7 48.1 208°21.8 59.6 20 214°26.8 112°56.0 46.0 174°20.9 33.3 149°03.5 48.2 223°24.2 59.6 21 229°29.3 127°55.1 · 45.8 189°21.6 · 33.9 164°05.4 · 48.3 238°26.6 · 59.6 22 244°31.8 142°54.2 45.7 204°22.2 34.4 179°07.3 48.4 253°29.1 59.6 23 259°34.2 157°53.3 45.5 219°22.9 35.0 194°09.2 48.5 268°31.5 59.6    Saturn 8°58.4 05:13     Jun 25 Tue SHA Mer.pass Venus 259°36.2 12:28     Mars 320°29.6 08:23     Jupiter 294°48.4 10:05     Saturn 8°58.4 05:13     Saturn 8°58.4 05:13     Jun 25 Tue SHA Mer.pass Venus 259°36.2 12:28     Mars 320°29.6 08:23     Jupiter 294°48.4 10:05     Saturn 8°58.4 05:13     Saturn 8°58.4 05:13     Jun 25 Tue SHA Mer.pass Venus 259°36.2 12:28     Mars 320°29.6 08:23     Jupiter 294°48.4 10:05     Saturn 8°58.4 05:13     Saturn 8°58.4 05:13     Jun 25 Tue SHA Mer.pass Venus 259°36.2 12:28     Mars 320°29.6 08:23     Jupiter 294°48.4 10:05     Saturn 8°58.4 05:13     Saturn 8°58.4 05:13     Jun 25 Tue SHA Mer.pass Venus 259°36.2 12:28     Mars 320°29.6 08:23     Jupiter 294°48.4 10:05     Saturn 8°58.4 05:13     Sa													I
15											Saturn	8°58.4	05:13
16       154°17.0       52°59.5       46.6       114°18.1       31.0       88°56.0       47.9       163°14.4       59.6       Venus       25°36.2       12:28         17       169°19.4       67°58.6       46.5       129°18.8       31.6       103°57.9       48.0       178°16.9       59.6       Mars       320°29.6       08:23         18       184°21.9       82°57.7       N23°46.3       144°19.5       N14°32.2       118°59.8       N20°48.0       193°19.3       S05°59.6       Jupiter       294°48.4       10:05         19       199°24.4       97°56.8       46.1       159°20.2       32.7       134°01.7       48.1       208°21.8       59.6       Saturn       8°57.8       05:09         20       214°26.8       112°56.0       46.0       174°20.9       33.3       149°03.5       48.2       223°24.2       59.6       53.6       Horizontal parallax         22       244°31.8       142°54.2       45.7       204°22.2       34.4       179°07.3       48.4       253°29.1       59.6       Mars:       0.1         23       259°34.2       157°53.3       45.5       219°22.9       35.0       194°09.2       48.5       268°31.5       59.6       Mars:<											Jun 25 Tue	SHA	Mer.nass
17													
18													
19 199°24.4 97°56.8 46.1 159°20.2 32.7 134°01.7 48.1 208°21.8 59.6 20 214°26.8 112°56.0 46.0 174°20.9 33.3 149°03.5 48.2 223°24.2 59.6 21 229°29.3 127°55.1 · 45.8 189°21.6 · 33.9 164°05.4 · 48.3 238°26.6 · 59.6 22 244°31.8 142°54.2 45.7 204°22.2 34.4 179°07.3 48.4 253°29.1 59.6 23 259°34.2 157°53.3 45.5 219°22.9 35.0 194°09.2 48.5 268°31.5 59.6  Saturn 8°57.8 05:09  Horizontal parallax Venus: 0.1  Mars: 0.1	18						118°59.8						
21       229°29.3       127°55.1       · · 45.8       189°21.6       · · 33.9       164°05.4       · · 48.3       238°26.6       · · 59.6       Horizontal parallax         22       244°31.8       142°54.2       45.7       204°22.2       34.4       179°07.3       48.4       253°29.1       59.6       Venus:       0.1         23       259°34.2       157°53.3       45.5       219°22.9       35.0       194°09.2       48.5       268°31.5       59.6       Mars:       0.1													
22 244°31.8 142°54.2 45.7 204°22.2 34.4 179°07.3 48.4 253°29.1 59.6 Venus: 0.1 23 259°34.2 157°53.3 45.5 219°22.9 35.0 194°09.2 48.5 268°31.5 59.6 Mars: 0.1											11	al may-11-:	
23 259°34.2 157°53.3 45.5 219°22.9 35.0 194°09.2 48.5 268°31.5 59.6 Mars: 0.1											Horizont	•	0.1
25 255 54.2 157 55.5 45.5 215 22.9 55.0													
Mer.pass. 05:45 $\nu$ -0.9' $d$ -0.1' m-3.91 $\nu$ 0.7' $d$ 0.6' m0.98 $\nu$ 1.9' $d$ 0.1' m-2.02 $\nu$ 2.4' $d$ 0.0' m0.93												141013.	V.1
	Mer.p	ass. 05:45	$\nu$ -0.9′ d-0	0.1′ m-3.91	$\nu 0.7' d0$	.6′ m0.98	$\nu 1.9' d0.$	1′ m-2.02	$\nu^{2.4'} d0$	.0′ m0.93			

h	Su						
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°26.3	N23°25.4	$345^{\circ}39.7$	4.9'	<b>S</b> 27°39.9	-4.0'	58.2'
1	194°26.2	25.3	0°03.6 14°27.4	4.9'	27°35.9	-4.2'	58.2'
2 3	209°26.1 224°25.9	25.3 •• 25.2	28°51.3	4.9' 4.9'	27°31.7 27°27.4	-4.4' -4.5'	58.2' 58.2'
4	239°25.8	25.2	43°15.3	5.0'	27°22.8	-4.7'	58.2'
5	254°25.7	25.2	57°39.2	5.0'	$27^{\circ}18.1$	-4.9'	58.3'
6	269°25.5	N23°25.1	72°03.2	5.0'	\$27°13.2	-5.1'	58.3'
7 8	284°25.4 299°25.3	25.1 25.0	86°27.2 100°51.3	5.0' 5.1'	27°08.2 27°02.9	-5.2' -5.4'	58.3' 58.3'
9	314°25.1	• • 25.0	115° 15.3	5.1'	26° 57.5	-5.4' -5.6'	58.3'
10	329°25.0	25.0	129°39.5	5.2'	$26^{\circ}51.9$	-5.8'	58.4'
11	344°24.9	24.9	144°03.6	5.2'	26°46.1	-6.0'	58.4'
12 13	359°24.7 14°24.6	N23°24.9 24.8	158°27.8 172°52.1	5.2' 5.3'	\$26°40.2 26°34.0	-6.1' -6.3'	58.4' 58.4'
14	29°24.5	24.8	172 32.1 187°16.4	5.3'	26°27.7	-0.5'	58.4'
15	44°24.3	24.7	201°40.7	5.4'	26°21.3	-6.6'	58.5'
16	59°24.2	24.7	216°05.1	5.4'	26°14.6	-6.8'	58.5'
17	74°24.1 89°23.9	24.6 N23°24.6	230°29.6 244°54.1	5.5'	26°07.8 \$26°00.8	-7.0'	58.5'
18 19	89°23.9 104°23.8	N23 24.6 24.5	244 54.1 259°18.6	5.6' 5.6'	25°53.6	-7.2' -7.3'	58.5' 58.5'
20	119°23.7	24.5	273°43.2	5.7'	25°46.3	-7.5'	58.6'
21	134°23.5	• • 24.4	288°07.9	5.7'	25°38.8	-7.7'	58.6'
22	149°23.4	24.4	302°32.6	5.8'	25°31.2	-7.8'	58.6'
23	164°23.3	24.3	316°57.4	5.8'	25°23.3	-8.0'	58.6'
	SD = 15.7'	d = -0.0'		S	D = 15.9'		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°23.1	N23°24.3	331°22.2	5.9'	S25°15.3	-8.2'	58.6'
1	194°23.0	24.2	345°47.2	6.0'	25°07.2	-8.3'	58.6'
2	209°22.9 224°22.7	24.2	0°12.1 14°37.2	6.0'	24°58.9 24°50.4	-8.5'	58.7'
3 4	224 22.7 239°22.6	· · 24.1 24.0	14°37.2 29°02.3	6.1' 6.2'	24°50.4 24°41.8	-8.6' -8.8'	58.7' 58.7'
5	254°22.5	24.0	43°27.5	6.2	24°33.0	-9.0'	58.7'
6	269°22.3	N23°23.9	57°52.7	6.3'	<b>S</b> 24°24.0	-9.1'	58.7'
7	284°22.2	23.9	72°18.0	6.4'	24°14.9	-9.3'	58.7'
8 9	299°22.1 314°21.9	23.8	86°43.4 101°08.9	6.5' 6.5'	24°05.6 23°56.2	-9.4' -9.6'	58.8' 58.8'
10	329°21.8	23.7	101 06.9 115°34.4	6.6'	23°46.7	-9.0 -9.7'	58.8'
11	344°21.7	23.6	130°00.0	6.7'	23°36.9	-9.9'	58.8'
12	359°21.5	N23°23.6	144°25.7	6.8'	S23°27.1	-10.0'	58.8'
13 14	14°21.4 29°21.3	23.5 23.4	158°51.5 173°17.3	6.8' 6.9'	23°17.1 23°06.9	-10.2' -10.3'	58.8' 58.8'
15	29 21.3 44°21.1	. 23.4	173 17.3 187°43.3	0.9 7.0'	23 00.9 22°56.6	-10.5'	58.9'
16	59°21.0	23.3	202°09.3	7.1'	22°46.1	-10.6'	58.9'
17	74°20.9	23.3	$216^{\circ}35.3$	7.2'	$22^{\circ}35.5$	-10.7'	58.9'
18	89°20.7	N23°23.2	231°01.5	7.2'	\$22°24.8	-10.9'	58.9'
19 20	104°20.6 119°20.5	23.1 23.1	245°27.7 259°54.1	7.3' 7.4'	22°13.9 22°02.9	-11.0'	58.9' 58.9'
21	134°20.4	. 23.0	274°20.5	7.5'	21°51.8	-11.1	58.9'
22	149°20.2	22.9	288°47.0	7.6'	21°40.5	-11.4'	58.9'
23	164°20.1	22.8	303°13.5	7.6'	21°29.1	-11.5'	59.0'
	SD = 15.7'	d = -0.1'		S	D = 16.0'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°20.0	N23° 22.8	317°40.2	7.7'	S21°17.5	-11.7'	59.0'
1	194°19.8	22.7	332°06.9 346°33.7	7.8'	21°05.9	-11.8'	59.0'
2 3	209°19.7 224°19.6	22.6 •• 22.6	346°33.7 1°00.6	7.9' 8.0'	20°54.0 20°42.1	-11.9' -12.1'	59.0' 59.0'
4	239°19.4	22.5	15°27.6	8.1'	20°30.1	-12.1	59.0'
5	254°19.3	22.4	29°54.7	8.1'	$20^{\circ}17.9$	-12.3'	59.0'
6	269°19.2	N23° 22.3	44°21.8	8.2'	\$20°05.6	-12.4'	59.0'
7 8	284°19.0 299°18.9	22.3 22.2	58°49.0 73°16.3	8.3' 8.4'	19°53.1 19°40.6	-12.5' -12.7'	59.0' 59.1'
9	299 18.9 314°18.8	22.2	73 10.3 87°43.7	8.5'	19° 40.6 19° 27.9	-12.7 -12.8'	59.1'
10	329°18.6	22.0	$102^{\circ}11.2$	8.6'	19° 15.2	-12.9'	59.1'
11	344°18.5	22.0	116°38.8	8.6'	19°02.3	-13.0'	59.1'
12 13	359°18.4 14°18.2	N23°21.9 21.8	131°06.4 145°34.1	8.7' 8.8'	\$18°49.3 18°36.2	-13.1' -13.2'	59.1' 59.1'
13 14	14 18.2 29°18.1	21.8 21.7	145°34.1 160°01.9	8.8	18° 36.2 18° 22.9	-13.2' -13.3'	59.1' 59.1'
15	44°18.0	21.6	174°29.8	9.0'	18°09.6	-13.4	59.1
16	59°17.9	21.5	188°57.8	9.0'	17°56.2	-13.5'	59.1'
17	74°17.7	21.5	203°25.8	9.1'	17°42.6	-13.6'	59.1'
18 19	89°17.6 104°17.5	N23°21.4 21.3	217°54.0 232°22.2	9.2' 9.3'	\$17°29.0 17°15.2	-13.7' -13.8'	59.1' 59.2'
20	119°17.3	21.3	232 22.2 246°50.4	9.3 9.4'	17 15.2 17°01.4	-13.6 -13.9'	59.2'
21	134°17.2	• • 21.1	261°18.8	9.4'	$16^{\circ}47.4$	-14.0'	59.2'
22	149°17.1	21.0	275°47.2	9.5'	16°33.4	-14.1'	59.2'
23	164°16.9	21.0	290°15.8	9.6'	16°19.3	-14.2'	59.2'
	SD = 15.7'	d = -0.1'		S	D = 16.1'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
N 72°						
<b>N</b> 70°						
68°						
66°						
64°	////	////	01:33	22:32	////	////
62°	////	////	02:11	21:54	////	////
$60^{\circ}$	////	00:51	02:37	21:28	23:13	////
<b>N</b> 58°	////	01:42	02:57	21:07	22:23	////
56°	////	02:12	03:14	20:51	21:53	////
54°	00:47	02:34	03:28	20:36	21:31	23:17
52°	01:34	02:52	03:41	20:24	21:13	22:31
50° 45°	02:01	03:07	03:52	20:13	20:58	22:03
	02:47	03:37	04:14	19:51	20:28	21:18
N 40° 35°	03:18	03:59	04:32	19:33	20:06	20:47
30°	03:41 03:59	04:18 04:33	04:47 05:00	19:18 19:05	19:47 19:32	20:24 20:06
20°	03.39	04.53	05:00	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
<b>S</b> 10°	05:27	05:53	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	17:35	18:05
35°	06:09	06:40	07:08	16:57	17:25	17:57
40°	06:18	06:52	07:23	16:43	17:13	17:47
45°	06:28	07:06	07:39	16:26	17:00	17:37
<b>S</b> 50°	06:40	07:22	08:00	16:05	16:44	17:25
52°	06:45	07:29	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	15:31	16:19	17:08
58°	07:04	07:57	08:49	15:17	16:09	17:01
<b>S</b> 60°	07:11	08:08	09:06	14:59	15:57	16:54
Lat.	Sun	Moonris Mon	i <b>e</b> Tue	Sun	Moonset Mon	t Tue
N 72°						
<b>N</b> 70°						
68°			01:44			04:26
66°			00:55			05:14
64°		00:58	00:24		03:12	05:45
62°	00:27	00:08	00:00	01:38	04:02	06:07
			23:54			
60°	23:36	23:41	23:42	02:44	04:33	06:25
N 58°	23:12	23:25	23:32	03:19	04:56	06:40
56°	22:53	23:11	23:23	03:44	05:15	06:53
54° 52°	22:36	23:00	23:15	04:04	05:31	07:04
52° 50°	22:22 22:10	22:49 22:40	23:08 23:02	04:21 04:35	05:44 05:56	07:14 07:23
45°	22:10	22:40	23:02	05:04	06:21	07:23
N 40°	21:24	22:04	22:36	05:27	06:40	07:56
35°	21:24	21:50	22:30	05:27	06:56	08:09
30°	20:52	21:38	22:20	06:02	07:10	08:19
20°	20:32	21:17	22:02	06:29	07:34	08:38
<b>N</b> 10°	20:06	21:00	21:49	06:52	07:54	08:54
0°	19:45	20:43	21:37	07:14	08:13	09:09
<b>S</b> 10°	19:25	20:26	21:24	07:36	08:32	09:24
20°	19:03	20:07	21:11	07:59	08:52	09:39
	18:37	19:46	20:55	08:25	09:14	09:57
$30^{\circ}$			00.46	08:41	09:28	10:07
35°	18:22	19:34	20:46	00.41	09.20	10.07
35° 40°	18:05	19:20	20:36	08:59	09:43	10:19
35° 40° 45°	18:05 17:44					
35° 40° 45° <b>S</b> 50°	18:05 17:44 17:17	19:20	20:36	08:59 09:21 09:48	09:43 10:01 10:24	10:19
35° 40° 45°	18:05 17:44	19:20 19:03	20:36 20:23	08:59 09:21	09:43 10:01	10:19 10:33

34	10.49	10.20	19.54	10.17	10.40	11.00
56°	16:31	18:07	19:45	10:35	11:00	11:15
58°	16:10	17:52	19:35	10:57	11:16	11:26
<b>S</b> 60°	15:42	17:33	19:23	11:25	11:35	11:39
	Sun				Moon	
Day	Eqn.o	Time	Mer.	Mer.	Pass.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	17-19
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	99-89%
23	02:15	02:21	12:02	01:00	13:30	
24	02:27	02:34	12:03	01:59	14:28	
25	02:40	02:46	12:03	02:56	15:23	

19:54

10:17 10:35

10:46 11:00

11:06 11:15

54° 56° 58°

16:49

18:20

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	274°36.7	172°52.4	N23°45.4	234°23.6	N14°35.6	209°11.1	N20°48.6	283°34.0	S05°59.6			
1	289°39.2	187°51.5	45.2	249°24.3	36.2	224°13.0	48.7	298°36.4	59.6	Alpheratz	357°35.2	29°13.4
2	304°41.6	202°50.6	45.0	264°25.0	36.7	239°14.8	48.8	313°38.9	59.6	Ankaa	353°07.6	-42°10.1
3	319°44.1	217°49.7	• • 44.9	279°25.7	• • 37.3	254°16.7	• • 48.9	328°41.3	• • 59.6	Schedar	349°31.6	56°40.0
4	334°46.5	232°48.9	44.7	294°26.4	37.9	269°18.6	49.0	343°43.8	59.7	Diphda	348°47.8	-17°51.0
5	349°49.0	247°48.0	44.5	309°27.0	38.4	284°20.5	49.1	358°46.2	59.7	Achernar	335°20.7	-57°06.5
6	4°51.5	262°47.1	N23°44.4	324°27.7	N14°39.0	299°22.4	N20°49.2	13°48.7	S05°59.7	Hamal	327°51.9	23°34.6
7	19°53.9	277°46.2	44.2	339°28.4	39.6	314°24.2	49.2	28°51.1	59.7	Polaris	314°34.8	89°21.8
8	34°56.4	292°45.3	44.0	354°29.1	40.2	329°26.1	49.3	43°53.5	59.7	Acamar	315°12.4	-40°12.2 4°11.1
9	49°58.9	307°44.4	• • 43.8	9°29.8	• • 40.7	344°28.0	• • 49.4	58°56.0	• • 59.7	Menkar	314°06.8 308°29.3	4 11.1 49°56.7
10	65°01.3	322°43.5	43.7	24°30.5	41.3	359°29.9	49.5	73°58.4	59.7	Mirfak	308 29.3 290°40.5	49 50.7 16°33.5
11	80°03.8	337°42.7	43.5	39°31.1	41.9	14°31.8	49.6	89°00.9	59.7	Aldebaran	290 40.5 281°04.6	-8°10.3
12	95°06.3	352°41.8	N23°43.3	54°31.8	N14°42.4	29°33.7	N20°49.7	104°03.3	S05°59.7	Rigel Capella	281 04.6 280°23.0	-8 10.3 46°01.3
13	110°08.7	7°40.9	43.1	69°32.5	43.0	44°35.5	49.8	119°05.8	59.7	Bellatrix	278°23.7	6°22.3
14	125°11.2	22°40.0	43.0	84°33.2	43.6	59°37.4	49.9	134°08.2	59.7	Elnath	278°02.8	28°37.7
15	140°13.6	37°39.1	• • 42.8	99°33.9	• • 44.1	74°39.3	• • 50.0	149°10.7	• • 59.7	Alnilam	276 02.6 275°38.5	-1°11.1
16	$155^{\circ}16.1$	52°38.2	42.6	114°34.6	44.7	89°41.2	50.1	164°13.1	59.7	Betelgeuse	270°52.9	7°24.7
17	170°18.6	67° 37.3	42.4	129°35.3	45.3	104°43.1	50.2	179°15.6	59.7	Canopus	263°53.2	-52°42.4
18	185°21.0	82°36.5	N23°42.2	144°35.9	N14°45.8	119°45.0	N20°50.3	194°18.0	S05°59.7	Sirius	258°27.0	-32 42.4 -16°44.9
19	200°23.5	97°35.6	42.0	159°36.6	46.4	134°46.8	50.3	209°20.5	59.7	Adhara	255°06.6	-10° 44.9 -29° 00.3
20	215°26.0	112°34.7	41.9	174°37.3	47.0	149°48.7	50.4	224°22.9	59.7	Procyon	244°51.6	5°09.8
21	230°28.4	127°33.8	• • 41.7	189°38.0	• • 47.6	164°50.6	• • 50.5	239°25.4	• • 59.7	Pollux	244 51.0 243°18.2	27°58.1
22	245°30.9	142°32.9	41.5	204°38.7	48.1	179°52.5	50.6	254°27.8	59.7	Avior	243 18.2 234°15.5	-59°35.3
23	260°33.4	157°32.0	41.3	219°39.4	48.7	194°54.4	50.7	269°30.3	59.7	Suhail	234 15.5 222°47.0	-59 35.3 -43°32.0
Mars	ass. 05:41	ν-0 0' d 0	.2′ m-3.91	νη 7' Αυ	.6′ m0.98	ν1 0 <sup>7</sup> 40	.1′ m-2.02	1/2 A/ d0	.0′ m0.93	Miaplacidus	222 47.0 221°39.1	-43 32.0 -69°49.2
ivier.p	ass. U3.41	ν-0.9 α-0	111-3.91	νο.ι αυ	.0 1110.90	ν1.9 d0	.1 111-2.02	ν2.4 d0.	.0 1110.93	Alphard	221 39.1 217°48.4	-8°45.9
										Regulus	207°35.1	11°50.9
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.8	61°37.4
0	275°35.8	172°31.1	N23°41.1	234°40.0	$N14^{\circ}49.2$	209°56.3	N20°50.8	284°32.7	S05°59.7	Denebola	182°25.5	14°26.2
1	290°38.3	187°30.3	40.9	249°40.7	49.8	224°58.1	50.9	299°35.2	59.7	Gienah	175°44.1	-17°40.7
2	305°40.8	202°29.4	40.7	264°41.4	50.4	240°00.0	51.0	314°37.6	59.8	Acrux	173°00.6	-63°14.4
3	320°43.2	217°28.5	• • 40.5	279°42.1	• • 50.9	255°01.9	• • 51.1	329°40.1	• • 59.8	Gacrux	171°52.1	-57°15.3
4	335°45.7	232°27.6	40.3	294°42.8	51.5	270°03.8	51.2	344°42.5	59.8	Alioth	166°13.3	55°49.9
5	350°48.1	247°26.7	40.1	309°43.5	52.1	285°05.7	51.3	359°45.0	59.8	Spica	158°22.7	-11°17.4
6	5°50.6	262°25.8	N23°39.9	324°44.2	$N14^{\circ}52.6$	300°07.6	N20°51.4	14°47.4	S05°59.8	Alkaid	150° 52.7	49°11.7
7	20°53.1	277°25.0	39.7	339°44.8	53.2	$315^{\circ}09.5$	51.4	29°49.9	59.8	Hadar	148°36.4	-60°29.7
8	35°55.5	292°24.1	39.5	354°45.5	53.8	330°11.3	51.5	44°52.3	59.8	Menkent	147°58.0	-36°29.6
9	50°58.0	307°23.2	• • 39.3	9°46.2	• • 54.3	345°13.2	• • 51.6	59°54.8	• • 59.8	Arcturus	145°48.1	19°03.4
10	66°00.5	322°22.3	39.1	24°46.9	54.9	$0^{\circ}15.1$	51.7	74°57.2	59.8	Rigil Kent.	139°40.6	-60°56.4
11	81°02.9	337°21.4	38.9	39°47.6	55.5	15°17.0	51.8	89°59.7	59.8	Kochab	137°19.0	74°03.5
12	96°05.4	352°20.5	N23°38.7	54°48.3	N14°56.0	30°18.9	N20°51.9	$105^{\circ}02.1$	S05°59.8	Zuben'ubi	136°56.3	-16°08.7
13	111°07.9	$7^{\circ}19.7$	38.5	69°48.9	56.6	45°20.8	52.0	120°04.6	59.8	Alphecca	126°03.8	26°38.0
14	126°10.3	22°18.8	38.3	84°49.6	57.1	60°22.6	52.1	135°07.0	59.8	Antares	112°16.1	-26°29.2
15	141°12.8	37° 17.9	• • 38.1	99°50.3	• • 57.7	75°24.5	• • 52.2	150°09.5	• • 59.8	Atria	107°10.1	-69°04.4
16	156°15.3	52° 17.0	37.9	114°51.0	58.3	90°26.4	52.3	165°11.9	59.8	Sabik	102°03.0	-15°45.3
17	171°17.7	67°16.1	37.7	129°51.7	58.8	105°28.3	52.4	180°14.4	59.8	Shaula	96°10.6	-37°07.3
18	186°20.2	82°15.3	N23°37.4	144°52.4	N14°59.4	120°30.2	N20°52.4	195°16.8	S05°59.8	Rasalhague	95°58.6	12°32.5
19	201°22.6	97°14.4	37.2	159°53.0	15°00.0	135°32.1	52.5	210°19.3	59.9	Eltanin	90°41.8	51°29.1
20	216°25.1	112° 13.5	37.0	174°53.7	00.5	150°34.0	52.6	225°21.7	59.9	Kaus Aust.	83°32.7	-34°22.4
21	231°27.6	127° 12.6	• • 36.8	189°54.4	• • 01.1	165°35.8	• • 52.7	240°24.2	• • 59.9	Vega	80°33.1	38°48.3
22	246°30.0	142°11.7	36.6	204°55.1	01.6	180°37.7	52.8	255°26.6	59.9	Nunki	75°47.9	-26°16.0
23	261°32.5	157° 10.9	36.4	219°55.8	02.2	195°39.6	52.9	270°29.1	59.9	Altair	62°00.1	8°55.9
Mer.p	ass. 05:37	$\nu$ -0.9' d-0	.2′ m-3.91	$\nu 0.7' d0$	.6′ m0.98	$\nu 1.9' d0$	.1′ m-2.02	$\nu 2.4' d0$	.0′ m0.93	Peacock	53°05.9	-56°39.2
										Deneb	49°25.7	45°21.9
_			_	_	_	_	_	_	_	Enif	33°39.0	9°59.2
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.2	-46°50.3
0	276°35.0	172°10.0	N23°36.1	234°56.5	N15°02.8	210°41.5	N20°53.0	285°31.5	S05°59.9	Fomalhaut	$15^{\circ}14.9$	-29°29.4
1	291°37.4	187°09.1	35.9	249°57.1	03.3	225°43.4	53.1	300°34.0	59.9	Scheat	13°45.5	28°12.8
2	306°39.9	202°08.2	35.7	264°57.8	03.9	240°45.3	53.2	315°36.4	59.9	Markab	13°30.2	15°20.1
3	321°42.4	217°07.3	• • 35.5	279°58.5	• • 04.4	255°47.2	• • 53.3	330°38.9	59.9	I 26 144 1	CIIA	Me:::::
4	336°44.8	232°06.5	35.2	294°59.2	05.0	270°49.0	53.3	345°41.4	59.9	Jun 26 Wed	SHA	Mer.pass
5	351°47.3	247°05.6	35.0	309°59.9	05.5	285°50.9	53.4	0°43.8	59.9	Venus		12:29
6	6°49.7	262°04.7	N23°34.8	325°00.6	N15°06.1	300°52.8	N20°53.5	15°46.3	S05°59.9	Mars	319°46.9	08:22
7	21°52.2	277°03.8	34.6	340°01.2	06.7	315°54.7	53.6	30°48.7	59.9	Jupiter	294°34.4	10:02
8	36°54.7	292°02.9	34.3	355°01.9	07.2	330°56.6	53.7	45°51.2	59.9	Saturn	8°57.3	05:05
9	51°57.1	307°02.1	• • 34.1	10°02.6	07.8	345°58.5	53.8	60°53.6	05°59.9	Jun 27 Thu	SHA	Mer.pass
10	66°59.6	322°01.2	33.9	25°03.3	08.3	1°00.4	53.9	75°56.1	06°00.0	Venus	256°55.3	12:31
11	82°02.1	337°00.3	33.6	40°04.0	08.9	16°02.2	54.0	90°58.5	00.0	Mars	319°04.2	08:21
12	97°04.5	351°59.4	N23°33.4	55°04.7	N15°09.4	31°04.1	N20°54.1	106°01.0	\$06°00.0	Jupiter	294°20.4	09:59
13	112°07.0	6°58.5	33.2	70°05.3	10.0	46°06.0	54.2	121°03.4	0.00	Saturn	8°56.9	05:01
14	127°09.5	21°57.7	32.9	85°06.0	10.6	61°07.9	54.2	136°05.9	0.00			
15	142°11.9	36°56.8	• • 32.7	100°06.7	11.1	76°09.8	• • 54.3	151°08.4	00.0	Jun 28 Fri	SHA	Mer.pass
16	157°14.4	51°55.9	32.4	115°07.4	11.7	91°11.7	54.4	166°10.8	00.0	Venus	255°35.0	12:32
17	172°16.9	66°55.0	32.2 N23°32.0	130°08.1 145°08.8	12.2 N15° 12.8	106°13.6 121°15.5	54.5 N20°54.6	181°13.3	00.0 \$06°00.0	Mars	318°21.5	08:20
18	187°19.3 202°21.8	81°54.2	N23°32.0				N20°54.6		\$06°00.0	Jupiter		09:56
19	202°21.8 217°24.2	96°53.3 111°52.4	31.7	160°09.4 175°10.1	13.3	136°17.3 151°19.2	54.7	211°18.2 226°20.6	00.0	Saturn	8°56.6	04:57
20	217 24.2 232°26.7	111 52.4 126° 51.5	31.5	175°10.1 190°10.8	13.9 •• 14.4	151°19.2 166°21.1	54.8 •• 54.9	226°20.6 241°23.1	00.0	Horizont	al parallax	
21 22	232°26.7 247°29.2	126°51.5 141°50.7	· · 31.2 31.0	190°10.8 205°11.5	15.0	181°23.0	55.0	241 23.1 256°25.5	00.1	1.0.12011	Venus:	0.1
23	262°31.6	141 50.7 156° 49.8	30.7	205 11.5 220°12.2	15.6	196°24.9	55.0 55.0	250 25.5 271°28.0	00.1		Mars:	0.1
Mer.p	ass. 05:33	$\nu$ -0.9′ d-0	.2′ m-3.90	$ u$ 0.7 $^{\prime}$ d0	.6′ m0.98	$ u$ 1.9 $^{\prime}$ d0	.1′ m-2.02	$\nu 2.5' \ d0$	.0′ m0.92			

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°16.8	N23°20.9	304°44.4	9.7'	S16°05.0	-14.3'	59.2'
1	194°16.7	20.8	319°13.0	9.7'	15°50.7	-14.4'	59.2'
2	209°16.5	20.7	333°41.8	9.8'	15°36.3	-14.5'	59.2'
3	224°16.4	20.6	348° 10.6	9.9'	15°21.8	-14.6'	59.2'
4	239°16.3	20.5	2°39.5	10.0'	15°07.2	-14.7'	59.2'
5	254°16.2	20.4	17°08.4	10.0'	14°52.6	-14.7'	59.2'
6	269°16.0	N23°20.3	31°37.5	10.1'	\$14°37.8	-14.8'	59.2'
7	284°15.9	20.2	46°06.6	10.2'	14°23.0	-14.9'	59.2'
8	299°15.8	20.1	60°35.8	10.2'	14°08.1	-15.0'	59.2'
9	314°15.6	20.0	75°05.0	10.3'	13°53.1	-15.1'	59.2'
10	329°15.5	20.0	89°34.3	10.4'	13°38.0	-15.1'	59.2'
11	344°15.4	19.9	104°03.7	10.5'	13°22.9	-15.2'	59.3'
12	359°15.2	N23°19.8	118° 33.2	10.5'	S13°07.7	-15.3'	59.3'
13	14°15.1	19.7	133°02.7	10.6'	12°52.4	-15.4'	59.3'
14	29°15.0	19.6	147°32.3	10.6'	12°37.1	-15.4'	59.3'
15	44°14.9	• • 19.5	162°01.9	10.7'	12°21.6	-15.5'	59.3'
16	59°14.7	19.4	176°31.6	10.8'	12°06.1	-15.6'	59.3'
17	74°14.6	19.3	191°01.4	10.8'	11°50.6	-15.6'	59.3'
18	89°14.5	N23° 19.2	205°31.2	10.9'	<b>S</b> 11°35.0	-15.7'	59.3'
19	104°14.3	19.1	220°01.1	10.9'	11°19.3	-15.7'	59.3'
20	119°14.2	19.0	234°31.0	11.0'	$11^{\circ}03.6$	-15.8'	59.3'
21	134°14.1	• • 18.9	249°01.0	11.1'	10°47.8	-15.9'	59.3'
22	149°13.9	18.8	263°31.1	11.1'	10°31.9	-15.9'	59.3'
23	164°13.8	18.7	278°01.2	11.2'	$10^{\circ}16.0$	-16.0'	59.3'
	SD = 15.7'	d = -0.1'		ÇI	D = 16.1'		
	3D = 13.7	<i>u</i> = -0.1		31	J — 10.1		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°13.7	N23°18.6	292°31.4	11.2'	S10°00.0	-16.0'	59.3'
1	194°13.6	18.4	307°01.6	11.3'	09°44.0	-16.1'	59.3'
2	209°13.4	18.3	321°31.9	11.3'	09°28.0	-16.1'	59.3'
3	224°13.3	· · 18.2	336°02.2	11.4'	09°11.8	-16.2'	59.3'
4	239°13.2	18.1	350°32.6	11.4'	08°55.7	-16.2'	59.3'
5	254°13.0	18.0	5°03.0	11.5'	08°39.5	-16.3'	59.3'
6	269°12.9	N23°17.9	19° 33.5	11.5'	508°23.2	-16.3'	59.3'
7	284°12.8	17.8	34°04.0	11.6'	08°06.9	-16.3'	59.3'
8	299°12.7	17.7	48° 34.5	11.6'	07°50.6	-16.4'	59.3'
9	314°12.5	• • 17.6	63°05.1	11.6'	07°34.2	-16.4'	59.3'
10	329°12.4	17.5	77° 35.8	11.7'	07°17.8	-16.5'	59.3'
11	344°12.3	17.4	92°06.4	11.7'	07°01.4	-16.5'	59.3'
12	359°12.1	N23°17.2	106° 37.2	11.8'	S06°44.9	-16.5'	59.3'
13	14°12.0	17.1	121°07.9	11.8'	06°28.4	-16.6'	59.3'
14	29°11.9	17.0	135°38.7	11.8'	$06^{\circ}11.8$	-16.6'	59.3'
15	44°11.8	• • 16.9	150°09.5	11.9'	05°55.2	-16.6'	59.3'
16	59°11.6	16.8	164°40.4	11.9'	05°38.6	-16.6'	59.3'
17	74°11.5	16.7	179° 11.3	11.9'	05°22.0	-16.7'	59.3'
18	89°11.4	N23° 16.5	193°42.2	12.0'	S05°05.3	-16.7'	59.3'
19	104°11.3	16.4	208° 13.2	12.0'	04°48.6	-16.7'	59.3'
20	$119^{\circ}11.1$	16.3	222°44.1	12.0'	04°31.9	-16.7'	59.3'
21	134°11.0	• • 16.2	237° 15.2	12.0'	04°15.2	-16.8'	59.3'
22	149°10.9	16.1	251°46.2	12.1'	03°58.4	-16.8'	59.3'
23	164°10.7	15.9	266° 17.2	12.1'	03°41.7	-16.8'	59.3'
	SD = 15.7'	d = -0.1'	-	SI	D = 16.2'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°10.6	N23°15.8	280°48.3	12.1'	S03°24.9	-16.8'	59.3'
1	194°10.5	15.7	$295^{\circ}19.4$	12.1'	$03^{\circ}08.1$	-16.8'	59.3'
2	209°10.4	15.6	$309^{\circ}50.6$	12.1'	02°51.2	-16.8'	59.3'
3	224°10.2	•• 15.5	324°21.7	12.2'	02°34.4	-16.8'	59.3'
4	239°10.1	15.3	338°52.9	12.2'	02°17.6	-16.9'	59.3'
5	254°10.0	15.2	353°24.0	12.2'	02°00.7	-16.9'	59.3'
6	269°09.9	N23° 15.1	7°55.2	12.2'	S01°43.9	-16.9'	59.3'
7	284°09.7	15.0	22°26.4	12.2'	01°27.0	-16.9'	59.3'
8	299°09.6	14.8	36°57.6	12.2'	01°10.1	-16.9'	59.3'
9	314°09.5	• • 14.7	51°28.9	12.2'	00°53.3	-16.9'	59.3'
10	329°09.3	14.6	66°00.1	12.2'	00°36.4	-16.9'	59.3'
11	344°09.2	14.4	80°31.3	12.2'	00°19.5	-16.9'	59.3'
12	359°09.1	N23°14.3	95°02.6	12.3'	S00°02.6	-16.9'	59.3'
13	14°09.0	14.2	109°33.8	12.3'	N00°14.2	16.9'	59.3'
14	29°08.8	14.0	124°05.1	12.3'	00°31.1	16.9'	59.3'
15	44°08.7	• • 13.9	138°36.3	12.3'	00°48.0	16.9'	59.2'
16	59°08.6	13.8	153°07.6	12.3'	01°04.8	16.9'	59.2'
17	74°08.5	13.6	167°38.8	12.3'	01°21.7	16.8'	59.2'
18	89°08.3 104°08.2	N23°13.5	182° 10.1 196° 41.4	12.3' 12.2'	N01°38.5 01°55.4	16.8'	59.2'
19 20	104°08.2 119°08.1	13.4 13.2	196°41.4 211°12.6	12.2'	01°55.4 02°12.2	16.8' 16.8'	59.2' 59.2'
20	119°08.1 134°08.0		211°12.6 225°43.8	12.2'	02°12.2 02°29.0	16.8'	59.2' 59.2'
21	134°08.0 149°07.8	· · 13.1 13.0	225°43.8 240°15.1	12.2'	02°29.0 02°45.8	16.8'	59.2' 59.2'
23	149°07.8 164°07.7	13.0 12.8	240° 15.1 254° 46.3	12.2'	02°45.8 03°02.5	16.8	59.2' 59.2'
23			254 40.3			10.δ	59.2
	SD = 15.7'	d = -0.1'		SI	O = 16.2'		

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

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

		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	81-61%	
26	02:53	02:59	12:03	03:49	16:14		
27	03:05	03:11	12:03	04:39	17:03		
28	03:18	03:24	12:03	05:27	17:51		

Section   Color   C	h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
1	Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
2 9279-86   309-86   309   309   209-13.5   10.7   209-23.5   209-13.5   301-32.9   0.01											1		
2 907990 001472 930 005442 1172 041930 505442 1172 041930 5054 301934 001 054643 007932 249746 1178 041946 1178 0									301°32.9				
3 327-41 5 210-43	2	307°39.0	201°47.2					55.3					
1		322°41.5											
\$\$ \$784.0, \$204.5\$ \$22 \$130*16.3 \$130*16.3 \$130*205.5\$ \$1.942.7 \$0.01.\$\$ \$1.442.5\$ \$0.01.\$\$ \$1.442.5\$ \$0.01.\$\$ \$1.442.5\$ \$1.00.\$\$ \$1.00.\$\$ \$1.													
The color of the	5												
7 22°51.4 27°428 27.7 49°176 20.3 316°40.0 58.8 31°47.7 0.1 4.6 47°17.2 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	6	7°48.9	261°43.7										
19	7												
9 52°56.3 300°4.0 - 22.2 10°18.0 - 21.1 346°4.38 - 55.9 61°52.6 - 00.1 4466.6 10.0 67°5.7 1.0 67°6.7 21.6 10.6 75.8 - 00.1 41.6 10.0 67°5.7 1.0 10.0 10.0 10.0 10.0 10.0 10.0 10.													
10   67   67   122   102   127   1	9	52°56.3	306°41.0	• • 28.2	10°19.0	• • 21.1	346°43.8	• • 55.9	61°52.6	• • 00.1			
18   18   18   18   18   18   18   18	10	67°58.7	321°40.2	27.9	25°19.7	21.6		56.0		00.2			
19   19   19   19   19   19   19   19					40°20.4								
131 131904 0 9735 771 707217 233 467513 56.3 122°024 00.2   September 11 120°036 217507 0 985724 238 00731 120°324 238 00731 120°324 238 00731 120°324 25.5   105°32 56.4   107°324 25.5   105°32 56.4   107°324 25.5   105°32 56.4   107°324 25.5   105°32 56.4   107°324 25.5   105°32 56.4   107°324 25.5   105°32 56.4   107°32	12	98°03.7	351°38.4	N23°27.4	55°21.0	N15°22.7	31°49.4	N20°56.2	107°00.0	S06°00.2			
1.5   1.5	13		6°37.5	27.1	70°21.7	23.3	46°51.3	56.3	122°02.4	00.2			
13	14	128°08.6	21°36.7		85°22.4	23.8	61°53.2	56.4	137°04.9				
16   186"  13.5   13"  24.0   26.0   31"  23.4   25.5   10"  25.0   10"  25.24   25.5   10"  25.0   10"  25.24   25.5   10"  25.0   12"  25.0   12"  25.0   12"  25.0   12"  25.0   12"  25.0   12"  25.0   12"  25.0   12"  25.0   12"  25.0   25.0	15	143°11.1	36°35.8	· · 26.6	100°23.1	• • 24.4	76°55.1	• • 56.5	152°07.3	• • 00.2	1		
189105	16	158°13.5	51°34.9	26.3	115°23.8	24.9		56.6	167°09.8	00.2			
Simple   S	17	173°16.0	66°34.1	26.0	130°24.4	25.5	106°58.9	56.6	$182^{\circ}12.2$	00.2			
Adhaba   25°066   29°003   29°104   11°214   25°2   19°505   20°105   20°204   20°106   20°003   20°106   20°003   20°106   20°	18	188°18.5	81°33.2	N23°25.8	145°25.1	N15°26.0	122°00.8	N20°56.7	197°14.7	S06°00.2			
23   23   23   23   24   23   24   25   24   25   25   26   26   27   27   27   27   27   27	19	203°20.9	96°32.3	25.5	160°25.8	26.6	137°02.7	56.8	212°17.2	00.2			
22 283 283 141 207 447 2827 29 180 297 20 21 287 180 180 4 297 245 00.3 247 181 297 281 297 282 281 297 20 20 297 20 20 297 20 20 20 297 20 20 20 297 20 20 20 297 20 20 20 297 20 20 20 297 20 20 20 297 20 20 20 297 20 20 20 20 20 20 20 20 20 20 20 20 20	20	218°23.4	111°31.4	25.2	175°26.5	27.1	152°04.5	56.9	227°19.6	00.3	1		
22 28°28.3   14°29.7   24.7   26°20.5   28.3   19°10.2   27.7   27.7   27.7   27.7   28.3   28°10.5   29°10.3   28°10.5   29°10.3   28°10.5   29°10.3   28°10.5   29°10.3   28°10.5   29°10.5   28°1		233°25.8	126°30.6	• • 25.0	190°27.2	• • 27.7	167°06.4	• • 57.0	242°22.1	• • 00.3	,		
Same   Change   Cha	22	248°28.3	141°29.7	24.7	205°27.9	28.2	182°08.3	57.1	257°24.5	00.3			
Marghass   05.29   \( \text{Pops} \)   \( \text{Pop} \)   \( P	23	263°30.8	156°28.8	24.4	220°28.5	28.8	197°10.2	57.2	272°27.0	00.3	1		
Sun   GHA   GHA   Dec   GHA	N/a= =	255 05:20	1,00/ 40	3/ m 2 00	,,O 7/ JO	6' m0 07	1,1 0/ 40	1/ m 2.02	1/2 5/ 40	0′ m0 02			
Sun   GHA   GHA   Dec   CHA   Dec   GHA   Dec   GHA   Dec   Dec   Dubbe   197-81   197-10	ivier.p	ass. U5:29	$\nu$ -0.9° $a$ -0	in-3.90	$\nu$ 0.1' d0	.u mu.97	$\nu_{1.9}$ a0.	ı ın-∠.U3	ν2.5 αU	.0 1110.92			
Section   CHA													
2 28°33.2 11°28.0 N22°4.1 23°29.2 N15°29.3 21°21.1 N20°57.3 28°29.5 N05°09.3 Poles   Denbol   12°31.2   Den	Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	_		
2 393°57   186°271   22.8   290°299   29.8   227°140   57.3   302°310   0.03   310°344   203°32°30   0.03   310°344   203°32°30   0.03   310°344   0.03   310°344   0.03   310°344   0.03   310°344   0.03   310°345   0.03   310°345   0.03   310°345   0.03		278°33.2							287°29.5				
2 308°38.2 201°26.2 23.6 265°30.6 30.4 242°15.9 57.4 317°34.4 0.0.3 32°36.0 0.10 21°25.4 1.23.0 295°31.9 31.5 272°19.7 57.6 347°39.3 0.0.3 21°32.6 20°31.3 0.30 25°71.5 57.6 347°39.3 0.0.3 21°32.6 20°32.3 10°32.6 20°22.4 10°35°7.8 17°44.2 506°00.4 34°36.6 265°2.5 20°2.2 10°32.6 20°22.4 10°35°7.8 17°44.2 506°00.4 34°36.6 265°2.6 26°2.6 20°2.8 10°32.6 20°22.4 10°35°7.8 17°44.2 506°00.4 34°36.7 33.1 317°2.5 35°7.9 32°46.7 0.0 4 34°36.7 33.1 317°2.3 57.9 32°46.7 0.0 4 34°36.7 33.1 317°2.5 35°7.9 32°46.7 0.0 4 34°36.7 33.1 317°2.9 58.0 47°49.2 0.0 4 34°36.7 33.1 317°2.9 58.0 47°49.2 0.0 4 34°36.7 33.1 317°2.9 58.0 47°49.2 0.0 4 34°36.7 33.1 317°2.9 58.0 47°49.2 0.0 4 34°36.7 33.1 317°2.9 58.0 36°36.0 0.0 4 36°36.1 30°36.0 338°14.4 21.0 40°36.7 35°3.3 17°32.9 88.0 10°30.5 506°0.4 41.3 18°36.0 338°14.4 21.0 40°36.7 35°3.3 17°32.9 88.0 10°30.5 506°0.4 41.3 18°36.0 338°14.4 21.0 40°36.7 35°3.3 17°32.9 88.0 10°30.5 506°0.4 41.3 18°36.0 506°0.5 41.4 120°0.5 3 38°11.4 50°30.7 50°36.4 50°3.3 10°30.5 50°0.4 41.4 120°3.5 30°11.7 82°2.0 7 50°36.4 11.5 36°3.2 20°36.0 50°36.4 50°3								57.3	$302^{\circ}31.9$	00.3			
332°40,0 216°254 2.33 280°313 3.09, 257°17.8 5.75 332°36,0 0.03 4 331°13.1 231°24.5 230,0 295°31.9 31.5 272°11.7 5.76 347°393 0.03 5.75°1.0 355°4.5 260°25.6 2.00 25°31.9 31.5 272°11.7 5.76 35°3.6 36°20.1 21.6 10°35.4 34.0 33.1 31°25.3 7.7 2°41.8 0.03 6.8 °48.0 261°22.8 22.1 340°34.0 33.1 31°25.3 7.79 32°46.7 0.04 6.8 °48.0 261°22.8 12.1 340°34.0 33.1 31°25.3 7.79 32°46.7 0.04 6.8 °48.0 261°22.8 12.1 340°34.0 33.1 31°25.3 7.79 32°46.7 0.04 6.8 °48.0 261°22.0 21.9 340°34.0 33.1 31°25.3 7.79 32°46.7 0.04 6.8 °48.0 261°22.0 1.2 1.6 10°35.4 34.2 347°29.1 58.0 62°51.6 0.04 6.8 °48.0 261°2.0 1.2 1.6 10°35.4 34.2 347°29.1 58.0 62°51.6 0.04 6.8 °48.0 261°2.0 1.2 1.6 10°35.4 34.2 347°29.1 58.0 62°51.6 0.04 6.8 °48.0 1.1 1.2 °40°1.3 °40°1.3 °40°1	2				265°30.6								
338*43. 5 231*24.5 2230 295*31.9 31.5 272*19.7 57.6 347*93. 3 0.03   5 353*46. 5 246*23.6 227. 310*32.6 20.2 287*21.5 57.7 2*41.8 0.03   6 8*48.0 261*22.8 N23*22.4 325*33. N15*32.6 302*23.4 N20*57.8 17*44.2 506*00.4   8 48*0.2 261*22.8 N23*22.4 325*33. N15*32.6 302*23.4 N20*57.8 17*44.2 506*00.4   9 53*55.4 306*20.1 21.6 10*554. 340*34.0 33.1 317*253. 57.9 32*46.7 0.0 4   10 66*57.9 321*19.3 21.3 25*36.0 34.7 32*27.2 58.0 47*94.2 0.0 4   11 84*03. 336*18.4 21.0 40*36.7 35.3 17*32.9 58.2 92*55.5 0.0 4   11 84*03. 336*18.4 21.0 40*36.7 35.3 17*32.9 58.2 92*55.5 0.0 4   12 99*02.8 351*17.5 N23*20.7 55*37.4 N15*35.8 32*34.8 N20*58.3 107*39.0 506*00.4   13 114*03. 3 6*16.4 7.0 0.4 70*38.1 36.4 47*36.7 58.4 123*01.5 0.0 4   14 129*07.7 21*15.8 0.1 85*38.8 36.9 5*2*34.8 N20*58.3 107*39.0 506*00.4   15 144*10.2 36*14.9 19.8 100*39.4 *0.75*5.7 *740.5 *58.6 138*03.9 0.0 4   16 159*12.7 51*14.1 19.5 115*40.1 38.0 92*42.3 \$8.7 168*08.9 0.05   17 147*15.1 66*12.2 19.2 19.2 10.0 1.0 18.0 10.0 34.6 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	3	323°40.6	216°25.4	• • 23.3	280°31.3	• • 30.9	257°17.8	• • 57.5	332°36.9	• • 00.3			
5 353°45.6 246°23.6 22.7 310°32.6 33.0 287°21.5 57.7 2°41.8 00.3 Spica 158°22.7 11°17.4 7 23°80.5 276°21.9 221 340°44.0 33.1 317°25.3 57.9 32°46.7 00.4 Hadar 148°36.4 60°29.7 12.8 8 38°53.0 291°21.0 21.9 35°53.4 33.7 332°72.5 56.0 47°49.2 00.4 Hadar 148°36.4 60°29.7 11°67.6 10°67.9 321°19.9 21.0 10°55.4 34.2 347°29.1 56.0 62°5.1.6 00.4 Hadar 148°36.4 60°29.7 11°67.9 321°19.9 21.0 21.9 58°6.3 34.7 2°31.0 56.1 77°54.1 00.4 Hadar 148°36.4 60°29.7 11°67.9 321°19.9 21.0 21.9 40°36.7 347°29.1 56.0 62°5.1.6 00.4 Hadar 148°36.4 19°30.4 60°55.4 11°67.9 33°19.9 21°1.5 80°6.0 42°1.0 10°55.4 34.7 28°1.0 56.1 77°54.1 00.4 Hadar 148°36.2 19°0.3 40°2.0 11°67.0 10°67.0 35°1.0 11°67.0 10°67.0 35°1.0 11°67.0 10°67.0 35°1.0 11°67.0 10°67.0 35°1.0 11°67.0 10°67.0 11°67.0 10°67.0 11°67.0 10°67.0 11°67.0 10°67.0 11°	4	338°43.1	231°24.5	23.0	295°31.9	31.5	272°19.7	57.6	347°39.3	00.3			
6 8°48.0 26°1°228 M22°22.4 325°33.3 NIS'32.6 302°234 N20'57.8 17'44.2 S06°00.4 Alkiad 152°52.2 49°11.7 72°50.5 276°21.9 221 340°34.0 331 317'253.3 57.9 32'46.7 00.4 Alkiad 152°52.2 49°11.7 74'0.5 56.0 47'49.2 00.4 Alkiad 168°36.4 60°29.7 Menkent 147'58.0 36'29.6 10'0.0 4 Alkiad 168'0.4 10'0.5 40'0.0 4 Alkiad 168'0.4 10'0.5 40'	5	353°45.6	246°23.6	22.7	310°32.6	32.0	287°21.5	57.7	2°41.8	00.3			
7 23°90.5 276°21.9 22.1 340°34.0 33.1 317°25.3 57.9 32°46.7 00.4 Hadar 148°36.4 60°29.7 9 32°19.3 00°20.1 21.6 10°35°34.7 43.2 347°29.1 58.0 62°51.6 00.4 Hadar 148°36.4 60°29.7 10 68°19.7 9 32°19.3 21.3 25°36.0 34.7 2°31.0 58.1 77°54.1 00.4 Rigil Ref. 139°40.6 60°56.4 Arcturus 145°48.2 19°03.4 11 84°03.3 336°18.4 21.0 40°36.7 35.3 17°32.9 58.2 92°55.5 0.0.4 Rigil Ref. 139°40.6 60°56.4 Kochab 137°19.0 74°03.5 11 14°05.3 6°16.7 20.4 70°38.1 36.4 47°36.7 58.4 122°01.5 0.0.4 Arcturus 145°48.2 19°03.4 11 12°07.7 21°15.8 20.1 85°38.8 36.9 62°36.6 58.5 138°05.9 00.4 Arcturus 145°48.2 19°03.4 11 12°0.2 36°14.9 1.9 8 100°39.4 37.5 77°40.5 58.6 153°06.4 00.4 Arcturus 145°48.2 12°10.4 11 12°5.1 15°40.1 38.0 92°42.3 58.7 168°08.9 00.5 Sabit 10°10.2 60°10.4 Arcturus 145°48.2 12°10.4 11 12°5.1 15°40.1 38.0 92°42.3 58.7 168°08.9 00.5 Sabit 10°20.2 12°22.2 511°10.6 613.2 19.2 130°40.8 38.5 107°44.2 58.7 183°11.3 0.0.5 Sabit 10°20.2 12°22.5 111°10.6 18.3 15°34.2 8.0 12°30.5 80°00.5 Sabit 10°20.2 12°22.5 111°10.6 18.3 15°34.2 8.0 12°30.5 80°00.5 Sabit 10°20.2 12°22.5 111°10.6 18.3 15°34.2 8.0 12°30.5 80°00.5 Sabit 10°20.2 12°22.5 111°10.6 18.3 15°34.2 8.0 12°30.5 80°00.5 Sabit 10°20.2 12°22.5 111°10.6 18.3 15°34.2 8.0 12°30.5 80°00.5 Sabit 10°20.2 12°22.5 111°10.6 18.3 15°34.2 8.0 12°30.5 80°00.5 Sabit 10°20.2 12°22.5 111°10.6 18.3 15°34.2 8.0 12°30.5 80°00.5 Sabit 10°20.2 12°30.7 5.0 12°30.2 50°00.5 Sabit 10°20.2 12°30.2 50°00.5 Sabit 10°20.2 50°00.5 Sabit 10	6	8°48.0	261°22.8	N23°22.4	325°33.3	N15°32.6	302°23.4	N20°57.8		S06°00.4			
8 38°530 291°210 210 355°34,7 33.7 332°27.2 58.0 47°49.2 0.0.4 10 68°67.9 321°19.3 21.3 25°36.0 34.7 2°31.0 58.1 77°54.1 0.0.4 18 20°0.3 336°18.4 21.0 40°36.7 35.3 17°32.9 58.2 92°56.0 0.4 18 20°0.3 336°18.4 21.0 40°36.7 35.3 17°32.9 58.2 92°56.0 0.4 18 20°0.3 336°18.4 21.0 40°36.7 35.3 17°32.9 58.2 92°56.0 0.4 18 20°0.3 336°18.4 21.0 40°36.7 35.3 17°32.9 58.2 92°56.0 0.4 18 20°3.3 16.7 20.4 40°36.7 58.8 22°34.8 N20°58.3 10°59.0 506°0.4 120°07.7 21°15.8 20.1 88°38.8 36.9 62°38.6 58.5 138°03.9 0.4 Alphace. 120°07.7 21°15.8 100°39.4 37.5 7°40.5 58.6 153°06.4 0.0.4 16 159°12.7 51°14.1 19.5 115°40.1 38.0 92°42.3 58.7 168°08.9 0.5 536.1 120°0.1 51°1.5 16°08.9 10.5 115°40.1 38.0 92°42.3 58.7 183°113. 00.5 18 189°17.6 81°12.3 N23°18.9 145°41.5 N15°39.1 122°461. N20°58.8 198°13.8 506°00.5 20 219°22.5 111°10.6 18.3 17°42.2 39.6 137°48.0 58.9 213°16.0 0.5 22°22.2 24°27.5 112°10.6 18.3 17°42.2 39.6 137°48.0 58.9 213°16.0 0.5 22°22.2 24°27.5 141°08.9 17.7 205°44.9 41.8 197°55.6 59.3 273°26.1 0.0.5 24°29.9 156°08.0 17.4 220°44.9 41.8 197°55.6 59.3 273°26.1 0.0.5 24°29.9 156°08.0 17.4 220°44.9 41.8 197°55.6 59.3 273°26.1 0.0.5 24°38.2 15.5 30°49.0 41.3 182°33.7 59.2 258°33.6 0.0.5 26°49.2 15.6 °08.0 17.4 220°44.9 41.8 197°55.6 59.3 273°26.1 0.0.5 26°49.2 15.5 30°49.0 44.8 197°55.6 59.3 273°26.1 0.0.5 26°49.2 15.5 30°49.0 44.9 41.8 197°55.6 59.3 273°26.1 0.0.5 26°49.2 15.5 30°49.0 44.9 41.8 197°55.6 59.3 273°26.1 0.0.5 26°49.2 15.5 30°49.0 44.9 41.8 197°55.6 59.3 273°26.1 0.0.5 26°49.2 15.5 30°49.0 45°0.2 22°59.4 59.4 50.4 50°59.3 24°39.8 216°0.4 50°59.3 15.5 30°49.0 45°0.2 22°59.4 59.4 50°4.0 40°4.0 258°0.3 1.5 50°4.0 50°4.0 4	7	23°50.5	$276^{\circ}21.9$	22.1	340°34.0	33.1	317°25.3	57.9	32°46.7	00.4			
9 53°554 306°201 216 107364 347291 58.0 62°51.6 0.04 118 84°003 321°19.3 21.3 25°36.0 347 291°10.5 81. 77°541.6 10.4 118 84°003 350°18.4 21.0 40°36.7 353 17°32.9 58.2 92°56.5 0.04 118 84°00.3 350°18.4 21.0 40°36.7 353 17°32.9 58.2 92°56.5 0.04 118 84°00.3 350°18.4 21.0 40°36.7 353 17°32.9 58.2 92°56.5 0.04 118 96°00.04 118 114°05.3 6°16.7 20.4 70°38.1 36.4 47°36.7 58.4 123°01.5 0.04 118 114°05.3 6°16.7 20.4 70°38.1 36.4 47°36.7 58.4 123°01.5 0.04 118 114°05.3 6°16.7 20.4 70°38.1 36.4 44°36.7 58.4 123°01.5 0.04 118 118°0.7 72°1.5 114°10.2 36°14.9 1.9 8 100°39.4 .37.5 77°40.5 .58.6 153°06.4 .00.4 118 118°1.2 15°1.4 1 19.5 115°40.1 38.0 92°42.3 58.7 166°08.0 0.5 138°03.3 17°41.5 115°40.1 38.0 92°42.3 58.7 166°08.0 0.5 138°10.3 0.5 118 189°1.7 6 81°12.3 N23°18.9 145°41.5 N15°39.1 122°46.1 N20°8.8 198°11.3 0.5 15°06.4 50.0 1.0 18°38.8 15°07°44.2 58.7 166°08.8 109°40.4 58.5 100°40.2 13°16.3 0.5 118 189°1.2 126°09.8 18.0 100°43.5 .40.7 167°51.8 .50.1 243°21.2 .00.5 126°09.8 18.0 100°43.5 .40.7 167°51.8 .50.1 243°21.2 .00.5 126°09.8 18.0 100°43.5 .40.7 167°51.8 .50.1 243°21.2 .00.5 126°09.8 18.0 100°43.5 .40.7 167°51.8 .50.1 243°21.2 .00.5 126°09.8 18.0 100°43.5 .40.7 167°51.8 .50.1 243°21.2 .00.5 126°09.8 18.0 100°43.5 .40.7 167°51.8 .50.1 243°21.2 .00.5 126°09.8 18.0 100°43.5 .40.7 167°51.8 .50.1 243°21.2 .00.5 126°09.8 18.0 100°43.5 .40.7 167°51.8 .50.1 243°21.2 .00.5 126°09.8 18.0 100°43.5 .40.2 126°09.8 18.0 10°43.5 .40.2 126°09.8 18.0 10°43.5 .40.2 126°09.8 18.0 10°43.5 .4	8	38°53.0	291°21.0	21.9	355°34.7	33.7	332°27.2	58.0	47°49.2	00.4			
10	9	53°55.4	$306^{\circ}20.1$	• • 21.6	10°35.4	• • 34.2		• • 58.0	62°51.6	• • 00.4			
11 84*00.3 336*18.4 21.0 40*36.7 55*37.4 N15*35.8 23*34.8 N20*58.3 10*79.9 \$0.4 No.4 N16*35.8 23*34.8 N20*59.5 \$0.6*0.4 N16*35.8 13*30*39 \$0.4 N16*35.8 32*34.8 N20*30.5 \$0.4 N16*35.8 13*30.9 \$0.5 N16*35.8 13*30.9 \$0.5 N16*35.8 13*30.9 \$0.5 N16*35.8 13*30.5 N16*35.8 N16*35.	10	68°57.9	321°19.3	21.3	25°36.0	34.7	2°31.0	58.1	77°54.1	00.4	1		
12 99°0.28 351°17.5 N22°20.7 70°35.8 136°45.8 N20°58.3 107°59.0 506°00.4 121 116°0.5 16°7.7 0.04 70°36.1 36.4 47°36.7 58.4 122°07.5 00.4 129°07.7 21°15.8 20.1 86°38.8 36.9 62°38.6 58.5 138°03.9 00.4 16 159°12.7 51°14.1 19.5 115°40.1 38.0 92°42.3 58.7 168°08.9 00.5 168°12.7 51°14.1 19.5 115°40.1 38.0 92°42.3 58.7 168°08.9 00.5 168°13.2 19.2 130°40.8 38.5 107°44.2 58.7 188°11.3 00.5 168°12.7 51°14.1 19.5 115°40.1 38.0 92°42.3 58.7 188°11.3 00.5 168°12.7 51°14.1 19.5 115°40.1 38.0 92°42.3 58.7 188°11.3 00.5 168°12.7 51°14.1 19.5 115°40.1 38.0 92°42.3 58.7 188°11.3 00.5 168°08.9 00.5 168°12.7 51°14.1 19.5 115°40.1 38.0 92°42.3 58.7 188°11.3 00.5 168°12.3 12°26.1 100°48.2 18.7 168°08.9 10.5 168°12.5 168°08.9 12°14.0 10.5 168°12.3 12°26.1 100°48.2 18.7 168°08.9 12°14.0 10.5 168°13.3 00.5 168°13.2 12°26.1 100°48.2 18.7 168°13.3 00.5 168°13.2 12°26.1 100°48.2 18.7 168°13.3 00.5 168°13.2 18.0 100°48.2 18.0 1	11	84°00.3	336° 18.4	21.0	40°36.7	35.3			92°56.5	00.4			
13 114°05.3 6°16.7 20.4 70°38.1 36.4 47°36.7 58.4 123°01.5 00.4 Alpheca 126°03.8 26°38.6 131°40.7 10.1 85°8.8 36.9 62°38.6 58.5 138°0.5 9 00.4 Alpheca 126°03.8 26°38.0 11.1 11.1 11.1 11.1 11.1 11.1 11.1 1	12	99°02.8		N23°20.7	55°37.4	N15°35.8		N20°58.3	$107^{\circ}59.0$	S06°00.4			
14 129°07.7 21°15.8 20.1 85°38.8 36.9 62°38.6 58.5 138°03.9 0.04 16 159°12.7 51°14.1 19.5 115°40.1 38.0 92°42.3 58.7 168°08.9 0.5 17 14°15.1 66°13.2 19.2 130°40.8 38.5 10°44.2 58.7 188°31.3 0.5 18 189°17.6 81°12.3 N23°18.9 145°41.5 N15°91.1 122°46.1 N20°58.8 198°31.8 50°0.5 19 204°20.1 96°11.5 18.6 160°42.2 39.6 13°48.0 58.9 213°16.3 0.5 20 219°22.5 111°10.6 18.3 175°42.8 40.2 152°49.9 59.0 228°18.7 00.5 21 234°25.0 126°09.8 18.0 190°43.5 ····································	13		6° 16.7	20.4	70°38.1	36.4		58.4	123°01.5	00.4			
15 144*10.2 36*14.9 1.95 115*40.1 38.0 92*42.3 58.7 168*06.9 0.0.5 115*40.1 38.0 92*42.3 58.7 168*06.9 0.0.5 115*40.1 38.0 92*42.3 58.7 168*06.9 0.0.5 115*40.1 38.0 92*42.3 58.7 168*06.9 0.0.5 115*45.3	14	129°07.7	21° 15.8	20.1		36.9	62°38.6	58.5	138°03.9	00.4			
16 159°12.7 51°14.1 19.5 115°40.1 38.0 9°42.3 58.7 168°08.9 00.5 17°14.5 16°13.2 19.2 130°40.8 35.5 10°744.2 58.7 168°08.9 00.5 10°74.2 58.7 168°13.8 189°17.6 81°12.3 N23°18.9 145°41.5 N15°39.1 12°246.1 N20°85.8 198°13.8 506°00.5 19°24.2 38.0 137°48.0 58.9 218°13.8 506°00.5 13°14.0 10°20.1 96°15.5 116°10.6 18.3 176°42.8 40.2 15°249.9 59.0 228°18.7 00.5 12°25.5 111°10.6 18.3 176°42.8 40.2 15°249.9 59.0 228°18.7 00.5 12°25.5 111°10.6 18.3 176°42.8 40.2 15°249.9 59.0 228°18.7 00.5 12°25.5 141°08.9 17.7 205°44.2 41.3 182°53.7 59.2 258°33.6 00.5 12°32.1 12°32.5 12°	15	144°10.2	36° 14.9	• • 19.8	100°39.4	• • 37.5	77°40.5	• • 58.6	153°06.4	• • 00.4			
18 18917.6 6613.2 19.2 130'40.8 38.5 107'44.2 58.7 183'11.3 00.5 1812.3 N22'81.8 145'41.5 N15'39.1 122'461.1 N20'85.8 19813.8 506'00.5 19.2 240'20.1 96'11.5 18.6 160'42.2 39.6 137'48.0 58.9 213'61.3 00.5 18.2 11.2 240'20.1 96'11.5 18.6 160'42.2 39.6 137'48.0 58.9 213'61.3 00.5 18.2 11.2 240'20.5 126'09.8 18.0 190'43.5 40.7 167'51.8 99.1 243'21.2 00.5 18.0 190'43.5 40.7 167'51.8 99.1 243'21.2 00.5 18.0 190'43.5 40.7 167'51.8 99.1 243'21.2 00.5 18.0 190'43.5 40.7 167'51.8 99.1 243'21.2 00.5 18.0 190'43.5 40.7 167'51.8 99.1 243'21.2 00.5 18.0 190'41.8 15'29.1 18.0 190'41.5 18.0	16		51°14.1	19.5	$115^{\circ}40.1$	38.0		58.7	168°08.9	00.5	I		
18   189° 17.6   181° 12.3   148° 41.5   181° 39.1   148° 41.5   181° 39.1   148° 41.5   181° 39.1   148° 41.5   181° 39.1   122° 46.1   182° 63.1	17		66°13.2	19.2	130°40.8	38.5				00.5			
19 204°20.1 96°11.5 18.6 160°42.2 39.6 137′48.0 98.9 218°16.3 00.5 228°18.7 00.5 228°18.7 00.5 228°18.7 00.5 228°18.7 00.5 228°18.7 00.5 228°18.7 00.5 228°18.7 00.5 228°23.6 00.5 228°23.6 00.5 228°23.6 00.5 228°23.6 00.5 273°26.1 00.5 273°27.1 00.5 273°	18	189°17.6		N23°18.9		$N15^{\circ}39.1$		N20°58.8	198°13.8	S06°00.5	1		
20 219°25.0 111°10.6 18.3 175°42.8 40.2 152°49.9 59.0 228°18.7 00.5 V23°25.0 126°09.8 \tag{8.7} 18.0 190°43.5 \tag{9.7} 40.7 167°51.8 59.1 243°21.2 \tag{9.7} 243°21.2 \tag{9.7} 243°21.2 \tag{9.7} 243°21.2 \tag{9.7} 253°2.5 00.5 V23°25.7 141°08.9 17.7 205°44.2 41.3 182°53.7 59.2 258°23.6 00.5 Nunki 75°47.9 -26°16.0 Altair 62°00.1 8°55.9 V25.7 40.0 mo.91 \tag{9.7} 240°49.9 156°08.0 17.4 220°44.9 41.8 197°55.6 59.3 273°26.1 00.5 Nunki 75°47.9 -26°16.0 Altair 62°00.1 8°55.9 Dence 53°05.9 160°0.1 8°55.9 Dence 53°05.9 160°0.1 8°55.9 Dence 53°05.9 16°39.2 Dence 49°25.7 45°21.9 Dence 49°25.7 45°	19	204°20.1	96°11.5	18.6	160°42.2	39.6	137°48.0	58.9	213°16.3	00.5			
21 234°25.0 126°09.8 · · · · · · · · · · · · · · · · · · ·	20									00.5	1		
22 249°27.5 141°08.9 17.7 205°44.2 41.3 182°53.7 59.2 258°23.6 00.5   Nunki 75°47.9 26°16.0   Nunki 75°47.0   Nunki 75°47.9 26°16.0   Nunki 75°47.9 26°16.0   Nunki 75°47.9 26°16.0   Nunki 75°47.9 2										• • 00.5	I		
Mer.pass   Dec	22			17.7		41.3		59.2		00.5			
Mon         GHA         GHA         Dec         GHA <td>23</td> <td>264°29.9</td> <td>156°08.0</td> <td>17.4</td> <td>220°44.9</td> <td>41.8</td> <td>197°55.6</td> <td>59.3</td> <td>273°26.1</td> <td>00.5</td> <td>1</td> <td></td> <td></td>	23	264°29.9	156°08.0	17.4	220°44.9	41.8	197°55.6	59.3	273°26.1	00.5	1		
Mon   GHA   GHA   CHA   Dec   GHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA	Mern	ass 05:25	ν-0 0' d-0	3′ m-3 00	ν0 7' d0	5′ m0 07	11 0' d0	1′ m-2 03	1/2 5' d0	0' m0 01			
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19													
20 220°21.7 110°49.9 10.7 175°59.2 53.1 153°35.3 01.1 229°17.9 00.8 21 235°24.1 125°49.1 · · 10.3 190°59.9 · · 53.6 168°37.2 · · 01.2 244°20.4 · · 00.8 22 250°26.6 140°48.2 10.0 206°00.5 54.1 183°39.1 01.2 259°22.8 00.8 23 265°29.1 155°47.4 09.7 221°01.2 54.7 198°41.0 01.3 274°25.3 00.8  Horizontal parallax Venus: 0.1 Mars: 0.1													
21       235°24.1       125°49.1       · · 10.3       190°59.9       · · 53.6       168°37.2       · · 01.2       244°20.4       · · 00.8       Horizontal parallax         22       250°26.6       140°48.2       10.0       206°00.5       54.1       183°39.1       01.2       259°22.8       00.8       0.8       Venus:       0.1         23       265°29.1       155°47.4       09.7       221°01.2       54.7       198°41.0       01.3       274°25.3       00.8       Mars:       0.1											Saturn	8°56.2	04:45
22 250°26.6 140°48.2 10.0 206°00.5 54.1 183°39.1 01.2 259°22.8 00.8 Venus: 0.1 23 265°29.1 155°47.4 09.7 221°01.2 54.7 198°41.0 01.3 274°25.3 00.8 Mars: 0.1											Horizont	al narallav	
23 265°29.1 155°47.4 09.7 221°01.2 54.7 198°41.0 01.3 274°25.3 00.8 Mars: 0.1											Horizont	-	0.1
Mer.pass. 05:21 $\nu$ -0.9′ $d$ -0.3′ m-3.90 $\nu$ 0.7′ $d$ 0.5′ m0.97 $\nu$ 1.9′ $d$ 0.1′ m-2.03 $\overline{\nu}$ 2.5′ $d$ 0.0′ m0.91	23	205~29.1	155~47.4	09.7	221~01.2	54.7	198~41.0	01.3	2/4~25.3	8.00		ividIS.	0.1
	Mer.p	ass. 05:21	$\nu$ -0.9′ d-0	).3′ m-3.90	$\nu$ 0.7′ d0	.5′ m0.97	$\nu$ 1.9′ d0.	1′ m-2.03	$\nu$ 2.5′ d0	.0′ m0.91			

h	Su	n	Moon					
Sat	GHA	Dec	GHA	ν	Dec	d	HP	
0	179°07.6	N23° 12.7	269°17.5	12.2'	N03°19.3	16.7'	59.2'	
1	194°07.5	12.5	283°48.7	12.2'	03°36.0	16.7'	59.2'	
2	209°07.3	12.4	298°19.9	12.2'	03°52.7	16.7'	59.2'	
3	224°07.2	• • 12.3	312°51.1	12.2'	04°09.4	16.7'	59.2'	
4	239°07.1 254°07.0	12.1 12.0	327°22.2 341°53.4	12.1' 12.1'	04°26.1 04°42.8	16.6'	59.2'	
5 6	254 07.0 269°06.8	N23° 11.8	341 53.4 356°24.5	12.1'	N04°59.4	16.6' 16.6'	59.2' 59.2'	
7	284°06.7	11.7	10°55.6	12.1'	05°16.0	16.6'	59.2'	
8	299°06.6	11.6	25°26.7	12.1'	05°32.5	16.5'	59.2'	
9	314°06.5	• • 11.4	39°57.7	12.0'	05°49.0	16.5'	59.1'	
10	329°06.3	11.3	54°28.7	12.0'	06°05.5	16.5'	59.1'	
11	344°06.2	11.1	68°59.7	12.0'	06°22.0	16.4'	59.1'	
12	359°06.1	N23°11.0	83°30.7 98°01.7	12.0'	N06°38.4	16.4	59.1'	
13 14	14°06.0 29°05.8	10.8 10.7	98°01.7 112°32.6	11.9' 11.9'	06°54.8 07°11.1	16.3' 16.3'	59.1' 59.1'	
15	44°05.7	. 10.5	112 32.0 127°03.5	11.9'	07 11.1 07°27.5	16.3	59.1'	
16	59°05.6	10.4	141°34.4	11.8'	07°43.7	16.2'	59.1'	
17	74°05.5	10.2	156°05.2	11.8'	0.00°80	16.2'	59.1'	
18	89°05.3	N23° 10.1	170°36.0	11.8'	$N08^{\circ}16.1$	16.1'	59.1'	
19	104°05.2	09.9	185°06.7	11.7'	08°32.3	16.1'	59.1'	
20	119°05.1	09.8	199°37.5	11.7'	08°48.4	16.0'	59.1'	
21	134°05.0	•• 09.6	214°08.1	11.6'	09°04.4	16.0'	59.1'	
22 23	149°04.8 164°04.7	09.5 09.3	228°38.8 243°09.4	11.6' 11.6'	09°20.4 09°36.3	15.9' 15.9'	59.0' 59.0'	
23			27J U9.4			13.9	39.0	
	SD = 15.7'	d = -0.1'		SE	D = 16.1'			
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0 1	179°04.6 194°04.5	N23°09.1 09.0	257°39.9 272°10.5	11.5' 11.5'	N09°52.2 10°08.0	15.8' 15.8'	59.0' 59.0'	
2	209°04.4	09.0	272 10.5 286°40.9	11.5	10°03.0	15.7	59.0'	
3	224°04.2	. 08.7	301°11.4	11.4'	10° 25.5	15.7	59.0'	
4	239°04.1	08.5	315°41.7	11.3'	10°55.2	15.6'	59.0'	
5	254°04.0	08.4	330°12.1	11.3'	11°10.8	15.5'	59.0'	
6	269°03.9	N23°08.2	344°42.4	11.2'	N11°26.3	15.5'	59.0'	
7	284°03.7	08.0	359°12.6	11.2'	11°41.8	15.4'	59.0'	
8 9	299°03.6 314°03.5	07.9	13°42.8 28°12.9	11.1' 11.1'	11°57.2 12°12.6	15.3' 15.3'	59.0' 58.9'	
10	314 03.5 329°03.4	· · 07.7 07.6	28 12.9 42°43.0	11.1	12 12.0 12°27.8	15.3 15.2'	58.9'	
11	344°03.3	07.4	57°13.0	11.0'	12°43.0	15.1	58.9'	
12	359°03.1	N23°07.2	71°43.0	10.9'	N12°58.2	15.1'	58.9'	
13	14°03.0	07.1	86°12.9	10.9'	13°13.2	15.0'	58.9'	
14	29°02.9	06.9	100°42.8	10.8'	13°28.2	14.9'	58.9'	
15	44°02.8	• • 06.7	115°12.6	10.7'	13°43.2	14.8'	58.9'	
16	59°02.6 74°02.5	06.6	129°42.3 144°12.0	10.7' 10.6'	13°58.0 14°12.8	14.8' 14.7'	58.9'	
17 18	89°02.4	06.4 N23°06.2	144 12.0 158°41.6	10.6'	N14°27.4	14.7	58.9' 58.9'	
19	104°02.3	06.1	173°11.2	10.5'	14°42.0	14.5	58.8'	
20	119°02.2	05.9	187°40.7	10.4'	14°56.6	14.4'	58.8'	
21	134°02.0	• • 05.7	202°10.1	10.4'	$15^{\circ}11.0$	14.4'	58.8'	
22	149°01.9	05.5	216°39.5	10.3'	15°25.4	14.3'	58.8'	
23	164°01.8	05.4	231°08.8	10.2'	15°39.6	14.2'	58.8'	
	SD = 15.7′	d = -0.2'		SE	O = 16.1'			
Mon	GHA	Dec	GHA	ν	Dec	d	НР	
0	179°01.7	N23° 05.2	245°38.0	10.2'	N15°53.8	14.1'	58.8'	
1	194°01.6	05.0	260°07.2	10.1'	16°07.9	14.0'	58.8'	
2	209°01.4	04.9	274°36.3	10.0'	$16^{\circ}21.9$	13.9'	58.8'	
3	224°01.3	• • 04.7	289°05.3	10.0'	16°35.8	13.8'	58.7'	
4	239°01.2	04.5	303°34.3	9.9'	16°49.6	13.7'	58.7'	
5 6	254°01.1 269°01.0	04.3 N23°04.1	318°03.2 332°32.0	9.8' 9.8'	17°03.3 N17°16.9	13.6' 13.5'	58.7' 58.7'	
7	284°00.8	04.0	347°00.8	9.6 9.7'	17°30.4	13.4	58.7'	
8	299°00.7	03.8	1°29.4	9.6'	17°43.8	13.3'	58.7'	
9	314°00.6	• • 03.6	15°58.1	9.5'	17°57.2	13.2'	58.7'	
10	329°00.5	03.4	30°26.6	9.5'	18°10.4	13.1'	58.7'	
11	344°00.4	03.3	44°55.1	9.4'	18°23.5	13.0'	58.6'	
12 13	359°00.2 14°00.1	N23°03.1 02.9	59°23.5 73°51.8	9.3' 9.2'	N18°36.5 18°49.4	12.9' 12.8'	58.6' 58.6'	
13 14	29°00.0	02.9 02.7	73°51.8 88°20.0	9.2' 9.2'	18°49.4 19°02.2	12.8	58.6'	
15	43°59.9	• • 02.5	102°48.2	9.1'	19°14.8	12.6'	58.6	
16	58°59.8	02.3	117°16.3	9.0'	19°27.4	12.4'	58.6'	
17	73°59.6	02.2	131°44.3	8.9'	19°39.8	12.3'	58.6'	
18	88°59.5	N23°02.0	146°12.3	8.9'	N19°52.2	12.2'	58.6'	
19	103°59.4	01.8	160°40.2	8.8'	20°04.4	12.1'	58.5'	
20 21	118°59.3 133°59.2	01.6 •• 01.4	175°08.0 189°35.7	8.7' 8.6'	20°16.5 20°28.5	12.0' 11.9'	58.5' 58.5'	
22	133 59.2 148°59.0	01.4	204°03.3	8.6'	20° 20.3	11.7	58.5'	
23	163°58.9	01.0	218°30.9	8.5'	20°52.1	11.6'	58.5'	
	SD = 15.7'	d = -0.2'		SE	O = 16.0'			

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

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

		Sun			Moon	
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	23-25
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	49-27%
29	03:30	03:36	12:04	06:15	18:39	
30	03:42	03:47	12:04	07:03	19:28	
01	03:53	03:59	12:04	07:54	20:20	

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	280°31.5	170° 46.5	N23°09.3	236°01.9	N15°55.2	213°42.9	N21°01.4	289°27.8	S06°00.8			
										Alpheratz	357°35.2	29°13.4
1	295°34.0	185° 45.6	09.0	251°02.6	55.7	228°44.8	01.5	304°30.2	00.9	Ankaa	353°07.5	-42°10.1
2	310°36.4	200°44.8	08.7	266°03.3	56.3	243°46.7	01.6	319°32.7	00.9	Schedar	349°31.6	56°40.0
3	325°38.9	215°43.9	• • 08.3	281°03.9	• • 56.8	258°48.6	• • 01.7	334°35.2	• • 00.9	Diphda	348°47.7	-17°51.0
4	340°41.4	230°43.1	0.80	296°04.6	57.3	273°50.5	01.8	349°37.6	00.9	Achernar	335°20.6	-57°06.4
5	355°43.8	245°42.2	07.6	311°05.3	57.9	288°52.4	01.8	4°40.1	00.9	Hamal	327°51.8	23°34.6
6	10°46.3	260°41.4	N23°07.3	326°06.0	N15°58.4	303°54.3	N21°01.9	19°42.6	S06°00.9	Polaris	314°32.1	89°21.8
7	25°48.8	275°40.5	07.0	341°06.7	58.9	$318^{\circ}56.1$	02.0	34°45.1	00.9	Acamar	315°12.3	-40°12.2
8	40°51.2	290°39.6	06.6	356°07.3	15°59.5	333°58.0	02.1	49°47.5	01.0			
9	55°53.7	305°38.8	• • 06.3	11°08.0	16°00.0	348°59.9	• • 02.2	64°50.0	• • 01.0	Menkar	314°06.8	4°11.2
10	70°56.2	320° 37.9	05.9	26°08.7	00.5	4°01.8	02.3	79°52.5	01.0	Mirfak	308°29.2	49°56.7
11	85°58.6	335°37.1	05.6	41°09.4	01.1	19°03.7	02.3	94°54.9	01.0	Aldebaran	290°40.4	16°33.5
12	101°01.1	350°36.2	N23°05.2	56°10.1	N16°01.6	34°05.6	N21°02.4	109°57.4	S06°01.0	Rigel	281°04.6	-8°10.3
13	116°03.6	5°35.4	04.9	71°10.7	02.1	49°07.5	02.5	124°59.9	01.0	Capella	280°23.0	46°01.3
14	131°06.0	20°34.5	04.5	86°11.4	02.1	64°09.4	02.5	140°02.3	01.0	Bellatrix	278°23.7	6°22.3
										Elnath	278°02.8	28°37.7
15	146°08.5	35°33.7	• • 04.2	101°12.1	• • 03.2	79°11.3	• • 02.7	155°04.8	• • 01.1	Alnilam	275°38.5	-1°11.1
16	161°10.9	50°32.8	03.8	116°12.8	03.7	94°13.2	02.8	170°07.3	01.1	Betelgeuse	270°52.9	7°24.7
17	176°13.4	65°32.0	03.5	131°13.5	04.2	109°15.1	02.9	185°09.8	01.1	Canopus	263°53.1	-52°42.4
18	191°15.9	80°31.1	N23°03.1	146°14.1	N16°04.8	124°17.0	N21°02.9	200°12.2	S06°01.1	Sirius	258°27.0	-16°44.9
19	206°18.3	95°30.3	02.7	161°14.8	05.3	139°18.9	03.0	215°14.7	01.1	Adhara	255°06.6	-29°00.3
20	221°20.8	110°29.4	02.4	176°15.5	05.8	154°20.8	03.1	230°17.2	01.1			
21	236°23.3	125°28.5	• • 02.0	191°16.2	• • 06.3	169°22.7	• • 03.2	245°19.6	• • 01.1	Procyon	244°51.6	5°09.8
22	251°25.7	140°27.7	01.7	206°16.8	06.9	184°24.6	03.3	260°22.1	01.2	Pollux	243°18.2	27°58.1
23	266°28.2	155°26.8	01.3	221°17.5	07.4	199°26.5	03.4	275°24.6	01.2	Avior	234°15.5	-59°35.3
										Suhail	222°47.0	-43°32.0
Mer.p	ass. 05:17	$\nu$ -0.9' d-0	).3′ m-3.90	$ u$ 0.7 $^{\prime}$ d0	.5′ m0.96	$\nu$ 1.9' d0.	.1′ m-2.03	$\nu 2.5' \ d0$	.0′ m0.90	Miaplacidus	221°39.2	-69°49.2
										Alphard	217°48.4	-8°45.9
14/	CHA	CIII	Б	6114	Б	6114	Б	C111	Б	Regulus	$207^{\circ}35.1$	11°51.0
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.8	61°37.4
0	281°30.7	170°26.0	N23°00.9	236°18.2	N16°07.9	214°28.4	N21°03.4	290°27.1	S06°01.2	Denebola	182°25.5	14°26.2
1	296°33.1	185°25.1	00.6	251°18.9	08.4	229°30.3	03.5	305°29.5	01.2	Gienah	175°44.1	-17°40.7
2	311°35.6	200°24.3	23°00.2	266°19.6	09.0	244°32.2	03.6	320°32.0	01.2		173°00.7	-63°14.4
3	326°38.1	215°23.4	22°59.8	281°20.2	• • 09.5	259°34.0	• • 03.7	335°34.5	• • 01.2		171°52.2	-57°15.3
4	341°40.5	230°22.6	59.5	296°20.9	10.0	274°35.9	03.8	350°36.9	01.2	1		
5	356°43.0	245°21.7	59.1	311°21.6	10.5	289°37.8	03.9	5°39.4	01.3	Alioth	166°13.3	55°49.9
6	11°45.4	260° 20.9	N22°58.7	326°22.3	N16°11.1	304°39.7	N21°04.0	20°41.9	S06°01.3	Spica	158°22.7	-11°17.4
7	26°47.9	275° 20.0	58.3	341°23.0	11.6	319°41.6	04.0	35°44.4	01.3	Alkaid	152°52.2	49°11.7
8	41°50.4	290° 19.2	58.0	356°23.6	12.1	334°43.5	04.1	50°46.8	01.3	Hadar	148°36.4	-60°29.7
9	56°52.8	305° 18.4	57.6	11°24.3	12.6	349°45.4	. 04.1	65°49.3	•• 01.3	Menkent	147°58.0	-36°29.6
				26°25.0						Arcturus	145°48.2	19°03.4
10	71°55.3	320° 17.5	57.2	20 25.0	13.2	4°47.3	04.3	80°51.8	01.3	Rigil Kent.	139°40.6	-60°56.4
11	86°57.8	335°16.7	56.8	41°25.7	13.7	19°49.2	04.4	95°54.3	01.4	Kochab	$137^{\circ}19.1$	74°03.5
12	102°00.2	350° 15.8	N22°56.5	56°26.4	N16°14.2	34°51.1	N21°04.5	110°56.7	S06°01.4	Zuben'ubi	136°56.3	-16°08.7
13	117°02.7	5° 15.0	56.1	71°27.0	14.7	49°53.0	04.5	125°59.2	01.4	Alphecca	126°03.8	26°38.0
14	132°05.2	20°14.1	55.7	86°27.7	15.3	64°54.9	04.6	141°01.7	01.4	Antares	112°16.1	-26°29.2
15	147°07.6	35°13.3	• • 55.3	101°28.4	• • 15.8	79°56.8	• • 04.7	156°04.2	•• 01.4	Atria	107°10.2	-69°04.4
16	$162^{\circ}10.1$	$50^{\circ}12.4$	54.9	$116^{\circ}29.1$	16.3	94°58.7	04.8	171°06.6	01.4	Sabik	102°03.0	-15°45.3
17	177°12.6	65°11.6	54.6	131°29.7	16.8	110°00.6	04.9	186°09.1	01.4	1	96°10.6	
18	192°15.0	80° 10.7	N22°54.2	146°30.4	N16°17.3	125°02.5	N21°05.0	201°11.6	S06°01.5	Shaula		-37°07.3
19	207°17.5	95°09.9	53.8	161°31.1	17.9	140°04.4	05.0	216°14.1	01.5	Rasalhague	95°58.6	12°32.5
20	222°19.9	110°09.0	53.4	176°31.8	18.4	155°06.3	05.1	231°16.5	01.5	Eltanin	90°41.9	51°29.1
21	237°22.4	125°08.2	• • 53.0	191°32.5	. 18.9	170°08.2	. 05.2	246°19.0	• • 01.5	Kaus Aust.	83°32.7	-34°22.4
	252°24.9	140°07.4		206°33.1	19.4	185°10.1	05.2	261°21.5		Vega	80°33.1	38°48.4
22			52.6						01.5	Nunki	75°47.9	-26°16.0
23	267°27.3	155°06.5	52.2	221°33.8	20.0	200°12.0	05.4	276°24.0	01.5	Altair	$62^{\circ}00.1$	8°56.0
Mer.p	ass. 05:13	$\nu$ -0.9' d-0	0.4′ m-3.90	$\nu$ 0.7′ d0	.5′ m0.96	$\nu 1.9' \ d0$	.1′ m-2.03	$\nu 2.5' \ d0$	.0′ m0.90	Peacock	53°05.8	-56°39.2
										Deneb	49°25.7	45°21.9
										Enif	33°39.0	9°59.2
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.1	-46°50.3
0	282°29.8	$170^{\circ}05.7$	N22°51.8	236°34.5	$N16^{\circ}20.5$	$215^{\circ}13.9$	N21°05.5	291°26.4	S06°01.6	Fomalhaut	15°14.8	-29°29.4
1	297°32.3	$185^{\circ}04.8$	51.4	251°35.2	21.0	230°15.8	05.5	306°28.9	01.6	Scheat	13°45.5	28°12.8
2	312°34.7	200°04.0	51.0	266°35.9	21.5	245°17.7	05.6	321°31.4	01.6	Markab	13°30.2	15°20.1
3	327°37.2	215°03.1	• • 50.6	281°36.5	• • 22.0	260°19.6	• • 05.7	336°33.9	• • 01.6	ividikaD	10 00.2	10 20.1
4	342°39.7	230°02.3	50.3	296°37.2	22.5	275°21.5	05.8	351°36.3	01.6	Jul 02 Tue	SHA	Mer.pass
5	357°42.1	245°01.5	49.9	311°37.9	23.1	290°23.4	05.9	6°38.8	01.6	Venus	250°15.0	12:38
6	12°44.6	260°00.6	N22°49.5	326°38.6	N16°23.6	305°25.3	N21°06.0	21°41.3	S06°01.7	Mars	315°30.4	08:15
	27°47.1	274° 59.8		341°39.2		320°27.2		21 41.3 36°43.8		Jupiter	293°11.4	09:44
7			49.1		24.1		06.0		01.7	Saturn	8°56.2	
8	42°49.5	289°58.9	48.7	356°39.9	24.6	335°29.1	06.1	51°46.3	01.7	Saturn	0 00.2	04:41
9	57°52.0	304°58.1	• • 48.2	11°40.6	• • 25.1	350°31.0	• • 06.2	66°48.7	• • 01.7	Jul 03 Wed	SHA	Mer.pass
10	72°54.4	319°57.3	47.8	26°41.3	25.7	5°32.9	06.3	81°51.2	01.7	Venus		12:39
11	87°56.9	334°56.4	47.4	41°42.0	26.2	20°34.8	06.4	96°53.7	01.7	Mars	314°47.5	08:14
12	102°59.4	349°55.6	N22°47.0	56°42.6	N16°26.7	35°36.7	N21°06.5	111°56.2	S06°01.8			
13	118°01.8	4°54.7	46.6	71°43.3	27.2	50°38.6	06.5	126°58.6	01.8	Jupiter		09:41
14	133°04.3	19°53.9	46.2	86°44.0	27.7	65°40.5	06.6	142°01.1	01.8	Saturn	8°56.4	04:37
15	148°06.8	34°53.1	• • 45.8	101°44.7	28.2	80°42.4	06.7	157°03.6	01.8	Jul 04 Thu	SHA	Mer.pass
16	163°09.2	49°52.2	45.4	116°45.4	28.7	95°44.3	06.8	172°06.1	01.8			
				110 45.4 131°46.0						Venus		12:40
17	178°11.7	64°51.4	45.0		29.3	110°46.2	06.9	187°08.6	01.9		314°04.7	08:13
18	193°14.2	79°50.5	N22°44.6	146°46.7	N16°29.8	125°48.1	N21°06.9	202°11.0	S06°01.9		292°44.1	09:38
19	208°16.6	94°49.7	44.2	161°47.4	30.3	140°50.0	07.0	217°13.5	01.9	Saturn	8°56.6	04:33
20	223°19.1	109°48.9	43.7	176°48.1	30.8	155°51.9	07.1	232°16.0	01.9	U! ·		
21	238°21.5	124°48.0	• • 43.3	191°48.7	• • 31.3	170°53.8	• • 07.2	247°18.5	• • 01.9	Horizont	al parallax	
22	253°24.0	139°47.2	42.9	206°49.4	31.8	185°55.7	07.3	262°21.0	01.9		Venus:	0.1
23	268°26.5	154°46.4	42.5	221°50.1	32.3	200°57.6	07.4	277°23.4	02.0		Mars:	0.1
N 4 -					E/ == 0.00							
Mer.p	ass. 05:09	$\nu$ -0.8′ $d$ -0	0.4′ m-3.90	$\nu$ 0.1' d0	.5′ m0.96	$\nu$ 1.9′ d0.	.1′ m-2.04	$\nu^{2.5'} d0$	.0′ m0.89			

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178° 58.8	N23°00.8	232°58.4	8.4'	N21°03.7	11.5'	58.5'
1	193°58.7	00.7	$247^{\circ}25.8$	8.3'	21°15.2	11.4'	58.5'
2	208°58.6	00.5	261°53.2	8.3'	21°26.5	11.2'	58.4'
3	223°58.5	• • 00.3	276°20.4	8.2'	21°37.8	11.1'	58.4'
4	238° 58.3 253° 58.2	23°00.1 22°59.9	290°47.6 305°14.7	8.1'	21°48.9 21°59.8	11.0'	58.4'
5 6	253°58.2 268°58.1	N22°59.9	305°14.7 319°41.8	8.0' 8.0'	21°59.8 N22°10.7	10.8' 10.7'	58.4' 58.4'
7	283°58.0	59.5	334°08.8	7.9'	22°21.4	10.6	58.4'
8	298° 57.9	59.3	348°35.7	7.8'	22°32.0	10.4	58.3'
9	313°57.7	• • 59.1	3°02.5	7.7'	22°42.4	10.3'	58.3'
10	328°57.6	58.9	$17^{\circ}29.2$	7.7'	22°52.7	10.2'	58.3'
11	343°57.5	58.7	31°55.9	7.6'	23°02.9	10.0'	58.3'
12	358° 57.4	N22°58.5	46°22.5	7.5'	N23°12.9	9.9'	58.3'
13	13° 57.3 28° 57.2	58.3	60°49.0 75°15.5	7.5'	23°22.8 23°32.6	9.7'	58.3'
14 15	28°57.2 43°57.1	58.1 •• 57.9	75°15.5 89°41.9	7.4' 7.3'	23° 42.2	9.6' 9.5'	58.2' 58.2'
16	58° 56.9	57.7	104°08.2	7.3	23°51.6	9.3	58.2'
17	73°56.8	57.5	118°34.5	7.2'	24°00.9	9.2'	58.2'
18	88°56.7	N22°57.3	133°00.6	7.1'	N24°10.1	9.0'	58.2'
19	103°56.6	57.1	147°26.8	7.0'	24°19.1	8.9'	58.2'
20	118° 56.5	56.9	161°52.8	7.0'	24°28.0	8.7'	58.1'
21	133°56.4	• • 56.7	176°18.8	6.9'	24°36.7	8.6'	58.1'
22 23	148° 56.2 163° 56.1	56.5 56.3	190°44.7 205°10.6	6.9' 6.8'	24°45.2 24°53.6	8.4' 8.3'	58.1' 58.1'
23			205 10.0			8.3	58.1
	SD = 15.7'	d = -0.2'		SI	D = 15.9'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178° 56.0	N22°56.1	219°36.3	6.7'	N25°01.9	8.1'	58.1'
1	193°55.9	55.9	234°02.1	6.7'	25°10.0	7.9'	58.1'
2	208°55.8	55.7	248°27.7	6.6'	25°18.0	7.8'	58.0'
3	223° 55.7 238° 55.5	• • 55.5	262°53.3 277°18.9	6.5'	25°25.7 25°33.4	7.6'	58.0'
4 5	238°55.5 253°55.4	55.3 55.0	277°18.9 291°44.4	6.5' 6.4'	25° 33.4 25° 40.8	7.5' 7.3'	58.0' 58.0'
6	268° 55.3	N22°54.8	306°09.8	6.4	N25°48.2	7.3	58.0'
7	283°55.2	54.6	320°35.2	6.3'	25°55.3	7.0'	58.0'
8	298°55.1	54.4	335°00.5	6.3'	26°02.3	6.8'	57.9'
9	313°55.0	• • 54.2	349°25.8	6.2'	$26^{\circ}09.1$	6.7'	57.9'
10	328° 54.9	54.0	3°51.0	6.2'	26°15.8	6.5'	57.9'
11	343°54.7	53.8	18°16.2	6.1'	26°22.3	6.3'	57.9'
12	358° 54.6 13° 54.5	N22°53.6 53.3	32°41.3 47°06.4	6.1'	N26°28.6 26°34.8	6.2'	57.9'
13 14	28° 54.4	53.3 53.1	47 06.4 61°31.4	6.0' 6.0'	26°40.8	6.0' 5.8'	57.8' 57.8'
15	43° 54.3	52.9	75°56.4	6.0'	26°46.6	5.7'	57.8'
16	58° 54.2	52.7	90°21.4	5.9'	26°52.3	5.5'	57.8'
17	73°54.1	52.5	$104^{\circ}46.3$	5.9'	$26^{\circ}57.8$	5.3'	57.8'
18	88°54.0	N22°52.3	119°11.2	5.8'	N27°03.1	5.2'	57.7'
19	103°53.8	52.0	133°36.0	5.8'	27°08.2	5.0'	57.7'
20	118°53.7 133°53.6	51.8 • • 51.6	148°00.8 162°25.6	5.8' 5.7'	27°13.2 27°18.0	4.8'	57.7'
21 22	133 53.0 148°53.5	· · 51.6 51.4	102 25.0 176°50.4	5.7' 5.7'	27 18.0 27°22.7	4.6' 4.5'	57.7' 57.7'
23	163°53.4	51.4	170 30.4 191°15.1	5.7'	27°27.1	4.3'	57.6'
	SD = 15.7'	d = -0.2'			D = 15.8'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178° 53.3 193° 53.2	N22°50.9 50.7	205°39.8 220°04.5	5.7' 5.6'	N27°31.4 27°35.6	4.1' 3.9'	57.6' 57.6'
2	193°53.2 208°53.1	50.7 50.5	220°04.5 234°29.1	5.6'	27°35.6 27°39.5	3.9	57.6'
3	223° 52.9	• • 50.3	248°53.7	5.6'	27°43.3	3.6'	57.6'
4	238° 52.8	50.0	263°18.3	5.6'	27°46.9	3.4'	57.5'
5	253°52.7	49.8	277°42.9	5.6'	27°50.3	3.3'	57.5'
6	268°52.6	N22°49.6	292°07.5	5.6'	N27°53.6	3.1'	57.5'
7	283°52.5	49.4	306°32.1	5.6'	27°56.6	2.9'	57.5'
8 9	298° 52.4 313° 52.3	49.1 •• 48.9	320°56.7 335°21.2	5.6' 5.5'	27°59.5 28°02.3	2.7' 2.5'	57.5' 57.4'
10	313 52.3 328°52.2	48.7	335 21.2 349°45.8	5.5'	28 02.3 28°04.8	2.5 2.4'	57.4 57.4'
11	343°52.1	48.4	4°10.3	5.5'	28°07.2	2.4	57.4'
12	358° 51.9	N22°48.2	18°34.9	5.5'	N28°09.4	2.0'	57.4'
13	13°51.8	48.0	$32^{\circ}59.4$	5.6'	28°11.4	1.8'	57.4'
14	28°51.7	47.7	47°24.0	5.6'	28°13.2	1.7'	57.3'
15	43°51.6	• • 47.5	61°48.5	5.6'	28°14.9	1.5'	57.3'
16 17	58° 51.5 73° 51.4	47.3 47.0	76°13.1 90°37.7	5.6' 5.6'	28°16.4 28°17.7	1.3' 1.1'	57.3' 57.3'
17	73°51.4 88°51.3	47.0 N22°46.8	90°37.7 105°02.2	5.6'	28°17.7 N28°18.9	1.1'	57.3° 57.2'
19	103°51.2	46.6	105 02.2 119°26.9	5.6'	28°19.8	0.8'	57.2'
20	118°51.1	46.3	133°51.5	5.6'	28°20.6	0.6'	57.2'
21	133°51.0	• • 46.1	148°16.1	5.7'	28°21.2	0.4'	57.2'
22	148° 50.9	45.9	162°40.8	5.7'	28°21.7	0.3'	57.2'
23	163°50.7	45.6	177°05.5	5.7'	28°21.9	0.1'	57.1'
	SD = 15.7'	d = -0.2'		SI	D = 15.7'		

			2024	July 0	2 to Ju	ıl. 04
Lat.	Twi	light	Sunrise	Sunset	Twi	light
	Naut.	Civil			Civil	Naut.
N 72°						
N 70°						
68°						
66°	7///	////	00:38	23:25	////	////
64°	////	////	01:46	22:21	////	////
62°	////	////	02:20	21:47	////	////
60°	////	01:10	02:45	21:23	22:57	////
<b>N</b> 58°	////	01:52	03:04	21:04	22:15	////
56°	11111	02:20	03:21	20:48	21:48	////
54°	01:04	02:41	03:34	20:40	21:27	23:03
52°	01:43	02:58	03:46	20:34	21:10	22:24
50°	02:09	03:13	03:57	20:12	20:55	21:59
45°	02:53	03:42	04:19	19:50	20:27	21:16
N 40°	03:22	04:04	04:36	19:32	20:05	20:46
35°		04:04				20:40
30°	03:45		04:51	19:18	19:47	
30° 20°	04:03	04:36	05:03	19:05	19:32	20:05
N 10°	04:31	05:01	05:25	18:44	19:08	19:37
0°	04:54	05:21	05:44	18:25	18:48	19:15
	05:12	05:38	06:01	18:08	18:30	18:57
<b>S</b> 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	06:57	17:12	17:39	18:08
35°	06:09	06:41	07:09	17:00	17:28	18:00
40°	06:18	06:52	07:22	16:46	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	16:48	17:29
52°	06:44	07:28	80:80	16:01	16:41	17:24
54°	06:50	07:36	08:19	15:50	16:33	17:19
56°	06:56	07:45	08:31	15:38	16:24	17:13
58°	07:02	07:54	08:45	15:24	16:15	17:07
<b>S</b> 60°	07:10	08:06	09:02	15:07	16:03	16:59
Lat.		Moonris	e		Moonset	:
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
N 70°						
68°						
66°						
64°	22:36			19:43		
62°	23:19	23:10		19:01	21:11	
60°	23:48		00:02	18:32	20:19	21:42
N 58°		00:10	00:34	18:11	19:47	21:04
56°	00:10	00:28	00:58	17:53	19:23	20:37
54°	00:22	00:44	01:18	17:38	19:04	20:16
52°	00:32	00:57	01:34	17:25	18:48	19:58
50°	00:41	01:09	01:48	17:14	18:34	19:43
45°	01:00	01.03	02:17	16:50	18:05	10.12

Lat.		1410011113	C		WIGOIISC	
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
<b>N</b> 70°						
68°						
66°						
64°	22:36			19:43		
62°	23:19	23:10		19:01	21:11	
60°	23:48		00:02	18:32	20:19	21:42
N 58°		00:10	00:34	18:11	19:47	21:04
56°	00:10	00:28	00:58	17:53	19:23	20:37
54°	00:22	00:44	01:18	17:38	19:04	20:16
52°	00:32	00:57	01:34	17:25	18:48	19:58
50°	00:41	01:09	01:48	17:14	18:34	19:43
45°	01:00	01:34	02:17	16:50	18:05	19:12
<b>N</b> 40°	01:15	01:53	02:40	16:31	17:43	18:48
35°	01:29	02:10	02:59	16:16	17:25	18:29
30°	01:40	02:24	03:15	16:02	17:09	18:12
20°	02:00	02:49	03:43	15:39	16:42	17:44
<b>N</b> 10°	02:18	03:10	04:06	15:19	16:19	17:19
0°	02:34	03:30	04:28	15:01	15:58	16:57
<b>S</b> 10°	02:51	03:50	04:51	14:42	15:37	16:34
20°	03:09	04:12	05:15	14:23	15:14	16:10
30°	03:30	04:37	05:43	14:00	14:47	15:41
35°	03:42	04:52	05:59	13:47	14:32	15:25
40°	03:56	05:10	06:19	13:32	14:14	15:05
45°	04:13	05:31	06:42	13:14	13:52	14:41
<b>S</b> 50°	04:34	05:57	07:12	12:51	13:25	14:11
52°	04:44	06:10	07:27	12:41	13:11	13:55
54°	04:55	06:25	07:45	12:29	12:56	13:38
56°	05:08	06:43	08:06	12:15	12:38	13:16
58°	05:23	07:04	08:33	12:00	12:16	12:49
<b>S</b> 60°	05:41	07:31	09:11	11:41	11:48	12:11

		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	18-5%	
02	04:05	04:10	12:04	08:47	21:15		
03	04:16	04:21	12:04	09:44	22:13		
04	04:27	04:32	12:05	10:43	23:12		

h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	283°28.9	169°45.5	N22°42.1	236°50.8	$N16^{\circ}32.9$	215°59.5	N21°07.4	292°25.9	S06°02.0	Alpheratz	357°35.1	29°13.4
1	298°31.4	184°44.7	41.6	251°51.5	33.4	231°01.4	07.5	307°28.4	02.0	Ankaa	353° 07.5	-42°10.1
2	313°33.9	199°43.9	41.2	266°52.1	33.9	246°03.3	07.6	322°30.9	02.0	Schedar	349°31.5	56°40.0
3	328°36.3	214°43.0	• • 40.8	281°52.8	• • 34.4	261°05.2	• • 07.7	337°33.4	• • 02.0	Diphda	349° 31.5	-17°51.0
4	343°38.8	229°42.2	40.4	296°53.5	34.9	$276^{\circ}07.1$	07.8	352°35.8	02.1	Achernar	335° 20.6	-17 51.0 -57°06.4
5	358°41.3	244°41.4	39.9	311°54.2	35.4	291°09.0	07.8	7°38.3	02.1	Hamal	327°51.8	23°34.6
6	13°43.7	259°40.5	N22°39.5	326°54.8	$N16^{\circ}35.9$	306°10.9	N21°07.9	22°40.8	S06°02.1	Polaris	314° 30.5	89°21.8
7	28°46.2	274°39.7	39.1	341°55.5	36.4	321°12.8	08.0	37°43.3	02.1	Acamar	314° 30.3	-40°12.2
8	43°48.7	289°38.9	38.7	356°56.2	36.9	336°14.7	08.1	52°45.8	02.1	Menkar	314°06.8	4°11.2
9	58°51.1	304°38.0	• • 38.2	11°56.9	• • 37.5	351°16.6	• • 08.2	67°48.2	• • 02.1	Mirfak	308° 29.2	49°56.7
10	73°53.6	319°37.2	37.8	26°57.6	38.0	6°18.5	08.3	82°50.7	02.2	Aldebaran	290°40.4	16°33.5
11	88°56.0	334°36.4	37.4	41°58.2	38.5	21°20.4	08.3	97°53.2	02.2	I	281°04.6	-8°10.3
12	103°58.5	349°35.5	N22°36.9	56°58.9	N16°39.0	36°22.3	N21°08.4	112°55.7	S06°02.2	Rigel		-6 10.3 46°01.3
13	$119^{\circ}01.0$	4°34.7	36.5	71°59.6	39.5	51°24.2	08.5	127°58.2	02.2	Capella	280°23.0 278°23.6	6°22.3
14	134°03.4	19°33.9	36.1	87°00.3	40.0	$66^{\circ}26.1$	08.6	143°00.6	02.2	Bellatrix		
15	149°05.9	34°33.0	· · 35.6	102°00.9	• • 40.5	81°28.0	· · 08.7	158°03.1	· · 02.3	Elnath	278°02.8	28°37.7
16	164°08.4	49°32.2	35.2	$117^{\circ}01.6$	41.0	96°29.9	08.7	173°05.6	02.3	Alnilam	275°38.5	-1°11.1
17	179°10.8	64°31.4	34.7	132°02.3	41.5	111°31.8	8.80	188°08.1	02.3	Betelgeuse	270°52.9	7°24.7
18	194°13.3	79°30.5	N22°34.3	147°03.0	N16°42.0	126°33.7	N21°08.9	203°10.6	S06°02.3	Canopus	263°53.1	-52°42.4
19	209°15.8	94°29.7	33.9	162°03.7	42.5	141°35.6	09.0	218°13.1	02.3	Sirius	258°27.0	-16°44.9
20	224°18.2	109°28.9	33.4	177°04.3	43.0	156°37.5	09.1	233°15.5	02.4	Adhara	255°06.6	-29°00.2
21	239°20.7	124° 28.1	33.0	192°05.0	• • 43.6	171°39.4	09.1	248°18.0	02.4	Procyon	244°51.6	5°09.8
22	254°23.2	139° 27.2	32.5	207°05.7	44.1	186°41.3	09.1	263°20.5	02.4	Pollux	243°18.2	27°58.1
23	269°25.6	154° 26.4	32.3	222°06.4	44.6	201°43.2	09.2	278°23.0	02.4	Avior	234° 15.5	-59°35.3
23	209 23.0									Suhail	222°47.0	-43°31.9
Mer.p	ass. 05:05	$\nu$ -0.8′ d-0	).4′ m-3.90	$ u$ 0.7 $^{\prime}$ d0	.5′ m0.96	$\nu 1.9' \ d0.$	.1′ m-2.04	$\nu 2.5' \ d0$	0′ m0.89	Miaplacidus	221°39.2	-69°49.2
										Alphard	217°48.4	-8°45.9
	G114	6114	-	6114	_	6114	-	6114	_	Regulus	$207^{\circ}35.1$	11°51.0
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.8	61°37.4
0	284°28.1	169°25.6	N22°31.6	237°07.0	N16°45.1	216°45.1	N21°09.4	293°25.5	S06°02.4	Denebola	$182^{\circ}25.5$	14°26.2
1	299°30.5	184°24.8	31.2	252°07.7	45.6	231°47.0	09.5	308°28.0	02.5	Gienah	$175^{\circ}44.1$	-17°40.7
2	314°33.0	199°23.9	30.7	267°08.4	46.1	246°48.9	09.6	323°30.4	02.5	Acrux		-63°14.4
3	329°35.5	214°23.1	• • 30.3	282°09.1	• • 46.6	261°50.8	• • 09.6	338°32.9	• • 02.5	Gacrux	171°52.2	-57°15.3
4	344°37.9	229°22.3	29.8	297°09.8	47.1	276°52.7	09.7	353°35.4	02.5	Alioth	166°13.3	55°49.9
5	359°40.4	244°21.4	29.4	312°10.4	47.6	291°54.6	09.8	8°37.9	02.5	Spica	158°22.7	-11°17.4
6	14°42.9	259°20.6	N22°28.9	327°11.1	N16°48.1	306°56.5	N21°09.9	23°40.4	S06°02.6	Alkaid	152°52.2	49°11.7
7	29°45.3	274° 19.8	28.5	$342^{\circ}11.8$	48.6	321°58.4	10.0	$38^{\circ}42.9$	02.6	Hadar	148°36.4	-60°29.7
8	44°47.8	289°19.0	28.0	357°12.5	49.1	337°00.3	10.0	53°45.4	02.6	Menkent	147°58.0	-36°29.6
9	59°50.3	304°18.2	• • 27.6	12°13.1	• • 49.6	352°02.2	• • 10.1	68°47.8	• • 02.6	Arcturus	145°48.2	19°03.4
10	74°52.7	319° 17.3	27.1	27°13.8	50.1	7°04.1	10.2	83°50.3	02.6	Rigil Kent.	139° 40.6	-60°56.4
11	89°55.2	334°16.5	26.6	42°14.5	50.6	22°06.0	10.3	98°52.8	02.7	Kochab	137° 19.2	74°03.5
12	104°57.7	349° 15.7	N22°26.2	57°15.2	$N16^{\circ}51.1$	37°07.9	N21°10.4	113°55.3	S06°02.7	Zuben'ubi	136° 56.3	-16°08.7
13	120°00.1	4°14.9	25.7	72°15.8	51.6	52°09.8	10.4	128°57.8	02.7		130° 50.5 126° 03.9	26°38.1
14	135°02.6	19° 14.0	25.2	87°16.5	52.1	67°11.7	10.5	144°00.3	02.7	Alphecca		
15	150°05.0	34°13.2	• • 24.8	102°17.2	• • 52.6	82°13.6	• • 10.6	159°02.8	• • 02.7	Antares	112°16.0	-26°29.2
16	165°07.5	49°12.4	24.3	117°17.9	53.1	97°15.5	10.7	174°05.2	02.8	Atria	107°10.1	-69°04.4
17	180°10.0	64°11.6	23.9	132°18.6	53.6	112°17.4	10.8	189°07.7	02.8	Sabik	102°02.9 96°10.5	-15°45.3
18	195°12.4	79° 10.8	N22°23.4	147°19.2	N16°54.1	127°19.3	N21°10.8	204°10.2	<b>S</b> 06°02.8	Shaula		-37°07.3
19	210°14.9	94°09.9	22.9	162°19.9	54.6	142°21.2	10.9	219°12.7	02.8	Rasalhague	95°58.6	12°32.6
20	225°17.4	109°09.1	22.4	177°20.6	55.1	157°23.2	11.0	234°15.2	02.8	Eltanin	90°41.9	51°29.2 -34°22.4
21	240°19.8	124°08.3	• • 22.0	192°21.3	• • 55.6	172°25.1	• • 11.1	249°17.7	• • 02.9	Kaus Aust.	83°32.7	
22	255°22.3	139°07.5	21.5	207°21.9	56.1	187°27.0	11.2	264°20.2	02.9	Vega	80°33.1	38°48.4
23	270°24.8	154°06.7	21.0	222°22.6	56.6	202°28.9	11.2	279°22.7	02.9	Nunki	75°47.9	-26°15.9
										Altair	62°00.0	8°56.0
Mer.p	ass. 05:01	$\nu$ -0.8′ d-0	0.4′ m-3.90	$ u 0.7' \ d0$	.5'  m 0.95	$\nu 1.9' d0$	.1′ m-2.04	$\nu$ 2.5′ d0.	0'  m 0.88	Peacock	53°05.8	-56°39.2
										Deneb	49°25.7	45°21.9
C	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.0	9°59.2
Sun 0	285°27.2	169°05.8	N22°20.6	237°23.3	N16°57.1	217°30.8	N21°11.3	294°25.1	506°02.9	Al Na'ir	27°33.1	-46°50.3
1	300°29.7	184° 05.0	20.1	252°24.0	57.6	232°32.7	11.4	309°27.6	02.9	Fomalhaut	15°14.8	-29°29.4
2	315°32.2	199°04.2	19.6	267°24.7	58.1	247°34.6	11.4	324°30.1	03.0	Scheat	13°45.4	28°12.8
3	315 32.2 330°34.6	199 04.2 214°03.4	19.6	282°25.3	58.1	247 34.6 262°36.5	11.5	324 30.1 339°32.6	• • 03.0	Markab	13°30.2	15°20.2
4	345°37.1	214 03.4 229°02.6	18.6	202 25.3 297°26.0	59.1	202 30.5 277°38.4	11.6	354°35.1	03.0	Jul 05 Fri	SHA	Mer.pass
	0°39.5	229 02.6 244°01.8	18.0	312°26.7	59.1 16°59.6	277 38.4 292°40.3	11.0	9°37.6	03.0	Venus	246°16.6	12:42
5	0°39.5 15°42.0		18.2 N22°17.7	312°26.7 327°27.4		292°40.3 307°42.2	11.7 N21°11.8	9°37.6 24°40.1		Mars	313°21.8	08:12
6		259°00.9			N17°00.1				S06°03.1	Jupiter	292°30.5	09:35
7	30°44.5	274°00.1	17.2	342°28.0	00.6	322°44.1	11.9	39°42.6	03.1			
8	45°46.9	288°59.3	16.7	357°28.7	01.1	337°46.0	11.9	54°45.0	03.1	Saturn	8°57.0	04:30
9	60°49.4	303°58.5	• • 16.2	12°29.4	• • 01.6	352°47.9	· · 12.0	69°47.5	• • 03.1	Jul 06 Sat	SHA	Mer.pass
10	75°51.9	318°57.7	15.7	27°30.1	02.1	7°49.8	12.1	84°50.0	03.1	Venus		12:43
11	90°54.3	333°56.9	15.3	42°30.7	02.6	22°51.7	12.2	99°52.5	03.2		312°39.0	08:11
12	105°56.8	348°56.1	N22°14.8	57°31.4	N17°03.1	37°53.6	N21°12.3	114°55.0	S06°03.2	Jupiter		09:32
13	120°59.3	3°55.2	14.3	72°32.1	03.6	52°55.5	12.3	129°57.5	03.2	Saturn	8°57.4	04:26
14	136°01.7	18°54.4	13.8	87°32.8	04.1	67°57.4	12.4	145°00.0	03.2			
15	151°04.2	33°53.6	• • 13.3	102°33.5	• • 04.6	82°59.4	• • 12.5	160°02.5	• • 03.3	Jul 07 Sun	SHA	Mer.pass
16	166°06.7	48°52.8	12.8	117°34.1	05.1	98°01.3	12.6	175°05.0	03.3	Venus		12:44
17	181°09.1	63°52.0	12.3	132°34.8	05.5	113°03.2	12.7	190°07.5	03.3	Mars	$311^{\circ}56.1$	08:10
17	$196^{\circ}11.6$	78°51.2	N22°11.8	147°35.5	N17°06.0	128°05.1	N21°12.7	205°09.9	S06°03.3	Jupiter		09:29
18		93°50.4	11.3	162°36.2	06.5	143°07.0	12.8	220°12.4	03.3	Saturn	8°57.9	04:22
18 19	$211^{\circ}14.0$									- Juliann	0 01.5	
18 19 20	211°14.0 226°16.5	108°49.6	10.8	$177^{\circ}36.8$	07.0	158°08.9	12.9	$235^{\circ}14.9$	03.4			
18 19 20 21	211°14.0 226°16.5 241°19.0	108° 49.6 123° 48.8	10.8 · · 10.3	177°36.8 192°37.5	07.0 •• 07.5	158°08.9 173°10.8	12.9 •• 13.0	235°14.9 250°17.4	• • 03.4		al parallax	_
18 19 20 21 22	211°14.0 226°16.5 241°19.0 256°21.4	108° 49.6 123° 48.8 138° 47.9	10.8	177°36.8 192°37.5 207°38.2		158°08.9 173°10.8 188°12.7	· · 13.0 13.1	235°14.9 250°17.4 265°19.9			tal parallax Venus:	0.1
18 19 20 21	211°14.0 226°16.5 241°19.0	108° 49.6 123° 48.8	10.8 · · 10.3	177°36.8 192°37.5	•• 07.5	158°08.9 173°10.8	• • 13.0	235°14.9 250°17.4	• • 03.4		al parallax	0.1 0.1

Fig.   CHA	h	Su	n			Moon		
1	Fri	GHA	Dec	GHA	ν	Dec	d	НР
2	0		N22°45.4		5.7'			57.1'
3         222° 503         ··· 44.7         234°445         5.8°         228° 20.7         -0.8°         57.0°           5         223° 50.1         44.2         263° 34.2         5.9°         28° 19.9         -0.9°         57.0°           6         268° 80.0         N22° 43.9         277° 89.1         60°         N28° 19.9         -1.1'         57.0°           8         298° 49.8         43.4         300° 49.1         60°         28° 15.7         1.3°         57.0°           10         328° 49.6         42.9         335° 39.2         61°         28° 15.5         -1.8°         56.9°           11         343° 49.5         42.7         350° 04.3         62°         N28° 19.8         -2.1'         56.8°           12         358° 49.3         N22° 42.5         4° 29.5         62°         N28° 19.8         -2.1'         56.8°           14         28° 49.1         42.0         33° 20.1         64°         28° 05.3         -2.5'         56.8°           15         48° 49.0         -41.7         74° 45.4         64°         28° 05.3         -2.5'         56.8°           16         58° 48.8         7         N22°         10°         18°         18°								
1								
5								
The color of th								
Sect   Section	6		N22°43.9		6.0'			57.0'
19								
10   328"49.6								
11								
13		343°49.5	42.7	350°04.3	6.2'	28°11.7	-2.0'	
14								
15		10 .5.2						
16								
18								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$								
20								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$								
SD = 15.7'	22	148°48.3	39.9	148°44.6	6.9'		-3.7'	56.6'
Sat         GHA (Dec)         CHA (Dec)         CHA (Dec)         U Dec (Dec)         d HP (Dec)           0         178° 48.1 (Dec)         39.2 (Dec) 2.5 (Dec)         7.0" (Dec)         4.1" (S6.6")           1         193° 48.0 (Dec)         39.2 (Dec) 2.5 (Dec)         7.1" (Dec)         27° 29.5 (Dec)         4.2" (S6.5")           2         208° 47.9 (Dec)         38.9 (Dec) 2.8" (Dec)         7.2" (Dec)         27° 25.2 (Dec)         4.4" (S6.5")         5.6.5" (S6.5")           4         238° 47.7 (Dec)         38.1 (249° 47.4 (Dec)         7.4" (27° 11.7 (Dec)         7.5" (Dec)         5.6.4" (Dec)         5.6.4" (Dec)         6.6 (Dec)         4.4" (Dec)         7.7" (Dec)         7.6.0" (Dec)         5.0" (Dec)         56.4" (Dec)         56.4" (Dec)         7.7" (Dec)         7.7" (Dec)         56.8 (Dec)         5.5" (Dec)         56.4" (Dec)         7.7" (Dec)         56.8 (Dec)         5.3" (Dec)         56.4" (Dec)         5.3" (Dec)         56.4" (Dec)         5.3" (Dec)         56.4" (Dec) <t< td=""><th>23</th><td>163°48.2</td><td>39.7</td><td>163°10.5</td><td>6.9'</td><td>27°37.4</td><td>-3.9'</td><td>56.6'</td></t<>	23	163°48.2	39.7	163°10.5	6.9'	27°37.4	-3.9'	56.6'
178° 48.1   N22° 39.4   177° 36.5   7.0   N27° 33.5   -4.1   56.6     1   193° 48.0   39.2   192° 02.5   7.1   27° 29.5   -4.2   56.5     2   208° 47.9   38.9   206° 28.6   7.2   27° 25.2   -4.4   56.5     3   222° 47.8   -38.7   220° 54.8   7.3   27° 26.9   -4.5   56.5     4   238° 47.7   38.4   235° 21.0   7.3   27° 16.4   -4.7   56.5     5   253° 47.6   38.1   249° 47.4   7.4   27° 11.7   -4.8   56.4     6   268° 47.4   N22° 37.9   264° 13.8   7.5   N27° 06.9   -5.0   56.4     7   283° 47.3   37.6   278° 40.3   7.6   27° 01.9   -5.1   56.4     8   298° 47.2   37.4   293° 06.9   7.7   26° 56.8   -5.3   56.4     9   313° 47.1   -37.1   307° 33.5   7.8   26° 51.5   -5.4   56.4     10   328° 47.0   36.8   322° 00.3   7.8   26° 41.5   -5.6   56.3     11   343° 46.9   36.6   336° 27.1   7.9   26° 40.5   -5.7   56.3     12   358° 46.8   N22° 36.3   350° 54.1   8.0   N26° 34.8   -5.8   56.3     13   13° 46.7   36.0   5° 21.1   8.1   26° 20.0   -6.0   56.2     15   43° 46.5   -35.5   34° 15.4   8.3   26° 16.9   -6.3   56.2     16   58° 46.4   35.2   48° 42.7   8.3   26° 16.9   -6.3   56.2     17   73° 46.3   35.0   63° 10.1   8.5   26° 04.2   -6.5   56.2     18   88° 46.2   N22° 34.7   77° 37.6   8.6   N25° 57.7   -6.7   56.1     20   118° 46.0   34.2   106° 32.8   8.8   25° 44.2   -6.9   56.1     21   133° 45.7   33.4   149° 56.4   9.1   25° 33.1   -7.1   56.1     22   148° 45.8   33.6   135° 28.5   9.0   25° 37.3   -7.1   56.1     22   148° 45.8   33.6   135° 28.5   9.0   25° 37.3   -7.1   56.1     3   123° 45.7   33.4   149° 56.4   9.1   25° 23.1   -7.3   56.0      5D   15.7'   d = -0.3'   SD = 15.4'      Sun   GHA   Dec   GHA   ν   Dec   d   HP     0   178° 45.6   N22° 33.1   121° 00.6   8.9   25° 37.3   -7.1   56.1     1   193° 45.5   32.8   178° 52.7   9.3   25° 08.3   -7.6   56.0     2   208° 45.4   32.5   32.8   178° 52.7   9.3   25° 08.3   -7.6   56.0     2   208° 45.4   32.5   32.6   30° 30° 10.1   25° 20.2   -7.2   56.0     3   223° 45.3   33.0   23.6   30° 10.1   24° 37.3   38.1   55.9     4   238° 44.		$SD = \overline{15.7'}$	d=-0.2'		SI	0 = 15.6'		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Sat				$\nu$	Dec	d	HP
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Sun         GHA         Dec         GHA         ν         Dec         d         HP           0         178°45.6         N22°33.1         164°24.5         9.2'         N25°15.7         -7.4'         56.0'           1         193°45.5         32.8         178°52.7         9.3'         25°08.3         -7.6'         56.0'           2         208°45.4         32.5         193°20.9         9.4'         25°00.7         -7.7'         56.0'           3         223°45.3         · 32.3         207°49.3         9.5'         24°53.0         -7.8'         55.9'           4         238°45.2         32.0         222°17.8         9.6'         24°45.2         -7.9'         55.9'           5         253°45.1         31.7         236°46.3         9.7'         24°37.3         -8.1'         55.9'           6         268°45.0         N22°31.4         251°15.0         9.8'         N24°29.2         -8.2'         55.9'           7         283°44.9         31.2         265°43.8         9.9'         24°21.0         -8.3'         55.8'           8         298°44.8         30.9         280°12.6         10.0'         24°12.7         -8.4'         55.8'	23			149 30.4			-7.5	
0       178°45.6       N22°33.1       164°24.5       9.2'       N25°15.7       -7.4'       56.0'         1       193°45.5       32.8       178°52.7       9.3'       25°08.3       -7.6'       56.0'         2       208°45.4       32.5       193°20.9       9.4'       25°00.7       -7.7'       56.0'         3       223°45.3       · 32.3       207°49.3       9.5'       24°53.0       -7.8'       55.9'         4       238°45.2       32.0       222°17.8       9.6'       24°45.2       -7.9'       55.9'         5       253°45.1       31.7       236°46.3       9.7'       24°37.3       -8.1'       55.9'         6       266°45.0       N22°31.4       251°15.0       9.8'       N24°29.2       -8.2'       55.9'         7       283°44.9       31.2       265°43.8       9.9'       24°21.0       -8.3'       55.8'         8       298°44.8       30.9       280°12.6       10.0'       24°12.7       -8.4'       55.8'         9       313°44.7       · 30.6       294°41.6       10.1'       24°04.3       -8.5'       55.8'         10       328°44.6       30.3       309°10.7       10.2'       23	_							
1       193°45.5       32.8       178°52.7       9.3'       25°08.3       -7.6'       56.0'         2       208°45.4       32.5       193°20.9       9.4'       25°00.7       -7.7'       56.0'         3       223°45.3       · 32.3       207°49.3       9.5'       24°53.0       -7.8'       55.9'         4       238°45.2       32.0       222°17.8       9.6'       24°45.2       -7.9'       55.9'         5       253°45.1       31.7       236°46.3       9.7'       24°37.3       -8.1'       55.9'         6       268°45.0       N22°31.4       251°15.0       9.8'       N24°29.2       -8.2'       55.9'         7       283°44.9       31.2       265°43.8       9.9'       24°21.0       -8.3'       55.8'         8       298°44.8       30.9       280°12.6       10.0'       24°12.7       -8.4'       55.8'         9       313°44.7       · 30.6       294°41.6       10.1'       24°04.3       -8.5'       55.8'         10       328°44.6       30.3       309°10.7       10.2'       23°55.8       -8.6'       55.8'         11       343°44.5       30.1       323°39.9       10.3'       23°47								
2       208°45.4       32.5       193°20.9       9.4'       25°00.7       -7.7'       56.0'         3       223°45.3       · · 32.3       207°49.3       9.5'       24°53.0       -7.8'       55.9'         4       238°45.2       32.0       222°17.8       9.6'       24°45.2       -7.9'       55.9'         5       253°45.1       31.7       236°46.3       9.7'       24°37.3       -8.1'       55.9'         6       268°45.0       N22°31.4       251°15.0       9.8'       N24°29.2       -8.2'       55.9'         7       283°44.9       31.2       265°43.8       9.9'       24°21.0       -8.3'       55.8'         8       298°44.8       30.9       280°12.6       10.0'       24°12.7       -8.4'       55.8'         9       313°44.7       · · 30.6       294°41.6       10.1'       24°04.3       -8.5'       55.8'         10       328°44.6       30.3       309°10.7       10.2'       23°55.8       -8.6'       55.8'         11       343°44.5       30.1       323°39.9       10.3'       23°47.2       -8.7'       55.7'         12       358°44.4       N22°29.8       338°09.2       10.4'								
4       238°45.2       32.0       222°17.8       9.6'       24°45.2       -7.9'       55.9'         5       253°45.1       31.7       236°46.3       9.7'       24°37.3       -8.1'       55.9'         6       268°45.0       N22°31.4       251°15.0       9.8'       N24°29.2       -8.2'       55.9'         7       283°44.9       31.2       265°43.8       9.9'       24°21.0       -8.3'       55.8'         8       298°44.8       30.9       280°12.6       10.0'       24°12.7       -8.4'       55.8'         9       313°44.7       · 30.6       294°41.6       10.1'       24°04.3       -8.5'       55.8'         10       328°44.6       30.3       309°10.7       10.2'       23°55.8       -8.6'       55.8'         11       343°44.5       30.1       323°39.9       10.3'       23°47.2       -8.7'       55.7'         12       358°44.4       N22°29.8       338°09.2       10.4'       N23°38.4       -8.9'       55.7'         13       13°44.3       29.5       352°38.5       10.5'       23°29.6       -9.0'       55.7'         14       28°44.2       29.2       7°08.0       10.6'	2	208°45.4	32.5	193°20.9	9.4'	25°00.7	-7.7'	56.0'
5       253°45.1       31.7       236°46.3       9.7'       24°37.3       -8.1'       55.9'         6       268°45.0       N22°31.4       251°15.0       9.8'       N24°29.2       -8.2'       55.9'         7       283°44.9       31.2       265°43.8       9.9'       24°21.0       -8.3'       55.8'         8       298°44.8       30.9       280°12.6       10.0'       24°12.7       -8.4'       55.8'         9       313°44.7       · 30.6       294°41.6       10.1'       24°04.3       -8.5'       55.8'         10       328°44.6       30.3       309°10.7       10.2'       23°55.8       -8.6'       55.8'         11       343°44.5       30.1       323°39.9       10.3'       23°47.2       -8.7'       55.7'         12       358°44.4       N22°29.8       338°09.2       10.4'       N23°38.4       -8.9'       55.7'         13       13°44.3       29.5       352°38.5       10.5'       23°29.6       -9.0'       55.7'         14       28°44.2       29.2       7°08.0       10.6'       23°20.6       -9.1'       55.7'         15       43°44.1       · 28.9       21°37.6       10.7' <t< td=""><th></th><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
6       268°45.0       N22°31.4       251°15.0       9.8'       N24°29.2       -8.2'       55.9'         7       283°44.9       31.2       265°43.8       9.9'       24°21.0       -8.3'       55.8'         8       298°44.8       30.9       280°12.6       10.0'       24°12.7       -8.4'       55.8'         9       313°44.7       · · · · 30.6       294°41.6       10.1'       24°04.3       -8.5'       55.8'         10       328°44.6       30.3       309°10.7       10.2'       23°55.8       -8.6'       55.8'         11       343°44.5       30.1       323°39.9       10.3'       23°47.2       -8.7'       55.7'         12       358°44.4       N22°29.8       338°09.2       10.4'       N23°38.4       -8.9'       55.7'         13       13°44.3       29.5       352°38.5       10.5'       23°29.6       -9.0'       55.7'         14       28°44.2       29.2       7°08.0       10.6'       23°20.6       -9.1'       55.7'         15       43°44.1       · · 28.9       21°37.6       10.7'       23°11.5       -9.2'       55.7'         16       58°44.0       28.6       36°07.3       10.8'								
7       283°44.9       31.2       265°43.8       9.9'       24°21.0       -8.3'       55.8'         8       298°44.8       30.9       280°12.6       10.0'       24°12.7       -8.4'       55.8'         9       313°44.7       · · · 30.6       294°41.6       10.1'       24°04.3       -8.5'       55.8'         10       328°44.6       30.3       309°10.7       10.2'       23°55.8       -8.6'       55.8'         11       343°44.5       30.1       323°39.9       10.3'       23°47.2       -8.7'       55.7'         12       358°44.4       N22°29.8       338°09.2       10.4'       N23°38.4       -8.9'       55.7'         13       13°44.3       29.5       352°38.5       10.5'       23°29.6       -9.0'       55.7'         14       28°44.2       29.2       7°08.0       10.6'       23°20.6       -9.1'       55.7'         15       43°44.1       · · 28.9       21°37.6       10.7'       23°11.5       -9.2'       55.7'         16       58°44.0       28.6       36°07.3       10.8'       23°02.3       -9.3'       55.6'         17       73°43.9       28.4       50°37.1       10.9'       <								
9 313°44.7 ··· 30.6 294°41.6 10.1' 24°04.3 -8.5' 55.8' 10 328°44.6 30.3 309°10.7 10.2' 23°55.8 -8.6' 55.8' 11 343°44.5 30.1 323°39.9 10.3' 23°47.2 -8.7' 55.7' 12 358°44.4 N22°29.8 338°09.2 10.4' N23°38.4 -8.9' 55.7' 13 13°44.3 29.5 352°38.5 10.5' 23°29.6 -9.0' 55.7' 14 28°44.2 29.2 7°08.0 10.6' 23°20.6 -9.1' 55.7' 15 43°44.1 ··· 28.9 21°37.6 10.7' 23°11.5 -9.2' 55.7' 16 58°44.0 28.6 36°07.3 10.8' 23°02.3 -9.3' 55.6' 17 73°43.9 28.4 50°37.1 10.9' 22°53.1 -9.4' 55.6' 18 88°43.8 N22°28.1 65°07.0 11.0' N22°43.7 -9.5' 55.6' 19 103°43.7 27.8 79°37.0 11.1' 22°34.2 -9.6' 55.6' 20 118°43.6 27.5 94°07.1 11.2' 22°24.6 -9.7' 55.5' 21 133°43.5 ··· 27.2 108°37.3 11.3' 22°14.9 -9.8' 55.5' 22 148°43.4 26.9 123°07.6 11.4' 22°05.1 -9.9' 55.5' 23 163°43.3 26.6 137°38.1 11.5' 21°55.2 -10.0' 55.5'	7		31.2	265°43.8	9.9'	24°21.0	-8.3'	
10         328°44.6         30.3         309°10.7         10.2'         23°55.8         -8.6'         55.8'           11         343°44.5         30.1         323°39.9         10.3'         23°47.2         -8.7'         55.7'           12         358°44.4         N22°29.8         338°09.2         10.4'         N23°38.4         -8.9'         55.7'           13         13°44.3         29.5         352°38.5         10.5'         23°29.6         -9.0'         55.7'           14         28°44.2         29.2         7°08.0         10.6'         23°20.6         -9.1'         55.7'           15         43°44.1         · 28.9         21°37.6         10.7'         23°11.5         -9.2'         55.7'           16         58°44.0         28.6         36°07.3         10.8'         23°02.3         -9.3'         55.6'           17         73°43.9         28.4         50°37.1         10.9'         22°53.1         -9.4'         55.6'           18         88°43.8         N22°28.1         65°07.0         11.0'         N22°43.7         -9.5'         55.6'           20         118°43.6         27.5         94°07.1         11.2'         22°24.6         -9.7'								
11       343°44.5       30.1       323°39.9       10.3'       23°47.2       -8.7'       55.7'         12       358°44.4       N22°29.8       338°09.2       10.4'       N23°38.4       -8.9'       55.7'         13       13°44.3       29.5       352°38.5       10.5'       23°29.6       -9.0'       55.7'         14       28°44.2       29.2       7°08.0       10.6'       23°20.6       -9.1'       55.7'         15       43°44.1       · · 28.9       21°37.6       10.7'       23°11.5       -9.2'       55.7'         16       58°44.0       28.6       36°07.3       10.8'       23°02.3       -9.3'       55.6'         17       73°43.9       28.4       50°37.1       10.9'       22°53.1       -9.4'       55.6'         18       88°43.8       N22°28.1       65°07.0       11.0'       N22°43.7       -9.5'       55.6'         19       103°43.7       27.8       79°37.0       11.1'       22°34.2       -9.6'       55.6'         20       118°43.6       27.5       94°07.1       11.2'       22°24.6       -9.7'       55.5'         21       133°43.5       · · 27.2       108°37.3       11.3'								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	12	358°44.4	N22°29.8	338°09.2	10.4'	N23°38.4	-8.9'	55.7'
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19     103°43.7     27.8     79°37.0     11.1'     22°34.2     -9.6'     55.6'       20     118°43.6     27.5     94°07.1     11.2'     22°24.6     -9.7'     55.5'       21     133°43.5     27.2     108°37.3     11.3'     22°14.9     -9.8'     55.5'       22     148°43.4     26.9     123°07.6     11.4'     22°05.1     -9.9'     55.5'       23     163°43.3     26.6     137°38.1     11.5'     21°55.2     -10.0'     55.5'	17	73°43.9	28.4	50°37.1	10.9'	22°53.1	-9.4'	55.6'
20     118°43.6     27.5     94°07.1     11.2'     22°24.6     -9.7'     55.5'       21     133°43.5     · · 27.2     108°37.3     11.3'     22°14.9     -9.8'     55.5'       22     148°43.4     26.9     123°07.6     11.4'     22°05.1     -9.9'     55.5'       23     163°43.3     26.6     137°38.1     11.5'     21°55.2     -10.0'     55.5'								
21       133°43.5       ··· 27.2       108°37.3       11.3'       22°14.9       -9.8'       55.5'         22       148°43.4       26.9       123°07.6       11.4'       22°05.1       -9.9'       55.5'         23       163°43.3       26.6       137°38.1       11.5'       21°55.2       -10.0'       55.5'								
22     148°43.4     26.9     123°07.6     11.4'     22°05.1     -9.9'     55.5'       23     163°43.3     26.6     137°38.1     11.5'     21°55.2     -10.0'     55.5'								
	22		26.9	123°07.6	11.4'		-9.9'	55.5'
SD = 15.7'  d = -0.3' $SD = 15.3'$	23			137°38.1			-10.0'	55.5'
		SD = 15.7'	d = -0.3'		SI	O = 15.3'		

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

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

		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	1-1%	
05	04:37	04:43	12:05	11:41	-:-		
06	04:48	04:53	12:05	12:38	00:10		
07	04:58	05:02	12:05	13:30	01:05		

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	286°26.4	168°46.3	N22°08.8	237°39.5	N17°09.0	218°16.5	N21°13.2	295°24.9	S06°03.5			
1	301°28.8	183°45.5	08.3	252°40.2	09.5	233°18.4	13.3	310°27.4	03.5	Alpheratz	357°35.1	29°13.4
2	316°31.3	198° 44.7	07.8	267°40.9	10.0	248°20.3	13.4	325°29.9	03.5	Ankaa	353°07.5	-42°10.1
3	331°33.8	213°43.9	• • 07.3	282°41.6	. 10.5	263°22.2	13.4	340°32.4	03.5	Schedar	349°31.5	56°40.0
4	346°36.2	228°43.1	06.8	297°42.2	11.0	278°24.1	13.5	355°34.9	03.5	Diphda	348°47.7	-17°51.0
5	1°38.7	243° 42.3	06.3	312°42.9	11.4	293°26.1	13.6	10°37.3	03.6	I	335°20.6	-57°06.4
6	16°41.1	258°41.5	N22°05.8	327°43.6	N17°11.9	308°28.0	N21°13.7	25°39.8	S06°03.6	Hamal	327°51.8	23°34.6
7	31°43.6	273°40.7	05.3	342°44.3	12.4	323°29.9	13.8	40°42.3	03.6		314°29.1	89°21.7
8	46°46.1	288°39.9	04.8	357°45.0	12.9	338°31.8	13.8	55°44.8	03.6	Acamar	315°12.3	-40°12.1
9	61°48.5	303°39.1	• • 04.2	12°45.6	• • 13.4	353°33.7	• • 13.9	70°47.3	• • 03.7	Menkar	314°06.7	4°11.2
10	76°51.0	318°38.3	03.7	27°46.3	13.9	8°35.6	14.0	85°49.8	03.7	Mirfak	308°29.2	49°56.7
11	91°53.5	333°37.5	03.2	42°47.0	14.4	23°37.5	14.1	100°52.3	03.7	Aldebaran	290°40.4 281°04.6	16°33.5 -8°10.3
12	106°55.9	348° 36.6	N22°02.7	57°47.7	N17°14.9	38°39.4	N21°14.1	115°54.8	S06°03.7	Rigel Capella	281 04.6 280°22.9	-8 10.3 46°01.3
13	121°58.4	3°35.8	02.2	72°48.3	15.4	53°41.3	14.2	130°57.3	03.8	Bellatrix	278°23.6	6°22.4
14	137°00.9	18°35.0	01.7	87°49.0	15.8	68°43.2	14.3	145°59.8	03.8	Elnath	278°02.7	28°37.7
15	152°03.3	33°34.2	• • 01.2	102°49.7	• • 16.3	83°45.1	• • 14.4	161°02.3	• • 03.8	Alnilam	275°38.5	-1°11.1
16	167°05.8	48°33.4	00.6	117°50.4	16.8	98°47.0	14.5	176°04.8	03.8	Betelgeuse	270°52.9	7°24.7
17	182°08.3	63°32.6	22°00.1	132°51.0	17.3	113°49.0	14.5	191°07.3	03.9	Canopus	263°53.1	-52°42.4
18	197°10.7	78°31.8	N21°59.6	147°51.7	N17°17.8	128°50.9	N21°14.6	206°09.8	S06°03.9	Sirius	258°27.0	-16°44.9
19	212°13.2	93°31.0	59.1	162°52.4	18.3	143°52.8	14.7	221°12.3	03.9	Adhara	255°06.6	-29°00.2
20	227°15.6	108°30.2	58.5	177°53.1	18.8	158°54.7	14.8	236°14.8	03.9	Procyon	244°51.6	5°09.8
21	242°18.1	123°29.4	• • 58.0	192°53.7	• • 19.2	173°56.6	• • 14.8	251°17.2	• • 04.0	Pollux	243°18.2	27°58.1
22	257°20.6	138° 28.6	57.5	207°54.4	19.7	188°58.5	14.9	266°19.7	04.0	Avior	234°15.6	-59°35.3
23	272°23.0	153°27.8	57.0	222°55.1	20.2	204°00.4	15.0	281°22.2	04.0	Suhail	222°47.0	-43°31.9
Mer.p	ass. 04:53	$\nu$ -0.8 $d$ -0	0.5′ m-3.89	$\nu 0.7' d0$	.5′ m0.95	$\nu$ 1.9 d0.	.1′ m-2.04	$\nu 2.5' d0$	.0′ m0.87	Miaplacidus	221°39.2	-69°49.2
										Alphard	217°48.4	-8°45.9
_	C	<b></b>	-	<b>611</b>	-	<b></b>	-		Б	Regulus	207°35.1	11°51.0
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.8	61°37.4
0	287°25.5	168°27.0	N21°56.4	237°55.8	N17°20.7	219°02.3	N21°15.1	296°24.7	S06°04.0	Denebola	$182^{\circ}25.5$	14°26.2
1	302°28.0	183°26.2	55.9	252°56.5	21.2	234°04.2	15.2	311°27.2	04.0	Gienah	$175^{\circ}44.1$	$-17^{\circ}40.7$
2	317°30.4	198°25.4	55.4	267°57.1	21.7	249°06.1	15.2	326°29.7	04.1	Acrux	173°00.7	-63°14.4
3	332°32.9	213°24.6	• • 54.8	282°57.8	• • 22.1	264°08.1	• • 15.3	341°32.2	• • 04.1	Gacrux	171°52.2	-57°15.3
4	347°35.4	228°23.8	54.3	297°58.5	22.6	279°10.0	15.4	356°34.7	04.1	Alioth	166°13.3	55°49.9
5	2°37.8	243°23.0	53.8	312°59.2	23.1	294°11.9	15.5	11°37.2	04.1	Spica	158°22.7	-11°17.4
6	17°40.3 32°42.8	258°22.2	N21°53.2	327°59.8 343°00.5	N17°23.6	309°13.8 324°15.7	N21°15.5	26°39.7 41°42.2	S06°04.2	Alkaid	152°52.2	49°11.7
7 8	32 42.8 47°45.2	273°21.5 288°20.7	52.7 52.2	343 00.5 358°01.2	24.1	324 15.7 339°17.6	15.6 15.7	41 42.2 56°44.7	04.2 04.2	Hadar	148°36.4	-60°29.7
9	47 45.2 62°47.7	303° 19.9	51.6	13°01.9	24.6 •• 25.0	354°19.5	15.8	71°47.2	• • 04.2	Menkent		-36°29.6
10	77°50.1	318° 19.1	51.1	28°02.5	25.5	9°21.4	15.8	86°49.7	04.2	Arcturus		19°03.4
11	92°52.6	333° 18.3	50.5	43°03.2	26.0	24°23.3	15.0	101°52.2	04.3	Rigil Kent.		-60°56.4
12	107°55.1	348° 17.5	N21°50.0	58°03.9	N17°26.5	39°25.2	N21°16.0	101 52.2 116°54.7	S06°04.3	1	137°19.2	74°03.5
13	122°57.5	3°16.7	49.5	73°04.6	27.0	54°27.2	16.1	131°57.2	04.3	Zuben'ubi		-16°08.7
14	138°00.0	18° 15.9	48.9	88°05.2	27.4	69°29.1	16.2	146°59.7	04.4	Alphecca	126°03.9	26°38.1
15	153°02.5	33° 15.1	• • 48.4	103°05.9	• • 27.9	84°31.0	. 16.2	162°02.2	04.4	Antares	112°16.0	-26°29.2
16	168°04.9	48° 14.3	47.8	118°06.6	28.4	99°32.9	16.3	177°04.7	04.4	Atria	107°10.2	-69°04.4
17	183°07.4	63° 13.5	47.3	133°07.3	28.9	114°34.8	16.4	192°07.2	04.5	Sabik	102°02.9	-15°45.3
18	198°09.9	78° 12.7	N21°46.7	148°07.9	N17°29.4	129°36.7	N21°16.5	207°09.7	S06°04.5	Shaula	96°10.5	-37°07.3 12°32.6
19	213°12.3	93°11.9	46.2	163°08.6	29.8	144°38.6	16.5	222°12.2	04.5	Rasalhague	95°58.6	
20	228°14.8	108°11.1	45.6	178°09.3	30.3	159°40.5	16.6	237°14.7	04.5	Eltanin	90°41.9 83°32.7	51°29.2
21	243°17.3	123°10.4	• • 45.1	193°10.0	• • 30.8	174°42.5	• • 16.7	252°17.2	• • 04.6	Kaus Aust.	83 32.7 80°33.1	-34°22.4 38°48.4
22	258°19.7	138°09.6	44.5	208°10.6	31.3	189°44.4	16.8	267°19.7	04.6	Vega	75°47.9	
23	273°22.2	153°08.8	44.0	223°11.3	31.8	204°46.3	16.8	282°22.2	04.6	Nunki Altair	62°00.0	-26°16.0 8°56.0
N 4 - · · · ·	04:50		0.5′ m-3.89	- 0.7/ -10	F/ 0 04	- 1 0/ -10	1/ 2.05	2.5/ -10	0/ 0 07	Peacock	53°05.8	-56°39.3
ivier.p	ass. 04:50	$\nu$ -0.8 a-0	7.5 m-3.89	$\nu$ 0.7 au	.5′ m0.94	$\nu_{1.9}$ au	.1′ m-2.05	ν2.5 αυ	.0′ m0.87	Deneb	49°25.7	45°21.9
										Enif	33°38.9	9°59.2
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.1	-46°50.3
0	$288^{\circ}24.6$	$168^{\circ}08.0$	N21°43.4	$238^{\circ}12.0$	$N17^{\circ}32.2$	219°48.2	N21°16.9		S06°04.6	Fomalhaut	15°14.8	-29°29.4
1	$303^{\circ}27.1$	183°07.2	42.9	253°12.7	32.7	$234^{\circ}50.1$	17.0	312°27.2	04.7	Scheat	13°45.4	28°12.8
2	318°29.6	198°06.4	42.3	268°13.4	33.2	249°52.0	17.1	327°29.7	04.7	Markab	13°30.1	15°20.2
3	333°32.0	213°05.6	• • 41.7	283°14.0	• • 33.7	264°53.9	• • 17.1	342°32.2	• • 04.7			
4	348°34.5	228°04.8	41.2	298°14.7	34.1	279°55.8	17.2	357°34.7	04.7	Jul 08 Mon	SHA	Mer.pass
5	3°37.0	243°04.0	40.6	313°15.4	34.6	294°57.8	17.3	12°37.2	04.8		242°20.0	12:46
6	18°39.4	258°03.3	N21°40.1	328°16.1	N17°35.1	309°59.7	N21°17.4	27°39.7	S06°04.8		311°13.2	08:09
7	33°41.9	273°02.5	39.5	343°16.7	35.6	325°01.6	17.4	42°42.2	04.8	Jupiter		09:26
8	48°44.4	288°01.7	38.9	358°17.4	36.0	340°03.5	17.5	57°44.7	04.8	Saturn	8°58.5	04:18
9	63°46.8	303°00.9	• • 38.4	13°18.1	• • 36.5	355°05.4	• • 17.6	72°47.2	• • 04.9	Jul 09 Tue	SHA	Mer.pass
10	78°49.3	318°00.1	37.8	28°18.8	37.0	10°07.3	17.7	87°49.7	04.9		241°01.5	12:47
11	93°51.7 108°54.2	332°59.3 347°58.6	37.2 N21°36.7	43°19.4 58°20.1	37.5 N17°37.9	25°09.2 40°11.1	17.7 N21°17.8	102°52.2	04.9 \$06°05.0		310°30.3	08:08
12 13	108°54.2 123°56.7	347°58.6 2°57.8	N21 36.7 36.1	73°20.8	N17 37.9 38.4	40°11.1 55°13.1	N21 17.8 17.9	117 54.7 132°57.2	05.0	Jupiter	291°36.8	09:23
13 14	123°56.7 138°59.1	2°57.8 17°57.0	36.1 35.5	73°20.8 88°21.5	38.4 38.9	70°15.0	17.9 18.0	132°57.2 147°59.7	05.0 05.0	Saturn	8°59.2	04:14
15	156 59.1 154°01.6	32° 56.2	35.0	103°22.1	39.3	85°16.9	18.0	163°02.2	• • 05.0	I.J. 10 M/- 1	CHA	Me:
16	169°04.1	47° 55.4	34.4	103 22.1 118°22.8	39.8	100°18.8	18.1	178°04.7	05.0	Jul 10 Wed	<b>SHA</b> 239°43.3	Mer.pass
17	184°06.5	62° 54.6	33.8	116 22.6 133°23.5	39.6 40.3	100 16.6 115°20.7	18.2	176 04.7 193°07.2	05.1	Venus		12:48
18	199°09.0	77°53.9	N21°33.2	148°24.2	N17°40.8	130°22.6	N21°18.3	208°09.7	S06°05.1	Mars	309°47.4 291°23.5	08:07 09:20
19	214°11.5	92°53.1	32.7	163°24.8	41.2	145°24.5	18.4	200°03.7 223°12.2	05.1	Saturn	9°00.0	09:20
20	229°13.9	107°52.3	32.1	178°25.5	41.7	160°26.5	18.4	238°14.7	05.2	Saturn	9 00.0	04:10
21	244°16.4	122°51.5	• • 31.5	193°26.2	• • 42.2	175°28.4	. 18.5	253°17.2	05.2	Horizont	al parallax	
22	259°18.9	137° 50.7	30.9	208°26.9	42.6	190°30.3	18.6	268°19.7	05.2	1	Venus:	0.1
23	274°21.3	152°50.0	30.4	223°27.5	43.1	205°32.2	18.7	283°22.2	05.2		Mars:	0.1
ivler.p	ass. 04:46	$\nu$ -0.8′ $d$ -0	).6′ m-3.89	νυ./′ d0	.5'  m 0.94	$\nu$ 1.9′ $d0$ .	.1′ m-2.05	$\nu$ 2.5′ $d0$	.0′ m0.86			

	٥.10.0	Moon					
h	Su				Moon		
Mon 0	<b>GHA</b> 178°43.2	<b>Dec</b> N22° 26.4	<b>GHA</b> 152°08.6	u 11.6'	<b>Dec</b> N21°45.2	d -10.1'	<b>HP</b> 55.5'
1	176 43.2 193°43.1	26.1	166°39.2	11.7'	21°35.2	-10.1	55.4'
2	208°43.0	25.8	181°09.9	11.8'	21°25.0	-10.3'	55.4'
3	223°42.9	•• 25.5	195°40.7	11.9'	21°14.7	-10.3'	55.4'
4	238°42.8	25.2	210°11.6	12.0'	21°04.4	-10.4'	55.4'
5 6	253°42.8 268°42.7	24.9 N22°24.6	224°42.6 239°13.8	12.1' 12.2'	20°54.0 N20°43.4	-10.5' -10.6'	55.4' 55.3'
7	283°42.6	24.3	253°45.0	12.3'	20°32.8	-10.7	55.3'
8	298°42.5	24.0	268°16.3	12.4'	$20^{\circ}22.1$	-10.8'	55.3'
9	313°42.4	• • 23.7	282°47.7	12.5'	20°11.4	-10.9'	55.3'
10 11	328° 42.3 343° 42.2	23.4 23.1	297°19.2 311°50.8	12.6' 12.7'	20°00.5 19°49.6	-10.9' -11.0'	55.2' 55.2'
12	358°42.1	N22°22.8	311 50.6 326°22.5	12.7	N19°38.5	-11.0	55.2'
13	13°42.0	22.5	340°54.3	12.9'	19°27.4	-11.2'	55.2'
14	28°41.9	22.2	$355^{\circ}26.2$	13.0'	$19^{\circ}16.3$	-11.3'	55.2'
15	43°41.8	• • 21.9	9°58.2	13.1'	19°05.0	-11.3'	55.1'
16 17	58°41.7 73°41.6	21.6 21.4	24°30.2 39°02.4	13.2' 13.3'	18°53.7 18°42.3	-11.4' -11.5'	55.1' 55.1'
18	88°41.5	N22°21.0	53°34.7	13.4	N18°30.8	-11.5'	55.1'
19	103°41.4	20.7	68°07.0	13.4'	18°19.3	-11.6'	55.1'
20	118°41.3	20.4	82°39.5	13.5'	18°07.7	-11.7'	55.0'
21	133°41.2	• • 20.1	97°12.0	13.6'	17°56.0	-11.7'	55.0'
22 23	148°41.2 163°41.1	19.8 19.5	111°44.6 126°17.3	13.7' 13.8'	17°44.2 17°32.4	-11.8' -11.9'	55.0' 55.0'
23						11.3	33.0
	SD = 15.7'	d = -0.3'		SI	D = 15.1'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°41.0	N22° 19.2	140°50.1 155°23.0	13.9'	N17°20.5	-11.9'	55.0'
1 2	193°40.9 208°40.8	18.9 18.6	155° 23.0 169° 56.0	14.0' 14.1'	17°08.6 16°56.6	-12.0' -12.1'	55.0' 54.9'
3	208 40.8 223°40.7	• • 18.3	184°29.0	14.1	16°44.5	-12.1'	54.9'
4	238°40.6	18.0	199°02.2	14.2'	16°32.4	-12.2'	54.9'
5	253°40.5	17.7	213°35.4	14.3'	16°20.2	-12.2'	54.9'
6	268°40.4	N22° 17.4	228°08.7	14.4'	N16°07.9	-12.3'	54.9'
7 8	283°40.3 298°40.2	17.1 16.8	242°42.1 257°15.5	14.5' 14.5'	15°55.6 15°43.3	-12.4' -12.4'	54.8' 54.8'
9	313°40.1	. 16.5	271°49.1	14.6'	15°30.9	-12.5'	54.8'
10	328°40.1	16.2	286°22.7	14.7'	15°18.4	-12.5'	54.8'
11	343°40.0	15.8	300°56.4	14.8'	15°05.9	-12.6'	54.8'
12	358°39.9 13°39.8	N22° 15.5 15.2	315°30.2 330°04.0	14.9' 14.9'	N14°53.3 14°40.7	-12.6' -12.7'	54.8' 54.7'
13 14	13 39.8 28°39.7	15.2 14.9	344°38.0	14.9 15.0'	14 40.7 14°28.0	-12.7'	54.7'
15	43°39.6	• • 14.6	359°12.0	15.1'	14°15.3	-12.8'	54.7'
16	58°39.5	14.3	13°46.0	15.1'	14°02.5	-12.8'	54.7'
17	73°39.4 88°39.3	14.0 N22°13.6	28°20.2 42°54.4	15.2' 15.3'	13°49.7 N13°36.8	-12.9'	54.7' 54.7'
18 19	00 39.3 103°39.2	13.3	57°28.7		13°23.9	-12.9' -13.0'	54.7 54.6'
20	118°39.2	13.0	72°03.0	15.4'	13°11.0	-13.0'	54.6'
21	133°39.1	•• 12.7	86°37.5	15.5'	12°58.0	-13.0'	54.6'
22	148°39.0	12.4	101°11.9	15.6'	12°44.9	-13.1'	54.6'
23	163°38.9	12.0	115°46.5	15.6'	12°31.8	-13.1'	54.6'
	SD = 15.7'	d = -0.3'		Si	D = 15.0'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°38.8	N22°11.7	130°21.1	15.7'	N12°18.7	-13.2'	54.6'
1 2	193°38.7 208°38.6	11.4 11.1	144°55.8 159°30.5	15.7' 15.8'	12°05.6 11°52.4	-13.2' -13.2'	54.6' 54.5'
3	200 30.0 223°38.5	. 10.8	174°05.3	15.6 15.9'	11°32.4 11°39.1	-13.2 -13.3'	54.5'
4	238°38.5	10.4	188°40.2	15.9'	11°25.9	-13.3'	54.5'
5	253°38.4	10.1	203°15.1	16.0'	11°12.5	-13.3'	54.5'
6 7	268°38.3 283°38.2	N22°09.8 09.5	217°50.1 232°25.2	16.0' 16.1'	N10°59.2 10°45.8	-13.4' -13.4'	54.5' 54.5'
8	283°38.2 298°38.1	09.5 09.1	232°25.2 247°00.3	16.1	10°45.8 10°32.4	-13.4' -13.4'	54.5'
9	313°38.0	08.8	261°35.4	16.2	10° 19.0	-13.5'	54.5
10	328° 37.9	08.5	276°10.6	16.3'	10°05.5	-13.5'	54.4'
11	343°37.9	08.2	290°45.9	16.3'	09°52.0	-13.5'	54.4'
12 13	358°37.8 13°37.7	N22°07.8 07.5	305°21.2 319°56.5	16.4' 16.4'	N09°38.5 09°24.9	-13.6' -13.6'	54.4' 54.4'
14	28°37.6	07.5 07.2	334°31.9	16.5	09°24.9	-13.6'	54.4'
15	43°37.5	• • 06.8	349°07.4	16.5'	08°57.7	-13.6'	54.4'
16	58°37.4	06.5	3°42.9	16.5'	08°44.1	-13.7'	54.4'
17	73°37.3	06.2 N22°05.8	18°18.4 32°54.0	16.6'	08°30.4	-13.7'	54.4'
18 19	88°37.3 103°37.2	N22°05.8 05.5	32°54.0 47°29.7	16.6' 16.7'	N08°16.7 08°03.0	-13.7' -13.7'	54.4' 54.3'
20	118°37.1	05.5	62°05.3	16.7'	07°49.3	-13.8'	54.3'
21	133°37.0	• • 04.8	$76^{\circ}41.1$	16.8'	07°35.5	-13.8'	54.3'
22	148°36.9	04.5	91°16.8	16.8'	07°21.7	-13.8'	54.3'
23	163°36.8	$\frac{04.2}{d = -0.3'}$	105°52.6	16.8'	07°07.9	-13.8'	54.3'
	SD = 15.7'	SD = 14.9'					

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

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

		Sun		Moon			
Day	Eqn.o	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	5-16%	
08	05:07	05:12	12:05	14:19	01:55		
09	05:16	05:21	12:05	15:03	02:42		
10	05:25	05:29	12:05	15:45	03:24		

July 11, 12, 13 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	289°23.8	167°49.2	N21°29.8	238°28.2	N17°43.6	220°34.1	N21°18.7	298°24.7	S06°05.3			
1	304°26.2	182°48.4	29.2	253°28.9	44.1	235°36.0	18.8	313°27.2	05.3	Alpheratz	$357^{\circ}35.1$	29°13.4
2	319°28.7	197°47.6	28.6	268°29.6	44.5	250°38.0	18.9	328°29.7	05.3	Ankaa	353°07.4	-42°10.1
3	334°31.2	212°46.9	• • 28.0	283°30.2	• • 45.0	265°39.9	. 19.0	343°32.2	• • 05.4	Schedar	349°31.4	56°40.0
4	349°33.6	212 40.9 227°46.1	27.4	298°30.9	45.5	280°41.8	19.0	358°34.7	05.4	Diphda	348°47.7	$-17^{\circ}51.0$
										Achernar	335°20.5	-57°06.4
5	4°36.1	242°45.3	26.9	313°31.6	45.9	295°43.7	19.1	13°37.2	05.4	Hamal	$327^{\circ}51.7$	23°34.6
6	19°38.6	257°44.5	N21°26.3	328°32.3	N17°46.4	310°45.6	N21°19.2	28°39.7	S06°05.4	Polaris	314°27.8	89°21.7
7	34°41.0	272°43.7	25.7	343°32.9	46.9	325°47.5	19.2	43°42.2	05.5	Acamar	315°12.3	-40°12.1
8	49°43.5	287°43.0	25.1	358°33.6	47.3	340°49.4	19.3	58°44.7	05.5	Menkar	314°06.7	4°11.2
9	64°46.0	302°42.2	• • 24.5	13°34.3	• • 47.8	355°51.4	• • 19.4	73°47.2	• • 05.5	Mirfak	308°29.1	49°56.7
10	79°48.4	317°41.4	23.9	28°35.0	48.3	10°53.3	19.5	88°49.7	05.6	Aldebaran	290°40.4	16°33.5
11	94°50.9	332°40.7	23.3	43°35.7	48.7	25°55.2	19.5	103°52.2	05.6	1		
12	109°53.3	347°39.9	N21°22.7	58°36.3	N17°49.2	40°57.1	N21°19.6	118°54.7	S06°05.6	Rigel	281°04.6	-8°10.3
13	124°55.8	2°39.1	22.1	73°37.0	49.7	55°59.0	19.7	133°57.2	05.6	Capella	280°22.9	46°01.3
14	139°58.3	17°38.3	21.5	88°37.7	50.1	71°00.9	19.8	148°59.7	05.7	Bellatrix	278°23.6	6°22.4
15	155°00.7	32° 37.6	20.9	103°38.4	• • 50.6	86°02.9	• • 19.8	164°02.2	• • 05.7	Elnath	278°02.7	28°37.7
16	170°03.2	47°36.8	20.3	118°39.0	51.1	101°04.8	19.9	179°04.8	05.7	Alnilam	275°38.4	$-1^{\circ}11.1$
17	185°05.7	62°36.0	19.7	133°39.7	51.5	116°06.7	20.0	194°07.3	05.8	Betelgeuse	270°52.8	$7^{\circ}24.8$
										Canopus	263°53.1	-52°42.4
18	200°08.1	77°35.2	N21°19.1	148°40.4	N17°52.0	131°08.6	N21°20.1	209°09.8	S06°05.8	Sirius	258°26.9	-16°44.9
19	215°10.6	92°34.5	18.5	163°41.1	52.4	146°10.5	20.1	224°12.3	05.8	Adhara	255°06.6	-29°00.2
20	230°13.1	107°33.7	17.9	178°41.7	52.9	161°12.4	20.2	239°14.8	05.8	Procyon	244°51.6	5°09.8
21	$245^{\circ}15.5$	122°32.9	• • 17.3	193°42.4	• • 53.4	176°14.4	• • 20.3	254°17.3	• • 05.9	Pollux	243°18.2	27°58.1
22	260°18.0	137°32.2	16.7	208°43.1	53.8	191°16.3	20.4	269°19.8	05.9	Avior	234° 15.6	-59°35.3
23	275°20.5	152°31.4	16.1	223°43.8	54.3	206°18.2	20.4	284°22.3	05.9			
N.A -	04:40	0 0/ 10		0 7/ /0	E/ == 0.04	1 0/ 10		0 =/		Suhail	222°47.0	-43°31.9
ivler.p	ass. 04:42	ν-0.8′ d-0	0.6′ m-3.89	$\nu$ 0.1' d0	.5′ m0.94	$\nu_{1.9'} d0.$	.1′ m-2.05	$\nu$ 2.5′ $d0$	.0′ m0.86	Miaplacidus	221°39.3	-69°49.1
										Alphard	217°48.4	-8°45.8
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.1	11°51.0
0 0	290°22.9	167° 30.6	N21°15.5	238°44.4	N17°54.8	221°20.1	N21°20.5	299°24.8	S06°06.0	Dubhe	193°41.9	61°37.4
										Denebola	182°25.5	14°26.2
1	305°25.4	182°29.9	14.9	253°45.1	55.2	236°22.0	20.6	314°27.3	06.0	Gienah	$175^{\circ}44.1$	$-17^{\circ}40.7$
2	320°27.8	197°29.1	14.3	268°45.8	55.7	251°24.0	20.7	329°29.8	06.0	Acrux	173°00.8	-63°14.4
3	335°30.3	212°28.3	• • 13.7	283°46.5	•• 56.1	266°25.9	• • 20.7	344°32.3	• • 06.0	Gacrux	171°52.2	$-57^{\circ}15.3$
4	350°32.8	227°27.6	13.1	298°47.1	56.6	281°27.8	20.8	359°34.8	06.1	Alioth	166°13.4	55°49.9
5	5°35.2	242°26.8	12.5	313°47.8	57.1	296°29.7	20.9	14°37.3	06.1	Spica	158°22.7	-11°17.4
6	20°37.7	257°26.0	N21°11.9	328°48.5	N17°57.5	311°31.6	N21°20.9	29°39.8	S06°06.1	Alkaid	152°52.2	49°11.7
7	35°40.2	272°25.3	11.2	343°49.2	58.0	326°33.5	21.0	44°42.4	06.2	Hadar	148°36.5	-60°29.7
8	50°42.6	287°24.5	10.6	358°49.8	58.5	341°35.5	21.1	59°44.9	06.2			
9	65°45.1	302°23.8	• • 10.0	13°50.5	• • 58.9	356°37.4	• • 21.2	74°47.4	• • 06.2	Menkent	147°58.0	-36°29.6
10	80°47.6	317°23.0	09.4	28°51.2	59.4	11°39.3	21.2	89°49.9	06.3	Arcturus	145°48.2	19°03.4
11	95°50.0	332°22.2	08.8	43°51.9	17°59.8	26°41.2	21.3	104°52.4	06.3	Rigil Kent.	139°40.7	-60°56.4
12	110°52.5	347°21.5	N21°08.2	58°52.5	N18°00.3	41°43.1	N21°21.4	119°54.9	S06°06.3	Kochab	137°19.2	74°03.5
	125°55.0	2°20.7		73°53.2		56°45.1		134°57.4		Zuben'ubi	136°56.3	-16°08.7
13			07.5		00.7		21.5		06.3	Alphecca	126°03.9	$26^{\circ}38.1$
14	140°57.4	17°19.9	06.9	88°53.9	01.2	71°47.0	21.5	149°59.9	06.4	Antares	$112^{\circ}16.1$	-26°29.2
15	155°59.9	32°19.2	• • 06.3	103°54.6	• • 01.7	86°48.9	• • 21.6	165°02.4	• • 06.4	Atria	$107^{\circ}10.2$	-69°04.4
16	171°02.3	47° 18.4	05.7	118°55.2	02.1	101°50.8	21.7	180°04.9	06.4	Sabik	102°02.9	-15°45.3
17	186°04.8	62°17.7	05.0	133°55.9	02.6	116°52.7	21.8	195°07.4	06.5	Shaula	96°10.5	-37°07.3
18	201°07.3	77°16.9	N21°04.4	148°56.6	N18°03.0	131°54.7	N21°21.8	210°09.9	S06°06.5	Rasalhague	95°58.6	12°32.6
19	216°09.7	$92^{\circ}16.1$	03.8	163°57.3	03.5	146°56.6	21.9	225°12.5	06.5	Eltanin	90°41.9	51°29.2
20	231°12.2	107°15.4	03.2	178°57.9	03.9	161°58.5	22.0	240°15.0	06.6	Kaus Aust.	83°32.7	-34°22.4
21	246°14.7	122°14.6	• • 02.5	193°58.6	• • 04.4	177°00.4	• • 22.0	255°17.5	• • 06.6			
22	261°17.1	137° 13.9	01.9	208°59.3	04.9	192°02.3	22.1	270°20.0	06.6	Vega	80°33.1	38°48.4
23	276°19.6	152° 13.1	01.3	224°00.0	05.3	207°04.3	22.2	285°22.5	06.6	Nunki	75°47.9	-26°16.0
										Altair	62°00.0	8°56.0
Mer.p	ass. 04:38	$\nu$ -0.8' d-0	).6′ m-3.89	$ u$ 0.7 $^{\prime}$ d0	.5'  m 0.93	$\nu 1.9' \ d0.$	.1' m-2.05	$\nu 2.5' \ d0$	.0′ m0.85	Peacock	53°05.8	-56°39.3
										Deneb	49°25.6	45°22.0
<b>.</b> .	C***	C	-		-	a	-	<b></b>	Б	Enif	33°38.9	9°59.2
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.0	-46°50.3
0	291°22.1	167°12.4	N21°00.6	239°00.6	N18°05.8	222°06.2	N21°22.3	300°25.0	S06°06.7	Fomalhaut	$15^{\circ}14.7$	-29°29.4
1	306°24.5	182°11.6	21°00.0	254°01.3	06.2	237°08.1	22.3	315°27.5	06.7	Scheat	13°45.4	28°12.8
2	321°27.0	197° 10.8	20°59.4	269°02.0	06.7	252°10.0	22.4	330°30.0	06.7	Markab	13°30.1	15°20.2
3	336°29.4	212°10.1	• • 58.7	284°02.7	•• 07.1	267°11.9	• • 22.5	345°32.5	• • 06.8			
4	351°31.9	$227^{\circ}09.3$	58.1	299°03.3	07.6	282°13.9	22.6	0°35.0	06.8	Jul 11 Thu	SHA	Mer.pass
5	6°34.4	242°08.6	57.5	314°04.0	0.80	$297^{\circ}15.8$	22.6	15°37.6	06.8	Venus	238°25.4	12:49
6	21°36.8	257°07.8	N20°56.8	329°04.7	N18°08.5	312°17.7	N21°22.7	30°40.1	S06°06.9	Mars	309°04.4	08:06
7	36°39.3	272°07.1	56.2	344°05.4	08.9	327°19.6	22.8	45°42.6	06.9	Jupiter	291°10.3	09:17
8	51°41.8	287°06.3	55.6	359°06.0	09.4	342°21.5	22.8	60°45.1	06.9	Saturn	9°00.9	04:06
9	66°44.2	302°05.6	• • 54.9	14°06.7	•• 09.8	357°23.5	22.9	75°47.6	07.0			
10	81°46.7	317°04.8	54.3	29°07.4	10.3	12°25.4	23.0	90°50.1	07.0	Jul 12 Fri	SHA	Mer.pass
										Venus	237°07.7	12:51
11	96°49.2	332°04.1	53.6	44°08.1	10.7	27°27.3	23.1	105°52.6	07.0	Mars	308°21.5	08:05
12	111°51.6	347°03.3	N20°53.0	59°08.7	N18°11.2	42°29.2	N21°23.1	120°55.1	S06°07.1	Jupiter	290°57.2	09:13
13	126°54.1	2°02.6	52.3	74°09.4	11.6	57°31.2	23.2	135°57.7	07.1	Saturn	9°01.9	04:02
14	141°56.6	$17^{\circ}01.8$	51.7	89°10.1	12.1	72°33.1	23.3	151°00.2	07.1	Jatuill	J 01.9	07.02
15	156°59.0	$32^{\circ}01.1$	•• 51.0	104°10.8	• • 12.6	87°35.0	• • 23.3	$166^{\circ}02.7$	• • 07.1	Jul 13 Sat	SHA	Mer.pass
16	172°01.5	47°00.3	50.4	119°11.4	13.0	102°36.9	23.4	181°05.2	07.2	Venus	235°50.3	12:52
17	187°03.9	61°59.6	49.8	134°12.1	13.5	117°38.8	23.5	196°07.7	07.2	Mars	307°38.6	08:04
18	202°06.4	76°58.8	N20°49.1	149°12.8	N18°13.9	132°40.8	N21°23.6	211°10.2	S06°07.2			
	202 00.4 217°08.9	91°58.1						211 10.2 226°12.7		Jupiter		09:10
19			48.5	164°13.5	14.3	147°42.7	23.6		07.3	Saturn	9°02.9	03:58
20	232°11.3	106°57.3	47.8	179°14.1	14.8	162°44.6	23.7	241°15.2	07.3	Horizont	al parallax	
20	0470400	121°56.6	• • 47.1	194°14.8	• • 15.2	177°46.5	• • 23.8	256°17.8	• • 07.3	HOLIZON	-	
21	247°13.8			000015 -		1000 10 -		0710000			\/cnuc	Λ1
21 22	$262^{\circ}16.3$	$136^{\circ}55.8$	46.5	209°15.5	15.7	192°48.5	23.8	271°20.3	07.4		Venus:	0.1
21				209°15.5 224°16.2	15.7 16.1	192°48.5 207°50.4	23.8 23.9	271°20.3 286°22.8	07.4 07.4		Venus: Mars:	0.1
21 22 23	$262^{\circ}16.3$	136°55.8 151°55.1	46.5	224°16.2		207°50.4		286°22.8				

h	Su	Moon					
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°36.8	N22°03.8	120°28.4	16.9'	N06°54.1	-13.8'	54.3'
1 2	193°36.7 208°36.6	03.5 03.2	135°04.3 149°40.2	16.9' 16.9'	06°40.2 06°26.4	-13.9' -13.9'	54.3' 54.3'
3	223°36.5	02.8	164° 16.2	17.0'	06°12.5	-13.9'	54.3'
4	238°36.4	02.5	178°52.1	17.0'	05°58.6	-13.9'	54.3'
5	253°36.3 268°36.3	02.1 N22°01.8	193°28.1 208°04.2	17.0' 17.1'	05°44.7 N05°30.8	-13.9'	54.3' 54.3'
6 7	268 36.3 283°36.2	N22 01.8 01.5	208 04.2 222°40.2	17.1' 17.1'	05°16.8	-13.9' -14.0'	54.3
8	298°36.1	01.1	237°16.3	17.1'	05°02.9	-14.0'	54.2'
9	313°36.0	• • 00.8	251°52.5	17.1'	04°48.9	-14.0'	54.2'
10 11	328°35.9 343°35.9	00.4 22°00.1	266°28.6 281°04.8	17.2' 17.2'	04°34.9 04°20.9	-14.0' -14.0'	54.2' 54.2'
12	358°35.8	N21°59.8	295°41.0	17.2'	N04°06.9	-14.0'	54.2'
13	13°35.7	59.4	$310^{\circ}17.2$	17.2'	$03^{\circ}52.9$	-14.0'	54.2'
14	28°35.6 43°35.5	59.1	324°53.4 339°29.7	17.3' 17.3'	03°38.8 03°24.8	-14.0'	54.2' 54.2'
15 16	43 35.5 58°35.5	· · 58.7 58.4	354°06.0	17.3'	03 24.8 03°10.8	-14.0' -14.1'	54.2'
17	73°35.4	58.0	8°42.3	17.3'	02°56.7	-14.1'	54.2'
18	88°35.3	N21°57.7	23° 18.6	17.3'	N02°42.7	-14.1'	54.2'
19 20	103°35.2 118°35.1	57.3 57.0	37°54.9 52°31.3	17.3' 17.4'	02°28.6 02°14.5	-14.1' -14.1'	54.2' 54.2'
21	133°35.1	• • 56.6	67° 07.6	17.4'	02°14.5	-14.1'	54.2'
22	148°35.0	56.3	81°44.0	17.4'	$01^{\circ}46.3$	-14.1'	54.2'
23	163°34.9	55.9	96°20.4	17.4'	01°32.3	-14.1'	54.2'
	SD = 15.7'	d = -0.3'		SI	O = 14.8'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°34.8	N21°55.6	$110^{\circ}56.8$	17.4'	N01°18.2	-14.1'	54.2'
1	193°34.7 208°34.7	55.2	125°33.2 140°09.6	17.4'	01°04.1 00°50.0	-14.1'	54.2' 54.2'
2	208°34.7 223°34.6	54.9 • • 54.5	140°09.6 154°46.0	17.4' 17.4'	00°50.0 00°35.9	-14.1' -14.1'	54.2'
4	238°34.5	54.2	169° 22.4	17.4'	00°21.8	-14.1'	54.2'
5	253°34.4	53.8	183°58.9	17.4'	N00°07.7	-14.1'	54.2'
6 7	268°34.4 283°34.3	N21°53.4 53.1	198°35.3 213°11.7	17.4' 17.4'	\$00°06.4 00°20.5	14.1' 14.1'	54.2' 54.2'
8	298°34.2	52.7	213 11.7 227°48.1	17.4'	00°20.5	14.1	54.2'
9	313°34.1	• • 52.4	242° 24.6	17.4'	00°48.7	14.1'	54.2'
10 11	328°34.1 343°34.0	52.0 51.7	257°01.0 271°37.4	17.4' 17.4'	01°02.8 01°16.9	14.1' 14.1'	54.2' 54.2'
12	358°33.9	N21°51.3	271 37.4 286°13.8	17.4	501°30.9	14.1	54.2'
13	13°33.8	50.9	300°50.3	17.4'	01°45.0	14.1'	54.2'
14	28°33.8	50.6	315°26.7	17.4'	01°59.1	14.1' 14.1'	54.2'
15 16	43°33.7 58°33.6	· · 50.2 49.9	330°03.1 344°39.5	17.4' 17.4'	02°13.1 02°27.2	14.1 14.0'	54.2' 54.2'
17	73°33.5	49.5	359°15.8	17.4'	02°41.2	14.0'	54.2'
18	88°33.5 103°33.4	N21°49.1	13°52.2	17.4'	S02°55.3	14.0'	54.2'
19 20	103°33.4 118°33.3	48.8 48.4	28°28.6 43°04.9	17.3' 17.3'	03°09.3 03°23.3	14.0' 14.0'	54.2' 54.2'
21	133°33.2	• • 48.0	57°41.2	17.3'	03°37.3	14.0'	54.2'
22	148°33.2	47.7	72°17.5	17.3'	03°51.3	14.0'	54.2'
23	163°33.1	47.3	86°53.8	17.3'	04°05.3	14.0'	54.2'
	SD = 15.7'	d = -0.4'		SI	D = 14.8'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°33.0 193°32.9	N21°46.9 46.6	101°30.1 116°06.4	17.3' 17.2'	\$04°19.3 04°33.3	14.0' 13.9'	54.2' 54.2'
2	208°32.9	46.0 46.2	110 06.4 130°42.6	17.2'	04 33.3 04°47.2	13.9'	54.2'
3	223°32.8	• • 45.8	$145^{\circ}18.8$	17.2'	05°01.1	13.9'	54.2'
4	238°32.7	45.5	159°55.0	17.2'	05°15.1	13.9'	54.2'
5 6	253°32.7 268°32.6	45.1 N21°44.7	174°31.2 189°07.3	17.1' 17.1'	05°29.0 \$05°42.9	13.9' 13.9'	54.2' 54.2'
7	283°32.5	44.3	203°43.4	17.1	05°56.7	13.9	54.2'
8	298°32.4	44.0	218° 19.5	17.1'	06°10.6	13.8'	54.2'
9 10	313°32.4 328°32.3	· · 43.6 43.2	232°55.5 247°31.6	17.0' 17.0'	06°24.4 06°38.2	13.8' 13.8'	54.2' 54.3'
11	343°32.2	43.2 42.8	262°07.6	17.0'	06°52.0	13.8'	54.3
12	358°32.2	N21° 42.5	276°43.5	16.9'	<b>S</b> 07°05.8	13.8'	54.3'
13 14	13°32.1 28°32.0	42.1 41.7	291°19.4 305°55.3	16.9' 16.9'	07°19.5 07°33.3	13.7' 13.7'	54.3' 54.3'
14 15	28° 32.0 43° 31.9	41.7 •• 41.3	305°55.3 320°31.2	16.8'	07°33.3	13.7'	54.3'
16	58°31.9	41.0	335°07.0	16.8'	08°00.7	13.7'	54.3'
17	73°31.8	40.6	349°42.8	16.7'	08°14.3	13.6'	54.3'
18 19	88°31.7 103°31.7	N21°40.2 39.8	4° 18.5 18° 54.2	16.7' 16.7'	\$08°28.0 08°41.6	13.6' 13.6'	54.3' 54.3'
20	118°31.6	39.4	$33^{\circ}29.9$	16.6'	08°55.2	13.6'	54.3'
21	133°31.5	• • 39.1	48°05.5	16.6'	09°08.7	13.5'	54.4'
22 23	148°31.5 163°31.4	38.7 38.3	62°41.0 77°16.6	16.5' 16.5'	09°22.3 09°35.8	13.5' 13.5'	54.4' 54.4'
23	SD = 15.7'	d = -0.4'	- 11 10.0		D = 14.8'	13.3	J+.+
	<u> </u>	u — -0.4		31	J — 14.0		

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

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

		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	24-41%	
11	05:33	05:37	12:06	16:24	04:05		
12	05:41	05:44	12:06	17:03	04:44	1	
13	05:48	05:51	12:06	17:42 05:23			

July 14, 15, 16 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	292°21.2	166° 54.3	N20°45.2	239°16.8	N18° 16.6	222°52.3	N21°24.0	301°25.3	S06°07.4			
1	307°23.7	181°53.6	44.5	254°17.5	17.0	237°54.2	24.1	316°27.8	07.5	Alpheratz	357°35.1	29°13.4
2	322°26.1	196° 52.9	43.9	269°18.2	17.5	252°56.2	24.1	331°30.3	07.5	Ankaa	353°07.4	-42°10.1
3	337°28.6	211°52.1	• • 43.2	284°18.9	. 17.9	267°58.1	24.2	346°32.8	07.5	Schedar	349°31.4	56°40.1
4	352°31.1	226°51.4	42.5	299°19.5	18.4	283°00.0	24.3	1°35.4	07.6	Diphda	348°47.6	-17°51.0
5	7°33.5	241°50.6	41.9	314°20.2	18.8	298°01.9	24.3	16°37.9	07.6	Achernar	335°20.5	-57°06.4
6	22°36.0	256° 49.9	N20°41.2	329°20.9	N18°19.3	313°03.9	N21°24.4	31°40.4	S06°07.6	Hamal	327°51.7	23°34.6
7	37°38.4	271°49.1	40.6	344°21.6	19.7	328°05.8	24.5	46°42.9	07.7	Polaris	314°26.3	89°21.7
8	52°40.9	286°48.4	39.9	359°22.2	20.2	343°07.7	24.6	61°45.4	07.7	Acamar	315°12.2	-40°12.1
9	67°43.4	301°47.7	• • 39.2	14°22.9	• • 20.6	358°09.6	• • 24.6	76°47.9	• • 07.7	Menkar	314°06.7	4°11.2
10	82°45.8	316°46.9	38.6	29°23.6	21.0	13°11.6	24.7	91°50.4	07.8	Mirfak Aldebaran	308°29.1 290°40.3	49°56.7 16°33.5
11	97°48.3	331°46.2	37.9	44°24.3	21.5	$28^{\circ}13.5$	24.8	106°53.0	07.8	Rigel	290 40.3 281°04.5	-8°10.3
12	112°50.8	346°45.4	N20°37.2	59°24.9	N18°21.9	43°15.4	N21°24.8	121°55.5	S06°07.8	Capella	280°22.9	46°01.3
13	127°53.2	1°44.7	36.6	74°25.6	22.4	58°17.3	24.9	136°58.0	07.9	Bellatrix	278°23.6	6°22.4
14	142°55.7	16°44.0	35.9	89°26.3	22.8	73°19.3	25.0	152°00.5	07.9	Elnath	278°02.7	28°37.7
15	157°58.2	31°43.2	• • 35.2	104°27.0	• • 23.3	88°21.2	• • 25.1	167°03.0	• • 07.9	Alnilam	275°38.4	-1°11.1
16	173°00.6	46° 42.5	34.5	119°27.7	23.7	103°23.1	25.1	182°05.5	08.0	Betelgeuse	270°52.8	7°24.8
17	188°03.1	61°41.8	33.9	134°28.3	24.1	118°25.0	25.2	197°08.1	0.80	Canopus	263°53.1	-52°42.3
18	203°05.5	76°41.0	N20°33.2	149°29.0	N18°24.6	133°27.0	N21°25.3	212°10.6	S06°08.0	Sirius	258°26.9	-16°44.9
19	218°08.0	91°40.3	32.5	164°29.7	25.0	148°28.9	25.3	227°13.1	08.1	Adhara	255°06.6	-29°00.2
20	233°10.5	106°39.5	31.8	179°30.4	25.5	163°30.8	25.4	242°15.6	08.1	Procyon	244°51.6	5°09.8
21	248°12.9	121°38.8	• • 31.2	194°31.0	• • 25.9	178°32.7	• • 25.5	257°18.1 272°20.6	08.1	Pollux	243°18.2	27°58.1
22	263°15.4	136°38.1	30.5	209°31.7	26.4	193°34.7	25.5		08.2	Avior	234°15.6	-59°35.3
23	278°17.9	151°37.3	29.8	224°32.4	26.8	208°36.6	25.6	287°23.2	08.2	Suhail	222°47.0	-43°31.9
Mer.p	ass. 04:30	$\nu$ -0.7' d-0	).7′ m-3.89	$ u$ 0.7 $^{\prime}$ d0	.4′ m0.93	$\nu 1.9' \ d0.$	.1′ m-2.06	$\nu 2.5' \ d0$	.0′ m0.84	Miaplacidus	221°39.3	-69°49.1
										Alphard	$217^{\circ}48.4$	-8°45.8
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.1	11°51.0
O	293°20.3	бпа 166°36.6	N20°29.1	239°33.1	N18°27.2	223°38.5	N21°25.7	302°25.7	S06°08.2	Dubhe	193°41.9	61°37.4
1	293 20.3 308°22.8	100 30.0 181°35.9	N20 29.1 28.4	254°33.7	27.7	223 38.5 238°40.4	NZ1 25.7 25.8	302 25.7 317°28.2	08.3	Denebola	182°25.5	14°26.2
2	323°25.3	196°35.1	27.8	269°34.4	28.1	253°42.4	25.8	332°30.7	08.3	Gienah	175°44.1	-17°40.7
3	338°27.7	211°34.4	27.1	284°35.1	28.6	268°44.3	25.9	347°33.2	•• 08.3		173°00.8	-63°14.4
4	353°30.2	211 34.4 226°33.7	26.4	299°35.8	29.0	283°46.2	26.0	2°35.7	08.4	1	171°52.3	-57°15.3
5	8°32.7	241°32.9	25.7	314°36.4	29.4	298°48.1	26.0	17°38.3	08.4	Alioth	166°13.4	55°49.9
6	23°35.1	256°32.2	N20°25.0	329°37.1	N18°29.9	313°50.1	N21°26.1	32°40.8	S06°08.4	Spica	158°22.7	-11°17.4
7	38°37.6	271°31.5	24.3	344°37.8	30.3	328°52.0	26.2	47°43.3	08.5	Alkaid	152°52.3	49°11.7
8	53°40.0	286°30.8	23.6	359°38.5	30.7	343°53.9	26.2	62°45.8	08.5	Hadar	148°36.5	-60°29.7
9	68°42.5	301°30.0	22.9	14°39.1	31.2	358°55.9	26.3	77°48.3	08.5	Menkent	147°58.0	-36°29.6
10	83°45.0	316°29.3	22.3	29°39.8	31.6	13°57.8	26.4	92°50.9	08.6	Arcturus	145°48.2	19°03.4
11	98°47.4	331°28.6	21.6	44°40.5	32.1	28°59.7	26.5	107°53.4	08.6	Rigil Kent.	139°40.7	-60°56.4
12	113°49.9	346°27.8	N20°20.9	59°41.2	N18°32.5	44°01.6	N21°26.5	122°55.9	<b>S</b> 06°08.6	Kochab	137°19.3 136°56.3	74°03.5 -16°08.7
13	128°52.4	1°27.1	20.2	74°41.8	32.9	59°03.6	26.6	137°58.4	08.7	Zuben'ubi Alphecca	130° 50.3 126° 03.9	26°38.1
14	143°54.8	$16^{\circ}26.4$	19.5	89°42.5	33.4	74°05.5	26.7	153°00.9	08.7	Antares	120 03.9 112°16.1	-26°29.2
15	158°57.3	31°25.7	• • 18.8	104°43.2	• • 33.8	89°07.4	• • 26.7	168°03.5	• • 08.7	Antares	112 10.1 107°10.2	-20 29.2 -69°04.4
16	173°59.8	46°24.9	18.1	119°43.9	34.2	104°09.4	26.8	183°06.0	8.80	Sabik	107 10.2 102°03.0	-15°45.3
17	189°02.2	61°24.2	17.4	134°44.5	34.7	$119^{\circ}11.3$	26.9	198°08.5	8.80	Shaula	96°10.5	-37°07.3
18	204°04.7	76°23.5	N20°16.7	149°45.2	N18°35.1	134°13.2	N21°26.9	213°11.0	S06°08.8	Rasalhague	95°58.6	12°32.6
19	$219^{\circ}07.2$	91°22.8	16.0	164°45.9	35.5	149°15.1	27.0	228°13.5	08.9	Eltanin	90°41.9	51°29.2
20	234°09.6	106°22.0	15.3	179°46.6	36.0	164°17.1	27.1	243°16.1	08.9	Kaus Aust.	83°32.7	-34°22.4
21	249°12.1	121°21.3	• • 14.6	194°47.2	• • 36.4	179°19.0	• • 27.1	258°18.6	• • 08.9	Vega	80°33.1	38°48.4
22	264°14.5	$136^{\circ}20.6$	13.9	209°47.9	36.8	194°20.9	27.2	273°21.1	09.0	Nunki	75°47.9	-26°16.0
23	279°17.0	151° 19.9	13.2	224°48.6	37.3	209°22.9	27.3	288°23.6	09.0	Altair	62°00.0	8°56.0
Mer n	ass. 04:26	ν-0.7' d-0	0.7′ m-3.89	$\nu 0.7' d0$	.4′ m0.92	v1.9'.d0	.1′ m-2.06	$v^{2} 5' d0$	.0′ m0.84	Peacock	53°05.8	-56°39.3
										Deneb	49°25.6	45°22.0
										Enif	33°38.9	9°59.2
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.0	-46°50.4
0	294°19.5	166° 19.2	N20°12.5	239°49.3	N18°37.7	224°24.8	N21°27.4	303°26.1		Fomalhaut	$15^{\circ}14.7$	-29°29.4
1	309°21.9	181°18.4	11.8	254°49.9	38.1	239°26.7	27.4	318°28.7	09.1	Scheat	13°45.4	28°12.8
2	324°24.4	196°17.7	11.1	269°50.6	38.6	254°28.6	27.5	333°31.2	09.1	Markab	13°30.1	15°20.2
3	339°26.9	211°17.0	10.4	284°51.3	• • 39.0	269°30.6	• • 27.6	348°33.7	•• 09.2	Jul 14 C.:	SHA	
4	354°29.3	226°16.3	09.7	299°52.0	39.4	284°32.5	27.6	3°36.2	09.2	Jul 14 Sun	234°33.1	Mer.pass 12:53
5 6	9°31.8 24°34.3	241°15.6 256°14.8	08.9 N20°08.2	314°52.6 329°53.3	39.9 N18°40.3	299°34.4 314°36.4	27.7 N21°27.8	18°38.8 33°41.3	09.2 \$06°09.3	Mars	306°55.7	08:03
о 7	24°34.3 39°36.7	256° 14.8 271° 14.1	N20 08.2 07.5	329°53.3 344°54.0	N18 40.3 40.7	314°36.4 329°38.3	N21 27.8 27.8	48°43.8	09.3		290°31.1	08:03
8	59° 30.7 54° 39.2	271 14.1 286°13.4	07.5 06.8	359°54.7	40.7	344°40.2	27.8 27.9	48 43.8 63°46.3	09.3	Saturn	9°04.1	03:54
9	69°41.6	301°12.7	•• 06.1	14°55.3	• • 41.6	359°42.2	28.0	78°48.8	•• 09.4			
10	84°44.1	316° 12.0	05.4	29°56.0	42.0	14°44.1	28.0	93°51.4	09.4	Jul 15 Mon	SHA	Mer.pass
11	99°46.6	331° 11.3	04.7	44°56.7	42.4	29°46.0	28.1	108°53.9	09.4		233°16.3	12:54
12	114°49.0	346° 10.5	N20°03.9	59°57.4	N18°42.9	44°47.9	N21°28.2	123°56.4	S06°09.5	Mars		08:01
13	129°51.5	1°09.8	03.2	74°58.0	43.3	59°49.9	28.2	138°58.9	09.5		290°18.2	09:04
14	144°54.0	16°09.1	02.5	89°58.7	43.7	74°51.8	28.3	154°01.5	09.5	Saturn	9°05.3	03:50
15	159°56.4	31°08.4	• • 01.8	104°59.4	• • 44.1	89°53.7	28.4	169°04.0	09.6	Jul 16 Tue	SHA	Mer.pass
16	174°58.9	46° 07.7	01.1	120°00.1	44.6	104°55.7	28.5	184°06.5	09.6		231°59.7	12:55
17	190°01.4	61°07.0	20°00.4	135°00.7	45.0	119°57.6	28.5	199°09.0	09.7	Mars		08:00
18	205°03.8	76°06.3	N19°59.6	150°01.4	N18°45.4	134°59.5	N21°28.6	214°11.6	S06°09.7		290°05.3	09:01
19	220°06.3	91°05.5	58.9	165°02.1	45.9	150°01.5	28.7	229°14.1	09.7	Saturn	9°06.7	03:46
20	235°08.8	106°04.8	58.2	180°02.8	46.3	165°03.4	28.7	244°16.6	09.8			
21	250°11.2	121°04.1	• • 57.5	195°03.4	• • 46.7	180°05.3	• • 28.8	$259^{\circ}19.1$	• • 09.8	Horizont	al parallax	
22	$265^{\circ}13.7$	$136^{\circ}03.4$	56.7	$210^{\circ}04.1$	47.1	195°07.3	28.9	$274^{\circ}21.7$	09.8		Venus:	0.1
23	$280^{\circ}16.1$	151°02.7	56.0	225°04.8	47.6	210°09.2	28.9	289°24.2	09.9		Mars:	0.1
Mern	ass. 04:22	ν-0.7' d.0	).7′ m-3.88	νη 7' Αη	.4′ m0.92	v1 0/ d0	.1′ m-2.06	1/2 5/ 40	.0′ m0.83			
		- 0.1 4-0	5.00	- 5.1 40		- 1.5 00.		- 2.5 00				

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°31.3	N21°37.9	91°52.0	16.4'	S09°49.2	13.4'	54.4'
1 2	193°31.3 208°31.2	37.5 37.1	106°27.5 121°02.8	16.4' 16.3'	10°02.7 10°16.1	13.4' 13.4'	54.4' 54.4'
3	223°31.1	36.8	135°38.2	16.3'	10°10.1	13.4	54.4
4	238°31.1	36.4	150°13.4	16.2'	10°42.8	13.3'	54.4'
5	253°31.0	36.0	164°48.7	16.2'	10°56.1	13.3'	54.4'
6 7	268°30.9 283°30.9	N21°35.6 35.2	179°23.8 193°58.9	16.1' 16.1'	\$11°09.4 11°22.7	13.2' 13.2'	54.5' 54.5'
8	298°30.8	34.8	208°34.0	16.0'	11°35.9	13.2'	54.5'
9	313°30.7	• • 34.4	223°09.0	15.9'	11°49.1	13.1'	54.5'
10 11	328°30.7 343°30.6	34.1 33.7	237°43.9 252°18.8	15.9' 15.8'	12°02.2 12°15.3	13.1' 13.1'	54.5' 54.5'
12	358°30.5	33.7 N21°33.3	266°53.6	15.8'	512°28.4	13.1	54.5
13	13°30.5	32.9	281°28.4	15.7'	12°41.4	13.0'	54.6'
14	28°30.4	32.5	296°03.0	15.6'	12°54.4	12.9'	54.6'
15 16	43°30.3 58°30.3	· · 32.1 31.7	310°37.7 325°12.2	15.6' 15.5'	13°07.3 13°20.2	12.9' 12.9'	54.6' 54.6'
17	73°30.2	31.3	339°46.7	15.4'	13°33.1	12.8'	54.6'
18	88°30.1	N21°30.9	354°21.1	15.4'	S13°45.9	12.8'	54.6'
19 20	103°30.1 118°30.0	30.5 30.1	8°55.5 23°29.8	15.3' 15.2'	13°58.7 14°11.4	12.7' 12.7'	54.7' 54.7'
20	118 30.0 133°30.0	29.7	23 29.8 38°04.0	15.2 15.1'	14 11.4 14°24.1	12.7	54.7'
22	148°29.9	29.3	52°38.1	15.1'	14°36.7	12.6'	54.7'
23	163°29.8	28.9	67°12.2	15.0'	14°49.3	12.5'	54.7'
	SD = 15.7'	d = -0.4'		SE	0 = 14.8'		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	178°29.8	N21°28.5	81°46.2	14.9'	<b>S</b> 15°01.8	12.5'	54.8'
1	193°29.7 208°29.6	28.1 27.7	96°20.1 110°53.9	14.8' 14.8'	15°14.3 15°26.7	12.4' 12.4'	54.8' 54.8'
2	208°29.6 223°29.6	27.3	110°53.9 125°27.7	14.8 14.7'	15°26.7 15°39.1	12.4	54.8'
4	238°29.5	26.9	140°01.4	14.6'	15°51.4	12.3	54.8'
5	253°29.5	26.5	154°35.0	14.5'	16°03.7	12.2'	54.8'
6 7	268°29.4 283°29.3	N21°26.1 25.7	169°08.5 183°41.9	14.4' 14.4'	\$16°15.9 16°28.0	12.2' 12.1'	54.9' 54.9'
8	298°29.3	25.7	198°15.3	14.4	16°40.1	12.1	54.9
9	313°29.2	• • 24.9	212°48.5	14.2'	$16^{\circ}52.2$	12.0'	54.9'
10	328°29.2 343°29.1	24.5 24.1	227°21.7 241°54.8	14.1' 14.0'	17°04.2 17°16.1	11.9' 11.9'	55.0' 55.0'
11 12	358°29.0	N21°23.7	241 54.8 256°27.8	13.9'	\$17°28.0	11.8'	55.0'
13	13°29.0	23.3	271°00.7	13.8'	17°39.7	11.7'	55.0'
14	28°28.9	22.9	285°33.6	13.7'	17°51.5	11.7'	55.0'
15 16	43°28.9 58°28.8	· · 22.5 22.1	300°06.3 314°39.0	13.6' 13.6'	18°03.2 18°14.8	11.6' 11.5'	55.1' 55.1'
17	73°28.7	21.7	329°11.5	13.5'	18°26.3	11.5'	55.1'
18	88°28.7	N21°21.3	343°44.0	13.4'	\$18°37.8	11.4'	55.1'
19 20	103°28.6 118°28.6	20.8 20.4	358°16.3 12°48.6	13.3' 13.2'	18°49.2 19°00.5	11.3'	55.2' 55.2'
21	133°28.5	. 20.0	27°20.8	13.1'	19°00.3	11.2'	55.2'
22	148°28.5	19.6	41°52.9	13.0'	$19^{\circ}22.9$	11.1'	55.2'
23	163°28.4	19.2	56°24.8	12.9'	19°34.0	11.0'	55.2'
	SD = 15.7'	d = -0.4'		SE	0 = 14.9'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°28.3	N21° 18.8	70°56.7	12.8'	\$19°45.1	11.0'	55.3'
1 2	193°28.3 208°28.2	18.4 18.0	85°28.5 100°00.2	12.7' 12.6'	19°56.0 20°06.9	10.9' 10.8'	55.3' 55.3'
3	223°28.2	• • 17.5	114°31.8	12.5'	20°17.7	10.7'	55.3'
4	238°28.1	17.1	129°03.2	12.4'	20°28.4	10.6'	55.4'
5 6	253°28.1 268°28.0	16.7 N21°16.3	143°34.6 158°05.9	12.3' 12.2'	20°39.1 \$20°49.6	10.6' 10.5'	55.4' 55.4'
7	283°28.0	15.9	172°37.1	12.1'	21°00.1	10.4	55.5
8	298°27.9	15.5	187°08.1	12.0'	21°10.5	10.3'	55.5'
9 10	313°27.8 328°27.8	· · 15.0 14.6	201°39.1 216°09.9	11.9' 11.7'	21°20.8 21°31.0	10.2' 10.1'	55.5' 55.5'
10	328 27.8 343°27.7	14.6 14.2	216 09.9 230°40.7	11.7	21 31.0 21°41.1	10.1	55.5° 55.6'
12	358°27.7	N21°13.8	245°11.3	11.5'	S21°51.1	9.9'	55.6'
13	13°27.6	13.4	259°41.8 274°12.3	11.4'	22°01.1 22°10.9	9.8'	55.6'
14 15	28°27.6 43°27.5	12.9 •• 12.5	274°12.3 288°42.6	11.3' 11.2'	22°10.9 22°20.7	9.8' 9.7'	55.6' 55.7'
16	58°27.5	12.1	303°12.8	11.1'	22°30.3	9.6'	55.7'
17	73°27.4	11.7	317°42.9	11.0'	22°39.9	9.5'	55.7'
18 19	88°27.4 103°27.3	N21°11.2 10.8	332°12.8 346°42.7	10.9' 10.8'	\$22°49.3 22°58.7	9.4' 9.3'	55.8' 55.8'
20	103 27.3 118°27.3	10.6	1°12.5	10.6'	23°08.0	9.3 9.2'	55.8'
21	133°27.2	• • 10.0	15°42.1	10.5'	23°17.1	9.1'	55.8'
22 23	148°27.2 163°27.1	09.5 09.1	30°11.7 44°41.1	10.4' 10.3'	23°26.2 23°35.1	8.9' 8.8'	55.9' 55.9'
23	SD = 15.7'	d = -0.4'	44 41.1		0 = 15.1'	0.0	55.9
	SD = 15.7′	a = -0.4		SL	ν = 15.1'		

			2024	July 14	t to Ju	. 10 (
Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junioc	Juliset	Civil	Naut.
N 72°						
N 70°						
68°						
$66^{\circ}$	////	////	01:37	22:31	////	////
64°	////	////	02:17	21:53	////	////
62°	////	00:53	02:44	21:27	23:13	////
60°	////	01:46	03:04	21:06	22:23	////
<b>N</b> 58°	////	02:17	03:21	20:50	21:53	////
56°	00:49	02:40	03:36	20:36	21:31	23:18
54°	01:38	02:58	03:48	20:23	21:13	22:32
52°	02:06	03:13	03:59	20:13	20:58	22:04
50°	02:27	03:26	04:08	20:03	20:45	21:43
45°	03:05	03:52	04:28	19:44	20:19	21:06
<b>N</b> 40°	03:32	04:12	04:44	19:28	19:59	20:39
35°	03:53	04:29	04:58	19:14	19:43	20:18
30°	04:10	04:43	05:09	19:02	19:29	20:02
20°	04:37	05:05	05:29	18:43	19:07	19:35
N $10^{\circ}$	04:57	05:24	05:47	18:26	18:48	19:15
0°	05:14	05:40	06:02	18:10	18:32	18:58
<b>S</b> 10°	05:30	05:56	06:18	17:54	18:16	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	18:13
35°	06:07	06:38	07:05	17:07	17:35	18:06
40°	06:15	06:48	07:18	16:54	17:24	17:58
45°	06:24	07:00	07:33	16:39	17:12	17:49
<b>S</b> 50°	06:34	07:14	07:51	16:21	16:58	17:39
52°	06:38	07:21	08:00	16:13	16:52	17:34
54°	06:43	07:28	08:10	16:03	16:45	17:30
56°	06:48	07:36	08:21	15:52	16:37	17:24
58°	06:54	07:44	08:33	15:40	16:28	17:19
<b>S</b> 60°	07:00	07:54	08:48	15:25	16:18	17:13
1-4		Moonris	e		Moonset	
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°	15:25			20:57		
<b>N</b> 70°	14:58	17:37		21:26	20:18	
68°	14:38	16:46		21:48	21:10	
66°	14:22	16:15	18:44	22:05	21:42	20:52
64°	14:09	15:52	17:51	22:19	22:06	21:46
62°	13:59	15:34	17:19	22:31	22:25	22:19

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

		Sun			Moon			
Day	Eqn.of Time		Mer.	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	51-69%		
14	05:55	05:58	12:06	18:23	06:02			
15	06:01	06:04	12:06	19:07	06:45			
16	06:07	06:09	12:06	19:55	07:31			

July 17, 18, 19 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
0	295°18.6	166°02.0	N19°55.3	240°05.5	N18°48.0	225°11.1	N21°29.0	304°26.7	S06°09.9			
1	310°21.1	181°01.3	54.5	255°06.1	48.4	240°13.1	29.1	319°29.2	09.9	Alpheratz	357°35.0	29°13.4
2	325°23.5	196°00.6	53.8	270°06.8	48.8	255°15.0	29.1	334°31.8	10.0	Ankaa	353°07.4	-42°10.1
3	340°26.0	210°59.9	53.1	285°07.5	49.3	270°16.9	29.2	349°34.3	• • 10.0	Schedar	349°31.4	56°40.1
4	355°28.5	225°59.2	52.3	300°08.2	49.7	285°18.9	29.2	4°36.8	10.0	Diphda	348°47.6	-17°51.0
5	10°30.9	240°58.4	51.6	315°08.8	50.1	300°20.8	29.3	19°39.3	10.1	Achernar	335°20.5	-57°06.4
6	25°33.4	255° 57.7	N19°50.9	330°09.5	N18°50.5	315°22.7	N21°29.4	34°41.9	S06°10.1	Hamal	$327^{\circ}51.7$	23°34.6
7	40°35.9	270° 57.0	50.1	345°10.2	50.9	330°24.7	29.5	49°44.4	10.2	Polaris	314°24.6	89°21.7
		270 57.0 285°56.3								Acamar	$315^{\circ}12.2$	-40°12.1
8 9	55°38.3		49.4	0°10.9	51.4	345°26.6	29.5 •• 29.6	64°46.9	10.2	Menkar	314°06.7	4°11.2
	70°40.8	300°55.6	• • 48.7	15°11.5	• • 51.8	0°28.5		79°49.4	• • 10.2	Mirfak	$308^{\circ}29.1$	49°56.7
10	85°43.3	315°54.9	47.9	30°12.2	52.2	15°30.5	29.7	94°52.0	10.3	Aldebaran	290°40.3	16°33.5
11	100°45.7	330°54.2	47.2	45°12.9	52.6 N18°53.1	30°32.4	29.7 N21°29.8	109°54.5	10.3	Rigel	281°04.5	-8°10.3
12	115°48.2	345°53.5	N19°46.5	60°13.6		45°34.3		124°57.0	S06°10.4	Capella	280°22.9	46°01.3
13	130°50.6	0°52.8	45.7	75°14.2	53.5	60°36.3	29.9	139°59.5	10.4	Bellatrix	278°23.6	6°22.4
14	145°53.1	15°52.1	45.0	90°14.9	53.9	75°38.2	29.9	155°02.1	10.4	Elnath	278°02.7	28°37.7
15	160°55.6	30°51.4	• • 44.2	105°15.6	• • 54.3	90°40.1	• • 30.0	170°04.6	• • 10.5	Alnilam	275°38.4	$-1^{\circ}11.1$
16	175°58.0	45°50.7	43.5	120°16.3	54.7	105°42.1	30.1	185°07.1	10.5	Betelgeuse	270°52.8	7°24.8
17	191°00.5	60°50.0	42.7	135°16.9	55.2	120°44.0	30.1	200°09.6	10.5	Canopus	263°53.1	-52°42.3
18	206°03.0	75°49.3	N19°42.0	150°17.6	N18°55.6	135°45.9	N21°30.2	215°12.2	S06°10.6	Sirius	258°26.9	-16°44.9
19	221°05.4	90°48.6	41.3	165°18.3	56.0	150°47.9	30.3	230°14.7	10.6	Adhara	255°06.6	-29°00.2
20	236°07.9	105°47.9	40.5	$180^{\circ}19.0$	56.4	165°49.8	30.3	245°17.2	10.7	Procyon	244°51.6	5°09.8
21	251°10.4	120°47.2	• • 39.8	195°19.6	• • 56.8	180°51.7	• • 30.4	$260^{\circ}19.8$	• • 10.7	Pollux	244 51.0 243°18.2	27°58.1
22	$266^{\circ}12.8$	135°46.5	39.0	210°20.3	57.3	195°53.7	30.5	275°22.3	10.7	Avior	245 16.2 234°15.6	-59°35.2
23	$281^{\circ}15.3$	150°45.8	38.3	225°21.0	57.7	210°55.6	30.5	290°24.8	10.8	I	234 15.6 222°47.0	-59°35.2 -43°31.9
N 4 = · ·	200 04:10	0 7/ -1 0	7/ = 200	.,0 7/ -/0	.4′ m0.92	1 0/ -/0	1/ m 2.07	1/2 E/ -10	0/ 20 02	Suhail		
ivier.p	ass. 04:18	$\nu$ -0.1' $d$ -0	0.7′ m-3.88	$\nu$ 0.7 d0	.4 mu.92	$\nu$ 1.9' $a$ 0.	.1′ m-2.07	$\nu 2.5' \ d0$	u mu.83	Miaplacidus	221°39.3	-69°49.1
										Alphard	217°48.4	-8°45.8
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.1	11°51.0
0	296°17.8	165°45.1	N19°37.5	240°21.7	N18°58.1	225°57.5	N21°30.6	305°27.3	S06°10.8	Dubhe	193°41.9	61°37.4
1	311°20.2	180°44.4	36.8	255°22.3	58.5	240°59.5	30.7	320°29.9	10.8	Denebola	182°25.5	14°26.2
2	326°22.7	195°43.7	36.0	270°23.0	58.9	256°01.4	30.7	335°32.4	10.9	Gienah	175°44.1	-17°40.7
3	341°25.1	210° 43.0	35.2	285°23.7	• • 59.3	271°03.4	30.8	350°34.9	. 10.9	Acrux	173°00.8	-63°14.3
4	356°27.6	225°42.3	34.5	300°24.4	18°59.8	286°05.3	30.9	5°37.5	11.0	Gacrux		-57°15.3
5	11°30.1	240°41.6	33.7	315°25.0	10° 39.0 19° 00.2	301°07.2	30.9	20°40.0	11.0	Alioth	166°13.4	55°49.9
6	26°32.5	255° 40.9	N19°33.0	330°25.7	N19°00.2	316°09.2	N21°31.0	35°42.5	S06°11.0	Spica	158°22.7	-11°17.4
	20 32.5 41°35.0			345°26.4		331°11.1		50°45.0		Alkaid	152°52.3	49°11.7
7		270°40.2	32.2		01.0	346°13.0	31.1		11.1	Hadar	148°36.5	-60°29.7
8	56°37.5	285°39.6	31.5	0°27.1	01.4		31.1	65°47.6	11.1	Menkent	147°58.0	-36°29.6
9	71°39.9	300°38.9	• • 30.7	15°27.7	• • 01.8	1°15.0	· · 31.2	80°50.1	• • 11.2	Arcturus	145°48.2	19°03.4
10	86°42.4	315°38.2	29.9	30°28.4	02.2	16°16.9	31.3	95°52.6	11.2	Rigil Kent.	139°40.7	-60°56.4
11	101°44.9	330°37.5	29.2	45°29.1	02.7	31°18.8	31.3	110°55.2	11.2	Kochab	$137^{\circ}19.4$	74°03.5
12	116°47.3	345°36.8	N19°28.4	60°29.8	N19°03.1	46°20.8	N21°31.4	125°57.7	S06°11.3	Zuben'ubi	136°56.3	-16°08.7
13	131°49.8	0°36.1	27.6	75°30.4	03.5	61°22.7	31.5	141°00.2	11.3	Alphecca	126°03.9	26°38.1
14	146°52.3	15°35.4	26.9	90°31.1	03.9	76°24.7	31.5	156°02.8	11.3	Antares	112°16.1	-26°29.2
15	161°54.7	30°34.7	• • 26.1	105°31.8	• • 04.3	91°26.6	• • 31.6	171°05.3	• • 11.4	Atria	107°10.2	-69°04.5
16	176°57.2	45°34.0	25.4	120°32.5	04.7	106°28.5	31.7	186°07.8	11.4	Sabik	102°03.0	-15°45.3
17	191°59.6	60°33.3	24.6	135°33.1	05.1	121°30.5	31.7	201°10.4	11.5	Shaula	96°10.5	-37°07.3
18	207°02.1	75°32.6	N19°23.8	150°33.8	N19°05.5	136°32.4	N21°31.8	$216^{\circ}12.9$	S06°11.5	Rasalhague	95°58.6	12°32.6
19	222°04.6	90°32.0	23.0	165°34.5	06.0	151°34.3	31.9	231°15.4	11.5	Eltanin	90°41.9	51°29.2
20	237°07.0	105°31.3	22.3	180°35.2	06.4	166°36.3	31.9	246°17.9	11.6	Kaus Aust.	83°32.6	-34°22.4
21	252°09.5	120°30.6	• • 21.5	195°35.8	• • 06.8	181°38.2	• • 32.0	261°20.5	• • 11.6	Vega	80°33.1	38°48.4
22	267°12.0	135°29.9	20.7	210°36.5	07.2	196°40.2	32.1	276°23.0	11.7	Nunki	75°47.9	-26°16.0
23	282°14.4	150°29.2	20.0	225°37.2	07.6	211°42.1	32.1	291°25.5	11.7	Altair	62°00.0	8°56.0
	04.14	0.7/ 1.0	2.00	0.7/ 10	4/ 0.01	1.0/.10	1/ 0.07	0.5/ 10	0/ 0.00	Peacock	53°05.7	-56°39.3
ivier.p	ass. 04:14	$\nu$ -0.7 a-0	).8′ m-3.88	$\nu$ 0.7 a0	.4′ m0.91	$\nu$ 1.9° $a$ 0.	.1′ m-2.07	$\nu$ 2.5° $a$ 0.	0′ m0.82	Deneb	49°25.6	-50 39.3 45°22.0
										I		
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.9 27°33.0	9°59.2 -46°50.4
0	297°16.9	165°28.5	N19°19.2	240°37.9	N19°08.0	226°44.0	N21°32.2	306°28.1		Al Na'ir Fomalhaut	27°33.0 15°14.7	-46°50.4 -29°29.4
1	312°19.4	180°27.8	18.4	255°38.5	08.4	241°46.0	32.3	321°30.6	11.8	Scheat	15 14.7 13°45.4	
2	327°21.8	195°27.2	17.6	270°39.2	08.8	256°47.9	32.3	336°33.1	11.8	I		28°12.9
3	342°24.3	210°26.5	. 16.9	285°39.9	09.2	271°49.9	32.4	351°35.7	• • 11.9	Markab	13°30.1	15°20.2
4	357°26.7	225°25.8	16.1	300°40.6	09.6	286°51.8	32.5	6°38.2	11.9	Jul 17 Wed	SHA	Mer.pass
5	12°29.2	240°25.1	15.3	315°41.2	10.1	301°53.7	32.5	21°40.7	11.9		230°43.4	12:56
6	27°31.7	255°24.4	N19°14.5	330°41.9	N19°10.5	316°55.7	N21°32.6	36°43.3	S06°12.0	Mars		07:59
7	42°34.1	270°23.7	13.7	345°42.6	10.9	331°57.6	32.7	51°45.8	12.0	Jupiter		08:58
8	57°36.6	285°23.1	13.0	0°43.3	11.3	346°59.6	32.7	66°48.3	12.0	Saturn	9°08.1	03:42
9	72°39.1	300°22.4	. 12.2	15°43.9	11.7	2°01.5	• • 32.8	81°50.9	•• 12.1			30.12
10	87°41.5	300°22.4 315°21.7	11.4	30°44.6	12.1	17°03.4	32.8	96°53.4	12.1	Jul 18 Thu	SHA	Mer.pass
11	102°44.0	330°21.0	10.6	45°45.3	12.1	32°05.4	32.0	90 55.4 111°55.9	12.1	Venus	229°27.4	12:58
12	102 44.0 117°46.5	345°20.3	N19°09.8	60°46.0	N19°12.9	47°07.3	N21°33.0	111 55.9 126°58.5	506°12.2	Mars		07:58
		345°20.3 0°19.7						126°58.5 142°01.0		Jupiter	289°39.8	08:55
13	132°48.9		09.0	75°46.6	13.3	62°09.3	33.0		12.3	Saturn	9°09.6	03:38
14	147°51.4	15°19.0	08.3	90°47.3	13.7	77°11.2	33.1	157°03.5	12.3		<u></u>	
15	162°53.9	30°18.3	• • 07.5	105°48.0	• • 14.1	92°13.1	• • 33.2	172°06.1	• • 12.3	Jul 19 Fri	SHA	Mer.pass
16	177°56.3	45°17.6	06.7	120°48.7	14.5	107°15.1	33.2	187°08.6	12.4	Venus		12:59
17	192°58.8	60°17.0	05.9	135°49.4	14.9	122°17.0	33.3	202°11.1	12.4	Mars		07:57
18	208°01.2	75°16.3	N19°05.1	150°50.0	N19°15.3	137°19.0	N21°33.4	217°13.7	S06°12.5		289°27.1	08:52
19	223°03.7	90° 15.6	04.3	165°50.7	15.7	152°20.9	33.4	232°16.2	12.5	Saturn	9°11.2	03:34
20	238°06.2	105°14.9	03.5	180°51.4	16.1	167°22.8	33.5	247°18.7	12.5	Haut	al paralla	
21	253°08.6	120°14.3	• • 02.7	195°52.1	• • 16.5	182°24.8	• • 33.6	262°21.3	• • 12.6	norizont	al parallax	0.1
22	268°11.1	135°13.6	01.9	210°52.7	16.9	197°26.7	33.6	277°23.8	12.6		Venus:	0.1
23	283°13.6	150°12.9	01.1	225°53.4	17.3	212°28.7	33.7	292°26.3	12.7		Mars:	0.1
Mern	ass. 04:10	$\nu$ -0.7' d-0	).8′ m-3.88	$\nu^{0.7'}$ do	.4′ m0.91	$\nu^{1.9'} d\Omega$	.1′ m-2.07	$\nu 2.5' \ d0.$	0' m0 82			

Wed   GHA   Dec   0   178°27.1   N21°08.7   S9°10.4   10.2' \$23°4.4   0.2' \$23°4.7   0.6' \$50°10.4   10.2' \$23°52.7   8.6   5.0   5.0   2.2   208°27.0   0.7.8   88°08.7   10.2' \$23°52.7   8.6   5.0   5	h	Su	n			Moon		
1	Wed	GHA	Dec	GHA	ν	Dec	d	HP
2								
3								
5								
The color of the		253°26.8	06.5	131°35.3		24°26.5	8.2'	
Section   Sect								
10   318°26.6   04.8   189°29.2   9.2'   24°88.5   7.7'   56.2'     11   348°26.5   00.4   203°57.4   9.1'   25°06.2   7.6'   56.2'     12   336°26.5   N21°03.5   232°53.4   8.9'   S25°21.2   7.3   56.3'     12   336°26.4   03.1   247°21.3   8.7'   25°28.5   7.74'   56.3'     13   13°26.4   03.1   247°21.3   8.7'   25°28.5   7.72   56.3'     14   28°26.4   02.6   261°49.0   8.6'   25°35.7   7.1'   56.4'     15   43°26.3   01.7   290°44.2   8.4'   25°49.7   6.8'   56.4'     16   58°26.3   01.7   290°44.2   8.4'   25°49.7   6.8'   56.4'     17   73°26.2   01.3   305°11.6   8.3'   25°45.5   6.7'   56.5'     18   88°26.2   N21°00.9   319°38.9   8.2'   S26°56.5   6.7'   56.5'     19   103°26.1   00.4   334°06.1   8.1'   26°09.7   6.4'   56.5'     20   118°26.1   2100.0   348°33.2   8.0'   26°16.1   6.3'   56.5'     21   133°26.0   20°59.5   3°00.1   7.9'   26°22.3   6.1'   56.6'     22   148°26.0   59.1   17°27.0   7.8'   26°28.4   6.0'   56.6'     23   163°25.9   58.7   31°53.8   7.7'   26°34.4   5.8'   56.6'     24   208°25.8   57.3   75°13.5   7.4'   26°51.5   5.4'   56.7'     2   208°25.8   57.3   75°13.5   7.4'   26°51.5   5.4'   56.7'     2   208°25.8   57.3   75°13.5   7.4'   26°51.5   5.4'   56.7'     2   208°25.8   57.3   75°13.5   7.4'   26°51.5   5.4'   56.7'     2   208°25.8   57.3   75°13.5   7.4'   26°51.5   5.4'   56.7'     2   208°25.5   56.4   104°06.1   7.1'   27°02.1   5.1'   56.8'     5   253°25.7   56.0   118°32.2   7.0'   27°07.2   5.0'   56.8'     6   268°25.6   N20°55.5   132°85.3   7.0'   S27°12.2   4.8'   56.9'     9   313°25.5   5.46   161°50.1   6.8'   27°21.7   4.7'   5.9'     8   298°25.5   5.46   161°50.1   6.8'   27°21.7   4.7'   5.9'     9   313°25.5   5.46   161°50.1   6.8'   27°21.7   4.7'   5.9'     10   328°25.5   5.46   161°50.1   6.8'   27°21.7   4.7'   5.9'     11   343°25.4   50.3   50.4'   33°57.9   6.3'   27°17.0   4.7'   5.9'     12   388°25.1   N20°50.1   306°03.6   5.9'   S27°35.2   2.9'   57.0'     13   18°25.0   49.2   338°57.9   6.3'   27°10.0   4.2'   5.6'								
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118°26.1   21°00.0   348°33.2   8.0'   26°16.1   6.3'   56.5'     133°26.0   20°59.5   3°00.1   7.9'   26°22.3   6.1'   56.6'     23   163°25.9   58.7   31°53.8   7.7'   26°34.4   5.8'   56.6'     SD = 15.7'   d = -0.4'   SD = 15.3'     Thu								
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Thu GHA   Dec   GHA   ν   Dec   d   HP						26°34.4		
178°25.9   N20°58.2   46°20.4   7.6'   \$26°40.2   5.7'   56.7'     193°25.9   57.8   60°47.0   7.5'   26°45.9   5.5'   56.7'     2 208°25.8   \$-56.9   89°39.8   7.2'   26°56.9   5.3'   56.8'     3 223°25.8   \$-56.9   89°39.8   7.2'   26°56.9   5.3'   56.8'     4 238°25.7   56.4   104°06.1   7.1'   27°02.1   5.1'   56.8'     5 253°25.7   56.0   118°32.2   7.0'   27°07.2   50'   56.8'     6 268°25.6   N20°55.5   132°58.3   7.0'   \$27°12.2   4.8'   56.9'     7 283°25.6   55.1   147°24.2   6.9'   27°17.0   4.7'   56.9'     8 298°25.5   54.6   161°50.1   6.8'   27°21.7   4.5'   56.9'     9 313°25.5   \$-54.2   176°15.8   6.7'   27°26.2   4.3'   57.0'     10 328°25.5   53.7   190°41.5   6.6'   27°30.5   4.2'   57.0'     11 343'25.4   53.3   205°07.1   6.5'   27°30.7   3.9'   57.1'     12 358°25.4   N20°52.8   219°32.5   6.4'   \$27°38.7   3.9'   57.1'     13 13°25.3   51.9   248°23.2   6.2'   27°46.3   3.5'   57.1'     14 28°25.3   51.9   248°23.2   6.2'   27°46.3   3.5'   57.1'     15 43°25.2   \$-51.5   26°48.4   6.1'   27°49.8   3.4'   57.2'     16 58°25.2   51.0   277°13.6   6.0'   27°50.4   3.1'   57.2'     17 73°25.2   50.6   291°38.6   6.0'   27°50.4   3.1'   57.2'     18 88°25.1   N20°50.1   306°03.6   5.9'   \$27°59.5   2.9'   57.3'     20 118°25.0   49.2   334°53.2   5.7'   28°05.1   2.5'   57.3'     21 133°25.0   48.8   349°18.0   5.6'   28°07.6   2.4'   57.4'     22 148°25.0   49.2   334°53.2   5.7'   28°05.1   2.5'   57.3'     22 208°24.8   46.5   61°20.5   5.3'   28°10.0   22'   57.4'     50 = 15.77'   d = -0.4'   SD = 15.5'      Fri   GHA   Dec   GHA   Dec   GHA   Dec   Dec   d   HP   193°24.8   46.5   61°20.5   5.3'   28°10.0   22'   57.4'     51 = 133°24.9   47.9   18°07.2   5.5'   28°12.2   2.0'   57.4'     52 = 233°24.7   45.1   104°33.2   5.1'   28°24.8   0.5'   57.5'     6 268°24.7   N20°47.4   32°31.7   5.4'   28°14.1   1.7'   57.5'     6 268°24.7   45.1   104°33.2   5.1'   28°21.8   1.0'   57.6'     7 283°24.8   46.5   61°20.5   5.3'   28°17.5   1.2'   57.6'     8 298°24.6   43.7   110°43.3   51		SD = 15.7'	d = -0.4'		SD	) = 15.3'		
178°25.9   N20°58.2   46°20.4   7.6'   \$26°40.2   5.7'   \$5.7'     1   193°25.9   57.8   60°47.0   7.5'   26°45.9   5.5'   56.7'     2   208°25.8   \$.57.3   75°13.5   7.4'   \$26°51.5   5.4'   \$67.7'     3   223°25.8   \$.56.9   89°39.8   7.2'   26°56.9   5.3'   56.8'     4   238°25.7   56.4   104°06.1   7.1'   27°02.1   5.1'   56.8'     5   253°25.7   56.0   118°32.2   7.0'   27°07.2   5.0'   56.8'     6   268°25.6   N20°55.5   132°58.3   7.0'   \$27°12.2   4.8'   56.9'     7   283°25.6   55.1   147°24.2   6.9'   27°17.0   4.7'   56.9'     8   298°25.5   54.6   161°50.1   6.8'   27°21.7   4.5'   56.9'     9   313°25.5   54.6   161°50.1   6.8'   27°21.7   4.5'   56.9'     10   328°55.5   53.7   190°41.5   6.6'   27°30.5   4.2'   57.0'     11   343°25.4   53.3   205°07.1   6.5'   27°30.5   4.2'   57.0'     12   358°25.4   N20°52.8   219°32.5   6.4'   \$27°38.7   3.9'   57.1'     13   13°25.3   51.9   248°23.2   6.2'   27°46.3   3.5'   57.1'     14   28°25.3   51.9   248°23.2   6.2'   27°46.3   3.5'   57.1'     15   43°25.2   51.0   277°13.6   6.0'   27°53.2   32.5'   57.2'     16   58°25.2   51.0   277°13.6   6.0'   27°53.2   32.5'   57.2'     17   73°25.2   50.6   291°38.6   6.0'   27°56.4   3.1'   57.2'     18   88°25.1   N20°50.1   306°03.6   5.9'   \$27°59.5   2.9'   57.3'     20   118°25.0   49.2   334°53.2   5.7'   28°05.1   2.5'   57.3'     21   133°25.0   48.3   39°42.6   5.6'   28°07.6   2.4'   57.4'     22   248°24.9   47.9   18°07.2   5.5'   28°10.0   22'   57.4'     50   215.7'   d = -0.4'   SD   15.5'   58°10.0   22'   57.6'     5   28°24.4   7.45.6   90°09.0   5.2'   28°20.6   1.2'   57.6'     6   268°24.7   N20°44.6   118°57.3   5.1'   528°24.2   2.0'   57.6'     7   283°44.8   46.5   61°20.5   5.3'   28°17.8   1.5'   57.5'     6   268°24.7   45.1   104°33.2   5.1'   28°21.8   1.0'   57.6'     6   268°24.7   45.1   104°33.2   5.1'   28°21.8   1.0'   57.6'     7   283°44.8   46.9   46°51.5   5.4'   28°10.1   1.7'   57.5'     6   268°24.7   45.1   104°33.2   5.1'   28°21.5   0.1'   57.5'     6   268°24	The	Cnv	Des	CHA		Das		μп
1 193°25.9 57.8 60°47.0 7.5' 26°45.9 5.5' 56.7' 2 208°25.8 57.3 75°13.5 7.4' 26°51.5 5.4' 56.7' 3 223°25.8 5.56.9 89°39.8 7.2' 26°51.5 5.4' 56.7' 4 238°25.7 56.4 104°06.1 7.1' 27°02.1 5.1' 56.8' 5 253°25.7 56.0 118°32.2 7.0' 27°07.2 5.0' 56.8' 6 268°25.6 N20°55.5 132°58.3 7.0' 527°12.2 4.8' 56.9' 7 283°25.6 55.1 147°24.2 6.9' 27°17.0 4.7' 56.9' 8 298°25.5 54.6 161°50.1 6.8' 27°21.7 4.5' 56.9' 9 313°25.5 5.54.2 176°15.8 6.7' 27°30.5 4.2' 57.0' 10 328°25.5 53.7 190°41.5 6.6' 27°30.5 4.2' 57.0' 11 343°25.4 53.3 205°07.1 6.5' 27°34.7 4.0' 57.0' 12 358°25.4 N20°52.8 219°32.5 6.4' 527°38.7 3.9' 57.1' 13 13°25.3 52.4 233°57.9 6.3' 27°42.6 3.7' 57.1' 14 28°25.3 51.9 248°23.2 6.2' 27°46.3 3.5' 57.1' 15 43°25.2 51.0 277°13.6 6.0' 27°56.4 31' 57.2' 16 58°25.2 51.0 277°13.6 6.0' 27°56.4 31' 57.2' 17 73°25.2 50.6 291°38.6 6.0' 27°56.4 31' 57.2' 18 88°25.1 N20°50.1 306°03.6 5.9' \$27°59.5 2.9' 57.3' 20 118°25.0 49.2 334°53.2 5.7' 28°05.1 2.5' 57.3' 21 133°25.0 48.8 349°18.0 5.6' 28°07.6 2.4' 57.4' 22 148°25.0 48.3 33°453.2 5.7' 28°05.1 2.5' 57.3' 22 148°25.0 48.3 33°45.3 2.5' 28°02.4 2.7' 57.3' 23 163°24.9 47.9 18°07.2 5.5' 28°12.2 2.0' 57.4' 24 228°24.8 46.5 61°20.5 5.3' 28°12.2 2.0' 57.4' 25 208°24.8 46.5 61°20.5 5.3' 28°12.2 2.0' 57.4' 26 268°24.7 N20°44.6 118°57.3 5.1' 28°21.6 1.1' 7' 57.5' 3 223°24.8 46.9 46.9 61°20.5 5.3' 28°12.2 2.0' 57.4' 4 238°24.9 47.9 18°07.2 5.5' 28°12.2 2.0' 57.4' 1 193°24.8 46.9 46.5 61°20.5 5.3' 28°18.3 1.3' 57.6' 4 238°24.7 45.1 104°33.2 5.1' 28°21.8 1.0' 57.6' 5 253°24.7 45.1 104°33.2 5.1' 28°21.8 1.0' 57.6' 6 268°24.7 N20°44.6 118°57.3 5.1' 528°22.8 0.8' 57.7' 7 283°24.6 43.2 133°21.4 5.0' 28°24.0 0.1' 57.8' 10 332°24.5 42.8 176°33.2 4.9' 28°24.0 0.1' 57.8' 11 33°24.4 41.4 219°44.7 4.7' 28°24.0 0.0' 57.7' 18 28°24.4 40.9 234°08.4 4.7' 28°24.0 0.0' 57.7' 18 28°24.4 40.9 234°08.4 4.7' 28°24.0 0.0' 57.7' 19 313°24.4 40.0 249°39.1 49°28°47.7 0.3' 57.9' 15 43°24.3 39.5 277°19.4 4.6' 28°21.7 1.0' 58.0' 16 58°24.3 30.0 50.5 4.5' 28°21.7 1.0' 58.0' 17 73°43.3 39.5 277°19.4 4.6' 28°21.7 1.0' 58.0' 1								
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4         238°25.7         56.4         104°06.1         7.1'         27°02.1         5.1'         56.8'           5         253°25.7         56.0         118°32.2         7.0'         27°07.2         5.0'         56.8'           6         268°25.6         N20°55.5         132°58.3         7.0'         27°17.0         4.7'         56.9'           7         283°25.5         55.4         161°50.1         6.8'         27°21.2         4.3'         57.0'           10         328°25.5         55.4         176°15.8         6.6'         27°30.5         4.2'         57.0'           11         343°25.4         53.3         205°07.1         6.5'         27°31.7         4.0'         57.0'           12         358°25.4         N20°52.8         219°32.5         6.4'         S27°38.7         3.9'         57.1'           13         13°25.3         55.9         248°33.2         6.2'         27°42.6         3.7'         57.1'           14         28°25.3         51.9         248°33.2         6.2'         27°42.6         3.7'         57.1'           15         43°25.2         51.5         262°48.4         6.1'         27°49.8         3.4'         57.2'								
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Fri         GHA         Dec         GHA         ν         Dec         d         HP           0         178° 24.9         N20° 47.4         32° 31.7         5.4'         \$28° 14.2         1.9'         57.5'           1         193° 24.8         46.9         46° 56.1         5.4'         28° 16.1         1.7'         57.5'           2         208° 24.8         46.5         61° 20.5         5.3'         28° 17.8         1.5'         57.5'           3         223° 24.8         · 46.0         75° 44.8         5.2'         28° 19.3         1.3'         57.6'           4         238° 24.7         45.6         90° 90.0         5.2'         28° 20.6         1.2'         57.6'           5         253° 24.7         45.1         104° 33.2         5.1'         28° 21.8         1.0'         57.6'           6         268° 24.7         N20° 44.6         118° 57.3         5.1'         S28° 22.8         0.8'         57.7'           7         283° 24.6         44.2         133° 21.4         5.0'         28° 23.6         0.6'         57.7'           8         298° 24.6         43.7         147° 45.4         5.0'         28° 24.2         0.4'         57.7'	23			10 07.2			2.0	37.1
0         178°24.9         N20°47.4         32°31.7         5.4'         S28°14.2         1.9'         57.5'           1         193°24.8         46.9         46°56.1         5.4'         28°16.1         1.7'         57.5'           2         208°24.8         46.5         61°20.5         5.3'         28°17.8         1.5'         57.5'           3         223°24.8         · 46.0         75°44.8         5.2'         28°19.3         1.3'         57.6'           4         238°24.7         45.6         90°09.0         5.2'         28°20.6         1.2'         57.6'           5         253°24.7         45.1         104°33.2         5.1'         28°21.8         1.0'         57.6'           6         268°24.7         N20°44.6         118°57.3         5.1'         528°22.8         0.8'         57.7'           7         283°24.6         44.2         133°21.4         5.0'         28°23.6         0.6'         57.7'           8         298°24.6         43.7         147°45.4         5.0'         28°24.2         0.4'         57.7'           9         313°24.5         42.8         176°33.2         4.9'         28°24.7         0.3'         57.8' <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>								
1       193°24.8       46.9       46°56.1       5.4'       28°16.1       1.7'       57.5'         2       208°24.8       46.5       61°20.5       5.3'       28°17.8       1.5'       57.5'         3       223°24.8       · 46.0       75°44.8       5.2'       28°19.3       1.3'       57.6'         4       238°24.7       45.6       90°09.0       5.2'       28°20.6       1.2'       57.6'         5       253°24.7       45.1       104°33.2       5.1'       28°21.8       1.0'       57.6'         6       268°24.7       N20°44.6       118°57.3       5.1'       528°22.8       0.8'       57.7'         7       283°24.6       44.2       133°21.4       5.0'       28°23.6       0.6'       57.7'         8       298°24.6       43.7       147°45.4       5.0'       28°24.2       0.4'       57.7'         9       313°24.5       .43.2       162°09.3       4.9'       28°24.2       0.4'       57.7'         10       328°24.5       42.8       176°33.2       4.9'       28°24.9       0.1'       57.8'         11       343°24.5       42.3       190°57.1       4.8'       28°24.6       -								
2       208°24.8       46.5       61°20.5       5.3'       28°17.8       1.5'       57.5'         3       223°24.8       · · 46.0       75°44.8       5.2'       28°19.3       1.3'       57.6'         4       238°24.7       45.6       90°09.0       5.2'       28°20.6       1.2'       57.6'         5       253°24.7       45.1       104°33.2       5.1'       28°21.8       1.0'       57.6'         6       268°24.7       N20°44.6       118°57.3       5.1'       28°21.8       1.0'       57.7'         7       283°24.6       44.2       133°21.4       5.0'       28°23.6       0.6'       57.7'         8       298°24.6       43.7       147°45.4       5.0'       28°24.2       0.4'       57.7'         9       313°24.5       +4.2       176°33.2       4.9'       28°24.9       0.1'       57.8'         10       328°24.5       42.8       176°33.2       4.9'       28°24.9       0.1'       57.8'         11       343°24.5       42.8       176°33.2       4.9'       28°24.9       0.1'       57.9'         12       358°24.4       N20°41.9       205°20.9       4.8'       228°25.0								
3       223°24.8       · · · 46.0       75°44.8       5.2'       28°19.3       1.3'       57.6'         4       238°24.7       45.6       90°09.0       5.2'       28°20.6       1.2'       57.6'         5       253°24.7       45.1       104°33.2       5.1'       28°21.8       1.0'       57.6'         6       268°24.7       N20°44.6       118°57.3       5.1'       528°22.8       0.8'       57.7'         7       283°24.6       44.2       133°21.4       5.0'       28°23.6       0.6'       57.7'         8       298°24.6       43.7       147°45.4       5.0'       28°24.2       0.4'       57.7'         9       313°24.5       · 43.2       162°09.3       4.9'       28°24.9       0.1'       57.8'         10       328°24.5       42.8       176°33.2       4.9'       28°24.9       0.1'       57.8'         11       343°24.5       42.3       190°57.1       4.8'       28°25.0       -0.1'       57.8'         12       358°24.4       N20°41.9       205°20.9       4.8'       S28°24.9       -0.3'       57.9'         13       13°24.4       41.4       219°44.7       4.7'       28°24.2 </th <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>								
5       253°24.7       45.1       104°33.2       5.1'       28°21.8       1.0'       57.6'         6       268°24.7       N20°44.6       118°57.3       5.1'       S28°22.8       0.8'       57.7'         7       283°24.6       44.2       133°21.4       5.0'       28°23.6       0.6'       57.7'         8       298°24.6       43.7       147°45.4       5.0'       28°24.2       0.4'       57.7'         9       313°24.5       · 43.2       162°09.3       4.9'       28°24.7       0.3'       57.8'         10       328°24.5       42.8       176°33.2       4.9'       28°24.9       0.1'       57.8'         11       343°24.5       42.8       176°33.2       4.9'       28°24.9       0.1'       57.8'         12       358°24.4       N20°41.9       205°20.9       4.8'       528°24.9       -0.3'       57.9'         13       13°24.4       41.4       219°44.7       4.7'       28°24.6       -0.5'       57.9'         14       28°24.4       40.9       234°08.4       4.7'       28°24.2       -0.6'       57.9'         15       43°24.3       40.5       248°32.1       4.7'       28°24.2	3							
6         268°24.7         N20°44.6         118°57.3         5.1'         \$28°22.8         0.8'         57.7'           7         283°24.6         44.2         133°21.4         5.0'         28°23.6         0.6'         57.7'           8         298°24.6         43.7         147°45.4         5.0'         28°24.2         0.4'         57.7'           9         313°24.5         · · 43.2         162°09.3         4.9'         28°24.7         0.3'         57.8'           10         328°24.5         42.8         176°33.2         4.9'         28°24.9         0.1'         57.8'           11         343°24.5         42.3         190°57.1         4.8'         28°25.0         -0.1'         57.8'           12         358°24.4         N20°41.9         205°20.9         4.8'         528°24.9         -0.3'         57.9'           13         13°24.4         41.4         219°44.7         4.7'         28°24.6         -0.5'         57.9'           14         28°24.3         40.9         234°08.4         4.7'         28°24.2         -0.6'         57.9'           15         43°24.3         40.5         248°32.1         4.7'         28°24.2         -0.6'         57.								
7								
8       298°24.6       43.7       147°45.4       5.0'       28°24.2       0.4'       57.7'         9       313°24.5       · · 43.2       162°09.3       4.9'       28°24.7       0.3'       57.8'         10       328°24.5       42.8       176°33.2       4.9'       28°24.9       0.1'       57.8'         11       343°24.5       42.3       190°57.1       4.8'       28°25.0       -0.1'       57.8'         12       358°24.4       N20°41.9       205°20.9       4.8'       S28°24.9       -0.3'       57.9'         13       13°24.4       41.4       219°44.7       4.7'       28°24.2       -0.6'       57.9'         14       28°24.4       40.9       234°08.4       4.7'       28°24.2       -0.6'       57.9'         15       43°24.3       · · · 40.5       248°32.1       4.7'       28°24.2       -0.6'       57.9'         16       58°24.3       40.0       262°55.7       4.6'       28°22.7       -1.0'       58.0'         17       73°24.3       39.5       277°19.4       4.6'       28°21.7       -1.2'       58.0'         18       88°24.2       N20°39.1       291°42.9       4.6'       2								
10       328°24.5       42.8       176°33.2       4.9'       28°24.9       0.1'       57.8'         11       343°24.5       42.3       190°57.1       4.8'       28°25.0       -0.1'       57.8'         12       358°24.4       N20°41.9       205°20.9       4.8'       S28°24.9       -0.3'       57.9'         13       13°24.4       41.4       219°44.7       4.7'       28°24.6       -0.5'       57.9'         14       28°24.4       40.9       234°08.4       4.7'       28°24.2       -0.6'       57.9'         15       43°24.3       · 40.5       248°32.1       4.7'       28°23.5       -0.8'       58.0'         16       58°24.3       40.0       262°55.7       4.6'       28°22.7       -1.0'       58.0'         17       73°24.3       39.5       277°19.4       4.6'       28°27.7       -1.2'       58.0'         18       88°24.2       N20°39.1       291°42.9       4.6'       528°20.5       -1.4'       58.1'         19       103°24.2       38.6       306°06.5       4.5'       28°17.5       -1.8'       58.1'         20       118°24.1       38.1       320°30.0       4.5'       28°1	8	298°24.6	43.7	147°45.4	5.0'	28°24.2	0.4'	57.7'
11       343°24.5       42.3       190°57.1       4.8'       28°25.0       -0.1'       57.8'         12       358°24.4       N20°41.9       205°20.9       4.8'       S28°24.9       -0.3'       57.9'         13       13°24.4       41.4       219°44.7       4.7'       28°24.6       -0.5'       57.9'         14       28°24.4       40.9       234°08.4       4.7'       28°24.2       -0.6'       57.9'         15       43°24.3       · · · 40.5       248°32.1       4.7'       28°23.5       -0.8'       58.0'         16       58°24.3       40.0       262°55.7       4.6'       28°22.7       -1.0'       58.0'         17       73°24.3       39.5       277°19.4       4.6'       28°21.7       -1.2'       58.0'         18       88°24.2       N20°39.1       291°42.9       4.6'       528°20.5       -1.4'       58.1'         19       103°24.2       38.6       306°06.5       4.5'       28°19.1       -1.6'       58.1'         20       118°24.1       38.1       320°30.0       4.5'       28°17.5       -1.8'       58.1'         21       133°24.1       · · 37.6       334°53.5       4.5'								
12       358°24.4       N20°41.9       205°20.9       4.8'       S28°24.9       -0.3'       57.9'         13       13°24.4       41.4       219°44.7       4.7'       28°24.6       -0.5'       57.9'         14       28°24.4       40.9       234°08.4       4.7'       28°24.2       -0.6'       57.9'         15       43°24.3       · · · 40.5       248°32.1       4.7'       28°23.5       -0.8'       58.0'         16       58°24.3       40.0       262°55.7       4.6'       28°22.7       -1.0'       58.0'         17       73°24.3       39.5       277°19.4       4.6'       28°21.7       -1.2'       58.0'         18       88°24.2       N20°39.1       291°42.9       4.6'       528°20.5       -1.4'       58.1'         19       103°24.2       38.6       306°06.5       4.5'       28°17.5       -1.8'       58.1'         20       118°24.1       38.1       320°30.0       4.5'       28°17.5       -1.8'       58.1'         21       133°24.1       · · 37.6       334°53.5       4.5'       28°15.7       -1.9'       58.2'         22       148°24.1       37.2       349°17.0       4.5'								
13       13°24.4       41.4       219°44.7       4.7'       28°24.6       -0.5'       57.9'         14       28°24.4       40.9       234°08.4       4.7'       28°24.2       -0.6'       57.9'         15       43°24.3       · · 40.5       248°32.1       4.7'       28°23.5       -0.8'       58.0'         16       58°24.3       40.0       262°55.7       4.6'       28°22.7       -1.0'       58.0'         17       73°24.3       39.5       277°19.4       4.6'       28°21.7       -1.2'       58.0'         18       88°24.2       N20°39.1       291°42.9       4.6'       528°20.5       -1.4'       58.1'         19       103°24.2       38.6       306°06.5       4.5'       28°19.1       -1.6'       58.1'         20       118°24.1       38.1       320°30.0       4.5'       28°17.5       -1.8'       58.1'         21       133°24.1       · · 37.6       334°53.5       4.5'       28°15.7       -1.9'       58.2'         22       148°24.1       37.2       349°17.0       4.5'       28°13.8       -2.1'       58.2'         23       163°24.0       36.7       3°40.5       4.4'       28°1								
14     28°24.4     40.9     234°08.4     4.7'     28°24.2     -0.6'     57.9'       15     43°24.3     · 40.5     248°32.1     4.7'     28°23.5     -0.8'     58.0'       16     58°24.3     40.0     262°55.7     4.6'     28°22.7     -1.0'     58.0'       17     73°24.3     39.5     277°19.4     4.6'     28°21.7     -1.2'     58.0'       18     88°24.2     N20°39.1     291°42.9     4.6'     S28°20.5     -1.4'     58.1'       19     103°24.2     38.6     306°06.5     4.5'     28°17.5     -1.8'     58.1'       20     118°24.1     38.1     320°30.0     4.5'     28°17.5     -1.8'     58.1'       21     133°24.1     · 37.6     334°53.5     4.5'     28°15.7     -1.9'     58.2'       22     148°24.1     37.2     349°17.0     4.5'     28°13.8     -2.1'     58.2'       23     163°24.0     36.7     3°40.5     4.4'     28°11.7     -2.3'     58.2'								
16       58°24.3       40.0       262°55.7       4.6'       28°22.7       -1.0'       58.0'         17       73°24.3       39.5       277°19.4       4.6'       28°21.7       -1.2'       58.0'         18       88°24.2       N20°39.1       291°42.9       4.6'       S28°20.5       -1.4'       58.1'         19       103°24.2       38.6       306°06.5       4.5'       28°19.1       -1.6'       58.1'         20       118°24.1       38.1       320°30.0       4.5'       28°17.5       -1.8'       58.1'         21       133°24.1       · 37.6       334°53.5       4.5'       28°15.7       -1.9'       58.2'         22       148°24.1       37.2       349°17.0       4.5'       28°13.8       -2.1'       58.2'         23       163°24.0       36.7       3°40.5       4.4'       28°11.7       -2.3'       58.2'	14	28°24.4	40.9		4.7'	28°24.2	-0.6'	57.9'
17     73°24.3     39.5     277°19.4     4.6'     28°21.7     -1.2'     58.0'       18     88°24.2     N20°39.1     291°42.9     4.6'     S28°20.5     -1.4'     58.1'       19     103°24.2     38.6     306°06.5     4.5'     28°19.1     -1.6'     58.1'       20     118°24.1     38.1     320°30.0     4.5'     28°17.5     -1.8'     58.1'       21     133°24.1     · 37.6     334°53.5     4.5'     28°15.7     -1.9'     58.2'       22     148°24.1     37.2     349°17.0     4.5'     28°13.8     -2.1'     58.2'       23     163°24.0     36.7     3°40.5     4.4'     28°11.7     -2.3'     58.2'								
18     88°24.2     N20°39.1     291°42.9     4.6'     \$28°20.5     -1.4'     58.1'       19     103°24.2     38.6     306°06.5     4.5'     28°19.1     -1.6'     58.1'       20     118°24.1     38.1     320°30.0     4.5'     28°17.5     -1.8'     58.1'       21     133°24.1     · · 37.6     334°53.5     4.5'     28°15.7     -1.9'     58.2'       22     148°24.1     37.2     349°17.0     4.5'     28°13.8     -2.1'     58.2'       23     163°24.0     36.7     3°40.5     4.4'     28°11.7     -2.3'     58.2'								
19     103°24.2     38.6     306°06.5     4.5'     28°19.1     -1.6'     58.1'       20     118°24.1     38.1     320°30.0     4.5'     28°17.5     -1.8'     58.1'       21     133°24.1     · 37.6     334°53.5     4.5'     28°15.7     -1.9'     58.2'       22     148°24.1     37.2     349°17.0     4.5'     28°13.8     -2.1'     58.2'       23     163°24.0     36.7     3°40.5     4.4'     28°11.7     -2.3'     58.2'								
21 133°24.1 ··· 37.6 334°53.5 4.5' 28°15.7 -1.9' 58.2' 22 148°24.1 37.2 349°17.0 4.5' 28°13.8 -2.1' 58.2' 23 163°24.0 36.7 3°40.5 4.4' 28°11.7 -2.3' 58.2'		103°24.2		306°06.5		28°19.1		
22     148° 24.1     37.2     349° 17.0     4.5'     28° 13.8     -2.1'     58.2'       23     163° 24.0     36.7     3° 40.5     4.4'     28° 11.7     -2.3'     58.2'								
23 163°24.0 36.7 3°40.5 4.4' 28°11.7 -2.3' 58.2'								
				3 10.5				- 3.2

Lat	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut
N 72°						
N 70°						
68°	////	////	00:39	23:22	////	////
66°	////	////	01:50	22:19	////	////
64°	////	////	02:26	21:44	////	////
62°	////	01:12	02:51	21:20	22:55	////
60°	////	01:56	03:10	21:01	22:14	////
N 58°	////	02:24	03:27	20:45	21:46	////
56°	01:06	02:46	03:40	20:31	21:25	23:02
54°	01:47	03:03	03:52	20:20	21:08	22:24
52°	02:13	03:18	04:02	20:09	20:54	21:58
50°	02:33	03:30	04:11	20:00	20:42	21:38
45°	03:09	03:55	04:31	19:41	20:17	21:02
N 40°						
35°	03:35	04:15 04:31	04:46	19:26	19:57	20:36
30°	03:56 04:12		05:00	19:13	19:41	20:16
30°	-	04:44	05:11	19:01	19:28	20:00 19:34
N 10°	04:38	05:06	05:30	18:42 18:25	19:06	
0°	04:58	05:25	05:47		18:48	19:14
	05:15	05:41	06:03	18:10	18:32	18:58
<b>S</b> 10°	05:30	05:56	06:18	17:55	18:17	18:43
20°	05:44	06:11	06:34	17:38	18:02	18:29
30°	05:58	06:27	06:53	17:20	17:46	18:15
35°	06:05	06:36	07:04	17:09	17:36	18:07
40°	06:13	06:47	07:16	16:57	17:26	18:00
45°	06:22	06:58	07:31	16:42	17:15	17:51
<b>S</b> 50°	06:31	07:12	07:48	16:25	17:01	17:42
52°	06:36	07:18	07:57	16:16	16:55	17:37
54°	06:40	07:25	08:06	16:07	16:48	17:33
56°	06:45	07:32	08:17	15:56	16:41	17:28
58°	06:51	07:41	08:29	15:44	16:32	17:23
<b>S</b> 60°	06:56	07:50	08:43	15:30	16:23	17:17
Lat.	\A/I	Moonris		)	Moonset	
N 70°	Wed	Thu	Fri	Wed	Thu	Fri
N 72° N 70°					=	
68°					_	
66° 64°						
62°	19:18					
60°	18:37			22:09 22:50	23:12	
		20:15	21:19			
N 58°	18:09	19:36	20:40	23:18	23:50	00.10
56°	17:48	19:09	20:12	23:40	•• ••	00:18
54°	17:30	18:48	19:50	23:58	00.14	00:39
52°	17:15	18:30	19:33		00:14	00:57
50°	17:02	18:15	19:17	00.10	00:27	01:12
45°	16:35	17:44	18:47	00:19	00:55	01:43
N 40°	16:14	17:21	18:23	00:37	01:16	02:07
$35^{\circ}$	15:57	17:01	18:03	00:52	01:35	02:26
		16:45	17:46	01:06	01:50	02:43
30°	15:42	4 4 4 -		01:29	02:17	03:12
30° 20°	15:16	16:17	17:17		00 00	~~ ~ -
30° 20° <b>N</b> 10°	15:16 14:55	15:53	16:53	01:49	02:39	
30° 20° <b>N</b> 10° 0°	15:16	15:53 15:31	16:53 16:30		02:39 03:01	03:59
30° 20° N 10° 0° S 10°	15:16 14:55	15:53 15:31 15:08	16:53	01:49		03:59 04:21
30° 20° N 10° 0° S 10° 20°	15:16 14:55 14:34 14:14 13:53	15:53 15:31	16:53 16:30	01:49 02:07	03:01 03:22 03:45	03:59 04:21 04:46
30° 20° N 10° 0° S 10° 20° 30°	15:16 14:55 14:34 14:14 13:53 13:28	15:53 15:31 15:08	16:53 16:30 16:07	01:49 02:07 02:26 02:46 03:09	03:01 03:22 03:45 04:12	03:59 04:21 04:46 05:14
30° 20° N 10° 0° S 10° 20° 30° 35°	15:16 14:55 14:34 14:14 13:53	15:53 15:31 15:08 14:45	16:53 16:30 16:07 15:43 15:14 14:58	01:49 02:07 02:26 02:46	03:01 03:22 03:45	03:59 04:21 04:46 05:14 05:31
30° 20° N 10° 0° S 10° 20° 30° 35° 40°	15:16 14:55 14:34 14:14 13:53 13:28	15:53 15:31 15:08 14:45 14:17	16:53 16:30 16:07 15:43 15:14 14:58 14:38	01:49 02:07 02:26 02:46 03:09	03:01 03:22 03:45 04:12	03:36 03:59 04:21 04:46 05:14 05:31 05:51
30° 20° N 10° 0° S 10° 20° 30° 35°	15:16 14:55 14:34 14:14 13:53 13:28 13:14	15:53 15:31 15:08 14:45 14:17 14:01	16:53 16:30 16:07 15:43 15:14 14:58	01:49 02:07 02:26 02:46 03:09 03:23	03:01 03:22 03:45 04:12 04:28	03:59 04:21 04:46 05:14 05:31
30° 20° N 10° 0° S 10° 20° 30° 35° 40°	15:16 14:55 14:34 14:14 13:53 13:28 13:14 12:57	15:53 15:31 15:08 14:45 14:17 14:01 13:42	16:53 16:30 16:07 15:43 15:14 14:58 14:38	01:49 02:07 02:26 02:46 03:09 03:23 03:39	03:01 03:22 03:45 04:12 04:28 04:46	03:59 04:21 04:46 05:14 05:31 05:51
30° 20° N 10° 0° S 10° 20° 30° 35° 40° 45°	15:16 14:55 14:34 14:14 13:53 13:28 13:14 12:57 12:37	15:53 15:31 15:08 14:45 14:17 14:01 13:42 13:19	16:53 16:30 16:07 15:43 15:14 14:58 14:38 14:14	01:49 02:07 02:26 02:46 03:09 03:23 03:39 03:58	03:01 03:22 03:45 04:12 04:28 04:46 05:09	03:59 04:21 04:46 05:14 05:31 05:51 06:15
30° 20° N 10° 0° S 10° 20° 30° 35° 40° 45° S 50°	15:16 14:55 14:34 14:14 13:53 13:28 13:14 12:57 12:37	15:53 15:31 15:08 14:45 14:17 14:01 13:42 13:19 12:50	16:53 16:30 16:07 15:43 15:14 14:58 14:38 14:14 13:44	01:49 02:07 02:26 02:46 03:09 03:23 03:39 03:58 04:22	03:01 03:22 03:45 04:12 04:28 04:46 05:09 05:37	03:59 04:21 04:46 05:14 05:31 05:51 06:15

		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	78-93%	
17	06:12	06:14	12:06	20:48	08:21		
18	06:16	06:19	12:06	21:45	09:16		
19	06:20	06:22	12:06	22:45	10:14		

12:49

12:22

11:31

11:12

12:00

11:35

56°

05:02

05:20

06:27

06:51

07:40

July 20, 21, 22 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	298°16.0	165°12.2	N19°00.3	240°54.1	N19°17.7	227°30.6	N21°33.8	307°28.9	S06°12.7			
1	313°18.5	180°11.6	18°59.5	255°54.8	18.1	242°32.6	33.8	322°31.4	12.7	Alpheratz	357°35.0	29°13.5
2	328°21.0	$195^{\circ}10.9$	58.7	270°55.4	18.5	257°34.5	33.9	337°34.0	12.8	Ankaa	353°07.4	-42°10.1
3	343°23.4	210° 10.2	• • 57.9	285°56.1	• • 18.9	272°36.4	• • 33.9	352°36.5	• • 12.8	Schedar	349°31.3	56°40.1
4	358°25.9	225°09.6	57.1	300°56.8	19.3	287°38.4	34.0	7°39.0	12.9	Diphda	348°47.6	-17°51.0
5	13°28.4	240°08.9	56.3	315°57.5	19.8	302°40.3	34.1	22°41.6	12.9	Achernar	335°20.4	-57°06.4
6	28°30.8	255°08.2	N18°55.5	330°58.1	N19°20.2	317°42.3	N21°34.1	37°44.1	S06°12.9	Hamal	327°51.7	23°34.6
7	43°33.3	270°07.5	54.7	345°58.8	20.6	332°44.2	34.2	52°46.6	13.0	Polaris	314°22.9	89°21.7
8	58°35.7	285°06.9	53.9	0°59.5	20.9	347°46.2	34.3	67°49.2	13.0	Acamar	315°12.2	-40°12.1
9	73°38.2	300°06.2	• • 53.1	$16^{\circ}00.2$	• • 21.3	2°48.1	• • 34.3	82°51.7	• • 13.1	Menkar	314°06.7	4°11.2
10	88°40.7	315°05.5	52.3	31°00.8	21.7	17°50.0	34.4	97°54.2	13.1	Mirfak	308°29.0	49°56.7
11	103°43.1	330°04.9	51.5	46°01.5	22.1	32°52.0	34.5	112°56.8	13.2	Aldebaran	290°40.3 281°04.5	16°33.5
12	118°45.6	345°04.2	N18°50.7	61°02.2	N19°22.5	47°53.9	N21°34.5	127°59.3	S06°13.2	Rigel		-8°10.3 46°01.3
13	133°48.1	0°03.5	49.9	76°02.9	22.9	62°55.9	34.6	143°01.9	13.2	Capella	280°22.8 278°23.6	6°22.4
14	148°50.5	15°02.9	49.1	91°03.5	23.3	77°57.8	34.7	158°04.4	13.3	Bellatrix	278°02.7	28°37.7
15	163°53.0	30°02.2	• • 48.3	106°04.2	· · 23.7	92°59.8	• • 34.7	173°06.9	· · 13.3	Elnath Alnilam	276 02.7 275°38.4	-1°11.1
16	178°55.5	45°01.6	47.5	121°04.9	24.1	108°01.7	34.8	188°09.5	13.4		270°52.8	-1 11.1 7°24.8
17	193°57.9	60°00.9	46.7	136°05.6	24.5	123°03.6	34.8	203°12.0	13.4	Betelgeuse	263°53.1	-52°42.3
18	209°00.4	75°00.2	N18°45.8	151°06.2	N19°24.9	138°05.6	N21°34.9	218°14.6	S06°13.4	Canopus Sirius	258°26.9	-52 42.3 -16°44.9
19	224°02.9	89° 59.6	45.0	166°06.9	25.3	153°07.5	35.0	233°17.1	13.5	Adhara	255°06.5	-10 44.9 -29°00.2
20	239°05.3	104°58.9	44.2	181°07.6	25.7	168°09.5	35.0	248°19.6	13.5	Procyon	244°51.6	5°09.8
21	254°07.8	119°58.2	• • 43.4	196°08.3	• • 26.1	183°11.4	• • 35.1	263°22.2	• • 13.6	Pollux	243°18.1	27°58.1
22	$269^{\circ}10.2$	134° 57.6	42.6	211°08.9	26.5	198°13.4	35.2	278°24.7	13.6	Avior	234° 15.6	-59°35.2
23	284°12.7	$149^{\circ}56.9$	41.8	$226^{\circ}09.6$	26.9	213°15.3	35.2	293°27.2	13.7	Suhail	234 15.6 222°47.0	-59 35.2 -43°31.9
Morn	ass. 04:06	υ-0 7′ d 0	).8' m-3.88	νη 7' Αη	.4′ m0.91	1/1 0/ d0	1' m-2.07	1/2 5/ 40	.0′ m0.81	Miaplacidus	222 47.0 221°39.3	-43 31.9 -69°49.1
ivier.p	ass. 04:00	$\nu$ -0.7 $a$ -0	0.0 111-3.00	νο.τ αυ	.4 1110.91	$\nu_{1.9} \ a_{0.}$	1 m-2.07	ν2.5 d0	.0 1110.61	Alphard	221 39.3 217°48.4	-8°45.8
										Regulus	217 46.4 207°35.1	-6 45.6 11°51.0
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.9	61°37.4
0	$299^{\circ}15.2$	$164^{\circ}56.3$	N18°40.9	241°10.3	$N19^{\circ}27.3$	228°17.3	N21°35.3	308°29.8	S06°13.7	Denebola	193 41.9 182°25.5	14°26.2
1	$314^{\circ}17.6$	$179^{\circ}55.6$	40.1	$256^{\circ}11.0$	27.7	243°19.2	35.4	323°32.3	13.7	Gienah		-17°40.7
2	329°20.1	194°54.9	39.3	271°11.6	28.1	258°21.1	35.4	338°34.9	13.8	Acrux	173°44.1	-63°14.3
3	344°22.6	209°54.3	• • 38.5	$286^{\circ}12.3$	• • 28.5	273°23.1	• • 35.5	353°37.4	• • 13.8	I	171°52.3	-57°15.3
4	359°25.0	224°53.6	37.7	301°13.0	28.9	288°25.0	35.5	8°39.9	13.9	Alioth	166°13.4	55°49.9
5	14°27.5	239°53.0	36.8	$316^{\circ}13.7$	29.3	303°27.0	35.6	23°42.5	13.9	Spica	158°22.7	-11°17.4
6	29°30.0	254° 52.3	N18°36.0	331°14.3	$N19^{\circ}29.7$	318°28.9	N21°35.7	38°45.0	S06°14.0	Alkaid	152°52.3	49°11.7
7	44°32.4	269°51.6	35.2	346°15.0	30.1	333°30.9	35.7	53°47.6	14.0	Hadar	148°36.5	-60°29.7
8	59°34.9	284°51.0	34.4	1°15.7	30.4	348°32.8	35.8	68°50.1	14.0		147°58.0	-36°29.6
9	74°37.4	299°50.3	• • 33.5	$16^{\circ}16.4$	• • 30.8	3°34.8	• • 35.9	83°52.6	• • 14.1	Arcturus	145°48.2	19°03.4
10	89°39.8	314°49.7	32.7	31°17.1	31.2	18°36.7	35.9	98°55.2	14.1	Rigil Kent.	139°40.7	-60°56.4
11	104°42.3	329°49.0	31.9	46°17.7	31.6	33°38.7	36.0	113°57.7	14.2	Kochab	137°19.4	74°03.5
12	119°44.7	344°48.4	N18°31.1	61°18.4	N19°32.0	48°40.6	N21°36.0	129°00.3	S06°14.2	Zuben'ubi	136°56.3	-16°08.7
13	134°47.2	359°47.7	30.2	$76^{\circ}19.1$	32.4	63°42.6	36.1	144°02.8	14.3	Alphecca	126°03.9	26°38.1
14	149°49.7	$14^{\circ}47.1$	29.4	91°19.8	32.8	78°44.5	36.2	159°05.3	14.3	Antares	112°16.1	-26°29.2
15	$164^{\circ}52.1$	29°46.4	• • 28.6	106°20.4	• • 33.2	93°46.5	• • 36.2	174°07.9	• • 14.3	Atria	107°10.2	-69°04.5
16	179°54.6	44° 45.8	27.7	121°21.1	33.6	108°48.4	36.3	189°10.4	14.4	Sabik	102°03.0	-15°45.3
17	194°57.1	59°45.1	26.9	136°21.8	34.0	123°50.4	36.4	204°13.0	14.4	Shaula	96°10.5	-37°07.4
18	209°59.5	74° 44.5	N18°26.1	151°22.5	N19°34.3	138°52.3	N21°36.4	219°15.5	S06°14.5	Rasalhague	95°58.6	12°32.6
19	225°02.0	89°43.8	25.2	166°23.1	34.7	153°54.2	36.5	234°18.1	14.5	Eltanin	90°41.9	51°29.2
20	240°04.5	104°43.2	24.4	181°23.8	35.1	168°56.2	36.5	249°20.6	14.6	Kaus Aust.	83°32.6	-34°22.4
21	255°06.9	119° 42.5	• • 23.6	196°24.5	• • 35.5	183°58.1	• • 36.6	264°23.1	• • 14.6	Vega	80°33.1	38°48.4
22	270°09.4	134°41.9	22.7	211°25.2	35.9	199°00.1	36.7	279°25.7	14.6	Nunki	75°47.9	-26°16.0
23	285°11.9	149°41.2	21.9	226°25.8	36.3	214°02.0	36.7	294°28.2	14.7	Altair	62°00.0	8°56.0
Mer.p	ass. 04:02	$\nu$ -0.7' d-0	).8′ m-3.88	$\nu 0.7' d0$	.4′ m0.90	$\nu 1.9' d0.$	1' m-2.08	$\nu 2.5' d0$	.0′ m0.81	Peacock	53°05.7	-56°39.3
										Deneb	49°25.6	45°22.0
										Enif	33°38.9	9°59.3
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.0	-46°50.4
0	300°14.3	164°40.6	N18°21.0	241°26.5	N19°36.7	229°04.0	N21°36.8	309°30.8	S06°14.7	Fomalhaut	$15^{\circ}14.7$	-29°29.4
1	315°16.8	179°39.9	20.2	256°27.2	37.1	244°05.9	36.9	324°33.3	14.8	Scheat	13°45.3	28°12.9
2	330°19.2	194°39.3	19.4	271°27.9	37.4	259°07.9	36.9	339°35.8	14.8	Markab	13°30.1	15°20.2
3	345°21.7	209°38.6	• • 18.5	286°28.5	• • 37.8	274°09.8	• • 37.0	354°38.4	• • 14.9	II 20 C	CHA	Ma: ====
4	0°24.2	224°38.0	17.7	301°29.2	38.2	289°11.8	37.0	9°40.9	14.9	Jul 20 Sat	SHA	Mer.pass
5	15°26.6	239°37.3	16.8	316°29.9	38.6	304°13.7	37.1	24°43.5	14.9	Venus	226°56.2 302°38.0	13:00 07:56
6	30°29.1	254°36.7	N18°16.0	331°30.6	N19°39.0	319°15.7	N21°37.2	39°46.0	S06°15.0	Mars		
7	45°31.6	269°36.0	15.1	346°31.3	39.4	334°17.6	37.2	54°48.6	15.0	Jupiter		08:49
8	60°34.0	284°35.4	14.3	1°31.9	39.8	349°19.6	37.3	69°51.1	15.1	Saturn	9°12.9	03:29
9	75°36.5	299°34.8	· · 13.5	16°32.6	• • 40.1	4°21.5	• • 37.4	84°53.7	15.1	Jul 21 Sun	SHA	Mer.pass
10	90°39.0	314°34.1	12.6	31°33.3	40.5	19°23.5	37.4	99°56.2	15.2	Venus	225°41.1	13:01
11	105°41.4	329°33.5	11.8 N19°10.0	46°34.0	40.9	34°25.4	37.5	114°58.7	15.2	Mars		07:55
12	120°43.9	344°32.8	N18°10.9	61°34.6	N19°41.3	49°27.4	N21°37.5	130°01.3	S06°15.3	Jupiter		08:46
13	135°46.4 150°48.8	359°32.2 14°31.6	10.1 09.2	76°35.3	41.7	64°29.3	37.6 37.7	145°03.8 160°06.4	15.3 15.3	Saturn	$9^{\circ}14.6$	03:25
14 15				91°36.0	42.1	79°31.3	37.7			11.00.11	6114	
15 16	165°51.3 180°53.7	29°30.9 44°30.3	· · 08.4 07.5	106°36.7 121°37.3	42.4	94°33.2 109°35.2	· · 37.7 37.8	175°08.9 190°11.5	· · 15.4 15.4	Jul 22 Mon	SHA	Mer.pass
16 17	180 53.7 195°56.2	44 30.3 59°29.6	07.5 06.6	121 37.3 136°38.0	42.8	109 35.2 124°37.1	37.8 37.8	205°14.0	15.4 15.5	Venus		13:02
17 18	195°56.2 210°58.7	74° 29.0	N18°05.8	136°38.0 151°38.7	43.2 N19°43.6	124°37.1 139°39.1	37.8 N21°37.9	205°14.0 220°16.6	15.5 S06°15.5	Mars		07:54
19	210 56.7 226°01.1	74 29.0 89°28.4	04.9	166°39.4	44.0	159 59.1 154°41.0	38.0	235°19.1	15.6		288°49.7	08:43
20	241°03.6	104° 27.7	04.9	181°40.0	44.0	169°43.0	38.0	250°21.6	15.6	Saturn	9°16.4	03:21
21	241 03.6 256°06.1	104 27.7 119°27.1	03.2	181 40.0 196°40.7	· · 44.7	169 43.0 184°44.9	38.1	265°24.2	15.0	Horizont	al parallax	
22	271°08.5	134° 26.4	02.4	211°41.4	45.1	199°46.9	38.2	280°26.7	15.7		Venus:	0.1
23	286°11.0	149° 25.8	01.5	211 41.4 226°42.1	45.5	214°48.8	38.2	295°29.3	15.7		Mars:	0.1
										L		
Mer.p	ass. 03:58	$ u$ -0.6 $^{\prime}$ d-0	).8′ m-3.88	$ u$ 0.7 $^{\prime}$ d0	.4′ m0.90	$\nu 1.9' \ d0.$	1′ m-2.08	$\nu$ 2.5′ $d$ 0	.0′ m0.80			
						-						

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°24.0	N20°36.2	18°03.9	4.4'	528°09.3	-2.5'	58.2'
1	193°24.0	35.8	32°27.4	4.4'	28°06.8	-2.7'	58.3'
2	208°23.9	35.3	46°50.8	4.4'	28°04.1	-2.9'	58.3'
3	223°23.9	• • 34.8	61°14.2	4.4'	28°01.2	-3.1'	58.3'
4	238°23.9	34.3	75°37.6	4.4'	27°58.2	-3.3'	58.4'
5	253°23.8 268°23.8	33.9 N20°33.4	90°01.0 104°24.4	4.4' 4.4'	27°54.9 \$27°51.5	-3.4' -3.6'	58.4' 58.4'
6 7	283°23.8	32.9	104 24.4 118°47.8	4.4 4.4'	27°47.8	-3.8'	58.5'
8	298°23.7	32.4	133°11.2	4.4'	27°44.0	-3.0 -4.0'	58.5
9	313°23.7	32.0	147°34.7	4.4'	27°40.0	-4.2'	58.5'
10	328°23.7	31.5	161°58.1	4.4'	27°35.8	-4.4'	58.6'
11	343°23.7	31.0	$176^{\circ}21.5$	4.4'	27°31.4	-4.6'	58.6'
12	358°23.6	N20°30.5	190°45.0	4.5'	S27°26.8	-4.8'	58.6'
13	13°23.6	30.0	205°08.4	4.5'	$27^{\circ}22.1$	-4.9'	58.6'
14	28°23.6	29.6	219°31.9	4.5'	27° 17.1	-5.1'	58.7'
15	43°23.5 58°23.5	• • 29.1	233°55.4 248°18.9	4.5'	27°12.0 27°06.7	-5.3'	58.7'
16 17	58 23.5 73°23.5	28.6 28.1	248 18.9 262°42.5	4.5' 4.6'	27 06.7 27°01.2	-5.5' -5.7'	58.7' 58.8'
18	88°23.4	N20°27.6	202 42.5 277°06.0	4.6'	\$26°55.5	-5.7 -5.9'	58.8'
19	103°23.4	27.1	291°29.6	4.6'	26°49.7	-6.0'	58.8'
20	118°23.4	26.7	305°53.3	4.7'	26°43.6	-6.2'	58.8'
21	133°23.4	• • 26.2	320°16.9	4.7'	26°37.4	-6.4	58.9'
22	148°23.3	25.7	334°40.6	4.7'	$26^{\circ}31.0$	-6.6'	58.9'
23	163°23.3	25.2	349°04.4	4.8'	$26^{\circ}24.4$	-6.8'	58.9'
	SD = 15.7'	d = -0.5'		S	D = 15.9'		
Sun 0	<b>GHA</b> 178°23.3	<b>Dec</b> N20°24.7	<b>GHA</b> 3°28.1	ν 4.8'	Dec \$26° 17.6	d -7.0'	<b>HP</b> 58.9'
1	176 23.3 193°23.2	24.2	3 20.1 17°52.0	4.0 4.9'	26° 10.7	-7.0 -7.1'	56.9 59.0'
2	208°23.2	23.7	32°15.8	4.9'	26°03.5	-7.1 -7.3	59.0'
3	223°23.2	23.3	46°39.7	5.0'	25°56.2	-7.5'	59.0'
4	238°23.2	22.8	61°03.7	5.0'	25°48.7	-7.7'	59.0'
5	253°23.1	22.3	75°27.7	5.1'	25°41.1	-7.8'	59.1'
6	268°23.1	N20°21.8	89°51.7	5.1'	S25°33.2	-8.0'	59.1'
7	283°23.1	21.3	104°15.8	5.2'	25°25.2	-8.2'	59.1'
8	298°23.1	20.8	118°40.0	5.2'	25° 17.0	-8.4'	59.1'
9	313°23.0	• • 20.3	133°04.2	5.3'	25°08.7	-8.5'	59.2'
10	328°23.0 343°23.0	19.8 19.3	147°28.5 161°52.8	5.3' 5.4'	25°00.2 24°51.5	-8.7'	59.2' 59.2'
11 12	343 23.0 358°23.0	N20° 18.8	101 52.8 176°17.2	5.4	24 51.5 \$24°42.6	-8.9' -9.0'	59.2'
13	13°22.9	18.3	170 17.2 190°41.7	5.5'	24° 33.6	-9.0 -9.2'	59.2 59.3'
14	28°22.9	17.8	205°06.2	5.6'	24°24.4	-9.4'	59.3'
15	43°22.9	• • 17.4	219°30.8	5.6'	24°15.0	-9.5'	59.3'
16	58°22.9	16.9	233°55.4	5.7'	24°05.5	-9.7'	59.3'
17	73°22.8	16.4	$248^{\circ}20.1$	5.8'	23°55.8	-9.8'	59.4'
18	88°22.8	N20° 15.9	262°44.9	5.9'	523°46.0	-10.0'	59.4'
19	103°22.8	15.4	277°09.7	5.9'	23°36.0	-10.2'	59.4'
20	118°22.8 133°22.8	14.9	291°34.7 305°59.7	6.0' 6.1'	23°25.8 23°15.5	-10.3'	59.4'
21 22	133 22.8 148°22.7	· · 14.4 13.9	305 59.7 320°24.7	6.1	23°15.5	-10.5' -10.6'	59.4' 59.5'
23	163°22.7	13.4	334°49.9	6.2	23°54.4	-10.8	59.5'
	SD = 15.7'	d = -0.5'			D = 16.1'		
	<u> </u>	u = -0.5			D = 10.1		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°22.7	N20° 12.9	349°15.1	6.3'	\$22°43.6	-10.9'	59.5'
1 2	193°22.7 208°22.6	12.4 11.9	3°40.4 18°05.7	6.4' 6.4'	22°32.6 22°21.6	-11.1' -11.2'	59.5' 59.5'
3	208 22.6 223°22.6	. 11.9	32°31.2	6.5	22° 10.3	-11.2 -11.4'	59.5 59.6'
4	238°22.6	10.9	46°56.7	6.6'	21°59.0	-11.5'	59.6'
5	253°22.6	10.4	61°22.3	6.7'	21°47.4	-11.7'	59.6'
6	268°22.6	N20°09.9	75°48.0	6.8'	S21°35.8	-11.8'	59.6'
7	283°22.5	09.3	$90^{\circ}13.7$	6.8'	21°24.0	-11.9'	59.6'
8	298°22.5	08.8	104°39.6	6.9'	21°12.0	-12.1'	59.6'
9	313°22.5	• • 08.3	119°05.5	7.0'	20°59.9	-12.2'	59.7'
10 11	328°22.5 343°22.5	07.8 07.3	133°31.5 147°57.5	7.1' 7.2'	20°47.7 20°35.4	-12.4' -12.5'	59.7' 59.7'
12	343°22.5 358°22.4	07.3 N20°06.8	147°57.5 162°23.7	7.2'	20°35.4 \$20°22.9	-12.5' -12.6'	59.7' 59.7'
13	13°22.4	06.3	102 23.7 176°49.9	7.3'	20° 10.3	-12.7'	59.7'
14	28°22.4	05.8	191°16.3	7.4	19°57.5	-12.9'	59.7'
15	43°22.4	• • 05.3	205°42.7	7.5'	19°44.6	-13.0'	59.7'
16	58°22.4	04.8	$220^{\circ}09.1$	7.6'	19°31.6	-13.1'	59.8'
17	73°22.4	04.3	234°35.7	7.6'	$19^{\circ}18.5$	-13.2'	59.8'
18	88°22.3	$N20^{\circ}03.8$	249°02.4	7.7'	S19°05.3	-13.4'	59.8'
19	103°22.3	03.2	263°29.1	7.8'	18°51.9	-13.5'	59.8'
20	118°22.3	02.7	277°55.9	7.9'	18°38.4	-13.6'	59.8'
21 22	133°22.3 148°22.3	· · 02.2 01.7	292°22.8 306°49.8	8.0' 8.1'	18° 24.8 18° 11.1	-13.7' -13.8'	59.8' 59.8'
23	148°22.3 163°22.3	01.7	306°49.8 321°16.8	8.1'	18° 11.1 17° 57.3	-13.8° -13.9°	59.8'
23			JZ1 10.0			-13.9	33.0
	SD = 15.7'	d = -0.5'		S	D = 16.2'		

			2024	July 2	0 to 3a	22 0
Lat.	Twi	light	Sunrise	Sunset	Twi	light
	Naut.	Civil	- Cumico	Camber	Civil	Naut.
N $72^{\circ}$						
N 70°						
68°	////	////	01:10	22:56	////	////
$66^{\circ}$	////	////	02:03	22:06	////	////
64°	////	////	02:35	21:36	////	////
62°	////	01:28	02:58	21:13	22:40	////
60°	////	02:06	03:17	20:55	22:04	////
N 58°	////	02:32	03:32	20:40	21:39	////
56°	01:21	02:52	03:45	20:27	21:19	22:48
54°	01:55	03:08	03:56	20:16	21:03	22:15
52°	02:20	03:22	04:06	20:06	20:50	21:52
50°	02:38	03:34	04:15	19:57	20:38	21:33
45°	03:13	03:59	04:34	19:38	20:14	20:58
$N 40^{\circ}$	03:39	04:18	04:49	19:24	19:55	20:34
$35^{\circ}$	03:58	04:33	05:02	19:11	19:39	20:14
30°	04:14	04:46	05:13	19:00	19:26	19:58
20°	04:39	05:08	05:32	18:41	19:05	19:33
N $10^{\circ}$	04:59	05:25	05:48	18:25	18:48	19:14
0°	05:15	05:41	06:03	18:10	18:32	18:58
<b>S</b> 10°	05:30	05:56	06:18	17:55	18:17	18:43
20°	05:43	06:10	06:34	17:39	18:03	18:30
30°	05:57	06:26	06:52	17:21	17:47	18:16
35°	06:04	06:35	07:02	17:11	17:38	18:09
40°	06:11	06:45	07:14	16:59	17:29	18:02
45°	06:20	06:56	07:28	16:45	17:18	17:54
<b>S</b> 50°	06:29	07:09	07:45	16:28	17:05	17:45
52°	06:33	07:15	07:53	16:20	16:59	17:41
54°	06:37	07:21	08:02	16:11	16:52	17:36
56°	06:42	07:29	08:12	16:01	16:45	17:32
58°	06:47	07:37	08:24	15:50	16:37	17:27
<b>S</b> 60°	06:52	07:46	08:37	15:36	16:28	17:21
Lat.		Moonris	е		Moonset	
	Sat	Sun	Mon	Sat	Sun	Mon
N $72^{\circ}$	_					
<b>N</b> 70°			23:48			
68°			23:11			
66°		23:31	22:44			02:15

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

		Sun			Moon			
Day	Day Eqn.of		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	97-99%		
20	06:24	06:26	12:06	23:46	11:15			
21	06:27	06:28	12:06	-:-	12:15			
22	06:29	06:30	12:07	00:45	13:13			

July 23, 24, 25 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	301°13.5	164° 25.2	N18°00.6	241°42.7	N19°45.9	229°50.8	N21°38.3	310°31.8	S06°15.8			
1	316°15.9	179° 24.5	17°59.8	256°43.4	46.2	244°52.8	38.3	325°34.4	15.8	Alpheratz	357°35.0	29°13.5
	331°18.4	179 24.5 194°23.9	17 59.6 58.9	271°44.1		259°54.7	38.4	340°36.9	15.0	Ankaa	353°07.3	-42°10.1
2				271 44.1 286°44.8	46.6	274°56.7				Schedar	349°31.3	56°40.1
3	346°20.8	209°23.3	• • 58.1		• • 47.0		• • 38.5	355°39.5	• • 15.9	Diphda	348°47.6	-17°51.0
4	1°23.3	224°22.6	57.2	301°45.5	47.4	289°58.6	38.5	10°42.0	16.0	Achernar	335°20.4	-57°06.4
5	16°25.8	239°22.0	56.3	316°46.1	47.7	305°00.6	38.6	25°44.6	16.0	Hamal	$327^{\circ}51.6$	23°34.6
6	31°28.2	254°21.4	N17°55.5	331°46.8	N19°48.1	320°02.5	N21°38.6	40°47.1	S06°16.1	Polaris	314°21.5	89°21.7
7	46°30.7	269° 20.7	54.6	346°47.5	48.5	335°04.5	38.7	55°49.7	16.1	Acamar	315°12.2	-40°12.1
8	61°33.2	284°20.1	53.7	1°48.2	48.9	350°06.4	38.8	70°52.2	16.2	Menkar	314°06.6	4°11.2
9	76°35.6	299° 19.5	• • 52.9	16°48.8	• • 49.3	5°08.4	• • 38.8	85°54.7	• • 16.2	Mirfak	308°29.0	49°56.7
10	91°38.1	314° 18.9	52.0	31°49.5	49.6	20°10.3	38.9	100°57.3	16.2	Aldebaran	290°40.3	16°33.5
11	106°40.6	329° 18.2	51.1	46°50.2	50.0	35°12.3	38.9	115°59.8	16.3	Rigel	281°04.5	-8°10.3
12	121°43.0	344°17.6	$N17^{\circ}50.3$	61°50.9	N19°50.4	50°14.2	N21°39.0	131°02.4	S06°16.3	Capella	280°22.8	46°01.3
13	136°45.5	359° 17.0	49.4	76°51.5	50.8	65°16.2	39.1	146°04.9	16.4	Bellatrix	278°23.5	6°22.4
14	151°48.0	14° 16.3	48.5	$91^{\circ}52.2$	51.1	80°18.1	39.1	161°07.5	16.4	Elnath	278°02.6	28°37.7
15	166°50.4	29° 15.7	• • 47.6	106°52.9	• • 51.5	95°20.1	• • 39.2	176°10.0	• • 16.5	Alnilam	275°38.4	-1°11.1
16	181°52.9	44°15.1	46.8	121°53.6	51.9	110°22.1	39.2	191°12.6	16.5	Betelgeuse	270°52.8	7°24.8
17	196°55.3	59° 14.5	45.9	136°54.3	52.2	125°24.0	39.3	$206^{\circ}15.1$	16.6	_		-52°42.3
18	211°57.8	74°13.8	N17°45.0	151°54.9	N19°52.6	140°26.0	N21°39.4	221°17.7	S06°16.6	Canopus	263°53.1 258°26.9	
19	227°00.3	89°13.2	44.1	166°55.6	53.0	155°27.9	39.4	236°20.2	16.7	Sirius		-16°44.8
20	242°02.7	104°12.6	43.3	181°56.3	53.4	170°29.9	39.5	251°22.8	16.7	Adhara	255°06.5	-29°00.2
21	257°05.2	119°12.0	• • 42.4	196°57.0	• • 53.7	185°31.8	• • 39.5	266°25.3	• • 16.8	Procyon	244°51.6	5°09.8
22	272°07.7	134°11.3	41.5	211°57.6	54.1	200°33.8	39.6	281°27.9	16.8	Pollux	243°18.1	27°58.1
23	287°10.1	149° 10.7	40.6	226°58.3	54.5	215°35.7	39.7	296°30.4	16.8	Avior	234°15.6	-59°35.2
			_							Suhail	222°47.0	-43°31.9
Mer.p	ass. 03:54	$\nu$ -0.6′ $d$ -0	).9′ m-3.88	$\nu$ 0.7′ d0.	.4′ m0.90	$\nu$ 2.0′ d0.	1'  m-2.08	$\nu$ 2.5′ $d$ 0	.0′ m0.80	Miaplacidus	221°39.3	-69°49.1
										Alphard	217°48.4	-8°45.8
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.1	11°51.0
oved 0	302°12.6	164° 10.1	N17°39.7	241°59.0	N19°54.9	230°37.7	N21°39.7	311°33.0	S06°16.9	Dubhe	193°41.9	61°37.4
1	302 12.6 317°15.1	164 10.1 179°09.5		241 59.0 256°59.7	N19 54.9 55.2	245°39.6		311 33.0 326°35.5		Denebola	182°25.5	14°26.2
	317°15.1 332°17.5		38.9	250°59.7 272°00.3		245°39.6 260°41.6	39.8 39.8	326°35.5 341°38.1	16.9	Gienah	$175^{\circ}44.1$	-17°40.7
2		194°08.8	38.0		55.6				17.0	Acrux	173°00.8	-63°14.3
3	347°20.0	209°08.2	• • 37.1	287°01.0	• • 56.0	275°43.6	• • 39.9	356°40.6	• • 17.0	Gacrux	171°52.3	-57°15.3
4	2°22.5	224°07.6	36.2	302°01.7	56.3	290°45.5	40.0	11°43.2	17.1	Alioth	166°13.4	55°49.9
5	17°24.9	239°07.0	35.3	317°02.4	56.7	305°47.5	40.0	26°45.7	17.1	Spica	158°22.7	-11°17.4
6	32°27.4	254°06.4	N17°34.4	332°03.1	N19°57.1	320°49.4	N21°40.1	41°48.3	S06°17.2	Alkaid	152°52.3	49°11.7
7	47°29.8	269°05.7	33.6	347°03.7	57.4	335°51.4	40.1	56°50.8	17.2	Hadar	148°36.5	-60°29.7
8	62°32.3	284°05.1	32.7	2°04.4	57.8	350°53.3	40.2	71°53.4	17.3	Menkent	147°58.1	-36°29.6
9	77°34.8	299°04.5	• • 31.8	17°05.1	• • 58.2	5°55.3	• • 40.3	86°55.9	• • 17.3	Arcturus	145°48.2	19°03.4
10	92°37.2	314°03.9	30.9	32°05.8	58.5	20°57.3	40.3	101°58.5	17.4	Rigil Kent.	139°40.7	-60°56.4
11	107°39.7	329°03.3	30.0	47°06.4	58.9	35°59.2	40.4	$117^{\circ}01.0$	17.4	Kochab	137°19.5	74°03.5
12	122°42.2	344°02.7	$N17^{\circ}29.1$	$62^{\circ}07.1$	$N19^{\circ}59.3$	51°01.2	N21°40.4	132°03.6	S06°17.5	Zuben'ubi	136°56.4	-16°08.7
13	137°44.6	359°02.0	28.2	77°07.8	$19^{\circ}59.6$	66°03.1	40.5	$147^{\circ}06.1$	17.5	Alphecca	126°03.9	26°38.1
14	152°47.1	14°01.4	27.3	92°08.5	20°00.0	81°05.1	40.6	162°08.7	17.5	Antares	112° 16.1	-26°29.2
15	167°49.6	29°00.8	• • 26.4	$107^{\circ}09.1$	• • 00.4	96°07.0	• • 40.6	$177^{\circ}11.2$	• • 17.6	Atria	107°10.1	-20 29.2 -69°04.5
16	182°52.0	44°00.2	25.5	122°09.8	00.7	111°09.0	40.7	192°13.8	17.6		107 10.2 102°03.0	-09 04.5 -15°45.3
17	197°54.5	58° 59.6	24.6	$137^{\circ}10.5$	01.1	126°11.0	40.7	207°16.3	17.7	Sabik		I
18	212°56.9	73°59.0	N17°23.7	152°11.2		141°12.9	N21°40.8	222°18.9	S06°17.7	Shaula	96°10.5	-37°07.4
19	227°59.4	88°58.4	22.9	167°11.9	01.8	156° 14.9	40.9	237°21.4	17.8	Rasalhague	95°58.6	12°32.6
20	243°01.9	103°57.7	22.0	182°12.5	02.2	171°16.8	40.9	252°24.0	17.8	Eltanin	90°41.9	51°29.2
21	258°04.3	118°57.1	• • 21.1	197°13.2	• • 02.6	186°18.8	• • 41.0	267°26.5	17.9	Kaus Aust.	83°32.6	-34°22.4
22	273°06.8	133°56.5	20.2	212°13.9	02.9	201°20.8	41.0	282°29.1	17.9	Vega	80°33.1	38°48.5
23	288°09.3	148° 55.9	19.3	227°14.6	03.3	216°22.7	41.1	297°31.6	18.0	Nunki	75°47.9	-26°16.0
						210 22.1	41.1			Altair	62°00.0	8°56.0
Mer.p	ass. 03:51	$\nu$ -0.6' d-0	).9′ m-3.88	$\nu$ 0.7' d0.	.4′ m0.89	$\nu 2.0' \ d0.$	1′ m-2.09	$\nu 2.5' \ d0$	.0′ m0.79	Peacock	53°05.7	-56°39.3
										Deneb	49°25.6	45°22.0
<del></del>	CIIA	CIII	Б	C114	_	6114	Б	6174	Б	Enif	33°38.9	9°59.3
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.0	-46°50.4
0	303°11.7	163°55.3	N17°18.4	242°15.2	N20°03.7	231°24.7	N21°41.2	312°34.2		Fomalhaut	15°14.6	-29°29.4
1	318°14.2	178°54.7	17.5	257°15.9	04.0	246°26.6	41.2	327°36.8	18.1	Scheat	13°45.3	28°12.9
2	333°16.7	193°54.1	16.6	272°16.6	04.4	261°28.6	41.3	342°39.3	18.1	Markab	13°30.0	15°20.2
3	348°19.1	208°53.5	• • 15.6	287°17.3	• • 04.8	276°30.5	• • 41.3	357°41.9	• • 18.2	L. 1.02 T	CIIA	Ma:: ::
4	3°21.6	223°52.9	14.7	302°18.0	05.1	291°32.5	41.4	12°44.4	18.2	Jul 23 Tue	SHA	Mer.pass
5	18°24.1	238° 52.3	13.8	317°18.6	05.5	306°34.5	41.4	27°47.0	18.3		223°11.7	13:03
6	33°26.5	253°51.6	N17°12.9	332°19.3	N20°05.8	321°36.4	N21°41.5		S06°18.3		300°29.3	07:53
7	48°29.0	268°51.0	12.0	347°20.0	06.2	336°38.4	41.6	57°52.1	18.4		288°37.3	08:39
8	63°31.4	283°50.4	11.1	2°20.7	06.6	351°40.3	41.6	72°54.6	18.4	Saturn	9°18.4	03:17
9	78°33.9	298°49.8	• • 10.2	17°21.3	• • 06.9	6°42.3	• • 41.7	87°57.2	• • 18.5	Jul 24 Wed	SHA	Mer.pass
10	93°36.4	313°49.2	09.3	32°22.0	07.3	21°44.3	41.7	102°59.7	18.5		221°57.5	13:04
11	108°38.8	328° 48.6	08.4	47°22.7	07.6	36°46.2	41.8	118°02.3	18.5		299°46.4	07:52
12	123°41.3	343°48.0	N17°07.5	62°23.4	N20°08.0	51°48.2	N21°41.9	133°04.8	S06°18.6		288°25.1	08:36
13	138°43.8	358° 47.4	06.6	77°24.1	08.4	66°50.2	41.9	148°07.4	18.6	Saturn	9°20.4	03:13
14	153°46.2	13°46.8	05.7	92°24.7	08.7	$81^{\circ}52.1$	42.0	163°10.0	18.7	Jatuill	3 <u>2</u> 0.4	05.13
15	168°48.7	28°46.2	• • 04.7	107°25.4	•• 09.1	$96^{\circ}54.1$	• • 42.0	$178^{\circ}12.5$	• • 18.7	Jul 25 Thu	SHA	Mer.pass
16	183°51.2	43°45.6	03.8	122°26.1	09.4	111°56.0	42.1	$193^{\circ}15.1$	18.8		220°43.6	13:05
17	198°53.6	58°45.0	02.9	137°26.8	09.8	126°58.0	42.1	$208^{\circ}17.6$	18.8		299°03.5	07:51
18	213°56.1	73°44.4	N17°02.0	152°27.4	$N20^{\circ}10.2$	142°00.0	N21°42.2		S06°18.9		288°12.9	08:33
19	228°58.5	88°43.8	01.1	167°28.1	10.5	157°01.9	42.3	238°22.7	18.9	Saturn	9°22.5	03:09
20	244°01.0	103°43.2	17°00.2	182°28.8	10.9	172°03.9	42.3	253°25.3	19.0			55.55
21	259°03.5	118° 42.6	16°59.3	197°29.5	. 11.2	187°05.8	• • 42.4	268°27.8	• • 19.0	Horizont	al parallax	
22	274°05.9	133°42.0	58.3	212°30.2	11.6	202°07.8	42.4	283°30.4	19.1		Venus:	0.1
23	289°08.4	148°41.4	57.4	227°30.8	11.9	217°09.8	42.5	298°33.0	19.1		Mars:	0.1
										-		
Mer.p	ass. 03:47	$\nu$ -0.6′ $d$ -0	).9′ m-3.87	$\nu$ 0.7′ d0.	.4′ m0.89	$\nu$ 2.0′ d0.	1′ m-2.09	$\nu$ 2.6′ d0	.0′ m0.79			

h	Su			Moon			
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°22.2	N20°00.7	335°44.0	8.2'	<b>S</b> 17°43.3	-14.1'	59.9'
1 2	193°22.2 208°22.2	20°00.2 19°59.7	350°11.2 4°38.5	8.3' 8.4'	17°29.3 17°15.1	-14.2' -14.3'	59.9' 59.9'
3	206 22.2 223°22.2	59.1	4 36.5 19°05.9	8.5'	17 15.1 17°00.8	-14.3 -14.4'	59.9'
4	238°22.2	58.6	33°33.3	8.5'	16°46.5	-14.5'	59.9'
5	253°22.2	58.1	48°00.9	8.6'	16°32.0	-14.6'	59.9'
6 7	268°22.1 283°22.1	N19° 57.6 57.1	62°28.5 76°56.2	8.7' 8.8'	\$16°17.4 16°02.7	-14.7' -14.8'	59.9' 59.9'
8	298°22.1	56.5	91°24.0	8.9'	15°48.0	-14.6 -14.9'	59.9'
9	313°22.1	• • 56.0	105°51.8	8.9'	15°33.1	-15.0'	59.9'
10	328°22.1	55.5	120° 19.7	9.0'	15°18.1	-15.0'	59.9'
11 12	343°22.1 358°22.1	55.0 N19° 54.5	134° 47.7 149° 15.8	9.1' 9.2'	15°03.1 \$14°48.0	-15.1' -15.2'	60.0' 60.0'
13	13°22.1	53.9	163°44.0	9.2'	14°32.7	-15.3'	60.0
14	28°22.0	53.4	178° 12.2	9.3'	$14^{\circ}17.4$	-15.4'	60.0'
15	43°22.0 58°22.0	· · 52.9 52.4	192° 40.5 207° 08.9	9.4' 9.4'	14°02.0 13°46.5	-15.5' -15.6'	60.0' 60.0'
16 17	73°22.0	52. <del>4</del> 51.8	201° 06.9 221° 37.3	9.4 9.5'	13°31.0	-15.6'	60.0
18	88°22.0	N19°51.3	236°05.9	9.6'	\$13°15.4	-15.7'	60.0'
19	103°22.0	50.8	250° 34.4	9.7'	12°59.6	-15.8'	60.0'
20 21	118°22.0 133°22.0	50.3 •• 49.7	265°03.1 279°31.8	9.7' 9.8'	12°43.9 12°28.0	-15.9' -15.9'	60.0' 60.0'
22	133 22.0 148°22.0	49.7	279 31.6 294°00.6	9.6 9.9'	12°12.1	-15.9 -16.0'	60.0
23	163°21.9	48.7	308° 29.5	9.9'	11°56.1	-16.1'	60.0'
	SD = 15.7'	d = -0.5'		SI	D = 16.3'		
Wed	<b>GHA</b> 178°21.9	<b>Dec</b> N19°48.2	<b>GHA</b> 322° 58.4	u  10.0'	Dec \$11°40.0	d -16.1'	<b>HP</b> 60.0'
0 1	178 21.9 193°21.9	N19 48.2 47.6	322 58.4 337°27.4	10.0	11°23.9	-16.1 -16.2'	60.0'
2	208°21.9	47.1	351°56.5	10.1'	11°07.7	-16.3	60.0'
3	223°21.9	• • 46.6	6°25.6	10.2'	10°51.4	-16.3'	60.0'
4	238°21.9 253°21.9	46.0	20°54.8 35°24.0	10.2'	10°35.1 10°18.7	-16.4'	60.0'
5 6	253°21.9 268°21.9	45.5 N19°45.0	49°53.3	10.3' 10.4'	10°18.7 \$10°02.3	-16.4' -16.5'	60.0' 60.0'
7	283°21.9	44.4	64°22.7	10.4'	09°45.8	-16.5	60.0'
8	298°21.9	43.9	78°52.1	10.5'	09°29.3	-16.6'	60.0'
9 10	313°21.9 328°21.9	· · 43.4 42.8	93°21.6 107°51.1	10.5' 10.6'	09°12.7 08°56.1	-16.6' -16.7'	60.0' 60.0'
11	343°21.8	42.0	107 51.1 122°20.7	10.6'	08°39.4	-10.7 -16.7'	60.0'
12	358°21.8	N19°41.8	136°50.3	10.7'	S08°22.7	-16.8'	60.0'
13	13°21.8	41.2	151°20.0	10.7'	08°05.9	-16.8'	60.0'
14 15	28°21.8 43°21.8	40.7 •• 40.2	165° 49.7 180° 19.5	10.8' 10.8'	07°49.1 07°32.3	-16.8' -16.9'	60.0' 60.0'
16	58°21.8	39.6	194°49.4	10.9'	07°15.4	-16.9'	60.0
17	73°21.8	39.1	209° 19.3	10.9'	06°58.5	-17.0'	60.0'
18 19	88°21.8 103°21.8	N19°38.6 38.0	223°49.2 238°19.2	11.0' 11.0'	\$06°41.5 06°24.5	-17.0' -17.0'	60.0' 60.0'
20	118°21.8	37.5	250° 19.2 252° 49.2		06°24.5		60.0
21	133°21.8	• • 36.9	267° 19.2	11.1'	05°50.5	-17.1'	60.0'
22	148°21.8	36.4	281°49.3	11.1'	05°33.4	-17.1'	60.0'
23	163°21.8	35.9	296°19.5	11.2'	05°16.3	-17.1'	60.0'
	SD = 15.7'	d = -0.5'		SI	O = 16.4'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°21.8	$N19^{\circ}35.3$	310°49.7	11.2'	S04°59.2	-17.1'	60.0'
1 2	193°21.8 208°21.8	34.8 34.2	325°19.9 339°50.1	11.3' 11.3'	04°42.0 04°24.9	-17.2'	60.0' 59.9'
3	208°21.8 223°21.8	34.2 · · 33.7	354° 20.4	11.3'	04°24.9 04°07.7	-17.2' -17.2'	59.9'
4	238°21.8	33.1	8°50.7	11.3'	03°50.5	-17.2	59.9'
5	253°21.8	32.6	23°21.1	11.4'	03°33.3	-17.2'	59.9'
6 7	268°21.8 283°21.8	N19°32.0 31.5	37°51.5 52°21.9	11.4' 11.4'	\$03°16.0 02°58.8	-17.2' -17.2'	59.9' 59.9'
8	298°21.8	31.0	66°52.3	11.5'	02°41.5	-17.3	59.9'
9	313°21.8	• • 30.4	81°22.8	11.5'	02°24.3	-17.3'	59.9'
10 11	328°21.8 343°21.8	29.9 29.3	95°53.2 110°23.8	11.5' 11.5'	02°07.0 01°49.8	-17.3' -17.3'	59.9' 59.9'
12	343°21.8 358°21.8	29.3 N19°28.8	110° 23.8 124° 54.3	11.6'	501°32.5	-17.3	59.9'
13	13°21.8	28.2	$139^{\circ}24.8$	11.6'	$01^{\circ}15.2$	-17.3'	59.9'
14	28°21.8	27.7	153° 55.4	11.6'	00°57.9	-17.3'	59.8'
15 16	43°21.8 58°21.8	· · 27.1 26.6	168°26.0 182°56.6	11.6' 11.6'	00°40.7 00°23.4	-17.3' -17.3'	59.8' 59.8'
17	73°21.8	26.0	102 50.0 197°27.2	11.6'	500°06.1	-17.3'	59.8'
18	88°21.8	N19°25.5	211°57.9	11.7'	N00°11.1	17.2'	59.8'
19	103°21.8	24.9	226°28.5	11.7'	00°28.4	17.2'	59.8'
20 21	118°21.8 133°21.8	24.4 •• 23.8	240°59.2 255°29.9	11.7' 11.7'	00°45.6 01°02.8	17.2' 17.2'	59.8' 59.8'
22	148°21.8	23.2	270°00.6	11.7'	01°20.1	17.2'	59.8'
23	163°21.8	22.7	284°31.2	11.7'	01°37.3	17.2'	59.7'
	SD = 15.7'	d = -0.5'		SI	O = 16.4'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°						
N 70°						
68°	////	////	01:32	22:36	////	////
66°	////	////	02:16	21:54	////	////
64°	////	00:37	02:44	21:26	23:24	////
62°	////	01:43	03:06	21:05	22:26	////
60°	////	02:16	03:23	20:48	21:55	////
N 58°	00:34	02:40	03:38	20:34	21:31	23:28
56°	01:34	02:58	03:50	20:22	21:13	22:36
54°	02:04	03:14	04:01	20:11	20:58	22:06
52°	02:27	03:27	04:10	20:02	20:45	21:45
50°	02:44	03:39	04:19	19:53	20:33	21:27
45°	03:18	04:02	04:37	19:35	20:10	20:54
N 40°	03:42	04:20	04:52	19:21	19:52	20:30
35°	04:01	04:35	05:04	19:09	19:37	20:12
30°	04:16	04:48	05:14	18:58	19:25	19:56
20°	04:41	05:09	05:33	18:40	19:04	19:32
N 10°	05:00	05:26	05:48	18:25	18:47	19:13
0°	05:15	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°	05:43	06:09	06:33	17:40	18:04	18:31
30°	05:56	06:25	06:50	17:23	17:49	18:18
35°	06:02	06:33	07:00	17:13	17:40	18:11
40°	06:10	06:42	07:12	17:02	17:31	18:04
45°	06:17	06:53	07:25	16:48	17:20	17:56
<b>S</b> 50°	06:26	07:06	07:42	16:32	17:08	17:48
52°	06:30	07:11	07:49	16:24	17:02	17:44
54°	06:34	07:18	07:58	16:16	16:56	17:40
56°	06:38	07:24	80:80	16:06	16:49	17:36
58°	06:43	07:32	08:19	15:55	16:42	17:31
<b>S</b> 60°	06:48	07:41	08:31	15:42	16:33	17:26

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

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	18-20	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	97-83%	
23	06:31	06:32	12:07	01:41	14:07		
24	06:32	06:33	12:07	02:33	14:59		
25	06:33	06:33	12:07	03:23 15:48			

h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	304°10.9	163°40.8	N16°56.5	242°31.5	N20°12.3	232°11.7	N21°42.6	313°35.5	506°19.2	Alpheratz	357°35.0	29°13.5
1	319°13.3	178°40.2	55.6	257°32.2	12.6	$247^{\circ}13.7$	42.6	328°38.1	19.2	Ankaa	353° 07.3	-42°10.1
2	334°15.8	193°39.6	54.7	272°32.9	13.0	262°15.7	42.7	343°40.6	19.3	Schedar	349°31.3	56°40.1
3	349°18.3	208°39.0	• • 53.7	287°33.5	• • 13.4	277°17.6	• • 42.7	358°43.2	• • 19.3	Diphda	349° 31.5	-17°50.9
4	4°20.7	223°38.4	52.8	302°34.2	13.7	$292^{\circ}19.6$	42.8	13°45.7	19.4	Achernar	335°20.3	-57°06.4
5	19°23.2	238° 37.8	51.9	317°34.9	14.1	$307^{\circ}21.5$	42.8	28°48.3	19.4	Hamal	327°51.6	23°34.7
6	34°25.7	253°37.2	N16°51.0	332°35.6	N20°14.4	322°23.5	N21°42.9	43°50.8	S06°19.5	Polaris	314°20.1	89°21.7
7	49°28.1	268°36.6	50.0	347°36.3	14.8	337°25.5	43.0	58°53.4	19.5	Acamar	314° 20.1	-40°12.1
8	64°30.6	283°36.0	49.1	2°36.9	15.1	352°27.4	43.0	73°56.0	19.6	Menkar	314°06.6	4°11.2
9	79°33.0	298°35.4	• • 48.2	17°37.6	•• 15.5	7°29.4	• • 43.1	88°58.5	• • 19.6	Mirfak	308°29.0	49°56.7
10	94°35.5	313°34.9	47.3	32°38.3	15.8	22°31.4	43.1	104°01.1	19.7	Aldebaran	290°40.3	16°33.5
11	109°38.0	328°34.3	46.3	47°39.0	16.2	37°33.3	43.2	119°03.6	19.7	Rigel	281°04.5	-8°10.3
12	124°40.4	343°33.7	N16°45.4	62°39.6	N20°16.5	52°35.3	N21°43.2	134°06.2	S06°19.8	Capella	280°22.8	46°01.2
13	139°42.9	358°33.1	44.5	77°40.3	16.9	67°37.3	43.3	149°08.8	19.8	Bellatrix	278°23.5	6°22.4
14	154°45.4	13°32.5	43.5	92°41.0	17.2	82°39.2	43.4	$164^{\circ}11.3$	19.9	Elnath	278°02.6	28°37.7
15	169°47.8	28°31.9	• • 42.6	$107^{\circ}41.7$	• • 17.6	97°41.2	• • 43.4	$179^{\circ}13.9$	• • 19.9	Alnilam	275°38.4	-1°11.1
16	184°50.3	43°31.3	41.7	122°42.4	17.9	112°43.2	43.5	194°16.4	20.0			7°24.8
17	199°52.8	58°30.7	40.7	137°43.0	18.3	$127^{\circ}45.1$	43.5	209°19.0	20.0	Betelgeuse	270°52.8	
18	214°55.2	73°30.1	N16°39.8	152°43.7	N20°18.6	142°47.1	N21°43.6	224°21.5	S06°20.1	Canopus	263°53.1 258°26.9	-52°42.3
19	229°57.7	88°29.5	38.9	167°44.4	19.0	157°49.1	43.6	239°24.1	20.1	Sirius		-16°44.8
20	245°00.2	103°29.0	37.9	182°45.1	19.3	172°51.0	43.7	254°26.7	20.2	Adhara	255°06.5	-29°00.2
21	260°02.6	118°28.4	• • 37.0	197°45.8	. 19.7	187°53.0	• • 43.8	269°29.2	20.2	Procyon	244°51.6	5°09.8
22	275°05.1	133°27.8	36.1	212°46.4	20.0	202°55.0	43.8	284°31.8	20.3	Pollux	243°18.1	27°58.1
23	290°07.5	148° 27.2	35.1	227°47.1	20.4	217°56.9	43.9	299°34.3	20.3	Avior	234°15.6	-59°35.2
										Suhail	222°47.0	-43°31.9
Mer.p	ass. 03:43	$\nu$ -0.6′ d-0	).9′ m-3.87	$\nu$ 0.7 $'$ d0	.4′ m0.89	$\nu 2.0' \ d0$	.1′ m-2.09	$\nu 2.6' \ d0.$	0′ m0.78	Miaplacidus	221°39.3	-69°49.1
										Alphard	217°48.4	-8°45.8
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.1	11°51.0
<u>0</u>	305°10.0	163° 26.6	N16°34.2	242°47.8	N20°20.7	232°58.9	N21°43.9	314°36.9	506°20.4	Dubhe	193°41.9	61°37.4
1	320° 12.5	103 20.0 178° 26.0	33.2	242 47.6 257°48.5	21.1	232 56.9 248°00.9	WZ1 43.9 44.0	329°39.5	20.4	Denebola	182°25.5	14°26.2
								344°42.0		Gienah	$175^{\circ}44.1$	-17°40.7
2	335°14.9	193°25.4	32.3	272°49.1	21.4	263°02.8	44.0		20.5	Acrux	173°00.9	-63°14.3
3	350°17.4	208°24.9	• • 31.4	287°49.8	• • 21.8	278°04.8	• • 44.1	359°44.6	• • 20.5	Gacrux	171°52.3	-57°15.2
4	5°19.9	223°24.3	30.4	302°50.5	22.1	293°06.8	44.2	14°47.1	20.6	Alioth	166° 13.5	55°49.9
5	20°22.3	238°23.7	29.5	317°51.2	22.5	308°08.7	44.2	29°49.7	20.6	Spica	158°22.8	-11°17.4
6	35°24.8	253°23.1	N16°28.5	332°51.9	N20°22.8	323°10.7	N21°44.3	44°52.3	S06°20.7	Alkaid	152°52.3	49°11.7
7	50°27.3	268° 22.5	27.6	347°52.5	23.1	338°12.7	44.3	59°54.8	20.7	Hadar	148°36.6	-60°29.7
8	65°29.7	283°21.9	26.6	2°53.2	23.5	353°14.6	44.4	74°57.4	20.8	Menkent	147°58.1	-36°29.6
9	80°32.2	298°21.4	• • 25.7	17°53.9	• • 23.8	8°16.6	• • 44.4	89°59.9	• • 20.8	Arcturus	145°48.2	19°03.4
10	95°34.6	313°20.8	24.7	32°54.6	24.2	23°18.6	44.5	105°02.5	20.9	Rigil Kent.	139°40.8	-60°56.4
11	110°37.1	328°20.2	23.8	47°55.3	24.5	38°20.5	44.5	120°05.1	20.9	Kochab	137° 19.5	74°03.5
12	125°39.6	343°19.6	$N16^{\circ}22.9$	62°55.9	N20°24.9	53°22.5	N21°44.6	135°07.6	S06°21.0	Zuben'ubi	136° 56.4	-16°08.7
13	140°42.0	$358^{\circ}19.0$	21.9	77°56.6	25.2	68°24.5	44.7	$150^{\circ}10.2$	21.0	Alphecca	126°03.9	26°38.1
14	155°44.5	13° 18.5	21.0	92°57.3	25.6	83°26.4	44.7	165°12.7	21.1	Antares	112° 16.1	-26°29.2
15	170°47.0	28° 17.9	• • 20.0	$107^{\circ}58.0$	• • 25.9	98°28.4	• • 44.8	180°15.3	•• 21.1	Atria	107° 10.3	-69°04.5
16	185°49.4	43°17.3	19.1	122°58.7	26.2	113°30.4	44.8	$195^{\circ}17.9$	21.2	Sabik	102°03.0	-15°45.3
17	200°51.9	58° 16.7	18.1	137°59.3	26.6	128°32.3	44.9	210°20.4	21.2	Shaula	96° 10.5	-37°07.4
18	215°54.4	73°16.2	N16°17.1	153°00.0	N20°26.9	143°34.3	N21°44.9	225°23.0	506°21.3	Rasalhague	95°58.6	12°32.6
19	230°56.8	88° 15.6	16.2	168°00.7	27.3	158°36.3	45.0	240°25.6	21.3	Eltanin	90°41.9	51°29.3
20	245°59.3	103° 15.0	15.2	183°01.4	27.6	173°38.2	45.0	255°28.1	21.4	Kaus Aust.	83°32.6	-34°22.4
21	261°01.8	118° 14.4	• • 14.3	198°02.1	• • 28.0	188°40.2	• • 45.1	270°30.7	• • 21.4	Vega	80°33.1	38°48.5
22	276°04.2	133°13.9	13.3	213°02.7	28.3	203°42.2	45.2	285°33.2	21.5	Nunki	75° 47.9	-26°16.0
23	291°06.7	148°13.3	12.4	228°03.4	28.6	218°44.2	45.2	300°35.8	21.5	Altair	62°00.0	8°56.0
	02.20	0.6/ 1.0	2.07	0.7/ 10	2/ 0.00	2.0/	1/ 0.10	0.6/ 10	1/ 0.70	I		
Mer.p	ass. 03:39	$\nu$ -0.6° $d$ -0	).9′ m-3.87	$\nu$ 0.7 d0	.3′ m0.88	$\nu$ 2.0′ d0.	.1′ m-2.10	$\nu$ 2.6′ d0.	1′ m0.78	Peacock	53°05.7 49°25.6	-56°39.3 45°22.0
										Deneb	33°38.9	9°59.3
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif		
0	306°09.1	163° 12.7	N16°11.4	243°04.1	N20°29.0	233°46.1	N21°45.3	315°38.4	S06°21.6	Al Na'ir Fomalhaut	27°32.9	-46°50.4
1	321°11.6	178° 12.1	10.5	258°04.8	29.3	248°48.1	45.3	330°40.9	21.7		15°14.6 13°45.3	-29°29.4
2	336°14.1	193°11.6	09.5	273°05.5	29.7	263°50.1	45.4	345°43.5	21.7	Scheat		28°12.9
3	351°16.5	208°11.0	• • 08.5	288°06.1	30.0	278°52.0	• • 45.4	0°46.1	21.8	Markab	13°30.0	15°20.2
4	6°19.0	223° 10.4	07.6	303°06.8	30.3	293°54.0	45.5	15°48.6	21.8	Jul 26 Fri	SHA	Mer.pass
5	21°21.5	238° 09.8	06.6	318°07.5	30.7	308°56.0	45.5	30°51.2	21.9	Venus	219°29.9	13:06
6	36°23.9	253° 09.3	N16°05.7	333°08.2	N20°31.0	323°58.0	N21°45.6	45°53.7	S06°21.9	Mars	298°20.6	07:50
7	51°26.4	268° 08.7	04.7	348°08.9	31.3	338°59.9	45.7	60°56.3	22.0	Jupiter	288°00.9	08:30
8	66°28.9	283°08.1	03.7	3°09.5	31.7	354°01.9	45.7	75°58.9	22.0	Saturn	9°24.6	03:05
9	81°31.3	298° 07.6	02.8	18°10.2	32.0	9°03.9	• • 45.8	91°01.4	22.1			
10	96°33.8	313°07.0	01.8	33°10.9	32.4	24°05.8	45.8	106°04.0	22.1	Jul 27 Sat	SHA	Mer.pass
11	90°35.6 111°36.3	313 07.0 328°06.4	16°00.8	48°11.6	32.4	39°07.8	45.6 45.9	100 04.0 121°06.6	22.1	Venus	$218^{\circ}16.6$	13:07
12	111 30.3 126°38.7	343°05.9	N15°59.9	63°12.3	N20°33.0	59 07.8 54°09.8	N21°45.9	121 00.0 136°09.1	506°22.2	Mars	297°37.8	07:48
13	120 38.7 141°41.2	343 05.9 358° 05.3	58.9	78°12.9	33.4	69°11.8	WZ1 45.9 46.0	150 09.1 151°11.7	22.3	Jupiter	287°48.9	08:27
				93°13.6						Saturn	9°26.9	03:01
14	156°43.6	13°04.7	57.9		33.7	84°13.7	46.0	166°14.3	22.3	1	c	
15	171°46.1	28°04.2	• • 57.0	108°14.3	• • 34.0	99°15.7	• • 46.1	181°16.8	• • 22.4	Jul 28 Sun	SHA	Mer.pass
16	186°48.6	43°03.6	56.0	123°15.0	34.4	114°17.7	46.2	196°19.4	22.4	Venus		13:08
	201°51.0	58°03.0	55.0	138°15.7	34.7	129°19.6	46.2	211°22.0	22.5	Mars	296°54.9	07:47
17		73°02.5	N15°54.0	153°16.3	N20°35.0	144°21.6	N21°46.3	226°24.5	S06°22.5	Jupiter		08:24
18	216°53.5		53.1	1600170	35.4	1500226	46.3	241°27.1	22.6	Saturn	9°29.2	02:57
18 19	231°56.0	88°01.9		168°17.0		159°23.6				Saturn	9 29.2	
18 19 20	231°56.0 246°58.4	103°01.3	52.1	183°17.7	35.7	$174^{\circ}25.6$	46.4	$256^{\circ}29.6$	22.6			
18 19 20 21	231°56.0 246°58.4 262°00.9	103°01.3 118°00.8	52.1 •• 51.1	183°17.7 198°18.4	35.7 · · 36.0	174°25.6 189°27.5	46.4 •• 46.4	256°29.6 271°32.2	22.6 •• 22.7		al parallax	
18 19 20 21 22	231°56.0 246°58.4 262°00.9 277°03.4	103°01.3 118°00.8 133°00.2	52.1 •• 51.1 50.2	183°17.7 198°18.4 213°19.1	35.7 · · 36.0 36.4	174°25.6 189°27.5 204°29.5	46.4 •• 46.4 46.5	256°29.6 271°32.2 286°34.8	22.6 •• 22.7 22.7		tal parallax Venus:	0.1
18 19 20 21	231°56.0 246°58.4 262°00.9	103°01.3 118°00.8	52.1 •• 51.1	183°17.7 198°18.4	35.7 · · 36.0	174°25.6 189°27.5	46.4 •• 46.4	256°29.6 271°32.2	22.6 •• 22.7		al parallax	

h	Su	Moon					
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°21.8 193°21.8	N19°22.1 21.6	299°01.9 313°32.6	11.7' 11.7'	N01°54.4 02°11.6	17.2' 17.1'	59.7' 59.7'
1 2	193 21.8 208°21.8	21.0	313 32.0 328°03.3	11.7'	02 11.6 02°28.7	17.1 17.1'	59.7' 59.7'
3	223°21.8	• • 20.5	342°34.0	11.7'	02°45.9	17.1'	59.7'
4	238°21.8 253°21.8	19.9 19.3	357°04.7 11°35.5	11.7'	03°03.0 03°20.1	17.1'	59.7'
5 6	268°21.8	19.3 N19° 18.8	26°06.2	11.7' 11.7'	N03° 37.1	17.1' 17.0'	59.7' 59.7'
7	283°21.8	18.2	40°36.9	11.7'	03°54.1	17.0'	59.6'
8	298°21.8	17.7	55°07.5	11.7'	04°11.1	17.0'	59.6'
9 10	313°21.8 328°21.8	· · 17.1 16.5	69°38.2 84°08.9	11.7' 11.7'	04°28.1 04°45.0	16.9' 16.9'	59.6' 59.6'
11	343°21.8	16.0	98°39.6	11.7'	05°01.9	16.9'	59.6'
12	358°21.8	N19° 15.4	113°10.3 127°40.9	11.7'	N05°18.8 05°35.6	16.8'	59.6'
13 14	13°21.8 28°21.8	14.9 14.3	127°40.9 142°11.5	11.6' 11.6'	05° 35.6 05° 52.4	16.8' 16.8'	59.6' 59.5'
15	43°21.8	•• 13.7	156°42.2	11.6'	06°09.2	16.7'	59.5'
16	58°21.8	13.2	171°12.8	11.6'	06°25.9	16.7'	59.5'
17 18	73°21.8 88°21.8	12.6 N19°12.0	185°43.4 200°13.9	11.6' 11.6'	06°42.6 N06°59.2	16.6' 16.6'	59.5' 59.5'
19	103°21.9	11.5	214°44.5	11.5'	07°15.8	16.5'	59.5'
20	118°21.9	10.9	229°15.0	11.5'	07°32.3	16.5'	59.4
21 22	133°21.9 148°21.9	· · 10.3 09.8	243°45.5 258°16.0	11.5' 11.5'	07°48.8 08°05.2	16.4' 16.4'	59.4' 59.4'
23	163°21.9	09.2	272°46.5	11.4'	08°21.6	16.3	59.4
	SD = 15.7'	d = -0.6'		SE	0 = 16.3'		
٠.						,	
Sat 0	<b>GHA</b> 178°21.9	<b>Dec</b> N19°08.6	<b>GHA</b> 287°16.9	u 11.4'	Dec N08°38.0	d 16.3'	<b>HP</b> 59.4'
1	193°21.9	08.1	301°47.4	11.4'	08°54.2	16.2'	59.4'
2	208°21.9	07.5	316°17.7	11.4'	09°10.5	16.2'	59.3'
3 4	223°21.9 238°21.9	· · 06.9 06.4	330°48.1 345°18.4	11.3' 11.3'	09°26.6 09°42.7	16.1' 16.0'	59.3' 59.3'
5	253°21.9	05.8	359°48.7	11.3'	09°58.8	16.0'	59.3'
6	268°21.9	N19°05.2	14°19.0	11.2'	N10°14.8	15.9'	59.3'
7 8	283°22.0 298°22.0	04.6 04.1	28°49.2 43°19.4	11.2' 11.2'	10°30.7 10°46.5	15.9' 15.8'	59.3' 59.2'
9	313°22.0	03.5	57°49.6	11.1'	11°02.3	15.7'	59.2'
10	328°22.0	02.9	72°19.7	11.1'	11°18.1	15.7'	59.2'
11 12	343°22.0 358°22.0	02.3 N19°01.8	86°49.8 101°19.8	11.0' 11.0'	11°33.7 N11°49.3	15.6' 15.5'	59.2' 59.2'
13	13°22.0	01.2	101 19.8 115°49.9	11.0'	12°04.8	15.4	59.2 59.1'
14	28°22.0	00.6	130°19.8	10.9'	12°20.3	15.4'	59.1'
15 16	43°22.0 58°22.1	19°00.0 18°59.5	144°49.7 159°19.6	10.9' 10.8'	12°35.6 12°50.9	15.3' 15.2'	59.1' 59.1'
17	73°22.1	58.9	173°49.5	10.8	12 50.9 13°06.1	15.1'	59.1'
18	88°22.1	N18°58.3	188°19.2	10.7'	N13°21.3	15.1'	59.0'
19 20	103°22.1 118°22.1	57.7 57.1	202°49.0 217°18.7	10.7' 10.6'	13°36.3 13°51.3	15.0'	59.0' 59.0'
21	133°22.1	• • 56.6	231°48.3	10.6'	14°06.2	14.8'	59.0'
22	148°22.1	56.0	246°17.9	10.6'	14°21.0	14.7'	59.0'
23	163°22.2	55.4	260°47.5	10.5'	14°35.7	14.6'	58.9'
	SD = 15.7'	d = -0.6'		SE	0 = 16.2'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°22.2 193°22.2	N18°54.8 54.2	275°17.0 289°46.4	10.4' 10.4'	N14°50.4 15°04.9	14.5' 14.5'	58.9' 58.9'
2	193°22.2 208°22.2	54.2 53.7	289°46.4 304°15.8	10.4	15° 14.9 15° 19.4	14.5° 14.4'	58.9' 58.9'
3	223°22.2	• • 53.1	318°45.2	10.3'	15°33.7	14.3'	58.9'
4 5	238°22.2 253°22.2	52.5 51.9	333°14.5 347°43.7	10.2' 10.2'	15°48.0 16°02.2	14.2' 14.1'	58.8' 58.8'
6	253°22.2 268°22.3	51.9 N18°51.3	2°12.9	10.2	N16°16.3	14.1	58.8'
7	283°22.3	50.7	16°42.0	10.1'	16°30.3	13.9'	58.8'
8 9	298°22.3 313°22.3	50.1 •• 49.6	31°11.1 45°40.1	10.0' 9.9'	16°44.2 16°57.9	13.8' 13.7'	58.8' 58.7'
10	313°22.3 328°22.3	49.0	45°40.1 60°09.0	9.9' 9.9'	16°57.9 17°11.6	13.6'	58.7' 58.7'
11	343°22.3	48.4	74°37.9	9.8'	17°25.2	13.5'	58.7'
12 13	358°22.4 13°22.4	N18° 47.8 47.2	89°06.7 103°35.5	9.8' 9.7'	N17°38.7 17°52.1	13.4' 13.3'	58.7' 58.7'
13 14	13°22.4 28°22.4	47.2 46.6	103°35.5 118°04.2	9.7° 9.6'	17°52.1 18°05.4	13.3'	58.7° 58.6'
15	43°22.4	• • 46.0	$132^{\circ}32.9$	9.6'	18°18.5	13.1'	58.6'
16	58°22.4	45.4	147°01.5	9.5'	18°31.6	12.9'	58.6'
17 18	73°22.5 88°22.5	44.8 N18°44.3	161°30.0 175°58.4	9.5' 9.4'	18°44.5 N18°57.4	12.8' 12.7'	58.6' 58.6'
19	103°22.5	43.7	190°26.8	9.3'	19°10.1	12.6'	58.5'
20	118°22.5	43.1	204°55.2	9.3'	19°22.7	12.5'	58.5'
21 22	133°22.5 148°22.5	· · 42.5 41.9	219°23.4 233°51.7	9.2' 9.1'	19°35.2 19°47.6	12.4' 12.3'	58.5' 58.5'
23	163°22.6	41.3	248°19.8	9.1	19°59.9	12.1'	58.4
	SD = 15.7'	d = -0.6'		SE	0 = 16.1'		

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

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

		Sun		Moon				
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age		
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	21-23		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	74-51%		
26	06:33	06:33	12:07	04:12	16:36			
27	06:32	06:32	12:07	05:01	17:26			
28	06:31	06:31	12:07	05:51	18:17			

h	Aries	Ve	nus	M	ars	Juj	piter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	307°08.3	162°59.1	N15°48.2	243°20.4	N20°37.0	234°33.5	N21°46.6	316°39.9	S06°22.9			
1	322°10.7	177°58.5	47.2	258°21.1	37.4	249°35.4	46.6	331°42.5	22.9	Alpheratz	357°35.0	29°13.5
2	337°13.2	192°58.0	46.3	273°21.8	37.7	264°37.4	46.7	346°45.0	23.0	Ankaa	353°07.3	-42°10.1
3	352°15.7	207°57.4	• • 45.3	288°22.5	• • 38.0	279°39.4	• • 46.8	1°47.6	• • 23.0	Schedar	349°31.2	56°40.1
4	7°18.1	222°56.9	44.3	303°23.1	38.4	294°41.4	46.8	16°50.2	23.1	Diphda	348°47.5	-17°50.9
5	22°20.6	237°56.3	43.3	318°23.8	38.7	309°43.3	46.9	31°52.7	23.1	Achernar		-57°06.4
6	37°23.1	252°55.7	N15°42.3	333°24.5	N20°39.0	324°45.3	N21°46.9	46°55.3	S06°23.2	Hamal	327°51.6	23°34.7
7	52°25.5	267°55.2	41.4	348°25.2	39.3	339°47.3	47.0	61°57.9	23.2	Polaris	314°18.3	89°21.7
8	67°28.0	282°54.6	40.4	3°25.9	39.7	354°49.3	47.0	77°00.4	23.3	Acamar	$315^{\circ}12.1$	-40°12.1
9	82°30.5	297°54.1	• • 39.4	18°26.5	• • 40.0	9°51.2	• • 47.1	92°03.0	• • 23.3	Menkar	314°06.6	$4^{\circ}11.2$
10	97°32.9	312°53.5	38.4	33°27.2	40.3	24°53.2	47.1	107°05.6	23.4	Mirfak	308°28.9	49°56.7
11	112°35.4	327°53.0	37.4	48°27.9	40.7	39°55.2	47.2	107 03.0 122°08.1	23.4	Aldebaran	290°40.2	16°33.5
12	112 33.4 127°37.9	342°52.4	N15°36.4	63°28.6	N20°41.0	54°57.2	N21°47.2	137°10.7	506°23.5	Rigel	281°04.4	-8°10.2
13	142°40.3	357°51.8		78°29.3		69°59.1	47.3	152°13.3		Capella	280°22.8	46°01.2
14	142 40.3 157°42.8	12°51.3	35.5 34.5	93°30.0	41.3 41.6	85°01.1	47.3 47.3	167°15.8	23.5 23.6	Bellatrix	278°23.5	6°22.4
15	172°45.2	27°50.7	33.5	108°30.6	• • 42.0	100°03.1	• • 47.4	182°18.4	23.7	Elnath	278°02.6	28°37.7
	172 45.2 187°47.7	42° 50.2		100° 30.0° 123° 31.3		100 05.1 115°05.1	47.5	197°21.0		Alnilam	275°38.3	$-1^{\circ}11.1$
16			32.5		42.3				23.7	Betelgeuse	270°52.7	7°24.8
17	202°50.2	57°49.6	31.5	138°32.0	42.6	130°07.0	47.5	212°23.6	23.8	Canopus	263°53.0	-52°42.3
18	217°52.6	72°49.1	N15°30.5	153°32.7	N20°42.9	145°09.0	N21°47.6	227°26.1	S06°23.8	Sirius	258°26.9	-16°44.8
19	232°55.1	87°48.5	29.5	168°33.4	43.3	160°11.0	47.6	242°28.7	23.9	Adhara	255°06.5	-29°00.1
20	247°57.6	102°48.0	28.5	183°34.0	43.6	175°13.0	47.7	257°31.3	23.9	Procyon	244°51.5	5°09.8
21	263°00.0	117° 47.4	• • 27.5	198°34.7	• • 43.9	190°15.0	• • 47.7	272°33.8	• • 24.0	Pollux	243°18.1	27°58.1
22	278°02.5	132°46.9	26.6	213°35.4	44.2	205°16.9	47.8	287°36.4	24.0	Avior	234°15.6	-59°35.2
23	293°05.0	147°46.3	25.6	228°36.1	44.6	220°18.9	47.8	302°39.0	24.1	Suhail	222°47.0	-43°31.8
Mern	ass. 03:31	$\nu$ -0.6' d-1	L.0′ m-3.87	ν0 7' d0	.3′ m0.87	ν2 0' d0	.1′ m-2.10	ν2 6' d0	.1′ m0.77	Miaplacidus	221°39.3	-69°49.1
		- U.O U 1				- Z.O GO				Alphard	217°48.4	-8°45.8
										Regulus	207°35.1	11°51.0
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.9	61°37.4
0	308°07.4	162°45.8	N15°24.6	243°36.8	N20°44.9	235°20.9	N21°47.9	317°41.5	S06°24.1	Denebola	182°25.5	14°26.2
1	323°09.9	177°45.2	23.6	258°37.5	45.2	250°22.9	47.9	$332^{\circ}44.1$	24.2	Gienah		-17°40.7
2	338°12.4	192°44.7	22.6	273°38.1	45.5	265°24.8	48.0	347°46.7	24.2		173°00.9	-63°14.3
3	353°14.8	$207^{\circ}44.1$	• • 21.6	288°38.8	• • 45.9	280°26.8	• • 48.0	2°49.2	• • 24.3		171°52.4	-57°15.2
4	8°17.3	222°43.6	20.6	303°39.5	46.2	295°28.8	48.1	$17^{\circ}51.8$	24.4	Alioth	166°13.5	55°49.9
5	23°19.7	237°43.0	19.6	318°40.2	46.5	310°30.8	48.2	32°54.4	24.4	Spica	158°22.8	-11°17.4
6	38°22.2	252° 42.5	N15°18.6	333°40.9	N20°46.8	325°32.8	N21°48.2	47°57.0	S06°24.5	Alkaid	152°52.3	49°11.7
7	53°24.7	$267^{\circ}41.9$	17.6	348°41.5	47.2	340°34.7	48.3	62°59.5	24.5	Hadar	148°36.6	-60°29.7
8	68°27.1	282°41.4	16.6	3°42.2	47.5	355°36.7	48.3	78°02.1	24.6		147°58.1	-36°29.6
9	83°29.6	297°40.9	• • 15.6	18°42.9	• • 47.8	10°38.7	• • 48.4	93°04.7	• • 24.6		145°48.2	19°03.4
10	98°32.1	312°40.3	14.6	33°43.6	48.1	25°40.7	48.4	108°07.2	24.7	Rigil Kent.		-60°56.4
11	113°34.5	327°39.8	13.6	48°44.3	48.4	40°42.7	48.5	123°09.8	24.7	Kochab	137°19.6	74°03.5
12	128°37.0	342°39.2	N15°12.6	63°45.0	N20°48.8	55°44.6	N21°48.5	138°12.4	S06°24.8	Zuben'ubi		-16°08.7
13	143°39.5	357°38.7	11.6	78°45.6	49.1	70°46.6	48.6	153°14.9	24.8	Alphecca	126°03.9	26°38.1
14	158°41.9	$12^{\circ}38.1$	10.6	93°46.3	49.4	85°48.6	48.6	168°17.5	24.9	Antares	112° 16.1	-26°29.2
15	173°44.4	27°37.6	• • 09.6	108°47.0	• • 49.7	100°50.6	• • 48.7	183°20.1	• • 25.0	Antares	107° 10.3	-20°29.2 -69°04.5
16	188°46.9	42°37.1	08.6	123°47.7	50.0	115°52.6	48.7	198°22.7	25.0	Sabik	107 10.3 102°03.0	-15°45.3
17	203°49.3	57° 36.5	07.6	138°48.4	50.4	130°54.5	48.8	213°25.2	25.1	Shaula	96°10.6	-13°43.3
18	218°51.8	72°36.0	N15°06.6	153°49.1	N20°50.7	145°56.5	N21°48.8	228°27.8	S06°25.1	Rasalhague	95°58.6	12°32.6
19	233°54.2	87°35.4	05.6	168°49.7	51.0	160°58.5	48.9	243°30.4	25.2	_	90°41.9	51°29.3
20	248°56.7	102°34.9	04.6	183°50.4	51.3	176°00.5	48.9	258°32.9	25.2	Eltanin Kaus Aust.	83°32.6	-34°22.4
21	263°59.2	117°34.4	• • 03.6	198°51.1	• • 51.6	191°02.5	• • 49.0	273°35.5	• • 25.3	Vega	80°33.1	-34 22.4 38°48.5
22	279°01.6	132°33.8	02.5	213°51.8	51.9	206°04.4	49.0	288°38.1	25.3	_		-26°16.0
23	294°04.1	147°33.3	01.5	228°52.5	52.3	221°06.4	49.1	303°40.7	25.4	Nunki	75°47.9 62°00.0	-26 16.0 8°56.0
	00.07		. 0/ 0.07	0.7/ 10	2/ 0.07	0.0/.10	1/ 0.11	0.6/10	1/ 0.76	Altair		-56°39.3
ivier.p	ass. 03:27	$\nu$ -0.5 a-1	L.0′ m-3.87	$\nu$ 0.7 au	.3′ m0.87	$\nu$ 2.0° $a$ 0	.1′ m-2.11	$\nu$ 2.6 au	.1′ m0.76	Peacock	53°05.7 49°25.6	-50 39.3 45°22.1
										Deneb		
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir	33°38.8 27°32.9	9°59.3 -46°50.4
0	309°06.6	162°32.7	N15°00.5	243°53.2	N20°52.6	236°08.4			S06°25.4	Fomalhaut	27 32.9 15°14.6	-46 50.4 -29°29.4
1	324°09.0	177°32.2	14°59.5	258°53.8	52.9	251°10.4	49.2	333°45.8	25.5	Scheat	15 14.0 13°45.3	-29 29.4 28°12.9
2	339°11.5	192°31.7	58.5	273°54.5	53.2	266°12.4	49.3	348°48.4	25.6	Markab	13° 30.0	28 12.9 15°20.3
3	354°14.0	207°31.1	• • 57.5	288°55.2	• • 53.5	281°14.4	• • 49.3	3°51.0	• • 25.6	iviarkab	13 30.0	13 20.3
4	9°16.4	222°30.6	56.5	303°55.9	53.8	296°16.3	49.4	18°53.5	25.7	Jul 29 Mon	SHA	Mer.pass
5	24°18.9	237°30.1	55.5	318°56.6	54.2	311°18.3	49.4	33°56.1	25.7	Venus	215°50.8	13:09
6	39°21.4	252° 29.5	N14°54.4	333°57.3	N20°54.5	326°20.3	N21°49.5	48°58.7	S06°25.8	Mars	296°12.1	07:46
7	54°23.8	267°29.0	53.4	348°57.9	54.8	341°22.3	49.5	64°01.2	25.8	Jupiter	287°25.2	08:21
8	69°26.3	282°28.5	52.4	3°58.6	55.1	356°24.3	49.6	79°03.8	25.9	Saturn	9°31.6	02:53
9	84°28.7	297°27.9	• • 51.4	18°59.3	• • 55.4	11°26.3	• • 49.6	94°06.4	• • 25.9	1 . 22 =		
10	99°31.2	312°27.4	50.4	34°00.0	55.7	26°28.2	49.7	109°09.0	26.0	Jul 30 Tue	SHA	Mer.pass
11	114°33.7	327°26.9	49.4	49°00.7	56.0	41°30.2	49.7	124°11.5	26.1		214°38.4	13:09
12	129°36.1	342°26.3	N14°48.3	64°01.4	N20°56.3	56°32.2	N21°49.8		S06°26.1	Mars		07:45
13	144°38.6	357°25.8	47.3	79°02.0	56.7	71°34.2	49.8	154°16.7	26.2		287°13.5	08:18
14	159°41.1	12°25.3	46.3	94°02.7	57.0	86°36.2	49.9	$169^{\circ}19.3$	26.2	Saturn	9°34.1	02:49
15	174°43.5	27°24.7	• • 45.3	109°03.4	• • 57.3	101°38.2	• • 49.9	184°21.8	• • 26.3	Jul 31 Wed	SHA	Mer.pass
16	189°46.0	42°24.2	44.3	124°04.1	57.6	116°40.1	50.0	199°24.4	26.3		213°26.2	13:10
17	204°48.5	57°23.7	43.2	139°04.8	57.9	131°42.1	50.0	214°27.0	26.4	Mars		07:44
18	219°50.9	72°23.1	N14°42.2	154°05.5	N20°58.2		N21°50.1	229°29.6	S06°26.5		287°01.8	08:14
19	234°53.4	87°22.6	41.2	$169^{\circ}06.1$	58.5	161°46.1	50.1	244°32.1	26.5	Saturn	9°36.7	02:45
20	249°55.8	102°22.1	40.2	184°06.8	58.8	176°48.1	50.2	259°34.7	26.6			
21	264°58.3	$117^{\circ}21.6$	• • 39.2	199°07.5	•• 59.1	191°50.1	• • 50.2	274°37.3	• • 26.6	Horizont	al parallax	
22	280°00.8	$132^{\circ}21.0$	38.1	$214^{\circ}08.2$	59.4	$206^{\circ}52.1$	50.3	289°39.9	26.7		Venus:	0.1
23	295°03.2	$147^{\circ}20.5$	37.1	229°08.9	59.8	221°54.0	50.3	304°42.4	26.7		Mars:	0.1
N.4 -				0 7/ /0	2/ = 0.07		1/ - 2 11					
ivier.p	ass. 03:23	$\nu$ -0.5 $\alpha$ -1	L.0′ m-3.87	νυ.ι αυ	.3′ m0.87	ν2.0° α0	.1′ m-2.11	ν2.0° α0	.1′ m0.76			

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°22.6	N18°40.7	262°47.9	9.0'	N20°12.0	12.0'	58.4'
1 2	193°22.6 208°22.6	40.1 39.5	277°15.9 291°43.8	9.0' 8.9'	20°24.0 20°35.9	11.9' 11.8'	58.4' 58.4'
3	223°22.7	38.9	306°11.7	8.8'	20° 47.7	11.7'	58.4
4	238°22.7	38.3	$320^{\circ}39.5$	8.8'	20°59.3	11.5'	58.3'
5	253°22.7	37.7	335°07.3	8.7'	21°10.9	11.4'	58.3'
6 7	268°22.7 283°22.7	N18° 37.1 36.5	349°35.0 4°02.6	8.6' 8.6'	N21°22.3 21°33.6	11.3' 11.1'	58.3' 58.3'
8	298°22.8	35.9	18°30.2	8.5'	21°44.7	11.0'	58.3
9	313°22.8	• • 35.3	32°57.7	8.4'	21°55.7	10.9'	58.2'
10 11	328°22.8 343°22.8	34.7 34.1	47°25.1 61°52.5	8.4' 8.3'	22°06.6 22°17.3	10.8' 10.6'	58.2' 58.2'
12	358°22.9	N18° 33.5	76°19.8	8.2'	N22°28.0	10.5	58.2
13	13°22.9	32.9	90°47.0	8.2'	22°38.4	10.3'	58.1'
14	28°22.9	32.3	105°14.2	8.1'	22°48.8	10.2'	58.1'
15 16	43°22.9 58°23.0	· · 31.7 31.1	119°41.3 134°08.3	8.0' 8.0'	22°59.0 23°09.1	10.1' 9.9'	58.1' 58.1'
17	73°23.0	30.5	148°35.3	7.9'	23°19.0	9.8'	58.1'
18	88°23.0	$N18^{\circ}29.9$	163°02.2	7.9'	N23°28.8	9.6'	58.0'
19 20	103°23.0 118°23.1	29.3 28.7	177°29.1 191°55.9	7.8' 7.7'	23°38.4 23°48.0	9.5' 9.4'	58.0' 58.0'
20	118 23.1 133°23.1	28.1	206°22.6	7.7'	23°57.3	9.4 9.2'	58.0'
22	148°23.1	27.5	220°49.3	7.6'	24°06.5	9.1	57.9'
23	163°23.1	26.9	235°15.9	7.6'	24° 15.6	8.9'	57.9'
	SD = 15.7'	d = -0.6'		SI	D = 15.9'		
Tue	GHA	Dec	GHA	ν	Dec	d	НР
0	178°23.2	N18°26.3	249°42.4	7.5'	N24°24.5	8.8'	57.9'
1	193°23.2	25.6	264°08.9	7.4'	24°33.3	8.6'	57.9'
2	208°23.2 223°23.2	25.0 •• 24.4	278°35.4 293°01.7	7.4' 7.3'	24°41.9 24°50.4	8.5' 8.3'	57.9' 57.8'
4	238°23.3	23.8	307°28.1	7.3'	24°58.8	8.2'	57.8'
5	253°23.3	23.2	321°54.3	7.2'	25°06.9	8.0'	57.8'
6	268°23.3 283°23.4	N18°22.6 22.0	336°20.5 350°46.7	7.2' 7.1'	N25°15.0 25°22.8	7.9'	57.8'
7 8	283 23.4 298°23.4	22.0	5°12.8	7.1'	25°22.8 25°30.5	7.7' 7.6'	57.7' 57.7'
9	313°23.4	20.8	19°38.9	7.0'	25°38.1	7.4'	57.7'
10	328°23.4	20.1	34°04.9	7.0'	25°45.5	7.2'	57.7'
11 12	343°23.5 358°23.5	19.5 N18° 18.9	48°30.8 62°56.7	6.9' 6.9'	25°52.8 N25°59.9	7.1' 6.9'	57.7' 57.6'
13	13°23.5	18.3	77°22.6	6.8	26°06.8	6.8	57.6'
14	28°23.6	17.7	91°48.4	6.8'	$26^{\circ}13.6$	6.6'	57.6'
15	43°23.6 58°23.6	• • 17.1	106°14.2 120°39.9	6.7'	26°20.2 26°26.6	6.5'	57.6' 57.6'
16 17	73°23.6	16.5 15.8	120 39.9 135°05.6	6.7' 6.6'	26°32.9	6.3' 6.1'	57.5'
18	88°23.7	N18° 15.2	149°31.2	6.6'	N26°39.0	6.0'	57.5'
19	103°23.7	14.6	163°56.8	6.6'	26°45.0	5.8'	57.5'
20 21	118°23.7 133°23.8	14.0 •• 13.4	178°22.4 192°47.9	6.5' 6.5'	26° 50.8 26° 56.5	5.6' 5.5'	57.5' 57.4'
22	148°23.8	12.8	207°13.4	6.5	20° 30.3 27° 01.9	5.3	57.4'
23	163°23.8	12.1	221°38.8	6.4'	27°07.2	5.1'	57.4'
	SD = 15.7'	d = -0.6'		SI	D = 15.8'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°23.9	$N18^{\circ}11.5$	$236^{\circ}04.3$	6.4'	N27°12.4	5.0'	57.4'
1 2	193°23.9 208°23.9	10.9 10.3	250°29.7 264°55.0	6.4' 6.3'	27°17.4 27°22.2	4.8' 4.6'	57.4' 57.3'
3	208°23.9 223°24.0	09.6	264°55.0 279°20.4	6.3	27°26.8	4.6° 4.5°	57.3'
4	238°24.0	09.0	293°45.7	6.3'	27°31.3	4.3'	57.3'
5	253°24.0	08.4	308°11.0	6.3'	27°35.6	4.1'	57.3'
6 7	268°24.1 283°24.1	N18° 07.8 07.2	322°36.2 337°01.5	6.2' 6.2'	N27°39.7 27°43.7	4.0' 3.8'	57.2' 57.2'
8	298°24.1	06.5	351°26.7	6.2'	27°47.5	3.6'	57.2'
9	313°24.2	• • 05.9	5°51.9	6.2'	27°51.2	3.5'	57.2'
10 11	328°24.2 343°24.3	05.3 04.7	20°17.1 34°42.3	6.2' 6.2'	27°54.6 27°57.9	3.3' 3.1'	57.2' 57.1'
12	343 24.3 358°24.3	04.7 N18°04.0	34 42.3 49°07.5	6.2	N28°01.0	3.1	57.1'
13	13°24.3	03.4	63°32.6	6.2'	28°04.0	2.8'	57.1'
14	28°24.4	02.8	77°57.8	6.1'	28°06.8	2.6'	57.1'
15 16	43°24.4 58°24.4	· · 02.1 01.5	92°22.9 106°48.1	6.1' 6.1'	28°09.4 28°11.8	2.4' 2.3'	57.0' 57.0'
17	73°24.5	00.9	100 48.1 121°13.2	6.1	28°14.1	2.1'	57.0'
18	88°24.5	N18°00.3	135°38.3	6.1'	N28° 16.2	1.9'	57.0'
19 20	103°24.5 118°24.6	17° 59.6 59.0	150°03.5 164°28.6	6.1' 6.2'	28° 18.1 28° 19.9	1.8' 1.6'	57.0' 56.9'
21	118 24.6 133°24.6	59.0 •• 58.4	104 28.0 178°53.8	6.2'	28°21.5	1.4	56.9'
22	148°24.7	57.7	193°19.0	6.2'	28°22.9	1.2'	56.9'
23	163°24.7	57.1	207°44.1	6.2'	28°24.2	1.1'	56.9'
	SD = 15.7'	d = -0.6'		SI	D = 15.6'		

			2024	July 2	9 to Ji	II. 31
Lat.	Twilight		Sunrise	Sunset	Twilight	
	Naut.	Civil	Sunrise	Juliset	Civil	Naut.
N 72°						
<b>N</b> 70°	////	////	01:11	22:52	////	////
68°	7777	////	02:07	22:01	////	////
66°	7777	7777	02:39	21:30	7777	////
64°	11111	01:30	03:03	21:07	22:37	////
62°	7777	02:09	03:22	20:49	22:01	////
60°	7777	02:35	03:37	20:34	21:35	////
<b>N</b> 58°	01:22	02:55	03:50	20:22	21:15	22:46
56°	01:57	03:12	04:01	20:11	20:59	22:13
54°	02:22	03:26	04:11	20:01	20:46	21:49
52°	02:41	03:38	04:19	19:52	20:34	21:30
50°	02:56	03:48	04:27	19:45	20:24	21:15
45°	03:27	04:10	04:44	19:29	20:02	20:45
<b>N</b> 40°	03:49	04:26	04:57	19:15	19:46	20:23
35°	04:06	04:40	05:08	19:04	19:32	20:06
30°	04:00	04:52	05:18	18:54	19:20	19:52
20°	04:21	05:11	05:35	18:38	19:01	19:32
N 10°	05:01	05:11	05:49	18:23	18:46	19:12
0°	05:01	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°	05:41	06:07	06:30	17:43	18:06	18:32
30°	05:52	06:21	06:47	17:27	17:52	18:21
35°	05:58	06:29	06:56	17:17	17:44	18:15
40°	06:05	06:37	07:06	17:07	17:36	18:08
45°	06:12	06:47	07:19	16:55	17:26	18:02
<b>S</b> 50°	06:19	06:58	07:34	16:40	17:15	17:54
52°	06:22	07:03	07:41	16:33	17:10	17:51
54°	06:26	07:09	07:49	16:25	17:04	17:48
56°	06:30	07:15	07:57	16:16	16:58	17:44
58°	06:34	07:22	08:07	16:07	16:52	17:40
<b>S</b> 60°	06:38	07:30	08:18	15:55	16:44	17:36
Lat.	Moonrise			Moonset		
	Mon	Tue	Wed	Mon	Tue	Wed
N 72°						
N 70°						
68°						
66°	19:54			18:13		
64°	20:55			17:12		
62°	21.30	21.21		16.38	18.45	

Lat.	Moonrise			Moonset			
	Mon	Tue	Wed	Mon	Tue	Wed	
N 72°							
N 70°							
68°							
66°	19:54			18:13			
64°	20:55			17:12			
62°	21:30	21:21		16:38	18:45		
60°	21:55	22:05	22:33	16:14	18:01	19:34	
N 58°	22:15	22:35	23:12	15:54	17:32	18:56	
56°	22:32	22:57	23:39	15:38	17:10	18:29	
54°	22:47	23:16		15:24	16:52	18:07	
52°	22:59	23:32		15:12	16:36	17:50	
50°	23:10	23:45		15:02	16:23	17:35	
45°	23:34		00:13	14:40	15:55	17:04	
N 40°	23:52		00:35	14:22	15:34	16:41	
35°		80:00	00:54	14:07	15:16	16:21	
30°		00:22	01:10	13:54	15:01	16:04	
20°		00:45	01:37	13:32	14:35	15:36	
N 10°	00:15	01:06	02:00	13:14	14:13	15:12	
0°	00:31	01:25	02:22	12:56	13:52	14:49	
S 10°	00:46	01:44	02:44	12:39	13:31	14:27	
20°	01:03	02:05	03:07	12:20	13:09	14:03	
30°	01:22	02:29	03:35	11:59	12:43	13:35	
35°	01:34	02:44	03:51	11:46	12:28	13:18	
40°	01:47	03:00	04:10	11:32	12:11	12:59	
45°	02:02	03:20	04:33	11:15	11:50	12:35	
<b>S</b> 50°	02:22	03:45	05:03	10:54	11:24	12:05	
52°	02:31	03:58	05:17	10:45	11:11	11:50	
54°	02:41	04:12	05:34	10:34	10:57	11:33	
56°	02:53	04:28	05:55	10:21	10:40	11:12	
58°	03:07	04:48	06:21	10:07	10:20	10:46	
<b>S</b> 60°	03:23	05:12	06:57	09:50	09:55	10:10	

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	24-26
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	40-20%
29	06:30	06:29	12:06	06:43	19:10	
30	06:27	06:26	12:06	07:38	20:07	
31	06:25	06:23	12:06	08:36	21:05	

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

Thu 0 1 2	<b>GHA</b> 310°05.7 325°08.2	<b>GHA</b> 162°20.0	<b>Dec</b> N14°36.1	<b>GHA</b> 244° 09.6	Dec	GHA	Dec	GHA	Dec		SHA	Dec
1 2		$162^{\circ}20.0$	N14°36 1	244000 6	11040004	0060 56 0		210045 0				
2	325°08 2			244 09.0	N21°00.1	236° 56.0	N21°50.4	319°45.0	S06°26.8	A I I	357°34.9	29° 13.5
	020 00.2	$177^{\circ}19.5$	35.0	259° 10.2	00.4	251°58.0	50.4	334°47.6	26.8	Alpheratz	353°07.2	-42° 10.1
3	340°10.6	192°18.9	34.0	274°10.9	00.7	267°00.0	50.5	349°50.2	26.9	Ankaa Schedar	349°31.2	56°40.1
•	355°13.1	207°18.4	• • 33.0	289°11.6	• • 01.0	282°02.0	• • 50.5	4°52.7	• • 27.0	Diphda	349° 31.2	-17°50.9
4	$10^{\circ}15.6$	222°17.9	32.0	304°12.3	01.3	297°04.0	50.6	19°55.3	27.0			
5	25°18.0	$237^{\circ}17.4$	30.9	319°13.0	01.6	$312^{\circ}06.0$	50.6	34°57.9	27.1	Achernar	335°20.3 327°51.6	-57°06.4 23°34.7
6	40°20.5	252°16.8	N14°29.9	334°13.7	N21°01.9	327°08.0	N21°50.7	50°00.5	506°27.1	Hamal	314°16.5	89°21.7
7	55°23.0	267°16.3	28.9	349° 14.4	02.2	342°09.9	50.8	65°03.0	27.2	Polaris		
8	70°25.4	282°15.8	27.8	4°15.0	02.5	357°11.9	50.8	80°05.6	27.2	Acamar	315°12.1	-40°12.1
9	85°27.9	297°15.3	• • 26.8	19° 15.7	• • 02.8	12° 13.9	• • 50.9	95°08.2	• • 27.3	Menkar	314°06.6	4°11.2
10	100°30.3	312°14.8	25.8	34° 16.4	03.1	27° 15.9	50.9	110°10.8	27.4	Mirfak	308°28.9 290°40.2	49°56.7
11	115°32.8	327°14.2	24.7	49° 17.1	03.4	42°17.9	51.0	125°13.3	27.4	Aldebaran		16°33.5
12	130°35.3	342°13.7	N14°23.7	64° 17.8	N21°03.7	57° 19.9	N21°51.0	140°15.9	S06°27.5	Rigel	281°04.4	-8°10.2 46°01.2
13	145°37.7	357°13.2	22.7	79° 18.5	04.0	72°21.9	51.1	155°18.5	27.5	Capella Bellatrix	280°22.7 278°23.5	6°22.4
14	160°40.2	12°12.7	21.6	94°19.2	04.3	87°23.9	51.1	170°21.1	27.6		278°02.6	28°37.7
15	175°42.7	27°12.2	• • 20.6	$109^{\circ}19.8$	• • 04.6	102°25.8	• • 51.2	185°23.7	• • 27.6	Elnath Alnilam	276 02.0 275°38.3	-1°11.1
16	190°45.1	42°11.6	19.6	124°20.5	04.9	117°27.8	51.2	200°26.2	27.7		270°52.7	7°24.8
17	205°47.6	$57^{\circ}11.1$	18.5	139°21.2	05.2	132°29.8	51.3	215°28.8	27.8	Betelgeuse		
18	220°50.1	72°10.6	N14°17.5	154°21.9	N21°05.6	147°31.8	N21°51.3	230°31.4	S06°27.8	Canopus	263°53.0 258°26.9	-52°42.3 -16°44.8
19	235°52.5	87°10.1	16.4	169°22.6	05.9	162°33.8	51.4	245°34.0	27.9	Sirius		-10 44.8 -29°00.1
20	250°55.0	102°09.6	15.4	184°23.3	06.2	177°35.8	51.4	260°36.5	27.9	Adhara	255°06.5	
21	265°57.5	$117^{\circ}09.1$	• • 14.4	199°24.0	• • 06.5	192°37.8	• • 51.5	275°39.1	• • 28.0	Procyon	244°51.5	5°09.8
22	280°59.9	132°08.5	13.3	214°24.6	06.8	207°39.8	51.5	290°41.7	28.0	Pollux	243°18.1	27°58.1
23	296°02.4	147°08.0	12.3	229°25.3	07.1	222°41.8	51.6	305°44.3	28.1	Avior	234°15.6	-59°35.2
										Suhail	222°47.0	-43°31.8
Mer.p	ass. 03:19	$\nu$ -0.5′ d-1	.0′ m-3.87	$\nu$ 0.7′ d0	.3′ m0.86	$\nu$ 2.0′ d0.	.1′ m-2.11	$\nu$ 2.6′ d0.	1'  m0.75	Miaplacidus	221°39.3	-69°49.0
										Alphard	217°48.4	-8°45.8
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.1	11°51.0
0	311°04.8	162°07.5	N14°11.2	244°26.0	N21°07.4	237°43.8	N21°51.6	320°46.9	S06°28.2	Dubhe	193°41.9	61°37.3
1	326°07.3	177°07.0	10.2	259° 26.7	07.7	252°45.7	51.7	335°49.4	28.2	Denebola	182°25.5	14°26.2
2	341°09.8	192°06.5	09.1	274° 27.4	08.0	267°47.7	51.7	350°52.0	28.3	Gienah	175°44.1	-17°40.7
3	356°12.2	207°06.0	08.1	289°28.1	•• 08.3	282°49.7	51.8	5°54.6	28.3	Acrux	173°00.9	-63°14.3
4	11°14.7	222°05.5	07.1	304°28.8	08.6	297°51.7	51.8	20°57.2	28.4	Gacrux	171°52.4	-57° 15.2
5	26°17.2	237°04.9	06.0	319° 29.4	08.9	312°53.7	51.9	35°59.7	28.4	Alioth	166°13.5	55°49.9
6	41°19.6	252°04.4	N14°05.0	334°30.1	N21°09.2	327°55.7	N21°51.9	51°02.3	S06°28.5	Spica	158°22.8	-11° 17.4
7	56°22.1	267°03.9	03.9	349°30.8	09.5	342°57.7	52.0	66°04.9	28.6	Alkaid	152°52.4	$49^{\circ}11.7$
8	71°24.6	282°03.4	03.9	4°31.5	09.5	357°59.7	52.0	81°07.5	28.6	Hadar	148°36.6	-60°29.7
9	86°27.0	297°02.9	•• 01.8	4 31.5 19°32.2	• • 10.0	13° 01.7	52.0	96°10.1	. 28.7	Menkent	147°58.1	-36°29.6
	101°29.5	312°02.4	14°00.8	34° 32.9		28°03.7		111°12.6		Arcturus	145°48.3	19°03.4
10	101 29.5 116°32.0	312 02.4 327°01.9	14 00.8 13°59.7	49° 33.6	10.3	43°05.7	52.1	111 12.0 126°15.2	28.7	Rigil Kent.	139°40.8	-60° 56.4
11					10.6		52.2	120 15.2 141°17.8	28.8	Kochab	$137^{\circ}19.6$	74°03.5
12	131°34.4	342°01.4	N13°58.7	64°34.3	N21°10.9	58°07.7	N21°52.2		S06°28.9	Zuben'ubi	$136^{\circ}56.4$	-16°08.7
13	146°36.9	357°00.9	57.6	79°34.9	11.2	73°09.6	52.3	156°20.4	28.9	Alphecca	126°03.9	26°38.1
14	161°39.3	12°00.4	56.6	94°35.6	11.5	88°11.6	52.3	171°23.0	29.0	Antares	$112^{\circ}16.1$	-26°29.2
15	176°41.8	26°59.9	• • 55.5	109°36.3	• • 11.8	103°13.6	• • 52.4	186°25.5	• • 29.0	Atria	$107^{\circ}10.3$	-69°04.5
16	191°44.3	41°59.3	54.5	124°37.0	12.1	118° 15.6	52.4	201°28.1	29.1	Sabik	$102^{\circ}03.0$	-15°45.3
17	206°46.7	56°58.8	53.4	139°37.7	12.4	133°17.6	52.5	216°30.7	29.1	Shaula	$96^{\circ}10.6$	-37°07.4
18	221°49.2	71°58.3	N13°52.4	154° 38.4	N21°12.7	148° 19.6	N21°52.5	231°33.3	S06°29.2	Rasalhague	95°58.6	12°32.6
19	236°51.7	86°57.8	51.3	169°39.1	13.0	163°21.6	52.6	246°35.9	29.3	Eltanin	90°41.9	51°29.3
20	251°54.1	101°57.3	50.2	184°39.8	13.3	178°23.6	52.6	261°38.5	29.3	Kaus Aust.	83°32.6	-34°22.4
21	266°56.6	116°56.8	• • 49.2	199°40.4	• • 13.6	193°25.6	• • 52.7	276°41.0	• • 29.4	Vega	80°33.1	38°48.5
22	281°59.1	131°56.3	48.1	214°41.1	13.9	208°27.6	52.7	291°43.6	29.4	Nunki	75°47.9	-26°16.0
23	297°01.5	146°55.8	47.1	229°41.8	14.2	223°29.6	52.8	306°46.2	29.5	Altair	62°00.0	$8^{\circ}56.1$
Mer.p	ass. 03:15	$\nu$ -0.5' d-1	.0′ m-3.87	$\nu$ 0.7′ d0	.3′ m0.86	$\nu 2.0' d0$	.1′ m-2.12	$\nu 2.6' \ d0$	1' m0.75	Peacock	53°05.7	-56° 39.3
- 1										Deneb	49°25.6	45°22.1
										Enif	33°38.8	9°59.3
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.9	-46°50.4
0	312°04.0	161°55.3	N13°46.0	244° 42.5	N21°14.5	238°31.6	N21°52.8	321°48.8	S06°29.6	Fomalhaut	$15^{\circ}14.6$	-29°29.4
1	327°06.5	176°54.8	45.0	259°43.2	14.8	253°33.6	52.9	336°51.4	29.6	Scheat	13°45.3	$28^{\circ}12.9$
2	342°08.9	191°54.3	43.9	274°43.9	15.0	268°35.6	52.9	351°53.9	29.7	Markab	13°30.0	$15^{\circ}20.3$
3	357°11.4	206°53.8	• • 42.8	289°44.6	• • 15.3	283°37.6	• • 53.0	6°56.5	• • 29.7	A. 01 T		N4.
4	12°13.8	221°53.3	41.8	304°45.3	15.6	298°39.6	53.0	21°59.1	29.8	Aug 01 Thu	SHA	Mer.pass
5	27°16.3	236°52.8	40.7	319°45.9	15.9	313°41.6	53.0	37°01.7	29.8	Venus	212°14.3	13:11
6	42°18.8	251°52.3	N13°39.7	334°46.6	N21°16.2	328°43.6	N21°53.1	52°04.3	S06°29.9	Mars	294°03.9	07:43
7	57°21.2	266°51.8	38.6	349°47.3	16.5	343°45.5	53.1	67°06.8	30.0	Jupiter	286°50.3	08:11
8	72°23.7	281°51.3	37.5	4°48.0	16.8	358° 47.5	53.2	82°09.4	30.0	Saturn	9°39.3	02:41
9	87°26.2	296°50.8	36.5	19°48.7	• • 17.1	13°49.5	• • 53.2	97°12.0	30.1	Aug 02 Fri	SHA	Mer.pass
10	102°28.6	311°50.3	35.4	34°49.4	17.4	28°51.5	53.3	112°14.6	30.1	Venus	211°02.7	13:12
11	117°31.1	326°49.8	34.3	49°50.1	17.7	43°53.5	53.3	127°17.2	30.2	Mars	293°21.2	07:42
12	132°33.6	341°49.3	N13°33.3	64°50.8	N21°17.9	58° 55.5	N21°53.4	142°19.8	S06°30.3	Jupiter	286°38.9	08:08
13	147°36.0	356°48.8	32.2	79°51.5	18.2	73°57.5	53.4	157°22.3	30.3	Saturn	9°42.0	02:36
14	162°38.5	11°48.3	31.1	94°52.1	18.5	88°59.5	53.5	172°24.9	30.4			
15	177°41.0	26°47.8	• • 30.1	109°52.8	• • 18.8	104°01.5	• • 53.5	187°27.5	30.4	Aug 03 Sat	SHA	Mer.pass
16	192°43.4	41°47.3	29.0	124°53.5	19.1	119°03.5	53.6	202°30.1	30.5	Venus	209°51.3	13:13
17	207°45.9	56°46.8	27.9	139°54.2	19.4	134°05.5	53.6	217°32.7	30.6	Mars	292°38.5	07:41
18	222°48.3	71°46.3	N13°26.9	154°54.9	N21°19.7	149°07.5	N21°53.7	232°35.3	S06°30.6	Jupiter	286°27.6	08:05
	237°50.8	86°45.8	25.8	169°55.6	20.0	164°09.5	53.7	247°37.8	30.7	Saturn	9°44.8	02:32
19	252°53.3	101°45.3	24.7	184°56.3	20.2	179°11.5	53.8	262°40.4	30.7			
20		110011	a	1000==	~ ~ -							
20 21	267°55.7	116°44.9	• • 23.7	199°57.0	• • 20.5	194°13.5	53.8	277°43.0	30.8	Horizont	tal parallax	0.1
20 21 22	267°55.7 282°58.2	131°44.4	22.6	214°57.7	20.8	$209^{\circ}15.5$	53.9	292°45.6	30.9	Horizoni	Venus:	0.1
20 21	267°55.7									Horizoni	•	0.1 0.1

h	Su	n	Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°24.7	$N17^{\circ}56.5$	222°09.3	6.2'	N28°25.2	0.9'	56.9'
1	193°24.8	55.8	236° 34.5	6.2'	28°26.1	0.7'	56.8'
2	208°24.8	55.2	250°59.7	6.2'	28°26.9	0.6'	56.8'
3 4	223°24.9 238°24.9	· · 54.6 53.9	265°24.9 279°50.2	6.2' 6.3'	28°27.5 28°27.9	0.4' 0.2'	56.8' 56.8'
4 5	258 24.9 253°24.9	53.9 53.3	279 50.2 294°15.5	6.3'	28°28.1	0.2	56.8 56.7'
6	268°25.0	N17°52.7	308° 40.8	6.3	N28°28.1	-0.1	56.7
7	283°25.0	52.0	323°06.1	6.3'	28°28.0	-0.3	56.7'
8	298°25.1	51.4	337°31.4	6.4'	28°27.8	-0.4'	56.7'
9	313°25.1	• • 50.8	351°56.8	6.4'	28°27.3	-0.6'	56.7'
10	328°25.1	50.1	6°22.2	6.4'	28°26.7	-0.8'	56.6'
11 12	343°25.2 358°25.2	49.5 N17°48.8	20° 47.6 35° 13.1	6.5' 6.5'	28°25.9 N28°25.0	-0.9' -1.1'	56.6'
13	358 25.2 13°25.3	N17 48.8 48.2	35 13.1 49°38.6	6.6'	28°23.9	-1.1 -1.3'	56.6' 56.6'
14	28°25.3	47.6	64°04.2	6.6'	28°22.6	-1.4'	56.6'
15	43°25.4	46.9	78° 29.8	6.6'	28°21.2	-1.6'	56.5'
16	58°25.4	46.3	92°55.4	6.7'	28°19.6	-1.8'	56.5'
17	73°25.4	45.6	$107^{\circ}21.1$	6.7'	28°17.8	-1.9'	56.5'
18	88°25.5	N17°45.0	121°46.8	6.8'	N28°15.9	-2.1'	56.5'
19	103°25.5	44.4	136° 12.6	6.8'	28°13.8	-2.3'	56.4
20	118°25.6 133°25.6	43.7 •• 43.1	150°38.4 165°04.3	6.9'	28°11.5 28°09.1	-2.4' -2.6'	56.4' 56.4'
21 22	133°25.6 148°25.7	42.4	105°04.3 179°30.2	6.9' 7.0'	28°09.1 28°06.5	-2.6 -2.7'	56.4'
23	163°25.7	41.8	179 50.2 193°56.2	7.0'	28°03.8	-2.1 -2.9'	56.4
	SD = 15.8'						
	3D = 15.8'	d = -0.6'		5L	0 = 15.5'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°25.8	N17°41.1	208°22.2	7.1'	N28°00.9	-3.1'	56.3'
1 2	193°25.8 208°25.8	40.5 39.8	222°48.3 237°14.5	7.2' 7.2'	27°57.8 27°54.6	-3.2' -3.4'	56.3' 56.3'
3	200 25.0 223°25.9	39.2	251°40.7	7.2	27°51.2	-3.4 -3.5'	56.3'
4	238°25.9	38.6	266° 07.0	7.3'	27°47.7	-3.7'	56.3'
5	253°26.0	37.9	280°33.3	7.4'	27°44.0	-3.8'	56.2'
6	268°26.0	N17°37.3	294°59.7	7.5'	N27°40.2	-4.0'	56.2'
7	283°26.1	36.6	309°26.2	7.5'	27°36.2	-4.1'	56.2'
8 9	298°26.1 313°26.2	36.0 •• 35.3	323°52.7 338°19.3	7.6' 7.7'	27°32.1 27°27.8	-4.3' -4.4'	56.2' 56.2'
10	313 20.2 328°26.2	34.7	352°46.0	7.7 7.8'	27°23.4	-4.4 -4.6'	56.1'
11	343°26.3	34.0	7°12.8	7.8'	27°18.8	-4.7'	56.1
12	358°26.3	N17°33.4	21°39.6	7.9'	N27°14.0	-4.9'	56.1'
13	13°26.4	32.7	$36^{\circ}06.5$	8.0'	$27^{\circ}09.1$	-5.0'	56.1'
14	28°26.4	32.1	50° 33.5	8.1'	27°04.1	-5.2'	56.1'
15 16	43°26.5 58°26.5	· · 31.4 30.8	65°00.6 79°27.7	8.1' 8.2'	26°58.9 26°53.6	-5.3' -5.5'	56.0' 56.0'
17	73°26.6	30.6	93°54.9	8.3'	26°48.2	-5.6'	56.0'
18	88°26.6	N17°29.4	108° 22.2	8.4'	N26°42.6	-5.7'	56.0'
19	103°26.7	28.8	122°49.6	8.5'	26°36.8	-5.9'	56.0'
20	118°26.7	28.1	$137^{\circ}17.1$	8.5'	26°30.9		55.9'
21	133°26.8	• • 27.5	151° 44.6	8.6'	26°24.9	-6.2'	55.9'
22	148°26.8 163°26.9	26.8	166° 12.3 180° 40.0	8.7'	26°18.8 26°12.5	-6.3'	55.9'
23		26.2	180 40.0	8.8'		-6.4'	55.9'
	SD = 15.8'	d = -0.6'		- SL	0 = 15.4'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°26.9	N17°25.5	195°07.8	8.9'	N26°06.0	-6.6'	55.9'
1	193°27.0	24.9	209°35.7 224°03.7	9.0'	25°59.5	-6.7'	55.8'
2	208°27.0 223°27.1	24.2 •• 23.5	224°03.7 238°31.7	9.1' 9.2'	25°52.8 25°45.9	-6.8' -7.0'	55.8' 55.8'
4	238°27.1	22.9	252° 59.9	9.2	25°39.0	-7.0 -7.1'	55.8'
5	253°27.2	22.2	267°28.2	9.3'	25°31.9	-7.2	55.8'
6	268°27.2	N17°21.6	281°56.5	9.4'	N25°24.7	-7.3'	55.7'
7	283°27.3	20.9	296°24.9	9.5'	25°17.3	-7.5'	55.7'
8	298°27.3 313°27.4	20.2	310°53.5 325°22.1	9.6'	25°09.9 25°02.3	-7.6'	55.7'
9 10	313°27.4 328°27.4	· · 19.6 18.9	325°22.1 339°50.8	9.7' 9.8'	25°02.3 24°54.6	-7.7' -7.8'	55.7' 55.7'
11	328 27.4 343°27.5	18.3	354°19.6	9.8 9.9'	24 54.6 24°46.7	-7.8 -8.0'	55.6'
12	358°27.6	N17° 17.6	8°48.5	10.0'	N24°38.8	-8.1	55.6'
13	13°27.6	16.9	23° 17.5	10.1'	24°30.7	-8.2'	55.6'
14	28°27.7	16.3	37°46.5	10.2'	24°22.5	-8.3'	55.6'
15 16	43°27.7 58°27.8	15.6	52° 15.7 66° 45.0	10.3'	24°14.2 24°05.8	-8.4'	55.6'
16 17	58°27.8 73°27.8	14.9 14.3	66°45.0 81°14.4	10.4' 10.5'	24°05.8 23°57.3	-8.5' -8.6'	55.5' 55.5'
18	88°27.9	N17° 13.6	95°43.8	10.6'	N23°48.6	-8.8'	55.5'
19	103°27.9	12.9	110°13.4	10.7'	23°39.9	-8.9'	55.5'
20	118°28.0	12.3	124° 43.1	10.8'	23°31.0	-9.0'	55.5'
21	133°28.1	• • 11.6	139° 12.8	10.8'	23°22.0	-9.1'	55.4'
22 23	148°28.1 163°28.2	10.9 10.3	153°42.6 168°12.6	10.9' 11.0'	23°12.9 23°03.7	-9.2' -9.3'	55.4' 55.4'
23			108 12.0			-9.3	55.4
	SD = 15.8'	d = -0.7'		SD	0 = 15.2'		

Lat.	Twi	light	Sunrise	Sunset		light
	Naut.	Civil			Civil	Naut.
N 72°						
N 70°	////	////	01:39	22:27	////	////
68°	////	////	02:22	21:46	////	////
66°	////	00:45	02:51	21:18	23:14	////
64°	////	01:48	03:13	20:57	22:20	////
62°	////	02:21	03:30	20:41	21:48	////
60°	00:41	02:45	03:44	20:27	21:25	23:20
<b>N</b> 58°	01:38	03:03	03:56	20:15	21:07	22:30
56°	02:08	03:19	04:07	20:05	20:52	22:02
54°	02:30	03:32	04:16	19:56	20:39	21:40
52°	02:48	03:43	04:24	19:47	20:28	21:23
50°	03:03	03:53	04:31	19:40	20:18	21:08
45°	03:31	04:13	04:47	19:25	19:58	20:40
<b>N</b> 40°	03:52	04:29	05:00	19:12	19:42	20:19
35°	04:09	04:43	05:10	19:02	19:29	20:03
30°	04:23	04:54	05:20	18:52	19:18	19:49
20°	04:45	05:13	05:36	18:36	19:00	19:27
N $10^{\circ}$	05:02	05:28	05:50	18:23	18:45	19:11
0°	05:16	05:41	06:03	18:10	18:31	18:57
<b>S</b> 10°	05:28	05:54	06:16	17:57	18:19	18:44
20°	05:40	06:06	06:29	17:44	18:07	18:33
30°	05:51	06:19	06:44	17:28	17:54	18:22
$35^{\circ}$	05:56	06:27	06:53	17:20	17:46	18:17
40°	06:02	06:35	07:03	17:10	17:38	18:11
45°	06:08	06:44	07:15	16:58	17:29	18:05
<b>S</b> 50°	06:15	06:54	07:29	16:44	17:19	17:58
52°	06:18	06:59	07:36	16:37	17:14	17:55
54°	06:21	07:04	07:43	16:30	17:09	17:52
56°	06:25	07:10	07:51	16:22	17:03	17:48
58°	06:28	07:16	08:01	16:12	16:57	17:45
<b>S</b> 60°	06:32	07:23	08:11	16:02	16:50	17:41
Lat.		Moonris			Moonset	
	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
<b>N</b> 70°						
68°						
66°						22:37
64°						21:49
62°	22:10		00:36	21:58	21:26	21:19
60°	22.20		01.14	20.20	20.40	20.56

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

		Sun		Moon			
Day	Eqn.of	f Time	Time 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	13-2%	
01	06:21	06:19	12:06	09:34	22:02		
02	06:17	06:15	12:06	10:30	22:57		
03	06:12	06:10	12:06	11:24	23:49		

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

h	Aries	Vei	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	313°03.1	161°43.4	N13°20.4	244°59.0	N21°21.4	239°19.5	N21°54.0	322°50.8	S06°31.0		ЗПА	Dec
1	313 03.1 328°05.6	101 43.4 176°42.9		259°59.7	21.7	259 19.5 254°21.5	54.0 54.0	322 50.6 337°53.4	31.0	Alpheratz	357°34.9	29°13.5
2	343°08.1	170 42.9 191°42.4	19.4 18.3	275°00.4	21.7	269°23.5	54.0 54.1	352° 55.9		Ankaa	353°07.2	-42°10.1
									31.1	Schedar	349°31.2	56°40.1
3	358° 10.5	206°41.9	• • 17.2	290°01.1	• • 22.2	284°25.5	54.1	7°58.5	• • 31.2	Diphda	348°47.5	-17°50.9
4	13° 13.0	221°41.4	16.1	305°01.8	22.5	299°27.5	54.2	23°01.1	31.2	Achernar	335°20.2	-57°06.4
5 6	28° 15.4 43° 17.9	236°40.9 251°40.4	15.1 N13°14.0	320°02.5 335°03.2	22.8 N21°23.1	314°29.5 329°31.5	54.2 N21°54.3	38° 03.7 53° 06.3	31.3 \$06°31.3	Hamal	327°51.5	23°34.7
7	58° 20.4	266°39.9	12.9	350°03.2	23.4	344°33.5	54.3	68°08.9	31.4	Polaris	314°15.0	89°21.7
8	73°22.8	200 39.9 281°39.5	11.8	5°04.6	23.4	359°35.5	54.3 54.4	83°11.4		Acamar	315°12.0	-40°12.1
9	88°25.3	201 39.5 296°39.0	. 10.7	20°05.2	23.9	14°37.5	54.4	98°14.0	31.5 · · 31.5	Menkar	$314^{\circ}06.5$	4°11.3
10	103°27.8	311°38.5	09.7	35°05.9	24.2	29°39.5	54.4	113° 16.6	31.6	Mirfak	308°28.9	49°56.7
11	103 27.8 118°30.2	326°38.0	08.6	50°06.6	24.2	29 39.5 44°41.5	54.4 54.5	113 10.0 128° 19.2	31.6	Aldebaran	290°40.2	16°33.5
12	133°32.7	341°37.5	N13°07.5	65°07.3	N21°24.8	59°43.5	N21°54.5	143°21.8	S06°31.7	Rigel	281°04.4	-8°10.2
13	133 32.7 148°35.2	356°37.0	06.4	80°08.0	25.0	74°45.5	54.6	158°24.4	31.8	Capella	280°22.7	46°01.2
14	163°37.6	11°36.5	05.3	95°08.7	25.3	89°47.5	54.6	173° 27.0	31.8	Bellatrix	278°23.5	6°22.4
15	178° 40.1	26°36.1	04.3	110°09.4	25.6	104°49.5	54.7	188°29.5	31.9	Elnath	278°02.5	28°37.7
16	193°42.6	41°35.6	03.2	125°10.1	25.9	119°51.5	54.7	203°32.1	31.9	Alnilam	275°38.3	-1°11.0
17	208° 45.0	56°35.1	02.1	140°10.8	26.2	134°53.5	54.8	218°34.7	32.0	Betelgeuse	270°52.7	7°24.8
18	223°47.5	71°34.6	N13°01.0	155°11.5	N21°26.4	149°55.5	N21°54.8	233°37.3	S06°32.1	Canopus	263°53.0	-52°42.2
19	238°49.9	86°34.1	12°59.9	170°12.2	26.7	164°57.5	54.9	248°39.9	32.1	Sirius	258°26.8	-16°44.8
20	253° 52.4	101°33.6	58.8	185°12.8	27.0	179°59.5	54.9	263°42.5	32.2	Adhara	255°06.5	-29°00.1
21	268° 54.9	116°33.2	57.8	200°13.5	27.3	195°01.5	• • 55.0	278°45.1	32.2	Procyon	244°51.5	5°09.8
22	283°57.3	131°32.7	56.7	215°14.2	27.5	210°03.5	55.0	293°47.7	32.3	Pollux	243°18.1	27°58.1
23	298°59.8	146°32.2	55.6	230°14.9	27.8	225°05.5	55.1	308° 50.2	32.4	Avior	234°15.5	-59°35.2
				-			<del></del>			Suhail	222°47.0	-43°31.8
Mer.p	ass. 03:07	$\nu$ -0.5′ $d$ -1	.1′ m-3.86	$\nu$ 0. $l' d0$	.3′ m0.85	$\nu^{2.0'} d^{0}$ .	0′ m-2.13	$\nu^{2.6'} d^{0}$	.1′ m0.74	Miaplacidus	221°39.3	-69°49.0
										Alphard	217°48.4	-8°45.8
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	207°35.1 193°41.9	11°51.0 61°37.3
0	314°02.3	161°31.7	N12°54.5	245°15.6	N21°28.1	240°07.5	N21°55.1	323°52.8	506°32.4	l .	193 41.9 182°25.5	
1	329°04.7	176°31.2	53.4	260°16.3	28.4	255°09.5	55.2	338°55.4	32.5	Denebola Gienah	182°25.5 175°44.2	14°26.2 -17°40.7
2	344°07.2	191°30.8	52.3	275°17.0	28.7	270°11.5	55.2	353°58.0	32.5		173 44.2 173°00.9	-17 40.7 -63°14.3
3	359°09.7	206°30.3	• • 51.2	290°17.7	• • 28.9	285°13.6	• • 55.3	9°00.6	• • 32.6			-03 14.3 -57°15.2
4	$14^{\circ}12.1$	221°29.8	50.1	305°18.4	29.2	300°15.6	55.3	24°03.2	32.7	Gacrux Alioth	171 52.4 166°13.5	55°49.9
5	29° 14.6	236°29.3	49.1	320°19.1	29.5	315°17.6	55.3	39°05.8	32.7	Spica	158°22.8	-11°17.4
6	44° 17.1	251°28.8	N12°48.0	335°19.8	N21°29.8	330°19.6	N21°55.4	54°08.4	S06°32.8	Alkaid	150° 22.6 152° 52.4	49°11.7
7	$59^{\circ}19.5$	266°28.4	46.9	350°20.5	30.0	345°21.6	55.4	$69^{\circ}10.9$	32.9	Hadar	148°36.6	-60°29.7
8	74°22.0	281°27.9	45.8	5°21.1	30.3	0°23.6	55.5	84° 13.5	32.9	Menkent	_	-36°29.6
9	89°24.4	296°27.4	• • 44.7	20°21.8	• • 30.6	15°25.6	• • 55.5	$99^{\circ}16.1$	• • 33.0	Arcturus	145°48.3	19°03.4
10	104°26.9	311°26.9	43.6	35°22.5	30.8	30°27.6	55.6	$114^{\circ}18.7$	33.0	Rigil Kent.	139°40.8	-60°56.5
11	119°29.4	326°26.5	42.5	50°23.2	31.1	45°29.6	55.6	129°21.3	33.1	Kochab	137°19.7	74°03.5
12	134°31.8	341°26.0	N12°41.4	65°23.9	N21°31.4	60°31.6	N21°55.7	144°23.9	S06°33.2	Zuben'ubi	136°56.4	-16°08.7
13	149°34.3	356°25.5	40.3	80°24.6	31.7	75°33.6	55.7	159° 26.5	33.2	Alphecca	126°03.9	26°38.1
14	164°36.8	11°25.0	39.2	95°25.3	31.9	90°35.6	55.8	174°29.1	33.3	Antares	112°16.1	-26°29.2
15	179°39.2	26°24.6	• • 38.1	110°26.0	• • 32.2	105°37.6	• • 55.8	189°31.7	• • 33.3	Atria	107°10.3	-69°04.5
16	194°41.7	41°24.1	37.0	125°26.7	32.5	120°39.6	55.9	204° 34.2	33.4	Sabik	102°03.0	-15°45.3
17	209°44.2	56°23.6	35.9	140°27.4	32.7	135°41.6	55.9	219°36.8	33.5	Shaula	96°10.6	-37°07.4
18	224°46.6	71°23.1	N12°34.8		N21°33.0	150°43.6	N21°56.0	234°39.4	S06°33.5	Rasalhague	95°58.6	12°32.6
19	239°49.1	86°22.7	33.7	170°28.8	33.3	165°45.6	56.0	249°42.0	33.6	Eltanin	90°41.9	51°29.3
20	254°51.5	101°22.2	32.6	185°29.5	33.6	180°47.7	56.0	264°44.6	33.7	Kaus Aust.	83°32.6	-34°22.4
21	269°54.0	116°21.7	• • 31.5	200°30.2	• • 33.8	195°49.7	56.1	279° 47.2 294° 49.8	• • 33.7	Vega	80°33.1	38°48.5
22	284° 56.5 299° 58.9	131°21.2	30.4	215°30.9	34.1	210°51.7	56.1		33.8	Nunki	75°47.9	-26°16.0
23	299 58.9	146°20.8	29.3	230°31.5	34.4	225°53.7	56.2	309°52.4	33.8	Altair	62°00.0	8°56.1
Mer.p	ass. 03:03	$\nu$ -0.5' d-1	.1' m-3.86	$\nu$ 0.7′ d0	.3′ m0.85	$\nu 2.0' \ d0.$	0′ m-2.13	$\nu$ 2.6′ d0	1'  m0.73	Peacock	53°05.6	-56°39.3
										Deneb	49°25.6	45°22.1
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.8	9°59.3
0 0	315°01.4	161°20.3	N12°28.2	245°32.2	N21°34.6	240°55.7	N21°56.2	324°55.0	S06°33.9	Al Na'ir	27°32.9	-46°50.4
1	330°03.9	176° 19.8	27.1	260°32.9	34.9	255°57.7	56.3	339° 57.5	34.0	Fomalhaut	15°14.6	-29°29.4
2	345°06.3	191°19.4	26.0	275°33.6	35.2	270°59.7	56.3	355°00.1	34.0	Scheat	13°45.2	28°12.9
3	0°08.8	206°18.9	24.9	290°34.3	35.4	286°01.7	56.4	10°02.7	34.1	Markab	13°30.0	15°20.3
4	15°11.3	221°18.4	23.8	305°35.0	35.7	301°03.7	56.4	25°05.3	34.2	Aug 04 Sun	SHA	Mer.pass
5	30° 13.7	236°18.0	22.7	320°35.7	36.0	316°05.7	56.5	40°07.9	34.2		208°40.3	13:14
6	45° 16.2	251°17.5	N12°21.6	335°36.4		331°07.7	N21°56.5		S06°34.3	Mars		07:40
7	60° 18.7	266°17.0	20.5	350°37.1	36.5	346°09.7	56.5	70°13.1	34.3	Jupiter	_	08:02
8	75°21.1	281°16.6	19.4	5°37.8	36.8	1°11.8	56.6	85° 15.7	34.4	Saturn	9°47.6	02:28
9	90°23.6	296°16.1	• • 18.3	20°38.5	• • 37.0	16°13.8	• • 56.6	100° 18.3	• • 34.5	A OF 11	CIII	N4-
10	$105^{\circ}26.0$	$311^{\circ}15.6$	17.2	35°39.2	37.3	31°15.8	56.7	115°20.9	34.5	Aug 05 Mon	SHA	Mer.pass
11	$120^{\circ}28.5$	$326^{\circ}15.2$	16.1	50°39.9	37.6	46°17.8	56.7	130°23.5	34.6		207°29.4 291°13.3	13:14 07:39
12	135°31.0	341°14.7	N12°15.0	65°40.6	N21°37.8	61°19.8	$N21^{\circ}56.8$	145°26.0	S06°34.7	Mars	291°13.3 286°05.3	07:39 07:58
13	150°33.4	356°14.2	13.9	80°41.3	38.1	76°21.8	56.8	160°28.6	34.7	Saturn	280 05.3 9°50.6	07:58
14	165°35.9	11°13.8	12.7	95°42.0	38.4	91°23.8	56.9	175°31.2	34.8	Jatuill	9 30.0	02.24
15	180°38.4	26°13.3	• • 11.6	110°42.7	• • 38.6	106°25.8	• • 56.9	190°33.8	• • 34.8	Aug 06 Tue	SHA	Mer.pass
16	195°40.8	41°12.8	10.5	125°43.4	38.9	121°27.8	57.0	205°36.4	34.9		206°18.9	13:15
17	210°43.3	56°12.4	09.4	140°44.0	39.1	136°29.9	57.0	220°39.0	35.0	Mars		07:37
18	225°45.8	71°11.9	N12°08.3	155°44.7		151°31.9	N21°57.0	235°41.6	S06°35.0		285°54.3	07:55
19	240°48.2	86°11.5	07.2	170°45.4	39.7	166°33.9	57.1	250°44.2	35.1	Saturn	9°53.6	02:20
20	255° 50.7	101°11.0	06.1	185°46.1	39.9	181°35.9	57.1	265°46.8	35.2	Horizont	al parallax	
21	270°53.2	116°10.5	05.0	200°46.8	· · 40.2	196°37.9	· · 57.2	280°49.4	• • 35.2	1101120111	Venus:	0.1
22 23	285°55.6 300°58.1	131°10.1 146°09.6	03.8 02.7	215°47.5 230°48.2	40.5 40.7	211°39.9 226°41.9	57.2 57.3	295°52.0 310°54.6	35.3 35.3		Mars:	0.1
Mer.p	ass. 02:59	$\nu$ -0.5' d-1	.1′ m-3.86	$ u$ 0.7 $^{\prime}$ d0	.3′ m0.84	$\nu 2.0' \ d0.$	0′ m-2.13	$\nu$ 2.6′ d0	.1' m $0.73$			

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°28.2	N17°09.6	182°42.6	11.1'	N22°54.4	-9.4'	55.4'
1	193°28.3	08.9	197°12.8	11.2'	22°45.0	-9.5'	55.4'
2	208°28.3	08.3	211°43.0	11.3'	22°35.5	-9.6'	55.4'
3	223°28.4	• • 07.6	226°13.3	11.4'	22°25.9	-9.7'	55.3'
4	238°28.5	06.9	240°43.7	11.5'	22°16.2	-9.8'	55.3'
5	253°28.5	06.3	255°14.3	11.6'	22°06.4	-9.9'	55.3'
6	268°28.6	$N17^{\circ}05.6$	269°44.9	11.7'	N21°56.5	-10.0'	55.3'
7	283°28.6	04.9	284°15.6	11.8'	21°46.5	-10.1'	55.3'
8	298°28.7	04.2	298°46.4	11.9'	21°36.4	-10.2'	55.2'
9	313°28.8	• • 03.6	313°17.3	12.0'	21°26.3	-10.3'	55.2'
10	328°28.8	02.9	327°48.3	12.1'	$21^{\circ}16.0$	-10.4'	55.2'
11	343°28.9	02.2	342°19.3	12.2'	21°05.6	-10.5'	55.2'
12	358°28.9	$N17^{\circ}01.6$	356°50.5	12.3'	N20°55.2	-10.5'	55.2'
13	13°29.0	00.9	11°21.8	12.4'	20°44.6	-10.6'	55.2'
14	28°29.1	17°00.2	25°53.2	12.5'	20°34.0	-10.7'	55.1'
15	43°29.1	16°59.5	40°24.6	12.5'	20°23.3	-10.8'	55.1'
16	58°29.2	58.9	54°56.2	12.6'	20°12.5	-10.9'	55.1'
17	73°29.2	58.2	69°27.8	12.7'	20°01.6	-11.0'	55.1'
18	88°29.3	N16° 57.5	83°59.5	12.8'	N19°50.6	-11.0'	55.1'
19	103°29.4	56.8	98°31.3	12.9'	19°39.6	-11.1'	55.1'
20	118°29.4	56.1	113°03.2 127°35.2	13.0'	19°28.4 19°17.2	-11.2'	55.0'
21	133°29.5 148°29.6	• • 55.5	127°35.2 142°07.3	13.1' 13.2'	19°17.2 19°06.0	-11.3'	55.0'
22 23	148°29.6 163°29.6	54.8 54.1	142°07.3 156°39.5	13.2	19°06.0 18°54.6	-11.4' -11.4'	55.0' 55.0'
23			100 39.5			-11.4	55.0
	SD = 15.8'	d = -0.7'		SI	O = 15.1'		
Mon	<b>GHA</b> 178°29.7	<b>Dec</b> N16°53.4	GHA	ν 12 4'	Dec	d 11 5'	HP
0 1	178°29.7 193°29.8	N16°53.4 52.7	171°11.8 185°44.1	13.4' 13.4'	N18°43.2 18°31.7	-11.5' -11.6'	55.0' 54.9'
2	193°29.8 208°29.8	52.7 52.1	185°44.1 200°16.6	13.4	18° 31.7 18° 20.1	-11.6	54.9'
3	206 29.6 223°29.9	51.4	200 10.0 214°49.1	13.6'	18°08.4	-11.7' -11.7'	54.9'
3 4	223°29.9 238°29.9	· · 51.4 50.7	214 49.1 229°21.7	13.7	18°08.4 17°56.7	-11.7 -11.8'	54.9'
5	253°30.0	50.7	243°54.4	13.8'	17°44.9	-11.0 -11.9'	54.9'
6	268°30.1	N16°49.3	258°27.2	13.9'	N17°33.1	-11.9'	54.9'
7	283°30.1	48.7	273°00.0	13.9'	17°21.1	-12.0'	54.9'
8	298°30.2	48.0	287°33.0	14.0'	17°09.1	-12.1'	54.8'
9	313°30.3	47.3	302°06.0	14.1'	16°57.1	-12.1'	54.8'
10	328°30.3	46.6	316°39.1	14.2'	16°45.0	-12.2'	54.8'
11	343°30.4	45.9	331°12.3	14.3'	16°32.8	-12.2'	54.8'
12	358°30.5	N16° 45.2	345°45.5	14.3'	N16°20.6	-12.3'	54.8'
13	13°30.5	44.5	0°18.9	14.4'	$16^{\circ}08.3$	-12.4'	54.8'
14	28°30.6	43.9	14°52.3	14.5'	15°55.9	-12.4'	54.7'
15	43°30.7	• • 43.2	29°25.8	14.6'	15°43.5	-12.5'	54.7'
16	58°30.7	42.5	43°59.4	14.6'	$15^{\circ}31.0$	-12.5'	54.7'
17	73°30.8	41.8	58°33.0	14.7'	15°18.5	-12.6'	54.7'
18	88°30.9	N16°41.1	73°06.7	14.8'	N15°05.9	-12.6'	54.7'
19	103°31.0	40.4	87°40.5	14.9'	14°53.3	-12.7'	54.7'
20	118°31.0	39.7	102°14.4	14.9'	14°40.6	-12.7'	54.7'
21	133°31.1	• • 39.0	116°48.3	15.0'	14°27.8	-12.8'	54.6'
22	148°31.2	38.4	131°22.4	15.1'	14°15.1	-12.8'	54.6'
23	163°31.2	37.7	145°56.4	15.2'	14°02.2	-12.9'	54.6'
	SD = 15.8'	d = -0.7'		SI	O = 15.0'		
т	GHA	D	CUA		D	.,	НР
Tue	178°31.3	<b>Dec</b> N16°37.0	<b>GHA</b> 160°30.6	u 15.2'	<b>Dec</b> N13°49.3	d -12.9'	54.6'
0 1	178°31.3 193°31.4	36.3	160°30.6 175°04.8	15.2 15.3'	13° 36.4	-12.9 -13.0'	54.6'
2	208°31.4	35.6	175 04.8 189°39.1	15.4'	13°23.4	-13.0'	54.6'
3	223°31.5	• • 34.9	204°13.4	15.4'	13°10.4	-13.1'	54.6'
4	238°31.6	34.2	218°47.9	15.5'	12°57.3	-13.1'	54.5'
5	253°31.7	33.5	233°22.3	15.5'	12°44.2	-13.2'	54.5'
6	268°31.7	N16°32.8	247°56.9	15.6'	N12°31.1	-13.2'	54.5'
7	283°31.8	32.1	262°31.5	15.7'	12°17.9	-13.2'	54.5'
8	298°31.9	31.4	277°06.2	15.7'	12°04.6	-13.3'	54.5'
9	313°31.9	• • 30.7	291°40.9	15.8'	$11^{\circ}51.3$	-13.3'	54.5'
10	328°32.0	30.0	$306^{\circ}15.7$	15.8'	11°38.0	-13.4'	54.5'
11	343°32.1	29.3	320°50.5	15.9'	11°24.7	-13.4'	54.5'
12	358°32.2	N16°28.6	335°25.4	16.0'	N11°11.3	-13.4'	54.4'
13	13°32.2	27.9	350°00.4	16.0'	10°57.9	-13.5'	54.4'
14	28°32.3	27.3	4°35.4	16.1'	10°44.4	-13.5'	54.4
15	43°32.4	• • 26.6	19°10.5	16.1'	10°30.9	-13.5'	54.4'
16	58°32.5	25.9	33°45.6	16.2'	10°17.4	-13.6'	54.4'
17	73°32.5	25.2	48°20.8	16.2'	10°03.8	-13.6'	54.4'
18	88°32.6 103°32.7	N16°24.5	62°56.0 77°31.3	16.3'	N09°50.3 09°36.6	-13.6'	54.4'
19 20	103°32.7 118°32.8	23.8 23.1	77°31.3 92°06.6	16.3' 16.4'	09°36.6 09°23.0	-13.6' -13.7'	54.4' 54.3'
20	118° 32.8 133° 32.8	22.4	92°06.6 106°42.0	16.4	09°23.0	-13.7' -13.7'	54.3'
22	133 32.8 148°32.9	21.7	106 42.0 121°17.4	16.4	09 09.3 08°55.6	-13.7' -13.7'	54.3'
23	163°33.0	21.7	121 17.4 135°52.9	16.5'	08°41.9	-13. <i>1</i> '	54.3'
23						13.0	J T.J
	SD = 15.8'	d = -0.7'		SI	O = 14.9'		

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

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

# August 07, 08, 09 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	316°00.5	161°09.2	N12°01.6	245°48.9	N21°41.0	241°43.9	N21°57.3	325° 57.2	S06°35.4			
1	331°03.0	176°08.7	12°00.5	260°49.6	41.2	256° 45.9	57.4	340°59.7	35.5	Alpheratz	357°34.9	29°13.5
2	346°05.5	191°08.2	11°59.4	275°50.3	41.5	271°48.0	57.4	356°02.3	35.5	Ankaa	353°07.2	-42°10.1
3	1°07.9	206°07.8	• • 58.3	290°51.0	• • 41.8	286° 50.0	• • 57.5	11°04.9	• • 35.6	Schedar	349°31.1	56°40.2
4	16°10.4	221°07.3	57.2	305°51.7	42.0	301°52.0	57.5	26° 07.5	35.7	Diphda	348°47.4	-17°50.9
5	31°12.9	236°06.9	56.0	320°52.4	42.3	316°54.0	57.5	41° 10.1	35.7	Achernar	335°20.2	-57°06.4
6	46°15.3	251°06.4	N11°54.9	335°53.1	N21°42.5	331°56.0	N21°57.6	56° 12.7	S06°35.8	Hamal	327°51.5	23°34.7
7	61°17.8	266°05.9	53.8	350°53.8	42.8	346°58.0	57.6	71° 15.3	35.8	Polaris	314° 13.6 315° 12.0	89°21.7 -40°12.0
8	76°20.3	281°05.5	52.7	5°54.5	43.0	2°00.0	57.7	86° 17.9	35.9	Acamar Menkar	314°06.5	4°11.3
9	91°22.7	296°05.0	• • 51.6	20°55.2	• • 43.3	17°02.1	• • 57.7	101°20.5	• • 36.0	Mirfak	308°28.8	49°56.7
10	106°25.2	311°04.6	50.4	35°55.9	43.6	32°04.1	57.8	116°23.1	36.0	Aldebaran	290°40.2	16°33.6
11	121°27.6	326°04.1	49.3	50°56.6	43.8	47°06.1	57.8	131°25.7	36.1	Rigel	281°04.4	-8°10.2
12	136°30.1	341°03.7	N11°48.2	65° 57.3	N21°44.1	62°08.1	N21°57.9	146°28.3	S06°36.2	Capella	280°22.7	46°01.2
13	151°32.6	356°03.2	47.1	80°58.0	44.3	$77^{\circ}10.1$	57.9	161°30.9	36.2	Bellatrix	278°23.4	6°22.4
14	166°35.0	11°02.8	46.0	95° 58.7	44.6	92°12.1	57.9	176° 33.5	36.3	Elnath	278°02.5	28°37.7
15	181°37.5	26°02.3	• • 44.8	110°59.4	• • 44.8	107° 14.1	· · 58.0	191°36.1	• • 36.4	Alnilam	275°38.3	-1°11.0
16	196°40.0	41°01.9	43.7	126°00.1	45.1	122°16.2	58.0	206°38.7	36.4	Betelgeuse	270°52.7	7°24.8
17	211°42.4	56°01.4	42.6	141°00.8	45.4	137°18.2	58.1	221°41.2	36.5	Canopus	263°53.0	-52°42.2
18	226°44.9	71°01.0	N11°41.5	156°01.5	N21°45.6	152°20.2	N21°58.1	236° 43.8	S06°36.5	Sirius	258° 26.8	-16°44.8
19	241°47.4	86°00.5	40.3	171°02.2	45.9	167°22.2	58.2	251°46.4	36.6	Adhara	255°06.5	-29°00.1
20	256°49.8	101°00.1	39.2	186°02.9	46.1	182°24.2	58.2	266° 49.0	36.7	Procyon	244°51.5	5°09.8
21	271°52.3	115°59.6	38.1	201°03.6	• • 46.4	197°26.2	• • 58.3	281°51.6	• • 36.7	Pollux	243°18.1	27°58.1
22	286°54.8	130°59.1	37.0	216°04.3	46.6	212°28.3	58.3	296° 54.2	36.8	Avior	234° 15.5	-59°35.1
23	301°57.2	145°58.7	35.8	231°05.0	46.9	227°30.3	58.3	311°56.8	36.9	Suhail	222°47.0	-43°31.8
Mer.n	ass. 02:55	$\nu$ -0.5' d-1	1.1′ m-3.86	$\nu$ 0.7' d0	.3′ m0.84	$\nu^{2.0'} d0$	.0′ m-2.14	$\nu^{2.6'} d0$	.1′ m0.72	Miaplacidus	221°39.3	-69°49.0
		- 0.0 4 1								Alphard	217°48.4	-8°45.8
			_		_		_		_	Regulus	207°35.1	11°51.0
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°42.0	61°37.3
0	316°59.7	160°58.3	N11°34.7	246°05.7	N21°47.1	242°32.3	N21°58.4	326°59.4	S06°36.9	Denebola	182°25.5	14°26.2
1	332°02.1	175°57.8	33.6	261°06.4	47.4	257°34.3	58.4	342°02.0	37.0	Gienah	175°44.2	-17°40.7
2	347°04.6	190°57.4	32.4	276°07.1	47.6	272°36.3	58.5	357°04.6	37.1	Acrux	173°01.0	-63°14.3
3	2°07.1	205°56.9	• • 31.3	291°07.7	• • 47.9	287°38.4	• • 58.5	12°07.2	· · 37.1	Gacrux	171°52.4	-57°15.2
4	17°09.5	220°56.5	30.2	306°08.4	48.1	302°40.4	58.6	27°09.8	37.2	Alioth	166° 13.5	55°49.9
5	32°12.0	235°56.0	29.0	321°09.1	48.4	317°42.4	58.6	42°12.4	37.2	Spica	158°22.8	-11°17.3
6	47°14.5	250°55.6	N11°27.9	336°09.8	N21°48.6	332°44.4	N21°58.6	57° 15.0	S06°37.3	Alkaid	152°52.4	49°11.7
7	62°16.9	265°55.1	26.8	351°10.5	48.9	347°46.4	58.7	72°17.6	37.4	Hadar	148°36.7	-60°29.7
8	77°19.4	280°54.7	25.7	6°11.2	49.1	2°48.4	58.7	87° 20.2	37.4	Menkent	$147^{\circ}58.1$	-36°29.6
9	92°21.9	295°54.2	• • 24.5	21°11.9	• • 49.4	17°50.5	• • 58.8	102°22.8	• • 37.5	Arcturus	145°48.3	19°03.4
10	107°24.3	310°53.8	23.4	36° 12.6	49.6	32°52.5	58.8	117°25.4	37.6	Rigil Kent.	139°40.9	-60°56.4
11	122°26.8	325°53.3	22.3	51° 13.3	49.9	47°54.5	58.9	132°28.0	37.6	Kochab	$137^{\circ}19.7$	74°03.5
12	137°29.2	340°52.9	N11°21.1	66° 14.0	N21°50.1	62°56.5	N21°58.9	147°30.6	S06°37.7	Zuben'ubi	136°56.4	-16°08.6
13	152°31.7	355°52.4	20.0	81°14.7	50.4	77°58.5	59.0	162°33.2	37.8	Alphecca	$126^{\circ}04.0$	$26^{\circ}38.1$
14	167°34.2	10°52.0	18.8	96°15.4	50.6	93°00.6	59.0	177°35.8	37.8	Antares	$112^{\circ}16.1$	-26°29.3
15	182°36.6	25°51.6	•• 17.7	111°16.1 126°16.8	• • 50.9	108°02.6	• • 59.0	192°38.4	• • 37.9	Atria	$107^{\circ}10.4$	-69°04.5
16	197°39.1 212°41.6	40°51.1	16.6		51.1	123°04.6	59.1	207°41.0 222°43.6	38.0	Sabik	$102^{\circ}03.0$	-15°45.3
17	212 41.0 227°44.0	55°50.7	15.4	141°17.5	51.4	138°06.6	59.1 N21°59.2	237° 46.2	38.0	Shaula	$96^{\circ}10.6$	-37°07.4
18 19	242°46.5	70°50.2 85°49.8	N11°14.3	156° 18.2	F. 0	153°08.6		252° 48.7	S06°38.1	Rasalhague	95°58.6	12°32.6
	242 40.5 257°49.0		13.2	171° 18.9 186° 19.6	51.9	168° 10.7 183° 12.7	59.2		38.2	Eltanin	90°42.0	51°29.3
20	257 49.0 272°51.4	100°49.3 115°48.9	12.0 •• 10.9	201°20.3	52.1 •• 52.4	103 12.7 198° 14.7	59.3 •• 59.3	267°51.3 282°53.9	38.2 •• 38.3	Kaus Aust.	83°32.6	-34°22.4
21 22	272 51.4 287°53.9	130°48.5	09.7	201 20.3 216°21.0	52.6	213° 16.7	59.3	202 55.9 297° 56.5	38.3	Vega	80°33.1	38°48.5
23	302°56.4	145°48.0	09.7	231°21.7	52.8	213 10.7 228° 18.8	59.5	312° 59.1	38.4	Nunki	75°47.9	-26°16.0
23	302 30.4					220 10.0				Altair	62°00.0	8°56.1
Mer.p	ass. 02:52	$\nu$ -0.4' d-1	$1.1^\prime$ m-3.86	$ u 0.7' \ d0$	.3′ m0.83	$\nu 2.0' \ d0$	.0′ m-2.14	$\nu 2.6' \ d0$	$.1' \; {\sf m0.72}$	Peacock	53°05.6	-56°39.3
										Deneb	49°25.6	45°22.1
E!	CHA	CHA	Daa	CHA	Don	CHA	Doo	CHA	Doo	Enif	33°38.8	9°59.3
Fri 0	<b>GHA</b> 317°58.8	<b>GHA</b> 160°47.6	<b>Dec</b> N11°07.5	<b>GHA</b> 246°22.4	<b>Dec</b> N21°53.1	<b>GHA</b> 243°20.8	<b>Dec</b> N21° 59.4	GHA 328°01.7	<b>Dec</b> <b>S</b> 06°38.5	Al Na'ir	27°32.9	-46°50.4
1	333°01.3	175°47.1	06.3	240 22.4 261°23.1	53.3	258° 22.8	59.5	343°04.3	38.5	Fomalhaut	15° 14.6	-29°29.4
2	348°03.7	175 47.1 190°46.7	05.2	276°23.8	53.6	273° 24.8	59.5	358° 06.9	38.6	Scheat	13°45.2	28°13.0
3	3°06.2	205°46.3	•• 04.0	270 23.6 291°24.5	53.8	288° 26.8	59.6	13° 09.5	•• 38.7	Markab	13°30.0	15°20.3
4	18°08.7	200°45.8	02.9	306°25.3	54.1	303°28.9	59.6	28° 12.1	38.7	Aug 07 Wed	SHA	Mer.pass
5	33°11.1	235°45.4	01.8	321°26.0	54.3	318° 30.9	59.6	43° 14.7	38.8	Venus		13:16
6	48°13.6	250°45.0	N11°00.6	336°26.7	N21°54.5	333°32.9	N21°59.7	58° 17.3	S06°38.9	Mars	289°48.4	07:36
7	63°16.1	265°44.5	10°59.5	351°27.4	54.8	348° 34.9	59.7	73° 19.9	38.9	Jupiter	285°43.4	07:52
8	78°18.5	280°44.1	58.3	6°28.1	55.0	3°37.0	59.8	88° 22.5	39.0	Saturn	9°56.6	02:16
9	93°21.0	295°43.7	57.2	21°28.8	• • 55.3	18°39.0	• • 59.8	103°25.1	39.1			
10	108°23.5	310°43.2	56.0	36°29.5	55.5	33°41.0	59.9	118° 27.7	39.1	Aug 08 Thu	SHA	Mer.pass
11	123°25.9	325°42.8	54.9	51°30.2	55.8	48°43.0	59.9	133°30.3	39.2	Venus	203°58.6	13:17
12	138°28.4	340°42.3	N10°53.7	66°30.9	N21°56.0	63°45.1	N21°59.9	148°32.9		Mars	289°06.0	07:35
13	153°30.8	355°41.9	52.6	81°31.6	56.2	78°47.1	22°00.0	163°35.5	39.3	Jupiter	285°32.6	07:49
14	168°33.3	10°41.5	51.5	96°32.3	56.5	93°49.1	00.0	178°38.1	39.4	Saturn	9°59.7	02:12
15	183°35.8	25°41.0	50.3	111°33.0	56.7	108°51.1	00.1	193°40.7	39.5	Aug 09 Fri	SHA	Mer.pass
16	198°38.2	40°40.6	49.2	126°33.7	57.0	123°53.2	00.1	208° 43.3	39.5	Venus		13:17
17	213°40.7	55°40.2	48.0	141°34.4	57.2	138°55.2	00.1	223°45.9	39.6	Mars	288°23.6	07:34
18	228°43.2	70°39.7	N10°46.9	156°35.1	N21°57.4		N22°00.2	238° 48.5	S06°39.7	Jupiter	285°22.0	07:46
19	243°45.6	85°39.3	45.7	171°35.8	57.7	168°59.2	00.2	253°51.1	39.7	Saturn	10°02.9	02:08
20	258°48.1	100°38.9	44.6	186°36.5	57.9	184°01.3	00.3	268°53.7	39.8			
21	273°50.6	115°38.5	• • 43.4	201°37.2	• • 58.1	199°03.3	• • 00.3	283°56.3	• • 39.8	Horizont	al parallax	
22	288°53.0	130°38.0	42.3	$216^{\circ}37.9$	58.4	214°05.3	00.4	298°58.9	39.9		Venus:	0.1
23	303°55.5	145°37.6	41.1	231°38.6	58.6	229°07.3	00.4	314°01.5	40.0		Mars:	0.1
Mers	ass. 02:48	ν-0 Λ' A 1	1.1′ m-3.86	νη 7/ ΑΩ	.2′ m0.83	1/2 N/ An	.0′ m-2.15	1/2 6/ 40	.1′ m0.71			
- wier.p	uss. U2.40	ν-0.4 U-1	111-3.00	νυ.τ d0		ν2.0 a0.		ν Δ.Ο UU	.1110.71			

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°33.1	N16°20.2	150°28.4	16.6'	N08°28.1	-13.8'	54.3'
1 2	193°33.1 208°33.2	19.5 18.8	165°04.0 179°39.6	16.6' 16.6'	08°14.4 08°00.6	-13.8' -13.8'	54.3' 54.3'
3	223°33.3	18.1	194°15.3	16.7'	07°46.7	-13.8'	54.3'
4	238° 33.4	17.4	208°50.9	16.7'	07°32.9	-13.9'	54.3'
5 6	253°33.5 268°33.5	16.7 N16°16.0	223°26.7 238°02.4	16.8' 16.8'	07°19.0 N07°05.1	-13.9' -13.9'	54.3' 54.2'
7	283°33.6	15.3	252°38.3	16.8	06°51.2	-13.9' -13.9'	54.2'
8	298°33.7	14.6	267°14.1	16.9'	06°37.3	-13.9'	54.2'
9	313°33.8	· · 13.9	281°50.0	16.9'	06°23.4	-14.0'	54.2'
10 11	328°33.8 343°33.9	13.2 12.5	296°25.9 311°01.8	16.9' 17.0'	06°09.4 05°55.4	-14.0' -14.0'	54.2' 54.2'
12	358° 34.0	N16°11.8	325°37.8	17.0'	N05°41.4	-14.0'	54.2'
13	13°34.1	11.1	340°13.8	17.0'	05°27.4	-14.0'	54.2'
14 15	28°34.2 43°34.2	10.4 •• 09.7	354°49.9 9°26.0	17.1' 17.1'	05°13.4 04°59.3	-14.0' -14.1'	54.2' 54.2'
16	58° 34.3	09.7	9 20.0 24°02.1	17.1'	04 59.3 04°45.3	-14.1'	54.2'
17	73°34.4	08.2	38°38.2	17.2'	04°31.2	-14.1'	54.2'
18	88°34.5 103°34.6	N16°07.5	53°14.3	17.2'	N04°17.2 04°03.1	-14.1'	54.1'
19 20	103°34.6 118°34.7	06.8 06.1	67°50.5 82°26.7	17.2' 17.2'	04°03.1 03°49.0	-14.1' -14.1'	54.1' 54.1'
21	133°34.7	• • 05.4	97°03.0	17.3'	03°34.9	-14.1'	54.1'
22	148° 34.8	04.7	111°39.2	17.3'	03°20.8	-14.1'	54.1'
23	163°34.9	04.0	126°15.5	17.3'	03°06.6	-14.1'	54.1'
	SD = 15.8'	d = -0.7'		SI	D = 14.8'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°35.0	$N16^{\circ}03.3$	$140^{\circ}51.8$	17.3'	$N02^{\circ}52.5$	-14.1'	54.1'
1	193°35.1 208°35.1	02.6 01.8	155°28.1 170°04.4	17.3'	02°38.4 02°24.3	-14.1' -14.1'	54.1' 54.1'
2	208 35.1 223°35.2	01.8	170 04.4 184°40.7	17.3' 17.4'	02 24.3 02°10.1	-14.1 -14.1'	54.1'
4	238°35.3	16°00.4	199°17.1	17.4'	01°56.0	-14.1'	54.1'
5	253°35.4	15°59.7	213°53.5	17.4	01°41.8	-14.2'	54.1'
6 7	268° 35.5 283° 35.6	N15°59.0 58.3	228°29.9 243°06.3	17.4' 17.4'	N01°27.7 01°13.5	-14.2' -14.2'	54.1' 54.1'
8	298°35.7	57.5	257°42.7	17.4	00°59.4	-14.2'	54.1'
9	313°35.7	• • 56.8	272°19.1	17.4'	00°45.2	-14.2'	54.1'
10 11	328° 35.8 343° 35.9	56.1 55.4	286°55.5 301°32.0	17.4' 17.4'	00°31.0 00°16.9	-14.2' -14.2'	54.1' 54.1'
12	358° 36.0	N15°54.7	316°08.4	17.4	N00°02.7	-14.1	54.1
13	13°36.1	54.0	330°44.9	17.5'	S00°11.4	14.1'	54.0'
14	28° 36.2 43° 36.3	53.2 •• 52.5	345°21.3 359°57.8	17.5'	00°25.5 00°39.7	14.1' 14.1'	54.0' 54.0'
15 16	43 36.3 58°36.3	51.8	359 57.8 14°34.2	17.5' 17.5'	00°53.8	14.1	54.0'
17	73°36.4	51.1	29°10.7	17.5'	$01^{\circ}08.0$	14.1'	54.0'
18	88°36.5	N15°50.4	43°47.1	17.5'	S01°22.1 01°36.2	14.1'	54.0'
19 20	103°36.6 118°36.7	49.6 48.9	58°23.6 73°00.1	17.5' 17.5'	01° 36.2 01° 50.3	14.1' 14.1'	54.0' 54.0'
21	133° 36.8	• • 48.2	87°36.5	17.4	02°04.4	14.1'	54.0'
22	148°36.9	47.5	102°13.0	17.4'	02°18.5	14.1'	54.0'
23	163°37.0	46.7	116°49.4	17.4'	02°32.6	14.1'	54.0'
	SD = 15.8'	d = -0.7'		Si	D = 14.8'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°37.0 193°37.1	N15°46.0 45.3	131°25.8 146°02.3	17.4' 17.4'	\$02°46.7 03°00.7	14.1' 14.1'	54.0' 54.0'
2	193 37.1 208° 37.2	45.3 44.6	146 02.3 160°38.7	17.4 17.4'	03 00.7 03°14.8	14.1 14.0'	54.0'
3	223°37.3	• • 43.8	175°15.1	17.4'	03°28.8	14.0'	54.0'
4	238° 37.4	43.1 42.4	189°51.5	17.4'	03°42.9	14.0'	54.0'
5 6	253°37.5 268°37.6	42.4 N15°41.7	204°27.9 219°04.3	17.4' 17.4'	03°56.9 \$04°10.9	14.0' 14.0'	54.0' 54.0'
7	283°37.7	40.9	233°40.6	17.3'	04°24.9	14.0'	54.0'
8	298°37.8	40.2	248°17.0	17.3'	04°38.8	14.0'	54.0'
9 10	313°37.9 328°38.0	· · 39.5 38.8	262°53.3 277°29.6	17.3' 17.3'	04°52.8 05°06.7	13.9' 13.9'	54.0' 54.0'
11	343°38.0	38.0	292°05.9	17.3	05°20.6	13.9	54.0'
12	358°38.1	N15°37.3	306°42.2	17.3'	S05°34.5	13.9'	54.0'
13 14	13°38.2 28°38.3	36.6 35.8	321°18.4 335°54.7	17.2' 17.2'	05°48.4 06°02.3	13.9' 13.8'	54.0' 54.0'
15	43°38.4	35.1	350°30.9	17.2'	06°16.1	13.8'	54.1
16	58° 38.5	34.4	5°07.0	17.2'	06°30.0	13.8'	54.1'
17 18	73°38.6 88°38.7	33.7 N15°32.9	19°43.2 34°19.3	17.1' 17.1'	06°43.8 \$06°57.5	13.8' 13.8'	54.1' 54.1'
18 19	88° 38.7 103° 38.8	N15°32.9 32.2	34°19.3 48°55.4	17.1' 17.1'	506°57.5 07°11.3	13.8'	54.1' 54.1'
20	118°38.9	31.5	63°31.5	17.0'	07°25.0	13.7'	54.1'
21	133°39.0	• • 30.7	78°07.5	17.0'	07°38.7	13.7'	54.1'
22 23	148°39.1 163°39.2	30.0 29.3	92°43.6 107°19.5	17.0' 16.9'	07°52.4 08°06.1	13.7' 13.6'	54.1' 54.1'
	SD = 15.8'	d = -0.7'			D = 14.7'	_0.0	

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

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

August 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	318° 58.0	160°37.2	N10°40.0	246°39.3	N21°58.9	244°09.4	N22°00.4	329°04.1	S06°40.0			
1	334°00.4	175°36.7	38.8	261°40.0	59.1	259°11.4	00.5	344°06.7	40.1	Alpheratz	357°34.9	29°13.5
2		175 30.7 190°36.3		276°40.7	59.1	274°13.4	00.5	359°09.3		Ankaa	353°07.2	-42°10.1
	349°02.9		37.6	270 40.7 291°41.4					40.2	Schedar	$349^{\circ}31.1$	56°40.2
3	4°05.3	205°35.9	• • 36.5		•• 59.6	289°15.5	00.6	14°11.9	• • 40.2	Diphda	348°47.4	-17°50.9
4	19°07.8	220°35.4	35.3	306°42.1	21°59.8	304°17.5	00.6	29° 14.5	40.3	Achernar	335°20.2	-57°06.4
5	34° 10.3	235°35.0	34.2	321°42.8	22°00.0	319°19.5	00.7	44° 17.1	40.4	Hamal	$327^{\circ}51.5$	23°34.7
6	49° 12.7	250°34.6	N10°33.0	336°43.5	N22°00.3	334°21.5	N22°00.7	59° 19.7	S06°40.4	Polaris	314°12.0	89°21.7
7	64° 15.2	265°34.2	31.9	351°44.2	00.5	349°23.6	00.7	74°22.3	40.5	Acamar	315°12.0	-40°12.0
8	79° 17.7	280°33.7	30.7	6°44.9	00.7	4°25.6	8.00	89°24.9	40.6	Menkar	314°06.5	4°11.3
9	94°20.1	295°33.3	• • 29.6	21°45.6	• • 01.0	19°27.6	• • 00.8	104° 27.5	• • 40.6	Mirfak	308°28.8	49°56.7
10	109° 22.6	310°32.9	28.4	36°46.3	01.2	34°29.7	00.9	119°30.1	40.7	Aldebaran	290°40.1	16°33.6
11	124° 25.1	325°32.5	27.2	51°47.0	01.4	49°31.7	00.9	134° 32.7	40.8	Rigel	281°04.4	-8°10.2
12	139°27.5	340°32.0	$N10^{\circ}26.1$	66°47.8	N22°01.7	64°33.7	N22°00.9	149°35.3	S06°40.8	Capella	280°22.6	46°01.2
13	154°30.0	355°31.6	24.9	81°48.5	01.9	79°35.7	01.0	164°37.9	40.9	Bellatrix	278°23.4	6°22.4
14	169°32.5	10°31.2	23.8	96°49.2	02.1	94°37.8	01.0	179°40.5	41.0	Elnath	278°02.5	28°37.7
15	184°34.9	25°30.8	• • 22.6	111°49.9	• • 02.4	109°39.8	•• 01.1	194°43.1	• • 41.0	Alnilam	275°38.3	-1°11.0
16	199°37.4	40°30.3	21.5	126°50.6	02.6	124°41.8	01.1	209°45.7	41.1	1	270°52.7	7°24.8
17	214°39.8	55°29.9	20.3	141°51.3	02.8	139°43.9	01.1	224°48.4	41.2	Betelgeuse		-52°42.2
18	229°42.3	70°29.5	N10°19.1	156°52.0	N22°03.1	154°45.9	N22°01.2	239°51.0	S06°41.2	Canopus	263°53.0	-52 42.2 -16°44.8
19	244°44.8	85°29.1	18.0	171°52.7	03.3	169°47.9	01.2	254°53.6	41.3	Sirius	258°26.8	
20	259°47.2	100°28.6	16.8	186°53.4	03.5	184°50.0	01.3	269°56.2	41.4	Adhara	255°06.5	-29°00.1
21	274°49.7	115°28.2	• • 15.6	201°54.1	• • 03.7	199°52.0	• • 01.3	284°58.8	• • 41.4	Procyon	244°51.5	5°09.8
22	289°52.2	130°27.8	14.5	216°54.8	04.0	214°54.0	01.4	300°01.4	41.5	Pollux	243°18.1	27°58.1
23	304°54.6	145°27.4	13.3	231°55.5	04.2	229°56.1	01.4	315°04.0	41.6	Avior	234°15.5	-59°35.1
										Suhail	222°47.0	-43°31.8
Mer.p	ass. 02:44	$\nu$ -0.4′ $d$ -1	2′ m-3.86	u0.7′ d0	.2′ m0.82	$\nu$ 2.0′ d0.	0′ m-2.15	$\nu$ 2.6′ d0	.1' m $0.71$	Miaplacidus	221°39.3	-69°49.0
										Alphard	217°48.4	-8°45.8
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.1	11°51.0
0	319°57.1	160°27.0	N10°12.2	246°56.2	N22°04.4	244°58.1	N22°01.4	330°06.6	S06°41.6	Dubhe	193°42.0	61°37.3
1	334° 59.6	175°26.5	11.0	261°56.9	04.7	260°00.1	01.5	345°09.2	41.7	Denebola	182°25.5	14°26.2
	350°02.0	175°20.5		201 50.9 276°57.6		275°02.1				Gienah	175°44.2	-17°40.7
2			09.8		04.9		01.5	0°11.8	41.8	Acrux	173°01.0	-63°14.3
3	5°04.5	205°25.7	• • 08.7	291°58.3	• • 05.1	290°04.2	• • 01.6	15° 14.4	• • 41.8	Gacrux	171°52.4	-57°15.2
4	20°06.9	220°25.3	07.5	306°59.0	05.3	305°06.2	01.6	30° 17.0	41.9	Alioth	$166^{\circ}13.5$	55°49.9
5	35°09.4	235°24.9	06.3	321°59.8	05.6	320°08.2	01.6	45° 19.6	42.0	Spica	158°22.8	-11°17.3
6	50°11.9	250°24.4	N10°05.2	337°00.5	N22°05.8	335°10.3	N22°01.7	60°22.2	S06°42.0	Alkaid	152°52.4	49°11.7
7	65° 14.3	265°24.0	04.0	352°01.2	06.0	350°12.3	01.7	75°24.8	42.1	Hadar	148°36.7	-60°29.7
8	80° 16.8	280°23.6	02.8	7°01.9	06.3	5°14.3	01.8	90°27.4	42.2	Menkent	147°58.1	-36°29.6
9	95° 19.3	295°23.2	• • 01.7	22°02.6	• • 06.5	20°16.4	• • 01.8	105° 30.0	• • 42.2	Arcturus	145°48.3	19°03.4
10	$110^{\circ}21.7$	310°22.8	10°00.5	37°03.3	06.7	35°18.4	01.8	120°32.6	42.3	Rigil Kent.	139°40.9	-60°56.4
11	125° 24.2	325°22.4	09°59.3	52°04.0	06.9	50°20.4	01.9	135° 35.2	42.4	Kochab	137°19.8	74°03.5
12	140°26.7	340°21.9	N09°58.2	67°04.7	N22°07.2	65°22.5	N22°01.9	150°37.8	S06°42.4	Zuben'ubi	136°56.4	-16°08.6
13	155°29.1	355°21.5	57.0	82°05.4	07.4	80°24.5	02.0	165°40.4	42.5	Alphecca	126°04.0	26°38.1
14	170°31.6	10°21.1	55.8	97°06.1	07.6	95°26.6	02.0	180°43.0	42.6	Antares	112°16.1	-26°29.2
15	185°34.1	25°20.7	• • 54.6	112°06.8	• • 07.8	110°28.6	• • 02.0	195°45.6	• • 42.6	Atria	107°10.4	-69°04.5
16	200°36.5	40°20.3	53.5	127°07.5	08.1	125°30.6	02.1	210°48.2	42.7	Sabik	102°03.0	-15°45.3
17	215°39.0	55°19.9	52.3	142°08.2	08.3	140°32.7	02.1	225°50.8	42.8	Shaula	96°10.6	-37°07.4
18	230°41.4	70°19.5	N09°51.1	157°08.9	N22°08.5	155°34.7	N22°02.2	240°53.4	S06°42.8	Rasalhague	95°58.7	12°32.6
19	245°43.9	85°19.0	50.0	172°09.7	08.7	170°36.7	02.2	$255^{\circ}56.1$	42.9	_	90°42.0	51°29.3
20	260°46.4	100°18.6	48.8	$187^{\circ}10.4$	08.9	185°38.8	02.2	270°58.7	43.0	Eltanin Kaus Aust.	83°32.7	-34°22.4
21	275°48.8	115°18.2	• • 47.6	202°11.1	• • 09.2	200°40.8	• • 02.3	286°01.3	• • 43.0			-34 22.4 38°48.5
22	290°51.3	130°17.8	46.4	$217^{\circ}11.8$	09.4	215°42.8	02.3	301°03.9	43.1	Vega	80°33.1	
23	305°53.8	145°17.4	45.3	232°12.5	09.6	230°44.9	02.4	316°06.5	43.2	Nunki	75°47.9	-26°16.0
										Altair	62°00.0	8°56.1
Mer.p	ass. 02:40	$\nu$ -0.4′ d-1	2′ m-3.86	$\nu$ 0.7′ d0	.2′ m0.82	$\nu$ 2.0′ d0.	0′ m-2.15	$\nu$ 2.6′ d0	.1' m $0.70$	Peacock	53°05.7	-56°39.4
										Deneb	49°25.6	45°22.1
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.8	9°59.3
0	320° 56.2	160°17.0	N09°44.1	247°13.2	N22°09.8	245°46.9	N22°02.4	331°09.1		Al Na'ir	27°32.9	-46°50.4
1	335° 58.7	175°16.6	42.9	262°13.9	10.0	260°49.0	02.4	346°11.7	43.3	Fomalhaut	15°14.5	-29°29.4
2	351°01.2	190°16.2	41.7	202 13.9 277°14.6	10.3	275°51.0	02.4	1°14.3	43.4	Scheat	13°45.2	28°13.0
3	6°03.6	205°15.8	• • 40.6	277 14.0 292°15.3	10.5	275 51.0 290°53.0	02.5	1 14.3 16°16.9	• 43.4	Markab	13°29.9	15°20.3
4	21°06.1	200° 15.8	39.4	307°16.0	10.5	305°55.1	02.5	31° 19.5	43.4	Aug 10 Sat	SHA	Mer.pass
5	36°08.6	235°14.9	38.2	307 10.0 322°16.7	10.7	320°57.1	02.6	46°22.1	43.6	_	201°39.2	13:18
6	50 08.6 51°11.0	250°14.5	38.2 N09°37.0	322 16.7 337°17.5	N22°11.1		N22°02.6		506°43.7	Mars		07:33
										Jupiter		07:33
7	66° 13.5	265°14.1	35.9	352°18.2	11.4	351°01.2	02.7	76°27.3	43.7	Saturn	285 11.4 10°06.2	07:42
8	81°15.9	280°13.7	34.7	7°18.9	11.6	6°03.2	02.7	91°29.9	43.8	Saturn	10 00.2	02:03
9	96° 18.4	295°13.3	• • 33.5	22°19.6	11.8	21°05.3	• • 02.8	106° 32.5	• • 43.9	Aug 11 Sun	SHA	Mer.pass
10	111°20.9	310°12.9	32.3	37°20.3	12.0	36°07.3	02.8	121°35.1	43.9	_	200°29.9	13:19
11	126°23.3	325°12.5	31.1	52°21.0	12.2	51°09.3	02.8	136° 37.7	44.0	Mars		07:32
12	141°25.8	340°12.1	N09°30.0	67°21.7	N22°12.5	66°11.4	N22°02.9	151°40.4	S06°44.1	Jupiter		07:39
13	156°28.3	355°11.7	28.8	82°22.4	12.7	81°13.4	02.9	166°43.0	44.1	Saturn	10°09.5	01:59
14	171°30.7	10°11.3	27.6	97°23.1	12.9	96°15.5	03.0	181°45.6	44.2			
15	186°33.2	25°10.9	• • 26.4	112°23.9	• • 13.1	111°17.5	• • 03.0	196°48.2	• • 44.3	Aug 12 Mon	SHA	Mer.pass
16	201°35.7	40°10.5	25.2	127°24.6	13.3	126°19.5	03.0	211°50.8	44.3		199°20.8	13:19
17	216°38.1	55°10.0	24.1	142°25.3	13.5	141°21.6	03.1	226°53.4	44.4		286°17.0	07:31
18	231°40.6	70°09.6	N09°22.9	157°26.0	N22°13.7	156°23.6	N22°03.1		S06°44.5		284°50.7	07:36
19	246°43.0	85°09.2	21.7	172°26.7	14.0	171°25.7	03.2	256° 58.6	44.5	Saturn	10°12.8	01:55
20	261°45.5	100°08.8	20.5	187°27.4	14.2	186°27.7	03.2	272°01.2	44.6		-1 P	
21	276°48.0	115°08.4	· · 19.3	202°28.1	• • 14.4	201°29.7	• • 03.2	287°03.8	• • 44.7	Horizont	al parallax	2.1
22	291°50.4	130°08.0	18.1	217°28.8	14.6	216°31.8	03.3	302°06.4	44.7		Venus:	0.1
23	306°52.9	145°07.6	17.0	232°29.5	14.8	231°33.8	03.3	317°09.0	44.8		Mars:	0.1
1/102 -	ass. 02:36	1/_O A/ A 1	2′ m-3.86	7/ 7/ 40	.2′ m0.81	1/2 D/ 40	0′ m-2.16	1/2 6/ do	.1′ m0.70			
ivier.p	-u33. U∠.3U	ν-0.4 u-1	111-3.00	νυ.ι αυ	1110.01	ν Δ.Ο	0 111-2.10	ν2.0 u0				

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°39.3	N15° 28.5	121°55.5	16.9'	508°19.7	13.6'	54.1'
1	193°39.4	27.8	136°31.4	16.9'	08°33.3	13.6'	54.1'
2	208°39.4	27.1	151°07.3	16.8'	08°46.9	13.5'	54.1'
3	223°39.5	• • 26.3	165°43.1	16.8'	09°00.4	13.5'	54.1'
4	238°39.6 253°39.7	25.6 24.9	180°18.9 194°54.7	16.8'	09°13.9 09°27.4	13.5'	54.1'
5 6	253 39.7 268°39.8	24.9 N15°24.1	209°30.4	16.7' 16.7'	509°40.9	13.5' 13.4'	54.1' 54.1'
7	283°39.9	23.4	224°06.1	16.6'	09°54.3	13.4	54.1'
8	298°40.0	22.6	238°41.7	16.6'	10°07.7	13.4'	54.1'
9	313°40.1	• • 21.9	253°17.3	16.6'	10°21.0	13.3'	54.2'
10	328°40.2	21.2	267°52.9	16.5'	10°34.4	13.3'	54.2'
11	343°40.3	20.4	282°28.4	16.5'	10°47.7	13.3'	54.2'
12	358°40.4	N15° 19.7	297°03.8	16.4	\$11°00.9	13.2'	54.2'
13 14	13°40.5 28°40.6	18.9 18.2	311°39.2 326°14.6	16.4' 16.3'	11°14.1 11°27.3	13.2' 13.1'	54.2' 54.2'
15	43°40.7	17.5	340°49.9	16.3	11°40.5	13.1	54.2'
16	58°40.8	16.7	355°25.2	16.2'	11°53.6	13.1'	54.2'
17	73°40.9	16.0	10°00.4	16.2'	12°06.6	13.0'	54.2'
18	88°41.0	N15° 15.2	24°35.5	16.1'	<b>S</b> 12°19.7	13.0'	54.2'
19	103°41.1	14.5	39°10.6	16.0'	12°32.6	12.9'	54.3'
20	118°41.2	13.8	53°45.7	16.0'	12°45.6	12.9'	54.3'
21 22	133°41.3 148°41.4	· · 13.0 12.3	68°20.7 82°55.6	15.9' 15.9'	12°58.5 13°11.3	12.9' 12.8'	54.3' 54.3'
22	148°41.4 163°41.5	12.3 11.5	82°55.6 97°30.5	15.9' 15.8'	13°11.3 13°24.2	12.8'	54.3' 54.3'
23					-	14.0	J T.J
	SD = 15.8'	d = -0.7'		SL	0 = 14.8'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0 1	178°41.6 193°41.7	N15° 10.8 10.0	112°05.3 126°40.0	15.8' 15.7'	\$13°36.9 13°49.6	12.7' 12.7'	54.3' 54.3'
2	193 41.7 208°41.8	09.3	120 40.0 141°14.7	15.7 15.6'	13 49.6 14°02.3	12.7	54.3'
3	223°41.9	08.6	155°49.3	15.6'	14°15.0	12.6'	54.4'
4	238°42.0	07.8	170°23.9	15.5'	14°27.5	12.5'	54.4'
5	253°42.1	07.1	184°58.4	15.4'	14°40.1	12.5'	54.4'
6	268°42.2	N15°06.3	199°32.8	15.4'	\$14°52.5	12.4'	54.4'
7	283°42.3	05.6	214°07.2 228°41.5	15.3'	15°05.0 15°17.4	12.4'	54.4'
8 9	298°42.4 313°42.5	04.8 •• 04.1	228°41.5 243°15.7	15.2' 15.2'	15°17.4 15°29.7	12.3' 12.3'	54.4' 54.4'
10	328°42.6	03.3	257°49.9	15.1'	15°42.0	12.2'	54.5'
11	343°42.7	02.6	272°24.0	15.0'	15°54.2	12.2'	54.5'
12	358°42.9	N15°01.8	286°58.0	14.9'	S16°06.3	12.1'	54.5'
13	13°43.0	01.1	301°31.9	14.9'	16°18.4	12.1'	54.5'
14	28°43.1	15°00.3	316°05.8	14.8'	16°30.5	12.0'	54.5'
15 16	43°43.2 58°43.3	14° 59.6 58.8	330°39.5 345°13.3	14.7' 14.6'	16°42.5 16°54.4	11.9' 11.9'	54.5' 54.5'
17	73°43.4	58.1	359°46.9	14.6'	10 54.4 17°06.3	11.8'	54.6'
18	88°43.5	N14° 57.3	14°20.4	14.5'	\$17°18.1	11.8'	54.6'
19	103°43.6	56.6	28°53.9	14.4'	17°29.9	11.7'	54.6'
20	118°43.7	55.8	43°27.3	14.3'	$17^{\circ}41.5$	11.6'	54.6'
21	133°43.8	•• 55.1	58°00.6	14.2'	17°53.2	11.6'	54.6'
22	148°43.9 163°44.0	54.3 53.6	72°33.8 87°07.0	14.1'	18°04.7 18°16.2	11.5'	54.7'
23		d = -0.7'	87 07.0	14.1'		11.4'	54.7'
	SD = 15.8'	a = -0.7		SL	0 = 14.8'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°44.1	N14° 52.8	101°40.1	14.0'	\$18°27.6	11.4'	54.7'
1 2	193°44.2 208°44.3	52.0 51.3	116°13.0 130°45.9	13.9' 13.8'	18°39.0 18°50.3	11.3' 11.2'	54.7' 54.7'
3	208°44.3 223°44.4	51.3 •• 50.5	130°45.9 145°18.7	13.8	18°50.3 19°01.5	11.2 11.1'	54.7 54.8'
4	238°44.6	49.8	159°51.4	13.6'	19°12.7	11.1	54.8
5	253°44.7	49.0	174°24.1	13.5'	19°23.7	11.0'	54.8'
6	268°44.8	N14°48.3	188°56.6	13.4'	\$19°34.7	10.9'	54.8'
7	283°44.9	47.5	203°29.0	13.4'	19°45.7	10.9'	54.8'
8	298°45.0	46.8	218°01.4	13.3'	19°56.5	10.8'	54.9'
9 10	313°45.1 328°45.2	· · 46.0 45.2	232°33.6 247°05.8	13.2' 13.1'	20°07.3 20°18.0	10.7' 10.6'	54.9' 54.9'
11	328 45.2 343°45.3	45.2 44.5	247 05.8 261°37.9	13.1	20 18.0 20°28.6	10.6	54.9'
12	358°45.4	N14°43.7	276°09.9	12.9'	S20°39.2	10.5	54.9'
13	13°45.5	43.0	290°41.8	12.8'	20°49.6	10.4'	55.0'
14	28°45.6	42.2	305°13.5	12.7'	21°00.0	10.3'	55.0'
15	43°45.8	• • 41.4	319°45.2	12.6'	21°10.3	10.2	55.0'
16 17	58°45.9 73°46.0	40.7 39.9	334°16.8 348°48.3	12.5' 12.4'	21°20.5 21°30.6	10.1' 10.0'	55.0' 55.1'
18	73°46.0 88°46.1	39.9 N14°39.2	348 48.3 3°19.7	12.4	\$21°40.7	10.0'	55.1'
19	103°46.2	38.4	17°51.0	12.2'	21°50.6	9.9'	55.1
20	118°46.3	37.6	32°22.2	12.1'	22°00.5	9.8'	55.1'
21	133°46.4	• • 36.9	46°53.3	12.0'	22°10.3	9.7'	55.2'
22 23	148°46.5 163°46.7	36.1	61°24.3 75°55.2	11.9' 11.8'	22°19.9 22°29.5	9.6'	55.2'
23		35.3	15 55.2			9.5'	55.2'
	SD = 15.8'	d = -0.8'		SL	0 = 14.9'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	////	////	01:58	22:06	////	////
$N 70^{\circ}$	////	////	02:37	21:28	////	////
68°	////	01:10	03:04	21:03	22:50	////
66°	////	02:01	03:25	20:43	22:04	////
64°	////	02:32	03:41	20:27	21:35	////
62°	01:03	02:54	03:54	20:14	21:13	22:59
$60^{\circ}$	01:49	03:12	04:06	20:03	20:56	22:17
N 58°	02:17	03:27	04:15	19:53	20:41	21:50
56°	02:38	03:39	04:24	19:45	20:29	21:30
54°	02:55	03:50	04:31	19:38	20:19	21:13
52°	03:09	03:59	04:38	19:31	20:10	21:00
50°	03:21	04:08	04:44	19:25	20:01	20:48
45°	03:45	04:25	04:57	19:12	19:44	20:24
<b>N</b> 40°	04:03	04:39	05:08	19:01	19:31	20:06
35°	04:18	04:50	05:17	18:52	19:19	19:52
$30^{\circ}$	04:30	05:00	05:25	18:45	19:10	19:40
$20^{\circ}$	04:49	05:16	05:39	18:31	18:54	19:21
N $10^{\circ}$	05:03	05:29	05:51	18:19	18:41	19:07
0°	05:15	05:40	06:02	18:09	18:30	18:55
<b>S</b> 10°	05:26	05:51	06:13	17:58	18:19	18:45
$20^{\circ}$	05:35	06:01	06:24	17:46	18:09	18:35
30°	05:44	06:12	06:37	17:34	17:58	18:27
$35^{\circ}$	05:48	06:18	06:44	17:26	17:52	18:22
40°	05:53	06:25	06:53	17:18	17:46	18:18
45°	05:57	06:32	07:03	17:08	17:39	18:14
<b>S</b> $50^{\circ}$	06:02	06:40	07:15	16:56	17:31	18:09
52°	06:04	06:44	07:20	16:51	17:27	18:07
54°	06:06	06:48	07:26	16:45	17:23	18:05
56°	06:09	06:53	07:33	16:38	17:18	18:03
58°	06:11	06:58	07:40	16:31	17:13	18:00
<b>S</b> 60°	06:14	07:03	07:49	16:22	17:08	17:58
		Moonris	e		Moonset	:
Lat.	C-+	C	N4	C-+	C	

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

		Sun		Moon				
Day	Eqn.of	Time	Mer.	Mer.	Age			
,	00 <sup>h</sup>	<sup>1</sup> 12 <sup>h</sup> Pass		Upper	Lower	6-8		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	26-44%		
10	05:23	05:18	12:05	16:19	03:59			
11	05:14	05:09	12:05	17:01	04:40			
12	05:04	04:58	12:05	17:46	05:23			

August 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	321°55.4	160°07.2	N09°15.8	247°30.3	N22°15.0	246°35.9	N22°03.4	332°11.6	S06°44.9			
1	336°57.8	175°06.8	14.6	262°31.0	15.2	240 33.9 261°37.9	03.4	347° 14.2	44.9	Alpheratz	357°34.9	29°13.6
2	352°00.3	190°06.4	13.4	202 31.0 277°31.7	15.2	201 37.9 276°40.0	03.4	2° 16.9	45.0	Ankaa	353°07.2	-42°10.1
3	7°02.8	205°06.0	12.2	292°32.4	15.7	291°42.0	03.5	17° 19.5	• • 45.1	Schedar	$349^{\circ}31.1$	56°40.2
4	22°05.2	200°05.6	11.0	307°33.1	15.7	306°44.0	03.5	32° 22.1		Diphda	348°47.4	-17°50.9
						306 44.0 321°46.1		32 22.1 47°24.7	45.2	Achernar	$335^{\circ}20.1$	-57°06.4
5	37°07.7	235°05.2	09.8	322°33.8	16.1		03.5		45.2	Hamal	$327^{\circ}51.5$	23°34.7
6	52°10.2	250°04.8	N09°08.7	337°34.5	N22°16.3	336°48.1	N22°03.6	62°27.3	S06°45.3	Polaris	314° 10.3	89°21.8
7	67°12.6	265°04.4	07.5	352°35.2	16.5	351°50.2	03.6	77°29.9	45.4	Acamar	$315^{\circ}12.0$	-40°12.0
8	82°15.1	280°04.0	06.3	7°36.0	16.7	6°52.2	03.7	92°32.5	45.4	Menkar	314°06.5	4°11.3
9	97°17.5	295°03.6	• • 05.1	22°36.7	• • 16.9	21°54.3	• • 03.7	107°35.1	• • 45.5	Mirfak	308°28.8	49°56.7
10	112°20.0	310°03.2	03.9	37°37.4	17.1	36°56.3	03.7	122°37.7	45.6	Aldebaran	290°40.1	16°33.6
11	127°22.5	325°02.8	02.7	52°38.1	17.4	51°58.3	03.8	137°40.3	45.6	Rigel	281°04.3	-8°10.2
12	142°24.9	340°02.4	N09°01.5	67°38.8	N22°17.6	67°00.4	N22°03.8	152° 42.9	S06°45.7	Capella	280°22.6	46°01.2
13	157°27.4	355°02.0	09°00.3	82°39.5	17.8	82°02.4	03.9	167° 45.6	45.8	Bellatrix	278°23.4	6°22.4
14	172°29.9	10°01.6	$08^{\circ}59.1$	97°40.2	18.0	97°04.5	03.9	182°48.2	45.8	Elnath	278°02.5	28°37.7
15	187°32.3	25°01.2	• • 57.9	112°41.0	· · 18.2	112°06.5	• • 03.9	197°50.8	• • 45.9	Alnilam	275°38.2	-1°11.0
16	202°34.8	40°00.8	56.8	127°41.7	18.4	127°08.6	04.0	212°53.4	46.0	Betelgeuse	270°52.7	7°24.8
17	217°37.3	55°00.4	55.6	142°42.4	18.6	142°10.6	04.0	227°56.0	46.0	Canopus	263°52.9	-52°42.2
18	232°39.7	70°00.0	N08°54.4	157°43.1	N22°18.8	157° 12.7	N22°04.0	242°58.6	S06°46.1	Sirius	258° 26.8	-16°44.8
19	247°42.2	84°59.6	53.2	172°43.8	19.0	172°14.7	04.1	258°01.2	46.2	!		-10 44.8 -29°00.1
20	262°44.7	99°59.2	52.0	187°44.5	19.2	187°16.8	04.1	273°03.8	46.3	Adhara	255°06.4	
21	277°47.1	114°58.8	• • 50.8	202°45.2	• • 19.4	202°18.8	• • 04.2	288°06.4	• • 46.3	Procyon	244°51.5	5°09.8
22	292°49.6	129°58.4	49.6	217°46.0	19.6	217° 20.8	04.2	303°09.0	46.4	Pollux	243°18.0	27°58.1
23	307°52.0	144°58.1	48.4	232°46.7	19.8	232°22.9	04.2	318° 11.6	46.5	Avior	234°15.5	-59°35.1
										Suhail	222°47.0	-43°31.8
Mer.p	ass. 02:32	$\nu$ -0.4' d-1	2′ m-3.86	$\nu_{0.7'} d0$	.2′ m0.81	$\nu^{2.0'} d0.$	.0′ m-2.16	$\nu^{2.6'} d0$	.1′ m0.69	Miaplacidus	221°39.3	-69°49.0
										Alphard	217°48.4	-8°45.8
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.1	11°51.0
0 0	322°54.5	159°57.7	N08°47.2	247° 47.4	N22°20.0	247°24.9	N22°04.3	333° 14.3	S06° 46.5	Dubhe	193°42.0	61°37.3
1	337°57.0	174°57.3	46.0	262°48.1	20.3	262°27.0	04.3	348° 16.9	46.6	Denebola	182°25.5	14°26.2
2	352°59.4					202 27.0 277°29.0		3° 19.5			175°44.2	-17°40.7
		189°56.9	44.8	277°48.8	20.5		04.4		46.7 •• 46.7	Acrux	$173^{\circ}01.0$	-63°14.3
3	8°01.9	204°56.5	• • 43.6	292°49.5	· · 20.7	292°31.1	• • 04.4	18°22.1		Gacrux	171°52.5	-57°15.2
4	23°04.4	219°56.1	42.4	307°50.2	20.9	307°33.1	04.4	33°24.7	46.8	Alioth	$166^{\circ}13.6$	55°49.8
5	38°06.8	234°55.7	41.2	322°51.0	21.1	322°35.2	04.5	48°27.3	46.9	Spica	158°22.8	-11°17.3
6	53°09.3	249°55.3	N08°40.0	337°51.7	N22°21.3	337°37.2	N22°04.5	63°29.9	506°46.9	Alkaid	152°52.4	49°11.7
7	68°11.8	264°54.9	38.8	352°52.4	21.5	352°39.3	04.5	78°32.5	47.0	Hadar	148°36.7	-60°29.7
8	83°14.2	279°54.5	37.6	7°53.1	21.7	7°41.3	04.6	93°35.1	47.1	1	147°58.1	-36°29.6
9	98°16.7	294°54.1	• • 36.4	22°53.8	• • 21.9	22°43.4	• • 04.6	108° 37.8	• • 47.1	1	145°48.3	19°03.4
10	113°19.2	309°53.7	35.2	37°54.5	22.1	37°45.4	04.7	123°40.4	47.2	Rigil Kent.		-60°56.4
11	128°21.6	324°53.3	34.0	52°55.3	22.3	52°47.5	04.7	138°43.0	47.3	Kochab	137° 19.9	74°03.5
12	143°24.1	339°53.0	N08°32.8	67°56.0	N22°22.5	67°49.5	N22°04.7	153°45.6	S06°47.4	Zuben'ubi	136°56.4	-16°08.6
13	158°26.5	354°52.6	31.6	82°56.7	22.7	82°51.6	04.8	168°48.2	47.4	Alphecca	126°04.0	26°38.1
14	173°29.0	9°52.2	30.4	97°57.4	22.9	97°53.6	04.8	183°50.8	47.5	Antares	112° 16.1	-26°29.2
15	188°31.5	24°51.8	• • 29.2	112°58.1	• • 23.1	112°55.7	• • 04.8	198°53.4	• • 47.6	Atria	107° 10.4	-69°04.5
16	203°33.9	39°51.4	28.0	127°58.8	23.3	127°57.7	04.9	213°56.0	47.6	Sabik	102°03.0	-15°45.3
17	218°36.4	54°51.0	26.8	142°59.6	23.5	142°59.8	04.9	228°58.6	47.7	Shaula	96° 10.6	-37°07.4
18	233°38.9	69°50.6	N08°25.6	158°00.3	N22°23.7	158°01.8	N22°05.0	244°01.3	S06°47.8	Rasalhague	95°58.7	12°32.6
19	248°41.3	84°50.2	24.4	173°01.0	23.9	173°03.9	05.0	259°03.9	47.8	_		51°29.3
20	263°43.8	99°49.8	23.2	188°01.7	24.1	188°05.9	05.0	274°06.5	47.9	Eltanin	90°42.0 83°32.7	-34°22.4
21	278°46.3	114°49.5	• • 22.0	203°02.4	• • 24.3	203°08.0	• • 05.1	289°09.1	• • 48.0	Kaus Aust.		
22	293°48.7	129°49.1	20.8	218°03.1	24.5	218°10.0	05.1	304°11.7	48.1	Vega	80°33.1	38°48.5
23	308°51.2	144°48.7	19.6	233°03.9	24.7	233°12.1	05.1	319° 14.3	48.1	Nunki	75°47.9	-26°16.0
										Altair	62°00.0	8°56.1
Mer.p	ass. 02:28	$\nu$ -0.4′ $d$ -1	2′ m-3.86	u 0.7' d0	.2′ m0.80	$\nu$ 2.0′ d0.	.0′ m-2.17	$\nu$ 2.6′ d0	$.1^\prime$ m $0.69$	Peacock	53°05.7	-56°39.4
										Deneb	49°25.6	45°22.1
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.8	9°59.3
0	323°53.6	159°48.3	N08°18.4	248°04.6	N22°24.9	248°14.1	N22°05.2	334°16.9	S06°48.2	Al Na'ir	27°32.8	-46°50.4
1	338°56.1	174° 47.9	17.2	263°05.3	25.1	263°16.2	05.2	349° 19.5	48.3	Fomalhaut	15°14.5	-29°29.4
2	353°58.6	189°47.5	16.0	278° 06.0	25.3	278° 18.2	05.2	4° 22.2	48.3	Scheat	13°45.2	28°13.0
3	9°01.0	204°47.1	• • 14.8	293°06.7	25.5	293°20.3	05.3	19° 24.8	• • 48.4	Markab	13°29.9	15°20.3
4	24°03.5	219°46.8	13.6	308° 07.5	25.7	308°22.4	05.3	34° 27.4	48.5	Aug 13 Tue	SHA	Mer.pass
5	39°06.0	234°46.4	12.4	323°08.2	25.7	323°24.4	05.3	49° 30.0	48.5	0	198°11.9	13:20
6	54°08.4	249°46.0	N08°11.2	338° 08.9	N22°26.1	338°26.5	N22°05.4	64° 32.6	506°48.6	Mars		07:30
7	69°10.9	264° 45.6	10.0	353° 09.6	26.3	353° 28.5	05.4	79° 35.2	48.7	Jupiter		07:33
8	84°13.4	204 45.0 279°45.2	08.8	8° 10.3		353 28.5 8°30.6	05.4 05.5	79 35.2 94°37.8	48. <i>1</i> 48.8	Saturn	10° 16.3	01:51
	99°15.8	279°45.2 294°44.8	· · 07.6	8° 10.3 23° 11.1	26.4 •• 26.6		· · 05.5	94°37.8 109°40.4	48.8 •• 48.8	Jaturn	10 10.3	01.31
9						23°32.6		109 40.4 124°43.1		Aug 14 Wed	SHA	Mer.pass
10	114°18.3	309°44.5	06.4	38°11.8	26.8	38°34.7	05.5		48.9		197°03.2	13:21
11	129°20.8	324°44.1 339°43.7	05.1	53°12.5	27.0	53°36.7	05.6	139°45.7	49.0	Mars	284°52.9	07:28
12	144°23.2		N08°03.9	68° 13.2	N22°27.2	68°38.8	N22°05.6		\$06°49.0	Jupiter	284°30.4	07:29
13	159°25.7	354°43.3	02.7	83°13.9	27.4	83°40.8	05.7	169°50.9	49.1	Saturn	10° 19.8	01:47
14	174°28.1	9°42.9	01.5	98°14.7	27.6	98°42.9	05.7	184°53.5	49.2			
15	189°30.6	24°42.5	08°00.3	113° 15.4	• • 27.8	113°45.0	• • 05.7	199°56.1	• • 49.2	Aug 15 Thu	SHA	Mer.pass
16	204°33.1	39°42.2	07°59.1	128° 16.1	28.0	128°47.0	05.8	214°58.7	49.3	!	195°54.6	13:21
17	219°35.5	54°41.8	57.9	143°16.8	28.2	143°49.1	05.8	230°01.4	49.4	Mars		07:27
18	234°38.0	69°41.4	N07°56.7	158° 17.5	N22°28.4	158°51.1	N22°05.8	245°04.0	S06°49.5	Jupiter		07:26
19	249°40.5	84°41.0	55.5	173°18.3	28.6	173°53.2	05.9	260°06.6	49.5	Saturn	10°23.3	01:43
20	264°42.9	99°40.6	54.3	188° 19.0	28.8	188°55.2	05.9	275°09.2	49.6		-1 "	
21	279°45.4	114°40.3	• • 53.0	203° 19.7	• • 29.0	203°57.3	• • 05.9	290°11.8	• • 49.7	Horizont	al parallax	
22	294°47.9	129°39.9	51.8	218° 20.4	29.1	218°59.4	06.0	305° 14.4	49.7		Venus:	0.1
23	309°50.3	144°39.5	50.6	233°21.1	29.3	234°01.4	06.0	320° 17.0	49.8		Mars:	0.1
Mars	ass. 02:24	ν-0 A' A 1	2′ m-3.86	νη 7' dη	.2′ m0.80	1/2 1/ d0	.0′ m-2.17	1/2 6/ d0	.1′ m0.68			
.vici.p	02.27	ν 0.¬ u-1	5.00	- J.1 UU		ν Δ.1 UO.	4.11	- 2.0 UU				

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°46.8	N14°34.6	90°26.0	11.7'	522°39.0	9.4'	55.2'
1	193°46.9	33.8	104°56.7	11.6'	22°48.4	9.3'	55.3'
2	208°47.0	33.1	119°27.2	11.5'	22°57.7	9.2'	55.3'
3	223°47.1	• • 32.3	133°57.7	11.4'	23°06.9	9.1'	55.3'
4	238° 47.2	31.5	148°28.1	11.3'	23°16.0	9.0'	55.3'
5	253° 47.3 268° 47.5	30.8 N14°30.0	162°58.4 177°28.5	11.2'	23°25.0 523°33.9	8.9'	55.4'
6 7	268 47.5 283°47.6	N14 30.0 29.2	177 28.5 191°58.6	11.1' 11.0'	523 33.9 23°42.7	8.8' 8.7'	55.4' 55.4'
8	298° 47.7	28.5	206°28.5	10.8	23°51.4	8.6'	55.5'
9	313°47.8	27.7	220°58.4	10.7	24°00.0	8.5	55.5'
10	328°47.9	26.9	235°28.1	10.6'	24°08.5	8.4'	55.5'
11	343°48.0	26.2	249°57.8	10.5'	24°16.9	8.3'	55.5'
12	358°48.1	N14°25.4	264°27.3	10.4'	S24°25.2	8.2'	55.6'
13	13°48.3	24.6	278°56.7	10.3'	24°33.3	8.0'	55.6'
14	28° 48.4	23.9	293°26.0	10.2'	24°41.4	7.9'	55.6'
15 16	43° 48.5 58° 48.6	· · 23.1 22.3	307°55.2 322°24.3	10.1' 10.0'	24°49.3 24°57.1	7.8' 7.7'	55.7' 55.7'
17	73°48.7	21.5	336°53.3	9.9'	24 37.1 25°04.8	7.6'	55.7'
18	88° 48.8	N14°20.8	351°22.2	9.8'	\$25°12.4	7.5	55.7'
19	103°49.0	20.0	5°51.0	9.7'	25°19.9	7.3'	55.8'
20	118°49.1	19.2	20°19.6	9.6'	25°27.2	7.2'	55.8'
21	133°49.2	• • 18.5	34°48.2	9.5'	25°34.5	7.1'	55.8'
22	148°49.3	17.7	49°16.7	9.3'	25°41.6	7.0'	55.9'
23	163°49.4	16.9	63°45.0	9.2'	25°48.6	6.9'	55.9'
	SD = 15.8'	d = -0.8'		SD	0 = 15.1'		
Wed	GHA	Dec	GHA	ν	Dec	d	НР
0	178°49.6	$N14^{\circ}16.1$	78°13.3	9.1'	\$25°55.4	6.7'	55.9'
1	193°49.7	15.4	92°41.4	9.0'	26°02.1	6.6'	56.0'
2	208°49.8	14.6	107°09.4	8.9'	26°08.7	6.5'	56.0'
3	223°49.9	• • 13.8	121°37.3	8.8'	26°15.2	6.3'	56.0'
4	238° 50.0	13.0	136°05.2 150°32.9	8.7'	26°21.6	6.2'	56.1'
5 6	253° 50.2 268° 50.3	12.3 N14°11.5	150° 32.9 165° 00.5	8.6' 8.5'	26°27.8 <b>S</b> 26°33.8	6.1' 5.9'	56.1' 56.1'
7	283°50.4	10.7	179°28.0	8.4'	26°39.8	5.8'	56.2
8	298° 50.5	09.9	193°55.4	8.3'	26°45.6	5.7'	56.2
9	313°50.6	09.2	208°22.7	8.2'	26°51.3	5.5'	56.2'
10	328°50.8	08.4	222°49.9	8.1'	26°56.8	5.4'	56.3'
11	343°50.9	07.6	237°17.0	8.0'	27°02.2	5.3'	56.3'
12	358°51.0	N14°06.8	251°44.0	7.9'	S27°07.4	5.1'	56.3'
13	13°51.1	06.0	266°10.9	7.8'	27°12.6	5.0'	56.4'
14	28°51.2 43°51.4	05.3	280°37.7 295°04.4	7.7'	27°17.5 27°22.3	4.8'	56.4' 56.4'
15 16	43 51.4 58°51.5	· · 04.5	295 04.4 309°31.0	7.6' 7.5'	27°27.0	4.7' 4.5'	56.5'
17	73°51.6	02.9	323°57.5	7.4'	27°31.5	4.4'	56.5
18	88°51.7	N14°02.2	338°23.9	7.3'	\$27°35.9	4.2'	56.5'
19	103°51.9	01.4	352°50.2	7.2'	27°40.1	4.1'	56.6'
20	118°52.0	14°00.6	7°16.4	7.1'	27°44.2	3.9'	56.6'
21	133°52.1	13°59.8	21°42.6	7.0'	27°48.1	3.8'	56.6'
22	148°52.2	59.0	36°08.6	6.9'	27°51.9	3.6'	56.7'
23	163°52.4	58.2	50°34.6	6.9'	27°55.5	3.5'	56.7'
	SD = 15.8'	d = -0.8'		SD	0 = 15.3'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°52.5	N13°57.5	65°00.4	6.8'	\$27°59.0	3.3'	56.8'
1	193°52.6	56.7	79°26.2	6.7'	28°02.3	3.1'	56.8'
2	208°52.7	55.9 • • 55.1	93°51.9	6.6'	28°05.4	3.0'	56.8'
3 4	223°52.9 238°53.0	· · 55.1 54.3	108°17.5 122°43.0	6.5' 6.4'	28°08.4 28°11.2	2.8' 2.7'	56.9' 56.9'
4 5	258 53.0 253°53.1	54.3 53.5	122 43.0 137°08.4	6.4	28°13.9	2.7	56.9'
6	268° 53.2	N13°52.8	151°33.8	6.3'	\$28°16.4	2.3'	57.0'
7	283°53.4	52.0	165°59.1	6.2'	28°18.7	2.2'	57.0'
8	298°53.5	51.2	180°24.3	6.1'	28°20.9	2.0'	57.0'
9	313°53.6	• • 50.4	194°49.4	6.1'	28°22.9	1.8'	57.1'
10	328°53.7	49.6	209°14.5	6.0'	28°24.7	1.7'	57.1'
11	343°53.9 358°54.0	48.8 N13°48.0	223°39.4 238°04.3	5.9' 5.8'	28°26.4 \$28°27.9	1.5' 1.3'	57.2' 57.2'
12 13	358°54.0 13°54.1	N13°48.0 47.3	238°04.3 252°29.2	5.8'	28°27.9 28°29.2	1.3'	57.2' 57.2'
14	28° 54.3	47.3 46.5	266°54.0	5.6 5.7'	28°30.3	1.0'	57.2 57.3'
15	43°54.4	• • 45.7	281°18.7	5.6'	28°31.3	0.8'	57.3'
16	58° 54.5	44.9	295°43.3	5.6'	28°32.1	0.6'	57.3'
17	73°54.6	44.1	310°07.9	5.5'	28°32.7	0.5'	57.4'
18	88° 54.8	N13°43.3	324°32.4	5.5'	\$28°33.2	0.3'	57.4'
19	103°54.9	42.5	338°56.9	5.4'	28°33.5	0.1'	57.5'
20	118°55.0	41.7	353°21.3	5.4'	28°33.6	-0.1'	57.5'
21 22	133° 55.2 148° 55.3	· · 40.9 40.2	7°45.7 22°10.0	5.3' 5.3'	28°33.5 28°33.3	-0.3' -0.4'	57.5' 57.6'
23	148 55.3 163°55.4	40.2 39.4	22 10.0 36°34.2	5.3 5.2'	28°32.8	-0.4 -0.6'	57.6'
			30 31.2			0.0	27.0
	SD = 15.8'	d = -0.8'		SL	0 = 15.5'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Juillise	Juliset	Civil	Naut
N 72°	////	////	02:21	21:43	////	////
<b>N</b> 70°	////	////	02:54	21:12	23:49	////
68°	////	01:39	03:17	20:49	22:23	////
66°	////	02:18	03:35	20:31	21:47	////
64°	////	02:45	03:50	20:17	21:21	23:51
62°	01:28	03:05	04:02	20:05	21:02	22:35
60°	02:04	03:21	04:13	19:55	20:46	22:02
<b>N</b> 58°	02:28	03:35	04:22	19:46	20:33	21:38
56°	02:47	03:46	04:30	19:38	20:21	21:20
54°	03:02	03:56	04:37	19:31	20:12	21:05
52°	03:16	04:05	04:43	19:25	20:03	20:52
50°	03:27	04:13	04:49	19:19	19:55	20:41
45°	03:49	04:29	05:01	19:07	19:39	20:19
<b>N</b> 40°	04:07	04:42	05:11	18:58	19:27	20:02
35°	04:20	04:53	05:20	18:49	19:16	19:48
30°	04:32	05:02	05:27	18:42	19:07	19:37
20°	04:50	05:17	05:40	18:29	18:52	19:19
N $10^{\circ}$	05:04	05:29	05:51	18:18	18:40	19:05
0°	05:15	05:40	06:01	18:08	18:29	18:54
<b>S</b> 10°	05:25	05:50	06:11	17:58	18:20	18:45
20°	05:33	05:59	06:22	17:47	18:10	18:36
30°	05:41	06:10	06:34	17:35	18:00	18:28
35°	05:45	06:15	06:41	17:28	17:55	18:24
40°	05:49	06:21	06:49	17:21	17:49	18:21
45°	05:53	06:28	06:58	17:12	17:42	18:17
<b>S</b> 50°	05:57	06:35	07:09	17:01	17:35	18:13
52°	05:59	06:39	07:14	16:56	17:31	18:11
54°	06:01	06:43	07:20	16:50	17:27	18:09
56°	06:03	06:47	07:26	16:44	17:23	18:07
58°	06:05	06:51	07:33	16:37	17:19	18:06
<b>S</b> 60°	06:07	06:56	07:41	16:29	17:14	18:04
		Moonris	e		Moonset	:
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
<b>N</b> 70°						
68°						
66°						
64°	17:35			19:26		
62°	16:40	18:58		20:22	19:56	
60°	16:07	17:48	19:10	20:55	21:07	21:45
<b>N</b> 58°	1		18:27	ı		

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

		Sun			Moon			
Day	Eqn.of	Time	Mer.	Mer.	Mer.Pass.			
- 45	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	9-11		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	54-73%		
13	04:53	04:47	12:05	18:36	06:10			
14	04:42	04:36	12:05	19:30	07:02			
15	04:30	04:24	12:04	20:28	07:58			

August 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	324°52.8	159°39.1	N07°49.4	248°21.9	N22°29.5	249°03.5	N22°06.1	335° 19.7	S06°49.9			
1	339°55.3	174°38.7	48.2	263°22.6	29.7	264°05.5	06.1	350°22.3	49.9	Alpheratz	357°34.8	29°13.6
										Ankaa	353°07.1	$-42^{\circ}10.1$
2	354°57.7	189°38.4	47.0	278°23.3	29.9	279°07.6	06.1	5°24.9	50.0	Schedar	349°31.0	56°40.2
3	10°00.2	204°38.0	• • 45.8	293°24.0	• • 30.1	294°09.6	• • 06.2	20°27.5	• • 50.1	Diphda	348°47.4	-17°50.9
4	25°02.6	219°37.6	44.6	308°24.7	30.3	309°11.7	06.2	35°30.1	50.2	Achernar	335°20.1	-57°06.4
5	$40^{\circ}05.1$	234°37.2	43.3	323°25.5	30.5	324°13.8	06.2	50°32.7	50.2	Hamal	327°51.4	23°34.7
6	55°07.6	249°36.9	N07°42.1	338°26.2	N22°30.7	339°15.8	N22°06.3	65°35.3	S06°50.3	1		89°21.8
7	70°10.0	264°36.5	40.9	353°26.9	30.8	354°17.9	06.3	80°38.0	50.4	Polaris	314°08.5	
8	85°12.5	279°36.1	39.7	8°27.6	31.0	9°19.9	06.3	95°40.6	50.4	Acamar	315°11.9	-40°12.0
9	100° 15.0	294°35.7	• • 38.5	23°28.4	• • 31.2	24°22.0	• • 06.4	110°43.2	• • 50.5	Menkar	314°06.4	4°11.3
10	115° 17.4	309°35.4	37.3	38°29.1	31.4	39°24.1	06.4	125°45.8	50.6	Mirfak	308°28.7	49°56.7
11	130°19.9	324°35.0	36.0	53°29.8	31.6	54°26.1	06.4	140°48.4	50.7	Aldebaran	290°40.1	16°33.6
	145° 22.4	339°34.6	N07°34.8	68°30.5	N22°31.8	69°28.2	N22°06.5	155°51.0	50.7 S06°50.7	Rigel	281°04.3	-8°10.2
12										Capella	280°22.6	46°01.2
13	160°24.8	354°34.2	33.6	83°31.3	32.0	84°30.2	06.5	170°53.7	50.8	Bellatrix	278°23.4	6°22.4
14	175°27.3	9°33.9	32.4	98°32.0	32.1	99°32.3	06.6	185°56.3	50.9	Elnath	278°02.5	28°37.7
15	190°29.8	24°33.5	• • 31.2	113°32.7	• • 32.3	114°34.4	• • 06.6	200°58.9	• • 50.9	Alnilam	275°38.2	-1°11.0
16	205°32.2	39°33.1	30.0	128°33.4	32.5	129°36.4	06.6	$216^{\circ}01.5$	51.0	Betelgeuse	270°52.6	7°24.8
17	220°34.7	54°32.7	28.7	143°34.1	32.7	144°38.5	06.7	231°04.1	51.1	Canopus	263°52.9	-52°42.2
18	235°37.1	69°32.4	N07°27.5	158°34.9	N22°32.9	159°40.5	N22°06.7	246°06.7	S06°51.2			
19	250°39.6	84°32.0	26.3	173°35.6	33.1	174°42.6	06.7	261°09.3	51.2	Sirius	258°26.8	-16°44.8
20	265°42.1	99°31.6	25.1	188°36.3	33.3	189°44.7	06.8	276° 12.0	51.3	Adhara	255°06.4	-29°00.1
21	280°44.5	114°31.2	23.9	203°37.0	• • 33.4	204°46.7	06.8	291°14.6	51.4	Procyon	244°51.5	5°09.8
22	295° 47.0	129°30.9	22.6	218°37.8	33.4	219°48.8	06.8	306° 17.2	51.4	Pollux	243°18.0	27°58.1
23	310°49.5	144°30.5	21.4	233°38.5	33.8	219 46.6 234°50.9	06.9	300 17.2 321°19.8	51.4	Avior	234°15.5	-59°35.1
23	310 49.3									Suhail	222°47.0	-43°31.8
Mer.p	pass. 02:20	$\nu$ -0.4' d-1	2′ m-3.86	$ u$ 0.7 $^{\prime}$ d0	.2′ m0.79	$\nu 2.1' \ d0.$	.0′ m-2.18	$\nu$ 2.6′ d0	$.1^\prime$ m0.68	Miaplacidus	221°39.3	-69°49.0
										Alphard	217°48.4	-8°45.8
٠.	CILA	CIIA		CIIA	Б.	CIIA	Б.	CIIA		Regulus	207°35.1	11°51.0
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°42.0	61°37.3
0	325°51.9	159°30.1	N07°20.2	248°39.2	N22°34.0	249°52.9	N22°06.9	336°22.4	S06°51.6	Denebola	182°25.5	14°26.2
1	340°54.4	174°29.8	19.0	263°39.9	34.2	264°55.0	06.9	351°25.0	51.7	Gienah	175°44.2	-17°40.7
2	355° 56.9	189°29.4	17.7	278°40.7	34.3	279°57.0	07.0	6°27.7	51.7	Acrux	173°01.0	-63°14.3
3	10°59.3	204°29.0	• • 16.5	293°41.4	• • 34.5	294°59.1	• • 07.0	21°30.3	• • 51.8		171°52.5	-57°15.2
4	26°01.8	219°28.6	15.3	308°42.1	34.7	310°01.2	07.1	36°32.9	51.9	Alioth	166°13.6	55°49.8
5	41°04.3	234°28.3	14.1	323°42.8	34.9	325°03.2	07.1	51°35.5	51.9	Spica	158°22.8	-11°17.3
6	56°06.7	249°27.9	N07°12.9	338°43.6	N22°35.1	340°05.3	N22°07.1	66°38.1	S06°52.0	Alkaid	152°52.4	49°11.7
7	$71^{\circ}09.2$	264°27.5	11.6	353°44.3	35.3	355°07.4	07.2	81°40.7	52.1	Hadar	148°36.7	-60°29.7
8	$86^{\circ}11.6$	279°27.2	10.4	8°45.0	35.4	10°09.4	07.2	96°43.4	52.1		147°58.2	-36°29.6
9	$101^{\circ}14.1$	294°26.8	• • 09.2	23°45.7	• • 35.6	25°11.5	• • 07.2	111°46.0	• • 52.2	Arcturus	145°48.3	19°03.4
10	$116^{\circ}16.6$	309°26.4	08.0	38°46.5	35.8	40°13.6	07.3	126°48.6	52.3	Rigil Kent.	139°40.9	-60°56.4
11	131°19.0	324°26.1	06.7	53°47.2	36.0	55°15.6	07.3	141°51.2	52.4	Kochab	137°19.9	74°03.5
12	146°21.5	339°25.7	N07°05.5	68°47.9	N22°36.1	70°17.7	N22°07.3	156° 53.8	S06°52.4			
13	161°24.0	354°25.3	04.3	83°48.7	36.3	85°19.8	07.4	171°56.5	52.5	Zuben'ubi	136°56.4	-16°08.6
14	176° 26.4	9°25.0	03.1	98°49.4	36.5	100°21.8	07.4	$186^{\circ}59.1$	52.6	Alphecca	126°04.0	26°38.1
15	191°28.9	24°24.6	• • 01.8	113°50.1	• • 36.7	115°23.9	• • 07.4	202°01.7	• • 52.7	Antares	112°16.1	-26°29.2
16	206°31.4	39°24.2	07°00.6	128°50.8	36.9	130°26.0	07.5	217°04.3	52.7	Atria	107°10.4	-69°04.5
17	221°33.8	54°23.9	06°59.4	143°51.6	37.0	145°28.0	07.5	232°06.9	52.8	Sabik	102°03.0	-15°45.3
18	236° 36.3	69°23.5	N06°58.2	158°52.3	N22°37.2	160°30.1	N22°07.5	247°09.5	S06°52.9	Shaula	96°10.6	-37°07.4
19	251°38.8	84°23.1	56.9	173°53.0	37.4	175°32.2	07.6	262° 12.2	52.9	Rasalhague	95°58.7	12°32.7
20	266°41.2	99°22.8	55.7	188°53.7	37.6	190°34.2	07.6	277° 14.8	53.0	Eltanin	90°42.0	51°29.3
21	281°43.7	114°22.4	• • 54.5	203°54.5	• • 37.7	205°36.3	07.6	292°17.4	• 53.0	Kaus Aust.	83°32.7	-34°22.4
				203 54.5 218°55.2						Vega	80°33.1	38°48.5
22	296°46.1	129°22.0	53.2		37.9	220°38.4	07.7	307°20.0	53.2	Nunki	75°47.9	-26°16.0
23	311°48.6	144°21.7	52.0	233°55.9	38.1	235°40.4	07.7	322°22.6	53.2	Altair	62°00.0	8°56.1
Mer.p	pass. 02:16	$\nu$ -0.4' d-1	2′ m-3.86	$\nu$ 0.7′ d0	.2′ m0.79	$\nu 2.1' \ d0$	.0′ m-2.18	$\nu 2.6' \ d0$	.1′ m0.67	Peacock	53°05.6	-56°39.4
										Deneb	49°25.6	45°22.2
										Enif	33°38.8	9°59.3
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.8	-46°50.4
0	326°51.1	$159^{\circ}21.3$	N06°50.8	248°56.7		250°42.5	N22°07.7	$337^{\circ}25.2$		Fomalhaut	15°14.5	-29°29.4
1	341°53.5	174°20.9	49.6	263°57.4	38.4	265°44.6	07.8	352°27.9	53.4	Scheat	13°45.2	28°13.0
2	356° 56.0	189°20.6	48.3	278°58.1	38.6	280°46.6	07.8	7°30.5	53.4	Markab	13°29.9	15°20.3
3	11°58.5	204°20.2	• • 47.1	293°58.8	• • 38.8	295°48.7	• • 07.8	22°33.1	• • 53.5			
4	27°00.9	$219^{\circ}19.8$	45.9	308°59.6	39.0	310°50.8	07.9	37°35.7	53.6	Aug 16 Fri	SHA	Mer.pass
5	42°03.4	$234^{\circ}19.5$	44.6	324°00.3	39.1	325°52.9	07.9	52°38.3	53.7		194°46.3	13:22
6	57°05.9	249°19.1	N06°43.4	339°01.0	N22°39.3	340°54.9	N22°08.0	67°41.0	S06°53.7	Mars		07:26
7	72°08.3	264°18.8	42.2	354°01.8	39.5	355°57.0	0.80	82°43.6	53.8	Jupiter	284°10.7	07:23
8	87°10.8	279°18.4	40.9	9°02.5	39.6	10°59.1	08.0	97°46.2	53.9	Saturn	$10^{\circ}26.9$	01:38
9	102°13.2	294°18.0	• • 39.7	24°03.2	• • 39.8	26°01.1	• • 08.1	112°48.8	• • 53.9		C	
10	117° 15.7	309°17.7	38.5	39°04.0	40.0	41°03.2	08.1	127°51.4	54.0	Aug 17 Sat	SHA	Mer.pass
11	132°18.2	324°17.3	37.2	54°04.7	40.2	56°05.3	08.1	142°54.1	54.1	1	193°38.2	13:22
12	147° 20.6	339°16.9	N06°36.0	69°05.4	N22°40.3	71°07.3	N22°08.2	157° 56.7	S06°54.2	Mars		07:25
13	162°23.1	354°16.6	34.8	84°06.1	40.5	86°09.4	08.2	172°59.3	54.2	Jupiter		07:19
14	177° 25.6	9°16.2	33.5	99°06.9	40.7	101°11.5	08.2	188°01.9	54.3	Saturn	10°30.5	01:34
15	192°28.0	24°15.9	• • 32.3	114°07.6	• • 40.8	116°13.6	• • 08.3	203°04.5	• • 54.4	Aug 18 Sun	SHA	Mer.pass
16	207° 30.5	39°15.5	31.1	129°08.3	41.0	131°15.6	08.3	218°07.2	54.4		192°30.2	13:23
17	222°33.0	54°15.1	29.8	144°09.1	41.2	146°17.7	08.3	233°09.8	54.5	Mars		07:24
18	237°35.4	69°14.8	N06°28.6	159°09.8	N22°41.4	161°19.8	N22°08.4	248° 12.4	S06°54.6	Jupiter		07:24
19	252°37.9	84°14.4	27.4	174°10.5	41.5	176°21.9	08.4	263° 15.0	54.7	Saturn	10°34.2	01:30
20	267° 40.4	99°14.1	26.1	189°11.3	41.7	191°23.9	08.4	278° 17.6	54.7	Jatuin	10 34.2	01.30
21	282° 42.8	114°13.7	• • 24.9	204°12.0	• • 41.9	206°26.0	•• 08.5	293°20.3	54.8	Horizont	al parallax	
22	297° 45.3	129°13.3	23.7	219°12.7	42.0	221°28.1	08.5	308°22.9	54.9		Venus:	0.1
23	312°47.7	144°13.0	22.4	234°13.5	42.2	236°30.1	08.5	323°25.5	55.0		Mars:	0.1
										-		
Mer.p	oass. 02:12	u-0.4' d-1	2′ m-3.86	$ u$ 0.7 $^{\prime}$ d0	.2′ m0.78	$\nu 2.1' d0$	.0′ m-2.19	$\nu$ 2.6′ d0	.1′ m0.67			

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°55.5	N13°38.6	50°58.5	5.2'	S28°32.2	-0.8'	57.7'
1	193°55.7	37.8	65°22.6	5.1'	28°31.4	-1.0'	57.7'
2	208°55.8	37.0	79°46.7	5.1'	28°30.5	-1.2'	57.7'
3 4	223°55.9 238°56.1	· · 36.2 35.4	94°10.8 108°34.9	5.0' 5.0'	28° 29.3 28° 28.0	-1.3' -1.5'	57.8' 57.8'
5	250 50.1 253°56.2	34.6	100 34.9 122°58.9	5.0'	28° 26.5	-1.5 -1.7'	57.8'
6	268°56.3	N13°33.8	137°22.9	4.9'	528° 24.8	-1.9'	57.9
7	283°56.5	33.0	151°46.8	4.9'	28° 22.9	-2.1'	57.9'
8	298°56.6	32.2	$166^{\circ}10.7$	4.9'	$28^{\circ}20.8$	-2.2'	58.0'
9	313°56.7	• • 31.4	180°34.6	4.9'	28°18.6	-2.4'	58.0'
10	328°56.9	30.6	194°58.5	4.8'	28° 16.2	-2.6'	58.0'
11 12	343°57.0 358°57.1	29.8 N13°29.0	209°22.3 223°46.1	4.8' 4.8'	28° 13.5 <b>S</b> 28° 10.7	-2.8' -3.0'	58.1' 58.1'
13	13°57.3	28.2	223 40.1 238°09.9	4.8'	28° 07.7	-3.0 -3.2'	58.1'
14	28°57.4	27.5	252°33.7	4.8'	28°04.6	-3.4	58.2
15	43°57.5	26.7	266°57.5	4.8'	28°01.2	-3.5'	58.2
16	58°57.7	25.9	281°21.2	4.7'	27°57.7	-3.7'	58.3'
17	73°57.8	25.1	295°45.0	4.7'	27°53.9	-3.9'	58.3'
18	88°57.9	N13°24.3	310°08.7	4.7'	\$27°50.0	-4.1'	58.3'
19	103°58.1 118°58.2	23.5	324°32.4 338°56.1	4.7'	27°45.9 27°41.6	-4.3'	58.4'
20 21	118°58.2 133°58.3	22.7 •• 21.9	353° 19.9	4.7' 4.7'	27°41.6 27°37.2	-4.5' -4.7'	58.4' 58.4'
22	148°58.5	21.1	7°43.6	4.7'	27°32.5	-4.7 -4.8	58.5
23	163°58.6	20.3	22°07.3	4.7'	27° 27.7	-5.0'	58.5'
	SD = 15.8'	d = -0.8'			D = 15.7'		
	<u>JD = 13.6</u>	<u>u = -0.6</u>			D = 13.7		
Sat	GHA	Dec	GHA	$\nu$	Dec	d 5 2'	HP
0 1	178°58.7 193°58.9	N13° 19.5 18.7	36°31.1 50°54.8	4.7' 4.8'	\$27° 22.6 27° 17.4	-5.2' -5.4'	58.6' 58.6'
2	208°59.0	17.9	65°18.6	4.8	27°17.4	-5.4 -5.6'	58.6'
3	223°59.2	• • 17.1	79°42.3	4.8'	27°06.4	-5.8'	58.7'
4	238°59.3	16.3	$94^{\circ}06.1$	4.8'	$27^{\circ}00.7$	-6.0'	58.7'
5	253°59.4	15.5	108°29.9	4.8'	26°54.7	-6.1'	58.7'
6	268°59.6	N13° 14.7	122°53.7 137°17.6	4.8'	\$26°48.6 26°42.3	-6.3'	58.8'
7 8	283°59.7 298°59.8	13.9 13.0	137°17.6 151°41.4	4.9' 4.9'	26° 42.3 26° 35.7	-6.5' -6.7'	58.8' 58.9'
9	314°00.0	12.2	166°05.3	4.9	26°29.1	-6.7 -6.9'	58.9'
10	329°00.1	11.4	180°29.2	4.9'	26°22.2	-7.0'	58.9'
11	344°00.3	10.6	194°53.2	5.0'	$26^{\circ}15.1$	-7.2'	59.0'
12	359°00.4	N13°09.8	209°17.1	5.0'	S26°07.9	-7.4'	59.0'
13	14°00.5	09.0	223°41.1	5.0'	26°00.5	-7.6'	59.0'
14 15	29°00.7 44°00.8	08.2 •• 07.4	238°05.2 252°29.2	5.1' 5.1'	25° 52.9 25° 45.2	-7.8' -7.9'	59.1' 59.1'
16	59°00.9	06.6	266°53.3	5.1'	25°37.2	-7.9 -8.1'	59.1'
17	74°01.1	05.8	281°17.5	5.2'	25°29.1	-8.3	59.2'
18	89°01.2	N13°05.0	295°41.7	5.2'	S25°20.8	-8.5'	59.2'
19	104°01.4	04.2	310°05.9	5.3'	25°12.3	-8.6'	59.2'
20	119°01.5	03.4	324°30.2	5.3'	25°03.7	-8.8'	59.3'
21	134°01.6 149°01.8	•• 02.6	338°54.5	5.4' 5.4'	24° 54.9 24° 45.9	-9.0' -9.2'	59.3'
22 23	149°01.8 164°01.9	01.8 01.0	353°18.9 7°43.3	5.4	24°45.9 24°36.7	-9.2 -9.3'	59.3' 59.4'
23		d = -0.8'	7 45.5			-9.5	
	SD = 15.8'	$a = -0.8^{\circ}$			D = 16.0'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°02.1	N13°00.1	22°07.7	5.5'	\$24°27.4	-9.5'	59.4'
1 2	194°02.2 209°02.4	12°59.3 58.5	36°32.2 50°56.8	5.6' 5.6'	24°17.9 24°08.2	-9.7' -9.8'	59.4' 59.5'
3	209 02.4 224°02.5	57.7	65°21.4	5.7'	24 06.2 23°58.4	-9.6 -10.0'	59.5'
4	239°02.6	56.9	79°46.1	5.7'	23°48.4	-10.2	59.5'
5	254°02.8	56.1	94°10.8	5.8'	23°38.2	-10.3'	59.6'
6	269°02.9	N12°55.3	108°35.6	5.8'	S23°27.9	-10.5'	59.6'
7	284°03.1	54.5	123°00.4	5.9'	23°17.4	-10.7'	59.6'
8	299°03.2 314°03.4	53.7	137°25.3 151°50.3	6.0' 6.0'	23°06.7 22°55.9	-10.8'	59.7'
9 10	314°03.4 329°03.5	· · 52.9 52.0	151°50.3 166°15.3	6.1	22°55.9 22°44.9	-11.0' -11.1'	59.7' 59.7'
11	344°03.6	52.0	180°40.4	6.1	22°44.9 22°33.8	-11.1	59. <i>1</i> 59.8'
12	359°03.8	N12° 50.4	195°05.5	6.2	S22°22.5	-11.4	59.8'
13	14°03.9	49.6	209°30.7	6.3'	$22^{\circ}11.1$	-11.6'	59.8'
14	29°04.1	48.8	223°56.0	6.3'	21°59.5	-11.7'	59.8'
15	44°04.2	• • 48.0	238°21.3	6.4'	21°47.7	-11.9'	59.9'
16 17	59°04.4 74°04.5	47.2 46.3	252°46.8 267°12.2	6.5' 6.5'	21°35.8 21°23.8	-12.0' -12.2'	59.9' 59.9'
18	89°04.6	40.3 N12°45.5	281°37.8	6.6'	S21°11.6	-12.2	60.0'
19	104°04.8	44.7	296°03.4	6.7'	20°59.3	-12.5'	60.0'
20	119°04.9	43.9	$310^{\circ}29.0$	6.7'	20°46.8	-12.6'	60.0'
21	134°05.1	• • 43.1	324°54.8	6.8'	20°34.2	-12.8'	60.0'
22	149°05.2	42.3	339°20.6	6.9'	20°21.4	-12.9'	60.1
23	164°05.4	41.4	353°46.5	6.9'	20°08.5	-13.0'	60.1'
	SD = 15.8'	d = -0.8'		S	D = 16.2'		

1	Twi	light	C	C	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut
N 72°	////	////	02:41	21:22	////	////
<b>N</b> 70°	////	01:06	03:09	20:55	22:50	////
68°	////	02:01	03:30	20:35	22:01	////
66°	////	02:34	03:46	20:19	21:30	////
64°	00:58	02:57	03:59	20:06	21:08	22:59
62°	01:48	03:15	04:11	19:55	20:50	22:15
60°	02:17	03:30	04:20	19:46	20:36	21:47
<b>N</b> 58°	02:39	03:42	04:28	19:38	20:24	21:26
56°	02:56	03:53	04:36	19:31	20:13	21:10
54°	03:10	04:02	04:42	19:25	20:04	20:56
52°	03:22	04:10	04:48	19:19	19:56	20:44
50°	03:33	04:18	04:53	19:14	19:49	20:34
45°	03:54	04:33	05:05	19:03	19:34	20:13
<b>N</b> 40°	04:10	04:45	05:14	18:53	19:22	19:57
30°	04:23 04:34	04:55 05:04	05:22 05:29	18:46 18:39	19:12 19:04	19:44 19:33
20°	04:54	05:04	05:29	18:27	18:50	19:53
N 10°	05:04	05:10	05:51	18:17	18:38	19:04
0°	05:15	05:39	06:01	18:07	18:29	18:53
<b>S</b> 10°	05:24	05:49	06:10	17:58	18:20	18:44
20°	05:31	05:57	06:20	17:48	18:11	18:37
30°	05:39	06:07	06:31	17:37	18:02	18:30
35°	05:42	06:12	06:38	17:31	17:57	18:26
40°	05:45	06:17	06:45	17:23	17:51	18:23
45°	05:49	06:23	06:53	17:15	17:45	18:20
<b>S</b> 50°	05:52	06:30	07:04	17:05	17:39	18:17
52°	05:54	06:33	07:08	17:00	17:36	18:15
54°	05:55	06:36	07:13	16:55	17:32	18:14
56°	05:56	06:40	07:19	16:50	17:29	18:12
58° <b>S</b> 60°	05:58 06:00	06:44 06:48	07:25 07:33	16:43 16:36	17:25 17:21	18:11 18:09
3 00	00.00	00.46	07.33	10.30	17.21	10.0
Lat.	Fri	Moonris Sat	s <b>e</b> Sun	Fri	Moonset Sat	t Sun
N 72°		Sat	Juli		Jat	Juli
N 70°			_			
68°			21:55			
66°			21:13			
64°		21:18	20:44		23:51	
62°	20:54	20:31	20:22	22:07		00:37
60°	19:49	20:01	20:04	23:13		01:06
<b>N</b> 58°	19:14	19:37	19:49	23:47		01:29
56°	18:49	19:19	19:36		00:12	01:47
54°	18:28	19:03	19:25	•• ••	00:32	02:03
52°	18:11	18:49	19:15	•• ••	00:49	02:16
50°	17:57	18:37	19:06		01:04	02:27
45°	17:27	18:12	18:47	00:24	01:33	02:51
N 40°	17:04	17:52	18:31	00:49	01:55	03:13
35°	16:44	17:35	18:18	01:09	02:14	03:26
30° 20°	16:28	17:20	18:06	01:26	02:30	03:40
N 10°	16:00 15:36	16:55 16:34	17:46 17:29	01:54 02:19	02:57 03:21	04:03 04:23
0°	15:30	16:34 16:14	17:29 17:12	02:19	03:21	04:23
<b>S</b> 10°	14:51	15:53	16:56	03:05	04:04	05:00
20°	14.27	15.22	16.38	03.30	04.27	05.30
20° 30°	14:27 13:59	15:32 15:06	16:38 16:18	03:29 03:58	04:27 04:53	05:20 05:42

			Sun		Moon				
	Day	Eqn.of Time		Mer.	Mer.	Pass.	Age		
	Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	12-14		
		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	82-95%		
	16	04:18	04:11	12:04	21:28	08:58			
İ	17	04:05	03:58	12:04	22:28	09:58			
	18	03:52	03:45	12:04	23:26	10:57			

16:06

15:52

15:35

15:15

15:05

14:54

14:41

14:27

04:15

04:34

04:58

05:29

05:44

06:01

06:23

06:50

35°

40°

45°

 $52^{\circ}$ 

56°

 $58^{\circ}$ 

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

13:42

13:23

12:59

12:29

12:14

11:56

11:35

11:08

14:52

14:34

14:13

13:47

13:34

13:19

13:02

12:41

05:55

06:10

06:28

06:50

07:00

07:12

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07:41

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05:27

05:48

06:16

06:29

06:44

07:02

07:24

August 19, 20, 21 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	327°50.2	159°12.6	N06°21.2	249°14.2	N22°42.4	251°32.2	N22°08.6	338°28.1	S06°55.0			
1	342°52.7	174°12.3	20.0	264°14.9	42.5	266°34.3	08.6	353°30.7	55.1	Alpheratz	357°34.8	29°13.6
2	357°55.1	189°11.9	18.7	279°15.6	42.7	281°36.4	08.6	8°33.4	55.2	Ankaa	353°07.1	-42°10.1
3	12°57.6	204°11.6	17.5	294°16.4	• • 42.9	296°38.4	08.7	23°36.0	55.2	Schedar	349°31.0	56°40.2
4	28°00.1	$219^{\circ}11.2$	16.2	309°17.1	43.0	311°40.5	08.7	38°38.6	55.3	Diphda	348°47.4	-17°50.9
5	43°02.5	234°10.8	15.0	324°17.8	43.2	326°42.6	08.7	53°41.2	55.4	Achernar	335°20.1 327°51.4	-57°06.4 23°34.7
6	58°05.0	249°10.5	N06°13.8	339°18.6	N22°43.4	341°44.7	N22°08.8	68°43.8	S06°55.5	Hamal Polaris	314°07.0	89°21.8
7	73°07.5	$264^{\circ}10.1$	12.5	354°19.3	43.5	356°46.7	8.80	83°46.5	55.5	Acamar	315°11.9	-40°12.0
8	88°09.9	279°09.8	11.3	9°20.0	43.7	11°48.8	8.80	98°49.1	55.6	Menkar	314°06.4	4°11.3
9	103° 12.4	294°09.4	• • 10.0	24°20.8	• • 43.8	26°50.9	• • 08.9	113°51.7	• • 55.7	Mirfak	308°28.7	49°56.8
10	118° 14.9	309°09.1	08.8	39°21.5	44.0	41°53.0	08.9	128°54.3	55.8	Aldebaran	290°40.1	16°33.6
11	133°17.3	324°08.7	07.6	54°22.2	44.2	56°55.1	08.9	143°56.9	55.8	Rigel	281°04.3	-8°10.2
12	148° 19.8	339°08.4	N06°06.3	69°23.0 84°23.7	N22°44.3	71°57.1	N22°09.0	158° 59.6	S06°55.9	Capella	280°22.5	46°01.2
13 14	163°22.2 178°24.7	354°08.0 9°07.6	05.1 03.8	84°23.7 99°24.4	44.5 44.7	86°59.2 102°01.3	09.0 09.0	174°02.2 189°04.8	56.0 56.0	Bellatrix	278°23.4	6°22.4
15	176 24.7 193°27.2	24°07.3	• • 02.6	114°25.2	• • 44.8	102 01.3 117°03.4	09.0	204°07.4	56.1	Elnath	278°02.4	28°37.7
16	208°29.6	39°06.9	01.4	129°25.9	45.0	132°05.4	09.1	219° 10.1	56.2	Alnilam	275°38.2	-1°11.0
17	223°32.1	54°06.6	06°00.1	144°26.7	45.1	147°07.5	09.1	234° 12.7	56.3	Betelgeuse	270°52.6	7°24.8
18	238°34.6	69°06.2	N05°58.9	159°27.4	N22°45.3	162°09.6	N22°09.2	249° 15.3	S06°56.3	Canopus	263°52.9	-52°42.2
19	253°37.0	84°05.9	57.6	174°28.1	45.5	177°11.7	09.2	264° 17.9	56.4	Sirius	258°26.8	-16°44.8
20	268°39.5	99°05.5	56.4	189°28.9	45.6	192°13.8	09.2	279°20.5	56.5	Adhara	255°06.4	-29°00.1
21	283°42.0	114°05.2	• • 55.2	204°29.6	• • 45.8	$207^{\circ}15.8$	• • 09.3	294°23.2	• • 56.6	Procyon Pollux	244°51.4 243°18.0	5°09.8 27°58.0
22	298°44.4	129°04.8	53.9	219°30.3	46.0	222°17.9	09.3	309°25.8	56.6	Avior	234° 15.5	-59°35.1
23	313°46.9	144°04.5	52.7	234°31.1	46.1	237°20.0	09.3	324°28.4	56.7	Suhail	222°47.0	-43°31.8
Mern	ass. 02:08	ν-0 4' d-1	.2′ m-3.86	ν0 7' d0	.2′ m0.78	ν2 1' dΩ	0′ m-2.19	v2 6' d0	.1′ m0.66	Miaplacidus	221°39.3	-69°48.9
-viei.p	uss. 02.00	ν σ. <del>τ</del> u-1		νσ.1 u0		ν Δ.1 UU.	- 111-4.13	ν Δ.Ο UU		Alphard	221 39.3 217°48.4	-8°45.8
										Regulus	207°35.1	11°51.0
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°42.0	61°37.3
0	328° 49.3	159°04.1	N05°51.4	249°31.8	N22°46.3	252°22.1	N22°09.4	339°31.0	S06°56.8	Denebola	182°25.5	14°26.2
1	343°51.8	174°03.8	50.2	264°32.5	46.4	267°24.1	09.4	354°33.7	56.8	Gienah	$175^{\circ}44.2$	-17°40.7
2	358° 54.3	189°03.4	48.9	279°33.3	46.6	282°26.2	09.4	9°36.3 24°38.9	56.9 •• 57.0	Acrux	173°01.0	-63°14.3
3 4	13°56.7 28°59.2	204°03.1 219°02.7	· · 47.7 46.5	294°34.0 309°34.7	· · 46.7 46.9	297°28.3 312°30.4	· · 09.4 09.5	24 38.9 39°41.5	· · 57.0 57.1	Gacrux	171°52.5	-57°15.2
5	44°01.7	219 02.7 234°02.4	45.2	324°35.5	47.1	312 30.4 327°32.5	09.5	54° 44.1	57.1	Alioth	166°13.6	55°49.8
6	59°04.1	249°02.0	N05°44.0	339°36.2	N22°47.2	342°34.6	N22°09.5	69°46.8	S06°57.2	Spica	158°22.8	-11°17.3
7	74°06.6	264°01.7	42.7	354°37.0	47.4	357°36.6	09.6	84°49.4	57.3	Alkaid	152°52.5	49°11.7
8	89°09.1	279°01.3	41.5	9°37.7	47.5	12°38.7	09.6	99°52.0	57.4	Hadar	148°36.8	-60°29.7
9	104° 11.5	294°01.0	40.2	24°38.4	• • 47.7	27°40.8	09.6	114°54.6	57.4	Menkent	147°58.2	-36°29.6
10	119° 14.0	309°00.6	39.0	39°39.2	47.8	42°42.9	09.7	129°57.3	57.5	Arcturus	145°48.3	19°03.4 -60°56.4
11	134° 16.5	324°00.3	37.7	54°39.9	48.0	57°45.0	09.7	144°59.9	57.6	Rigil Kent. Kochab	139°41.0 137°20.0	74°03.5
12	149° 18.9	338°59.9	N05°36.5	69°40.6	N22°48.2	72°47.0	N22°09.7	$160^{\circ}02.5$	S06°57.7	Zuben'ubi	136°56.4	-16°08.6
13	164°21.4	353°59.6	35.2	84°41.4	48.3	87°49.1	09.8	175°05.1	57.7	Alphecca	126°04.0	26°38.1
14	179°23.8	8°59.2	34.0	99°42.1	48.5	102°51.2	09.8	190°07.7	57.8	Antares	112°16.1	-26°29.2
15	194° 26.3	23°58.9	• • 32.7	114°42.9	• • 48.6	117°53.3	• • 09.8	205° 10.4	• • 57.9	Atria	107°10.5	-69°04.5
16	209°28.8	38°58.5	31.5	129°43.6	48.8	132°55.4	09.9	220° 13.0	57.9	Sabik	102°03.0	-15°45.3
17	224°31.2	53°58.2	30.2	144°44.3	48.9	147°57.5	09.9	235° 15.6	58.0	Shaula	96°10.6	-37°07.4
18	239°33.7	68°57.8 83°57.5	N05°29.0	159°45.1 174°45.8	N22°49.1	162°59.5	N22°09.9	250° 18.2	S06°58.1	Rasalhague	95°58.7	12°32.7
19 20	254° 36.2 269° 38.6	98°57.1	27.8 26.5	174 45.8 189°46.5	49.2 49.4	178°01.6 193°03.7	10.0 10.0	265°20.9 280°23.5	58.2 58.2	Eltanin	90°42.0	51°29.3
21	209 38.0 284°41.1	113°56.8	• • 25.3	204°47.3	• • 49.5	208°05.8	. 10.0	295°26.1	58.3	Kaus Aust.	83°32.7	-34°22.4
22	299°43.6	128°56.4	24.0	219°48.0	49.7	223°07.9	10.1	310°28.7	58.4	Vega	80°33.2	38°48.6
23	314°46.0	143°56.1	22.8	234°48.8	49.9	238°10.0	10.1	325°31.4	58.5	Nunki	75°47.9	-26°16.0
										Altair	62°00.0	8°56.1
Mer.p	ass. 02:04	$\nu$ -0.4′ d-1	.2′ m-3.86	$\nu$ 0.7 d0	.2′ m0.77	$\nu$ 2.1′ d0.	0′ m-2.20	$\nu$ 2.6′ $d0$	.1′ m0.66	Peacock Deneb	53°05.6 49°25.6	-56°39.4 45°22.2
										Enif	33°38.8	9°59.4
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.8	-46°50.4
0	329° 48.5	158°55.7	N05°21.5	249°49.5	$N22^{\circ}50.0$	253°12.1	$N22^{\circ}10.1$	340° 34.0	S06°58.5	Fomalhaut	15°14.5	-40°30.4 -29°29.4
1	344°51.0	173°55.4	20.3	264°50.2	50.2	268°14.1	10.2	355°36.6	58.6	Scheat	13°45.2	28°13.0
2	359°53.4	188°55.0	19.0	279°51.0	50.3	283°16.2	10.2	10°39.2	58.7	Markab	$13^{\circ}29.9$	15°20.3
3	14°55.9	203°54.7	•• 17.8	294°51.7	• • 50.5	298°18.3	10.2	25°41.9	• 58.8	Aug 10 N4-	CHA	Mon no
4	29°58.3	218°54.4	16.5	309°52.5	50.6	313°20.4	10.2	40°44.5	58.8	Aug 19 Mon	<b>SHA</b> 191°22.4	Mer.pass 13:23
5 6	45°00.8	233°54.0	15.3 NO5°14.0	324°53.2	50.8	328°22.5	10.3 N22°10.3	55°47.1	58.9 506° 50.0	Venus		07:23
7	60°03.3 75°05.7	248°53.7 263°53.3	N05°14.0 12.8	339°53.9 354°54.7		343°24.6 358°26.7	10.3	70°49.7 85°52.4	S06°59.0	Jupiter		07:23
8	75°05.7 90°08.2	263°53.3 278°53.0	12.8 11.5	354 54.7 9°55.4	51.1 51.2	13°28.7	10.3 10.4	85°52.4 100°55.0	59.1 59.1	Saturn	10°37.9	01:26
9	105° 10.7	278 53.0 293°52.6	• • 10.2	24°56.2	51.4	28°30.8	. 10.4	100 55.0 115° 57.6	• • 59.2			
10	120° 13.1	308°52.3	09.0	39°56.9	51.5	43°32.9	10.4	131°00.2	59.3	Aug 20 Tue	SHA	Mer.pass
11	135° 15.6	323°51.9	07.7	54°57.6	51.7	58°35.0	10.5	146°02.9	59.3	l .	190°14.8	13:24
12	150° 18.1	338°51.6	N05°06.5	69°58.4	N22°51.8	73°37.1	N22°10.5		S06°59.4	Mars		07:22
13	$165^{\circ}20.5$	353°51.3	05.2	$84^{\circ}59.1$	51.9	$88^{\circ}39.2$	10.5	$176^{\circ}08.1$	59.5	Jupiter Saturn	283°32.7 10°41.7	07:10 01:22
14	180°23.0	8°50.9	04.0	99°59.9	52.1	103°41.3	10.6	191° 10.7	59.6	Jatum	10 41.7	01.22
15	195°25.4	23°50.6	• • 02.7	115°00.6	• • 52.2	118°43.4	• • 10.6	206°13.4	• • 59.6	Aug 21 Wed	SHA	Mer.pass
16	210°27.9	38°50.2	01.5	130°01.4	52.4	133°45.5	10.6	221°16.0	59.7	l .	189°07.3	13:25
17	225°30.4	53°49.9	05°00.2	145°02.1	52.5	148°47.5	10.7	236° 18.6	59.8	Mars		07:20
18	240°32.8	68°49.5	N04°59.0	160°02.8	N22°52.7	163°49.6	N22°10.7		\$06°59.9	1	283°23.6	07:06
19 20	255°35.3 270°37.8	83°49.2 98°48.9	57.7 56.5	175°03.6 190°04.3	52.8 53.0	178°51.7 193°53.8	10.7 10.7	266°23.9 281°26.5	06°59.9 07°00.0	Saturn	10°45.5	01:18
20	270 37.8 285°40.2	98 48.9 113°48.5	. 55.2	205°05.1	53.1	193 55.8 208°55.9	10.7	281 20.5 296°29.1	• • 00.0	Horizont	al parallax	
22	300° 42.7	113 48.3 128°48.2	53.9	200°05.8	53.3	200°55.9 223°58.0	10.8	311°31.7	00.1		Venus:	0.1
23	315°45.2	143°47.8	52.7	235°06.6	53.4	239°00.1	10.8	326°34.4	00.2		Mars:	0.1
ivier.p	ass. 02:00	$\nu$ -0.5 a-1	.3′ m-3.86	νυ.ι αυ	.2′ m0.77	ν2.1 a0.	0′ m-2.20	ν2.0° α0	.1′ m0.65			

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°05.5	N12°40.6	8°12.4	7.0'	\$19°55.5	-13.2'	60.1'
1 2	194°05.7 209°05.8	39.8 39.0	22°38.4 37°04.5	7.1' 7.2'	19°42.3 19°29.0	-13.3' -13.4'	60.1' 60.2'
3	224°06.0	• • 38.2	51°30.7	7.2'	19°15.6	-13.6'	60.2
4	239°06.1	37.4	65°56.9	7.3'	19°02.0	-13.7'	60.2
5 6	254°06.3 269°06.4	36.5 N12°35.7	80°23.2 94°49.6	7.4' 7.4'	18°48.3 \$18°34.5	-13.8' -13.9'	60.2' 60.3'
7	284°06.6	34.9	109° 16.0	7. <del>4</del> 7.5'	18°20.5	-13.9 -14.1'	60.3
8	299°06.7	34.1	123°42.5	7.6'	18°06.4	-14.2'	60.3'
9	314°06.9	• • 33.3	138°09.1	7.6'	17°52.3	-14.3'	60.3'
10 11	329°07.0 344°07.1	32.4 31.6	152°35.7 167°02.5	7.7' 7.8'	17°37.9 17°23.5	-14.4' -14.5'	60.3' 60.4'
12	359°07.3	N12°30.8	181°29.3	7.9'	S17°09.0	-14.7'	60.4
13	14°07.4	30.0	195°56.1	7.9'	16°54.3	-14.8'	60.4'
14 15	29°07.6 44°07.7	29.2 •• 28.3	210°23.0 224°50.0	8.0' 8.1'	16°39.5 16°24.6	-14.9' -15.0'	60.4' 60.4'
16	59°07.9	27.5	239° 17.1	8.1'	16°09.6	-15.1'	60.5
17	74°08.0	26.7	253°44.2	8.2'	$15^{\circ}54.5$	-15.2'	60.5'
18	89°08.2 104°08.3	N12°25.9	268°11.4 282°38.7	8.3' 8.3'	\$15°39.3 15°24.0	-15.3'	60.5'
19 20	104 08.3 119°08.5	25.0 24.2	282 38.7 297°06.1	8.4'	15 24.0 15°08.6	-15.4' -15.5'	60.5' 60.5'
21	134°08.6	• • 23.4	311°33.5	8.5'	14°53.1	-15.6'	60.5
22	149°08.8	22.6	326°00.9	8.5'	14°37.5	-15.7'	60.6
23	164°08.9	21.7	340°28.5	8.6'	14°21.8	-15.8'	60.6'
	SD = 15.8'	d = -0.8'		SI	0 = 16.4'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°09.1	N12°20.9	354°56.1	8.7'	<b>S</b> 14°06.0	-15.9'	60.6
1	194°09.3	20.1	9°23.7	8.7'	13°50.1	-16.0'	60.6'
2 3	209°09.4 224°09.6	19.3 •• 18.4	23°51.5 38°19.3	8.8' 8.9'	13°34.2 13°18.1	-16.1' -16.1'	60.6' 60.6'
4	239°09.7	17.6	50° 19.3	8.9'	13°02.0	-16.1 -16.2'	60.6
5	254°09.9	16.8	$67^{\circ}15.0$	9.0'	$12^{\circ}45.7$	-16.3'	60.7'
6	269°10.0 284°10.2	N12°15.9	81°43.0 96°11.0	9.0'	\$12°29.4 12°13.0	-16.4'	60.7'
7 8	284°10.2 299°10.3	15.1 14.3	96°11.0 110°39.1	9.1' 9.2'	12°13.0 11°56.6	-16.5' -16.5'	60.7' 60.7'
9	314°10.5	· · 13.5	125°07.3	9.2'	11°40.0	-16.6'	60.7
10	329°10.6	12.6	139°35.5	9.3'	11°23.4	-16.7'	60.7'
11 12	344°10.8 359°10.9	11.8 N12°11.0	154°03.8 168°32.1	9.3' 9.4'	11°06.7 \$10°50.0	-16.8' -16.8'	60.7' 60.7'
13	14°11.1	10.1	183°00.5	9.4'	10°33.2	-16.9	60.7
14	29°11.2	09.3	$197^{\circ}28.9$	9.5'	$10^{\circ}16.3$	-16.9'	60.7'
15 16	44°11.4 59°11.5	· · 08.5 07.7	211°57.4 226°26.0	9.5' 9.6'	09°59.3 09°42.3	-17.0' -17.1'	60.8' 60.8'
17	74°11.7	06.8	240°54.6	9.6'	09°42.3	-17.1'	60.8
18	89°11.9	N12°06.0	255°23.2	9.7'	S09°08.1	-17.2'	60.8'
19	104°12.0	05.2	269°51.9	9.7'	08°51.0	-17.2'	60.8'
20 21	119°12.2 134°12.3	04.3 · · 03.5	284° 20.6 298° 49.4	9.8' 9.8'	08°33.7 08°16.4	-17.3' -17.3'	60.8' 60.8'
22	149°12.5	02.7	313° 18.3	9.9'	07°59.1	-17.4	60.8
23	164°12.6	01.8	327°47.1	9.9'	07°41.7	-17.4'	60.8'
	SD = 15.8'	d = -0.8'		SI	O = 16.5'		
Wed	GHA	Dec	GHA	ν	Dec	d	НР
0	179°12.8	N12°01.0	342°16.1	10.0'	S07°24.3	-17.5'	60.8
1	194°12.9	12°00.2	356° 45.0	10.0'	07°06.8	-17.5'	60.8'
2 3	209°13.1 224°13.3	11°59.3 · · 58.5	11°14.0 25°43.1	10.0' 10.1'	06°49.3 06°31.8	-17.5' -17.6'	60.8' 60.8'
4	239°13.4	57.7	40° 12.2	10.1	06°14.2	-17.6'	60.8
5	254°13.6	56.8	54°41.3	10.2'	05°56.6	-17.7'	60.8'
6 7	269°13.7 284°13.9	N11°56.0 55.2	69° 10.5 83° 39.7	10.2' 10.2'	\$05°38.9 05°21.2	-17.7' -17.7'	60.8' 60.8'
8	299°14.0	54.3	98° 08.9	10.2	05°03.5	-17.7'	60.8
9	314°14.2	• • 53.5	112°38.2	10.3'	04°45.8	-17.8'	60.8'
10	329°14.4	52.6	127°07.5	10.3'	04°28.0	-17.8'	60.8'
11 12	344°14.5 359°14.7	51.8 N11°51.0	141°36.8 156°06.1	10.4' 10.4'	04°10.2 \$03°52.4	-17.8' -17.8'	60.8' 60.8'
13	14°14.8	50.1	$170^{\circ}35.5$	10.4'	03°34.6	-17.8'	60.8'
14	29°15.0	49.3	185°05.0	10.4'	03°16.8	-17.9'	60.8'
15 16	44°15.2 59°15.3	· · 48.5 47.6	199°34.4 214°03.9	10.5' 10.5'	02°58.9 02°41.1	-17.9' -17.9'	60.8' 60.8'
17	74°15.5	46.8	214 03.9 228°33.4	10.5'	02°23.2	-17.9' -17.9'	60.8
18	89°15.6	N11°45.9	243°02.9	10.5'	S02°05.3	-17.9'	60.8
19 20	104°15.8 119°16.0	45.1 44.3	257°32.4 272°02.0	10.6' 10.6'	01°47.4 01°29.5	-17.9' -17.9'	60.8' 60.7'
21	134°16.1	• • 43.4	272 02.0 286°31.5	10.6'	01°29.5	-17.9' -17.9'	60.7
22	149°16.3	42.6	$301^{\circ}01.1$	10.6'	$00^{\circ}53.7$	-17.9'	60.7'
23	164°16.4	41.7	315°30.7	10.6'	00°35.8	-17.9'	60.7'
	SD = 15.8'	d = -0.8'		SI	O = 16.6'		

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

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

		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	99-98%		
19	03:38	03:31	12:04	-:-	11:54			
20	03:24	03:16	12:03	00:21	12:48			
21	03:09	03:01	12:03	01:13	13:39			

August 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	330°47.6	158°47.5	N04°51.4	250° 07.3	N22°53.6	254°02.2	N22°10.9	341°37.0	\$07°00.3			
				265°08.0		269°04.3		356°39.6		Alpheratz	357°34.8	29°13.6
1	345°50.1	173°47.2	50.2		53.7		10.9		00.4	Ankaa	$353^{\circ}07.1$	-42°10.1
2	0°52.6	188°46.8	48.9	280°08.8	53.8	284°06.4	10.9	11°42.2	00.5	Schedar	349°31.0	56°40.2
3	15°55.0	203°46.5	• • 47.7	295°09.5	• • 54.0	299°08.5	• • 11.0	26°44.9	• • 00.5	Diphda	348°47.4	-17°50.9
4	30°57.5	218°46.1	46.4	310°10.3	54.1	314°10.5	11.0	41°47.5	00.6	Achernar	335°20.0	-57°06.4
5	45°59.9	233°45.8	45.2	325°11.0	54.3	329°12.6	11.0	56°50.1	00.7	Hamal	327°51.4	23°34.7
6	61°02.4	248°45.5	N04°43.9	340°11.8	N22°54.4	344°14.7	N22°11.1	71°52.7	S07°00.8	Polaris	$314^{\circ}05.6$	89°21.8
7	76°04.9	263°45.1	42.6	355°12.5	54.6	359° 16.8	11.1	86°55.4	8.00	Acamar	$315^{\circ}11.9$	-40°12.0
8	91°07.3	278°44.8	41.4	10°13.3	54.7	14°18.9	11.1	101°58.0	00.9	Menkar	314°06.4	4°11.3
9	106°09.8	293°44.4	• • 40.1	25°14.0	• • 54.8	29°21.0	· · 11.1	117°00.6	•• 01.0	Mirfak	308°28.7	49°56.8
10	121°12.3	308°44.1 323°43.8	38.9	40°14.7	55.0	44°23.1	11.2	132°03.2 147°05.9	01.0	Aldebaran	290°40.0	16°33.6
11	136°14.7 151°17.2		37.6	55°15.5	55.1	59°25.2 74°27.3	11.2 N22°11.2	147 05.9 162°08.5	01.1	Rigel	281°04.3	-8°10.2
12		338°43.4	N04°36.4	70°16.2	N22°55.3				S07°01.2	Capella	280°22.5	46°01.2
13	166°19.7 181°22.1	353°43.1 8°42.7	35.1	85° 17.0 100° 17.7	55.4 55.5	89°29.4 104°31.5	11.3	177°11.1 192°13.7	01.3	Bellatrix	278°23.3	6°22.4
14 15	101 22.1 196°24.6	23°42.4	33.8 •• 32.6	115° 18.5	55.7	104 31.5 119°33.6	11.3 · · 11.3	207°16.4	01.3 · · 01.4	Elnath	278°02.4	28° 37.7
16	211°27.0	38°42.1	31.3	130° 19.2	55.8	119 35.0 134° 35.7	11.4	207 10.4 222°19.0	01.5	Alnilam	275°38.2	-1°11.0
	211 27.0 226° 29.5	50°42.1	30.1	130 19.2 145°20.0		134 35.7 149°37.8	11.4	237°21.6	01.5	Betelgeuse	270°52.6	7°24.8
17 18	241°32.0	68°41.4	N04°28.8	160° 20.7	56.0 N22°56.1	164° 39.9	N22°11.4	252°24.3	S07°01.6	Canopus	263°52.9	-52° 42.2
19	241 32.0 256°34.4	83°41.1	27.5	175° 21.5	56.2	104 39.9 179°42.0	11.4	267°26.9	01.7	Sirius	258°26.7	-16°44.8
20	250 34.4 271°36.9	98°40.7		175 21.5 190°22.2	56.4	179 42.0 194°44.1		282°29.5		Adhara	255°06.4	-29°00.1
21	271 30.9 286°39.4	96 40.7 113°40.4	26.3 •• 25.0	205° 23.0	56.5	209° 46.1	11.5 •• 11.5	202 29.5 297°32.1	01.8 · · 01.9	Procyon	244°51.4	5°09.8
21	280 39.4 301°41.8	113 40.4 128°40.0	23.8	205 23.0 220° 23.7	56.7	209 46.1 224°48.2	11.5	297 32.1 312°34.8	01.9	Pollux	243°18.0	27°58.0
23	316°44.3	128 40.0 143°39.7	23.6 22.5	235° 24.4	56.8	239° 50.3	11.5	312 34.6 327°37.4	01.9	Avior	$234^{\circ}15.5$	-59°35.1
			_							Suhail	222°47.0	-43°31.7
Mer.p	ass. 01:57	$\nu$ -0.3' d-1	3′ m-3.86	$ u$ 0.7 $^{\prime}$ d0	.1' m0.76	$\nu 2.1' \ d0.$	0′ m-2.21	$\nu$ 2.6 $^{\prime}$ d0	1' m0.65	Miaplacidus	221°39.3	-69°48.9
										Alphard	217°48.4	-8°45.8
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.1	11°51.0
6 0	дна 331°46.8	БПА 158°39.4	N04°21.2	250° 25.2	N22°56.9	254° 52.4	N22°11.6	342°40.0	S07°02.1	Dubhe	193°42.0	61°37.2
1	346°49.2	158 39.4 173°39.0	20.0	250 25.2 265° 25.9	N22 50.9 57.1	254 52.4 269°54.5	11.6	342 40.0 357°42.6	02.2	Denebola	182°25.5	14°26.2
2	340 49.2 1°51.7	173 39.0 188°38.7	20.0 18.7	205 25.9 280° 26.7	57.1 57.2	209 54.5 284° 56.6	11.0	12°45.3	02.2	Gienah	175°44.2	-17°40.7
3	16°54.2	203°38.4	•• 17.4	295° 27.4	57.3	299° 58.7	•• 11.7	27°47.9	02.2		173°01.1	-63°14.3
4	31°56.6	203°38.4 218°38.0	16.2	310°28.2	57.5	315°00.8	11.7	42°50.5	02.3	1	171°52.5	-57° 15.2
5	46°59.1	233°37.7	14.9	325° 28.9	57.6	330°02.9	11.7	57°53.2	02.4	Alioth	166°13.6	55°49.8
6	62°01.5	248°37.4	N04°13.7	340° 29.7	N22°57.7	345°05.0	N22°11.8	72°55.8	S07°02.5	Spica	158°22.8	-11°17.3
7	77°04.0	263°37.4	12.4	355°30.4	57.9	0°07.1	11.8	87°58.4	02.6	Alkaid	152°52.5	49°11.7
8	92°06.5	278°36.7	11.1	10°31.2	58.0	15°09.2	11.8	103°01.0	02.7	Hadar	148°36.8	-60°29.7
9	107°08.9	293°36.4	• • 09.9	25°31.9	. 58.1	30°11.3	•• 11.9	118°03.7	• • 02.8	1	147°58.2	-36° 29.5
10	122°11.4	308°36.0	08.6	40° 32.7	58.3	45° 13.4	11.9	133°06.3	02.8	Arcturus	145°48.3	19°03.4
11	137°13.9	323°35.7	07.3	55°33.4	58.4	60° 15.5	11.9	148°08.9	02.9	Rigil Kent.	139°41.0	-60°56.4
12	152°16.3	338°35.3	N04°06.1	70°34.2	N22°58.5	75° 17.6	N22°12.0	163°11.6	S07°03.0	Kochab	137°20.0	74°03.5
13	167°18.8	353°35.0	04.8	85°34.9	58.7	90°19.7	12.0	178°14.2	03.1	Zuben'ubi	136°56.5	-16°08.6
14	182°21.3	8°34.7	03.6	100°35.7	58.8	105°21.8	12.0	170°14.2	03.1	Alphecca	126°04.0	26°38.1
15	197°23.7	23°34.3	02.3	115°36.4	• • 58.9	120°23.9	• • 12.0	208°19.4	• • 03.2	Antares	112°16.2	-26°29.2
16	212°26.2	38°34.0	04°01.0	130°37.2	59.1	135°26.0	12.1	223°22.1	03.3	Atria	107°10.5	-69°04.5
17	227°28.6	53°33.7	03°59.8	145°37.9	59.2	150°28.1	12.1	238°24.7	03.4	Sabik	102°03.0	-15°45.3
18	242°31.1	68°33.3	N03°58.5	160°38.7		165°30.2	N22°12.1	253°27.3	S07°03.4	Shaula	96°10.6	-37°07.4
19	257°33.6	83°33.0	57.2	175°39.4	59.5	180°32.3	12.2	268°29.9	03.5	Rasalhague	95°58.7	12°32.7
20	272°36.0	98°32.7	56.0	190°40.2	59.6	195° 34.4	12.2	283°32.6	03.6	Eltanin	90°42.1	51°29.3
21	287°38.5	113°32.3	• • 54.7	205°40.9	• • 59.7	210°36.5	12.2	298°35.2	03.7	Kaus Aust.	83°32.7	-34°22.4
22	302°41.0	128°32.0	53.4	220°41.7	22°59.9	225°38.6	12.2	313°37.8	03.7	Vega	80°33.2	38°48.6
23	317°43.4	143°31.7	52.2	235°42.4	23°00.0	240°40.7	12.3	328°40.5	03.8	Nunki	75°47.9	-26°16.0
										Altair	62°00.0	8°56.1
Mer.p	ass. 01:53	$\nu$ -0.3′ d-1	3′ m-3.86	u0.7′ d0	.1'  m0.76	$\nu 2.1' \ d0.$	0′ m-2.21	$\nu$ 2.6′ d0	1' m0.64	Peacock	53°05.6	-56°39.4
										Deneb	49°25.6	45°22.2
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.8	9°59.4
0	332°45.9	158°31.4	N03°50.9	250° 43.2	N23°00.1	255° 42.8	N22°12.3	343°43.1		Al Na'ir	27°32.8	-46°50.4
1	347°48.4	173°31.0	49.6	265°43.9	00.2	270°44.9	12.3	358°45.7	04.0	Fomalhaut	15°14.5	-29°29.4
2	2°50.8	188°30.7	48.4	280°44.7	00.4	285°47.0	12.4	13°48.4	04.0	Scheat	13°45.2	28°13.0
3	17°53.3	203°30.4	• • 47.1	295°45.4	• • 00.5	300°49.2	. 12.4	28°51.0	04.1	Markab	13°29.9	15°20.3
4	32°55.8	218°30.0	45.8	310°46.2	00.6	315°51.3	12.4	43°53.6	04.2	Aug 22 Thu	SHA	Mer.pass
5	47°58.2	233°29.7	44.6	325°47.0	00.8	330°53.4	12.4	58°56.2	04.3		187°59.9	13:25
6	63°00.7	248°29.4	N03°43.3	340°47.7		345°55.5	N22°12.5		S07°04.3		$279^{\circ}19.7$	07:19
7	78°03.1	263°29.0	42.0	355°48.5	01.0	0°57.6	12.5	89°01.5	04.4	Jupiter		07:03
8	93°05.6	278°28.7	40.8	10°49.2	01.1	15°59.7	12.5	104°04.1	04.5	Saturn	$10^{\circ}49.4$	01:13
9	108°08.1	293°28.4	• • 39.5	25°50.0	01.3	31°01.8	• • 12.6	119°06.8	• • 04.6	A 22 -	6	
10	123°10.5	308°28.0	38.2	40°50.7	01.4	46°03.9	12.6	134°09.4	04.6	Aug 23 Fri	SHA	Mer.pass
11	138°13.0	323°27.7	37.0	55°51.5	01.5	61°06.0	12.6	149°12.0	04.7		186°52.6	13:26
12	153° 15.5	338°27.4	N03°35.7	70°52.2	N23°01.7	76°08.1	N22°12.6	164°14.6	S07°04.8	Mars		07:18
13	$168^{\circ}17.9$	353°27.1	34.4	85°53.0	01.8	91°10.2	12.7	179°17.3	04.9	Jupiter		07:00
14	183°20.4	8°26.7	33.2	$100^{\circ}53.7$	01.9	$106^{\circ}12.3$	12.7	$194^{\circ}19.9$	04.9	Saturn	10°53.3	01:09
15	198°22.9	23°26.4	• • 31.9	$115^{\circ}54.5$	•• 02.0	121°14.4	•• 12.7	$209^{\circ}22.5$	• • 05.0	Aug 24 Sat	SHA	Mer.pass
16	213°25.3	38°26.1	30.6	$130^{\circ}55.2$	02.2	$136^{\circ}16.5$	12.8	224°25.2	05.1		185°45.5	13:26
17	228°27.8	53°25.7	29.3	$145^{\circ}56.0$	02.3	151°18.6	12.8	239°27.8	05.2	l l	277°57.3	07:17
18	243°30.3	68°25.4	N03°28.1	$160^{\circ}56.8$	N23°02.4	166°20.7	N22° 12.8	254°30.4	S07°05.2		282°56.9	06:56
19	258°32.7	83°25.1	26.8	$175^{\circ}57.5$	02.5	181°22.8	12.8	269°33.1	05.3	Saturn	10°57.2	01:05
20	273°35.2	98°24.7	25.5	190°58.3	02.6	196°25.0	12.9	284°35.7	05.4			
21	288°37.6	113°24.4	• • 24.3	205°59.0	•• 02.8	$211^{\circ}27.1$	•• 12.9	299°38.3	• • 05.5	Horizont	al parallax	
22	303°40.1	128°24.1	23.0	220°59.8	02.9	226° 29.2	12.9	314°40.9	05.5		Venus:	0.1
23	318°42.6	143°23.8	21.7	236°00.5	03.0	241°31.3	13.0	329°43.6	05.6		Mars:	0.1
Mern	ass. 01:49	v-0 3/ d 1	3′ m-3.86	νη 8/ <b>Α</b> υ	.1′ m0.75	ν2 1' dΩ	0′ m-2.22	1/2 6/ d0	.1′ m0.64			
р		- 0.0 u-1	5.00									

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°16.6	N11°40.9	330°00.4	10.6'	S00°17.9	-17.9'	60.7'
1 2	194°16.8 209°16.9	40.1 39.2	344°30.0 358°59.6	10.6' 10.7'	N00°00.0 00°17.9	17.9' 17.9'	60.7' 60.7'
3	224°17.1	• • 38.4	13° 29.3	10.7'	00°35.8	17.9	60.7'
4	239°17.2	37.5	27°59.0	10.7'	00°53.7	17.9'	60.7'
5	254°17.4 269°17.6	36.7 N11°35.8	42°28.7 56°58.3	10.7' 10.7'	01°11.5 N01°29.4	17.8' 17.8'	60.7' 60.7'
6 7	269 17.6 284°17.7	N11 35.8 35.0	50 58.3 71°28.0	10.7'	01°47.2	17.8	60.6
8	299°17.9	34.2	85°57.7	10.7'	02°05.0	17.8'	60.6'
9	314°18.1	• • 33.3	100°27.4	10.7'	02°22.8	17.8'	60.6'
10 11	329°18.2 344°18.4	32.5 31.6	114°57.1 129°26.8	10.7' 10.7'	02°40.6 02°58.3	17.7' 17.7'	60.6' 60.6'
12	359°18.5	N11°30.8	143°56.5	10.7	N03°16.1	17.7	60.6
13	14°18.7	29.9	$158^{\circ}26.2$	10.7'	03°33.7	17.7'	60.6'
14	29°18.9 44°19.0	29.1	172°55.9	10.7'	03°51.4	17.6'	60.5'
15 16	59°19.2	· · 28.2 27.4	187°25.6 201°55.3	10.7' 10.7'	04°09.0 04°26.7	17.6' 17.6'	60.5' 60.5'
17	74°19.4	26.5	216°25.0	10.7'	04°44.2	17.5'	60.5
18	89°19.5	N11°25.7	230°54.7	10.7'	N05°01.8	17.5'	60.5
19 20	104°19.7 119°19.9	24.8 24.0	245°24.4 259°54.0	10.7' 10.6'	05°19.2 05°36.7	17.5' 17.4'	60.5' 60.4'
21	134°20.0	• • 23.1	274°23.7	10.6'	05°54.1	17.4	60.4
22	149°20.2	22.3	288°53.3	10.6'	$06^{\circ}11.5$	17.3'	60.4'
23	164°20.3	21.5	303°22.9	10.6'	06°28.8	17.3'	60.4'
	SD = 15.8'	d = -0.8'		SI	O = 16.6'		
Fri	GHA	Dec	GHA	ν	Dec	d	НР
0	179°20.5	N11°20.6	$317^{\circ}52.5$	10.6'	N06°46.1	17.2'	60.4'
1	194°20.7 209°20.8	19.8 18.9	332°22.1 346°51.7	10.6'	07°03.3 07°20.5	17.2'	60.4'
2	209°20.8 224°21.0	18.9	1°21.2	10.5' 10.5'	07°20.5 07°37.6	17.1' 17.1'	60.3' 60.3'
4	239°21.2	17.2	15°50.7	10.5'	07°54.7	17.0'	60.3
5	254°21.3	16.4	30°20.2	10.5'	08°11.7	17.0'	60.3
6 7	269°21.5 284°21.7	N11° 15.5 14.7	44°49.7 59°19.2	10.5' 10.4'	N08°28.7 08°45.6	16.9' 16.8'	60.3' 60.2'
8	299°21.8	13.8	73°48.6	10.4	00°43.0	16.8	60.2
9	314°22.0	• • 12.9	$88^{\circ}18.0$	10.4'	$09^{\circ}19.2$	16.7'	60.2'
10 11	329°22.2 344°22.3	12.1 11.2	102°47.4 117°16.8	10.4' 10.3'	09°35.9 09°52.6	16.6' 16.6'	60.2' 60.2'
12	359°22.5	N11° 10.4	117 10.8 131°46.1	10.3	N10°09.1	16.5	60.1
13	14°22.7	09.5	146° 15.4	10.3'	10°25.7	16.4'	60.1'
14	29°22.8	08.7 •• 07.8	160°44.7	10.2'	10°42.1	16.4' 16.3'	60.1
15 16	44°23.0 59°23.2	07.8	175°13.9 189°43.1	10.2' 10.2'	10°58.5 11°14.8	16.3	60.1' 60.0'
17	74°23.4	06.1	204° 12.3	10.1'	11°31.0	16.1'	60.0'
18	89°23.5	N11°05.3	218°41.4	10.1'	N11°47.1	16.1'	60.0'
19 20	104°23.7 119°23.9	04.4 03.6	233°10.5 247°39.6	10.1' 10.0'	12°03.2 12°19.2	16.0' 15.9'	60.0' 59.9'
21	134°24.0	02.7	262°08.6	10.0'	12°35.1	15.8'	59.9'
22	149°24.2	01.8	276° 37.6	9.9'	12°50.9	15.7'	59.9'
23	164°24.4	01.0	291°06.6	9.9'	13°06.7	15.6'	59.9'
	$\frac{SD = 15.8'}{}$	d = -0.8'		SI	O = 16.5'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°24.5	N11°00.1 10°59.3	305°35.5	9.9'	N13°22.3 13°37.9	15.6'	59.8'
1 2	194°24.7 209°24.9	10 59.3 58.4	320°04.3 334°33.2	9.8' 9.8'	13°53.3	15.5' 15.4'	59.8' 59.8'
3	224°25.0	• • 57.6	$349^{\circ}01.9$	9.7'	14°08.7	15.3'	59.8'
4	239°25.2	56.7	3°30.7	9.7'	14°24.0	15.2'	59.7'
5 6	254°25.4 269°25.6	55.8 N10°55.0	17°59.4 32°28.0	9.6' 9.6'	14°39.2 N14°54.3	15.1' 15.0'	59.7' 59.7'
7	284°25.7	54.1	46° 56.6	9.6'	15°09.3	14.9'	59.7
8	299°25.9	53.3	61°25.2	9.5'	15°24.2	14.8'	59.6'
9 10	314°26.1 329°26.2	· · 52.4 51.6	75°53.7 90°22.1	9.5' 9.4'	15°39.0 15°53.7	14.7' 14.6'	59.6' 59.6'
11	344°26.4	50.7	104°50.5	9.4'	16°08.3	14.5	59.5
12	359°26.6	N10°49.8	119° 18.9	9.3'	N16°22.8	14.4'	59.5'
13 14	14°26.8 29°26.9	49.0 48.1	133° 47.2 148° 15.5	9.3' 9.2'	16°37.2 16°51.4	14.3' 14.2'	59.5' 59.5'
15	29 26.9 44°27.1	· · 47.2	148 15.5 162°43.7	9.2 9.2'	16 51.4 17°05.6	14.2 14.1'	59.5 59.4'
16	59°27.3	46.4	$177^{\circ}11.8$	9.1'	17°19.7	13.9'	59.4'
17	74°27.4	45.5	191°39.9	9.0'	17°33.6	13.8'	59.4'
18 19	89°27.6 104°27.8	N10°44.7 43.8	206°08.0 220°36.0	9.0' 8.9'	N17°47.5 18°01.2	13.7' 13.6'	59.3' 59.3'
20	119°28.0	42.9	235°03.9	8.9'	18°14.8	13.5	59.3'
21	134°28.1	• • 42.1	249°31.8	8.8'	18°28.3	13.4'	59.3'
22 23	149°28.3 164°28.5	41.2 40.4	263°59.6 278°27.4	8.8' 8.7'	18°41.6 18°54.9	13.2' 13.1'	59.2' 59.2'
23	$\frac{104 \ 26.5}{\text{SD} = 15.8'}$	d = -0.9'	210 21.4		D = 16.3'	13.1	33.4
	שט = 15.δ' 	$a = -0.9^{\circ}$		51	∠ = 10.3°		

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

Lat.		Moonris	е		Moonset	:
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°	19:33	18:46	17:12	08:44	11:20	14:45
N 70°	19:40	19:06	18:11	08:41	11:03	13:48
68°	19:46	19:21	18:46	08:38	10:50	13:14
66°	19:51	19:34	19:12	08:36	10:40	12:50
64°	19:55	19:45	19:32	08:34	10:31	12:32
62°	19:59	19:54	19:48	08:33	10:23	12:17
60°	20:03	20:02	20:02	08:31	10:17	12:04
N 58°	20:05	20:09	20:14	08:30	10:11	11:53
56°	20:08	20:15	20:24	08:29	10:06	11:44
54°	20:11	20:21	20:33	08:28	10:02	11:36
52°	20:13	20:26	20:42	08:27	09:58	11:28
50°	20:15	20:30	20:49	08:27	09:54	11:21
45°	20:19	20:40	21:05	08:25	09:46	11:07
<b>N</b> 40°	20:23	20:49	21:18	08:23	09:40	10:56
35°	20:26	20:56	21:29	08:22	09:34	10:46
30°	20:29	21:03	21:39	08:21	09:29	10:37
20°	20:34	21:14	21:56	08:19	09:21	10:23
N 10°	20:38	21:24	22:11	08:18	09:13	10:10
0°	20:43	21:33	22:26	08:16	09:06	09:58
<b>S</b> 10°	20:47	21:43	22:40	08:14	08:59	09:46
20°	20:51	21:53	22:55	08:13	08:52	09:33
30°	20:57	22:05	23:13	08:11	08:44	09:19
35°	21:00	22:12	23:24	08:10	08:39	09:11
40°	21:03	22:19	23:36	08:08	08:34	09:01
45°	21:07	22:29	23:50	08:07	08:28	08:50
<b>S</b> 50°	21:12	22:40		08:05	08:20	08:37
52°	21:15	22:45		08:04	08:17	08:31
54°	21:17	22:51		08:04	08:13	08:24
56°	21:20	22:57		08:03	08:09	08:17
58°	21:23	23:05		08:02	08:04	80:80
<b>S</b> 60°	21:27	23:13		08:00	07:59	07:59

		Sun		Moon				
Day	Eqn.of	f Time	Mer.	Mer.	Age			
_u,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	18-20		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	93-76%		
22	02:54	02:46	12:03	02:04	14:29			
23	02:38	02:30	12:02	02:54	15:20			
24	02:22	02:14	12:02	03:45	16:12			

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

Fig.   Girk   Girk   Dec   Girk   Gi	h	Aries	Ve	` nus	M	ars	Jup	oiter	Sat	urn		Stars	
1   339/45   1772-14   101-20   280-70.0   329-13.1   291-13.1   349-74.2   379-74.2	Sun	CHV	CHV.	Doc	CHA	Doc	CHA	Doc	CHA	Doc		SHA	Doc
1 1447-47 17-22-23 1 19 20 200-20 03 3 201-26 130 201-26 130 201-26 201-												SHA	Dec
2   1970   1987   198											Alpheratz	357°34.8	29°13.6
1											Ankaa	$353^{\circ}07.1$	-42°10.1
3   35   50   201   21   15.4   311   63.5   30.7   313   64.6   13.1   44   55.7   30.6   45.7   30.7   31											Schedar	349°31.0	56°40.2
14											Diphda	348°47.3	-17°50.9
Section   Sect											Achernar	335°20.0	-57°06.4
7 9°023 28°211 11.6 \$50°06 0.0 1°022 132 90°016 0.0 2 8 9°1017 27°202 0.0 31 100 3 110°07 0.0 3 132 00°07 0.0 3 10 12°107 0.0 20°02 0.0 77 41°09 0.0 1.0 110°05 133 10°17 0.0 110°107 0.0											Hamal	$327^{\circ}51.4$	23°34.7
8 e <sup>4</sup> fe 7 278° 388 10.3   11°07.3   0.4   16°8.0.3   13.2   10°07.0   0.63   0.40° 0.61   0.62   0.12° 0.7   0.63   0.65° 0.7   0.65° 0											Polaris	314°03.9	89°21.8
10   10   10   10   10   10   10   10											Acamar	$315^{\circ}11.9$	-40°12.0
10   124**1997   30**2002   97.7   41**08.9   90.3   46**94.5   13.3   135**12.5   96.4											Menkar	$314^{\circ}06.4$	4°11.3
11 139"121. 393"198											Mirfak	308°28.6	49°56.8
13 109174 338195 N3705 239 867111 047 97008 133 1091713 507065 CLAW 339195 24701 11 047 97008 133 109174 308195 047 9701 11 047 97008 133 109174 308195 047 9701 131 131 047 97008 133 109174 30 06 6 CLAW 339195 239 30 02 1 13134 0 31 1317072 134 135 109174 130 06 6 CLAW 339195 239 30 070 070 070 070 070 070 070 070 070											Aldebaran	290°40.0	16°33.6
13   109   171   39   39   39   39   39   111   94   30   177   92   93   39   123   380   204   96   77   15   199   220   231   39   231   30   231   30   231   30   231   30   231   30   30   30   30   30   30   30											Rigel	281°04.3	-8°10.2
14   189*199   91*189   0.27   101*119   0.88   107*02.9   13.4   395*22.0   0.67   1.68											Capella	280°22.5	46°01.2
1997    220   2318-5   1.01   1.01   1.07											Bellatrix	278°23.3	6°22.4
214°245   33°112   03°01   131°134   05.1   137°072   134   22°83   0.09   07.0   05°8.0   141°142   05.2   15°093   131°15   200°30   07.0   05°8.0   141°142   05.2   15°093   131°15   200°30   07.0   05°8.0   141°143   05°30											Elnath		
18   244°904   68°176   00°568   146°142   052°   052°   150°   093   13.5   240° 30.9   07.0   07											Alnilam		
284   294   294   294   295   38   317   29   295   38   317   29   39   39   39   39   39   39   39											Betelgeuse	270°52.6	
299°310   391°12   503   176°157   054   182°135   135   20°262   071   150°27   136   130°415   172   136   172   136   172   136   172   136   172   172   136   172													
20													
22 304°36.8 113°16.6 · 53.7 206°17.2 · 0.6.6 212°17.7 · 13.6 305°41.5 · 0.73 d.  23 319°41.7 143°15.9 · 51.2 226°18.7 0.6.9 226°19.2 0 13.6 313°44.1 0.74 d.  Mer.pass. 01.45 · .0.33 d· 1.3 m·													
22 304*39.2 122*6.3 5.5 22*18.0 6.5 7 22*19.8 13.6 315*44.1 074.  Mer. pass. 01.45													
Mon   GHA   Char   Ch													
Mon   GHA   CHA   Dec   GHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA	23	319°41.7							330°46.7		l .		
Mon   GHA   GHA   Dec   GHA		01.45		2/ 2.06		1/ 0.74	0.1/ /0	0/ 0.00	0.6/10		l .		
Mon   GHA   Dec   GHA   Dec   GHA   Dec   CHA   Dec   Dubbe   137:35.1   119:0.0   Dubbe   237:35.1   2	Mer.p	ass. 01:45	$\nu$ -0.3′ d-1	3′ m-3.86	$\nu$ 0.8′ d0	.1′ mU.74	$\nu 2.1' d0.$	u′ m-2.22	$\nu$ 2.6′ d0	.1′ m0.64			
Mon   GHA													
1 394"442 188"156 N02"499 251"195 N23"060 25"241 N22"137 345"493 20"7075 Density 12.2 1.2 13.3 19"51.0 139"466 173"153 486 26"203 36"610 172"262 13.7 10"520 076 C	Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec			
1 349"46.6 173"15.3 4 46.6 266"20.3 06.1 272"25.2 13.7 0"52.0 0"7.6 clean.b 175"42. 177"60.7 23"14.0 31"15.0 474 281"21.0 06.2 287"28.3 13.7 15"54.6 0"7.7 40"1.0 181"15.0 474 281"21.0 06.2 287"28.3 13.7 15"54.6 0"7.7 40"1.0 181"15.0 44.6 1.20"21.8 0.63 30"30.4 1.37 30"57.2 0"7.7 40"1.0 181"15.0 44.0 218"14.3 44.8 31"22.5 0.64 31"22.5 13.8 45"5.9 0.0 18 50"6.8 1.0 181"2.5 5.0 0.64 31"22.5 13.8 45"5.9 0.0 18 50"6.8 1.0 181"2.5 5.0 0.64 31"2.5 5.0 0.0 18 50"6.0 18	0	334°44.2	158°15.6	N02°49.9	251°19.5	N23°06.0	257°24.1	N22°13.7	345°49.3	\$07°07.5			
2 4 449.1 88°15.0 203°14.6 461. 281°21.0 06.2 287°28.3 13.7 15°24.6 07.7 3 19°51.6 203°14.6 461. 280°21.8 663. 302°30.4 1.3.7 30°57.2 07.7 4.3 18°51.0 203°14.6 461. 280°21.8 663. 302°30.4 1.3.7 30°57.2 07.7 4.3 18°51.0 203°14.0 4.8 311°22.5 06.4 311°22.5 13.8 45°59.9 07.8 6.5 182°32.3 13.8 11°22.5 06.5 332°34.7 13.8 45°59.9 07.8 6.5 182°32.3 11°32.5 06.5 332°34.7 13.8 45°59.9 07.8 6.5 182°32.3 11°32.5 06.5 332°34.7 13.8 45°59.9 07.8 6.5 182°32.3 11°32.5 06.5 332°34.7 13.8 10°20.5 00°08.0 182°32.3 11°32.5 180°0.0 180°0.1 180°													
3 19-51.6 233-14.6 461 296-21.8 06.3 300-30.4 13.7 30-57.2 07.7 4 43-49-0 218-14.3 44.8 311-22.5 06.4 317-32.5 13.8 45-59.9 07.8 5 64-65.0 281-13.7 44.5 300-30.4 13.7 30-57.2 07.8 5 07.9 5 64-65.0 281-13.7 102-24.2 311-22.5 06.5 33.7-34.7 13.8 61-02.5 07.9 5 14.1 1	2	4°49.1	$188^{\circ}15.0$	47.4	281°21.0	06.2	287°28.3	13.7	15°54.6	07.7			
34   34   34   34   34   31   22   5   0.64   317   32   318   318   39   90   07.8	3	19°51.6	203°14.6	• • 46.1	296°21.8	• • 06.3	302°30.4	• • 13.7	30°57.2	• • 07.7			
5	4	34°54.0	218°14.3	44.8	311°22.5	06.4	317°32.5	13.8	45°59.9	07.8	l .		
6 64°99.0 248°13.7 0.2°42.3 341°24.1 N22°06.7 347°36.8 N22°13.8 76°05.1 S07′08.0 Aliaid 152°52.5 49°11.7 78°01.4 203°13.3 41.0 36°24.8 0.68 2°38.9 13.8 76°05.1 S07′08.0 B.0 B.0 95°03.9 278°13.0 39.7 11°25.6 0.68 2°38.9 13.8 76°05.1 S07′08.0 B.0 Hadra 148°36.8 6.0°2.9 7.0°2.0 2°47.4 13.9 106°10.4 08.1 Hadra 148°36.8 6.0°2.9 7.0°2.0 2°47.4 13.9 120°13.0 N8.2 Actum. 145°8.3 19°03.4 11.140°11.3 323°12.0 35.9 65°27.9 0.72 62°47.4 13.9 136°15.7 08.3 N8.3 12°13.7 338°11.7 0°34.6 71.26 N22°07.3 77°49.5 N22°14.0 166°20.9 S07′08.4 N6.2 13°70.1 11.140°11.3 323°11.4 33.3 86°29.4 0.74 92°51.6 14.0 166°20.9 S07′08.4 N6.2 13°70.1 11.2 11°21.3 10°30.2 0.76 107°53.7 14.0 196°52.2 0.86 Alphea. 126°04.0 26°38.1 14.1 85°18.7 8°11.1 32.1 101°30.2 0.76 107°53.7 14.0 196°52.2 0.86 Alphea. 126°04.0 26°38.1 11.1 101°10.2 35°11.1 42°32.1 101°30.2 0.76 107°53.7 14.0 196°52.2 0.86 Alphea. 126°04.0 26°38.1 11.1 101°10.2 0.0°56.1 12°32.8 N6.2 11.1	5	49°56.5	233°14.0	43.5	326°23.3	06.5	332°34.7	13.8	61°02.5	07.9	l .		
8 96°01.4 268°13.3 41.0 366°24.8 06.8 2°38.9 13.8 91°07.8 08.0 1 Hadar 148°36.8 -60°29.7 10°10.6 8 95°09.7 21°12.5 06.9 110°06.4 293°12.7 38.4 26°26.4 · 0.70 32°43.1 · 13.9 121°13.0 · 08.1 10°10.0 110°10.0 12°10.0	6	64°59.0	248°13.7	N02°42.3	341°24.1	N23°06.7	347°36.8	N22°13.8	$76^{\circ}05.1$	S07°08.0			
8 95°03.9 278°13.0 39.7 11°25.6 0.69 17°41.0 13.9 106°10.4 081. 9 110°06.4 293°12.7 38.4 26°26.4 0.70.0 32°34.1 13.9 121°13.0 082. 10 125°08.8 308°12.4 37.2 41°27.1 07.1 47°45.2 13.9 136°15.7 08.3 11 140°11.3 323°12.0 35.9 56°27.9 07.2 62°47.4 13.9 151°18.3 08.3 12 155°13.7 338°11.7 402°34.6 71°28.6 N23°07.3 77°49.5 N22°14.0 166°20.9 507°08.4 13 170°16.2 333°11.1 4 33.3 86°29.4 07.4 92°51.6 14.0 181°23.6 08.5 14 185°18.7 8°11.1 32.1 101°30.2 07.6 107°53.7 14.0 160°20.9 507°08.4 15 200°21.1 23°10.7 0.30.8 116°30.9 07.7 122°5.8 14.1 211°28.8 08.6 15 200°21.1 23°10.7 0.30.8 116°30.9 07.7 122°5.8 14.1 211°28.8 08.6 16 215°23.6 38°10.4 29.5 131°31.7 07.6 137°58.0 14.1 241°34.1 08.8 17 230°26.1 53°10.1 29.5 131°31.7 07.6 137°58.0 14.1 241°34.1 08.8 18 245°28.5 68°09.8 N02°26.9 101°33.2 N23°08.0 168°02.2 N22°14.1 265°36.7 507°09.4 20 275°33.5 98°09.1 24.4 191°34.8 08.2 198°06.4 14.2 266°30.7 09.9 21 200°35.9 113°08.8 23.1 206°35.5 08.3 215°08.6 14.2 201°34.6 09.1 22 200°33.4 128°08.5 21.8 221°30.3 08.4 228°10.7 14.2 301°44.6 09.1 23 330°40.9 143°08.2 206°35.5 08.3 215°08.6 14.2 301°44.6 09.1 24 5°48.2 188°07.2 218°06.6 14.2 216°30.4 08.9 218°30.2 14.3 31°49.9 09.2 25 8°48.2 188°07.2 216°6.7 286°30.8 227°17.0 14.3 16°57.8 09.5 50°55.6 233°06.2 14.2 311°40.9 09.1 318°23.4 14.4 47°0.1 09.9 418°2.6 48°0.2 14.3 15°45.8 20°0.0 8°56.1 32°3.2 30°38.0 100°2.1 14.4 32°0.4 09.6 43°3.5 14.0 09.5 14°40.9 09.1 318°23.4 14.4 47°0.1 09.9 418°2.6 48°0.2 18°2.0 18°3.0 14.1 10°40.2 316°40.9 09.1 318°23.4 14.4 47°0.1 09.9 418°2.2 18°0.0 8°56.1 13°3.0 11°40.9 09.1 318°23.4 14.4 14°0.1 10°1.8 09.9 111°0.5 203°0.5 0.0 11°40.3 138°40.9 14.4 12°20.1 10°1.3 09.9 14.1 15°1.4 122°1.0 10.0 14.1 11°1.0 10°1.0 1	7	80°01.4	263°13.3	41.0	356°24.8	06.8	2°38.9	13.8	91°07.8	08.0			
10 126'06.48 306'12.4 37.2 41'27.1 07.1 47'45.2 139 136'15.7 08.3 11 140'11.3 323'12.0 35.9 56'27.9 07.2 62'47.4 13.9 151'18.3 08.3 11.1 140'11.3 323'12.0 35.9 56'27.9 07.2 62'47.4 13.9 151'18.3 08.3 11.1 140'11.3 323'12.0 35.9 56'27.9 07.2 62'47.4 13.9 151'18.3 08.3 11.1 140'11.3 323'12.0 35.9 156'27.9 07.2 62'47.4 13.9 151'18.3 08.3 11.1 140'11.3 323'12.0 35.9 150'19.1 140'11.3 36'30.1 170'16.2 353'11.4 33.3 86'29.4 07.4 92'51.6 14.0 186'20.9 06.6 6.6 14.1 18.1 18.2 11.1 19.1 101'30.2 07.6 107'53.7 14.0 196'20.5 08.5 6.1 14.1 18.1 12.2 15.2 08.5 1.1 11.1 19.1 101'30.2 07.6 107'53.7 14.0 196'20.5 08.5 14.1 11.2 12.8 14.1 11'20.8 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	8	95°03.9	278°13.0	39.7		06.9		13.9	$106^{\circ}10.4$	08.1			
10 125°08.8 308°12.4 37.2 4°27.1 07.1 47°45.2 13.9 151°15.7 08.3 111°13.3 23°12.0 35.9 56°27.9 07.2 62°47.4 13.9 151°18.7 08.3 08.3 12 155°13.7 380°11.7 08°5.9 56°27.9 07.2 62°47.4 13.9 151°18.3 08.3 08.3 12 155°13.7 380°11.7 08°11.4 33.3 86°29.4 07.4 92°51.6 14.0 181°26.2 08.6 14.1 121°16.2 383°11.1 32.1 101°30.2 07.6 107°53.7 14.0 196°26.2 08.6 14.1 121°26°2.1 128.8 08.6 15.2 00°21.1 23°10.1 32.1 101°30.2 07.6 107°53.7 14.0 196°26.2 08.6 14.1 21°26°2.1 128.8 08.6 14.1 21°26°2.2 11°28.8 08.6 14.1 21°26°2.2 11°28.8 08.6 14.1 21°26°2.2 11°28.8 08.6 14.1 21°26°2.2 11°28.8 08.6 14.1 21°26°2.1 12°26°2.1 12°26°4.0 26°30.1 12°26°4.1 26°31.5 08.7 14.1 241°34.1 08.8 14.1 241°38.0 08.7 158°00.1 14.1 241°34.1 08.8 14.1 21°26°3.1 12°36°4.0 26°31.5 08.7 158°00.1 14.1 241°34.1 08.8 158°00.2 14.1 241°34.1 08.8 158°00.2 14.1 241°34.1 08.8 158°00.2 14.1 241°34.1 08.8 158°00.2 14.1 241°34.1 08.8 158°00.2 14.1 121°34.1 08.8 158°00.2 14.2 11°30°8.0 14.2 21°36°3.0 14.2 21	9	110°06.4	293°12.7	• • 38.4	26°26.4	• • 07.0	32°43.1	•• 13.9	121°13.0	• • 08.2			
11   140°11.3   333°11.7   N02°34.6   77°36.6   N23°07.3   77°49.5   N22°14.0   166°0.9   50°08.4   12   15°13.7   338°11.7   N02°34.6   77°36.6   N23°07.3   77°49.5   N22°14.0   166°0.9   50°08.4   13   170°16.2   335°11.4   33.3   86°29.4   07.4   92°51.6   14.0   181°23.6   08.5   14   185°18.7   8°11.1   32.1   101°30.2   07.6   107°83.7   14.0   196°26.2   08.6   Alphecta   126°04.0   26°38.1   Artara   112°16.2   26°83.1   Artara   107°10.6   69°04.5   Sabi   102°30.0   15°45.3   Shaula   96°10.6   69°04.5   Sabi   102°30.1   28.2   146°32.5   07.9   153°00.1   14.1   241°34.1   08.8   Shaula   96°10.6   69°04.5   Sabi   102°30.5   55°0.1   26°0.4   191°34.8   08.2   198°06.4   14.2   286°40.7   08.9   Sabi   12°30.1   28°0.2   146°32.5   07.9   138°04.3   14.2   221°39.4   08.9   Sabi   12°30.1   28°0.2   138°08.5   21.8   221°36.3   08.4   228°10.7   14.2   316°47.3   09.2   Sabi   13°08.8   -231   206°35.5   08.3   213°08.6   14.2   301°44.6   09.1   Sabi   13°09.1   141°08.2   20.6   236°37.1   08.5   245°12.8   14.3   311°49.9   09.2   Sabi   13°504.8   173°705.5   18.0   26°63.6   08.8   08.8   233°40.9   Sabi   13°507.5   18.0   26°63.6   08.8   08.8   23°17.0   14.3   15°52.0   09.4   Sabi   13°504.8   173°705.5   18.0   26°63.6   08.8   08.8   23°17.0   14.3   15°57.8   09.5   Sabi   13°308.8   09.9   288°19.2   14.3   31°49.9   09.2   Sabi   13°606.6   14.2   311°40.9   09.1   318°33.4   14.4   47°03.1   09.6   09.6   Sabi   13°40.9   09.1   318°33.4   14.4   47°03.1   09.6	10	125°08.8	308°12.4	37.2	41°27.1	07.1		13.9	$136^{\circ}15.7$	08.3			
12   155   13.7   338"   11.4   0.02"   34.6   0.73"   0.75   0.75"													
13 170°16.2 353°11.4 33.3 86°29.4 07.4 92°51.6 14.0 181°23.6 08.5 14 181°23.6 08.5 15.2 00°21.1 23°10.7 · 30.8 116°30.9 · 07.7 122°55.8 · 14.1 211°28.8 · 08.6 16°21.2 126°20.2 08.6 16°21.2 126°20.5 131°31.7 · 07.8 137°58.0 14.1 226°31.5 · 08.7 17 230°26.1 53°10.1 28.2 146°32.5 · 07.9 153°00.1 14.1 241°34.1 08.8 102°03.0 - 15°45.3 102°03.0 - 15°45.3 102°03.0 183°09.5 25.7 176°34.0 08.1 183°04.3 14.2 271°39.4 08.9 122°35.5 Spin. 183°09.5 25.7 176°34.0 08.1 183°04.3 14.2 271°39.4 08.9 122°35.3 13°08.6 · 14.2 28°07.3 14.0 183°04.3 14.2 271°39.4 08.9 122°35.3 13°08.6 · 123°2.3 13°08.6 · 123°2.3 13°08.6 · 123°2.3 13°08.6 · 123°2.3 13°08.6 · 123°2.3 13°08.6 · 123°2.3 13°08.6 · 123°2.3 13°08.6 · 123°2.3 13°08.6 · 123°2.3 12°0.2 143°08.2 20.6 236°37.1 08.5 243°12.8 14.3 331°49.9 09.2 14.3 15°0.5											l .		
14   185*18.7   8*11.1   32.1   101*30.2   07.6   107*53.7   14.0   196*26.2   08.6   14.1   211*28.8   08.6   16   215*23.6   38*10.4   29.5   131*31.7   07.8   137*98.0   14.1   226*31.5   08.7   14.1   21*34.1   08.8													
16 200°21.1 23°10.7 · 30.8 116°30.9 · 0.7.7 122°55.8 · 14.1 210°28.8 · 0.8.6 162°12.3 6 38°10.4 295 131°31.7 07.8 137°58.0 14.1 241°34.1 08.8 137°58.0 14.1 241°34.1 08.8 18 245°28.5 68°08.8 NO2°60.9 161°33.2 N23°08.0 168°02.2 N22°14.1 241°34.1 08.8 18 24°32.8 56°09.8 NO2°60.9 161°33.2 N23°08.0 168°02.2 N22°14.1 241°34.1 08.8 18 24°32.5 N23°08.0 168°02.2 N22°14.1 241°34.1 08.8 18 24°32.9 N22°14.3 128°08.5 98°09.1 24.4 191°34.8 08.2 198°06.4 14.2 286°42.0 09.0 18 20°35.9 118°08.8 · 23.1 206°35.5 · 08.3 213°08.6 · 14.2 286°42.0 09.0 18 20°35.9 118°08.8 · 23.1 206°35.5 · 08.3 213°08.6 · 14.2 310°44.6 · 09.1 18 20°30.9 N23°35.9 118°08.5 · 21.8 221°36.3 08.4 228°10.7 14.2 316°47.3 09.2 Altair 62°00.0 8°56.1 M22°32.3 20°40.9 143°08.2 20.6 236°37.1 08.5 243°12.8 14.3 316°47.3 09.2 Altair 62°00.0 8°56.1 M23°32.3 32°40.9 143°08.2 20.6 236°37.1 08.5 243°12.8 14.3 316°47.3 09.2 Altair 62°00.0 8°56.1 M23°32.3 32°40.9 143°07.5 18.0 266°38.6 08.8 273°17.0 14.3 1°55.2 09.4 18.0 18.0 266°38.6 08.8 273°17.0 14.3 1°55.2 09.4 18.0 18.0 266°38.6 08.8 273°17.0 14.3 1°55.2 09.4 18.0 18.0 266°38.6 08.8 273°17.0 14.3 1°55.2 09.4 18.0 18.0 266°38.6 08.8 273°17.0 14.3 1°55.2 09.4 18.0 18.0 18.0 266°38.6 08.8 273°17.0 14.3 1°55.2 09.4 18.0 18.0 18.0 18.0 18.0 18.0 18.0 18.0													
16 215°23.6 38°10.4 295 131°31.7 07.8 131°31.7 07.9 131°31											1		
18 245°28.5 68°09.8 No2°26.9 161°32.2 No.2°4.2 No.2°4.2 No.2°4.1 14.1 241°34.1 08.8 No.2°4.2													
19   260°31.0   83°09.5   25.7   176°34.0   08.1   183°04.3   14.2   271°39.4   08.9   183°04.5   12.5.7   12											Shaula	96°10.6	-37°07.4
20 275°33.5 98°09.1 24.4 191°34.8 08.2 198°06.4 14.2 286°4.0 09.0 c   21 290°35.9 113°08.8 · 23.1 206°35.5 · 08.3 213°08.6 · 14.2 316°47.3 09.2   23 305°38.4 128°08.5 21.8 221°36.3 08.4 228°10.7 14.2 316°47.3 09.2    Mer.pass. 01:41											Rasalhague	95°58.7	12°32.7
21   290°359   113°08.8     23.1   206°35.5     08.3   213°08.6     14.2   301°44.6     0.9.1     Nais Alsa B.   33.3   38°48.6   23.3   300°40.9   143°08.2   20.6   236°37.1   08.5   243°12.8   14.2   313°49.9   0.9.2     Nunki   75°47.9     26°16.0     Nunki   75°47.8     Nunki   75°47.8     Nunki   75°47.8     Nunki											Eltanin	90°42.1	51°29.4
22   305°38.4   128°08.5   21.8   221°36.3   08.4   228°10.7   14.2   316°47.3   09.2   09.2											Kaus Aust.	83°32.7	-34°22.4
Mer.pass   01:41   ν-0.3' d-1.3' m-3.86   ν-0.8' d0.1' m0.74   ν-2.1' d0.0' m-2.23   ν-2.6' d0.1' m0.63   Peacock   53°05.7   -56°39.4   Fomaliar   72°32.8   -46°50.4   Fomaliar   73°47.9   -22°18.0   Fomaliar   73°48.9   -22°18.0   -22°18.0   Fomaliar   73°48.9   -22°18.0											Vega	80°33.2	38°48.6
Mer.pass. 01:41   ν-0.3′ d-1.3′ m-3.86   ν0.8′ d0.1′ m0.74   ν2.1′ d0.0′ m-2.23   ν2.6′ d0.1′ m0.63   Paccock   53° 05.7   55° 39.4   Paccock   53° 05.7   Paccock   53° 05.7   Paccock   53° 05.7   Paccock   Paccoc											Nunki	75°47.9	-26°16.0
Tue GHA GHA Dec GHA De	23	320 40.9	143 08.2	20.0			243 12.8	14.3	331 49.9	09.2	Altair		
Tue GHA GHA GHA Dec GH	Mer.p	ass. 01:41	$\nu$ -0.3' d-1	3′ m-3.86	$\nu$ 0.8 $'$ d0	.1'  m $0.74$	$\nu 2.1' \ d0.$	0′ m-2.23	$\nu 2.6' \ d0$	1'  m0.63	Peacock		
Tue GHA GHA CHA Dec GHA													
0 335°43.3 158°07.8 N02°19.3 251°37.8 N23°08.6 258°14.9 N22°14.3 346°52.5 S07°09.3 1 350°45.8 173°07.5 18.0 266°38.6 08.8 273°17.0 14.3 1°55.2 09.4 16.7 281°39.4 08.9 288°19.2 14.3 1°55.2 09.4 16.7 281°39.4 08.9 288°19.2 14.3 1°55.2 09.4 16.7 281°39.4 08.9 288°19.2 14.3 1°55.2 09.4 16.7 281°39.4 08.9 288°19.2 14.3 1°55.2 09.4 16.7 281°39.4 08.9 288°19.2 14.3 1°55.2 09.4 16.7 281°39.4 08.9 288°19.2 14.3 1°55.2 09.4 16.7 281°39.4 08.9 288°19.2 14.3 1°55.2 09.4 16.5 20.0 0.6 13.3 5°53.2 218°06.6 14.2 311°40.9 09.1 318°23.4 14.4 47°03.1 09.6 16.5 5°55.6 233°06.2 12.9 326°41.7 09.2 333°25.5 14.4 6°05.7 09.7 16.3 13°22.5 14.5 16.2 16.2 16.2 16.2 16.2 16.2 16.2 16.2	т	CHA	CHV	Das	CHA	Dar	CHA	Daa	CUA	Daa	l .		
1 350°45.8 173°07.5 18.0 266°38.6 08.8 273°17.0 14.3 1°55.2 09.4 2 5°48.2 188°07.2 16.7 281°39.4 08.9 288°19.2 14.3 16°57.8 09.5													
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15 201°20.3 23°03.0 02°00.1 116°49.3 · 10.2 123°46.8 · 14.7 212°32.0 · 10.5 16 216°22.7 38°02.7 01°58.8 131°50.1 10.3 138°48.9 14.7 227°34.7 10.5 17 231°25.2 53°02.4 57.5 146°50.9 10.4 153°51.0 14.7 242°37.3 10.6 18 246°27.7 68°02.1 N01°56.2 161°51.6 N23°10.5 168°53.1 N22°14.8 257°39.9 507°10.7 19 261°30.1 83°01.8 55.0 176°52.4 10.6 183°55.3 14.8 272°42.6 10.8 20 276°32.6 98°01.4 53.7 191°53.2 10.7 198°57.4 14.8 287°45.2 10.8 21 291°35.1 113°01.1 · 52.4 206°54.0 · 10.8 213°59.5 · 14.8 302°47.8 · 10.9 22 306°37.5 128°00.8 51.1 221°54.7 10.9 229°01.7 14.9 317°50.5 11.0 23 321°40.0 143°00.5 49.8 236°55.5 11.0 244°03.8 14.9 332°53.1 11.1  Aug 27 Tue SHA Mer.pass Venus 182°24.5 07:13  Aug 27 Tue SHA Mer.pass Venus 182°24.5 13:28  13:28 13:28 14.7 221°32.0 · 10.5  Nenus 182°24.5 07:13  Jupiter 282°31.6 06:46 Saturn 11°09.2 00:52  Horizontal parallax Venus: 0.1  Mars: 0.1													
16       216°22.7       38°02.7       01°58.8       131°50.1       10.3       138°48.9       14.7       227°34.7       10.5       Venus       182°24.5       13:28         17       231°25.2       53°02.4       57.5       146°50.9       10.4       153°51.0       14.7       242°37.3       10.6       Mars       275°54.5       07:13         18       246°27.7       68°02.1       N01°56.2       161°51.6       N23°10.5       168°53.1       N22°14.8       257°39.9       507°10.7       Jupiter       282°31.6       06:46         19       261°30.1       83°01.8       55.0       176°52.4       10.6       183°55.3       14.8       272°42.6       10.8       Saturn       11°09.2       00:52         20       276°32.6       98°01.4       53.7       191°53.2       10.7       198°57.4       14.8       287°45.2       10.8       Horizontal parallax         21       291°35.1       113°01.1        52.4       206°54.0        10.8       213°59.5        14.8       302°47.8        10.9       Venus:       0.1         22       306°37.5       128°00.8       51.1       221°54.7       10.9       229°01.7											Jatuin	11 00.2	00.31
17       231°25.2       53°02.4       57.5       146°50.9       10.4       153°51.0       14.7       242°37.3       10.6       Mars 275°54.5       07:13         18       246°27.7       68°02.1       N01°56.2       161°51.6       N23°10.5       168°53.1       N22°14.8       257°39.9       507°10.7       Jupiter 282°31.6       06:46         19       261°30.1       83°01.8       55.0       176°52.4       10.6       183°55.3       14.8       272°42.6       10.8       Saturn 11°09.2       00:52         20       276°32.6       98°01.4       53.7       191°53.2       10.7       198°57.4       14.8       287°45.2       10.8       11°09.2       00:52         21       291°35.1       113°01.1        52.4       206°54.0        10.8       213°59.5        14.8       302°47.8        10.9       Horizontal parallax         22       306°37.5       128°00.8       51.1       221°54.7       10.9       229°01.7       14.9       317°50.5       11.0       Mars: 0.1       Mars: 0.1         23       321°40.0       143°00.5       49.8       236°55.5       11.0       244°03.8       14.9       332°53.1       11.1       Mars													
18       246°27.7       68°02.1       N01°56.2       161°51.6       N23°10.5       168°53.1       N22°14.8       257°39.9       S07°10.7       Jupiter 282°31.6       06:46         19       261°30.1       83°01.8       55.0       176°52.4       10.6       183°55.3       14.8       272°42.6       10.8       10.8       Saturn 11°09.2       00:52         20       276°32.6       98°01.4       53.7       191°53.2       10.7       198°57.4       14.8       287°45.2       10.8       11°09.2       00:52         21       291°35.1       113°01.1       52.4       206°54.0       10.8       213°59.5       14.8       302°47.8       10.9       Horizontal parallax         22       306°37.5       128°00.8       51.1       221°54.7       10.9       229°01.7       14.9       317°50.5       11.0       Venus:       0.1         23       321°40.0       143°00.5       49.8       236°55.5       11.0       244°03.8       14.9       332°53.1       11.1       Mars:       0.1													13:28
19 261°30.1 83°01.8 55.0 176°52.4 10.6 183°55.3 14.8 272°42.6 10.8 276°32.6 98°01.4 53.7 191°53.2 10.7 198°57.4 14.8 287°45.2 10.8 21 291°35.1 113°01.1 · 52.4 206°54.0 · 10.8 213°59.5 · 14.8 302°47.8 · 10.9 29°01.7 14.9 317°50.5 11.0 241°00.5 11.0 241°03.8 14.9 332°53.1 11.1													
20 276°32.6 98°01.4 53.7 191°53.2 10.7 198°57.4 14.8 287°45.2 10.8 21 291°35.1 113°01.1 · · 52.4 206°54.0 · · 10.8 213°59.5 · · 14.8 302°47.8 · · 10.9 22 306°37.5 128°00.8 51.1 221°54.7 10.9 229°01.7 14.9 317°50.5 11.0 23 321°40.0 143°00.5 49.8 236°55.5 11.0 244°03.8 14.9 332°53.1 11.1  Horizontal parallax Venus: 0.1 Mars: 0.1													
21       291°35.1       113°01.1       ·· 52.4       206°54.0       ·· 10.8       213°59.5       ·· 14.8       302°47.8       ·· 10.9       Horizontal parallax         22       306°37.5       128°00.8       51.1       221°54.7       10.9       229°01.7       14.9       317°50.5       11.0       Venus:       0.1         23       321°40.0       143°00.5       49.8       236°55.5       11.0       244°03.8       14.9       332°53.1       11.1       Mars:       0.1											Saturn	11°09.2	00:52
22 306°37.5 128°00.8 51.1 221°54.7 10.9 229°01.7 14.9 317°50.5 11.0 Venus: 0.1 23 321°40.0 143°00.5 49.8 236°55.5 11.0 244°03.8 14.9 332°53.1 11.1 Mars: 0.1											Horizont	al narallav	
23 321°40.0 143°00.5 49.8 236°55.5 11.0 244°03.8 14.9 332°53.1 11.1 Mars: 0.1											1101120111	•	0.1
25 321 40.0 145 00.5 45.0 250 35.5 11.0 244 05.0 14.5 352 35.1 11.1													
Mer.pass. 01:37 $\nu$ -0.3′ d-1.3′ m-3.86 $\nu$ 0.8′ d0.1′ m0.73 $\nu$ 2.1′ d0.0′ m-2.23 $\nu$ 2.6′ d0.1′ m0.63	25	321 40.0											V.1
	Mer.p	ass. 01:37	$\nu$ -0.3' d-1	3′ m-3.86	$\nu$ 0.8′ d0	.1′ m0.73	$\nu 2.1' d0.$	0′ m-2.23	$\nu 2.6' d0$	.1′ m0.63			

h	Su	Moon					
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°28.7	$N10^{\circ}39.5$	292°55.1	8.7'	N19°08.0	13.0'	59.2'
1 2	194°28.8 209°29.0	38.6 37.8	307°22.8 321°50.4	8.6'	19°21.0 19°33.9	12.9'	59.1'
3	209 29.0 224°29.2	· · 36.9	321 50.4 336°18.0	8.6' 8.5'	19 33.9 19°46.7	12.8' 12.6'	59.1' 59.1'
4	239°29.4	36.0	350°45.5	8.4'	19°59.3	12.5'	59.0'
5	254°29.5	35.2	5°12.9	8.4'	20°11.8	12.4'	59.0'
6	269°29.7 284°29.9	N10°34.3	19°40.3	8.3'	N20°24.2 20°36.4	12.2'	59.0'
7 8	284 29.9 299°30.0	33.4 32.6	34°07.7 48°34.9	8.3' 8.2'	20° 36.4 20° 48.5	12.1' 12.0'	59.0' 58.9'
9	314°30.2	31.7	63°02.2	8.2'	21°00.5	11.8'	58.9'
10	329°30.4	30.8	$77^{\circ}29.3$	8.1'	21°12.4	11.7'	58.9'
11	344°30.6 359°30.8	30.0 N10°29.1	91°56.4 106°23.5	8.1'	21°24.1	11.6'	58.8'
12 13	359°30.8 14°30.9	N10 29.1 28.2	106°23.5 120°50.5	8.0' 7.9'	N21°35.6 21°47.1	11.4' 11.3'	58.8' 58.8'
14	29°31.1	27.4	135°17.4	7.9'	21°58.4	11.2'	58.7'
15	44°31.3	• • 26.5	149°44.3	7.8'	22°09.5	11.0'	58.7'
16	59°31.5	25.6	164°11.1	7.8'	22°20.6	10.9'	58.7'
17 18	74°31.6 89°31.8	24.8 N10°23.9	178°37.9 193°04.6	7.7' 7.7'	22°31.4 N22°42.2	10.7' 10.6'	58.6' 58.6'
19	104°32.0	23.0	207°31.3	7.6'	22°52.8	10.4	58.6'
20	119°32.2	22.2	221°57.9	7.6'	23°03.2	10.3'	58.6'
21	134°32.3	· · 21.3	236°24.5	7.5'	23°13.5	10.2'	58.5'
22 23	149°32.5 164°32.7	20.4 19.5	250°51.0 265°17.4	7.5' 7.4'	23°23.6 23°33.7	10.0' 9.9'	58.5' 58.5'
23	SD = 15.8'	d = -0.9'			D = 16.1'	9.9	30.3
	$5D = 15.8^{\circ}$	$a = -0.9^{\circ}$		51	$D = 10.1^{\circ}$		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°32.9	N10° 18.7	279°43.8 294°10.2	7.4' 7.3'	N23°43.5	9.7'	58.4'
1 2	194°33.0 209°33.2	17.8 16.9	294°10.2 308°36.5	7.3' 7.2'	23°53.2 24°02.8	9.6' 9.4'	58.4' 58.4'
3	224°33.4	. 16.1	323°02.7	7.2'	24° 12.2	9.2'	58.3
4	239°33.6	15.2	337°28.9	7.2'	24°21.4	9.1'	58.3'
5	254°33.8	14.3	351°55.1	7.1'	24°30.5	8.9'	58.3'
6 7	269°33.9 284°34.1	N10° 13.4 12.6	6°21.2 20°47.2	7.1' 7.0'	N24°39.5 24°48.2	8.8' 8.6'	58.2' 58.2'
8	299°34.3	11.7	35°13.3	7.0'	24° 56.9	8.5	58.2
9	314°34.5	• • 10.8	49°39.2	6.9'	25°05.3	8.3'	58.2'
10	329°34.7	09.9	64°05.1	6.9'	25° 13.7	8.2'	58.1'
11 12	344°34.8 359°35.0	09.1 N10°08.2	78°31.0 92°56.8	6.8' 6.8'	25°21.8 N25°29.8	8.0' 7.8'	58.1' 58.1'
13	14°35.2	07.3	107°22.6	6.8	25°37.6	7.6 7.7'	58.0'
14	29°35.4	06.4	121°48.4	6.7'	25°45.3	7.5'	58.0'
15	44°35.6	• • 05.6	136°14.1	6.7'	25°52.8	7.4'	58.0'
16 17	59°35.7 74°35.9	04.7 03.8	150°39.8 165°05.4	6.6' 6.6'	26°00.2 26°07.4	7.2' 7.0'	57.9' 57.9'
18	89°36.1	N10°02.9	179°31.0	6.6'	N26°14.4	6.9'	57.9'
19	104°36.3	02.1	193°56.6	6.5'	$26^{\circ}21.3$	6.7'	57.8'
20	119°36.5	01.2	208°22.1		26°27.9		57.8'
21 22	134°36.6 149°36.8	10°00.3 09°59.4	222°47.6 237°13.1	6.5' 6.4'	26°34.5 26°40.8	6.4' 6.2'	57.8' 57.8'
23	164°37.0	58.6	251°38.5	6.4	26° 47.0	6.0'	57.7'
	SD = 15.8'	d = -0.9'		SI	D = 15.9'		
Tue	<b>GHA</b> 179°37.2	<b>Dec</b> N09° 57.7	<b>GHA</b> 266°03.9	ν 6.4'	<b>Dec</b> N26°53.1	<i>d</i> 5.9'	<b>HP</b> 57.7'
0 1	179 37.2 194°37.4	56.8	280°29.3	6.4'	26°58.9	5.9 5.7'	57.7'
2	209°37.5	55.9	294°54.7	6.3'	27°04.6	5.5'	57.6'
3	224°37.7	• 55.1	309°20.0	6.3'	27°10.2	5.4'	57.6'
4 5	239°37.9 254°38.1	54.2 53.3	323°45.3 338°10.6	6.3' 6.3'	27° 15.5 27° 20.7	5.2' 5.0'	57.6' 57.5'
6	269°38.3	N09° 52.4	352°35.9	6.3'	N27°25.7	4.9'	57.5'
7	284°38.5	51.5	$7^{\circ}01.1$	6.2'	27°30.6	4.7'	57.5'
8	299°38.6	50.7	21°26.3	6.2'	27°35.3	4.5'	57.5'
9 10	314°38.8 329°39.0	• • 49.8 48.9	35°51.6 50°16.8	6.2' 6.2'	27°39.8 27°44.1	4.3' 4.2'	57.4' 57.4'
11	344°39.2	48.0	64°42.0	6.2	27°48.3	4.0'	57.4°
12	359°39.4	N09°47.1	79°07.2	6.2'	N27°52.3	3.8'	57.3'
13	14°39.6	46.3	93°32.3	6.2'	27°56.1	3.7'	57.3'
14 15	29°39.7 44°39.9	45.4 •• 44.5	107°57.5 122°22.7	6.2' 6.2'	27°59.8 28°03.2	3.5' 3.3'	57.3' 57.2'
16	59°40.1	43.6	136°47.8	6.2	28°06.6	3.1'	57.2'
17	74°40.3	42.7	151°13.0	6.2'	28°09.7	3.0'	57.2'
18	89°40.5	N09°41.8	165°38.2	6.2'	N28°12.7	2.8'	57.2'
19 20	104°40.7 119°40.8	41.0 40.1	180°03.3 194°28.5	6.2' 6.2'	28° 15.5 28° 18.1	2.6' 2.5'	57.1' 57.1'
21	134°41.0	•• 39.2	208°53.7	6.2	28°20.6	2.3'	57.1
22	149°41.2	38.3	223°18.9	6.2'	28°22.8	2.1'	57.0'
23	164°41.4	37.4	237°44.0	6.2'	28°25.0	1.9'	57.0'
	SD = 15.8'	d = -0.9'		SI	D = 15.7'		

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

Lat.		Moonris	е		Moonset	:
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°						
<b>N</b> 70°						
68°						
66°	18:30			15:25		
64°	19:13			14:43		
62°	19:42	19:33		14:15	16:22	
60°	20:04	20:11	20:30	13:54	15:45	17:26
<b>N</b> 58°	20:22	20:38	21:08	13:37	15:18	16:48
56°	20:37	20:59	21:35	13:22	14:57	16:22
54°	20:51	21:17	21:56	13:09	14:40	16:01
52°	21:02	21:32	22:13	12:58	14:25	15:43
50°	21:13	21:45	22:29	12:49	14:13	15:28
45°	21:34	22:12	22:59	12:28	13:47	14:58
<b>N</b> 40°	21:52	22:33	23:23	12:12	13:26	14:35
35°	22:07	22:51	23:42	11:58	13:09	14:15
30°	22:20	23:07	23:59	11:46	12:54	13:59
20°	22:42	23:33		11:25	12:29	13:31
N 10°	23:02	23:56		11:08	12:07	13:07
0°	23:20		00:17	10:51	11:47	12:45
<b>S</b> 10°	23:39		00:38	10:35	11:27	12:22
20°	23:58		01:01	10:17	11:06	11:58
30°		00:22	01:28	09:57	10:41	11:31
35°		00:35	01:44	09:46	10:27	11:14
40°		00:51	02:03	09:33	10:10	10:55
45°		01:10	02:26	09:17	09:50	10:32
<b>S</b> 50°	80:00	01:34	02:54	08:58	09:25	10:03
52°	00:16	01:45	03:09	08:49	09:13	09:48
54°	00:25	01:58	03:25	08:39	09:00	09:31
56°	00:36	02:14	03:45	08:27	08:44	09:11
58°	00:48	02:32	04:10	08:14	08:25	08:46
<b>S</b> 60°	01:02	02:54	04:43	07:59	08:02	08:12

		Sun		Moon				
Day	Eqn.of	f 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	66-43%		
25	02:05	01:57	12:02	04:38	17:06			
26	01:49	01:40	12:02	05:34	18:02			
27	01:31	01:23	12:01	06:31	19:00			

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	336°42.5	158°00.2	N01°48.6	251°56.3	N23°11.1	259°05.9	N22°14.9	347°55.7	S07°11.2	A lash a seata	357°34.8	29°13.6
1	351°44.9	172°59.8	47.3	266°57.0	11.2	274°08.0	14.9	2°58.4	11.2	Alpheratz	357 34.8 353°07.0	-42°10.1
2	6°47.4	187°59.5	46.0	281°57.8	11.3	289°10.2	15.0	18°01.0	11.3	Ankaa Schedar	349°30.9	56°40.3
3	21°49.8	202°59.2	• • 44.7	296° 58.6	• • 11.4	304°12.3	• • 15.0	33°03.6	• • 11.4	Diphda	348° 47.3	-17°50.9
4	36°52.3	$217^{\circ}58.9$	43.4	311°59.4	11.5	$319^{\circ}14.4$	15.0	48°06.3	11.5	Achernar	335°20.0	-17 30.9 -57°06.4
5	51°54.8	232°58.6	42.2	$327^{\circ}00.1$	11.6	334°16.5	15.0	63°08.9	11.5	Hamal	327°51.4	23°34.8
6	66°57.2	247°58.2	N01°40.9	342°00.9	N23°11.7	349° 18.7	$N22^{\circ}15.1$	78° 11.5	S07°11.6	Polaris	314°02.2	89°21.8
7	81°59.7	262°57.9	39.6	357°01.7	11.8	4°20.8	15.1	93°14.2	11.7	Acamar	315°11.8	-40°12.0
8	97°02.2	277°57.6	38.3	12°02.4	11.9	19°22.9	15.1	108° 16.8	11.8	Menkar	314°06.4	4°11.3
9	112°04.6	292°57.3	• • 37.0	27°03.2	•• 12.0	34°25.1	• • 15.2	123°19.4	• • 11.8	Mirfak	308°28.6	49°56.8
10	$127^{\circ}07.1$	307°57.0	35.7	42°04.0	12.1	49°27.2	15.2	138°22.1	11.9	Aldebaran	290°40.0	16°33.6
11	142°09.6	322°56.7	34.5	57°04.8	12.2	64°29.3	15.2	153°24.7	12.0	Rigel	281°04.2	-8°10.2
12	157°12.0	337°56.3	N01°33.2	72°05.5	N23°12.3	79°31.5	N22°15.2	168°27.3	S07°12.1	Capella	280°22.4	46°01.2
13	172°14.5	352°56.0	31.9	87°06.3	12.4	94°33.6	15.3	183°30.0	12.1	Bellatrix	278°23.3	6°22.4
14	187°17.0	7°55.7	30.6	102°07.1	12.5	109°35.7	15.3	198°32.6	12.2	Elnath	278°02.3	28°37.7
15	202°19.4	22°55.4	· · 29.3	117° 07.9	• • 12.6	124°37.9	• • 15.3	213°35.2	• • 12.3	Alnilam	275°38.1	-1°11.0
16	217°21.9	$37^{\circ}55.1$	28.0	132°08.6	12.7	139°40.0	15.3	228°37.9	12.4	1	270°52.5	7°24.8
17	232°24.3	52°54.7	26.8	147°09.4	12.8	154°42.1	15.4	243°40.5	12.5	Betelgeuse	263°52.8	-52°42.2
18	247°26.8	67°54.4	N01°25.5	162° 10.2	N23°12.9	169°44.2	N22° 15.4	258°43.2	S07°12.5	Canopus		-52 42.2 -16°44.8
19	262°29.3	82°54.1	24.2	$177^{\circ}11.0$	13.0	184°46.4	15.4	273°45.8	12.6	Sirius	258°26.7	
20	277°31.7	97°53.8	22.9	192° 11.7	13.1	199°48.5	15.4	288°48.4	12.7	Adhara	255°06.3	-29°00.0
21	292°34.2	112°53.5	• • 21.6	$207^{\circ}12.5$	• • 13.2	214°50.6	• • 15.5	303°51.1	• • 12.8	Procyon	244°51.4	5°09.8
22	307°36.7	127°53.2	20.3	222° 13.3	13.3	229°52.8	15.5	318°53.7	12.8	Pollux	243°17.9	27°58.0
23	322°39.1	142°52.8	19.1	237° 14.1	13.4	244° 54.9	15.5	333° 56.3	12.9	Avior	234°15.4	-59°35.0
										Suhail	222°47.0	-43°31.7
Mer.p	ass. 01:33	$\nu$ -0.3′ $d$ -1	L.3′ m-3.86	$\nu$ 0.8′ d0	.1′ m0.73	$\nu^{2.1'} d^{0}$	.0′ m-2.24	$\nu^{2.6'} d^{0}$	1′ m0.62	Miaplacidus	221°39.3	-69°48.9
										Alphard	217°48.4	-8°45.8
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.1	11°50.9
0	337°41.6	157°52.5	N01°17.8	252° 14.8	N23°13.5	259° 57.0	N22° 15.5	348° 59.0	S07°13.0	Dubhe	193°42.0	61°37.2
1	352°44.1	172°52.2	16.5	267° 15.6	13.6	274°59.2	15.6	4°01.6	13.1	Denebola	182°25.5	14°26.2
2	7°46.5	187°51.9	15.2	282°16.4	13.7	290°01.3	15.6	19°04.2	13.1	Gienah	175°44.2	-17°40.7
3	22°49.0	202°51.6	. 13.9	297° 17.2	· · 13.7	305°03.5	. 15.6	34°06.9	• • 13.2	Acrux	173°01.1	-63°14.2
4	37°51.5	217°51.3	12.6	312° 17.9	13.8	320°05.6	15.6	49°09.5	13.3	Gacrux	171°52.5	-57°15.1
5	52°53.9	232°50.9	11.4	327°18.7	13.9	335°07.7	15.7	64°12.1	13.4	Alioth	166°13.6	55°49.8
6	67°56.4	247°50.6	N01°10.1	342° 19.5	N23°14.0	350°09.9	N22° 15.7	79° 14.8	S07°13.4	Spica	158°22.8	-11°17.3
7	82°58.8	262°50.3	08.8	357°20.3	14.1	5° 12.0	15.7	94° 17.4	13.5	Alkaid	152°52.5	49°11.7
8	98°01.3	277°50.0	07.5	12°21.0	14.2	20° 14.1	15.7	109° 20.0	13.6	Hadar	148°36.8	-60°29.7
9	113°03.8	292°49.7	06.2	27°21.8	. 14.3	35° 16.3	• • 15.8	124°22.7	• • 13.7	Menkent	147°58.2	-36°29.5
10	128°06.2	307°49.4	04.9	42°22.6	14.4	50° 18.4	15.8	139°25.3	13.8	Arcturus	145°48.3	19°03.4
11	143°08.7	322°49.0	03.7	57°23.4	14.5	65° 20.5	15.8	154°28.0	13.8	Rigil Kent.	139°41.0	-60°56.4
12	158°11.2	337°48.7	N01°02.4	72°24.2	N23°14.6	80°22.7	N22° 15.8	169° 30.6	S07° 13.9	Kochab	137°20.2	74°03.5
13	173°13.6	352°48.4	01°01.1	87°24.9	14.7	95°24.8	15.8	184°33.2	14.0	Zuben'ubi	136°56.5	-16°08.6
14	188°16.1	7°48.1	00°59.8	102°25.7	14.7	110°27.0	15.9	199°35.9	14.1	Alphecca	126°04.1	26°38.1
15	203°18.6	22°47.8	• • 58.5	117°26.5	• • 14.8	125°29.1	• • 15.9	214° 38.5	• • 14.1	Antares	112°16.2	-26°29.2
16	218°21.0	37°47.5	57.2	132°27.3	14.9	140°31.2	15.9	229°41.1	14.2	Atria	107°10.6	-69°04.5
17	233°23.5	52°47.1	55.9	147°28.1	15.0	155°33.4	15.9	244°43.8	14.3	Sabik	102°03.0	-15°45.3
18	248°26.0	67°46.8	N00°54.7	162°28.8	N23°15.1	170°35.5	N22°16.0	259°46.4	S07°14.4	Shaula	96°10.6	-37°07.4
19	263°28.4	82°46.5	53.4	177° 29.6	15.2	185° 37.6	16.0	274°49.0	14.4	Rasalhague	95°58.7	12°32.7
20	278°30.9	97°46.2	52.1	192°30.4	15.3	200°39.8	16.0	289°51.7	14.5	Eltanin	90°42.1	51°29.4
21	293°33.3	112°45.9	50.8	207°31.2	• • 15.4	215°41.9	16.0	304°54.3	• • 14.6	Kaus Aust.	83°32.7	-34°22.4
22	308°35.8	127°45.6	49.5	222°32.0	15.4	230°44.1	16.1	319°56.9	14.7	Vega	80°33.2	38°48.6
23	323°38.3	142°45.3	48.2	237°32.7	15.5	245°46.2	16.1	334°59.6	14.8	Nunki	75°47.9	-26°16.0
										Altair	62°00.0	8°56.1
Mer.p	ass. 01:29	$\nu$ -0.3' d-1	L.3′ m-3.86	$ u$ 0.8 $^{\prime}$ d0	.1'  m $0.72$	$\nu 2.1' \ d0$	.0′ m-2.25	$\nu 2.6' \ d0$	1'  m0.62	Peacock	53°05.7	-56°39.4
										Deneb	49°25.6	45°22.2
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.8	9°59.4
0	338°40.7	157°44.9	N00°46.9	252°33.5	N23°15.6	260°48.3	N22° 16.1		507°14.8	Al Na'ir	27°32.8	-46°50.4
1	353°43.2	172°44.6	45.7	267°34.3	15.7	275° 50.5	16.1	5°04.9	14.9	Fomalhaut	15° 14.5	-29°29.4
2	8°45.7	187°44.3	44.4	282°35.1	15.7	290°52.6	16.2	20°07.5	15.0	Scheat	13°45.2	28°13.1
3	23°48.1	202°44.0	• • 43.1	202 35.1 297°35.9	15.9	305°54.8	. 16.2	35° 10.1	15.1	Markab	13°29.9	15°20.4
4	38°50.6	202 44.0 217°43.7	41.8	312°36.7	16.0	320°56.9	16.2	50° 12.8	15.1	Aug 28 Wed	SHA	Mer.pass
5	53°53.1	232°43.4	40.5	312 30.7 327°37.4	16.0	335°59.1	16.2	65° 15.4	15.1	Venus	181°17.7	13:28
6	68°55.5	247°43.0	N00°39.2	342°38.2	N23°16.1	351°01.2	N22°16.3	80° 18.0	S07°15.3	Mars	275°13.8	07:12
7	83°58.0	262°42.7	37.9	357°39.0	16.2	6°03.3	16.3	95°20.7	15.4	Jupiter	282°23.4	06:43
8	99°00.4	202 42.1 277°42.4	36.7	12°39.8	16.3	21°05.5	16.3	110°23.3	15.4	Saturn	11°13.3	00:48
9	114°02.9	292°42.1	35.4	27° 40.6	. 16.4	36°07.6	. 16.3	125° 25.9	15.5			
10	129°05.4	307°41.8	34.1	42°41.4	16.5	51°09.8	16.4	140°28.6	15.6	Aug 29 Thu	SHA	Mer.pass
11	144°07.8	322°41.5	32.8	57°42.1	16.6	66°11.9	16.4	155°31.2	15.7	Venus	180° 10.9	13:29
12	159°10.3	337°41.2	N00°31.5	72°42.9	N23°16.6	81°14.1	N22°16.4	170° 33.9	S07° 15.7	Mars	274°33.2	07:11
13	174°12.8	352°40.8	30.2	87°43.7	16.7	96°16.2	16.4	185° 36.5	15.8	Jupiter	282°15.5	06:39
14	189°15.2	7°40.5	28.9	102°44.5	16.8	111°18.3	16.4	200°39.1	15.9	Saturn	11° 17.4	00:44
15	204°17.7	22°40.2	27.7	117° 45.3	16.9	126° 20.5	• • 16.5	215°41.8	. 16.0	Aug 30 Fri	SHA	Mer.pass
16	219°20.2	37°39.9	26.4	132°46.1	17.0	141°22.6	16.5	230° 44.4	16.1	Venus	179°04.2	13:29
17	234°22.6	52°39.6	25.1	147°46.8	17.0	156°24.8	16.5	245° 47.0	16.1	Mars	273°52.8	07:09
18	249°25.1	67°39.3	N00°23.8	162°47.6	N23°17.1	171°26.9	N22°16.5	260°49.7	S07°16.2	Jupiter	282° 07.6	06:36
19	264°27.6	82°39.0	22.5	177° 48.4	17.2	186°29.1	16.6	275°52.3	16.3	Saturn	11°21.5	00:40
20	279°30.0	97°38.6	21.2	192°49.2	17.3	201°31.2	16.6	290°55.0	16.4	Jaturn	11 21.3	00:40
21	294°32.5	112°38.3	19.9	207°50.0	•• 17.4	216°33.4	. 16.6	305°57.6	. 16.4	Horizont	al parallax	
22	309°34.9	127°38.0	18.6	222°50.8	17.5	231°35.5	16.6	321°00.2	16.5		Venus:	0.1
23	324°37.4	142°37.7	17.4	237°51.6	17.5	246° 37.7	16.7	336°02.9	16.6		Mars:	0.1
										-		
Mer.p	ass. 01:25	$ u$ -0.3 $^{\prime}$ d-1	l.3′ m-3.86	$ u$ 0.8 $^{\prime}$ $d$ 0	.1' m $0.71$	$\nu$ 2.1′ d0.	.0′ m-2.25	$\nu$ 2.6′ $d$ 0	1'  m0.61			

h	Su	n	Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°41.6	N09°36.5	252°09.3	6.2'	$N28^{\circ}26.9$	1.8'	57.0'
1	194°41.8	35.7	266°34.5	6.2'	28°28.7	1.6'	57.0'
2	209° 42.0 224° 42.1	34.8 •• 33.9	280°59.7 295°24.9	6.2' 6.3'	28°30.3 28°31.7	1.4' 1.3'	56.9' 56.9'
4	239° 42.3	33.0	309°50.2	6.3	28° 33.0	1.1'	56.9'
5	254°42.5	32.1	324°15.5	6.3'	28°34.1	0.9'	56.9'
6	269°42.7	N09°31.2	338°40.8	6.3'	N28° 35.0	0.8'	56.8'
7 8	284° 42.9 299° 43.1	30.3 29.5	353°06.1 7°31.5	6.4' 6.4'	28°35.7 28°36.3	0.6' 0.4'	56.8' 56.8'
9	314° 43.3	28.6	21°56.9	6.4	28°36.7	0.4	56.7'
10	329°43.4	27.7	36°22.3	6.4'	28° 37.0	0.1	56.7'
11	344°43.6	26.8	50°47.8	6.5'	28°37.1	-0.1'	56.7'
12	359°43.8	N09°25.9	65°13.2	6.5'	N28° 37.0 28° 36.7	-0.3'	56.7'
13 14	14° 44.0 29° 44.2	25.0 24.1	79°38.8 94°04.3	6.6' 6.6'	28°36.7 28°36.3	-0.4' -0.6'	56.6' 56.6'
15	44°44.4	23.2	108°29.9	6.6'	28° 35.7	-0.8	56.6'
16	59°44.6	22.4	122°55.5	6.7'	28°34.9	-0.9'	56.6'
17	74° 44.7	21.5	137°21.2	6.7'	28°34.0	-1.1'	56.5'
18	89°44.9 104°45.1	N09°20.6	151°46.9 166°12.7	6.8'	N28°32.9 28°31.7	-1.2'	56.5
19 20	104°45.1 119°45.3	19.7 18.8	166°12.7 180°38.5	6.8' 6.9'	28°31.7 28°30.3	-1.4' -1.6'	56.5' 56.5'
21	134° 45.5	17.9	195°04.3	6.9	28° 28.7	-1.7'	56.4
22	149° 45.7	17.0	209°30.2	7.0'	28°27.0	-1.9'	56.4'
23	164°45.9	16.1	223°56.2	7.0'	28°25.1	-2.1'	56.4'
	SD = 15.8'	d = -0.9'		SE	0 = 15.5'		
<del>-</del>							
Thu 0	<b>GHA</b> 179° 46.1	<b>Dec</b> N09°15.2	<b>GHA</b> 238°22.2	u  7.1'	Dec N28° 23.0	d -2.2'	<b>HP</b> 56.4'
1	194°46.3	14.4	250° 22.2	7.1'	28° 20.8	-2.2 -2.4'	56.3
2	209° 46.4	13.5	267°14.4	7.2'	28° 18.4	-2.5'	56.3
3	224°46.6	•• 12.6	281°40.5	7.2'	28° 15.9	-2.7'	56.3'
4	239° 46.8	11.7	296°06.8	7.3'	28°13.2	-2.8'	56.3'
5 6	254° 47.0 269° 47.2	10.8 N09°09.9	310°33.1 324°59.4	7.4' 7.4'	28°10.3 N28°07.3	-3.0' -3.2'	56.2' 56.2'
7	284° 47.4	09.0	339°25.9	7.5'	28° 04.2	-3.3'	56.2'
8	299°47.6	08.1	353°52.3	7.6'	28°00.9	-3.5'	56.2'
9	314° 47.8	•• 07.2	8°18.9	7.6'	27°57.4	-3.6'	56.1'
10	329°48.0 344°48.1	06.3	22°45.5 37°12.2	7.7'	27°53.8 27°50.0	-3.8'	56.1'
11 12	344 48.1 359°48.3	05.4 N09°04.5	51°39.0	7.8' 7.8'	N27°46.1	-3.9' -4.1'	56.1' 56.1'
13	14° 48.5	03.6	66°05.8	7.9'	27°42.0	-4.2'	56.0'
14	29°48.7	02.8	80°32.7	8.0'	27°37.8	-4.4'	56.0'
15	44°48.9	• • 01.9	94°59.7	8.0'	27°33.4	-4.5'	56.0'
16 17	59°49.1 74°49.3	01.0 09°00.1	109°26.7 123°53.8	8.1' 8.2'	27°28.9 27°24.2	-4.7' -4.8'	56.0' 55.9'
18	89° 49.5	N08°59.2	138°21.0	8.3'	N27° 19.4	-4.9'	55.9'
19	104°49.7	58.3	152°48.3	8.4'	27° 14.5	-5.1'	55.9'
20	119°49.9	57.4	167° 15.7	8.4'	27°09.4		55.9'
21	134°50.1	• • 56.5	181°43.1	8.5'	27°04.1	-5.4'	55.8'
22 23	149°50.2 164°50.4	55.6 54.7	196°10.6 210°38.2	8.6' 8.7'	26°58.8 26°53.3	-5.5' -5.7'	55.8' 55.8'
	SD = 15.8'	d = -0.9'			0 = 15.4'		
	<u>JD = 13.0</u>	u = -0.9		JL	7 = 13.4		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	179°50.6 194°50.8	N08°53.8 52.9	225°05.9 239°33.7	8.8' 8.8'	N26°47.6 26°41.8	-5.8' -5.9'	55.8' 55.8'
2	209°51.0	52.9 52.0	254°01.5	8.9'	26° 35.9	-5.9 -6.1'	55.7'
3	224°51.2	51.1	268°29.5	9.0'	26°29.8	-6.2	55.7'
4	239°51.4	50.2	282°57.5	9.1'	26°23.6	-6.3	55.7'
5	254° 51.6 269° 51.8	49.3 N08°48.4	297°25.6 311°53.8	9.2'	26°17.3 N26°10.8	-6.5'	55.7'
6 7	269°51.8 284°52.0	N08° 48.4 47.5	311°53.8 326°22.1	9.3' 9.4'	N26°10.8 26°04.3	-6.6' -6.7'	55.6' 55.6'
8	299° 52.2	46.6	340°50.4	9.5'	25° 57.5	-6.8'	55.6'
9	314°52.4	• • 45.7	355°18.9	9.5'	25°50.7	-7.0'	55.6'
10	329°52.6	44.8	9°47.4	9.6'	25°43.7	-7.1'	55.6'
11 12	344° 52.8 359° 52.9	43.9 N08°43.0	24°16.1 38°44.8	9.7' 9.8'	25°36.6 N25°29.4	-7.2' -7.3'	55.5' 55.5'
13	14°53.1	42.1	50° 44.6	9.6 9.9'	25°22.0	-7.5'	55.5'
14	29°53.3	41.2	67°42.5	10.0'	25°14.6	-7.6'	55.5
15	44° 53.5	• • 40.3	82°11.5	10.1'	25°07.0	-7.7'	55.5'
16	59°53.7	39.4	96°40.6	10.2'	24°59.3	-7.8'	55.4'
17 18	74°53.9 89°54.1	38.5 N08°37.6	111°09.8 125°39.1	10.3' 10.4'	24°51.4 N24°43.5	-8.0' -8.1'	55.4' 55.4'
19	104° 54.3	36.7	140°08.4	10.4	24° 35.4	-8.2'	55.4'
20	119°54.5	35.8	154°37.9	10.5'	24°27.2	-8.3'	55.4'
21	134°54.7	• • 34.9	169°07.4	10.6'	24°18.9	-8.4'	55.3'
22 23	149°54.9 164°55.1	34.0	183°37.1 198°06.8	10.7'	24°10.5 24°02.0	-8.5'	55.3' 55.3'
23		33.1	190 00.8	10.8'		-8.6'	55.3
	SD = 15.8'	d = -0.9'		SE	0 = 15.2'		

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

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

August 31, 01, 02 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
Sat 0	339°39.9	157°37.4	N00°16.1	252°52.3	N23° 17.6	261°39.8	N22°16.7	351°05.5	507°16.7			Dec
1	354°42.3	172°37.1	14.8	267°53.1	17.7	201 39.8 276°41.9	16.7	6°08.1	16.7	Alpheratz	357°34.8	29°13.6
2	9°44.8	187°36.8	13.5	282°53.9	17.7	291°44.1	16.7	21°10.8	16.8	Ankaa	353°07.0	-42°10.1
3	24°47.3	202°36.4	. 12.2	297°54.7	. 17.8	306°46.2	. 16.8	36°13.4	. 16.9	Schedar	349°30.9	56°40.3
4	39°49.7	202 30.4 217°36.1	10.9	312°55.5	17.0	321°48.4	16.8	51°16.1	17.0	Diphda	348°47.3	-17°50.9
5	54°52.2	232°35.8	09.6	312 55.3 327°56.3	18.0	336°50.5	16.8	66°18.7	17.0	Achernar	335°20.0	-57°06.4
6	69°54.7	247°35.5	N00°08.3	342°57.1	N23° 18.1	351°52.7	N22°16.8	81°21.3	S07°17.1	Hamal	327°51.3	23°34.8
7	84°57.1	262°35.2	07.1	357°57.9	18.2	6°54.8	16.8	96°24.0	17.2	Polaris	314°00.7	89°21.8
8	99°59.6	277°34.9	05.8	12°58.7	18.2	21°57.0	16.9	111°26.6	17.3	Acamar	315°11.8	-40°12.0
9	115°02.1	292°34.6	• • 04.5	27°59.4	. 18.3	36°59.1	. 16.9	126°29.2	17.4	Menkar	314°06.3	4°11.3
10	130°04.5	307°34.2	03.2	43°00.2	18.4	52°01.3	16.9	141°31.9	17.4	Mirfak	308°28.5	49°56.8
11	145°07.0	322°33.9	01.9	58°01.0	18.5	67°03.4	16.9	156°34.5	17.5	Aldebaran	290°40.0	16°33.6
12	160°09.4	337°33.6	N00°00.6	73°01.8	N23° 18.5	82°05.6	N22°17.0	171°37.2	S07°17.6	Rigel	281°04.2	-8°10.2
13	175°11.9	352°33.3	S00°00.7	88°02.6	18.6	97°07.7	17.0	186°39.8	17.7	Capella	280°22.4	46°01.2
14	190°14.4	7°33.0	02.0	103°03.4	18.7	112°09.9	17.0	201°42.4	17.8	Bellatrix	278°23.3	6°22.4
15	205°16.8	22°32.7	• • 03.2	118°04.2	• • 18.8	127°12.0	• • 17.0	216°45.1	17.8	Elnath	278°02.3	28°37.7
16	220°19.3	37°32.4	04.5	133°05.0	18.8	142°14.2	17.1	231°47.7	17.9	Alnilam	275°38.1	-1°11.0
17	235°21.8	52°32.1	05.8	148°05.8	18.9	157°16.3	17.1	246°50.3	18.0	Betelgeuse	270°52.5	7°24.8
18	250°24.2	67°31.7	S00°07.1	163°06.6	N23° 19.0	172°18.5	N22°17.1	261°53.0	S07°18.1	Canopus	263°52.8	-52°42.1
19	265°26.7	82°31.4	08.4	178°07.3	19.1	187°20.6	17.1	276°55.6	18.1	Sirius	258°26.7	-16°44.7
20	280°29.2	97°31.1	09.7	193°08.1	19.1	202°22.8	17.1	291°58.3	18.2	Adhara	255°06.3	-29°00.0
21	295°31.6	112°30.8	• • 11.0	208°08.9	• • 19.2	217°25.0	• • 17.2	307°00.9	• • 18.3	Procyon	244°51.4	5°09.8
22	310°34.1	127°30.5	12.3	223°09.7	19.3	232°27.1	17.2	322°03.5	18.4	Pollux	243°17.9	27°58.0
23	325°36.6	142°30.2	13.6	238°10.5	19.4	247°29.3	17.2	337°06.2	18.4	Avior	234°15.4	-59°35.0
	01.01	0.2/ 1.1	200	0.0/	1/ 0.71	0.1/ /0	0/ 0.00	2.6/ 10	1/ 0.61	Suhail	222°47.0	-43°31.7
Mer.p	ass. 01:21	$\nu$ -0.3′ d-1	l.3′ m-3.86	$\nu_{0.8'} = 0.00$	.1′ m0.71	$\nu$ 2.1′ d0.	0′ m-2.26	$\nu$ 2.6′ $d0$	1′ m0.61	Miaplacidus	221°39.3	-69°48.9
										Alphard	217°48.4 207°35.1	-8°45.8
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207 35.1 193°42.0	11°50.9
0	340°39.0	157°29.9	\$00°14.8	253°11.3	N23° 19.4	262°31.4	N22°17.2	352°08.8	S07°18.5	Dubhe Denebola	193°42.0 182°25.5	61°37.2 14°26.2
1	355°41.5	172°29.5	16.1	268°12.1	19.5	277°33.6	17.3	7°11.4	18.6	Denebola Gienah	182°25.5 175°44.2	-17°40.6
2	10°43.9	187°29.2	17.4	283°12.9	19.6	292°35.7	17.3	22°14.1	18.7	1	175 44.2 173°01.1	-17 40.6 -63°14.2
3	25°46.4	202°28.9	• • 18.7	298°13.7	• • 19.6	307°37.9	• • 17.3	$37^{\circ}16.7$	• • 18.8			-63 14.2 -57°15.1
4	40°48.9	217°28.6	20.0	313°14.5	19.7	322°40.0	17.3	52°19.4	18.8	Gacrux	171 52.5 166°13.6	-57 15.1 55°49.8
5	55°51.3	232°28.3	21.3	328°15.3	19.8	337°42.2	17.3	67°22.0	18.9	Alioth	158°22.8	-11°17.3
6	70°53.8	247°28.0	500°22.6	343°16.1	N23° 19.9	352°44.3	N22°17.4	82°24.6	S07°19.0	Spica	150 22.6 152°52.5	49°11.6
7	85°56.3	262°27.7	23.9	358°16.9	19.9	7°46.5	17.4	97°27.3	19.1	Alkaid Hadar	152 52.5 148°36.8	-60°29.7
8	100°58.7	277°27.4	25.1	13°17.7	20.0	22°48.7	17.4	112°29.9	19.1	Menkent	146 50.8 147°58.2	-36°29.5
9	116°01.2	292°27.0	• • 26.4	28°18.5	• • 20.1	37°50.8	• • 17.4	127°32.5	• • 19.2	Arcturus	147 38.2 145°48.4	19°03.4
10	131°03.7	307°26.7	27.7	43°19.3	20.1	52°53.0	17.5	142°35.2	19.3	Rigil Kent.	139°41.1	-60°56.4
11	$146^{\circ}06.1$	322°26.4	29.0	58°20.0	20.2	67°55.1	17.5	157°37.8	19.4	Kochab	137°20.2	74°03.5
12	161°08.6	337°26.1	500°30.3	73°20.8	N23°20.3	82°57.3	N22°17.5	172°40.5	S07°19.4	Zuben'ubi	136°56.5	-16°08.6
13	$176^{\circ}11.0$	352°25.8	31.6	88°21.6	20.3	97°59.4	17.5	187°43.1	19.5	Alphecca	126°04.1	26°38.1
14	191°13.5	7°25.5	32.9	103°22.4	20.4	113°01.6	17.5	202°45.7	19.6	Antares	112° 16.2	-26°29.2
15	$206^{\circ}16.0$	22°25.2	• • 34.2	118°23.2	• • 20.5	128°03.8	• • 17.6	217°48.4	• • 19.7	Atria	107°10.6	-69°04.5
16	221°18.4	37°24.9	35.5	133°24.0	20.6	143°05.9	17.6	232°51.0	19.8	Sabik	102°03.1	-15°45.3
17	236°20.9	52°24.5	36.7	148°24.8	20.6	158°08.1	17.6	247°53.7	19.8	Shaula	96°10.6	-37°07.4
18	251°23.4	67°24.2	500°38.0	163°25.6	N23°20.7	173°10.2	N22°17.6	262°56.3	S07°19.9	Rasalhague	95°58.7	12°32.7
19	266°25.8	82°23.9	39.3	178°26.4	20.8	188°12.4	17.7	277°58.9	20.0	Eltanin	90°42.1	51°29.4
20	281°28.3	97°23.6	40.6	193°27.2	20.8	203°14.5	17.7	293°01.6	20.1	Kaus Aust.	83°32.7	-34°22.4
21	296°30.8	112°23.3	• • 41.9	208°28.0	• • 20.9	218°16.7	• • 17.7	308°04.2	• • 20.1	Vega	80°33.2	38°48.6
22	311°33.2	127°23.0	43.2	223°28.8	21.0	233°18.9	17.7	323°06.8	20.2	Nunki	75°47.9	-26°16.0
23	326°35.7	142°22.7	44.5	238°29.6	21.0	248°21.0	17.7	338°09.5	20.3	Altair	62°00.0	8°56.1
Morn	ass. 01:17	u 0 3′ d1	.3′ m-3.86	υΩ 8 <sup>7</sup> dΩ	.1′ m0.70	1/2 2 <sup>1</sup> d0	0′ m-2.26	1/2 6' d0	1' m0.61	Peacock	53°05.7	-56°39.4
- wier.p	,uss. U1.11	ν-0.3 UI	.5 111-5.00	ν υ.υ	.1110.70	ν Ζ. Ζ u U	0 111-2.20	ν 2.0 a0	1110.01	Deneb	49°25.6	45°22.2
										Enif	33°38.8	9°59.4
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.8	-46°50.4
0	$341^{\circ}38.2$	157°22.3	S00°45.8	253°30.4	$N23^{\circ}21.1$	263°23.2	N22°17.8		S07°20.4	Fomalhaut	15°14.5	-29°29.4
1	356°40.6	172°22.0	47.1	268°31.2	21.2	278°25.4	17.8	8°14.8	20.4	Scheat	13°45.1	28°13.1
2	11°43.1	187°21.7	48.3	283°32.0	21.2	293°27.5	17.8	23°17.4	20.5	Markab	13°29.9	15°20.4
3	26°45.5	202°21.4	• • 49.6	298°32.8	• • 21.3	308°29.7	• • 17.8	38°20.0	• • 20.6			
4	41°48.0	217°21.1	50.9	313°33.6	21.3	323°31.8	17.9	53°22.7	20.7	Aug 31 Sat	SHA	Mer.pass
5	56°50.5	232°20.8	52.2	328°34.4	21.4	338°34.0	17.9	68°25.3	20.8		177°57.5	13:30
6	71°52.9	247°20.5	S00°53.5	343°35.2	N23°21.5	353°36.2	N22°17.9		S07°20.8	1	273°12.5	07:08
7	86°55.4	262°20.2	54.8	358°36.0	21.5	8°38.3	17.9	98°30.6	20.9	Jupiter		06:32
8	101°57.9	277°19.8	56.1	13°36.8	21.6	23°40.5	17.9	113°33.2	21.0	Saturn	11°25.6	00:36
9	117°00.3	292°19.5	• • 57.4	28°37.6	• • 21.7	38°42.6	• • 18.0	128°35.9	· · 21.1	Sep 01 Sun	SHA	Mer.pass
10	132°02.8	307°19.2	58.7	43°38.4	21.7	53°44.8	18.0	143°38.5	21.1		176°50.8	13:30
11	147°05.3	322°18.9	00°59.9	58°39.2	21.8	68°47.0	18.0	158°41.2	21.2		272°32.3	07:07
12	162°07.7	337°18.6	S01°01.2	73°40.0	N23°21.9	83°49.1	N22°18.0	173°43.8	S07°21.3	Jupiter		06:29
13	177°10.2	352°18.3	02.5	88°40.8	21.9	98°51.3	18.0	188°46.4	21.4	Saturn	11°29.8	00:23
14	192°12.6	7°18.0	03.8	103°41.6	22.0	113°53.5	18.1	203°49.1	21.5			00.01
15	207°15.1	22°17.7	• • 05.1	118°42.4	• • 22.0	128°55.6	• • 18.1	218°51.7	· · 21.5	Sep 02 Mon	SHA	Mer.pass
16	222°17.6	37°17.3	06.4	133°43.2	22.1	143°57.8	18.1	233°54.4	21.6	1	175°44.2	13:31
17	237°20.0	52°17.0	07.7	148°44.0	22.2	159°00.0	18.1	248°57.0	21.7		271°52.3	07:06
18	252°22.5	67° 16.7	S01°09.0	163°44.8	N23°22.2	174°02.1	N22°18.1		S07°21.8	1	281°45.0	06:26
19	267°25.0	82°16.4	10.3	178°45.6	22.3	189°04.3	18.2	279°02.3	21.8	Saturn	11°34.0	00:27
20	282°27.4	97°16.1	11.5	193°46.4	22.3	204°06.5	18.2	294°04.9	21.9	Horizont	al navallav	
21	297°29.9	112°15.8	• • 12.8	208°47.2	• • 22.4	219°08.6	• • 18.2	309°07.5	• • 22.0	Horizon	al parallax Venus:	0.1
22	312°32.4	127° 15.5	14.1	223°48.0	22.5	234°10.8	18.2	324°10.2	22.1		Venus: Mars:	0.1 0.1
23	327°34.8	142°15.2	15.4	238°48.9	22.5	249°13.0	18.3	339°12.8	22.1		iviars:	0.1
Mer.p	ass. 01:13	$\nu$ -0.3' d1	.3′ m-3.86	$\nu 0.8' \ d0$	.1′ m0.69	$\nu 2.2' \ d0$	0′ m-2.27	$\nu 2.6' \ d0$	1′ m0.60			
				_		_						

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°55.3	N08°32.2	212°36.6	10.9'	N23°53.4	-8.7'	55.3'
1	194°55.5	31.3	227°06.5	11.0'	23°44.6	-8.8'	55.3'
2	209°55.7	30.4	241°36.6	11.1'	23°35.8	-9.0'	55.2'
3	224°55.9	• • 29.5	256°06.7	11.2'	23°26.8	-9.1'	55.2'
4 5	239°56.1 254°56.3	28.6 27.7	270°36.9 285°07.2	11.3' 11.4'	23°17.8 23°08.6	-9.2' -9.3'	55.2' 55.2'
6	269° 56.5	N08° 26.8	205 07.2 299°37.5	11.5'	N22°59.3	-9.3 -9.4'	55.2'
7	284°56.6	25.9	314°08.0	11.6'	22°50.0	-9.5'	55.2'
8	299°56.8	25.0	328°38.6	11.7'	22°40.5	-9.6'	55.1'
9	314°57.0	• • 24.1	343°09.3	11.8'	22°30.9	-9.7'	55.1'
10	329°57.2	23.2	357°40.0	11.8'	22°21.2	-9.8'	55.1'
11	344°57.4	22.3	12°10.9	11.9'	22°11.5	-9.9'	55.1'
12 13	359°57.6 14°57.8	N08°21.4 20.5	26°41.8 41°12.8	12.0' 12.1'	N22°01.6 21°51.7	-10.0' -10.1'	55.1' 55.0'
14	29°58.0	20.5 19.5	55°43.9	12.1	21°41.6	-10.1	55.0'
15	44°58.2	. 18.6	70°15.1	12.3'	21°31.5	-10.1	55.0'
16	59°58.4	17.7	84°46.5	12.4'	21°21.2	-10.3'	55.0'
17	74°58.6	16.8	99°17.8	12.5'	21°10.9	-10.4'	55.0'
18	89°58.8	N08° 15.9	113°49.3	12.6'	N21°00.5	-10.5'	55.0'
19	104°59.0	15.0	128°20.9	12.7'	20°50.0	-10.6'	54.9'
20 21	119°59.2 134°59.4	14.1 •• 13.2	142°52.5 157°24.3	12.7' 12.8'	20°39.4 20°28.7	-10.7' -10.8'	54.9' 54.9'
22	149°59.6	12.3	157 24.3 171°56.1	12.0	20°28.7	-10.8'	54.9'
23	164°59.8	11.4	186°28.0	13.0'	20°07.1	-10.0	54.9'
	SD = 15.8'	d = -0.9'			D = 15.1'		
	טט = 15.8′	$a = -0.9^{\circ}$		51	D = 10.1		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°00.0	N08° 10.5	201°00.1	13.1'	N19°56.2	-11.0'	54.9'
1 2	195°00.2 210°00.4	09.6 08.7	215°32.2 230°04.3	13.2' 13.3'	19°45.2 19°34.1	-11.1' -11.2'	54.8' 54.8'
3	225°00.6	• • 07.8	244°36.6	13.3'	19°23.0	-11.2'	54.8
4	240°00.8	06.8	259°08.9	13.4'	19°11.7	-11.3'	54.8'
5	255°01.0	05.9	273°41.4	13.5'	19°00.4	-11.4'	54.8'
6	270°01.2	N08°05.0	288°13.9	13.6'	N18°49.0	-11.5'	54.8'
7	285°01.4	04.1	302°46.5	13.7'	18°37.5	-11.5'	54.8'
8 9	300°01.6 315°01.8	03.2	317°19.2 331°51.9	13.8' 13.8'	18°26.0 18°14.4	-11.6' -11.7'	54.7' 54.7'
10	330°02.0	01.4	346°24.8	13.9'	18°02.7	-11.7' -11.7'	54.7'
11	345°02.2	08° 00.5	0°57.7	14.0'	17°51.0	-11.8'	54.7'
12	0°02.4	N07°59.6	15°30.7	14.1'	N17°39.2	-11.9'	54.7'
13	15°02.6	58.7	30°03.8	14.2'	17°27.3	-11.9'	54.7'
14	30°02.8	57.7	44°37.0	14.2'	17°15.3	-12.0'	54.7'
15 16	45°03.0 60°03.2	· · 56.8 55.9	59°10.2 73°43.5	14.3' 14.4'	17°03.3 16°51.2	-12.1' -12.1'	54.6' 54.6'
17	75°03.4	55.0	88°16.9	14.5	16°39.1	-12.1 -12.2'	54.6'
18	90°03.6	N07°54.1	102°50.4	14.5'	N16°26.9	-12.3'	54.6'
19	105°03.8	53.2	117°23.9	14.6'	16°14.6	-12.3'	54.6'
20	120°04.0	52.3	131°57.5	14.7'	$16^{\circ}02.3$	-12.4'	54.6'
21	135°04.2	• • 51.4	146°31.2	14.8'	15°49.9	-12.4'	54.6'
22	150°04.4 165°04.6	50.4	161°05.0	14.8' 14.9'	15°37.5 15°25.0	-12.5'	54.5'
23		49.5	175°38.8			-12.6'	54.5'
	SD = 15.8'	d = -0.9'		SI	O = 15.0'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°04.8	N07°48.6	190°12.7	15.0'	N15°12.4	-12.6'	54.5'
1 2	195°05.0 210°05.2	47.7 46.8	204°46.7 219°20.7	15.0' 15.1'	14°59.8 14°47.2	-12.7' -12.7'	54.5' 54.5'
3	210 05.2 225°05.4	· · 45.9	219 20.7 233°54.8	15.1	14 47.2 14°34.4	-12.7 -12.8'	54.5'
4	240°05.6	45.0	248°29.0	15.2'	14°21.7	-12.8'	54.5'
5	255°05.8	44.0	263°03.2	15.3'	14°08.9	-12.9'	54.5'
6	270°06.0	N07°43.1	277°37.5	15.4'	N13°56.0	-12.9'	54.4'
7	285°06.2	42.2	292°11.9	15.4'	13°43.1	-13.0'	54.4'
8 9	300°06.4 315°06.6	41.3 •• 40.4	306°46.3 321°20.8	15.5' 15.6'	13°30.1 13°17.1	-13.0' -13.1'	54.4' 54.4'
10	330°06.8	39.5	321 20.6 335°55.4	15.6'	13 17.1 13°04.1	-13.1'	54.4'
11	345°07.0	38.6	350°30.0	15.7'	12°51.0	-13.1'	54.4
12	0°07.2	N07°37.6	5°04.7	15.7'	N12°37.8	-13.2'	54.4'
13	15°07.4	36.7	19°39.4	15.8'	12°24.6	-13.2'	54.4'
14	30°07.6	35.8	34°14.2	15.8'	12°11.4	-13.3'	54.3'
15 16	45°07.8 60°08.0	· · 34.9 34.0	48°49.0 63°23.9	15.9' 16.0'	11°58.1 11°44.8	-13.3' -13.3'	54.3' 54.3'
16 17	60°08.0 75°08.2	34.0 33.1	63°23.9 77°58.9	16.0'	11°44.8 11°31.5	-13.3' -13.4'	54.3'
18	90°08.4	N07°32.1	92°33.9	16.1	N11°18.1	-13.4'	54.3'
19	105°08.6	31.2	107°09.0	16.1'	11°04.7	-13.5'	54.3'
20	120°08.8	30.3	121°44.1	16.2'	10°51.2	-13.5'	54.3'
21	135°09.0	• • 29.4	136°19.3	16.2'	10°37.7	-13.5'	54.3'
22 23	150°09.2 165°09.5	28.5 27.5	150°54.5 165°29.8	16.3' 16.3'	10°24.2 10°10.6	-13.6' -13.6'	54.3' 54.3'
23			100 29.0			-13.0	J4.3
	SD = 15.8'	d = -0.9'		SI	O = 14.9'		

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

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

		Sun		Moon				
Day	Eqn.of Time		Mer.	Mer.Pass.		Age		
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	27-29		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	9-1%		
31	00:19	00:09	12:00	10:10	22:33			
01	00:00	00:10	12:00	10:56	23:18			
02	00:19	00:29	12:00	11:39	-:-			

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

The Control   Control	h	Aries	Ven	us	М	ars	Jup	oiter	Sat	urn		Stars	
1	Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
1 977-98   1771-15   180   26* 05   20   278   178   18   29* 18													
2 12-92   1971-12   193   2875   3   277   28   2875   3   277   22   4   224   225   30   30   30   30   30   30   30   3													
3 27-447 207113													
4 4 - 47   217   327   337   337   337   347													
1	4	42°47.1			313°52.9	22.8	324°23.8		54°26.0				
1.	5	57°49.6	232° 13.3	23.1	328°53.7	22.9	339°26.0	18.4	69°28.7	22.6			
Section   Column	6	72°52.1	247°13.0	S01°24.4	343°54.5	N23°22.9	354°28.1	N22° 18.4	84°31.3	S07°22.7			
19 10 130°0 0	7	87°54.5	262°12.7	25.7	358°55.3	23.0	9°30.3	18.4	99°33.9	22.8	1		
10 111 1910	8	102°57.0	$277^{\circ}12.3$	27.0	13°56.1	23.0	24°32.5	18.4	$114^{\circ}36.6$				
11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	9			• • 28.3		• • 23.1		• • 18.5		• • 22.9			
14   16   16   16   17   18   18   18   19   18   18   19   18   18													
19   19   19   19   19   19   19   19													
14   103*118   77.05   5.47   104*01.0   2.24   114*8.5   18.6   2045*2.4   23.3   23.3   23.1   2											_		
16 2971-14 2971-14 360   119°01.8 22.4   120°4.77   18.6   219°15.1 2.24   18.24   19												278°23.2	
16											Elnath	278°02.3	28° 37.7
18											Alnilam	275°38.1	
18											_		
19   268°241   18   268°294   412   179°65   237   189°564   137   289°65   237   238													
202   283°266   126°087													
22 338°340 12°00°80 1.48 20°00°6 151 22°00°6 238 22°00°0 118.7 30°10°9 228 239 23°10°10°9 228 23°10°10°9 20°00°6 151 27°00°00 1651 22°00°6 151 23°00°00 10°00 20°00°00°00°00°00°00°00°00°00°00°00°00°0													
22 333°31.5   120°6.0   45.1   224°07.4   2238   235°02.5   18.7   325°13.5   23.9   18.0   325°13.5   23.9   18.0   325°13.5   24.0   24.0   24.0   24.0   24.0   24.0   24.0   24.0   24.0   24.0   24.0   24.0   24.0   24.0   24.0   24.0   24.0   24.0   24.0   2	21	298°29.0	112°08.3	• • 43.8	209°06.6	• • 23.8	220°00.7	• • 18.7	$310^{\circ}10.9$				
Mer. pass. 0.10   Mer. pass.	22	313°31.5	127°08.0	45.1	224°07.4	23.8	235°02.9	18.7		23.9			
Mer pass, 01.09  Med GHA  Med	23	328°34.0	142°07.6	46.3	239°08.2	23.9	$250^{\circ}05.1$	18.7	$340^{\circ}16.2$				
Mode   GHA   GHA   CHA   Dec   GHA   Dec   GHA   Dec   CHA   Dec	Mare	ass 01.00	1/-D 3/ 41 3	1 m 3 96	1/U 8/ 40	1' m0 60	1/2 2/ 40	0' m 2 27	1/2 6/ 40	1' m0 60			
West    GHA	ivier.p	ass. U1.U9	$\nu$ -0.3 $a_{1.3}$	. 111-3.00	νυ.ο a0	.1110.09	ν Δ.Δ UU.	0 111-2.21	ν2.0 a0	.1110.00			
Ved GHA CHA CHA Dec GHA Dec GHA Dec GHA Dec GHA Dec Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA GHA Dec GHA DEC G													
383°364   15°°073   501°476   256°091   N3°2239   265°072   N2°2183   355°18.8   50°724.1   Denebola   182°25.5   14°26.2   2   13°414   18°7067   05°2   28°107   240   29°116   18.8   25°24.1   24.2   4.2   3   28°438   200°664   51.5   29°211.5   24.1   310°13.8   18.8   40°27.7   24.3   4   43°463   23°656   23°565   24.8   314°12.3   24.1   32°11.5   31°11.3   31°13.8   31°12.3   24.3   32°14.2   5   80°46,2   23°56.5   50°44   33°41.2   24.3   340°13.1   31°13.8   31°12.3   31°12.3   31°12.3   31°12.3   34°12.3   3											_		
1 388*389   172   172   170   189   269*099   240   289*014   188   10*215   242   242   31*34.4   187*06.7   50.2   289*10.7   240   299*116   188   25*24.1   242   243   328*30.8   25*24.1   242   328*30.8   328*30.8   217*06.1   52.3   31*31.8   31*31.8   31*31.8   328*30													
2 13*41.4 187*06.7 50.2 288*10.7 24.0 298*11.6 18.8 25*24.1 242 3 28*48.8 202*06.4 5.15.5 298*11.5 24.0 13.0 13.8 18.8 40*26.7 2.43 4 43*46.3 202*06.4 5.15.5 28 314*12.3 24.1 315*13.8 18.8 40*26.7 2.44 4 34*63.8 202*06.4 501*55.4 344*13.9 123*13.1 24.2 340*10.1 18.9 55*29.4 24.4 16 73*51.2 24*705.4 501*55.4 344*13.9 123*24.2 340*10.1 18.9 70*32.0 24.5 5 58*49.7 222*06.8 56.4 305*5.4 344*13.9 123*24.2 340*10.1 18.9 10*37.8 2.5 10 134*01.1 307*02.2 24*0.5 56.6 398*10.2 24.1 10*22.2 18.9 10.0 10*37.3 2.4 10 134*01.1 307*02.2 2*0*0.5 4.4 4.4 40*26.8 19.0 10.0 3.7 2.4 11 149*03.5 322*03.9 01.8 59*18.0 24.5 70*31.2 19.0 160*47.9 24.9 11 149*03.5 322*03.9 01.8 59*18.0 24.5 70*31.2 19.0 160*47.9 24.9 11 149*03.5 322*03.9 01.8 59*18.0 24.5 70*31.2 19.0 160*47.9 24.9 11 149*03.5 322*03.9 01.8 59*18.0 24.5 70*31.2 19.0 160*47.9 24.9 11 149*03.5 322*03.3 04.4 880*19.6 24.6 100*35.5 19.0 190*31.2 25.1 13 119*06.5 322*03.3 04.4 880*19.6 24.6 100*35.5 19.0 190*31.2 25.1 14 149*10.9 7*02.9 0.57.7 10*20.2 4.6 115*37.7 19.0 208*55.8 25.2 448 14 149*10.9 7*02.9 0.57.7 10*20.2 4.6 115*37.7 19.0 208*55.8 25.2 448 14 149*10.9 7*02.9 0.57.7 10*20.2 4.6 115*37.7 19.0 208*55.8 25.2 448 14 149*10.9 7*02.9 0.57.7 10*20.2 4.6 115*37.7 19.0 208*55.8 25.2 448 14 149*10.9 7*02.9 0.57.7 10*20.2 24.6 115*37.7 19.0 208*55.8 25.2 448 14 149*10.9 7*02.9 0.57.7 10*20.2 24.6 115*37.7 19.0 208*55.8 25.2 448 14 149*10.9 7*02.9 0.57.7 10*20.2 24.6 115*37.7 19.0 208*55.8 25.2 448 14 149*6.9 10*20.4 24.6 110*39.9 19.1 220*84.0 25.2 448 152*20.2 40*25.7 07*01.1 13.4 194*25.2 24.9 109*48.6 19.1 220*69.5 5.6 25.2 448 16 224*26.0 66*01.7 02*10.8 16*02.3 120*20													
4 43*46.3 21*706.1 52.8 314*12.3 24.1 32*15.9 18.9 55*29.4 24.4 55*29.4 24.5 58*47. 23*2*08.8 54.1 32*2*13.0 14.2 24.2 340*18.1 18.9 70*32.0 24.5 59*2.3 14*16*16*18.6 18.5 58*9.8 58*47. 23*2*08.8 54.1 32*2*13.0 14.2 24.3 10*2*2.5 18.9 10*3*7.3 24.6 48*18.2 24.6 18.9 118*3*9.9 24.7 48*18.7 20*2*18.9 18*5*8.6 22*2*0.5 10*99.2 29*16.4 2.4 40*6.8 1.90.0 118*3*0.2 24.7 14*2*18.0 118*3*9.9 24.7 14*2*18.0 118*3*7*0.3 14*2*18.0 118*2*2.9 24.6 100*3*5.5 19.0 10*3*1.2 24.0 14*2*19.0 17*3*0.3 14*2*2.0 14*2*19.0 17*3*0.3 14*2*2.0 14*2*19.0 17*3*0.3 14*2*2.0 14*2*19.0 17*3*0.3 14*2*2.0 14*2*19.0 17*3*0.3 14*2*2.0 14*2*19.0 17*3*0.3 14*2*2.0 14*2*19.0 17*3*0.3 14*2*2.0 14*2*19.0 17*3*0.3 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*2*2.0 14*3*0.0 14*											Acrux	173°01.1	-63°14.2
5 58°48.7 222°05.8 54.1 329°13.1 24.2 340°18.1 18.9 70°32.0 24.5 54.0 15.6 320°19.1 34°13.9 32°12.2 340°18.1 18.9 70°32.0 24.5 54.0 18.9 1.0 14.0 18.0 18.0 18.0 18.0 18.0 18.0 18.0 18											Gacrux	$171^{\circ}52.5$	-57° 15.1
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8 8 137 26°205.1 56.6 399°14.7 24.3 10°22.5 18.9 100°37.3 24.6 8 103°66.1 277°04.8 57.9 14°15.5 24.3 25°24.6 18.9 115°39.9 24.7 9 118°88.6 29°04.5 01°59.2 29°16.4 24.4 55°29.0 190 313°42.6 24.8 11 149°03.5 322°03.9 01.8 59°18.0 24.5 70°31.2 190 160°4.7 2 24.9 Arctura: 145°48.1 19°03.4 11 149°03.5 322°03.9 01.8 59°18.0 24.5 70°31.2 190 160°4.7 2 24.9 Arctura: 145°48.1 19°03.4 11 149°03.5 32°03.9 01.8 59°18.0 24.5 70°31.2 190 160°4.9 24.9 Arctura: 145°48.1 19°03.4 13 179°08.5 352°03.3 04.4 89°19.6 24.6 110°35.5 190 190°53.1 25.1 21.1 21.1 21.1 21.1 21.1 21.1 21											Spica		
8 1103°66.1 277°04.8 57.9 14°15.5 24.3 25°24.6 18.9 115°39.9 24.7 Markett 14°30.8 30°2.0 29°16.4 24.4 40°6.6 8 19.0 130°42.5 24.8 Markett 14°30.8 30°2.0 11 149°01.1 30°04.2 02°00.5 44°17.2 24.4 55°29.0 19.0 145°45.2 24.9 19.0 19.0 140°42.2 24.9 19.0 19.0 140°42.2 24.9 19.0 19.0 140°42.2 24.9 19.0 19.0 140°42.2 24.9 19.0 19.0 140°42.2 24.9 19.0 19.0 140°42.2 24.9 19.0 19.0 140°42.2 24.9 19.0 19.0 140°42.2 24.9 19.0 19.0 140°42.2 24.9 19.0 19.0 140°42.2 24.0 19.0 19.0 140°42.2 24.0 19.0 19.0 140°42.2 24.0 19.0 19.0 140°42.2 24.0 19.0 19.0 140°42.2 24.0 19.0 19.0 140°42.2 25.1 19.0 19.0 140°42.2 25.0 140°4													
9 118°886 292°045 01°992 29°164 · 24.4													
11   149°01.5   307°04.2   02°00.5   44°17.2   24.4   55°29.0   19.0   145°45.2   24.9   140°40.5   130°3.5   120°03.9   0.18   59°18.0   24.5   70°11.2   19.0   160°47.0   150°1.2   19.0   150°47.0   150°1.2   19.0   150°47.0   150°1.2   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   150°3.5   19.0   100°3.5   19.0   19.0   100°3.5   19.0   19.0   100°3.5   19.0   19.0   100°3.5   19.0   19.0   100°3.5   19.0   19.0   19.0   100°3.5   19.0   19.0   19.0   19.0   100°3.5   19.0													
11 149°03.5 322°03.9 01.8 59°18.0 24.5 70°31.2 19.0 160°47.9 24.9 12.166°60. 33°03.6 \$02°03.1 74°18.8 \$032°04.5 86°33.4 \$022°19.0 175°05.0 \$50°25.0 \$50°25.0 13 179°08.5 \$32°03.3 04.4 89°19.6 24.6 100°35.5 19.0 190°53.1 25.1 14°04.0 7°0.9 05.7 104°0.0 24.6 110°35.5 19.0 190°53.1 25.1 14°04.0 7°0.9 05.7 104°0.0 24.6 110°37.7 19.0 205°58.8 25.2 1.5 209°13.4 22°0.0 6 0.7 0 119°21.2 0.2 4.7 130°39.9 0.191. 220°58.4 0.52.2 Atria 107°10.7 6.09°0.4 15°0.2 15°0.						=							
12   164°06   337°03   082   37°03   04   89°196   24.6   100°355   190   190°531   25.1   14   194°10   9 °702   05.7   104°204   24.6   115°37.7   190   205°55.8   25.2   15   209°134   22°02.6   07.0   119°21   24.7   130°399   191   220°35.8   25.2   16   224°15   37°02.3   08.2   134°22.1   24.7   130°399   191   220°35.8   25.2   17   239°18.3   52°02.0   09.5   149°22.9   24.8   160°44.2   19.1   251°03.7   254   18   254°20.8   67°01.7   S02°10.8   164°23.7   N23°24.8   157°46.4   N22°19.1   251°03.7   254   19   209°23.2   82°01.4   12.1   179°4.5   24.9   190°4.8   19.1   231°09.0   25.5   22   314°30.6   127°00.4   16.0   224°27.0   25.0   230°55.1   19.2   230°55.1   19.2   230°58.7   19.2   23   314°30.6   127°00.4   16.0   224°27.0   25.0   230°55.1   19.2   230°55.1   20.2   230°33.1   142°00.1   17.3   239°27.8   25.0   250°57.3   19.2   341°19.5   25.9    Mer.pass. 01.05   \$\bullet \text{CHA} \text{ CHA} \text{ Dec } \text{ Advisors}  1.5°37.7   2.90°3.9   19.3   20°27.5   2.01   2													
13 179°08.5 352°03.3 04.4 89°19.6 100°35.5 19.0 190°55.8 25.2 14 14 194°19.9 7°02.9 0.57 104°20.4 24.6 115°37.7 19.0 20°55.8 25.2 15 209°13.4 22°02.6 · 07.0 119°21.2 · 24.7 130°39.9 · 19.1 220°58.4 · 25.2 14.2 12.2 12.4 145°42.1 19.1 230°0.1 25.3 17 239°18.3 52°02.0 09.5 149°22.9 · 24.8 160°44.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 251°03.7 25.4 14.2 19.1 14.2 14.2 19.1 251°03.7 25.4 14.2 19.1 14.2 14.2 19.1 14.2 14.2 14.2 14.2 14.2 14.2 14.2 14		164°06.0	337°03.6						175°50.5				
14   194*10.9   7*02.9   0.57   0.14*20.4   24.6   116*37.7   19.0   206*95.8   25.2	13	179°08.5	352°03.3	04.4	89°19.6	24.6	100°35.5	19.0	190°53.1	25.1			
16 224°15.9 37°0.2 3 08.2 134°2.1 24.7 130°39.9 · 19.1 220°58.4 × 52.1   16 224°15.9 37°0.2 3 08.2 134°2.1 24.7 145°2.1 19.1 236°0.1 25.3   17 239°18.3 52°0.2 0 09.5 149°2.2 9.4.8 160°4.4 2 19.1 251°0.37 25.4   18 254°2.8 6°10.7 50°2.10.8 164°2.7 N23°24.8 150°4.4 22°19.1 266°0.6 3 507°2.5 5   19 269°23.2 82°0.1 4 12.1 179°2.5 24.9 190°4.8 6 19.1 281°0.0 25.5   21 299°2.8 2 112°0.0 7 · 1.4 7 209°2.6 1 · 25.0 200°5.0 8 19.2 296°11.6 25.6   22 314°30.6 127°0.0 4 16.0 224°2.7 0 · 25.0 250°5.5 1 19.2 326°16.9 25.8   23 329°3.1 142°0.0 1 17.3 239°2.8 25.0 250°5.5 1 19.2 326°16.9 25.8    Mer.pass. 01.05    Mer.pass. 01.05    Met.pass. 01.0	14		7°02.9	05.7	104°20.4	24.6		19.0	205°55.8	25.2			
16   224*15.9   37*02.3   08.2   134*22.1   24.7   145*42.1   19.1   235*01.1   25.5     17   239*18.3   52*02.0   09.5   149*22.9   24.8   160*44.2   19.1   251*03.7   25.4     18   254*20.8   67*01.7   502*10.8   164*23.7   N23*24.8   175*46.4   N22*19.1   266*06.3   507*25.5     26   232*25.7   97*01.1   13.4   194*25.3   24.9   205*80.8   19.2   296*11.6   25.6     21   299*28.2   112*00.7   1.47   200*26.1   2.50   2.20*83.0   19.2   311*14.3   2.55     22   314*30.6   127*00.4   16.0   224*27.0   25.0   235*85.1   19.2   336*16.9   25.8     23   329*33.1   142*00.1   17.3   239*27.8   25.0   250*57.3   19.2   341*19.5   25.9     Mer.pass. 01:05   \$\bar{\text{V-0.3'}}\$ \ \( \bar{\text{V-0.3'}}\$ \ \( \bar{\text{V-1.8}}\$ \) \( \bar{\text{V-0.8'}}\$ \ \) \( \bar{\text{V-0.8'}}\$ \ \( \bar{\text{V-0.8'}}\$ \ \) \( \bar{\text{V-0.8'}}\$ \ \( \bar{\text{V-0.8'}}\$ \ \) \( \bar{\text{V-0.8'}}\$ \ \( \bar{\text{V-0.8'}}\$ \ \) \( \bar{\text{V-0.8'}}\$ \ \( \bar{\text{V-0.8'}}\$ \ \) \( \bar{\text{V-0.8'}}\$ \ \( \bar{\text{V-0.8'}}\$ \ \) \( \bar{\text{V-0.8'}}\$ \ \( \bar{\text{V-0.8'}}\$ \ \) \( \bar{\text{V-0.8'}}\$ \ \) \( \bar{\text{V-0.8'}}\$ \ \( \bar{\text{V-0.8'}}\$ \ \) \( \bar{\text{V-0.8'}}\$ \ \( \bar{\text{V-0.8'}}\$ \ \) \( \bar{\text{V-0.8'}}\$ \ \) \( \bar{\text{V-0.8'}}\$ \ \( \bar{\text{V-0.8'}}\$ \	15			•• 07.0		• • 24.7		• • 19.1	220°58.4	• • 25.2			
18 254°28.8 6°02.0 095. 149°22.9 24.8 160°44.2 19.1 251°37. 25.4 Shaula 96°10.7 37°07.4 18 254°28.8 6°01.7 50°10.8 164°23.7 N25°24.8 175°46.4 N22°19.1 266°06.3 50°25.5 19.2 266°06.3 50°25.5 19.2 20 284°25.7 9°01.1 13.4 194°25.3 24.9 205°50.8 19.2 296°11.6 25.6 14.2 199°28.2 112°00.7 · · 1.4 7 200°26.1 · · 25.0 20°83.0 · · 19.2 31°14.3 · · 25.7 19.2 31°14.3 · · 25.7 19.2 31°14.3 · · 25.7 19.2 31°14.3 · · 25.9 19.2 31°14.3 · · 25.9 19.2 31°14.3 · · 25.9 19.2 31°14.3 · · 25.9 19.2 19.2 19.2 19.2 19.2 19.2 19.2 19													
18   294*20.8   07*01.7   10*2*01.8   104*23.7   N23*24.8   105*48.6   10.5   281*09.0   295*5   295*03.2   29*01.4   12.1   179*24.5   24.9   109*48.6   19.2   296*11.6   25.6   25.0   220*93.0   19.2   296*11.6   25.6   25.0   220*93.0   19.2   296*11.6   25.6   25.0   220*93.0   19.2   296*11.6   25.6   25.0   220*93.0   19.2   296*11.6   25.6   25.0   220*93.0   19.2   296*11.6   25.6   25.0   220*93.0   19.2   296*11.6   25.6   25.0   25.0   230*93.0   19.2   231*19*14.3   22.5   25.0   25.0   230*93.3   19.2   231*19*14.3   22.5   25.0   25.0   230*93.3   230*93.3   142*00.1   17.3   239*27.8   25.0   230*95.5   19.2   231*19*15.   25.9   25.0   25.0   230*93.3   230*93.3   242*00.1   17.3   239*27.8   25.0   250*57.3   19.2   231*19*15.   25.9   25.0													
20 284°257 97°01.1 13.4 194°25.3 24.9 205°50.8 19.2 290°11.6 25.6 220°28.2 112°00.7 1.47 209°26.1 2.50 220°35.0 1.19.2 326°16.9 25.8 2310°30.6 127°00.4 16.0 224°27.0 25.0 235°55.1 19.2 326°16.9 25.8 Nunki 75°47.9 26°16.0 Nunki 75°47.9 26°16.0 Nunki 75°47.9 26°16.0 Nunki 75°47.9 26°16.0 Nunki 75°47.9 26°16.0 Nunki 75°47.9 26°16.0 Nunki 75°47.9 26°16.0 Nunki 75°47.9 26°16.0 Nunki 75°47.9 26°16.0 Nunki 75°47.9 26°16.0 Nunki 75°47.9 26°16.0 Nunki 75°47.9 26°16.0 Nunki 75°47.9 26°16.0 Nunki 75°47.9 21°16°10.1 Nunki 75°47.9 Nunki											Rasalhague		12°32.7
21 299°282 112°00.7 · 14.7 209°26.1 · 25.0 220°8.3.0 · 19.2 311°14.3 · 25.7 Vega 80°33.2 · 38°28.6 23 32°33.1 142°00.1 17.3 239°27.8 25.0 250°57.3 19.2 341°19.5 25.9 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Attair 62°00.0 8°56.1 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°38.8 vega 80°33.2 · 38°38.8 vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°38.8 · 26°29.9 Vega 80°33.2 · 38°28.6 Nunki 75°47.9 · 26°16.0 Vega 80°33.2 · 38°38.8 · 26°29.2 · 26°17.0 · 19.4 · 116°48.3 · 26°3.5 · 26°1.0 · 26°3.5 · 26°1.0 · 26°3.5 · 26°1.0 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.1 · 26°3.5 · 26°3.0 · 26°3.5 · 26°3.0 · 26°3.5 · 26°3.0											Eltanin		
22 314°30.6   127°00.4   16.0   224°27.0   25.0   235°65.1   19.2   326°16.9   25.8   Nunkii 75°47.9   -26°16.0   Altair 62°00.0   Refs. 10.5											Kaus Aust.		
Mer.pass   142°00.1   17.3   239°27.8   25.0   250°57.3   19.2   341°19.5   25.9											_		
Mer.pass. 01:05													
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Thu GHA GHA Dec GHA DE	Mer.p	ass. 01:05	$\nu$ -0.3′ $d1.3$	3′ m-3.86	$\nu$ 0.8′ d0	.1′ m0.68	$\nu$ 2.2′ d0.	0′ m-2.28	$\nu$ 2.6′ d0	.1′ m0.59			
Thu GHA GHA Dec GHA DE													
0 344°35.6 156°59.8 502°18.5 254°28.6 N23°25.1 265°59.5 N22°19.2 356°22.2 507°25.9 1 35°38.0 171°59.5 19.8 269°29.4 25.1 281°01.7 19.3 11°24.8 26.0 26.0 268°43.0 201°58.9 21.1 284°30.2 25.2 296°03.9 19.3 26°27.5 26.1 3°245.1 281°31.1 284°30.2 25.2 296°03.9 19.3 26°27.5 26.1 281°01.7 19.3 41°30.1 26.2 26.2 26.2 26°24.2 299°31.1 25.2 311°06.1 19.3 41°30.1 26.2 26.2 26.2 26°24.2 299°31.1 25.2 311°06.1 19.3 41°30.1 26.2 26.2 26.2 26°24.2 299°31.1 25.2 311°06.1 19.3 56°32.7 26.2 26.2 26°24.2 29°31.5 25.0 329°32.7 25.3 326°08.2 19.3 56°32.7 26.2 26.2 26°24.2 25.0 329°32.7 25.3 341°10.4 19.3 71°35.4 26.3 26°25.4 26°25.8 26°27.0 24°25.8 2	Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec			
1 359°38.0 171°59.5 19.8 269°29.4 25.1 281°01.7 19.3 11°24.8 26.0 Scheat 13°45.1 28°13.1 1°40.5 186°59.2 21.1 284°30.2 25.2 296°03.9 19.3 26°27.5 26.1 Markab 13°29.9 15°20.4 1°40.5 186°59.2 21.1 284°30.2 25.2 296°03.9 19.3 26°27.5 26.1 Markab 13°29.9 15°20.4 1°40.5 186°59.2 21.1 284°30.2 25.2 296°03.9 19.3 26°27.5 26.1 Markab 13°29.9 15°20.4 1°40.5 186°9.2 21.5 28°13.1 1°40.5 1°40.5 18.0 18.0 1°40.5 18.0 18.0 18.0 18.0 18.0 18.0 18.0 18.0													
2 14°40.5 186°59.2 21.1 284°30.2 25.2 296°03.9 19.3 26°27.5 26.1   4 29°43.0 201°58.9 · · · · · · · · · · · · · · · · · · ·	1	359°38.0	171°59.5		$269^{\circ}29.4$	25.1	$281^{\circ}01.7$		$11^{\circ}24.8$	26.0			
29°43.0 201°58.9 · · · · · · · · · · · · · · · · · · ·													
5 59°47.9 231°58.2 25.0 329°32.7 25.3 341°10.4 19.3 71°35.4 26.3 74°50.3 246°57.9 502°26.3 344°33.5 N23°25.4 356°12.6 N22°19.4 86°38.0 507°26.4 340°35.2 276°57.3 28.8 14°35.1 25.5 26°17.0 19.4 116°43.3 26.5 26.0 11°38.2 271°12.4 07.04 34°35.1 25.5 26°17.0 19.4 116°43.3 26.5 26°17.0 19.4 116°43.5 26.8 26°27.0 19.5 160°53.9 26.9 26°27.0 26°53.1 26°27.0 26°53.1 26°27.0 26°53.1 26°27.0 26°53.1 26°27.0 26°53.1 26°27.0 26°53.1 26°27.0 26°53.1 26°27.0 26°53.1 26°27.0 26°53.1 26°27.0 26°53.1 26°27.0 26°53.1 26°27.0 26°37.0													
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7 89°52.8 261°57.6 27.6 359°34.3 25.4 11°14.8 19.4 101°40.7 26.5 8 104°55.3 276°57.3 28.8 14°35.1 25.5 26°17.0 19.4 116°43.3 26.5 9 119°57.7 291°57.0 · · · 30.1 29°36.0 · · · 25.5 41°19.2 · · · 19.4 131°45.9 · · · 26.6 10 135°00.2 306°56.7 31.4 44°36.8 25.5 56°21.3 19.4 146°48.6 26.7 11 150°02.7 321°56.3 32.7 59°37.6 25.6 71°23.5 19.5 161°51.2 26.8 12 165°05.1 336°56.0 502°34.0 74°38.4 N23°25.6 86°25.7 N22°19.5 176°53.9 S07°26.9 13 180°07.6 351°55.7 35.3 89°39.3 25.7 101°27.9 19.5 191°56.5 26.9 14 195°10.1 6°55.4 36.6 104°40.1 25.7 116°30.1 19.5 206°59.1 27.0 15 210°12.5 21°55.1 · · · 37.8 119°40.9 · · · 25.7 131°32.3 · · · 19.5 222°01.8 · · · 27.1 240°17.5 51°54.5 40.4 149°42.5 25.8 161°36.6 19.6 252°07.1 27.2 18 255°19.9 66°54.1 S02°41.7 164°43.4 N23°25.9 176°38.8 N22°19.6 267°09.7 \$07°27.3 19 270°22.4 81°53.8 43.0 179°44.2 25.9 191°41.0 19.6 282°12.4 27.4 20 238°24.8 96°53.5 44.3 194°45.0 26.0 206°43.2 19.6 297°15.0 27.5 21°30°27.3 111°53.2 · · · 45.6 209°45.8 · · · 26.0 221°45.4 · · · 19.6 312°17.6 · · · 27.6 23 330°32.2 141°52.6 48.1 239°47.5 26.1 251°49.8 19.7 342°22.9 27.7   1 89°52.8 26°17.0 19.4 116°43.3 26.5 Saturn 11°38.2 00:23      Jupiter 281°37.8 06:22 Saturn 11°38.2 00:23     Sep 04 Wed Venus 173°30.9 13:32     Sep 04 Wed Venus 173°30.9 13:32     Sep 04 Wed Venus 173°30.9 13:32     Sep 05 Thu ShA Mer.pass Saturn 11°42.4 00:19     Sep 05 Thu Venus 11°42.4 00:19     Sep 05 Thu Venus 11°42.4 00:19     Sep 05 Thu Venus 11°42.4 00:19     Sep 05 Thu Venus 11°42.4 00:19     Sep 05 Thu Venus 172°24.2 13:32     Mars 269°53.0 07:02     Jupiter 281°37.8 06:22     Saturn 11°42.4 00:19     Sep 05 Thu Venus 11°42.4 00:19     Sep 05 Thu Venus 11°42.4 00:19     Sep 05 Thu Venus 11°42.4 00:19     Sep 05 Thu Venus 11°42.2     Sep 05 Thu Venus 172°24.2 13:32     Sep 05 Thu Venus 172°24.2 13:32     Sep 05 Thu Venus 11°42.4 00:19     Sep 05 Thu Venus 11°42.4 00:19     Sep 05 Thu Venus 11°42.4 00:19     Sep 05 Thu Venus 11°42.2     Saturn 11°46.6 00:14     Sep 05 Thu Venus 11°42.2     Sep 05 Thu Venus 11°44.2     Sep													
8													
9 119°57.7 291°57.0 · · · 30.1 29°36.0 · · · 25.5 41°19.2 · · · 19.4 131°45.9 · · · 26.6 10 135°00.2 306°56.7 31.4 44°36.8 25.5 56°21.3 19.4 146°48.6 26.7 11 150°02.7 321°56.3 32.7 59°37.6 25.6 71°23.5 19.5 161°51.2 26.8 12 165°05.1 336°56.0 \$02°34.0 74°38.4 \$N23°25.6 \$86°25.7 \$N22°19.5 \$176°53.9 \$07°26.9 13 180°07.6 351°55.7 35.3 89°39.3 25.7 101°27.9 19.5 191°56.5 26.9 14 195°10.1 6°55.4 36.6 104°40.1 25.7 116°30.1 19.5 206°59.1 27.0 15 210°12.5 21°55.1 · · · 37.8 119°40.9 · · · 25.7 131°32.3 · · 19.5 222°01.8 · · · 27.1 16°25.5 17.5 51°54.5 \$40.4 \$149°42.5 \$25.8 \$161°36.6 \$19.6 \$252°07.1 \$27.2 \$18 \$255°19.9 \$66°54.1 \$502°41.7 \$164°43.4 \$N23°25.9 \$176°38.8 \$N22°19.6 \$252°07.1 \$27.2 \$18 \$255°19.9 \$66°54.1 \$502°41.7 \$164°43.4 \$N23°25.9 \$176°38.8 \$N22°19.6 \$252°07.1 \$27.2 \$27.3 \$27.0 \$27.0 \$285°24.8 \$96°53.5 \$44.3 \$194°45.0 \$26.0 \$206°43.2 \$19.6 \$297°15.0 \$27.5 \$27													
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11 150°02.7 321°56.3 32.7 59°37.6 25.6 71°23.5 19.5 161°51.2 26.8   12 165°05.1 336°56.0 S02°34.0 74°38.4 N23°25.6 86°25.7 N22°19.5 176°53.9 S07°26.9   13 180°07.6 351°55.7 35.3 89°39.3 25.7 101°27.9 19.5 191°56.5 26.9   14 195°10.1 6°55.4 36.6 104°40.1 25.7 116°30.1 19.5 206°59.1 27.0   15 210°12.5 21°55.1 · 37.8 119°40.9 · 25.7 131°32.3 · 19.5 222°01.8 · 27.1   16 225°15.0 36°54.8 39.1 134°41.7 25.8 146°34.5 19.6 237°04.4 27.2   17 240°17.5 51°54.5 40.4 149°42.5 25.8 161°36.6 19.6 252°07.1 27.2   18 255°19.9 66°54.1 S02°41.7 164°43.4 N23°25.9 176°38.8 N22°19.6 252°07.1 27.2   18 255°19.9 66°54.1 S02°41.7 164°43.4 N23°25.9 176°38.8 N22°19.6 267°09.7 S07°27.3   19 270°22.4 81°53.8 43.0 179°44.2 25.9 191°41.0 19.6 282°12.4 27.4   20 285°24.8 96°53.5 44.3 194°45.0 26.0 206°43.2 19.6 297°15.0 27.5   21 300°27.3 111°53.2 · 45.6 209°45.8 · 26.0 221°45.4 · 19.6 312°17.6 · 27.6   22 315°29.8 126°52.9 46.9 224°46.7 26.0 236°47.6 19.7 327°20.3 27.6   23 330°32.2 141°52.6 48.1 239°47.5 26.1 251°49.8 19.7 342°22.9 27.7    Mars 270°32.6 07:03 Mars 270°32.6 07:03 Mars 270°32.6 07:03 Mars 270°32.6 07:03 Mars 270°32.6 07:03 Mars 270°32.6 07:03 Mars 270°32.6 07:03 Mars 270°32.6 07:03 Mars 270°32.6 07:03 Mars 270°32.6 07:03  Saturn 11°42.4 00:19  Sep 05 Thu SHA Mer.pass Venus 172°24.2 13:32  Venus 172°24.2 13:32  13:32													
12 165°05.1 336°56.0 S02°34.0 74°38.4 N23°25.6 86°25.7 N22°19.5 176°53.9 S07°26.9 13 180°07.6 351°55.7 35.3 89°39.3 25.7 101°27.9 19.5 191°56.5 26.9 14 195°10.1 6°55.4 36.6 104°40.1 25.7 116°30.1 19.5 206°59.1 27.0 15 210°12.5 21°55.1 ··· 37.8 119°40.9 ··· 25.7 131°32.3 ··· 19.5 222°01.8 ··· 27.1 240°17.5 51°54.5 40.4 149°42.5 25.8 161°36.6 19.6 252°07.1 27.2 18 255°19.9 66°54.1 S02°41.7 164°43.4 N23°25.9 176°38.8 N22°19.6 252°07.1 27.2 18 255°19.9 66°54.1 S02°41.7 164°43.4 N23°25.9 176°38.8 N22°19.6 267°09.7 S07°27.3 19 270°22.4 81°53.8 43.0 179°44.2 25.9 191°41.0 19.6 282°12.4 27.4 20 285°24.8 96°53.5 44.3 194°45.0 26.0 206°43.2 19.6 297°15.0 27.5 21 300°27.3 111°53.2 ··· 45.6 209°45.8 ··· 26.0 221°45.4 ··· 19.6 312°17.6 ··· 27.6 27.6 283°30.8 20.1 29.0 11°52.0 48.1 239°47.5 26.1 251°49.8 19.7 342°22.9 27.7 Mars: 0.1 10°32.6 07°03 11°52.6 07°03.9 10°24.9 19.5 191°56.5 26.9 191°41.0 19.6 282°12.4 27.4 10°4.6 00.14 10°4.0 19.6 282°12.4 27.4 10°4.6 19.7													
13 180°07.6 351°55.7 35.3 89°39.3 25.7 101°27.9 19.5 191°56.5 26.9 14 195°10.1 6°55.4 36.6 104°40.1 25.7 116°30.1 19.5 206°59.1 27.0 15 210°12.5 21°55.1 37.8 119°40.9 25.7 131°32.3 19.6 222°01.8 27.1 27.2 17 240°17.5 51°54.5 40.4 149°42.5 25.8 161°36.6 19.6 252°07.1 27.2 18 255°19.9 66°54.1 S02°41.7 164°43.4 N23°25.9 176°38.8 N22°19.6 267°09.7 S07°27.3 19 270°22.4 81°53.8 43.0 179°44.2 25.9 191°41.0 19.6 282°12.4 27.4 20 285°24.8 96°53.5 44.3 194°45.0 26.0 206°43.2 19.6 297°15.0 27.5 21 300°27.3 111°53.2 45.6 209°45.8 26.0 221°45.4 19.6 282°12.4 27.4 27.4 20 285°29.8 126°52.9 46.9 224°46.7 26.0 236°47.6 19.7 327°20.3 27.6 23 330°32.2 141°52.6 48.1 239°47.5 26.1 251°49.8 19.7 342°22.9 27.7 Mars: 0.1 Mars: 0.1													
14 195°10.1 6°55.4 36.6 104°40.1 25.7 116°30.1 19.5 206°59.1 27.0 15 210°12.5 21°55.1 ··· 37.8 119°40.9 ··· 25.7 131°32.3 ··· 19.5 222°01.8 ··· 27.1 16 225°15.0 36°54.8 39.1 134°41.7 25.8 146°34.5 19.6 237°04.4 27.2 17 240°17.5 51°54.5 40.4 149°42.5 25.8 161°36.6 19.6 252°07.1 27.2 18 255°19.9 66°54.1 \$02°41.7 164°43.4 N23°25.9 176°38.8 N22°19.6 267°09.7 \$07°27.3 19 270°22.4 81°53.8 43.0 179°44.2 25.9 191°41.0 19.6 282°12.4 27.4 20 285°24.8 96°53.5 44.3 194°45.0 26.0 206°43.2 19.6 297°15.0 27.5 21 300°27.3 111°53.2 ··· 45.6 209°45.8 ··· 26.0 221°45.4 ··· 19.6 312°17.6 ··· 27.6 22 315°29.8 126°52.9 46.9 224°46.7 26.0 236°47.6 19.7 327°20.3 27.6 23 330°32.2 141°52.6 48.1 239°47.5 26.1 251°49.8 19.7 342°22.9 27.7     Saturn   11°42.4   00:19   Sep 05 Thu   SHA   Mer.pass   17°2°24.2   13:32													
15       210°12.5       21°55.1       · · · 37.8       119°40.9       · · · 25.7       131°32.3       · · 19.5       222°01.8       · · · 27.1       Sep 05 Thu       SHA       Mer.pass         16       225°15.0       36°54.8       39.1       134°41.7       25.8       146°34.5       19.6       237°04.4       27.2       Venus       172°24.2       13:32         17       240°17.5       51°54.5       40.4       149°42.5       25.8       161°36.6       19.6       252°07.1       27.2       Mars       269°53.0       07:02         18       255°19.9       66°54.1       S02°41.7       164°43.4       N23°25.9       176°38.8       N22°19.6       267°09.7       507°27.3       Jupiter       281°23.9       06:15         20       285°24.8       96°53.5       44.3       194°45.0       26.0       206°43.2       19.6       297°15.0       27.5         21       300°27.3       111°53.2       · · 45.6       209°45.8       · · 26.0       221°45.4       · · 19.6       312°17.6       · · 27.6         23       330°32.2       141°52.6       48.1       239°47.5       26.1       251°49.8       19.7       342°22.9       27.7											Saturn	11~42.4	00:19
16       225°15.0       36°54.8       39.1       134°41.7       25.8       146°34.5       19.6       237°04.4       27.2       Venus       172°24.2       13:32         17       240°17.5       51°54.5       40.4       149°42.5       25.8       161°36.6       19.6       252°07.1       27.2       Mars       269°53.0       07:02         18       255°19.9       66°54.1       S02°41.7       164°43.4       N23°25.9       176°38.8       N22°19.6       267°09.7       S07°27.3       Jupiter       281°23.9       06:15         20       285°24.8       96°53.5       44.3       194°45.0       26.0       206°43.2       19.6       297°15.0       27.5         21       300°27.3       111°53.2       45.6       209°45.8       26.0       221°45.4       19.6       297°15.0       27.6         22       315°29.8       126°52.9       46.9       224°46.7       26.0       236°47.6       19.7       327°20.3       27.6         23       330°32.2       141°52.6       48.1       239°47.5       26.1       251°49.8       19.7       342°22.9       27.7       Mars:       0.1											Sep 05 Thu	SHA	Mer.pass
17       240°17.5       51°54.5       40.4       149°42.5       25.8       161°36.6       19.6       252°07.1       27.2       Mars       269°53.0       07:02         18       255°19.9       66°54.1       S02°41.7       164°43.4       N23°25.9       176°38.8       N22°19.6       267°09.7       S07°27.3       S07°27.3       Jupiter       281°23.9       06:15         20       285°24.8       96°53.5       44.3       194°45.0       26.0       206°43.2       19.6       297°15.0       27.5       27.5       27.6       27.6       27.6       27.6       27.6       27.6       27.6       27.6       27.6        27.6										27.2			
18       255°19.9       66°54.1       S02°41.7       164°43.4       N23°25.9       176°38.8       N22°19.6       267°09.7       S07°27.3       Jupiter 281°23.9       06:15         19       270°22.4       81°53.8       43.0       179°44.2       25.9       191°41.0       19.6       282°12.4       27.5       27.5       27.5       27.5       27.5       27.5       27.5       27.5       27.5       27.5       27.5       27.5       27.6													
20 285°24.8 96°53.5 44.3 194°45.0 26.0 206°43.2 19.6 297°15.0 27.5 21 300°27.3 111°53.2 · 45.6 209°45.8 · 26.0 221°45.4 · 19.6 312°17.6 · 27.6 22 315°29.8 126°52.9 46.9 224°46.7 26.0 236°47.6 19.7 327°20.3 27.6 23 330°32.2 141°52.6 48.1 239°47.5 26.1 251°49.8 19.7 342°22.9 27.7  Horizontal parallax Venus: 0.1 Mars: 0.1													
21       300°27.3       111°53.2       · · 45.6       209°45.8       · · 26.0       221°45.4       · · 19.6       312°17.6       · · 27.6       Horizontal parallax         22       315°29.8       126°52.9       46.9       224°46.7       26.0       236°47.6       19.7       327°20.3       27.6       Venus: 0.1         23       330°32.2       141°52.6       48.1       239°47.5       26.1       251°49.8       19.7       342°22.9       27.7       Mars: 0.1											Saturn	11°46.6	00:14
22 315°29.8 126°52.9 46.9 224°46.7 26.0 236°47.6 19.7 327°20.3 27.6 23 330°32.2 141°52.6 48.1 239°47.5 26.1 251°49.8 19.7 342°22.9 27.7 Mars: 0.1											Under	al parallas	
23 330°32.2 141°52.6 48.1 239°47.5 26.1 251°49.8 19.7 342°22.9 27.7 Mars: 0.1											HORIZON	•	0.1
25 550 522 112 52.0 10.1 255 11.5 20.1 251 15.0 15.1 512 22.5 21.1													
Mer.pass. 01:01 $\nu$ -0.3′ d1.3′ m-3.86 $\nu$ 0.8′ d0.0′ m0.67 $\nu$ 2.2′ d0.0′ m-2.29 $\nu$ 2.6′ d0.1′ m0.59	23	JJU JZ.Z											V
	Mer.p	ass. 01:01	$\nu$ -0.3' d1.3	3′ m-3.86	$\nu$ 0.8′ d0	.0′ m0.67	$\nu$ 2.2′ d0.	0′ m-2.29	$\nu^{2.6'} d0$	.1′ m0.59			

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°09.7	$N07^{\circ}26.6$	$180^{\circ}05.1$	16.4'	N09°57.0	-13.6'	54.2'
1	195°09.9	25.7	194°40.5	16.4'	09°43.4	-13.7'	54.2'
2	210° 10.1 225° 10.3	24.8 •• 23.9	209°15.9 223°51.3	16.5' 16.5'	09°29.8 09°16.1	-13.7' -13.7'	54.2' 54.2'
4	240° 10.5	23.0	238°26.8	16.5'	09°02.4	-13.7'	54.2'
5	255°10.7	22.0	253°02.4	16.6'	08°48.6	-13.8'	54.2'
6	270°10.9	N07°21.1	267°38.0	16.6'	N08°34.9 08°21.1	-13.8'	54.2'
7 8	285°11.1 300°11.3	20.2 19.3	282°13.6 296°49.3	16.7' 16.7'	08° 21.1	-13.8' -13.8'	54.2' 54.2'
9	315° 11.5	. 18.4	311°25.0	16.8'	07°53.4	-13.9'	54.2'
10	330°11.7	17.4	326°00.8	16.8'	07°39.5	-13.9'	54.1'
11	345°11.9	16.5	340°36.5	16.8'	07°25.6	-13.9'	54.1'
12 13	0°12.1 15°12.3	N07°15.6 14.7	355°12.4 9°48.2	16.9' 16.9'	N07°11.7 06°57.8	-13.9' -14.0'	54.1' 54.1'
14	30° 12.5	13.7	24°24.1	16.9	06°43.8	-14.0'	54.1'
15	45°12.7	• • 12.8	$39^{\circ}00.1$	17.0'	06°29.8	-14.0'	54.1'
16	60°12.9	11.9	53°36.0	17.0'	06° 15.8	-14.0'	54.1'
17 18	75° 13.1 90° 13.3	11.0 N07°10.1	68°12.0 82°48.0	17.0' 17.1'	06°01.8 N05°47.8	-14.0' -14.0'	54.1' 54.1'
19	105° 13.6	09.1	97°24.1	17.1	05°33.7	-14.1'	54.1
20	120° 13.8	08.2	112°00.2	17.1'	05° 19.7	-14.1'	54.1'
21	135°14.0	•• 07.3	126°36.3	17.1'	05°05.6	-14.1'	54.1'
22	150° 14.2	06.4	141°12.4	17.2'	04°51.5	-14.1'	54.1'
23	165°14.4	05.4	155°48.6	17.2'	04°37.4	-14.1'	54.0'
	SD = 15.8'	d = -0.9'		SI	D = 14.8'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180° 14.6	N07°04.5	170°24.8	17.2'	N04°23.3	-14.1'	54.0'
1	195° 14.8 210° 15.0	03.6 02.7	185°01.0 199°37.2	17.2' 17.3'	04°09.1 03°55.0	-14.1' -14.2'	54.0'
2	210°15.0 225°15.2	01.7	199°37.2 214°13.5	17.3' 17.3'	03°55.0 03°40.9	-14.2' -14.2'	54.0' 54.0'
4	240° 15.4	07°00.8	214 13.3 228°49.8	17.3'	03°26.7	-14.2'	54.0'
5	255° 15.6	06°59.9	243°26.1	17.3'	03°12.5	-14.2'	54.0'
6	270° 15.8	N06°59.0	258°02.4	17.3'	N02°58.3	-14.2'	54.0'
7	285° 16.0 300° 16.2	58.1 57.1	272°38.7 287°15.1	17.4' 17.4'	02°44.2 02°30.0	-14.2'	54.0'
8 9	315° 16.4	56.2	287 15.1 301°51.4	17.4 17.4'	02°30.0	-14.2' -14.2'	54.0' 54.0'
10	330° 16.7	55.3	316°27.8	17.4'	02°01.6	-14.2'	54.0'
11	345°16.9	54.3	331°04.2	17.4'	01°47.4	-14.2'	54.0'
12	0°17.1	N06°53.4	345°40.6	17.4	N01°33.2	-14.2'	54.0'
13 14	15° 17.3 30° 17.5	52.5 51.6	0°17.0 14°53.5	17.4' 17.4'	01°19.0 01°04.7	-14.2' -14.2'	54.0' 54.0'
15	45° 17.7	50.6	29°29.9	17.4'	00°50.5	-14.2'	54.0'
16	60°17.9	49.7	44°06.4	17.5'	00°36.3	-14.2'	54.0'
17	75°18.1	48.8	58°42.8	17.5'	00°22.1	-14.2'	54.0'
18 19	90° 18.3 105° 18.5	N06°47.9 46.9	73°19.3 87°55.7	17.5' 17.5'	N00°07.9 S00°06.3	-14.2' 14.2'	54.0' 53.9'
20	100° 18.7	46.0	102°32.2	17.5	00° 20.5	14.2	53.9'
21	135° 18.9	• • 45.1	117°08.7	17.5'	00°34.7	14.2'	53.9'
22	150° 19.2	44.2	131°45.2	17.5'	00°48.9	14.2'	53.9'
23	165°19.4	43.2	146°21.6	17.5'	01°03.1	14.2'	53.9'
	SD = 15.9'	d = -0.9'		SI	O = 14.7'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	180° 19.6 195° 19.8	N06°42.3 41.4	160°58.1 175°34.6	17.5'	\$01°17.3 01°31.5	14.2' 14.2'	53.9'
2	195° 19.8 210° 20.0	41.4 40.4	175°34.6 190°11.1	17.5' 17.5'	01° 31.5 01° 45.7	14.2' 14.2'	53.9' 53.9'
3	225° 20.2	• • 39.5	204°47.6	17.5'	01°59.8	14.2'	53.9'
4	240° 20.4	38.6	219°24.0	17.5'	02°14.0	14.1'	53.9'
5	255°20.6 270°20.8	37.7 N06°36.7	234°00.5 248°36.9	17.5'	02°28.1 \$02°42.3	14.1'	53.9'
6 7	270°20.8 285°21.0	N06°36.7 35.8	248°36.9 263°13.4	17.5' 17.4'	502°42.3 02°56.4	14.1' 14.1'	53.9' 53.9'
8	300°21.2	34.9	277°49.8	17.4'	03°10.5	14.1'	53.9'
9	315°21.5	• • 33.9	292°26.3	17.4'	03°24.6	14.1'	53.9'
10	330°21.7	33.0	307°02.7	17.4'	03°38.7	14.1'	53.9'
11 12	345°21.9 0°22.1	32.1 N06°31.1	321°39.1 336°15.5	17.4' 17.4'	03°52.8 \$04°06.8	14.1' 14.0'	53.9' 53.9'
13	15°22.3	30.2	350°51.9	17.4'	04°20.9	14.0'	53.9'
14	30°22.5	29.3	5°28.3	17.4'	04°34.9	14.0'	53.9'
15	45°22.7	• • 28.4	20°04.7	17.3'	04°48.9	14.0'	53.9'
16 17	60°22.9 75°23.1	27.4 26.5	34°41.0 49°17.3	17.3' 17.3'	05°02.9 05°16.9	14.0' 14.0'	53.9' 53.9'
18	75 23.1 90°23.4	20.5 N06°25.6	49 17.3 63°53.6	17.3'	505°30.9	13.9'	53.9'
19	105°23.6	24.6	78°29.9	17.3'	05°44.8	13.9'	53.9'
20	120°23.8	23.7	93°06.2	17.3'	05°58.7	13.9'	53.9'
21	135°24.0 150°24.2	• • 22.8	107°42.5 122°18.7	17.2'	06°12.6 06°26.5	13.9'	53.9'
22 23	165°24.2	21.8 20.9	122°18.7 136°54.9	17.2' 17.2'	06°26.5 06°40.3	13.9' 13.8'	53.9' 53.9'
	SD = 15.9'	d = -0.9'			D = 14.7'	_0.0	23.3

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	////	02:55	04:18	19:36	20:58	////
N 70°	01:10	03:18	04:30	19:25	20:36	22:36
68°	01:59	03:36	04:39	19:17	20:19	21:52
66°	02:29	03:50	04:46	19:09	20:05	21:24
64°	02:51	04:01	04:53	19:03	19:54	21:03
62°	03:08	04:11	04:58	18:58	19:45	20:47
60°	03:22	04:19	05:03	18:53	19:37	20:33
N 58°	03:34	04:26	05:07	18:49	19:30	20:22
56°	03:44	04:32	05:11	18:46	19:24	20:12
54°	03:52	04:37	05:14	18:42	19:19	20:04
52°	04:00	04:42	05:17	18:39	19:14	19:57
50°	04:06	04:47	05:20	18:37	19:10	19:50
45°	04:20	04:56	05:26	18:31	19:01	19:37
N 40°	04:30	05:03	05:31	18:26	18:54	19:26
35°	04:39	05:09	05:35	18:22	18:48	19:18
30°	04:46	05:15	05:39	18:18	18:43	19:11
20°	04:57	05:23	05:45	18:12	18:35	19:00
N 10°	05:05	05:29	05:51	18:07	18:28	18:53
0°	05:11	05:35	05:56	18:02	18:23	18:47
S 10°	05:15	05:39	06:00	17:57	18:18	18:43
20°	05:18	05:43	06:06	17:52	18:15	18:40
30°	05:20	05:47	06:11	17:47	18:11	18:39
35°	05:20	05:49	06:15	17:44	18:09	18:38
40°	05:20	05:51	06:18	17:40	18:07	18:39
45°	05:19	05:53	06:22	17:36	18:06	18:40
<b>S</b> 50°	05:18	05:55	06:27	17:31	18:04	18:41
52°	05:17	05:56	06:29	17:29	18:03	18:42
54°	05:16	05:57	06:32	17:27	18:02	18:43
56°	05:15	05:57	06:35	17:24	18:01	18:44
58°	05:13	05:58	06:38	17:21	18:01	18:46
<b>S</b> 60°	05:11	05:59	06:41	17:18	18:00	18:48
		N 4	_			

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

		Sun		Moon			
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	0-3%	
03	00:39	00:48	11:59	12:20	00:00		
04	00:58	01:08	11:59	12:59	00:39		
05	01:18	01:28	11:59	13:38	01:18		

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	345°34.7	156° 52.2	S02°49.4	254°48.3	N23°26.1	266°52.0	N22°19.7	357°25.6	S07°27.8			
1	0°37.2	171°51.9	50.7	269°49.1	26.2	281°54.1	19.7	12°28.2	27.9	Alpheratz	357°34.7	29°13.7
2	15°39.6	171 51.9 186°51.6	52.0	284°50.0	26.2	296° 56.3	19.7	27°30.8	27.9	Ankaa	353°07.0	-42°10.1
										Schedar	349°30.9	56°40.3
3	30°42.1	201°51.3	• • 53.3	299°50.8	• • 26.2	311°58.5	• • 19.8	42°33.5	• • 28.0	Diphda	348°47.3	-17°50.9
4	45°44.6	216°51.0	54.6	314°51.6	26.3	327°00.7	19.8	57°36.1	28.1	Achernar	335°19.9	-57°06.4
5	60°47.0	231°50.7	55.9	329°52.4	26.3	342°02.9	19.8	72°38.8	28.2	Hamal	327°51.3	23°34.8
6	75°49.5	246°50.4	S02°57.1	344°53.3	N23°26.3	357°05.1	N22°19.8	87°41.4	S07°28.2	Polaris		89°21.8
7	90°51.9	261°50.0	58.4	359°54.1	26.4	12°07.3	19.8	102°44.0	28.3	Acamar	315°11.8	-40°12.0
8	105°54.4	276°49.7	02°59.7	14°54.9	26.4	27°09.5	19.9	117°46.7	28.4	Menkar	314°06.3	4°11.3
9	120°56.9	291°49.4	03°01.0	29°55.7	• • 26.5	42°11.7	• • 19.9	132°49.3	• • 28.5	Mirfak	308°28.5	49°56.8
10	135°59.3	$306^{\circ}49.1$	02.3	44° 56.6	26.5	57° 13.9	19.9	147°52.0	28.6	Aldebaran	290°39.9	16°33.6
11	151°01.8	321°48.8	03.6	59° 57.4	26.5	72°16.0	19.9	162°54.6	28.6			
12	166°04.3	336°48.5	S03°04.8	74°58.2	N23°26.6	87°18.2	N22°19.9	177°57.2	S07°28.7	Rigel	281°04.2	-8°10.2
13	181°06.7	351°48.1	06.1	89°59.0	26.6	102°20.4	19.9	192°59.9	28.8	Capella	280°22.4	46°01.2
14	196°09.2	6°47.8	07.4	104°59.9	26.6	117°22.6	20.0	208°02.5	28.9	Bellatrix	278°23.2	6°22.5
15	211°11.7	21°47.5	08.7	120°00.7	26.7	132°24.8	20.0	223°05.2	• • 28.9	Elnath	278°02.3	28°37.7
16	226°14.1	36° 47.2	10.0	135°01.5	26.7	147°27.0	20.0	238° 07.8	29.0	Alnilam	275°38.1	-1°11.0
17	241°16.6	51°46.9	11.3	150°02.4	26.7	162°29.2	20.0	253° 10.4	29.1	Betelgeuse	270°52.5	7°24.8
										Canopus	263°52.7	-52°42.1
18	256°19.1	66°46.6	503°12.6	165°03.2	N23°26.8	177°31.4	N22°20.0	268°13.1	S07°29.2	Sirius	258°26.6	-16°44.7
19	271°21.5	81°46.2	13.8	180°04.0	26.8	192°33.6	20.1	283°15.7	29.2	Adhara	255°06.3	-29°00.0
20	286°24.0	96°45.9	15.1	195°04.8	26.8	207°35.8	20.1	298° 18.4	29.3	Procyon	244°51.3	5°09.9
21	301°26.4	111°45.6	. 16.4	210°05.7	26.9	222°38.0	• • 20.1	313°21.0	• • 29.4	Pollux	243°17.9	27°58.0
22	316°28.9	126° 45.3	17.7	225°06.5	26.9	237°40.2	20.1	328° 23.7	29.5	Avior	234°15.4	-59°35.0
23	331°31.4	141°45.0	19.0	240°07.3	26.9	252°42.4	20.1	343°26.3	29.6	Suhail	222°46.9	-43°31.7
Mer	pass. 00:58	v-0 3′ d1	.3′ m-3.86	νη 8' 40	.0′ m0.67	1/2 2/ d0	.0′ m-2.29	v2 6' d0	.1′ m0.58	Miaplacidus	221°39.2	-69°48.9
ivier.	pass. 00.30	ν-0.3 d1	.5 111-3.00	νυ.ο d0	.0 1110.07	ν2.2 UU.		ν2.0 d0	.1110.36	Alphard	221 39.2 217°48.3	-8°45.7
											217 46.3 207°35.1	11°50.9
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus		
0	346°33.8	156° 44.7	S03°20.3	255°08.2	N23°27.0	267°44.6	N22°20.1	358° 28.9	507°29.6	Dubhe	193°42.0	61°37.2
1	1°36.3	171° 44.3	21.5	270°09.0	27.0	282°46.8	20.2	13°31.6	29.7	Denebola	182°25.5	14°26.2
2	16°38.8	186°44.0	22.8	285°09.8	27.0	297°49.0	20.2	28° 34.2	29.8	Gienah	175°44.2	-17°40.6
3		201°43.7				312°51.2		43°36.9		Acrux	173°01.1	-63°14.2
	31°41.2		• • 24.1	300°10.7	• • 27.1		· · 20.2			Gacrux	171°52.6	-57°15.1
4	46°43.7	216°43.4	25.4	315°11.5	27.1	327°53.4	20.2	58°39.5	29.9	Alioth	$166^{\circ}13.7$	55°49.7
5	61°46.2	231°43.1	26.7	330°12.3	27.1	342°55.5	20.2	73°42.1	30.0	Spica	158°22.9	-11°17.3
6	76°48.6	246° 42.8	S03°28.0	345°13.2	N23°27.2	357°57.7	N22°20.3	88°44.8	507°30.1	Alkaid	152°52.5	49°11.6
7	$91^{\circ}51.1$	261°42.4	29.2	0°14.0	27.2	12°59.9	20.3	103°47.4	30.2	Hadar	148°36.9	-60°29.7
8	106°53.5	$276^{\circ}42.1$	30.5	15° 14.8	27.2	28°02.1	20.3	118°50.1	30.2	Menkent	_	-36°29.5
9	121°56.0	291°41.8	• • 31.8	$30^{\circ}15.7$	• • 27.3	43°04.3	• • 20.3	133°52.7	• • 30.3	Arcturus	145°48.4	19°03.4
10	136°58.5	306°41.5	33.1	45° 16.5	27.3	58°06.5	20.3	148°55.3	30.4	Rigil Kent.	139°41.1	-60°56.4
11	152°00.9	321°41.2	34.4	60°17.3	27.3	73°08.7	20.3	163°58.0	30.5		137°20.3	74°03.5
12	167°03.4	336° 40.8	S03°35.7	75° 18.2	N23°27.4	88°10.9	N22°20.4	179°00.6	507°30.6	Kochab		
13	182°05.9	351°40.5	36.9	90°19.0	27.4	103°13.1	20.4	194°03.3	30.6	Zuben'ubi	136°56.5	-16°08.6
14	197°08.3	6°40.2	38.2	105° 19.8	27.4	118° 15.3	20.4	209°05.9	30.7	Alphecca	126°04.1	26°38.1
15	212°10.8	21°39.9	• • 39.5	120° 20.7	27.4	133° 17.5	. 20.4	224°08.6	30.8	Antares	112°16.2	-26°29.2
	212 10.8 227°13.3	36°39.6	40.8	135° 21.5	27.4	133 17.5 148° 19.7	20.4	239°11.2	30.9	Atria	$107^{\circ}10.7$	-69°04.6
16				150°22.3						Sabik	$102^{\circ}03.1$	-15°45.3
17	242°15.7	51°39.3	42.1		27.5	163°21.9	20.4	254° 13.8	30.9	Shaula	96°10.7	-37°07.4
18	257°18.2	66°38.9	S03°43.4		N23°27.5	178°24.1	N22°20.5	269° 16.5	S07°31.0	Rasalhague	95°58.8	12°32.7
19	272°20.7	81°38.6	44.6	180°24.0	27.6	193°26.3	20.5	284°19.1	31.1	Eltanin	90°42.2	51°29.4
20	287°23.1	96° 38.3	45.9	195°24.8	27.6	208° 28.5	20.5	299°21.8	31.2	Kaus Aust.	83°32.7	-34°22.4
21	302°25.6	111°38.0	• • 47.2	210°25.7	• • 27.6	223°30.7	• • 20.5	314°24.4	• • 31.2	Vega	80°33.2	38°48.6
22	317°28.0	126°37.7	48.5	225° 26.5	27.6	238° 32.9	20.5	329°27.0	31.3	Nunki	75°47.9	-26°16.0
23	332°30.5	141°37.3	49.8	240°27.4	27.7	253°35.1	20.5	344°29.7	31.4	Altair	62°00.0	8°56.1
N 4	00.54	- 0 2/ -/1	2/ 2.06	- 0 0/ -10	0/ 0 66	- 2 2/ -10	0/ 2 20	- 2.6/ -10	1/ 0 50	Peacock	53°05.7	-56°39.4
ivier.	pass. 00:54	$\nu$ -0.3 a1	.3′ m-3.86	$\nu$ 0.8° $a$ 0	.0′ m0.66	$\nu$ 2.2 au.	.0′ m-2.30	$\nu$ 2.6 au	.1′ m0.58		49°25.6	-50 39.4 45°22.3
										Deneb		
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.8	9°59.4
0	347°33.0	156° 37.0	S03°51.0	255° 28.2	N23°27.7	268°37.4	N22°20.6	359°32.3	S07°31.5	Al Na'ir	27°32.8	-46°50.5
1	2°35.4	171°36.7	52.3	270°29.0	27.7	283°39.6	20.6	14°35.0	31.6	Fomalhaut	15°14.5	-29°29.4
2	17°37.9	186° 36.4	53.6	285° 29.9	27.7	298°41.8	20.6	29°37.6	31.6	Scheat	13°45.1	28°13.1
3	32°40.4	201°36.1	• • 54.9	300° 30.7	27.8	313°44.0	. 20.6	44°40.2	31.7	Markab	13°29.9	15°20.4
3 4	32 40.4 47°42.8	201 36.1 216°35.7	56.2	315° 31.6	27.8	313 44.0 328°46.2	20.6	59°42.9	31.7	Sep 06 Fri	SHA	Mer.pass
				315 31.0 330°32.4							ла 171°17.5	13:33
5	62°45.3	231°35.4	57.5		27.8	343°48.4	20.7	74°45.5	31.9			
6	77°47.8	246°35.1	S03°58.7	345°33.2		358°50.6	N22°20.7		S07°31.9	Mars		07:00
7	92°50.2	261°34.8	04°00.0	0°34.1	27.9	13°52.8	20.7	104°50.8	32.0	Jupiter		06:12
8	107°52.7	276°34.5	01.3	15°34.9	27.9	28°55.0	20.7	119°53.5	32.1	Saturn	11°50.9	00:10
9	122°55.2	291°34.1	• • 02.6	30°35.8	• • 27.9	43°57.2	• • 20.7	134°56.1	• • 32.2	Sep 07 Sat	SHA	Mer.pass
10	137°57.6	306°33.8	03.9	45°36.6	27.9	58° 59.4	20.7	149°58.7	32.2		170°10.8	13:33
11	153°00.1	321°33.5	05.1	60°37.4	28.0	74°01.6	20.8	$165^{\circ}01.4$	32.3			
12	168°02.5	336°33.2	S04°06.4	75°38.3	N23°28.0	89°03.8	N22°20.8	180°04.0	S07°32.4	Mars		06:59
13	183°05.0	351°32.9	07.7	90°39.1	28.0	104°06.0	20.8	195°06.7	32.5	Jupiter		06:08
14	198°07.5	6°32.5	09.0	105°40.0	28.0	119°08.2	20.8	210°09.3	32.5	Saturn	11°55.1	00:06
15	213°09.9	21°32.2	10.3	120°40.8	28.1	134° 10.4	20.8	225°11.9	32.6	Sep 08 Sun	SHA	Mer.pass
16	228°12.4	36°31.9	11.5	135°41.6	28.1	149°12.6	20.8	240° 14.6	32.7		169°04.0	13:34
17	243°14.9	51°31.6	12.8	150°42.5	28.1	164° 14.8	20.9	255° 17.2	32.8			
18	243 14.9 258°17.3	66°31.3	504°14.1			104 14.8 179°17.1	N22° 20.9		507° 32.9	Mars		06:58
					N23°28.1			270 19.9 285°22.5			281°04.4	06:05
19	273°19.8	81°30.9	15.4	180°44.2	28.2	194° 19.3	20.9		32.9	Saturn	11°59.3	00:02
20	288°22.3	96°30.6	16.7	195° 45.0	28.2	209°21.5	20.9	300°25.1	33.0	Horizon	tal parallax	
21	303°24.7	111°30.3	• • 17.9	210°45.9	• • 28.2	224°23.7	• • 20.9	315°27.8	• • 33.1	HORIZON	-	0.1
22	318°27.2	126°30.0	19.2	225°46.7	28.2	239°25.9	20.9	330°30.4	33.2		Venus:	0.1
23	333°29.6	141°29.6	20.5	240°47.5	28.2	254°28.1	21.0	345°33.1	33.2		Mars:	0.1
Mar	pass. 00:50	7/=0 3/ d1	.3′ m-3.86	νη 8/ 40	.0′ m0.65	1/2 2/ An	.0′ m-2.31	1/2 6/ d0	.1′ m0.57			
10101.	Pass. 00.50	ν 0.5 u1	.5 111-5.00	- V U.U UU	.5 1110.03	ν Δ.Δ u0.	111-4.31	- Z.O UU				

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°24.6	N06°20.0	151°31.1	17.2'	S06°54.2	13.8'	53.9'
1 2	195°24.8 210°25.0	19.0 18.1	166°07.2 180°43.4	17.1' 17.1'	07°08.0 07°21.8	13.8' 13.8'	53.9' 53.9'
3	225°25.3	• • 17.2	195°19.5	17.1	07°35.5	13.7'	53.9'
4	240°25.5	16.2	209°55.5	17.0'	$07^{\circ}49.2$	13.7'	53.9'
5	255°25.7	15.3	224°31.6	17.0'	08°02.9	13.7'	53.9'
6 7	270°25.9 285°26.1	N06° 14.4 13.4	239°07.6 253°43.6	17.0' 17.0'	\$08°16.6 08°30.3	13.6' 13.6'	53.9' 53.9'
8	300°26.3	12.5	268°19.5	16.9'	08°43.9	13.6'	53.9'
9	315°26.5	• • 11.6	282°55.5	16.9'	08°57.5	13.6'	53.9'
10 11	330°26.7 345°26.9	10.6 09.7	297°31.3 312°07.2	16.8' 16.8'	09°11.0 09°24.6	13.5' 13.5'	53.9' 53.9'
12	0°27.2	N06°08.8	312 07.2 326°43.0	16.8	509°38.0	13.5'	54.0'
13	15°27.4	07.8	341°18.8	16.7'	09°51.5	13.4'	54.0'
14	30°27.6	06.9	355°54.5	16.7'	10°04.9	13.4'	54.0'
15 16	45°27.8 60°28.0	· · 06.0 05.0	10°30.2 25°05.9	16.7' 16.6'	10°18.3 10°31.7	13.4' 13.3'	54.0' 54.0'
17	75°28.2	04.1	39°41.5	16.6'	10°45.0	13.3'	54.0'
18	90°28.4	$N06^{\circ}03.1$	54°17.1	16.5'	S10°58.3	13.2'	54.0'
19 20	105°28.6 120°28.9	02.2 01.3	68°52.6 83°28.1	16.5' 16.4'	11°11.5 11°24.7	13.2' 13.2'	54.0' 54.0'
20	120 28.9 135°29.1	01.3 06°00.3	98°03.5	16.4	11 24.7 11°37.9	13.1'	54.0'
22	150°29.3	05°59.4	112°38.9	16.3'	11°51.0	13.1'	54.0'
23	165°29.5	58.5	127°14.3	16.3'	12°04.1	13.0'	54.0'
	SD = 15.9'	d = -0.9'		SE	0 = 14.7'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0	180°29.7	N05°57.5	141°49.6	16.2'	<b>S</b> 12°17.2	13.0'	54.0'
1	195°29.9	56.6	156°24.8	16.2'	12°30.2	13.0'	54.0'
2	210°30.1 225°30.4	55.7 •• 54.7	171°00.0 185°35.2	16.1' 16.1'	12°43.1 12°56.0	12.9' 12.9'	54.0' 54.0'
4	240°30.6	53.8	200°10.2	16.0'	13°08.9	12.8'	54.0'
5	255°30.8	52.8	214°45.3	16.0'	$13^{\circ}21.7$	12.8'	54.1'
6	270°31.0 285°31.2	N05°51.9 51.0	229°20.3 243°55.2	15.9' 15.9'	\$13°34.5 13°47.2	12.7' 12.7'	54.1' 54.1'
7 8	285 31.2 300°31.4	50.0	243 55.2 258°30.1	15.9 15.8'	13 47.2 13°59.9	12.7	54.1'
9	315°31.6	• • 49.1	273°04.9	15.8'	14°12.5	12.6'	54.1'
10	330°31.9	48.2	287°39.7	15.7'	14°25.1	12.5'	54.1'
11 12	345°32.1 0°32.3	47.2 N05°46.3	302°14.4 316°49.0	15.6' 15.6'	14°37.7 \$14°50.1	12.5' 12.4'	54.1' 54.1'
13	15°32.5	45.3	331°23.6	15.5'	15°02.6	12.4	54.1
14	30°32.7	44.4	345°58.1	15.5'	15°14.9	12.3'	54.1'
15	45°32.9 60°33.1	• • 43.5	0°32.6 15°07.0	15.4' 15.3'	15°27.3 15°39.5	12.3'	54.1'
16 17	75°33.4	42.5 41.6	29°41.3	15.3'	15 39.5 15°51.7	12.2' 12.2'	54.2' 54.2'
18	90°33.6	N05°40.6	44°15.6	15.2'	S16°03.9	12.1'	54.2'
19	105°33.8	39.7	58°49.8	15.1'	16°16.0	12.0'	54.2'
20 21	120°34.0 135°34.2	38.8 •• 37.8	73°23.9 87°58.0	15.1' 15.0'	16°28.0 16°40.0	12.0° 11.9°	54.2' 54.2'
22	150°34.4	36.9	102°32.0	14.9'	16°51.9	11.9'	54.2'
23	165°34.6	35.9	117°05.9	14.9'	17°03.8	11.8'	54.2'
	SD = 15.9'	d = -0.9'		SE	0 = 14.7'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°34.9	N05°35.0	131°39.7	14.8'	<b>S</b> 17°15.6	11.7'	54.2'
1 2	195°35.1 210°35.3	34.1 33.1	146°13.5 160°47.2	14.7' 14.6'	17°27.3 17°39.0	11.7' 11.6'	54.3' 54.3'
3	210°35.3 225°35.5	32.2	160°47.2 175°20.9	14.6'	17° 39.0 17° 50.6	11.5	54.3'
4	240°35.7	31.2	189°54.4	14.5'	$18^{\circ}02.1$	11.5'	54.3'
5	255°35.9	30.3	204°27.9	14.4'	18°13.6	11.4'	54.3'
6 7	270°36.2 285°36.4	N05°29.3 28.4	219°01.3 233°34.7	14.3' 14.3'	\$18°25.0 18°36.3	11.3' 11.3'	54.3' 54.3'
8	300°36.6	27.5	248°07.9	14.2'	18°47.6	11.2'	54.4'
9	315°36.8	· · 26.5	262°41.1	14.1'	18°58.8	11.1'	54.4'
10 11	330°37.0 345°37.2	25.6 24.6	277°14.2 291°47.2	14.0' 13.9'	19°09.9 19°20.9	11.0' 11.0'	54.4' 54.4'
12	0°37.5	N05°23.7	306°20.2	13.9'	\$19°31.9	10.9	54.4
13	15°37.7	22.8	320°53.0	13.8'	19°42.8	10.8'	54.4'
14 15	30°37.9 45°38.1	21.8 •• 20.9	335°25.8 349°58.5	13.7' 13.6'	19°53.6 20°04.4	10.7' 10.7'	54.4' 54.5'
15 16	45°38.1 60°38.3	19.9	349°58.5 4°31.1	13.5	20°04.4 20°15.0	10.7	54.5'
17	75°38.5	19.0	19°03.6	13.4'	20°25.6	10.5'	54.5'
18	90°38.8	N05°18.0	33°36.1	13.4'	\$20°36.1	10.4'	54.5'
19 20	105°39.0 120°39.2	17.1 16.1	48°08.4 62°40.7	13.3' 13.2'	20°46.6 20°56.9	10.3' 10.3'	54.5' 54.5'
21	135°39.4	• • 15.2	$77^{\circ}12.9$	13.1'	21°07.2	10.2'	54.6'
22	150°39.6	14.3	91°45.0	13.0'	21°17.4	10.1'	54.6'
23	165°39.8	13.3	106°17.0	12.9'	21°27.4	10.0'	54.6'
	SD = 15.9'	d = -0.9'		SE	0 = 14.8'		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	3-5	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	8-20%	
06	01:38	01:49	11:58	14:17	01:57		
07	01:59	02:09	11:58	14:58	02:37		
08	02:19	02:30	11:58	15:41	03:19		

# September 09, 10, 11 UT (Mon., Tue., Wed.)

Fig.   GEAR   160-293   Self-11   200-348   April 200   201   200-348   2	h	Aries	Ver	nus	М	ars	Jup	iter	Sat	urn		Stars	
1	Mon	CHV		Doc	CHV.	Doc	CHA	Doc	CHV	Doc			Doc
2 1 13'346 171'200 23.0 20'02.1 20'02 20.0 20'325 20'10 13'36.4 31.4 Market 11 10'020' 20'10'													
18											Alpheratz		
3 37795 5 007264 - 250 0 95799 - 283 3 147506 - 220 457450 - 335 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0													
4 e   4 c   2 c													
Section   Contemp													
10   10   10   10   10   10   10   10	5	63°44.4					344°41.4						
10   13   13   13   13   13   13   13		78°46.9					359°43.6		90°51.6				
10   13   13   16   16   17   18   18   18   18   18   18   18	7	93°49.4	261°27.1	30.7	0°54.3	28.4	14°45.8	21.1	105°54.2	33.8			
13   13   13   13   13   13   13   13	8	108°51.8	276°26.7	32.0	15°55.2	28.4	29°48.0	21.1	120°56.8	33.9			
10 139-30.8 300-20.8 34.9 49-50.7 28.4 99-62.4 21.1 131-02.1 34.9 1.2 1.2 1.0 1.0 1.2 1.0 1.0 1.2 1.0 1.0 1.2 1.0 1.0 1.2 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	9			• • 33.3		• • 28.4		• • 21.1		• • 34.0			
15   15   15   15   15   15   15   15													
19   10   10   10   10   10   10   10													
16   24" 101   21" 24" 24" 24" 24" 25" 25" 25" 25" 25" 25" 25" 25" 25" 25											_		
15   224°91   15   36°242   422   136°020   236   150°65   212   226°13   3 · 345   15   226°16   17   246°14   36°24   221°16   236°16													
29°115   30°242   422   33°620   266   190°657   21.2   24°180   34.5   51°160   28°161   30°161   31°											Elnath	$278^{\circ}02.3$	28°37.7
17											Alnilam	$275^{\circ}38.1$	
18   299*16.5   60°23.5   50°44.8   166°18.7   N23°28.6   180°10.7   122°21.3   280°25.6   34.8											_		
247-189   347-289   348-22   460   181-04.5   266   195-124   213   286-259   34.8   Amount of the control of													
20   299*214   99*22.9													
22 319°26.3 126°22.2 49.9 226°07.1 26.6 229°16.8 213 31°31.2 349.9 Representation of the process													
23 347-286   141219   511   21179   287   255212   213   3467-355   351   31-338   31-338   31-33											,		
Mex-pass, Dollar   Mex-pass, D		319°26.3	126° 22.2	49.9	226°07.1	28.6	240°19.0		331°33.8				
Marghash   Marghash			141°21.9						$346^{\circ}36.5$				
Tue GHA GHA GHA Dec GHA DEC GH	Mare	ncc 00.46	1/_D 3/ 41	3' m 3 07	νυ α/ μο	0' m0 65	112 2/ 40	0/ m 2 21	1/2 6/ 40	1' m0 F7			
Two GHA	ivier.p	ass. UU:40	ν-0.5 al.	J III-3.81	νυ.ο αU	.0 1110.05	ν2.2 <b>α</b> 0.	U III-2.31	ν2.0 a0	10.01			
Tue GHA													
0 349°31.3   150°21.6   504°52.4   250°08.8   M32°32.7   227°23.5   N22°21.4   1-30.1   507°35.1   Clearly 17.0   1.4   1.5											_		
1 4 33.7 11 21.2 137.8 137.8 12 137.8 1													
2 19°36.2 186°20.9 5.50 286°10.5 28.7 30°0?7.9 21.4 31°44.4 35.3 3 3 43°38.8 20°1°20.6 5.50 280°11.3 3.00°17.9 1.21.4 46°47.0 3.5 4 4 40°41.1 21°20.6 5.50 200°11.3 30°11.3 2.2 28.7 330°32.3 21.4 61°49.7 3.5.4 5 64°43.6 231°19.9 04°58.8 331°13.0 28.8 7 345°34.5 21.4 76°52.3 3.5 5 5 64°43.6 231°19.9 04°58.8 331°13.0 28.8 7 345°34.5 21.4 76°52.3 3.5 5 5 64°43.6 231°19.9 04°58.8 331°13.0 01.3 1°14.7 28.8 15°30.0 21.5 106°5.6 5.0 5.5 5 7 94°46.5 201°13.0 01.3 1°14.7 28.8 15°30.0 21.5 106°5.6 5.7 5 7 94°46.5 201°13.3 01.3 1°14.7 28.8 15°30.0 21.5 106°5.6 3.7 5 10 130°5.3 40°11.6 30°3.0 3.9 3°16.4 28.8 15°30.0 21.5 106°5.6 3.5 5 10 130°5.3 40°11.6 30°3.0 3.9 3°16.4 28.8 60°45.6 21.5 135°0.2 3.5 8 11 156°8.4 321°11.0 0.6 4 61°18.2 28.8 76°47.9 21.5 166°6.2 3.6 0 11 156°8.4 321°11.0 0.6 4 61°18.2 28.8 76°47.9 21.5 166°6.2 3.6 0 11 210°0.8 336°17.7 50°507.7 6°19.0 N23°2.8 90°0.1 N22°2.6 182°10.8 30°3.1 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3													
4 49°41.1 216°20.3 5.75 316°12.2 28.7 330°32.3 21.4 61°49.7 35.4 566°43.6 231°19.9 04°58.8 331°13.0 28.7 345°44.5 21.4 76°52.3 35.5 566°45.7 99°46.0 246°19.6 50°50.0 1 346°13.9 N23°28.8 0°56.8 N22°21.5 91°54.9 50°55.6 100°57.6 35.7 484.5 261°19.3 01.3 1°14.7 28.8 15°39.0 21.5 100°57.6 35.7 484.5 261°19.3 01.3 1°14.7 28.8 15°39.0 21.5 100°57.6 35.7 484.5 261°19.3 01.3 1°14.7 28.8 50°34.2 21.5 122°0.2 35.8 18.9 100°51.0 276°19.0 0.26 16°15.6 28.8 30°41.2 21.5 122°0.2 35.8 18.9 11.1 154°58.3 291°18.0 06.4 61°18.2 28.8 55°47.9 21.5 152°05.5 35.9 11.1 154°58.4 321°18.0 06.4 61°18.2 28.8 55°47.9 21.5 152°05.5 35.9 11.1 154°58.4 321°18.0 06.4 61°18.2 28.8 55°47.9 21.5 152°05.5 35.9 11.1 154°58.3 351°17.7 50°67.7 76°19.0 N23°28.8 90°50.1 N22°21.6 182°10.8 50°36.1 12.2 100°03.3 351°17.3 090.0 91°19.9 28.8 105°52.3 21.6 190°13.4 36.1 120°20.4 78.1 11.1 154°18.4 120°20°5.8 61°17.0 10.2 106°20.7 28.9 120°64.5 21.6 212°16.1 36.2 122°16.1 3											Acrux	173°01.1	
6 69°43.6 231°19.9 of 5°68.8 331°13.0 28.7 345°34.5 21.4 76°52.3 35.5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5											Gacrux	$171^{\circ}52.6$	-57°15.1
6 79°46.0 246°19.6 506°00.1 346°13.9 N23°28.8 N°36.8 N22°21.5 91°54.9 S07°35.6 Alfield 152°52.6 49°11.6 79°46.5 210°57.6 35.7 Hold 148°36.9 60°24.6 10°36.8 N22°21.5 10°57.6 35.7 Hold 148°36.9 60°24.6 10°36.8 N22°21.5 10°57.6 35.7 Hold 148°36.9 60°24.6 10°36.8 N22°21.5 152°00.2 35.8 Alfield 148°36.9 60°24.6 10°36.8 N23°21.5 12°20.0 2 35.8 Methett 147°58.2 36°28.5 11°16.9 N23°2.5 11°16.9 N23°2.5 N28°2.5 N											Alioth	$166^{\circ}13.7$	55°49.7
8 100°61.0 276°19.0 0.2.6 16°18.5 0.16°18.6 0.2.8 30°14.2 21.5 106°57.6 35.7 Alkida 15°2.2 3.6°29.5 10°18.6 0.03.9 31°16.4 0.2.8 30°14.2 21.5 122°00.2 35.8 Harbert 147°8.2 36°29.5 10°18.6 10°18.6 0.03.9 31°16.4 0.2.8 6°24.6 21.5 13°00.9 0.5 35.9 Menhent 147°8.2 36°29.5 11°18.6 11°19.3 4°3.1 11°19.3 4°40°3.9 4°40°3.9 11°19.4 11°19.4 11°19.3 4°40°3.9 11°19.4 11°19.4 11°19.3 4°40°3.9 11°19.4 11°19.4 11°19.3 4°40°3.9 11°19.4 11°19.4 11°19.3 4°40°3.1 11°19.4 11°19.3 4°40°3.3 11°40°3.3 11°40°3.3 11°40°3.3 11°40°3.3 11°40°40°5.8 11°40°40°40°40°5.8 11°40°40°40°40°40°40°40°40°40°40°40°40°40°											Spica		
8 109°51.0 276°19.0 0.26 16°15.6 28.8 30°41.2 21.5 122°00.2 35.8   Hadai 18'0.30' 30' 31' 15.4 28.8 48' 33.4 221.5 137''0.9 2 35.8   Arcturus 18' 34.8 4 30' 218' 35.2 11' 154' 58.2 36' 29.5 10' 139' 55.9 306' 18.3 05.2 46' 17.3 28.8 60' 45.6 21.5 152''0.5 35.9   Arcturus 145' 48.4 19''0.34 11' 154' 58.2 36' 29.5 16' 70.2 5 36.0   Arcturus 145' 48.4 19''0.34 11' 154' 58.2 36' 29.5 16''0.0 3 36' 17.7 \$05''0.7 76' 19.0 N.32''8.8 90'\$0.1 N.22''2.16 182''1.8 50''3.6 1   Arcturus 145' 48.4 19''0.34 11' 160''5.6 11' 160''0.0 11' 160''0.0 100''0													
19   124*534   291*18.6   0.39   31*16.4   0.28   46*17.3   28.8   60*45.6   21.5   152*05.5   306*18.3   0.52   46*17.3   28.8   60*45.6   21.5   152*05.5   30.5   30.5   11.5   45*84.4   31*18.0   0.64   61*18.2   28.8   75*47.9   21.5   16*708.2   3.60   30*91.													
10 139°559 306°18.3 05.2 46°17.3 28.8 00°45.6 21.5 152°05.5 35.9 11 154°84.3 21°18.0 06.4 61°18.2 28.8 75°47.9 21.5 167°06.5 35.0 16.0 12.0 10°00.8 336°17.7 55°07.7 76°19.0 N23°28.8 90°50.1 N22°21.6 182°10.8 507°36.1 137°20.4 74°03.5 131°80.3 36°17.7 55°07.7 76°19.0 N23°28.8 90°50.1 N22°21.6 182°10.8 507°36.1 137°20.4 74°03.5 131°80.3 36°17.7 55°07.7 76°19.0 N23°28.8 90°50.1 N22°21.6 197°13.4 36.1 136°20.4 12.0 10°20.7 28.9 120°45.5 21.6 197°13.4 36.1 136°20.2 120°16.7 11.5 12°21.6 10°20.7 28.9 120°45.5 21.6 120°16.1 36.2 136°10.2 16.0 120°16.5 120°21.6 120°10.1 36.1 36.1 151°23.3 28.9 166°10.2 21.6 227°18.1 36°16.0 14.1 151°23.3 28.9 166°10.2 21.6 257°24.4 36.4 5361k 102°10.7 36°04.5 5361k 102°10.7 36°04.5 5361k 102°10.7 36°04.5 18.0 120°20.1 11.5 151°23.3 18 260°15.6 66°15.7 50°15.3 166°14.2 N23°28.9 181°03.4 N22°21.6 227°26.6 507°36.5 5361k 102°10.7 36°04.5 181°250.0 28.9 196°57.7 21.7 247°28.2 11.1 124.7 192.2 11°26.7 28.9 226°10.1 21.7 30°31.9 36.6 181°250.0 28.9 196°57.7 21.7 347°34.6 36.7 18.0 18.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12													
11 154*58.4 321*18.0 06.4 61*18.2 28.8 75*47.9 21.5 167*08.2 56.0 Ngl. rel. 1.9*47.2 0.05*20.7 76*19.0 Ng2*28.8 09*50.1 Ng2*21.6 182*09.5 Ng*36.1 1.5 Ng*37.2 Ng*47.0 Ng*37.2 Ng*47.0 Ng*37.2 Ng*47.2 Ng*47.0 Ng*37.2 Ng*47.0 Ng*37.2 Ng*47.2													
170°00.8   336°17.7   506°07.7   76°19.0   N22°28.8   90°50.1   N22°21.6   182°10.8   S0°50.5   1.											_		
13 185*03.3 351*17.3 090.0 91*19.9 28.8 105*52.3 21.6 197*13.4 36.1 420*058.5 617.0 10.2 166*20.7 28.9 135*56.8 21.6 227*18.1 36.1 36.2 1.6 227*18.7 36.3 1.6 212*16.1 36.2 1.6 212*16.1 36.2 1.6 212*16.1 36.2 1.6 212*16.1 36.2 1.6 212*16.1 36.2 1.6 212*16.1 36.2 1.6 212*16.1 36.2 1.6 212*16.1 36.2 1.6 212*16.1 36.2 1.6 212*16.1 36.2 1.6 212*16.1 36.2 1.6 212*16.1 36.2 1.6 212*16.1 36.1 1.6 21.6 212*16.1 36.2 1.6 216*16.1 36.2 1.6 216*16.1 36											!		
14 200°05.8 6°17.0 10.2 106°20.7 28.9 120°54.5 21.6 212°16.7 36.2 Antares 112°16.2 2-62°20.2 16 230°10.7 36°16.4 12.8 136°22.4 28.9 150°69.0 21.6 242°21.4 36.4 12.8 136°22.4 28.9 150°69.0 21.6 242°21.4 36.4 12.8 136°22.4 28.9 150°69.0 21.6 242°21.4 36.4 12.8 136°22.4 28.9 150°69.0 21.6 25°724.0 36.4 12.8 12°16.2 28.9 12°1.0 25°724.0 36.4 12.8 12°16.2 28.9 12°1.0 25°724.0 36.4 12.8 12°16.2 28.9 12°1.0 25°724.0 36.4 12.8 12°16.2 28.9 12°1.0 25°724.0 36.4 12.8 12°16.2 28.9 12°1.0 25°724.0 36.4 12.8 12°16.2 28.9 12°1.0 25°724.0 36.4 12.8 12°16.2 28.9 12°1.0 25°724.0 36.4 12.8 12°16.2 28.9 12°1.0 25°724.0 36.4 12.8 12°16.2 28.9 12°1.0 25°724.0 36.4 12.8 12°16.2 28.9 12°1.0 30°22.5 12°1.0 11°14.7 19.2 211°26.7 28.9 226°10.1 21.7 31°34.6 36.7 28.9 226°10.1 21.7 31°34.6 36.7 28.9 226°10.1 21.7 34°39.8 36.9 12°32.7 28.9 226°10.1 21.7 34°39.8 36.9 12°32.7 28.9 226°10.1 21.7 34°39.8 36.9 12°32.4 12°32.2 28.9 256°14.5 21.7 34°39.8 36.9 12°32.7 26°16.0 12.1 31°34.6 28.9 12°32.4 12°32.2 28.9 256°14.5 21.7 34°39.8 36.9 12°32.3 12°32.3 12°32.2 28.9 12°32.3 12°32													
15 215°08.2 21°16.7 · · · · · · · · · · · · · · · · · · ·	14	200°05.8	6°17.0	10.2	106°20.7	28.9	120°54.5	21.6	$212^{\circ}16.1$	36.2			
16 230°10.7 36°16.4 12.8 136°22.4 28.9 150°59.0 21.6 22°22.4 36.4 18 260°13.6 66°13.7 505°15.3 166°24.2 N23°28.9 166°01.2 21.6 22°22.6 50°73.6 21.7 26°18.1 81°15.4 16.6 181°22.3 22.8 196°05.7 21.7 26°29.3 36.6 21.7 26°29.3 36.6 21.7 26°29.3 36.6 21.7 26°29.3 36.6 21.7 26°29.3 36.6 21.7 26°29.3 36.6 21.7 26°29.3 36.6 21.7 26°29.3 36.6 21.7 26°29.3 36.6 21.7 26°29.3 36.6 21.7 26°29.3 20°20.5 26°15.0 17.9 196°25.9 28.9 211°07.9 21.7 30°231.9 36.7 22.2 300°20.5 126°14.4 20.4 226°27.6 28.9 241°12.3 21.7 33°237.2 36.8 21.8 26°20.0 20°20.5 126°14.4 20.4 226°27.6 28.9 241°12.3 21.7 33°237.2 36.8 21.8 26°20.0 20°20.5 126°14.4 20.4 226°27.6 28.9 241°12.3 21.7 33°237.2 36.8 21.8 26°20.0 20°20.5 126°14.4 20.4 226°27.6 28.9 241°12.3 21.7 347°39.8 36.9 21.8 26°20.0 26°20.1 21.7 26°20.0 26°20.1 21.7 26°20.0 26°20.1 21.7 26°20.0 26°20.1 21.7 26°20.0 26°20.1 21.7 26°20.0 26°20.1 21.7 26°20.0 26°20.1 21.7 26°20.0 26°20.1 21.7 26°20.0 26°20.1 21.7 26°20.0 26°20.1 21.7 26°20.0 26°20.1 21.7 26°20.0 26°20.1 21.8 17°45.1 37.0 5.6 21.0 20°20.2 26°20.1 21.8 17°45.1 37.0 5.6 21.1 21.8 26°20.0 26°20.1 21.7 26°20.0 26°20.1 21.8 17°45.1 37.0 5.6 21.1 26°20.0 26°20.1 21.7 26°20.0 26°20.1 21.8 12°20.1 21.8 26°20.0 26°20.1 21.7 26°20.0 26°20.1 21.8 12°20.1 21.8 26°20.0 26°20.1 21.7 26°20.1 21.8 26°20.0 26°20.1 21.7 26°20.1 21.8 26°20.0 26°20.1 21.7 26°20.1 21.8 26°20.0 26°20.1 21.7 26°20.1 21.8 26°20.0 26°20.1 21.7 26°20.1 21.8 26°20.0 26°20.1 21.7 26°20.1 21.8 26°20.0 26°20.1 21.7 26°20.1 21.8 26°20.0 26°20.1 21.7 26°20.1 21.8 26°20.0 26°20.1 21.8	15	215°08.2	21°16.7	• • 11.5	121°21.6	• • 28.9	135°56.8	• • 21.6	$227^{\circ}18.7$	• • 36.3			
18 260°15.6 66°15.7 \$60°15.5 3166°24.2 N22°28.9 180°03.4 N22°21.6 272°26.6 \$07°3.05.5 181°15.3 166°24.2 N22°28.9 181°03.4 N22°21.6 272°26.6 \$07°3.05.5 181°3.4 16.6 181°25.0 28.9 181°03.4 N22°21.6 272°26.6 \$07°3.05.5 181°3.4 17.0 196°25.9 28.9 211°07.9 21.7 30°3.19 36.6 181°25.0 28.9 211°07.9 21.7 30°3.19 36.6 181°25.0 28.9 211°07.9 21.7 30°3.19 36.6 181°25.0 28.9 211°07.9 21.7 30°3.19 36.7 181°3.4 6 36.7 181°3.4 6 36.7 181°3.4 6 36.7 181°3.4 6 36.7 181°3.4 6 36.7 181°3.4 6 36.7 181°3.4 6 36.7 181°3.4 6 36.7 181°3.4 6 36.9 181°3.4 181°3. 181°3.4 181°3.4 181°3.4 181°3.4 181°3.	16	230°10.7	36° 16.4	12.8	136°22.4	28.9	150°59.0	21.6		36.4			
Ray   18   200°15.6   00°15.7   160°24.2   23°28.9   196°05.7   21.7   30°29.3   36.6													
20   290°20.5   96°15.0   17.9   196°25.9   28.9   211°07.9   21.7   302°31.9   36.7   36.8   36.7   31.9   36.7   32.9   32.													
21 306°23.0 111°14.7 · · · · · · · · · · · · · · · · · · ·											Eltanin	90°42.2	51°29.4
22 320°25.5 126°14.4 20.4 226°27.6 28.9 241°12.3 21.7 332°37.2 36.8 Nunit 75°47.9 226°16.0 Altair 62°00.0 8°56.1 Nunit 75°47.9 226°16.0 Altair 62°00.0 8°56.1 Nunit 75°47.9 226°16.0 Altair 62°00.0 8°56.1 Nunit 75°47.9 226°16.0 Altair 62°00.0 8°56.1 Nunit 75°47.9 226°16.0 Altair 62°00.0 8°56.1 Nunit 75°47.9 226°16.0 Altair 62°00.0 8°56.1 Nunit 75°47.9 226°16.0 Altair 62°00.0 8°56.1 Nunit 75°47.9 226°16.0 Altair 62°00.0 8°56.1 Nunit 75°47.9 226°16.0 Altair 62°00.0 8°56.1 Nunit 75°47.9 226°16.0 Altair 62°00.0 8°56.1 Nunit 75°47.9 226°16.0 Altair 62°00.0 8°56.1 Nunit 75°47.9 226°16.0 Altair 62°00.0 8°56.1 Nunit 75°47.9 226°16.0 Altair 62°00.0 8°56.1 Nunit 75°47.9 226°16.0 Altair 62°00.0 8°56.1 Nunit 75°47.9 226°16.0 Altair 62°00.0 Nunit 75°47.9 226°16.0 Altair 62°00.0 Nunit 75°47.9 226°16.0 Altair 62°00.0 Nunit 75°47.9 226°16.0 Altair 62°00.0 Nunit 75°47.9 226°16.0 Altair 62°00.0 Nunit 75°47.9 226°16.0 Altair 62°00.0 Nunit 75°47.9 226°16.0 Altair 62°00.0 Nunit 75°47.9 226°16.0 Altair 62°00.0 Nunit 75°47.9 226°16.0 Altair 62°00.0 Nunit 75°47.9 226°16.0 Nunit 75°47.9 226°17.0 Nunit 75°47.9											Kaus Aust.	83°32.8	
Mer.pass. 00:42   ν-0.3' d1.3' m-3.87   ν 0.9' d0.0' m0.64   ν-2.2' d0.0' m-2.32   ν-2.6' d0.1' m0.58   Altair 62°0.0 8°56.1   δε°3.9											Vega	80°33.3	
Mer. pass. 01:42         \$\nu_{0.0}^{1}\] d1.3' m-3.87         \$\nu_{0.0}^{1}\] d0.0' m0.64         \$\nu_{2.2}^{2}\] d0.0' m-2.32         \$\nu_{2.6}^{1}\] d0.0' m0.58         Peacock 49°25.7         \$53°05.7         \$56°39.4         \$6°39.4         \$6°39.4         \$6°3.9         \$6°5.9         \$6°5.2         \$6°5.2         \$6°6.2											l l		
Wed         GHA         GHA         Dec         GHA         Nair         2°9.9         30.0         20.2         22.0         286° 19.0         29.0         30.0°21.2         21.8         2°9.1         37.0													
Wed         GHA         GHA         Dec         Al Na ir         279 2.8         4-6° 50.5         50° 30.4         156° 13.7         505° 23.0         256° 29.3         N23° 28.9         271° 16.8         N22° 21.7         2° 42.5         507° 37.0         Al Na ir         27° 32.8         4-6° 50.5         50° 23.0         256° 29.3         N23° 28.9         271° 16.8         N22° 21.7         2° 42.5         507° 37.0         Scheat         13° 45.1         28° 13.1         30° 30.8         11° 15° 13.4         24.2         271° 30.2         29.0         306° 31.5         21.8         17° 45.1         37.0         Scheat         13° 45.1         28° 13.1           3         35° 37.8         201° 12.7         26.8         301° 31.9         2.90         316° 33.5         21.8         6° 53.0         37.3         37.2         56° 42.7         23° 11° 12.4         28.0         316° 32.7         29.0         316° 31.5         21.8         6° 53.0         37.3         37.4         40° 32.4         21.8         6° 50.3         37.3         37.4         40° 36° 3.2         29.0         1° 30.1         822° 18.8<	Mer.p	ass. 00:42	$\nu$ -0.3′ $d1$ .	3′ m-3.87	$\nu$ 0.9′ d0	.0′ m0.64	$\nu$ 2.2′ d0.	0′ m-2.32	$\nu 2.6' \ d0$	1' m $0.58$	1		
Wed         GHA         GHA         Dec         GHOR         Dec         GHOR         Dec         GHA         Dec         GHOR         Dec         GHOR         Dec         Cenum         Parallal           3         10         20.7         29.0         310°21.2         21.8         32°47.8         37.1         37.1         48.1         31.2         29.0         346°37.9         21.8         6°55.4         37.2         49.0         46°31.8         29.0         346°37.9         21.8         76°55.7         37.4         Mars         26°16.3         06:01.3         39.0													
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10 140°55.0 306°10.4 35.7 46°37.9 29.0 61°39.0 21.9 153°08.9 37.7 11 155°57.5 321°10.1 36.9 61°38.8 29.0 76°41.3 21.9 168°11.5 37.8 12 171°00.0 336°09.8 S05°38.2 76°39.6 N23°29.0 91°43.5 N22°21.9 183°14.2 S07°37.9 13 186°02.4 351°09.5 39.5 91°40.5 29.0 106°45.7 21.9 198°16.8 38.0 14 201°04.9 6°09.1 40.7 106°41.4 29.0 121°48.0 21.9 213°19.5 38.0 15 216°07.4 21°08.8 · 42.0 121°42.2 · 29.0 136°50.2 · 22.0 228°22.1 · 38.1 16 231°09.8 36°08.5 43.3 136°43.1 29.1 151°52.4 22.0 243°24.7 38.2 17 246°12.3 51°08.1 44.5 151°44.0 29.1 166°54.7 22.0 258°27.4 38.3 18 261°14.7 66°07.8 S05°45.8 166°44.8 N23°29.1 181°56.9 N22°22.0 273°30.0 S07°38.3 19 276°17.2 81°07.5 47.1 181°45.7 29.1 196°59.1 22.0 288°32.7 38.4 20 291°19.7 96°07.1 48.4 196°46.6 29.1 212°01.3 22.0 288°32.7 38.4 20 291°19.7 96°07.1 48.4 196°46.6 29.1 212°01.3 22.0 288°32.7 38.4 20 291°19.7 96°07.1 48.4 196°46.6 29.1 212°01.3 22.0 288°32.7 38.6 21 306°22.1 111°06.8 · 49.6 211°47.4 · 29.1 227°03.6 · 22.1 318°37.9 · 38.6 21 330°27.1 141°06.1 52.2 241°49.2 29.1 257°08.0 22.1 348°43.2 38.7											Saturn	12 U3.0	25:53
10 140 53.0 306 10.4 33.7 46 37.9 29.0 61 39.0 21.9 153 06.9 37.7 11 155° 57.5 321° 10.1 36.9 61° 38.8 29.0 76° 41.3 21.9 168° 11.5 37.8 12 171° 00.0 336° 09.8 \$05° 38.2 76° 39.6 \$023° 29.0 91° 43.5 \$022° 21.9 \$183° 14.2 \$07° 37.9 13 186° 02.4 \$351° 09.5 \$39.5 \$91° 40.5 \$29.0 \$106° 45.7 \$21.9 \$198° 16.8 \$38.0 \$14 \$201° 04.9 \$6° 09.1 \$40.7 \$106° 41.4 \$29.0 \$121° 48.0 \$21.9 \$213° 19.5 \$38.0 \$15 \$216° 07.4 \$21° 08.8 \$42.0 \$121° 42.2 \$42.0 \$22.0 \$288° 22.1 \$38.1 \$246° 12.3 \$51° 08.1 \$44.5 \$151° 44.0 \$29.1 \$151° 52.4 \$22.0 \$243° 24.7 \$38.2 \$17 \$246° 12.3 \$51° 08.1 \$44.5 \$151° 44.0 \$29.1 \$166° 54.7 \$22.0 \$258° 27.4 \$38.3 \$19 \$276° 17.2 \$81° 07.5 \$47.1 \$181° 45.7 \$29.1 \$196° 59.1 \$22.0 \$288° 32.7 \$38.4 \$20 \$291° 19.7 \$96° 07.1 \$48.4 \$196° 46.6 \$29.1 \$212° 01.3 \$22.0 \$303° 35.3 \$35.5 \$21 \$336° 22.1 \$111° 06.8 \$49.6 \$211° 47.4 \$40.2 \$29.1 \$227° 03.6 \$40.2 \$21.1 \$338° 40.6 \$38.6 \$21.1 \$41° 06.1 \$52.2 \$241° 49.2 \$29.1 \$257° 08.0 \$22.1 \$348° 43.2 \$38.7 \$48.4 \$41.2 \$41° 07.5 \$41.1 \$41° 06.1 \$41.4 \$41.7 \$41.1 \$41° 06.1 \$41.4 \$41.7 \$41.1 \$41° 06.1 \$41.4 \$41.7 \$41.1 \$41° 06.1 \$41.4 \$41.1 \$41° 06.1 \$41.4 \$41.1 \$41° 06.1 \$41.4 \$41.1 \$41° 06.1 \$41.4 \$41.1 \$41° 06.1 \$41.4 \$41.1 \$41° 06.1 \$41.4 \$41.1 \$41° 06.1 \$41.4 \$41.1 \$41° 06.1 \$41.4 \$41.1 \$41° 06.1 \$41.4 \$41.1 \$41° 06.1 \$41.4 \$41.1 \$41° 06.1 \$41.4 \$41.1 \$41° 06.1 \$41.4 \$41.1 \$41° 06.1 \$41.4 \$41.1 \$41° 06.1 \$41.4 \$41.1 \$41° 07.1 \$41.4 \$41.1 \$41° 07.1 \$41.4 \$41.1 \$41° 07.1 \$41.4 \$41.1 \$41° 07.1 \$41.4 \$41.1 \$41° 07.1 \$41.4 \$41.1 \$41° 07.1 \$											Sep 10 Tue	SHA	Mer.pass
12 171°00.0 336°09.8 S05°38.2 76°39.6 N23°29.0 91°43.5 N22°21.9 183°14.2 S07°37.9 13 186°02.4 351°09.5 39.5 91°40.5 29.0 106°45.7 21.9 198°16.8 38.0 14 201°04.9 6°09.1 40.7 106°41.4 29.0 121°48.0 21.9 213°19.5 38.0 15 216°07.4 21°08.8 · · · 42.0 121°42.2 · · · 29.0 136°50.2 · · · 22.0 228°22.1 · · · 38.1 16 231°09.8 36°08.5 43.3 136°43.1 29.1 151°52.4 22.0 243°24.7 38.2 17 246°12.3 51°08.1 44.5 151°44.0 29.1 166°54.7 22.0 243°24.7 38.3 18 261°14.7 66°07.8 S05°45.8 166°44.8 N23°29.1 181°56.9 N22°22.0 273°30.0 S07°38.3 19 276°17.2 81°07.5 47.1 181°45.7 29.1 196°59.1 22.0 288°32.7 38.4 20 291°19.7 96°07.1 48.4 196°46.6 29.1 212°01.3 22.0 288°32.7 38.4 20 291°19.7 96°07.1 48.4 196°46.6 29.1 212°01.3 22.0 303°35.3 38.5 21 336°22.1 111°06.8 · · 49.6 211°47.4 · · · 29.1 227°03.6 · · · 22.1 318°37.9 · · · 38.6 21 336°47.1 141°06.1 52.2 241°49.2 29.1 257°08.0 22.1 348°43.2 38.7 Mars: 260°37.5 Mars: 260°37.5 06:55 36.9 06:54 32.49      Horizontal parallax Venus: 0.1 233°40.6 38.6 23.7 38.4 32.9													
13													
14													
15											Saturn	12°07.8	23:49
16 231°09.8 36°08.5 43.3 136°43.1 29.1 151°52.4 22.0 243°24.7 38.2 Venus 165°43.3 13:35 17 246°12.3 51°08.1 44.5 151°44.0 29.1 166°54.7 22.0 258°27.4 38.3 Mars 265°58.9 06:54 18 261°14.7 66°07.8 S05°45.8 166°44.8 N23°29.1 181°56.9 N22°22.0 273°30.0 S07°38.3 19 276°17.2 81°07.5 47.1 181°45.7 29.1 196°59.1 22.0 288°32.7 38.4 20 291°19.7 96°07.1 48.4 196°46.6 29.1 212°01.3 22.0 303°35.3 38.5 21 306°22.1 111°06.8 · 49.6 211°47.4 · 29.1 227°03.6 · 22.1 318°37.9 · 38.6 22 321°24.6 126°06.5 50.9 226°48.3 29.1 242°05.8 22.1 333°40.6 38.6 23.7 Mars: 0.1 0.1 23 336°47.1 141°06.1 52.2 241°49.2 29.1 257°08.0 22.1 348°43.2 38.7											Sep 11 Wed	SHA	Mer.pass
17													
18		246°12.3	51°08.1	44.5	151°44.0	29.1	166°54.7		$258^{\circ}27.4$	38.3			
19 276°17.2 81°07.5 47.1 181°45.7 29.1 196°59.1 22.0 288°32.7 38.4 20 291°19.7 96°07.1 48.4 196°46.6 29.1 212°01.3 22.0 303°35.3 38.5 21 306°22.1 111°06.8 · · 49.6 211°47.4 · · 29.1 227°03.6 · · 22.1 318°37.9 · · 38.6 22 321°24.6 126°06.5 50.9 226°48.3 29.1 242°05.8 22.1 333°40.6 38.6 23 336°27.1 141°06.1 52.2 241°49.2 29.1 257°08.0 22.1 348°43.2 38.7 Mars: 0.1													
21       306°22.1       111°06.8       · · 49.6       211°47.4       · · 29.1       227°03.6       · · 22.1       318°37.9       · · 38.6       Horizontal parallax         22       321°24.6       126°06.5       50.9       226°48.3       29.1       242°05.8       22.1       333°40.6       38.6       Venus: 0.1         23       336°27.1       141°06.1       52.2       241°49.2       29.1       257°08.0       22.1       348°43.2       38.7       Mars: 0.1											Saturn		23:45
22 321°24.6 126°06.5 50.9 226°48.3 29.1 242°05.8 22.1 333°40.6 38.6 Venus: 0.1 23 336°27.1 141°06.1 52.2 241°49.2 29.1 257°08.0 22.1 348°43.2 38.7 Mars: 0.1											Und-s-4	al parallas	
23 336°27.1 141°06.1 52.2 241°49.2 29.1 257°08.0 22.1 348°43.2 38.7 Mars: 0.1											norizoni	•	0.1
25 350 27.2 112 00.1 02.2 27.1 15.2 25.1 00.0 22.2 010 15.2 00.1													
Mer.pass. 00:38 $\nu$ -0.3 $^{\prime}$ d1.3 $^{\prime}$ m-3.87 $\nu$ 0.9 $^{\prime}$ d0.0 $^{\prime}$ m0.63 $\nu$ 2.2 $^{\prime}$ d0.0 $^{\prime}$ m-2.32 $\nu$ 2.6 $^{\prime}$ d0.1 $^{\prime}$ m0.58	23	330 27.1										141013.	U.1
	Mer.p	ass. 00:38	$\nu$ -0.3′ $d1$ .	3′ m-3.87	$ u$ 0.9 $^{\prime}$ d0	.0′ m0.63	$\nu$ 2.2′ d0.	0′ m-2.32	$\nu$ 2.6′ d0	.1′ m0.58			

h	Su	n	Moon						
Mon	GHA	Dec	GHA	ν	Dec	d	HP		
0	180°40.1	N05°12.4	120°48.9	12.8'	S21°37.5	9.9'	54.6'		
1 2	195°40.3 210°40.5	11.4 10.5	135°20.7 149°52.5	12.7' 12.7'	21°47.4 21°57.2	9.8' 9.7'	54.6' 54.7'		
3	225°40.7	09.5	164°24.1	12.6'	21°07.0	9.7'	54.7		
4	240°40.9	08.6	178°55.7	12.5'	22°16.6	9.6'	54.7'		
5	255°41.1	07.6	193°27.2 207°58.5	12.4'	22°26.2 522°35.7	9.5'	54.7'		
6 7	270°41.4 285°41.6	N05°06.7 05.8	207°58.5 222°29.8	12.3' 12.2'	522°35.7 22°45.0	9.4' 9.3'	54.7' 54.8'		
8	300°41.8	04.8	237°01.0	12.1'	22°54.3	9.2'	54.8'		
9	315°42.0	•• 03.9	251°32.1	12.0'	23°03.5	9.1'	54.8'		
10 11	330°42.2 345°42.5	02.9 02.0	266°03.1 280°34.0	11.9' 11.8'	23°12.6 23°21.6	9.0' 8.9'	54.8' 54.8'		
12	0°42.7	N05° 01.0	295°04.9	11.7'	\$23°30.5	8.8'	54.9'		
13	15°42.9	$05^{\circ}00.1$	$309^{\circ}35.6$	11.6'	23°39.3	8.7'	54.9'		
14	30°43.1 45°43.3	04°59.1 •• 58.2	324°06.2 338°36.8	11.5' 11.4'	23°48.0 23°56.5	8.6' 8.5'	54.9'		
15 16	45 43.3 60°43.5	57.2	353° 30.8 353° 07.2	11.4	23 50.5 24°05.0	8.4'	54.9' 54.9'		
17	75°43.8	56.3	7°37.5	11.3'	24°13.4	8.3'	55.0'		
18	90°44.0	N04°55.3	22°07.8	11.2'	S24°21.7	8.2'	55.0'		
19 20	105°44.2 120°44.4	54.4 53.5	36°38.0 51°08.0	11.1' 11.0'	24°29.9 24°37.9	8.1' 7.9'	55.0' 55.0'		
21	135°44.6	52.5	65°38.0	10.9'	24°45.9	7.8'	55.1		
22	150°44.9	51.6	80°07.8	10.8'	24°53.7	7.7'	55.1'		
23	165°45.1	50.6	94°37.6	10.7'	25°01.4	7.6'	55.1'		
	SD = 15.9'	d = -0.9'		SD	= 14.9'				
Tue	GHA	Dec	GHA	ν	Dec	d	HP		
0	180°45.3	N04°49.7	109°07.3	10.6'	S25°09.0	7.5'	55.1'		
1	195°45.5	48.7	123°36.9	10.5'	25°16.5	7.4'	55.2'		
2 3	210°45.7 225°45.9	47.8 •• 46.8	138°06.4 152°35.8	10.4' 10.3'	25°23.9 25°31.2	7.3' 7.2'	55.2' 55.2'		
3 4	240°46.2	45.9	167°05.0	10.3	25°38.3	7.2 7.0'	55.2'		
5	255°46.4	44.9	181°34.2	10.1'	$25^{\circ}45.4$	6.9'	55.3'		
6	270°46.6	N04°44.0	196°03.3	10.0'	\$25°52.3	6.8'	55.3'		
7 8	285°46.8 300°47.0	43.0 42.1	210°32.3 225°01.3	9.9' 9.8'	25°59.1 26°05.7	6.7' 6.5'	55.3' 55.3'		
9	315°47.3	• • 41.1	239°30.1	9.7'	26°12.3	6.4	55.4'		
10	330°47.5	40.2	253°58.8	9.6'	26°18.7	6.3'	55.4'		
11 12	345°47.7 0°47.9	39.2 N04°38.3	268°27.4 282°56.0	9.5' 9.4'	26°25.0 <b>S</b> 26°31.2	6.2' 6.0'	55.4' 55.5'		
13	15°48.1	37.3	202 50.0 297°24.4	9.4	26°37.2	5.9'	55.5'		
14	30°48.4	36.4	$311^{\circ}52.7$	9.3'	$26^{\circ}43.1$	5.8'	55.5'		
15	45°48.6 60°48.8	• • 35.4	326°21.0 340°49.2	9.2'	26°48.9 26°54.5	5.6' 5.5'	55.5'		
16 17	75°49.0	34.5 33.5	340 49.2 355°17.2	9.1' 9.0'	20 54.5 27°00.1	5.4'	55.6' 55.6'		
18	90°49.2	N04°32.6	9°45.2	8.9'	S27°05.4	5.2'	55.6'		
19	105°49.5	31.6	24°13.1	8.8'	27°10.7	5.1'	55.7'		
20 21	120°49.7 135°49.9	30.7 •• 29.7	38°40.9 53°08.6	8.7' 8.6'	27°15.8 27°20.8	5.0' 4.8'	55.7' 55.7'		
22	150°50.1	28.8	67°36.2	8.5'	27°25.6	4.7'	55.7'		
23	165°50.3	27.8	82°03.8	8.4'	27°30.3	4.6'	55.8'		
	SD = 15.9'	d = -0.9'		SD	= 15.0'				
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP		
0	180°50.6	N04°26.9	96°31.2	8.4'	S27°34.9	4.4'	55.8'		
1	195°50.8 210°51.0	25.9	110°58.6	8.3'	27°39.3	4.3'	55.8'		
2 3	210°51.0 225°51.2	25.0 •• 24.0	125°25.8 139°53.0	8.2' 8.1'	27°43.5 27°47.7	4.1' 4.0'	55.9' 55.9'		
4	240°51.4	23.1	$154^{\circ}20.1$	8.0'	27°51.6	3.8'	55.9'		
5	255°51.7	22.1	168°47.2	7.9'	27°55.5	3.7'	56.0'		
6 7	270°51.9 285°52.1	N04°21.2 20.2	183°14.1 197°41.0	7.9' 7.8'	\$27°59.2 28°02.7	3.5' 3.4'	56.0' 56.0'		
8	300°52.3	19.3	212°07.7	7.7'	28°06.1	3.2'	56.1		
9	315°52.5	• • 18.3	226°34.4	7.6'	28°09.3	3.1'	56.1		
10 11	330°52.8 345°53.0	17.3 16.4	241°01.1 255°27.6	7.5' 7.5'	28°12.4 28°15.3	2.9' 2.8'	56.1' 56.2'		
12	0°53.2	N04° 15.4	269°54.1	7.4'	528°18.1	2.6'	56.2		
13	15°53.4	14.5	284°20.5	7.3'	28°20.8	2.5'	56.2'		
14 15	30°53.7 45°53.9	13.5 •• 12.6	298°46.8 313°13.1	7.3' 7.2'	28°23.2 28°25.5	2.3' 2.2'	56.3' 56.3'		
15 16	45°53.9 60°54.1	11.6	313°13.1 327°39.3	7.2 7.1'	28°25.5 28°27.7	2.0'	56.3'		
17	75°54.3	10.7	$342^{\circ}05.4$	7.1'	28°29.7	1.8'	56.4		
18	90°54.5	N04°09.7	356°31.4	7.0'	\$28°31.5	1.7'	56.4		
19 20	105°54.8 120°55.0	08.8 07.8	10°57.4 25°23.3	6.9' 6.9'	28°33.2 28°34.7	1.5' 1.4'	56.4' 56.5'		
21	135°55.2	•• 06.9	39°49.2	6.8'	28°36.1	1.4	56.5		
22	150°55.4	05.9	54°15.0	6.7'	28°37.3	1.0'	56.5'		
23	165°55.6	05.0	68°40.7	6.7'	28°38.3	0.9'	56.6'		
	SD = 15.9'	d = -1.0'		SD	= 15.2'				

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

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

		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%	
09	02:40	02:51	11:57	16:28	04:04		
10	03:01	03:12	11:57	17:20	04:53		
11	03:22	03:33	11:56	18:14	05:47		

# September 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	351°29.5	156°05.8	S05°53.4	256° 50.0	N23°29.1	272°10.3	N22°22.1	3°45.9	S07°38.8			
1	6°32.0	171°05.5	54.7	271°50.9	29.1	287° 12.5	22.1	18°48.5	38.9	Alpheratz	357°34.7	29°13.7
2	21°34.5	186°05.1	56.0	286°51.8	29.1	302°14.7	22.1	33°51.1	38.9	Ankaa	353°07.0	-42°10.1
3	36°36.9	201°04.8	57.2	301°52.6	29.1	317° 17.0	22.1	48°53.8	• • 39.0	Schedar	349°30.9	56°40.3
4	51°39.4	216°04.5	58.5	316°53.5	29.1	$332^{\circ}19.2$	22.2	63°56.4	39.1	Diphda	348°47.3	-17°50.9
5	66°41.9	231°04.1	05°59.7	331°54.4	29.1	$347^{\circ}21.4$	22.2	$78^{\circ}59.1$	39.2	Achernar	335°19.9	-57°06.4
6	81°44.3	246°03.8	S06°01.0	346°55.2	N23°29.1	2°23.7	N22°22.2	94°01.7	S07°39.2	Hamal	327°51.3	23°34.8 89°21.8
7	96°46.8	261°03.5	02.3	$1^{\circ}56.1$	29.1	17°25.9	22.2	109°04.4	39.3	Polaris Acamar	313°54.8 315°11.7	-40°12.0
8	111°49.2	$276^{\circ}03.1$	03.5	16°57.0	29.1	32°28.1	22.2	124°07.0	39.4	Menkar	314°06.3	4°11.3
9	126°51.7	291°02.8	• • 04.8	31°57.8	• • 29.1	47°30.4	• • 22.2	139°09.6	• • 39.5	Mirfak	308°28.4	49°56.8
10	141°54.2	306°02.5	06.1	46°58.7	29.1	62°32.6	22.2	154°12.3	39.5	Aldebaran	290°39.9	16°33.6
11	156°56.6	321°02.1	07.3	61°59.6	29.1	77°34.9	22.3	169°14.9	39.6	Rigel	281°04.1	-8°10.2
12	171°59.1	336°01.8	S06°08.6	77°00.5	N23°29.1	92°37.1	N22°22.3	184°17.6	S07°39.7	Capella	280°22.3	46°01.2
13	187°01.6	351°01.5	09.9	92°01.3	29.1	107°39.3	22.3	199°20.2	39.8	Bellatrix	278°23.2	6°22.5
14	202°04.0	6°01.1	11.1	107°02.2	29.1	122°41.6	22.3	214°22.8	39.8	Elnath	278°02.2	28°37.7
15	217°06.5	21°00.8	• • 12.4	122°03.1	• • 29.1	137° 43.8	• • 22.3	229°25.5	• • 39.9	Alnilam	275°38.0	-1°11.0
16	232°09.0	36°00.5	13.7	137°03.9	29.1	152°46.0	22.3	244°28.1	40.0	Betelgeuse	270°52.4	7°24.8
17	247°11.4	51°00.1	14.9	152°04.8	29.1	167°48.3	22.3	259°30.8	40.1	Canopus	263°52.7	-52°42.1
18	262°13.9 277°16.4	65° 59.8 80° 59.5	506°16.2	167°05.7 182°06.6	N23°29.1 29.1	182°50.5 197°52.8	N22°22.4 22.4	274°33.4 289°36.0	\$07°40.1 40.2	Sirius	258°26.6	-16°44.7
19 20	277 10.4 292°18.8	95°59.1	17.4 18.7	197° 07.4	29.1	212° 55.0	22.4	304°38.7	40.2	Adhara	255°06.2	-29°00.0
21	307°21.3	95° 59.1 110° 58.8	• • 20.0	212°08.3	29.1	212 55.0 227° 57.2	22.4	319°41.3	. 40.4	Procyon	244°51.3	5°09.8
22	322°23.7	125°58.5	21.2	212 00.3 227°09.2	29.1	242°59.5	22.4	334°44.0	40.4	Pollux	243°17.8	27°58.0
23	337°26.2	140°58.1	22.5	242°10.0	29.1	258°01.7	22.4	349°46.6	40.5	Avior	234°15.3	-59°35.0
										Suhail	222°46.9	-43°31.7
Mer.p	pass. 00:34	$\nu$ -0.3' d1.	.3′ m-3.87	$\nu$ 0.9′ d0	.0′ m0.62	$\nu$ 2.2′ d0.	.0′ m-2.33	$\nu 2.6' \ d0$	$.1^\prime$ m0.58	Miaplacidus	221°39.2	-69°48.8
										Alphard	217°48.3	-8°45.7
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.0	11°50.9
0	352°28.7	155°57.8	S06°23.8	257° 10.9	N23°29.1	273°04.0	N22°22.4	4°49.2	S07°40.6	Dubhe	193°41.9	61°37.1
1	7°31.1	170° 57.5	25.0	272°11.8	29.1	288°06.2	22.5	19°51.9	40.7	Denebola	182°25.5	14°26.2
2	22°33.6	185°57.1	26.3	287°12.7	29.1	303°08.4	22.5	34°54.5	40.7	Gienah	175°44.2	-17°40.6
3	37°36.1	200° 56.8	27.5	302°13.5	29.1	318° 10.7	22.5	49°57.2	• • 40.8	Acrux	173°01.1	-63°14.2
4	52°38.5	215° 56.4	28.8	317°14.4	29.1	333° 12.9	22.5	64°59.8	40.9	Gacrux	171°52.6	-57°15.1
5	67°41.0	230°56.1	30.1	332°15.3	29.1	348° 15.2	22.5	80°02.4	41.0	Alioth	166°13.7	55°49.7
6	82°43.5	245°55.8	S06°31.3	347°16.2	N23°29.1	3° 17.4	N22°22.5	95°05.1	S07°41.0	Spica	158°22.9	-11°17.3
7	97°45.9	260°55.4	32.6	2°17.1	29.0	18° 19.6	22.5	110°07.7	41.1	Alkaid	152°52.6	49°11.6
8	112°48.4	275°55.1	33.8	17° 17.9	29.0	33°21.9	22.5	125°10.4	41.2	Hadar	148°36.9	-60°29.6
9	127°50.8	290°54.8	35.1	32° 18.8	• • 29.0	48°24.1	22.6	140°13.0	• • 41.3	Menkent	147°58.3	-36°29.5
10	142°53.3	305°54.4	36.4	47° 19.7	29.0	63°26.4	22.6	155°15.6	41.3	Arcturus	145°48.4	19°03.4
11	157°55.8	320°54.1	37.6	62°20.6	29.0	78° 28.6	22.6	170°18.3	41.4	Rigil Kent.	139°41.2	-60°56.4
12	172°58.2	335°53.7	S06°38.9	77°21.4	N23°29.0	93°30.9	N22°22.6	185°20.9	S07°41.5	Kochab	137°20.4 136°56.5	74°03.4 -16°08.6
13	188°00.7	350°53.4	40.1	92°22.3	29.0	108°33.1	22.6	200°23.6	41.6	Zuben'ubi Alphecca	130 50.5 126°04.1	26°38.1
14	203°03.2	5°53.1	41.4	107°23.2	29.0	123°35.4	22.6	215°26.2	41.6	Antares	120 04.1 112°16.3	-26°29.2
15	218°05.6	20°52.7	• • 42.7	122°24.1	• • 29.0	138°37.6	• • 22.6	230°28.8	• • 41.7	Antares	112 10.3 107°10.8	-20 29.2 -69°04.5
16	233°08.1	$35^{\circ}52.4$	43.9	137°25.0	29.0	153°39.8	22.7	245°31.5	41.8	Sabik	107 10.8 102°03.1	-15°45.3
17	$248^{\circ}10.6$	50°52.1	45.2	152°25.8	29.0	$168^{\circ}42.1$	22.7	260°34.1	41.9	Shaula	96°10.7	-13 43.3 -37°07.4
18	263°13.0	65°51.7	S06°46.4	167° 26.7	N23°29.0	183°44.3	N22°22.7	275°36.8	S07°41.9	Rasalhague	95°58.8	12°32.7
19	278°15.5	80°51.4	47.7	182°27.6	29.0	198°46.6	22.7	290°39.4	42.0	Eltanin	90°42.2	51°29.4
20	293°18.0	$95^{\circ}51.0$	48.9	197°28.5	29.0	213°48.8	22.7	305°42.0	42.1	Kaus Aust.	83°32.8	-34°22.4
21	308°20.4	110°50.7	• • 50.2	212°29.4	• • 29.0	228°51.1	• • 22.7	320°44.7	• • 42.2	Vega	80°33.3	38°48.6
22	323°22.9	125° 50.4	51.5	227°30.2	29.0	243°53.3	22.7	335°47.3	42.2	Nunki	75°47.9	-26°16.0
23	338°25.3	140°50.0	52.7	242°31.1	28.9	258°55.6	22.8	350°50.0	42.3	Altair	62°00.0	8°56.1
Mer.r	pass. 00:30	$\nu$ -0.3' d1	.3′ m-3.87	$\nu 0.9' \ d-0$	0.0' m0.62	$\nu 2.2' d0$	.0′ m-2.34	$\nu 2.6' d0$	.1′ m0.59	Peacock	53°05.7	-56°39.5
										Deneb	49°25.7	45°22.3
										Enif	33°38.8	9°59.4
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.8	-46°50.5
0	353°27.8	155°49.7	S06°54.0	257°32.0	N23°28.9	273°57.8	N22°22.8	5°52.6		Fomalhaut	$15^{\circ}14.4$	-29°29.4
1	8°30.3	170°49.3	55.2	272°32.9	28.9	289°00.1	22.8	20°55.2	42.5	Scheat	13°45.1	28°13.1
2	23°32.7 38°35.2	185°49.0	56.5	287°33.8	28.9 •• 28.9	304°02.3	22.8	35°57.9	42.5	Markab	13°29.9	15°20.4
3 4	38°35.2 53°37.7	200° 48.6 215° 48.3	· · 57.7 06°59.0	302°34.7 317°35.5	28.9	319°04.6 334°06.8	· · 22.8 22.8	51°00.5 66°03.2	•• 42.6 42.7	Sep 12 Thu	SHA	Mer.pass
5	68°40.1	215 46.3 230°48.0	00°59.0	317 35.5 332°36.4	28.9	349°09.1	22.8	81°05.8	42.7		164°36.3	13:36
6	83°42.6	245°47.6	S07°01.5	347°37.3	N23°28.9	4°11.3	N22°22.8		\$07°42.8	Mars	265°20.5	06:52
7	98°45.1	245 47.0 260°47.3	02.8	2°38.2	28.9	19° 13.6	22.9	90 08.4 111°11.1	42.9	Jupiter	280°40.7	05:50
8	96 45.1 113°47.5	200 47.3 275°46.9	02.8	2 36.2 17°39.1	28.9	34° 15.8	22.9	111 11.1 126°13.7	42.9	Saturn	12°16.3	23:41
9	113 47.5 128°50.0	275°46.9 290°46.6	•• 05.3	32° 40.0	28.8	49° 18.1	22.9	141°16.4	• • 43.1			
10	143°52.5	305°46.3	06.5	47° 40.8	28.8	64° 20.3	22.9	156°19.0	43.1	Sep 13 Fri	SHA	Mer.pass
11	158°54.9	320°45.9	07.8	62°41.7	28.8	79°22.6	22.9	171°21.6	43.2		163°29.1	13:36
12	173°57.4	335°45.6	S07°09.0	77°42.6	N23° 28.8	94°24.8	N22°22.9	186°24.3	S07°43.3		264°42.3	06:51
13	188°59.8	350°45.2	10.3	92°43.5	28.8	109°27.1	22.9	201°26.9	43.4		280°35.3	05:47
14	204°02.3	5°44.9	11.5	107°44.4	28.8	124°29.3	22.9	216°29.6	43.4	Saturn	12°20.6	23:37
15	219°04.8	20°44.5	12.8	122°45.3	28.8	139°31.6	• • 23.0	231°32.2	• • 43.5	Sep 14 Sat	SHA	Mer.pass
16	234°07.2	35°44.2	14.0	137°46.2	28.8	154° 33.8	23.0	246°34.8	43.6		162°21.9	13:37
17	249°09.7	50°43.8	15.3	152°47.1	28.8	169°36.1	23.0	261°37.5	43.7	Mars		06:49
18	264°12.2	65°43.5	S07°16.5	167°47.9	N23°28.7	184°38.3	N22°23.0		S07°43.7		280°30.0	05:43
19	279°14.6	80°43.2	17.8	182°48.8	28.7	199°40.6	23.0	291°42.8	43.8	Saturn	12°24.8	23:32
20	294°17.1	95°42.8	19.0	$197^{\circ}49.7$	28.7	214°42.8	23.0	306°45.4	43.9			
21	$309^{\circ}19.6$	$110^{\circ}42.5$	• • 20.3	$212^{\circ}50.6$	• • 28.7	$229^{\circ}45.1$	• • 23.0	321°48.0	• • 44.0	Horizont	al parallax	
22	324°22.0	125°42.1	21.5	227°51.5	28.7	244°47.4	23.1	336°50.7	44.0		Venus:	0.1
23	339°24.5	140°41.8	22.8	242°52.4	28.7	259°49.6	23.1	351°53.3	44.1		Mars:	0.1
Merr	pass. 00:26	$\nu$ -0.3' d1	.3′ m-3.87	ν0.9' d-0	0.0' m0.61	$\nu 2.2' d0$	.0′ m-2.34	$\nu^{2.6'} d0$	.1′ m0.59			
		- 0.0 01		- 3.3 4 6								

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°55.9	N04°04.0	83°06.4	6.6'	S28°39.2	0.7'	56.6'
1	195°56.1	03.0	97°32.0	6.6'	28°39.9	0.5'	56.6'
2	210°56.3	02.1	111°57.6	6.5'	28°40.4	0.4'	56.7'
3 4	225°56.5 240°56.8	· · 01.1 04°00.2	126°23.1 140°48.6	6.5' 6.4'	28° 40.8 28° 41.0	0.2' 0.0'	56.7' 56.8'
4 5	240 56.8 255°57.0	04 00.2 03°59.2	140 48.6 155°14.0	6.4	28°41.0	-0.1	56.8'
6	270°57.2	N03°58.3	169° 39.3	6.3	S28°40.9	-0.1	56.8
7	285°57.4	57.3	184°04.6	6.3'	28° 40.6	-0.5	56.9'
8	300°57.6	56.4	198° 29.9	6.2'	28°40.1	-0.6'	56.9'
9	315°57.9	• • 55.4	212°55.1	6.2'	28°39.5	-0.8'	56.9'
10	330°58.1	54.5	227°20.3	6.1'	28°38.7	-1.0'	57.0'
11	345°58.3	53.5 N03°52.5	241°45.5	6.1'	28°37.7	-1.2'	57.0'
12 13	0°58.5 15°58.7	NU3 52.5 51.6	256° 10.6 270° 35.6	6.1' 6.0'	\$28°36.6 28°35.2	-1.3' -1.5'	57.1' 57.1'
14	30°59.0	50.6	270 35.0 285°00.7	6.0'	26 33.2 28°33.7	-1.5 -1.7'	57.1'
15	45°59.2	• • 49.7	299° 25.7	6.0'	28° 32.0	-1.8'	57.2'
16	60°59.4	48.7	313° 50.6	5.9'	28°30.2	-2.0'	57.2'
17	75°59.6	47.8	$328^{\circ}15.6$	5.9'	28°28.2	-2.2'	57.2'
18	90°59.9	N03°46.8	342°40.5	5.9'	S28°26.0	-2.4'	57.3'
19	106°00.1	45.8	357°05.4	5.9'	28°23.6	-2.5'	57.3'
20	121°00.3	44.9	11°30.2	5.8'	28°21.1	-2.7'	57.4'
21 22	136°00.5 151°00.7	· · 43.9 43.0	25°55.1 40°19.9	5.8' 5.8'	28° 18.3 28° 15.4	-2.9' -3.1'	57.4' 57.4'
23	166°01.0	43.0 42.0	40 19.9 54°44.7	5.8'	28°12.4	-3.1 -3.3'	57.4 57.5'
23						3.3	51.5
	SD = 15.9'	d = -1.0'			D = 15.4'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°01.2 196°01.4	N03°41.1 40.1	69°09.5 83°34.3	5.8' 5.8'	\$28°09.1 28°05.7	-3.4' -3.6'	57.5' 57.6'
1 2	211°01.4	40.1 39.1	83° 34.3 97° 59.0	5.8	28°05.7 28°02.1	-3.6° -3.8'	57.6'
3	226°01.9	• • 38.2	112° 23.8	5.7'	27°58.3	-3.0 -4.0'	57.6'
4	241°02.1	37.2	126° 48.5	5.7'	27°54.3	-4.1'	57.7'
5	256°02.3	36.3	141°13.2	5.7'	27°50.2	-4.3'	57.7'
6	271°02.5	N03°35.3	155°38.0	5.7'	S27°45.9	-4.5'	57.8'
7	286°02.8	34.4	170°02.7	5.7'	27°41.4	-4.7'	57.8'
8	301°03.0 316°03.2	33.4	184°27.4 198°52.1	5.7'	27°36.7 27°31.9	-4.8'	57.8'
9 10	310°03.2 331°03.4	· · 32.4 31.5	213° 16.9	5.7' 5.7'	27°31.9 27°26.8	-5.0' -5.2'	57.9' 57.9'
11	346°03.6	30.5	213 10.9 227° 41.6	5.7'	27°21.6	-5.2 -5.4'	58.0'
12	1°03.9	N03°29.6	242°06.3	5.7'	S27°16.3	-5.6'	58.0'
13	16°04.1	28.6	$256^{\circ}31.1$	5.8'	27°10.7	-5.7'	58.0'
14	31°04.3	27.7	270°55.8	5.8'	27°05.0	-5.9'	58.1'
15	46°04.5	• • 26.7	285°20.6	5.8'	26°59.1	-6.1'	58.1'
16	61°04.8 76°05.0	25.7 24.8	299° 45.4 314° 10.2	5.8' 5.8'	26°53.0 26°46.7	-6.3' -6.4'	58.2' 58.2'
17 18	91°05.2	N03°23.8	314 10.2 328° 35.0	5.8'	526°40.3	-6.6'	58.2'
19	106°05.4	22.9	342° 59.8	5.8'	26° 33.7	-6.8'	58.3'
20	121°05.7	21.9	357°24.6	5.9'	26°26.9	-7.0'	58.3'
21	136°05.9	• • 20.9	11°49.5	5.9'	26°20.0	-7.1'	58.4'
22	151°06.1	20.0	26° 14.4	5.9'	26°12.8	-7.3'	58.4'
23	166°06.3	19.0	40°39.3	5.9'	26°05.5	-7.5'	58.4'
	SD = 15.9'	d = -1.0'		S	D = 15.7'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	НР
0 0	181°06.5	N03°18.1	55°04.2	6.0'	\$25°58.0	-7.6'	58.5
1	196°06.8	17.1	69°29.1	6.0'	25°50.4	-7.8'	58.5'
2	211°07.0	16.1	83°54.1	6.0'	25°42.6	-8.0'	58.6'
3	226°07.2	• • 15.2	98° 19.1	6.0'	25°34.6	-8.2'	58.6'
4	241°07.4 256°07.7	14.2	112°44.2 127°09.3	6.1'	25°26.4 25°18.1	-8.3'	58.6'
5 6	256°07.7 271°07.9	13.3 N03°12.3	127° 09.3 141° 34.4	6.1' 6.1'	25°18.1 \$25°09.6	-8.5' -8.7'	58.7' 58.7'
7	271 07.9 286°08.1	11.3	141 54.4 155° 59.5	6.2	25°00.9	-8.8'	58.8'
8	301°08.3	10.4	170° 24.7	6.2'	24°52.1	-9.0'	58.8'
9	316°08.6	• • 09.4	184°49.9	6.2'	24°43.1	-9.2'	58.8'
10	331°08.8	08.5	199° 15.1	6.3'	24°33.9	-9.3'	58.9'
11	346°09.0	07.5	213°40.4	6.3'	24°24.6	-9.5'	58.9'
12 13	1°09.2 16°09.5	N03°06.5 05.6	228°05.8 242°31.1	6.4' 6.4'	\$24°15.1 24°05.4	-9.7' -9.8'	59.0' 59.0'
13 14	31°09.5	05.6 04.6	242°31.1 256°56.5	6.5	24°05.4 23°55.6	-9.8 -10.0'	59.0' 59.0'
15	46°09.9	• • 03.7	271°22.0	6.5	23°45.6	-10.0	59.1'
16	61°10.1	02.7	285° 47.5	6.5'	23°35.4	-10.3	59.1'
17	76°10.3	01.7	300° 13.0	6.6'	23°25.1	-10.5'	59.2'
18	91°10.6	N03°00.8	314°38.6	6.6'	\$23°14.7	-10.6'	59.2'
19	106°10.8	02°59.8	329°04.2	6.7'	23°04.0	-10.8'	59.2'
20 21	121°11.0 136°11.2	58.9 •• 57.9	343°29.9 357°55.7	6.7' 6.8'	22°53.3 22°42.3	-10.9' -11.1'	59.3' 59.3'
22	150 11.2 151°11.5	56.9	12° 21.4	6.8	22 42.3 22°31.2	-11.1 -11.2'	59.3 59.4'
23	166°11.7	56.0	26°47.3	6.9'	22°20.0	-11.4	59.4'
	SD = 15.9'	d = -1.0'			D = 15.9'		
	JD — 13.3	u - 1.0					

	Twi	light			Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut
N 72°	01:54	03:47	05:00	18:49	20:01	21:50
N 70°	02:29	04:01	05:06	18:43	19:47	21:17
68°	02:54	04:01	05:00	18:38	19:36	20:54
66°	03:12	04:22	05:15	18:34	19:27	20:36
64°	03:27	04:29	05:19	18:31	19:20	20:22
62°	03:39	04:36	05:22	18:28	19:14	20:10
60°	03:49	04:42	05:24	18:26	19:08	20:00
<b>N</b> 58°	03:57	04:46	05:26	18:24	19:04	19:52
56°	04:05	04:51	05:28	18:22	18:59	19:45
54°	04:11	04:54	05:30	18:20	18:56	19:39
52°	04:17	04:58	05:32	18:18	18:53	19:33
50°	04:22	05:01	05:33	18:17	18:50	19:28
45°	04:32	05:07	05:37	18:14	18:43	19:18
<b>N</b> 40°	04:40	05:12	05:39	18:11	18:39	19:11
$35^{\circ}$	04:46	05:16	05:42	18:09	18:35	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	18:52
N 10°	05:04	05:29	05:50	18:01	18:22	18:47
0°	05:08	05:32	05:53	17:59	18:20	18:44
<b>S</b> 10°	05:10	05:34	05:55	17:57	18:18	18:42
20°	05:10	05:36	05:58	17:54	18:16	18:42
30°	05:09	05:36	06:00	17:52	18:16	18:43
35° 40°	05:07	05:37	06:02 06:04	17:50	18:15	18:45
40 45°	05:05 05:02	05:37 05:36	06:04	17:49 17:47	18:16 18:16	18:47 18:50
<b>S</b> 50° 52°	04:58 04:56	05:36 05:35	06:08 06:09	17:45 17:44	18:17	18:54 18:57
54°	04:54	05:35	06:10	17:44	18:17 18:18	18:59
56°	04:51	05:34	06:11	17:41	18:18	19:02
58°	04:48	05:34	06:13	17:40	18:19	19:0
<b>S</b> 60°	04:44	05:33	06:14	17:39	18:20	19:09
		Moonris	. O		Moonset	
					IVIOUIISCI	
Lat.				Thu	Fri	Sat
	Thu	Fri	Sat	Thu	Fri	Sat
N 72°				Thu	Fri	
N 72° N 70°	Thu		Sat			
N 72° N 70° 68°	Thu		Sat			
N 72° N 70° 68° 66°	Thu		Sat			22:30
N 72° N 70° 68°	Thu	Fri	Sat 19:57			22:36 23:23
N 72° N 70° 68° 66° 64°	Thu	Fri	19:57 19:10			22:36 23:23 23:53
N 72° N 70° 68° 66° 64° 62° 60°	Thu	Fri 18:52 18:10	19:57 19:10 18:39 18:16	20:36	21:38 22:20	22:36 23:23
N 72° N 70° 68° 66° 64° 62° 60° N 58°	Thu	Fri	19:57 19:10 18:39		21:38	22:36 23:23 23:53
N 72° N 70° 68° 66° 64° 62° 60° N 58° 56° 54°	Thu  17:51 17:10	Fri 18:52 18:10 17:41	19:57 19:10 18:39 18:16 17:57	20:36 21:17	21:38 22:20 22:48	22:36 23:23 23:53
N 72° N 70° 68° 66° 64° 62° 60° N 58° 56° 54° 52°	Thu  17:51 17:10 16:42	18:52 18:10 17:41 17:19	19:57 19:10 18:39 18:16 17:57 17:41 17:27 17:15	20:36 21:17 21:45	21:38 22:20 22:48 23:10	22:36 23:23 23:53
N 72° N 70° 68° 66° 64° 62° 60° N 58° 56° 54° 52° 50°	Thu  17:51 17:10 16:42 16:20	18:52 18:10 17:41 17:19 17:01	Sat  19:57 19:10 18:39 18:16 17:57 17:41 17:27	20:36 21:17 21:45 22:07	21:38 22:20 22:48 23:10 23:28	22:36 23:23 23:55 
N 72° N 70° 68° 66° 64° 62° 60° N 58° 56° 54° 52°	17:51 17:10 16:42 16:20 16:02	18:52 18:10 17:41 17:19 17:01 16:45	19:57 19:10 18:39 18:16 17:57 17:41 17:27 17:15	20:36 21:17 21:45 22:07 22:25	21:38 22:20 22:48 23:10 23:28 23:43	22:36 23:23 23:53 
N 72° N 70° 68° 66° 64° 62° 60° 58° 56° 54° 52° 50° 45° N 40°	17:51 17:10 16:42 16:20 15:47 15:16 14:51	18:52 18:10 17:41 17:19 17:01 16:45 16:32 16:04 15:42	19:57 19:10 18:39 18:16 17:57 17:41 17:27 17:15 17:05	20:36 21:17 21:45 22:07 22:25 22:40	21:38 22:20 22:48 23:10 23:28 23:43 23:56	22:36 23:22 23:55 
N 72° N 70° 68° 66° 64° 60° N 58° 54° 52° 50° 45° N 40° 35°	Thu  17:51 17:10 16:42 16:20 15:47 15:16 14:51 14:32	18:52 18:10 17:41 17:19 17:01 16:45 16:32 16:04 15:42 15:24	19:57 19:10 18:39 18:16 17:57 17:41 17:27 17:15 17:05 16:42 16:24 16:09	20:36 21:17 21:45 22:07 22:25 22:40 23:11 23:35 23:54	21:38 22:20 22:48 23:10 23:28 23:43 23:56 	22:36 23:23 23:53  00:23 00:48 01:02
N 72° N 70° 68° 66° 64° 62° 60° N 58° 54° 52° 50° 45° N 40° 35° 30°	17:51 17:51 16:42 16:20 16:02 15:47 15:16 14:51 14:32 14:14	18:52 18:10 17:41 17:19 17:01 16:45 16:32 16:04 15:42 15:24 15:08	19:57 19:10 18:39 18:16 17:57 17:41 17:27 17:15 17:05 16:42 16:24 16:09 15:56	20:36 21:17 21:45 22:07 22:25 22:40 23:11 23:35 23:54	21:38 22:20 22:48 23:10 23:28 23:43 23:56 	22:36 23:23 23:53  00:23 00:48 01:02 01:17
N 72° N 70° 68° 66° 64° 62° 60° N 58° 54° 52° 50° 45° N 40° 35° 30° 20°	Thu  17:51 17:10 16:42 16:20 16:02 15:47 15:16 14:51 14:32 14:14 13:46	18:52 18:10 17:41 17:19 17:01 16:45 16:32 16:04 15:42 15:24 15:08 14:41	19:57 19:10 18:39 18:16 17:57 17:41 17:27 17:15 17:05 16:42 16:09 15:56 15:33	20:36 21:17 21:45 22:07 22:25 22:40 23:11 23:35 23:54 	21:38 22:20 22:48 23:10 23:28 23:43 23:56  00:11 00:39	22:36 23:23 23:53 
N 72° N 70° 68° 66° 64° 62° 60° N 58° 56° 52° 50° 45° N 40° 35° 30° N 10°	Thu  17:51 17:10 16:42 16:20 16:02 15:47 15:16 14:51 14:32 14:14 13:46 13:21	18:52 18:10 17:41 17:19 17:01 16:45 16:32 16:04 15:42 15:08 14:41 14:18	19:57 19:10 18:39 18:16 17:57 17:41 17:27 17:15 17:05 16:42 16:24 16:09 15:56 15:33 15:14	20:36 21:17 21:45 22:07 22:25 22:40 23:11 23:35 23:54 	21:38 22:20 22:48 23:10 23:28 23:43 23:56  00:11 00:39 01:04	22:36 23:22 23:55 
N 72° N 70° 68° 66° 64° 62° 60° N 58° 56° 52° 50° 45° N 40° 35° 30° N 10° 0°	Thu  17:51 17:10 16:42 16:20 16:02 15:47 15:16 14:51 14:32 14:14 13:46 13:21 12:58	18:52 18:10 17:41 17:19 17:01 16:45 16:32 16:04 15:42 15:24 15:08 14:41 14:18 13:57	19:57 19:10 18:39 18:16 17:57 17:41 17:27 17:15 17:05 16:42 16:24 16:09 15:56 15:33 15:14 14:55	20:36 21:17 21:45 22:07 22:25 22:40 23:11 23:35 23:54  00:05 00:28	21:38 22:20 22:48 23:10 23:28 23:43 23:56  00:11 00:39 01:04 01:26	22:36 23:22 23:55 
N 72° N 70° 68° 66° 64° 60° N 58° 56° 52° 50° 45° N 40° 35° 30° 20° N 10° 0° S 10°	Thu  17:51 17:10 16:42 16:20 16:02 15:47 15:16 14:51 14:32 14:14 13:46 13:21 12:58 12:35	18:52 18:10 17:41 17:19 17:01 16:45 16:32 16:04 15:42 15:24 15:08 14:41 14:18 13:57	19:57 19:10 18:39 18:16 17:57 17:41 17:27 17:15 17:05 16:42 16:24 16:24 16:09 15:56 15:33 15:14 14:55	20:36 21:17 21:45 22:07 22:25 22:40 23:11 23:35 23:54  00:05 00:28 00:51	21:38 22:20 22:48 23:10 23:28 23:43 23:56  00:11 00:39 01:04 01:26 01:49	22:36 23:23 23:53 
N 72° N 70° 68° 660° 62° 60° N 58° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 0° S 10° 20°	17:51 17:10 16:42 16:20 16:02 15:16 14:51 14:32 14:14 13:46 13:21 12:58 12:35 12:11	18:52 18:10 17:41 17:19 17:01 16:45 16:32 16:04 15:42 15:24 15:08 14:41 14:18 13:57 13:35 13:12	19:57 19:10 18:39 18:16 17:57 17:41 17:27 17:15 16:42 16:24 16:09 15:56 15:33 15:14 14:55 14:36 14:16	20:36 21:17 21:45 22:07 22:25 22:40 23:11 23:35 23:54  00:05 00:28 00:51 01:16	21:38 22:20 22:48 23:10 23:28 23:43 23:56  00:11 00:39 01:04 01:26 01:49 02:13	22:36 23:23 23:53 
N 72° N 70° 68° 66° 64° 60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° S 10° 20° 30°	Thu  17:51 17:10 16:42 16:20 16:02 15:47 15:16 14:51 14:32 14:14 13:46 13:21 12:58 12:35 12:11 11:42	18:52 18:10 17:41 17:19 17:01 16:45 16:04 15:42 15:24 15:08 14:41 14:18 13:57 13:35 13:12 12:45	19:57 19:10 18:39 18:16 17:57 17:41 17:27 17:15 16:42 16:42 16:24 16:09 15:56 15:33 15:14 14:55 14:36 14:16 13:53	20:36 21:17 21:45 22:07 22:25 22:40 23:11 23:35 23:54 00:05 00:28 00:51 01:16 01:45	21:38 22:20 22:48 23:10 23:28 23:43 23:56  00:11 00:39 01:04 01:26 01:49 02:13 02:40	22:36 23:23 23:53 00:23 00:48 01:02 01:17 01:43 02:04 02:25 03:00 03:31
N 72° N 70° 68° 66° 64° 62° 60° N 58° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 0° S 10° 20° 30° 35°	Thu  17:51 17:10 16:42 16:20 16:02 15:16 14:51 14:32 14:14 13:46 13:21 12:58 12:35 12:11 11:42 11:25	18:52 18:10 17:41 17:19 17:01 16:45 16:32 16:04 15:42 15:24 15:24 14:18 13:57 13:35 13:12 12:45 12:29	19:57 19:10 18:39 18:16 17:57 17:41 17:27 17:15 17:05 16:42 16:09 15:56 15:33 15:14 14:55 14:36 14:16 13:53 13:40	20:36 21:17 21:45 22:07 22:25 22:40 23:11 23:35 23:54  00:05 00:28 00:51 01:16 01:45 02:02	21:38 22:20 22:48 23:10 23:28 23:43 23:56  00:11 00:39 01:04 01:26 01:49 02:13 02:40 02:57	22:36 23:23 23:53 
N 72° N 70° 68° 66° 64° 62° 50° N 58° 56° 52° 50° 45° N 40° 35° 30° 0° S 10° 20° 30° 35° 40°	Thu  17:51 17:10 16:42 16:20 16:02 15:47 15:16 14:51 14:32 14:14 13:46 13:21 12:58 12:35 12:11 11:42 11:25 11:05	18:52 18:10 17:41 17:19 17:01 16:45 16:32 16:04 15:42 15:24 15:24 13:57 13:35 13:12 12:29 12:10	19:57 19:10 18:39 18:16 17:57 17:41 17:27 17:15 17:05 16:42 16:24 16:09 15:56 15:33 15:14 14:55 14:36 14:16 13:53 13:40 13:24	20:36 21:17 21:45 22:07 22:25 22:40 23:11 23:35 23:54  00:05 00:28 00:51 01:16 01:45 02:02 02:21	21:38 22:20 22:48 23:10 23:28 23:43 23:56  00:11 00:39 01:04 01:26 01:49 02:13 02:40 02:57 03:16	22:36 23:22 23:55 00:23 00:45 01:01 01:43 02:04 02:25 02:45 03:33 03:46 04:02
N 72° N 70° 68° 66° 64° 52° 50° 54° 52° 50° N 40° 35° 30° 20° N 10° 0° 5 10° 20° 30° 35°	Thu  17:51 17:10 16:42 16:20 16:02 15:16 14:51 14:32 14:14 13:46 13:21 12:58 12:35 12:11 11:42 11:25	18:52 18:10 17:41 17:19 17:01 16:45 16:32 16:04 15:42 15:24 15:24 14:18 13:57 13:35 13:12 12:45 12:29	19:57 19:10 18:39 18:16 17:57 17:41 17:27 17:15 17:05 16:42 16:09 15:56 15:33 15:14 14:55 14:36 14:16 13:53 13:40	20:36 21:17 21:45 22:07 22:25 22:40 23:11 23:35 23:54  00:05 00:28 00:51 01:16 01:45 02:02	21:38 22:20 22:48 23:10 23:28 23:43 23:56  00:11 00:39 01:04 01:26 01:49 02:13 02:40 02:57	22:36 23:23 23:53 

		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%	
12	03:43	03:54	11:56	19:12	06:43		
13	04:05	04:15	11:56	20:11	07:41		
14	04:26	04:37	11:55	21:09	08:40		

12:41

12:30 12:17

12:02

11:44

03:17

03:32

03:50

04:12

04:41

04:08

04:23

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05:00

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04:47

04:59

05:13

05:28

05:47

10:10

09:54

09:36

09:14

08:46

**S** 50° 52°

56°

58°

11:19

11:05

10:48

10:29

10:04

09:31

# September 15, 16, 17 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	354°27.0	155°41.4	S07°24.0	257°53.3	N23°28.7	274°51.9	N22°23.1	6°56.0	S07°44.2			
1	9°29.4	170°41.1	25.3	272°54.2	28.6	289°54.1	23.1	21°58.6	44.3	Alpheratz	357°34.7	29°13.7
2	24°31.9	185°40.7	26.5	287°55.1	28.6	304°56.4	23.1	37°01.2	44.3	Ankaa	353°07.0	-42°10.2
3	39°34.3	200°40.4	27.8	302°56.0	• • 28.6	319°58.6	23.1	52°03.9	• • 44.4	Schedar	349°30.8	56°40.4
4	54°36.8	215°40.0	29.0	317°56.8	28.6	335°00.9	23.1	67°06.5	44.5	Diphda	348°47.2	-17°50.9
5	69°39.3	230°39.7	30.3	332°57.7	28.6	350°03.2	23.1	82°09.2	44.6	Achernar	335°19.8	-57°06.5
6	84°41.7	245°39.4	S07°31.5	347°58.6	N23°28.6	5°05.4	N22°23.2	97°11.8	S07°44.6	Hamal	327°51.2	23°34.8
7	99°44.2	260°39.0	32.8	2°59.5	28.6	20°07.7	23.2	112°14.4	44.7	Polaris	313°53.5	89°21.9
8	114°46.7	275°38.7	34.0	18°00.4	28.5	35°09.9	23.2	127°17.1	44.8	Acamar	315°11.7	-40°12.0
9	129°49.1	290°38.3	• • 35.3	33°01.3	• • 28.5	50°12.2	• • 23.2	142°19.7	• • 44.9	Menkar	314°06.2	4°11.3
10	144°51.6	305°38.0	36.5	48°02.2	28.5	65°14.4	23.2	157°22.4	44.9	Mirfak	308°28.4 290°39.8	49°56.8 16°33.6
11	159°54.1	320°37.6	37.8	63°03.1	28.5	80°16.7	23.2	172°25.0	45.0	Aldebaran		
12	174°56.5	335°37.3	S07°39.0	78°04.0	N23°28.5	95°19.0	N22°23.2	187°27.6	S07°45.1	Rigel	281°04.1	-8°10.2
13	189°59.0	350°36.9	40.3	93°04.9	28.5	110°21.2	23.2	202°30.3	45.2	Capella	280°22.3	46°01.2
14	205°01.4	5°36.6	41.5	108°05.8	28.4	125°23.5	23.3	217°32.9	45.2	Bellatrix	278°23.2 278°02.2	6°22.5 28°37.7
15	220°03.9	$20^{\circ}36.2$	• • 42.8	123°06.7	• • 28.4	140°25.7	• • 23.3	232°35.6	• • 45.3	Elnath Alnilam	276 02.2 275°38.0	-1°11.0
16	235°06.4	35°35.9	44.0	138°07.6	28.4	155°28.0	23.3	247°38.2	45.4		275° 58.0° 270° 52.4	-1 11.0 7°24.8
17	250°08.8	50°35.5	45.2	153°08.5	28.4	170°30.3	23.3	262°40.8	45.4	Betelgeuse Canopus	263°52.6	-52°42.1
18	265°11.3	65°35.2	S07°46.5	168°09.4	N23°28.4	185°32.5	N22°23.3	277°43.5	S07°45.5	Sirius	258°26.6	-32 42.1 -16°44.7
19	280°13.8	80°34.8	47.7	183°10.3	28.3	200°34.8	23.3	292°46.1	45.6	Adhara	255°06.2	-10 44.7 -29°00.0
20	295°16.2	95°34.5	49.0	$198^{\circ}11.2$	28.3	215°37.1	23.3	307°48.7	45.7	Procyon	244°51.3	5°09.8
21	310°18.7	$110^{\circ}34.1$	• • 50.2	$213^{\circ}12.1$	• • 28.3	230°39.3	• • 23.3	322°51.4	• • 45.7	Pollux	243°17.8	27°58.0
22	$325^{\circ}21.2$	125°33.8	51.5	$228^{\circ}12.9$	28.3	245°41.6	23.4	337°54.0	45.8	Avior	245 17.6 234°15.3	-59°35.0
23	340°23.6	140°33.4	52.7	243°13.8	28.3	260°43.8	23.4	352°56.7	45.9	Suhail	234 15.3 222°46.9	-59 35.0 -43°31.7
Mern	ass. 00:22	v-0 3′ d1	.2′ m-3.87	ν0 0' d 0	0.0' m0.60	1/2 3/ d0	.0′ m-2.35	1/2 6' d0	.1′ m0.60	Miaplacidus	222 40.9 221°39.2	-43 31.7 -69°48.8
- wier.p	,uss. UU.ZZ	ν-0.5 UI	111-3.01	νυ.σ u-(	,.0 1110.00	ν2.5 u0.	.0 111-2.33	ν2.0 d0	. 1110.00	Alphard	221 39.2 217°48.3	-8°45.7
										Regulus	207°35.0	11°50.9
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.9	61°37.1
0	$355^{\circ}26.1$	155°33.1	S07°54.0	$258^{\circ}14.7$	N23°28.2	$275^{\circ}46.1$	$N22^{\circ}23.4$	7°59.3	S07°46.0	Denebola	182°25.5	14°26.2
1	10°28.6	$170^{\circ}32.7$	55.2	273°15.6	28.2	290°48.4	23.4	23°01.9	46.0	Gienah	175°44.2	-17°40.6
2	25°31.0	185°32.4	56.4	$288^{\circ}16.5$	28.2	305°50.6	23.4	38°04.6	46.1		173°01.1	-63°14.2
3	40°33.5	200°32.0	•• 57.7	303°17.4	• • 28.2	320°52.9	• • 23.4	53°07.2	• • 46.2		171°52.6	-57°15.1
4	55°35.9	$215^{\circ}31.7$	07°58.9	318° 18.3	28.2	335°55.2	23.4	68°09.9	46.3	Alioth	166°13.7	55°49.7
5	70°38.4	230°31.3	08°00.2	333° 19.2	28.1	350° 57.4	23.4	83°12.5	46.3	Spica	158°22.9	-11°17.3
6	85°40.9	245°31.0	S08°01.4	348°20.1	N23°28.1	5°59.7	N22°23.4	98°15.1	S07°46.4	Alkaid	152°52.6	49°11.6
7	100°43.3	260° 30.6	02.7	3°21.0	28.1	21°02.0	23.5	113°17.8	46.5	Hadar	148°36.9	-60°29.6
8	115°45.8	275°30.3	03.9	18°21.9	28.1	36°04.2	23.5	128°20.4	46.6		147°58.3	-36°29.5
9	130°48.3	290° 29.9	•• 05.1	33°22.8	• • 28.1	51°06.5	• • 23.5	143°23.1	• • 46.6	Arcturus	145°48.4	19°03.4
10	145°50.7	305° 29.5	06.4	48°23.7	28.0	66°08.8	23.5	158°25.7	46.7	Rigil Kent.	139°41.2	-60°56.4
11	160°53.2	320°29.2	07.6	63°24.6	28.0	81°11.0	23.5	173°28.3	46.8	Kochab	137°20.5	74°03.4
12	175°55.7	335°28.8	S08°08.9	78°25.5	N23°28.0	96° 13.3	N22°23.5	188°31.0	S07°46.9	Zuben'ubi	136°56.5	-16°08.6
13	190°58.1	350°28.5	10.1	93°26.5	28.0	111°15.6	23.5	203°33.6	46.9	Alphecca	126°04.1	26°38.1
14	206°00.6	5°28.1	11.3	108°27.4	28.0	126° 17.8	23.5	218°36.2	47.0	Antares	112°16.3	-26°29.2
15	221°03.1	20°27.8	• • 12.6	123°28.3	• • 27.9	141°20.1	• • 23.6	233°38.9	• • 47.1	Atria	$107^{\circ}10.8$	-69°04.5
16	236°05.5	35°27.4	13.8	138° 29.2	27.9	156°22.4	23.6	248°41.5	47.1	Sabik	$102^{\circ}03.1$	-15°45.3
17	251°08.0	50°27.1	15.1	153°30.1	27.9	171°24.6	23.6	263°44.2	47.2	Shaula	$96^{\circ}10.7$	-37°07.4
18	266°10.4	65°26.7	508°16.3	168°31.0	N23°27.9	186°26.9	N22°23.6	278°46.8	S07°47.3	Rasalhague	95°58.8	12°32.7
19	281°12.9	80°26.4	17.5	183°31.9	27.8	201°29.2	23.6	293°49.4	47.4	Eltanin	90°42.3	51°29.4
20	296°15.4	95°26.0	18.8	198°32.8	27.8	216°31.4	23.6	308°52.1	47.4	Kaus Aust.	83°32.8	-34°22.5
21	311°17.8	110°25.6	• • 20.0	213°33.7	• • 27.8	231°33.7	• • 23.6	323°54.7	• • 47.5	Vega	80°33.3	38°48.6
22	326°20.3	125°25.3	21.2	228°34.6	27.8	246°36.0	23.6	338°57.4	47.6	Nunki	75°48.0	-26°16.0
23	341°22.8	140°24.9	22.5	243°35.5	27.7	261°38.3	23.6	354°00.0	47.7	Altair	62°00.0	8°56.1
Mer.p	ass. 00:18	$\nu$ -0.4' d1	.2′ m-3.87	$\nu$ 0.9' d-0	0.0′ m0.59	$\nu 2.3' \ d0.$	.0′ m-2.36	$\nu 2.6' \ d0$	.1′ m0.60	Peacock	53°05.7	-56°39.5
										Deneb	49°25.7	45°22.3
-	CIIA	CIIA	Б	CIIA	Б	CIIA	Б	CIIA	Б	Enif	33°38.8	9°59.4
Tue 0	GHA	GHA	<b>Dec</b> \$08°23.7	GHA	<b>Dec</b> N23° 27.7	GHA	<b>Dec</b> N22°23.7	<b>GHA</b> 9°02.6	<b>Dec</b> <b>S</b> 07°47.7	Al Na'ir	27°32.8	-46°50.5
1	356°25.2 11°27.7	155°24.6 170°24.2	25.0	258°36.4 273°37.3	N23 27.7 27.7	276° 40.5 291° 42.8	23.7	9°02.6 24°05.3	47.8	Fomalhaut	15°14.4	-29°29.4
	26°30.2	170 24.2 185°23.9	25.0 26.2	273 37.3 288°38.2	27.7 27.7	291 42.8 306°45.1	23.7	24 05.3 39°07.9	47.8 47.9	Scheat	13°45.1	28°13.1
2	41°32.6	185°23.9 200°23.5	27.4	288° 38.2 303° 39.1	•• 27.6	306°45.1 321°47.3	. 23.7	54°10.5	47.9 •• 48.0	Markab	13°29.8	15°20.4
3 4	41 32.6 56°35.1	200 23.5 215°23.1	28.7	303 39.1 318°40.0	27.6	321 47.3 336°49.6	23.7	69°13.2	48.0	Sep 15 Sun	SHA	Mer.pass
4 5	50 35.1 71°37.5	215 23.1 230°22.8	28.7 29.9	318 40.0 333°40.9	27.6 27.6	351°51.9	23.7	84°15.8	48.0 48.1		161°14.5	13:38
6	71 37.5 86°40.0	230 22.8 245°22.4	508°31.1	348°41.8	N23°27.6	6°54.2	N22° 23.7	99°18.5	48.1 S07°48.2	Mars		06:48
7	101°42.5	245 22.4 260°22.1	32.4	3° 42.8	27.5	21°56.4	23.7	99 16.5 114°21.1	48.2	Jupiter		05:40
8	101 42.5 116°44.9	260 22.1 275°21.7	32.4	3 42.8 18°43.7	27.5 27.5	21 56.4 36°58.7	23.7	114 21.1 129°23.7	48.2 48.3	Saturn	12°29.0	23:28
9	131°47.4	290°21.3	• • 34.8	33°44.6	27.5	52°01.0	• • 23.8	144° 26.4	• 48.4			
10	146°49.9	305°21.0	36.1	48° 45.5	27.5	67°03.3	23.8	159°29.0	48.5	Sep 16 Mon	SHA	Mer.pass
11	161°52.3	320°20.6	37.3	63°46.4	27.3	82°05.5	23.8	174°31.6	48.5		160°07.0	13:38
12	101 52.5 176°54.8	335°20.3	508°38.5	78° 47.3	N23° 27.4	97°07.8	N22°23.8	189°34.3	\$07°48.6	Mars		06:47
13	191°57.3	350° 19.9	39.8	93°48.2	27.4	112° 10.1	23.8	204°36.9	48.7	Jupiter		05:36
14	206°59.7	5° 19.5	41.0	108°49.1	27.4	112 10.1 127°12.4	23.8	219°39.6	48.8	Saturn	12°33.2	23:24
15	200° 03.7 222° 02.2	20° 19.2	• • 42.2	123° 50.0	27.3	142° 14.6	• • 23.8	219 39.0 234°42.2	• 48.8	Sep 17 Tue	SHA	Mer pass
16	237°04.7	35° 18.8	43.5	138° 50.9	27.3	157° 16.9	23.8	249°44.8	48.9		<b>5ПА</b> 158°59.3	Mer.pass 13:39
17	252°07.1	50° 18.5	44.7	153° 51.9	27.3	172° 19.2	23.8	264° 47.5	49.0		262°11.2	06:45
18	267°09.6	65° 18.1	\$08°45.9	168° 52.8	N23° 27.2	172 19.2 187°21.5	N22°23.9		\$07°49.1	Jupiter		05:32
19	282°12.0	80° 17.7	47.1	183°53.7	27.2	202°23.8	23.9	294°52.7	49.1	Saturn	280 15.3 12°37.4	23:20
20	202 12.0 297°14.5	95°17.4	48.4	198° 54.6	27.2	202 23.8 217°26.0	23.9	309°55.4	49.1	Saturn	12 31.4	25:20
21	312°17.0	110° 17.0	• 49.6	213° 55.5	27.2	232°28.3	• • 23.9	324°58.0	• • 49.3	Horizont	al parallax	
22	327°19.4	125° 16.7	50.8	228° 56.4	27.1	247°30.6	23.9	340°00.7	49.3		Venus:	0.1
23	342°21.9	140° 16.3	52.1	243°57.3	27.1	262°32.9	23.9	355°03.3	49.4		Mars:	0.1
Mer.p	ass. 00:14	u-0.4' $d1$	.2′ m-3.88	$\nu$ 0.9' $d$ -0	0.0′ m0.58	$\nu 2.3' \ d0.$	.0′ m-2.36	$\nu$ 2.6′ $d$ 0	.1′ m0.60			
				-								

h	Su	n	Moon					
Sun	GHA	Dec	GHA	ν	Dec	d	HP	
0	181°11.9	N02°55.0	41°13.1	6.9'	S22°08.6	-11.6'	59.4'	
1	196°12.1 211°12.4	54.0	55°39.1 70°05.0	7.0'	21°57.0 21°45.3	-11.7'	59.5'	
2	211 12.4 226°12.6	53.1 •• 52.1	70°05.0 84°31.1	7.0' 7.1'	21°45.3 21°33.5	-11.8' -12.0'	59.5' 59.5'	
4	241°12.8	51.2	98°57.1	7.1	21°21.5	-12.1'	59.6'	
5	256°13.0	50.2	113°23.3	7.2'	$21^{\circ}09.4$	-12.3'	59.6'	
6	271°13.3 286°13.5	N02°49.2	127°49.5 142°15.7	7.2'	\$20°57.1 20°44.6	-12.4'	59.6'	
7 8	280 13.5 301°13.7	48.3 47.3	142 15.7 156°42.0	7.3' 7.3'	20°44.6 20°32.1	-12.6' -12.7'	59.7' 59.7'	
9	316°13.9	• • 46.3	171°08.3	7.4	20° 19.3	-12.9'	59.8'	
10	331°14.2	45.4	185°34.7	7.5'	20°06.5	-13.0'	59.8'	
11 12	346°14.4 1°14.6	44.4 N02°43.5	200°01.2 214°27.7	7.5' 7.6'	19°53.5 \$19°40.4	-13.1' -13.3'	59.8' 59.9'	
13	1 14.0 16°14.8	NU2 43.5 42.5	214 27.7 228°54.3	7.6'	19°27.1	-13.3 -13.4'	59.9' 59.9'	
14	31°15.0	41.5	243°20.9	7.7'	19° 13.7	-13.5'	59.9'	
15	46°15.3	• • 40.6	257°47.5	7.7'	19°00.2	-13.7'	60.0'	
16 17	61°15.5 76°15.7	39.6 38.6	272°14.3 286°41.1	7.8' 7.8'	18° 46.5 18° 32.7	-13.8' -13.9'	60.0' 60.0'	
18	91°15.9	N02° 37.7	301°07.9	7.9'	518° 18.8	-13.9	60.1	
19	106°16.2	36.7	315°34.8	7.9'	18°04.7	-14.2'	60.1	
20	121°16.4	35.7	330°01.7	8.0'	17°50.6	-14.3'	60.1'	
21 22	136°16.6 151°16.8	· · 34.8 33.8	344°28.7 358°55.8	8.0' 8.1'	17° 36.3 17° 21.9	-14.4'	60.2'	
23	166°17.1	33.8 32.9	356 55.6 13°22.9	8.2	17 21.9 17°07.3	-14.5' -14.7'	60.2' 60.2'	
	SD = 15.9'	d = -1.0'			D = 16.2'			
	JD = 15.9′	u = -1.∪			υ — 10.2′			
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	181°17.3	N02°31.9	27°50.0	8.2'	\$16°52.7	-14.8'	60.3'	
1 2	196°17.5 211°17.7	30.9 30.0	42°17.2 56°44.5	8.3' 8.3'	16° 37.9 16° 23.0	-14.9' -15.0'	60.3' 60.3'	
3	226°18.0	29.0	71°11.8	8.4	16°08.0	-15.1	60.4	
4	241°18.2	28.0	85°39.2	8.4'	$15^{\circ}52.9$	-15.2'	60.4'	
5	256°18.4	27.1	100°06.6	8.5'	15°37.7	-15.3'	60.4	
6 7	271°18.6 286°18.9	N02°26.1 25.1	114°34.1 129°01.6	8.5' 8.6'	\$15°22.4 15°06.9	-15.4' -15.5'	60.4' 60.5'	
8	301°19.1	24.2	143°29.2	8.6'	14°51.4	-15.6'	60.5	
9	316°19.3	• • 23.2	157°56.8	8.7'	$14^{\circ}35.7$	-15.7'	60.5'	
10	331°19.5	22.2	172°24.4	8.7'	14°20.0	-15.8'	60.6'	
11 12	346°19.8 1°20.0	21.3 N02°20.3	186°52.2 201°19.9	8.8' 8.8'	14°04.1 <b>5</b> 13°48.2	-15.9' -16.0'	60.6' 60.6'	
13	16°20.2	19.4	215°47.7	8.9'	13°32.2	-16.1	60.6	
14	31°20.4	18.4	$230^{\circ}15.6$	8.9'	$13^{\circ}16.0$	-16.2'	60.7'	
15	46°20.7 61°20.9	· · 17.4 16.5	244°43.5 259°11.5	9.0' 9.0'	12°59.8 12°43.5	-16.3'	60.7'	
16 17	76°21.1	16.5 15.5	259°11.5 273°39.5	9.0'	12°43.5 12°27.1	-16.4' -16.5'	60.7' 60.7'	
18	91°21.3	N02° 14.5	288°07.5	9.1'	S12°10.6	-16.6'	60.8	
19	106°21.6	13.6	302°35.6	9.1'	11°54.0	-16.7'	60.8'	
20	121°21.8 136°22.0	12.6	317°03.7 331°31.9		11°37.4 11°20.6		60.8' 60.8'	
21 22	150°22.2	· · 11.6 10.7	346°00.1	9.2' 9.2'	11 20.6 11°03.8	-16.8' -16.9'	60.8	
23	166°22.5	09.7	0°28.3	9.3'	10°46.9	-17.0'	60.9'	
	SD = 15.9'	d = -1.0'		S	D = 16.4'			
Tue	GHA	Dec	GHA	ν	Dec	d	HP	
0 1	181°22.7 196°22.9	N02°08.7 07.8	14°56.6 29°24.9	9.3' 9.4'	\$10°29.9 10°12.9	-17.0' -17.1'	60.9' 60.9'	
2	211°23.1	06.8	43°53.3	9.4	09°55.8	-17.1	60.9	
3	226°23.3	• • 05.8	58°21.7	9.4'	09°38.6	-17.3'	61.0'	
4	241°23.6 256°23.8	04.9 03.9	72°50.1 87°18.6	9.5' 9.5'	09°21.3 09°04.0	-17.3' -17.4'	61.0' 61.0'	
5 6	250°23.8 271°24.0	03.9 N02°02.9	87°18.6 101°47.1	9.5'	508°46.6	-17.4'	61.0'	
7	286°24.2	02.0	$116^{\circ}15.6$	9.6'	$08^{\circ}29.2$	-17.5'	61.0'	
8	301°24.5	01.0	130°44.2	9.6'	08°11.7	-17.6'	61.0'	
9 10	316°24.7 331°24.9	02°00.0 01°59.1	145°12.8 159°41.4	9.6' 9.7'	07°54.2 07°36.5	-17.6' -17.7'	61.1' 61.1'	
11	331 24.9 346°25.1	58.1	159 41.4 174°10.1	9.7 9.7'	07 36.5 07°18.9	-17.7'	61.1	
12	1°25.4	N01°57.1	188°38.7	9.7'	<b>S</b> 07°01.2	-17.8'	61.1'	
13	16°25.6	56.2	203°07.5	9.7'	06°43.4	-17.8'	61.1'	
14 15	31°25.8 46°26.0	55.2 •• 54.2	217°36.2 232°04.9	9.8' 9.8'	06° 25.6 06° 07.7	-17.9' -17.9'	61.1' 61.1'	
16	40°26.3	53.3	232 04.9 246°33.7	9.8'	05°49.8	-17.9'	61.2	
17	76°26.5	52.3	$261^{\circ}02.5$	9.8'	$05^{\circ}31.9$	-18.0'	61.2'	
18	91°26.7	N01°51.3	275°31.3	9.8'	S05°13.9	-18.0'	61.2'	
19 20	106°26.9 121°27.2	50.4 49.4	290°00.2 304°29.0	9.9' 9.9'	04°55.9 04°37.8	-18.1' -18.1'	61.2' 61.2'	
21	136°27.4	• • 48.4	318°57.9	9.9' 9.9'	04° 37.8	-16.1 -18.1'	61.2	
22	151°27.6	47.5	333°26.8	9.9'	$04^{\circ}01.6$	-18.1'	61.2'	
23	166°27.8	46.5	347°55.7	9.9'	03°43.5	-18.2'	61.2'	
	SD = 15.9'	d = -1.0'		S	D = 16.6'			

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	02:19	04:02	05:14	18:33	19:43	21:24
<b>N</b> 70°	02:48	04:14	05:18	18:29	19:32	20:57
68°	03:09	04:24	05:22	18:26	19:23	20:37
66°	03:25	04:32	05:25	18:23	19:15	20:21
64°	03:38	04:39	05:27	18:21	19:09	20:09
62°	03:48	04:44	05:29	18:19	19:03	19:59
60°	03:57	04:49	05:31	18:17	18:59	19:50
N 58°	04:05	04:53	05:33	18:15	18:55	19:43
56°	04:11	04:57	05:34	18:14	18:51	19:36
54°	04:17	05:00	05:36	18:13	18:48	19:31
52°	04:22	05:03	05:37	18:11	18:45	19:26
50°	04:27	05:05	05:38	18:10	18:43	19:21
45°	04:36	05:11	05:40	18:08	18:38	19:12
<b>N</b> 40°	04:43	05:15	05:42	18:06	18:34	19:05
35°	04:49	05:19	05:44	18:05	18:30	19:00
30°	04:53	05:21	05:45	18:04	18:28	18:55
20°	05:00	05:26	05:48	18:01	18:23	18:49
N 10° 0°	05:04	05:29	05:50	18:00	18:21	18:45
-	05:07	05:31	05:51	17:58	18:19	18:43
<b>S</b> 10°	05:08	05:32	05:53	17:56	18:17	18:42
20°	05:07	05:33	05:55	17:55	18:17	18:42
30° 35°	05:05 05:03	05:33 05:32	05:57 05:58	17:53 17:52	18:17 18:18	18:45 18:47
35 40°	05:03	05:32	05:58	17:52	18:18	18:50
45°	03.00	05:32	06:00	17:50	18:20	18:54
<b>S</b> 50°						
50°	04:51 04:49	05:29 05:28	06:01 06:02	17:49 17:48	18:21 18:22	18:59 19:02
54°	04:49	05:26	06:02	17:46	18:23	19:02
56°	04:43	05:26	06:03	17:47	18:24	19:04
58°	04:43	05:25	06:04	17:46	18:26	19:12
<b>S</b> 60°	04:35	05:24	06:05	17:46	18:27	19:16

Lat.		Moonri	se		Moonse	t
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°	21:19	19:33	18:44	23:17		02:58
<b>N</b> 70°	20:12	19:13	18:37		00:22	03:14
68°		18:58	18:32		00:57	03:27
66°		18:45	18:27		01:22	03:38
64°		18:34	18:23		01:41	03:47
62°		18:25	18:19		01:57	03:54
60°		18:17	18:16	00:15	02:10	04:01
N 58°		18:10	18:13	00:33	02:21	04:07
56°		18:03	18:10	00:48	02:30	04:12
54°		17:58	18:08	01:01	02:39	04:16
52°		17:53	18:06	01:13	02:46	04:20
50°		17:48	18:04	01:23	02:53	04:24
45°	17:13	17:38	18:00	01:44	03:07	04:31
N 40°		17:30	17:56	02:01	03:19	04:38
35°		17:22	17:53	02:15	03:29	04:43
30°		17:16	17:51	02:27	03:38	04:48
20°		17:05	17:46	02:48	03:53	04:57
N 10°		16:55	17:42	03:05	04:05	05:04
0°		16:46	17:38	03:22	04:17	05:10
<b>S</b> 10°		16:36	17:34	03:39	04:29	05:17
20°		16:26	17:30	03:56	04:42	05:24
30°		16:15	17:25	04:16	04:56	05:32
35°		16:08	17:22	04:28	05:04	05:36
40°	1	16:00	17:19	04:41	05:13	05:41
45°		15:52	17:15	04:56	05:24	05:47
<b>S</b> 50°		15:41	17:11	05:15	05:37	05:54
52°		15:36	17:09	05:24	05:43	05:57
54°		15:30	17:07	05:34	05:49	06:01
56°		15:24	17:04	05:45	05:57	06:05
58°		15:17	17:02	05:58	06:05	06:09
<b>S</b> 60°	13:16	15:09	16:59	06:13	06:14	06:13

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	12-14	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	86-98%	
15	04:48	04:58	11:55	22:04	09:37		
16	05:09	05:20	11:55	22:58	10:32		
17	05:31	05:41	11:54	23:50	11:24		

# September 18, 19, 20 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	357°24.4	155° 15.9	S08°53.3	258°58.3	N23°27.0	277°35.1	N22°23.9	10°05.9	S07°49.5			
1	12°26.8	170° 15.6	54.5	273°59.2	27.0	292°37.4	23.9	25°08.6	49.6	Alpheratz	357°34.7	29°13.7
2	27°29.3	185° 15.2	55.8	289°00.1	27.0	307°39.7	23.9	40°11.2	49.6	Ankaa	353°07.0	-42°10.2
3	42°31.8	200° 14.8	57.0	304°01.0	• • 27.0	322°42.0	• • 24.0	55°13.8	49.7	Schedar	349°30.8	56°40.4
4	57°34.2	215° 14.5	58.2	319°01.9	26.9	337°44.3	24.0	70°16.5	49.8	Diphda	348°47.2	-17°50.9
5	72°36.7	230° 14.1	08°59.4	334°02.8	26.9	352°46.6	24.0	85°19.1	49.9	Achernar	335°19.8	-57°06.5
6	87°39.1	245°13.7	S09°00.7	349°03.7	N23°26.9	7°48.8	N22°24.0	100°21.8	S07°49.9	Hamal	327°51.2	23°34.8
7	102°41.6	260°13.4	01.9	4°04.7	26.8	22°51.1	24.0	115°24.4	50.0	Polaris	313°52.4	89°21.9
8	117°44.1	275°13.0	03.1	19°05.6	26.8	37°53.4	24.0	130°27.0	50.1	Acamar	315°11.7	-40°12.0
9	132°46.5	$290^{\circ}12.6$	• • 04.3	34°06.5	• • 26.8	52°55.7	• • 24.0	145°29.7	• • 50.1	Menkar	314°06.2	4°11.3
10	147°49.0	$305^{\circ}12.3$	05.6	49°07.4	26.7	67°58.0	24.0	160°32.3	50.2	Mirfak Aldebaran	308° 28.4 290° 39.8	49°56.8 16°33.6
11	162°51.5	$320^{\circ}11.9$	06.8	64°08.3	26.7	83°00.2	24.0	175°34.9	50.3	Rigel	290 39.8 281°04.1	-8°10.2
12	177°53.9	$335^{\circ}11.5$	S09°08.0	79°09.3	N23°26.7	98°02.5	N22°24.1	190°37.6	S07°50.4	Capella	280°22.2	46°01.3
13	192°56.4	$350^{\circ}11.2$	09.2	$94^{\circ}10.2$	26.6	113°04.8	24.1	205°40.2	50.4	Bellatrix		6°22.5
14	207°58.9	5° 10.8	10.5	109°11.1	26.6	128°07.1	24.1	220°42.9	50.5	Elnath	278°02.2	28°37.7
15	223°01.3	20° 10.4	• • 11.7	124° 12.0	• • 26.6	143°09.4	• • 24.1	235°45.5	• • 50.6	Alnilam	275°38.0	-1°11.0
16	238°03.8	35° 10.1	12.9	139°12.9	26.5	158° 11.7	24.1	250°48.1	50.7	Betelgeuse	270°52.4	7°24.8
17	253°06.3	50°09.7	14.1	154°13.9	26.5	173°14.0	24.1	265°50.8	50.7	Canopus	263°52.6	-52°42.1
18	268°08.7	65°09.3	S09°15.4	169°14.8	N23°26.5	188° 16.2	N22°24.1	280°53.4 295°56.0	S07°50.8	Sirius	258°26.6	-16°44.7
19	283°11.2	80°09.0	16.6	184° 15.7	26.4	203°18.5	24.1		50.9	Adhara	255°06.2	-29°00.0
20 21	298°13.6 313°16.1	95°08.6 110°08.2	17.8 • • 19.0	199°16.6 214°17.5	26.4 •• 26.4	218° 20.8 233° 23.1	24.1 •• 24.1	310°58.7 326°01.3	50.9 •• 51.0	Procyon	244°51.3	5°09.8
21	313°16.1 328°18.6	110°08.2 125°07.9	20.3	214° 17.5 229° 18.5	26.3	233°23.1 248°25.4	24.1	326°01.3 341°04.0	51.1	Pollux	243°17.8	27°58.0
23	343°21.0	140°07.5	20.5	244° 19.4	26.3	246 25.4 263°27.7	24.2	356°06.6	51.1	Avior	234° 15.3	-59°35.0
			_							Suhail	222°46.9	-43°31.6
Mer.p	pass. 00:10	$\nu$ -0.4' d1.	.2′ m-3.88	$\nu$ 0.9′ d-0	.0′ m0.58	$\nu$ 2.3′ d0.	.0′ m-2.37	$\nu$ 2.6′ d0	.1' m $0.61$	Miaplacidus	221°39.1	-69°48.8
	-									Alphard	217°48.3	-8°45.7
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.0	11°50.9
0	358°23.5	155°07.1	S09°22.7	259°20.3	N23°26.3	278°30.0	N22°24.2	11°09.2	S07°51.2	Dubhe	193°41.9	61°37.1
1	13°26.0	170°06.8	23.9	274°21.2	26.2	293°32.2	24.2	26°11.9	51.3	Denebola	182°25.5	14°26.2
2	28°28.4	185°06.4	25.1	289°22.2	26.2	308° 34.5	24.2	41°14.5	51.4	Gienah	175°44.2	-17°40.6
3	43°30.9	200°06.0	26.4	304°23.1	26.2	323°36.8	• • 24.2	56°17.1	• • 51.4	Acrux		-63°14.1
4	58°33.4	215°05.6	27.6	319°24.0	26.1	338°39.1	24.2	$71^{\circ}19.8$	51.5	Gacrux	171°52.6	-57°15.1
5	73°35.8	230°05.3	28.8	334°24.9	26.1	353°41.4	24.2	86°22.4	51.6	Alioth Spica	166° 13.7 158° 22.9	55°49.7 -11°17.3
6	88°38.3	245°04.9	S09°30.0	349°25.9	N23°26.0	8°43.7	N22°24.2	101°25.0	S07°51.7	Alkaid	150 22.9 152°52.6	49°11.6
7	103°40.7	260°04.5	31.2	4°26.8	26.0	23°46.0	24.2	$116^{\circ}27.7$	51.7	Hadar	148° 37.0	-60°29.6
8	118°43.2	275°04.2	32.4	19°27.7	26.0	38°48.3	24.3	131°30.3	51.8	Menkent	140°58.3	-36°29.5
9	133°45.7	290°03.8	• • 33.7	34°28.6	• • 25.9	53°50.6	• • 24.3	146°33.0	•• 51.9	Arcturus	147° 38.4	19°03.4
10	148°48.1	305°03.4	34.9	49°29.6	25.9	68° 52.8	24.3	161°35.6	51.9	Rigil Kent.	139°41.2	-60°56.4
11	163°50.6	320°03.0	36.1	64°30.5	25.9	83°55.1	24.3	176°38.2	52.0	Kochab	137°20.5	74°03.4
12	178°53.1	335°02.7	S09°37.3	79°31.4	N23°25.8	98° 57.4	N22°24.3	191°40.9	S07°52.1	Zuben'ubi	136°56.5	-16°08.6
13	193°55.5	350°02.3	38.5	94°32.3	25.8	113°59.7	24.3	206°43.5	52.2	Alphecca	126°04.1	26°38.1
14	208°58.0	5°01.9	39.7	109°33.3	25.7	129°02.0	24.3	221°46.1	52.2	Antares	112°16.3	-26°29.2
15	224°00.5	20°01.5	• • 41.0	124°34.2	• • 25.7	144°04.3	• • 24.3	236°48.8	• • 52.3	Atria	107°10.9	-69°04.5
16	239°02.9	35°01.2	42.2	139°35.1	25.7	159°06.6	24.3	251°51.4	52.4	Sabik	$102^{\circ}03.1$	-15°45.3
17	254°05.4	50°00.8	43.4 \$09°44.6	154°36.0	25.6 N23°25.6	174°08.9	24.3	266°54.0	52.5	Shaula	$96^{\circ}10.7$	-37°07.4
18	269°07.9 284°10.3	65°00.4 80°00.0		169° 37.0 184° 37.9		189°11.2 204°13.5	N22°24.4	281°56.7 296°59.3	S07°52.5	Rasalhague	95°58.8	12°32.7
19	204 10.3 299°12.8	94°59.7	45.8 47.0	199°38.8	25.6 25.5	204 15.5 219°15.8	24.4	312°02.0	52.6 52.7	Eltanin	90°42.3	51°29.4
20 21	314°15.2	94 59.7 109°59.3	• • 48.3	214°39.8	25.5	219 15.6 234°18.1	24.4 •• 24.4	312 02.0 327°04.6	• • 52.7	Kaus Aust.	83°32.8	-34°22.5
22	329°17.7	109 59.5 124°58.9	49.5	214 39.0 229°40.7	25.4	249° 20.4	24.4	342°07.2	52.8	Vega	80°33.3	38°48.6
23	344°20.2	139°58.5	50.7	244°41.6	25.4	264°22.7	24.4	357°09.9	52.9	Nunki	75°48.0	-26°16.0
										Altair	62°00.1	8°56.1
Mer.p	pass. 00:06	$\nu$ -0.4′ $d1$ .	.2′ m-3.88	$\nu$ 0.9′ d-0	.0′ m0.57	$\nu 2.3' \ d0.$	.0′ m-2.38	$\nu$ 2.6′ d0	.1' m $0.61$	Peacock	53°05.7	-56°39.5
										Deneb	49°25.7	45°22.3
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.8	9°59.4
0	359°22.6	154° 58.2	S09°51.9	259°42.6	N23°25.4	279°25.0	N22°24.4	12°12.5	S07°53.0	Al Na'ir Fomalhaut	27°32.8 15°14.4	-46°50.5 -29°29.4
1	14°25.1	169°57.8	53.1	274°43.5	25.3	294°27.3	24.4	27°15.1	53.0	Scheat	13°45.1	-29 29.4 28°13.1
2	29°27.6	184°57.4	54.3	289°44.4	25.3	309°29.5	24.4	42°17.8	53.1	Markab	13°29.8	15°20.4
3	44°30.0	199°57.0	• • 55.5	304°45.4	• • 25.2	$324^{\circ}31.8$	• • 24.4	57°20.4	• • 53.2			
4	59°32.5	$214^{\circ}56.6$	56.7	$319^{\circ}46.3$	25.2	339°34.1	24.5	72°23.0	53.2	Sep 18 Wed	SHA	Mer.pass
5	74°35.0	229° 56.3	57.9	334°47.2	25.1	354° 36.4	24.5	87°25.7	53.3		157°51.6	13:39
6	89°37.4	244°55.9	S09°59.2	349°48.2	N23°25.1	9°38.7	N22°24.5	102°28.3	S07°53.4	Mars	261°33.9	06:44
7	104°39.9	259° 55.5	10°00.4	4°49.1	25.1	24°41.0	24.5	117°30.9	53.5	Jupiter	280°10.8	05:29
8	119°42.4	274°55.1	01.6	19°50.0	25.0	39°43.3	24.5	132°33.6	53.5	Saturn	12°41.6	23:16
9	134°44.8	289°54.8	• • 02.8	34°51.0	• • 25.0	54° 45.6	• • 24.5	147°36.2	• • 53.6	Sep 19 Thu	SHA	Mer.pass
10	149°47.3	304°54.4	04.0	49°51.9	24.9	69°47.9	24.5	162°38.8	53.7		156°43.6	13:40
11	164°49.7	319°54.0	05.2	64°52.8	24.9 N22°24.0	84°50.2	24.5	177°41.5	53.7 507°52.9	Mars	260°56.8	06:42
12 13	179°52.2 194°54.7	334°53.6 349°53.2	\$10°06.4 07.6	79°53.8 94°54.7	N23°24.9 24.8	99°52.5 114°54.8	N22°24.5 24.5	192°44.1 207°46.8	S07°53.8 53.9	Jupiter	$280^{\circ}06.5$	05:25
13	194 54.7 209°57.1	4°52.8	07.6	94 54.7 109°55.6	24.8 24.8	114 54.8 129°57.1	24.5 24.5	207 46.8 222°49.4	53.9 54.0	Saturn	12°45.7	23:11
15	209 57.1 224°59.6	19°52.5	• • 10.0	109 55.0 124°56.6	24.7	144° 59.4	24.6	237°52.0	• • 54.0	Sep 20 Fri	SHA	Mor noss
16	240°02.1	34°52.1	11.2	139°57.5	24.7	160°01.7	24.6	252°54.7	54.1		3HA 155°35.5	Mer.pass 13:40
17	255°04.5	49°51.7	12.4	154°58.5	24.6	175°04.0	24.6	267°57.3	54.2	Mars	260° 19.9	06:41
18	270°07.0	64°51.3	S10°13.6	169°59.4	N23°24.6	190°06.3	N22°24.6	282°59.9	S07°54.2	Jupiter	280°02.3	05:22
19	285°09.5	79° 50.9	14.9	185°00.3	24.5	205°08.6	24.6	298°02.6	54.3	Saturn	12°49.9	23:07
20	300°11.9	94°50.6	16.1	200°01.3	24.5	220° 10.9	24.6	313°05.2	54.4			25.01
21	315°14.4	109°50.2	• • 17.3	215°02.2	• • 24.5	235°13.2	• • 24.6	328°07.8	• • 54.5	Horizont	al parallax	
22	$330^{\circ}16.8$	124°49.8	18.5	$230^{\circ}03.1$	24.4	$250^{\circ}15.5$	24.6	343°10.5	54.5		Venus:	0.1
23	345°19.3	139°49.4	19.7	$245^{\circ}04.1$	24.4	265° 17.8	24.6	358°13.1	54.6	L	Mars:	0.1
Mern	pass. 23:59	$\nu$ -0 4' d1	.2′ m-3.88	ν0 9' d-0	.0′ m0.56	ν2 3' d0	.0′ m-2.39	ν2 6' dΩ	.1′ m0.61			
.vici.p		<i>□</i> 0.∓ U1.	5.00	- J.J u-0	.5 1110.50	- Z.5 UO.	2.33	-2.0 00				

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	181°28.1	N01°45.5	2°24.6	9.9'	\$03°25.3	-18.2'	61.2'
1 2	196°28.3 211°28.5	44.6 43.6	16°53.6 31°22.5	9.9' 10.0'	03°07.1 02°48.9	-18.2' -18.2'	61.2' 61.3'
3	226° 28.7	. 42.6	45°51.5	10.0'	02°40.9	-18.3'	61.3
4	241°29.0	41.7	60°20.4	10.0'	02°12.4	-18.3'	61.3'
5	256° 29.2	40.7	74°49.4	10.0'	01°54.1	-18.3'	61.3'
6 7	271°29.4 286°29.6	N01°39.7 38.8	89°18.4 103°47.4	10.0' 10.0'	S01°35.9 01°17.6	-18.3' -18.3'	61.3' 61.3'
8	301°29.9	36.6 37.8	103 47.4 118°16.3	10.0'	01 17.0 00°59.3	-10.3 -18.3'	61.3
9	316°30.1	• • 36.8	132°45.3	10.0'	00°40.9	-18.3'	61.3'
10	331°30.3	35.9	147°14.3	10.0'	00°22.6	-18.3'	61.3'
11 12	346°30.5 1°30.7	34.9 N01°33.9	161°43.3 176°12.3	10.0' 10.0'	S00°04.3 N00°14.0	-18.3' 18.3'	61.3' 61.3'
13	16°31.0	32.9	190°41.3	10.0'	00°32.3	18.3	61.3
14	31°31.2	32.0	$205^{\circ}10.3$	10.0'	00°50.7	18.3'	61.3'
15	46°31.4	• • 31.0	219°39.3	10.0'	01°09.0	18.3'	61.3'
16 17	61°31.6 76°31.9	30.0 29.1	234°08.3 248°37.2	10.0' 10.0'	01°27.3 01°45.6	18.3' 18.3'	61.3' 61.3'
18	91°32.1	N01°28.1	263°06.2	10.0'	N02°03.9	18.3	61.3'
19	106°32.3	27.1	$277^{\circ}35.1$	9.9'	$02^{\circ}22.1$	18.3'	61.3'
20	121°32.5 136°32.8	26.2 •• 25.2	292°04.1 306°33.0	9.9'	02°40.4 02°58.6	18.2'	61.3'
21 22	150 32.8 151°33.0	· · 25.2 24.2	300 33.0 321°01.9	9.9' 9.9'	02 58.6 03°16.8	18.2' 18.2'	61.3' 61.3'
23	166° 33.2	23.3	335°30.8	9.9'	03°35.0	18.2	61.3'
	SD = 15.9'	d = -1.0'		SI	D = 16.7'		
Thu 0	<b>GHA</b> 181°33.4	Dec N01°22.3	<b>GHA</b> 349°59.7	u 9.9'	Dec N03° 53.2	<i>d</i> 18.1'	HP 61.3'
1	181 33.4 196°33.7	21.3	4°28.6	9.9 9.9'	04° 11.4	18.1	61.3
2	211°33.9	20.4	18°57.5	9.8'	04°29.5	18.1'	61.2'
3	226°34.1	• • 19.4	33°26.3	9.8'	04°47.6	18.1'	61.2'
4 5	241°34.3 256°34.6	18.4 17.4	47°55.1 62°23.9	9.8' 9.8'	05°05.6 05°23.6	18.0' 18.0'	61.2' 61.2'
6	271°34.8	N01°16.5	76°52.7	9.8'	N05°41.6	17.9	61.2
7	286°35.0	15.5	91°21.4	9.7'	05°59.6	17.9'	61.2'
8	301°35.2	14.5	105°50.2	9.7'	06°17.5	17.9	61.2'
9 10	316° 35.5 331° 35.7	· · 13.6 12.6	120°18.9 134°47.5	9.7' 9.6'	06°35.3 06°53.1	17.8' 17.8'	61.2' 61.2'
11	346° 35.9	11.6	149°16.2	9.6'	00° 33.1	17.7	61.2
12	1°36.1	N01°10.7	163°44.8	9.6'	N07°28.6	17.7'	61.1'
13	16°36.3	09.7	178°13.4 192°41.9	9.6'	07°46.3	17.6'	61.1'
14 15	31°36.6 46°36.8	08.7 •• 07.7	192°41.9 207°10.5	9.5' 9.5'	08°03.9 08°21.5	17.6' 17.5'	61.1' 61.1'
16	61°37.0	06.8	221°39.0	9.5'	08°39.0	17.4	61.1
17	76° 37.2	05.8	236°07.4	9.4'	08°56.4	17.4'	61.1'
18	91°37.5 106°37.7	N01°04.8 03.9	250°35.8 265°04.2	9.4' 9.3'	N09°13.8 09°31.1	17.3' 17.3'	61.1' 61.0'
19 20	100 37.7 121°37.9	03.9	205 04.2 279°32.6	9.3'	09° 31.1		61.0'
21	136° 38.1	• • 01.9	294°00.9	9.3'	10°05.5	17.1	61.0'
22	151°38.4	01.0	308°29.2	9.2'	10°22.7	17.0'	61.0'
23	166°38.6	00.0	322°57.4	9.2'	10°39.7	17.0'	61.0'
	SD = 15.9'	d = -1.0'		SI	D = 16.7'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°38.8	N00°59.0	337°25.6	9.1'	N10°56.7	16.9'	61.0'
1 2	196°39.0 211°39.2	58.0 57.1	351°53.7 6°21.8	9.1' 9.1'	11°13.6 11°30.4	16.8' 16.7'	60.9' 60.9'
3	211 39.2 226°39.5	56.1	20°49.9	9.0'	11°47.1	16.7	60.9
4	241°39.7	55.1	35°17.9	9.0'	12°03.8	16.6'	60.9'
5	256°39.9	54.2	49°45.9	8.9'	12°20.4	16.5'	60.9'
6 7	271°40.1 286°40.4	N00°53.2 52.2	64°13.8 78°41.7	8.9' 8.8'	N12°36.9 12°53.3	16.4' 16.3'	60.8' 60.8'
8	301°40.6	51.3	93°09.5	8.8'	13°09.6	16.2	60.8
9	316°40.8	• • 50.3	107°37.3	8.7'	13°25.8	16.1'	60.8'
10	331°41.0 346°41.3	49.3 48.3	122°05.0 136°32.7	8.7' 8.6'	13°41.9 13°58.0	16.0' 15.9'	60.7' 60.7'
11 12	346 41.3 1°41.5	48.3 N00°47.4	136° 32.7 151° 00.3	8.6'	N14° 13.9	15.9	60.7'
13	16°41.7	46.4	165°27.9	8.5'	14°29.8	15.7'	60.7'
14	31°41.9	45.4	179°55.4	8.5'	14° 45.5	15.6'	60.6'
15 16	46° 42.1 61° 42.4	· · 44.5 43.5	194°22.9 208°50.3	8.4' 8.4'	15°01.1 15°16.7	15.5' 15.4'	60.6' 60.6'
17	76° 42.6	43.5 42.5	223°17.7	8.4 8.3'	15 16.7 15°32.1	15.4	60.6
18	91°42.8	N00°41.5	237°45.0	8.3'	N15°47.4	15.2'	60.5'
19	106°43.0	40.6	252°12.3	8.2'	16°02.7	15.1'	60.5'
20 21	121°43.3 136°43.5	39.6 •• 38.6	266°39.5 281°06.6	8.1' 8.1'	16° 17.8 16° 32.8	15.0' 14.9'	60.5' 60.5'
22	150° 43.5° 151° 43.7	37.7	295°33.7	8.0'	16° 47.6	14.8	60.4
23	166°43.9	36.7	310°00.7	8.0'	17°02.4	14.6'	60.4'
	SD = 15.9'	d = -1.0'		SI	O = 16.6'	-	

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
- 43	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	15-17	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	100-95%	
18	05:52	06:03	11:54	-:-	12:16		
19	06:14	06:24	11:54	00:41	13:07		
20	06:35	06:46	11:53	01:34	14:00		

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

h	Aries	Vei	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0 0	0°21.8	154° 49.0	\$10°20.9	260°05.0	N23° 24.3	280°20.2	N22° 24.6	13°15.7	S07°54.7		ЗПА	
1	15°24.2	169° 48.6		275°06.0		295°22.5		28°18.4		Alpheratz	357°34.7	29°13.7
		184° 48.2	22.1		24.3		24.6		54.7	Ankaa	353°07.0	-42°10.2
2	30°26.7		23.3	290°06.9	24.2	310°24.8	24.7	43°21.0	54.8	Schedar	349°30.8	56°40.4
3	45°29.2	199° 47.9	• • 24.5	305°07.9	· · 24.2	325°27.1	• • 24.7	58°23.6	• • 54.9	Diphda	348°47.2	$-17^{\circ}50.9$
4	60°31.6	214°47.5	25.7	320°08.8	24.1	340°29.4	24.7	73°26.3	54.9	Achernar	335°19.8	-57°06.5
5	75°34.1	229°47.1	26.9	335°09.7	24.1	355° 31.7	24.7	88°28.9	55.0	Hamal	327°51.2	23°34.8
6	90°36.6	244°46.7	S10°28.1	350° 10.7	N23°24.0	10°34.0	N22°24.7	103°31.5	S07°55.1	Polaris	313°51.0	89°21.9
7	105°39.0	259°46.3	29.3	5°11.6	24.0	25°36.3	24.7	118°34.2	55.2	Acamar	315°11.7	-40°12.1
8	120°41.5	274°45.9	30.5	20°12.6	24.0	40°38.6	24.7	133°36.8	55.2	Menkar	314°06.2	4°11.3
9	135°44.0	289°45.5	• • 31.7	35° 13.5	• • 23.9	55°40.9	• • 24.7	148°39.4	• • 55.3		308°28.3	49°56.8
10	150°46.4	304°45.2	32.9	50° 14.5	23.9	70°43.2	24.7	163°42.1	55.4	Mirfak		
11	165°48.9	319°44.8	34.1	65° 15.4	23.8	85°45.5	24.7	178°44.7	55.4	Aldebaran	290°39.8	16°33.6
12	180°51.3	334°44.4	<b>S</b> 10°35.3	80°16.3	N23°23.8	100°47.8	N22°24.7	193°47.3	S07°55.5	Rigel	281°04.1	-8°10.2
13	195°53.8	349°44.0	36.5	95°17.3	23.7	115°50.1	24.8	208°50.0	55.6	Capella	280°22.2	46°01.2
14	210°56.3	4°43.6	37.7	110° 18.2	23.7	130°52.4	24.8	223°52.6	55.7	Bellatrix	278°23.1	6°22.5
15	225°58.7	19°43.2	• • 38.9	125° 19.2	23.6	145° 54.8	• • 24.8	238°55.3	55.7	Elnath	278°02.1	28°37.7
16	241°01.2	34° 42.8	40.1	140°20.1	23.6	160°57.1	24.8	253°57.9	55.8	Alnilam	275°38.0	$-1^{\circ}11.0$
		49° 42.4		155°21.1				269°00.5		Betelgeuse	270°52.4	$7^{\circ}24.8$
17	256°03.7		41.3		23.5	175°59.4	24.8		55.9	Canopus	263°52.6	-52°42.1
18	271°06.1	64°42.0	\$10°42.5	170°22.0	N23°23.5	191°01.7	N22°24.8	284°03.2	S07°55.9	Sirius	258°26.5	$-16^{\circ}44.7$
19	286°08.6	79°41.7	43.7	185°23.0	23.4	206°04.0	24.8	299°05.8	56.0	Adhara	255°06.2	-29°00.0
20	301°11.1	94°41.3	44.9	200°23.9	23.4	221°06.3	24.8	314°08.4	56.1	Procyon	244°51.2	5°09.8
21	316°13.5	109°40.9	• • 46.1	215°24.9	• • 23.3	236°08.6	• • 24.8	329°11.1	• • 56.1	Pollux	243°17.8	27°58.0
22	331°16.0	124°40.5	47.3	230°25.8	23.3	251°10.9	24.8	344°13.7	56.2	Avior	234°15.2	-59°35.0
23	$346^{\circ}18.5$	$139^{\circ}40.1$	48.4	245°26.8	23.2	$266^{\circ}13.2$	24.8	359°16.3	56.3	Suhail	234 15.2 222°46.8	-39 35.0 -43°31.6
N 4 = · · ·	22.55	1, 0 4/ -11	2/ 2 2 00	10 0/ -1 C	0.0′ m0.55	2/ -10	0/ = 2.30	1/2 6/ -/2	1/ 20 60			
ivier.p	ass. 23:55	$\nu$ -0.4′ $d1$ .	.2′ m-3.88	$\nu$ 0.9' $d$ -0	J.U MU.55	$\nu$ 2.3' $d0$ .	.0′ m-2.39	$\nu$ 2.6′ $d0$	.1′ m0.62	Miaplacidus	221°39.1	-69°48.8
										Alphard	217°48.3	-8°45.7
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°35.0	11°50.9
0	1°20.9	154°39.7	S10°49.6	260°27.7	N23°23.2	281° 15.5	N22°24.8	14°19.0	S07°56.4	Dubhe	193°41.9	61°37.1
	16°23.4	169°39.3		275°28.7		296° 17.9		29°21.6		Denebola	182°25.5	14°26.2
1			50.8		23.1		24.9		56.4	Gienah	175°44.2	-17°40.6
2	31°25.8	184°38.9	52.0	290°29.6	23.1	311°20.2	24.9	44°24.2	56.5	Acrux	173°01.2	-63°14.1
3	46°28.3	199°38.5	• • 53.2	305°30.6	• • 23.0	326°22.5	• • 24.9	59°26.9	• • 56.6	Gacrux	171°52.6	-57°15.0
4	61°30.8	214°38.1	54.4	320°31.5	23.0	341°24.8	24.9	74°29.5	56.6	Alioth	166°13.7	55°49.7
5	76°33.2	229°37.7	55.6	335°32.5	22.9	$356^{\circ}27.1$	24.9	89°32.1	56.7	Spica	158°22.9	-11°17.3
6	91°35.7	244°37.3	S10°56.8	350°33.4	N23°22.9	11°29.4	N22°24.9	104°34.8	S07°56.8	Alkaid	152°52.6	49°11.6
7	$106^{\circ}38.2$	259°36.9	58.0	5°34.4	22.8	26°31.7	24.9	119°37.4	56.8	Hadar	148°37.0	-60°29.6
8	121°40.6	274°36.5	10°59.2	20°35.3	22.8	41°34.1	24.9	134°40.0	56.9		140°57.0	-36°29.5
9	136°43.1	289°36.1	11°00.4	35°36.3	• • 22.7	56°36.4	• • 24.9	149°42.7	• • 57.0			
10	151°45.6	304°35.8	01.6	50°37.2	22.7	71°38.7	24.9	164°45.3	57.1	Arcturus	145°48.4	19°03.4
11	166°48.0	319°35.4	02.7	65°38.2	22.6	86°41.0	24.9	179°47.9	57.1	Rigil Kent.	139°41.2	-60°56.3
12	181°50.5	334°35.0	S11°03.9	80°39.1	N23°22.6	101°43.3	N22°24.9	194°50.6	S07°57.2	Kochab	137°20.5	74°03.4
13	196°52.9	349°34.6	05.1	95°40.1	22.5	116° 45.6	25.0	209°53.2	57.3	Zuben'ubi	136°56.6	-16°08.6
	211°55.4	4°34.2		110°41.0	22.5	131° 47.9		209 55.2 224°55.8		Alphecca	126°04.2	26°38.1
14			06.3				25.0		57.3	Antares	$112^{\circ}16.3$	-26°29.2
15	226°57.9	19°33.8	• • 07.5	125° 42.0	• • 22.4	146°50.3	• • 25.0	239°58.5	• • 57.4	Atria	$107^{\circ}10.9$	-69°04.5
16	242°00.3	34°33.4	08.7	140°42.9	22.4	161°52.6	25.0	255°01.1	57.5	Sabik	102°03.1	-15°45.3
17	257°02.8	49°33.0	09.9	155°43.9	22.3	176° 54.9	25.0	270°03.7	57.5	Shaula	96°10.8	-37°07.4
18	272°05.3	64°32.6	<b>S</b> 11°11.1	170°44.9	N23°22.3	191°57.2	N22°25.0	285°06.3	S07°57.6	Rasalhague	95°58.8	12°32.7
19	287°07.7	79°32.2	12.2	185°45.8	22.2	206° 59.5	25.0	300°09.0	57.7	Eltanin	90°42.3	51°29.4
20	302°10.2	94°31.8	13.4	200°46.8	22.1	222°01.9	25.0	315°11.6	57.8	Kaus Aust.	83°32.8	-34°22.5
21	$317^{\circ}12.7$	109°31.4	• • 14.6	215°47.7	• • 22.1	237°04.2	• • 25.0	330°14.2	• • 57.8	Vega	80°33.3	38°48.6
22	332°15.1	124°31.0	15.8	230°48.7	22.0	252°06.5	25.0	345°16.9	57.9	_	75°48.0	
23	347°17.6	139°30.6	17.0	245°49.6	22.0	267°08.8	25.0	0°19.5	58.0	Nunki		-26°16.0
										Altair	62°00.1	8°56.1
Mer.p	ass. 23:51	$\nu$ -0.4′ $d1$ .	.2′ m-3.89	u0.9' d-0	$0.1' \; { m m0.54}$	$\nu$ 2.3′ d0.	.0′ m-2.40	$\nu$ 2.6′ d0	.1' m $0.62$	Peacock	53°05.8	-56°39.5
										Deneb	49°25.7	45°22.3
NA	CHA	CHA	Das	CHA	Daa	CD 4	Daa	CHA	Das	Enif	33°38.8	9°59.4
Mon	GHA 2°20 1	GHA	Dec	GHA	Dec	GHA	Dec	GHA	<b>Dec</b> <b>S</b> 07°58.0	Al Na'ir	27°32.8	-46°50.5
0	2°20.1	154°30.2	\$11°18.2	260°50.6	N23°21.9	282°11.1				Fomalhaut	15°14.4	-29°29.4
1	17°22.5	169°29.8	19.4	275°51.6	21.9	297° 13.5	25.1	30°24.8	58.1	Scheat	13°45.1	28°13.1
2	32°25.0	184°29.4	20.5	290°52.5	21.8	312° 15.8	25.1	45°27.4	58.2	Markab	13°29.8	15°20.4
3	47°27.4	199°29.0	• • 21.7	305°53.5	· · 21.8	327° 18.1	• • 25.1	60°30.0	• • 58.2	6 01 1	C	
4	62°29.9	214°28.6	22.9	320°54.4	21.7	342°20.4	25.1	75°32.7	58.3	Sep 21 Sat	SHA	Mer.pass
5	77°32.4	229°28.2	24.1	335°55.4	21.7	357° 22.7	25.1	90°35.3	58.4		154°27.2	13:41
6	92°34.8	244°27.8	<b>S</b> 11°25.3	350°56.4	N23°21.6	12°25.1	N22°25.1	105°37.9	S07°58.4	Mars		06:39
7	$107^{\circ}37.3$	259°27.4	26.4	5°57.3	21.5	27°27.4	25.1	120°40.6	58.5		279°58.4	05:18
8	122°39.8	274°27.0	27.6	20°58.3	21.5	42°29.7	25.1	135°43.2	58.6	Saturn	12°54.0	23:03
9	137°42.2	289°26.6	• • 28.8	35°59.2	• • 21.4	57°32.0	• • 25.1	150°45.8	• • 58.7	6 25 5	C	
10	152°44.7	304°26.1	30.0	51°00.2	21.4	72°34.4	25.1	165°48.5	58.7	Sep 22 Sun	SHA	Mer.pass
11	167°47.2	319°25.7	31.2	66°01.2	21.3	87°36.7	25.1	180°51.1	58.8		153°18.8	13:42
12	182°49.6	334°25.3	\$11°32.3	81°02.1		102°39.0	N22°25.1	195°53.7	S07°58.9	1	259°06.8	06:38
13	197°52.1	349°24.9	33.5	96°03.1	21.2	102 39.0 117°41.3	25.1	210°56.4	58.9	Jupiter		05:14
	197 52.1 212°54.6	349 24.9 4°24.5			21.2	117 41.3 132°43.7	25.1 25.2	210 56.4 225°59.0	58.9 59.0	Saturn	12°58.0	22:59
14			34.7	111°04.1							<u> </u>	
15	227°57.0	19°24.1	• • 35.9	126°05.0	• • 21.1	147°46.0	• • 25.2	241°01.6	• • 59.1	Sep 23 Mon	SHA	Mer.pass
16	242°59.5	34°23.7	37.1	141°06.0	21.0	162°48.3	25.2	256°04.3	59.1		152°10.1	13:42
17	258°01.9	49°23.3	38.2	156°07.0	21.0	177°50.6	25.2	271°06.9	59.2	1	258°30.5	06:36
18	273°04.4	64°22.9	<b>S</b> 11°39.4	171°07.9	N23°20.9	192°53.0	N22°25.2		S07°59.3	Jupiter	$279^{\circ}51.1$	05:10
19	288°06.9	79°22.5	40.6	186°08.9	20.9	207°55.3	25.2	$301^{\circ}12.1$	59.3	Saturn	13°02.1	22:55
20	303°09.3	94°22.1	41.8	201°09.8	20.8	222°57.6	25.2	316°14.8	59.4			
21	$318^{\circ}11.8$	109°21.7	• • 42.9	216° 10.8	• • 20.7	237°59.9	• • 25.2	331°17.4	• • 59.5	Horizont	al parallax	
22	333°14.3	124°21.3	44.1	231°11.8	20.7	253°02.3	25.2	346°20.0	59.6		Venus:	0.1
23	348°16.7	139°20.9	45.3	246°12.8	20.6	268°04.6	25.2	1°22.7	59.6		Mars:	0.1
										-		
Mer.p	ass. 23:47	u-0.4' $d1$	.2′ m-3.89	$\nu$ 1.0′ d-0	$0.1^\prime$ m $0.53$	$\nu$ 2.3′ d0.	.0′ m-2.41	$\nu$ 2.6′ $d$ 0	$.1^\prime$ m $0.63$			

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	181°44.1	N00°35.7	324°27.7	7.9'	N17°17.1	14.5'	60.4
1 2	196°44.4 211°44.6	34.7 33.8	338°54.6 353°21.5	7.9' 7.8'	17°31.6 17°46.0	14.4' 14.3'	60.3' 60.3'
3	226°44.8	• • 32.8	7°48.3	7.7'	18°00.3	14.2	60.3
4	241°45.0	31.8	22°15.0	7.7'	18°14.4	14.0'	60.3'
5	256°45.3	30.9	36°41.7	7.6'	18°28.5	13.9'	60.2'
6 7	271°45.5 286°45.7	N00°29.9 28.9	51°08.4 65°34.9	7.6' 7.5'	N18° 42.4 18° 56.2	13.8' 13.7'	60.2' 60.2'
8	301°45.9	26.9 27.9	80°01.4	7.5'	10 50.2 19°09.8	13.7	60.2
9	316°46.1	27.0	94°27.9	7.4'	19°23.3	13.4'	60.1
10	331°46.4	26.0	108°54.3	7.3'	19°36.7	13.2'	60.1'
11 12	346°46.6 1°46.8	25.0 N00°24.1	123°20.6 137°46.9	7.3' 7.2'	19°50.0 N20°03.1	13.1' 13.0'	60.0' 60.0'
13	16°47.0	23.1	157 40.9 152°13.1	7.2'	20°16.1	12.8'	60.0
14	31°47.3	22.1	166°39.3	7.1	20°28.9	12.7'	59.9'
15	46°47.5	• • 21.1	181°05.4	7.0'	20°41.6	12.6'	59.9'
16 17	61°47.7 76°47.9	20.2 19.2	195°31.4 209°57.4	7.0' 6.9'	20°54.1 21°06.6	12.4' 12.3'	59.9' 59.8'
18	91°48.1	N00° 18.2	209 57.4 224°23.4	6.9	N21°18.8	12.1'	59.8'
19	106°48.4	17.2	238°49.2	6.8'	21°30.9	12.0'	59.8'
20	121°48.6	16.3	253°15.0	6.8'	21°42.9	11.8'	59.7'
21 22	136°48.8 151°49.0	· · 15.3 14.3	267°40.8 282°06.5	6.7' 6.7'	21°54.7 22°06.4	11.7' 11.5'	59.7' 59.7'
23	166°49.2	13.4	296°32.2	6.6'	22°17.9	11.5	59.7 59.6'
	SD = 15.9'	d = -1.0'			D = 16.5'		
		u — -1.0		اد	_ 10.5		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°49.5	N00° 12.4	310°57.8	6.5'	N22°29.3 22°40.5	11.2'	59.6'
1 2	196°49.7 211°49.9	11.4 10.4	325°23.3 339°48.8	6.5' 6.4'	22°40.5 22°51.6	11.1' 10.9'	59.6' 59.5'
3	226°50.1	09.5	354°14.2	6.4	23°02.5	10.7	59.5'
4	241°50.3	08.5	8°39.6	6.3'	23°13.2	10.6'	59.5'
5	256°50.6	07.5	23°04.9	6.3'	23°23.8	10.4	59.4
6 7	271°50.8 286°51.0	N00°06.6 05.6	37°30.2 51°55.4	6.2' 6.2'	N23°34.2 23°44.5	10.3' 10.1'	59.4' 59.4'
8	301°51.2	04.6	66°20.6	6.1	23°54.6	9.9'	59.3'
9	316°51.5	• • 03.6	80°45.8	6.1'	24°04.5	9.8'	59.3'
10	331°51.7	02.7	95°10.8	6.0'	24°14.3	9.6'	59.2'
11 12	346°51.9 1°52.1	01.7 N00°00.7	109°35.9 124°00.9	6.0' 6.0'	24°23.9 N24°33.3	9.4' 9.3'	59.2' 59.2'
13	16°52.3	S00°00.3	138°25.8	5.9'	24°42.6	9.1'	59.1
14	31°52.6	01.2	$152^{\circ}50.7$	5.9'	24°51.7	8.9'	59.1'
15	46°52.8 61°53.0	• • 02.2	167°15.6 181°40.4	5.8'	25°00.7 25°09.4	8.8'	59.1'
16 17	76°53.2	03.2 04.1	181 40.4 196°05.2	5.8' 5.7'	25 09.4 25°18.0	8.6' 8.4'	59.0' 59.0'
18	91°53.4	500°05.1	210°30.0	5.7'	N25°26.5	8.3'	58.9'
19	106°53.7	06.1	224°54.7	5.7'	25°34.7	8.1'	58.9'
20 21	121°53.9 136°54.1	07.1 •• 08.0	239°19.4 253°44.0	5.6' 5.6'	25°42.8 25°50.7	7.9' 7.7'	58.9' 58.8'
22	150 54.1 151°54.3	09.0	268°08.6	5.6'	25°58.5	7.7 7.6	58.8'
23	166°54.5	10.0	282°33.2	5.5'	26°06.0	7.4'	58.8'
	SD = 15.9'	d = -1.0'		SI	D = 16.3'		
Mon	GHA 101° 54 0	<b>Dec</b> <b>S</b> 00° 11.0	<b>GHA</b> 296°57.7	u 5.5'	<b>Dec</b> N26°13.4	d 7.2'	HP
0 1	181°54.8 196°55.0	500°11.0 11.9	296°57.7 311°22.2	5.5' 5.5'	N26°13.4 26°20.6	7.2' 7.0'	58.7' 58.7'
2	211°55.2	12.9	325°46.7	5.5'	26°27.7	6.9'	58.6'
3	226°55.4	• • 13.9	340°11.2	5.4'	26°34.5	6.7'	58.6'
4 5	241°55.6 256°55.8	14.8 15.8	354°35.6 9°00.1	5.4' 5.4'	26°41.2 26°47.7	6.5' 6.3'	58.6' 58.5'
6	271°56.1	500° 16.8	23°24.5	5.4	N26°54.1	6.1	58.5
7	286°56.3	17.8	37°48.8	5.4'	27°00.2	6.0'	58.5'
8	301°56.5	18.7	52°13.2	5.3'	27°06.2	5.8'	58.4'
9 10	316°56.7 331°56.9	· · 19.7 20.7	66°37.5 81°01.9	5.3' 5.3'	27°12.0 27°17.6	5.6' 5.4'	58.4' 58.3'
11	346°57.2	21.7	95°26.2	5.3'	27° 17.0	5.3	58.3'
12	1°57.4	\$00°22.6	109°50.5	5.3'	N27°28.3	5.1'	58.3'
13	16°57.6	23.6	124°14.8	5.3' 5.3'	27°33.3	4.9'	58.2'
14 15	31°57.8 46°58.0	24.6 •• 25.6	138°39.1 153°03.4	5.3' 5.3'	27°38.2 27°42.9	4.7' 4.5'	58.2' 58.2'
16	61°58.3	26.5	167°27.7	5.3'	27°47.5	4.3'	58.1
17	76°58.5	27.5	181°52.0	5.3'	27°51.8	4.2'	58.1'
18 19	91°58.7 106°58.9	\$00°28.5 29.4	196°16.3 210°40.5	5.3' 5.3'	N27°56.0 28°00.0	4.0' 3.8'	58.0' 58.0'
20	106 58.9 121°59.1	29.4 30.4	210°40.5 225°04.8	5.3'	28° 00.0 28° 03.8	3.6'	58.0'
21	136°59.3	• • 31.4	$239^{\circ}29.1$	5.3'	28°07.4	3.4'	57.9'
22	151°59.6	32.4	253°53.5	5.3'	28° 10.9	3.3'	57.9'
23	166°59.8	33.3	268°17.8	5.3'	28°14.1	3.1'	57.9'
	SD = 15.9'	d = 1.0'		SI	D = 16.0'		

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

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

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	18-20
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	88-69%
21	06:57	07:07	11:53	02:28	14:55	
22	07:18	07:28	11:53	03:24	15:53	
23	07:39	07:50	11:52	04:23	16:52	

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

h	Aries	Ver	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	3°19.2	154° 20.5	S11°46.5	261° 13.7	N23°20.6	283°06.9	N22° 25.2	16°25.3	S07°59.7			
1	18°21.7	169° 20.0	47.6	201 13.7 276°14.7	20.5	298° 09.3	25.2	31°27.9	59.8	Alpheratz	357°34.7	29°13.7
	33°24.1	184° 19.6	48.8	270 14.7 291°15.7	20.5	313°11.6	25.2	46°30.6	59.6 59.8	Ankaa	353°06.9	-42°10.2
2										Schedar	349°30.8	56°40.4
3	48°26.6	199° 19.2	• • 50.0	306° 16.6	20.4	328° 13.9	• • 25.2	61°33.2	07°59.9	Diphda	348°47.2	$-17^{\circ}50.9$
4	63°29.1	214° 18.8	51.1	321°17.6	20.3	343°16.2	25.3	76°35.8	0.00°80	Achernar	$335^{\circ}19.8$	-57°06.5
5	78°31.5	229° 18.4	52.3	336°18.6	20.3	358° 18.6	25.3	91°38.5	0.00	Hamal	327°51.2	23°34.8
6	93°34.0	244°18.0	S11°53.5	351°19.5	N23°20.2	13°20.9	N22°25.3	106°41.1	S08°00.1	Polaris	313°49.5	89°21.9
7	108°36.4	259° 17.6	54.7	6°20.5	20.1	28°23.2	25.3	121°43.7	00.2	Acamar	315°11.6	-40°12.1
8	123°38.9	274° 17.2	55.8	21°21.5	20.1	43°25.6	25.3	136°46.3	00.2	Menkar	314°06.2	4°11.3
9	138°41.4	289° 16.8	• • 57.0	36°22.4	• • 20.0	58°27.9	• • 25.3	151°49.0	• • 00.3	Mirfak	308°28.3	49°56.8
10	153°43.8	304°16.3	58.2	51°23.4	20.0	73°30.2	25.3	166°51.6	00.4	Aldebaran	290°39.8	16°33.6
11	168°46.3	319° 15.9	11°59.3	66°24.4	19.9	88°32.6	25.3	181°54.2	00.4	Rigel	281°04.0	-8°10.2
12	183°48.8	334°15.5	S12°00.5	81°25.4	N23° 19.8	103°34.9	N22°25.3	196°56.9	S08°00.5	Capella	280°22.2	46°01.3
13	198°51.2	349°15.1	01.7	96°26.3	19.8	118°37.2	25.3	211°59.5	00.6	Bellatrix	278°23.1	6°22.5
14	213°53.7	4° 14.7	02.8	111°27.3	19.7	133°39.6	25.3	$227^{\circ}02.1$	00.6	Elnath	278°02.1	28°37.7
15	228°56.2	19° 14.3	• • 04.0	126°28.3	• • 19.7	148°41.9	• • 25.3	242°04.8	• • 00.7	Alnilam	275° 37.9	-1°11.0
16	243°58.6	34°13.9	05.2	141°29.3	19.6	163°44.2	25.3	257°07.4	8.00		270°52.3	
17	259°01.1	49°13.4	06.3	156°30.2	19.5	178°46.6	25.3	272°10.0	00.9	Betelgeuse		7°24.8
18	274°03.5	64°13.0	S12°07.5	171°31.2	N23° 19.5	193°48.9	N22°25.4	287°12.7	S08°00.9	Canopus	263°52.5	-52°42.1
19	289°06.0	79° 12.6	08.7	186°32.2	19.4	208°51.2	25.4	302°15.3	01.0	Sirius	258°26.5	-16°44.7
20	304°08.5	94° 12.2	09.8	201°33.2	19.3	223°53.6	25.4	317°17.9	01.1	Adhara	255°06.1	-29°00.0
21	319°10.9	109°11.8	· · 11.0	216°34.1	. 19.3	238°55.9	• • 25.4	332°20.5	01.1	Procyon	244°51.2	5°09.8
22	334°13.4	124°11.4	12.2	231°35.1	19.2	253°58.3	25.4	347°23.2	01.2	Pollux	243°17.7	27°58.0
23	349°15.9	139° 10.9	13.3	246°36.1	19.2	269°00.6	25.4	2°25.8	01.3	Avior	234°15.2	-59°34.9
				-						Suhail	222°46.8	-43°31.6
Mer.p	ass. 23:43	$\nu$ -0.4′ d1.	2′ m-3.89	$\nu 1.0' \ d$ -0	$0.1' \; { m m0.52}$	$\nu 2.3' \ d0.$	.0′ m-2.41	$\nu$ 2.6′ d0	$.1' \; m0.63$	Miaplacidus	221°39.0	-69°48.8
										Alphard	217°48.2	-8°45.7
\A/ <sub>*</sub> -l	CHV	CHA	Doo	CH A	Daa	CHA	Daa	CHA	Daa	Regulus	207°35.0	11°50.9
Wed	GHA 4°10.3	GHA	Dec	GHA	Dec	GHA	Dec	GHA 17°20 4	Dec	Dubhe	193°41.9	61°37.1
0	4°18.3	154° 10.5	\$12°14.5	261°37.1	N23° 19.1	284°02.9	N22°25.4	17°28.4	S08°01.3	Denebola	$182^{\circ}25.5$	14°26.2
1	19°20.8	169° 10.1	15.6	276°38.0	19.0	299°05.3	25.4	32°31.1	01.4	Gienah	175°44.2	-17°40.6
2	34°23.3	184°09.7	16.8	291°39.0	19.0	314°07.6	25.4	47°33.7	01.5	Acrux	173°01.1	-63°14.1
3	49°25.7	199°09.3	• • 18.0	306°40.0	• • 18.9	329°09.9	• • 25.4	62°36.3	• • 01.5	Gacrux	171°52.6	-57°15.0
4	64°28.2	214°08.8	19.1	321°41.0	18.8	344° 12.3	25.4	77°38.9	01.6	Alioth	166°13.7	55°49.7
5	79°30.7	229°08.4	20.3	336°42.0	18.8	359° 14.6	25.4	92°41.6	01.7	Spica	158°22.9	-11°17.3
6	94°33.1	244°08.0	S12°21.4	351°42.9	N23° 18.7	14° 17.0	N22°25.4	107°44.2	S08°01.7	Alkaid	152°52.6	49°11.6
7	109°35.6	259°07.6	22.6	6°43.9	18.6	29° 19.3	25.4	122°46.8	01.8	Hadar	148°37.0	-60°29.6
8	124°38.0	274°07.2	23.8	21°44.9	18.6	44°21.6	25.4	137°49.5	01.9		147°58.3	-36°29.5
9	139°40.5	289°06.7	• • 24.9	36°45.9	• • 18.5	59°24.0	• • 25.5	152°52.1	• • 01.9	Arcturus	147 30.3 145°48.4	19°03.4
10	154°43.0	304°06.3	26.1	51°46.9	18.4	74°26.3	25.5	167°54.7	02.0		139°41.2	-60°56.3
11	169°45.4	319°05.9	27.2	66°47.8	18.4	89°28.7	25.5	182°57.4	02.1	Rigil Kent.		
12	184°47.9	334° 05.5	512°28.4	81°48.8	N23°18.3	104°31.0	N22°25.5	198°00.0	508°02.1	Kochab	137°20.6	74°03.4
13	199°50.4	349°05.0	29.5	96°49.8	18.3	119°33.3	25.5	213°02.6	02.2	Zuben'ubi	136°56.6	-16°08.6
14	214°52.8	4°04.6	30.7	111°50.8	18.2	134°35.7	25.5	228°05.2	02.3	Alphecca	126°04.2	26°38.1
15	229°55.3	19°04.2	31.9	126°51.8	. 18.1	149°38.0	25.5	243°07.9	02.3	Antares	112°16.3	-26°29.2
16	244°57.8	34°03.8	33.0	141°52.8	18.1	164° 40.4	25.5	258°10.5	02.3	Atria	107°10.9	-69°04.5
17	260°00.2	49°03.3	34.2	156°53.7	18.0	179° 42.7	25.5	273°13.1	02.4	Sabik	102°03.2	-15°45.3
	275°02.7	64° 02.9		171°54.7				288°15.8		Shaula	$96^{\circ}10.8$	-37°07.4
18		79°02.5	\$12°35.3		N23° 17.9	194° 45.1 209° 47.4	N22°25.5		S08°02.5	Rasalhague	95°58.8	12°32.7
19	290°05.2		36.5	186°55.7	17.9		25.5	303°18.4	02.6	Eltanin	90°42.3	51°29.4
20	305°07.6	94°02.1	37.6	201°56.7	17.8	224°49.7	25.5	318°21.0	02.7	Kaus Aust.	83°32.8	-34°22.5
21	320°10.1	109°01.6	• 38.8	216°57.7	• • 17.7	239°52.1	• • 25.5	333°23.6	• • 02.7	Vega	80°33.4	38°48.6
22	335°12.5	124°01.2	39.9	231°58.7	17.7	254° 54.4	25.5	348°26.3	02.8	Nunki	75°48.0	-26°16.0
23	350°15.0	139°00.8	41.1	246°59.7	17.6	269° 56.8	25.5	3°28.9	02.9	Altair	62°00.1	8°56.1
Mern	ass. 23:39	$\nu$ -0.4' d1.	2′ m-3.89	$\nu 1.0' d_{-0}$	0.1' m0.51	ν2 3' dΩ	0′ m-2.42	ν2 6' d0	.1′ m0.63	Peacock	53°05.8	-56°39.5
сг.р		- 0.1 01.					4.74			Deneb	49°25.7	45°22.3
										Enif	33°38.8	9°59.4
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.8	-46°50.5
0	5°17.5	154°00.4	S12°42.2	262°00.6	N23° 17.5	$284^{\circ}59.1$	N22°25.6	18°31.5	S08°02.9	Fomalhaut	15° 14.4	-29°29.4
1	$20^{\circ}19.9$	$168^{\circ}59.9$	43.4	277°01.6	17.5	300°01.5	25.6	33°34.2	03.0	Scheat	13°45.1	28°13.2
2	35°22.4	183°59.5	44.5	292°02.6	17.4	$315^{\circ}03.8$	25.6	48°36.8	03.1	Markab	13° 29.8	15°20.4
3	50°24.9	$198^{\circ}59.1$	• • 45.7	307°03.6	• • 17.3	330°06.2	• • 25.6	63°39.4	• • 03.1	ividindD	13 43.0	13 20.4
4	65°27.3	213°58.6	46.8	322°04.6	17.2	345°08.5	25.6	78°42.0	03.2	Sep 24 Tue	SHA	Mer.pass
5	80°29.8	228°58.2	48.0	337°05.6	17.2	0°10.9	25.6	93°44.7	03.3	Venus	151°01.3	13:43
6	95°32.3	243°57.8	S12°49.1	352°06.6	N23°17.1	15° 13.2	N22°25.6		S08°03.3		257°54.5	06:35
7	110°34.7	258° 57.4	50.3	7°07.6	17.0	30° 15.6	25.6	123°49.9	03.4		279°47.7	05:07
8	125°37.2	273°56.9	51.4	22°08.6	17.0	45° 17.9	25.6	138°52.5	03.5	Saturn	13°06.1	22:50
9	140°39.7	288° 56.5	• • 52.6	37°09.5	16.9	60°20.3	25.6	153°55.2	• • 03.5			
10	155°42.1	303°56.1	53.7	52° 10.5	16.8	75°22.6	25.6	168°57.8	03.6	Sep 25 Wed	SHA	Mer.pass
11	170°44.6	318° 55.6	54.9	67° 11.5	16.8	90°25.0	25.6	184°00.4	03.0		149°52.2	13:44
12	170 44.0 185°47.0	333° 55.2	\$12°56.0	82° 12.5	N23° 16.7	105° 27.3	N22°25.6	199°03.1	508°03.7	Mars	$257^{\circ}18.7$	06:33
13	200°49.5	348° 54.8	57.1	97° 13.5	16.6	105°27.3	25.6	214°05.7	03.8		279°44.6	05:03
14	200 49.5 215°52.0	3° 54.3	58.3	97 13.5 112°14.5	16.6	120 29.7 135°32.0	25.6	214 05.7 229°08.3	03.6	Saturn	$13^{\circ}10.1$	22:46
					16.5				• • 03.9	c	C	
15 16	230°54.4	18° 53.9	12°59.4	127° 15.5		150°34.4	• • 25.6	244°10.9		Sep 26 Thu	SHA	Mer.pass
16	245°56.9	33°53.5	13°00.6	142°16.5	16.4	165°36.7	25.6	259°13.6	04.0		148°42.9	13:44
17	260°59.4	48°53.0	01.7	157°17.5	16.3	180°39.1	25.7	274°16.2	04.1		256°43.2	06:32
18	276°01.8	63°52.6	S13°02.9	172°18.5	N23° 16.3	195°41.4	N22°25.7		S08°04.1		279°41.6	04:59
19	291°04.3	78°52.2	04.0	187°19.5	16.2	210°43.8	25.7	304°21.4	04.2	Saturn	13°14.0	22:42
20	306°06.8	93°51.7	05.1	202°20.5	16.1	225°46.1	25.7	319°24.1	04.3	Usu! ·		
21	321°09.2	108°51.3	• • 06.3	217°21.5	• • 16.1	240°48.5	• • 25.7	334°26.7	• • 04.3	Horizont	al parallax	0.1
22	336°11.7	123°50.9	07.4	232°22.5	16.0	255° 50.8	25.7	349°29.3	04.4		Venus:	0.1
23	351°14.1	138°50.4	08.6	247°23.5	15.9	270°53.2	25.7	4°32.0	04.5		Mars:	0.1
Morn	ass. 23:35	$\nu$ -0.4' d1.	2′ m-3 80	1/1 0/ d 0	0.1′ m0.50	1/2 3/ 40	.0′ m-2.43	1/2 6/ d0	.1′ m0.64			
.vici.p		ν U.¬ UI.	5.09	ν 1.0 u-0	.110.50	ν 2.5 UO.		- Z.O UO				

h	Sui	า		Moon			
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	182°00.0	500°34.3	282°42.1	5.3'	N28°17.2	2.9'	57.8'
1	197°00.2	35.3	297°06.5	5.4'	$28^{\circ}20.1$	2.7'	57.8'
2	212°00.4	36.3	311°30.8	5.4'	28°22.8	2.5'	57.7'
3	227°00.7	• • 37.2	325°55.2	5.4'	28°25.4	2.4'	57.7'
4	242°00.9 257°01.1	38.2 39.2	340°19.6 354°44.0	5.4'	28°27.7 28°29.9	2.2' 2.0'	57.7'
5 6	257 01.1 272°01.3	39.2 \$00°40.2	9°08.5	5.4' 5.5'	28 29.9 N28°31.9	1.8'	57.6' 57.6'
7	287° 01.5	41.1	23°32.9	5.5'	28°33.8	1.6'	57.6'
8	302°01.7	42.1	37°57.4	5.5'	28°35.4	1.5'	57.5'
9	317°02.0	• • 43.1	52°22.0	5.6'	28°36.9	1.3'	57.5'
10	332°02.2	44.1	66°46.5	5.6'	28°38.2	1.1'	57.4'
11	347°02.4	45.0	81°11.1	5.6'	28°39.3	0.9'	57.4'
12	2°02.6	S00°46.0	95°35.8 110°00.4	5.7'	N28°40.2 28°41.0	0.8'	57.4'
13 14	17°02.8 32°03.0	47.0 47.9	110°00.4 124°25.2	5.7' 5.8'	28°41.0	0.6' 0.4'	57.3' 57.3'
15	47°03.3	. 48.9	138° 49.9	5.8'	28°42.0	0.4	57.3'
16	62°03.5	49.9	153° 14.7	5.8'	28°42.2	0.1	57.2'
17	77°03.7	50.9	167°39.5	5.9'	28°42.3	-0.1'	57.2'
18	92°03.9	S00°51.8	182°04.4	5.9'	N28°42.2	-0.3'	57.2'
19	$107^{\circ}04.1$	52.8	196°29.4	6.0'	28°41.9	-0.5'	57.1'
20	122°04.3	53.8	210°54.3	6.0'	28°41.4	-0.6'	57.1'
21	137°04.6 152°04.8	• • 54.8	225°19.4 239°44.5	6.1'	28°40.8 28°40.0	-0.8'	57.1'
22 23	152°04.8 167°05.0	55.7 56.7	239°44.5 254°09.6	6.1' 6.2'	28°40.0 28°39.1	-1.0' -1.1'	57.0' 57.0'
23						-1.1	31.0
	SD = 15.9'	d = 1.0'		SE	0 = 15.8'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	182°05.2 197°05.4	\$00°57.7 58.7	268°34.8 283°00.1	6.3' 6.3'	N28°37.9 28°36.6	-1.3' -1.5'	57.0' 56.9'
2	212°05.6	00°59.6	203 00.1 297°25.4	6.4'	28°35.2	-1.5 -1.6'	56.9'
3	227°05.9	01°00.6	311°50.8	6.5'	28°33.5	-1.8'	56.8'
4	242°06.1	01.6	326° 16.3	6.5'	28°31.7	-2.0'	56.8'
5	257°06.3	02.5	340°41.8	6.6'	28°29.8	-2.1'	56.8'
6	272°06.5	S01°03.5	355°07.4	6.7'	N28°27.6	-2.3'	56.7'
7	287°06.7	04.5	9°33.0	6.7'	28°25.3	-2.5'	56.7'
8 9	302°06.9 317°07.2	05.5 •• 06.4	23°58.7 38°24.5	6.8' 6.9'	28°22.9 28°20.3	-2.6' -2.8'	56.7' 56.6'
10	317 07.2 332°07.4	07.4	38 24.5 52°50.4	6.9'	28°17.5	-2.8 -2.9'	56.6'
11	347°07.6	08.4	67°16.3	7.0'	28°14.5	-3.1'	56.6'
12	2°07.8	S01°09.4	81°42.3	7.1'	N28°11.5	-3.3'	56.6'
13	17°08.0	10.3	96°08.4	7.2'	28°08.2	-3.4'	56.5'
14	32°08.2	11.3	110°34.6	7.2'	28°04.8	-3.6'	56.5'
15	47°08.4	• • 12.3	125°00.9	7.3'	28°01.2	-3.7'	56.5
16 17	62°08.7 77°08.9	13.3 14.2	139°27.2 153°53.6	7.4' 7.5'	27°57.5 27°53.7	-3.9' -4.0'	56.4' 56.4'
18	92°09.1	S01°15.2	168° 20.1	7.6'	N27°49.6	-4.2	56.4
19	107°09.3	16.2	182°46.7	7.7'	27°45.5	-4.3	56.3'
20	122°09.5	17.2	197° 13.3	7.7'	27°41.1	-4.5'	56.3'
21	137°09.7	• • 18.1	$211^{\circ}40.1$	7.8'	27°36.7	-4.6'	56.3'
22	152°09.9	19.1	226°06.9	7.9'	27°32.1	-4.8'	56.2'
23	167°10.2	20.1	240°33.8	8.0'	27°27.3	-4.9'	56.2'
	SD = 15.9'	d = 1.0'		SE	0 = 15.5'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	НР
0	182°10.4	S01°21.0	255°00.8	8.1'	N27°22.4	-5.0'	56.2'
1	197° 10.6	22.0	269°28.0	8.2'	27°17.3	-5.2'	56.1'
2	212°10.8	23.0	283°55.1	8.3'	27°12.2	-5.3'	56.1'
3	227°11.0 242°11.2	· · 24.0 24.9	298°22.4 312°49.8	8.4'	27°06.8 27°01.3	-5.5'	56.1'
4 5	242°11.2 257°11.4	24.9 25.9	312°49.8 327°17.3	8.5' 8.6'	27°01.3 26°55.7	-5.6' -5.8'	56.1' 56.0'
6	272°11.7	501°26.9	341°44.8	8.7'	N26°50.0	-5.0 -5.9'	56.0'
7	287° 11.9	27.9	356° 12.5	8.8'	26°44.1	-6.0'	56.0'
8	302°12.1	28.8	$10^{\circ}40.2$	8.8'	26°38.1	-6.2'	55.9'
9	317° 12.3	• • 29.8	25°08.1	8.9'	26°31.9	-6.3'	55.9'
10	332°12.5	30.8	39°36.0	9.0'	26°25.6	-6.4'	55.9'
11 12	347° 12.7 2° 12.9	31.8 \$01°32.7	54°04.1 68°32.2	9.1' 9.2'	26°19.2 N26°12.6	-6.6' -6.7'	55.9' 55.8'
13	2 12.9 17°13.2	33.7	83°00.4	9.2 9.3'	26°06.0	-6.8'	55.8'
14	32° 13.4	34.7	97°28.8	9.4'	25°59.2	-6.9'	55.8'
15	47°13.6	• • 35.6	$111^{\circ}57.2$	9.5'	25°52.2	-7.1'	55.7'
16	62°13.8	36.6	126°25.7	9.6'	25°45.2	-7.2'	55.7'
17	77°14.0	37.6	140°54.3	9.7'	25°38.0	-7.3'	55.7'
18	92°14.2	S01°38.6	155°23.1 169°51.9	9.8'	N25°30.7 25°23.2	-7.4'	55.7'
19 20	107° 14.4 122° 14.6	39.5 40.5	169°51.9 184°20.8	9.9' 10.0'	25°23.2 25°15.7	-7.6' -7.7'	55.6' 55.6'
21	137°14.9	41.5	104 20.6 198°49.8	10.0	25°08.0	-7.7 -7.8	55.6'
22	152° 15.1	42.5	213° 18.9	10.2'	25°00.2	-7.9'	55.6'
23	167°15.3	43.4	227°48.2	10.3'	24°52.3	-8.0'	55.5'
	SD = 15.9'	d = 1.0'		SE	0 = 15.3'		

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

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

		Sun		Moon				
Day	Eqn.of	f 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	59-38%		
24	08:00	08:10	11:52	05:22	17:51			
25	08:21	08:31	11:51	06:20	18:48			
26	08:42	08:52	11:51	07:16	19:42			

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	6°16.6	153°50.0	S13°09.7	262°24.5	N23° 15.8	285°55.5	N22°25.7	19°34.6	S08°04.5			
1	21°19.1	168° 49.5	10.8	277°25.5	15.8	300° 57.9	25.7	34°37.2	04.6	Alpheratz	357°34.7	29°13.7
2	36°21.5	183°49.1	12.0	292°26.5	15.7	316°00.2	25.7	49°39.8	04.0	Ankaa	353°06.9	-42° 10.2
3		198°48.7								Schedar	349°30.8	56° 40.4
	51°24.0		· · 13.1	307°27.5	• • 15.6	331°02.6 346°05.0	• • 25.7	64°42.5	• • 04.7	Diphda	348°47.2	$-17^{\circ}50.9$
4	66°26.5	213°48.2	14.3	322°28.5	15.6		25.7	79°45.1	04.8	Achernar	$335^{\circ}19.8$	-57°06.5
5	81°28.9	228°47.8	15.4	337°29.5	15.5	1°07.3	25.7	94°47.7	04.9	Hamal	327°51.2	23°34.8
6	96°31.4	243° 47.3	S13°16.5	352°30.5	N23°15.4	16°09.7	N22°25.7	109°50.3	S08°04.9	Polaris	313°48.3	89°21.9
7	111°33.9	258° 46.9	17.7	7°31.5	15.3	31°12.0	25.7	124°53.0	05.0	Acamar	315°11.6	-40° 12.1
8	126°36.3	273°46.5	18.8	22°32.5	15.3	46°14.4	25.7	139°55.6	05.1	Menkar	314°06.2	4°11.3
9	141°38.8	288°46.0	• • 19.9	37°33.5	• • 15.2	61°16.7	• • 25.7	154°58.2	• • 05.1	Mirfak	308°28.3	49°56.9
10	156°41.3	303°45.6	21.1	52°34.5	15.1	$76^{\circ}19.1$	25.8	170°00.8	05.2	Aldebaran	290°39.8	16°33.6
11	171°43.7	318°45.1	22.2	67°35.5	15.1	91°21.5	25.8	185°03.5	05.3			
12	186°46.2	333°44.7	S13°23.3	82°36.5	N23°15.0	106°23.8	N22°25.8	200°06.1	S08°05.3	Rigel	281°04.0	-8°10.2
13	201°48.6	348°44.3	24.5	97°37.5	14.9	121°26.2	25.8	215°08.7	05.4	Capella	280°22.1	46°01.3
14	216°51.1	3°43.8	25.6	112°38.5	14.8	136°28.5	25.8	230°11.3	05.5	Bellatrix	278°23.1	6°22.5
15	231°53.6	18°43.4	26.7	127°39.5	• • 14.8	151°30.9	25.8	245°14.0	• • 05.5	Elnath	278°02.1	28° 37.7
16	246°56.0	33°42.9	27.9	142°40.5	14.7	166°33.2	25.8	260°16.6	05.6	Alnilam	275°37.9	-1°11.0
17	261°58.5	48° 42.5	29.0	157°41.5	14.6	181°35.6	25.8	275°19.2	05.7	Betelgeuse	270°52.3	7°24.8
	201° 30.3 277° 01.0	63°42.0			N23° 14.5	196°38.0	N22° 25.8	290°21.8		Canopus	263°52.5	$-52^{\circ}42.1$
18			\$13°30.1	172°42.5					S08°05.7	Sirius	258°26.5	-16°44.7
19	292°03.4	78°41.6	31.2	187° 43.5	14.5	211°40.3	25.8	305°24.5	05.8	Adhara	255°06.1	-29°00.0
20	307°05.9	93°41.1	32.4	202°44.5	14.4	226° 42.7	25.8	320°27.1	05.9	Procyon	244°51.2	5°09.8
21	322°08.4	108°40.7	• • 33.5	217°45.5	• • 14.3	241°45.1	• • 25.8	335°29.7	• • 05.9	Pollux	243°17.7	27°58.0
22	337°10.8	123°40.3	34.6	232°46.5	14.2	256° 47.4	25.8	350°32.3	06.0	Avior	234°15.2	-59°34.9
23	352°13.3	138°39.8	35.7	247°47.5	14.2	271°49.8	25.8	5°35.0	06.1	Suhail	222°46.8	-43°31.6
Morn	pass. 23:31	11 0 1' d1	.1′ m-3.90	11 0' d C	0.1' m0.50	12 A' d0	0′ m-2.44	1/2 6' d0	.1′ m0.64	Miaplacidus	221°39.0	-69°48.8
ivier.p	Jass. 23.31	ν-0.4 α1	.1 111-3.90	$\nu$ 1.0 $u$ -0	7.1 1110.50	ν2.4 d0.	.0 111-2.44	ν2.0 d0	.1 1110.04	Alphard	221 39.0 217°48.2	-8° 45.7
											217 46.2 207°35.0	-6 45.7 11°50.9
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus		
0	7°15.8	153°39.4	S13°36.9	262°48.5	N23°14.1	286°52.1	N22°25.8	20°37.6	S08°06.1	Dubhe	193°41.9	61°37.0
1	22°18.2	168° 38.9	38.0	277°49.5	14.0	301°54.5	25.8	35°40.2	06.2	Denebola	182°25.5	14°26.2
2	37°20.7	183°38.5	39.1	292°50.5	13.9	316° 56.9	25.8	50°42.8	06.3	Gienah	175°44.2	-17°40.6
										Acrux	173°01.1	-63°14.1
3	52°23.1	198°38.0	• • 40.3	307°51.6	• • 13.9	331°59.2	• • 25.8	65°45.5	• • 06.3	Gacrux	171°52.6	$-57^{\circ}15.0$
4	67°25.6	213°37.6	41.4	322°52.6	13.8	347°01.6	25.8	80°48.1	06.4	Alioth	$166^{\circ}13.7$	55°49.6
5	82°28.1	228° 37.1	42.5	337°53.6	13.7	2°04.0	25.9	95°50.7	06.4	Spica	158°22.9	-11°17.3
6	97°30.5	243°36.7	S13°43.6	352°54.6	N23°13.6	17°06.3	N22°25.9	110°53.3	S08°06.5	Alkaid	152°52.6	49°11.5
7	112°33.0	258° 36.2	44.7	7°55.6	13.6	$32^{\circ}08.7$	25.9	125°56.0	06.6	Hadar	148°37.0	-60°29.6
8	127°35.5	273°35.8	45.9	22°56.6	13.5	$47^{\circ}11.1$	25.9	140°58.6	06.6	Menkent	147°58.3	-36° 29.5
9	142°37.9	288°35.3	• • 47.0	37° 57.6	• • 13.4	62°13.4	• • 25.9	156°01.2	• • 06.7	Arcturus	145°48.4	19°03.4
10	157°40.4	303°34.9	48.1	52°58.6	13.3	77° 15.8	25.9	171°03.8	06.8	Rigil Kent.	139°41.2	-60° 56.3
11	172°42.9	318°34.4	49.2	67°59.6	13.2	92°18.2	25.9	186°06.5	06.8	_	137°20.6	74°03.4
12	187°45.3	333°34.0	S13°50.3	83°00.6	N23°13.2	107°20.5	N22°25.9	201°09.1	S08°06.9	Kochab		
13	202°47.8	348°33.5	51.5	98°01.7	13.1	122°22.9	25.9	216°11.7	07.0	Zuben'ubi	136°56.6	-16°08.6
14	217°50.3	3°33.1	52.6	113°02.7	13.0	137°25.3	25.9	231°14.3	07.0	Alphecca	126°04.2	26°38.1
15	232°52.7	18° 32.6	53.7	128°03.7	. 12.9	152°27.6	25.9	246°17.0	• • 07.1	Antares	112°16.3	-26°29.2
16	247°55.2	33°32.1	54.8	143°04.7	12.9	167°30.0	25.9	261°19.6	07.2	Atria	107°10.9	-69°04.5
17	262°57.6	48°31.7	55.9	158°05.7	12.8	182°32.4	25.9	276°22.2	07.2	Sabik	102°03.2	-15°45.3
				173° 06.7	N23° 12.7					Shaula	$96^{\circ}10.8$	-37°07.4
18	278°00.1	63°31.2	\$13°57.1	_	10.5	197°34.7	N22°25.9	291°24.8	S08°07.3	Rasalhague	95°58.8	$12^{\circ}32.7$
19	293°02.6	78°30.8	58.2	188° 07.8	12.6	212°37.1	25.9	306°27.5	07.4	Eltanin	90°42.4	51°29.4
20	308°05.0	93°30.3	13°59.3	203°08.8	12.5	227°39.5	25.9	321°30.1	07.4	Kaus Aust.	83°32.8	-34°22.5
21	323°07.5	108° 29.9	14°00.4	218°09.8	· · 12.5	242°41.9	• • 25.9	336°32.7	• • 07.5	Vega	80°33.4	38°48.6
22	338°10.0	123° 29.4	01.5	233°10.8	12.4	257° 44.2	25.9	351°35.3	07.5	Nunki	75°48.0	-26° 16.0
23	353°12.4	138°29.0	02.6	248°11.8	12.3	272°46.6	25.9	6°37.9	07.6	Altair	62°00.1	8°56.1
Mern	pass. 23:27	υ-0 4' d1	.1′ m-3.90	ν1 0' d-0	0.1' m0.49	1/2 A' d0	.0′ m-2.44	1/2 6' d0	.1′ m0.64	Peacock	53°05.8	-56° 39.5
IVIEL.P	Jass. 23.21	ν-0.4 d1	.1 111-3.90	ν1.0 u-0	7.1 1110.49	ν2.4 d0.	.0 111-2.44	ν2.0 d0	.1 1110.04	Deneb	49°25.7	45° 22.3
										Enif	33°38.8	9°59.4
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.8	-46° 50.5
0	8°14.9	153°28.5	S14°03.7	263°12.8	N23° 12.2	287°49.0	N22°25.9	21°40.6	508°07.7	Fomalhaut	27 32.0 15°14.4	-40° 50.5 -29° 29.4
1	23°17.4	168°28.0	04.9	278°13.9	12.1	302°51.3	25.9	36°43.2	07.7	Scheat	13°45.1	28° 13.2
2	38°19.8	183°27.6	06.0	293°14.9	12.1	317°53.7	26.0	51°45.8	07.8	Markab	13°29.8	26 13.2 15°20.4
3	53°22.3	198° 27.1	07.1	308° 15.9	• • 12.0	332°56.1	26.0	66°48.4	07.9	iviarkab	13 29.8	15 20.4
4	68°24.7	213° 26.7	08.2	323°16.9	11.9	347°58.5	26.0	81°51.1	07.9	Sep 27 Fri	SHA	Mer.pass
5	83°27.2	228°26.2	09.3	338° 17.9	11.8	3°00.8	26.0	96°53.7	08.0		147°33.4	13:45
6	98°29.7	243°25.7	S14°10.4	353° 19.0	N23°11.7	18°03.2	N22°26.0	111°56.3		Mars		06:30
7	96 29.7 113°32.1	243 25.7 258°25.3	11.5	8° 20.0	11.7	33°05.6	26.0	111 50.5 126°58.9	08.1	Jupiter		04:56
				8 20.0 23°21.0		48°08.0				Saturn	13°18.0	22:38
8	128°34.6	273°24.8	12.6		11.6		26.0	142°01.6	08.2	Saturn	13 10.0	
9	143°37.1	288°24.4	• • 13.7	38°22.0	· · 11.5	63°10.3	• • 26.0	157°04.2	• • 08.3	Sep 28 Sat	SHA	Mer.pass
10	158°39.5	303°23.9	14.8	53°23.0	11.4	78° 12.7	26.0	172°06.8	08.3		146°23.6	13:46
11	173°42.0	318°23.4	15.9	68°24.1	11.3	93° 15.1	26.0	187°09.4	08.4	Mars		06:28
12	188°44.5	333°23.0	S14°17.1	83°25.1	N23°11.3	108° 17.5	N22°26.0	202°12.0	S08°08.4	Jupiter		04:52
13	203°46.9	348°22.5	18.2	98°26.1	11.2	$123^{\circ}19.8$	26.0	$217^{\circ}14.7$	08.5	Saturn	13°21.8	22:34
14	218°49.4	3°22.1	19.3	113°27.1	11.1	$138^{\circ}22.2$	26.0	232°17.3	08.6	Saturn	13 21.6	22:34
15	233°51.9	18°21.6	• • 20.4	128°28.2	• • 11.0	153°24.6	• • 26.0	247°19.9	• • 08.6	Sep 29 Sun	SHA	Mer.pass
16	248°54.3	33°21.1	21.5	143°29.2	10.9	168° 27.0	26.0	262°22.5	08.7		145°13.6	13:47
17	263°56.8	48°20.7	22.6	158°30.2	10.9	183°29.3	26.0	277°25.2	08.8	Mars		06:27
18	278°59.2	63°20.2	\$14°23.7	173° 31.2	N23° 10.8	198°31.7	N22°26.0	292°27.8	S08°08.8			
19	276 39.2 294°01.7	78° 19.7	24.8	173 31.2 188° 32.3	10.7	213°34.1	26.0	307°30.4	08.9	Jupiter		04:48
								307 30.4 322°33.0		Saturn	13°25.7	22:29
20	309°04.2	93°19.3	25.9	203°33.3	10.6	228° 36.5	26.0		09.0	Horizon	al parallax	_
21	324°06.6	108° 18.8	•• 27.0	218°34.3	10.5	243°38.9	• • 26.0	337°35.6	• • 09.0		Venus:	0.1
22	339°09.1	123°18.3	28.1	233°35.3	10.4	258°41.2	26.0	352°38.3	09.1		Mars:	0.1
23	354°11.6	138° 17.9	29.2	248°36.4	10.4	273°43.6	26.0	7°40.9	09.1		ividi5.	
Mern	pass. 23:23	$\nu$ -0.5' d1	.1′ m-3.90	$\nu 1.0' d-0$	0.1′ m0.48	$\nu^{2.4'} d\Omega$	.0′ m-2.45	$\nu^{2.6'}$ d0	.1′ m0.65			

h	Sui	า					
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	182°15.5	S01°44.4	242°17.5	10.4'	N24°44.3	-8.1'	55.5'
1	197°15.7	45.4	256°46.9	10.5'	24°36.2	-8.2'	55.5'
2	212°15.9	46.4	271°16.4	10.6'	24°27.9	-8.4'	55.5'
3 4	227°16.1 242°16.3	· · 47.3 48.3	285°46.0 300°15.7	10.7' 10.8'	24°19.5 24°11.1	-8.5' -8.6'	55.4' 55.4'
4 5	242 16.3 257°16.5	48.3 49.3	300 15.7 314°45.5	10.8	24 11.1 24°02.5	-8.7'	55.4'
6	272°16.8	501°50.2	329°15.5	11.0'	N23°53.8	-8.8'	55.4'
7	287°17.0	51.2	343°45.5	11.1'	23°45.0	-8.9'	55.3'
8	302°17.2	52.2	$358^{\circ}15.6$	11.2'	$23^{\circ}36.1$	-9.0'	55.3'
9	317°17.4	• • 53.2	12°45.8	11.3'	23°27.1	-9.1'	55.3'
10	332°17.6	54.1	27°16.1	11.4'	23°18.0	-9.2'	55.3'
11 12	347°17.8 2°18.0	55.1 \$01°56.1	41°46.5 56°17.0	11.5' 11.6'	23°08.8 N22°59.5	-9.3' -9.4'	55.2' 55.2'
13	17°18.2	57.1	70°47.6	11.7'	22°50.1	-9.4 -9.5'	55.2'
14	32°18.4	58.0	85°18.3	11.8'	22°40.6	-9.6'	55.2'
15	47°18.7	$01^{\circ}59.0$	99°49.1	11.9'	22°30.9	-9.7'	55.2'
16	62°18.9	02°00.0	114°20.0	12.0'	22°21.2	-9.8'	55.1'
17	77°19.1 92°19.3	00.9 <b>S</b> 02°01.9	128°51.0 143°22.1	12.1' 12.2'	22°11.4 N22°01.6	-9.9'	55.1'
18 19	92 19.3 107°19.5	02.9	143 22.1 157°53.3	12.2	21°51.6	-10.0' -10.1'	55.1' 55.1'
20	107 19.3 122°19.7	03.9	172°24.5	12.4	21°41.5	-10.1 -10.2'	55.1'
21	137°19.9	• • 04.8	186°55.9	12.5'	21°31.3	-10.3	55.0'
22	152°20.1	05.8	201°27.4	12.6'	$21^{\circ}21.1$	-10.3'	55.0'
23	167°20.3	06.8	215°58.9	12.6'	21°10.7	-10.4'	55.0'
	SD = 15.9'	d = 1.0'		SI	D = 15.1'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0	182°20.5	502°07.8	230°30.6	12.7'	N21°00.3	-10.5'	55.0'
1	197°20.8	08.7	245°02.3	12.8'	20°49.8	-10.6'	54.9'
2	212°21.0	09.7	$259^{\circ}34.1$	12.9'	20°39.2	-10.7'	54.9'
3	227°21.2	• 10.7	274°06.0	13.0'	20°28.5	-10.8'	54.9'
4	242°21.4 257°21.6	11.6	288°38.1 303°10.1	13.1'	20°17.8 20°06.9	-10.8'	54.9'
5 6	257°21.6 272°21.8	12.6 S02°13.6	303°10.1 317°42.3	13.2' 13.3'	N19°56.0	-10.9' -11.0'	54.9' 54.9'
7	287°22.0	14.6	332°14.6	13.4	19°45.0	-11.1'	54.8'
8	302°22.2	15.5	346°47.0	13.5'	19°33.9	-11.2'	54.8'
9	317°22.4	• • 16.5	1°19.4	13.5'	19°22.7	-11.2'	54.8'
10	332°22.6	17.5	15°52.0	13.6'	19° 11.5	-11.3'	54.8'
11	347°22.8	18.5	30°24.6	13.7'	19°00.2	-11.4'	54.8'
12 13	2°23.0 17°23.3	\$02°19.4 20.4	44°57.3 59°30.1	13.8' 13.9'	N18° 48.8 18° 37.4	-11.5' -11.5'	54.7' 54.7'
14	32°23.5	21.4	74°03.0	14.0'	18°25.9	-11.6'	54.7'
15	47°23.7	22.3	88°35.9	14.0'	18° 14.3	-11.7'	54.7'
16	62°23.9	23.3	103°09.0	14.1'	18°02.6	-11.7'	54.7'
17	77°24.1	24.3	117°42.1	14.2'	17°50.9	-11.8'	54.7'
18	92°24.3	S02°25.3	132°15.3 146°48.6	14.3'	N17°39.1 17°27.2	-11.9'	54.6'
19 20	107°24.5 122°24.7	26.2 27.2	146°48.6 161°21.9	14.4' 14.4'	17°27.2 17°15.3	-11.9' -12.0'	54.6' 54.6'
21	137°24.9	. 28.2	101 21.9 175°55.3	14.5'	17°13.3	-12.1'	54.6'
22	152°25.1	29.1	190°28.8	14.6'	16°51.3	-12.1'	54.6'
23	167°25.3	30.1	205°02.4	14.7'	$16^{\circ}39.2$	-12.2'	54.6'
	SD = 16.0'	d = 1.0'		SI	D = 15.0'		
Sun	GHA	Dec	GHA	ν	Dec	d	НР
0	182°25.5	S02°31.1	219°36.1	ν 14.7'	N16°27.0	-12.2'	54.5'
1	197°25.7	32.1	234°09.8	14.8'	16°14.7	-12.3'	54.5'
2	212°25.9	33.0	248°43.6	14.9'	16°02.5	-12.3'	54.5'
3	227°26.2	• • 34.0	263°17.5	15.0'	15°50.1	-12.4'	54.5'
4	242°26.4	35.0 36.0	277°51.5	15.0'	15°37.7	-12.5' -12.5'	54.5'
5 6	257°26.6 272°26.8	36.0 \$02°36.9	292°25.5 306°59.6	15.1' 15.2'	15°25.2 N15°12.7	-12.5' -12.6'	54.5' 54.5'
7	272 20.8 287°27.0	37.9	300 59.0 321°33.7	15.2'	15°00.2	-12.6'	54.5 54.4'
8	302°27.2	38.9	336°08.0	15.3'	14°47.5	-12.7'	54.4'
9	317°27.4	• • 39.8	350°42.3	15.4'	14°34.9	-12.7'	54.4'
10	332°27.6	40.8	5°16.6	15.4'	14°22.1	-12.8'	54.4'
11	347°27.8	41.8	19°51.0	15.5'	14°09.4	-12.8'	54.4'
12 13	2°28.0 17°28.2	\$02°42.8 43.7	34°25.5 49°00.1	15.6' 15.6'	N13°56.5 13°43.7	-12.9' -12.9'	54.4' 54.4'
13 14	32°28.4	43. <i>1</i> 44.7	49°00.1 63°34.7	15.6	13° 43.7 13° 30.7	-12.9 -13.0'	54.4 54.3'
15	47°28.6	• • 45.7	78°09.4	15.7'	13° 17.8	-13.0'	54.3'
16	62°28.8	46.6	92°44.1	15.8'	13°04.8	-13.1'	54.3'
17	77°29.0	47.6	107°18.9	15.9'	12°51.7	-13.1'	54.3'
18	92°29.2	S02°48.6	121°53.7	15.9'	N12°38.6	-13.1'	54.3'
19	107°29.4 122°29.6	49.5 50.5	136°28.6 151°03.6	16.0'	12°25.5 12°12.3	-13.2'	54.3' 54.3'
20 21	122°29.6 137°29.8	50.5 •• 51.5	151°03.6 165°38.6	16.0' 16.1'	12°12.3 11°59.1	-13.2' -13.3'	54.3' 54.3'
22	157 29.0 152°30.1	52.5	105 36.0 180°13.7	16.1	11°45.8	-13.3'	54.3'
23	167°30.3	53.4	194°48.8	16.2'	11°32.5	-13.3'	54.2'
	SD = 16.0'	d = 1.0'	-	SI	D = 14.9'		

N   172°   03:36   05:00   06:07   17:31   18:38   20:01     N   70°   03:50   05:05   06:05   17:34   18:34   19:48     68°   04:01   05:08   06:04   17:35   18:30   19:37     66°   04:10   05:11   06:02   17:37   18:28   19:29     64°   04:17   05:14   06:01   17:38   18:25   19:21     62°   04:24   05:16   06:00   17:39   18:23   19:15     60°   04:29   05:18   05:59   17:40   18:22   19:10     N   58°   04:33   05:19   05:58   17:42   18:19   19:02     56°   04:37   05:21   05:58   17:42   18:19   19:02     54°   04:41   05:22   05:57   17:43   18:18   18:59     52°   04:43   05:23   05:57   17:43   18:18   18:59     52°   04:46   05:24   05:56   17:44   18:16   18:54     45°   04:51   05:25   05:55   17:45   18:15   18:49     N   40°   04:55   05:27   05:54   17:47   18:14   18:45     35°   04:58   05:27   05:53   17:48   18:13   18:42     20°   05:03   05:28   05:50   17:50   18:12   18:38     N   10°   05:03   05:28   05:50   17:50   18:12   18:38     N   10°   05:03   05:28   05:50   17:50   18:12   18:38     S   10°   05:00   05:25   05:44   17:57   18:19   18:45     30°   04:56   05:27   05:47   17:54   18:14   18:45     30°   04:56   05:27   05:47   17:54   18:14   18:45     30°   04:50   05:18   05:49   17:52   18:13   18:37     0°   05:03   05:28   05:49   17:52   18:13   18:37     0°   05:03   05:28   05:49   17:52   18:13   18:45     30°   04:50   05:18   05:42   18:00   18:24   18:52     35°   04:45   05:15   05:40   18:01   18:27   18:56     40°   04:40   05:12   05:39   18:03   18:30   19:02     45°   04:33   05:08   05:37   18:05   18:34   19:09     S   50°   04:24   05:02   05:35   18:07   18:40   19:18     52°   04:19   05:00   05:34   18:08   18:42   19:23     54°   04:15   04:57   05:33   18:09   18:45   19:28     56°   04:09   04:54   05:30   18:12   18:52   19:40	Lat.	Twi	light	Sunrise	Sunset	Twi	light
N 70°         03:50         05:05         06:05         17:34         18:34         19:48           68°         04:01         05:08         06:04         17:35         18:30         19:37           66°         04:10         05:11         06:02         17:37         18:28         19:29           64°         04:17         05:14         06:01         17:38         18:25         19:21           60°         04:24         05:16         06:00         17:39         18:23         19:15           60°         04:29         05:18         05:59         17:40         18:22         19:10           N 58°         04:33         05:19         05:59         17:40         18:22         19:10           N 56°         04:37         05:21         05:58         17:42         18:19         19:02           56°         04:37         05:21         05:58         17:42         18:19         19:02           54°         04:41         05:22         05:57         17:43         18:18         18:59           52°         04:46         05:24         05:56         17:44         18:16         18:54           45°         04:55         05:27	Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
68°         04:01         05:08         06:04         17:35         18:30         19:37           66°         04:10         05:11         06:02         17:37         18:28         19:29           64°         04:17         05:14         06:01         17:38         18:25         19:21           62°         04:24         05:16         06:00         17:39         18:23         19:15           60°         04:29         05:18         05:59         17:40         18:22         19:10           N 58°         04:33         05:19         05:59         17:41         18:20         19:06           56°         04:37         05:21         05:59         17:42         18:19         19:02           54°         04:41         05:22         05:57         17:43         18:18         18:59           52°         04:46         05:24         05:56         17:44         18:16         18:54           45°         04:51         05:25         05:55         17:45         18:15         18:49           N 40°         04:55         05:27         05:53         17:47         18:14         18:45           35°         04:58         05:27	N 72°	03:36	05:00	06:07	17:31	18:38	20:01
66°         04:10         05:11         06:02         17:37         18:28         19:29           64°         04:17         05:14         06:01         17:38         18:25         19:21           62°         04:24         05:16         06:00         17:39         18:23         19:15           60°         04:29         05:18         05:59         17:40         18:22         19:10           N 58°         04:33         05:19         05:59         17:41         18:20         19:06           56°         04:37         05:21         05:59         17:41         18:20         19:06           54°         04:41         05:22         05:57         17:43         18:18         18:59           52°         04:43         05:23         05:57         17:43         18:17         18:56           50°         04:46         05:24         05:56         17:44         18:16         18:54           45°         04:51         05:25         05:55         17:47         18:14         18:45           35°         04:58         05:27         05:53         17:48         18:13         18:42           30°         05:03         05:28	N 70°	03:50	05:05	06:05	17:34	18:34	19:48
64°         04:17         05:14         06:01         17:38         18:25         19:21           62°         04:24         05:16         06:00         17:39         18:23         19:15           60°         04:29         05:18         05:59         17:40         18:22         19:10           N 58°         04:33         05:19         05:59         17:41         18:20         19:06           56°         04:37         05:21         05:58         17:42         18:19         19:02           54°         04:41         05:22         05:57         17:43         18:18         18:59           52°         04:43         05:23         05:57         17:43         18:16         18:54           45°         04:46         05:24         05:56         17:44         18:16         18:54           45°         04:51         05:25         05:55         17:45         18:15         18:49           N 40°         04:55         05:27         05:54         17:47         18:14         18:45           35°         04:58         05:27         05:53         17:48         18:13         18:42           20°         05:03         05:28		04:01	05:08	06:04	17:35	18:30	19:37
62°         04:24         05:16         06:00         17:39         18:23         19:15           60°         04:29         05:18         05:59         17:40         18:22         19:10           N 58°         04:33         05:19         05:59         17:41         18:20         19:06           56°         04:37         05:21         05:58         17:42         18:19         19:02           54°         04:41         05:22         05:57         17:43         18:18         18:59           52°         04:43         05:23         05:57         17:43         18:17         18:56           50°         04:46         05:24         05:56         17:44         18:16         18:54           45°         04:51         05:25         05:55         17:45         18:15         18:49           N 40°         04:55         05:27         05:54         17:47         18:14         18:45           35°         04:58         05:27         05:53         17:48         18:13         18:42           20°         05:03         05:28         05:50         17:59         18:12         18:40           20°         05:03         05:28		04:10	05:11	06:02	17:37	18:28	19:29
60°         04:29         05:18         05:59         17:40         18:22         19:10           N 58°         04:33         05:19         05:59         17:41         18:20         19:06           56°         04:37         05:21         05:58         17:42         18:19         19:02           54°         04:41         05:22         05:57         17:43         18:18         18:59           50°         04:43         05:23         05:57         17:43         18:17         18:56           50°         04:46         05:24         05:56         17:44         18:16         18:54           45°         04:51         05:25         05:55         17:45         18:15         18:49           N 40°         04:55         05:27         05:54         17:47         18:14         18:45           35°         04:58         05:27         05:53         17:48         18:13         18:42           30°         05:03         05:28         05:52         17:49         18:12         18:40           20°         05:03         05:28         05:50         17:50         18:12         18:38           N 10°         05:03         05:28	1	04:17	05:14	06:01	17:38	18:25	19:21
N 58°         04:33         05:19         05:59         17:41         18:20         19:06           56°         04:37         05:21         05:58         17:42         18:19         19:02           54°         04:41         05:22         05:57         17:43         18:18         18:59           52°         04:43         05:23         05:57         17:43         18:17         18:56           50°         04:46         05:24         05:56         17:44         18:16         18:54           45°         04:51         05:25         05:55         17:45         18:15         18:49           N 40°         04:55         05:27         05:54         17:47         18:14         18:45           35°         04:58         05:27         05:53         17:48         18:13         18:45           30°         05:00         05:28         05:52         17:49         18:12         18:40           20°         05:03         05:28         05:50         17:50         18:12         18:33           N 10°         05:03         05:28         05:49         17:52         18:13         18:37           0°         05:03         05:25		04:24	05:16	06:00	17:39	18:23	19:15
56°         04:37         05:21         05:58         17:42         18:19         19:02           54°         04:41         05:22         05:57         17:43         18:18         18:59           52°         04:43         05:23         05:57         17:43         18:17         18:56           50°         04:46         05:24         05:56         17:44         18:16         18:54           45°         04:51         05:25         05:55         17:45         18:15         18:49           N 40°         04:55         05:27         05:54         17:47         18:14         18:49           35°         04:58         05:27         05:54         17:47         18:14         18:42           30°         05:00         05:28         05:52         17:49         18:12         18:40           20°         05:03         05:28         05:50         17:50         18:12         18:38           N 10°         05:03         05:28         05:49         17:52         18:13         18:37           0°         05:03         05:25         05:47         17:54         18:14         18:38           S 10°         05:00         05:25	60°	04:29	05:18	05:59	17:40	18:22	19:10
54°         04:41         05:22         05:57         17:43         18:18         18:59           52°         04:43         05:23         05:57         17:43         18:17         18:56           50°         04:46         05:24         05:56         17:44         18:16         18:54           45°         04:51         05:25         05:55         17:45         18:15         18:49           N 40°         04:55         05:27         05:54         17:47         18:14         18:45           35°         04:58         05:27         05:53         17:49         18:12         18:40           20°         05:03         05:28         05:50         17:50         18:12         18:38           N 10°         05:03         05:28         05:49         17:52         18:13         18:37           0°         05:03         05:25         05:47         17:54         18:14         18:38           S 10°         05:03         05:25         05:47         17:54         18:14         18:38           S 10°         05:03         05:25         05:46         17:55         18:16         18:41           20°         04:56         05:25	N 58°	04:33	05:19	05:59	17:41	18:20	19:06
52°         04:43         05:23         05:57         17:43         18:17         18:56           50°         04:46         05:24         05:56         17:44         18:16         18:54           45°         04:51         05:25         05:55         17:45         18:15         18:49           N 40°         04:55         05:27         05:54         17:47         18:14         18:45           30°         04:58         05:27         05:53         17:48         18:13         18:42           20°         05:03         05:28         05:50         17:50         18:12         18:38           N 10°         05:03         05:28         05:49         17:52         18:13         18:37           0°         05:03         05:27         05:47         17:54         18:14         18:38           S 10°         05:03         05:25         05:46         17:55         18:16         18:41           20°         04:56         05:25         05:46         17:55         18:16         18:41           20°         04:50         05:18         05:42         18:00         18:24         18:52           35°         04:45         05:15	56°	04:37	05:21	05:58	17:42	18:19	19:02
50°         04:46         05:24         05:56         17:44         18:16         18:54           45°         04:51         05:25         05:55         17:45         18:15         18:49           N 40°         04:55         05:27         05:54         17:47         18:14         18:45           35°         04:58         05:27         05:53         17:48         18:13         18:42           30°         05:00         05:28         05:52         17:49         18:12         18:40           20°         05:03         05:28         05:50         17:59         18:12         18:40           N 10°         05:03         05:28         05:49         17:52         18:13         18:37           0°         05:03         05:27         05:47         17:54         18:14         18:38           S 10°         05:00         05:25         05:46         17:55         18:16         18:41           20°         04:56         05:22         05:44         17:57         18:19         18:45           30°         04:50         05:18         05:42         18:00         18:24         18:52           35°         04:45         05:12	54°	04:41	05:22	05:57	17:43	18:18	18:59
N 40°   04:51   05:25   05:55   17:45   18:15   18:49     N 40°   04:55   05:27   05:54   17:47   18:14   18:45     35°   04:58   05:27   05:53   17:48   18:13   18:42     30°   05:00   05:28   05:52   17:49   18:12   18:40     20°   05:03   05:28   05:50   17:50   18:12   18:38     N 10°   05:03   05:28   05:49   17:52   18:13   18:37     0°   05:03   05:27   05:47   17:54   18:14   18:38     S 10°   05:00   05:25   05:46   17:55   18:16   18:41     20°   04:56   05:22   05:44   17:57   18:19   18:45     30°   04:50   05:18   05:42   18:00   18:24   18:52     35°   04:45   05:15   05:40   18:01   18:27   18:56     40°   04:40   05:12   05:39   18:03   18:30   19:02     45°   04:33   05:08   05:37   18:05   18:34   19:09     S 50°   04:24   05:02   05:34   18:08   18:42   19:23     54°   04:15   04:57   05:33   18:09   18:48   19:24     56°   04:03   04:51   05:30   18:12   18:52   19:40     58°   04:03   04:51   05:30   18:12   18:52   19:40     10; N 40°   18:40   19:18   18:48   19:34     58°   04:03   04:51   05:30   18:12   18:52   19:40     10; N 40°   18:40   19:40   18:40   19:40     10; N 40°   18:40   19:18   19:28   18:48   19:34     58°   04:03   04:51   05:30   18:12   18:52   19:40     10; N 50°   18:10   18:45   19:28   18:40   19:48     58°   04:03   04:51   05:30   18:12   18:52   19:40	52°	04:43	05:23	05:57	17:43	18:17	18:56
N 40°         04:55         05:27         05:54         17:47         18:14         18:45           35°         04:58         05:27         05:53         17:48         18:13         18:42           30°         05:00         05:28         05:52         17:49         18:12         18:40           20°         05:03         05:28         05:50         17:50         18:12         18:38           N 10°         05:03         05:28         05:49         17:52         18:13         18:37           0°         05:03         05:27         05:47         17:54         18:14         18:38           S 10°         05:00         05:25         05:46         17:55         18:16         18:41           20°         04:50         05:18         05:42         18:00         18:24         18:52           35°         04:45         05:15         05:40         18:01         18:27         18:56           40°         04:40         05:12         05:39         18:03         18:30         19:02           45°         04:33         05:08         05:37         18:05         18:34         19:09           S 50°         04:24         05:02		04:46	05:24	05:56	17:44	18:16	18:54
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	45°	04:51	05:25	05:55	17:45	18:15	18:49
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		04:55	05:27	05:54	17:47	18:14	18:45
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		04:58	05:27		17:48	18:13	18:42
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			05:28				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		05:03	05:28	05:50	17:50	18:12	18:38
S 10°         05:00         05:25         05:46         17:55         18:16         18:41           20°         04:56         05:22         05:44         17:57         18:19         18:45           30°         04:50         05:18         05:42         18:00         18:24         18:52           35°         04:45         05:15         05:40         18:01         18:27         18:56           40°         04:40         05:12         05:39         18:03         18:30         19:02           45°         04:33         05:08         05:37         18:05         18:34         19:09           \$50°         04:24         05:02         05:35         18:07         18:40         19:18           52°         04:19         05:00         05:34         18:08         18:42         19:23           54°         04:15         04:57         05:33         18:01         18:48         19:34           56°         04:09         04:54         05:31         18:11         18:48         19:34           58°         04:03         04:51         05:30         18:12         18:52         19:40		05:03	05:28	05:49	17:52	18:13	18:37
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	0°	05:03	05:27	05:47	17:54	18:14	18:38
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		05:00	05:25	05:46	17:55	18:16	18:41
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		04:56	05:22	05:44	17:57	18:19	18:45
40°         04:40         05:12         05:39         18:03         18:30         19:02           45°         04:33         05:08         05:37         18:05         18:34         19:09           S 50°         04:24         05:02         05:35         18:07         18:40         19:18           52°         04:19         05:00         05:34         18:08         18:42         19:23           54°         04:15         04:57         05:33         18:09         18:45         19:28           56°         04:09         04:54         05:31         18:11         18:48         19:34           58°         04:03         04:51         05:30         18:12         18:52         19:40		04:50	05:18	05:42	18:00	18:24	
45°         04:33         05:08         05:37         18:05         18:34         19:09           \$ 50°         04:24         05:02         05:35         18:07         18:40         19:18           52°         04:19         05:00         05:34         18:08         18:42         19:23           54°         04:15         04:57         05:33         18:09         18:45         19:28           56°         04:09         04:54         05:31         18:11         18:48         19:34           58°         04:03         04:51         05:30         18:12         18:52         19:40		04:45	05:15	05:40	18:01	18:27	18:56
S 50°         04:24         05:02         05:35         18:07         18:40         19:18           52°         04:19         05:00         05:34         18:08         18:42         19:23           54°         04:15         04:57         05:33         18:09         18:45         19:28           56°         04:09         04:54         05:31         18:11         18:48         19:34           58°         04:03         04:51         05:30         18:12         18:52         19:40		04:40	05:12	05:39	18:03		
52°         04:19         05:00         05:34         18:08         18:42         19:23           54°         04:15         04:57         05:33         18:09         18:45         19:28           56°         04:09         04:54         05:31         18:11         18:48         19:34           58°         04:03         04:51         05:30         18:12         18:52         19:40	45°	04:33	05:08	05:37	18:05	18:34	19:09
54°     04:15     04:57     05:33     18:09     18:45     19:28       56°     04:09     04:54     05:31     18:11     18:48     19:34       58°     04:03     04:51     05:30     18:12     18:52     19:40							
56° 04:09 04:54 05:31 18:11 18:48 19:34 58° 04:03 04:51 05:30 18:12 18:52 19:40							
58° 04:03 04:51 05:30 18:12 18:52 19:40					l		
					l		
<b>S</b> 60°   03:55	<b>S</b> 60°	03:55	04:47	05:28	18:14	18:56	19:48

Lat.			Moonris	e		Moonset	:
Lat.		Fri	Sat	Sun	Fri	Sat	Sun
N 72	0		22:54			20:02	18:44
<b>N</b> 70			23:45			19:09	18:23
68		21:33		00:17	19:46	18:36	18:06
66		22:34		00:40	18:44	18:12	17:52
64		23:08		00:58	18:09	17:53	17:41
62		23:32		01:12	17:43	17:37	17:31
60	0	23:52		01:24	17:23	17:24	17:23
N 58			80:00	01:35	17:07	17:12	17:16
56			00:21	01:44	16:52	17:02	17:09
54			00:33	01:52	16:40	16:54	17:03
52			00:43	01:59	16:29	16:46	16:58
50			00:52	02:06	16:20	16:39	16:53
45	0	00:02	01:12	02:20	15:59	16:23	16:43
N 40	0	00:21	01:27	02:31	15:42	16:10	16:34
35	0	00:38	01:40	02:41	15:28	16:00	16:27
30		00:52	01:52	02:49	15:16	15:50	16:20
20		01:16	02:11	03:04	14:55	15:34	16:08
<b>N</b> 10		01:36	02:28	03:16	14:36	15:19	15:58
0	0	01:55	02:44	03:28	14:19	15:05	15:48
<b>S</b> 10	0	02:14	02:59	03:40	14:01	14:52	15:39
20		02:35	03:16	03:52	13:43	14:37	15:28
30		02:58	03:35	04:06	13:21	14:20	15:16
35		03:12	03:46	04:15	13:08	14:10	15:09
40		03:27	03:58	04:24	12:53	13:58	15:01
45	0	03:46	04:13	04:35	12:35	13:45	14:52
<b>S</b> 50		04:09	04:31	04:48	12:13	13:28	14:40
52		04:21	04:40	04:54	12:03	13:20	14:35
54		04:33	04:49	05:00	11:51	13:11	14:29
56		04:48	05:00	05:08	11:37	13:01	14:23
58		05:04	05:12	05:16	11:20	12:50	14:15
<b>S</b> 60	U	05:25	05:26	05:25	11:01	12:37	14:07

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	24-26	
	mm:ss mm:ss		hh:mm	hh:mm	hh:mm	28-13%	
27	09:02	09:12	11:51	08:07	20:31		
28	09:22	09:32	11:50	08:55	21:17		
29	09:42	09:52	11:50	09:38	21:59		

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

h	Aries	Venu	ıs	M	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	9°14.0		\$14°30.3	263°37.4	N23°10.3	288° 46.0	N22°26.0	22°43.5	508°09.2			
1	9 14.0 24°16.5	168° 16.9	31.4	278°38.4	10.2	303°48.4	26.0	37°46.1	09.3	Alpheratz	357°34.7	29°13.7
	39°19.0			276 36.4 293°39.5	10.2	318° 50.8		52°48.7		Ankaa	353°06.9	-42°10.2
2		183°16.5	32.5				26.1		09.3	Schedar	349°30.8	56°40.4
3	54°21.4	198° 16.0	• • 33.6	308°40.5	• • 10.0	333°53.1	. 26.1	67°51.4	• • 09.4	Diphda	348°47.2	$-17^{\circ}50.9$
4	69°23.9	213° 15.5	34.7	323°41.5	09.9	348°55.5	26.1	82°54.0	09.5	Achernar	335°19.8	-57°06.5
5	84°26.3	228° 15.0	35.8	338°42.6	09.9	3°57.9	26.1	97°56.6	09.5	Hamal	327°51.2	23°34.8
6	99°28.8		\$14°36.9	353°43.6	N23°09.8	19°00.3	N22°26.1	112°59.2	S08°09.6	Polaris	313°47.3	89°21.9
7	114°31.3	258° 14.1	38.0	8°44.6	09.7	34°02.7	26.1	128°01.9	09.7	Acamar	315°11.6	-40°12.1
8	129°33.7	273°13.6	39.1	23°45.7	09.6	49°05.1	26.1	143°04.5	09.7	Menkar	314°06.1	4°11.3
9	144°36.2	288° 13.2	• • 40.1	38° 46.7	• • 09.5	64°07.4	• • 26.1	158°07.1	• • 09.8	Mirfak	308°28.3	49°56.9
10	159°38.7	303°12.7	41.2	53°47.7	09.4	79°09.8	26.1	173°09.7	09.8	Aldebaran	290°39.7	16°33.6
11	174°41.1	318° 12.2	42.3	68°48.7	09.4	94°12.2	26.1	188°12.3	09.9	Rigel	281°04.0	-8°10.2
12	189°43.6	333°11.7	S14°43.4	83°49.8	$N23^{\circ}09.3$	$109^{\circ}14.6$	N22°26.1	203°15.0	S08°10.0	Capella	280°22.1	46°01.3
13	204°46.1	348°11.3	44.5	98°50.8	09.2	124° 17.0	26.1	218°17.6	10.0	Bellatrix	278°23.0	6°22.5
14	219°48.5	3°10.8	45.6	113°51.9	09.1	$139^{\circ}19.4$	26.1	233°20.2	10.1	1	278°23.0	28°37.7
15	234°51.0	18° 10.3	• • 46.7	128° 52.9	• • 09.0	154°21.7	• • 26.1	248°22.8	· · 10.2	Elnath		
16	249°53.5	33°09.8	47.8	143°53.9	08.9	$169^{\circ}24.1$	26.1	263°25.4	10.2	Alnilam	275°37.9	-1°11.0
17	264°55.9	48°09.4	48.9	158°55.0	8.80	184° 26.5	26.1	278°28.1	10.3	Betelgeuse	270°52.3	7°24.8
18	279°58.4	63°08.9	S14°50.0	173°56.0	N23°08.8	199°28.9	N22°26.1	293°30.7	S08°10.3	Canopus	263°52.5	-52°42.1
19	295°00.8	78°08.4	51.1	188°57.0	08.7	214°31.3	26.1	308°33.3	10.4	Sirius	258°26.5	-16°44.7
20	310°03.3	93°07.9	52.1	203°58.1	08.6	229°33.7	26.1	323°35.9	10.5	Adhara	255°06.1	-29°00.0
21	325°05.8	108° 07.5	• • 53.2	218° 59.1	• • 08.5	244°36.1	. 26.1	338°38.5	. 10.5	Procyon	244°51.2	5°09.8
22	340°08.2	123° 07.0	54.3	234°00.2	08.4	259°38.5	26.1	353°41.2	10.6	Pollux	243°17.7	27°58.0
23	355°10.7	138° 06.5	55.4	249°01.2	08.3	274° 40.9	26.1	8°43.8	10.0	Avior	234°15.1	-59°34.9
23	333 10.1									Suhail	222°46.8	-43°31.6
Mer.p	ass. 23:19	$\nu$ -0.5' $d1.1'$	m-3.90	$\nu$ 1.0′ d-0	.1'  m0.47	$\nu$ 2.4′ d0.	0′ m-2.46	$\nu$ 2.6 $^{\prime}$ d0	1' m0.65	Miaplacidus	$221^{\circ}39.0$	-69°48.8
<u>.</u>							_	-		Alphard	$217^{\circ}48.2$	-8°45.7
_			_		_		_		_	Regulus	207°34.9	11°50.9
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.9	61°37.0
0	10°13.2		S14°56.5	264°02.2	N23°08.2	289°43.2	N22°26.1	23°46.4	S08°10.7	Denebola	182°25.5	14°26.2
1	25°15.6	168°05.6	57.6	279°03.3	08.2	304°45.6	26.1	38°49.0	10.8	Gienah	175°44.2	-17°40.6
2	40°18.1	183°05.1	58.7	294°04.3	08.1	319°48.0	26.1	53°51.6	10.8		173°01.1	-63°14.1
3	55°20.6	198°04.6	$14^{\circ}59.7$	309°05.4	• • 08.0	334°50.4	• • 26.1	68°54.2	• • 10.9		171°52.6	-57°15.0
4	70°23.0	213°04.1	15°00.8	324°06.4	07.9	349°52.8	26.1	83°56.9	11.0	Alioth	166°13.7	55°49.6
5	85°25.5	228°03.6	01.9	339°07.4	07.8	4°55.2	26.2	98°59.5	11.0	Spica	158°22.9	-11°17.3
6	100°27.9	243°03.2	S15°03.0	354°08.5	N23°07.7	19°57.6	N22°26.2	114°02.1	S08°11.1			49°11.5
7	115°30.4	258°02.7	04.1	9°09.5	07.6	35°00.0	26.2	129°04.7	11.2	Alkaid	152°52.6	1
8	130°32.9	273°02.2	05.1	24° 10.6	07.5	50°02.4	26.2	144°07.3	11.2	Hadar	148°37.0	-60°29.6
9	145°35.3	288°01.7	. 06.2	39°11.6	07.5	65°04.8	26.2	159°10.0	• • 11.3	1	147°58.3	-36°29.5
10	160°37.8	303°01.2	07.3	54°12.7	07.4	80°07.2	26.2	174°12.6	11.3	Arcturus	145°48.4	19°03.4
11	175°40.3	318° 00.7	08.4	69° 13.7	07.3	95°09.5	26.2	189°15.2	11.4	Rigil Kent.	139°41.3	-60°56.3
12	175°40.3		S15°09.5	84° 14.7	N23°07.2	110° 11.9	N22°26.2	204°17.8	S08°11.5	Kochab	137°20.7	74°03.4
										Zuben'ubi	136°56.6	-16°08.6
13	205°45.2	347° 59.8	10.5	99°15.8	07.1	125°14.3	26.2	219°20.4	11.5	Alphecca	126°04.2	26°38.1
14	220°47.7	2°59.3	11.6	114°16.8	07.0	140°16.7	26.2	234°23.1	11.6	Antares	$112^{\circ}16.3$	-26°29.2
15	235°50.1	17°58.8	• • 12.7	129°17.9	• • 06.9	155° 19.1	• • 26.2	249°25.7	• • 11.6	Atria	$107^{\circ}11.0$	-69°04.5
16	250°52.6	32°58.3	13.8	144°18.9	06.8	170°21.5	26.2	264°28.3	11.7	Sabik	102°03.2	-15°45.3
17	265°55.1	47°57.8	14.8	159° 20.0	06.8	185°23.9	26.2	279°30.9	11.8	Shaula	96°10.8	-37°07.4
18	280°57.5		S15°15.9	174°21.0	N23°06.7	200°26.3	N22°26.2	294°33.5	S08°11.8	Rasalhague	95°58.9	12°32.7
19	296°00.0	77°56.9	17.0	$189^{\circ}22.1$	06.6	215°28.7	26.2	309°36.1	11.9	Eltanin	90°42.4	51°29.4
20	311°02.4	92°56.4	18.1	204°23.1	06.5	230°31.1	26.2	324°38.8	12.0	Kaus Aust.	83°32.8	-34°22.5
21	326°04.9	$107^{\circ}55.9$	• • 19.1	219°24.2	• • 06.4	245°33.5	• • 26.2	339°41.4	• • 12.0	Vega	80°33.4	38°48.6
22	341°07.4	122°55.4	20.2	234° 25.2	06.3	260°35.9	26.2	354°44.0	12.1	Nunki	75°48.0	-26°16.0
23	356°09.8	137°54.9	21.3	249°26.3	06.2	275°38.3	26.2	9°46.6	12.1	Altair	62°00.1	8°56.1
	22.15			1 0/ / 0	1/ == 0.40		0/ 2.47					
ivler.p	ass. 23:15	$\nu$ -0.5' $d1.1'$	m-3.91	$\nu_{1.0'} d_{-0}$	.1′ m0.46	$\nu$ 2.4′ d0.	0′ m-2.47	ν2.6′ d0	1′ m0.66	Peacock	53°05.8	-56°39.5
_										Deneb	49°25.8	45°22.3
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.8	9°59.4
0	11°12.3		S15°22.3	264°27.3	N23°06.1	290° 40.7	N22°26.2	24°49.2	S08°12.2	Al Na'ir	27°32.8	-46°50.5
1	26°14.8	167°53.9	23.4	279°28.4	06.0	305°43.1	26.2	39°51.8	12.3	Fomalhaut	15°14.4	-29°29.4
2	41°17.2	182°53.4	24.5	294°29.4	06.0	320° 45.5	26.2	54°54.5	12.3	Scheat	13°45.1	28°13.2
3	56°19.7	197°52.9	25.5	309°30.5	• • 05.9	335° 47.9	. 26.2	69°57.1	12.4	Markab	13°29.8	15°20.4
4	71°22.2	212°52.4	26.6	309 30.5 324°31.5	05.8	350°50.3	26.2	84°59.7	12.4	Sep 30 Mon	SHA	Mer.pass
				324 31.5 339°32.6							144°03.4	13:47
5	86°24.6	227°52.0	27.7		05.7	5°52.7	26.2	100°02.3	12.5		254°23.4	06:25
6	101°27.1		S15°28.8	354°33.6	N23°05.6	20°55.1	N22°26.2		S08°12.6			
7	116°29.5	257°51.0	29.8	9°34.7	05.5	35°57.5	26.2	130°07.6	12.6		279°32.0	04:44
8	131°32.0	272°50.5	30.9	24°35.7	05.4	50°59.9	26.2	145°10.2	12.7	Saturn	13°29.5	22:25
9	146°34.5	287° 50.0	• • 31.9	39°36.8	• • 05.3	66°02.3	• • 26.2	160°12.8	• • 12.8	Oct 01 Tue	SHA	Mer.pass
10	161°36.9	302°49.5	33.0	54°37.9	05.2	81°04.7	26.2	175°15.4	12.8		142°52.9	13:48
11	176°39.4	317°49.0	34.1	69°38.9	05.1	96°07.1	26.2	190°18.0	12.9		253°49.1	06:23
12	191°41.9		S15°35.1	84°40.0	N23°05.0	111°09.5	N22°26.2	205°20.6	S08°12.9		279°30.1	04:40
13	206°44.3	347°48.0	36.2	99°41.0	05.0	126°11.9	26.2	220°23.2	13.0	Saturn	13°33.2	22:21
14	221°46.8	2°47.5	37.3	114°42.1	04.9	141°14.3	26.3	235°25.9	13.1	Jatuill	10 00.4	44.41
15	236°49.3	17°47.0	• • 38.3	129°43.1	• • 04.8	156° 16.7	• • 26.3	250°28.5	•• 13.1	Oct 02 Wed	SHA	Mer.pass
16	251°51.7	32°46.5	39.4	144°44.2	04.7	171°19.1	26.3	265°31.1	13.2		141°42.1	13:49
17	266°54.2	47°46.0	40.4	159°45.3	04.6	186°21.5	26.3	280°33.7	13.2		253°15.0	06:22
18	281°56.7	62°45.5	S15°41.5	174°46.3	N23°04.5	201°23.9	N22°26.3	295°36.3	S08°13.3		279°28.4	04:37
19	296°59.1	77°45.0	42.6	189°47.4	04.4	216°26.3	26.3	310°38.9	13.4	Saturn	13°36.9	22:17
20	312°01.6	92°44.5	43.6	204°48.4	04.3	231°28.7	26.3	325°41.6	13.4			
21	327°04.0		• • 44.7	219°49.5	04.2	246°31.1	26.3	340°44.2	. 13.5	Horizont	al parallax	
22	342°06.5	122°43.5	45.7	234°50.6	04.1	261°33.6	26.3	355°46.8	13.5		Venus:	0.1
23	357°09.0	137° 43.0	46.8	249°51.6	04.0	276°36.0	26.3	10°49.4	13.6		Mars:	0.1
Mer.p	ass. 23:11	$\nu$ -0.5' $d1.1'$	m-3.91	$\nu$ 1.1′ d-0	.1'  m0.45	$\nu$ 2.4′ d0.	0′ m-2.47	$\nu 2.6' \ d0$	1′ m0.66			

h	Sui	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	182°30.5	502°54.4	209°24.0	16.2'	N11° 19.2	-13.4'	54.2'
1	197°30.7	55.4	223°59.2	16.3'	11°05.8	-13.4'	54.2'
2	212°30.9	56.3	238°34.5	16.3'	10°52.4	-13.5'	54.2'
3	227°31.1	• • 57.3	253°09.8	16.4'	10°38.9	-13.5'	54.2'
4	242°31.3	58.3	267°45.2	16.4'	10°25.4	-13.5'	54.2'
5	257°31.5	02°59.3	282°20.6	16.5'	$10^{\circ}11.9$	-13.6'	54.2'
6	272°31.7	S03°00.2	$296^{\circ}56.1$	16.5'	N09°58.4	-13.6'	54.2'
7	287°31.9	01.2	311°31.6	16.6'	09°44.8	-13.6'	54.2
8	302°32.1	02.2	326°07.2	16.6'	09°31.2	-13.6'	54.1'
9	317°32.3	• • 03.1	340°42.8	16.6'	09° 17.5	-13.7'	54.1'
10	332°32.5	04.1	355°18.4	16.7'	09°03.8	-13.7'	54.1'
11	347°32.7	05.1	9°54.1	16.7'	$08^{\circ}50.1$	-13.7'	54.1'
12	2°32.9	S03°06.0	24°29.8	16.8'	N08° 36.4	-13.8'	54.1'
13	17°33.1	07.0	39°05.6	16.8'	08°22.6	-13.8'	54.1'
14	32°33.3	08.0	53°41.4	16.8'	08°08.9	-13.8'	54.1'
15	47°33.5	• • 09.0	68°17.2	16.9'	07°55.0	-13.8'	54.1'
16	62°33.7	09.9	82°53.1	16.9'	$07^{\circ}41.2$	-13.9'	54.1'
17	77°33.9	10.9	97°29.0	16.9'	07°27.3	-13.9'	54.1'
18	92°34.1	S03°11.9	112°05.0	17.0'	N07° 13.5	-13.9'	54.1
19	107°34.3	12.8	126°41.0	17.0'	06°59.6	-13.9'	54.1
20	122°34.5	13.8	141°17.0	17.0'	06° 45.6	-13.9'	54.0
21	137°34.7	• • 14.8	155°53.0	17.1'	06°31.7	-14.0'	54.0
22	152°34.9	15.7	170°29.1	17.1'	06° 17.7	-14.0'	54.0
23	167°35.1	16.7	185°05.2	17.1'	06°03.7	-14.0'	54.0
						21.0	5 1.0
	SD = 16.0'	d = 1.0'		SI	D = 14.8'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°35.3	503°17.7	199°41.3	17.2'	N05°49.7	-14.0'	54.0
1	197°35.5	18.7	214°17.5	17.2'	05°35.7	-14.0'	54.0
2	212°35.7	19.6	$228^{\circ}53.7$	17.2'	$05^{\circ}21.7$	-14.1'	54.0
3	227°35.9	• • 20.6	243°29.9	17.2'	05°07.6	-14.1'	54.0'
4	242°36.1	21.6	258°06.1	17.3'	04°53.5	-14.1'	54.0'
5	257°36.3	22.5	272°42.3	17.3'	04°39.4	-14.1'	54.0'
6	272°36.5	S03°23.5	287°18.6	17.3'	N04°25.3	-14.1'	54.0
7	287°36.7	24.5	301°54.9	17.3'	$04^{\circ}11.2$	-14.1'	54.0
8	302°36.9	25.4	316°31.2	17.3'	03°57.1	-14.1'	54.0'
9	317°37.1	• • 26.4	331°07.6	17.4'	03°43.0	-14.1'	54.0'
10	332°37.3	27.4	345°43.9	17.4'	03°28.8	-14.2'	54.0'
11	347°37.5	28.3	0°20.3	17.4'	03°14.7	-14.2'	54.0'
12	2°37.7	S03°29.3	14°56.7	17.4'	N03°00.5	-14.2'	53.9'
13	17°37.9	30.3	29°33.1	17.4'	02°46.3	-14.2'	53.9'
14	32°38.1	31.3	44°09.5	17.4'	$02^{\circ}32.1$	-14.2'	53.9'
15	47°38.3	• • 32.2	58°45.9	17.4'	$02^{\circ}18.0$	-14.2'	53.9
16	62°38.5	33.2	73°22.4	17.5'	$02^{\circ}03.8$	-14.2'	53.9'
17	77°38.7	34.2	87°58.8	17.5'	$01^{\circ}49.6$	-14.2'	53.9'
18	92°38.9	S03°35.1	102°35.3	17.5'	N01°35.3	-14.2'	53.9'
19	$107^{\circ}39.1$	36.1	$117^{\circ}11.7$	17.5'	$01^{\circ}21.1$	-14.2'	53.9
20	122°39.3	37.1	131°48.2	17.5'	$01^{\circ}06.9$	-14.2'	53.9
21	137°39.5	• • 38.0	146°24.7	17.5'	00°52.7	-14.2'	53.9
22	152°39.7	39.0	161°01.2	17.5'	00°38.5	-14.2'	53.9
23	167°39.9	40.0	175°37.7	17.5'	00°24.3	-14.2'	53.9
	SD = 16.0'	d = 1.0'		SI	D = 14.7'		
۱۸/	GHA	Dec	GHA		Dec	اد	НР
Wed	<b>GHA</b> 182°40.1	Dec \$03°40.9	БНА 190°14.2	u 17.5'	Dec N00° 10.1	d -14.2'	53.9
0	182°40.1 197°40.3		190°14.2 204°50.7		500°04.2		53.9
1		41.9	204°50.7 219°27.2	17.5'	00° 04.2	14.2'	
2	212°40.5	42.9		17.5'		14.2'	53.9
3	227°40.7	• • 43.8	234°03.7	17.5'	00°32.6 00°46.8	14.2'	53.9
4	242°40.9	44.8	248°40.2	17.5'		14.2'	53.9
5	257°41.1	45.8	263°16.7	17.5'	01°01.0	14.2'	53.9
6	272°41.3	S03°46.7	277°53.2	17.5'	S01°15.2	14.2'	53.9
7	287°41.5	47.7	292°29.7	17.5'	01°29.4	14.2'	53.9
8	302°41.7	48.7	307°06.2	17.5'	01°43.6	14.2'	53.9
9	317°41.9	• • 49.6	321°42.7	17.5'	01°57.8	14.2'	53.9
				17.5'	$02^{\circ}12.0$	14.2'	53.9
10	332°42.1	50.6	336°19.2				F2 01
11	332°42.1 347°42.3	51.6	350°55.6	17.5'	02°26.1	14.2'	
11 12	332°42.1 347°42.3 2°42.5	51.6 \$03°52.5	350°55.6 5°32.1	17.5' 17.5'	02°26.1 \$02°40.3	14.2' 14.2'	53.9
11 12 13	332°42.1 347°42.3 2°42.5 17°42.7	51.6 \$03°52.5 53.5	350°55.6 5°32.1 20°08.6	17.5' 17.5' 17.4'	02°26.1 \$02°40.3 02°54.4	14.2' 14.2' 14.1'	53.9°
11 12 13 14	332°42.1 347°42.3 2°42.5 17°42.7 32°42.9	51.6 \$03° 52.5 53.5 54.5	350°55.6 5°32.1 20°08.6 34°45.0	17.5' 17.5' 17.4' 17.4'	02°26.1 502°40.3 02°54.4 03°08.6	14.2' 14.2' 14.1' 14.1'	53.9° 53.9° 53.9°
11 12 13 14 15	332°42.1 347°42.3 2°42.5 17°42.7 32°42.9 47°43.1	51.6 \$03°52.5 53.5 54.5 •• 55.4	350°55.6 5°32.1 20°08.6 34°45.0 49°21.4	17.5' 17.5' 17.4' 17.4' 17.4'	02°26.1 \$02°40.3 02°54.4 03°08.6 03°22.7	14.2' 14.2' 14.1' 14.1' 14.1'	53.9 53.9 53.9 53.9
11 12 13 14 15 16	332° 42.1 347° 42.3 2° 42.5 17° 42.7 32° 42.9 47° 43.1 62° 43.2	51.6 \$03° 52.5 53.5 54.5 • 55.4 56.4	350°55.6 5°32.1 20°08.6 34°45.0 49°21.4 63°57.9	17.5' 17.5' 17.4' 17.4' 17.4' 17.4'	02°26.1 \$02°40.3 02°54.4 03°08.6 03°22.7 03°36.8	14.2' 14.2' 14.1' 14.1' 14.1' 14.1'	53.9 53.9 53.9 53.9 53.9
11 12 13 14 15 16 17	332° 42.1 347° 42.3 2° 42.5 17° 42.7 32° 42.9 47° 43.1 62° 43.2 77° 43.4	51.6 \$03° 52.5 53.5 54.5 • • 55.4 56.4 57.4	350°55.6 5°32.1 20°08.6 34°45.0 49°21.4 63°57.9 78°34.3	17.5' 17.5' 17.4' 17.4' 17.4' 17.4' 17.4'	02°26.1 \$02°40.3 02°54.4 03°08.6 03°22.7 03°36.8 03°50.9	14.2' 14.2' 14.1' 14.1' 14.1' 14.1' 14.1'	53.9 53.9 53.9 53.9 53.9 53.9
11 12 13 14 15 16 17 18	332°42.1 347°42.3 2°42.5 17°42.7 32°42.9 47°43.1 62°43.2 77°43.4 92°43.6	51.6 \$03° 52.5 53.5 54.5 · · 55.4 56.4 57.4 \$03° 58.3	350°55.6 5°32.1 20°08.6 34°45.0 49°21.4 63°57.9 78°34.3 93°10.7	17.5' 17.5' 17.4' 17.4' 17.4' 17.4' 17.4' 17.4'	02°26.1 \$02°40.3 02°54.4 03°08.6 03°22.7 03°36.8 03°50.9 \$04°05.0	14.2' 14.2' 14.1' 14.1' 14.1' 14.1' 14.1'	53.9 53.9 53.9 53.9 53.9 53.9
11 12 13 14 15 16 17 18 19	332°42.1 347°42.3 2°42.5 17°42.7 32°42.9 47°43.1 62°43.2 77°43.4 92°43.6 107°43.8	51.6 \$03° 52.5 53.5 54.5 · · 55.4 56.4 57.4 \$03° 58.3 03° 59.3	350°55.6 5°32.1 20°08.6 34°45.0 49°21.4 63°57.9 78°34.3 93°10.7 107°47.0	17.5' 17.5' 17.4' 17.4' 17.4' 17.4' 17.4' 17.4' 17.4'	02°26.1 \$02°40.3 02°54.4 03°08.6 03°22.7 03°36.8 03°50.9 \$04°05.0 04°19.1	14.2' 14.2' 14.1' 14.1' 14.1' 14.1' 14.1' 14.1'	53.9 53.9 53.9 53.9 53.9 53.9 53.9
11 12 13 14 15 16 17 18 19 20	332°42.1 347°42.3 2°42.5 17°42.7 32°42.9 47°43.1 62°43.2 77°43.4 92°43.6 107°43.8 122°44.0	51.6 \$03° 52.5 53.5 54.5 • 55.4 56.4 57.4 \$03° 58.3 03° 59.3 04° 00.3	350° 55.6 5° 32.1 20° 08.6 34° 45.0 49° 21.4 63° 57.9 78° 34.3 93° 10.7 107° 47.0 122° 23.4	17.5' 17.5' 17.4' 17.4' 17.4' 17.4' 17.4' 17.4' 17.4' 17.3'	02°26.1 \$02°40.3 02°54.4 03°08.6 03°22.7 03°36.8 03°50.9 \$04°05.0 04°19.1 04°33.2	14.2' 14.2' 14.1' 14.1' 14.1' 14.1' 14.1' 14.1' 14.0'	53.9° 53.9° 53.9° 53.9° 53.9° 53.9° 53.9°
11 12 13 14 15 16 17 18 19 20 21	332°42.1 347°42.3 2°42.5 17°42.7 32°42.9 47°43.1 62°43.2 77°43.4 92°43.6 107°43.8 122°44.0 137°44.2	51.6 \$03° 52.5 53.5 54.5 · · 55.4 56.4 57.4 \$03° 58.3 03° 59.3 04° 00.3 · · 01.2	350°55.6 5°32.1 20°08.6 34°45.0 49°21.4 63°57.9 78°34.3 93°10.7 107°47.0 122°23.4 136°59.8	17.5' 17.5' 17.4' 17.4' 17.4' 17.4' 17.4' 17.4' 17.3' 17.3'	02°26.1 \$02°40.3 02°54.4 03°08.6 03°22.7 03°36.8 03°50.9 \$04°05.0 04°19.1 04°33.2 04°47.2	14.2' 14.2' 14.1' 14.1' 14.1' 14.1' 14.1' 14.1' 14.0' 14.0'	53.9' 53.9' 53.9' 53.9' 53.9' 53.9' 53.9' 53.9' 53.9'
11 12 13 14 15 16 17 18 19 20 21 22	332°42.1 347°42.3 2°42.5 17°42.7 32°42.9 47°43.1 62°43.2 77°43.4 92°43.6 107°43.8 122°44.0 137°44.2 152°44.4	51.6 \$03° 52.5 \$3.5 \$4.5 \$5.4 \$6.4 \$7.4 \$03° 58.3 03° 59.3 04° 00.3 \$\cdot\$ 01.2 02.2	350°55.6 5°32.1 20°08.6 34°45.0 49°21.4 63°57.9 78°34.3 93°10.7 107°47.0 122°23.4 136°59.8 151°36.1	17.5' 17.5' 17.4' 17.4' 17.4' 17.4' 17.4' 17.4' 17.3' 17.3'	02°26.1 S02°40.3 02°54.4 03°08.6 03°22.7 03°36.8 03°50.9 S04°05.0 04°19.1 04°33.2 04°47.2 05°01.2	14.2' 14.1' 14.1' 14.1' 14.1' 14.1' 14.1' 14.1' 14.1' 14.1' 14.0' 14.0'	53.9' 53.9' 53.9' 53.9' 53.9' 53.9' 53.9' 53.9' 53.9'
11 12 13 14 15 16 17 18 19 20 21	332°42.1 347°42.3 2°42.5 17°42.7 32°42.9 47°43.1 62°43.2 77°43.4 92°43.6 107°43.8 122°44.0 137°44.2	51.6 \$03° 52.5 53.5 54.5 · · 55.4 56.4 57.4 \$03° 58.3 03° 59.3 04° 00.3 · · 01.2	350°55.6 5°32.1 20°08.6 34°45.0 49°21.4 63°57.9 78°34.3 93°10.7 107°47.0 122°23.4 136°59.8	17.5' 17.5' 17.4' 17.4' 17.4' 17.4' 17.4' 17.4' 17.3' 17.3'	02°26.1 \$02°40.3 02°54.4 03°08.6 03°22.7 03°36.8 03°50.9 \$04°05.0 04°19.1 04°33.2 04°47.2	14.2' 14.2' 14.1' 14.1' 14.1' 14.1' 14.1' 14.1' 14.0' 14.0'	53.9' 53.9' 53.9' 53.9' 53.9' 53.9' 53.9' 53.9' 53.9'

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

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

		Sun		Moon			
Day	Eqn.of	f Time	Mer.	Mer.	Mer.Pass.		
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	27-0	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	7-1%	
30	10:02	10:12	11:50	10:19	22:39		
01	10:21	10:31	11:49	10:59	23:18		
02	10:40	10:50	11:49	11:37	23:57		

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

Thu   CHA	h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
12 11.14   122'162   515'163   525'163   525'17   527'103   525'10	Thu -	C II V	CHV	Dos	CHV	Doc	СПУ	Doc	CHV	Doc		SHV	Doc
1 277138   107720   489   279587   938   800740   733   90740   137   740720   137												ЗПА	Dec
1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1											Alpheratz	357°34.7	29° 13.8
1													
3 97.88				49.9		03.8		26.3		13.8			
1	3	57°18.8	$197^{\circ}41.0$	• • 51.0		• • 03.7		• • 26.3	70°59.9	• • 13.8			
1	4	72°21.3	212°40.5	52.1	324°56.9	03.6	351°48.0	26.3	86°02.5	13.9			
1 117-02	5	87°23.8	227°40.0	53.1	339°58.0	03.5	6°50.4	26.3	101°05.1	14.0			
1 117/287 277383 5.63 25701. 0.33 36'5.2 0.33 131'0.3 14.1 Member 3.1 14.1 Mem	6	102°26.2	242°39.5	S15°54.2	354°59.1	N23°03.4	21°52.8	N22°26.3	116°07.7	S08°14.0			
1	7	117°28.7	257°39.0	55.2	10°00.1	03.3	36°55.2	26.3	131°10.3				
14   17   18   18   18   18   18   18   18													
10													
1											Mirfak		
12 192'41.0 332'85 5 16'00.4 85'05 N25'02 5 112'07.7 23.3 200'23.4 508'14.4 Charles 13 207'45.6 347'86.0 15.1 10'10.5 10'10.6 120'10.0 7 23.4 21'20.0 14.4 Charles 13 207'45.6 22'13.0 15'07.7 23.4 21'20.0 14.5 14.6 14.5 14.6 14.5 14.6 14.6 14.6 14.6 14.6 14.6 14.6 14.6											Aldebaran	290°39.7	$16^{\circ}33.6$
13 207°43 5 347°50 01.5 100°65 07.7 127°097 20.3 221°20 01.44 14 227°09 27.55 197°14 5 227°30 01.44 18 227°09 27.55 197°14 5 20.3 220°25 01.44 18 227°14 19											Rigel	281°04.0	-8°10.2
15   237"46   17"850   0.05   115"076   0.26   142"121   0.23   238"36   14.5   0.07"273   0.07"2											Capella	280°22.1	46°01.3
18 2578							127°09.7				Bellatrix	278°23.0	6°22.5
15											Elnath	278°02.0	28° 37.7
177. 197. 197. 197. 197. 197. 197. 197.											Alnilam		
Simple   S	17	267°53.3	47°33.9	05.7	$160^{\circ}10.8$		187° 19.3		281°36.5		_		
Adheat   287-901   287-91	18	282°55.8	62°33.4	<b>S</b> 16°06.7	$175^{\circ}11.9$	N23°02.2	202°21.8	N22°26.3	296°39.1	508°14.7			
Processor   Proc	19	297°58.3	77°32.9	07.8	190°13.0	02.2	217°24.2	26.3	311°41.7	14.8			
22 3870.02 1273.1 10.00 20.1 11.0 11.0 20.1 11.0 11.0 20.1 11.0 11.0	20	313°00.7	92°32.4	08.8	205°14.0	02.1	232°26.6	26.3	326°44.3	14.9			
23   38°066   12°314   109   28°162   0.19   28°14   26.3   386°485   15.0   Foliar   36°145   15.0													
Mer.   pass   23.07													
				_				_					
Fro	Mer.p	pass. 23:07	$ u$ -0.5 $^{\prime}$ $d1$	.1' m-3 $.91$	$\nu 1.1' \ d$ -0	.1′ m0.44	$\nu 2.4' \ d0.$	0′ m-2.48	$\nu 2.6' \ d0$	1′ m0.66			
Fin GHA GHA CHA Doc CHA Doc CHA Doc CHA Doc CHA Doc CHA Doc CHA Doc CHA Doc CHA Doc CHA Doc CHA Doc CHA Doc CHA DOC C											Alphard		
1 28°13.0   13°10.6   15°2°30.4   S16°13.0   26°18.3   N23°01.7   29°2°6.5   N22°2.03   20°5.4   S06°15.1   12°13.0   10°7°2.0   14°3.1   10°7°2.0   11°2.0   15°3.0   15°2.0	E	CHA	CHA	Dee	CHA	Doo	CHA	Doo	CHA	Doo	Regulus	207°34.9	11°50.9
1 28"13.0 in 16"29.8 in 16.0 280"19.4 in 16.0 30"38.7 26.3 in 16"57.0 in 17"26.2 in 17"											Dubhe	193°41.8	61°37.0
4 43°15.5 182°29.3 15.0 296°20.5 01.5 322°41.1 26.3 57°00.0 15.2 Across 17.2 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6											Denebola	182°25.5	$14^{\circ}26.1$
8 8 18 10 197° 28 8 16.1 310° 21.5 0.1.4 33° 43.5 0.26.3 72° 02.6 0.15.3 4 73° 0.4 212° 28.3 17.1 32° 22.6 0.13 352° 2.6 0.13 352° 3.5 0.20 3. 87° 05.2 15.3 4 5.5 0.6 1.5 3 87° 05.2 15.3 4 78° 0.2 15.											Gienah	175°44.2	-17°40.6
4 73°204 212°283 17.1 328°22.6 01.3 382°45.9 06.3 87°05.2 15.3 6 88°20.9 217°278 181.3 40°237 01.2 7°48.3 26.3 10°2078 15.4 54.   6 103°25.4 242°27.3 516°19.2 355°26.8 10.23°61.1 22°80.8 102°26.3 117°10.4 506°15.4   8 133°30.3 27°2°26.2 12.1 25°26.9 0.0.9 52°85.6 2.0.3 117°10.4 506°15.4   8 133°30.3 27°2°26.2 12.1 25°26.9 0.0.9 52°85.6 2.0.3 147°15.7 15.6   10 163°35.2 302°25.2 12.2 25°26.9 0.0.9 52°85.6 2.0.3 147°15.7 15.6   10 163°35.2 302°25.2 12.3 55°29.1 0.0.7 83°00.4 2.0.3 117°20.9 15.7   11 176°37.7 317°24.7 24.3 70°30.2 0.0.6 96°02.9 26.3 117°20.9 15.7   11 176°37.7 317°24.7 24.3 70°30.2 0.0.6 96°02.9 26.3 117°20.9 15.7   12 193°40.1 332°24.2 516°55.4 85°31.2 12°23°05.1 115°05.3 102°26.4 207°26.1 506°15.8   12 208°45.1 12°23.1 27.4 115°33.4 0.0.3 143°10.7 26.4 222°28.7 15.9   14 223°45.1 12°23.1 27.4 115°33.4 0.0.3 143°10.7 26.4 222°38.1 15.9   15 238°47.5 11°22.6 2.2 5.8 513.8 0.0.3 143°10.7 26.4 222°38.7 10.0   16 233°50.0 32°22.1 29.5 145°35.6 0.01 173°15.0 26.4 225°33.9 10.0   18 233°54.9 6°21.1 516°31.5 175°37.7 102°9.9 203°19.8 102°25.4 22°34.9 10.0   18 233°49.9 09°20.0 33.6 200°39.9 59.7 233°47.7 26.4 327°47.0 16.3   18 233°49.9 09°20.0 33.6 200°39.9 59.7 233°47.7 26.4 327°47.0 16.3   18 233°49.9 09°20.0 33.6 200°39.9 59.7 233°47.7 26.4 327°47.0 16.3   18 233°49.9 09°20.0 33.6 200°39.9 59.7 233°47.7 26.4 327°47.0 16.3   18 234°49.4 272°19.0 35.6 235°42.1 59.5 263°9.5 26.4 327°47.0 16.3   18 243°49.0 1.2 12°19.0 35.6 235°42.1 59.5 263°9.5 26.4 327°47.0 16.3   18 243°49.0 1.2 12°19.0 35.6 235°42.1 59.5 263°9.5 26.4 327°47.0 16.3   18 243°49.0 1.3 107°19.5 34.6 200°39.9 59.7 233°47.7 26.4 327°47.0 16.3   18 243°49.0 1.3 107°19.5 34.6 200°39.9 59.7 233°47.7 26.4 327°47.0 16.3   18 243°49.0 1.3 107°19.5 34.6 200°39.9 59.7 233°47.7 26.4 327°47.0 16.3   18 243°49.0 1.3 107°19.5 34.6 200°39.9 59.7 233°47.7 26.4 327°47.0 16.3   18 243°49.0 1.3 107°19.5 34.6 200°39.9 59.7 233°47.7 26.4 327°47.0 16.3   18 243°49.0 1.3 107°49.5 34.6 200°39.5 200°39.5 200°39.5 200°39.5 200°39.5 200°39.5 200°39.5 200°39.5 20											Acrux	$173^{\circ}01.1$	-63°14.1
88*229 22*2*78 8 1813 340*23.7 01.2 7*48.3 03.02*07.8 15.4											Gacrux	171°52.6	-57° 15.0
103"25.4   242"27.3   S16"10.2   355"24.8   N25"01.1   22"80.8   N22"26.3   117"10.4   S08"15.4   Alkaid   152"25.6   49"11.5   S16.8   S18"25.3   49"11.5   S18.8   S18"25.3   49"11.5   49"11.5   S18"25.3   49"11.5   49"11.5   59"11.5											Alioth	166°13.7	55°49.6
6 103 254 2 257 3 516 19.2 355 248 023 01.0 375 32 26.3 117 10.4 508 15.4 Alkiald 152 15.2 10.2 10.2 15.2 10.0 375 32.2 26.3 113 12 13.1 15.5 Hadra 188 37.0 60°29.6 8 133°30.3 22°22.2 2 22°20.2 21.2 25°20.9 0.0.9 52°55.6 26.3 147 15.7 15.6 Menkent 147°8.3 36°29.5 10.1 1878 32.8 267°25.7 · 22.3 55°29.1 00.7 83°00.4 26.3 177°20.9 15.7 Kochab 137°20.7 14.7 10.1 163°35.2 302°25.2 23.3 55°29.1 00.7 83°00.4 26.3 177°20.9 15.7 Kochab 137°20.7 14.7 10.3 12 193°40.1 32°22.5 15.7 Kochab 137°20.7 14.7 10.3 12 193°40.1 32°22.5 15.7 Kochab 137°20.7 14.7 10.3 12 193°40.1 32°22.5 15.7 Kochab 137°20.7 14.7 10.3 12 193°40.1 32°22.5 15.7 Kochab 137°20.7 14.7 10.3 12 193°40.1 32°22.5 15.7 Kochab 137°20.7 14.7 10.3 12 193°40.1 3 10.2 193°40.1 3 10.3 12.5 15.7 Kochab 137°20.7 14.0 10.3 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5											Spica	158°22.9	-11°17.3
National Color   Nati											Alkaid	152°52.6	49°11.5
8 133°30.2 2 272°86.2 21.2 25°26.9 0.09 52°55.6 26.3 147°15.7 15.6 Menkent 147°58.3 36°29.5 10 163°35.2 30°25.2 23.3 55°29.1 0.07 83°00.4 26.3 177°20.9 15.7 Refull 178°37.7 317°24.7 24.3 70°30.2 0.06 98°0.2 9 26.3 192°25.5 15.7 Refull 178°37.7 317°24.7 24.3 70°30.2 0.06 98°0.2 9 26.3 192°25.5 15.7 Refull 178°37.7 317°24.7 24.3 70°30.2 0.06 98°0.2 9 26.3 192°25.5 15.7 Refull 178°37.7 31°24.7 24.3 10°32.3 0.04 128°0.2 9 26.4 202°26.1 508°15.8 Level 139°40.1 32°26.2 10°25.3 12°25.5 15.7 Refull 136°35.3 N22°26.4 22°23.3 15°29.3 15.9 Refull 136°56.6 1.6°0.6 132°25.2 12°4.1 115°33.4 0.03 143°10.1 26.4 23°31.3 15.9 Refull 136°56.6 1.6°0.6 1.6°25.6 23°20.0 188°12.5 26.4 252°33.3 15.9 Refull 136°56.6 1.6°0.6 1.6°25.6 23°0.0 188°17.4 26.4 252°35.0 16.0 Attria 10°10.1 .0°90.2 11.0 Refull 136°56.6 1.6°0.6 1.6°25.5 1.0°25.6 23°0.0 188°17.4 26.4 252°35.0 16.0 Refull 136°56.6 1.6°25.6 23°0.0 188°17.4 26.4 252°35.0 16.0 Refull 136°35.6 1.6°35.6 23°0.0 188°17.4 26.4 252°35.0 16.0 Refull 136°35.6 1.6°35.6 23°0.0 188°17.4 26.4 252°35.0 16.0 Refull 136°35.0											Hadar	148°37.0	
188*328   287*257   22.3   40°28.0   00.8   67°88.0   26.3   17°29.5   15.7   Ratcurus   145°48.4   19°03.4   118°33.7   118°33.7   118°33.7   137°24.7   24.3   70°30.2   00.6   98°02.9   26.3   192°23.5   15.7   Ratcurus   138°24.2   516°25.4   86°31.2   723°00.5   118°05.3   72°26.4   20°2°25.7   15.99   15.00°15.8   128°07.7   26.4   222°28.7   15.99   15.00°15.8   128°07.7   26.4   222°28.7   15.99   15.90°15.8   128°07.7   26.4   223°3.1   15.90°15.8   128°07.7   26.4   222°28.7   15.99   15.90°15.8   15.												147°58.3	
10 163°35.2 300°252.2 23.3 55°29.1 00.7 83°00.4 26.3 177°20.9 15.7   Rigil Kent. 139°41.3 40°50.5   118°65.3 192°25.1 508°15.8   Kochab 137°20.7 74°0.3   12 193°40.1 33°20.4 2 161°25.4 88°31.2 N23°00.5 133°05.3 N22°26.4 202°26.1 508°15.8   Zuberlubi 136°56.6 16°0.6 6 132°25.5 28°47.5 17°22.6 -28°25.1 116°33.4 0.03 143°10.1 26.4 223°31.3 15.9   Liberubi 136°56.6 16°0.6 6 15.2 28°47.5 17°22.6 -28°25.1 116°35.6 0.01 173°15.0 26.4 252°33.3 -16.0   Artiar 107°11.0 99°0.6 16.1   Spill 136°35.6 0.01 173°15.0 26.4 26°36.6 16.0   Spill 136°35.6 16°36.6 23°00.0 188°17.4 26.4 228°39.4   16.1   Spill 136°35.5 175°37.7 N22°59.9 203°19.8 N22°26.4 282°39.1   16.1   Spill 136°35.5 15°36.5 15°3													
11 178°37.7 317°24.7 24.3 70°30.2 mol. 99°0.9 go.3 192°23.5 l.57.   Kochab 137°20.7 74°0.3   12 193°40.1 332°24.2 S16°25.4 88°31.2 N23°00.5 133°65.3 N22°26.4 20°31.5 of S08°15.8   3208°42.6 347°23.7 26.4 100°32.3 00.4 128°07.7 26.4 222°28.7 l.59.   14 223°45.1 2°24.8 115°33.4 00.3 143°10.1 26.4 237°31.3 l.59.   Alphenical 136°65.6 i.16.0 6.6 Alpheca 126°04.2 26°33.9 l.60.   16 253°90.0 32°22.1 29.5 l.45°35.5 00.1 173°15.0 26.4 267°33.9 l.16.   17 268°9.5 47°21.6 30.5 l.60°36.6 23°00.0 l.88°17.4 26.4 282°39.2 l.61.   18 283°45.9 6°22.1 S16°31.5 l.75°37.7 N22°59.9 20°39.8 N22°56.4 29°4.8 S08°16.1   19 299°57.4 77°20.5 32.6 l.90°38.8 59.8 218°22.2 26.4 312°44.4 l.6.   19 299°57.4 77°20.5 32.6 l.90°38.8 59.8 218°22.2 26.4 312°44.9 l.6.   22 344°04.8 122°19.0 33.6 205°39.9 59.7 233°24.7 0.6.   335°07.2 137°18.5 35.7 250°42.1 59.5 263°29.5 26.4 332°40.7 l.6.3   Kaus Mat.   Mer. pass. 23.04    W0.5' d1.0' m-3.91   V.1.1' d-0.1' m0.42   V.2.4' d0.0' m-2.49   V.2.6' d0.1' m0.67   Peacok 53°03.5   Sol. 182°16.4 40°16.   182°16.9 39.7 29°64.4 59°1.1 322°20.4 27°57.4 508°16.5   Sol. GHA   GHA   GHA   GHA   GHA   GHA   GHA   CHA   CH											1		
193°40.1   332°24.2   516°25.4   85°31.2   N23°00.5   13°05.3   N22°26.4   207°26.1   508°15.8   13°06.6   34°08.6   14°08.6   14°08.6   14°09.7   13°05.6   13°05.8   13°05.6   13°05.8											_		
13   208°426   347°237   26.4   100°32.3   00.4   128°077   26.4   222°28.7   15.9   Alpheca   126°04.2   26°38.1     14   223°451   27.2   156°31.3   16.9   Alpheca   126°04.2   26°38.1     15   238°47.5   17°22.6   28.5   130°34.5   00.0   186°12.5   26.4   25°33.9   16.0   Alrais   107°11.0   65°04.0     17   268°52.5   47°21.6   30.5   160°36.6   23°00.0   188°17.4   26.4   282°39.2   16.1     18   288°54.9   66°21.1   516°31.5   175°377, 782°59.9   00.9   188°12.2   26.4   282°39.2   16.1     18   288°54.9   66°21.1   516°31.5   175°377, 782°59.9   00.9   188°12.2   26.4   312°44.4   16.2     19   298°57.4   77°20.5   32.6   190°38.8   59.8   218°22.2   26.4   312°44.4   16.2     21   329°02.3   107°19.5   34.6   206°39.9   50.7   233°24.7   26.4   327°40.6   16.3     22   346°48.1   22°19.0   35.6   238°42.1   50.5   268°39.5   56.4   357°52.2   16.4     Mer.pass. 23:04   \$\bullet \text{Vega}				S16°25.4						508°15.8			
14 223°451 22°31. 27.4 115°33.4 00.3 143°10.1 26.4 23°31.3 15.9 4 Antares 11.2°16.3 26°29.2 15 238°47.5 17°2.2 6 × 28.5 130°34.5 × 00.2 15°12.5 × 26.4 25°23.9 × 16.0 4 16.0 69°04.5 16.0 16°05.5 16°03.6 23°00.1 173°15.0 26.4 26°36.6 16.0 25°350.0 18°2.7 10°05.0 18°17.4 26.4 28°239.2 16.1 5 28°35.5 16°03.6 23°00.1 18°37.7 802°55.9 26.4 26°36.6 16.0 28°39.2 16.1 5 28°35.2 16°03.8 5.8 5.8 5.8 5.8 5.8 18°22.0 22°4.1 516°31.5 175°37.7 802°55.9 203°19.8 802°66.4 29°41.8 508°16.1 5 28°40.4 16.2 16.2 16°03.2 16°03.8 5.8 5.8 5.8 5.8 5.8 216°22.2 26.4 312°44.4 16.2 16.3 16.2 16°03.4 5.2 16°03.8 5.8 5.8 5.8 5.8 5.8 5.8 5.8 5.8 5.8 5	13			26.4		00.4		26.4		15.9			
16 238°47.0 17°22.0 128'5 17'22.0 160'36.6 00.1 173°15.0 26.4 26°36.6 16.0 Sabis 102°03.2 15°45.3 17°26°55.6 47°21.6 30.5 160'36.6 23°00.0 188°17.4 26.4 28°39.2 16.1 Sabis 102°03.2 15°45.3 11°36°56.9 16.1 Sabis 102°03.2 15°45.3 11°36°56.9 16.1 Sabis 102°03.2 15°45.3 16.1 Sabis 102°03.2 16°45.3 16.1 Sabis 102°03.2 16°45.3 16.1 Sabis 102°03.2 16°45.3 16.1 Sabis 102°03.2 16°45.3 16°													
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19 298*57.4 77*20.5 32.6 190*38.8 59.8 258*22.2 26.4 312*44.4 16.2 2   131*39.9 92*0.0 33.6 205*99.5 9.7 233*24.7 26.4 312*44.6 16.2   123 329*02.3 107*19.5 ·· 34.6 220*41.0 ·· 59.6 248*27.1 ·· 26.4 342*49.6 ·· 16.3   123 349*0.8 122*19.0 35.6 235*24.1 59.5 263*29.5 26.4 325*45.2 16.4   123 359*07.2 137*18.5 36.7 250*43.1 59.4 278*31.9 26.4 12*54.8 16.4   128 349*0.3 107*19.5 ·· 34.6 220*41.0 ·· 59.6 248*27.1 ·· 26.4 342*49.6 ·· 16.3   128 359*07.2 137*18.5 36.7 250*43.1 59.4 278*31.9 26.4 12*54.8 16.4   128 349*0.7 152*17.9 516*37.7 265*44.2 N22*59.3 293*34.4 N22*26.4 27*57.4 508*16.5   14 4*09.7 152*17.9 516*37.7 265*44.2 N22*59.3 293*34.4 N22*26.4 27*57.4 508*16.5   14 4*09.7 152*17.9 516*37.7 265*44.2 N22*59.3 293*34.4 N22*26.4 27*57.4 508*16.5   14 4*04.6 182*19.9 39.7 295*46.4 59.1 323*39.2 26.4 43*00.1 16.6   14 4*04.6 182*19.9 39.7 295*46.4 59.1 323*39.2 26.4 43*00.1 16.6   14 74*19.6 212*15.8 41.8 325*48.6 58.9 353*44.1 26.4 88*07.9 16.7   14 74*19.6 212*15.8 41.8 325*48.6 58.9 353*44.1 26.4 88*07.9 16.7   15 89*22.0 227*15.3 42.8 340*49.7 58.8 8*46.5 26.4 103*10.5 16.8   18 134*29.4 27*213.7 45.9 25*82.9 58.5 53*83.8 26.4 188*13.3 508*16.8   18 134*29.4 27*213.7 45.9 25*82.9 58.5 33*83.8 26.4 188*23.5 17.1   19 149*31.9 287*13.2 ·· 46.9 40*54.0 ·· 58.4 68*56.2 ·· 26.4 163*20.9 ·· 17.0   11 179*36.8 317*12.1 48.9 70*56.2 58.2 99*01.1 299*59.5 26.4 233*31.4 7.2   11 179*36.8 317*12.1 48.9 70*56.2 58.2 99*01.1 299*59.2 26.4 233*31.4 7.2   12 14*39.3 332*16 516*9.9 85*73. N22*88.1 114*03.5 N22*26.4 288*34.0 17.3   11 179*36.8 317*12.1 48.9 70*56.2 58.2 99*01.1 299*59.0 26.4 233*31.4 7.2   12 14*39.3 332*19.1 516*0.0 53.0 131*0.0 6 ·· 57.8 159*0.8 N22*26.4 288*38.0 17.3   14 224*4.2 2*10.5 51.9 110*0.8 57.5 57.9 144*08.3 26.4 288*38.0 17.3   15 239*46.7 71*00.0 ·· 53.0 131*00.6 ·· 57.8 159*0.8 N22*26.4 288*38.0 17.5   18 284*54.1 6*20*0.8 16*69.0 176*03.8 N22*57.5 204*18.1 N22*26.4 288*34.1 81.5   18 284*54.1 6*20*0.8 16*69.0 210*07.1 57.2 249*25.4 26.4 288*33.3 ·· 17.6   19 299*56.5 77*0.9 57.0 100*88.4 5		283°54.9		S16°31.5		N22°59.9		N22°26.4		S08°16.1			
20 313°599 92°20.0 33.6 205°39.9 59.7 233°24.7 26.4 32°47.0 16.3 Vega 80°33.4 38°32.9 3-4°22.5 21 32°02.3 10°19.5 36.6 235°42.1 59.5 263°29.5 26.4 35°55.2 16.4 Nunki 75°48.0 -26°16.0 Altair 62°00.1 8°56.1 Nunki 75°48.0 -26°16.0 Altair 62°00.1 8°56.1 Nunki 75°48.0 -26°16.0 Altair 62°00.1 8°56.1 Nunki 75°48.0 -26°16.0 Altair 62°00.1 8°56.1 Nunki 75°48.0 -26°16.0 Altair 62°00.1 8°56.3 Nunki 75°48.0 -26°16.0 Altair 62°00.1 8°56.1 Nunki 75°48.0 -26°16.0 Altair 62°00.1 8°56.3 Nunki 75°48.0 -26°16.0 Nunki 75°48.0 -26°16.0 Nunki 75°48.0 -26°16.0 Nunki 75°48.0 -26°16.0 Nunki 75°48.0 -26°16.0 Nunki 75°48.0 Nunki 75°48.0 -26°16.0 Nunki 75°48.0 Nunki 75°48.0 -26°16.0 Nunki 75°48.0	19	298°57.4	77° 20.5	32.6	190°38.8	59.8	218° 22.2	26.4	312°44.4	16.2	_		
21   329°02.3   107°19.5   · · · · · · · · · · · · · · · · · ·	20	313°59.9	92°20.0	33.6	205°39.9	59.7	233°24.7	26.4		16.3			
22 344°04.8 122°19.0 35.6 235°42.1 59.5 263°29.5 26.4 35°752.2 16.4    12°54.8 16.5    12°54.8 16.4    12°54.8 16.5    12°54.8	21	329°02.3	$107^{\circ}19.5$	• • 34.6	220°41.0	• • 59.6	248°27.1	• • 26.4	342°49.6	• • 16.3			
Note	22	344°04.8	$122^{\circ}19.0$	35.6	235°42.1	59.5	263°29.5	26.4	357°52.2	16.4			
Mer.pass. 23:04   V-0.5' d1.0' m-3.91   V1.1' d-0.1' m0.42   V2.4' d0.0' m-2.49   V2.6' d0.1' m0.67   Peacock   S3°05.8   56°39.5   Mer.pass	23	359°07.2	137° 18.5	36.7		59.4	278°31.9	26.4	12°54.8	16.4			
Sat         GHA         GHA         Dec         GHA         Name         27°57.4         508°16.5         Formalhaut         27°32.8         40°50.6           1         29°12.2         16°17.7         38.7         26°44.2         N2°59.3         59.2         308°36.8         26.2         43°00.1         16.6         50°17.1         19°16.4         40.83         59.2         308°36.8         59.2         30°27.1         16.6         50°17.1         19°16.4         40.83         310°47.5         59.0         338°41.6         26.4         43°0.7         16.6         Markab         13°49.1         23°29.3         16.7         47°19.6         12°15.8         41.8         32°48.6         58.9         33°41.6         26.4         43°0.7         16.7         Markab         13°29.9         15°20.4           5         89°2.0         22°15.3         42.8         340°49.7         58.8         8°46.5         26.4         133°1.5         16.7         10°29°26.9         18°20.2         10°29°26.9         18°20.2         11°2°20.2 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td>1/ 0.10</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						1/ 0.10							
Sat   GHA   GHA   Dec   GHA	Mer.p	bass. 23:04	$\nu$ -0.5′ $d1$	.0′ m-3.91	$\nu 1.1' d-0$	.1′ m0.42	$\nu$ 2.4′ d0.	0′ m-2.49	$\nu$ 2.6′ $d0$	1′ m0.67			
Sat         GHA         CHA         Dec         GHA         Possible													
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5         89°22.0         227°15.3         42.8         340°49.7         58.8         8°46.5         26.4         103°10.5         16.8         Venus         140°31.1         13:50           6         104°24.5         242°14.8         516°43.8         355°50.8         N22°58.7         23°48.9         N22°26.4         118°13.1         508°16.8         Mars         252°41.2         06:20           7         119°27.0         257°14.2         44.8         10°51.8         58.6         38°51.3         26.4         133°15.7         16.9         Jupiter         279°26.9         04:33           9         149°31.9         287°13.2         46.9         40°54.0         58.4         68°56.2         26.4         163°20.9         17.0         55um         13°40.6         22:13           10         164°34.4         302°12.7         47.9         55°55.1         58.3         83°88.6         26.4         178°23.5         17.1         Venus         139°19.8         13:50           12         194°39.3         332°11.6         516°49.9         85°57.3         N22°58.1         114°03.5         N22°26.4         208°28.8         508°17.2         Jupiter         279°25.7         06:18           13         209°41.7 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Oct 03 Thu</td> <td>SHA</td> <td>Mer.pass</td>											Oct 03 Thu	SHA	Mer.pass
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9 149°31.9 287°13.2 ·· 46.9 40°54.0 ·· 58.4 68°56.2 ·· 26.4 163°20.9 ·· 17.0 164°34.4 302°12.7 47.9 55°55.1 58.3 83°58.6 26.4 178°23.5 17.1 179°36.8 317°12.1 48.9 70°56.2 58.2 99°01.1 26.4 193°26.2 17.1 179°36.8 317°12.1 50.9 100°58.4 58.0 129°05.9 26.4 223°31.4 17.2 179°26.7 21.5 239°46.7 17°10.0 ·· 53.0 131°00.6 ·· 57.8 159°10.8 ·· 26.4 253°36.6 ·· 17.4 17.2 1824°54.1 62°08.4 516°56.0 176°03.8 N22°57.5 204°18.1 N22°26.4 288°41.8 17.5 1828°57.6 189°15.6 26.4 283°41.8 17.5 1828°55.6 77°07.9 57.0 191°04.9 57.4 219°20.5 26.4 313°47.0 17.6 21.6 330°01.5 107°06.8 16°59.0 221°07.1 ·· 57.2 249°25.4 ·· 26.4 313°57.5 17.8 17.8 17.8 17.8 17.8 17.9 17.8 182°36.8 11.9 10°06.8 16°59.0 221°07.1 ·· 57.2 249°25.4 ·· 26.4 358°54.9 17.8 17.8 17.8 17.8 182°36.8 11.9 10°06.8 16°59.0 221°07.1 ·· 57.2 249°25.4 ·· 26.4 358°54.9 17.8 17.8 17.8 17.8 182°36.8 11.0 251°09.3 57.0 279°30.2 26.4 13°57.5 17.8 17.8 17.8 17.8 18.2 18.2 18.2 18.2 18.2 18.2 18.2 18													
10													
11 179°36.8 317°12.1 48.9 70°56.2 58.2 99°01.1 26.4 193°26.2 17.1   12 194°39.3 332°11.6 \$16°49.9 85°57.3 N22°58.1 114°03.5 N22°26.4 208°28.8 \$08°17.2   13 209°41.7 347°11.1 50.9 100°58.4 58.0 129°05.9 26.4 223°31.4 17.2   14 224°44.2 2°10.5 51.9 115°59.5 57.9 144°08.3 26.4 238°34.0 17.3   15 239°46.7 17°10.0 ·· 53.0 131°00.6 ·· 57.8 159°10.8 ·· 26.4 253°36.6 ·· 17.4   16 254°49.1 32°09.5 54.0 146°01.7 57.7 174°13.2 26.4 268°39.2 17.4   17 269°51.6 47°09.0 55.0 161°02.8 57.6 189°15.6 26.4 283°41.8 17.5   18 284°54.1 62°08.4 \$16°55.0 176°03.8 N22°57.5 204°18.1 N22°26.4 298°44.4 \$08°17.5   19 299°56.5 77°07.9 57.0 191°04.9 57.4 219°20.5 26.4 313°47.0 17.6   20 314°59.0 92°07.4 58.0 206°06.0 57.3 234°22.9 26.4 313°47.0 17.6   21 330°01.5 107°06.8 16°59.0 221°07.1 ·· 57.2 249°25.4 ·· 26.4 343°52.3 ·· 17.7   22 345°03.9 122°06.3 17°00.0 236°08.2 57.1 264°27.8 26.4 358°54.9 17.8   23 0°06.4 137°05.8 01.0 251°09.3 57.0 279°30.2 26.4 13°57.5 17.8    Venus 139°19.8 13:50   Mars 252°07.7 06:18   Mars 252°07.7 06:18   Mars 252°07.7 06:18   NA2°25.7 04:29   Saturn 13°44.2 22:08    Saturn 13°44.2 22:08    Venus 138°08.2 13:51   Mars 251°34.5 06:17   Jupiter 279°24.6 04:25   Saturn 13°47.7 22:04    Horizontal parallax   Venus: 0.1   Mars: 0.1													•
12 194°39.3 332°11.6 \$16°49.9 85°57.3 N22°58.1 114°03.5 N22°26.4 208°28.8 \$08°17.2 13 209°41.7 347°11.1 50.9 100°58.4 58.0 129°05.9 26.4 223°31.4 17.2 14 224°44.2 2°10.5 51.9 115°59.5 57.9 144°08.3 26.4 238°34.0 17.3 15 239°46.7 17°10.0 ·· 53.0 131°00.6 ·· 57.8 159°10.8 ·· 26.4 253°36.6 ·· 17.4 16 254°49.1 32°09.5 54.0 146°01.7 57.7 174°13.2 26.4 268°39.2 17.4 17 269°51.6 47°09.0 55.0 161°02.8 57.6 189°15.6 26.4 283°41.8 17.5 18 284°54.1 62°08.4 \$16°56.0 176°03.8 N22°57.5 204°18.1 N22°26.4 298°44.4 \$08°17.5 19 299°56.5 77°07.9 57.0 191°04.9 57.4 219°20.5 26.4 313°47.0 17.6 20 314°59.0 92°07.4 58.0 206°06.0 57.3 234°22.9 26.4 313°47.0 17.6 21 330°01.5 107°06.8 16°59.0 221°07.1 ·· 57.2 249°25.4 ·· 26.4 343°52.3 ·· 17.7 22:04 18.1 N22°26.4 26.4 343°52.3 ·· 17.7 22:04 18.2 345°03.9 122°06.3 17°00.0 236°08.2 57.1 264°27.8 26.4 358°54.9 17.8 17.8 18 Mars: 0.1 18 Mars: 0.1													
13													
14 224°44.2 2°10.5 51.9 115°59.5 57.9 144°08.3 26.4 238°34.0 17.3 15 239°46.7 17°10.0 · · 53.0 131°00.6 · · 57.8 159°10.8 · · 26.4 253°36.6 · · 17.4 16 254°49.1 32°09.5 54.0 146°01.7 57.7 174°13.2 26.4 268°39.2 17.4 17 269°51.6 47°09.0 55.0 161°02.8 57.6 189°15.6 26.4 283°41.8 17.5 18 284°54.1 62°08.4 \$16°56.0 176°03.8 N22°57.5 204°18.1 N22°26.4 298°44.4 \$08°17.5 19 299°56.5 77°07.9 57.0 191°04.9 57.4 219°20.5 26.4 313°47.0 17.6 20 314°59.0 92°07.4 58.0 206°06.0 57.3 234°22.9 26.4 328°49.6 17.6 21 330°01.5 107°06.8 16°59.0 221°07.1 · · 57.2 249°25.4 · · 26.4 343°52.3 · · 17.7 22 345°03.9 122°06.3 17°00.0 236°08.2 57.1 264°27.8 26.4 358°54.9 17.8 23 0°06.4 137°05.8 01.0 251°09.3 57.0 279°30.2 26.4 13°57.5 17.8    Saturn 13°44.2 22:08   Oct 05 Sat SHA Mer.pass													
15 239°46.7 17°10.0 ··· 53.0 131°00.6 ··· 57.8 159°10.8 ··· 26.4 253°36.6 ··· 17.4   16 254°49.1 32°09.5 54.0 146°01.7 57.7 174°13.2 26.4 268°39.2 17.4   17 269°51.6 47°09.0 55.0 161°02.8 57.6 189°15.6 26.4 283°41.8 17.5   18 284°54.1 62°08.4 516°56.0 176°03.8 N22°57.5 204°18.1 N22°26.4 298°44.4 508°17.5   19 299°56.5 77°07.9 57.0 191°04.9 57.4 219°20.5 26.4 313°47.0 17.6   20 314°59.0 92°07.4 58.0 206°06.0 57.3 234°22.9 26.4 328°49.6 17.6   21 330°01.5 107°06.8 16°59.0 221°07.1 ··· 57.2 249°25.4 ··· 26.4 343°52.3 ··· 17.7   22 345°03.9 122°06.3 17°00.0 236°08.2 57.1 264°27.8 26.4 358°54.9 17.8   23 0°06.4 137°05.8 01.0 251°09.3 57.0 279°30.2 26.4 13°57.5 17.8      Oct 05 Sat SHA Mer.pass     Venus 138°08.2 13:51     Mars 251°34.5 06:17     Jupiter 279°24.6 04:25     Saturn 13°47.7 22:04     Horizontal parallax											Saturn	13°44.2	22:08
16       254°49.1       32°09.5       54.0       146°01.7       57.7       174°13.2       26.4       268°39.2       17.4       Venus       138°08.2       13:51         17       269°51.6       47°09.0       55.0       161°02.8       57.6       189°15.6       26.4       283°41.8       17.5       Mars       251°34.5       06:17         18       284°54.1       62°08.4       516°56.0       176°03.8       N22°57.5       204°18.1       N22°26.4       298°44.4       508°17.5       Jupiter       279°24.6       04:25         19       299°56.5       77°07.9       57.0       191°04.9       57.4       219°20.5       26.4       313°47.0       17.6       Saturn       13°47.7       22:04         20       314°59.0       92°07.4       58.0       206°06.0       57.3       234°22.9       26.4       328°49.6       17.6       330°01.5       107°06.8       16°59.0       221°07.1       · 57.2       249°25.4       · 26.4       343°52.3       · 17.7       40       Horizontal parallax       Venus:       0.1         22       345°03.9       122°06.3       17°00.0       236°08.2       57.1       264°27.8       26.4       358°54.9       17.8       40       Mars:											Oct OF Cat	C L V	Mor noss
17       269°51.6       47°09.0       55.0       161°02.8       57.6       189°15.6       26.4       283°41.8       17.5       Mars       251°34.5       06:17         18       284°54.1       62°08.4       516°56.0       176°03.8       N22°57.5       204°18.1       N22°26.4       298°44.4       508°17.5       Jupiter       279°24.6       04:25         19       299°56.5       77°07.9       57.0       191°04.9       57.4       219°20.5       26.4       313°47.0       17.6       310°47.7       22:04         20       314°59.0       92°07.4       58.0       206°06.0       57.3       234°22.9       26.4       328°49.6       17.6       330°01.5       107°06.8       16°59.0        221°07.1       · 57.2       249°25.4       · 26.4       343°52.3       · 17.7       400°0.0													-
18													
19 299°56.5 77°07.9 57.0 191°04.9 57.4 219°20.5 26.4 313°47.0 17.6 20 314°59.0 92°07.4 58.0 206°06.0 57.3 234°22.9 26.4 328°49.6 17.6 21 330°01.5 107°06.8 16°59.0 221°07.1 · 57.2 249°25.4 · 26.4 343°52.3 · 17.7 22 345°03.9 122°06.3 17°00.0 236°08.2 57.1 264°27.8 26.4 358°54.9 17.8 23 0°06.4 137°05.8 01.0 251°09.3 57.0 279°30.2 26.4 13°57.5 17.8    Saturn 13°47.7 22:04   Horizontal parallax   Venus: 0.1   Mars: 0.1													
20 314°59.0 92°07.4 58.0 206°06.0 57.3 234°22.9 26.4 328°49.6 17.6 21 330°01.5 107°06.8 16°59.0 221°07.1 · 57.2 249°25.4 · 26.4 343°52.3 · 17.7 22 345°03.9 122°06.3 17°00.0 236°08.2 57.1 264°27.8 26.4 358°54.9 17.8 23 0°06.4 137°05.8 01.0 251°09.3 57.0 279°30.2 26.4 13°57.5 17.8  Horizontal parallax Venus: 0.1 Mars: 0.1													
21 330°01.5 107°06.8 16°59.0 221°07.1 · · · 57.2 249°25.4 · · · 26.4 343°52.3 · · · 17.7 22 345°03.9 122°06.3 17°00.0 236°08.2 57.1 264°27.8 26.4 358°54.9 17.8 264°27.8 26.4 13°57.5 17.8 4 Mars: 0.1											Saturn	13 41.1	∠Z:U4
22 345°03.9 122°06.3 17°00.0 236°08.2 57.1 264°27.8 26.4 358°54.9 17.8 Venus: 0.1 23 0°06.4 137°05.8 01.0 251°09.3 57.0 279°30.2 26.4 13°57.5 17.8 Mars: 0.1											Horizont	al parallax	
23 0°06.4 137°05.8 01.0 251°09.3 57.0 279°30.2 26.4 13°57.5 17.8 Mars: 0.1												-	0.1
Mer.pass. 23:00 $\nu$ -0.5' $d$ 1.0' m-3.92 $\nu$ 1.1' $d$ -0.1' m0.41 $\nu$ 2.4' $d$ 0.0' m-2.50 $\nu$ 2.6' $d$ 0.1' m0.67													
	Mer.p	pass. 23:00	$\nu$ -0.5' $d1$	.u′ m-3.92	$\nu$ 1.1' d-0	.1′ m0.41	$\nu$ 2.4′ d0.	υ′ m-2.50	$\nu$ 2.6′ d0.	1′ m0.67			

h	Sui	+0.0300 sec		1-011	Moon	202 360	-
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	182°44.8	S04°04.1	180°48.7	17.3'	S05°29.2	14.0'	53.9'
1	197°45.0	05.1	195°25.0	17.2	05°43.2	14.0'	53.9'
2	212°45.2 227°45.4	06.1 •• 07.0	210°01.2 224°37.4	17.2' 17.2'	05°57.2 06°11.1	13.9' 13.9'	53.9' 53.9'
4	242°45.6	08.0	239°13.6	17.2	06°25.0	13.9'	53.9'
5	257°45.8	09.0	253°49.8	17.2'	06°38.9	13.9'	53.9'
6	272°46.0 287°46.2	S04°09.9 10.9	268°26.0 283°02.1	17.1' 17.1'	\$06°52.8 07°06.6	13.8' 13.8'	53.9' 53.9'
7 8	287 46.2 302°46.4	10.9	283 02.1 297°38.2	17.1' 17.1'	07 06.6 07°20.5	13.8	53.9' 53.9'
9	317°46.5	• • 12.8	312°14.3	17.0'	07°34.2	13.8'	53.9'
10	332°46.7	13.8	326°50.3	17.0'	07°48.0	13.7'	53.9'
11 12	347°46.9 2°47.1	14.8 \$04°15.7	341°26.3 356°02.3	17.0' 16.9'	08°01.8 \$08°15.5	13.7' 13.7'	53.9' 53.9'
13	17°47.3	16.7	10°38.2	16.9	08° 29.2	13.7	53.9'
14	32°47.5	17.7	25°14.1	16.9'	08°42.8	13.6'	53.9'
15 16	47°47.7 62°47.9	· · 18.6 19.6	39°50.0 54°25.8	16.8' 16.8'	08°56.5 09°10.1	13.6' 13.6'	53.9' 53.9'
17	77°48.1	20.5	69°01.6	16.8	09° 10.1	13.5'	53.9
18	92°48.3	S04°21.5	83°37.4	16.7'	<b>S</b> 09°37.2	13.5'	53.9'
19	107°48.5 122°48.7	22.5 23.4	98°13.1 112°48.8	16.7' 16.7'	09°50.7 10°04.1	13.5'	53.9'
20 21	122 48.7 137°48.9	24.4	112 48.8 127°24.5	16.6'	10 04.1 10°17.6	13.4' 13.4'	53.9' 53.9'
22	152°49.0	25.4	142°00.1	16.6'	10°31.0	13.4'	53.9'
23	167°49.2	26.3	156°35.7	16.5'	10°44.3	13.3'	53.9'
	SD = 16.0'	d = 1.0'		SE	O = 14.7'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°49.4	S04°27.3	171°11.2	16.5'	S10°57.7	13.3'	53.9'
1 2	197°49.6 212°49.8	28.3 29.2	185°46.7 200°22.1	16.4' 16.4'	11°11.0 11°24.2	13.3' 13.2'	53.9' 53.9'
3	212 49.6 227°50.0	30.2	200 22.1 214°57.5	16.3	11°24.2	13.2'	53.9'
4	242°50.2	31.1	229°32.8	16.3'	11°50.6	13.1'	54.0'
5	257°50.4	32.1	244°08.1	16.2'	12°03.7	13.1'	54.0'
6 7	272°50.6 287°50.8	S04°33.1 34.0	258°43.4 273°18.6	16.2' 16.1'	\$12°16.8 12°29.9	13.0' 13.0'	54.0' 54.0'
8	302°50.9	35.0	287°53.7	16.1	12°42.9	13.0'	54.0'
9	317°51.1	• • 36.0	302°28.8	16.0'	12°55.8	12.9'	54.0'
10 11	332°51.3 347°51.5	36.9 37.9	317°03.9 331°38.9	16.0' 15.9'	13°08.7 13°21.6	12.9' 12.8'	54.0' 54.0'
12	2°51.7	504°38.9	346°13.8	15.9	\$13°34.4	12.8'	54.0'
13	17°51.9	39.8	0°48.7	15.8'	$13^{\circ}47.2$	12.7'	54.0'
14 15	32°52.1 47°52.3	40.8 •• 41.7	15°23.5 29°58.3	15.8' 15.7'	13°59.9 14°12.6	12.7' 12.6'	54.0' 54.0'
16	62°52.5	42.7	44°33.0	15.7'	14 12.0 14°25.2	12.6'	54.0'
17	77°52.6	43.7	$59^{\circ}07.7$	15.6'	$14^{\circ}37.7$	12.5'	54.0'
18 19	92°52.8 107°53.0	\$04°44.6 45.6	73°42.3 88°16.8	15.5' 15.5'	\$14°50.3 15°02.7	12.5' 12.4'	54.0' 54.0'
20	107 53.0 122°53.2	45.0 46.5	102°51.3	15.4	15 02.7 15°15.1	12.4	54.0'
21	137°53.4	• • 47.5	$117^{\circ}25.7$	15.4'	15°27.5	12.3'	54.1'
22	152°53.6 167°53.8	48.5	132°00.1	15.3'	15°39.8	12.2'	54.1'
23	SD = 16.0'	$\frac{49.4}{d=1.0'}$	146°34.4	15.2'	0 = 14.7'	12.2'	54.1'
Sat 0	<b>GHA</b> 182°54.0	Dec \$04°50.4	<b>GHA</b> 161°08.6	u 15.2'	<b>Dec</b> \$16° 04.2	d 12.1'	<b>HP</b> 54.1'
1	182 54.0 197°54.1	51.4	101 08.6 175°42.8	15.2 15.1'	16° 16.3	12.1'	54.1'
2	212°54.3	52.3	190°16.9	15.0'	16°28.4	12.0'	54.1'
3 4	227°54.5 242°54.7	· · 53.3 54.2	204°50.9 219°24.9	15.0' 14.9'	16°40.4 16°52.3	11.9' 11.9'	54.1' 54.1'
4 5	242 54.7 257°54.9	54.2 55.2	219 24.9 233°58.8	14.9	10 52.3 17°04.2	11.9	54.1'
6	272°55.1	S04°56.2	248°32.6	14.8'	S17°16.0	11.7'	54.1'
7	287°55.3	57.1	263°06.4	14.7'	17°27.7	11.7'	54.1'
8 9	302°55.4 317°55.6	58.1 04°59.0	277°40.1 292°13.7	14.6' 14.6'	17°39.4 17°51.0	11.6' 11.5'	54.2' 54.2'
10	332°55.8	05°00.0	306°47.3	14.5	18°02.6	11.5'	54.2'
11	347°56.0	01.0	321°20.8	14.4'	18° 14.1	11.4'	54.2'
12 13	2°56.2 17°56.4	\$05°01.9 02.9	335°54.2 350°27.5	14.3' 14.3'	\$18°25.5 18°36.8	11.3' 11.3'	54.2' 54.2'
13	32°56.6	02.9	5°00.8	14.3 14.2'	18°48.1	11.3 11.2'	54.2'
15	47°56.7	• • 04.8	19°34.0	14.1'	18°59.3	11.1'	54.2'
16	62°56.9 77°57.1	05.8	34°07.1 48°40.1	14.0'	19° 10.4 19° 21.4	11.0' 11.0'	54.2'
17 18	92°57.3	06.7 \$05°07.7	48°40.1 63°13.1	14.0' 13.9'	19°21.4 \$19°32.4	10.9	54.2' 54.3'
19	107°57.5	08.6	77°46.0	13.8'	19°43.3	10.8'	54.3'
20	122°57.7	09.6	92°18.8	13.7'	19°54.1	10.7'	54.3'
21 22	137°57.8 152°58.0	· · 10.6 11.5	106°51.5 121°24.2	13.7' 13.6'	20°04.9 20°15.5	10.7' 10.6'	54.3' 54.3'
23	167°58.2	12.5	135°56.8	13.5	20°26.1	10.5	54.3
	SD = 16.0'	d = 1.0'		SE	O = 14.7'		

Lat.	Twi	light	Sunrise	C	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	04:06	05:27	06:34	17:01	18:08	19:27
<b>N</b> 70°	04:16	05:28	06:29	17:06	18:06	19:18
68°	04:24	05:30	06:25	17:10	18:06	19:11
66°	04:30	05:30	06:22	17:14	18:05	19:05
64°	04:36	05:31	06:19	17:17	18:04	19:00
62°	04:40	05:32	06:16	17:20	18:04	18:55
60°	04:44	05:32	06:14	17:22	18:04	18:52
<b>N</b> 58°	04:47	05:32	06:12	17:24	18:03	18:49
56°	04:49	05:33	06:10	17:26	18:03	18:46
54°	04:52	05:33	06:08	17:28	18:03	18:44
52°	04:54	05:33	06:07	17:30	18:03	18:42
50° 45°	04:55	05:33	06:05	17:31	18:03	18:41
1	04:59	05:33	06:02	17:34	18:03	18:37
N 40°	05:01	05:33	06:00	17:37	18:04	18:35
35° 30°	05:03	05:32	05:57	17:39	18:05	18:34
20°	05:04 05:04	05:31 05:30	05:55 05:52	17:41 17:45	18:05 18:07	18:33 18:33
N 10°	05:04	05:30	05:52	17:45	18:10	18:34
0°	05:00	05:25	05:45	17:52	18:13	18:37
<b>S</b> 10°	04:56	05:21	05:42	17:55	18:16	18:41
20°	04:51	05:16	05:38	17:59	18:21	18:47
30°	04:42	05:10	05:34	18:03	18:27	18:56
35°	04:36	05:06	05:32	18:06	18:31	19:01
40°	04:29	05:02	05:29	18:09	18:36	19:09
45°	04:21	04:56	05:26	18:12	18:42	19:17
<b>S</b> 50°	04:10	04:49	05:22	18:16	18:49	19:29
52°	04:04	04:46	05:20	18:18	18:53	19:34
54°	03:58	04:42	05:18	18:20	18:57	19:41
56°	03:51	04:38	05:16	18:23	19:01	19:48
58°	03:43	04:33	05:13	18:25	19:06	19:56
<b>S</b> 60°	03:34	04:27	05:10	18:28	19:11	20:05

Lat.		Moonris	e		Moonset	
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°	07:43	09:57		16:21	15:32	
N 70°	07:31	09:30	12:05	16:35	16:01	14:55
68°	07:22	09:11	11:16	16:46	16:22	15:45
66°	07:15	08:55	10:46	16:56	16:39	16:16
64°	07:08	08:42	10:23	17:04	16:53	16:40
62°	07:03	08:32	10:05	17:11	17:05	16:59
60°	06:58	08:22	09:51	17:17	17:15	17:14
N 58°	06:54	08:15	09:38	17:22	17:24	17:28
56°	06:51	80:80	09:27	17:27	17:32	17:39
54°	06:47	08:01	09:18	17:31	17:39	17:49
52°	06:44	07:56	09:10	17:35	17:45	17:58
50°	06:42	07:51	09:02	17:38	17:51	18:06
45°	06:36	07:40	08:46	17:46	18:03	18:24
<b>N</b> 40°	06:31	07:31	08:33	17:52	18:14	18:38
35°	06:27	07:24	08:22	17:58	18:22	18:50
30°	06:23	07:17	08:13	18:03	18:30	19:01
20°	06:17	07:06	07:56	18:11	18:44	19:19
N 10°	06:12	06:56	07:42	18:19	18:56	19:35
0°	06:07	06:47	07:29	18:26	19:07	19:50
<b>S</b> 10°	06:02	06:38	07:16	18:33	19:18	20:05
20°	05:57	06:28	07:02	18:41	19:30	20:21
30°	05:51	06:17	06:46	18:49	19:44	20:40
35°	05:47	06:11	06:37	18:54	19:52	20:51
40°	05:43	06:04	06:26	19:00	20:01	21:04
45°	05:39	05:55	06:14	19:07	20:12	21:19
<b>S</b> 50°	05:34	05:45	05:59	19:15	20:25	21:37
52°	05:31	05:41	05:53	19:19	20:31	21:46
54°	05:28	05:36	05:45	19:23	20:38	21:56
56°	05:26	05:30	05:37	19:28	20:46	22:07
58°	05:22	05:24	05:27	19:33	20:54	22:19
<b>S</b> 60°	05:19	05:17	05:16	19:38	21:04	22:34

			Sun		Moon			
	Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
	,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	1-3	
L		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	0-4%	
	03	10:59	11:09	11:49	12:16	-:-		
	04	11:18	11:27	11:49	12:57	00:36		
	05	11:36	11:45	11:48	13:39	01:18		

## October 06, 07, 08 UT (Sun., Mon., Tue.)

h	Aries	Ve	nus		ars	Jup	iter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	15°08.9	152°05.2	\$17°02.0	266°10.4	N22°56.9	294°32.7	N22°26.4	29°00.1	S08°17.9			
1	30°11.3	167°04.7	03.0	281°11.5	56.8	309°35.1	26.4	44°02.7	17.9	Alpheratz	357°34.7 353°06.9	29°13.8 -42°10.2
2	45°13.8	$182^{\circ}04.1$	04.0	$296^{\circ}12.6$	56.7	324°37.5	26.4	59°05.3	18.0	Ankaa Schedar	349°30.8	56° 40.5
3	60°16.2	197°03.6	• • 05.0	311°13.7	• • 56.6	339°40.0	• • 26.4	74°07.9	· · 18.0	Diphda	348°47.2	-17°50.9
4	75°18.7	212°03.1	06.0	326°14.8	56.5	354°42.4	26.4	89°10.5	18.1	Achernar	335°19.7	-57°06.5
5 6	90°21.2 105°23.6	227°02.5 242°02.0	07.0 \$17°08.1	341°15.9 356°17.0	56.4 N22°56.3	9°44.8 24°47.3	26.4 N22°26.4	104°13.1 119°15.7	18.2 \$08°18.2	Hamal	$327^{\circ}51.1$	23°34.9
7	105°25.0	257°01.5	09.1	11°18.1	56.2	39°49.7	26.4	134°18.3	18.3	Polaris	313°45.1	89°21.9
8	135°28.6	272°00.9	10.1	26°19.2	56.1	54°52.2	26.4	149°20.9	18.3	Acamar	315°11.6	-40°12.1
9	150°31.0	287°00.4	• • 11.1	41°20.3	• • 56.0	69°54.6	• • 26.4	164°23.5	• • 18.4	Menkar	314°06.1 308°28.2	4°11.3
10	165°33.5	301°59.8	12.0	56°21.4	55.9	84°57.0	26.4	179°26.2	18.4	Mirfak Aldebaran	308 28.2 290°39.7	49°56.9 16°33.6
11	180°36.0	316°59.3	13.0	71°22.5	55.8	99°59.5	26.4	194°28.8	18.5	Rigel	281°03.9	-8° 10.2
12	195°38.4	331°58.8	\$17°14.0	86°23.6	N22°55.7	115°01.9	N22°26.4	209°31.4	S08°18.6	Capella	280°22.0	46°01.3
13 14	210°40.9 225°43.3	346°58.2 1°57.7	15.0 16.0	101°24.7 116°25.8	55.6 55.5	130°04.3 145°06.8	26.4 26.4	224°34.0 239°36.6	18.6 18.7	Bellatrix	278°23.0	6°22.5
15	240°45.8	16°57.1	. 17.0	131°26.9	• • 55.4	160°09.2	26.4	254°39.2	• • 18.7	Elnath	278°02.0	28°37.7
16	255°48.3	31°56.6	18.0	146°28.0	55.3	175°11.7	26.4	269°41.8	18.8	Alnilam	275°37.9	-1°11.0
17	270°50.7	46°56.0	19.0	161°29.2	55.2	$190^{\circ}14.1$	26.4	284°44.4	18.8	Betelgeuse Canopus	270°52.2 263°52.4	7°24.8 -52°42.1
18	285°53.2	61°55.5	<b>S</b> 17°20.0	176°30.3	N22°55.1	205°16.5	N22°26.4	299°47.0	S08°18.9	Sirius	203 52.4 258°26.4	-32 42.1 -16°44.7
19	300°55.7	76°55.0	21.0	191°31.4	55.0	220°19.0	26.4	314°49.6	18.9	Adhara	255°06.1	-29°00.0
20	315°58.1	91°54.4	22.0	206°32.5	54.9	235°21.4	26.4	329°52.2 344°54.8	19.0	Procyon	244°51.1	5°09.8
21 22	331°00.6 346°03.1	106°53.9 121°53.3	· · 23.0 24.0	221°33.6 236°34.7	•• 54.8 54.7	250°23.9 265°26.3	· · 26.4 26.4	344 54.8 359°57.4	· · 19.1 19.1	Pollux	243°17.7	27°58.0
23	1°05.5	136°52.8	25.0	251°35.8	54.6	280°28.8	26.4	15°00.0	19.1	Avior	234°15.1	-59°34.9
		-								Suhail	222°46.7	-43°31.6
Mer.p	bass. 22:56	$\nu$ -0.5′ $d1$	.0′ m-3.92	$\nu$ 1.1' d-0	0.1' m0.40	$\nu$ 2.4′ d0.	0′ m-2.50	$\nu$ 2.6′ d0	.1′ m0.68	Miaplacidus Alphard	221°38.9 217°48.2	-69°48.8 -8°45.7
										Regulus	217 46.2 207°34.9	-6 45.7 11°50.9
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.8	61°37.0
0	16°08.0	151°52.2	S17°26.0	266°36.9	N22°54.5	295°31.2	N22°26.4	30°02.6	508°19.2	Denebola	182°25.5	14°26.1
1	31°10.5	166°51.7	26.9	281°38.0	54.4	310°33.6	26.4	45°05.3	19.3	Gienah	175°44.2	-17°40.6
2 3	46°12.9 61°15.4	181°51.1 196°50.6	27.9 •• 28.9	296°39.1 311°40.2	54.3 •• 54.2	325°36.1 340°38.5	26.4 •• 26.4	60°07.9 75°10.5	19.3 •• 19.4	Acrux	173°01.1	-63°14.1
4	76°17.8	211°50.0	29.9	326°41.4	54.1	355°41.0	26.4	90°13.1	19.4	Gacrux	171°52.5	-57°15.0
5	91°20.3	226°49.5	30.9	341°42.5	54.0	10°43.4	26.4	105°15.7	19.5	Alioth	166°13.7	55°49.6
6	106°22.8	241°48.9	\$17°31.9	356°43.6	N22°53.8	25°45.9	N22°26.4	120°18.3	S08°19.6	Spica Alkaid	158°22.9 152°52.6	-11°17.3 49°11.5
7	121°25.2	256°48.4	32.9	11°44.7	53.7	40°48.3	26.4	135°20.9	19.6	Hadar	148°37.0	-60°29.5
8	136°27.7	271°47.8	33.8	26°45.8	53.6	55°50.8	26.4	150°23.5	19.7	Menkent	147°58.3	-36°29.4
9	151°30.2	286°47.3	• • 34.8	41°46.9	53.5	70°53.2	• • 26.4	165°26.1	• • 19.7	Arcturus	145°48.4	19°03.3
10 11	166°32.6 181°35.1	301°46.7 316°46.2	35.8 36.8	56°48.0 71°49.1	53.4 53.3	85°55.7 100°58.1	26.4 26.4	180°28.7 195°31.3	19.8 19.8	Rigil Kent.	139°41.3	-60°56.3
12	196°37.6	331°45.6	\$17°37.8	86°50.3	N22°53.2	116°00.6	N22°26.4	210°33.9	S08°19.9	Kochab	137°20.7	74°03.3
13	211°40.0	346°45.1	38.7	101°51.4	53.1	131°03.0	26.4	225°36.5	19.9	Zuben'ubi	136°56.6 126°04.2	-16°08.6 26°38.0
14	226°42.5	1°44.5	39.7	$116^{\circ}52.5$	53.0	$146^{\circ}05.4$	26.4	$240^{\circ}39.1$	20.0	Alphecca Antares	120 04.2 112°16.3	-26°29.2
15	241°45.0	16°44.0	• • 40.7	131°53.6	• • 52.9	161°07.9	• • 26.4	255°41.7	• • 20.0	Atria	107°11.1	-69°04.5
16	256°47.4	31°43.4	41.7	146°54.7	52.8	176°10.3	26.4	270°44.3	20.1	Sabik	102°03.2	-15°45.3
17 18	271°49.9 286°52.3	46°42.9 61°42.3	42.6 \$17°43.6	161°55.8 176°57.0	52.7 N22°52.6	191°12.8 206°15.2	26.4 N22°26.4	285°46.9 300°49.5	20.2 \$08°20.2	Shaula	$96^{\circ}10.8$	-37°07.4
19	301°54.8	76°41.7	44.6	170 57.0 191°58.1	52.5	200 15.2 221°17.7	26.4	315°52.1	20.3	Rasalhague	95°58.9	12°32.7
20	316°57.3	91°41.2	45.6	206°59.2	52.4	236°20.1	26.4	330°54.7	20.3	Eltanin	90°42.4	51°29.4
21	331°59.7	106°40.6	• • 46.5	222°00.3	• • 52.3	251°22.6	• • 26.4	345°57.4	20.4	Kaus Aust. Vega	83°32.9 80°33.4	-34°22.5 38°48.6
22	347°02.2	121°40.1	47.5	237°01.4	52.2	266°25.0	26.4	1°00.0	20.4	Nunki	75°48.1	-26° 16.0
23	2°04.7	136°39.5	48.5	252°02.6	52.1	281°27.5	26.4	16°02.6	20.5	Altair	62°00.1	8°56.2
Mer.p	pass. 22:52	$\nu$ -0.5' d1	.0′ m-3.92	$\nu 1.1' \ d-0$	0.1' m0.39	$\nu$ 2.4′ d0.	0′ m-2.51	$\nu$ 2.6′ d0	.1′ m0.68	Peacock	53°05.9	-56° 39.5
				-						Deneb	49°25.8	45°22.4
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.8	9°59.4
0	17°07.1	151°39.0	\$17°49.5	267°03.7	N22°52.0	296°30.0	N22°26.4	31°05.2		Al Na'ir Fomalhaut	27°32.8 15°14.4	-46°50.6 -29°29.5
1	32°09.6	166°38.4	50.4	282°04.8	51.8	311°32.4	26.4	46°07.8	20.6	Scheat	15 14.4 13°45.1	-29 29.5 28°13.2
2	47°12.1	181°37.8	51.4	297°05.9	51.7	326°34.9	26.4	61°10.4	20.6	Markab	13°29.9	15°20.4
3	62°14.5	196°37.3	• • 52.4	312°07.1	• • 51.6	341°37.3	• • 26.4	76°13.0	• • 20.7			
4	77°17.0 92°19.4	211°36.7 226°36.1	53.3	327°08.2	51.5	356°39.8	26.4	91°15.6 106°18.2	20.8	Oct 06 Sun	<b>SHA</b> 136°56.4	Mer.pass 13:52
5 6	92°19.4 107°21.9	241°35.6	54.3 \$17°55.3	342°09.3 357°10.4	51.4 N22°51.3	11°42.2 26°44.7	26.4 N22°26.4	106°18.2 121°20.8	20.8 \$08°20.9	Mars		06:15
7	122°24.4	256°35.0	56.2	12°11.6	51.2	41°47.1	26.4	136°23.4	20.9	Jupiter		04:21
8	137°26.8	271°34.5	57.2	27°12.7	51.1	56°49.6	26.4	151°26.0	21.0	Saturn	13°51.2	22:00
9	152°29.3	286°33.9	• • 58.2	42°13.8	• • 51.0	71°52.0	• • 26.4	$166^{\circ}28.6$	• • 21.0	Oct 07 Mon	SHA	Mer.pass
10	167°31.8	301°33.3	17°59.1	57°14.9	50.9	86°54.5	26.4	181°31.2	21.1		135°44.2	13:53
11	182°34.2	316°32.8	18°00.1	72°16.1	50.8	101°57.0	26.4	196°33.8	21.1	Mars		06:13
12 13	197°36.7 212°39.2	331°32.2 346°31.6	\$18°01.0 02.0	87°17.2 102°18.3	N22°50.7 50.6	116°59.4 132°01.9	N22°26.4 26.4	211°36.4 226°39.0	508°21.2 21.2	Jupiter	279°23.2	04:17
13 14	212 39.2 227°41.6	1°31.1	02.0	102 18.3 117°19.4	50.6 50.5	132 01.9 147°04.3	26.4 26.4	220 39.0 241°41.6	21.2	Saturn	13°54.7	21:56
15	242°44.1	16°30.5	• • 03.9	132°20.6	50.3	162°06.8	26.4	256°44.2	. 21.3	Oct 08 Tue	SHA	Mer.pass
16	257°46.6	31°29.9	04.9	147°21.7	50.2	177°09.2	26.4	271°46.8	21.4		134°31.8	13:54
17	272°49.0	46°29.4	05.8	162°22.8	50.1	192°11.7	26.4	286°49.4	21.5	Mars	249°56.6	06:11
18	287°51.5	61°28.8	\$18°06.8	177°24.0	N22°50.0	207°14.2	N22°26.4	301°52.0	S08°21.5	Jupiter		04:13
19	302°53.9	76°28.2	07.7	192°25.1	49.9	222°16.6	26.4	316°54.6	21.6	Saturn	13°58.0	21:52
20 21	317°56.4 332°58.9	91°27.7 106°27.1	08.7 •• 09.7	207°26.2 222°27.4	49.8 •• 49.7	237°19.1 252°21.5	26.4 •• 26.4	331°57.2 346°59.8	21.6 · · 21.7	Horizont	al parallax	
22	348°01.3	100 27.1 121°26.5	10.6	237°28.5	49.7	267°24.0	26.4	2°02.4	21.7		Venus:	0.1
23	3°03.8	136°26.0	11.6	252°29.6	49.5	282°26.5	26.4	17°05.0	21.8		Mars:	0.1
Mern	pass. 22:48		.0′ m-3.93		0.1' m0.38		.0′ m-2.52		.1′ m0.69			
- vici.p		ν 0.0 UI	111-3.33	ν 1.1 U-C	.1110.30	ν Δ.σ u-0	.0 111-4.34	ν Δ.Ο UU	1110.09			

h	Sui	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	182°58.4	S05°13.4	150°29.3	13.4'	S20°36.6	10.4'	54.3'
1	197°58.6	14.4	165°01.7	13.3'	20°47.0	10.3'	54.3'
2	212°58.8	15.4	179°34.0	13.3'	20°57.4	10.2'	54.4'
3	227°58.9 242°59.1	· · 16.3	194°06.3 208°38.4	13.2' 13.1'	21°07.6 21°17.8	10.2' 10.1'	54.4' 54.4'
4 5	242 59.1 257°59.3	17.3	208 38.4 223°10.5	13.1	21 17.8 21°27.9	10.1	54.4' 54.4'
6	272°59.5	S05°19.2	237°42.5	12.9'	S21°37.8	9.9'	54.4'
7	287°59.7	20.1	252°14.5	12.8'	21°47.7	9.8'	54.4'
8	302°59.9	21.1	266°46.3	12.8'	21°57.6	9.7'	54.4'
9	318°00.0	• • 22.1	281°18.1	12.7'	22°07.3	9.6'	54.4'
10	333°00.2	23.0	295°49.7	12.6'	22°16.9	9.5'	54.5'
11	348°00.4	24.0	310°21.3 324°52.9	12.5'	22°26.4	9.4'	54.5'
12 13	3°00.6 18°00.8	\$05°24.9 25.9	324°52.9 339°24.3	12.4' 12.3'	\$22°35.9 22°45.2	9.3' 9.3'	54.5' 54.5'
14	33°00.9	26.8	353°55.6	12.3'	22°54.5	9.3 9.2'	54.5'
15	48°01.1	27.8	8°26.9	12.2'	23°03.6	9.1'	54.5'
16	63°01.3	28.8	22°58.0	12.1'	23°12.7	9.0'	54.6'
17	78°01.5	29.7	$37^{\circ}29.1$	12.0'	$23^{\circ}21.6$	8.9'	54.6'
18	93°01.7	S05°30.7	52°00.1	11.9'	S23°30.5	8.8'	54.6'
19	108°01.8	31.6	66°31.0	11.8'	23°39.3	8.7'	54.6'
20	123°02.0 138°02.2	32.6 · · 33.5	81°01.9 95°32.6	11.7'	23° 47.9 23° 56.5	8.5'	54.6'
21 22	138°02.2 153°02.4	34.5	95°32.6 110°03.2	11.7' 11.6'	23°56.5 24°04.9	8.4' 8.3'	54.6' 54.6'
23	168°02.4	34.5 35.5	110 03.2 124°33.8	11.5'	24 04.9 24°13.2	8.2'	54.0 54.7'
23			121 33.0			0.2	31.1
	SD = 16.0'	d = 1.0'		SL	D = 14.8'		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0 1	183°02.7 198°02.9	S05°36.4 37.4	139°04.3 153°34.7	11.4' 11.3'	\$24°21.5 24°29.6	8.1' 8.0'	54.7' 54.7'
2	213°03.1	38.3	168°05.0	11.2'	24° 37.6	7.9'	54.7'
3	228°03.3	• • 39.3	182°35.2	11.1'	24°45.5	7.8'	54.7'
4	243°03.5	40.2	$197^{\circ}05.4$	11.0'	$24^{\circ}53.3$	7.7'	54.8'
5	258°03.6	41.2	211°35.4	11.0'	25°01.0	7.6'	54.8'
6	273°03.8	S05°42.1	226°05.4	10.9'	\$25°08.6	7.5'	54.8'
7	288°04.0 303°04.2	43.1	240°35.2 255°05.0	10.8'	25° 16.0 25° 23.4	7.3'	54.8'
8 9	303°04.2 318°04.3	44.1 •• 45.0	269°34.7	10.7' 10.6'	25° 23.4 25° 30.6	7.2' 7.1'	54.8' 54.8'
10	333°04.5	46.0	284°04.4	10.5	25°37.7	7.0'	54.9'
11	348°04.7	46.9	298°33.9	10.5'	25°44.7	6.9'	54.9'
12	3°04.9	S05°47.9	313°03.4	10.4'	\$25°51.6	6.7'	54.9'
13	18°05.1	48.8	327°32.7	10.3'	25°58.3	6.6'	54.9'
14	33°05.2	49.8	342°02.0	10.2'	26°04.9	6.5'	54.9'
15	48°05.4 63°05.6	· · 50.7 51.7	356°31.2 11°00.3	10.1'	26° 11.4 26° 17.8	6.4'	55.0'
16 17	78°05.8	51.7 52.6	25°29.4	10.0' 10.0'	26 17.8 26°24.1	6.3' 6.1'	55.0' 55.0'
18	93°05.9	S05°53.6	39°58.3	9.9'	\$26°30.2	6.0'	55.0'
19	108°06.1	54.6	54°27.2	9.8'	26°36.2	5.9'	55.0'
20	123°06.3	55.5	68°56.0	9.7'	$26^{\circ}42.1$	5.7'	55.1'
21	138°06.5	• • 56.5	83°24.7	9.6'	26°47.8	5.6'	55.1'
22	153°06.6	57.4	97°53.3	9.5'	26°53.5	5.5'	55.1'
23	168°06.8	58.4	112°21.9	9.5'	26°58.9	5.4'	55.1'
	SD = 16.0'	d = 1.0'		SE	0 = 14.9'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	183°07.0	S05°59.3	126°50.3	9.4'	S27°04.3	5.2'	55.2'
1	198°07.2	06°00.3	$141^{\circ}18.7$	9.3'	$27^{\circ}09.5$	5.1'	55.2'
2	213°07.3	01.2	155°47.0	9.2'	27° 14.6	5.0'	55.2'
3	228°07.5	• • 02.2	170°15.3 184°43.4	9.2'	27° 19.6	4.8'	55.2'
4 5	243°07.7 258°07.9	03.1 04.1	184° 43.4 199° 11.5	9.1' 9.0'	27° 24.4 27° 29.1	4.7' 4.5'	55.2' 55.3'
6	258°07.9 273°08.0	04.1 \$06°05.0	213°39.5	9.0° 8.9°	527°33.6	4.5	55.3'
7	288°08.2	06.0	213 39.5 228°07.5	8.9'	27°38.0	4.4	55.3'
8	303°08.4	06.9	242°35.3	8.8'	27°42.3	4.1'	55.3'
9	318°08.5	• • 07.9	257°03.1	8.7'	27°46.4	4.0'	55.4'
10	333°08.7	08.8	271°30.8	8.7'	27°50.4	3.8'	55.4'
11	348°08.9	09.8	285°58.5	8.6'	27°54.2	3.7'	55.4'
12 13	3°09.1 18°09.2	S06°10.7 11.7	300°26.1 314°53.6	8.5' 8.4'	\$27°57.9 28°01.5	3.6' 3.4'	55.4' 55.5'
13 14	18°09.2 33°09.4	11.7 12.6	314°53.6 329°21.0	8.4' 8.4'	28°01.5 28°04.9	3.4	55.5' 55.5'
15	48°09.6	• • 13.6	343°48.4	8.3	28°08.2	3.1'	55.5'
16	63°09.8	14.5	358°15.8	8.3'	28° 11.3	3.0'	55.5'
17	78°09.9	15.5	12°43.0	8.2'	28° 14.3	2.8'	55.6'
18	93°10.1	<b>S</b> 06°16.4	27°10.2	8.1'	\$28°17.1	2.7'	55.6'
19	108°10.3	17.4	41°37.3	8.1'	28° 19.7	2.5'	55.6'
20	123°10.4 138°10.6	18.3	56°04.4 70°31.4	8.0'	28° 22.3 28° 24.6	2.4'	55.6'
21 22	138°10.6 153°10.8	· · 19.3 20.2	70°31.4 84°58.4	8.0' 7.9'	28°24.6 28°26.9	2.2' 2.1'	55.7' 55.7'
23	168°11.0	21.2	99°25.3	7.8'	28° 28.9	1.9'	55.7'
-	SD = 16.0'	d = 1.0'			0 = 15.0'		
				JL			

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

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

		Sun			Moon	
Day	Eqn.of	f 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	9-23%
06	11:54	12:02	11:48	14:25	02:02	
07	12:11	12:20	11:48	15:14	02:49	
08	12:28	12:36	11:47	16:07	03:40	

## October 09, 10, 11 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	18°06.3	151°25.4	S18°12.5	267°30.8	N22°49.4	297°28.9	N22°26.4	32°07.6	S08°21.8			
1	33°08.7	$166^{\circ}24.8$	13.5	282°31.9	49.3	312°31.4	26.4	$47^{\circ}10.2$	21.9	Alpheratz	357°34.7 353°06.9	29°13.8 -42°10.2
2	48°11.2	181°24.2	14.4	297°33.0	49.2	327°33.8	26.4	62°12.8	21.9	Ankaa Schedar	349°30.8	56°40.5
3	63°13.7	196°23.7	• • 15.4	312°34.2	• • 49.0	342°36.3	26.4	77° 15.4	• • 22.0	Diphda	348°47.2	-17°50.9
4	78°16.1	211°23.1	16.3	327°35.3	48.9	357°38.8	26.4	92°18.0	22.0	Achernar	335°19.7	-57°06.6
5 6	93°18.6 108°21.1	226°22.5 241°22.0	17.3 \$18°18.2	342°36.4 357°37.6	48.8 N22°48.7	12°41.2 27°43.7	26.4 N22°26.4	107°20.6 122°23.2	22.1 \$08°22.1	Hamal	$327^{\circ}51.1$	23°34.9
7	100° 21.1° 123° 23.5	256°21.4	19.2	12°38.7	48.6	42°46.2	26.4	137°25.8	22.2	Polaris	313°43.9	89°22.0
8	138°26.0	271°20.8	20.1	27°39.9	48.5	57° 48.6	26.4	152°28.4	22.2	Acamar	315°11.6	-40°12.1
9	153°28.4	286°20.2	• • 21.0	42°41.0	• • 48.4	72°51.1	26.4	167°31.0	• • 22.3	Menkar	314°06.1 308°28.2	4°11.3
10	168°30.9	301°19.7	22.0	57°42.1	48.3	87°53.6	26.4	182°33.6	22.4	Mirfak Aldebaran	290°39.7	49°56.9 16°33.6
11	183°33.4	316° 19.1	22.9	72°43.3	48.2	102°56.0	26.4	197°36.2	22.4	Rigel	281°03.9	-8°10.2
12	198°35.8	331°18.5	\$18°23.9	87°44.4	N22°48.1	117°58.5	N22°26.4	212°38.8	S08°22.5	Capella	280°22.0	46°01.3
13 14	213°38.3 228°40.8	346°17.9 1°17.3	24.8 25.8	102°45.6 117°46.7	48.0 47.8	133°00.9 148°03.4	26.4 26.4	227°41.4 242°44.0	22.5 22.6	Bellatrix	278°23.0	6°22.5
15	243°43.2	16°16.8	26.7	132°47.8	• • 47.7	163°05.9	. 26.4	257°46.6	22.6	Elnath	278°02.0	28°37.7
16	258°45.7	31°16.2	27.6	147°49.0	47.6	178°08.3	26.4	272°49.2	22.7	Alnilam	275°37.8	-1°11.0
17	273°48.2	$46^{\circ}15.6$	28.6	$162^{\circ}50.1$	47.5	193°10.8	26.4	$287^{\circ}51.8$	22.7	Betelgeuse Canopus	270°52.2 263°52.4	7°24.8 -52°42.1
18	288°50.6	61°15.0	S18°29.5	177°51.3	N22°47.4	208° 13.3	N22°26.4	302°54.4	S08°22.8	Sirius	203 52.4 258°26.4	-32 42.1 -16°44.7
19	303°53.1	76° 14.5	30.4	192°52.4	47.3	223°15.8	26.4	317°57.0	22.8	Adhara	255°06.0	-29°00.0
20	318°55.6 333°58.0	91°13.9	31.4	207°53.6	47.2	238° 18.2	26.4	332°59.6	22.9	Procyon	244°51.1	5°09.8
21 22	349°00.5	106° 13.3 121° 12.7	· · 32.3 33.3	222°54.7 237°55.8	· · 47.1 47.0	253°20.7 268°23.2	· · 26.4 26.4	348°02.2 3°04.8	· · 22.9 23.0	Pollux	243°17.6	27°58.0
23	4°02.9	136° 12.1	34.2	252°57.0	46.9	283°25.6	26.4	18° 07.4	23.0	Avior	234°15.0	-59°34.9
			_							Suhail	222°46.7	-43°31.6
Mer.p	ass. 22:44	$\nu$ -0.6′ d1	.0′ m-3.93	$\nu$ 1.1' $d$ -0	0.1′ m0.37	$\nu$ 2.5′ d-0	.0′ m-2.53	$\nu$ 2.6′ $d0$	1′ m0.69	Miaplacidus Alphard	221°38.8 217°48.2	-69°48.7 -8°45.7
										Regulus	217 46.2 207°34.9	-6 45.7 11°50.9
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.8	61°37.0
0	19°05.4	151°11.5	S18°35.1	267°58.1	N22°46.7	298°28.1	N22°26.4	33°10.0	508°23.1	Denebola	182°25.5	14°26.1
1 2	34°07.9 49°10.3	166°11.0 181°10.4	36.1	282°59.3	46.6	313°30.6 328°33.0	26.4	48°12.6 63°15.2	23.1	Gienah	175°44.2	-17°40.6
3	49 10.3 64°12.8	181 10.4 196°09.8	37.0 •• 37.9	298°00.4 313°01.6	46.5 •• 46.4	328 33.0 343°35.5	26.4 •• 26.4	78° 17.8	23.2 · · 23.2	Acrux	173°01.1	-63°14.0
4	79°15.3	211°09.2	38.8	328°02.7	46.3	358° 38.0	26.4	93°20.4	23.3	Gacrux	171°52.5	-57°15.0
5	94°17.7	226°08.6	39.8	343°03.9	46.2	13°40.5	26.4	108°23.0	23.3	Alioth Spica	166°13.7 158°22.9	55°49.6 -11°17.3
6	109°20.2	241°08.0	S18°40.7	358°05.0	N22°46.1	28°42.9	N22°26.4	123°25.6	S08°23.4	Alkaid	150° 22.9 152° 52.6	49°11.5
7	124°22.7	256°07.5	41.6	13°06.2	46.0	43°45.4	26.4	138°28.2	23.4	Hadar	148°37.0	-60°29.5
8	139°25.1	271°06.9	42.6	28°07.3	45.9	58°47.9	26.4	153°30.8	23.5	Menkent	147°58.3	-36°29.4
9	154°27.6 169°30.1	286°06.3 301°05.7	• • 43.5	43°08.5 58°09.6	• • 45.8	73°50.4 88°52.8	• • 26.4	168°33.4 183°36.0	• • 23.5	Arcturus	145°48.4	19°03.3
10 11	184°32.5	316°05.1	44.4 45.3	73°10.8	45.6 45.5	00 52.0 103°55.3	26.4 26.4	103 30.0 198°38.6	23.6 23.6	Rigil Kent.	139°41.3	-60°56.3
12	199°35.0	331°04.5	\$18°46.3	88°11.9	N22°45.4	118° 57.8	N22°26.4	213°41.2	S08°23.7	Kochab	137°20.8	74°03.3
13	214°37.4	346°03.9	47.2	103°13.1	45.3	134°00.3	26.4	228°43.8	23.7	Zuben'ubi Alphecca	136°56.6 126°04.2	-16°08.6 26°38.0
14	229°39.9	1°03.3	48.1	118°14.3	45.2	149°02.7	26.4	243°46.4	23.8	Antares	112° 16.4	-26°29.2
15	244°42.4	16°02.7	• • 49.0	133°15.4	•• 45.1	164°05.2	• • 26.4	258°49.0	• • 23.9	Atria	107°11.1	-69°04.5
16	259°44.8	31°02.2	49.9	148°16.6	45.0	179°07.7	26.4	273°51.6	23.9	Sabik	102°03.2	-15°45.3
17 18	274°47.3 289°49.8	46°01.6 61°01.0	50.9 \$18°51.8	163°17.7 178°18.9	44.9 N22°44.8	194° 10.2 209° 12.6	26.4 N22°26.4	288°54.2 303°56.7	24.0 \$08°24.0	Shaula	96°10.8	-37°07.4
19	304°52.2	76°00.4	52.7	193°20.0	44.6	224° 15.1	26.4	318°59.3	24.1	Rasalhague	95°58.9	12°32.7
20	319°54.7	90°59.8	53.6	208°21.2	44.5	239° 17.6	26.4	334°01.9	24.1	Eltanin	90°42.5 83°32.9	51°29.4 -34°22.5
21	334°57.2	105°59.2	• • 54.5	223°22.3	• • 44.4	$254^{\circ}20.1$	26.4	349°04.5	• • 24.2	Kaus Aust. Vega	80°33.5	-34 22.5 38°48.6
22	349°59.6	120°58.6	55.4	238°23.5	44.3	269°22.5	26.4	4°07.1	24.2	Nunki	75°48.1	-26°16.0
23	5°02.1	135°58.0	56.4	253°24.7	44.2	284°25.0	26.4	19°09.7	24.3	Altair	62°00.1	8°56.2
Mer.p	ass. 22:40	$\nu$ -0.6' d0	.9′ m-3.93	$ u$ 1.1 $^{\prime}$ d-0	0.1'  m 0.36	$\nu$ 2.5′ d-0	.0′ m-2.53	$\nu 2.6' \ d0.$	1'  m0.69	Peacock	53°05.9	-56°39.5
										Deneb	49°25.8	45°22.4
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.8	9°59.4
0	20°04.5	150°57.4	S18°57.3	268°25.8	N22°44.1	299°27.5	N22°26.4	34°12.3	508°24.3	Al Na'ir Fomalhaut	27°32.9 15°14.5	-46°50.6 -29°29.5
1	35°07.0	$165^{\circ}56.8$	58.2	283°27.0	44.0	$314^{\circ}30.0$	26.4	49°14.9	24.4	Scheat	13°45.1	28°13.2
2	50°09.5	180°56.2	18°59.1	298°28.1	43.9	329° 32.5	26.4	64°17.5	24.4	Markab	13°29.9	15°20.5
3	65°11.9	195°55.6	19°00.0	313°29.3	• • 43.7	344°34.9	• • 26.4	79°20.1	• • 24.5	Oct 09 Wed	SHA	
4 5	80°14.4 95°16.9	210°55.0 225°54.4	00.9 01.8	328°30.5 343°31.6	43.6 43.5	359° 37.4 14° 39.9	26.3 26.3	94°22.7 109°25.3	24.5 24.6		3HA 133°19.1	Mer.pass 13:55
6	95 16.9 110°19.3	240°53.8	519°02.7	358°32.8	43.5 N22°43.4	14 39.9 29°42.4	26.3 N22°26.3	109 25.3 124°27.9	508°24.6	Mars	249°24.5	06:09
7	125°21.8	255°53.2	03.6	13°34.0	43.3	44°44.9	26.3	139°30.5	24.7	Jupiter	279°22.6	04:09
8	140°24.3	270°52.6	04.5	28°35.1	43.2	59°47.4	26.3	154°33.1	24.7	Saturn	14°01.3	21:48
9	155°26.7	285°52.0	•• 05.4	43°36.3	• • 43.1	74°49.8	• • 26.3	169°35.7	• • 24.8	Oct 10 Thu	SHA	Mer.pass
10	170°29.2	300°51.4	06.4	58°37.4	43.0	89°52.3	26.3	184°38.3	24.8		132°06.1	13:56
11 12	185°31.7 200°34.1	315°50.8 330°50.2	07.3 \$19°08.2	73°38.6 88°39.8	42.8 N22°42.7	104°54.8 119°57.3	26.3 N22°26.3	199°40.9 214°43.5	24.9 \$08°24.9	Mars		06:08
13	200 34.1 215°36.6	345°49.6	09.1	88 39.8 103°40.9	N22 42.7 42.6	119 57.3 134°59.8	26.3	214 43.5 229°46.1	25.0	Jupiter		04:05
14	230°39.0	0°49.0	10.0	118°42.1	42.5	150°02.3	26.3	244°48.6	25.0	Saturn	14°04.6	21:44
15	245°41.5	15°48.4	• • 10.9	133°43.3	• • 42.4	165°04.7	• • 26.3	259°51.2	• • 25.1	Oct 11 Fri	SHA	Mer.pass
16	260°44.0	30°47.8	11.8	148°44.4	42.3	180°07.2	26.3	274°53.8	25.1		$130^{\circ}52.9$	13:57
17	275°46.4	45°47.2	12.7	163°45.6	42.2	195°09.7	26.3	289°56.4	25.2	Mars		06:06
18	290°48.9 305°51.4	60° 46.6 75° 46.0	\$19°13.6	178°46.8 193°48.0	N22°42.0 41.9	210° 12.2 225° 14.7	N22°26.3 26.3	304°59.0 320°01.6	S08°25.2	Jupiter		04:02
19 20	305°51.4 320°53.8	75°46.0 90°45.4	14.5 15.4	193°48.0 208°49.1	41.9 41.8	225° 14.7 240° 17.2	26.3 26.3	320°01.6 335°04.2	25.3 25.3	Saturn	14°07.8	21:39
20	335°56.3	90°45.4 105°44.8	. 16.3	206 49.1 223°50.3	• • 41.7	240 17.2 255°19.7	. 26.3	350°06.8	25.4	Horizont	al parallax	
22	350°58.8	120°44.2	17.1	238°51.5	41.6	270°22.1	26.3	5°09.4	25.4		Venus:	0.1
23	6°01.2	$135^{\circ}43.6$	18.0	253°52.6	41.5	$285^{\circ}24.6$	26.3	$20^{\circ}12.0$	25.5		Mars:	0.1
Mer.n	ass. 22:36	ν-0.6' d0	.9′ m-3.94	$\nu 1.2' \ d-0$	0.1' m0.35	ν2.5′ d-0	.0′ m-2.54	$\nu 2.6' d0$	1′ m0.70			

h	Sui	า			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	183°11.1	S06°22.1	113°52.1	7.8'	\$28°30.9	1.8'	55.7'
1 2	198° 11.3 213° 11.5	23.1 24.0	128° 18.9 142° 45.7	7.7' 7.7'	28° 32.6 28° 34.2	1.6' 1.5'	55.8' 55.8'
3	228°11.6	25.0	157° 12.3	7.6'	28° 35.7	1.3'	55.8'
4	243°11.8	25.9	$171^{\circ}39.0$	7.6'	28° 37.0	1.1'	55.9'
5	258° 12.0	26.9	186°05.6	7.5'	28°38.1	1.0'	55.9'
6 7	273°12.1 288°12.3	S06°27.8 28.8	200°32.1 214°58.6	7.5' 7.5'	\$28°39.1 28°40.0	0.8' 0.7'	55.9' 55.9'
8	303°12.5	29.7	229°25.1	7.4'	28° 40.6	0.5'	56.0'
9	318° 12.6	• • 30.7	243°51.5	7.4'	28°41.1	0.4'	56.0'
10 11	333°12.8 348°13.0	31.6 32.6	258° 17.9 272° 44.2	7.3' 7.3'	28°41.5 28°41.7	0.2' 0.0'	56.0' 56.1'
12	3°13.2	S06°33.5	287° 10.5	7.3'	\$28°41.7	-0.1	56.1
13	18° 13.3	34.5	$301^{\circ}36.7$	7.2'	$28^{\circ}41.6$	-0.3'	56.1'
14 15	33°13.5 48°13.7	35.4 •• 36.4	316°03.0 330°29.2	7.2' 7.2'	28°41.3 28°40.9	-0.4' -0.6'	56.1' 56.2'
16	63°13.8	37.3	344°55.3	7.2 7.1'	28°40.3	-0.8'	56.2'
17	78°14.0	38.3	359°21.4	7.1'	28°39.5	-0.9'	56.2'
18	93°14.2	S06°39.2	13°47.5	7.1'	\$28°38.6	-1.1'	56.3'
19 20	108°14.3 123°14.5	40.1 41.1	28°13.6 42°39.7	7.0' 7.0'	28° 37.5 28° 36.2	-1.3' -1.4'	56.3' 56.3'
21	138° 14.7	• • 42.0	57°05.7	7.0'	28°34.8	-1.6'	56.4
22	153°14.8	43.0	$71^{\circ}31.7$	7.0'	28° 33.2	-1.8'	56.4'
23	168°15.0	43.9	85°57.7	7.0'	28°31.4	-1.9'	56.4'
	SD = 16.0'	d = 0.9'		SI	O = 15.2'		
Thu	GHA	Dec	GHA	ν	Dec	d	НР
0	183°15.2	S06°44.9	100°23.6	6.9'	S28°29.5	-2.1'	56.5
1	198° 15.3	45.8	114°49.6	6.9'	28° 27.4	-2.2'	56.5'
2	213° 15.5 228° 15.6	46.8 •• 47.7	129° 15.5 143° 41.4	6.9' 6.9'	28° 25.2 28° 22.8	-2.4' -2.6'	56.5' 56.6'
4	243° 15.8	48.7	158°07.3	6.9'	28° 20.2	-2.7'	56.6
5	258°16.0	49.6	$172^{\circ}33.2$	6.9'	$28^{\circ}17.5$	-2.9'	56.6'
6	273°16.1 288°16.3	S06°50.5	186°59.1	6.9'	\$28° 14.6	-3.1'	56.7'
7 8	288° 16.3 303° 16.5	51.5 52.4	201°25.0 215°50.8	6.9' 6.9'	28°11.5 28°08.2	-3.2' -3.4'	56.7' 56.7'
9	318° 16.6	• • 53.4	230° 16.7	6.9'	28° 04.8	-3.6'	56.8'
10	333°16.8	54.3	244°42.6	6.9'	28°01.3	-3.7'	56.8'
11 12	348° 17.0 3° 17.1	55.3 \$06°56.2	259°08.4 273°34.3	6.9' 6.9'	27°57.5 <b>S</b> 27°53.6	-3.9' -4.1'	56.8' 56.9'
13	18° 17.3	57.2	273 34.3 288°00.1	6.9	27°49.6	-4.1 -4.2'	56.9
14	33°17.4	58.1	$302^{\circ}26.0$	6.9'	$27^{\circ}45.3$	-4.4'	56.9'
15 16	48° 17.6 63° 17.8	06°59.0 07°00.0	316°51.9 331°17.7	6.9' 6.9'	27° 40.9 27° 36.4	-4.6' -4.7'	57.0' 57.0'
17	78° 17.9	00.0	345°43.6	6.9	27°31.6	-4.1 -4.9'	57.0'
18	93°18.1	S07°01.9	0°09.5	6.9'	\$27°26.7	-5.1'	57.1'
19	108° 18.3	02.8	14°35.4	6.9'	27°21.7	-5.2'	57.1'
20 21	123° 18.4 138° 18.6	03.8 •• 04.7	29°01.3 43°27.2	6.9' 6.9'	27°16.4 27°11.0	-5.4' -5.6'	57.1' 57.2'
22	153° 18.7	05.6	57°53.2	7.0'	27°05.5	-5.7'	57.2'
23	168° 18.9	06.6	72°19.1	7.0'	26°59.8	-5.9'	57.2'
	SD = 16.0'	d = 0.9'		SI	O = 15.4'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°19.1	S07°07.5	86°45.1	7.0'	\$26°53.9	-6.0'	57.3'
1 2	198° 19.2 213° 19.4	08.5 09.4	101°11.1 115°37.1	7.0' 7.0'	26° 47.8 26° 41.6	-6.2' -6.4'	57.3' 57.3'
3	228° 19.5	10.3	130°03.1	7.1'	$26^{\circ}35.2$	-6.5	57.4
4	243°19.7	11.3	144°29.2	7.1'	26°28.7	-6.7'	57.4'
5 6	258° 19.9 273° 20.0	12.2 <b>S</b> 07°13.2	158° 55.2 173° 21.3	7.1' 7.1'	26°22.0 \$26°15.1	-6.9' -7.0'	57.5' 57.5'
7	288° 20.2	14.1	187°47.5	7.2'	26°08.1	-7.2	57.5
8	303°20.3	15.0	202°13.6	7.2'	26°00.9	-7.3'	57.6'
9 10	318° 20.5 333° 20.7	· · 16.0 16.9	216°39.8 231°06.0	7.2' 7.2'	25°53.6 25°46.1	-7.5' -7.7'	57.6' 57.6'
11	348° 20.8	17.9	245°32.2	7.3'	25°38.4	-7.1 -7.8'	57.0 57.7'
12	3°21.0	S07°18.8	259°58.5	7.3'	S25°30.6	-8.0'	57.7'
13	18°21.1	19.7	274°24.8	7.3'	25°22.6	-8.1'	57.8'
14 15	33°21.3 48°21.5	20.7 •• 21.6	288°51.1 303°17.5	7.4' 7.4'	25° 14.5 25° 06.2	-8.3' -8.5'	57.8' 57.8'
16	63°21.6	22.6	$317^{\circ}43.9$	7.4'	24°57.7	-8.6'	57.9'
17	78°21.8	23.5	332°10.3	7.5'	24°49.1	-8.8'	57.9'
18 19	93°21.9 108°22.1	S07°24.4 25.4	346°36.8 1°03.3	7.5' 7.5'	\$24°40.3 24°31.4	-8.9' -9.1'	57.9' 58.0'
20	106 22.1 123°22.2	26.3	15°29.9	7.6'	24°22.3	-9.1 -9.2'	58.0'
21	138°22.4	• • 27.3	29°56.5	7.6'	$24^{\circ}13.1$	-9.4'	58.1'
22	153°22.6	28.2	44°23.1 58°49.7	7.7'	24°03.7 23°54.2	-9.5'	58.1'
23	168°22.7	29.1	58° 49.7	7.7'		-9.7'	58.1'
	SD = 16.0'	d = 0.9'		51	O = 15.6'		

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

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

		Sun			Moon	
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	7-9
	mm:ss mm:ss		hh:mm	hh:mm	hh:mm	32-52%
09	12:44	12:53	11:47	17:03	04:35	
10	13:01	13:08	11:47	17:59	05:31	
11	13:16	13:24	11:47	18:56	06:28	

# October 12, 13, 14 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 0	21°03.7	150°43.0	\$19°18.9	268°53.8	N22°41.4	300°27.1	N22°26.3	35°14.6	S08°25.5		ЗПА	
1	36°06.2	165°42.4		283°55.0		315°29.6		50°17.2		Alpheratz	357°34.7	29°13.8
			19.8		41.3		26.3		25.6	Ankaa	353°06.9	-42°10.2
2	51°08.6	180°41.8	20.7	298°56.2	41.1	330°32.1	26.3	65°19.8	25.6	Schedar	349°30.8	56°40.5
3	66°11.1	195°41.2	• • 21.6	313°57.3	• • 41.0	345°34.6	• • 26.3	80°22.4	• • 25.6	Diphda	348°47.2	-17°50.9
4	81°13.5	210°40.6	22.5	328°58.5	40.9	0°37.1	26.3	95°25.0	25.7	Achernar	335°19.7	-57°06.6
5	96°16.0	225°39.9	23.4	343°59.7	40.8	15°39.6	26.3	110°27.5	25.7	Hamal	327°51.1	23°34.9
6	111°18.5	240°39.3	S19°24.3	359°00.9	N22°40.7	30°42.1	N22°26.3	125°30.1	S08°25.8	Polaris	313°43.0	89°22.0
7	126°20.9	255°38.7	25.2	14°02.0	40.6	45°44.6	26.3	140°32.7	25.8	Acamar	315°11.5	-40°12.1
8	141°23.4	270°38.1	26.1	29°03.2	40.5	60°47.0	26.3	155°35.3	25.9	Menkar	314°06.1	4°11.3
9	156°25.9	285°37.5	• • 26.9	44°04.4	• • 40.3	75°49.5	• • 26.3	170°37.9	• • 25.9		308°28.2	49°56.9
10	171°28.3	300°36.9	27.8	59°05.6	40.2	90°52.0	26.3	185°40.5	26.0	Mirfak		
11	186°30.8	315°36.3	28.7	74°06.8	40.1	105°54.5	26.3	200°43.1	26.0	Aldebaran	290°39.6	16°33.6
12	201°33.3	330°35.7	519°29.6	89°07.9	N22°40.0	120°57.0	N22°26.3	215°45.7	S08°26.1	Rigel	281°03.9	-8°10.2
13	216°35.7	345°35.1	30.5	104°09.1	39.9	135°59.5	26.3	230°48.3	26.1	Capella	280°22.0	46°01.3
14	231°38.2	0°34.4	31.4	119°10.3	39.8	151°02.0	26.3	245°50.9	26.2	Bellatrix	278°23.0	6°22.5
15	246°40.7	15°33.8	32.2	134°11.5	• • 39.7	166°04.5	. 26.3	260°53.5	26.2	Elnath	278°02.0	28°37.7
16	261°43.1	30°33.2	33.1	149°12.7	39.5	181°07.0	26.3	275°56.0	26.3	Alnilam	275°37.8	$-1^{\circ}11.0$
17	201 45.1 276°45.6	45°32.6	34.0	164°13.8	39.4	196°09.5	26.3	290°58.6		Betelgeuse	270°52.2	7°24.8
									26.3	Canopus	263°52.4	-52°42.1
18	291°48.0	60°32.0	S19°34.9	179°15.0	N22°39.3	211°12.0	N22°26.3	306°01.2	S08°26.4	Sirius	258°26.4	-16°44.7
19	306°50.5	75°31.4	35.7	194°16.2	39.2	226°14.5	26.3	321°03.8	26.4	Adhara	255°06.0	-29°00.0
20	321°53.0	90°30.8	36.6	209°17.4	39.1	241°17.0	26.3	336°06.4	26.5	Procyon	244°51.1	5°09.8
21	336°55.4	105°30.1	• • 37.5	224°18.6	• • 39.0	256°19.5	• • 26.3	351°09.0	• • 26.5	Pollux	243°17.6	27°58.0
22	351°57.9	120°29.5	38.4	$239^{\circ}19.8$	38.8	271°22.0	26.3	$6^{\circ}11.6$	26.6	Avior	234°15.0	-59°34.9
23	7°00.4	135°28.9	39.2	254°20.9	38.7	286°24.5	26.3	21°14.2	26.6	Suhail	234 15.0 222°46.7	-59 34.9 -43°31.6
N 4 a ··	200 22:22	., 0.6/ -/0	.9′ m-3.94	.1 2/ -1 0	0.1' m0.33	10 E/ 40	0/ m 2 FF	1,2 6/ -12	0/ m0 70			
ivier.p	ass. 22:32	$\nu$ -0.0′ $d0$	.y m-3.94	$\nu$ 1.2' $d$ -(	v.1 mu.33	ν2.5 d-0	.0′ m-2.55	ν2.0′ d0	0′ m0.70	Miaplacidus	221°38.8	-69°48.7
										Alphard	217°48.1	-8°45.8
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.9	11°50.9
0	22°02.8	150°28.3	\$19°40.1	269°22.1	N22°38.6	301°27.0	N22°26.3	36°16.8	508°26.7	Dubhe	193°41.8	61°37.0
	22 02.8 37°05.3	150 28.3 165°27.7		284°23.3	38.5	301 27.0 316°29.5	26.3	51°19.4	26.7	Denebola	182°25.5	14°26.1
1			41.0							Gienah	$175^{\circ}44.1$	-17°40.6
2	52°07.8	180°27.0	41.9	299°24.5	38.4	331°32.0	26.3	66°22.0	26.8	Acrux	173°01.1	-63°14.0
3	67°10.2	195°26.4	• • 42.7	314°25.7	• • 38.3	346°34.5	• • 26.3	81°24.5	• • 26.8	Gacrux	171°52.5	-57° 15.0
4	82°12.7	210°25.8	43.6	329°26.9	38.2	1°36.9	26.2	96°27.1	26.9	Alioth	166°13.7	55°49.5
5	97°15.1	225°25.2	44.5	344°28.1	38.0	16°39.4	26.2	111°29.7	26.9	Spica	158°22.9	-11°17.3
6	112°17.6	240°24.6	S19°45.3	359°29.2	N22°37.9	31°41.9	N22°26.2	126°32.3	S08°26.9	Alkaid	152°52.6	49°11.5
7	$127^{\circ}20.1$	255°23.9	46.2	14°30.4	37.8	46°44.4	26.2	141°34.9	27.0	Hadar	148°37.0	-60°29.5
8	142°22.5	270°23.3	47.1	29°31.6	37.7	61°46.9	26.2	156°37.5	27.0		140°57.0	-36° 29.4
9	157°25.0	285°22.7	• • 47.9	44°32.8	• • 37.6	76°49.5	• • 26.2	171°40.1	• • 27.1			
10	172°27.5	300°22.1	48.8	59°34.0	37.5	91°52.0	26.2	186°42.7	27.1	Arcturus	145°48.4	19°03.3
11	187°29.9	315°21.4	49.7	74°35.2	37.3	106°54.5	26.2	201°45.3	27.2	Rigil Kent.	139°41.3	-60°56.3
12	202°32.4	330°20.8	S19°50.5	89°36.4	N22°37.2	121°57.0	N22°26.2	216°47.8	S08°27.2	Kochab	137°20.8	74°03.3
13	217°34.9	345°20.2	51.4	104°37.6	37.1	136°59.5	26.2	231°50.4	27.3	Zuben'ubi	136°56.6	-16°08.6
				119°38.8						Alphecca	126°04.2	26°38.0
14	232°37.3	0°19.6	52.2		37.0	152°02.0	26.2	246°53.0	27.3	Antares	112°16.4	-26°29.2
15	247°39.8	15°18.9	• • 53.1	134°40.0	• • 36.9	167°04.5	26.2	261°55.6	• • 27.4	Atria	$107^{\circ}11.1$	-69°04.5
16	262°42.3	30°18.3	54.0	149°41.2	36.8	182°07.0	26.2	276°58.2	27.4	Sabik	102°03.2	-15°45.3
17	277°44.7	45°17.7	54.8	164°42.4	36.6	197°09.5	26.2	292°00.8	27.5	Shaula	96°10.9	-37°07.4
18	292°47.2	$60^{\circ}17.1$	S19°55.7	179°43.6	N22°36.5	212°12.0	N22°26.2	307°03.4	S08°27.5	Rasalhague	95°58.9	12°32.7
19	307°49.6	75°16.4	56.5	194°44.8	36.4	$227^{\circ}14.5$	26.2	322°06.0	27.6	Eltanin	90°42.5	51°29.4
20	322°52.1	90°15.8	57.4	209°46.0	36.3	242°17.0	26.2	337°08.5	27.6	Kaus Aust.	83°32.9	-34°22.5
21	337°54.6	105°15.2	• • 58.2	224°47.2	• • 36.2	257°19.5	• • 26.2	352°11.1	• • 27.7	Vega	80°33.5	38°48.6
22	352°57.0	120°14.5	59.1	239°48.4	36.1	272°22.0	26.2	7°13.7	27.7	_		-26°16.0
23	7°59.5	135°13.9	59.9	254°49.5	35.9	287°24.5	26.2	22°16.3	27.7	Nunki	75°48.1	
										Altair	62°00.1	8°56.2
Mer.p	ass. 22:28	$\nu$ -0.6' d0	.9′ m-3.94	$\nu$ 1.2' d-0	$0.1' \; \text{m}0.32$	$\nu 2.5' \ d-0$	.0′ m-2.56	$\nu$ 2.6′ $d$ 0	0'  m 0.71	Peacock	53°05.9	-56°39.5
										Deneb	49°25.8	45°22.4
N4	CHA	CHA	Daa	CH 4	Daa	CH A	Daa	CHA	Doo	Enif	33°38.8	9°59.4
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.9	-46°50.6
0	23°02.0	150°13.3	\$20°00.8	269°50.7	N22°35.8	302°27.0	N22°26.2	37°18.9	508°27.8	Fomalhaut	15°14.5	-29°29.5
1	38°04.4	165°12.7	01.6	284°51.9	35.7	317°29.5	26.2	52°21.5	27.8	Scheat	13°45.1	28°13.2
2	53°06.9	180°12.0	02.5	299°53.1	35.6	332°32.0	26.2	67°24.1	27.9	Markab	13°29.9	15°20.5
3	68°09.4	195°11.4	• • 03.3	314°54.3	• • 35.5	347°34.5	• • 26.2	82°26.7	• • 27.9	0 : 10 5	C	
4	83°11.8	210°10.8	04.2	329°55.6	35.4	2°37.0	26.2	97°29.2	28.0	Oct 12 Sat	SHA	Mer.pass
5	98°14.3	225°10.1	05.0	344°56.8	35.2	17°39.5	26.2	112°31.8	28.0		129°39.3	13:58
6	113°16.8	240°09.5	S20°05.9	359°58.0	N22°35.1	32°42.1	N22°26.2	127°34.4	S08°28.1		247°50.1	06:04
7	$128^{\circ}19.2$	255°08.9	06.7	14°59.2	35.0	47°44.6	26.2	142°37.0	28.1	Jupiter	279°23.4	03:58
8	143°21.7	270°08.2	07.6	30°00.4	34.9	62°47.1	26.2	157°39.6	28.2	Saturn	14°10.9	21:35
9	158°24.1	285°07.6	• • 08.4	45°01.6	• • 34.8	77°49.6	• • 26.2	172°42.2	• • 28.2	0 : 12 2	C	
10	173°26.6	300°07.0	09.3	60°02.8	34.7	92°52.1	26.2	187°44.8	28.3	Oct 13 Sun	SHA	Mer.pass
11	188°29.1	315°06.3	10.1	75°04.0	34.5	107°54.6	26.2	202°47.3	28.3		128°25.5	13:59
12	203°31.5	330°05.7	\$20°10.9	90°05.2	N22°34.4	122°57.1	N22°26.2	217°49.9	S08°28.3		247°19.3	06:02
13	203°31.3	345°05.0	11.8	105°06.4	34.3	137°59.6	26.2	232°52.5	28.4	Jupiter		03:54
	216 34.0 233°36.5	0°04.4	12.6	105 00.4 120°07.6	34.3			232 52.5 247°55.1	28.4	Saturn	14°13.9	21:31
14						153°02.1	26.1			0.11:	<u> </u>	
15	248°38.9	15°03.8	· · 13.5	135°08.8	34.1	168°04.7	• • 26.1	262°57.7	• • 28.5	Oct 14 Mon	SHA	Mer.pass
16	263°41.4	30°03.1	14.3	150°10.0	34.0	183°07.2	26.1	278°00.3	28.5		127°11.3	14:00
17	278°43.9	45°02.5	15.1	165°11.2	33.8	198°09.7	26.1	293°02.8	28.6	Mars		06:00
18	293°46.3	60°01.9	S20°16.0	180°12.4	N22°33.7	213°12.2	N22°26.1	308°05.4	S08°28.6	Jupiter	279°25.0	03:50
19	308°48.8	75°01.2	16.8	195°13.6	33.6	228°14.7	26.1	323°08.0	28.7	Saturn	14°16.9	21:27
20	323°51.2	90°00.6	17.6	210°14.9	33.5	243°17.2	26.1	$338^{\circ}10.6$	28.7			
21	338°53.7	104°59.9	• • 18.5	$225^{\circ}16.1$	• • 33.4	258°19.7	26.1	353°13.2	• • 28.8	Horizont	al parallax	
22	353°56.2	119°59.3	19.3	240°17.3	33.3	273°22.2	26.1	8°15.8	28.8		Venus:	0.1
23	8°58.6	134°58.6	20.1	255°18.5	33.1	288°24.8	26.1	23°18.4	28.8		Mars:	0.1
										-	•	
Mer.p	ass. 22:24	$\nu$ -0.6′ d0	.9′ m-3.95	$\nu$ 1.2' d-0	$0.1^\prime $ m $0.31$	$\nu 2.5' \ d-0$	.0′ m-2.56	$\nu$ 2.6′ d0	u′ m0.71			

h	Sui	n	Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	183°22.9	S07°30.1	73°16.5	7.7'	S23°44.5	-9.8'	58.2'
1 2	198°23.0 213°23.2	31.0 31.9	87°43.2 102°10.0	7.8' 7.8'	23°34.7 23°24.7	-10.0' -10.1'	58.2' 58.2'
3	228°23.3	32.9	116°36.8	7.9'	23° 14.6	-10.1	58.3
4	243°23.5	33.8	131°03.7	7.9'	$23^{\circ}04.3$	-10.4'	58.3'
5	258°23.6	34.7	145°30.6	8.0'	22°53.9	-10.6'	58.4'
6 7	273°23.8 288°23.9	\$07°35.7 36.6	159°57.6 174°24.6	8.0' 8.0'	\$22°43.3 22°32.6	-10.7' -10.9'	58.4' 58.4'
8	303°24.1	37.6	188°51.6	8.1	22°21.7	-10.9	58.5
9	318°24.3	• • 38.5	203°18.7	8.1'	$22^{\circ}10.7$	-11.1'	58.5'
10	333°24.4	39.4	217°45.9	8.2'	21°59.6 21°48.3	-11.3'	58.5'
11 12	348°24.6 3°24.7	40.4 \$07°41.3	232°13.0 246°40.3	8.2' 8.3'	521°36.9	-11.4' -11.6'	58.6' 58.6'
13	18°24.9	42.2	261°07.5	8.3'	21°25.3	-11.7'	58.7'
14	33°25.0	43.2	275°34.9	8.4'	21°13.6	-11.8'	58.7'
15 16	48°25.2 63°25.3	• • 44.1 45.0	290°02.2 304°29.6	8.4' 8.5'	21°01.8 20°49.8	-12.0' -12.1'	58.7' 58.8'
17	78°25.5	46.0	318°57.1	8.5'	20° 49.8 20° 37.7	-12.1 -12.2'	58.8'
18	93°25.6	S07°46.9	333°24.6	8.6'	S20°25.5	-12.4'	58.8'
19	108°25.8	47.8	347°52.2	8.6'	20° 13.1	-12.5'	58.9'
20 21	123°25.9 138°26.1	48.8 • • 49.7	2°19.8 16°47.4	8.6' 8.7'	20°00.6 19°47.9	-12.6' -12.8'	58.9' 59.0'
22	153°26.2	50.6	31°15.1	8.7'	19° 35.2	-12.9'	59.0'
23	168°26.4	51.6	45°42.8	8.8'	$19^{\circ}22.3$	-13.0'	59.0'
	SD = 16.0'	d = 0.9'		SI	O = 15.9'		
_							
Sun 0	<b>GHA</b> 183°26.5	<b>Dec</b> <b>S</b> 07°52.5	<b>GHA</b> 60°10.6	ν 8.8'	<b>Dec</b> 519° 09.3	d -13.1'	<b>HP</b> 59.1'
1	198°26.7	53.4	74°38.4	o.o 8.9'	18° 56.1	-13.1 -13.3'	59.1'
2	213°26.8	54.4	89°06.3	8.9'	18°42.8	-13.4'	59.2'
3	228°27.0	• • 55.3	103°34.2	9.0'	18° 29.5	-13.5'	59.2'
4 5	243°27.1 258°27.3	56.2 57.2	118°02.2 132°30.2	9.0' 9.1'	18° 15.9 18° 02.3	-13.6' -13.8'	59.2' 59.3'
6	273°27.4	S07°58.1	146°58.2	9.1'	S17°48.5	-13.9	59.3'
7	288°27.6	07°59.0	$161^{\circ}26.3$	9.1'	$17^{\circ}34.7$	-14.0'	59.3'
8	303°27.7	0.00°80	175°54.5	9.2'	17°20.7	-14.1'	59.4'
9 10	318°27.9 333°28.0	· · 00.9 01.8	190°22.6 204°50.9	9.2' 9.3'	17°06.6 16°52.4	-14.2' -14.3'	59.4' 59.4'
11	348°28.2	02.8	219°19.1	9.3'	16°38.0	-14.4'	59.5'
12	3°28.3	S08°03.7	233°47.4	9.3'	S16°23.6	-14.6'	59.5'
13 14	18°28.5 33°28.6	04.6 05.5	248°15.8 262°44.2	9.4' 9.4'	16°09.0 15°54.4	-14.7' -14.8'	59.6' 59.6'
15	48° 28.8	06.5	202 44.2 277°12.6	9.5'	15° 39.6	-14.9'	59.6'
16	63°28.9	07.4	291°41.1	9.5'	15° 24.7	-15.0'	59.7'
17	78°29.1 93°29.2	08.3 \$08°09.3	306°09.6 320°38.1	9.5' 9.6'	15°09.7 \$14°54.6	-15.1'	59.7' 59.7'
18 19	93 29.2 108°29.4	10.2	320 38.1 335°06.7	9.6' 9.6'	14°39.4	-15.2' -15.3'	59.7 59.8'
20	123°29.5	11.1	349°35.3	9.7'	14°24.2		59.8'
21	138°29.6	• • 12.0	4°04.0	9.7'	14°08.8	-15.5'	59.8'
22 23	153°29.8 168°29.9	13.0 13.9	18°32.7 33°01.4	9.7' 9.8'	13°53.3 13°37.7	-15.6' -15.7'	59.9' 59.9'
23	SD = 16.0'	d = 0.9'			0 = 16.1'	-13.1	J9.9
	$SD = 16.0^{\circ}$	$a = 0.9^{\circ}$		51	O = 10.1		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°30.1	S08°14.8	47°30.2	9.8'	\$13°22.0	-15.8'	59.9'
1 2	198°30.2 213°30.4	15.8 16.7	61°59.0 76°27.8	9.8' 9.9'	13°06.3 12°50.4	-15.9' -15.9'	60.0' 60.0'
3	228°30.5	• • 17.6	90°56.7	9.9'	12°34.5	-16.0'	60.0
4	243°30.7	18.5	105°25.5	9.9'	12° 18.4	-16.1'	60.1'
5 6	258°30.8 273°31.0	19.5 \$08°20.4	119°54.5 134°23.4	9.9' 10.0'	12°02.3 \$11°46.1	-16.2' -16.3'	60.1' 60.1'
7	288°31.1	21.3	134 23.4 148°52.4	10.0'	11°29.8	-16.3 -16.4'	60.2
8	303°31.2	22.3	163°21.4	10.0'	$11^{\circ}13.4$	-16.5'	60.2'
9	318°31.4	· · 23.2	177°50.4	10.1'	10°57.0	-16.5'	60.2'
10 11	333°31.5 348°31.7	24.1 25.0	192°19.5 206°48.5	10.1' 10.1'	10°40.4 10°23.8	-16.6' -16.7'	60.3' 60.3'
12	3°31.8	S08°26.0	221°17.6	10.1	<b>S</b> 10°07.2	-16.8	60.3
13	18°32.0	26.9	235°46.8	10.1'	09°50.4	-16.8'	60.3'
14 15	33°32.1 48°32.2	27.8 •• 28.7	250°15.9 264°45.1	10.2' 10.2'	09° 33.6 09° 16.7	-16.9' -17.0'	60.4' 60.4'
16	63°32.4	29.7	279°14.3	10.2'	09°10.7 08°59.7	-17.0'	60.4
17	78°32.5	30.6	293°43.5	10.2'	08°42.7	-17.1'	60.5'
18	93°32.7 108°32.8	S08°31.5	308°12.7 322°41.9	10.2'	\$08°25.6 08°08.4	-17.2'	60.5'
19 20	108° 32.8 123° 32.9	32.4 33.4	322°41.9 337°11.2	10.3' 10.3'	08°08.4 07°51.2	-17.2' -17.3'	60.5' 60.5'
21	138°33.1	• • 34.3	351°40.4	10.3'	$07^{\circ}33.9$	-17.3'	60.6'
22	153°33.2	35.2	6°09.7	10.3'	07°16.5	-17.4'	60.6
23	168°33.4	36.1	20°39.0	10.3'	06°59.1	-17.5'	60.6'
	SD = 16.0'	d = 0.9'		SE	0 = 16.3'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light	
Lat.	Naut.	Civil	Juillise	Juliset	Civil	Naut.	
<b>N</b> 72°	04:48	06:07	07:17	16:14	17:23	18:41	
<b>N</b> 70°	04:53	06:04	07:06	16:24	17:27	18:37	
68°	04:57	06:01	06:58	16:33	17:29	18:33	
66°	05:00	05:59	06:51	16:40	17:32	18:31	
64°	05:02	05:57	06:45	16:46	17:34	18:29	
62°	05:04	05:55	06:40	16:51	17:36	18:27	
60°	05:05	05:53	06:35	16:56	17:38	18:26	
<b>N</b> 58°	05:06	05:52	06:32	17:00	17:39	18:24	
56°	05:07	05:50	06:28	17:03	17:41	18:24	
54°	05:08	05:49	06:25	17:06	17:42	18:23	
52°	05:09	05:48	06:22	17:09	17:43	18:22	
50°	05:09	05:47	06:19	17:12	17:45	18:22	
45°	05:10	05:44	06:14	17:18	17:47	18:21	
<b>N</b> 40°	05:10	05:42	06:09	17:23	17:50	18:21	
35°	05:10	05:39	06:05	17:27	17:53	18:22	
30°	05:09	05:37	06:01	17:31	17:55	18:23	
20°	05:06	05:32	05:54	17:38	18:00	18:25	
$N 10^{\circ}$	05:03	05:27	05:48	17:44	18:05	18:29	
0°	04:58	05:22	05:43	17:49	18:10	18:35	
<b>S</b> $10^{\circ}$	04:51	05:16	05:37	17:55	18:16	18:41	
20°	04:43	05:09	05:31	18:02	18:24	18:50	
30°	04:31	04:59	05:24	18:09	18:33	19:02	
35°	04:23	04:54	05:20	18:13	18:39	19:10	
40°	04:14	04:47	05:15	18:18	18:46	19:19	
45°	04:03	04:39	05:09	18:24	18:54	19:31	
<b>S</b> 50°	03:48	04:29	05:03	18:31	19:04	19:46	
52°	03:41	04:24	04:59	18:34	19:09	19:53	
54°	03:33	04:19	04:56	18:37	19:15	20:01	
56°	03:24	04:13	04:52	18:41	19:21	20:10	
58°	03:13	04:06	04:48	18:46	19:28	20:21	
<b>S</b> 60°	03:01	03:59	04:43	18:51	19:36	20:34	
1 -4	Moonris		se .		Moonset		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon	

Lat.		Moonris	е		Moonset	:
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°	_	18:20	17:19		23:36	
<b>N</b> 70°		17:49	17:07			00:05
68°	18:18	17:26	16:56	21:42		00:26
66°	17:37	17:07	16:48	22:22	•• ••	00:43
64°	17:08	16:52	16:40	22:50		00:56
62°	16:46	16:40	16:34	23:11		01:07
60°	16:29	16:29	16:28	23:27		01:17
<b>N</b> 58°	16:14	16:19	16:23	23:42		01:25
56°	16:01	16:11	16:19	23:54		01:32
54°	15:49	16:04	16:15		00:04	01:39
52°	15:39	15:57	16:11		00:13	01:44
50°	15:31	15:51	16:08	•• ••	00:22	01:49
45°	15:11	15:38	16:00		00:39	02:01
<b>N</b> 40°	14:56	15:27	15:54		00:53	02:10
35°	14:43	15:18	15:49		01:05	02:17
30°	14:31	15:09	15:44	80:00	01:16	02:24
20°	14:11	14:55	15:36	00:31	01:33	02:36
N 10°	13:54	14:43	15:29	00:50	01:49	02:46
0°	13:37	14:31	15:22	01:09	02:03	02:55
<b>S</b> 10°	13:21	14:19	15:16	01:27	02:17	03:05
20°	13:03	14:06	15:08	01:47	02:32	03:15
30°	12:43	13:52	15:00	02:09	02:49	03:26
35°	12:31	13:43	14:55	02:22	02:59	03:32
40°	12:17	13:33	14:50	02:37	03:10	03:39
45°	12:01	13:22	14:43	02:54	03:23	03:48
<b>S</b> 50°	11:41	13:08	14:36	03:16	03:39	03:57
52°	11:31	13:01	14:32	03:26	03:47	04:02
54°	11:20	12:54	14:28	03:38	03:55	04:07
56°	11:07	12:46	14:24	03:51	04:04	04:13
58°	10:53	12:36	14:19	04:06	04:14	04:19
<b>S</b> 60°	10:36	12:26	14:13	04:24	04:26	04:26

		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	63-83%
12	13:31	13:39	11:46	19:50	07:23	
13	13:46	13:53	11:46	20:43	08:17	
14	14:00	14:07	11:46	21:34	09:09	

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Tuo	CH4	CHV	Doc	CHV	Dos	CHA	Doc	CH V	Doc		CHV	Doc
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	24°01.1	149°58.0	S20°21.0	270°19.7	N22°33.0	303°27.3	N22°26.1	38°20.9	S08°28.9	Alpheratz	357°34.7	29°13.8
1	39°03.6	164°57.4	21.8	285°20.9	32.9	318° 29.8	26.1	53°23.5	28.9	Ankaa	353°06.9	-42°10.3
2	54°06.0	179°56.7	22.6	300°22.1	32.8	333°32.3	26.1	68°26.1	29.0	Schedar	349°30.8	56°40.5
3	69°08.5	194°56.1	• • 23.4	315°23.3	• • 32.7	348° 34.8	26.1	83°28.7	• • 29.0	Diphda	348°47.2	-17°51.0
4	84°11.0	209°55.4	24.3	330°24.6	32.5	3°37.3	26.1	98°31.3	29.1	Achernar	335°19.7	-57°06.6
5	99°13.4	224°54.8	25.1	345°25.8	32.4	18° 39.9	26.1	113°33.9	29.1	Hamal	327°51.1	23°34.9
6	114°15.9	239°54.1	S20°25.9	0°27.0	N22°32.3	33°42.4	N22°26.1	128° 36.4	S08°29.2	Polaris	313°42.4	89°22.0
7	129°18.4	254° 53.5	26.7	15°28.2	32.2	48° 44.9	26.1	143°39.0	29.2	Acamar	315°11.5	-40°12.1
8	144°20.8	269°52.9	27.6	30°29.4	32.1	63°47.4	26.1	158°41.6	29.2	Menkar	314°06.1	4°11.3
9	159°23.3	284° 52.2	• • 28.4	45°30.6	• • 32.0	78° 49.9	• • 26.1	173°44.2	• • 29.3	Mirfak	308°28.1	49°56.9
10	174°25.7	299°51.6	29.2	60°31.9	31.8	93°52.5	26.1	188°46.8	29.3	Aldebaran	290°39.6	16°33.6
11	189°28.2	314°50.9	30.0	75°33.1	31.7	108° 55.0	26.1	203°49.4	29.4	Rigel	281°03.9	-8°10.2
12	204°30.7	329°50.3	S20°30.9	90°34.3	N22°31.6	123° 57.5	N22°26.1	218°51.9	S08°29.4	Capella	280°21.9	46°01.3
13	219°33.1	344°49.6	31.7	105°35.5	31.5	139°00.0	26.1	233°54.5	29.5	Bellatrix	278°22.9	6°22.5
14	234°35.6	359° 49.0	32.5	120°36.7	31.4	154°02.5	26.1	248°57.1	29.5	Elnath	278°01.9	28°37.7
15	249°38.1	14°48.3	• • 33.3	135°38.0	• • 31.2	169°05.1	• • 26.1	263°59.7	• • 29.6	Alnilam	275°37.8	-1°11.0
16	264°40.5	29°47.7	34.1	150°39.2	31.1	184°07.6	26.1	279°02.3	29.6	Betelgeuse	270°52.2	7°24.8
17	279°43.0	44° 47.0	34.9	165°40.4	31.0	199° 10.1	26.1	294°04.8	29.6	Canopus	263°52.3	-52°42.1
18	294°45.5	59° 46.4	S20°35.7	180°41.6	N22°30.9	214° 12.6	N22°26.0	309°07.4	S08°29.7	Sirius	258°26.3	-16°44.7
19	309°47.9	74° 45.7	36.6	195°42.8	30.8	229°15.1	26.0	324°10.0	29.7	Adhara	255°06.0	-29°00.0
20	324°50.4	89°45.1	37.4	210°44.1	30.6	244° 17.7	26.0	339°12.6	29.8	Procyon	244°51.1	5°09.8
21	339°52.8	104°44.4	• • 38.2	225°45.3	• • 30.5	259°20.2	• • 26.0	354°15.2	• • 29.8	Pollux	243°17.6	27°58.0
22	354°55.3	119°43.8	39.0	240°46.5	30.4	274°22.7	26.0	9°17.8	29.9	Avior	234°15.0	-59°34.9
23	9°57.8	134°43.1	39.8	255°47.7	30.3	289°25.2	26.0	24°20.3	29.9	Suhail	222°46.7	-43°31.6
Mern	ass. 22:20	$\nu$ -0.6' d0	.8′ m-3.95	ν1.2′ d-Ω	0.1' m0.30	ν2.5′ d-0	.0′ m-2.57	$\nu^{2.6'} d0$	0′ m0.72	Miaplacidus	221°38.8	-69°48.7
р										Alphard	217°48.1	-8°45.8
										Regulus	207°34.9	11°50.9
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.7	61°36.9
0	25°00.2	149°42.4	\$20°40.6	270°49.0	N22°30.2	304°27.8	N22°26.0	39°22.9	S08°30.0	Denebola	182°25.5	14°26.1
1	40°02.7	164°41.8	41.4	285°50.2	30.1	319°30.3	26.0	54°25.5	30.0	Gienah	175°44.1	-17°40.6
2	55°05.2	179°41.1	42.2	300°51.4	29.9	334° 32.8	26.0	69°28.1	30.0	Acrux	173°01.1	-63°14.0
3	70°07.6	194° 40.5	• • 43.0	315°52.7	• • 29.8	349° 35.3	• • 26.0	84°30.7	• • 30.1	Gacrux	171°52.5	-57°15.0
4	85°10.1	209°39.8	43.8	330°53.9	29.7	4° 37.9	26.0	99°33.2	30.1	Alioth	166°13.7	55°49.5
5	100°12.6	224°39.2	44.6	345°55.1	29.6	19°40.4	26.0	114°35.8	30.2	Spica	158°22.9	-11°17.3
6	115°15.0	239°38.5	S20°45.4	0°56.3	N22°29.5	34° 42.9	N22°26.0	129°38.4	S08°30.2	Alkaid	152°52.6	49°11.4
7	130°17.5	254° 37.9	46.2	15°57.6	29.3	49°45.4	26.0	144°41.0	30.3	Hadar	148°37.0	-60°29.5
8	145°20.0	269° 37.2	47.0	30°58.8	29.2	64°48.0	26.0	159°43.6	30.3	Menkent	147°58.3	-36°29.4
9	160°22.4	284° 36.5	• • 47.8	46°00.0	• • 29.1	79° 50.5	• • 26.0	174°46.1	• • 30.3	Arcturus	145°48.4	19°03.3
10	175°24.9	299°35.9	48.6	61°01.3	29.0	94°53.0	26.0	189°48.7	30.4	Rigil Kent.	139°41.3	-60°56.3
11	190°27.3	314°35.2	49.4	76°02.5	28.9	109°55.6	26.0	204°51.3	30.4	Kochab	137°20.8	74°03.3
12	205°29.8	329°34.6	\$20°50.2	91°03.7	N22°28.7	124°58.1	N22°26.0	219°53.9	S08°30.5	Zuben'ubi	136°56.6	-16°08.6
13	220°32.3	344°33.9	51.0	106°05.0	28.6	140°00.6	26.0	234°56.5	30.5	Alphecca	126°04.2	26°38.0
14	235°34.7	359°33.2	51.8	121°06.2	28.5	155°03.1	26.0	249°59.0	30.6	Antares	112°16.4	-26°29.2
15	250°37.2	14°32.6	• • 52.6	136°07.4	• • 28.4	170°05.7	• • 26.0	265°01.6	• • 30.6	Atria	$107^{\circ}11.1$	-69°04.5
16	265°39.7	29°31.9	53.4	151°08.7	28.3	185°08.2	26.0	280°04.2	30.6	Sabik	102°03.2	-15°45.3
17	280°42.1	44°31.2	54.2	166°09.9	28.1	200° 10.7	26.0	295°06.8	30.7	Shaula	$96^{\circ}10.9$	-37°07.4
18	295°44.6	59°30.6	\$20°55.0	181°11.2	N22°28.0	215° 13.3	N22°25.9	310°09.4	S08°30.7	Rasalhague	95°58.9	12°32.7
19	310°47.1	74°29.9	55.8	196°12.4	27.9	230°15.8	25.9	325°11.9	30.8	Eltanin	90°42.5	51°29.4
20	325°49.5	89°29.3	56.6	211°13.6	27.8	245° 18.3	25.9	340°14.5	30.8	Kaus Aust.	83°32.9	-34°22.5
21	340°52.0	104°28.6	• • 57.4	226°14.9	• • 27.7	260°20.9	• • 25.9	355°17.1	• • 30.9	Vega	80°33.5	38°48.6
22	355°54.4	119°27.9	58.1	241°16.1	27.5	275°23.4	25.9	10°19.7	30.9	Nunki	75°48.1	-26°16.0
23	10°56.9	134°27.3	58.9	256°17.3	27.4	290°25.9	25.9	25°22.2	30.9	Altair	62°00.2	8°56.1
Mer.p	ass. 22:16	$\nu$ -0.7' d0.	.8′ m-3.95	$\nu$ 1.2′ d-0	0.1'  m 0.29	$\nu 2.5' \ d-0$	.0′ m-2.58	$\nu 2.6' \ d0$	0′ m0.72	Peacock	53°05.9	-56°39.5
										Deneb	49°25.9	45°22.4
<del></del> .	CIIA	CILL	-	C114	Б	C115	Б	CI14	Б	Enif	33°38.8	9°59.4
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA 40°24 0	Dec	Al Na'ir	27°32.9	-46°50.6
0	25°59.4	149°26.6	\$20°59.7	271°18.6	N22°27.3	305°28.5	N22°25.9	40°24.8	508°31.0	Fomalhaut	15°14.5	-29°29.5
1	41°01.8	164°25.9	21°00.5	286°19.8	27.2	320°31.0	25.9	55°27.4	31.0	Scheat	13°45.1	28°13.2
2	56°04.3	179°25.3	01.3	301°21.1	27.1	335°33.5	25.9	70°30.0	31.1	Markab	13°29.9	15°20.5
3	71°06.8	194°24.6	02.1	316°22.3	• • 26.9	350°36.1	• • 25.9	85°32.6	•• 31.1	Oct 15 Tue	SHA	Mor noss
4	86°09.2	209°23.9	02.8	331°23.6	26.8	5°38.6	25.9	100°35.1	31.1		3HA 125°56.9	Mer.pass 14:01
5 6	101°11.7	224°23.3	03.6	346°24.8 1°26.0	26.7 N22°26.6	20°41.1	25.9 N22°25.9	115°37.7	31.2		246°18.6	05:58
	116°14.2	239°22.6	S21°04.4	1°26.0 16°27.3		35°43.7			508°31.2	Jupiter		03:46
7 8	131°16.6 146°19.1	254°21.9 269°21.3	05.2 06.0		26.5 26.3	50° 46.2 65° 48.7	25.9 25.9	145°42.9 160°45.4	31.3 31.3	Saturn	14°19.8	21:23
9	146° 19.1 161° 21.6	269°21.3 284°20.6	06.0 •• 06.7	31°28.5 46°29.8	26.3	80°51.3	25.9	160°45.4 175°48.0	31.3	Jatuill	14 19.0	۷1.۷
10	101 21.0 176°24.0	299° 19.9	07.5	40 29.8 61°31.0	26.2	95°53.8	25.9	175 46.0 190°50.6	31.4	Oct 16 Wed	SHA	Mer.pass
11	170 24.0 191°26.5	314° 19.2	07.5	76°32.3	26.1	95 55.6 110°56.4	25.9 25.9	205°53.2	31.4	Venus	124°42.2	14:02
12	206°28.9	314 19.2 329°18.6	521°09.1	91°33.5	N22°25.9	110 50.4 125°58.9	N22°25.9	200°55.7	508°31.5	Mars		05:56
13	200 28.9 221°31.4	344°17.9	09.8	91 33.3 106°34.8	25.7	141°01.4	25.9	235°58.3	31.5	Jupiter		03:42
14	236°33.9	359°17.2	10.6	121°36.0	25.6	156°04.0	25.9	251°00.9	31.6	Saturn	14°22.7	21:19
15	250° 35.9 251° 36.3	14° 16.6	• • 11.4	136°37.3	25.5	171°06.5	• • 25.9	266°03.5	31.6	Oct 17 Thu	SHA	Mer pass
16	266°38.8	29° 15.9	12.1	150°37.5	25.4	186°09.1	25.8	281°06.0	31.6		3HA 123°27.2	Mer.pass 14:03
17	281°41.3	44° 15.2	12.1	166°39.8	25.4	201°11.6	25.8	296°08.6	31.7		123°27.2 245°19.2	05:54
18	296°43.7	59° 14.5	S21°13.7	181°41.0	N22°25.1	216° 14.1	N22°25.8	311°11.2			245 19.2 279°29.1	03:37
19	311°46.2	74° 13.9	14.4	196°42.3	25.0	231° 16.7	25.8	326°13.8	31.8	Saturn	14°25.4	21:15
20	326°48.7	89° 13.2	15.2	211°43.5	24.9	246° 19.2	25.8	341°16.4	31.8	Jatuill	17 4J.4	21.13
21	341°51.1	104° 12.5	. 16.0	226°44.8	• • 24.8	261°21.8	25.8	356° 18.9	31.9	Horizont	al parallax	
22	356°53.6	119°11.8	16.7	241°46.0	24.7	276°24.3	25.8	11°21.5	31.9		Venus:	0.1
23	11°56.1	134° 11.2	17.5	256°47.3	24.5	291°26.8	25.8	26°24.1	31.9		Mars:	0.1
ivier.p	ass. 22:12	$\nu$ -0.1' $a$ 0.	.8′ m-3.96	$\nu$ 1.2 a-0	0.1′ m0.27	ν2.5 a-0	.0′ m-2.59	ν2.0′ <b>α</b> 0.	0′ m0.73			

1 1 196°33.5	HP 50.6' 50.7' 50.7' 50.7' 50.7' 50.8' 50.8' 50.8' 50.9' 50.9' 50.9' 51.0' 51.1' 51.1' 51.1' 61.1' 61.1' 61.1'
1 198°33.6 38.0 49°37.6 10.3' 06°24.2 -17.6' 02 213°33.8 38.9 64°06.9 10.3' 06°06.6 -17.6' 06 02 -17.6' 06 06.9' 03.3' 06°06.6 -17.6' 06 06 -17.6' 06 06 -17.6' 06 06 -17.6' 06 06 -17.6' 06 06 -17.6' 06 07 -17.7' 08 07 -18.0'	50.7' 50.7' 50.7' 50.7' 50.8' 50.8' 50.8' 50.9' 50.9' 50.9' 50.9' 51.0' 51.0' 51.1' 51.1' 51.1'
2 213°33.8 38.9 64°06.9 10.3° 06°06.6 -17.6° 07.3° 1.28° 33.9 · 39.8 78°36.3 10.3° 05°49.0 -17.7° 07.5° 1.28° 34.2	50.7' 50.7' 50.7' 50.8' 50.8' 50.9' 50.9' 50.9' 50.9' 50.9' 50.9' 51.0' 51.0' 51.1' 51.1' 51.1'
3	50.7' 50.7' 50.8' 50.8' 50.8' 50.8' 50.9' 50.9' 50.9' 51.0' 51.0' 51.1' 51.1'
4 243°34.1 40.7 93°05.6 10.3' 05°31.3 -17.7' 6 5 258°34.2 41.7 107°34.9 10.3' 05°31.3 -17.7' 6 6 273°34.3 508°42.6 122°04.3 10.3' 05°31.6 -17.7' 6 6 273°34.3 508°42.6 122°04.3 10.3' 05°513.6 -17.8' 6 7 288°34.5 43.5 136°33.6 10.3' 04°38.1 -17.8' 6 8 303°34.6 44.4 151°03.0 10.3' 04°20.3 -17.9' 6 10 333°34.9 46.3 180°01.6 10.3' 03°44.5 -17.9' 6 11 348°35.0 47.2 194°31.0 10.3' 03°26.6 -18.0' 6 12 3°35.2 508°48.1 209°00.3 10.3' 03°26.6 -18.0' 6 13 18°35.3 49.0 223°29.7 10.3' 02°50.6 -18.0' 6 14 33°35.4 49.9 237°59.0 10.3' 02°32.6 -18.1' 6 15 48°35.6 · 50.9 252°28.3 10.3' 02′14.5 -18.1' 6 16 63°35.7 51.8 266°57.6 10.3' 01°56.5 -18.1' 6 17 78°35.8 5.7 281°26.9 10.3' 01°38.4 -18.1' 6 19 108°36.1 54.5 310°25.5 10.3' 01°02.1 -18.2' 6 20 123°36.2 55.5 324°54.7 10.2' 00°43.9 -18.2' 6 21 138°36.4 · 56.4 339°24.0 10.2' 00°43.9 -18.2' 6 22 153°36.5 57.3 353°53.2 10.2' 500°07.6 -18.2' 6 22 153°37.0 01.0 51°49.9 10.1' 01°05.2 18.2' 6 23 168°36.6 58.2 8°22.4 10.2' N00°10.6 18.2' 6 24 23°37.3 02.8 80°48.1 00.0' 00°25.8 18.2' 6 25 258°37.4 03.7 95°17.3 10.1' 01°05.2 18.2' 6 26 273°37.6 509°04.6 109°46.3 10.0' N02°18.1 18.2' 6 27 288°37.7 05.6 124°15.3 10.0' 02°36.3 18.2' 6 28°37.7 05.6 124°15.3 10.0' 02°36.3 18.2' 6 28°37.7 05.6 124°15.3 10.0' 02°36.3 18.2' 6 28°37.7 05.6 124°15.3 10.0' 02°36.3 18.2' 6 28°37.7 05.6 124°15.3 10.0' 02°36.3 18.2' 6 28°37.7 05.6 124°15.3 10.0' 02°36.3 18.2' 6 28°37.7 05.6 124°15.3 10.0' 02°36.3 18.2' 6 28°37.7 05.6 124°15.3 10.0' 02°36.3 18.2' 6 28°37.7 05.6 124°15.3 10.0' 02°36.3 18.2' 6 28°37.7 05.6 124°15.3 10.0' 02°36.3 18.2' 6 28°37.7 05.6 124°15.3 10.0' 02°36.3 18.2' 6 28°37.7 05.6 124°15.3 10.0' 02°36.3 18.2' 6 29 318°38.0 · 07.4 153°13.3 9.9' 03°12.7 18.2' 6 10 333°38.1 08.3 167°42.2 9.9' 03°30.8 18.2' 6 11 38°39.5 11.0 121°08.9 18.0' 00°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 18.1' 10°07.1 1	50.7' 50.8' 50.8' 50.8' 50.8' 50.9' 50.9' 50.9' 51.0' 51.0' 51.1' 51.1'
5	50.8' 50.8' 50.8' 50.9' 50.9' 50.9' 50.9' 51.0' 51.0' 51.1' 51.1'
6	50.8' 50.8' 50.9' 50.9' 50.9' 51.0' 51.0' 51.1' 51.1' 51.1'
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68°         05:07         06:11         07:09         16:20         17:18         18:22           66°         05:09         06:08         07:01         16:29         17:21         18:20           64°         05:10         06:05         06:54         16:36         17:24         18:19           62°         05:11         06:03         06:48         16:42         17:27         18:18           60°         05:12         06:00         06:43         16:47         17:29         18:17           N 58°         05:13         05:58         06:38         16:52         17:31         18:17           56°         05:13         05:56         06:38         16:52         17:31         18:16           54°         05:14         05:55         06:30         16:59         17:35         18:16           52°         05:14         05:53         06:27         17:03         17:37         18:16           45°         05:14         05:51         06:24         17:06         17:39         18:16           45°         05:14         05:48         06:17         17:13         17:42         18:16           N 40°         05:13         05:45	N 72°	05:02	06:20	07:31	15:58	17:09	18:27
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20°         04:40         05:06         05:29         18:03         18:25         18:51           30°         04:27         04:56         05:20         18:11         18:35         19:04           35°         04:19         04:50         05:16         18:16         18:42         19:13           40°         04:09         04:42         05:10         18:21         18:49         19:23           45°         03:57         04:34         05:04         18:28         18:58         19:35           5 50°         03:41         04:22         04:56         18:36         19:10         19:51           52°         03:33         04:17         04:53         18:39         19:15         19:59           54°         03:25         04:11         04:49         18:43         19:21         20:08           56°         03:15         04:05         04:45         18:48         19:28         20:18           58°         03:03         03:57         04:40         18:53         19:35         20:30	0°	04:57	05:21	05:42	17:49	18:10	18:34
30°         04:27         04:56         05:20         18:11         18:35         19:04           35°         04:19         04:50         05:16         18:16         18:42         19:13           40°         04:09         04:42         05:10         18:21         18:49         19:23           45°         03:57         04:34         05:04         18:28         18:58         19:35 <b>5</b> 50°         03:41         04:22         04:56         18:36         19:10         19:51           52°         03:33         04:17         04:53         18:39         19:15         19:59           54°         03:25         04:11         04:49         18:43         19:21         20:08           56°         03:15         04:05         04:45         18:48         19:28         20:18           58°         03:03         03:57         04:40         18:53         19:35         20:30		04:50	05:14	05:36	17:55	18:17	18:42
35°         04:19         04:50         05:16         18:16         18:42         19:13           40°         04:09         04:42         05:10         18:21         18:49         19:23           45°         03:57         04:34         05:04         18:28         18:58         19:35           \$ 50°         03:41         04:22         04:56         18:36         19:10         19:51           52°         03:33         04:17         04:53         18:39         19:15         19:59           54°         03:25         04:11         04:49         18:43         19:21         20:08           56°         03:15         04:05         04:45         18:48         19:28         20:18           58°         03:03         03:57         04:40         18:53         19:35         20:30	20°	04:40	05:06	05:29	18:03	18:25	18:51
40°         04:09         04:42         05:10         18:21         18:49         19:23           45°         03:57         04:34         05:04         18:28         18:58         19:35           S 50°         03:41         04:22         04:56         18:36         19:10         19:51           52°         03:33         04:17         04:53         18:39         19:15         19:59           54°         03:25         04:11         04:49         18:43         19:21         20:08           56°         03:15         04:05         04:45         18:48         19:28         20:18           58°         03:03         03:57         04:40         18:53         19:35         20:30		04:27	04:56	05:20	18:11	18:35	19:04
45°         03:57         04:34         05:04         18:28         18:58         19:35           \$ 50°         03:41         04:22         04:56         18:36         19:10         19:51           52°         03:33         04:17         04:53         18:39         19:15         19:59           54°         03:25         04:11         04:49         18:43         19:21         20:08           56°         03:15         04:05         04:45         18:48         19:28         20:18           58°         03:03         03:57         04:40         18:53         19:35         20:30		04:19	04:50	05:16	18:16	18:42	19:13
S 50°         03:41         04:22         04:56         18:36         19:10         19:51           52°         03:33         04:17         04:53         18:39         19:15         19:59           54°         03:25         04:11         04:49         18:43         19:21         20:08           56°         03:15         04:05         04:45         18:48         19:28         20:18           58°         03:03         03:57         04:40         18:53         19:35         20:30		04:09	04:42	05:10	18:21	18:49	19:23
52°         03:33         04:17         04:53         18:39         19:15         19:59           54°         03:25         04:11         04:49         18:43         19:21         20:08           56°         03:15         04:05         04:45         18:48         19:28         20:18           58°         03:03         03:57         04:40         18:53         19:35         20:30	45°	03:57	04:34	05:04	18:28	18:58	19:35
54°     03:25     04:11     04:49     18:43     19:21     20:08       56°     03:15     04:05     04:45     18:48     19:28     20:18       58°     03:03     03:57     04:40     18:53     19:35     20:30							
56° 03:15 04:05 04:45 18:48 19:28 20:18 58° 03:03 03:57 04:40 18:53 19:35 20:30		03:33	04:17	04:53	18:39	19:15	19:59
58° 03:03 03:57 04:40 18:53 19:35 20:30		03:25	04:11	04:49	18:43	19:21	20:08
		03:15	04:05	04:45	18:48	19:28	20:18
<b>S</b> 60°   02:49		58° 03:03 03					
	<b>S</b> 60°	02:49	03:49	04:34	18:58	19:44	20:45

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

		Sun			Moon			
Day	Eqn.of	of Time M		Mer.Pass.		Age		
- 43	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	13-15		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	91-100%		
15	14:14	14:21	11:46	22:25	10:00			
16	14:27	14:33	11:45	23:17	10:51			
17	14:40	14:46	11:45	-:-	11:43			

## October 18, 19, 20 UT (Fri., Sat., Sun.)

Fig.   GIA   Dec   OHA   OHA   Dec   OHA   OHA   Dec   OHA	h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
0 20°585   16°107   521°18   70°108   10°29   10°29   10°29   10°29   10°20	E:	CHA	CHA	Doo	CHA	Doo	CHA	Daa	CHA	Doo		CHA	Doo
1												эна	Dec
2											Alpheratz	357°34.7	29° 13.8
1						24.3							
Color	2	57°03.4	$179^{\circ}09.1$	19.8	301°51.0	24.2	336°34.5	25.8	71°31.8	32.1			
19	3	72°05.9	194°08.4	• • 20.5	316°52.3	• • 24.1	351°37.0	• • 25.8	86°34.4	• • 32.1			
10	4	87°08.4	209°07.8	21.3	331°53.6	23.9	6°39.6	25.8	101°36.9	32.1			
11   117-133   220   200   201   2													
15											Hamal		23°34.9
8											Polaris	313°41.5	89°22.0
10   1772   286   146   286   276   276   276   286   276											Acamar	$315^{\circ}11.5$	-40°12.1
10   1979   13   2879   13   2879   28   10   28   28   10   28   28   28   28   28   28   28   2											Menkar	314°06.1	4°11.3
11 107-256													
1.1   227   237													
14   2077-30.3   3697-100   288   127-26   127	11		314°03.0	26.6		23.1					l l		
13 22° 136 14° 14° 14° 14° 14° 14° 14° 14° 14° 14°	12	207°28.1	329°02.3	S21°27.3	92°03.6	N22°23.0	126°59.9	N22°25.7	221°57.5	S08°32.5	_		
14   227*33.0   39*00.9   28.8   127*00.7   27.1   157*05.0   25.7   227*02.7   23.5   25.6	13	222°30.5	344°01.6	28.1	107°04.9	22.9	142°02.5	25.7	237°00.1	32.5			
15   229"35.5   14"00.3   -9.6   13"10.7   -9.2.6   17"07.6   -25.7   26"10.5   3-2.6   1.5   26"10.5   3-2.6   1.5   26"10.5   3-2.6   1.5   26"10.5   3-2.6   1.5   26"10.5   3-2.6   1.5   26"10.5   3-2.6   1.5   26"10.5   3-2.5   1.5   26"10.5   3-2.5   1.5   26"10.5   3-2.5   1.5   26"10.5   3-2.5   1.5   26"10.5   3-2.5   1.5   26"10.5   3-2.5   1.5   26"10.5   3-2.5   1.5   26"10.5   3-2.	14	237°33.0	359°00.9	28.8		22.7	157°05.0	25.7	252°02.7	32.5			
20° 20° 37° 39° 39° 59° 59° 50° 30° 3 132° 68° 7° 22° 58° 187° 101° 22° 40° 12° 7° 20° 40° 40° 40° 40° 40° 50° 50° 40° 40° 40° 40° 40° 40° 40° 40° 40° 4													
17   229"   140   35"   160"   160"   160"   17   17   17   17   17   17   17   1											Alnilam		
287 429 87842 521318 182*11.2 h22*23.3 217*15.2 h22*25.7 327*15.5 327.4 April 2014 325*36 327.4 April											Betelgeuse	270°52.2	7°24.8
19   312"453   315"455   33.6   197"125   22.1   232"178   25.7   372"181   32.8   Abbar   232"60.0   232"60											Canopus	263°52.3	-52°42.1
327 473 8											Sirius	258°26.3	-16°44.8
23   347   347   348													
Mor. pass   22-08   W-0.7"   60-08"   m-396   W-0.7"													
23 12*552 135*548 355 25*176 21.7 20*228.0 25*7 27*25.8 32.9   Mer.pass. 22.08   Mer				• • 34.0		• • 21.9							
Metropass   22:08	22	357°52.7	118°55.5	34.8	242°16.3	21.8	277°25.4	25.7	12°23.3	32.9			
Subal	23	12°55.2	133°54.8	35.5	257°17.6	21.7	292°28.0	25.7	27°25.8	32.9	l l		
Sat   CHA										_			
Second   GHA	Mer.p	ass. 22:08	$\nu$ -0.7′ d0.	.8′ m-3.96	$\nu$ 1.3′ d-0	0.1′ m0.26	$\nu 2.5' \ d-0$	.0′ m-2.59	$\nu$ 2.6′ $d$ 0	.0′ m0.73			
Sat GHA											Alphard		
27°577, 148°541, 522°363, 27°218, 802°215, 30°305, N22°257, 42°284, 508°329	Sat	CHV	CHV	Doc	CHV	Doc	CHV	Doc	CHV	Doc	_		
1 43°00.1 163°53.4 37.0 287°20.1 2.14 322°33.1 25.7 57°31.0 33.0 26800.1 37°20.2 25.5 60.2 37°30.5 33.0 33.0 30.0 21.4 21.3 337°35.6 25.7 7°2°33.5 33.0 33.0 33.0 37°20.2 37°20.2 37°30.5 33.0 33.0 38°20.2 30.0 21.4 21.3 337°35.6 25.7 7°2°33.5 33.1 33.1 33.1 36.0 23°20.2 31°20.2 32°30.2 25.7 117°41.3 33.1 4 32°30.2 31°20.2 31°20.2 32°30.2 25.7 117°41.3 33.1 4 32°30.2 31°20.2 31°20.2 31°20.2 31°20.2 31°20.2 31°20.2 31°20.2 31°20.2 31°20.3 31°40.2 31°40													
Serole											Denebola	182°25.4	14°26.1
78'050   199"520   38.5   317"226   212   392"382   25.7   87"361   331   331   48"675   208"332   331   392   332"239   210   7"40.7   25.7   102"387   331   331   392   332"239   210   7"40.7   25.7   117"413   331   331   311   32"369   34"252   20.6   25"68   25"69											Gienah	$175^{\circ}44.1$	-17°40.6
73 95.0 1 939 52.0 1 939 52.0 1 939 52.1 17 22.6 1 92.1 352 382 1 97 32.6 1 12.1 352 382 1 92.5 1 17 40.7 25.7 102 38.7 33.1   5 103*10.0 23*50.6 39.9 347*25.2 20.9 22*43.3 25.7 117*413 33.1   5 103*10.0 23*50.6 39.9 347*25.2 20.9 22*43.3 25.7 117*413 33.1   5 103*10.0 23*50.6 39.9 347*25.2 20.9 22*43.3 22.5 117*413 33.1   5 103*10.0 23*50.6 23.6 117*21.4 288*49.9 \$21*40.7 72.7 20.7 52*48.4 22.5 6 147*64.4 33.2   8 146*174 208*48.9 \$21*40.7 22*50.0 56*50.9 25.6 162*49.0 33.2   9 165*10.8 28*347.9 4.2 4.3 6 22*50.0 20.6 67*50.9 25.6 162*49.0 33.2   10 178*22.3 288*47.2 4.3 6 62*31.5 20.9 97*56.6 25.6 128*51.5 133*3.4   148*23.3 288*47.2 4.3 6 62*31.5 20.9 97*56.6 25.6 128*51.5 138*23.3   10 178*22.3 288*47.2 4.3 6 62*31.5 20.9 97*56.6 25.6 128*51.3 33.3   13 22*25.7 2.3 288*44.4 46.5 17*32.8 1.02*20.1 128*56.5 202*56.6 202*56.3 308*34.4   148*238*32.2 388*44.4 46.5 122*86.7 109*8.4 128*31.5 25*34.4 128*31.5 25*34.4 128*31.5 25*34.4 128*31.5 25*34.4 128*31.5 25*34.4 128*31.5 25*34.5 128*31.5 25*34.4 128*31.5 25*34.5 128*31.5 25*34.5 128*31.5											Acrux	173°01.1	-63°14.0
88 °07.5 200° 51.3 30.2 332° 23.9 21.0 740.7 25.7 102° 38.7 33.1 Alioth 166°13.7 55° 49.5 105° 100° 202° 500.0 225° 500.0 225° 500.0 225° 500.0 225° 500.0 225° 500.0 225° 500.0 225° 500.0 225° 500.0 225° 500.0 225° 500.0 225° 500.0 225° 500.0 225° 500.0 225° 500.0 225° 500.0 225° 500.0 225° 500.0 225° 500.0 23.2 Alkaid 152° 52.6 49° 1.4 148° 37.0 60° 29.5 100° 500.0 33.2 Alkaid 152° 52.6 49° 1.4 148° 37.0 60° 29.5 100° 500.0 33.2 Alkaid 152° 52.6 49° 1.4 148° 37.0 60° 29.5 100° 500.0 33.2 Alkaid 148° 37.0 60° 29.5 100° 500.0 33.2 Alkaid 148° 37.0 60° 29.5 100° 500.0 33.2 Alkaid 152° 52.6 49° 1.4 148° 37.0 60° 29.5 100° 500.0 33.2 Alkaid 152° 52.6 49° 1.4 148° 37.0 60° 29.5 100° 500.0 33.2 Alkaid 152° 52.6 49° 1.4 148° 37.0 10° 500.0 30° 30° 500.0	3	73°05.0	193°52.0	• • 38.5	317°22.6	• • 21.2		• • 25.7		• • 33.1			
6 118°1.00 22°8°9.06 30.99 347°2.2°2.00 37°45.8° N22°2.6° 137°4.13 33.1 Spica 158°2.2° 9.11°1.73 7 133°1.49 258°4.99 21.41 17°2.77 20.7 52°4.84 N22°2.6° 147°46.4° 33.2 Hadar 148°3.70 -60°2.0° 9.10°1.79 14.41 3° 131°4.9° 14.41 17°2.77 20.7 52°4.84 N22°2.6° 147°46.4° 33.2 Hadar 148°3.70 -60°2.0° 10° 10° 10° 10° 10° 10° 10° 10° 10° 1	4	88°07.5	208°51.3	39.2	332°23.9	21.0	7°40.7	25.7	102°38.7	33.1			
118°12-4   238°49.9   S21'40.7   22°25   N22°20.8   37'45.8   N22°25.6   132'45.8   S08'33.2   Alkiald   152°25.6   49'11.4   7   138'14.9   255'49.2   41.4   7'27.7   20'7   52'48.4   25.5   132'45.8   33.2   Alkiald   188'37.0   60°29.5   8   148'17.4   268'48.5   42.1   32°29.0   20.6   67'50.9   25.6   162'49.0   33.2   Alkiald   188'37.0   60°29.5   8   148'17.4   268'48.7   42.1   32°29.0   20.6   67'50.9   25.6   162'49.0   33.2   Alkiald   188'37.0   47'80.3   3.6°29.4   8   198'48.8   313'46.5   43.3   32°24.8   25.8   20.2   112'88.6   25.6   207'55.7   33.4   Kochab.   33'20.8   11   199'34.8   313'46.5   43.3   7'32.8   20.2   112'88.6   25.6   207'55.7   33.4   Kochab.   33'20.8   33'4.1   36'55.6   16'0.86.6   13   228'79.7   343'45.1   45.8   02'34.1   N22'20.1   128'01.2   N22'25.6   222'99.3   508'33.4   Kochab.   37'20.8   33.6   43.	5	103°10.0	223°50.6	39.9	347°25.2	20.9	22°43.3	25.7	117°41.3	33.1			
8 148°14.9 258°49.2 41.4 17°27.7 20.7 52°48.4 25.6 147°46.4 33.2 Alphaer 18°37.6 06°29.5 10°49.0 33.2 Menkent 14°58.3 36°29.4 10°178°2.3 298°47.2 43.6 62°31.5 20.3 9°56.0 25.6 10°29.5 13°3.3 Actures 145°48.1 19°3.3 36°20.4 82°83.5 25.6 12°79.1 33.3 Actures 145°48.1 19°3.3 36°20.4 19°3.3 11°193°24.8 313°46.5 44.3 77°32.8 20.2 112°8.6 25.6 20°56.7 33.4 Kochab 137°20.8 12°20.1 228°17.2 328°4.8 521°48.1 458°5.0 22°49.1 38°20.1 128°10.1 20°20.2 22°59.3 80°83.4 Kochab 137°20.8 20°31.1 223°29.7 343°45.1 45.8 10°33.4 20.0 143°03.7 25.6 238°01.8 33.4 Kochab 137°20.8 20°31.1 223°29.7 343°45.1 45.8 10°33.4 20.0 143°03.7 25.6 238°01.8 33.4 Kochab 137°20.8 20°31.1 223°37.1 28°3.4 20.0 143°03.7 25.6 238°01.8 33.4 Alphaer 128°04.2 26°320.1 12°56.6 26°30°1.4 33.5 Alphaer 128°04.2 26°320.1 12°56.8 25°04.8 33.5 Alphaer 128°04.2 26°320.1 12°56.8 25°04.8 33.5 Alphaer 128°04.2 26°320.1 12°56.8 25°04.8 137°20.8 26°30.8 33.4 Alphaer 128°04.2 26°320.1 12°56.8 25°04.8 12°32.6 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.8 28°07.0 33.5 Alphaer 128°04.2 26°320.1 12°56.1 1	6	118°12.4	238°49.9	S21°40.7	2°26.5	N22°20.8	37°45.8	N22°25.6	132°43.8	S08°33.2			
8 148°17.4 268°48.5 42.1 32°29.0 20.6 67°59.9 25.6 162°49.0 33.2 4 813°47.9 4.29 47°30.3 20.4 82°33.5 22.5 6 177°51.5 33.3 4 Arcturus 145°48.4 31.3 10°18°22.3 298°47.2 43.6 62°31.5 20.3 97°56.0 25.6 192°54.1 33.3 Arcturus 145°48.4 79°3.3 11 193°34.8 313°46.5 44.3 77°32.8 20.2 112°8.6 25.6 20°56.6 20°56.6 33°61.3 34.4 Kochab 137°20.8 74°03.3 11 293°43.7 34°2.5 10°354. 4 20.0 143°03.7 25.6 22°59.5 508°33.4 4 238°32.2 388°44.4 46.5 122°36.7 19.8 158°06.3 25.6 238°01.8 33.4 Alphacca 126°04.2 26°38.0 Alphacca 128°04.2 26°36.0 20°56.6 238°01.8 33.4 Alphacca 137°20.8 74°03.3 14°23.9 1.0 11.0 11.0 11.0 11.0 11.0 11.0 11.													
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10   178*223   298*47.2											Menkent	147°58.3	-36°29.4
11 193°24.8 313°46.5 44.3 77°32.8 20.2 112°8.6 25.6 207°55.7 33.4 Kochab 13°20.8 120°35.6 122°35.6 22°35.3 508°33.4 Kochab 13°47.3 13°20.8 74°30.3 13°223°29.7 343°45.1 45.8 107°35.4 20.0 143°03.7 25.6 228°01.8 33.4 Alphacea 16°04.2 26°38.0 14 238°32.2 38°84.4 46.5 122°36.7 19.8 188°06.3 25.6 228°30.4 33.5 Alphacea 16°04.2 26°38.0 15°26.3 13°43.7 47.2 13°37.9 19.7 173°08.8 25.6 228°07.0 33.5 Alphacea 112°16.4 -26°29.2 16°26.2 283°03.5 34.5 Alphacea 112°16.4 -26°29.2 16°26.2 34.5 Alphacea 112°16.4 -26°29.2 16°26.2 34.5 Alphacea 112°16.4 -26°29.2 16°26.2 34.5 Alphacea 112°16.4 -26°29.2 16°26.2 34.5 Alphacea 112°16.4 -26°29.2 16°26.2 34.5 Alphacea 112°16.4 -26°29.2 15°26.2 34.5 Alphacea 112°16.4 -26°29.2 16°26.2 34.5 Alphacea 112°16.4 -26°29.2 16°26.2 34.5 Alphacea 112°16.4 -26°29.2 16°26.2 34.5 Alphacea 112°16.4 -26°29.2 112°16.2 34.5 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphacea 112°16.4 Alphac											Arcturus	145°48.4	19°03.3
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15 253°34.6 13°43.7 · 47.2 13°737.9 · 19.7 173°08.8 · 25.6 268°07.0 · 33.5 16 268°37.1 28°43.0 47.9 152°39.2 19.6 188°11.4 25.6 288°09.5 33.5 16 288°17.1 28°39.5 43°42.3 48.7 16°740.5 19.5 203°13.9 25.6 298°12.1 33.6 18.0 19.6 19.0 19.0 19.0 19.0 19.0 19.0 19.0 19.0	14	238°32.2	358°44.4	46.5	122°36.7	19.8	158°06.3	25.6	253°04.4	33.5			
16 268°37.1 28°43.0 47.9 152°39.2 19.6 188°11.4 25.6 283°09.5 33.6 13.6 13.6 13.6 13.6 13.6 13.6 13.6	15	253°34.6	13°43.7	• • 47.2	137°37.9	• • 19.7	173°08.8	• • 25.6	268°07.0	• • 33.5			
18   288°39.5   43°42.3   48.7   167°40.5   19.5   203°13.9   25.6   288°12.1   33.6													
18   298°42.0   58°41.6   521°49.4   182°41.8   N22°19.4   218°16.5   N22°25.6   313°14.7   508°33.6   Shallay   90°10.9   31°34.5   73°40.9   50.1   197°43.1   19.2   233°19.1   25.6   343°19.8   33.7   33.8   33.7   343°49.4   103°39.5   51.5   522°44.5   19.0   263°24.2   -25.6   343°19.8   33.7   33.8   33.8   33.9   33.8   33°38.1   53.0   227°45.6   -19.0   263°24.2   -25.6   358°22.4   -33.7   263°24.2   -33.7   263°24.2   -33.7   263°24.2   -33.7   263°24.2   -33.8   263°24.5   -33.8   263°24													
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Mer.pass   22:05   \( \nu \cdot \) \( \nu \cdot \cdot \) \( \nu \cdo \cdot \cdot \) \( \nu \cdot \cdot \) \( \nu \cdot \cdot \) \( \nu \cdot										33.8	_		
Mer.pass. 22:05   V-0.7' d0.7' m-3.96   V1.3' d-0.1' m0.25   V2.6' d-0.0' m-2.60   V2.6' d0.0' m0.74   Peacok   53°06.0   -56°39.5	23	13°54.3	133°38.1	53.0	257°48.2	18.7	293°29.3	25.5	28°27.5	33.8			
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Sun         GHA         CHA         Dec         GHA         Dec         Her         Parallal         Parallal         Parallal         Parallal         Cenum         Dec         GHA         Dec         GHA         Dec         Her         GHA         Dec         GHA         Dec         GHA         Dec         All Asir         2.92°13.2           4         289°06.6         208°34.6         55.5													
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12 209°26.4 328°29.0 \$22°02.2 93°04.9 N22°17.2 129°02.6 N22°25.5 224°00.9 \$08°34.3 13 224°28.8 343°28.3 02.9 108°06.2 17.0 144°05.2 25.5 239°03.5 34.3 14 239°31.3 358°27.5 03.6 123°07.5 16.9 159°07.7 25.5 254°06.0 34.4 15 254°33.8 13°26.8 · 04.3 138°08.8 · 16.8 174°10.3 · · · 25.4 269°08.6 · · · 34.4 16 269°36.2 28°26.1 05.0 153°10.1 16.7 189°12.9 25.4 284°11.2 34.5 18 299°41.1 58°24.7 \$22°06.4 183°12.7 N22°16.4 219°18.0 N22°25.4 314°16.3 \$08°34.5 19 314°43.6 73°24.0 07.1 198°14.0 16.3 234°20.6 25.4 329°18.9 34.6 21 344°48.5 103°22.6 · · 08.5 228°16.6 · · 16.1 264°25.7 · · · 25.4 359°24.0 · · · 34.6 22 359°51.0 118°21.9 09.2 243°17.9 16.0 279°28.3 25.4 14°26.5 34.7 29°29.1 34.7													
13													
14 239°31.3 358°27.5 03.6 123°07.5 16.9 159°07.7 25.5 254°06.0 34.4 15 254°33.8 13°26.8 ···04.3 138°08.8 ···16.8 174°10.3 ···25.4 269°08.6 ···34.4 16 269°36.2 28°26.1 05.0 153°10.1 16.7 189°12.9 25.4 284°11.2 34.5 17 284°38.7 43°25.4 05.7 168°11.4 16.6 204°15.4 25.4 299°13.7 34.5 18 299°41.1 58°24.7 \$22°06.4 183°12.7 N22°16.4 219°18.0 N22°25.4 314°16.3 \$08°34.5 19 314°43.6 73°24.0 07.1 198°14.0 16.3 234°20.6 25.4 329°18.9 34.6 20 329°46.1 88°23.3 07.8 213°15.3 16.2 249°23.1 25.4 344°21.4 34.6 21 344°48.5 103°22.6 ···08.5 228°16.6 ···16.1 264°25.7 ···25.4 359°24.0 ···34.6 22 359°51.0 118°21.9 09.2 243°17.9 16.0 279°28.3 25.4 14°26.5 34.7 23 14°53.5 133°21.2 09.9 258°19.2 15.8 294°30.8 25.4 29°29.1 34.7													
15											Saturn	14°30.8	21:06
16											0 : 20 0	CIIA	N4 -
17													
18													
19 314°43.6 73°24.0 07.1 198°14.0 16.3 234°20.6 25.4 329°18.9 34.6 20 329°46.1 88°23.3 07.8 213°15.3 16.2 249°23.1 25.4 344°21.4 34.6 21 344°48.5 103°22.6 08.5 228°16.6 16.1 264°25.7 25.4 359°24.0 34.6 34.6 22 359°51.0 118°21.9 09.2 243°17.9 16.0 279°28.3 25.4 14°26.5 34.7 23 14°53.5 133°21.2 09.9 258°19.2 15.8 294°30.8 25.4 29°29.1 34.7 Mars: 0.1													
20 329°46.1 88°23.3 07.8 213°15.3 16.2 249°23.1 25.4 344°21.4 34.6 21 344°48.5 103°22.6 ·· 08.5 228°16.6 ·· 16.1 264°25.7 ·· 25.4 359°24.0 ·· 34.6 22 359°51.0 118°21.9 09.2 243°17.9 16.0 279°28.3 25.4 14°26.5 34.7 23 14°53.5 133°21.2 09.9 258°19.2 15.8 294°30.8 25.4 29°29.1 34.7  Horizontal parallax Venus: 0.1 Mars: 0.1											Jupiter	$279^{\circ}35.1$	03:25
20 329°46.1 88°23.3 07.8 213°15.3 16.2 249°23.1 25.4 344°21.4 34.6 21 344°48.5 103°22.6 ·· 08.5 228°16.6 ·· 16.1 264°25.7 ·· 25.4 359°24.0 ·· 34.6 22 359°51.0 118°21.9 09.2 243°17.9 16.0 279°28.3 25.4 14°26.5 34.7 23 14°53.5 133°21.2 09.9 258°19.2 15.8 294°30.8 25.4 29°29.1 34.7  Horizontal parallax Venus: 0.1 Mars: 0.1	19	314°43.6		07.1	198°14.0	16.3		25.4		34.6			21:02
22 359°51.0 118°21.9 09.2 243°17.9 16.0 279°28.3 25.4 14°26.5 34.7 Venus: 0.1 23 14°53.5 133°21.2 09.9 258°19.2 15.8 294°30.8 25.4 29°29.1 34.7 Mars: 0.1	20	$329^{\circ}46.1$	88°23.3	07.8	213°15.3	16.2	249°23.1	25.4	344°21.4	34.6			
22       359°51.0       118°21.9       09.2       243°17.9       16.0       279°28.3       25.4       14°26.5       34.7       Venus: 0.1         23       14°53.5       133°21.2       09.9       258°19.2       15.8       294°30.8       25.4       29°29.1       34.7       Mars: 0.1	21	344°48.5	103°22.6	• • 08.5	228°16.6	• • 16.1	264°25.7	• • 25.4	359°24.0	• • 34.6	Horizont	al parallax	ļ
23 14°53.5 133°21.2 09.9 258°19.2 15.8 294°30.8 25.4 29°29.1 34.7 Mars: 0.1												Venus:	0.1
												Mars:	0.1
Mer.pass. 22:01 $\nu$ -0.7 $'$ d0.7 $'$ m-3.97 $\nu$ 1.3 $'$ d-0.1 $'$ m0.23 $\nu$ 2.6 $'$ d-0.0 $'$ m-2.61 $\nu$ 2.6 $'$ d0.0 $'$ m0.74													
	Mer.p	ass. 22:01	$\nu$ -0.7′ d0.	./′ m-3.97	$\nu$ 1.3′ d-0	0.1′ m0.23	$\nu 2.6' \ d-0$	.0′ m-2.61	$\nu$ 2.6′ d0	.0′ m0.74			

h	Sui	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	183°42.9	S09°42.9	357°27.4	7.9'	N14°31.0	16.0'	61.2'
1 2	198°43.0 213°43.1	43.8 44.7	11°54.3 26°21.1	7.8' 7.7'	14°47.0 15°02.9	15.9' 15.8'	61.1' 61.1'
3	228°43.3	• • 45.6	40°47.8	7.7'	15°18.7	15.7'	61.1
4	243°43.4	46.5	55°14.5	7.6'	15°34.4	15.6'	61.1'
5	258°43.5 273°43.6	47.4	69°41.1	7.5'	15°50.0 N16°05.5	15.5'	61.1'
6 7	273°43.6 288°43.7	S09°48.4 49.3	84°07.6 98°34.0	7.4' 7.4'	16°20.9	15.4' 15.3'	61.1' 61.0'
8	303°43.9	50.2	113°00.4	7.3'	16°36.2	15.2'	61.0'
9	318°44.0	• • 51.1	127°26.7	7.2'	16°51.3	15.0'	61.0'
10 11	333°44.1 348°44.2	52.0 52.9	141°52.9 156°19.0	7.1' 7.1'	17°06.4 17°21.3	14.9' 14.8'	61.0' 61.0'
12	3°44.3	S09°53.8	170°45.1	7.0'	N17°36.1	14.7'	61.0'
13	18°44.4	54.7	185°11.1	6.9'	17°50.8	14.6'	60.9'
14 15	33°44.6 48°44.7	55.6 •• 56.5	199°37.0 214°02.8	6.8' 6.8'	18°05.3 18°19.8	14.4' 14.3'	60.9' 60.9'
16	63°44.8	57.4	214 02.8 228°28.6	6.7'	18°34.1	14.2	60.9
17	78°44.9	58.3	242°54.3	6.6'	18°48.3	14.0'	60.9'
18	93°45.0 108°45.1	\$09°59.2 10°00.1	257°19.9	6.5'	N19°02.3 19°16.2	13.9' 13.8'	60.8'
19 20	108°45.1 123°45.3	01.0	271°45.5 286°11.0	6.5' 6.4'	19°16.2 19°30.0	13.6'	60.8' 60.8'
21	138°45.4	• • 01.9	300°36.4	6.3'	19°43.6	13.5'	60.8
22	153°45.5	02.8	315°01.7	6.3'	19°57.1	13.4	60.7'
23	168°45.6	03.7	329°26.9	6.2'	20°10.5	13.2'	60.7'
	SD = 16.0'	d = 0.9'		S	D = 16.7'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°45.7	S10°04.6	343°52.1	6.1'	N20°23.7	13.1'	60.7'
1 2	198°45.8 213°46.0	05.5 06.4	358°17.2 12°42.3	6.0' 6.0'	20°36.8 20°49.7	12.9' 12.8'	60.7' 60.6'
3	213 40.0 228°46.1	07.3	27°07.2	5.9'	20°49.7 21°02.5	12.6'	60.6
4	243°46.2	08.2	41°32.1	5.8'	21°15.1	12.5'	60.6'
5	258°46.3 273°46.4	09.1 \$10°10.0	55°56.9 70°21.7	5.8'	21°27.6 N21°39.9	12.3'	60.6'
6 7	273 46.4 288°46.5	10.9	70 21.7 84°46.4	5.7' 5.6'	N21 39.9 21°52.1	12.2' 12.0'	60.5' 60.5'
8	303°46.6	11.8	99°11.0	5.5'	22°04.1	11.9'	60.5
9	318°46.7	• • 12.7	113°35.5	5.5'	22°16.0	11.7'	60.4'
10 11	333°46.9 348°47.0	13.6 14.5	128°00.0 142°24.4	5.4' 5.3'	22°27.7 22°39.2	11.5' 11.4'	60.4' 60.4'
12	3°47.1	\$10°15.4	156°48.8	5.3'	N22°50.6	11.2'	60.3
13	18°47.2	16.3	171°13.0	5.2'	23°01.8	11.0'	60.3'
14 15	33°47.3 48°47.4	17.2 •• 18.1	185°37.3 200°01.4	5.2' 5.1'	23°12.9 23°23.7	10.9' 10.7'	60.3' 60.3'
16	63°47.5	19.0	214°25.5	5.0'	23°34.4	10.7	60.2
17	78°47.6	19.9	228°49.5	5.0'	23°45.0	10.4'	60.2'
18 19	93°47.7 108°47.9	\$10°20.8 21.7	243°13.5 257°37.4	4.9' 4.9'	N23°55.4 24°05.6	10.2' 10.0'	60.2' 60.1'
20	123°48.0	22.6	272°01.3	4.8'	24°15.6		60.1
21	138°48.1	• • 23.5	286°25.1	4.7'	24°25.4	9.7'	60.1'
22 23	153°48.2 168°48.3	24.4 25.2	300°48.8 315°12.5	4.7' 4.6'	24°35.1 24°44.6	9.5' 9.3'	60.0' 60.0'
23	SD = 16.1'	d = 0.9'	315 12.5		D = 16.6'	9.3	00.0
	<u>JD = 10.1</u>	<u>u = 0.9</u>			D = 10.0		
Sun	GHA	Dec	<b>GHA</b> 329°36.2	ν	Dec	d 0.1'	HP
0 1	183°48.4 198°48.5	\$10°26.1 27.0	329°36.2 343°59.8	4.6' 4.5'	N24°53.9 25°03.1	9.1' 9.0'	60.0' 59.9'
2	213°48.6	27.9	358°23.3	4.5'	25°12.1	8.8'	59.9'
3	228°48.7 243°48.8	• • 28.8	12°46.8 27°10.3	4.5'	25°20.8 25°29.4	8.6'	59.9'
4 5	243°48.8 258°48.9	29.7 30.6	27°10.3 41°33.7	4.4' 4.4'	25°29.4 25°37.9	8.4' 8.2'	59.8' 59.8'
6	273°49.0	S10°31.5	55°57.1	4.3'	N25°46.1	8.0'	59.7'
7	288°49.1	32.4	70°20.4	4.3'	25°54.1	7.9'	59.7'
8 9	303°49.2 318°49.4	33.3 •• 34.2	84°43.7 99°07.0	4.3' 4.2'	26°02.0 26°09.7	7.7' 7.5'	59.7' 59.6'
10	333°49.5	35.1	113°30.2	4.2'	$26^{\circ}17.2$	7.3	59.6'
11	348°49.6	36.0	127°53.4	4.2'	26°24.5	7.1'	59.6'
12 13	3°49.7 18°49.8	\$10°36.9 37.7	142°16.6 156°39.7	4.1' 4.1'	N26°31.6 26°38.5	6.9' 6.7'	59.5' 59.5'
14	33°49.9	38.6	171°02.8	4.1'	26°45.2	6.5	59.5'
15	48°50.0	• • 39.5	$185^{\circ}25.9$	4.1'	$26^{\circ}51.8$	6.4'	59.4'
16	63°50.1 78°50.2	40.4 41.3	199°49.0 214°12.0	4.0'	26°58.1 27°04.3	6.2'	59.4'
17 18	78°50.2 93°50.3	41.3 S10°42.2	214°12.0 228°35.0	4.0' 4.0'	27°04.3 N27°10.3	6.0' 5.8'	59.3' 59.3'
19	108°50.4	43.1	242°58.1	4.0'	27°16.0	5.6'	59.3'
20	123°50.5	44.0	257°21.1	4.0'	27°21.6	5.4'	59.2'
21 22	138°50.6 153°50.7	• • 44.9 45.8	271°44.1 286°07.0	4.0' 4.0'	27°27.0 27°32.2	5.2' 5.0'	59.2' 59.1'
23	168°50.8	46.6	300°30.0	4.0'	27°37.2	4.8'	59.1
	SD = 16.1'	d = 0.9'		S	D = 16.4'		

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

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

		Sun		Moon			
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	16-18	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	100-91%	
18	14:52	14:57	11:45	00:11	12:38		
19	15:03	15:08	11:45	01:07	13:37		
20	15:14	15:19	11:45	02:07	14:37		

## October 21, 22, 23 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
	29°55.9		\$22°10.5		N22°15.7	309°33.4		44°31.7			эпа	Dec
0		148°20.5		273°20.5			N22°25.4		S08°34.7	Alpheratz	357°34.7	29°13.8
1	44°58.4	163°19.7	11.2	288°21.8	15.6	324°36.0	25.4	59°34.2	34.8	Ankaa	353°06.9	-42°10.3
2	60°00.9	178°19.0	11.9	303°23.1	15.5	339°38.6	25.4	74°36.8	34.8	Schedar	349°30.8	56°40.6
3	75°03.3	193°18.3	• • 12.6	318°24.4	• • 15.3	354°41.1	• • 25.4	89°39.4	• • 34.9	Diphda	348°47.2	-17°51.0
4	90°05.8	208°17.6	13.3	333°25.7	15.2	9°43.7	25.4	104°41.9	34.9	Achernar	335°19.7	-57°06.6
5	105°08.3	223°16.9	14.0 \$22°14.7	348°27.0	15.1	24°46.3	25.4	119°44.5	34.9	Hamal	$327^{\circ}51.1$	23°34.9
6	120°10.7	238°16.2		3°28.3	N22°15.0	39°48.8	N22°25.3	134°47.1 149°49.6	S08°35.0	Polaris	313°40.4	89°22.0
7	135°13.2	253°15.5	15.3	18°29.6	14.9	54°51.4	25.3		35.0	Acamar	$315^{\circ}11.5$	-40°12.1
8	150°15.6	268°14.8	16.0	33°30.9	14.7	69°54.0	25.3	164°52.2	35.0	Menkar	$314^{\circ}06.0$	4°11.3
9	165°18.1	283°14.0	• • 16.7	48°32.2	• • 14.6	84°56.6 99°59.1	• • 25.3	179°54.8	• • 35.1	Mirfak	308°28.1	49°56.9
10	180°20.6 195°23.0	298°13.3	17.4	63°33.5	14.5		25.3	194°57.3	35.1	Aldebaran	290°39.6	16°33.6
11	210°25.5	313°12.6 328°11.9	18.1 \$22°18.7	78°34.8 93°36.1	14.4 N22°14.3	115°01.7 130°04.3	25.3 N22°25.3	209°59.9 225°02.4	35.1 \$08°35.2	Rigel	281°03.8	-8°10.2
12	210 25.5 225°28.0					130 04.3 145°06.9		240°05.0		Capella	$280^{\circ}21.9$	46°01.3
13	240°30.4	343°11.2 358°10.5	19.4 20.1	108°37.4 123°38.7	14.1	145 06.9 160°09.4	25.3	240 05.0 255°07.6	35.2	Bellatrix	278°22.9	6°22.4
14 15	255°32.9	13°09.7	20.1	123 36.7 138°40.0	14.0 •• 13.9	175°12.0	25.3 •• 25.3	270°10.1	35.2 •• 35.3	Elnath	278°01.9	28°37.7
16	270°35.4	28°09.0	21.4	153°41.3	13.8	173 12.0 190°14.6	25.3	285°12.7	35.3	Alnilam	275°37.7	-1°11.0
17	285°37.8	43°08.3	22.1	168°42.6	13.7	205°17.2	25.3	300°15.3	35.3	Betelgeuse	$270^{\circ}52.1$	7°24.8
18	300°40.3	58° 07.6	\$22°22.8	183°44.0	N22°13.5	200°17.2	N22°25.3	315°17.8	508°35.4	Canopus	263°52.3	-52°42.1
19	300 40.3 315°42.8	73°06.9	23.5	198°45.3	13.4	235°22.3	25.3	330°20.4	35.4	Sirius	258°26.3	-16°44.8
20	330°45.2	88°06.1	24.1	213°46.6	13.4	250°24.9	25.3	345°22.9	35.4	Adhara	255°05.9	-29°00.0
21	345°47.7	103°05.4	24.8	213°40.0 228°47.9	. 13.2	265°27.5	. 25.2	0°25.5	• • 35.5	Procyon	244°51.0	5°09.8
22	0°50.1	103 03.4 118°04.7	25.5	243°49.2	13.0	280°30.0	25.2	15°28.1	35.5	Pollux	243°17.5	27°58.0
23	15°52.6	118 04.7 133°04.0	26.1	243 49.2 258°50.5	12.9	295°32.6	25.2	30°30.6	35.6	Avior	234°14.9	-59°34.9
23	13 32.0									Suhail	222°46.6	-43°31.6
Mer.p	ass. 21:57	$\nu$ -0.7' d0.	.7′ m-3.97	$\nu$ 1.3′ d-0	.1'  m0.22	$\nu$ 2.6′ d-0	.0′ m-2.61	$\nu 2.6' \ d0$	.0′ m0.75	Miaplacidus	221°38.7	-69°48.7
										Alphard	217°48.1	-8°45.8
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.8	11°50.8
0	30°55.1	148°03.3	\$22°26.8	273°51.8	N22°12.8	310°35.2	N22°25.2	45°33.2	S08°35.6	Dubhe	193°41.7	61°36.9
1	45°57.5	163°02.5	27.5	288°53.1	12.7	325°37.8	25.2	60°35.8	35.6	Denebola	182°25.4	14°26.1
2	61°00.0	178°01.8	28.1	303°54.5	12.6	340°40.3	25.2	75°38.3	35.7	Gienah	175°44.1	-17°40.6
3	76°02.5	193°01.1	28.8	318°55.8	. 12.4	355°42.9	• • 25.2	90°40.9	35.7		173°01.0	-63°14.0
4	91°04.9	208°00.4	29.5	333°57.1	12.3	10°45.5	25.2	105°43.4	35.7	Gacrux	171°52.5	-57° 14.9
5	106°07.4	222°59.6	30.1	348°58.4	12.2	25°48.1	25.2	120°46.0	35.8	Alioth	166°13.7	55°49.5
6	121°09.9	237°58.9	S22°30.8	3°59.7	N22°12.1	40°50.7	N22°25.2	135°48.6	S08°35.8	Spica	158°22.8	-11°17.3
7	136°12.3	252°58.2	31.4	19°01.0	12.0	55°53.2	25.2	150°51.1	35.8	Alkaid	152°52.6	49°11.4
8	151°14.8	267°57.5	32.1	34°02.4	11.8	70°55.8	25.2	165°53.7	35.9	Hadar	148°37.0	-60°29.5
9	166°17.3	282°56.7	32.7	49°03.7	11.7	85°58.4	25.2	180°56.2	35.9	Menkent	147°58.3	-36°29.4
10	181°19.7	297°56.0	33.4	64°05.0	11.6	101°01.0	25.2	195°58.8	35.9	Arcturus	145°48.4	19°03.3
11	196°22.2	312°55.3	34.1	79°06.3	11.5	116°03.6	25.1	211°01.4	36.0	Rigil Kent.	139°41.3	-60°56.2
12	211°24.6	327°54.6	S22°34.7	94°07.6	N22°11.4	131°06.2	N22°25.1	226°03.9	S08°36.0	Kochab	137°20.9	74°03.2
13	226°27.1	342°53.8	35.4	109°09.0	11.2	146°08.7	25.1	241°06.5	36.0	Zuben'ubi	136°56.6	-16°08.6
14	241°29.6	357°53.1	36.0	124°10.3	11.1	161°11.3	25.1	256°09.0	36.1	Alphecca	126°04.2 112°16.4	26°38.0
15	256°32.0	12°52.4	• • 36.7	139°11.6	• • 11.0	176°13.9	• • 25.1	271°11.6	• • 36.1	Antares		-26°29.2
16	271°34.5	27°51.6	37.3	154°12.9	10.9	191°16.5	25.1	$286^{\circ}14.2$	36.1	Atria	107°11.2 102°03.2	-69°04.5 -15°45.3
17	286°37.0	42°50.9	38.0	169°14.3	10.7	$206^{\circ}19.1$	25.1	301°16.7	36.2	Sabik Shaula	96°10.9	-15 45.5 -37°07.4
18	301°39.4	57°50.2	S22°38.6	184°15.6	N22°10.6	221°21.7	N22°25.1	316°19.3	S08°36.2	Rasalhague	95°58.9	12°32.6
19	316°41.9	72°49.4	39.2	199°16.9	10.5	236°24.2	25.1	331°21.8	36.2	_	90°42.6	51°29.3
20	331°44.4	87°48.7	39.9	214°18.2	10.4	251°26.8	25.1	346°24.4	36.3	Eltanin Kaus Aust.	83°32.9	-34°22.4
21	346°46.8	102°48.0	• • 40.5	229°19.6	• • 10.3	266°29.4	• • 25.1	1°27.0	• • 36.3	Vega	80°33.5	38°48.6
22	1°49.3	117°47.3	41.2	244°20.9	10.1	281°32.0	25.1	$16^{\circ}29.5$	36.3	Nunki	75°48.1	-26° 16.0
23	16°51.8	132°46.5	41.8	259°22.2	10.0	296°34.6	25.1	31°32.1	36.4	Altair	62°00.2	8°56.2
11000	21.52	0. 7/	.7′ m-3.98	1 2/ ./ 0	.1′ m0.21	26/ 40	.0′ m-2.62		.0′ m0.75	Peacock	53°06.0	-56°39.5
ivier.p	ass. 21:53	ν-0.1 αυ.	.7 111-3.90	$\nu$ 1.5 $a$ -0	.1 MU.21	ν2.0 <i>a</i> -0	.0 m-2.02	ν2.0 d0	.0 1110.75	Deneb	49°25.9	45°22.4
										Enif	33°38.9	9°59.5
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.9	-46°50.6
0	$31^{\circ}54.2$	147°45.8	S22°42.5	$274^{\circ}23.6$	N22°09.9	311°37.2	N22°25.1	46°34.6	S08°36.4	Fomalhaut	15°14.5	-40° 30.0 -29° 29.5
1	46°56.7	$162^{\circ}45.1$	43.1	$289^{\circ}24.9$	09.8	326°39.8	25.0	61°37.2	36.4	Scheat	13°45.2	28° 13.2
2	$61^{\circ}59.1$	177°44.3	43.7	$304^{\circ}26.2$	09.7	341°42.4	25.0	$76^{\circ}39.7$	36.5	Markab	13°29.9	15°20.5
3	$77^{\circ}01.6$	192°43.6	• • 44.4	$319^{\circ}27.6$	• • 09.5	356°44.9	• • 25.0	91°42.3	• • 36.5			
4	92°04.1	207°42.9	45.0	$334^{\circ}28.9$	09.4	11°47.5	25.0	$106^{\circ}44.9$	36.5	Oct 21 Mon	SHA	Mer.pass
5	$107^{\circ}06.5$	222°42.1	45.6	$349^{\circ}30.2$	09.3	$26^{\circ}50.1$	25.0	121°47.4	36.6		118°24.5	14:07
6	122°09.0	237°41.4	<b>5</b> 22°46.3	4°31.6	N22°09.2	41°52.7	N22°25.0	136°50.0	S08°36.6	Mars		05:46
7	137°11.5	252°40.6	46.9	19°32.9	09.1	56°55.3	25.0	151°52.5	36.6	Jupiter		03:21
8	152°13.9	267°39.9	47.5	34°34.2	08.9	71°57.9	25.0	166°55.1	36.7	Saturn	14°35.7	20:58
9	167°16.4	282°39.2	• • 48.2	49°35.6	• • 08.8	87°00.5	• • 25.0	181°57.6	• • 36.7	Oct 22 Tue	SHA	Mer.pass
10	182°18.9	297°38.4	48.8	64°36.9	08.7	102°03.1	25.0	197°00.2	36.7		117°08.2	14:08
11	197°21.3	312°37.7	49.4	79°38.2	08.6	117°05.7	25.0	212°02.8	36.8	Mars		05:44
12	212°23.8	327°37.0	\$22°50.1	94°39.6	N22°08.5	132°08.3	N22°25.0	227°05.3	S08°36.8	Jupiter		03:17
13	227°26.2	342°36.2	50.7	109°40.9	08.3	147°10.8	25.0	242°07.9	36.8	Saturn	14°38.1	20:54
14	242°28.7	357°35.5	51.3	124°42.3	08.2	162°13.4	24.9	257°10.4	36.9			
15 16	257°31.2	12°34.7	· · 51.9	139°43.6	08.1	177°16.0	• • 24.9	272°13.0	• • 36.9	Oct 23 Wed	SHA	Mer.pass
16	272°33.6	27°34.0	52.6	154°44.9	08.0	192°18.6	24.9	287°15.5	36.9		115°51.6	14:10
17	287°36.1	42°33.3	53.2	169°46.3	07.8	207°21.2	24.9 N22°24.0	302°18.1	37.0		242°29.3	05:42
18 19	302°38.6 317°41.0	57°32.5 72°31.8	\$22°53.8 54.4	184°47.6 199°49.0	N22°07.7 07.6	222°23.8 237°26.4	N22°24.9 24.9	317°20.7 332°23.2			279°43.0	03:13
20	317°41.0 332°43.5	72°31.8 87°31.0	54.4 55.0	214°50.3	07.6 07.5	252°29.0	24.9 24.9	332°23.2 347°25.8	37.0 37.1	Saturn	14°40.4	20:50
20	332 43.5 347°46.0	102°30.3	55.7	214 50.3 229°51.6	07.5	252 29.0 267°31.6	• • 24.9	2°28.3	37.1	Horizont	al parallax	
22	2°48.4	102 30.3 117°29.6	56.3	244°53.0	07.4	282°34.2	24.9	2 20.3 17°30.9	37.1		Venus:	0.1
23	17°50.9	132°28.8	56.9	259°54.3	07.1	297°36.8	24.9	32°33.4	37.2		Mars:	0.1
Mer.p	ass. 21:49	$\nu$ -0. $l' d0$	.6′ m-3.98	$\nu$ 1.3′ d-0	.1′ m0.19	ν2.6′ d-0	.0′ m-2.63	$\nu$ 2.6′ d0	.0′ m0.76			

		T0.0347 Sec		1-01		293 30	
h	Sui	<u> </u>			Moon		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°50.9 198°51.0	\$10°47.5 48.4	314°53.0 329°16.0	4.0' 4.0'	N27°42.1 27°46.7	4.6' 4.4'	59.1' 59.0'
1 2	213°51.1	48.4 49.3	343°38.9	4.0'	27 46.7 27°51.1	4.4 4.2'	59.0'
3	228°51.2	50.2	358°01.9	4.0'	27°55.3	4.0'	58.9
4	243°51.3	51.1	12°24.9	4.0'	27°59.4	3.8'	58.9'
5	258°51.4	52.0	26°47.9	4.0'	28°03.2	3.7'	58.9'
6	273°51.5	S10°52.9	41°10.9	4.0'	N28°06.9	3.5'	58.8'
7 8	288°51.6 303°51.7	53.7 54.6	55°33.9 69°57.0	4.0' 4.1'	28°10.3 28°13.6	3.3' 3.1'	58.8' 58.7'
9	318°51.8	• • 55.5	84°20.0	4.1'	28°16.7	2.9'	58.7
10	333°51.9	56.4	98°43.1	4.1'	28°19.5	2.7'	58.7'
11	348°52.0	57.3	$113^{\circ}06.2$	4.1'	28°22.2	2.5'	58.6'
12	3°52.1	S10°58.2	127°29.3	4.1'	N28°24.7	2.3'	58.6'
13 14	18°52.2 33°52.3	59.0 10°59.9	141°52.4 156°15.6	4.2' 4.2'	28°27.0 28°29.1	2.1' 1.9'	58.5' 58.5'
15	48°52.4	10° 39.9 11° 00.8	170°38.8	4.2'	28°31.1	1.7'	58.5
16	63°52.5	01.7	185°02.1	4.3'	28°32.8	1.5'	58.4
17	78°52.6	02.6	199°25.3	4.3'	28°34.3	1.4'	58.4'
18	93°52.7	S11°03.5	213°48.7	4.4'	N28°35.7	1.2'	58.3
19 20	108°52.8 123°52.9	04.3 05.2	228°12.0 242°35.4	4.4' 4.5'	28°36.8 28°37.8	1.0' 0.8'	58.3' 58.3'
21	138°53.0	06.1	256°58.9	4.5	28°38.6	0.6	58.2
22	153°53.0	07.0	271°22.4	4.5'	28°39.2	0.4	58.2
23	168°53.1	07.9	285°45.9	4.6'	28°39.6	0.2'	58.1'
	SD = 16.1'	d = 0.9'		S	D = 16.1'		
Tue 0	<b>GHA</b> 183°53.2	<b>Dec</b> \$11°08.8	<b>GHA</b> 300°09.5	ν 4.7'	<b>Dec</b> N28°39.8	<i>d</i> 0.0'	<b>HP</b> 58.1'
1	183 53.2 198°53.3	09.6	300 09.5 314°33.2	4.7 4.7'	28°39.8	-0.1	58.1
2	213°53.4	10.5	328°56.9	4.8'	28°39.7	-0.3	58.0'
3	228°53.5	• • 11.4	$343^{\circ}20.7$	4.8'	28°39.4	-0.5'	58.0'
4	243°53.6	12.3	357°44.5	4.9'	28°38.9	-0.7'	57.9
5 6	258°53.7 273°53.8	13.2 \$11°14.0	12°08.4 26°32.4	5.0' 5.0'	28°38.2 N28°37.3	-0.9' -1.1'	57.9' 57.9'
7	288°53.9	14.9	40°56.4	5.1'	28°36.3	-1.2'	57.8
8	303°54.0	15.8	55°20.5	5.2'	28°35.1	-1.4'	57.8'
9	318°54.1	• • 16.7	69°44.7	5.2'	28°33.7	-1.6'	57.7'
10	333°54.2	17.6	84°08.9	5.3'	28°32.1	-1.8'	57.7'
11 12	348°54.2 3°54.3	18.4 <b>S</b> 11°19.3	98°33.2 112°57.6	5.4' 5.5'	28°30.3 N28°28.4	-1.9' -2.1'	57.7' 57.6'
13	18°54.4	20.2	127°22.1	5.6'	28°26.3	-2.3	57.6
14	33°54.5	21.1	$141^{\circ}46.7$	5.6'	28°24.0	-2.5'	57.5'
15	48°54.6	• • 21.9	156°11.3	5.7'	28°21.5	-2.6'	57.5
16 17	63°54.7 78°54.8	22.8 23.7	170°36.0 185°00.9	5.8' 5.9'	28°18.9 28°16.1	-2.8' -3.0'	57.5' 57.4'
18	93°54.9	\$11°24.6	199°25.8	6.0'	N28°13.2	-3.1'	57.4
19	108°55.0	25.4	213°50.7		28°10.0		57.3'
20	123°55.1	26.3	$228^{\circ}15.8$	6.2'	$28^{\circ}06.8$	-3.5'	57.3'
21	138°55.1	• • 27.2	242°41.0	6.3'	28°03.3	-3.6'	57.3
22 23	153°55.2 168°55.3	28.1 28.9	257°06.2 271°31.6	6.4' 6.5'	27°59.7 27°55.9	-3.8' -3.9'	57.2' 57.2'
23	SD = 16.1'	d = 0.9'	271 31.0		D = 15.8'	-3.9	31.2
	SD = 10.1	$a = 0.9^{\circ}$		5	$D = 15.8^{\circ}$		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°55.4	S11°29.8	285°57.1	6.5'	N27°52.0	-4.1'	57.1
1 2	198°55.5 213°55.6	30.7 31.6	300°22.6 314°48.3	6.6' 6.7'	27°47.9 27°43.6	-4.3' -4.4'	57.1' 57.1'
3	213°55.6 228°55.7	32.4	314°48.3 329°14.0	6.8'	27°43.6 27°39.2	-4.4 -4.6'	57.1° 57.0°
4	243°55.7	33.3	343°39.8	6.9	27°34.7	-4.7'	57.0'
5	258°55.8	34.2	358°05.8	7.1'	27°29.9	-4.9'	57.0'
6	273°55.9	S11°35.1	12°31.8	7.2'	N27°25.1	-5.0'	56.9
7 8	288°56.0 303°56.1	35.9 36.8	26°58.0 41°24.3	7.3' 7.4'	27°20.0 27°14.9	-5.2' -5.3'	56.9' 56.8'
9	318° 56.2	37.7	41 24.3 55°50.6	7.4 7.5'	27 14.9 27°09.6	-5.5'	56.8'
10	333°56.2	38.5	70°17.1	7.6'	27°04.1	-5.6'	56.8
11	348°56.3	39.4	84°43.7	7.7'	26°58.5	-5.8'	56.7'
12	3°56.4	S11°40.3	99°10.3	7.8'	N26°52.7	-5.9'	56.7
13 14	18°56.5 33°56.6	41.2 42.0	113°37.1 128°04.0	7.9' 8.0'	26°46.8 26°40.8	-6.0' -6.2'	56.7' 56.6'
15	48°56.7	• • 42.9	142°31.0	8.1	26°34.6	-6.2'	56.6
16	63°56.7	43.8	$156^{\circ}58.2$	8.2'	26°28.3	-6.4	56.5'
17	78°56.8	44.6	171°25.4	8.3'	$26^{\circ}21.9$	-6.6'	56.5'
18	93°56.9	S11°45.5	185°52.7	8.5'	N26°15.3	-6.7'	56.5
19 20	108°57.0 123°57.1	46.4 47.2	200°20.2 214°47.8	8.6' 8.7'	26°08.6 26°01.7	-6.8' -7.0'	56.4' 56.4'
20	123°57.1 138°57.1	47.2 · · 48.1	214°47.8 229°15.4	8.7	25°54.8	-7.0° -7.1°	56.4
22	153°57.2	49.0	243°43.2	8.9'	25°47.6	-7.1 -7.2	56.3
23	168°57.3	49.8	258°11.1	9.0'	25°40.4	-7.4'	56.3'
	SD = 16.1'	d = 0.9'		S	D = 15.6'		

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

Lat.		Moonris	e		Moonset	:
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°						
<b>N</b> 70°						
68°						
66°						
64°						
62°			19:13			16:07
60°	17:04	18:13	19:51	14:12	15:09	15:28
N 58°	17:44	18:50	20:18	13:32	14:31	15:01
56°	18:11	19:17	20:39	13:05	14:04	14:40
54°	18:33	19:38	20:56	12:43	13:43	14:22
52°	18:51	19:55	21:11	12:25	13:26	14:07
50°	19:07	20:10	21:24	12:10	13:10	13:54
45°	19:37	20:41	21:50	11:39	12:40	13:27
<b>N</b> 40°	20:02	21:04	22:11	11:15	12:16	13:05
35°	20:21	21:23	22:28	10:55	11:57	12:47
30°	20:38	21:40	22:43	10:39	11:40	12:32
20°	21:07	22:08	23:08	10:10	11:11	12:05
N 10°	21:32	22:32	23:29	09:46	10:47	11:43
0°	21:55	22:54	23:50	09:23	10:24	11:21
S 10°	22:18	23:17		09:00	10:01	11:00
20°	22:43	23:40		08:36	09:36	10:37
30°	23:12		80:00	08:07	09:07	10:10
35°	23:29		00:25	07:51	08:50	09:54
40°	23:49		00:44	07:31	08:30	09:35
45°		00:14	01:07	07:07	08:06	09:13
<b>S</b> 50°		00:45	01:36	06:37	07:34	08:44
52°	••••	01:01	01:51	06:22	07:19	08:30
54°	80:00	01:19	02:08	06:04	07:00	08:13
56°	00:28	01:42	02:28	05:43	06:38	07:53
58°	00:55	02:11	02:53	05:17	06:08	07:29
<b>S</b> 60°	01:32	02:55	03:27	04:39	05:25	06:55

			Sun		Moon			
	Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
	,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper Lower		19-21	
Į		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	83-64%	
	21	15:24	15:28	11:45	03:08	15:39		
ı	22	15:33	15:37	11:44	04:09	16:39		
	23	15:42	15:46	11:44	05:08	17:36		

## October 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	32°53.4	147°28.1	\$22°57.5	274°55.7	N22°07.0	312°39.4	N22°24.9	47°36.0	508°37.2			
1	47°55.8	162°27.3	58.1	289°57.0	06.9	327°42.0	24.9	62°38.5	37.2	Alpheratz	357°34.7	29°13.8
2	62°58.3	177°26.6	58.7	304°58.4	06.8	342°44.6	24.8	$77^{\circ}41.1$	37.2	Ankaa	353°06.9	-42°10.3
3	78°00.7	192°25.8	• • 59.3	319°59.7	• • 06.6	357° 47.2	• • 24.8	92°43.6	• • 37.3	Schedar	349°30.8	56°40.6
4	93°03.2	207°25.1	22°59.9	335°01.1	06.5	12°49.8	24.8	107°46.2	37.3	Diphda	348°47.2	-17°51.0
5	108°05.7	222°24.4	23°00.6	350°02.4	06.4	27° 52.4	24.8	122°48.8	37.3	Achernar	335°19.7	-57°06.6
6	123°08.1	237°23.6	S23°01.2	5°03.8	N22°06.3	42°55.0	N22°24.8	137°51.3	S08°37.4	Hamal	327°51.1	23°34.9 89°22.1
7	138°10.6	252°22.9	01.8	20°05.1	06.2	57°57.6	24.8	152°53.9	37.4	Polaris Acamar	313°39.7 315°11.5	-40°12.2
8	153°13.1	$267^{\circ}22.1$	02.4	35°06.5	06.0	73°00.2	24.8	167° 56.4	37.4	Menkar	314°06.0	4°11.3
9	168°15.5	282°21.4	• • 03.0	50°07.8	•• 05.9	88°02.8	• • 24.8	$182^{\circ}59.0$	• • 37.5	Mirfak	308°28.1	4 11.3 49°57.0
10	183°18.0	$297^{\circ}20.6$	03.6	65°09.2	05.8	103°05.4	24.8	$198^{\circ}01.5$	37.5	Aldebaran	290°39.6	16°33.6
11	198°20.5	$312^{\circ}19.9$	04.2	80°10.5	05.7	$118^{\circ}08.0$	24.8	$213^{\circ}04.1$	37.5	Rigel	290 39.0 281°03.8	-8°10.2
12	213°22.9	$327^{\circ}19.1$	S23°04.8	95°11.9	$N22^{\circ}05.6$	$133^{\circ}10.6$	N22°24.8	228°06.6	S08°37.6	Capella	280°21.8	46°01.3
13	228°25.4	$342^{\circ}18.4$	05.4	110°13.2	05.4	$148^{\circ}13.2$	24.8	243°09.2	37.6	Bellatrix	278° 22.9	6°22.4
14	243°27.9	$357^{\circ}17.6$	06.0	125°14.6	05.3	163° 15.8	24.8	258°11.7	37.6	Elnath	278°01.9	28°37.7
15	258°30.3	12°16.9	• • 06.6	140°15.9	• • 05.2	178° 18.4	• • 24.7	273°14.3	• • 37.6	Alnilam	275°37.7	-1°11.0
16	273°32.8	27° 16.1	07.2	155°17.3	05.1	193°21.0	24.7	288° 16.8	37.7	Betelgeuse	270°52.1	7°24.8
17	288°35.2	42° 15.4	07.8	170°18.7	05.0	208°23.6	24.7	303° 19.4	37.7	Canopus	263°52.2	-52°42.2
18	303°37.7	57° 14.6	S23°08.4	185°20.0	N22°04.8	223°26.2	N22°24.7	318°21.9	S08°37.7	Sirius	258°26.3	-16°44.8
19	318°40.2	72° 13.9	09.0	200°21.4	04.7	238° 28.8	24.7	333°24.5	37.8	Adhara	255°05.9	-29°00.0
20	333°42.6	87°13.1	09.6	215°22.7	04.6	253°31.4	24.7	348°27.0	37.8	Procyon	244°51.0	5°09.8
21	348°45.1	102°12.4	• • 10.2	230°24.1	• • 04.5	268° 34.0	• • 24.7	3°29.6	• • 37.8	Pollux	243°17.5	27°57.9
22	3°47.6	117°11.6	10.7	245°25.5	04.4	283°36.6	24.7	18° 32.2	37.9	Avior	234°14.9	-59°34.9
23	18°50.0	132°10.9	11.3	260°26.8	04.2	298°39.2	24.7	33°34.7	37.9	Suhail	222°46.6	-43°31.6
Mer.n	pass. 21:45	$\nu$ -0.7' d0	.6′ m-3.98	$\nu$ 1.3' d-0	0.1' m0.18	$\nu^{2.6'} d-0$	.0′ m-2.64	$\nu^{2.6'}$ d0	.0′ m0.76	Miaplacidus	221°38.6	-69°48.7
										Alphard	217°48.1	-8°45.8
			_		_		_		_	Regulus	207°34.8	11°50.8
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.6	61°36.9
0	33°52.5	147° 10.1	S23°11.9	275°28.2	N22°04.1	313°41.8	N22°24.7	48°37.3	S08°37.9	Denebola	182°25.4	14°26.1
1	48°55.0	162°09.4	12.5	290°29.5	04.0	328° 44.4	24.7	63°39.8	38.0	Gienah	175°44.1	-17°40.6
2	63°57.4	177°08.6	13.1	305°30.9	03.9	343°47.0	24.6	78°42.4	38.0	Acrux	173°01.0	-63°14.0
3	78°59.9	192°07.9	• • 13.7	320°32.3	• • 03.8	358° 49.6	• • 24.6	93°44.9	• • 38.0		171°52.4	-57°14.9
4	94°02.4	207°07.1	14.3	335°33.6	03.7	13°52.2	24.6	108°47.5	38.0	Alioth	166°13.6	55°49.5
5	109°04.8	222°06.3	14.9	350°35.0	03.5	28°54.8	24.6	123°50.0	38.1	Spica	158°22.8	-11°17.3
6	124°07.3	237°05.6	\$23°15.4	5°36.4	N22°03.4	43°57.4	N22°24.6	138°52.6	S08°38.1	Alkaid	152°52.6	49°11.4
7	139°09.7	252°04.8	16.0	20°37.7	03.3	59°00.0	24.6	153°55.1	38.1	Hadar	148°37.0	-60°29.5
8	154°12.2	267°04.1	16.6	35°39.1	03.2	74°02.6	24.6	168°57.7	38.2	Menkent	147°58.3	-36°29.4
9	169°14.7	282°03.3	• • 17.2	50°40.5	03.1	89°05.2	• • 24.6	184°00.2	• 38.2	Arcturus	145°48.4	19°03.3
10	184°17.1	297°02.6	17.8	65°41.8	02.9	104°07.9	24.6	199°02.8	38.2	Rigil Kent.	$139^{\circ}41.3$	-60°56.2
11	199°19.6	312°01.8	18.3 \$23°18.9	80°43.2	02.8	119° 10.5	24.6	214°05.3 229°07.9	38.2	Kochab	137°20.9	74°03.2
12	214°22.1	327°01.0		95°44.6	N22°02.7	134° 13.1	N22°24.6		S08°38.3	Zuben'ubi	$136^{\circ}56.6$	-16°08.6
13	229°24.5 244°27.0	342°00.3	19.5	110°46.0 125°47.3	02.6	149° 15.7	24.6	244°10.4 259°13.0	38.3	Alphecca	126°04.2	26°38.0
14		356° 59.5 11° 58.8	20.0		02.5	164° 18.3 179° 20.9	24.5		38.3	Antares	$112^{\circ}16.4$	-26°29.2
15	259°29.5 274°31.9	26°58.0	• • 20.6	140°48.7 155°50.1	· · 02.3 02.2	179 20.9 194°23.5	• • 24.5	274°15.5 289°18.1	· · 38.4 38.4	Atria	$107^{\circ}11.2$	-69°04.5
16 17	289°34.4	41°57.3	21.2 21.8	170°51.4	02.2	209° 26.1	24.5 24.5	304°20.6	38.4	Sabik	102°03.3	-15°45.3
18	304°36.8	56° 56.5	\$23°22.3	170 51.4 185°52.8	N22°02.0	209° 20.1° 224° 28.7	N22°24.5	319°23.1	508°38.5	Shaula	96°10.9	-37°07.4
19	319°39.3	71°55.7	22.9	200°54.2	01.0	239°31.3	24.5	334°25.7	00.5	Rasalhague	95°58.9	12°32.6
20	334°41.8	86°55.0	23.5	215°55.6	01.9 01.7	254° 34.0	24.5	349°28.2	38.5 38.5	Eltanin	90°42.6	51°29.3
21	349°44.2	101°54.2	• • 24.0	230°56.9	01.6	269°36.6	. 24.5	4°30.8	• • 38.5	Kaus Aust.	83°33.0	-34°22.4
22	4°46.7	116° 53.4	24.6	245°58.3	01.5	284°39.2	24.5	19°33.3	38.6	Vega	80°33.5	38°48.6
23	19°49.2	131°52.7	25.2	260°59.7	01.4	299°41.8	24.5	34° 35.9	38.6	Nunki	75°48.1	-26°16.0
										Altair	62°00.2	8°56.1
Mer.p	oass. 21:41	$\nu$ -0.8' d0.	.6′ m-3.99	$\nu$ 1.4′ d-0	$0.1' \; { m m0.17}$	$\nu$ 2.6′ d-0	.0′ m-2.64	$\nu$ 2.6′ d0	.0′ m0.76	Peacock	53°06.0	-56°39.5
										Deneb	49°25.9	45°22.4
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.9	9°59.5
0 0	34°51.6	146°51.9	\$23°25.7	276°01.1		314° 44.4	N22°24.5	49°38.4	508°38.6	Al Na'ir	27°32.9	-46°50.6
1	49°54.1	161°51.2	26.3	291°02.5	01.2	329° 47.0	24.4	64°41.0	38.7	Fomalhaut	15°14.5	-29°29.5
2	64°56.6	176° 50.4	26.8	306°03.8	01.0	344° 49.6	24.4	79°43.5	38.7	Scheat	13°45.2	28°13.2
3	79°59.0	191°49.6	27.4	321°05.2	00.9	359° 52.2	• • 24.4	94°46.1	• • 38.7	Markab	13°29.9	15°20.5
4	95°01.5	206°48.9	28.0	336°06.6	00.8	14° 54.9	24.4	109°48.6	38.7	Oct 24 Thu	SHA	Mer.pass
5	110°04.0	221°48.1	28.5	351°08.0	00.7	29° 57.5	24.4	124°51.2	38.8		114°34.7	14:11
6	125°06.4	236° 47.3	S23°29.1	6°09.4	N22°00.6	45°00.1	N22°24.4	139°53.7	S08°38.8	Mars	242°02.3	05:40
7	140°08.9	251°46.6	29.6	21°10.8	00.4	60°02.7	24.4	154°56.3	38.8		279°46.0	03:09
8	155°11.3	266° 45.8	30.2	36°12.1	00.3	75°05.3	24.4	169°58.8	38.8	Saturn	14°42.6	20:46
9	170°13.8	281°45.0	• • 30.7	51°13.5	00.2	90°07.9	• • 24.4	185°01.4	• • 38.9	0 : 25 5 :	CIIA	N4-
10	185°16.3	296°44.3	31.3	66°14.9	00.1	105° 10.6	24.4	200°03.9	38.9	Oct 25 Fri	SHA	Mer.pass
11	200°18.7	311°43.5	31.8	81°16.3	22°00.0	120° 13.2	24.4	215°06.5	38.9		113°17.6	14:12
12	215°21.2	326°42.7	S23°32.4	96°17.7	N21°59.9	135° 15.8	N22°24.3	230°09.0	S08°39.0		241°35.7	05:38
13	230°23.7	341°42.0	32.9	111°19.1	59.7	150° 18.4	24.3	$245^{\circ}11.5$	39.0	Jupiter		03:05
14	245°26.1	356°41.2	33.5	126°20.5	59.6	165°21.0	24.3	260°14.1	39.0	Saturn	14°44.8	20:42
15	260°28.6	11°40.4	• • 34.0	141°21.9	•• 59.5	180°23.6	• • 24.3	275°16.6	• • 39.0	Oct 26 Sat	SHA	Mer.pass
16	275°31.1	26°39.7	34.6	156°23.2	59.4	195°26.3	24.3	$290^{\circ}19.2$	39.1		112°00.3	14:13
17	290°33.5	41°38.9	35.1	171°24.6	59.3	210°28.9	24.3	$305^{\circ}21.7$	39.1	1	241°09.5	05:35
18	305°36.0	56°38.1	S23°35.6	$186^{\circ}26.0$	N21°59.1	225°31.5	N22°24.3	320°24.3	S08°39.1		279°52.8	03:01
19	320°38.5	71°37.4	36.2	201°27.4	59.0	240°34.1	24.3	$335^{\circ}26.8$	39.2	Saturn	14°46.8	20:38
20	335°40.9	86°36.6	36.7	$216^{\circ}28.8$	58.9	255°36.7	24.3	$350^{\circ}29.4$	39.2			
21	350°43.4	101°35.8	• • 37.3	231°30.2	• • 58.8	270°39.4	• • 24.3	5°31.9	• • 39.2	Horizont	al parallax	
22	5°45.8	116°35.0	37.8	246°31.6	58.7	285°42.0	24.3	$20^{\circ}34.4$	39.2		Venus:	0.1
23	20°48.3	131°34.3	38.3	261°33.0	58.6	300°44.6	24.2	35°37.0	39.3		Mars:	0.1
Mern	pass. 21:37	ν-0 8' d0	.6′ m-3.99	ν1 Δ' d.Ω	0.1' m0.15	v2 6′ d-∩	.0′ m-2.65	1/2 5/ dn	.0′ m0.77			
		- 0.0 00		ν I.¬ U-U	1110.13	- 2.0 u-0	2.03	-2.5 00				

h	Sui	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	183°57.4	S11°50.7	272°39.1	9.1'	N25°33.0	-7.5'	56.3'
1 2	198°57.5 213°57.5	51.6 52.4	287°07.3 301°35.5	9.2' 9.4'	25°25.6 25°18.0	-7.6' -7.7'	56.2' 56.2'
3	213 57.5 228°57.6	53.3	316°03.9	9. <del>4</del> 9.5'	25°10.0	-7.7 -7.9'	56.2
4	243°57.7	54.2	330°32.3	9.6'	25°02.4	-8.0'	56.1'
5	258°57.8	55.0	345°00.9	9.7'	24°54.4	-8.1'	56.1'
6 7	273°57.9 288°57.9	\$11°55.9 56.8	359°29.6 13°58.4	9.8' 9.9'	N24°46.3 24°38.1	-8.2' -8.3'	56.1' 56.0'
8	303°58.0	57.6	28°27.4	10.0'	24° 29.8	-8.4'	56.0'
9	318°58.1	• • 58.5	42°56.4	10.1'	24°21.3	-8.5'	56.0'
10	333°58.2 348°58.2	11°59.4 12°00.2	57°25.5 71°54.8	10.3'	24°12.8 24°04.1	-8.7'	55.9'
11 12	348 58.2 3°58.3	12 00.2 \$12°01.1	71 54.8 86°24.2	10.4' 10.5'	24 04.1 N23°55.4	-8.8' -8.9'	55.9' 55.9'
13	18°58.4	02.0	100°53.7	10.6'	23°46.5	-9.0'	55.8'
14	33°58.5	02.8	115°23.3	10.7'	23°37.5	-9.1'	55.8'
15 16	48°58.5 63°58.6	· · 03.7 04.5	129°53.0 144°22.8	10.8' 10.9'	23°28.4 23°19.3	-9.2' -9.3'	55.8' 55.8'
17	78°58.7	05.4	158°52.7	11.0'	23°10.0	-9.3 -9.4'	55.7'
18	93°58.8	S12°06.3	173°22.7	11.1'	N23°00.6	-9.5'	55.7'
19	108°58.8	07.1	187°52.9	11.3'	22°51.1	-9.6'	55.7'
20 21	123°58.9 138°59.0	08.0 •• 08.9	202°23.2 216°53.5	11.4' 11.5'	22°41.5 22°31.8	-9.7' -9.8'	55.6' 55.6'
22	153°59.0	09.7	231°24.0	11.6'	22°22.0	-9.9'	55.6'
23	168°59.1	10.6	245°54.6	11.7'	$22^{\circ}12.1$	-10.0'	55.5'
	SD = 16.1'	d = 0.9'		SI	D = 15.3'		
F	CUA	D	CHA		D	.,	
Fri 0	<b>GHA</b> 183°59.2	<b>Dec</b> <b>S</b> 12°11.4	<b>GHA</b> 260°25.3	u 11.8'	Dec N22° 02.2	d -10.1'	HP 55.5'
1	198°59.3	12.3	274°56.1	11.9'	21°52.1	-10.2'	55.5'
2	213°59.3	13.2	289°27.0	12.0'	21°42.0	-10.2'	55.5'
3 4	228°59.4 243°59.5	· · 14.0 14.9	303°58.0 318°29.1	12.1' 12.2'	21°31.7 21°21.4	-10.3' -10.4'	55.4' 55.4'
5	258°59.5	15.7	333°00.3	12.3'	21°11.0	-10.4	55.4'
6	273°59.6	S12°16.6	347°31.6	12.4'	N21°00.5	-10.6'	55.4'
7	288°59.7	17.4	2°03.1	12.5'	20°49.9	-10.7'	55.3'
8 9	303°59.7 318°59.8	18.3 •• 19.2	16°34.6 31°06.2	12.6' 12.7'	20°39.2 20°28.5	-10.7' -10.8'	55.3' 55.3'
10	333°59.9	20.0	45°37.9	12.8'	20°17.6	-10.9'	55.2'
11	349°00.0	20.9	60°09.8	12.9'	20°06.7	-11.0'	55.2'
12 13	4°00.0 19°00.1	\$12°21.7 22.6	74°41.7 89°13.7	13.0' 13.1'	N19°55.7 19°44.7	-11.1' -11.1'	55.2' 55.2'
14	34°00.2	23.4	103°45.8	13.1	19°33.5	-11.1 -11.2'	55.1'
15	49°00.2	• • 24.3	118°18.0	13.3'	19°22.3	-11.3'	55.1'
16 17	64°00.3 79°00.4	25.1 26.0	132°50.3 147°22.8	13.4' 13.5'	19°11.0 18°59.7	-11.4' -11.4'	55.1' 55.1'
18	94°00.4	\$12°26.8	147 22.0 161°55.2	13.6'	N18° 48.2	-11.4	55.0'
19	109°00.5	27.7	176°27.8	13.7'	18°36.7	-11.6'	55.0'
20	124°00.6	28.6	191°00.5		18°25.2		55.0'
21 22	139°00.6 154°00.7	· · 29.4 30.3	205°33.3 220°06.2	13.9' 13.9'	18° 13.5 18° 01.8	-11.7' -11.8'	55.0' 55.0'
23	169°00.7	31.1	234°39.1	14.0'	17°50.1	-11.8'	54.9'
	SD = 16.1'	d = 0.9'		SI	O = 15.1'		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	184°00.8	S12°32.0	249°12.1	14.1'	N17°38.2	-11.9'	54.9'
1	199°00.9	32.8	263°45.3	14.2'	17°26.3	-12.0'	54.9'
2	214°00.9 229°01.0	33.7 • • 34.5	278°18.5 292°51.8	14.3' 14.4'	17°14.4 17°02.3	-12.0' -12.1'	54.9' 54.8'
4	244°01.1	35.4	307°25.1	14.5	16°50.3	-12.1'	54.8'
5	259°01.1	36.2	321°58.6	14.5'	16°38.1	-12.2'	54.8'
6	274°01.2 289°01.2	\$12°37.1	336°32.1	14.6'	N16°25.9	-12.3' -12.3'	54.8'
7 8	289°01.2 304°01.3	37.9 38.8	351°05.8 5°39.5	14.7' 14.8'	16°13.7 16°01.3	-12.3' -12.4'	54.8' 54.7'
9	319°01.4	• • 39.6	20°13.2	14.9'	15°49.0	-12.4'	54.7'
10	334°01.4	40.5	34°47.1	14.9'	15°36.5	-12.5'	54.7'
11 12	349°01.5 4°01.5	41.3 \$12°42.2	49°21.0 63°55.0	15.0' 15.1'	15°24.1 N15°11.5	-12.5' -12.6'	54.7' 54.7'
13	19°01.6	43.0	78°29.1	15.2'	14°59.0	-12.6'	54.6'
14	34°01.7	43.9	93°03.3	15.2'	14°46.3	-12.7'	54.6'
15 16	49°01.7 64°01.8	· · 44.7 45.5	107°37.5 122°11.8	15.3' 15.4'	14°33.6 14°20.9	-12.7' -12.8'	54.6' 54.6'
16 17	79°01.8	45.5 46.4	122°11.8 136°46.2	15.4' 15.4'	14° 20.9 14° 08.1	-12.8' -12.8'	54.6'
18	94°01.9	S12°47.2	151°20.6	15.5'	N13°55.3	-12.9'	54.6'
19	109°02.0	48.1	165°55.1	15.6'	13°42.4	-12.9'	54.5'
20 21	124°02.0 139°02.1	48.9 • • 49.8	180°29.7 195°04.3	15.6' 15.7'	13°29.5 13°16.6	-13.0' -13.0'	54.5' 54.5'
22	154°02.1	50.6	209°39.0	15.8'	13°03.6	-13.0'	54.5
23	169°02.2	51.5	224°13.8	15.8'	12°50.5	-13.1'	54.5'
	SD = 16.1'	d = 0.9'		SI	O = 15.0'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	05:40	07:00	08:18	15:08	16:26	17:46
<b>N</b> 70°	05:38	06:50	07:59	15:27	16:36	17:48
68°	05:37	06:43	07:44	15:43	16:44	17:49
66°	05:36	06:36	07:32	15:55	16:50	17:50
64°	05:35	06:31	07:22	16:05	16:56	17:52
62°	05:34	06:26	07:13	16:14	17:01	17:53
60°	05:33	06:22	07:05	16:22	17:05	17:54
<b>N</b> 58°	05:32	06:18	06:59	16:28	17:09	17:55
56°	05:31	06:14	06:53	16:34	17:13	17:56
54°	05:30	06:11	06:48	16:39	17:16	17:57
52°	05:29	06:08	06:43	16:44	17:19	17:58
50°	05:28	06:05	06:39	16:49	17:22	18:00
45°	05:25	05:59	06:29	16:58	17:28	18:02
<b>N</b> 40°	05:22	05:54	06:22	17:06	17:34	18:05
35°	05:19	05:49	06:15	17:13	17:39	18:08
30°	05:16	05:45	06:09	17:19	17:43	18:11
20°	05:10	05:36	05:59	17:29	17:52	18:18
N 10°	05:03	05:28	05:49	17:39	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	05:00	05:22	18:06	18:29	18:55
30°	04:17	04:46	05:11	18:17	18:42	19:12
35°	04:07	04:38	05:05	18:24	18:50	19:22
40° 45°	03:55	04:29	04:57	18:31	19:00	19:34
	03:39	04:18	04:49	18:40	19:11	19:50
<b>S</b> 50°	03:20	04:03	04:39	18:51	19:26	20:10
52°	03:10	03:57	04:34	18:55	19:33	20:20
54°	02:59	03:49	04:28	19:01	19:40	20:31
56° 58°	02:46	03:41	04:22	19:07	19:49	20:45
<b>S</b> 60°	02:30 02:11	03:31 03:20	04:16 04:08	19:14 19:21	19:59 20:11	21:01 21:20
3 00	02:11	03:20	04.00	19:21	20:11	21:20

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper Lower		22-24	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	54-34%	
24	15:50	15:53	11:44	06:02	18:27		
25	15:57	16:00	11:44	06:52	19:15		
26	16:03	16:06	11.44	07:37	19.58		

# October 27, 28, 29 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
					N21°58.4			50°39.5	508°39.3		ЗПА	Dec
0	35°50.8	146°33.5	\$23°38.9	276°34.4		315°47.2	N22°24.2			Alpheratz	357°34.7	29°13.8
1	50°53.2	161°32.7	39.4	291°35.8	58.3	330°49.9	24.2	65°42.1	39.3	Ankaa	353°06.9	-42°10.3
2	65°55.7	176°32.0	39.9	306°37.2	58.2	345°52.5	24.2	80°44.6	39.3	Schedar	349°30.8	56°40.6
3	80°58.2	191°31.2	• • 40.5	321°38.6	• • 58.1	$0^{\circ}55.1$	• • 24.2	95°47.2	• • 39.4	Diphda	348°47.2	-17°51.0
4	96°00.6	206°30.4	41.0	336°40.0	58.0	15°57.7	24.2	110°49.7	39.4			
5	111°03.1	221°29.6	41.5	351°41.4	57.9	31°00.3	24.2	125°52.3	39.4	Achernar	335°19.7	-57°06.6
6	126°05.6	236°28.9	S23°42.1	6°42.8	N21°57.7	46°03.0	N22°24.2	140°54.8	S08°39.4	Hamal	327°51.1	23°34.9
7	141°08.0	251°28.1	42.6	21°44.2	57.6	61°05.6	24.2	155°57.3	39.5	Polaris	313°39.2	89°22.1
8	156° 10.5	266°27.3	43.1	36°45.6	57.5	76°08.2	24.2	170°59.9	39.5	Acamar	$315^{\circ}11.5$	-40°12.2
9	171°12.9	281°26.5	• • 43.6	51°47.0	•• 57.4	91°10.8	24.2	186°02.4	• • 39.5	Menkar	314°06.0	4°11.3
										Mirfak	308°28.1	49°57.0
10	186°15.4	296°25.8	44.2	66°48.4	57.3	106°13.5	24.1	201°05.0	39.6	Aldebaran	290°39.6	16°33.6
11	201°17.9	311°25.0	44.7	81°49.8	57.2	121°16.1	24.1	216°07.5	39.6	Rigel	281°03.8	-8°10.2
12	216°20.3	326°24.2	S23°45.2	96°51.2	N21°57.0	136°18.7	N22°24.1	231°10.1	S08°39.6	Capella	280°21.8	46°01.3
13	231°22.8	341°23.4	45.7	111°52.6	56.9	151°21.3	24.1	$246^{\circ}12.6$	39.6	Bellatrix	278°22.8	6°22.4
14	246°25.3	356°22.7	46.2	126°54.0	56.8	166°24.0	24.1	261°15.1	39.7	Elnath	278°01.8	28°37.7
15	261°27.7	11°21.9	• • 46.8	141°55.4	• • 56.7	181°26.6	• • 24.1	276°17.7	• • 39.7	Alnilam	275°37.7	-1°11.0
16	276°30.2	$26^{\circ}21.1$	47.3	156°56.8	56.6	196°29.2	24.1	291°20.2	39.7			
17	291°32.7	41°20.3	47.8	171°58.2	56.5	211°31.9	24.1	306°22.8	39.7	Betelgeuse	270°52.1	7°24.8
18	306°35.1	56°19.5	S23°48.3	186°59.6	N21°56.3	226°34.5	N22°24.1	321°25.3	S08°39.8	Canopus	263°52.2	-52°42.2
19	321°37.6	71°18.8	48.8	202°01.0	56.2	241°37.1	24.0	336°27.8	39.8	Sirius	258°26.3	-16°44.8
20	336°40.1	86°18.0	49.3	217°02.5	56.1	256°39.7	24.0	351°30.4	39.8	Adhara	255°05.9	-29°00.0
21	351°42.5	101°17.2	• • 49.8	232°03.9	• • 56.0	271°42.4	• • 24.0	6°32.9	• • 39.8	Procyon	244°51.0	5°09.8
22	6°45.0	116°16.4	50.4	247°05.3	55.9	286°45.0	24.0	21°35.5	39.8	Pollux	243°17.5	27°57.9
										Avior	234°14.8	-59°34.9
23	21°47.4	131°15.7	50.9	262°06.7	55.8	301°47.6	24.0	36°38.0	39.9	Suhail	222°46.5	-43°31.6
Mer.p	ass. 21:33	$\nu$ -0.8' d0.	.5′ m-4.00	$\nu$ 1.4' d-0	0.1' m0.14	$\nu$ 2.6′ d-0	.0′ m-2.66	$\nu 2.5' \ d0$	0′ m0.77	Miaplacidus	221°38.6	-69°48.7
										Alphard	217°48.0	-8°45.8
										Regulus	207°34.8	11°50.8
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.6	61°36.9
0	36°49.9	146°14.9	S23°51.4	277°08.1	N21°55.6	316°50.3	N22°24.0	51°40.5	S08°39.9	Denebola	182°25.4	14°26.1
1	51°52.4	$161^{\circ}14.1$	51.9	292°09.5	55.5	331°52.9	24.0	66°43.1	39.9	Gienah		-17°40.6
2	66°54.8	176°13.3	52.4	307°10.9	55.4	346°55.5	24.0	81°45.6	40.0	Acrux		-63°14.0
3	81°57.3	191°12.5	• • 52.9	322°12.3	• • 55.3	1°58.2	• • 24.0	96°48.2	• • 40.0		171°52.4	-57°14.9
4	96°59.8	$206^{\circ}11.7$	53.4	337°13.8	55.2	17°00.8	24.0	111°50.7	40.0	Alioth	166°13.6	55° 49.5
5	112°02.2	221°11.0	53.9	352°15.2	55.1	32°03.4	23.9	126°53.2	40.0	Spica	158°22.8	-11° 17.3
6	127°04.7	236°10.2	S23°54.4	7°16.6	N21°54.9	47°06.1	N22°23.9	141°55.8	S08°40.1		150° 22.6 152° 52.6	49°11.4
7	142°07.2	251°09.4	54.9	22°18.0	54.8	62°08.7	23.9	156°58.3	40.1	Alkaid		
8	157°09.6	266°08.6	55.4	37°19.4	54.7	77°11.3	23.9	172°00.9	40.1	Hadar	148°37.0	-60°29.5
9	172°12.1	281°07.8	• • 55.9	52°20.9	• • 54.6	92°14.0	• • 23.9	187°03.4	• • 40.1		147°58.3	-36°29.4
10	187°14.5	296°07.0	56.4	67°22.3	54.5	107°16.6	23.9	202°05.9	40.2	Arcturus	145°48.4	19°03.3
11	202°17.0	311°06.3	56.9	82°23.7	54.4	122°19.2	23.9	217°08.5	40.2	Rigil Kent.	139°41.3	-60°56.2
12	217°19.5	326°05.5	S23°57.4	97°25.1	N21°54.3	137°21.9	N22°23.9	232°11.0	508°40.2	Kochab	137°20.9	74°03.2
13	232°21.9	341°04.7	57.9	112°26.5	54.1	152°24.5	23.9	247°13.6	40.2	Zuben'ubi	136°56.6	-16°08.6
14	247°24.4	356°03.9	58.4	112 20.3 127°28.0	54.0	167°27.1	23.8	262°16.1	40.2	Alphecca	126°04.2	26°38.0
15	262°26.9	11°03.1	• • 58.8	142°29.4	• • 53.9	182°29.8	• • 23.8	202 10.1 277°18.6	• • 40.3	Antares	112°16.4	-26°29.2
	202 20.9 277°29.3	26°02.3		157°30.8	53.8	102 29.0 197°32.4	23.8	292°21.2	40.3	Atria	$107^{\circ}11.2$	-69°04.4
16 17	211 29.3 292°31.8	41°01.5	59.3 23°59.8	172°32.2	53.6 53.7	212°35.0	23.8	307°23.7	40.3	Sabik	102°03.3	-15°45.3
	307°34.3	56°00.8	524°00.3			212 35.0 227°37.7	N22°23.8	322°26.2	508°40.4	Shaula	$96^{\circ}10.9$	-37°07.4
18				187°33.7					40.4	Rasalhague	95°59.0	12°32.6
19	322°36.7	71°00.0	8.00	202°35.1	53.4	242°40.3	23.8	337°28.8	40.4	Eltanin	90°42.6	51°29.3
20	337°39.2	85°59.2	01.3	217°36.5	53.3	257°42.9	23.8	352°31.3	40.4	Kaus Aust.	83°33.0	-34°22.4
21	352°41.7	100°58.4	• • 01.8	232°37.9	• • 53.2	272°45.6	• • 23.8	7°33.9	• • 40.4	Vega	80°33.6	38°48.6
22	7°44.1	115°57.6	02.3	247°39.4	53.1	287°48.2	23.8	22°36.4	40.5	Nunki	75°48.1	-26°16.0
23	22°46.6	130°56.8	02.7	262°40.8	53.0	302°50.9	23.8	37°38.9	40.5	Altair	62°00.2	8°56.1
Mer n	ass. 21:29	v-0.8' d0	.5′ m-4.00	$\nu 1.4' d-0$	0.1' m0.12	$\nu^{2} 6' d-0$	.0′ m-2.66	$v^{2} 5' d0$	0′ m0.78	Peacock	53°06.0	-56°39.5
		- 0.0 40.		ν I. ι α σ		- Z.O G O				Deneb	49°25.9	45°22.4
										Enif	33°38.9	9°59.5
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.9	-46°50.6
0	37°49.0	145°56.0	S24°03.2	277°42.2	N21°52.9	317°53.5	N22°23.7	52°41.5	S08°40.5	Fomalhaut	15°14.5	-40° 30.0 -29° 29.5
1	52°51.5	160°55.2	03.7	292°43.7	52.8	$332^{\circ}56.1$	23.7	67°44.0	40.5	Scheat	13°45.2	28°13.2
2	67°54.0	175°54.5	04.2	307°45.1	52.6	347°58.8	23.7	82°46.5	40.5	Markab	13°29.9	15° 20.5
3	82°56.4	190°53.7	• • 04.6	322°46.5	• • 52.5	3°01.4	• • 23.7	97°49.1	• • 40.6	ividiNdD	13 43.3	10 20.0
4	97°58.9	205°52.9	05.1	337°48.0	52.4	18°04.1	23.7	112°51.6	40.6	Oct 27 Sun	SHA	Mer.pass
5	113°01.4	220°52.1	05.6	352°49.4	52.3	33°06.7	23.7	127°54.2	40.6		110°42.7	14:15
6	128°03.8	235°51.3	S24°06.1	7°50.8	N21°52.2	48°09.3	N22°23.7	142°56.7	S08°40.6	Mars	240°43.6	05:33
7	143°06.3	250°50.5	06.5	22°52.3	52.1	63°12.0	23.7	157°59.2	40.7	Jupiter		02:56
8	158°08.8	265°49.7	07.0	37°53.7	52.0	78°14.6	23.7	173°01.8	40.7	Saturn	14°48.8	20:34
9	173°11.2	280°48.9	07.5	52°55.2	51.8	93°17.3	23.6	188°04.3	40.7			
10	188°13.7	295°48.1	08.0	67°56.6	51.7	108°19.9	23.6	203°06.8	40.7	Oct 28 Mon	SHA	Mer.pass
11	203°16.1	310°47.3	08.4	82°58.0	51.6	123°22.6	23.6	218°09.4	40.8		109°25.0	14:16
12	218°18.6	325°46.5	S24°08.9	97°59.5	N21°51.5	138°25.2	N22°23.6	233°11.9	S08°40.8	Mars		05:31
13	233°21.1	340°45.7	09.3	113°00.9	51.4	153°27.8	23.6	248°14.4	40.8	Jupiter	280°00.4	02:52
14	248°23.5	355°45.0	09.8	128°02.3	51.3	168°30.5	23.6	263°17.0	40.8	Saturn	14°50.6	20:30
15	263°26.0	10°44.2	10.3	143°03.8	51.2	183°33.1	23.6	278°19.5	• • 40.8	Oct 29 Tue	C LIV	Mornos
16	203°20.0° 278°28.5	25°43.4	10.3	158°05.2	51.1	198°35.8	23.6	293°22.0	40.8		<b>SHA</b>	Mer.pass
	276 26.5 293°30.9	40°42.6	11.2	173°06.7	50.9	213°38.4	23.6	308°24.6	40.9	Venus		14:17
17	293 30.9 308°33.4	40 42.6 55°41.8	524°11.7	173 06.7 188°08.1	N21°50.8	213 38.4 228°41.1	N22°23.5	308 24.6 323°27.1	508°40.9	Mars		05:29
18 19	308 33.4 323°35.9	55 41.8 70°41.0	12.1	203°09.6	N21 50.8 50.7	243°43.7	23.5	323 27.1 338°29.6	40.9	Jupiter		02:48
								358 29.0 353°32.2		Saturn	14°52.4	20:26
20	338°38.3	85°40.2	12.6	218°11.0	50.6	258°46.4	23.5		41.0	Horizont	al parallax	
21	353°40.8	100°39.4	• • 13.0	233°12.5	50.5	273°49.0	• • 23.5	8°34.7	• • 41.0	1.31120111	Venus:	0.1
22	8°43.3	115°38.6	13.5	248°13.9	50.4	288°51.6	23.5	23°37.2	41.0		Mars:	0.1
23	23°45.7	130°37.8	13.9	263°15.4	50.3	303°54.3	23.5	38°39.8	41.0		141013.	3.1
Mer.p	ass. 21:25	$\nu$ -0.8′ d0.	.5′ m-4.01	$\nu$ 1.4 $^{\prime}$ d-0	$0.1'  \mathrm{m}0.11$	$\nu$ 2.6′ d-0	.0′ m-2.67	$\nu 2.5' \ d0$	0′ m0.78			

h	Sur	า			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	184°02.2	S12°52.3	238°48.6	15.9'	N12°37.4	-13.1'	54.5'
1	199°02.3	53.1	253°23.5	15.9'	$12^{\circ}24.3$	-13.2'	54.4'
2	214°02.4	54.0	267°58.4	16.0'	12°11.1	-13.2'	54.4'
3 4	229°02.4 244°02.5	· · 54.8 55.7	282°33.5 297°08.5	16.1' 16.1'	11°57.9 11°44.7	-13.2' -13.3'	54.4' 54.4'
5	259°02.5	56.5	311°43.6	16.1	11 44.7 11°31.4	-13.3'	54.4'
6	274°02.6	\$12°57.4	326°18.8	16.2'	N11°18.1	-13.4	54.4'
7	289°02.6	58.2	340°54.0	16.3'	11°04.7	-13.4'	54.3'
8	304°02.7	59.0	355°29.3	16.3'	10°51.3	-13.4'	54.3'
9	319°02.7	12°59.9 13°00.7	10°04.7	16.4' 16.4'	10°37.9	-13.5'	54.3'
10 11	334°02.8 349°02.8	01.6	24°40.0 39°15.5	16.4	10°24.5 10°11.0	-13.5' -13.5'	54.3' 54.3'
12	4°02.9	S13°02.4	53°51.0	16.5	N09°57.5	-13.5'	54.3
13	19°02.9	03.2	68°26.5	16.6'	09°43.9	-13.6'	54.3'
14	34°03.0	04.1	83°02.1	16.6'	09°30.3	-13.6'	54.3'
15	49°03.0	• • 04.9	97°37.7	16.7'	09°16.7	-13.6'	54.2'
16 17	64°03.1 79°03.1	05.8 06.6	112°13.4 126°49.1	16.7' 16.8'	09°03.1 08°49.4	-13.7' -13.7'	54.2' 54.2'
18	94°03.2	\$13°07.4	141°24.8	16.8'	N08° 35.7	-13.7'	54.2'
19	109°03.2	08.3	156°00.6	16.8'	08°22.0	-13.7'	54.2'
20	124°03.3	09.1	$170^{\circ}36.5$	16.9'	08°08.3	-13.8'	54.2'
21	139°03.3	• • 09.9	185°12.3	16.9'	07°54.5	-13.8'	54.2'
22 23	154°03.4 169°03.4	10.8 11.6	199°48.3 214°24.2	16.9' 17.0'	07°40.7 07°26.9	-13.8' -13.8'	54.2' 54.2'
23			214 24.2			-13.0	J4.Z
	SD = 16.1'	d = 0.8'		SI	O = 14.9'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	184°03.5 199°03.5	\$13°12.4 13.3	229°00.2 243°36.2	17.0' 17.1'	N07°13.1 06°59.2	-13.9'	54.1' 54.1'
1 2	199°03.5 214°03.6	13.3 14.1	243°36.2 258°12.3	17.1' 17.1'	06°59.2	-13.9' -13.9'	54.1'
3	229°03.6	• • 14.9	272°48.3	17.1	06°31.4	-13.9'	54.1'
4	244°03.7	15.8	287°24.4	17.1'	06° 17.5	-13.9'	54.1'
5	259°03.7	16.6	$302^{\circ}00.6$	17.2'	06°03.6	-14.0'	54.1'
6	274°03.8	S13°17.4	316°36.8	17.2'	N05°49.6	-14.0'	54.1'
7	289°03.8 304°03.9	18.3 19.1	331°13.0 345°49.2	17.2' 17.3'	05°35.7 05°21.7	-14.0' -14.0'	54.1' 54.1'
8 9	319°03.9	. 19.1	0°25.4	17.3	05° 21.7	-14.0'	54.1'
10	334°03.9	20.8	15°01.7	17.3'	04°53.7	-14.0'	54.1'
11	349°04.0	21.6	29°38.0	17.3'	04°39.6	-14.0'	54.1'
12	4°04.0	S13°22.4	44°14.3	17.3'	N04°25.6	-14.1'	54.0'
13 14	19°04.1 34°04.1	23.3 24.1	58°50.7 73°27.0	17.4' 17.4'	04°11.5 03°57.5	-14.1' -14.1'	54.0' 54.0'
15	49°04.2	24.1	88°03.4	17.4	03°43.4	-14.1'	54.0'
16	64°04.2	25.8	102°39.8	17.4'	03°29.3	-14.1'	54.0'
17	79°04.2	26.6	$117^{\circ}16.2$	17.4'	$03^{\circ}15.2$	-14.1'	54.0'
18	94°04.3	S13°27.4	131°52.7	17.4'	N03°01.1	-14.1'	54.0'
19	109°04.3 124°04.4	28.2	146°29.1 161°05.6	17.5'	02°47.0 02°32.9	-14.1'	54.0'
20 21	139°04.4	29.1 • • 29.9	175°42.0	17.5' 17.5'	02° 18.7	-14.1' -14.1'	54.0' 54.0'
22	154°04.5	30.7	190°18.5	17.5'	02°04.6	-14.1'	54.0'
23	169°04.5	31.5	204°55.0	17.5'	01°50.4	-14.1'	54.0'
	SD = 16.1'	d = 0.8'		SI	D = 14.8'		
Tue	GHA	Dec	GHA	.,	Dec	d	HP
o 0	<b>GНА</b> 184°04.5	S13°32.4	219°31.5	u 17.5'	N01°36.3	-14.2'	пР 54.0'
1	199°04.6	33.2	234°08.0	17.5'	01°22.1	-14.2'	54.0'
2	214°04.6	34.0	248°44.5	17.5'	01°08.0	-14.2'	54.0'
3	229°04.6 244°04.7	• • 34.9	263°21.0 277°57.6	17.5'	00°53.8	-14.2'	54.0'
4 5	244°04.7 259°04.7	35.7 36.5	277°57.6 292°34.1	17.5' 17.5'	00°39.7 00°25.5	-14.2' -14.2'	54.0' 54.0'
6	274°04.8	\$13°37.3	307°10.6	17.5'	N00°11.3	-14.2'	53.9'
7	289°04.8	38.2	321°47.2	17.5'	<b>S</b> 00°02.8	14.2'	53.9'
8	304°04.8	39.0	336°23.7	17.5'	00°17.0	14.2'	53.9'
9	319°04.9	• • 39.8	351°00.2	17.5'	00°31.2	14.2'	53.9'
10 11	334°04.9 349°04.9	40.6 41.4	5°36.8 20°13.3	17.5' 17.5'	00°45.3 00°59.5	14.2' 14.2'	53.9' 53.9'
12	4°05.0	\$13°42.3	20 13.3 34°49.8	17.5'	501°13.6	14.2	53.9
13	19°05.0	43.1	49°26.3	17.5'	01°27.8	14.1'	53.9'
14	34°05.1	43.9	64°02.8	17.5'	01°41.9	14.1'	53.9'
15	49°05.1	• • 44.7	78°39.3	17.5'	01°56.1	14.1'	53.9'
16 17	64°05.1 79°05.2	45.5 46.4	93°15.8 107°52.3	17.5' 17.5'	02°10.2 02°24.3	14.1' 14.1'	53.9' 53.9'
18	94°05.2	40.4 \$13°47.2	107 52.3 122°28.8	17.5	02 24.3 \$02°38.4	14.1	53.9
19	109°05.2	48.0	137°05.3	17.5'	02°52.5	14.1'	53.9'
20	124°05.3	48.8	151°41.7	17.4'	03°06.6	14.1'	53.9'
21	139°05.3	• • 49.6	166°18.2	17.4	03°20.7	14.1'	53.9'
22 23	154°05.3 169°05.4	50.5 51.3	180°54.6 195°31.0	17.4' 17.4'	03°34.8 03°48.9	14.1' 14.1'	53.9' 53.9'
23	SD = 16.1'	d = 0.8'	190 31.0		O = 14.7'	14.1	33.9
	JD = 10.1	u — 0.0		31	J — 14.1°		

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

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

		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	25-11%	
27	16:09	16:12	11:44	08:19	20:39		
28	16:14	16:16	11:44	08:58	21:18		
29	16:18	16:20	11:44	09:37	21:56		

## October 30, 31, 01 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	38°48.2	145°37.0	S24°14.4	278°16.8	N21°50.1	318° 56.9	N22°23.5	53°42.3	S08°41.0			
1	53°50.6	160°36.2	14.8	293°18.3	50.0	333°59.6	23.5	68°44.8	41.1	Alpheratz	357°34.7 353°06.9	29°13.8 -42°10.3
2	68°53.1	175°35.4	15.3	308°19.7	49.9	349°02.2	23.5	83°47.4	41.1	Ankaa Schedar	349°30.8	-42 10.3 56°40.6
3	83°55.6	190°34.6	• • 15.7	323°21.2	• • 49.8	4°04.9	• • 23.4	98°49.9	• • 41.1	Diphda	348°47.2	-17°51.0
4	98°58.0	205°33.8	16.2	338°22.6	49.7	19°07.5	23.4	113°52.4	41.1	Achernar	335°19.7	-57°06.7
5	114°00.5	220°33.0	16.6	353°24.1	49.6	34°10.2	23.4	128°55.0	41.2	Hamal	327°51.1	23°34.9
6 7	129°03.0 144°05.4	235°32.2 250°31.4	\$24°17.1 17.5	8°25.5 23°27.0	N21°49.5 49.4	49° 12.8 64° 15.5	N22°23.4 23.4	143°57.5 159°00.0	508°41.2 41.2	Polaris	313°38.8	89°22.1
8	159°07.9	265°30.6	18.0	38°28.4	49.4	79°18.1	23.4	174°02.6	41.2	Acamar	$315^{\circ}11.5$	-40°12.2
9	174°10.4	280° 29.8	• • 18.4	53°29.9	• • 49.1	94°20.8	• • 23.4	189°05.1	• • 41.2	Menkar	314°06.0	4°11.3
10	189°12.8	295°29.0	18.8	68°31.3	49.0	109°23.4	23.4	204°07.6	41.3	Mirfak	308°28.0	49°57.0
11	204°15.3	$310^{\circ}28.2$	19.3	83°32.8	48.9	124°26.1	23.4	$219^{\circ}10.2$	41.3	Aldebaran	290°39.5	16°33.6
12	$219^{\circ}17.8$	325°27.4	S24°19.7	98°34.2	N21°48.8	139°28.7	N22°23.3	234°12.7	S08°41.3	Rigel Capella	281°03.8 280°21.8	-8°10.2 46°01.3
13	234°20.2	340°26.6	20.2	113°35.7	48.7	154°31.4	23.3	249°15.2	41.3	Bellatrix	278°22.8	6°22.4
14	249°22.7	355°25.8	20.6	128°37.2	48.6	169°34.0	23.3	264°17.8	41.3	Elnath	278°01.8	28°37.7
15 16	264°25.1 279°27.6	10°25.0 25°24.2	· · 21.0 21.5	143°38.6 158°40.1	· · 48.5 48.4	184°36.7 199°39.3	· · 23.3 23.3	279°20.3 294°22.8	· · 41.4 41.4	Alnilam	275°37.7	-1°11.0
17	279 27.0 294°30.1	40°23.4	21.5	173°41.5	48.2	214°42.0	23.3	309°25.3	41.4	Betelgeuse	$270^{\circ}52.1$	7°24.8
18	309°32.5	55° 22.6	S24°22.3	188°43.0	N21°48.1	229°44.7	N22°23.3	324°27.9	\$08°41.4	Canopus	263°52.2	-52°42.2
19	324°35.0	70°21.8	22.8	203°44.5	48.0	244°47.3	23.3	339°30.4	41.5	Sirius	258°26.2	-16°44.8
20	339°37.5	85°21.0	23.2	218°45.9	47.9	259°50.0	23.3	354°32.9	41.5	Adhara	255°05.9	-29°00.0
21	354°39.9	100°20.2	• • 23.6	233°47.4	• • 47.8	274°52.6	• • 23.2	9°35.5	• • 41.5	Procyon Pollux	244°50.9 243°17.4	5°09.8 27°57.9
22	9°42.4	$115^{\circ}19.4$	24.0	248°48.9	47.7	289°55.3	23.2	24°38.0	41.5	Avior	234°14.8	-59°34.9
23	24°44.9	130° 18.6	24.5	263°50.3	47.6	304°57.9	23.2	39°40.5	41.5	Suhail	222°46.5	-43°31.6
Mer.p	ass. 21:21	$\nu$ -0.8' d0.	.5′ m-4.01	$\nu 1.4' \ d-0$	.1′ m0.09	$\nu 2.6' \ d-0$	.0′ m-2.68	$\nu 2.5' d0$	.0′ m0.79	Miaplacidus	221°38.5	-69°48.7
										Alphard	217°48.0	-8°45.8
Thu	CHA	GHA	Dee	GHA	Doo	GHA	Doo	GHA	Dee	Regulus	207°34.8	11°50.8
1 nu 0	<b>GHA</b> 39°47.3	<b>GПА</b> 145°17.8	<b>Dec</b> \$24°24.9	278°51.8	<b>Dec</b> N21°47.5	320°00.6	<b>Dec</b> N22°23.2	54°43.1	<b>Dec</b> \$08°41.6	Dubhe	193°41.6	61°36.9
1	54°49.8	160°17.0	25.3	293°53.3	47.4	335°03.2	23.2	69°45.6	41.6	Denebola	182°25.4	14°26.1
2	69°52.2	175°16.2	25.7	308°54.7	47.2	350°05.9	23.2	84°48.1	41.6	Gienah	175°44.1	-17°40.6
3	84°54.7	190° 15.4	26.2	323°56.2	• • 47.1	5°08.5	23.2	99°50.6	41.6	Acrux	173°01.0	-63°14.0
4	99°57.2	205°14.6	26.6	338°57.7	47.0	20°11.2	23.2	114°53.2	41.6	Gacrux Alioth	171°52.4 166°13.6	-57°14.9 55°49.4
5	114°59.6	220°13.8	27.0	353°59.2	46.9	$35^{\circ}13.9$	23.1	129°55.7	41.7	Spica	158°22.8	-11°17.3
6	130°02.1	235° 13.0	S24°27.4	9°00.6	N21°46.8	50° 16.5	N22°23.1	144°58.2	S08°41.7	Alkaid	150° 52.6	49°11.4
7	145°04.6	250° 12.1	27.8	24°02.1	46.7	65° 19.2	23.1	160°00.8	41.7	Hadar	148°37.0	-60°29.5
8	160°07.0	265°11.3	28.2	39°03.6	46.6	80°21.8	23.1	175°03.3	41.7	Menkent	147°58.3	-36°29.4
9	175°09.5	280°10.5	• • 28.6	54°05.0	• • 46.5	95°24.5	• • 23.1	190°05.8	• • 41.7	Arcturus	145°48.4	19°03.3
10 11	190°12.0 205°14.4	295°09.7 310°08.9	29.1 29.5	69°06.5 84°08.0	46.4 46.3	110°27.2 125°29.8	23.1 23.1	205°08.3 220°10.9	41.8 41.8	Rigil Kent.	139°41.3	-60°56.2
12	200° 16.9	325°08.1	\$24°29.9	99°09.5	N21°46.1	140°32.5	N22°23.1	235°13.4	\$08°41.8	Kochab	137°20.9	74°03.2
13	235°19.4	340°07.3	30.3	114°10.9	46.0	155°35.1	23.1	250° 15.9	41.8	Zuben'ubi	136°56.6	-16°08.6
14	250°21.8	355°06.5	30.7	129°12.4	45.9	170°37.8	23.0	265°18.4	41.8	Alphecca	126°04.2	26°38.0
15	265°24.3	10°05.7	• • 31.1	144°13.9	• • 45.8	185°40.5	• • 23.0	280°21.0	• • 41.9	Antares Atria	112°16.4 107°11.3	-26°29.2 -69°04.4
16	280°26.7	25°04.9	31.5	159°15.4	45.7	200°43.1	23.0	295°23.5	41.9	Sabik	107 11.3 102°03.3	-15°45.3
17	295°29.2	40°04.1	31.9	174°16.9	45.6	215°45.8	23.0	310°26.0	41.9	Shaula	96°10.9	-37°07.4
18	310°31.7	55°03.3	S24°32.3	189°18.3	N21°45.5	230°48.4	N22°23.0	325°28.5	S08°41.9	Rasalhague	95°59.0	12°32.6
19	325°34.1	70°02.5	32.7	204°19.8	45.4	245°51.1	23.0	340°31.1	41.9	Eltanin	90°42.6	51°29.3
20 21	340°36.6 355°39.1	85°01.6 100°00.8	33.1 · · 33.5	219°21.3 234°22.8	45.3 •• 45.2	260° 53.8 275° 56.4	23.0	355°33.6 10°36.1	41.9 · · 42.0	Kaus Aust.	83°33.0	-34°22.4
22	10°41.5	115°00.0	33.9	249°24.3	45.1	275°50.4° 290°59.1	22.9	25°38.7	42.0	Vega	80°33.6	38°48.6
23	25°44.0	129°59.2	34.3	264°25.8	44.9	306°01.8	22.9	40°41.2	42.0	Nunki	75°48.2	-26°16.0
										Altair	62°00.2	8°56.1
Mer.p	ass. 21:17	$\nu$ -0.8′ d0.	.4′ m-4.02	$\nu$ 1.5′ $d$ -0	.1′ m0.08	$\nu$ 2.7′ d-0	.0′ m-2.68	$\nu$ 2.5′ d0.	.0′ m0.79	Peacock Deneb	53°06.0 49°26.0	-56°39.5 45°22.4
										Enif	33°38.9	9°59.5
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.9	-46°50.6
0	40°46.5	144°58.4	\$24°34.7	279°27.2	N21°44.8	321°04.4	N22°22.9	55°43.7		Fomalhaut	15°14.5	-29°29.5
1	55°48.9	159°57.6	35.1	294°28.7	44.7	336°07.1	22.9	70°46.2	42.0	Scheat	13°45.2	28°13.2
2 3	70°51.4 85°53.8	174°56.8 189°56.0	35.5 •• 35.9	309°30.2 324°31.7	44.6 •• 44.5	351°09.7 6°12.4	22.9 •• 22.9	85°48.8 100°51.3	42.1 · · 42.1	Markab	13°29.9	15°20.5
4	05 55.0 100°56.3	204°55.2	36.3	339°33.2	44.4	21°15.1	22.9	100 51.5 115°53.8	42.1	Oct 30 Wed	SHA	Mer.pass
5	115°58.8	219°54.3	36.7	354°34.7	44.3	36° 17.7	22.9	130°56.3	42.1	Venus	106°48.8	14:18
6	131°01.2	234°53.5	S24°37.0	9°36.2	N21°44.2	51°20.4	N22°22.8	145°58.9	S08°42.1	Mars	239°28.6	05:26
7	146°03.7	249°52.7	37.4	24°37.7	44.1	66°23.1	22.8	161°01.4	42.2	Jupiter	280°08.8	02:44
8	161°06.2	264°51.9	37.8	39°39.2	44.0	81°25.7	22.8	176°03.9	42.2	Saturn	14°54.1	20:22
9	176°08.6	279°51.1	• • 38.2	54°40.7	• • 43.9	96°28.4	• • 22.8	191°06.4	• • 42.2	Oct 31 Thu	SHA	Mer.pass
10	191°11.1	294°50.3	38.6	69°42.1	43.8	111°31.1	22.8	206°08.9	42.2		105°30.5	14:20
11	206°13.6 221°16.0	309°49.5 324°48.7	39.0 \$24°39.4	84°43.6 99°45.1	43.7 N21°43.5	126°33.7 141°36.4	22.8 N22°22.8	221°11.5 236°14.0	42.2 \$08°42.2	Mars	239°04.5	05:24
12 13	221 16.0 236°18.5	324 48.7 339°47.8	39.4	99 45.1 114°46.6	N21 43.5 43.4	141 36.4 156°39.1	22.8	250 14.0 251°16.5	42.3	Jupiter	280°13.3	02:39
14	250°18.5°251.0°251	354° 47.0	40.1	129°48.1	43.4	171°41.7	22.7	266° 19.0	42.3	Saturn	14°55.7	20:18
15	266°23.4	9°46.2	• • 40.5	144°49.6	• • 43.2	186°44.4	• • 22.7	281°21.6	• • 42.3	Nov 01 Fri	SHA	Mer.pass
16	281°25.9	24°45.4	40.9	159°51.1	43.1	201°47.1	22.7	296°24.1	42.3	Venus		14:21
17	296°28.3	39° 44.6	41.2	174°52.6	43.0	216°49.8	22.7	311°26.6	42.3	Mars	238°40.8	05:22
18	311°30.8	54° 43.8	S24°41.6	189°54.1	N21°42.9	231°52.4	N22°22.7	326°29.1	S08°42.3	Jupiter	$280^{\circ}18.0$	02:35
19	326°33.3	69° 42.9	42.0	204°55.6	42.8	246°55.1	22.7	341°31.7	42.4	Saturn	14°57.2	20:14
20	341°35.7	84°42.1	42.4	219°57.1	42.7	261°57.8	22.7	356°34.2	42.4	Horizont	al parallax	
21 22	356°38.2 11°40.7	99°41.3 114°40.5	· · 42.7 43.1	234°58.6 250°00.1	· · 42.6 42.5	277°00.4 292°03.1	· · 22.7 22.6	11°36.7 26°39.2	· · 42.4 42.4	1.512011	Venus:	0.1
23	26°43.1	114 40.5 129°39.7	43.1	265°01.6	42.5 42.4	307°05.8	22.6	20 39.2 41°41.7	42.4		Mars:	0.1
ivier.p	pass. 21:13	ν-υ.κ' d0.	.4′ m-4.02	$\nu$ 1.5′ $d$ -0	.1′ m0.06	ν2.1' d-0	.0′ m-2.69	$\nu$ 2.5′ $d0$	.0′ m0.80			

h	Sun				Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	184°05.4	S13°52.1	210°07.4	17.4'	S04°02.9	14.0'	53.9'
1 2	199°05.4 214°05.4	52.9 53.7	224°43.8 239°20.2	17.4' 17.3'	04°17.0 04°31.0	14.0' 14.0'	53.9' 53.9'
3	229°05.5	• • 54.5	253° 56.5	17.3	04°45.0	14.0'	53.9
4	244°05.5	55.4	268°32.8	17.3'	$04^{\circ}59.0$	14.0'	53.9'
5	259°05.5	56.2	283°09.1	17.3'	05°13.0	14.0'	53.9'
6 7	274°05.6 289°05.6	\$13°57.0 57.8	297°45.4 312°21.7	17.3' 17.2'	\$05°27.0 05°40.9	13.9' 13.9'	53.9' 53.9'
8	304°05.6	58.6	326°57.9	17.2'	05°54.8	13.9'	53.9'
9	319°05.7	13°59.4	341°34.1	17.2'	06°08.7	13.9'	53.9'
10 11	334°05.7 349°05.7	14°00.2 01.1	356° 10.3 10° 46.4	17.2' 17.1'	06°22.6 06°36.5	13.9' 13.8'	53.9' 53.9'
12	4°05.7	S14°01.9	25°22.5	17.1	506°50.4	13.8'	53.9
13	19°05.8	02.7	39°58.6	17.1'	07°04.2	13.8'	53.9'
14	34°05.8	03.5	54°34.7	17.0'	07°18.0	13.8'	53.9'
15 16	49°05.8 64°05.8	· · 04.3 05.1	69° 10.7 83° 46.7	17.0' 17.0'	07°31.8 07°45.5	13.8' 13.7'	53.9' 53.9'
17	79°05.9	05.9	98°22.7	16.9'	07°59.3	13.7'	54.0'
18	94°05.9	<b>S</b> 14°06.7	112°58.6	16.9'	S08°13.0	13.7'	54.0'
19	109°05.9 124°05.9	07.6	127°34.5 142°10.4	16.9'	08°26.6	13.7'	54.0'
20 21	124°05.9 139°06.0	08.4 •• 09.2	142°10.4 156°46.2	16.8' 16.8'	08°40.3 08°53.9	13.6' 13.6'	54.0' 54.0'
22	154°06.0	10.0	171°22.0	16.7'	09°07.5	13.6'	54.0'
23	169°06.0	10.8	185°57.7	16.7'	09°21.1	13.5'	54.0'
	SD = 16.1'	d = 0.8'		SE	0 = 14.7'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	184°06.0	\$14°11.6	200°33.4	ν 16.7'	S09°34.6	13.5'	54.0'
1	199°06.1	12.4	$215^{\circ}09.1$	16.6'	$09^{\circ}48.1$	13.5'	54.0'
2	214°06.1	13.2	229° 44.7	16.6'	10°01.6	13.4	54.0'
3 4	229°06.1 244°06.1	· · 14.0 14.8	244°20.3 258°55.8	16.5' 16.5'	10°15.0 10°28.4	13.4' 13.4'	54.0' 54.0'
5	259°06.2	15.6	273°31.3	16.4	10°20.4	13.3'	54.0'
6	274°06.2	<b>S</b> 14°16.4	288°06.7	16.4'	S10°55.1	13.3'	54.0'
7 8	289°06.2 304°06.2	17.2 18.0	302°42.1 317°17.5	16.3' 16.3'	11°08.4 11°21.7	13.3' 13.2'	54.0' 54.0'
9	319°06.2	18.0	311° 17.5	16.2'	11 21.7 11°34.9	13.2'	54.0'
10	334°06.3	19.7	346°28.0	16.2'	11°48.1	13.1'	54.0'
11	349°06.3	20.5	1°03.2	16.1'	12°01.2	13.1'	54.0'
12 13	4°06.3 19°06.3	\$14°21.3 22.1	15°38.4 30°13.5	16.1' 16.0'	\$12°14.3 12°27.3	13.1' 13.0'	54.0' 54.0'
14	34°06.3	22.1	44°48.5	16.0'	12°40.4	13.0'	54.1'
15	49°06.3	• • 23.7	59°23.5	15.9'	$12^{\circ}53.3$	12.9'	54.1'
16	64°06.4 79°06.4	24.5	73°58.4 88°33.3	15.9'	13°06.3 13°19.1	12.9'	54.1' 54.1'
17 18	79 06.4 94°06.4	25.3 \$14°26.1	88 33.3 103°08.1	15.8' 15.8'	13 19.1 \$13°32.0	12.8' 12.8'	54.1'
19	109°06.4	26.9	117°42.9	15.7'	13°44.8	12.7'	54.1'
20	124°06.4	27.7	132°17.6		13°57.5		54.1'
21 22	139°06.5 154°06.5	· · 28.5 29.3	146°52.2 161°26.8	15.6' 15.5'	14°10.2 14°22.8	12.6' 12.6'	54.1' 54.1'
23	169°06.5	30.1	176°01.3	15.5'	14°35.4	12.5'	54.1'
	SD = 16.1'	d = 0.8'		SE	0 = 14.7'		
Fri 0	<b>GHA</b> 184° 06.5	<b>Dec</b> \$14°30.9	<b>GHA</b> 190° 35.8	u 15.4'	Dec \$14°47.9	<i>d</i> 12.5'	<b>HP</b> 54.1'
1	199°06.5	31.7	205°10.2	15.3'	15°00.4	12.4'	54.1'
2	214°06.5	32.5	219°44.5	15.3'	15°12.8	12.4'	54.1'
3 4	229°06.5 244°06.6	· · 33.3 34.1	234° 18.8 248° 53.0	15.2' 15.1'	15°25.2 15°37.5	12.3' 12.3'	54.1' 54.2'
5	259°06.6	34.1	263°27.1	15.1'	15°49.8	12.2'	54.2'
6	274°06.6	S14°35.7	278°01.2	15.0'	<b>S</b> 16°02.0	12.1'	54.2'
7	289°06.6 304°06.6	36.5 37.2	292°35.2 307°09.1	14.9' 14.9'	16°14.1 16°26.2	12.1' 12.0'	54.2' 54.2'
8 9	304°06.6 319°06.6	37.2 · · 38.0	307°09.1 321°43.0	14.9' 14.8'	16°26.2 16°38.3	12.0'	54.2' 54.2'
10	334°06.6	38.8	336° 16.8	14.7'	$16^{\circ}50.2$	11.9'	54.2'
11	349°06.6	39.6	350°50.5	14.7'	17°02.1	11.8'	54.2'
12 13	4°06.6 19°06.7	\$14°40.4 41.2	5°24.2 19°57.8	14.6' 14.5'	\$17°14.0 17°25.7	11.8' 11.7'	54.2' 54.2'
14	34°06.7	42.0	34°31.3	14.5 14.4'	17° 37.4	11.6'	54.2'
15	49°06.7	• • 42.8	49°04.7	14.4'	$17^{\circ}49.1$	11.6'	54.3'
16	64°06.7	43.6	63°38.1	14.3'	18°00.6	11.5'	54.3'
17 18	79°06.7 94°06.7	44.4 \$14°45.2	78°11.4 92°44.6	14.2' 14.1'	18°12.2 \$18°23.6	11.4' 11.4'	54.3' 54.3'
19	109°06.7	46.0	107° 17.8	14.1'	18°34.9	11.3'	54.3'
20	124°06.7	46.8	121°50.8	14.0'	18°46.2	11.2'	54.3'
21 22	139°06.7 154°06.7	· · 47.5 48.3	136°23.8 150°56.7	13.9' 13.8'	18°57.5 19°08.6	11.1' 11.1'	54.3' 54.3'
23	169°06.7	49.1	165° 29.6	13.8'	19° 08.0 19° 19.7	11.0'	54.3'
	SD = 16.1'	d = 0.8'		SE	0 = 14.8'		

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

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

		Sun		Moon			
Day	Eqn.of	f 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	6-0%	
30	16:22	16:23	11:44	10:16	22:35		
31	16:24	16:25	11:44	10:56	23:16		
01	16:26	16:27	11:44	11:38	-:-		

## November 02, 03, 04 UT (Sat., Sun., Mon.)

h	Aries	Ve	nus	М	ars	Jup	iter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	41°45.6	144°38.9	S24°43.8	280°03.1	N21°42.3	322°08.4	N22°22.6	56° 44.3	508°42.4			
1	56°48.1	159°38.0	44.2	295°04.7	42.2	337°11.1	22.6	71°46.8	42.5	Alpheratz	357°34.7	29°13.8
2	71°50.5	174°37.2	44.6	310°06.2	42.1	352°13.8	22.6	86°49.3	42.5	Ankaa	353°07.0	-42°10.3
3	86°53.0	189°36.4	• • 44.9	325°07.7	• • 42.0	$7^{\circ}16.5$	• • 22.6	101°51.8	• • 42.5	Schedar	349°30.8	56°40.6
4	$101^{\circ}55.5$	204°35.6	45.3	340°09.2	41.8	22°19.1	22.6	116°54.3	42.5	Diphda	348°47.2	-17°51.0
5	$116^{\circ}57.9$	219°34.8	45.6	355°10.7	41.7	37°21.8	22.6	131°56.9	42.5	Achernar Hamal	335°19.7 327°51.1	-57°06.7 23°34.9
6	132°00.4	234°34.0	S24°46.0	10° 12.2	N21°41.6	52°24.5	N22°22.5	146°59.4	S08°42.5	Polaris	313°38.2	89°22.1
7	147°02.8	249°33.1	46.4	25° 13.7	41.5	67°27.2	22.5	162°01.9	42.6	Acamar	315°11.5	-40°12.2
8	162°05.3	264°32.3	46.7	40° 15.2	41.4	82°29.8	22.5	177°04.4	42.6	Menkar	314°06.0	4°11.3
9	177°07.8	279°31.5	• • 47.1	55°16.7	• • 41.3	97°32.5	• • 22.5	192°06.9	• 42.6	Mirfak	308°28.0	49°57.0
10	192° 10.2 207° 12.7	294°30.7 309°29.9	47.4 47.8	70° 18.2 85° 19.8	41.2 41.1	112°35.2 127°37.9	22.5 22.5	207°09.5 222°12.0	42.6 42.6	Aldebaran	290°39.5	16°33.6
11 12	207 12.7 222° 15.2	309 29.9 324°29.0	524°48.1	100°21.3	N21°41.0	142°40.5	N22°22.5	222 12.0 237°14.5	\$08° 42.6	Rigel	281°03.8	-8°10.2
13	237° 17.6	339°28.2	48.5	115°22.8	40.9	157°43.2	22.4	252° 17.0	42.7	Capella	280°21.8	46°01.3
14	252°20.1	354°27.4	48.8	130°24.3	40.8	172°45.9	22.4	267° 19.5	42.7	Bellatrix	278°22.8	6°22.4
15	267° 22.6	9°26.6	• • 49.2	145°25.8	• • 40.7	187°48.6	• • 22.4	282°22.1	• • 42.7	Elnath	278°01.8	28°37.7
16	282°25.0	24°25.8	49.5	160°27.3	40.6	202°51.2	22.4	297°24.6	42.7	Alnilam	275°37.7	-1°11.0 7°24.8
17	297°27.5	39°24.9	49.9	175°28.8	40.5	217°53.9	22.4	$312^{\circ}27.1$	42.7	Betelgeuse Canopus	270°52.1 263°52.1	-52°42.2
18	$312^{\circ}29.9$	54°24.1	\$24°50.2	190°30.4	N21°40.4	232°56.6	N22°22.4	327° 29.6	508°42.7	Sirius	258°26.2	-32 42.2 -16°44.8
19	327° 32.4	69°23.3	50.6	205°31.9	40.3	247°59.3	22.4	342°32.1	42.8	Adhara	255°05.8	-29°00.1
20	342°34.9	84°22.5	50.9	220°33.4	40.2	263°02.0	22.4	357°34.7	42.8	Procyon	244°50.9	5°09.8
21	357°37.3	99°21.7	• • 51.2	235°34.9	• • 40.1	278°04.6	• • 22.3	12°37.2	• • 42.8	Pollux	243°17.4	27°57.9
22	12°39.8	114°20.8	51.6	250°36.5	40.0	293°07.3	22.3	27°39.7	42.8	Avior	234°14.8	-59°34.9
23	27°42.3	129°20.0	51.9	265°38.0	39.9	308°10.0	22.3	42°42.2	42.8	Suhail	222°46.5	-43°31.6
Mer.p	ass. 21:09	$\nu$ -0.8' d0.	.4′ m-4.03	$\nu$ 1.5′ d-0	.1' m0.04	$\nu$ 2.7′ d-0	.0′ m-2.70	$\nu$ 2.5 $^{\prime}$ d0	.0′ m0.80	Miaplacidus	221°38.4	-69°48.7
										Alphard	217°48.0	-8°45.8
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.7	11°50.8
0	42°44.7	144°19.2	S24°52.3	280°39.5	N21°39.8	323°12.7	N22°22.3	57° 44.7	508°42.8	Dubhe Denebola	193°41.6 182°25.4	61°36.9 14°26.1
1	57° 47.2	159°18.4	52.6	295°41.0	39.7	$338^{\circ}15.3$	22.3	72°47.2	42.9	Gienah	175°44.1	-17°40.6
2	72°49.7	174° 17.5	52.9	310°42.6	39.6	353°18.0	22.3	87°49.8	42.9	1	173°00.9	-63°14.0
3	87°52.1	189°16.7	• • 53.3	325°44.1	• • 39.4	8°20.7	· · 22.3	102°52.3	• • 42.9	Gacrux	171°52.4	-57°14.9
4	102°54.6	204°15.9	53.6	340°45.6	39.3	23°23.4	22.2	117°54.8	42.9	Alioth	166°13.6	55°49.4
5 6	117°57.1 132°59.5	219°15.1 234°14.3	53.9 \$24°54.3	355°47.1 10°48.7	39.2 N21°39.1	38°26.1 53°28.8	22.2 N22°22.2	132°57.3 147°59.8	42.9 \$08° 42.9	Spica	158°22.8	-11°17.3
7	132 39.3 148°02.0	249° 13.4	54.6	25°50.2	39.0	68°31.4	22.2	163° 02.4	42.9	Alkaid	152°52.6	49°11.3
8	163°04.4	264° 12.6	54.9	40°51.7	38.9	83°34.1	22.2	178° 04.9	43.0	Hadar	148°37.0	-60°29.4
9	178°06.9	279°11.8	• • 55.2	55°53.3	• • 38.8	98°36.8	22.2	193°07.4	• • 43.0	Menkent	147°58.3	-36°29.4
10	193°09.4	294°11.0	55.6	70°54.8	38.7	113°39.5	22.2	208°09.9	43.0	Arcturus Rigil Kent.	145°48.4 139°41.3	19°03.3 -60°56.2
11	$208^{\circ}11.8$	309°10.1	55.9	85°56.3	38.6	128°42.2	22.2	223° 12.4	43.0	Kochab	139°41.3	74°03.2
12	223°14.3	324°09.3	S24°56.2	100°57.9	N21°38.5	143°44.8	N22°22.1	238° 14.9	S08°43.0	Zuben'ubi	136°56.6	-16°08.6
13	238° 16.8	339°08.5	56.5	115°59.4	38.4	158°47.5	22.1	253°17.4	43.0	Alphecca	126°04.3	26°37.9
14	253° 19.2	354°07.7	56.9	131°00.9	38.3	173°50.2	22.1	268° 20.0	43.0	Antares	112°16.4	-26°29.2
15 16	268°21.7 283°24.2	9°06.8 24°06.0	· · 57.2 57.5	146°02.5 161°04.0	· · 38.2 38.1	188°52.9 203°55.6	· · 22.1 22.1	283°22.5 298°25.0	· · 43.1 43.1	Atria	107°11.3	-69°04.4
17	298° 26.6	39°05.2	57.8	176° 05.5	38.0	203 55.0 218°58.3	22.1	313° 27.5	43.1	Sabik	102°03.3	-15°45.3
18	313°29.1	54°04.4	S24°58.1	191°07.1	N21°37.9	234°01.0	N22°22.1	328° 30.0	S08°43.1	Shaula	96°10.9	-37°07.4
19	328°31.6	69°03.5	58.4	206°08.6	37.8	249°03.6	22.0	343°32.5	43.1	Rasalhague	95°59.0 90°42.6	12°32.6 51°29.3
20	343°34.0	84°02.7	58.7	221°10.2	37.7	264°06.3	22.0	358°35.0	43.1	Eltanin Kaus Aust.	90 42.6 83°33.0	-34°22.4
21	$358^{\circ}36.5$	99°01.9	• • 59.1	236°11.7	• • 37.6	279°09.0	• • 22.0	13°37.6	• • 43.1	Vega	80°33.6	38°48.6
22	13°38.9	114°01.0	59.4	251°13.2	37.5	294°11.7	22.0	28°40.1	43.2	Nunki	75°48.2	-26°16.0
23	28°41.4	129°00.2	59.7	266°14.8	37.4	309°14.4	22.0	43°42.6	43.2	Altair	62°00.2	8°56.1
Mer.p	ass. 21:06	$\nu$ -0.8' d0.	.3′ m-4.03	$\nu 1.5' \ d-0$	0.1' m0.03	$\nu 2.7' \ d-0$	.0′ m-2.70	$\nu 2.5' \ d0$	.0′ m0.81	Peacock	53°06.1	-56°39.5
<u>.</u>										Deneb	49°26.0	45°22.4
Man	CHA	CHA	Dee	CHA	Doo	CHA	Dee	CHA	Dee	Enif	33°38.9	9°59.5
Mon 0	<b>GHA</b> 43°43.9	<b>GHA</b> 143°59.4	<b>Dec</b> \$25°00.0	<b>GHA</b> 281°16.3	<b>Dec</b> N21°37.3	<b>GHA</b> 324°17.1	<b>Dec</b> N22°22.0	GHA 58°45 1	<b>Dec</b> <b>S</b> 08° 43.2	Al Na'ir	27°33.0	-46°50.6
1	58° 46.3	158°58.6	00.3	296° 17.9	37.2	339°19.8	22.0	73° 47.6	43.2	Fomalhaut	15°14.5	-29°29.5
2	73° 48.8	173° 57.7	00.6	311°19.4	37.1	354°22.5	21.9	88°50.1	43.2	Scheat	13°45.2 13°29.9	28°13.2
3	88°51.3	188°56.9	00.9	326°21.0	37.0	9°25.1	21.9	103°52.6	• • 43.2	Markab	13 29.9	15°20.5
4	103°53.7	203°56.1	01.2	$341^{\circ}22.5$	36.9	24°27.8	21.9	118°55.2	43.2	Nov 02 Sat	SHA	Mer.pass
5	$118^{\circ}56.2$	$218^{\circ}55.3$	01.5	$356^{\circ}24.1$	36.8	39°30.5	21.9	133°57.7	43.2	I	102°53.3	14:22
6	133°58.7	233°54.4	S25°01.8		N21°36.7	54°33.2	N22°21.9		S08°43.3	1	238°17.5	05:19
7	149°01.1	248°53.6	02.1	26°27.2	36.6	69°35.9	21.9	164°02.7	43.3	Jupiter		02:31
8	164°03.6	263°52.8	02.4	41°28.7	36.5	84°38.6	21.9	179°05.2	43.3	Saturn	14°58.7	20:10
9 10	179°06.1 194°08.5	278°51.9 293°51.1	· · 02.7 03.0	56°30.3 71°31.8	· · 36.4 36.3	99°41.3 114°44.0	· · 21.8 21.8	194°07.7 209°10.2	· · 43.3 43.3	Nov 03 Sun	SHA	Mer.pass
11	209°11.0	308° 50.3	03.3	86°33.4	36.2	129°46.7	21.8	224° 12.7	43.3	Venus	101°34.5	14:24
12	224° 13.4	323°49.5	S25°03.6	101°34.9	N21°36.1	144°49.4	N22°21.8	239° 15.3	508° 43.3	Mars		05:17
13	239° 15.9	338°48.6	03.9	116°36.5	36.0	159°52.0	21.8	254° 17.8	43.4	Jupiter		02:27
14	254° 18.4	353°47.8	04.2	$131^{\circ}38.0$	35.9	174°54.7	21.8	$269^{\circ}20.3$	43.4	Saturn	15°00.0	20:06
15	269°20.8	8°47.0	• • 04.5	146°39.6	• • 35.8	189°57.4	• • 21.8	284°22.8	• • 43.4	Nov 04 Mon	SHA	Mer.pass
16	284°23.3	23°46.1	04.7	161°41.1	35.7	205°00.1	21.7	299°25.3	43.4	1	100°15.5	14:25
17	299°25.8	38°45.3	05.0	176°42.7	35.6	220°02.8	21.7	314°27.8	43.4		237°32.5	05:14
18 19	314°28.2 329°30.7	53°44.5 68°43.6	\$25°05.3 05.6	191°44.3 206°45.8	N21°35.5 35.4	235°05.5 250°08.2	N22°21.7 21.7	329°30.3 344°32.8	508° 43.4 43.4	1	280°33.2	02:22
20	344° 33.2	83°42.8	05.0	200 45.6 221°47.4	35.4	265°10.9	21.7	359° 35.3	43.4	Saturn	15°01.2	20:02
21	359°35.6	98°42.0	06.2	236°48.9	35.2	280°13.6	21.7	14°37.9	• • 43.4	Horizont	tal parallax	
22	14°38.1	113°41.2	06.4	251°50.5	35.1	295°16.3	21.7	29°40.4	43.5		Venus:	0.1
23	29°40.6	128°40.3	06.7	$266^{\circ}52.1$	35.0	$310^{\circ}19.0$	21.6	44°42.9	43.5		Mars:	0.1
Mern	ass. 21:02	ν-0.8' d0	.3′ m-4.04	$\nu 1.5' d-0$	0.1' m0.01	ν2.7′ d-0	.0′ m-2.71	$\nu^{2.5'} d0$	.0′ m0.81			

h	Sun				Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	184°06.8	S14°49.9	180°02.3	13.7'	S19°30.7	10.9'	54.3'
1	199°06.8	50.7	194°35.0	13.6'	$19^{\circ}41.6$	10.8'	54.4'
2	214°06.8	51.5	209°07.6	13.5'	19°52.4	10.8'	54.4'
3	229°06.8	• • 52.3	223°40.1	13.4'	20°03.2	10.7'	54.4'
4	244°06.8 259°06.8	53.1 53.9	238°12.6 252°44.9	13.4' 13.3'	20° 13.9 20° 24.5	10.6'	54.4'
5 6	259 06.8 274°06.8	53.9 \$14°54.6	252 44.9 267°17.2	13.2'	20°24.5 S20°35.0	10.5' 10.4'	54.4' 54.4'
7	289°06.8	55.4	281°49.4	13.1'	20°45.4	10.4	54.4'
8	304°06.8	56.2	296°21.5	13.0'	20°55.7	10.3	54.4'
9	319°06.8	• • 57.0	310°53.6	13.0'	21°06.0	10.2'	54.4'
10	334°06.8	57.8	325°25.5	12.9'	21°16.2	10.1'	54.5'
11	349°06.8	58.6	339°57.4	12.8'	21°26.3	10.0'	54.5'
12	4°06.8 19°06.8	\$14°59.3 15°00.1	354°29.2 9°00.9	12.7' 12.6'	\$21°36.3 21°46.2	9.9'	54.5' 54.5'
13 14	19°06.8 34°06.8	00.9	23°32.5	12.5	21°46.2 21°56.0	9.8' 9.7'	54.5'
15	49°06.8	01.7	38°04.0	12.5'	21°05.7	9.6'	54.5'
16	64°06.8	02.5	52°35.5	12.4'	22° 15.3	9.5'	54.5'
17	79°06.8	03.3	67°06.9	12.3'	$22^{\circ}24.9$	9.4'	54.5'
18	94°06.8	<b>S</b> 15°04.0	81°38.1	12.2'	S22°34.3	9.3'	54.6'
19	109°06.8	04.8	96°09.3	12.1'	22°43.7	9.2'	54.6'
20	124°06.8	05.6	110°40.4	12.0'	22°52.9 23°02.1	9.1'	54.6'
21 22	139°06.8 154°06.8	· · 06.4 07.2	125°11.5 139°42.4	11.9' 11.9'	23°02.1 23°11.1	9.0' 8.9'	54.6' 54.6'
23	169°06.8	07.2 07.9	159 42.4 154°13.3	11.8'	23 11.1 23°20.1	8.8'	54.6'
						5.0	25
	SD = 16.1'	d = 0.8'		SL	0 = 14.8'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0 1	184°06.8 199°06.8	\$15°08.7 09.5	168°44.0 183°14.7	11.7' 11.6'	\$23°28.9 23°37.6	8.7' 8.6'	54.6' 54.7'
2	214°06.8	10.3	103 14.7 197°45.3	11.5'	23°46.3	8.5'	54.7'
3	229°06.8	. 11.0	212°15.8	11.4	23°54.8	8.4	54.7'
4	244°06.8	11.8	226°46.3	11.3'	24°03.2	8.3'	54.7'
5	259°06.8	12.6	241°16.6	11.3'	$24^{\circ}11.6$	8.2'	54.7'
6	274°06.8	\$15°13.4	255°46.9	11.2'	S24°19.8	8.1'	54.7'
7	289°06.8 304°06.8	14.2	270°17.1 284°47.2	11.1'	24° 27.9 24° 35.8	8.0'	54.7'
8 9	304°06.8 319°06.8	14.9 •• 15.7	284°47.2 299°17.2	11.0' 10.9'	24° 35.8 24° 43.7	7.9' 7.8'	54.8' 54.8'
10	334°06.8	16.5	313°47.1	10.8	24° 51.5	7.6'	54.8'
11	349°06.8	17.2	328°16.9	10.8'	24°59.1	7.5'	54.8'
12	4°06.8	S15°18.0	342°46.7	10.7'	S25°06.7	7.4'	54.8'
13	19°06.7	18.8	357°16.4	10.6'	25° 14.1	7.3'	54.8'
14	34°06.7 49°06.7	19.6	11°45.9 26°15.5	10.5'	25°21.4 25°28.6	7.2'	54.8'
15 16	49°06.7 64°06.7	· · 20.3 21.1	20°15.5 40°44.9	10.4' 10.3'	25° 28.6 25° 35.6	7.1' 6.9'	54.9' 54.9'
17	79°06.7	21.1	55°14.2	10.3	25°42.6	6.8	54.9'
18	94°06.7	S15°22.7	69°43.5	10.2'	S25°49.4	6.7'	54.9'
19	109°06.7	23.4	84°12.7	10.1'	$25^{\circ}56.1$	6.6'	54.9'
20	124°06.7	24.2	98°41.8	10.0'	26°02.6	6.4'	54.9'
21	139°06.7	• • 25.0	113°10.8	9.9'	26°09.1	6.3'	55.0'
22	154°06.7 169°06.7	25.7	127°39.8 142°08.6	9.9'	26° 15.4 26° 21.6	6.2'	55.0'
23		26.5	142 08.0	9.8'		6.1'	55.0'
	SD = 16.1'	d = 0.8'		SE	0 = 14.9'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	184°06.7	<b>S</b> 15°27.3	156°37.4	9.7'	S26°27.7	5.9'	55.0'
1	199°06.6	28.0	171°06.1	9.6'	26°33.6	5.8'	55.0'
2	214°06.6 229°06.6	28.8 • • 29.6	185°34.8 200°03.3	9.6' 9.5'	26° 39.4 26° 45.1	5.7' 5.5'	55.0' 55.1'
3 4	229°06.6 244°06.6	30.3	200°03.3 214°31.8	9.5° 9.4'	26°45.1 26°50.6	5.5'	55.1'
5	259°06.6	31.1	214 31.6 229°00.3	9.4	26°56.0	5.4	55.1'
6	274°06.6	\$15°31.9	243°28.6	9.3'	\$27°01.3	5.1'	55.1'
7	289°06.6	32.6	257°56.9	9.2'	$27^{\circ}06.5$	5.0'	55.1'
8	304°06.6	33.4	272°25.1	9.1'	27°11.5	4.9'	55.1'
9	319°06.5	• • 34.2	286°53.2	9.1'	27°16.3	4.7'	55.2'
10 11	334°06.5 349°06.5	34.9 35.7	301°21.3 315°49.3	9.0' 8.9'	27°21.1 27°25.7	4.6' 4.5'	55.2' 55.2'
12	4°06.5	\$15°36.4	315 49.3 330°17.2	8.9'	\$27°30.1	4.5	55.2'
13	19°06.5	37.2	344°45.0	8.8'	27°34.4	4.2'	55.2'
14	34°06.5	38.0	359°12.8	8.7'	27°38.6	4.0'	55.3'
15	49°06.5	• • 38.7	13°40.6	8.7'	27°42.6	3.9'	55.3'
16	64°06.4	39.5	28°08.2	8.6'	27°46.5	3.7'	55.3'
17 18	79°06.4 94°06.4	40.3 \$15°41.0	42°35.8 57°03.4	8.5' 8.5'	27°50.3 <b>S</b> 27°53.9	3.6' 3.5'	55.3' 55.3'
19	109°06.4	41.8	71°30.9	8.4'	27°57.3	3.3'	55.3'
20	124°06.4	42.5	85°58.3	8.4	28°00.6	3.2'	55.4'
21	139°06.4	• • 43.3	$100^{\circ}25.7$	8.3'	28°03.8	3.0'	55.4'
22	154°06.3	44.0	114°53.0	8.3'	28°06.8	2.9'	55.4'
23	169°06.3	44.8	129°20.3	8.2'	28°09.7	2.7'	55.4'
	SD = 16.1'	d = 0.8'		SE	0 = 15.0'		

		202	·····	11501 02		
Lat.	Twi	light	Sunrise	Sunset	Twi	light
	Naut.	Civil			Civil	Naut.
N 72°	06:16	07:40	09:13	14:13	15:45	17:09
<b>N</b> 70°	06:11	07:26	08:43	14:43	16:00	17:15
68°	06:06	07:14	08:21	15:05	16:12	17:19
66°	06:02	07:04	08:04	15:22	16:21	17:24
64°	05:59	06:56	07:50	15:36	16:30	17:27
62°	05:56	06:49	07:38	15:48	16:37	17:30
60°	05:53	06:43	07:28	15:58	16:43	17:33
N $58^{\circ}$	05:50	06:37	07:20	16:06	16:49	17:36
56°	05:48	06:32	07:12	16:14	16:54	17:38
54°	05:45	06:27	07:05	16:21	16:59	17:41
52°	05:43	06:23	06:59	16:27	17:03	17:43
50°	05:41	06:19	06:54	16:33	17:07	17:45
45°	05:36	06:11	06:42	16:45	17:16	17:50
<b>N</b> 40°	05:31	06:04	06:32	16:55	17:23	17:55
35°	05:27	05:57	06:23	17:03	17:30	18:00
30°	05:22 05:51 05:14 05:40		06:16	17:11	17:36	18:04
20°	05:14 05:40		06:03	17:24	17:47	18:13
<b>N</b> 10°	05:04	05:29	05:51	17:36	17:58	18:23
0°	04:54	05:19	05:40	17:47	18:08	18:33
<b>S</b> 10°	04:42	05:07	05:29	17:58	18:20	18:46
20°	04:27	04:54	05:17	18:10	18:33	19:01
30°	04:08	04:38	05:03	18:24	18:50	19:20
35°	03:56	04:28	04:55	18:32	18:59	19:32
40°	03:41	04:17	04:46	18:42	19:11	19:47
45°	03:23	04:03	04:35	18:53	19:25	20:05
<b>S</b> 50°	02:59	03:46	04:22	19:06	19:43	20:30
52°	02:47	03:37	04:16	19:12	19:51	20:42
54°	02:33	03:28	04:09	19:19	20:01	20:57
56°	02:16	03:17	04:02	19:27	20:12	21:14
58°	01:55	03:05	03:53	19:35	20:24	21:36
<b>S</b> 60°	01:27	02:50	03:43	19:45	20:39	22:05
Lat.		Moonris	se .		Moonset	
	Sat	Sun	Mon	Sat	Sun	Mon
N $72^{\circ}$						
<b>N</b> 70°						
68°	11:37			12:53		
66°	10:27			14:04		
c . 0	00.51	40.00			4 4 00	

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

		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	0-6%	
02	16:27	16:27	11:44	12:23	00:00		
03	16:27	16:27	11:44	13:11	00:47		
04	16:27	16:26	11:44	14:03	01:37		

## November 05, 06, 07 UT (Tue., Wed., Thu.)

h	Aries	Vei	nus	М	ars	Jup	oiter	Saturn			Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA [	Dec		SHA	Dec
0	44°43.0	143°39.5	S25°07.0	281°53.6	N21°34.9	325°21.7	N22°21.6		°43.5			
1	59°45.5	158° 38.7	07.3	296°55.2	34.8	340°24.4	21.6	74°47.9	43.5	Alpheratz	357°34.7	29°13.8
2	74°47.9	173° 37.8	07.6	311°56.8	34.8	355°27.1	21.6	89°50.4	43.5	Ankaa	353°07.0	-42° 10.3
3	89°50.4	188°37.0	07.8	326°58.3	• • 34.7	10°29.8	21.6		43.5	Schedar	349°30.8	56°40.6
4	104°52.9	203°36.2	08.1	341°59.9	34.6	25°32.5	21.6	119°55.4	43.5	Diphda	348°47.2	-17°51.0
5	119°55.3	218° 35.3	08.4	357°01.5	34.5	40°35.2	21.6	134°57.9	43.5	Achernar	335°19.7	-57°06.7
6	134°57.8	233°34.5	\$25°08.6	12°03.0	N21°34.4	55°37.8	N22°21.5		°43.6	Hamal	327°51.1	23°34.9
7	150°00.3	248°33.7	08.9	27°04.6	34.3	70°40.5	21.5	165°02.9	43.6	Polaris	313°37.6	89°22.1
8	165°02.7	263°32.8	09.2	42°06.2	34.2	85°43.2	21.5	180°05.5	43.6	Acamar	$315^{\circ}11.5$	-40°12.2
9	180°05.2	278°32.0	09.5	57°07.7	34.1	100°45.9	21.5		43.6	Menkar	314°06.0	4°11.3
10	195°07.7	293°31.2	09.7	72°09.3	34.0	115°48.6	21.5	210°10.5	43.6	Mirfak	308°28.0	49°57.0
11	210°10.1	308°30.3	10.0	87°10.9	33.9	130°51.3	21.5	225°13.0	43.6	Aldebaran	290°39.5	16°33.6
12	225°12.6	323°29.5	\$25°10.2	102°12.5	N21°33.8	145°54.0	N22°21.5		°43.6	Rigel	281°03.8	-8°10.2
13	240°15.0	338°28.7	10.5	117°14.0	33.7	160°56.7	21.4	255°18.0	43.6	Capella	280°21.7	46°01.3
14	255°17.5	353°27.8	10.8	132°15.6	33.6	175°59.4	21.4	270°20.5	43.6	Bellatrix	278°22.8	6°22.4
15	270°20.0	8°27.0	11.0	147°17.2	33.5	191°02.1	21.4		43.7	Elnath	278°01.8	28° 37.7
16	285°22.4	23°26.2	11.3	162°18.8	33.4	206°04.8	21.4	300°25.5	43.7	Alnilam	275°37.6	-1°11.0
17	300°24.9	38°25.3	11.5	177°20.3	33.3	221°07.5	21.4	315°28.0	43.7	Betelgeuse	270°52.0	7°24.8
18	315°27.4	53°24.5	S25°11.8	192°21.9	N21°33.2	236°10.2	N22°21.4		°43.7	Canopus	263°52.1	-52° 42.2
19	330°29.8	68°23.7	12.1	207°23.5	33.1	251°12.9	21.4	345°33.0	43.7	Sirius	258°26.2	-16°44.8
20	345°32.3	83°22.8	12.3	222°25.1	33.0	266°15.6	21.3	0°35.5	43.7	Adhara	255°05.8	-29°00.1
21	0°34.8	98°22.0	12.6	237°26.7	• • 32.9	281°18.3	21.3	15°38.1 · ·		Procyon	244°50.9	5°09.8
22	15°37.2	113°21.2	12.8	252°28.3	32.8	296°21.0	21.3	30°40.6	43.7	Pollux	243°17.4	27°57.9
23	30°39.7	128°20.3	13.1	267°29.8	32.7	311°23.7	21.3	45°43.1	43.7	Avior	234°14.7	-59°34.9
								-		Suhail	222°46.5	-43°31.6
Mer.p	ass. 20:58	$\nu$ -0.8′ d0.	3′ m-4.04	$\nu$ 1.6′ d-0	.1′ m-0.00	$\nu^{2.7'} d-0$	.0′ m-2.71	$\nu 2.5' \ d0.0' \ m$	10.82	Miaplacidus	221°38.4	-69°48.7
										Alphard	217°48.0	-8°45.8
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA [	Оес	Regulus	207°34.7	11°50.8
0	45°42.2	143°19.5	S25°13.3	282°31.4	N21°32.7	326°26.4	N22°21.3		°43.7	Dubhe	193°41.5	61°36.8
1	60°44.6	158° 18.7	13.6	297°33.0	32.6	341°29.1	21.3	75°48.1	43.8	Denebola	182°25.3	14°26.0
2	75°47.1	173°17.8	13.8	312°34.6	32.5	356°31.9	21.3	90°50.6	43.8	Gienah	175°44.0	-17°40.6
3	90°49.5	188° 17.0	• • 14.0	327°36.2	32.4	11°34.6	21.2		43.8		173°00.9	-63°14.0
4	105°52.0	203°16.2	14.3	342°37.8	32.3	26°37.3	21.2	120°55.6	43.8	Gacrux	171°52.4	-57°14.9
5	120°54.5	218° 15.3	14.5	357°39.4	32.2	41°40.0	21.2	135°58.1	43.8	Alioth	166°13.6	55°49.4
6	135°56.9	233°14.5	S25°14.8	12°40.9	N21°32.1	56°42.7	N22°21.2		°43.8	Spica	158°22.8	-11°17.3
7	150°59.4	248°13.6	15.0	27°42.5	32.0	71°45.4	21.2	166°03.1	43.8	Alkaid	152°52.6	49°11.3
8	166°01.9	263°12.8	15.3	42°44.1	31.9	86°48.1	21.2	181°05.6	43.8	Hadar	148°36.9	-60°29.4
9	181°04.3	278°12.0	• • 15.5	57°45.7	• • 31.8	101°50.8	• • 21.1	196°08.1 · ·		Menkent	147°58.2	-36°29.4
10	196°06.8	293°11.1	15.7	72°47.3	31.7	116°53.5	21.1	211°10.6	43.8	Arcturus	145°48.4 139°41.2	19°03.2 -60°56.2
11	211°09.3	308°10.3	16.0	87°48.9	31.6	131°56.2	21.1	226°13.1	43.9	Rigil Kent. Kochab	139 41.2 137°20.9	74°03.1
12	$226^{\circ}11.7$	323°09.5	\$25°16.2	102°50.5	N21°31.5	146°58.9	N22°21.1	241°15.6 <b>S</b> 08	°43.9	Zuben'ubi	136°56.6	-16°08.6
13	241°14.2	338°08.6	16.4	$117^{\circ}52.1$	31.4	162°01.6	21.1	256°18.1	43.9	Alphecca	126°04.2	26°37.9
14	$256^{\circ}16.7$	353°07.8	16.7	132°53.7	31.4	177°04.3	21.1	271°20.6	43.9	Antares	112° 16.4	-26°29.2
15	$271^{\circ}19.1$	8°07.0	• • 16.9	147°55.3	• • 31.3	192°07.0	• • 21.1	286°23.1 · ·	43.9	Atria	107°11.3	-69°04.4
16	$286^{\circ}21.6$	23°06.1	17.1	162°56.9	31.2	207°09.7	21.0	301°25.6	43.9	Sabik	102°03.3	-15°45.3
17	301°24.0	38°05.3	17.3	177°58.5	31.1	222°12.4	21.0	316°28.1	43.9	Shaula	96°10.9	-37°07.4
18	316°26.5	53°04.4	S25°17.6	193°00.1	N21°31.0	237°15.1	N22°21.0		°43.9	Rasalhague	95°59.0	12°32.6
19	331°29.0	68°03.6	17.8	208°01.7	30.9	252°17.9	21.0	346°33.1	43.9	Eltanin	90°42.7	51°29.3
20	346°31.4	83°02.8	18.0	223°03.3	30.8	267°20.6	21.0	1°35.7	43.9	Kaus Aust.	83°33.0	-34°22.4
21	1°33.9	98°01.9	• • 18.2	238°04.9	• • 30.7	282°23.3	· · 21.0		43.9	Vega	80°33.6	38° 48.6
22	16°36.4	113°01.1	18.5	253°06.5	30.6	297°26.0	20.9	31°40.7	44.0	Nunki	75°48.2	-26°16.0
23	31°38.8	128°00.3	18.7	268°08.1	30.5	312°28.7	20.9	46°43.2	44.0	Altair	62°00.2	$8^{\circ}56.1$
Mer.n	ass. 20:54	$\nu$ -0.8' d0.	2' m-4.05	$\nu 1.6' \ d-0$	.1′ m-0.02	$\nu 2.7' \ d-0$	.0′ m-2.72	$\nu 2.5' \ d0.0' \ m$	10.82	Peacock	53°06.1	-56° 39.5
										Deneb	49°26.0	45°22.4
			_		_		_		_	Enif	33°38.9	9°59.5
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec		Dec	Al Na'ir	27°33.0	-46°50.6
0	46°41.3	142°59.4	\$25°18.9	283°09.7	N21°30.4	327°31.4	N22°20.9	61°45.7 S08		Fomalhaut	$15^{\circ}14.5$	-29°29.5
1	61°43.8	157°58.6	19.1	298°11.3	30.4	342°34.1	20.9	76°48.2	44.0	Scheat	13°45.2	28°13.2
2	76°46.2	172°57.7	19.3	313°12.9	30.3	357°36.8	20.9	91°50.7	44.0	Markab	13°29.9	$15^{\circ}20.5$
3	91°48.7	187°56.9	• • 19.5	328°14.5	· · 30.2	12°39.5	• • 20.9		44.0	No: OF T	CIIA	Me::::
4	106°51.2	202°56.1	19.8	343°16.1	30.1	27°42.2	20.9	121°55.7	44.0	Nov 05 Tue	SHA	Mer.pass
5	121°53.6	217°55.2	20.0	358°17.7	30.0	42°45.0	20.8	136°58.2	44.0	Venus Mars	98°56.5 237°10.6	14:26
6	136°56.1	232°54.4	S25°20.2	13°19.3	N21°29.9	57°47.7	N22°20.8		°44.0	Jupiter	237°10.6 280°38.7	05:12 02:18
7	151°58.5	247°53.6	20.4	28°21.0 43°22.6	29.8	72°50.4 87°53.1	20.8	167°03.2 182°05.7	44.0	Saturn	280 38.7 15°02.4	19:58
8 9	167°01.0 182°03.5	262°52.7 277°51.9	20.6	43°22.6 58°24.2	29.7 •• 29.6	87°53.1 102°55.8	20.8		44.0 44.0	Jaturn	13 02.4	15.50
9 10	182 03.5 197°05.9	277 51.9 292°51.0	· · 20.8 21.0	58 24.2 73°25.8	29.6	102 55.8 117°58.5	20.8	212°10.7	44.0	Nov 06 Wed	SHA	Mer.pass
11	212°08.4	307°50.2	21.0	73 25.6 88°27.4	29.0	117 56.5 133°01.2	20.6	212 10.7 227°13.2	44.1	Venus	97°37.3	14:28
12	212 08.4 227°10.9	307 30.2 322°49.4	\$25°21.4	103°29.0	N21°29.4	133 01.2 148°03.9	N22°20.7		°44.1	Mars	236°49.3	05:09
13	242°13.3	337°48.5	21.6	118°30.6	29.3	163°06.7	20.7	257°18.2	44.1	Jupiter	280°44.3	02:14
14	257°15.8	352°47.7	21.8	133°32.3	29.2	178°09.4	20.7	272°20.7	44.1	Saturn	15°03.4	19:54
15	272°18.3	7°46.8	22.0	148°33.9	• • 29.1	193°12.1	20.7		44.1	Nov 07 Thu	SHA	Mer.pass
16	287°20.7	22°46.0	22.2	163°35.5	29.0	208°14.8	20.7	302°25.7	44.1	Venus	96°18.1	14:29
17	302°23.2	37°45.2	22.4	178°37.1	28.9	223°17.5	20.7	317°28.2	44.1	Mars	236°28.4	05:07
18	317°25.7	52°44.3	S25°22.6	193°38.7	N21°28.8	238°20.2	N22°20.6		°44.1	Jupiter	280°50.1	02:10
19	332°28.1	67°43.5	22.8	208°40.4	28.8	253°22.9	20.6	347°33.2	44.1	Saturn	15°04.4	19:50
20	347°30.6	82°42.7	23.0	223°42.0	28.7	268°25.7	20.6	2°35.7	44.1			
21	2°33.0	97°41.8	• • 23.2	238°43.6	• • 28.6	283°28.4	20.6	17°38.2 · ·	44.1	Horizont	al parallax	
22	$17^{\circ}35.5$	$112^{\circ}41.0$	23.4	253°45.2	28.5	298°31.1	20.6	32°40.7	44.1		Venus:	0.1
23	$32^{\circ}38.0$	127°40.1	23.6	268°46.9	28.4	313°33.8	20.6	47°43.2	44.1		Mars:	0.2
Morn	ass. 20:50	ν-0.8′ d0.	2′ m_4 05	v1 6/ d 0	.1′ m-0.04	1/2 7/ d 0	.0′ m-2.73	ν2.5' d0.0' m	JU 83			
ivici.p	ass. 20.50	ν 0.0 d0.	_ III 7.03	ν 1.0 u-0	0.07	ν Δ.1 u-0	.5 111 2.13	ν Δ.Ο UO.O II	.5.55			

h	Sui	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	184°06.3	<b>S</b> 15°45.6	$143^{\circ}47.5$	8.2'	S28°12.4	2.6'	55.4'
1	199°06.3	46.3	158° 14.6	8.1'	28° 15.0	2.4'	55.5'
2 3	214°06.3 229°06.2	47.1 •• 47.8	172°41.8 187°08.8	8.1' 8.0'	28° 17.4 28° 19.7	2.3' 2.1'	55.5' 55.5'
4	244°06.2	48.6	201°35.8	8.0'	28° 21.8	2.0'	55.5'
5	259°06.2	49.3	$216^{\circ}02.8$	7.9'	28°23.8	1.8'	55.5'
6	274°06.2	\$15°50.1	230°29.7	7.9'	\$28°25.6	1.7'	55.6'
7 8	289°06.2 304°06.1	50.9 51.6	244°56.6 259°23.5	7.8' 7.8'	28° 27.2 28° 28.8	1.5' 1.4'	55.6' 55.6'
9	319°06.1	• • 52.4	273°50.3	7.8'	28°30.1	1.2'	55.6'
10	334°06.1	53.1	288° 17.0	7.7'	28° 31.3	1.0'	55.6'
11	349°06.1 4°06.0	53.9 \$15°54.6	302°43.8 317°10.4	7.7'	28° 32.4 \$28° 33.2	0.9'	55.7'
12 13	4 06.0 19°06.0	515 54.0 55.4	317 10.4 331°37.1	7.7' 7.6'	28° 34.0	0.7' 0.6'	55.7' 55.7'
14	34°06.0	56.1	346°03.7	7.6'	28°34.6	0.4	55.7'
15	49°06.0	• • 56.9	0°30.3	7.6'	28° 35.0	0.3'	55.8'
16 17	64°06.0 79°05.9	57.6 58.4	14° 56.9 29° 23.4	7.5' 7.5'	28° 35.2 28° 35.3	0.1' -0.1'	55.8' 55.8'
18	94°05.9	\$15°59.1	43°50.0	7.5'	\$28° 35.3	-0.1	55.8'
19	109°05.9	15°59.9	58°16.4	7.5'	28°35.1	-0.4'	55.8'
20	124°05.8	16°00.6	72°42.9	7.4'	28°34.7	-0.5'	55.9'
21 22	139°05.8 154°05.8	· · 01.4 02.1	87°09.4 101°35.8	7.4' 7.4'	28° 34.2 28° 33.5	-0.7' -0.8'	55.9' 55.9'
23	169°05.8	02.1	116° 02.2	7.4 7.4'	28° 32.6	-1.0'	55.9'
	SD = 16.1'	d = 0.8'			D = 15.1'		
				J1			
Wed	GHA	<b>Dec</b> \$16°03.6	GHA	$\nu$	Dec	d 1.2'	HP
0 1	184°05.7 199°05.7	04.3	130°28.6 144°55.0	7.4' 7.4'	\$28°31.6 28°30.5	-1.2' -1.3'	56.0' 56.0'
2	214°05.7	05.1	159°21.4	7.4'	28°29.1	-1.5'	56.0'
3	229°05.7	•• 05.8	173° 47.7	7.4'	28° 27.6	-1.6'	56.0'
4	244°05.6	06.6	188° 14.1	7.3'	28°26.0	-1.8'	56.0'
5 6	259°05.6 274°05.6	07.3 \$16°08.1	202°40.4 217°06.8	7.3' 7.3'	28°24.2 \$28°22.2	-2.0' -2.1'	56.1' 56.1'
7	289°05.5	08.8	231°33.1	7.3'	28° 20.1	-2.3'	56.1
8	304°05.5	09.6	245°59.4	7.3'	28° 17.8	-2.5'	56.1'
9 10	319°05.5 334°05.4	· · 10.3 11.0	260°25.7 274°52.1	7.3' 7.3'	28° 15.4 28° 12.7	-2.6' -2.8'	56.2' 56.2'
11	349°05.4	11.0	274 52.1 289°18.4	7.3'	28° 10.0	-2.0 -2.9'	56.2'
12	4°05.4	S16°12.5	303°44.7	7.3'	\$28°07.0	-3.1'	56.2'
13	19°05.4	13.3	318°11.1	7.3'	28°03.9	-3.3'	56.3'
14 15	34°05.3 49°05.3	14.0 •• 14.7	332°37.4 347°03.8	7.4' 7.4'	28°00.7 27°57.3	-3.4' -3.6'	56.3' 56.3'
16	64° 05.3	15.5	1°30.2	7.4'	27°53.7	-3.0 -3.7'	56.3
17	79°05.2	16.2	$15^{\circ}56.5$	7.4'	$27^{\circ}50.0$	-3.9'	56.4'
18	94°05.2 109°05.2	S16°17.0	30°22.9 44°49.3	7.4'	\$27°46.1	-4.1'	56.4
19 20	109 05.2 124°05.1	17.7 18.4	44 49.3 59°15.7	7.4' 7.4'	27° 42.0 27° 37.8	-4.2' -4.4'	56.4' 56.4'
21	139°05.1	19.2	73°42.2	7.5'	27°33.5	-4.5	56.5
22	154°05.0	19.9	88°08.6	7.5'	27°28.9	-4.7'	56.5'
23	169°05.0	20.6	102°35.1	7.5'	27°24.2	-4.8'	56.5'
	SD = 16.1'	d = 0.7'		SI	O = 15.3'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	184°05.0 199°04.9	\$16°21.4	117°01.6	7.5'	\$27°19.4	-5.0'	56.5'
1 2	199°04.9 214°04.9	22.1 22.8	131°28.1 145°54.7	7.5' 7.6'	27° 14.4 27° 09.2	-5.2' -5.3'	56.6' 56.6'
3	229°04.9	• • 23.6	$160^{\circ}21.2$	7.6'	27°03.9	-5.5'	56.6'
4	244°04.8	24.3	174° 47.8	7.6'	26° 58.4	-5.6'	56.6'
5 6	259°04.8 274°04.8	25.0 \$16°25.8	189°14.5 203°41.1	7.7' 7.7'	26°52.8 \$26°47.0	-5.8' -5.9'	56.7' 56.7'
7	289°04.7	26.5	218° 07.8	7.7'	26°41.1	-6.1'	56.7
8	304°04.7	27.2	232°34.5	7.7'	26°35.0	-6.2'	56.7'
9	319°04.6 334°04.6	• • 28.0	247°01.3	7.8'	26°28.7 26°22.3	-6.4'	56.8' 56.8'
10 11	334°04.6 349°04.6	28.7 29.4	261°28.0 275°54.9	7.8' 7.9'	26° 22.3 26° 15.8	-6.6' -6.7'	56.8'
12	4°04.5	S16°30.1	290°21.7	7.9	\$26°09.1	-6.9	56.9
13	19°04.5	30.9	304°48.6	7.9'	26°02.2	-7.0'	56.9'
14 15	34°04.4 49°04.4	31.6 · · 32.3	319° 15.5 333° 42.5	8.0' 8.0'	25°55.2 25°48.0	-7.2' -7.3'	56.9' 56.9'
15 16	49°04.4 64°04.4	33.1	333°42.5 348°09.5	8.0'	25° 48.0 25° 40.7	-7.5'	56.9° 57.0'
17	79°04.3	33.8	2°36.5	8.1'	25°33.3	-7.6'	57.0'
18	94°04.3	S16°34.5	17°03.6	8.1'	\$25°25.7	-7.8'	57.0'
19 20	109°04.2 124°04.2	35.2 36.0	31°30.7 45°57.9	8.2' 8.2'	25° 17.9 25° 10.0	-7.9' -8.1'	57.1' 57.1'
20	124°04.2 139°04.1	36.7	45°57.9 60°25.1	8.2	25° 10.0 25° 01.9	-8.1' -8.2'	57.1' 57.1'
22	154°04.1	37.4	74°52.4	8.3'	24°53.7	-8.3	57.1
23	169°04.0	38.1	89°19.7	8.3'	24°45.4	-8.5'	57.2'
	SD = 16.1'	d = 0.7'		SI	O = 15.4'		

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

Lat.		Moonris	e		Moonset	:
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
<b>N</b> 70°						
68°						
66°						
64°			16:15			17:33
62°			15:09			18:39
60°	13:40	14:21	14:34	16:15	17:31	19:13
N 58°	12:58	13:44	14:09	16:58	18:07	19:38
56°	12:29	13:18	13:49	17:26	18:33	19:58
54°	12:07	12:57	13:32	17:49	18:54	20:15
52°	11:49	12:40	13:17	18:07	19:11	20:29
50°	11:33	12:25	13:04	18:22	19:26	20:41
45°	11:02	11:55	12:38	18:54	19:56	21:06
N 40°	10:38	11:31	12:17	19:18	20:19	21:26
35°	10:18	11:12	12:00	19:38	20:38	21:43
30°	10:01	10:55	11:45	19:55	20:54	21:58
20°	09:32	10:27	11:19	20:24	21:22	22:22
<b>N</b> 10°	09:07	10:03	10:57	20:48	21:45	22:43
0°	08:45	09:40	10:36	21:11	22:07	23:02
<b>S</b> 10°	08:22	09:18	10:15	21:34	22:29	23:22
20°	07:57	08:53	09:53	21:59	22:52	23:42
30°	07:29	08:25	09:27	22:27	23:19	
35°	07:12	80:80	09:11	22:44	23:35	
40°	06:52	07:49	08:54	23:04	23:54	
45°	06:29	07:25	08:32	23:28		00:16
<b>S</b> 50°	05:58	06:55	08:05	23:59		00:44
52°	05:43	06:39	07:51		00:14	00:58
54°	05:26	06:22	07:36		00:32	01:14
56°	05:04	06:00	07:17		00:53	01:32
58°	04:37	05:33	06:55	00:21	01:21	01:55
<b>S</b> 60°	03:59	04:54	06:25	00:59	02:00	02:25

		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	11-27%		
05	16:25	16:24	11:44	14:58	02:30			
06	16:23	16:22	11:44	15:54	03:26			
07	16:20	16:18	11:44	16:49	04:22			

## November 08, 09, 10 UT (Fri., Sat., Sun.)

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
	47°40.4	142°39.3	S25°23.8		N21°28.3	328°36.5	N22°20.5	62°45.7	S08°44.2		SHA	Dec
0	62°42.9	142 39.3 157°38.5		283°48.5 298°50.1		343°39.2	20.5	77°48.1		Alpheratz	357°34.7	29°13.8
1 2	77°45.4		24.0	313°51.7	28.2	358°42.0		92°50.6	44.2	Ankaa	353°07.0	-42°10.3
		172°37.6	24.1		28.2		20.5		44.2	Schedar	349°30.8	56°40.6
3	92°47.8	187°36.8	• • 24.3	328°53.4	• • 28.1	13°44.7	• • 20.5	107°53.1	• • 44.2	Diphda	348°47.2	-17°51.0
4	107°50.3	202°35.9	24.5	343°55.0	28.0	28°47.4	20.5	122°55.6	44.2	Achernar	335°19.7	-57°06.7
5	122°52.8	217°35.1	24.7	358° 56.6	27.9	43°50.1	20.5	137°58.1	44.2	Hamal	327°51.0	23°34.9
6	137°55.2	232°34.3	S25°24.9	13°58.3	N21°27.8	58°52.8	N22°20.4	153°00.6	S08°44.2	Polaris	313°37.2	89°22.1
7	152°57.7	247°33.4	25.0	28°59.9	27.7	73°55.6	20.4	168°03.1	44.2	Acamar	315°11.5	-40°12.2
8	168°00.1	262°32.6	25.2	44°01.5	27.6	88°58.3	20.4	183°05.6	44.2	Menkar	314°06.0	4°11.3
9	183°02.6	277°31.7	• • 25.4	59°03.2	• • 27.6	104°01.0	• • 20.4	198°08.1	• • 44.2	Mirfak	308°28.0	49°57.0
10	198°05.1	292°30.9	25.6	74°04.8	27.5	119°03.7	20.4	213°10.6	44.2	Aldebaran	290°39.5	16°33.6
11	213°07.5	$307^{\circ}30.1$	25.8	89°06.4	27.4	134°06.4	20.4	228°13.1	44.2	Rigel	281°03.7	-8°10.2
12	228°10.0	322°29.2	S25°25.9	104°08.1	N21°27.3	149°09.2	N22°20.3	243°15.6	508°44.2	Capella	280°21.7	46°01.3
13	243°12.5	337°28.4	26.1	$119^{\circ}09.7$	27.2	164°11.9	20.3	258°18.1	44.2	Bellatrix	278°22.8	6°22.4
14	258°14.9	$352^{\circ}27.5$	26.3	$134^{\circ}11.3$	27.1	179°14.6	20.3	273°20.6	44.2	1		
15	273°17.4	$7^{\circ}26.7$	• • 26.4	149°13.0	• • 27.0	194°17.3	• • 20.3	288°23.1	• • 44.2	Elnath	278°01.8	28°37.7
16	288°19.9	22°25.9	26.6	164°14.6	27.0	209°20.0	20.3	303°25.6	44.2	Alnilam	275°37.6	-1°11.0
17	303°22.3	$37^{\circ}25.0$	26.8	$179^{\circ}16.3$	26.9	224°22.8	20.3	318°28.1	44.3	Betelgeuse	270°52.0	7°24.8
18	318°24.8	52°24.2	S25°26.9	194° 17.9	N21°26.8	239°25.5	N22°20.2	333°30.6	S08°44.3	Canopus	263°52.1	-52°42.2
19	333°27.3	67°23.3	27.1	209° 19.5	26.7	254°28.2	20.2	348°33.1	44.3	Sirius	258°26.2	-16°44.8
20	348°29.7	82°22.5	27.3	224°21.2	26.6	269°30.9	20.2	3°35.6	44.3	Adhara	255°05.8	-29°00.1
21	3°32.2	97°21.6	• • 27.4	239°22.8	. 26.5	284°33.6	. 20.2	18°38.1	• • 44.3	Procyon	244°50.9	5°09.8
22	18°34.6	112°20.8	27.4	254°24.5	26.5	299°36.4	20.2	33°40.6	44.3	Pollux	243°17.4	27°57.9
23	33°37.1	112 20.0 127°20.0	27.7	269°26.1	26.4	314°39.1	20.2	48°43.1	44.3	Avior	234°14.7	-59°34.9
										Suhail	222°46.4	-43°31.6
Mer.p	pass. 20:46	$\nu$ -0.8′ d0	.2′ m-4.06	$\nu$ 1.6′ d-0	.1' m-0.05	$\nu 2.7' \ d-0$	.0′ m-2.73	$\nu 2.5' \ d0.$	.0'  m0.83	Miaplacidus	221°38.3	-69°48.7
										Alphard	217°47.9	-8°45.8
<b>.</b> .	CIIA	C115	Б	C114	Б	CI14	Б	CIII	_	Regulus	207°34.7	11°50.8
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.5	61°36.8
0	48°39.6	142°19.1	S25°27.9	284°27.8	N21°26.3	329°41.8	N22°20.2	63°45.5	S08°44.3	Denebola	182°25.3	14°26.0
1	63°42.0	157° 18.3	28.1	299°29.4	26.2	344°44.5	20.1	78°48.0	44.3	Gienah	175°44.0	-17°40.6
2	78°44.5	172°17.4	28.2	314°31.1	26.1	359°47.3	20.1	93°50.5	44.3		173°00.9	-63°14.0
3	93°47.0	187° 16.6	• • 28.4	329° 32.7	• • 26.1	14°50.0	• • 20.1	108°53.0	• • 44.3		171°52.3	-57°14.9
4	108°49.4	202° 15.8	28.5	344°34.4	26.0	29°52.7	20.1	123°55.5	44.3	Alioth	166°13.6	55°49.4
5	123°51.9	$217^{\circ}14.9$	28.7	359°36.0	25.9	44°55.4	20.1	138°58.0	44.3	Spica	158°22.8	-11°17.3
6	138°54.4	$232^{\circ}14.1$	\$25°28.8	14°37.7	N21°25.8	59°58.2	N22°20.1	154°00.5	S08°44.3	Alkaid	152°52.6	49°11.3
7	153°56.8	$247^{\circ}13.2$	29.0	29°39.3	25.7	75°00.9	20.0	169°03.0	44.3	Hadar	148°36.9	-60°29.4
8	168°59.3	$262^{\circ}12.4$	29.1	44°41.0	25.6	90°03.6	20.0	184°05.5	44.3		140°58.2	-36°29.4
9	184°01.8	$277^{\circ}11.6$	• • 29.3	59°42.6	• • 25.6	105°06.3	• • 20.0	199°08.0	• • 44.3	Arcturus	147 30.2 145°48.4	19°03.2
10	199°04.2	292°10.7	29.4	74°44.3	25.5	120°09.1	20.0	214°10.5	44.3	Rigil Kent.	139°41.2	-60°56.2
11	214°06.7	307°09.9	29.6	89°46.0	25.4	135°11.8	20.0	229°13.0	44.3	"		
12	229°09.1	322°09.0	\$25°29.7	104°47.6	N21°25.3	150°14.5	N22°20.0	244°15.5	508°44.3	Kochab	137°20.9	74°03.1
13	244°11.6	337°08.2	29.8	119°49.3	25.2	165°17.3	19.9	259°18.0	44.4	Zuben'ubi	136°56.5	-16°08.6
14	259°14.1	352°07.4	30.0	134°50.9	25.2	180°20.0	19.9	274°20.4	44.4	Alphecca	126°04.2	26°37.9
15	274°16.5	7°06.5	30.1	149°52.6	. 25.1	195°22.7	19.9	289°22.9	• • 44.4	Antares	112°16.4	-26°29.2
16	289°19.0	22°05.7	30.3	164°54.3	25.0	210°25.4	19.9	304°25.4	44.4	Atria	107°11.3	-69°04.4
17	304°21.5	37°04.8	30.4	179°55.9	24.9	225°28.2	19.9	319°27.9	44.4	Sabik	102°03.3	-15°45.3
18	319°23.9	52°04.0	\$25°30.5	194°57.6	N21°24.8	240°30.9	N22°19.9	334°30.4	S08°44.4	Shaula	96°10.9	-37°07.4
19	334°26.4	67°03.1	00 7		0.4.0	255°33.6		349°32.9		Rasalhague	95°59.0	12°32.6
		82°02.3	30.7	209°59.2	24.8		19.8		44.4	Eltanin	90°42.7	51°29.3
20	349°28.9 4°31.3		30.8	225°00.9	24.7	270°36.4	19.8	4°35.4	44.4	Kaus Aust.	83°33.0	-34°22.4
21		97°01.5	• • 30.9	240°02.6	• • 24.6	285°39.1	• • 19.8	19°37.9	• • 44.4	Vega	80°33.6	38°48.6
22	19°33.8	112°00.6	31.1	255°04.2	24.5	300°41.8	19.8	34°40.4	44.4	Nunki	75°48.2	-26°16.0
23	34°36.3	126°59.8	31.2	270°05.9	24.5	315°44.5	19.8	49°42.9	44.4	Altair	62°00.2	8°56.1
Mer.r	pass. 20:42	$\nu$ -0.8' d0	.2′ m-4.06	$\nu 1.6' d-0$	.1′ m-0.07	$\nu 2.7' d-0$	.0′ m-2.74	$\nu 2.5' d0$	.0′ m0.84	Peacock	53°06.1	-56°39.5
							. =			Deneb	49°26.0	45°22.4
										Enif	33°38.9	9°59.5
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.0	-46°50.6
0	49°38.7	141°58.9	S25°31.3	285°07.6	N21°24.4	330°47.3	N22°19.7	64°45.3		Fomalhaut	15°14.5	-29°29.5
1	64°41.2	156° 58.1	31.4	300°09.3	24.3	345°50.0	19.7	79°47.8	44.4	Scheat	13°45.2	28°13.3
2	79°43.6	171°57.3	31.6	315° 10.9	24.2	0°52.7	19.7	94°50.3	44.4	Markab	13°29.9	15°20.5
3	94°46.1	186° 56.4	• • 31.7	330° 12.6	• • 24.1	15°55.5	• • 19.7	109°52.8	• • 44.4			
4	109°48.6	201°55.6	31.8	345°14.3	24.1	30°58.2	19.7	124°55.3	44.4	Nov 08 Fri	SHA	Mer.pass
5	124°51.0	216°54.7	31.9	0°15.9	24.0	46°00.9	19.7	139°57.8	44.4	Venus	94°58.9	14:30
6	139°53.5	231°53.9	S25°32.1	15° 17.6	N21°23.9	61°03.7	N22°19.6	155°00.3	S08°44.4	Mars		05:04
7	154°56.0	$246^{\circ}53.1$	32.2	30°19.3	23.8	76°06.4	19.6	170°02.8	44.4	Jupiter	280°56.1	02:05
8	169°58.4	261°52.2	32.3	45°21.0	23.8	91°09.1	19.6	185°05.3	44.4	Saturn	15°05.2	19:46
9	185°00.9	276°51.4	• • 32.4	60°22.6	• • 23.7	$106^{\circ}11.9$	• • 19.6	200°07.7	• • 44.4	N 00 C :	CIIA	Ma::::
10	200°03.4	291°50.5	32.5	75°24.3	23.6	121°14.6	19.6	215°10.2	44.4	Nov 09 Sat	SHA	Mer.pass
11	215°05.8	306°49.7	32.6	90°26.0	23.5	136°17.3	19.6	230°12.7	44.4	Venus	93°39.6	14:32
12	230°08.3	321°48.8	S25°32.8	105°27.7	N21°23.4	151°20.1	N22°19.5	245°15.2	S08°44.4	Mars		05:02
13	245°10.7	336°48.0	32.9	120°29.4	23.4	166°22.8	19.5	260°17.7	44.4	Jupiter	281°02.2	02:01
14	260°13.2	351°47.2	33.0	135°31.0	23.3	181°25.5	19.5	275°20.2	44.4	Saturn	15°06.0	19:42
15	275°15.7	6°46.3	33.1	150° 32.7	23.2	196°28.3	• • 19.5	290°22.7	• • 44.4	Nov 10 Sun	SHA	Mer.pass
16	290°18.1	21°45.5	33.2	165°34.4	23.1	211°31.0	19.5	305°25.2	44.4	Venus	92°20.2	14:33
17	305°20.6	36°44.6	33.3	180°36.1	23.1	211 31.0 226°33.7	19.5	320°27.6	44.4	1		
18	320°23.1	51°43.8	\$25°33.4	195°37.8	N21°23.0	241°36.5	N22°19.4	335°30.1	S08°44.4	Mars		04:59
19	320 23.1 335°25.5	66°43.0	33.5	210°39.5	22.9	241 30.5 256°39.2	19.4	350°32.6	44.4	Jupiter		01:56
20	350°28.0	81°42.1	33.6	210 39.5 225°41.2	22.9	250 39.2 271°42.0	19.4	5°35.1	44.4 44.4	Saturn	15°06.6	19:38
	5°30.5	96°41.3	33.7	240°42.8	• • 22.8	271 42.0 286°44.7	19.4	5 35.1 20°37.6	• • 44.4	Horizont	al parallax	
21 22	5 30.5 20°32.9	96 41.3 111°40.4	33.8	240 42.8 255°44.5	22.7	280 44.7 301°47.4	19.4	20 37.6 35°40.1	44.4	1.52011	Venus:	0.1
	20 32.9 35°35.4							50°42.6			Mars:	0.2
23	JO 35.4	126°39.6	33.9	270°46.2	22.6	316°50.2	19.4		44.4			V
Mer.	pass. 20:38	$\nu$ -0.8′ d0	.1′ m-4.07	$\nu 1.7' \ d-0$	.1′ m-0.09	$\nu 2.7' \ d-0$	.0′ m-2.74	$\nu 2.5' \ d0.$	.0′ m0.84			

h	Sui	1	Moon							
Fri	GHA	Dec	GHA	ν	Dec	d	HP			
0	184°04.0	S16°38.9	103°47.0	8.4'	S24°36.9	-8.6'	57.2'			
1	199°04.0	39.6	$118^{\circ}14.4$	8.4'	24°28.3	-8.8'	57.2'			
2	214°03.9	40.3	132°41.9	8.5'	24°19.5	-8.9'	57.3'			
3 4	229°03.9 244°03.8	· · 41.0 41.7	147°09.3 161°36.9	8.5' 8.6'	24°10.6 24°01.5	-9.1' -9.2'	57.3' 57.3'			
5	259°03.8	41.7	176°04.5	8.6'	24 01.5 23°52.3	-9.2 -9.3'	57.3'			
6	274°03.7	\$16°43.2	190°32.1	8.7'	\$23°42.9	-9.5'	57.4			
7	289°03.7	43.9	204°59.8	8.7'	23°33.5	-9.6'	57.4'			
8	304°03.6	44.6	219°27.5	8.8'	23°23.8	-9.8'	57.4'			
9	319°03.6	• • 45.3	233°55.3 248°23.1	8.8'	23°14.1 23°04.2	-9.9'	57.5'			
10 11	334°03.5 349°03.5	46.1 46.8	248°23.1 262°51.0	8.9' 8.9'	23°04.2 22°54.2	-10.0' -10.2'	57.5' 57.5'			
12	4°03.4	\$16°47.5	277°19.0	9.0'	S22°44.0	-10.3	57.5			
13	19°03.4	48.2	291°46.9	9.0'	22°33.7	-10.4'	57.6'			
14	34°03.3	48.9	306°15.0	9.1'	22°23.3	-10.6'	57.6'			
15 16	49°03.3 64°03.2	· · 49.6 50.4	320°43.1 335°11.2	9.1' 9.2'	22°12.7 22°02.0	-10.7' -10.8'	57.6' 57.7'			
17	79°03.2	50.4	349°39.4	9.2'	22 02.0 21°51.2	-10.6	57.7'			
18	94°03.1	S16°51.8	4°07.6	9.3'	S21°40.2	-11.1'	57.7'			
19	109°03.1	52.5	18°35.9	9.3'	21°29.1	-11.2'	57.8'			
20	124°03.0	53.2	33°04.3	9.4'	21°17.9	-11.3'	57.8'			
21	139°03.0	• • 53.9	47°32.7	9.5'	21°06.6	-11.5'	57.8'			
22 23	154°02.9 169°02.9	54.6 55.4	62°01.1 76°29.6	9.5' 9.6'	20°55.1 20°43.6	-11.6' -11.7'	57.8' 57.9'			
23	SD = 16.1'	d = 0.7'	70 29.0		D = 15.6'	-1.1	51.5			
	SD = 10.1	a = 0.7		51	$J = 15.0^{\circ}$					
Sat	GHA	Dec	GHA	ν	Dec	d	HP			
0 1	184°02.8 199°02.8	\$16°56.1 56.8	90°58.2 105°26.8	9.6' 9.7'	\$20°31.8 20°20.0	-11.8' -12.0'	57.9' 57.9'			
2	214°02.7	50.6 57.5	105 20.8 119°55.5	9.7' 9.7'	20°20.0	-12.1'	57.9 58.0'			
3	229°02.7	• • 58.2	134°24.2	9.8'	19°56.0	-12.2'	58.0'			
4	244°02.6	58.9	$148^{\circ}52.9$	9.8'	19°43.8	-12.3'	58.0'			
5	259°02.6	16°59.6	163°21.7	9.9'	19°31.5	-12.4'	58.1'			
6 7	274°02.5 289°02.4	\$17°00.3 01.0	177°50.6 192°19.5	9.9' 10.0'	\$19°19.1 19°06.5	-12.5' -12.7'	58.1' 58.1'			
8	304°02.4	01.0	206°48.5	10.0'	19 00.5 18°53.9	-12.7 -12.8'	58.2'			
9	319°02.3	• • 02.4	221°17.5	10.1	18°41.1	-12.9'	58.2			
10	334°02.3	03.1	235°46.5	10.1'	18°28.2	-13.0'	58.2'			
11	349°02.2	03.9	250°15.6	10.2'	18°15.2	-13.1'	58.2'			
12 13	4°02.2 19°02.1	\$17°04.6 05.3	264°44.8 279°14.0	10.2' 10.2'	\$18°02.1 17°48.9	-13.2' -13.3'	58.3' 58.3'			
14	34°02.0	06.0	279 14.0 293°43.2	10.2	17 46.9 17°35.6	-13.3 -13.4'	58.3'			
15	49°02.0	06.7	308°12.5	10.3'	17°22.2	-13.5'	58.4'			
16	64°01.9	07.4	$322^{\circ}41.8$	10.4'	17°08.7	-13.6'	58.4'			
17	79°01.9	08.1	337°11.2	10.4	16°55.0	-13.7'	58.4'			
18 19	94°01.8 109°01.7	\$17°08.8 09.5	351°40.7 6°10.1	10.5' 10.5'	\$16°41.3 16°27.4	-13.8' -13.9'	58.5' 58.5'			
20	124°01.7	10.2	20°39.6	10.6	16°13.5	-14.0'	58.5'			
21	139°01.6	• • 10.9	35°09.2	10.6'	15°59.5	-14.1'	58.6'			
22	154°01.6	11.6	49°38.8	10.6'	15°45.3	-14.2'	58.6'			
23	169°01.5	12.3	64°08.4	10.7'	15°31.1	-14.3'	58.6'			
	SD = 16.1'	d = 0.7'		SI	O = 15.8'					
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP			
0	184°01.4	<b>S</b> 17°13.0	78°38.1	10.7'	\$15°16.7	-14.4'	58.7'			
1	199°01.4	13.7	93°07.8	10.8' 10.8'	15°02.3	-14.5'	58.7'			
2	214°01.3 229°01.3	14.4 •• 15.1	107°37.6 122°07.4	10.8'	14°47.8 14°33.2	-14.6' -14.7'	58.7' 58.7'			
4	244°01.2	15.1	136°37.2	10.0	14°18.5	-14.8'	58.8'			
5	259°01.1	16.5	151°07.1	10.9'	14°03.7	-14.9'	58.8'			
6	274°01.1	\$17°17.2	165°37.0	10.9'	\$13°48.8	-15.0'	58.8'			
7 8	289°01.0 304°00.9	17.9 18.6	180°06.9 194°36.9	11.0' 11.0'	13°33.8 13°18.8	-15.1' -15.1'	58.9' 58.9'			
9	304 00.9 319°00.9	18.0	209°06.9	11.0'	13 18.8 13°03.6	-15.1 -15.2'	58.9'			
10	334°00.8	19.9	223°36.9	11.1'	12°48.4	-15.3'	59.0'			
11	349°00.7	20.6	238°07.0	11.1'	12°33.1	-15.4'	59.0'			
12	4°00.7	\$17°21.3	252°37.1	11.1'	\$12°17.7	-15.5'	59.0'			
13 14	19°00.6 34°00.5	22.0 22.7	267°07.2 281°37.3	11.2' 11.2'	12°02.2 11°46.7	-15.5' -15.6'	59.1' 59.1'			
15	49°00.5	• • 23.4	296°07.5	11.2'	11°31.1	-15.7	59.1'			
16	64°00.4	24.1	310°37.7	11.2'	11°15.3	-15.8'	59.1'			
17	79°00.3	24.8	325°08.0	11.3'	10°59.6	-15.8'	59.2'			
18 19	94°00.3 109°00.2	\$17°25.5 26.2	339°38.2 354°08.5	11.3' 11.3'	\$10°43.7 10°27.8	-15.9' -16.0'	59.2' 59.2'			
19 20	109°00.2 124°00.1	26.2 26.9	354°08.5 8°38.8	11.3'	10°27.8 10°11.8	-16.0° -16.1'	59.2° 59.3'			
21	139°00.1	• • 27.5	23°09.1	11.3'	09°55.8	-16.1	59.3'			
22	154°00.0	28.2	37°39.4	11.4'	09°39.6	-16.2'	59.3'			
23	168°59.9	28.9	52°09.8	11.4'	09°23.4	-16.3'	59.3'			
	SD = 16.1'	d = 0.7'		SI	O = 16.0'					

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

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

		Sun				
Day	Eqn.of	Time	Mer.	Mer.Pass.		Age
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper Lowe		7-9
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	37-58%
08	16:16	16:14	11:44	17:43	05:16	
09	16:11	16:09	11:44	18:34	06:09	
10	16:06	16:03	11:44	19:24	07:00	

## November 11, 12, 13 UT (Mon., Tue., Wed.)

Color	h	Aries	Vei	nus	M	ars	Jup	oiter	Sat	urn		Stars	
0 99737 9 141798 925°140 88747 912′125 935°59 102′126 155°59 1674 4 Alpharett 97747 727130 1 65°60 150′716 141 100′716 2 144 1 100′716 2 144 1 100′716 1 100′717 1 100′716 1 100′716 1 100′716 1 100′716 1 100′716 1 100′716 1 100′716 1 100′716 1 100′716 1 100′716 1 100′716 1 100′716 1 100′716 1 100′716 1 100′716 1 100′716 1 100′717 1 100′717 1 100′717 1 100′716 1 100′716 1 100′716 1 100′716 1 100′717 1 10	Mon –	GHΔ	CHA	Dec	GHA	Dec	GHA	Dec	GH4	Dec		SHA	Dec
1 0.74 0.74 0.74 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75													
2											Alpheratz	357°34.7	29°13.8
2 1907 Sept. 2 1867											Ankaa	353°07.0	-42°10.4
11   12   12   13   13   13   13   13											Schedar	349°30.8	56°40.6
5   125°   100   270°   100°											Diphda	348°47.2	-17°51.0
14   16   16   17   18   18   18   18   18   18   18											Achernar	335°19.7	-57°06.7
7 155°55.1 206°22.9 34.6 30°59.8 22.0 77°12.1 39.2 171°02.4 44.5 5.0 1.0 201°02.9 44.5 1.0 201°02.9 41.3 1.0 201°02.9 41.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0											Hamal	327°51.0	23°34.9
9 186°00 20°025 29°130 3 549 6°104 5 200 00°144 5 100 2 100°104 415 6 100 20°025 29°130 3 549 6°1049 218 122°03 100 20°025 29°130 3 549 6°1049 218 122°03 100 101 211014 445 6 10114											Polaris	313°37.2	89°22.2
10													
13   12   12   12   13   13   13   13													
10 10 10 10 10 10 10 10 10 10 10 10 10 1													
13 24°90 30°77 35 22 12°10 22°10 21°10 20°10 30°												290°39.5	
19   20   20   20   20   20   20   20   2													
Belatix   28°22.8   0°22.4   1.50													
Beauty   18													
19   19   19   19   19   19   19   19													
18   18   18   18   18   18   18   18											Alnilam		
19   39   39   39   39   39   39   39													
18 35 27 7 1 67 29 8 5 28 36 31 60 31 60 37 6 27 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1													
38 3-37.71   872.10   35.7   2872.19   35.7   2872.19   21.11   277.47.7   10.0   3.6°34.7   44.5   21.0   21.11   277.47.7   10.0   21.37.7   44.5   21.0   21.0													
2													
23 36°34.5 111°203 33.8 220°25.7 1210 207 30°55.2 1210 30°55.2 1210 207 30°55.2 1210 207 30°55.2 1210 30°55.2 1210 207 30°55.2 1210 30°55.2													
22   21-21.1											,		
Subaria													
Mer. pass. 20:34   ν.08	23	36°34.5	126°19.4	35.9	271°27.1	20.9	317°55.9	18.9	51°42.2	44.5			
Table CHA	Mer na	ass. 20·34	$\nu$ -0.8' d0	1' m-4 07	$\nu 1.7' d-0$	1' m-0 11	ν2.7' d-0	.0′ m-2 75	$\nu 2.5' d0$	.0′ m0.85			
Time GHA GHA CHA Dec GHA Dec GHA Dec GHA Dec District 1990 S 199	p		- 0.0 40.			0.11							
Tue GHA CHA Dec GHA DE													
0 51-37.0 161-17.7 30.0 307.05 20.8 347014 18.9 66-44.7 508-44.5 14-17.4 17-20.6 12-20.7 30.0 30.05 20.8 347014 18.9 181-47.1 44.5 66-44.5 66-44.7 17-20.6 17-20.6 17-											_		
1 66 795 9 171 7 36.0 301 30.5 20.8 348 01.4 81.9 81.47.1 44.5   2 81 44.9 171 16.9 36.1 315 32.2 20.7 3°0.4 2 18.9 96 49.6 44.5   3 66 74.6 18.6 16.1 3 3.1 331 33.9 2.0 6 18°06.9 11.8 115°2.1 44.5   4 111 46.8 201 15.2 36.2 36.7 36.7 36.3 36°36.7 18.8 110°56.1 14.5   5 141 78.1 201 15.2 36.2 36.3 16°30.1 N21°20.4 (3°15.1 N22°18.8 115°2.5 5 50°4.4 5   5 141 78.1 201 15.2 36.3 16°30.1 N21°20.4 (3°15.1 N22°18.8 115°2.5 5 50°4.4 5   6 141 78.1 201 15.2 36.4 316°30.1 N21°20.4 (3°15.1 N22°18.8 115°2.5 5 50°4.4 5   7 156°54.2 246°12.7 36.4 314°0.8 20.3 33°20.6 18.8 118°0.4 5   7 156°54.2 246°12.0 36.5 61°4.4 5   7 156°54.2 246°12.0 36.5 61°4.4 5   7 156°54.2 246°12.0 36.5 61°4.4 5   7 156°54.2 246°12.0 36.6 76°4.6 0 20.1 123°26.1 18.7 21°0.9 5 44.5   10 202°16. 291°10.2 36.6 76°4.6 0 20.1 123°26.1 18.7 21°0.9 5 44.5   11 217°40.1 306°0.4 36.6 76°4.6 0 20.1 123°26.1 18.7 217°0.9 44.5   12 223°06.0 336°07.3 36.7 121°51.2 19.9 168°3.4 18.7 217°0.9 44.5   12 223°06.0 336°07.3 36.7 121°51.2 19.9 168°3.4 18.7 217°0.9 44.5   12 223°06.0 336°07.3 36.7 121°51.2 19.9 168°3.4 18.6 277°1.9 44.5   12 276°1.0 36°5.6 16°5.6 3.0 1.5 25°5.0 19.9 18.8 33°3.1 18.6 277°1.9 4.5   12 277°1.0 4 6°60.0 3.6 18°56.3 19.7 213°42.6 18.6 307°2.4 3 44.5   12 276°1.0 4 6°60.0 3.6 18°56.3 19.7 213°42.6 18.6 307°2.4 3 44.5   12 327°10.8 18.1 16°50.1 3.0 18.5 18.1 12.7 21°4.4 18.6 307°2.4 4 4.5   12 327°3.3 19.0 10.3 3.0 18°59.1 19.3 19°0.1 18.5 52°4.1 4.4   12 327°3.3 19.0 10.3 3.0 18°59.1 19.3 19°0.1 18.5 52°4.1 4.4   12 327°3.3 19.0 10.8 3.0 10.8 3.0 10.5 18.0 12°1.0 18.4 19°4.0 18.4   12 327°3.3 19.0 10.8 3.0 10.8 10.5 19.1 19.0 218°3.5 18.4 112°51.6 44.4   12 327°3.3 125°5.3 3.7 1 272°0.5 19.3 19.0 19.1 18.5 52°4.1 4.4   12 328°2.6 1 140°5.5 52°3.7 2 28°71.0 2 122°1.5 19.0 28°4.5 18.4 112°51.6 44.4   12 22 22°1.1 10.0 10.1 37.1 270°1.5 19.3 190°1.0 18.5 52°4.7 4.4   12 22 23°1.5 10.0 10.3 19.0 19.0 18.5 18.4 112°51.6 44.4   12 22 32°1.5 10.0 10.3 19.0 19.0 18.5 18.4 112°51.6 44.4   12 22 32°1.5 10.0 10.3 19.0 19.0 18.5 18.4 112°51.6 44.4   12 22													
2 81*419 171*16.9 36.1 316*32.2 20.7 3*04.2 18.9 96*49.6 44.5 45.8 36.0 31*30.9 11*52.1 4.4 15*0*16.1 36.1 331*33.9 20.6 18*0*0.9 18.9 11*52.1 4.4 15*0*16.1 36.1 331*33.9 20.0 6 18*0*0.9 18.9 11*52.1 4.4 15*0*16.4 14.5 11*46.8 20.1 15.2 20.0 12*15.2 36.2 346*35.7 20.6 18*0*0.9 18.9 11*52.1 4.4 15*0*16.4 4.5 15*0*16.4 14.5 11*46.8 20.1 15*0*16.4 14.5				36.0				18.9		44.5			
3 99°44.4   180°16.1   361   331°33.9   206   33°09.7   188   111°52.1   44.5   4 111'46.8   201'19.2   36.2   36.2   36°35.7   206   33°09.7   188   126°34.6   44.5   5 126°49.3   210°14.4   36°39.1   10°39.1   80°21.1   82°18.1   812°39.5   80°44.5   6 141'51.8   231'13.5   S25°36.3   10°39.0   40°31.1   82°18.1   812°39.5   80°44.5   8 147'56.7   201'11.9   36.4   46°42.5   20.3   49°10.6   81.8   156°39.5   80°44.5   9 186°89.2   276°11.0   36.5   61°44.3   20.2   108°23.4   18.7   220°07.0   44.5   10 202°01.6   291°10.2   36.6   76°46.0   20.1   132°6.1   18.7   221°19.5   44.5   11 21°04.1   306°99.4   36.6   61°44.3   20.2   108°29.9   18.7   222°11.9   44.5   12 223°66.6   321°08.5   S25°36.7   106°49.4   812°00.0   153°31.6   812°18.7   222°11.9   44.5   13 24°40.9   338°67.7   36.7   121°51.2   19.9   168°39.9   18.6   222°21.9   44.5   14 262°11.5   351°06.8   36.8   136°52.9   19.9   188°39.9   18.7   622°21.9   44.5   15 277°14.0   6°60.0   36.8   151°54.6   19.8   198°39.9   18.6   202°21.9   44.5   16 292°16.4   21°05.2   36.8   166°56.3   19.7   213°42.6   18.6   30°24.3   44.5   19 337°23.8   6°00.6   37.0   227°013.3   19.7   228°45.4   18.6   30°24.3   44.5   19 337°23.8   6°00.6   37.0   227°013.3   19.7   228°45.4   18.6   30°24.3   44.5   19 337°23.8   6°00.6   37.0   227°013.3   19.7   228°45.4   18.6   30°24.3   44.5   19 337°23.8   6°00.6   37.0   227°013.3   19.5   237°55.6   18.5   7°34.2   44.4   10 407.1   40.6										44.5			
1111-64-83 201-15-2 36-2 36-2 37-7 20-6 31-09-7 18-8 126-94-6 44.5 5 1267-93 216-14-4 36.3 1-37-7 20-5 48-12-4 18-12-13-14-5 6 1417-51-8 211-15-5 525-36-3 16-39-1 N21-20-4 63-15-1 N22-18-8 1147-57-1 44.5 6 1417-51-8 231-15-5 525-36-3 16-39-1 N21-20-4 63-15-1 N22-18-8 156-95-5 508-44.5 7 1567-54-2 246-12-7 36-4 31-40-8 20-4 78-17-9 18-8 126-74-5 44.5 8 1717-56-7 261-11-0 -36.5 61-44-3 20-4 78-17-9 18-8 126-74-5 44.5 8 1717-56-7 261-11-0 -36.5 61-44-3 20-4 78-17-9 18-8 126-74-5 44.5 10 1807-50-2 276-11-0 -36.5 61-44-3 20-1 310-22-1 31-20-2-10-1 31-20-2										• • 44.5			
5 126°49.3 36.3 1°37.4 20.5 48°12.4 18.8 141°57.1 44.5 Spic. 186°2.8 1-10°17.3 19.1 44.5 Spic. 186°2.8 1-10°17.3 19.1 44.5 Spic. 186°2.8 1-10°17.3 19.1 19.1 19.1 19.1 19.1 19.1 19.1 19	4		201°15.2	36.2		20.6		18.8	126°54.6	44.5			
141°51.8 231°13.5 S25°36.3 16°39.1 N21°20.4 63°15.1 N22°18.8 156°95.9 S68°44.5 171°56.7 261°11.9 36.4 46°42.5 20.3 93°20.6 18.8 187°0.5 44.5 Hadra 148°36.9 60°29.4 Menkert 147°58.2 36°29.4 110°1.0 36.5 61°44.3 20.2 108°23.4 1.817 202°0.70 44.5 Hadra 148°36.9 60°29.4 Menkert 147°58.2 36°29.4 110°1.0 36.5 61°44.3 20.2 108°23.4 1.817 202°0.70 44.5 Hadra 148°36.9 180°32.2 10°20°1.6 291°10.2 36.6 76°46.0 20.1 123°26.1 18.7 217°09.5 44.5 Hadra 148°36.9 180°32.2 10°20°1.6 291°10.2 36.6 76°46.0 20.1 123°26.1 18.7 217°09.5 44.5 Hadra 148°36.9 180°32.2 10°20°1.6 291°10.2 36.6 76°46.0 20.1 123°26.1 18.7 22°11.9 44.5 Hadra 148°36.9 180°32.2 180°	5	126°49.3	216° 14.4	36.3	1°37.4	20.5	48°12.4	18.8	141°57.1	44.5			
7 156°54.2 246°12.7 36.4 31'40.8 204 78°17.9 18.8 172'02.0 445 8 171'6567 26'11.19 36.4 46'42.5 20.3 93'20.6 18.8 187'04.5 445 9 186°99.2 276'11.0 36.5 61'44.3 .20.2 108°23.4 18.7 202'07.0 .445 10 202'01.6 291'0.2 36.6 67'46.0 20.1 123'26.1 18.7 222'07.0 .445 11 217'0.41 306'09.4 36.6 91'47.7 20.1 138'28.9 18.7 232'11.9 445 112 232'06.6 32'08.5 528'36.7 106'49.4 N21'20.0 153'31.6 N22'18.7 247'14.4 506'44.5 13 247'09.0 336'07.7 36.7 121'51.2 19.9 168'34.4 18.7 262'16.9 445 14 262'11.5 351'06.8 36.8 151'54.6 .19.8 198'39.9 18.6 292'1.9 .445 16 292'16.4 21'05.2 36.8 151'54.6 .19.8 198'39.9 18.6 292'1.9 .445 17 307'18.9 36'04.3 36.9 181'58.1 19.7 228'8.5 4 18.6 32'2'28. 445 18 32'2'21.3 51'03.5 528'36.9 196'59.8 N21'19.6 248'8.1 N22'18.6 337'29.3 508'44.5 18 32'2'21.3 51'03.5 528'36.9 196'59.8 N21'19.6 248'8.1 N22'18.6 337'23.3 508'44.5 19 337'32.8 66'02.6 37.0 212'01.5 19.6 258'50.9 18.6 352'31.8 445.5 19 337'32.8 66'02.6 37.0 212'01.5 19.6 258'50.9 18.6 352'31.8 445.5 20 352'26.3 81'01.8 37.0 212'01.5 19.6 258'50.9 18.6 352'31.8 445.5 21 7'28.7 96'01.0 37.1 242'05.0 .19.4 288'56.4 18.5 22'36.7 .444.4 21 7'28.7 96'01.0 37.1 242'05.0 .19.4 288'56.4 18.5 22'36.7 .444.4 21 7'28.7 96'01.0 37.1 242'05.0 .19.4 288'56.4 18.5 22'36.7 .444.4 22 22'31.2 111'00.1 37.1 242'05.0 .19.4 288'56.4 18.5 22'36.7 .444.4 22 22'31.2 111'00.1 37.1 247'00.1 m.0.1 22'2.0 1.8 1.8 1.8 22'36.7 .444.4 23 37'33.7 125'59.3 37.1 272'08.5 19.3 319'01.9 18.5 52'41.7 44.4 24 102'46.0 200'55.1 37.3 332'15.4 .10.0 19'10.9 .18.5 52'41.7 44.4 24 102'46.0 200'55.1 37.3 332'15.4 .10.0 19'10.9 .18.5 52'41.7 44.4 28 11.7 10'56.8 37.2 37'13.7 10.1 4'10.1 18.4 82'46.6 44.4 28 10'60.0 200'55.1 37.3 332'15.4 .10.0 19'10.9 .18.5 52'41.7 44.4 28 11.6 10'56.8 37.2 37'13.7 10.1 4'10.1 18.4 82'46.6 44.4 28 10'60.0 200'55.1 37.3 332'15.4 .10.0 19'10.9 .18.5 52'41.7 44.4 28 10'60.0 200'55.1 37.3 332'15.4 .10.0 19'10.9 .18.5 52'41.7 44.4 28 10'60.0 200'55.1 37.3 332'15.4 .10.0 19'10.9 .18.5 52'41.7 44.4 28 10'60.0 30'60.4 37.5 22'45.8 11.8 10.9 49'11.8 18.8 22'46.6 44	6			S25°36.3		N21°20.4		N22° 18.8		S08°44.5			
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9 187°58.3 275°50.9 · · 37.4 62°25.9 · · 18.7 109°29.4 · · 18.3 203°06.5 · · · 44.4 10 203°00.8 290°50.1 37.5 77°27.6 18.6 124°32.1 18.3 218°08.9 44.4 1218°03.2 305°49.2 37.5 92°29.4 18.5 139°34.9 18.3 233°11.4 44.4 123°305.7 320°48.4 \$25°37.5 107°31.1 N21°18.5 154°37.6 N22°18.2 248°13.9 \$508°44.4 14.2 263°10.6 350°46.7 37.5 122°32.9 18.4 169°40.4 18.2 263°10.4 44.4 14.2 263°10.6 350°46.7 37.5 137°34.6 18.3 184°43.1 18.2 278°18.8 44.4 15 278°13.1 5°45.9 · · 37.6 152°36.4 · · 18.3 199°45.9 · · 18.2 293°21.3 · · · 44.4 15 23°31.5 50°45.1 37.6 167°38.1 18.2 214°48.6 18.2 308°23.8 44.4 19 338°22.9 508°44.4 \$25°37.6 197°41.6 N21°18.1 244°54.1 N22°18.1 323°26.3 44.4 19 338°22.9 65°42.6 37.6 212°43.4 18.0 259°56.9 18.1 353°31.2 44.4 19 338°22.9 65°42.6 37.6 212°45.1 18.0 274°59.7 18.1 8°33.7 44.4 19 38°32.9 95°40.9 · · 37.6 227°45.1 18.0 274°59.7 18.1 8°33.7 44.4 18°27.9 95°40.9 · · 37.6 227°45.1 18.0 274°59.7 18.1 8°33.7 44.4 18°27.9 95°40.9 · · 37.6 227°45.1 18.0 274°59.7 18.1 8°33.7 44.4 18°27.9 95°40.9 · · 37.6 227°45.1 18.0 274°59.7 18.1 8°33.7 44.4 18°27.9 95°40.9 · · 37.6 227°45.1 18.0 274°59.7 18.1 8°33.7 44.4 18°27.9 95°40.9 · · 37.6 227°45.1 18.0 274°59.7 18.1 8°33.7 44.4 18°27.9 95°40.9 · · 37.6 227°45.1 18.0 274°59.7 18.1 8°33.7 44.4 18°33.7 44.4 18°33.7 100°40.0 37.6 227°45.1 18.0 274°59.7 18.1 8°33.7 44.4 18°33.7 44	7	157°53.4	245°52.6	37.4	32°22.4	18.8	79°23.9	18.3	173°01.5	44.4			
10 203°00.8 290°50.1 37.5 77°27.6 18.6 124°32.1 18.3 218°08.9 44.4 11 218°03.2 305°49.2 37.5 92°29.4 18.5 139°34.9 18.3 233°11.4 44.4 12 233°05.7 320°48.4 \$25°37.5 107°31.1 N21°18.5 154°37.6 N22°18.2 248°13.9 \$508°44.4 13 248°08.2 335°47.6 37.5 122°32.9 18.4 169°40.4 18.2 263°16.4 44.4 14 263°10.6 350°46.7 37.5 137°34.6 18.3 184°43.1 18.2 278°18.8 44.4 15 278°13.1 5°45.9 · 37.6 152°36.4 · 18.3 199°45.9 · 18.2 293°21.3 · 44.4 16 293°15.6 20°45.1 37.6 167°38.1 18.2 214°48.6 18.2 308°23.8 44.4 19 338°22.9 65°42.6 37.6 197°41.6 N21°18.1 244°54.1 N22°18.1 338°28.7 \$508°44.4 19 338°22.9 65°42.6 37.6 212°43.4 18.0 259°56.9 18.1 353°31.2 44.4 20 353°25.4 80°41.7 37.6 227°45.1 18.0 274°59.7 18.1 8°33.7 44.4 21 8°27.9 95°40.9 · 37.6 242°46.9 · 17.9 290°02.4 · 18.1 23°36.1 · 44.4 21 8°27.9 95°40.9 · 37.6 242°46.9 · 17.9 290°02.4 · 18.1 23°36.1 · 44.4 22 23°30.3 110°40.0 37.6 257°48.7 17.9 305°05.2 18.0 38°38.6 44.4 23 38°32.8 125°39.2 37.7 272°50.4 17.8 320°07.9 18.0 53°41.1 44.4	8	172°55.8	260°51.8	37.4	47°24.1	18.7	94°26.6	18.3	188°04.0		Saturn	15°07.2	19:34
10 203*00.8 290*50.1 37.5 77*27.6 18.6 124*32.1 18.3 218*08.9 44.4 11 218*03.2 305*49.2 37.5 92*29.4 18.5 139*34.9 18.3 233*11.4 44.4 12 233*05.7 320*48.4 \$25*37.5 107*31.1 N21*18.5 154*37.6 N22*18.2 248*13.9 \$08*44.4 13 248*08.2 335*47.6 37.5 122*32.9 18.4 169*40.4 18.2 263*16.4 44.4 14 263*10.6 350*46.7 37.5 137*34.6 18.3 184*43.1 18.2 278*18.8 44.4 15 278*13.1 5*45.9 · 37.6 152*36.4 · 18.3 199*45.9 · 18.2 293*21.3 · 44.4 16 293*15.6 20*45.1 37.6 167*38.1 18.2 214*48.6 18.2 308*23.8 44.4 17 308*18.0 35*44.2 37.6 182*39.9 18.2 229*51.4 18.1 323*26.3 44.4 18 323*20.5 50*43.4 \$25*37.6 197*41.6 N21*18.1 244*54.1 N22*18.1 338*28.7 \$508*44.4 \$23*34.1 04:51 19 338*22.9 65*42.6 37.6 212*43.4 18.0 259*56.9 18.1 353*31.2 44.4 20 353*25.4 80*41.7 37.6 227*45.1 18.0 274*59.7 18.1 8*33.7 44.4 21 8*27.9 95*40.9 · 37.6 242*46.9 · 17.9 290*02.4 · 18.1 23*36.1 · 44.4 21 8*27.9 95*40.9 · 37.6 225*48.7 17.9 305*05.2 18.0 38*38.6 44.4 22 23*30.3 110*40.0 37.6 257*48.7 17.9 305*05.2 18.0 38*38.6 44.4 23 38*32.8 125*39.2 37.7 272*50.4 17.8 320*07.9 18.0 53*41.1 44.4	9	187°58.3	275°50.9	• • 37.4	62°25.9	• • 18.7	109°29.4	• • 18.3	203°06.5	• • 44.4	Nov. 12 To-	C LIV	Mor noss
11 218 03.2 305 49.2 37.5 92 29.4 18.5 139 34.9 18.3 233 11.4 44.4  12 233 05.7 320 48.4 \$25 37.5 107 31.1 N21 18.5 154 37.6 N22 18.2 248 13.9 \$08 44.4  13 248 08.2 335 47.6 37.5 122 32.9 18.4 169 40.4 18.2 263 16.4 44.4  14 263 10.6 350 46.7 37.5 137 34.6 18.3 184 43.1 18.2 278 18.8 44.4  15 278 13.1 5 45.9 37.6 152 36.4 18.3 199 45.9 18.2 293 21.3 44.4  16 293 15.6 20 45.1 37.6 167 38.1 18.2 214 48.6 18.2 308 23.8 44.4  17 308 18.0 35 44.2 37.6 182 39.9 18.2 229 51.4 18.1 323 26.3 44.4  18 323 20.5 50 43.4 \$25 37.6 197 41.6 N21 18.1 244 54.1 N22 18.1 338 22.9 65 42.6 37.6 212 43.4 18.0 259 56.9 18.1 353 31.2 44.4  20 353 25.4 80 41.7 37.6 227 45.1 18.0 274 59.7 18.1 8 33.7 44.4  21 8 27.9 95 40.9 37.6 242 46.9 17.9 290 02.4 18.1 23 36.1 44.4  22 23 30.3 110 40.0 37.6 257 48.7 17.9 305 05.2 18.0 38 38.6 44.4  23 38 32.8 125 39.2 37.7 272 50.4 17.8 320 07.9 18.0 53 41.1 44.4  Nars 234 51.8 04:54  Jupiter 281 21.7 01:48  Saturn 15 07.7 19:30  Nov 13 Wed SHA Mer.pass  Venus 88 22.3 14:37  Mars 234 51.8 04:54  Jupiter 281 21.7 01:48  Saturn 15 07.7 19:30	10	203°00.8	290°50.1	37.5	77°27.6	18.6	124°32.1	18.3	218°08.9	44.4			
12 233 '05.7 320 '48.4 525 '37.5 107 '31.1 N21 '18.5 154 '37.6 N22 '18.2 248 '13.9 508 '44.4 14.4 15 248 '08.2 350 '46.7 37.5 122 '32.9 18.4 169 '40.4 18.2 263 '16.4 44.4 15 278 '13.1 5 '45.9 · · · 37.6 152 '36.4 · · · 18.3 199 '45.9 · · · 18.2 293 '21.3 · · · 44.4 16 293 '15.6 20 '45.1 37.6 167 '38.1 18.2 214 '48.6 18.2 308 '23.8 44.4 17 308 '18.0 35 '44.2 37.6 182 '39.9 18.2 229 '51.4 18.1 323 '26.3 44.4 18.3 323 '20.5 50 '43.4 \$25 '37.6 197 '41.6 N21 '18.1 244 '54.1 N22 '18.1 338 '28.7 \$08 '44.4 19 338 '22.9 65 '42.6 37.6 212 '43.4 18.0 259 '56.9 18.1 353 '31.2 44.4 19 338 '22.9 65 '42.6 37.6 227 '45.1 18.0 274 '59.7 18.1 8 '33.7 44.4 18.0 259 '56.9 18.1 353 '31.2 44.4 19 8 '27.9 95 '40.9 · · 37.6 242 '46.9 · · · 17.9 290 '02.4 · · 18.1 23 '36.1 · · · 44.4 18.0 274 '59.7 18.1 8 '33.7 44.4 19 8 '27.9 95 '40.9 · · 37.6 242 '46.9 · · · 17.9 290 '02.4 · · 18.1 23 '36.1 · · · 44.4 19 15 '08.0 19:26 18.2 23 '30.3 110 '40.0 37.6 257 '48.7 17.9 305 '05.2 18.0 38 '38.6 44.4 18.0 15 '38 '38.6 44.4 18.0 15 '38 '38 '38 '38.8 125 '39.2 37.7 272 '50.4 17.8 320 '07.9 18.0 53 '41.1 44.4 18.4 18.9 18.1 15 '07.7 19:30 19:26 18.0 18.2 18.2 18.2 19.1 19.2 19.2 19.2 19.2 19.2 19.2 19	11	218°03.2	305°49.2	37.5	92°29.4	18.5	139°34.9	18.3	233°11.4	44.4			
13										S08°44.4			
15										44.4			
16       293°15.6       20°45.1       37.6       167°38.1       18.2       214°48.6       18.2       308°23.8       44.4       Venus       88°22.3       14:37         17       308°18.0       35°44.2       37.6       182°39.9       18.2       229°51.4       18.1       323°26.3       44.4       Mars       234°34.1       04:51         18       323°20.5       50°43.4       S25°37.6       197°41.6       N21°18.1       244°54.1       N22°18.1       338°28.7       S08°44.4       Jupiter       281°28.5       01:43         19       338°22.9       65°42.6       37.6       212°43.4       18.0       259°56.9       18.1       353°31.2       44.4       Saturn       15°08.0       19:26         20       353°25.4       80°41.7       37.6       227°45.1       18.0       274°59.7       18.1       8°33.7       44.4       44.4       Horizontal parallax         21       8°27.9       95°40.9       · 37.6       242°46.9       · 17.9       290°02.4       · 18.1       23°36.1       · 44.4       Horizontal parallax         22       23°30.3       110°40.0       37.6       257°48.7       17.9       305°05.2       18.0       38°38.6       44.4       Mars:											Saturn	13 01.1	19.30
16       293°15.6       20°45.1       37.6       167°38.1       18.2       214°48.6       18.2       308°23.8       44.4       Venus       88°22.3       14:37         17       308°18.0       35°44.2       37.6       182°39.9       18.2       229°51.4       18.1       323°26.3       44.4       Mars       234°34.1       04:51         18       323°20.5       50°43.4       \$25°37.6       197°41.6       N21°18.1       244°54.1       N22°18.1       338°28.7       \$08°44.4       Jupiter       281°28.5       01:43         19       338°22.9       65°42.6       37.6       212°43.4       18.0       259°56.9       18.1       353°31.2       44.4       3530.0       15°08.0       19:26         20       353°25.4       80°41.7       37.6       227°45.1       18.0       274°59.7       18.1       8°33.7       44.4	15									• • 44.4	Nov 13 Wed	SHA	Mer.pass
18 323°20.5 50°43.4 \$25°37.6 197°41.6 N21°18.1 244°54.1 N22°18.1 338°28.7 \$08°44.4 19 338°22.9 65°42.6 37.6 212°43.4 18.0 259°56.9 18.1 353°31.2 44.4 21 8°27.9 95°40.9 · 37.6 242°45.9 17.9 290°02.4 · 18.1 23°36.1 · 44.4 22 23°30.3 110°40.0 37.6 257°48.7 17.9 305°05.2 18.0 38°38.6 44.4 23 38°32.8 125°39.2 37.7 272°50.4 17.8 320°07.9 18.0 53°41.1 44.4	16									44.4			
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19 338°22.9 65°42.6 37.6 212°43.4 18.0 259°56.9 18.1 353°31.2 44.4 20 353°25.4 80°41.7 37.6 227°45.1 18.0 274°59.7 18.1 8°33.7 44.4 21 8°27.9 95°40.9 · · 37.6 242°46.9 · · 17.9 290°02.4 · · 18.1 23°36.1 · · · 44.4 22 23°30.3 110°40.0 37.6 257°48.7 17.9 305°05.2 18.0 38°38.6 44.4 23 38°32.8 125°39.2 37.7 272°50.4 17.8 320°07.9 18.0 53°41.1 44.4    Saturn 15°08.0 19:26   Horizontal parallax   Venus: 0.1											Jupiter		
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22 23°30.3 110°40.0 37.6 257°48.7 17.9 305°05.2 18.0 38°38.6 44.4 Venus: 0.1 23 38°32.8 125°39.2 37.7 272°50.4 17.8 320°07.9 18.0 53°41.1 44.4 Mars: 0.2	20												
23 38°32.8 125°39.2 37.7 272°50.4 17.8 320°07.9 18.0 53°41.1 44.4 Mars: 0.2	21		95°40.9	• • 37.6	242°46.9	• • 17.9	290°02.4	• • 18.1		• • 44.4	Horizont	-	
25 36 52.0 125 55.2 51.1 212 50.1 11.0 326 61.5 12.0 35 12.1 11.1													
Mer.pass. 20:26 $\nu$ -0.8' $d$ 0.0' m-4.08 $\nu$ 1.7' $d$ -0.1' m-0.14 $\nu$ 2.8' $d$ -0.0' m-2.76 $\nu$ 2.5' $d$ -0.0' m0.86	23	38°32.8	125°39.2	37.7	272°50.4	17.8	$320^{\circ}07.9$	18.0	53°41.1	44.4		Mars:	0.2
	Mer.na	ass. 20:26	$\nu$ -0.8' d0	.0′ m-4.08	ν1.7′ d-0	1' m-0.14	ν2.8′ d-0	.0′ m-2.76	$\nu 2.5' \ d-0$	.0′ m0.86			

Mon	h	Sui	n	Moon						
1	Mon	GHA		GHA	ν	Dec	d	HP		
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7 288°59.3 34.4 168°13.1 11.5 00°28.3 .16.7 59.5   8 303°59.3 35.1 182°43.6 11.5 00°58.2 .16.8° 59.6   9 318°59.2 · 35.8 197°14.0 11.5 00°58.2 .16.8° 59.6   10 333°59.1 37.1 122°43.6 11.5 00°58.2 .16.8° 59.6   11 348°59.1 37.1 226°15.0 11.5 06°58.4 .16.9° 59.7   11 348°59.1 37.1 226°15.0 11.5 06°58.4 .16.9° 59.7   11 348°59.1 37.1 226°15.0 11.5 06°50.4 .16.9° 59.7   13 18°59.9 \$37.8 240°45.5 11.5 06°50.4 .16.9° 59.7   13 18°59.9 \$37.8 240°45.5 11.5 06°38.2 .16.8° 59.6   14 33°58.8 30.2 260°44.5 11.5 06°30.5 .17.0   15 48°58.8 · 39.8 226°16.9 11.5 06°30.5 .17.0   15 48°58.8 · 39.8 284°16.9 11.5 04°39.4 .17.1 59.8°   16 63°58.7 40.5 298°47.4 11.5 04°26.5 .17.1 59.8°   18 93°58.5 \$17°41.9 327°48.3 11.5 504°0.5 .17.2 59.8°   19 108°58.4 43.2 335°49.2 11.4 03°30.6 .17.3 59.9°   20 123°58.4 43.2 356°49.2 11.4 03°30.6 .17.3 59.9°   21 138°58.3 · 43.9 1119.6 11.4 03°30.6 .17.3 59.9°   22 133°57.9 47.3 38°51.7 11.4 02°56.0 .17.2 59.3°   3 168°58.1 45.2 40°20.5 11.4 02°56.0 .17.3 60.0°   2 213°57.9 47.3 38°51.7 11.4 02°56.0 .17.3 60.0°   1 1 198°58.0 46.6 69°21.3 11.4 02°36.6 .17.4 60.0°   2 213°57.9 47.3 38°51.7 11.4 02°66.0 .17.5 60.1°   3 228°57.8 · 47.9 98°22.0 11.3 01°28.9 .17.5 60.1°   4 243°57.7 49.3 127°22.7 11.3 00°54.0 .17.5 60.1°   2 288°57.5 50.6 16°32.3 11.2 00°38.9 .17.5 60.1°   3 33°57.2 55.0 146°3.3 11.3 00°34.0 .17.5 60.1°   11 348°57.0 54.6 1252.3 11.3 01°18.5 17.6 60.2°   2 38°57.5 550.6 150°32.3 11.2 00°38.9 .17.6 60.2°   2 13°55.0 18°0.9 42°3.3 11.1 00°3.1 17.6 60.2°   2 13°55.0 18°0.9 42°3.3 11.1 00°3.1 17.6 60.2°   2 13°55.0 18°0.9 42°3.3 11.1 00°3.1 17.6 60.2°   2 13°55.0 58°0.9 138°54.3 11.0 00°3.8 17.6 60.3°   3 228°55.8 0.0 0.6 55°2.2 11.1 00°3.8 17.6 60.4°   2 223°55.8 0.0 0.9 38°54.3 11.0 00°3.8 17.6 60.4°   2 23°55.5 518°0.9 128°59.3 11.2 00°3.8 17.6 60.4°   2 23°55.5 518°0.9 128°59.3 11.2 00°3.8 17.6 60.4°   2 23°55.5 518°0.9 128°59.3 11.2 00°3.8 17.6 60.4°   2 23°55.5 518°0.9 128°59.3 10°0.0 00°3.8 17.6 60.4°   2 23°55.5 518°0.9 128°59.3 10°0.0 00°3.8 17.6 60.4°   2 23°55.5 518°0.9 128°59										
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10   333°S91   36.4   211°445   11.5'   06°21.3   16.9'   59.7'   11   348°S91   37.1   226°15.0   11.5'   06°04.4   -16.9'   59.7'   12   3°59.0   511°37.8   240°45.5   11.5'   06°03.5   -17.0'   59.7'   13   18°S8.9   38.5   255°15.9   11.5'   06°03.5   -17.0'   59.7'   15   48°S8.8   39.2   269°46.4   11.5'   06°30.5   -17.0'   59.7'   15   48°S8.8   39.2   269°46.4   11.5'   06°35.5   -17.1'   59.8'   16   63°58.7   40.5   298°47.4   11.5'   04°36.5   -17.1'   59.8'   17   78°S8.6   41.2   313°17.8   11.5'   04°36.7   -17.2'   59.9'   19   108°58.4   42.5   342°18.8   11.4'   03°47.8   -17.2'   59.9'   19   108°58.4   42.5   342°18.8   11.4'   03°47.8   -17.3'   59.9'   22   133°58.2   44.6   25°50.1   11.4'   03°30.6   -17.3'   59.9'   22   133°58.1   517°45.9   54°50.9   11.4'   02°36.6   -17.3'   60.0'   42.3'   60.0'   42.3'   60.0	8									
11   348°59,1   37.1   226°15,0   11.5'   06°04.4   -16,9   59.7'     12   3°59,0   \$517°37,8   240°45,5   11.5'   \$05°30.5   -17.0'   59.7'     13   18°58,9   38.5   255°15,9   11.5'   06°30.5   -17.0'   59.7'     14   33°58,8   39.2   269°46,4   11.5'   06°31.5   -17.1'   59.8'     15   44°58,8   39.8   284°16,9   11.5'   04°30.5   -17.1'   59.8'     16   63°58,7   40.5   298°47,4   11.5'   04°30.4   -17.1'   59.8'     17   78°58,6   41.2   313°17,8   11.5'   04°39.4   -17.1'   59.8'     18   93°58,5   517°41,9   327°48,3   11.5'   504°05.0   -17.2'   59.9'     19   108°88,4   42.5   342°18,8   11.4'   03°41.8   -17.3'   59.9'     20   123°58,4   43.2   356°49.2   11.4'   03°41.8   -17.3'   59.9'     21   138°58,3   -43.9   11°19.6   11.4'   02°56.0   -17.3'   50.9'     22   153°58,2   44.6   25°50.1   11.4'   02°56.0   -17.3'   60.0'     22   213°58,1   45.2   40°20.5   11.4'   02°36.6   -17.4'   60.0'     31   198°58,0   46.6   66°21.3   11.4'   02°36.6   -17.4'   60.0'     2   213°57,9   47.3   38°51.7   11.4'   02°44.4   -17.5'   60.1'     3   228°57,8   -47.9   96°22.0   11.3'   01°28.9   -17.5'   60.1'     4   243°57,7   48.6   112°52.3   11.3'   01°11.5   -17.5'   60.1'     5   2585°5,7   49.3   127°22.7   11.3'   00°43.0   -17.5'   60.1'     6   273°57,6   517°50.0   141°53.0   11.3'   500°36.4   -17.5'   60.1'     7   288°57,5   50.6   156°32.2   11.2'   00°43.8   17.6'   60.2'     9   318°57,3   52.0   185°23,7   11.2'   00°43.8   17.6'   60.3'     11   348°57,3   55.0   56°323   11.2'   00°43.8   17.6'   60.3'     12   3757,1   517°50.0   141°53.0   11.3'   00°44.0   17.5'   60.1'     13   38°57,2   55.6   199°53,9   11.2'   00°43.8   17.6'   60.3'     15   48°56,8   5560   528°4,2   11.1'   00°51.4   17.6'   60.3'     15   48°56,5   5560   528°54,2   11.1'   00°51.4   17.6'   60.3'     16   63°56,7   57.3   301°24.4   10.9'   02°37.0   17.6'   60.4'     17   78°56,5   58.6   330°24,2   10.9'   02°47.0   17.6'   60.5'     22   133°55,9   03.3   71°52.2   10.5'   06°42.7   17.6'   60.5'     22										
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5         258°57.7         49.3         127°22.7         11.3'         00°54.0         -17.5'         60.1'           6         273°57.6         S17°50.0         141°53.0         11.3'         500°36.4         -17.5'         60.2'           7         288°57.5         50.6         156°23.2         11.2'         00°18.9         -17.6'         60.2'           8         303°57.4         51.3         170°53.5         11.2'         N00°16.2         17.6'         60.2'           10         333°57.2         52.6         199°53.9         11.2'         00°33.8         17.6'         60.3'           11         348°57.2         53.3         214°24.1         11.1'         00°33.8         17.6'         60.3'           12         3°57.1         517°54.0         228°54.2         11.1'         N01°90.0         17.6'         60.3'           13         18°57.0         54.6         243°24.3         11.1'         01°44.2         17.6'         60.3'           15         48°56.8         · 56.0         272°24.4         11.0'         02°19.4         17.6'         60.3'           15         48°56.8         · 56.0         272°24.4         11.0'         02°1.8         17.6' <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>										
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Wed         GHA         Dec         GHA         ν         Dec         d         HP           0         183°56.0         \$18°01.9         42°53.0         10.6'         N04°40.2         17.5'         60.5'           1         198°56.0         02.6         57°22.6         10.6'         04°57.7         17.5'         60.5'           2         213°55.9         03.3         71°52.2         10.5'         05°15.2         17.5'         60.5'           3         228°55.8         · 03.9         86°21.7         10.5'         05°32.7         17.5'         60.6'           4         243°55.7         04.6         100°51.2         10.4'         05°50.2         17.5'         60.6'           5         258°55.6         05.2         115°20.6         10.4'         06°07.7         17.4'         60.6'           6         273°55.5         \$18°05.9         129°50.0         10.3'         N06°25.1         17.4'         60.6'           7         288°55.4         06.5         144°19.3         10.3'         06°42.5         17.4'         60.6'           8         303°55.3         07.2         158°48.6         10.2'         06°59.9         17.4'         60.6'	23						17.0	00.5		
0         183°56.0         \$18°01.9         42°53.0         10.6'         N04°40.2         17.5'         60.5'           1         198°56.0         02.6         57°22.6         10.6'         04°57.7         17.5'         60.5'           2         213°55.9         03.3         71°52.2         10.5'         05°15.2         17.5'         60.5'           3         228°55.8         · 03.9         86°21.7         10.5'         05°32.7         17.5'         60.6'           4         243°55.7         04.6         100°51.2         10.4'         05°50.2         17.5'         60.6'           5         258°55.6         05.2         115°20.6         10.4'         06°07.7         17.4'         60.6'           6         273°55.5         \$18°05.9         129°50.0         10.3'         N06°25.1         17.4'         60.6'           7         288°55.4         06.5         144°19.3         10.3'         06°42.5         17.4'         60.6'           8         303°55.3         07.2         158°48.6         10.2'         06°59.9         17.4'         60.6'           9         318°55.2         · 07.9         173°17.8         10.1'         07°34.6         17.3'		3D = 10.2	u = 0.7		SL	J = 10.4				
1       198°56.0       02.6       57°22.6       10.6'       04°57.7       17.5'       60.5'         2       213°55.9       03.3       71°52.2       10.5'       05°15.2       17.5'       60.5'         3       228°55.8       · 03.9       86°21.7       10.5'       05°32.7       17.5'       60.6'         4       243°55.7       04.6       100°51.2       10.4'       05°50.2       17.5'       60.6'         5       258°55.6       05.2       115°20.6       10.4'       06°07.7       17.4'       60.6'         6       273°55.5       518°05.9       129°50.0       10.3'       N06°25.1       17.4'       60.6'         7       288°55.4       06.5       144°19.3       10.3'       N06°25.1       17.4'       60.6'         8       303°55.3       07.2       158°48.6       10.2'       06°59.9       17.4'       60.6'         9       318°55.2       · 07.9       173°17.8       10.1'       07°17.3       17.3'       60.6'         10       333°55.1       08.5       187°46.9       10.1'       07°34.6       17.3'       60.7'         11       348°55.1       09.2       202°16.0       10.0'										
2       213°55.9       03.3       71°52.2       10.5'       05°15.2       17.5'       60.5'         3       228°55.8       · 03.9       86°21.7       10.5'       05°32.7       17.5'       60.6'         4       243°55.7       04.6       100°51.2       10.4'       05°50.2       17.5'       60.6'         5       258°55.6       05.2       115°20.6       10.4'       06°07.7       17.4'       60.6'         6       273°55.5       518°05.9       129°50.0       10.3'       N06°25.1       17.4'       60.6'         7       288°55.4       06.5       144°19.3       10.3'       N06°25.1       17.4'       60.6'         8       303°55.3       07.2       158°48.6       10.2'       06°59.9       17.4'       60.6'         9       318°55.2       · 07.9       173°17.8       10.1'       07°17.3       17.3'       60.6'         10       333°55.1       08.5       187°46.9       10.1'       07°34.6       17.3'       60.7'         11       348°55.1       09.2       202°16.0       10.0'       07°51.9       17.3'       60.7'         12       3°55.0       S18°09.8       216°45.0       10.0'										
4       243°55.7       04.6       100°51.2       10.4'       05°50.2       17.5'       60.6'         5       258°55.6       05.2       115°20.6       10.4'       06°07.7       17.4'       60.6'         6       273°55.5       \$18°05.9       129°50.0       10.3'       N06°25.1       17.4'       60.6'         7       288°55.4       06.5       144°19.3       10.3'       06°42.5       17.4'       60.6'         8       303°55.3       07.2       158°48.6       10.2'       06°59.9       17.4'       60.6'         9       318°55.2       · 07.9       173°17.8       10.1'       07°17.3       17.3'       60.6'         10       333°55.1       08.5       187°46.9       10.1'       07°34.6       17.3'       60.7'         11       348°55.1       09.2       202°16.0       10.0'       07°51.9       17.3'       60.7'         12       3°55.0       \$18°09.8       216°45.0       10.0'       N08°09.2       17.2'       60.7'         13       18°54.9       10.5       231°14.0       9.9'       08°26.4       17.2'       60.7'         14       33°54.8       11.1       245°42.9       9.8' <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>										
5       258°55.6       05.2       115°20.6       10.4'       06°07.7       17.4'       60.6'         6       273°55.5       \$18°05.9       129°50.0       10.3'       N06°25.1       17.4'       60.6'         7       288°55.4       06.5       144°19.3       10.3'       06°42.5       17.4'       60.6'         8       303°55.3       07.2       158°48.6       10.2'       06°59.9       17.4'       60.6'         9       318°55.2       · 07.9       173°17.8       10.1'       07°17.3       17.3'       60.6'         10       333°55.1       08.5       187°46.9       10.1'       07°34.6       17.3'       60.7'         11       348°55.1       09.2       202°16.0       10.0'       07°51.9       17.3'       60.7'         12       3°55.0       \$18°09.8       216°45.0       10.0'       N08°09.2       17.2'       60.7'         13       18°54.9       10.5       231°14.0       9.9'       08°26.4       17.2'       60.7'         14       33°54.8       11.1       245°42.9       9.8'       08°43.5       17.1'       60.7'         15       48°54.7       · 11.8       260°11.7       9.8'       <										
6         273°55.5         \$18°05.9         129°50.0         10.3'         N06°25.1         17.4'         60.6'           7         288°55.4         06.5         144°19.3         10.3'         06°42.5         17.4'         60.6'           8         303°55.3         07.2         158°48.6         10.2'         06°59.9         17.4'         60.6'           9         318°55.2         · 07.9         173°17.8         10.1'         07°17.3         17.3'         60.6'           10         333°55.1         08.5         187°46.9         10.1'         07°34.6         17.3'         60.7'           11         348°55.1         09.2         202°16.0         10.0'         07°51.9         17.3'         60.7'           12         3°55.0         \$18°09.8         216°45.0         10.0'         N08°09.2         17.2'         60.7'           13         18°54.9         10.5         231°14.0         9.9'         08°26.4         17.2'         60.7'           14         33°54.8         11.1         245°42.9         9.8'         08°43.5         17.1'         60.7'           15         48°54.7         · 11.8         260°11.7         9.8'         09°00.7         17.1'										
8       303°55.3       07.2       158°48.6       10.2'       06°59.9       17.4'       60.6'         9       318°55.2       · · 07.9       173°17.8       10.1'       07°17.3       17.3'       60.6'         10       333°55.1       08.5       187°46.9       10.1'       07°34.6       17.3'       60.7'         11       348°55.1       09.2       202°16.0       10.0'       07°51.9       17.3'       60.7'         12       3°55.0       S18°09.8       216°45.0       10.0'       N08°09.2       17.2'       60.7'         13       18°54.9       10.5       231°14.0       9.9'       08°26.4       17.2'       60.7'         14       33°54.8       11.1       245°42.9       9.8'       08°43.5       17.1'       60.7'         15       48°54.7       · 11.8       260°11.7       9.8'       09°00.7       17.1'       60.7'         16       63°54.6       12.4       274°40.4       9.7'       09°17.8       17.0'       60.7'         18       93°54.4       S18°13.7       303°37.8       9.6'       N09°51.8       16.9'       60.7'         20       123°54.2       15.0       332°34.8       9.4'       <		273°55.5								
9       318°55.2       · · 07.9       173°17.8       10.1'       07°17.3       17.3'       60.6'         10       333°55.1       08.5       187°46.9       10.1'       07°34.6       17.3'       60.7'         11       348°55.1       09.2       202°16.0       10.0'       07°51.9       17.3'       60.7'         12       3°55.0       518°09.8       216°45.0       10.0'       N08°09.2       17.2'       60.7'         13       18°54.9       10.5       231°14.0       9.9'       08°26.4       17.2'       60.7'         14       33°54.8       11.1       245°42.9       9.8'       08°43.5       17.1'       60.7'         15       48°54.7       · · 11.8       260°11.7       9.8'       09°00.7       17.1'       60.7'         16       63°54.6       12.4       274°40.4       9.7'       09°17.8       17.0'       60.7'         18       93°54.4       518°13.7       303°37.8       9.6'       N09°51.8       16.9'       60.7'         19       108°54.3       14.4       318°06.3       9.5'       10°08.7       16.9'       60.7'         20       123°54.2       15.0       332°34.8       9.4'	7									
10       333°55.1       08.5       187°46.9       10.1'       07°34.6       17.3'       60.7'         11       348°55.1       09.2       202°16.0       10.0'       07°51.9       17.3'       60.7'         12       3°55.0       \$18°09.8       216°45.0       10.0'       N08°09.2       17.2'       60.7'         13       18°54.9       10.5       231°14.0       9.9'       08°26.4       17.2'       60.7'         14       33°54.8       11.1       245°42.9       9.8'       08°43.5       17.1'       60.7'         15       48°54.7       · 11.8       260°11.7       9.8'       09°00.7       17.1'       60.7'         16       63°54.6       12.4       274°40.4       9.7'       09°17.8       17.0'       60.7'         18       93°54.4       \$18°13.7       303°37.8       9.6'       N09°51.8       16.9'       60.7'         19       108°54.3       14.4       318°06.3       9.5'       10°08.7       16.9'       60.7'         20       123°54.2       15.0       332°34.8       9.4'       10°25.6       16.8'       60.8'         21       138°54.1       · 15.7       347°03.2       9.3' <td< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></td<>										
11       348°55.1       09.2       202°16.0       10.0'       07°51.9       17.3'       60.7'         12       3°55.0       \$18°09.8       216°45.0       10.0'       N08°09.2       17.2'       60.7'         13       18°54.9       10.5       231°14.0       9.9'       08°26.4       17.2'       60.7'         14       33°54.8       11.1       245°42.9       9.8'       08°43.5       17.1'       60.7'         15       48°54.7       · 11.8       260°11.7       9.8'       09°00.7       17.1'       60.7'         16       63°54.6       12.4       274°40.4       9.7'       09°17.8       17.0'       60.7'         17       78°54.5       13.1       289°09.1       9.6'       09°34.8       17.0'       60.7'         18       93°54.4       \$18°13.7       303°37.8       9.6'       N09°51.8       16.9'       60.7'         19       108°54.3       14.4       318°06.3       9.5'       10°08.7       16.9'       60.7'         20       123°54.2       15.0       332°34.8       9.4'       10°25.6       16.8'       60.8'         21       138°54.1       · 15.7       347°03.2       9.3'       1										
13       18°54.9       10.5       231°14.0       9.9'       08°26.4       17.2'       60.7'         14       33°54.8       11.1       245°42.9       9.8'       08°43.5       17.1'       60.7'         15       48°54.7       · · 11.8       260°11.7       9.8'       09°00.7       17.1'       60.7'         16       63°54.6       12.4       274°40.4       9.7'       09°17.8       17.0'       60.7'         17       78°54.5       13.1       289°09.1       9.6'       09°34.8       17.0'       60.7'         18       93°54.4       518°13.7       303°37.8       9.6'       N09°51.8       16.9'       60.7'         19       108°54.3       14.4       318°06.3       9.5'       10°08.7       16.9'       60.7'         20       123°54.2       15.0       332°34.8       9.4'       10°25.6       16.8'       60.8'         21       138°54.1       · 15.7       347°03.2       9.3'       10°42.4       16.8'       60.8'         22       153°54.0       16.3       1°31.5       9.3'       10°59.2       16.7'       60.8'         23       168°53.9       17.0       15°59.8       9.2'       11°15.9	11			$202^{\circ}16.0$		$07^{\circ}51.9$	17.3'	60.7'		
14     33°54.8     11.1     245°42.9     9.8'     08°43.5     17.1'     60.7'       15     48°54.7     · · 11.8     260°11.7     9.8'     09°00.7     17.1'     60.7'       16     63°54.6     12.4     274°40.4     9.7'     09°17.8     17.0'     60.7'       17     78°54.5     13.1     289°09.1     9.6'     09°34.8     17.0'     60.7'       18     93°54.4     \$18°13.7     303°37.8     9.6'     N09°51.8     16.9'     60.7'       19     108°54.3     14.4     318°06.3     9.5'     10°08.7     16.9'     60.7'       20     123°54.2     15.0     332°34.8     9.4'     10°25.6     16.8'     60.8'       21     138°54.1     · 15.7     347°03.2     9.3'     10°42.4     16.8'     60.8'       22     153°54.0     16.3     1°31.5     9.3'     10°59.2     16.7'     60.8'       23     168°53.9     17.0     15°59.8     9.2'     11°15.9     16.7'     60.8'										
15       48°54.7       · · 11.8       260°11.7       9.8'       09°00.7       17.1'       60.7'         16       63°54.6       12.4       274°40.4       9.7'       09°17.8       17.0'       60.7'         17       78°54.5       13.1       289°09.1       9.6'       09°34.8       17.0'       60.7'         18       93°54.4       \$18°13.7       303°37.8       9.6'       N09°51.8       16.9'       60.7'         19       108°54.3       14.4       318°06.3       9.5'       10°08.7       16.9'       60.7'         20       123°54.2       15.0       332°34.8       9.4'       10°25.6       16.8'       60.8'         21       138°54.1       · · 15.7       347°03.2       9.3'       10°42.4       16.8'       60.8'         22       153°54.0       16.3       1°31.5       9.3'       10°59.2       16.7'       60.8'         23       168°53.9       17.0       15°59.8       9.2'       11°15.9       16.7'       60.8'										
17     78°54.5     13.1     289°09.1     9.6'     09°34.8     17.0'     60.7'       18     93°54.4     \$18°13.7     303°37.8     9.6'     \$N09°51.8     16.9'     60.7'       19     108°54.3     14.4     318°06.3     9.5'     10°08.7     16.9'     60.7'       20     123°54.2     15.0     332°34.8     9.4'     10°25.6     16.8'     60.8'       21     138°54.1     · · 15.7     347°03.2     9.3'     10°42.4     16.8'     60.8'       22     153°54.0     16.3     1°31.5     9.3'     10°59.2     16.7'     60.8'       23     168°53.9     17.0     15°59.8     9.2'     11°15.9     16.7'     60.8'	15		• • 11.8	$260^{\circ}11.7$	9.8'	09°00.7	17.1'	60.7'		
18     93°54.4     \$18°13.7     303°37.8     9.6'     \$N09°51.8     16.9'     60.7'       19     108°54.3     14.4     318°06.3     9.5'     10°08.7     16.9'     60.7'       20     123°54.2     15.0     332°34.8     9.4'     10°25.6     16.8'     60.8'       21     138°54.1     · · 15.7     347°03.2     9.3'     10°42.4     16.8'     60.8'       22     153°54.0     16.3     1°31.5     9.3'     10°59.2     16.7'     60.8'       23     168°53.9     17.0     15°59.8     9.2'     11°15.9     16.7'     60.8'										
19     108°54.3     14.4     318°06.3     9.5'     10°08.7     16.9'     60.7'       20     123°54.2     15.0     332°34.8     9.4'     10°25.6     16.8'     60.8'       21     138°54.1     · · 15.7     347°03.2     9.3'     10°42.4     16.8'     60.8'       22     153°54.0     16.3     1°31.5     9.3'     10°59.2     16.7'     60.8'       23     168°53.9     17.0     15°59.8     9.2'     11°15.9     16.7'     60.8'										
21       138°54.1       · · 15.7       347°03.2       9.3'       10°42.4       16.8'       60.8'         22       153°54.0       16.3       1°31.5       9.3'       10°59.2       16.7'       60.8'         23       168°53.9       17.0       15°59.8       9.2'       11°15.9       16.7'       60.8'	19	108°54.3	14.4	318°06.3	9.5'	10°08.7	16.9'	60.7'		
22       153°54.0       16.3       1°31.5       9.3'       10°59.2       16.7'       60.8'         23       168°53.9       17.0       15°59.8       9.2'       11°15.9       16.7'       60.8'										
23 168°53.9 17.0 15°59.8 9.2' 11°15.9 16.7' 60.8'										
SD = 16.2'  d = 0.7' $SD = 16.5'$										
		SD = 16.2'	d = 0.7'		SI	0 = 16.5'				

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

Lat.		Moonris	е		Moonset	:
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°	15:07	14:28	13:47		02:01	04:31
<b>N</b> 70°	15:00	14:31	14:00		02:03	04:22
68°	14:54	14:32	14:10		02:06	04:15
66°	14:49	14:34	14:18	80:00	02:08	04:09
64°	14:45	14:35	14:25	00:16	02:09	04:04
62°	14:42	14:37	14:31	00:23	02:11	03:59
60°	14:39	14:38	14:37	00:29	02:12	03:56
N 58°	14:36	14:39	14:42	00:35	02:13	03:52
56°	14:33	14:39	14:46	00:40	02:14	03:50
54°	14:31	14:40	14:50	00:44	02:15	03:47
52°	14:29	14:41	14:53	00:48	02:15	03:45
50°	14:27	14:42	14:57	00:51	02:16	03:43
45°	14:23	14:43	15:04	00:59	02:17	03:38
N 40°	14:20	14:44	15:10	01:05	02:19	03:34
35°	14:17	14:45	15:15	01:10	02:20	03:31
30°	14:14	14:46	15:19	01:15	02:21	03:28
20°	14:09	14:48	15:27	01:23	02:22	03:23
N 10°	14:05	14:49	15:35	01:29	02:24	03:18
0°	14:02	14:51	15:41	01:36	02:25	03:14
<b>S</b> 10°	13:58	14:52	15:48	01:42	02:26	03:10
20°	13:54	14:54	15:56	01:49	02:27	03:06
30°	13:49	14:56	16:04	01:56	02:29	03:01
35°	13:46	14:57	16:09	02:01	02:29	02:58
40°	13:43	14:58	16:15	02:06	02:30	02:55
45°	13:40	14:59	16:21	02:11	02:31	02:51
<b>S</b> 50°	13:36	15:01	16:29	02:18	02:32	02:47
52°	13:34	15:02	16:33	02:21	02:33	02:45
54°	13:31	15:03	16:37	02:24	02:33	02:43
56°	13:29	15:04	16:41	02:28	02:34	02:40
58°	13:26	15:05	16:47	02:32	02:35	02:37
<b>S</b> 60°	13:23	15:06	16:52	02:37	02:36	02:34

		Sun		Moon			
Day	Eqn.of	f Time	Mer.	Mer.Pass.		Age	
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	10-12	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	69-88%	
11	15:59	15:56	11:44	20:13	07:49		
12	15:52	15:48	11:44	21:02	08:38		
13	15:44	15:40	11:44	21:54	09:28		

## November 14, 15, 16 UT (Thu., Fri., Sat.)

h	Aries	Ve	nus	Mars		Jupiter		Saturn		Stars		
Thu –	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	53°35.3	140° 38.4	\$25°37.7	287°52.2	N21° 17.7	335° 10.7	N22°18.0	68° 43.6	508°44.4			
1	68°37.7	155°37.5	37.7	302°53.9	17.7	350° 13.4	18.0	83°46.0	44.4	Alpheratz	357°34.7	29°13.8
2	83°40.2	170°36.7	37.7	317°55.7	17.6	5° 16.2	18.0	98° 48.5	44.4	Ankaa	353°07.0	-42°10.4
3	98°42.7	185°35.9	37.7	332°57.5	17.6	20° 19.0	17.9	113°51.0	• • 44.4	Schedar	349°30.8	56°40.7
4	113°45.1	200°35.0	37.7	347°59.2	17.5	35°21.7	17.9	128°53.5	44.4	Diphda	348°47.2	-17°51.0
5	128°47.6	215°34.2	37.7	3°01.0	17.4	50°24.5	17.9	143°55.9	44.4	Achernar	335° 19.7 327° 51.0	-57°06.7 23°34.9
6	143°50.1	230°33.4	S25°37.7	18°02.7	N21°17.4	65°27.2	N22°17.9	158° 58.4	S08°44.4	Hamal Polaris	313°37.0	89°22.2
7	158°52.5	$245^{\circ}32.5$	37.7	33°04.5	17.3	80°30.0	17.9	174°00.9	44.3	Acamar	315°11.4	-40°12.3
8	173°55.0	260°31.7	37.7	48°06.3	17.3	95°32.7	17.9	189°03.4	44.3	Menkar	314°06.0	4°11.3
9	188°57.4	275°30.9	• • 37.7	63°08.1	• • 17.2	110°35.5	• • 17.8	204°05.8	• • 44.3	Mirfak	308°28.0	49°57.0
10	203°59.9	290°30.0	37.6	78°09.8	17.2	125°38.3	17.8	219°08.3	44.3	Aldebaran	290°39.5	16°33.6
11 12	219°02.4 234°04.8	305°29.2 320°28.4	37.6 \$25°37.6	93°11.6 108°13.4	17.1 N21°17.0	140°41.0 155°43.8	17.8 N22°17.8	234°10.8 249°13.2	44.3 \$08°44.3	Rigel	281°03.7	-8°10.2
13	249°07.3	335° 27.5	37.6	108 15.4 123°15.1	17.0	170°46.5	17.8	249 13.2 264° 15.7	44.3	Capella	$280^{\circ}21.7$	46°01.3
14	264°09.8	350°26.7	37.6	138°16.9	16.9	185° 49.3	17.7	279° 18.2	44.3	Bellatrix	278°22.7	6°22.4
15	279°12.2	5°25.9	37.6	153°18.7	16.9	200°52.1	17.7	294°20.7	• • 44.3	Elnath	278°01.7	28°37.7
16	294°14.7	20°25.0	37.6	168°20.5	16.8	215°54.8	17.7	309°23.1	44.3	Alnilam	275°37.6	-1°11.0
17	309°17.2	35°24.2	37.6	183°22.2	16.8	230°57.6	17.7	324°25.6	44.3	Betelgeuse	270°52.0	7°24.8
18	324°19.6	50°23.4	S25°37.5	198°24.0	N21°16.7	246°00.3	N22°17.7	339°28.1	S08°44.3	Canopus Sirius	263°52.0 258°26.1	-52°42.2 -16°44.8
19	339°22.1	65°22.5	37.5	213°25.8	16.7	261°03.1	17.6	354°30.5	44.3	Adhara	255°05.7	-10 44.0 -29°00.1
20	354°24.5	80°21.7	37.5	228°27.6	16.6	276°05.9	17.6	9°33.0	44.3	Procyon	244°50.8	5°09.8
21	9°27.0	95°20.9	• • 37.5	243°29.4	• • 16.5	291°08.6	• • 17.6	24°35.5	• • 44.3	Pollux	243°17.3	27°57.9
22	24°29.5	110°20.0	37.5	258°31.1	16.5	306°11.4	17.6	39°37.9	44.3	Avior	234°14.6	-59°35.0
23	39°31.9	125°19.2	37.4	273°32.9	16.4	321°14.1	17.6	54°40.4	44.3	Suhail	222°46.4	-43°31.6
Mer.p	ass. 20:22	$\nu$ -0.8′ d0.	.0′ m-4.09	$\nu$ 1.8′ d-0.	1' m-0.16	$\nu$ 2.8′ d-0	.0′ m-2.76	$\nu$ 2.5′ d-0	.0′ m0.86	Miaplacidus	221°38.2	-69°48.7
										Alphard	$217^{\circ}47.9$	-8°45.8
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.6	11°50.8
0	54°34.4	140°18.4	\$25°37.4	288°34.7	N21°16.4	336° 16.9	N22°17.5	69° 42.9	508°44.3	Dubhe	193°41.4	61°36.8
1	69°36.9	$155^{\circ}17.5$	37.4	303°36.5	16.3	351°19.7	17.5	84°45.4	44.3	Denebola Gienah	182°25.3 175°44.0	14°26.0 -17°40.6
2	84°39.3	170°16.7	37.4	318°38.3	16.3	6°22.4	17.5	99°47.8	44.3	Acrux	173°44.0	-63°13.9
3	99°41.8	$185^{\circ}15.9$	• • 37.3	333°40.1	•• 16.2	21°25.2	• • 17.5	114°50.3	• • 44.3	Gacrux	171°52.3	-57°14.9
4	$114^{\circ}44.3$	200°15.0	37.3	348°41.8	16.2	36°28.0	17.5	129°52.8	44.2	Alioth	166° 13.5	55°49.4
5	129°46.7	215° 14.2	37.3	3°43.6	16.1	51°30.7	17.4	144°55.2	44.2	Spica	158° 22.8	-11°17.3
6	144°49.2	230°13.4	\$25°37.2	18°45.4	N21°16.1	66°33.5	N22°17.4	159° 57.7	508°44.2	Alkaid	152°52.6	49°11.3
7	159°51.7	245° 12.5	37.2	33°47.2	16.0	81°36.2	17.4	175°00.2	44.2	Hadar	148°36.9	-60°29.4
8	174°54.1 189°56.6	260°11.7	37.2	48°49.0	15.9	96°39.0	17.4	190°02.6	44.2	Menkent	$147^{\circ}58.2$	-36°29.4
9 10	204°59.0	275°10.9 290°10.1	· · 37.1 37.1	63°50.8 78°52.6	· · 15.9 15.8	111°41.8 126°44.5	· · 17.4 17.3	205°05.1 220°07.6	•• 44.2 44.2	Arcturus	145°48.4	19°03.2
11	204 59.0 220°01.5	305°09.2	37.1	93°54.4	15.8	141°47.3	17.3	235° 10.0	44.2	Rigil Kent.	139°41.2	-60°56.1
12	235°04.0	320°08.4	\$25°37.0	108°56.2	N21°15.7	156°50.1	N22°17.3	250° 12.5	508°44.2	Kochab	137°20.9	74°03.1
13	250°06.4	335°07.6	37.0	123°58.0	15.7	171°52.8	17.3	265° 15.0	44.2	Zuben'ubi Alphecca	136°56.5 126°04.2	-16°08.6 26°37.9
14	$265^{\circ}08.9$	350°06.7	36.9	$138^{\circ}59.8$	15.6	186°55.6	17.3	280°17.4	44.2	Antares	112° 16.4	-26°29.2
15	280°11.4	5°05.9	• • 36.9	154°01.6	• • 15.6	201°58.4	• • 17.2	295° 19.9	• • 44.2	Atria	107°11.3	-69°04.4
16	295°13.8	20°05.1	36.8	169°03.4	15.5	217°01.1	17.2	310°22.4	44.2	Sabik	102°03.3	-15°45.3
17 18	310°16.3	35°04.2	36.8	184°05.2	15.5 N21° 15.4	232°03.9 247°06.7	17.2 N22°17.2	325°24.8	44.2	Shaula	$96^{\circ}10.9$	-37°07.3
19	325°18.8 340°21.2	50°03.4 65°02.6	\$25°36.7 36.7	199°07.0 214°08.8	15.4	262°09.4	17.2	340°27.3 355°29.8	\$08° 44.2 44.2	Rasalhague	95°59.0	12°32.6
20	355°23.7	80°01.8	36.6	214 00.0 229°10.6	15.4	202 09.4 277°12.2	17.2	10° 32.2	44.1	Eltanin	90°42.7	51°29.3
21	10°26.2	95°00.9	36.6	244°12.4	15.3	292° 15.0	17.1	25°34.7	• • 44.1	Kaus Aust.	83°33.0	-34°22.4
22	25°28.6	110°00.1	36.5	259°14.2	15.2	307° 17.7	17.1	40°37.2	44.1	Vega	80°33.6	38°48.5
23	40°31.1	124°59.3	36.5	274°16.0	15.2	322°20.5	17.1	55° 39.6	44.1	Nunki Altair	75°48.2 62°00.3	-26°16.0 8°56.1
N/au ==	20.10	0 9/ 4 0	.0′ m-4.09	1 0/ 4 0	1′ m-0.18		.0′ m-2.77	2 5/ 4 0	.0′ m0.87	Peacock	53°06.1	-56°39.5
ivier.p	ass. 20:18	ν-0.6 α-0	.0 m-4.09	$\nu$ 1.6 $u$ -0.	1 111-0.10	ν2.ο α-υ	.U M-2.77	ν2.5 <i>a</i> -0	.0 1110.67	Deneb	49° 26.0	45°22.4
										Enif	33°38.9	9°59.4
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.0	-46°50.6
0	55°33.5	139°58.4	\$25°36.4	289°17.8	N21° 15.1	337°23.3	N22°17.1	70°42.1	S08°44.1	Fomalhaut	$15^{\circ}14.6$	-29°29.5
1	70°36.0	154° 57.6 169° 56.8	36.4 36.3	304°19.6	15.1 15.0	352°26.0	17.0	85°44.6	44.1	Scheat	13°45.2	28°13.3
2	85°38.5 100°40.9	169°56.8 184°56.0	36.3 · · 36.3	319°21.4 334°23.2	15.0 •• 15.0	7°28.8 22°31.6	17.0 •• 17.0	100°47.0 115°49.5	44.1 •• 44.1	Markab	13°29.9	15°20.5
4	100 40.9 115°43.4	199°55.1	36.2	349°25.0	14.9	37°34.3	17.0	115 49.5 130°52.0	44.1	Nov 14 Thu	SHA	Mer.pass
5	130°45.9	214° 54.3	36.1	4°26.9	14.9	52° 37.1	17.0	145° 54.4	44.1	Venus	87°03.1	14:38
6	145°48.3	229°53.5	S25°36.1	19°28.7	N21°14.9	67°39.9	N22°16.9	160°56.9	S08°44.1		234°16.9	04:48
7	160°50.8	244°52.7	36.0	34°30.5	14.8	82°42.6	16.9	175°59.3	44.1	Jupiter	281°35.4	01:39
8	175°53.3	259°51.8	35.9	49°32.3	14.8	97°45.4	16.9	191°01.8	44.1	Saturn	15°08.3	19:22
9	190°55.7	274°51.0	• • 35.9	64°34.1	• • 14.7	112°48.2	• • 16.9	206°04.3	• • 44.1	Nov 15 Fri	SHA	Mer.pass
10	205°58.2	289°50.2	35.8	79°35.9	14.7	127°50.9	16.9	221°06.7	44.0	Venus	<b>ЗПА</b> 85°44.0	14:40
11	221°00.7	304°49.4	35.7	94°37.7	14.6	142°53.7	16.8	236°09.2	44.0	Mars	234°00.3	04:45
12	236°03.1 251°05.6	319°48.5 334°47.7	\$25°35.7 35.6	109°39.6 124°41.4	N21°14.6	157° 56.5 172° 59.3	N22°16.8 16.8	251°11.7 266°14.1	\$08°44.0	Jupiter	281°42.5	01:35
13 14	251°05.6 266°08.0	334°47.7 349°46.9	35.6 35.5	124°41.4 139°43.2	14.5 14.5	172°59.3 188°02.0	16.8 16.8	281°16.6	44.0 44.0	Saturn	15°08.5	19:18
15	281°10.5	4° 46.1	• • 35.4	159° 45.2 154° 45.0	. 14.5	203°04.8	. 16.8	296° 19.1	• • 44.0	Nov 16 Sat	SHA	Mer.pass
16	296°13.0	19°45.2	35.4	169°46.9	14.4	218°07.6	16.7	311°21.5	44.0	Venus	<b>ЗПА</b> 84°24.9	14:41
17	311°15.4	34°44.4	35.3	184°48.7	14.3	233°10.3	16.7	326°24.0	44.0	Mars	233°44.3	04:42
18	$326^{\circ}17.9$	49°43.6	\$25°35.2	199°50.5	N21°14.3	248°13.1	N22°16.7	341°26.4	<b>S</b> 08°44.0	1	281°49.7	01:30
19	341°20.4	64°42.8	35.1	214°52.3	14.3	263°15.9	16.7	356°28.9	44.0	Saturn	15°08.6	19:14
20	356°22.8	79°41.9	35.1	229°54.2	14.2	278° 18.7	16.6	11°31.4	44.0	Horizont	al parallax	
21 22	11°25.3 26°27.8	94°41.1 109°40.3	· · 35.0 34.9	244°56.0 259°57.8	· · 14.2 14.1	293°21.4 308°24.2	· · 16.6 16.6	26°33.8 41°36.3	· · 44.0	TIOTIZONI	Venus:	0.1
22	20 27.8 41°30.2	109 40.3 124°39.5	34.9 34.8	259 57.8 274°59.7	14.1 14.1	308 24.2 323°27.0	16.6	41 36.3 56°38.8	43.9 43.9		Mars:	0.2
Mer.p	ass. 20:14	ν-0.8′ d-0	.1′ m-4.10	$\nu$ 1.8′ $d$ -0.	.0′ m-0.20	$\nu$ 2.8′ d-0	.0′ m-2.77	$\nu$ 2.5′ d-0	.0′ m0.87			

h	Sui	Moon					
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	183°53.8	\$18°17.6	30°28.0	9.1'	N11°32.6	16.6'	60.8
1	198°53.7	18.3	44°56.1	9.0'	11°49.2	16.5'	60.8'
2	213°53.6	18.9	59°24.1	9.0'	12°05.7	16.5'	60.8'
3	228°53.5	• • 19.6	73°52.1	8.9'	12°22.2	16.4'	60.8'
4 5	243°53.4 258°53.3	20.2 20.9	88°20.0 102°47.8	8.8' 8.7'	12°38.5 12°54.9	16.3' 16.2'	60.8' 60.8'
6	258 53.3 273°53.2	20.9 S18°21.5	102 47.8 117°15.5	8.6'	N13°11.1	16.2	60.8
7	288°53.1	22.1	131°43.1	8.6'	13°27.3	16.1	60.8
8	303°53.0	22.8	146°10.7	8.5'	13°43.4	16.0'	60.8'
9	318°52.9	• • 23.4	160°38.2	8.4'	13°59.4	15.9'	60.8'
10	333°52.8	24.1	175°05.5	8.3'	14°15.3	15.8'	60.8'
11	348°52.7	24.7	189°32.8	8.2'	14°31.1	15.8'	60.8'
12	3°52.6	S18°25.4	204°00.1	8.1'	N14°46.9	15.7'	60.8'
13	18°52.5 33°52.4	26.0	218°27.2 232°54.2	8.0' 8.0'	15°02.5 15°18.1	15.6' 15.5'	60.8'
14 15	33 52.4 48°52.3	26.6 •• 27.3	232 54.2 247°21.2	8.0 7.9'	15 18.1 15°33.6	15.5 15.4'	60.8' 60.8'
16	63°52.2	27.9	261°48.0	7.8'	15°49.0	15.3'	60.8
17	78°52.1	28.6	276°14.8	7.7'	16°04.3	15.2'	60.8'
18	93°52.0	S18°29.2	290°41.5	7.6'	$N16^{\circ}19.4$	15.1'	60.8'
19	108°51.9	29.8	$305^{\circ}08.1$	7.5'	16°34.5	15.0'	60.8'
20	123°51.8	30.5	319°34.6	7.4'	16°49.5	14.9'	60.8'
21	138°51.7 153°51.6	· · 31.1	334°01.0 348°27.4	7.3'	17°04.4	14.8'	60.8'
22 23	153°51.6 168°51.5	31.7 32.4	348°27.4 2°53.6	7.2' 7.1'	17°19.1 17°33.8	14.7' 14.5'	60.8' 60.8'
23			2 53.0			14.5	8.00
	SD = 16.2'	d = 0.6'		SI	D = 16.6'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°51.4	<b>S</b> 18°33.0	17°19.7	7.1'	N17°48.3	14.4'	60.8'
1	198°51.3	33.6	31°45.8	7.0'	18°02.8	14.3'	60.8'
2	213°51.2	34.3	46°11.7	6.9'	18°17.1	14.2'	60.8'
3	228°51.1 243°51.0	• • 34.9	60°37.6 75°03.4	6.8'	18°31.2 18°45.3	14.1'	60.7'
4 5	243°51.0 258°50.9	35.5 36.2	75°03.4 89°29.1	6.7' 6.6'	18° 45.3 18° 59.3	13.9' 13.8'	60.7' 60.7'
6	273°50.8	518°36.8	103°54.7	6.5	N19°13.1	13.7	60.7
7	288°50.7	37.4	118°20.1	6.4	19°26.8	13.6'	60.7'
8	303°50.6	38.1	132°45.6	6.3'	19°40.3	13.4'	60.7'
9	318°50.4	• • 38.7	$147^{\circ}10.9$	6.2'	19°53.8	13.3'	60.7'
10	333°50.3	39.3	161°36.1	6.1'	20°07.0	13.2'	60.7'
11	348°50.2	39.9	176°01.2	6.0'	20°20.2	13.0'	60.7'
12	3°50.1	\$18°40.6	190°26.3	5.9'	N20°33.2	12.9'	60.7'
13 14	18°50.0 33°49.9	41.2 41.8	204°51.2 219°16.1	5.9' 5.8'	20°46.1 20°58.9	12.7' 12.6'	60.6' 60.6'
15	48°49.8	. 42.4	233°40.8	5.7'	20° 30.9	12.5'	60.6
16	63°49.7	43.1	248°05.5	5.6'	21°23.9	12.3'	60.6'
17	78°49.6	43.7	$262^{\circ}30.1$	5.5'	21°36.2	12.2'	60.6'
18	93°49.5	<b>S</b> 18°44.3	276°54.6	5.4'	N21°48.4	12.0'	60.6'
19	108°49.3	44.9	291°19.0	5.3'	22°00.4	11.8'	60.6'
20	123°49.2 138°49.1	45.6	305°43.3	5.2'	22°12.2	11.7'	60.5'
21 22	138°49.1 153°49.0	· · 46.2 46.8	320°07.6 334°31.7	5.2' 5.1'	22°23.9 22°35.4	11.5' 11.4'	60.5' 60.5'
23	168°48.9	47.4	348°55.8	5.0'	22°46.8	11.2'	60.5
	SD = 16.2'	d = 0.6'			D = 16.6'		
Sat 0	<b>GHA</b> 183°48.8	<b>Dec</b> \$18°48.0	<b>GHA</b> 3°19.8	ν 4.9'	<b>Dec</b> N22°58.0	d 11.1'	<b>HP</b> 60.5'
1	198°48.7	48.7	3 19.6 17°43.7	4.9 4.8'	23°09.1	10.9'	60.5
2	213°48.5	49.3	32°07.5	4.7'	23°20.0	10.7	60.4
3	228°48.4	• • 49.9	46°31.2	4.7'	23°30.7	10.6'	60.4'
4	243°48.3	50.5	60°54.9	4.6'	23°41.3	10.4'	60.4
5	258°48.2	51.1	75°18.5	4.5'	23°51.6	10.2'	60.4
6 7	273°48.1 288°48.0	\$18°51.8 52.4	89°42.0 104°05.4	4.4' 4.4'	N24°01.9 24°11.9	10.0' 9.9'	60.4'
7 8	288 48.0 303°47.8	52.4 53.0	104°05.4 118°28.8	4.4	24°11.9 24°21.8	9.9 9.7'	60.3' 60.3'
9	318°47.7	53.6	110 20.0 132°52.1	4.3 4.2'	24°21.6	9.7 9.5'	60.3
10	333°47.6	54.2	147°15.3	4.1'	24°41.0	9.3'	60.3
11	348°47.5	54.8	161°38.4	4.1'	24°50.4	9.2'	60.2'
12	3°47.4	S18°55.4	176°01.5	4.0'	N24°59.5	9.0'	60.2'
13	18°47.3	56.1	190°24.5	4.0'	25°08.5	8.8'	60.2'
14 15	33°47.1 48°47.0	56.7 •• 57.3	204°47.5 219°10.4	3.9' 3.8'	25°17.3 25°25.9	8.6' 8.4'	60.2' 60.1'
16	48 47.0 63°46.9	57.9	219 10.4 233°33.2	3.8'	25 25.9 25°34.4	8.4 8.2'	60.1
17	78°46.8	58.5	247°56.0	3.7'	25°42.6	8.1	60.1
18	93°46.7	\$18°59.1	262°18.7	3.7'	N25°50.7	7.9'	60.1
19	108°46.5	18°59.7	276°41.4	3.6'	$25^{\circ}58.5$	7.7'	60.0'
20	123°46.4	19°00.3	291°04.0	3.6'	26°06.2	7.5'	60.0'
21	138°46.3	• • 00.9	305°26.5	3.5'	26°13.7	7.3'	60.0'
22 23	153°46.2 168°46.1	01.5 02.2	319°49.1 334°11.5	3.5' 3.4'	26°21.0 26°28.1	7.1' 6.9'	60.0' 59.9'
23	SD = 16.2'	d = 0.6'	334 11.5		D = 16.5'	0.9	59.9
	3D = 10.2	u = 0.0	-	31			

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	13-15	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	95-100%	
14	15:35	15:31	11:44	22:48	10:20		
15	15:26	15:20	11:45	23:46	11:17		
16	15:15	15:10	11:45	-:-	12:17		

## November 17, 18, 19 UT (Sun., Mon., Tue.)

h	Aries	Ve	nus	M	ars	Jup	iter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	56°32.7	139° 38.6	S25°34.7	290°01.5	N21°14.0	338°29.7	N22°16.6	71°41.2	S08°43.9			
1	71°35.1	154°37.8	34.6	305°03.3	14.0	353°32.5	16.5	86° 43.7	43.9	Alpheratz	357°34.7	29°13.9
2	86°37.6	169°37.0	34.5	320°05.2	14.0	8°35.3	16.5	101°46.1	43.9	Ankaa	353°07.0	-42°10.4
3	$101^{\circ}40.1$	184°36.2	• • 34.5	335°07.0	• • 13.9	23°38.1	• • 16.5	116°48.6	• • 43.9	Schedar Diphda	349°30.8 348°47.2	56°40.7 -17°51.0
4	116°42.5	199°35.3	34.4	350°08.8	13.9	38°40.8	16.5	131°51.1	43.9	Achernar	335° 19.8	-17 31.0 -57°06.7
5	131°45.0	214°34.5	34.3	5°10.7	13.8	53°43.6	16.5	146°53.5	43.9	Hamal	327°51.0	23°34.9
6	146°47.5	229°33.7	\$25°34.2	20°12.5	N21°13.8	68°46.4	N22°16.4	161°56.0	S08°43.9	Polaris	313°36.6	89°22.2
7 8	161°49.9 176°52.4	244°32.9 259°32.1	34.1 34.0	35°14.3 50°16.2	13.7 13.7	83° 49.2 98° 51.9	16.4	176° 58.4 192° 00.9	43.9 43.9	Acamar	315°11.4	-40°12.3
9	170 52.4 191°54.9	259 32.1 274°31.2	33.9	65°18.0	•• 13.7	96 51.9 113°54.7	16.4 •• 16.4	207°03.4	• 43.8	Menkar	314°06.0	4°11.3
10	206°57.3	289° 30.4	33.8	80°19.9	13.6	128° 57.5	16.4	222°05.8	43.8	Mirfak	308°28.0	49°57.0
11	221°59.8	304°29.6	33.7	95°21.7	13.6	144°00.3	16.3	237°08.3	43.8	Aldebaran	290°39.4	16°33.6
12	237°02.3	319°28.8	\$25°33.6	110°23.6	N21°13.5	159°03.0	N22°16.3	252°10.7	S08°43.8	Rigel Capella	281°03.7 280°21.7	-8°10.3 46°01.3
13	252°04.7	334°28.0	33.5	125°25.4	13.5	174°05.8	16.3	$267^{\circ}13.2$	43.8	Bellatrix	278° 22.7	6°22.4
14	267°07.2	349°27.1	33.4	140°27.2	13.5	189°08.6	16.3	282° 15.7	43.8	Elnath	278°01.7	28°37.7
15	282°09.6	4°26.3	• • 33.3	155°29.1	• • 13.4	204°11.4	. 16.2	297°18.1	• • 43.8	Alnilam	275°37.6	-1°11.1
16 17	297°12.1 312°14.6	19°25.5 34°24.7	33.2 33.1	170°30.9 185°32.8	13.4 13.3	219°14.1 234°16.9	16.2 16.2	312°20.6 327°23.0	43.8 43.8	Betelgeuse	270°52.0	7°24.8
18	312 14.0 327°17.0	49° 23.9	\$25°33.0	200°34.6	N21°13.3	249°19.7	N22°16.2	342°25.5	\$08°43.8	Canopus	263°52.0	-52°42.3
19	342°19.5	64°23.0	32.8	215°36.5	13.3	264°22.5	16.2	357°27.9	43.7	Sirius	258°26.1	-16°44.8
20	357°22.0	79°22.2	32.7	230°38.3	13.2	279°25.3	16.1	12°30.4	43.7	Adhara	255°05.7	-29°00.1
21	12°24.4	94°21.4	• • 32.6	245°40.2	• • 13.2	294°28.0	• • 16.1	27°32.9	• • 43.7	Procyon Pollux	244°50.8 243°17.3	5°09.7 27°57.9
22	27°26.9	$109^{\circ}20.6$	32.5	260°42.1	13.1	309°30.8	16.1	42°35.3	43.7	Avior	245 17.5 234°14.6	-59°35.0
23	42°29.4	124°19.8	32.4	275°43.9	13.1	324°33.6	16.1	57°37.8	43.7	Suhail	222°46.3	-43°31.6
Mer.n	ass. 20:11	ν-0.8' d-0	.1' m-4.11	$\nu 1.8' \ d-0$	.0′ m-0.22	ν2.8′ d-0.	.0′ m-2.77	$\nu 2.5' \ d-0$	.0′ m0.88	Miaplacidus	221°38.2	-69°48.7
										Alphard	217°47.9	-8°45.8
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.6	11°50.8
0	57°31.8	139° 19.0	S25° 32.3	290°45.8	N21°13.1	339°36.4	N22°16.1	72°40.2	S08°43.7	Dubhe	193°41.4	61°36.8
1	72°34.3	154° 18.1	32.2	305°47.6	13.0	354°39.1	16.0	87°42.7	43.7	Denebola	182°25.3	14°26.0
2	87°36.8	169°17.3	32.0	320°49.5	13.0	9°41.9	16.0	102°45.1	43.7	Gienah	175°43.9 173°00.8	-17°40.6 -63°13.9
3	$102^{\circ}39.2$	184°16.5	• • 31.9	$335^{\circ}51.3$	• • 13.0	24°44.7	• • 16.0	$117^{\circ}47.6$	• • 43.7	Acrux Gacrux	173 00.8 171°52.2	-03 13.9 -57°14.9
4	$117^{\circ}41.7$	$199^{\circ}15.7$	31.8	350°53.2	12.9	39°47.5	16.0	$132^{\circ}50.1$	43.7	Alioth	166° 13.5	55°49.3
5	132°44.1	214°14.9	31.7	5°55.1	12.9	54°50.3	16.0	147°52.5	43.6	Spica	158° 22.7	-11°17.4
6	147°46.6	229°14.1	\$25°31.6	20°56.9	N21°12.9	69°53.0	N22°15.9	162°55.0	S08°43.6	Alkaid	152°52.5	49°11.2
7 8	162°49.1 177°51.5	244°13.2 259°12.4	31.4 31.3	35°58.8 51°00.7	12.8 12.8	84°55.8 99°58.6	15.9 15.9	177° 57.4 192° 59.9	43.6	Hadar	148°36.8	-60°29.4
9	177 51.5 192°54.0	259 12.4 274° 11.6	31.2	66°02.5	12.7	99 56.0 115°01.4	15.9	208° 02.3	43.6 •• 43.6	Menkent	147°58.2	-36°29.4
10	207°56.5	289°10.8	31.0	81°04.4	12.7	130°04.2	15.8	223°04.8	43.6		145°48.4	19°03.2
11	222°58.9	304°10.0	30.9	96°06.3	12.7	145°06.9	15.8	238° 07.2	43.6	Rigil Kent.	139°41.2	-60°56.1
12	238°01.4	319°09.2	S25°30.8	111°08.1	N21°12.6	160°09.7	N22°15.8	253°09.7	S08°43.6	Kochab Zuben'ubi	137°20.9 136°56.5	74°03.1 -16°08.6
13	253°03.9	334°08.4	30.7	$126^{\circ}10.0$	12.6	$175^{\circ}12.5$	15.8	$268^{\circ}12.2$	43.6	Alphecca	130° 30.3 126° 04.2	26°37.9
14	268°06.3	349°07.5	30.5	141°11.9	12.6	190° 15.3	15.8	283°14.6	43.5	Antares	112° 16.4	-26°29.2
15	283°08.8	4°06.7	30.4	156°13.8	• • 12.5	205°18.1	• • 15.7	298°17.1	• • 43.5	Atria	107°11.3	-69°04.4
16	298°11.3	19°05.9	30.2	171°15.6 186°17.5	12.5	220°20.8 235°23.6	15.7	313° 19.5	43.5	Sabik	$102^{\circ}03.3$	-15°45.3
17 18	313°13.7 328°16.2	34°05.1 49°04.3	30.1 \$25°30.0	201°19.4	12.5 N21°12.4	250°26.4	15.7 N22°15.7	328°22.0 343°24.4	43.5 \$08° 43.5	Shaula	96°10.9	-37°07.3
19	343°18.6	64°03.5	29.8	216°21.3	12.4	265°29.2	15.6	358°26.9	43.5	Rasalhague	95°59.0	12°32.6
20	358°21.1	79°02.7	29.7	231°23.1	12.4	280°32.0	15.6	13° 29.3	43.5	Eltanin	90°42.7	51°29.2
21	13°23.6	94°01.8	• • 29.5	246°25.0	• • 12.3	295°34.8	• • 15.6	28°31.8	• • 43.5	Kaus Aust. Vega	83°33.0 80°33.6	-34°22.4 38°48.5
22	$28^{\circ}26.0$	$109^{\circ}01.0$	29.4	261°26.9	12.3	310°37.5	15.6	43°34.2	43.4	Nunki	75° 48.2	-26°16.0
23	43°28.5	124°00.2	29.3	276°28.8	12.3	325°40.3	15.6	58°36.7	43.4	Altair	62°00.3	8°56.1
Mer.p	ass. 20:07	$\nu$ -0.8' d-0	.1′ m-4.11	$\nu 1.9' \ d-0$	.0′ m-0.23	$\nu 2.8' \ d-0$	.0′ m-2.78	$\nu 2.5' \ d-0$	.0′ m0.88	Peacock	53°06.2	-56°39.5
<u>.</u>										Deneb	$49^{\circ}26.1$	45°22.4
Tuo	GHA	CHV	Doc	CHV	Doc	CHA	Dos	GHA	Dec	Enif	33°39.0	9°59.4
Tue 0	58°31.0	<b>GHA</b> 138°59.4	<b>Dec</b> \$25°29.1	<b>GHA</b> 291°30.7	<b>Dec</b> N21°12.3	<b>GHA</b> 340°43.1	<b>Dec</b> N22°15.5	73°39.1	S08° 43.4	Al Na'ir	27°33.0	-46°50.6
1	73°33.4	153°58.6	29.0	306°32.5	12.2	355° 45.9	15.5	88°41.6	43.4	Fomalhaut Scheat	15°14.6 13°45.2	-29°29.5 28°13.3
2	88°35.9	168°57.8	28.8	321°34.4	12.2	10°48.7	15.5	103°44.1	43.4	Markab	13° 29.9	26 13.3 15°20.5
3	103°38.4	183°57.0	• • 28.7	336°36.3	• • 12.2	25°51.5	•• 15.5	118° 46.5	• • 43.4			
4	118°40.8	198°56.2	28.5	351°38.2	12.1	40°54.2	15.5	133°49.0	43.4	Nov 17 Sun	SHA	Mer.pass
5	133°43.3	213°55.4	28.4	6°40.1	12.1	55°57.0	15.4	148°51.4	43.4	Venus	83°06.0	14:42
6	148°45.8	228°54.6	\$25° 28.2	21°42.0	N21°12.1	70°59.8	N22°15.4	163°53.9	\$08°43.4	Mars Jupiter	233°28.8 281°57.1	04:39 01:26
7 8	163°48.2 178°50.7	243°53.7 258°52.9	28.1 27.9	36°43.9 51°45.8	12.0 12.0	86°02.6 101°05.4	15.4 15.4	178°56.3 193°58.8	43.3 43.3	Saturn	281 57.1 15°08.5	19:10
9	176 50.7 193°53.1	256 52.9 273°52.1	•• 27.7	66°47.7	• • 12.0	101 05.4 116°08.2	15.3	209°01.2	43.3			
10	208°55.6	288°51.3	27.6	81°49.5	12.0	131°11.0	15.3	224°03.7	43.3	Nov 18 Mon	SHA	Mer.pass
11	223°58.1	303°50.5	27.4	96°51.4	11.9	146° 13.7	15.3	239°06.1	43.3	Venus	81°47.1	14:44
12	239°00.5	318°49.7	S25°27.3	111°53.3	N21°11.9	$161^{\circ}16.5$	N22°15.3	254°08.6	508°43.3	Mars Jupiter	233°13.9 282°04.5	04:36 01:21
13	254°03.0	333°48.9	27.1	126°55.2	11.9	176°19.3	15.3	269°11.0	43.3	Saturn	262 04.5 15°08.4	19:06
14	269°05.5	348°48.1	26.9	141°57.1	11.8	191°22.1	15.2	284°13.5	43.2			
15 16	284°07.9 299°10.4	3°47.3 18°46.5	· · 26.8 26.6	156°59.0 172°00.9	11.8	206°24.9 221°27.7	· · 15.2 15.2	299° 15.9 314° 18.4	· · 43.2 43.2	Nov 19 Tue	SHA	Mer.pass
17	299 10.4 314°12.9	18 46.5 33°45.7	26.4	172 00.9 187°02.8	11.8 11.8	221 27.7 236°30.5	15.2	314 18.4 329° 20.8	43.2	Venus Mars	80°28.4 232°59.7	14:45 04:33
18	329°15.3	48° 44.9	\$25°26.3	202°04.7	N21°11.7	251°33.2	N22°15.1	344°23.3	\$08°43.2	Jupiter	232°59.7 282°12.1	04:33
19	344°17.8	63°44.1	26.1	217°06.6	11.7	266°36.0	15.1	359°25.7	43.2	Saturn	15°08.2	19:02
20	359°20.3	78°43.2	25.9	232°08.5	11.7	281°38.8	15.1	14° 28.2	43.2			
21	14°22.7	93°42.4	• • 25.8	247°10.4	• • 11.7	296°41.6	• • 15.1	29°30.6	• • 43.2	Horizont	al parallax	0.1
22	29°25.2	108°41.6	25.6	262°12.4	11.6	311°44.4	15.1	44°33.1	43.1		Venus: Mars:	0.1 0.2
23	44°27.6	123°40.8	25.4	277°14.3	11.6	326°47.2	15.0	59° 35.5	43.1		ividi5.	0.2
Mer.p	ass. 20:03	$\nu$ -0.8′ d-0	.1′ m-4.12	$\nu$ 1.9′ d-0.	.0′ m-0.25	$\nu$ 2.8′ d-0	.0′ m-2.78	$\nu$ 2.5′ d-0	.0′ m0.89			

h	Sui	n	Moon				
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	183°45.9	S19°02.8	348°34.0	3.4'	N26°35.0	6.7'	59.9'
1 2	198°45.8 213°45.7	03.4 04.0	2°56.3 17°18.7	3.4' 3.3'	26°41.8 26°48.3	6.5' 6.3'	59.9' 59.9'
3	228°45.6	• • 04.6	31°41.0	3.3'	26°54.6	6.1	59.8'
4	243°45.4	05.2	46°03.3	3.3'	27°00.8	5.9'	59.8'
5	258°45.3	05.8	60°25.5	3.2'	27°06.7	5.7'	59.8'
6 7	273°45.2 288°45.1	\$19°06.4 07.0	74°47.8 89°10.0	3.2' 3.2'	N27°12.5 27°18.0	5.5' 5.3'	59.7' 59.7'
8	303°44.9	07.6	103°32.1	3.2'	27°23.3	5.1'	59.7'
9	318°44.8	•• 08.2	117°54.3	3.1'	27°28.5	4.9'	59.6'
10 11	333°44.7 348°44.6	08.8 09.4	132°16.4 146°38.6	3.1' 3.1'	27°33.4 27°38.2	4.7' 4.5'	59.6' 59.6'
12	3°44.4	S19°10.0	161°00.7	3.1'	N27°42.7	4.3	59.5
13	18°44.3	10.6	$175^{\circ}22.8$	3.1'	27°47.1	4.1'	59.5'
14	33°44.2	11.2	189°44.9 204°07.0	3.1'	27°51.2	3.9'	59.5'
15 16	48°44.0 63°43.9	· · 11.8 12.4	204 07.0 218°29.1	3.1' 3.1'	27°55.2 27°58.9	3.7' 3.5'	59.4' 59.4'
17	78°43.8	13.0	232°51.2	3.1'	28°02.5	3.3'	59.4'
18	93°43.7	S19°13.6	247°13.3	3.1'	N28°05.8	3.1'	59.3'
19 20	108°43.5 123°43.4	14.2 14.8	261°35.4 275°57.5	3.1' 3.1'	28°09.0 28°11.9	2.9' 2.7'	59.3' 59.3'
21	138°43.3	. 15.4	275° 37.5 290° 19.6	3.1'	28°14.6	2.7	59.3'
22	153°43.1	16.0	304°41.8	3.2'	28°17.2	2.3'	59.2'
23	168°43.0	16.5	319°03.9	3.2'	28°19.5	2.1'	59.2'
	SD = 16.2'	d = 0.6'		SI	O = 16.3'		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	183°42.9	\$19°17.1	333°26.1	3.2'	N28°21.7	1.9'	59.1'
1	198°42.7	17.7	347°48.3	3.2'	28°23.6	1.7'	59.1'
2	213°42.6 228°42.5	18.3 •• 18.9	2°10.6 16°32.8	3.3' 3.3'	28°25.3 28°26.9	1.5' 1.3'	59.1' 59.0'
3 4	243°42.3	19.5	30°55.1	3.3'	28°28.2	1.1'	59.0'
5	258°42.2	20.1	45°17.5	3.4'	28°29.4	0.9'	59.0'
6	273°42.1	S19°20.7	59°39.9	3.4'	N28°30.3	0.7'	58.9'
7 8	288°41.9 303°41.8	21.3 21.9	74°02.3 88°24.7	3.5' 3.5'	28°31.0 28°31.6	0.6' 0.4'	58.9' 58.9'
9	318°41.7	22.4	102°47.3	3.6'	28°32.0	0.2	58.8'
10	333°41.5	23.0	117°09.8	3.6'	28°32.1	-0.0'	58.8'
11 12	348°41.4 3°41.3	23.6 <b>S</b> 19°24.2	131°32.4 145°55.1	3.7' 3.7'	28°32.1 N28°31.9	-0.2' -0.4'	58.7' 58.7'
13	18°41.1	24.8	145 55.1 160°17.8	3.8'	28°31.4	-0.4 -0.6'	58.7'
14	33°41.0	25.4	174°40.6	3.8'	28°30.8	-0.8'	58.6'
15	48°40.9 63°40.7	· · 26.0 26.5	189°03.5 203°26.4	3.9' 4.0'	28°30.0 28°29.0	-1.0'	58.6'
16 17	78°40.6	20.5 27.1	203 26.4 217°49.3	4.0'	28°27.8	-1.2' -1.4'	58.6' 58.5'
18	93°40.4	S19°27.7	232°12.4	4.1'	N28°26.5	-1.6'	58.5'
19	108°40.3 123°40.2	28.3	246°35.5	4.2'	28°24.9	-1.7'	58.4'
20 21	123°40.2 138°40.0	28.9 •• 29.4	260°58.7 275°22.0	4.3° 4.4'	28°23.2 28°21.2	-1.9 -2.1'	58.4' 58.4'
22	153°39.9	30.0	289°45.3	4.4'	28°19.1	-2.3'	58.3'
23	168°39.8	30.6	304°08.8	4.5'	28°16.8	-2.5'	58.3'
	SD = 16.2'	d = 0.6'		SI	O = 16.1'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	183°39.6	S19°31.2	318°32.3	4.6'	N28°14.3	-2.7'	58.3'
1 2	198°39.5 213°39.3	31.7 32.3	332°55.9 347°19.6	4.7' 4.8'	28°11.7 28°08.8	-2.8' -3.0'	58.2' 58.2'
3	213 39.3 228°39.2	32.9	1°43.4	4.9	28°05.8	-3.0' -3.2'	58.1
4	243°39.0	33.5	$16^{\circ}07.2$	5.0'	28°02.6	-3.4'	58.1'
5	258°38.9 273°38.8	34.1 \$19°34.6	30°31.2 44°55.3	5.1' 5.2'	27°59.3 N27°55.7	-3.5'	58.1' 58.0'
6 7	273 36.6 288°38.6	35.2	59°19.4	5.2 5.3'	27°52.0	-3.7' -3.9'	58.0'
8	303°38.5	35.8	73°43.7	5.4'	27°48.1	-4.1'	57.9'
9	318°38.3	• • 36.3	88°08.0	5.5'	27°44.1	-4.2'	57.9'
10 11	333°38.2 348°38.0	36.9 37.5	102°32.5 116°57.1	5.6' 5.7'	27°39.9 27°35.5	-4.4' -4.6'	57.9' 57.8'
12	3°37.9	S19°38.1	131°21.7	5.8'	N27°30.9	-4.7'	57.8'
13	18°37.8	38.6	145°46.5	5.9'	27°26.2	-4.9'	57.8'
14 15	33°37.6 48°37.5	39.2 •• 39.8	160°11.4 174°36.4	6.0' 6.1'	27°21.3 27°16.3	-5.0' -5.2'	57.7' 57.7'
16	63°37.3	40.3	174 30.4 189°01.5	6.2	27°11.1	-5.2 -5.4'	57.7 57.6'
17	78°37.2	40.9	203°26.7	6.3'	27°05.7	-5.5'	57.6'
18	93°37.0	S19°41.5	217°52.0	6.4'	N27°00.2	-5.7'	57.6'
19 20	108°36.9 123°36.7	42.0 42.6	232°17.5 246°43.0	6.6' 6.7'	26°54.6 26°48.7	-5.8' -6.0'	57.5' 57.5'
21	138°36.6	• • 43.2	261°08.7	6.8'	26°42.8	-6.1'	57.4'
22	153°36.4	43.7	275°34.5	6.9'	26°36.7	-6.3'	57.4'
23	168°36.3	44.3	290°00.4	7.0'	26°30.4	-6.4'	57.4'
	SD = 16.2'	d = 0.6'		SI	D = 15.9'		

N 72°         07:12         08:51         ■         14:39         16:18           N 70°         07:00         08:25         10:14         13:16         15:05         16:29           68°         06:51         08:05         09:29         14:00         15:24         16:39           66°         06:42         07:50         09:00         14:29         15:40         16:47           64°         06:35         07:37         08:38         14:51         15:53         16:54           62°         06:29         07:26         08:21         15:09         16:04         17:00           60°         06:24         07:16         08:06         15:23         16:14         17:06           N 58°         06:19         07:08         07:54         15:36         16:22         17:11           56°         06:14         07:01         07:43         15:46         16:29         17:16           54°         06:10         06:54         07:34         15:56         16:36         17:20           52°         06:06         06:48         07:26         16:04         16:42         17:24           45°         05:54         06:30         07:02	Lat.	Twi	light	Sunrise	Sunset	Twi	light
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	N 72°	07:12	08:51			14:39	16:18
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$N 70^{\circ}$	07:00	08:25	10:14	13:16	15:05	16:29
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		06:51	08:05	09:29	14:00	15:24	16:39
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		06:42	07:50	09:00	14:29	15:40	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		06:35	07:37	08:38	14:51	15:53	16:54
N 58°         06:19         07:08         07:54         15:36         16:22         17:11           56°         06:14         07:01         07:43         15:46         16:29         17:16           54°         06:10         06:54         07:34         15:56         16:36         17:20           52°         06:06         06:48         07:26         16:04         16:42         17:24           50°         06:03         06:42         07:18         16:12         16:48         17:27           45°         05:54         06:30         07:02         16:28         17:00         17:36           N 40°         05:47         06:20         06:49         16:41         17:10         17:43							
56°         06:14         07:01         07:43         15:46         16:29         17:16           54°         06:10         06:54         07:34         15:56         16:36         17:20           52°         06:06         06:48         07:26         16:04         16:42         17:24           50°         06:03         06:42         07:18         16:12         16:48         17:27           45°         05:54         06:30         07:02         16:28         17:00         17:36           N 40°         05:47         06:20         06:49         16:41         17:10         17:43	60°	06:24	07:16	08:06	15:23	16:14	17:06
54°         06:10         06:54         07:34         15:56         16:36         17:20           52°         06:06         06:48         07:26         16:04         16:42         17:24           50°         06:03         06:42         07:18         16:12         16:48         17:27           45°         05:54         06:30         07:02         16:28         17:00         17:36           N 40°         05:47         06:20         06:49         16:41         17:10         17:43	<b>N</b> 58°	06:19	07:08	07:54	15:36	16:22	17:11
52°         06:06         06:48         07:26         16:04         16:42         17:24           50°         06:03         06:42         07:18         16:12         16:48         17:27           45°         05:54         06:30         07:02         16:28         17:00         17:36           N 40°         05:47         06:20         06:49         16:41         17:10         17:43		06:14		07:43	15:46	16:29	
50° 06:03 06:42 07:18 16:12 16:48 17:27 45° 05:54 06:30 07:02 16:28 17:00 17:36 <b>N</b> 40° 05:47 06:20 06:49 16:41 17:10 17:43					l		
45°   05:54   06:30   07:02   16:28   17:00   17:36   N 40°   05:47   06:20   06:49   16:41   17:10   17:43							
<b>N</b> 40° 05:47 06:20 06:49 16:41 17:10 17:43					l		
		05:54	06:30	07:02	16:28	17:00	17:36
	35°	05:40	06:11	06:38	16:52	17:20	17:50
30° 05:33 06:02 06:28 17:02 17:28 17:57							
20° 05:21 05:47 06:11 17:20 17:43 18:10							
N 10° 05:08 05:34 05:56 17:35 17:57 18:22							
0° 04:54 05:20 05:42 17:49 18:11 18:36		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 18:42 19:11							
30° 03:56 04:28 04:54 18:37 19:03 19:35							
35° 03:41 04:16 04:44 18:47 19:15 19:50							
40° 03:23 04:01 04:32 18:59 19:30 20:08							
45° 02:59 03:43 04:18 19:13 19:48 20:32					ł		
<b>S</b> 50° 02:27 03:21 04:00 19:31 20:11 21:05							
52° 02:10 03:09 03:52 19:39 20:22 21:22							
54° 01:49 02:57 03:43 19:49 20:35 21:44					1		
56° 01:21 02:42 03:32 19:59 20:51 22:13		-					
58° 00:36 02:24 03:21 20:11 21:09 23:03					1		
<b>S</b> 60° //// 02:02 03:07 20:26 21:32 ////	<b>5</b> 60°	////	02:02	03:07	20:26	21:32	1///

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

		Sun		Moon				
Day	Eqn.of Time		Eqn.of Time Mer. Mer.Pass.		Pass.	Age		
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	16-18		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	98-87%		
17	15:04	14:58	11:45	00:48	13:19			
18	14:52	14:45	11:45	01:51	14:22			
19	14:38	14:32	11:45	02:53	15:22			

## November 20, 21, 22 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	59°30.1	138°40.0	\$25°25.2	292°16.2	N21°11.6	341°50.0	N22°15.0	74° 38.0	508°43.1			
1	74°32.6	153°39.2	25.0	307°18.1	11.6	356° 52.8	15.0	89°40.4	43.1	Alpheratz	357°34.7	29°13.9
2	89°35.0	168°38.4	24.9	322°20.0	11.5	11°55.5	15.0	104°42.9	43.1	Ankaa	353°07.0	-42°10.4
3	104°37.5	183°37.6	• • 24.7	337°21.9	• • 11.5	26°58.3	• • 14.9	119°45.3	• • 43.1	Schedar	349°30.8	56°40.7
4	119°40.0	198°36.8	24.5	352°23.8	11.5	42°01.1	14.9	134°47.8	43.1	Diphda Achernar	348°47.2 335°19.8	-17°51.0 -57°06.7
5	134°42.4	213°36.0	24.3	7°25.7	11.5	57°03.9	14.9	149°50.2	43.0	Hamal	327°51.0	23°34.9
6	149°44.9	228°35.2	S25°24.1	22°27.7	N21°11.4	72°06.7	N22°14.9	164°52.7	S08°43.0	Polaris	313°36.5	89°22.2
7	164°47.4	243°34.4	24.0	37°29.6	11.4	87°09.5	14.9	179°55.1	43.0	Acamar	315°11.4	-40°12.3
8	179°49.8	258°33.6	23.8	52°31.5	11.4	102°12.3	14.8	194°57.6	43.0	Menkar	314°06.0	4°11.3
9	194°52.3 209°54.8	273°32.8	• • 23.6	67°33.4	• • 11.4	117°15.1	• • 14.8	210°00.0 225°02.5	• • 43.0	Mirfak	308°27.9	49°57.1
10 11	209 54.6 224°57.2	288°32.0 303°31.2	23.4 23.2	82°35.3 97°37.2	11.4 11.3	132° 17.9 147° 20.7	14.8 14.8	240°04.9	43.0 43.0	Aldebaran	290°39.4	16°33.6
12	239°59.7	318° 30.4	\$25°23.0	112°39.2	N21°11.3	162°23.4	N22°14.7	255°07.3	508°42.9	Rigel	281°03.7	-8°10.3
13	255°02.1	333°29.6	22.8	127°41.1	11.3	177° 26.2	14.7	270°09.8	42.9	Capella	280°21.6	46°01.3
14	270°04.6	348°28.8	22.6	142°43.0	11.3	192°29.0	14.7	285°12.2	42.9	Bellatrix	278°22.7	6°22.4
15	$285^{\circ}07.1$	3°28.0	• • 22.4	157°44.9	• • 11.2	207°31.8	• • 14.7	300°14.7	• • 42.9	Elnath Alnilam	278°01.7	28°37.7 -1°11.1
16	300°09.5	18°27.2	22.2	172°46.9	11.2	222°34.6	14.7	$315^{\circ}17.1$	42.9	Betelgeuse	275°37.6 270°51.9	7°24.8
17	315°12.0	33°26.4	22.0	187°48.8	11.2	237° 37.4	14.6	330°19.6	42.9	Canopus	263°52.0	-52° 42.3
18	330°14.5	48°25.6	S25°21.8	202°50.7	N21°11.2	252°40.2	N22°14.6	345°22.0	S08°42.9	Sirius	258°26.1	-16°44.8
19	345°16.9	63°24.8	21.6	217°52.7	11.2	267°43.0	14.6	0°24.5	42.8	Adhara	255°05.7	-29°00.1
20	0°19.4	78°24.0	21.4	232°54.6	11.1	282°45.8	14.6	15°26.9	42.8	Procyon	244°50.8	5°09.7
21	15°21.9 30°24.3	93°23.2 108°22.4	• • 21.2	247°56.5	• • 11.1	297°48.6 312°51.4	• • 14.5	30° 29.4 45° 31.8	• • 42.8	Pollux	243°17.2	27°57.9
22 23	30 24.3 45°26.8	106 22.4 123°21.6	21.0 20.8	262°58.5 278°00.4	11.1 11.1	312 51.4 327°54.1	14.5 14.5	60°34.2	42.8 42.8	Avior	$234^{\circ}14.5$	-59°35.0
23	45 20.6									Suhail	222°46.3	-43°31.7
_Mer.p	ass. 19:59	$\nu$ -0.8' d-0	).2′ m-4.12	$\nu 1.9' \ d-0$	.0′ m-0.27	$\nu 2.8' \ d-0$	.0′ m-2.78	$\nu$ 2.4′ d-0	.0′ m0.89	Miaplacidus	221°38.1	-69°48.8
										Alphard	217°47.8 207°34.6	-8°45.8
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	207 34.6 193°41.3	11°50.8 61°36.8
0	60°29.3	$138^{\circ}20.8$	\$25°20.6	293°02.3	N21°11.1	342°56.9	N22°14.5	75°36.7	S08°42.8	Denebola	182°25.2	14° 26.0
1	75°31.7	153°20.0	20.4	308°04.3	11.1	357°59.7	14.4	90°39.1	42.7	Gienah	175°43.9	-17°40.6
2	90°34.2	168° 19.2	20.2	323°06.2	11.0	13°02.5	14.4	105°41.6	42.7	1	173°00.7	-63°13.9
3	105°36.6	183°18.4	• • 20.0	338°08.1	•• 11.0	28°05.3	• • 14.4	120°44.0	• • 42.7	Gacrux	171°52.2	-57°14.9
4	120°39.1 135°41.6	198°17.6	19.8	353°10.1	11.0	43°08.1	14.4 14.4	135° 46.5	42.7	Alioth	$166^{\circ}13.5$	55°49.3
5 6	150°44.0	213°16.8 228°16.1	19.6 \$25°19.4	8°12.0 23°14.0	11.0 N21°11.0	58° 10.9 73° 13.7	N22°14.3	150°48.9 165°51.4	42.7 \$08° 42.7	Spica	158°22.7	-11°17.4
7	165°46.5	243° 15.3	19.1	38°15.9	10.9	88° 16.5	14.3	180°53.8	42.6	Alkaid	152°52.5	49°11.2
8	180°49.0	258° 14.5	18.9	53°17.8	10.9	103° 19.3	14.3	195°56.2	42.6	Hadar	148°36.8	-60°29.4
9	195°51.4	273°13.7	• • 18.7	68°19.8	. 10.9	118° 22.1	14.3	210°58.7	• • 42.6	Menkent	147°58.2	-36°29.4
10	210°53.9	$288^{\circ}12.9$	18.5	83°21.7	10.9	133°24.9	14.2	226°01.1	42.6	Arcturus Rigil Kent.	145°48.3 139°41.1	19°03.2 -60°56.1
11	225°56.4	303°12.1	18.3	98°23.7	10.9	148° 27.7	14.2	241°03.6	42.6	Kochab	137°20.9	74°03.0
12	240°58.8	318°11.3	S25°18.0	113°25.6	N21°10.9	163°30.5	N22°14.2	256°06.0	S08°42.6	Zuben'ubi	136°56.5	-16°08.6
13	256°01.3	333°10.5	17.8	128°27.6	10.9	178°33.3	14.2	271°08.5	42.5	Alphecca	$126^{\circ}04.2$	26°37.9
14	271°03.7 286°06.2	348°09.7 3°08.9	17.6	143°29.5	10.8	193°36.1 208°38.9	14.1	286°10.9 301°13.3	42.5	Antares	$112^{\circ}16.4$	-26°29.2
15 16	301°08.7	3 06.9 18°08.1	· · 17.4 17.1	158°31.5 173°33.4	· · 10.8 10.8	206 36.9 223°41.7	· · 14.1 14.1	316° 15.8	•• 42.5 42.5	Atria	107°11.3	-69°04.3
17	316°11.1	33°07.3	16.9	188°35.4	10.8	238° 44.4	14.1	331°18.2	42.5	Sabik	102°03.3	-15°45.3
18	331°13.6	48°06.5	\$25° 16.7	203°37.4	N21°10.8	253°47.2	N22°14.1	346° 20.7	S08°42.5	Shaula	96°10.9 95°59.0	-37°07.3 12°32.6
19	$346^{\circ}16.1$	63°05.8	16.5	218°39.3	10.8	268°50.0	14.0	1°23.1	42.4	Rasalhague Eltanin	95° 59.0 90° 42.7	51° 29.2
20	1°18.5	78°05.0	16.2	233°41.3	10.8	283°52.8	14.0	16°25.6	42.4	Kaus Aust.	83°33.0	-34°22.4
21	16°21.0	93°04.2	• • 16.0	248°43.2	• • 10.8	298°55.6	• • 14.0	31°28.0	• • 42.4	Vega	80°33.7	38° 48.5
22	31°23.5	108°03.4	15.8	263°45.2	10.7	313°58.4	14.0	46°30.4	42.4	Nunki	75°48.2	-26°16.0
23	46°25.9	123°02.6	15.5	278°47.2	10.7	329°01.2	13.9	61°32.9	42.4	Altair	62°00.3	8°56.1
Mer.p	ass. 19:55	$\nu$ -0.8' d-0	).2′ m-4.13	$\nu$ 1.9′ d-0.	.0′ m-0.29	$\nu$ 2.8′ d-0.	.0′ m-2.79	$\nu$ 2.4′ d-0	.0′ m0.90	Peacock	53°06.2	-56° 39.5
										Deneb	49°26.1	45°22.4
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.0	9°59.4
0	61°28.4	138° 01.8	\$25°15.3	293°49.1	N21° 10.7	344°04.0	N22°13.9	76°35.3	508° 42.4	Al Na'ir Fomalhaut	27°33.1	-46°50.6 -29°29.5
1	76°30.9	153°01.0	15.1	308°51.1	10.7	359°06.8	13.9	91°37.8	42.3		15°14.6	
2	91°33.3	168°00.2	14.8	323°53.0	10.7	14°09.6	13.9	106°40.2	42.3	Scheat Markab	13°45.2 13°29.9	28°13.3 15°20.5
3	$106^{\circ}35.8$	182°59.4	• • 14.6	338°55.0	• 10.7	29°12.4	• • 13.8	121°42.6	• • 42.3			
4	121°38.2	$197^{\circ}58.7$	14.3	353°57.0	10.7	44° 15.2	13.8	$136^{\circ}45.1$	42.3	Nov 20 Wed	SHA	Mer.pass
5	136°40.7	212°57.9	14.1	8°58.9	10.7	59° 18.0	13.8	151° 47.5	42.3	Venus	79°09.9	14:46
6	151°43.2	227°57.1	S25°13.9	24°00.9	N21°10.7	74°20.8	N22°13.8	166°50.0	S08°42.3		232°46.1	04:30
7	166°45.6	242°56.3	13.6	39°02.9	10.6	89°23.6	13.8	181°52.4	42.2	Jupiter Saturn	282°19.9 15°07.9	01:12
8	181°48.1	257°55.5	13.4	54°04.9	10.6	104°26.4	13.7	196°54.8	42.2	Saturn	15 07.9	18:58
9 10	196°50.6 211°53.0	272°54.7 287°53.9	· · 13.1 12.9	69°06.8 84°08.8	· · 10.6 10.6	119°29.2 134°32.0	· · 13.7 13.7	211°57.3 226°59.7	•• 42.2 42.2	Nov 21 Thu	SHA	Mer.pass
11	226°55.5	302°53.2	12.6	99°10.8	10.6	149°34.8	13.7	242°02.2	42.2	Venus	77°51.6	14:47
12	241°58.0	317°52.4	\$25° 12.4	114°12.8	N21°10.6	164°37.6	N22°13.6	257°04.6	S08°42.2	1	232°33.1	04:27
13	257°00.4	$332^{\circ}51.6$	12.1	$129^{\circ}14.7$	10.6	179°40.4	13.6	272°07.0	42.1	Jupiter Saturn	282°27.7 15°07.4	01:08
14	272°02.9	347°50.8	11.9	144°16.7	10.6	194°43.2	13.6	287°09.5	42.1	Saturn	10 01.4	18:54
15	287°05.4	2°50.0	• • 11.6	159°18.7	• • 10.6	209°46.0	• • 13.6	302°11.9	• • 42.1	Nov 22 Fri	SHA	Mer.pass
16	302°07.8	17°49.2	11.3	174°20.7	10.6	224°48.8	13.5	317°14.3	42.1	Venus	76°33.4	14:49
17	317°10.3	32°48.5	11.1	189°22.7	10.6	239°51.6	13.5	332°16.8	42.1	Mars		04:24
18 19	332°12.7 347°15.2	47° 47.7 62° 46.9	\$25°10.8 10.6	204°24.6 219°26.6	N21°10.6 10.6	254° 54.4 269° 57.2	N22°13.5 13.5	347°19.2 2°21.7	\$08° 42.0 42.0		282°35.6	01:04
20	2°17.7	77°46.1	10.0	219 20.0 234°28.6	10.6	285°00.0	13.5	2 21.7 17°24.1	42.0	Saturn	15°06.9	18:51
21	17°20.1	92°45.3	. 10.1	249°30.6	• 10.5	300°02.8	13.4	32°26.5	• • 42.0	Horizont	al parallax	
22	$32^{\circ}22.6$	107°44.6	09.8	264°32.6	10.5	315°05.6	13.4	47°29.0	42.0		Venus:	0.1
23	47°25.1	122°43.8	09.5	279°34.6	10.5	330°08.4	13.4	62°31.4	41.9		Mars:	0.2
Mer.n	ass. 19:51	ν-0.8′ d-0	).2′ m-4.14	ν2.0′ d-0	.0′ m-0.31	ν2.8′ d-0	.0′ m-2.79	$\nu 2.4' \ d-0$	.0′ m0.90			

h	Sui	า					
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	183°36.1	S19°44.9	304°26.4	7.1'	N26°24.0	-6.6'	57.3'
1 2	198° 36.0 213° 35.8	45.4 46.0	318°52.6 333°18.8	7.3' 7.4'	26°17.4 26°10.7	-6.7' -6.8'	57.3' 57.3'
3	228° 35.7	• • 46.5	347°45.2	7.5'	26°03.9	-7.0'	57.2'
4	243°35.5	47.1	$2^{\circ}11.7$	7.6'	25°56.9	-7.1'	57.2'
5	258° 35.4	47.7	16°38.4	7.8'	25°49.8	-7.3'	57.1'
6 7	273°35.2 288°35.1	\$19°48.2 48.8	31°05.1 45°32.0	7.9' 8.0'	N25°42.5 25°35.2	-7.4' -7.5'	57.1' 57.1'
8	303°34.9	49.3	59°59.0	8.1	25°27.6	-7.7'	57.0'
9	318° 34.8	• • 49.9	74°26.1	8.2'	25°20.0	-7.8'	57.0'
10 11	333°34.6 348°34.5	50.4 51.0	88°53.4 103°20.7	8.4' 8.5'	25°12.2 25°04.3	-7.9' -8.0'	57.0' 56.9'
12	3°34.3	\$1.0 \$19°51.6	103 20.7 117°48.2	8.6'	25 04.3 N24°56.3	-8.2'	56.9
13	18°34.2	52.1	132°15.8	8.7'	24°48.1	-8.3'	56.8'
14	33°34.0	52.7	146°43.6	8.9'	24°39.8	-8.4'	56.8'
15 16	48°33.9 63°33.7	· · 53.2 53.8	161°11.4 175°39.4	9.0' 9.1'	24°31.4 24°22.9	-8.5' -8.6'	56.8' 56.7'
17	78° 33.6	54.3	190°07.6	9.2'	24°14.3	-8.8'	56.7'
18	93°33.4	S19°54.9	204°35.8	9.4'	N24°05.5	-8.9'	56.7'
19	108°33.2 123°33.1	55.4 56.0	219°04.2 233°32.7	9.5'	23°56.6 23°47.7	-9.0' -9.1'	56.6'
20 21	123°33.1 138°32.9	56.0 •• 56.5	233° 32.7 248° 01.3	9.6' 9.7'	23°47.7 23°38.6	-9.1' -9.2'	56.6' 56.6'
22	153°32.8	57.1	262°30.0	9.9'	23°29.3	-9.3	56.5'
23	168°32.6	57.6	276°58.9	10.0'	23°20.0	-9.4'	56.5'
	SD = 16.2'	d = 0.6'		SI	O = 15.6'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	183°32.5	S19°58.2	$291^{\circ}27.9$	10.1'	N23°10.6	-9.5'	56.4
1	198°32.3	58.7	305°57.0	10.2'	23°01.1	-9.6'	56.4'
2 3	213°32.1 228°32.0	59.3 19°59.8	320°26.2 334°55.5	10.4' 10.5'	22°51.5 22°41.7	-9.7' -9.8'	56.4' 56.3'
4	243°31.8	20°00.4	349° 25.0	10.5	22°31.9	-9.8 -9.9'	56.3
5	258°31.7	00.9	3°54.6	10.7'	22°22.0	-10.0'	56.3'
6	273°31.5	S20°01.5	18°24.3	10.8'	N22°11.9	-10.1'	56.2'
7 8	288°31.4 303°31.2	02.0 02.5	32°54.1 47°24.1	11.0' 11.1'	22°01.8 21°51.6	-10.2' -10.3'	56.2' 56.2'
9	318° 31.0	03.1	61°54.2	11.2'	21°41.3	-10.4	56.1
10	333°30.9	03.6	76°24.4	11.3'	21°30.9	-10.5'	56.1'
11 12	348°30.7 3°30.5	04.2 <b>5</b> 20°04.7	90°54.7 105°25.1	11.4' 11.5'	21°20.4 N21°09.8	-10.6' -10.7'	56.1' 56.0'
13	18° 30.4	05.2	105 25.1 119°55.6	11.7	20°59.1	-10.7 -10.8'	56.0'
14	33°30.2	05.8	134°26.3	11.8'	20°48.3	-10.8'	56.0'
15	48°30.1 63°29.9	• • 06.3	148°57.0 163°27.9	11.9'	20°37.5 20°26.6	-10.9'	55.9'
16 17	78° 29.7	06.9 07.4	163° 27.9 177° 58.9	12.0' 12.1'	20°26.6 20°15.6	-11.0' -11.1'	55.9' 55.9'
18	93°29.6	S20°07.9	192°30.0	12.2'	N20°04.5	-11.2'	55.8'
19	108°29.4	08.5	207°01.2	12.3'	19°53.3	-11.2'	55.8'
20 21	123°29.2 138°29.1	09.0 •• 09.5	221°32.6 236°04.0	12.4' 12.5'	19°42.1 19°30.7	-11.3' -11.4'	55.8' 55.8'
22	153° 28.9	10.1	250° 35.5	12.6'	19° 19.3	-11.5'	55.7'
23	168°28.7	10.6	265°07.2	12.8'	19°07.9	-11.5'	55.7'
	SD = 16.2'	d = 0.5'		SI	O = 15.4'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°28.6	S20°11.1	279°38.9	12.9'	N18°56.3	-11.6'	55.7'
1 2	198° 28.4 213° 28.3	11.7 12.2	294°10.8 308°42.8	13.0' 13.1'	18°44.7 18°33.0	-11.7' -11.8'	55.6' 55.6'
3	213° 28.3 228° 28.1	12.2	308°42.8 323°14.8	13.1	18° 33.0 18° 21.3	-11.8'	55.6'
4	243°27.9	13.3	337°47.0	13.3'	18°09.5	-11.9'	55.5'
5	258° 27.7	13.8	352°19.3	13.4'	17°57.6	-11.9'	55.5'
6 7	273°27.6 288°27.4	\$20°14.3 14.9	6°51.6 21°24.1	13.5' 13.6'	N17°45.6 17°33.6	-12.0' -12.1'	55.5' 55.5'
8	303°27.2	15.4	35°56.7	13.7'	17°21.5	-12.1'	55.4'
9	318°27.1	•• 15.9	50°29.3	13.8'	17°09.4	-12.2'	55.4'
10 11	333°26.9 348°26.7	16.4 17.0	65°02.1 79°34.9	13.9' 13.9'	16°57.2 16°45.0	-12.3' -12.3'	55.4' 55.3'
11	348° 26.7 3° 26.6	17.0 \$20°17.5	79°34.9 94°07.9	14.0'	N16°32.6	-12.3' -12.4'	55.3'
13	18°26.4	18.0	108°40.9	14.1'	16°20.3	-12.4'	55.3'
14	33°26.2	18.5	123°14.1	14.2'	16°07.8	-12.5'	55.3'
15 16	48° 26.1 63° 25.9	· · 19.1 19.6	137°47.3 152°20.6	14.3' 14.4'	15°55.4 15°42.8	-12.5' -12.6'	55.2' 55.2'
17	78°25.7	20.1	166° 54.0	14.5	15°30.2	-12.6'	55.2'
18	93°25.5	\$20°20.6	181°27.5	14.6'	N15°17.6	-12.7'	55.2'
19 20	108° 25.4 123° 25.2	21.1 21.7	196°01.0 210°34.7	14.7' 14.7'	15°04.9 14°52.2	-12.7' -12.8'	55.1' 55.1'
21	138° 25.0	22.2	210 34.7 225°08.4	14.7	14 52.2 14°39.4	-12.8'	55.1'
22	153°24.8	22.7	239°42.2	14.9'	14°26.6	-12.9'	55.1'
23	168°24.7	23.2	254°16.1	15.0'	14°13.7	-12.9'	55.0'
	SD = 16.2'	d = 0.5'		SI	D = 15.2'		

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

Lat.	Moonrise			Moonset			
Lat.	Wed	Thu	Fri	Wed	Thu	Fri	
N 72°			20:23			15:49	
<b>N</b> 70°			20:57			15:13	
68°		19:00	21:21		15:34	14:47	
66°		19:40	21:40		14:53	14:27	
64°	17:59	20:07	21:54	14:49	14:25	14:11	
62°	18:37	20:28	22:07	14:10	14:03	13:58	
60°	19:05	20:44	22:17	13:42	13:46	13:46	
N 58°	19:26	20:58	22:26	13:20	13:31	13:36	
56°	19:43	21:11	22:34	13:03	13:18	13:28	
54°	19:57	21:21	22:41	12:48	13:07	13:20	
52°	20:10	21:30	22:47	12:34	12:57	13:13	
50°	20:21	21:39	22:53	12:23	12:48	13:06	
45°	20:44	21:56	23:05	11:59	12:29	12:53	
<b>N</b> 40°	21:03	22:10	23:15	11:39	12:14	12:41	
35°	21:18	22:22	23:23	11:23	12:01	12:32	
30°	21:31	22:33	23:31	11:09	11:49	12:23	
20°	21:54	22:51	23:44	10:45	11:29	12:08	
N 10°	22:13	23:06	23:55	10:24	11:12	11:55	
0°	22:32	23:21		10:04	10:56	11:43	
<b>S</b> 10°	22:50	23:35		09:44	10:39	11:30	
20°	23:09	23:50		09:23	10:22	11:17	
30°	23:31	•• ••	80:00	08:58	10:01	11:01	
35°	23:44	•• ••	00:18	08:43	09:49	10:52	
40°	23:59	•• ••	00:30	08:26	09:35	10:42	
45°		00:17	00:43	08:06	09:19	10:30	
<b>S</b> 50°	00:09	00:38	00:59	07:40	08:58	10:15	
52°	00:22	00:49	01:07	07:27	08:48	10:08	
54°	00:37	01:00	01:16	07:12	08:37	10:00	
56°	00:54	01:14	01:25	06:55	08:25	09:51	
58°	01:15	01:29	01:36	06:35	08:10	09:41	
<b>S</b> 60°	01:42	01:47	01:48	06:08	07:52	09:30	

## November 23, 24, 25 UT (Sat., Sun., Mon.)

Section   CHA	h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
0	Sat	GHA	GHA	Dec			GHA	Dec	GHA	Dec		SHA	Dec
1 77730   15742   200													
2 927325   167744   077 927406   105   15760   133   107307   419   Access   107407   107408   107407   107408   107407   107408   107407   107408   107407   107408   107407   107408   107407   107408   107407   107408   107407   107408											Alpheratz		I
3											1		
Color													I
Section   Color   Co													
Color	5												
Fig.   167-46.8   242-77.0   07.4   99-90.5   20.5   99-90.8   13.2   132-75.3   41.6   Morella   137-31.4   41.6   13	6								167°48.5		1		
10   127-202   267-303   605   847-55   603   103-562   1.12   227-516   1.12	7	167°44.8	242°37.6	07.4	39°50.5	10.5	90°30.8	13.2	182°50.9	41.8			
19   19   19   19   19   19   19   19	8	182°47.2		07.1	54°52.5	10.5	105°33.6	13.2	197°53.3	41.8			
10   127-192.2   207-195.2   207-195.2   207-195.3	9			• • 06.8		• • 10.5		• • 13.1		• • 41.8	1		
13   2579   18   279													
14   277   27   27   27   27   27   27													
14   15   16   16   16   16   16   16   16											_		
15   15   16   16   16   16   16   16													
19 303'07.0 4 32'28.6 0.48 175'88.6 10.5 225'86.1 13.0 318'128 41.6 600.8 10.5 125'84.1 13.0 318'128 41.6 600.8 10.5 125'84.1 13.0 318'128 41.6 600.8 10.5 125'84.1 13.0 318'128 41.6 600.8 125'84.1 13.0 318'84.1 125'21.1 13.0 318'84.1 13.0 318'84.1 125'21.1 13.0 318'84.1 125'21.1 13.0 318'84.1											Elnath	278°01.7	28°37.7
18 383°94 97 47°261 52°043 20°16.0 190°10.0 10.5 20°16.9 12.9 33°15.2 41.0 190°10.0											Alnilam	275°37.5	
183 333"11.9 4"291 52"04.3 209"12.6 N2"10.5 25"01.7 N2"12.9 33"01.1 N2"12.9 3"01.1 14.6 A. S.											Betelgeuse		
19													
20   3168   377275   037   235*16.6   10.5   236*07.3   12.9   18*22.5   41.5   Percent   24*15.7   22.3   33*21.7   107*26.0   031   265*20.7   10.5   31*15.2   12.8   33*25.0   41.5   Percent   24*15.7   27*37.7   23.3 *27*27   22.3 *3*21.7   107*26.0   031   265*20.7   10.5   31*15.7   11.8   63*29.8   41.5   Percent   24*15.7   Avior   23*16.5   23*31.3   23*20.3   41.5   Percent   24*15.7   Avior   23*16.5   Percent   24*15.7   Avior   23*16.5   Percent   24*15.7   Avior   23*16.5   Percent   24*15.7   Percent   2											1		
23 3 3"21,7 107"260 0.33 25"207 10.5 30"120.1 12.8 46"37.9 41.5 Suhall 22"6.3 3"6"20.7 10.5 30"120.7 12.8 46"34.2 41.5 Suhall 22"6.3 46"24.2 12"6.5 99"35.0 Mer. pass. 1947													
Main   Main											1		
Mer. pass. 194   122   22   22   23   390   22   40   30   331   125   31   125   31   125   31   31   32   32   40   32   32   32   32   32   32   32   3	22	33°21.7	107°26.0	03.1	265°20.7	10.5	$316^{\circ}12.9$	12.8	48°27.4	41.5	1		
Misplacide   Mi	23	48°24.2	$122^{\circ}25.2$	02.8	280°22.7	10.5	331°15.7	12.8	63°29.8	41.5	I		
Sm GHA GHA GHA Dec GHA DEC GH	Morn	ass 10·17	ν-0 8 <sup>7</sup> 4 0	13' m-/ 1/	1/2 n/ d n	U, m-U 33	1/2 8/ d n	0' m-2 70	1/2 // 4 0	0' m0 01	1		
Sun   GHA   CHA   Dec   GHA   Dec   GHA   Dec   CHA   Dec   CHA   Dec   Dubh   1879   278   1190   278   278   288	- Ivier.p	1455. 19.4 <i>1</i>	ν-0.6 α-0	.5 111-4.14	ν2.0 <i>u</i> -0.	.0 111-0.33	ν2.6 u-0	.0 111-2.79	ν2.4 <b>u</b> -0	.0 1110.91			
GHA GHA GHA Dec GHA DEC GHA D													
0 63°26.7 137°24.4 S25°0.25 296°24.7 N21°10.5 31°21.3 12′12.8 78°32.3 508°41.5 Denebola 132°25.2 14°26.0 2 1 76°29.1 152°23.7 0.22 310°26.7 1.05 11°31.3 12′1.7 108°37.3 4.14 4.4 4.4 4.3 10°20.3 10°2											1		
3 108°31.6 167°22.9 0.19 325°28.7 10.5 16°24.1 12.7 108°37.1 41.4 4 123°36.5 118°22.1 1.01.6 340°30.8 10.5 31°26.9 12.7 128°39.6 0.41.4 4 14.4 14.4 123°36.5 197°21.4 0.13 356°32.8 10.5 46°29.7 12.7 138°42.0 41.4 5.1 14.4 14.4 14.4 14.4 14.4 14.4											l l		
9 93 31.6   167°229   0.19   325°287   10.5   16°241   127   108°371   41.4   4   123°355   127°121   0.16   30°308   0.15   31°359   127   123°396   41.4   Alich   160°134   51°325   127   5   138°350   212°206   0.10   10°348   10.5   61°225   127   138°420   41.4   Alich   160°134   55°414   41.6   6   135°41.5   227°1918   225°000   25°368   N21°10.5   61°225   N21°126   168°46.5   508°41.3   Alich   160°134   55°424   7   168°46   227°125   24°998   70°429   10.6   121°437   12.6   213°542   41.3   Alich   152°25.5   49°11.2   10   121°31.3   287°128   25°501   10°47.0   10.6   136°46.6   12.5   228°56.6   41.3   Alich   152°25.5   49°11.2   11   228°36.8   021°12.0   59.2   100°47.0   10.6   136°46.6   12.5   228°56.6   41.3   Alich   15°45.2   Alich   12.2   41.3   Alich   15°45.3   13°40.3   Alich   12.2   41.3   Alich   15°45.3   Alich   12.2   41.3   Alich   15°45.3   Ali													
\$\frac{1}{5}\$\frac{1}{38}\$\frac{3}{30}\$\frac{1}{2}\$\frac{1}{3}\$\frac{3}{3}\$\fr											Acrux	173°00.7	-63°13.9
5   138°390   212°206   01.0   10°348   10.5   61°32.5   12.6   135°44.4   41.3   Allot   61°45.9   50°41.3   71°168°43.9   22°19.8   528°00.7   22°30.8   N21°10.5   10°35.3   N22°10.6   168°46.9   30°41.3   Allot   138°30.8   10.5   10°40.9   12.6   168°44.9   34°3.3   41.3   Allot   138°30.8   42°19.1   00.4   40°39.9   10.5   10°64.0   12.6   183°45.7   41.3   Allot   138°30.8   40°30.9   10.5   10°64.0   12.6   183°45.7   41.3   Allot   138°30.8   40°30.9   10.5   10°64.0   12.6   183°51.7   41.3   Allot   138°30.8   40°30.9   10.5   10°64.0   12.6   183°51.5   228°56.2   41.2   41.3											Gacrux	171°52.2	-57°14.9
153°41.5 227°19.8 525°00.7 25°36.8 N21°10.5 76°35.3 N22°12.6 168°46.9 508°41.3 13 144.0 148°10.5 15°106°40.9 12.6 168°349.3 141.3 144.1 147°48.5 16.0°20.4 141.3 144.1 148′14											Alioth		
8   183°46.4   257°18.3   25°00.1   55°40.9   10.5   106°40.9   12.6   1883°49.3   41.3   Hafar 1487°38.1   36°29.4   41.3   128°35.3   287°16.8   595.5   595.6   10.6   136°46.6   12.5   228°56.4   41.2   41.3   128°55.2   42°58.8   30°216.0   592.2   100°47.0   10.6   151°49.4   12.5   248°96.0   41.2   128°55.2   31°35.6   31°35.3   32°16.0   592.2   100°47.0   10.6   151°49.4   12.5   248°96.0   41.2   128°55.2   31°35.6   31°35.3   31°35.3   11.0   60°55.2   122°15.5   259°10.3   58°41.2   128°55.2   15°49.0   115°49.0   121°6.6   166°52.2   122°15.5   259°10.3   41.2   41.1													
8 183°46.4 257°18.3 25°00.1 55°40.9 10.5 106°40.9 12.5 198°51.7 41.3 Memicri 147°80.8 36°29.4 10 128°35.1 328°16.8 99.5 85°45.0 10.6 136°46.6 12.5 228°56.6 41.2 128°35.3 802°16.8 99.5 100°47.0 10.6 151°94.4 12.5 243°96.0 41.2 143°48.3 13°65.1 128°38.3 36°29.4 12.2 143°35.3 802°16.8 99.5 100°47.0 10.6 151°94.4 12.5 243°96.0 41.2 143°48.3 13°65.5 140°16.1 147°8.2 143°48.3 13°65.5 140°40.0 10.6 151°94.4 12.5 243°96.0 41.2 143°48.3 13°65.5 140°40.0 121°10.6 166°52.2 N22°12.5 243°96.0 41.2 140°40.0 132°36.3 13°65.5 140°40.1 13°60.5 140°40.1 140°													
198°48.8   272°17.5   24°59.8   70°42.9   .10.6   121°43.7   .12.6   213°54.2   .41.3   Michael   .14°39.8   .30°39.8   .30°316.0   .30°39.8   .30°46.0   .12.5   .228°56.0   .41.2   .238°53.8   .30°16.0   .592   .100°47.0   .10.6   .151°49.4   .12.5   .243°59.0   .41.2   .238°56.2   .31°15.2   .248°56.2   .31°15.2   .248°56.2   .31°15.2   .248°56.2   .31°15.2   .248°56.2   .31°15.2   .248°56.2   .31°15.2   .248°56.2   .31°15.2   .248°56.2   .31°15.2   .248°56.2   .31°15.2   .248°56.2   .31°15.2   .248°56.2   .31°15.2   .													
10 213*51.3 287*16.8 59.5 88*45.0 10.6 136*46.6 12.5 228*95.6 41.2 12 128*53.8 302*16.0 59.2 100*47.0 10.6 1518*94.0 12.5 243*95.2 317*15.2 524*58.9 115*49.0 N21*01.6 166*52.2 N22*12.5 259*01.4 508*41.2 Kochab 137*29.9 74*03.0 13.9 3.9 3.9 3.9 3.9 3.9 3.9 3.9 3.9 3.9											1		
11 228*53.8 302*16.0 59.2 100*47.0 10.6 151*94,4 12.5 243*99.0 41.2 12 243*56.2 317*12.5 254*98.9 115*49.0 121*0.6 16*52.2 N2*0*21.2 59*0.1 42.2 12.6 12.2 12.0 16*52.2 N2*0.3 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5													
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15 289°03.6 2°12.9 · · · · · · · · · · · · · · · · · · ·	14	274°01.2		58.3	$145^{\circ}53.1$	10.6	196° 57.8	12.4	289°06.3	41.2			
16   304°06.1   17°12.2   57.6   176°57.2   10.6   227°03.4   12.4   339°11.5   41.1   5381k   102°03.3   15°45.3   18°34°11.0   47°10.7   524°57.0   206°01.2   N21°10.6   227°09.0   N22°12.3   349°16.0   508°41.1   5481k   349°11.0   548°11.5   541.0   508°41.1   5481k   541.0   5481k   548	15			• • 57.9	$160^{\circ}55.1$	• • 10.6		• • 12.4	304°08.7	• • 41.1			
18 334°11.0 47°10.7 \$24°57.0 206°01.2 N21°10.6 25°09.0 N22°12.3 34°13.6 41.1 41.1 41.1 41.1 41.1 41.1 41.1 41													
19   348*11.0   47*10.1   524*57.0   200*01.2   201*01.8   21.2   34*18.5   41.0   41.0   5											1		
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10   18   14   92   92   93   107   97   65   55   7   266   90   4   107   317   20   2   12   2   49   25.7   4   1.0   4   1.0											Eltanin	90°42.7	
No.   Section											Kaus Aust.		
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Mer.pass   19:43   ν-0.8' d-0.3' m-4.15   ν-2.0' d0.0' m-0.35   ν-2.8' d-0.0' m-2.80   ν-2.4' d-0.0' m0.91													
Mon         GHA         GHA         Dec         All Nair         20°954.         46°50.6         GHA         Markab         20°954.         46°50.6         6         66°40.8         20°40.8         34°19.7         10°0.7         10°23.4         10°31.5         12.1         10°93.5         40.9         40°7         40°8.2         508°40.8         Markab         20°20.5         508°40.8 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>													
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Mon         GHA         GHA         Dec         Horizontal parallax         Venus         Total         Personal parallax         Central parallax         Central parallax         Central parallax         Central parallax         Central parallax         Central parallax         Al Na'ir         20°, 29°, 29°, 31°, 14°, 29°, 29°, 20°, 20°, 20°, 20°, 20°, 20°, 20°, 20													
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1 79°28.3 152°05.3 54.7 311°15.6 10.7 2°28.7 12.2 94°33.0 40.9 2 94°30.7 167°04.6 54.4 326°17.6 10.7 17°31.5 12.1 109°35.5 40.9 3 109°33.2 182°03.8 · 54.1 341°19.7 · 10.7 32°34.3 · 12.1 124°37.9 · 40.9 4 124°35.7 197°03.1 53.8 356°21.7 10.7 47°37.1 12.1 139°40.3 40.8 5 139°38.1 212°02.3 53.4 11°23.8 10.7 62°39.9 12.1 154°42.7 40.8 6 154°40.6 227°01.6 524°53.1 26°25.8 N21°10.7 77°42.7 N22°12.0 169°45.2 508°40.8 8 184°45.5 257°00.0 52.4 56°29.9 10.8 107°48.3 12.0 199°50.0 40.8 9 199°48.0 271°59.3 · 52.1 71°32.0 · 10.8 122°51.1 · 12.0 214°52.4 · 40.7 10 214°50.4 286°58.5 51.8 86°34.1 10.8 137°54.0 11.9 229°54.9 40.7 11 229°52.9 301°57.8 51.4 101°36.1 10.8 152°56.8 11.9 224°57.3 40.7 12 244°55.4 316°57.0 524°51.1 116°38.2 N21°10.8 167°59.6 N22°11.9 259°59.7 508°40.7 13 259°57.8 331°56.3 50.8 131°40.3 10.8 183°02.4 11.9 259°59.7 508°40.7 14 275°00.3 346°55.5 50.4 146°42.3 10.8 198°05.2 11.8 290°04.6 40.6 15 290°02.8 1°54.8 · 50.1 161°44.4 · 10.9 213°08.0 · 11.8 305°07.0 · 40.6 16 305°05.2 16°54.0 49.7 176°46.5 10.9 228°10.8 11.8 320°09.4 40.6 16 305°05.2 16°54.0 49.7 176°46.5 10.9 228°10.8 11.8 320°09.4 40.6 16 305°05.2 16°54.0 49.7 176°46.5 10.9 228°10.8 11.8 320°09.4 40.6 16 305°05.2 16°54.0 49.7 176°46.5 10.9 228°10.8 11.8 335°10.9 40.5 Saturn 15°0.5 14.9 11.5 11.5 11.7 5°16.7 40.5 Saturn 15°0.6 11.5 11.5 11.5 11.5 11.5 11.5 11.5 11													
3 109°33.2 182°03.8 · 54.1 341°19.7 · 10.7 17°31.5 12.1 109°35.5 40.9 4 124°35.7 197°03.1 53.8 356°21.7 10.7 47°37.1 12.1 139°40.3 40.8 5 139°38.1 212°02.3 53.4 11°23.8 10.7 62°39.9 12.1 154°42.7 40.8 6 154°40.6 227°01.6 \$24°53.1 26°25.8 N21°10.7 77°42.7 N22°12.0 169°45.2 \$08°40.8 7 169°43.1 242°00.8 52.4 10°27.9 10.8 92°45.5 12.0 184°47.6 40.8 8 184°45.5 257°00.0 52.4 56°29.9 10.8 107°48.3 12.0 199°50.0 40.8 9 199°48.0 271°59.3 · 52.1 71°32.0 · 10.8 122°51.1 · 12.0 214°52.4 · 40.7 10 214°50.4 286°58.5 51.8 86°34.1 10.8 137°54.0 11.9 229°54.9 40.7 11 229°52.9 301°57.8 51.4 101°36.1 10.8 152°56.8 11.9 244°57.3 40.7 12 244°55.4 316°57.0 \$24°51.1 116°38.2 N21°10.8 167°59.6 N22°11.9 259°59.7 \$08°40.7 12 244°55.4 316°57.0 \$24°51.1 116°38.2 N21°10.8 167°59.6 N22°11.9 259°59.7 \$08°40.7 12 244°55.4 316°57.0 \$24°51.1 116°38.2 N21°10.8 167°59.6 N22°11.9 259°59.7 \$08°40.7 12 244°55.4 316°57.0 \$24°51.1 116°38.2 N21°10.8 167°59.6 N22°11.9 259°59.7 \$08°40.7 12 244°55.4 316°57.0 \$24°51.1 116°38.2 N21°10.8 167°59.6 N22°11.9 259°59.7 \$08°40.7 12 244°55.4 316°57.0 \$24°51.1 116°38.2 N21°10.8 167°59.6 N22°11.9 259°59.7 \$08°40.7 12 244°55.4 316°57.0 \$24°51.1 116°38.2 N21°10.8 167°59.6 N22°11.9 259°59.7 \$08°40.7 13 259°57.8 331°60.3 50.8 131°40.3 10.8 183°02.4 11.9 275°02.1 40.6 14 275°00.3 346°55.5 50.4 146°42.3 10.8 198°05.2 11.8 290°04.6 40.6 15 290°02.8 1°54.8 · 50.1 161°44.4 · 10.9 213°08.0 · 11.8 305°07.0 · 40.6 16 305°05.2 16°54.0 49.7 176°46.5 10.9 228°10.8 11.8 320°09.4 40.6 17 320°07.7 31°53.3 49.4 191°48.5 10.9 243°13.6 11.8 335°11.9 40.5 Mars 231°47.7 04:15 18 335°10.2 46°52.5 \$24°49.0 206°50.6 N21°10.9 258°16.4 N22°11.7 350°14.3 \$08°40.5 149 149°24.2 14.7 140.8 18:39 20 5°15.1 76°51.0 48.3 326°54.7 10.9 288°22.1 11.7 35°16.7 40.5 540.5 540.1 11.9 11.0 11.0 11.0 11.0 11.0 11.0 1	1			54.7	$311^{\circ}15.6$	10.7		12.2		40.9			I
109°33.2   182°03.8   · · · · · · · · · · · · · · · · · ·											1		
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11 229°52.9 301°57.8 51.4 101°36.1 10.8 152°56.8 11.9 244°57.3 40.7 12 244°55.4 316°57.0 524°51.1 116°38.2 N21°10.8 167°59.6 N22°11.9 259°59.7 508°40.7 13 259°57.8 331°56.3 50.8 131°40.3 10.8 183°02.4 11.9 275°02.1 40.6 14 275°00.3 346°55.5 50.4 146°42.3 10.8 198°05.2 11.8 290°04.6 40.6 15 290°02.8 1°54.8 · 50.1 161°44.4 · 10.9 213°08.0 · 11.8 305°07.0 · 40.6 16 305°05.2 16°54.0 49.7 176°46.5 10.9 228°10.8 11.8 320°09.4 40.5 17 320°07.7 31°53.3 49.4 191°48.5 10.9 243°13.6 11.8 335°11.9 40.5 18 335°10.2 46°52.5 524°49.0 206°50.6 N21°10.9 258°16.4 N22°11.7 350°14.3 508°40.5 19 350°12.6 61°51.8 48.7 221°52.7 10.9 273°19.3 11.7 5°16.7 40.5 20 5°15.1 76°51.0 48.3 236°54.7 10.9 288°22.1 11.7 20°19.1 40.5 21 20°17.5 91°50.3 · 48.0 251°56.8 · 11.0 303°24.9 · 11.7 35°21.6 · 40.5 22 35°20.0 106°49.5 47.6 266°58.9 11.0 318°27.7 11.6 50°24.0 40.4 23 50°22.5 121°48.8 47.3 282°01.0 11.0 333°30.5 11.6 65°26.4 40.4													
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23 50°22.5 121°48.8 47.3 282°01.0 11.0 333°30.5 11.6 65°26.4 40.4 Mars: 0.2											Horizon	-	0.1
25 56 22.5 121 6.6 17.5 262 61.6 11.6 55 56.5 12.6 65 26.1 16.1													
Mer.pass. 19:39 $\nu$ -0.8' $d$ -0.3' m-4.16 $\nu$ 2.0' $d$ 0.0' m-0.37 $\nu$ 2.8' $d$ -0.0' m-2.80 $\nu$ 2.4' $d$ -0.0' m0.92													V
	Mer.p	ass. 19:39	$\nu$ -0.8′ d-0	0.3′ m-4.16	$\nu 2.0' d0.$	0′ m-0.37	$\nu 2.8' \ d-0$	.0′ m-2.80	$\nu$ 2.4′ d-0	.0′ m0.92			

h	Sui	n			Moon			
Sat	GHA	Dec	GHA	ν	Dec	d	HP	
0	183°24.5	520°23.7	268°50.1	15.1'	N14°00.8	-13.0'	55.0'	
1	198°24.3	24.2	283°24.2	15.1'	13°47.8	-13.0'	55.0'	
2	213°24.1	24.8	297°58.3	15.2'	13°34.8	-13.1'	55.0'	
3 4	228°24.0 243°23.8	· · 25.3 25.8	312°32.5 327°06.8	15.3' 15.4'	13°21.7 13°08.6	-13.1' -13.1'	54.9' 54.9'	
5	243 23.6 258°23.6	26.3	341°41.1	15.4'	13 06.0 12°55.5	-13.1	54.9'	
6	273°23.4	\$20°26.8	356°15.6	15.5'	N12°42.3	-13.2'	54.9'	
7	288°23.3	27.3	$10^{\circ}50.1$	15.6'	$12^{\circ}29.1$	-13.2'	54.9'	
8	303°23.1	27.8	25°24.6	15.6'	12° 15.9	-13.3'	54.8'	
9 10	318°22.9 333°22.7	· · 28.4 28.9	39°59.3 54°34.0	15.7' 15.8'	12°02.6 11°49.3	-13.3' -13.4'	54.8' 54.8'	
11	348°22.6	20.9	69°08.7	15.8'	11 49.3 11°35.9	-13.4'	54.8'	
12	3°22.4	S20°29.9	83°43.6	15.9'	N11°22.5	-13.4	54.7'	
13	18°22.2	30.4	$98^{\circ}18.5$	16.0'	$11^{\circ}09.1$	-13.5'	54.7'	
14	33°22.0	30.9	112°53.4	16.0'	10°55.6	-13.5'	54.7'	
15 16	48°21.8 63°21.7	· · 31.4 31.9	127°28.4 142°03.5	16.1' 16.1'	10°42.1 10°28.6	-13.5' -13.5'	54.7' 54.7'	
17	78°21.5	32.4	156°38.7	16.2'	10° 25.0	-13.6'	54.7'	
18	93°21.3	520°32.9	171°13.9	16.2'	N10°01.5	-13.6'	54.6'	
19	108°21.1	33.4	$185^{\circ}49.1$	16.3'	09°47.9	-13.6'	54.6'	
20	123°20.9	33.9	200°24.4	16.4'	09°34.3	-13.7'	54.6'	
21 22	138°20.8 153°20.6	· · 34.4 34.9	214°59.8 229°35.2	16.4' 16.5'	09°20.6 09°06.9	-13.7' -13.7'	54.6' 54.6'	
23	168°20.4	35.4	244°10.6	16.5	09 00.9 08°53.2	-13.7'	54.5'	
25		d = 0.5'			O = 15.0'	15.7	31.3	
	SD = 16.2'	$a = 0.5^{\circ}$		31	$J = 15.0^{\circ}$			
Sun	GHA	Dec	GHA	ν	Dec	d	HP	
0 1	183°20.2 198°20.0	\$20°35.9 36.5	258°46.1 273°21.7	16.6' 16.6'	N08°39.5 08°25.7	-13.8' -13.8'	54.5' 54.5'	
2	213°19.8	37.0	287°57.3	16.7	08° 11.9	-13.8'	54.5'	
3	228°19.7	• • 37.5	302°33.0	16.7'	07°58.1	-13.8'	54.5'	
4	243°19.5	37.9	$317^{\circ}08.7$	16.7'	07°44.3	-13.8'	54.5'	
5	258°19.3	38.4	331°44.4	16.8'	07°30.5	-13.9'	54.4'	
6 7	273°19.1 288°18.9	\$20°38.9 39.4	346°20.2 0°56.0	16.8' 16.9'	N07°16.6 07°02.7	-13.9' -13.9'	54.4' 54.4'	
8	303°18.7	39. <del>4</del> 39.9	15°31.9	16.9'	07 02.7 06°48.8	-13.9' -13.9'	54.4'	
9	318° 18.6	• • 40.4	30°07.8	16.9'	06°34.9	-13.9'	54.4'	
10	333°18.4	40.9	44°43.7	17.0'	$06^{\circ}21.0$	-13.9'	54.4'	
11	348°18.2	41.4	59°19.7	17.0'	06°07.0	-14.0'	54.4'	
12 13	3°18.0 18°17.8	\$20°41.9 42.4	73°55.7 88°31.7	17.0' 17.1'	N05°53.1 05°39.1	-14.0' -14.0'	54.3' 54.3'	
14	33°17.6	42.4	103°07.8	17.1	05°25.1	-14.0'	54.3'	
15	48°17.4	• • 43.4	117°43.9	17.1'	05°11.1	-14.0'	54.3'	
16	63°17.3	43.9	132°20.1	17.2'	04°57.1	-14.0'	54.3'	
17	78°17.1 93°16.9	44.4 \$20°44.9	146°56.2	17.2'	04°43.0	-14.0'	54.3' 54.3'	
18 19	93°16.9 108°16.7	\$20°44.9 45.4	161°32.4 176°08.6	17.2' 17.2'	N04°29.0 04°15.0	-14.1' -14.1'	54.3'	
20	123°16.5	45.8	190°44.9	17.3'	04°00.9	-14.1'	54.2'	
21	138°16.3	• • 46.3	205°21.2	17.3'	03°46.8	-14.1'	54.2'	
22	153°16.1	46.8	219°57.4	17.3'	03°32.7	-14.1'	54.2'	
23	168°15.9	47.3	234°33.8	17.3'	03°18.7	-14.1'	54.2'	
	SD = 16.2'	d = 0.5'		SI	O = 14.9'			
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	183°15.7	S20°47.8	249°10.1	17.4'	N03°04.6	-14.1'	54.2'	
1	198°15.5	48.3	263°46.4	17.4'	02°50.5	-14.1'	54.2'	
2 3	213°15.4 228°15.2	48.8 •• 49.2	278°22.8 292°59.2	17.4' 17.4'	02°36.4 02°22.3	-14.1' -14.1'	54.2' 54.2'	
4	243°15.0	49.7	307°35.6	17.4	02° 08.1	-14.1'	54.2'	
5	258°14.8	50.2	322°12.0	17.4'	01°54.0	-14.1'	54.2'	
6	273°14.6	\$20°50.7	336°48.5	17.4'	N01°39.9	-14.1'	54.2'	
7 8	288°14.4 303°14.2	51.2 51.6	351°24.9 6°01.4	17.5' 17.5'	01°25.8 01°11.7	-14.1' -14.1'	54.1' 54.1'	
9	318°14.0	52.1	0 01.4 20°37.8	17.5'	01 11.7 00°57.5	-14.1 -14.1'	54.1'	
10	333°13.8	52.6	$35^{\circ}14.3$	17.5'	00°43.4	-14.1'	54.1'	
11	348°13.6	53.1	49°50.8	17.5'	00°29.3	-14.1'	54.1'	
12	3°13.4	\$20°53.6	64°27.3	17.5'	N00° 15.2	-14.1'	54.1'	
13 14	18°13.2 33°13.0	54.0 54.5	79°03.8 93°40.3	17.5' 17.5'	N00°01.0 S00°13.1	-14.1' 14.1'	54.1' 54.1'	
15	48°12.8	55.0	108°16.7	17.5'	00°27.2	14.1	54.1	
16	63°12.6	55.5	122°53.2	17.5'	00°41.3	14.1'	54.1'	
17	78°12.4	55.9	137°29.7	17.5'	00°55.4	14.1'	54.1'	
18 19	93°12.2 108°12.1	\$20°56.4 56.9	152°06.2 166°42.7	17.5' 17.5'	S01°09.5 01°23.6	14.1' 14.1'	54.1' 54.1'	
19 20	108°12.1 123°11.9	56.9 57.4	166°42.7 181°19.2	17.5' 17.5'	01°23.6 01°37.7	14.1' 14.1'	54.1' 54.1'	
21	138°11.7	57.8	195°55.7	17.5'	01°51.8	14.1	54.1	
22	153°11.5	58.3	210°32.2	17.5'	02°05.9	14.1'	54.1'	
23	168°11.3	58.8	225°08.7	17.5'	02°20.0	14.1'	54.1'	
	SD = 16.2'	d = 0.5'		SI	O = 14.8'			

N 72°         O7:32         O9:19         ■         14:13         16:01           N 70°         O7:18         O8:48         11:19         12:14         14:45         16:15           68°         O7:06         O8:25         10:00         13:33         15:08         16:26           66°         O6:57         O8:06         O9:23         14:10         15:26         16:36           64°         O6:48         O7:52         O8:57         14:36         15:41         16:36           60°         O6:48         O7:52         O8:57         14:36         15:41         16:52           60°         O6:48         O7:29         O8:21         15:12         16:04         16:58           N 58°         O6:29         O7:19         O8:07         15:26         16:14         17:04           56°         O6:24         O7:11         O7:55         15:38         16:22         17:09           54°         O6:19         O7:04         O7:45         15:48         16:30         17:14           50°         O6:15         O6:57         O7:36         15:57         16:36         17:12           45°         O6:01         O6:37         O7:10	Lat.	Twi	light	Sunrise	Sunset	Twi	light
N 70°         07:18         08:48         11:19         12:14         14:45         16:15           68°         07:06         08:25         10:00         13:33         15:08         16:26           66°         06:57         08:06         09:23         14:10         15:26         16:36           64°         06:48         07:52         08:57         14:36         15:41         16:44           62°         06:41         07:39         08:37         14:56         15:54         16:52           60°         06:35         07:29         08:21         15:12         16:04         16:58           N 58°         06:29         07:19         08:07         15:26         16:14         17:04           56°         06:29         07:19         08:07         15:26         16:14         17:04           56°         06:29         07:19         08:07         15:26         16:14         17:04           56°         06:29         07:19         08:07         15:26         16:14         17:04           56°         06:19         07:04         07:45         15:48         16:30         17:14           52°         06:15         06:57	Lat.	Naut.	Civil	Junisc	Julisce	Civil	Naut.
68° 07:06 08:25 10:00 13:33 15:08 16:26 66° 06:57 08:06 09:23 14:10 15:26 16:36 64° 06:48 07:52 08:57 14:36 15:41 16:44 62° 06:41 07:39 08:37 14:56 15:54 16:52 60° 06:35 07:29 08:21 15:12 16:04 16:58 N 58° 06:29 07:19 08:07 15:26 16:14 17:04 56° 06:15 06:57 07:36 15:57 16:36 17:18 52° 06:15 06:57 07:36 15:57 16:36 17:18 50° 06:11 06:51 07:27 16:06 16:42 17:23 45° 06:01 06:37 07:10 16:23 16:56 17:32 N 40° 05:53 06:26 06:56 16:38 17:07 17:48 30° 05:38 06:07 06:33 17:01 17:26 17:58 18:23 0° 05:24 05:51 06:14 17:19 17:43 18:10 N 10° 05:10 05:36 05:58 17:35 17:58 18:23 0° 04:55 05:21 05:43 17:50 18:13 18:38 S 10° 04:39 05:05 05:28 18:06 18:28 18:55 20° 04:19 04:47 05:11 18:22 18:46 19:15 30° 03:54 04:26 04:52 18:42 19:08 19:40 35° 03:37 04:12 04:41 18:53 19:22 19:57 40° 03:18 03:57 04:28 19:06 19:37 20:17 45° 05:40 04:26 04:52 18:42 19:08 19:40 35° 03:37 04:12 04:41 18:53 19:22 19:57 40° 03:18 03:57 04:28 19:06 19:37 20:17 45° 02:52 03:37 04:13 19:21 19:57 20:43 54° 01:32 02:46 03:35 20:00 20:49 22:04 556° 00:56 02:30 03:23 20:10 20:25 21:26 ////	N 72°	07:32	09:19			14:13	16:01
66° 06:57 08:06 09:23 14:10 15:26 16:36 64° 06:48 07:52 08:57 14:36 15:41 16:44 62° 06:41 07:39 08:37 14:56 15:54 16:52 60° 06:35 07:29 08:21 15:12 16:04 16:58 N 58° 06:29 07:19 08:07 15:26 16:14 17:04 56° 06:40 407:11 07:55 15:38 16:22 17:09 54° 06:19 07:04 07:45 15:48 16:30 17:14 52° 06:15 06:57 07:36 15:57 16:36 17:18 50° 06:11 06:51 07:27 16:06 16:42 17:23 45° 06:01 06:37 07:10 16:23 16:56 17:32 N 40° 05:53 06:26 06:56 16:38 17:07 17:41 35° 05:45 06:16 06:43 16:50 17:17 17:48 30° 05:38 06:07 06:33 17:01 17:26 17:56 20° 05:24 05:51 06:14 17:19 17:43 18:10 N 10° 05:10 05:36 05:58 17:35 17:58 18:23 0° 04:55 05:21 05:43 17:50 18:13 18:38 \$ 10° 04:39 05:05 05:28 18:06 18:28 18:55 20° 04:19 04:47 05:11 18:22 18:46 19:15 30° 03:54 04:26 04:52 11:18:19 17:40° 03:18 03:57 04:28 19:06 19:37 20:17 45° 02:52 03:37 04:12 04:41 18:53 19:22 19:57 40° 03:18 03:57 04:28 19:06 19:37 20:17 45° 02:52 03:37 04:13 19:21 19:57 20:43 54° 01:32 02:46 03:35 20:00 20:49 22:04 56° 00:56 02:30 03:23 20:11 21:06 22:42 58° //// 02:09 03:10 20:25 21:26 ////	N 70°	07:18	08:48	11:19	12:14	14:45	16:15
64° 06:48 07:52 08:57 14:36 15:41 16:44 62° 06:41 07:39 08:37 14:56 15:54 16:52 60° 06:35 07:29 08:21 15:12 16:04 16:58 N 58° 06:29 07:19 08:07 15:26 16:14 17:04 56° 06:24 07:11 07:55 15:38 16:22 17:09 54° 06:15 06:57 07:36 15:57 16:36 17:18 52° 06:15 06:57 07:36 15:57 16:36 17:18 50° 06:11 06:51 07:27 16:06 16:42 17:23 45° 06:01 06:37 07:10 16:23 16:56 17:32 N 40° 05:53 06:26 06:56 16:38 17:07 17:41 35° 05:45 06:16 06:43 17:17 17:48 30° 05:38 06:07 06:33 17:01 17:26 17:17 17:48 30° 05:38 06:07 06:33 17:01 17:26 17:58 18:23 0° 05:24 05:51 06:14 17:19 17:43 18:10 N 10° 05:10 05:36 05:58 17:35 17:58 18:23 0° 04:55 05:21 05:43 17:50 18:13 18:38 S 10° 04:39 05:05 05:28 18:06 18:28 18:55 20° 04:19 04:47 05:11 18:22 18:46 19:15 30° 03:54 04:26 04:52 18:42 19:08 19:40 35° 03:37 04:12 04:41 18:53 19:22 19:57 40° 03:18 03:57 04:28 19:06 19:37 20:17 45° 02:52 03:37 04:13 19:21 19:57 20:43 56° 00:56 02:30 03:25 20:00 20:49 22:04 56° 00:56 02:30 03:25 20:00 20:49 22:04 56° 00:56 02:30 03:25 20:25 21:26 ////		07:06	08:25	10:00	13:33	15:08	16:26
62° 06:41 07:39 08:37 14:56 15:54 16:52 60° 06:35 07:29 08:21 15:12 16:04 16:58    N 58° 06:29 07:19 08:07 15:26 16:14 17:04 56° 06:24 07:11 07:55 15:38 16:22 17:09 54° 06:19 07:04 07:45 15:48 16:30 17:14 52° 06:15 06:57 07:36 15:57 16:36 17:18 50° 06:11 06:51 07:27 16:06 16:42 17:23 45° 06:01 06:37 07:10 16:23 16:56 17:32    N 40° 05:53 06:26 06:56 16:38 17:07 17:41 35° 05:45 06:16 06:43 16:50 17:17 17:48 30° 05:38 06:07 06:33 17:01 17:26 17:56 17:58 18:23 0° 05:24 05:51 06:14 17:19 17:43 18:10    N 10° 05:10 05:36 05:58 17:35 17:58 18:23 0° 04:55 05:21 05:43 17:50 18:13 18:38    S 10° 04:39 05:05 05:28 18:06 18:28 18:55 20° 04:19 04:47 05:11 18:22 18:46 19:15 30° 03:54 04:26 04:52 18:42 19:08 19:40 35° 03:37 04:12 04:41 18:53 19:22 19:57 40° 03:18 03:57 04:28 19:06 19:37 20:17 45° 02:52 03:37 04:13 19:21 19:57 20:43 55° 01:57 03:01 03:45 19:20 19:57 20:43 55° 01:57 03:01 03:45 19:50 20:34 21:38 54° 01:32 02:46 03:35 20:00 20:49 22:04 556° 00:56 01:32 00:10 20:25 21:26 ////		06:57	08:06	09:23	14:10	15:26	16:36
60°         06:35         07:29         08:21         15:12         16:04         16:58           N 58°         06:29         07:19         08:07         15:26         16:14         17:04           56°         06:24         07:11         07:55         15:38         16:22         17:09           54°         06:19         07:04         07:45         15:48         16:30         17:14           52°         06:15         06:57         07:36         15:57         16:36         17:18           50°         06:11         06:51         07:27         16:06         16:42         17:23           45°         06:01         06:37         07:10         16:23         16:56         17:32           N 40°         05:53         06:26         06:56         16:38         17:07         17:41           35°         05:45         06:16         06:43         16:50         17:17         17:48           30°         05:38         06:07         06:33         17:01         17:26         17:56           20°         05:24         05:51         06:14         17:19         17:43         18:10           N 10°         05:10         05:36		06:48			14:36	15:41	16:44
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50°         06:11         06:51         07:27         16:06         16:42         17:23           45°         06:01         06:37         07:10         16:23         16:56         17:32           N 40°         05:53         06:26         06:56         16:38         17:07         17:41           35°         05:45         06:16         06:43         16:50         17:17         17:48           30°         05:38         06:07         06:33         17:01         17:26         17:56           20°         05:24         05:51         06:14         17:19         17:43         18:10           N 10°         05:10         05:36         05:58         17:35         17:58         18:23           0°         04:55         05:21         05:43         17:50         18:13         18:38           S 10°         04:39         05:05         05:28         18:06         18:28         18:55           20°         04:19         04:47         05:11         18:22         18:46         19:15           30°         03:54         04:26         04:52         18:42         19:08         19:40           35°         03:37         04:12		06:19	07:04	07:45	15:48	16:30	17:14
45°         06:01         06:37         07:10         16:23         16:56         17:32           N 40°         05:53         06:26         06:56         16:38         17:07         17:41           35°         05:45         06:16         06:43         16:50         17:17         17:48           30°         05:38         06:07         06:33         17:01         17:26         17:56           20°         05:24         05:51         06:14         17:19         17:43         18:10           N 10°         05:10         05:36         05:58         17:35         17:58         18:23           0°         04:55         05:21         05:43         17:50         18:13         18:38           S 10°         04:39         05:05         05:28         18:06         18:28         18:55           20°         04:19         04:47         05:11         18:22         18:46         19:15           30°         03:54         04:26         04:52         18:42         19:08         19:40           35°         03:37         04:12         04:41         18:53         19:22         19:57           40°         03:18         03:57	52°	06:15	06:57	07:36	15:57	16:36	17:18
N 40° 05:53 06:26 06:56 16:38 17:07 17:41 35° 05:45 06:16 06:43 16:50 17:17 17:48 30° 05:38 06:07 06:33 17:01 17:26 17:56 20° 05:24 05:51 06:14 17:19 17:43 18:10 N 10° 05:10 05:36 05:58 17:35 17:58 18:23 0° 04:55 05:21 05:43 17:50 18:13 18:38 S 10° 04:39 05:05 05:28 18:06 18:28 18:55 20° 04:19 04:47 05:11 18:22 18:46 19:15 30° 03:54 04:26 04:52 18:42 19:08 19:40 35° 03:37 04:12 04:41 18:53 19:22 19:57 40° 03:18 03:57 04:28 19:06 19:37 20:17 45° 02:52 03:37 04:13 19:21 19:57 20:43 S 50° 02:16 03:13 03:54 19:41 20:22 21:19 52° 01:57 03:01 03:45 19:50 20:34 21:38 54° 01:32 02:46 03:35 20:00 20:49 22:04 56° 00:56 02:30 03:10 20:25 21:26 ////		06:11	06:51	07:27	16:06	16:42	17:23
35°         05:45         06:16         06:43         16:50         17:17         17:48           30°         05:38         06:07         06:33         17:01         17:26         17:56           20°         05:24         05:51         06:14         17:19         17:43         18:10           N 10°         05:10         05:36         05:58         17:35         17:58         18:23           0°         04:55         05:21         05:43         17:50         18:13         18:38           S 10°         04:39         05:05         05:28         18:06         18:28         18:55           20°         04:19         04:47         05:11         18:22         18:46         19:15           30°         03:54         04:26         04:52         18:42         19:08         19:40           35°         03:37         04:12         04:41         18:53         19:22         19:57           40°         03:18         03:57         04:28         19:06         19:37         20:17           45°         02:52         03:37         04:13         19:21         19:57         20:43           \$50°         02:16         03:13	45°	06:01	06:37	07:10	16:23	16:56	17:32
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					-		
45°         02:52         03:37         04:13         19:21         19:57         20:43           \$ 50°         02:16         03:13         03:54         19:41         20:22         21:19           52°         01:57         03:01         03:45         19:50         20:34         21:38           54°         01:32         02:46         03:35         20:00         20:49         22:04           56°         00:56         02:30         03:23         20:11         21:06         22:42           58°         ////         02:09         03:10         20:25         21:26         ////							
S 50°         02:16         03:13         03:54         19:41         20:22         21:19           52°         01:57         03:01         03:45         19:50         20:34         21:38           54°         01:32         02:46         03:35         20:00         20:49         22:04           56°         00:56         02:30         03:23         20:11         21:06         22:42           58°         ////         02:09         03:10         20:25         21:26         ////							
52°         01:57         03:01         03:45         19:50         20:34         21:38           54°         01:32         02:46         03:35         20:00         20:49         22:04           56°         00:56         02:30         03:23         20:11         21:06         22:42           58°         ////         02:09         03:10         20:25         21:26         ////	45°	02:52	03:37	04:13	19:21	19:57	20:43
54°     01:32     02:46     03:35     20:00     20:49     22:04       56°     00:56     02:30     03:23     20:11     21:06     22:42       58°     ////     02:09     03:10     20:25     21:26     ////	<b>S</b> 50°	02:16	03:13	03:54	19:41	20:22	21:19
56° 00:56 02:30 03:23 20:11 21:06 22:42 58° //// 02:09 03:10 20:25 21:26 ////							
58° //// 02:09 03:10 20:25 21:26 ////							
					-		
<b>S</b> 60°   /// 01:43 02:54   20:41 21:54 ///							
	<b>S</b> 60°	////	01:43	02:54	20:41	21:54	////

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

		Sun		Moon			
Day	Eqn.of	f 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	51-32%	
23	13:38	13:30	11:47	06:15	18:36		
24	13:21	13:12	11:47	06:56	19:16		
25	13:03	12:54	11:47	07:35	19:55		

## November 26, 27, 28 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	65°24.9	136°48.0	S24° 46.9	297°03.0	N21°11.0	348°33.3	N22° 11.6	80°28.8	S08°40.4		эпа	Dec
										Alpheratz	357°34.7	29°13.9
1	80°27.4	151°47.3	46.6	312°05.1	11.0	3°36.1	11.6	95°31.2	40.4	Ankaa	353°07.0	-42°10.4
2	95°29.9	166°46.5	46.2	327°07.2	11.0	18°38.9	11.5	110°33.7	40.3	Schedar	349°30.9	56°40.7
3	110°32.3	181°45.8	• • 45.9	342°09.3	• • 11.1	33°41.8	• • 11.5	125°36.1	• • 40.3	Diphda	348°47.2	-17°51.0
4	125°34.8	196° 45.0	45.5	357°11.4	11.1	48°44.6	11.5	140°38.5	40.3	Achernar	335°19.8	-57°06.8
5	140°37.3	211°44.3	45.2	12°13.4	11.1	63°47.4	11.5	155°40.9	40.3	Hamal	327°51.0	23°34.9
6	155°39.7	226°43.5	\$24°44.8	27°15.5	N21°11.1	78°50.2	N22°11.4	170°43.4	508°40.2	Polaris	313°36.9	89°22.3
7	170°42.2	241°42.8	44.4	42°17.6	11.1	93°53.0	11.4	185°45.8	40.2	Acamar	315°11.4	-40°12.3
8	185°44.7	256°42.1	44.1	57°19.7	11.2	108°55.8	11.4	200°48.2	40.2	Menkar	314°06.0	4°11.3
9	200°47.1	271°41.3	• • 43.7	72°21.8	• • 11.2	123°58.6	• • 11.4	215°50.6	• • 40.2	Mirfak	308°27.9	49°57.1
10	215°49.6	286° 40.6	43.3	87°23.9	11.2	139°01.4	11.3	230°53.1	40.1	Aldebaran	290°39.4	16°33.6
11	230°52.0	301°39.8	43.0	102°26.0	11.2	154°04.3	11.3	245°55.5	40.1	Rigel	281°03.6	-8°10.3
12	245°54.5	316°39.1	\$24°42.6	117°28.1	N21°11.3	169°07.1	N22°11.3	260°57.9	S08°40.1	Capella	280°21.6	46°01.4
13	260°57.0	331°38.3	42.2	132°30.2	11.3	184°09.9	11.3	276°00.3	40.1	Bellatrix	278°22.7	6°22.4
14	275°59.4	346°37.6	41.9	147°32.2	11.3	199°12.7	11.2	291°02.7	40.0	Elnath	278°01.6	28°37.7
15	291°01.9	1°36.9	• • 41.5	162°34.3	• • 11.3	214°15.5	• • 11.2	306°05.2	• • 40.0	Alnilam	275°37.5	-1°11.1
16	306°04.4	16°36.1	41.1	177°36.4	11.3	229°18.3	11.2	321°07.6	40.0	Betelgeuse	270°51.9	7°24.8
17	321°06.8	31°35.4	40.8	192°38.5	11.4	244°21.1	11.1	336°10.0	40.0	Canopus	263°52.0	-52°42.3
18	336°09.3	46°34.6	S24°40.4	207°40.6	N21°11.4	259°24.0	N22°11.1	351°12.4	S08°39.9	Sirius	258°26.1	-16°44.9
19	351°11.8	61°33.9	40.0	222°42.7	11.4	274°26.8	11.1	6°14.9	39.9	Adhara	255°05.7	-29°00.2
20	6°14.2	76°33.2	39.6	237°44.8	11.4	289°29.6	11.1	21°17.3	39.9	Procyon	244°50.7	5°09.7
21	21°16.7	91°32.4	• • 39.2	252°46.9	• • 11.5	304°32.4	• • 11.0	36°19.7	• • 39.9	Pollux	243°17.2	27°57.9
22	36°19.2	106°31.7	38.9	267°49.1	11.5	319°35.2	11.0	51°22.1	39.8	Avior	234°14.5	-59°35.0
23	51°21.6	121°31.0	38.5	282°51.2	11.5	334°38.0	11.0	66°24.5	39.8	Suhail	222°46.3	-43°31.7
Mer n	ass. 19:35	ν-0.7' d-0	.4' m-4.16	$\nu 2.1' d0$	0′ m-0.39	ν2.8' d-0	.0′ m-2.80	ν2.4' d-0	.0′ m0.92	Miaplacidus	221°38.0	-69°48.8
		ν σ.π u-0	7.10				2.00	ν <u>2</u> . τ α - 0		Alphard	217°47.8	-8°45.9
										Regulus	207°34.5	11°50.7
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.2	61°36.8
0	66°24.1	136°30.2	\$24°38.1	297°53.3	N21°11.5	349°40.8	N22°11.0	81°27.0	S08°39.8	Denebola	182°25.2	14°26.0
1	81°26.5	151°29.5	37.7	312°55.4	11.6	4°43.7	10.9	96°29.4	39.8	Gienah	175°43.9	-17°40.7
2	96°29.0	166°28.7	37.3	327°57.5	11.6	19°46.5	10.9	111°31.8	39.7		173°00.7	-63°13.9
3	111°31.5	181°28.0	• • 37.0	342°59.6	• • 11.6	34°49.3	• • 10.9	126°34.2	• • 39.7		171°52.1	-57°14.9
4	126°33.9	196°27.3	36.6	358°01.7	11.6	49°52.1	10.9	141°36.6	39.7	Alioth	166°13.4	55°49.3
5	141°36.4	211°26.5	36.2	13°03.8	11.7	64°54.9	10.8	156°39.1	39.7	Spica	158°22.7	-11°17.4
6	156°38.9	226°25.8	S24°35.8	28°05.9	N21°11.7	79°57.7	N22°10.8	171°41.5	S08°39.6	Alkaid	152°52.5	49°11.2
7	171°41.3	241°25.1	35.4	43°08.1	11.7	95°00.6	10.8	186°43.9	39.6	Hadar	148°36.8	-60°29.4
8	186°43.8	256°24.3	35.0	58°10.2	11.8	110°03.4	10.8	201°46.3	39.6		147°58.1	-36°29.4
9	201°46.3	271°23.6	• • 34.6	73°12.3	• • 11.8	125°06.2	• • 10.7	216°48.7	• • 39.5	Arcturus	145°48.3	19°03.1
10	216°48.7	286°22.9	34.2	88°14.4	11.8	140°09.0	10.7	231°51.1	39.5	Rigil Kent.	$139^{\circ}41.1$	-60°56.1
11	231°51.2	301°22.2	33.8	103°16.5	11.8	155°11.8	10.7	246°53.6	39.5	Kochab	137°20.9	74°03.0
12	246°53.6	316°21.4	S24°33.4	118°18.7	N21°11.9	170°14.6	N22°10.7	261°56.0	S08°39.5	Zuben'ubi	136°56.5	-16°08.6
13	261°56.1	331°20.7	33.0	133°20.8	11.9	185°17.5	10.6	276°58.4	39.4	Alphecca	126°04.2	26°37.8
14	276°58.6	346°20.0	32.6	148°22.9	11.9	200°20.3	10.6	292°00.8	39.4	Antares	$112^{\circ}16.4$	-26°29.2
15	292°01.0	1°19.2	• • 32.2	163°25.0	• • 12.0	215°23.1	• • 10.6	307°03.2	• • 39.4	Atria	$107^{\circ}11.3$	-69°04.3
16	307°03.5	16° 18.5	31.8	178°27.2	12.0	230°25.9	10.6	322°05.7	39.4	Sabik	102°03.3	-15°45.3
17	322°06.0	31°17.8	31.4	193°29.3	12.0	245°28.7	10.5	337°08.1 352°10.5	39.3	Shaula	$96^{\circ}10.9$	-37°07.3
18	337°08.4	46° 17.1 61° 16.3	\$24°31.0	208°31.4 223°33.5	N21°12.1	260°31.5 275°34.4	N22°10.5		\$08°39.3	Rasalhague	95°59.0	12°32.6
19	352°10.9		30.6		12.1		10.5	7°12.9	39.3	Eltanin	90°42.7	51°29.2
20	7°13.4	76°15.6	30.2	238°35.7	12.1	290°37.2	10.5	22°15.3	39.3	Kaus Aust.	83°33.0	-34°22.4
21	22°15.8	91°14.9	• • 29.8	253°37.8	• • 12.2	305°40.0	• • 10.4	37°17.7	• • 39.2	Vega	80°33.7	38°48.5
22	37°18.3	106°14.2	29.4	268°39.9	12.2	320°42.8	10.4	52°20.2	39.2	Nunki	75°48.2	-26°16.0
23	52°20.8	121°13.4	29.0	283°42.1	12.2	335°45.6	10.4	67°22.6	39.2	Altair	62°00.3	8°56.1
Mer.p	ass. 19:31	$\nu$ -0.7′ d-0	.4′ m-4.17	$\nu 2.1' \ d0.$	0′ m-0.42	$\nu$ 2.8′ d-0	.0′ m-2.80	$\nu$ 2.4′ d-0	.0′ m0.92	Peacock	53°06.2	-56°39.5
										Deneb	49°26.1	45°22.4
	CILA	CIIA	Б	CIIA	Б	CILA	Б	CIIA	Б	Enif	33°39.0	9°59.4
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.1	-46°50.6
0	67°23.2	136°12.7	S24°28.6	298°44.2	N21°12.2	350°48.5	N22°10.3	82°25.0	S08°39.1	Fomalhaut	15° 14.6	-29°29.6
1	82°25.7	151°12.0	28.2	313°46.4	12.3	5°51.3	10.3	97°27.4	39.1	Scheat	13°45.3	28°13.3
2	97°28.1	166°11.3	27.8	328°48.5	12.3	20°54.1	10.3	112°29.8	39.1	Markab	13°30.0	15°20.5
3	112°30.6	181°10.5	• • 27.4	343°50.6	• • 12.4	35°56.9	• • 10.3	127°32.2	• • 39.1	N 26 T	CLIA	NA
4	127°33.1	196°09.8	26.9	358°52.8	12.4	50°59.7	10.2	142°34.7	39.0	Nov 26 Tue	SHA 71°23 1	Mer.pass
5	142°35.5 157°38.0	211°09.1	26.5	13°54.9	12.4 N21°12.5	66°02.5	10.2 N22°10.2	157°37.1 172°39.5	39.0	Venus	71°23.1 231°38.1	14:54 04:11
6		226°08.4	\$24°26.1			81°05.4			S08°39.0	Jupiter	283°08.4	00:46
7	172°40.5	241°07.7	25.7	43°59.2	12.5	96°08.2	10.2	187°41.9	38.9	Saturn	15°03.9	
8 9	187°42.9 202°45.4	256°06.9 271°06.2	25.3	59°01.4 74°03.5	12.5 •• 12.6	111°11.0 126°13.8	10.1	202°44.3 217°46.7	38.9 •• 38.9	Saturn	10 00.9	18:35
9 10	202 45.4 217°47.9	271 06.2 286°05.5	· · 24.9 24.4	74 03.5 89°05.7	12.6	120 13.8 141°16.6	· · 10.1 10.1	217 46.7 232°49.1	38.9	Nov 27 Wed	SHA	Mer.pass
11	217 47.9 232°50.3	301°04.8	24.4	89 05.7 104°07.8	12.6	141 16.6 156°19.5	10.1	232 49.1 247°51.6	38.9	Venus	$70^{\circ}06.1$	14:55
12	232 50.3 247°52.8	316°04.1	\$24.0 \$24°23.6	104 07.8 119°10.0	N21°12.7	171°22.3	N22° 10.0	262°54.0	508°38.8	Mars		04:08
13	262°55.3	331° 03.3	23.2	134°12.1	12.7	171 22.3 186°25.1	10.0	202 54.0 277°56.4	38.8	Jupiter		00:41
14	202 55.5 277°57.7	346°02.6	22.7	149°14.3	12.7	201°27.9	10.0	292°58.8	38.8	Saturn	15°02.9	18:31
15	293°00.2	1°01.9	22.3	164°16.4	. 12.8	216°30.7	• • 10.0	308°01.2	• • 38.7	Nov 28 Thu	SHA	Mer.pass
16	308°02.6	16°01.2	21.9	179°18.6	12.8	231°33.6	09.9	323°03.6	38.7	Venus	68°49.5	14:56
17	323°05.1	31°00.5	21.5	194°20.8	12.9	246°36.4	09.9	338°06.0	38.7		231°21.0	04:04
18	338°07.6	45°59.8	\$24°21.0	209°22.9	N21°12.9	261°39.2	N22°09.9	353°08.4	S08°38.6		283°25.2	00:37
19	353°10.0	60°59.1	20.6	224°25.1	13.0	276°42.0	09.8	8°10.9	38.6	Saturn	15°01.8	18:27
20	8°12.5	75°58.3	20.2	239°27.2	13.0	291°44.8	09.8	23°13.3	38.6	Jatuill	13 01.0	10.41
21	23°15.0	90°57.6	• • 19.7	254°29.4	• • 13.0	306°47.7	• • 09.8	38°15.7	• • 38.5	Horizont	al parallax	
22	38°17.4	$105^{\circ}56.9$	19.3	269°31.6	13.1	$321^{\circ}50.5$	09.8	53°18.1	38.5		Venus:	0.1
23	53°19.9	120°56.2	18.9	284°33.7	13.1	$336^{\circ}53.3$	09.7	68°20.5	38.5		Mars:	0.2
Mern	ass. 19:27	ν-0 7' d.0	.4′ m-4.18	v2 1/ d0	0′ m-0.44	1/2 8/ d-0	.0′ m-2.81	υ2 Δ' d.Ω	.0′ m0.93			
ivici.p	17.41	ν υ.ι u-υ	7.10	ν <u>-</u> . ± U U.	J U.TT	ν <u>-</u> .υ u-υ	2.01	ν Δ.∓ U-U				

h	Sui	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	183°11.1	\$20°59.2	239°45.2	17.5'	502°34.0	14.1'	54.1'
1	198° 10.9	$20^{\circ}59.7$	$254^{\circ}21.6$	17.5'	$02^{\circ}48.1$	14.0'	54.1'
2	213° 10.7	21°00.2	268°58.1	17.4'	03°02.1	14.0'	54.0'
3	228° 10.5	•• 00.6	283°34.5	17.4'	03°16.2	14.0'	54.0'
4 5	243°10.3 258°10.1	01.1 01.6	298° 10.9 312° 47.4	17.4' 17.4'	03°30.2 03°44.2	14.0' 14.0'	54.0' 54.0'
6	273°09.9	521°02.0	312 47.4 327°23.8	17.4	503°58.2	14.0'	54.0'
7	288°09.7	02.5	342°00.1	17.4	04°12.2	14.0'	54.0'
8	303°09.5	03.0	356°36.5	17.3'	04°26.1	14.0'	54.0'
9	318°09.3	• • 03.4	$11^{\circ}12.9$	17.3'	04°40.1	13.9'	54.0'
10	333°09.1	03.9	25°49.2	17.3'	04°54.0	13.9'	54.0'
11	348°08.9	04.4	40°25.5	17.3'	05°08.0	13.9'	54.0'
12	3°08.7 18°08.5	\$21°04.8 05.3	55°01.8 69°38.0	17.3' 17.2'	\$05°21.9 05°35.8	13.9' 13.9'	54.0' 54.0'
13 14	33°08.3	05.3 05.7	84°14.3	17.2'	05 35.8 05°49.6	13.9'	54.0'
15	48° 08.0	06.2	98°50.5	17.2	06°03.5	13.8'	54.0'
16	63°07.8	06.6	113°26.7	17.2'	06°17.3	13.8'	54.0'
17	78°07.6	07.1	128°02.9	17.1'	$06^{\circ}31.1$	13.8'	54.0'
18	93°07.4	S21°07.6	142°39.0	17.1'	S06°44.9	13.8'	54.0'
19	108° 07.2	0.80	157° 15.1	17.1'	06°58.7	13.7'	54.0'
20	123°07.0	08.5	171°51.2	17.0'	07°12.4	13.7'	54.0'
21 22	138°06.8 153°06.6	· · 08.9	186°27.2 201°03.3	17.0' 17.0'	07°26.1 07°39.8	13.7' 13.7'	54.0' 54.0'
23	168°06.4	09.4	201 03.3 215°39.2	16.9	07°53.5	13.6'	54.1'
23						15.0	J T. 1
	SD = 16.2'	d = 0.5'		SL	D = 14.7'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	183°06.2	521°10.3	230° 15.2	16.9'	508°07.2	13.6'	54.1'
1 2	198°06.0 213°05.8	10.7 11.2	244°51.1 259°27.0	16.9' 16.8'	08°20.8 08°34.4	13.6' 13.6'	54.1' 54.1'
3	213 05.8 228°05.6	11.6	259 27.0 274°02.8	16.8	08 34.4 08°47.9	13.5	54.1'
4	243°05.4	12.1	288°38.6	16.8'	00°41.5	13.5'	54.1'
5	258°05.2	12.5	303°14.4	16.7'	09°15.0	13.5'	54.1'
6	273°05.0	S21°13.0	$317^{\circ}50.1$	16.7'	S09°28.5	13.4'	54.1'
7	288°04.8	13.4	$332^{\circ}25.8$	16.6'	09°41.9	13.4'	54.1'
8	303°04.5	13.9	347°01.4	16.6'	09°55.3	13.4'	54.1'
9	318°04.3	• • 14.3	1°37.0	16.5'	10°08.7	13.4'	54.1'
10 11	333°04.1 348°03.9	14.8 15.2	16°12.5 30°48.0	16.5' 16.5'	10°22.1 10°35.4	13.3' 13.3'	54.1' 54.1'
12	3°03.7	S21°15.7	45°23.5	16.4	\$10°48.7	13.2	54.1'
13	18°03.5	16.1	59° 58.9	16.4'	11°01.9	13.2'	54.1'
14	33°03.3	16.6	74°34.3	16.3'	$11^{\circ}15.1$	13.2'	54.1'
15	48°03.1	• • 17.0	89°09.6	16.3'	11°28.3	13.1'	54.1'
16	63°02.9	17.4	103°44.8	16.2'	11°41.5	13.1'	54.1'
17 18	78°02.7 93°02.4	17.9 \$21°18.3	118°20.0 132°55.2	16.1' 16.1'	11°54.6 \$12°07.6	13.1' 13.0'	54.1' 54.1'
19	108° 02.2	18.8	132 33.2 147°30.3	16.1	12°20.6	13.0'	54.1'
20	123°02.0	19.2	162°05.3	16.0'	12°33.6	12.9'	54.2'
21	138°01.8	• • 19.6	176°40.3	15.9'	12°46.5	12.9'	54.2'
22	153°01.6	20.1	191°15.2	15.9'	12°59.4	12.8'	54.2'
23	168°01.4	20.5	205°50.1	15.8'	13°12.3	12.8'	54.2'
	SD = 16.2'	d = 0.5'		SE	0 = 14.7'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	183°01.2	S21°20.9	$220^{\circ}24.9$	15.7'	\$13°25.1	12.8'	54.2'
1	198°00.9	21.4	234°59.6	15.7'	13°37.8	12.7'	54.2'
2	213°00.7	21.8	249°34.3	15.6'	13°50.6	12.7'	54.2'
3 4	228°00.5 243°00.3	· · 22.3	264°08.9 278°43.5	15.6' 15.5'	14°03.2 14°15.8	12.6' 12.6'	54.2' 54.2'
5	258°00.1	23.1	276 43.5 293°18.0	15.5 15.4'	14 15.6 14°28.4	12.5'	54.2'
6	272°59.9	S21°23.6	307°52.4	15.4'	\$14°40.9	12.5'	54.2'
7	287°59.7	24.0	$322^{\circ}26.8$	15.3'	$14^{\circ}53.4$	12.4'	54.2'
8	302°59.4	24.4	337°01.1	15.2'	15°05.8	12.4'	54.3'
9	317°59.2	• • 24.8	351°35.4	15.2'	15°18.1	12.3'	54.3'
10 11	332°59.0 347°58.8	25.3 25.7	6°09.5 20°43.6	15.1' 15.0'	15°30.4 15°42.7	12.2' 12.2'	54.3' 54.3'
11	347°58.8 2°58.6	25.7 \$21°26.1	20°43.6 35°17.7	15.0'	15°42.7 \$15°54.9	12.1'	54.3'
13	17° 58.4	26.6	49°51.6	14.9'	16°07.0	12.1'	54.3
14	32°58.1	27.0	64°25.5	14.8'	16°19.1	12.0'	54.3'
15	47°57.9	• • 27.4	$78^{\circ}59.3$	14.7'	$16^{\circ}31.1$	12.0'	54.3'
16	62°57.7	27.8	93°33.1	14.7'	16°43.1	11.9'	54.3'
17	77°57.5	28.3	108°06.7	14.6'	16°55.0	11.8'	54.3'
18 19	92°57.3 107°57.0	\$21°28.7 29.1	122°40.3 137°13.9	14.5' 14.4'	\$17°06.8 17°18.6	11.8' 11.7'	54.4' 54.4'
20	107°57.0 122°56.8	29.1 29.5	137° 13.9 151° 47.3	14.4' 14.4'	17°18.6 17°30.3	11.7	54.4° 54.4°
21	137°56.6	29.9	166°20.7	14.3'	17°41.9	11.6'	54.4
22	152° 56.4	30.4	$180^{\circ}53.9$	14.2'	17°53.5	11.5'	54.4'
23	167°56.2	30.8	195°27.2	14.1'	18°05.0	11.4'	54.4'
	SD = 16.2'	d = 0.4'		SE	0 = 14.8'		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup> 12 <sup>h</sup>		Pass	Upper Lower		25-27	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	24-10%	
26	12:44	12:35	11:47	08:14	20:33		
27	12:25	12:15	11:48	08:53	21:14		
28	12:05	11:54	11:48	09:35	21:56		

## November 29, 30, 01 UT (Fri., Sat., Sun.)

CHA	h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
0.00000000000000000000000000000000000	Fri -	CHA	GHA	Dec	GHA	Dec	GHA.	Dec	GHA	Dec		SHA	Dec
1													
1											Alpheratz	357°34.8	29°13.9
11   12   12   13   13   14   15   15   15   15   15   15   15											Ankaa	353°07.0	-42°10.4
14   128*   12											Schedar	349°30.9	56°40.7
14   14   14   12   12   12   15   15   15   15   15											Diphda	348°47.2	-17°51.0
Fig.   1.55											Achernar	$335^{\circ}19.8$	-57°06.8
87 1973 90 200 505 133 41 151 133 97159 005 187398 33											Hamal	327°51.0	23°34.9
18   18   18   18   18   18   18   18											Polaris	313°37.0	89°22.3
19   18   14   14   15   15   15   16   17   18   18   18   18   18   18   18													
10 223 - 307 - 30													I
11 21 24614.3 300427 11.3 36759.6 12.7 22.2 00.4 24619.3 81.3 1.2 10.7 32.4											1		
13   23   24   25   24   25   25   25   25   25											1		
1.5   200   1.5   200   1.5   2.5											1		I
1.5   2019   3919   3											_		
18 38°61.0 15°44.2 113 180°10.0 1813 132°41.1 0.3 38°13.3 180.0 1813 1814 1814 1914 1914 1914 1914 1914 1914	13	263°54.4		12.6	135°04.2	13.7		09.4		38.1			
Alaniam   275   75   75   75   75   75   75   7	14	278°56.9	345°45.6	12.2	150°06.4	13.8	202°35.6	09.3	293°56.7	38.0			
18   38   39   39   30   30   30   30   30   30	15	293°59.3	0°44.9	• • 11.7	165°08.6	• • 13.8	217°38.4	• • 09.3	$308^{\circ}59.1$	• • 38.0	1		
1.5   35   35   36   36   36   36   36   3	16	309°01.8	15°44.2	11.3	$180^{\circ}10.8$	13.9	232°41.3	09.3	324°01.5	38.0	I		I
Simple   S	17	324°04.2	30°43.5	10.8	195°13.0	13.9	247°44.1	09.3	339°03.9	38.0			
Adhara   285'656   2970'02   298'145   979'414   904   209'140   141   209'140   902   298'145   979'41   909'40   905   270'140   412   327'852   909   918'115   978   970'02   248'907   270'75	18	339°06.7	45°42.8	S24°10.3	210°15.2	N21°14.0	262°46.9	N22°09.2	354°06.3	S08°37.9			
24   11	19	354°09.2	60°42.1	09.9	225°17.4	14.0	277°49.7	09.2	9°08.7	37.9	1		
Morr pass 19-38   Politic   Age   Politic	20	9°11.6	75°41.4	09.4	240°19.6	14.1	292°52.6	09.2	24°11.1	37.9			
22   38°166   105°40.0   08.5   270°24.0   14.2   32°28.2   09.1   54°15.9   37.8   Flower State   14.2   38°10.0   09.1   66°18.3   37.8   540°22   38°10.0   09.1   66°18.3   37.8   540°22   38°10.0   09.1   66°18.3   37.8   540°22   38°10.0   09°21.5   136°30.8   54°20°6.0   09°21.5   136°30.8   54°076   30°20.8   14.3   36°0.6   70°20.1   48°20.8   00°27.1   136°30.8   14.3   38°0.8   72°00.1   48°20.8   00°27.3   14.3   14°28.9   180°5.5   06.6   33°3.2   14.4   38°12.3   09.0   142°20.8   37.6   14.3   180°3.5   06.7   33°3.2   14.4   38°12.3   09.0   142°30.8   33°3.8   30°3.2   14.4   38°12.3   09.0   142°30.8   33°7.6   34°31.8   38°30.8   32°30.8   38°30.8	21	24°14.1	90°40.7	• • 09.0	255°21.8	• • 14.1	307°55.4	• • 09.2	39°13.5	• • 37.8			
Mer. pass. 19-23													
Same   Same													
Sat   GHA   GHA   Dec   GHA								_			1		
Second   Color	Mer.p	ass. 19:23	$ u$ -0.7 $^{\prime}$ d-0	).4′ m-4.18	$\nu 2.2' \ d0.$	0′ m-0.46	$\nu 2.8' \ d-0$	.0′ m-2.81	$\nu$ 2.4′ d-0	.0′ m0.93			
Section													
0 69721.5   155°38.6   524°07.6   300°28.4   N22°18.1   35°03.8   N22°09.1   84°20.8   506°37.7   Deminded   150°32.2   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.1   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.0   31.4°36.1   31.4°36.0   31.4°3	Ca4	CHA	CHA	Doo	CHA	Doo	CHA	Doo	CHA	Das	Regulus	207°34.5	11°50.7
1 94°24 0, 190°37 9, 07.1 315°30.6 14.3 8°60.7 09.0 99°323 57.7 6 2 99°64 165°37.2 0.66 330°32.8 14.4 23°09.5 09.0 114°25.6 37.7 6 3 114°28.0 180°36.5 0.62 345°35.0 ·14.4 38°12.3 09.0 129°28.0 ·37.6 14.2 14°30.4 37.6 15.2 14°33.8 0.7 6 159°38.3 120°38.1 05.2 15°39.4 14.5 68°18.0 08.9 159°32.8 37.6 15.2 14°33.8 0.7 6 159°38.3 225°34.4 524°04.8 30°41.6 121°46.8 8°23.6 N22°08.9 129°37.6 37.5 14.2 14°30.4 37.6 15.2 14°33.8 0.7 14.2 14°30.4 37.6 15.2 14°33.8 0.7 14.2 14°30.4 37.6 15.2 14°33.8 0.7 14.2 14°30.4 37.6 15.2 14°33.8 0.7 14.2 14°30.4 37.6 15.2 14°33.8 0.7 14.2 14°30.4 37.6 15.2 14°33.8 0.7 14.2 14°30.4 37.6 15.2 14°33.8 0.7 14.2 14°30.4 37.6 15.2 14°33.8 14.6 14.2 14°30.4 37.6 15.2 14°33.8 14.6 14.2 14°30.4 37.6 15.2 14°33.2 1											Dubhe	193°41.2	61°36.7
99°26.4   165°37.2   0.66   330°32.8   14.4   23°09.5   0.00   114°26.6   37.7   According 173°50.6   -63°10.6   -63°10.4   33   114°28   180°36.5   0.66   330°32.8   14.4   33°12.3   0.00.0   114°26.0   37.6   According 173°50.6   -63°10.4   41°34.8   41°32.3   0.00.0   144°30.4   37.6   According 173°50.6   -63°10.4   41°34.8   41°32.8   41°32.8   41°33.8   210°35.1   56.7   16°36.3   25°34.4   524°04.8   30°41.6   821°14.6   88°20.8   820°20.6   126°32.5   50°32.6   37.6   According 173°50.6   41°32.6   According 173°50.6   Accord											Denebola	$182^{\circ}25.2$	14°26.0
114°28,9 180°36,5 . 0.6.2 345°35,0 . 1.4.4 36°12,3 . 0.0.0 129°28,0 . 37,6 4. 129°31, 199°38,8 . 0.5.7 0°37,2 1.4.5 55°15,1 . 0.0.0 149°30,4 37,6 5 1.4.5 1.5.5 1.0.5 1.											Gienah	175°43.9	-17°40.7
\$\frac{1}{2}\frac{1}{3}\frac{1}{4} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \											Acrux	173°00.6	-63°13.9
5 144°33 8 210°551 05.2 05°394 145 68°15.1 09.0 144°30.4 37.6 190°32.8 37.6 190°32.8 37.6 190°32.8 37.6 190°32.8 37.6 190°32.8 37.6 190°32.8 37.6 190°32.8 37.6 190°32.8 37.6 190°32.8 37.6 190°32.8 37.6 190°32.8 37.6 190°32.8 190											Gacrux	171°52.1	-57°14.9
1447-33.8   2107-35.1   05.2   157-39.4   14.5   687-18.0   08.9   1597-32.8   37.6   0.157-30.8   0.147-312.5   0.087-3.0   0.147-312.5   0.087-3.0   0.147-312.5   0.087-3.0   0.147-312.5   0.087-3.0   0.147-312.5   0.087-3.0   0.147-312.5   0.087-3.0   0.147-312.5   0.087-3.0						14.5					1		
159°363   228°344   524°04.8   30°41.6   N21°14.6   83°20.8   N22°06.9   147' 35.2   S08°37.5     7 176°387   240°338   04.3   45°338   45°338   14.6   98°236   06.9   189°37.6   37.5     8 180°41.2   255°331   03.8   60°46.0   14.7   119°26.3   06.9   204°40.0   37.5     9 204°437   270°324   0.33   75°482   14.7   128°29.3   0.88   229°44.8   37.4     10 219°46.1   288°31.7   0.29   90°50.4   14.8   143°32.1   0.88   229°44.8   37.4     11 234°48.6   300°31.0   0.24   105°52.6   14.8   159°43.9   0.88   229°47.2   37.4     12 249°51.1   315°30.3   524°0.9   120°59.9   121°14.9   188°40.0   0.87   279°52.0   37.3     14 2279°56.0   345°28.9   0.9   150°59.3   15.0   203°43.4   0.67   249°45.5   37.3     15 294°68.5   0°38.2   0.05   166°01.5   15.1   218°62.0   0.67   309°50.9   37.3     16 310°00.9   15°27.9   24°00.0   181°03.7   15.1   233°49.0   0.6   324°59.3   37.2     18 340°05.9   48°56.2   522°59.0   211°02.8   121°15.2   248°19.1   0.6   340°10.7   37.2     19 355°03.6   00°25.5   58.5   226°10.4   15.3   278°75.0   0.6   340°10.7   37.2     21 25°13.2   90°24.1   57.5   256°14.9   51.5   328°60.0   0.5   55°1.3   37.1     21 25°13.2   90°24.1   57.5   256°14.9   51.5   328°60.0   0.5   55°1.3   37.1     22 35°18.2   120°27.5   56.6   268°13.3   35°1.0   0.6   356°1.1   37.0     22 40°15.7   105°23.4   57.0   271°17.1   15.4   328°60.0   0.5   55°1.3   37.1     22 35°18.2   120°27.5   56.6   268°13.3   35°1.3   329°0.0   0.5   25°0.9   37.1     22 40°15.7   105°23.4   57.5   266°14.9   51.5   328°6.0   0.5   55°1.3   33°3.0   36°5.0   12°3.5     23 55°18.2   120°2.7   56.6   266°13.5   356°1.1   0.6   35°3.7   36°7     24 130°3.5   159°19.3   54.1   1°3.5   15.8   36°6.0   0.5   55°1.3   37.1     25 40°1.5   100°2													
7 174*38.7 240*33.8 0.43 60*46.0 14.7 113*26.4 08.9 204*0.3 37.5 97.5 97.0 97.0 97.0 97.0 14.7 113*26.4 08.9 204*0.3 37.5 97.0 97.0 97.0 14.8 143*22.1 08.8 234*0.4 37.5 11. 234*0.6 1 285*31.7 0.2 9 00*50.4 14.8 143*22.1 08.8 234*0.4 37.5 11. 234*0.6 1 285*31.7 0.2 9 00*50.4 14.8 143*22.1 08.8 234*0.4 37.5 11. 234*0.6 1 285*31.7 0.2 9 00*50.4 14.8 158*34.9 08.8 243*0.4 37.4 11. 234*0.6 1 285*31.7 0.2 9 00*50.4 14.8 158*34.9 08.8 243*0.4 37.4 11. 234*0.6 50.8 330*29.6 01.4 135*57.1 14.9 188*0.6 0.8 7. 279*52.0 37.3 14. 279*56.0 345*2.8 9 0.0 9 150*59.3 15.0 203*0.4 0.8 2. 20*0.6 3.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1	6			S24°04.8		N21°14.6		N22°08.9		S08°37.6			
8 189°41.2 256°331 03.8 60°46.0 14.7 113°26.4 08.9 204°40.0 37.5 9 9 204°43.7 270°32.4 0.33 75°48.2 14.7 113°26.4 08.9 204°40.0 37.5 11.0 219°46.1 286°31.7 02.9 90°50.4 14.8 143°32.1 08.8 234°44.8 37.4 11.2 249°51.1 315°30.3 524°01.9 120°44.9 14.8 143°32.1 08.8 234°44.8 37.4 11.2 249°51.1 315°30.3 524°01.9 120°44.9 121°44.9 173°37.7 N22°08.8 264°49.6 508°37.3 13.2 64°35.3 330°30.5 02.4 14.8 183°34.9 08.8 249°47.2 37.4 12.2 12.2 12.2 12.2 12.2 12.2 12.2 12	7	174°38.7	240°33.8	04.3	45°43.8	14.6	98°23.6	08.9		37.5			
9 204*43.7 270*324 · .03.3 75*48.2 · .14.7 128°.29.3 · .08.8 234°44.8 · 37.5   10 219*46.1 285°31.7 · .02.9 90°50.4 14.8 158°34.9 0.8.8 234°44.8 · 37.5   11 249*48.6 300°31.0 · .02.4 105°52.6 14.8 158°34.9 0.8.8 249°47.2 · 37.4   11 249*48.6 300°31.0 · .02.4 105°52.6 14.8 158°34.9 0.8.8 249°47.2 · 37.4   12 249*51.1 315°30.3 524°01.9 120°54.9 120°54.9 1.8 168°30.6 · .08.7 279°52.0 · .37.3   14 279*50.5 346°28.9 · .00.9 150°59.3 15.0 0.80°34.4 0.8.7 279°52.0 · .37.3   15 294*58.5 0°28.2 · .00.5 166°01.5 · .15.1 218°46.2 · .08.7 309°56.9 · .37.3   16 310°00.9 15°27.5 24°00.0 181°03.7 · .15.1 223°49.0 0.8.6 340°01.7 · .37.2   18 340°05.9 45°26.2 523°59.5 196°06.0 15.2 248°51.9 0.8.6 340°01.7 · .37.2   18 340°05.9 45°26.2 523°59.5 196°06.0 15.2 248°51.9 0.8.6 340°01.7 · .37.2   19 355°08.3 60°25.5 · .58.5 226°10.4 · .15.3 276°57.5 0.8.6 10°06.5 · .37.1   20 10°10.8 75°24.8 · .58.0 241°12.6 15.3 276°57.5 0.8.6 10°06.5 · .37.1   21 224°15.7 105°23.4 · .57.0 256°14.9 · .15.4 300°03.2 · .08.5 25°08.9 · .37.3   22 40°15.7 105°23.4 · .57.0 271°17.1 15.4 330°08.8 0.8 · .70°16.1 · .37.0   23 55°18.2 120°22.7 · .56.6 286°19.3 · .15.5 330°08.8 0.8 · .70°16.1 · .37.0   23 55°18.2 120°22.7 · .56.6 286°19.3 · .15.5 330°08.8 0.8 · .70°16.1 · .37.0   24 130°30.5 195°19.3 · .54.6 346°22.8 · .15.7 36°2.1 · .08.3 130°25.7 · .36.9   25 100°25.6 165°20.7 · .55.1 31°22.8 · .15.1 · .18.9 · .18.4 · .00°20.9 36.9   25 100°25.6 165°20.7 · .55.1 31°22.8 · .15.1 · .18.9 · .18.4 · .20°2.9 · .18.3 · .18.9 · .20°2.9 · .18.3 · .20°2.9 · .20°3.3 · .38°2.2 · .20°3.3 · .38°2.2 · .20°3.3 · .38°3.3 · .39°2.2 · .20°3.3 · .38°3.4 · .20°3.3 · .38°3.3 · .38°2.2 · .20°3.3 · .38°3.4 · .20°3.3 · .38°3.3	8	189°41.2	255°33.1	03.8	60°46.0	14.7		08.9	204°40.0	37.5			
10 219"46.1 286"31.7 02.9 9"50.4 14.8 143"32.1 08.8 234"44.8 37.4 No. 21 12 249"51.1 315"30.3 02.4 105"52.6 14.8 158"34.9 08.8 249"47.2 37.4 No. 21 249"51.1 315"30.3 024"61.9 120"54.9 N21"14.9 173"37.7 N22"08.8 264"49.6 508"37.4 No. 21 249"51.1 315"30.3 02"61.9 120"54.9 N21"14.9 173"37.7 N22"08.8 264"49.6 508"37.4 No. 21 249"51.1 315"30.3 24"61.9 120"54.9 N21"14.9 173"37.7 N22"08.8 264"49.6 508"37.4 No. 21 22"61.2 N21"55.5 N30"29.6 01.4 136"567.1 14.9 188"40.6 0.8.7 279"50.0 37.3 Alpheca 1.2 22"64.2 2.0 0.5 166"01.5 1.5 1.5 12.33"49.0 08.6 34"59.3 37.3 N. 21"61.9 N. 21"0.9 N. 21"	9	204°43.7	270°32.4	• • 03.3	75°48.2	• • 14.7	128°29.3	• • 08.8	219°42.4	• • 37.5	1		
112 249*48.6 300*31.0 02.4 105*92.6 14.8 158*34.9 08.8 249*47.2 37.4 Kochab 137*20.9 74*03.0 74*03.6 13 264*51.5 135*30.3 S24*01.9 120*54.9 N21*14.9 1188*04.6 08.7 279*52.0 37.4 Zuben'ubi 137*20.9 74*03.0 14 279*56.0 345*28.9 0.9 150*953 15.0 029*43.4 08.7 294*54.5 37.3 Alpha 24*54.5 26*3.2 15*0.0 15*0	10	219°46.1	285°31.7	02.9	90°50.4	14.8	143°32.1	8.80	234°44.8	37.4			
12   249°51.1   315°30.3   261°40.19   138°51.7   14.9   178°37.7   17.2°08.8   264°49.6   508°37.4   136°56.5   -16°08.6   136°06.5   16°08.6   136°06.5   136°06.2   136°06.2   136°06.2   126°04.2   226°37.8   14.2°09.6   136°06.5   15.0   203°43.4   0.8.7   294°54.5   37.3   14.4   26°04.2   26°37.8   15.5   203°43.4   0.8.7   294°54.5   37.3   14.4   26°04.2   26°37.8   11.2°16.4   26°09.2   15°09.3   15°00.5   15.1   233°49.0   0.8.6   340°01.7   37.2   5.5   14.5   18.0   13.0°36.1   15.1   233°49.0   0.8.6   340°01.7   37.2   5.5   18.0   120°13.3   15°03.3   15°05.3   20°10.3   15°05.5   25°05.5   226°10.4   15.3   294°00.3   0.8.5   25°08.9   37.1   25°08.5   25°08.9   21°05.2   20°010°10.8   75°24.8   58.0   241°12.6   15.3   294°00.3   0.8.5   25°08.9   37.1   25°05.2   20°	11	234°48.6	300°31.0	02.4	105°52.6	14.8	158°34.9	8.80	249°47.2	37.4			
13 264°53.5 330°29.6 01.4 135°57.1 14.9 188°40.6 08.7 279°52.0 37.3 14.9 14.9 188°40.6 08.7 279°52.0 37.3 14.9 14.9 188°40.6 08.7 279°52.0 37.3 15.0 203°43.4 08.7 204°54.5 37.3 14.9 18.9 14.9 18.9 18.9 18.9 18.9 18.9 18.9 18.9 18	12	249°51.1	315°30.3	S24°01.9	120°54.9	N21°14.9	173°37.7	N22°08.8	264°49.6	S08°37.4	1		
14 279°56.0 345°28.9 0.0.9 150°59.3 15.0 203°43.4 08.7 246°56.5 37.3 Alria 107°1.3 -60°20.3 16 310°0.0 15°27.5 24°0.0 181°0.37 15.1 213°46.2 0.87 300°55.9 3.73 34 30°55.9 32.2 15.0 15°69.3 15°1.0 15								08.7					
16 310°09 15°75 24°80 0 86°01.5 15.1 218°46.2													
16 310°00 9 15°27.5 24°00.0 181°03.7 15.1 233°49.0 08.6 342°89.3 37.2 37.0 37.0 18.1 19.1 19.1 19.1 19.1 19.1 19.1 19.1													
18 340°05.9 45°02.4 30°26.9 23°99.5 196°06.0 15.2 248°51.9 0.8   18 340°01.7 37.2   19 355°08.3 60°25.5 85.5 230°90. 211°08.2 N21°15.2 263°54.7 N22°08.6 35°04.1 508°37.2   20 10°10.8 75°24.8 58.0 241°12.6 15.3 278°57.5 0.8   21 25°13.2 90°24.1 57.5 256°14.9 15.4 309°03.2 0.85. 25°08.9 37.1   22 40°15.7 105°23.4 57.0 271°17.1 15.4 324°06.0 0.8.5 55°13.7 37.0   23 55°18.2 120°22.7 56.6 286°19.3 15.5 339°08.8 0.8.5 70°16.1 37.0   24 10°15.7 105°23.4 57.0 271°17.1 15.4 324°06.0 0.8.5 55°13.7 37.0   25 10°16.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1													
18   340°05.9   45°26.2   \$23°59.0   \$21°08.2   \$12°15.2   \$263°54.7   \$12°208.6   \$355°04.1   \$150°05.5   \$31.1   \$355°08.3   \$60°55.5   \$58.5   \$226°10.4   \$15.3   \$278°57.5   \$08.6   \$10°06.5   \$37.1   \$12°22.5   \$12°22.4   \$15.3   \$24°40.3   \$08.5   \$25°08.9   \$37.1   \$12°22.5   \$13.2   \$90°24.1   \$1.57.5   \$256°14.9   \$1.54   \$324°06.0   \$08.5   \$59°13.7   \$37.0   \$12°22.5   \$15.2   \$120°22.7   \$56.6   \$286°19.3   \$15.5   \$339°08.8   \$08.5   \$70°16.1   \$37.0   \$12.5											1		
17   18   18   18   19   18   18   18   19   19													
20											Rasalhague		
25   32   90   24												90°42.8	
22											Kaus Aust.		
Mer.pass. 19:19   ν-0.7' d-0.5' m-4.19   ν-2.2' d0.1' m-0.48   ν-2.8' d-0.0' m-2.81   ν-2.4' d-0.0' m0.94   Peacock   53°06.2   -56°39.5											Vega	80°33.7	38°48.5
Mer.pass. 19:19											Nunki	75°48.2	-26°16.0
Sun         GHA         GHA         Dec         GHA         Nov208.4         86°18.5         S08°37.0         Fomalhaut         1.8°67.0         22°33.1         46°50.6         6°50.6         6°50.6         6°50.6         6°50.6         6°50.6         6°50.6         6°50.6         6°50.6         6°50.6         6°50.6         6°50.6         6°50.6         6°50.6         6°50.6         6°50.6         6°50.6         6°50.6         15.7         24°17.3         0.8.4         10°20.9         36.9         56.1         13°45.3         28°13.3         115°28.0         180°20.0         54.6         346°28.3         15.7         39°20.1         0.8.3         145°28.1         36.9         Markab         15°3.0         15°8.5         54°22.9         0.8.3         145°28.1         36.9         Markab         15°3.0         15°8.5         54°22.9         0.8.3         145°28.1         36.9         Markab         15°8.1         48°28.6         N22°08.3         16°28.7         36.9         Markab         15°8.0         48°28.6         N22°08.3         15°53	23	55-18.2	120-22.7	50.0	286 19.3	15.5	339 08.8	08.5	70-16.1	37.0	Altair	62°00.3	8°56.1
Sun         GHA         GHA         Dec         Hail         Sistent	Mer.p	ass. 19:19	$\nu$ -0.7' d-0	).5′ m-4.19	$\nu 2.2' \ d0.$	1' m-0.48	$\nu 2.8' \ d-0$	.0′ m-2.81	$\nu 2.4' \ d-0$	.0′ m0.94	Peacock	53°06.2	-56°39.5
Sun GHA GHA GHA GHA Dec GHA											Deneb	49°26.1	45°22.3
0 70°20.6 135°22.1 523°56.1 301°21.6 N21°15.6 354°11.6 N22°08.4 85°18.5 S08°37.0 1 85°23.1 150°21.4 55.6 316°23.8 15.6 9′14.5 08.4 100°20.9 36.9 36.9 165°20.7 55.1 331°26.0 15.7 24°17.3 08.4 115°23.3 36.9 4 130°30.5 195°19.3 54.1 1°30.5 15.8 54°22.9 08.3 145°28.1 36.9 51.4 1°30.5 15.8 54°22.9 08.3 145°28.1 36.9 16°35.0 120°18.7 53.6 16°32.7 15.9 69°25.8 08.3 160°30.5 36.8 16°35.0 \$22°18.0 \$23°53.1 31°35.0 N21°15.9 84°28.6 N22°08.3 175°32.9 \$508°36.8 190°40.4 255°16.6 52.1 61°39.5 16.0 114°34.2 08.2 205°37.7 36.7 1220°48.3 285°15.3 51.1 91°44.0 16.2 144°39.9 08.2 220°40.1 36.7 122°20.5 122°48.4 N21°16.3 174°45.5 N22°08.1 250°44.9 36.6 122°25°55.1 345°12.6 49.1 151°52.9 16.4 189°48.4 08.1 280°49.7 36.6 230°55.1 345°12.6 49.1 151°52.9 16.4 204°51.2 08.0 295°55.1 345°12.6 49.1 151°52.9 16.4 204°51.2 08.0 295°55.1 36.5 11.2 48.0 181°57.5 16.5 234°56.8 08.0 325°56.9 36.5 11°00.1 15°11.2 48.0 181°57.5 16.5 234°56.8 08.0 325°56.9 36.5 11°00.9 97.5 08.5 46.0 242°06.5 16.8 295°08.1 07.9 26°06.5 36.3 11°00.9 75°08.5 44.0 242°06.5 16.8 295°08.1 07.9 26°06.5 36.3 11°00.9 75°08.5 44.0 242°06.5 16.8 295°08.1 07.9 26°06.5 36.3 11°00.9 75°08.5 44.4 280°17.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 41°14.8 105°07.2 44.9	_			_		_		_		_	Enif	33°39.0	9°59.4
0 70°20.6 135°22.1 S23°56.1 301°21.6 N21°15.6 354°11.6 N22°08.4 85°18.5 S08°37.0 1 85°23.1 15°21.4 55.6 316°23.8 15.6 9°14.5 08.4 100°20.9 36.9 36.9 15°20.5 15°20.5 15°20.7 55.1 331°26.0 15.7 24°17.3 08.4 115°23.3 36.9 15°23.8 15.6 16°20.7 55.1 331°26.0 15.7 24°17.3 08.4 115°23.3 36.9 15°23.5 15°20.5											Al Na'ir	27°33.1	-46°50.6
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8			225°18.0	\$23°53.1		N21°15.9		N22°08.3	175°32.9	S08°36.8	1		
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15											Saturn	14~59.3	18:20
16 311°00.1 15°11.2 48.0 181°57.5 16.5 234°56.8 08.0 325°56.9 36.5 17 326°02.5 30°10.6 47.5 196°59.7 16.6 249°59.7 08.0 340°59.3 36.4 18 341°05.0 45°09.9 \$23°47.0 212°02.0 N21°16.7 265°02.5 N22°07.9 356°01.7 \$08°36.4 19 356°07.5 60°09.2 46.5 227°04.2 16.7 280°05.3 07.9 11°04.1 36.4 20 11°09.9 75°08.5 46.0 242°06.5 16.8 295°08.1 07.9 26°06.5 36.3 21 26°12.4 90°07.9 • 45.5 257°08.7 • 16.9 310°11.0 • 07.8 41°08.9 • 36.3 22 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 23 56°17.3 120°06.5 44.4 287°13.3 17.0 340°16.6 07.8 71°13.7 36.2      Venus 65°01.4 14:59											Dec 01 Sun	SHA	Mer nass
17       326°02.5       30°10.6       47.5       196°59.7       16.6       249°59.7       08.0       340°59.3       36.4       Mars       231°00.9       03:54         18       341°05.0       45°09.9       \$23°47.0       212°02.0       N21°16.7       265°02.5       N22°07.9       356°01.7       508°36.4       Jupiter       283°51.0       00:23         19       356°07.5       60°09.2       46.5       227°04.2       16.7       280°05.3       07.9       11°04.1       36.4       Saturn       14°57.9       18:16         20       11°09.9       75°08.5       46.0       242°06.5       16.8       295°08.1       07.9       26°06.5       36.3       41°08.9       36.3       36.2       Horizontal parallax         21       26°12.4       90°07.9       44.9       272°11.0       16.9       325°13.8       07.8       56°11.3       36.2       Venus:       0.2         23       56°17.3       120°06.5       44.4       287°13.3       17.0       340°16.6       07.8       71°13.7       36.2       Mars:       0.2													
18       341°05.0       45°09.9       \$23°47.0       212°02.0       N21°16.7       265°02.5       N22°07.9       356°01.7       \$508°36.4       Jupiter       283°51.0       00:23         19       356°07.5       60°09.2       46.5       227°04.2       16.7       280°05.3       07.9       11°04.1       36.4       36.4       Saturn       14°57.9       18:16         20       11°09.9       75°08.5       46.0       242°06.5       16.8       295°08.1       07.9       26°06.5       36.3       36.3       36.3       41°08.9       36.3       36.3       41°08.9       36.3       36.3       41°14.8       105°07.2       44.9       272°11.0       16.9       325°13.8       07.8       56°11.3       36.2       56°11.3       36.2       Venus:       0.2         23       56°17.3       120°06.5       44.4       287°13.3       17.0       340°16.6       07.8       71°13.7       36.2       Mars:       0.2											1		
19 356°07.5 60°09.2 46.5 227°04.2 16.7 280°05.3 07.9 11°04.1 36.4 20 11°09.9 75°08.5 46.0 242°06.5 16.8 295°08.1 07.9 26°06.5 36.3 21 26°12.4 90°07.9 · 45.5 257°08.7 · 16.9 310°11.0 · 07.8 41°08.9 · 36.3 22 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 23 56°17.3 120°06.5 44.4 287°13.3 17.0 340°16.6 07.8 71°13.7 36.2  Horizontal parallax Venus: 0.2 Mars: 0.2													
20 11°09.9 75°08.5 46.0 242°06.5 16.8 295°08.1 07.9 26°06.5 36.3 21 26°12.4 90°07.9 · 45.5 257°08.7 · 16.9 310°11.0 · 07.8 41°08.9 · 36.3 22 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 23 56°17.3 120°06.5 44.4 287°13.3 17.0 340°16.6 07.8 71°13.7 36.2  Horizontal parallax Venus: 0.2 Mars: 0.2									11°04 1				
21       26°12.4       90°07.9       · · 45.5       257°08.7       · · 16.9       310°11.0       · · 07.8       41°08.9       · · 36.3       Horizontal parallax         22       41°14.8       105°07.2       44.9       272°11.0       16.9       325°13.8       07.8       56°11.3       36.2       Venus:       0.2         23       56°17.3       120°06.5       44.4       287°13.3       17.0       340°16.6       07.8       71°13.7       36.2       Mars:       0.2											Saturn	14-57.9	18:10
22 41°14.8 105°07.2 44.9 272°11.0 16.9 325°13.8 07.8 56°11.3 36.2 Venus: 0.2 23 56°17.3 120°06.5 44.4 287°13.3 17.0 340°16.6 07.8 71°13.7 36.2 Mars: 0.2											Horizont	al parallay	
23 56°17.3 120°06.5 44.4 287°13.3 17.0 340°16.6 07.8 71°13.7 36.2 Mars: 0.2												-	0.2
25 36 11.5 120 00.5 11.1 201 10.5 11.0 310 10.0 01.0 11 10.1 30.2													
Mer.pass. 19:15 $\nu$ -0.7′ $d$ -0.5′ m-4.20 $\nu$ 2.2′ $d$ 0.1′ m-0.50 $\nu$ 2.8′ $d$ -0.0′ m-2.81 $\nu$ 2.4′ $d$ -0.0′ m0.94	23	50-17.3			287-13.3	17.0	340 <sup>-</sup> 16.6	07.8	/1-13./	36.2		ividi 5.	0.2
	Mer.n	ass. 19:15	$\nu$ -0.7' d-0	).5′ m-4.20	$\nu 2.2' d\Omega$	1′ m-0.50	$\nu 2.8' \ d-0$	.0′ m-2.81	$\nu 2.4' \ d-0$	.0′ m0.94			

h	Sui	า			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	182°55.9	S21°31.2	210°00.3	14.1'	\$18°16.5	11.4'	54.4'
1 2	197°55.7 212°55.5	31.6 32.0	224°33.3 239°06.3	14.0' 13.9'	18°27.9 18°39.2	11.3' 11.2'	54.4' 54.5'
3	227°55.3	32.5	253°39.2	13.8'	18°50.4	11.2'	54.5'
4	242°55.1	32.9	268°12.0	13.7'	19°01.6	11.1'	54.5'
5 6	257°54.8 272°54.6	33.3 \$21°33.7	282°44.7 297°17.4	13.6' 13.6'	19°12.6 \$19°23.7	11.0' 10.9'	54.5' 54.5'
7	287°54.4	34.1	311°49.9	13.5'	19°34.6	10.9	54.5
8	302°54.2	34.5	$326^{\circ}22.4$	13.4'	19°45.5	10.8'	54.5'
9	317°53.9 332°53.7	• • 34.9	340°54.8 355°27.1	13.3' 13.2'	19°56.2 20°06.9	10.7'	54.5' 54.6'
10 11	332 53.7 347°53.5	35.4 35.8	9°59.3	13.1'	20° 06.9 20° 17.6	10.6' 10.5'	54.6'
12	2°53.3	S21°36.2	24°31.5	13.0'	S20°28.1	10.5'	54.6'
13	17°53.0 32°52.8	36.6	39°03.5	13.0'	20°38.6	10.4'	54.6'
14 15	32°52.8 47°52.6	37.0 •• 37.4	53°35.5 68°07.3	12.9' 12.8'	20°48.9 20°59.2	10.3' 10.2'	54.6' 54.6'
16	62°52.4	37.8	82°39.1	12.7'	21°09.4	10.1'	54.6'
17	77°52.1	38.2 \$21°38.6	97°10.8	12.6'	21°19.6	10.0'	54.7'
18 19	92°51.9 107°51.7	39.0	111°42.4 126°14.0	12.5' 12.4'	\$21°29.6 21°39.5	9.9' 9.9'	54.7' 54.7'
20	122°51.5	39.4	140°45.4	12.3'	21°49.4	9.8'	54.7'
21	137°51.2	• • 39.8	155°16.7	12.3'	21°59.1	9.7'	54.7'
22 23	152°51.0 167°50.8	40.2 40.6	169°48.0 184°19.1	12.2' 12.1'	22°08.8 22°18.4	9.6' 9.5'	54.7' 54.7'
23			104 19.1			9.0	J+.1
	SD = 16.2'	d = 0.4'		SL	0 = 14.8'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	182°50.5 197°50.3	\$21°41.1 41.5	198°50.2 213°21.2	12.0' 11.9'	\$22°27.8 22°37.2	9.4' 9.3'	54.8' 54.8'
2	212°50.1	41.5	213 21.2 227°52.1	11.8'	22°46.5	9.3 9.2'	54.8'
3	227°49.9	42.3	242°22.9	11.7'	22°55.7	9.1'	54.8'
4	242°49.6 257°49.4	42.7 43.1	256°53.6 271°24.2	11.6' 11.5'	23°04.8 23°13.8	9.0'	54.8'
5 6	257 49.4 272°49.2	43.1 S21°43.4	271 24.2 285°54.7	11.5	23 13.8 S23°22.6	8.9' 8.8'	54.8' 54.9'
7	287°48.9	43.8	$300^{\circ}25.2$	11.3'	23°31.4	8.7'	54.9'
8	302°48.7 317°48.5	44.2 •• 44.6	314°55.5 329°25.8	11.3' 11.2'	23°40.1 23°48.7	8.6'	54.9'
9 10	317 48.5 332°48.2	• • 44.6 45.0	329 25.8 343°55.9	11.1'	23 48.7 23°57.1	8.5' 8.4'	54.9' 54.9'
11	347°48.0	45.4	358°26.0	11.0'	24°05.5	8.2'	54.9'
12	2°47.8 17°47.6	S21°45.8	12°56.0 27°25.9	10.9' 10.8'	\$24°13.7 24°21.9	8.1' 8.0'	54.9' 55.0'
13 14	32°47.3	46.2 46.6	21 25.9 41°55.7	10.8	24 21.9 24°29.9	8.0 7.9'	55.0'
15	47°47.1	• • 47.0	56°25.4	10.6'	24°37.8	7.8'	55.0'
16	62°46.9 77°46.6	47.4	70°55.0 85°24.6	10.5'	24°45.6 24°53.3	7.7'	55.0'
17 18	92°46.4	47.8 \$21°48.2	99°54.0	10.4' 10.4'	24 53.3 S25°00.8	7.6' 7.4'	55.0' 55.0'
19	107°46.2	48.6	114°23.4	10.3'	25°08.3	7.3'	55.1'
20	122°45.9	48.9	128°52.7	-0	25°15.6 25°22.8	7.2'	55.1'
21 22	137°45.7 152°45.5	· · 49.3 49.7	143°21.8 157°50.9	10.1' 10.0'	25 22.8 25°29.9	7.1' 7.0'	55.1' 55.1'
23	167°45.2	50.1	172°19.9	9.9'	25°36.9	6.8'	55.1'
	SD = 16.2'	d = 0.4'		SE	0 = 14.9'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	182°45.0	S21°50.5	186°48.9	9.8'	S25°43.7	6.7'	55.2'
1 2	197°44.7 212°44.5	50.9 51.3	201°17.7 215°46.5	9.8' 9.7'	25°50.4 25°57.0	6.6' 6.5'	55.2' 55.2'
3	212 44.5 227°44.3	51.6	215 46.5 230°15.1	9.7 9.6'	25°57.0 26°03.5	6.3	55.2'
4	242°44.0	52.0	244°43.7	9.5'	26°09.8	6.2'	55.2'
5	257°43.8	52.4	259°12.2	9.4'	26°16.0	6.1'	55.2'
6 7	272°43.6 287°43.3	\$21°52.8 53.2	273°40.6 288°09.0	9.3' 9.3'	\$26°22.1 26°28.0	5.9' 5.8'	55.3' 55.3'
8	302°43.1	53.5	302°37.2	9.2'	26°33.9	5.7'	55.3'
9	317°42.9	• • 53.9	317°05.4	9.1'	26°39.5	5.5'	55.3'
10 11	332°42.6 347°42.4	54.3 54.7	331°33.5 346°01.5	9.0' 8.9'	26°45.1 26°50.5	5.4' 5.3'	55.3' 55.3'
12	2°42.1	\$21°55.0	0°29.5	8.9'	S26°55.8	5.1'	55.4
13	17°41.9	55.4	14°57.4	8.8'	27°00.9	5.0'	55.4'
14 15	32°41.7 47°41.4	55.8 •• 56.2	29°25.2 43°52.9	8.7' 8.7'	27°05.9 27°10.8	4.9' 4.7'	55.4' 55.4'
16	62°41.2	56.5	58°20.5	8.6'	$27^{\circ}15.5$	4.6'	55.4
17	77°40.9	56.9	72°48.1	8.5'	27°20.1	4.4'	55.5'
18 19	92°40.7 107°40.5	\$21°57.3 57.7	87°15.6 101°43.1	8.4' 8.4'	\$27°24.5 27°28.8	4.3' 4.2'	55.5' 55.5'
20	122°40.2	58.0	$116^{\circ}10.4$	8.3'	27°33.0	4.0'	55.5'
21	137°40.0	58.4	130°37.7	8.2'	27°37.0	3.9'	55.5'
22 23	152°39.7 167°39.5	58.8 59.1	145°05.0 159°32.2	8.2' 8.1'	27°40.8 27°44.5	3.7' 3.6'	55.5' 55.6'
23	SD = 16.2'	$\frac{d}{d = 0.4'}$			0 = 15.0'	3.0	55.5
	- 10.2	u — U.T		JL			

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

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

		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%	
29	11:44	11:33	11:48	10:19	22:42		
30	11:22	11:11	11:49	11:06	23:32		
01	11:00	10:49	11:49	11:58	-:-		

## December 02, 03, 04 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	71°19.8	135°05.9	\$23°43.9	302°15.5	N21°17.1	355°19.4	N22°07.8	86°16.1	S08°36.2			
1	86°22.2	150°05.2	43.4	317°17.8	17.1	10°22.3	07.7	101°18.5	36.1	Alpheratz	357°34.8	29° 13.9
2	101°24.7	165°04.5	42.9	332°20.1	17.2	25°25.1	07.7	116°20.9	36.1	Ankaa	353°07.0	-42° 10.4
3	116°27.2	180°03.9	• • 42.3	347°22.3	• • 17.3	40°27.9	• • 07.7	131°23.3	• • 36.1	Schedar Diphda	349°30.9 348°47.2	56° 40.7 -17° 51.0
4	131°29.6	195°03.2	41.8	2°24.6	17.3	55°30.8	07.7	146°25.7	36.0	Achernar	335°19.8	-17 51.0 -57°06.8
5	146°32.1	210°02.5	41.3	17°26.9	17.4	70°33.6	07.6	161°28.1	36.0	Hamal	327°51.0	23°34.9
6	161°34.6	225°01.9	\$23°40.8	32°29.2	N21°17.5	85°36.4	N22°07.6	176°30.5	S08°36.0	Polaris	313°37.1	89°22.3
7	176°37.0	240°01.2	40.2	47°31.4	17.6	100°39.2	07.6	191°32.9	35.9	Acamar	315°11.4	-40°12.3
8	191°39.5	255°00.5	39.7	62°33.7	17.6	115°42.1	07.5	206°35.3	35.9	Menkar	314°06.0	4°11.3
9 10	206°42.0 221°44.4	269°59.9 284°59.2	· · 39.2 38.7	77°36.0 92°38.3	· · 17.7 17.8	130°44.9 145°47.7	· · 07.5 07.5	221°37.7 236°40.1	· · 35.9 35.8	Mirfak	308°27.9	49°57.1
11	236°46.9	299° 58.6	38.1	92 36.3 107°40.5	17.8	160°50.5	07.5	251°42.5	35.8	Aldebaran	290°39.4	16°33.6
12	251°49.3	314°57.9	\$23°37.6	122°42.8	N21°17.9	175°53.4	N22°07.4	266°44.9	S08°35.8	Rigel	281°03.6	-8° 10.3
13	266°51.8	329°57.2	37.1	137°45.1	18.0	190°56.2	07.4	281°47.3	35.7	Capella	280°21.6	46°01.4
14	281°54.3	344°56.6	36.5	152°47.4	18.0	205°59.0	07.4	296°49.7	35.7	Bellatrix Elnath	278°22.7 278°01.6	6°22.4 28°37.7
15	296°56.7	359°55.9	• • 36.0	167°49.7	•• 18.1	221°01.9	• • 07.4	311°52.1	• • 35.7	Alnilam	275°37.5	-1°11.1
16	311°59.2	14°55.3	35.4	182°52.0	18.2	236°04.7	07.3	326°54.5	35.6	Betelgeuse	270°51.9	7°24.8
17	327°01.7	29°54.6	34.9	197°54.2	18.3	251°07.5	07.3	341°56.9	35.6	Canopus	263°51.9	-52°42.3
18	342°04.1	44°54.0	\$23°34.4	212°56.5	N21°18.3	266°10.3	N22°07.3	356°59.3	S08°35.6	Sirius	258°26.0	-16°44.9
19	357°06.6 12°09.1	59°53.3	33.8	227°58.8	18.4 18.5	281°13.2 296°16.0	07.2	12°01.7 27°04.1	35.5	Adhara	255°05.6	-29°00.2
20 21	27°11.5	74°52.6 89°52.0	33.3 · · 32.7	243°01.1 258°03.4	18.6	311°18.8	07.2 •• 07.2	42°06.5	35.5 •• 35.4	Procyon	244°50.7	5°09.7
22	42°14.0	104°51.3	32.2	273°05.7	18.6	326°21.7	07.2	57°08.9	35.4	Pollux	243°17.2	27°57.9
23	57°16.5	119°50.7	31.7	288°08.0	18.7	341°24.5	07.1	72°11.3	35.4	Avior	234°14.4	-59°35.0
Maxa	10.12	0 7/ 4 0	0.5' m-4.20	2 3/ 40	1′ m-0.52	2 9/ 4 0	.0′ m-2.81		0′0 05	Suhail	222°46.2 221°37.9	-43°31.7
ivier.p	ass. 19:12	$\nu$ -0.7 a-0	0.5 m-4.20	$\nu$ 2.3 au.	1 m-0.52	ν2.8 α-0	.0 m-2.81	$\nu_2.4^{\circ} a$ -0	.0′ m0.95	Miaplacidus Alphard	221 37.9 217°47.7	-69°48.8 -8°45.9
										Regulus	207°34.5	11°50.7
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.2	61°36.7
0	72°18.9	134°50.0	\$23°31.1	303°10.3	N21°18.8	356°27.3	N22°07.1	87°13.7	S08°35.3	Denebola	182°25.1	14°25.9
1	87°21.4	149°49.4	30.6	318°12.6	18.9	11°30.1	07.1	102°16.1	35.3	Gienah	175°43.8	-17°40.7
2	102°23.8 117°26.3	164°48.7 179°48.1	30.0 •• 29.5	333°14.9 348°17.2	18.9 •• 19.0	26°33.0 41°35.8	07.0 •• 07.0	117°18.5 132°20.9	35.3 •• 35.2	Acrux	173°00.6	-63° 13.9
4	132°28.8	179 46.1 194° 47.4	28.9	3°19.5	19.1	56°38.6	07.0	132 20.9 147°23.3	35.2	Gacrux	171°52.1	-57° 14.9
5	147°31.2	209°46.8	28.4	18°21.8	19.2	71°41.4	07.0	162°25.7	35.2	Alioth	166°13.4	55°49.3
6	162°33.7	224°46.1	\$23°27.8	33°24.1	N21°19.2	86°44.3	N22°06.9	177°28.1	S08°35.1	Spica	158°22.6	-11°17.4
7	177°36.2	239°45.5	27.3	48°26.4	19.3	101°47.1	06.9	192°30.4	35.1	Alkaid Hadar	152°52.4 148°36.7	49°11.2 -60°29.4
8	192°38.6	254°44.8	26.7	63°28.7	19.4	116°49.9	06.9	207°32.8	35.1	Menkent	146 50.7 147°58.1	-36°29.4
9	$207^{\circ}41.1$	269°44.2	• • 26.2	78°31.0	• • 19.5	131°52.8	• • 06.8	222°35.2	• • 35.0	Arcturus	145°48.3	19°03.1
10	222°43.6	284° 43.5	25.6	93°33.3	19.6	146°55.6	06.8	237°37.6	35.0	Rigil Kent.	139°41.0	-60°56.1
11	237°46.0	299°42.9	25.0	108°35.7	19.6	161°58.4	06.8	252°40.0	34.9	Kochab	137°20.8	74°03.0
12	252°48.5	314°42.2	\$23°24.5	123°38.0	N21°19.7	177°01.2	N22°06.8	267°42.4	\$08°34.9	Zuben'ubi	$136^{\circ}56.4$	-16°08.6
13 14	267°51.0 282°53.4	329°41.6 344°41.0	23.9 23.4	138°40.3 153°42.6	19.8 19.9	192°04.1 207°06.9	06.7 06.7	282°44.8 297°47.2	34.9 34.8	Alphecca	126°04.2	26° 37.8
15	202 55.4 297°55.9	359° 40.3	• • 22.8	168°44.9	. 20.0	207 00.9 222°09.7	•• 06.7	312°49.6	• • 34.8	Antares	112°16.3	-26°29.2
16	312°58.3	14°39.7	22.2	183°47.2	20.0	237°12.6	06.7	327°52.0	34.8	Atria	107°11.2	-69°04.3
17	328°00.8	29°39.0	21.7	198°49.6	20.1	252°15.4	06.6	342°54.4	34.7	Sabik Shaula	102°03.3 96°10.9	-15°45.3 -37°07.3
18	343°03.3	44°38.4	S23°21.1	213°51.9	N21°20.2	267°18.2	N22°06.6	357°56.8	S08°34.7	Rasalhague	95°59.0	12°32.5
19	358°05.7	59°37.8	20.5	228°54.2	20.3	282°21.0	06.6	12°59.2	34.6	Eltanin	90°42.8	51°29.2
20	13°08.2	74°37.1	20.0	243°56.5	20.4	297°23.9	06.5	28°01.6	34.6	Kaus Aust.	83°33.0	-34°22.4
21	28°10.7	89°36.5	• • 19.4	258°58.9	• • 20.5	312°26.7	• • 06.5	43°04.0	• • 34.6	Vega	80°33.7	38° 48.5
22 23	43°13.1 58°15.6	104°35.8 119°35.2	18.8 18.3	274°01.2 289°03.5	20.5 20.6	327°29.5 342°32.4	06.5 06.5	58°06.3 73°08.7	34.5	Nunki	75°48.2	-26°16.0
		-							34.5	Altair	62°00.3	8°56.1
Mer.p	ass. 19:08	$\nu$ -0.7' d-0	).5′ m-4.21	$\nu 2.3' \ d0.$	1'  m-0.55	$\nu$ 2.8′ d-0	.0′ m-2.81	$\nu$ 2.4′ d-0	.0′ m0.95	Peacock	53°06.2	-56°39.5
										Deneb	49°26.1	45°22.3
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir	33°39.0 27°33.1	9°59.4 -46°50.6
0	73°18.1	134°34.6	\$23°17.7	304°05.9	N21°20.7	357°35.2	N22°06.4	88°11.1	S08°34.5	Fomalhaut	27 33.1 15°14.6	-40° 50.6 -29° 29.6
1	88°20.5	149°33.9	17.1	319°08.2	20.8	12°38.0	06.4	103°13.5	34.4	Scheat	13°45.3	28° 13.3
2	103°23.0	164°33.3	16.5	334°10.5	20.9	27°40.9	06.4	118°15.9	34.4	Markab	13°30.0	15°20.5
3	118°25.5	179°32.7	• • 16.0	349°12.9	• • 21.0	42°43.7	• • 06.3	133°18.3	• • 34.3	D 02 M	CIIA	N4
4	133°27.9 148°30.4	194°32.0	15.4	4°15.2 19°17.5	21.1	57°46.5	06.3	148°20.7 163°23.1	34.3	Dec 02 Mon Venus	<b>SHA</b> 63°46.1	Mer.pass 15:00
5 6	163°32.8	209°31.4 224°30.8	14.8 \$23°14.2	34°19.9	21.1 N21°21.2	72°49.3 87°52.2	06.3 N22°06.3	103 25.1 178°25.5	34.3 \$08°34.2	Mars	230°55.8	03:50
7	178°35.3	239° 30.1	13.7	49°22.2	21.3	102°55.0	06.2	170°23.3 193°27.9	34.2	Jupiter	283°59.7	00:19
8	193°37.8	254°29.5	13.1	64°24.5	21.4	117°57.8	06.2	208°30.3	34.2	Saturn	14°56.4	18:12
9	208°40.2	269° 28.9	• • 12.5	79°26.9	• • 21.5	133°00.7	06.2	223°32.6	• • 34.1			
10	223°42.7	284°28.2	11.9	94°29.2	21.6	148°03.5	06.1	238°35.0	34.1	Dec 03 Tue Venus	<b>SHA</b> 62°31.1	Mer.pass
11	238°45.2	299°27.6	11.3	109°31.6	21.7	163°06.3	06.1	253°37.4	34.0	Mars	230°51.4	15:01 03:47
12	253°47.6	314°27.0	\$23°10.7	124°33.9	N21°21.8	178°09.1	N22°06.1	268°39.8	S08°34.0	Jupiter	284°08.4	00:14
13	268°50.1	329°26.3	10.2	139°36.3	21.8	193°12.0	06.1	283°42.2	34.0	Saturn	14°54.8	18:08
14 15	283°52.6 298°55.0	344°25.7 359°25.1	09.6 •• 09.0	154°38.6 169°41.0	21.9 •• 22.0	208°14.8 223°17.6	06.0 •• 06.0	298°44.6 313°47.0	33.9 · · 33.9	Doc 04 14/- 1		
16	290 55.0 313°57.5	14° 24.5	08.4	184°43.3	22.1	238°20.5	06.0	313 47.0 328°49.4	33.9	Dec 04 Wed Venus	<b>SHA</b> 61°16.5	Mer.pass 15:02
17	329°00.0	29° 23.8	07.8	199°45.7	22.2	253°23.3	05.9	343°51.8	33.8	Mars	230°47.8	03:43
18	344°02.4	44° 23.2	\$23°07.2	214°48.0	N21°22.3	268°26.1	N22°05.9	358°54.1	S08°33.8	Jupiter	284°17.1	00:10
19	359°04.9	59°22.6	06.6	229°50.4	22.4	283°29.0	05.9	13°56.5	33.7	Saturn	14°53.1	18:04
20	14°07.3	74°22.0	06.0	244°52.8	22.5	298°31.8	05.9	28°58.9	33.7	Haulas	al paralla:	
21	29°09.8	89°21.4	05.4	259°55.1	• • 22.6	313°34.6	•• 05.8	44°01.3	• • 33.7	norizont	al parallax Venus:	0.2
22 23	44°12.3 59°14.7	104°20.7 119°20.1	04.8 04.2	274°57.5 289°59.8	22.7 22.8	328°37.4 343°40.3	05.8 05.8	59°03.7 74°06.1	33.6 33.6		Mars:	0.2
Mer.pass. 19:04 $\nu$ -0.6′ $d$ -0.6′ m-4.22		$\nu$ 2.3′ d0.	1′ m-0.57	$\nu$ 2.8′ d-0	.0′ m-2.81	$\nu 2.4' \ d-0$	.0′ m0.95					

h	Sui	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	182°39.3	S21°59.5	$173^{\circ}59.3$	8.1'	S27°48.1	3.4'	55.6'
1	197°39.0	21°59.9	188°26.3	8.0'	27°51.5	3.3'	55.6'
2 3	212°38.8 227°38.5	22°00.2 •• 00.6	202°53.3 217°20.3	7.9' 7.9'	27°54.8 27°57.9	3.1' 3.0'	55.6' 55.6'
4	242°38.3	01.0	231°47.1	7.8'	28°00.9	2.8'	55.7'
5	257°38.0	01.3	$246^{\circ}14.0$	7.8'	28°03.7	2.7'	55.7'
6	272°37.8	S22°01.7	260°40.7	7.7'	\$28°06.4	2.5'	55.7'
7 8	287°37.6 302°37.3	02.0 02.4	275°07.4 289°34.1	7.7' 7.6'	28°08.9 28°11.2	2.4' 2.2'	55.7' 55.7'
9	317°37.1	02.8	304°00.7	7.6'	28°13.4	2.0'	55.8'
10	332°36.8	03.1	$318^{\circ}27.3$	7.5'	28°15.5	1.9'	55.8'
11	347°36.6	03.5	332°53.8 347°20.3	7.5'	28°17.4 528°19.1	1.7'	55.8'
12 13	2°36.3 17°36.1	\$22°03.8 04.2	347°20.3 1°46.8	7.4' 7.4'	528°19.1 28°20.7	1.6' 1.4'	55.8' 55.8'
14	32°35.9	04.6	16°13.2	7.4	28°22.1	1.3'	55.9'
15	47°35.6	• • 04.9	$30^{\circ}39.5$	7.3'	28°23.4	1.1'	55.9'
16	62°35.4	05.3	45°05.8	7.3'	28°24.5	0.9'	55.9'
17 18	77°35.1 92°34.9	05.6 \$22°06.0	59°32.1 73°58.4	7.3' 7.2'	28°25.4 <b>5</b> 28°26.2	0.8' 0.6'	55.9' 55.9'
19	107°34.6	06.3	88°24.6	7.2'	28°26.8	0.5	56.0'
20	122°34.4	06.7	102°50.8	7.2'	28°27.3	0.3'	56.0'
21	137°34.1	• • 07.0	117°17.0	7.1'	28°27.6	0.1'	56.0'
22	152°33.9	07.4	131°43.1 146°09.2	7.1'	28°27.7	-0.0'	56.0'
23	167°33.6	07.7	140 - 09.2	7.1'	28°27.7	-0.2'	56.0'
	SD = 16.2'	d = 0.4'		SI	O = 15.2'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	182°33.4	S22°08.1	160°35.3	7.1'	S28°27.5	-0.3'	56.0'
1	197°33.1	08.4	175°01.4	7.1'	28°27.2	-0.5'	56.1'
2	212°32.9 227°32.6	08.8 •• 09.1	189°27.5 203°53.5	7.0' 7.0'	28°26.7 28°26.0	-0.7' -0.8'	56.1' 56.1'
3 4	242°32.4	09.1	203 53.5 218°19.5	7.0' 7.0'	28°25.2	-0.8 -1.0'	56.1'
5	257°32.1	09.8	232°45.5	7.0'	28°24.2	-1.2'	56.1
6	272°31.9	S22°10.2	247°11.5	7.0'	S28°23.1	-1.3'	56.2'
7	287°31.6	10.5	261°37.5	7.0'	28°21.8	-1.5'	56.2'
8 9	302°31.4 317°31.1	10.9 •• 11.2	276°03.5 290°29.5	7.0' 7.0'	28°20.3 28°18.6	-1.6' -1.8'	56.2' 56.2'
10	332°30.9	11.5	304°55.5	7.0'	28°16.8	-2.0'	56.2
11	347°30.6	11.9	319°21.4	7.0'	28°14.9	-2.1'	56.3'
12	2°30.4	S22°12.2	333°47.4	7.0'	S28°12.7	-2.3'	56.3'
13	17°30.1 32°29.9	12.6 12.9	348°13.4 2°39.4	7.0' 7.0'	28°10.4 28°08.0	-2.5' -2.6'	56.3' 56.3'
14 15	32 29.9 47°29.6	. 13.2	2 39.4 17°05.3	7.0' 7.0'	28 08.0 28°05.4	-2.8'	56.3'
16	62°29.4	13.6	31°31.3	7.0'	28°02.6	-2.9'	56.4
17	77°29.1	13.9	45°57.3	7.0'	27°59.6	-3.1'	56.4'
18	92°28.9 107°28.6	\$22°14.2 14.6	60°23.3 74°49.4	7.0'	\$27°56.5 27°53.3	-3.3'	56.4' 56.4'
19 20	107 28.6 122°28.4	14.6	74 49.4 89°15.4	7.0' 7.1'	27°49.8	-3.4' -3.6'	56.4'
21	137°28.1	15.3	103°41.5	7.1'	27°46.2	-3.8'	56.5'
22	152°27.9	15.6	118°07.5	7.1'	27°42.5	-3.9'	56.5'
23	167°27.6	15.9	132°33.6	7.1'	27°38.5	-4.1'	56.5'
	SD = 16.2'	d = 0.3'		SI	D = 15.3'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°27.4	S22°16.2	146°59.7	7.1'	S27°34.5	-4.2'	56.5'
1 2	197°27.1 212°26.9	16.6 16.9	161°25.9 175°52.0	7.2' 7.2'	27°30.2 27°25.8	-4.4' -4.6'	56.5' 56.6'
3	212 20.9 227°26.6	10.9	175 52.0 190°18.2	7.2'	27°21.3	-4.0 -4.7'	56.6'
4	242°26.3	17.6	204°44.4	7.2'	27°16.5	-4.9	56.6'
5	257°26.1	17.9	$219^{\circ}10.7$	7.3'	27°11.7	-5.0'	56.6'
6	272°25.8	\$22°18.2	233°36.9	7.3'	\$27°06.6	-5.2'	56.6'
7 8	287°25.6 302°25.3	18.5 18.9	248°03.2 262°29.6	7.3' 7.4'	27°01.4 26°56.1	-5.4' -5.5'	56.7' 56.7'
9	317°25.1	•• 19.2	276°56.0	7.4'	26°50.6	-5.5' -5.7'	56.7
10	332°24.8	19.5	$291^{\circ}22.4$	7.4'	$26^{\circ}44.9$	-5.8'	56.7'
11	347°24.6	19.8	305°48.8	7.5'	26°39.1	-6.0'	56.7'
12 13	2°24.3 17°24.0	\$22°20.2 20.5	320°15.3 334°41.8	7.5' 7.6'	\$26°33.1 26°27.0	-6.1' -6.3'	56.8' 56.8'
13 14	32°23.8	20.5	334 41.8 349°08.4	7.6'	26°20.7	-6.4'	56.8'
15	47°23.5	• • 21.1	3°35.0	7.7'	$26^{\circ}14.3$	-6.6'	56.8'
16	62°23.3	21.5	18°01.7	7.7'	26°07.7	-6.7'	56.9'
17	77°23.0	21.8	32°28.4	7.7'	26°00.9	-6.9'	56.9'
18 19	92°22.7 107°22.5	\$22°22.1 22.4	46°55.1 61°21.9	7.8' 7.8'	\$25°54.0 25°47.0	-7.0' -7.2'	56.9' 56.9'
20	122°22.2	22.7	75°48.8	7.9'	25°39.8	-7.3'	56.9'
21	137°22.0	• • 23.0	90°15.7	7.9'	25°32.4	-7.5'	57.0'
22	152°21.7	23.4	104°42.6	8.0'	25°25.0	-7.6'	57.0'
23	167°21.5	23.7	119°09.6	8.0'	25°17.3	-7.8'	57.0'
	SD = 16.2'	d = 0.3'		SI	D = 15.4'		

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

Lat.		Moonris	е		Moonset	
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°				_		
<b>N</b> 70°						
68°						
66°						
64°						
62°	11.00	10.01	13:22	1116	15.00	16:17
60°	11:28	12:21	12:41	14:16	15:20	16:57
N 58°	10:48	11:43	12:13	14:56	15:58	17:25
56°	10:20	11:16	11:51	15:24	16:25	17:46
54°	09:58	10:54	11:34	15:45	16:46	18:04
52° 50°	09:40	10:37	11:18	16:03	17:04	18:18
45°	09:25 08:54	10:22 09:51	11:05 10:38	16:19 16:50	17:19 17:49	18:31 18:58
<b>N</b> 40° 35°	08:31	09:27	10:16	17:14	18:12	19:19
35°	08:11 07:54	09:08 08:51	09:58 09:42	17:33 17:50	18:32 18:48	19:36 19:51
20°	07:34	08:22	09:42	18:19	19:16	20:17
N 10°	07:02	07:58	08:53	18:43	19:40	20:17
0°	06:39	07:35	08:32	19:06	20:03	20:58
<b>S</b> 10°	06:17	07:13	08:10	19:29	20:25	21:18
20°	05:53	06:48	07:47	19:53	20:48	21:40
30°	05:25	06:20	07:21	20:22	21:16	22:04
35°	05:08	06:03	07:05	20:39	21:32	22:19
40°	04:49	05:43	06:47	20:58	21:51	22:35
45°	04:26	05:20	06:24	21:22	22:14	22:55
<b>S</b> 50°	03:56	04:49	05:56	21:53	22:43	23:20
52°	03:42	04:34	05:42	22:08	22:57	23:32
54°	03:25	04:16	05:26	22:26	23:13	23:45
56°	03:04	03:55	05:07	22:47	23:33	
58°	02:39	03:27	04:43	23:15	23:57	
<b>S</b> 60°	02:05	02:48	04:11	23:54		00:29

ĺ			Sun		Moon			
ı	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	1-8%	
ı	02	10:37	10:25	11:50	12:53	00:25		
ı	03	10:14	10:02	11:50	13:49	01:21		
	04	09:49	09:37	11:50	14:45	02:17		

## December 05, 06, 07 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
					N21°22.8				S08°33.5		эпа	Dec
0	74°17.2	134°19.5	\$23°03.7	305°02.2		358°43.1	N22°05.7	89°08.5		Alpheratz	357°34.8	29° 13.9
1	89°19.7	149°18.9	03.1	320°04.6	22.9	13°45.9	05.7	104°10.9	33.5	Ankaa	353°07.1	-42°10.4
2	104°22.1	164° 18.3	02.5	335°06.9	23.0	28°48.8	05.7	119°13.3	33.5	Schedar	349°30.9	56° 40.7
3	119°24.6	179° 17.6	• • 01.9	350°09.3	• • 23.1	43°51.6	• • 05.7	134°15.6	• • 33.4	Diphda	348°47.2	-17°51.1
4	134°27.1	194° 17.0	01.3	5°11.7	23.2	58°54.4	05.6	149°18.0	33.4	Achernar	335°19.8	-57°06.8
5	149°29.5	209°16.4	00.6	20°14.1	23.3	73°57.3	05.6	164°20.4	33.3	Hamal	327°51.0	23°34.9
6	164°32.0	224° 15.8	\$23°00.0	35°16.4	N21°23.4	89°00.1	N22°05.6	179°22.8	508°33.3	Polaris	313°37.5	89°22.3
7	179°34.5	239° 15.2	22°59.4	50°18.8	23.5	104°02.9	05.6	194°25.2	33.3	Acamar	315°11.4	-40°12.3
8	194°36.9	254° 14.6	58.8	65°21.2	23.6	119°05.7	05.5	209°27.6	33.2	Menkar	314°05.9	4°11.3
9	209°39.4	269°13.9	• • 58.2	80°23.6	• • 23.7	134°08.6	• • 05.5	224°30.0	• • 33.2	Mirfak	308°27.9	49°57.1
10	224°41.8	284°13.3	57.6	95°25.9	23.8	149°11.4	05.5	239°32.3	33.1	Aldebaran	290°39.4	16°33.6
11	239°44.3	299°12.7	57.0	110°28.3	23.9	164°14.2	05.4	254°34.7	33.1	Rigel	281°03.6	-8° 10.3
12	254°46.8	314°12.1	S22°56.4	125°30.7	N21°24.0	179°17.1	N22°05.4	269°37.1	S08°33.1	Capella	280°21.5	46°01.4
13	269°49.2	329°11.5	55.8	140°33.1	24.1	194°19.9	05.4	284°39.5	33.0	Bellatrix	278°22.6	6°22.4
14	284°51.7	344°10.9	55.2	155°35.5	24.2	209°22.7	05.4	299°41.9	33.0	Elnath	278°01.6	28°37.7
15	299°54.2	359°10.3	• • 54.6	170°37.8	• • 24.3	224°25.6	• • 05.3	314°44.3	• • 32.9	Alnilam	275°37.5	-1°11.1
16	314°56.6	14°09.7	54.0	185°40.2	24.4	239°28.4	05.3	329°46.7	32.9	Betelgeuse	270°51.8	7°24.7
17	329°59.1	29°09.1	53.3	200°42.6	24.5	254°31.2	05.3	344°49.0	32.9	Canopus	263°51.9	-52°42.3
18	345°01.6	44°08.4	S22°52.7	215°45.0	N21°24.6	269°34.1	N22°05.2	359°51.4	S08°32.8	Sirius	258°26.0	-16°44.9
19	0°04.0	59°07.8	52.1	230°47.4	24.7	284°36.9	05.2	14°53.8	32.8	Adhara	255°05.6	-29°00.2
20	15°06.5	74°07.2	51.5	245°49.8	24.8	299°39.7	05.2	29°56.2	32.7	Procyon	244°50.7	5°09.7
21	30°08.9	89°06.6	• • 50.9	260°52.2	• • 24.9	314°42.5	• • 05.2	44°58.6	• • 32.7	Pollux	244° 30.7 243° 17.1	27° 57.9
22	45°11.4	104°06.0	50.2	275°54.6	25.0	329°45.4	05.1	60°01.0	32.7	Avior	234°14.4	-59°35.1
23	60°13.9	119°05.4	49.6	290°57.0	25.1	344°48.2	05.1	75°03.3	32.6	Suhail	234 14.4 222°46.2	-43°31.7
N A	10.00	0.6/ -1.0	16/ 100	- 0 4/ -10	1′ m-0.59	-20/ -10	0/ 0.01	-24/-10	0/ 0.06			
ivier.p	bass. 19:00	$\nu$ -0.6 $a$ -0	0.6′ m-4.22	$\nu$ 2.4 au.	1 m-0.59	ν2.8 a-0	.0′ m-2.81	$\nu_{2.4}$ a-0	.0′ m0.96	Miaplacidus	221°37.9	-69°48.8
										Alphard	217°47.7 207°34.5	-8°45.9
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus		11°50.7
0	75°16.3	134°04.8	S22°49.0	305°59.4	N21°25.2	359°51.0	N22°05.1	90°05.7	S08°32.6	Dubhe	193°41.1	61°36.7
1	90°18.8	149°04.2	48.4	321°01.8	25.3	14°53.9	05.0	105°08.1	32.5	Denebola	182°25.1	14°25.9
2	105°21.3	164°03.6	47.8	336°04.2	25.4	29°56.7	05.0	120°10.5	32.5	Gienah	175°43.8	-17°40.7
3	120°23.7	179°03.0	• • 47.1	351°06.6	• • 25.5	44°59.5	05.0	135°12.9	• • 32.5		173°00.5	-63°13.9
4	135°26.2	194°02.4	46.5	6°09.0	25.6	60°02.4	04.9	150°15.3	32.4	Gacrux	171°52.0	-57° 14.9
5	150°28.7	209°01.8	45.9	21°11.4	25.7	75°05.2	04.9	165°17.6	32.4	Alioth	166°13.3	55°49.2
6	165°31.1	224°01.2	\$22°45.2	36°13.8	N21°25.8	90°08.0	N22°04.9	180°20.0	S08°32.3	Spica	158°22.6	-11° 17.4
7	180°33.6	239°00.6	44.6	51°16.2	25.9	105°10.8	04.9	195°22.4	32.3	Alkaid	152°52.4	49°11.1
8	195°36.1	254°00.0	44.0	66°18.6	26.0	100°10.8	04.9	210°24.8	32.3	Hadar	148°36.7	-60°29.4
9	210°38.5	268° 59.4	• • 43.4	81°21.0	26.1	135°16.5	• • 04.8	210°24.8 225°27.2	• • 32.2	Menkent	147°58.0	-36°29.4
	210 38.5 225°41.0	283°58.8		96°23.4	26.2	150°19.3	04.8	240°29.6		Arcturus	145°48.3	19°03.1
10	240°43.4		42.7	90 23.4 111°25.9		165°22.2			32.2	Rigil Kent.	139°41.0	-60°56.1
11		298°58.2 313°57.6	42.1		26.3	180°25.0	04.7	255°31.9	32.1 \$08°32.1	Kochab	137°20.8	74°03.0
12	255°45.9		\$22°41.5	126°28.3	N21°26.4		N22°04.7	270°34.3		Zuben'ubi	136°56.4	-16°08.6
13	270°48.4	328°57.0	40.8	141°30.7	26.5	195°27.8	04.7	285°36.7	32.0	Alphecca	126°04.2	26°37.8
14	285°50.8	343°56.4	40.2	156°33.1	26.7	210°30.7	04.7	300°39.1	32.0	Antares	112°16.3	-26°29.2
15	300°53.3	358°55.9	• • 39.5	171°35.5	• • 26.8	225°33.5	• • 04.6	315°41.5	• • 32.0	Atria	$107^{\circ}11.2$	-69°04.3
16	315°55.8	13°55.3	38.9	186°38.0	26.9	240°36.3	04.6	330°43.8	31.9	Sabik	102°03.2	-15°45.3
17	330°58.2	28°54.7	38.3	201°40.4	27.0	255°39.2	04.6	345°46.2	31.9	Shaula	$96^{\circ}10.9$	-37°07.3
18	346°00.7	43°54.1	\$22°37.6	216°42.8	N21°27.1	270°42.0	N22°04.5	0°48.6	S08°31.8	Rasalhague	95°59.0	12°32.5
19	1°03.2	58°53.5	37.0	231°45.2	27.2	285°44.8	04.5	15°51.0	31.8	Eltanin	90°42.8	51°29.2
20	16°05.6	73°52.9	36.3	246°47.7	27.3	300°47.6	04.5	30°53.4	31.8	Kaus Aust.	83°33.0	-34°22.4
21	31°08.1	88°52.3	• • 35.7	261°50.1	• • 27.4	315°50.5	• • 04.5	45°55.8	• • 31.7	Vega	80°33.7	38° 48.5
22	46°10.6	103°51.7	35.1	276°52.5	27.5	330°53.3	04.4	60°58.1	31.7	Nunki	75°48.2	-26°16.0
23	61°13.0	118°51.1	34.4	291°54.9	27.6	345°56.1	04.4	76°00.5	31.6	Altair	62°00.3	8°56.1
Mer.p	ass. 18:56	$\nu$ -0.6' d-0	0.6′ m-4.23	$\nu 2.4' d0.$	1' m-0.61	$\nu 2.8' \ d-0$	.0′ m-2.81	$\nu 2.4' d-0$	.0′ m0.96	Peacock	53°06.2	-56°39.5
										Deneb	49°26.2	45°22.3
										Enif	33°39.0	9°59.4
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.1	-46°50.6
0	76°15.5	133°50.6	S22°33.8	306°57.4	N21°27.7	0°59.0	N22°04.4	91°02.9	508°31.6	Fomalhaut	15°14.6	-29°29.6
1	91°17.9	148°50.0	33.1	321°59.8	27.9	16°01.8	04.3	106°05.3	31.5	Scheat	13°45.3	28° 13.3
2	106°20.4	163°49.4	32.5	337°02.3	28.0	31°04.6	04.3	121°07.7	31.5	Markab	13°30.0	15°20.5
3	121°22.9	178° 48.8	• • 31.8	352°04.7	• • 28.1	46°07.5	• • 04.3	136°10.0	· · 31.5	D 05 =:	6	
4	136°25.3	193°48.2	31.2	7°07.1	28.2	61°10.3	04.3	151°12.4	31.4	Dec 05 Thu	SHA	Mer.pass
5	151°27.8	208°47.6	30.5	22°09.6	28.3	76°13.1	04.2	166°14.8	31.4	Venus	60°02.3	15:03
6	166°30.3	223°47.1	\$22°29.9	37°12.0	N21°28.4	91°16.0	N22°04.2	181°17.2	S08°31.3	Mars		03:39
7	181°32.7	238°46.5	29.2	52°14.5	28.5	106°18.8	04.2	196°19.5	31.3	Jupiter	284°25.9	00:05
8	196°35.2	253°45.9	28.5	67°16.9	28.6	121°21.6	04.1	211°21.9	31.2	Saturn	14°51.3	18:01
9	211°37.7	268°45.3	• • 27.9	82°19.3	• • 28.8	136°24.4	• • 04.1	226°24.3	• • 31.2	Dec 06 Fri	SHA	Mer.pass
10	226°40.1	283°44.7	27.2	97°21.8	28.9	151°27.3	04.1	241°26.7	31.2	Venus	58°48.5	15:04
11	241°42.6	298°44.2	26.6	112°24.2	29.0	166°30.1	04.1	256°29.1	31.1	Mars		03:35
12	256°45.1	313°43.6	S22°25.9	127°26.7	N21°29.1	181°32.9	N22°04.0	271°31.4	S08°31.1	Jupiter		00:01
13	271°47.5	328°43.0	25.3	142°29.1	29.2	196°35.8	04.0	286°33.8	31.0	Saturn	14°49.4	17:57
14	286°50.0	343°42.4	24.6	157°31.6	29.3	211°38.6	04.0	301°36.2	31.0	Jutuill		
15	301°52.4	358°41.9	• • 23.9	172°34.0	• • 29.5	226°41.4	• • 03.9	316°38.6	• • 30.9	Dec 07 Sat	SHA	Mer.pass
16	316°54.9	13°41.3	23.3	187°36.5	29.6	241°44.3	03.9	331°40.9	30.9	Venus	57°35.1	15:05
17	331°57.4	28°40.7	22.6	202°39.0	29.7	256°47.1	03.9	346°43.3	30.9	Mars	230°41.9	03:32
18	346°59.8	43°40.1	\$22°21.9	217°41.4	N21°29.8	271°49.9	N22°03.9	1°45.7	<b>S</b> 08°30.8	Jupiter	284°43.5	23:52
19	2°02.3	58°39.6	21.3	232°43.9	29.9	286°52.8	03.8	16°48.1	30.8	Saturn	14°47.4	17:53
20	17°04.8	73°39.0	20.6	247°46.3	30.0	301°55.6	03.8	31°50.5	30.7			
21	32°07.2	88°38.4	• • 19.9	262°48.8	• • 30.2	316°58.4	• • 03.8	46°52.8	• • 30.7	Horizon	al parallax	2.2
22	47°09.7	103°37.9	19.3	277°51.3	30.3	332°01.2	03.7	61°55.2	30.6		Venus:	0.2
23	62°12.2	118°37.3	18.6	292°53.7	30.4	347°04.1	03.7	76°57.6	30.6		Mars:	0.2
Mars	ass. 18:52	v-0.6/ d.0	0.6' m-4.24	1/2 // 40	1′ m-0.64	1/2 8/ d n	.0′ m-2.81	$\nu 2.4' \ d-0$	0' m0 07			
-νισι.μ	10.02	₽ 0.0 U-0	7.47	ν <u>-</u> . ¬ u 0.		- 2.0 U-0	2.01	∠2.∓ u-0	.5 1110.91			

h	Sun						
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	182°21.2	S22°24.0	$133^{\circ}36.6$	8.1'	\$25°09.5	-7.9'	57.0'
1	197°20.9	24.3	148°03.8	8.2'	25°01.6	-8.1'	57.0'
2	212°20.7 227°20.4	24.6 • • 24.9	162°30.9 176°58.1	8.2' 8.3'	24°53.5 24°45.3	-8.2' -8.4'	57.1' 57.1'
4	242°20.2	25.2	191°25.4	8.3	24° 36.9	-8.5'	57.1'
5	257°19.9	25.5	205°52.7	8.4'	24°28.4	-8.6'	57.1'
6	272°19.6	S22°25.8	220°20.1	8.4'	S24°19.8	-8.8'	57.1'
7	287°19.4	26.2	234°47.5 249°15.0	8.5'	24°11.0 24°02.1	-8.9'	57.2'
8 9	302°19.1 317°18.8	26.5 • • 26.8	249°15.0 263°42.6	8.6' 8.6'	24°02.1 23°53.0	-9.1' -9.2'	57.2' 57.2'
10	332°18.6	27.1	278°10.2	8.7'	23°43.8	-9.2' -9.3'	57.2'
11	347°18.3	27.4	292°37.9	8.7'	23°34.5	-9.5'	57.2'
12	2°18.1	\$22°27.7	307°05.6	8.8'	\$23°25.0	-9.6'	57.3'
13 14	17°17.8 32°17.5	28.0 28.3	321°33.4 336°01.3	8.9' 8.9'	23°15.4 23°05.7	-9.7' -9.9'	57.3' 57.3'
15	47°17.3	. 28.6	350°29.2	9.0'	23 05.7 22°55.8	-9.9 -10.0'	57.3'
16	62°17.0	28.9	4°57.2	9.0'	22°45.8	-10.1'	57.3'
17	77°16.7	29.2	19°25.3	9.1'	22°35.7	-10.3'	57.4'
18	92°16.5	S22°29.5	33°53.4	9.2'	\$22°25.4	-10.4'	57.4
19 20	107°16.2 122°16.0	29.8 30.1	48°21.5 62°49.8	9.2' 9.3'	22°15.0 22°04.5	-10.5' -10.6'	57.4' 57.4'
21	137°15.7	30.4	77°18.1	9.4'	21°53.9	-10.8'	57.4'
22	152°15.4	30.7	91°46.4	9.4'	21°43.1	-10.9'	57.5'
23	167°15.2	31.0	106°14.9	9.5'	21°32.2	-11.0'	57.5'
	SD = 16.2'	d = 0.3'		SI	O = 15.5'		
F. ·	CUA	D	CUA		D-:	.1	LID
Fri 0	<b>GHA</b> 182°14.9	Dec \$22°31.3	<b>GHA</b> 120°43.4	u 9.6'	<b>Dec</b> \$21°21.2	d -11.1'	<b>HP</b> 57.5'
1	197°14.6	31.6	135°11.9	9.6'	21°10.1	-11.2'	57.5'
2	212°14.4	31.9	149°40.5	9.7'	20°58.8	-11.4'	57.6'
3	227°14.1	• • 32.2	164°09.2	9.7'	20°47.5	-11.5'	57.6'
4 5	242°13.8 257°13.6	32.4 32.7	178°38.0 193°06.8	9.8' 9.9'	20°36.0 20°24.4	-11.6' -11.7'	57.6' 57.6'
6	272°13.3	522°33.0	207°35.7	9.9	520°12.7	-11.7	57.6'
7	287°13.0	33.3	222°04.6	10.0'	20°00.8	-11.9'	57.7'
8	302°12.8	33.6	236°33.6	10.1'	19°48.9	-12.1'	57.7'
9	317°12.5	• • 33.9	251°02.6	10.1'	19°36.8	-12.2'	57.7'
10 11	332°12.2 347°12.0	34.2 34.5	265°31.8 280°01.0	10.2' 10.2'	19°24.7 19°12.4	-12.3' -12.4'	57.7' 57.7'
12	2°11.7	\$22°34.8	294°30.2	10.3	S19°00.0	-12.5'	57.8'
13	17°11.4	35.0	308°59.5	10.4'	18°47.5	-12.6'	57.8'
14	32°11.2	35.3	323°28.9	10.4'	18°34.9	-12.7'	57.8'
15 16	47°10.9 62°10.6	· · 35.6 35.9	337°58.3 352°27.8	10.5' 10.5'	18°22.2 18°09.4	-12.8' -12.9'	57.8' 57.8'
17	77°10.4	36.2	6°57.3	10.6	17° 56.5	-12.9 -13.0'	57.0°
18	92°10.1	\$22°36.5	21°26.9	10.7'	S17°43.5	-13.1'	57.9'
19	107°09.8	36.7	35°56.6	10.7'	17°30.4	-13.2'	57.9'
20	122°09.6	37.0	50°26.3		17°17.2		
21 22	137°09.3 152°09.0	· · 37.3 37.6	64°56.1 79°25.9	10.8' 10.9'	17°03.9 16°50.5	-13.4' -13.5'	57.9' 58.0'
23	167°08.7	37.9	93°55.8	10.9'	16° 37.0	-13.6'	58.0'
	SD = 16.2'	d = 0.3'		SI	O = 15.7'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0	182°08.5	S22°38.1	108°25.8	11.0'	\$16°23.4	-13.7'	58.0'
1	197°08.2	38.4	122°55.8	11.1'	16°09.7	-13.8'	58.0'
2	212°07.9	38.7	137°25.8	11.1'	15°55.9	-13.9'	58.1'
3 4	227°07.7 242°07.4	· · 39.0 39.2	151°55.9 166°26.1	11.2' 11.2'	15° 42.1 15° 28.1	-14.0' -14.0'	58.1' 58.1'
5	257°07.1	39.5	180°56.3	11.3'	15° 14.1	-14.1'	58.1
6	272°06.8	S22°39.8	195°26.5	11.3'	S15°00.0	-14.2'	58.1'
7	287°06.6	40.0	209°56.8	11.4'	14°45.8	-14.3'	58.2'
8 9	302°06.3 317°06.0	40.3 •• 40.6	224°27.2 238°57.6	11.4' 11.5'	14°31.5 14°17.1	-14.4' -14.5'	58.2' 58.2'
10	332°05.8	40.9	253°28.1	11.5'	14 17.1 14°02.6	-14.5'	58.2'
11	347°05.5	41.1	267°58.6	11.5'	13°48.1	-14.6'	58.2'
12	2°05.2	S22°41.4	282°29.1	11.6'	\$13°33.5	-14.7'	58.3'
13 14	17°04.9 32°04.7	41.7 41.9	296°59.7 311°30.3	11.6' 11.7'	13°18.8 13°04.0	-14.8' -14.8'	58.3' 58.3'
15	47°04.4	• • 42.2	326°01.0	11.7'	13 04.0 12°49.2	-14.6 -14.9'	58.3'
16	62°04.1	42.4	$340^{\circ}31.7$	11.8'	12°34.3	-15.0'	58.3'
17	77°03.9	42.7	355°02.5	11.8'	12° 19.3	-15.1'	58.4'
18	92°03.6	\$22°43.0	9°33.3	11.8'	\$12°04.2	-15.1'	58.4'
19 20	107°03.3 122°03.0	43.2 43.5	24°04.1 38°35.0	11.9' 11.9'	11°49.1 11°33.9	-15.2' -15.3'	58.4' 58.4'
21	137°02.8	• • 43.8	53°05.9	11.9'	11° 18.6	-15.3'	58.4
22	152°02.5	44.0	67°36.8	12.0'	11°03.3	-15.4'	58.5'
23	167°02.2	44.3	82°07.8	12.0'	10°47.9	-15.5'	58.5'
	SD = 16.2'	d = 0.3'		SI	O = 15.8'		

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

Lat.		Moonris	e		Moonset	t
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°			14:18			20:53
N 70°		14:56	13:55		18:29	21:13
68°		14:14	13:37		19:09	21:30
66°	14:32	13:45	13:22	17:02	19:37	21:43
64°	13:43	13:23	13:10	17:50	19:58	21:53
62°	13:11	13:05	12:59	18:20	20:14	22:02
60°	12:48	12:50	12:50	18:43	20:28	22:10
N 58°	12:29	12:37	12:42	19:02	20:40	22:17
56°	12:13	12:26	12:35	19:17	20:50	22:22
54°	11:59	12:16	12:29	19:30	20:59	22:28
52°	11:47	12:08	12:23	19:42	21:07	22:32
50°	11:36	12:00	12:18	19:52	21:14	22:37
45°	11:14	11:43	12:07	20:13	21:29	22:46
<b>N</b> 40°	10:56	11:29	11:57	20:30	21:42	22:54
35°	10:41	11:18	11:49	20:44	21:52	23:00
30°	10:28	11:07	11:42	20:56	22:01	23:06
20°	10:05	10:49	11:30	21:17	22:17	23:16
<b>N</b> 10°	09:45	10:34	11:19	21:35	22:31	23:24
0°	09:27	10:19	11:09	21:52	22:43	23:32
<b>S</b> 10°	09:08	10:04	10:59	22:09	22:56	23:40
20°	08:48	09:49	10:48	22:26	23:09	23:48
30°	08:25	09:30	10:35	22:47	23:24	23:57
35°	08:11	09:20	10:28	22:58	23:33	•• ••
40°	07:56	09:07	10:19	23:12	23:42	
45°	07:37	08:53	10:09	23:28	23:54	•• ••
<b>S</b> 50°	07:13	08:35	09:58	23:47		80:00
52°	07:02	08:26	09:52	23:56	•• ••	00:14
54°	06:49	08:17	09:46		00:06	00:21
56°	06:34	08:06	09:39	00:01	00:18	00:29
58°	06:16	07:54	09:31	00:19	00:31	00:38
<b>S</b> 60°	05:54	07:39	09:22	00:42	00:46	00:48

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	4-6	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	14-32%	
05	09:25	09:12	11:51	15:39	03:13		
06	09:00	08:47	11:51	16:31	04:06		
07	08:34	08:21	11:52	17:21	04:56		

## December 08, 09, 10 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
											ЗПА	Dec
0	77°14.6	133°36.7	S22°17.9	307°56.2	N21°30.5	2°06.9	N22°03.7	92°00.0	S08°30.6	Alpheratz	357°34.8	29° 13.9
1	92°17.1	148°36.2	17.3	322°58.7	30.6	$17^{\circ}09.7$	03.6	$107^{\circ}02.3$	30.5	Ankaa	353°07.1	-42°10.4
2	$107^{\circ}19.5$	163°35.6	16.6	338°01.1	30.8	32°12.6	03.6	122°04.7	30.5	Schedar	349°30.9	56° 40.7
3	122°22.0	178°35.0	• • 15.9	353°03.6	• • 30.9	47°15.4	• • 03.6	$137^{\circ}07.1$	• • 30.4			I
4	137°24.5	193°34.5	15.2	8°06.1	31.0	62°18.2	03.6	152°09.5	30.4	Diphda	348°47.2	-17°51.1
5	152°26.9	208°33.9	14.6	23°08.6	31.1	77°21.1	03.5	167°11.8	30.3	Achernar	335°19.9	-57°06.8
6	167°29.4	223°33.3	S22°13.9	38°11.0	N21°31.2	92°23.9	N22°03.5	182°14.2	S08°30.3	Hamal	$327^{\circ}51.0$	23°34.9
7	182°31.9	238° 32.8	13.2	53°13.5	31.4	107°26.7	03.5	197°16.6	30.2	Polaris	313°38.1	89°22.3
										Acamar	$315^{\circ}11.5$	-40°12.4
8	197°34.3	253°32.2	12.5	68°16.0	31.5	122°29.6	03.4	212°19.0	30.2	Menkar	314°05.9	4°11.3
9	212°36.8	268°31.6	• • 11.8	83°18.5	• • 31.6	137°32.4	• • 03.4	227°21.3	· · 30.2	Mirfak	308°27.9	49°57.1
10	227°39.3	283°31.1	11.2	98°21.0	31.7	152°35.2	03.4	242°23.7	30.1	Aldebaran	290°39.4	16°33.6
11	242°41.7	298°30.5	10.5	113°23.4	31.9	167°38.0	03.4	257°26.1	30.1	Rigel	281°03.6	-8°10.3
12	257°44.2	313°30.0	S22°09.8	128°25.9	N21°32.0	182°40.9	$N22^{\circ}03.3$	272°28.5	S08°30.0	Capella	280°21.5	46°01.4
13	272°46.7	328°29.4	09.1	143°28.4	32.1	197°43.7	03.3	287°30.8	30.0	Bellatrix	278°22.6	6°22.4
14	287°49.1	343°28.9	08.4	158°30.9	32.2	212°46.5	03.3	302°33.2	29.9		278°22.0	
15	302°51.6	358°28.3	• • 07.7	173°33.4	• • 32.4	227°49.4	• • 03.2	317°35.6	• • 29.9	Elnath		28°37.7
16	317°54.0	13°27.7	07.1	188°35.9	32.5	242°52.2	03.2	332°37.9	29.8	Alnilam	275°37.5	-1°11.1
17	332°56.5	28°27.2	06.4	203°38.4	32.6	257°55.0	03.2	347°40.3	29.8	Betelgeuse	270°51.8	7°24.7
18	347°59.0	43°26.6	\$22°05.7	218°40.9	N21°32.7	272°57.9	N22°03.2	2°42.7	S08°29.8	Canopus	263°51.9	-52°42.4
19	3°01.4	58°26.1	05.0	233°43.4	32.9	288°00.7	03.1	17°45.1	29.7	Sirius	258°26.0	-16°44.9
	18°03.9	73° 25.5		248°45.9	33.0	303°03.5		32°47.4		Adhara	255°05.6	-29°00.2
20			04.3				03.1		29.7	Procyon	244°50.6	5°09.7
21	33°06.4	88°25.0	• • 03.6	263°48.4	• • 33.1	318°06.3	• • 03.1	47°49.8	• • 29.6	Pollux	243°17.1	27°57.9
22	48°08.8	103°24.4	02.9	278°50.9	33.2	333°09.2	03.0	62°52.2	29.6	Avior	234°14.3	-59°35.1
23	63°11.3	118°23.9	02.2	293°53.4	33.4	348°12.0	03.0	77°54.6	29.5	Suhail	222°46.1	-43°31.7
Mar	ass. 18:48	1/_0 6/ A 0	).7' m-4.25	1/2 5/ 40	1' m-0.66	1/2 g/ 4 n	.0′ m-2.81	1/2 A/ d O	.0′ m0.97	Miaplacidus	221°37.8	-69°48.8
ivier.p	vass. 10.40	ν-0.0 α-0	7.7 111-4.25	ν2.5 d0.	111-0.00	ν2.0 <b>u</b> -U	.0 111-2.01	ν2.4 <b>u</b> -0	.0 1110.97	Alphard	221 37.8 217°47.7	-8° 45.9
										Regulus	207°34.4	11° 50.7
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.1	61°36.7
0	78°13.8	133°23.3	S22°01.5	308°55.9	N21°33.5	3°14.8	N22°03.0	92°56.9	S08°29.5	Denebola	182°25.1	14° 25.9
1	93°16.2	148°22.8	8.00	323°58.4	33.6	$18^{\circ}17.7$	02.9	107°59.3	29.4			
2	108°18.7	163°22.2	22°00.1	339°00.9	33.8	33°20.5	02.9	123°01.7	29.4	Gienah	175°43.8	-17°40.7
3	123°21.2	178°21.7	21°59.4	354°03.4	33.9	48°23.3	02.9	138°04.0	29.3		173°00.5	-63°13.9
4	138°23.6	193°21.1	58.7	9°05.9	34.0	63°26.2	02.9	153°06.4	29.3	Gacrux	171°52.0	-57° 14.9
5	153°26.1	208°20.6	58.0	24°08.4	34.2	78°29.0	02.8	168°08.8	29.3	Alioth	166°13.3	55°49.2
6	168°28.5	223°20.0	S21°57.3	39°10.9	N21°34.3	93°31.8	N22°02.8	183°11.2	S08°29.2	Spica	158°22.6	-11°17.4
										Alkaid	152°52.4	49°11.1
7	183°31.0	238° 19.5	56.6	54°13.4	34.4	108°34.7	02.8	198°13.5	29.2	Hadar	148°36.6	-60°29.4
8	198°33.5	253°19.0	55.9	69°15.9	34.5	123°37.5	02.7	213°15.9	29.1	Menkent	147°58.0	-36°29.4
9	213°35.9	268° 18.4	• • 55.2	84°18.5	• • 34.7	138°40.3	• • 02.7	228°18.3	• • 29.1	Arcturus	145°48.2	19°03.1
10	228°38.4	283°17.9	54.5	99°21.0	34.8	153°43.1	02.7	243°20.6	29.0	Rigil Kent.	139°41.0	-60°56.1
11	243°40.9	298°17.3	53.8	114°23.5	34.9	168°46.0	02.7	258°23.0	29.0	Kochab	137°20.8	74°02.9
12	258°43.3	313° 16.8	S21°53.1	129°26.0	N21°35.1	183°48.8	N22°02.6	273°25.4	S08°28.9	Zuben'ubi	136°56.4	-16°08.6
13	273°45.8	328°16.3	52.4	144°28.5	35.2	198°51.6	02.6	288°27.7	28.9			26° 37.8
14	288°48.3	343°15.7	51.7	159°31.1	35.3	213°54.5	02.6	303°30.1	28.8	Alphecca	126°04.2	
15	303°50.7	358° 15.2	• • 51.0	174°33.6	• • 35.5	228°57.3	• • 02.5	318°32.5	• • 28.8	Antares	112°16.3	-26°29.2
16	318°53.2	13°14.6	50.3	189°36.1	35.6	244°00.1	02.5	333°34.9	28.7	Atria	107°11.2	-69°04.3
17	333°55.6	28°14.1	49.6	204°38.6	35.7	259°03.0	02.5	348°37.2	28.7	Sabik	102°03.2	-15°45.3
18	348°58.1	43°13.6	S21°48.8	219°41.2	N21°35.9	274°05.8	N22°02.4	3°39.6	S08°28.7	Shaula	96°10.9	-37°07.3
19	4°00.6	58° 13.0	48.1	234°43.7	36.0	289°08.6	02.4	18°42.0	28.6	Rasalhague	95°59.0	12°32.5
										Eltanin	90°42.8	51°29.1
20	19°03.0	73°12.5	47.4	249°46.2	36.2	304°11.4	02.4	33°44.3	28.6	Kaus Aust.	83°33.0	-34°22.4
21	34°05.5	88°12.0	• • 46.7	264°48.8	• • 36.3	319°14.3	• • 02.4	48°46.7	• • 28.5	Vega	80°33.7	38° 48.4
22	49°08.0	103°11.4	46.0	279°51.3	36.4	334°17.1	02.3	63°49.1	28.5	Nunki	75°48.2	-26° 16.0
23	64°10.4	118°10.9	45.3	294°53.8	36.6	349°19.9	02.3	78°51.4	28.4	Altair	62°00.3	8°56.1
Mern	ass. 18:44	v-0.5' d-0	).7′ m-4.25	v2 5' d0	1' m-0.68	v2 8′ d₌0	.0′ m-2.81	1/2 4' d-0	.0′ m0.98	Peacock	53°06.3	-56°39.5
- IVICI.P	7433. 10.77	ν-0.5 α-0	7.7 111-4.23	ν2.5 do.	1 111-0.00	ν2.0 u-0	.0 111-2.01	ν2. <del>4</del> α-0	.0 1110.90	Deneb	49°26.2	45°22.3
										Enif	33°39.0	9°59.4
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.1	-46° 50.6
0	79°12.9	133°10.4	S21°44.6	309°56.4	N21°36.7	4°22.8	N22°02.3	93°53.8	508°28.4	Fomalhaut	27 33.1 15°14.6	-40 50.0 -29°29.6
1	94°15.4	148°09.8	43.8	324°58.9	36.8	19°25.6	02.2	108°56.2	28.3			I
2	109°17.8	163°09.3	43.1	340°01.5	37.0	34°28.4	02.2	123°58.5	28.3	Scheat	13°45.3	28° 13.3
3	109 17.8 124°20.3	103 09.3 178°08.8	• • 42.4	355°04.0	37.0	49°31.2	02.2	139°00.9	. 28.2	Markab	13°30.0	15°20.5
	124 20.3 139°22.8	176 06.6 193°08.3	41.7	10°06.5		64°34.1	02.2	159°00.9 154°03.3		Dec 08 Sun	SHA	Mer.pass
4					37.3				28.2			
5	154°25.2	208°07.7	41.0	25°09.1	37.4	79°36.9	02.1	169°05.6	28.1	Venus	56°22.1	15:06
6	169°27.7	223°07.2	S21°40.2	40°11.6	N21°37.5	94°39.7	N22°02.1	184°08.0	508°28.1	Mars		03:28
7	184°30.1	238°06.7	39.5	55°14.2	37.7	109°42.6	02.1	199°10.4	28.0	Jupiter	284°52.3	23:47
8	199°32.6	253°06.2	38.8	70°16.7	37.8	124°45.4	02.0	214°12.7	28.0	Saturn	14°45.3	17:49
9	$214^{\circ}35.1$	268°05.6	• • 38.0	85°19.3	• • 38.0	139°48.2	• • 02.0	229°15.1	• • 27.9	Dec 09 Mon	SHA	Mor noss
10	229°37.5	283°05.1	37.3	100°21.8	38.1	154°51.1	02.0	244°17.5	27.9			Mer.pass
11	244°40.0	298°04.6	36.6	115°24.4	38.2	169°53.9	01.9	259°19.8	27.8	Venus	55°09.6	15:07
12	259°42.5	313°04.1	S21°35.9	130°27.0	N21°38.4	184°56.7	N22°01.9	274°22.2	508°27.8	Mars		03:24
13	274°44.9	328°03.5	35.1	145°29.5	38.5	199°59.5	01.9	289°24.6	27.8	Jupiter	285°01.1	23:43
14	289°47.4	343°03.0	34.4	160°32.1	38.7	215°02.4	01.9	304°26.9	27.7	Saturn	14°43.2	17:45
15	304°49.9	358°02.5	• • 33.7	175°34.6	• • 38.8	230°05.2	01.8	319°29.3	27.7	Dec 10 Tue	SHA	Mer.pass
16	319°52.3	13°02.0	32.9	190°37.2	38.9	245°08.0	01.8	334°31.7	27.6	Venus	53°57.5	15:08
17	334°54.8	28°01.5	32.2	205°39.8	39.1	260°10.9	01.8	349°34.0	27.6			
18	349°57.3	43°01.0	\$21° 31.5	200°42.3	N21°39.2	275°13.7	N22°01.7	4°36.4	S08°27.5	Mars		03:20
19	4°59.7	58° 00.4	30.7	235°44.9	39.4	275 13.7 290°16.5	01.7	4 30.4 19°38.8	27.5	Jupiter		23:38
	4 59.7 20°02.2	72°59.9				305°19.3				Saturn	14°40.9	17:42
20			30.0	250°47.5	39.5		01.7	34°41.1	27.4	Horizont	al parallax	
21	35°04.6	87°59.4	• • 29.3	265°50.0	• • 39.7	320°22.2	•• 01.7	49°43.5	• • 27.4	TIOTIZUIII	Venus:	0.2
22	50°07.1	102°58.9	28.5	280°52.6	39.8	335°25.0	01.6	64°45.9	27.3		Mars:	0.2
23	65°09.6	117°58.4	27.8	295°55.2	40.0	350°27.8	01.6	79°48.2	27.3		ividi5.	0.2
Mer.n	ass. 18:40	$\nu$ -0.5 $'$ d-0	).7′ m-4.26	$\nu 2.5' d0$	1′ m-0.70	$\nu 2.8' \ d-0$	.0′ m-2.81	$\nu 2.4' d-0$	.0′ m0.98			
	Mer.pass. 18:40 $\nu$ -0.5' $d$ -0.7' m-4.26											

h	Sui	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	182°01.9	\$22°44.5	96°38.8	12.0'	S10°32.4	-15.5'	58.5'
1	197°01.7 212°01.4	44.8 45.0	111°09.8 125°40.9	12.1' 12.1'	10°16.9 10°01.3	-15.6'	58.5'
2	212 01.4 227°01.1	45.0 • • 45.3	125 40.9 140°12.0	12.1'	10 01.3 09°45.7	-15.6' -15.7'	58.5' 58.6'
4	242°00.8	45.6	154°43.1	12.2'	09°30.0	-15.8'	58.6'
5	257°00.6	45.8	169°14.3	12.2'	09°14.2	-15.8'	58.6'
6	272°00.3 287°00.0	\$22°46.1 46.3	183°45.5 198°16.7	12.2' 12.2'	\$08°58.4 08°42.6	-15.9' -15.9'	58.6' 58.6'
7 8	301°59.7	46.5 46.6	212°47.9	12.2	08° 26.6	-15.9 -16.0'	58.7'
9	316°59.5	• • 46.8	227°19.2	12.3'	08° 10.7	-16.0'	58.7'
10	331°59.2	47.1	241°50.4	12.3'	07°54.6	-16.1'	58.7'
11 12	346°58.9 1°58.6	47.3 \$22°47.6	256°21.7 270°53.0	12.3' 12.3'	07°38.6 507°22.5	-16.1' -16.2'	58.7' 58.7'
13	16°58.3	47.8	270 55.0 285°24.4	12.3'	07°06.3	-16.2'	58.8'
14	31°58.1	48.1	299°55.7	12.4'	06°50.1	-16.3'	58.8'
15	46°57.8	• • 48.3	314°27.1	12.4'	06°33.8	-16.3'	58.8'
16 17	61°57.5 76°57.2	48.6 48.8	328°58.4 343°29.8	12.4' 12.4'	06°17.5 06°01.2	-16.3' -16.4'	58.8' 58.8'
18	91°57.0	522°49.0	358°01.2	12.4'	S05°44.8	-16.4	58.9'
19	106°56.7	49.3	12°32.6	12.4'	05°28.4	-16.5'	58.9'
20	121°56.4	49.5	27°04.0	12.4'	05°11.9	-16.5'	58.9'
21 22	136°56.1 151°55.8	• • 49.8 50.0	41°35.4 56°06.9	12.4' 12.4'	04°55.4 04°38.9	-16.5' -16.6'	58.9' 58.9'
23	166°55.6	50.0	70°38.3	12.4'	04° 36.9	-16.6'	59.0'
	SD = 16.2'	d = 0.3'			O = 16.0'		
	<u> </u>	<u>u — 0.5</u>		ال			
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0 1	181°55.3 196°55.0	\$22°50.5 50.7	85°09.7 99°41.1	12.4' 12.4'	\$04°05.8 03°49.1	-16.6' -16.7'	59.0' 59.0'
2	196 55.0 211°54.7	50.7 51.0	99°41.1 114°12.6	12.4'	03°49.1 03°32.5	-16.7' -16.7'	59.0' 59.0'
3	226°54.4	• • 51.2	128°44.0	12.4'	03° 15.8	-16.7'	59.0'
4	241°54.2	51.4	143°15.4	12.4'	02°59.1	-16.7'	59.0'
5 6	256°53.9 271°53.6	51.7 \$22°51.9	157°46.9 172°18.3	12.4' 12.4'	02°42.4 502°25.6	-16.8' -16.8'	59.1' 59.1'
7	271 55.0 286°53.3	52.2	172 16.3 186°49.7	12.4'	02°08.8	-10.8	59.1'
8	301°53.0	52.4	201°21.1	12.4'	01°52.0	-16.8'	59.1'
9	316°52.8	• • 52.6	215°52.5	12.4'	01°35.2	-16.8'	59.1'
10 11	331°52.5 346°52.2	52.8 53.1	230°23.9 244°55.2	12.4' 12.4'	01°18.4 01°01.5	-16.9' -16.9'	59.2' 59.2'
12	1°51.9	522°53.3	259°26.6	12.3'	S00°44.6	-16.9	59.2'
13	16°51.6	53.5	273°57.9	12.3'	$00^{\circ}27.7$	-16.9'	59.2'
14	31°51.4	53.8	288°29.2	12.3'	500°10.9	-16.9'	59.2'
15 16	46°51.1 61°50.8	• • 54.0 54.2	303°00.5 317°31.8	12.3' 12.3'	N00°06.1 00°23.0	16.9' 16.9'	59.2' 59.3'
17	76°50.5	54.4	332°03.1	12.2'	00°25.0	16.9'	59.3'
18	91°50.2	S22°54.7	346°34.3	12.2'	N00°56.8	16.9'	59.3'
19	106°49.9	54.9	1°05.5 15°36.7	12.2' 12.2'	01°13.8	16.9'	59.3'
20 21	121°49.7 136°49.4	55.1 •• 55.3	30°07.9	12.1'	01°30.7 01°47.7	16.9' 16.9'	59.3' 59.3'
22	151°49.1	55.6	44°39.0	12.1'	02°04.6	16.9	59.4
23	166°48.8	55.8	59°10.1	12.1'	$02^{\circ}21.6$	16.9'	59.4'
	SD = 16.2'	d = 0.2'		SI	D = 16.1'		
_	CUA	D-				,	
Tue 0	<b>GHA</b> 181°48.5	Dec \$22°56.0	<b>GHA</b> 73°41.2	u 12.0'	<b>Dec</b> N02° 38.5	<i>d</i> 16.9'	<b>HP</b> 59.4'
1	196°48.2	56.2	88°12.3	12.0'	02°55.4	16.9	59.4'
2	211°48.0	56.4	102°43.3	12.0'	03°12.4	16.9'	59.4'
3	226°47.7 241°47.4	· · 56.7 56.9	117°14.3 131°45.2	11.9' 11.9'	03°29.3 03°46.2	16.9' 16.9'	59.4' 59.5'
4 5	241 47.4 256°47.1	56.9 57.1	131°45.2 146°16.1	11.9'	03°46.2 04°03.1	16.9	59.5' 59.5'
6	271°46.8	\$22°57.3	160°46.9	11.8'	N04°20.0	16.9	59.5'
7	286°46.5	57.5	175°17.8	11.8'	04°36.9	16.9'	59.5'
8 9	301°46.3 316°46.0	57.7 •• 58.0	189°48.5 204°19.3	11.7' 11.7'	04°53.8 05°10.6	16.9' 16.8'	59.5' 59.5'
10	310°45.7	58.0	204 19.3 218°50.0	11.6'	05° 10.6	16.8	59.5'
11	346°45.4	58.4	233°20.6	11.6'	05°44.3	16.8'	59.6'
12	1°45.1	\$22°58.6	247°51.2	11.5'	N06°01.1	16.8'	59.6'
13 14	16°44.8 31°44.5	58.8 59.0	262°21.7 276°52.2	11.5' 11.4'	06°17.9 06°34.6	16.8' 16.7'	59.6' 59.6'
15	46°44.3	• • 59.2	270 52.2 291°22.7	11.4'	06°51.3	16.7	59.6'
16	61°44.0	59.4	$305^{\circ}53.1$	11.3'	07°08.0	16.7'	59.6'
17	76°43.7	59.6	320°23.4	11.3'	07°24.7	16.6'	59.6'
18 19	91°43.4 106°43.1	\$22°59.8 23°00.0	334°53.7 349°23.9	11.2' 11.2'	N07°41.4 07°58.0	16.6' 16.6'	59.6' 59.7'
20	100°43.1 121°42.8	00.3	3°54.1	11.1'	07 38.0 08°14.5	16.5	59.7'
21	136°42.5	• • 00.5	18°24.2	11.0'	08°31.1	16.5'	59.7'
22	151°42.2	00.7	32°54.2	11.0'	08°47.6	16.5'	59.7'
23	166°42.0	00.9	47°24.2	10.9'	09°04.0	16.4'	59.7'
	SD = 16.2'	d = 0.2'		SI	O = 16.2'		

N 72°       08:11       10:27       ■       13:17       1         N 70°       07:52       09:36       ■       14:09       1         68°       07:37       09:04       ■       14:41       1         66°       07:25       08:40       10:14       13:31       15:04       1         64°       07:14       08:22       09:37       14:08       15:23       1         60°       06:57       07:53       08:50       14:34       15:38       1         60°       06:57       07:53       08:50       14:55       15:51       1         N 58°       06:50       07:42       08:33       15:12       16:03       1         56°       06:44       07:32       08:19       15:26       16:12       1         54°       06:38       07:24       08:07       15:38       16:21       1         50°       06:32       07:16       07:56       15:49       16:29       1         50°       06:27       07:09       07:47       15:58       16:36       1         45°       06:16       06:53       07:27       16:18       16:52       1         N 4	Twilight		
N 70°       07:52       09:36       ■       14:09       1         68°       07:37       09:04       ■       14:41       1         66°       07:25       08:40       10:14       13:31       15:04       1         64°       07:14       08:22       09:37       14:08       15:23       1         60°       06:57       07:53       08:50       14:34       15:38       1         60°       06:57       07:42       08:33       15:12       16:03       1         56°       06:44       07:32       08:19       15:26       16:12       1         54°       06:38       07:24       08:07       15:38       16:21       1         50°       06:32       07:16       07:56       15:49       16:29       1         50°       06:27       07:09       07:47       15:58       16:36       1         45°       06:16       06:53       07:27       16:18       16:52       1         N 40°       06:06       06:40       07:10       16:35       17:05       1         35°       05:57       06:29       06:57       16:48       17:16       1	laut.		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	5:34		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	5:52		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	6:07		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	6:20		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	6:30		
N 58°         06:50         07:42         08:33         15:12         16:03         1           56°         06:44         07:32         08:19         15:26         16:12         1           54°         06:38         07:24         08:07         15:38         16:21         1           52°         06:32         07:16         07:56         15:49         16:29         1           50°         06:27         07:09         07:47         15:58         16:36         1           45°         06:16         06:53         07:27         16:18         16:52         1           N 40°         06:06         06:40         07:10         16:35         17:05         1           35°         05:57         06:29         06:57         16:48         17:16         1	6:39		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	6:47		
54°         06:38         07:24         08:07         15:38         16:21         1           52°         06:32         07:16         07:56         15:49         16:29         1           50°         06:27         07:09         07:47         15:58         16:36         1           45°         06:16         06:53         07:27         16:18         16:52         1           N 40°         06:06         06:40         07:10         16:35         17:05         1           35°         05:57         06:29         06:57         16:48         17:16         1	6:55		
52°         06:32         07:16         07:56         15:49         16:29         1           50°         06:27         07:09         07:47         15:58         16:36         1           45°         06:16         06:53         07:27         16:18         16:52         1           N 40°         06:06         06:40         07:10         16:35         17:05         1           35°         05:57         06:29         06:57         16:48         17:16         1	7:01		
50°         06:27         07:09         07:47         15:58         16:36         1           45°         06:16         06:53         07:27         16:18         16:52         1           N 40°         06:06         06:40         07:10         16:35         17:05         1           35°         05:57         06:29         06:57         16:48         17:16         1	7:07		
45°   06:16   06:53   07:27   16:18   16:52   1   N 40°   06:06   06:40   07:10   16:35   17:05   1   35°   05:57   06:29   06:57   16:48   17:16   1	7:12		
N 40° 06:06 06:40 07:10 16:35 17:05 1 35° 05:57 06:29 06:57 16:48 17:16 1	7:18		
35° 05:57 06:29 06:57 16:48 17:16 1	7:29		
	7:39		
30°   05:49 06:18 06:45   17:00 17:27 1	7:48		
	7:56		
	8:12		
	8:28		
0° 05:00 05:26 05:49 17:56 18:19 1	8:45		
<b>S</b> 10° 04:42 05:09 05:32 18:13 18:36 1	9:03		
	9:26		
	9:54		
	0:12		
	0:35		
45° 02:41 03:30 04:07 19:38 20:15 2	1:04		
	1:48		
	2:14		
	2:53		
	////		
	////		
<b>S</b> 60° //// 01:00 02:34 21:12 22:47	////		

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	7-9	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	43-65%	
08	08:08	07:54	11:52	18:08	05:44		
09	07:41	07:28	11:53	18:55	06:32		
10	07:14	07:00	11:53	19:44	07:19		

## December 11, 12, 13 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	80°12.0	132°57.9	\$21°27.0	310°57.7	N21°40.1	5°30.7	N22°01.6	94°50.6	508°27.2			
1	95°14.5	147°57.4	26.3	326°00.3	40.3	20°33.5	01.5	109°53.0	27.2	Alpheratz	357°34.8	29°13.9
2	110°17.0	162°56.9	25.6	341°02.9	40.4	35°36.3	01.5	124°55.3	27.1	Ankaa	353°07.1	-42°10.4
3	125°19.4	177°56.3	• • 24.8	356°05.5	• • 40.5	50°39.1	01.5	139°57.7	• • 27.1	Schedar	349°30.9	56°40.7
4	140°21.9	192°55.8	24.1	11°08.0	40.7	65°42.0	01.4	155°00.0	27.0	Diphda	348°47.2	-17°51.1
5	$155^{\circ}24.4$	207°55.3	23.3	26°10.6	40.8	80°44.8	01.4	170°02.4	27.0	Achernar Hamal	335°19.9 327°51.0	-57°06.8 23°34.9
6	170°26.8	222°54.8	S21°22.6	41°13.2	N21°41.0	95°47.6	N22°01.4	185°04.8	S08°26.9	Polaris	313°38.7	89°22.3
7	185°29.3	237°54.3	21.8	56°15.8	41.1	110°50.5	01.4	200°07.1	26.9	Acamar	315° 11.5	-40°12.4
8	200°31.7	252°53.8	21.1	71°18.4	41.3	125°53.3	01.3	215°09.5	26.8	Menkar	314°06.0	4°11.3
9	215°34.2	267°53.3	• • 20.3	86°21.0	• • 41.4	140°56.1	• • 01.3	230°11.9	• • 26.8	Mirfak	308°27.9	49°57.1
10 11	230°36.7 245°39.1	282°52.8 297°52.3	19.6 18.8	101°23.6 116°26.1	41.6	155°58.9 171°01.8	01.3 01.2	245°14.2 260°16.6	26.7	Aldebaran	290°39.4	16°33.6
12	245 39.1 260°41.6	312°51.8	521°18.1	110 20.1 131°28.7	41.7 N21°41.9	171 01.8 186°04.6	N22°01.2	275°19.0	26.7 \$08°26.6	Rigel	281°03.6	-8°10.3
13	275°44.1	327°51.3	17.3	146°31.3	42.0	201°07.4	01.2	290°21.3	26.6	Capella	280°21.5	46°01.4
14	290°46.5	342°50.8	16.6	161°33.9	42.2	216°10.3	01.1	305°23.7	26.5	Bellatrix	278°22.6	6°22.4
15	305°49.0	357°50.3	• • 15.8	176°36.5	• • 42.3	231°13.1	• • 01.1	320°26.0	• • 26.5	Elnath	278°01.6	28°37.7
16	$320^{\circ}51.5$	12°49.8	15.1	191°39.1	42.5	$246^{\circ}15.9$	01.1	335°28.4	26.4	Alnilam	275°37.5	-1°11.1 7°24.7
17	335°53.9	27°49.3	14.3	206°41.7	42.6	261°18.7	01.1	350°30.8	26.4	Betelgeuse Canopus	270°51.8 263°51.9	-52°42.4
18	350°56.4	42°48.8	S21°13.5	221°44.3	N21°42.8	$276^{\circ}21.6$	N22°01.0	5°33.1	S08°26.3	Sirius	258° 26.0	-32 42.4 -16°44.9
19	5°58.9	57° 48.3	12.8	236°46.9	43.0	291°24.4	01.0	20°35.5	26.3	Adhara	255°05.6	-29°00.2
20	21°01.3	72°47.8	12.0	251°49.5	43.1	306°27.2	01.0	35°37.8	26.2	Procyon	244°50.6	5°09.7
21	36°03.8	87°47.3	• • 11.3	266°52.1	• • 43.3	321°30.1	• • 00.9	50°40.2	• • 26.2	Pollux	243°17.1	27°57.9
22 23	51°06.2 66°08.7	102°46.8 117°46.3	10.5	281°54.7 296°57.3	43.4 43.6	336°32.9 351°35.7	00.9 00.9	65°42.6 80°44.9	26.1	Avior	234°14.3	-59°35.1
23	00 00.7	117 40.5	09.7		_				26.1	Suhail	222°46.1	-43°31.7
_Mer.p	ass. 18:36	$\nu$ -0.5' d-0	).7′ m-4.27	$\nu 2.6' d0.$	1′ m-0.73	$\nu 2.8' \ d-0$	.0′ m-2.81	$\nu$ 2.4′ d-0	.0′ m0.98	Miaplacidus	221°37.8	-69°48.8
										Alphard	217°47.7	-8°45.9
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	207°34.4 193°41.0	11°50.7 61°36.7
0	81°11.2	132°45.8	S21°09.0	312°00.0	N21°43.7	6°38.5	$N22^{\circ}00.9$	95°47.3	508°26.0	Denebola	182°25.1	14°25.9
1	96°13.6	147°45.3	08.2	327°02.6	43.9	21°41.4	8.00	110°49.6	26.0	Gienah	175°43.8	-17°40.7
2	111°16.1	162°44.9	07.5	342°05.2	44.0	36°44.2	8.00	125°52.0	25.9	Acrux	173°00.4	-63°13.9
3 4	126°18.6 141°21.0	177°44.4 192°43.9	•• 06.7	357°07.8 12°10.4	• • 44.2	51°47.0	•• 00.8	140°54.4 155°56.7	• • 25.9	Gacrux	171°51.9	-57°14.9
5	156°23.5	192 43.9 207°43.4	05.9 05.2	27°13.0	44.3 44.5	66°49.8 81°52.7	00.7 00.7	170°59.1	25.8 25.8	Alioth	166° 13.3	55°49.2
6	171°26.0	222° 42.9	S21°04.4	42°15.6	N21°44.7	96°55.5	N22°00.7	186°01.4	S08°25.7	Spica	158°22.6	-11°17.4
7	186°28.4	237° 42.4	03.6	57°18.3	44.8	111°58.3	00.6	201°03.8	25.7	Alkaid	152°52.4	49°11.1
8	201°30.9	252°41.9	02.8	72°20.9	45.0	$127^{\circ}01.2$	00.6	216°06.2	25.6	Hadar Menkent	148°36.6 147°58.0	-60°29.3 -36°29.4
9	216°33.4	267°41.4	•• 02.1	87°23.5	• • 45.1	142°04.0	• • 00.6	231°08.5	• • 25.6	Arcturus	145°48.2	19°03.1
10	231°35.8	282°41.0	01.3	102°26.1	45.3	157°06.8	00.6	246°10.9	25.5	Rigil Kent.	139°41.0	-60°56.1
11	246°38.3	297°40.5	21°00.5	117°28.8	45.4	172°09.6	00.5	261°13.2	25.5	Kochab	137°20.7	74°02.9
12	261°40.7	312°40.0	\$20°59.8	132°31.4	N21°45.6	187°12.5	N22°00.5	276°15.6	S08°25.4	Zuben'ubi	$136^{\circ}56.4$	-16°08.6
13 14	276°43.2 291°45.7	327°39.5 342°39.0	59.0 58.2	147°34.0 162°36.6	45.8 45.9	202°15.3 217°18.1	00.5 00.4	291°18.0 306°20.3	25.4 25.3	Alphecca	126°04.1	26°37.8
15	306°48.1	357°38.6	57.4	177°39.3	. 46.1	232°20.9	. 00.4	321°22.7	. 25.3	Antares	112°16.3	-26°29.2
16	321°50.6	12°38.1	56.7	192°41.9	46.2	247°23.8	00.4	336°25.0	25.2	Atria	107°11.2	-69°04.3
17	$336^{\circ}53.1$	27°37.6	55.9	207°44.5	46.4	262°26.6	00.3	351°27.4	25.2	Sabik Shaula	102°03.2 96°10.9	-15°45.3 -37°07.3
18	351°55.5	42°37.1	S20°55.1	222°47.2	N21°46.6	277°29.4	N22°00.3	6°29.7	S08°25.1	Rasalhague	95°59.0	12°32.5
19	6°58.0	57°36.6	54.3	237°49.8	46.7	292°32.2	00.3	21°32.1	25.1	Eltanin	90°42.8	51°29.1
20	22°00.5	72°36.2	53.5	252°52.5	46.9	307°35.1	00.3	36°34.5	25.0	Kaus Aust.	83°33.0	-34°22.4
21	37°02.9	87°35.7	• • 52.8	267°55.1 282°57.7	• • 47.1	322°37.9	• • 00.2	51°36.8	• • 25.0	Vega	80°33.7	38°48.4
22 23	52°05.4 67°07.8	102°35.2 117°34.8	52.0 51.2	282 57.7 298°00.4	47.2 47.4	337°40.7 352°43.6	00.2 00.2	66°39.2 81°41.5	24.9 24.9	Nunki	75°48.2	-26°16.0
_										Altair	62°00.3	8°56.1
Mer.p	ass. 18:32	$\nu$ -0.5′ $d$ -0	).8′ m-4.28	$\nu$ 2.6′ d0.	2′ m-0.75	$\nu 2.8' \ d-0$	.0′ m-2.81	$\nu$ 2.4′ d-0	.1' m $0.99$	Peacock	53°06.3	-56°39.5
										Deneb Enif	49°26.2 33°39.0	45°22.3 9°59.4
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27° 33.2	-46°50.6
0	$82^{\circ}10.3$	132°34.3	\$20°50.4	313°03.0	N21°47.5	7°46.4	N22°00.1	96°43.9	S08°24.8	Fomalhaut	15° 14.6	-29°29.6
1	97°12.8	147°33.8	49.6	328°05.7	47.7	22°49.2	00.1	111°46.2	24.8	Scheat	13°45.3	28°13.3
2	112°15.2	162°33.3	48.8	343°08.3	47.9	37°52.0	00.1	126°48.6	24.7	Markab	13°30.0	15°20.5
3	127°17.7	177°32.9	• • 48.0	358°11.0	• • 48.0	52°54.9	•• 00.0	141°51.0	• • 24.7	De- 11 14/	CIIA	
4	142°20.2	192°32.4	47.3	13°13.6	48.2	67°57.7	0.00	156°53.3	24.6	Dec 11 Wed	<b>SHA</b> 52° 45.8	Mer.pass 15:09
5 6	157°22.6 172°25.1	207°31.9 222°31.5	46.5 \$20°45.7	28°16.3 43°18.9	48.4 N21°48.5	83°00.5 98°03.3	00.0 N22°00.0	171°55.7 186°58.0	24.6 \$08°24.5	Venus	52°45.8 230°45.7	03:16
7	172 23.1 187°27.6	237°31.0	44.9	58°21.6	48.7	113°06.2	21°59.9	202°00.4	24.5	Jupiter	285° 18.6	23:34
8	202°30.0	252°30.5	44.1	73°24.3	48.9	128°09.0	59.9	217°02.7	24.4	Saturn	14°38.6	17:38
9	217°32.5	267°30.1	• • 43.3	88°26.9	• • 49.0	143°11.8	59.9	232°05.1	24.3	- 10 -	• • • • • • • • • • • • • • • • • • • •	
10	232°35.0	282°29.6	42.5	103°29.6	49.2	$158^{\circ}14.6$	59.8	247°07.4	24.3	Dec 12 Thu	SHA	Mer.pass
11	247°37.4	297°29.1	41.7	118°32.2	49.4	173°17.5	59.8	262°09.8	24.2	Venus	51°34.7 230°48.8	15:09 03:11
12	262°39.9	312°28.7	\$20°40.9	133°34.9	N21°49.5	188°20.3	N21°59.8	277°12.2	S08°24.2	Jupiter	285° 27.4	23:29
13	277°42.3	327°28.2	40.1	148°37.6	49.7	203°23.1	59.8	292°14.5	24.1	Saturn	14°36.1	17:34
14 15	292°44.8 307°47.3	342°27.8 357°27.3	39.3 •• 38.5	163°40.2 178°42.9	49.9 •• 50.0	218°25.9 233°28.8	59.7 •• 59.7	307°16.9 322°19.2	24.1 •• 24.0	Dag 12 F 1	ÇU A	
15 16	307 47.3 322°49.7	12° 26.8	37.7	178 42.9 193°45.6	50.2	233 28.8 248°31.6	59.7 59.7	322 19.2 337°21.6	24.0	Dec 13 Fri Venus	<b>SHA</b> 50°24.0	Mer.pass 15:10
17	337°52.2	27°26.4	36.9	208°48.2	50.4	263°34.4	59.6	352°23.9	23.9		230°52.7	03:07
18	352°54.7	42°25.9	S20°36.1	223°50.9	N21°50.5	278°37.2	N21°59.6	7°26.3	S08°23.9		285°36.1	23:24
19	7°57.1	57° 25.5	35.3	238°53.6	50.7	293°40.1	59.6	22°28.6	23.8	Saturn	14°33.6	17:30
20	22°59.6	72°25.0	34.5	253°56.3	50.9	308°42.9	59.5	37°31.0	23.8	United the	al paralla.	
21	38°02.1	87°24.6	•• 33.7	268°58.9	51.1	323°45.7	• • 59.5	52°33.3	• • 23.7	norizoni	tal parallax Venus:	0.2
22 23	53°04.5 68°07.0	102°24.1 117°23.6	32.9 32.1	284°01.6 299°04.3	51.2 51.4	338°48.5 353°51.4	59.5 59.5	67°35.7 82°38.1	23.7 23.6		Mars:	0.2
Mer.p	ass. 18:28	$\nu$ -0.5′ d-0	).8′ m-4.29	$\nu$ 2.6′ d0.	2′ m-0.77	$\nu 2.8' \ d-0$	.0′ m-2.81	$\nu$ 2.4′ d-0	.1′ m0.99			

h	Sur	1		1-011	Moon	J1 360	
Wed	GHA	Dec	GHA	ν	Dec	d	НР
0	181°41.7	\$23°01.1	61°54.1	10.8'	N09°20.5	16.4'	59.7'
1	196°41.4	01.3	76°23.9	10.8'	09°36.8	16.3'	59.7'
2	211°41.1	01.5	90°53.7	10.7'	09°53.2	16.3'	59.7'
3	226°40.8	• • 01.7	105°23.4	10.6'	10°09.5	16.2'	59.7'
4	241°40.5	01.9	$119^{\circ}53.1$	10.6'	10°25.7	16.2'	59.8'
5	256° 40.2	02.1	134°22.6	10.5'	10°41.9	16.1'	59.8'
6	271°39.9	<b>S</b> 23°02.3	148°52.1	10.4'	N10°58.0	16.1'	59.8'
7	286°39.7	02.5	163°21.6	10.4'	11°14.1	16.0'	59.8'
8	301°39.4	02.6	177°50.9	10.3'	11°30.1	16.0'	59.8'
9	316°39.1	• • 02.8	192°20.2	10.2'	11°46.1	15.9'	59.8'
10	331°38.8	03.0	206°49.4	10.1'	12°02.0 12°17.9	15.9'	59.8'
11	346°38.5	03.2 <b>5</b> 23°03.4	221° 18.5 235° 47.5	10.0' 10.0'	N12°33.7	15.8'	59.8' 59.8'
12 13	1°38.2 16°37.9	03.6	235°47.5 250°16.5	9.9'	12°49.4	15.7' 15.7'	59.8'
14	31° 37.6	03.8	264° 45.4	9.9 9.8'	12 49.4 13°05.1	15.6'	59.6 59.8'
15	46° 37.3	• • 04.0	279°14.2	9.7'	13°20.7	15.5'	59.9'
16	61°37.1	04.2	293°42.9	9.6'	13°36.2	15.5'	59.9'
17	76°36.8	04.4	308°11.6	9.6'	13°51.6	15.4	59.9'
18	91°36.5	\$23°04.6	322°40.1	9.5'	N14°07.0	15.3'	59.9'
19	106°36.2	04.7	337°08.6	9.4'	14°22.3	15.2'	59.9'
20	121°35.9	04.9	351°36.9	9.3'	14°37.6	15.1'	59.9'
21	136° 35.6	•• 05.1	6°05.2	9.2'	14°52.7	15.1'	59.9'
22	151°35.3	05.3	20°33.4	9.1'	15°07.8	15.0'	59.9'
23	166°35.0	05.5	$35^{\circ}01.5$	9.0'	15°22.8	14.9'	59.9'
	SD = 16.2'	d = 0.2'		ÇГ	0 = 16.3'		
	<u>JD = 10.2</u>	<u>u = 0.2</u>			7 = 10.5		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°34.7	\$23°05.7	49°29.6	8.9'	N15°37.7	14.8'	59.9'
1	196°34.4	05.8	63°57.5	8.8'	15°52.5	14.7'	59.9'
2	211°34.1	06.0	78°25.3	8.7'	16°07.2	14.6'	59.9'
3	226°33.9	• • 06.2	92°53.1	8.7'	16°21.8	14.5'	59.9'
4	241°33.6	06.4	107°20.7	8.6'	16°36.4	14.4'	59.9'
5	256°33.3 271°33.0	06.6 <b>S</b> 23°06.7	121°48.3	8.5'	16°50.8 N17°05.2	14.4'	59.9'
6	271°33.0 286°32.7		136° 15.8 150° 43.1	8.4'	17°19.4	14.3'	59.9'
7 8	286°32.7 301°32.4	06.9 07.1	150° 43.1 165° 10.4	8.3' 8.2'	17°19.4 17°33.6	14.2' 14.0'	59.9' 59.9'
9	316°32.1	07.1	105 10.4 179°37.6	8.1'	17 33.0 17°47.6	13.9'	59.9'
10	331° 31.8	07.3	179 37.0 194°04.6	8.0'	17 47.0 18°01.6	13.8'	59.9'
11	346°31.5	07.4	208°31.6	7.9'	18°15.4	13.7	59.9'
12	1°31.2	\$23°07.8	222°58.5	7.8'	N18°29.1	13.6'	59.9
13	16°30.9	08.0	237°25.3	7.7'	18°42.7	13.5'	59.9'
14	31°30.6	08.1	251°52.0	7.6'	18°56.3	13.4'	59.9'
15	46°30.3	• • 08.3	266°18.6	7.5'	19°09.6	13.3'	59.9'
16	61°30.1	08.5	280°45.1	7.4'	19°22.9	13.2'	59.9'
17	$76^{\circ}29.8$	08.6	$295^{\circ}11.5$	7.3'	$19^{\circ}36.1$	13.0'	59.9'
18	91°29.5	\$23°08.8	309°37.7	7.2'	N19°49.1	12.9'	59.9'
19	106°29.2	09.0	324°03.9	7.1'	20°02.0		59.9'
20	121°28.9	09.2	338°30.0	7.0'	20°14.8	12.7'	59.9'
21	136°28.6	• • 09.3	352°56.0	6.9'	20°27.5	12.5'	59.9'
22	151°28.3	09.5	7°21.9	6.8'	20°40.0	12.4'	59.9'
23	166°28.0	09.6	21°47.7	6.7'	20°52.5	12.3'	59.9'
	SD = 16.2'	d = 0.2'		SE	0 = 16.3'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	181° 27.7	S23°09.8	36°13.4	6.6'	N21°04.7	12.1'	59.9'
1	196°27.4	10.0	50°39.0	6.5'	21°16.9	12.0'	59.9'
2	211°27.1	10.1	65°04.5	6.4'	21°28.9	11.9'	59.9'
3	226°26.8	•• 10.3	79°29.9	6.3'	21°40.8	11.7'	59.9'
4	241°26.5	10.5	93°55.2	6.2'	$21^{\circ}52.5$	11.6'	59.9'
5	256°26.2	10.6	$108^{\circ}20.4$	6.1'	$22^{\circ}04.1$	11.5'	59.9'
6	271°25.9	S23°10.8	122°45.5	6.0'	N22°15.5	11.3'	59.9'
7	286°25.6	10.9	137° 10.5	5.9'	22°26.9	11.2'	59.9'
8	301°25.3	11.1	151°35.4	5.8'	22°38.0	11.0'	59.9'
9	316°25.1	• • 11.2	166°00.3	5.7'	22°49.0	10.9'	59.9'
10	331°24.8	11.4	180°25.0	5.6'	22°59.9	10.7'	59.9'
11	346°24.5	11.6	194°49.6	5.5'	23°10.6	10.6'	59.9'
12	1°24.2	\$23°11.7	209°14.2	5.4'	N23°21.2	10.4'	59.8'
13 14	16°23.9 31°23.6	11.9 12.0	223°38.6 238°03.0	5.4' 5.3'	23°31.6 23°41.8	10.2' 10.1'	59.8' 59.8'
14 15	31°23.6 46°23.3	12.0	238° 03.0 252° 27.2	5.3° 5.2'	23°41.8 23°51.9	9.9'	59.8° 59.8°
15 16	46 23.3 61°23.0	12.3	252 27.2 266°51.4	5.2 5.1'	23 51.9 24°01.8	9.9 9.8'	59.8'
16	76° 22.7	12.3 12.5	281°15.5	5.1	24°01.8 24°11.6	9.8'	59.8'
18	91°22.4	523°12.6	281 15.5 295°39.5	5.0 4.9'	N24°21.2	9.6	59.8'
19	106° 22.1	12.8	310°03.4	4.8'	24°30.6	9.4	59.8'
20	121°21.8	12.0	324°27.3	4.8'	24°39.9	9.1'	59.8'
21	136° 21.5	13.1	338°51.0	4.7'	24°49.0	8.9'	59.8'
22	151°21.2	13.2	353°14.7	4.6'	24°57.9	8.8'	59.7'
23	166° 20.9	13.3	7°38.3	4.5'	25°06.7	8.6'	59.7'
	SD = 16.2'	d = 0.2'	-	ÇГ	0 = 16.3'		
	JD — 10.2	u — U.Z		JL	_ 10.3		

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

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

		Sun		Moon				
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age		
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	10-12		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	76-92%		
11	06:47	06:33	11:53	20:35	08:09			
12	06:19	06:05	11:54	21:29	09:02			
13	05:51	05:37	11:54	22:28	09:58			

# December 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 0	83°09.5	132°23.2	\$20°31.3	314°07.0	N21°51.6	8°54.2	N21°59.4	97°40.4	S08°23.6		SHA	Dec
1	98°11.9	132 23.2 147°22.7	30.5	329°09.7	51.7	0 54.2 23°57.0	59.4 59.4	97 40.4 112°42.8	23.5	Alpheratz	357°34.8	29° 13.9
2	113°14.4	162° 22.3	29.7	344°12.4	51.7	38°59.8	59.4	112 42.8 127°45.1	23.4	Ankaa	353°07.1	-42°10.4
										Schedar	$349^{\circ}31.0$	56° 40.7
3	128°16.8	177°21.8	• • 28.9	359°15.0	52.1	54°02.7	59.3	142°47.5	• • 23.4	Diphda	348°47.3	-17°51.1
4 5	143°19.3	192°21.4 207°20.9	28.1	14°17.7	52.3	69°05.5	59.3	157°49.8	23.3	Achernar	$335^{\circ}19.9$	-57°06.8
6	158°21.8 173°24.2	207 20.9 222° 20.5	27.3 \$20°26.5	29°20.4 44°23.1	52.4 N21°52.6	84°08.3 99°11.1	59.3 N21°59.2	172°52.2 187°54.5	23.3 \$08°23.2	Hamal	$327^{\circ}51.0$	23°34.9
7	173 24.2 188°26.7	222 20.5 237° 20.1	25.7	59°25.8	52.8	99 11.1 114°14.0	59.2	202°56.9	23.2	Polaris	313°39.0	89°22.4
8	203°29.2	252°19.6	24.8	74°28.5	53.0	114 14.0 129°16.8	59.2	202 50.9 217°59.2	23.2	Acamar	$315^{\circ}11.5$	-40°12.4
9	203 29.2 218°31.6	267° 19.0	. 24.0	89°31.2	. 53.0	129 10.6 144°19.6	59.2	217 59.2 233°01.6	23.1	Menkar	$314^{\circ}05.9$	4°11.3
10	233°34.1	282° 18.7	23.2	104°33.9	53.3	159°22.4	59.2	248°03.9	23.1	Mirfak	308°27.9	49°57.1
11	248°36.6	202 10.7 297°18.3	23.2	104 33.9 119°36.6	53.5 53.5	174°25.2	59.1 59.1	246 03.9 263°06.3	23.0	Aldebaran	290°39.4	16°33.6
12	263°39.0	312° 17.8	\$20°21.6	134°39.3	N21°53.7	189°28.1	N21°59.1	278°08.6	S08°22.9	Rigel	281°03.6	-8° 10.3
13	203° 39.0° 278° 41.5	327° 17.4	20.8	149°42.0	53.8	204°30.9	59.0	293°11.0	22.9	Capella	$280^{\circ}21.5$	46°01.4
14	276 41.5 293°44.0	342° 17.4	19.9	164°44.7	54.0	204 30.9 219°33.7	59.0	308°13.3	22.9	Bellatrix	278°22.6	6°22.4
15	308°46.4	357°16.5	. 19.1	179°47.4	54.2	234°36.5	• • 59.0	323°15.7	22.7	Elnath	278°01.6	28°37.7
16	323°48.9	12° 16.1	18.3	194°50.1	54.4	249°39.4	58.9	338° 18.0	22.7	Alnilam	275°37.5	-1°11.1
17	338°51.3	27° 15.6	17.5	209°52.8	54.5	264°42.2	58.9	353°20.4	22.6	Betelgeuse	270°51.8	7°24.7
18	353°53.8	42° 15.2	\$20°16.7	224°55.5	N21°54.7	279°45.0	N21°58.9	8°22.7	S08°22.6	Canopus	263°51.9	-52°42.4
19	8°56.3	57° 14.8	15.8	239°58.2	54.9	294°47.8	58.9	23°25.1	22.5	Sirius	258°26.0	-16°44.9
20	23°58.7	72°14.3	15.0	255°00.9	55.1	309°50.7	58.8	38°27.4	22.5	Adhara	255°05.6	-29°00.2
21	39°01.2	87° 13.9	14.2	270°03.7	55.3	324°53.5	• • 58.8	53°29.8	22.4	Procyon	244°50.6	5°09.7
22	54°03.7	102°13.5	13.4	285°06.4	55.4	339°56.3	58.8	68°32.1	22.4	Pollux	243°17.1	27°57.9
23	69°06.1	102 13.3 117°13.0	12.6	300°09.1	55.6	354°59.1	58.7	83°34.5	22.4	Avior	234°14.3	-59°35.1
										Suhail	222°46.1	-43°31.8
Mer.p	ass. 18:24	$\nu$ -0.5' d-0	).8′ m-4.29	$\nu$ 2.7′ d0.	2′ m-0.80	$\nu$ 2.8′ <i>d</i> -0	.0′ m-2.81	$\nu$ 2.4′ d-0	.1' m $0.99$	Miaplacidus	221°37.7	-69°48.8
										Alphard	217°47.6	-8°45.9
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.4	11°50.7
0	84°08.6	132°12.6	\$20°11.7	315°11.8	N21°55.8	10°01.9	N21°58.7	98°36.8	S08°22.3	Dubhe	193°41.0	61°36.7
1	99°11.1	147°12.2	10.9	330°14.5	56.0	25°04.8	58.7	113°39.2	22.2	Denebola	182°25.0	14°25.9
2	114°13.5	162°11.7	10.1	345°17.3	56.2	40°07.6	58.7	128°41.5	22.1	Gienah	175°43.7	-17°40.7 -63°13.9
3	$129^{\circ}16.0$	$177^{\circ}11.3$	• • 09.2	0°20.0	• • 56.3	55°10.4	• • 58.6	143°43.9	• • 22.1		173°00.4 171°51.9	-03 13.9 -57°14.9
4	144°18.5	192°10.9	08.4	15°22.7	56.5	$70^{\circ}13.2$	58.6	158°46.2	22.0	Gacrux Alioth	166°13.2	55° 49.2
5	159°20.9	207°10.5	07.6	30°25.4	56.7	$85^{\circ}16.1$	58.6	173°48.6	22.0	Spica	158°22.5	-11°17.4
6	174°23.4	222°10.0	S20°06.8	45°28.2	N21°56.9	100°18.9	N21°58.5	188°50.9	S08°21.9	Alkaid	150° 22.3° 152° 52.3	49°11.1
7	189°25.8	237°09.6	05.9	60°30.9	57.1	$115^{\circ}21.7$	58.5	203°53.3	21.9	Hadar	132 32.3 148°36.5	-60°29.3
8	204°28.3	252°09.2	05.1	75°33.6	57.3	130°24.5	58.5	218°55.6	21.8	Menkent	140°58.0	-36°29.4
9	219°30.8	267°08.7	• • 04.3	90°36.3	•• 57.4	145°27.3	• • 58.4	233°58.0	• • 21.8	Arcturus	145°48.2	19°03.1
10	234°33.2	282°08.3	03.4	$105^{\circ}39.1$	57.6	160°30.2	58.4	249°00.3	21.7	Rigil Kent.	139°40.9	-60°56.1
11	249°35.7	297°07.9	02.6	120°41.8	57.8	175°33.0	58.4	264°02.7	21.7	Kochab	137°20.7	74°02.9
12	264°38.2	312°07.5	S20°01.7	135°44.6	N21°58.0	190°35.8	N21°58.4	279°05.0	S08°21.6	Zuben'ubi	136°56.4	-16°08.7
13	279°40.6	327°07.1	00.9	150°47.3	58.2	205°38.6	58.3	294°07.4	21.5	Alphecca	126°04.1	26°37.7
14	294°43.1	342°06.6	20°00.1	165°50.0	58.4	220°41.4	58.3	309°09.7	21.5	Antares	112°16.3	-26°29.2
15	309°45.6	357°06.2	19°59.2	180°52.8	• • 58.5	235°44.3	• • 58.3	324°12.0	• • 21.4	Atria	107°11.2	-69°04.2
16	324°48.0	12°05.8	58.4	195°55.5	58.7	250°47.1	58.2	339°14.4	21.4	Sabik	102°03.2	-15°45.3
17	339°50.5	27°05.4	57.6	210°58.3	58.9	265°49.9	58.2	354°16.7	21.3	Shaula	96°10.9	-37°07.3
18	354°53.0	42°05.0	\$19°56.7	226°01.0	N21°59.1	280°52.7	N21°58.2	9°19.1	S08°21.3	Rasalhague	95°59.0	12°32.5
19	9°55.4	57°04.6	55.9	241°03.8	59.3	295°55.5	58.1	24°21.4	21.2	Eltanin	90°42.8	51°29.1
20	24°57.9 40°00.3	72°04.1	55.0	256°06.5 271°09.3	59.5	310°58.4 326°01.2	58.1	39°23.8	21.2	Kaus Aust.	83°33.0	-34°22.4
21		87°03.7 102°03.3	• • 54.2		· · 59.7 21°59.8	341°04.0	58.1	54°26.1	• • 21.1	Vega	80°33.7	38°48.4
22 23	55°02.8 70°05.3	102 03.3 117°02.9	53.3	286°12.0 301°14.8	21 59.8 22°00.0	341 04.0 356°06.8	58.1	69°28.5 84°30.8	21.0	Nunki	75°48.2	-26°16.0
23	70 05.5	117 02.9	52.5				58.0		21.0	Altair	62°00.3	8°56.1
Mer.p	ass. 18:20	$\nu$ -0.4' d-0	).8′ m-4.30	$\nu 2.7' \ d0.$	2′ m-0.82	$\nu 2.8' \ d-0$	.0′ m-2.80	$\nu 2.3' \ d-0$	.1'  m1.00	Peacock	53°06.3	-56° 39.5
										Deneb	49°26.2	45°22.3
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.0	9°59.4
0	85°07.7	132°02.5	\$19°51.7	316°17.5	N22°00.2	11°09.6	N21°58.0	99°33.2	S08°20.9	Al Na'ir	27°33.2	-46°50.6
1	100°10.2	132 02.3 147°02.1	50.8	331°20.3	00.4	26°12.5	58.0	114°35.5	20.9	Fomalhaut	15°14.7	-29°29.6
2	100 10.2 115°12.7	147 02.1 162°01.7	50.6	346°23.0	00.4	41°15.3	56.0 57.9	114 35.5 129°37.9	20.9	Scheat	13°45.3	28° 13.2
3	130°15.1	102 01.7 177°01.3	• • 49.1	1°25.8	• • 00.8	56°18.1	•• 57.9	144°40.2	• • 20.8	Markab	13°30.0	15°20.5
4	145°17.6	192°00.9	48.3	16°28.6	01.0	71°20.9	57.9	159°42.5	20.7	Dec 14 Sat	SHA	Mer.pass
5	160°20.1	207°00.4	47.4	31°31.3	01.0	86°23.7	57.8	174°44.9	20.7	Venus	49°13.7	15:11
6	175°22.5	222°00.0	\$19°46.6		N22°01.4	101°26.6	N21°57.8	189°47.2	S08°20.6	Mars		03:03
7	190°25.0	236° 59.6	45.7	61°36.8	01.6	116°29.4	57.8	204°49.6	20.5	Jupiter	285°44.7	23:20
8	205°27.5	251°59.2	44.9	76°39.6	01.7	131°32.2	57.8	219°51.9	20.5	Saturn	14°30.9	17:27
9	220°29.9	266°58.8	• • 44.0	91°42.4	01.9	146°35.0	• • 57.7	234°54.3	20.4			
10	235°32.4	281°58.4	43.1	106°45.2	02.1	161°37.8	57.7	249°56.6	20.4	Dec 15 Sun	SHA	Mer.pass
11	250°34.8	296°58.0	42.3	121°47.9	02.3	176°40.7	57.7	264°59.0	20.3	Venus	48°04.0	15:12
12	265°37.3	311°57.6	S19°41.4	136°50.7	N22°02.5	191°43.5	N21°57.6	280°01.3	508°20.2	Mars		02:59
13	280°39.8	326°57.2	40.6	$151^{\circ}53.5$	02.7	206°46.3	57.6	295°03.6	20.2	Jupiter	285°53.3	23:15
14	295°42.2	$341^{\circ}56.8$	39.7	$166^{\circ}56.2$	02.9	221°49.1	57.6	310°06.0	20.1	Saturn	14°28.2	17:23
15	$310^{\circ}44.7$	$356^{\circ}56.4$	• • 38.9	$181^{\circ}59.0$	• • 03.1	$236^{\circ}51.9$	• • 57.6	325°08.3	• • 20.1	Dec 16 Mon	SHA	Mer.pass
16	325°47.2	11°56.0	38.0	$197^{\circ}01.8$	03.3	251°54.8	57.5	340°10.7	20.0	Venus	46°54.8	15:12
17	$340^{\circ}49.6$	26°55.6	37.1	$212^{\circ}04.6$	03.5	266°57.6	57.5	355°13.0	20.0	Mars		02:54
18	355°52.1	41°55.2	<b>S</b> 19°36.3	227°07.4	N22°03.7	282°00.4	N21°57.5	10°15.4	S08°19.9	Jupiter	$286^{\circ}01.9$	23:11
19	10°54.6	56° 54.8	35.4	242°10.2	03.9	297°03.2	57.4	25°17.7	19.8	Saturn	$14^{\circ}25.4$	17:19
20	25°57.0	71°54.4	34.6	257°12.9	04.1	312°06.0	57.4	40°20.0	19.8	11. 1	al ac::-!!	
21	40°59.5	86°54.1	· · 33.7	272°15.7	• • 04.3	327°08.8	• • 57.4	55°22.4	• • 19.7	Horizont	al parallax	0.0
22	56°02.0	101°53.7	32.8	287°18.5	04.5	342°11.7	57.3	70°24.7	19.7		Venus: Mars:	0.2 0.2
23	71°04.4	116°53.3	32.0	302°21.3	04.7	357°14.5	57.3	85°27.1	19.6		iviars:	0.2
Mer.p	ass. 18:16	$\nu$ -0.4′ d-0	0.8′ m-4.31	$\nu$ 2.8′ d0.	2′ m-0.84	$\nu$ 2.8′ d-0	.0′ m-2.80	$\nu$ 2.3′ d-0	.1′ m1.00			

h	Sui	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	181°20.6	S23°13.5	22°01.8	4.4'	$N25^{\circ}15.2$	8.4'	59.7'
1	196°20.3	13.6	36°25.2	4.4'	25°23.7	8.2'	59.7'
2	211°20.0 226°19.7	13.8 •• 13.9	50°48.6 65°11.9	4.3' 4.2'	25°31.9 25°40.0	8.1' 7.9'	59.7' 59.7'
3 4	220 19.7 241°19.4	14.1	79°35.1	4.2	25°47.8	7.9 7.7'	59.7'
5	256°19.1	14.2	93°58.2	4.1'	25°55.5	7.5'	59.7'
6	271°18.8	\$23°14.3	$108^{\circ}21.3$	4.0'	$N26^{\circ}03.1$	7.3'	59.6'
7	286°18.5	14.5	122°44.3	3.9'	26°10.4	7.2'	59.6'
8	301°18.2 316°17.9	14.6 • • 14.8	137°07.3	3.9'	26°17.5	7.0'	59.6'
9 10	316°17.9 331°17.6	· · 14.8 14.9	151°30.1 165°53.0	3.8' 3.8'	26°24.5 26°31.3	6.8' 6.6'	59.6' 59.6'
11	346°17.3	15.0	180°15.7	3.7'	26°37.9	6.4	59.6'
12	1°17.0	<b>S</b> 23°15.2	194°38.5	3.7'	N26°44.3	6.2'	59.5'
13	16°16.7	15.3	$209^{\circ}01.1$	3.6'	26°50.5	6.0'	59.5'
14	31°16.4	15.4	223°23.7 237°46.3	3.6'	26°56.6 27°02.4	5.8'	59.5'
15 16	46°16.1 61°15.8	· · 15.6 15.7	237°46.3 252°08.8	3.5' 3.5'	27°02.4 27°08.0	5.6' 5.5'	59.5' 59.5'
17	76°15.5	15.8	266°31.3	3.4'	27°13.5	5.3'	59.5
18	91°15.2	523°16.0	280°53.8	3.4'	N27°18.8	5.1'	59.4'
19	106°14.9	16.1	295°16.2	3.4'	27°23.8	4.9'	59.4'
20	121°14.6	16.2	309°38.5	3.3'	27°28.7 27°33.4	4.7'	59.4
21 22	136°14.3 151°14.0	· · 16.3 16.5	324°00.9 338°23.2	3.3' 3.3'	27°33.4 27°37.9	4.5' 4.3'	59.4' 59.4'
23	166°13.7	16.6	352°45.4	3.3'	27°42.2	4.3 4.1'	59.4 59.3'
20	SD = 16.2'	d = 0.1'			D = 16.3'		05.0
	3D = 10.2	a = 0.1		31	D = 10.3		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°13.4 196°13.1	\$23°16.7	7°07.7 21°29.9	3.2' 3.2'	N27°46.3 27°50.1	3.9' 3.7'	59.3' 59.3'
1 2	196 13.1 211°12.8	16.8 17.0	21 29.9 35°52.1	3.2'	27°53.8	3.7 3.5'	59.3'
3	226°12.5	. 17.1	50°14.3	3.2'	27°57.3	3.3'	59.3'
4	241°12.2	17.2	64°36.5	3.2'	28°00.6	3.1'	59.2'
5	256°11.9	17.3	78°58.7	3.2'	28°03.7	2.9'	59.2'
6	271°11.6	\$23°17.4	93°20.8	3.2'	N28°06.6	2.7'	59.2'
7 8	286°11.3 301°11.0	17.6 17.7	107°43.0 122°05.2	3.2' 3.2'	28°09.4 28°11.9	2.5' 2.3'	59.2' 59.1'
9	316°10.7	17.8	136°27.3	3.2'	28°14.2	2.1'	59.1
10	331°10.4	17.9	150°49.5	3.2'	28°16.3	1.9'	59.1'
11	346°10.1	18.0	$165^{\circ}11.6$	3.2'	28°18.2	1.7'	59.1'
12	1°09.8	\$23°18.2	179°33.8	3.2'	N28°19.9	1.5'	59.1'
13 14	16°09.5 31°09.2	18.3 18.4	193°56.0 208°18.2	3.2' 3.2'	28°21.4 28°22.7	1.3' 1.1'	59.0' 59.0'
15	46°08.9	. 18.5	200 10.2 222°40.5	3.3'	28°23.8	0.9'	59.0'
16	61°08.6	18.6	237°02.7	3.3'	28°24.7	0.7'	59.0'
17	76°08.3	18.7	251°25.0	3.3'	28°25.4	0.5'	58.9'
18	91°08.0	\$23°18.8	265°47.3	3.3'	N28°26.0	0.3'	58.9'
19 20	106°07.7 121°07.4	18.9 19.0	280°09.6 294°32.0	3.4'	28°26.3 28°26.4	0.1'	58.9'
21	136°07.1	. 19.0	308°54.4	3.4' 3.4'	28°26.3	-0.1' -0.3'	58.8' 58.8'
22	151°06.8	19.3	323°16.8	3.5'	28°26.1	-0.5	58.8'
23	166°06.5	19.4	337°39.3	3.5'	28°25.6	-0.7'	58.8'
	SD = 16.2'	d = 0.1'		SI	D = 16.2'		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	181°06.2	\$23°19.5	$352^{\circ}01.9$	3.6'	N28°25.0	-0.9'	58.7'
1	196°05.9	19.6	6°24.4	3.6'	28°24.1	-1.0'	58.7'
2 3	211°05.6 226°05.3	19.7 •• 19.8	20°47.1 35°09.8	3.7' 3.7'	28°23.1 28°21.8	-1.2'	58.7' 58.7'
3 4	226°05.3 241°05.0	19.8	35°09.8 49°32.5	3.7° 3.8′	28°21.8 28°20.4	-1.4' -1.6'	58.7° 58.6'
5	256°04.7	20.0	63°55.3	3.9'	28°18.8	-1.8'	58.6'
6	271°04.4	S23°20.1	78°18.1	3.9'	N28°17.0	-2.0'	58.6'
7	286°04.1	20.2	92°41.1	4.0'	28°15.0	-2.2'	58.5'
8 9	301°03.8 316°03.5	20.3	107°04.1 121°27.1	4.1' 4.1'	28°12.8 28°10.4	-2.4' -2.6'	58.5' 58.5'
10	331° 03.2	20.4	135°50.2	4.1	28°07.9	-2.0 -2.7'	58.5
11	346°02.9	20.6	150°13.4	4.3'	28°05.1	-2.9'	58.4
12	1°02.6	\$23°20.7	164°36.7	4.4'	N28°02.2	-3.1'	58.4'
13	16°02.3	20.8	179°00.1	4.4'	27°59.1	-3.3'	58.4'
14 15	31°02.0 46°01.7	20.9 •• 21.0	193°23.5 207°47.0	4.5' 4.6'	27°55.8 27°52.4	-3.5' -3.6'	58.3' 58.3'
16	46 01.7 61°01.4	21.0	207 47.0 222°10.6	4.0 4.7'	27 52.4 27°48.7	-3.8'	58.3'
17	76°01.0	21.1	236°34.3	4.8'	27°44.9	-4.0'	58.2
18	91°00.7	S23°21.2	250°58.1	4.9'	N27°40.9	-4.2'	58.2'
19	106°00.4	21.3	265°22.0	5.0'	27°36.7	-4.3'	58.2'
20 21	121°00.1 135°59.8	21.4 •• 21.5	279°45.9 294°10.0	5.1' 5.2'	27°32.4 27°27.9	-4.5' -4.7'	58.2' 58.1'
21	135°59.8 150°59.5	21.6	294°10.0 308°34.2	5.2'	27°27.9 27°23.2	-4.7' -4.9'	58.1'
23	165°59.2	21.7	322°58.4	5.4'	27°18.3	-5.0'	58.1
	SD = 16.2'	d = 0.1'		SI	D = 16.0'		

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

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

		Sun		Moon					
Day	Eqn.of	Eqn.of Time   Mer.   Mer.Pass.		Pass.	Age				
Day	00 <sup>h</sup>	00 <sup>h</sup> 12 <sup>h</sup>		Upper	Lower	13-15			
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	97-99%			
14	05:22	05:08	11:55	23:30	10:59				
15	04:54	04:39	11:55	-:-	12:02				
16	04:25	04:10 11:56		00:33 13:04					

## December 17, 18, 19 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	86°06.9	131°52.9	\$19°31.1	317°24.1	N22°04.8	12°17.3	N21°57.3	100°29.4	508°19.6			
1	101°09.3	146°52.5	30.2	332°26.9	05.0	27°20.1	57.3	115°31.7	19.5	Alpheratz	357°34.8	29°13.9
2	116°11.8	161°52.1	29.4	347°29.7	05.2	42°22.9	57.2	130°34.1	19.4	Ankaa	353°07.1	-42°10.4
3	131°14.3	176°51.7	• • 28.5	2°32.5	05.4	57°25.8	57.2	145°36.4	• • 19.4	Schedar	349°31.0	56°40.7
4	$146^{\circ}16.7$	191°51.3	27.6	17°35.3	05.6	72°28.6	57.2	160°38.8	19.3	Diphda	348°47.3	-17°51.1
5	161°19.2	206°50.9	26.8	32°38.1	05.8	87°31.4	57.1	175°41.1	19.3	Achernar Hamal	335°19.9 327°51.0	-57°06.8 23°35.0
6	176°21.7	221°50.6	S19°25.9	47°40.9	N22°06.0	102°34.2	N21°57.1	190°43.5	S08°19.2	Polaris	313°39.6	89°22.4
7	191°24.1	236°50.2	25.0	62°43.7	06.2	117°37.0	57.1	205°45.8	19.2	Acamar	315° 11.5	-40°12.4
8	206°26.6	251°49.8	24.2	77°46.5	06.4	132°39.8	57.0	220°48.1	19.1	Menkar	314°05.9	4°11.3
9	221°29.1 236°31.5	266°49.4 281°49.0	• • 23.3	92°49.3 107°52.1	· · 06.6 06.8	147°42.7 162°45.5	• • 57.0	235°50.5 250°52.8	• • 19.0	Mirfak	308°27.9	49°57.1
10 11	250°34.0	201 49.0 296°48.6	22.4 21.5	107 52.1 122°54.9	07.0	102 45.5 177°48.3	57.0 57.0	265°55.2	19.0 18.9	Aldebaran	290°39.3	16°33.6
12	266°36.5	311°48.3	\$19°20.7	137°57.7	N22°07.2	192°51.1	N21°56.9	280°57.5	508°18.9	Rigel	281°03.6	-8°10.3
13	281°38.9	326°47.9	19.8	153°00.5	07.4	207°53.9	56.9	295°59.8	18.8	Capella	280°21.5	46°01.4
14	296°41.4	341°47.5	18.9	168°03.4	07.6	222°56.7	56.9	311°02.2	18.7	Bellatrix	278° 22.6	6°22.4
15	311°43.8	$356^{\circ}47.1$	• • 18.0	183°06.2	• • 07.8	237°59.5	• • 56.8	326°04.5	• • 18.7	Elnath Alnilam	278°01.5 275°37.4	28°37.7 -1°11.1
16	326°46.3	11°46.7	17.2	198°09.0	08.0	253°02.4	56.8	341°06.9	18.6	Betelgeuse	270°51.8	7°24.7
17	341°48.8	26°46.4	16.3	213°11.8	08.2	268°05.2	56.8	356°09.2	18.6	Canopus	263°51.9	-52°42.4
18 19	356°51.2 11°53.7	41°46.0 56°45.6	\$19°15.4	228°14.6 243°17.4	N22°08.4 08.6	283°08.0 298°10.8	N21°56.7	11°11.5 26°13.9	S08°18.5	Sirius	258°25.9	-16°45.0
20	26°56.2	71°45.2	14.5 13.6	258°20.3	08.8	313°13.6	56.7 56.7	41°16.2	18.5 18.4	Adhara	255°05.5	-29°00.3
21	41°58.6	86°44.9	• • 12.8	273°23.1	09.1	328°16.4	• • 56.7	56°18.6	• 18.3	Procyon	244°50.6	5°09.7
22	57°01.1	101°44.5	11.9	288°25.9	09.3	343°19.3	56.6	71°20.9	18.3	Pollux	243°17.0	27°57.9
23	72°03.6	$116^{\circ}44.1$	11.0	303°28.7	09.5	358°22.1	56.6	86°23.2	18.2	Avior Suhail	234°14.2 222°46.1	-59°35.1 -43°31.8
Mern	ass. 18:13	v-0 4' d-0	0.9' m-4.32	v2 8′ d0	2′ m-0.87	v2 8′ d₌0	.0′ m-2.80	ν2.3′ d-0	1' m1 01	Miaplacidus	221°37.7	-43° 31.8 -69° 48.9
- Ivier.p		ν-0. <del>4</del> α-0	7.9 111-4.52	ν2.0 do.	2 111-0.07	ν2.0 d-0	.0 111-2.00	ν2.5 u-0		Alphard	217°47.6	-8°45.9
			_		_		_		_	Regulus	207°34.4	11°50.7
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.9	61°36.7
0 1	87°06.0 102°08.5	131°43.8 146°43.4	\$19° 10.1 09.2	318°31.6 333°34.4	N22°09.7 09.9	13°24.9 28°27.7	N21°56.6 56.5	101°25.6 116°27.9	\$08°18.2 18.1	Denebola	182°25.0	14°25.9
2	102 08.5 117°10.9	161°43.4	09.2	348°37.2	10.1	43°30.5	56.5	131°30.2	18.0	Gienah	175°43.7	-17°40.7
3	132°13.4	176° 42.7	• • 07.4	3°40.1	. 10.1	58°33.3	56.5	146°32.6	• • 18.0		173°00.3	-63°13.9
4	147°15.9	191°42.3	06.6	18°42.9	10.5	73°36.1	56.5	161°34.9	17.9	Gacrux	171°51.9	-57°14.9
5	$162^{\circ}18.3$	206°41.9	05.7	33°45.7	10.7	88°39.0	56.4	176°37.3	17.9	Alioth Spica	166° 13.2 158° 22.5	55°49.2 -11°17.4
6	177°20.8	221°41.6	S19°04.8	48°48.6	N22°10.9	103°41.8	N21°56.4	191°39.6	S08°17.8	Alkaid	150° 22.3	49°11.1
7	192°23.3	236°41.2	03.9	63°51.4	11.1	118°44.6	56.4	206°41.9	17.7	Hadar	148°36.5	-60°29.3
8	207°25.7	251°40.8	03.0	78°54.3	11.3	133°47.4	56.3	221°44.3	17.7	Menkent	147°57.9	-36°29.4
9	222°28.2	266°40.5	•• 02.1	93°57.1	• • 11.5	148°50.2	• • 56.3	236°46.6	• • 17.6	Arcturus	145°48.2	19°03.0
10 11	237°30.7 252°33.1	281°40.1 296°39.8	01.2 19°00.3	108°59.9 124°02.8	11.7 11.9	163°53.0 178°55.8	56.3 56.2	251°48.9 266°51.3	17.6 17.5	Rigil Kent.	139°40.9	-60°56.1
12	267°35.6	311°39.4	\$18°59.4	139°05.6	N22°12.1	193°58.7	N21°56.2	281°53.6	508°17.4	Kochab	137°20.7	74°02.9
13	282°38.1	326°39.0	58.5	154°08.5	12.3	209°01.5	56.2	296°55.9	17.4	Zuben'ubi	136°56.3	-16°08.7
14	297°40.5	341°38.7	57.6	$169^{\circ}11.3$	12.6	224°04.3	56.2	311°58.3	17.3	Alphecca Antares	126°04.1 112°16.3	26°37.7 -26°29.2
15	312°43.0	356°38.3	• • 56.7	184°14.2	• • 12.8	$239^{\circ}07.1$	•• 56.1	327°00.6	• • 17.3	Atria	107° 11.1	-69°04.2
16	327°45.4	11°38.0	55.8	199°17.0	13.0	254°09.9	56.1	342°03.0	17.2	Sabik	102°03.2	-15°45.3
17	342°47.9	26°37.6	55.0	214°19.9	13.2	269°12.7	56.1	357°05.3	17.1	Shaula	96°10.9	-37°07.3
18 19	357°50.4 12°52.8	41°37.3 56°36.9	\$18°54.1 53.2	229°22.8 244°25.6	N22°13.4 13.6	284°15.5 299°18.3	N21°56.0 56.0	12°07.6 27°10.0	\$08°17.1	Rasalhague	95°58.9	12°32.5
20	27°55.3	71°36.6	52.3	259°28.5	13.8	314°21.2	56.0	42°12.3	17.0 17.0	Eltanin	90°42.8	51°29.1
21	42°57.8	86°36.2	• • 51.4	274°31.3	. 14.0	329°24.0	56.0	57°14.6	. 16.9	Kaus Aust.	83°33.0	-34°22.4
22	58°00.2	101°35.8	50.5	289°34.2	14.2	344°26.8	55.9	72°17.0	16.8	Vega Nunki	80°33.7 75°48.2	38°48.4 -26°16.0
23	73°02.7	116°35.5	49.6	304°37.1	14.5	359°29.6	55.9	87°19.3	16.8	Altair	62°00.3	-20 10.0 8°56.1
Mer n	ass. 18:09	ν-0 4' d-0	0.9' m-4.33	v2 8' d0	2′ m-0.89	v2 8' d-0	.0′ m-2.80	v2 3' d-0	.1′ m1.01	Peacock	53°06.3	-56°39.5
- Wici.p		V 0.4 U 0	7.5 111 4.55	ν2.0 do.	2 111 0.03		.0 111 2.00	ν2.5 u σ		Deneb	49°26.2	45°22.3
			_		_		_		_	Enif	33°39.0	9°59.4
Thu 0	<b>GHA</b> 88°05.2	<b>GHA</b> 131°35.2	<b>Dec</b> \$18°48.6	<b>GHA</b> 319°39.9	<b>Dec</b> N22°14.7	<b>GHA</b> 14°32.4	<b>Dec</b> N21°55.9	<b>GHA</b> 102°21.6	<b>Dec</b> \$08°16.7	Al Na'ir	27°33.2	-46°50.6
1	103°07.6	131 33.2 146°34.8	47.7	334°42.8	14.9	29°35.2	55.8	102 21.0 117°24.0	16.7	Fomalhaut	15° 14.7	-29°29.6
2	118°10.1	161°34.5	46.8	349°45.7	15.1	44°38.0	55.8	132°26.3	16.6	Scheat Markab	13°45.3 13°30.0	28°13.2 15°20.5
3	133°12.6	176°34.1	• • 45.9	4°48.5	• • 15.3	59°40.8	• • 55.8	147°28.6	• • 16.5	IVIAIKAD	13 30.0	15 20.5
4	$148^{\circ}15.0$	191°33.8	45.0	19°51.4	15.5	74°43.7	55.7	162°31.0	16.5	Dec 17 Tue	SHA	Mer.pass
5	163°17.5	206°33.4	44.1	34°54.3	15.7	89°46.5	55.7	177°33.3	16.4	Venus	45°46.0	15:13
6	178°19.9	221°33.1	\$18°43.2	49°57.2		104°49.3	N21°55.7	192°35.6	S08°16.4		231°17.2	02:50
7	193°22.4	236°32.7	42.3	65°00.0	16.2	119°52.1	55.7	207°38.0	16.3	Jupiter Saturn	286°10.4 14°22.5	23:07
8 9	208°24.9 223°27.3	251°32.4 266°32.1	41.4 •• 40.5	80°02.9 95°05.8	16.4 •• 16.6	134°54.9 149°57.7	55.6 •• 55.6	222°40.3 237°42.6	16.2 •• 16.2			17:15
10	238°29.8	281°31.7	39.6	110°08.7	16.8	165°00.5	55.6	252°45.0	16.1	Dec 18 Wed	SHA	Mer.pass
11	253°32.3	296°31.4	38.7	125°11.6	17.0	180°03.3	55.5	267°47.3	16.1	Venus	44°37.7	15:13
12	268°34.7	311°31.0	<b>S</b> 18°37.8	140°14.4	N22°17.2	195°06.1	N21°55.5	282°49.6	S08°16.0		231°25.6	02:45
13	283°37.2	326°30.7	36.8	155° 17.3	17.4	210°08.9	55.5	297°52.0	15.9	Jupiter Saturn	286°18.9 14°19.5	23:02 17:12
14	298°39.7	341°30.4	35.9	170°20.2	17.7	225°11.8	55.5	312°54.3	15.9			
15	313°42.1	356°30.0	• • 35.0	185°23.1	. 17.9	240°14.6	• • 55.4	327°56.6	15.8	Dec 19 Thu	SHA	Mer.pass
16 17	328°44.6 343°47.1	11°29.7 26°29.4	34.1 33.2	200°26.0 215°28.9	18.1 18.3	255°17.4 270°20.2	55.4 55.4	342°59.0 358°01.3	15.7 15.7	Venus	43°30.0	15:14
17 18	343°47.1 358°49.5	41°29.0	33.2 \$18°32.3	215°28.9 230°31.8	18.3 N22°18.5	270°20.2 285°23.0	55.4 N21°55.3	13°03.6	15.7 \$08°15.6		231°34.8 286°27.2	02:41 22:58
19	13°52.0	56°28.7	31.4	245°34.7	18.7	300°25.8	55.3	28°06.0	15.6	Saturn	280 27.2 14°16.5	17:08
20	28°54.4	71°28.4	30.4	260°37.6	19.0	315°28.6	55.3	43°08.3	15.5			11.00
21	43°56.9	86°28.0	• • 29.5	275°40.5	• • 19.2	330°31.4	•• 55.2	58°10.6	• • 15.4	Horizont	al parallax	
22	58°59.4	101°27.7	28.6	290°43.4	19.4	345°34.2	55.2	73°13.0	15.4		Venus:	0.2
23	74°01.8	116°27.4	27.7	305°46.3	19.6	0°37.0	55.2	88°15.3	15.3		Mars:	0.2
Mer.p	ass. 18:05	$\nu$ -0.3′ d-0	).9′ m-4.33	$\nu$ 2.9′ d0.	2′ m-0.92	$\nu$ 2.8′ d-0	.0′ m-2.79	$\nu$ 2.3′ d-0	.1' m $1.01$			

h	Sui	า			Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP		
0	180°58.9	523°21.8	337°22.8	5.5'	N27°13.3	-5.2'	58.0'		
1	195°58.6	21.9	351°47.2	5.6'	27°08.1	-5.4'	58.0'		
2	210°58.3	21.9	6°11.8	5.7'	27°02.7	-5.5'	58.0'		
3	225°58.0	• • 22.0	20°36.4	5.8'	26°57.2	-5.7'	57.9'		
4	240° 57.7 255° 57.4	22.1 22.2	35°01.2 49°26.1	5.9'	26°51.5 26°45.7	-5.8' -6.0'	57.9'		
5 6	255 57.4 270°57.1	523°22.3	49 20.1 63°51.1	6.0' 6.1'	26 45.7 N26°39.7	-6.2'	57.9' 57.8'		
7	285° 56.8	22.3	78° 16.2	6.2	26°33.6	-6.3	57.8'		
8	300°56.5	22.4	92°41.4	6.3'	26°27.2	-6.5	57.8'		
9	315°56.2	• • 22.5	107°06.7	6.4'	26°20.8	-6.6'	57.7'		
10	330°55.9	22.6	121°32.2	6.6'	26°14.2	-6.8'	57.7'		
11	345°55.6	22.7	135°57.7	6.7'	26°07.4	-6.9'	57.7'		
12	0°55.3 15°54.9	\$23°22.7 22.8	150°23.4 164°49.2	6.8' 6.9'	N26°00.5 25°53.4	-7.1'	57.6'		
13 14	30° 54.6	22.8	104 49.2 179°15.1	6.9 7.0'	25° 53.4	-7.2' -7.3'	57.6' 57.6'		
15	45° 54.3	. 23.0	179 13.1 193°41.1	7.1'	25°38.9	-7.5'	57.5'		
16	60°54.0	23.0	208°07.3	7.3'	25°31.4	-7.6'	57.5'		
17	75°53.7	23.1	222°33.5	7.4'	25°23.8	-7.8'	57.5'		
18	90°53.4	<b>S</b> 23°23.2	236°59.9	7.5'	N25°16.0	-7.9'	57.4'		
19	105°53.1	23.3	251°26.4	7.6'	25°08.1	-8.0'	57.4'		
20	120°52.8	23.3	265°53.1	7.8'	25°00.1 24°51.9	-8.2'	57.4'		
21 22	135°52.5 150°52.2	· · 23.4 23.5	280° 19.8 294° 46.7	7.9' 8.0'	24°51.9 24°43.6	-8.3' -8.4'	57.3' 57.3'		
23	150 52.2 165°51.9	23.5 23.5	294 46.7 309°13.7	8.1'	24 43.0 24°35.2	-8.4 -8.6'	57.3'		
	SD = 16.2'	d = 0.1'			O = 15.8'	3.0			
	3D = 10.2'	a = 0.1		51	J = 15.8'				
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP		
0	180°51.6 195°51.3	\$23°23.6 23.7	323°40.8 338°08.1	8.2' 8.4'	N24°26.6 24°17.9	-8.7' -8.8'	57.2' 57.2'		
1 2	195 51.3 210°51.0	23.7	352°35.4	8.5'	24 17.9 24°09.1	-8.9'	57.2'		
3	225°50.7	23.8	7°02.9	8.6'	24°00.2	-9.1'	57.1'		
4	240°50.4	23.9	21°30.6	8.7'	23°51.1	-9.2'	57.1'		
5	255° 50.0	23.9	35°58.3	8.9'	23°42.0	-9.3'	57.1'		
6	270°49.7	S23°24.0	50°26.2	9.0'	N23°32.7	-9.4'	57.0'		
7 8	285°49.4 300°49.1	24.0 24.1	64°54.2 79°22.3	9.1' 9.2'	23°23.3 23°13.7	-9.5' -9.6'	57.0' 57.0'		
9	315° 48.8	24.2	93°50.6	9.4	23°04.1	-9.0 -9.7'	56.9		
10	330°48.5	24.2	108° 18.9	9.5'	22°54.4	-9.9'	56.9'		
11	345°48.2	24.3	122°47.4	9.6'	22°44.5	-10.0'	56.9'		
12	0°47.9	\$23°24.3	137° 16.0	9.7'	N22°34.6	-10.1'	56.8'		
13 14	15° 47.6 30° 47.3	24.4 24.4	151°44.8 166°13.7	9.9' 10.0'	22°24.5 22°14.3	-10.2' -10.3'	56.8' 56.8'		
15	45° 47.0	24.5	180° 42.7	10.0	22°04.1	-10.3 -10.4	56.7'		
16	60°46.7	24.6	195°11.8	10.2'	21°53.7	-10.5'	56.7'		
17	75°46.4	24.6	209°41.0	10.4'	21°43.2	-10.6'	56.7'		
18	90°46.1	\$23°24.7	224°10.4	10.5'	N21°32.7	-10.7'	56.6'		
19	105° 45.7	24.7	238°39.9 253°09.5	10.6'	21°22.0	-10.8'	56.6'		
20 21	120° 45.4 135° 45.1	24.8 • • 24.8	253 09.5 267°39.2	10.7' 10.8'	21°11.2 21°00.4	-10.8' -10.9'	56.6' 56.5'		
22	150°44.8	24.9	282°09.0	11.0'	20°49.5	-11.0'	56.5		
23	165°44.5	24.9	296°39.0	11.1'	20°38.4	-11.1'	56.5'		
	SD = 16.2'	d = 0.1'		SI	D = 15.6'				
Thu	GHA	Dec	GHA	ν	Dec	d	HP		
i nu O	GHA 180°44.2	S23°25.0	311°09.1	u 11.2'	N20°27.3	-11.2'	56.5'		
1	195°43.9	25.0	325°39.3	11.3'	20°16.1	-11.3'	56.4		
2	210°43.6	25.0	340°09.6	11.4'	$20^{\circ}04.8$	-11.4'	56.4'		
3	225°43.3	• • 25.1	354°40.0	11.5'	19°53.4	-11.5'	56.4'		
4	240°43.0	25.1	9°10.6	11.7'	19°42.0	-11.5'	56.3'		
5 6	255° 42.7 270° 42.4	25.2 <b>S</b> 23°25.2	23°41.2 38°12.0	11.8' 11.9'	19°30.5 N19°18.8	-11.6' -11.7'	56.3' 56.3'		
7	270 42.4 285°42.0	25.3	50° 12.0	12.0'	19°07.2	-11. <i>1</i> -11.8'	56.2		
8	300°41.7	25.3	67°13.9	12.1'	18°55.4	-11.8'	56.2'		
9	315°41.4	• • 25.3	81°45.0	12.2'	18°43.6	-11.9'	56.2'		
10	330°41.1	25.4	96°16.2	12.3'	18°31.6	-12.0'	56.1'		
11 12	345° 40.8 0° 40.5	25.4 \$23°25.5	110°47.6 125°19.0	12.4' 12.6'	18°19.7 N18°07.6	-12.1' -12.1'	56.1' 56.1'		
13	15°40.2	25.5	125° 19.0 139° 50.6	12.6	17°55.5	-12.1 -12.2'	56.0'		
14	30°39.9	25.5	154° 22.2	12.8'	17°43.3	-12.3'	56.0'		
15	45°39.6	• • 25.6	168°54.0	12.9'	$17^{\circ}31.1$	-12.3'	56.0'		
16	60°39.3	25.6	183°25.9	13.0'	17°18.7	-12.4'	56.0'		
17	75°39.0	25.6	197°57.8	13.1'	17°06.4	-12.4'	55.9'		
18 19	90°38.6 105°38.3	\$23°25.7 25.7	212°29.9 227°02.1	13.2' 13.3'	N16°53.9 16°41.4	-12.5' -12.6'	55.9' 55.9'		
20	105 36.3 120°38.0	25.7 25.7	241°34.4	13.4'	16° 28.8	-12.6'	55.8'		
21	135°37.7	• • 25.8	256°06.7	13.5'	16°16.2	-12.7'	55.8'		
22	150°37.4	25.8	270°39.2	13.6'	16°03.5	-12.7'	55.8'		
23	165°37.1	25.8	285°11.8	13.7'	15°50.8	-12.8'	55.7'		
	SD = 16.2'	d = 0.0'		SI	O = 15.4'				

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

		Sun				
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	16-18
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	96-85%
17	03:56	03:41	11:56	01:34	14:03	
18	03:26	03:12	11:57	02:31	14:57	
19	02:57	02:42	11:57	03:22	15:46	

# December 20, 21, 22 UT (Fri., Sat., Sun.)

Column   C	h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
1	Fri -	GΗΔ	GHA	Dec	CHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
1 101 008													
1											Alpheratz	357°34.8	29°13.9
14   16   16   17   17   17   18   18   18   19   19   19   19   19											Ankaa	$353^{\circ}07.1$	-42°10.4
14   14   14   15   15   15   15   15											Schedar	349°31.0	56°40.7
Section   Sect											Diphda	348°47.3	-17°51.1
The color of the											Achernar	$335^{\circ}19.9$	-57°06.8
19											Hamal	$327^{\circ}51.1$	23°35.0
20											Polaris	313°40.5	89°22.4
10   2007-200   2007													
10 229°383 38°128 18.5 111183 22.3 104°77.													
11 220-231 3 301-232 5 11-23 1											1		
13   284163   387223   5187167   147-241   727-223   1867-243   187-244   187-243   187-244   147-243   187-244   147-243											1		
14   200   200   201											1		
18 28 36 3 5 36 27 28 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1											_		
15   18   18   18   18   18   18   18	13			14.7		22.7		54.8		14.4			
All   All													
Betelgems   2016   10   2016	15	314°41.3		· · 12.9		• • 23.2	241°22.0	• • 54.7	328°52.6	• • 14.3	1		
19   14   15   15   15   15   15   15   15	16	329°43.7	11°21.9	11.9	201°35.8	23.4	256°24.8	54.7	343°54.9	14.3	I		
19   19   19   19   19   19   19   19	17	344°46.2	26°21.6	11.0	216°38.8	23.6	271°27.6	54.7	358°57.2	14.2			
Adhaba   25°16.5   29°10.3   29°10.5   29°10	18	359°48.7	41°21.3	\$18°10.1	231°41.7	N22°23.8	286°30.4	N21°54.6		S08°14.1			
24 4750 0	19	14°51.1	56°21.0	09.1	246°44.6	24.1	301°33.2	54.6	29°01.9	14.1	1		
A	20	29°53.6	71°20.7	08.2	261°47.6	24.3	316°36.0	54.6	44°04.2	14.0			
23   75   10   10   10   10   10   10   10   1	21	44°56.0	86°20.4	• • 07.3	276°50.5	• • 24.5	331°38.8	• • 54.5	59°06.5	• • 13.9			
Metropast 1810   P.O.3' d.0.9' m-4.34	22	59°58.5	101°20.1	06.3	291°53.4	24.7	346°41.6	54.5	74°08.9	13.9			
Sur	23	75°01.0	$116^{\circ}19.8$	05.4	306°56.4	25.0	1°44.4	54.5	89°11.2				
Sat   GHA   GHA   Dec   GHA			-								1		
Sat   GHA	ivler.p	bass. 18:01	$\nu$ -0.3′ d-0	y.y m-4.34	$\nu$ 2.9° d0.	∠ m-0.94	ν2.8′ d-0	.u m-2./9	$\nu$ 2.3′ d-0	.ı m1.02			
CHA													
0 90°034   11°194   \$18°045   \$31°93   \$32°952   \$12°93   \$32°953	Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec			
1 109°09 9 146°191 03.5 337°022 25.4 31°800 54.4 119°159 13.7 6 General 157°437 17°202 130°303 130°108 101°183 02.6 380°052 25.6 46°82.8 54.4 149°82.0 513.6 4 150°13.3 101°18.2 18°00.7 °20°11.2 55.9 61°85.6 54.4 149°82.0 513.6 13.6 140°22.8 13.5 13.6 160°13.3 101°18.2 18°00.7 °20°11.1 50°10.1 70°8.8 4 54.3 149°82.0 513.6 13.6 140°22.8 13.5 13.6 160°13.1 \$50°10.2 \$2111.1 \$0.2 \$1.0 \$1.0 \$1.0 \$1.0 \$1.0 \$1.0 \$1.0 \$1.0													
2 120°08.4 161°18.8 0.26 352°05.2 2.56 46°52.8 54.4 134°18.2 13.6 3 136°10.8 176°18.5 0.016 70°81.4 140°20.5 13.6 136°13.0 176°18.5 0.016 17.5 10.5 150°13.3 10°18.2 18°00.7 22°11.1 26.1 76°84.5 4.3 164°22.8 13.5 14.6 12.8 13.5 150°13.3 10°18.2 18°00.7 176°84.5 140°20.5 13.6 13.4 140°20.5 13.6 13.4 140°20.5 13.6 13.4 140°20.5 13.6 13.4 140°20.5 13.6 13.4 140°20.5													
1 139°10.8 1 10°10.5 0.10.6 7'08.1 .25.9 61'95.6 35.4 149°20.5 1.36 4 150°13.3 10°10.2 18°00.7 22°11.1 26.1 76°8.8 4 54.3 149°20.5 1.35 5 16°21.3 10°10.3 10°10.2 18°00.7 22°11.1 26.1 76°8.8 4 54.3 149°20.5 1.35 5 16°15.8 20°17.9 17°95.8 37°14.0 26.3 92°01.2 54.3 179°52.5 13.4 6 160°18.2 22°17.0 55.9 837°14.0 26.3 92°01.2 54.3 179°52.5 13.4 6 160°18.2 22°17.0 55.9 8°27.0 12°0.6 10°0.40 N21°54.3 12°9.25 2 13.4 6 160°13.1 35°14.2 140°1.2 140°20.5 140°20.2 25°25.6 266°16.7 .56.0 9°252.8 .72.0 137°0.6 65.3 209°29.8 13.3 Hadar 18°25.3 31°11.2 12°10.2 15°25.0 140°1.2 140°20.2 140°1.2 140°20.2 140°1											1		
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6 186°15.8 200°17.9 1"99.8 37°14.0 2.63 92°01.2 \$43. 197°25.2 \$13.4 \$Albiton   196°30.7 \$236°17.3 \$17°89.8 \$2°17.0 \$12°26.6 \$10°40.0 \$127°8.3 \$194°27.5 \$00°13.4 \$Albiton   196°30.7 \$236°17.3 \$5.9 \$67°19.9 \$2.68 \$122°06.8 \$5.3 \$20°92.8 \$13.3 \$40°12.5 \$2.9 \$2.24°32.1 \$13.2 \$40°10.2 \$10°28.2 \$22°25.6 \$266°16.7 \$5.0 \$97°25.8 \$2.72 \$152°12.4 \$4.54.2 \$23°34.5 \$13.2 \$40°10.2 \$40°28.1 \$281°16.4 \$5.5 \$0.11°25.8 \$2.75 \$16°15.5 \$5.4 \$2.24°32.1 \$13.2 \$40°10.1 \$10°28.8 \$2.75 \$16°15.5 \$5.2 \$24°36.8 \$13.1 \$13.0 \$40°10.2 \$40°28.1 \$281°16.4 \$5.5 \$11°25.8 \$2.75 \$16°15.2 \$5.4 \$2.24°32.1 \$13.2 \$40°10.1 \$11°25.9 \$9.5 \$2.9 \$10°10.2 \$10°28.8 \$2.75 \$16°15.2 \$5.4 \$2.24°32.1 \$13.2 \$40°10.1 \$11°25.9 \$9.5 \$2.9 \$10°10.2 \$10°28.8 \$2.75 \$16°15.2 \$5.4 \$2.24°32.8 \$13.1 \$10°10.2 \$40°20.3 \$11°15.8 \$11°53.7 \$2.77 \$182°18.1 \$5.1 \$20°10.9 \$12°28.9 \$20°10.1 \$10°20.3 \$10°20.9 \$12°20.9 \$10°20.9 \$12°20.3 \$10°20.3 \$11°15.8 \$11°53.5 \$13.3 \$12°40.6 \$2.84 \$22°27.9 \$19°20.9 \$12°25.5 \$5.0 \$14°46.1 \$12.9 \$40°40.2 \$10											Gacrux	171°51.8	-57°14.9
180°18.2   221°17.6   51°58.8   52°170   N22°26.6   107°64.0   N21°54.3   104°27.5   508°13.4   Alkaii   182°52.3   49°11.1   17   191°2.2   13.2   13.2   Alkaii   182°52.3   49°11.1   13.2   13.2   Alkaii   182°52.3   49°11.1   13.2   13.2   Alkaii   182°52.3   49°12.1   49°12.2   49°12.3   49°12.1   49°12.2   49°12											Alioth	$166^{\circ}13.1$	55°49.2
196°20.7   236°17.3   57.9   67°19.9   26.8   122°66.8   54.3   209°29.8   13.3   All 148°36.5   60°29.3     20°25.5   266°16.7   56.0   97°25.8   27.2   152°12.4   54.2   239°34.5   13.2   All 148°36.5   60°29.3     10   240°28.1   281°16.4   55.0   112°38.   27.5   161°15.2   54.2   239°34.5   13.2   All 148°36.5   60°29.3     11   255°30.5   296°16.1   54.1   127°31.7   27.7   182°18.1   54.1   269°39.1   13.0   All 148°36.5   60°36.1     12   270°30.3   311°15.8   517°53.2   142°34.7   122°7.9   197°20.0   N21°54.1   284°41.4   80°13.0   Kochab   137°20.6   60°36.1     13   285°35.5   336°15.5   51.3   127°40.6   28.4   227°25.5   54.0   30°48.4   1.9   All 148°36.5   16°80.7     14   300°37.9   341°15.3   51.3   127°40.6   28.4   227°25.5   54.0   30°48.4   1.9   All 148°36.3   16°80.7     15   331°40.4   356°15.0   50.3   187°43.6   28.6   242°29.3   54.0   339°35.1   1.7   All 148°36.2   26°37.1     16   330°42.9   11°14.7   49.4   20°40.5   28.9   257°21.   54.0   339°51.1   1.7   All 148°10.1   1.0   60°0.0     18   0°47.8   41°14.1   517°47.5   222°25.2   822°25.2   827°27.1   82°21.1   827°27.1   82°21.1   827°27.1   82°21.1											Spica	158° 22.5	-11°17.4
8 210°23 2 25°170 56.9 82°22.9 27.0 137°09.6 54.2 224°32.1 13.2 https://doi.org/10.1009/10.100											Alkaid	152°52.3	49°11.1
9 225°25.6 266°16.7 · 56.0 97°25.8 · 27.2 152°12.4 · 54.2 293°34.5 · 13.2   Methods   147°37.9 · 30°39.4   10 240°28.1 281°16.4 · 55.0 112°28.8 · 27.5 167°15.2 · 54.2 293°34.5 · 13.2   Methods   131°18.2   11 255°30.5 296°16.1 · 54.1 127°31.7 27.7 182°18.1 · 54.1 269°39.1 · 130   12 270°33.0 311°18.8 · S17°53.5 · 12°28.7 142°34.7 · 72°27.9 197°20.9 N21°24.1 284°41.4 · 284°41.2 84°14.1   13 285°35.5 336°15.5 · 55.2 157°37.7 28.2 212°33.7 · 54.1 299°43.8 · 12.9   14 300°37.9 341°15.3 · 51.3 · 172°40.6 · 28.4 227°26.5 · 54.0 314°46.1 · 12.9   15 315°40.4 356°15.0 · 50.3 187°43.6 · 28.6 242°29.3 · 54.0 344°60.1 · 12.9   16 330°42.9 · 11°14.7 · 494.4 · 022°45.5 · 28.9 25°7.2 · 1 · 54.0 344°69.1 · 12.7   17 345°45.3 · 26°14.4 · 48.4 · 217°49.5 · 29.1 · 272°34.9 · 54.0 399°53.1 · 12.7   18 0°47.8 · 41°14.1 · S17°47.5 · 232°52.5 · 22°29.3 · 287°3.7 · N21°3.9 · 148°55.2 · 86°12.6   19 15°50.3 · 56°13.8 · 46.5 · 247°55.4 · 29.5 · 302°40.5 · 53.9 · 29°57.7 · 12.5   21 46°55.2 · 86°13.2 · 44.6 · 278°01.4 · 30.0 · 332°46.1 · 53.8 · 60°02.4 · 12.4   22 60°57.6 · 101°12.9 · 43.7 · 203°04.4 · 30.0 · 332°46.1 · 53.8 · 60°02.4 · 12.4   23 76°00.1 · 116°12.7 · 42.7 · 308°07.3 · 30.5 · 2°51.7 · 53.8 · 90°07.0 · 12.3   24 48°55.2 · 86°13.2 · 44.6 · 278°01.4 · 30.0 · 332°46.1 · 53.8 · 90°07.0 · 12.3   25 Mer.pass. 17.57 · \(\nu_{\text{C}}\) \(											Hadar	148°36.5	-60°29.3
10   240°28.1   281°16.4   55.0   112′28.8   27.5   167°15.2   54.2   254°36.8   13.1   13.0   13.0   12.5   12.											Menkent	$147^{\circ}57.9$	-36°29.4
11 255°30.5 296°16.1 541 127°31.7 27.7 182°18.1 541 269°39.1 13.0 Nghreft 1.93°20.6 -0.0 Sh. 122°20.3 0 31°15.5 51.5 51.2 142°34.7 N22°7.9 197°20.9 N1°44.1 286°4.4 508°13.0 Nghreft 1.93°20.6 -0.0 Sh. 122°3.5 326°15.5 52.2 15°73.7 28.2 212°23.7 541 290°43.8 12.9 Nghreft 1.93°20.6 27.4 20.9 Nghreft 1.93°20.6 Nghreft 1.											Arcturus	145°48.2	19°03.0
12 270°33.0 311°15.8 \$17°63.2 142°34.7 \$122°7.9 \$19°20.0 \$12.61 284°41.4 \$08°33.0 \$1.0 \$16°0.8.7 \$1.0 \$20°3.5 \$1.0 \$20°3.5 \$1.0 \$20°3.5 \$1.0 \$20°3.0 \$1.0 \$16°0.8.7 \$1.0 \$20°3.0 \$1.0 \$16°0.8.7 \$1.0 \$20°3.0 \$1.0 \$16°0.8.7 \$1.0 \$10°0.0 \$1.0 \$1.0 \$1.0 \$1.0 \$1.0 \$1.0 \$1.0 \$											Rigil Kent.	139°40.8	-60°56.1
13 285°35.5 326°15.5 52.2 15°07.7 28.2 212°37.7 54.1 299°43.8 12.9 143°03.79 341°15.3 51.3 172°40.6 24.4 227°26.5 540 314°46.1 12.9 15.1 26°37.7 12.5 16°33°42.9 11°47.7 40.4 202°46.5 28.9 245°29.3 ·· 54.0 329°48.4 ·· 12.8 44°50.7 12.7 16°30°42.9 11°47.7 40.4 202°46.5 28.9 25°52.1 540 344°50.7 12.7 536.1 10°71.1 - 60°0.4 202°46.5 28.9 25°52.1 540 344°50.7 12.7 536.1 10°71.1 - 60°0.4 202°46.5 28.9 25°52.1 540 344°50.7 12.7 536.1 10°71.1 - 60°0.4 202°46.5 28.9 25°52.5 13.9 26°50.3 56°13.8 46.5 247°55.4 29.5 302°40.5 53.9 25°5.7 12.5 53.9 25°5.2 12°22°2.5 540°2.2 29.3 287°37.7 N21°53.9 45°00.0 12.5 12.9 43.7 293°0.4 30.2 32°40.1 53.8 45°00.2 4 ·· 12.4 54°5.2 86°13.2 ·· 44.6 278°01.4 ·· 30.0 32°46.1 ·· 53.8 60°02.4 ·· 12.4 54°2.2 26°15.0 10°12.9 43.7 293°0.4 30.2 347°48.9 53.8 75°04.7 12.3 54°50.0 11°12.9 43.7 293°0.4 30.2 347°48.9 53.8 75°04.7 12.3 54°50.0 11°12.9 43.7 293°0.4 30.2 347°48.9 53.8 75°04.7 12.3 54°50.0 11°12.7 42.7 308°07.3 30.5 2°51.5 75.8 90°07.0 12.3 54°50.0 11°12.7 42.7 308°07.3 30.5 2°51.7 53.8 90°07.0 12.3 54°50.0 11°12.7 42.7 308°07.3 30.5 2°51.7 53.8 90°07.0 12.3 54°50.0 11°12.7 42.7 308°07.3 30.5 2°51.7 53.8 90°07.0 12.3 54°50.0 11°12.7 42.7 308°07.3 30.5 2°51.7 53.8 90°07.0 12.3 54°50.0 11°12.7 42.7 308°07.3 30.5 2°51.7 53.8 90°07.0 12.3 54°50.0 11°12.7 42.7 308°07.3 30.5 2°51.7 53.8 105°09.3 58°12.2 55°51.0 11°12.4 51°40.4 30.0 33°51.3 30.9 32°57.3 135°14.0 12.1 56°51.5 30.2 12.0 55°51.0 12°51.5 55°51.0 12°51.5 55°51.0 12°51.5 55°51.0 12°51.5 55°51.0 12°51.5 55°51.0 12°51.5 55°51.0 12°51.5 55°51.0 12°51.5 55°51.0 12°51.5 55°51.0 12°51.5 55°51.0 12°51.5 55°51.0 12°51.5 55°51.0 12°51.5 55°51.0 12°51.5 55°51.0 12°51.0 12°51.5 55°51.											Kochab	$137^{\circ}20.6$	74°02.9
13 285°35.5 5 326°15.5 52.2 157°37.7 28.2 212°23.7 54.1 299°43.8 12.9 1430°37.9 341°15.3 51.3 172°40.6 28.4 227°26.5 54.0 314°46.1 12.9 16 315°40.4 356°15.0 · 50.3 187°43.6 · 28.6 242°29.3 · 54.0 320°48.4 · 12.8 12°16.3 11°40.4 356°15.0 · 50.3 187°43.6 · 28.6 242°29.3 · 54.0 320°48.4 · 12.8 12°16.3 11°40.4 356°15.0 · 50.3 187°43.6 · 28.6 242°29.3 · 54.0 320°48.4 · 12.8 12°16.3 12°7 11°1.4 · 69°04.2 11°1.4 · 69°04.2 11°1.4 · 69°04.2 11°4.0 · 69											Zuben'ubi	136°56.3	-16°08.7
14 300°37.9 341°15.0 50.3 187°43.6 28.4 227°28.5 54.0 314°46.1 12.9 15.3 15°40.4 356°15.0 50.3 187°43.6 28.6 247°29.3 5.5 54.0 314°46.1 12.9 16.1 12.9 11°14.7 49.4 202°46.5 28.9 257°32.1 54.0 344°50.7 12.7 12.7 12.1 14.7 49.4 21°10.1 12.9 44.0 202°46.5 28.9 257°32.1 54.0 344°50.7 12.7 12.7 12.7 12.1 14.5 12.9 14.1 15°12.7 42.7 302°40.5 12.2 12.9 14.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12													
15 315*40.4 356*15.0 · · · 50.3 la7*43.6 · · · 28.6 242*29.3 · · · 54.0 349*48.4 · · 12.8 la 336*42.9 li 14.7 49.4 202*46.5 28.9 257*32.1 54.0 349*69.7 l. 27 5abik 100*20.2 - 15*6.3 li 10*0*20.2 - 1													
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18 0 47.8 41741 51745 229:55 102°293 287°37.7 N21°53.1 102°7.5 194.5 195.5 195.5 192°9.5 195.5 192°9.5 195.5								54.0					
18	17	345°45.3		48.4			272°34.9		359°53.1		1		
19				S17°47.5									
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12 271°32.1 311°09.0 \$17°30.2 143°46.2 \$N22°33.5 198°28.1 \$N21°53.4 285°37.2 \$S08°11.4 286°34.6 326°08.7 29.3 158°49.1 33.8 213°30.9 53.4 300°39.5 11.4 301°37.1 341°08.5 28.3 173°52.1 34.0 228°33.7 53.4 315°41.9 11.3 21.5 316°39.5 356°08.2 \$\cdot 27.3 188°55.1 \$\cdot 34.2 243°36.5 \$\cdot 53.3 330°44.2 \$\cdot 11.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.											1		
13													
14 301°37.1 341°08.5 28.3 173°52.1 34.0 228°33.7 53.4 315°41.9 11.3 15 316°39.5 356°08.2 ··· 27.3 188°55.1 ··· 34.2 243°36.5 ··· 53.3 330°44.2 ··· 11.2 16 331°42.0 11°07.9 26.4 203°58.1 34.5 258°39.3 53.3 345°46.5 11.2 17 346°44.5 26°07.7 25.4 219°01.1 34.7 273°42.1 53.3 0°48.8 11.1 18 1°46.9 41°07.4 \$17°24.4 234°04.1 N22°35.0 288°44.9 N21°53.2 15°51.1 \$08°11.0 16°49.4 56°07.1 23.5 249°07.2 35.2 303°47.7 53.2 30°53.5 11.0 20 31°51.9 71°06.9 22.5 264°10.2 35.4 318°50.5 53.2 45°55.8 10.9 21 46°54.3 86°06.6 ··· 21.5 279°13.2 ··· 35.7 333°53.3 ··· 53.2 60°58.1 ··· 10.8 22 61°56.8 101°06.3 20.6 294°16.2 35.9 348°56.1 53.1 76°00.4 10.8 23 60°59.3 116°06.1 19.6 309°19.2 36.1 3°58.9 53.1 91°02.7 10.7 Mars: 0.2													
15 316°39.5 356°08.2 ··· 27.3 188°55.1 ··· 34.2 243°36.5 ··· 53.3 330°44.2 ··· 11.2 11.2 11.2 11.2 11.2 11.2 11.											Saturn	14°10.1	17:00
16 331°42.0 11°07.9 26.4 203°58.1 34.5 258°39.3 53.3 345°46.5 11.2 Venus 40°09.8 15:15 17 346°44.5 26°07.7 25.4 219°01.1 34.7 273°42.1 53.3 0°48.8 11.1 18 1°46.9 41°07.4 \$17°24.4 234°04.1 N22°35.0 288°44.9 N21°53.2 15°51.1 \$08°11.0 19 16°49.4 56°07.1 23.5 249°07.2 35.2 303°47.7 53.2 30°53.5 11.0 20 31°51.9 71°06.9 22.5 264°10.2 35.4 318°50.5 53.2 45°55.8 10.9 21 46°54.3 86°06.6 · · · 21.5 279°13.2 · · · 35.7 333°53.3 · · · 53.2 60°58.1 · · 10.8 22 61°56.8 101°06.3 20.6 294°16.2 35.9 348°56.1 53.1 76°00.4 10.8 23 76°59.3 116°06.1 19.6 309°19.2 36.1 3°58.9 53.1 91°02.7 10.7 Mars: 0.2											Dec 22 Sun	SHA	Mer pass
17 346°44.5 26°07.7 25.4 219°01.1 34.7 273°42.1 53.3 0°48.8 11.1 Mars 232°07.7 02:27 18 1°46.9 41°07.4 \$17°24.4 234°04.1 \$N22°35.0 288°44.9 \$N21°53.2 15°51.1 \$08°11.0 \$ 19 16°49.4 56°07.1 23.5 249°07.2 35.2 303°47.7 53.2 30°53.5 11.0 \$ 20 31°51.9 71°06.9 22.5 264°10.2 35.4 318°50.5 53.2 45°55.8 10.9 \$ 21 46°54.3 86°06.6 · 21.5 279°13.2 · 35.7 333°53.3 · 53.2 60°58.1 · 10.8 \$ 22 61°56.8 101°06.3 20.6 294°16.2 35.9 348°56.1 53.1 76°00.4 10.8 \$ 23 76°59.3 116°06.1 19.6 309°19.2 36.1 3°58.9 53.1 91°02.7 10.7 Mars: 0.2													
18													
19 16°49.4 56°07.1 23.5 249°07.2 35.2 30°47.7 53.2 30°53.5 11.0 20 31°51.9 71°06.9 22.5 264°10.2 35.4 318°50.5 53.2 45°55.8 10.9 21 46°54.3 86°06.6 · 21.5 279°13.2 · 35.7 333°53.3 · 53.2 60°58.1 · 10.8 22 61°56.8 101°06.3 20.6 294°16.2 35.9 348°56.1 53.1 76°00.4 10.8 23 76°59.3 116°06.1 19.6 309°19.2 36.1 3°58.9 53.1 91°02.7 10.7  Mars: 0.2													
20 31°51.9 71°06.9 22.5 264°10.2 35.4 318°50.5 53.2 45°55.8 10.9 21 46°54.3 86°06.6 · · 21.5 279°13.2 · · 35.7 333°53.3 · · 53.2 60°58.1 · · 10.8 22 61°56.8 101°06.3 20.6 294°16.2 35.9 348°56.1 53.1 76°00.4 10.8 23 76°59.3 116°06.1 19.6 309°19.2 36.1 3°58.9 53.1 91°02.7 10.7 Mars: 0.2													
21       46°54.3       86°06.6       · · · 21.5       279°13.2       · · 35.7       333°53.3       · · 53.2       60°58.1       · · 10.8       Horizontal parallax         22       61°56.8       101°06.3       20.6       294°16.2       35.9       348°56.1       53.1       76°00.4       10.8       Venus:       0.2         23       76°59.3       116°06.1       19.6       309°19.2       36.1       3°58.9       53.1       91°02.7       10.7       Mars:       0.2											Saturn	14 00.8	10:57
22 61°56.8 101°06.3 20.6 294°16.2 35.9 348°56.1 53.1 76°00.4 10.8 Venus: 0.2 23 76°59.3 116°06.1 19.6 309°19.2 36.1 3°58.9 53.1 91°02.7 10.7 Mars: 0.2											Horizont	al parallax	
23 76°59.3 116°06.1 19.6 309°19.2 36.1 3°58.9 53.1 91°02.7 10.7 Mars: 0.2												-	0.2
25 10 333 110 031 1330 303 1332 3031 3 3031 31 0231 1031													
Mer.pass. 17:53 $\nu$ -0.3′ $d$ -1.0′ m-4.36 $\nu$ 3.0′ $d$ 0.2′ m-0.99 $\nu$ 2.8′ $d$ -0.0′ m-2.79 $\nu$ 2.3′ $d$ -0.1′ m1.02	23	10 39.3	110 00.1	19.0									
	Mer.p	bass. 17:53	$\nu$ -0.3′ d-1	0′ m-4.36	$\nu$ 3.0′ d0.	2′ m-0.99	$\nu$ 2.8′ d-0	.0′ m-2.79	$\nu$ 2.3′ d-0	.1′ m1.02			

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°36.8	\$23°25.8	299°44.5	13.8'	$N15^{\circ}38.0$	-12.8'	55.7'
1	195°36.5	25.9	314°17.2	13.9'	15°25.2	-12.9'	55.7'
2	210°36.2	25.9	328°50.1	14.0'	15°12.3	-12.9'	55.7'
3 4	225°35.9 240°35.6	· · 25.9 25.9	343°23.0 357°56.1	14.0' 14.1'	14°59.4 14°46.4	-13.0' -13.0'	55.6' 55.6'
5	255°35.2	26.0	12°29.2	14.2'	14°33.3	-13.1'	55.6'
6	270°34.9	\$23°26.0	27°02.4	14.3'	N14°20.2	-13.1'	55.6'
7	285°34.6	26.0	$41^{\circ}35.7$	14.4'	$14^{\circ}07.1$	-13.2'	55.5'
8	300°34.3	26.0	56°09.1	14.5'	13°53.9	-13.2'	55.5'
9 10	315°34.0 330°33.7	· · 26.1 26.1	70°42.6 85°16.2	14.6' 14.7'	13°40.7 13°27.5	-13.3' -13.3'	55.5' 55.4'
11	345°33.4	26.1	99°49.8	14.7'	13°14.2	-13.3'	55.4'
12	0°33.1	\$23°26.1	114°23.6	14.8'	N13°00.8	-13.4'	55.4'
13	15°32.8	26.1	128°57.4	14.9'	12°47.4	-13.4'	55.4'
14	30°32.5	26.1	143°31.3	15.0'	12°34.0	-13.5'	55.3'
15 16	45°32.2 60°31.8	· · 26.2 26.2	158°05.2 172°39.3	15.0' 15.1'	12°20.5 12°07.1	-13.5' -13.5'	55.3' 55.3'
17	75°31.5	26.2	187°13.4	15.2'	11°53.5	-13.6'	55.3'
18	90°31.2	\$23°26.2	201°47.6	15.3'	N11°40.0	-13.6'	55.2'
19	105°30.9	26.2	$216^{\circ}21.9$	15.3'	11°26.4	-13.6'	55.2'
20	120°30.6	26.2	230°56.2	15.4'	11°12.7	-13.7'	55.2'
21 22	135°30.3 150°30.0	· · 26.2 26.3	245°30.6 260°05.1	15.5' 15.6'	10°59.1 10°45.4	-13.7' -13.7'	55.2' 55.1'
23	165°29.7	26.3	274°39.7	15.6'	10°43.4	-13.7' -13.7'	55.1'
	SD = 16.2'	d = 0.0'			D = 15.2'		
	<u>JD = 10.2</u>	<u>u = 0.0</u>		JI	D = 13.2		
Sat	GHA	Dec	<b>GHA</b> 289°14.3	ν 15.7'	<b>Dec</b> N10°17.9	d 12.0'	HP
0 1	180°29.4 195°29.1	\$23°26.3 26.3	289°14.3 303°49.0	15.7' 15.7'	10°17.9 10°04.1	-13.8' -13.8'	55.1' 55.1'
2	210°28.7	26.3	318°23.7	15.8'	09°50.3	-13.8'	55.1
3	225°28.4	• • 26.3	$332^{\circ}58.6$	15.9'	09°36.5	-13.9'	55.0'
4	240°28.1	26.3	347°33.4	15.9'	09°22.7	-13.9'	55.0'
5 6	255°27.8 270°27.5	26.3 \$23°26.3	2°08.4 16°43.4	16.0' 16.1'	09°08.8 N08°54.9	-13.9' -13.9'	55.0' 55.0'
7	285°27.2	26.3	31°18.4	16.1	08°41.0	-13.9'	54.9'
8	300°26.9	26.3	45°53.5	16.2'	08°27.0	-14.0'	54.9'
9	315°26.6	• • 26.3	60°28.7	16.2'	$08^{\circ}13.1$	-14.0'	54.9'
10	330°26.3	26.3	75°03.9	16.3'	07°59.1	-14.0'	54.9'
11 12	345°25.9 0°25.6	26.3 \$23°26.3	89°39.2 104°14.5	16.3' 16.4'	07°45.1 N07°31.1	-14.0' -14.0'	54.9' 54.8'
13	15°25.3	26.3	118°49.9	16.4	07°17.1	-14.0'	54.8'
14	30°25.0	26.3	133°25.3	16.5'	07°03.0	-14.1'	54.8'
15	45°24.7	• • 26.3	148°00.8	16.5'	06°48.9	-14.1'	54.8'
16	60°24.4 75°24.1	26.3 26.3	162°36.3 177°11.9	16.6' 16.6'	06°34.9 06°20.8	-14.1' -14.1'	54.8' 54.7'
17 18	90°23.8	20.3 \$23°26.3	177 11.9 191°47.5	16.7	N06°06.7	-14.1	54.7'
19	105°23.5	26.3	206°23.1	16.7'	05°52.6	-14.1'	54.7'
20	120°23.2	26.3	220°58.8	16.7'	05°38.4	-14.1'	54.7'
21	135°22.8	• • 26.2	235°34.5	16.8'	05°24.3	-14.1'	54.7'
22 23	150°22.5 165°22.2	26.2 26.2	250°10.3 264°46.1	16.8' 16.8'	05°10.1 04°56.0	-14.2' -14.2'	54.6' 54.6'
23	SD = 16.3'	d = 0.0'	204 40.1		D = 15.0'	-14.2	34.0
		u = 0.0		31	D = 15.0		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0 1	180°21.9 195°21.6	\$23°26.2 26.2	279°22.0 293°57.8	16.9' 16.9'	N04°41.8 04°27.6	-14.2' -14.2'	54.6' 54.6'
2	210°21.3	26.2	293 57.6 308°33.8	16.9	04°27.0	-14.2'	54.6'
3	225°21.0	• • 26.2	323°09.7	17.0'	03°59.3	-14.2'	54.6'
4	240°20.7	26.2	337°45.7	17.0'	03°45.1	-14.2'	54.5'
5 6	255°20.4 270°20.0	26.1 \$23°26.1	352°21.7 6°57.7	17.0' 17.1'	03°30.9 N03°16.7	-14.2' -14.2'	54.5' 54.5'
7	270 20.0 285°19.7	26.1	0 57.7 21°33.8	17.1'	03°02.5	-14.2'	54.5'
8	300°19.4	26.1	36°09.9	17.1'	02°48.3	-14.2	54.5'
9	315°19.1	• • 26.1	50°46.0	17.1'	02°34.1	-14.2'	54.5'
10	330°18.8	26.1	65°22.2	17.2'	02°19.8	-14.2'	54.5'
11 12	345°18.5 0°18.2	26.0 \$23°26.0	79°58.3 94°34.5	17.2' 17.2'	02°05.6 N01°51.4	-14.2' -14.2'	54.4' 54.4'
13	15°17.9	26.0	94 34.5 109°10.7	17.2'	01°37.2	-14.2'	54.4'
14	30°17.6	26.0	$123^{\circ}46.9$	17.2'	01°23.0	-14.2'	54.4'
15	45°17.2	• • 25.9	138°23.2	17.3'	01°08.8	-14.2'	54.4'
16	60°16.9	25.9	152°59.4	17.3'	00°54.6	-14.2'	54.4'
17 18	75°16.6 90°16.3	25.9 \$23°25.9	167°35.7 182°12.0	17.3' 17.3'	00°40.4 N00°26.2	-14.2' -14.2'	54.4' 54.4'
19	105°16.0	25.8	196°48.3	17.3'	N00° 20.2 N00° 12.0	-14.2'	54.4
20	120°15.7	25.8	211°24.6	17.3'	S00°02.2	14.2'	54.3'
21	135°15.4	• • 25.8	226°00.9	17.3'	00°16.4	14.2'	54.3'
22 23	150°15.1 165°14.8	25.8	240°37.3 255°13.6	17.3' 17.3'	00°30.6 00°44.7	14.2'	54.3'
23		25.7	∠55 13.0			14.2'	54.3'
	SD = 16.3'	d = -0.0'		SI	D = 14.9'		

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

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

		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	77-59%		
20	02:27	02:12	11:58	04:09	16:30			
21	01:57	01:43	11:58	04:51	17:12			
22	01:28	01:13	11:59	05:31	17:51			

## December 23, 24, 25 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
	92°01.7	131°05.8	\$17° 18.6	324°22.2	N22°36.4	19°01.7	N21°53.1	106°05.1	S08°10.6			Dec
0								100 05.1 121°07.4		Alpheratz	357°34.8	29°13.9
1	107°04.2	146°05.5	17.7	339°25.2	36.6	34°04.5	53.0		10.6	Ankaa	353°07.1	-42°10.4
2	122°06.6	161°05.3	16.7	354°28.2	36.9	49°07.2	53.0	136°09.7	10.5	Schedar	349°31.0	56°40.7
3	137°09.1	176°05.0 191°04.8	• • 15.7	9°31.3	37.1	64°10.0	53.0	151°12.0	. 10.4	Diphda	348°47.3	-17°51.1
4	152°11.6		14.7	24°34.3	37.3	79°12.8	53.0	166°14.3	10.4	Achernar	335°20.0	-57°06.9
5 6	167°14.0 182°16.5	206°04.5 221°04.2	13.8 \$17°12.8	39°37.3 54°40.3	37.6 N22°37.8	94°15.6 109°18.4	52.9 N21°52.9	181°16.7 196°19.0	10.3 \$08°10.2	Hamal	$327^{\circ}51.1$	23°34.9
7	197°19.0	236° 04.2	11.8	69°43.3	38.1	109 10.4 124°21.2	52.9	211°21.3	10.2	Polaris	313°41.4	89°22.4
8	212°21.4	251°03.7	10.8	84°46.4	38.3	139°24.0	52.8	226°23.6	10.2	Acamar	$315^{\circ}11.5$	-40°12.4
9	212 21.4 227°23.9	266°03.5	• • 09.9	99°49.4	• • 38.5	154°26.8	• • 52.8	241°25.9	. 10.1	Menkar	314°06.0	4°11.3
10	242°26.4	281°03.2	08.9	114°52.4	38.8	169°29.6	52.8	256°28.3	10.0	Mirfak	308°27.9	49°57.2
11	257°28.8	296°03.0	07.9	129°55.4	39.0	184°32.4	52.8	271°30.6	09.9	Aldebaran	290°39.3	16° 33.6
12	272°31.3	311°02.7	\$17°06.9	144°58.5	N22°39.3	199°35.2	N21°52.7	286°32.9	S08°09.8	Rigel	281°03.6	-8°10.4
13	287°33.7	326°02.5	06.0	160°01.5	39.5	214°38.0	52.7	301°35.2	09.8	Capella	280°21.5	46°01.4
14	302°36.2	341°02.2	05.0	175°04.5	39.8	229°40.8	52.7	316°37.5	09.7	Bellatrix	278°22.6	6°22.4
15	317°38.7	356°02.0	• • 04.0	190°07.6	• • 40.0	244°43.6	• • 52.6	331°39.9	• • 09.6	Elnath	278°01.5	28°37.7
16	$332^{\circ}41.1$	11°01.7	03.0	205°10.6	40.2	259°46.4	52.6	346°42.2	09.6	Alnilam	275°37.4	-1°11.1 7°24.7
17	347°43.6	26°01.5	02.0	220°13.6	40.5	274°49.2	52.6	1°44.5	09.5	Betelgeuse	270°51.8	
18	2°46.1	41°01.2	S17°01.1	235°16.7	N22°40.7	289°52.0	N21°52.6	16°46.8	S08°09.4	Canopus Sirius	263°51.8 258°25.9	-52°42.5 -16°45.0
19	17°48.5	56°01.0	$17^{\circ}00.1$	250°19.7	41.0	304°54.8	52.5	$31^{\circ}49.1$	09.4	Adhara	255°05.5	-10 45.0 -29°00.3
20	32°51.0	71°00.7	$16^{\circ}59.1$	265°22.8	41.2	319°57.6	52.5	46°51.4	09.3	Procyon	244°50.6	5°09.7
21	47°53.5	86°00.5	• • 58.1	280°25.8	• • 41.5	335°00.4	• • 52.5	61°53.8	•• 09.2	Pollux	243°17.0	27°57.9
22	62°55.9	101°00.2	57.1	295°28.9	41.7	350°03.1	52.4	76°56.1	09.2	Avior	234°14.2	-59°35.1
23	77°58.4	116°00.0	56.1	310°31.9	42.0	5°05.9	52.4	91°58.4	09.1	Suhail	222°46.0	-43°31.8
Mern	ass. 17:49	v-0 3' d-1	.0′ m-4.37	v3 0' d0	2′ m-1.01	v2 8′ d₌0	.0′ m-2.78	ν2.3′ d-0	1' m1 03	Miaplacidus	221°37.6	-69°48.9
- IVICI.P	ass. 17.45	ν-0.5 α-1	.0 111-4.57	ν 5.0 do.	2 111-1.01	ν2.0 u-0	.0 111-2.70	ν2.5 u-0	.1 1111.05	Alphard	217°47.6	-8°46.0
										Regulus	207°34.3	11°50.7
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.8	61°36.7
0	93°00.9	130°59.7	S16°55.1	325°35.0	N22°42.2	20°08.7	N21°52.4	107°00.7	S08°09.0	Denebola	182°25.0	14°25.9
1	108°03.3	145°59.5	54.2	340°38.0	42.4	35°11.5	52.4	122°03.0	09.0	Gienah	175°43.6	-17°40.7
2	123°05.8	160°59.3	53.2	355°41.1	42.7	50°14.3	52.3	137°05.4	08.9		173°00.2	-63°13.9
3	138°08.2	175°59.0	• • 52.2	10°44.1	• • 42.9	65°17.1	• • 52.3	152°07.7	• • 08.8	Gacrux	171°51.8	-57° 14.9
4	153°10.7	190°58.8	51.2	25°47.2	43.2	80°19.9	52.3	167°10.0	8.80	Alioth	166°13.1	55°49.2
5	168°13.2	205°58.6	50.2	40°50.2	43.4	95°22.7	52.2	182°12.3	08.7	Spica	158°22.5	-11° 17.4
6	183°15.6	220°58.3	S16°49.2	55°53.3	N22°43.7	110°25.5	N21°52.2	197°14.6	S08°08.6	Alkaid	152°52.2	49°11.1
7	198°18.1	235°58.1	48.2	70°56.3	43.9	125°28.3	52.2	212°16.9	08.6	Hadar	148°36.4	-60°29.3
8	213°20.6	250°57.8	47.2	85°59.4	44.2	140°31.1	52.2	227°19.2	08.5	Menkent	147°57.9	-36° 29.4
9	228°23.0	265°57.6	• • 46.2	101°02.5	• • 44.4	155°33.9	52.1	242°21.6	• • 08.4	Arcturus	145°48.1	19°03.0
10	243°25.5	280°57.4	45.3	116°05.5	44.7	170°36.7	52.1	257°23.9	08.4	Rigil Kent.	139°40.8	-60°56.1
11	258°28.0	295°57.1	44.3	131°08.6	44.9	185°39.4	52.1	272°26.2	08.3	Kochab	137°20.6	74°02.8
12	273°30.4	310°56.9	\$16°43.3	146°11.7	N22°45.2	200°42.2	N21°52.0	287°28.5	S08°08.2	Zuben'ubi	136°56.3	-16°08.7
13	288°32.9 303°35.4	325°56.7	42.3	161°14.7	45.4 45.7	215°45.0 230°47.8	52.0	302°30.8 317°33.1	08.1	Alphecca	126°04.1	26° 37.7
14	318°37.8	340°56.5	41.3 •• 40.3	176°17.8 191°20.9	45.7	245°50.6	52.0	332°35.5	08.1	Antares	$112^{\circ}16.2$	-26°29.2
15 16	318 37.8 333°40.3	355°56.2 10°56.0	39.3	206°23.9	•• 45.9 46.2	245 50.6 260°53.4	· · 52.0 51.9	332 35.5 347°37.8	· · 08.0 07.9	Atria	$107^{\circ}11.1$	-69°04.2
17	348°42.7	25° 55.8	38.3	200°23.9 221°27.0	46.4	275°56.2	51.9	2°40.1	07.9	Sabik	102°03.2	-15°45.3
18	3°45.2	40° 55.5	\$16° 37.3	236°30.1	N22°46.7	290°59.0	N21°51.9	17°42.4	S08°07.8	Shaula	96°10.9	-37°07.3
19	18°47.7	55° 55.3	36.3	251°33.2	46.9	306°01.8	51.8	32°44.7	07.7	Rasalhague	95°58.9	12°32.5
20	33°50.1	70°55.1	35.3	266°36.2	47.2	321°04.5	51.8	47°47.0	07.7	Eltanin	90°42.8	51°29.0
21	48°52.6	85°54.9	34.3	281°39.3	• • 47.4	336°07.3	• • 51.8	62°49.3	• • 07.6	Kaus Aust.	83°33.0	-34°22.4
22	63°55.1	100°54.7	33.3	296°42.4	47.7	351°10.1	51.8	77°51.7	07.5	Vega	80°33.7	38°48.4
23	78°57.5	115°54.4	32.3	311°45.5	47.9	6°12.9	51.7	92°54.0	07.5	Nunki	75°48.2	-26°16.0
										Altair	62°00.3	8°56.0
Mer.p	ass. 17:45	$\nu$ -0.2′ d-1	.0′ m-4.38	$\nu 3.1' d0.$	2′ m-1.03	$\nu$ 2.8′ d-0	.0′ m-2.78	$\nu 2.3' \ d-0$	.1′ m1.03	Peacock	53°06.3	-56°39.4 45°22.3
										Deneb Enif	49°26.2 33°39.0	45 22.3 9°59.4
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.2	-46° 50.6
0	94°00.0	130°54.2	<b>S</b> 16°31.3	326°48.6	N22°48.2	21°15.7	N21°51.7	107°56.3	508°07.4	Fomalhaut	15°14.7	-40° 30.0° -29° 29.6
1	$109^{\circ}02.5$	145°54.0	30.3	341°51.7	48.4	36°18.5	51.7	122°58.6	07.3	Scheat	13°45.4	28° 13.2
2	$124^{\circ}04.9$	160°53.8	29.3	356°54.7	48.7	51°21.3	51.6	138°00.9	07.3	Markab	13°30.0	15° 20.4
3	139°07.4	175°53.6	• • 28.3	11°57.8	• • 48.9	66°24.1	•• 51.6	153°03.2	• • 07.2	manas	10 00.0	10 20.1
4	154°09.8	190°53.3	27.3	27°00.9	49.2	81°26.9	51.6	168°05.5	07.1	Dec 23 Mon	SHA	Mer.pass
5	$169^{\circ}12.3$	205°53.1	26.3	42°04.0	49.4	96°29.6	51.6	183°07.8	07.0	Venus	39°04.1	15:16
6	184°14.8	220°52.9	S16°25.3	57°07.1	N22°49.7	111°32.4	N21°51.5	198°10.2	S08°07.0		232°20.5	02:22
7	199°17.2	235°52.7	24.3	72°10.2	49.9	126°35.2	51.5	213°12.5	06.9	Jupiter	286°59.9	22:40
8	214°19.7	250°52.5	23.3	87°13.3	50.2	141°38.0	51.5	228°14.8	06.8	Saturn	14°03.4	16:53
9	229°22.2	265°52.3	• • 22.3	102°16.4	• • 50.4	156°40.8	• • 51.5	243°17.1	• • 06.8	Dec 24 Tue	SHA	Mer.pass
10	244°24.6	280°52.1	21.2	117°19.5	50.7	171°43.6	51.4	258°19.4	06.7	Venus	37°58.9	15:16
11	259°27.1	295°51.9	20.2	132°22.6	50.9	186°46.4	51.4	273°21.7	06.6		232°34.1	02:17
12	274°29.6	310°51.6	\$16° 19.2	147°25.7	N22°51.2	201°49.1	N21°51.4	288°24.0	S08°06.6	Jupiter	287°07.9	22:35
13	289°32.0	325°51.4	18.2	162°28.8	51.4	216°51.9	51.3	303°26.3	06.5	Saturn	13°59.9	16:49
14	304°34.5	340°51.2	17.2	177°31.9	51.7	231°54.7	51.3	318°28.7	06.4			
15 16	319°37.0	355°51.0	· · 16.2	192°35.0	• • 52.0	246°57.5	51.3	333°31.0	06.3	Dec 25 Wed	SHA	Mer.pass
16 17	334°39.4	10°50.8	15.2	207°38.1	52.2	262°00.3	51.3	348°33.3	06.3	Venus	36°54.2	15:17
17 18	349°41.9 4°44.3	25°50.6 40°50.4	14.2 \$16°13.2	222°41.2 237°44.3	52.5 N22°52.7	277°03.1 292°05.9	51.2 N21°51.2	3°35.6 18°37.9	06.2 \$08°06.1	Mars		02:12
18	4 44.3 19°46.8	40 50.4 55° 50.2	12.2	252°47.4	53.0	307°08.6	N21 51.2 51.2	33°40.2	06.1		287°15.7	22:31
20	34°49.3	70° 50.2	11.1	267°50.6	53.0	307 06.0 322°11.4	51.2	48°42.5	06.1	Saturn	13°56.3	16:46
21	49°51.7	85° 49.8	•• 10.1	282°53.7	• • 53.5	337°14.2	51.1	63°44.8	05.9	Horizont	al parallax	
22	64°54.2	100°49.6	09.1	202 55.7 297°56.8	53.7	352°17.0	51.1	78°47.1	05.9		Venus:	0.2
23	79°56.7	115°49.4	08.1	312°59.9	54.0	7°19.8	51.1	93°49.5	05.8		Mars:	0.2
Mer.p	ass. 17:41	$\nu$ -0.2' d-1	.0′ m-4.38	$\nu$ 3.1′ $d$ 0.	3′ m-1.06	$\nu$ 2.8′ <b>d</b> -0	.0′ m-2.77	$\nu 2.3' \ d-0$	.ı′ m1.03			

h	Su	Moon					
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°14.4	\$23°25.7	269°49.9	17.4'	S00°58.9	14.2'	54.3'
1 2	195°14.1 210°13.8	25.7 25.6	284°26.3 299°02.7	17.4' 17.4'	01°13.1 01°27.2	14.1' 14.1'	54.3' 54.3'
3	225°13.5	25.6	313°39.0	17.4	01°41.3	14.1	54.3'
4	240°13.2	25.6	$328^{\circ}15.4$	17.4'	01°55.5	14.1'	54.3'
5	255°12.9	25.5	342°51.7	17.4'	02°09.6	14.1'	54.3'
6 7	270°12.6 285°12.3	\$23°25.5 25.5	357°28.1 12°04.5	17.4' 17.4'	\$02°23.7 02°37.8	14.1' 14.1'	54.2' 54.2'
8	300°12.0	25.4	26°40.8	17.4	02°51.9	14.1	54.2'
9	315°11.7	• • 25.4	41°17.2	17.3'	03°05.9	14.1'	54.2'
10	330°11.3	25.3	55°53.5	17.3'	03°20.0 03°34.0	14.0'	54.2'
11 12	345°11.0 0°10.7	25.3 \$23°25.3	70°29.9 85°06.2	17.3' 17.3'	03°34.0 S03°48.0	14.0' 14.0'	54.2' 54.2'
13	15°10.4	25.2	99°42.5	17.3	04°02.0	14.0'	54.2'
14	30°10.1	25.2	$114^{\circ}18.8$	17.3'	04°16.0	14.0'	54.2'
15	45°09.8	. 25.1	128°55.1	17.3'	04°30.0	14.0'	54.2'
16 17	60°09.5 75°09.2	25.1 25.0	143°31.4 158°07.7	17.3' 17.3'	04°43.9 04°57.9	13.9' 13.9'	54.2' 54.2'
18	90°08.9	\$23°25.0	172°44.0	17.2'	S05°11.8	13.9'	54.2'
19	105°08.5	25.0	187°20.2	17.2'	05°25.7	13.9'	54.2'
20	120°08.2	24.9	201°56.4	17.2'	05°39.6 05°53.4	13.9'	54.2'
21 22	135°07.9 150°07.6	· · 24.9 24.8	216°32.6 231°08.8	17.2' 17.2'	05°53.4 06°07.3	13.8' 13.8'	54.2' 54.2'
23	165°07.3	24.8	245°45.0	17.1'	06°21.1	13.8'	54.2'
	SD = 16.3'	d = -0.0'		SI	0 = 14.8'		
Tue	GHA	Dec	GHA	ν 17.1'	Dec	d 12.0'	HP
0 1	180°07.0 195°06.7	\$23°24.7 24.7	260°21.1 274°57.3	17.1' 17.1'	506°34.9 06°48.6	13.8' 13.7'	54.2' 54.2'
2	210°06.4	24.7	289°33.4	17.1	00°48.0	13.7'	54.2'
3	225°06.1	• • 24.5	$304^{\circ}09.4$	17.0'	$07^{\circ}16.1$	13.7'	54.2'
4	240°05.7	24.5	318°45.5	17.0'	07°29.8 07°43.4	13.7'	54.2'
5 6	255°05.4 270°05.1	24.4 \$23°24.4	333°21.5 347°57.5	17.0' 17.0'	507°57.1	13.6' 13.6'	54.1' 54.1'
7	285°04.8	24.3	2°33.4	16.9'	08°10.7	13.6'	54.1'
8	300°04.5	24.3	17°09.4	16.9'	08°24.2	13.6'	54.1'
9	315°04.2	• • 24.2	31°45.3 46°21.1	16.9'	08°37.8 08°51.3	13.5'	54.1'
10 11	330°03.9 345°03.6	24.2 24.1	46°21.1 60°57.0	16.8' 16.8'	08°51.3	13.5' 13.5'	54.1' 54.2'
12	0°03.3	\$23°24.0	75°32.7	16.8'	S09°18.3	13.4	54.2'
13	15°03.0	24.0	90°08.5	16.7'	09°31.7	13.4'	54.2'
14 15	30°02.6 45°02.3	23.9 •• 23.8	104°44.2 119°19.9	16.7' 16.6'	09°45.1 09°58.4	13.4' 13.3'	54.2' 54.2'
16	60°02.0	23.8	119 19.9 133°55.5	16.6'	10° 11.8	13.3'	54.2'
17	75°01.7	23.7	148°31.1	16.6'	$10^{\circ}25.1$	13.3'	54.2'
18	90°01.4	\$23°23.7	163°06.7	16.5'	\$10°38.3	13.2'	54.2'
19 20	105°01.1 120°00.8	23.6 23.5	177°42.2 192°17.6	16.5' 16.4'	10°51.5 11°04.7	13.2'	54.2' 54.2'
21	135°00.5	23.5	206°53.1	16.4	11°17.9	13.1	54.2'
22	150°00.2	23.4	221°28.4	16.3'	11°31.0	13.1'	54.2'
23	164°59.8	23.3	236°03.8	16.3'	11°44.1	13.0'	54.2'
	SD = 16.3'	d = -0.1'		SE	0 = 14.8'		
Wed	GHA	Dec	GHA	ν	Dec	d	НР
0	179°59.5	\$23°23.2	250°39.0	16.2'	S11°57.1	13.0'	54.2'
1	194°59.2	23.2	265°14.3	16.2'	12°10.1	12.9'	54.2'
2 3	209°58.9 224°58.6	23.1 23.0	279°49.4 294°24.5	16.1' 16.1'	12°23.0 12°35.9	12.9' 12.9'	54.2' 54.2'
3 4	239°58.3	23.0	294 24.5 308°59.6	16.1	12 35.9 12°48.8	12.8'	54.2'
5	254°58.0	22.9	323°34.6	16.0'	13°01.6	12.8'	54.2'
6	269°57.7	\$23°22.8	338°09.6	15.9'	\$13°14.4	12.7'	54.2'
7 8	284°57.4 299°57.1	22.7 22.6	352°44.5 7°19.3	15.8' 15.8'	13°27.1 13°39.8	12.7' 12.6'	54.2' 54.2'
9	314°56.7	• • 22.6	21°54.1	15.7'	13°52.4	12.6'	54.2'
10	329°56.4	22.5	36°28.8	15.7'	14°05.0	12.5'	54.3'
11 12	344°56.1 359°55.8	22.4 \$23°22.3	51°03.5 65°38.1	15.6' 15.5'	14°17.6 \$14°30.0	12.5' 12.4'	54.3' 54.3'
13	359 55.8 14°55.5	22.3	80°12.6	15.5'	14°42.5	12.4'	54.3'
14	29°55.2	22.2	94°47.1	15.4'	14°54.9	12.3'	54.3'
15	44°54.9	• • 22.1	109°21.5	15.3'	15°07.2	12.3'	54.3'
16 17	59°54.6 74°54.3	22.0 21.9	123°55.8 138°30.1	15.3' 15.2'	15°19.5 15°31.7	12.2' 12.2'	54.3' 54.3'
18	89°54.0	\$23°21.8	150° 04.3	15.1'	\$15°43.9	12.1	54.3'
19	104°53.7	21.8	167°38.5	15.1'	15°56.0	12.1'	54.3'
20	119°53.3	21.7	182°12.5	15.0'	16°08.1	12.0'	54.3'
21 22	134°53.0 149°52.7	· · 21.6 21.5	196°46.5 211°20.5	14.9' 14.9'	16°20.1 16°32.0	11.9' 11.9'	54.3' 54.4'
23	164°52.4	21.4	225°54.3	14.8'	16°43.9	11.8'	54.4'
	SD = 16.3'	d = -0.1'		SE	0 = 14.8'		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Mer.Pass.		
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	22-24	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	49-31%	
23	00:58	00:43	11:59	06:10	18:30		
24	00:28	00:13	12:00	06:49	19:09		
25	00:02	00:17	12:00	07:30	19:51		

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

The   CHA   Dec	h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
1	Thu -	CHA	CHV	Doc	CHV.	Doc	CHV	Doc	CHV	Doc		SHV	Doc
1 110710   105-420   105   385-051   445   377-253   115   1275-51   100   275-51   355-00													Dec
2   100											Alpheratz	357°34.8	29° 13.9
1   150											Ankaa	353°07.2	-42°10.4
Section   190"											Schedar	349°31.0	56° 40.7
5											Diphda	348°47.3	-17°51.1
Bell   18   18   18   18   18   18   18											Achernar	335°20.0	-57°06.9
7 00°16.6 295°18 10°000 777°19'9 50 127°420 508 224°07'8 052 Charles 15°42.8 30°47'8 10°500 47113 10°500 10°512 10											Hamal	$327^{\circ}51.1$	23°34.9
18   125   126   205   175   105											Polaris	313°42.3	89°22.4
29 22°21.3   208°47.5   579   109°31.2   596   137°47.6   598   248°12.6   591   49 60.5   11 00°20.2   209°47.1   515 59   115°33   588   127°47.6   598   299°14.9   505   12 00°20.2   209°47.1   515 59   115°33   588   127°47.0   597   297°47.7   13 00°20.2   209°47.1   515 59   115°33   588   127°47.1   50°72.2   50°7   50°7   27°47.7   14 00°31.6   230°46.5   518   137°46.8   574   76   21°70.1   50°8   20°70.1   50°8   50°7   20°70.1   15 320°31.5   340°46.5   518   315°46   574   23°10.1   50.6   310°24.1   047   50°8   17 30°40.1   50°40.2   50°40.1   50°8   50											Acamar	$315^{\circ}11.5$	-40° 12.4
10   266*728   266*743   500   186*343   571   187*34   571   187*32   507   274*172   506*104   506.											Menkar	314°06.0	4°11.3
19 26 26 26 26 27 10 1 40 2											Mirfak	308°27.9	49° 57.2
21   2075   22   30   46   315   54   30   42   42   57   30   42   50   30   42   16   47   47   47   47   47   47   47   4											Aldebaran	290°39.3	16°33.6
19											Rigel	281°03.6	-8° 10.4
164 089*336 30 36*465 52.8 178*486 52.8 178*486 52.8 178*486 52.8 178*486 52.8 178*486 52.8 178*486 52.8 178*486 52.8 178*486 52.8 178*486 52.8 178*486 52.8 178*486 52.8 178*486 52.8 178*486 52.8 178*486 52.8 178*486 52.8 178*48 52.8											Capella	280°21.5	46°01.4
15 330"361 36 13"642 3.0 13.0 12"61 35"361 36"37.0 10.0 12"17"5.0 12"17"18" 130"31.0 12"17"18" 130"31.0 12"18"											Bellatrix	278°22.6	6°22.4
395*386 0 407.0 22*46.0 407. 22*563 56.0 26*37.1 50.0 49*31.0 04.5 55.0 49*31.0 04.5											Elnath	278°01.5	28°37.7
18   18   18   18   18   18   18   18											Alnilam	275°37.4	$-1^{\circ}11.1$
19   20   45.9   55   45.6   47.7   25   25   49.4   102   82.5											Betelgeuse	270°51.8	7°24.7
20   30° 48.4   70° 48.6   477   284° 02.6   59.1   308° 15.4   59.5   34° 35.6   0.4											Canopus	263°51.8	-52° 42.5
20											Sirius	258°25.9	-16°45.0
21   50°599   83°48.53   1.46   296°120   22°599   383°237   100°46.5   50.4   97°44.6   0.42   50°42   22°40.0   43°43.0   314°15.2   22°40.0   83°46.5   50.4   94°44.9   0.41   50°40.1   50°40											Adhara	255°05.5	-29°00.3
23 80*58.3   115*44   43.6   31*16*52   32*00.2   8*26.5   50.4   9*44.9   0.4.1											Procyon	244°50.5	5°09.6
Mor. pass. 17:37											Pollux	243°17.0	27° 57.9
Fri   GHA   CHA   Dec   GHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA											Avior	234°14.2	-59°35.2
Fri GHA  GHA  GHA  GPA  GHA  Dec  GH	23	80 55.8	115-44.9	43.0	314 15.2	23-00.2	8-26.5	50.4	94-44.9	04.1	Suhail	222°46.0	-43°31.8
Fri GHA  GHA  GHA  GPA  GHA  Dec  GH	Mer.p	ass. 17:37	$\nu$ -0.2' d-1	0′ m-4.39	$\nu$ 3.1′ d0.	3′ m-1.08	$\nu$ 2.8′ d-0	.0′ m-2.77	$\nu$ 2.3′ d-0	.1′ m1.04			-69°48.9
Fig. 6HA											Alphard		-8°46.0
0 95°58.3 130°44.7 \$15°42.5 32°18.3 N23°00.4 23°29.3 N21°50.4 100°47.2 \$98°04.0 110°10.7 145°44.6 415.3 34°21.5 00.7 36°32.1 50.3 130°51.8 0.39	<b>-</b> ·	CIIA	CIIA	ъ.	CIIA	Б	CILA	Б	CIIA		Regulus	207°34.3	11°50.6
1 111°00,7 146°44.6 4 40.5 346°21.5 00.7 36°32.1 50.3 124°49.5 03.9 124°49.5 03.9 124°49.5 139°51.8 03.9 124°49.5 130°51.8 03.9 139°51.8 03.9 139°51.8 03.9 139°51.8 03.9 139°51.8 03.9 139°51.8 03.9 139°51.8 03.9 139°51.8 03.9 139°51.8 03.9 139°51.8 03.9 130°51.8 03.0 130°51.8 130°51.8 03.0 130°51.8 130°51.8 03.0 130°51.8 130°51.8 03.0 130°51.8 130°51.8 03.0 130°51.8 130°51.8 03.0 130°51.8 130°51.8 03.0 130°51.8 130°51.8 03.0 130°51.8 130°51.8 03.7 130°51.8 1											Dubhe	193°40.8	61°36.7
2 126°03.2 100°44.4 00.5 359°24.6 01.0 55°34.9 50.3 139°51.8 03.9 3.19°51.8 03.9 131°41.7 103.8											Denebola	182°24.9	14°25.8
141°05.7   175°44.2   39.4   14°27.8   0.1.2   66°37.6   50.3   154°54.1   0.38   4   156°68.1   190°40.4   38.4   20°30.9   0.15   83°40.4   50.3   169°56.4   0.37   5   171°10.6   26°43.9   37.4   44°34.1   0.18   98°43.2   50.2   184°58.7   0.37   6   186°13.1   220°43.7   S15°36.3   55°37.3   N23°30.2   113°46.0   N21°50.2   20°01.0   50°03.6   8   216°18.0   250°43.3   34.3   34.3   38°43.6   0.25   143°51.5   50.2   221°03.3   0.35   8   216°18.0   250°43.3   34.3   38°43.6   0.25   143°51.5   50.2   221°05.6   0.34   9   231°20.4   26°43.2   33.2   104°46.7   0.28   158°54.3   50.1   245°07.9   0.34   10   246°22.9   260°43.0   32.2   118°49.9   0.31   173°57.1   50.1   265°07.9   0.34   11   261°25.4   256°42.8   31.2   134°53.1   0.33   188°59.9   50.1   275°12.5   0.32   12   276°27.8   310°42.7   S15°30.1   149°6.3   N23°30.6   200°0.2   N21°50.0   305°17.1   0.31   14   306°32.8   306°42.4   28.1   180°02.6   0.41   234°08.2   50.0   305°17.1   0.31   14   306°32.8   306°42.4   28.1   180°02.6   0.41   234°08.2   50.0   305°17.1   0.31   14   306°32.8   306°42.4   28.1   180°02.6   0.41   234°08.2   50.0   305°17.1   0.31   15   36°40.2   56°41.9   2.9   255°12.1   0.49   279°16.5   49.9   35°02.4   0.29   15   321°35.7   35°42.2   270   195°05.8   0.44   249°11.0   0.50   335°21.8   0.29   16   346°37.7   10°42.0   260   210°08.9   0.46   264°13.7   49.9   35°02.4   0.29   17   351°40.2   360°40.5   1.3											Gienah	175°43.6	-17°40.7
156'08.1   190'440   38.4   29'30.9   0.15   83'40.4   50.3   169'56.4   0.37											Acrux	173°00.2	
5   171°10.6   206°43.9   37.4   44°34.1   0.18   99°43.2   50.2   184°86.7   0.37   0.00°63.6   5.0											Gacrux	171°51.7	-57° 14.9
186°13.1   220°43.7   315°46.3   59°37.3   N23°02.0   113°46.0   N21°50.2   200°10.1   508°03.6   5344   1446											Alioth	$166^{\circ}13.1$	55°49.2
8 216°18.0 250°43.3 3 34.3 89°43.6 0.25 143°51.5 50.2 215°03.3 0.5.   9 231°20.4 266°43.2 33.2 104°46.7 0.28 158°54.3 50.1 245°07.9 0.34   10 246°22.9 280°43.0 32.2 119°49.9 0.31 173°57.1 50.1 265°10.9 0.33   11 261°25.4 298°42.8 31.2 134°53.1 0.33 188°99.9 50.1 275°12.5 0.32   12 276°78 310°42.7 515°30.1 149°56.3 0.32°3.6 204°02.6 N21°50.0 290°14.8 0.80°03.1   13 291°30.3 325°42.5 29.1 164°59.4 0.38 219°05.4 50.0 305°17.1 0.31   14 306°32.8 340°42.4 281 180°02.6 0.41 234°08.2 50.0 305°17.1 0.31   15 321°35.2 8 340°42.4 281 180°02.6 0.41 234°08.2 50.0 305°17.1 0.31   16 336°37.7 10°42.0 26.0 210°08.9 0.46 264°13.7 49.9 35°24.8 0.0.   16 336°37.7 10°42.0 26.0 210°08.9 0.46 264°13.7 49.9 35°24.8 0.0.   18 6°42.6 40°41.7 515°33.9 240°153. 380°36.2 240°93. 381°30.2 25°41.9 2.9 225°12.1 0.49 276°16.5 49.9 5°26.4 0.28   18 6°42.6 40°41.7 515°33.9 240°153. 380°36.2 240°49.3 381°24.8 0.02 0.0   19 21°45.1 55°41.6 22.9 255°18.5 0.54 300°22.1 49.9 35°31.0 0.6   20 36°46.7 6 70°41.4 21.8 22.9 255°18.5 0.54 300°22.1 49.9 35°31.0 0.6   20 36°47.6 70°41.4 21.8 227°21.7 0.57 324°48.4 98 50°33.3 0.40 6   22 26°55.5 100°41.1 19.7 300°28.0 0.62 254°30.4 49.8 60°33.6 0.02.5   10 96°57.4 130°40.8 515°17.7 300°28.0 0.62 254°30.4 49.8 60°33.6 0.02.5   1111°99.9 148°40.6 15.6 345°37.0 49.8 60°33.1 49.8 80°33.0 40.4 880°33.9 40.4 40.8 80°33.3 38°46.4   1116°40.9 115°40.9 18.7 30°38.4 0.60 333°87.6 0.0 4.9 8 60°35.6 0.0 5.5   1111°99.9 148°40.6 15.6 345°37.6 0.0 0.2 54°40.2 0.0 3 81°54.0 115°40.2 0.0 38°34.1 49.8 0.0 338°34.1 49.8 0.0 338°34.1 49.8 0.0 338°34.1 49.8 0.0 0.9 60°40.2 54°40.2 0.0 3 81°41.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0											Spica	158°22.4	-11° 17.5
8 216°18.0 250°43.3 34.3 89°43.6 0.2.5 143°51.5 50.2 230°05.6 0.3.4 Markett 147°57.9 38°20.3 10 246°02.9 280°43.0 32.2 119°49.9 0.31 173°57.1 50.1 245°07.0 30.3 4 Arcturus 145°24.3 11 26°12.6 4 295°42.8 31.2 134°53.1 0.3.3 188°9.9 50.1 275°12.6 0.3.2 (Kochab 170°5.1 245°07.3 1.2 0.3.2 12 276°27.8 310°42.7 515°30.1 149°5.3 N.23°03.6 204°02.6 N.21°50.0 200°14.8 508°03.1 1.3 0.3 1.3 188°9.9 50.1 275°12.0 0.3.2 1.3 1.3 0.3 1.3 1.3 1.3 0.3 1.3 1.3 1.3 0.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1											Alkaid	152°52.2	49°11.0
9 231°20.4 265°43.2											Hadar	148°36.4	-60°29.3
10 246*22.9 280*43.0 32.2 119*49.9 03.1 173*67.1 50.1 260*10.2 03.3   Arcture 149*49.1 19.05.0   126*24. 295*28.3 10*42.7 \$15*20.1 149*56.3 \$123*03.6 \$204*02.6 \$12.1*50.0 290*14.8 \$08*03.1   Arcture 149*56.3 \$123*03.6 \$204*02.6 \$12.1*50.0 290*14.8 \$08*03.1   Arcture 149*56.3 \$123*03.6 \$204*02.6 \$12.1*50.0 290*14.8 \$08*03.1   Arcture 149*56.3 \$123*03.6 \$204*02.6 \$12.1*50.0 290*14.8 \$08*03.1   Arcture 149*56.3 \$123*03.6 \$204*02.6 \$10.0 290*14.8 \$08*03.1   Arcture 149*56.3 \$123*03.6 \$204*02.6 \$10.0 290*14.8 \$10.0 0.9   Arcture 149*56.3											Menkent	147°57.9	-36°29.4
11 261 25.4 295 42.8 31.2 13.4 53.1 03.3 188 59.9 50.1 275 12.5 03.2 Noglither 1.59 40.6 -00 96.7 12.7 12.7 12.7 12.7 12.7 12.7 12.7 12											Arcturus	145°48.1	19°03.0
12 276*27.8 310*42.7 \$15*30.1 149*56.3 N23*03.6 204*02.6 N21*90.0 290*14.8 \$08*03.1 2.0ben'ubi 15*63.3 1.60*03.1 14*306*32.8 340*42.2 \$1.1 180*02.6 0.41 234*08.2 \$5.00 350*19.4 03.0 Alphecta 126*04.1 26*37.1 03.1 4306*32.8 340*42.2 \$2.7.0 195*05.8 \$0.44 249*11.0 \$1.50*0.0 335*21.8 \$0.0.9 Alphecta 126*04.1 26*37.1 13.1 14*306*32.8 \$340*32.2 \$2.2.7.0 195*05.8 \$0.44 249*11.0 \$1.50*0.0 335*21.8 \$0.0.9 Alphecta 126*04.1 26*37.1 13.1 14*306*33.2 \$35*42.2 \$2.7.0 195*05.8 \$0.44 249*11.0 \$1.50*0.0 335*21.8 \$0.0.9 Alphecta 126*04.1 26*37.1 13.1 15*10.2 \$2.50*10.1 \$1.50*10.1 \$											Rigil Kent.	139°40.8	-60°56.1
13 291°30.3 328°42.5 291.1 164°89.4 03.8 219°05.4 50.0 305°17.1 03.1 Algorithms (14 306°32.8 340°42.4 24.8 180°10.26 04.1 234°08.2 50.0 330°19.4 03.0 Algorithms (15 326°37.7 10°42.0 26.0 210°08.0 04.6 26°43.7 49.9 350°24.1 02.9 Antares 112°16.2 -26°39.2 17 351°40.2 25°41.9 24.9 225°12.1 04.9 279°16.5 49.9 350°24.1 02.9 Antares 112°16.2 -26°39.2 18 6°42.6 40°41.7 \$151°23.8 20°51.8 505.4 30°22.1 49.9 350°24.1 02.9 25°41.9 24.9 225°12.1 04.9 279°16.5 49.9 350°24.1 02.9 25°41.0 24.9 25°41.9 24.9 25°41.9 24.9 25°18.5 505.4 30°22.1 49.9 35°31.0 02.6 Sabik 102°03.2 -15°45.3 18 6°42.6 40°41.7 \$151°23.9 255°18.5 505.4 30°22.1 49.9 35°31.0 02.6 Sabik 102°03.2 -15°45.3 20°2.2 20°36°47.6 70°41.4 21.8 270°21.7 50.7 324°24.8 49.8 50°33.3 0.26 Kasalhague 95°56.9 12°32.4 22 66°52.5 100°41.1 19.7 300°28.0 60.2 356°30.4 49.8 80°37.9 02.4 40.0 40.2 31.5 10.0 40.2 350°40.9 49.8 80°37.9 02.4 40.0 40.2 31.5 10.0 40.2 40.0 40.2 40.0 40.2 40.0 40.2 40.0 40.2 40.0 40.2 40.0 40.2 40.0 40.2 40.0 40.2 40.0 40.2 40.0 40.2 40.0 40.2 40.0 40.2 40.0 40.2 40.0 40.2 40.0 40.2 40.0 40.2 40.0 40.2 40.0 40.0											Kochab	$137^{\circ}20.5$	74°02.8
14 306*32.8 340*42.4 28.1 180*02.6 04.1 234*08.2 50.0 320*19.4 03.0 Annex 12*0.5 2*0.2 16*0.8 04.1 249*11.0 **1.5 0.0 335*21.8 **0.29*16* 336*37.7 10*42.0 26.0 210*08.9 04.6 264*31.7 49.9 35*21.8 **0.29*2 Arria* 10*2*0.2 25*41.9 2*0.9 25*12.1 04.9 35*21.8 **0.29*2 25*2.1 04.9 35*21.8 **0.29*2 25*2.1 04.9 35*21.8 **0.29*2 25*2.1 04.9 35*21.8 **0.29*2 25*2.1 04.9 35*21.8 **0.29*2 25*2.1 04.9 35*31.0 0.26*2 25*2.1 04.9 35*31.0 0.26*2 25*2.1 04.9 35*31.0 0.26*2 25*2.1 04.9 35*31.0 0.26*2 25*2.1 04.9 35*31.0 0.26*2 25*18.5 0.54*309*22.1 49.9 35*31.0 0.26*2 25*2.1 0.29*2 25*18.5 0.54*309*22.1 49.9 35*31.0 0.26*2 25*2.1 0.29*2 25*18.5 0.54*309*22.1 49.9 35*31.0 0.26*2 25*2.1 0.29*2 25*2.1 0.0 0.25*2 25*2.2 0.0 0.25*2 25*2.2 0.0 0.25*2 25*2.2 0.0 0.25*2 25*2.2 0.0 0.25*2 25*2 25*2 25*2 25*2 25*2 25*2 25*2											Zuben'ubi	$136^{\circ}56.3$	-16°08.7
15   321°352   355°422											Alphecca	$126^{\circ}04.1$	26°37.7
16 336°37.7 10°42.0 26.0 210°08.9 04.6 26°13.7 49.9 350°24.1 02.9 173°16.0 25°14.9 24.9 25°12.1 04.9 279°16.5 49.9 5°26.4 02.8 18.0 10°0.0 40.5 18.0 18.0 18.0 18.0 18.0 18.0 18.0 18.0											Antares	$112^{\circ}16.2$	-26°29.2
18   642   64   17   515° 233   240° 125° 12.1   04.9   279° 16.5   49.9   5° 26.4   02.8   35404   06.102   03.1   04.9   18.8   05° 23.5   05.4   030° 22.1   49.9   35° 31.0   02.6   18.4   02.9   02.3   36° 47.6   70° 41.4   21.8   270° 21.7   05.7   324° 24.8   49.8   50° 33.3   02.6   18.5   02.											Atria	$107^{\circ}11.0$	-69°04.2
19											Sabik	102°03.2	-15°45.3
19											Shaula	$96^{\circ}10.8$	-37°07.3
21 51°50.0 85°41.2 \( \) 20.8 285°24.8 \( \) 20.6 \( \) 332°26 \( \) 48.8 \( \) 65°33.3 \( \) 20.6 \( \) 22 \( \) 66°52.5 \( \) 100°41.1 \( \) 19.7 \( \) 300°28.0 \( \) 06.2 \( \) 35°49.4 \( \) 49.8 \( \) 86°37.9 \( \) 02.3 \( \) 40.2 \( \) Vega \( \) 80°33.7 \( \) 38°48.2 \( \) 49.8 \( \) 95°40.2 \( \) 20.3 \( \) Altair \( \) 60°25.5 \( \) 115°40.9 \( \) 18.7 \( \) 315°31.2 \( \) 06.5 \( \) 9°33.1 \( \) 49.8 \( \) 95°40.2 \( \) 20.3 \( \) Altair \( \) 62°00.3 \( \) 85°60.0 \( \) 50°35.3 \( \) 20.4 \( \) 40.3 \( \) m-1.7 \( \) 22.8 \( \) 40.0 \( \) m-2.77 \( \) 22.3 \( \) 40.1 \( \) m1.04 \( \) 10°41.1 \( \) 19.7 \( \) 300°28.0 \( \) 06.5 \( \) 9°33.1 \( \) 49.8 \( \) 95°40.2 \( \) 20.3 \( \) Altair \( \) 62°00.3 \( \) 85°639.9 \( \) 21°10°3.2 \( \) 110°42.5 \( \) 506°50.3 \( \) 111°9.9 \( \) 145°40.6 \( \) 16.6 \( \) 345°3.6 \( \) 07.0 \( \) 39°38.7 \( \) 49.7 \( \) 125°44.8 \( \) 02.2 \( \) 212°02.3 \( \) 160°40.5 \( \) 15.6 \( \) 0°40.8 \( \) 07.3 \( \) 54°41.5 \( \) 49.7 \( \) 140°47.1 \( \) 02.1 \( \) 187°07.3 \( \) 190°40.2 \( \) 13.5 \( \) 30°47.2 \( \) 07.8 \( \) 84°47.0 \( \) 49.6 \( \) 170°51.7 \( \) 02.0 \( \) 187°12.2 \( \) 220°39.9 \( \) 515°11.4 \( \) 60°53.5 \( \) 823°08.3 \( \) 114°52.6 \( \) 821°49.5 \( \) 215°58.6 \( \) 18.8 \( \) 193°39.7 \( \) 10°40.2 \( \) 220°39.9 \( \) 515°11.4 \( \) 60°53.5 \( \) 823°08.3 \( \) 116°09.9 \( \) 49.5 \( \) 261°05.5 \( \) 15.6 \( \) 10°40.8											Rasalhague	95°58.9	12°32.4
Simple   S											Eltanin	90°42.7	51°29.0
Name											Kaus Aust.	83°33.0	-34°22.4
Mer.pass. 17:33											Vega	80°33.7	38°48.4
Mer.pass. 17:33											Nunki	75°48.2	-26°16.0
Sat         GHA         GHA         Dec         GHA         Nair         27°95.4         Al Nair         27°33.2         46°50.6         60°657.4         130°40.8         515°17.7         330°34.4         N23°06.7         24°35.9         21°249.7         110°42.5         508°02.3         508°02.3         Fomalhaut         15°147.7         29°29.6         60°40.8         07.3         54°41.5         49.7         110°42.5         508°02.3         50°43.2         50°80.2         50	23	81 54.9	115 40.9	18.7	315 31.2	00.5	9 33.1	49.8	95 40.2	02.3	Altair	62°00.3	8°56.0
Sat GHA         GHA         Dec         Al Na'ir         27°59.4         Al Na'ir         27°33.2         -46°50.6         50.6         60.6         345°37.6         07.0         39°38.7         49.7         110°42.5         508°02.3         50.8         50.2.1         50.8°02.3         50.8°02.3         50.8°02.3         50.8°02.3         60.8         10.8°17.0         40°47.1         02.1         10°42.5         508°02.3         50.9°03.3         60.9°4.2         70.9°03.4         49.6         10°51.7         50.2         50.8°02.3         50.8°02.3         50.8°02.3         50.8°02.3         50.8°02.3         50.8°02.3         50.9°02.0         50.9°02.0         50.9°02.0         50.9°02.0         50.9°02.0	Mer.p	ass. 17:33	$\nu$ -0.2' d-1	0′ m-4.40	$\nu$ 3.2′ d0.	3′ m-1.10	$\nu 2.8' \ d-0$	.0′ m-2.77	$\nu 2.3' \ d-0$	.1′ m1.04	Peacock	53°06.3	-56° 39.4
Sat         GHA         CHA         Dec         GHA         Dec         Horizontal parallax           1         111°59.9         145°40.6         16.6         345°37.6         07.0         39°38.7         49.7         140°47.1         02.1         Fomilhaut         15°14.7         29°29.4         18°15°17.0         02.0         6         157°07.3         190°40.2         13.5         30°47.2         07.8         84°47.0         49.6         156°54.0         01.9         49.6         185°54.0         01.9         49.6         185°54.0         01.9         49.0         18°71.7         02.0         49.0         18°17.7         22.0         30°30.9         20°0.0         15.7         22.0													
0 96°57.4 130°40.8 \$15°17.7 330°34.4 N23°06.7 24°35.9 N21°49.7 110°42.5 \$08°02.3   1 111°59.9 145°40.6 16.6 345°37.6 07.0 39°38.7 49.7 125°44.8 02.2   127°02.3 160°40.5 15.6 0°40.8 07.3 54°41.5 49.7 140°47.1 02.1   4 157°07.3 190°40.2 13.5 30°47.2 07.8 84°47.0 49.6 170°51.7 02.0   5 172°09.7 205°40.0 12.4 45°50.4 08.1 99°49.8 49.6 185°54.0 01.9   6 187°12.2 220°39.9 \$15°11.4 60°53.5 N23°08.3 114°52.6 N21°49.6 020°56.3 \$08°01.8   8 217°17.1 250°39.6 09.3 90°59.9 08.9 144°58.1 49.5 231°00.9 01.7   9 232°19.6 265°39.4 · 08.3 106°03.1 · 09.1 160°00.9 · 49.5 246°03.2 · 01.6   11 262°24.5 295°39.1 06.2 136°09.5 09.7 190°06.4 49.4 276°07.8 01.5   12 277°27.0 310°39.0 \$15°05.1 151°12.7 N23°09.9 205°09.9 N21°49.4 291°10.1 508°01.4   307°31.9 340°38.7 03.0 181°19.2 10.5 235°14.7 49.3 321°14.7 01.2   15 322°34.4 355°38.6 · 02.0 196°22.4 · 10.7 250°17.5 · 49.3 336°17.0 · 01.2   20°34.5 \$538.0 \$57.7 256°35.2 11.8 310°28.6 49.2 36°26.2 00.9   20 37°46.7 70°37.9 56.7 271°38.4 12.1 325°31.3 49.2 51°28.5 00.8   10 22°44.2 55°38.0 57.7 256°35.2 11.8 310°28.6 49.2 36°26.2 00.9   20 37°46.7 70°37.9 56.6 286°41.6 · 12.3 340°34.1 · 49.2 66°30.8 · 00.7   20 382°54.1 115°37.5 53.5 316°48.1 12.9 10°39.6 49.1 96°35.4 00.6   10 40°57.5 44.8 02.2   10°40.8 10°40.8 11.9 10°39.6 49.1 96°35.4 00.6   10 40°57.4 11.5 11.5 11.5 11.5 11.5 11.5 11.5 11	٠.	CIIA	CIIA	ъ.	CIIA	Б	CILA	Б	CIIA		Enif		
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13											Mars		02:02
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15 322°34.4 355°38.6 · · · 02.0 196°22.4 · · · 10.7 250°17.5 · · · 49.3 336°17.0 · · · 01.2 16 337°36.8 10°38.4 15°00.9 211°25.6 11.0 265°20.3 49.3 351°19.3 01.1 Venus 33°43.4 15:17 17 352°39.3 25°38.3 14°59.9 226°28.8 11.3 280°23.0 49.3 6°21.6 01.0 Mars 233°37.0 01:57 18 7°41.8 40°38.2 \$14°58.8 241°32.0 N23°11.5 295°25.8 N21°49.2 21°23.9 \$08°00.9 19 22°44.2 55°38.0 57.7 256°35.2 11.8 310°28.6 49.2 36°26.2 00.9 20 37°46.7 70°37.9 56.7 271°38.4 12.1 325°31.3 49.2 51°28.5 00.8 21 52°49.2 85°37.7 · · · 55.6 286°41.6 · · · 12.3 340°34.1 · · · 49.2 66°30.8 · · 00.7 22 66°51.6 100°37.6 54.6 301°44.8 12.6 355°36.9 49.1 81°33.1 00.7 23 82°54.1 115°37.5 53.5 316°48.1 12.9 10°39.6 49.1 96°35.4 00.6											Saturn	13°48.9	16:38
16 337°36.8 10°38.4 15°00.9 211°25.6 11.0 265°20.3 49.3 351°19.3 01.1 Venus 33°43.4 15:17 17 352°39.3 25°38.3 14°59.9 226°28.8 11.3 280°23.0 49.3 6°21.6 01.0 18 7°41.8 40°38.2 \$14°58.8 241°32.0 N23°11.5 295°25.8 N21°49.2 21°23.9 \$08°00.9 19 22°44.2 55°38.0 57.7 256°35.2 11.8 310°28.6 49.2 36°26.2 00.9 20 37°46.7 70°37.9 56.7 271°38.4 12.1 325°31.3 49.2 51°28.5 00.8 21 52°49.2 85°37.7 · 55.6 286°41.6 · 12.3 340°34.1 · 49.2 66°30.8 · 00.7 22 67°51.6 100°37.6 54.6 301°44.8 12.6 355°36.9 49.1 81°33.1 00.7 23 82°54.1 115°37.5 53.5 316°48.1 12.9 10°39.6 49.1 96°35.4 00.6    Venus 33°43.4 15:17   Mars 233°37.0 01:57   Jupiter 287°38.5 22:17   Saturn 13°45.1 16:35     Horizontal parallax Venus 0.2     Venus 33°43.4 15:17											D 20 C :	CIIA	Me:: :-
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21       52°49.2       85°37.7       ·· 55.6       286°41.6       ·· 12.3       340°34.1       ·· 49.2       66°30.8       ·· 00.7       Horizontal parallax         22       67°51.6       100°37.6       54.6       301°44.8       12.6       355°36.9       49.1       81°33.1       00.7       Venus:       0.2         23       82°54.1       115°37.5       53.5       316°48.1       12.9       10°39.6       49.1       96°35.4       00.6       Mars:       0.2											Saturn	13~45.1	16:35
22 67°51.6 100°37.6 54.6 301°44.8 12.6 355°36.9 49.1 81°33.1 00.7 Venus: 0.2 23 82°54.1 115°37.5 53.5 316°48.1 12.9 10°39.6 49.1 96°35.4 00.6 Mars: 0.2											Horizont	al parallax	
23 82°54.1 115°37.5 53.5 316°48.1 12.9 10°39.6 49.1 96°35.4 00.6 Mars: 0.2												•	0.2
25 02 51.1 115 51.5 55.5 55.5 15.1 55.5 15.1 55.5 15.1													
Mer.pass. 17:29 $\nu$ -0.2′ $d$ -1.0′ m-4.41 $\nu$ 3.2′ $d$ 0.3′ m-1.13 $\nu$ 2.8′ $d$ -0.0′ m-2.76 $\nu$ 2.3′ $d$ -0.1′ m1.04		02 34.1											
	Mer.p	ass. 17:29	$\nu$ -0.2' d-1	0′ m-4.41	$\nu$ 3.2′ d0.	3′ m-1.13	$\nu 2.8' \ d-0$	.0′ m-2.76	$\nu$ 2.3′ d-0	.1′ m1.04			

h	Su	n	Moon					
Thu	GHA	Dec	GHA	ν	Dec	d	HP	
0	179°52.1	\$23°21.3	240°28.1	14.7'	S16°55.7	11.8'	54.4'	
1	194°51.8	21.2	255°01.8	14.6'	$17^{\circ}07.5$	11.7'	54.4'	
2	209°51.5	21.1	269°35.4	14.6'	17°19.2	11.6'	54.4'	
3	224°51.2	• • 21.0	284°09.0	14.5'	17°30.8	11.6'	54.4'	
4	239°50.9 254°50.6	20.9 20.8	298° 42.5 313° 15.9	14.4'	17°42.4 17°53.9	11.5'	54.4'	
5 6	254 50.0 269°50.3	20.8 S23°20.8	313 15.9 327°49.2	14.3' 14.2'	\$18°05.4	11.4' 11.4'	54.4' 54.5'	
7	284°49.9	20.7	342°22.4	14.2'	18°16.7	11.3'	54.5	
8	299°49.6	20.6	356° 55.6	14.1'	18°28.0	11.2'	54.5'	
9	314°49.3	• • 20.5	11°28.7	14.0'	18°39.3	11.2'	54.5'	
10	329°49.0	20.4	26°01.7	13.9'	18°50.5	11.1'	54.5'	
11	344°48.7	20.3	40°34.6	13.8'	19°01.6	11.0'	54.5'	
12	359°48.4 14°48.1	\$23°20.2 20.1	55°07.4 69°40.1	13.7' 13.7'	\$19°12.6 19°23.5	11.0' 10.9'	54.5'	
13 14	14 48.1 29°47.8	20.1	84°12.8	13.7	19°23.5 19°34.4	10.9	54.5' 54.6'	
15	44°47.5	. 19.9	98° 45.4	13.5'	19°45.2	10.7	54.6'	
16	59°47.2	19.8	113° 17.9	13.4'	19°55.9	10.6'	54.6'	
17	74°46.9	19.7	127°50.3	13.3'	20°06.6	10.6'	54.6'	
18	89°46.5	S23°19.6	142°22.6	13.2'	S20°17.2	10.5'	54.6'	
19	104°46.2	19.4	156° 54.8	13.1'	20°27.7	10.4'	54.6'	
20	119°45.9	19.3	171°27.0	13.0'	20°38.1	10.3'	54.7'	
21 22	134°45.6 149°45.3	· · 19.2 19.1	185°59.0 200°31.0	13.0' 12.9'	20°48.4 20°58.6	10.2' 10.2'	54.7' 54.7'	
23	149 45.3 164°45.0	19.1	200 31.0 215°02.8	12.9	20 58.6 21°08.8	10.2	54.7'	
23						10.1	5 1.7	
	SD = 16.3'	d = -0.1'		SL	0 = 14.8'			
Fri	GHA	Dec	GHA	ν	Dec	d	HP	
0 1	179°44.7 194°44.4	\$23°18.9 18.8	229°34.6 244°06.3	12.7' 12.6'	\$21°18.9 21°28.9	10.0' 9.9'	54.7' 54.7'	
2	209°44.1	18.7	258° 37.9	12.5'	21°28.9	9.8'	54.8'	
3	224°43.8	• • 18.6	273°09.4	12.4'	21°48.6	9.7'	54.8'	
4	239°43.5	18.5	287°40.8	12.3'	21°58.3	9.6'	54.8'	
5	254°43.2	18.3	302°12.1	12.2'	22°07.9	9.5'	54.8'	
6	269°42.9 284°42.5	\$23°18.2	316°43.3 331°14.5	12.1'	\$22°17.5 22°26.9	9.4'	54.8'	
7 8	284 42.5 299°42.2	18.1 18.0	331 14.5 345 45.5	12.0' 11.9'	22°26.9 22°36.3	9.4' 9.3'	54.8' 54.9'	
9	314°41.9	. 17.9	0° 16.5	11.8'	22°45.5	9.2'	54.9'	
10	329°41.6	17.8	14° 47.3	11.7'	22°54.7	9.1'	54.9'	
11	344°41.3	17.6	29°18.0	11.7'	23°03.8	9.0'	54.9'	
12	359°41.0	S23°17.5	43°48.7	11.6'	523°12.7	8.9'	54.9'	
13	14°40.7 29°40.4	17.4	58° 19.3 72° 49.7	11.5' 11.4'	23°21.6 23°30.4	8.8'	54.9'	
14 15	44°40.1	17.3 · · 17.2	87°20.1	11.4	23°39.0	8.7' 8.6'	55.0' 55.0'	
16	59°39.8	17.0	101°50.4	11.2'	23°47.6	8.4'	55.0'	
17	74°39.5	16.9	$116^{\circ}20.5$	11.1'	23°56.0	8.3'	55.0'	
18	89°39.2	S23°16.8	130°50.6	11.0'	524°04.4	8.2'	55.0'	
19	104°38.9	16.7	145°20.6	10.9'	24°12.6	8.1'	55.1'	
20	119°38.6 134°38.2	16.5 •• 16.4	159° 50.5 174° 20.3	10.8' 10.7'	24°20.7 24°28.7	8.0' 7.9'	55.1' 55.1'	
21 22	134 36.2 149°37.9	16.3	174 20.3 188° 50.0	10.7	24 26.7 24°36.6	7.9 7.8'	55.1'	
23	164°37.6	16.2	203° 19.6	10.5'	24°44.4	7.7'	55.1'	
	SD = 16.3'	d = -0.1'		SE	0 = 14.9'			
٠.			CUA			,		
Sat 0	<b>GHA</b> 179°37.3	<b>Dec</b> \$23°16.0	<b>GHA</b> 217° 49.1	u 10.4'	Dec \$24°52.1	d 7.6'	<b>HP</b> 55.2'	
1	194°37.0	15.9	232° 18.5	10.4	24°59.7	7.4	55.2'	
2	209°36.7	15.8	246°47.8	10.2'	25°07.1	7.3'	55.2'	
3	224°36.4	•• 15.6	261° 17.0	10.1'	25°14.5	7.2'	55.2'	
4	239°36.1	15.5	275°46.1	10.0'	25°21.7	7.1'	55.2'	
5 6	254°35.8 269°35.5	15.4 \$23°15.2	290° 15.2 304° 44.1	9.9' 9.8'	25°28.8 \$25°35.7	7.0' 6.8'	55.3' 55.3'	
7	284°35.2	15.1	304 44.1 319°12.9	9.8 9.7'	25°42.6	6.7	55.3'	
8	299°34.9	15.0	333°41.7	9.7'	25°49.3	6.6'	55.3'	
9	314°34.6	• • 14.8	348°10.3	9.6'	25°55.9	6.5'	55.4'	
10	329°34.3	14.7	2°38.9	9.5'	26°02.4	6.3'	55.4'	
11	344°34.0	14.6 \$23°14.4	17°07.4	9.4'	26°08.7	6.2'	55.4'	
12 13	359°33.7 14°33.3	523°14.4 14.3	31°35.8 46°04.0	9.3' 9.2'	\$26°14.9 26°21.0	6.1' 6.0'	55.4' 55.4'	
14	29°33.0	14.3	60°32.2	9.1'	26°27.0	5.8'	55.5'	
15	44°32.7	• • 14.0	$75^{\circ}00.4$	9.0'	26°32.8	5.7'	55.5'	
16	59°32.4	13.9	89°28.4	8.9'	26°38.5	5.6'	55.5'	
17	74°32.1	13.7	103°56.3	8.9'	26°44.1	5.4'	55.5'	
18 19	89°31.8 104°31.5	\$23°13.6 13.4	118°24.2 132°51.9	8.8' 8.7'	\$26°49.5 26°54.8	5.3' 5.2'	55.6' 55.6'	
20	119°31.2	13.4	132 51.9 147°19.6	8.6'	26°59.9	5.2' 5.0'	55.6'	
21	134°30.9	· · 13.1	161°47.2	8.5'	27°05.0	4.9'	55.6'	
22	149°30.6	13.0	176° 14.7	8.4'	27°09.8	4.7'	55.6'	
23	164°30.3	12.8	190°42.2	8.4'	27°14.6	4.6'	55.7'	
	SD = 16.3'	d = -0.1'		SE	0 = 15.0'			

				nber 26		
Lat.		light	Sunrise	Sunset	Twil	_
<b>81.70</b> 0	Naut.	Civil			Civil	Naut.
N 72°	08:27	10:54			13:09	15:36
N 70° 68°	08:07	09:54			14:08	15:56
66°	07:51 07:38	09:20 08:55	10:34	13:29	14:43 15:08	16:12 16:25
64°	07:30	08:35	09:53	14:10	15:27	16:35
62°	07:18	08:20	09:25	14:38	15:43	16:45
60°	07:09	08:06	09:04	14:59	15:57	16:53
<b>N</b> 58°	07:02	07:54	08:46	15:16	16:08	17:01
56°	06:55	07:44	08:32	15:31	16:18	17:07
54°	06:49	07:35	08:19	15:44	16:27	17:14
52°	06:43	07:27	80:80	15:55	16:35	17:19
50°	06:38	07:20	07:58	16:04	16:43	17:24
45°	06:27	07:04	07:38	16:25	16:59	17:36
N 40°	06:16	06:50	07:21	16:42	17:12	17:46
35°	06:07	06:39	07:07	16:56	17:24	17:56
30° 20°	05:58	06:28	06:54	17:08	17:34	18:04
N 10°	05:42 05:26	06:09 05:52	06:33 06:15	17:29 17:48	17:53 18:10	18:21 18:37
0°	05:09	05:35	05:58	18:05	18:28	18:54
<b>S</b> 10°	04:50	05:17	05:40	18:22	18:46	19:13
20°	04:30	03:17	05:40	18:41	19:06	19:35
30°	03:58	04:32	04:59	19:03	19:31	20:04
35°	03:40	04:17	04:46	19:16	19:46	20:23
40°	03:17	03:58	04:31	19:31	20:04	20:46
45°	02:46	03:36	04:13	19:49	20:26	21:16
<b>S</b> $50^{\circ}$	02:01	03:06	03:51	20:11	20:56	22:01
52°	01:34	02:51	03:40	20:22	21:11	22:28
54°	00:49	02:34	03:28	20:34	21:29	23:12
56°	////	02:12	03:14	20:48	21:50	////
58° <b>S</b> 60°		01:42 00:53	02:57 02:37	21:05 21:25	22:20 23:07	////
3 00				l		7111
Lat.	Thu	Moonris Fri	<b>e</b> Sat	Thu	Moonset Fri	Sat
N 72°			Jat			Jat
<b>N</b> 70°	06:30			09:36		
68°				10.22		
	05:45			10:23		
$66^{\circ}$	05:45 05:16	07:34		10:23	10:10	
64°	05:16 04:54	06:47		10:53 11:16	10:58	
64° 62°	05:16 04:54 04:36	06:47 06:17	08:10	10:53 11:16 11:35	10:58 11:28	11:19
64° 62° 60°	05:16 04:54 04:36 04:22	06:47	08:10 07:33	10:53 11:16	10:58	
64° 62° 60° <b>N</b> 58°	05:16 04:54 04:36 04:22 04:09	06:47 06:17 05:55 05:37	07:33 07:06	10:53 11:16 11:35 11:50 12:03	10:58 11:28 11:52 12:10	11:19 11:57 12:24
64° 62° 60° <b>N</b> 58° 56°	05:16 04:54 04:36 04:22 04:09 03:59	06:47 06:17 05:55 05:37 05:22	07:33 07:06 06:46	10:53 11:16 11:35 11:50 12:03 12:14	10:58 11:28 11:52 12:10 12:26	11:19 11:57 12:24 12:45
64° 62° 60° <b>N</b> 58° 56° 54°	05:16 04:54 04:36 04:22 04:09 03:59 03:50	06:47 06:17 05:55 05:37 05:22 05:09	07:33 07:06 06:46 06:29	10:53 11:16 11:35 11:50 12:03 12:14 12:24	10:58 11:28 11:52 12:10 12:26 12:40	11:19 11:57 12:24 12:45 13:03
64° 62° 60° <b>N</b> 58° 56° 54° 52°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41	06:47 06:17 05:55 05:37 05:22 05:09 04:57	07:33 07:06 06:46 06:29 06:14	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33	10:58 11:28 11:52 12:10 12:26 12:40 12:52	11:19 11:57 12:24 12:45 13:03 13:18
64° 62° 60° <b>N</b> 58° 56° 54° 52° 50°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34	06:47 06:17 05:55 05:37 05:22 05:09 04:57 04:47	07:33 07:06 06:46 06:29 06:14 06:01	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02	11:19 11:57 12:24 12:45 13:03 13:18 13:31
64° 62° 60° <b>N</b> 58° 56° 54° 52° 50° 45°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34 03:18	06:47 06:17 05:55 05:37 05:22 05:09 04:57 04:47 04:26	07:33 07:06 06:46 06:29 06:14 06:01 05:35	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58
64° 62° 60° N 58° 56° 54° 52° 50° 45° N 40°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34 03:18	06:47 06:17 05:55 05:37 05:22 05:09 04:57 04:47 04:26 04:09	07:33 07:06 06:46 06:29 06:14 06:01 05:35 05:15	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58 13:12	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24 13:42	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58 14:19
64° 62° 60° <b>N</b> 58° 56° 54° 52° 50° 45° <b>N</b> 40° 35°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34 03:18 03:06 02:55	06:47 06:17 05:55 05:37 05:22 05:09 04:57 04:47 04:26 04:09 03:55	07:33 07:06 06:46 06:29 06:14 06:01 05:35 05:15 04:57	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58 13:12 13:24	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24 13:42 13:57	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58 14:19 14:37
64° 62° 60°  N 58° 56° 54° 52° 50° 45°  N 40°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34 03:18	06:47 06:17 05:55 05:37 05:22 05:09 04:57 04:47 04:26 04:09	07:33 07:06 06:46 06:29 06:14 06:01 05:35 05:15	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58 13:12	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24 13:42	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58 14:19
64° 62° 60° N 58° 54° 52° 50° 45° N 40° 35° 30° 20° N 10°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34 03:18 03:06 02:55 02:45	06:47 06:17 05:55 05:37 05:22 05:09 04:57 04:47 04:26 04:09 03:55 03:43	07:33 07:06 06:46 06:29 06:14 06:01 05:35 05:15 04:57 04:43	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58 13:12 13:24 13:35	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24 13:42 13:57 14:10	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58 14:19 14:37 14:52
64° 62° 60° N 58° 56° 54° 52° 45° N 40° 35° 30° 20° N 10° 0°	05:16 04:54 04:36 04:22 04:09 03:59 03:51 03:34 03:18 03:06 02:55 02:45 02:29	06:47 06:17 05:55 05:37 05:22 05:09 04:57 04:47 04:26 04:09 03:55 03:43	07:33 07:06 06:46 06:29 06:14 06:01 05:35 05:15 04:57 04:43	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58 13:12 13:24 13:35 13:53	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24 13:42 13:57 14:10 14:33	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58 14:19 14:37 14:52 15:18
64° 62° 60° N 58° 56° 54° 52° 45° N 40° 35° 30° 20° N 10° 0° S 10°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34 03:18 03:06 02:55 02:45 02:29 02:15 02:02	06:47 06:17 05:55 05:37 05:22 05:09 04:57 04:47 04:26 04:09 03:55 03:43 03:22 03:04	07:33 07:06 06:46 06:29 06:14 06:01 05:35 05:15 04:57 04:43 04:18	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58 13:12 13:24 13:35 13:53 14:09	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24 13:42 13:57 14:10 14:33 14:52 15:11 15:29	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58 14:19 14:37 14:52 15:18 15:41
64° 62° 60° N 58° 56° 54° 52° 45° N 40° 35° 30° 0° N 10° 0° S 10° 20°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34 03:18 03:06 02:55 02:45 02:29 02:15 02:02	06:47 06:17 05:55 05:37 05:22 05:09 04:57 04:47 04:26 04:09 03:55 03:43 03:22 03:04 02:47 02:31 02:13	07:33 07:06 06:46 06:29 06:14 06:01 05:35 05:15 04:57 04:43 03:56 03:37 03:17 02:56	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58 13:12 13:24 13:24 13:25 13:24 13:24 13:25 13:25 13:40 14:23 14:38 14:54	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24 13:42 13:57 14:10 14:33 14:52 15:11 15:29 15:49	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58 14:19 14:37 14:52 15:18 15:41 16:02 16:23 16:45
64° 62° 60° N 58° 56° 52° 50° 45° N 40° 35° 30° 20° N 10° 0° S 10° 20° 30°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34 03:06 02:55 02:45 02:29 02:15 02:02 01:49 01:35 01:20	06:47 06:17 05:55 05:37 05:22 05:09 04:57 04:47 04:26 04:09 03:55 03:43 03:22 03:04 02:47 02:31 02:13 01:53	07:33 07:06 06:46 06:29 06:14 06:01 05:35 05:15 04:57 04:43 04:18 03:56 03:37 02:56 02:31	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58 13:12 13:24 13:35 13:53 14:09 14:23 14:23 14:54 15:13	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24 13:42 13:57 14:10 14:33 14:52 15:11 15:29 15:49 16:12	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58 14:19 14:37 14:52 15:18 15:41 16:02 16:23 16:45 17:12
64° 62° 60° N 56° 54° 52° 50° 45° N 40° 30° 20° N 10° 0° S 10° 20° 30° 35°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34 03:06 02:55 02:45 02:29 02:15 02:02 01:43 01:35 01:20 01:11	06:47 06:17 05:55 05:37 05:22 05:09 04:57 04:47 04:26 04:09 03:55 03:43 03:22 03:04 02:47 02:31 02:13 01:53 01:41	07:33 07:06 06:46 06:29 06:14 06:01 05:35 05:15 04:57 04:43 04:18 03:56 03:37 03:17 02:56 02:31	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58 13:12 13:24 13:35 13:53 14:09 14:23 14:38 14:54 15:13 15:24	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24 13:42 13:57 14:10 14:33 14:52 15:11 15:29 15:49 16:12 16:25	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58 14:19 14:37 14:52 15:18 15:41 16:02 16:23 16:45 17:12 17:27
64° 62° 60° N 58° 56° 54° 50° 45° N 40° 35° 30° 20° N 10° 0° S 10° 20° 30° 35° 40°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34 03:06 02:55 02:45 02:29 02:15 02:02 01:49 01:35 01:20 01:11 01:00	06:47 06:17 05:55 05:37 05:22 05:09 04:57 04:47 04:26 04:09 03:55 03:43 03:22 03:04 02:47 02:31 02:31 01:53 01:41 01:28	07:33 07:06 06:46 06:29 06:14 06:01 05:35 05:15 04:57 04:43 04:18 03:56 03:37 03:17 02:56 02:31 02:17	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58 13:12 13:35 13:53 14:09 14:23 14:38 14:54 15:13 15:24	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24 13:42 13:57 14:10 14:33 14:52 15:11 15:29 15:49 16:12 16:25 16:41	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58 14:19 14:37 14:52 15:18 15:41 16:02 16:23 16:45 17:12 17:27 17:46
64° 62° 60° N 58° 56° 54° 52° 50° 45° N 40° 35° 20° N 10° 0° S 10° 20° 30° 35° 40° 45°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34 03:06 02:55 02:45 02:29 02:15 02:02 01:49 01:35 01:20 00:49	06:47 06:17 05:55 05:37 05:22 05:09 04:57 04:47 04:26 04:09 03:55 03:43 03:22 03:04 02:47 02:31 02:31 02:13 01:53 01:41 01:28 01:12	07:33 07:06 06:46 06:29 06:14 06:01 05:35 04:57 04:43 04:18 03:56 03:37 03:17 02:56 02:31 02:17 02:01 01:41	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58 13:12 13:35 13:53 14:09 14:23 14:23 14:54 15:13 15:24 15:36 15:51	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24 13:42 13:57 14:10 14:33 14:52 15:11 15:29 15:49 16:12 16:25 16:41 16:59	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58 14:19 14:37 14:52 15:18 15:41 16:02 16:23 16:45 17:12 17:27 17:46 18:07
64° 62° 60° N 58° 54° 52° 50° 45° N 40° 35° 20° N 10° 0° S 10° 20° 30° 45° S 50°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34 03:18 03:06 02:55 02:29 02:15 02:02 01:35 01:20 01:11 01:00 00:49 00:34	06:47 06:17 05:55 05:37 05:29 05:09 04:57 04:47 04:26 04:09 03:55 03:43 03:22 03:04 02:47 02:13 01:53 01:41 01:28 01:12	07:33 07:06 06:46 06:29 06:14 06:01 05:35 05:15 04:57 04:43 04:18 03:56 03:37 02:56 02:31 02:17 02:01 01:41	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58 13:12 13:24 13:35 14:09 14:23 14:38 14:54 15:13 15:24 15:36 15:51 16:09	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24 13:42 13:47 14:10 14:33 14:52 15:11 15:29 15:49 16:25 16:25 16:59 17:23	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58 14:19 14:37 14:52 15:18 15:41 16:02 16:23 16:45 17:12 17:27 17:46 18:07 18:35
64° 62° 60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° N 10° 0° S 10° 20° 30° 35° 40° 45° S 50° 52°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34 03:18 03:06 02:55 02:25 02:29 02:15 02:02 01:49 01:35 01:20 01:11 01:00 00:49 00:34 00:27	06:47 06:17 05:55 05:37 05:29 04:57 04:47 04:26 04:09 03:55 03:43 03:22 03:04 02:47 02:13 01:53 01:53 01:12 00:52 00:43	07:33 07:06 06:46 06:29 06:14 06:01 05:35 05:15 04:57 04:43 03:56 03:37 03:17 02:56 02:31 02:17 02:01 01:41 01:17 01:05	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58 13:12 13:24 13:35 14:09 14:23 14:38 14:54 15:13 15:24 15:36 15:51 16:09 16:18	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24 13:42 13:57 14:10 14:33 14:52 15:11 15:29 15:49 16:12 16:25 16:41 16:59 17:23 17:34	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58 14:19 14:37 14:52 15:18 15:41 16:02 16:23 16:45 17:12 17:27 17:46 18:07 18:35 18:49
64° 62° 60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 0° S 10° 20° 30° 35° 40° 45° S 50° 52° 54°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34 03:06 02:55 02:45 02:29 02:15 02:02 01:49 01:35 01:20 01:11 01:00 00:49 00:34 00:27 00:20	06:47 06:17 05:55 05:37 05:22 05:09 04:57 04:47 04:26 04:09 03:55 03:43 03:22 03:04 02:47 02:31 01:53 01:41 01:22 00:43 00:33	07:33 07:06 06:46 06:29 06:14 06:01 05:35 05:15 04:57 04:43 03:36 03:37 03:17 02:56 02:31 02:17 02:01 01:41 01:05 00:52	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58 13:12 13:24 13:35 14:09 14:23 14:38 14:54 15:13 15:24 15:36 15:51 16:09 16:18 16:27	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24 13:42 13:57 14:10 14:33 14:52 15:11 15:29 15:49 16:12 16:25 16:41 16:59 17:23 17:34 17:47	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58 14:19 14:37 14:52 15:18 15:41 16:02 16:23 16:45 17:12 17:46 18:07 18:35 18:49 19:05
64° 62° 60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 0° S 10° 20° 30° 30° 35° 40° 45° S 50° 52°	05:16 04:54 04:36 04:22 04:09 03:59 03:50 03:41 03:34 03:18 03:06 02:55 02:25 02:29 02:15 02:02 01:49 01:35 01:20 01:11 01:00 00:49 00:34 00:27	06:47 06:17 05:55 05:37 05:29 04:57 04:47 04:26 04:09 03:55 03:43 03:22 03:04 02:47 02:13 01:53 01:53 01:12 00:52 00:43	07:33 07:06 06:46 06:29 06:14 06:01 05:35 05:15 04:57 04:43 03:56 03:37 03:17 02:56 02:31 02:17 02:01 01:41 01:17 01:05	10:53 11:16 11:35 11:50 12:03 12:14 12:24 12:33 12:41 12:58 13:12 13:24 13:35 14:09 14:23 14:38 14:54 15:13 15:24 15:36 15:51 16:09 16:18	10:58 11:28 11:52 12:10 12:26 12:40 12:52 13:02 13:24 13:42 13:57 14:10 14:33 14:52 15:11 15:29 15:49 16:12 16:25 16:41 16:59 17:23 17:34	11:19 11:57 12:24 12:45 13:03 13:18 13:31 13:58 14:19 14:37 14:52 15:18 15:41 16:02 16:23 16:45 17:12 17:27 17:46 18:07 18:35 18:49

		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	23-9%	
26	00:32	00:46	12:01	08:13	20:35		
27	01:01	01:16	12:01	08:59	21:23		
28	01:31	01:45	12:02	09:49	22:16		

23:57

## December 29, 30, 31 UT (Sun., Mon., Tue.)

CHA	h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
1	Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
1 127550 147572 514 987515 134 96752 91 126 90751 137 97519 10711													
2 120*01.5 180*37.1 59.4 1*57.7 137 5*5*0*79 7.0 49. 11*0*2.3 0.4 6. 0.33 40*37.4 42.1 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1											Alpheratz		1
3   197   39   175   750   693   170   9   130   70   597   690   186   446   0.03   0.03   0.05													
1													
S 177 009 029 167 7 472 4704 1 0710 0 12451 1007962 0 000 187 400 0 1071400 0 1071400 0 1071400 10714													
88*113. 202*86 51.4*40.1 62*106 N25*147 1107580 30*050 40 20*151.5 598*00.1 NB Policy 10.7 10.0 110.0													
7 200*138 235*34 451 77*139 150 137*018 489 21*538 06*000 4*113 3 14*0*11 133 14*0*15 489 21*538 06*000 4*113 130 14*0*15 489 21*538 06*000 4*113 130 14*0*15 489 21*538 06*000 4*113 130 14*0*15 489 21*538 06*000 4*113 130 14*0*15													
19	7	203°13.8	235°36.4	45.1		15.0	131°01.8	48.9	216°53.8	0.00°80			
13   26   27   28   28   28   28   28   28   28	8	218°16.3	250°36.3	44.0	92°17.1	15.3	146°04.5	48.9	231°56.1	07°59.9			
11 2 278°6.1 300°5.8 6 4.9 187°50.8 127°10.0 127°16.4 10.0 10.0 18.8 277°10.0 19.9 7   12 278°6.1 300°5.8 6 310°5.8 6 310°5.8 6 310°5.8 10.0 10.0 18.1 10.0 19.8 1.0 10.0 19.8 1.0 10.0 19.8 1.0 10.0 19.8 1.0 10.0 19.8 1.0 10.0 19.8 1.0 10.0 19.8 1.0 10.0 19.8 1.0 1	9	233°18.7	265°36.2	• • 43.0	107°20.3	• • 15.6	161°07.3	• • 48.8	246°58.4	• • 59.8			
13   207   208	10	248°21.2	280°36.1	41.9		15.8		48.8	262°00.7	59.8			
19   19   19   19   19   19   19   19	11						191°12.8		277°03.0	59.7			
15 237 337 367 367 37 367 367 37 37 37 37 37 37 37 37 37 37 37 37 37	12			<b>S</b> 14°39.8		N23°16.4		N21°48.8		S07°59.6	_		
15 331"36   395"35   395"35   395   397"37   397"32   397"32   397"37   397"34   397"35   398"37   398	13												
Amilian   Amil													
19   383-360													
19													
23   43   43   59   58   50   32   3   257   527   18   3   311   349   48   6   37   21   59   19   5   22   26   60   60   31   32   275   59   18   5   320   327   37   48   6   37   21   39   19   22   60   60   31   10   347   39   10   30   34   10   34   39   34   30   22   22   26   36   30   34   34   36   32   32   34   36   36   34   34   36   32   32   34   34   36   32   32   34   34   36   32   32   34   34   36   32   34   36   36   34   34   34   34   34											_		
20 88'458 97'349 31.3 272'559 18.5 326'377 48.6 52'23.7 99.0   Face of the common of t											Sirius	258°25.9	-16°45.0
22											Adhara	255°05.5	-29°00.3
22 68"50.8   105"34.6   281   318"05.7   19.1   356"42.2   48.5   97"30.6   58.8											Procyon	244°50.5	5°09.6
Mor.   Part											Pollux	243°17.0	27°57.9
Mon   GHA   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   G**54.5   G**55.6   G**56.6   G**56.7   G**56.											Avior		
Mon GHA GHA CHA CHA Dec GHA D													
Mon	Mer.p	ass. 17:25	$\nu$ -0.1' d-1	1′ m-4.42	$\nu$ 3.2′ d0.	3′ m-1.15	$\nu$ 2.8′ d-0	.0′ m-2.76	$\nu$ 2.3′ d-0	$.1^\prime$ m $1.05$			
Mon GHA CHA Dec CHA D													
0 98°55.7   103°34.5   514°27.0   333°0.9   N23°19.6   20°48.8   N21°48.5   112°32.9   50°758.7   1 13°56.2   145°34.3   25.9   34°12.2   10.9   44°51.5   48.4   142°37.5   58.5   3 144°0.1   175°34.1   23.8   18°18.7   20.4   71°57.0   48.4   142°37.5   58.5   5 174°0.0   205°33.9   21.6   48°25.2   21.1   102°0.6   48.3   137°4.4   58.3   5 174°0.0   205°33.9   21.6   48°25.2   21.1   102°0.6   48.3   137°4.4   58.3   6 189°10.5   20°33.8   514°30.6   63°26.5   N23°21.2   117°0.3   N21°48.3   202°4.6   50°5.8   8 219°15.4   20°33.8   514°30.6   63°26.5   N23°21.2   117°0.3   N21°48.3   202°4.6   50°5.8   9 219°15.4   20°33.8   514°30.6   63°26.5   N23°21.2   117°0.3   N21°48.3   202°4.6   50°5.8   9 219°15.4   20°33.8   514°30.6   63°26.5   N23°21.2   117°0.3   N21°48.3   202°4.6   50°5.8   9 219°15.4   20°33.8   514°30.6   63°26.5   N23°21.2   117°0.3   N21°48.3   202°4.6   50°5.8   10 249°20.3   260°33.4   16.3   122°41.5   22.3   177°16.4   48.2   247°3.6   58.0   11 249°20.3   260°33.4   16.3   122°41.5   22.3   177°16.4   48.2   247°5.6   50°5.5   12 249°20.3   260°33.3   15.2   138°44.8   22.6   122°10.4   48.2   277°5.8   57.9   12 249°27.3   30°33.2   15.2   138°44.8   22.6   122°10.4   48.2   277°5.8   57.9   13 249°27.7   35°33.1   13.1   166°51.3   23.1   222°24.6   48.1   306°0.7   57.7   14 300°30.2   30°33.0   12.0   138°54.6   23.4   237°2.2   22°30.2   48.1   333°0.7   57.7   16 339°3.5   10°32.8   03.8   214°0.1   24.2   20°2.3   22°30.4   48.1   338°0.7   57.6   16 339°3.5   10°32.8   03.8   214°0.1   24.2   20°3.2   48.0   338°0.7   57.4   17 344°3.7   30°3.0   30°3.0   12.0   138°54.6   23.4   23.7   22°30.2   48.1   338°0.7   57.6   18 244°2.5   55°3.5   50°6.6   50°6.0	Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	_		
1 137562 1687343 259 3467122 199 41751.5 484 1277352 586 Giordon 127574.6 177402 3 127606 1607342 249 37154 201 567543 484 157739.8 585 415706 1607340 227 337154 201 56754.8 484 157739.8 585 415706 1007340 227 33721.9 20.7 86759.8 484 157739.8 585 415706 1007340 227 33721.9 20.7 86759.8 484 157739.8 585 415706 100734.0 227 33721.9 20.7 86759.8 484 157739.8 585 415706 100734.0 227 33721.9 20.7 86759.8 483 18744.4 583 585 585 585 585 585 585 585 585 585													
2 129°00.6 109°34.2 24.9 3°15.4 20.1 5°54.3 48.4 142°27.5 58.5 3.4 40.1 173°03.1 175°34.1 1.23.8 18°18.7 ·													
1 144°03.1 175'34.1													
4 159°05.6 190°34.0 227°339 21.0 46°25.2 21.0 10°20.6 48.3 18°744.4 \$83.3 56°39.1 21.0 10°20.6 188°10.5 18°24.1 \$84.4 \$172°42.1 \$84.4 \$172°42.1 \$84.4 \$172°42.1 \$84.4 \$172°42.1 \$84.4 \$172°42.1 \$84.4 \$172°42.1 \$84.4 \$172°42.1 \$84.4 \$172°42.1 \$84.4 \$172°42.1 \$84.4 \$172°42.1 \$84.4 \$172°42.1 \$84.4 \$172°42.1 \$84.4 \$172°42.1 \$170°53.1 \$172°46.3 \$18°744.4 \$83.3 \$18°744.4 \$83.3 \$18°744.4 \$83.3 \$18°744.4 \$83.3 \$18°744.4 \$83.3 \$18°744.4 \$83.3 \$18°744.4 \$83.3 \$18°744.4 \$83.3 \$18°744.4 \$83.3 \$18°744.4 \$83.3 \$18°744.4 \$83.3 \$18°744.4 \$83.3 \$18°744.2 \$18°42.3 \$													
5 174°08.0 205°33.9 21.6 48°25.2 21.0 102°02.6 48.3 187°44.4 58.3 5 5 174°08.0 205°33.5 140°06.0 63°26.5 N22°21.2 117°03.3 N21°48.3 102°46.7 70°85.2 44°31.0 140°0.2 205°33.5 18.4 30°333.0 21.8 147°10.8 48.3 21°79.0 58.2 48°31.0 140°0.3 20°36.0 18.4 30°333.0 21.8 147°10.8 48.3 22°51.3 58.1 144 183°36.3 -60°29.3 10 249°20.3 280°33.4 16.3 123°41.5 2.2 3.17°16.4 48.2 24°735.6 58.0 140°20.3 280°33.4 16.3 123°41.5 2.2 3.17°16.4 48.2 24°735.6 58.0 140°20.3 280°33.4 16.3 15.2 183°44.8 22.5 192°10.1 48.2 27°738.2 579.0 17.1 120°20.3 280°33.3 15.2 183°44.8 22.5 192°10.1 48.2 27°73.6 25°575.8 181°10.3 181°40.0 182°2.9 20°21.9 N21°48.1 293°00.4 50°575.8 181°10.3 1	4	159°05.6						48.4	172°42.1				
6 189°10.7 200°33.8 514°20.6 63°28.5 N22°21.2 117°05.3 120°48.3 200°4.0 507°58.2 Aliaid 152°52.2 49°11.0 7 200°12.9 203°33.7 19.5 78°31.7 2.1.5 132°08.1 48.3 22°51.3 58.1 Menkert 147°57.8 36°29.4 40°21.0 10°240°20.3 250°33.5 117.4 108°34.2 2.20 102°13.6 48.2 26°255.9 57.9 Menkert 147°57.8 36°29.4 Menkert 147°57.8 36°29.4 112 60°22.8 295°33.3 152 183°44.8 22.6 192°19.1 48.2 26°255.9 57.9 Kochab 137°20.5 74°02.8 212 270°25.3 310°33.2 544°14.1 153°46.0 N22°22.9 207°21.9 N21°48.1 293°0.0 4 50°757.8 Kochab 137°20.5 74°02.8 213 294°27.7 325°33.1 131 106°51.3 23.1 222°46.6 48.1 323°05.0 57.6 Alphace 126°64.2 28.2 33°32.4 48.1 323°40.5 57.6 Alphace 126°64.2 28.2 33°32.1 222°46.6 48.1 323°05.0 57.6 Alphace 126°64.2 28.2 33°32.1 222°46.6 48.1 332°05.0 57.6 Alphace 126°64.0 26°37.7 Alphace 126°64.2 28.2 33°33.3 152 108°57.8 23°7 22°30.2 48.1 338°07.3 57.6 Alphace 126°64.2 28.2 33°7 36°30.6 8°11.9 57.4 Alphace 126°64.2 28.2 35°3.7 48.0 353°90.6 57.5 Alphace 126°64.2 28.2 35°3.2 40°3.0 10°3.2 50°65.9 48.0 353°90.6 57.5 Alphace 126°64.2 28.2 35°3.2 50.6 520°10.9 248°3.2 297°38.4 N21°48.0 23°14.2 50°757.3 Alphace 126°64.2 50°51.3 40°3.0 11.0 13.2 40°0.8 20°10.9 248°3.2 297°38.4 N21°48.0 23°14.2 50°757.3 Alphace 126°64.2 50°10.9 248°3.2 297°38.4 N21°48.0 23°14.2 50°757.3 Alphace 126°64.2 50°10.9 248°3.2 297°38.4 N21°48.0 23°14.2 50°757.3 Alphace 126°64.2 50°10.9 248°3.2 297°38.4 N21°48.0 23°14.2 50°757.3 Alphace 126°64.2 28°10.9 248°40.7 47°9.6 8°22.1 57°1.4 50°3.2 50°5.5 247°44.2 250°3.2 347°49.4 47°9.5 318.8 57.2 Elamin 90°42.7 50°5.9 240°44.2 28°23.3 24°40.7 47°9.6 8°22.1 57°1.4 50°3.2 50°4.	5	174°08.0	205°33.9	21.6	48°25.2	21.0	102°02.6	48.3	187°44.4	58.3			
8 219*15-14 259*33.6 18.4 93*35.0 21.8 147*10.8 48.3 217*49.0 58.2	6	189°10.5	220°33.8	S14°20.6	63°28.5	N23°21.2	117°05.3	N21°48.3		S07°58.2			
8 219°15-49 226°33.6	7	204°12.9	235°33.7	19.5	78°31.7	21.5	$132^{\circ}08.1$	48.3	217°49.0	58.2			
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18											Atria	$107^{\circ}11.0$	-69°04.2
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22   66°49,9   100°32,3   0.3   30,4   306°20,8   25.6   357°49,5   47.9   83°23,4   57.0   83°25,7   56.9     Mer.pass. 17:21   ν-0.1' d-1.1' m-4.43   ν3.3' d0.3' m-1.17   ν2.8' d-0.0' m-2.75   ν2.3' d-0.1' m1.05     Tue   GHA   GHA   Dec   GHA   Dec   GHA   Dec   114°57,3   145°32,0   14°00,1   34°30,6   26.4   42°77,   47.8   118°28,0   50°56,9   56.1   114°57,3   145°32,0   14°00,1   34°30,6   26.4   42°77,   47.8   118°34,0   56.6   100°04,7   190°31,8   56.9   34°40,5   72.2   72.0   73°03,2   47.8   118°34,9   56.6   15°00,6   56.7   72.0   73°03,2   47.7   188°34,9   56.6   72.0   73°03,1   55.8   40°43,7   27.5   103°08,7   47.7   188°34,9   56.5   47.8   47.7   47.8   47.8   47.7   47.8													
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16       340°34.3       10°30.8       43.9       215°20.0       30.5       268°39.0       47.4       354°04.7       55.6       Venus       30°37.3       15:18         17       355°36.7       25°30.8       42.8       230°23.3       30.8       283°41.8       47.4       9°07.0       55.6       Mars       234°32.5       01:42         18       10°39.2       40°30.7       513°41.7       245°26.6       N23°31.1       298°44.5       N21°47.4       24°09.2       507°55.5       Jupiter       288°00.1       22:04         19       25°41.7       55°30.6       40.6       260°29.9       31.3       313°47.3       47.4       39°11.5       55.4       Saturn       13°33.1       16:24         20       40°44.1       70°30.6       39.5       275°33.2       31.6       328°50.0       47.3       54°13.8       55.3         21       55°46.6       85°30.5       · 38.5       290°36.5       · 31.9       343°52.8       · 47.3       69°16.1       · 55.2       Horizontal parallax         22       70°49.0       100°30.4       37.4       305°39.8       32.2       358°55.5       47.3       84°18.4       55.2       Mars:       0.2         23											Dec 31 Tue	SHA	Mer.nass
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20 40°44.1 70°30.6 39.5 275°33.2 31.6 328°50.0 47.3 54°13.8 55.3 21 55°46.6 85°30.5 · 38.5 290°36.5 · 31.9 343°52.8 · 47.3 69°16.1 · 55.2 22 70°49.0 100°30.4 37.4 305°39.8 32.2 358°55.5 47.3 84°18.4 55.2 23 85°51.5 115°30.4 36.3 320°43.1 32.4 13°58.3 47.3 99°20.7 55.1  Horizontal parallax Venus: 0.2 Mars: 0.2			55°30.6							55.4			
22 70°49.0 100°30.4 37.4 305°39.8 32.2 358°55.5 47.3 84°18.4 55.2 Venus: 0.2 23 85°51.5 115°30.4 36.3 320°43.1 32.4 13°58.3 47.3 99°20.7 55.1 Mars: 0.2													
23 85°51.5 115°30.4 36.3 320°43.1 32.4 13°58.3 47.3 99°20.7 55.1 Mars: 0.2											Horizont	-	0.0
Mer.pass. 17:18 $\nu$ -0.1' $d$ -1.1' m-4.44 $\nu$ 3.3' $d$ 0.3' m-1.19 $\nu$ 2.8' $d$ -0.0' m-2.75 $\nu$ 2.3' $d$ -0.1' m1.05	23	85°51.5	115°30.4	36.3	320°43.1	32.4	13°58.3	47.3	99°20.7	55.1		iviars:	0.2
	Mer.p	ass. 17:18	$\nu$ -0.1' d-1	1′ m-4.44	$\nu$ 3.3′ d0.	3′ m-1.19	$\nu$ 2.8′ d-0	.0′ m-2.75	$\nu 2.3' \ d-0$	.1′ m1.05			

h	Su	Moon					
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°30.0	<b>S</b> 23°12.7	205°09.5	8.3'	S27°19.2	4.4'	55.7'
1 2	194°29.7 209°29.4	12.5 12.4	219°36.8 234°04.0	8.2' 8.1'	27°23.6 27°27.9	4.3' 4.2'	55.7' 55.7'
3	209 29.4 224°29.1	. 12.4	248°31.1	8.0'	27°32.1	4.2	55.8'
4	239°28.8	12.1	262°58.2	8.0'	27°36.1	3.9'	55.8'
5	254°28.5	11.9	277°25.1	7.9'	27°39.9	3.7'	55.8'
6 7	269°28.2 284°27.9	\$23°11.8 11.6	291°52.0 306°18.9	7.8' 7.8'	\$27°43.7 27°47.2	3.6' 3.4'	55.8' 55.9'
8	299°27.6	11.5	320°45.6	7.6 7.7'	27°50.6	3.4	55.9'
9	314°27.3	• • 11.3	335°12.3	7.6'	27°53.9	3.1'	55.9'
10	329°27.0	11.2	349°38.9	7.6'	27°57.0	3.0'	55.9'
11 12	344°26.7 359°26.4	11.0 \$23°10.9	4°05.5 18°32.0	7.5' 7.4'	28°00.0 528°02.8	2.8' 2.7'	56.0' 56.0'
13	14°26.0	10.7	32°58.4	7.4	28°05.4	2.5'	56.0'
14	29°25.7	10.5	47°24.8	7.3'	28°07.9	2.3'	56.0'
15	44°25.4	• • 10.4	61°51.1 76°17.3	7.2'	28° 10.3	2.2'	56.0'
16 17	59°25.1 74°24.8	10.2 10.0	76 17.3 90°43.5	7.2' 7.1'	28° 12.5 28° 14.5	2.0' 1.9'	56.1' 56.1'
18	89°24.5	\$23°09.9	105°09.7	7.1'	\$28°16.4	1.7'	56.1
19	104°24.2	09.7	119°35.7	7.0'	28° 18.1	1.6'	56.1'
20 21	119°23.9 134°23.6	09.6 •• 09.4	134°01.8 148°27.8	7.0' 6.9'	28° 19.6 28° 21.0	1.4' 1.2'	56.2' 56.2'
22	134 23.0 149°23.3	09.4	148 27.8 162°53.7	6.9'	28°22.3	1.1'	56.2'
23	164°23.0	09.1	177°19.6	6.8'	28° 23.3	0.9'	56.2'
	SD = 16.3'	d = -0.1'		SI	D = 15.2'		
Mon	<b>GHA</b> 179°22.7	<b>Dec</b> <b>S</b> 23°08.9	<b>GHA</b> 191°45.4	u 6.8'	Dec 528° 24.2	d 0.7'	<b>HP</b> 56.3'
0 1	179 22.7 194°22.4	08.7	206°11.2	6.8	28°25.0	0.7	56.3'
2	209°22.1	08.6	220°37.0	6.7'	28° 25.5	0.4	56.3
3	224°21.8	• • 08.4	235°02.7	6.7'	28°26.0	0.2'	56.3'
4 5	239°21.5 254°21.2	08.2 08.0	249°28.4 263°54.1	6.7' 6.6'	28° 26.2 28° 26.3	0.1' -0.1'	56.4' 56.4'
6	269°20.9	\$23° 07.9	278° 19.7	6.6'	\$28° 26.2	-0.1	56.4
7	284°20.6	07.7	292°45.3	6.6'	$28^{\circ}26.0$	-0.4'	56.4'
8	299°20.3	07.5	307°10.8	6.5'	28°25.5	-0.6'	56.5
9 10	314°20.0 329°19.7	· · 07.3 07.2	321°36.4 336°01.9	6.5' 6.5'	28° 25.0 28° 24.2	-0.7' -0.9'	56.5' 56.5'
11	344°19.4	07.0	350°27.4	6.5	28°23.3	-1.1'	56.5
12	359°19.1	\$23°06.8	4°52.9	6.5'	S28°22.2	-1.3'	56.5'
13	14°18.8 29°18.5	06.6	19°18.3 33°43.8	6.4'	28°21.0 28°19.5	-1.4'	56.6'
14 15	29°18.5 44°18.2	06.5 •• 06.3	33°43.8 48°09.2	6.4' 6.4'	28° 19.5 28° 17.9	-1.6' -1.8'	56.6' 56.6'
16	59°17.9	06.1	62°34.6	6.4	28° 16.2	-1.9'	56.6'
17	74°17.6	05.9	77°00.0	6.4'	28°14.3	-2.1'	56.7'
18 19	89°17.3 104°17.0	\$23°05.7 05.5	91°25.4 105°50.8	6.4' 6.4'	\$28° 12.2 28° 09.9	-2.3' -2.4'	56.7' 56.7'
20	119° 16.7	05.4	100° 16.1		28° 07.5		56.7
21	134°16.4	• • 05.2	$134^{\circ}41.5$	6.4'	28°04.9	-2.8'	56.8'
22	149°16.1	05.0	149°06.9	6.4'	28°02.1	-2.9'	56.8'
23	164°15.8	04.8	163°32.3	6.4'	27°59.2	-3.1'	56.8'
	SD = 16.3'	d = -0.2'		SI	D = 15.3'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°15.5	<b>S</b> 23°04.6	177°57.7	6.4'	S27°56.1	-3.3'	56.8'
1 2	194°15.2 209°14.9	04.4 04.2	192°23.1 206°48.5	6.4' 6.4'	27°52.8 27°49.3	-3.4' -3.6'	56.9' 56.9'
3	224°14.6	• • 04.1	200°40.3 221°13.9	6.4	27°45.7	-3.8'	56.9
4	239°14.3	03.9	$235^{\circ}39.3$	6.4'	$27^{\circ}41.9$	-3.9'	56.9'
5	254°14.0	03.7	250°04.8	6.5'	27°38.0	-4.1'	56.9'
6 7	269°13.7 284°13.4	\$23°03.5 03.3	264°30.2 278°55.7	6.5' 6.5'	\$27°33.9 27°29.6	-4.3' -4.5'	57.0' 57.0'
8	299°13.1	03.1	293°21.2	6.5	27°25.1	-4.6'	57.0'
9	314°12.8	•• 02.9	307°46.7	6.5'	27°20.5	-4.8'	57.0'
10 11	329°12.5 344°12.2	02.7 02.5	322°12.2 336°37.8	6.6' 6.6'	27° 15.7 27° 10.8	-4.9' -5.1'	57.1' 57.1'
12	344 12.2 359°11.9	02.5 \$23°02.3	330°37.8 351°03.4	6.6'	\$27° 10.8 \$27° 05.7	-5.1° -5.3'	57.1° 57.1°
13	14°11.6	02.1	5°29.0	6.6'	27°00.4	-5.4'	57.1'
14	29°11.3	01.9	19°54.6	6.7'	26°55.0	-5.6'	57.1'
15 16	44°11.0 59°10.7	· · 01.7 01.5	34°20.3 48°46.0	6.7' 6.7'	26° 49.3 26° 43.6	-5.8' -5.9'	57.2' 57.2'
17	74°10.4	01.3	63°11.8	6.8'	26°37.6	-6.1'	57.2
18	89°10.1	\$23°01.1	77°37.6	6.8'	S26°31.6	-6.3'	57.2'
19 20	104°09.9 119°09.6	00.9 00.7	92°03.4 106°29.3	6.9' 6.9'	26° 25.3 26° 18.9	-6.4' -6.6'	57.3' 57.3'
20	119°09.6 134°09.3	00.7	106°29.3 120°55.2	6.9° 7.0'	26° 18.9 26° 12.3	-6.7'	57.3'
22	149°09.0	00.3	135°21.1	7.0'	$26^{\circ}05.6$	-6.9'	57.3'
23	164°08.7	00.1	149°47.1	7.0'	25°58.7	-7.1'	57.3'
	SD = 16.3'	d = -0.2'		SI	O = 15.5'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Junset	Civil	Naut.
N 72°	08:25	10:47			13:19	15:41
<b>N</b> 70°	08:06	09:52			14:14	16:00
68°	07:51	09:18			14:47	16:15
66°	07:38	08:54	10:30	13:35	15:12	16:28
64°	07:27	08:35	09:51	14:15	15:31	16:39
62°	07:18	08:19	09:24	14:42	15:46	16:48
60°	07:10	08:06	09:03	15:03	16:00	16:56
N $58^{\circ}$	07:02	07:55	08:46	15:20	16:11	17:03
56°	06:56	07:45	08:32	15:34	16:21	17:10
54°	06:50	07:36	08:19	15:46	16:30	17:16
52°	06:44	07:28	80:80	15:57	16:38	17:22
50°	06:39	07:20	07:59	16:07	16:45	17:27
45°	06:27	07:04	07:38	16:27	17:01	17:38
N 40°	06:17	06:51	07:22	16:44	17:14	17:48
35°	06:08	06:40	07:08	16:58	17:26	17:58
30°	05:59	06:29	06:55	17:10	17:36	18:06
20°	05:43	06:11	06:35	17:31	17:55	18:22
N $10^{\circ}$	05:27	05:53	06:16	17:49	18:12	18:38
0°	05:10	05:37	05:59	18:06	18:29	18:55
<b>S</b> 10°	04:52	05:19	05:42	18:24	18:47	19:14
20°	04:29	04:58	05:23	18:42	19:07	19:36
30°	04:01	04:34	05:01	19:04	19:32	20:05
35°	03:42	04:19	04:48	19:17	19:47	20:23
40°	03:19	04:01	04:33	19:32	20:04	20:46
45°	02:49	03:38	04:16	19:50	20:27	21:16
<b>S</b> 50°	02:05	03:09	03:54	20:12	20:56	22:00
52°	01:38	02:54	03:43	20:22	21:10	22:26
54°	00:56	02:37	03:31	20:34	21:28	23:08
56°	////	02:15	03:17	20:48	21:49	////
58°	////	01:47	03:00	21:04	22:18	////
<b>S</b> 60°	////	01:01	02:40	21:24	23:02	////
Lat		Moonris	e		Moonset	;

Lat.		Moonris	e		Moonset	
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°						
<b>N</b> 70°						
68°						
66°						
64°						
62°			11:37			13:44
60°	09:08	10:18	10:47	12:14	13:03	14:34
<b>N</b> 58°	08:31	09:37	10:16	12:51	13:44	15:05
56°	08:05	09:09	09:52	13:18	14:12	15:28
54°	07:44	08:47	09:33	13:39	14:34	15:47
52°	07:27	08:29	09:16	13:56	14:52	16:03
50°	07:12	08:14	09:02	14:11	15:07	16:17
45°	06:42	07:43	08:34	14:42	15:38	16:45
<b>N</b> 40°	06:19	07:19	08:11	15:05	16:02	17:07
35°	06:00	06:59	07:52	15:25	16:21	17:25
30°	05:43	06:42	07:36	15:41	16:38	17:41
20°	05:15	06:13	07:09	16:10	17:07	18:07
N 10°	04:52	05:49	06:45	16:34	17:31	18:30
0°	04:30	05:26	06:23	16:56	17:54	18:51
<b>S</b> 10°	04:08	05:03	06:01	17:19	18:16	19:12
20°	03:44	04:39	05:38	17:43	18:40	19:34
30°	03:17	04:10	05:10	18:12	19:08	20:00
35°	03:01	03:53	04:54	18:28	19:25	20:15
40°	02:42	03:34	04:35	18:48	19:44	20:32
45°	02:20	03:10	04:12	19:12	20:07	20:53
<b>S</b> 50°	01:51	02:39	03:43	19:42	20:37	21:19
52°	01:37	02:24	03:28	19:57	20:52	21:32
54°	01:21	02:06	03:11	20:15	21:09	21:47
56° 58°	01:02	01:45	02:51	20:36	21:30	22:03
<b>S</b> 60°	00:39 00:08	01:18 00:39	02:26 01:51	21:03 21:42	21:55 22:30	22:24 22:49
<b>3</b> 60°	00:08	00:39	01:51	21:42	22:30	22:49

	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%
29	02:00	02:15	12:02	10:43	23:11	
30	02:29	02:44	12:03	11:40	-:-	
31	02:58	03:12	12:03	12:37	80:00	